



# Audi

## Workshop Manual Audi A8 2003 >

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.

**8-cylinder TDI engine (4.0 ltr. 4-valve common rail),  
mechanics**

Engine ID	ASE								
-----------	-----	--	--	--	--	--	--	--	--

Edition 12.2013

## 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
- 21 - Turbocharging/supercharging
- 26 - Exhaust 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.

## Contents

<b>00 - Technical data</b> .....	<b>1</b>
<b>1 Technical data</b> .....	<b>1</b>
1.1 Engine number .....	1
1.2 Engine data .....	1
<b>2 Safety precautions</b> .....	<b>2</b>
2.1 Safety precautions when working on the fuel supply system .....	2
2.2 Safety precautions when using testers and measuring instruments during a road test .....	3
2.3 Safety precautions when working on the cooling system .....	3
<b>3 General repair instructions</b> .....	<b>4</b>
3.1 Rules for cleanliness .....	4
3.2 Checking for leaks in the fuel system .....	4
3.3 Foreign particles in engine .....	5
3.4 Contact corrosion .....	5
3.5 Routing and attachment of pipes, hoses and wiring .....	5
3.6 Installing radiators and condensers .....	5
3.7 Checking vacuum system .....	5
<b>10 - Removing and installing engine</b> .....	<b>7</b>
<b>1 Removing and installing engine</b> .....	<b>7</b>
1.1 Removing engine .....	7
1.2 Separating engine and gearbox .....	28
1.3 Securing engine to assembly stand .....	33
1.4 Installing engine .....	35
<b>13 - Crankshaft group</b> .....	<b>42</b>
<b>1 Dismantling and assembling engine</b> .....	<b>42</b>
1.1 Moving lock carrier into service position .....	42
1.2 Lowering subframe for repair and assembly work .....	45
<b>2 Servicing work on pulley end</b> .....	<b>54</b>
2.1 Poly V-belt drive for alternator and air conditioner - exploded view of components .....	54
2.2 Poly V-belt drive for alternator and air conditioner compressor .....	55
2.3 Removing and installing poly V-belt .....	55
2.4 Removing and installing vibration damper .....	56
2.5 Renewing crankshaft oil seal (pulley end) .....	58
2.6 Removing and installing sealing flange (front) .....	60
<b>3 Servicing work on timing chain end</b> .....	<b>64</b>
3.1 Drive plate - exploded view .....	64
3.2 Removing and installing drive plate .....	64
3.3 Renewing crankshaft oil seal (timing chain end) .....	65
3.4 Vacuum pump - exploded view .....	67
3.5 Removing and installing vacuum pump .....	68
<b>4 Removing and installing crankshaft</b> .....	<b>71</b>
4.1 Crankshaft - exploded view .....	71
4.2 Allocation of main bearing shells for new crankshafts .....	73
4.3 Allocation of crankshaft bearing shells for retaining frame without visible colour coding ..	73
4.4 Crankshaft dimensions .....	74
4.5 Measuring axial clearance .....	74
4.6 Measuring radial clearance .....	74
<b>5 Dismantling and assembling pistons and conrods</b> .....	<b>76</b>
5.1 Pistons and conrods - exploded view .....	76
5.2 Removing and installing pistons .....	79
5.3 Piston and cylinder dimensions .....	80

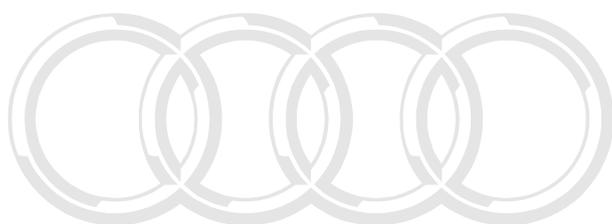


5.4	Measuring radial clearance of conrods	80
5.5	Checking piston projection at TDC	81
<b>15</b>	<b>Cylinder head, valve gear</b>	<b>83</b>
<b>1</b>	<b>Timing chain covers</b>	<b>83</b>
1.1	Timing chain covers - exploded view	83
1.2	Removing and installing oil seal for toothed belt sprocket on high-pressure pump	84
1.3	Removing and installing all timing chain covers	86
<b>2</b>	<b>Drive chains for camshafts and valve gear</b>	<b>97</b>
2.1	Camshaft timing chain (left-side) - exploded view of components	97
2.2	Camshaft timing chain (right-side) - exploded view of components	98
2.3	Removing and installing camshaft timing chains	99
2.4	Detaching camshaft timing chains from camshafts	106
2.5	Drive chain for valve gear - exploded view	117
2.6	Removing and installing drive chain for valve gear	119
2.7	Checking drive chains for camshafts and valve gear for elongation	120
<b>3</b>	<b>Auxiliary drives</b>	<b>123</b>
3.1	Chain for auxiliary drives - exploded view	123
3.2	Removing and installing chain for auxiliary drives	123
3.3	Auxiliary drives - exploded view	124
3.4	Renewing oil seal for power steering pump drive	125
3.5	Removing and installing spur gear drive	129
<b>4</b>	<b>Removing and installing cylinder head</b>	<b>133</b>
4.1	Cylinder head - exploded view	133
4.2	Cylinder head cover - exploded view	135
4.3	Removing and installing cylinder head cover (left-side)	137
4.4	Removing and installing cylinder head cover (right-side)	141
4.5	Removing and installing cylinder head	149
4.6	Checking compression	153
<b>5</b>	<b>Servicing valve gear</b>	<b>156</b>
5.1	Valve gear - exploded view	156
5.2	Checking axial clearance of camshafts	158
5.3	Removing and installing camshafts	159
5.4	Renewing valve stem oil seals with cylinder head installed	163
5.5	Renewing valve stem oil seals with cylinder head removed	166
5.6	Checking hydraulic valve compensation elements	169
5.7	Valve dimensions	170
5.8	Machining valve seats	170
5.9	Checking valve guides	171
5.10	Checking valves	171
<b>17</b>	<b>Lubrication</b>	<b>173</b>
<b>1</b>	<b>Removing and installing parts of lubrication system</b>	<b>173</b>
1.1	Oil pump, sump (bottom section), sump (centre section) - exploded view	173
1.2	Removing and installing oil level and oil temperature sender G266	175
1.3	Removing and installing sump (bottom section)	175
1.4	Removing and installing sump (centre section)	178
1.5	Removing and installing oil pump	187
1.6	Sump (top section) - exploded view	189
1.7	Removing and installing sump (top section)	190
1.8	Oil cooler, pressure control valve, oil filter housing and spray nozzle valve - exploded view	193
1.9	Removing and installing oil cooler	195
1.10	Removing and installing oil filter housing	196
1.11	Removing and installing pressure control valve for crankcase breather system	198

1.12	Removing and installing mounting plate for oil cooler, pressure control valve and oil filter housing	199
1.13	Removing and installing spray nozzle valve	203
1.14	Removing and installing oil pressure switch F1	203
1.15	Removing and installing oil temperature sender G8	204
1.16	Checking oil pressure	206
1.17	Engine oil	207
1.18	Checking oil level	207
<b>19</b>	<b>- Cooling</b>	<b>209</b>
<b>1</b>	<b>Removing and installing parts of cooling system</b>	<b>209</b>
1.1	Draining and filling cooling system	209
1.2	Coolant pump and thermostat - exploded view	215
1.3	Removing and installing coolant pump	217
1.4	Removing, installing and checking thermostat	220
1.5	Checking thermostat	221
1.6	Removing and installing coolant pipes (front)	222
1.7	Removing and installing coolant pipe (left-side)	227
1.8	Removing and installing coolant pipe (right-side)	229
1.9	Removing and installing coolant pipe (rear)	229
1.10	Removing and installing coolant temperature sender G62	233
1.11	Radiator and radiator fans - exploded view of components	233
1.12	Removing and installing radiator	234
1.13	Removing and installing radiator cowl	239
1.14	Removing and installing radiator fan	240
1.15	Checking cooling system for leaks	241
<b>21</b>	<b>- Turbocharging/supercharging</b>	<b>244</b>
<b>1</b>	<b>Servicing charge air system with turbocharger</b>	<b>244</b>
1.1	Turbocharger - exploded view	244
1.2	Removing and installing turbocharger (left-side)	246
1.3	Removing and installing turbocharger (right-side)	252
1.4	Charge air cooling - exploded view	267
1.5	Removing and installing charge air cooler (left-side)	268
1.6	Removing and installing charge pressure sender G31	270
1.7	Removing and installing charge air cooler (right-side)	272
<b>26</b>	<b>- Exhaust system</b>	<b>275</b>
<b>1</b>	<b>Removing and installing parts of exhaust system</b>	<b>275</b>
1.1	Exhaust system - exploded view	275
1.2	Removing and installing exhaust gas temperature sender 1 G235	279
1.3	Removing and installing exhaust gas temperature sender 1 for bank 2 G236	280
1.4	Separating centre and rear silencers	281
1.5	Removing and installing main catalytic converter (left-side)	282
1.6	Removing and installing main catalytic converter (right-side)	284
1.7	Removing and installing front exhaust pipe (left-side) with starter catalytic converter	286
1.8	Removing and installing front exhaust pipe (right-side) with starter catalytic converter	289
1.9	Exhaust manifold - exploded view	291
1.10	Removing and installing exhaust manifold (left-side)	292
1.11	Removing and installing exhaust manifold (right-side)	292
1.12	Stress-free alignment of exhaust system	293
1.13	Aligning tailpipes	294
1.14	Checking exhaust system for leaks	294
<b>2</b>	<b>Exhaust gas recirculation system</b>	<b>295</b>
2.1	Exhaust gas recirculation system - exploded view of components	295
2.2	Removing and installing mechanical exhaust gas recirculation valve (left-side)	296



2.3	Removing and installing mechanical exhaust gas recirculation valve (right-side) . . . . .	297
2.4	Removing and installing exhaust gas recirculation cooler (left-side) . . . . .	298
2.5	Removing and installing exhaust gas recirculation cooler (right-side) . . . . .	300



**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.

# 00 – Technical data

## 1 Technical data

(ARL003636; Edition 12.2013)

⇒ [“1.1 Engine number”, page 1](#)

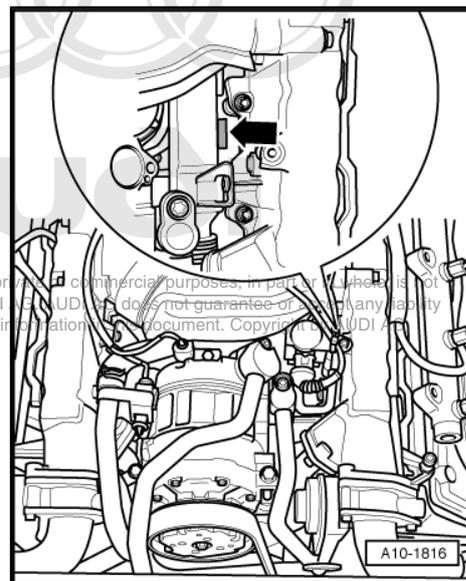
⇒ [“1.2 Engine data”, page 1](#)

### 1.1 Engine number

The engine number (including “engine code” and “serial number”) can be found on the inner part of the block below the intake manifold (left-side).

There is also a sticker on the intake manifold showing the “engine code” and “serial number”.

The engine code is also included on the vehicle data sticker.



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

### 1.2 Engine data

Code letters		ASE
Capacity	ltr.	3.936
Power output	kW at rpm	202/3750
Torque	Nm at rpm	650/1800 ... 2500
Bore	∅ mm	81.0
Stroke	mm	95.5
Compression ratio		17.5
Fuel	According to	DIN EN 590
Firing order		1-5-4-8-6-3-7-2
Exhaust gas recirculation		yes
Turbocharging/supercharging		yes
Self-diagnosis		yes
Catalytic converter		yes
Charge air cooling		yes

## 2 Safety precautions

⇒ [“2.1 Safety precautions when working on the fuel supply system”, page 2](#)

⇒ [“2.2 Safety precautions when using testers and measuring instruments during a road test”, page 3](#)

⇒ [“2.3 Safety precautions when working on the cooling system”, page 3](#)

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

When working on the fuel system note the following warnings:



#### WARNING

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

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

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

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

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



#### Caution

***The high-pressure pump has very close tolerances and must not be allowed to run without fuel. To prevent this and to enable the engine to start quickly after parts have been renewed, it is important to observe the following:***

- ◆ *If the high-pressure pump or the components of the fuel system between the fuel tank and the high-pressure pump are removed or renewed, the fuel system must be bled ⇒ Rep. gr. 23 ; Bleeding fuel system after installing high-pressure pump .*

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

- ◆ Persons wearing a cardiac pacemaker must at all times maintain a safe distance from high-voltage components such as injectors and gas-discharge headlights.
- ◆ Always switch off the ignition before connecting or disconnecting tester cables or electrical wiring for the injection or glow plug system.
- ◆ Do not open any fuel line connections while the engine is running.
- ◆ Always switch off ignition before washing engine.

- ◆ Erase any entries in event memory resulting from repairs  
⇒ Vehicle diagnostic tester, Guided Functions, then In-  
terrogate event memory.

**Caution**

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

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

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

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

**WARNING**

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

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

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

## 2.3 Safety precautions when working on the cooling system

When working on the cooling system note the following warnings:

**WARNING**

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

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

**Caution**

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

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



## 3 General repair instructions

⇒ [“3.1 Rules for cleanliness”, page 4](#)

⇒ [“3.2 Checking for leaks in the fuel system”, page 4](#)

⇒ [“3.3 Foreign particles in engine”, page 5](#)

⇒ [“3.4 Contact corrosion”, page 5](#)

⇒ [“3.5 Routing and attachment of pipes, hoses and wiring”, page 5](#)

⇒ [“3.6 Installing radiators and condensers”, page 5](#)

⇒ [“3.7 Checking vacuum system”, page 5](#)

### 3.1 Rules for cleanliness

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

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

### 3.2 Checking for leaks in the fuel system

- Start the engine and let it run at medium speed for a few minutes.
- Switch off ignition.
- Check the entire fuel system for leaks.
- If leaks are found although the connections have been tightened to the correct torque, the relevant component must be renewed.
- Then carry out a test drive with at least one full-power acceleration.

- Then check high-pressure part of fuel system again for leakage.

### 3.3 Foreign particles in engine

- ◆ When performing assembly work on the engine, all open passages in the intake and exhaust systems 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 chambers of the opposite cylinder bank must always be examined to prevent further damage occurring later.



**Note**

*If the turbocharger has suffered mechanical damage*  
 ⇒ [page 246](#)

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.

### 3.4 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 used.

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 .

**Note the following:**

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

### 3.5 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 prevent damaging pipes, hoses and wiring, ensure sufficient clearance from all moving or hot components in engine compartment (little space in engine compartment).

### 3.6 Installing radiators and condensers

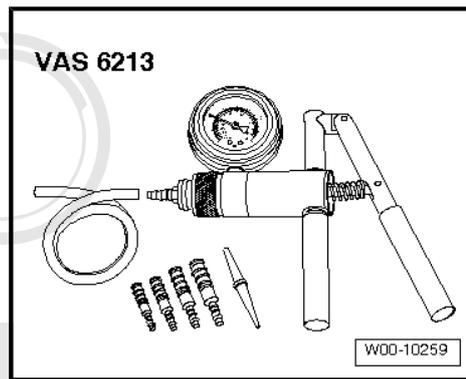
Even when the radiator, condenser and charge air cooler are correctly installed, slight impressions may be visible on the fins of these components. This does not mean that the components are damaged. If the fins are only very slightly distorted, this does not justify renewal of the radiator, charge air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

### 3.7 Checking vacuum system

**Special tools and workshop equipment required**



◆ Hand vacuum pump - VAS 6213-



**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.

- Check all vacuum lines in the complete vacuum system for:
  - ◆ Cracks
  - ◆ Traces of animal bites
  - ◆ Kinked or crushed lines
  - ◆ Lines porous or leaking
- Check vacuum line to solenoid valve and from solenoid valve to corresponding component.
- If a fault is stored in the memory, check the vacuum lines leading to the corresponding component and also check the remaining vacuum lines in the system.
- If it is not possible to build up pressure with hand vacuum pump - VAS 6213- or if the pressure drops again immediately, check hand vacuum pump and connecting hoses for leaks.

