# Workshop Manual

## Audi A5 Coupé 2008 ➤

| 8-cylinder direct injection engine (4.2 ltr. 4-valve) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Engine ID | CAU A | | | | | | | | |

Edition 10.2017

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

00 - Technical data
10 - Removing and installing engine
13 - Crankshaft group
15 - Cylinder head, valve gear
17 - Lubrication
19 - Cooling
24 - Mixture preparation - injection
26 - Exhaust system
28 - Ignition system

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

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

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

Copyright © 2017 Audi AG, Ingolstadt

# Contents


00 - Technical data . . . . . 1
1 Identification . . . . . 1
1.1 Engine identification number/engine data . . . . . 1
2 General notes . . . . . 2
2.1 General notes on ignition system . . . . . 2
3 Safety precautions . . . . . 3
3.1 Safety precautions when working on the fuel system . . . . . 3
3.2 Safety precautions when working on the fuel supply system . . . . . 4
3.3 Safety precautions when working on vehicles with start/stop system . . . . . 6
3.4 Safety precautions when using testers and measuring instruments during a road test . . . . 6
3.5 Safety precautions when working on the subframe . . . . . 6
3.6 Safety precautions when working on the cooling system . . . . . 7
3.7 Safety precautions when working on the ignition system . . . . . 7
3.8 Safety precautions when working on the exhaust system . . . . . 8
4 Repair instructions . . . . . 9
4.1 Rules for cleanliness . . . . . 9
4.2 Checking fuel system for leaks . . . . . 9
4.3 Foreign particles in engine . . . . . 9
4.4 Contact corrosion . . . . . 10
4.5 Installing radiators and condensers . . . . . 10
4.6 Routing and attachment of pipes, hoses and wiring . . . . . 10
4.7 Checking vacuum system . . . . . 10
5 Technical data . . . . . 12
5.1 Technical data of injection system . . . . . 12

10 - Removing and installing engine . . . . . 13
1 Removing and installing engine . . . . . 13
1.1 Removing engine . . . . . 13
1.2 Separating engine and gearbox . . . . . 51
1.3 Securing engine to engine and gearbox support . . . . . 61
1.4 Installing engine . . . . . 64
2 Assembly mountings . . . . . 80
2.1 Exploded view - assembly mountings . . . . . 80
2.2 Removing and installing engine mountings . . . . . 81
3 Engine cover panel . . . . . 92
3.1 Removing and installing engine cover panel . . . . . 92

13 - Crankshaft group . . . . . 93
1 Cylinder block (pulley end) . . . . . 93
1.1 Exploded view - poly V-belt drive . . . . . 93
1.2 Removing and installing poly V-belt . . . . . 94
1.3 Removing and installing tensioner for poly V-belt . . . . . 95
1.4 Removing and installing vibration damper . . . . . 96
1.5 Renewing crankshaft oil seal (pulley end) . . . . . 96
2 Cylinder block (gearbox end) . . . . . 99
2.1 Exploded view - drive plate . . . . . 99
2.2 Removing and installing drive plate . . . . . 99
2.3 Renewing crankshaft oil seal (gearbox end) . . . . . 100
2.4 Renewing needle bearing in drive plate . . . . . 102
3 Crankshaft . . . . . 104
3.1 Exploded view - crankshaft . . . . . 104
3.2 Crankshaft dimensions . . . . . 107


Copyright by AUDI AG. Passing on to third parties or commercial use of this service in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability.

3.3 Allocation of main bearing shells . . . 107
3.4 Measuring axial clearance of crankshaft . . . 109
3.5 Measuring radial clearance of crankshaft . . . 110
**4 Auxiliary drive . . . 111**
4.1 Exploded view - auxiliary drive . . . 111
4.2 Removing and installing spur gear drive . . . 112
4.3 Renewing oil seal for power steering pump drive . . . 115
4.4 Renewing oil seal for AC compressor drive . . . 116
**5 Pistons and conrods . . . 119**
5.1 Exploded view - pistons and conrods . . . 119
5.2 Removing and installing pistons . . . 121
5.3 Checking pistons and cylinder bores . . . 122
5.4 Checking radial clearance of conrod bearings . . . 123

**15 - Cylinder head, valve gear . . . 125**
**1 Cylinder head . . . 125**
1.1 Exploded view - cylinder head . . . 125
1.2 Removing and installing cylinder head . . . 127
1.3 Removing and installing cylinder head cover . . . 134
1.4 Checking compression . . . 137
**2 Timing chain cover . . . 142**
2.1 Exploded view - timing chain cover . . . 142
2.2 Removing and installing timing chain cover . . . 144
**3 Chain drive . . . 157**
3.1 Exploded view - camshaft timing chains . . . 157
3.2 Exploded view - drive chain for valve gear . . . 160
3.3 Exploded view - drive chain for auxiliary drives . . . 161
3.4 Removing and installing camshaft timing chain . . . 161
3.5 Removing camshaft timing chain from camshafts . . . 163
3.6 Removing and installing drive chain for valve gear . . . 171
3.7 Removing and installing drive chain for auxiliary drive . . . 173
**4 Valve gear . . . 174**
4.1 Exploded view - valve gear . . . 174
4.2 Measuring axial clearance of camshaft . . . 177
4.3 Measuring radial clearance of camshaft . . . 177
4.4 Removing and installing camshaft . . . 178
4.5 Checking hydraulic compensation elements . . . 187
4.6 Removing and installing valve stem oil seals . . . 189
**5 Inlet and exhaust valves . . . 198**
5.1 Checking valve guides . . . 198
5.2 Checking valves . . . 199
5.3 Valve dimensions . . . 200

**17 - Lubrication . . . 201**
**1 Sump/oil pump . . . 201**
1.1 Exploded view - sump/oil pump . . . 201
1.2 Exploded view - sump (top section) . . . 204
1.3 Engine oil . . . 205
1.4 Removing and installing sump (bottom section) . . . 205
1.5 Removing and installing sump (top section) . . . 207
1.6 Removing and installing oil pump . . . 209
1.7 Removing and installing oil level and oil temperature sender G266 . . . 214
1.8 Checking oil level . . . 214
**2 Engine oil cooler . . . 215**
2.1 Removing and installing engine oil cooler . . . 215

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 and completeness of this copy. © AUDI AG.

**3 Crankcase breather ... 217**
3.1 Removing and installing hose for crankcase breather system ... 217
**4 Oil filter/oil pressure switches ... 218**
4.1 Exploded view - oil filter housing/oil pressure switch ... 218
4.2 Removing and installing oil pressure switch F1 ... 219
4.3 Checking oil pressure and oil pressure switch ... 219
4.4 Removing and installing oil filter housing ... 221
**5 Oil circuit ... 223**
5.1 Exploded view - oil spray jets/valves ... 223
5.2 Removing and installing oil spray jets/valves ... 223

**19 - Cooling ... 225**
**1 Cooling system/coolant ... 225**
1.1 Connection diagram - coolant hoses ... 225
1.2 Checking cooling system for leaks ... 227
1.3 Draining and filling cooling system ... 229
**2 Coolant pump/thermostat assembly ... 237**
2.1 Exploded view - coolant pump/thermostat ... 237
2.2 Removing and installing electric coolant pump ... 238
2.3 Removing and installing coolant pump ... 240
2.4 Removing and installing map-controlled engine cooling system thermostat F265 ... 241
2.5 Removing and installing coolant temperature sender G62 ... 243
2.6 Removing and installing coolant connection ... 244
2.7 Thermostat opening values ... 246
**3 Coolant pipes ... 247**
3.1 Exploded view - coolant pipes ... 247
3.2 Removing and installing coolant pipes ... 248
**4 Radiator/radiator fans ... 257**
4.1 Exploded view - radiator/radiator fans ... 257
4.2 Removing and installing radiator ... 258
4.3 Removing and installing radiator cowl ... 262
4.4 Removing and installing radiator fans ... 265

**24 - Mixture preparation - injection ... 266**
**1 Injection system ... 266**
1.1 Overview of fitting locations - injection system ... 266
**2 Vacuum system ... 277**
2.1 Connection diagram - vacuum system ... 277
**3 Injectors ... 278**
3.1 Exploded view - fuel rail with injectors ... 278
3.2 Removing and installing injectors ... 281
**4 Air cleaner ... 290**
4.1 Exploded view - air cleaner housing ... 290
4.2 Removing and installing air cleaner housing ... 292
**5 Intake manifold ... 297**
5.1 Exploded view - intake manifold ... 297
5.2 Exploded view - intake manifold (bottom section) with fuel rail ... 301
5.3 Removing and installing intake manifold (bottom section) with fuel rail ... 302
5.4 Removing and installing intake manifold ... 306
**6 Senders and sensors ... 317**
6.1 Removing and installing fuel pressure sender G247 ... 317
6.2 Removing and installing air mass meter ... 318
**7 Engine control unit ... 319**
7.1 Wiring and component check with test box V.A.G 1598/42 ... 319

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

7.2 Removing and installing engine/motor control unit J623 . . . 321
**8 High-pressure pump . . . 325**
8.1 Exploded view - high-pressure pump . . . 325
8.2 Removing and installing high-pressure pump . . . 327
8.3 Removing and installing high-pressure pipe . . . 329
8.4 Checking fuel pressure and residual pressure (up to high-pressure pump) . . . 331
**9 Lambda probe . . . 335**
9.1 Exploded view - Lambda probe . . . 335
9.2 Removing and installing Lambda probe . . . 336

**26 - Exhaust system . . . 340**
**1 Exhaust pipes/silencers . . . 340**
1.1 Exploded view - silencers . . . 340
1.2 Removing and installing front silencers . . . 343
1.3 Separating exhaust pipes/silencers . . . 344
1.4 Renewing tailpipes . . . 345
1.5 Stress-free alignment of exhaust system . . . 346
1.6 Checking exhaust system for leaks . . . 347
1.7 Aligning tailpipes . . . 347
**2 Emission control system . . . 348**
2.1 Removing and installing catalytic converters . . . 348
**3 Secondary air system . . . 354**
3.1 Exploded view - secondary air system . . . 354
3.2 Removing and installing secondary air pump motor V101 . . . 358
3.3 Checking secondary air inlet valve . . . 362
3.4 Removing and installing combination valve . . . 366
**4 Exhaust manifolds . . . 371**
4.1 Exploded view - exhaust manifolds . . . 371
4.2 Removing and installing exhaust manifolds . . . 372

**28 - Ignition system . . . 380**
**1 Ignition system . . . 380**
1.1 Exploded view - ignition system . . . 380
1.2 Test data, spark plugs . . . 381
1.3 Removing and installing ignition coils . . . 381
1.4 Removing and installing knock sensor . . . 383
1.5 Removing and installing Hall senders . . . 384
1.6 Removing and installing engine speed sender G28 . . . 385

Copyright by AUDI AG. Distribution to third parties 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.

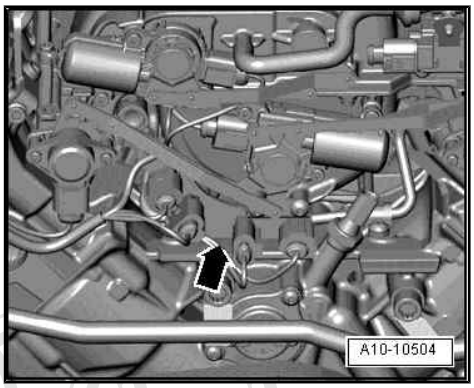
# 00 – Technical data

## 1 Identification

(ARL005460; Edition 10.2017)

⇒ “1.1 Engine identification number/engine data”, page 1

### 1.1 Engine identification number/engine data




**Note**

*The engine code is only visible after the engine cover panel has been removed.*

- The engine number (engine code and serial number) is located on the top of the cylinder block at the front -arrow-.
- Engine codes starting with the letter “C” have four letters (previously three letters).
- The first 3 characters of the engine code stand for the engine capacity and the mechanical construction and design. They are stamped onto the cylinder block together with the serial number.
- The 4th character indicates the power output and torque of the engine and is determined by the engine control unit.

**Note**

- *The four-letter engine code is found on the type plate (certain countries only), vehicle data sticker and engine control unit.*
- *Fitting locations of the type plate (certain countries only) and the vehicle data sticker ⇒ Maintenance ; Booklet 811*

Copyright by AUDI AG. Reproduction 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.

# 2 General notes

⇒ “2.1 General notes on ignition system”, page 2

## 2.1 General notes on ignition system

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

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 Safety precautions

⇒ “3.1 Safety precautions when working on the fuel system”, page 3

⇒ “3.2 Safety precautions when working on the fuel supply system”, page 4

⇒ “3.3 Safety precautions when working on vehicles with start/stop system”, page 6

⇒ “3.4 Safety precautions when using testers and measuring instruments during a road test”, page 6

⇒ “3.5 Safety precautions when working on the subframe”, page 6

⇒ “3.6 Safety precautions when working on the cooling system”, page 7

⇒ “3.7 Safety precautions when working on the ignition system”, page 7

⇒ “3.8 Safety precautions when working on the exhaust system”, page 8

## 3.1 Safety precautions when working on the fuel system

**When working on the fuel system note the following warnings:**

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**

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

- *The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system.*
- *Wrap a clean cloth around the connection and carefully loosen the connection to allow the residual pressure to dissipate.*

– Procedure before opening high-pressure section of injection system ⇒ page 4 .

**Observe the following to prevent injuries to persons and damage to the injection and ignition system:**

- Always switch off the ignition before connecting or disconnecting electrical wiring for the injection or ignition system or tester cables.
- Always switch off ignition before washing engine.
- Entries are stored in event memory of engine control unit if electrical connectors were unplugged and engine was started: `Generate readiness code` in `Guided Functions` ⇒ Vehicle diagnostic tester.

**Caution**

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

- *Observe notes on procedure for disconnecting the battery.*
- *Always switch off the ignition before disconnecting the battery.*

– Disconnect battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .

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

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

**Caution**

*The injection system consists of a high-pressure section (maximum approx. 120 bar) and a low-pressure section (approx. 6 bar).*

*Before opening the high-pressure section, e.g. before removing different components, the fuel pressure in the high-pressure section must be reduced. The procedure is described below.*

**Reducing fuel pressure in high-pressure section:**

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

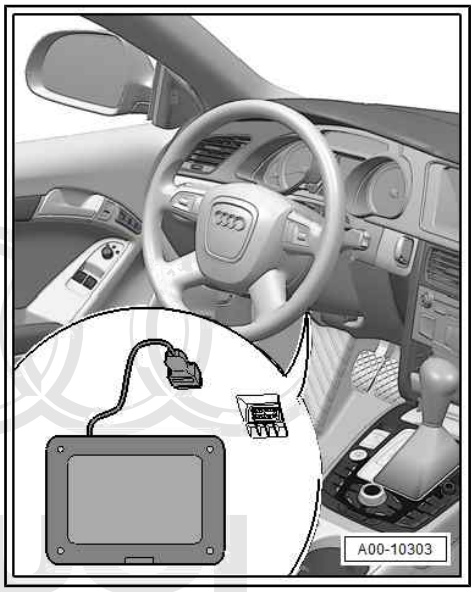
– Start engine and run at idling speed.

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

– Then select “Measured values”.

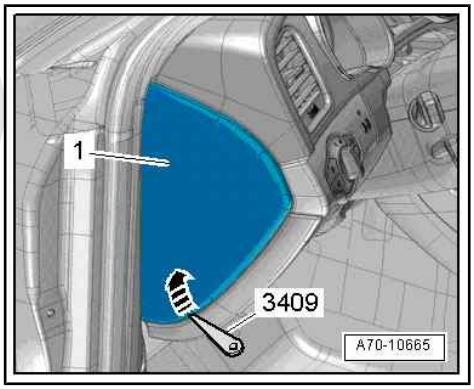
– Select “Fuel pressure” from the list.

– With the engine idling, the fuel pressure displayed will be between 30 and 40 bar.

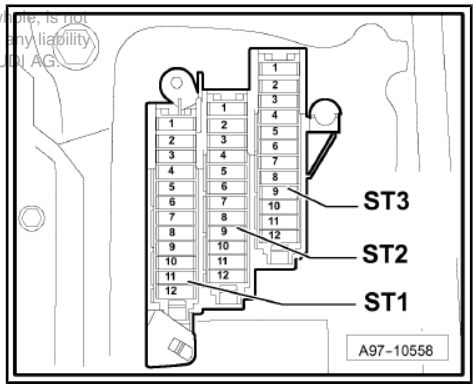



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Pry off cover -1- -arrow- on left side of dash panel using removal wedge - 3409- or similar.




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




– Observe fuel pressure.

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

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

**Note**

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

**WARNING**

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

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

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

The following operations must be performed after completing repair work:

– Refit fuse.

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

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.

## 3.3 Safety precautions when working on vehicles with start/stop system

**When performing repairs on vehicles with start/stop system, note the following:**

WARNING

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

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

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

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

WARNING

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

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

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

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.

## 3.5 Safety precautions when working on the subframe

**When working on the subframe note the following warnings:**

Caution

*Risk of damage to running gear components.*

- *The vehicle must NOT be lowered onto its wheels if the engine/gearbox mountings, steering rack or subframe cross brace are not properly installed.*
- *The vehicle must NOT be supported by applying a trolley jack or similar to the subframe or subframe cross brace.*

## 3.6 Safety precautions when working on the cooling system

**When working on the cooling system note the following warnings:**

**WARNING**

*Risk of scalding due to hot steam and hot coolant.*

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

**Caution**

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

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

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.

## 3.7 Safety precautions when working on the ignition system

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

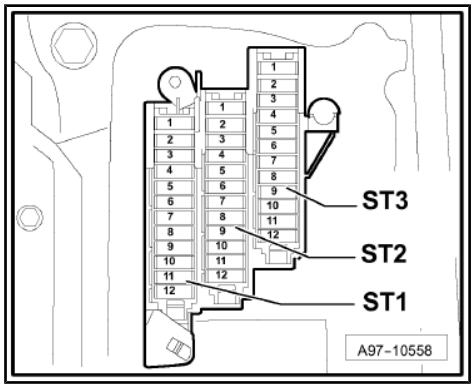
**WARNING**

- *The fuel system operates under high pressure. The pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 4 .*
- *A clean cloth must then be wrapped around the connection and the residual pressure dissipated by carefully loosening the connection.*

**Caution**

- *Always switch off the ignition before connecting or disconnecting the battery, otherwise the engine control unit may be damaged.*
- *Observe notes on procedure for disconnecting the battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .*

- If the battery is not disconnected, the fuse -SC 3 on fuse holder ST2 (brown) in dash panel (driver's side)- for the fuel pump control unit - J538- must be removed as a precaution before opening the fuel system, because the fuel pump will otherwise be activated by the contact switch on the driver's door.
- Persons wearing a cardiac pacemaker must at all times maintain a safe distance from high-voltage components such as the ignition system and gas-discharge headlights.
- Do not open any fuel line connections while the engine is running.
- Always switch off the ignition before connecting or disconnecting injection or ignition system wiring or tester cables.
- If the engine is to be operated at cranking speed without it starting (e.g. compression test), unplug the connectors from the ignition coils and remove the fuse for the electric fuel pump.
- During some of the tests the control unit may detect a fault and store it in the memory. The event memory should therefore be interrogated and, if necessary, erased after completing all tests and repair work.
- Always switch off the ignition before cleaning the engine.
- Always switch off the ignition before connecting or disconnecting the battery, otherwise the engine control unit may be damaged.




## 3.8 Safety precautions when working on the exhaust system

**When working on the exhaust system note the following:**

**Caution**

*Risk of damage to flexible joint.*

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

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 Repair instructions

⇒ “4.1 Rules for cleanliness”, page 9

⇒ “4.2 Checking fuel system for leaks”, page 9

⇒ “4.3 Foreign particles in engine”, page 9

⇒ “4.4 Contact corrosion”, page 10

⇒ “4.5 Installing radiators and condensers”, page 10

⇒ “4.6 Routing and attachment of pipes, hoses and wiring”, page 10

⇒ “4.7 Checking vacuum system”, page 10

## 4.1 Rules for cleanliness

**Even small quantities of dirt can lead to defects. For this reason, please observe the following rules when working on the fuel supply system and injection system:**

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not
with regard to the correctness of the information in this document. Copyright by AUDI AG.

- Clean connections and surrounding area thoroughly with engine cleaner or brake cleaner and dry cleaned area before loosening.
- Plug open lines and connections with suitable protective caps immediately.
- After removal, place parts on a clean surface and cover them. Only use lint-free cloths.
- Carefully cover or seal open components if repairs cannot be carried out immediately.
- Only install clean components; replacement parts should only be unpacked immediately prior to installation. Do not use parts that have been previously unpacked and stored away loose (e.g. in toolboxes, etc.).
- Do not work with compressed air when the system is open. If possible, do not move vehicle.
- Protect unplugged electrical connectors against dirt and moisture and make sure connections are dry when attaching.

## 4.2 Checking fuel system for leaks

– Allow engine to run for several minutes at moderate rpm.

– Switch off ignition.

– Check complete fuel system for leaks.

– If leaks are found although the connections have been tightened to the correct torque, the relevant component must be renewed.

– Road-test vehicle and accelerate with full throttle at least once.

– Then inspect high-pressure section of fuel system again for leaks.

## 4.3 Foreign particles in engine

- When working on the engine, all open inlet and exhaust ports must be sealed with suitable plugs (e.g. from engine bung set - VAS 6122- ) to prevent foreign particles from entering the engine.
- In the event of mechanical damage to one of the cylinder banks, the intake and exhaust systems and combustion cham-

bers of the opposite cylinder bank must always be examined for foreign particles to prevent further damage occurring later.

## 4.4 Contact corrosion

Contact corrosion can occur if unsuitable fasteners are used (e.g. bolts, nuts, washers, etc.).

For this reason, only fasteners with a special surface coating are fitted.

Additionally, all rubber and plastic parts and all adhesives are made of non-conductive materials.

Always install new parts if you are not sure whether used parts can be re-fitted ⇒ Electronic parts catalogue .

**Please note:**

- We recommend using only genuine replacement parts; these have been tested and are compatible with aluminium.
- We recommend the use of Audi accessories.
- Damage caused by contact corrosion is not covered by warranty.

## 4.5 Installing radiators and condensers

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

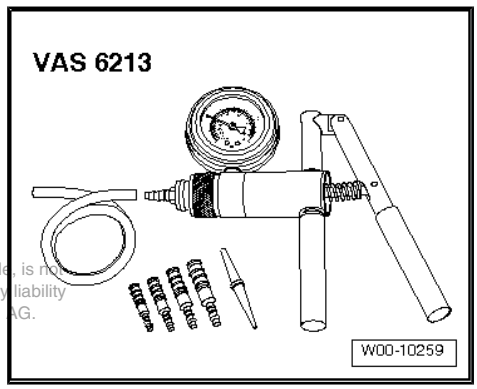
## 4.6 Routing and attachment of pipes, hoses and wiring

- Mark fuel lines, hydraulic lines, vacuum lines, lines for activated charcoal filter and electrical wiring etc. before removal so they can be re-installed in the original positions and correctly connected. Make sketches or take photographs if necessary.
- To avoid damaging pipes, hoses and wiring, ensure sufficient clearance from all moving or hot components in engine compartment (limited space in engine compartment).

## 4.7 Checking vacuum system

**Special tools and workshop equipment required**

- Hand vacuum pump - VAS 6213-




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.

**Procedure**

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

- Cracks

- ♦ Traces of animal bites
- ♦ Kinked or crushed lines
- ♦ Porous or leaking lines

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

– If a fault is stored in the event memory, check the vacuum lines leading to the relevant component and also check the remaining vacuum lines in the system.

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

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

# 5 Technical data

⇒ “5.1 Technical data of injection system”, page 12

## 5.1 Technical data of injection system

| Engine data | 4.2 ltr. / 4V / 260 kW engine |
|---|---|
| Idling speed (not adjustable) | approx. 650 rpm 1) |
| Fuel pressure after high-pressure pump | 18 ... 120 bar<br>approx. 25 bar at idling speed |
| Fuel pressure before high-pressure pump | approx. 6 bar |
| • 1) Depending on demands placed on engine control unit. | |

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

# 10 – Removing and installing engine

## 1 Removing and installing engine

⇒ “1.1 Removing engine”, page 13

⇒ “1.2 Separating engine and gearbox”, page 51

⇒ “1.3 Securing engine to engine and gearbox support”, page 61

⇒ “1.4 Installing engine”, page 64

### 1.1 Removing engine

⇒ “1.1.1 Removing engine - vehicles with manual gearbox”, page 13

⇒ “1.1.2 Removing engine - vehicles with automatic gearbox”, page 32

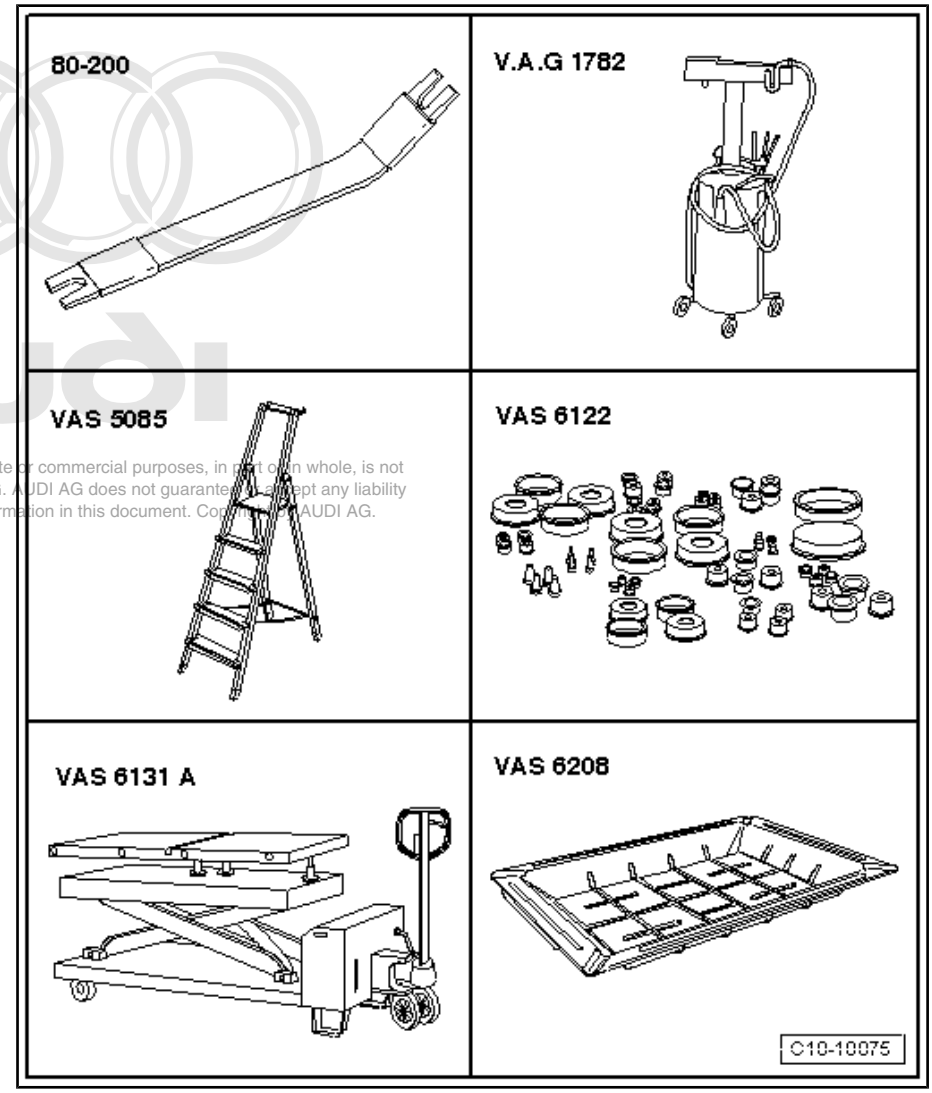
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

#### 1.1.1 Removing engine - vehicles with manual gearbox

**Note**

- *The engine is removed from underneath together with the gearbox and subframe (with lock carrier installed).*
- *Collect drained coolant in a clean container for re-use or disposal.*
- *Fit cable ties in the original positions when installing.*

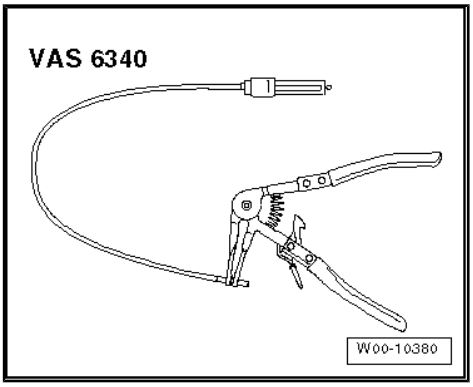
## Special tools and workshop equipment required



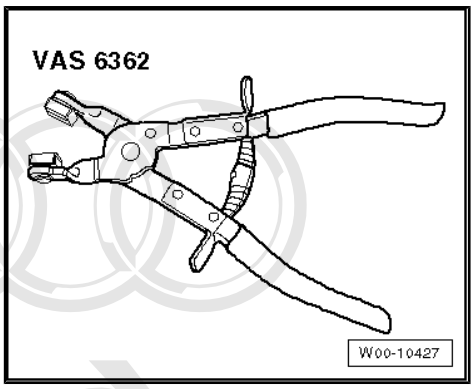

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Removal lever - 80 - 200-
- Used oil collection and extraction unit - V.A.G 1782-
- Stepladder - VAS 5085-
- Engine bung set - VAS 6122-
- Scissor-type assembly platform - VAS 6131 A- with support set for Audi - VAS 6131/10- , and support set -VAS 6131/11- , -VAS 6131/13- and 3x -VAS 6131/10-2-
- Drip tray for workshop hoist - VAS 6208-

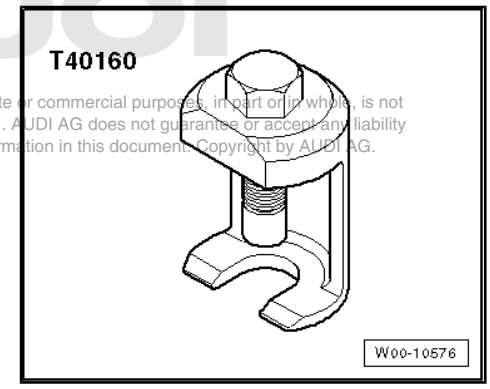
♦ Hose clip pliers - VAS 6340-




♦ Hose clip pliers - VAS 6362-




♦ Puller -T40160-




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.

**Procedure**

**WARNING**

***Make sure the vehicle cannot tip over when the engine is removed.***

- ***Secure the vehicle, to do so, the luggage compartment must be empty.***

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

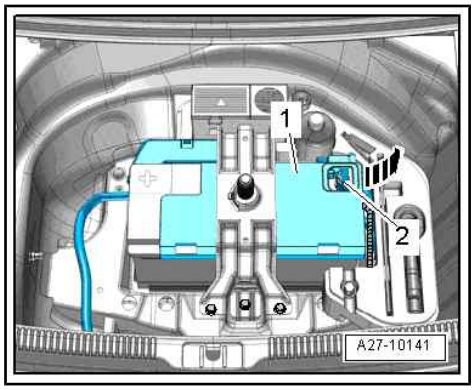
- ***The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system.***

– Reduce fuel pressure in high-pressure section of injection system ⇒ page 4 .

**Note**

*The electromechanical parking brake must be released before disconnecting the battery, so that the propshaft can be turned during removal.*

– Bring front wheels into straight-ahead position.




**Caution**

***Risk of irreparable damage to electronic components.***

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

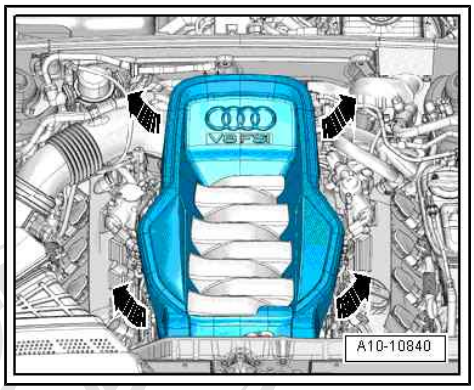
– Switch off ignition and remove ignition key.

– Disconnect earth wire -2- from battery terminal ⇒ Electrical system; Rep. gr. 27 ; Battery, Disconnecting and connecting battery .

– Discharge refrigerant circuit ⇒ Heating, air conditioning; Rep. gr. 87 ; Refrigerant circuit .

– Extract hydraulic fluid for power steering from reservoir using used oil collection and extraction unit - V.A.G 1782- .

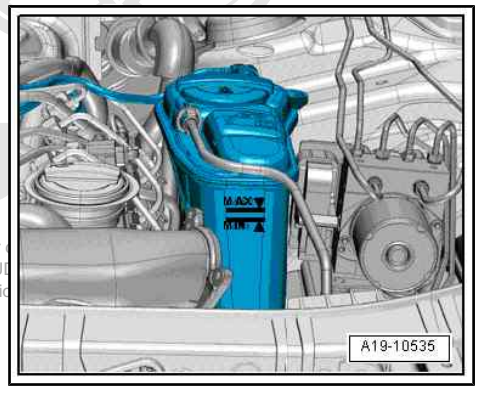
– Remove engine cover panel -arrows-.




**WARNING**

***Risk of scalding due to hot steam and hot coolant.***

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

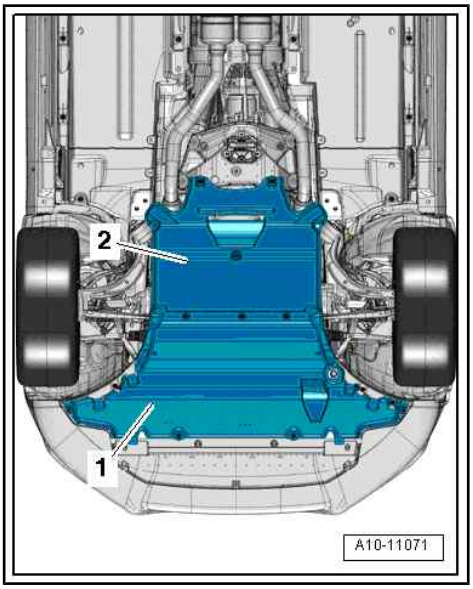



...private or ...
...authorised by AUDI AG. AU...
...with respect to the correctness of informatio...

– Remove both front wheels ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres; Tightening torque for wheel bolts .

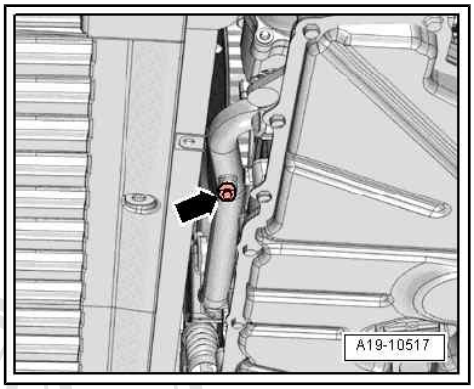
– Remove wheel spoilers (front) on both sides ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .

– Remove noise insulation -1- and -2- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

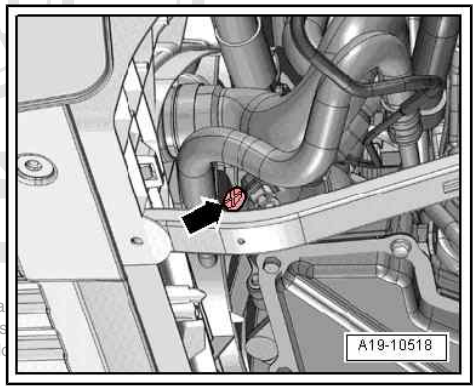



– Place drip tray for workshop hoist - VAS 6208- beneath engine.

– Unscrew drain plug -arrow- on coolant pipe (front) and drain off coolant.




– Unscrew drain plug -arrow- on map-controlled engine cooling system thermostat - F265- and drain off coolant.

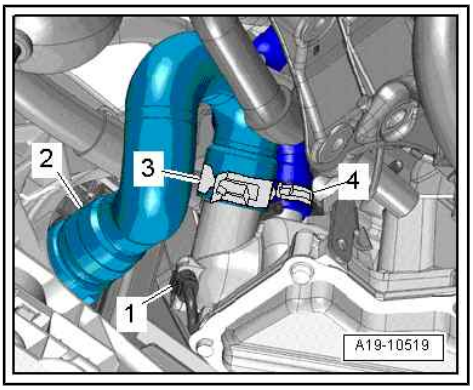



Protected by copyright. Copying for private or commercial
permitted unless authorised by AUDI AG. AUDI AG does
with respect to the correctness of information in this do

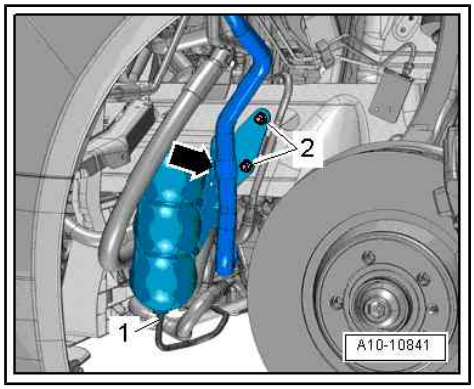
– Pull out retaining clip -2- and disconnect coolant hose from radiator.

**Note**

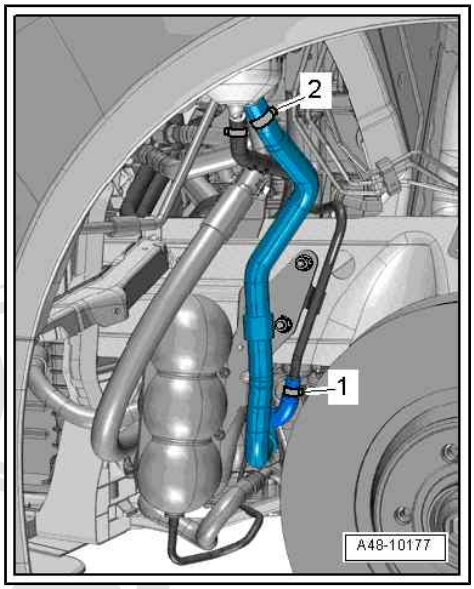
*Disregard -items 1, 3, 4-.*



– Detach vacuum hose -1- and move hydraulic hose -arrow- clear at bracket.
– Unscrew nuts -2- and detach vacuum reservoir.




– Position used oil collection and extraction unit - V.A.G 1782- below connection point.
– Disconnect hydraulic fluid supply hose -2- and return hose -1- for power steering.
– Seal off open pipes/lines and connections with clean plugs from engine bung set - VAS 6122- .



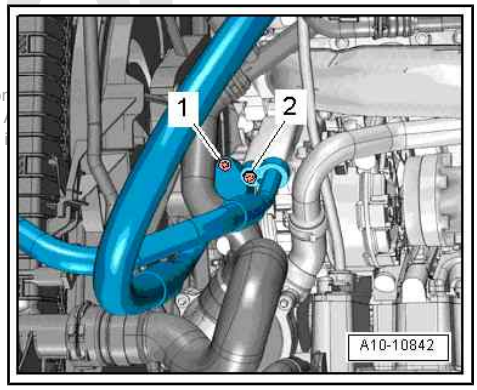

**Caution**

***Danger of damage to refrigerant lines and hoses.***

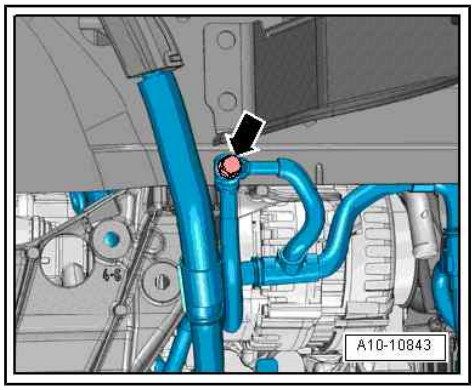
- ***Do NOT stretch, kink or bend refrigerant lines and hoses.***

Protected by copyright. Copying for private or com
permitted unless authorised by AUDI AG. AUDI A
with respect to the correctness of information

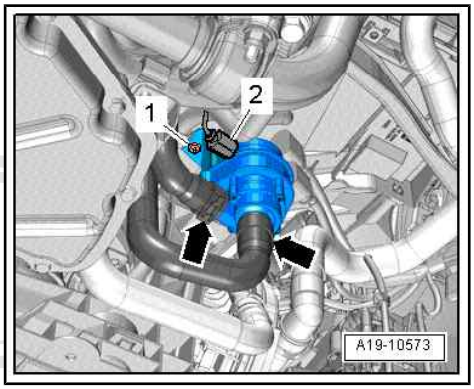
– Remove bolts -1- and -2-.
– Disconnect refrigerant lines from A/C compressor.
– Seal off open pipes/lines and connections with clean plugs from engine bung set - VAS 6122- .




– Unscrew nut -arrow- on longitudinal member (right-side) and move earth cables clear.



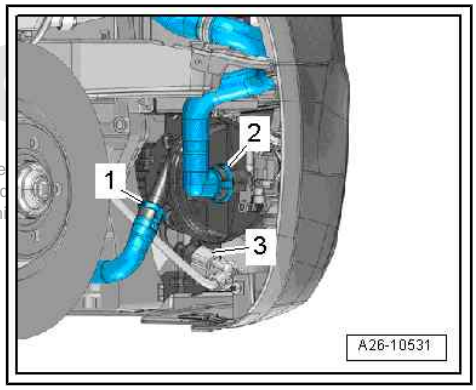
– Unplug electrical connector -2-.
– Place drip tray for workshop hoist - VAS 6208- beneath engine.
– Disconnect coolant hoses from continued coolant circulation pump - V51- -arrows-.




**Note**

*Disregard -item 1-.*

– Unplug electrical connector -3- at secondary air pump motor - V101- and move electrical wiring clear.
– Disconnect hose -1- for secondary air system and move clear.

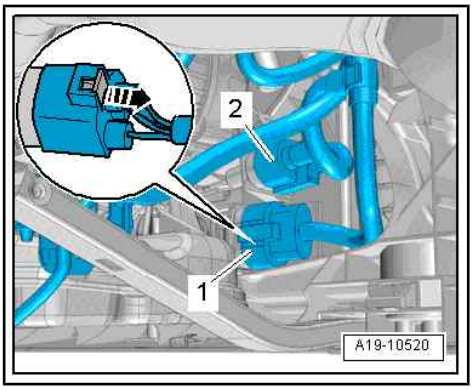



**Note**

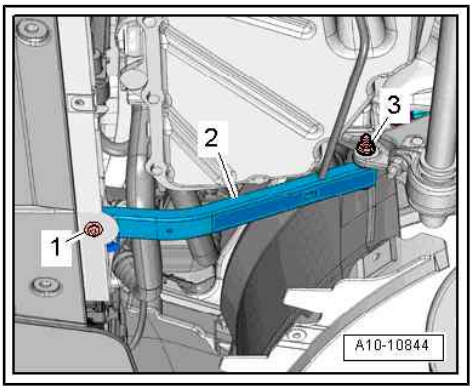
*Disregard -item 2-.*

Protected by copyright. Copying for private or comme
permitted unless authorised by AUDI AG. AUDI AG d
with respect to the correctness of information in thi

– Unplug electrical connectors -1- and -2- for radiator fan (push retainer to the rear -arrow- and press down release catch).
– Move electrical wiring harness clear.



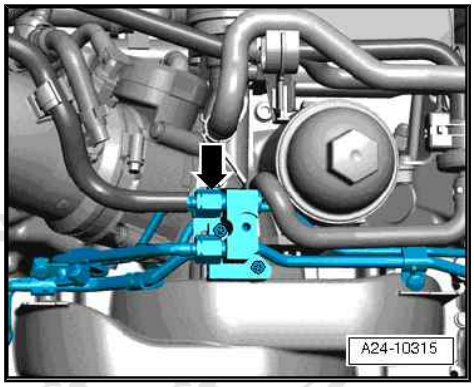

– Remove bolts -1- and nuts -3- on both sides and detach lock carrier braces -2-.



**WARNING**

*Risk of injury caused by fuel.*

- *To allow the fuel pressure to dissipate, wrap a clean cloth around the connection and carefully loosen the connection before opening the fuel system.*




**Caution**

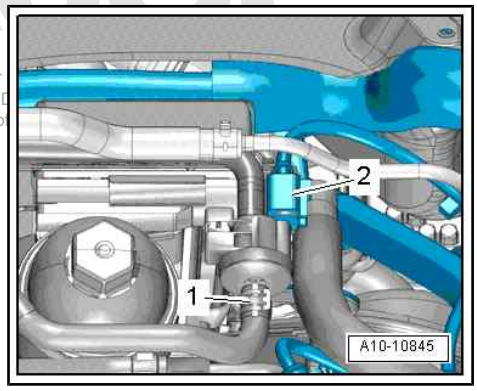
*Observe rules for cleanliness when working on the fuel supply system ⇒ page 9 .*

– Disconnect fuel line -arrow-.

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

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

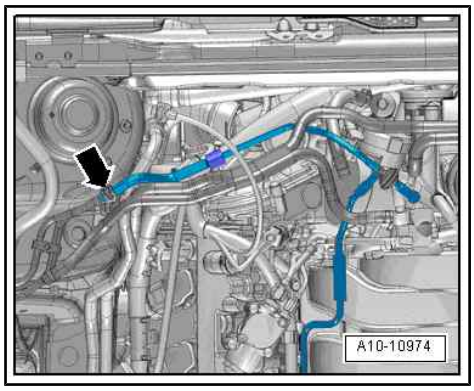
– Detach activated charcoal filter solenoid valve 1 - N80- from bracket and move to one side with hose and fuel line still attached.




Protected by copyright. Copying for private or commercial purposes, 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.

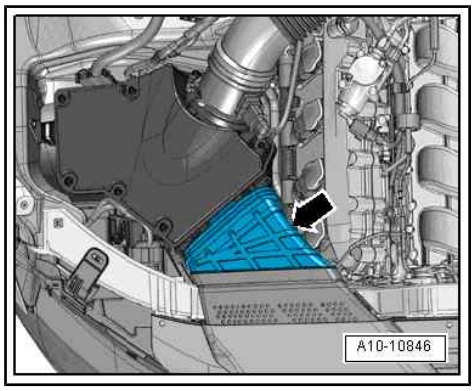
**USA models:**

– Disconnect vacuum hose leading to fuel system diagnostic pump - V144- -arrow-.

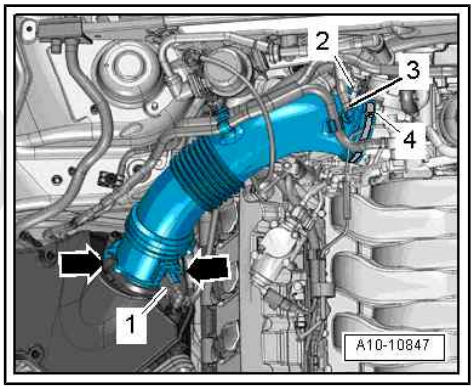



**Continued for all vehicles:**

– Remove air duct -arrow-.



– Unplug electrical connector -1- at air mass meter - G70- .
– Disconnect vacuum line -3- from air pipe.




**Rest-of-world vehicles:**

– Press release tabs and detach crankcase breather hose -2- from air pipe.
– Unfasten hose clip -4-, release retaining clips -arrows- and remove air pipe with air mass meter - G70- .

**USA models:**

**Caution**

***Risk of violating emission legislation applying to USA models.***

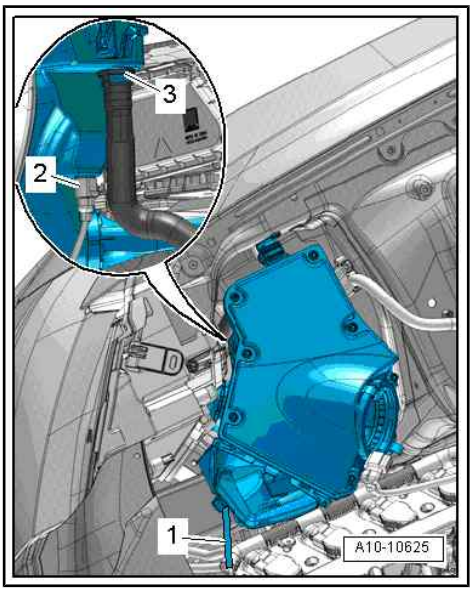
- ***Do NOT open hose connection -2-.***

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.

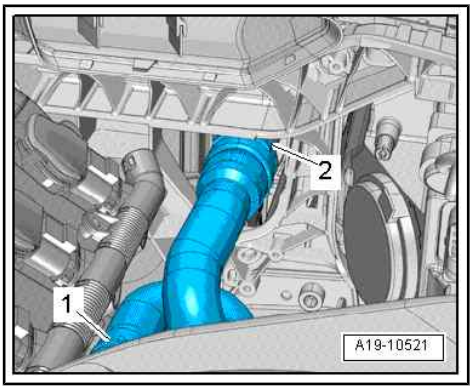
– Move air pipe clear to one side (crankcase breather hose -2- remains connected). To do so, release hose clip -4- and clamps -arrows-.

**Continued for all vehicles:**

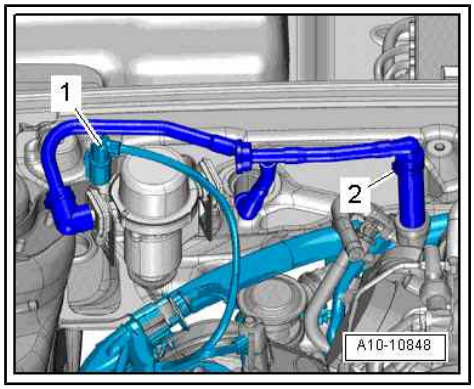
– Disconnect vacuum line -1-.
– Detach air cleaner housing and unplug electrical connector -2- at variable intake manifold change-over valve - N335- on reverse side of air cleaner.
– Disconnect hose -3- for secondary air system.




– Lift retaining clip -2-, release hose clip -1- on coolant pipe (right-side) and remove coolant hose.



– Unplug electrical connector -1- for vacuum pump for brakes - V192- and move wiring clear.
– Disconnect vacuum hose -2-.

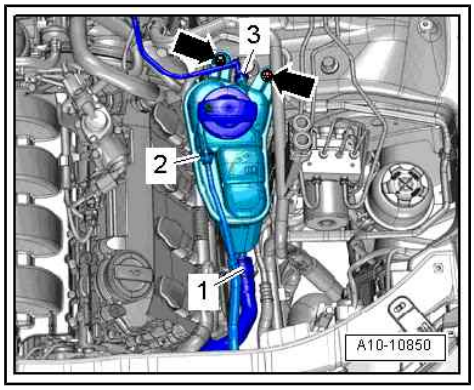



– Disconnect coolant hoses -1- and -3- from coolant expansion tank.

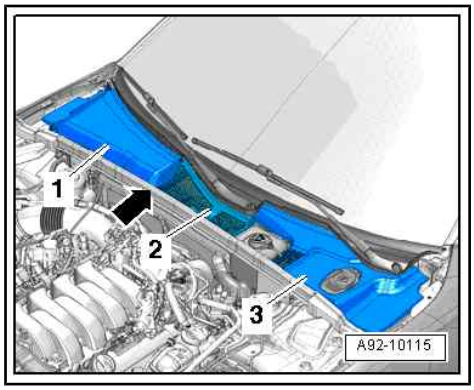
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

**Note**

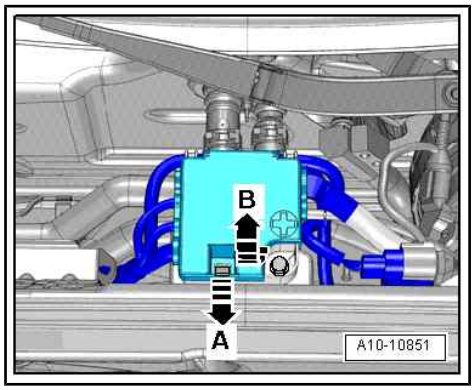
*-Item 2- and -arrows- can be disregarded.*



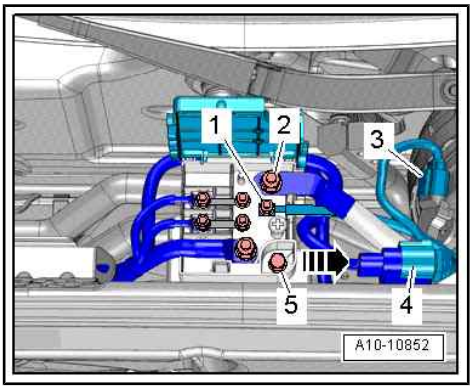

– Remove seal -arrow-.
– Remove plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .




– Release retainer -arrow A- and open cover -arrow B-.

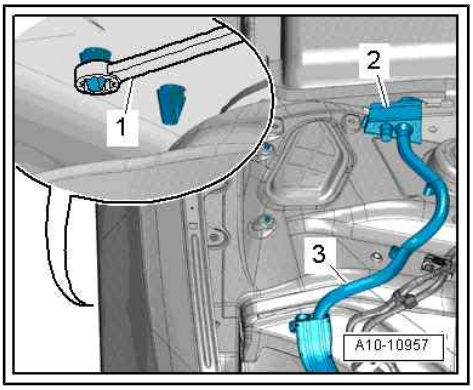


– Remove nuts -1- and -2- for electrical wiring.
– Unplug electrical connectors -3- and -4- and move clear.
– Remove bolt -5- and detach terminal 30 wiring junction 2 - TV22- from body brace -arrow-.

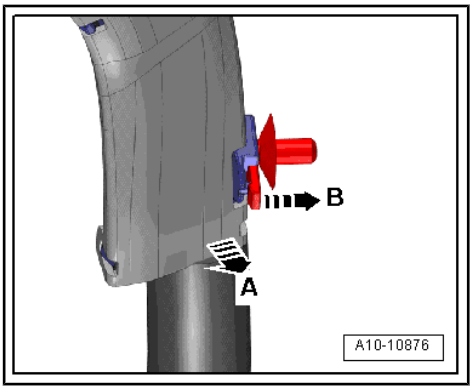



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

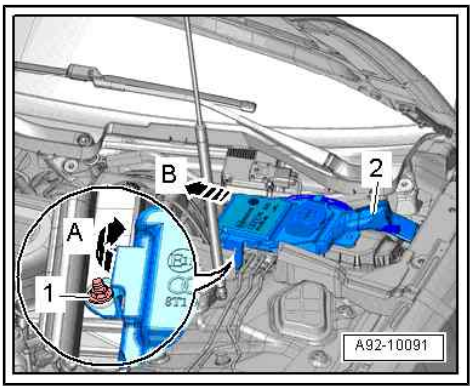
– Working from wheel housing, release catches using a 5.5 mm ring spanner -item 1- and remove wiring protector -2- from above.
– Release wiring harness -3- leading to alternator and starter using removal lever - 80 - 200- and move clear.



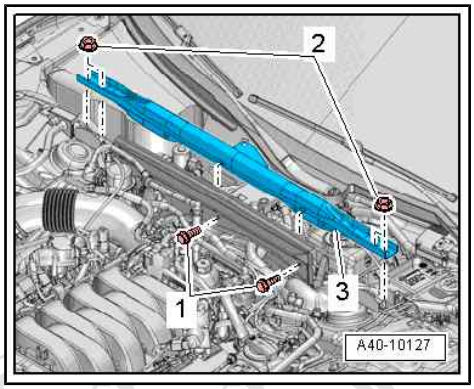

– Release catch -arrow B-, pull wiring duct forwards -arrow A- and move clear.



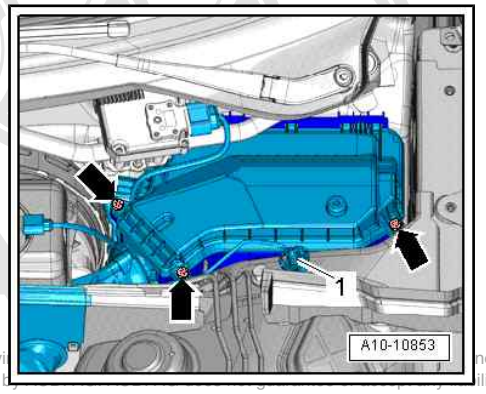

– Remove nut -1- and swivel filler neck for washer fluid reservoir slightly upwards -arrow A-.
– Pull filler neck -2- with filler pipe out of washer fluid reservoir and through opening in body -arrow B-.



– Remove bolts -1- and nuts -2- and detach body brace -3- (different types may be fitted depending on version).

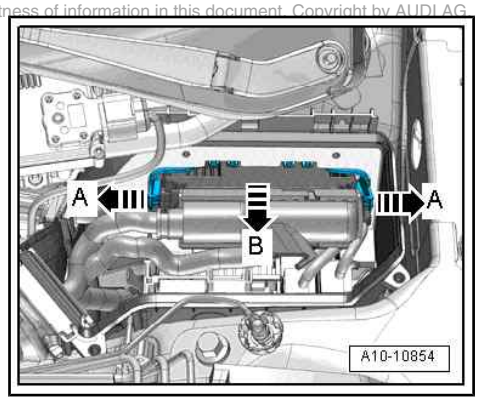



– Remove bolts -arrows- and detach cover for electronics box in engine compartment.
– Remove nut -1- and move electrical wiring clear.

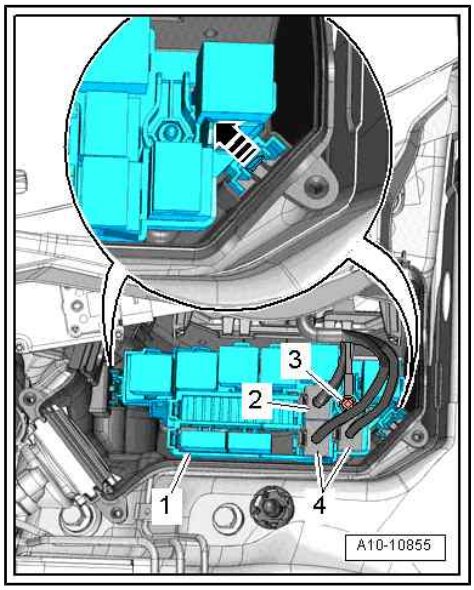



Protected by copyright. Copyi not permitted unless authorised by ility with respect to the correctness of information in this document. Copyright by AUDI AG.

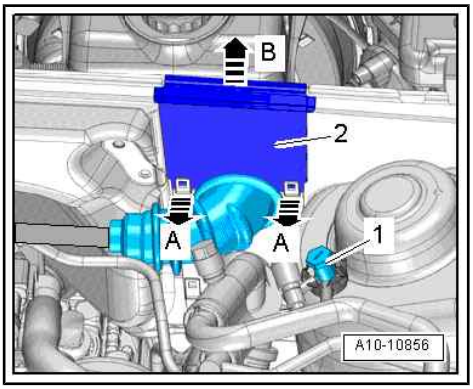
– Release catches -arrows A- and take out engine control unit -arrow B-.



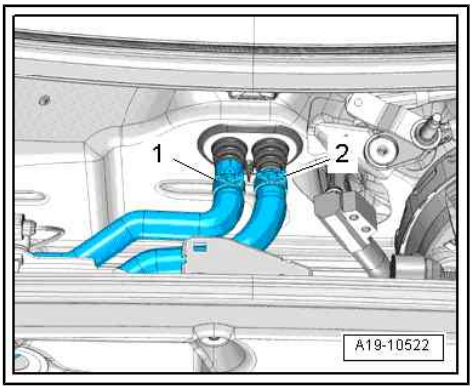

– If fitted, unplug electrical connector -2-.
– Unplug electrical connectors -4- and unscrew nut -3- for wiring.
– Release catches -arrow- and detach relay carrier with fuse holder -1-.
– Disengage engine wiring harness at electronics box in engine compartment and move clear.



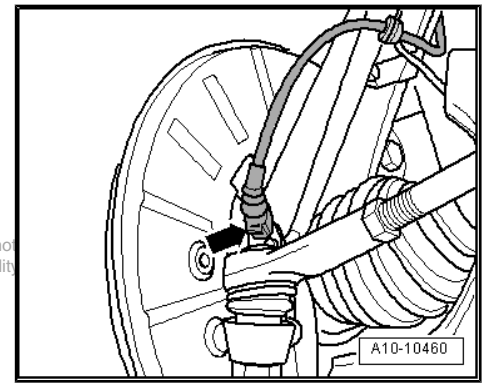
– Release catches -arrows A- and detach wiring protector -2- -arrow B-.
– Unscrew earth stud -1- and move earth wiring clear.
– Place wiring harness on engine and secure engine control unit to prevent it from dropping.




– Mark coolant hoses -1- and -2- for later installation and disconnect hoses.
– Push coolant hoses with hose protector through into engine compartment.

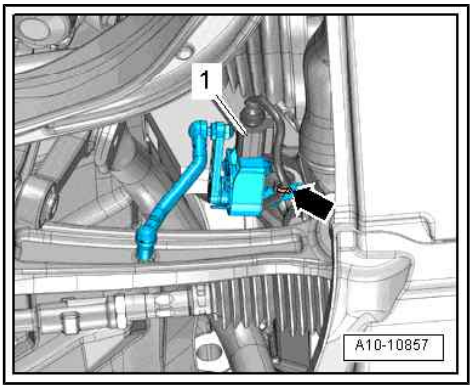



– Unplug electrical connectors -arrow- at front wheel speed sensors on both sides.

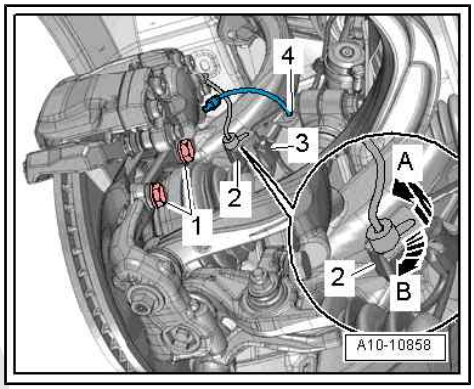



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Unplug electrical connector -1- on headlight range control sender 1 - G233- and release wiring -arrow-.



– Release electrical connector -2- at bracket by pulling retainer catch to the rear -arrow A- and turning connector approx. 90° in direction of -arrow B-.
– Move clear electrical wire -3- and brake hose -4- at bracket.
– Remove bolts -1- and tie up brake caliper in wheel housing with wire (brake line remains attached).

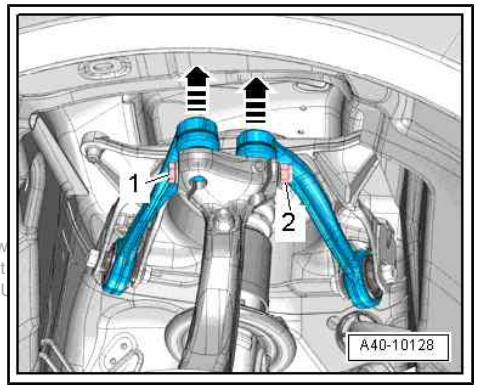



**Caution**

*Risk of damage to brake pistons.*

- *Do not operate brake pedal with brake caliper removed.*

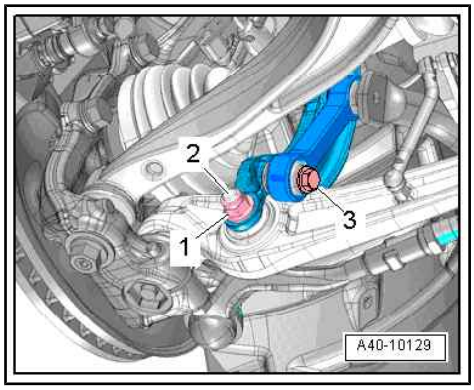
– Remove nut -2- and pull out bolt -1-.
– Pull upper suspension links upwards out of wheel bearing housing -arrows-.
– Repeat procedure on opposite side of vehicle.




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

**Vehicles up to identification no. 8T-8A-011200:**

– Remove bolt -3- for anti-roll bar on both sides.
– Remove nut -1- on both sides.

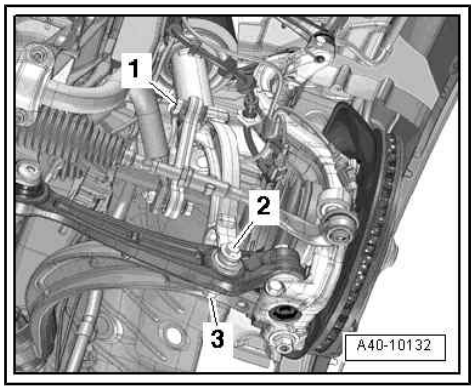



**Note**

*The bolts -2- are removed at a later stage.*

**Vehicles from identification no. 8T-8A-011201 onwards:**

– Remove bolt -1- for anti-roll bar on both sides.
– Remove nut -3- on both sides.




**Note**

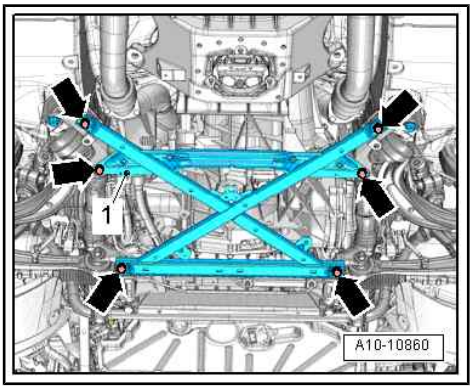
*The bolts -2- are removed at a later stage.*

**Continued for all vehicles:**

**Caution**

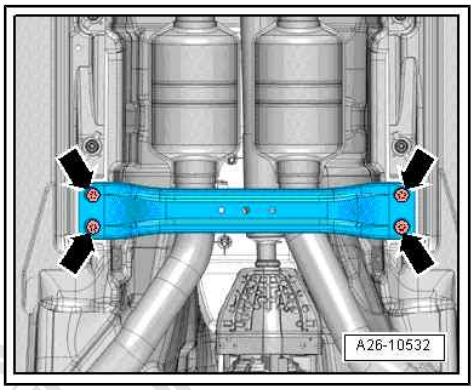
*Risk of damage to running gear components.*

- *The vehicle must NOT be lowered onto its wheels if the engine/gearbox mountings, steering rack or subframe cross brace are not properly installed.*

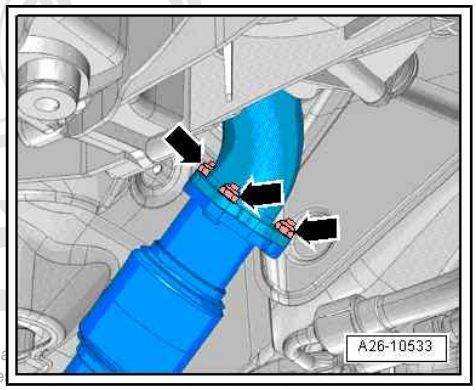



– Remove subframe cross brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .

– Remove bolts -arrows- and detach front cross member.

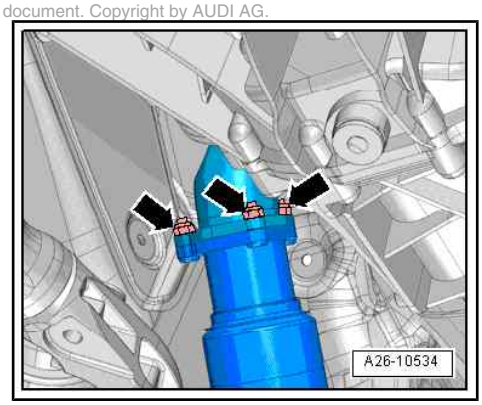



– Unscrew nuts -arrows- for front silencer (left-side).




Protected by copyright. Copying for private or commercia
permitted unless authorised by AUDI AG. AUDI AG doe
with respect to the correctness of information in this document. Copyright by AUDI AG.

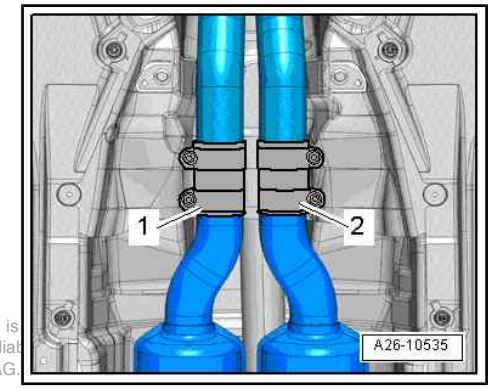
– Unscrew nuts -arrows- for front silencer (right-side).



**Caution**

*Risk of damage to flexible joints in front silencer.*

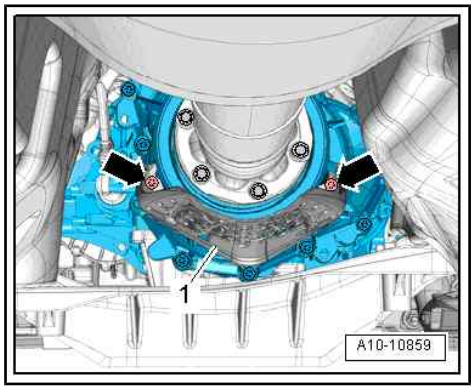
- *Do NOT bend the flexible joints in the front silencer more than 10°.*



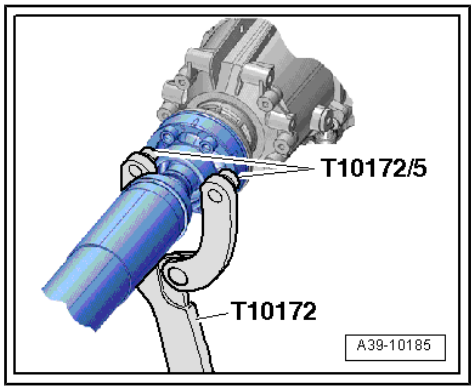

– Loosen and push back clamps -1- and -2- and detach front silencers on both sides.

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

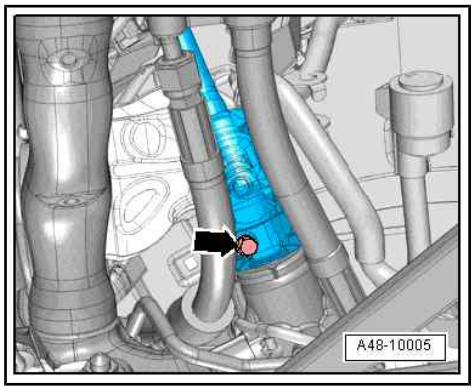
– Remove bolts -arrows- and detach heat shield -1- for propshaft.



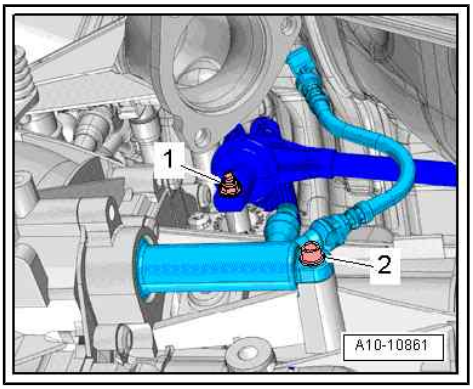

– Remove propshaft from gearbox ⇒ Rear final drive; Rep. gr. 39 ; Propshaft; Removing and installing propshaft .
– Slide propshaft towards rear final drive; the constant velocity joints can be moved axially.
– Tie up propshaft on one side.




– Detach intermediate steering shaft from steering rack and move clear by telescoping upwards ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Exploded view - steering column .



– Remove bolt -2- and tie up clutch slave cylinder at side of engine compartment.



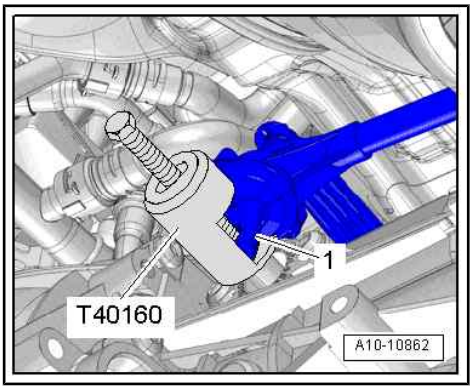

**Caution**

*Risk of damage to clutch slave cylinder.*

- *Do not press clutch pedal after removing slave cylinder.*

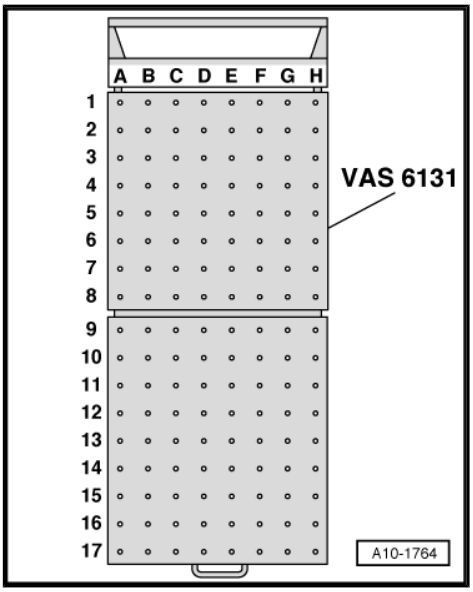
– Remove nut -1- for selector rod.

– Apply puller -T40160- and pull off selector rod -1-.




**Set up the scissor-type assembly platform as follows:**

– Set up scissor-type assembly platform - VAS 6131 A- with support set for Audi - VAS 6131/10- and supplementary set - VAS 6131/13- as follows:




| Platform coordinates | Parts of support set for Audi - VAS 6131/10- and supplementary set -VAS 6131/13- | | | |
|---|---|---|---|---|
| B4 | /13-4 | /10-4 | /10-5 | /13-1 |
| G4 | /13-4 | /10-4 | /10-5 | /13-1 |
| B6 | /10-1 | /10-2 | /10-5 | /10-11 |
| G6 | /10-1 | /10-2 | /10-5 | /10-11 |
| A8+C8 | /13-6 | | | /13-2 |
| F8+H8 | /13-6 | | | /13-2 |
| C14 | /10-1 | /10-3 | /10-5 | /10-13 |
| F14 | /10-1 | /10-3 | /10-5 | /10-10 |

– Initially hand-tighten the support elements on the scissor-type assembly platform.

– Position scissor-type assembly platform - VAS 6131 A- horizontally.

• Take note of spirit level (bubble gauge).

– Position scissor-type assembly platform - VAS 6131 A- below engine/gearbox assembly.

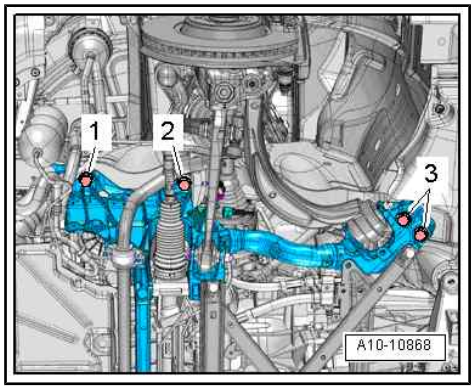
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

**WARNING**

*Accident risk if subframe mountings are detached.*

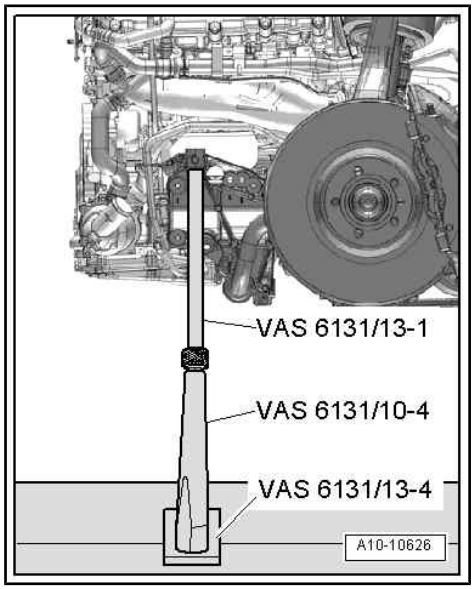
- *Subframe bolts -2- and -3- must not be loosened.*

– Remove subframe bolts -1- on both sides.

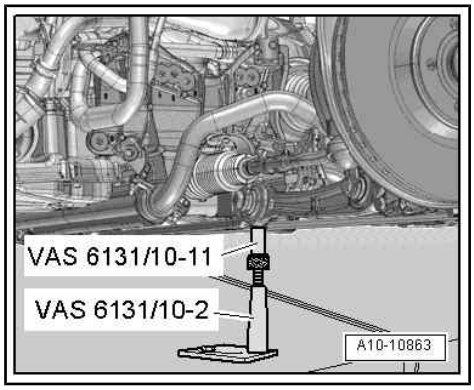



– Position support elements from -VAS 6131/10- and -VAS 6131/13- at front left and right of subframe as shown.
– Make sure that threaded spindles are screwed in completely.

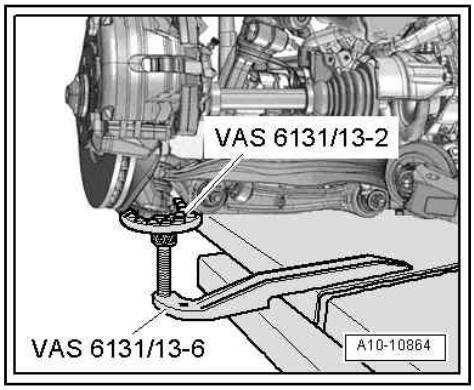
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not
with respect to the correctness of information in this document. Copyright by AUDI AG.



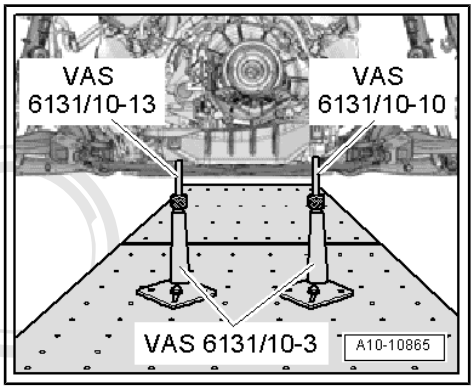

– Position support elements from -VAS 6131/10- (rear left and right) at front attachment points of subframe cross brace as shown.




– Position support elements from -VAS 6131/13- under left and right wheel bearing housings as shown.



– Detach retaining clips for noise insulation from cross member.
– Position support elements from -VAS 6131/10- at rear of cross member on both sides, as shown in illustration.
– Turn all spindles for support elements upwards until all locating lugs make contact with mounting points.
– Tighten base plates for support elements to 20 Nm on scissor-type assembly platform - VAS 6131 A- .

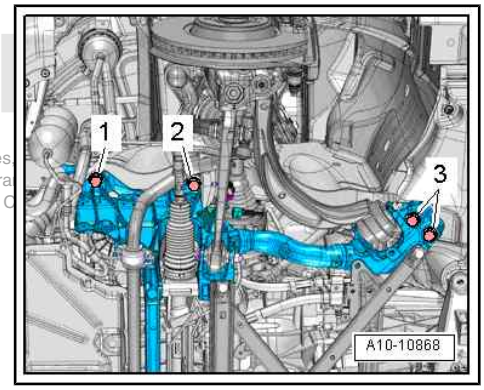



– Mark installation position of subframe and tunnel cross member on longitudinal members with felt-tip pen.
– Unscrew subframe bolts -2- and -3- on both sides in several stages and in diagonal sequence.

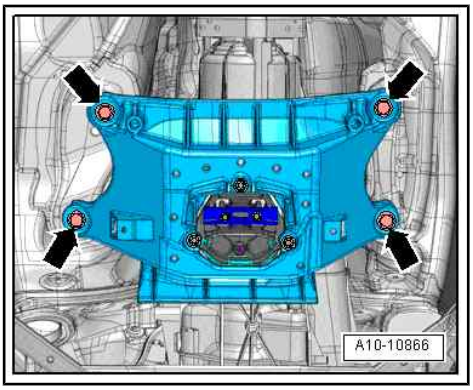
Protected by copyright. Copying for private or commercial purposes, permitted unless authorised by AUDI AG. AUDI AG does not guara with respect to the correctness of information in this document. C

**Note**

*Disregard -item 1-.*

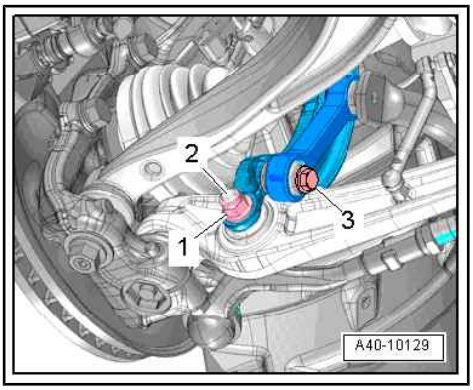



– Remove bolts -arrows- and detach tunnel cross member.



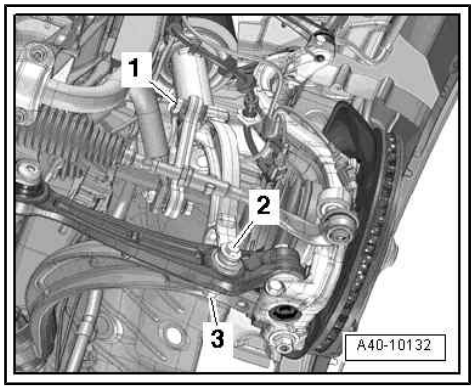

**Vehicles up to identification no. 8T-8A-011200:**

– Remove bolt -2- on both sides.



**Vehicles from identification no. 8T-8A-011201 onwards:**

– Remove bolt -2- on both sides.




**Continued for all vehicles:**

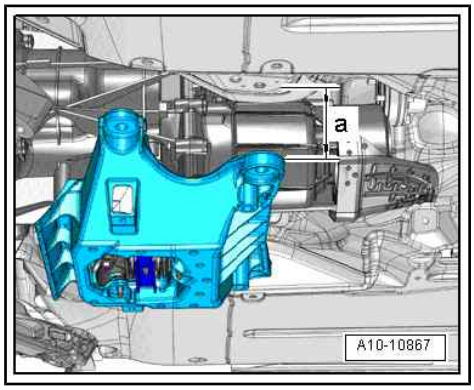
**Caution**

***Danger of damage to hoses, pipes and wiring connections and to engine compartment.***

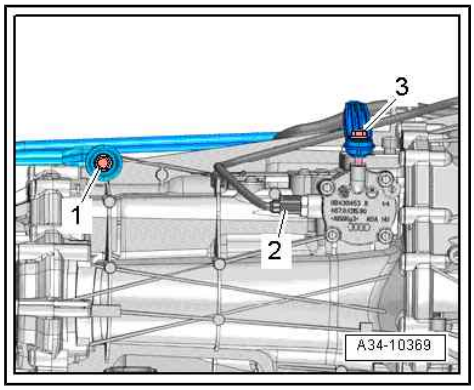
- ***Check that all hoses and wiring connections between engine, gearbox, subframe and body have been detached.***
- ***Carefully guide out engine/gearbox assembly with subframe from engine compartment when lowering.***

– Lower engine/gearbox assembly using scissor-type assembly platform - VAS 6131 A- initially only as far as distance -a-.

• Distance -a- = 100 mm (maximum).




– Remove bolts -1- and -3- for selector rod and push rod.




**Note**

*Disregard -item 2-.*

– Lower engine/gearbox assembly further.

– Pull out scissor-type assembly platform - VAS 6131 A- with engine/gearbox assembly from underneath vehicle.

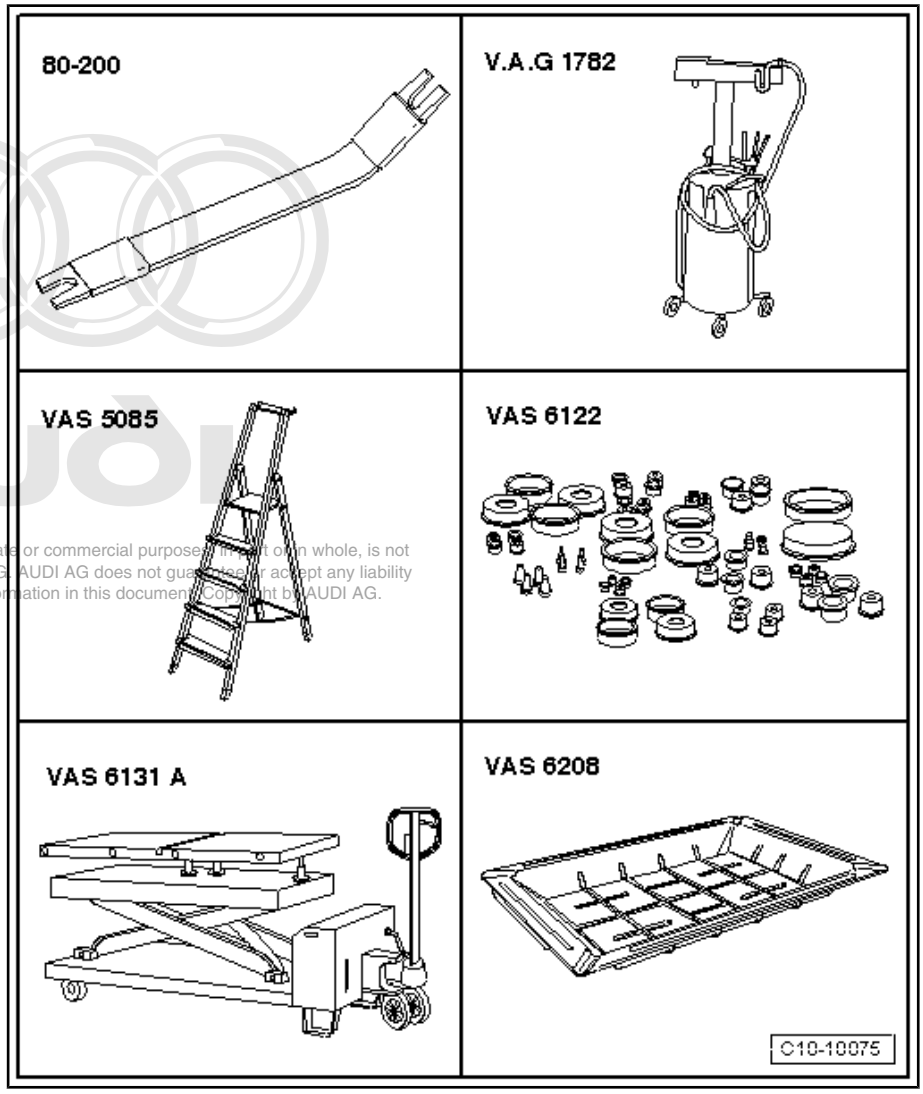
## 1.1.2 Removing engine - vehicles with automatic gearbox

**Note**

- *The engine is removed from underneath together with the gearbox and subframe (with lock carrier installed).*
- *Collect drained coolant in a clean container for re-use or disposal.*
- *Fit cable ties in the original positions when installing.*

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

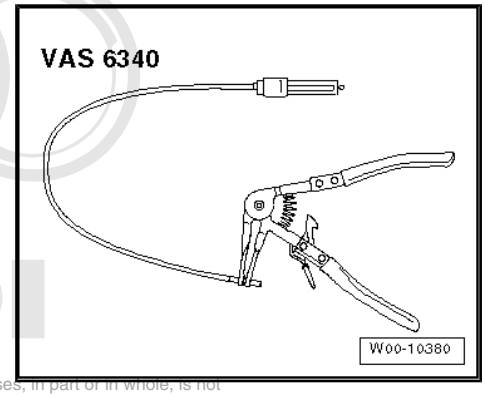
## Special tools and workshop equipment required




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.

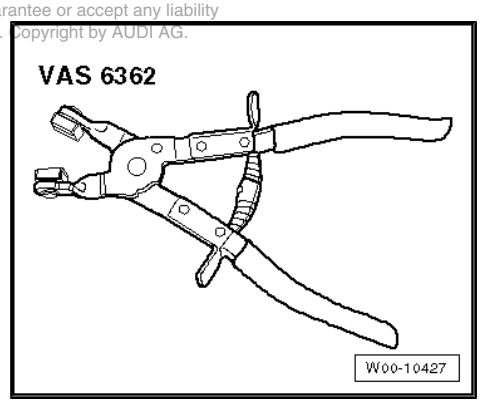
- Removal lever - 80 - 200-
- Used oil collection and extraction unit - V.A.G 1782-
- Stepladder - VAS 5085-
- Engine bung set - VAS 6122-
- Scissor-type assembly platform - VAS 6131 A- with support set for Audi - VAS 6131/10- , and support set -VAS 6131/11- , -VAS 6131/13- and 3x -VAS 6131/10-2-
- Drip tray for workshop hoist - VAS 6208-

- Hose clip pliers - VAS 6340-




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

- Hose clip pliers - VAS 6362-




**Procedure**

**WARNING**

*Make sure the vehicle cannot tip over when the engine is removed.*

- *Secure the vehicle, to do so, the luggage compartment must be empty.*

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

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

– Reduce fuel pressure in high-pressure section of injection system ⇒ page 4 .

**Note**

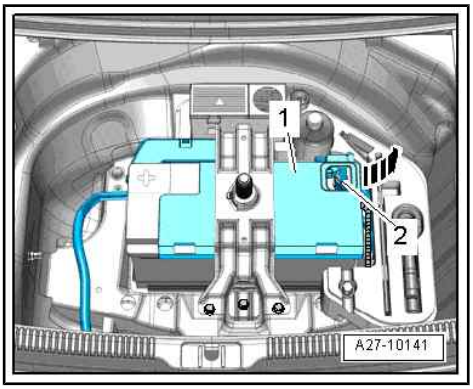
- *The electromechanical parking brake must be released before disconnecting the battery, so that the propshaft can be turned during removal.*
- *To allow the propshaft to turn freely, move the selector lever to position “N” and release the electromechanical parking brake before disconnecting the battery.*

– Bring front wheels into straight-ahead position.

**Caution**

*Risk of irreparable damage to electronic components.*

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



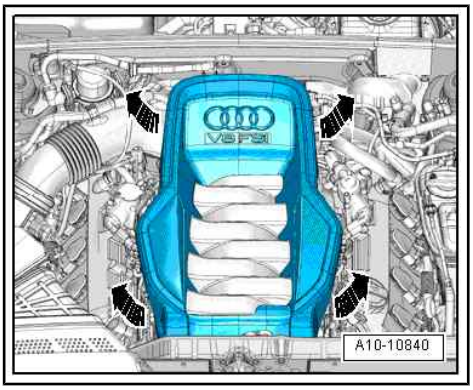

– Switch off ignition and remove ignition key.

– Disconnect earth wire -2- from battery terminal ⇒ Electrical system; Rep. gr. 27 ; Battery, Disconnecting and connecting battery .

– Discharge refrigerant circuit ⇒ Heating, air conditioning; Rep. gr. 87 ; Refrigerant circuit .

– Extract hydraulic fluid for power steering from reservoir using used oil collection and extraction unit - V.A.G 1782- .

– Remove engine cover panel -arrows-.

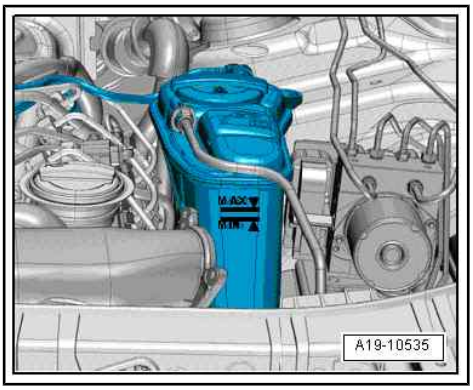



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

**WARNING**

*Risk of scalding due to hot steam and hot coolant.*

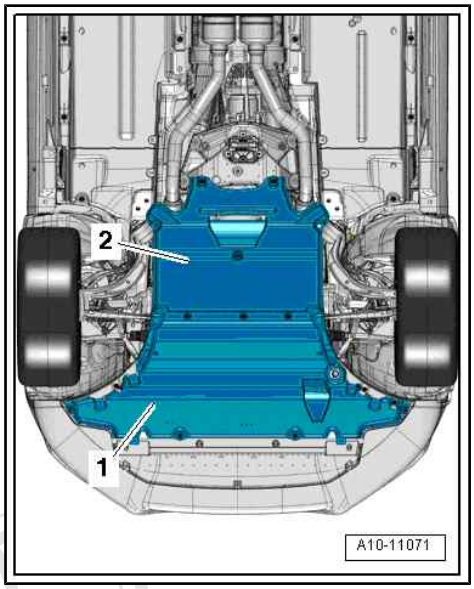
- *The cooling system is under pressure when the engine is hot.*
- *To allow pressure to dissipate, cover filler cap on coolant expansion tank with cloth and open carefully.*



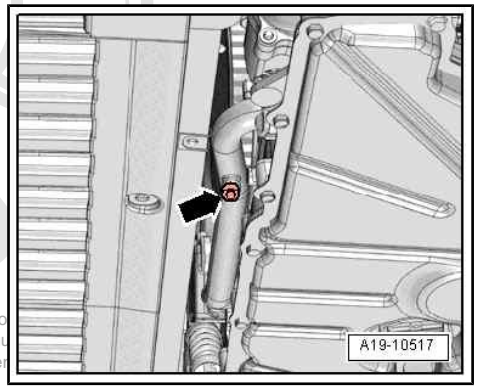

– Remove both front wheels ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres; Tightening torque for wheel bolts .

– Remove wheel spoilers (front) on both sides ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .

– Remove noise insulation -1- and -2- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

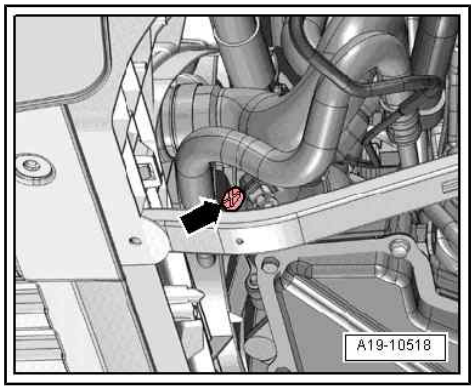



– Place drip tray for workshop hoist - VAS 6208- beneath engine.
– Unscrew drain plug -arrow- on coolant pipe (front) and drain off coolant.




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

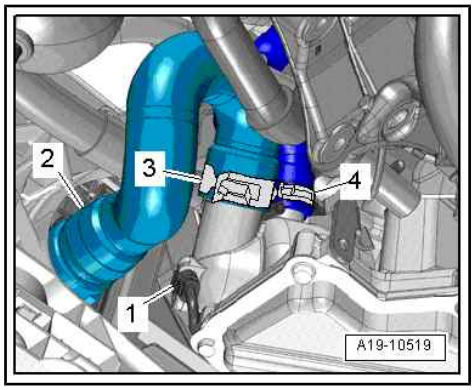
– Unscrew drain plug -arrow- on map-controlled engine cooling system thermostat - F265- and drain off coolant.



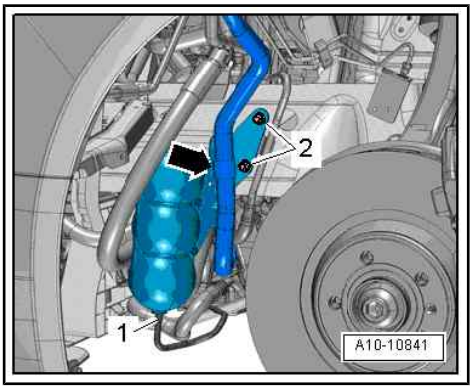

– Pull out retaining clip -2- and disconnect coolant hose from radiator.

**Note**

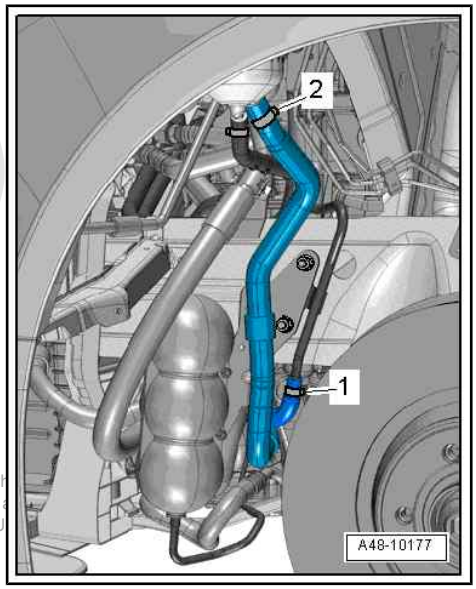
*Disregard -items 1, 3, 4-.*



– Detach vacuum hose -1- and move hydraulic hose -arrow- clear at bracket.
– Unscrew nuts -2- and detach vacuum reservoir.




– Position used oil collection and extraction unit - V.A.G 1782- below connection point.
– Disconnect hydraulic fluid supply hose -2- and return hose -1- for power steering.
– Seal off open pipes/lines and connections with clean plugs from engine bung set - VAS 6122- .

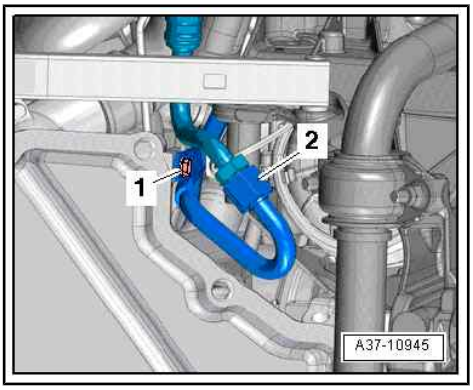



Protected by copyright. Copying for private or commercial purposes, in part or in wh
permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept a
with respect to the correctness of information in this document. Copyright by AU

**Note**

*Observe rules for cleanliness when working on automatic gearbox ⇒ Rep. gr. 00 ; Repair instructions; Rules for cleanliness .*

– Position used oil collection and extraction unit - V.A.G 1782- below connection point.
– Disconnect ATF line -2-.
– Seal off open pipes/lines and connections with clean plugs from engine bung set - VAS 6122- .



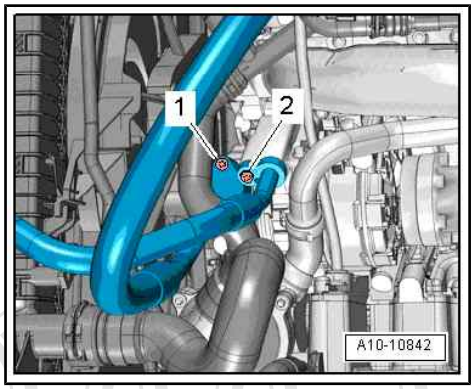

**Note**

*Disregard -item 1-.*

**Caution**

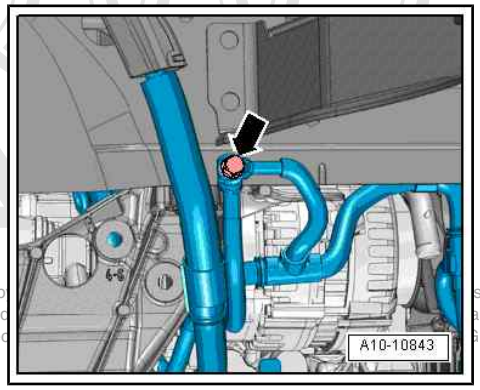
*Danger of damage to refrigerant lines and hoses.*

- *Do NOT stretch, kink or bend refrigerant lines and hoses.*



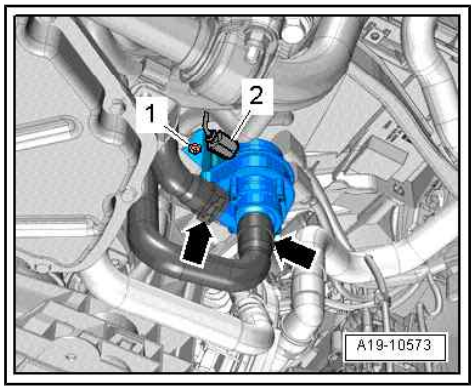

– Remove bolts -1- and -2-.
– Disconnect refrigerant lines from A/C compressor.
– Seal off open pipes/lines and connections with clean plugs from engine bung set - VAS 6122- .

– Unscrew nut -arrow- on longitudinal member (right-side) and move earth cables clear.




Protected by copyright. Cop
permitted unless authorised
with respect to the correc
s not
ability

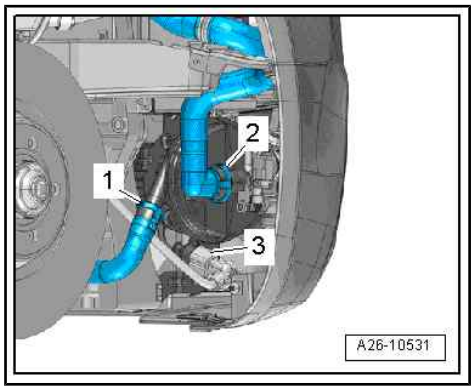
– Unplug electrical connector -2-.
– Place drip tray for workshop hoist - VAS 6208- beneath engine.
– Disconnect coolant hoses from continued coolant circulation pump - V51- -arrows-.




**Note**

*Disregard -item 1-.*

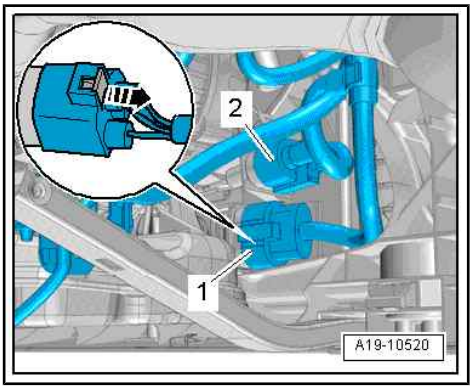
– Unplug electrical connector -3- at secondary air pump motor - V101- and move electrical wiring clear.
– Disconnect hose -1- for secondary air system and move clear.




**Note**

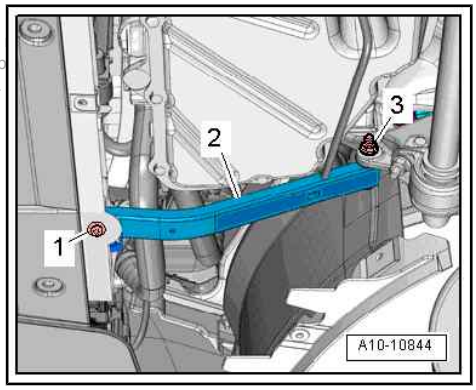
*Disregard -item 2-.*

– Unplug electrical connectors -1- and -2- for radiator fan (push retainer to the rear -arrow- and press down release catch).
– Move electrical wiring harness clear.




– Remove bolts -1- and nuts -3- on both sides and detach lock carrier braces -2-.

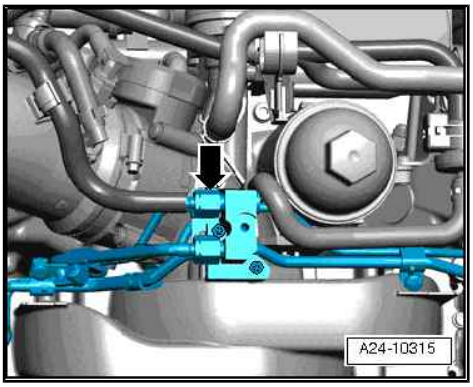
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liab with respect to the correctness of information in this document. Copyright by AUDI AG.




**WARNING**

*Risk of injury caused by fuel.*

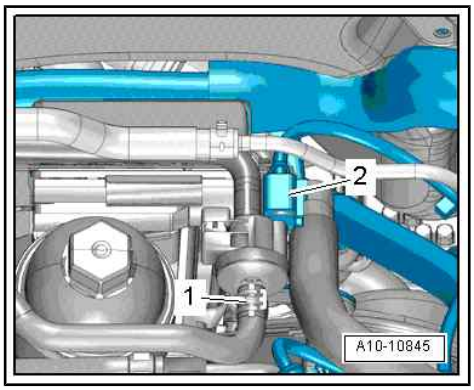
- *To allow the fuel pressure to dissipate, wrap a clean cloth around the connection and carefully loosen the connection before opening the fuel system.*




**Caution**

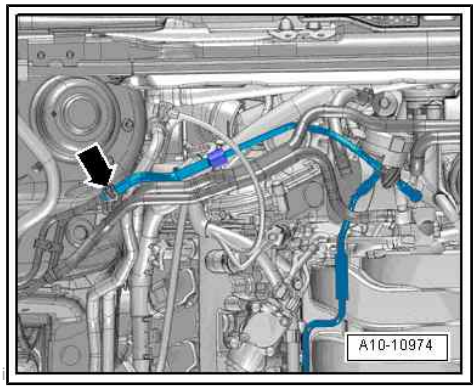
*Observe rules for cleanliness when working on the fuel supply system ⇒ page 9 .*

– Disconnect fuel line -arrow-.
– Move clear fuel line and line going to activated charcoal filter at air pipe.
– Unplug electrical connector -2- at activated charcoal filter solenoid valve 1 - N80- and detach vacuum hose -1-.
– Detach activated charcoal filter solenoid valve 1 - N80- from bracket and move to one side with hose and fuel line still attached.



**USA models:**

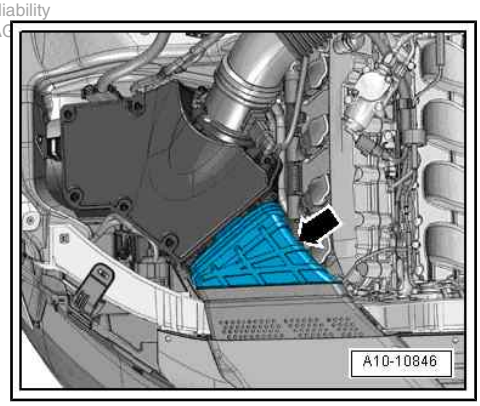
– Disconnect vacuum hose leading to fuel system diagnostic pump - V144- -arrow-.




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.

**Continued for all vehicles:**

– Remove air duct -arrow-.



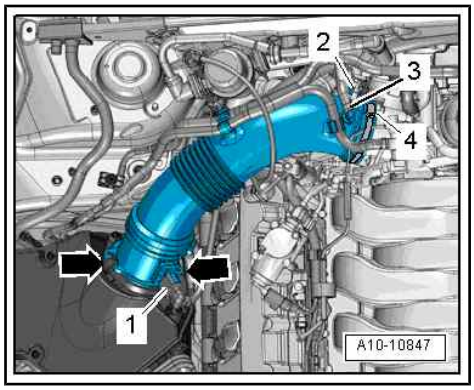

– Unplug electrical connector -1- at air mass meter - G70- .

– Disconnect vacuum line -3- from air pipe.

**Rest-of-world vehicles:**

– Press release tabs and detach crankcase breather hose -2- from air pipe.

– Unfasten hose clip -4-, release retaining clips -arrows- and remove air pipe with air mass meter - G70- .




**USA models:**

**Caution**

*Risk of violating emission legislation applying to USA models.*

- *Do NOT open hose connection -2-.*

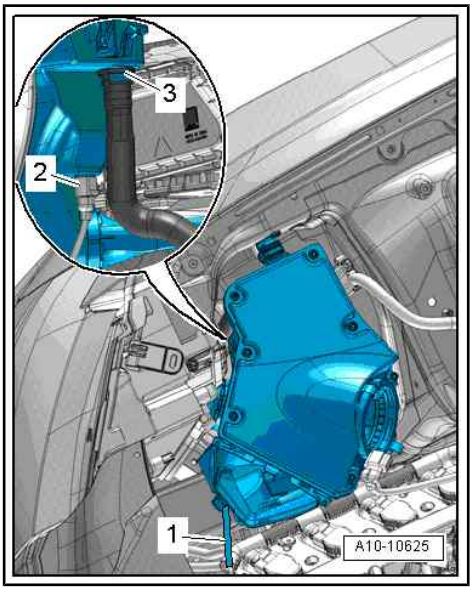
– Move air pipe clear to one side (crankcase breather hose -2- remains connected). To do so, release hose clip -4- and clamps -arrows-.

**Continued for all vehicles:**

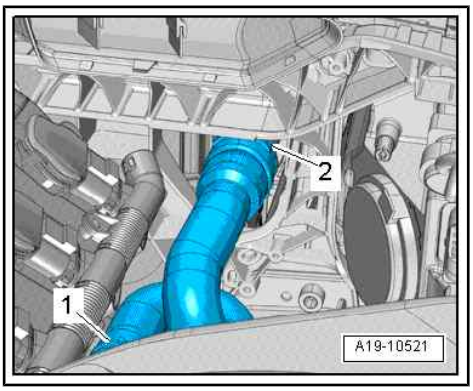
– Disconnect vacuum line -1-.

– Detach air cleaner housing and unplug electrical connector -2- at variable intake manifold change-over valve - N335- on reverse side of air cleaner.

– Disconnect hose -3- for secondary air system.

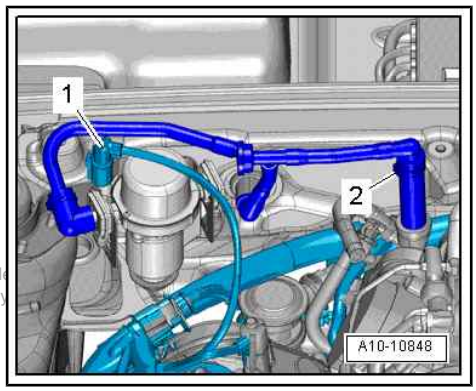



– Lift retaining clip -2-, release hose clip -1- on coolant pipe (right-side) and remove coolant hose.




– Unplug electrical connector -1- for vacuum pump for brakes - V192- and move wiring clear.

– Disconnect vacuum hose -2-.

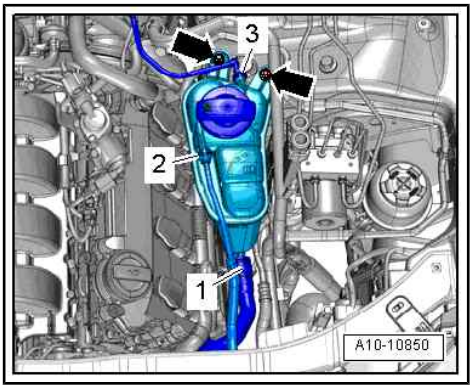



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Disconnect coolant hoses -1- and -3- from coolant expansion tank.

**Note**

*-Item 2- and -arrows- can be disregarded.*

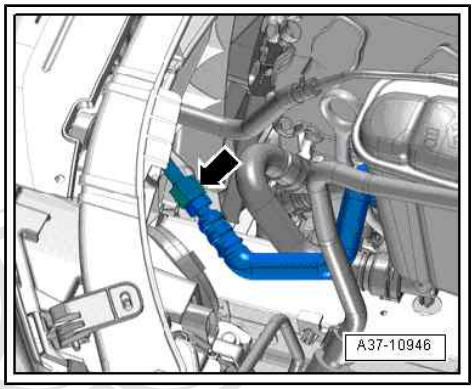


**Note**

*Place a cloth underneath to catch escaping ATF.*

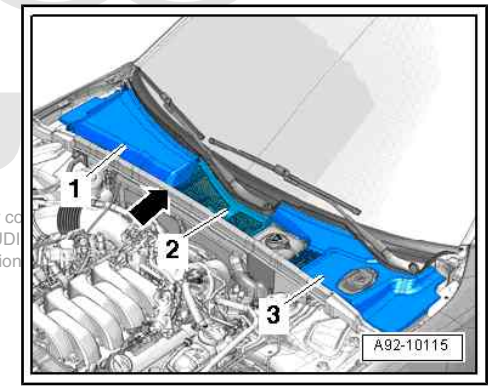
– Disconnect ATF line -arrow-.

– Seal off open pipes/lines and connections with clean plugs from engine bung set - VAS 6122- .



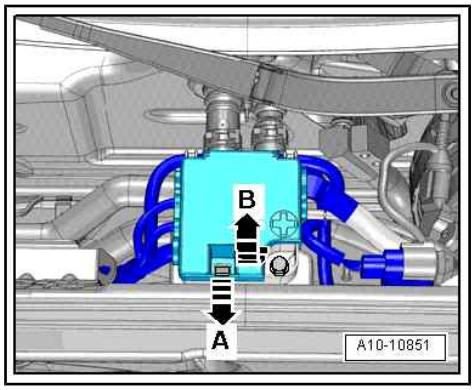

– Remove seal -arrow-.

– Remove plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .




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

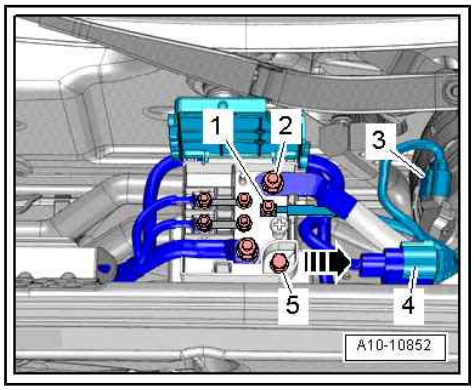
– Release retainer -arrow A- and open cover -arrow B-.



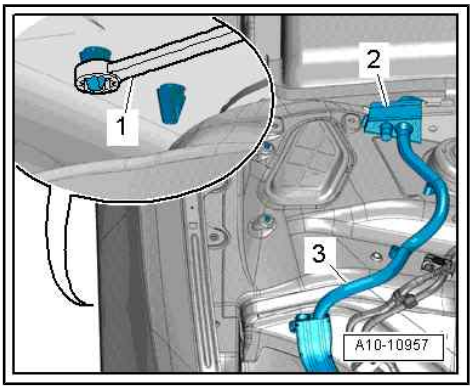

– Remove nuts -1- and -2- for electrical wiring.

– Unplug electrical connectors -3- and -4- and move clear.

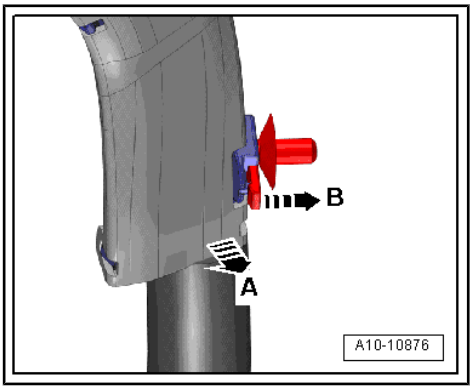
– Remove bolt -5- and detach terminal 30 wiring junction 2 - TV22- from body brace -arrow-.



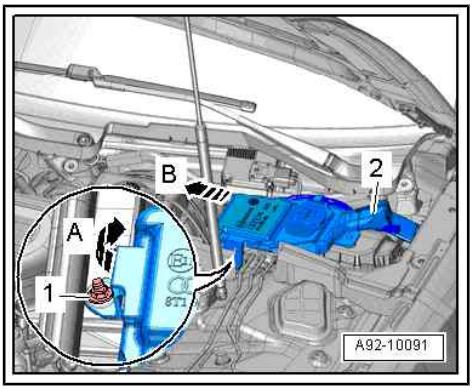
– Working from wheel housing, release catches using a 5.5 mm ring spanner -item 1- and remove wiring protector -2- from above.
– Release wiring harness -3- leading to alternator and starter using removal lever - 80 - 200- and move clear.



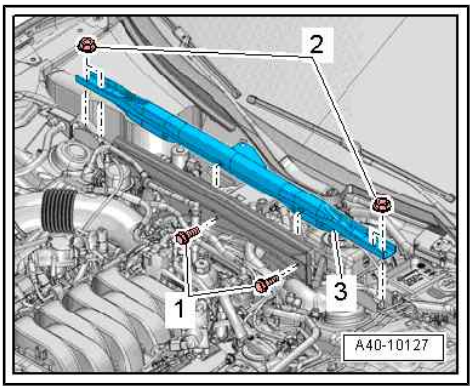

– Release catch -arrow B-, pull wiring duct forwards -arrow A- and move clear.




– Remove nut -1- and swivel filler neck for washer fluid reservoir slightly upwards -arrow A-.
– Pull filler neck -2- with filler pipe out of washer fluid reservoir and through opening in body -arrow B-.

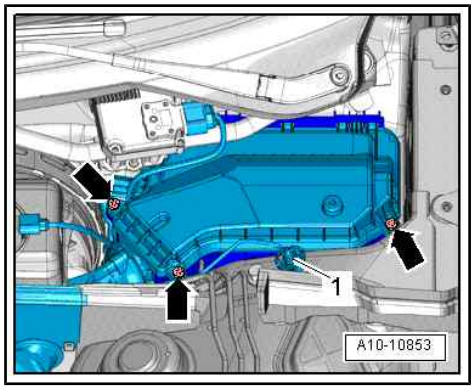



– Remove bolts -1- and nuts -2- and detach body brace -3- (different types may be fitted depending on version).

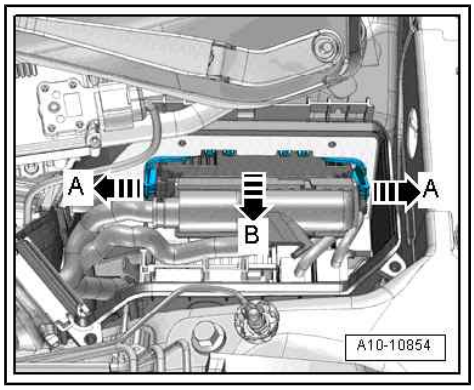



Audi
Copyright by AUDI AG.
The reproduction, distribution and utilization of this document for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this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

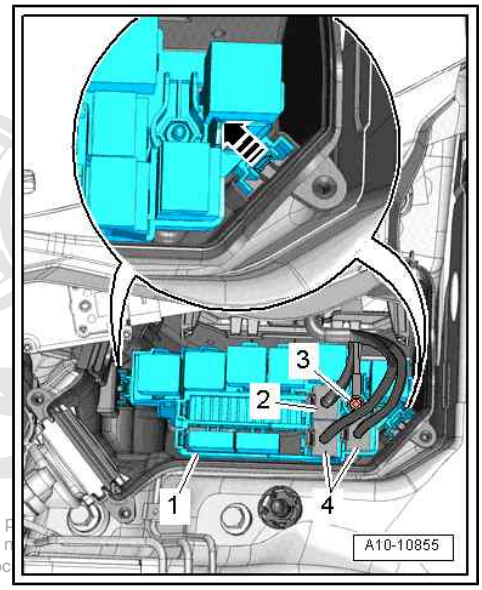
– Remove bolts -arrows- and detach cover for electronics box in engine compartment.
– Remove nut -1- and move electrical wiring clear.




– Release catches -arrows A- and take out engine control unit -arrow B-.

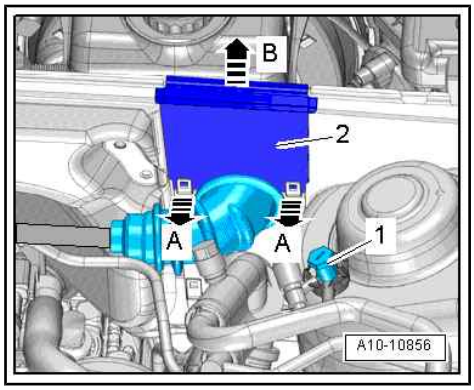



– If fitted, unplug electrical connector -2-.
– Unplug electrical connectors -4- and unscrew nut -3- for wiring.
– Release catches -arrow- and detach relay carrier with fuse holder -1-.
– Disengage engine wiring harness at electronics box in engine compartment and move clear.

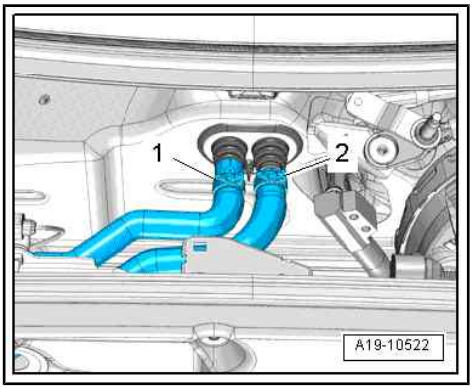



Protected by copyright. Copying for private or commercial p
permitted unless authorised by AUDI AG. AUDI AG does n
with respect to the correctness of information in this doc

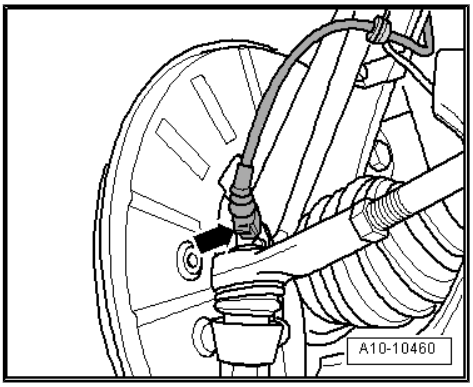
– Release catches -arrows A- and detach wiring protector -2- -arrow B-.
– Unscrew earth stud -1- and move earth wiring clear.
– Place wiring harness on engine and secure engine control unit to prevent it from dropping.



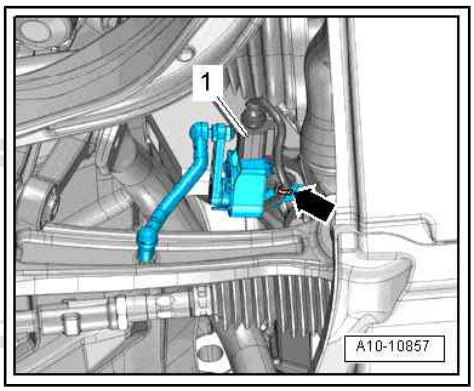
– Mark coolant hoses -1- and -2- for later installation and disconnect hoses.
– Push coolant hoses with hose protector through into engine compartment.



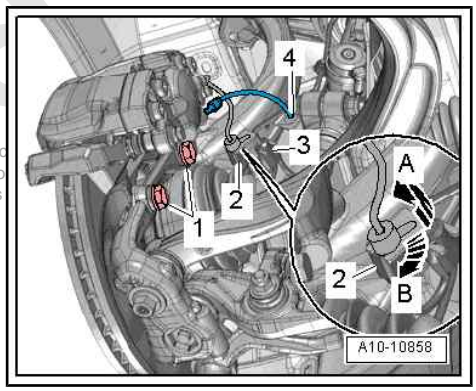

– Unplug electrical connectors -arrow- at front wheel speed sensors on both sides.




– Unplug electrical connector -1- on headlight range control sender 1 - G233- and release wiring -arrow-.




– Release electrical connector -2- at bracket by pulling retainer catch to the rear -arrow A- and turning connector approx. 90° in direction of -arrow B-.
– Move clear electrical wire -3- and brake hose -4- at bracket.
– Remove bolts -1- and tie up brake caliper in wheel housing with wire (brake line remains attached).



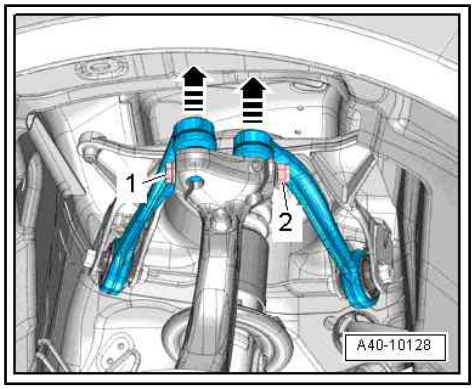

Protected by copyright. Copying for private or commerc
Translated by Volkswagen AUDI AG do
No liability with respect to the correctness of information in this

**Caution**

***Risk of damage to brake pistons.***

- ***Do not operate brake pedal with brake caliper removed.***

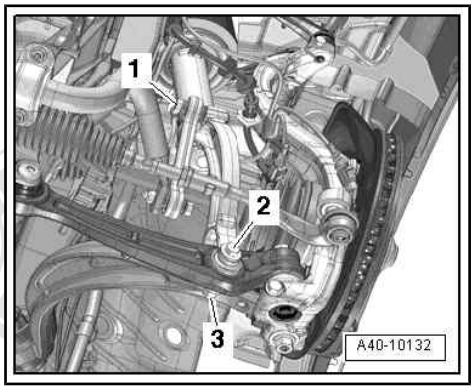
– Remove nut -2- and pull out bolt -1-.
– Pull upper suspension links upwards out of wheel bearing housing -arrows-.
– Repeat procedure on opposite side of vehicle.




– Remove bolt -1- for anti-roll bar on both sides.
– Remove nut -3- on both sides.

**Note**

*The bolt -2- is removed at a later stage.*

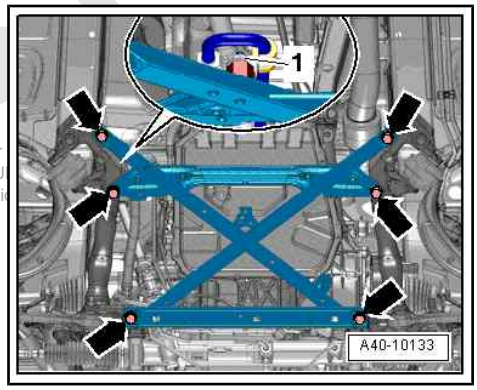



**Caution**

***Risk of damage to running gear components.***

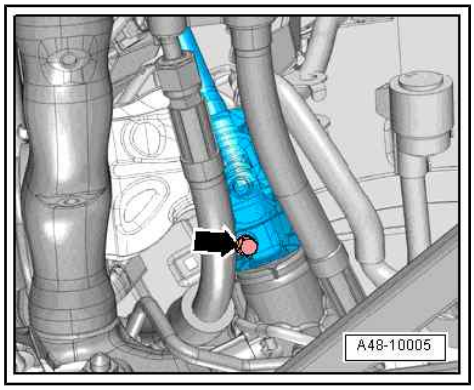
- ***The vehicle must NOT be lowered onto its wheels if the engine/gearbox mountings, steering rack or subframe cross brace are not properly installed.***
- ***The vehicle must NOT be jacked up by applying a trolley jack or similar to the subframe or subframe cross brace.***

Protected by copyright. Copying for private or
AUDI AG. AU
ess of informati

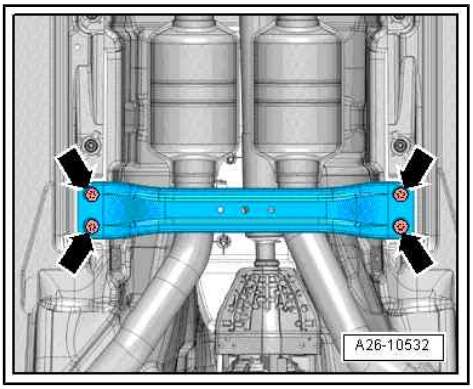



– Remove subframe cross brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .

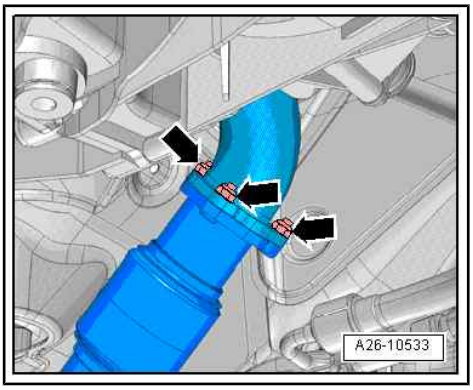
– Detach intermediate steering shaft from steering rack and move clear by telescoping upwards ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Exploded view - steering column .



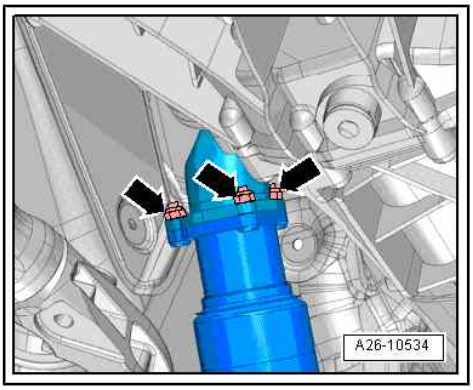
– If fitted, remove bolts -arrows- and detach front cross member.




– Unscrew nuts -arrows- for front silencer (left-side).



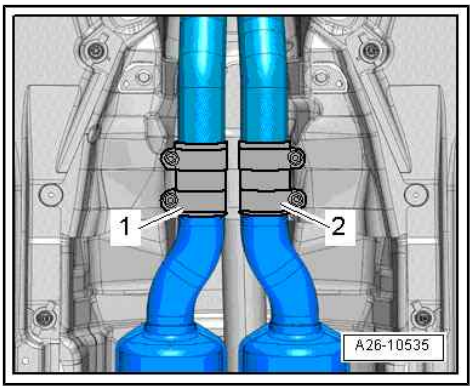

– Unscrew nuts -arrows- for front silencer (right-side).




**Caution**

***Risk of damage to flexible joints in front silencer.***

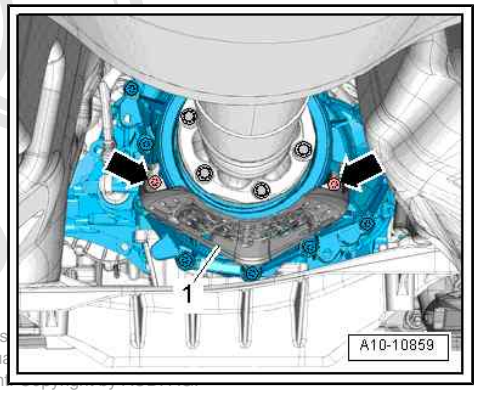
- ***Do NOT bend the flexible joints in the front silencer more than 10°.***




– Loosen and push back clamps -1- and -2- and detach front silencers on both sides.

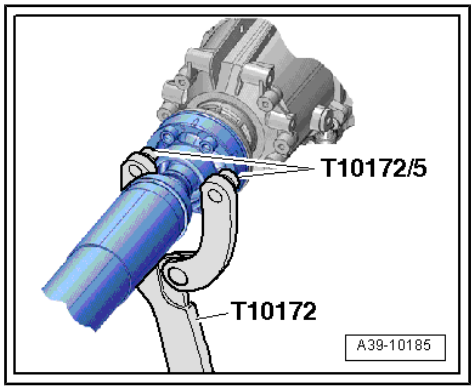
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Remove bolts -arrows- and detach heat shield -1- for propshaft.

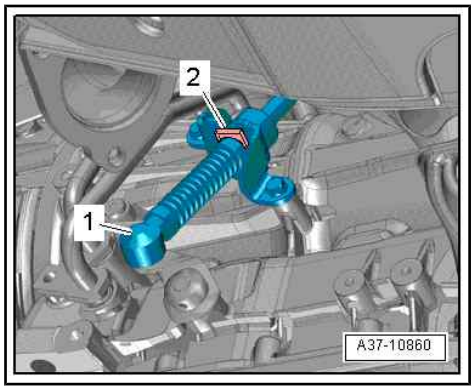



Protected by copyright. Copying for private or commercial purpos
permitted unless authorised by AUDI AG. AUDI AG does not gua
with respect to the correctness of information in this documen

– Remove propshaft from gearbox ⇒ Rear final drive; Rep. gr. 39 ; Propshaft; Removing and installing propshaft .
– Slide propshaft towards rear final drive; the constant velocity joints can be moved axially.
– Tie up propshaft on one side.




– Pry ball socket -1- of selector lever cable off gearbox selector lever using removal lever - 80 - 200- .
– Press off securing clip -2- and remove selector lever cable from gearbox.



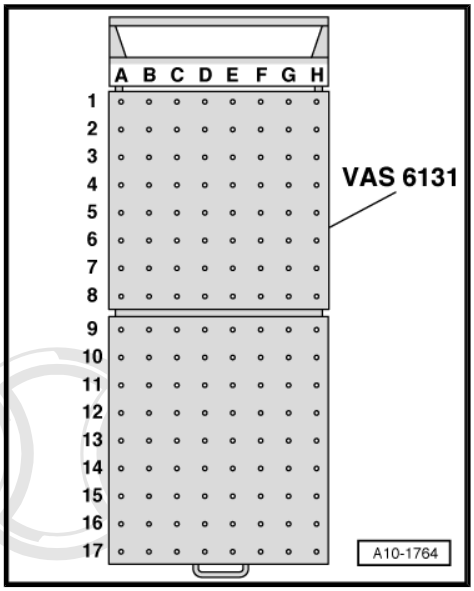

**Note**

*Take care not to bend or kink selector lever cable.*

**Set up the scissor-type assembly platform as follows:**

– Set up scissor-type assembly platform - VAS 6131 A- with support set for Audi - VAS 6131/10- and supplementary set - VAS 6131/13- as follows:

| Platform coordinates | Parts of support set for Audi - VAS 6131/10- and supplementary set -VAS 6131/13- | | | |
|---|---|---|---|---|
| B4 | /13-4 | /10-4 | /10-5 | /13-1 |
| G4 | /13-4 | /10-4 | /10-5 | /13-1 |
| B6 | /10-1 | /10-2 | /10-5 | /10-11 |
| G6 | /10-1 | /10-2 | /10-5 | /10-11 |
| A8+C8 | /13-6 | | | /13-2 |
| F8+H8 | /13-6 | | | /13-2 |
| C14 | /10-1 | /10-4 | /10-5 | /10-7 |
| F14 | /10-1 | /10-4 | /10-5 | /11-1 |




– Initially hand-tighten the support elements on the scissor-type assembly platform.

– Position scissor-type assembly platform - VAS 6131 A- horizontally.

• Take note of spirit level (bubble gauge).

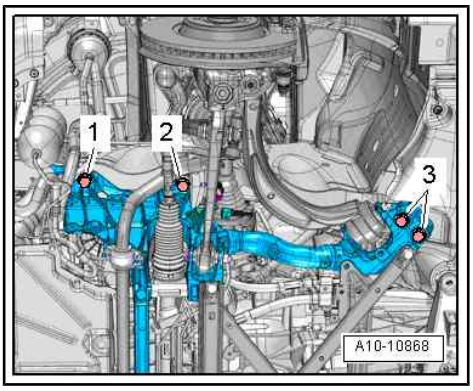
– Position scissor-type assembly platform - VAS 6131 A- below engine/gearbox assembly.

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**

***Accident risk if subframe mountings are detached.***

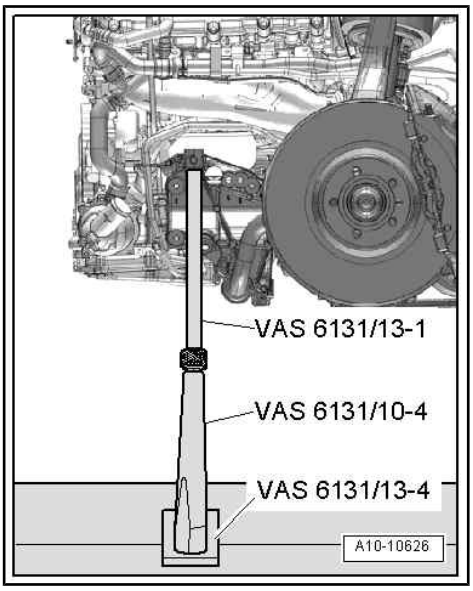
- ***Subframe bolts -2- and -3- must not be loosened.***



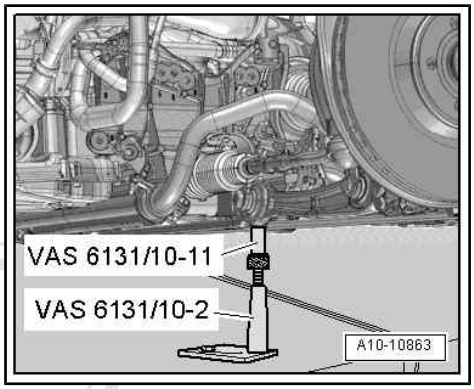

– Remove subframe bolts -1- on both sides.

– Position support elements from -VAS 6131/10- and -VAS 6131/13- at front left and right of subframe as shown.

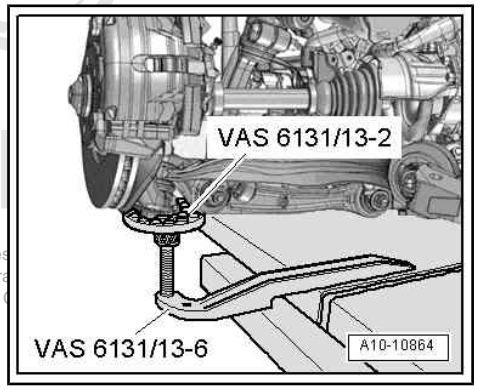
– Make sure that threaded spindles are screwed in completely.



– Position support elements from -VAS 6131/10- (rear left and right) at front attachment points of subframe cross brace as shown.

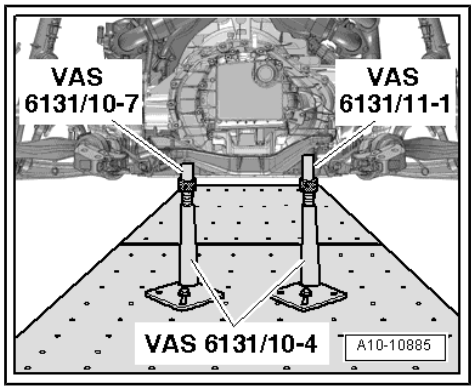



– Position support elements from -VAS 6131/13- under left and right wheel bearing housings as shown.




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

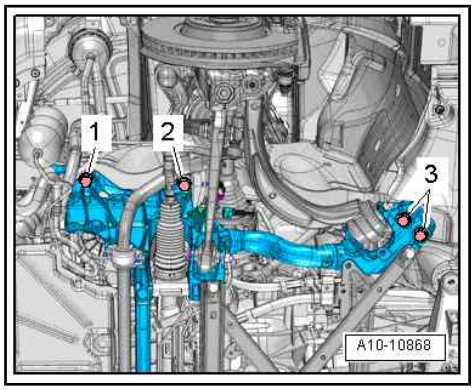
– Position support elements from -VAS 6131/10- and -VAS 6131/11- (rear left and right) at tunnel cross member as shown.
– Turn all spindles for support elements upwards until all locating lugs make contact with mounting points.
– Tighten base plates for support elements to 20 Nm on scissor-type assembly platform - VAS 6131 A- .



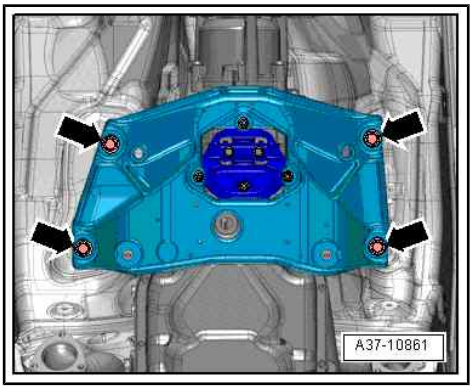

– Mark installation position of subframe and tunnel cross member on longitudinal members with felt-tip pen.
– Unscrew subframe bolts -2- and -3- on both sides in several stages and in diagonal sequence.

**Note**

*Disregard -item 1-.*

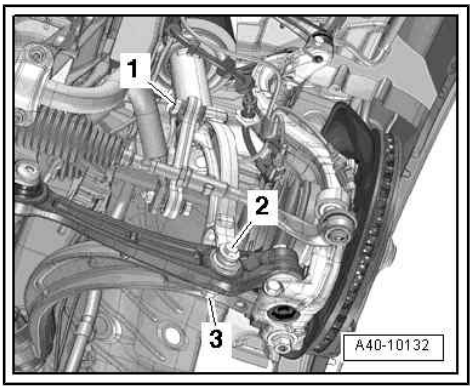


– Remove bolts -arrows- on tunnel cross member.




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 bolt -2- on both sides.




**Note**

*Disregard items -1 and 3-.*

**Caution**

***Danger of damage to hoses, pipes and wiring connections and to engine compartment.***

- ***Check that all hoses and wiring connections between engine, gearbox, subframe and body have been detached.***
- ***Carefully guide out engine/gearbox assembly with subframe from engine compartment when lowering.***

– Lower engine/gearbox assembly using scissor-type assembly platform - VAS 6131 A- .

– Pull out scissor-type assembly platform - VAS 6131 A- with engine/gearbox assembly from underneath vehicle.

## 1.2 Separating engine and gearbox

⇒ “1.2.1 Separating engine and gearbox - vehicles with manual gearbox”, page 51

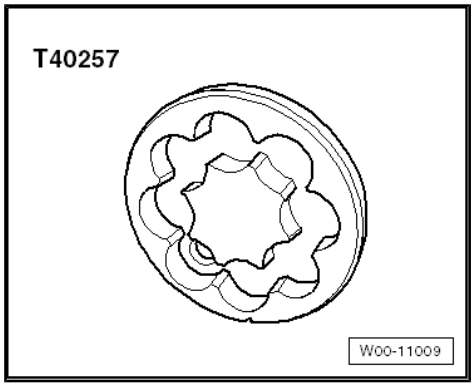
⇒ “1.2.2 Separating engine and gearbox - vehicles with automatic gearbox”, page 56

## 1.2.1 Separating engine and gearbox - vehicles with manual gearbox

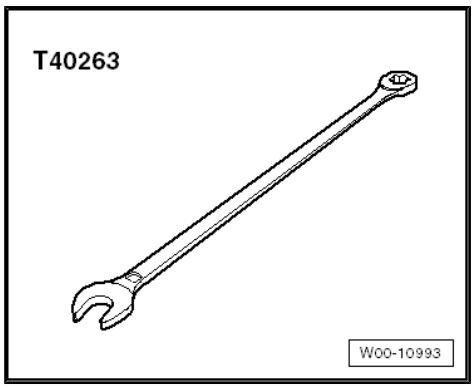
**Special tools and workshop equipment required**

- Support set for Audi - VAS 6131/10- , support -VAS 6131/13-7- and gearbox support - VAS 6131/14-

♦ Turning-over tool - T40257-




♦ Wrench, 21 mm - T40263-




♦ Articulated wrench (12 mm) - T40220- for engines up to engine number CAUA 005 521

♦ M10x65 bolt

**Procedure**

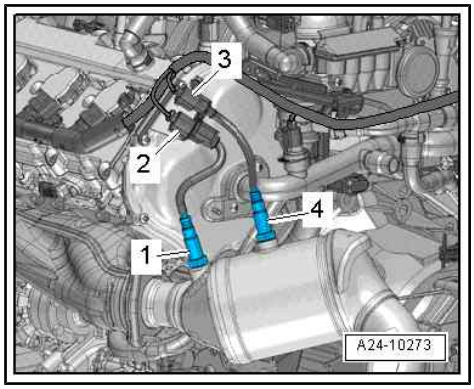
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Engine/gearbox assembly removed and secured to scissor-type assembly platform - VAS 6131 A-

– Detach electrical connectors from bracket and unplug.

2 - For Lambda probe 2 - G108-

3 - For Lambda probe 2 after catalytic converter - G131-

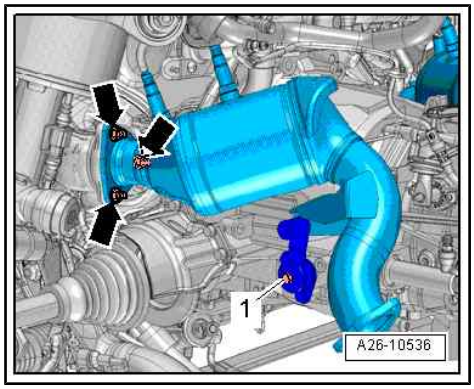



**Note**

*Disregard items -1 and 4-.*

– Remove nuts -arrows-; use articulated wrench (12 mm) - T40220- if necessary.

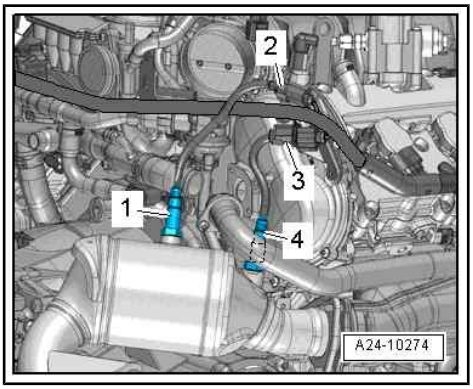
– Unscrew bolt -1- and remove catalytic converter (left-side).



– Detach electrical connectors from bracket and unplug.

2 - For Lambda probe after catalytic converter - G130-

3 - For Lambda probe - G39-

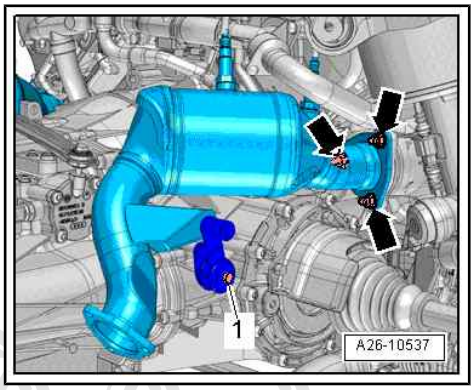



**Note**

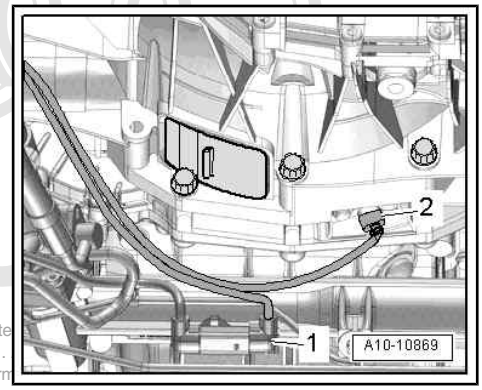
*Disregard items -1 and 4-.*

– Remove nuts -arrows-; use articulated wrench (12 mm) - T40220- if necessary.

– Unscrew bolt -1- and remove catalytic converter (right-side).




– Unplug electrical connectors -1- for steering rack and -2- for engine speed sender - G28- and move wiring clear.



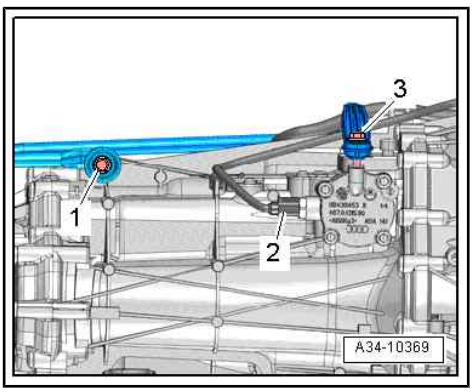

Protected by copyright. Copying for private
permitted unless authorised by AUDI AG.
with respect to the correctness of inform

– Unplug electrical connector -2- at reversing light switch - F4- .

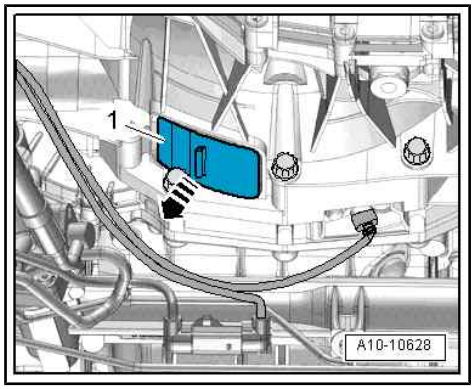
**Note**

*Disregard items -1 and 3-.*

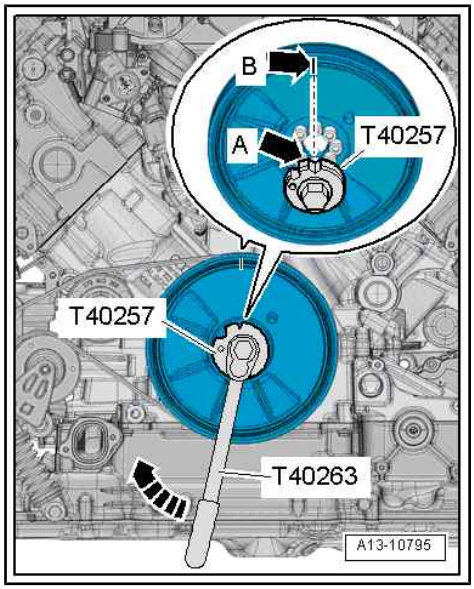
– Unbolt drive shafts (left and right) from gearbox flange shafts.



– Detach bottom cover -1- from gearbox -arrow-.




– Fit turning-over tool - T40257- onto wrench (21 mm) - T40263- .
– Position turning-over tool - T40257- on bolts of vibration damper.
• Notch -arrow A- on turning-over tool - T40257- must point to coloured line -arrow B- on vibration damper.

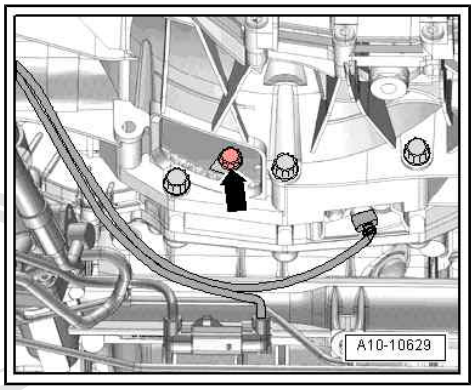



**Note**

♦ *Semi-circular recess on adapter can be disregarded.*

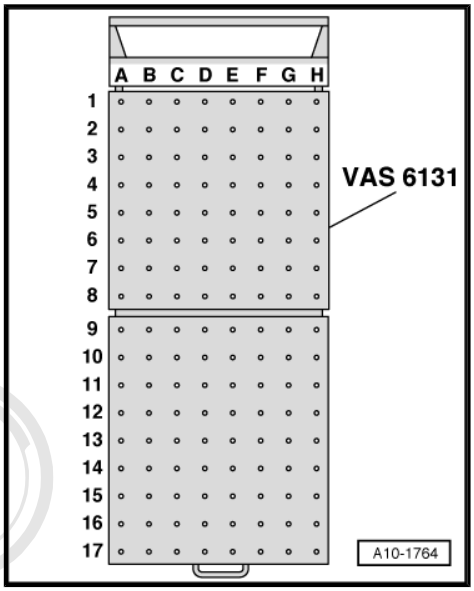
♦ *When performing the next step, turn the crankshaft only in the normal direction of rotation -arrow-.*

– Remove 6 bolts -arrow- for drive plate, turning crankshaft 60° in normal direction of rotation each time.




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

– Set up scissor-type assembly platform - VAS 6131 A- with support set for Audi - VAS 6131/10- , support -VAS 6131/13-7- and gearbox support - VAS 6131/14- as follows.



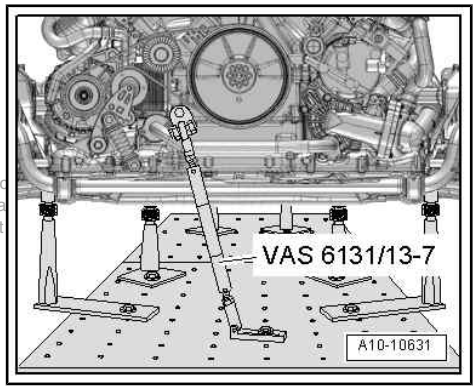

**Note**

*The other support elements remain unchanged.*

| Platform coordinates | Parts from support set for Audi - VAS 6131/10- , support -VAS 6131/13-7- and gearbox support - VAS 6131/14- | | | |
|---|---|---|---|---|
| D2 | /13-7 | | | |
| B10 | /10-1 | /10-2 | /10-5 | /14 |
| G10 | /10-1 | /10-2 | /10-5 | |

– Secure support -VAS 6131/13-7- at tapped hole at front of engine (right-side) with bolt M10x65, as illustrated.

– Secure support -VAS 6131/13-7- to scissor-type assembly platform and tighten to 20 Nm.

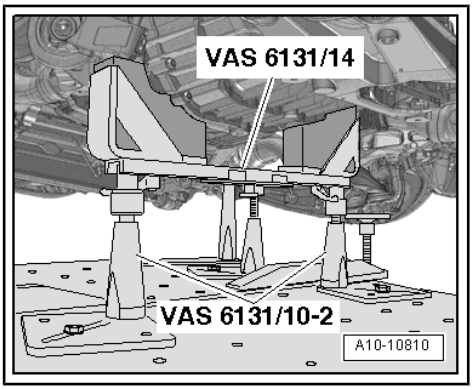



Protected by copyright. Copying for private or commercial purposes, in part o
permitted unless authorised by AUDI AG. AUDI AG does not guarantee or a
with respect to the correctness of information in this document. Copyright

– Position support elements from -VAS 6131/10- and gearbox support - VAS 6131/14- at front of gearbox, as illustrated.

– Screw spindles on both sides upwards until gearbox support - VAS 6131/14- makes full contact with gearbox.

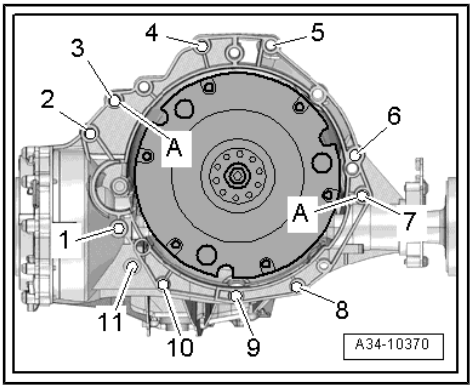
– Tighten base plates for support elements to 20 Nm on scissor-type assembly platform - VAS 6131 A- .




– Remove bolts -1- and -2- for starter.

– Separate starter from gearbox and leave in position.

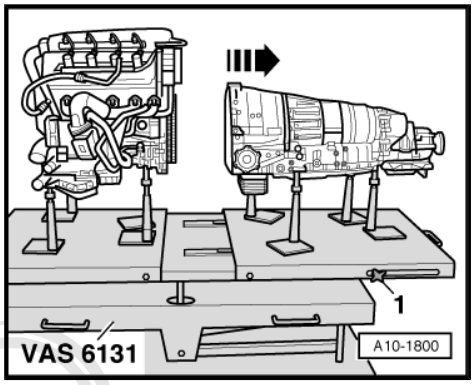
– Unscrew remaining bolts -3 ... 11- securing engine to gearbox.




**Note**

*Disregard -item A-.*

– Loosen clamping bolts -1- on sides of scissor-type assembly platform - VAS 6131 A- and pull rear section of platform together with gearbox towards rear -arrow-.

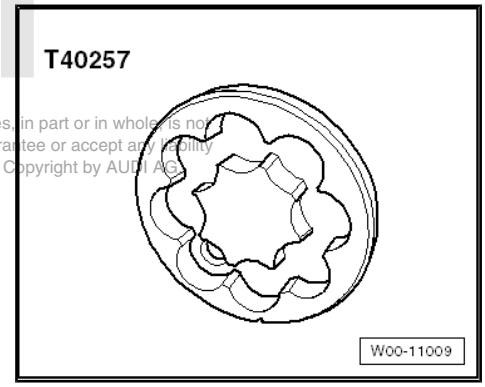



## 1.2.2 Separating engine and gearbox - vehicles with automatic gearbox

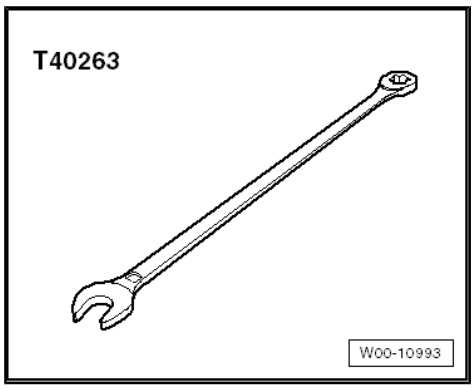
**Special tools and workshop equipment required**

- Support set for Audi - VAS 6131/10- , support -VAS 6131/13-7- and gearbox support - VAS 6131/14-
- Turning-over tool - T40257-

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.




- Wrench, 21 mm - T40263-




- M10x65 bolt

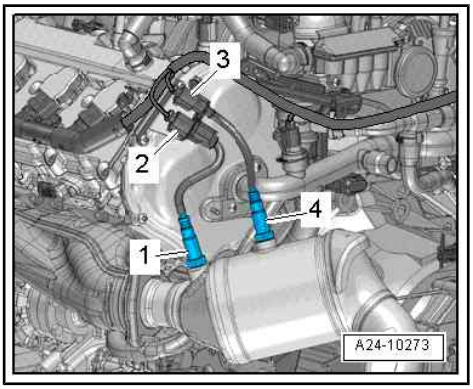
**Procedure**

- Engine/gearbox assembly removed and secured to scissor-type assembly platform - VAS 6131 A-

– Detach electrical connectors from bracket and unplug.

2 - For Lambda probe 2 - G108-

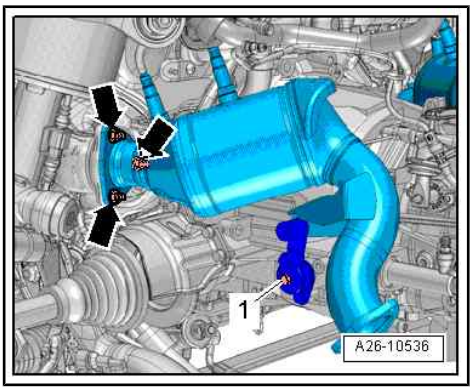
3 - For Lambda probe 2 after catalytic converter - G131-




**Note**

*Disregard items -1 and 4-.*

– Remove nuts -arrows- and bolt -1- and detach catalytic converter (left-side).




**Note**

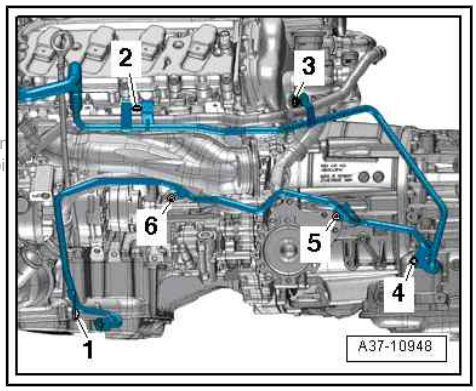
*Place a cloth underneath to catch escaping ATF.*

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

– Remove bolts -1, 2, 4, 5, 6- and nut -3-.

– Detach ATF line.

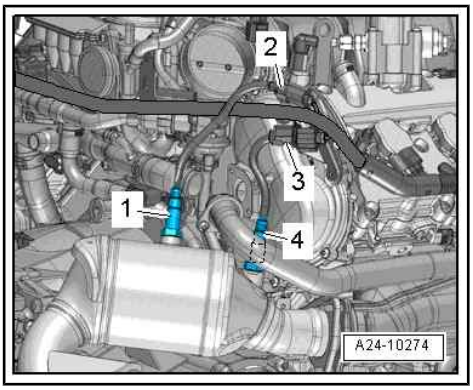
– Seal off open pipes/lines and connections with clean plugs from engine bung set - VAS 6122- .




– Detach electrical connectors from bracket and unplug.

2 - For Lambda probe after catalytic converter - G130-

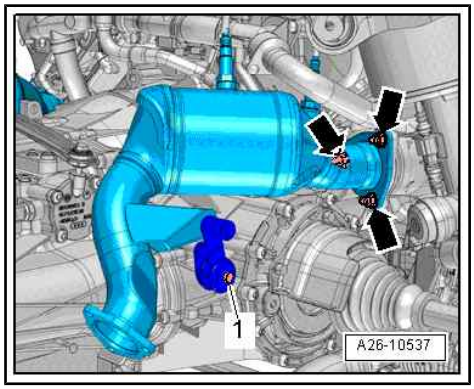
3 - For Lambda probe - G39-



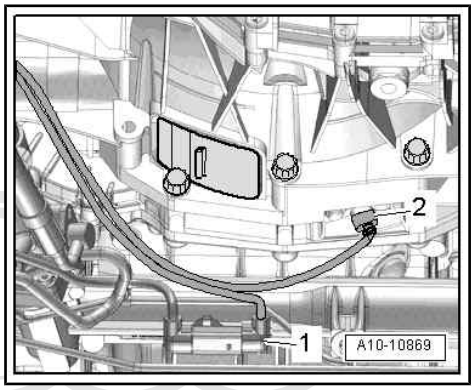

**Note**

*Disregard items -1 and 4-.*

– Remove nuts -arrows- and bolt -1- and detach catalytic converter (right-side).




– Unplug electrical connectors -1- for steering rack and -2- for engine speed sender - G28- and move wiring clear.

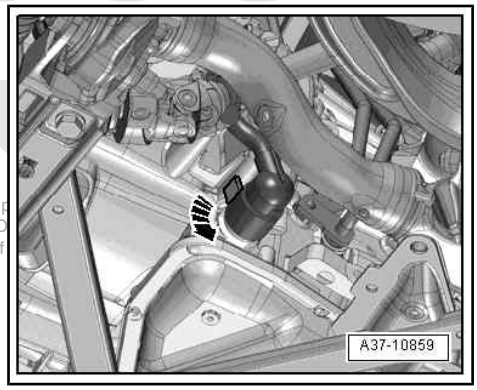



**Caution**

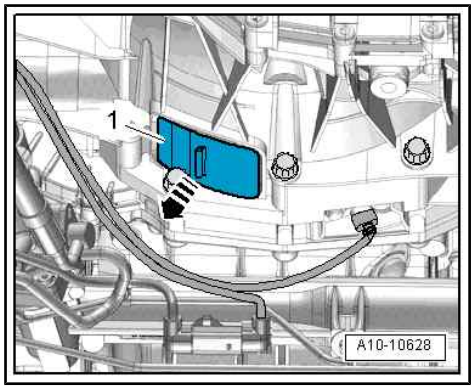
***Risk of irreparable damage to gearbox control unit (mechatronic unit) because of static discharge.***

- ***Do NOT touch connector contacts in gearbox connector with your hands.***

Audi AG. All rights reserved. Copying for p
permitted unless authorised by AUD
with respect to the correctness of



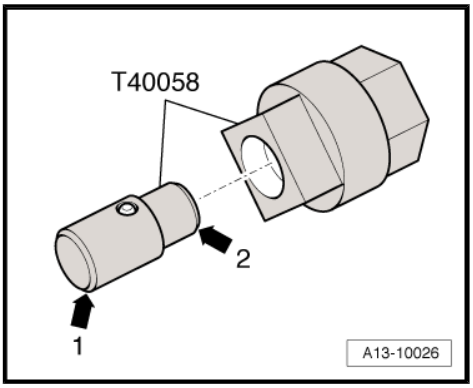

– Touch gearbox housing with your hand (without wearing gloves) to eliminate static charge.
– Turn retainer catch anti-clockwise -arrow- and unplug electrical connector at gearbox.
– Move electrical wiring harness clear at gearbox.
– Unbolt drive shafts (left and right) from gearbox flange shafts.
– Detach bottom cover -1- from gearbox -arrow-.



– Insert guide pin of adapter -T40058- as follows:

• The larger-diameter section -arrow 1- faces towards the engine.

• The smaller-diameter section -arrow 2- faces the adapter.




– Fit turning-over tool - T40257- onto wrench (21 mm) - T40263- .

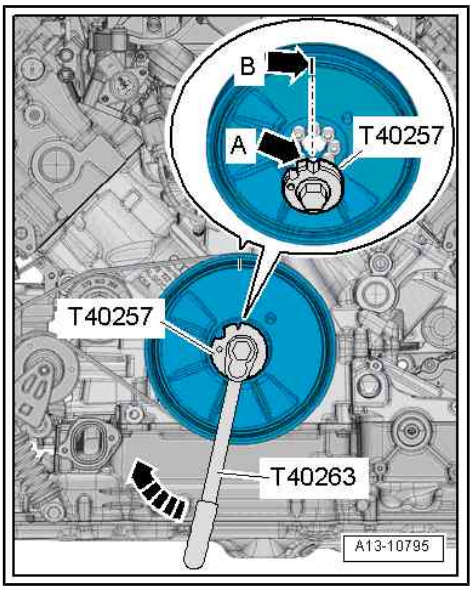
– Position turning-over tool - T40257- on bolts of vibration damper.

• Notch -arrow A- on turning-over tool - T40257- must point to coloured line -arrow B- on vibration damper.

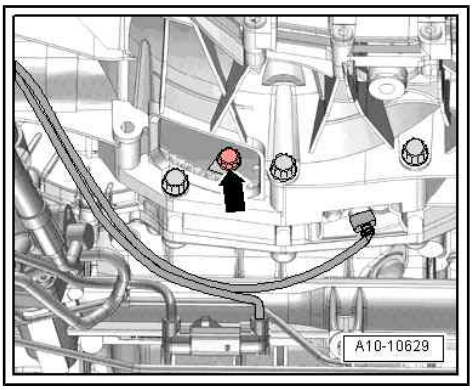
**Note**

♦ *Semi-circular recess on turning-over tool - T40257- can be disregarded.*

♦ *When performing the next step, turn the crankshaft only in the normal direction of rotation -arrow-.*

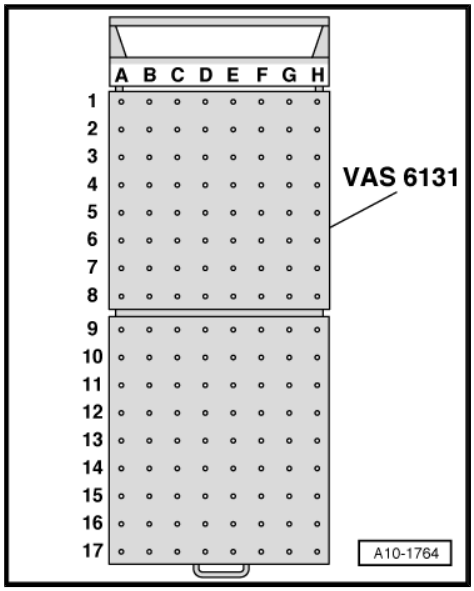



– Remove 6 bolts -arrow- for torque converter, turning crankshaft 60° in normal direction of rotation each time.




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

– Set up scissor-type assembly platform - VAS 6131 A- with support set for Audi - VAS 6131/10- , support -VAS 6131/13-7- and gearbox support - VAS 6131/14- as follows.



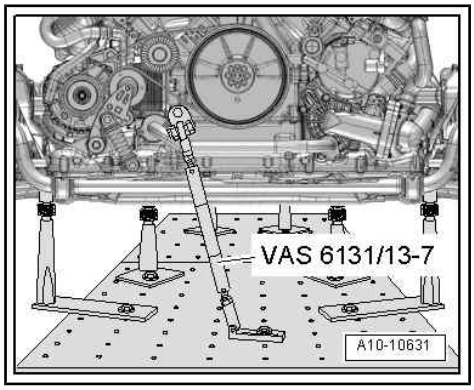

**Note**

*The other support elements remain unchanged.*

| Platform coordinates | Parts from support set for Audi - VAS 6131/10- , support -VAS 6131/13-7- and gearbox support - VAS 6131/14- | | | |
|---|---|---|---|---|
| D2 | /13-7 | | | |
| B10 | /10-1 | /10-2 | /10-5 | /14 |
| G10 | /10-1 | /10-2 | /10-5 | |

– Secure support -VAS 6131/13-7- at tapped hole at front of engine (right-side) with bolt M10x65, as illustrated.

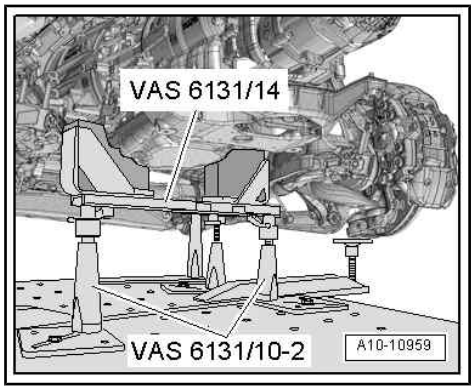
– Secure support -VAS 6131/13-7- to scissor-type assembly platform and tighten to 20 Nm.




– Position support elements from -VAS 6131/10- and gearbox support - VAS 6131/14- at front of gearbox, as illustrated.

– Screw spindles on both sides upwards until gearbox support - VAS 6131/14- makes full contact with gearbox.

– Tighten base plates for support elements to 20 Nm on scissor-type assembly platform - VAS 6131 A-.

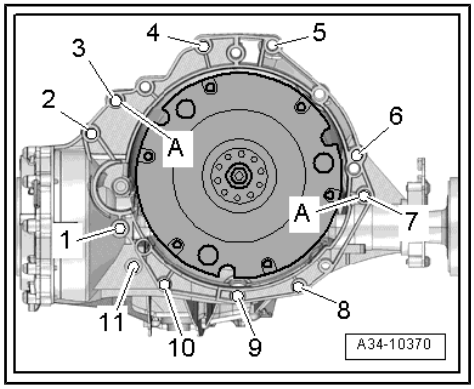



Audi
The reproduction or distribution of this document or any part of it, is not permitted without written permission of AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Remove bolts -1- and -2- for starter.

– Separate starter from gearbox and leave in position.

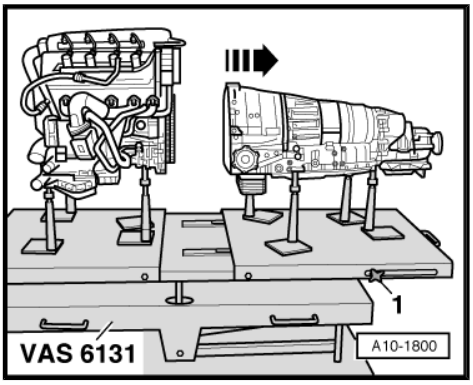
– Unscrew remaining bolts -3 ... 11- securing engine to gearbox.




**Note**

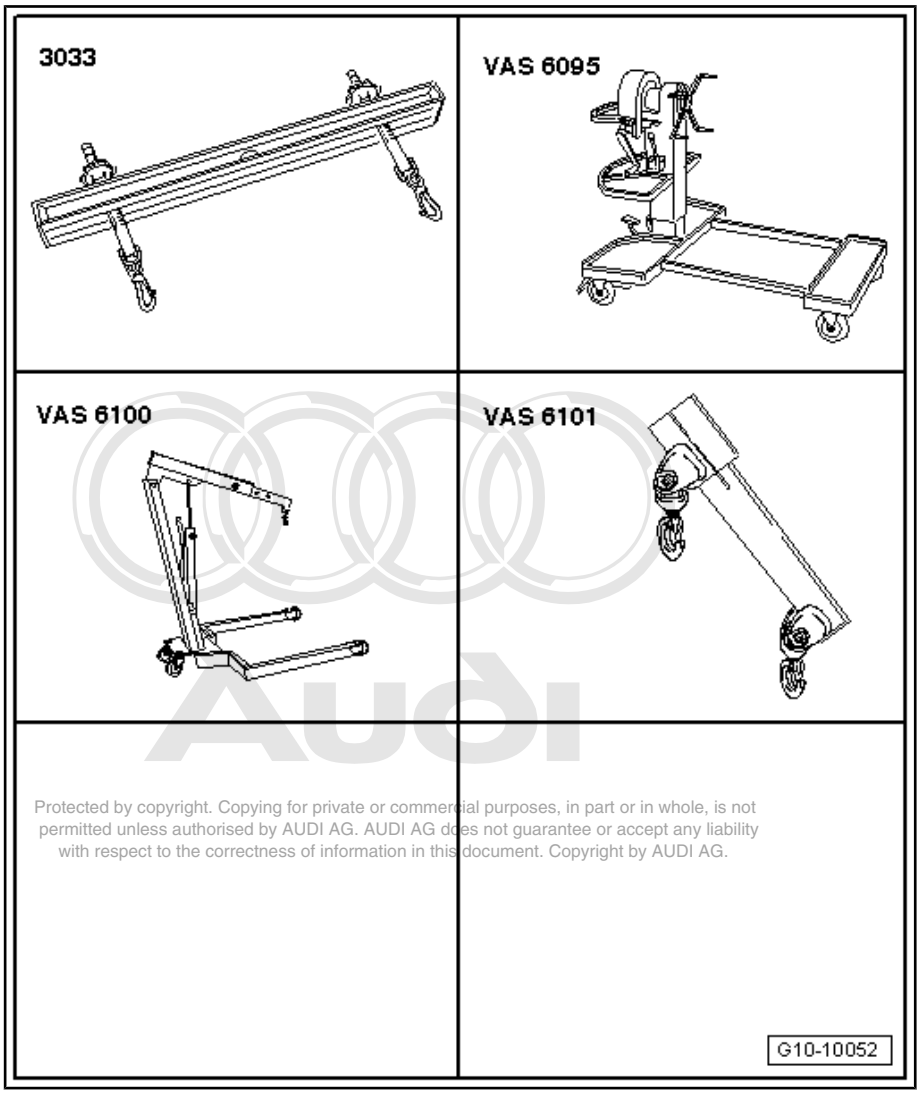
*Disregard -item A-.*

– Loosen clamping bolts -1- on sides of scissor-type assembly platform - VAS 6131 A- and pull rear section of platform together with gearbox towards rear -arrow-.




## 1.3 Securing engine to engine and gearbox support

**Special tools and workshop equipment required**




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.

- Lifting tackle - 3033-
- Engine and gearbox support - VAS 6095- with universal mounting - VAS 6095/1- and support bracket for V8 FSI engine -VAS 6095/1-6A-
- Workshop hoist - VAS 6100-
- Lift arm extension (workshop hoist) - VAS 6101-

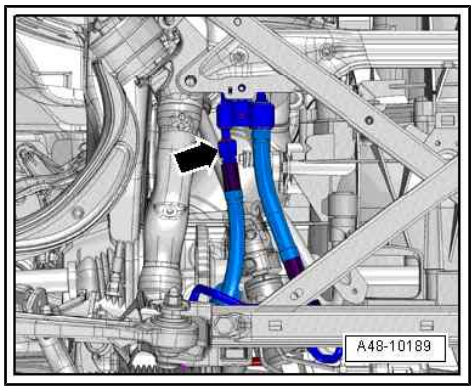
**Procedure**

- Engine/gearbox assembly removed ⇒ page 32 ; engine separated from gearbox ⇒ page 56
- Engine secured with support -VAS 6131/13-7- .

**Note**

*Lay a cloth under the separating point to catch escaping hydraulic fluid.*

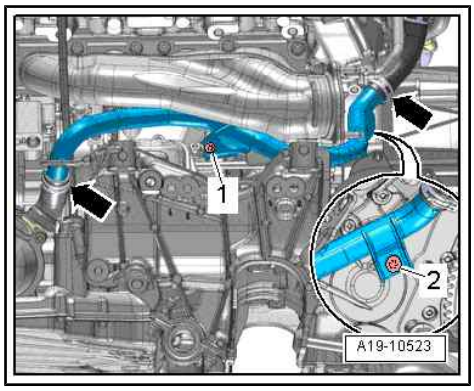
– Disconnect hydraulic line -arrow- for power steering.



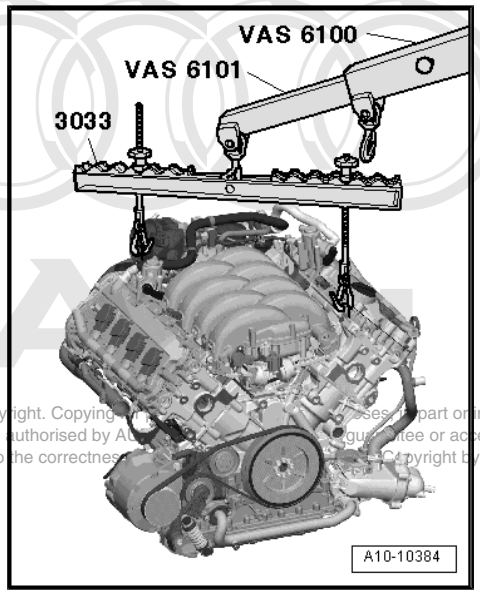

– Move clear electrical wiring at coolant pipe (bottom left).
– Remove bolt -2- and disconnect coolant pipe (bottom left) from coolant hoses -arrows-.

**Note**

*Disregard -item 1-.*

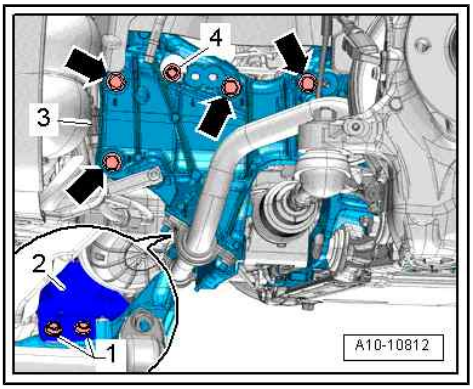



– Attach lifting tackle - 3033- to engine lifting eyes and workshop hoist as shown in illustration.
– Take up weight of engine with workshop hoist, but do not lift.




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

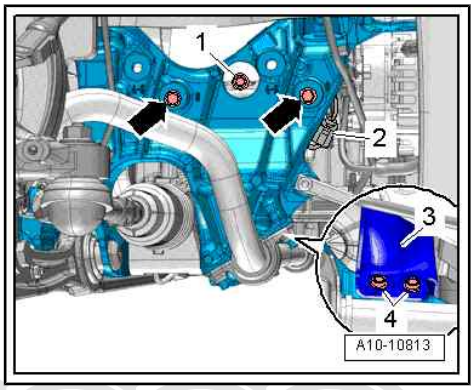
– Unplug electrical connector -3- on left electrohydraulic engine mounting solenoid valve - N144- .
– Remove bolt -4- for engine mounting (left-side).




**Note**

*Disregard items marked -1, 2- and -arrows-.*

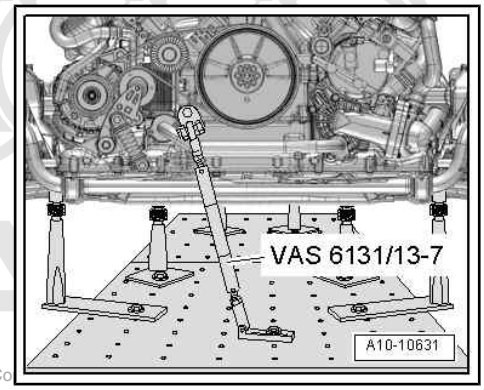
– Unplug electrical connector -2- on right electrohydraulic engine mounting solenoid valve - N145- .
– Remove bolt -1- for engine mounting (right-side).




**Note**

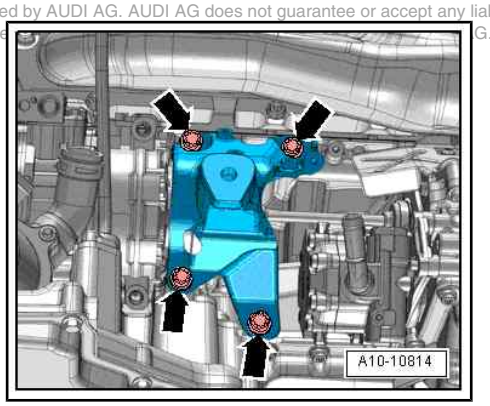
*Disregard items marked -3, 4- and -arrows-.*

– Remove support -VAS 6131/13-7- from engine.
– Lift engine off engine cross member.

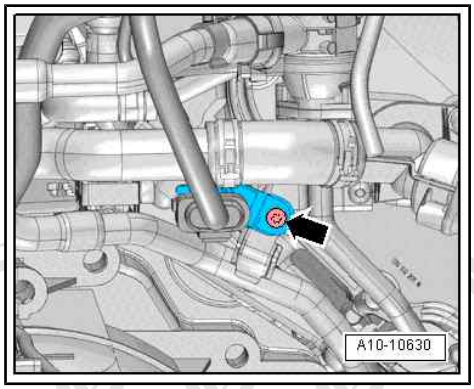



Protected by copyright. Co is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the corre G.

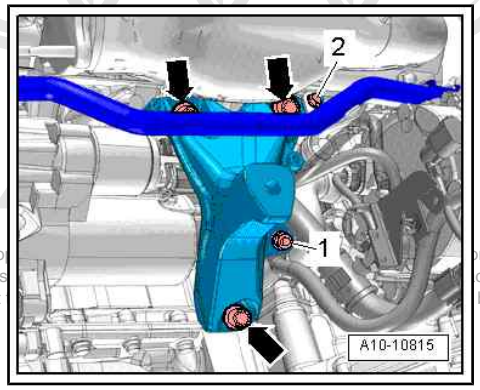
– Unscrew bolts -arrows- and remove engine support (left-side).



– Remove bolt -arrow-.

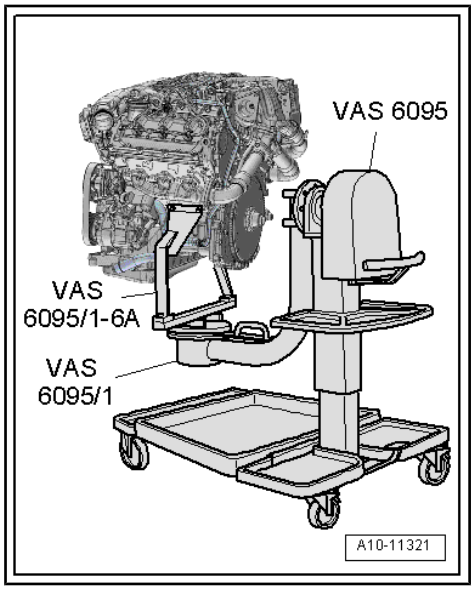



– Remove bolt -2- and push secondary air pipe down slightly.
– Remove nut -1- and move earth wire clear at engine support.
– Unscrew bolts -arrows- and remove engine support (right-side).
– Tie up starter on engine.




Protected by co
permitted unles
with respect
r in whole, is not
ccept any liability
by AUDI AG.

– Secure engine to engine and gearbox support - VAS 6095- (40 Nm) using universal mounting - VAS 6095/1- and support bracket for V8 FSI engine -VAS 6095/1-6A- , as shown in illustration.




## 1.4 Installing engine

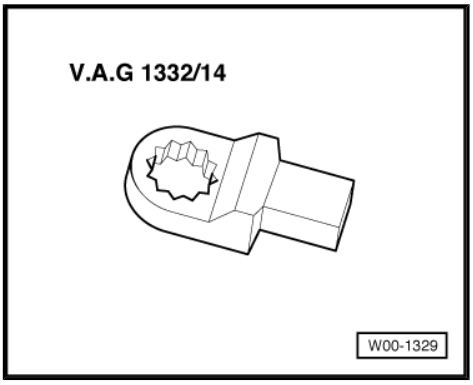
⇒ “1.4.1 Installing engine, vehicles with manual gearbox”, page 64

⇒ “1.4.2 Installing engine - vehicles with automatic gearbox”, page 71

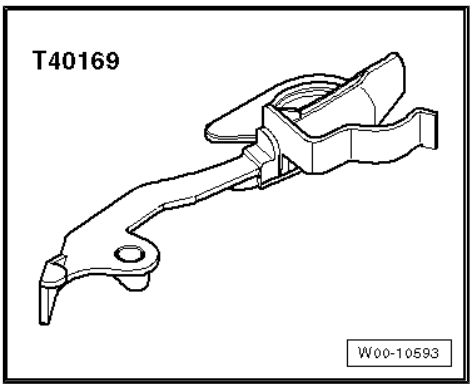
### 1.4.1 Installing engine, vehicles with manual gearbox

**Special tools and workshop equipment required**

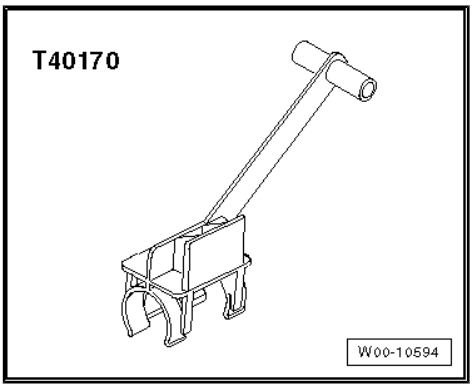
- Ring spanner insert AF 16 - V.A.G 1332/14-




- Assembly aid - T40169-




- Transport lock - T40170-




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.

## Tightening torques

**Note**

- *Tightening torques apply only to lightly greased, oiled, phosphated or black-finished nuts and bolts.*
- *Additional lubricants such as engine or gearbox oil may be used, but do not use lubricants containing graphite.*
- *Do not use de-greased parts.*
- *Tolerance for tightening torques: ± 15 %.*

| Component | | Nm |
|---|---|---|
| Bolts/nuts | M6 | 9 |
| | M7 | 15 |
| | M8 | 20 |
| | M10 | 40 |
| | M12 | 65 |

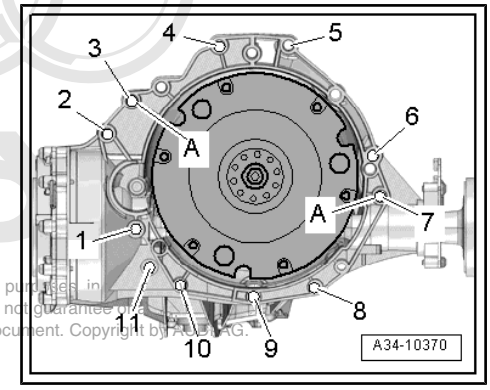
| Component | Nm |
|---|---|
| Except for the following: | |
| Earth stud to suspension turret | 9 |

**Assembly mountings**
⇒ “2.1 Exploded view - assembly mountings”, page 80

**Engine to manual gearbox**

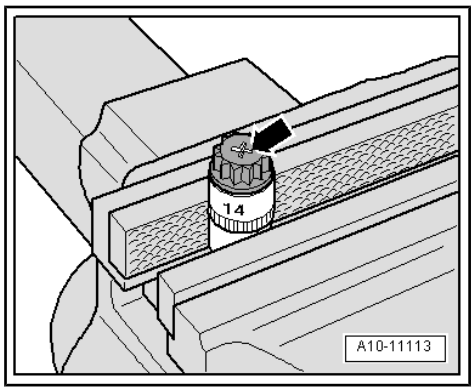
| Item | Bolt | Nm |
|---|---|---|
| 1 [1] | M10x50 [2] | 65 |
| 2 [3] … 6 | M12x100 [4][5] | 30 + 90° |
| 7 | M12x125 [4][5] | 30 + 90° |
| 8, 11 | M10x60 [4][5] | 15 + 90° |
| 9, 10 | M10x95 [4][5] | 15 + 90° |
| A | Dowel sleeves for centralising | |

- [1] Also secures starter
- [2] Property class 10.9. The steel bolt may be re-used as often as necessary.
- [3] Also secures starter.
- [4] Up to vehicle identification no. 8T-9A-007999: Renew aluminium bolts.
- [5] From vehicle identification no. 8T-9A-008000 onwards: Aluminium bolts can be used twice ⇒ page 66 .




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

- From vehicle identification no. 8T-9A-008000 onwards: Aluminium bolts -2 … 11- can be used twice. After first use, bolts must therefore be identified with an “X” made by two chisel marks -arrow-.
- To avoid damaging the bolts when making this mark, do not clamp them directly in a vice. Clamp a 14 mm socket with 1/2" drive in a vice and insert the bolt as shown.
- Bolts already marked with an “X” must not be used again.




**Procedure**

**Note**

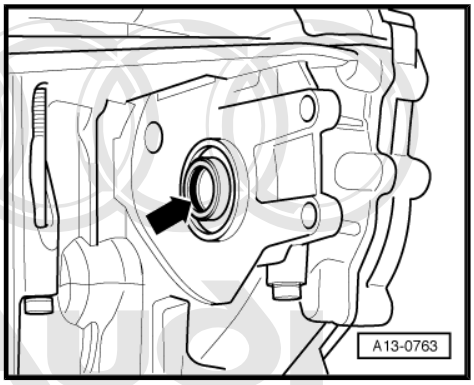
- *Renew the bolts tightened with specified tightening angle.*
- *Renew self-locking nuts and bolts as well as seals, gaskets and O-rings.*
- *A needle bearing is fitted in the drive plate. Before installing, check that the needle bearing is fitted. Removing and installing needle bearing in drive plate (pressing in and out)* *⇒ page 102* .
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *Fit all cable ties in the original positions when installing.*

– Before installing gearbox, remove residue from threaded holes for engine/gearbox bolts in cylinder block using a thread tap.

– Before installing an exchange engine, check whether flat-section O-ring -arrow- is fitted in drive shaft of power steering pump.

– Install engine supports and engine mountings ⇒ page 80 .

– Install coolant pipe (bottom left) ⇒ page 253 .

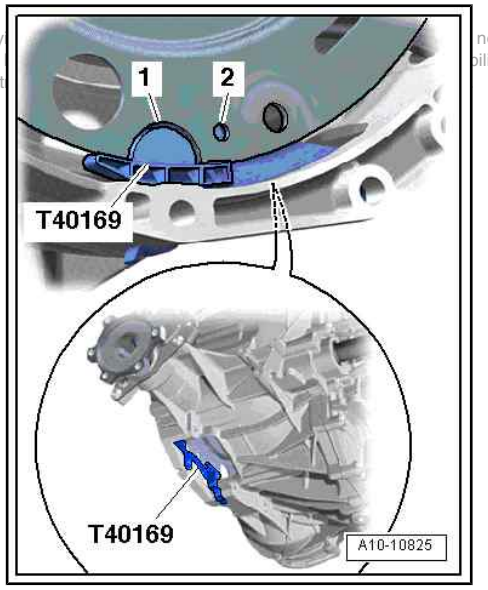



– The following preparations are required before joining engine and gearbox:

Protected by copyright. Copy
permitted unless authorised
with respect to the correct

– Insert assembly aid - T40169- into gearbox housing and clutch module from below, as illustrated.

• The assembly aid must engage in the semi-circular recess -1- and in the inspection hole -2-.

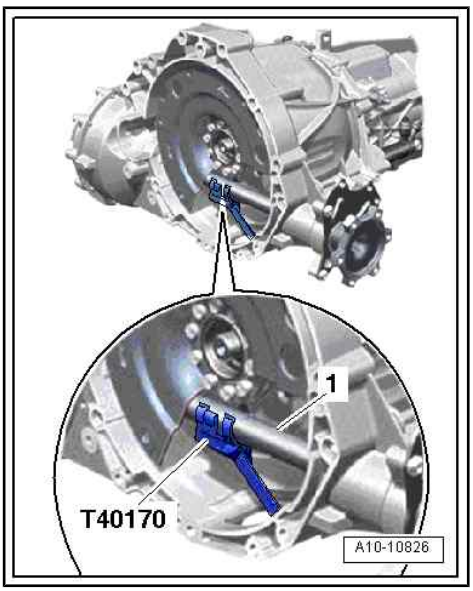



**Note**

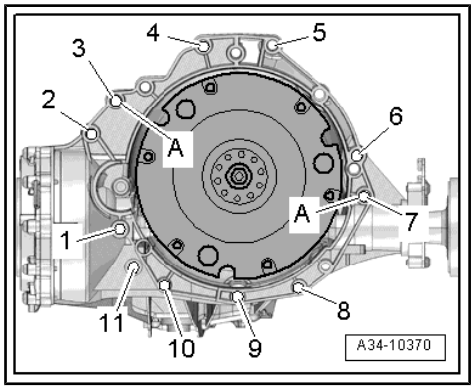
*There is only one inspection hole on the circumference; turn the clutch module accordingly.*

– Insert pin of assembly aid into hole on gearbox housing.

– Insert transport lock - T40170- into gearbox housing from below and clamp onto flange shaft -1-.



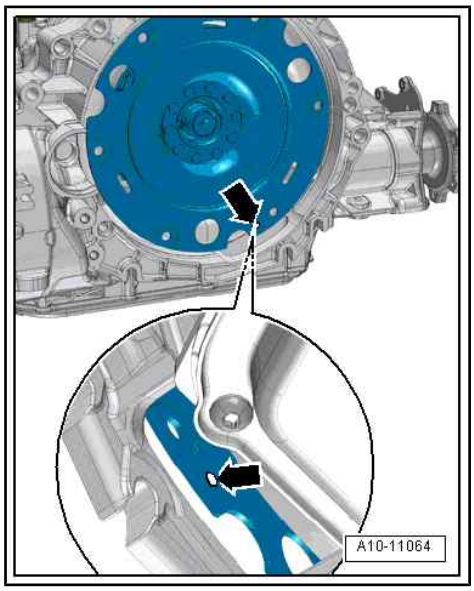
– Check whether dowel sleeves -A- for centring engine and gearbox are fitted in cylinder block; install missing dowel sleeves.
– Check whether aluminium bolts securing engine to gearbox can be reused; if so, apply marking ⇒ page 66 .
– Bring gearbox into position on engine and tighten bolts -1 … 11-.
– Remove transport lock - T40170- and assembly aid - T40169- .
– Secure drive shafts to gearbox flange shafts ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft .
– Install wheel housing liners ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .
– Fit front wheels ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres; Tightening torque for wheel bolts .




**Note**

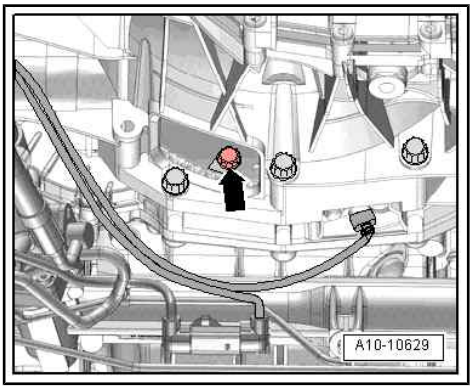
*The following step is necessary to ensure that the clutch module is straight and that it makes even contact with the drive plate.*

– Engage 4th gear and turn front wheels in direction of travel until clutch module is rotated by one complete turn (360°).
• The inspection hole -arrow- should be visible again in the recess on the gearbox housing.




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.

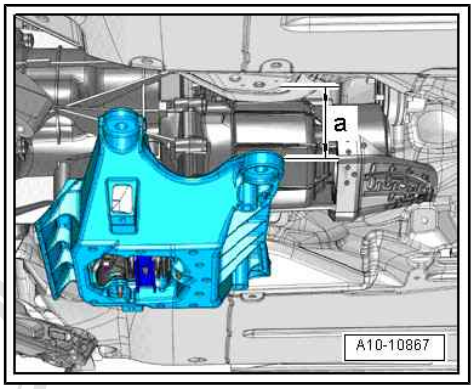
– Bolt clutch module onto drive plate as follows:



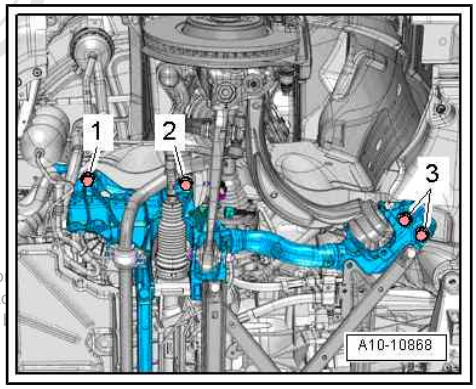

**Note**

*Use ring spanner insert AF 16 - V.A.G 1332/14- to tighten bolts.*

– Screw in first bolt -arrow- hand-tight (2 Nm).
– Turn front wheels in direction of travel until clutch module is rotated by one half turn (180°).
– Tighten bolt accessible in this position to specified torque ⇒ Rep. gr. 30 ; Clutch; Exploded view - clutch module .
– Turn front wheels in direction of travel until clutch module is rotated by $^{1}/_{6}$ turn (60°) each time and tighten remaining 5 bolts to specified torque ⇒ Rep. gr. 30 ; Clutch; Exploded view - clutch module .
– Install power steering hydraulic lines ⇒ Running gear, axles, steering; Rep. gr. 48 ; Hydraulic power steering; Exploded view - hydraulic lines, reservoir .
– Install secondary air pipe ⇒ page 354 .
– Install catalytic converters ⇒ page 340 .




– Raise engine/gearbox assembly using scissor-type assembly platform - VAS 6131 A- only until distance between tunnel cross member and body is -a-.
• Dimension -a- = min. 100 mm.
– Install selector rod and push rod ⇒ Rep. gr. 34 ; Selector mechanism; Exploded view - selector mechanism .
– Raise engine/gearbox assembly further using scissor-type assembly platform - VAS 6131 A- .
– Align subframe and tunnel cross member on longitudinal members according to markings made before removal.



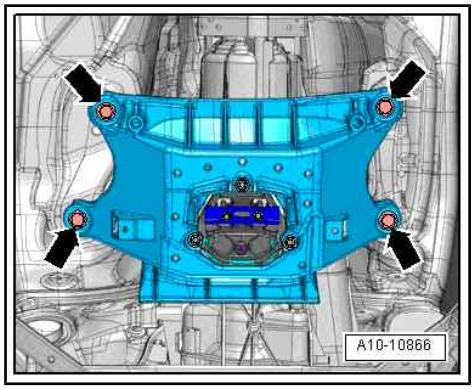

– Tighten subframe bolts only to specified torque (do not turn further); the bolts should only be fully tightened after performing the wheel alignment check ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .

**WARNING**

***Risk of accident if bolted connections are loose.***

- ***Do NOT drive the vehicle unless the subframe bolts have been tightened to their final torque.***

with respect to the correctness of information in this document. Copyright




– Tighten bolts -arrows- for tunnel cross-piece ⇒ Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings .

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

– Install clutch slave cylinder ⇒ Rep. gr. 30 ; Clutch; Exploded view - clutch .
– Secure intermediate steering shaft to steering rack ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Exploded view - steering column .
– Install propshaft ⇒ Rear final drive; Rep. gr. 39 ; Propshaft; Removing and installing propshaft .
– Install front silencer ⇒ page 343 .
– Align the exhaust system so it is free of stress ⇒ page 346 .
– Install front cross member ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .
– Install subframe cross brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .
– Install upper suspension links ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Exploded view - suspension strut, upper links .
– Install anti-roll bar ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .
– Secure suspension strut to track control link ⇒ Running gear, axles, steering; Rep. gr. 40 ; Lower suspension links, swivel joint; Exploded view - lower suspension links, swivel joint .
– Install brake calipers ⇒ Brake system; Rep. gr. 46 ; Front brakes; Removing and installing brake caliper .
– Install engine control unit ⇒ page 321 .
– Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
– Install electrical wiring, terminal 30 wiring junction 2 - TV22- and cover for electronics box in engine compartment ⇒ Electrical system; Rep. gr. 97 ; Relay carriers, fuse carriers, electronic boxes; Overview of fitting locations - relay carriers, fuse carriers, electronic boxes .
– Install body brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Removing and installing body brace .
– Install filler neck for washer fluid reservoir ⇒ Electrical system; Rep. gr. 92 ; Windscreen washer system; Removing and installing washer fluid reservoir .
– Install refrigerant lines ⇒ Heating, air conditioning; Rep. gr. 87 ; Overview of fitting locations - air conditioner; Overview of fitting locations - components not located in passenger compartment .
– Observe steps required after re-connecting battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .

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

**Caution**

***Risk of irreparable damage to control units because of excessive voltage.***

- ***Never use battery charging equipment for boost starting.***

– Install and adjust wiper arms ⇒ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing wiper arms .

– Install air cleaner housing ⇒ page 292 .

– Install lock carrier braces ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Exploded view - lock carrier .

– Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 811 .

– Before starting engine, top up hydraulic fluid in power steering reservoir ⇒ Running gear, axles, steering; Rep. gr. 48 ; Hydraulic power steering; Checking power steering fluid level .

**Note**

*The power steering pump must not be run when dry.*

– Fill up with coolant ⇒ page 232 .

**Note**

- *Do not use drained coolant again if:*
- *the cylinder head or cylinder block have been renewed.*
- *the coolant is contaminated or dirty.*

– Charge refrigerant circuit ⇒ Heating, air conditioning; Rep. gr. 87 ; Refrigerant circuit .

– Align subframe ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .

– Check wheel alignment ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheel alignment check; Wheel alignment procedure .

**WARNING**

***Risk of accident if bolted connections are loose.***

- ***Tighten subframe bolts to final setting after performing wheel alignment check.***

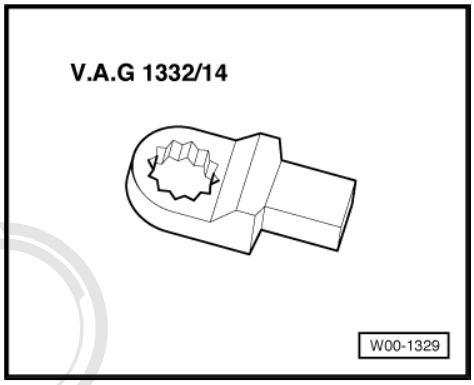
– Install noise insulation panels ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

Protection of privacy and copyright: This document is confidential. Passing on to third parties and any other use is not permitted without the express consent of AUDI AG. We reserve all rights in the event of any violation of the foregoing, with particular regard to the correctness of information in this document. Copyright by AUDI AG.

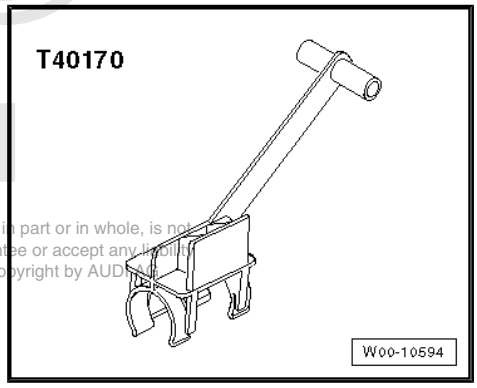
## 1.4.2 Installing engine - vehicles with automatic gearbox

**Special tools and workshop equipment required**

- Ring spanner insert AF 16 - V.A.G 1332/14-

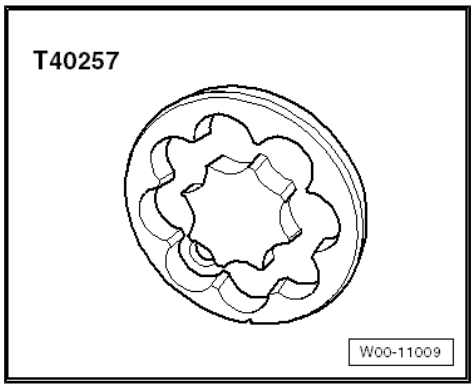



- Transport lock - T40170-

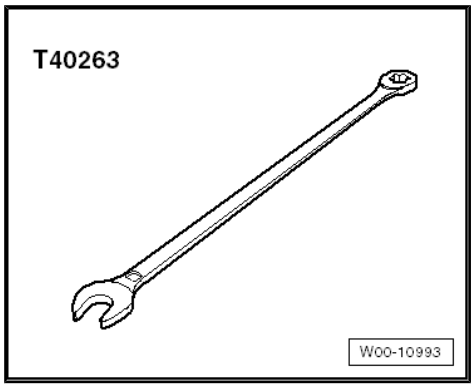



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Turning-over tool - T40257-




- Wrench, 21 mm - T40263-



## Tightening torques

**Note**

- *Tightening torques apply only to lightly greased, oiled, phosphated or black-finished nuts and bolts.*
- *Additional lubricants such as engine or gearbox oil may be used, but do not use lubricants containing graphite.*
- *Do not use de-greased parts.*
- *Tolerance for tightening torques: ± 15 %.*

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.

| Component | | Nm |
|---|---|---|
| Bolts/nuts | M6 | 9 |
| | M7 | 15 |
| | M8 | 20 |
| | M10 | 40 |
| | M12 | 65 |
| Except for the following: | | |
| Earth stud to suspension turret | | 9 |

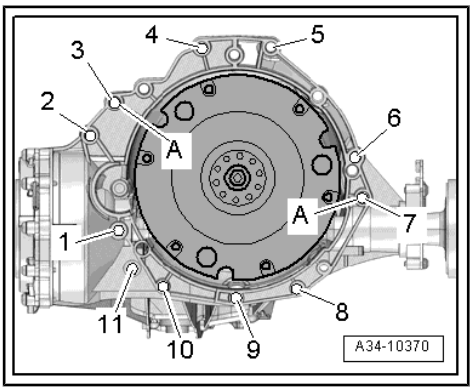
### Assembly mountings

⇒ "2.1 Exploded view - assembly mountings", page 80

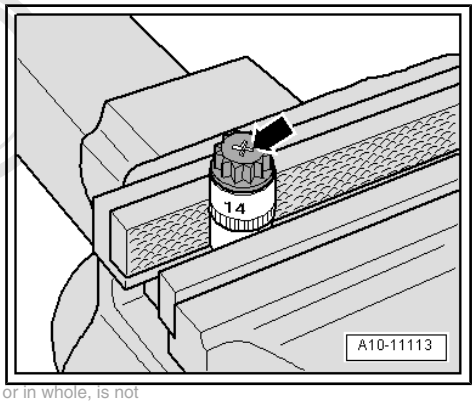
### Engine to automatic gearbox 0B6

| Item | Bolt | Nm |
|---|---|---|
| 1 | M10x50 1) | 65 |
| 2 … 6 | M12x100 2)3) | 30 + 90° |
| 7 | M12x175 2)3) | 30 + 90° |
| 8, 11 | M10x60 2)3) | 15 + 90° |
| 9 | M10x75 2)3) | 15 + 90° |
| 10 | M10x95 2)3) | 15 + 90° |
| A | Dowel sleeves for centralising | |

- 1) Property class 10.9. The steel bolt may be re-used as often as necessary.
- 2) Up to vehicle identification no. 8T-9A-007999: Renew aluminium bolts.
- 3) From vehicle identification no. 8T-9A-008000 onwards: Aluminium bolts can be used twice ⇒ page 74 .



- From vehicle identification no. 8T-9A-008000 onwards: Aluminium bolts -2 … 11- can be used twice. After first use, bolts must therefore be identified with an “X” made by two chisel marks -arrow-.
- To avoid damaging the bolts when making this mark, do not clamp them directly in a vice. Clamp a 14 mm socket with 1/2" drive in a vice and insert the bolt as shown.
- Bolts already marked with an “X” must not be used again.




**Procedure**

**Note**

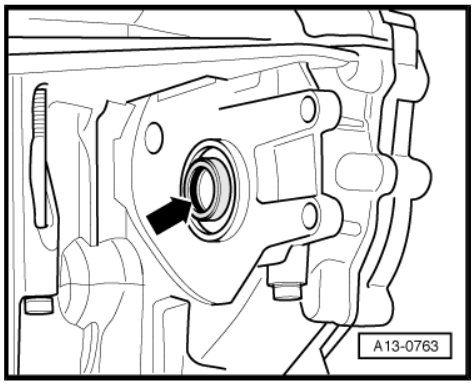
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- *Renew the bolts tightened with specified tightening angle.*
- *Renew self-locking nuts and bolts as well as seals, gaskets and O-rings.*
- *Hose connections and hoses for charge air system must be free of oil and grease prior to fitting.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *The screw sections of used screw-type clips must be sprayed with rust remover prior to fitting so that the air hoses can be attached securely to the hose connections.*
- *Fit all cable ties in the original positions when installing.*

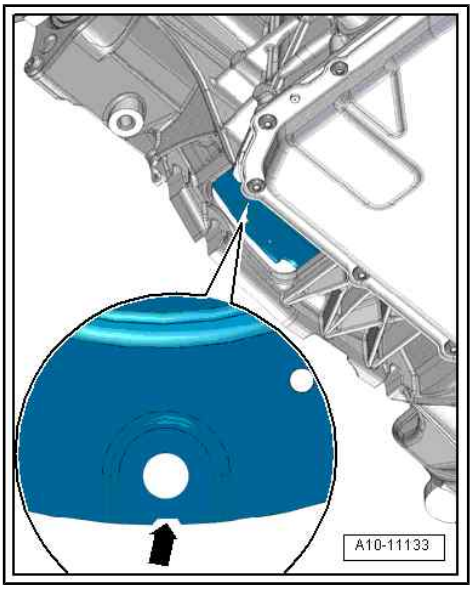
– Install secondary air pipe ⇒ page 354 .

– Before installing gearbox, remove residue from threaded holes for engine/gearbox bolts in cylinder block using a thread tap.

– Before installing an exchange engine, check whether flat-section O-ring -arrow- is fitted in drive shaft of power steering pump.



– The following preparations are required before joining engine and gearbox:
– Turn torque converter until hole is visible next to notch -arrow- in recess in bottom of gearbox housing, as shown in illustration.

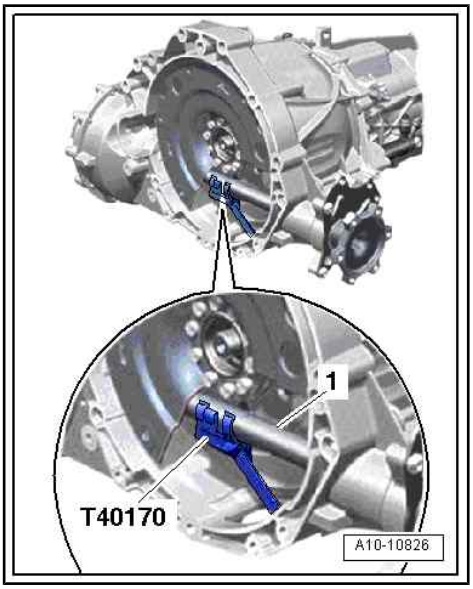



**Note**

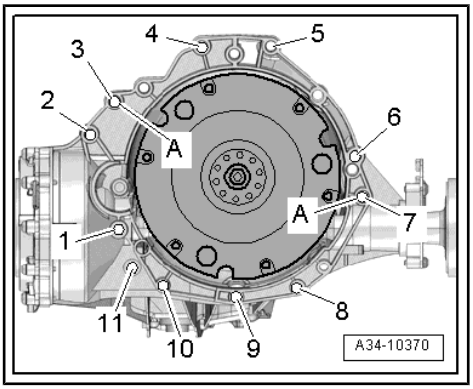
*There is only one notch on the circumference; turn the torque converter accordingly.*

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 and completeness of this copyright [illegible] AG.

– Insert transport lock - T40170- into gearbox housing from below and clamp onto flange shaft -1-.
– Hold ATF lines in installation position when joining engine and subframe.
– Install engine supports and engine mountings ⇒ page 80 .



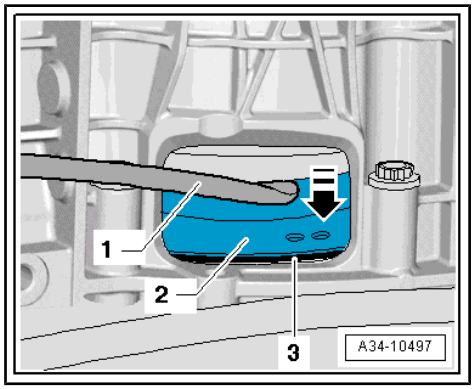

– Check whether dowel sleeves -A- for centring engine and gearbox are fitted in cylinder block; install missing dowel sleeves.
– Check whether aluminium bolts securing engine to gearbox can be reused; if so, apply marking ⇒ page 74 .
– Bring gearbox into position on engine (pay attention to starter).
– Tighten bolts -1 … 11-.
– Remove transport lock - T40170- .



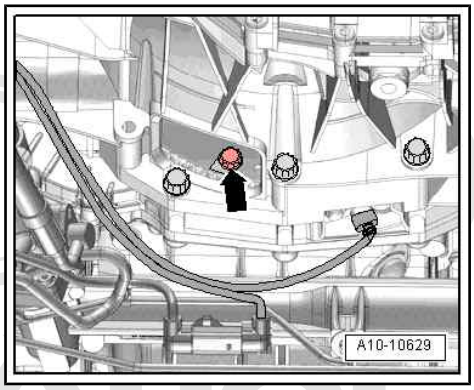
**Note**

*The following step is necessary to ensure that the torque converter is straight and that it makes even contact with the drive plate.*

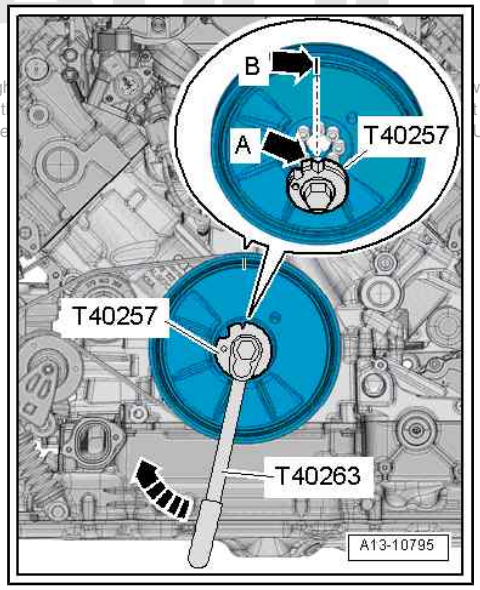
– Use assembly lever -1- to press torque converter -2- slightly against drive plate -3- in direction of -arrow-.




– Screw in first bolt -arrow- hand-tight (2 Nm).

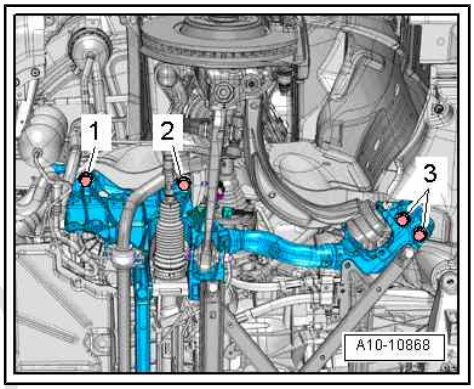



– Fit turning-over tool - T40257- onto wrench (21 mm) - T40263- .
– Position turning-over tool - T40257- on bolts of vibration damper.
– Turn crankshaft 180° in direction of engine rotation -arrow-.
– Tighten bolt accessible in this crankshaft position to specified torque ⇒ Rep. gr. 37 ; Removing and installing gearbox; Tightening torques for gearbox .
– Turn crankshaft by 60° each time and tighten remaining 5 bolts to specified torque ⇒ Rep. gr. 37 ; Removing and installing gearbox; Tightening torques for gearbox .
– Install power steering hydraulic lines ⇒ Running gear, axles, steering; Rep. gr. 48 ; Hydraulic power steering; Exploded view - hydraulic lines, reservoir .
– Secure drive shafts (left and right) to gearbox flange shafts ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft .
– Install coolant pipe (bottom left) ⇒ page 253 .
– Install selector lever cable ⇒ Rep. gr. 37 ; Selector mechanism; Removing and installing selector lever cable .
– Install ATF lines ⇒ Rep. gr. 37 ; ATF circuit; Removing and installing ATF lines .
– Install catalytic converters ⇒ page 340 .
– Raise engine/gearbox assembly using scissor-type assembly platform - VAS 6131 A- .
– Align subframe and tunnel cross member on longitudinal members according to markings made before removal.




Protected by copyrigh
permitted unless aut
with respect to the
whole, is not
any liability
UDI AG.

– Tighten subframe bolts only to specified torque (do not turn further); the bolts should only be fully tightened after performing the wheel alignment check ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .

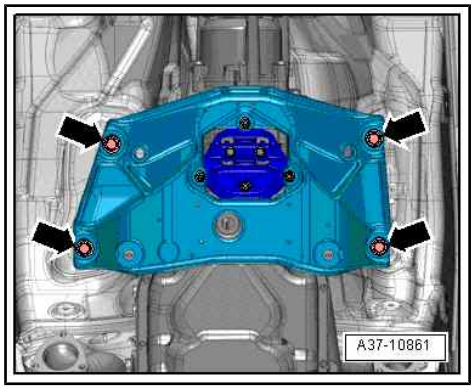



**WARNING**

***Risk of accident if bolted connections are loose.***

- ***Do NOT drive the vehicle unless the subframe bolts have been tightened to their final torque.***

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.




– Tighten bolts -arrows- for tunnel cross-piece ⇒ Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings .

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

– Secure intermediate steering shaft to steering rack ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Exploded view - steering column .

– Install propshaft ⇒ Rear final drive; Rep. gr. 39 ; Propshaft; Removing and installing propshaft .

– Install front silencer ⇒ page 343 .

– Align the exhaust system so it is free of stress ⇒ page 346 .

– Install front cross member ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .

– Install subframe cross brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .

– Install upper suspension links ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Exploded view - suspension strut, upper links .

– Install anti-roll bar ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .

– Secure suspension strut to track control link ⇒ Running gear, axles, steering; Rep. gr. 40 ; Lower suspension links, swivel joint; Exploded view - lower suspension links, swivel joint .

– Install brake calipers ⇒ Brake system; Rep. gr. 46 ; Front brakes; Exploded view - front brakes .

– Install engine control unit ⇒ page 321 .

– Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

– Install electrical wiring, terminal 30 wiring junction 2 - TV22- and cover for electronics box in engine compartment ⇒ Electrical system; Rep. gr. 97 ; Relay carriers, fuse carriers, electronic boxes; Overview of fitting locations - relay carriers, fuse carriers, electronic boxes .

– Install body brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Removing and installing body brace .

– Install filler neck for washer fluid reservoir ⇒ Electrical system; Rep. gr. 92 ; Windscreen washer system; Removing and installing washer fluid reservoir .

– Install refrigerant lines ⇒ Heating, air conditioning; Rep. gr. 87 ; Overview of fitting locations - air conditioner; Overview of fitting locations - components not located in passenger compartment .

– Observe steps required after re-connecting battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .

**Caution**

***Risk of irreparable damage to control units because of excessive voltage.***

- ***Never use battery charging equipment for boost starting.***

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.

– Install and adjust wiper arms ⇒ Electrical system; Rep. gr. 92 ; Windscreen wiper system; Removing and installing wiper arms .
– Install air cleaner housing ⇒ page 292 .
– Install lock carrier braces ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Exploded view - lock carrier .
– Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 811 .
– Before starting engine, top up hydraulic fluid in power steering reservoir ⇒ Running gear, axles, steering; Rep. gr. 48 ; Hydraulic power steering; Checking power steering fluid level .

**Note**

*The power steering pump must not be run when dry.*

– Fill up with coolant ⇒ page 232 .

**Note**

- *Do not use drained coolant again if:*
- *the cylinder head or cylinder block have been renewed.*
- *the coolant is contaminated or dirty.*

– Charge refrigerant circuit ⇒ Heating, air conditioning; Rep. gr. 87 ; Refrigerant circuit .
– Align subframe ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .
– Install wheel housing liners ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .
– Fit front wheels ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres; Tightening torque for wheel bolts .
– Check wheel alignment ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheel alignment check; Wheel alignment procedure .

**WARNING**

***Risk of accident if bolted connections are loose.***

- ***Tighten subframe bolts to final setting after performing wheel alignment check.***

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.

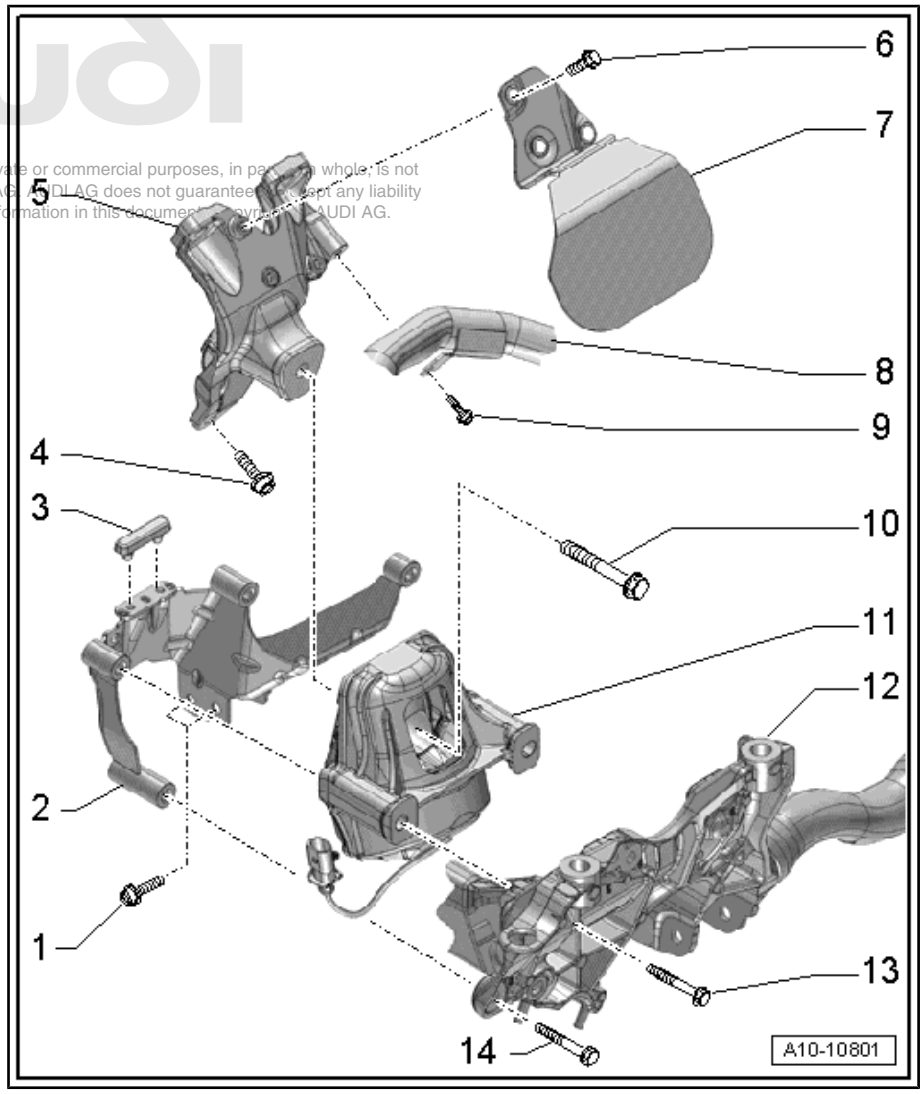
– Top up ATF ⇒ Rep. gr. 37 ; ATF; Checking ATF level .
– Install noise insulation panels ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

# 2 Assembly mountings

⇒ “2.1 Exploded view - assembly mountings”, page 80

⇒ “2.2 Removing and installing engine mountings”, page 81

## 2.1 Exploded view - assembly mountings




**1 - Bolt**

- ❑ 20 Nm

**2 - Bracket**

- ❑ For engine mounting
- ❑ Renew retaining plate if engine mounting is defective
- ❑ Check retaining plate on opposite side; renew if necessary

**3 - Stop buffer**

- ❑ Not supplied separately

**4 - Bolt**

- ❑ 40 Nm

**5 - Engine support**

**6 - Bolt**

- ❑ 10 Nm

**7 - Heat shield**

**8 - Coolant pipe (bottom left)**

**9 - Bolt**

- ❑ Tightening torque ⇒ Item 26 (page 248)

**10 - Bolt**

- ❑ Renew
- ❑ 90 Nm +90°

**11 - Engine mounting**

- ❑ With electrohydraulic engine mounting solenoid valve
- ❑ Left-side: left electrohydraulic engine mounting solenoid valve - N144- ; right-side: right electrohydraulic engine mounting solenoid valve - N145-
- ❑ Removing and installing: left-side ⇒ page 81 , right-side ⇒ page 88
- ❑ Renew in pairs

**12 - Subframe**

**13 - Bolt**

- ❑ 55 Nm

**14 - Bolt**

- ❑ 55 Nm

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

## 2.2 Removing and installing engine mountings

⇒ "2.2.1 Removing and installing engine mounting (left-side)", page 81

⇒ "2.2.2 Removing and installing engine mounting (right-side)", page 88

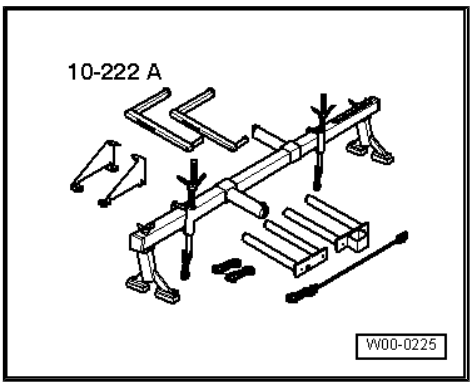
## 2.2.1 Removing and installing engine mounting (left-side)

**Note**

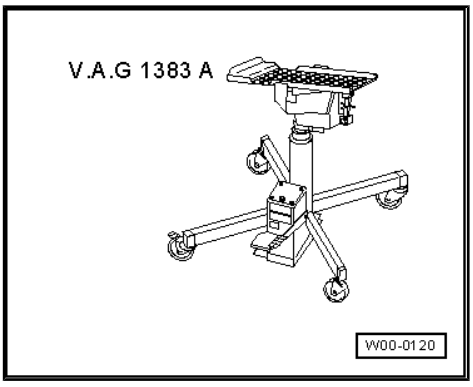
- *To avoid repeat repairs, proceed as follows if an engine mounting is defective:*
- *Renew engine mounting and corresponding bracket.*
- *Also renew engine mounting on opposite side; check corresponding bracket and renew if necessary.*

**Special tools and workshop equipment required**

- Support bracket - 10 - 222 A-

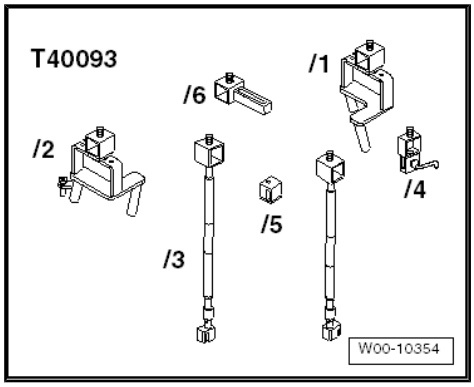



- Engine and gearbox jack - V.A.G 1383 A-




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.

♦ Engine support supplement set - T40093-




**Removing**

– Bring front wheels into straight-ahead position.

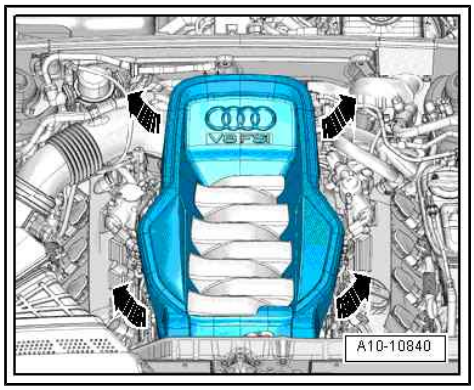
**Caution**

***Risk of irreparable damage to electronic components.***

♦ ***Observe notes on procedure for disconnecting the battery.***

– Disconnect battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .

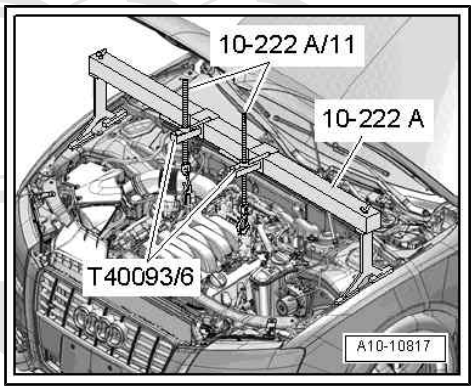
– Remove engine cover panel -arrows-.




– Set up support bracket - 10 - 222 A- with adapters -T40093/6- on suspension turrets (left and right) as illustrated.

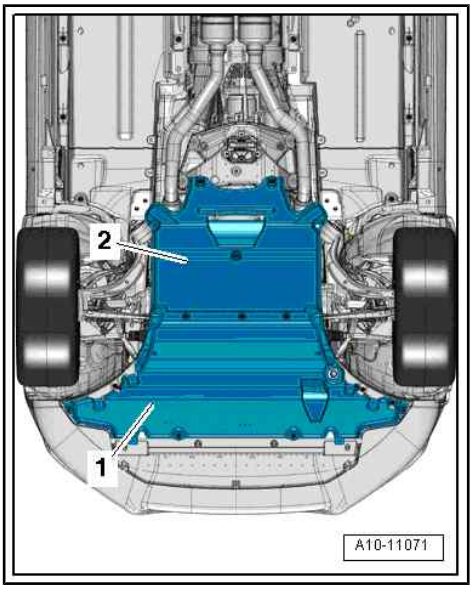
– Attach spindles -10 - 222 A /11- at rear engine lifting eyes.

– Partly take up weight of engine with spindles.

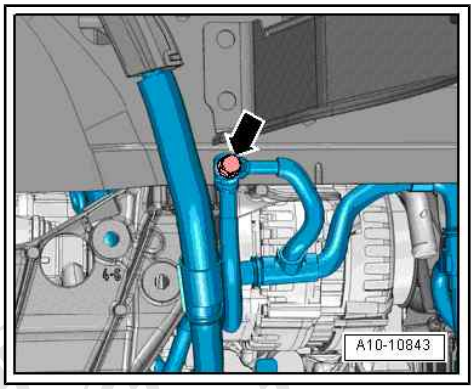



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

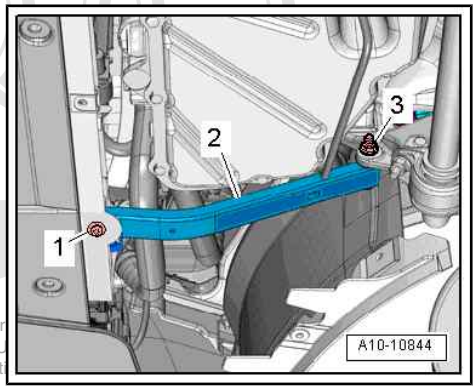
– Remove noise insulation -1- and -2- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .
– Remove both front wheels ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres; Tightening torque for wheel bolts .
– Remove wheel spoilers (front) on both sides ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .
– Unbolt drive shafts (left and right) from gearbox flange shafts.




– Unscrew nut -arrow- on longitudinal member (right-side) and move earth cables clear.

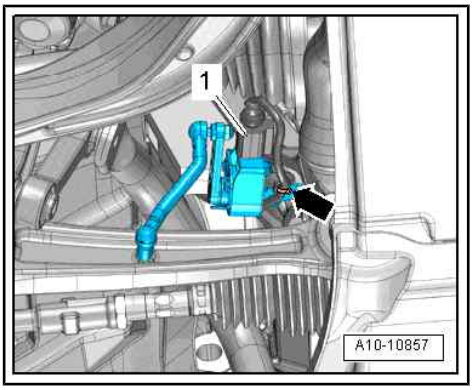



– Remove bolts -1- and nuts -3- on both sides and detach lock carrier braces -2-.




Protected by copyright. Copying for private or
permitted unless authorised by AUDI AG. AU
with respect to the correctness of informati

– Unplug electrical connector -1- on headlight range control sender 1 - G233- and release wiring -arrow-.

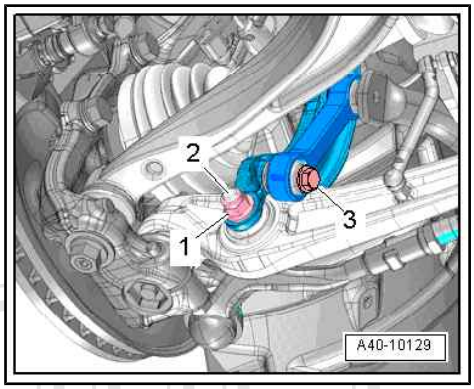


**Vehicles up to identification no. 8T-8A011200:**

– Remove bolt -3- for anti-roll bar on both sides.

**Note**

*Disregard items -1 and 2-.*

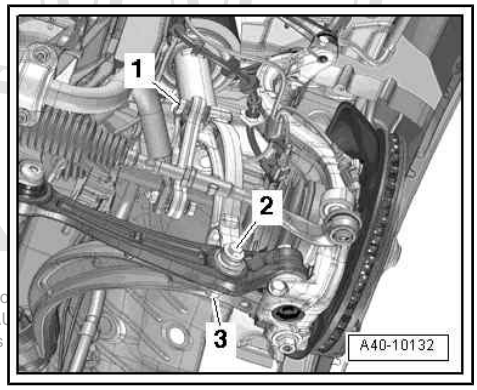



**Vehicles from identification no. 8T-8A011201 onwards:**

– Remove bolt -1- for anti-roll bar on both sides.

**Note**

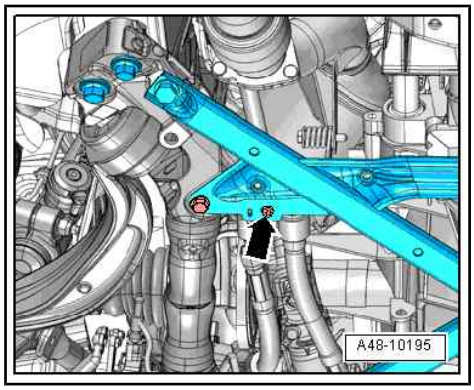
*Disregard -items 2 and 3-.*




Protected by copyright. Copying fo
permitted unless authorised by A
with respect to the correctness

**Vehicles with manual gearbox:**

– Remove bolt -arrow- for power steering hydraulic line.

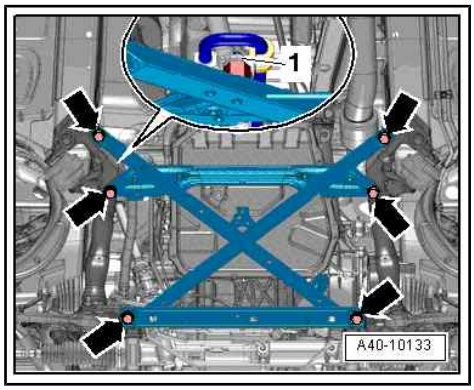



**Vehicles with automatic gearbox:**

– Remove nut -1- for power steering hydraulic line.

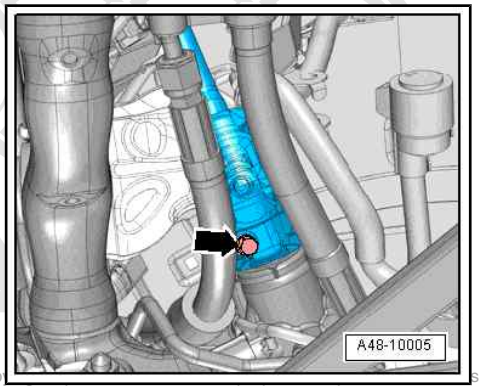
**Note**

*Disregard -arrows-.*



**Continued for all vehicles:**

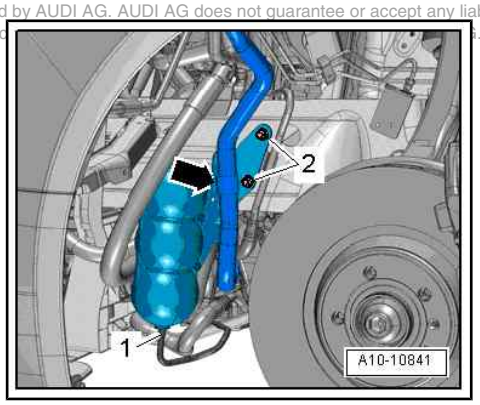
– Detach intermediate steering shaft from steering rack and move clear by telescoping upwards ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Exploded view - steering column .



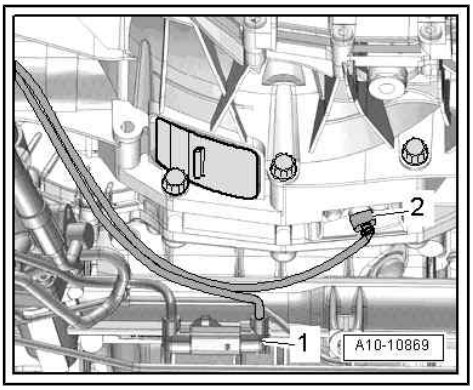

Protected by copyright. Copy... is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness...

– Detach vacuum hose -1- and move hydraulic hose -arrow- for power steering clear at bracket.

– Unscrew nuts -2- and detach vacuum reservoir.




– Unplug electrical connector -1- for steering rack and move clear.




**Note**

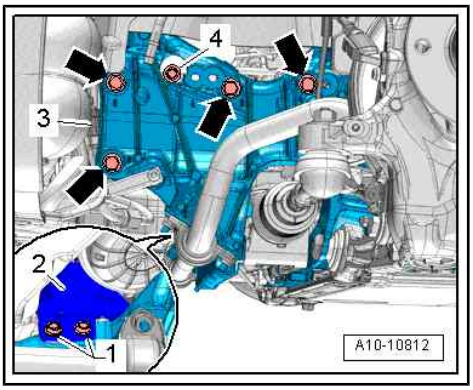
*Disregard -item 2-.*

– Move clear hydraulic hose for power steering on subframe (left-side).

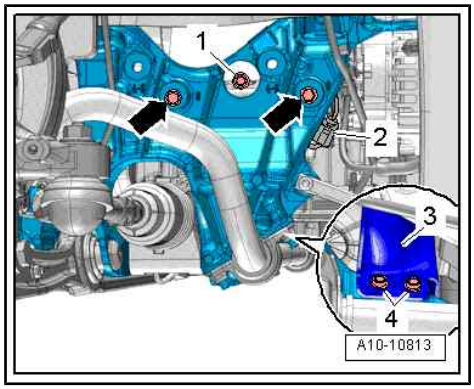
– Move clear electrical wiring on subframe (right-side).

– Unplug electrical connector -3- on left electrohydraulic engine mounting solenoid valve - N144- .

– Remove bolts -1, 4- and -arrows-; retaining plate -2- for engine mounting (left-side) does not have to be removed.



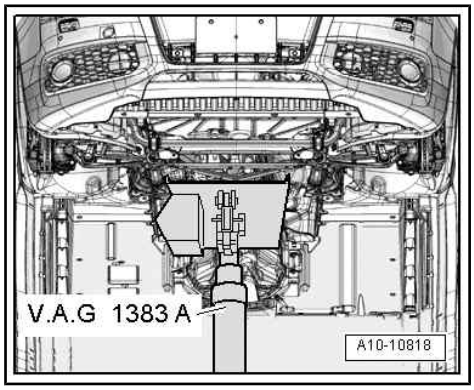
– Unplug electrical connector -2- on right electrohydraulic engine mounting solenoid valve - N145- .
– Remove bolt -1- for engine mounting (right-side).




**Note**

*Disregard items marked -3, 4- and -arrows-.*

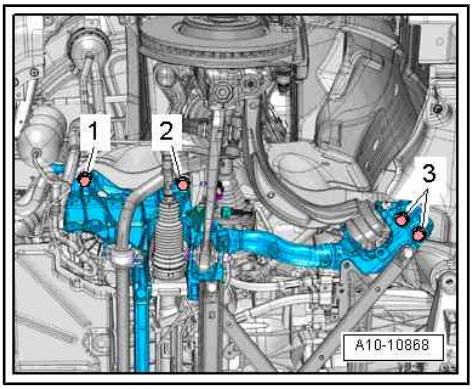
– Support subframe with engine and gearbox jack - V.A.G 1383 A- , as shown in illustration.




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.

– Mark installation position of subframe on longitudinal members with felt-tip pen.

– Unscrew subframe bolts -1, 2, 3- on both sides in several stages and in diagonal sequence.




**Caution**

***Risk of damage to running gear components.***

- ***The vehicle must NOT be lowered onto its wheels if the engine/gearbox mountings, steering rack or subframe cross brace are not properly installed.***

– Lower subframe using engine and gearbox jack - V.A.G 1383 A- only far enough to detach engine mounting (left-side). At the same time check clearance of hydraulic hoses (left-side) and electrical wiring (right-side).

– Detach engine mounting (left-side).

### Installing

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

- Tightening torques
⇒ “2.1 Exploded view - assembly mountings”, page 80

**Note**

- *Renew the bolts tightened with specified tightening angle.*
- *Fit all cable ties in the original positions when installing.*

– Align subframe on longitudinal members according to markings made before removal.

– Tighten subframe bolts only to specified torque (do not turn further); the bolts should only be fully tightened after performing the wheel alignment check ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .

**WARNING**

***Risk of accident if bolted connections are loose.***

- ***Do NOT drive the vehicle unless the subframe bolts have been tightened to their final torque.***

– Install anti-roll bar (⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Removing and installing anti-roll bar ), and secure suspension strut to track control link (⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe ).

– Install electrical wiring ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

– Observe steps required after re-connecting battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .

– Secure intermediate steering shaft to steering rack ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Exploded view - steering column .

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.

– Install power steering hydraulic line ⇒ Running gear, axles, steering; Rep. gr. 48 ; Hydraulic power steering; Exploded view - hydraulic lines, reservoir .
– Install lock carrier braces ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Exploded view - lock carrier .
– Secure drive shafts (left and right) to gearbox flange shafts ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft .
– Install wheel housing liners ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .
– Fit front wheels ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres; Tightening torque for wheel bolts .
– Check wheel alignment ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheel alignment check; Wheel alignment procedure .

**WARNING**

***Risk of accident if bolted connections are loose.***

- ***Tighten subframe bolts to final setting after performing wheel alignment check.***

– Install noise insulation panels ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

## 2.2.2 Removing and installing engine mounting (right-side)

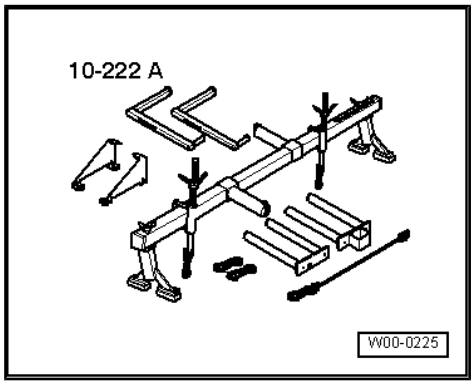
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

**Note**

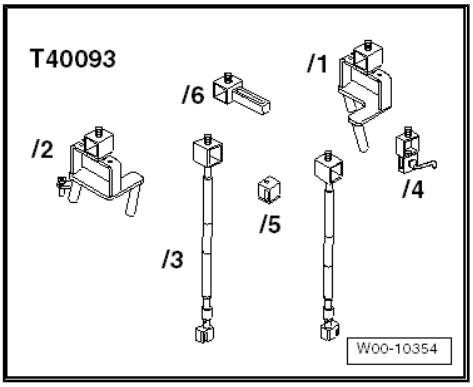
- *To avoid repeat repairs, proceed as follows if an engine mounting is defective:*
- *Renew engine mounting and corresponding bracket.*
- *Also renew engine mounting on opposite side; check corresponding bracket and renew if necessary.*

**Special tools and workshop equipment required**

- Support bracket - 10 - 222 A-



♦ Engine support supplement set - T40093-

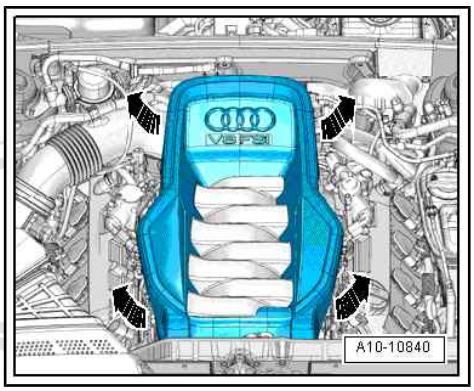



**Removing**

**Note**

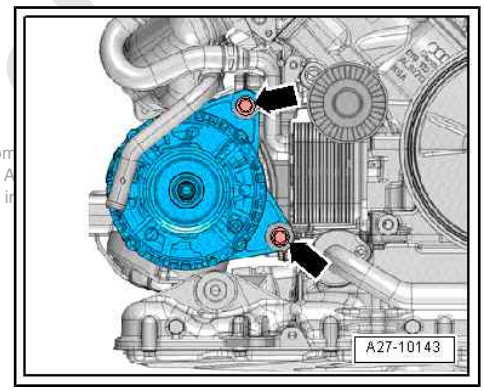
*Engine mountings must be renewed in pairs.*

– Remove engine cover panel -arrows-.

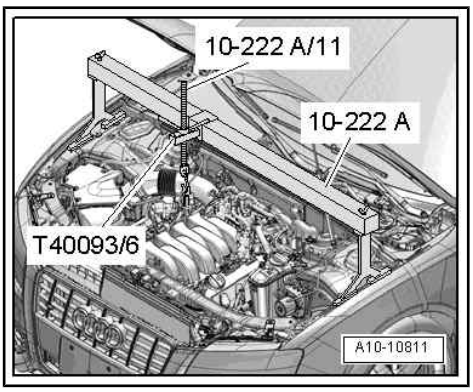



– Remove alternator ⇒ Electrical system; Rep. gr. 27 ; Alternator; Removing and installing alternator .

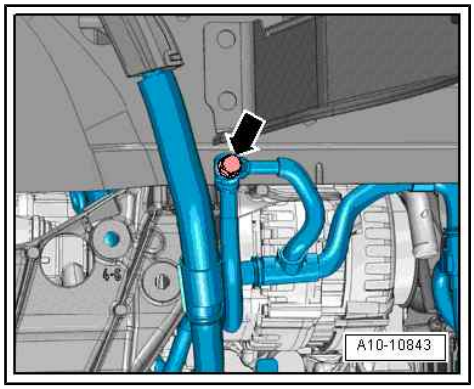
Protected by copyright. Copying for private or com
permitted unless authorised by AUDI AG. AUDI A
with respect to the correctness of information in



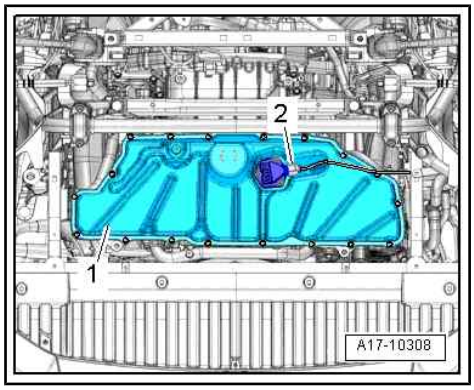

– Set up support bracket - 10 - 222 A- with adapter -T40093/6- on suspension turrets (left and right) as illustrated.
– Attach spindle -10 - 222 A /11- to engine lifting eye (rear right).
– Partly take up weight of engine with spindle.



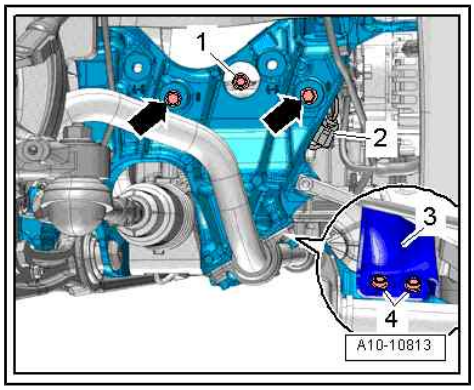
– Unscrew nut -arrow- on longitudinal member (right-side) and move earth cables clear.




– Unplug electrical connector -2- at oil level and oil temperature sender - G266- and move clear.




– Unplug electrical connector -2- on solenoid valve (right-side) for electro-hydraulic engine mounting - N145- and move clear.
– Remove bolts -1, 4- and -arrows- for retaining plate for engine mounting (right-side).
– Move wiring harness clear at retaining plate -3- for engine mounting (right-side).
– Move retaining plate for engine mounting clear to one side.

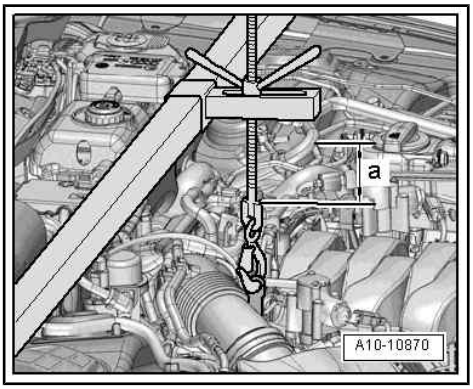



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Using spindle - 10 - 222 A /11- , raise engine through distance -a-.

• Distance -a- = approx. 20 mm.

– Detach engine mounting (right-side).




### Installing

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

• Tightening torques
⇒ “2.1 Exploded view - assembly mountings”, page 80

**Note**

♦ *Renew the bolts tightened with specified tightening angle.*

♦ *Fit all cable ties in the original positions when installing.*

– Install electrical wiring ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

– Install alternator ⇒ Electrical system; Rep. gr. 27 ; Alternator; Removing and installing alternator .

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

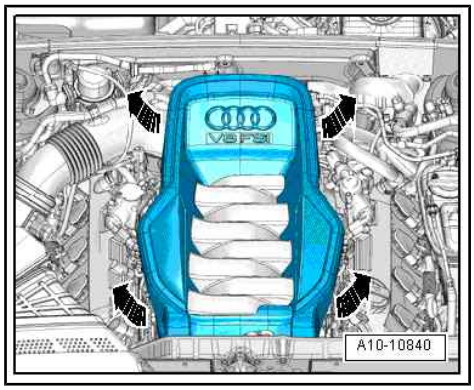
# 3 Engine cover panel

⇒ “3.1 Removing and installing engine cover panel”, page 92

## 3.1 Removing and installing engine cover panel

### Removing

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




### Installing

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

– First press engine cover panel into rear rubber grommets and then into front rubber grommets with both hands.

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.

# 13 – Crankshaft group

## 1 Cylinder block (pulley end)

⇒ "1.1 Exploded view - poly V-belt drive", page 93

⇒ "1.2 Removing and installing poly V-belt", page 94

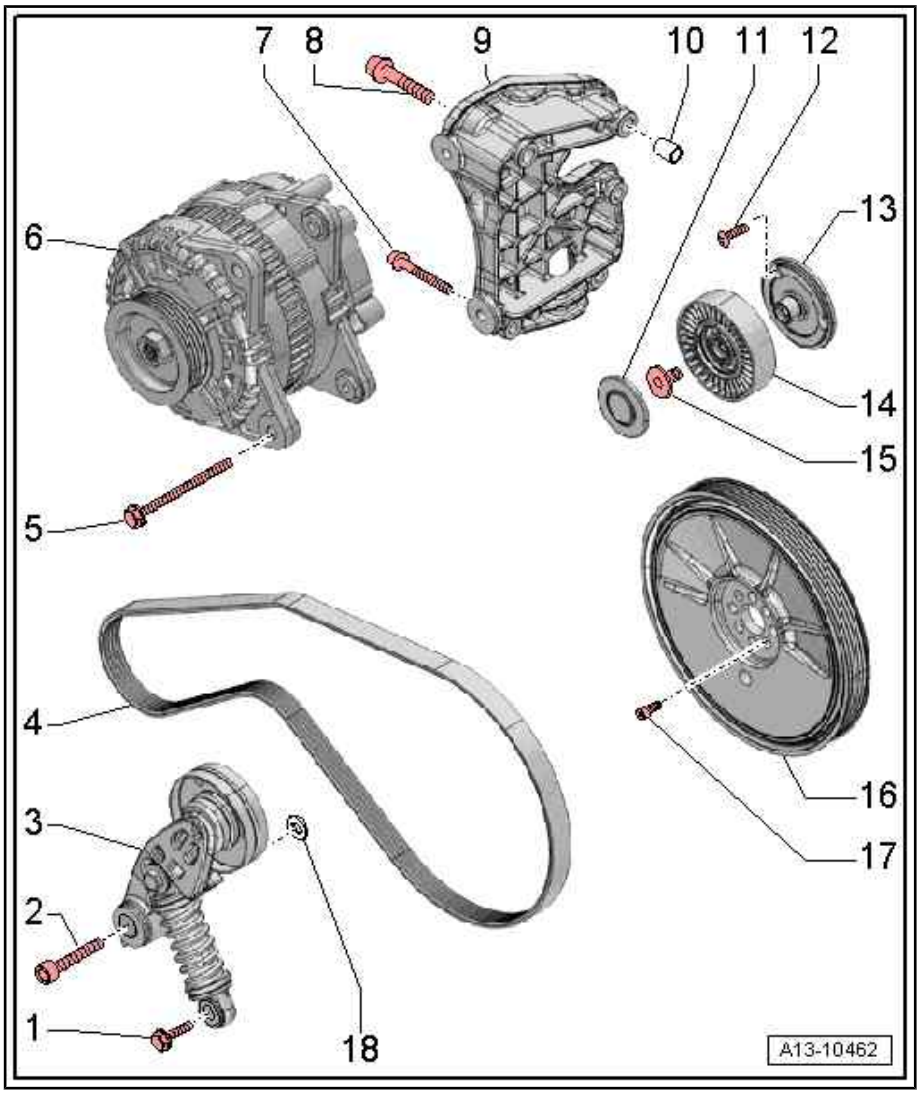
⇒ "1.3 Removing and installing tensioner for poly V-belt", page 95

⇒ "1.4 Removing and installing vibration damper", page 96

⇒ "1.5 Renewing crankshaft oil seal (pulley end)", page 96

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.

### 1.1 Exploded view - poly V-belt drive




**1 - Bolt**
- ❑ 22 Nm

**2 - Bolt**
- ❑ 55 Nm

**3 - Tensioner for poly V-belt**
- ❑ Removing and installing ⇒ page 95

**4 - Poly V-belt**
- ❑ Check for wear
- ❑ Before removing, mark direction of rotation with chalk or felt-tip pen
- ❑ Removing and installing ⇒ page 94
- ❑ Do not kink
- ❑ When installing, make sure it is properly seated on pulleys

**5 - Bolt**
- ❑ 22 Nm

**6 - Alternator**
- ❑ Removing and installing ⇒ Electrical system; Rep. gr. 27 ; Alternator; Removing and installing alternator

**7 - Bolt**
- ❑ Tightening torque ⇒ Electrical system; Rep. gr. 27 ; Alternator; Exploded view - alternator

**8 - Bolt**
- ❑ 46 Nm

**9 - Bracket for alternator**

**10 - Dowel sleeve**
- ❑ For bracket for alternator
- ❑ 2x

**11 - Cover for idler roller**

**12 - Bolt**

- ❑ 9 Nm

**13 - Bearing bracket**

- ❑ For idler roller

**14 - Idler roller for poly V-belt**

**15 - Bolt**

- ❑ 22 Nm

**16 - Vibration damper**

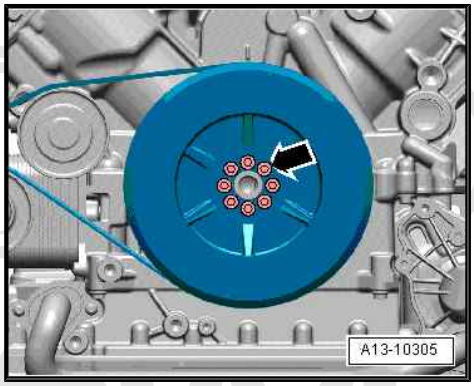
- ❑ With poly V-belt pulley
- ❑ Removing and installing ⇒ page 96

**17 - Bolt**

- ❑ Renew
- ❑ Threaded holes for bolts must be cleaned using a thread tap or similar
- ❑ Apply locking fluid when installing; refer to ⇒ Electronic parts catalogue
- ❑ Tightening torque and sequence ⇒ page 94

**18 - Thrust washer**

**Vibration damper - tightening torque and sequence**




**Note**

- *Renew the bolts tightened with specified tightening angle.*
- *The threaded holes for the bolts must be cleaned using a thread tap or similar.*
- *Apply locking fluid to bolts when installing; for locking fluid refer to ⇒ Electronic parts catalogue .*

– Tighten bolts in 3 stages as follows:

| Stage | Bolts | Tightening torque/angle specification |
|---|---|---|
| 1. | -arrow- | 15 Nm in diagonal sequence |
| 2. | -arrow- | 22 Nm in diagonal sequence |
| 3. | -arrow- | Turn 90° further in diagonal sequence |

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

## 1.2 Removing and installing poly V-belt

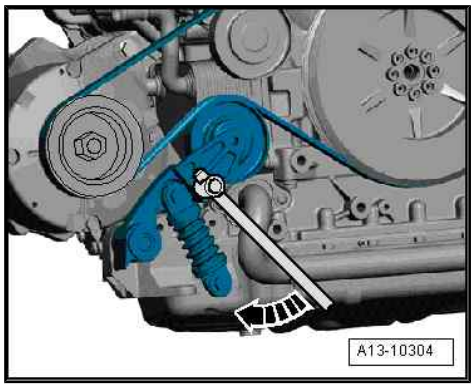
**Removing**

– Remove radiator cowl ⇒ page 262 .

**Caution**

***Wrong direction of rotation for a used poly V-belt can lead to irreparable damage.***

- ***Before removing the poly V-belt mark the direction of rotation with chalk or a felt-tip pen for re-installation.***




– To slacken poly V-belt turn tensioner in direction of -arrow-.

– Remove poly V-belt and release tensioner.

### Installing

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

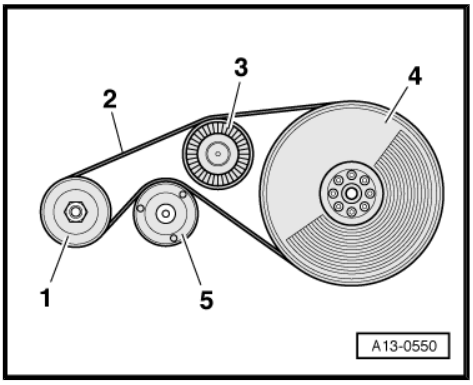
– Fit poly V-belt -2- onto pulleys in the following sequence:

1 - Alternator

3 - Idler roller

4 - Vibration damper

5 - Tensioning roller




**Note**

*When installing poly V-belt, make sure it is properly seated on pulleys.*

– Install radiator cowl ⇒ page 262 .

– Start engine and check that poly V-belt(s) run properly.

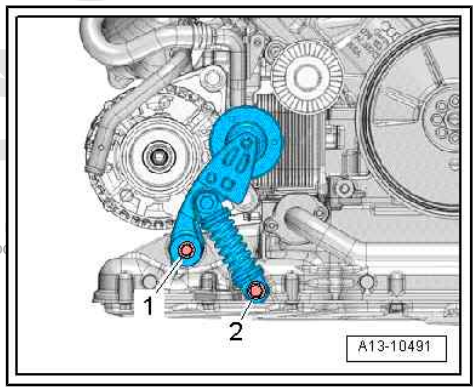
## 1.3 Removing and installing tensioner for poly V-belt

### Removing

– Remove poly V-belt ⇒ page 94 .

– Remove bolts -1- and -2-.

– Detach poly V-belt tensioner from sump (top section)




### Installing

Protected by copyright. Copying for private or commercial purposes, 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.

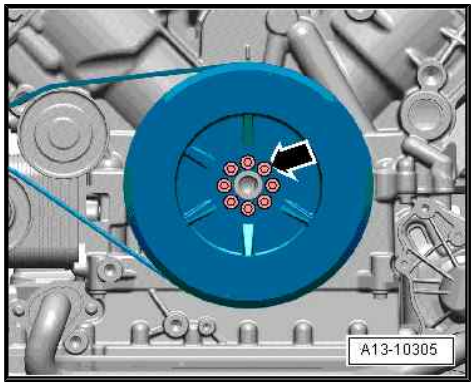
Installation is carried out in the reverse order; note the following:

- Tightening torque
  ⇒ “1.1 Exploded view - poly V-belt drive”, page 93

– Install poly V-belt ⇒ page 94 .

## 1.4 Removing and installing vibration damper

### Removing




– Remove radiator cowl ⇒ page 262 .

– Slacken off bolts -arrow- on vibration damper several turns (counterhold with ring spanner on nut for poly V-belt pulley for alternator).

– Remove poly V-belt ⇒ page 94 .

– Unscrew bolts -arrow- and remove vibration damper.

### Installing

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

- Tightening torque
⇒ Fig. ""Vibration damper - tightening torque and sequence"" , page 94

**Note**

- ♦ *Renew the bolts tightened with specified tightening angle.*
- ♦ *The threaded holes for the bolts must be cleaned using a thread tap or similar.*
- ♦ *Apply locking fluid to bolts when installing; for locking fluid refer to ⇒ Electronic parts catalogue .*

- The vibration damper can only be fitted in one position
⇒ Fig. ""Vibration damper - tightening torque and sequence"" , page 94 .

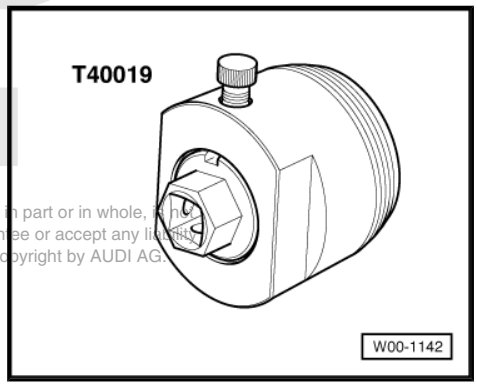
– Install poly V-belt ⇒ page 94 .

– Install radiator cowl ⇒ page 262 .

## 1.5 Renewing crankshaft oil seal (pulley end)

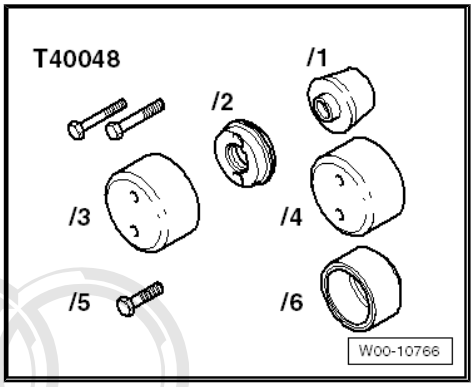
### Special tools and workshop equipment required

♦ Oil seal extractor - T40019-




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.

♦ Assembly tool - T40048-




♦ Bolts M8x55 mm (2x)

**Procedure**

– Remove vibration damper ⇒ page 96 .

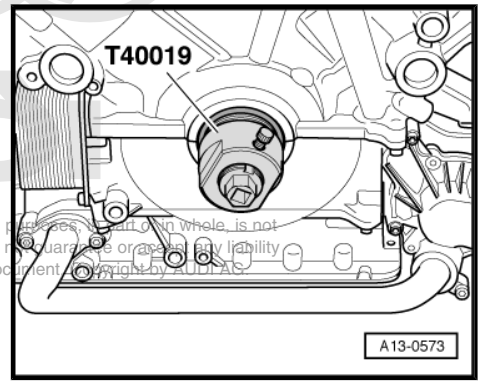
– Adjust inner part of oil seal extractor -T40019- so that it is level with the outer part and lock in position with knurled screw.

– Lubricate threaded head of oil seal extractor, place it in position and screw it into oil seal as far as possible (applying firm pressure).

– Loosen knurled screw and turn inner part against crankshaft until the oil seal is pulled out.

– Clamp flats of oil seal extractor in vice and use pliers to remove oil seal.

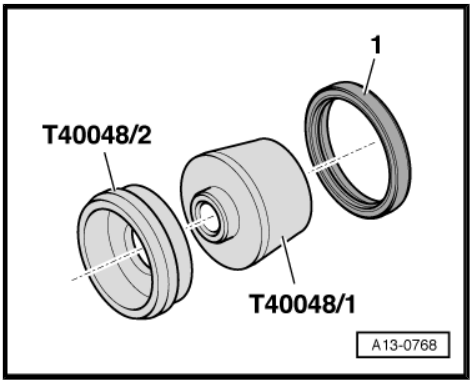
– Clean contact surface and sealing surface.




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

– Fit assembly aid -T40048/1- onto assembly sleeve -T40048/2- and slide oil seal -1- onto assembly sleeve.

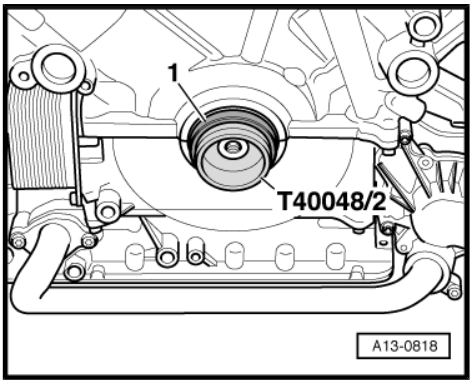
– Detach assembly aid.




– Fit assembly sleeve -T40048/2- on crankshaft and slide oil seal -1- into sealing surface in cylinder block.