## 10 – Removing and installing engine

### 1 Removing and installing engine

⇒ [“1.1 Removing engine”, page 7](#)

⇒ [“1.2 Separating engine and gearbox”, page 28](#)

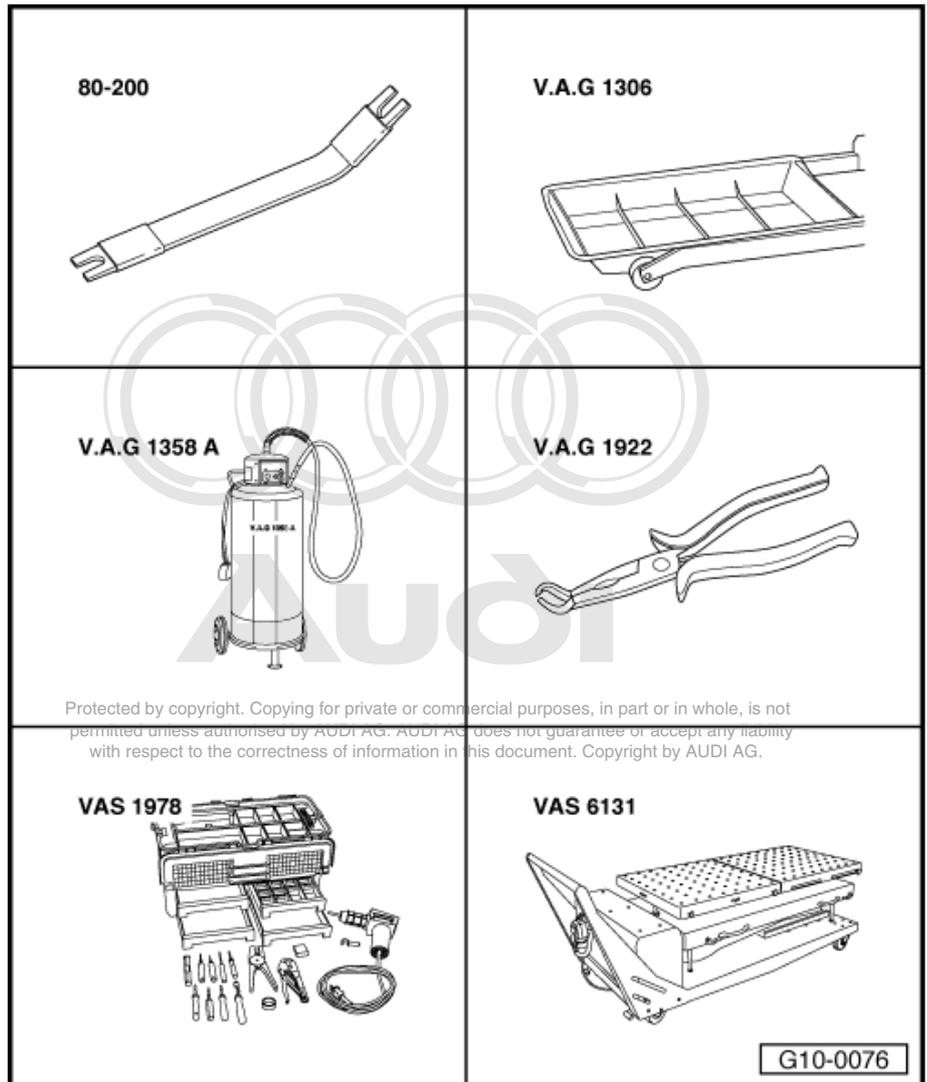
⇒ [“1.3 Securing engine to assembly stand”, page 33](#)

⇒ [“1.4 Installing engine”, page 35](#)

#### 1.1 Removing engine

##### Special tools and workshop equipment required

- ◆ Removal lever - 80-200-
- ◆ Drip tray for workshop hoist - VAS 6208- or drip tray - V.A.G 1306-
- ◆ Used oil collection and extraction unit - V.A.G 1782- or -VAS 6622A- or - V.A.G 1358 A-
- ◆ Spark plug connector pliers - V.A.G 1922-
- ◆ Removing tool - VAS 1978/8- from wiring harness repair set - VAS 1978 B-
- ◆ Scissor-type assembly platform - VAS 6131 A- with support set - VAS 6131/10-





## Procedure



### Note

- ◆ *The engine is removed from underneath together with the gearbox and subframe (with lock carrier detached).*
- ◆ *All cable ties which are released or cut open when removing must be fitted in the same position when installing.*
- ◆ *Collect drained coolant in a clean container for re-use or disposal.*



### WARNING

***Before removing the engine secure the vehicle against tipping over. To do so, the luggage compartment must be empty.***

- Discharge the refrigerant system ⇒ Air conditioner system - with refrigerant R134a .
- Activate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .



### Caution

***Observe notes on procedure for disconnecting the battery. ⇒ Electrical system; Rep. gr. 27 .***

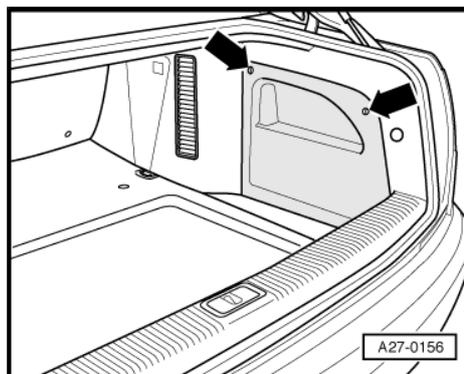
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Switch off ignition.



### Note

- ◆ *To make sure you can still move the front wheels when the battery has been disconnected, only disconnect the battery with the ignition key inserted.*
  - ◆ *On four-wheel drive vehicles the electronic parking brake must be released before disconnecting the battery, so that the prop-shaft can be turned during removal.*
- Remove luggage compartment side trim cover (right-side) -arrows-.

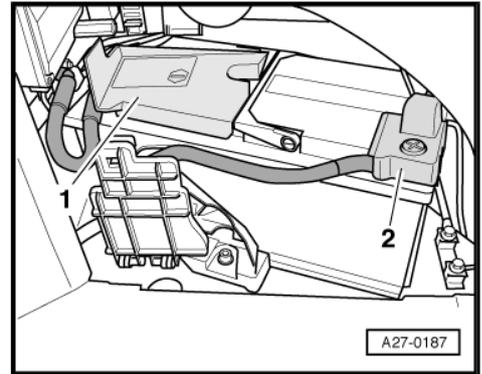


- Remove cover -1- over battery.

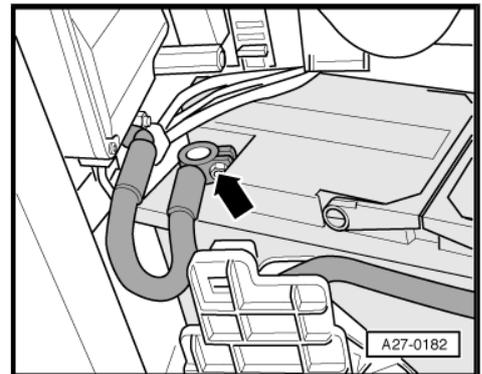


**Note**

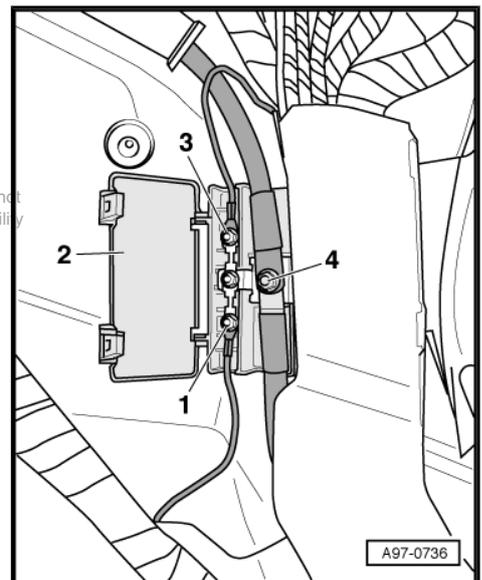
*Item -2- can be disregarded.*



- Disconnect earth cable -arrow- at battery.



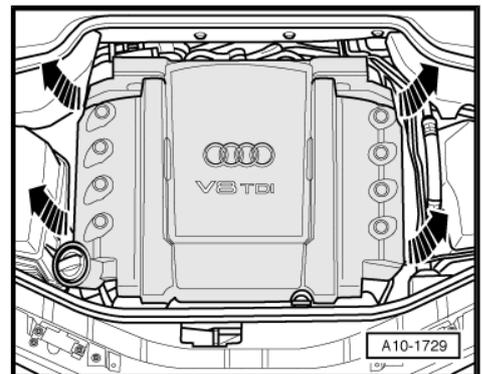
- Remove A-pillar trim (right-side) ⇒ General body repairs, interior; Rep. gr. 70 .
- Fold back floor carpet.
- Detach retaining bracket above main fuse box.
- Fold cover -2- to side.
- Remove nut -4-.
- Detach terminal 30 wire to starter.



**Note**

*Disregard items -1- and -3-.*

- Carefully pull engine cover panel off four retaining pins one after the other -arrows-.



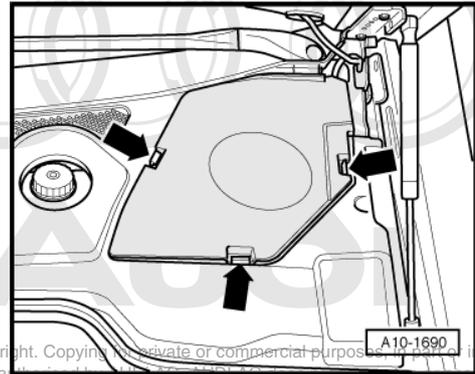


- Remove cover above coolant expansion tank -arrows-.



**WARNING**

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



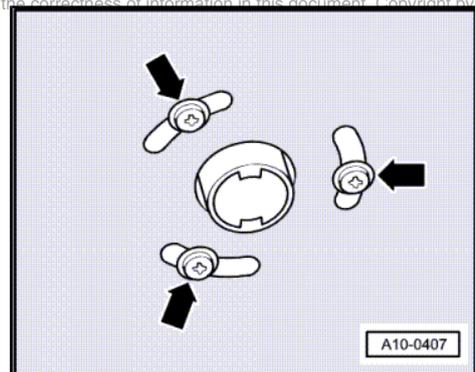
- Open filler cap on coolant expansion tank.

- Remove both front wheels.

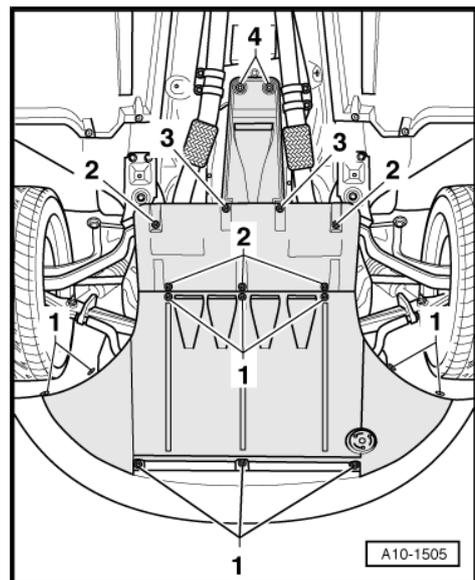
 **Note**

*Secure brake discs with wheel bolts.*

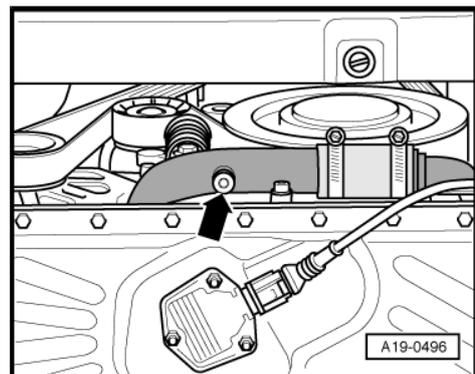
- Vehicles with auxiliary heater: remove bolts -arrows- securing exhaust pipe for auxiliary/additional heater to noise insulation.



- Release fasteners -1-, -2- and -4- and take off noise insulation panels.

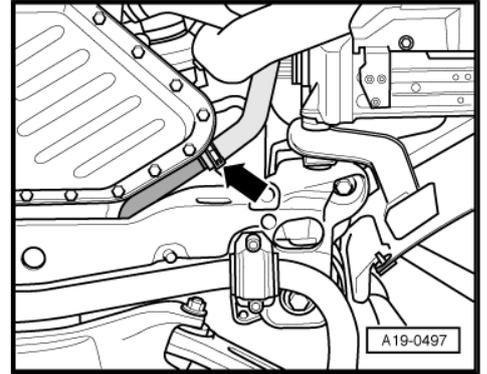


- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Remove drain plug -arrow- and let coolant drain.

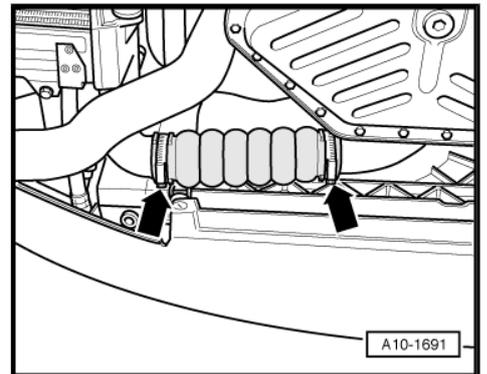


Protected by copyright. Copying, reuse or commercial purposes, in whole, is not permitted unless authorized by Audi AG. Audi AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Disconnect coolant hose -arrow- from coolant pipe and drain off remaining coolant from engine.



- Remove air hose (front left) -arrows-.

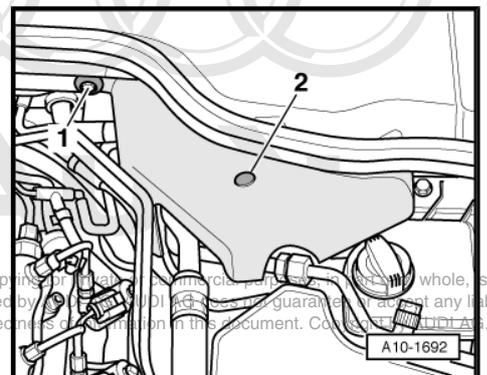
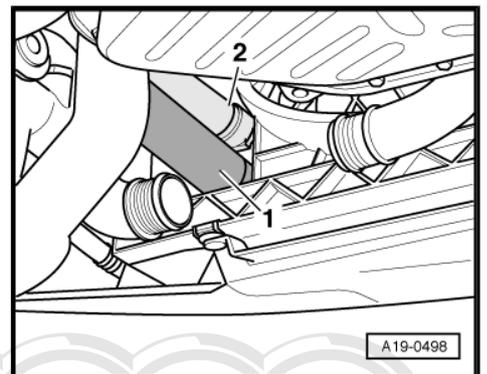


- Pull off retaining clip for bottom coolant hose and detach coolant hose -1- from radiator.

 **Note**

*Item -2- can be disregarded.*

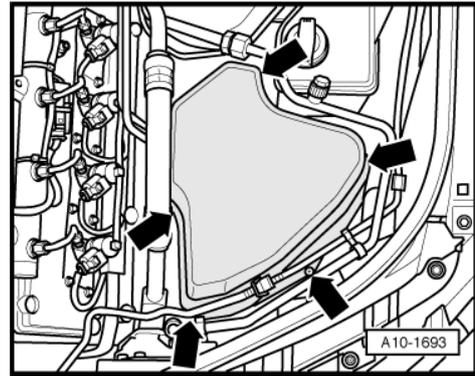
- Disconnect both coolant hoses leading to cooler for fuel cooling system.
- Remove front section of wheel housing liner (front left and front right) ⇒ General body repairs, exterior; Rep. gr. 66 .
- Remove front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 .
- Remove cover for suspension turret (left-side); to do so, remove nut -1- and detach spreader clip -2-.



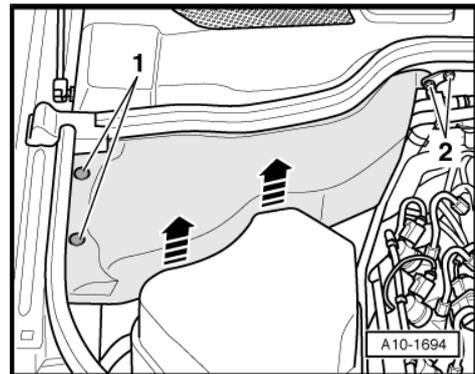
Protected by copyright. Copying or distributing in print or electronic forms without written permission of the copyright owner is prohibited. All rights reserved. Audi AG is not permitted unless authorised by Audi AG. Audi AG cannot guarantee the accuracy of any liability with respect to the correctness of any information in this document. Copyright © Audi AG.



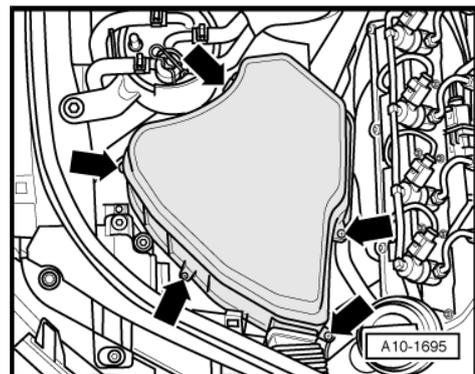
- Remove bolts -arrows-.
- Detach top section of air cleaner housing (left-side).



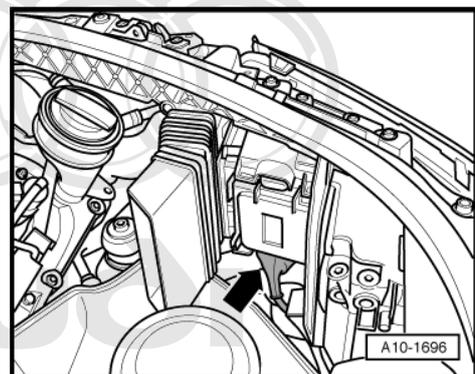
- Remove cover for right suspension turret; to do so, detach spreader clips -1- and unscrew bolted joint -2-.
- Pull cover out of retainers -arrows-.



- Remove bolts -arrows-.
- Detach top section of air cleaner housing (right-side).

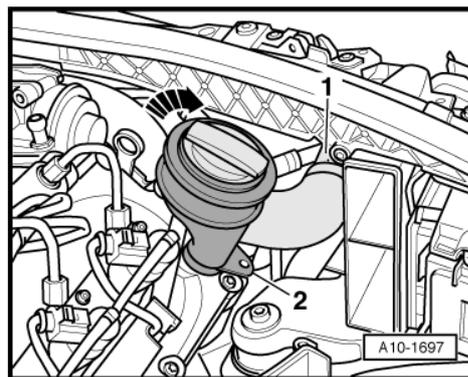


- Unplug electrical connector -arrow- for headlights on both sides.



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.

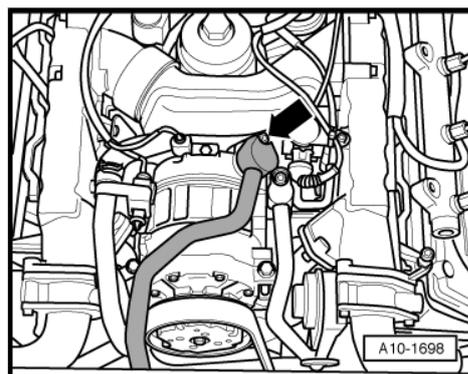
- Remove oil filler neck. To do so, lift tab -2- and turn oil filler neck clockwise -arrow-.
- Remove upper coolant hose -1- from radiator by pulling off retaining clip.
- Re-fit oil filler neck.



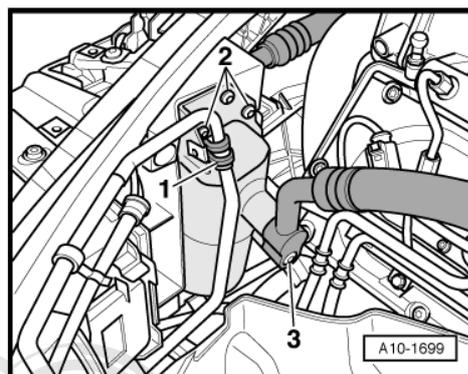
 **Note**

*To prevent damage to the air conditioner compressor and refrigerant pipes/hoses, ensure that the pipes and hoses are not stretched, kinked or bent.*

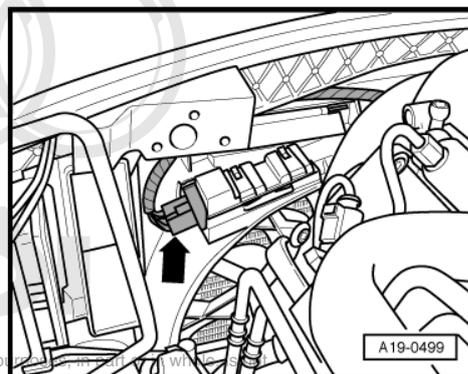
- Remove refrigerant line from air conditioner compressor.
- Plug the opening in the air conditioner compressor.



- Detach clamp -1- on reservoir.
- Detach refrigerant line -3- from reservoir.
- Remove bolts -2-.
- Remove reservoir from lock carrier.



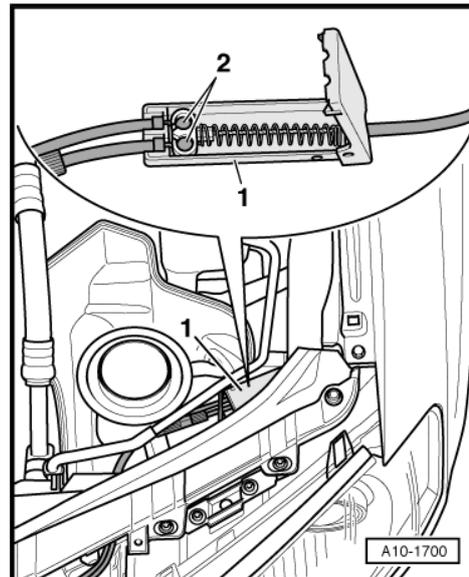
- Unplug electrical connector -arrow- going to radiator fan 2 - V177- .



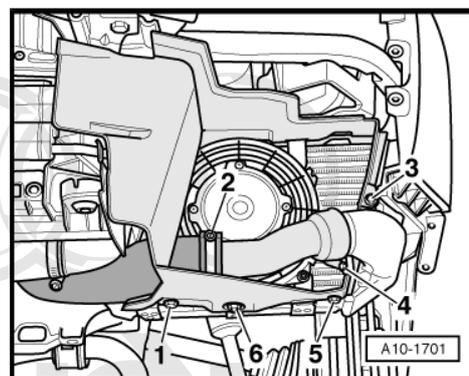
Protected by copyright. Copying for private or commercial purposes is prohibited without the written permission of AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



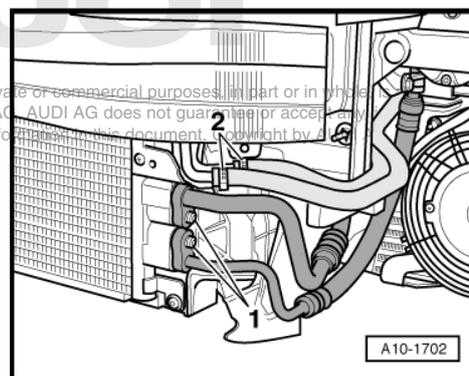
- Detach cable junction for bonnet lock cables -1- from lock carrier.
- Open cable junction and detach both bonnet lock cables -2-.



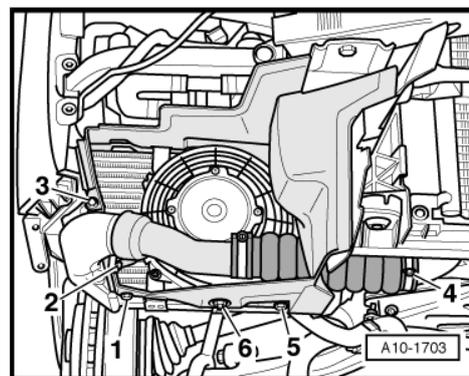
- Remove bolt -4- and nut -6-.
- Slacken hose clip -2- and detach air pipe.
- Remove bolts -1-, -3- and -5-.
- Detach air duct from charge air cooler (left-side).



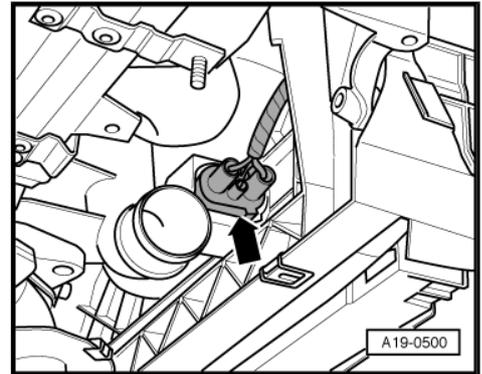
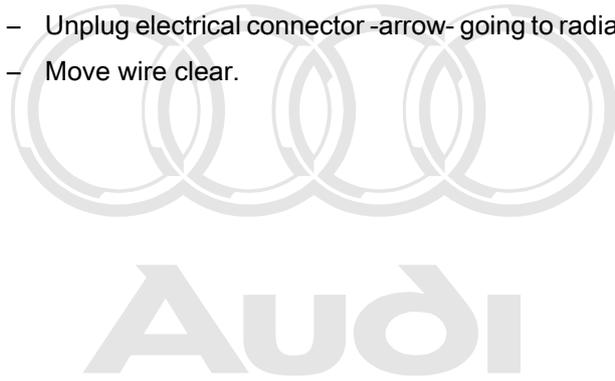
- Extract hydraulic fluid for power steering from reservoir using used oil collection and extraction unit .
- Place used oil collection and extraction unit underneath.
- Detach hydraulic lines for power steering -2-.
- Detach refrigerant lines -1- from condenser.



- Remove bolt -2- and nut -6-.
- Slacken hose clip -4- and detach air pipe with hose.
- Remove bolts -1-, -3- and -5-.
- Detach air duct from charge air cooler (right-side).

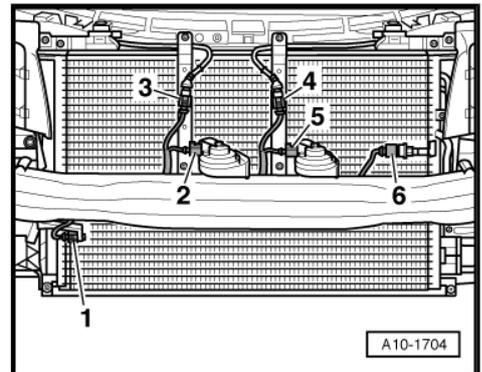


- Unplug electrical connector -arrow- going to radiator fan - V7- .
- Move wire clear.

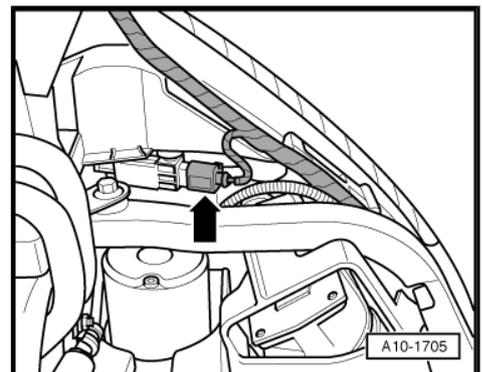


Protected by copyright. All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage and retrieval system, without the prior written permission 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.

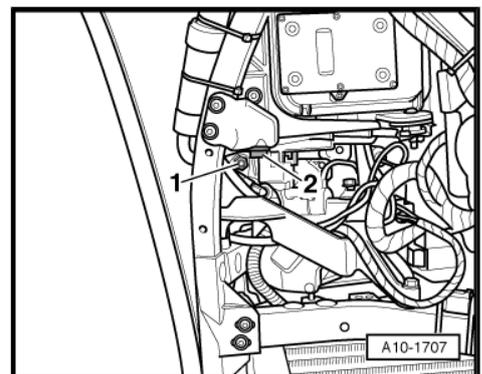
- Detach ambient temperature sensor G174 item 1 from bracket.**
- Unplug electrical connectors -2 ... 6-.
  - Move wiring clear.



- Unplug electrical connector -arrow- at front airbag crash sensors for front passenger side - G283- and -G284- on both sides.
- Move all wires clear at rear of lock carrier.

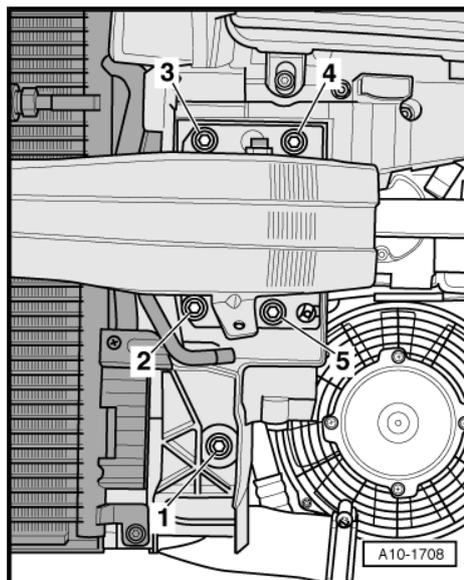


- Working from wheel housing, remove one nut -1- and one bolt -2- for lock carrier on each side.





- Unscrew bolts -1 ... 5- on both sides of vehicle.

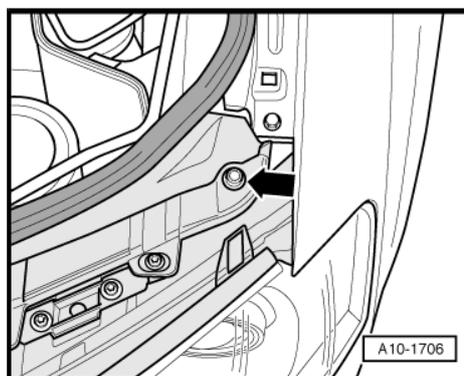


- Pull off bonnet seal at both wing panels.
- Remove one bolt -arrow- on each side from top of lock carrier.
- Detach lock carrier.

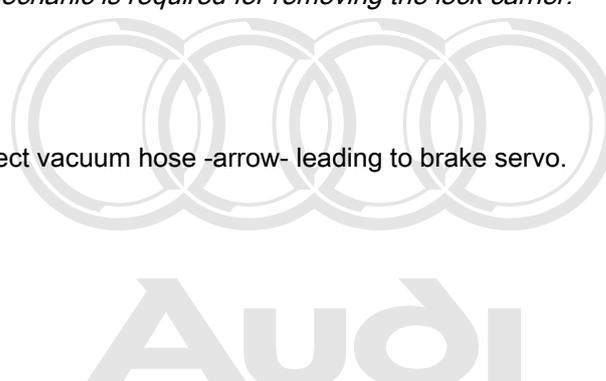
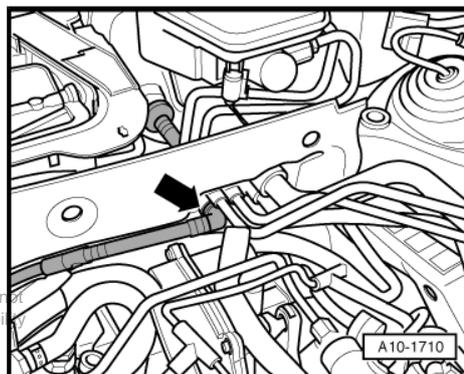


**Note**

*A second mechanic is required for removing the lock carrier.*

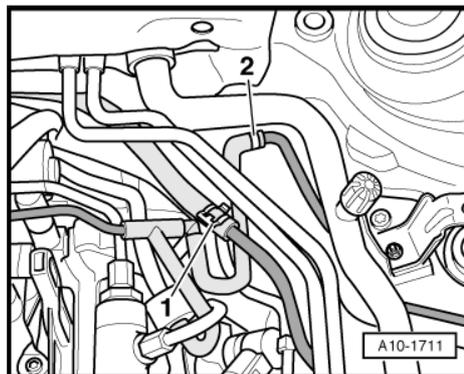


- Disconnect vacuum hose -arrow- leading to brake servo.

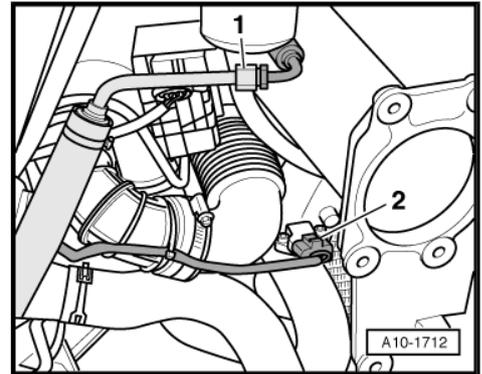


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Disconnect coolant hose -1-.
- Detach vacuum hose -2-.

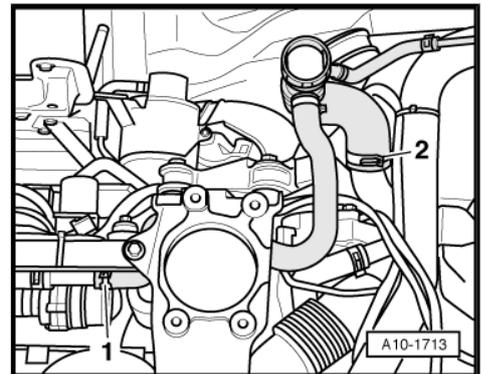


- Detach hydraulic pressure line -1- going to steering rack.
- Unplug electrical connector -2- going to charge pressure sender - G31- .

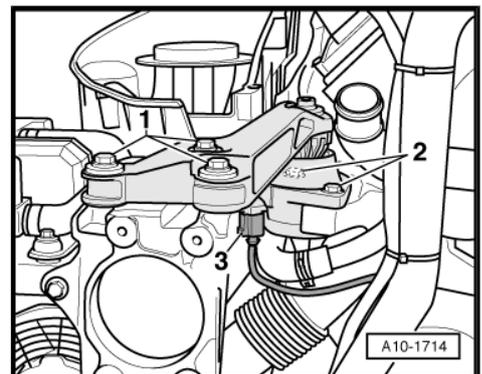


- Detach coolant hoses from additional heater -1- and coolant pipe -2-.
- Move coolant hoses to the side.

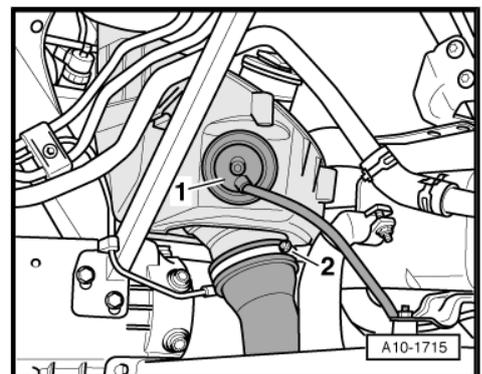
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- Unplug electrical connector -3-.
- Remove bolts -1- and -2-.
- Remove bracket and mounting for torque reaction support.



- Working from wheel housing (right-side), pull rubber grommet -1- off bottom section of air cleaner housing
- Disconnect air intake hose -2- from bottom section of air cleaner housing.