**Note**

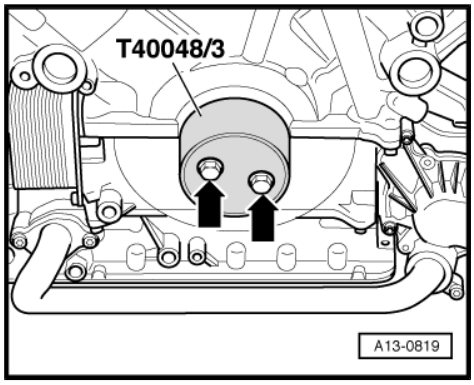
*Leave assembly sleeve in position on crankshaft when pressing in seal.*



– Apply press sleeve -T40048/3- to crankshaft using two M8×55 mm bolts -arrows-.
– Screw in bolts hand-tight at first.
– Tighten bolts alternately, $^1/_2$ turn at a time, to press in oil seal onto stop.

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

– Install vibration damper ⇒ page 96 .




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 Cylinder block (gearbox end)

⇒ “2.1 Exploded view - drive plate”, page 99

⇒ “2.2 Removing and installing drive plate”, page 99

⇒ “2.3 Renewing crankshaft oil seal (gearbox end)”, page 100

⇒ “2.4 Renewing needle bearing in drive plate”, page 102

## 2.1 Exploded view - drive plate

**Note**

*When performing assembly work, secure engine to engine and gearbox support - VAS 6095- ⇒ page 61.*

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

**1 - Drive plate**

- ❑ With bearing flange
- ❑ Check running surface on bearing flange and holes for clutch module for cracks and scoring.
- ❑ Removing and installing ⇒ page 99

**2 - Bolt**

- ❑ Renew
- ❑ 60 Nm +90°

**3 - Needle bearing**

- ❑ Only for vehicles with manual gearbox
- ❑ Installation position: closed side towards engine
- ❑ Removing and installing ⇒ page 102

**4 - Sender wheel**

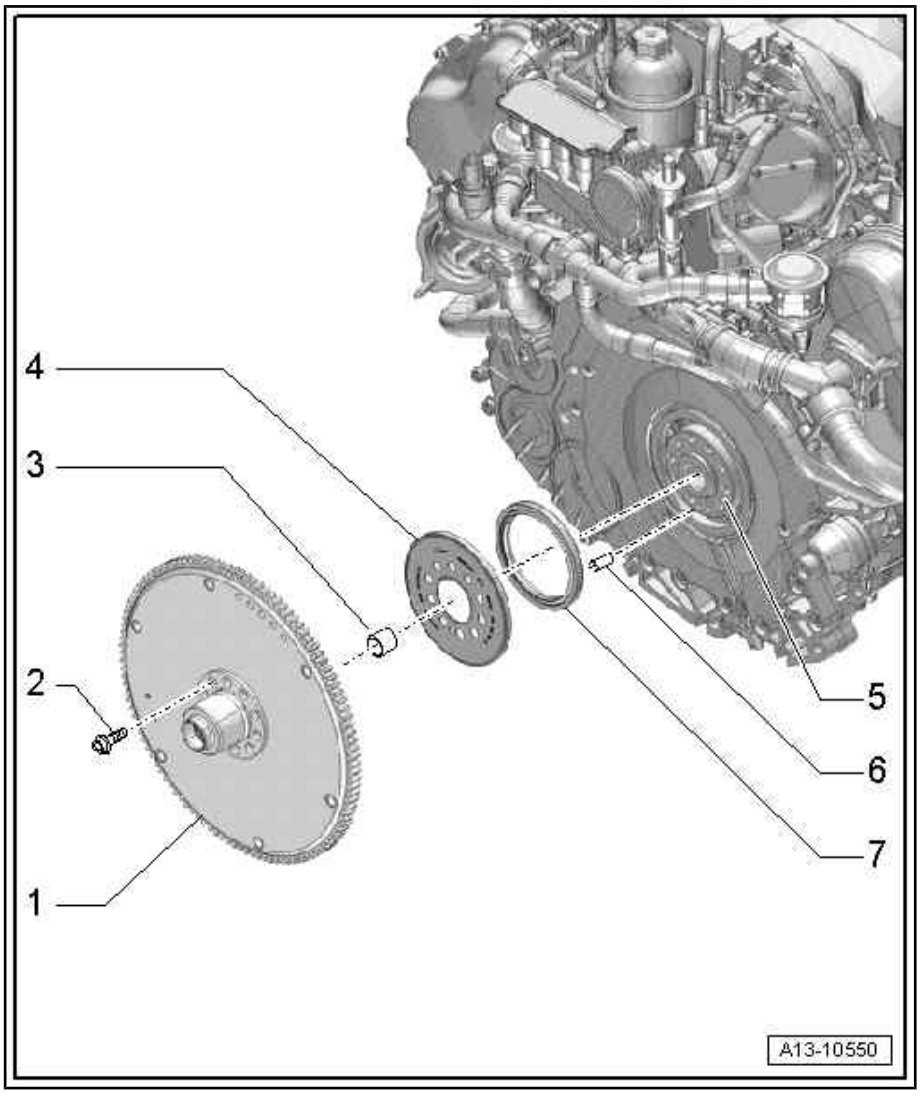
- ❑ For engine speed sender - G28-

**5 - Crankshaft**

**6 - Dowel sleeve**

**7 - Crankshaft oil seal (gearbox end)**

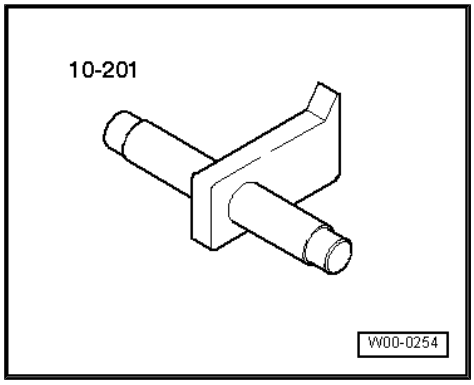
- ❑ Renewing ⇒ page 100




## 2.2 Removing and installing drive plate

**Special tools and workshop equipment required**

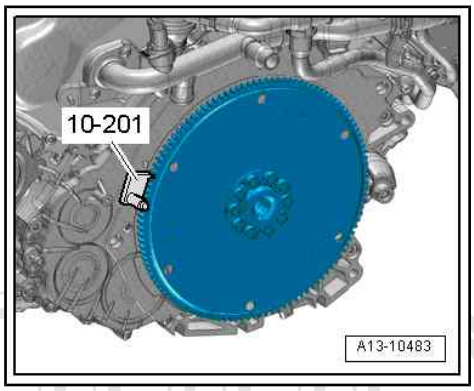
♦ Counterhold tool - 10 - 201-




**Removing**

- Gearbox removed ⇒ Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox or ⇒ Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .

– Insert counterhold tool - 10 - 201- to slacken bolts.




**Caution**

***Take care not to damage outer surface of bearing flange on drive plate.***

♦ ***Use a multi-point socket bit with a length of at least 40 mm to slacken and tighten the drive plate bolts.***

– Remove bolts and take off drive plate.

**Installing**

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

- Tightening torque
⇒ “2.1 Exploded view - drive plate”, page 99

**Note**

♦ *Renew the bolts tightened with specified tightening angle.*

♦ *Vehicles with manual gearbox: A needle bearing is fitted in the drive plate. Before installing, check that the needle bearing is fitted. Removing and installing needle bearing in drive plate (pressing in and out)* ⇒ page 102 .

– Observe dowel pin when installing drive plate.

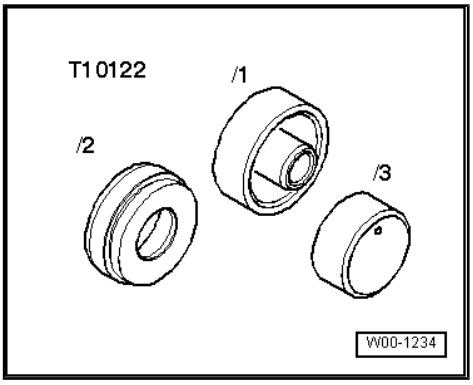
– Fit counterhold tool - 10 - 201- the other way round to tighten bolts.

## 2.3 Renewing crankshaft oil seal (gearbox end)

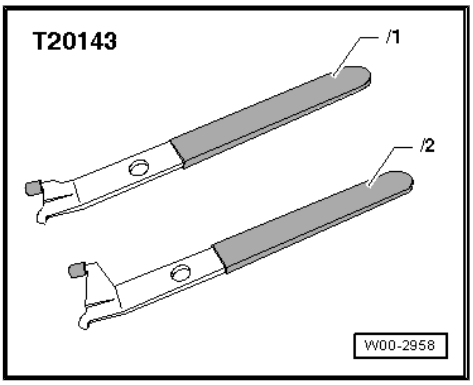
**Special tools and workshop equipment required**

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.

♦ Fitting tool - T10122-




♦ Extractor hook - T20143/2-



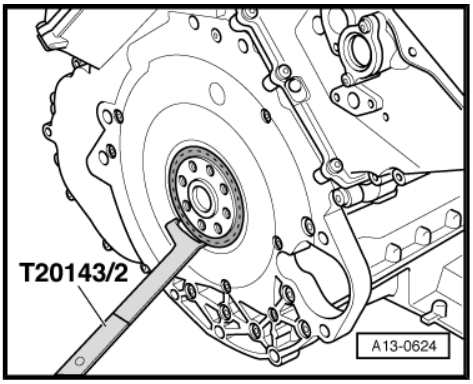

**Procedure**

- Gearbox removed ⇒ Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox or ⇒ Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .

– Remove drive plate ⇒ page 99 .

– Pry out oil seal using extractor hook -T20143/2- .

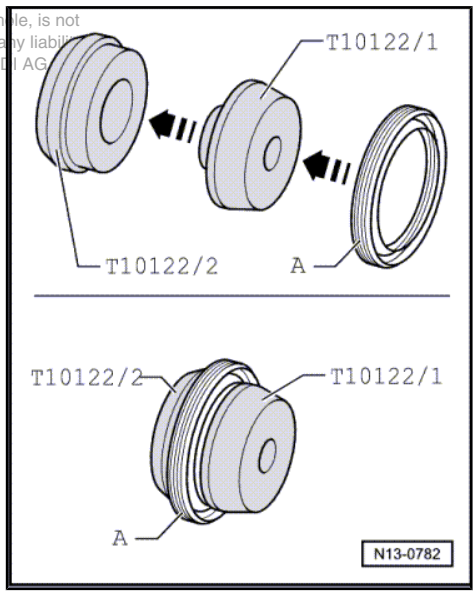
– Clean contact surface and sealing surface.



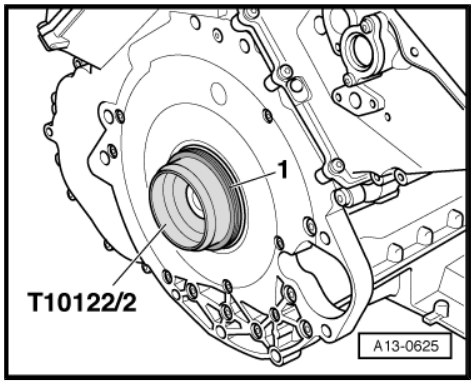

– Fit assembly aid -T10122/1- onto assembly sleeve -T10122/2- and slide oil seal -A- onto assembly sleeve.

– Detach assembly aid.

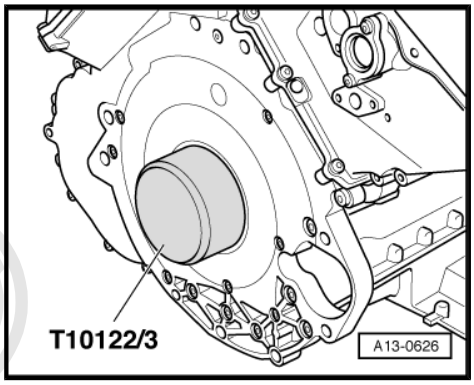
Audi
Printed in Germany. Subject to change. AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



– Fit assembly sleeve -T10122/2- with oil seal -1- onto crankshaft.




– Press in oil seal uniformly until flush all round using thrust piece -T10122/3- .
– Install drive plate ⇒ page 99 .




## 2.4 Renewing needle bearing in drive plate

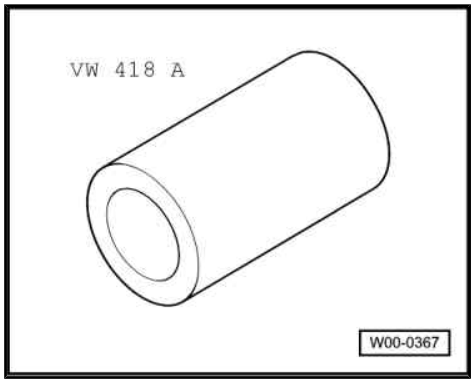
⇒ “2.4.1 Renewing needle bearing in drive plate - vehicles with manual gearbox”, page 102

## 2.4.1 Renewing needle bearing in drive plate - vehicles with manual gearbox

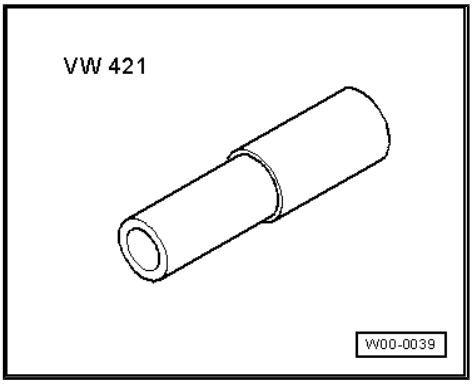
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

**Special tools and workshop equipment required**

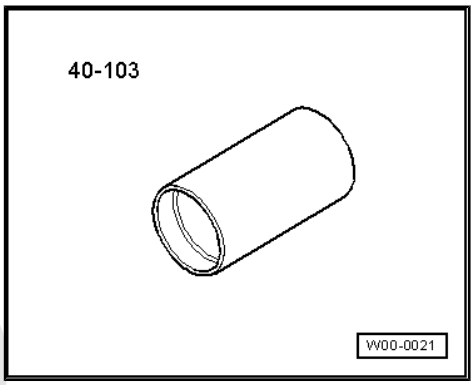
♦ Tube - VW 418 A-



♦ Tube - VW 421-




♦ Support - 40 - 103-




**Procedure**

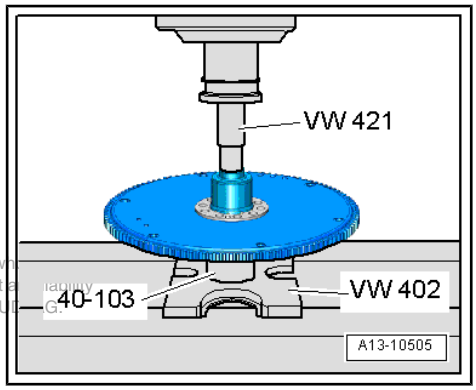
- Gearbox removed ⇒ Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox

– Remove drive plate ⇒ page 99 .

– Place support - 40 - 103- under drive plate when pressing out and pressing in needle bearing.

– Use tube - VW 421- and workshop press and press out needle bearing.

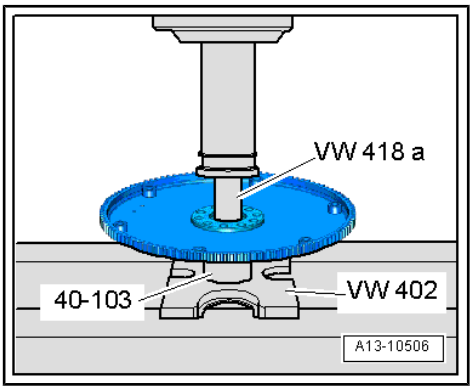
- Smaller diameter of tube -VW 421- faces drive plate.




– Carefully press in needle bearing as far as stop, using tube - VW 418 A- and workshop press.

- Installation position: closed side of needle bearing faces engine.

– Install drive plate ⇒ page 99 .




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.

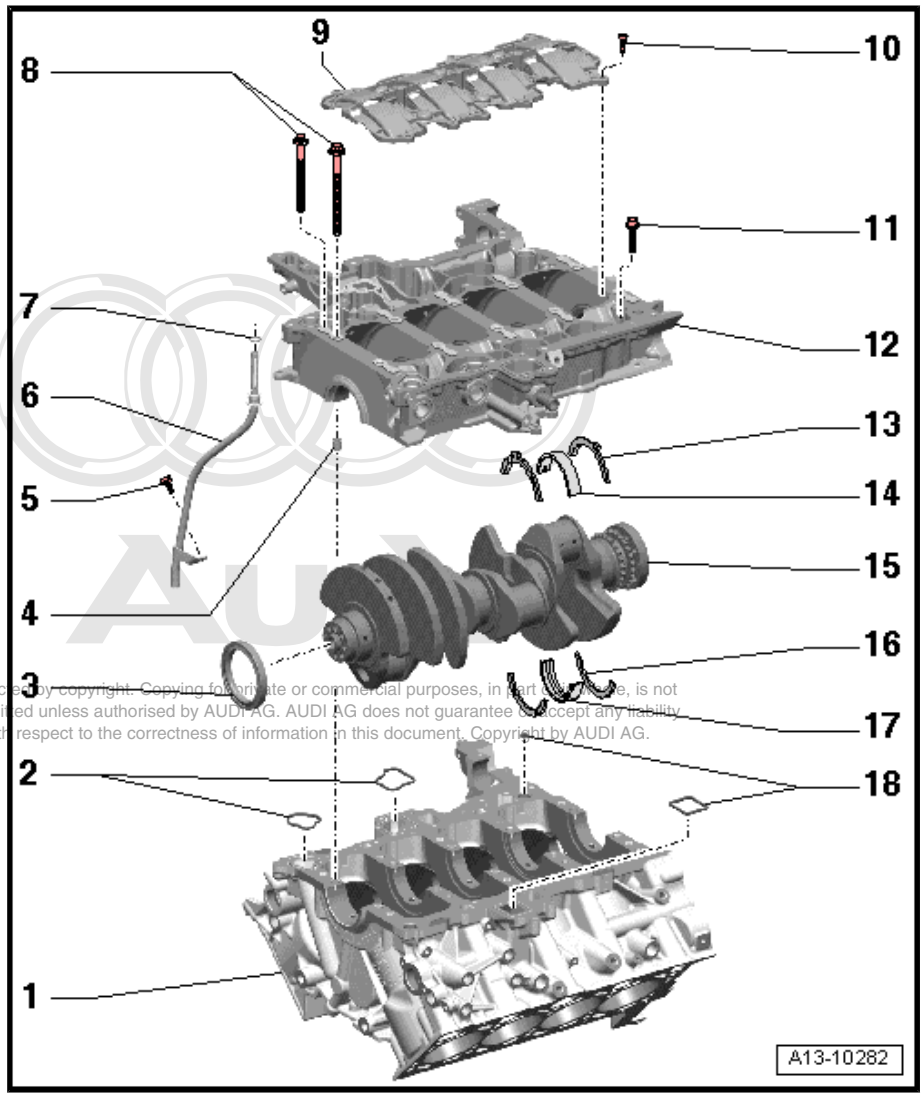
# 3 Crankshaft

⇒ “3.1 Exploded view - crankshaft”, page 104
⇒ “3.2 Crankshaft dimensions”, page 107
⇒ “3.3 Allocation of main bearing shells”, page 107
⇒ “3.4 Measuring axial clearance of crankshaft”, page 109
⇒ “3.5 Measuring radial clearance of crankshaft”, page 110

## 3.1 Exploded view - crankshaft

**Note**

- *When performing assembly work, secure engine to engine and gearbox support - VAS 6095- ⇒ page 61 .*
- *All bearing and running surfaces must be oiled before assembling.*




**1 - Cylinder block**
- ❑ Matched to -item 12-
- ❑ Applying sealant onto cylinder block (for retaining frame) ⇒ page 106

**2 - Gaskets**
- ❑ Renew

**3 - Oil seal for crankshaft (pulley end)**
- ❑ Renewing ⇒ page 96

**4 - Dowel sleeve**
- ❑ 2x
- ❑ Insert in retaining frame
- ❑ Installation position ⇒ page 106

**5 - Bolt**
- ❑ 9 Nm

**6 - Dipstick guide tube**

**7 - O-ring**
- ❑ Renew

**8 - Bolts**
- ❑ For retaining frame
- ❑ Renew
- ❑ Different bolt lengths
- ❑ Tightening torque and sequence ⇒ page 107

**9 - Baffle plate**

**10 - Bolt**
- ❑ Tightening torque and sequence ⇒ page 105

**11 - Bolt**
- ❑ For sealing surfaces: retaining frame to cylinder block

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.

- ❑ Different bolt lengths
- ❑ Tightening sequence ⇒ page 107

**12 - Retaining frame**

- ❑ Matched to -item 1-
- ❑ Applying sealant onto cylinder block (for retaining frame) ⇒ page 106

**13 - Thrust washer**

- ❑ Only fitted on 4th crankshaft bearing
- ❑ Installation position: oil grooves face outwards
- ❑ Make sure it engages in retaining frame

**14 - Bearing shell**

- ❑ For retaining frame (without oil groove)
- ❑ Always renew after removing
- ❑ Fit new bearing shells for retaining frame with the correct colour coding: new crankshaft ⇒ page 107 , used and machined crankshaft ⇒ page 109

**15 - Crankshaft**

- ❑ Measuring axial clearance ⇒ page 109
- ❑ Measuring radial clearance ⇒ page 110
- ❑ Crankshaft dimensions ⇒ page 107

**16 - Thrust washer**

- ❑ Only fitted on 4th crankshaft bearing
- ❑ Installation position: oil grooves face outwards

**17 - Bearing shell**

- ❑ For cylinder block (with oil groove)
- ❑ Always renew after removing
- ❑ Fit new bearing shells for cylinder block with the correct colour coding: new crankshaft ⇒ page 107 , used and machined crankshaft ⇒ page 109

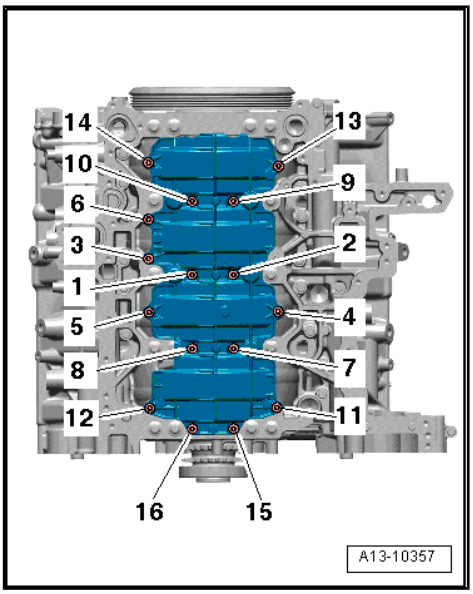
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

**18 - Gaskets**

- ❑ Renew

**Baffle plate - tightening torque and tightening sequence**

– Tighten bolts for baffle plate in the sequence -1 ... 16- to 9 Nm.



### Applying sealant onto cylinder block (for retaining frame)

– Clean sealing surfaces; they must be free of oil and grease.

**Caution**

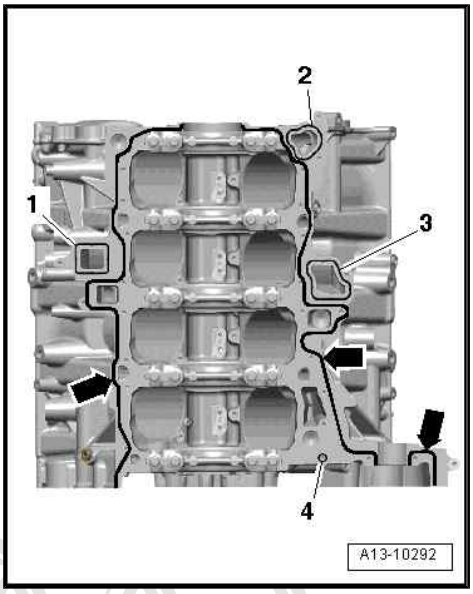
***Make sure lubrication system is not clogged by excess sealant.***

- ***The sealant bead must not be thicker than specified.***

– Apply beads of sealant -arrows- onto clean sealing surfaces as shown in illustration.

- Width of sealant beads: 2.0 mm.

– Fit seals -1 ... 4-.

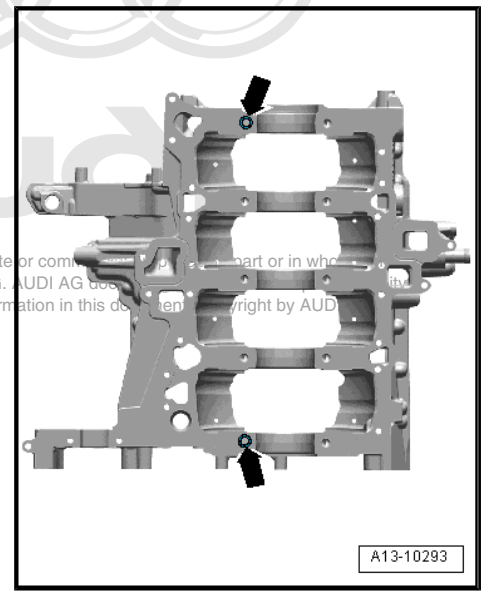



**Note**

*The retaining frame must be installed within 5 minutes after applying the sealant.*

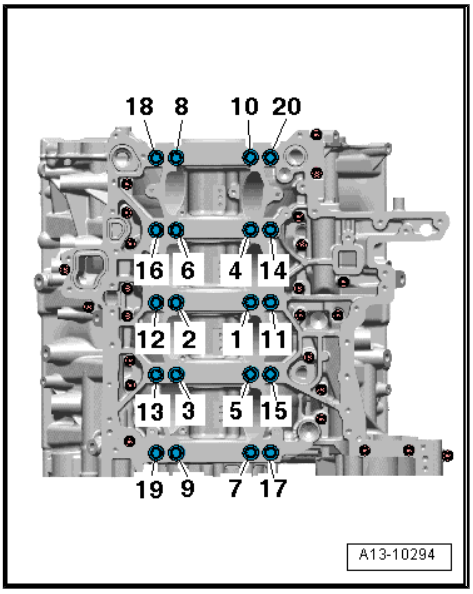
### Fitting location of dowel sleeves

– Fit dowel sleeves -arrows-, if not fitted on the retaining frame at the points marked.




Protected by copyright. Copying for private or com... part or in wh... permitted unless authorised by AUDI AG. AUDI AG do... with respect to the correctness of information in this d... ...yright by AUDI

**Retaining frame - tightening torque and sequence**




**Note**

*Renew the bolts tightened with specified tightening angle.*

– Tighten bolts in 5 stages in the sequence shown:

| Stage | Bolts | Tightening torque/angle specification |
|---|---|---|
| 1. | -1 … 10- | 30 Nm |
| 2. | -11 … 20- | 20 Nm |
| 3. | -1 … 10- | 50 Nm |
| 4. | -11 … 20- | 30 Nm |
| 5. | -1 … 20- | Turn 90° further |

– Tighten bolts for sealing surfaces between retaining frame and cylinder block -shaded dark- to 9 Nm in diagonal sequence.

## 3.2 Crankshaft dimensions

| Honing dimension | Crankshaft bearing journal ∅ mm | Crankshaft conrod journal ∅ mm |
|---|---|---|
| Basic dimension | 65.000 – 0.022 – 0.042 | 54.000 – 0.022 – 0.042 |
| Repair undersize | 64.750 – 0.022 – 0.042 | 53.750 – 0.022 – 0.042 |

## 3.3 Allocation of main bearing shells

⇒ "3.3.1 Allocation of main bearing shells for new crankshaft", page 107

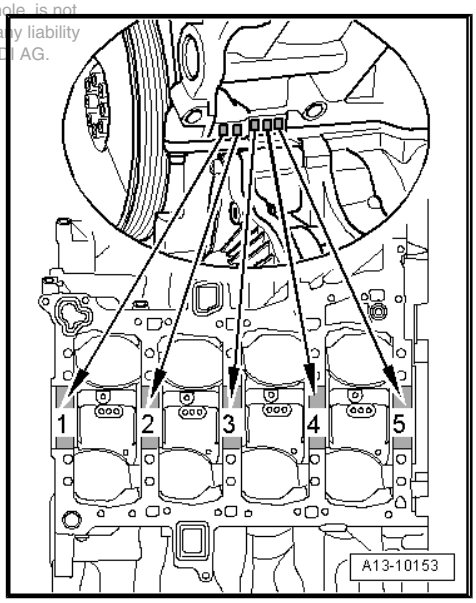
⇒ "3.3.2 Allocation of main bearing shells on used and machined crankshafts", page 109

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

### 3.3.1 Allocation of main bearing shells for new crankshaft

**Allocation of crankshaft bearing shells for cylinder block**

- Bearing shells of the correct thickness are matched to the bearings in the cylinder block at the factory. Coloured dots on the side of the bearing shells are used to identify the bearing shell thickness.
- The allocation of the bearing shells to the cylinder block is indicated by letters on the front left of the cylinder block (legible from outside), as shown in illustration.




| Letter on cylinder block | Colour coding of bearing |
|---|---|
| R = | Red |
| G = | Yellow |
| B = | Blue |

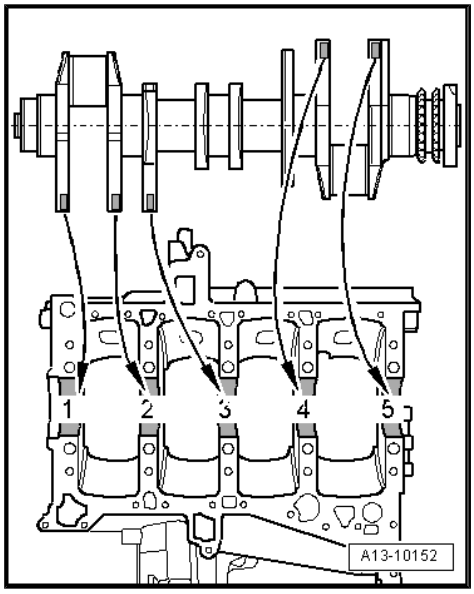
**Note**

*The code letters are also stamped on the retaining frame.*

**Allocation of crankshaft bearing shells for retaining frame - version 1**

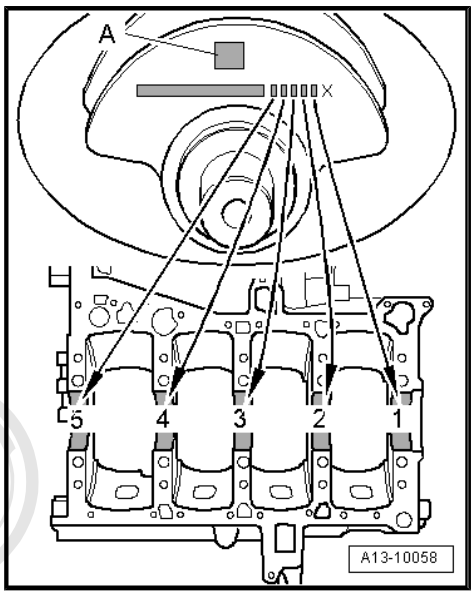
- Bearing shells of the correct thickness are matched to the bearings in the retaining frame at the factory. Coloured dots on the side of the bearing shells are used to identify the bearing shell thickness.
- The allocation of the bearing shells to the retaining frame is indicated by colour codings on the crankshaft webs, as shown in the illustration.

| Coloured marking on crankshaft | Colour coding of bearing |
|---|---|
| Red | Red |
| Yellow | Yellow |
| Blue | Blue |




**Allocation of crankshaft bearing shells for retaining frame - version 2**

- Bearing shells of the correct thickness are matched to the bearings in the retaining frame at the factory. Coloured dots on the side of the bearing shells are used to identify the bearing shell thickness.
- The allocation of the bearing shells to the retaining frame is indicated by letters on the front crankshaft web, as shown in illustration. The “X” indicates the end of the row of letters and is next to the colour coding for bearing 1 (pulley end).



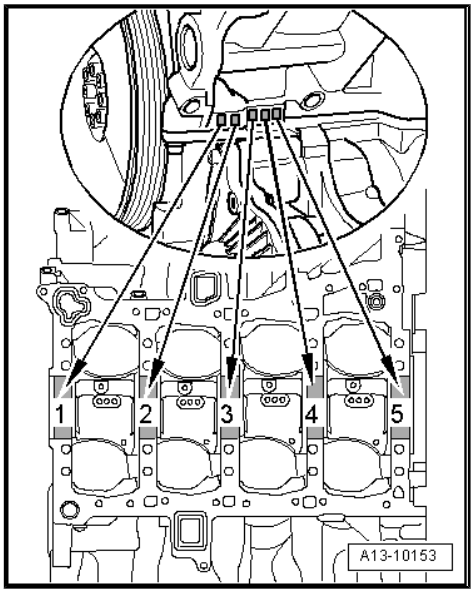

**Note**

*Disregard -item A-.*

| Letter on crankshaft | Colour coding of bearing |
|---|---|
| R = | Red |
| G = | Yellow |
| B = | Blue |

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.

## 3.3.2 Allocation of main bearing shells on used and machined crankshafts




**Allocation of crankshaft bearing shells for cylinder block**

- Bearing shells are allocated to the cylinder block according to the colour codes stamped on the cylinder block.
- On used and machined crankshafts, the main bearing journals must be measured in order to allocate the correct bearing shells.
- Crankshaft dimensions ⇒ page 107 .
- Oversized (thicker) bearing shells are available for a machined crankshaft. However, these bearing shells have the same colour coding as the original-size bearing shells.

| Letter on cylinder block | Colour coding of bearing |
|---|---|
| R = | Red |
| G = | Yellow |
| B = | Blue |

**Allocation of crankshaft bearing shells for retaining frame**

- On used and machined crankshafts, the main bearing journals must be measured in order to allocate the correct bearing shells.
- Any markings still visible on a machined crankshaft are invalid.
- Allocate the bearing shells according to the measured diameter of the crankshaft bearing journals as follows:

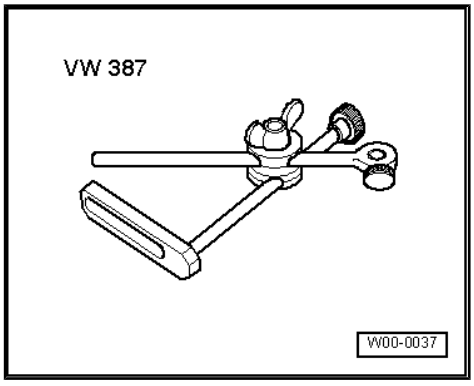
| Crankshaft main bearing journal ∅ | Colour code of bearing shells for retaining frame | | |
|---|---|---|---|
| **Dimensions in mm** | **Red** | **Yellow** | **Blue** |
| Basic dimension 65.000 | 64.978 … 64.972 | 64.972 … 64.965 | 64.965 … 64.958 |
| Repair undersize 64.750 [1)] | 64.728 … 64.722 | 64.722 … 64.715 | 64.715 … 64.708 |

- [1)] The colour codes for the oversized (thicker) bearing shells required for a machined crankshaft are the same as those on bearing shells for a new crankshaft, in spite of the greater bearing thickness.

## 3.4 Measuring axial clearance of crankshaft

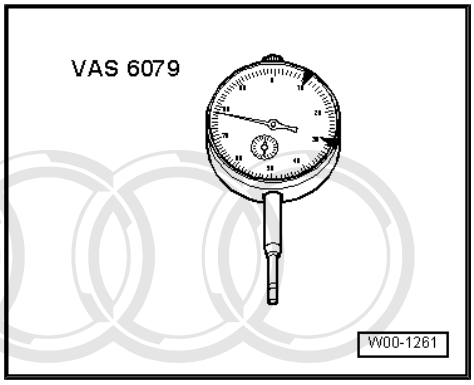
**Special tools and workshop equipment required**

- Universal dial gauge bracket - VW 387-




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.

♦ Dial gauge - VAS 6079-




**Procedure**

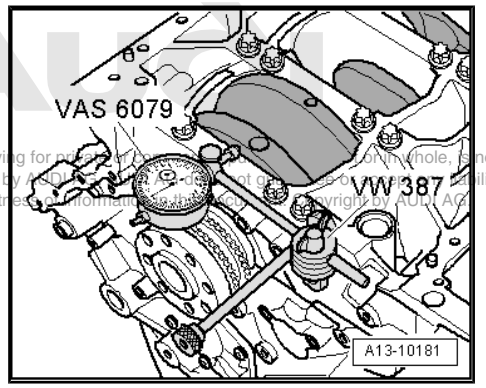
– Secure dial gauge - VAS 6079- with universal dial gauge bracket - VW 387- to cylinder block as shown in illustration.

– Apply dial gauge to crank web.

– Press crankshaft against dial gauge by hand and set gauge to "0".

– Push crankshaft away from dial gauge and read off value.

• Axial clearance: 0.090 ... 0.251 mm




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.

## 3.5 Measuring radial clearance of crankshaft

**Special tools and workshop equipment required**

♦ Plastigauge

**Procedure**

– Remove retaining frame and clean bearing journals.

– Place a length of Plastigauge corresponding to the width of the bearing on the bearing journal or in the bearing shell.

• The Plastigauge must be positioned in the centre of the bearing shell.

– Fit retaining frame and tighten to 30 Nm without turning bolts further; do not rotate crankshaft.

– Remove retaining frame again.

– Compare width of Plastigauge with measurement scale.

Radial clearance:

• New: 0.017 ... 0.044 mm.

• Wear limit: 0.08 mm.

# 4 Auxiliary drive

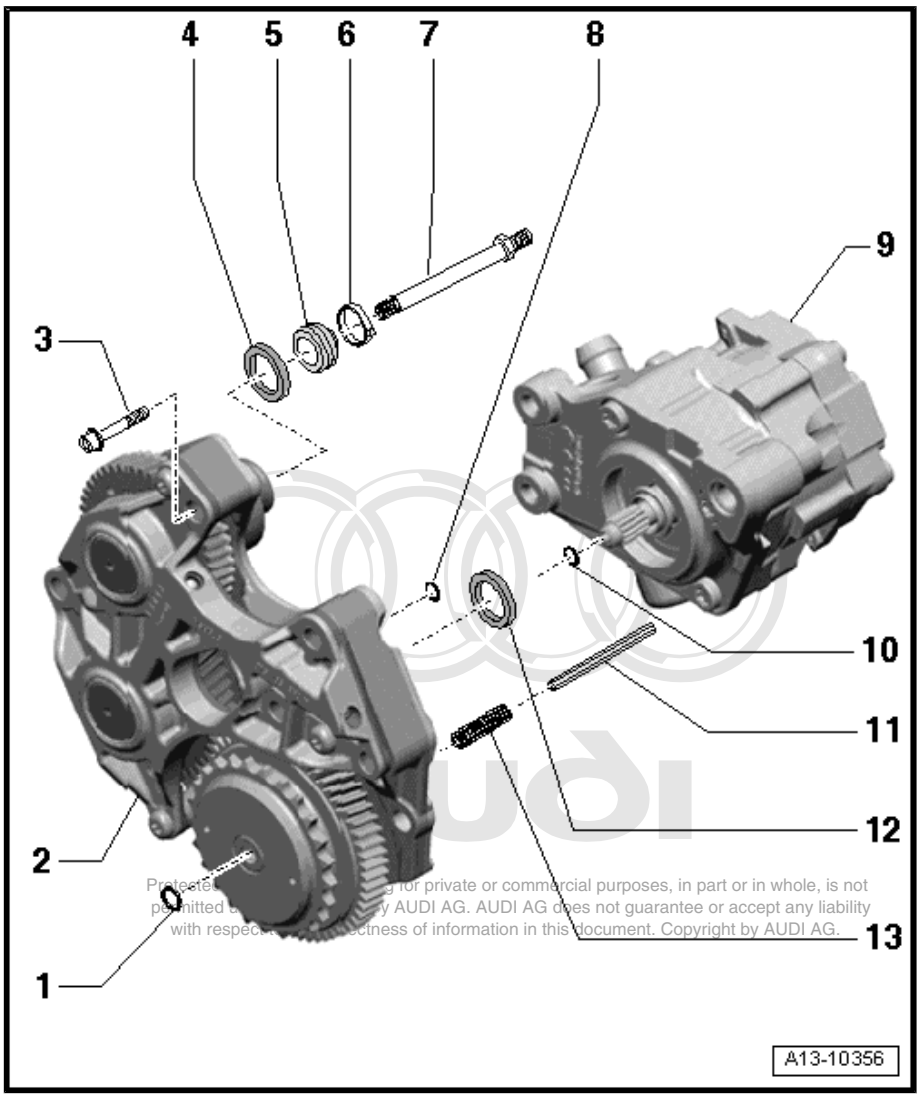
⇒ “4.1 Exploded view - auxiliary drive”, page 111

⇒ “4.2 Removing and installing spur gear drive”, page 112

⇒ “4.3 Renewing oil seal for power steering pump drive”, page 115

⇒ “4.4 Renewing oil seal for AC compressor drive”, page 116

## 4.1 Exploded view - auxiliary drive




**1 - Circlip**

**2 - Spur gear drive**

- ❑ Do not dismantle
- ❑ Removing and installing ⇒ page 112
- ❑ With flat-section O-ring in power steering pump drive
- ❑ Installation position of flat-section O-ring ⇒ page 112

**3 - Bolt**

- ❑ Tightening torque and sequence ⇒ page 112

**4 - Oil seal for air conditioner compressor drive**

- ❑ Renewing ⇒ page 116

**5 - Dust cap for air conditioner compressor drive**

**6 - Clamp**

**7 - Drive shaft for air conditioner compressor**

- ❑ 60 Nm

**8 - O-ring**

- ❑ Renew

**9 - Power steering pump**

**10 - O-ring**

- ❑ Renew

**11 - Oil pump drive shaft**

**12 - Oil seal for power steering pump drive**

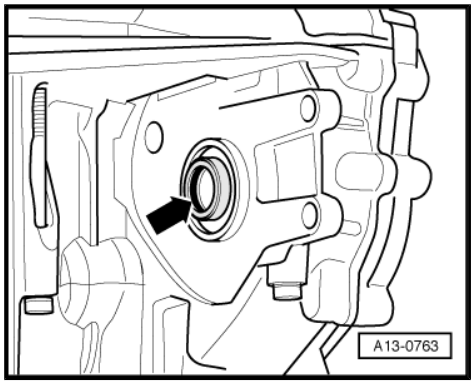
- ❑ Renewing ⇒ page 115

**13 - Compression spring**

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

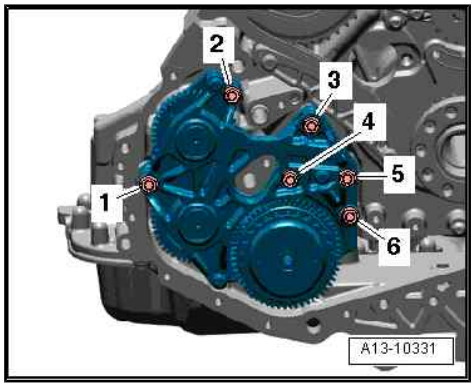
**Installation position of flat-section O-ring**

♦ In power steering pump drive -arrow-.




**Spur gear drive - tightening torque and sequence**

– Tighten bolts -1 ... 6- for spur gear drive in diagonal sequence to 22 Nm.




## 4.2 Removing and installing spur gear drive

**Special tools and workshop equipment required**

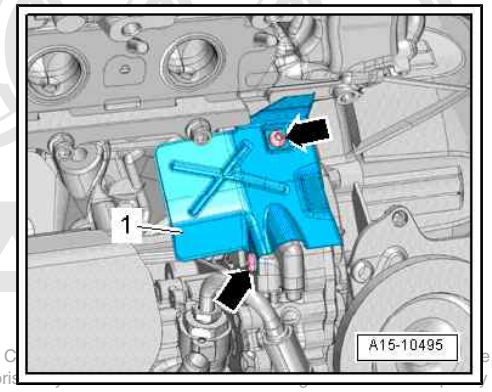
♦ Sealant ⇒ Electronic parts catalogue

**Removing**

• Gearbox removed ⇒ Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox or ⇒ Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .

– Remove exhaust manifold (left-side) ⇒ page 372 .

– Remove bolts -arrows- and detach heat shield -1-.



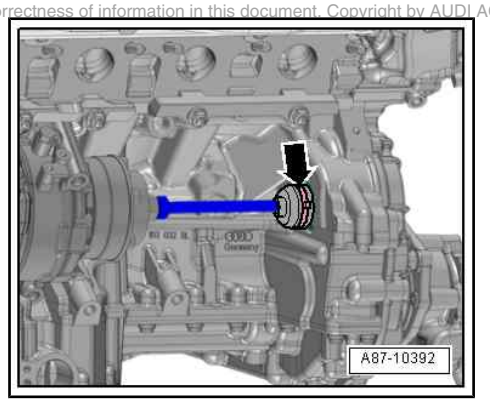

Protected by copyright. C e, is not
permitted unless authoris y liability
with respect to the correctness of information in this document. Copyright by AUDI AG.

– Detach hose clip on dust cap -arrow- for air conditioner compressor drive.

– Remove timing chain cover (bottom) ⇒ page 151 .

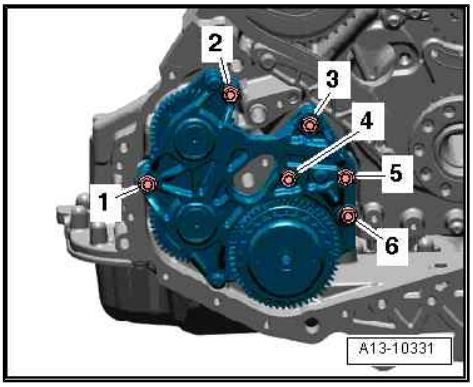
– Detach power steering pump from retaining frame.

– Remove drive chain for auxiliary drives ⇒ page 173 .



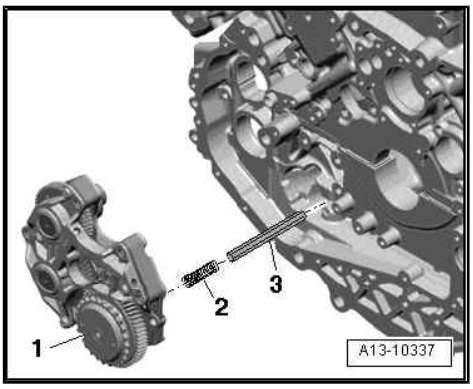
– Slacken bolts -1 ... 6- in diagonal sequence and remove.

– Carefully release spur gear drive from bonded joint and detach.



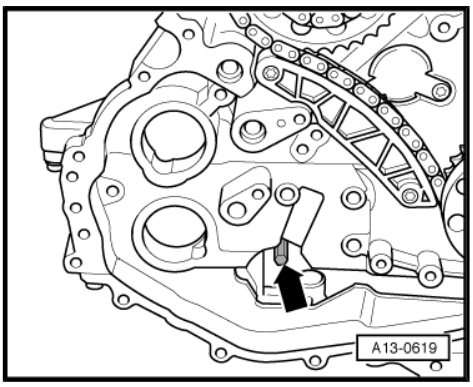

**Up to engine number CAUA 003 685:**

– Remove spring -2- between spur gear drive -1- and drive shaft -3- for oil pump.




**All engine versions (continued):**

– Pull out oil pump drive shaft -arrow-.




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

**Installing**

- Tightening torque
⇒ Fig. ""Spur gear drive - tightening torque and sequence"" , page 112

**Note**

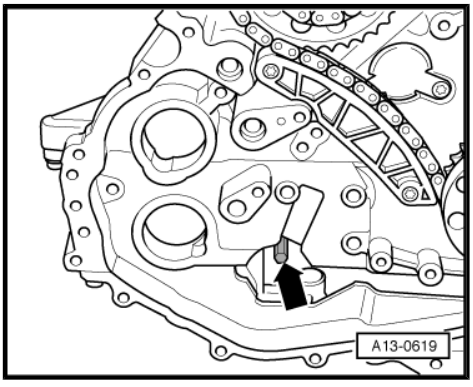
*Fit new O-ring.*

– Renew oil seals ⇒ Item 12 (page 111) , ⇒ Item 4 (page 111) and flat-section O-ring
⇒ Fig. ""Installation position of flat-section O-ring"" , page 112 in power steering pump drive if damaged.

– Remove sealant residue from spur gear drive and cylinder block.

– Clean contact surfaces and sealing surfaces; they must be free of oil and grease.

– Insert drive shaft -arrow- for oil pump into guide sleeve at oil pump.



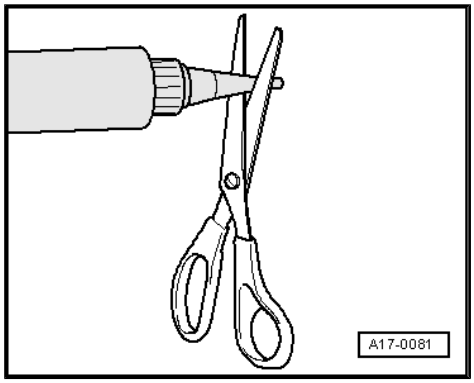

**Note**

*To ensure that drive shaft engages correctly in oil pump, insert drive shaft separately into oil pump (NOT together with spur gear drive).*

**Note**

*Note the use-by date of the sealant.*

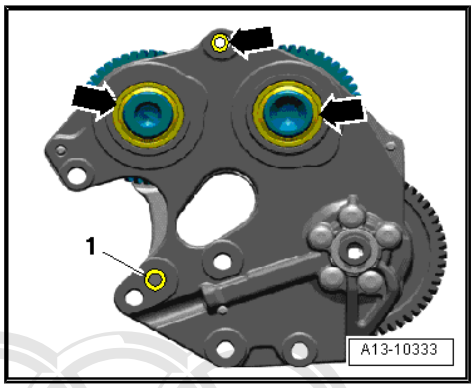
– Cut off nozzle of tube at front marking (nozzle ∅ approx. 1.5 mm).




**Caution**

***Make sure lubrication system is not clogged by excess sealant.***

- ***The sealant beads must not be thicker than specified.***




– Apply beads of sealant -arrows- onto clean sealing surfaces of spur gear drive as shown in illustration.

• Width of sealant beads: 2.0 mm.

– Fit new O-ring -1- and secure in position with a small amount of grease.

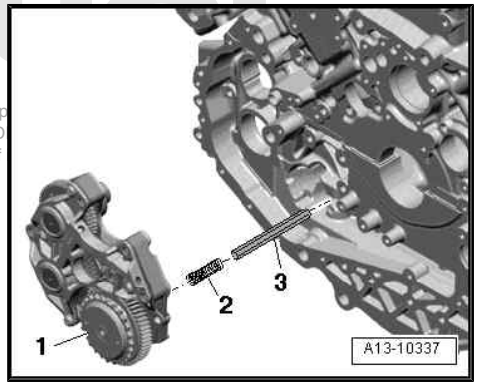
**Note**

*The spur gear drive must be installed within 5 minutes after applying the sealant.*

**Up to engine number CAUA 003 685:**

– Insert spring -2- for drive shaft -3- in spur gear drive -1-.

Protected by copyright. Copying for p
permitted unless authorised by AUD
with respect to the correctness of

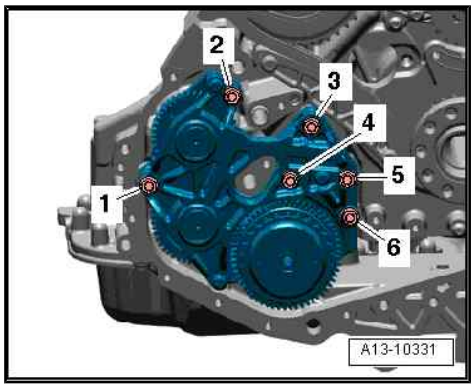



**All engine versions (continued):**

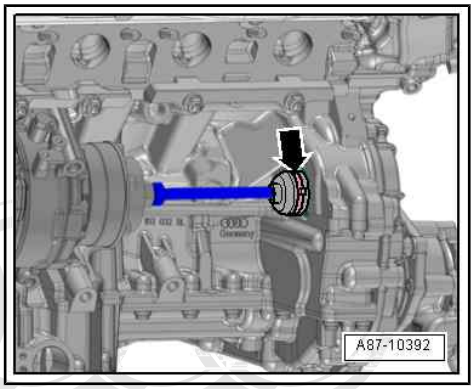
– Fit spur gear drive and tighten bolts ⇒ Fig. ""Spur gear drive - tightening torque and sequence"" , page 112 .

– Install drive chain for auxiliary drives ⇒ page 173 .

– Slide power steering pump with new O-ring onto spur gear for power steering pump drive.



– Press dust cap -arrow- with hose clip fitted onto stub shaft of spur gear for AC compressor drive.




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

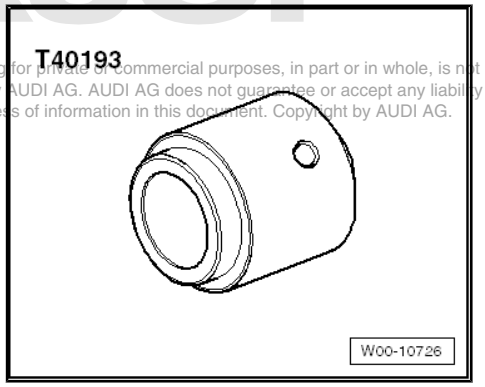
– Install timing chain cover (bottom) ⇒ page 151 .

– Install exhaust manifold (left-side) ⇒ page 372 .

## 4.3 Renewing oil seal for power steering pump drive

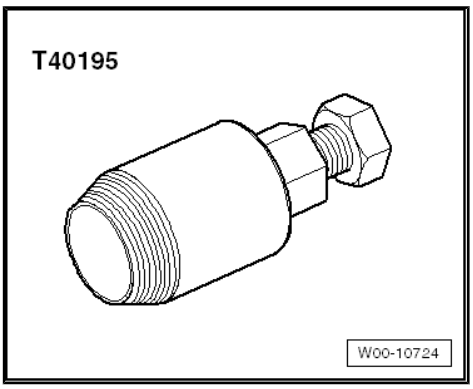
**Special tools and workshop equipment required**

♦ Thrust piece - T40193-




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

♦ Oil seal extractor - T40195-



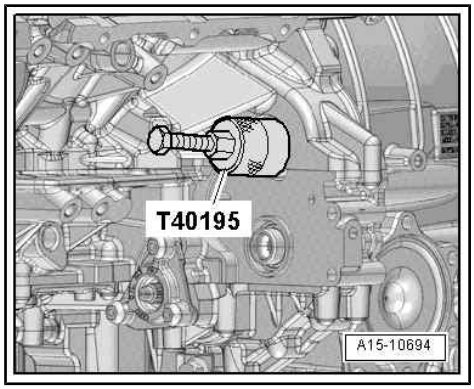
**Procedure**

– Remove power steering pump ⇒ Running gear, axles, steering; Rep. gr. 48 ; Hydraulic power steering; Exploded view - power steering pump .

– Screw spindle of oil seal extractor -T40195- all the way out.

– Lubricate threaded head of oil seal extractor, place it in position and screw it into oil seal as far as possible (applying firm pressure).

– Turn inner part of oil seal extractor against spur gear drive until the oil seal is pulled out.



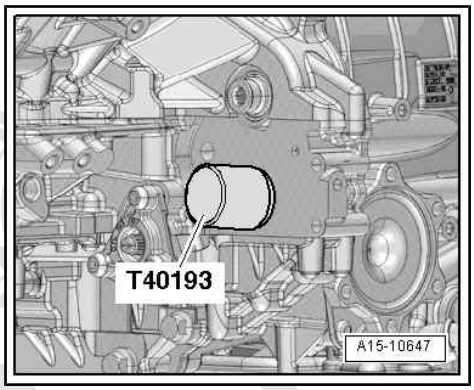

**Note**

*If the sections of the oil seal come apart, apply oil seal extractor again and pull out remaining part of oil seal.*

– Clamp hexagon flats of oil seal extractor in vice and use pliers to remove oil seal.

– Clean contact surface and sealing surface.

– Drive in oil seal for power steering pump drive as far as stop using thrust piece - T40193- .




**Note**

*For illustration purposes, the installation position is shown with the engine removed.*

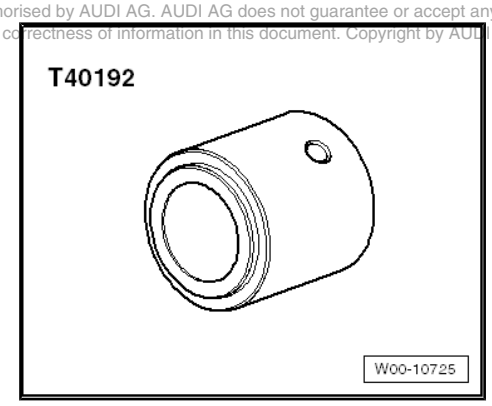
– Install power steering pump ⇒ Running gear, axles, steering; Rep. gr. 48 ; Hydraulic power steering; Exploded view - power steering pump .

## 4.4 Renewing oil seal for AC compressor drive

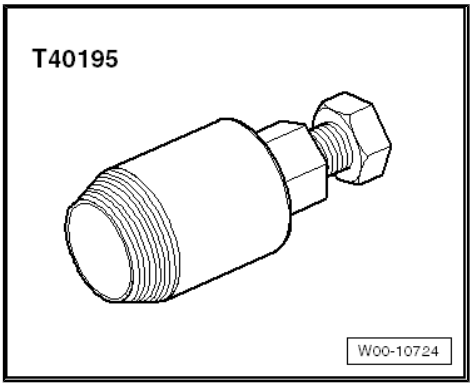
**Special tools and workshop equipment required**

♦ Thrust piece - T40192-

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



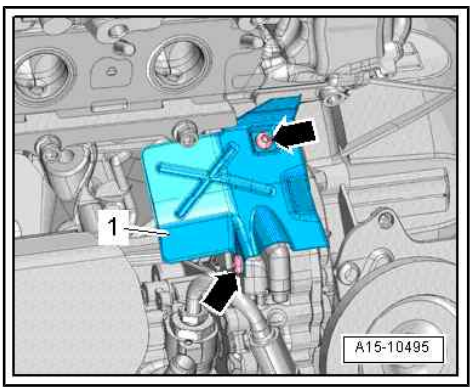
♦ Oil seal extractor - T40195-




**Procedure**

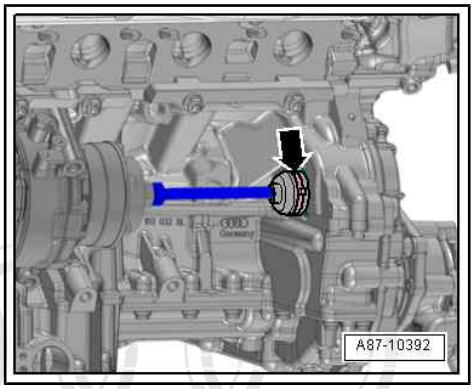
– Remove air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket .

– Remove bolts -arrows- and detach heat shield -1-.




– Detach hose clip on dust cap -arrow-.

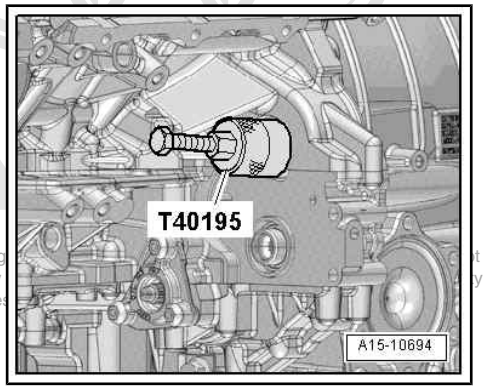
– Pull off dust cap together with drive shaft for air conditioner compressor from stub shaft of spur gear for air conditioner compressor drive.




– Screw spindle of oil seal extractor -T40195- all the way out.

– Lubricate threaded head of oil seal extractor, place it in position and screw it into oil seal as far as possible (applying firm pressure).

– Turn inner part of oil seal extractor against spur gear drive until the oil seal is pulled out.




**Note**

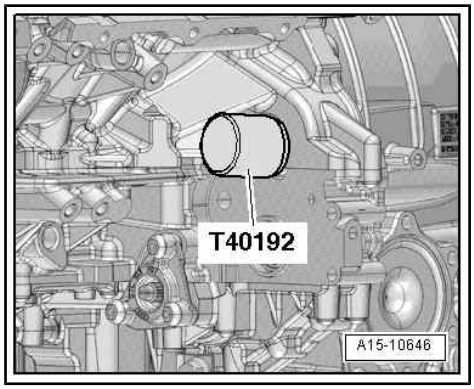
*If the sections of the oil seal come apart, apply oil seal extractor again and pull out remaining part of oil seal.*

– Clamp hexagon flats of oil seal extractor in vice and use pliers to remove oil seal.

– Clean contact surface and sealing surface.

Protected by copyright. Copying permitted unless authorised by with respect to the correctnes

– Drive in oil seal for AC compressor drive using thrust piece - T40192- .

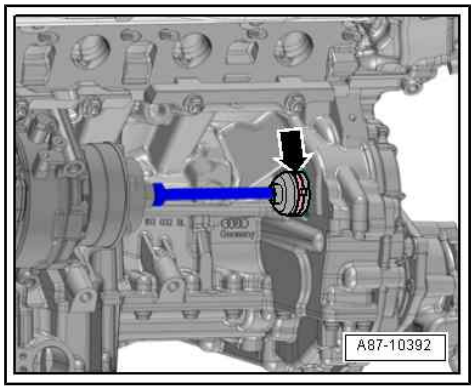



**Note**

*Secure with correct type of hose clip (same as original equipment) ⇒ Electronic parts catalogue .*

– Press dust cap -arrow- with hose clip fitted onto stub shaft of spur gear for AC compressor drive.

– Install air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket .




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 Pistons and conrods

⇒ "5.1 Exploded view - pistons and conrods", page 119

⇒ "5.2 Removing and installing pistons", page 121

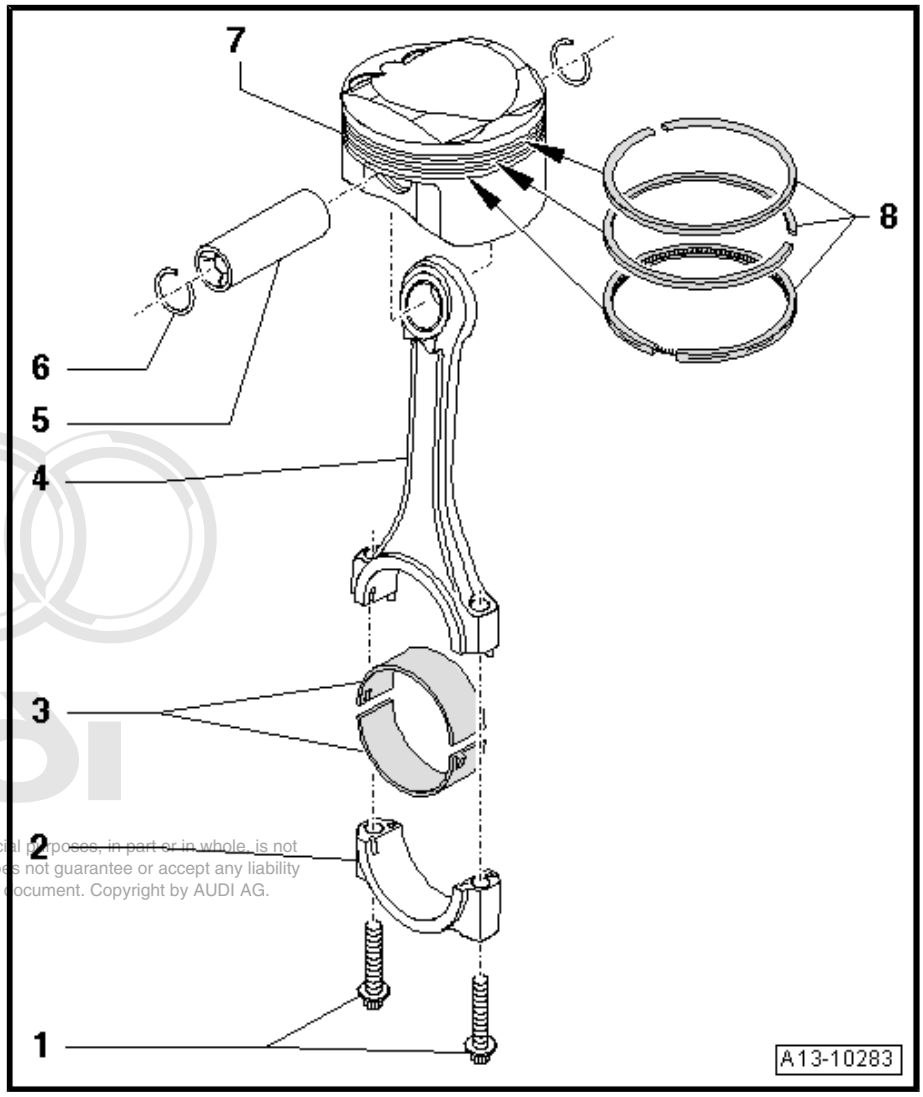
⇒ "5.3 Checking pistons and cylinder bores", page 122

⇒ "5.4 Checking radial clearance of conrod bearings", page 123

## 5.1 Exploded view - pistons and conrods

**Note**

- *All bearing and running surfaces must be oiled before assembling.*
- *Oil spray jet for piston cooling ⇒ Fig. ""Oil spray jet for piston cooling"" , page 121 .*




**1 - Bolts**

- ❑ Renew
- ❑ Lubricate threads and contact surface
- ❑ 40 Nm + 120°

**2 - Conrod bearing cap**

- ❑ Mark installation position for re-installation
- ❑ Mark cylinder allocation in colour ⇒ page 120
- ❑ Installation position of conrod pairs ⇒ page 121

**3 - Bearing shells**

- ❑ Ensure that retaining lugs are securely seated.
- ❑ Always renew after removing
- ❑ Oversized bearings are available for machined crankshaft conrod journals ⇒ Electronic parts catalogue

**4 - Conrod**

- ❑ Only renew as a complete set
- ❑ Mark cylinder allocation in colour ⇒ page 120
- ❑ Installation position of conrod pairs ⇒ page 121
- ❑ Axial clearance for each conrod pair (when new): 0.20 … 0.27 mm
- ❑ Axial clearance: wear limit: 0.30 mm
- ❑ Measuring radial clearance ⇒ page 123

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 - Piston pin**

- ❑ Removing and installing ⇒ page 121

**6 - Circlip**

- ❑ 2x
- ❑ Renew

**7 - Piston**

- ❑ Removing and installing ⇒ page 121
- ❑ Checking pistons and cylinder bores ⇒ page 122
- ❑ Installation position ⇒ page 120

**8 - Piston rings**

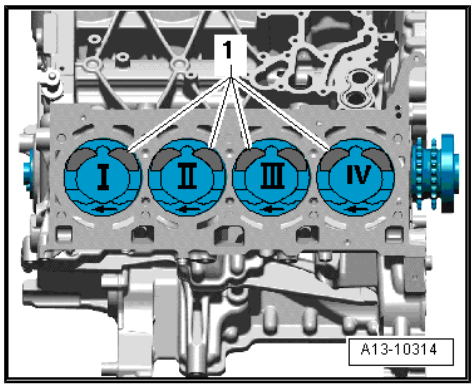
- ❑ Measuring ring gap ⇒ page 123
- ❑ Measuring ring-to-groove clearance ⇒ page 123
- ❑ Use piston ring pliers (commercially available) to remove and install
- ❑ Installation position: marking “TOP” or side with lettering faces towards piston crown.
- ❑ Offset gaps by 120°.

### Installation position of pistons

**Caution**

*Do not damage the coating of the piston crown.*

- *If you intend to re-install used pistons, mark the cylinder number on the piston crown using paint. Do not mark piston crown by means of centre punch, notch or the like.*




Installation position:

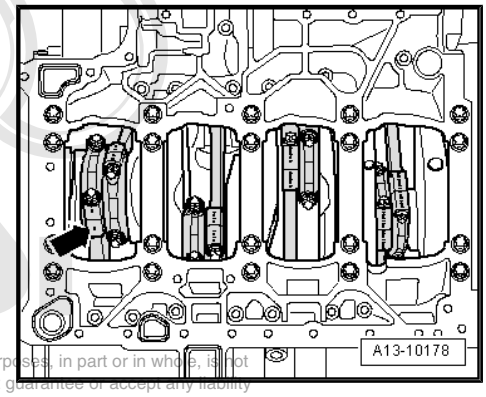
- Arrows on piston crowns point to pulley end.
- Large valve recesses -1- face centre of engine.

### Marking conrods

**Note**

*Only renew conrods as a complete set.*

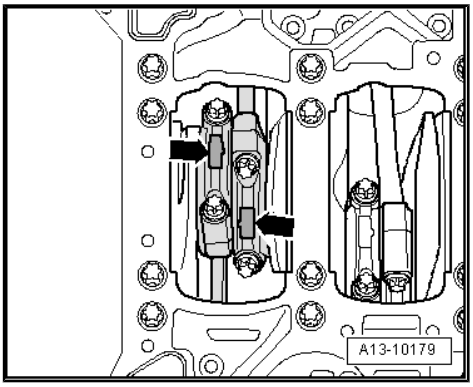
– Use a coloured pen to mark matching conrods and conrod bearing caps with cylinder numbers -arrow- for re-installation.




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.

### Installation position of conrods

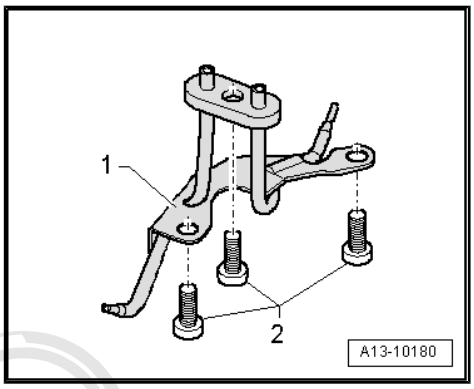
- The cast lugs -arrows- on the ground surfaces of the conrod pairs “1 and 2”, “3 and 4”, “5 and 6” and “7 and 8” must face each other.




### Oil spray jet for piston cooling

1 - Oil spray jet

2 - Apply locking fluid to bolts and tighten to 9 Nm; for locking fluid refer to ⇒ Electronic parts catalogue .



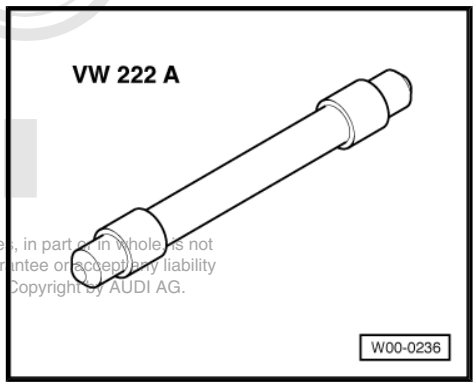

**Note**

- *Take care not to bend spray jets for pistons.*
- *Always renew bent spray jets for pistons.*

## 5.2 Removing and installing pistons

### Special tools and workshop equipment required

- Drift - VW 222 A-




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.

- Piston ring clamp, commercially available

### Removing

- Engine secured to engine and gearbox support - VAS 6095- ⇒ page 61

– Remove cylinder head:

- ⇒ “1.2.1 Removing cylinder head (left-side)”, page 127
- ⇒ “1.2.2 Removing cylinder head (right-side)”, page 129

– Remove sump (top section) ⇒ page 207 .

– Mark installation position and matching of conrod bearing caps to cylinders for re-installation ⇒ Fig. ““Marking conrods”“ , page 120 .

– Unbolt conrod bearing caps.

– Pull out pistons upwards with conrods.

**Note**

*If piston pin is difficult to remove, heat piston to approx. 60 °C.*

– Take circlip out of piston pin boss.

– Use drift - VW 222 A- to drive out piston pin.

**Installing**

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

- Tightening torque
  ⇒ “5.1 Exploded view - pistons and conrods”, page 119

**Note**

*Renew the bolts tightened with specified tightening angle.*

– Oil running surfaces of bearing shells.

– Install pistons using piston ring clamp.

Installation position:

- Pistons ⇒ Fig. ““Installation position of pistons”“ , page 120
- Conrods ⇒ Fig. ““Installation position of conrods”“ , page 121

– Install conrod bearing caps according to markings.

– Install sump (upper section) ⇒ page 207 .

– Install cylinder head ⇒ page 130 .

## 5.3 Checking pistons and cylinder bores

**Checking piston**

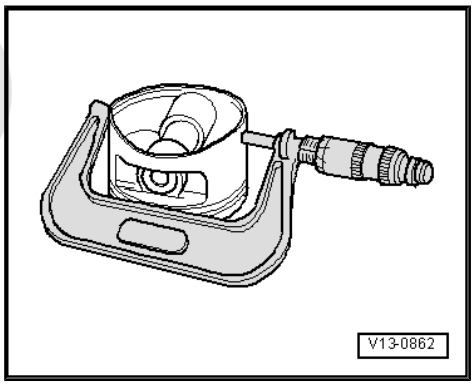
– Using a micrometer (75 ... 100 mm), measure approx. 15 mm from the lower edge, perpendicular to the piston pin axis.

- Maximum deviation from nominal dimension: 0.03 mm.

There are different piston sizes specifically matched to the varying bore dimensions for the cylinder block.

| Piston ∅ mm | |
|---|---|
| Nominal piston dimension I | 84.490[1)] |
| Nominal piston dimension II | 84.590[1)] |

- [1)] Dimensions including coating (thickness 0.01 mm). The coating will wear down in service.



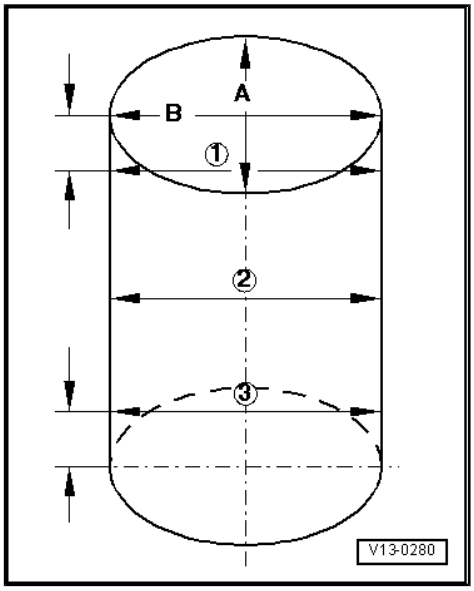

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

### Measuring cylinder bore

– Use a cylinder gauge - VAS 6078- to take measurements at 3 points in transverse direction -A- and in longitudinal direction -B-.

• Maximum deviation from nominal dimension: 0.08 mm.

| Cylinder bore ∅ mm | |
|---|---|
| Nominal bore dimension I | 84.510 ± 0.005 |
| Nominal bore dimension II | 84.610 ± 0.005 |

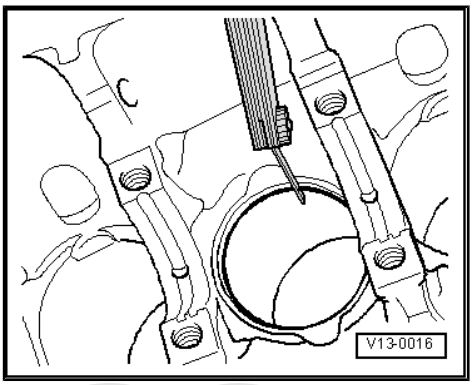



### Measuring piston ring gap

– Insert ring at right angle to cylinder wall from above and push down into lower cylinder opening approx. 15 mm from bottom of cylinder.

– To do so, use a piston without rings.

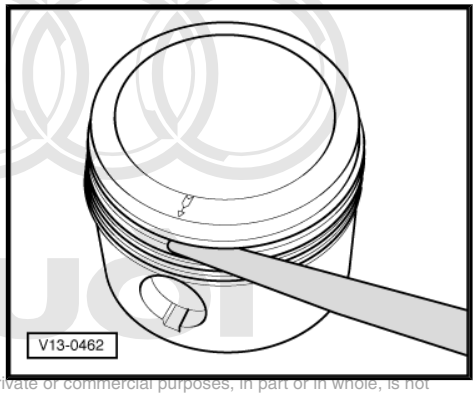
| Piston ring | new mm | Wear limit mm |
|---|---|---|
| 1st compression ring | 0.20 … 0.35 | 0.80 |
| 2nd compression ring | 0.20 … 0.40 | 0.80 |
| Oil scraper ring | 0.20 … 0.40 | 0.80 |




### Measuring ring-to-groove clearance

– Clean groove in piston before checking clearance.

| Piston ring | new mm | Wear limit mm |
|---|---|---|
| 1st compression ring | 0.035 … 0.085 | 0.200 |
| 2nd compression ring | 0.005 … 0.045 | 0.150 |
| Oil scraper ring | 0.010 … 0.050 | 0.200 |




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.

## 5.4 Checking radial clearance of conrod bearings

### Special tools and workshop equipment required

♦ Plastigauge

### Procedure

– Remove conrod bearing cap.

– Clean bearing cap and bearing journal.

– Place a length of Plastigauge corresponding to the width of the bearing on the bearing journal or in the bearing shell.

– Fit conrod bearing cap and tighten to 60 Nm, but do not turn further. Do not rotate crankshaft.
– Remove conrod bearing cap again.
– Compare width of Plastigauge with measurement scale.

Radial clearance:

- New: 0.020 ... 0.069 mm.
- Wear limit: 0.120 mm.

– Renew conrod bolts.

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.

# 15 – Cylinder head, valve gear

## 1 Cylinder head

⇒ "1.1 Exploded view - cylinder head", page 125

⇒ "1.2 Removing and installing cylinder head", page 127

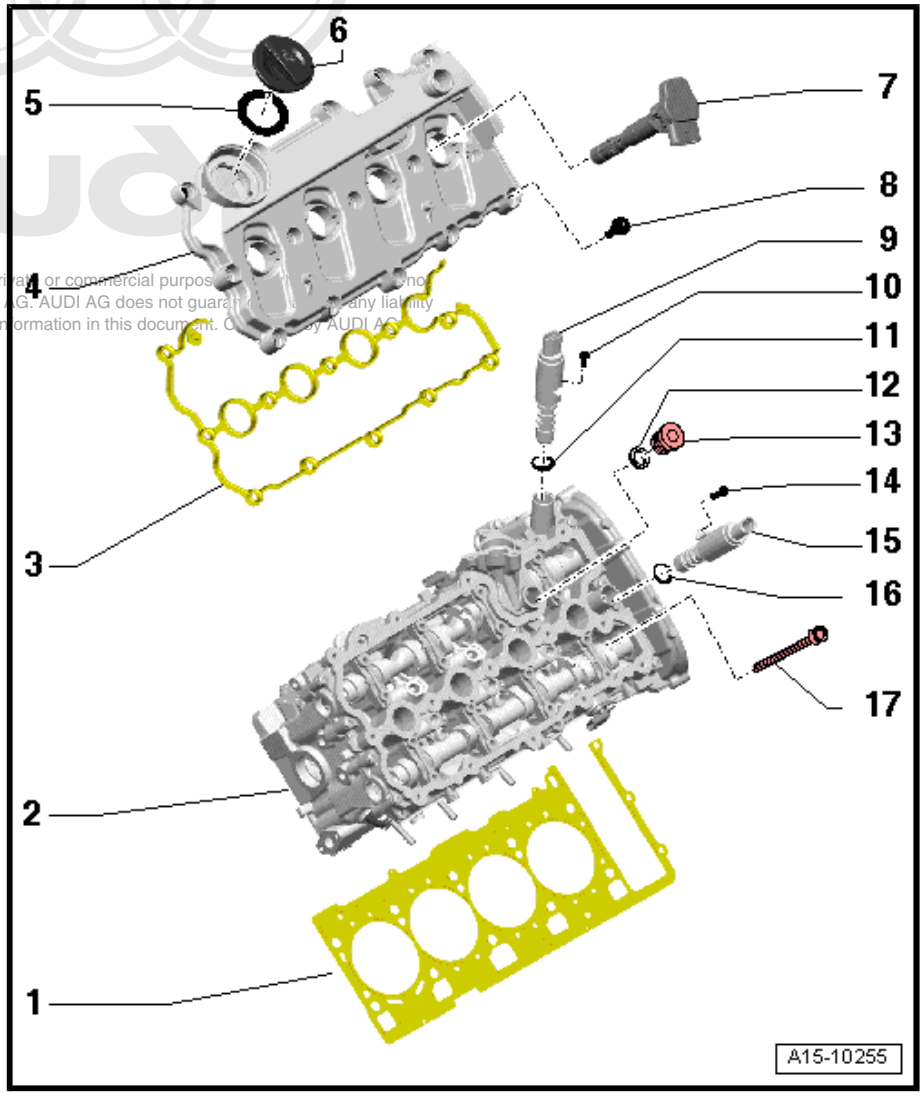
⇒ "1.3 Removing and installing cylinder head cover", page 134

⇒ "1.4 Checking compression", page 137

## 1.1 Exploded view - cylinder head

**Note**

*The diagram shows the cylinder head on cylinder bank 2 (left-side).*




**1 - Cylinder head gasket**

- ❑ Renewing ⇒ page 127 or ⇒ page 129
- ❑ Installing ⇒ page 130
- ❑ Installation position: part number must face cylinder head
- ❑ If renewed, change coolant and engine oil

**2 - Cylinder head**

- ❑ Removing: left-side ⇒ page 127 ; right-side ⇒ page 129
- ❑ Installing ⇒ page 130
- ❑ Checking for distortion ⇒ page 127
- ❑ Machining limit ⇒ page 127
- ❑ If renewed, change coolant and engine oil

**3 - Gasket for cylinder head cover**

- ❑ Renew if damaged or leaking

**4 - Cylinder head cover**

- ❑ Removing and installing: left-side ⇒ page 134 , right-side ⇒ page 135

**5 - Gasket**

- ❑ For filler cap
- ❑ Renew if damaged or leaking

**6 - Filler cap**

**7 - Ignition coil**

- ❑ Remove using puller - T40039-

**8 - Bolt**

- ❑ Renew if gasket is damaged
- ❑ Tightening torque and tightening sequence: cylinder head cover (left-side) ⇒ page 126 , cylinder head cover (right-side) ⇒ page 126

**9 - Camshaft control valve 2 - N208-**

**10 - Bolt**

- ❑ 2.4 Nm

**11 - O-ring**

- ❑ Renew

**12 - Seal**

- ❑ Renew

**13 - Plug**

- ❑ 35 Nm

**14 - Bolt**

- ❑ 2.4 Nm

**15 - Exhaust camshaft control valve 2 - N319-**

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.

**16 - O-ring**

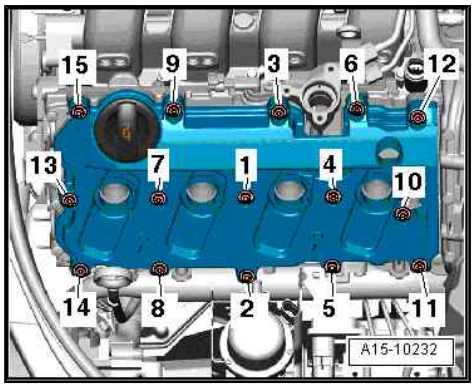
- ❑ Renew

**17 - Bolt**

- ❑ Renew
- ❑ Correct sequence when slackening ⇒ page 129
- ❑ Tightening torque and sequence ⇒ page 127

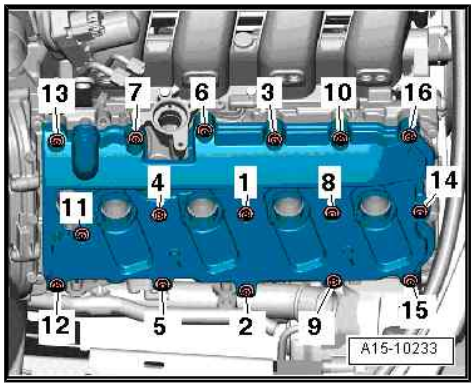
**Cylinder head cover (left-side) - tightening torque and sequence**

– Tighten bolts for cylinder head cover (left-side) in the sequence -1 ... 15- to 9 Nm.

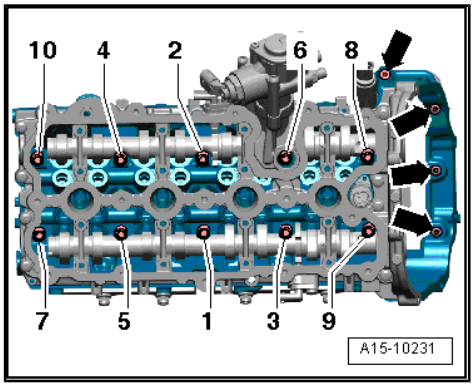



**Cylinder head cover (right-side) - tightening torque and sequence**

– Tighten bolts for cylinder head cover (right-side) in the sequence -1 ... 16- to 9 Nm.



### Cylinder head - tightening torque and sequence



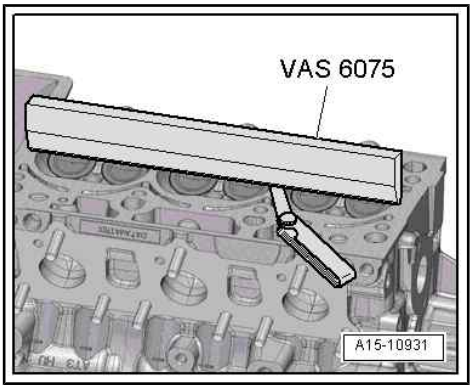

**Note**

*Renew the bolts tightened with specified tightening angle.*

– Tighten bolts in 7 stages in the sequence shown:

| Stage | Bolts | Tightening torque/angle specification |
|---|---|---|
| 1. | -1 … 10- | Screw in by hand until contact is made |
| 2. | -1 … 10- | 30 Nm |
| 3. | -1 … 10- | 60 Nm |
| 4. | -1 … 10- | Turn 90° further |
| 5. | -1 … 10- | Turn 90° further |
| 6. | -arrows- | Apply locking fluid when installing; 8 Nm<br>Locking fluid ⇒ Electronic parts catalogue |
| 7. | -arrows- | Turn 90° further |

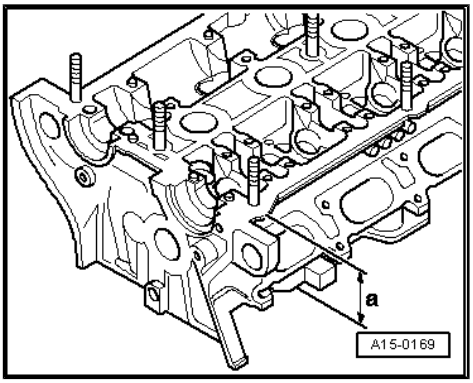
### Checking cylinder head for distortion




– Use straight edge 500 mm - VAS 6075- and feeler gauge to measure cylinder head for distortion at several points.

• Max. permissible distortion: 0.1 mm.

### Cylinder head machining limit




Machining of the cylinder head (surface grinding) is only permissible down to the minimum dimension -a-.

• Minimum dimension: -a- = 139.5 mm

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

## 1.2 Removing and installing cylinder head

⇒ "1.2.1 Removing cylinder head (left-side)", page 127

⇒ "1.2.2 Removing cylinder head (right-side)", page 129

⇒ "1.2.3 Installing cylinder head", page 130

## 1.2.1 Removing cylinder head (left-side)

### Special tools and workshop equipment required

♦ Socket XZN M12 (at least 140 mm), commercially available

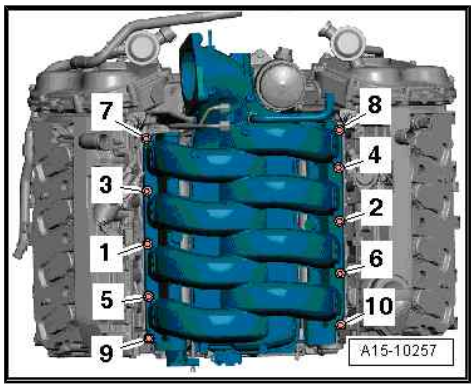
**Procedure**

– Remove timing chain cover (left-side) ⇒ page 144 .

– Remove timing chain (left-side) from camshafts ⇒ page 163 .

– Remove intake manifold ⇒ page 306 .

– Remove cylinder head cover (left-side) ⇒ page 134 .




– Unplug electrical connectors:

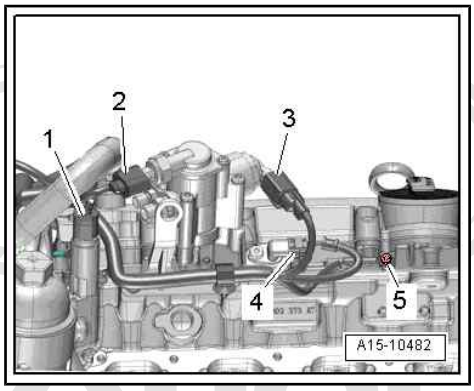
1 - At camshaft control valve 2 - N208-

2 - At fuel pressure sender - G247-

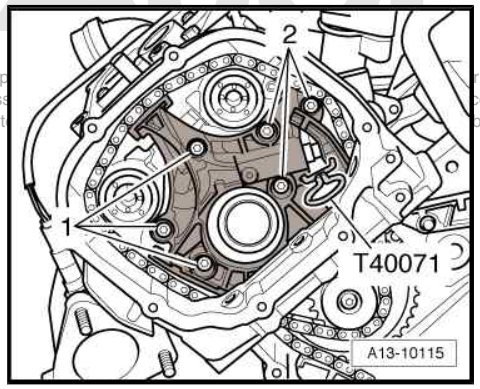
3 - At high-pressure pump (left-side)

4 - At Hall sender 2 - G163-

– Remove bolt -5- and move wiring harness to one side.




– Remove bolts -1- and -2- and take off chain tensioner (left-side).



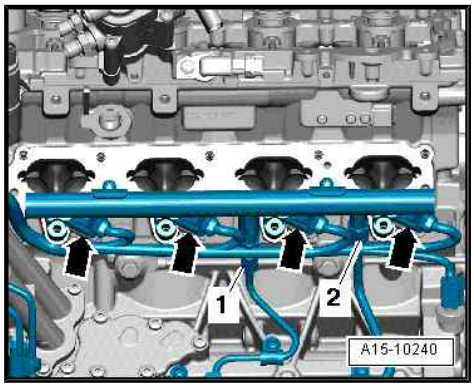

– Unplug electrical connectors -arrows- at injectors.

– Unscrew high-pressure pipe -2- from connection on fuel rail.

– Unscrew high-pressure pipe -1- from connection on fuel rail. To do so, counterhold at hexagon flats with an open-end spanner and loosen union nut.

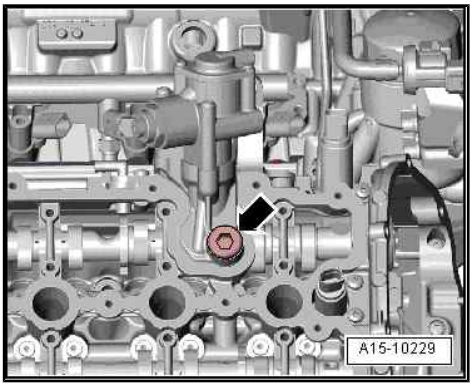
**Note**

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

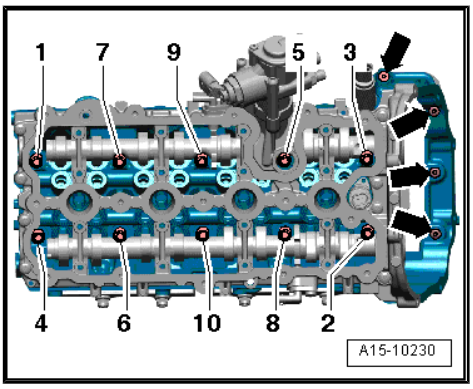



Protected by cop
permitted unless
with respect t
r in whole, is not
ccept any liability
by AUDI AG.

– Remove screw plug -arrow-.




– Remove bolts -arrows-.
– Slacken cylinder head bolts in the sequence -1 ... 10-.
– Remove bolts and carefully take off cylinder head.
– Place cylinder head onto soft surface (foam plastic).




## 1.2.2 Removing cylinder head (right-side)

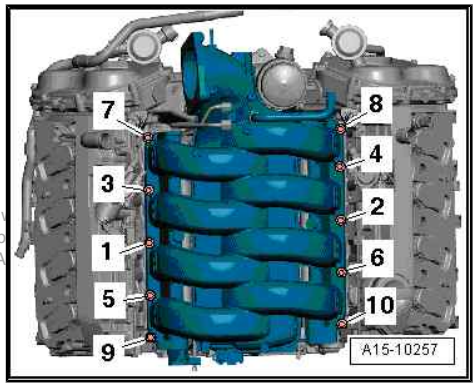
**Special tools and workshop equipment required**

♦ Socket XZN M12 (at least 140 mm), commercially available

**Procedure**

– Remove timing chain cover (right-side) ⇒ page 146 .
– Remove timing chain (right-side) from camshafts ⇒ page 163 .
– Remove intake manifold ⇒ page 306 .
– Remove cylinder head cover (right-side) ⇒ page 135 .

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



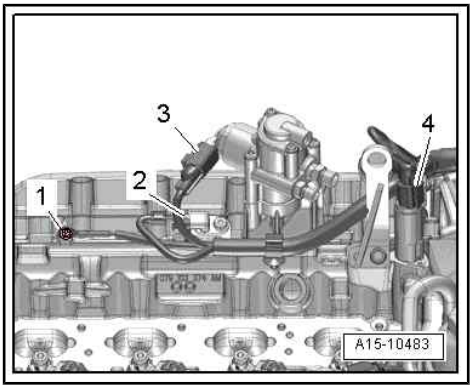

– Unplug electrical connectors:

2 - At Hall sender 4 - G301-

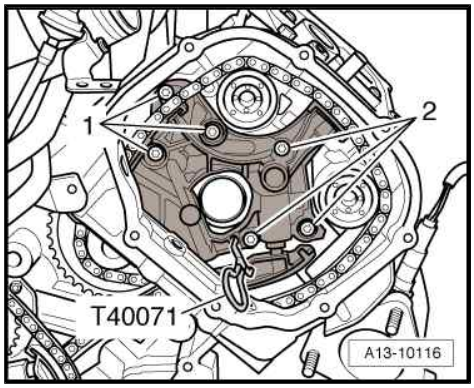
3 - At high-pressure pump (right-side)

4 - At camshaft control valve 1 - N205-

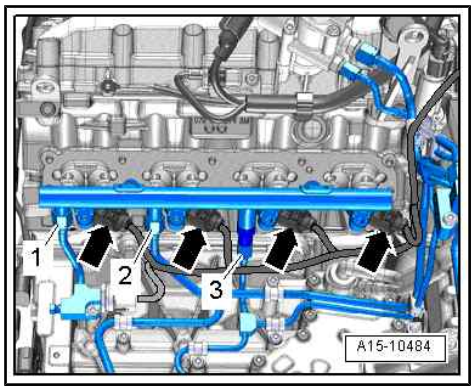
– Remove bolt -1-, detach wiring harness and move clear to one side.



– Remove bolts -1- and -2- and take off chain tensioner (right-side).




– Unplug electrical connectors -arrows- at injectors.
– Unscrew high-pressure pipes -1- and -2- at connections on fuel rail.
– Unscrew high-pressure pipe -3- from connection on fuel rail. To do so, counterhold at hexagon flats with an open-end spanner and loosen union nut.



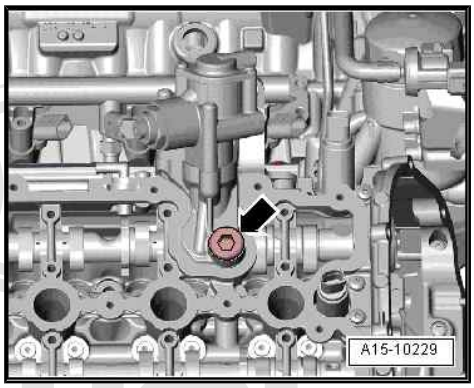

**Note**

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

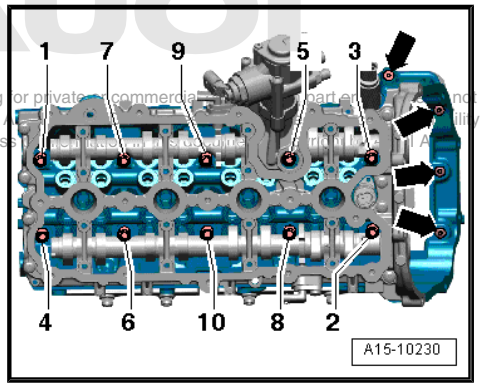
**Note**

*The following illustrations show the left-side cylinder head.*

– Remove screw plug -arrow-.




– Remove bolts -arrows-.
– Slacken cylinder head bolts in the sequence -1 ... 10-.
– Remove bolts and carefully take off cylinder head.
– Place cylinder head onto soft surface (foam plastic).




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

## 1.2.3 Installing cylinder head

**Procedure**

Tightening torques

- ⇒ “1.1 Exploded view - cylinder head”, page 125
- ⇒ Fig. ““Cylinder head - tightening torque and sequence”“ , page 127

**Caution**

*Risk of damage to sealing surfaces.*

- *Carefully remove sealant residue from cylinder head and cylinder block.*
- *Ensure that no long scores or scratches are made on the surfaces.*

*Risk of damage to cylinder block.*

- *No oil or coolant must be allowed to remain in the blind holes for the cylinder head bolts in the cylinder block.*

*Risk of leaks at cylinder head gasket.*

- *Carefully remove any sealant residue from the cylinder head and cylinder block. Ensure that no long scores or scratches are made on the surfaces.*
- *Carefully remove any remaining emery and abrasive material.*
- *Do not remove new cylinder head gasket from packaging until it is ready to be fitted.*
- *Handle the cylinder head gasket very carefully to prevent damage to the silicone coating or the indented area of the gasket.*

*Risk of damage to open valves.*

- *When installing an exchange cylinder head, the plastic protectors fitted to protect the open valves should not be removed until the cylinder head is ready to be fitted.*

*Risk of damage to valves and piston crowns after working on valve gear.*

- *Turn the engine carefully at least 2 rotations to ensure that none of the valves make contact when the starter is operated.*

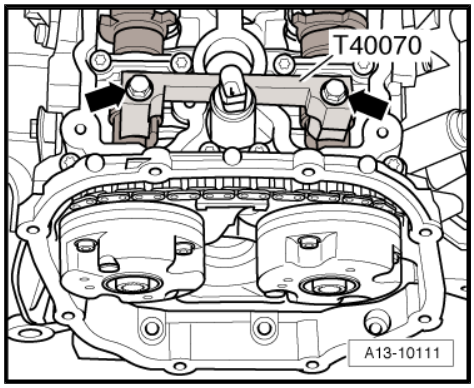
**Note**

- *Renew the bolts tightened with specified tightening angle.*
- *Renew self-locking nuts as well as seals, gaskets and O-rings.*
- *When installing an exchange cylinder head, the contact surfaces between the hydraulic compensation elements, roller rocker fingers and cams must be oiled before installing the cylinder head cover.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *After fitting a new cylinder head or cylinder head gasket, change the engine oil and the coolant in the entire cooling system.*

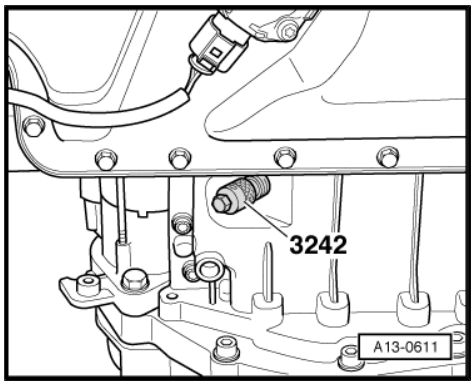
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Check that camshafts on both cylinder heads are positioned at “TDC”.

• Camshaft clamps - T40070- secured on both cylinder heads and tightened to 25 Nm -arrows-.




• Locking pin - 3242- screwed in.




**Note**

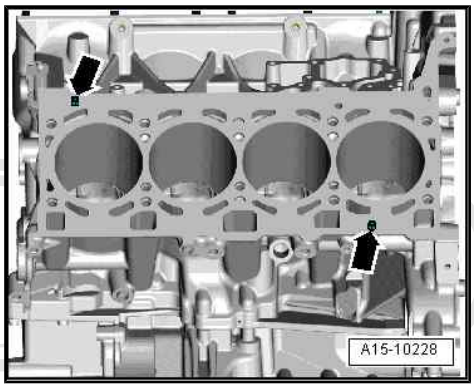
*The following illustrations show the left-side cylinder head.*

– Place cylinder head gasket in position.

• Pay attention to dowel sleeves -arrows- in cylinder block.

• Installation position of cylinder head gasket: the word “oben” (top) or the part number should face towards the cylinder head.

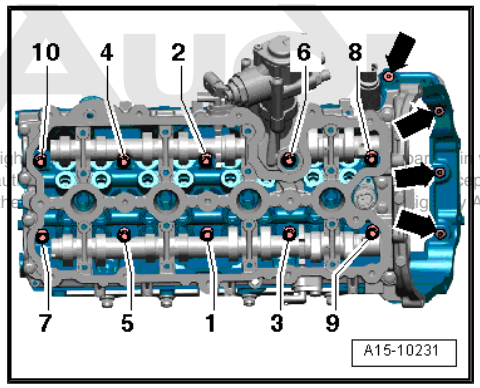
– Fit cylinder head.




– Tighten cylinder head bolts
⇒ Fig. ““Cylinder head - tightening torque and sequence”“ , page 127 .

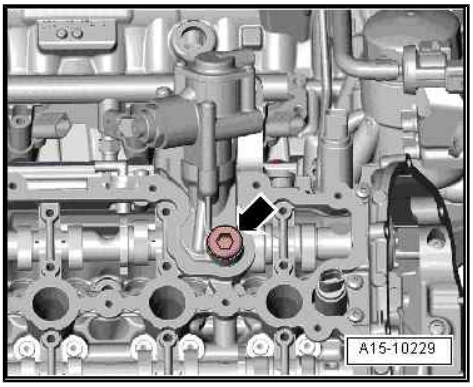
**Note**

*Cylinder head bolts do not have to be torqued down again later after repair work.*

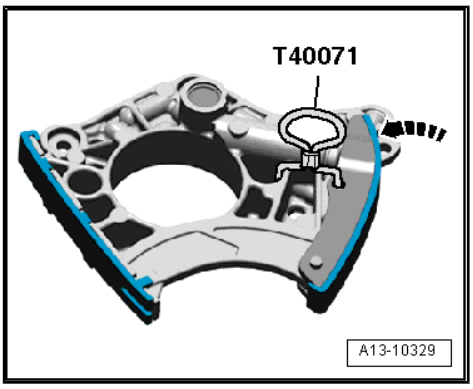



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Tighten screw plug -arrow-.



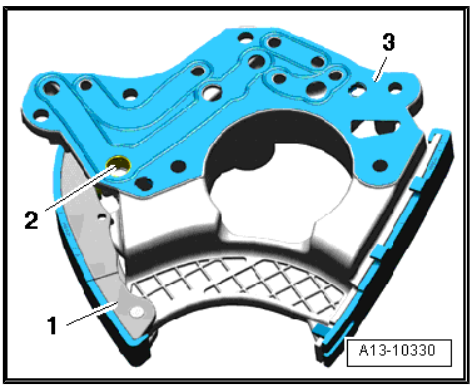

– Make sure that guide rail of chain tensioner for camshaft timing chain is locked with locking pin - T40071- .




**Note**

- *Note the correct installation position if the tensioning element has been removed from the chain tensioner: drilling in base of housing faces chain tensioner and piston faces tensioner rail.*
- *Disregard -arrow-.*

– Clean oil strainer -2- of chain tensioner.
– Fit new gasket -3- on rear of chain tensioner -1-.

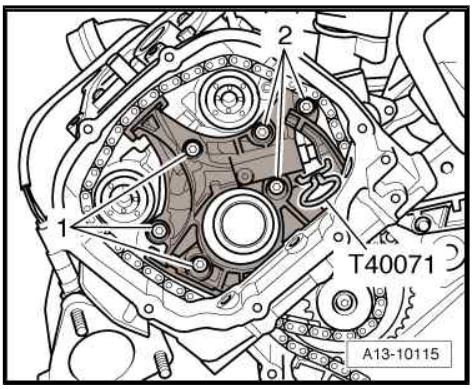



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Install chain tensioner and fit timing chain as shown in illustration.
– Tighten bolts -1- and -2-.

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

– Install cylinder head cover: left-side ⇒ page 134 ; right-side ⇒ page 135 .
– Install high-pressure pipes and intake manifold ⇒ page 306 .
– Fit timing chains on camshafts ⇒ page 167 .
– Install timing chain covers: left-side ⇒ page 144 , right-side ⇒ page 146 .
– Change engine oil ⇒ Maintenance ; Booklet 811 .
– Fill cooling system with fresh coolant ⇒ page 232 .



## 1.3 Removing and installing cylinder head cover

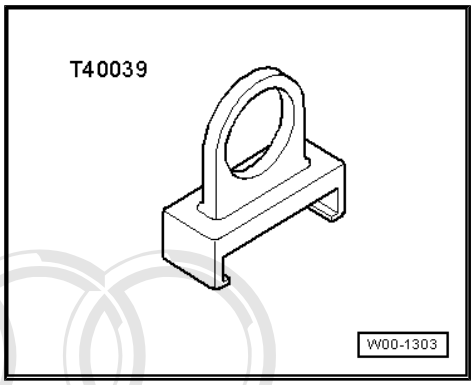
⇒ "1.3.1 Removing and installing cylinder head cover (left-side)", page 134

⇒ "1.3.2 Removing and installing cylinder head cover (right-side)", page 135

## 1.3.1 Removing and installing cylinder head cover (left-side)

**Special tools and workshop equipment required**

- Puller - T40039-



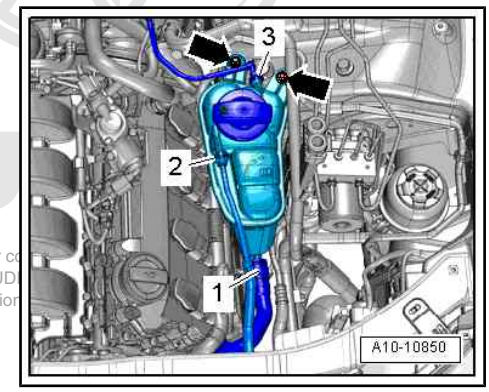

**Removing**

– Disconnect coolant hose -3- from coolant expansion tank.

– Remove bolts -arrows-.

– Unplug electrical connector at coolant shortage indicator switch - F66- and move expansion tank to one side with coolant hoses -1- and -2- attached.

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

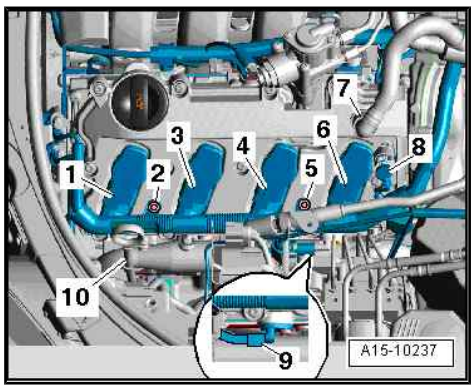



– Pull oil dipstick -10- out of guide tube.

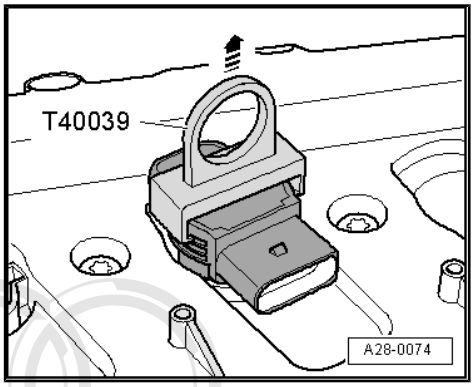
– Remove bolts -2- and -5-.

– Unplug electrical connectors -1, 3, 4, 6, 8, 9- and move wiring harness clear.

– Press release tabs and detach crankcase breather hose -7-.

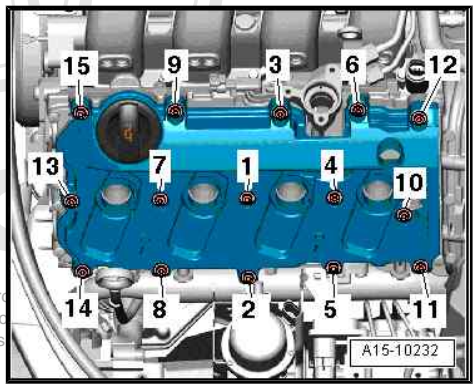


– Pull out ignition coils with puller - T40039- .




– Slacken bolts for cylinder head cover (left-side) in the sequence -15 ... 1-.

– Remove bolts and take off cylinder head cover (left-side).




**Installing**

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

- Tightening torque
  ⇒ Fig. ""Cylinder head cover (left-side) - tightening torque and sequence"" , page 126

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

**Note**

- *Renew gasket for cylinder head cover if damaged.*
- *Renew bolts for cylinder head cover if seals on bolts are damaged.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

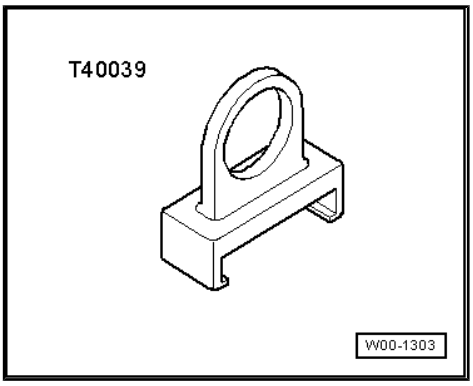
– Clean sealing surfaces; they must be free of oil and grease.

– Tighten bolts for cylinder head cover (left-side)
⇒ Fig. ""Cylinder head cover (left-side) - tightening torque and sequence"" , page 126 .

## 1.3.2 Removing and installing cylinder head cover (right-side)

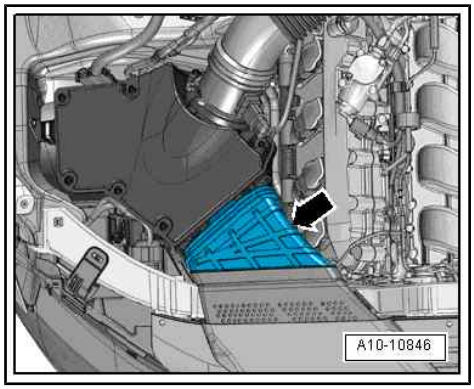
**Special tools and workshop equipment required**

- Puller - T40039-



**Removing**

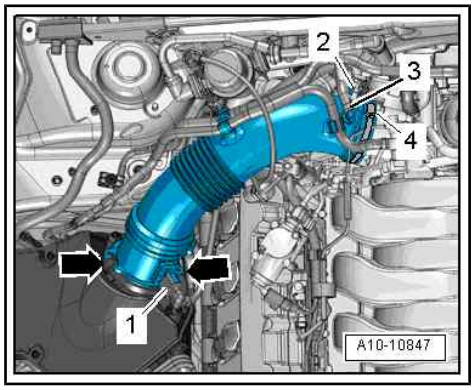
– Remove air duct -arrow-.




– Move clear fuel line and line going to activated charcoal filter at air pipe.
– Unplug electrical connector -1- at air mass meter - G70- .
– Disconnect vacuum line -3- from air pipe.

**Rest-of-world vehicles:**

– Press release tabs and detach crankcase breather hose -2- from air pipe.
– Unfasten hose clip -4-, release retaining clips -arrows- and remove air pipe with air mass meter - G70- .




**USA models:**

**Caution**

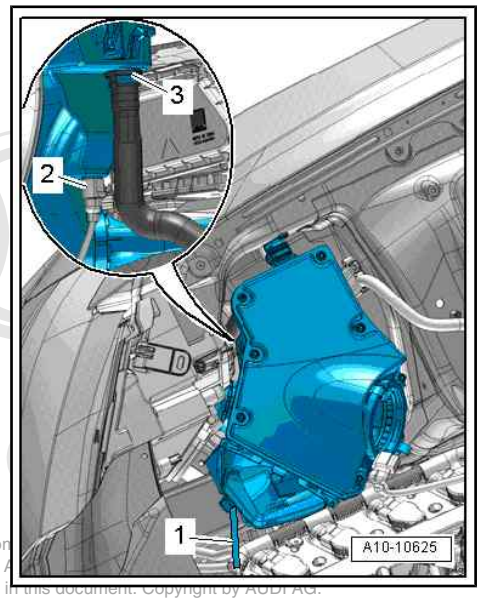
*Risk of violating emission legislation applying to USA models.*

- *Do NOT open hose connection -2-.*

– Move air pipe clear to one side (crankcase breather hose -2- remains connected). To do so, release hose clip -4- and clamps -arrows-.

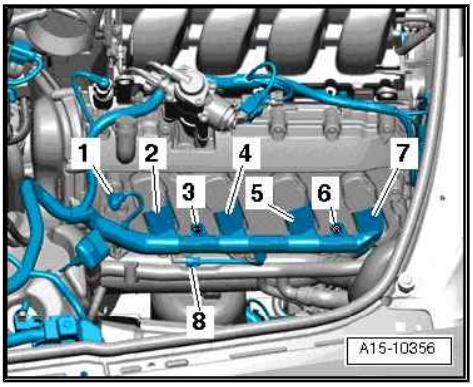
**Continued for all vehicles:**

– Disconnect vacuum line -1-.
– Detach air cleaner housing and unplug electrical connector -2- at variable intake manifold change-over valve - N335- on reverse side of air cleaner.
– Disconnect hose -3- for secondary air system.

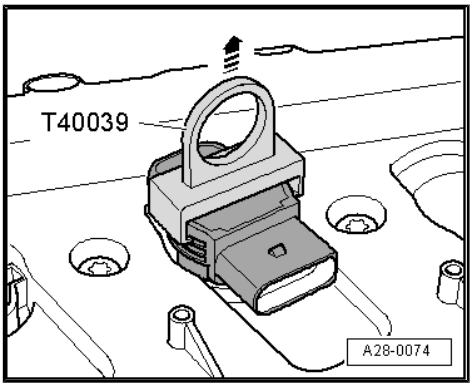



Protected by copyright. Copying for private or com
permitted unless authorised by AUDI AG. AUDI A
with respect to the correctness of information in this document. Copyright by AUDI AG.

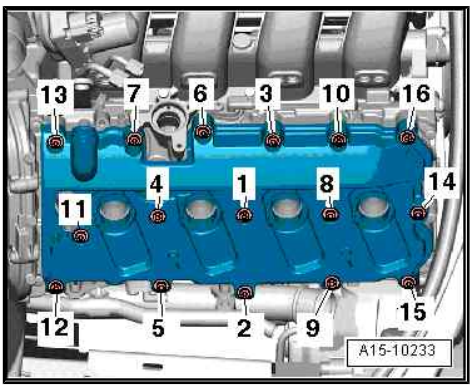
– Remove bolts -3- and -6- on cylinder head cover (right-side).
– Unplug electrical connectors -1, 2, 4, 5, 7, 8-.




– Pull out ignition coils with puller - T40039- .




– Slacken bolts for cylinder head cover (right-side) in the sequence -16 ... 1-.
– Remove bolts and take off cylinder head cover (right-side).




**Installing**

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

- Tightening torque
  ⇒ Fig. ""Cylinder head cover (right-side) - tightening torque and sequence"" , page 126

**Note**

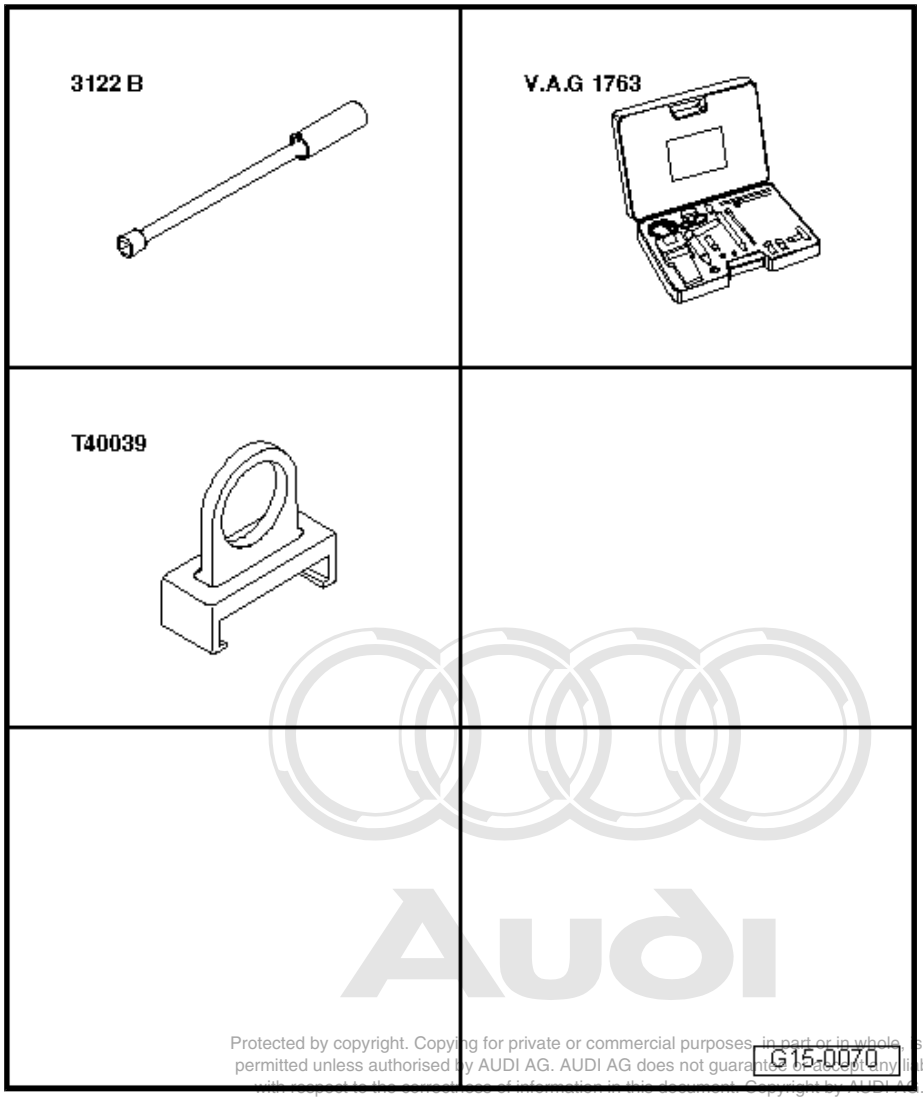
- *Renew gasket for cylinder head cover if damaged.*
- *Renew bolts for cylinder head cover if seals on bolts are damaged.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

– Clean sealing surfaces; they must be free of oil and grease.
– Tighten bolts for cylinder head cover (right-side)
  ⇒ Fig. ""Cylinder head cover (right-side) - tightening torque and sequence"" , page 126 .

## 1.4 Checking compression

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

## Special tools and workshop equipment required



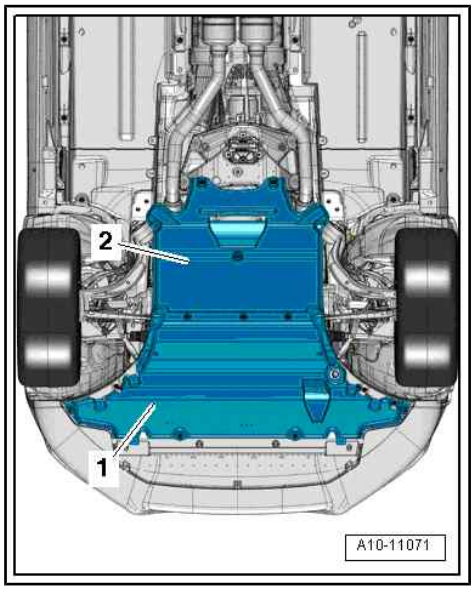

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Spark plug spanner - 3122 B-
- Compression tester - V.A.G 1763-
- Puller - T40039-

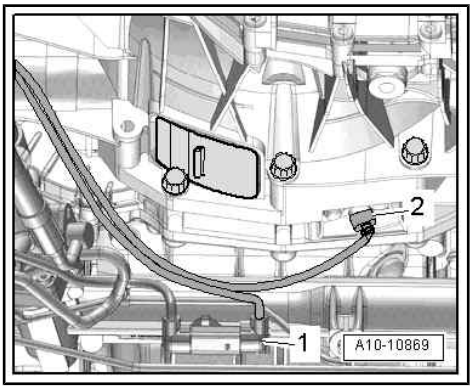
### Procedure

- Engine oil temperature at least 30 °C
- Battery voltage at least 12.5 V

– Remove rear noise insulation -2- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .



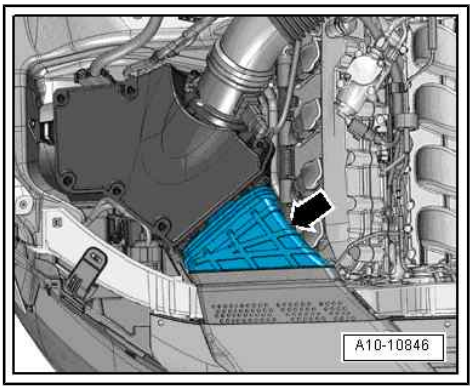
– Unplug electrical connector -2- for engine speed sender - G28- .




**Note**

*Disregard -item 1-.*

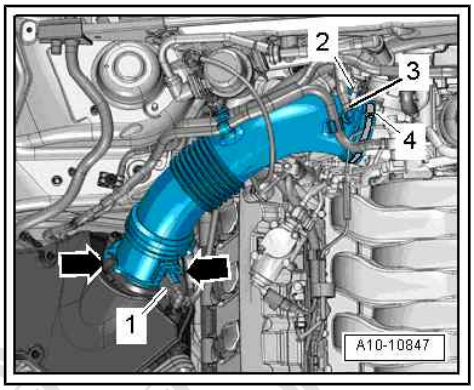
– Remove air duct -arrow-.




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

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

– Disconnect vacuum line -3- from air pipe.




**Rest-of-world vehicles:**

– Press release tabs and detach crankcase breather hose -2- from air pipe.

– Unfasten hose clip -4-, release retaining clips -arrows- and remove air pipe with air mass meter - G70- .

**USA models:**

**Caution**

***Risk of violating emission legislation applying to USA models.***

- ***Do NOT open hose connection -2-.***

– Move air pipe clear to one side (crankcase breather hose -2- remains connected). To do so, release hose clip -4- and clamps -arrows-.

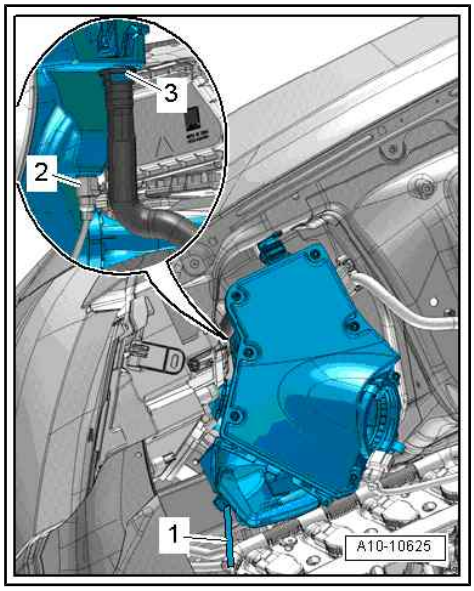
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

**Continued for all vehicles:**

– Disconnect vacuum line -1-.

– Detach air cleaner housing and unplug electrical connector -2- at variable intake manifold change-over valve - N335- on reverse side of air cleaner.

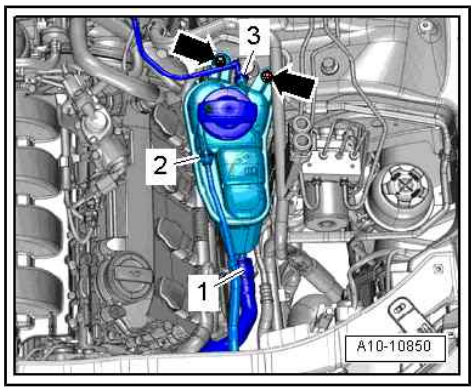
– Disconnect hose -3- for secondary air system.




– Disconnect coolant hose -3- from coolant expansion tank.

– Remove bolts -arrows-.

– Unplug electrical connector at coolant shortage indicator switch - F66- and move expansion tank to one side with coolant hoses -1- and -2- attached.

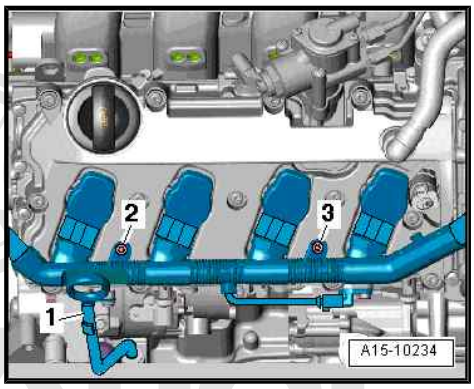



– Pull oil dipstick -1- out of guide tube.

– Remove bolts -2- and -3-.

– Unplug electrical connectors at ignition coils.

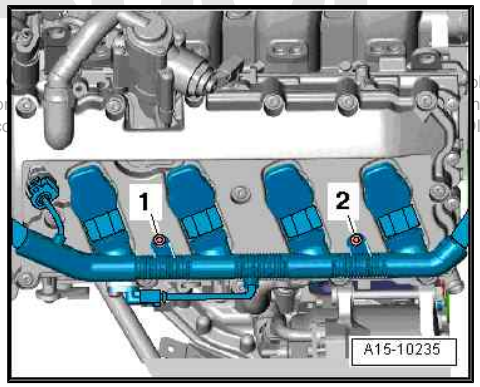
– Move wiring harness clear to the side.



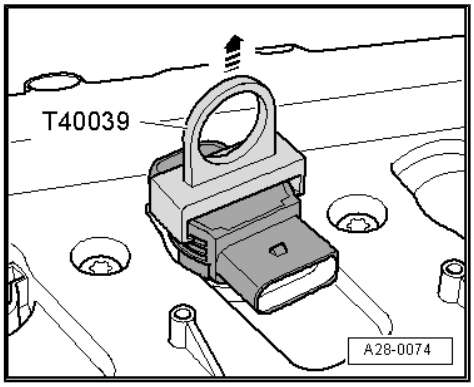

– Remove bolts -1- and -2-.

– Unplug electrical connectors at ignition coils.

– Move wiring harness clear to the side.




Protected by copyright. ... permitted unless author... with respect to the co... AG.




– Remove all ignition coils using puller - T40039- .
– Unscrew spark plugs using spark plug socket - 3122 B- .
– Check compression pressure with compression tester - V.A.G 1763- .

**Note**

*Using the compression tester ⇒ Operating instructions .*

– Have a 2nd mechanic press down the accelerator pedal completely and at the same time operate the starter until the pressure on the tester display no longer increases.
– Repeat procedure on each cylinder.

| Compression pressure | bar |
|---|---|
| When new | 10.0 … 14.0 |
| Wear limit | 9.0 |
| Maximum difference between cylinders | 3.0 |

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

– Install spark plugs ⇒ Maintenance ; Booklet 811 .
– Install noise insulation (rear) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

Entries are stored in the event memory of the engine control unit because electrical connectors were unplugged.

– `Generate readiness code` in `Guided Functions` ⇒ Vehicle diagnostic tester.

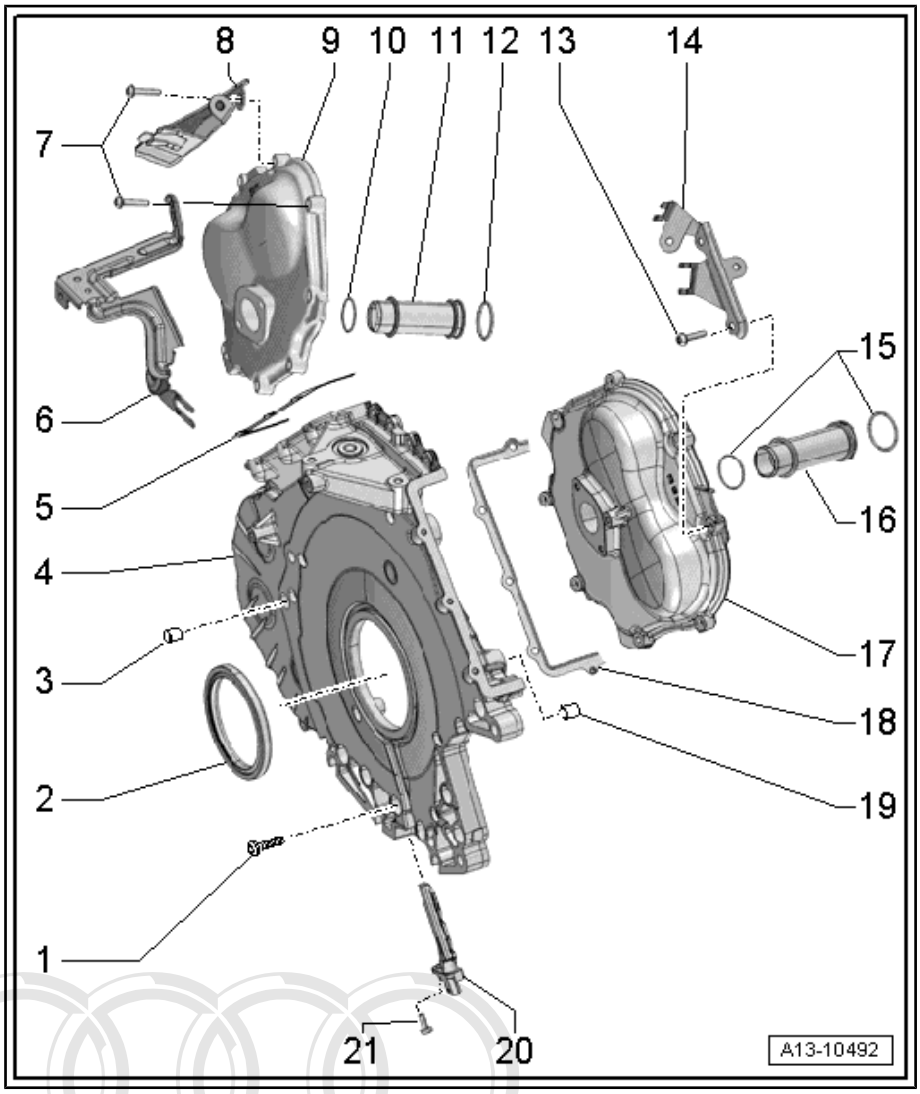
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

# 2 Timing chain cover

⇒ "2.1 Exploded view - timing chain cover", page 142

⇒ "2.2 Removing and installing timing chain cover", page 144

## 2.1 Exploded view - timing chain cover




**1 - Bolt**
- ❑ Tightening torque and sequence ⇒ page 144

**2 - Crankshaft oil seal (gearbox end)**
- ❑ Renewing ⇒ page 100

**3 - Dowel sleeve**
- ❑ 2x

**4 - Timing chain cover (bottom)**
- ❑ Removing and installing ⇒ page 151

**5 - Cylinder head gasket (left-side)**

**6 - Bracket**
- ❑ For electrical wiring harness

**7 - Bolts**
- ❑ Tightening torque and sequence ⇒ page 143

**8 - Bracket**
- ❑ For electrical connectors for Lambda probes (left-side)

**9 - Timing chain cover (left-side)**
- ❑ Removing and installing ⇒ page 144

**10 - O-ring**
- ❑ Renew

**11 - Intermediate coolant pipe (left-side)**
- ❑ Drive out with drift

**12 - O-ring**
- ❑ Renew

**13 - Bolt**
- ❑ Tightening torque and sequence ⇒ page 143

**14 - Bracket**
- ❑ For electrical connectors for Lambda probes (right-side)

**15 - O-rings**
- ❑ Renew

**16 - Intermediate coolant pipe (right-side)**
- ❑ Drive out with drift

Copyright AUDI AG. Duplication or distribution, for any 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.