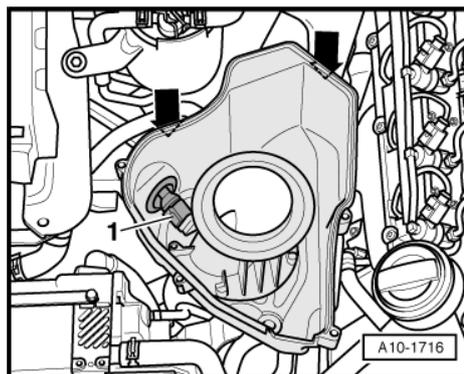


- Unplug electrical connector -1- at air mass meter - G70- .
- Remove bolts -arrows-.
- Detach bottom section of air cleaner housing (right side).

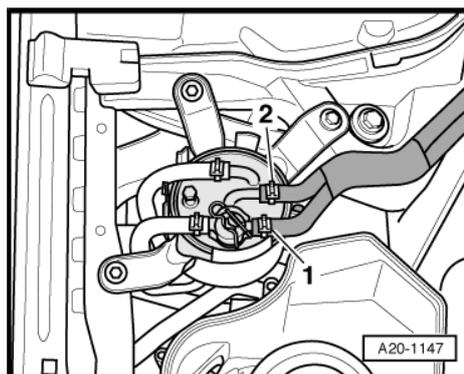


**Caution**

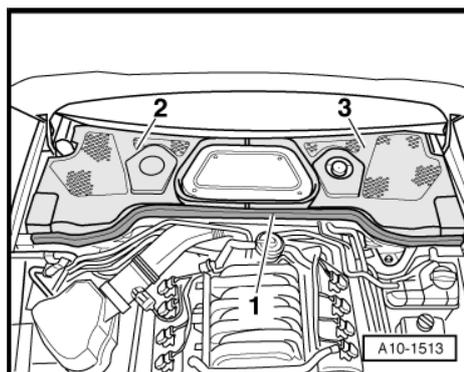
*Rules for cleanliness when working on the injection system  
⇒ page 4 .*



- Disconnect fuel return line -1- and fuel supply line -2- from fuel filter.



- Pull off rubber seal -1- on plenum chamber covers.
- Detach plenum chamber covers -2- and -3-.

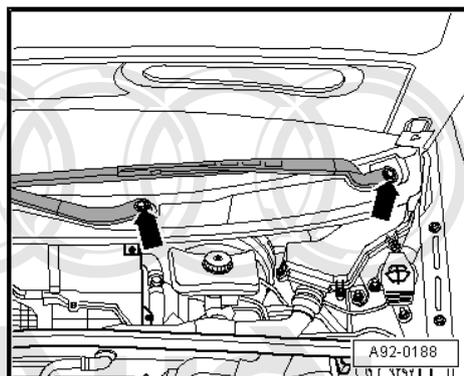


- Lever off caps on windscreen wiper arms with a screwdriver.
- Loosen hexagon nuts -arrows- several turns.
- Loosen wiper arms from wiper shafts by tilting slightly, remove hexagon nuts and take off wiper arms.
- Remove dust and pollen filter ⇒ Air conditioning; Rep. gr. 87 .

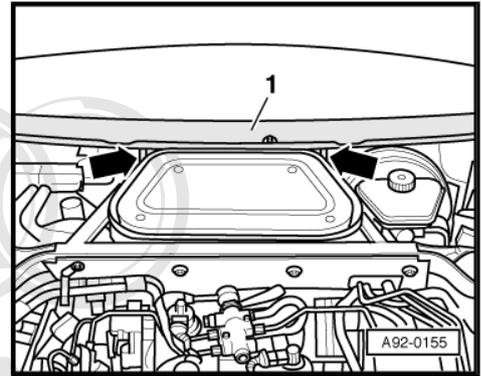


**Note**

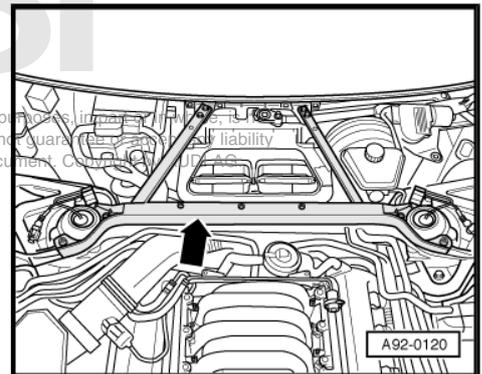
*Cover air duct at air conditioner housing with clean cloth to prevent anything falling in.*



- Unscrew bolts on left and right -arrows- for cowl panel grille -1-.
- Carefully pull cowl panel grille off retainer at windscreen.



- Unscrew body brace -arrow-.

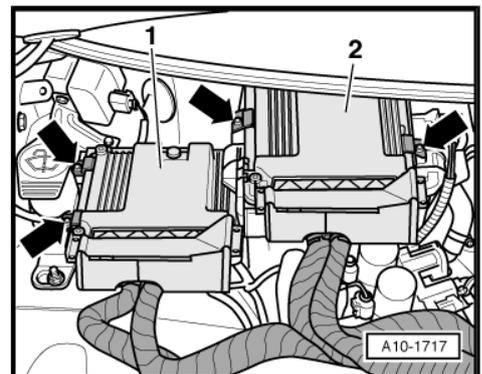


Protected by copyright. Copying for private or commercial purposes, in particular for advertising or promotional purposes, is prohibited without the prior written permission of Audi AG. Audi AG does not guarantee the accuracy of the information in this document. Copyright © Audi AG

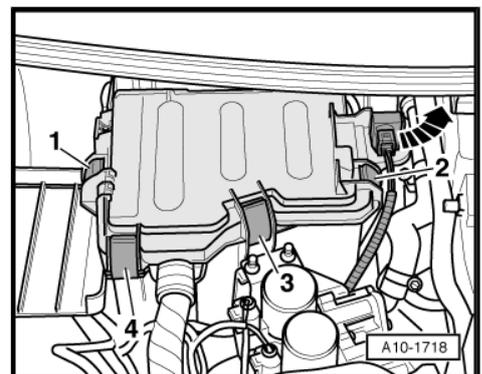
- Remove bolts -arrows-.
- Detach retainers and engine control units -1- and -2- from electronics box (plenum chamber).

 **Note**

*The electrical wires remain connected.*

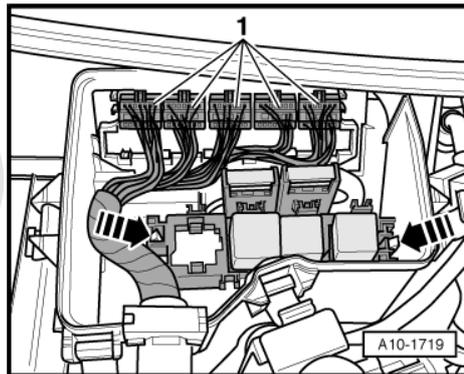


- Turn air quality sensor - G238- 90° anti-clockwise -arrow- and remove from retainer.
- Release retaining clips -1 ... 4-.
- Open electronics box (plenum chamber) cover slightly and pull off to front.

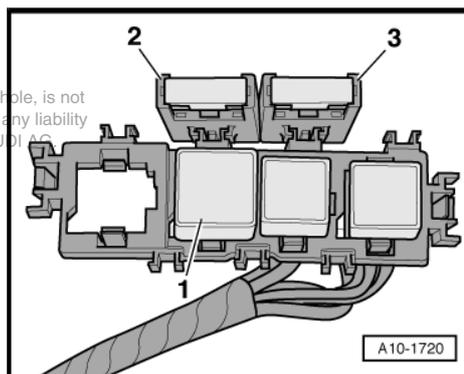




- Disconnect the electrical multi-pin connectors -1- using spark plug connector pliers - V.A.G 1922- .
- Release retainers -arrows- and push auxiliary relay carrier in electronics box upwards to remove.



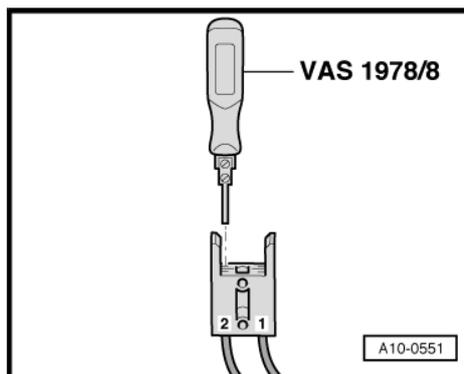
- Disconnect relay -item 1- and unclip socket from relay carrier.
- Release both fuse holders -2- and -3- from relay carrier and pull off from above.
- Pull off fuses.



**i** Note

*Make sure to fit each wire in its original position when connecting (apply a marking on each wire for allocation).*

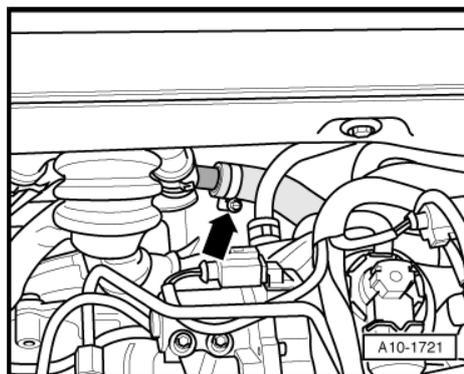
- Release contact in chamber 2 of each fuse holder using removing tool - VAS 1978/8- .
- Place engine control units with wiring harness attached on top of engine.



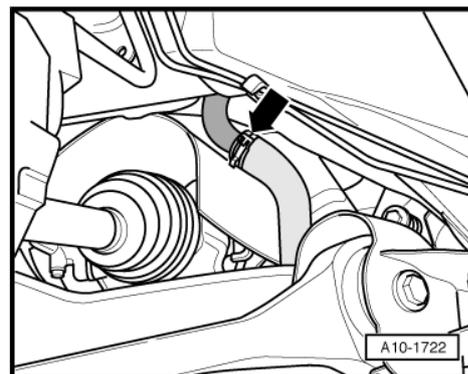
**i** Note

*Secure the engine control units to prevent them falling.*

- Disconnect coolant hose at bulkhead -arrow-.



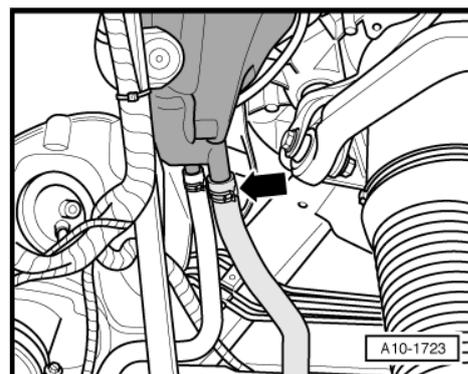
- Disconnect coolant hose from coolant pipe next to drive shaft (left-side) -arrow-.



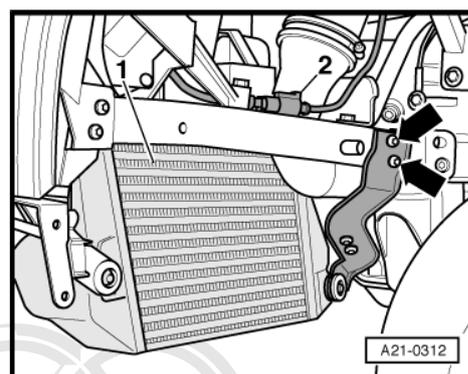
 **Note**

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

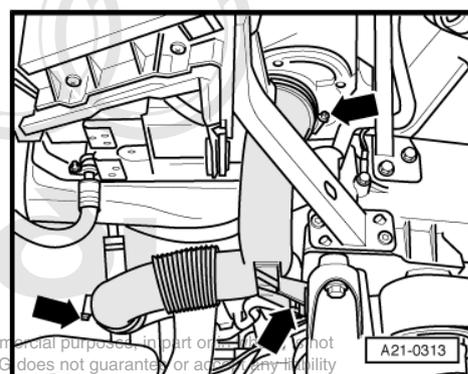
- Disconnect hydraulic hose -arrow- at bottom of hydraulic fluid reservoir.



- Unplug electrical connector -2-.
- Remove bolts -arrows- and detach bracket for charge air cooler.
- Take off charge air cooler -1- (left-side).



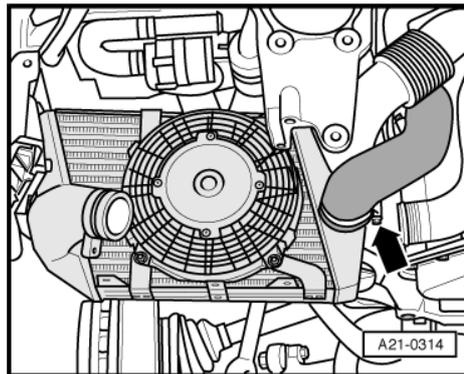
- Remove air intake hose between air cleaner and turbocharger (left-side) -arrows-.



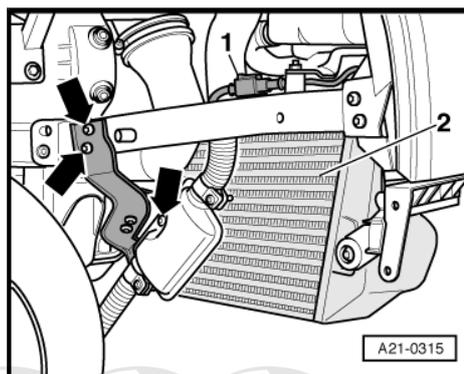
Protected by copyright. Copying for private or commercial purposes in part or in full is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



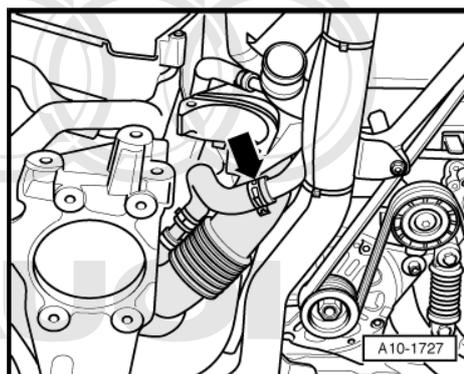
- Detach air intake hose -arrow- from charge air cooler (right-side).



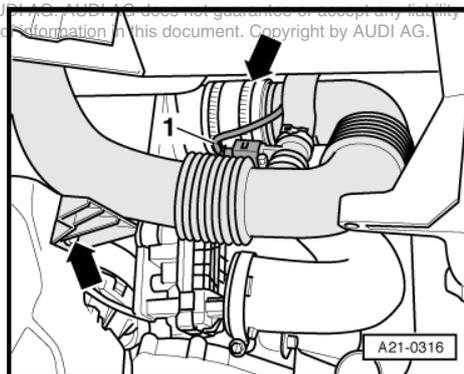
- Unplug electrical connector -1-.
- Remove bolts -arrows- and detach bracket for charge air cooler.
- Take off charge air cooler -2- (right-side).



- Detach crankcase breather hose -arrow-.

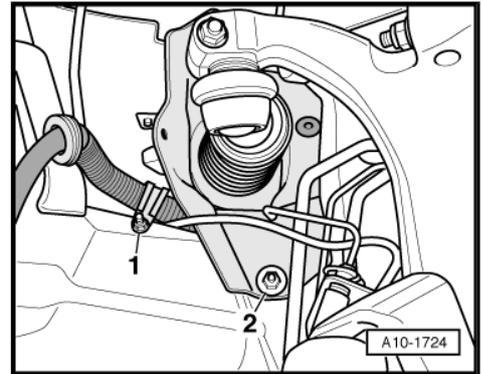


- Unplug electrical connector for heater element for crankcase breather - N79- -item 1-.
- Remove air intake hose between air cleaner and turbocharger -arrows-.

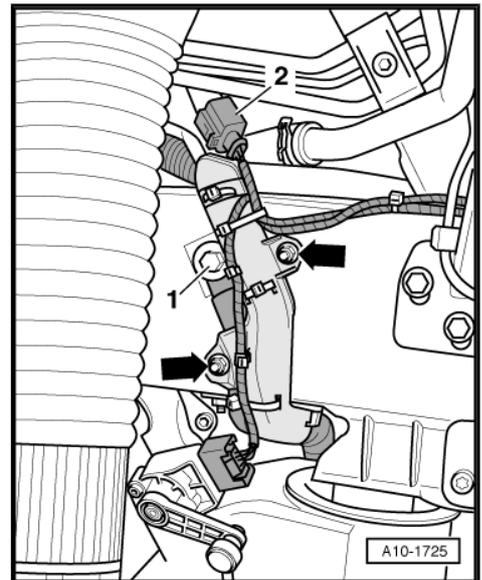


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

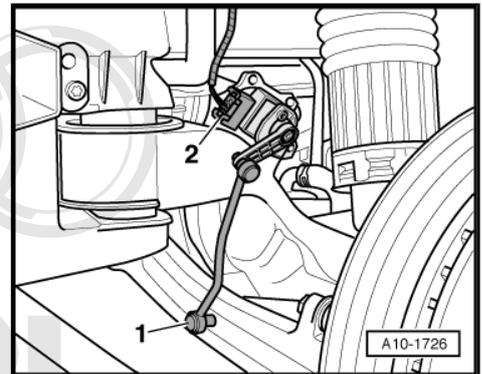
- Remove rear section of wheel housing liner (front right) ⇒ General body repairs, exterior; Rep. gr. 66 .
- Unscrew clamp -1-.
- Unscrew retaining nut -2- for track rod cover.