**17 - Timing chain cover (right-side)**

Removing and installing ⇒ page 146

**18 - Cylinder head gasket (right-side)**

**19 - Dowel sleeve**

- ❑ 2x

**20 - Engine speed sender - G28-**

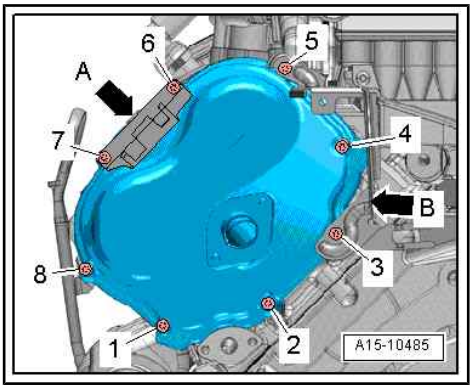
- ❑ Removing and installing ⇒ page 385

**21 - Bolt**

- ❑ Tightening torque ⇒ page 380

**Timing chain cover (left-side) - tightening torque and sequence**

– Tighten bolts for timing chain cover (left-side) in the sequence -1 ... 8- to 9 Nm.

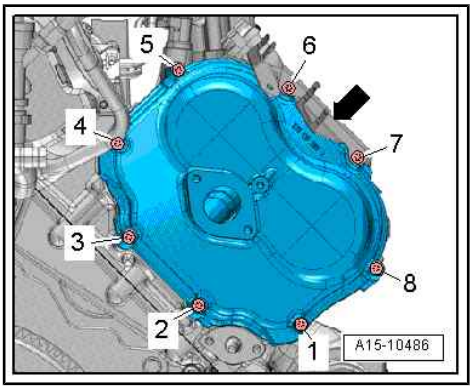



**Note**

*The brackets -arrows A and B- are secured together with the timing chain cover (left-side).*

**Timing chain cover (right-side) - tightening torque and sequence**

– Tighten bolts for timing chain cover (right-side) in the sequence -1 ... 8- to 9 Nm.

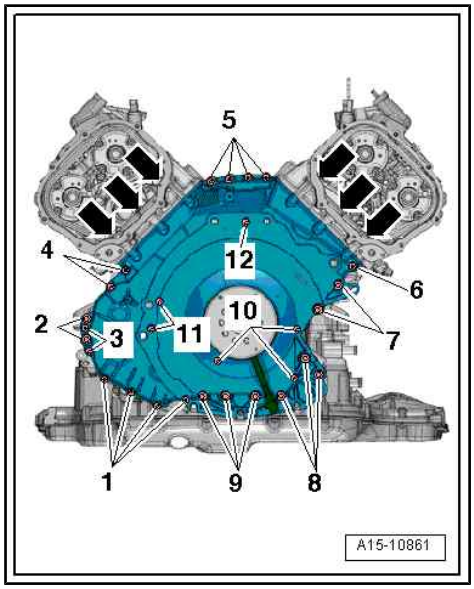



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

**Note**

*The bracket -arrow- is secured together with the timing chain cover (right-side).*

**Timing chain cover (bottom) - tightening torque and sequence**




**Note**

*Renew the bolts tightened with specified tightening angle.*

– Tighten bolts in 6 stages as follows:

| Stage | Bolts | Tightening torque/angle specification |
|---|---|---|
| 1. | -arrows- | Apply locking fluid when installing; 5 Nm<br>Locking fluid ⇒ Electronic parts catalogue |
| 2. | -1- ... -12- | 8 Nm in diagonal sequence |
| 3. | -arrows- | 8 Nm |
| 4. | -2, 7, 8, 9- | 22 Nm in diagonal sequence |
| 5. | -1, 3, 4, 5, 6, 10, 11, 12- | Turn 90° further in diagonal sequence |
| 6. | -arrows- | Turn 90° further |

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

## 2.2 Removing and installing timing chain cover

⇒ "2.2.1 Removing and installing timing chain cover (left-side)", page 144

⇒ "2.2.2 Removing and installing timing chain cover (right-side)", page 146

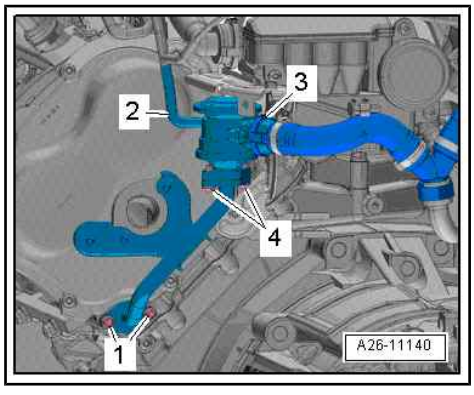
⇒ "2.2.3 Removing and installing timing chain cover (bottom)", page 151

## 2.2.1 Removing and installing timing chain cover (left-side)

**Special tools and workshop equipment required**

- Electric drill with plastic brush
- Safety goggles
- Sealant ⇒ Electronic parts catalogue

**Removing**



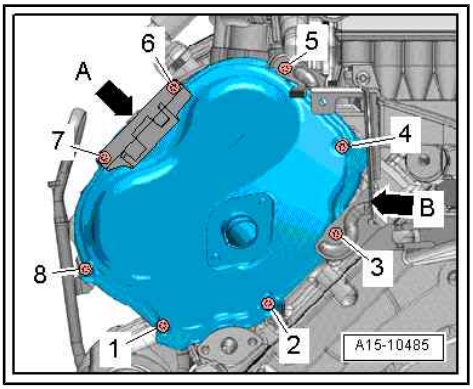

– Remove coolant pipe (top left) ⇒ page 249 .
– Remove coolant pipe (rear) ⇒ page 255 .
– If fitted, disconnect vacuum hose -2- from combination valve for secondary air system.
– Press release tabs and disconnect secondary air hose -3-.
– Unscrew bolts -1- and detach combination valve for secondary air system.

**Note**

*Disregard -item 4-.*

– Loosen and remove bolts in the sequence -8 ... 1- and detach bracket -arrow A- for electrical connectors for Lambda probes.

– Push bracket -arrow B- for wiring harness to one side, carefully detach timing chain cover (left-side) from bonded joint and remove.




### Installing

- Tightening torque
⇒ Fig. ""Timing chain cover (left-side) - tightening torque and sequence"" , page 143

**Note**

*Fit new O-rings.*

– Remove old sealant from grooves on timing chain cover and from sealing surfaces.

**Caution**

***Protect lubrication system against contamination.***

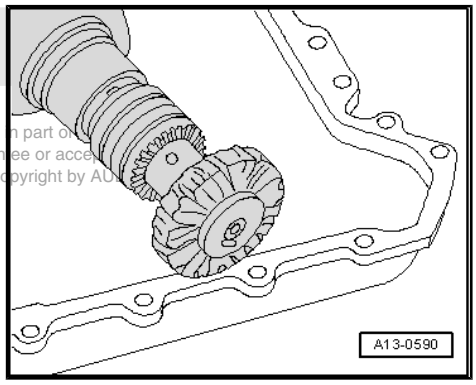
- ***Cover exposed parts of the engine.***

**WARNING**

***Risk of eye injury.***

- ***Put on safety goggles.***

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
with respect to the correctness of information in this document. Copyright by AUDI



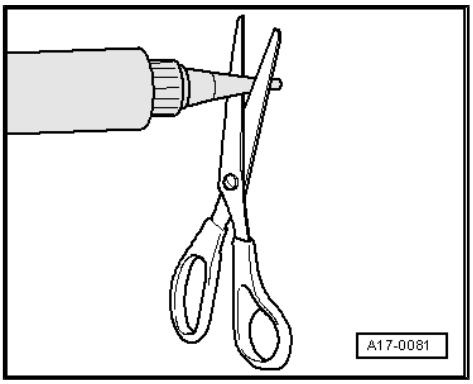

– Remove remaining sealant on timing chain cover and cylinder head using rotating plastic brush or similar.

– Clean sealing surfaces; they must be free of oil and grease.

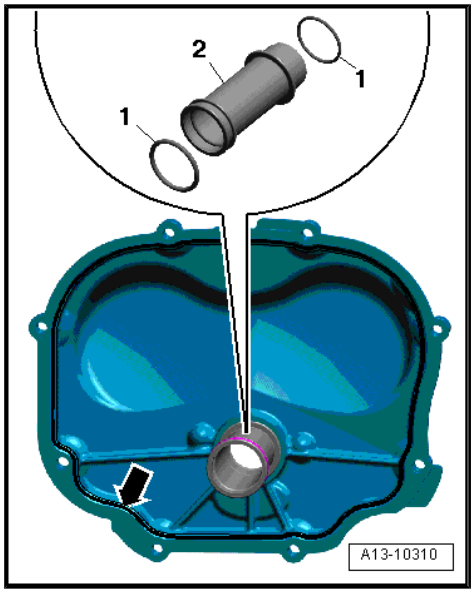
**Note**

*Note the use-by date of the sealant.*

– Cut off nozzle of tube at front marking (nozzle ∅ approx. 2 mm).



– Use drift to drive intermediate coolant pipe (left-side) -2- out of timing chain cover (left-side).
– Fit O-rings -1- on intermediate coolant pipe -2-.
– Fit intermediate coolant pipe in timing chain cover (left-side).




**Caution**

***Make sure lubrication system is not clogged by excess sealant.***

- ***The sealant bead must not be thicker than specified.***

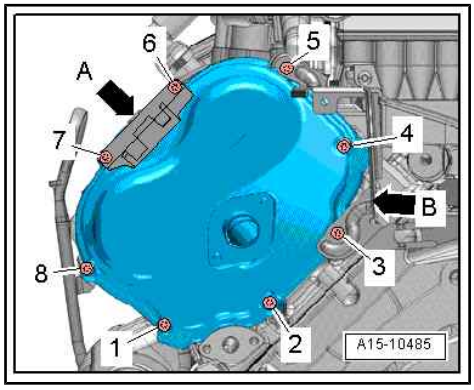
– Apply sealant bead -arrow- onto clean sealing surfaces of timing chain cover (left-side) as illustrated.

• Width of sealant bead: 2.5 mm.

**Note**

*The timing chain cover must be installed within 5 minutes after applying the sealant.*

– Fit timing chain cover (left-side) together with both brackets -arrows A and B- and tighten bolts ⇒ Fig. ""Timing chain cover (left-side) - tightening torque and sequence"" , page 143 .




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

– Install combination valve for secondary air (left-side) ⇒ page 366 .
– Install coolant pipe (rear) ⇒ page 255 .
– Install coolant pipe (top left) ⇒ page 249 .

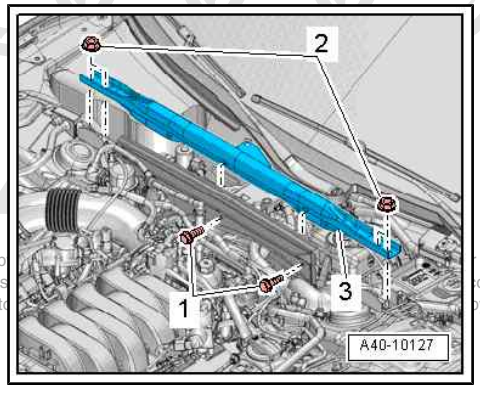
## 2.2.2 Removing and installing timing chain cover (right-side)

**Special tools and workshop equipment required**

- Articulated wrench (12 mm) - T40220- for engines up to engine number CAUA 005 521
- Electric drill with plastic brush
- Safety goggles
- Sealant ⇒ Electronic parts catalogue

**Removing**

– Drain coolant ⇒ page 229 .
– Remove front silencer (right-side) ⇒ page 343 .
– Remove body brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Removing and installing body brace .
– Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .

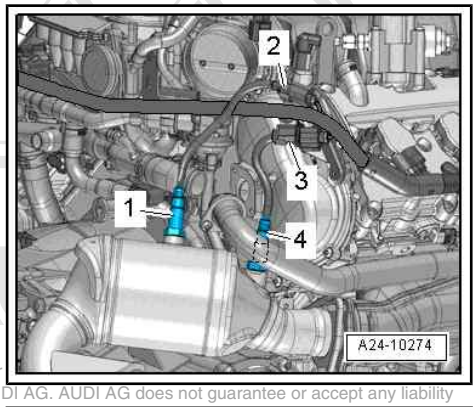



Protected by copyright. Copying for private or commercial purposes, in whole or in part, is not permitted unless authorized by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Remove Lambda probe - G39- -item 1- ⇒ page 336 .

– Detach electrical connector from bracket and unplug:

2 - For Lambda probe after catalytic converter - G130-



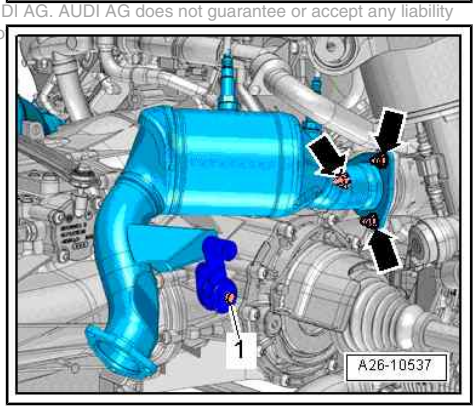

**Note**

- *Disregard items -3 and 4-.*
- *For illustration purposes, the installation position is shown with the engine removed.*

Protected by copyright. Copying for
permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability
with respect to the correctness o

– Remove nuts -arrows-; use articulated wrench (12 mm) - T40220- if necessary.

– Remove bolt -1-, detach catalytic converter (right-side) and move it clear to the side.



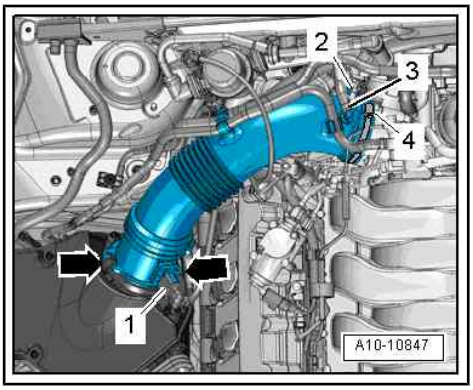

**Note**

*For illustration purposes, the installation position is shown with the engine removed.*

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

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

– Disconnect vacuum line -3- from air pipe.




**Rest-of-world vehicles:**

– Press release tabs and detach crankcase breather hose -2- from air pipe.

– Unfasten hose clip -4-, release retaining clips -arrows- and remove air pipe with air mass meter - G70- .

**USA models:**

**Caution**

***Risk of violating emission legislation applying to USA models.***

- ***Do NOT open hose connection -2-.***

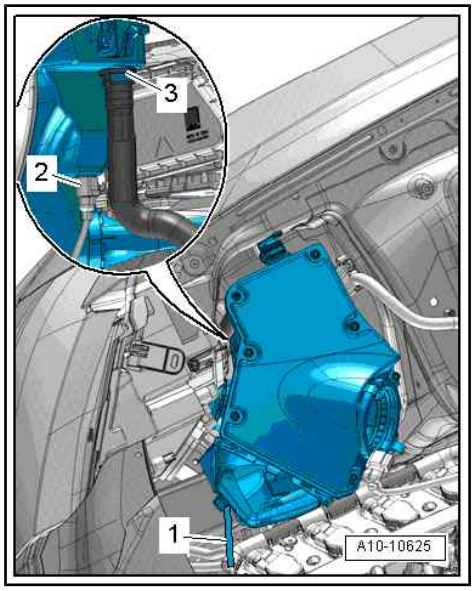
– Move air pipe clear to one side (crankcase breather hose -2- remains connected). To do so, release hose clip -4- and clamps -arrows-.

**Continued for all vehicles:**

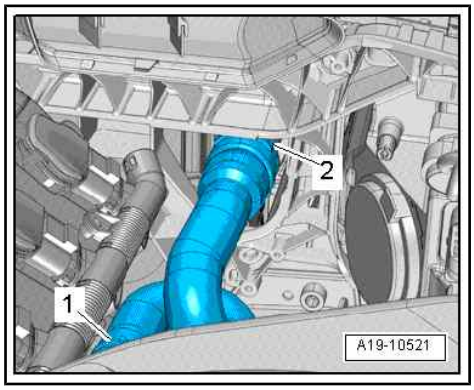
– Disconnect vacuum line -1-.

– Detach air cleaner housing and unplug electrical connector -2- at variable intake manifold change-over valve - N335- on reverse side of air cleaner.

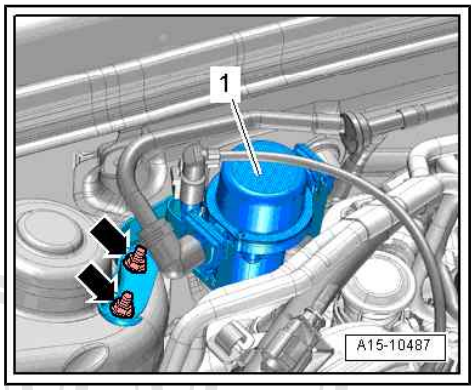
– Disconnect hose -3- for secondary air system.




– Lift retaining clip -2-, release hose clip -1- on coolant pipe (right-side) and remove coolant hose.

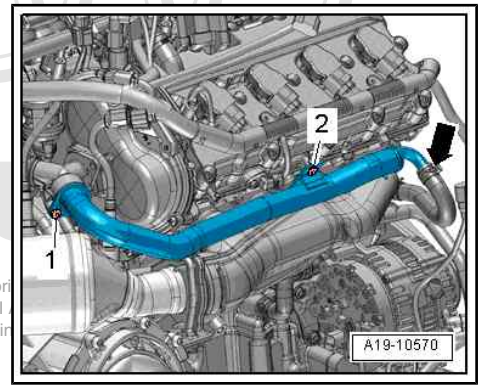



– Remove nuts -arrows- and move vacuum pump -1- to one side with lines connected.



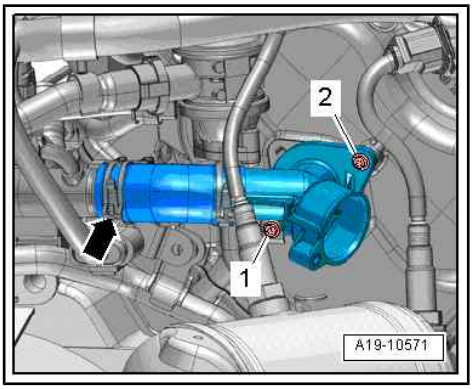

– Remove bolts -1- and -2- and detach coolant hose -arrow-.

– Detach coolant pipe (right-side) from coolant connection and move clear to the side.




Protected by copyright. Copying for pri
permitted unless authorised by AUDI
with respect to the correctness of in

– Remove bolts -1- and -2- and release hose clip -arrow-.
– Pull out coolant connection towards the right side.

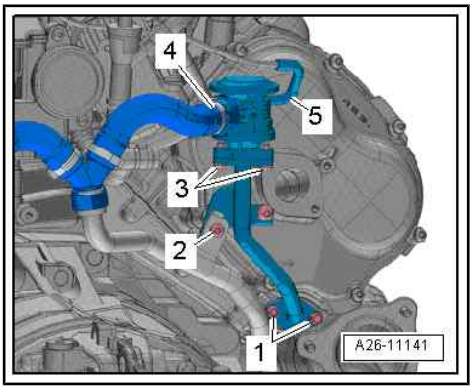



– If fitted, disconnect vacuum hose -5- from combination valve for secondary air system.
– Press release tabs and disconnect secondary air hose -4-.
– Unscrew bolts -1- and -2- and remove combination valve for secondary air system.

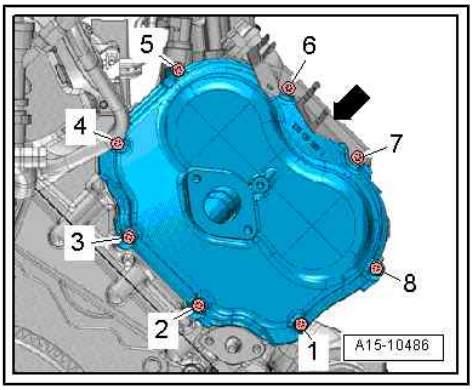
**Note**

*Disregard -item 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.




– Slacken and remove bolts in the sequence: -8 ... 1-.
– Carefully detach timing chain cover (right-side) from bonded joint and remove together with bracket -arrow- for electrical connectors for Lambda probes.




### Installing

- Tightening torques
⇒ Fig. ""Timing chain cover (right-side) - tightening torque and sequence"" , page 143

**Note**

*Fit new O-rings.*

– Remove old sealant from grooves on timing chain cover and from sealing surfaces.

**Caution**

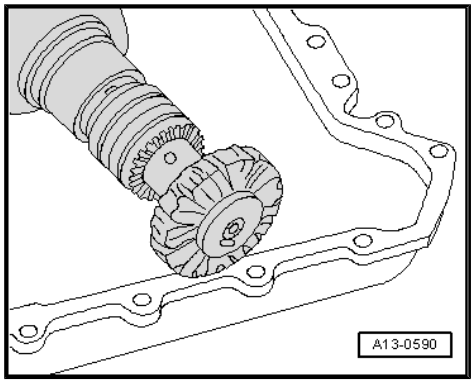
***Protect lubrication system against contamination.***

- ***Cover exposed parts of the engine.***

**WARNING**

*Risk of eye injury.*

- *Put on safety goggles.*



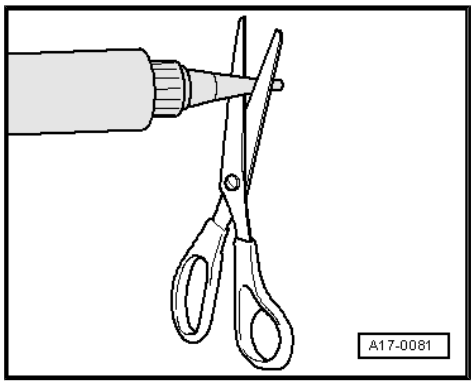

– Remove remaining sealant on timing chain cover and cylinder head using rotating plastic brush or similar.

– Clean sealing surfaces; they must be free of oil and grease.

**Note**

*Note the use-by date of the sealant.*

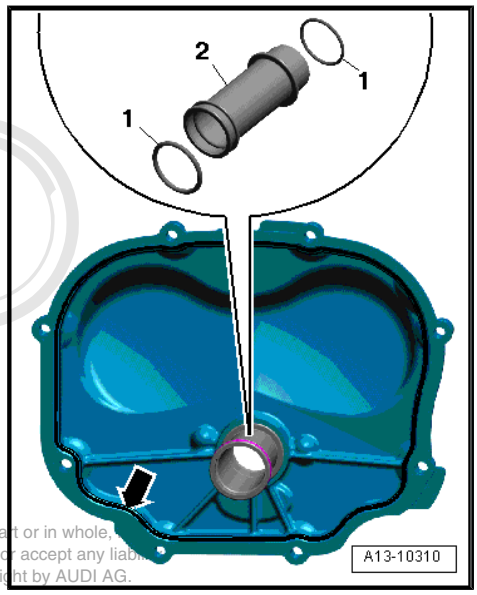
– Cut off nozzle of tube at front marking (nozzle ∅ approx. 2 mm).




– Use drift to drive intermediate coolant pipe (right-side) -2- out of timing chain cover (right-side).

– Fit O-rings -1- on intermediate coolant pipe -2-.

– Fit intermediate coolant pipe in timing chain cover (right-side).




**Caution**

*Make sure lubrication system is not clogged by excess sealant.*

- *The sealant bead must not be thicker than specified.*

– Apply sealant bead -arrow- onto clean sealing surfaces of timing chain cover (right-side) as illustrated.

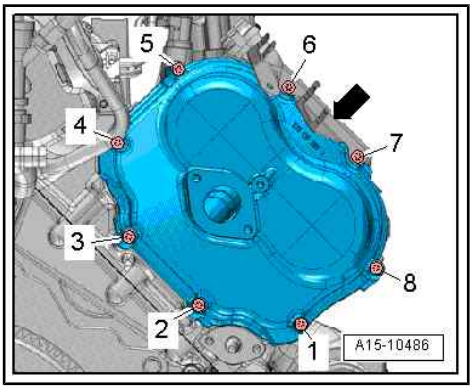
- Width of sealant bead: 2.5 mm.

**Note**

*The timing chain cover must be installed within 5 minutes after applying the sealant.*

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

– Fit timing chain cover (right-side) together with bracket -arrow- and tighten bolts
⇒ Fig. ""Timing chain cover (right-side) - tightening torque and sequence"" , page 143 .



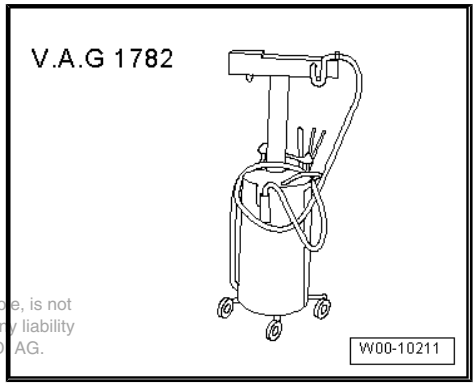

Remaining installation steps are carried out in reverse sequence; note the following:

– Install combination valve for secondary air (right-side) ⇒ page 367 .
– Install coolant connection ⇒ page 244 .
– Install coolant pipe (right-side) ⇒ page 254 .
– Install catalytic converter (right-side): vehicles with manual gearbox ⇒ page 351 ; vehicles with automatic gearbox ⇒ page 351 .
– Install front silencer (right-side) ⇒ page 343 .
– Install Lambda probe - G39- ⇒ page 336 .
– Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .
– Install body brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Removing and installing body brace .
– Install vacuum pump ⇒ Brake system; Rep. gr. 47 ; Vacuum system; Exploded view - vacuum pump .

## 2.2.3 Removing and installing timing chain cover (bottom)

**Special tools and workshop equipment required**

♦ Used oil collection and extraction unit - V.A.G 1782-



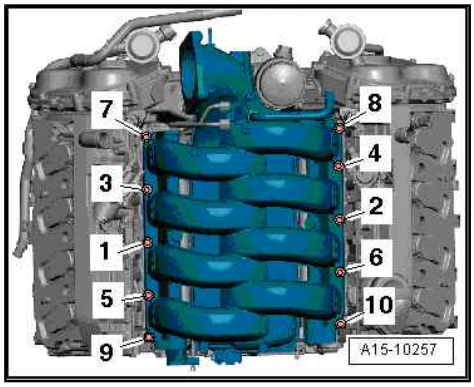

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

♦ Electric drill with plastic brush attachment
♦ Safety goggles
♦ Sealant ⇒ Electronic parts catalogue

**Removing**

• Gearbox removed ⇒ Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox or ⇒ Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .
– Place used oil collection and extraction unit - V.A.G 1782- below engine and drain off engine oil.
– Remove drive plate ⇒ page 99 .
– Remove timing chain covers: left-side ⇒ page 144 , right-side ⇒ page 146 .

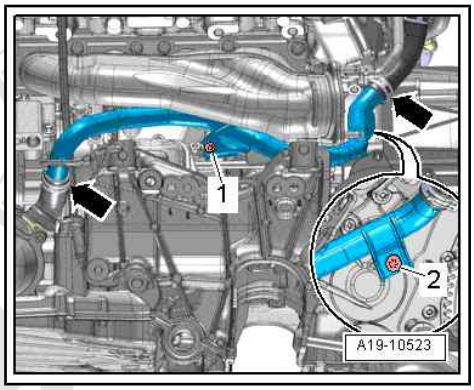
– Remove intake manifold ⇒ page 306 .
– Remove oil filter housing ⇒ page 221 .



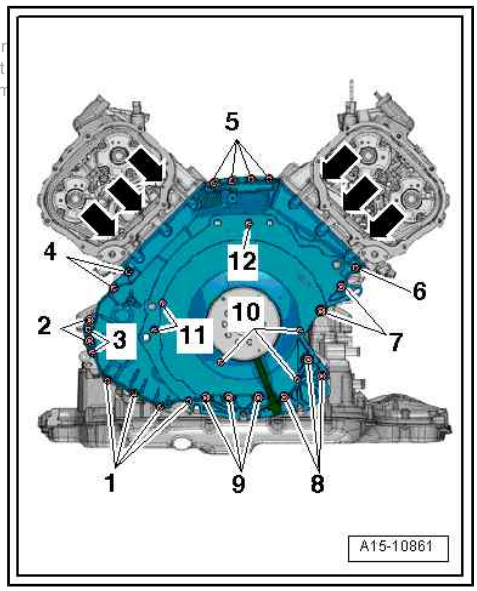

– Remove bolts -1- and -2- and swivel coolant pipe (bottom left) to one side.

**Note**

*Disregard -arrows-.*




– Remove bolts -arrows-.
– Slacken and remove bolts in the sequence: -12- -1-
– Carefully release timing chain cover (bottom) from bonded joint and remove cover.
– Press crankshaft oil seal (gearbox end) out of timing chain cover (bottom).




Protected by copyright. Copying for private or commercial pur
with respect to the correctness of information in this docum

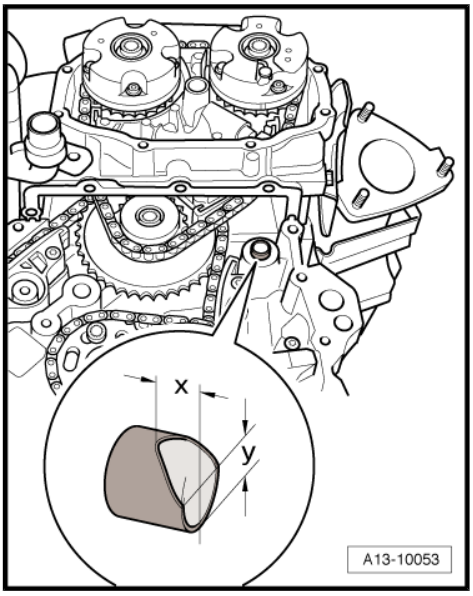
### Installing

- Tightening torques
  ⇒ Fig. ““Timing chain cover (bottom) - tightening torque and sequence”“ , page 144

**Note**

*Renew M6 bolts.*

– Pull dowel sleeve at top right out of cylinder block.
– Bevel the dowel sleeve with a file, as illustrated.
- Dimension -x- = 6.5 mm.
- Dimension -y- = 8 mm.
– Fit dowel sleeve on cylinder block in such a way that the bevelled side points upwards.




**Note**

*Bevelling the dowel sleeve makes it easier to fit the timing chain cover (bottom) with the cylinder head installed.*

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 res the correctness of information in this document. Copyright by AUDI AG.

**Caution**

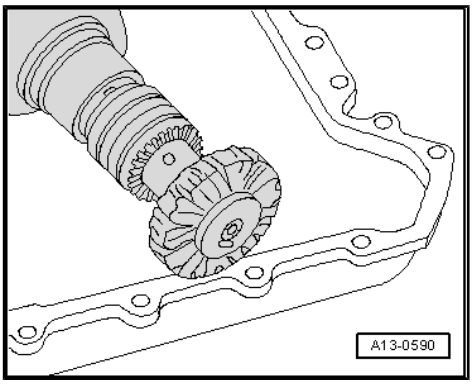
***Protect lubrication system against contamination.***

- ***Cover exposed parts of the engine.***

**WARNING**

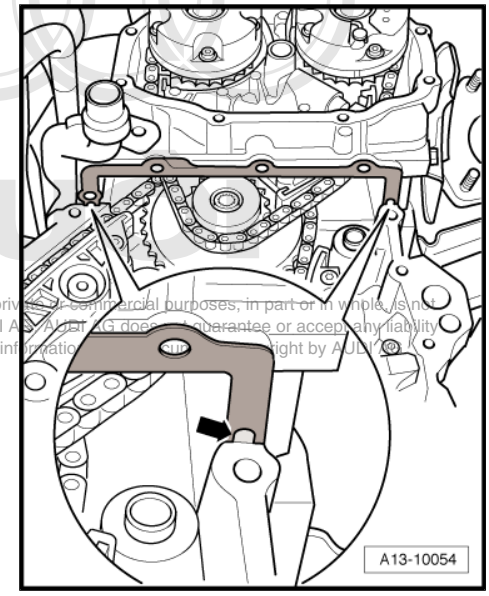
***Risk of eye injury.***

- ***Put on safety goggles.***




– Remove remaining sealant on timing chain cover (bottom) and on cylinder block and cylinder head using rotating plastic brush or similar.
– Clean sealing surfaces; they must be free of oil and grease.
– Before installing gearbox, remove residue from threaded holes for engine/gearbox bolts in cylinder block using a thread tap.

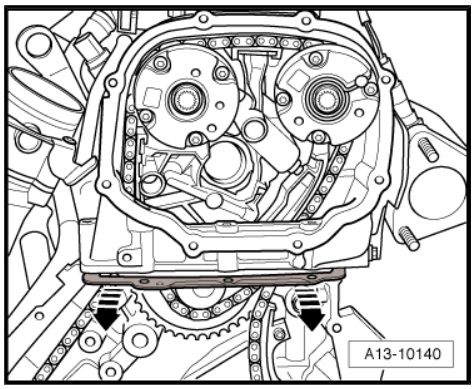
– Clean old sealant from holes -arrow- in cylinder head gaskets.




**Note**

*With the cylinder head installed the holes in the cylinder head gasket are only half visible.*

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




**Caution**

***Avoid damage to cylinder head gasket.***

- ***Only bend the ends of the cylinder head gaskets slightly and do not kink.***

**Note**

*If the cylinder head gasket has been bent and kinked it must be renewed.*

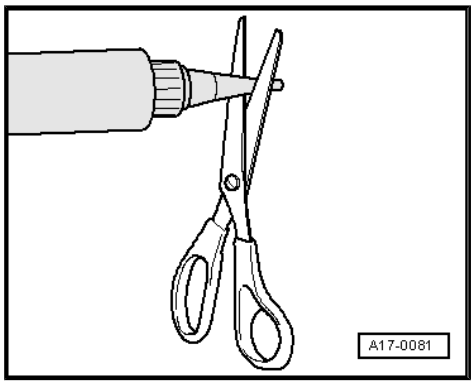
– Carefully bend the ends of the cylinder head gaskets down very slightly -arrows-, just far enough to be able to clean the upper sealing surface on the cylinder head gasket and cylinder head.

– Clean cylinder head gaskets (top and bottom); they must be free of oil and grease.

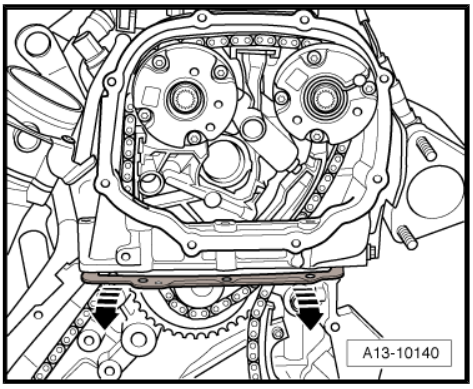
**Note**

*Note the use-by date of the sealant.*

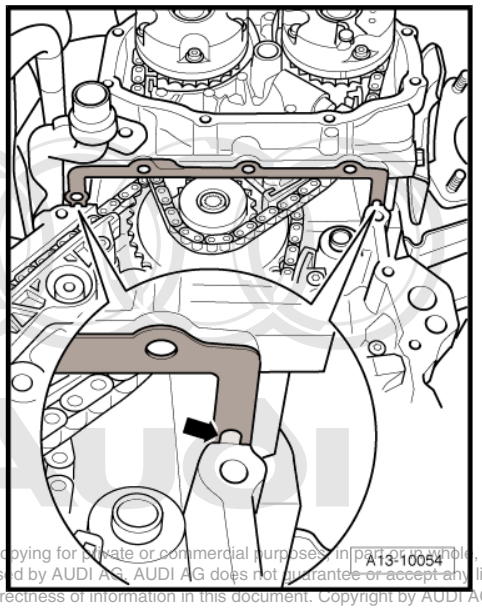
– Cut off nozzle of tube at front marking (nozzle ∅ approx. 2 mm).



– Apply a small amount of sealant to sealing surfaces of cylinder head gaskets (top and bottom). To do so, you again have to bend cylinder head gaskets down very slightly -arrows-.
– Use a flat object (e.g. a feeler gauge) to apply sealant to the area between cylinder head and gasket.




– Clean holes -arrow- in cylinder head gaskets and fill them with sealant.




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

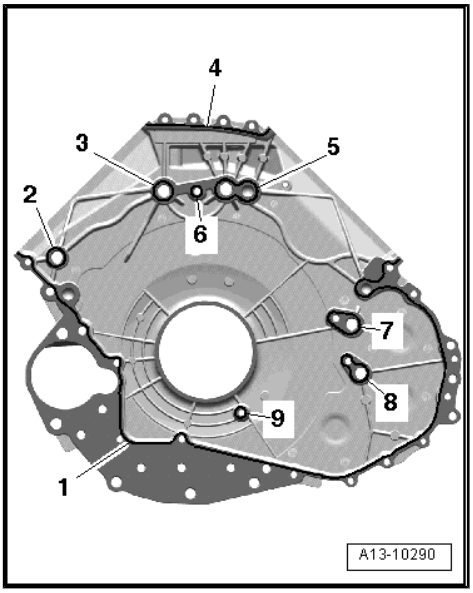
**Caution**

***Make sure lubrication system is not clogged by excess sealant.***

- ***The sealant bead must not be thicker than specified.***

– Apply sealant beads -1 ... 9- onto the clean sealing surfaces of the timing chain cover (bottom) as illustrated.

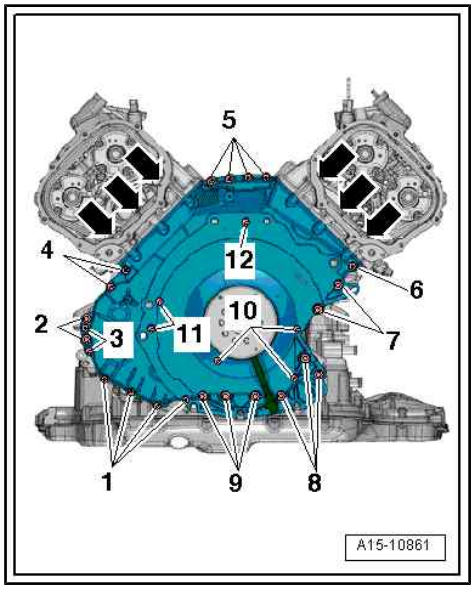
• Width of sealant beads: 2.5 mm.




**Note**

*The timing chain cover must be installed within 5 minutes after applying the sealant.*

– Fit timing chain cover (bottom), guiding it towards the sealing surface on cylinder block and cylinder head at an angle and from below.
– Take care not to damage the cylinder head gaskets when fitting the cover.
– Tighten bolts
⇒ Fig. ""Timing chain cover (bottom) - tightening torque and sequence"" , page 144 .




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

– Install crankshaft oil seal (gearbox end) ⇒ page 100 .
– Install coolant pipe (bottom left) ⇒ page 253 .
– Install oil filter housing ⇒ page 221 .
– Install intake manifold ⇒ page 306 .
– Install timing chain covers: left-side ⇒ page 144 , right-side ⇒ page 146 .
– Install drive plate ⇒ page 99 .

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 Chain drive

⇒ “3.1 Exploded view - camshaft timing chains”, page 157

⇒ “3.2 Exploded view - drive chain for valve gear”, page 160

⇒ “3.3 Exploded view - drive chain for auxiliary drives”, page 161

⇒ “3.4 Removing and installing camshaft timing chain”, page 161

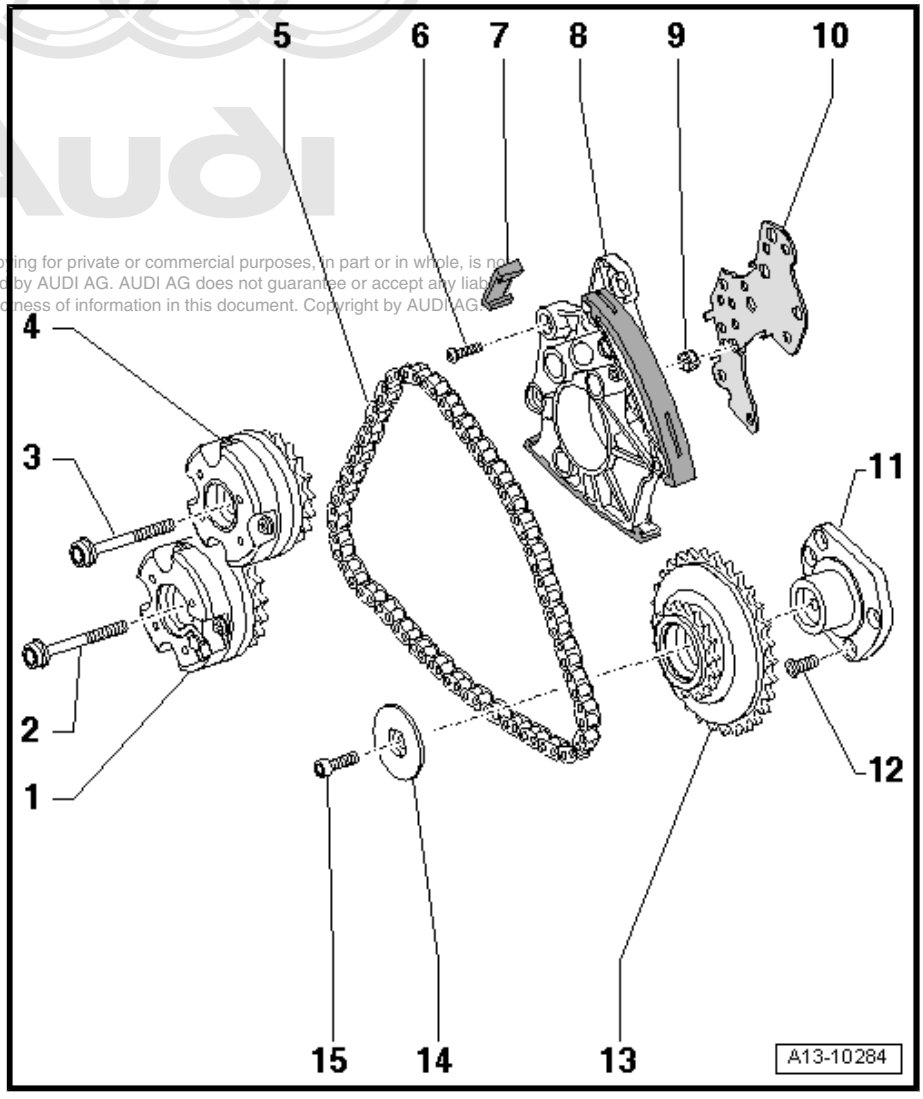
⇒ “3.5 Removing camshaft timing chain from camshafts”, page 163

⇒ “3.6 Removing and installing drive chain for valve gear”, page 171

⇒ “3.7 Removing and installing drive chain for auxiliary drive”, page 173

## 3.1 Exploded view - camshaft timing chains

**Camshaft timing chain (left-side)**




**1 - Camshaft adjuster for exhaust camshaft**

- ❑ Identification “Exhaust”
- ❑ Removing and installing ⇒ page 161

**2 - Bolt**

- ❑ Renew
- ❑ 80 Nm +90°

**3 - Bolt**

- ❑ Renew
- ❑ 80 Nm +90°

**4 - Camshaft adjuster for inlet camshaft**

- ❑ Identification “Intake”
- ❑ Removing and installing ⇒ page 161

**5 - Camshaft timing chain (left-side)**

- ❑ Removing from camshafts ⇒ page 163
- ❑ Before removing, mark running direction with paint
- ❑ Removing and installing ⇒ page 161

**6 - Bolt**

- ❑ Renew
- ❑ 5 Nm +90°

**7 - Slide**

**8 - Chain tensioner for camshaft timing chain (left-side)**

- ❑ Removing and installing ⇒ page 161

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.

**9 - Oil strainer**

- ❑ Inserted in chain tensioner
- ❑ Watch position of locking lug on outer circumference

**10 - Gasket**

- ❑ Renew
- ❑ Clipped onto chain tensioner

**11 - Bearing bracket for drive sprocket**

**12 - Bolt**

- ❑ Tightening torque ⇒ Item 10 (page 160)

**13 - Drive sprocket for camshaft timing chain (left-side)**

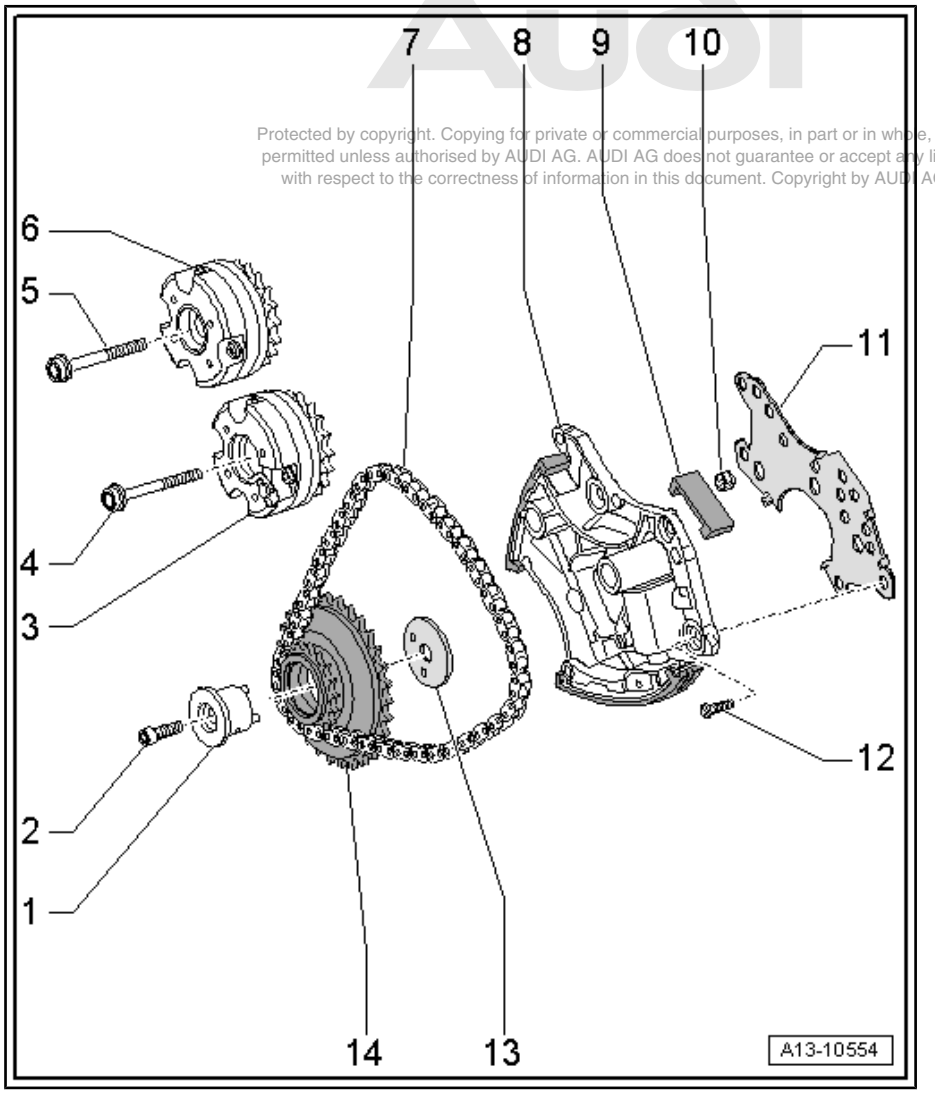
**14 - Thrust washer for drive sprocket**

**15 - Bolt**

- ❑ Tightening torque ⇒ Item 3 (page 160)

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.

## Camshaft timing chain (right-side)




**1 - Bearing mounting for drive sprocket**

- ❑ For camshaft timing chain (right-side)
- ❑ Asymmetric version
- ❑ Installation position ⇒ page 159

**2 - Bolt**

- ❑ Tightening torque ⇒ Item 15 (page 160)

**3 - Camshaft adjuster for exhaust camshaft**

- ❑ Identification “Exhaust”
- ❑ Removing and installing ⇒ page 161

**4 - Bolt**

- ❑ Renew
- ❑ 80 Nm +90°

**5 - Bolt**

- ❑ Renew
- ❑ 80 Nm +90°

**6 - Camshaft adjuster for inlet camshaft**

- ❑ Identification “Intake”
- ❑ Removing and installing ⇒ page 161

**7 - Camshaft timing chain (right-side)**

- ❑ Removing from camshafts ⇒ page 163
- ❑ Before removing, mark running direction with paint
- ❑ Removing and installing ⇒ page 161

**8 - Chain tensioner for camshaft timing chain (right-side)**

- ❑ Removing and installing ⇒ page 161

**9 - Slide**

**10 - Oil strainer**

- ❑ Inserted in chain tensioner
- ❑ Installation position: note locating lug on outer circumference

**11 - Gasket**

- ❑ Renew
- ❑ Clipped onto chain tensioner

**12 - Bolt**

- ❑ Renew
- ❑ 5 Nm +90°

**13 - Thrust washer for drive sprocket**

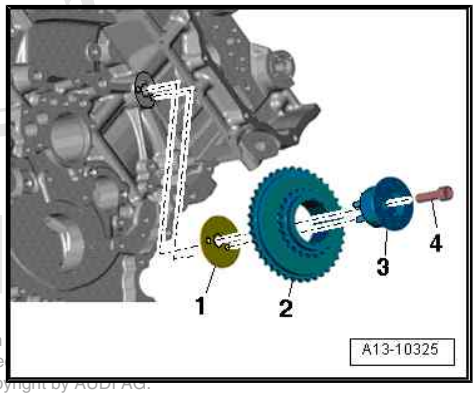
**14 - Drive sprocket for camshaft timing chain (right-side)**

**Installation position: bearing mounting for drive sprocket for camshaft timing chain (right-side)**

- Dowel pins in bearing mounting -3- for drive sprocket for camshaft timing chain (right-side) must engage in drillings in thrust washer -1- and in cylinder block drillings.

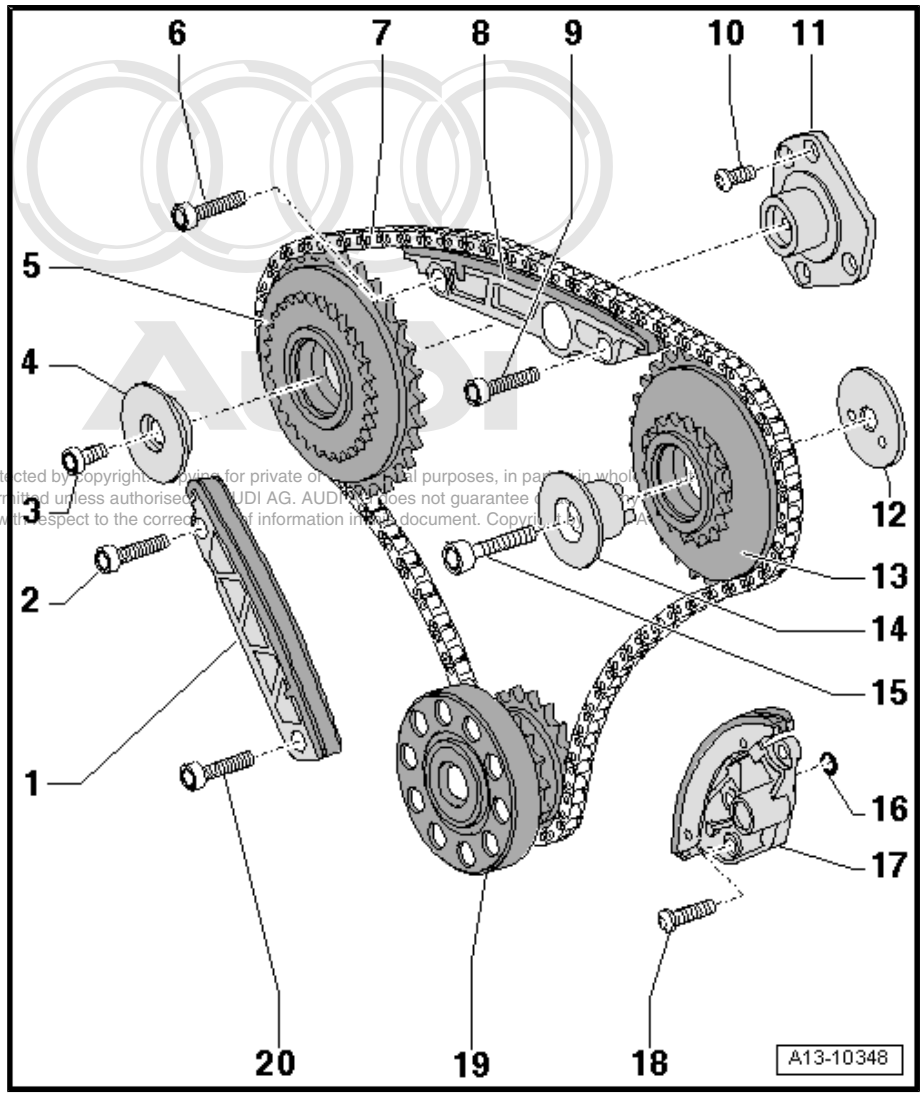
2 - Drive sprocket for camshaft timing chain (right-side)

4 - Bolt




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

## 3.2 Exploded view - drive chain for valve gear




**1 - Guide rail**

**2 - Bolt**
- ❑ Renew
- ❑ 10 Nm +90°

**3 - Bolt**
- ❑ 22 Nm

**4 - Thrust washer for drive sprocket**

**5 - Drive sprocket for timing chain (left-side)**

**6 - Bolt**
- ❑ Renew
- ❑ 10 Nm +90°

**7 - Drive chain for valve gear**
- ❑ Removing and installing ⇒ page 171

**8 - Guide rail**

**9 - Bolt**
- ❑ Renew
- ❑ 10 Nm +90°

**10 - Bolt**
- ❑ 9 Nm

**11 - Bearing mounting for drive sprocket**
- ❑ For camshaft timing chain (right-side)
- ❑ Asymmetric version
- ❑ Installation position ⇒ page 161

**12 - Thrust washer**

**13 - Drive sprocket for timing chain (right-side)**

**14 - Bearing mounting for drive sprocket**

**15 - Bolt**
- ❑ 42 Nm

**16 - O-ring**
- ❑ Renew

**17 - Chain tensioner**

**18 - Bolt**
- ❑ Renew
- ❑ 5 Nm +90°

**19 - Crankshaft**

**20 - Bolt**
- ❑ Renew
- ❑ 10 Nm +90°

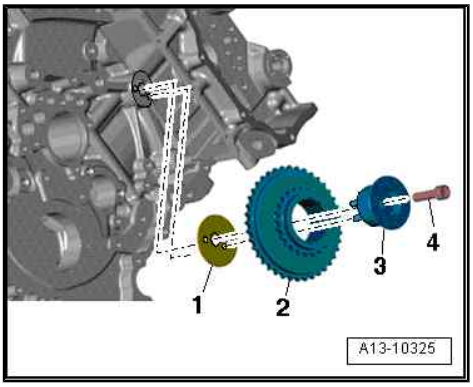
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness and completeness of information in this document. Copyright by AUDI AG.

**Installation position: bearing mounting for drive sprocket for camshaft timing chain (right-side)**

- Dowel pins in bearing mounting -3- for drive sprocket for camshaft timing chain (right-side) must engage in drillings in thrust washer -1- and in cylinder block drillings.

2 - Drive sprocket for camshaft timing chain (right-side)

4 - Bolt




## 3.3 Exploded view - drive chain for auxiliary drives

**1 - Bolt**
- ❑ 9 Nm

**2 - Chain tensioner**
- ❑ With guide rail

**3 - Gasket**
- ❑ Renew

**4 - Compression spring**

**5 - Bolt**
- ❑ 42 Nm

**6 - Bearing mounting for idler sprocket**

**7 - Idler sprocket for chain of auxiliary drives**

**8 - Bearing bracket for idler sprocket**

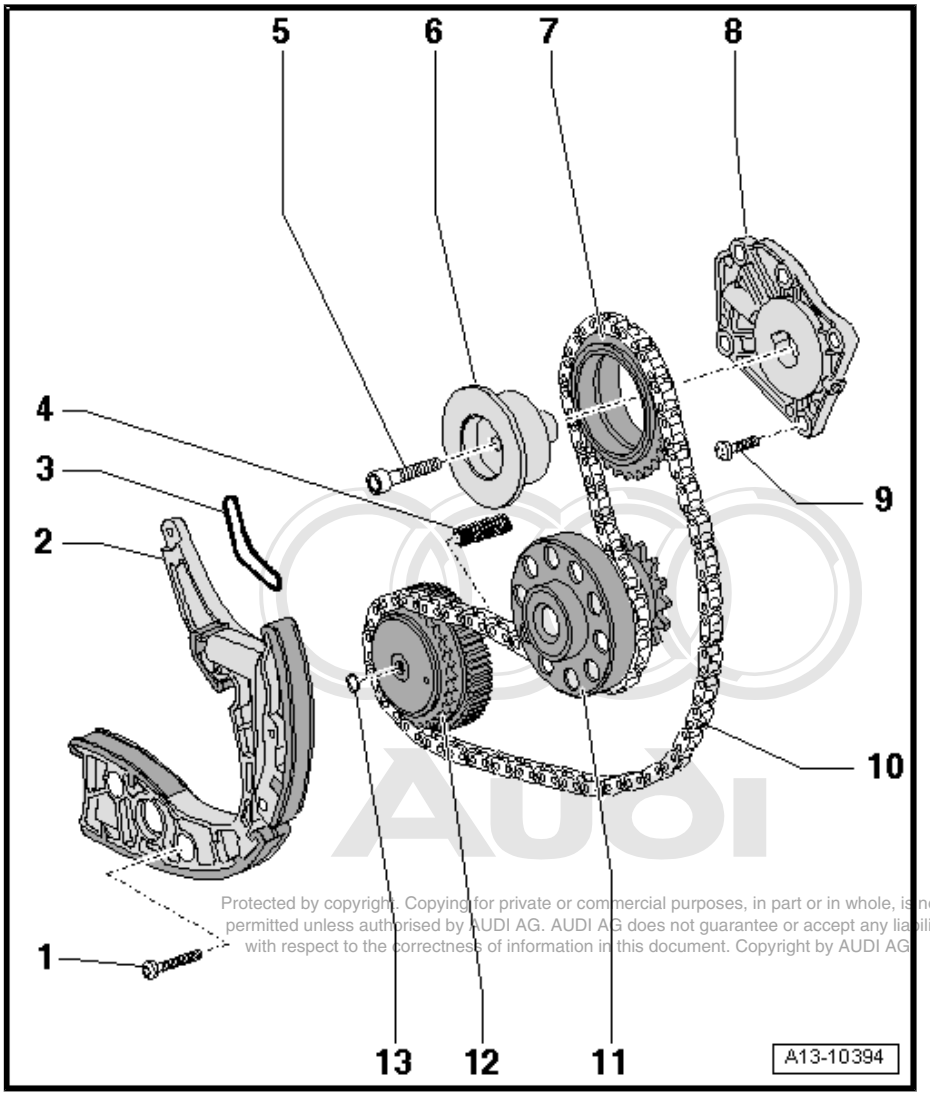
**9 - Bolt**
- ❑ 9 Nm

**10 - Drive chain for auxiliary drives**
- ❑ Removing and installing ⇒ page 173

**11 - Crankshaft**

**12 - Drive chain sprocket for auxiliary drives**

**13 - Circlip**




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.

## 3.4 Removing and installing camshaft timing chain

**Removing**

- Gearbox removed ⇒ Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox or ⇒ Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .

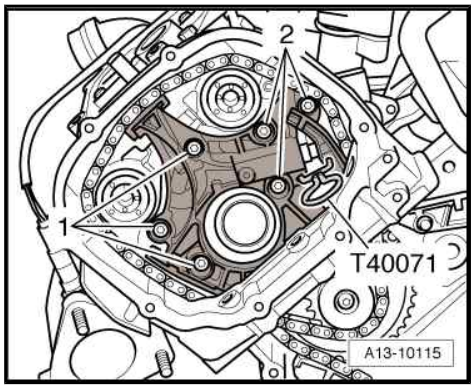
– Remove timing chain cover (bottom) ⇒ page 151 .

– Remove timing chains from camshafts ⇒ page 163 .

**Caution**

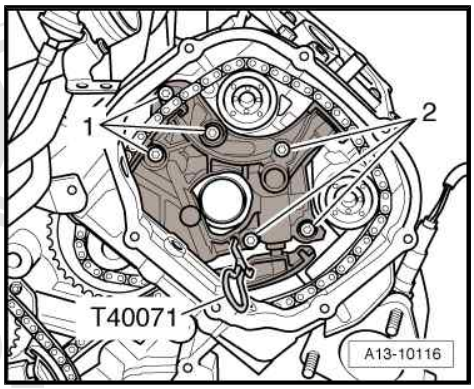
***If a used timing chain rotates in the opposite direction when it is refitted, this can cause breakage.***

- ***Mark running direction of timing chain with coloured arrows for re-installation.***




– Remove bolts -1- and -2- and take off chain tensioner (left-side) and camshaft timing chain (left-side).

– Remove bolts -1- and -2- and take off chain tensioner (right-side) and timing chain (right-side).




**Installing**

- Tightening torque
⇒ “3.1 Exploded view - camshaft timing chains”, page 157

**Note**

- *Note the correct installation position if the tensioning element has been removed from the chain tensioner: drilling in base of housing faces chain tensioner and piston faces tensioner rail.*
- *Renew the bolts tightened with specified tightening angle.*
- *Renew seals and/or gaskets.*

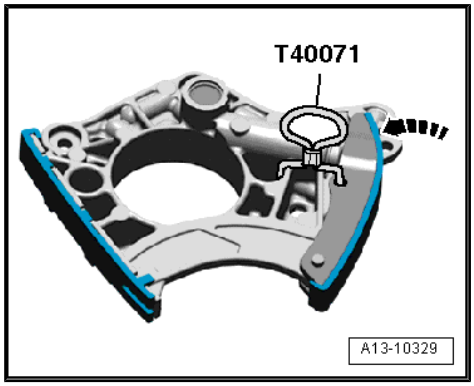
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

**Caution**

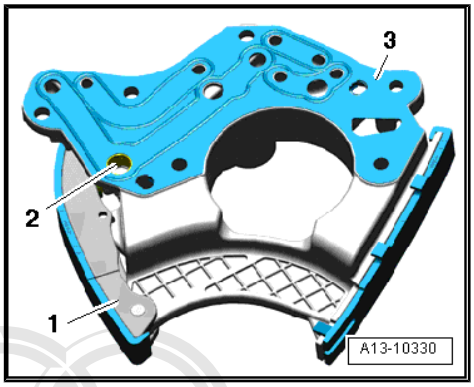
***Risk of damage to valves and piston crowns.***

- ***The crankshaft must not be at “TDC” at any cylinder when the camshafts are turned.***

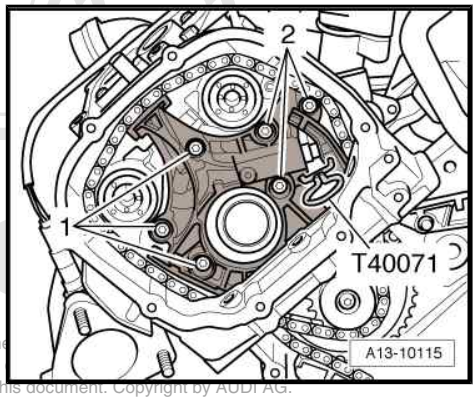
– Press guide rail of chain tensioner for camshaft timing chain (left or right) inwards -arrow- as far as the stop. Then lock chain tensioner by inserting locking pin - T40071- .



– If necessary, clean oil strainer -2- in both chain tensioners.
– Fit new gasket -3- on rear of chain tensioner -1-.

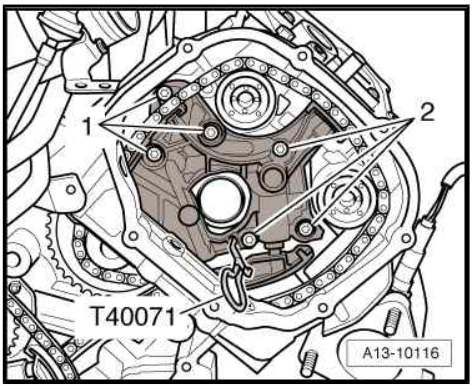



– Fit chain tensioner on cylinder head (left-side) and position timing chain as shown in the illustration (according to marks applied when removing).
– Tighten bolts -1- and -2-.




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

– Fit chain tensioner on cylinder head (right-side) and position timing chain as shown in the illustration (according to marks applied when removing).
– Tighten bolts -1- and -2-.

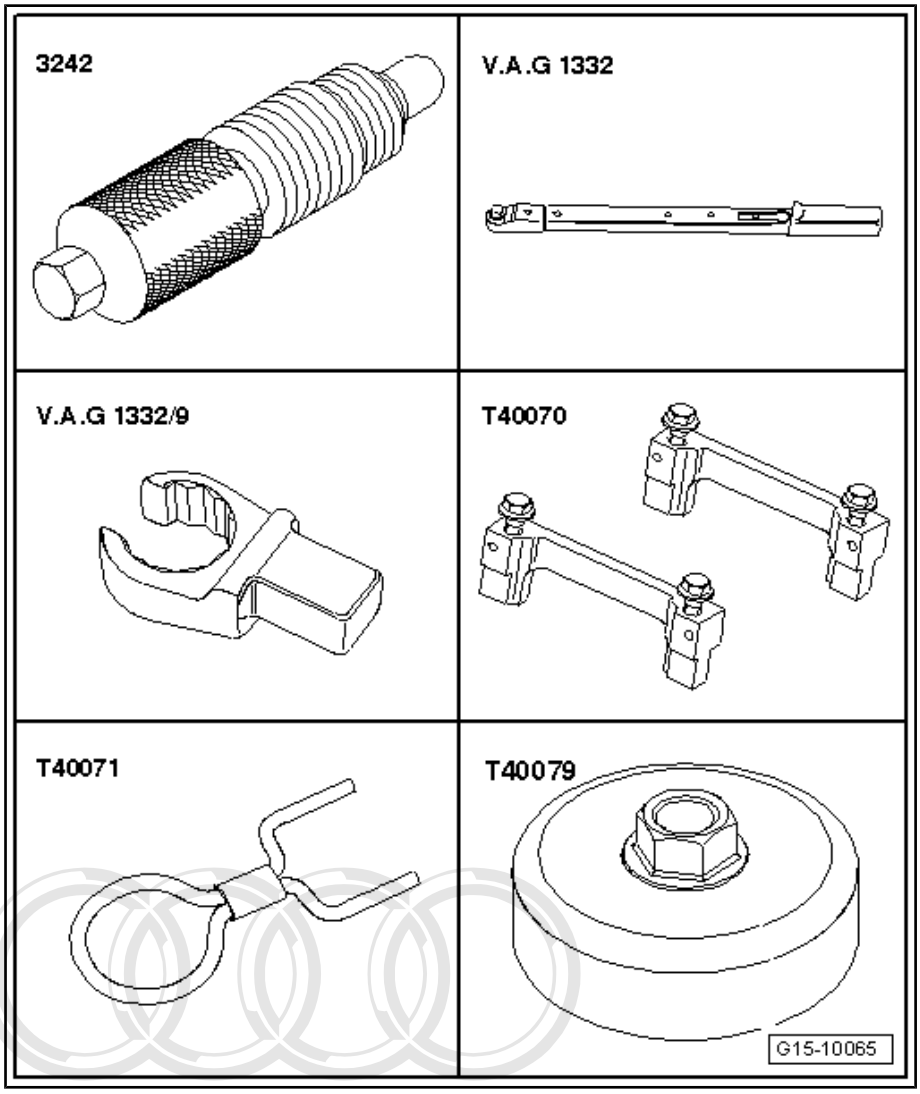



Remaining installation steps are carried out in reverse sequence; note the following:

– Fit timing chains on camshafts ⇒ page 167 .
– Install timing chain cover (bottom) ⇒ page 151 .

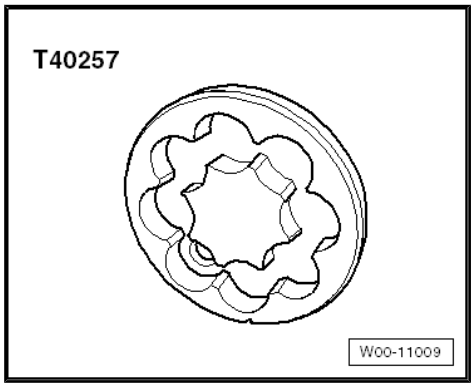
## 3.5 Removing camshaft timing chain from camshafts

## Special tools and workshop equipment required

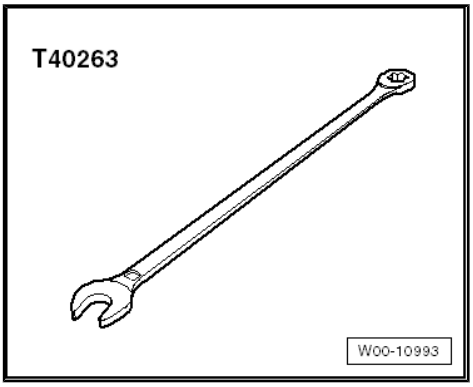



- Locking pin - 3242-
- Torque wrench - V.A.G 1332-
- Tool insert - V.A.G 1332/9-
- 2x camshaft clamp - T40070-
- 2x locking pin - T40071-
- Key - T40079-
- Turning-over tool - T40257-

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.



♦ Wrench, 21 mm - T40263-




## Removing

**Note**

*In the following procedure the camshaft timing chains remain on the engine.*

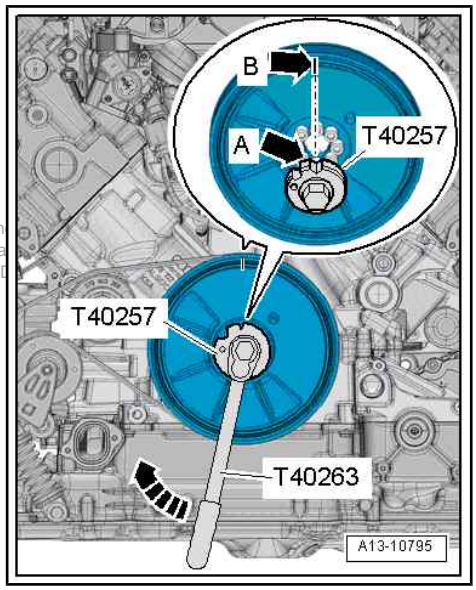
– Remove relevant cylinder head cover: left-side ⇒ page 134 ; right-side ⇒ page 135 .

– Remove relevant timing chain cover: left-side ⇒ page 144 ; right-side ⇒ page 146 .

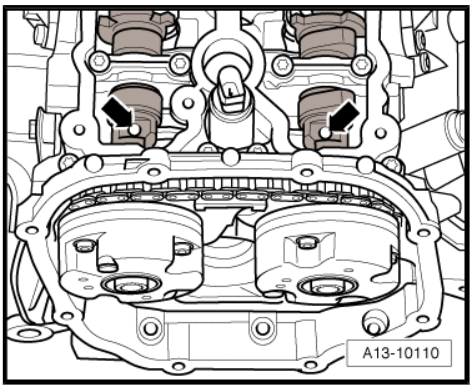
– Fit turning-over tool - T40257- onto wrench (21 mm) - T40263- .

– Apply turning-over tool - T40257- to bolts of vibration damper and turn crankshaft in normal direction of rotation -arrow- to “TDC”.

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

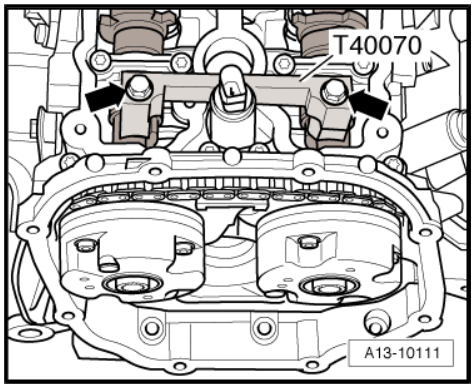



• The threaded holes -arrows- in the camshafts must face upwards.

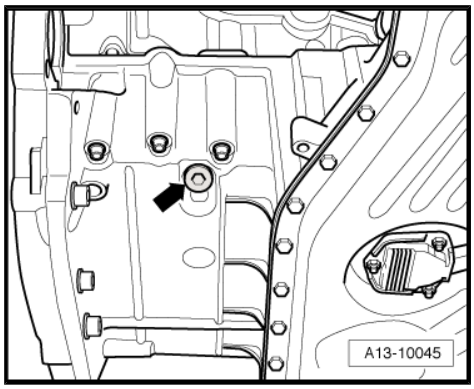


– Secure camshaft clamps - T40070- on both cylinder heads and tighten to 25 Nm -arrows-.

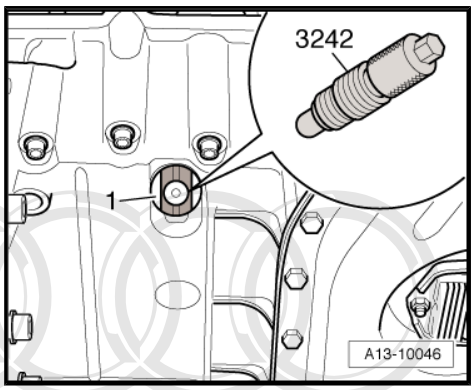
• The camshaft clamp - T40070- is positioned correctly if the holes for the cylinder head bolts remain free.



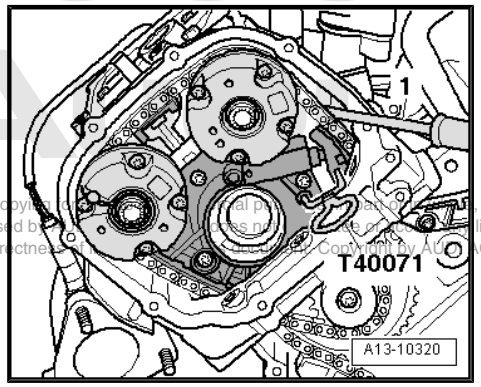

– Use extended hexagon socket wrench with ball head and unscrew plug -arrow- from sump (top section).




– Screw locking pin - 3242- into hole (20 Nm); if necessary, turn crankshaft -1- backwards and forwards slightly to fully centralise locking pin.




– Press guide rail of chain tensioner for camshaft timing chain (left-side) inwards as far as the stop using a screwdriver -1-. Then lock chain tensioner by inserting locking pin - T40071- .

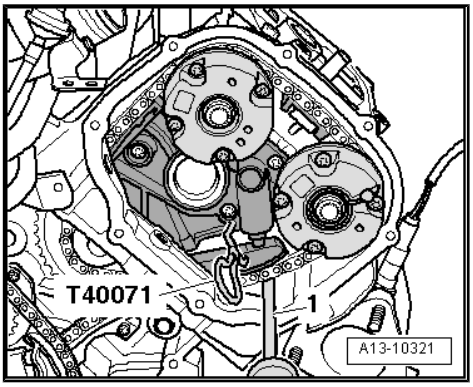



**Note**

*The chain tensioner is oil-damped and can therefore only be compressed slowly by applying constant pressure.*

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.

– Press guide rail of chain tensioner for camshaft timing chain (right-side) inwards as far as the stop using a screwdriver -1-. Then lock chain tensioner by inserting locking pin - T40071- .




**Note**

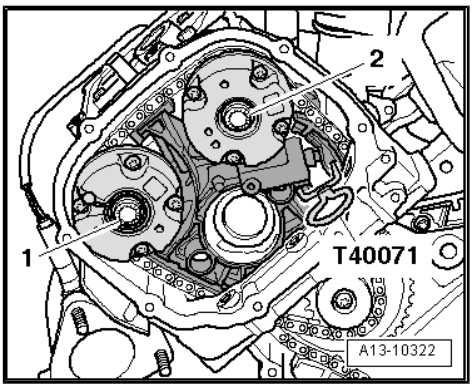
*The chain tensioner is oil-damped and can therefore only be compressed slowly by applying constant pressure.*

– Mark position of camshaft adjusters with paint for re-installation.

**Caution**

***Risk of irreparable damage to engine.***

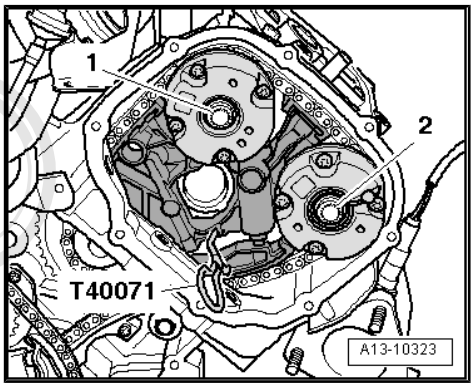
- ***Block off the opening in the valve timing housing with a clean cloth to prevent small items from dropping into the engine.***




– Unscrew bolts -1- and -2- on cylinder head (left-side) and remove both camshaft adjusters.

– Mark position of camshaft adjusters with paint for re-installation.

– Unscrew bolts -1- and -2- on cylinder head (right-side) and remove both camshaft adjusters.




**Installing**

- Tightening torques
⇒ “3.1 Exploded view - camshaft timing chains”, page 157

**Note**

- *Renew the bolts tightened with specified tightening angle.*
- *Renew the seal on the screw plug for the “TDC” mark.*

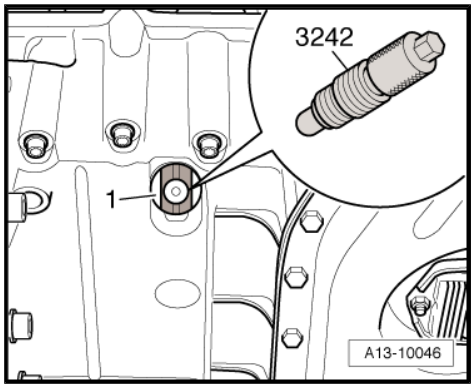
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

**Caution**

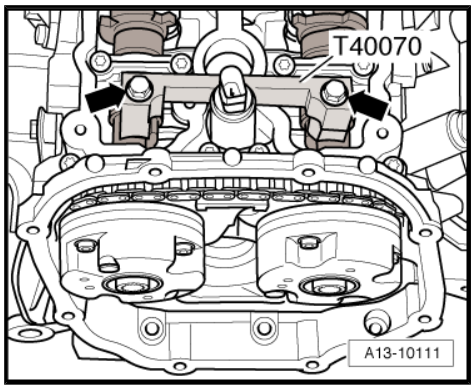
***Risk of damage to valves and piston crowns.***

- ***The crankshaft must not be at “TDC” at any cylinder when the camshafts are turned.***

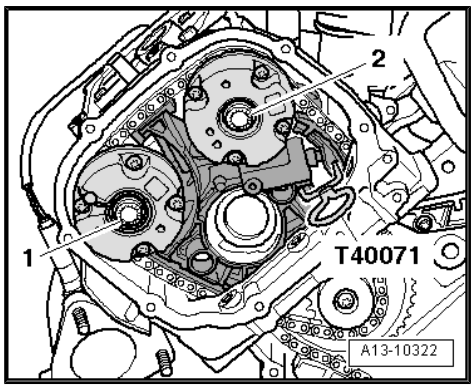
- Drive chain for valve gear installed ⇒ page 171
- Crankshaft -1- locked in “TDC” position with locking pin - 3242- .



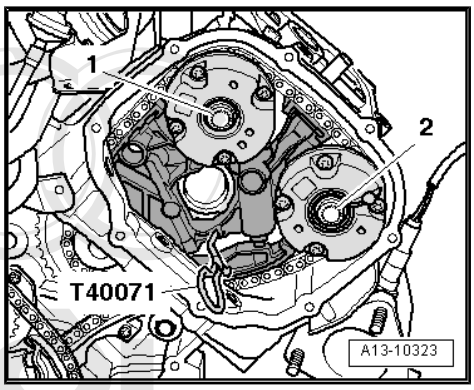

- Camshaft clamps - T40070- secured on both cylinder heads and tightened to 25 Nm -arrows-.




– Re-install camshaft adjusters on cylinder head (left-side) in the same position as before (pay attention to marks applied when removing).
– Fit timing chain onto drive chain sprocket and camshaft adjusters and fit bolts -1- and -2- without tightening.
- It should just be possible to turn both camshaft adjusters on the camshaft without axial movement.
– Remove locking pin - T40071- .

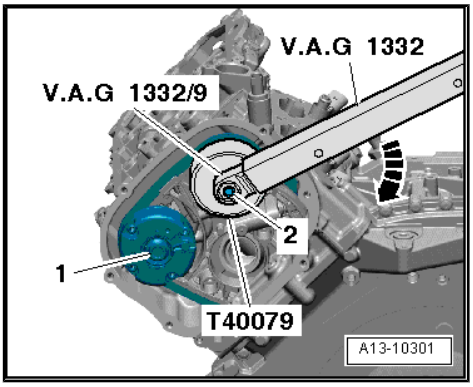



– Re-install camshaft adjuster on cylinder head (right-side) in the same position as before (pay attention to marks applied when removing).
– Fit timing chain onto drive chain sprocket and camshaft adjusters and fit bolts -1- and -2- without tightening.
- It should just be possible to turn both camshaft adjusters on the camshaft without axial movement.
– Remove locking pin - T40071- .



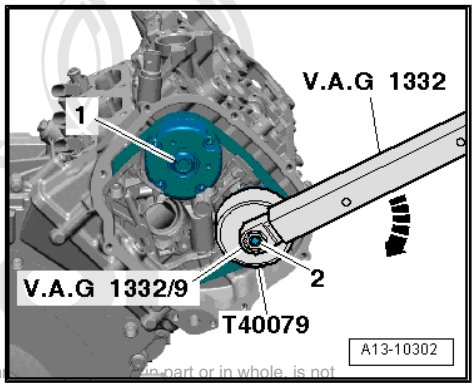

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Fit key - T40079- onto camshaft adjuster of inlet camshaft on cylinder head (left-side).
– Apply torque wrench - V.A.G 1332- with open ring spanner insert - V.A.G 1332/9- to key - T40079- .
– Have a second mechanic apply a torque of 40 Nm to camshaft adjuster in direction of -arrow-.
– Tighten bolts as follows while keeping camshaft adjuster under tension:




| Stage | Bolt | Tightening torque |
|---|---|---|
| 1. | -1- | On exhaust camshaft: 60 Nm |
| 1. | -2- | On inlet camshaft: 60 Nm |

– Fit key - T40079- onto camshaft adjuster of exhaust camshaft on cylinder head (right-side).
– Apply torque wrench - V.A.G 1332- with open ring spanner insert - V.A.G 1332/9- to key - T40079- .
– Have a second mechanic apply a torque of 40 Nm to camshaft adjuster in direction of -arrow-.
– Tighten bolts as follows while keeping camshaft adjuster under tension:

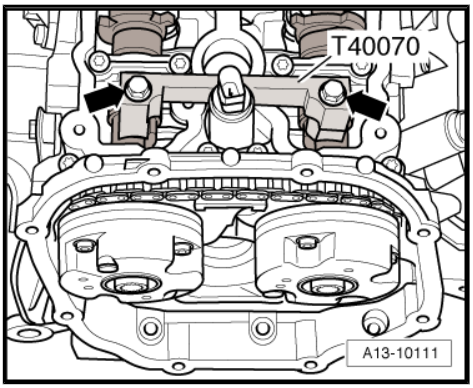



| Stage | Bolt | Tightening torque |
|---|---|---|
| 1. | -1- | On inlet camshaft: 60 Nm |
| 1. | -2- | On exhaust camshaft: 60 Nm |

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

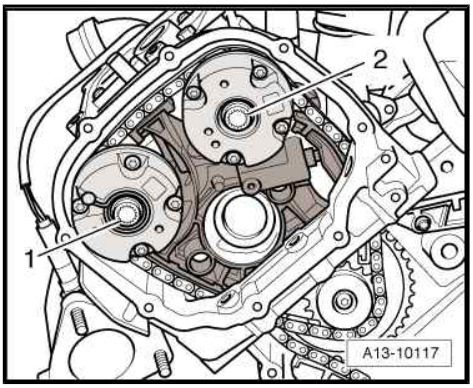
– Remove key - T40079- .

– Remove camshaft clamps - T40070- from both cylinder heads -arrows-.



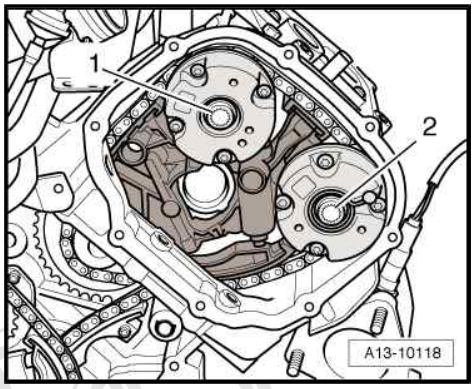

– Tighten camshaft adjuster bolts on cylinder head (left-side) as follows:

| Stage | Bolt | Tightening torque |
|---|---|---|
| 2. | -1- | Tighten on exhaust camshaft to final tightening torque |
| 2. | -2- | Tighten on inlet camshaft to final tightening torque |

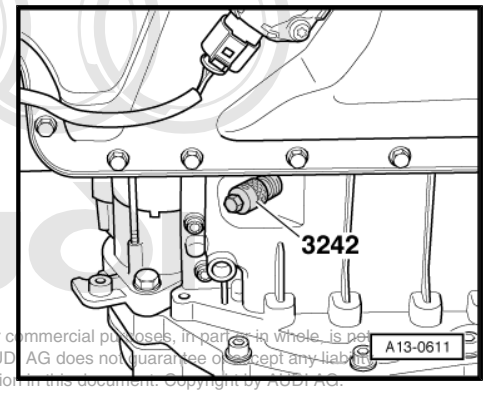


– Tighten camshaft adjuster bolts on cylinder head (right-side) as follows:

| Stage | Bolt | Tightening torque |
|---|---|---|
| 2. | -1- | Tighten on inlet camshaft to final tightening torque |
| 2. | -2- | Tighten on exhaust camshaft to final tightening torque |

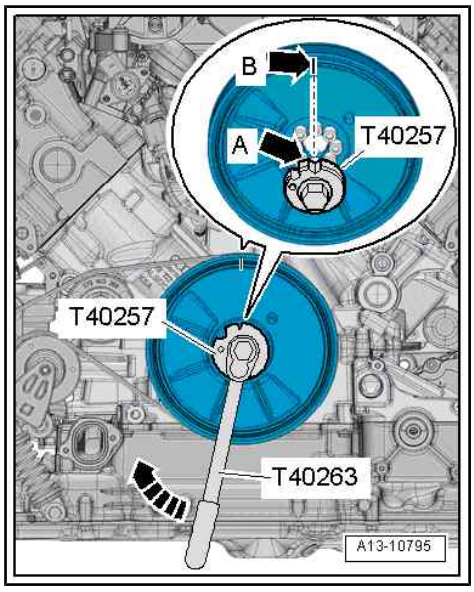



– Remove locking pin - 3242- .




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.

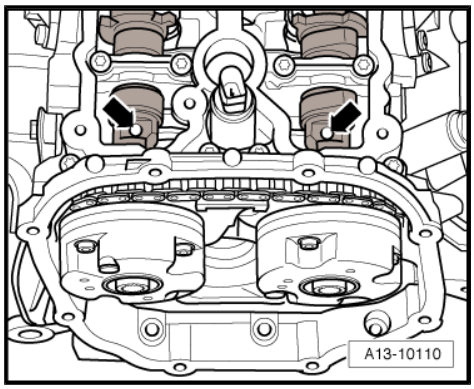
– Turn crankshaft two revolutions in normal direction of rotation -arrow- until crankshaft is once again at “TDC”.




**Note**

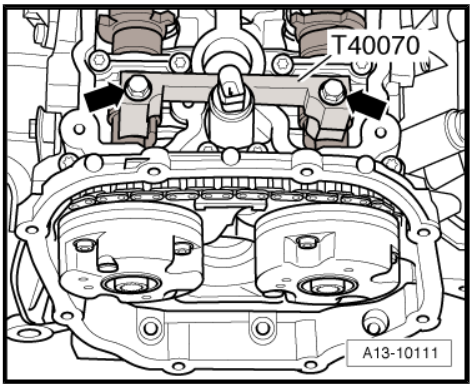
*If you turn the crankshaft beyond “TDC” by mistake, turn it back approx. 30° and set to “TDC” again.*

• The threaded holes -arrows- in the camshafts must face upwards.



– Secure camshaft clamps - T40070- on both cylinder heads and tighten to 25 Nm -arrows-.

• The camshaft clamp - T40070- is positioned correctly if the holes for the cylinder head bolts remain free.

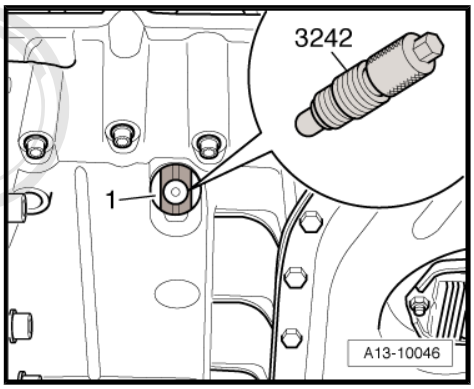



– Screw locking pin - 3242- into hole and tighten to 20 Nm.

• The locking pin - 3242- must engage in the locating hole in crankshaft -1-. If it does not, reset valve timing.

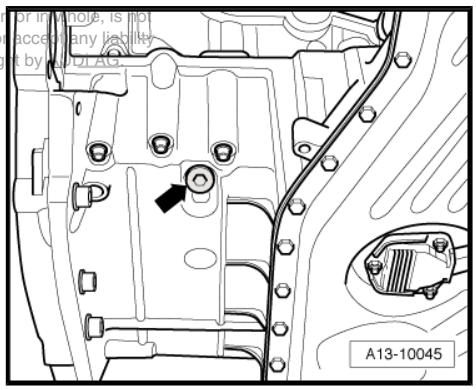
– Remove camshaft clamps from both cylinder heads.

– Remove locking pin - 3242- .




– Tighten plug -arrow- for "TDC" marking in sump (top section) ⇒ page 204 .

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.




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

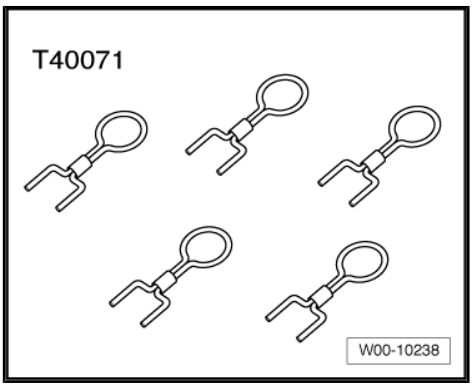
– Install timing chain covers: left-side ⇒ page 144 , right-side ⇒ page 146 .

– Install cylinder head covers: left-side ⇒ page 134 ; right-side ⇒ page 135 .

## 3.6 Removing and installing drive chain for valve gear

**Special tools and workshop equipment required**

♦ Locking pin - T40071-



### Removing

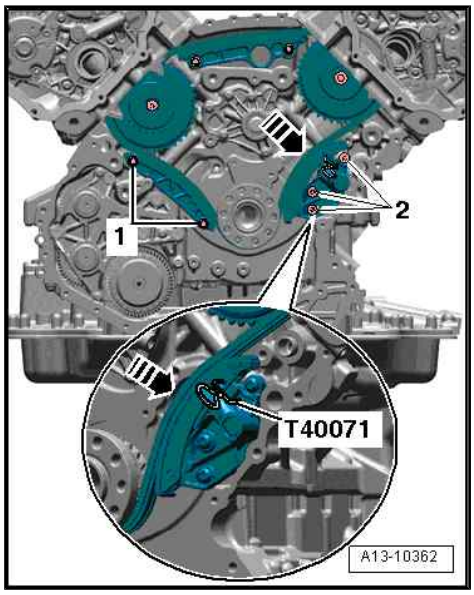
- Gearbox removed ⇒ Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox or ⇒ Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .

– Remove timing chain cover (bottom) ⇒ page 151 .

– Remove timing chains ⇒ page 161 .

– Remove drive chain for auxiliary drives ⇒ page 173 .

– Press guide rail of chain tensioner for drive chain in direction of -arrow- and lock chain tensioner by inserting locking pin - T40071- .




**Caution**

*If a used drive chain rotates in the opposite direction when it is refitted, this can cause breakage.*

- *Mark running direction of drive chain with coloured arrows for re-installation.*

– Unscrew bolts -1- and remove guide rail.

– Remove bolts -2- and take off chain tensioner.

– Detach drive chain for valve gear.

### Installing

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

- Tightening torques
  ⇒ “3.2 Exploded view - drive chain for valve gear”, page 160

**Note**

*Renew the bolts tightened with specified tightening angle.*

– Position drive chain for valve gear onto drive chain sprockets (according to marks applied during removal).

– Install guide rail and tighten bolts -1-.

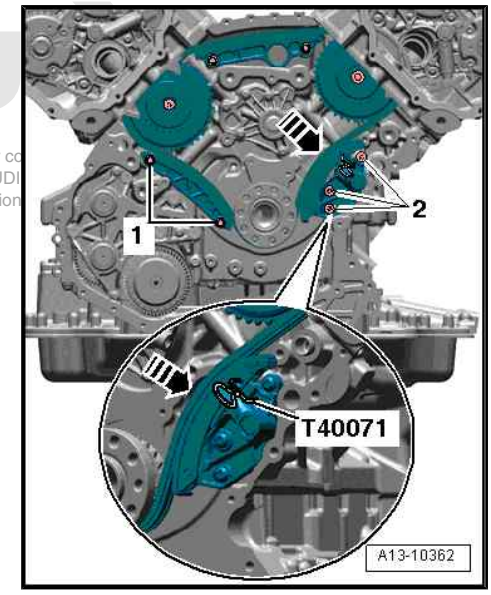
– Install chain tensioner and tighten bolts -2-.

– Press guide rail of chain tensioner for drive chain in direction of -arrow- and pull locking pin - T40071- out of chain tensioner.

– Install drive chain for auxiliary drives ⇒ page 173 .

– Install camshaft timing chains ⇒ page 161 .

– Install timing chain cover (bottom) ⇒ page 151 .

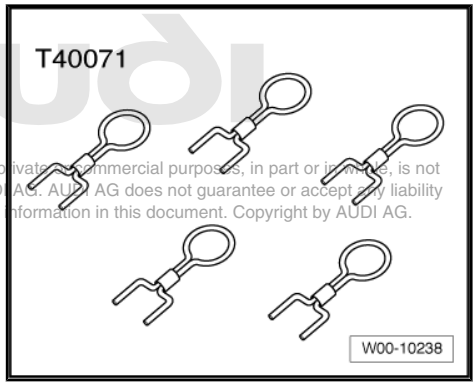



Protected by copyright. Copying for private or co
permitted unless authorised by AUDI AG. AUDI
with respect to the correctness of information

## 3.7 Removing and installing drive chain for auxiliary drive

### Special tools and workshop equipment required

- Locking pin - T40071-




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

### Removing

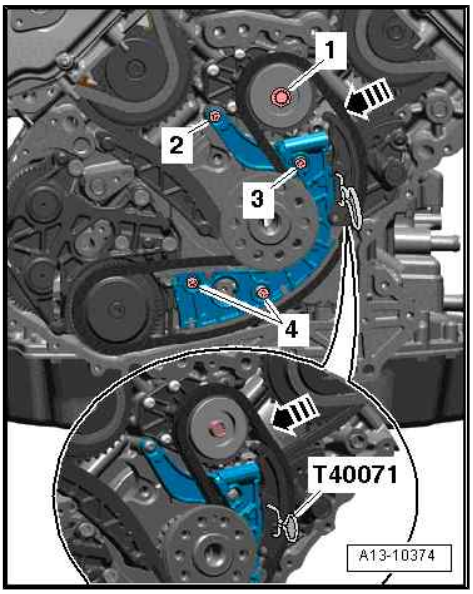
- Gearbox removed ⇒ Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox or ⇒ Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .

– Remove timing chain cover (bottom) ⇒ page 151 .

**Caution**

*If a used drive chain rotates in the opposite direction when it is refitted, this can cause breakage.*

- *Mark running direction of drive chain for auxiliary drives with coloured arrows for re-installation.*




– Press tensioning rail in direction of -arrow- and lock chain tensioner in place using locking pin - T40071- .

– Unscrew bolt -1- and remove idler sprocket.

**Note**

*Pay attention to spring ⇒ Item 4 (page 161) when dismantling.*

– Remove bolts -2, 3, 4- and take off chain tensioner.

– Detach drive chain for auxiliary drives.

### Installing

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

- Tightening torques
⇒ "3.3 Exploded view - drive chain for auxiliary drives", page 161

**Note**

- *Renew seal.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

– Install timing chain cover (bottom) ⇒ page 151 .

# 4 Valve gear

⇒ “4.1 Exploded view - valve gear”, page 174
⇒ “4.2 Measuring axial clearance of camshaft”, page 177
⇒ “4.3 Measuring radial clearance of camshaft”, page 177
⇒ “4.4 Removing and installing camshaft”, page 178
⇒ “4.5 Checking hydraulic compensation elements”, page 187
⇒ “4.6 Removing and installing valve stem oil seals”, page 189

## 4.1 Exploded view - valve gear

**Caution**

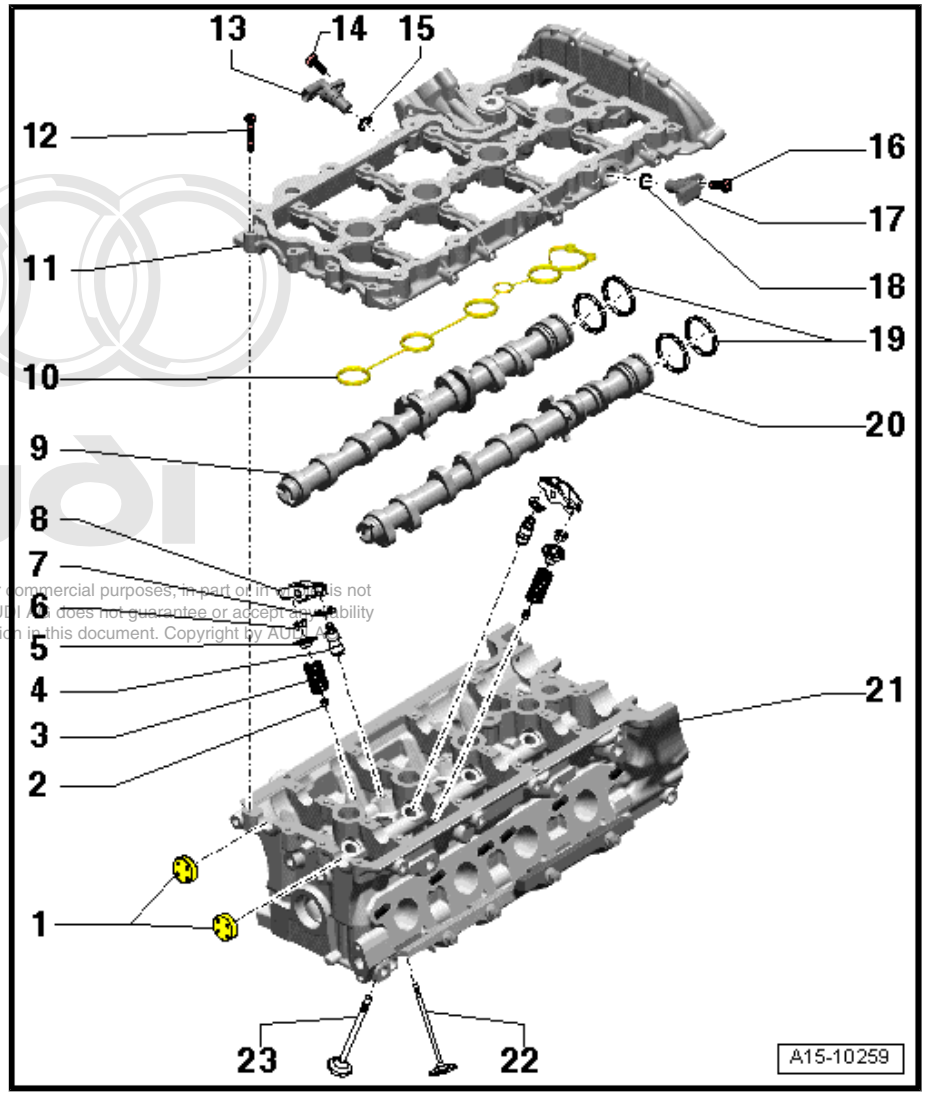
*Risk of damage to valves and piston crowns after working on valve gear.*

- *The hydraulic tappets have to settle; wait for approx. 30 minutes after installing camshafts before starting engine.*
- *Turn the engine carefully at least 2 rotations to ensure that none of the valves make contact when the starter is operated.*

**Note**

- *Cylinder heads which have cracks between the valve seats or between a valve seat insert and the spark plug thread can be re-installed without reducing service life, provided the cracks are only slight and do not exceed a maximum of 0.3 mm in width, and no more than the first 4 turns of the spark plug threads are cracked.*
- *The diagram shows the cylinder head on cylinder bank 2 (left-side).*

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




**1 - Sealing plugs**

**2 - Valve stem oil seal**

- ❑ Renewing: with cylinder head installed ⇒ page 189 , with cylinder head removed ⇒ page 193

**3 - Valve spring**

- ❑ Installation position ⇒ page 177

**4 - Hydraulic compensation element**

- ❑ Clipped into roller rocker finger -item 8-
- ❑ Checking ⇒ page 187
- ❑ Mark installation position for re-installation with a coloured pen
- ❑ Lubricate contact surfaces before installing

**5 - Valve spring plate**

**6 - Valve cotters**

**7 - Securing clip**

- ❑ Not supplied separately
- ❑ Check for firm attachment

**8 - Roller rocker finger**

- ❑ Mark installation position for re-installation with a coloured pen
- ❑ Check roller bearings for ease of movement
- ❑ Lubricate contact surfaces before installing
- ❑ Attach to hydraulic compensation element -item 4- using securing clip -item 7-

**9 - Inlet camshaft**

- ❑ Removing and installing ⇒ page 178
- ❑ Measuring axial clearance ⇒ page 177
- ❑ Measuring radial clearance ⇒ page 177
- ❑ Runout: max. 0.04 mm

**10 - Gasket**

- ❑ Renew

**11 - Retaining frame**

- ❑ With integrated camshaft bearings
- ❑ Removing and installing ⇒ page 178

**12 - Bolt**

- ❑ Renew
- ❑ Tightening torque and sequence ⇒ page 176

**13 - Hall sender 2 - G163-**

**14 - Bolt**

- ❑ Tightening torque ⇒ page 380

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.

**15 - O-ring**

- ❑ Renew

**16 - Bolt**

- ❑ Tightening torque ⇒ page 380

**17 - Hall sender 4 - G301-**

**18 - O-ring**

- ❑ Renew

**19 - Rectangular section seals**

- ❑ For camshaft adjuster

**20 - Exhaust camshaft**

- ❑ Removing and installing ⇒ page 178
- ❑ Measuring axial clearance ⇒ page 177
- ❑ Measuring radial clearance ⇒ page 177
- ❑ Runout: max. 0.04 mm

**21 - Cylinder head**

- ❑ Checking valve guides ⇒ page 198

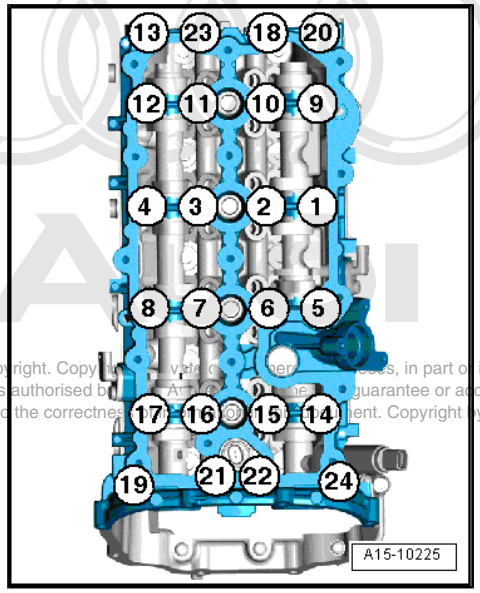
**22 - Inlet valve**

- ❑ Do not machine, only grinding-in is permitted
- ❑ Mark installation position for re-installation
- ❑ Valve dimensions ⇒ page 200
- ❑ Checking valve guides ⇒ page 198

**23 - Exhaust valve**

- ❑ Do not machine, only grinding-in is permitted
- ❑ Mark installation position for re-installation
- ❑ Valve dimensions ⇒ page 200
- ❑ Checking valve guides ⇒ page 198

**Retaining frame for camshafts - tightening torque and sequence**




**Note**

*Renew the bolts tightened with specified tightening angle.*

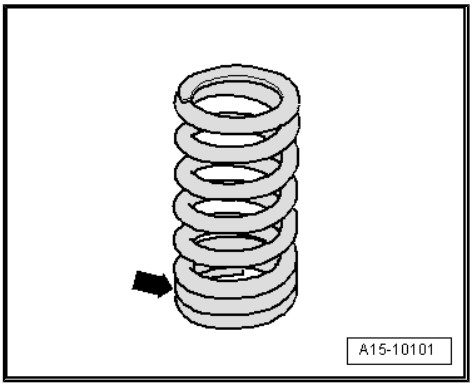
– Tighten bolts in 3 stages in the sequence shown:

| Stage | Bolts | Tightening torque/angle specification |
|---|---|---|
| 1. | -1 … 24- | Screw in by hand until contact is made<br>• The retaining frame should make contact with the cylinder head over the full surface |
| 2. | -1 … 24- | 8 Nm |
| 3. | -1 … 24- | Turn 90° further |

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.

**Position of valve spring**

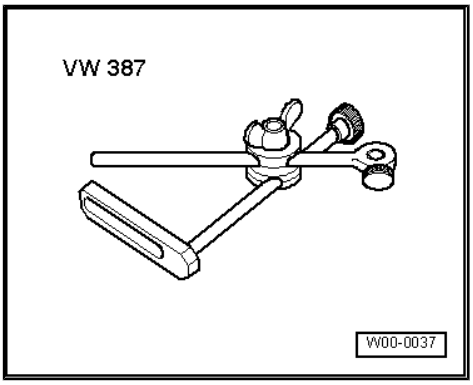
- Closely spaced spring coils -arrow- face towards cylinder head.



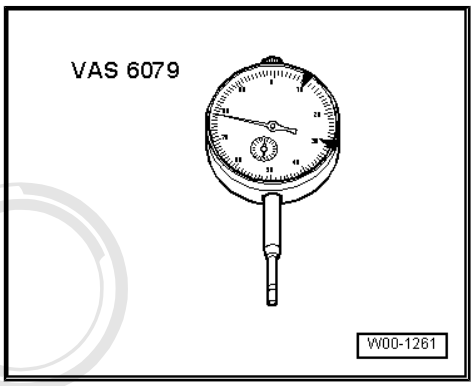

## 4.2 Measuring axial clearance of camshaft

**Special tools and workshop equipment required**

- Universal dial gauge bracket - VW 387-




- Dial gauge - VAS 6079-



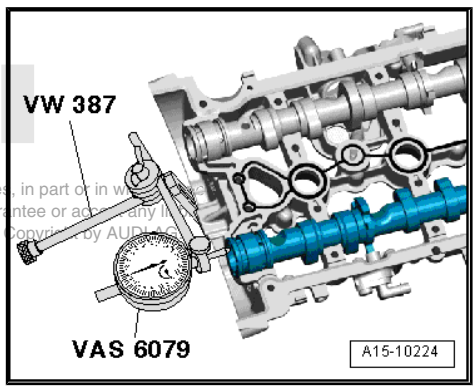

**Procedure**

– Perform measurement with retaining frame removed.

– Secure universal dial gauge bracket - VW 387- with dial gauge - VAS 6079- to cylinder head as shown in illustration.

– Measure axial clearance.

- Axial clearance: 0.100 ... 0.191 mm




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.

## 4.3 Measuring radial clearance of camshaft

**Special tools and workshop equipment required**

- Plastigauge

**Procedure**

– Remove camshafts ⇒ page 178 .

– Mark allocation of roller rocker fingers for re-installation.

– Carefully remove roller rocker fingers and place them on a clean surface.

– Clean bearings and bearing journals.

– Place a length of Plastigauge corresponding to the width of the bearing on the bearing journal or bearing shell to be measured.

• The Plastigauge must be positioned in the centre of the bearing.

– Re-insert camshafts, fit retaining frame and tighten to 8 Nm, but do not turn bolts further: Do not rotate camshafts ⇒ Fig. ""Retaining frame for camshafts - tightening torque and sequence"" , page 176 .

– Remove retaining frame and camshafts again.

– Compare width of Plastigauge with measurement scale.

Radial clearance:

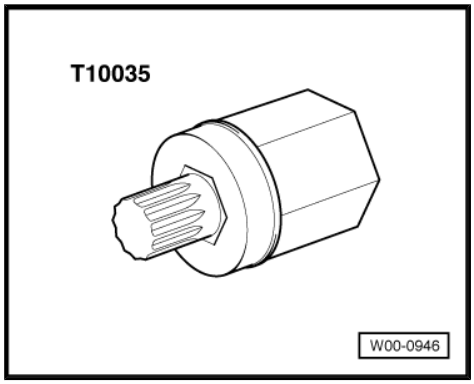
• 24 mm bearing ∅: 0.024 ... 0.066 mm

• 36 mm bearing ∅: 0.032 ... 0.078 mm

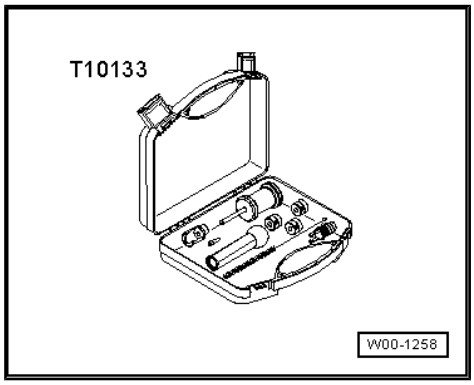
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

## 4.4 Removing and installing camshaft

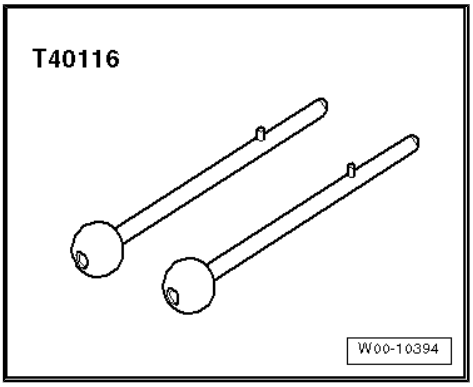
♦ Socket - T10035-



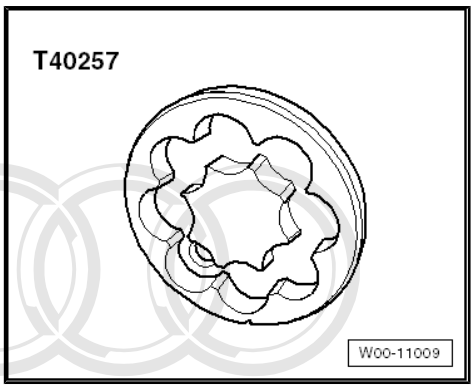

♦ Tool set for FSI engines - T10133-



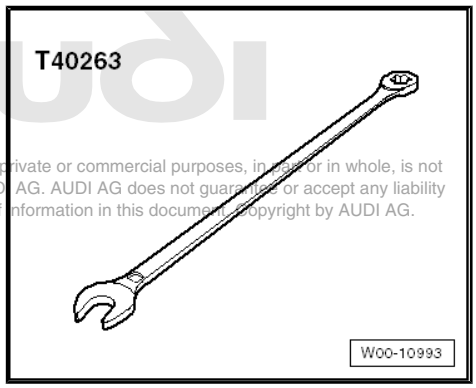
- Locating pins - T40116-




- Turning-over tool - T40257-




- Wrench, 21 mm - T40263-




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.

- Electric drill with plastic brush attachment
- Safety goggles
- Sealant ⇒ Electronic parts catalogue

**Removing**

**Note**

*The following description is for removing and installing on cylinder head (left-side).*

– Remove timing chain from camshafts on relevant side ⇒ page 163 .

– Unplug electrical connectors:

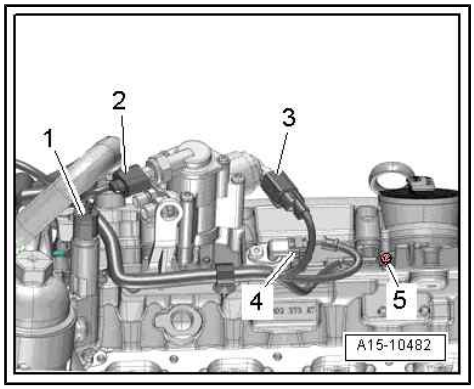
1 - At camshaft control valve 2 - N208-

2 - At fuel pressure sender - G247-

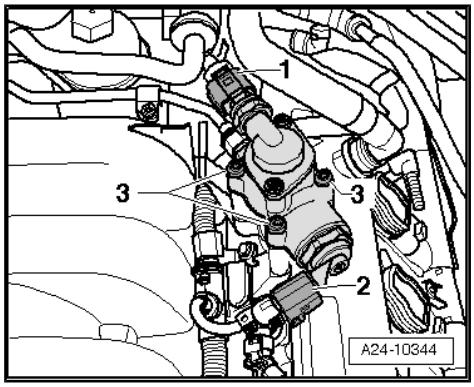
3 - At high-pressure pump (left-side)

4 - At Hall sender 2 - G163-

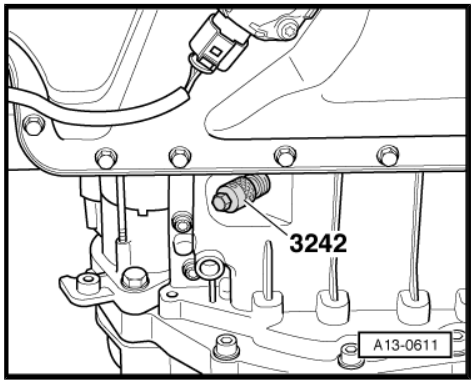
– Remove bolt -5- and move wiring harness clear.




– Remove high-pressure pump ⇒ page 327 .



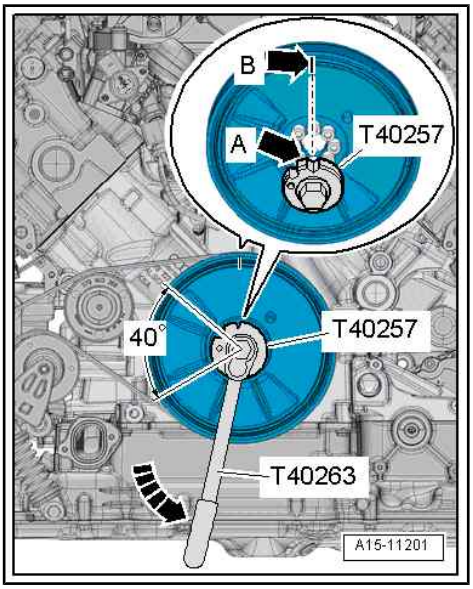

– Remove locking pin - 3242- .




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

– Fit turning-over tool - T40257- onto wrench (21 mm) - T40263- .
– Position turning-over tool - T40257- on bolts of vibration damper.

• Notch -arrow A- on turning-over tool - T40257- must point to coloured line -arrow B- on vibration damper.




**Note**

*Semi-circular recess on turning-over tool - T40257- can be disregarded.*

**Caution**

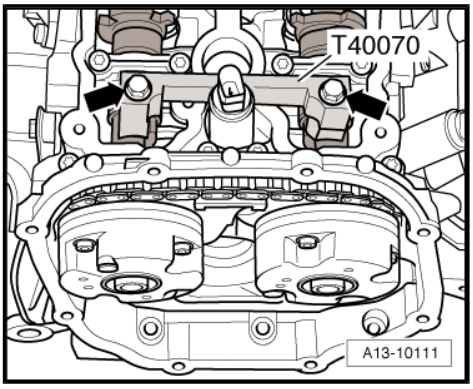
***Risk of damage to valves and piston crowns.***

- ***When performing the following steps, the crankshaft must not be at "TDC" position at any cylinder.***

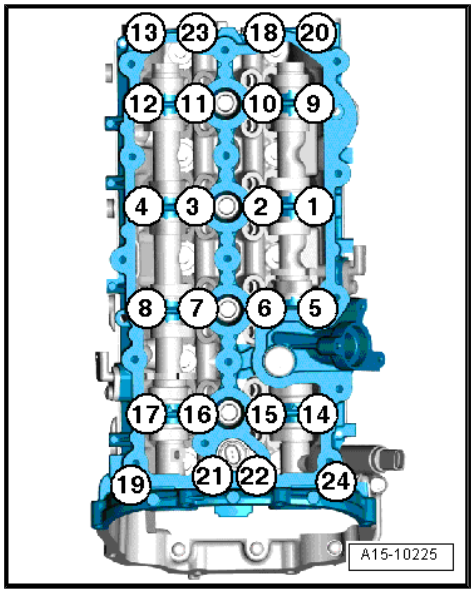
– Using counterhold tool - T10172- with -T10172/7- , turn crankshaft back through 40° out of "TDC" position in opposite direction to normal rotation -arrow-.

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 camshaft clamp - T40070- -arrows-.



– Loosen and remove bolts for retaining frame in the sequence -24 ... 1-.




**Note**

*Perform the same procedure (laterally reversed) on retaining frame (right-side).*

– Carefully release retaining frame from bonded joint and detach.

– Mark fitting location of camshafts for re-installation and remove.

**Installing**

- Tightening torque
⇒ Fig. ""Retaining frame for camshafts - tightening torque and sequence"" , page 176

**Note**

- *Renew seals and gaskets.*
- *Renew the bolts tightened with specified tightening angle.*

**Caution**

***Protect lubrication system and bearings against contamination.***

- ***Cover exposed parts of the engine.***

**WARNING**

***Risk of eye injury.***

- ***Put on safety goggles.***

– Remove remaining sealant from cylinder head and retaining frame using rotating plastic brush or similar.

– Clean sealing surfaces; they must be free of oil and grease.

– Oil running surfaces of both camshafts.

– Insert camshafts in cylinder head; note position of camshafts to make sure retaining frame is fitted free of stress.

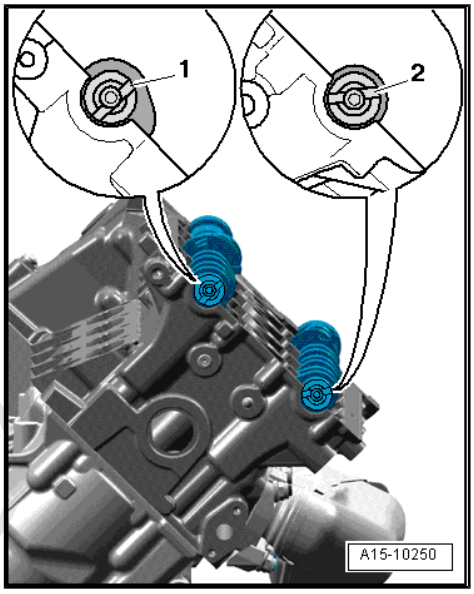
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

**Cylinder head (left-side):**

1 - Inlet camshaft

2 - Exhaust camshaft

- The groove on the end of the shaft must be positioned as shown in the illustration.



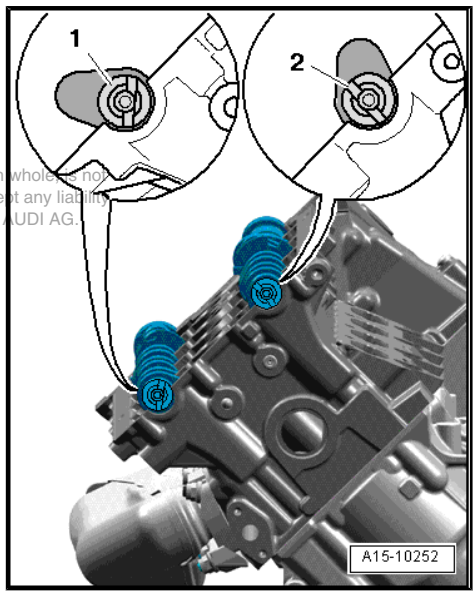

**Cylinder head (right-side):**

1 - Exhaust camshaft

2 - Inlet camshaft

- The groove on the end of the shaft must be positioned as shown in the illustration.

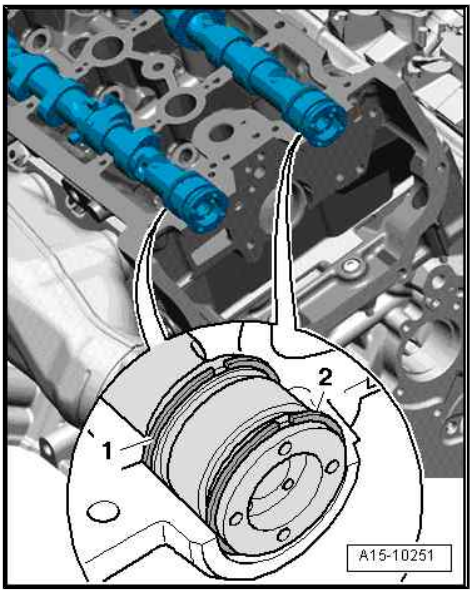
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.




**Both sides (continued):**

– Check position of ends of rectangular section seals.

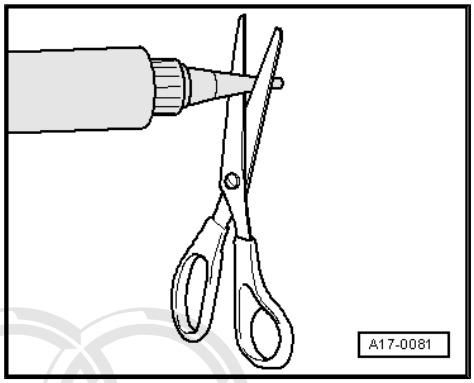
- The ends of the rectangular section seals -1 and 2- must point up or down, never to the side.



**Note**

*Note the use-by date of the sealant.*

– Cut off nozzle of tube at front marking (nozzle ∅ approx. 2 mm).

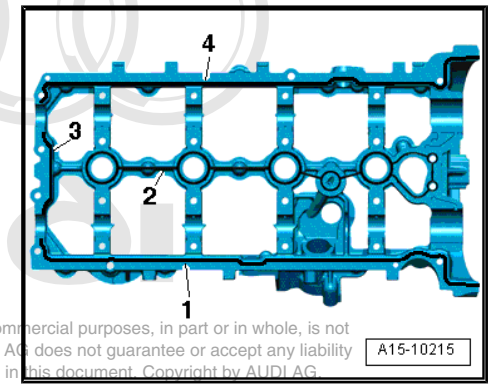



– Fit gasket -2- in grooves on retaining frame.

**Caution**

***Make sure excess sealant does not contaminate camshaft bearings.***

- ***The sealant beads must not be thicker than specified.***




– Apply sealant beads -1, 3, 4- onto clean sealing surfaces of retaining frame as shown in illustration.

• Width of sealant beads: 2.5 mm.

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

**Note**

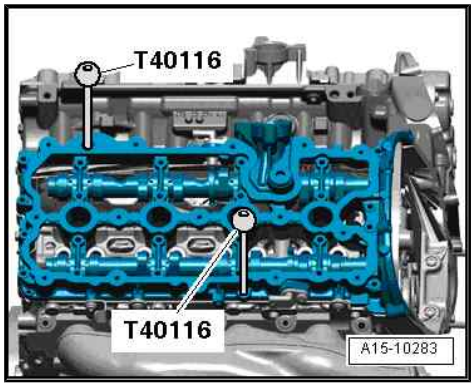
*The retaining frame must be installed within 5 minutes after applying the sealant.*

– Fit retaining frame onto cylinder head.

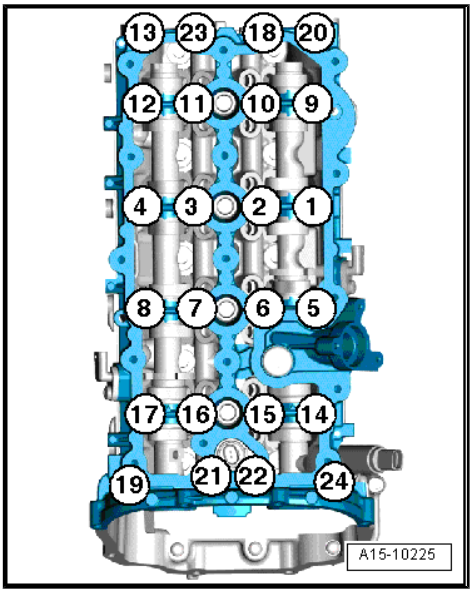
**Note**

*Make sure that camshafts can be inserted into axial bearing of retaining frame without applying force.*

– Insert locating pins -T40116- in retaining frame and cylinder head.



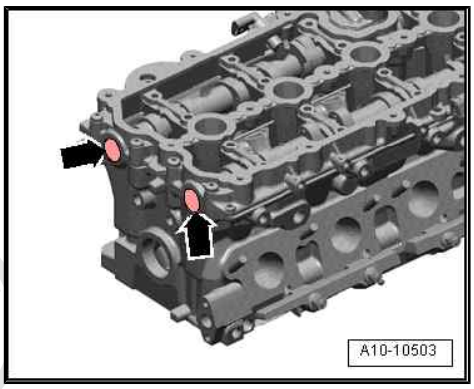
– Tighten bolts for retaining frame
⇒ Fig. ""Retaining frame for camshafts - tightening torque and sequence"" , page 176 .



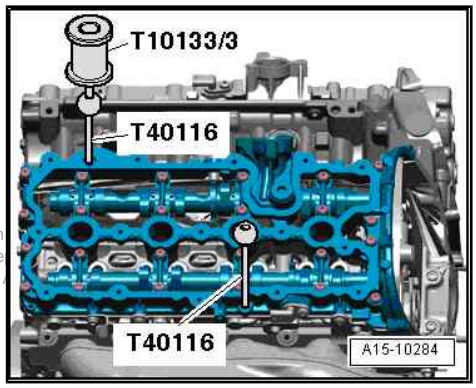

**Note**

*After installing the retaining frame, the sealant must dry for approx. 30 minutes.*

– Drive in sealing plugs -arrows- until flush.

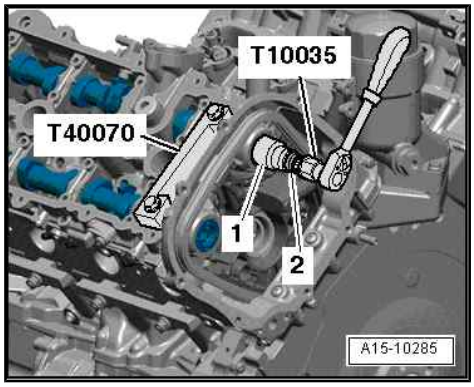



– Use impact extractor attachment -T40116- to pull out locating pins -T10133/3- .




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

– Turn inlet camshaft to “TDC” position; to do so, fit a socket (24 mm) -item 1- between inlet camshaft and camshaft adjuster bolt -2- and secure camshaft adjuster bolt to camshaft as shown in illustration.




**Note**

*Use pliers to counterhold socket when tightening bolt.*

– Apply lever or ratchet with special wrench - T10035- and turn camshaft until threaded hole for camshaft clamp - T40070- points upwards.

– Initially screw bolt for camshaft clamp - T40070- only a few turns into inlet camshaft.

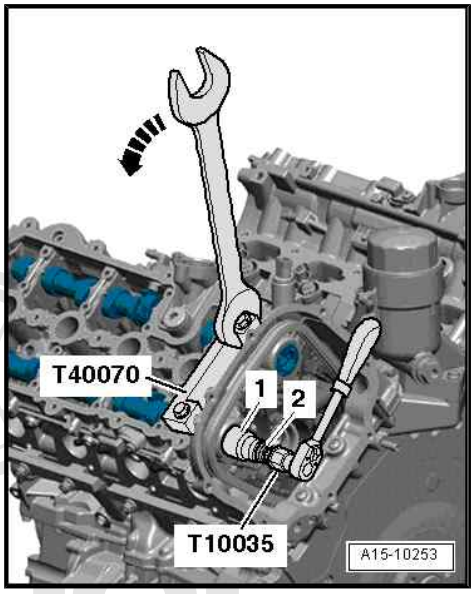
• The camshaft clamp - T40070- is positioned correctly if the holes for the cylinder head bolts remain free.

– Fit camshaft adjuster bolt -2- and socket (24 mm) -item 1- onto exhaust camshaft.

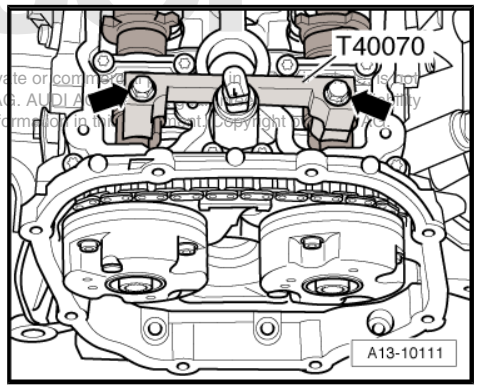
– Turn exhaust camshaft until threaded hole for camshaft clamp - T40070- points upwards.

– At the same time apply open-end spanner (24 mm) to camshaft clamp - T40070- and pivot camshaft clamp - T40070- towards exhaust camshaft -arrow- until camshaft clamp can be fastened.

– Secure camshaft clamp - T40070- to exhaust camshaft only hand-tight, to avoid damaging the thread (assistance of second mechanic required).

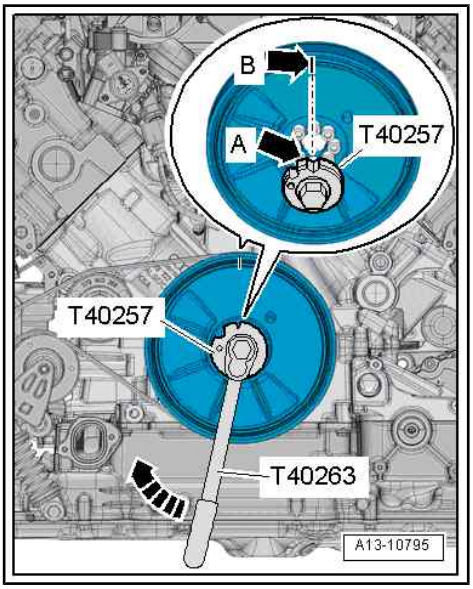



– Tighten bolts on camshaft clamp - T40070- to 25 Nm -arrows-.