- Unplug electrical connector -2-.
- Unbolt earth cable -1- at longitudinal member.
- Unbolt bracket for wiring harness from longitudinal member -arrows-.
- Move wiring harness clear.

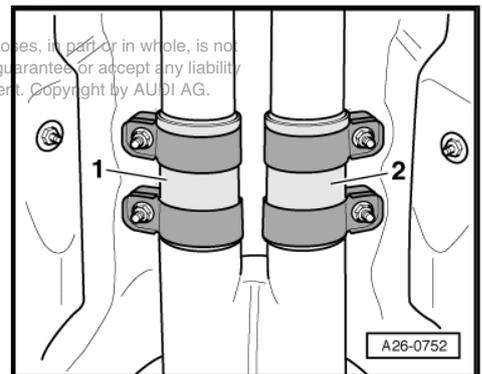


- Unplug electrical connector -2- at vehicle level sender.
- Detach coupling rod -1- at track control link.
- Repeat procedure on other side of vehicle.



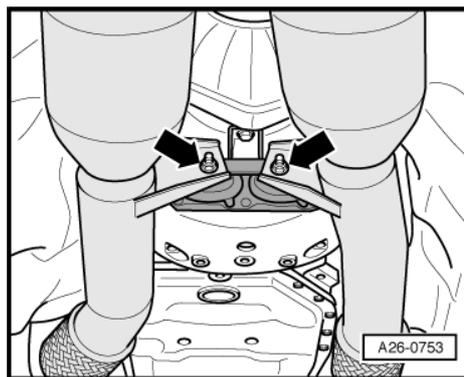
- Loosen clamps -1- and -2-.

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.

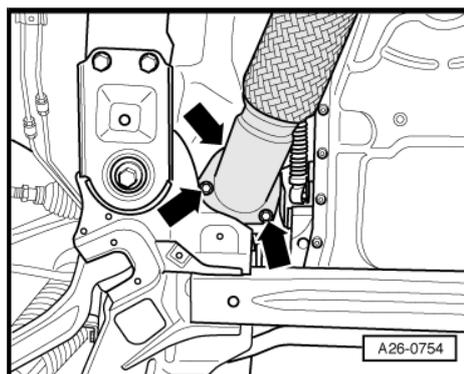




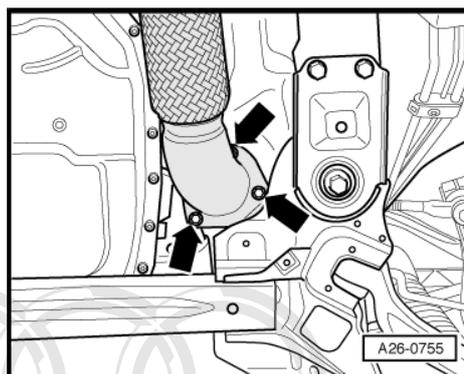
- Unscrew nuts -arrows- on brackets for main catalytic converters (left and right).



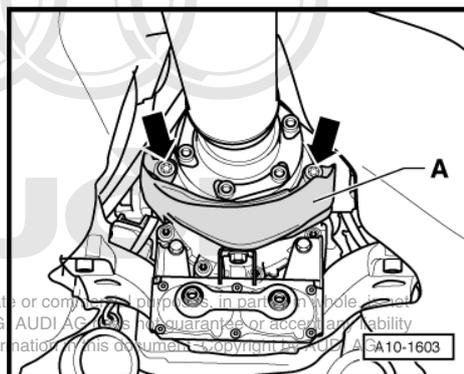
- Unbolt main catalytic converter (left-side) from front exhaust pipe -arrows-.
- Detach the main catalytic converter (left-side).



- Unbolt main catalytic converter (right-side) from front exhaust pipe -arrows-.
- Detach the main catalytic converter (right-side).

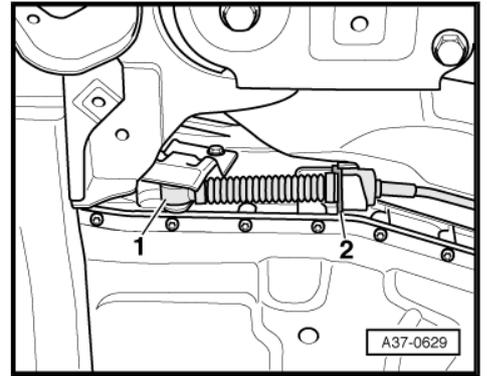


- Unbolt heat shield for propshaft -A - -arrows-.
- Unscrew bolts at gearbox/propshaft flange.
- Push propshaft back towards rear final drive. The constant velocity joints can be moved axially.
- Tie up propshaft on body.

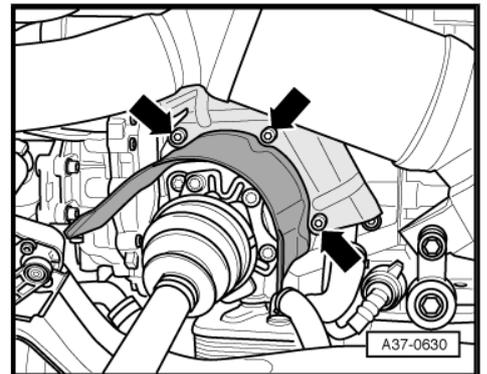


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright © Audi AG 2013

- Pry ball socket -1- of selector lever cable off selector shaft lever using removal lever - 80-200- .
- Unclip retaining clip -2- at support bracket for selector lever cable.
- Detach selector lever cable.



- Unscrew heat shields for drive shafts (left and right) from gear-box -arrows-.
- Unbolt drive shafts (left and right) from gearbox flanges.

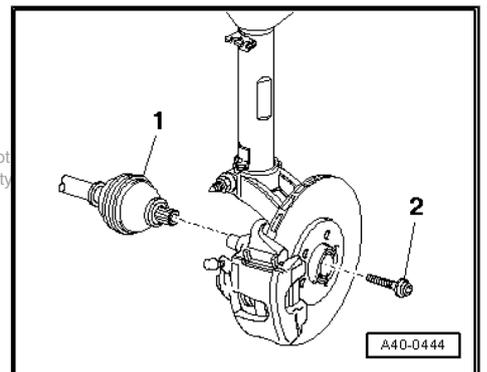


- Have a 2nd mechanic press the brake pedal.



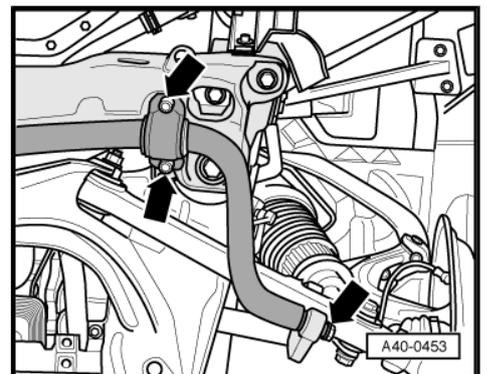
**Caution**

***When slackening the flange bolt securing the drive shaft, the wheel bearing must not be under load (vehicle must not be standing on its wheels).***



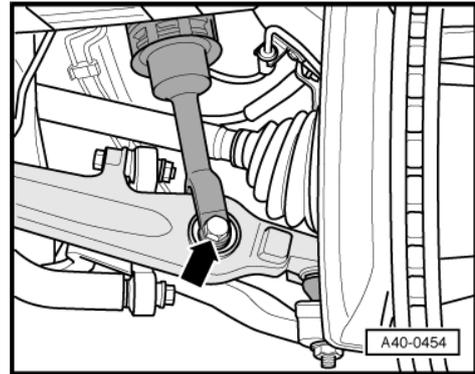
- Unscrew flange bolt -2- from drive shaft -1- (left and right).
- Take out drive shafts (left and right).

- Unscrew bolts (left and right) -arrows- evenly.
- Take out anti-roll bar.

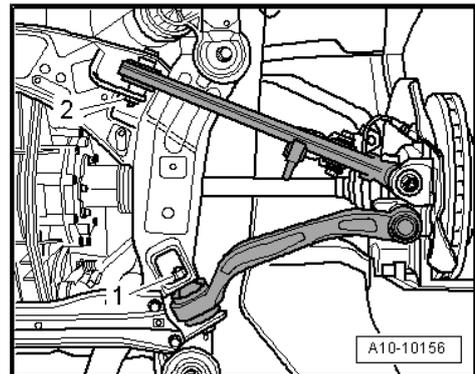




- Unbolt air spring struts (left and right) from track control links -arrow-.



- Unbolt guide link -1- and track control link -2- at subframe.



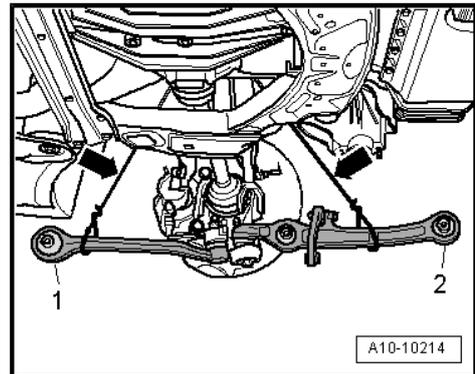
- Pivot guide link -1- and track control link -2- outwards.



**Caution**

*The guide link and track control link must not be allowed to hang down without support. Tie up both bottom links to wheel bearing housing as illustrated -arrow-.*

- Repeat procedure on other side of vehicle.



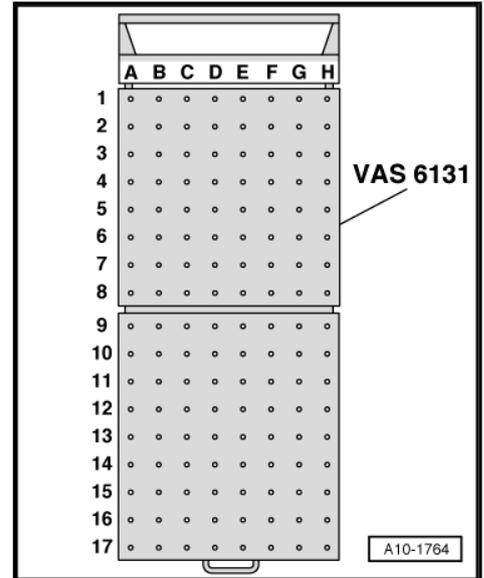
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

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

- Set up scissor-type assembly platform - VAS 6131 A- with support set - VAS 6131/10- as follows:

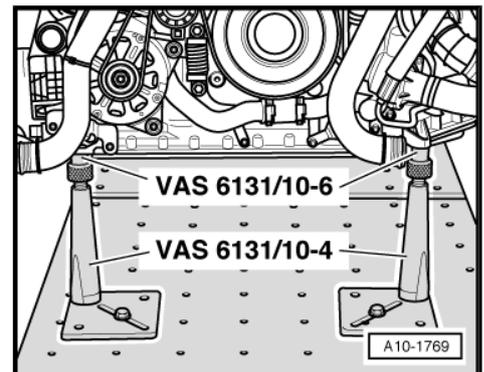
Platform co-ordinates	Parts of support set from -VAS 6131/10-			
C3	/10-1	/10-4	/10-5	/10-6
G3	/10-1	/10-4	/10-5	/10-6
B6	/10-1	/10-3	/10-5	/10-7
G6	/10-1	/10-3	/10-5	/10-7
B10	/10-1	/10-2	/10-5	/10-8
G10	/10-1	/10-2	/10-5	/10-8
D16	/10-1	/10-4	/10-5	/10-9
G15	/10-1	/10-4	/10-5	/10-10

- Initially tighten the support elements on the assembly platform only hand-tight.
- Adjust the scissor-type assembly platform - VAS 6131 A- so that it is horizontal.
- Take note of spirit level (bubble gauge).
- Place scissor-type assembly platform, VAS 6131 A- under engine/gearbox assembly.

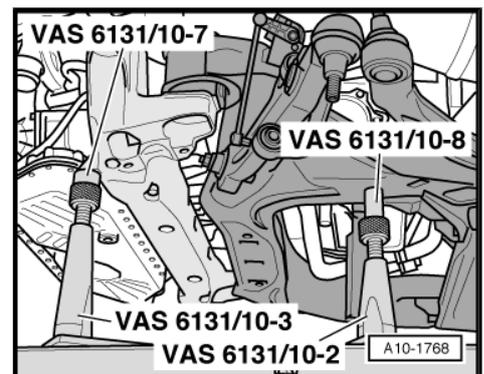


Protected by copyright. Copying or reproducing, even partially, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of the information.

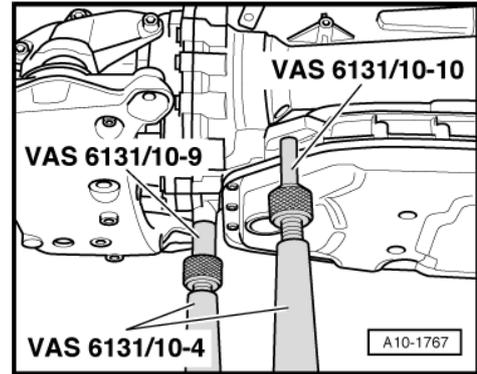
- Position the support elements from support set - VAS 6131/10- at front of engine, as shown in the illustration.



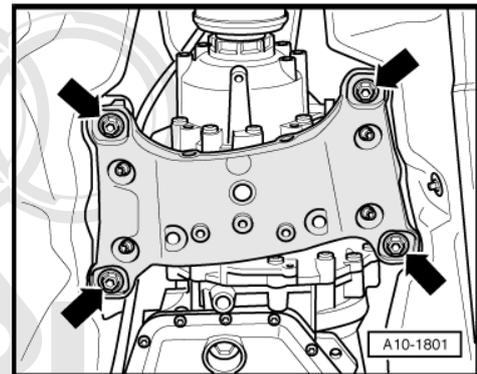
- Position support elements from support set - VAS 6131/10- on engine cross member and subframe (left and right), as shown in the illustration.



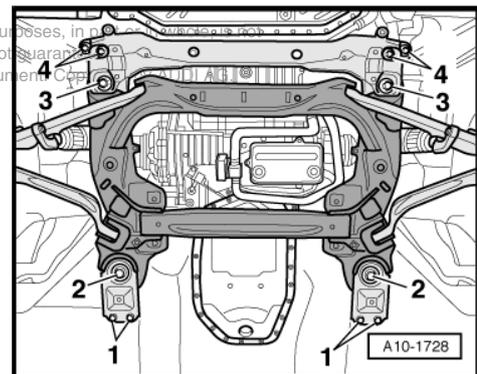
- Position the support elements from support set - VAS 6131/10- at rear of gearbox, as shown in the illustration.
- Turn all spindles for the support elements upwards until all locating lugs make contact with the mounting points.
- When all support elements make contact, raise assembly platform until load is taken off engine and gearbox mountings.
- Tighten base plates for support elements on scissor-type assembly platform - VAS 6131 A- to 20 Nm.



- Remove bolts -arrows- at tunnel cross member.



- Mark the installation position of subframe with a felt-tip pen on longitudinal member.
- Remove bolts -1- and -4-.
- Remove bolts -2- and -3- in a diagonal sequence and in stages.



**Note**

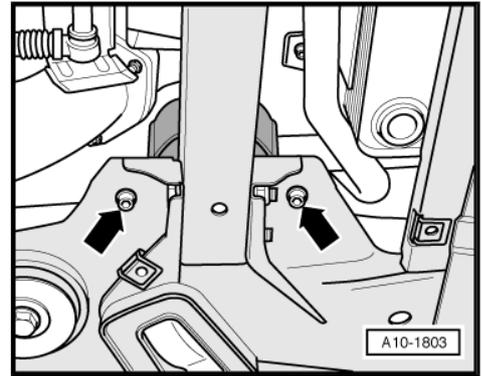
- ◆ Check that all hoses and wiring connections between engine, gearbox, subframe and body have been detached.
- ◆ Carefully guide out engine/gearbox assembly with subframe from engine compartment when lowering to avoid damage.

- Lower engine/gearbox assembly gradually.
- Pull out scissor-type assembly platform - VAS 6131 A- from under the vehicle.

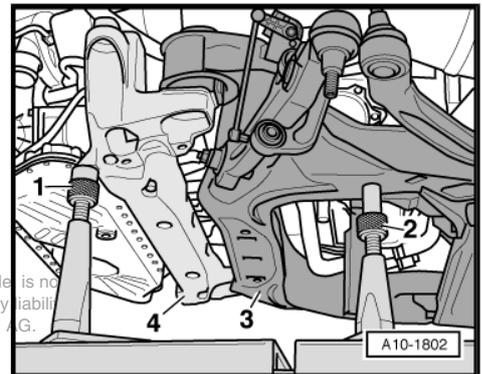
## 1.2 Separating engine and gearbox

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

- Remove bolts -arrows- for front gearbox mounting (left and right).



- Screw down spindles of support elements -2- (left and right) at subframe as far as possible.
- Remove locating lugs from spindles.
- Take out subframe -3- from the side.