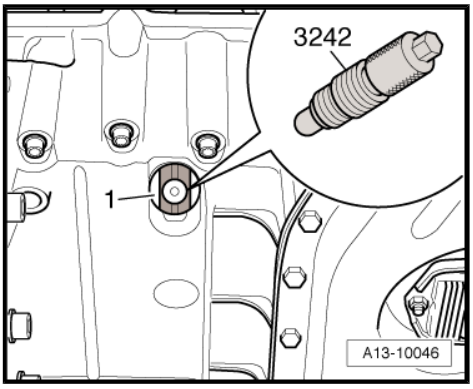

Protected by copyright. Copying for private or commercial purposes, in part, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Rotate crankshaft in normal direction of rotation -arrow- to “TDC”.




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.

– Screw locking pin - 3242- into hole (20 Nm); if necessary, turn crankshaft -1- backwards and forwards slightly to fully centralise locking pin.




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

– Install high-pressure pump ⇒ page 327 .

– Fit timing chains on camshafts ⇒ page 167 .

**Caution**

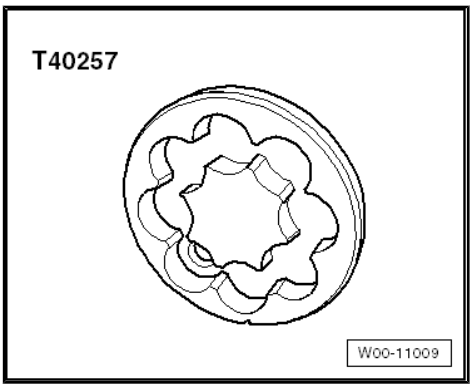
***Risk of damage to valves and piston crowns after working on valve gear.***

- ***The hydraulic tappets have to settle; wait for approx. 30 minutes after installing camshafts before starting engine.***
- ***Turn the engine carefully at least 2 rotations to ensure that none of the valves make contact when the starter is operated.***

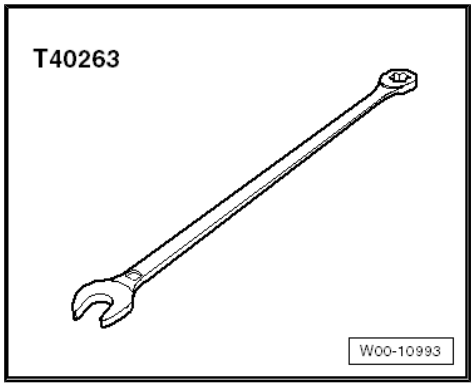
## 4.5 Checking hydraulic compensation elements

**Special tools and workshop equipment required**

- Turning-over tool - T40257- for vehicles with automatic gearbox



- Wrench, 21 mm - T40263- for vehicles with automatic gearbox




- Feeler gauge

**Note**

- *The hydraulic compensation elements cannot be serviced.*
- *Irregular valve noises when starting engine are normal.*

**Procedure**

– Start engine and run until radiator fan has started up once.

– Increase engine speed to approx. 2500 rpm for 2 minutes (perform road test if necessary).

**Note**

*If irregular valve noise disappears but repeatedly re-occurs when travelling short distances, renew oil retention valve. Fitting location of oil retention valve ⇒ page 223 .*

– If the compensation elements are still noisy, locate the defective compensation element as follows:

– Remove cylinder head cover: left-side ⇒ page 134 ; right-side ⇒ page 135 .

– Turn crankshaft until cam of compensation element to be tested is at top.

**Vehicles with manual gearbox:**

– Push vehicle forwards with 4th gear engaged and ignition switched off.

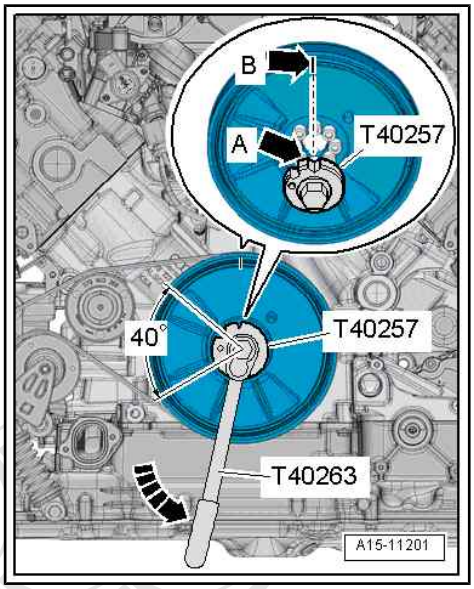
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

**Vehicles with automatic gearbox:**

– Fit turning-over tool - T40257- onto wrench (21 mm) - T40263- .

– Position turning-over tool - T40257- on bolts of vibration damper.

• Notch -arrow A- on turning-over tool - T40257- must point to coloured line -arrow B- on vibration damper.



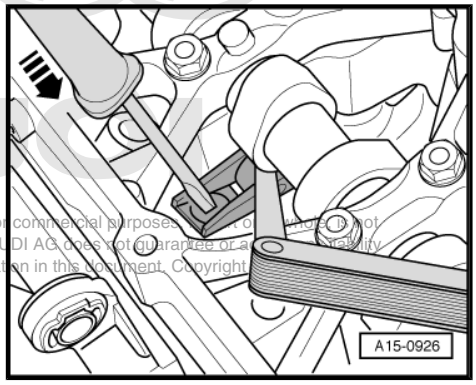

**Note**

*Semi-circular recess on turning-over tool - T40257- can be disregarded.*

**Continued for all vehicles:**

– Press roller rocker finger down -arrow- to determine clearance between cam and roller rocker finger.

– If it is possible to insert a feeler gauge of 0.20 mm between cam and roller rocker finger, renew hydraulic compensation element ⇒ page 178 .




**Additional steps required**

– Install cylinder head cover: left-side ⇒ page 134 ; right-side ⇒ page 135 .

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

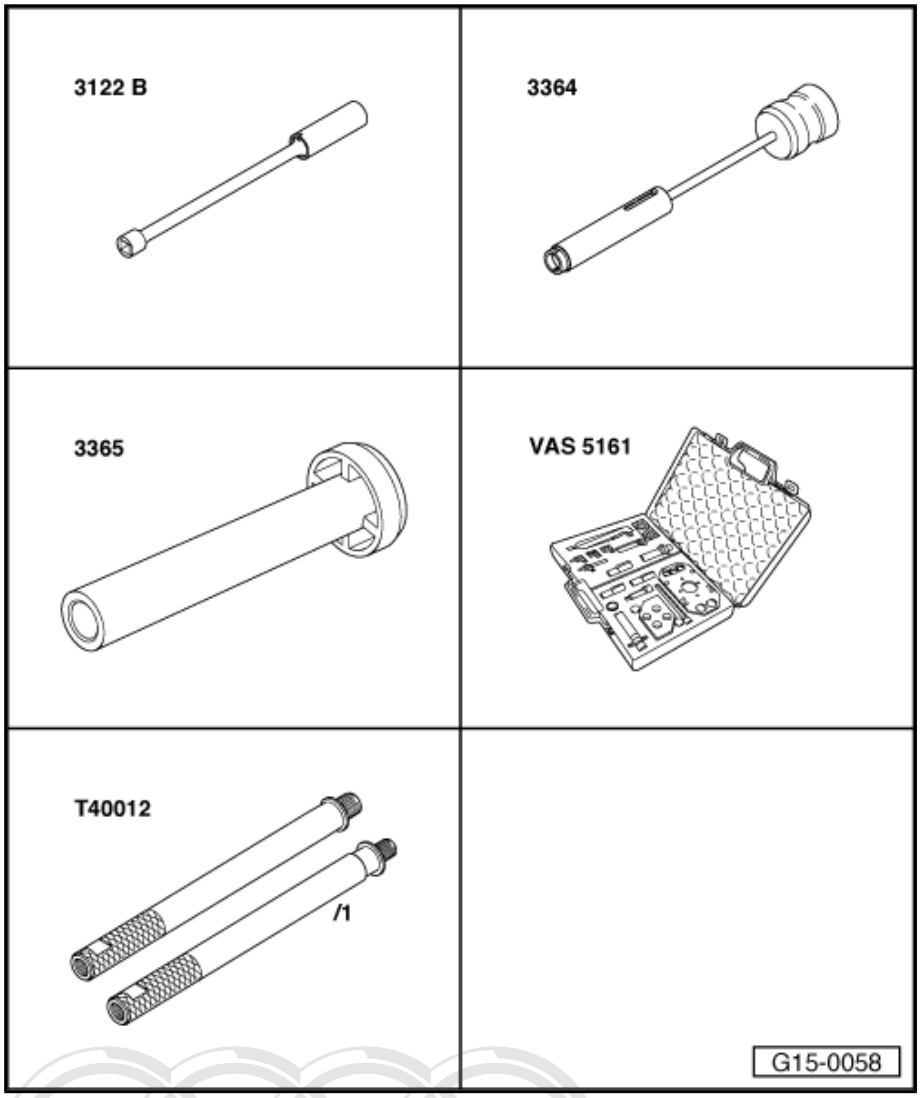
## 4.6 Removing and installing valve stem oil seals

⇒ "4.6.1 Renewing valve stem oil seals with cylinder head installed", page 189

⇒ "4.6.2 Renewing valve stem oil seals with cylinder head removed", page 193

## 4.6.1 Renewing valve stem oil seals with cylinder head installed

**Special tools and workshop equipment required**



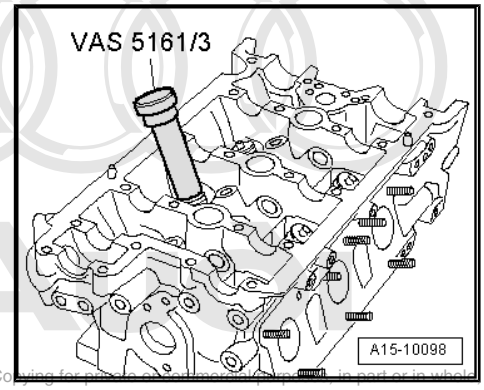

- Spark plug spanner - 3122 B-
- Valve stem seal puller - 3364-
- Valve stem seal fitting tool - 3365-
- Removal and installation device for valve cotters - VAS 5161- with guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B-
- Adapters - T40012-

**Removing**

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

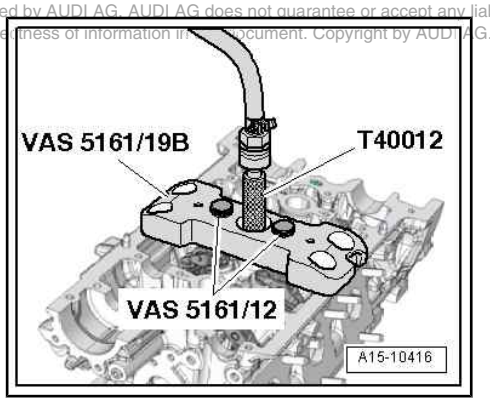
– Remove camshafts ⇒ page 178.
– Mark original positions of roller rocker fingers and hydraulic compensation elements for re-installation.
– Remove roller rocker fingers together with hydraulic compensation elements and put down on a clean surface.
– Unscrew spark plugs using spark plug socket - 3122 B- .
– Set piston of appropriate cylinder to “bottom dead centre”.

– Apply drift -VAS 5161/3- to valve spring plate and use plastic-headed hammer to release sticking valve cotters.

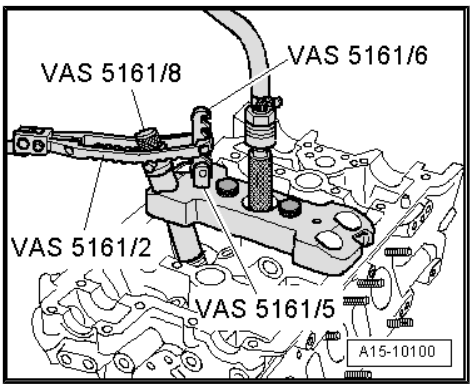



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

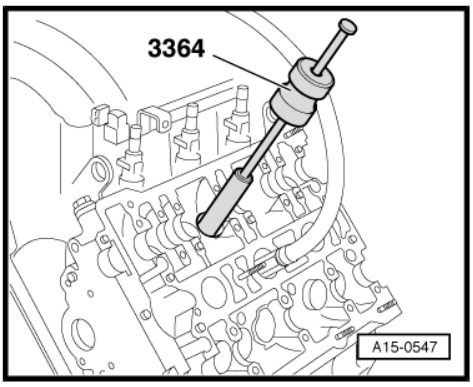
– Fit guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B- onto cylinder head.
– Secure guide plate with knurled screws -VAS 5161/12- .
– Screw adapter - T40012- with seal hand-tight into the corresponding spark plug thread.
– Connect adapter to compressed air line using a commercially available connection piece and apply constant air pressure.
• Minimum pressure: 6 bar




– Screw snap-in device -VAS 5161/6- with engaging fork - VAS 5161/5- into guide plate.
– Insert assembly cartridge -VAS 5161/8- in guide plate.
– Attach pressure fork -VAS 5161/2- to snap-in device and push assembly cartridge down.
– At the same time, turn knurled screw of assembly cartridge clockwise until tips engage in valve cotters.
– Move knurled screw back and forth slightly; the valve cotters are thus forced apart and taken up by the assembly cartridge.
– Release pressure fork.
– Take out assembly cartridge.
– Detach guide plate and turn to one side.
• The compressed air hose remains connected.
– Detach valve spring with valve spring plate.

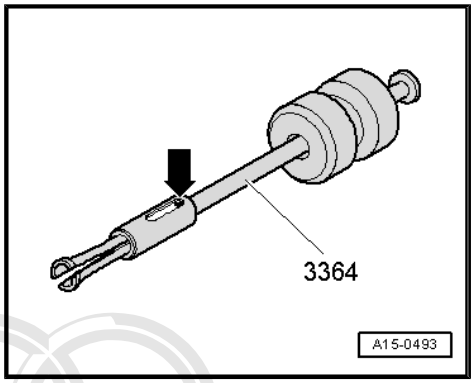



– Pull off valve stem oil seal with valve stem seal puller - 3364- .

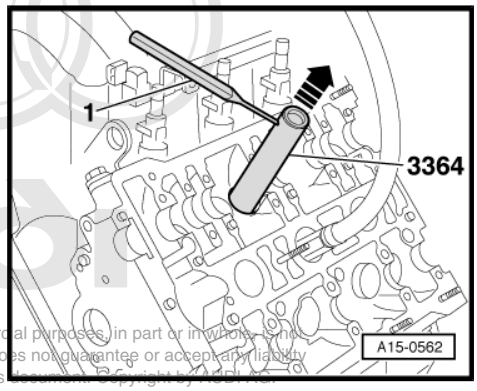


If the valve stem seal puller - 3364- cannot be used on some of the valve stem oil seals due to the confined space, proceed as follows:

– Knock out pin -arrow- of puller using a drift and remove impact extractor attachment.




– Apply bottom section of puller -3364- to valve stem oil seal.
– Secure puller with a punch or roll-pin drift -1-, as shown in illustration.
– Apply assembly lever to puller and pull out valve stem oil seal -arrow-.

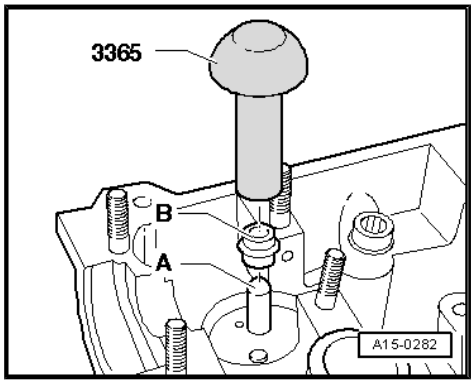



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. © Copyright by AUDI AG

**Caution**

*Make sure valve stem oil seals are not damaged when installing.*

- *New valve stem oil seals -B- are supplied with plastic sleeve; fit plastic sleeve -A- onto valve stem.*

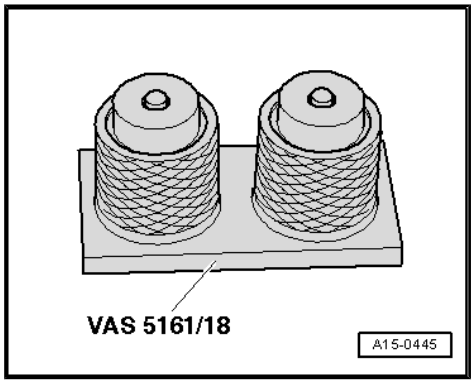



– Lightly oil sealing lip of valve stem oil seal.
– Slide valve stem oil seal onto plastic sleeve.
– Carefully press valve stem oil seal onto valve guide using valve stem seal fitting tool - 3365- .
– Remove plastic sleeve.

If valve cotters have been removed from assembly cartridge, they must first be inserted in insertion device -VAS 5161/18- .

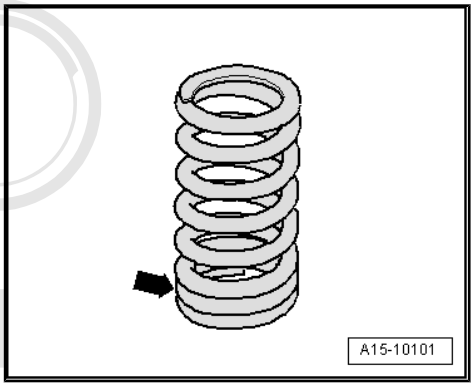
- Larger diameter of valve cotters faces upwards.

– Press assembly cartridge onto insertion device from above and pick up valve cotters.



– Insert valve spring and valve spring plate.

• Installation position: Closely spaced spring coils -arrow- face towards cylinder head.




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

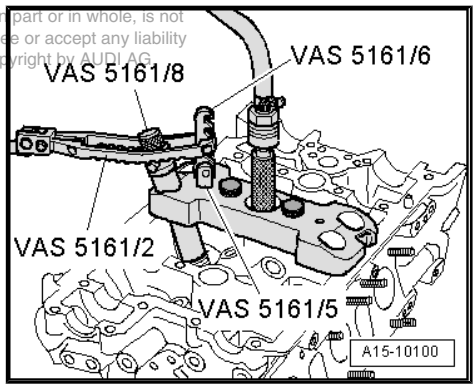
– Bolt guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B- onto cylinder head once again.

– Insert assembly cartridge in guide plate.

– Press down pressure fork and pull knurled screw upwards while turning screw in both directions - this will insert the valve cotters.

– Release pressure fork with knurled screw still in pulled position.

– Repeat procedure for each valve.




**Installing**

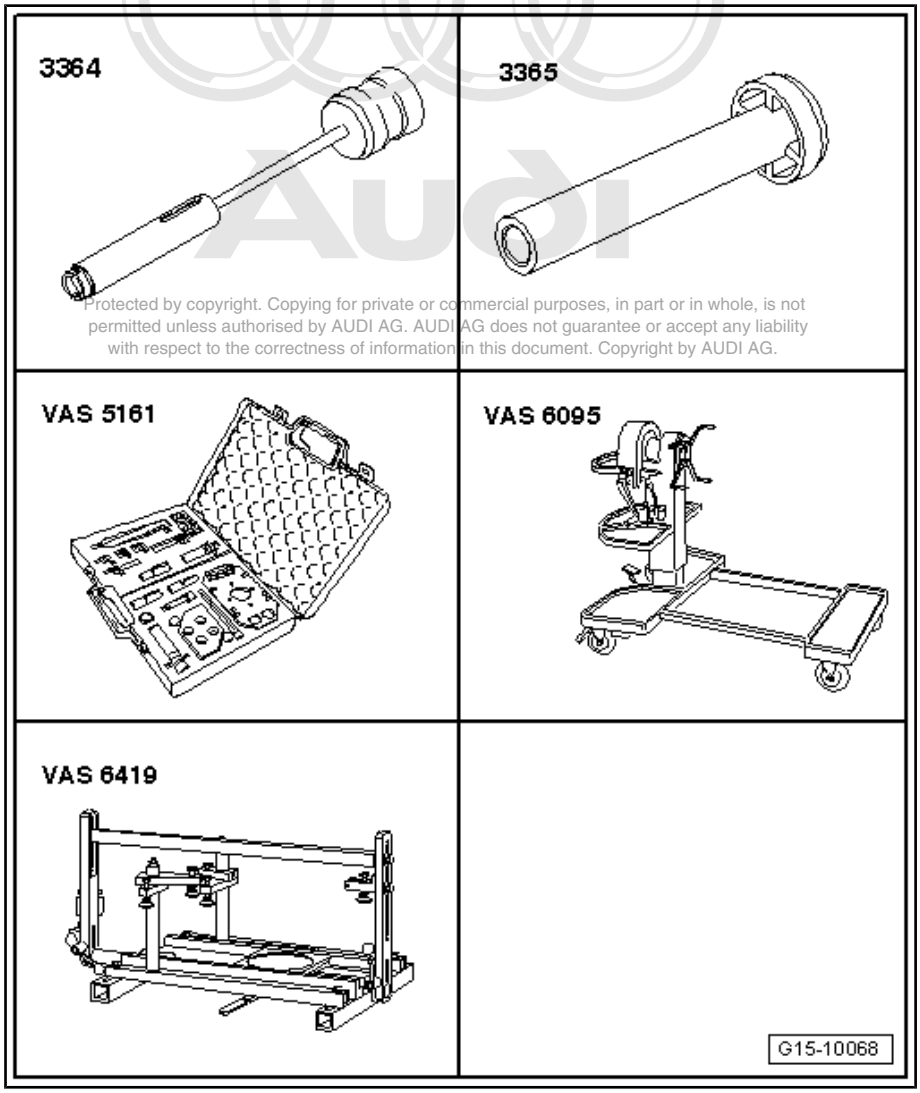
– Ensure that all roller rocker fingers make contact with the ends of the valve stems correctly and are clipped onto their respective hydraulic compensation elements.

– Install spark plugs ⇒ Maintenance ; Booklet 811 .

– Install camshafts ⇒ page 178 .

## 4.6.2 Renewing valve stem oil seals with cylinder head removed

**Special tools and workshop equipment required**




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.

- Valve stem seal puller - 3364-
- Valve stem seal fitting tool - 3365-
- Removal and installation device for valve cotters - VAS 5161- with guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B-
- Engine and gearbox support - VAS 6095-
- Cylinder head tensioning device - VAS 6419-

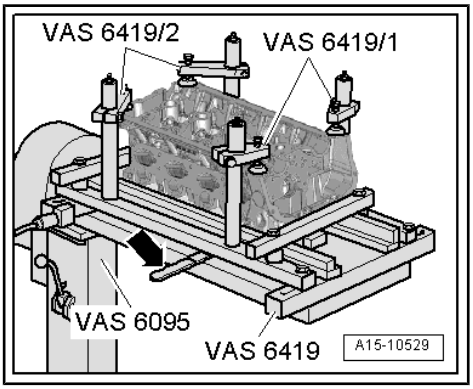
**Procedure**

– Remove camshafts ⇒ page 178 .

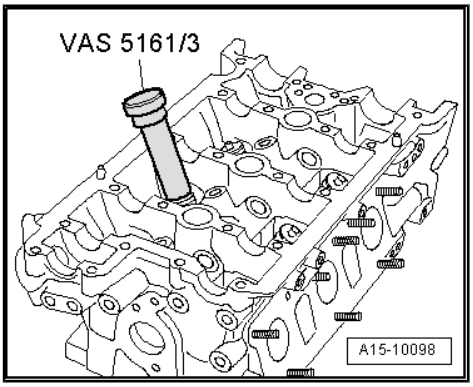
– Mark original positions of roller rocker fingers and hydraulic compensation elements for re-installation.

– Remove roller rocker fingers together with hydraulic compensation elements and put down on a clean surface.

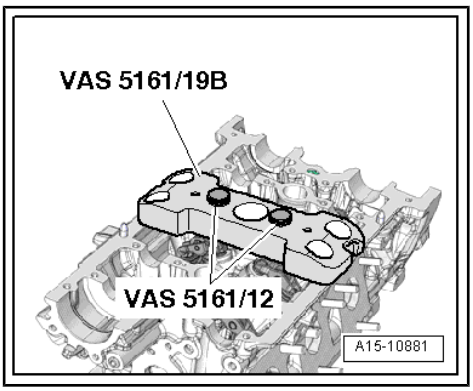
– Insert cylinder head tensioning device - VAS 6419- into engine and gearbox support - VAS 6095- .
– Secure cylinder head in cylinder head tensioning device, as shown in illustration.
– Connect cylinder head tensioning device to compressed air supply.
– Using lever -arrow-, slide air pad under combustion chamber where valve stem oil seal is to be removed.
– Apply just enough compressed air to bring air pad into contact with valve heads.



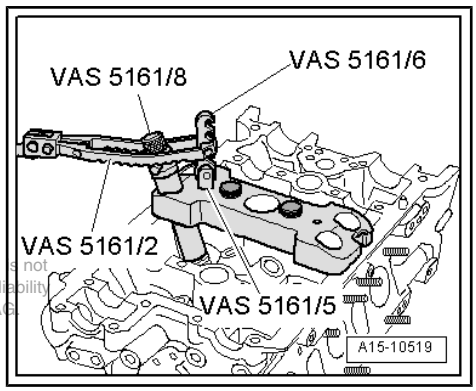

– Apply drift -VAS 5161/3- to valve spring plate and use plastic-headed hammer to release sticking valve cotters.




– Fit guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B- onto cylinder head.
– Secure guide plate with knurled screws -VAS 5161/12- .

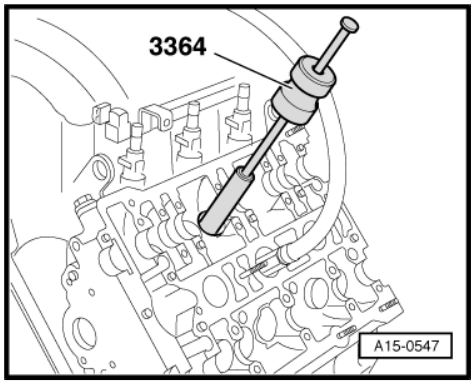



– Screw snap-in device -VAS 5161/6- with engaging fork - VAS 5161/5- into guide plate.
– Insert assembly cartridge -VAS 5161/8- in guide plate.
– Attach pressure fork -VAS 5161/2- to snap-in device and push assembly cartridge down.
– At the same time, turn knurled screw of assembly cartridge clockwise until tips engage in valve cotters.
– Move knurled screw back and forth slightly; the valve cotters are thus forced apart and taken up by the assembly cartridge.
– Release pressure fork.
– Take out assembly cartridge.
– Detach guide plate and turn to one side.
– Detach valve spring with valve spring plate.




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.

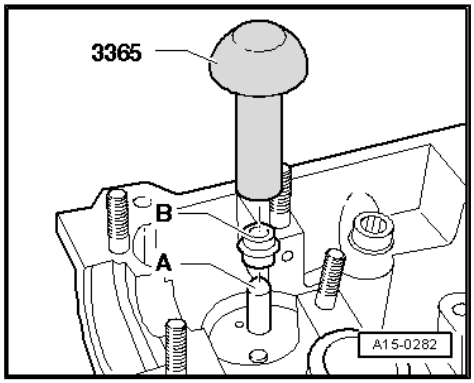
– Pull off valve stem oil seal with valve stem seal puller - 3364- .




**Caution**

*Make sure valve stem oil seals are not damaged when installing.*

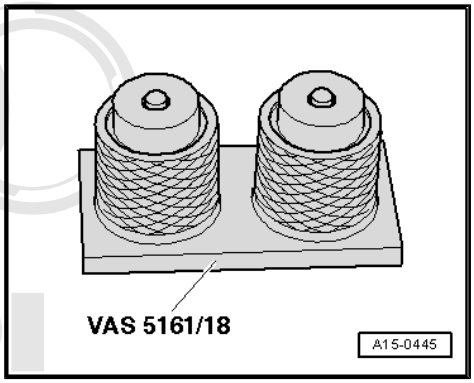
- *New valve stem oil seals -B- are supplied with plastic sleeve; fit plastic sleeve -A- onto valve stem.*



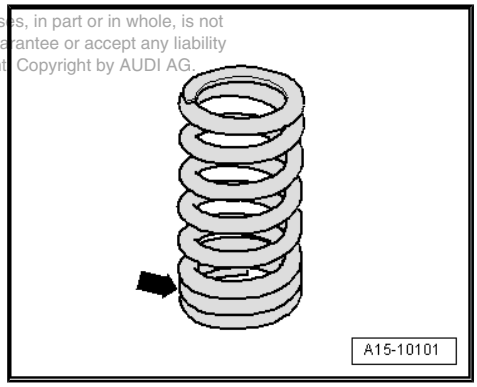

– Lightly oil sealing lip of valve stem oil seal.
– Slide valve stem oil seal onto plastic sleeve.
– Carefully press valve stem oil seal onto valve guide using valve stem seal fitting tool - 3365- .
– Remove plastic sleeve.

If valve cotters had been removed from assembly cartridge they must first be inserted in insertion device -VAS 5161/18- .

• Larger diameter of valve cotters faces upwards.
– Press assembly cartridge onto insertion device from above and pick up valve cotters.

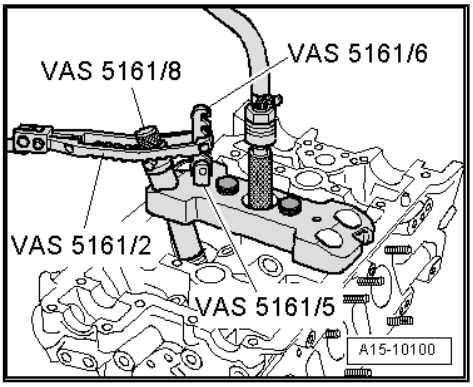



– Insert valve spring and valve spring plate.
• The closely spaced spring coils -arrow- face the cylinder head.




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

– Bolt guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B- onto cylinder head once again.
– Insert assembly cartridge in guide plate.
– Press down pressure fork and pull knurled screw upwards while turning screw in both directions - this will insert the valve cotters.
– Release pressure fork with knurled screw still in pulled position.
– Repeat procedure for each valve.




### Installing

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

– Ensure that all roller rocker fingers make contact with the ends of the valve stems correctly and are clipped onto their respective hydraulic compensation elements.
– Install camshafts ⇒ page 178 .

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 Inlet and exhaust valves

⇒ “5.1 Checking valve guides”, page 198

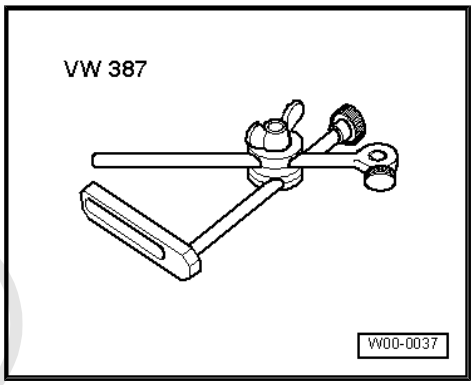
⇒ “5.2 Checking valves”, page 199

⇒ “5.3 Valve dimensions”, page 200

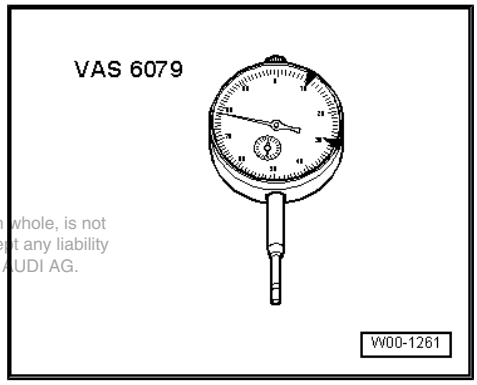
## 5.1 Checking valve guides

**Special tools and workshop equipment required**

- Universal dial gauge bracket - VW 387-

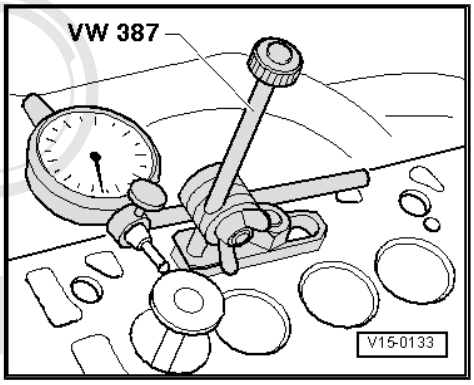



- Dial gauge - VAS 6079-




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.

**Procedure**




**Note**

- *If the valve has to be renewed as part of a repair, use a new valve for the measurement.*
- *Only insert inlet valve into inlet valve guide and exhaust valve into exhaust valve guide, as the stem diameters are different.*

– Insert valve into guide.

• End of valve stem must be flush with valve guide.

– Measure the amount of sideways play.

• Wear limit: 0.8 mm.

– If the wear limit is exceeded, repeat the measurement with new valves.

– Renew cylinder head if wear limit is still exceeded.

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

**Note**

*Valve guides cannot be renewed.*

## 5.2 Checking valves

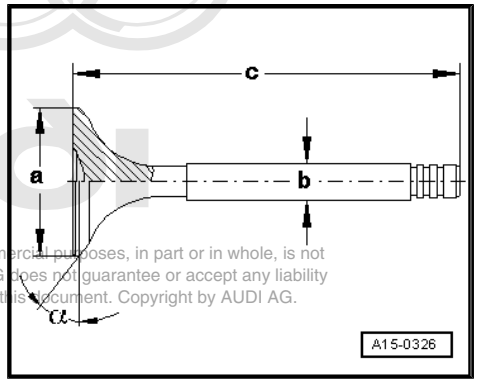
– Visually inspect for scoring on valve stems and valve seat surfaces.

– Renew valve if scoring is clearly visible.

## 5.3 Valve dimensions

**Note**

*Inlet and exhaust valves must not be machined. Only grinding-in is permitted.*




| Dimension | | Inlet valve | Exhaust valve |
|---|---|---|---|
| ∅ a | mm | 33.85 + 0.10 | 28.0 + 0.1 |
| ∅ b | mm | 5.98 + 0.01 | 5.96 + 0.01 |
| c | mm | 103.97 + 0.20 | 101.9 + 0.2 |
| α | ∠° | 45 | 45 |

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**

***Care must be taken when disposing of old sodium-cooled exhaust valves - risk of injury.***

- ***The valves must be sawn in two with a metal saw between the centre of the stem and valve head. When doing so, the valves must not come into contact with water.***
- ***Then throw a maximum of ten valves into a bucket of water and step away immediately.***
- ***A sudden chemical reaction will occur upon contact with water in which the sodium filling burns.***
- ***After performing these steps the valves can be disposed of in the normal way.***

# 17 – Lubrication

## 1 Sump/oil pump

⇒ “1.1 Exploded view - sump/oil pump”, page 201

⇒ “1.2 Exploded view - sump (top section)”, page 204

⇒ “1.3 Engine oil”, page 205

⇒ “1.4 Removing and installing sump (bottom section)”, page 205

⇒ “1.5 Removing and installing sump (top section)”, page 207

⇒ “1.6 Removing and installing oil pump”, page 209

⇒ “1.7 Removing and installing oil level and oil temperature sender G266 ”, page 214

⇒ “1.8 Checking oil level”, page 214

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

### 1.1 Exploded view - sump/oil pump

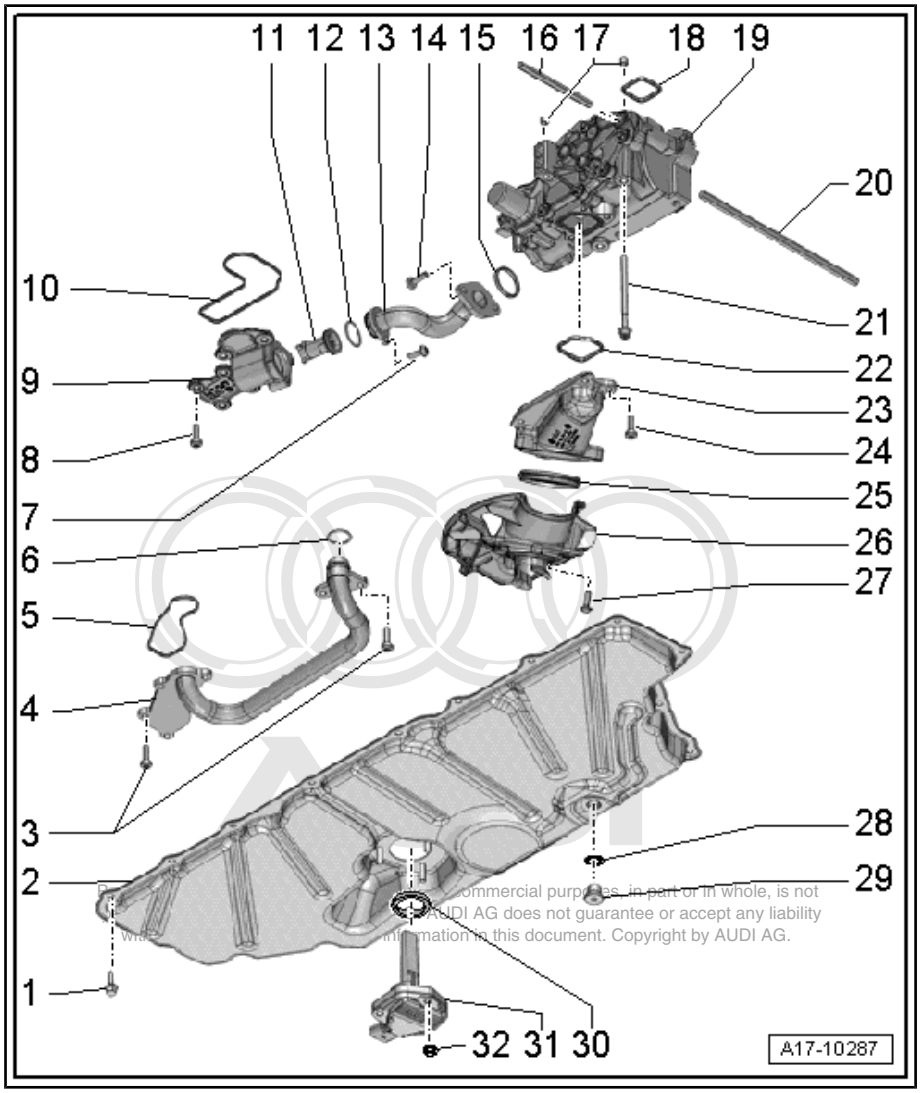
**Caution**

*Risk of damage to catalytic converter.*

- *The oil level must not be above the “MAX” mark on the dipstick.*

**Note**

- *If large quantities of metal shavings or abrasion are found when performing engine repairs, this may be an indication of damage to the crankshaft or conrod bearings. To prevent further damage, the following steps are required after completion of repair work: clean the oil passages carefully and renew the oil spray jets, engine oil cooler and oil filter.*
- *Refer to ⇒ Maintenance tables for engine oil capacity, oil specifications and viscosity grades.*




**1 - Bolt**
- ❑ Tightening torque and sequence ⇒ page 203

**2 - Sump (bottom section)**
- ❑ Removing and installing ⇒ page 205

**3 - Bolts**
- ❑ 9 Nm

**4 - Oil pipe**
- ❑ Removing and installing ⇒ page 209 or ⇒ page 212

**5 - Gasket**
- ❑ Renew

**6 - O-ring**
- ❑ Renew

**7 - Bolt**
- ❑ 9 Nm

**8 - Bolt**
- ❑ 9 Nm

**9 - Housing for oil retention valve**
- ❑ Removing and installing ⇒ page 209 or ⇒ page 212

**10 - Gasket**
- ❑ Renew

**11 - Oil retention valve**

**12 - O-ring**
- ❑ Renew

**13 - Oil pipe**
- ❑ Removing and installing ⇒ page 209 or ⇒ page 212

**14 - Bolt**
- ❑ 9 Nm

**15 - O-ring**
- ❑ Renew

**16 - Drive shaft for coolant pump**

**17 - Dowel sleeves**

**18 - Gasket**
- ❑ Renew

**19 - Oil pump**
- ❑ Do not dismantle
- ❑ With pressure control valve: approx. 5.5 bar
- ❑ Removing and installing: up to engine number CAUA 003 685 ⇒ page 209 , from engine number CAUA 003 686 onwards ⇒ page 212

**20 - Oil pump drive shaft**

**21 - Bolt**
- ❑ Renew

❑ 8 Nm +90°

**22 - Gasket**

❑ Renew

**23 - Intake connecting pipe**

❑ For oil pump

**24 - Bolt**

❑ 9 Nm

**25 - Oil strainer**

❑ Clean

**26 - Baffle plate**

**27 - Bolt**

❑ 9 Nm

**28 - Seal**

❑ Renew

**29 - Oil drain plug**

❑ 25 Nm

**30 - Seal**

❑ Renew

**31 - Oil level and oil temperature sender - G266-**

❑ Removing and installing ⇒ page 214

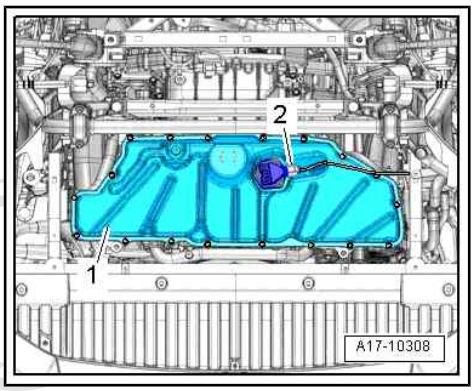
**32 - Nut**

❑ 9 Nm

**Sump (bottom section) - tightening torque and sequence**

– Tighten bolts for sump (bottom section) -1- in 3 stages as follows:

| Stage | Tightening torque |
|---|---|
| 1. | Screw in by hand until contact is made |
| 2. | 5 Nm in diagonal sequence |
| 3. | 9 Nm in diagonal sequence |




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

## 1.2 Exploded view - sump (top section)

**1 - Gaskets**
- ❑ Renew

**2 - Sump (top section)**
- ❑ Removing and installing ⇒ page 207

**3 - O-ring**
- ❑ Renew

**4 - Gaskets**
- ❑ Renew

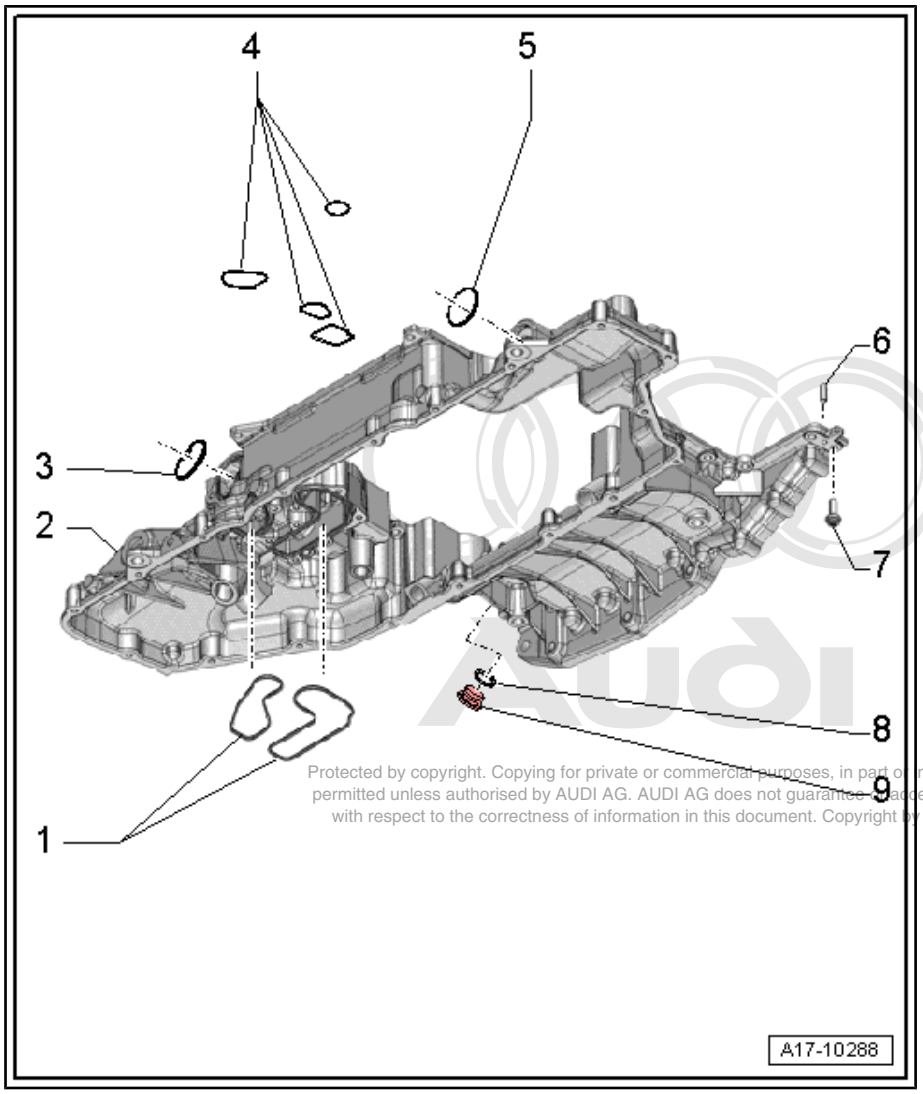
**5 - O-ring**
- ❑ Renew

**6 - Dowel pin**
- ❑ 2x

**7 - Bolt**
- ❑ Renew
- ❑ Tightening torque and sequence ⇒ page 204

**8 - Seal**
- ❑ Renew

**9 - Plug for "TDC" drilling**
- ❑ 35 Nm
- ❑ Use extended hexagon socket wrench with ball head to unscrew or tighten plug




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.

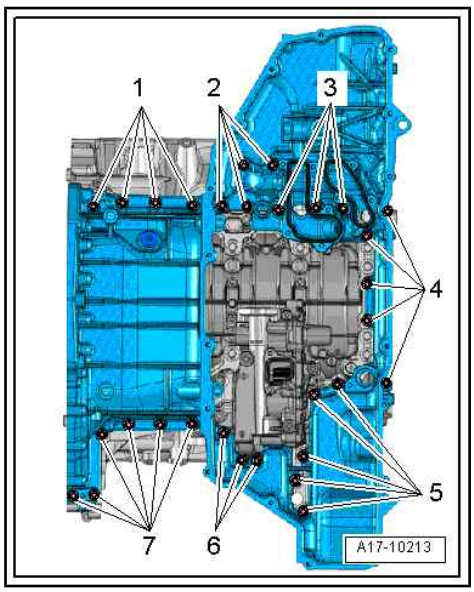
**Sump (top section) - tightening torque and sequence**

**Note**

*Renew the bolts tightened with specified tightening angle.*

– Tighten bolts in 3 stages as follows:

| Stage | Bolts | Tightening torque |
|---|---|---|
| 1. | -1 … 7- | Screw in by hand until contact is made |
| 2. | -1 … 7- | 5 Nm in diagonal sequence |
| 3. | -1 … 7- | Turn 90° further in diagonal sequence |



## 1.3 Engine oil

Refer to ⇒ Maintenance tables for engine oil capacity, oil specifications and viscosity grades.

## 1.4 Removing and installing sump (bottom section)

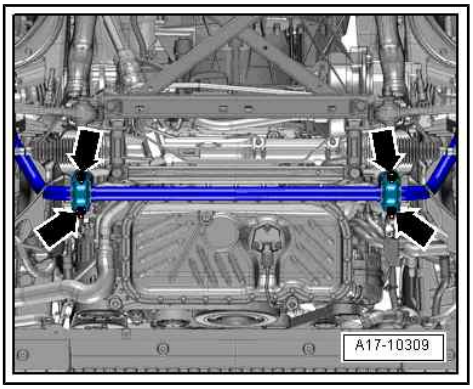
**Special tools and workshop equipment required**

- Electric drill with plastic brush attachment
- Safety goggles
- Sealant ⇒ Electronic parts catalogue

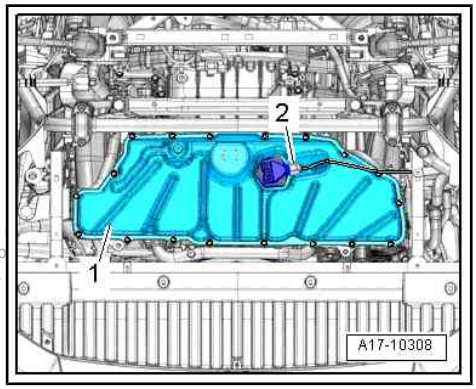
**Removing**

- Engine oil drained ⇒ Maintenance ; Booklet 811

– Remove nuts -arrows- and lower anti-roll bar.




– Unplug electrical connector -2- at oil level and oil temperature sender - G266- .




**Caution**

*Take care to keep components clean.*

- *There will still be some oil in the sump (bottom section).*

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

– Loosen and remove bolts for sump (bottom section) in diagonal sequence.

– Carefully release sump (bottom section) -1- from bonded joint and detach.

**Installing**

- Tightening torque
⇒ Fig. ""Sump (bottom section) - tightening torque and sequence"" , page 203

**Note**

*Renew seals.*

**Caution**

*Protect lubrication system and bearings against contamination.*

- *Cover exposed parts of the engine.*

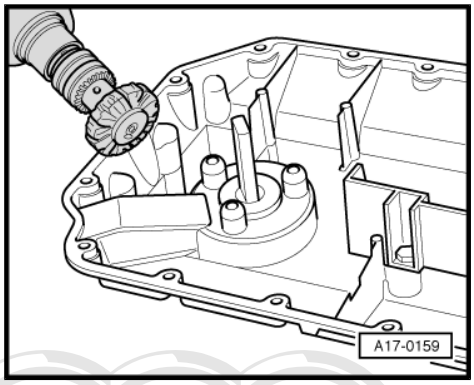
**WARNING**

*Risk of eye injury.*

- *Put on safety goggles.*

– Remove remaining sealant on bottom and top sections of sump with a rotating plastic brush or similar.

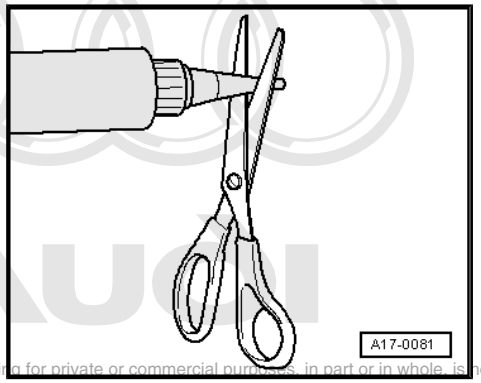
– Clean sealing surfaces; they must be free of oil and grease.




**Note**

*Note the use-by date of the sealant.*

– Cut off nozzle of tube at front marking (nozzle ∅ approx. 2 mm).




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

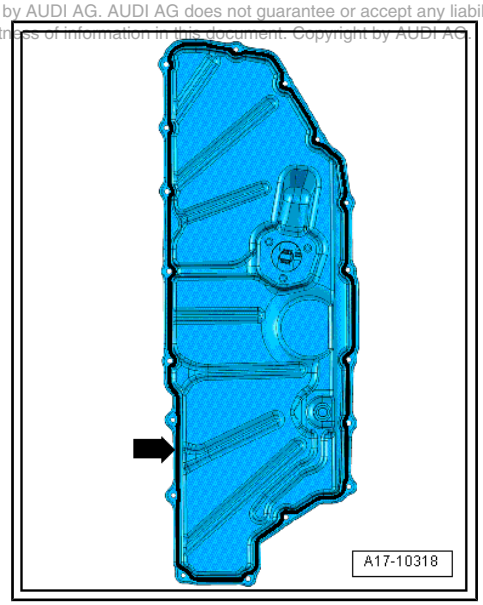
**Caution**

*Make sure lubrication system is not clogged by excess sealant.*

- *The sealant bead must not be thicker than specified.*

– Apply sealant bead -arrow- onto clean sealing surface of sump (bottom section) as shown in illustration.

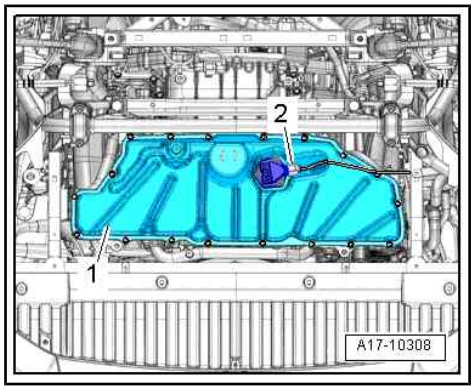
- Width of sealant bead: 2.5 mm.




**Note**

*The sump (bottom section) must be installed within 5 minutes after applying the sealant.*

– Fit sump (bottom section) and tighten bolts
⇒ Fig. ""Sump (bottom section) - tightening torque and sequence"" , page 203 .




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

– Install anti-roll bar ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Removing and installing anti-roll bar .

– Install noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

– Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 811 .

## 1.5 Removing and installing sump (top section)

**Special tools and workshop equipment required**

- Safety goggles
- Electric drill with plastic brush attachment
- Sealant ⇒ Electronic parts catalogue

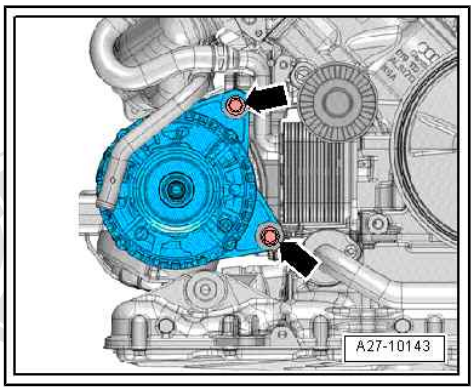
**Removing**

- Gearbox removed ⇒ Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox or ⇒ Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .

– Remove timing chain cover (bottom) ⇒ page 151 .

– Remove tensioner for poly V-belt ⇒ page 95 .

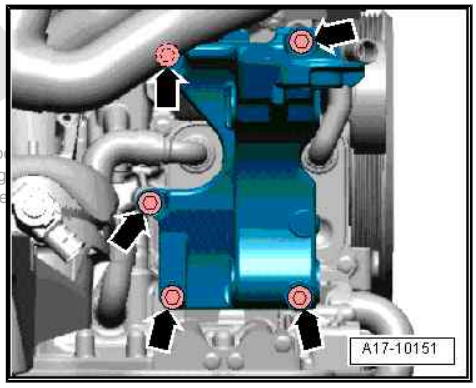
– Remove alternator ⇒ Electrical system; Rep. gr. 27 ; Alternator; Removing and installing alternator .




– Remove bolts -arrows- and detach bracket for alternator.

– Remove oil pump: up to engine number CAUA 003 685 ⇒ page 209 , from engine number CAUA 003 686 onwards ⇒ page 212 .

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

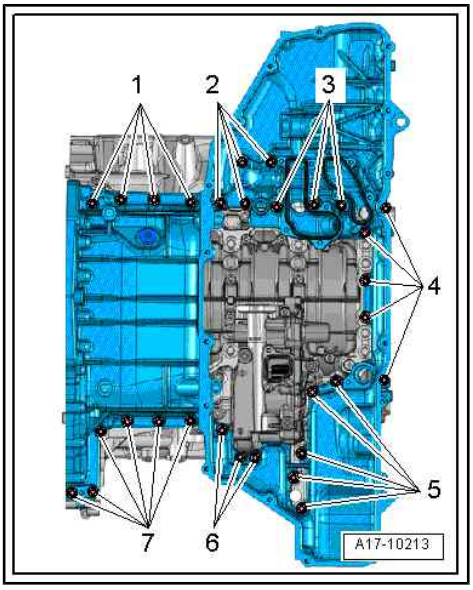



– Slacken bolts -1 ... 7- for sump (top section) in diagonal sequence and remove.

– Carefully release sump (top section) from bonded joint, pry sump off dowel sleeves and detach.

**Installing**

- Tightening torque ⇒ Fig. ""Sump (top section) - tightening torque and sequence"" , page 204




**Note**

*Renew seals and O-rings.*

**Caution**

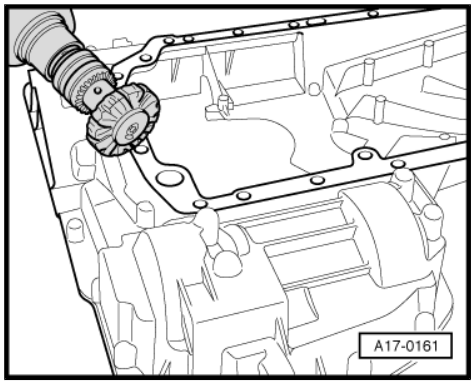
***Protect lubrication system and bearings against contamination.***

- ***Cover exposed parts of the engine.***

**WARNING**

*Risk of eye injury.*

- *Put on safety goggles.*



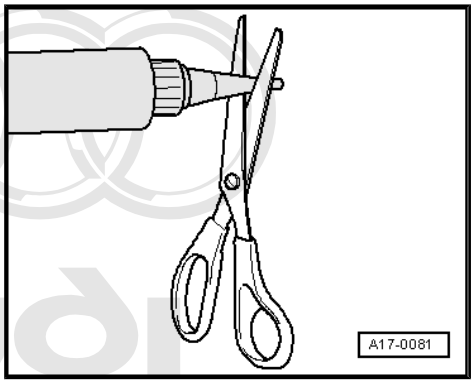

– Remove remaining sealant from sump (top section) and cylinder block using rotating plastic brush or similar.

– Clean sealing surfaces; they must be free of oil and grease.

**Note**

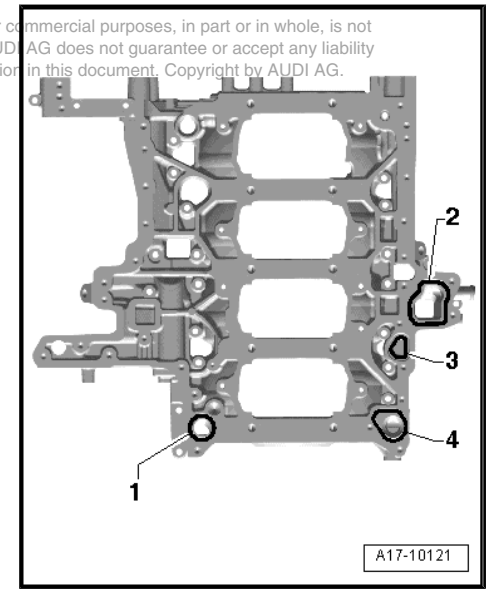
*Note the use-by date of the sealant.*

– Cut off nozzle of tube at front marking (nozzle ∅ approx. 1 mm).




– Fit new gaskets -1 … 4- in grooves on retaining frame.

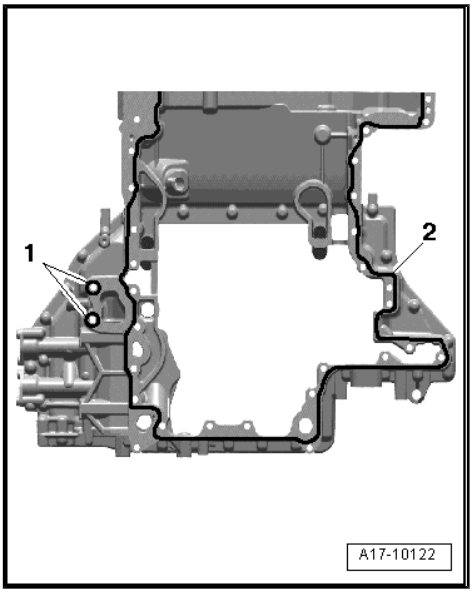
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



**Caution**

*Make sure lubrication system is not clogged by excess sealant.*

- *The sealant bead must not be thicker than specified.*



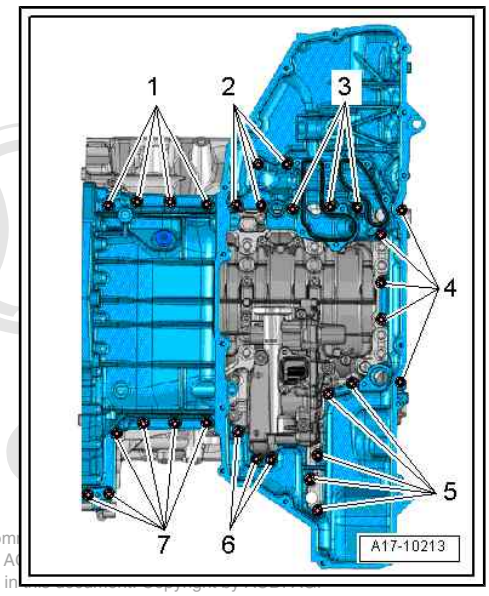

– Apply beads of sealant -1- and -2- onto clean sealing surface of sump (top section) as shown in illustration.

• Width of sealant beads: 2.5 mm.

**Note**

*The sump (top section) must be installed within 5 minutes after applying the sealant.*

– Fit sump (bottom section) and tighten bolts ⇒ Fig. ""Sump (top section) - tightening torque and sequence"" , page 204 .




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

– Install oil pump: up to engine number CAUA 003 685 ⇒ page 209 , from engine number CAUA 003 686 onwards ⇒ page 212 .

– Install bracket for alternator ⇒ page 93 .

– Install alternator ⇒ Electrical system; Rep. gr. 27 ; Alternator; Removing and installing alternator .

– Install poly V-belt tensioner ⇒ page 95 .

– Install timing chain cover (bottom) ⇒ page 151 .

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

## 1.6 Removing and installing oil pump

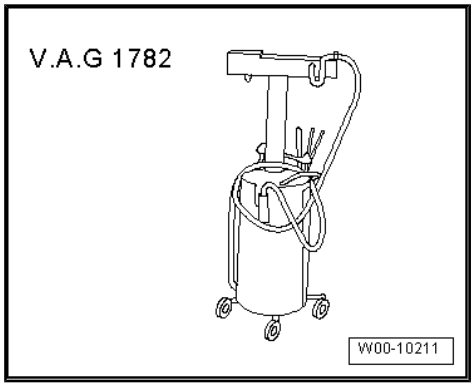
⇒ "1.6.1 Removing and installing oil pump up to engine number CAUA 003 685", page 209

⇒ "1.6.2 Removing and installing oil pump from engine number CAUA 003 686 onwards", page 212

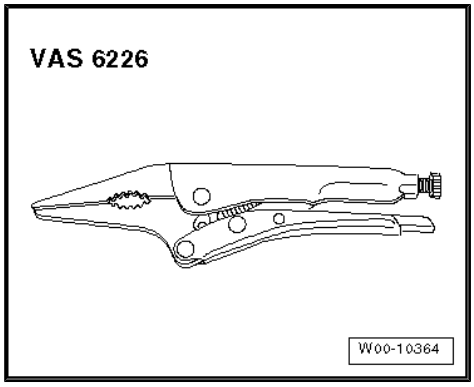
## 1.6.1 Removing and installing oil pump up to engine number CAUA 003 685

**Special tools and workshop equipment required**

♦ Used oil collection and extraction unit - V.A.G 1782-

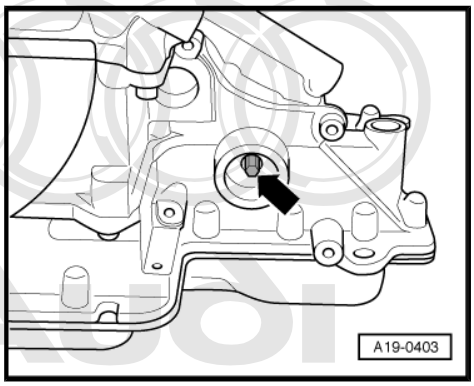



♦ Long-nose grip pliers - VAS 6226-



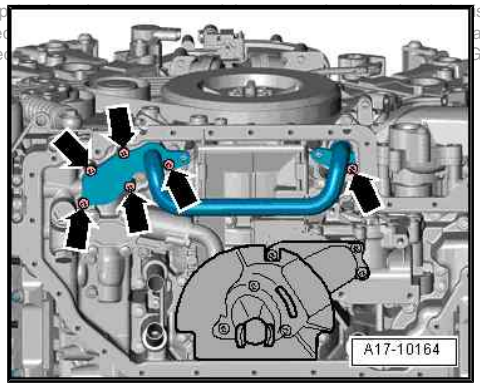

**Removing**

– Remove coolant pump ⇒ page 240 .
– Remove sump (bottom section) ⇒ page 205 .
– Detach coolant pump drive shaft -arrow- from oil pump.




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.

– Place used oil collection and extraction unit - V.A.G 1782- under engine and leave in position for the following procedure.

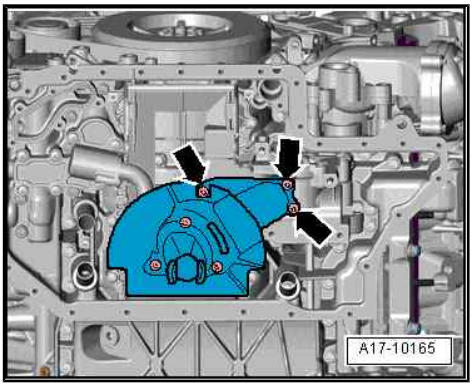



**Note**

*Some oil will come out when oil pipe is removed.*

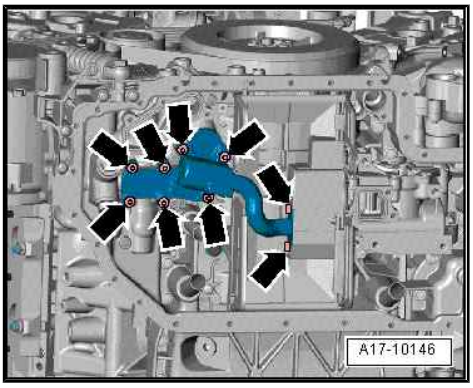
– Remove bolts -arrows- and take out oil pipe.

– Remove bolts -arrows- and take out intake connection.

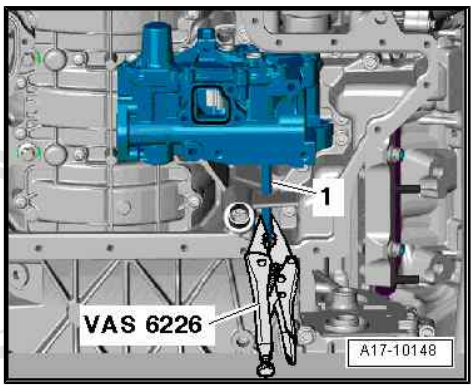



**Note**

- *Some oil will come out when oil pipe is removed.*
- *Take out oil pipe together with housing for oil non-return valve.*




– Press oil pump drive shaft -1- back against spring pressure and hold firmly with long-nose grip pliers - VAS 6226- .

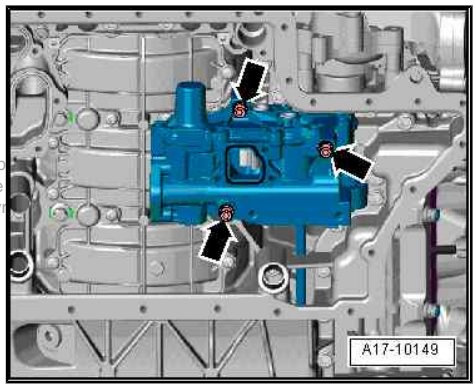



– Remove bolts -arrows- and remove oil pump.

**Installing**

- Tightening torques
  ⇒ “1.1 Exploded view - sump/oil pump”, page 201

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



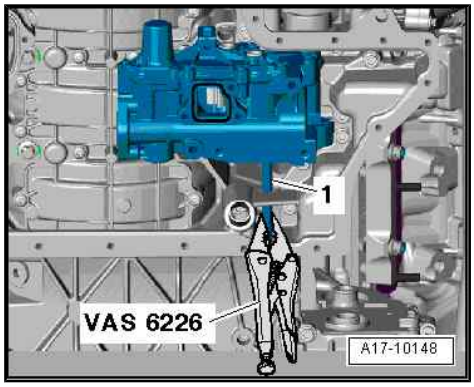

**Note**

*Renew seals and O-rings.*

– Check that both centring sleeves are fitted in cylinder block.

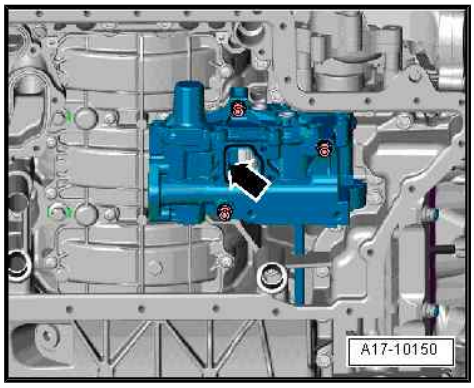
– Secure oil pump -arrows-.

– Release long-nose grip pliers - VAS 6226- and let drive shaft -1- slide into oil pump.




– Check that drive shaft is positively engaged in oil pump: try to turn oil pump gears by reaching into intake opening -arrow- of oil pump.

• You should not be able to turn the gears.




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

– Install coolant pump ⇒ page 240 .

– Install sump (bottom section) ⇒ page 205 .

– Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 811 .

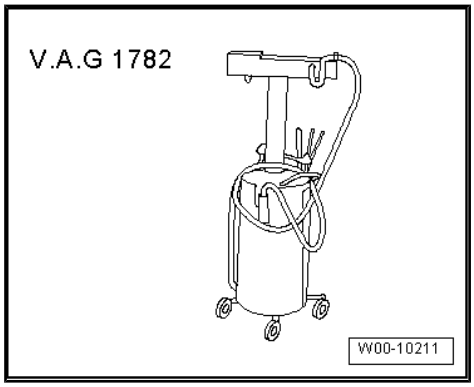
– Fill up with coolant ⇒ page 232 .

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

## 1.6.2 Removing and installing oil pump from engine number CAUA 003 686 onwards

### Special tools and workshop equipment required

♦ Used oil collection and extraction unit - V.A.G 1782-




### Removing

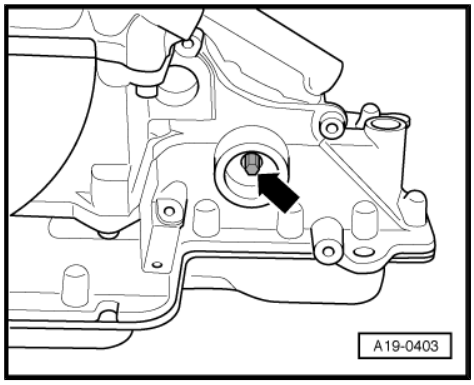
• Gearbox removed ⇒ Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox or ⇒ Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .

– Remove spur gear drive ⇒ page 112 .

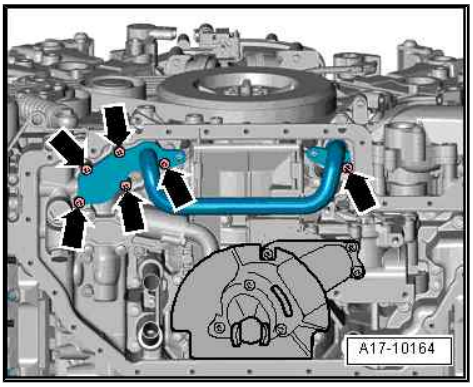
– Remove coolant pump ⇒ page 240 .

– Remove sump (bottom section) ⇒ page 205 .

– Detach coolant pump drive shaft -arrow- from oil pump.



– Place used oil collection and extraction unit - V.A.G 1782- under engine and leave in position for the following procedure.

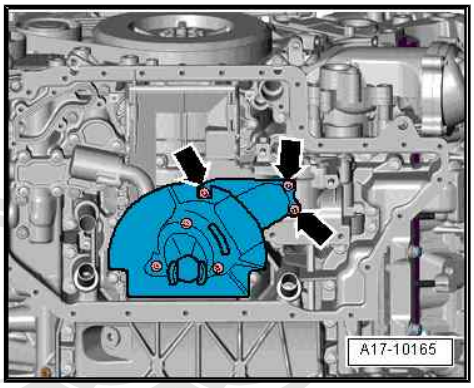



**Note**

*Some oil will come out when oil pipe is removed.*

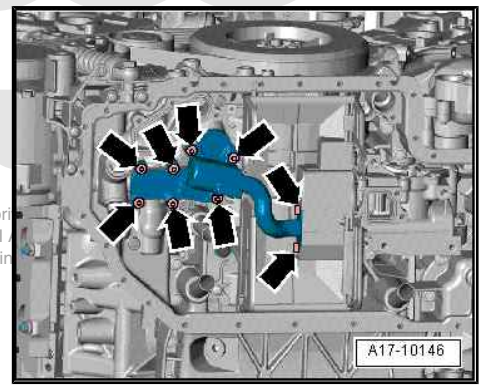
– Remove bolts -arrows- and take out oil pipe.

– Remove bolts -arrows- and take out intake connection.



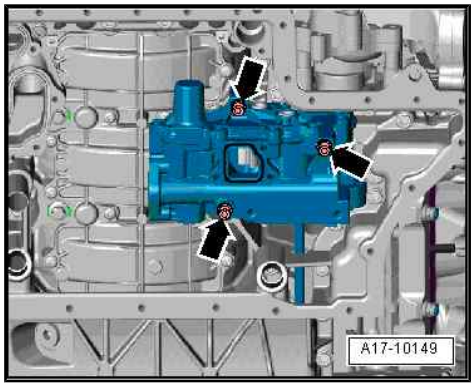

**Note**

- *Some oil will come out when oil pipe is removed.*
- *Take out oil pipe together with housing for oil non-return valve.*




Protected by copyright. Copying for pri
permitted unless authorised by AUDI
with respect to the correctness of in

– Remove bolts -arrows- and remove oil pump.




**Installing**

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

- Tightening torques
  ⇒ “1.1 Exploded view - sump/oil pump”, page 201

**Note**

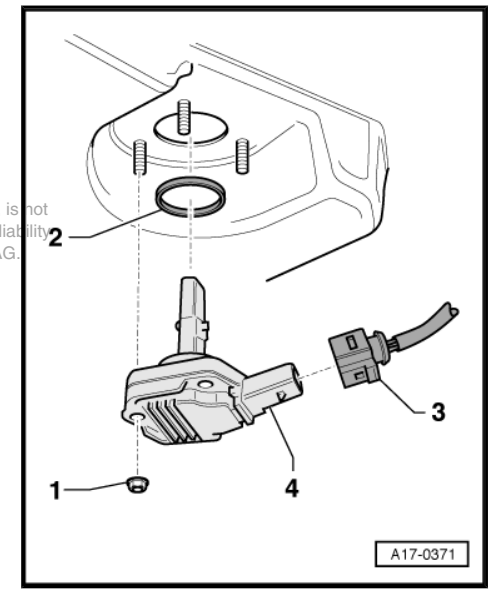
*Renew seals and O-rings.*

– Check that both centring sleeves are fitted in cylinder block.
– Install coolant pump ⇒ page 240 .
– Install spur gear drive ⇒ page 112 .
– Install sump (bottom section) ⇒ page 205 .
– Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 811 .
– Fill up with coolant ⇒ page 232 .

## 1.7 Removing and installing oil level and oil temperature sender - G266-

**Removing**

- Engine oil drained ⇒ Maintenance ; Booklet 811
– Unplug electrical connector -3-.
– Remove nuts -1- and detach oil level and oil temperature sender - G266- -item 4-.




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

**Installing**

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

- Tightening torque
  ⇒ “1.1 Exploded view - sump/oil pump”, page 201

**Note**

*Renew seal -2-.*

– Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 811 .

## 1.8 Checking oil level

Check oil level ⇒ Maintenance ; Booklet 811 .

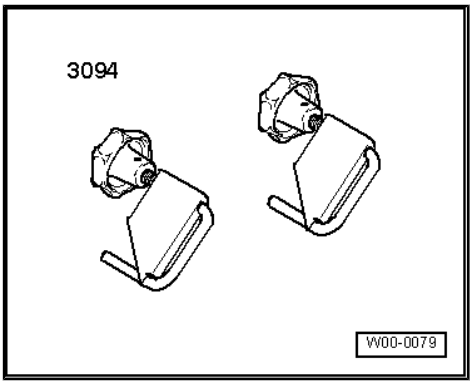
# 2 Engine oil cooler

⇒ “2.1 Removing and installing engine oil cooler”, page 215

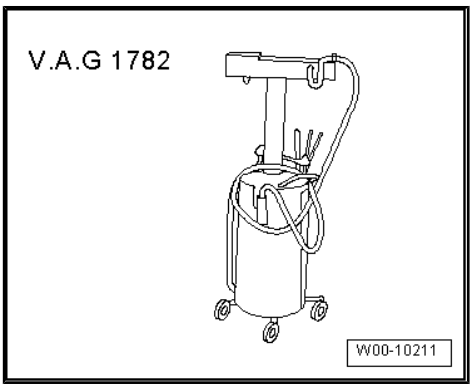
## 2.1 Removing and installing engine oil cooler

**Special tools and workshop equipment required**

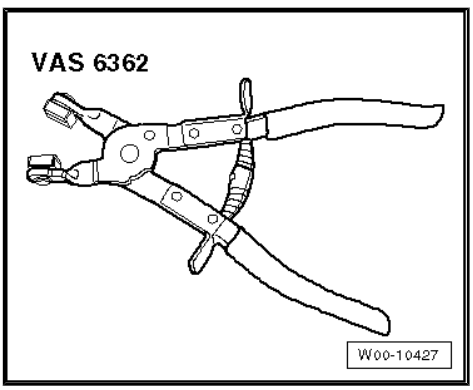
- Hose clamps, up to 25 mm - 3094-




- Used oil collection and extraction unit - V.A.G 1782-



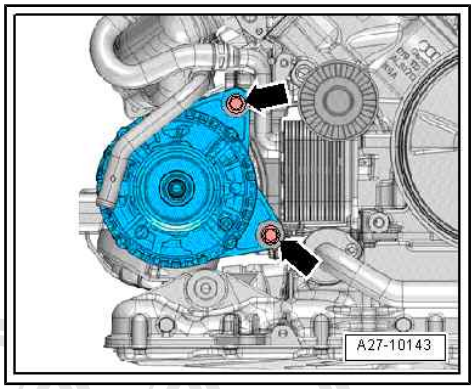

- Hose clip pliers - VAS 6362-



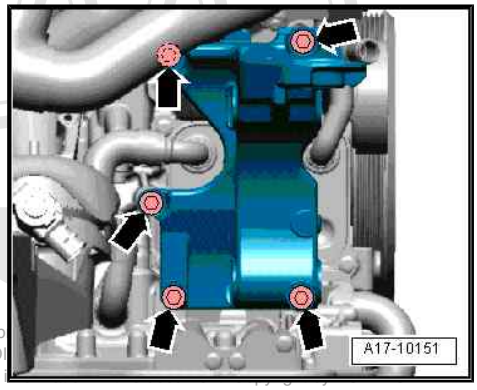

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

### Removing

– Remove alternator ⇒ Electrical system; Rep. gr. 27 ; Alternator; Removing and installing alternator .

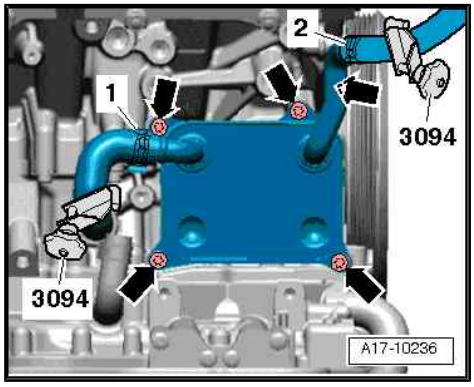



– Remove bolts -arrows- and detach bracket for alternator.




Protected by copyright. Copying for p
permitted unless authorised by AUD
with respect to the correctness of

– Clamp off coolant hoses with hose clamps -3094- as shown in illustration.




**Note**

*Place a cloth underneath to catch escaping coolant.*

– Disconnect coolant hoses -1- and -2- from engine oil cooler.
– Position used oil collection and extraction unit - V.A.G 1782- below engine.
– Unscrew bolts -arrows- and detach engine oil cooler.

### Installing

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

- Tightening torques
  ⇒ Fig. ""Engine oil cooler - tightening torque and sequence"" , page 219

**Note**

- *Renew O-rings.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

– Install bracket for alternator ⇒ page 93 .
– Install alternator ⇒ Electrical system; Rep. gr. 27 ; Alternator; Removing and installing alternator .
– Check oil level ⇒ Maintenance ; Booklet 811 .
– Check coolant level ⇒ page 232 .

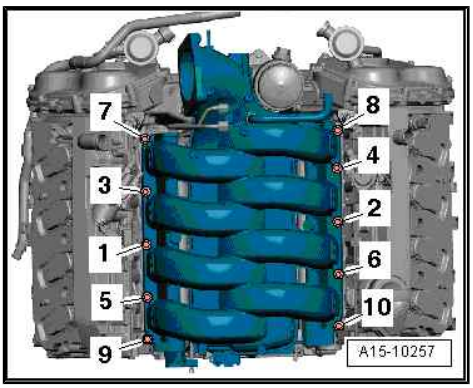
# 3 Crankcase breather

⇒ “3.1 Removing and installing hose for crankcase breather system”, page 217

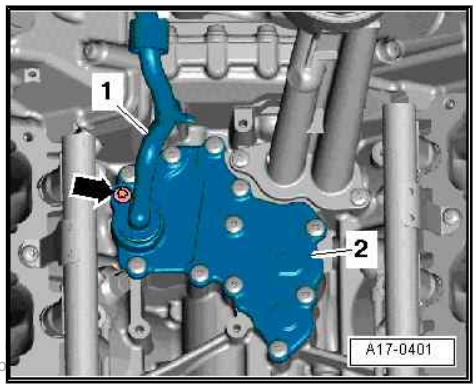
## 3.1 Removing and installing hose for crankcase breather system

### Removing

– Remove intake manifold ⇒ page 306 .




– Remove bolt -arrow- and pull crankcase breather hose -1- out of cover -2-.




### Installing

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

- Tightening torque
  ⇒ “5.1 Exploded view - oil spray jets/valves”, page 223

**Note**

*Fit new O-ring.*

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

– Install intake manifold ⇒ page 306 .

# 4 Oil filter/oil pressure switches

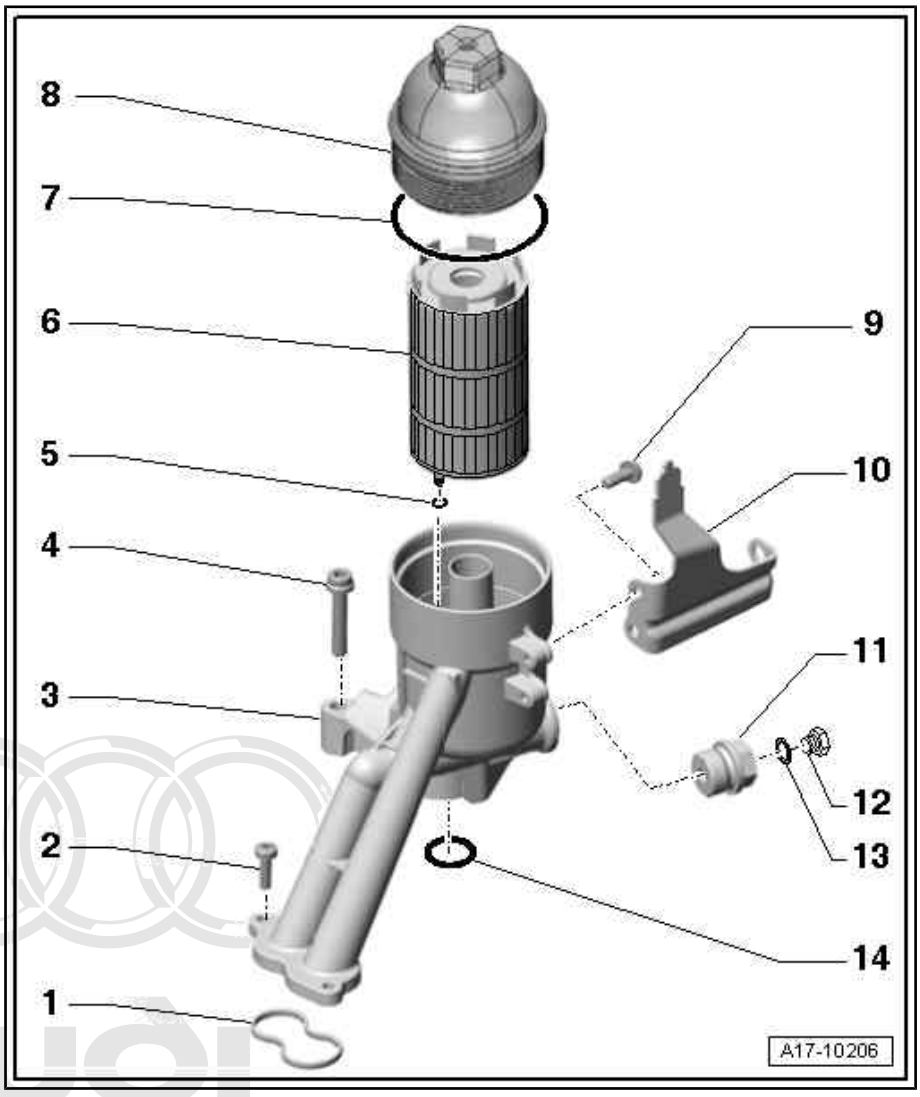
⇒ “4.1 Exploded view - oil filter housing/oil pressure switch”, page 218

⇒ “4.2 Removing and installing oil pressure switch F1 ”, page 219

⇒ “4.3 Checking oil pressure and oil pressure switch”, page 219

⇒ “4.4 Removing and installing oil filter housing”, page 221

## 4.1 Exploded view - oil filter housing/oil pressure switch




**1 - Gasket**
- ❑ Renew

**2 - Bolt**
- ❑ 9 Nm

**3 - Oil filter housing**
- ❑ With oil filter bypass valve 1.3 bar

**4 - Bolt**
- ❑ 22 Nm

**5 - O-ring**
- ❑ Part of oil filter element

**6 - Oil filter element**
- ❑ Removing and installing ⇒ Maintenance ; Booklet 811

**7 - O-ring**
- ❑ Renew

**8 - Sealing cap**
- ❑ 25 Nm

**9 - Bolt**
- ❑ 9 Nm

**10 - Bracket**
- ❑ For activated charcoal filter solenoid valve 1 - N80-

**11 - Plug**
- ❑ 50 Nm

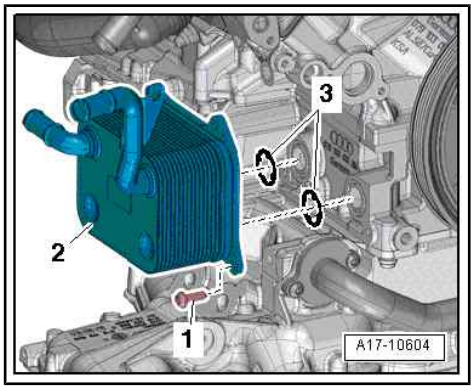
**12 - Plug**
- ❑ 9 Nm

**13 - Seal**
- ❑ Renew

**14 - O-ring**
- ❑ Renew

ected 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.

**Engine oil cooler - tightening torque and sequence**



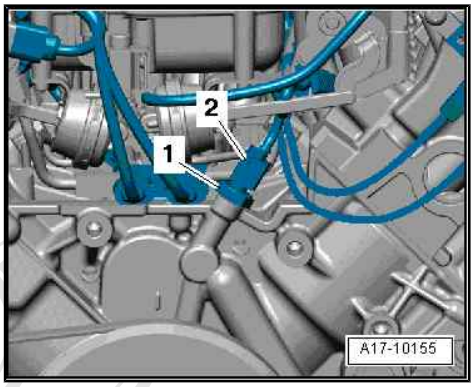

**Note**

*Renew gaskets -3- for engine oil cooler -2-.*

– Tighten bolts in 2 stages as follows:

| Stage | Bolts | Tightening torque |
|---|---|---|
| 1. | -1- | 3 Nm |
| 2. | -1- | 9 Nm |

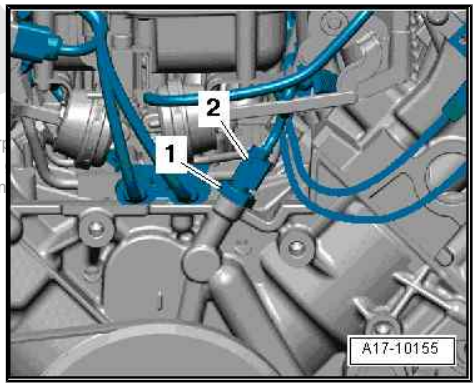
**Oil pressure switch - F1- - tightening torque**




– Renew seal.
– Tighten oil pressure switch - F1- -item 1- to 20 Nm.

## 4.2 Removing and installing oil pressure switch - F1-

**Removing**




– Remove radiator cowl ⇒ page 262 .
– Unplug electrical connector -2-.
– Remove oil pressure switch - F1- -item 1-.

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

**Installing**

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

- Tightening torque
  ⇒ Fig. “” Oil pressure switch -F1- - tightening torque”“ , page 219

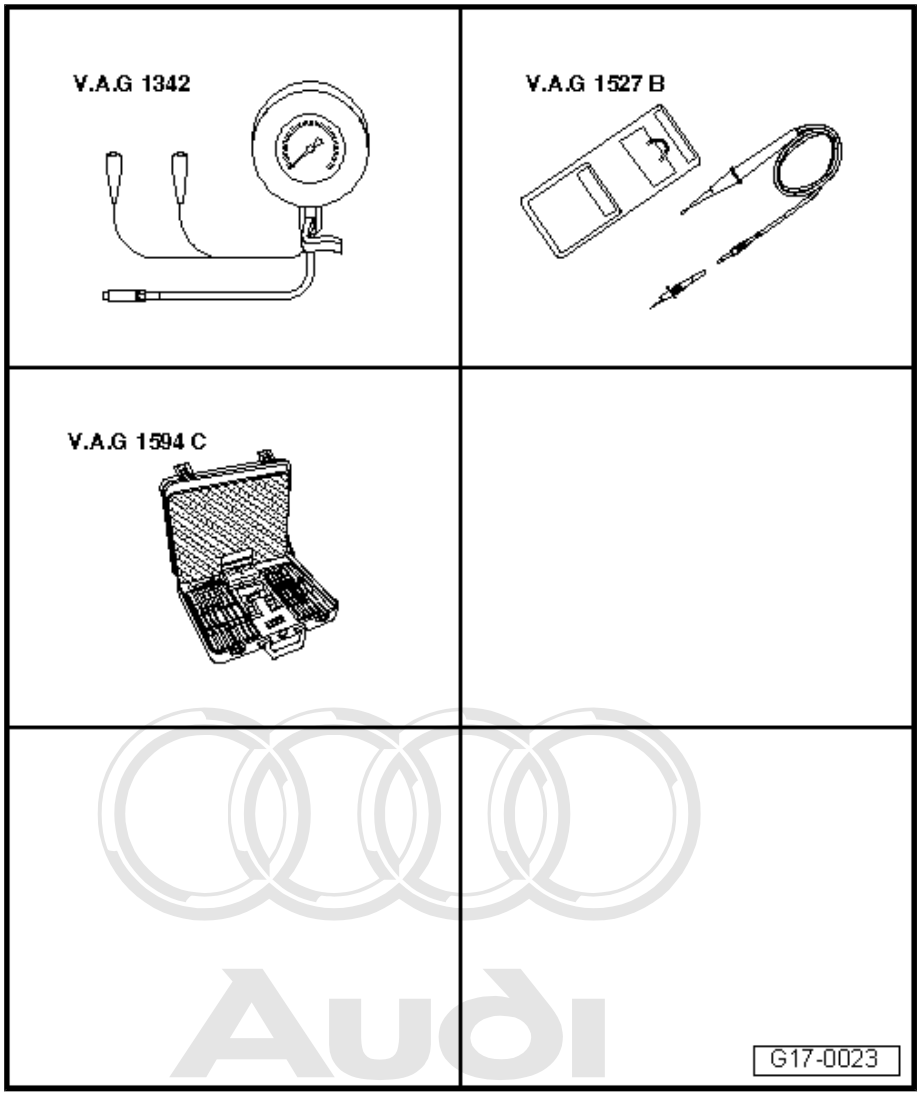
**Note**

*Renew seal.*

– Install radiator cowl ⇒ page 262 .

## 4.3 Checking oil pressure and oil pressure switch

## Special tools and workshop equipment required




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

- Oil pressure tester - V.A.G 1342- with adapter - V.A.G 1342/14-
- Voltage tester - V.A.G 1527B-
- Auxiliary measuring set - V.A.G 1594C-

**Procedure**

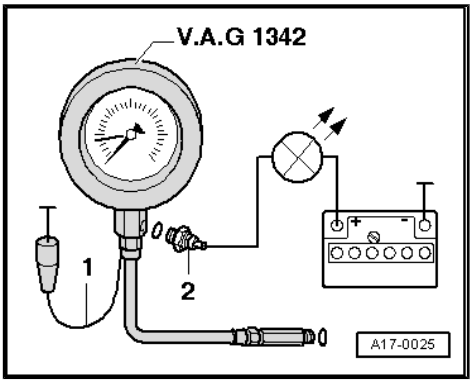
- Oil level OK
- Engine oil temperature approx. 80 °C

– Remove oil pressure switch - F1- ⇒ page 219 .

– Connect oil pressure tester - V.A.G 1342- with adapter - V.A.G 1342/14- to bore for oil pressure switch.

– Screw oil pressure switch -2- into oil pressure tester - V.A.G 1342- .

– Connect brown wire of oil pressure tester to earth (“–”).




**Checking oil pressure switch**

– Connect voltage tester - V.A.G 1527B- with adapter leads from auxiliary measuring set - V.A.G 1594C- to oil pressure switch and battery positive (“+”).

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.

- LED should not light up.

**Note**

*Renew oil pressure switch if LED lights up at this stage.*

– Start engine.

**Note**

*Observe the oil pressure tester and LED while starting the engine, as the switching point of the oil pressure switch may already be exceeded when starting.*

- LED should light up at 1.2 ... 1.6 bar.

– Renew oil pressure switch if LED does not light up.

**Checking oil pressure**

– Start engine.

- Oil pressure at idling speed: at least 1.5 bar.
- Oil pressure at 2000 rpm: at least 3.5 bar.

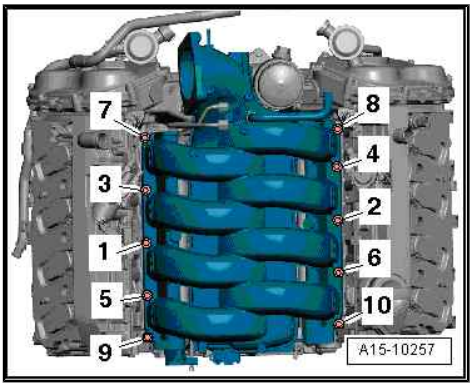
**Installing**

– Install oil pressure switch - F1- ⇒ page 219 .

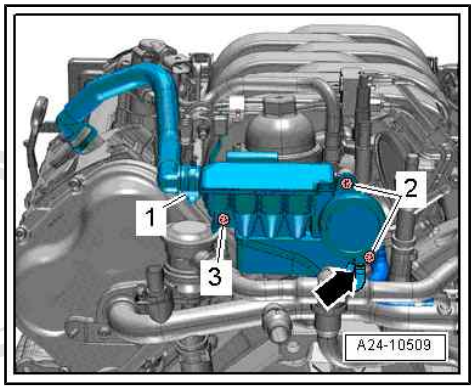
## 4.4 Removing and installing oil filter housing

**Removing**

– Remove intake manifold ⇒ page 306 .



– Remove bolt -3- and push pressure control valve for crankcase breather slightly towards the rear.

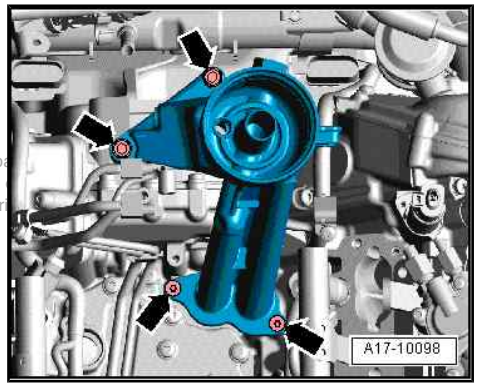



**Note**

*Disregard -items 1, 2- and -arrow-.*

– Remove oil filter element ⇒ Maintenance ; Booklet 811 .

– Unscrew bolts -arrows- and remove oil filter housing.




**Installing**

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

permitted unless authorised by AUDI AG. AUDI AG does not guarantee with respect to the correctness of information in this document. Copyr

- Tightening torques ⇒ “4.1 Exploded view - oil filter housing/oil pressure switch”, page 218

**Note**

*Renew seals and O-rings.*

– Install intake manifold ⇒ page 306 .

– Check oil level ⇒ Maintenance ; Booklet 811 .

# 5 Oil circuit

⇒ "5.1 Exploded view - oil spray jets/valves", page 223

⇒ "5.2 Removing and installing oil spray jets/valves", page 223

## 5.1 Exploded view - oil spray jets/valves

**1 - O-ring**
- ❑ Renew

**2 - Spray nozzle valve**
- ❑ Removing and installing ⇒ page 223

**3 - Gasket**
- ❑ Renew

**4 - Cover**

**5 - O-ring**
- ❑ Renew

**6 - Hose**
- ❑ For crankcase breather

**7 - Bolt**
- ❑ 9 Nm

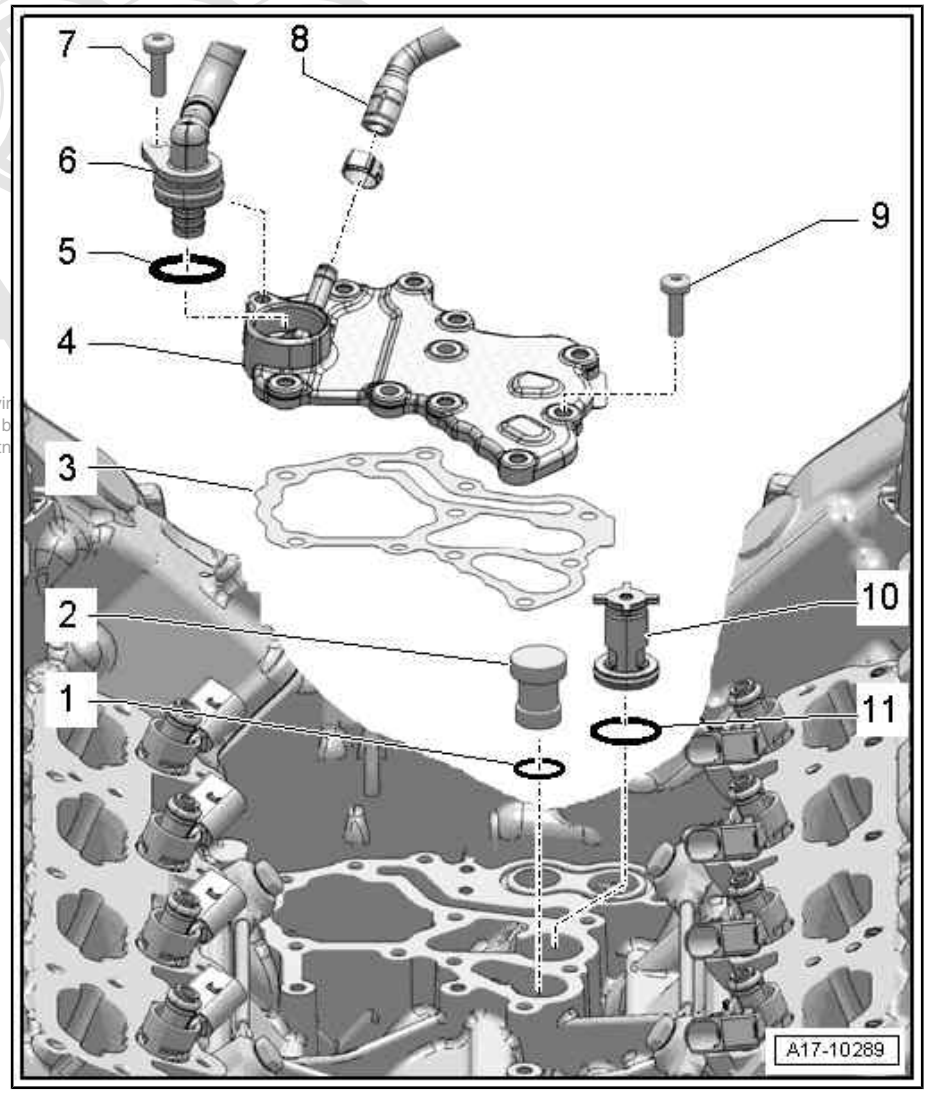
**8 - Oil return hose**

**9 - Bolt**
- ❑ 9 Nm

**10 - Oil retention valve**
- ❑ Removing and installing ⇒ page 223

**11 - O-ring**
- ❑ Renew

Protected by copyright. Copyin
permitted unless authorised b
with respect to the correctn



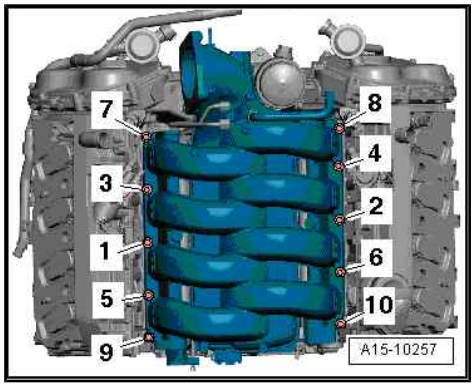

## 5.2 Removing and installing oil spray jets/ valves

**Note**

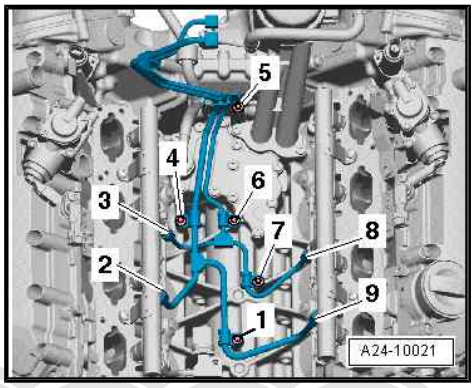
*If irregular valve noise disappears after a lengthy drive but repeatedly re-occurs when travelling short distances, renew oil retention valve.*

### Removing

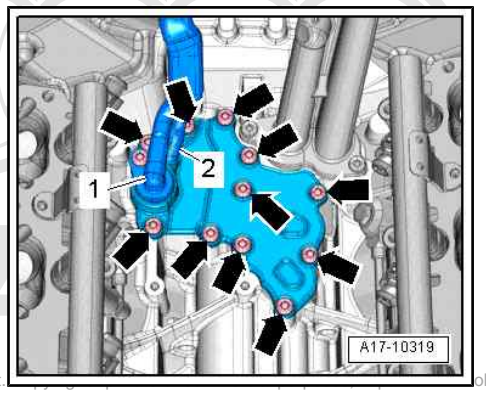
– Remove intake manifold ⇒ page 306 .




– Remove bolts -1, 4, 5, 6, 7- at retaining clips for high-pressure pipes.
– Unplug electrical connectors at injectors.
– Unscrew high-pressure pipes at connections -2- and -9- on fuel rail.
– Unscrew high-pressure pipes at connections -3- and -8- on fuel rail. To do so, counterhold at hexagon flats with an open-end spanner and slacken union nut.
– Take off high-pressure pipes.




– Remove bolts -arrows-.
– Detach cover with crankcase breather hose -1- and oil return hose -2-.
– Detach gasket.



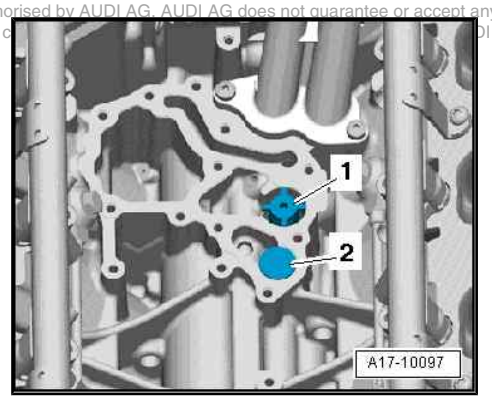

Protected by copyright. ole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the c DI AG.

– Pull out oil retention valve -1- and spray nozzle valve -2-.

### Installing

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

- Tightening torques
  ⇒ “5.1 Exploded view - oil spray jets/valves”, page 223




**Note**

*Renew gaskets and O-rings.*

– Install high-pressure pipes ⇒ page 329 .
– Install intake manifold ⇒ page 306 .

# 19 – Cooling

## 1 Cooling system/coolant

⇒ “1.1 Connection diagram - coolant hoses”, page 225

⇒ “1.2 Checking cooling system for leaks”, page 227

⇒ “1.3 Draining and filling cooling system”, page 229

### 1.1 Connection diagram - coolant hoses

**WARNING**

*Risk of scalding due to hot steam and hot coolant.*

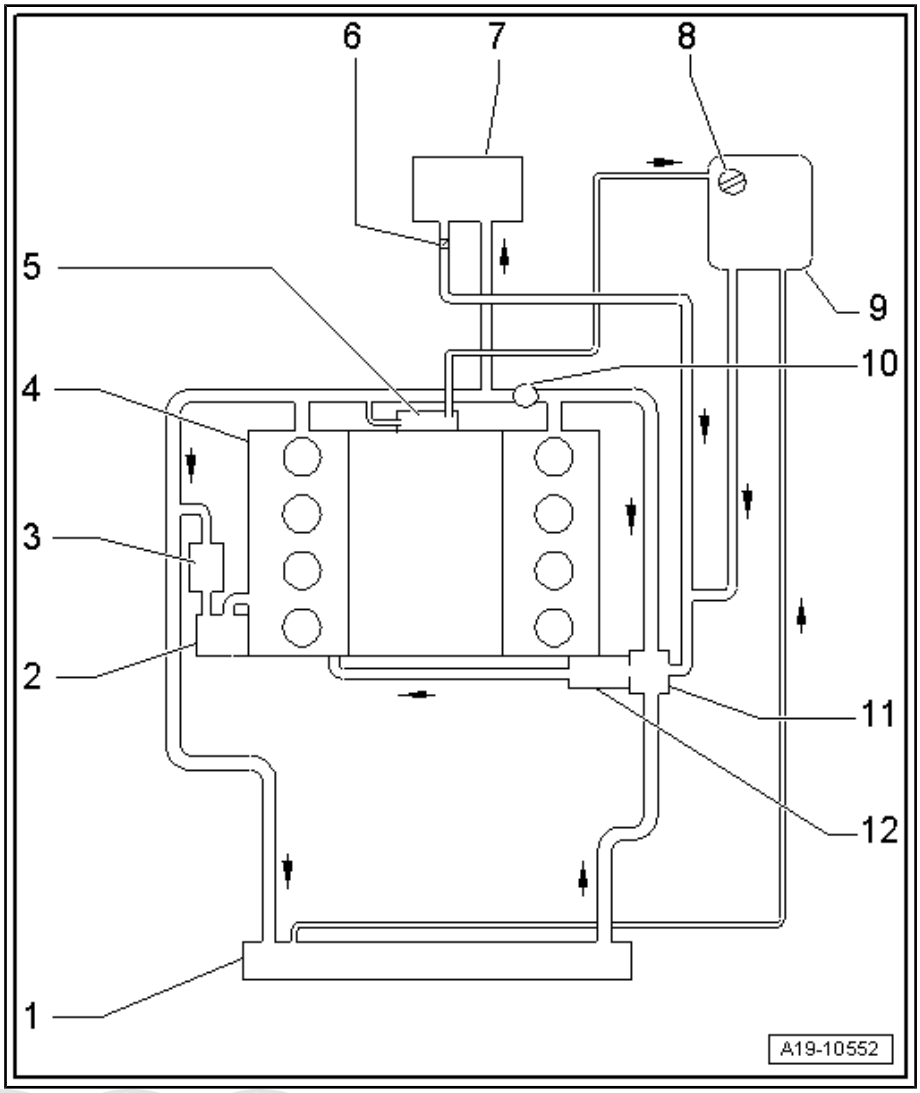
- *The cooling system is under pressure when the engine is hot.*
- *To allow pressure to dissipate, cover filler cap on coolant expansion tank with cloth and open carefully.*

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

**Note**

- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *The arrow markings on coolant pipes and on ends of hoses must align.*

**Vehicles without auxiliary heater**




**1 - Radiator**

- ❑ If renewed, refill system with fresh coolant

**2 - Engine oil cooler**

- ❑ If renewed, refill system with fresh coolant

**3 - Continued coolant circulation pump - V51-**

**4 - Cylinder head and cylinder block**

- ❑ If renewed, refill system with fresh coolant

**5 - Throttle valve connection**

**6 - Bleeder hole**

- ❑ In coolant hose for heat exchanger

**7 - Heat exchanger for heater**

- ❑ If renewed, refill system with fresh coolant

**8 - Filler cap**

- ❑ Checking pressure relief valve ⇒ page 229

**9 - Coolant expansion tank**

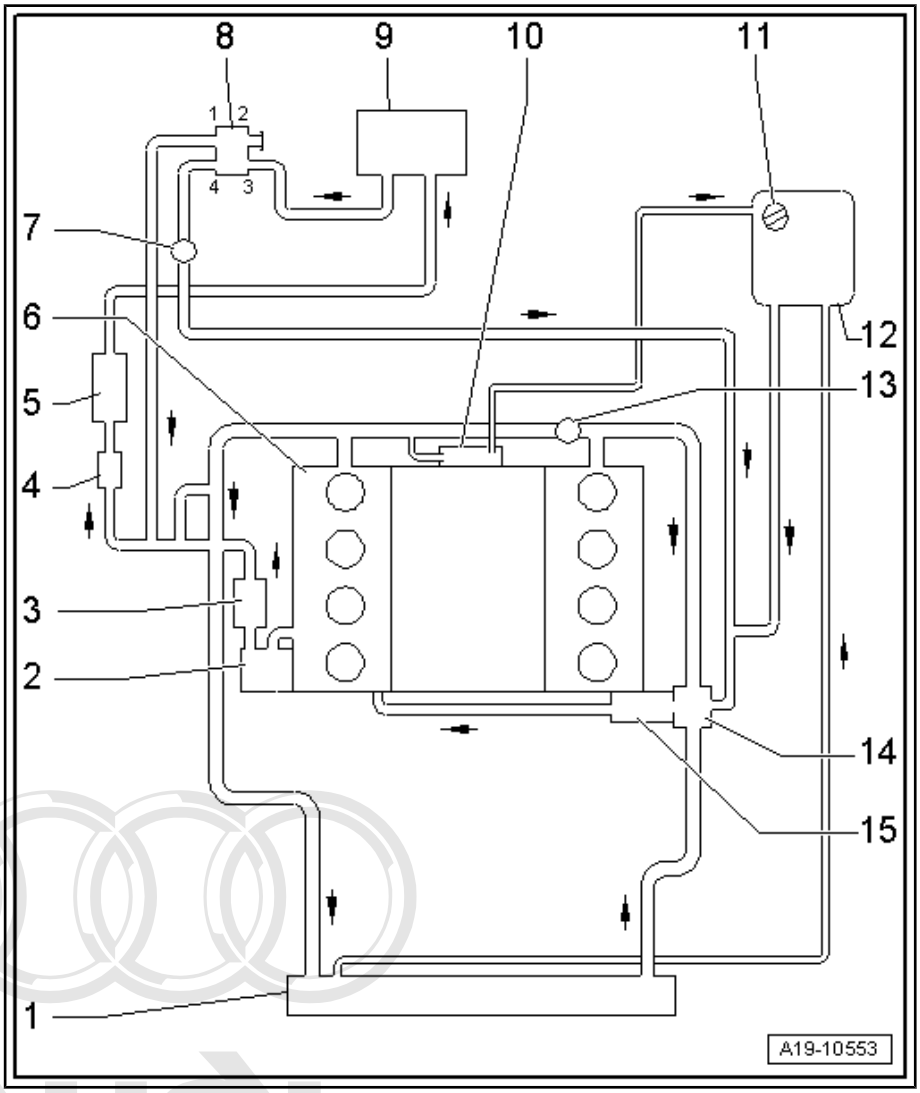
**10 - Coolant temperature sender - G62-**

**11 - Map-controlled engine cooling system thermostat - F265-**

**12 - Coolant pump**

**Vehicles with auxiliary heater**

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




**1 - Radiator**

- ❑ If renewed, refill system with fresh coolant

**2 - Engine oil cooler**

- ❑ If renewed, refill system with fresh coolant

**3 - Continued coolant circulation pump - V51-**

**4 - Circulation pump - V55-**

- ❑ Removing and installing ⇒ Auxiliary heater, supplementary heater; Rep. gr. 82 ; Auxiliary/supplementary heater; Removing and installing circulation pump - V55-

**5 - Auxiliary heater**

**6 - Cylinder head and cylinder block**

- ❑ If renewed, refill system with fresh coolant

**7 - Bleeder hole**

- ❑ In coolant hose for heat exchanger

**8 - Heater coolant shut-off valve - N279-**

- ❑ Removing and installing ⇒ Auxiliary/supplementary heater; Rep. gr. 82 ; Coolant circuit with auxiliary/supplementary heater; Removing and installing heater coolant shut-off valve

**9 - Throttle valve connection**

**10 - Heat exchanger for heater**

- ❑ If renewed, refill system with fresh coolant

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.

**11 - Filler cap**

- ❑ Checking pressure relief valve ⇒ page 229

**12 - Coolant expansion tank**

**13 - Coolant temperature sender - G62-**

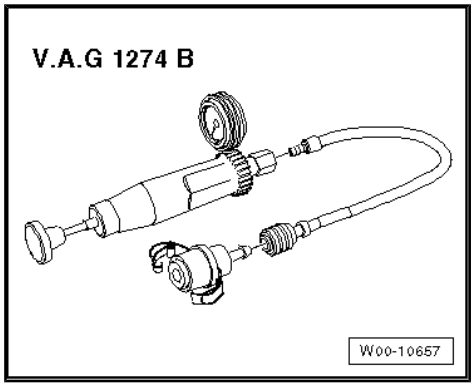
**14 - Map-controlled engine cooling system thermostat - F265-**

**15 - Coolant pump**

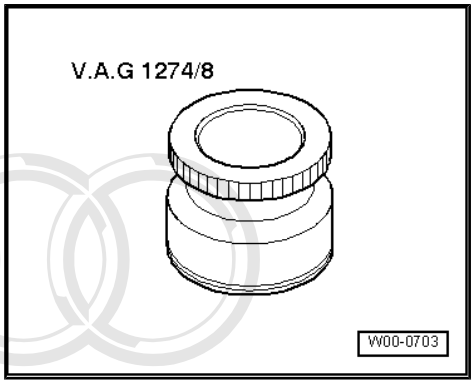
## 1.2 Checking cooling system for leaks

**Special tools and workshop equipment required**

♦ Cooling system tester - V.A.G 1274 B-




♦ Adapter for cooling system tester - V.A.G 1274/8-




♦ Adapter for cooling system tester - V.A.G 1274/9-




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.

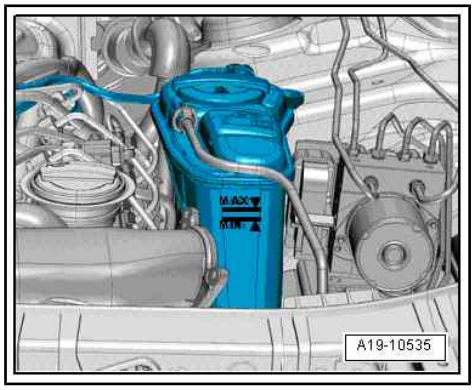
**Procedure**

• Engine must be warm.

**WARNING**

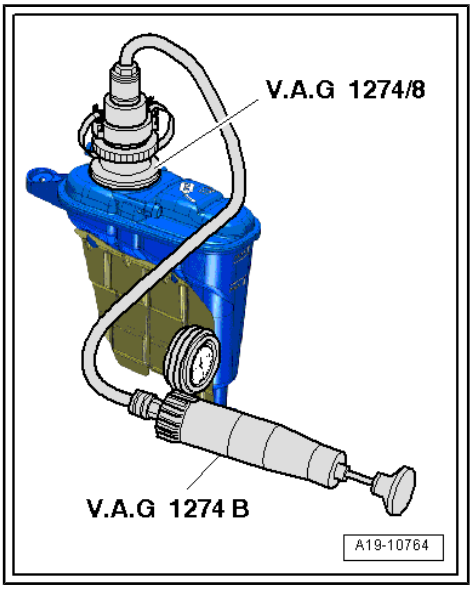
***Risk of scalding due to hot steam and hot coolant.***

- ***The cooling system is under pressure when the engine is hot.***
- ***Cover filler cap on coolant expansion tank with a cloth and open carefully to dissipate pressure.***



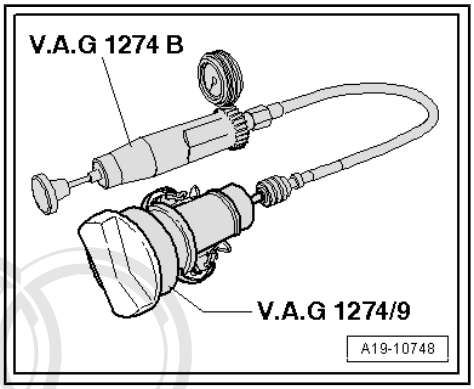

– Open filler cap on coolant expansion tank.

– Fit cooling system tester - V.A.G 1274 B- with adapter - V.A.G 1274/8- onto coolant expansion tank.
– Using hand pump on cooling system tester, build up a pressure of approx. 1.0 bar.
– If this pressure is not maintained, locate and rectify leaks.




**Checking pressure relief valve in filler cap**

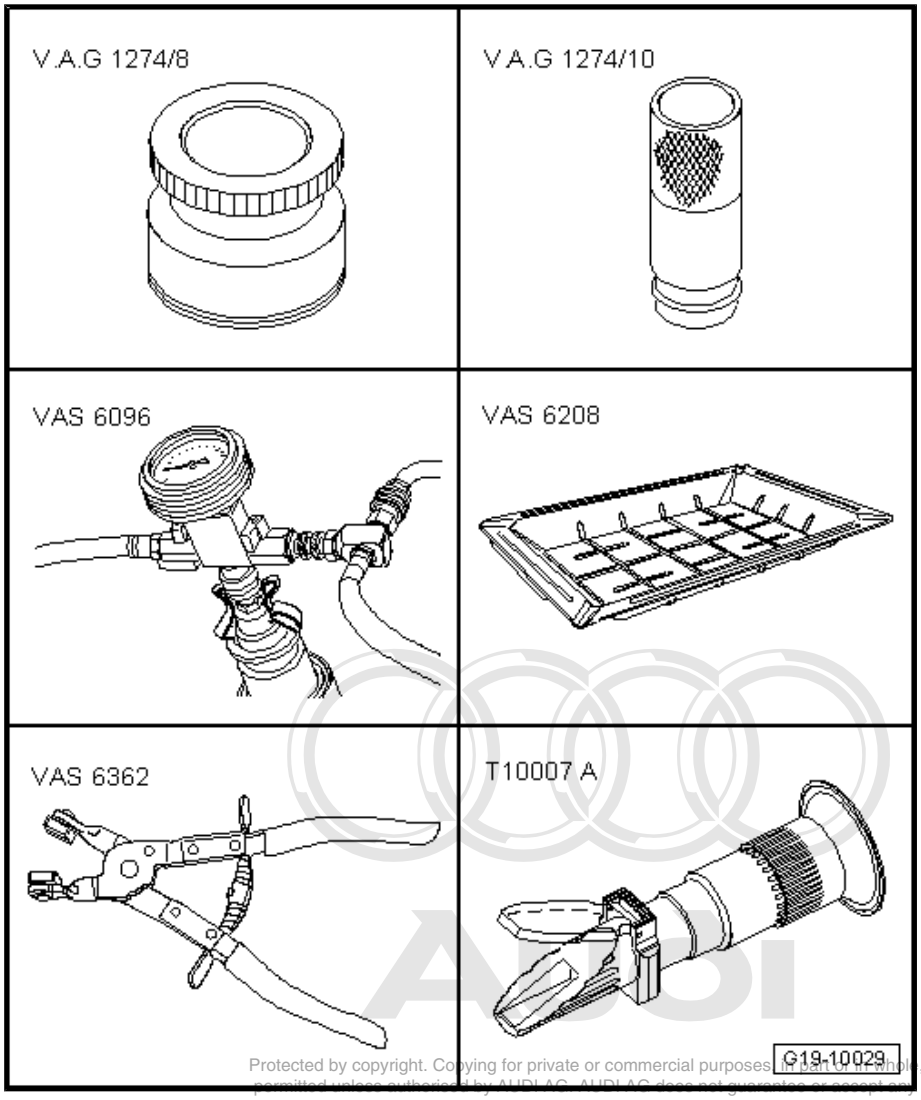
– Fit cooling system tester - V.A.G 1274 B- with adapter - V.A.G 1274/9- onto filler cap.
– Build up pressure with hand pump on cooling system tester.
• The pressure relief valve should open at a pressure of 1.4 ... 1.6 bar.
– Renew filler cap if pressure relief valve does not open as described.




## 1.3 Draining and filling cooling system

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

**Special tools and workshop equipment required**




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 for cooling system tester - V.A.G 1274/8-
- Pipe for cooling system tester - V.A.G 1274/10-
- Cooling system charge unit - VAS 6096-
- Drip tray for workshop hoist - VAS 6208-
- Hose clip pliers - VAS 6362-
- Refractometer - T10007 A-

**Draining**

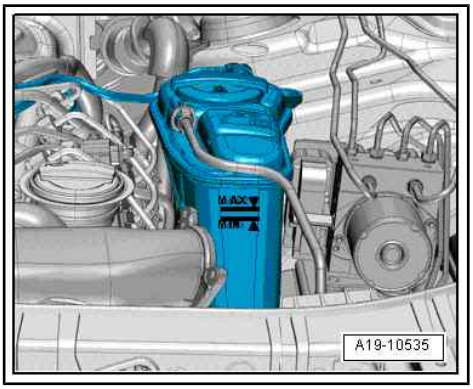
**Note**

*Collect drained coolant in a clean container for re-use or disposal.*

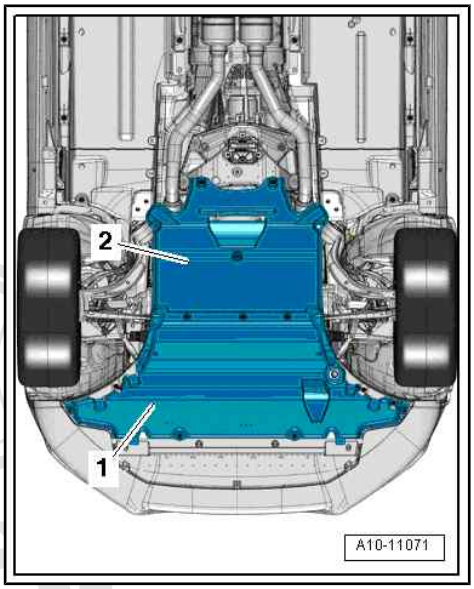
**WARNING**

*Risk of scalding due to hot steam and hot coolant.*

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

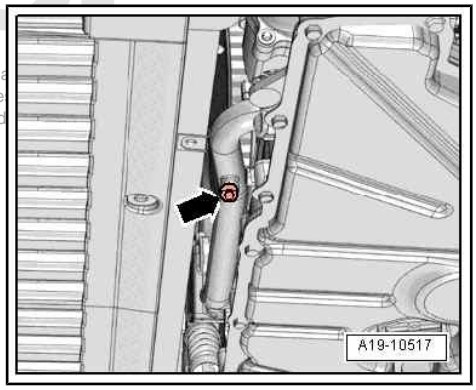



– Remove front noise insulation -1- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

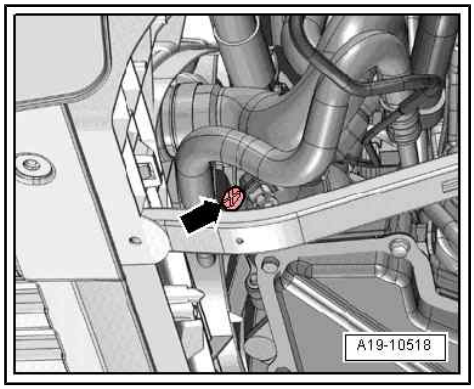



– Place drip tray for workshop hoist - VAS 6208- beneath engine.
– Unscrew drain plug -arrow- on coolant pipe (front) and drain off coolant.

Protected by copyright. Copying for private or commercia
with respect to the correctness of information in this d



– Unscrew drain plug -arrow- on map-controlled engine cooling system thermostat - F265- and drain off coolant.



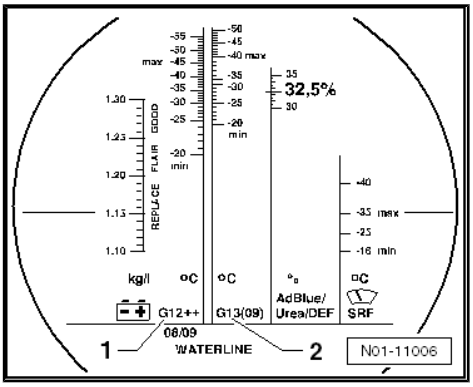

### Filling

- Tightening torques
  ⇒ “2.1 Exploded view - coolant pump/thermostat”, page 237 ,
  ⇒ “3.1 Exploded view - coolant pipes”, page 247 .
- Ignition switched off.

**Caution**

***To ensure optimal corrosion protection, only distilled water may be mixed with coolant additives.***

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




**Note**

- *The effectiveness of the coolant is greatly influenced by the quality of the water with which it is mixed. Because water may contain different substances depending on the country or even the region, the water quality to be used for cooling systems has been specified. Distilled water meets all the requirements and is therefore recommended for use when topping up or filling up with coolant.*
- *Use only coolant additives listed in the ⇒ Electronic parts catalogue (ETKA) . If you use other coolant additives, this can significantly impair in particular the corrosion protection effect. The resulting damage could lead to loss of coolant and consequently to serious engine damage.*
- *Coolant with the recommended mixture ratio prevents frost and corrosion damage and stops scaling. At the same time it raises the boiling point of the fluid in the system. For this reason the cooling system must be filled all year round with the correct coolant additive.*
- *Because of its high boiling point, the coolant improves engine reliability under heavy loads, particularly in countries with tropical climates.*
- *The refractometer - T10007A- MUST be used to determine the current level of frost protection.*
- *The mixture must guarantee frost protection down to at least -25 °C (in countries with arctic climate: down to -36 °C). The amount of antifreeze should only be increased if greater frost protection is required in very cold climates. This must only be down to -48 °C, however, as otherwise the cooling efficiency of the coolant is impaired.*
- *The coolant concentration must not be reduced by adding water even in warmer seasons and in warmer countries. Frost protection must be provided to at least -25 °C.*
- *Read off the level of frost protection on the scale for the relevant coolant additive.*
- *The temperature indicated on the refractometer - T10007A- corresponds to the temperature at which the first ice crystals can form in the coolant.*
- *Do not reuse coolant.*
- *Only use water/coolant additive as a lubricant for coolant hoses.*

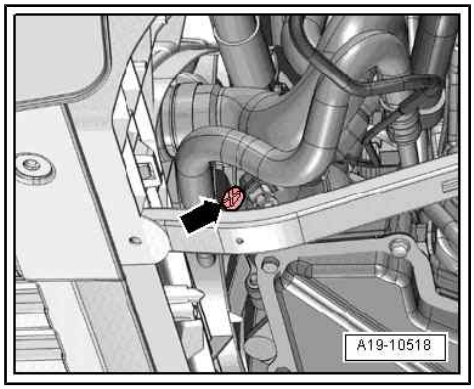
Copyright by AUDI AG. Reproduction of this document for commercial purposes, in part or in whole, is not permitted unless authorized by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

**Recommended mixture ratio for coolant**

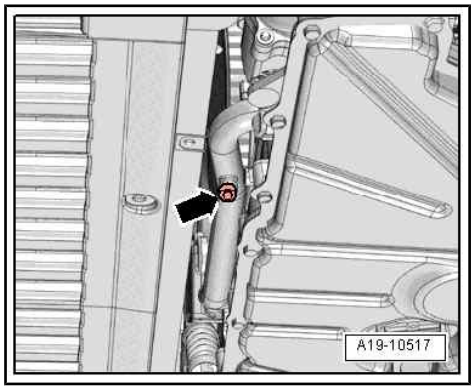
- Coolant (40 %) and distilled water (60 %) for frost protection to -25 °C
- Coolant (50 %) and distilled water (50 %) for frost protection to -36 °C
- Coolant ⇒ Electronic parts catalogue (ETKA)

**Procedure**

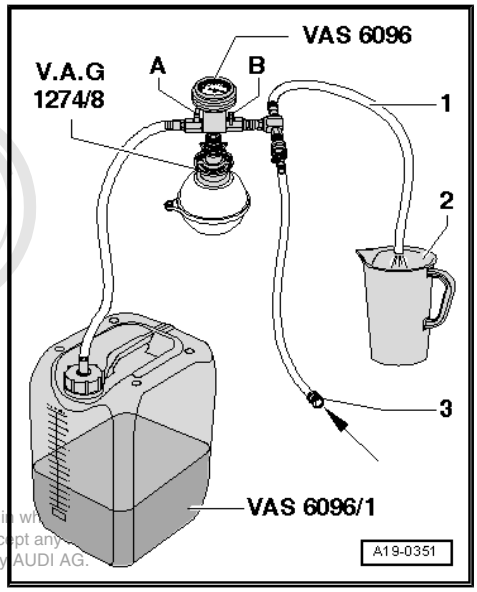
– Install drain plug -arrow- with new O-ring on map-controlled engine cooling system thermostat - F265- .




– Install drain plug -arrow- with new seal on coolant pipe (front).




– Fill reservoir of -VAS 6096- with 15 litres of premixed coolant (according to recommended ratio).
– Fit adapter for cooling system tester - V.A.G 1274/8- onto coolant expansion tank.
– Attach cooling system charge unit - VAS 6096- to adapter - V.A.G 1274/8- .
– Run vent hose -1- into a small container -2-.




**Note**

*The vented air draws along a small amount of coolant, which should be collected.*

– Close both valves -A- and -B- (turn lever at right angles to direction of flow).
– Connect hose -3- to compressed air supply.

• Pressure: 6 ... 10 bar.

Protected by copyright. Copying for private or commercial purposes, in part or in wh
Translation into other languages AUDI AG. AUDI AG does not guarantee or accept any
with respect to the correctness of information in this document. Copyright by AUDI AG.

– Open valve -B- by setting lever in direction of flow.

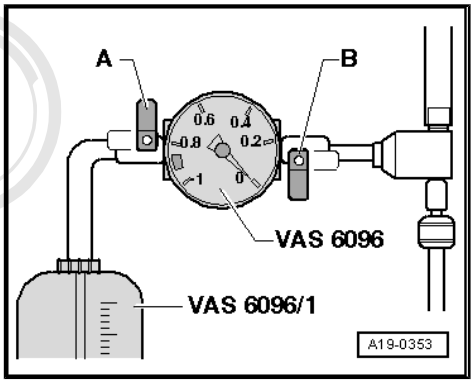
• The suction jet pump generates a partial vacuum in the cooling system; the needle on the gauge should move into the green zone.

– Also briefly open valve -A- (turn lever in direction of flow) so that hose on reservoir of -VAS 6096- can fill with coolant.

– Close valve -A- again.

– Leave valve -B- open for another 2 minutes.

• The suction jet pump continues to generate a partial vacuum in the cooling system; the needle on the gauge should remain in the green zone.