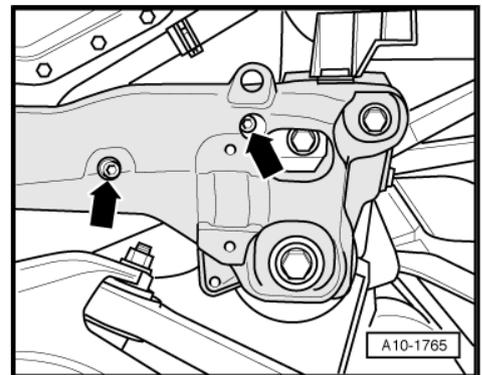


 **Note**

*A second mechanic is required for removing the subframe.*

- Screw down spindles of support elements -1- (left and right) at engine cross member -4- as far as possible.

- Remove bolts -arrows- for engine mounting (left and right-side)
- Take out engine cross member.
- Unscrew the 4 base plates for support elements (for engine cross member and subframe) at assembly platform - VAS 6131 A- .



 **Note**

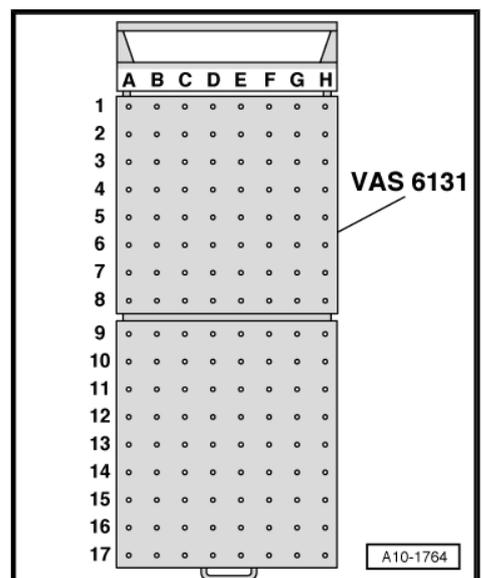
*The mounting points for engine (front) and gearbox (rear) remain unchanged.*

- Set up scissor-type assembly platform - VAS 6131 A- with support set - VAS 6131/10- as follows:

Platform co-ordinates	Parts of support set from -VAS 6131/10-			
	/10-1	/10-4	/10-5	/10-6
C3 <sup>1)</sup>	/10-1	/10-4	/10-5	/10-6
G3 <sup>1)</sup>	/10-1	/10-4	/10-5	/10-6
D7	/10-1	/10-4	/10-5	/10-11 <sup>2)</sup>
F7	/10-1	/10-4	/10-5	/10-11
B11	/10-1	/10-4	/10-5	/10-12
G11	/10-1	/10-3	/10-5	/10-13
D16 <sup>1)</sup>	/10-1	/10-4	/10-5	/10-9
G15 <sup>1)</sup>	/10-1	/10-4	/10-5	/10-10

1) Support elements remain unchanged.

2) Two washers (total height: 3 mm) must also be placed on the support element.



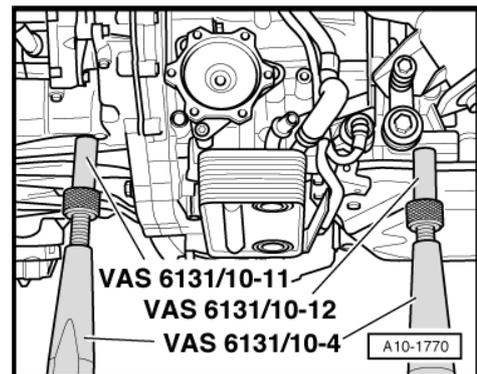
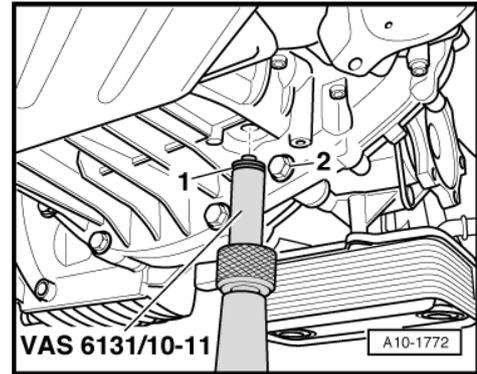


- Remove bolt -2- on engine/gearbox flange (bottom left).
- Place two washers -1- (total height: 3 mm) on locating lug for support element at rear left of engine.
- Position the support elements from support set - VAS 6131/10- at upper section of sump (rear left), as shown in the illustration.

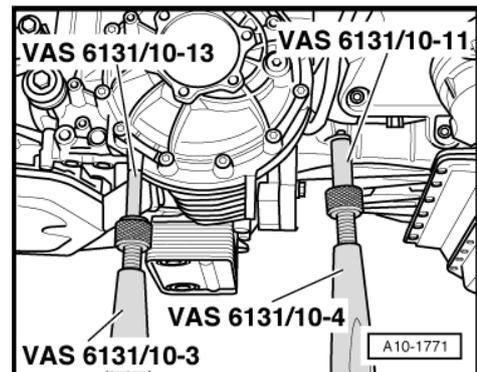


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

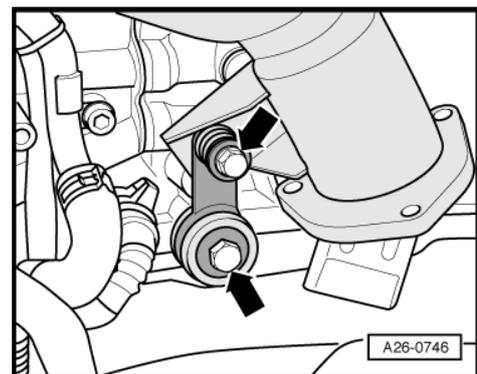
- Position support elements from support set - VAS 6131/10- at left of engine/gearbox assembly, as shown in illustration.



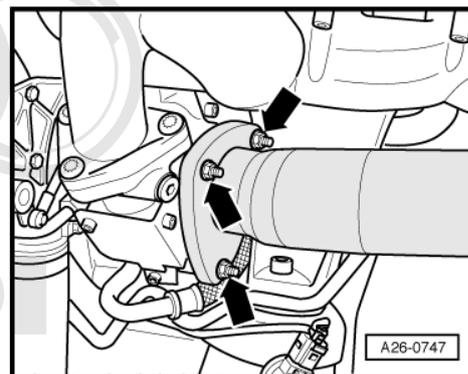
- Position support elements from support set - VAS 6131/10- at right of engine/gearbox assembly, as shown in illustration.
- Turn spindles for the support elements upwards until all locating lugs make contact with the mounting points.
- Tighten base plates for support elements on scissor-type assembly platform - VAS 6131 A- to 20 Nm.



- Unbolt bracket for front exhaust pipe -arrows-.



- Unscrew nuts -arrows- at front exhaust pipe/turbocharger.
- Remove front exhaust pipe (left-side).

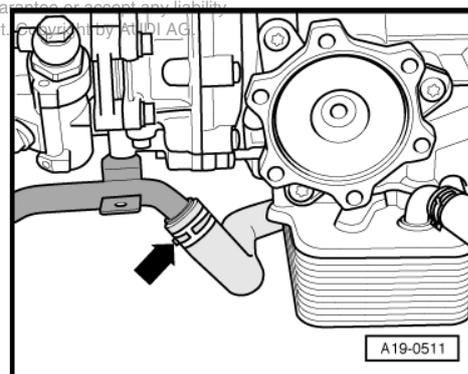


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

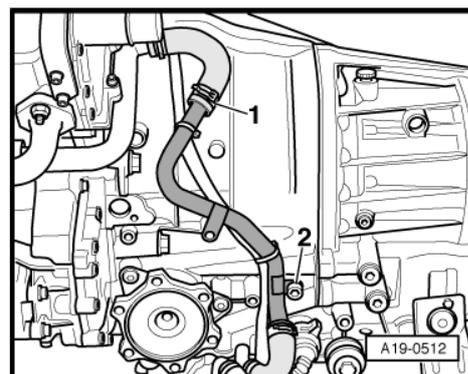
 **Note**

*Lay a cloth under the connection to catch escaping coolant.*

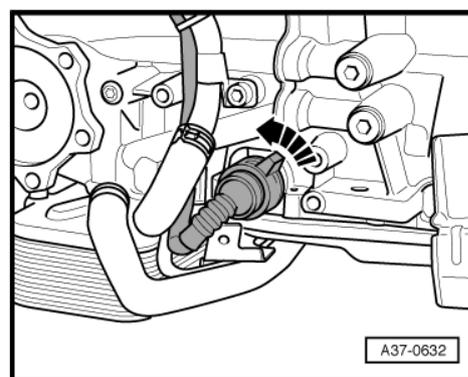
- Detach coolant hose at coolant pipe -arrows-.



- Remove bolt -2-.
- Detach coolant pipe from coolant hose -1-.

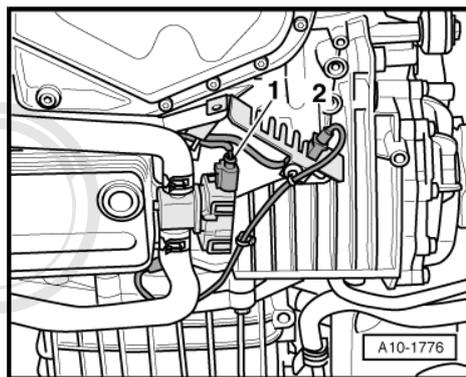


- Turn retainer catch anti-clockwise -arrow- and unplug electrical connector at gearbox.



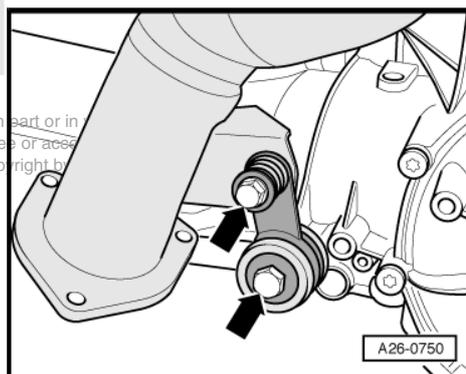


- Unplug electrical connectors -1- and -2- for continued circulation coolant pump and engine speed sender.

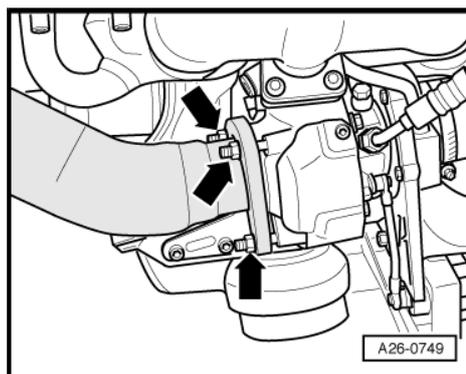


- Unbolt bracket for front exhaust pipe (right-side) -arrows-.

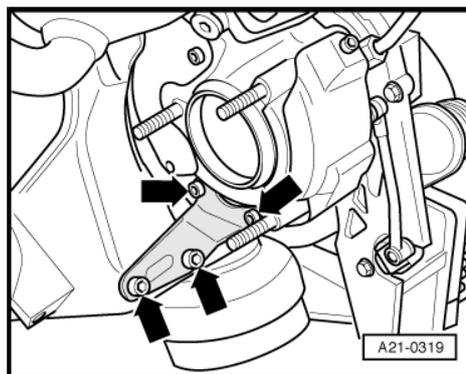
Protected by copyright. Copying for private or commercial purposes, in part or in full, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee the accuracy or completeness of the information in this document. Copyright by Audi AG.



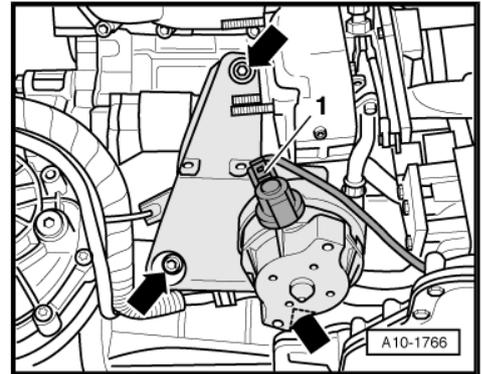
- Unscrew nuts -arrows- at front exhaust pipe/turbocharger.
- Remove front exhaust pipe (right-side).



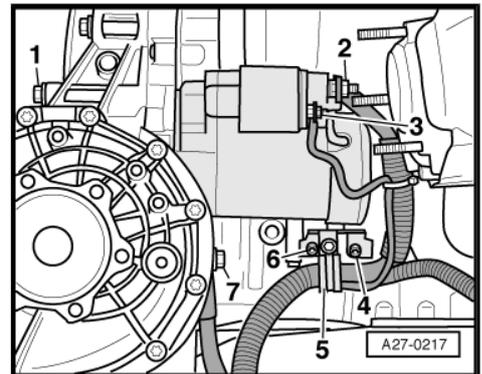
- Unscrew bracket for turbocharger -arrows-.



- Unplug electrical connector -1- at engine mounting (right-side).
- Move wiring clear at engine support.
- Remove bolts -arrows-.
- Remove engine support with engine mounting.



- Remove clamp -5-.
- Remove bolts -4- and -6-.
- Detach electrical wires -2- and -3- at starter.
- Unscrew bolts -1- and -7- and remove starter from below.

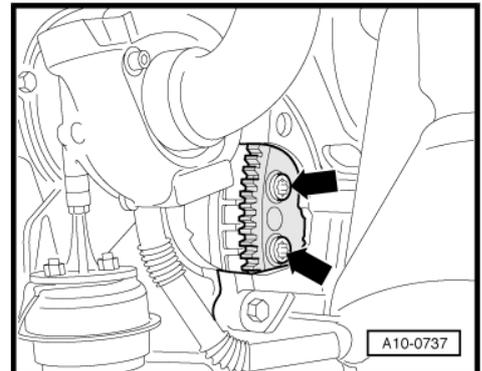


- Unscrew 6 bolts -arrows- for torque converter through opening for starter motor (turn crankshaft 1/3 turn each time).

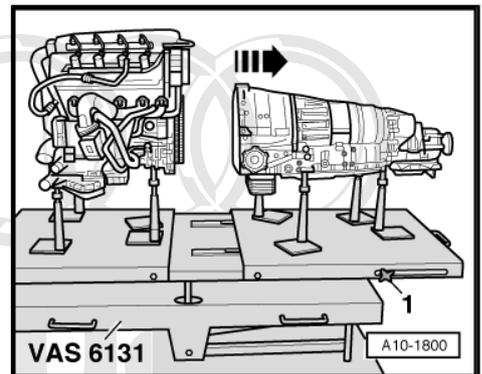
**i** Note

*When loosening torque converter bolts, counterhold at the crankshaft central bolt.*

- Unscrew securing bolts for engine/gearbox.



- Loosen clamping bolts -1- on sides of scissor-type assembly platform - VAS 6131 A- and pull rear section of platform together with gearbox towards the rear -arrow-; simultaneously separate the torque converter from the drive plate through the opening.
- Secure the torque converter in the gearbox to prevent it falling out.



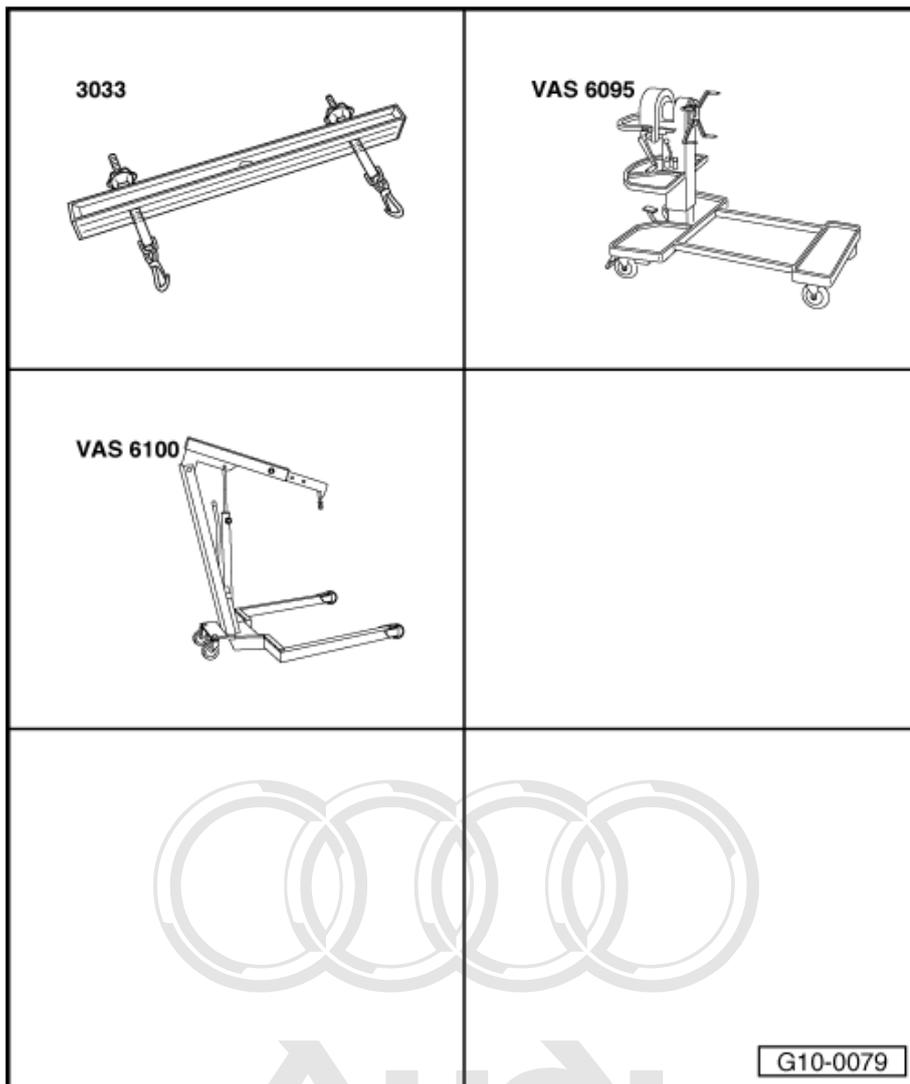
### 1.3 Securing engine to assembly stand

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

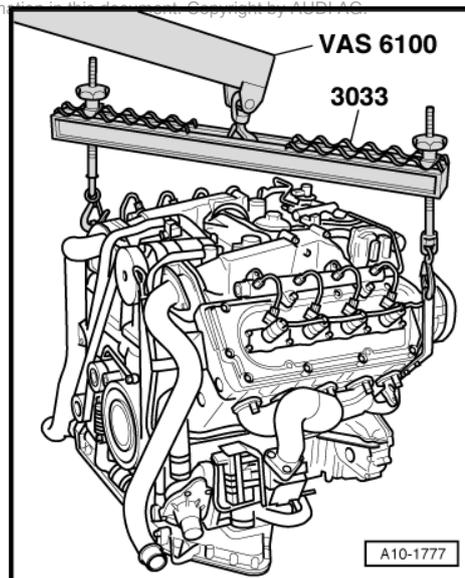
- ◆ Lifting tackle - 3033-
- ◆ Engine and gearbox support - VAS 6095- with support bracket for V8 TDI engine, Audi A8 - VAS 6095/1-3-
- ◆ Workshop hoist - VAS 6100-



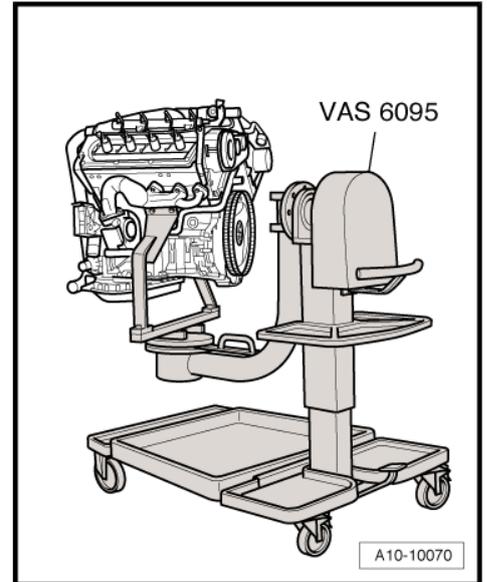
**Procedure**

- Engine separated from gearbox => [page 28](#)
- Attach lifting tackle - 3033- to workshop hoist - VAS 6100- as shown in illustration.
- Lift engine off the support elements on scissor-type assembly platform - VAS 6131 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 published here. Copyright by AUDI AG.



- Using bracket - VAS 6095/1-3- , secure engine to engine and gearbox support - VAS 6095- as shown in illustration.

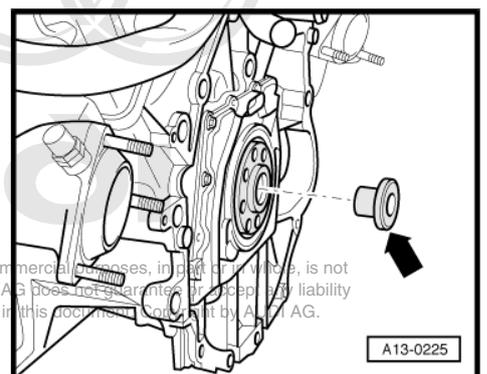


## 1.4 Installing engine

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

### Note

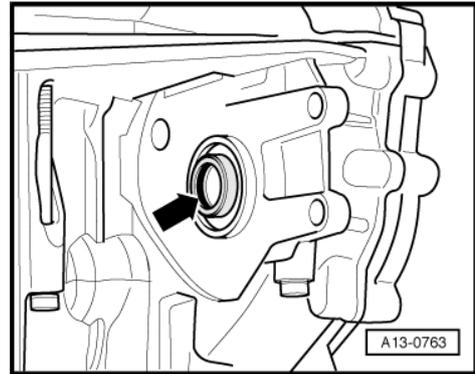
- ◆ *Renew self-locking nuts and bolts when performing assembly work.*
  - ◆ *Renew bolts which are tightened to a specified angle as well as oil seals and gaskets.*
  - ◆ *Hose connections and hoses for charge air system must be free of oil and grease before assembly.*
  - ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
  - ◆ *Reinstall all cable ties in the same locations when assembling.*
- Before installing an exchange engine, check whether the centralising bush -arrow- for the torque converter is fitted at the rear of the crankshaft.



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



- Before installing an exchange engine, check whether the O-ring -arrow- is fitted in the drive shaft of the power steering pump.
- Check whether dowel sleeves for centring the engine/gearbox assembly are fitted in the cylinder block; install dowel sleeves if necessary.
- To secure torque converter on drive plate, use only new bolts (same as original equipment); refer to ⇒ Electronic parts catalogue .



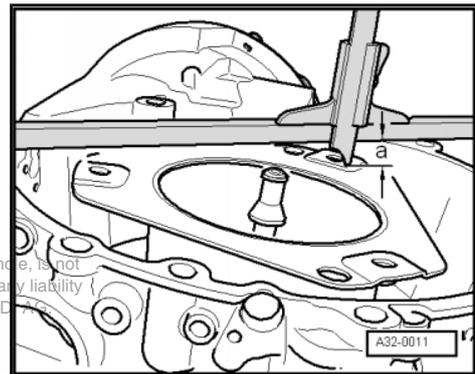
### Checking installation depth of torque converter

If the torque converter has been correctly installed, the distance a- between the contact surfaces at the threaded holes in the torque converter and the joint surface on the torque converter bell-housing for automatic gearbox 09E is at least 18.9 mm.



#### Caution

***If the torque converter is not installed correctly, the drive lugs of the torque converter and the ATF pump will be seriously damaged when the gearbox is joined to the engine.***

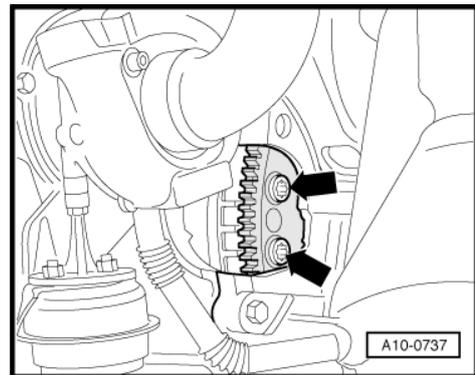


- Before bringing engine and gearbox together, turn torque converter and drive plate on engine so that the holes for the securing bolts are in line with the opening for the starter motor -arrows-.
- To secure torque converter on drive plate, use only new ribbed bolts of the correct type (same as original equipment) as specified in ⇒ Electronic parts catalogue .
- Bolt gearbox to engine.



#### Caution

***Before and during tightening of bolts on engine/gearbox flange, continually check that the torque converter behind the drive plate can be turned. If the converter cannot be turned, it must be assumed that it has not been installed correctly and the drive lugs for the ATF pump and consequently the gearbox will be damaged during final tightening of bolt connections.***



#### Note

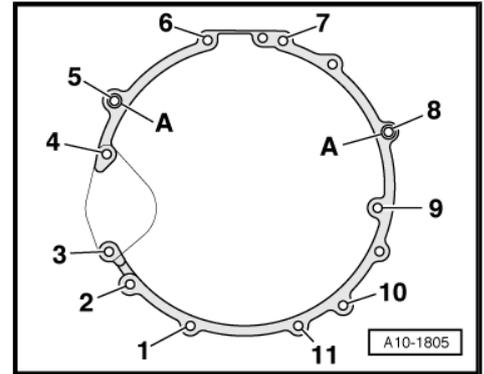
- ◆ *Tightening torques apply only to lightly greased, oiled, phosphated or black-finished nuts and bolts.*
- ◆ *Additional lubricant such as engine oil or gearbox oil may be used, but do not use lubricant containing graphite.*
- ◆ *Do not use degreased parts.*
- ◆ *Tolerance for tightening torques: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

Securing engine to gearbox

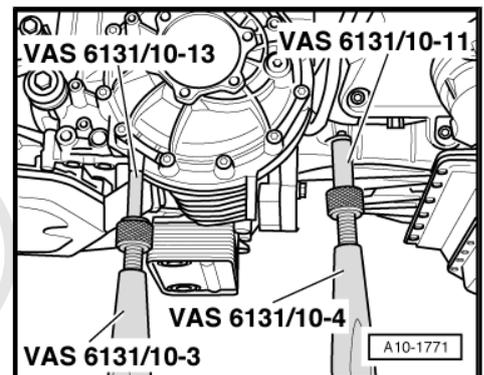
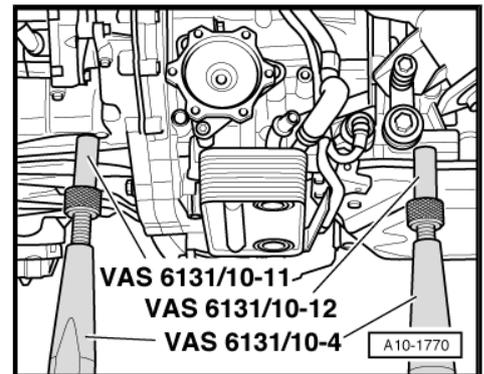
Item	Bolt	Nm
1, 2, 8, 10, 11	M12x75	65
3	M10x45	45
4	M10x135	65 <sup>3)</sup>
5, 6, 7	M12x100	65
9	M12x155	65
A	Dowel sleeves for centralising	

3) Property class 10.9

- Install front exhaust pipe: left-side => [page 288](#) ; right-side => [page 290](#) .
- Screw down the spindles for support elements - VAS 6131/10-11- and -VAS 6131/10-12- (left-side) at engine/gearbox assembly.
- Unscrew both base plates for support elements (left-side) at scissor-type assembly platform - VAS 6131 A- .



- Screw down the spindles for support elements - VAS 6131/10-11- and -VAS 6131/10-13- (right-side) at engine/gearbox assembly.
- Unscrew both base plates for support elements (right-side) at scissor-type assembly platform - VAS 6131 A- .



**Note**

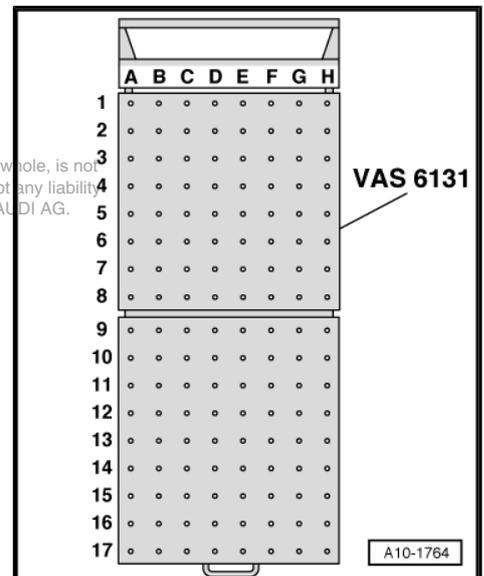
*The mounting points for engine (front) and gearbox (rear) remain unchanged.*

- Set up scissor-type assembly platform - VAS 6131 A- with support set - VAS 6131/10- as follows:

Platform co-ordinates	Parts of support set from -VAS 6131/10-			
C3	/10-1	/10-4	/10-5	/10-6
G3	/10-1	/10-4	/10-5	/10-6
B6	/10-1	/10-3	/10-5	/10-7
G6	/10-1	/10-3	/10-5	/10-7
B10	/10-1	/10-2	/10-5	/10-8 <sup>5)</sup>
G10	/10-1	/10-2	/10-5	/10-8 <sup>5)</sup>
D16 <sup>4)</sup>	/10-1	/10-4	/10-5	/10-9
G15 <sup>4)</sup>	/10-1	/10-4	/10-5	/10-10

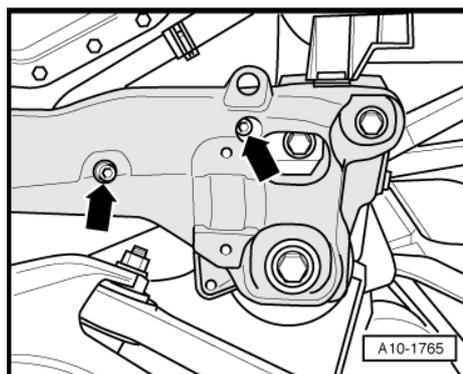
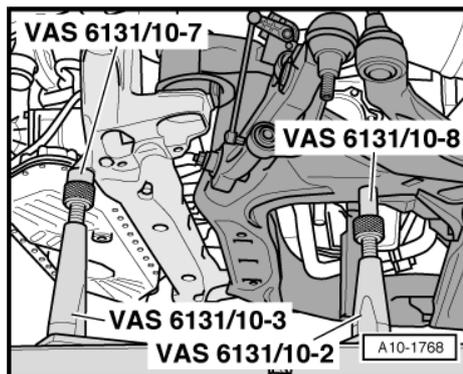
4) Support elements remain unchanged.

5) Secure support elements only after installing the subframe.





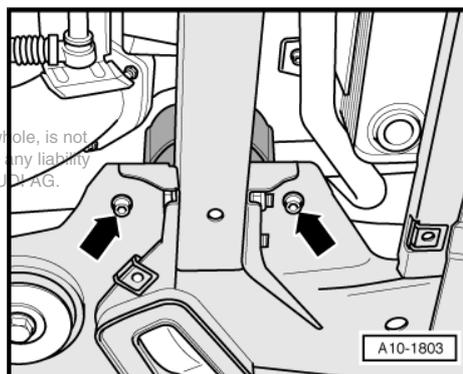
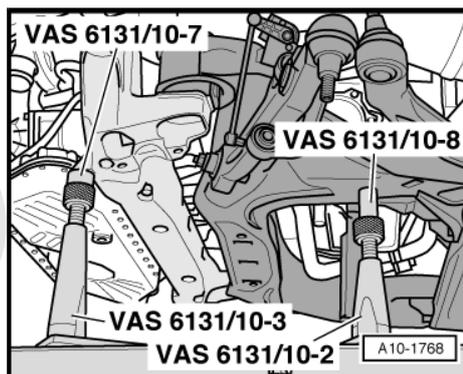
- Position engine cross member on the two support elements - VAS 6131/10-7- .
  - Screw up spindles for support elements -VAS 6131/10-7- on both sides.
  - Tighten base plates for support elements on scissor-type assembly platform - VAS 6131 A- to 20 Nm.
- 
- Tighten bolts -arrows- for engine mountings on both sides.



**Note**

*A second mechanic is required for positioning the subframe on the support elements.*

- Fit subframe onto the two support elements -VAS 6131/10-8- .
- Screw up spindles for support elements -VAS 6131/10-8- on both sides.
- Tighten base plates for support elements on scissor-type assembly platform - VAS 6131 A- to 20 Nm.
- Tighten bolts for front gearbox mounting -arrows- on both sides.
- Guide engine/gearbox assembly together with subframe and engine cross member into the body from below using scissor-type assembly platform - VAS 6131 A-.
- Adjust the subframe and engine cross member according to the markings previously made on the longitudinal members.



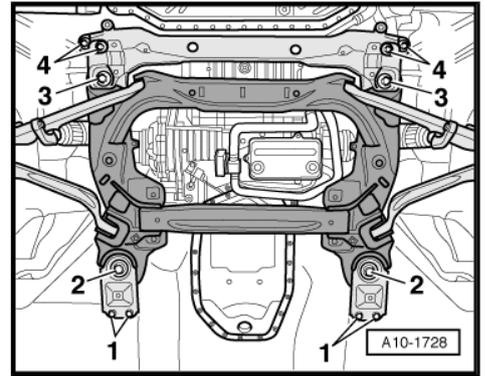
- Only tighten bolts for subframe to the specified torque (do not turn further); tighten bolts only after performing alignment check.

- 1 - 50 Nm
- 2 - 150 Nm
- 3 - 150 Nm



**WARNING**

*The vehicle must not be driven at this stage.*



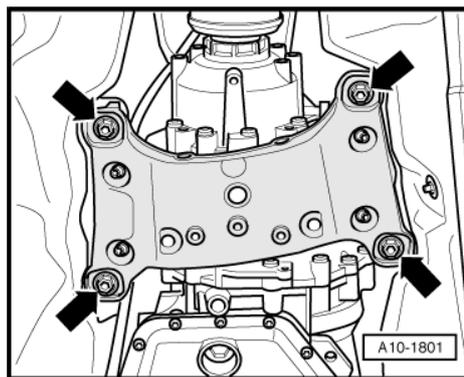
- Tighten bolts -4- for engine cross member.
- Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- Tighten bolts -arrows- at tunnel cross member.