– Close valve -B-.

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.

• The needle on the gauge should stop in the green zone. The vacuum level in the cooling system is then sufficient for subsequent filling.

**Note**

♦ *If the needle does not reach the green zone, repeat the process.*

♦ *Check cooling system for leaks if the vacuum is not maintained.*

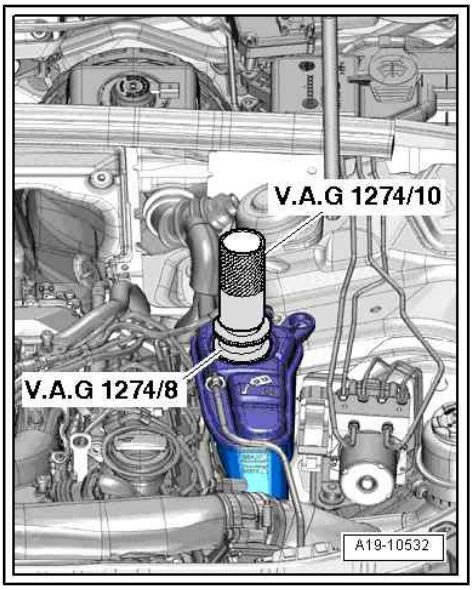
– Detach compressed air hose.

– Open valve -A-.

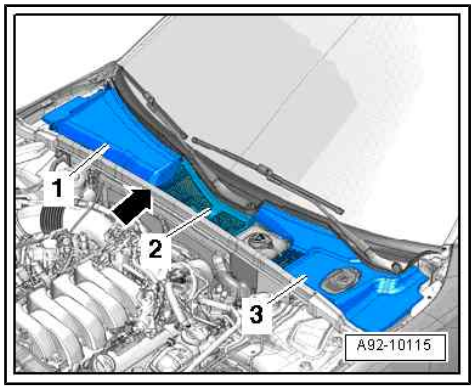
• The vacuum in the cooling system causes the coolant to be drawn out of the reservoir of -VAS 6096- ; the cooling system is then filled.

– Detach cooling system charge unit - VAS 6096- from adapter -V.A.G 1274/8- on coolant expansion tank.

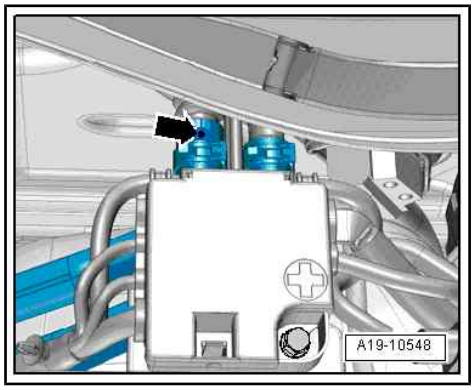
– Attach pipe -V.A.G 1274/10- onto adapter -V.A.G 1274/8- .



– Depending on version, remove centre part of plenum chamber cover -2- or entire plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .




– Release coolant hose going to heat exchanger for heater and pull back hose until bleeder hole -arrow- in hose is no longer blocked by connection.




– Fill up with coolant until it flows out at bleeder hole in coolant hose.

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.

– Push coolant hose back onto connection and secure with spring-type hose clip.

– On vehicles with auxiliary heater, switch heater on (for about 30 seconds) and then off again.

– Close filler cap on coolant expansion tank (make sure it engages).

– Start engine.

– Set temperature to “HI” in all zones.

– Switch off air conditioner compressor (press AC button).

• LED in button should not light up.

– Run engine for 3 minutes at 2000 rpm.

– Allow engine to run at idling speed until both large coolant hoses at radiator become warm.

– Run engine for 1 minute at 2000 rpm.

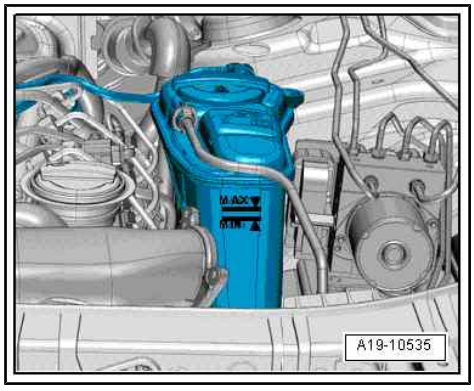
– Switch off ignition and allow engine to cool down.

– Install noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

– Check coolant level.

• The coolant level must be at the MAX marking when the engine is cold.

• The coolant level can be above the MAX marking when the engine is warm.



# 2 Coolant pump/thermostat assembly

⇒ “2.1 Exploded view - coolant pump/thermostat”, page 237

⇒ “2.2 Removing and installing electric coolant pump”, page 238

⇒ “2.3 Removing and installing coolant pump”, page 240

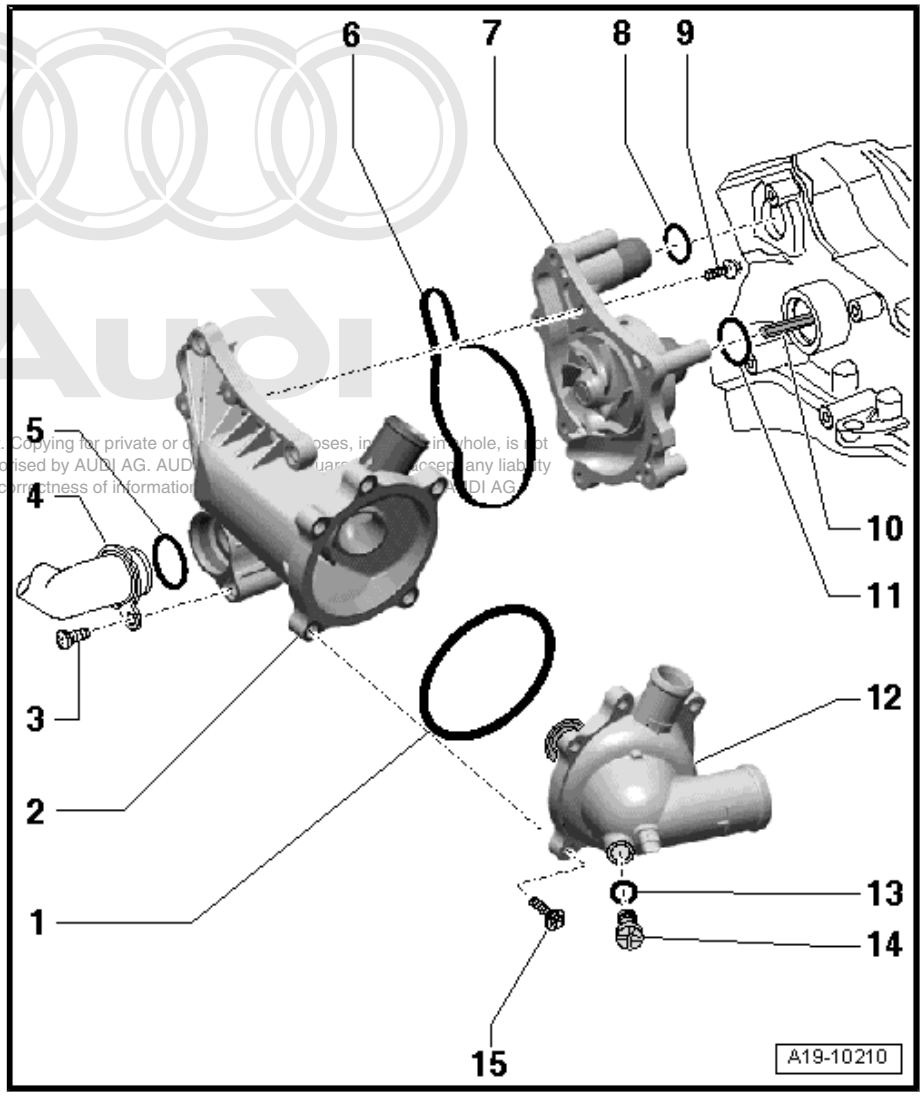
⇒ “2.4 Removing and installing map-controlled engine cooling system thermostat F265 ”, page 241

⇒ “2.5 Removing and installing coolant temperature sender G62 ”, page 243

⇒ “2.6 Removing and installing coolant connection”, page 244

⇒ “2.7 Thermostat opening values”, page 246

## 2.1 Exploded view - coolant pump/thermostat




Protected by copyright. Copying for private or c... uses, in... whole, is not permitted unless authorised by AUDI AG. AUDI ... guarantees ... any liability with respect to the correctness of information ... AUDI AG.

**1 - Seal**
- ❑ Renew

**2 - Housing for coolant pump**
- ❑ Removing and installing ⇒ page 240

**3 - Bolt**
- ❑ Tightening torque ⇒ page 247

**4 - Coolant pipe (front)**
- ❑ Removing and installing ⇒ page 248

**5 - O-ring**
- ❑ Renew

**6 - Seal**
- ❑ Renew

**7 - Coolant pump**
- ❑ Removing and installing ⇒ page 240

**8 - O-ring**
- ❑ Renew

**9 - Bolt**
- ❑ 9 Nm

**10 - Drive shaft for coolant pump**

**11 - O-ring**
- ❑ Renew

**12 - Map-controlled engine cooling system thermostat - F265-**
- ❑ Removing and installing ⇒ page 241
- ❑ Thermostat opening data ⇒ page 246

**13 - O-ring**
- ❑ Renew

**14 - Drain plug**

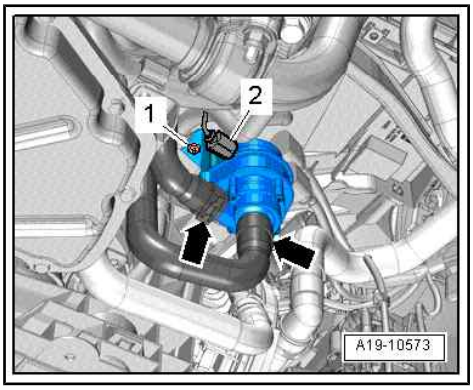
- ❑ 4 Nm

**15 - Bolt**

- ❑ 9 Nm

**Continued coolant circulation pump - V51- - tightening torque**

– Tighten nut -1- for continued coolant circulation pump - V51- to 5 Nm.




**Note**

*-Item 2- and -arrows- can be disregarded.*

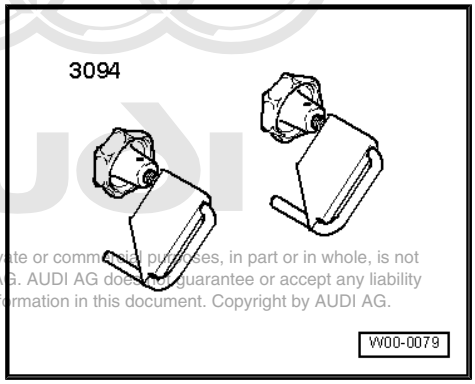
## 2.2 Removing and installing electric coolant pump

⇒ "2.2.1 Removing and installing continued coolant circulation pump V51 ", page 238

## 2.2.1 Removing and installing continued coolant circulation pump - V51-

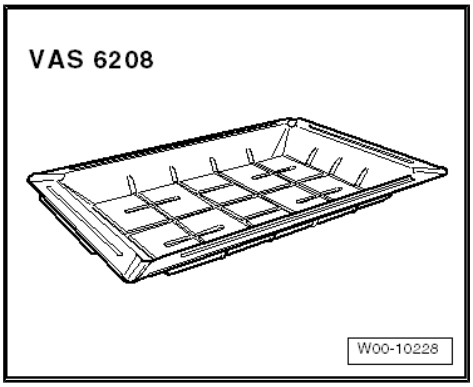
**Special tools and workshop equipment required**

- ♦ Hose clamps, up to 25 mm - 3094-

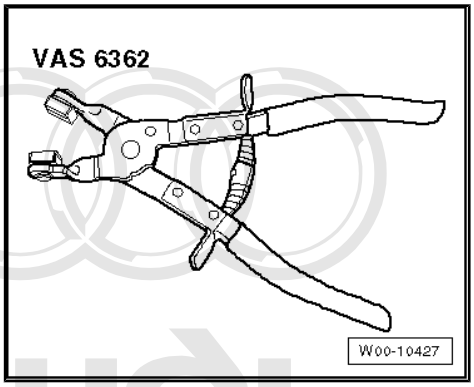



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- ♦ Drip tray for workshop hoist - VAS 6208-



- Hose clip pliers - VAS 6362-



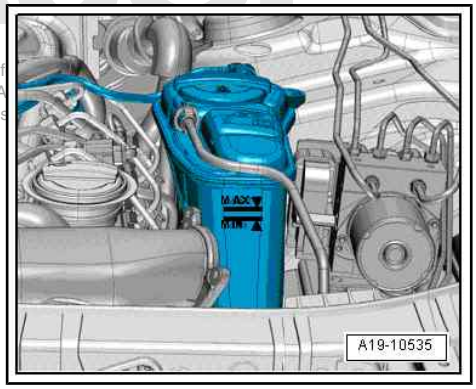

## Removing

**WARNING**

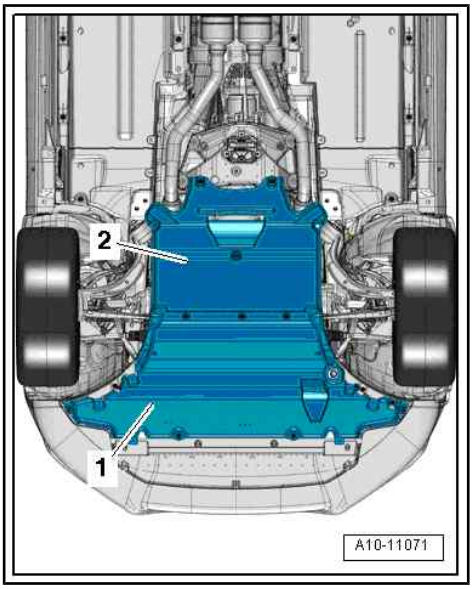
*Risk of scalding due to hot steam and hot coolant.*

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

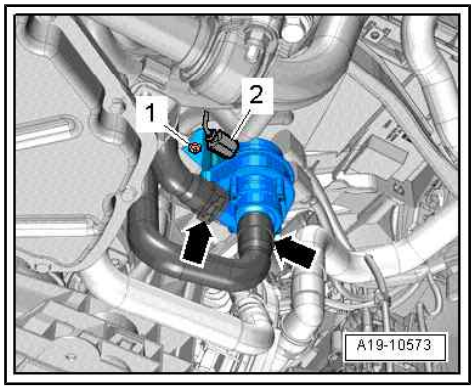
Protected by copyright. Copying f
permitted unless authorised by A
with respect to the correctness




– Remove front noise insulation -1- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .



– Clamp off coolant hoses -arrows- with hose clamps -3094- .
– Unplug electrical connector -2-.
– Unscrew nut -1-.
– Place drip tray for workshop hoist - VAS 6208- under continued coolant circulation pump - V51- .
– Disconnect coolant hoses and detach continued coolant circulation pump - V51- .




**Installing**

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

- Tightening torque
⇒ Fig. "" Continued coolant circulation pump -V51- - tightening torque"" , page 238

**Note**

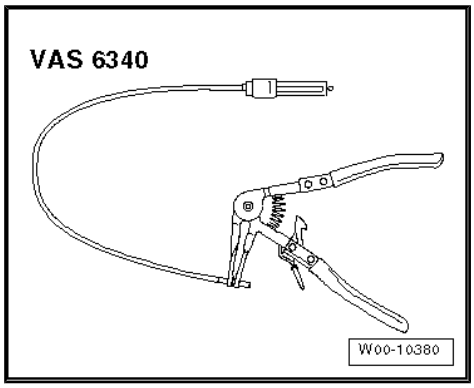
*Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

– Install noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .
– Check coolant level ⇒ page 236 .

## 2.3 Removing and installing coolant pump

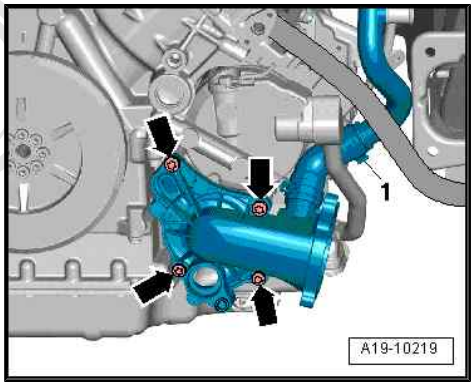
**Special tools and workshop equipment required**

♦ Hose clip pliers - VAS 6340-




**Removing**

– Remove coolant pipe (front) ⇒ page 248 .
– Remove map-controlled engine cooling system thermostat - F265- ⇒ page 241 .
– Release hose clip -1- on coolant hose.
– Remove bolts -arrows-.
– Pull off coolant pump housing forwards (note the drive shaft for coolant pump).

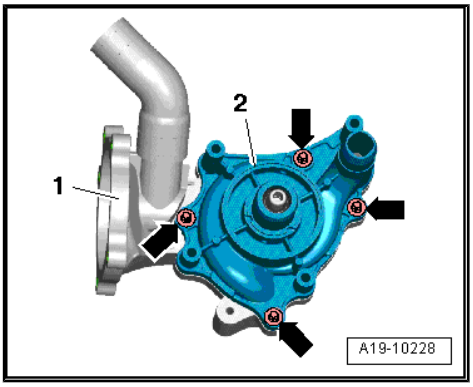



**Note**

*The coolant hose can only be disconnected when the coolant pump is removed.*

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 coolant pump -2- from housing -1-.



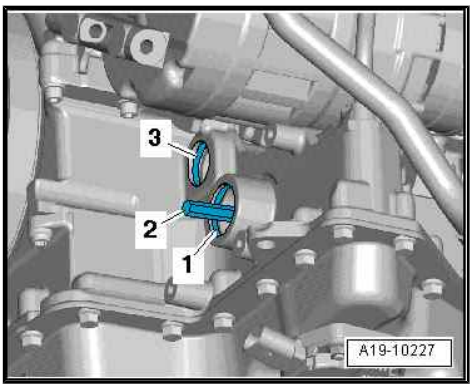

### Installing

- Tightening torques
⇒ “2.1 Exploded view - coolant pump/thermostat”, page 237

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

**Note**

- *Renew seals and O-rings.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*




– Fit new O-rings -1- and -3-.
– Insert drive shaft -2- for coolant pump in mounting for oil pump as far as stop.
– Slide coolant pipe into mountings on sump (top section).

**Note**

*To fit the drive flange onto the hexagon flats of the drive shaft, use your finger to turn the impeller (access through the bottom pipe connection of coolant pump) until the coolant pump can be pressed on all the way.*

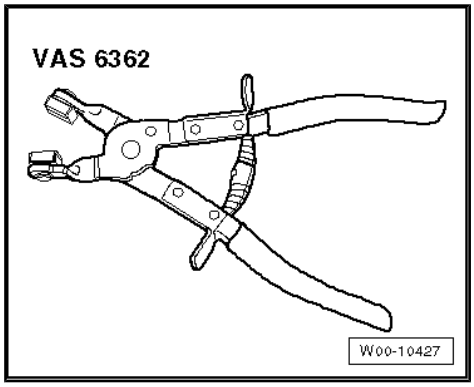
Remaining installation steps are carried out in reverse sequence; note the following:

– Install map-controlled engine cooling system thermostat - F265- ⇒ page 241 .
– Install coolant pipe (front) ⇒ page 248 .

## 2.4 Removing and installing map-controlled engine cooling system thermostat - F265-

### Special tools and workshop equipment required

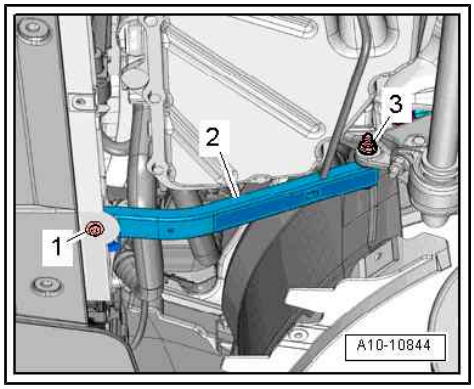
♦ Hose clip pliers - VAS 6362-




### Removing

– Drain coolant ⇒ page 229 .

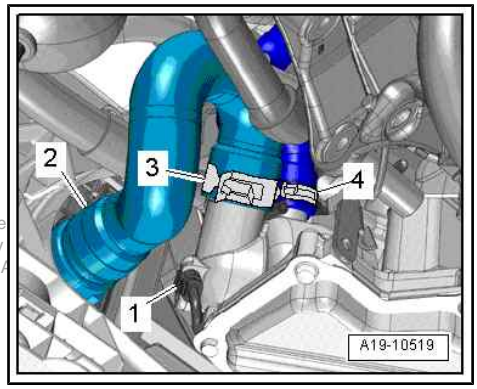
– Remove bolt -1- and nut -3- and detach lock carrier brace (left-side) -2-.




– Unplug electrical connector -1- at map-controlled engine cooling system thermostat - F265- .

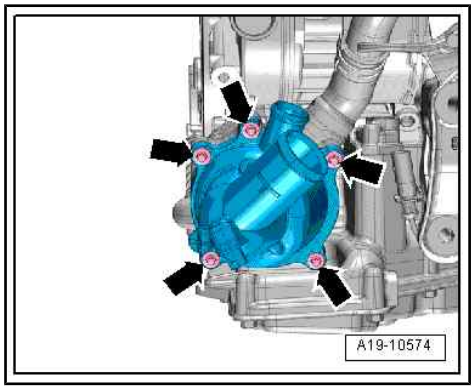
– Lift retaining clip -2-, release hose clip -3- and remove coolant hose.

– Detach coolant hose -4-.




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

– Remove bolts -arrows- and detach map-controlled engine cooling system thermostat - F265- .




### Installing

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

- Tightening torque
  ⇒ “2.1 Exploded view - coolant pump/thermostat”, page 237

**Note**

♦ *Renew seals and O-rings.*

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

– Install lock carrier brace (left-side) ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Exploded view - lock carrier .

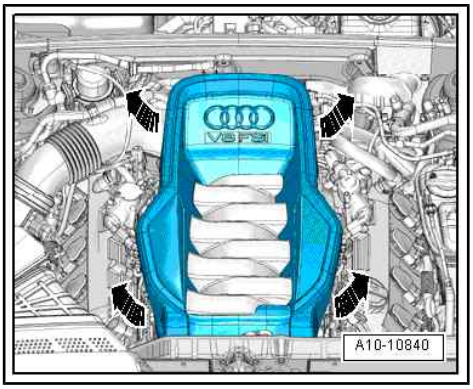
– Fill up with coolant ⇒ page 232 .

## 2.5 Removing and installing coolant temperature sender - G62-

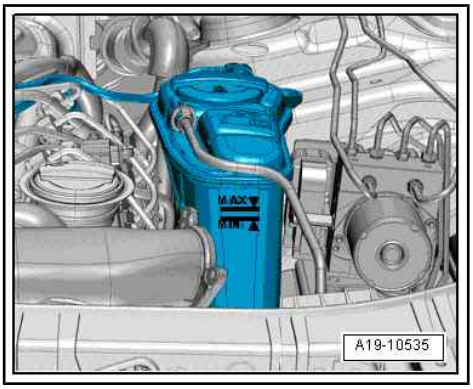
### Removing

- Engine cold.

– Remove engine cover panel -arrows-.

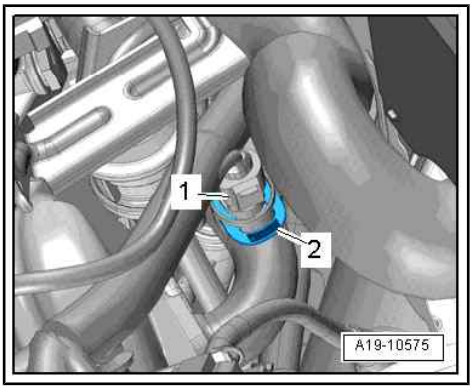



– Open filler cap on coolant expansion tank briefly to dissipate residual pressure in cooling system.




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

– Unplug electrical connector -1- at coolant temperature sender - G62- .




**Note**

*Place a cloth underneath to catch escaping coolant.*

– Pull out retaining clip -2- and detach coolant temperature sender - G62- .

### Installing

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

**Note**

- *Fit new O-ring.*
- *Insert new coolant temperature sender - G62- immediately into connection to avoid loss of coolant.*

– Check coolant level ⇒ page 236 .

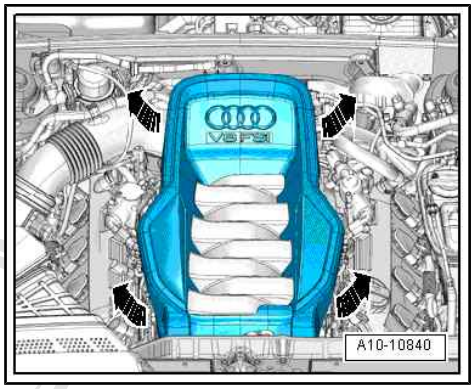
## 2.6 Removing and installing coolant connection

**Removing**

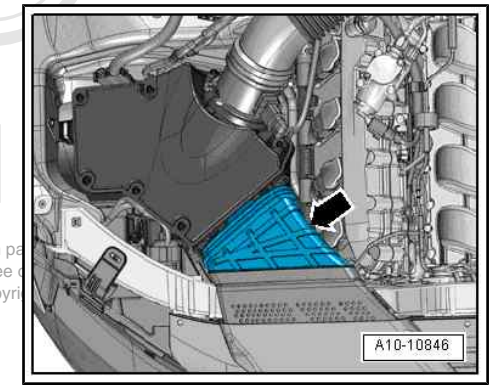
– Remove engine cover panel -arrows-.

– Drain coolant ⇒ page 229 .

– Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .




– Remove air duct -arrow-.

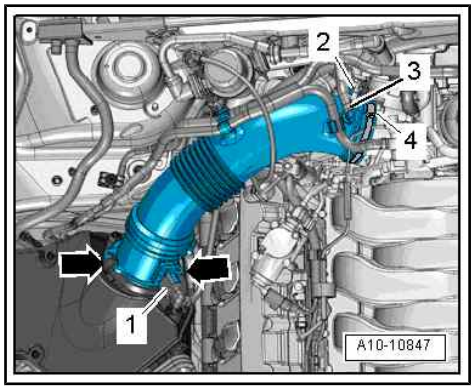



Protected by copyright. Copying for private or commercial purposes, in pa
permitted unless authorised by AUDI AG. AUDI AG does not guarantee
with respect to the correctness of information in this document. Copyri

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

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

– Disconnect vacuum line -3- from air pipe.




**Rest-of-world vehicles:**

– Press release tabs and detach crankcase breather hose -2- from air pipe.

– Unfasten hose clip -4-, release retaining clips -arrows- and remove air pipe with air mass meter - G70- .

**USA models:**

**Caution**

*Risk of violating emission legislation applying to USA models.*

- *Do NOT open hose connection -2-.*

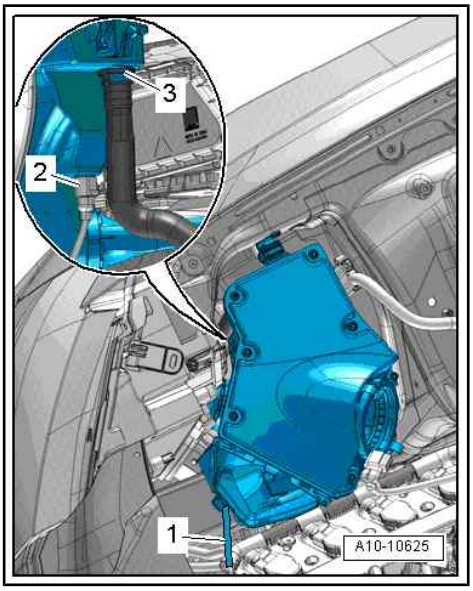
– Move air pipe clear to one side (crankcase breather hose -2- remains connected). To do so, release hose clip -4- and clamps -arrows-.

**Continued for all vehicles:**

– Disconnect vacuum line -1-.

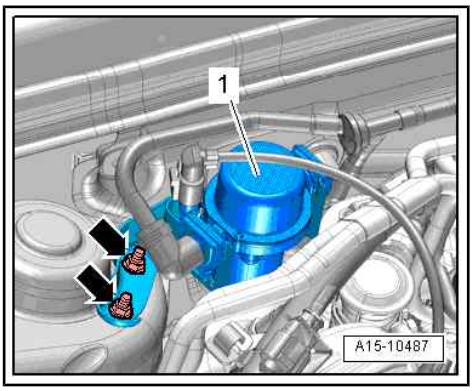
– Detach air cleaner housing and unplug electrical connector -2- at variable intake manifold change-over valve - N335- on reverse side of air cleaner.

– Disconnect hose -3- for secondary air system.




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

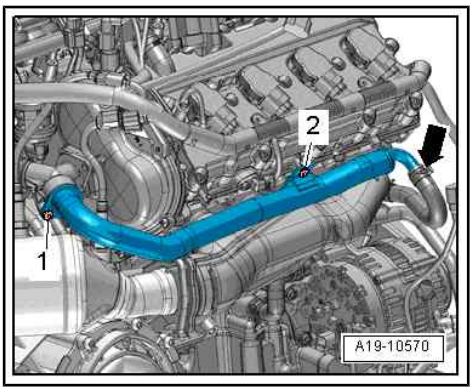
– Remove nuts -arrows- and move vacuum pump -1- to one side with lines connected.




– Remove bolts -1- and -2- and disconnect coolant pipe (right-side) from coolant connection.

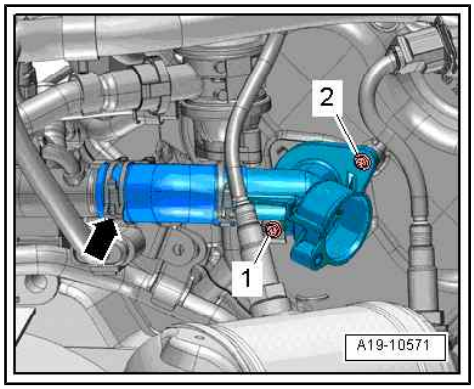
**Note**

*Disregard -arrow-.*



– Remove bolts -1- and -2- and release hose clip -arrow-.

– Pull out coolant connection towards the right side.




**Installing**

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

- Tightening torque
  ⇒ "3.1 Exploded view - coolant pipes", page 247

**Note**

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

♦ *Fit all cable ties in the original positions when installing.*

– Clean or smoothen sealing surface.

– Install coolant pipe (right-side) ⇒ page 254 .

– Install air cleaner housing ⇒ page 292 .

– Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .

– Install vacuum pump ⇒ Brake system; Rep. gr. 47 ; Vacuum system; Removing and installing vacuum pump .

– Fill up with coolant ⇒ page 232 .

## 2.7 Thermostat opening values

| Starts to open | Fully open | Opening travel | Voltage measured at thermostat |
|---|---|---|---|
| approx. 105 °C | approx. 117 °C | at least 8 mm | 0 V |
| – | approx. 105 °C | at least 8 mm | 14 V |

**Note**

*The thermostat cannot be tested with workshop equipment.*

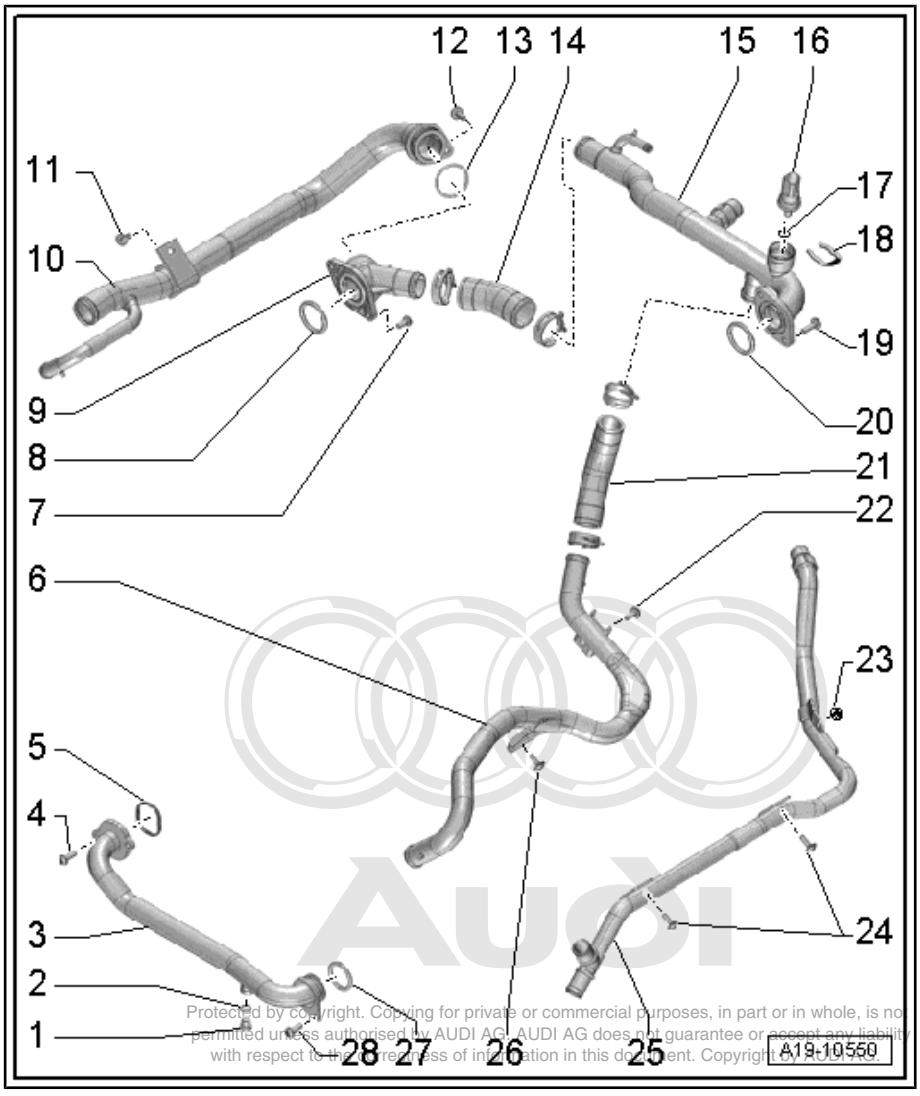
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

# 3 Coolant pipes

⇒ “3.1 Exploded view - coolant pipes”, page 247

⇒ “3.2 Removing and installing coolant pipes”, page 248

## 3.1 Exploded view - coolant pipes




**1 - Drain plug**
- ❑ 10 Nm

**2 - Seal**
- ❑ Renew

**3 - Coolant pipe (front)**
- ❑ Removing and installing ⇒ page 248

**4 - Bolt**
- ❑ 9 Nm

**5 - Seal**
- ❑ Renew

**6 - Coolant pipe (bottom left)**
- ❑ Removing and installing ⇒ page 253

**7 - Bolt**
- ❑ 9 Nm

**8 - O-ring**
- ❑ Renew

**9 - Coolant connection**
- ❑ Removing and installing ⇒ page 244

**10 - Coolant pipe (right-side)**
- ❑ Removing and installing ⇒ page 254

**11 - Bolt**
- ❑ 9 Nm

**12 - Bolt**
- ❑ 9 Nm

**13 - O-ring**
- ❑ Renew

**14 - Coolant hose**

**15 - Coolant pipe (rear)**
- ❑ Removing and installing ⇒ page 255

**16 - Coolant temperature sender - G62-**
- ❑ Removing and installing ⇒ page 243

**17 - O-ring**
- ❑ Renew

**18 - Retaining clip**

**19 - Bolt**
- ❑ 9 Nm

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

**20 - O-ring**

- ❑ Renew

**21 - Coolant hose**

**22 - Bolt**

- ❑ 9 Nm

**23 - Nut**

- ❑ 9 Nm

**24 - Bolts**

- ❑ 9 Nm

**25 - Coolant pipe (top left)**

- ❑ Removing and installing ⇒ page 249

**26 - Bolt**

- ❑ 9 Nm

**27 - O-ring**

- ❑ Renew

**28 - Bolt**

- ❑ 9 Nm

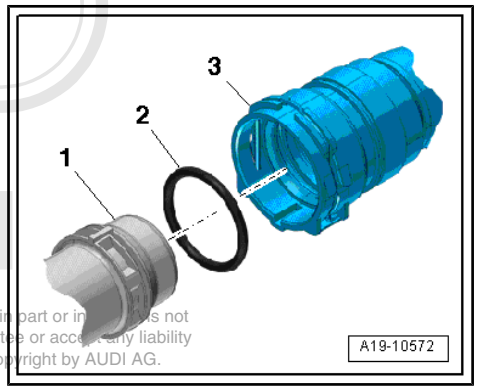
**Connecting coolant hose with plug-in connector to coolant pipe**

– Remove old O-ring -2- from coolant hose -3-.

– Lightly lubricate new O-ring with coolant and fit O-ring in coolant hose.

– Press coolant hose onto coolant pipe -1- until it engages with a click.

– Press coolant hose in again and then pull to check that plug-in connector is correctly engaged.




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.

## 3.2 Removing and installing coolant pipes

⇒ "3.2.1 Removing and installing coolant pipe (front)", page 248

⇒ "3.2.2 Removing and installing coolant pipe (top left)", page 249

⇒ "3.2.3 Removing and installing coolant pipe (bottom left)", page 253

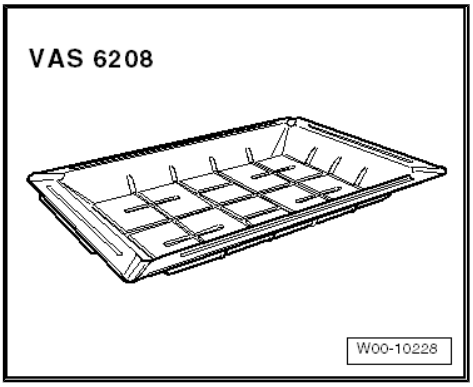
⇒ "3.2.4 Removing and installing coolant pipe (right-side)", page 254

⇒ "3.2.5 Removing and installing coolant pipe (rear)", page 255

### 3.2.1 Removing and installing coolant pipe (front)

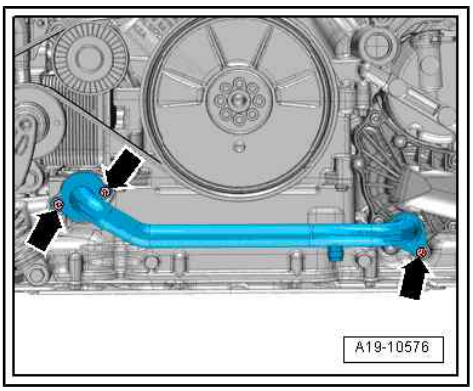
**Special tools and workshop equipment required**

♦ Drip tray for workshop hoist - VAS 6208-




**Removing**

– Drain coolant ⇒ page 229 .
– Remove radiator cowl ⇒ page 262 .
– Remove bolts -arrows-.
– Detach front coolant pipe from engine and coolant pump.




**Installing**

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

- Tightening torque
  ⇒ “3.1 Exploded view - coolant pipes”, page 247

**Note**

*Fit new O-rings.*

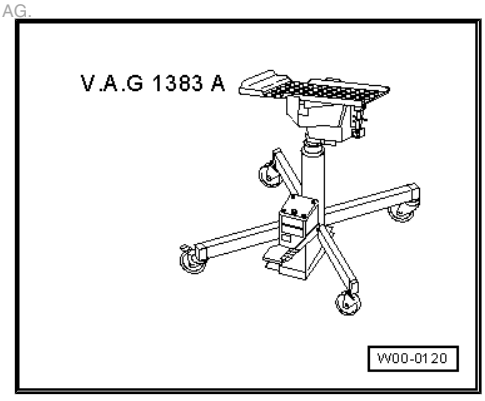
– Clean or smoothen sealing surfaces for O-rings.
– Lubricate O-rings with coolant and fit O-rings.
– Install radiator cowl ⇒ page 262 .
– Fill up with coolant ⇒ page 232 .

## 3.2.2 Removing and installing coolant pipe (top left)

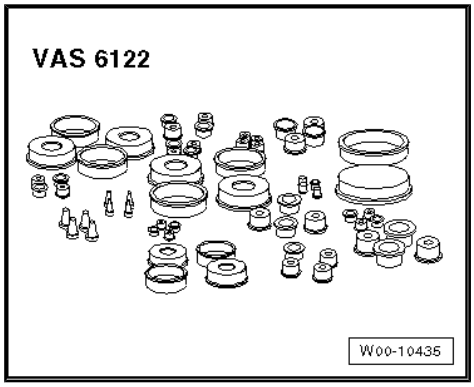
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not
permitted unless authorized by AUDI AG. Audi does not guarantee or accept any liability
with respect to the correctness of information in this document. Copyright by AUDI AG.

**Special tools and workshop equipment required**

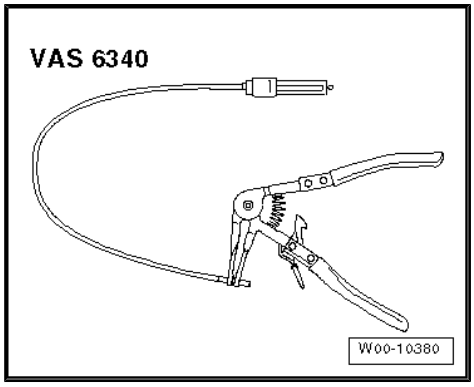
♦ Engine and gearbox jack - V.A.G 1383 A-



♦ Engine bung set - VAS 6122-

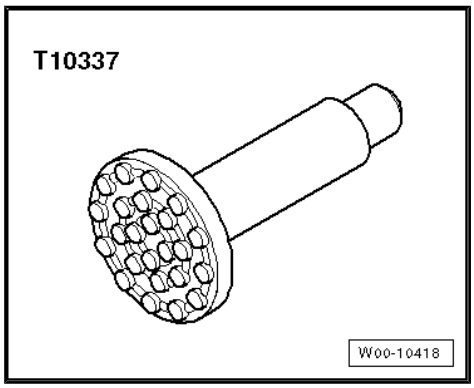



♦ Hose clip pliers - VAS 6340-




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.

♦ Gearbox support - T10337-

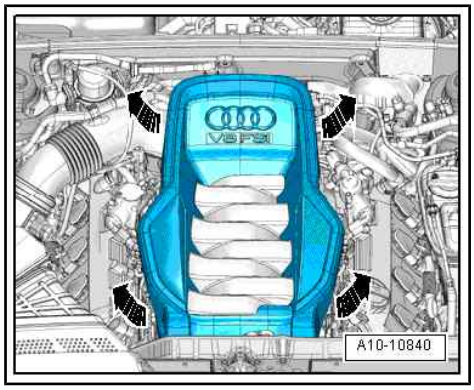



**Removing**

– Remove engine cover panel -arrows-.

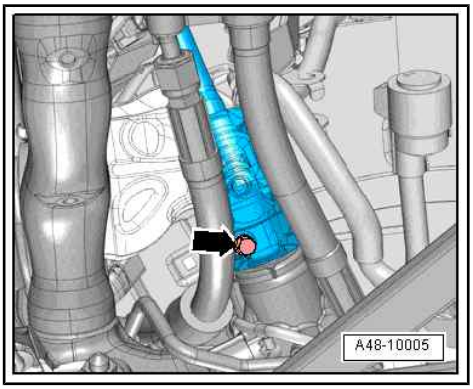
– Drain coolant ⇒ page 229 .

– Remove catalytic converter (left-side) ⇒ page 348 .



**Vehicles with manual gearbox:**

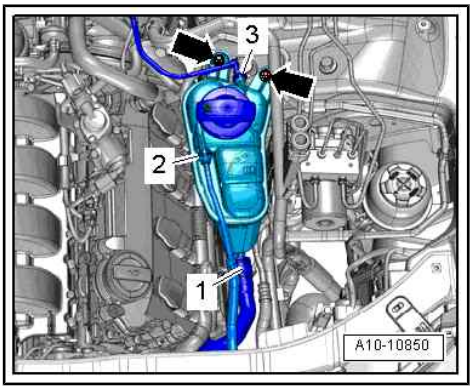
– Detach intermediate steering shaft from steering rack and move clear by telescoping upwards ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Exploded view - steering column .



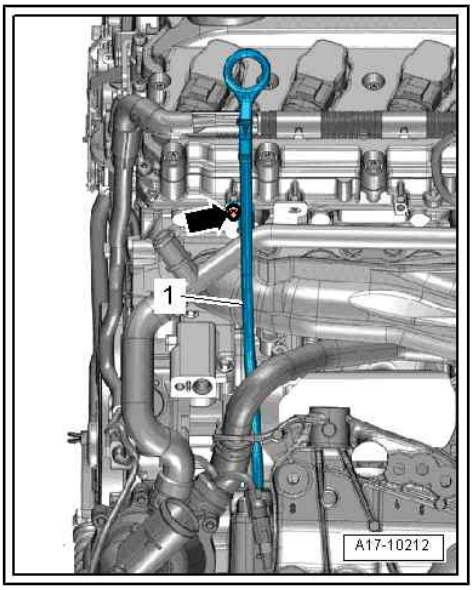

**Continued for all vehicles:**

– Detach coolant hoses -1, 2, 3- from coolant expansion tank.
– Remove bolts -arrows-.
– Unplug electrical connector at coolant shortage indicator switch - F66- and detach coolant expansion tank.

Protected by copyright. Copying 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 by AUDI AG.



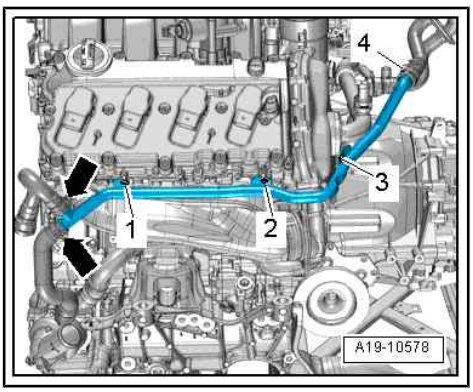

– Remove bolt -arrow- and pull guide tube -1- for oil dipstick out of sump (top section).



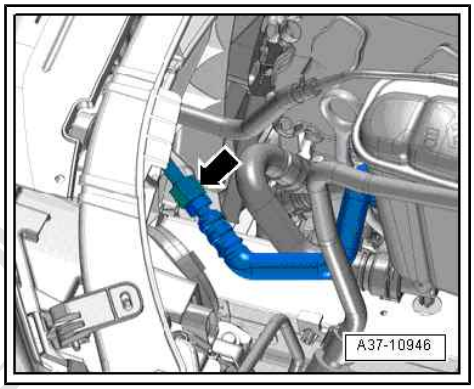

– Remove bolts -1- and -2- and nut -3-.
– Detach coolant hoses -arrows-.
– Lift retaining clip and disconnect coolant hose -4-.

**Vehicles with manual gearbox:**

– Take out coolant pipe (top left) towards the rear.



**Vehicles with automatic gearbox:**



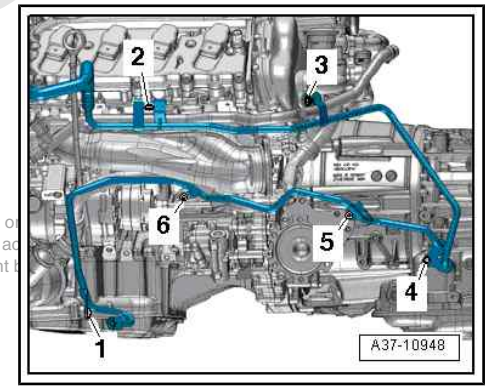

**Note**

*Place a cloth underneath to catch escaping ATF.*

– Disconnect ATF line -arrow-.
– Seal off open pipes/lines and connections with clean plugs from engine bung set - VAS 6122- .

**Note**

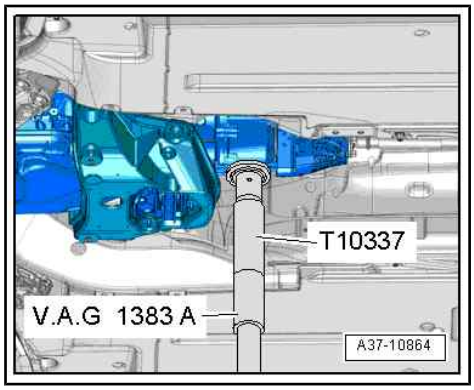
*Place a cloth underneath to catch escaping ATF.*




– Unscrew bolt -2- and nut -3- and move ATF line clear to one side.

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

– Fit gearbox support - T10337- onto engine and gearbox jack - V.A.G 1383 A- and position underneath gearbox.
– Raise gearbox slightly.

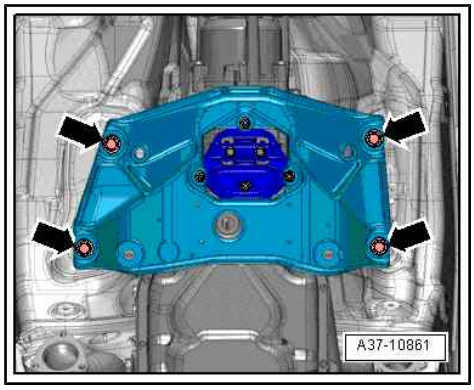



**WARNING**

***Risk of accident.***

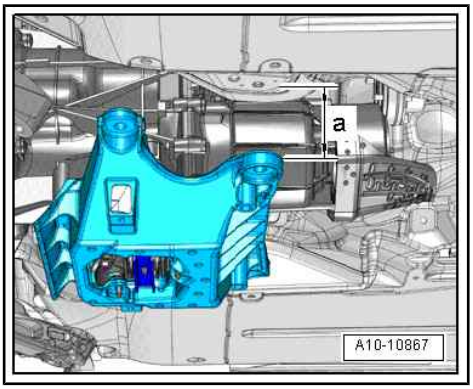
- ***Engine and gearbox jack - V.A.G 1383 A- must remain in position when work is being carried out and must not be left unattended under the vehicle.***

– Remove bolts -arrows- on tunnel cross member.



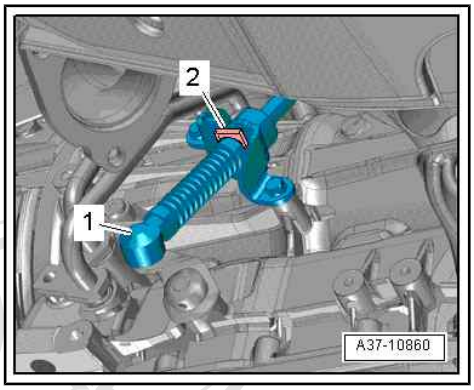
– Lower engine/gearbox assembly using engine and gearbox jack - V.A.G 1383 A- initially only as far as distance -a-.

• Distance -a- = 35 mm (maximum).




– Pry ball socket -1- of selector lever cable off gearbox selector lever using removal lever - 80 - 200- .

– Pull off securing clip and remove selector lever cable from gearbox.




**Note**

*Take care not to bend or kink selector lever cable.*

– Take out coolant pipe (top left) towards the rear.

**Installing**

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

• Tightening torque
⇒ “3.1 Exploded view - coolant pipes”, page 247

**Note**

♦ *Fit new O-ring to guide tube for oil dipstick.*

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

– Connect coolant hose with plug-in connector to coolant pipe ⇒ Fig. ““Connecting coolant hose with plug-in connector to coolant pipe”“ , page 248 .

– Install dipstick guide tube ⇒ page 104 .

– Install selector lever cable ⇒ Rep. gr. 37 ; Selector mechanism; Removing and installing selector lever cable .

– Install ATF lines ⇒ Rep. gr. 37 ; ATF circuit; Removing and installing ATF lines .

– Install catalytic converter (left-side) ⇒ page 348 .

– Align the exhaust system so it is free of stress ⇒ page 346 .

– Secure intermediate steering shaft to steering rack ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Exploded view - steering column .

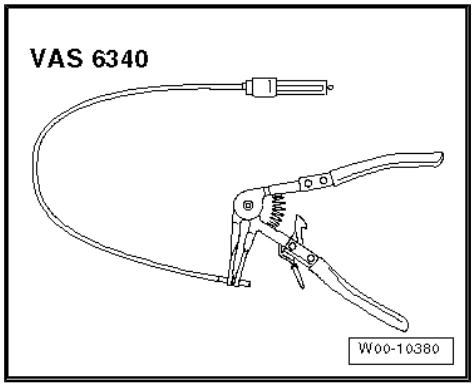
– Install front cross member ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .

## 3.2.3 Removing and installing coolant pipe (bottom left)

**Special tools and workshop equipment required**

Audi
This document is subject to 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 information in this document. Copyright by AUDI AG.

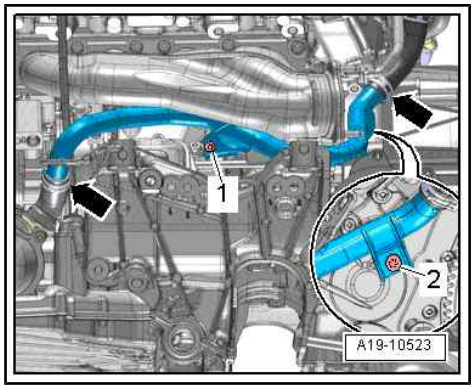
♦ Hose clip pliers - VAS 6340-




**Removing**

– Remove exhaust manifold (left-side) ⇒ page 372 .

– Remove bolts -1- and -2-, disconnect coolant pipe (bottom left) from coolant hoses -arrows- and remove coolant pipe (bottom left) towards the rear.




**Installing**

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

- Tightening torque
  ⇒ “3.1 Exploded view - coolant pipes”, page 247

**Note**

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

– Install exhaust manifold (left-side) ⇒ page 372 .

## 3.2.4 Removing and installing coolant pipe (right-side)

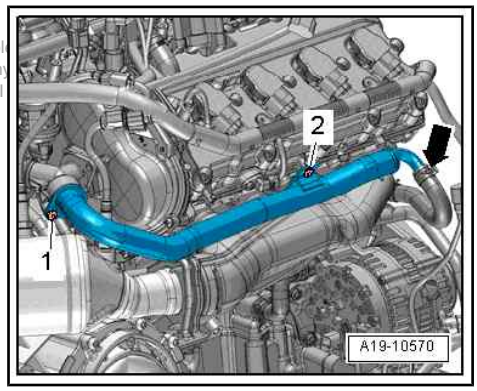
**Removing**

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

– Remove exhaust manifold (right-side) ⇒ page 374 .

– Remove bolts -1- and -2-.

– Detach coolant pipe (right-side) from coolant connection and disconnect from coolant hose -arrow-.




**Installing**

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

- Tightening torque
  ⇒ “3.1 Exploded view - coolant pipes”, page 247

**Note**

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

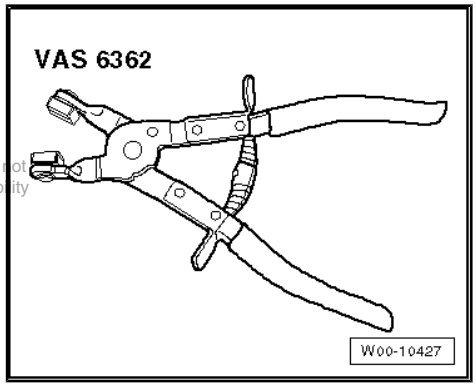
– Lubricate O-ring with coolant.

– Install exhaust manifold (right-side) ⇒ page 374 .

## 3.2.5 Removing and installing coolant pipe (rear)

### Special tools and workshop equipment required

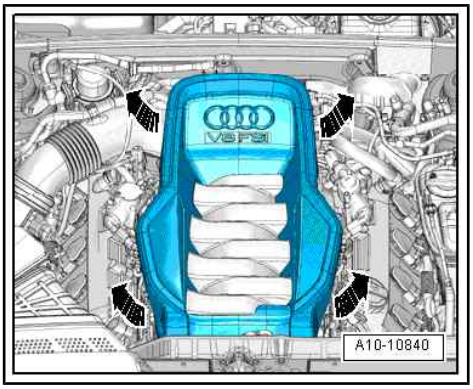
- Hose clip pliers - VAS 6362-




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

### Removing

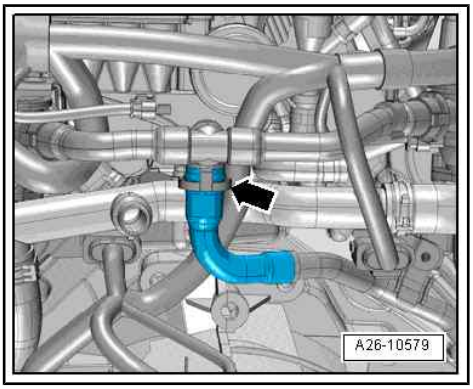
– Remove engine cover panel -arrows-.



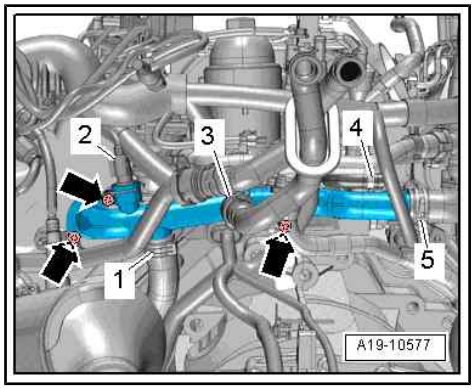

– Drain coolant ⇒ page 229 .

– Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .

– Press release tabs and disconnect secondary air hose -arrow-.



– Unplug electrical connector -2- at coolant temperature sender - G62- .
– Lift retaining clip and disconnect coolant hose -3-.
– Detach coolant hoses -1- and -4- and release hose clip -5-.
– Remove bolts -arrows-.
– Pull coolant pipe (rear) off coolant hose towards the left side.




**Installing**

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

- Tightening torque
⇒ “3.1 Exploded view - coolant pipes”, page 247

**Note**

♦ *Fit new O-rings.*
♦ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
♦ *Fit all cable ties in the original positions when installing.*

– Clean and smoothen sealing surface for O-ring.
– Lubricate O-ring with coolant.
– Connect coolant hose with plug-in connector to coolant pipe
⇒ Fig. ““Connecting coolant hose with plug-in connector to coolant pipe”“ , page 248 .
– Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .
– Fill up with coolant ⇒ page 232 .

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 Radiator/radiator fans

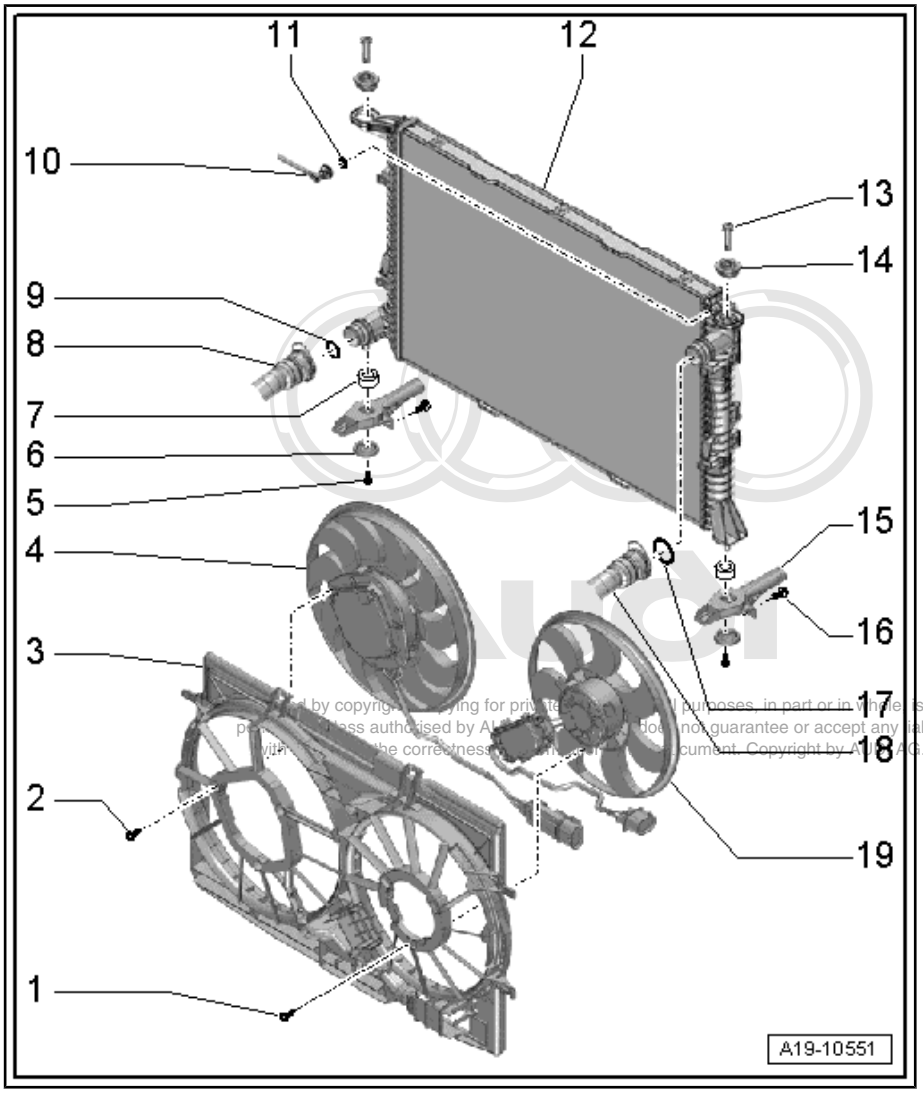
⇒ “4.1 Exploded view - radiator/radiator fans”, page 257
⇒ “4.2 Removing and installing radiator”, page 258
⇒ “4.3 Removing and installing radiator cowl”, page 262
⇒ “4.4 Removing and installing radiator fans”, page 265

## 4.1 Exploded view - radiator/radiator fans

**WARNING**

*Risk of injury as the radiator fans may start up automatically.*

- *Unplug electrical connectors before starting to work in the area of radiator cowl.*




**1 - Bolt**
- ❑ 5 Nm

**2 - Bolt**
- ❑ 5 Nm

**3 - Radiator cowl**
- ❑ Removing and installing ⇒ page 262

**4 - Radiator fan - V7-**
- ❑ With radiator fan control unit - J293-
- ❑ Removing and installing ⇒ page 265

**5 - Bolt**
- ❑ 3.5 Nm

**6 - Support pad**

**7 - Rubber bush**
- ❑ For radiator

**8 - Coolant hose**
- ❑ Lift retaining clip to detach

**9 - O-ring**
- ❑ Renew

**10 - Coolant hose**
- ❑ To coolant expansion tank

**11 - O-ring**
- ❑ Renew

**12 - Radiator**
- ❑ Removing and installing ⇒ page 258
- ❑ If renewed, refill system with fresh coolant

**13 - Retaining pin**
- ❑ Use screwdriver to release and pull off

Audi

**14 - Rubber buffer**

**15 - Radiator bracket**

**16 - Bolt**

**17 - O-ring**

- ❑ Renew

**18 - Coolant hose**

- ❑ Lift retaining clip to detach

**19 - Radiator fan 2 - V177-**

- ❑ With radiator fan control unit 2 - J671-
- ❑ Removing and installing ⇒ page 265

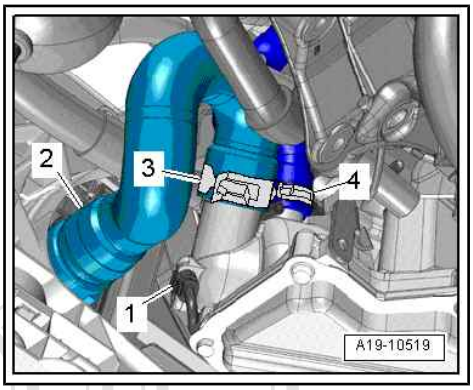
## 4.2 Removing and installing radiator

**Removing**

– Drain coolant ⇒ page 229 .

– Remove bumper cover (front) and bumper ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Exploded view - bumper cover .

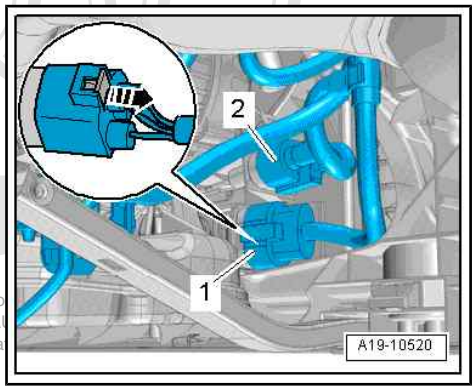
– Pull out retaining clip -2- and disconnect coolant hose from radiator.




**Note**

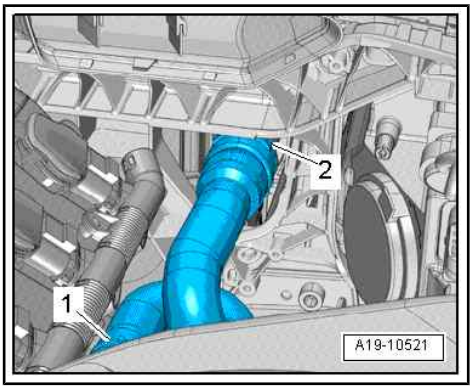
*Disregard -items 1, 3, 4-.*

– Unplug electrical connectors -1- and -2- for radiator fan (push retainer to the rear -arrow- and press down release catch).




Protected by copyright. Copying for private o
permitted unless authorised by AUDI AG. A
with respect to the correctness of informa

– Pull out retaining clip -2- and disconnect coolant hose from radiator.

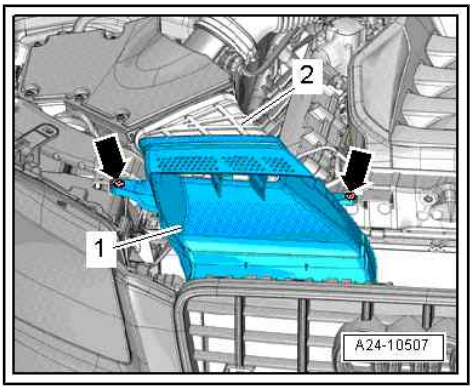



**Note**

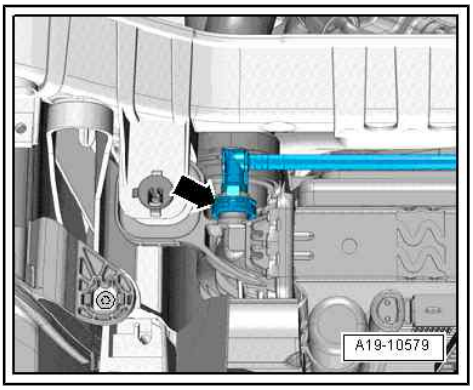
*Disregard -item 1-.*

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

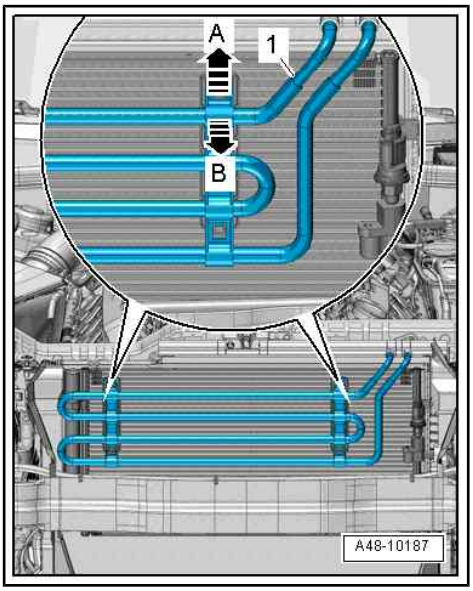
– Remove bolts -arrows-.
– Detach air duct -1- at intermediate flange -2- for air cleaner housing.



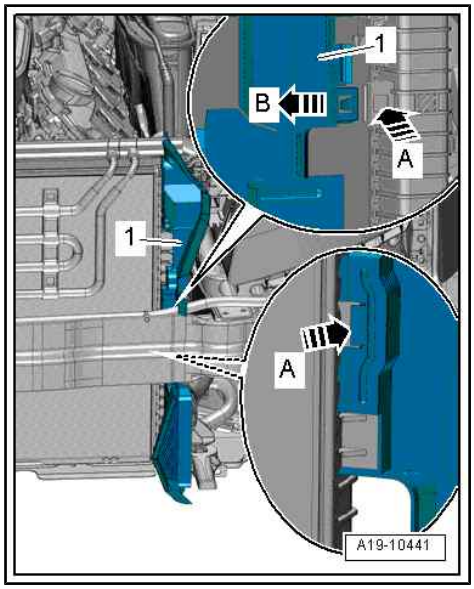

– Lift retaining clip and disconnect coolant line -arrow- (leading to expansion tank) at radiator.



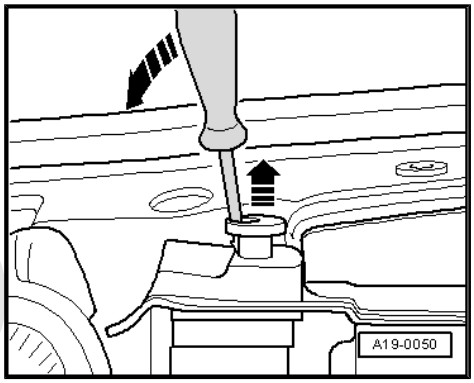

– Release retaining clips -arrow A- and move power steering cooling pipe -1- to front -arrow B-.
– Lift power steering cooling pipe away from condenser and place onto engine.



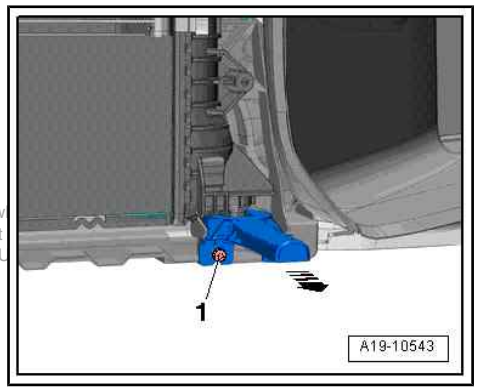
– Release catches -arrows A- and detach air duct -1- on left and right -arrow B-.




– Release retaining pins for radiator on both sides and pull out upwards -arrows-.

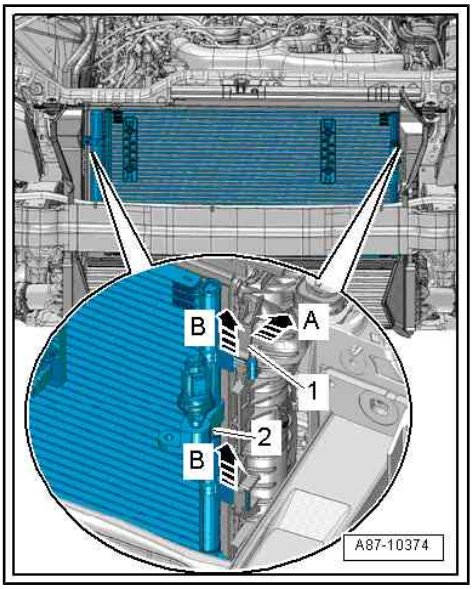



– Remove bolts -1- on both sides and detach radiator bracket with radiator from lock carrier -arrow-.
– Slightly lower radiator.




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

– Have a 2nd mechanic release retaining clips -1- in direction of -arrow A- and lift condenser -2- out of mounts on radiator -arrows B-.




**Caution**

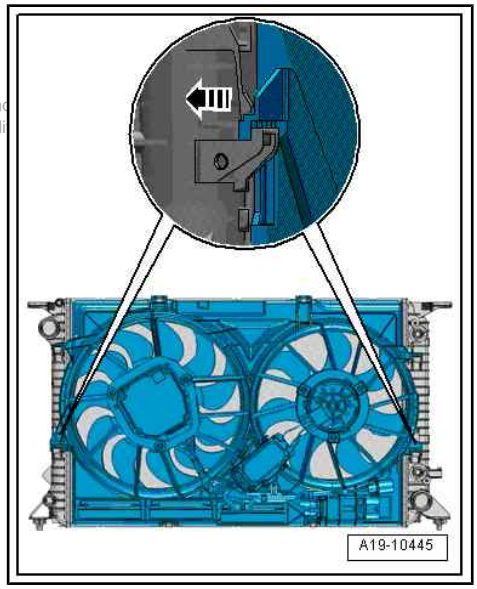
***Risk of damage to condenser, refrigerant lines and refrigerant hoses.***

- ***Do NOT stretch, kink or bend refrigerant lines and hoses.***

– Pivot condenser forwards with pipes/hoses attached.

– Detach radiator.

– Press locking tabs on left and right sides of radiator cowl together -arrow- and lift radiator cowl off radiator.




## Installing

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

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

- Tightening torque
⇒ “4.1 Exploded view - radiator/radiator fans”, page 257

**Note**

*If there are slight impressions on the fins, refer to ⇒ page 10 .*

– Install bumper and bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Exploded view - bumper cover .

– Attach air duct to intermediate flange for air cleaner housing ⇒ page 290 .

– Fill up with coolant ⇒ page 232 .

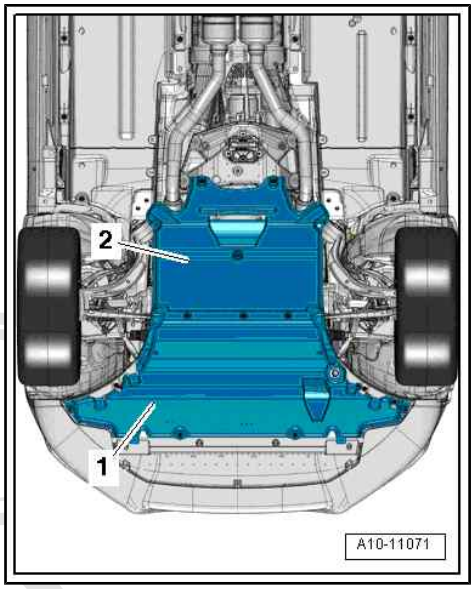
**Note**

*The coolant in the entire system must be changed if the radiator is renewed.*

## 4.3 Removing and installing radiator cowl

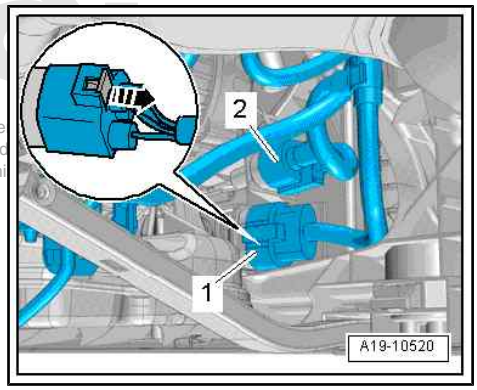
### Removing

– Remove front noise insulation -1- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

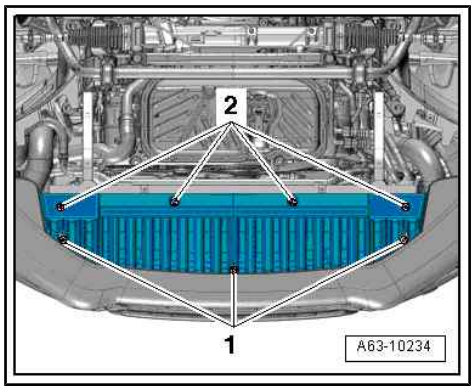



– Unplug electrical connectors -1- and -2- for radiator fan (push retainer to the rear -arrow- and press down release catch).

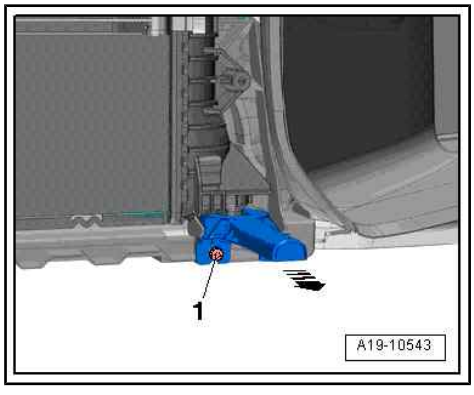
Protected by copyright. Copying for private or comme
permitted unless authorised by AUDI AG. AUDI AG d
with respect to the correctness of information in thi




– Loosen bolts -1- and -2- and detach noise insulation at front bumper cover towards rear.



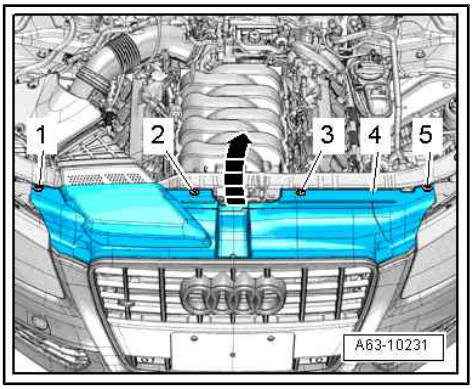

– Remove bolts -1- on both sides.



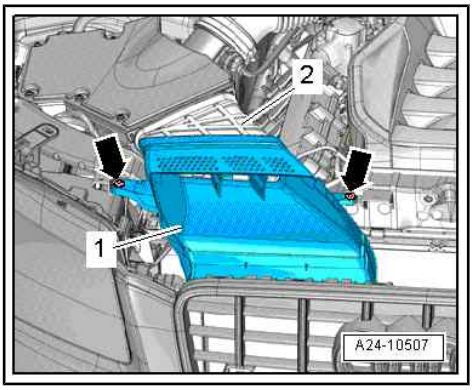

**Note**

*Disregard -arrow-.*

– Remove bolts -1, 2, 3, 5-.
– Lift cover -4- at lock carrier and detach from radiator grille.

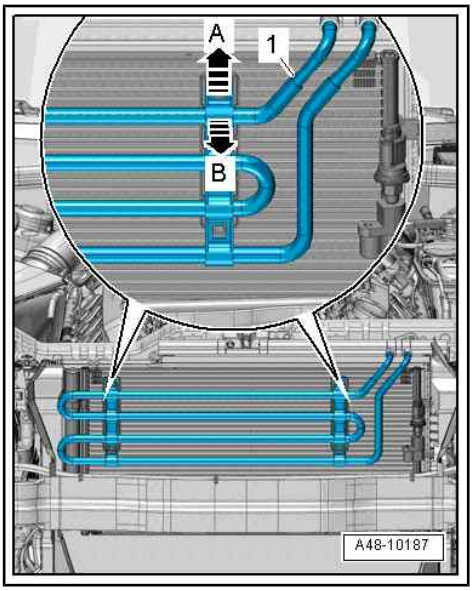



– Remove bolts -arrows-.
– Detach air duct -1- at intermediate flange -2- for air cleaner housing.

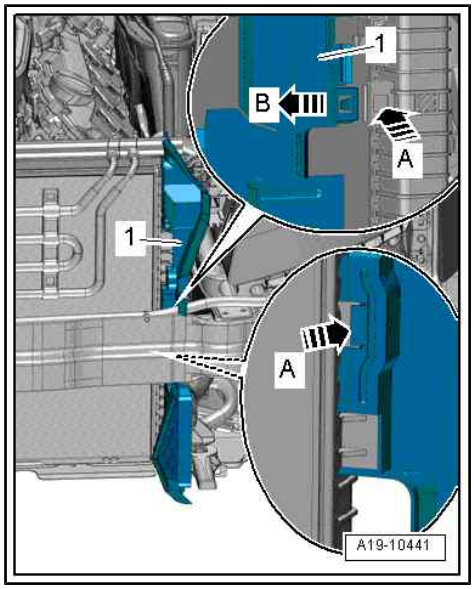



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Release retaining clips -arrow A- and move power steering cooling pipe -1- to front -arrow B-.
– Lift power steering cooling pipe away from condenser and place onto engine.



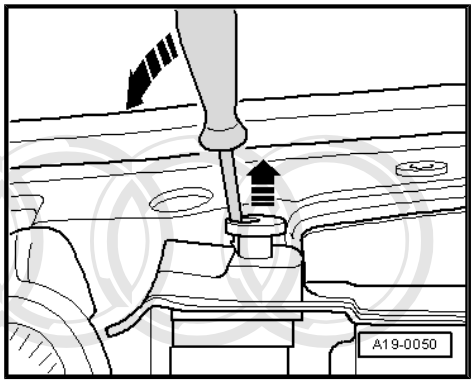
– Release catches -arrows A- and swivel air duct -1- on left and right to centre of vehicle -arrow B-.



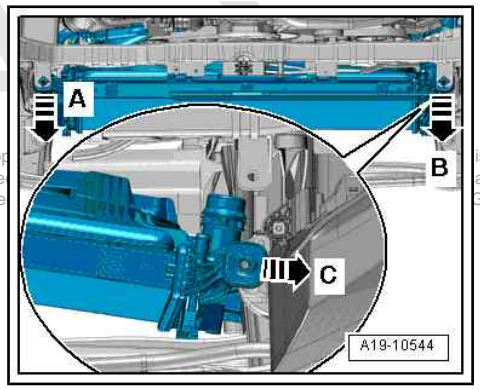

**Note**

*For illustration purposes, the installation position is shown with the bumper cover removed.*

– Release retaining pins for radiator on both sides and pull out upwards -arrows-.

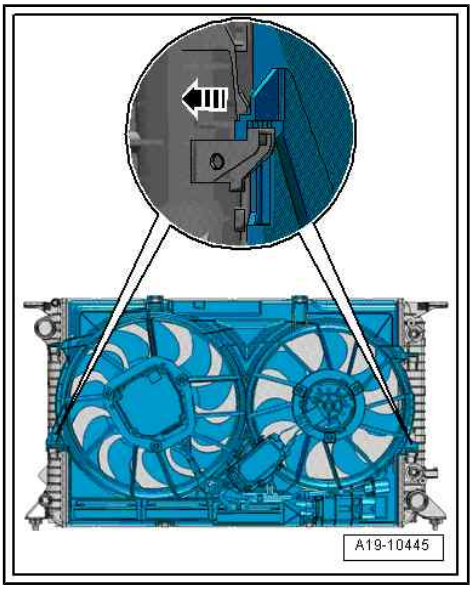



– Move left side of radiator to front -arrow B-, then press to left -arrow C- and then move forward on right side -arrow A-.




Protected by copyright. Co
permitted unless authorise
with respect to the corre
is not
ability
G.

– Press locking tabs on left and right sides of radiator cowl together -arrow- and lift radiator cowl off radiator.




**Installing**

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

- Tightening torque
  ⇒ “4.1 Exploded view - radiator/radiator fans”, page 257

– Install noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

– Install bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Exploded view - bumper cover .

– Attach air duct to intermediate flange for air cleaner housing ⇒ page 290 .

– Install lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Exploded view - lock carrier .

– Install noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

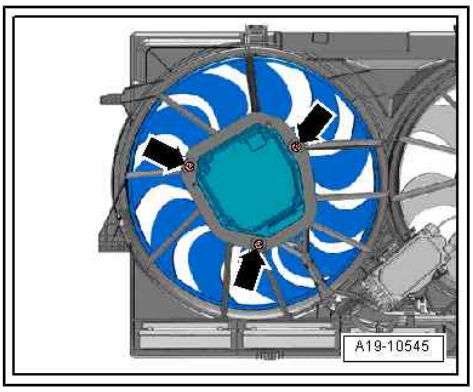
## 4.4 Removing and installing radiator fans

**Removing**

– Remove radiator cowl ⇒ page 262 .

– Remove bolts -arrows- on radiator fan (left-side).

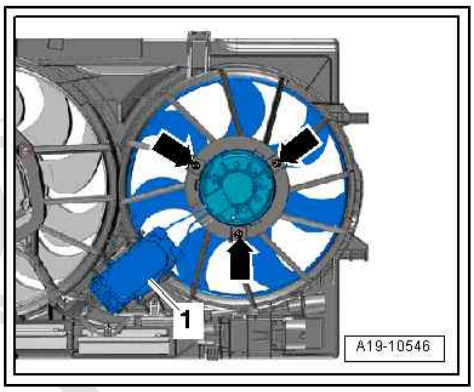
– Move electrical wiring harness clear and detach radiator fan (left-side).




– Remove bolts -arrows- on radiator fan (right-side).

– Move electrical wiring harness clear.

– Unclip radiator fan control unit -1- from radiator cowl and detach radiator fan (right-side) with control unit.




**Installing**

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

- Tightening torque
  ⇒ “4.1 Exploded view - radiator/radiator fans”, page 257

**Note**

*Fit all cable ties in the original positions when installing.*

– Install radiator cowl ⇒ page 262 .

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

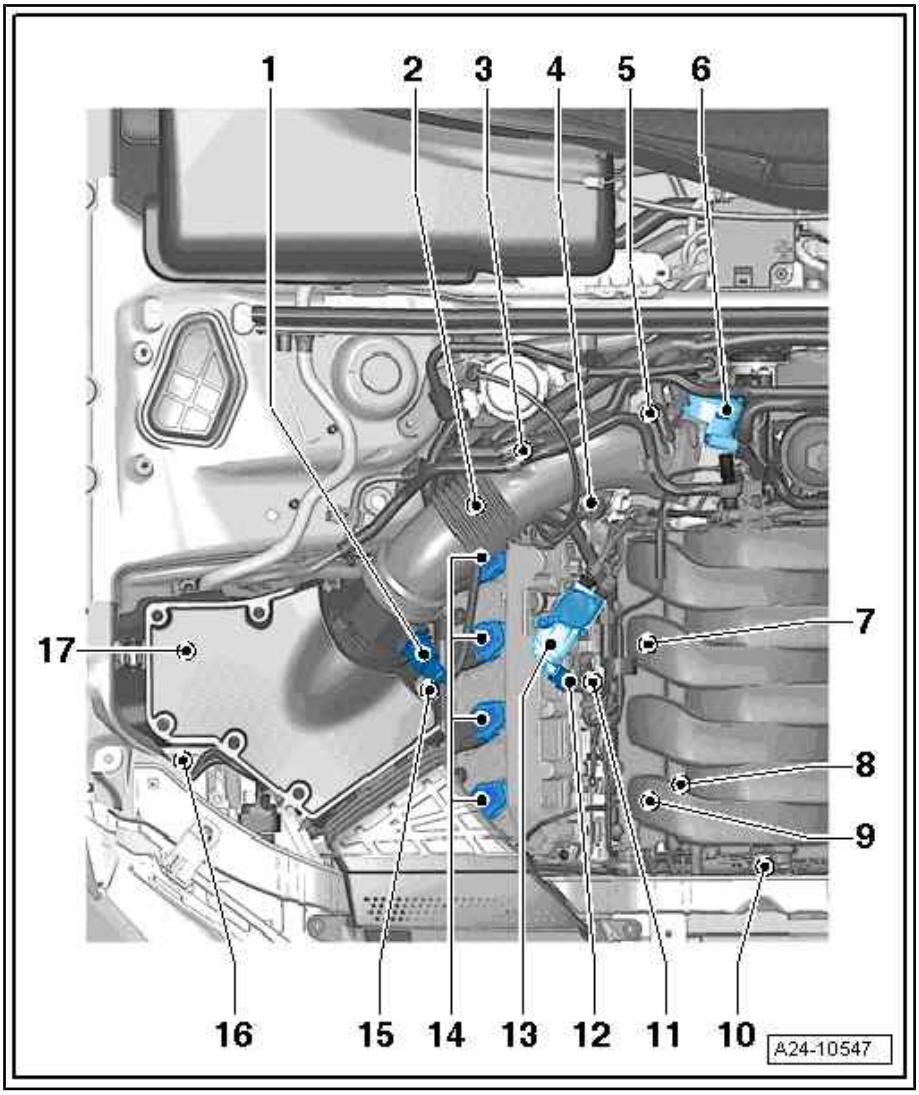
# 24 – Mixture preparation - injection

## 1 Injection system

⇒ “1.1 Overview of fitting locations - injection system”, page 266

## 1.1 Overview of fitting locations - injection system

**Engine compartment (right-side)**




**1 - Air mass meter - G70- / intake air temperature sender - G42-**

- ❑ Removing and installing ⇒ page 318

**2 - Exhaust camshaft control valve 1 - N318-**

- ❑ 2.4 Nm

**3 - Electrical connectors for**

- ❑ Lambda probe - G39- (before catalytic converter) with Lambda probe heater - Z19-
- ❑ Lambda probe after catalytic converter - G130- with Lambda probe 1 heater after catalytic converter - Z29-
- ❑ Fitting location ⇒ page 272

**4 - Camshaft control valve 1 - N205-**

- ❑ Fitting location ⇒ page 274
- ❑ 2.4 Nm

**5 - Electrical connector for throttle valve module - J338-**

**6 - Throttle valve module - J338-**

- ❑ After renewing throttle valve module - J338- , select “Adapt throttle valve module” in “Gui-

ded Functions” mode

**7 - Knock sensor 2 - G66-**

- ❑ Fitting location ⇒ page 274
- ❑ Electrical connector ⇒ page 275
- ❑ Removing and installing ⇒ page 383
- ❑ 20 Nm

**8 - Fuel pressure sender - G247-**

- ❑ Fitting location ⇒ page 274
- ❑ Removing and installing ⇒ page 317
- ❑ 25 Nm
- ❑ Lubricate threads lightly with clean oil

**9 - Knock sensor 1 - G61-**

- ❑ Fitting location ⇒ page 274
- ❑ Electrical connector ⇒ page 275
- ❑ Removing and installing ⇒ page 383
- ❑ 20 Nm

**10 - Components at front of engine**

- ❑ Fitting locations ⇒ page 275
- ❑ Intake manifold flap motor - V157-
- ❑ In model year 2009, intake manifold flap motor - V157- is replaced with intake manifold flap valve - N316-
- ❑ Intake manifold flap potentiometer - G336-
- ❑ Variable intake manifold motor - V183-
- ❑ In model year 2009, variable intake manifold motor - V183- is replaced with variable intake manifold change-over valve - N156-
- ❑ Intake manifold flap potentiometer 2 - G512-
- ❑ Electrical connector for knock sensor 4 - G199-
- ❑ Electrical connector for knock sensor 3 - G198-
- ❑ Electrical connector for knock sensor 1 - G61-
- ❑ Electrical connector for knock sensor 2 - G66-
- ❑ Checking, removing and installing oil pressure switch - F1- ⇒ page 219

**11 - Hall sender - G40-**

- ❑ Fitting location ⇒ page 274
- ❑ Removing and installing ⇒ page 384
- ❑ 10 Nm

**12 - Fuel metering valve - N290-**

- ❑ Fitting location ⇒ page 276

**13 - High-pressure pump**

- ❑ With fuel metering valve - N290-
- ❑ Fitting location ⇒ page 276
- ❑ Removing and installing ⇒ page 327

**14 - Ignition coils, cylinder bank 1**

- ❑ Ignition coil 1 with output stage - N70-
- ❑ Ignition coil 2 with output stage - N127-
- ❑ Ignition coil 3 with output stage - N291-
- ❑ Ignition coil 4 with output stage - N292-
- ❑ Removing and installing ⇒ page 381

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.

**15 - Hall sender 3 - G300-**

- ❑ Secured to outside of cylinder head
- ❑ Fitting location ⇒ page 273
- ❑ Removing and installing ⇒ page 384
- ❑ 10 Nm

**16 - Secondary air pump motor - V101-**

- ❑ Fitting location ⇒ page 276
- ❑ Removing and installing ⇒ page 358

**17 - Variable intake manifold changeover valve - N335-**

- ❑ Fitting location ⇒ page 273

**Engine compartment (left-side)**

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

**1 - Fuel metering valve 2 - N402-**

- ❑ Combined with high-pressure pump in one unit
- ❑ Fitting location ⇒ page 276

**2 - Fuel pressure sender for low pressure - G410-**

- ❑ Fitting location ⇒ page 276

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

- ❑ Fitting location ⇒ page 276
- ❑ Activated charcoal filter solenoid valve 2 - N115- (only on USA vehicles)

**4 - Camshaft control valve 2 - N208-**

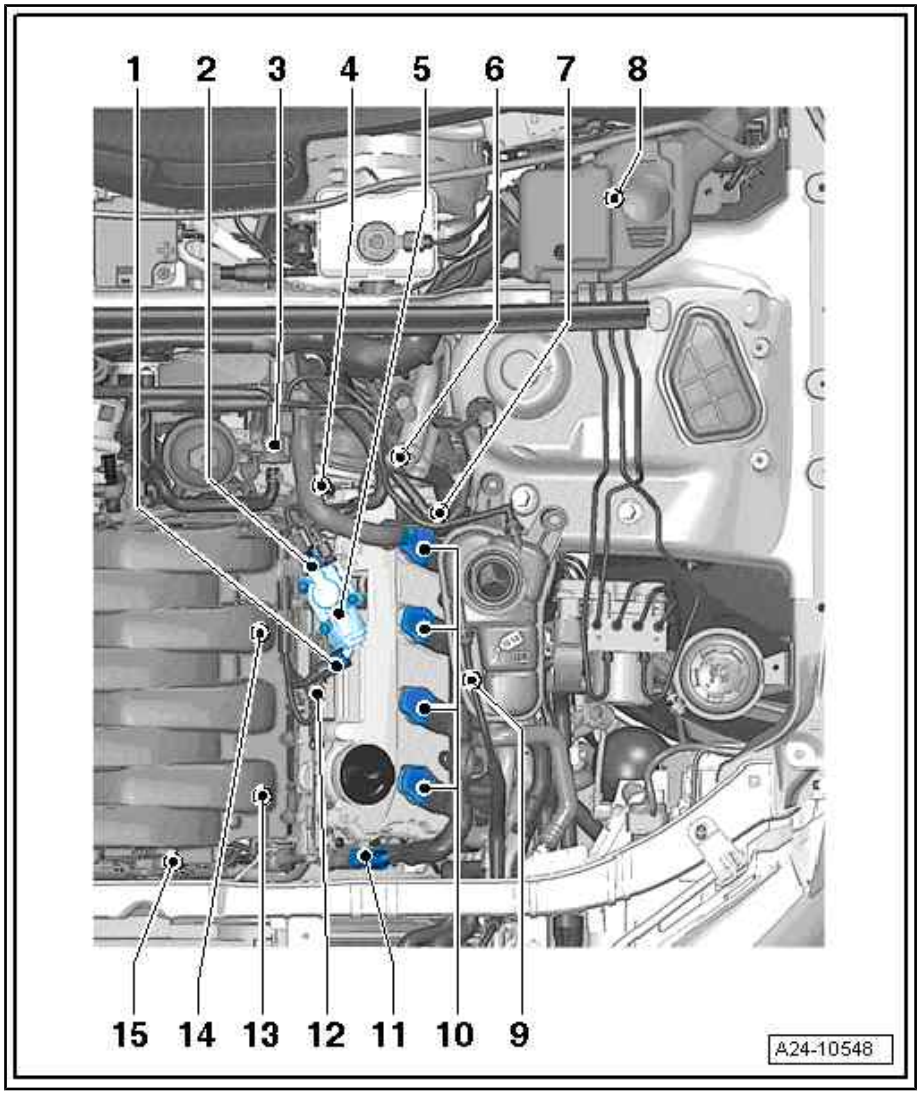
- ❑ Fitting location ⇒ page 274
- ❑ 2.4 Nm

**5 - High-pressure pump**

- ❑ With fuel metering valve 2 - N402-
- ❑ Fitting location ⇒ page 276

**6 - Electrical connectors for**

- ❑ Lambda probe 2 - G108- (before catalytic converter) with Lambda



probe 2 heater - Z28-

- ❑ Lambda probe 2 after catalytic converter - G131- with Lambda probe 2 heater after catalytic converter - Z30-
- ❑ Fitting location ⇒ page 272

**7 - Exhaust camshaft control valve 2 - N319-**

- ❑ Fitting location ⇒ page 273
- ❑ 2.4 Nm

**8 - Engine control unit - J623-**

- ❑ Fitting location ⇒ page 271
- ❑ Removing and installing ⇒ page 321

**9 - Hall sender 4 - G301-**

- ❑ Fitting location ⇒ page 273
- ❑ Removing and installing ⇒ page 384
- ❑ 10 Nm

**10 - Ignition coils, cylinder bank 2**

- ❑ Ignition coil 5 with output stage - N323-
- ❑ Ignition coil 6 with output stage - N324-
- ❑ Ignition coil 7 with output stage - N325-
- ❑ Ignition coil 8 with output stage - N326-
- ❑ Fitting location ⇒ page 273
- ❑ Removing and installing ⇒ page 381

**11 - Electrical connectors**

- ❑ Knock sensor 3 - G198-
- ❑ Knock sensor 4 - G199-

**12 - Hall sender 2 - G163-**

- ❑ Fitting location ⇒ page 274
- ❑ Removing and installing ⇒ page 384
- ❑ 10 Nm

**13 - Knock sensor 3 - G198-**

- ❑ Fitting location ⇒ page 274
- ❑ Removing and installing ⇒ page 383
- ❑ 20 Nm

**14 - Knock sensor 4 - G199-**

- ❑ Fitting location ⇒ page 274
- ❑ Removing and installing ⇒ page 383
- ❑ 20 Nm

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.

**15 - Components at front of engine**

- Electrical connector ⇒ page 275
- Intake manifold flap motor - V157-
- In model year 2009, intake manifold flap motor - V157- is replaced with intake manifold flap valve - N316-
- Intake manifold flap potentiometer - G336-
- Variable intake manifold motor - V183-
- In model year 2009, variable intake manifold motor - V183- is replaced with variable intake manifold change-over valve - N156-
- Intake manifold flap potentiometer 2 - G512-
- Electrical connector for knock sensor 4 - G199-
- Electrical connector for knock sensor 3 - G198-
- Electrical connector for knock sensor 1 - G61-
- Electrical connector for knock sensor 2 - G66-

**A - Coolant temperature sender - G62-**

- Fitting location ⇒ page 273
- Removing and installing ⇒ page 243

**B - Engine speed sender - G28-**

- Fitting location ⇒ page 272
- Removing and installing ⇒ page 385

**C - Accelerator position sender - G79- / accelerator position sender 2 - G185-**

- In footwell on accelerator pedal (both senders are fitted in one housing)
- Fitting location ⇒ page 272
- Removing and installing ⇒ Fuel supply system, petrol engines; Rep. gr. 20 ; Accelerator mechanism; Removing and installing accelerator pedal module with accelerator position sender -G79- / -G185-

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

- In footwell on brake pedal
- Removing and installing ⇒ Brake system; Rep. gr. 45 ; Sensors; Removing and installing brake light sensor

**E - Clutch position sender - G476-**

- Clutch position sender - G476- incorporates clutch pedal switch for engine start - F194- and clutch pedal switch - F36-
- Only fitted on vehicles with manual gearbox
- In footwell on clutch pedal

**F - Fuel pump control unit - J538-**

- Fitting location ⇒ page 271

**G - Lambda probe - G39- (before catalytic converter) with Lambda probe heater - Z19-**

- Fitting location of electrical connector ⇒ page 272
- Fitting location of Lambda probe ⇒ page 272
- Removing and installing ⇒ page 336
- Tightening torque ⇒ page 335

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.

**H - Lambda probe 2 - G108- (before catalytic converter) with Lambda probe 2 heater - Z28-**

- Fitting location of electrical connector ⇒ page 272
- Fitting location of Lambda probe ⇒ page 272
- Removing and installing ⇒ page 336
- Tightening torque ⇒ page 335

**I - Lambda probe after catalytic converter - G130- with Lambda probe 1 heater after catalytic converter - Z29-**

- ❑ Fitting location of electrical connector ⇒ page 272
- ❑ Fitting location of Lambda probe ⇒ page 272
- ❑ Removing and installing ⇒ page 336
- ❑ Tightening torque ⇒ page 335

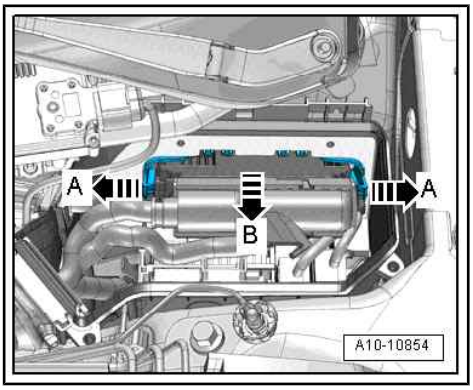
**J - Lambda probe 2 after catalytic converter - G131- with Lambda probe 2 heater after catalytic converter - Z30-**

- ❑ Fitting location of electrical connector ⇒ page 272
- ❑ Fitting location of Lambda probe ⇒ page 272
- ❑ Removing and installing ⇒ page 336
- ❑ Tightening torque ⇒ page 335

**Fitting location of engine control unit - J623-**

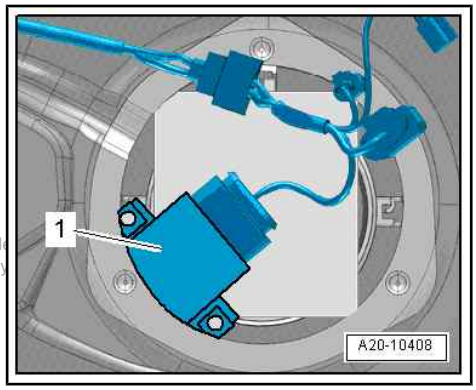
♦ In left electronics box in engine compartment

Removing and installing ⇒ page 321




**Fuel pump control unit - J538- -1-**

Removing and installing ⇒ Fuel supply system, petrol engines; Rep. gr. 20 ; Fuel pump; Removing and installing fuel pump control unit - J538-




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.

**Relay and fuse holder in electronics box in plenum chamber (left-side)**

A - Current supply relay for engine components - J757-

B - Starter motor relay - J53- (black/purple socket)

B - Starter motor relay 2 - J695- (black/blue socket)

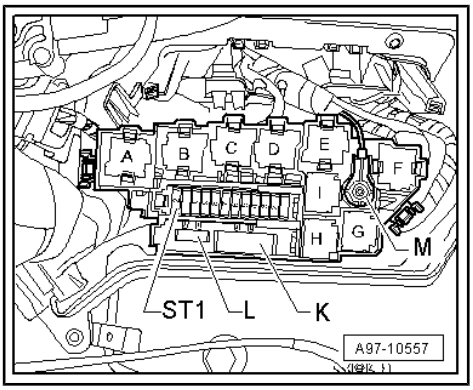
C - Secondary air pump relay - J299-

D - Motronic current supply relay - J271-

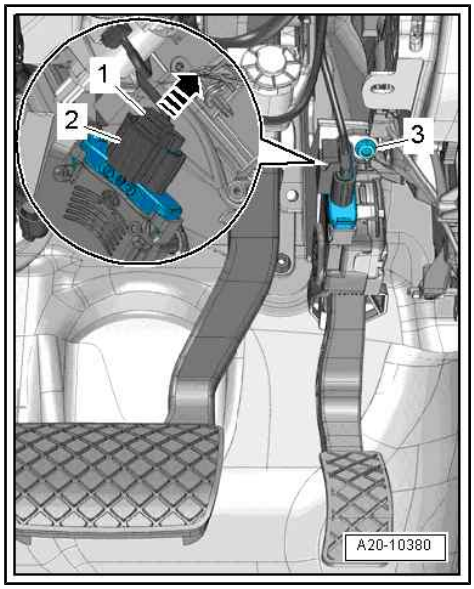
E - Continued coolant circulation relay - J151- (brown/blue socket)

E - Brake servo relay - J569- (brown/purple socket)

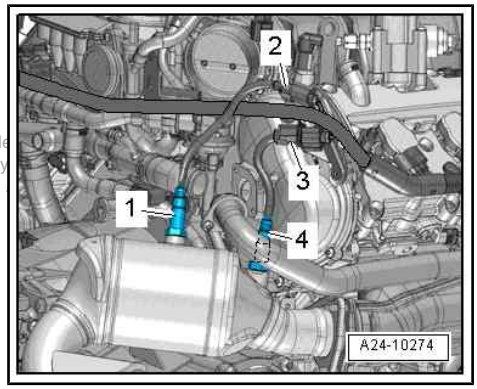
Refer to ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.



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




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




1 - Lambda probe after catalytic converter - G130-

2 - Electrical connector for Lambda probe after catalytic converter - G130-

3 - Electrical connector for Lambda probe - G39-

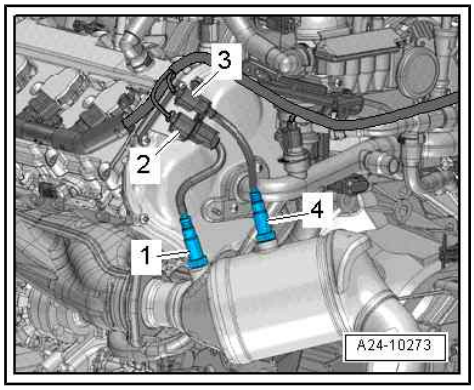
4 - Lambda probe - G39-

Removing and installing ⇒ page 336

- Tightening torque
  ⇒ “9.1 Exploded view - Lambda probe”, page 335 .

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.

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




1 - Lambda probe 2 - G108-

2 - Electrical connector for Lambda probe 2 - G108-

3 - Electrical connector for Lambda probe 2 after catalytic converter - G131-

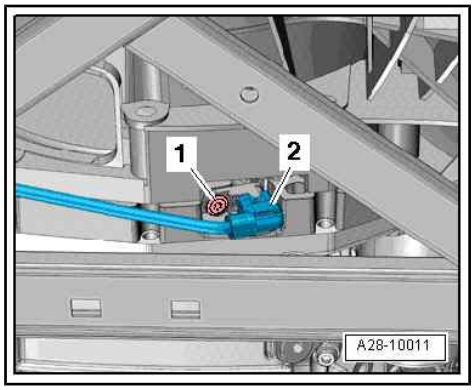
4 - Lambda probe 2 after catalytic converter - G131-

Removing and installing ⇒ page 338

- Tightening torque
  ⇒ “9.1 Exploded view - Lambda probe”, page 335 .

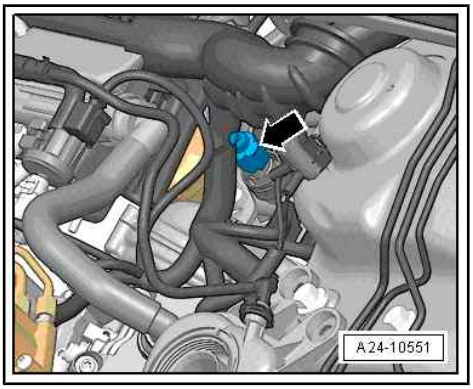
### Fitting location of engine speed sender - G28- -arrow-

Engine speed sender - G28- is bolted to the gearbox from below.

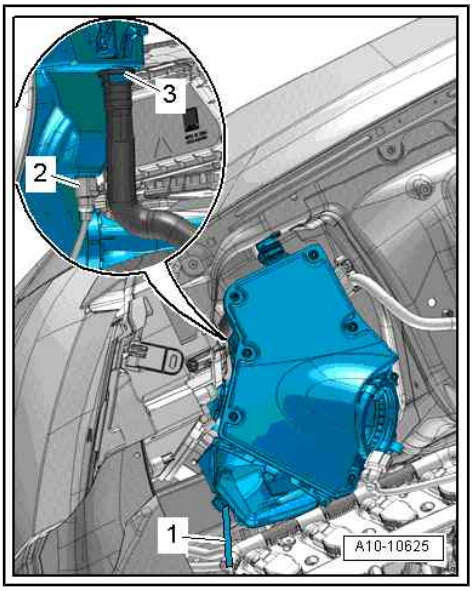


**Fitting location of coolant temperature sender - G62- -arrow-**

Removing and installing ⇒ page 243

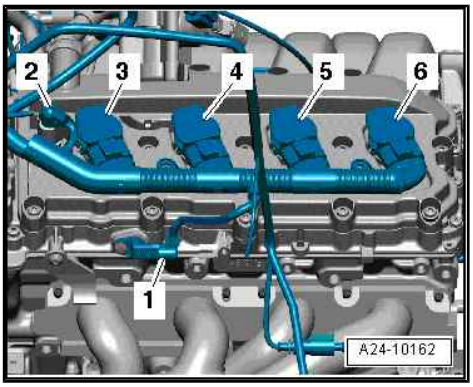



**Variable intake manifold changeover valve - N335- -2-**




**Fitting locations on cylinder bank 1 (right-side)**

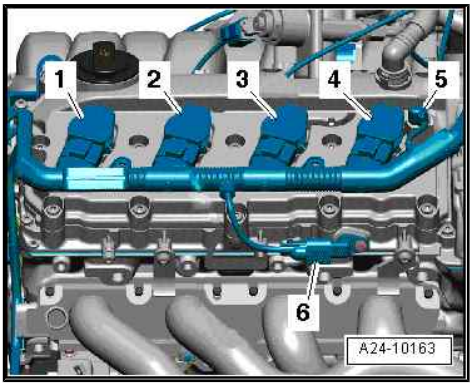
1 - Hall sender 3 - G300-
2 - Exhaust camshaft control valve 1 - N318-
3 - Ignition coil 4 with output stage - N292-
4 - Ignition coil 3 with output stage - N291-
5 - Ignition coil 2 with output stage - N127-
6 - Ignition coil 1 with output stage - N70-



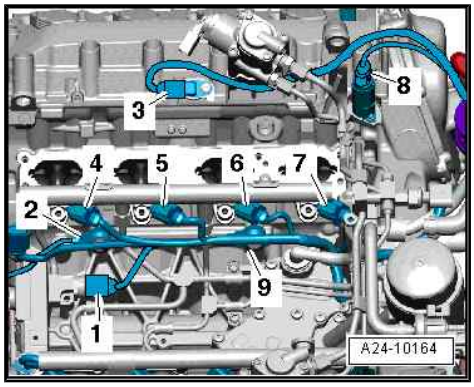

Copyright by AUDI AG. Commercial use or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

**Fitting locations on cylinder bank 2 (left-side)**

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



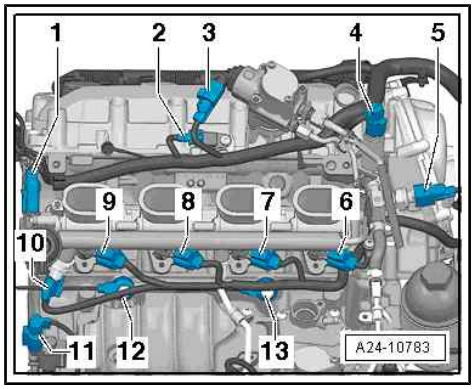
### Fitting locations: components on inside of right cylinder head




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

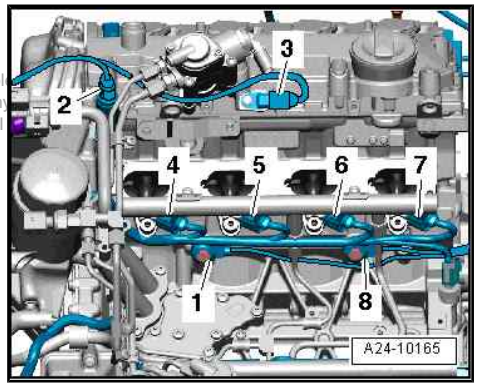
For fitting locations of components on inside of cylinder head, right-side (gradual introduction in model year 2009), see next illustration.

### Fitting locations: components on inside of right cylinder head (gradual introduction in model year 2009)




1 - Intake manifold flap potentiometer - G336-
2 - Hall sender - G40-
3 - Fuel metering valve - N290-
4 - Camshaft control valve 1 - N205-
5 - Fuel pressure sender for low pressure - G410-
6 - Injector, cylinder 4 - N33-
7 - Injector, cylinder 3 - N32-
8 - Injector, cylinder 2 - N31-
9 - Injector, cylinder 1 - N30-
10 - Fuel pressure sender - G247-
11 - Intake manifold flap valve - N316-
12 - Knock sensor 1 - G61-
13 - Knock sensor 2 - G66-

### Fitting locations: components on inside of left cylinder head

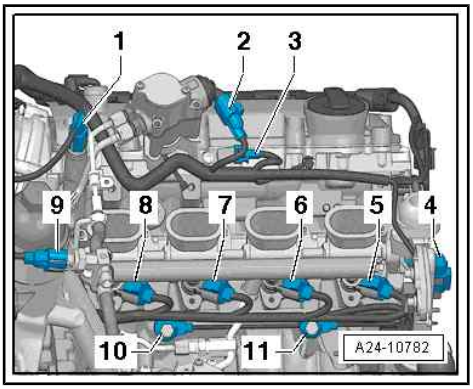



1 - Knock sensor 4 - G199-
2 - Camshaft control valve 2 - N208-
3 - Hall sender 2 - G163-
4 - Injector, cylinder 8 - N86-
5 - Injector, cylinder 7 - N85-
6 - Injector, cylinder 6 - N84-
7 - Injector, cylinder 5 - N83-
8 - Knock sensor 3 - G198-

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

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.

**Fitting locations: components on inside of left cylinder head (gradual introduction in model year 2009)**




1 - Camshaft control valve 2 - N208-

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

3 - Hall sender 2 - G163-

4 - Intake manifold flap potentiometer 2 - G512-

5 - Injector, cylinder 5 - N83-

6 - Injector, cylinder 6 - N84-

7 - Injector, cylinder 7 - N85-

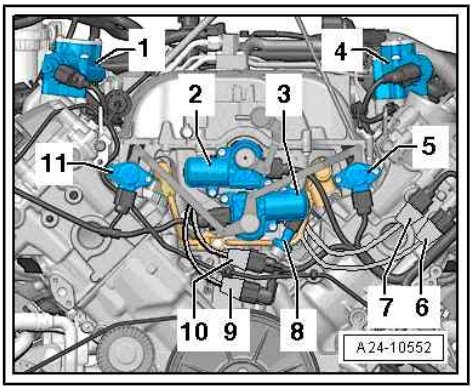
8 - Injector, cylinder 8 - N86-

9 - Fuel pressure sender for low pressure - G410-

10 - Knock sensor 4 - G199-

11 - Knock sensor 3 - G198-

**Fitting location: at front of engine**




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

2 - Variable intake manifold motor - V183-

3 - Intake manifold flap motor - V157-

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

5 - Intake manifold flap potentiometer 2 - G512-

6 - Electrical connector for knock sensor 4 - G199-

7 - Electrical connector for knock sensor 3 - G198-

8 - Oil pressure switch - F1-

9 - Electrical connector for knock sensor 2 - G66-

10 - Electrical connector for knock sensor 1 - G61-

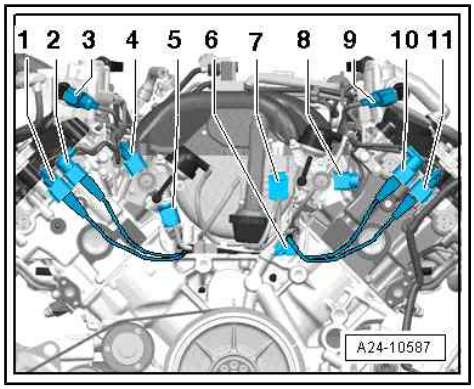
11 - Intake manifold flap potentiometer - G336-

In model year 2009, -items 2 and 3- are replaced with vacuum-controlled valves.

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

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.

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




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

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

3 - Fuel metering valve - N290-

4 - Intake manifold flap potentiometer - G336-

5 - Fuel pressure sender - G247-

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

7 - Variable intake manifold changeover valve - N156-

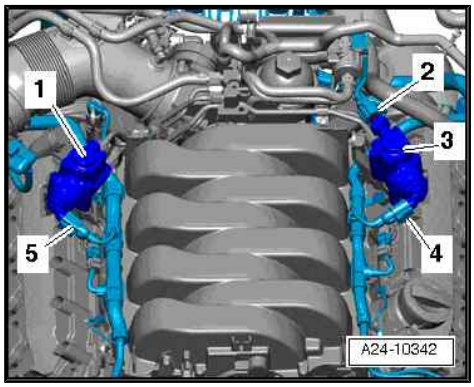
8 - Intake manifold flap potentiometer 2 - G512-

9 - Fuel metering valve - N290-

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

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

**Fitting locations of high-pressure pumps**




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

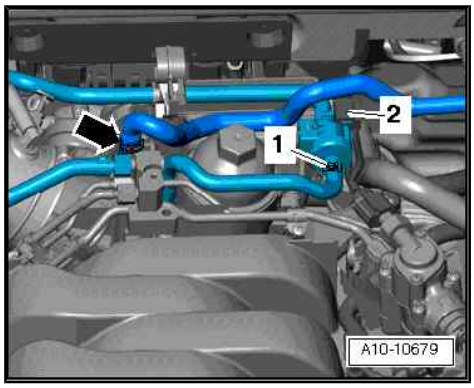
2 - Fuel pressure sender for low pressure - G410-

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

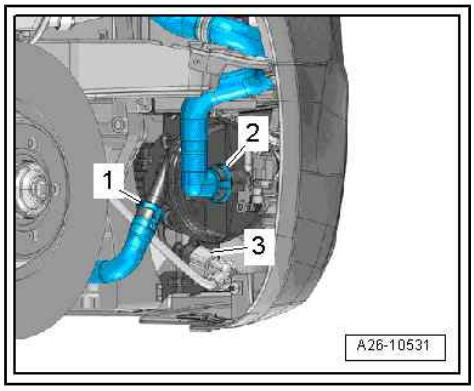
4 - Fuel metering valve 2 - N402-

5 - Fuel metering valve - N290-

**Activated charcoal filter solenoid valve 1 - N80- -2-**




**Secondary air pump motor - V101-**




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 Vacuum system

⇒ “2.1 Connection diagram - vacuum system”, page 277

## 2.1 Connection diagram - vacuum system

⇒ “2.1.1 Connection diagram - vacuum system, plastic intake manifold (gradual introduction in model year 2009)”, page 277

### 2.1.1 Connection diagram - vacuum system, plastic intake manifold (gradual introduction in model year 2009)

**1 - Vacuum hose with non-return valve**

**2 - Vacuum unit for intake manifold flap**

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

**3 - Vacuum unit for intake manifold flap 2**

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

**4 - Variable intake manifold changeover valve - N156-**

**5 - Vacuum unit for intake manifold change-over**

- ❑ Check with hand vacuum pump - VAS 6213-

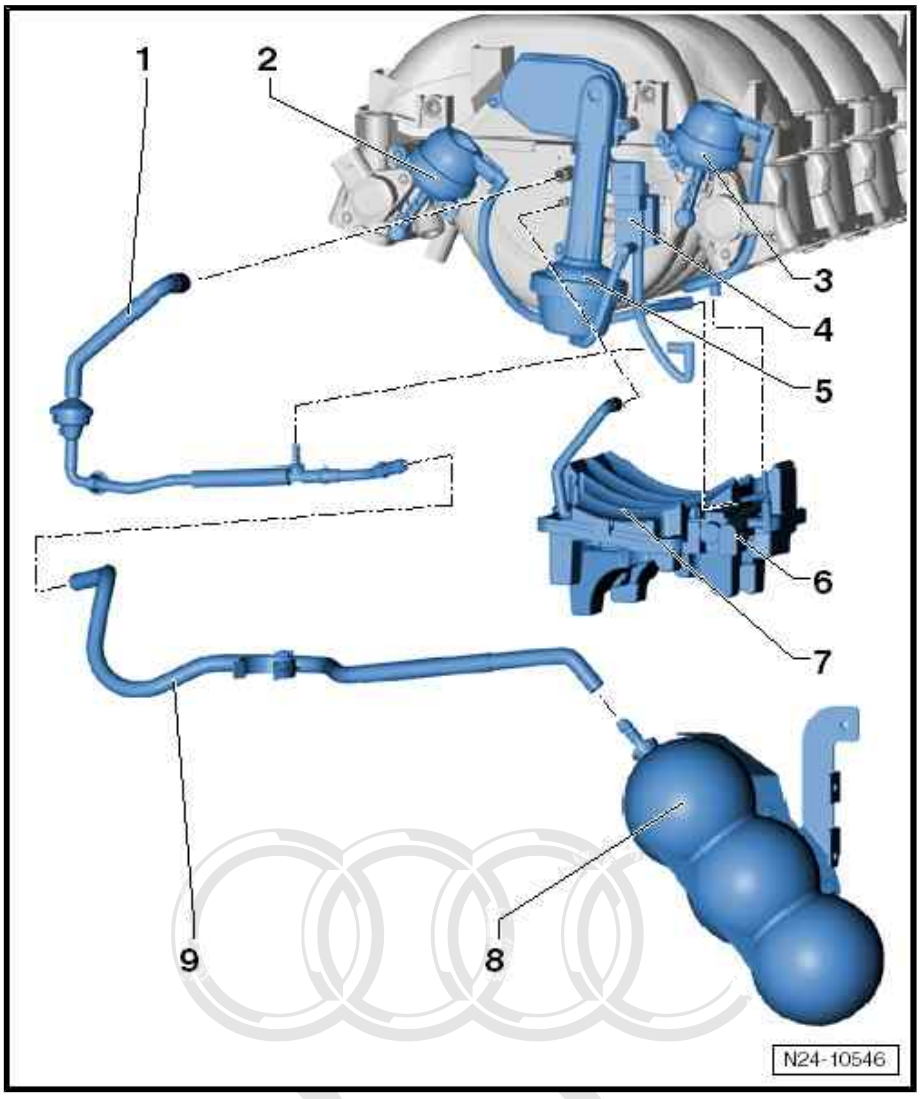
**6 - Intake manifold flap valve - N316-**

- ❑ Take out intake manifold for removal and installation

**7 - Vacuum reservoir**

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

**8 - Vacuum reservoir**




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

# 3 Injectors

⇒ “3.1 Exploded view - fuel rail with injectors”, page 278

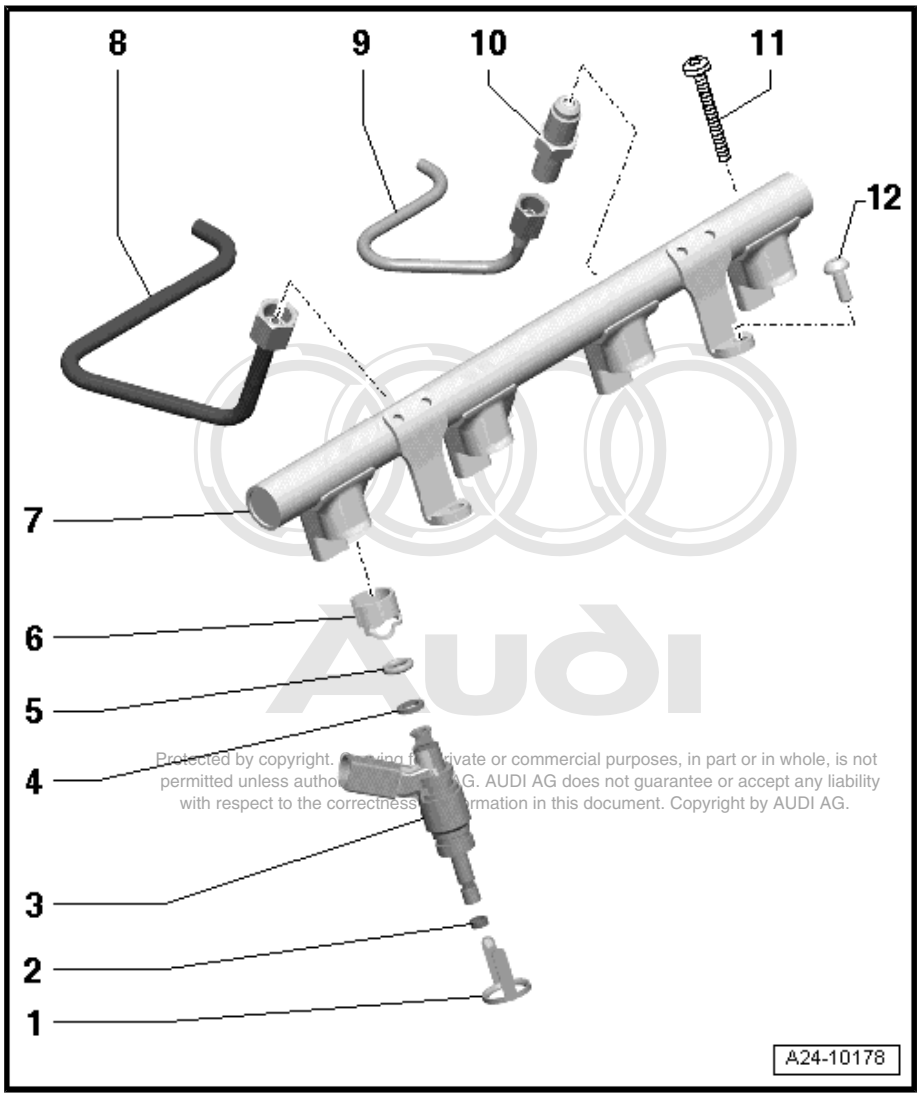
⇒ “3.2 Removing and installing injectors”, page 281

## 3.1 Exploded view - fuel rail with injectors

⇒ “3.1.1 Exploded view - fuel rail with injectors, magnesium intake manifold”, page 278

⇒ “3.1.2 Exploded view - fuel rail with injectors, plastic intake manifold (gradual introduction in model year 2009)”, page 280

### 3.1.1 Exploded view - fuel rail with injectors, magnesium intake manifold




**1 - Radial compensation element**

- ❑ Renew if damaged
- ❑ Clip onto support ring ⇒ Item 6 (page 278)

**2 - Combustion chamber ring seal**

- ❑ Do not apply grease to ring seal or use any other lubricants
- ❑ Renewing ⇒ page 281

**3 - Injector**

- ❑ Removing and installing ⇒ page 281

**4 - Spacer ring**

- ❑ Renewing ⇒ page 281
- ❑ Via this support ring, the fuel rail exerts the clamping force that holds the injector in the cylinder head

**5 - O-ring**

- ❑ Renew
- ❑ Lubricate lightly with clean engine oil

**6 - Support ring**

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

**7 - Fuel rail**

- ❑ Removing and installing ⇒ page 281

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.

**8 - High-pressure pipe**

> **WARNING**
>
> *The pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 4 .*
>
> *A clean cloth must then be wrapped around the connection and the residual pressure dissipated by carefully loosening the connection.*

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

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

**9 - High-pressure pipe**

> **WARNING**
>
> *The pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 4 .*
>
> *A clean cloth must then be wrapped around the connection and the residual pressure dissipated by carefully loosening the connection.*

- ❑ Connections must not be damaged
- ❑ Do not alter shape
- ❑ 25 Nm
- ❑ Installing high-pressure pipes ⇒ page 329

**10 - Pressure relief valve, 140 bar**

- ❑ For high-pressure pipe
- ❑ 25 Nm

**11 - Bolt**

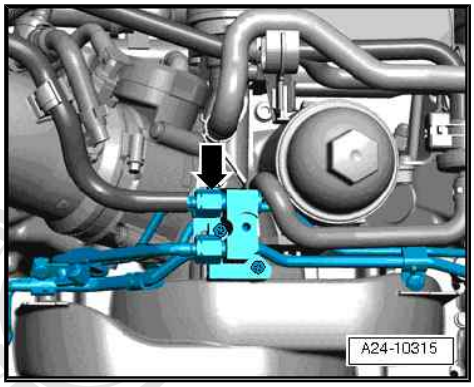
- ❑ 9 Nm
- ❑ Tighten in stages and in diagonal sequence

**12 - Bolt**

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

**Tightening torque for fuel supply line**

- Tightening torque: 25 Nm




## 3.1.2 Exploded view - fuel rail with injectors, plastic intake manifold (gradual introduction in model year 2009)

**Note**

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.

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

**1 - Bolts**
- ❑ 0.3 Nm

**2 - Bracket**

**3 - Support ring**
- ❑ Renew if damaged
- ❑ Clip onto support ring ⇒ Item 8 (page 280)

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

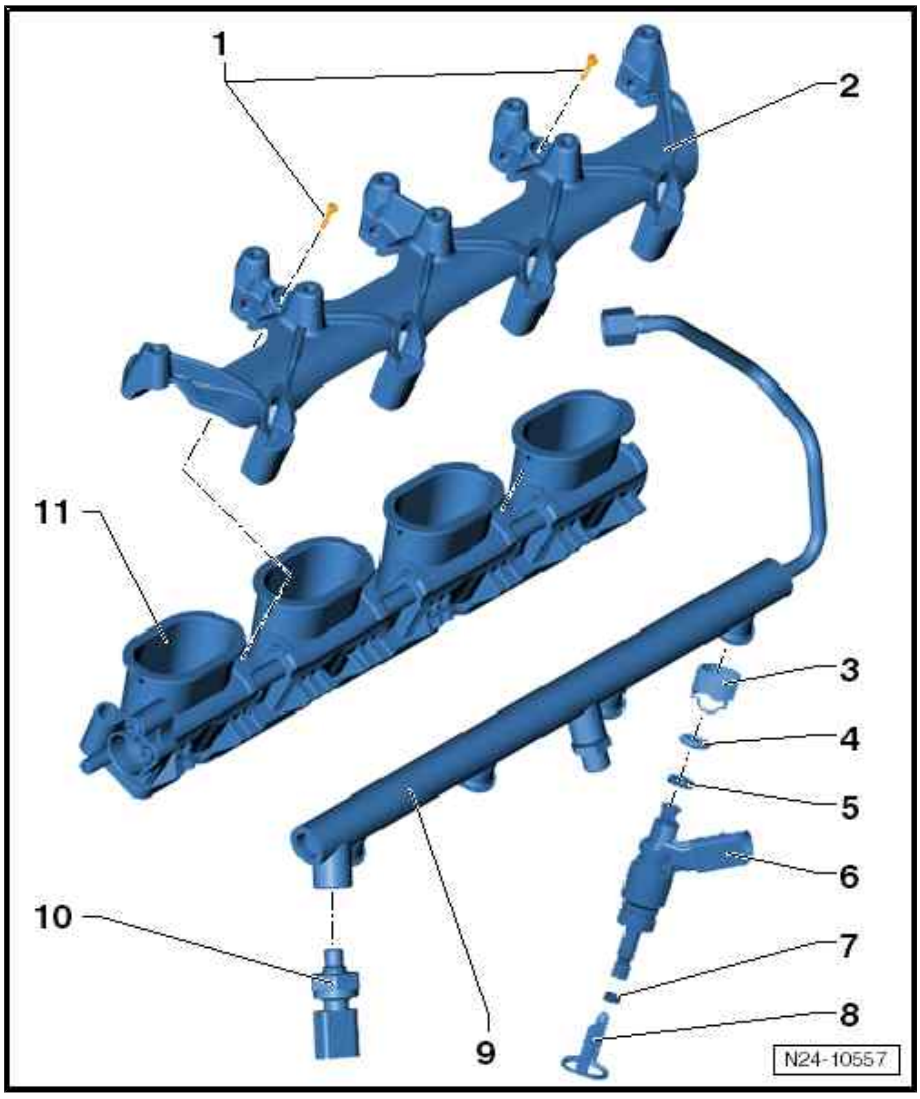
**5 - Spacer ring**
- ❑ Renew if damaged

**6 - Injector**
- ❑ Removing and installing ⇒ page 285

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

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

**9 - Fuel rail**
- ❑ Removing and installing ⇒ page 302



**10 - Fuel pressure sender - G247-**

- ❑ Lubricate taper seal with oil
- ❑ 25 Nm

**11 - Intake manifold (bottom section)**

- ❑ Removing and installing ⇒ page 302
- ❑ 10 Nm

## 3.2 Removing and installing injectors

⇒ "3.2.1 Removing and installing injectors - magnesium intake manifold", page 281

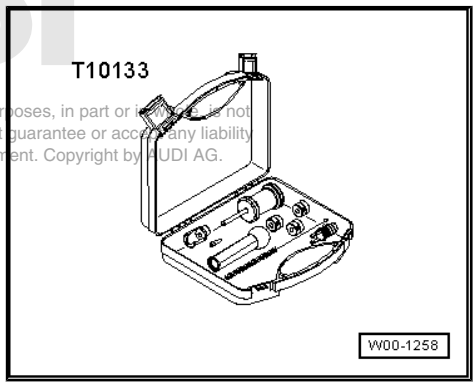
⇒ "3.2.2 Removing and installing injectors - plastic intake manifold (gradual introduction in model year 2009)", page 285

### 3.2.1 Removing and installing injectors - magnesium intake manifold

**Special tools and workshop equipment required**

- ♦ Tool set for FSI engines - T10133-

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




**Note**

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

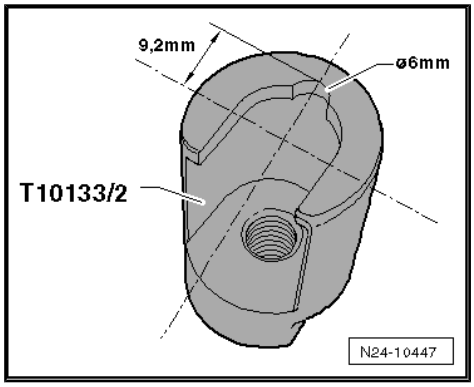
**Modifying special tool T10133/2 (puller) to make it equivalent to puller T10133/2 A**

**Special tools and workshop equipment required**

- ♦ Round file, approx. 6 mm

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

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




### Removing

**WARNING**

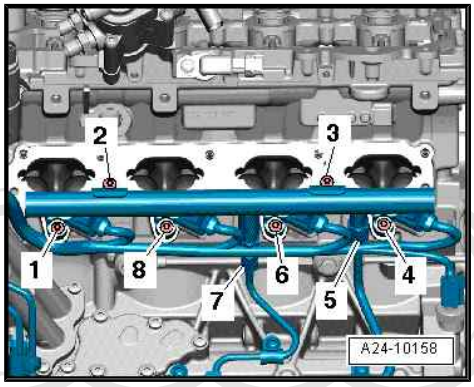
- *The fuel system operates under high pressure. The pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 4 .*
- *A clean cloth must then be wrapped around the connection and the residual pressure dissipated by carefully loosening the connection.*

– Remove intake manifold ⇒ page 306 .

**Note**

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

– Unplug electrical connectors at injectors.



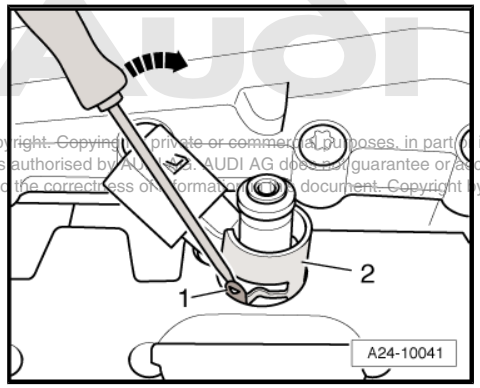

– Unscrew high-pressure pipe -5- at connection on fuel rail.
– Unscrew high-pressure pipe -7- at connection on fuel rail. To do so, counterhold at hexagon flats with an open-end spanner and slacken union nut.
– Remove bolts -1, 2, 3, 4, 6 and 8-.

**Note**

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

– Pull off fuel rail together with injectors.

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

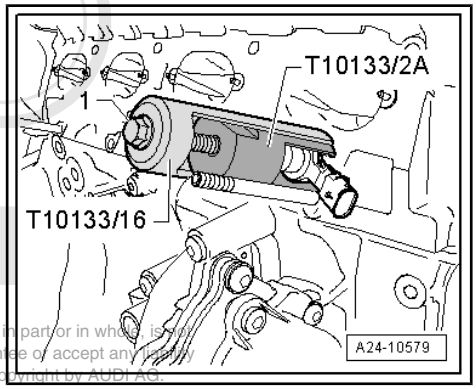



– Use a screwdriver to bend retainer tabs -1- of radial compensation element to side -arrow- and pull support ring -2- off injector.
– Remove O-ring from injector.

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.

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

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

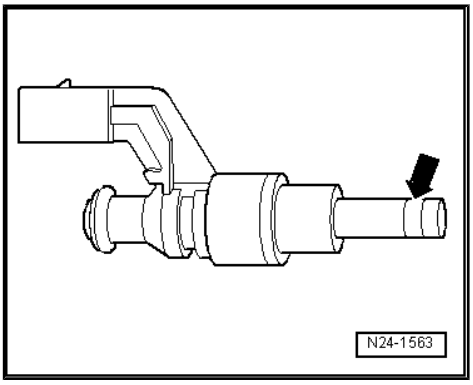



**Note**

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

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




**Note**

*The injector must be renewed if the groove is damaged.*

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

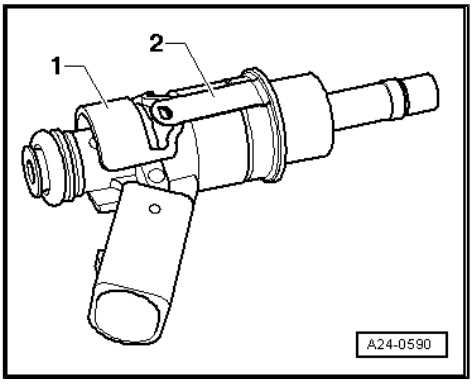
**Installing**

**Note**

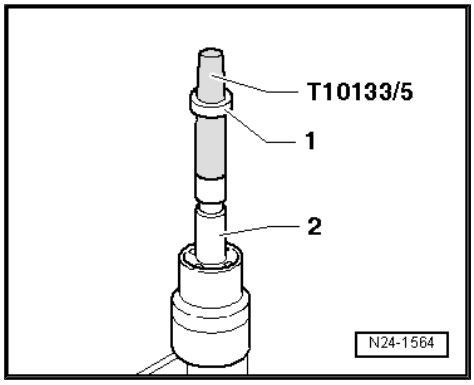
- *Renew combustion chamber ring seal and O-ring.*
- *Renew spacer ring if damaged.*
- *Lightly lubricate O-rings for injectors with clean engine oil.*
- *The injector pipes must be re-installed on the same cylinders.*

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

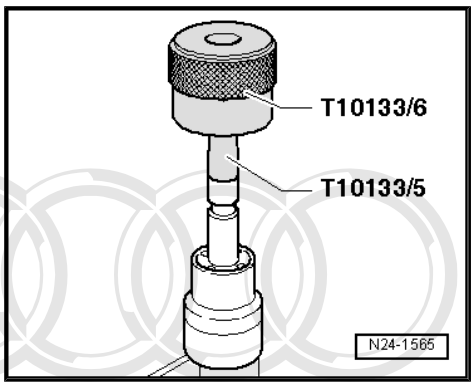
– When re-installing an injector, clean any combustion residue off groove for combustion chamber ring seal and injector stem with a clean cloth.



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




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

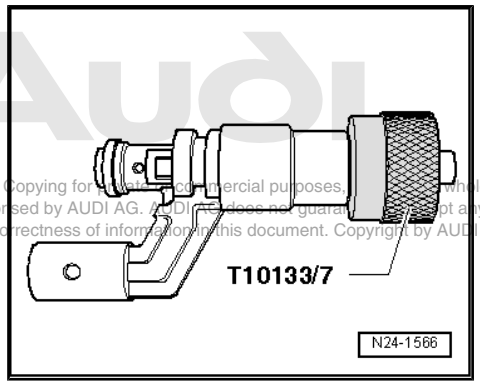



**Note**

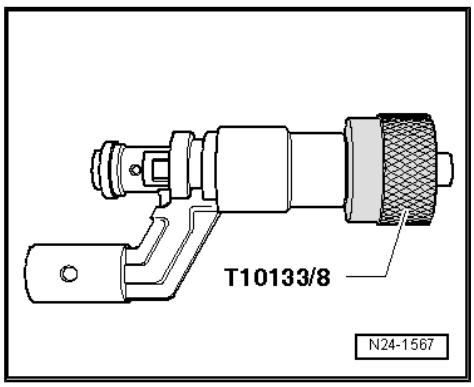
*The combustion chamber ring seal is widened when it is pushed onto the injector. After pushing on the combustion chamber ring seal, it therefore has to be compressed again. This is done in two stages, as described below.*

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

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




– Push calibration sleeve -T10133/8- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).
– Pull calibration sleeve -T10133/8- off again by turning it in the opposite direction.
– Lubricate new O-ring lightly with clean engine oil before installing.



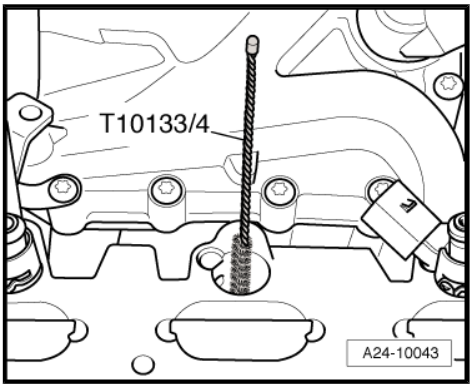

**Note**

- *The combustion chamber ring seal must not be lubricated.*
- *Do not apply grease, oil or any other lubricant to combustion-chamber ring seal.*

**Installing injectors:**

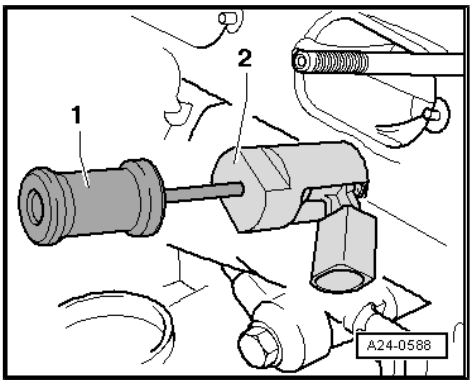
– Clean bore in cylinder head with nylon cylinder brush - T10133/4- .

– Push injector by hand as far as it will go into aperture in cylinder head (do not use oil or grease). Ensure that the injector is properly seated in the cylinder head.




**Note**

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



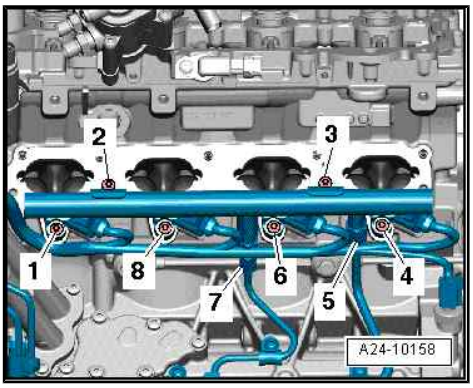

• Electrical connector of injector must engage in recess in cylinder head.

– Press fuel rail evenly onto injectors.

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

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

• Tightening torques: refer to exploded view of injectors with fuel rail ⇒ "3.1.1 Exploded view fuel rail with injectors, magnesium intake manifold", page 278 .




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

**Note**

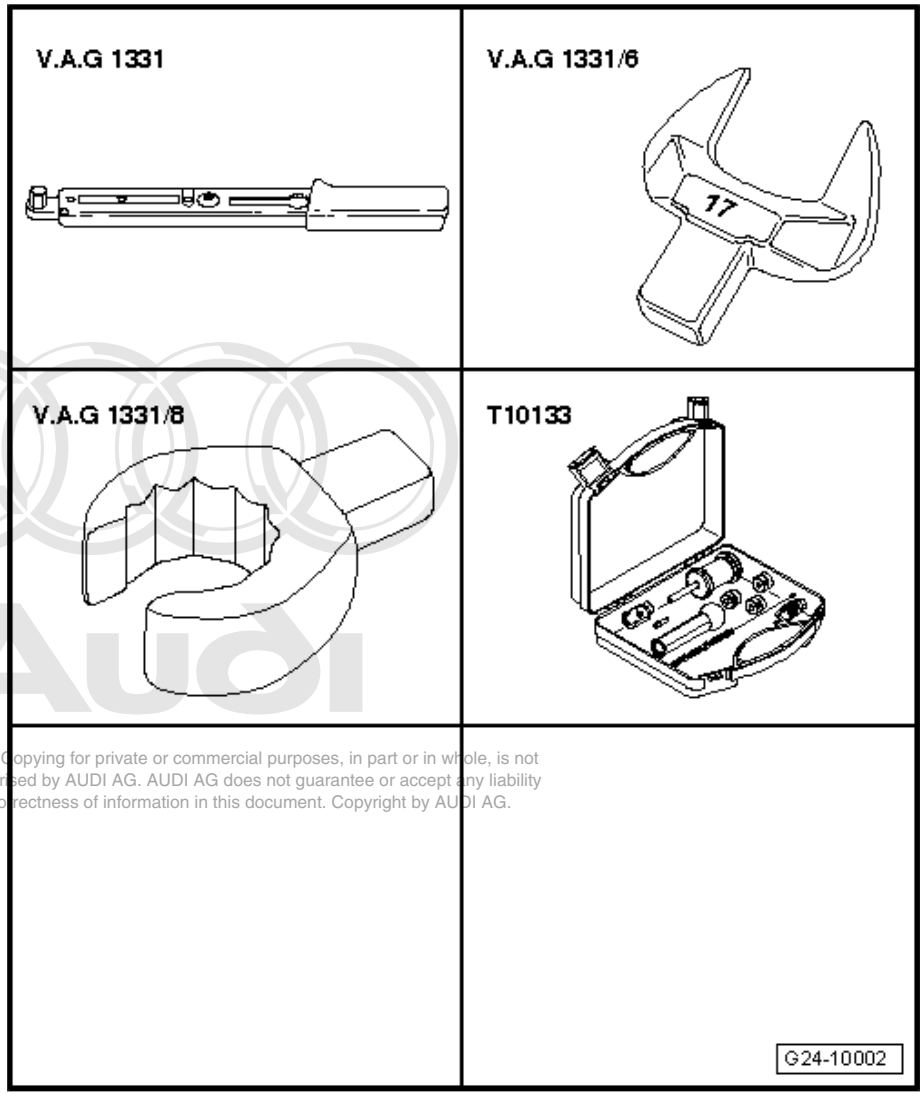
- *The connections of the high-pressure pipes must not be damaged.*
- *Do not attempt to bend high-pressure pipes to a different shape.*

– Install intake manifold ⇒ page 306 .

– Install high-pressure pipes ⇒ page 329 .

## 3.2.2 Removing and installing injectors - plastic intake manifold (gradual introduction in model year 2009)

**Special tools and workshop equipment required**




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.

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

**Removing**

**Note**

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

**WARNING**

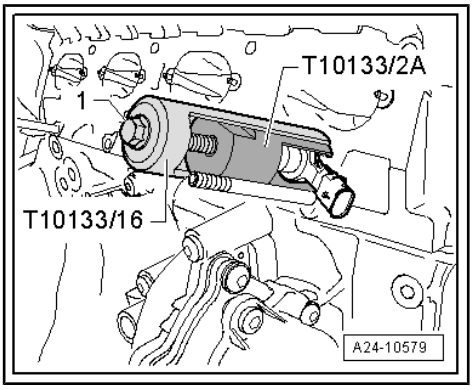
- *The fuel system operates under high pressure. The pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 4 .*
- *A clean cloth must then be wrapped around the connection and the residual pressure dissipated by carefully loosening the connection.*

– Remove intake manifold ⇒ page 311 .

– Remove intake manifold (bottom section) on relevant side ⇒ page 302 .

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

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

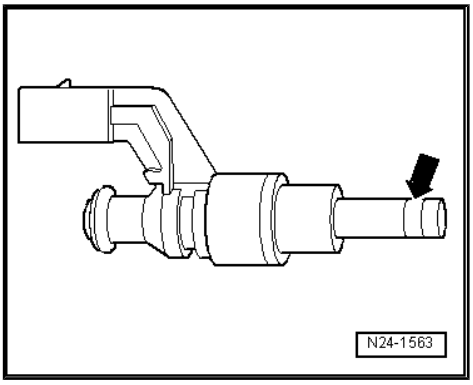



**Note**

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

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

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



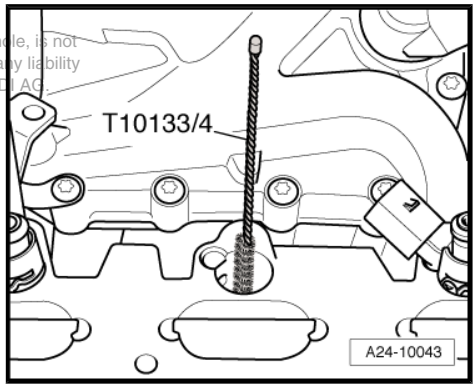

**Installing**

**Note**

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

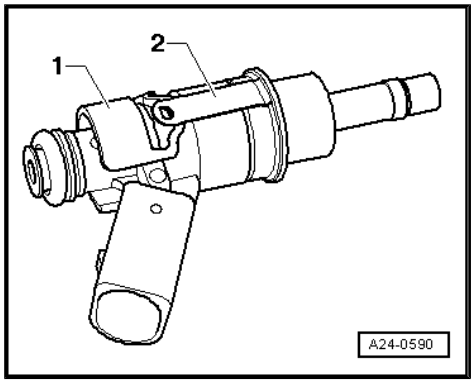
– Clean bore in cylinder head with nylon cylinder brush - T10133/4- .

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.

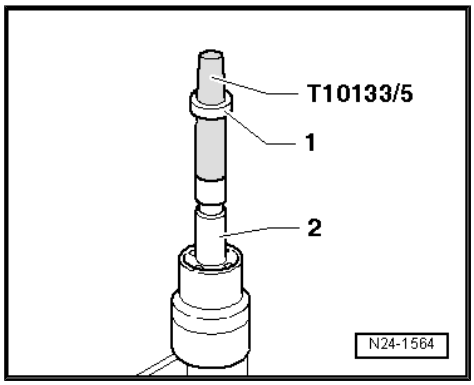


– Clip radial compensation element -1- into support ring -2-.

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

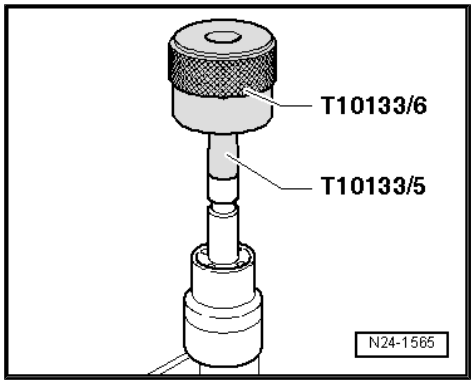



– Fit assembly cone -T10133/5- with new combustion chamber ring seal -1- onto injector -2-.




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

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

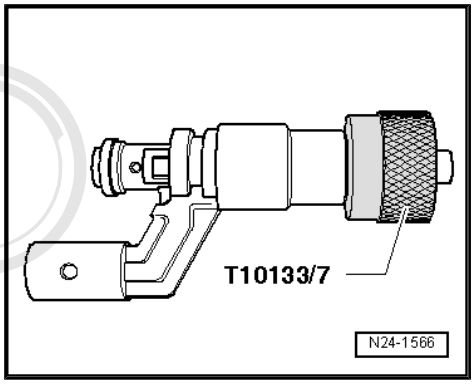



**Note**

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

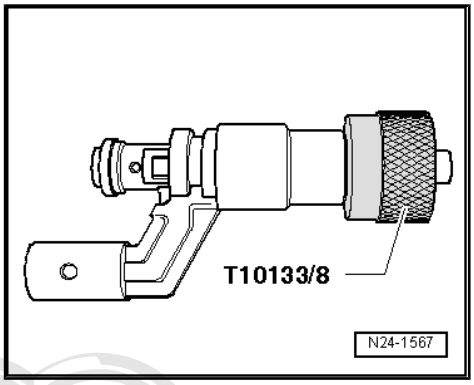
– Push calibration sleeve -T10133/7- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).

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




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.

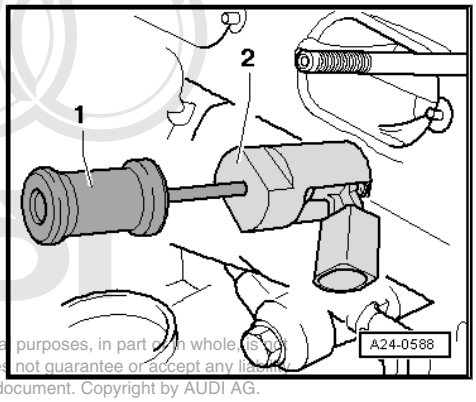
– Push calibration sleeve -T10133/8- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).
– Pull calibration sleeve -T10133/8- off again by turning it in the opposite direction.




**Note**

*The combustion chamber ring seal must not be lubricated.*

– Push injector by hand as far as it will go into aperture in cylinder head (do not use oil or grease). Ensure that the injector is properly seated in the cylinder head.




**Note**

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

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.

- Electrical connector of injector must engage in recess in cylinder head.
- Coat O-rings of injectors with clean engine oil to facilitate insertion into fuel rail.
- Renew all seals.

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

- Tightening torque: exploded view - intake manifold
⇒ “5.1.2 Exploded view - plastic intake manifold (gradual introduction in model year 2009)”, page 299

**Note**

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

– Do not install mounting brackets until high-pressure pipes have been finally secured.
– Install relevant bottom section of intake manifold
⇒ page 302 .
– Install intake manifold ⇒ page 311 .

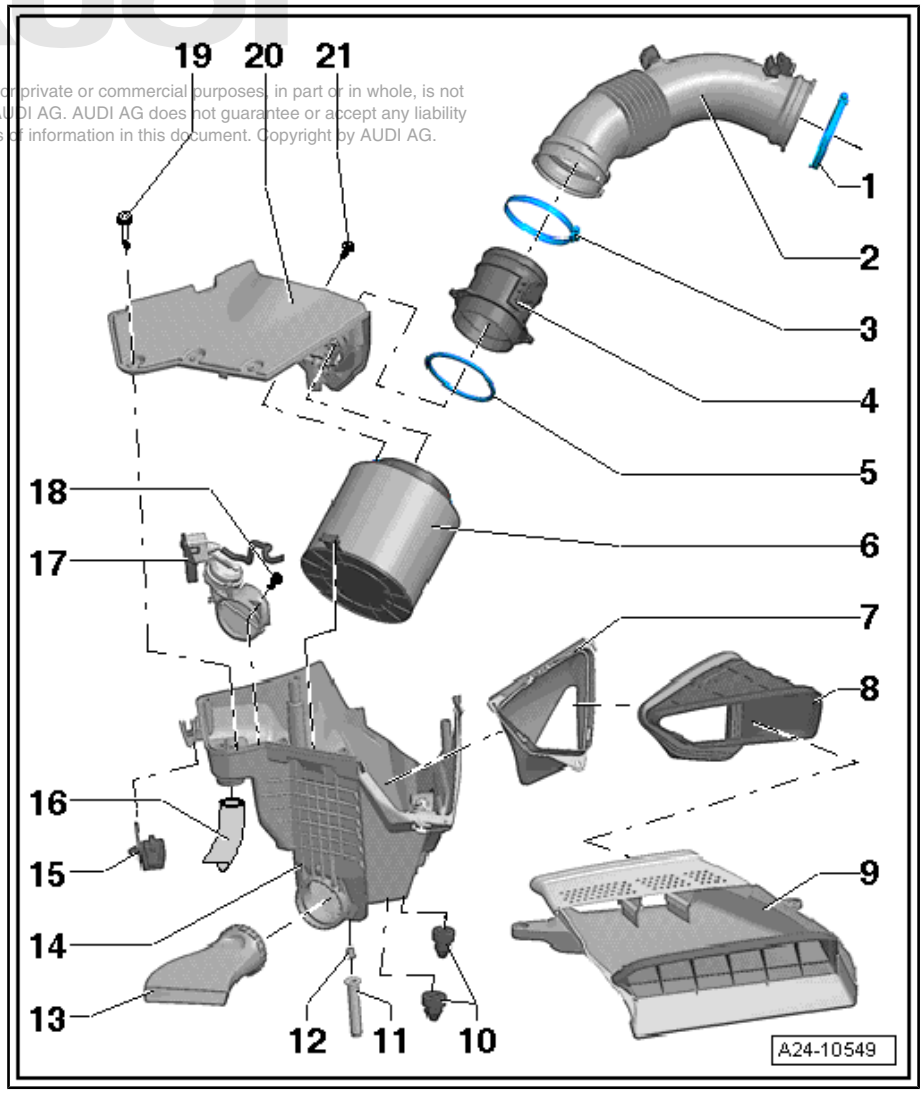
# 4 Air cleaner

⇒ “4.1 Exploded view - air cleaner housing”, page 290

⇒ “4.2 Removing and installing air cleaner housing”, page 292

## 4.1 Exploded view - air cleaner housing

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




**1 - Hose clip**

**2 - Air hose**

- ❑ To throttle valve module - J338-
- ❑ When installing, pay attention to marking. Arrow on air hose should point towards bolt of throttle valve module - J338-

**3 - Hose clip**

**4 - Air mass meter**

- ❑ Removing and installing air mass meter - G70- with intake air temperature sender - G42- ⇒ page 318

**5 - O-ring**

- ❑ Renew if damaged

**6 - Air filter element**

- ❑ Always use genuine part for air filter element
- ❑ Maintenance intervals ⇒ Maintenance ; Booklet 811
- ❑ Removing and installing ⇒ page 292
- ❑ Also clean snow screen (if fitted)

**7 - Air duct**

- ❑ Clipped into air cleaner

(top section)

- ❑ Make sure it is engaged correctly (to prevent unmetered air)
- ❑ Clean dirt and leaves out of air duct

**8 - Air duct**

- ❑ Clean dirt and leaves out of air duct

**9 - Air duct**

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

**10 - Rubber grommet**

**11 - Water drain hose**

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

**12 - Guide for water drain hose**

**13 - Hot air intake (countries with cold climates only)**

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

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

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

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.

**15 - Retainer for air cleaner (bottom section)**

**16 - Intake hose for secondary air pump**

**17 - Variable intake manifold changeover valve - N335-**

- ❑ With flap for variable intake manifold change-over

**18 - Bolt**

- ❑ For variable intake manifold changeover valve - N335-

**19 - Bolt**

**20 - Air cleaner (top section)**

- ❑ Clean any salt residue, leaves and dirt out of air cleaner (top section)
- ❑ Make sure it is engaged correctly (to prevent unmetered air)

**21 - Bolt**

- ❑ For securing air filter element

## 4.2 Removing and installing air cleaner housing

⇒ “4.2.1 Removing and installing air filter element”, page 292

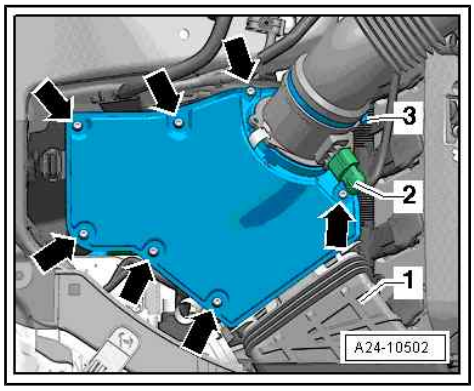
⇒ “4.2.2 Removing air cleaner (bottom section)”, page 293

## 4.2.1 Removing and installing air filter element

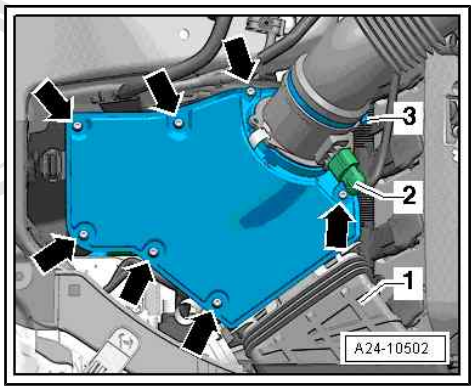
### Removing

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

– Release hose clip -3- and detach air hose from air mass meter - G70- .

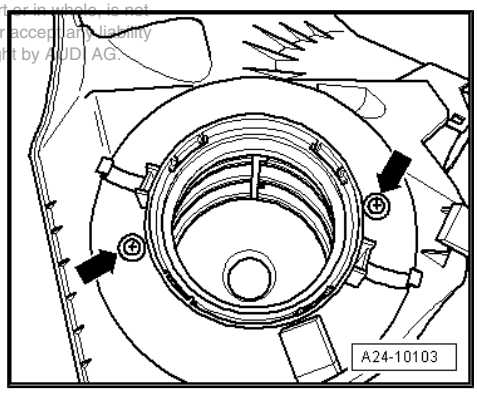



– Remove bolts -arrows- from air cleaner (top section) and pull out air cleaner (top section) upwards.




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 the two bolts -arrows- securing the air filter element.



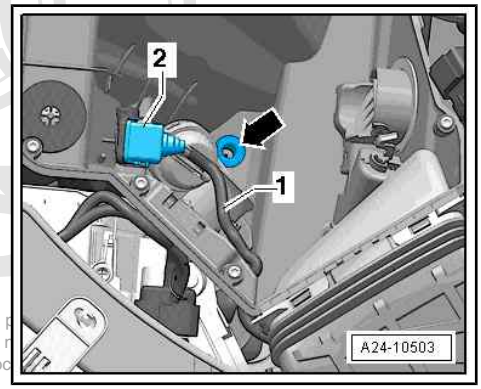

### Installing

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

**Note**

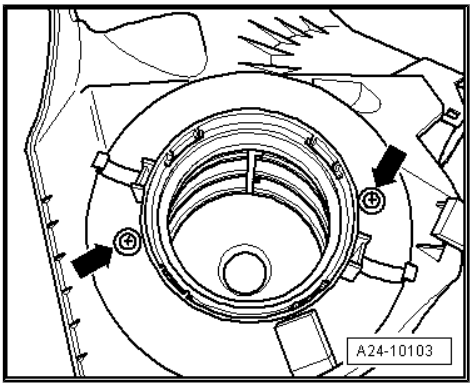
- *If the air filter element is very dirty or wet, dirt particles or water can reach the air mass meter - G70- and falsify the detected air mass values. This will cause a loss of power, as the calculated injection quantities will be too low.*
- *Always use genuine air filter elements (same as original equipment).*
- *Use a silicone-free lubricant when installing the intake hose.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Parts catalogue .*

– Check whether water drain hose -arrow- in air cleaner (bottom section) is dirty or blocked (clean if necessary).
– Clean salt residue, dirt and leaves out of air cleaner housing (top and bottom sections); use a vacuum cleaner if necessary.
– Check air mass meter and air hose (engine intake side) for salt residue, dirt and leaves.
– Check intake duct as far as air filter element for dirt.
– When installing air filter element, check that it is properly centred in retainer in air cleaner (top section).

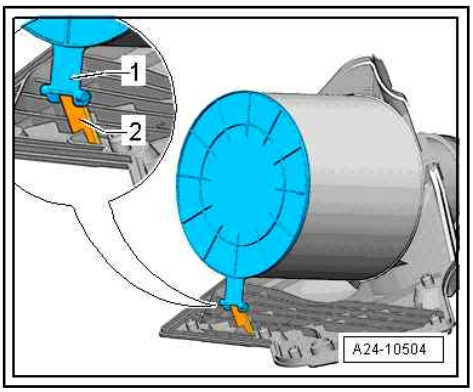



Protected by copyright. Copying for private or commercial p
permitted unless authorised by AUDI AG. AUDI AG does n
with respect to the correctness of information in this doc

– Screw air cleaner (top section) onto new air filter element.




– Tab of air filter element -1- must rest against tab of air cleaner housing -2-.
– Carefully fit air cleaner (top section) on air cleaner (bottom section) without applying any force.




**Note**

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

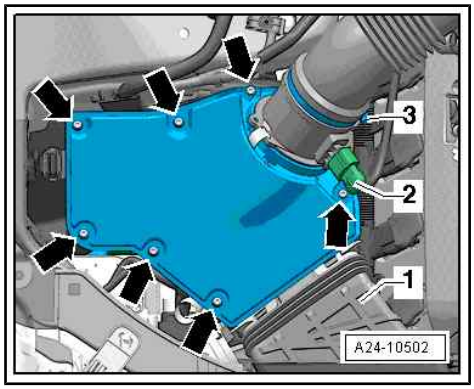
– Then secure top section of air cleaner to bottom section.
– Make sure that air hose is seated securely at air mass meter - G70- (note marking between air hose and air mass meter - G70- ).
– Re-attach electrical connector to air mass meter - G70- .
– The remaining installation steps are carried out in the reverse sequence.

## 4.2.2 Removing air cleaner (bottom section)

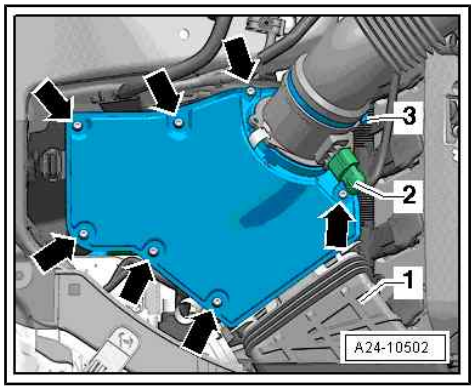
**Removing**

– Remove cover above radiator grille (4 bolts).
– Completely remove air duct -1-.

– Unplug electrical connector -2- at air mass meter - G70- .
– Release hose clip -3- and detach air hose from air mass meter - G70- .

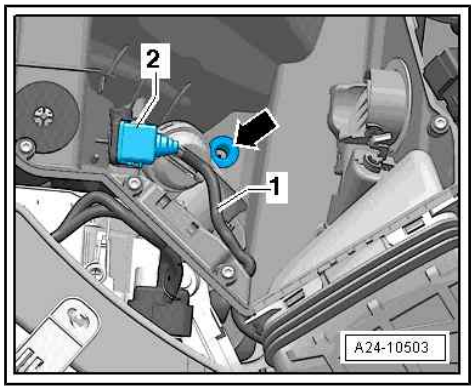



– Remove bolts -arrows- from air cleaner (top section) and pull out air cleaner (top section) upwards.




– Pull vacuum hose -1- off variable intake manifold changeover valve - N335- -2-.
– Release fastener for air cleaner (bottom section) by pressing rubber in on both sides and pulling upwards.

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



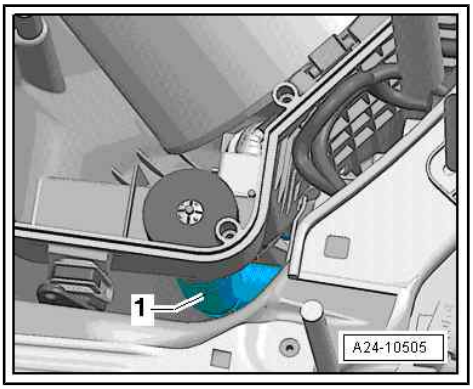

**Note**

*Do not use lubricants when installing retainer.*

– Disconnect air hose -1- going to secondary air pump.

– Disconnect electrical connector at variable intake manifold changeover valve - N335- .

– Carefully take out air cleaner (bottom section).



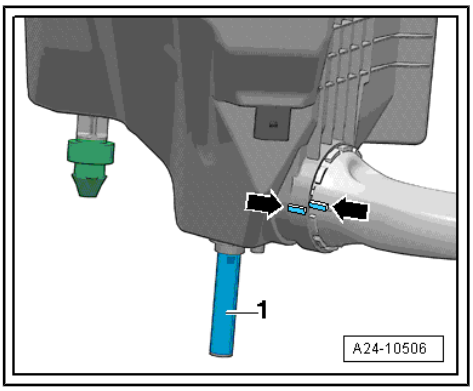

### Installing

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

**Note**

- *If the air filter element is very dirty or wet, dirt particles or water can reach the air mass meter - G70- and falsify the detected air mass values. This will cause a loss of power, as the calculated injection quantities will be too low.*
- *Always use genuine air filter elements (same as original equipment).*
- *Use a silicone-free lubricant when installing the intake hose.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Parts catalogue .*

– If hot air intake is fitted (for countries with cold climates only), make sure that air intake connection has engaged properly -arrows- (pay attention to marking).



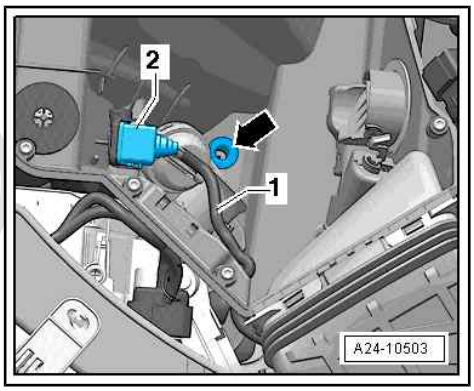

– Check whether water drain hose -arrow- in air cleaner (bottom section) is dirty or blocked (clean if necessary).

– Clean salt residue, dirt and leaves out of air cleaner housing (top and bottom sections); use a vacuum cleaner if necessary.

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

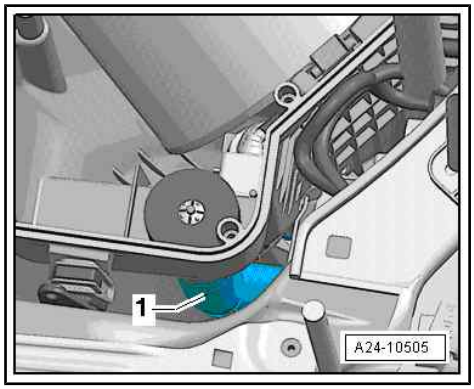
– Check intake duct as far as air filter element for dirt.

– Re-attach electrical connector at variable intake manifold changeover valve - N335- .




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.

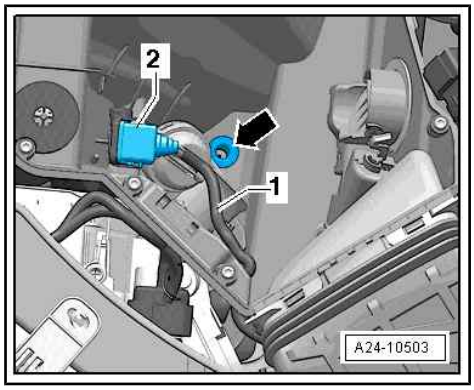
– Re-attach air hose -1- (make sure connection has engaged properly).
– Re-install air cleaner (bottom section).



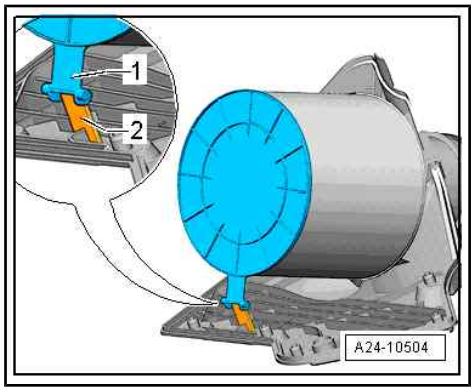

**Note**

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

– Press vacuum hose -1- back onto connection at variable intake manifold changeover valve - N335- .




– Tab of air filter element -1- must rest against tab of air cleaner housing -2-.
– Carefully fit air cleaner (top section) on air cleaner (bottom section) without applying any force.




**Note**

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

– Then secure top section of air cleaner to bottom section.
– Make sure that air hose is seated securely at air mass meter - G70- (note marking between air hose and air mass meter - G70- “arrows”).
– Re-attach electrical connector to air mass meter - G70- .
– The remaining installation steps are carried out in the reverse sequence.

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

⇒ “5.1 Exploded view - intake manifold”, page 297

⇒ “5.2 Exploded view - intake manifold (bottom section) with fuel rail”, page 301

⇒ “5.3 Removing and installing intake manifold (bottom section) with fuel rail”, page 302

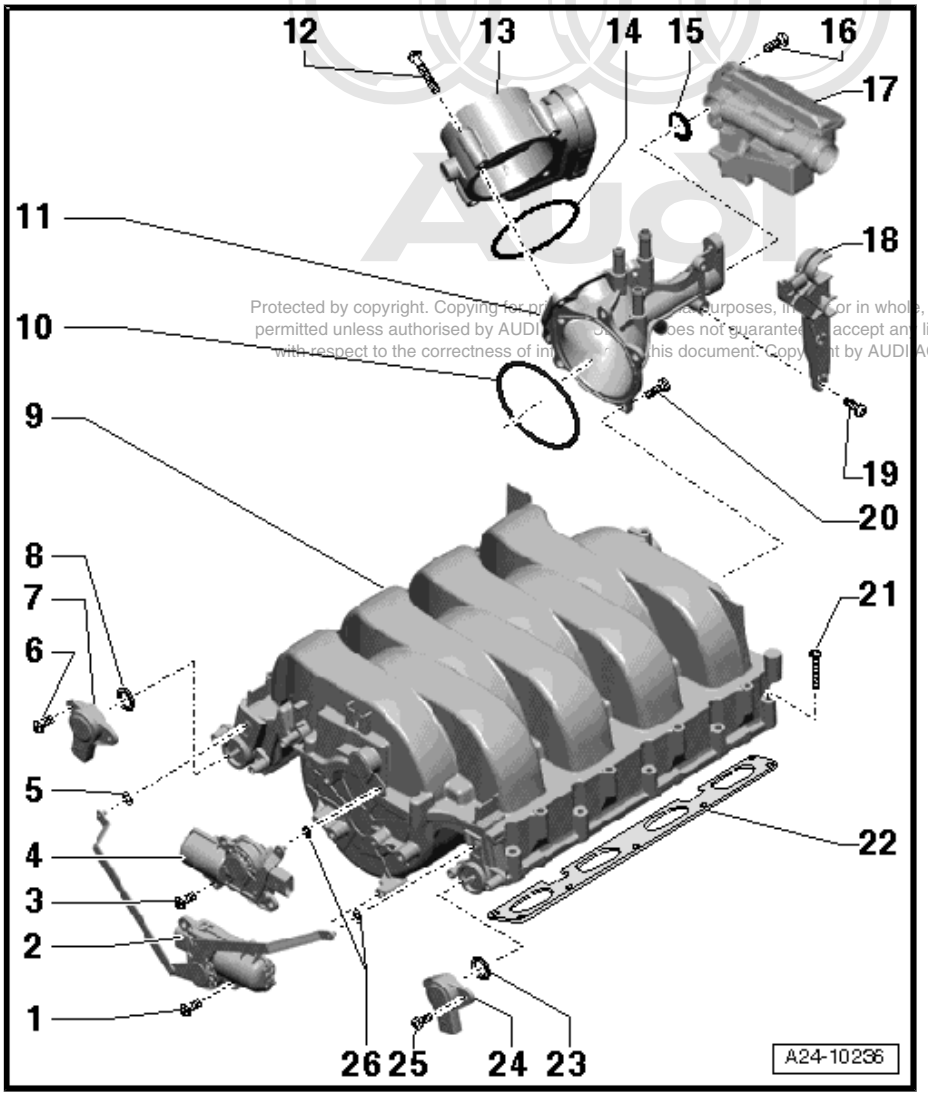
⇒ “5.4 Removing and installing intake manifold”, page 306

## 5.1 Exploded view - intake manifold

⇒ “5.1.1 Exploded view - magnesium intake manifold”, page 297

⇒ “5.1.2 Exploded view - plastic intake manifold (gradual introduction in model year 2009)”, page 299

## 5.1.1 Exploded view - magnesium intake manifold




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

**1 - Bolt**

- ❑ 9 Nm

**2 - Intake manifold flap motor - V157-**

- ❑ In model year 2009 intake manifold flap motor - V157- is replaced with intake manifold flap valve - N316-

**3 - Bolt**

- ❑ 9 Nm

**4 - Variable intake manifold motor - V183-**

- ❑ In model year 2009 variable intake manifold motor - V183- is replaced with variable intake manifold changeover valve - N156-

**5 - Circlip**

**6 - Bolt**

- ❑ 2.5 Nm

**7 - Intake manifold flap potentiometer - G336-**

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

**8 - Gasket**

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

**9 - Intake manifold**

- ❑ Removing and installing ⇒ page 306

**10 - O-ring**

- ❑ Renew

**11 - Intake connecting pipe**

- ❑ With crankcase breather connection

**12 - Bolt**

- ❑ 9 Nm

**13 - Throttle valve module - J338-**

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

**14 - O-ring**

- ❑ Renew

**15 - O-ring**

- ❑ Renew

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.

**16 - Bolt**

- ❑ 9 Nm

**17 - Pressure control valve for crankcase breather system**

**18 - Bracket**

- ❑ For vacuum hose

**19 - Bolt**

- ❑ 9 Nm

**20 - Bolt**

- ❑ 9 Nm

**21 - Bolt**

- ❑ For tightening torque and tightening sequence, refer to ⇒ page 299

**22 - Gaskets for intake manifold**

- ❑ Renew

**23 - Gasket**

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

**24 - Intake manifold flap potentiometer 2 - G512-**

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

**25 - Bolt**

- ❑ 2.5 Nm

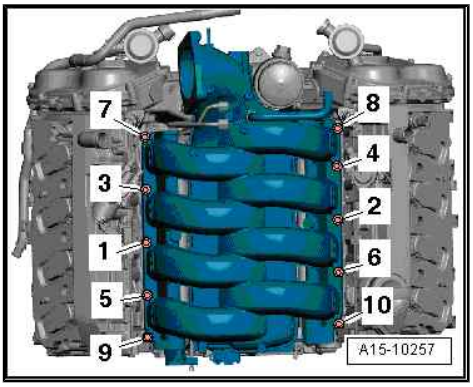
**26 - Circlips**

**Tightening sequence for intake manifold**

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

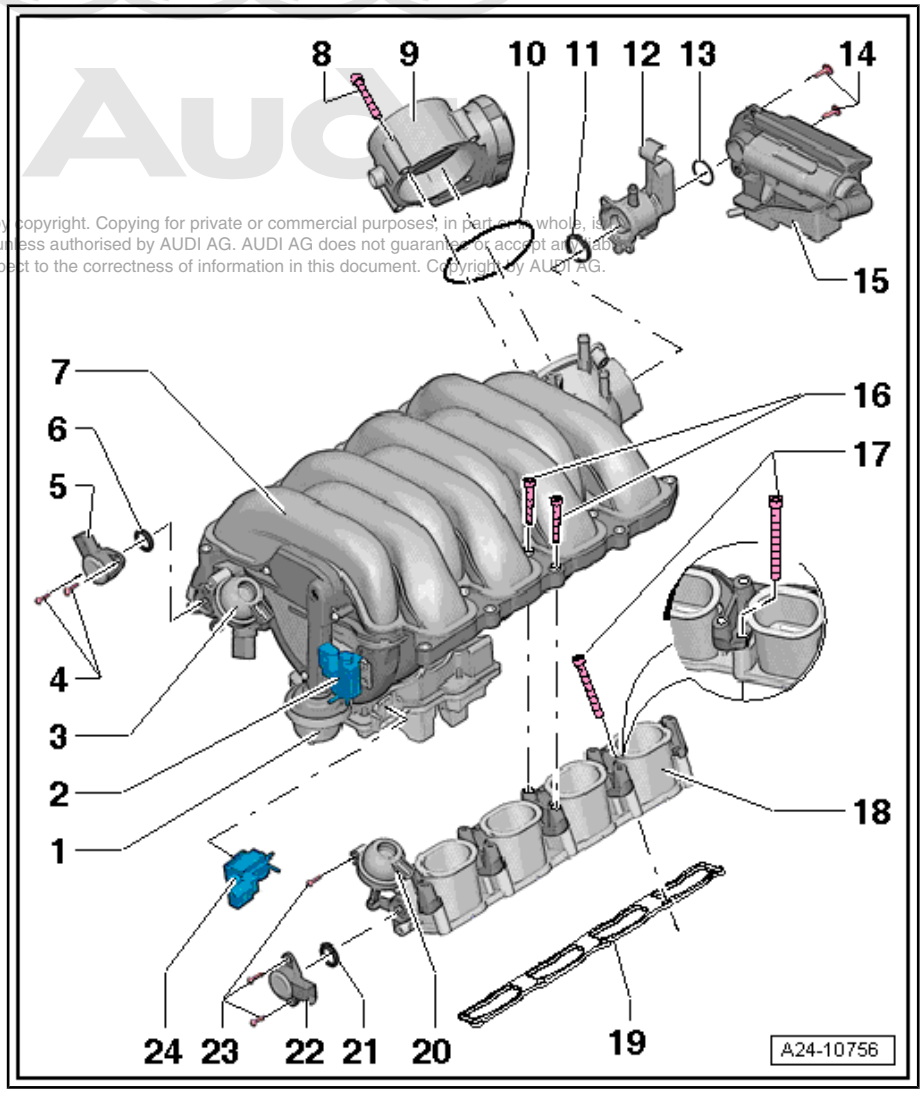
♦ Tighten initially to 8 Nm

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




## 5.1.2 Exploded view - plastic intake manifold (gradual introduction in model year 2009)

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




**1 - Vacuum unit for intake manifold change-over**

**2 - Variable intake manifold changeover valve - N156-**

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

- ❑ For CVTS tumble flaps (cylinder bank 1)

**4 - Bolt**

- ❑ 2.5 Nm

**5 - Intake manifold flap potentiometer - G336-**

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

**6 - Gasket**

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

**7 - Intake manifold**

- ❑ Removing and installing ⇒ page 311

**8 - Bolt**

- ❑ 9 Nm

**9 - Throttle valve module - J338-**

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

**10 - O-ring**

- ❑ Renew

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.

**11 - O-ring**

- ❑ Renew

**12 - Adapter for crankcase breather system**

- ❑ Tighten to 2.5 Nm

**13 - O-ring**

- ❑ Renew

**14 - Bolt**

- ❑ 9 Nm

**15 - Pressure control valve for crankcase breather system**

**16 - Bolts for intake manifold**

- ❑ For tightening torque and tightening sequence, refer to ⇒ page 300

**17 - Bolts for intake manifold (bottom section)**

- ❑ For tightening torque and tightening sequence, refer to ⇒ page 301

**18 - Intake manifold (bottom section)**

**19 - Gaskets for intake manifold**

- ❑ Renew

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

- ❑ For CVTS tumble flaps (cylinder bank 2)

**21 - Seal**

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

**22 - Intake manifold flap potentiometer 2 - G512-**

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

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.

**23 - Bolt**

- ❑ 2.5 Nm

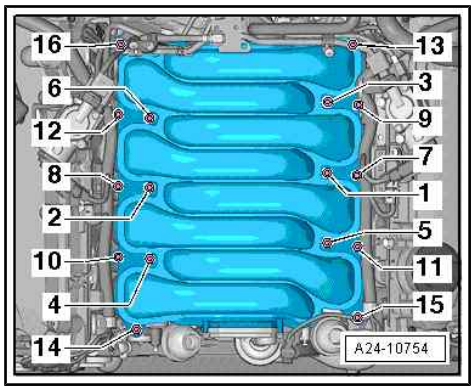
**24 - Intake manifold flap valve - N316-**

**Tightening torque and tightening sequence for intake manifold**

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

♦ Tighten initially to 8 Nm in specified sequence

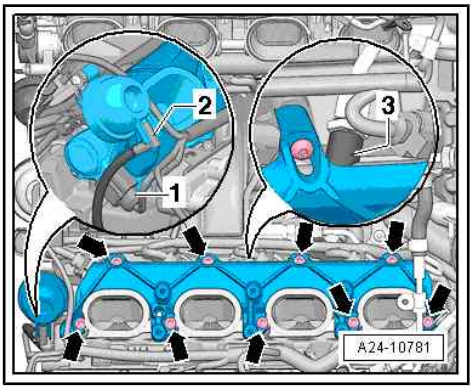
♦ Subsequently tighten to 11 Nm in specified sequence



**Intake manifold (bottom section) - tightening torque**

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

• 10 Nm




## 5.2 Exploded view - intake manifold (bottom section) with fuel rail

⇒ "5.2.1 Exploded view - plastic intake manifold (bottom section) with fuel rail (gradual introduction in model year 2009)", page 301

## 5.2.1 Exploded view - plastic intake manifold (bottom section) with fuel rail (gradual introduction in model year 2009)

**1 - Bracket**

**2 - Gasket**

- ❑ Renew

**3 - Distance sleeve**

**4 - Intake manifold (bottom section)**

- ❑ When installing intake manifold (bottom section), intake manifold flaps must be in output position (intake channel fully open)
- ❑ Removing and installing ⇒ page 302
- ❑ 10 Nm

**5 - Support ring**

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

**6 - O-ring**

- ❑ Renew
- ❑ Lubricate lightly with clean engine oil

**7 - Spacer ring**

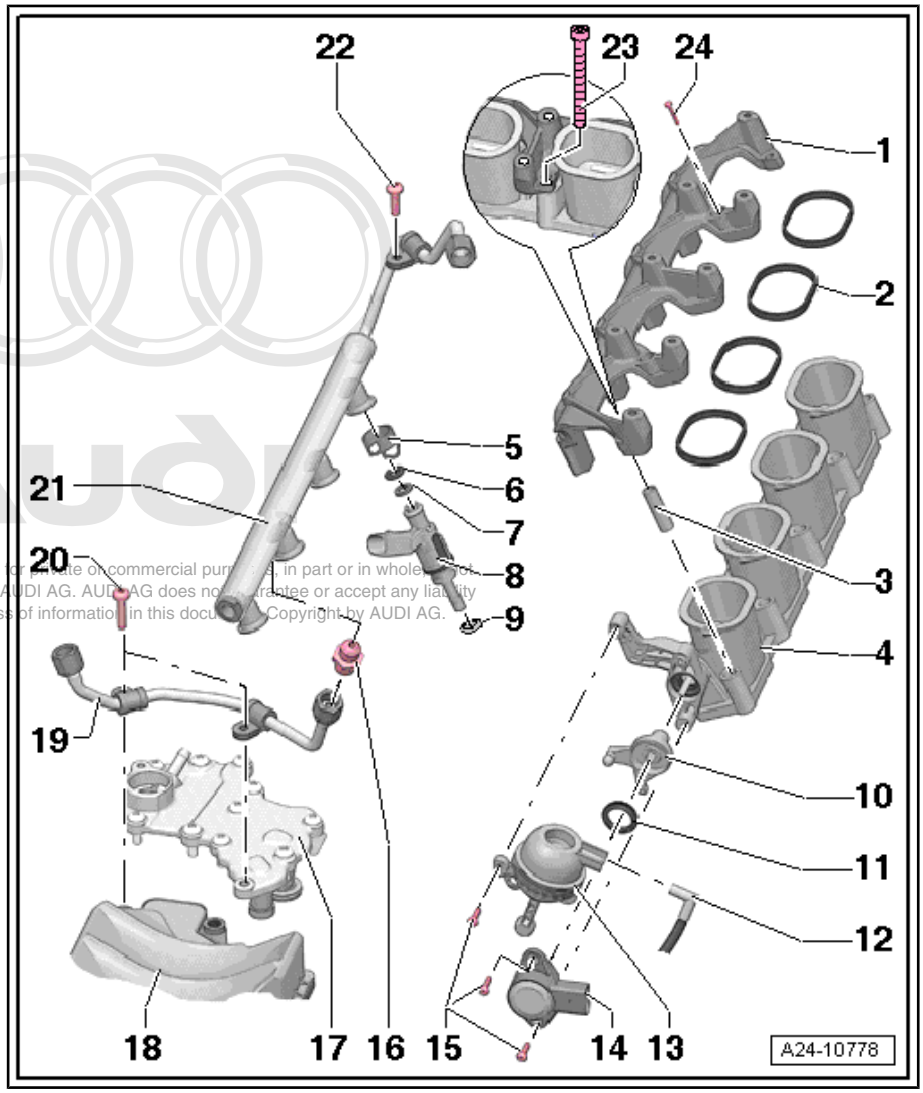
- ❑ Renew if damaged

**8 - Injector**

- ❑ Removing and installing ⇒ page 285

**9 - Combustion chamber ring seal**

- ❑ Do not apply grease to ring seal or use any other lubricants




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.

- ❑ Renew

**10 - Operating lever**

- ❑ For vacuum unit

**11 - Seal**

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

**12 - Vacuum hose**

- ❑ From intake manifold flap valve - N316-

**13 - Vacuum unit for actuating intake manifold flaps**

**14 - Intake manifold flap potentiometer 2 - G512-**

**15 - Bolts**

- ❑ 2.5 Nm

**16 - Threaded connection**

- ❑ 40 Nm

**17 - Cover**

- ❑ For spray nozzle valve and oil retention valve
- ❑ Removing and installing ⇒ page 209

**18 - Vacuum reservoir**

**19 - High-pressure fuel pipe**

**20 - Bolts**

- ❑ 9 Nm

**21 - Fuel rail**

- ❑ Removing and installing ⇒ page 302

**22 - Bolts**

- ❑ 9 Nm

**23 - Bolts**

- ❑ 9 Nm

**24 - Bolts**

- ❑ 0.3 Nm

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

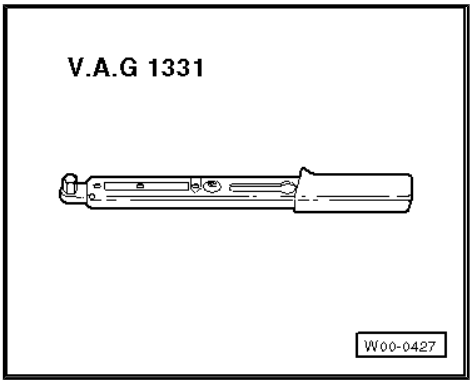
⇒ “5.3.1 Removing and installing intake manifold (bottom section) with fuel rail - plastic intake manifold (gradual introduction in model year 2009)”, page 302

## 5.3.1 Removing and installing intake manifold (bottom section) with fuel rail - plastic intake manifold (gradual introduction in model year 2009)

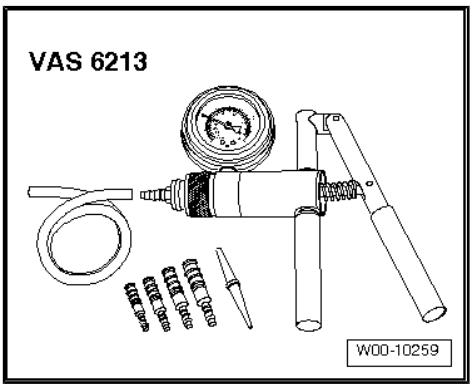
**Special tools and workshop equipment required**

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.

- Torque wrench - V.A.G 1331-




- Tool inserts - V.A.G 1331/2- , 17 mm
- Hand vacuum pump - VAS 6213-




## Removing

**Note**

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

**WARNING**

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

- ***The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 4 .***

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.

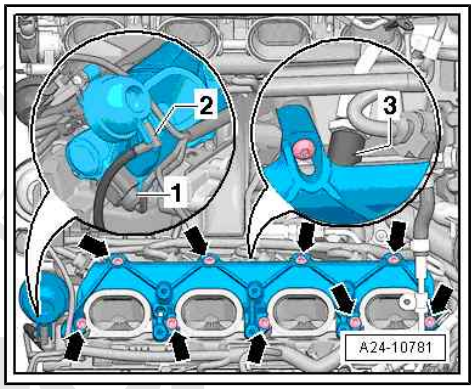
– Reduce fuel pressure in high-pressure section of injection system ⇒ page 4 .

– Detach vacuum hose from vacuum unit for intake manifold flaps.

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

– Unplug electrical connector -1- at intake manifold flap potentiometer and pull off vacuum hose -2-.

– Unscrew union nut -3- (counterhold threaded connection).
– Remove bolts -arrows- and detach intake manifold (bottom section) with fuel rail.




**Caution**

***Risk of irreparable damage to engine.***

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

### Installing

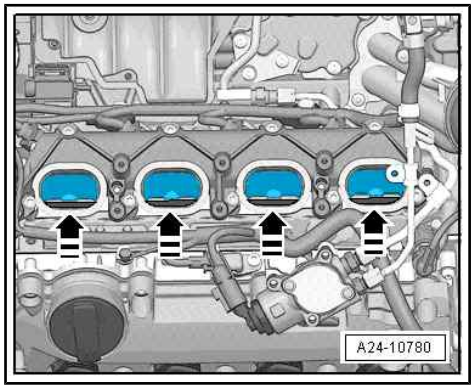
Installation is carried out in the reverse order; note the following:

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

**Note**

- *If an injector has been pulled out of the cylinder head, the teflon ring seal must be renewed.*
- *Renew gaskets and O-rings.*
- *Lubricate O-rings of injectors lightly with clean engine oil.*

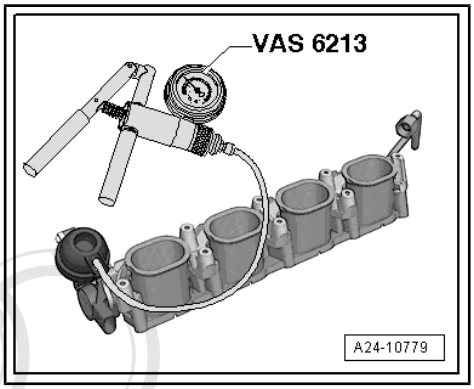
When installing intake manifold (bottom section) move intake manifold flaps in direction of -arrow-.



– To do so, connect hand vacuum pump - VAS 6213- to connection for vacuum unit for intake manifold flaps.

– Use hand vacuum pump to generate vacuum.

• This will cause the intake manifold flaps to open.




**Note**

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

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

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

• Tightening torque: refer to intake manifold - exploded view
⇒ “5.1.2 Exploded view - plastic intake manifold (gradual introduction in model year 2009)”, page 299

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

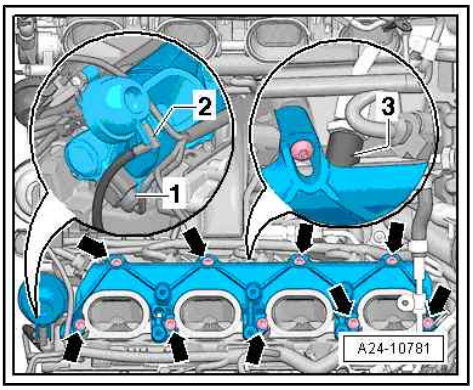
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

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

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

• Tightening torque: exploded view - high-pressure pump
⇒ “8.1 Exploded view - high-pressure pump”, page 325

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



## 5.4 Removing and installing intake manifold

⇒ "5.4.1 Removing and installing magnesium intake manifold", page 306

⇒ "5.4.2 Removing and installing plastic intake manifold (gradual introduction in model year 2009)", page 311

### 5.4.1 Removing and installing magnesium intake manifold

**Removing**

**WARNING**

- *The fuel system operates under high pressure. The pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 4 .*
- *A clean cloth must then be wrapped around the connection and the residual pressure dissipated by carefully loosening the connection.*

**Note**

*Fit all cable ties in the original positions when installing.*

**Caution**

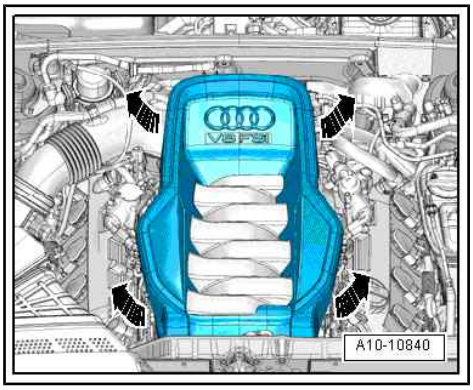
***To prevent irreparable damage to the electronic components when disconnecting the battery:***

- ***Observe notes on procedure for disconnecting the battery.***
- ***Always switch off the ignition before disconnecting the battery.***

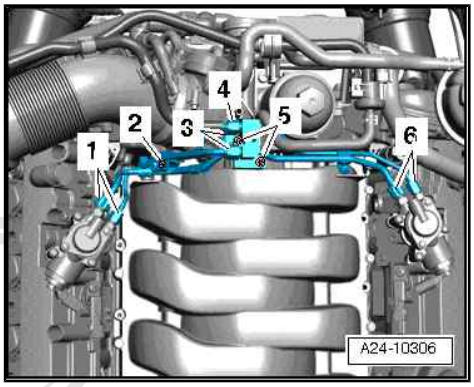
Audi
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Disconnect battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .

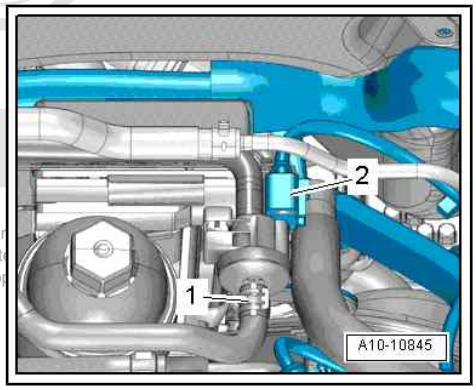
– Remove engine cover panel -arrows-.



– Disconnect fuel lines -1, 3, 4, 6-.
– Remove bolts -2- and -5- and detach fuel rail with high-pressure pipes.
– Move fuel line and vacuum line going to activated charcoal filter clear at air intake hose.




– Unplug electrical connector -2- at activated charcoal filter solenoid valve 1 - N80- and detach vacuum hose -1-.
– Take activated charcoal filter solenoid valve 1 - N80- out of bracket and move to side with hose attached.

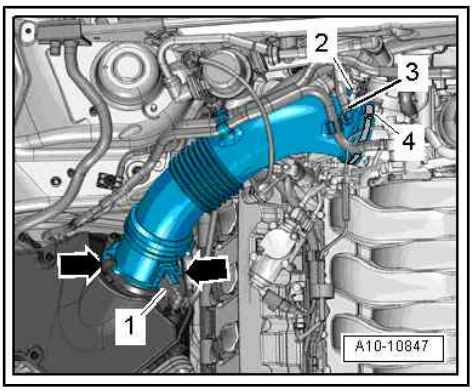



Protected by copyright. Copying for private or commercial purposes, in
permitted unless authorised by AUDI AG. AUDI AG does not guarant
with respect to the correctness of information in this document. Co

– Unplug electrical connector -1- at air mass meter - G70- .
– Detach vacuum line -3- going to air pipe.

**Rest-of-world vehicles:**

– Disconnect crankcase breather hose -2- from air hose by pressing release tabs.
– Remove air hose and air mass meter - G70- . To do so, release hose clip -4- and clamps -arrows-.

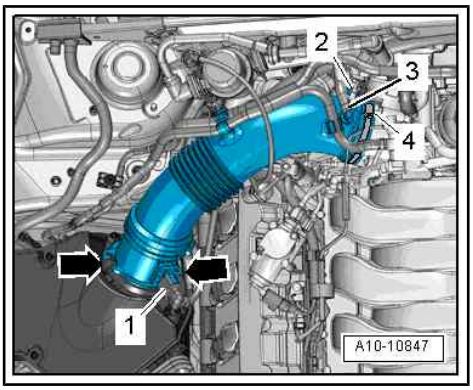



**USA models:**

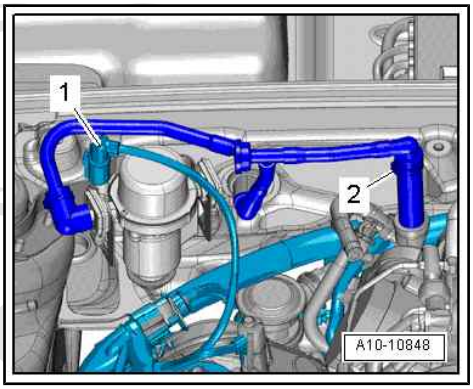
> **Caution**
>
> ***Risk of violating emission legislation applying to USA models.***
>
> ♦ ***Do NOT open hose connection -2-.***

– Move air intake hose clear to one side (crankcase breather hose -2- remains connected). To do so, release hose clips -4- and clamps -arrows-.

**Continued for all vehicles:**



– Disconnect vacuum hose -2-.

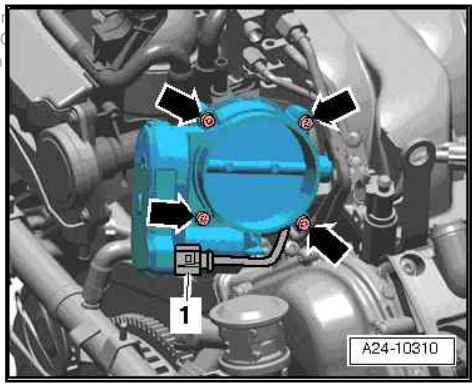



**Note**

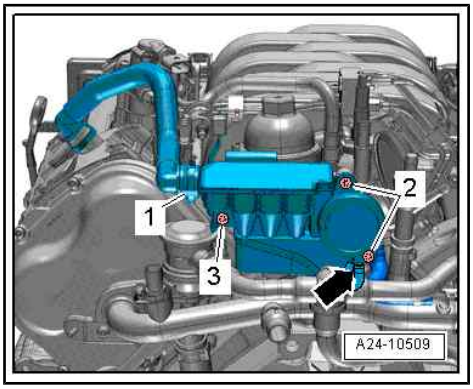
*Disregard -item 1-.*

Copyright by Volkswagen AG. Alle Rechte vorbehalten. Jede private oder comm
permitted unless authorised by AUDI AG. AUDI AG
with respect to the correctness of information in

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




– Slacken bolt -3- a few turns.
– Unscrew bolts -2- and remove pressure control valve for crankcase breather system from throttle valve housing.




**Note**

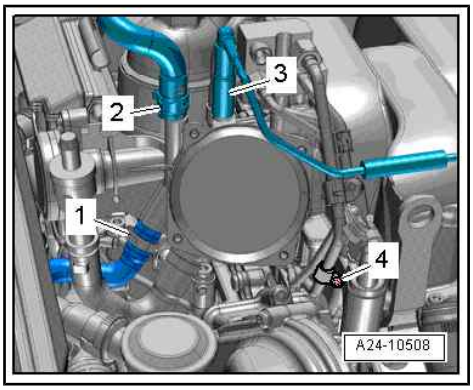
- *Disregard items marked -1- and -arrow-.*
- *For illustration purposes, the installation position is shown from the rear and with the engine removed.*

**WARNING**

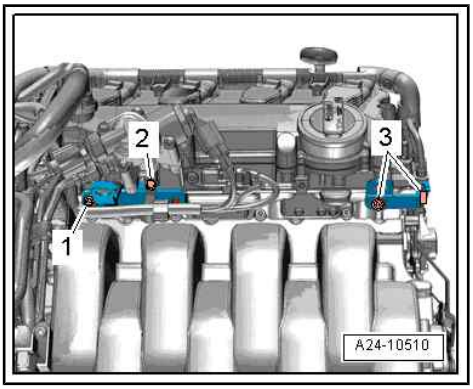
***Hot steam or hot coolant can escape when coolant expansion tank is opened; cover filler cap with cloth and open carefully.***

– Open filler cap on coolant expansion tank.

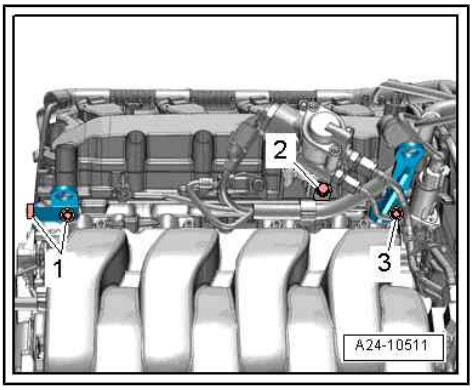
– Clamp off coolant hose -1- with hose clamp up to 25 mm - 3094- and detach.
– Detach coolant hose -2-.
– Detach vacuum hose -3- and move clear to side.
– Remove bolt -4- at retaining clip for high-pressure lines.
– Remove bolts -1- and detach engine lifting eye (rear left).



– Remove bolt -2- on bracket for wiring harness.
– Remove bolts -3- and move engine lifting eye (front left) with electrical connectors to one side.
– Push wiring harness to the left.

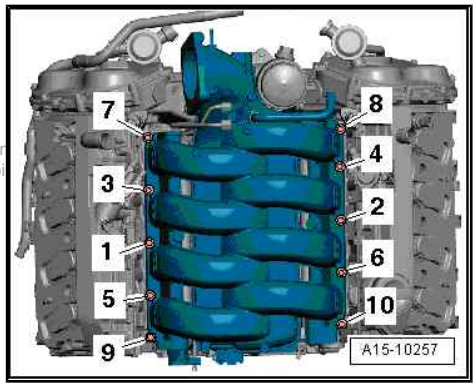



– Remove bolt -3- and remove engine lifting eye (rear right).
– Remove bolt -2- on bracket for wiring harness.

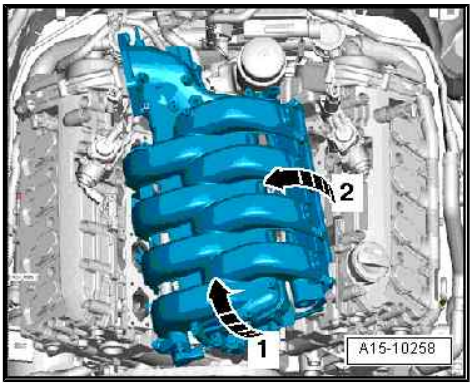



– Remove bolts for intake manifold in the sequence -10 ... 1-.
– To prevent scratches, mask off intake manifold in vicinity of high-pressure pipes with adhesive tape.

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




– First lift up intake manifold at the front -arrow 1-.



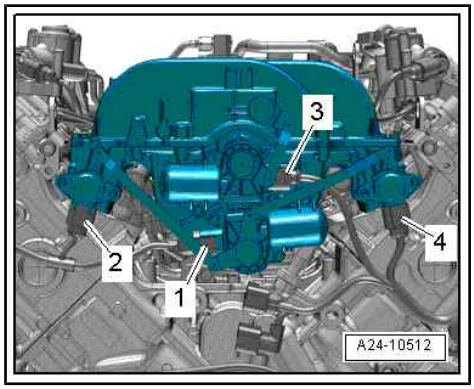
– Now unplug electrical connectors.

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

2 - Intake manifold flap potentiometer - G336-

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

4 - Intake manifold flap potentiometer 2 - G512-




**Note**

*For illustration purposes, the installation position is shown from the front and with the engine removed.*

– Then pivot out intake manifold below high-pressure fuel pipes towards right side of vehicle -arrow 2-.

– Lift intake manifold out of engine compartment.

**Caution**

***Risk of irreparable damage to engine.***

- ***Block off the intake ducts in the cylinder heads with clean cloths to prevent small items from dropping into the ducts.***

### Installing

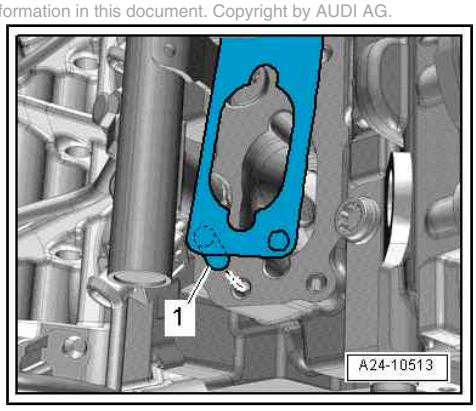
Installation is carried out in the reverse order; note the following:

**Note**

- *If an injector has been pulled out of the cylinder head, the teflon ring seal must be renewed.*
- *Renew gaskets and O-rings.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Parts catalogue .*
- *The connections of the high-pressure pipes must not be damaged.*

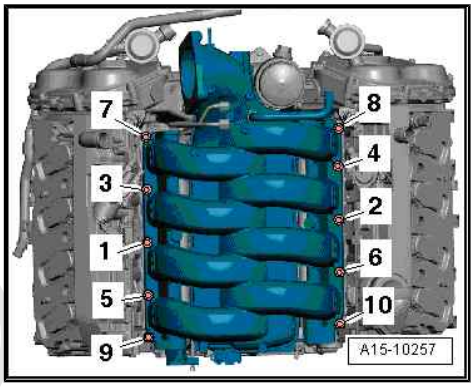
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Note locating feature -1- when fitting gaskets for intake manifold.



– Tighten bolts for intake manifold
⇒ Fig. ““Tightening sequence for intake manifold”“ , page 299 .

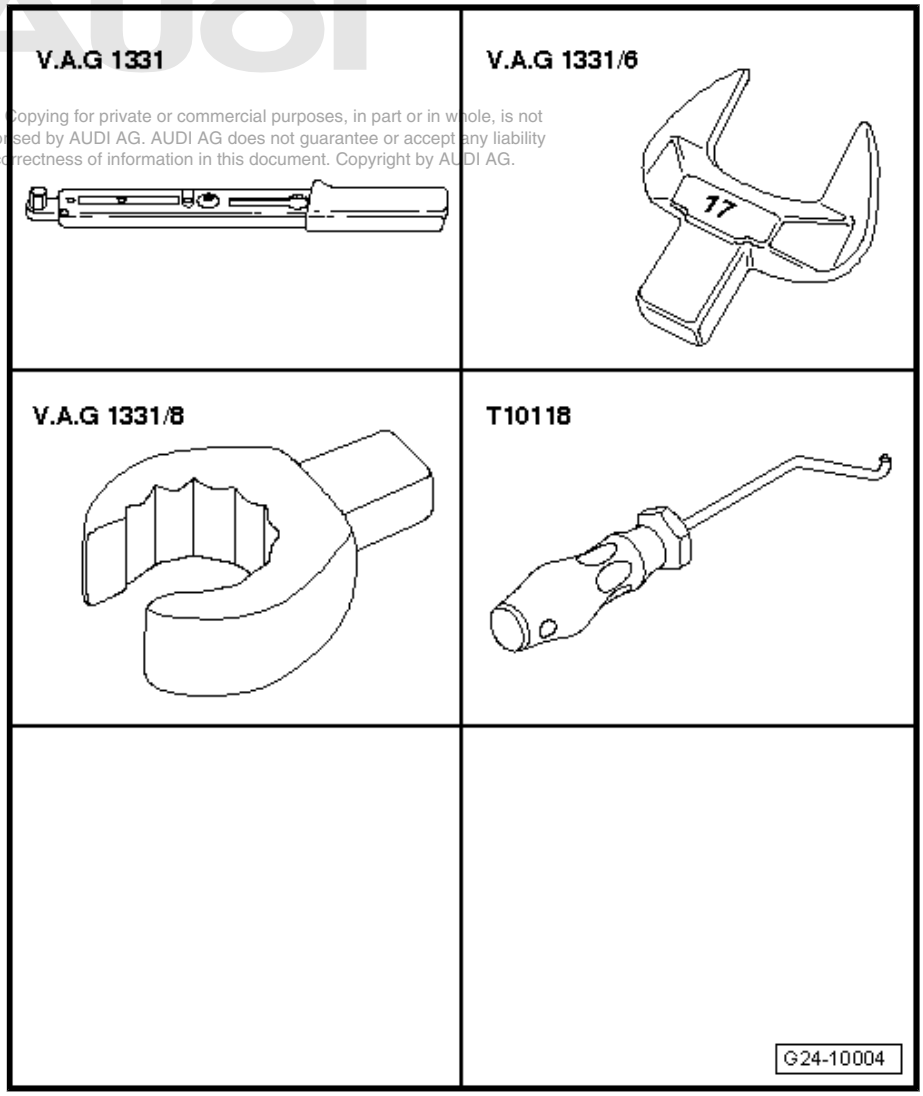
– Install high-pressure pipes ⇒ page 329 .




## 5.4.2 Removing and installing plastic intake manifold (gradual introduction in model year 2009)

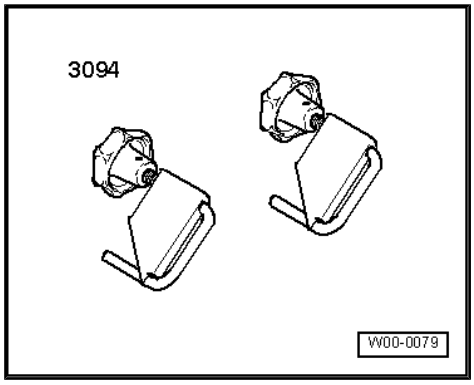
**Special tools and workshop equipment required**

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.




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

- Hose clamps, up to 25 mm - 3094-




## Removing

**WARNING**

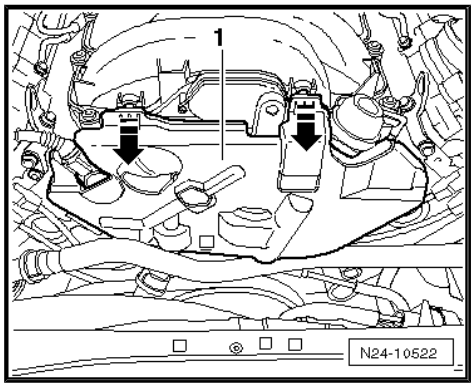
- *The fuel system operates under high pressure. The pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 4 .*
- *A clean cloth must then be wrapped around the connection and the residual pressure dissipated by carefully loosening the connection.*

**Note**

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

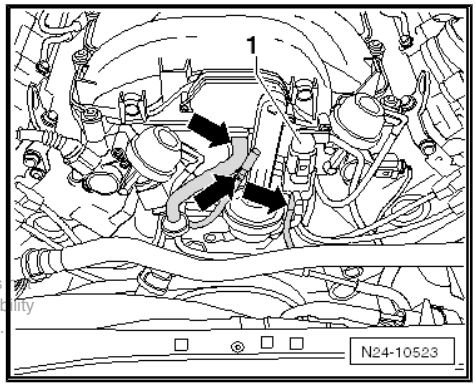
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

– Disconnect earth wire at battery with ignition switched off.
– Remove engine cover panel.
– Pull cover -1- towards front and lift off.

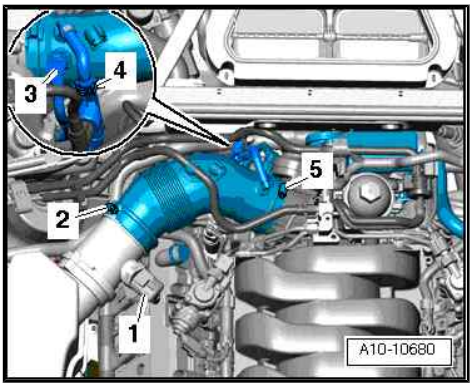


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

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




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




**Note**

*Disregard -item 1-.*

**Rest-of-world vehicles:**

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

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

**USA models:**

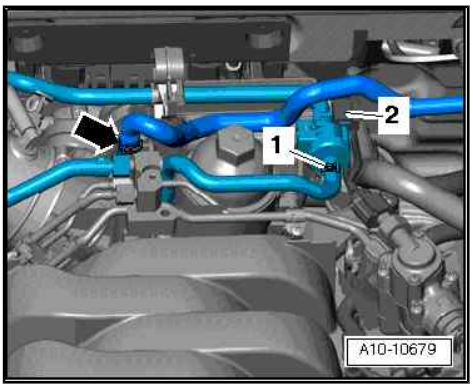
– Release hose clips -2- and -5- and move air intake hose clear to one side (crankcase breather hose -3- remains connected).

**Caution**

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

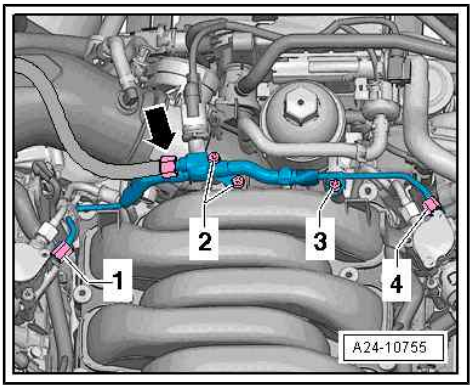
– Unplug electrical connector -2- at activated charcoal filter solenoid valve 1 - N80- and detach vacuum hose -1-.

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

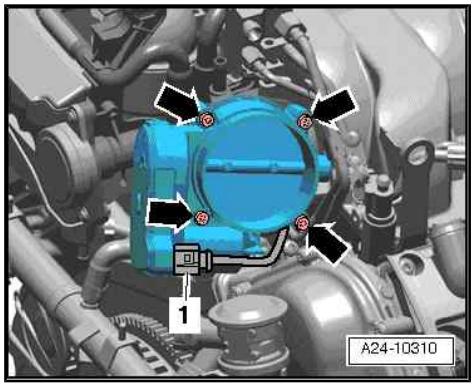



– Disconnect fuel lines -1 and 4- at high-pressure pumps.

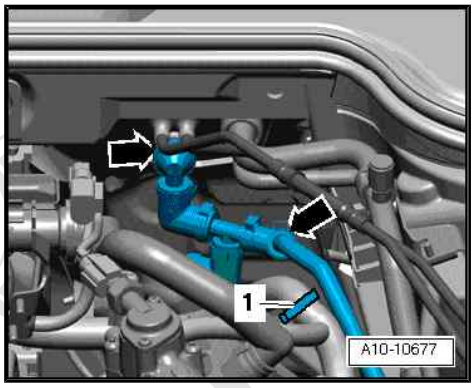
– Remove bolts -2 and 3-.



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




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




**Note**

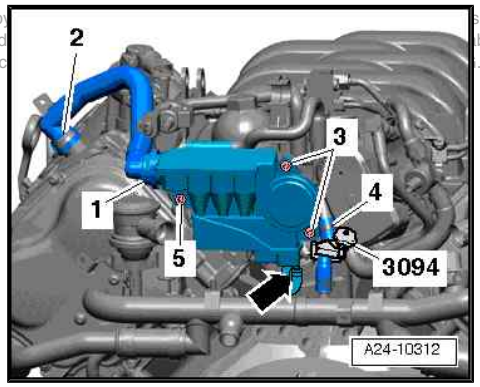
*Disregard -item 1-.*

**WARNING**

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

– Open filler cap on coolant expansion tank.

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




**Note**

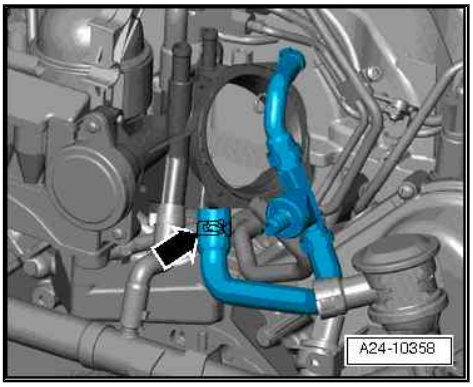
- *Disregard -arrow-.*
- *Shown from rear with engine removed for illustration purposes.*

**Note**

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

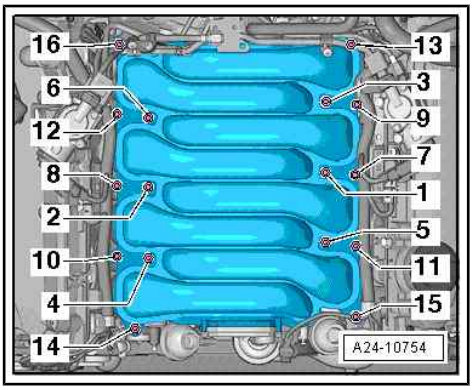
– Detach coolant hose -arrow- and move clear to one side.

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




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

– Remove intake manifold from engine compartment.




**Note**

*Seal intake ducts in cylinder heads with clean cloths.*

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

## Installing

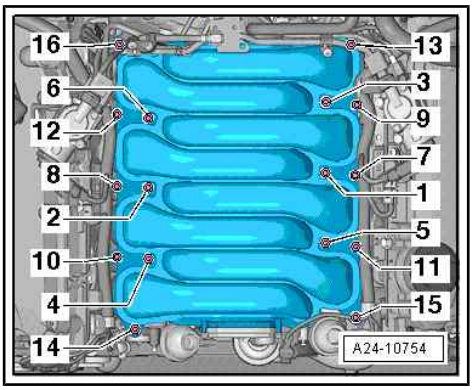
**Note**

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

– Check seals in intake manifold for damage and make sure they are positioned correctly.

– Make sure that hoses and wires are not trapped.

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




- Tightening torques: refer to exploded view of intake manifold ⇒ Fig. ""Tightening torque and tightening sequence for intake manifold"" , page 300
- Tightening torques: refer to exploded view of fuel rail with injectors ⇒ "3.1.2 Exploded view - fuel rail with injectors, plastic intake manifold (gradual introduction in model year 2009)", page 280 .

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

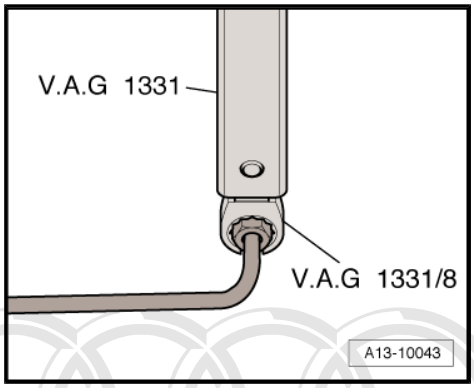
**Note**

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

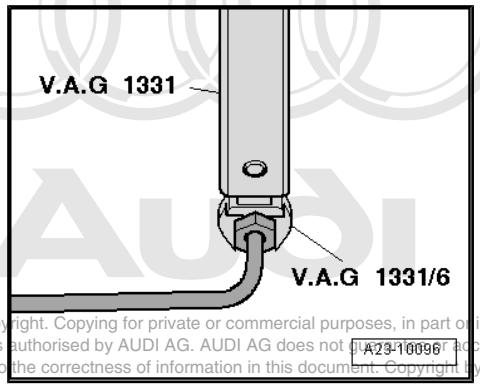
– Tighten union nuts on high-pressure pipes hand-tight initially.

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

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




– To tighten union nuts (17 mm) for high-pressure pipes, use torque wrench - V.A.G 1331- with tool insert (17 mm) - V.A.G 1331/6- .
– Do not install mounting brackets until high-pressure pipes have been finally secured.
– Observe notes on procedure after disconnecting the battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .
– If necessary, fill up with coolant ⇒ page 229 .




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.

# 6 Senders and sensors

⇒ “6.1 Removing and installing fuel pressure sender G247 ”, page 317

⇒ “6.2 Removing and installing air mass meter”, page 318

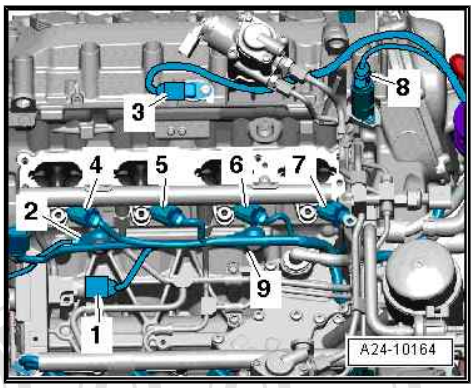
## 6.1 Removing and installing fuel pressure sender - G247-

### Removing

– Remove intake manifold.

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

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




**Note**

*Fitting location may differ on vehicles from model year 2009 onwards.*

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

**Note**

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

### Installing

– Tighten fuel pressure sender - G247- .

- Tightening torque: refer to overview of fitting locations ⇒ “1.1 Overview of fitting locations - injection system”, page 266 .

**Note**

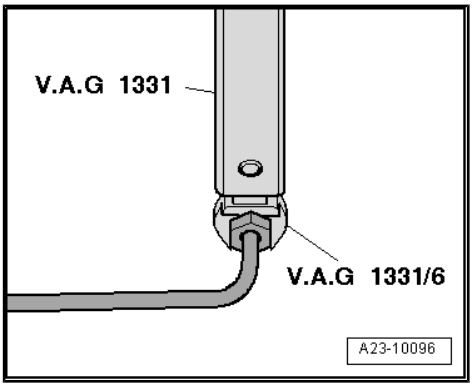
♦ *The connections -arrows- of the high-pressure pipe must not be damaged.*

♦ *Do not attempt to bend high-pressure pipe to a different shape.*

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

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

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



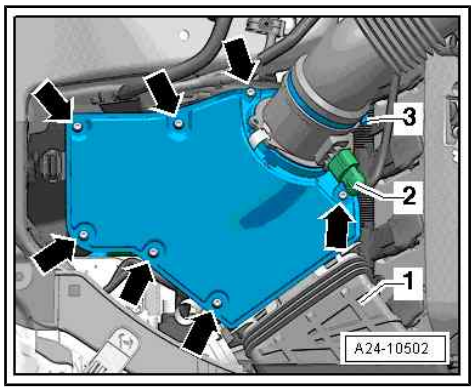

The remaining installation steps are carried out in the reverse sequence.

– Install intake manifold.

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.

## 6.2 Removing and installing air mass meter

### Removing




– Unplug electrical connector at air mass meter - G70- -2-.
– Open hose clip -3- at air hose and disconnect air hose from air mass meter - G70- .
– Open both clamps at air mass meter - G70- .
– Carefully pull air mass meter - G70- out of guide on air cleaner housing.

### Installing

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

**Note**

- *If the air filter element is very dirty or wet, dirt particles or water can reach the air mass meter - G70- and falsify the detected air mass values. This will cause a loss of power, as the calculated injection quantities will be too low.*
- *Always use genuine air filter elements (same as original equipment).*
- *Use a silicone-free lubricant when installing the intake hose.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Parts catalogue .*

– Check air mass meter - G70- and air hose (engine intake side) for salt residue, dirt and leaves.
– Check intake duct as far as air filter element for dirt. If necessary, clean salt residue, dirt and leaves out of air cleaner housing (top and bottom sections); wash out or use a vacuum cleaner as required. Removing and installing air cleaner ⇒ page 292 .
– If air filter element has been removed, clean water drain hose in air cleaner (bottom section).
– Align O-ring in slot on air cleaner housing and carefully push air mass meter - G70- into air cleaner housing.

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

**Note**

*Renew O-ring if damaged.*

– Engage the two clamps.
– Fit air hose and tighten hose clamp.
– Plug electrical connector back onto air mass meter - G70- .

# 7 Engine control unit

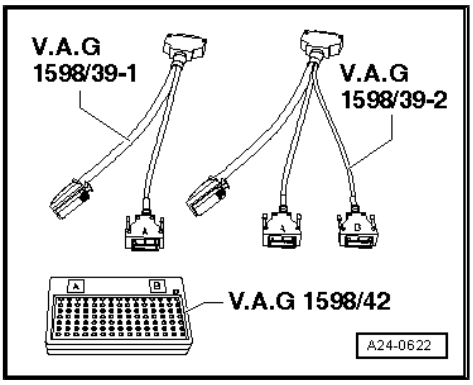
⇒ “7.1 Wiring and component check with test box V.A.G 1598/42 ”, page 319

⇒ “7.2 Removing and installing engine/motor control unit J623 ”, page 321

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

**Special tools and workshop equipment required**

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




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

**Note**

- *The test box has 105 sockets. The connecting cable can be disconnected from the test box. This means that only the cable (and not the test box) has to be purchased for future engine control units with different types of connectors.*
- *The smaller of the two connectors on the engine control unit has the contacts 1 to 60. The larger of the two connectors has the contacts 1 to 94.*
- *If you want to check a wiring connection to the engine control unit, first refer to the current flow diagram to find out which connector on the engine control unit the wiring connection leads to. If the wire goes to the 60-pin connector, connect the smaller of the two connectors -V.A.G 1598/39-1- to input "A" of test box - V.A.G 1598/42- .*
- *If a wiring connection leads to the 94-pin connector (according to current flow diagram), connect the larger of the two connectors -V.A.G 1598/39-2- as follows: The connector marked "A" must be attached to input "A" on the test box - V.A.G 1598/42- and the connector marked "B" must be attached to input "B" on the test box - V.A.G 1598/42- .*
- *The test box - V.A.G 1598/42- is designed so it can be connected both to the wiring harness for the engine control unit and to the engine control unit itself at the same time.*
- *The advantage of this is that the electronic engine control system remains fully functional when the test box is connected (for example, for measuring signals when the engine is running).*
- *The relevant test procedure will state whether it is necessary to also connect the engine control unit to the test box.*
- *Always use auxiliary measuring set - V.A.G 1527 B- to connect test equipment (e.g. voltage tester - V.A.G 1526 C- , hand-held multimeter - V.A.G 1594 C- etc.).*

**WARNING**

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

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 engine control unit - J623- ⇒ page 321 .
– Connect test box - V.A.G 1598/42- to wiring harness connector. The earth clip on the test box must be connected to the negative battery terminal. The instructions for performing the individual tests indicate whether or not the engine control unit - J623- itself also needs to be connected to the test box.
– Carry out test as described in appropriate repair procedures.

**Installing engine control unit:**

Installation is performed in the reverse sequence.

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

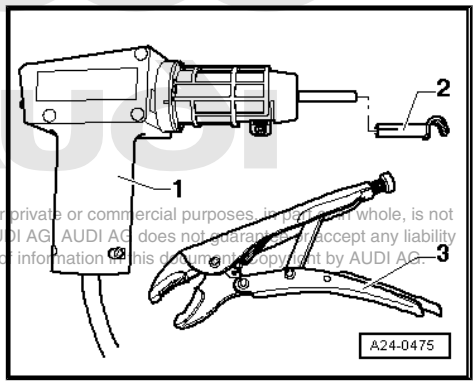
**Note**

*After completion of the Guided Fault Finding routine, the tester will attempt to erase the event memories of all control units. If this is not successful, the remaining event(s) saved in the memories must be dealt with so that all event memory entries can be erased.*

## 7.2 Removing and installing engine/motor control unit - J623-

**Special tools and workshop equipment required**

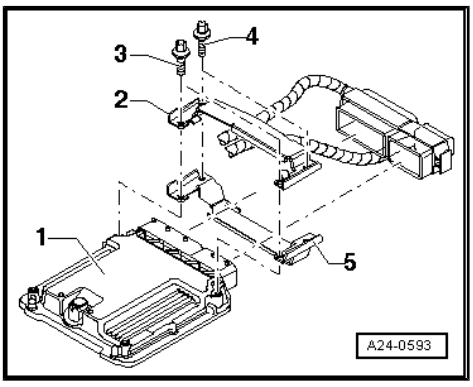
- Hot air blower -1- from the wiring harness repair set - VAS 1978A-
- Nozzle attachment -2- from the wiring harness repair set - VAS 1978A-
- Small, commercially available mole grips -3-




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.

**Note**

- *Not every engine control unit is bolted to a protective housing. On vehicles with automatic gearbox, there is no protective housing installed.*
- *The engine control unit -1- is bolted to the protective housing -5-. To make it more difficult to unscrew the shear bolts -4- for locking plate -2-, their threads have been coated with locking fluid.*
- *The metal housing has to be removed before the connectors can be unplugged from the engine control unit (e.g. to connect the test box or renew the engine control unit).*

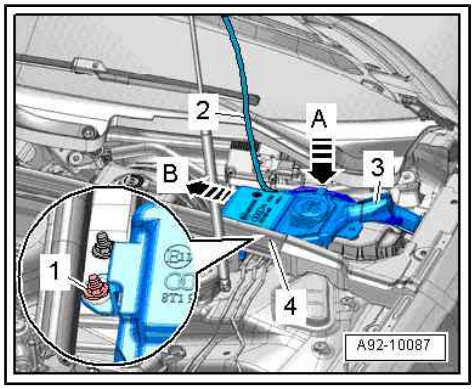



**Removing**

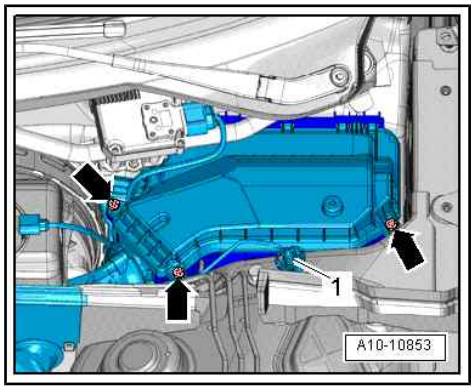
– When renewing engine control unit, select “Guided Functions” and then select diagnosis object “Replace engine control unit” on vehicle diagnostic, testing and information system - VAS 5051B- .

– Switch off ignition and remove ignition key.

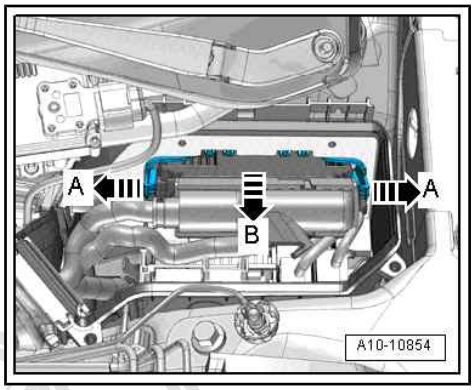
– Slightly pull off rubber seal in front of nut -1- on plenum chamber cover.
– Unhook wiring harness -2- from retainers -A-.
– Unscrew nut -1-.
– Pull filler neck -3- with filler pipe out of washer fluid reservoir and through opening in body.



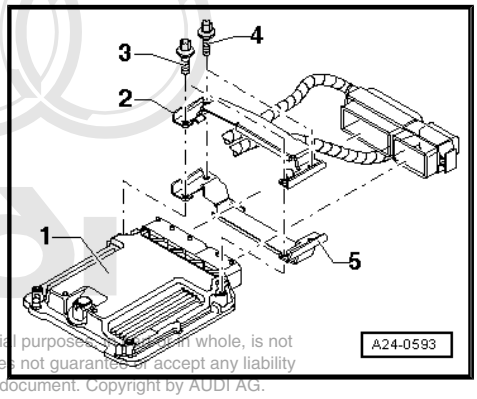

– Unscrew bolts -arrows- and take off lid for electronics box.




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




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



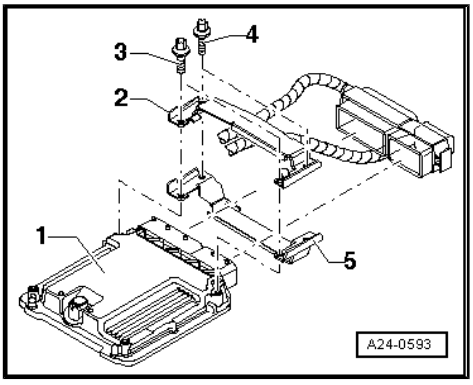

**Note**

*Not every engine control unit is bolted to a protective housing. On vehicles with automatic gearbox, there is no protective housing installed.*

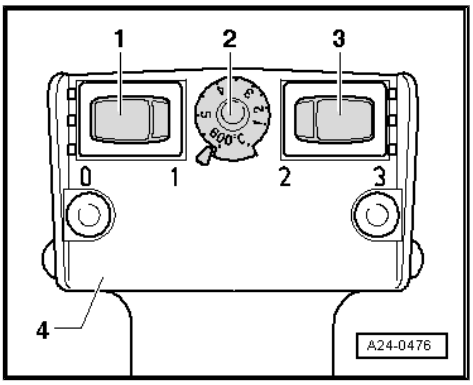
The threads of the two shear bolts -4- which are not screwed into the engine control unit are secured with locking fluid. To unscrew these two bolts, the threads must therefore be heated with the hot air blower.

Protected by copyright. Copying for private or commercial purposes, 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.

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




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



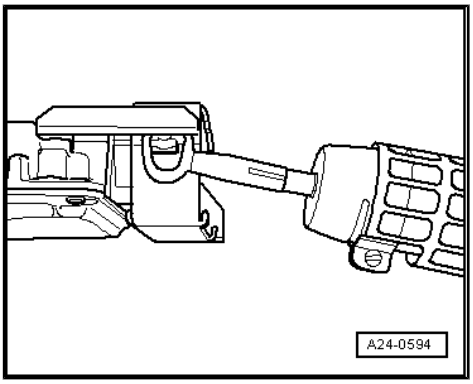

**WARNING**

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

***Grinding or drilling is not permitted.***

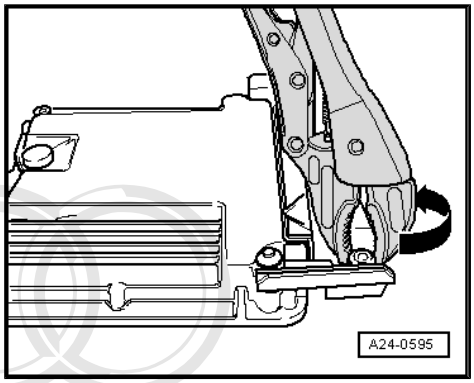
– Apply heat to the threads of the shear bolts on the connector side for approx. 25 to 30 seconds.

– Unscrew shear bolts using mole grips (see arrow in illustration).




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.

– The two shear bolts screwed into the engine control unit do not need to be heated.
– Detach metal locking plate from control unit connectors.
– Release connectors on engine control unit and unplug connectors.
– Take out old engine control unit - J623- and install new engine control unit - J623- .




**Installing**

Installation is performed in the reverse sequence.

– After installation, the locking plate must be re-fitted on the engine control unit - J623- .
– Clean threaded holes for shear bolts to remove any residue from locking fluid. This can be done using a thread tap.
– Always use new shear bolts.
• Tightening torque for bolts securing lid of electronics box: 3.5 Nm.

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

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

– Activate engine control unit via vehicle diagnostic, testing and information system - VAS 5051B- in “Guided Functions” mode, “Replace engine control unit”.

# 8 High-pressure pump

⇒ “8.1 Exploded view - high-pressure pump”, page 325

⇒ “8.2 Removing and installing high-pressure pump”, page 327

⇒ “8.3 Removing and installing high-pressure pipe”, page 329

⇒ “8.4 Checking fuel pressure and residual pressure (up to high-pressure pump)”, page 331

## 8.1 Exploded view - high-pressure pump

**1 - High-pressure pump**

- ❑ Fuel metering valve - N290- is installed in high-pressure pump on right-side (cylinder bank 1).
- ❑ Fuel metering valve 2 - N402- is installed in high-pressure pump on left-side (cylinder bank 2).
- ❑ Fuel pressure sender for low pressure - G410- is installed in high-pressure pump on left-side (cylinder bank 2).
- ❑ Removing and installing ⇒ page 327

**2 - Bolt**

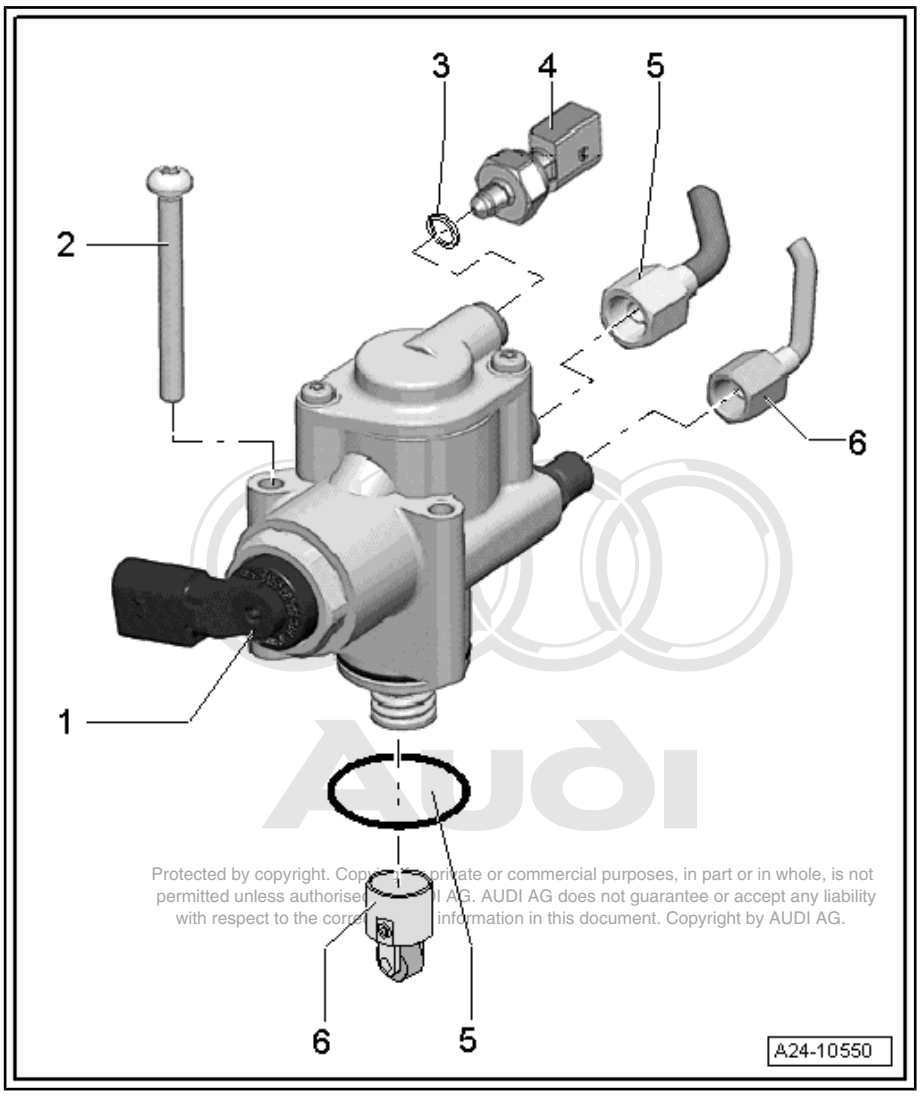
- ❑ 9 Nm

**3 - Seal**

- ❑ Renew

**4 - Fuel pressure sender for low pressure - G410-**

- ❑ 10 Nm
- ❑ Only fitted in high-pressure pump on left side (cylinder bank 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.

5 - High-pressure pipe

**WARNING**

*The pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 4 .*

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

*Observe notes on procedure for disconnecting the battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .*

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

6 - Fuel supply line

**WARNING**

*The pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 4 .*

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

*Observe notes on procedure for disconnecting the battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .*

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

7 - O-ring

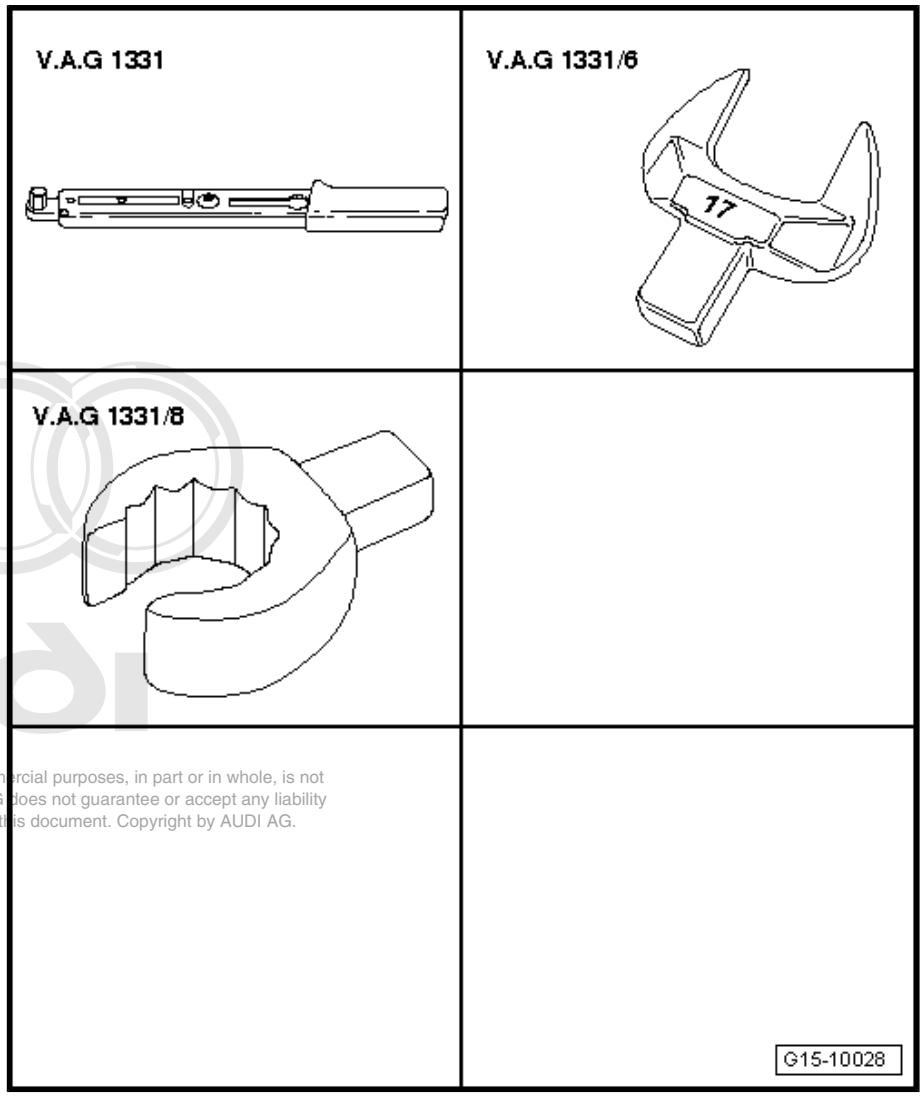
- ❑ Renew

8 - Roller tappet

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.

## 8.2 Removing and installing high-pressure pump

**Special tools and workshop equipment required**




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.

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

**Removing**

**Note**

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

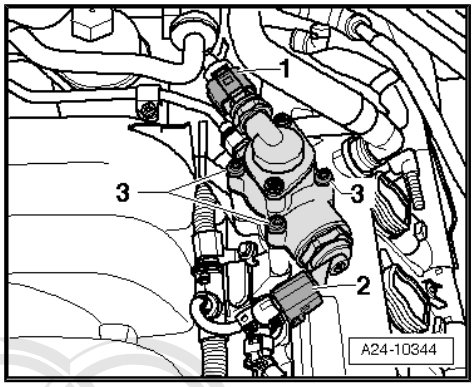
**WARNING**

- *The fuel system operates under high pressure. The pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 4 .*
- *A clean cloth must then be wrapped around the connection and the residual pressure dissipated by carefully loosening the connection.*
- *Observe notes on procedure for disconnecting the battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .*

– Disconnect earth wire at battery with ignition switched off.

– Pull off engine cover ⇒ page 92 .

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




**Note**

*The fuel pressure sender for low pressure - G410- is installed only in the high-pressure pump on the left-side (cylinder bank 2).*

– Detach both union nuts for fuel lines.

– Unscrew bolts -3-.

**Note**

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

– Carefully pull out high-pressure pump.

– Pull roller tappet out of cylinder head.

**Installing**

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

**Note**

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.

*Renew O-ring.*

– Fit roller tappet in cylinder head.

**Note**

*The roller tappet must be positioned at the lowest point when installing the high-pressure pump.*

– Turn crankshaft until roller tappet is positioned at lowest point.

– Only lift high-pressure pipes slightly to fit the high-pressure pump.

– Fit high-pressure pump in cylinder head and secure in position.

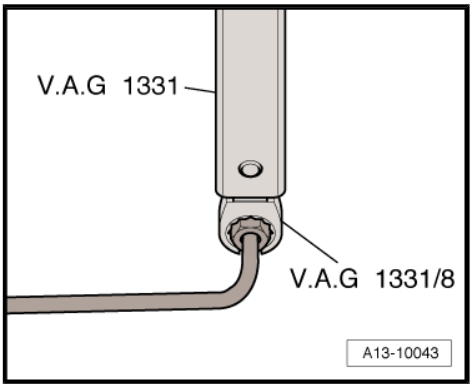
**Note**

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

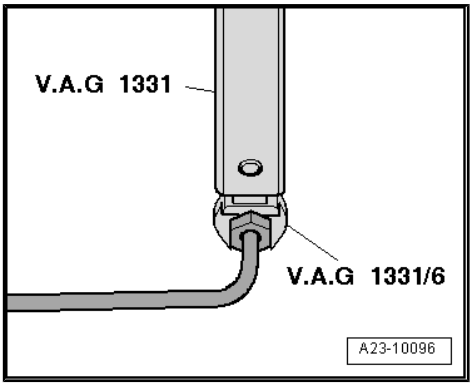
– Tighten union nuts on high-pressure pipes hand-tight initially.

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

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




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

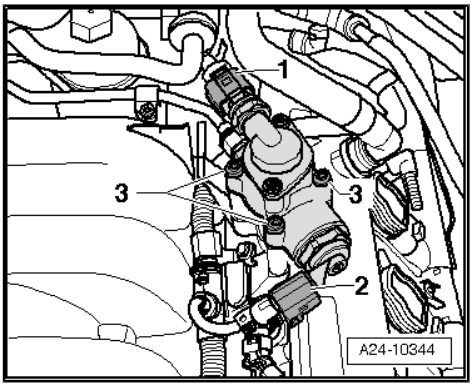



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Tightening torques: refer to exploded view of high pressure pump ⇒ page 325 .

– Observe notes on procedure after disconnecting the battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .

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



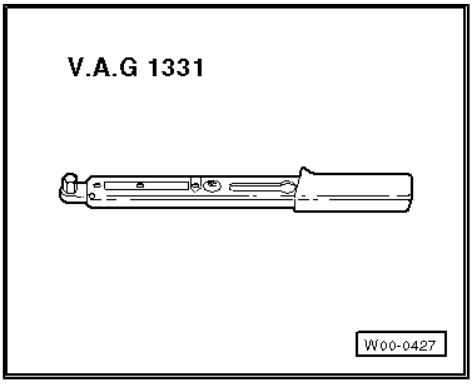

**Note**

*Check fuel system for leaks.*

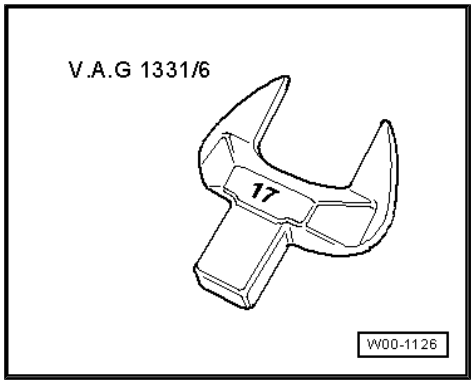
## 8.3 Removing and installing high-pressure pipe

**Special tools and workshop equipment required**

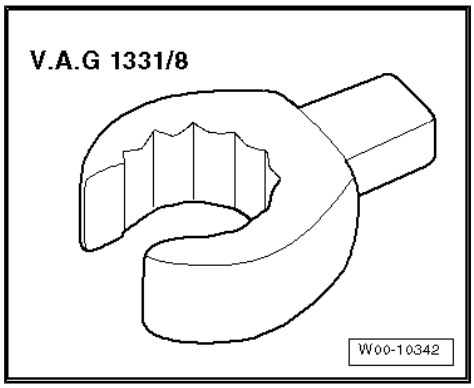
- Torque wrench - V.A.G 1331-



- Open end spanner insert, AF 17 - V.A.G 1331/6-




- Socket insert AF 14, flared ring spanner - V.A.G 1331/8-




**Procedure**

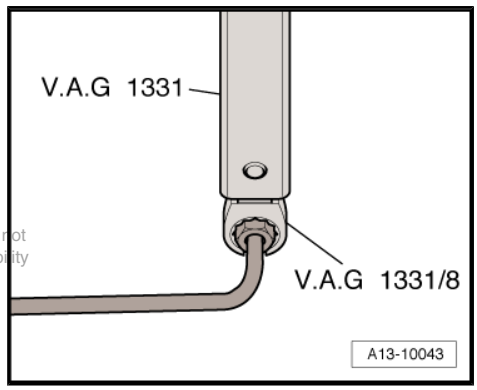
**Note**

- *Do not bend fuel pipes to a different shape.*
- *The connections of the high-pressure pipes must not be damaged.*
- *Do NOT bend open retaining clamps for fuel pipe.*
- *If one of the retaining clamps has been bent open or the fuel pipe has to be renewed, the retaining clamps must also be renewed.*

– Lubricate threads of union nuts with fuel.

– Hand-tighten union nuts on high-pressure pipes (ensure that pipes are not under tension).

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



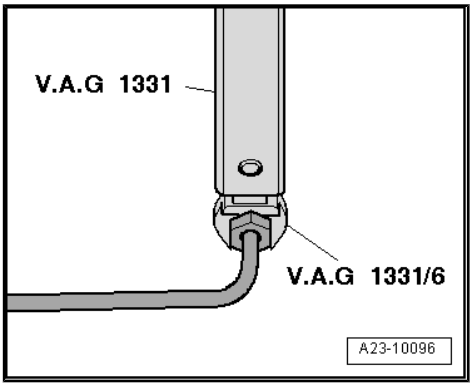

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

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

• Tightening torque: 25 Nm

– Do not fasten retaining clips until high-pressure pipes have been tightened.

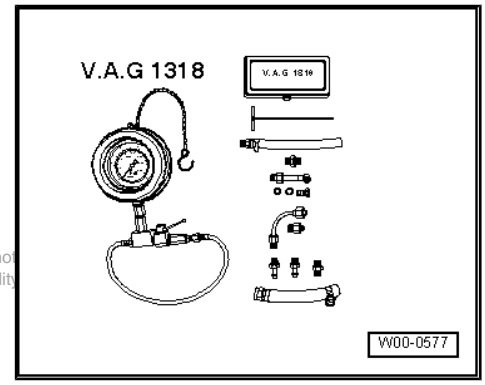
– Check fuel system for leaks.




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

**Special tools and workshop equipment required**

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

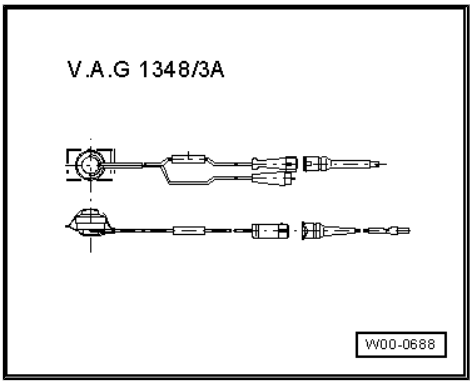



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

♦ Adapter set - V.A.G 1318/10-12-

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

♦ Remote control - V.A.G 1348/3A- for V.A.G 1348 with adapter cable -V.A.G 1348/3-3-




♦ Fuel-resistant measuring container

♦ Protective gloves

**Checking fuel pressure:**

• Battery voltage at least 12.5 V

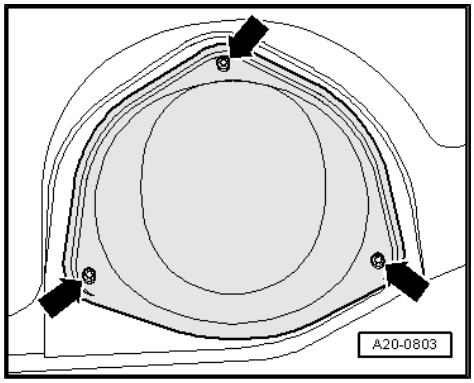
• Fuel filter OK.

• Fuel tank at least $^1/_4$ full

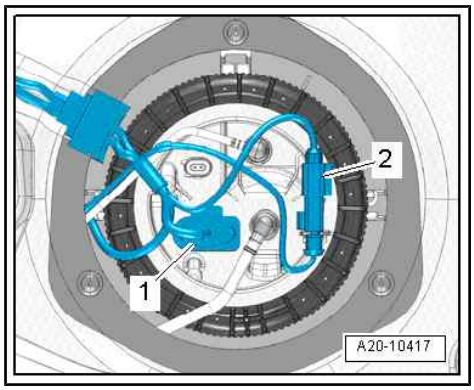
• Fuel pump control unit - J538- OK.

• Ignition switched off.

– Remove rear seat bench ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Exploded view - seat bench/individual seats .
– Unscrew cover for flange -arrows-.



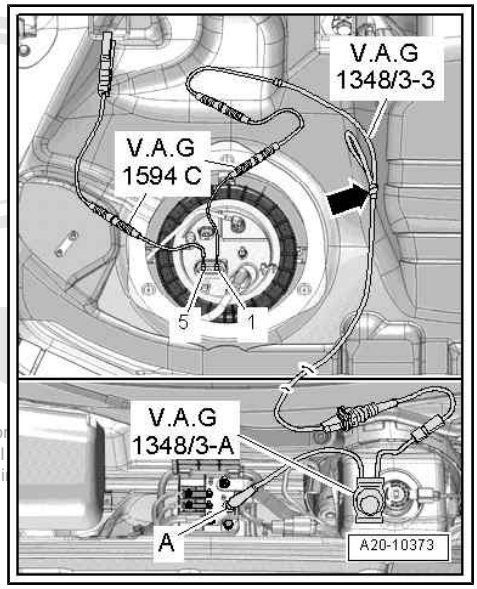

– Unplug electrical connector -1- at flange.




**Note**

*Disregard -item 2-.*

– Connect remote control - V.A.G 1348/3A- for V.A.G 1348 to contact -1- using adapter cable -V.A.G 1348/3-3- and test lead from auxiliary measuring set - V.A.G 1594C- .
– Tape off 2nd connector contact of adapter cable -V.A.G 1348/3-3- with insulating tape -arrow- to prevent short circuits.
– Connect contact -5- to the body (earth) using a test lead from auxiliary measuring set - V.A.G 1594C- .
– Move control switch of remote control - V.A.G 1348/3A- for V.A.G 1348 to front into engine compartment.
– Connect remote control - V.A.G 1348/3A- for V.A.G 1348 to connection -A- of distribution box in plenum chamber (battery positive). For safety reasons an in-line fuse (10 A) must be connected into the lead.
– Remove filler cap from fuel filler neck.
– Remove engine cover panel.

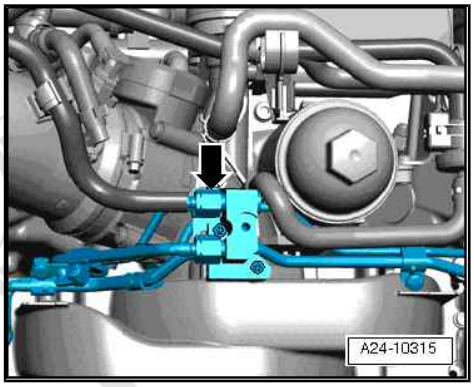



Protected by copyright. Copying for pr
permitted unless authorised by AUDI
with respect to the correctness of i

**WARNING**

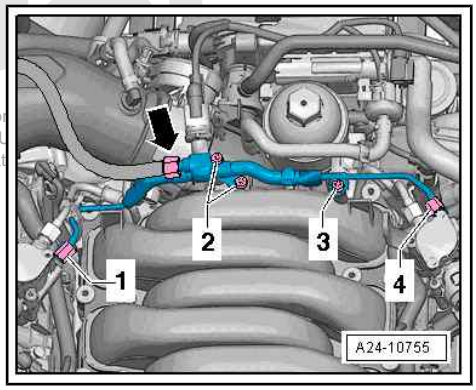
- *The pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 4 .*
- *A clean cloth must then be wrapped around the connection and the residual pressure dissipated by carefully loosening the connection.*

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

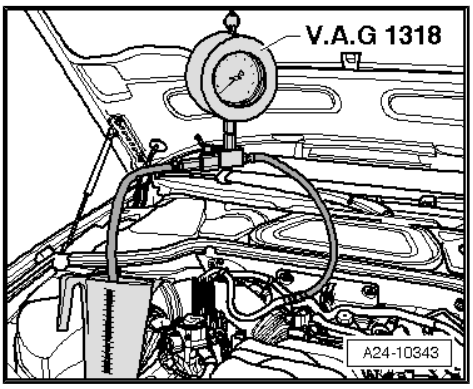



**Disconnecting fuel supply line -arrow- from connecting piece (engines with plastic intake manifolds)**

Protected by copyright. Copying for private or
permitted unless authorised by AUDI AG. AU
with respect to the correctness of informat




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



– Close cut-off valve on pressure gauge.

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

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

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

If specification is not obtained:

– Check delivery rate of fuel pump ⇒ Fuel supply system, petrol engines; Rep. gr. 20 ; Fuel pump; Checking fuel system pressurisation pump - G6- .

**Checking residual pressure:**

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

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

If the residual pressure drops below 3 bar:

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

♦ Test pressure gauge for leaks.

♦ Check fuel lines and their connections for leaks.

♦ Check delivery rate of fuel pump ⇒ Fuel supply system, petrol engines; Rep. gr. 20 ; Fuel pump; Checking fuel system pressurisation pump - G6- .

♦ Renew fuel filter with integrated fuel pressure regulator ⇒ Fuel supply system, petrol engines; Rep. gr. 20 ; Fuel filter; Exploded view - fuel filter .

♦ Non-return valve of fuel pump is defective ⇒ Fuel supply system, petrol engines; Rep. gr. 20 ; Fuel pump; Removing and installing fuel pump .

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

– Switch off ignition.

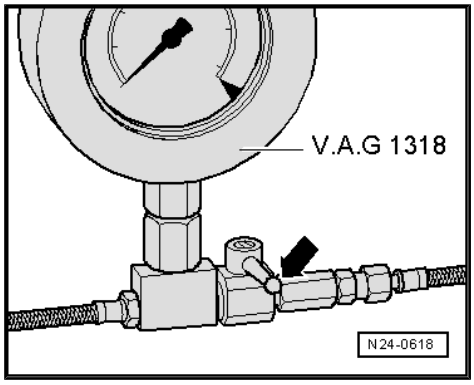
**Note**

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

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

**Tightening torque**

| Component | Nm |
|---|---|
| Fuel supply line | 25 |



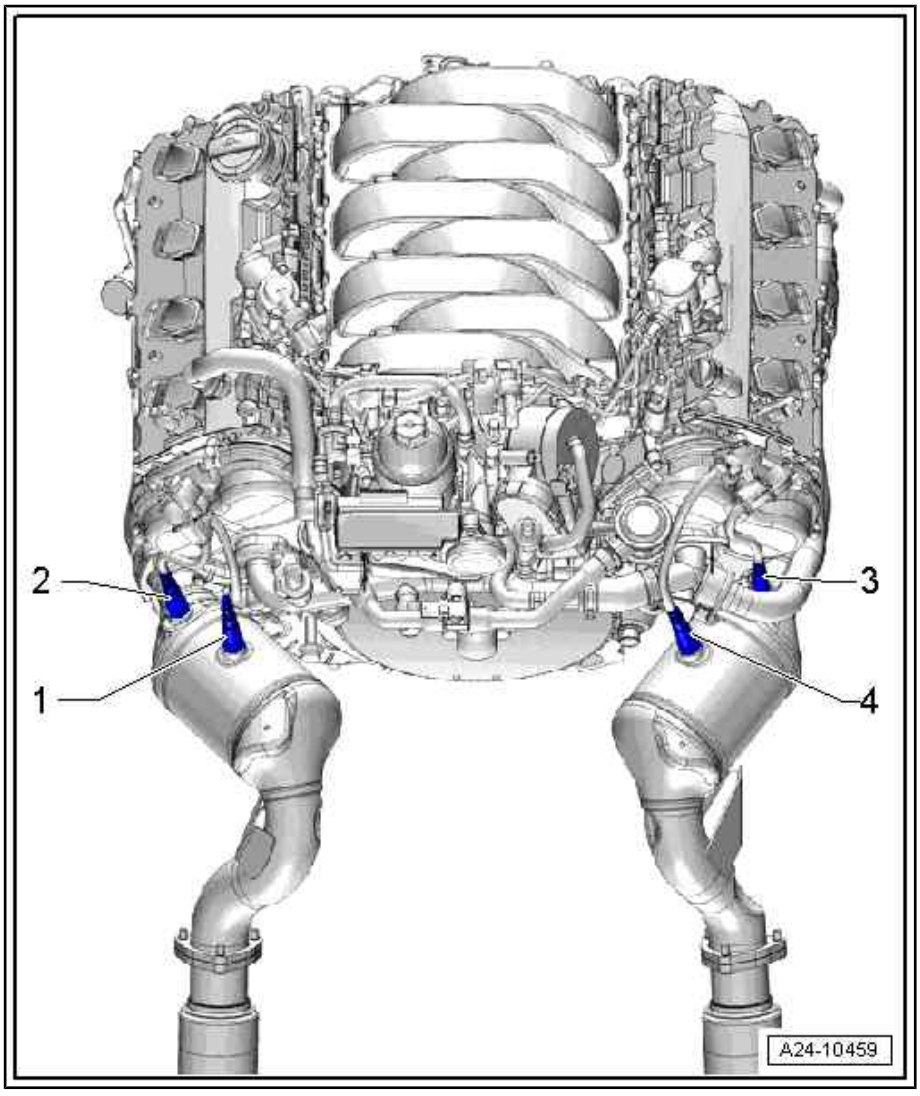

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

# 9 Lambda probe

⇒ "9.1 Exploded view - Lambda probe", page 335

⇒ "9.2 Removing and installing Lambda probe", page 336

## 9.1 Exploded view - Lambda probe




**1 - Lambda probe 2 after catalytic converter - G131- with Lambda probe 2 heater after catalytic converter - Z30-**

- ❑ 50 Nm
- ❑ New Lambda probes are coated with an assembly paste
- ❑ In the case of a used Lambda probe, coat only thread with high-temperature paste; refer to ⇒ Parts catalogue for high-temperature paste
- ❑ The assembly paste/ high-temperature paste must not make contact with the slots on the Lambda probe body
- ❑ Removing and installing ⇒ page 338

**2 - Lambda probe 2 - G108- with Lambda probe heater 2 - Z28-**

- ❑ 50 Nm
- ❑ New Lambda probes are coated with an assembly paste
- ❑ In the case of a used Lambda probe, coat only thread with high-temperature paste; refer to ⇒ Parts catalogue for high-temperature paste
- ❑ The assembly paste/ high-temperature paste must not make contact with the slots on the Lambda probe body
- ❑ Removing and installing ⇒ page 338

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

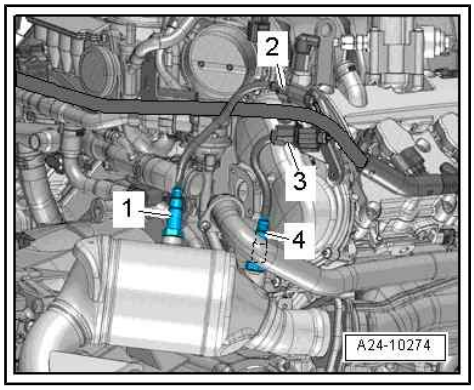
- ❑ 50 Nm
- ❑ New Lambda probes are coated with an assembly paste
- ❑ In the case of a used Lambda probe, coat only thread with high-temperature paste; refer to ⇒ Parts catalogue for high-temperature paste
- ❑ The assembly paste/high-temperature paste must not make contact with the slots on the Lambda probe body
- ❑ Removing and installing ⇒ page 336

**4 - Lambda probe after catalytic converter - G130- with Lambda probe 1 heater after catalytic converter - Z29-**

- ❑ 50 Nm
- ❑ New Lambda probes are coated with an assembly paste

- ❑ In the case of a used Lambda probe, coat only thread with high-temperature paste; refer to ⇒ Parts catalogue for high-temperature paste
- ❑ The assembly paste/high-temperature paste must not make contact with the slots on the Lambda probe body
- ❑ Removing and installing ⇒ page 336

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




1 - Lambda probe after catalytic converter - G130-

2 - Electrical connector for Lambda probe after catalytic converter - G130-

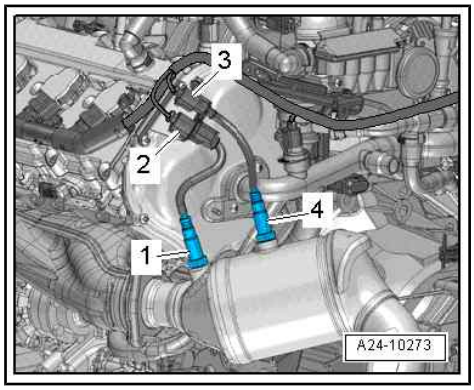
3 - Electrical connector for Lambda probe - G39-

4 - Lambda probe - G39-

Removing and installing ⇒ page 336

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.

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




1 - Lambda probe 2 - G108-

2 - Electrical connector for Lambda probe 2 - G108-

3 - Electrical connector for Lambda probe 2 after catalytic converter - G131-

4 - Lambda probe 2 after catalytic converter - G131-

Removing and installing ⇒ page 338

## 9.2 Removing and installing Lambda probe

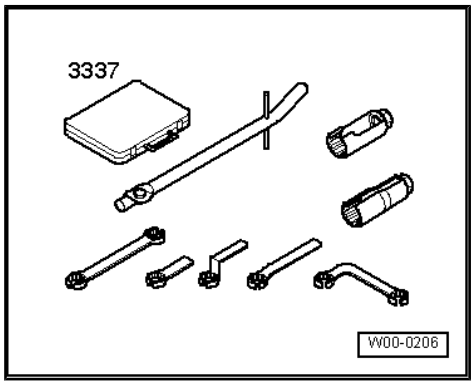
⇒ "9.2.1 Removing and installing Lambda probe G39 / Lambda probe after catalytic converter G130 , cylinder bank 1", page 336

⇒ "9.2.2 Removing and installing Lambda probe 2 G108 / Lambda probe after catalytic converter G131 , cylinder bank 2", page 338

### 9.2.1 Removing and installing Lambda probe - G39- / Lambda probe after catalytic converter - G130- , cylinder bank 1

**Special tools and workshop equipment required**

♦ Lambda probe open ring spanner set - 3337-

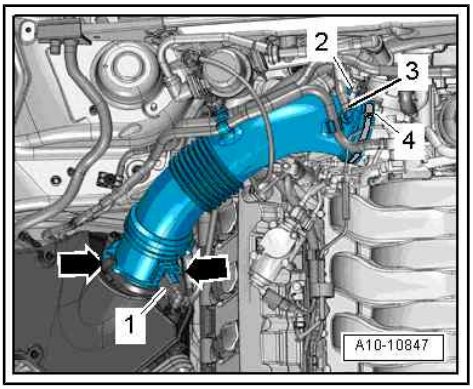


### Removing

**Note**

*Fit all cable ties in the original positions when installing.*

– Remove engine cover panel.
– Unplug electrical connector -1- at air mass meter - G70- .
– Detach vacuum line -3- going to air pipe.




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.

**Rest-of-world vehicles:**

– Disconnect crankcase breather hose -2- from air hose by pressing release tabs.
– Remove air hose and air mass meter - G70- . To do so, release hose clip -4- and clamps -arrows-.

**USA models:**

**Caution**

***Risk of violating emission legislation applying to USA models.***

- ***Do NOT open hose connection -2-.***

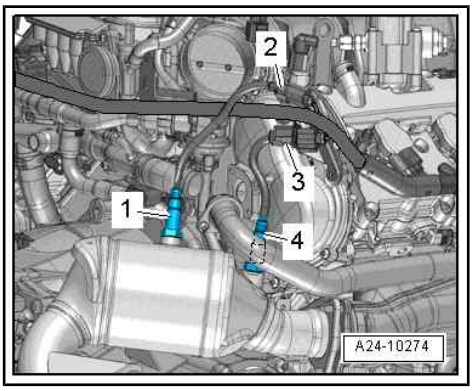
– Move air intake hose clear to one side (crankcase breather hose -2- remains connected). To do so, release hose clips -4- and clamps -arrows-.

**Continued for all vehicles:**

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

2 - For Lambda probe after catalytic converter - G130-

3 - For Lambda probe - G39-

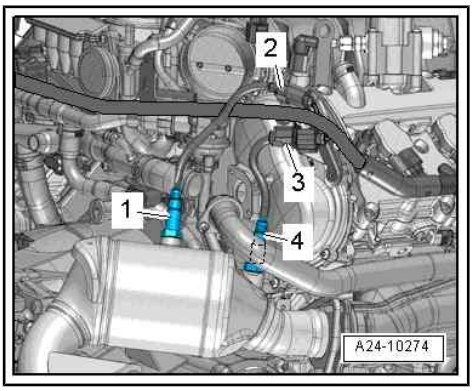



**Note**

*For illustration purposes, the installation position is shown with the engine removed.*

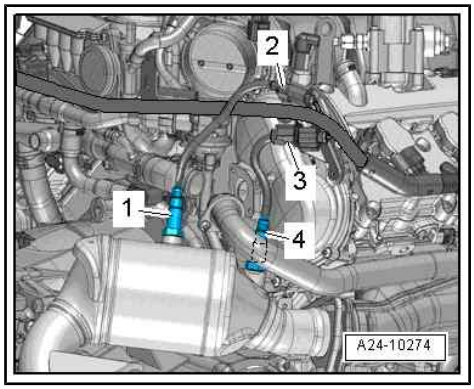
### Removing Lambda probe - G39-

– Unscrew Lambda probe - G39- -4- using tool from Lambda probe open ring spanner set - 3337- .



**Removing Lambda probe after catalytic converter - G130-**

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




**Installing**

- Tightening torque: refer to Lambda probes - overview ⇒ “9.1 Exploded view - Lambda probe”, page 335 .

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

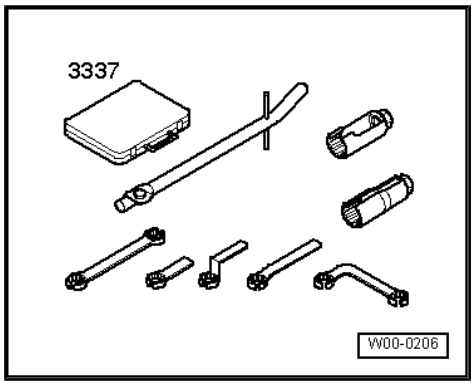
**Note**

- *New Lambda probes are coated with an assembly paste. The paste must not get into the slots on the Lambda probe body.*
- *In the case of a used Lambda probe grease only the thread with high-temperature paste. The paste must not get into the slots on the Lambda probe body. High-temperature paste ⇒ Parts catalogue*
- *When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.*
- *Fit all cable ties in the original positions when installing.*

## 9.2.2 Removing and installing Lambda probe 2 - G108- / Lambda probe after catalytic converter - G131- , cylinder bank 2

**Special tools and workshop equipment required**

- Lambda probe open ring spanner set - 3337-




**Removing**

**Note**

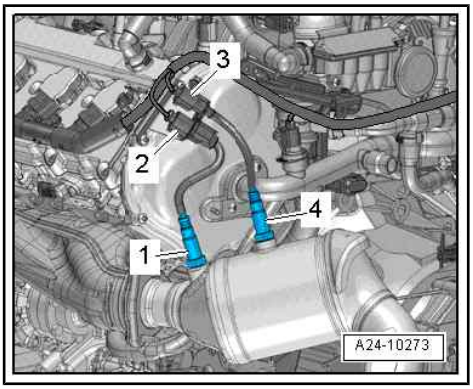
*Fit all cable ties in the original positions when installing.*

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

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

2 - For Lambda probe 2 - G108-

3 - For Lambda probe 2 after catalytic converter - G131-

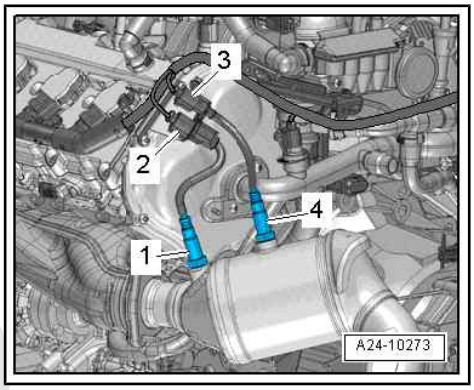



**Note**

*For illustration purposes, the installation position is shown with the engine removed.*

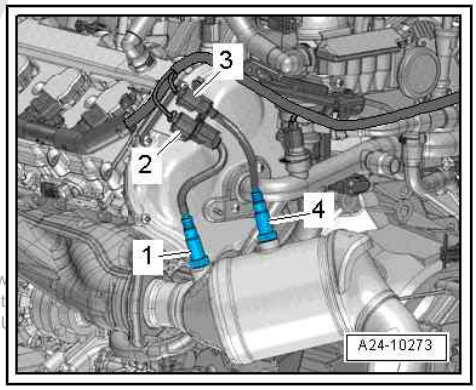
### Removing Lambda probe 2 - G108-

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




### Removing Lambda probe 2 after catalytic converter - G131-

– Unscrew Lambda probe 2 after catalytic converter - G131- -4- using tool from Lambda probe open ring spanner set - 3337- .




### Installing

- Tightening torque: refer to Lambda probes - overview ⇒ “9.1 Exploded view - Lambda probe”, page 335 .

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

permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept
with respect to the correctness of information in this document. Copyright by AU

**Note**

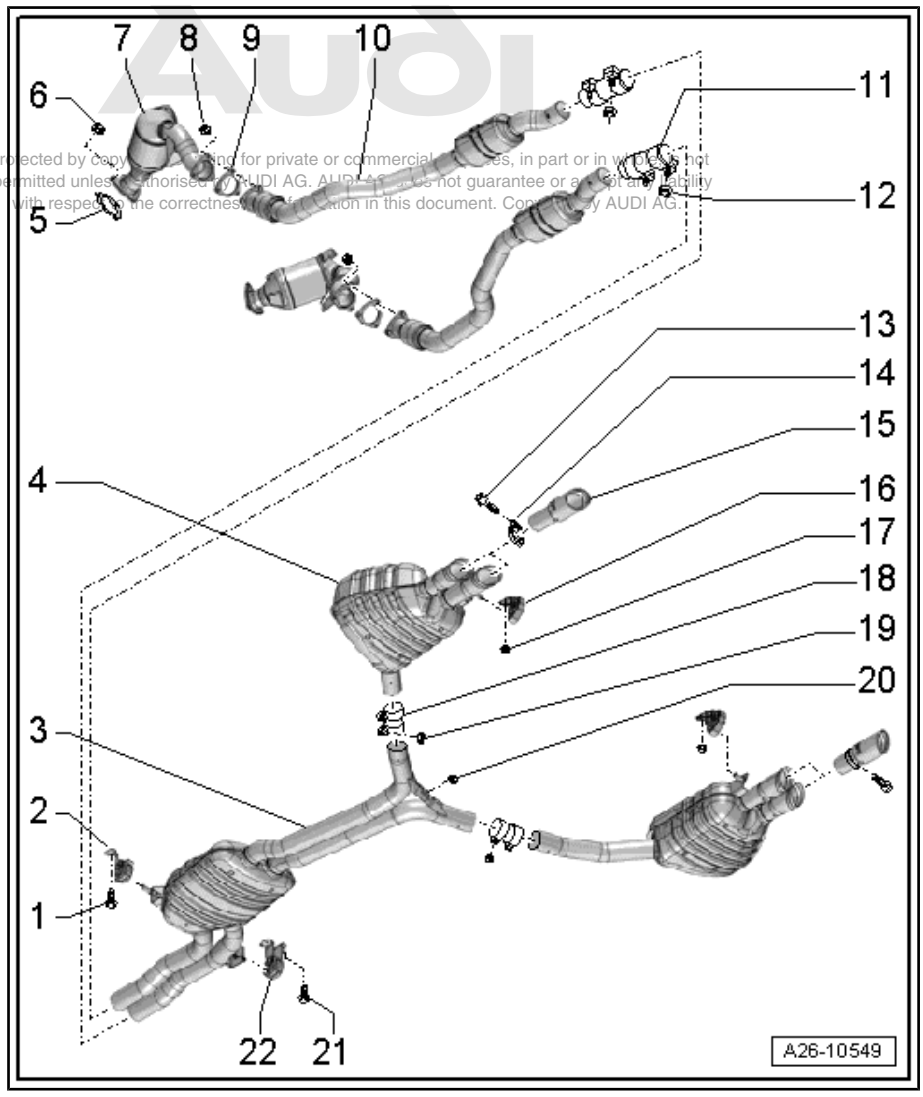
- *New Lambda probes are coated with an assembly paste. The paste must not get into the slots on the Lambda probe body.*
- *In the case of a used Lambda probe grease only the thread with high-temperature paste. The paste must not get into the slots on the Lambda probe body. High-temperature paste ⇒ Parts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

# 26 – Exhaust system

## 1 Exhaust pipes/silencers

⇒ “1.1 Exploded view - silencers”, page 340
⇒ “1.2 Removing and installing front silencers”, page 343
⇒ “1.3 Separating exhaust pipes/silencers”, page 344
⇒ “1.4 Renewing tailpipes”, page 345
⇒ “1.5 Stress-free alignment of exhaust system”, page 346
⇒ “1.6 Checking exhaust system for leaks”, page 347
⇒ “1.7 Aligning tailpipes”, page 347

### 1.1 Exploded view - silencers




**1 - Bolt**

- ❑ 23 Nm

**2 - Mounting**

- ❑ Renew if damaged
- ❑ Check preload ⇒ page 346

**3 - Centre silencer**

- ❑ Combined in one unit with rear silencers as original equipment. Can be renewed individually for repair purposes
- ❑ Cutting point ⇒ page 344
- ❑ Align exhaust system so it is free of stress ⇒ page 346

**4 - Rear silencer**

- ❑ Combined as one unit with centre silencer and tailpipe as original equipment
- ❑ Centre silencer, rear silencer and tailpipe can be renewed separately as required
- ❑ Cutting point between centre silencer and rear silencer ⇒ page 344
- ❑ Cutting point between rear silencer and tailpipe ⇒ page 345
- ❑ Align exhaust system so it is free of stress ⇒ page 346

**5 - Gasket**

- ❑ Renew

**6 - Nut**

- ❑ 23 Nm

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

**7 - Catalytic converter**

- ❑ Protect against knocks and impact
- ❑ Mounting components ⇒ page 342
- ❑ Removing and installing: left-side ⇒ page 348 , right-side on vehicles with manual gearbox ⇒ page 351 , right-side on vehicles with automatic gearbox ⇒ page 351

**8 - Nut**

- ❑ 23 Nm

**9 - Gasket**

- ❑ Renew

**10 - Front silencer**

- ❑ With flexible joint; do not bend flexible joint more than 10° – otherwise it can be damaged
- ❑ Removing and installing ⇒ page 343
- ❑ Align exhaust system so it is free of stress ⇒ page 346

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.

**11 - Clamp (front)**

- ❑ Installation position ⇒ page 342
- ❑ Before tightening, align exhaust system so it is free of stress ⇒ page 346
- ❑ Tighten bolted connections evenly

**12 - Nut**

- ❑ 23 Nm

**13 - Bolt**

- ❑ 23 Nm

**14 - Clamp**

**15 - Tailpipe**

- ❑ Combined in one unit with rear silencer as original equipment. Can be renewed individually for repair purposes
- ❑ Cutting point ⇒ page 345
- ❑ Aligning ⇒ page 347

**16 - Mounting**

- ❑ Renew if damaged
- ❑ Check preload ⇒ page 346

**17 - Nut**

- ❑ Renew
- ❑ 20 Nm

**18 - Clamp (rear)**

- ❑ For separate replacement of centre and rear silencers
- ❑ Installation position ⇒ page 342
- ❑ Before tightening, align exhaust system so it is free of stress ⇒ page 346
- ❑ Tighten bolted connections evenly

**19 - Nut**

- ❑ 23 Nm

**20 - Nut**

- ❑ Renew
- ❑ 23 Nm

**21 - Bolt**

- ❑ 23 Nm

**22 - Mounting**

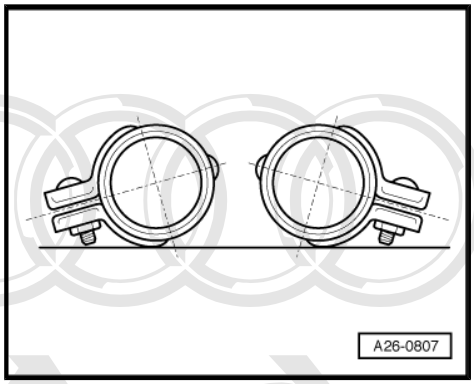
- ❑ Renew if damaged

❑ Check preload ⇒ page 346

### Installation position of front clamps

– Install clamps so that the bolt ends do not protrude beyond bottom of clamp.

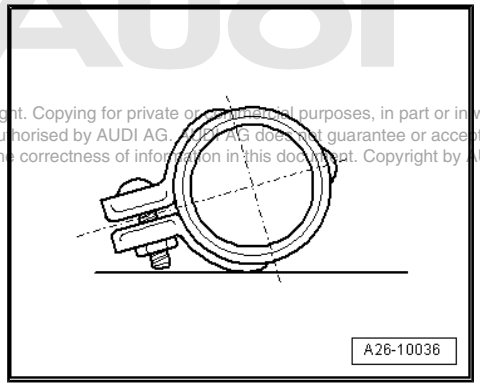
• Installation position: bolted connections face outwards.




### Installation position of rear clamps

– Install clamps so that the bolt ends do not protrude beyond bottom of clamp.

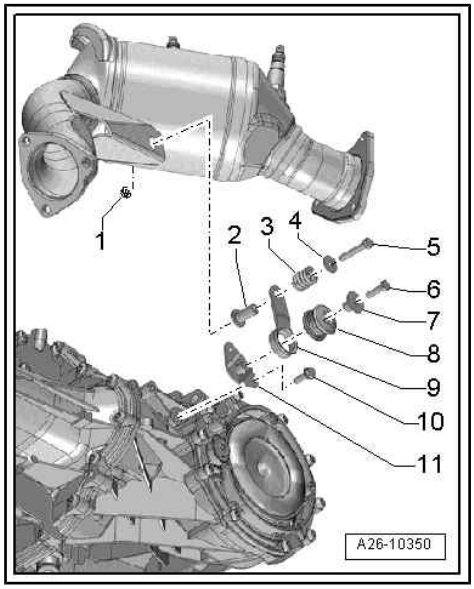
• Installation position: bolted connections face forwards.




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.

### Components of mountings for catalytic converter

1 - Nut, 23 Nm
2 - Spacer sleeve
3 - Compression spring
4 - Washer
5 - Bolt
6 - Bolt, 23 Nm
7 - Spacer sleeve
8 - Buffer
9 - Bracket
10 - Bolt, 23 Nm
11 - Bracket



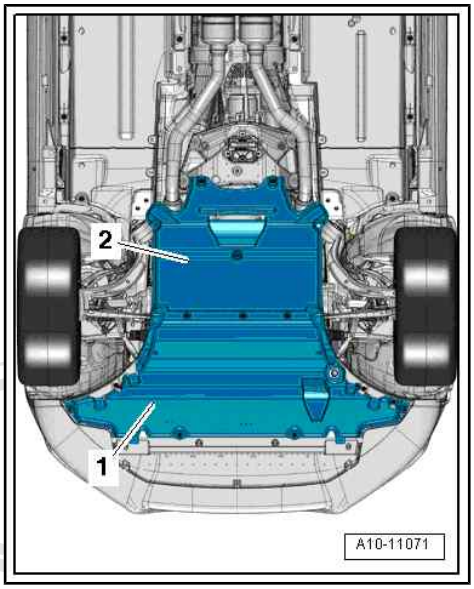

**Note**

*The illustration shows the right-side mountings; the left-side mountings are symmetrically reversed.*

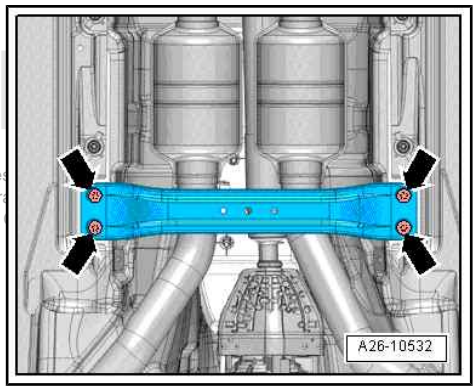
## 1.2 Removing and installing front silencers

**Removing**

– Remove rear noise insulation -2- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

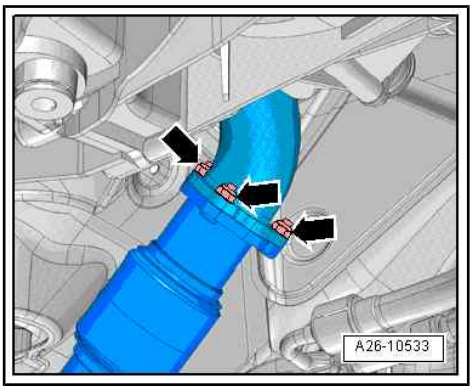



– Remove bolts -arrows- and detach front cross member.

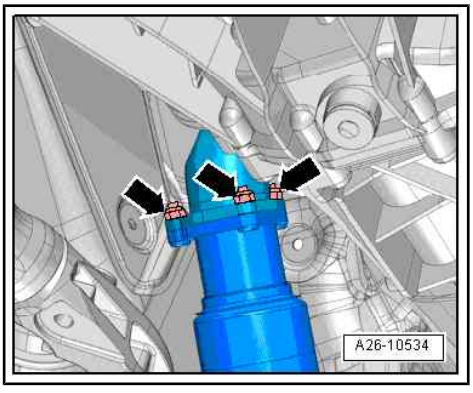



Protected by copyright. Copying for private or commercial purposes
permitted unless authorised by AUDI AG. AUDI AG does not guara
with respect to the correctness of information in this document.

– Unscrew nuts -arrows- for front silencer (left-side).



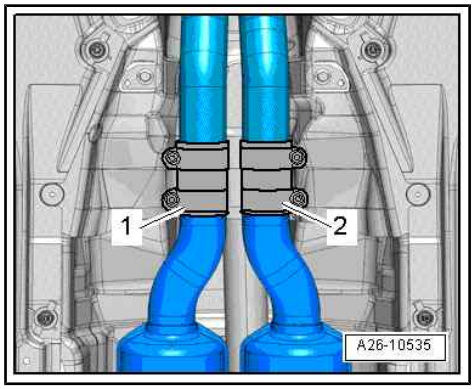

– Unscrew nuts -arrows- for front silencer (right-side).



**Caution**

*Risk of damage to flexible joints in front silencer.*

- *Do NOT bend the flexible joints in the front silencer more than 10°.*




– Release and push back clamp -1- or -2- and detach relevant front silencer.

**Installing**

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

- Tightening torque
⇒ "1.1 Exploded view - silencers", page 340

**Note**

*Renew seals, gaskets and self-locking nuts.*

– Align the exhaust system so it is free of stress ⇒ page 346 .

– Install front cross member ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .

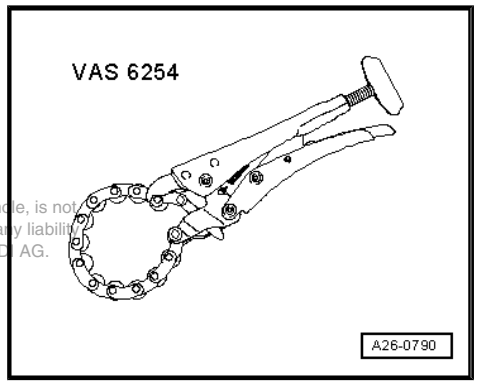
– Install noise insulation (rear) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

## 1.3 Separating exhaust pipes/silencers

- The connecting pipe can be cut through at the cutting point in order to renew the centre or rear silencer separately.
- The cutting point is marked by an indentation on the circumference of the exhaust pipe.

**Special tools and workshop equipment required**

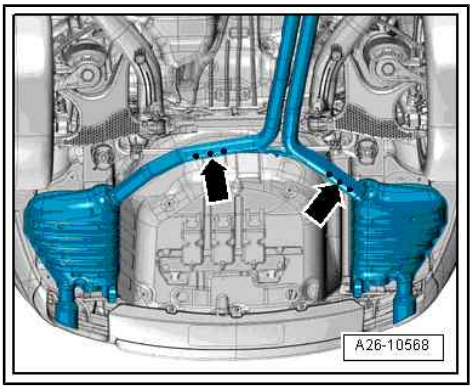
- Chain pipe cutter - VAS 6254-



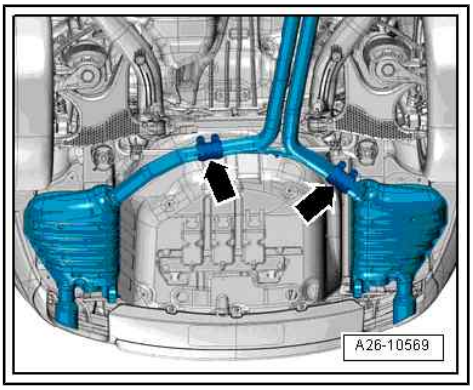

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

**Procedure**

– Cut through exhaust pipes at right angles at the positions marked -arrows- using chain pipe cutter - VAS 6254- .



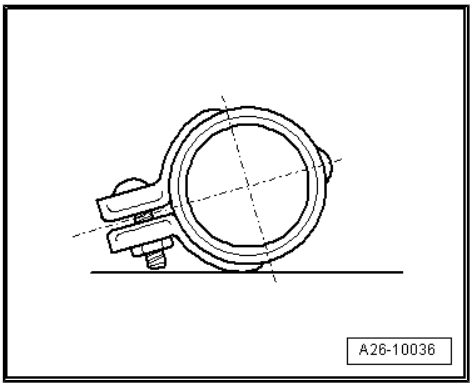

– Position centre of clamps -arrows- over cutting location.




– Install clamps so that the bolt ends do not protrude beyond bottom of clamp.

• Installation position: bolted connections face forwards.

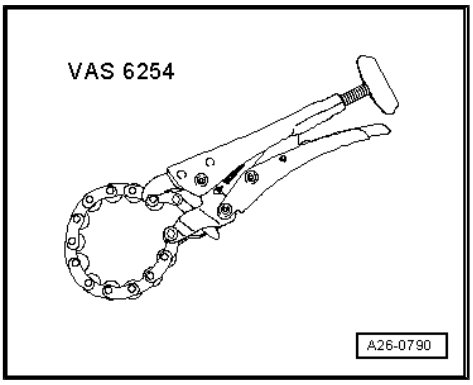
– Align the exhaust system so it is free of stress ⇒ page 346 .




## 1.4 Renewing tailpipes

**Special tools and workshop equipment required**

♦ Chain pipe cutter - VAS 6254-




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.

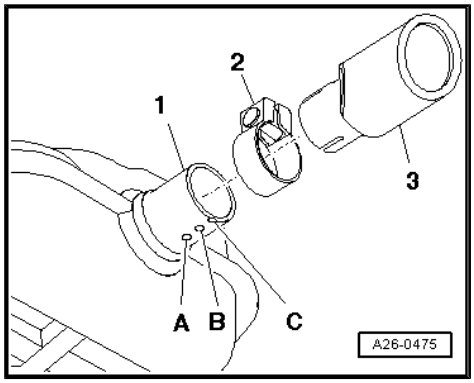
**Procedure**

- Tightening torque
  ⇒ "1.1 Exploded view - silencers", page 340

– Cut through tailpipe -1- with chain pipe cutter - VAS 6254- at the position marked -C-.

– Push new tailpipe -3- onto tailpipe as far as marking -A-. Slot on tailpipe should align with marking -B-.

– Tighten nut for clamp -2-.




## 1.5 Stress-free alignment of exhaust system

**Procedure**

- The exhaust system must be aligned when it is cool.
- Tightening torque
  ⇒ "1.1 Exploded view - silencers", page 340

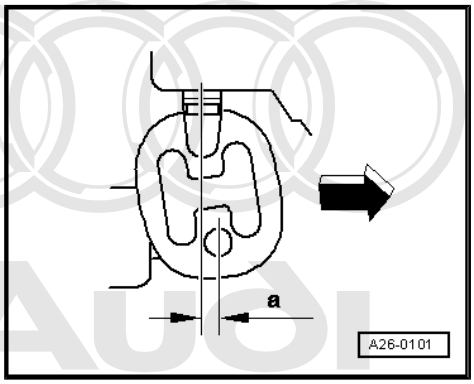
**Vehicles without clamps between centre silencer and rear silencers**

– Loosen bolted connections on front clamps.

– Push exhaust system towards front of vehicle -arrow- until mountings in front of centre silencer are preloaded by -a- = 6 ... 10 mm.

– Tighten bolted connections on clamps evenly.

– Align tailpipes ⇒ page 347 .




**Vehicles with clamps between centre silencer and rear silencers**

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

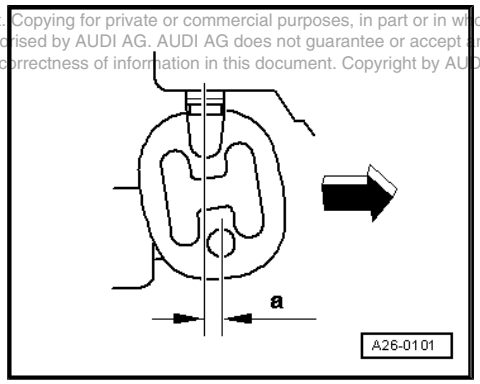
**Note**

*On a vehicle with clamps fitted between the centre silencer and rear silencers, it is also necessary to align the centre silencer.*

– Loosen bolted connections on front and rear clamps.

– Push exhaust system towards front of vehicle -arrow- until mountings in front of centre silencer are preloaded by -a- = 6 ... 10 mm.

– Tighten bolted connections on front clamps evenly.

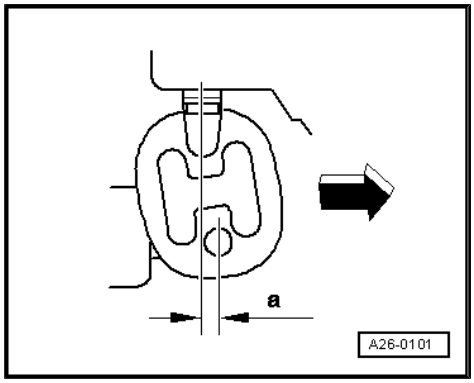



– Push rear section of exhaust system towards front of vehicle -arrow-, so that mountings (rear) for rear silencers are preloaded by -a- = 11 ... 15 mm.

– Align rear silencers so they are horizontal.

– Tighten bolted connections on rear clamps evenly.

– Align tailpipes ⇒ page 347 .



## 1.6 Checking exhaust system for leaks

– Start the engine and run at idling speed.

– Plug tailpipes during leak test (e.g. with cloth or plugs).

– Listen for noise at connections between cylinder head/exhaust manifold, exhaust manifold/front exhaust pipe, etc. to locate any leaks.

– Rectify any leaks that are found.

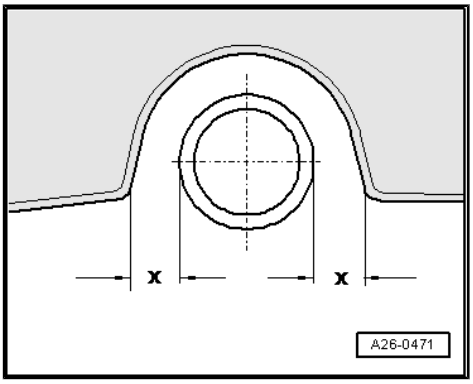
## 1.7 Aligning tailpipes

**Procedure**

• Tightening torque
⇒ “1.1 Exploded view - silencers”, page 340

– Check clearance between tailpipes and bumper on both sides:

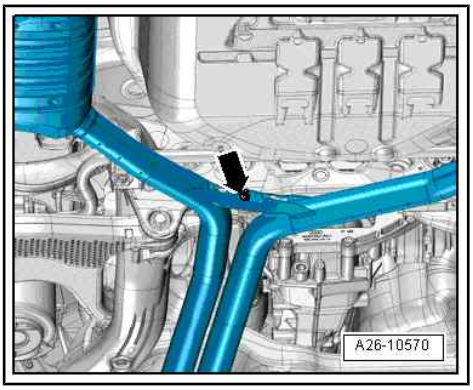
• Dimension -x- (left-side) = dimension -x- (right-side)




If necessary, correct dimension -x- as follows:

– Loosen connection -arrow- on strut between exhaust pipes.

– Adjust the distance between the rear silencers.




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 Emission control system

⇒ “2.1 Removing and installing catalytic converters”, page 348

## 2.1 Removing and installing catalytic converters

⇒ “2.1.1 Removing and installing catalytic converter (left-side)”, page 348

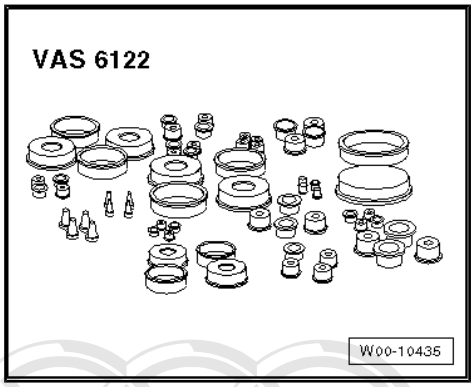
⇒ “2.1.2 Removing and installing catalytic converter (right-side) - vehicles with manual gearbox”, page 351

⇒ “2.1.3 Removing and installing catalytic converter (right-side) - vehicles with automatic gearbox”, page 351

## 2.1.1 Removing and installing catalytic converter (left-side)

**Special tools and workshop equipment required**

- Engine bung set - VAS 6122-

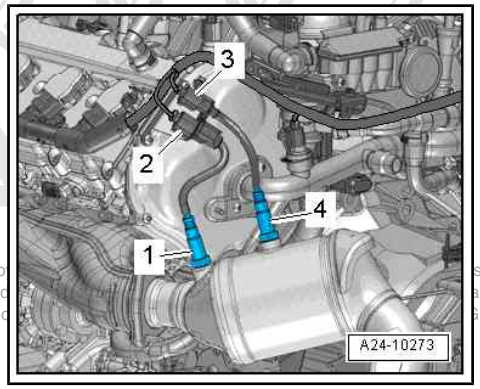



- Articulated wrench (12 mm) - T40220- for engines up to engine number CAUA 005 521

**Removing**

– Remove front silencer (left-side) ⇒ page 343 .

– Remove Lambda probes -G108- and -G131- ⇒ page 338 .

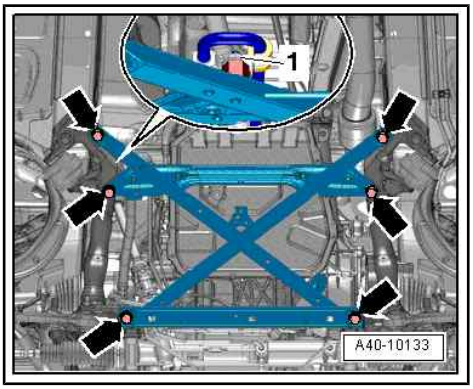



Protected by copyright. Cop
permitted unless authorised
with respect to the correc
s not
ability
s.

**Caution**

*Risk of damage to running gear components.*

- *The vehicle must NOT be lowered onto its wheels if the engine/gearbox mountings, steering rack or subframe cross brace are not properly installed.*
- *The vehicle must NOT be supported by applying a trolley jack or similar to the subframe or subframe cross brace.*

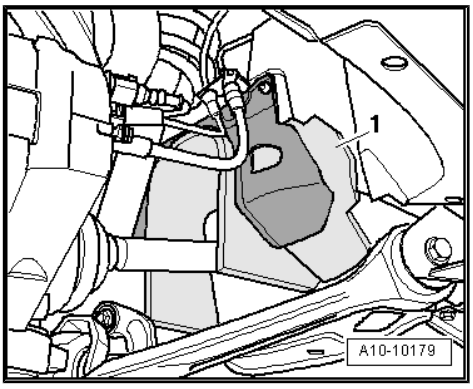



– Remove subframe cross brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .

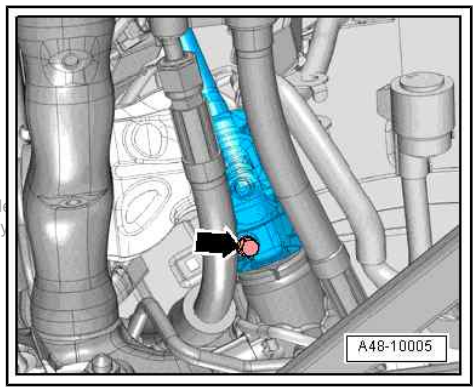
**Vehicles with automatic gearbox:**

– Remove front wheel (left-side) ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres; Tightening torque for wheel bolts .

– Remove noise insulation -1- in wheel housing (left-side).




– Detach intermediate steering shaft from steering rack and move clear by telescoping upwards ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Exploded view - steering column .




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

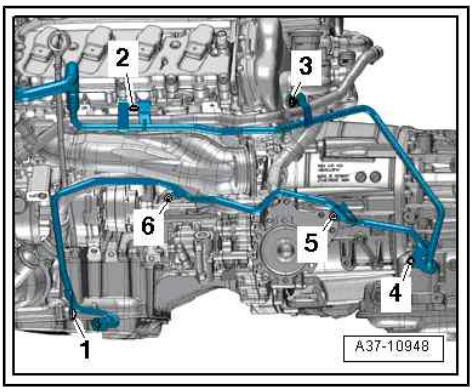
**Note**

*Place a cloth underneath to catch escaping ATF.*

– Remove bolts -1, 4, 5, 6-.

– Detach ATF line.

– Seal off open pipes/lines and connections with clean plugs from engine bung set - VAS 6122- .



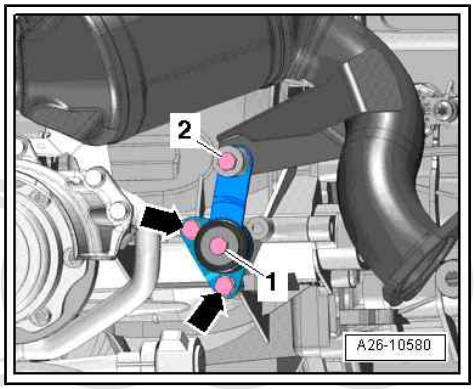

**Note**

*Disregard items marked -2- and -3-.*

**Continued for all vehicles:**

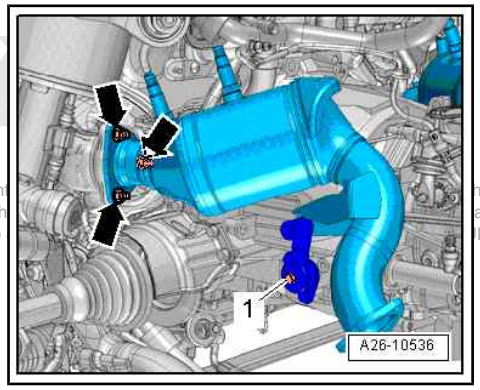
– Unscrew bolt -2- and detach bracket with spring.

– Remove bolts -arrows- and remove bracket.




– Remove nuts -arrows-; use articulated wrench (12 mm) - T40220- if necessary.

– Unscrew bolt -1- and remove catalytic converter (left-side).




**Installing**

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

Protected by copyright
permitted unless auth
with respect to the
hole, is not
any liability
DI AG.

- Tightening torque
  ⇒ “1.1 Exploded view - silencers”, page 340

**Note**

*Renew seals, gaskets and self-locking nuts.*

– Secure intermediate steering shaft to steering rack ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Exploded view - steering column .

– Install ATF lines ⇒ Rep. gr. 34 ; ATF circuit; Removing and installing ATF lines .

– Install subframe cross brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .

– Install upper suspension links ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Exploded view - suspension strut, upper links .

– Install anti-roll bar ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .

– Secure suspension strut to track control link ⇒ Running gear, axles, steering; Rep. gr. 40 ; Lower suspension links, swivel joint; Exploded view - lower suspension links, swivel joint .

– Install Lambda probes -G108- and -G131- ⇒ page 338 .

– Install front silencer (left-side) ⇒ page 343 .

– Align the exhaust system so it is free of stress ⇒ page 346 .

## 2.1.2 Removing and installing catalytic converter (right-side) - vehicles with manual gearbox

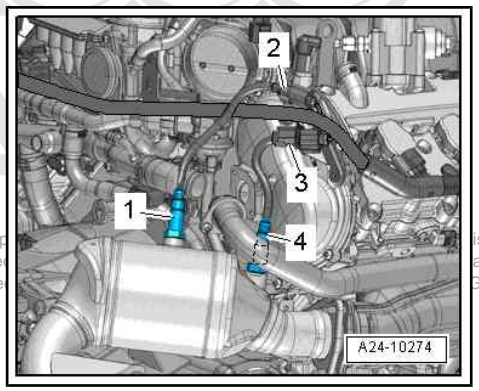
### Removing

- Gearbox removed ⇒ Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox

– Detach electrical connectors from bracket and unplug.

2 - For Lambda probe after catalytic converter - G130-

3 - For Lambda probe - G39-




Protected by copyright. Cop
permitted unless authorise
with respect to the corre
is not
ability
G.

**Note**

*Disregard items -1 and 4-.*

– Detach catalytic converter.

### Installing

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

- Tightening torque
⇒ “1.1 Exploded view - silencers”, page 340

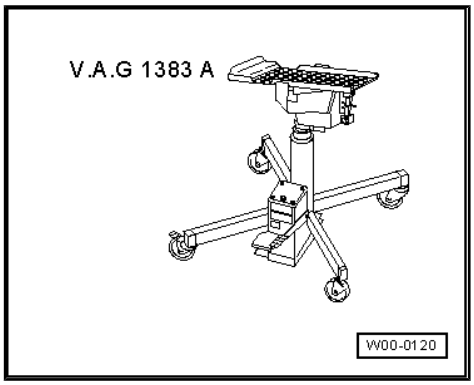
**Note**

*Renew seals, gaskets and self-locking nuts.*

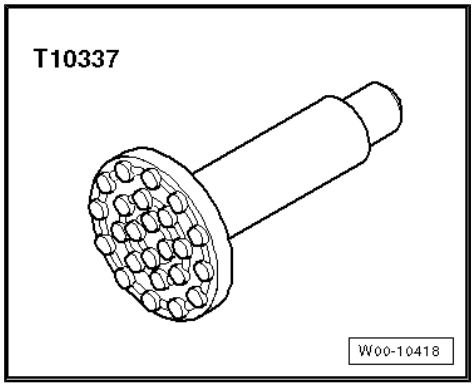
## 2.1.3 Removing and installing catalytic converter (right-side) - vehicles with automatic gearbox

### Special tools and workshop equipment required

♦ Engine and gearbox jack - V.A.G 1383 A-



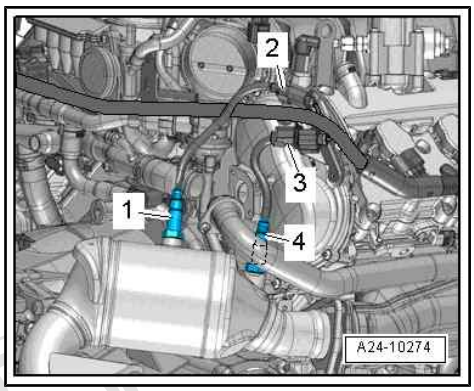
- Gearbox support - T10337-




**Removing**

– Remove front silencer (right-side) ⇒ page 343 .

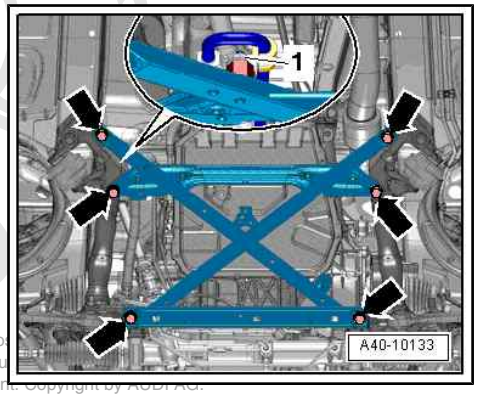
– Remove Lambda probes -G39- and -G130- ⇒ page 336 .




**Caution**

*Risk of damage to running gear components.*

- *The vehicle must NOT be lowered onto its wheels if the engine/gearbox mountings, steering rack or subframe cross brace are not properly installed.*
- *The vehicle must NOT be jacked up by applying a trolley jack or similar to the subframe or subframe cross brace.*



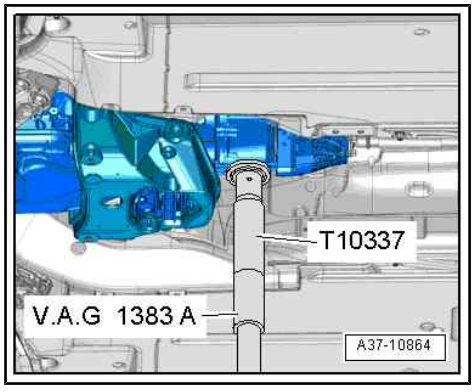

Protected by copyright. Copying for private or commercial purpo
permitted unless authorised by AUDI AG. AUDI AG does not gu
the completeness and accuracy of this document. Copyright by AUDI AG.

– Remove subframe cross brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .

– Set up gearbox support - T10337- on engine and gearbox jack - V.A.G 1383 A- .

– Position gearbox support - T10337- underneath gearbox.

– Raise gearbox slightly using engine and gearbox jack - V.A.G 1383 A- .

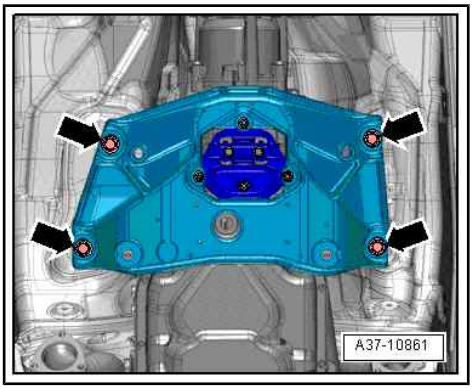



**WARNING**

*Risk of accident.*

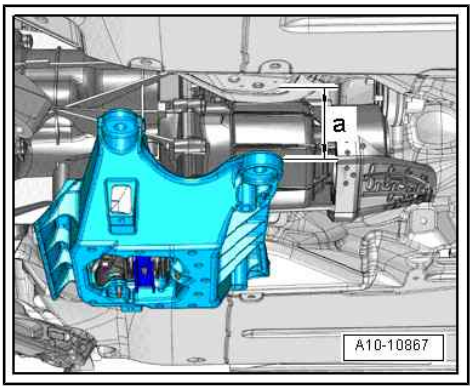
- *Engine and gearbox jack - V.A.G 1383 A- must remain in position when work is being carried out and must not be left unattended under the vehicle.*

– Remove bolts -arrows- for tunnel cross member.




– Lower engine/gearbox assembly using scissor-type assembly platform - VAS 6131 A- initially only as far as distance -a-.

• Distance -a- = 35 mm (maximum).




– Remove nuts -arrows- and bolt -1- and detach catalytic converter (right-side).

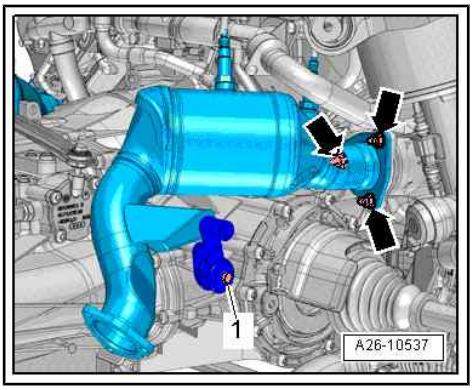
**Installing**

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

• Tightening torque
⇒ “1.1 Exploded view - silencers”, page 340

**Note**

*Renew seals, gaskets and self-locking nuts.*




– Install Lambda probes -G39- and -G130- ⇒ page 336 .

– Install front silencer (right-side) ⇒ page 343 .

– Align the exhaust system so it is free of stress ⇒ page 346 .

– Install subframe cross brace (⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe ), upper suspension links (⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Exploded view - suspension strut, upper links ) and anti-roll bar (⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Removing and installing anti-roll bar ), and secure suspension strut to track control link (⇒ Running gear, axles, steering; Rep. gr. 40 ; Lower suspension links, swivel joint; Exploded view - lower suspension links, swivel joint ).

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 Secondary air system

⇒ “3.1 Exploded view - secondary air system”, page 354

⇒ “3.2 Removing and installing secondary air pump motor V101 ”, page 358

⇒ “3.3 Checking secondary air inlet valve”, page 362

⇒ “3.4 Removing and installing combination valve”, page 366

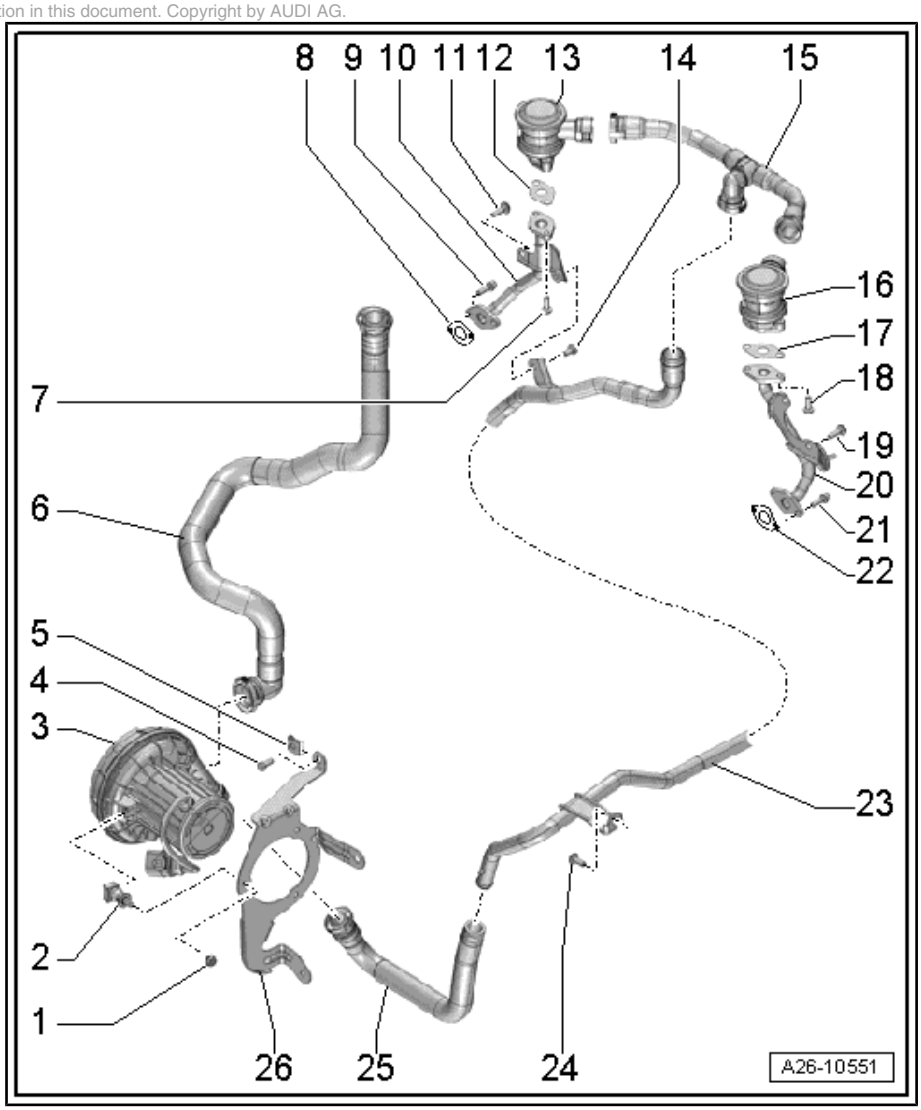
## 3.1 Exploded view - secondary air system

⇒ “3.1.1 Exploded view - secondary air system without vacuum control”, page 354

⇒ “3.1.2 Exploded view - secondary air system with vacuum control”, page 356

### 3.1.1 Exploded view - secondary air system without vacuum control

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




**1 - Nut**

- ❑ 9 Nm

**2 - Bonded rubber bush**

**3 - Secondary air pump motor - V101-**

- ❑ Fitting location: At front right in engine compartment below longitudinal member
- ❑ Removing and installing ⇒ page 358
- ❑ Check in `Guided Fault Finding` ⇒ Vehicle diagnostic tester

**4 - Bolt**

- ❑ 9 Nm

**5 - Speed nut**

**6 - Secondary air hose**

- ❑ From air cleaner housing

**7 - Bolt**

- ❑ 9 Nm

**8 - Gasket**

- ❑ Renew

**9 - Bolt**

- ❑ 9 Nm

**10 - Connecting pipe**

- ❑ To cylinder head (right-side)

**11 - Bolt**

- ❑ 9 Nm

**12 - Gasket**

- ❑ Renew

**13 - Combination valve for secondary air system (right-side)**

- ❑ Fitting location: at rear of cylinder head (right-side)
- ❑ Checking ⇒ page 362
- ❑ Removing and installing ⇒ page 367

**14 - Bolt**

- ❑ 9 Nm

**15 - Secondary air hose**

- ❑ To combination valves for secondary air inlet

**16 - Combination valve for secondary air system (left-side)**

- ❑ Fitting location: at rear of cylinder head (left-side)
- ❑ Checking ⇒ page 362
- ❑ Removing and installing ⇒ page 366

**17 - Gasket**

- ❑ Renew

**18 - Bolt**

- ❑ 9 Nm

**19 - Bolt**

- ❑ 9 Nm

**20 - Connecting pipe**

- ❑ To cylinder head (left-side)

**21 - Bolt**

- ❑ 9 Nm

**22 - Gasket**

- ❑ Renew

**23 - Secondary air pipe**

- ❑ Between secondary air pump motor - V101- and combination valves for secondary air system

**24 - Bolt**

- ❑ 9 Nm

**25 - Secondary air hose**

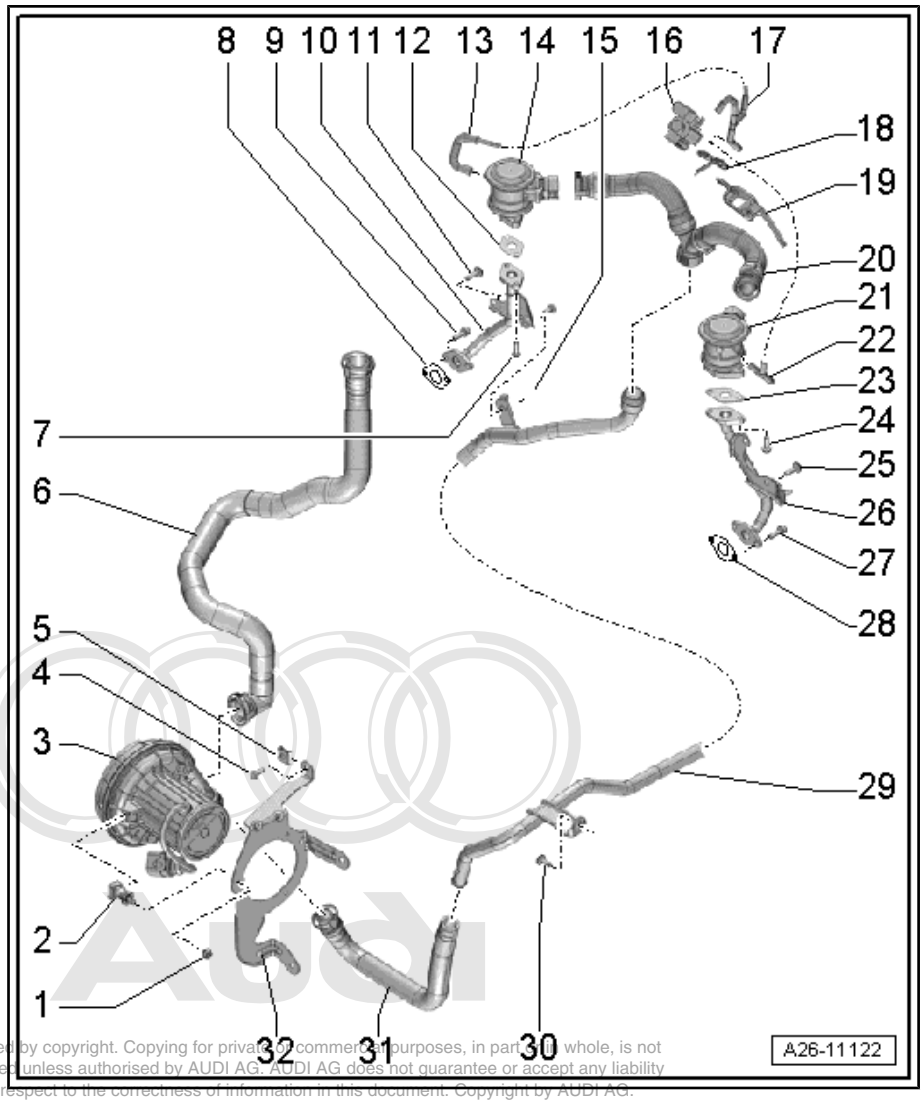
- ❑ To combination valves for secondary air inlet

**26 - Bracket**

- ❑ For secondary air pump motor - V101-

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.

## 3.1.2 Exploded view - secondary air system with vacuum control




**1 - Nut**
- ❑ 9 Nm

**2 - Bonded rubber bush**

**3 - Secondary air pump motor - V101-**
- ❑ Fitting location: At front right in engine compartment below longitudinal member
- ❑ Removing and installing ⇒ page 360
- ❑ Check in `Guided Fault Finding` ⇒ Vehicle diagnostic tester

**4 - Bolt**
- ❑ 9 Nm

**5 - Speed nut**

**6 - Secondary air hose**
- ❑ From air cleaner housing

**7 - Bolt**
- ❑ 9 Nm

**8 - Gasket**
- ❑ Renew

**9 - Bolt**
- ❑ 9 Nm

**10 - Connecting pipe**
- ❑ To cylinder head (right-side)

**11 - Bolt**
- ❑ 9 Nm

**12 - Gasket**
- ❑ Renew

**13 - Vacuum hose**
- ❑ To combination valve for secondary air system (right-side)

**14 - Combination valve for secondary air system (right-side)**
- ❑ Fitting location: at rear of cylinder head (right-side)
- ❑ Checking ⇒ page 364
- ❑ Removing and installing ⇒ page 369

**15 - Bolt**
- ❑ 9 Nm

**16 - Secondary air inlet valve - N112-**
- ❑ Fitting location ⇒ page 357

**17 - Vacuum line**
- ❑ To intake manifold

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

**18 - Vacuum line**

- ❑ To combination valves for secondary air inlet

**19 - Bracket**

- ❑ For secondary air inlet valve - N112-

**20 - Secondary air hose**

- ❑ To combination valves for secondary air inlet

**21 - Combination valve for secondary air system (left-side)**

- ❑ Fitting location: at rear of cylinder head (left-side)
- ❑ Checking ⇒ page 364
- ❑ Removing and installing ⇒ page 368

**22 - Vacuum hose**

- ❑ To combination valve for secondary air system (left-side)

**23 - Gasket**

- ❑ Renew

**24 - Bolt**

- ❑ 9 Nm

**25 - Bolt**

- ❑ 9 Nm

**26 - Connecting pipe**

- ❑ To cylinder head (left-side)

**27 - Bolt**

- ❑ 9 Nm

**28 - Gasket**

- ❑ Renew

**29 - Secondary air pipe**

- ❑ Between secondary air pump motor - V101- and combination valves for secondary air system

**30 - Bolt**

- ❑ 9 Nm

**31 - Secondary air hose**

- ❑ To combination valves for secondary air inlet

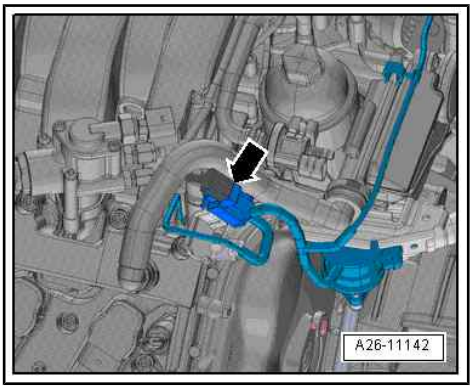
**32 - Bracket**

- ❑ For secondary air pump motor - V101-

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.

**Fitting location of secondary air inlet valve - N112-**

- ♦ At rear of cylinder head (left-side) -arrow-



## 3.2 Removing and installing secondary air pump motor - V101-

⇒ “3.2.1 Removing and installing secondary air pump motor V101 - system without vacuum control”, page 358

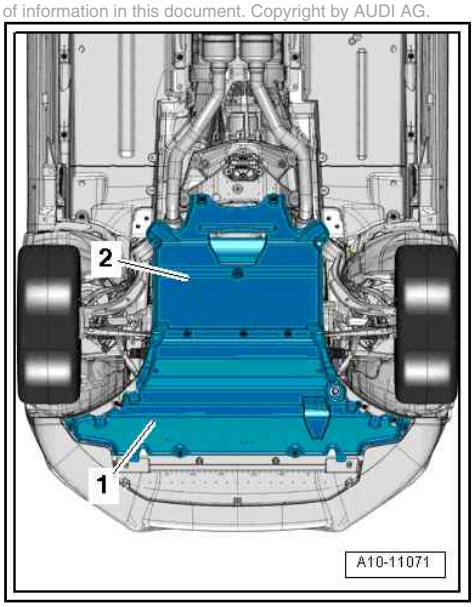
⇒ “3.2.2 Removing and installing secondary air pump motor V101 - system with vacuum control”, page 360

## 3.2.1 Removing and installing secondary air pump motor - V101- - system without vacuum control

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

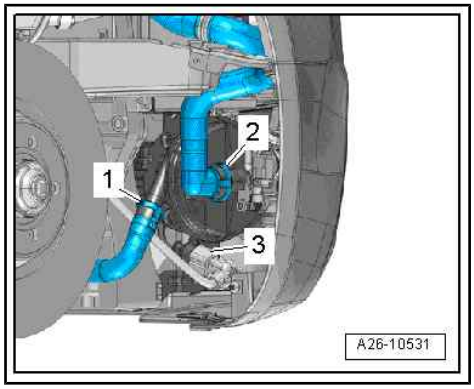
### Removing

– Remove front noise insulation -1- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

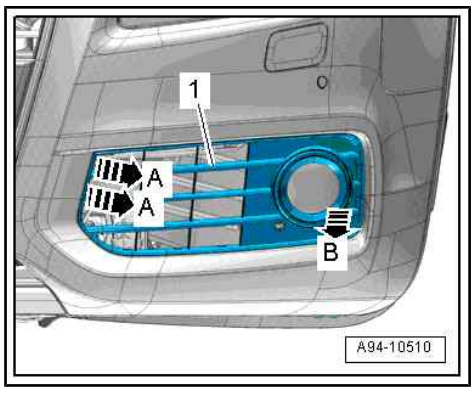



– Unplug electrical connector -3- at secondary air pump motor - V101- .

– Detach secondary air hoses -1- and -2-.



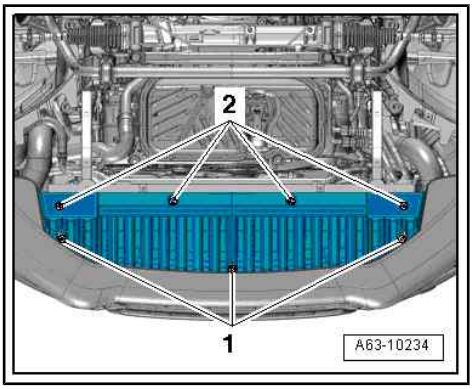

– Release retaining hooks -arrows A- and detach air intake grille -1- (right-side) from bottom section of bumper cover -arrow B-.



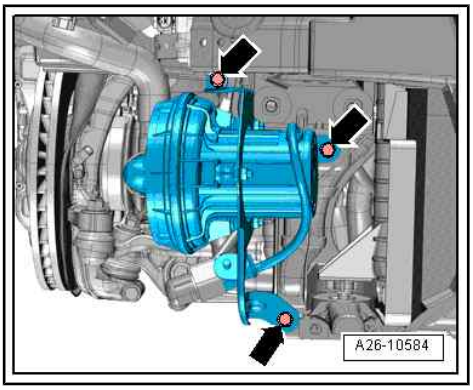

**Note**

*The procedure is illustrated for the left-side air intake grille.*

– Loosen bolts -1- and -2- and detach noise insulation at front bumper cover towards rear.




– Remove bolts -arrows- and detach secondary air pump.




**Note**

*For illustration purposes, the installation position is shown with the bumper cover removed.*

### Installing

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

- Tightening torque
  ⇒ “3.1.1 Exploded view - secondary air system without vacuum control”, page 354

**Note**

*Fit all cable ties in the original positions when installing.*

– Install noise insulation at bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Exploded view - bumper cover .

– Install noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

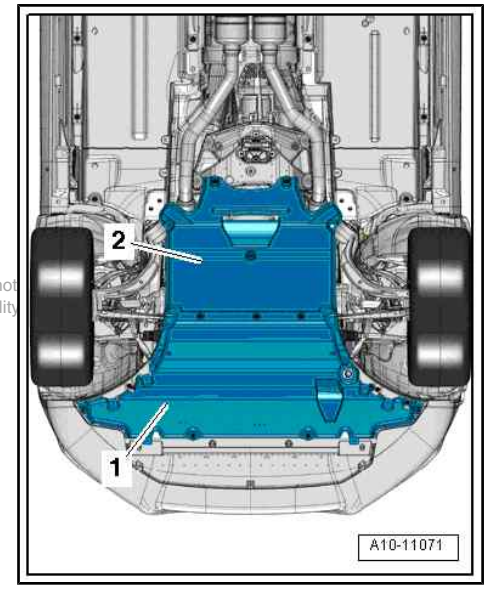
Reproduction of this Owner's Manual, even in extracts, is only permitted with written authorisation. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

## 3.2.2 Removing and installing secondary air pump motor - V101- - system with vacuum control

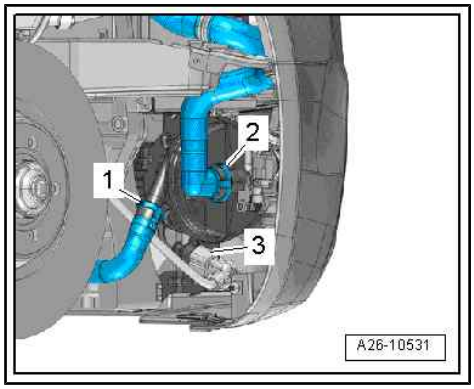
### Removing

– Remove front noise insulation -1- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

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



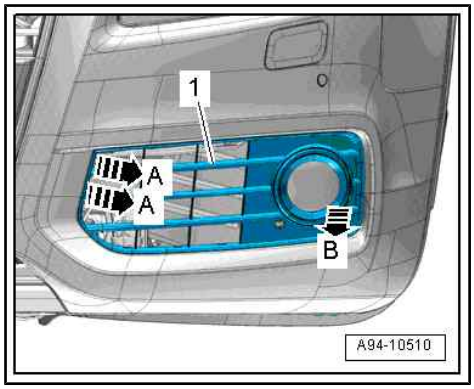

– Unplug electrical connector -3- at secondary air pump motor - V101- .
– Detach secondary air hoses -1- and -2-.



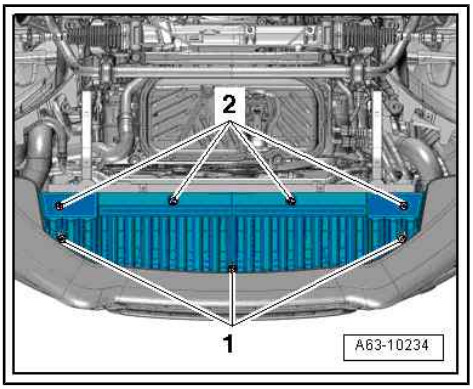

– Release retaining hooks -arrows A- and detach air intake grille -1- (right-side) from bottom section of bumper cover -arrow B-.

**Note**

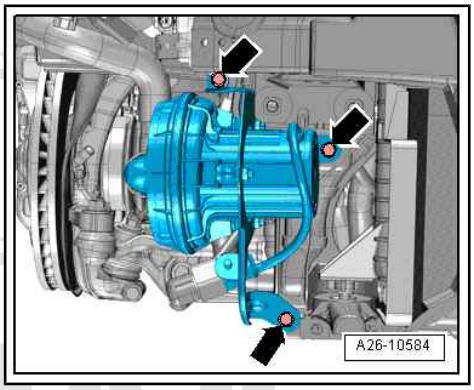
*The procedure is illustrated for the left-side air intake grille.*



– Loosen bolts -1- and -2- and detach noise insulation at front bumper cover towards rear.




– Remove bolts -arrows- and detach secondary air pump.




**Note**

*For illustration purposes, the installation position is shown with the bumper cover removed.*

### Installing

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

- Tightening torque
  ⇒ “3.1.2 Exploded view - secondary air system with vacuum control”, page 356

**Note**

*Fit all cable ties in the original positions when installing.*

– Install noise insulation at bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Exploded view - bumper cover .

– Install noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

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.

## 3.3 Checking secondary air inlet valve

⇒ “3.3.1 Checking secondary air inlet valve - system without vacuum control”, page 362

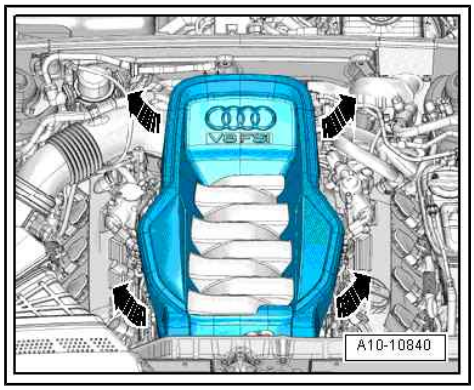
⇒ “3.3.2 Checking secondary air inlet valve - system with vacuum control”, page 364

### 3.3.1 Checking secondary air inlet valve - system without vacuum control

**Procedure**

- No leaks in hose connections.

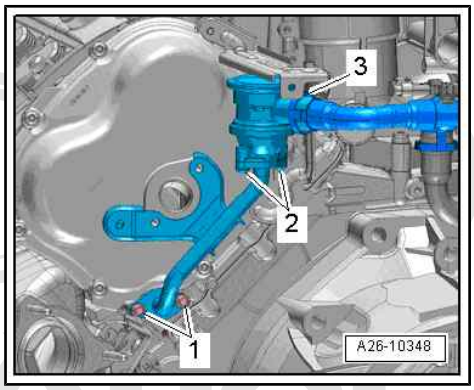
– Remove engine cover panel -arrows-.




**Combination valve for secondary air system (left-side):**

– Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .

– Press release tabs and disconnect secondary air hose -3-.

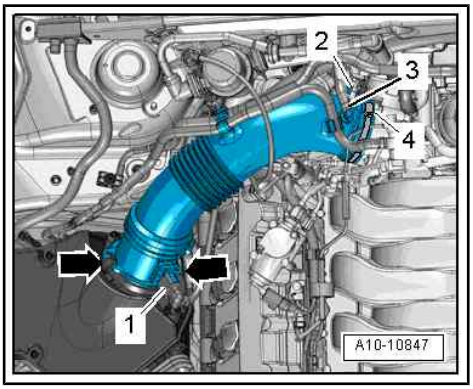



**Note**

*Disregard items -1 and 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.

**Combination valve for secondary air system (right-side):**




– Move clear fuel line and line going to activated charcoal filter at air pipe.
– Unplug electrical connector -1- at air mass meter - G70- .
– Disconnect vacuum line -3- from air pipe.

**Rest-of-world vehicles:**

– Press release tabs and detach crankcase breather hose -2- from air pipe.
– Unfasten hose clip -4-, release retaining clips -arrows- and remove air pipe with air mass meter - G70- .

**USA models:**

**Caution**

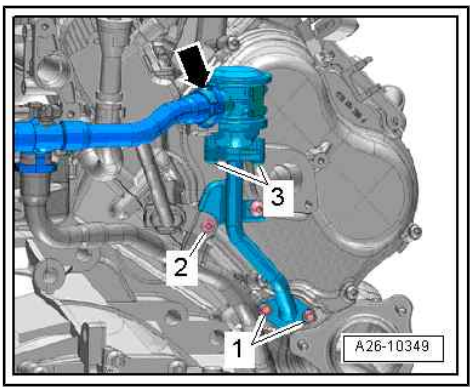
*Risk of violating emission legislation applying to USA models.*

- *Do NOT open hose connection -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.

– Release hose clip -4- and clamps -arrows- and move air pipe clear to one side (crankcase breather hose -2- remains connected).

**Continued for combination valve for secondary air system (right-side):**

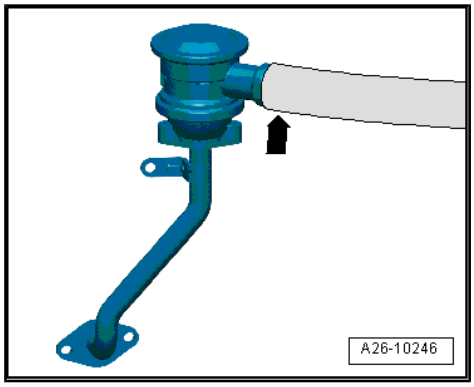



– Press release tabs and disconnect secondary air hose -arrow-.

**Note**

*Disregard -items 1, 2, 3-.*

**Both sides (continued):**




– Connect test hose -arrow- to combination valve for secondary air system.

– Blow lightly into test hose with your mouth (do not use compressed air).

• The combination valve for secondary air system should be closed; it should not be possible to blow through the hose.

– Blow more firmly (i.e. with greater pressure) into test hose with your mouth (do not use compressed air).

• The combination valve for secondary air system should open; it should now be possible to blow through the hose.

– Renew combination valve for secondary air system if you cannot determine the switching point: (left-side) ⇒ page 366 , (right-side) ⇒ page 367

**Installing**

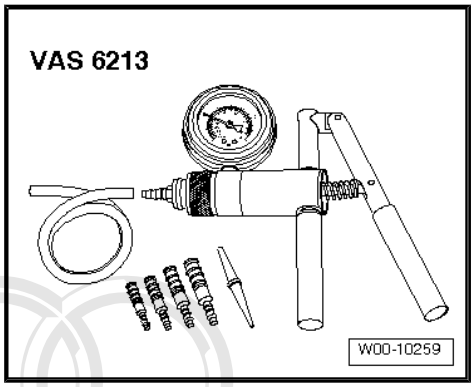
Installation is carried out in the reverse order; note the following:

– Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .

## 3.3.2 Checking secondary air inlet valve - system with vacuum control

**Special tools and workshop equipment required**

♦ Hand vacuum pump - VAS 6213-




**Procedure**

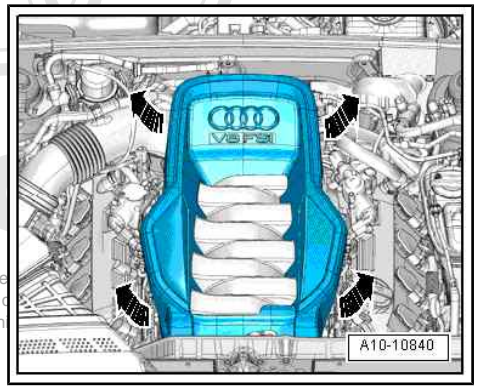
• Vacuum hoses and hose connections do not leak.

• Vacuum hoses are not clogged.

– Remove engine cover panel -arrows-.

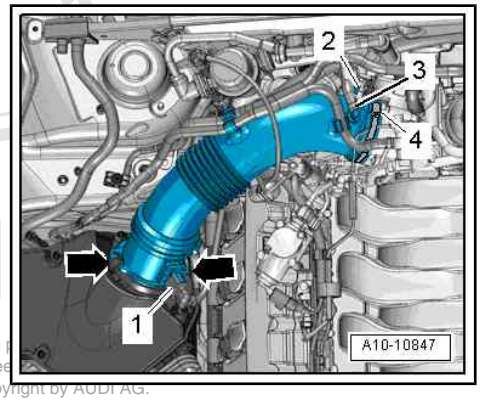
**Combination valve for secondary air system (left-side):**

– Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .




Protected by copyright. Copying for private or comme
permitted unless authorised by AUDI AG. AUDI AG d
with respect to the correctness of information in th

**Combination valve for secondary air system (right-side):**




– Move clear fuel line and line going to activated charcoal filter at air pipe.
– Unplug electrical connector -1- at air mass meter - G70- .
– Disconnect vacuum line -3- from air pipe.

**Rest-of-world vehicles:**

– Press release tabs and detach crankcase breather hose -2- from air pipe.
– Unfasten hose clip -4-, release retaining clips -arrows- and remove air pipe with air mass meter - G70- .

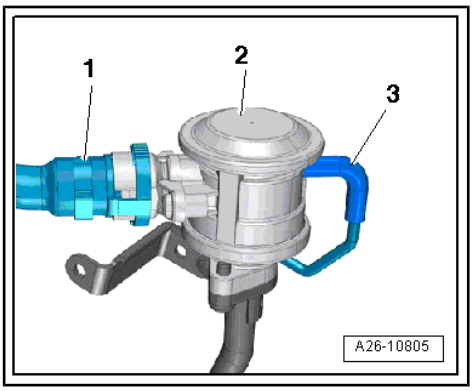
Reproduction and disclosure to third parties as well as other use for other purposes, in particular technical documentation, is authorised only with the express permission of AUDI AG. AUDI AG does not guarantee with respect to the correctness of information in this document. Copyright by AUDI AG.

**USA models:**

> **Caution**
>
> *Risk of violating emission legislation applying to USA models.*
>
> ♦ *Do NOT open hose connection -2-.*

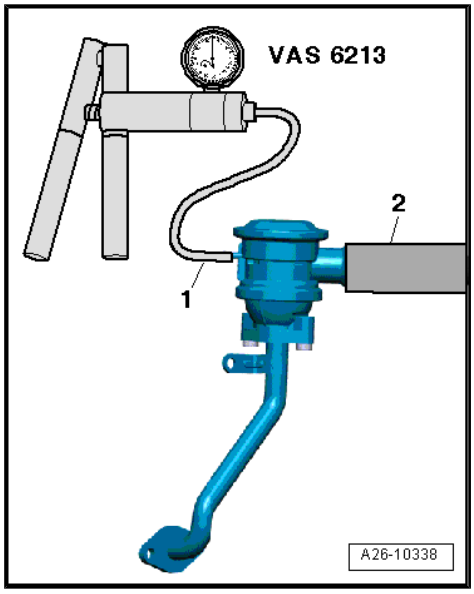
– Release hose clip -4- and clamps -arrows- and move air pipe clear to one side (crankcase breather hose -2- remains connected).

**Both sides (continued):**




– Detach vacuum hose -3- from combination valve to be checked.
– Press release tabs and disconnect secondary air hose -3-.

– Connect hand vacuum pump - VAS 6213- to vacuum connection -1- of combination valve to be checked.
– Connect test hose -2- to combination valve for secondary air system.
– Blow lightly into test hose with your mouth (do not use compressed air).
• The combination valve for secondary air system should be closed; it should not be possible to blow through the hose.
– Blow more firmly (i.e. with greater pressure) into test hose with your mouth (do not use compressed air).
• The combination valve for secondary air system should open; it should now be possible to blow through the hose.
– Renew combination valve for secondary air system if valve does not react as described:




⇒ “3.4.3 Removing and installing combination valve (left-side) - system with vacuum control”, page 368

⇒ “3.4.4 Removing and installing combination valve (right-side) - system with vacuum control”, page 369

**Installing**

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

– Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .

## 3.4 Removing and installing combination valve

⇒ “3.4.1 Removing and installing combination valve (left-side) - system without vacuum control”, page 366

⇒ “3.4.2 Removing and installing combination valve (right-side) - system without vacuum control”, page 367

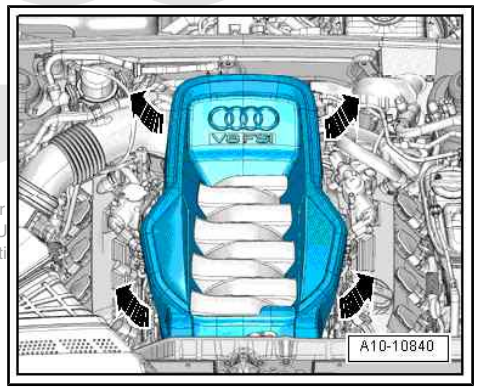
⇒ “3.4.3 Removing and installing combination valve (left-side) - system with vacuum control”, page 368

⇒ “3.4.4 Removing and installing combination valve (right-side) - system with vacuum control”, page 369

## 3.4.1 Removing and installing combination valve (left-side) - system without vacuum control

**Removing**

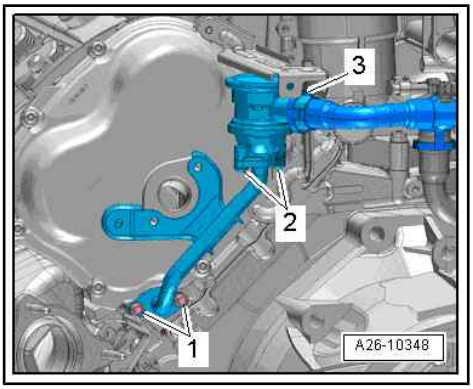
– Remove engine cover panel -arrows-.
– Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .
– Move electrical wiring harness clear and press to one side.




Copyright protected for private or
permitted unless authorised by AUDI AG. AU
with respect to the correctness of informati

– Press release tabs and disconnect secondary air hose -3-.

– Remove bolts -2- and detach combination valve (left-side) for secondary air system.




**Note**

- *Disregard -item 1-.*
- *For illustration purposes, the installation position is shown from the rear and with the engine removed.*

### Installing

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

- Tightening torque
  ⇒ "3.1.1 Exploded view - secondary air system without vacuum control", page 354

**Note**

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.

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

– Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .

## 3.4.2 Removing and installing combination valve (right-side) - system without vacuum control

### Removing

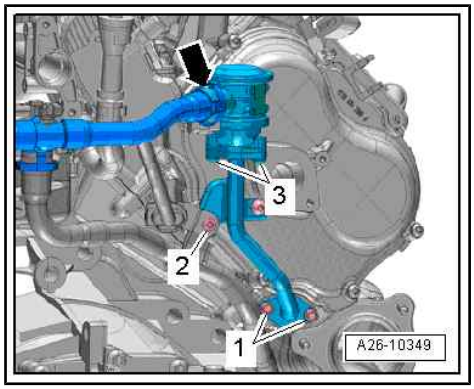
– Remove coolant connection ⇒ page 244 .

– Remove throttle valve module - J338- ⇒ page 306 .

– Press release tabs and disconnect secondary air hose -arrow-.

– Remove bolt -2- and move bracket with electrical connector to one side.

– Unscrew bolts -3- and detach combination valve (right-side) for secondary air system.




**Note**

- *Disregard -item 1-.*
- *For illustration purposes, the installation position is shown from the rear and with the engine removed.*

### Installing

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

- Tightening torque
  ⇒ “3.1.1 Exploded view - secondary air system without vacuum control”, page 354

**Note**

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.

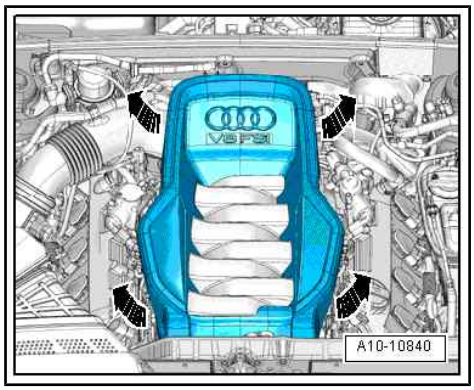
- *Renew gaskets and O-rings.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *Fit all cable ties in the original positions when installing.*

– Install throttle valve module - J338- ⇒ page 306 .

– Install coolant connection ⇒ page 244 .

## 3.4.3 Removing and installing combination valve (left-side) - system with vacuum control

### Removing

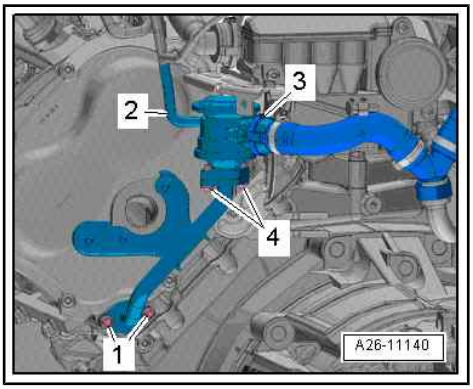



– Remove engine cover panel -arrows-.

– Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .

– Move electrical wiring harness clear and press to one side.

– Detach vacuum hose -2- from combination valve for secondary air system.
– Press release tabs and disconnect secondary air hose -3-.
– Remove bolts -4- and detach combination valve (left-side) for secondary air system.




**Note**

- *Disregard -item 1-.*
- *For illustration purposes, the installation position is shown from the rear and with the engine removed.*

### Installing

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

- Tightening torque
⇒ “3.1.2 Exploded view - secondary air system with vacuum control”, page 356

**Note**

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

– Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .

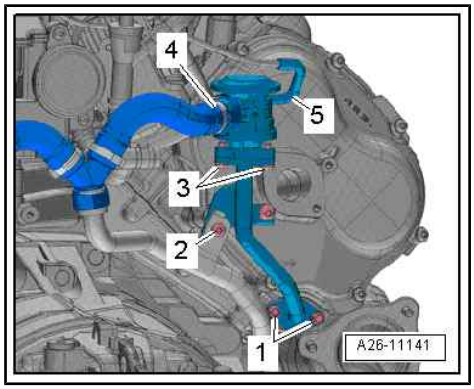
## 3.4.4 Removing and installing combination valve (right-side) - system with vacuum control

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

### Removing

– Remove coolant connection ⇒ page 244 .
– Remove throttle valve module - J338- ⇒ page 306 .

– Detach vacuum hose -5- from combination valve for secondary air system.
– Press release tabs and disconnect secondary air hose -4-.
– Remove bolt -2- and move bracket with electrical connector to one side.
– Unscrew bolts -3- and detach combination valve (right-side) for secondary air system.




**Note**

- *Disregard -item 1-.*
- *For illustration purposes, the installation position is shown from the rear and with the engine removed.*

### Installing

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

- Tightening torque
⇒ "3.1.2 Exploded view - secondary air system with vacuum control", page 356

**Note**

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

– Install throttle valve module - J338- ⇒ page 306 .
– Install coolant connection ⇒ page 244 .

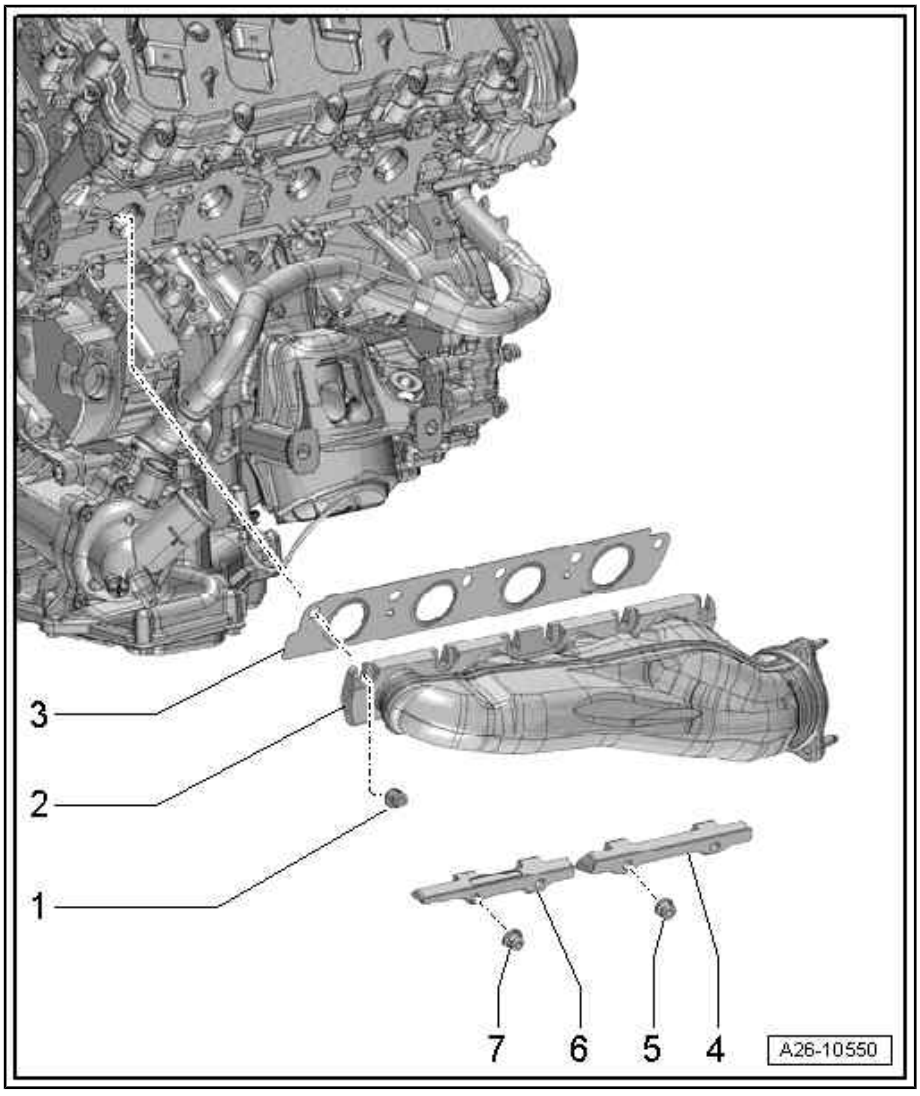
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

# 4 Exhaust manifolds

⇒ "4.1 Exploded view - exhaust manifolds", page 371

⇒ "4.2 Removing and installing exhaust manifolds", page 372

## 4.1 Exploded view - exhaust manifolds




**1 - Nut**

- ❑ Renew
- ❑ Coat with high-temperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue
- ❑ Tightening torque and tightening sequence: exhaust manifold (left-side) ⇒ page 372 ; exhaust manifold (right-side) ⇒ page 372

**2 - Exhaust manifold**

- ❑ Removing and installing: left-side ⇒ page 372 , right-side ⇒ page 374

**3 - Gasket**

- ❑ Renew

**4 - Mounting strip**

- ❑ Remains installed when exhaust manifold is removed

**5 - Nut**

- ❑ Renew
- ❑ Coat with high-temperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue
- ❑ 25 Nm

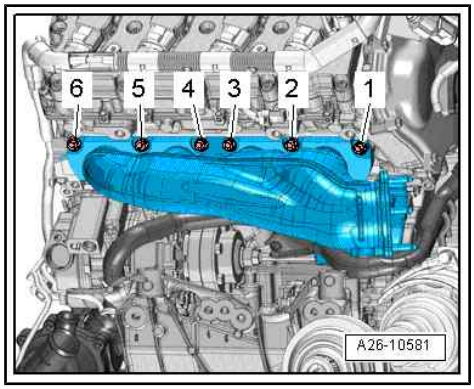
**6 - Mounting strip**

- ❑ Remains installed when exhaust manifold is removed

**7 - Nut**

- ❑ Renew
- ❑ Coat with high-temperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue
- ❑ 25 Nm

**Exhaust manifold (left-side) - tightening torque and sequence**



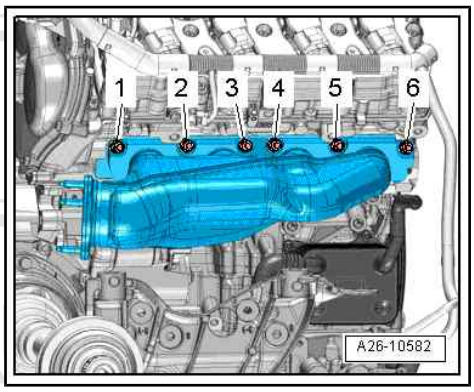

**Note**

- *Renew nuts for exhaust manifold.*
- *Coat threads of nuts with high-temperature paste; for high temperature paste refer to ⇒ Electronic parts catalogue .*

– Tighten nuts in 3 stages in the sequence shown:

| Stage | Nuts | Tightening torque |
|---|---|---|
| 1. | -1 … 6- | Screw in by hand until contact is made |
| 2. | -1 … 6- | 20 Nm |
| 3. | -1 … 6- | 30 Nm |

**Exhaust manifold (right-side) - tightening torque and sequence**




**Note**

- *Renew nuts for exhaust manifold.*
- *Coat threads of nuts with high-temperature paste; for high temperature paste refer to ⇒ Electronic parts catalogue .*

– Tighten nuts in 3 stages in the sequence shown:

| Stage | Nuts | Tightening torque |
|---|---|---|
| 1. | -1 … 6- | Screw in by hand until contact is made |
| 2. | -1 … 6- | 20 Nm |
| 3. | -1 … 6- | 30 Nm |

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

## 4.2 Removing and installing exhaust manifolds

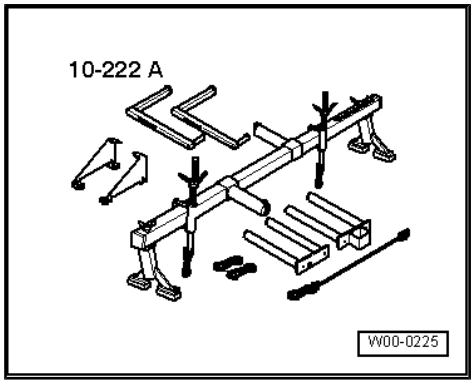
⇒ “4.2.1 Removing and installing exhaust manifold (left-side)”, page 372

⇒ “4.2.2 Removing and installing exhaust manifold (right-side)”, page 374

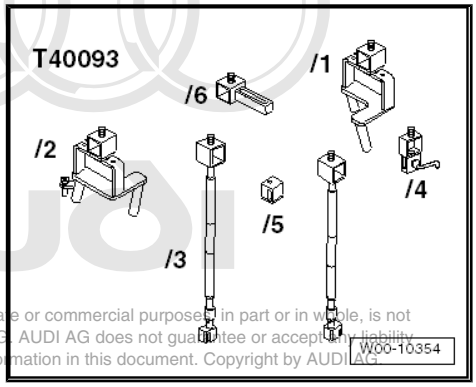
## 4.2.1 Removing and installing exhaust manifold (left-side)

**Special tools and workshop equipment required**

- Support bracket - 10 - 222 A-



♦ Engine support supplement set - T40093-




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

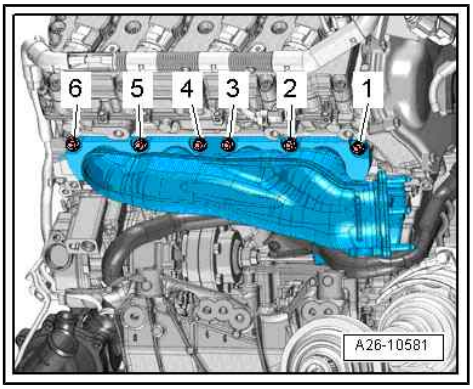
### Removing

– Remove coolant pipe (top left) ⇒ page 249 .

– Remove front wheel (left-side) ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres; Tightening torque for wheel bolts .

– Remove wheel housing liner (front left) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .

– Loosen nuts in the sequence -6 ... 1-.




**Note**

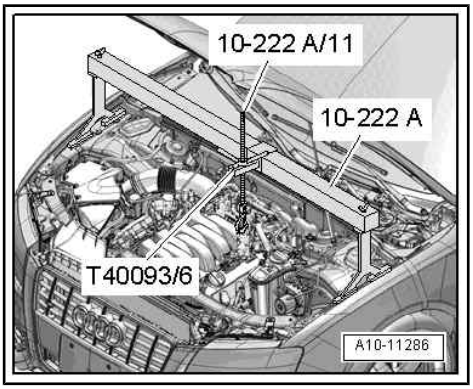
♦ *For illustration purposes, the installation position is shown with the engine removed.*

♦ *Both mounting strips (bottom) remain installed.*

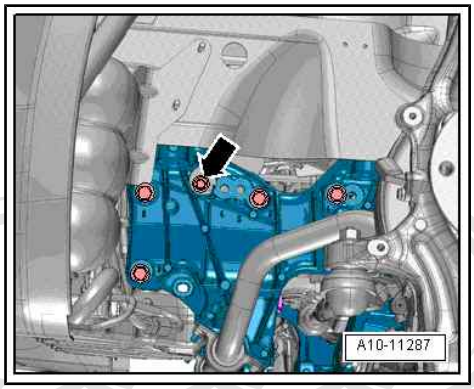
– Set up support bracket - 10 - 222 A- with adapter -T40093/6- on suspension turrets (left and right) as illustrated.

– Attach spindle - 10 - 222 A /11- to rear engine lifting eye (left-side).

– Partly take up weight of engine with spindle.



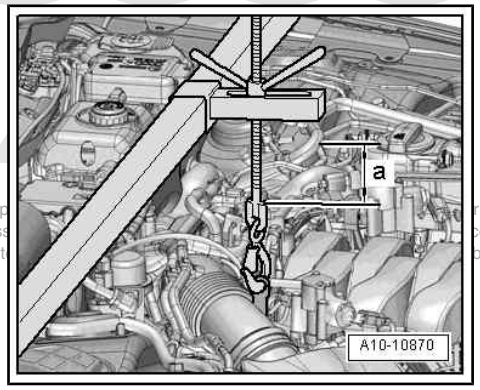
– Remove bolt -arrow- for engine mounting (left-side).




– Using spindle - 10 - 222 A /11- , raise engine through distance -a-.

• Distance -a- = approx. 30 mm.

– Unscrew nuts, detach exhaust manifold (left-side) from mounting strips and remove.




**Installing**

Protected by cop
permitted unless
respect t
r in whole, is not
ccept any liability
by AUDI AG.

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

• Tightening torque
⇒ Fig. ""Exhaust manifold (left-side) - tightening torque and sequence"" , page 372

**Note**

♦ *Renew gasket and self-locking nuts.*

♦ *Fit all cable ties in the original positions when installing.*

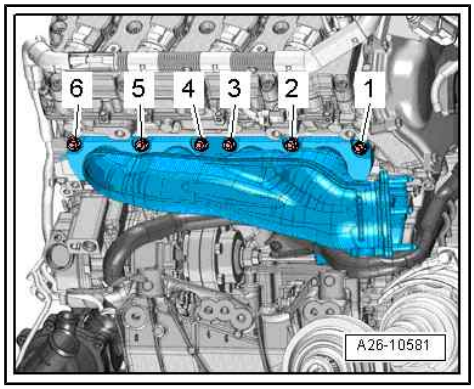
– Fit gasket onto studs.

– Fit exhaust manifold in mounting strips and tighten nuts ⇒ page 372 .

– Install engine mounting (left-side) ⇒ page 81 .

– Install front wheel housing liner (left-side) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .

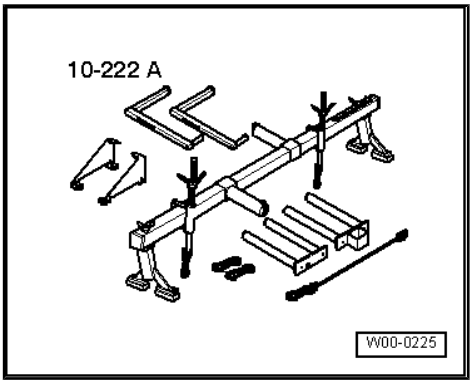
– Install coolant pipe (top left) ⇒ page 249 .



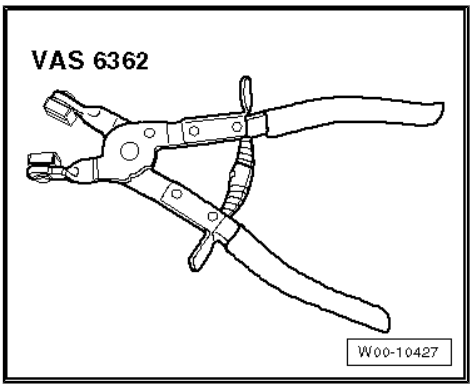

## 4.2.2 Removing and installing exhaust manifold (right-side)

**Special tools and workshop equipment required**

♦ Support bracket - 10 - 222 A-

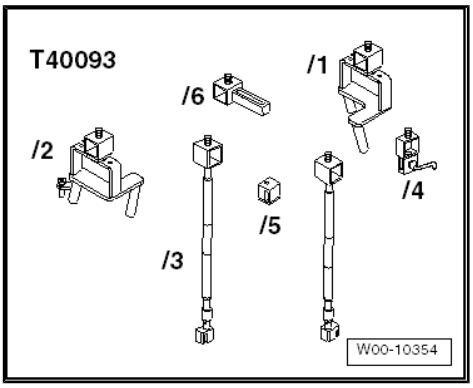



♦ Hose clip pliers - VAS 6362-




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.

♦ Engine support supplement set - T40093-




♦ Articulated wrench (12 mm) - T40220- for engines up to engine number CAUA 005 521

**Removing**

– Remove engine cover panel -arrows-.

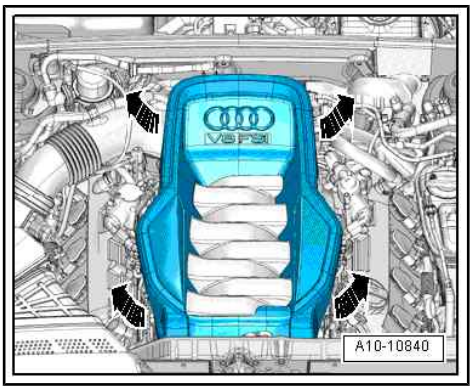
– Remove front wheel (right-side) ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres; Tightening torque for wheel bolts .

– Remove wheel housing liner (front right) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .

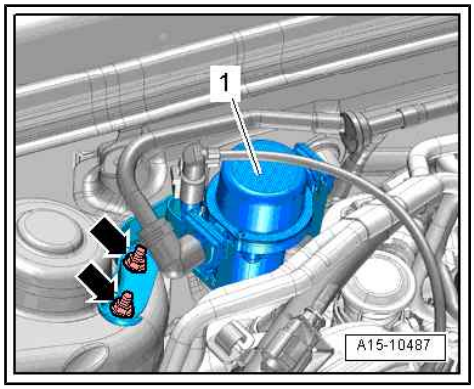
– Drain coolant ⇒ page 229 .

– Remove front silencer (right-side) ⇒ page 343 .

– Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .



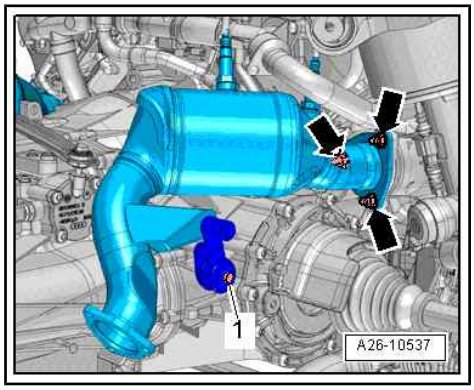
– Remove nuts -arrows- and move vacuum pump -1- to one side with lines connected.



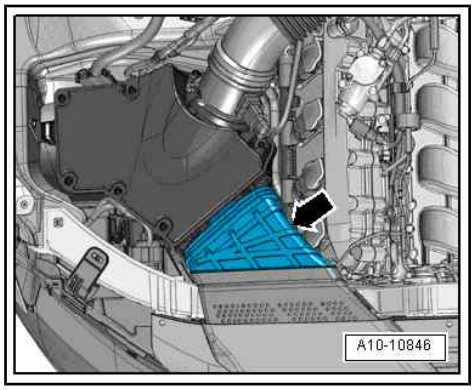

– Remove nuts -arrows-; use articulated wrench (12 mm) - T40220- if necessary.
– Remove bolt -1- and press catalytic converter (right-side) to the side.

**Note**

*For illustration purposes, the installation position is shown with the engine removed.*



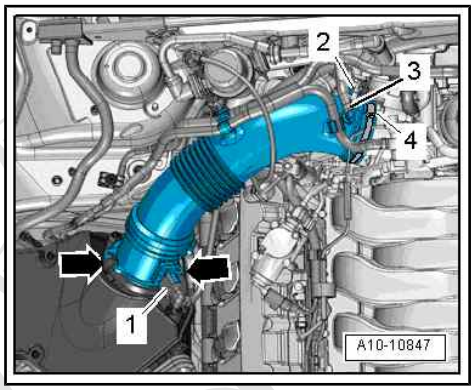

– Remove air duct -arrow-.




– Unplug electrical connector -1- at air mass meter - G70- .
– Disconnect vacuum line -3- from air pipe.

**Rest-of-world vehicles:**

– Press release tabs and detach crankcase breather hose -2- from air pipe.
– Unfasten hose clip -4-, release retaining clips -arrows- and remove air pipe with air mass meter - G70- .




**USA models:**

**Caution**

***Risk of violating emission legislation applying to USA models.***

- ***Do NOT open hose connection -2-.***

– Move air pipe clear to one side (crankcase breather hose -2- remains connected). To do so, release hose clip -4- and clamps -arrows-.

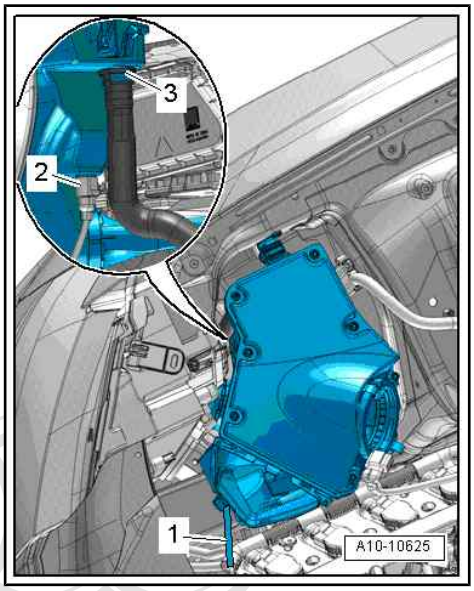
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

**Continued for all vehicles:**

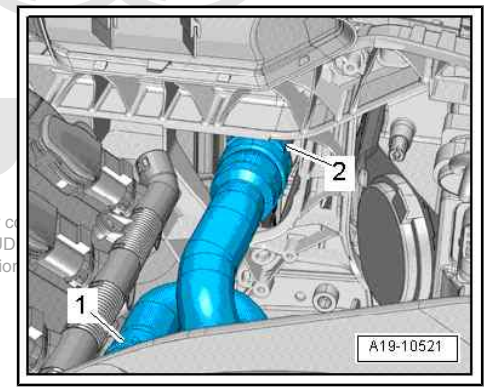
– Disconnect vacuum line -1-.

– Detach air cleaner housing and unplug electrical connector -2- at variable intake manifold change-over valve - N335- on reverse side of air cleaner.

– Disconnect hose -3- for secondary air system.



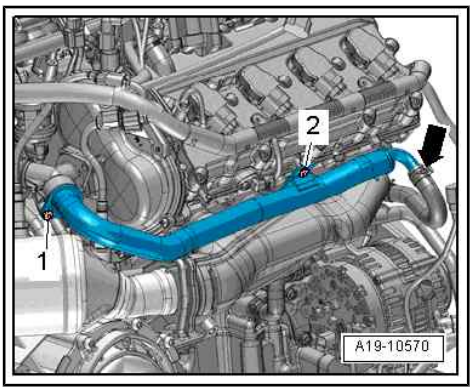

– Lift retaining clip -2-, release hose clip -1- on coolant pipe (right-side) and remove coolant hose.




Protected by copyright. Copying for private or c
permitted unless authorised by AUDI AG. AUD
with respect to the correctness of informatio

– Remove bolts -1- and -2- and detach coolant hose -arrow-.

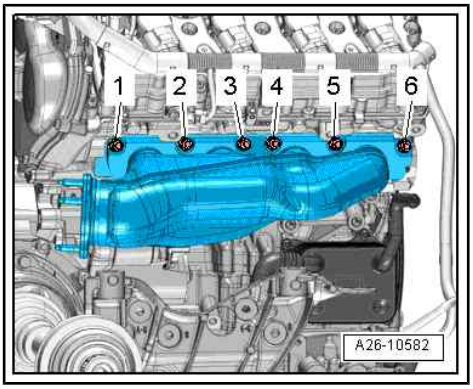
– Detach coolant pipe (right-side) from coolant connection and move clear to the side.



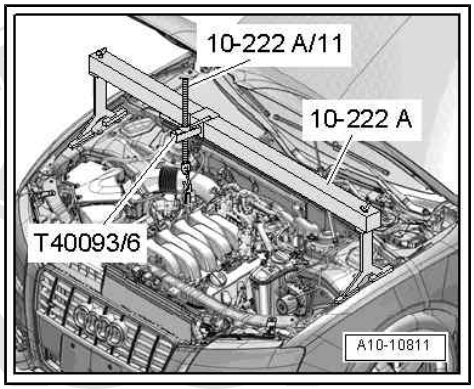

– Loosen nuts in the sequence -6 ... 1-.

**Note**

- *For illustration purposes, the installation position is shown with the engine removed.*
- *Both mounting strips (bottom) remain installed.*

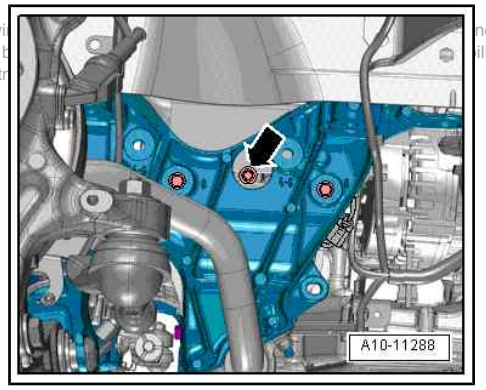


– Set up support bracket - 10 - 222 A- with adapter -T40093/6- on suspension turrets (left and right) as illustrated.
– Attach spindle -10 - 222 A /11- to engine lifting eye (rear right).
– Partly take up weight of engine with spindle.

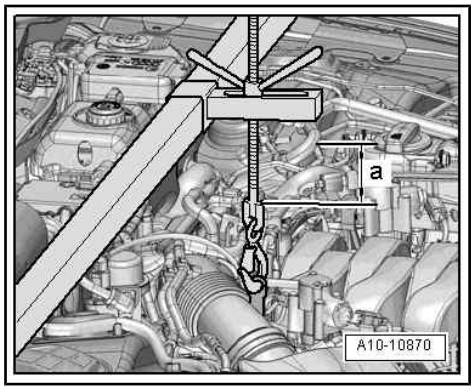



– Remove bolt -arrow- for engine mounting (right-side).

Protected by copyright. Copyi not permitted unless authorised b ility with respect to the correctr




– Using spindle - 10 - 222 A /11- , raise engine through distance -a-.
• Distance -a- = approx. 30 mm.
– Unscrew nuts, detach exhaust manifold (right-side) from mounting strips and remove.



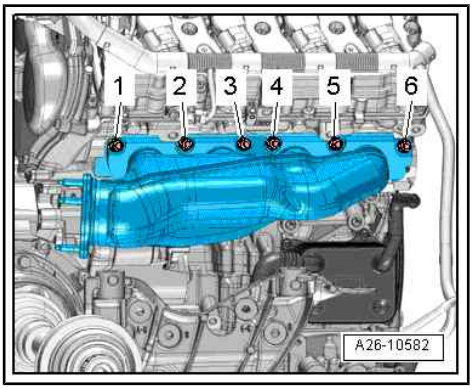

### Installing

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

• Tightening torque
⇒ Fig. ""Exhaust manifold (left-side) - tightening torque and sequence"" , page 372

**Note**

♦ *Renew gasket and self-locking nuts.*
♦ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*




- Fit gasket onto studs.
- Fit exhaust manifold in mounting strips and tighten nuts ⇒ Fig. ""Exhaust manifold (right-side) - tightening torque and sequence"" , page 372 .
- Install engine mounting (right-side) ⇒ page 88 .
- Install coolant pipe (right-side) ⇒ page 254 .
- Install front silencer (right-side) ⇒ page 343 .
- Install catalytic converter (right-side): vehicles with manual gearbox ⇒ page 351 ; vehicles with automatic gearbox ⇒ page 351 .
- Install vacuum pump ⇒ Brake system; Rep. gr. 47 ; Vacuum system; Removing and installing vacuum pump .
- Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .
- Install front right wheel housing liner ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .
- Fill up with coolant ⇒ page 232 .

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.

# 28 – Ignition system

## 1 Ignition system

⇒ “1.1 Exploded view - ignition system”, page 380

⇒ “1.2 Test data, spark plugs”, page 381

⇒ “1.3 Removing and installing ignition coils”, page 381

⇒ “1.4 Removing and installing knock sensor”, page 383

⇒ “1.5 Removing and installing Hall senders”, page 384

⇒ “1.6 Removing and installing engine speed sender G28 ”, page 385

### 1.1 Exploded view - ignition system

**1 - Connector for ignition coil**

- ❑ 4-pin

**2 - Bolt**

- ❑ 10 Nm

**3 - 3-pin connector**

**4 - Hall sender**

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

**5 - O-ring**

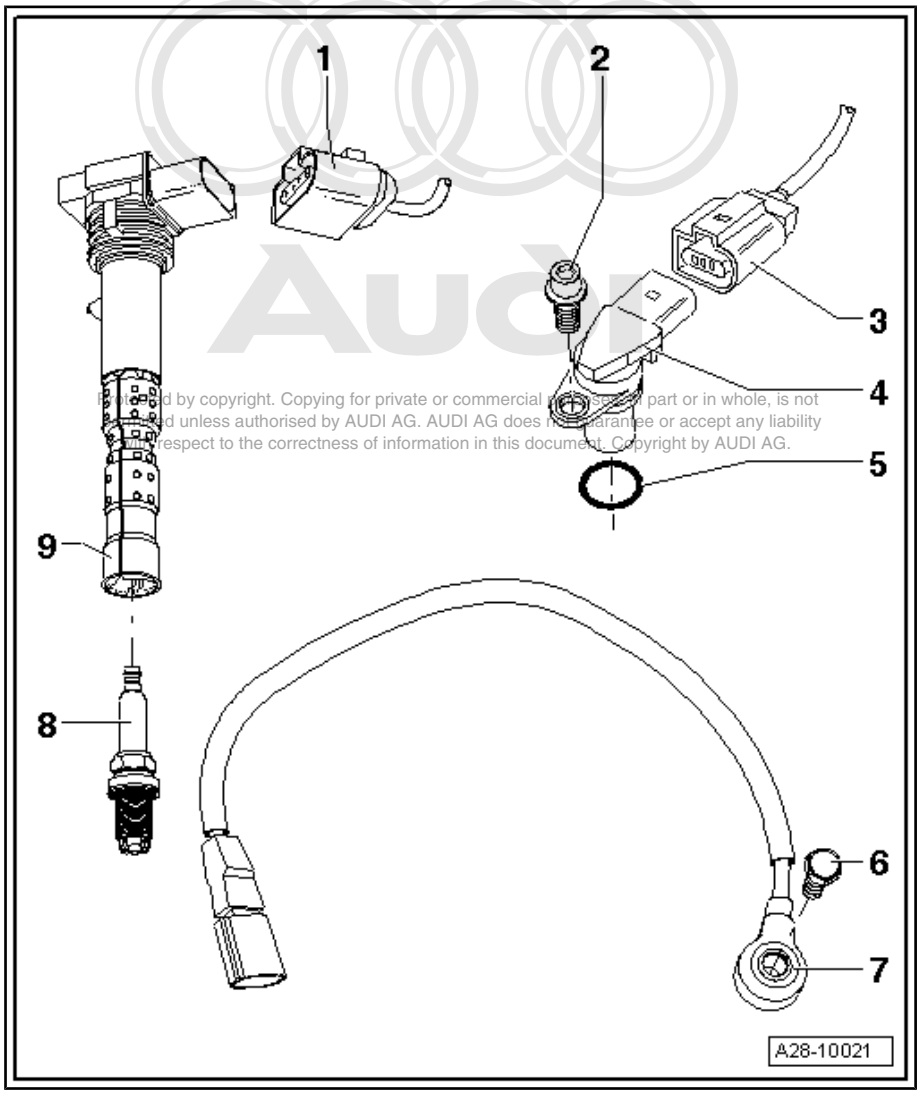
- ❑ Renew if damaged
- ❑ Lubricate lightly with engine oil

**6 - Bolt**

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

**7 - Knock sensors**

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




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.

(cylinder bank 1)

- ❑ Knock sensor 2 - G66- (cylinder bank 1)
- ❑ Knock sensor 3 - G198- (cylinder bank 2)
- ❑ Knock sensor 4 - G199- (cylinder bank 2)
- ❑ Removing and installing ⇒ page 383

**8 - Spark plug**

- ❑ Remove and install with spark plug socket and extension - 3122 B- ⇒ Maintenance ; Booklet 811
- ❑ 30 Nm

**9 - Ignition coil**

- ❑ Ignition coil 1 with output stage - N70-
- ❑ Ignition coil 2 with output stage - N127-
- ❑ Ignition coil 3 with output stage - N291-
- ❑ Ignition coil 4 with output stage - N292-
- ❑ Ignition coil 5 with output stage - N323-
- ❑ Ignition coil 6 with output stage - N324-
- ❑ Ignition coil 7 with output stage - N325-
- ❑ Ignition coil 8 with output stage - N326-
- ❑ Removing and installing ⇒ page 381
- ❑ Remove using puller - T40039-

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

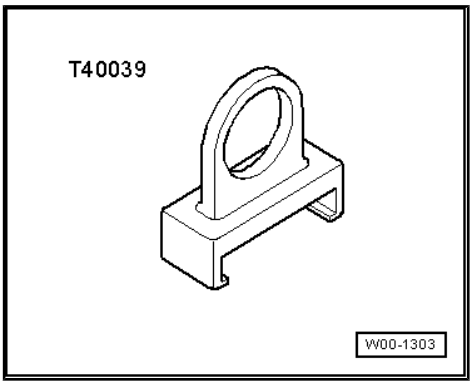
## 1.2 Test data, spark plugs

| Engine data | | 4.2 ltr. / 4V / 260 kW engine |
|---|---|---|
| Idling speed (not adjustable) | | |
| Ignition timing | | Not adjustable (determined by control unit) |
| Ignition system | | Multi-coil system with 8 ignition coils (output stages integrated) connected directly to spark plugs via spark plug connectors |
| Spark plugs | Designations | ⇒ Data sheets for exhaust emissions test |
| | Removing and installing | ⇒ Maintenance ; Booklet 811 . |
| Firing order | | 1-5-4-8-6-3-7-2 |
| | | |

## 1.3 Removing and installing ignition coils

**Special tools and workshop equipment required**

- ♦ Puller - T40039-

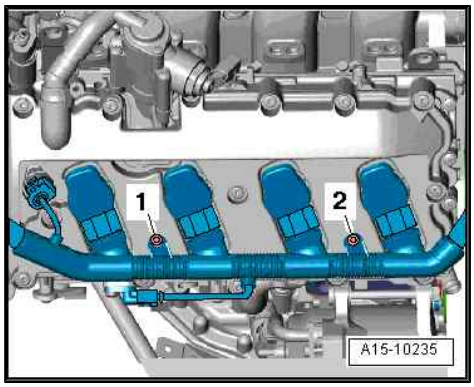


**Removing ignition coils, cylinder bank 1:**

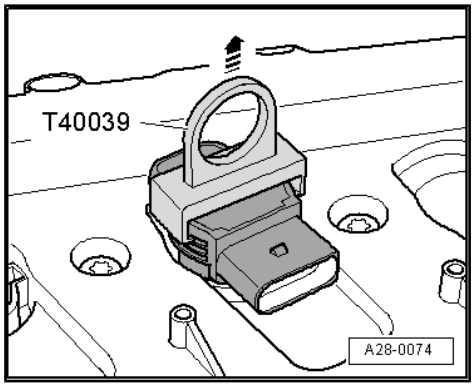
– Remove air cleaner (bottom section) ⇒ page 293 .

– Remove bolts -1- and -2-.

– Use puller - T40039- to pull ignition coils approx. 30 mm out of spark plug holes.



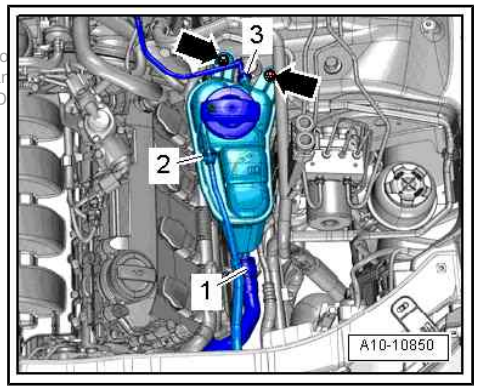

– Release electrical connectors and pull connectors off ignition coils at the same time.




**Removing ignition coils, cylinder bank 2:**

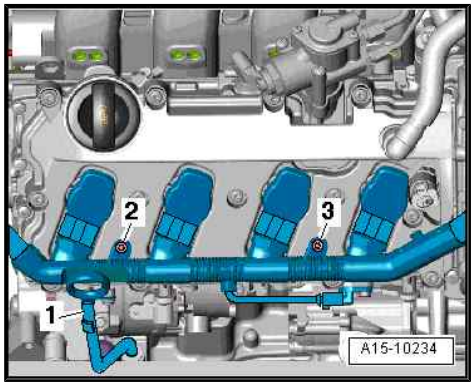
– Detach coolant expansion tank -arrow- and unplug electrical connector at coolant shortage indicator switch - F66- at bottom of coolant expansion tank.

– Move coolant expansion tank to one side with coolant hoses -1 and 3- attached.



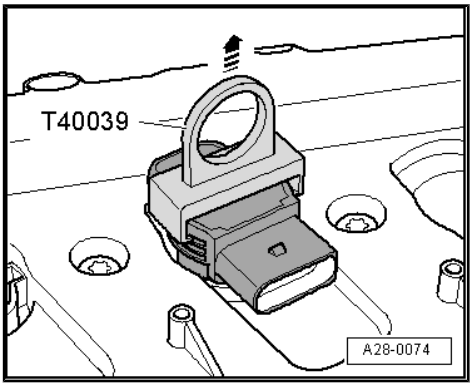

– Remove bolts -2- and -3-.

– Use puller - T40039- to pull ignition coils approx. 30 mm out of spark plug holes.




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.

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




**Installing**

– Fit all ignition coils loosely into spark plug holes.

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

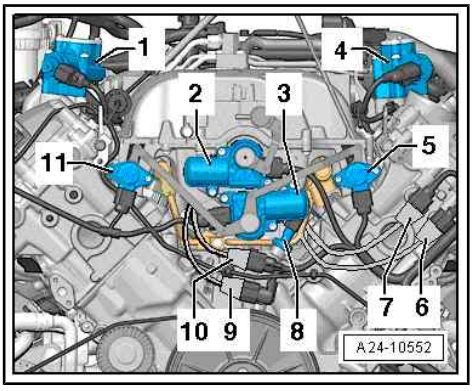
– Push ignition coils evenly onto spark plugs by hand (do NOT attempt to knock in coils with any kind of tool).

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

**Tightening torque**

| Component | Nm |
|---|---|
| Electrical wiring guide for ignition coils to cylinder head cover | 5 |

## 1.4 Removing and installing knock sensor




**Electrical connectors**

6 - Knock sensor 3 - G198-

7 - Knock sensor 4 - G199-

9 - Knock sensor 2 - G66-

10 - Knock sensor 1 - G61-

**Removing**

**WARNING**

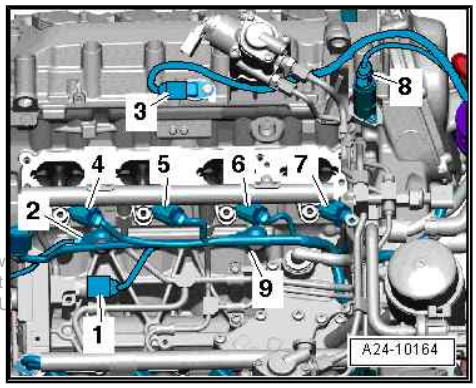
- *The fuel system operates under high pressure. The pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 4 .*
- *A clean cloth must then be wrapped around the connection and the residual pressure dissipated by carefully loosening the connection.*
- *Observe notes on procedure for disconnecting the battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .*

– Remove intake manifold ⇒ page 306 .

**Remove appropriate knock sensor on cylinder bank (right-side).**

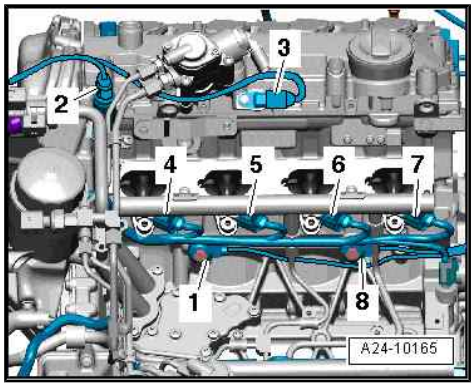
2 - Knock sensor 1 - G61-

9 - Knock sensor 2 - G66-




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

**Remove appropriate knock sensor on cylinder bank (left-side).**




8 - Knock sensor 3 - G198-

1 - Knock sensor 4 - G199-

**Installing**

– Re-install whichever knock sensor was removed.

**Note**

*The tightening torque influences the function of the knock sensor.*

Tightening torques for knock sensors: refer to exploded view of ignition system
⇒ “1.1 Exploded view - ignition system”, page 380 .

– Install intake manifold ⇒ page 306 .

## 1.5 Removing and installing Hall senders

For fitting locations of the four Hall senders, refer to overview of fitting locations ⇒ page 266 .

– Unplug electrical connector from corresponding Hall sender.

**Note**

- *The following Hall senders are installed in cylinder bank 1 (right-side): Hall sender - G40- and Hall sender 3 - G300-*
- *The following Hall senders are installed in cylinder bank 2 (left-side): Hall sender 2 - G163- and Hall sender 4 - G301-*

– To remove Hall sender 3 - G300- on cylinder bank 1 you must first remove the air cleaner housing.

– To remove Hall sender 4 - G301- on cylinder bank 2 you must first remove the coolant expansion tank.

**Installing**

**Note**

*Renew O-ring if damaged.*

– Lubricate O-ring with engine oil and carefully press in Hall sender by hand.

– Secure Hall sender and plug back connector.

- Tightening torques for Hall senders: refer to exploded view of ignition system
⇒ “1.1 Exploded view - ignition system”, page 380 .

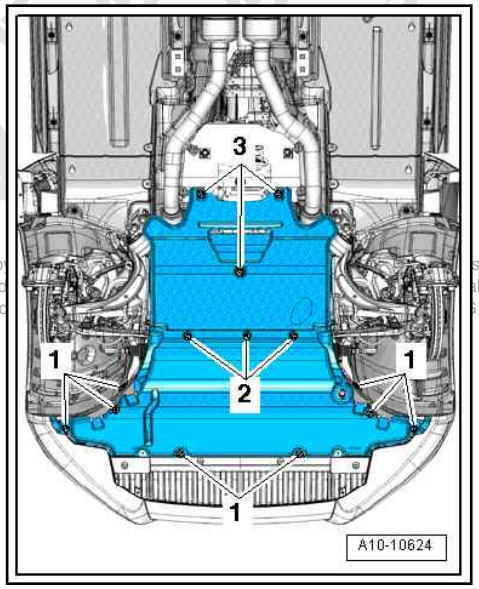
– The remaining installation steps are carried out in the reverse sequence.

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

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

### Removing

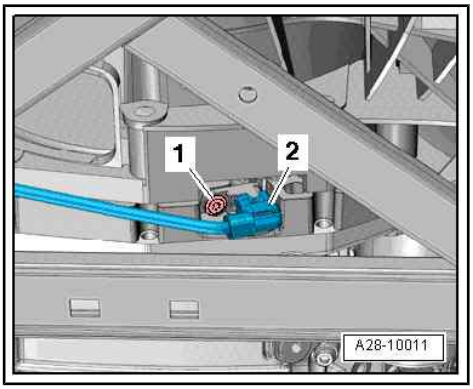
– Release fasteners -1, 2, 3- and remove noise insulation panels.




Protected by copyright. Copy
permitted unless authorised
with respect to the correc
s not
ability

– Unplug electrical connector -2-.

– Unscrew bolt -1- and remove engine speed sender - G28- .




### Installing

Installation is carried out in reverse sequence.

### Tightening torque

| Component | Nm |
|---|---|
| Engine speed sender - G28- | 9 |