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

- Install propshaft ⇒ Rear final drive 01R; Rep. gr. 39 .
- Install selector lever cable; check adjustment if necessary ⇒ Automatic gearbox 09E, four-wheel drive; Rep. gr. 37 .
- Install main catalytic converter: left-side ⇒ [page 284](#) , right-side ⇒ [page 285](#) .
- Align exhaust system so it is free of stress ⇒ [page 293](#) .
- Install guide link, track control link and anti-roll bar ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 40 .
- Install drive shafts ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 40 .
- Install refrigerant lines ⇒ Air conditioning system; Rep. gr. 87
- Install lock carrier with attachments ⇒ General body repairs, exterior; Rep. gr. 50 .
- Install front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 .
- Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Observe notes on procedures required after connecting battery ⇒ Electrical system; Rep. gr. 27 .

**Caution**

***Do not use a battery charger to boost starting. There is danger of damaging the vehicle's control units.***

- Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
- Install body brace ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 47 .
- Install and adjust wiper arms ⇒ **Electrical system**; Rep. gr. 92 .
- Before starting the engine for the first time, fill up the power steering reservoir with hydraulic fluid; the power steering pump must not run dry.
- Charge the refrigerant system ⇒ Air conditioner system - with refrigerant R134a .

**Note**

*Do not reuse coolant.*

- Fill cooling system ⇒ [page 211](#) .
- Check oil level ⇒ Maintenance ; Booklet 404 .
- Top up power steering fluid and bleed steering system: ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 48
- Perform wheel alignment check ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 44 .

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

- Check headlight adjustment ⇒ Maintenance ; Booklet 404 .
- Check fuel system for leaks ⇒ [page 4](#) .

**Tightening torques**

 **Note**

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

Component	Nm
Bolts/nuts	M6 9
	M8 20
	M10 40
	M12 65
Except for the following:	
Drive plate to torque converter	85
Engine cross member to engine mounting	23
Gearbox mounting to subframe	23
Tunnel cross member to body	40
Engine cross member to longitudinal member	68
Coolant pipe to gearbox	22
Terminal B+ to starter	16
Terminal 50 to starter	10
Engine support to engine	42
Bracket for turbocharger to:	Turbocharger 10
	Engine support 10
Battery cable to fuse box	20
Bracket for torque reaction support to longitudinal member	40
Mounting for torque reaction support to torque reaction support	23
Hydraulic pressure pipe connection	45
Hose clips (9 mm wide)	3
Hose clips (13 mm wide)	5.5

## 13 – Crankshaft group

### 1 Dismantling and assembling engine

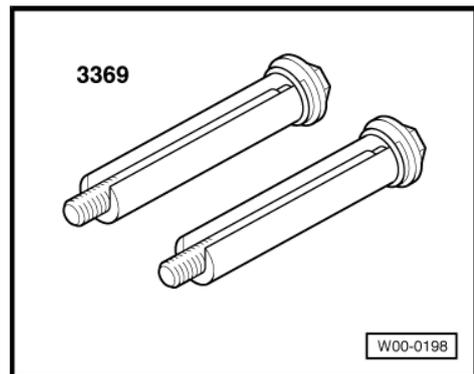
⇒ [“1.1 Moving lock carrier into service position”, page 42](#)

⇒ [“1.2 Lowering subframe for repair and assembly work”, page 45](#)

#### 1.1 Moving lock carrier into service position

Special tools and workshop equipment required

- ◆ Front-end service sleeves - 3369-



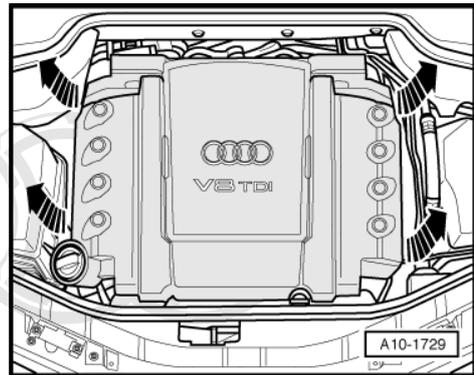
#### Removing



#### Note

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

- Activate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
- Carefully pull engine cover panel off four retaining pins one after the other -arrows-.



#### WARNING

The air conditioner refrigerant circuit must not be opened.

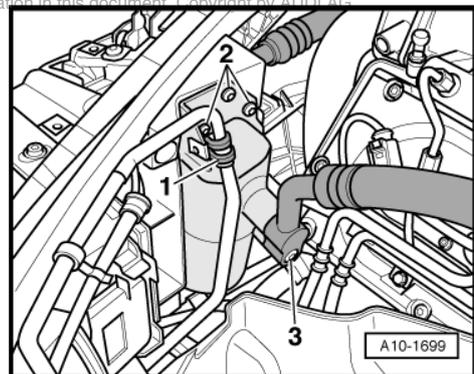
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG



#### Note

To prevent damage to the air conditioner compressor and refrigerant pipes/hoses, ensure that the pipes and hoses are not stretched, kinked or bent.

- Detach clamp -1- on reservoir.
- Remove bolts -2-.



#### Note

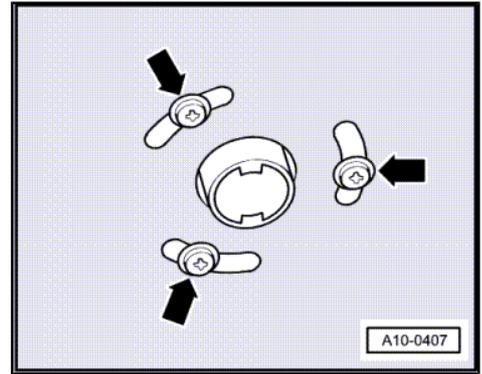
Refrigerant line -3- must not be unscrewed.

- Remove both front wheels.

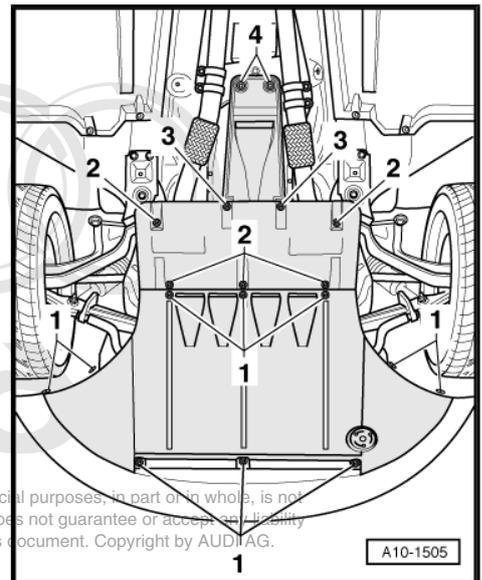
 **Note**

*Secure brake discs with wheel bolts.*

- Vehicles with auxiliary heater: remove bolts -arrows- securing exhaust pipe for auxiliary/additional heater to noise insulation.

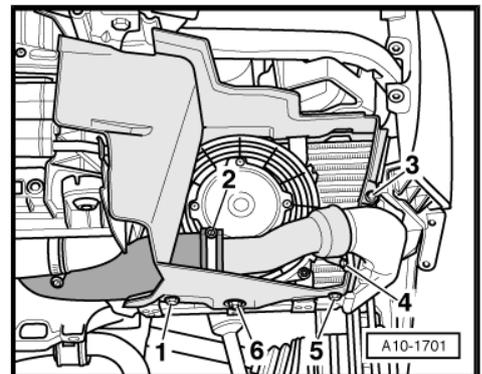


- Open quick-release fasteners -1- and remove noise insulation (front).
- Remove front section of wheel housing liner (front left and front right) ⇒ General body repairs, exterior; Rep. gr. 66 .
- Remove front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 .

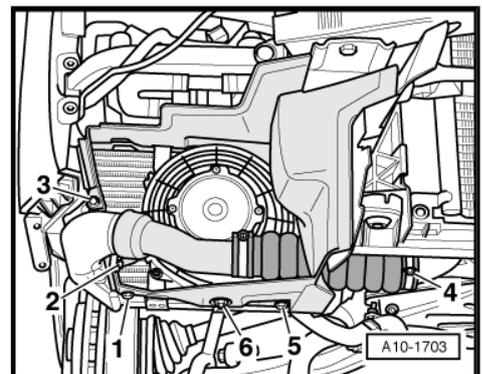


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Remove bolt -4- and nut -6-.
- Slacken hose clip -2- and detach air pipe.
- Remove bolts -1-, -3- and -5-.
- Detach air duct from charge air cooler (left-side).

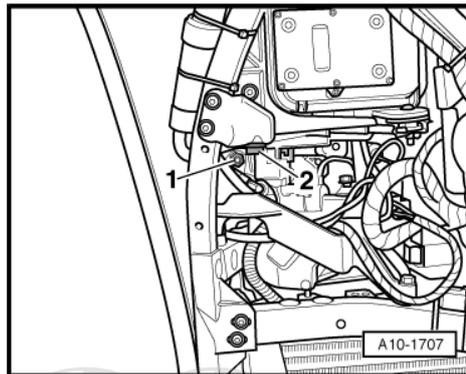


- Remove bolt -2- and nut -6-.
- Slacken hose clip -4- and detach air pipe with hose.
- Remove bolts -1-, -3- and -5-.
- Detach air duct from charge air cooler (right-side).





- Working from wheel housing, remove one nut -1- and one bolt -2- for lock carrier on each side.

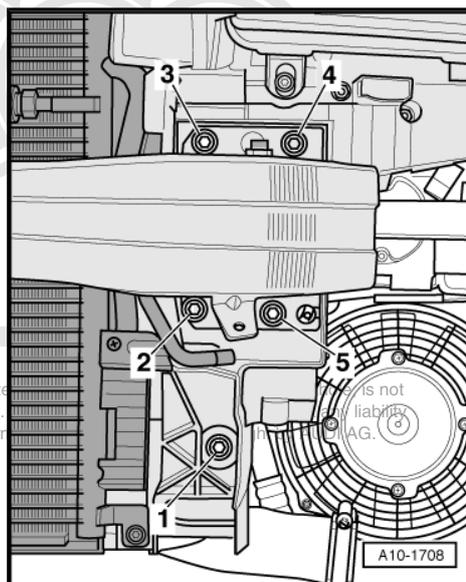


- Unscrew bolts -1 ... 5- on both sides of vehicle.

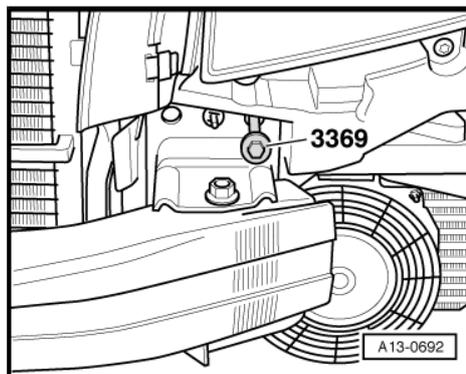


**Note**

*First unscrew one bolt on each side and mark the installation location of the lock carrier through the holes with a felt-tip pen.*



- Remove bolts from front-end service sleeves - 3369- (special tool).
- Screw bolts from front-end service sleeves - 3369- into top bolt holes for impact damper (left and right sides).



Protected by copyright. Copying for private use is permitted unless authorised by AUDI AG. Liability is not assumed with respect to the correctness of information.

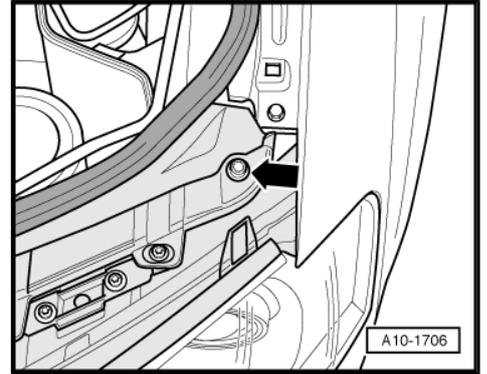
- Pull off bonnet seal at both wing panels.
- Remove one bolt -arrow- on each side from top of lock carrier.
- Carefully pull the lock carrier forward.

### Installing

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

#### Note

- ◆ *Hose connections and hoses for charge air system must be free of oil and grease before assembly.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- Install lock carrier with attachments ⇒ General body repairs, exterior; Rep. gr. 50 .
- Install front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 .
- Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
- Check headlight adjustment ⇒ Maintenance ; Booklet 404 .



## 1.2 Lowering subframe for repair and assembly work

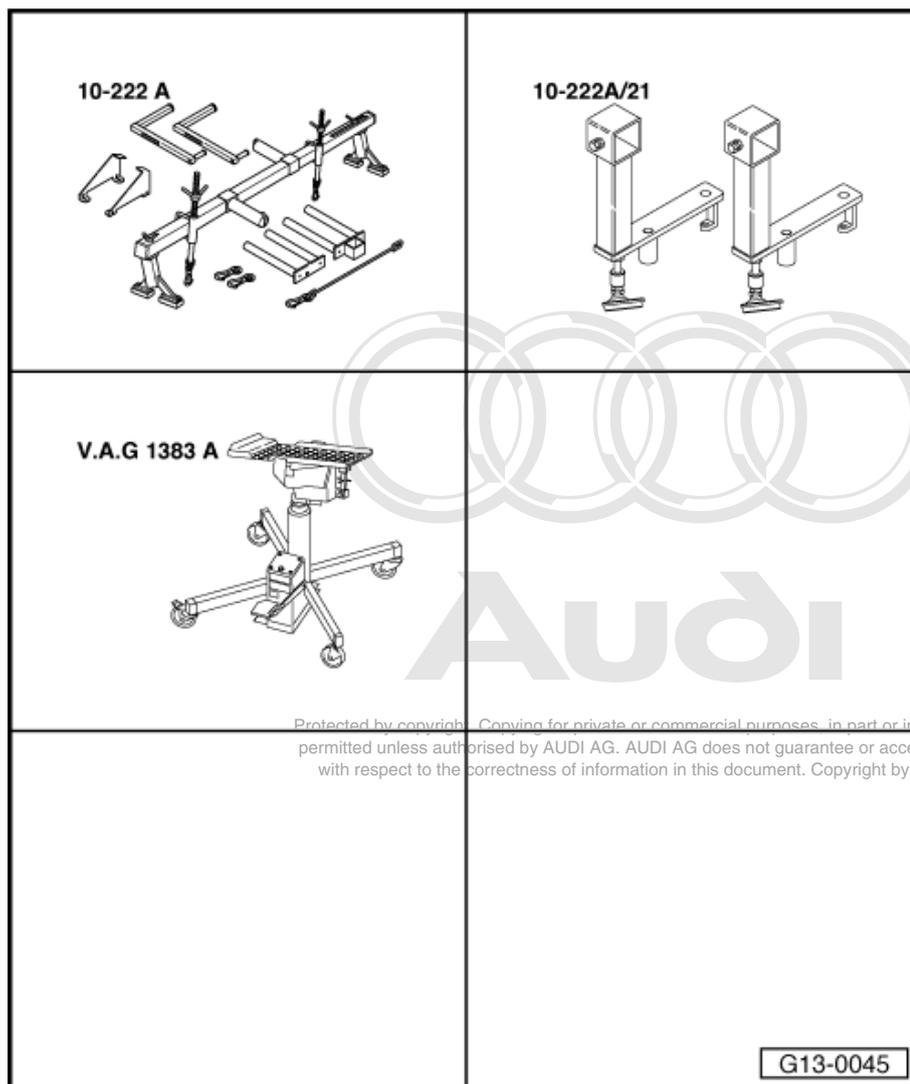


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



### Special tools and workshop equipment required

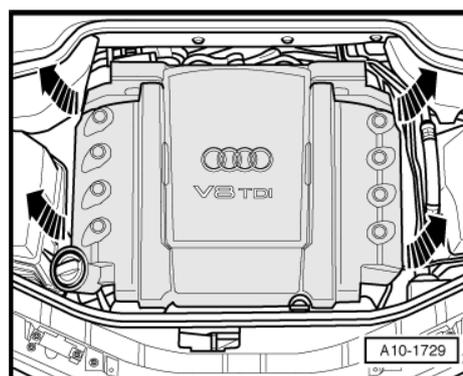
- ◆ Support bracket - 10-222 A-
- ◆ Support - 10-222 A/21-
- ◆ Engine and gearbox jack - V.A.G 1383 A-



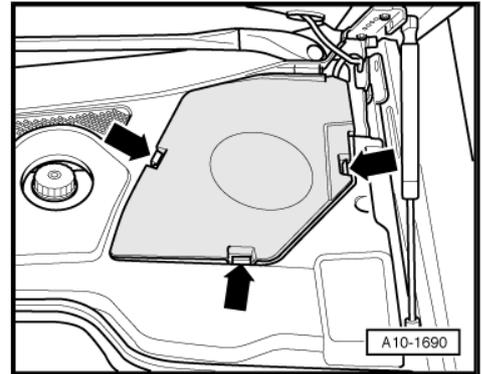
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

### Removing

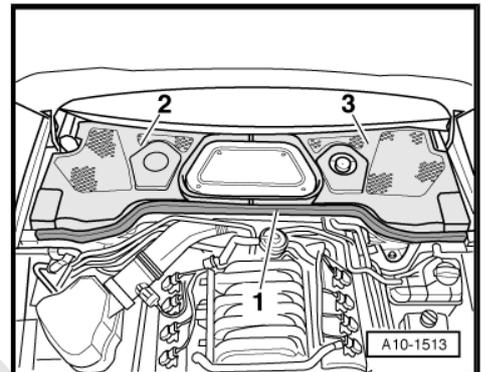
- Activate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
- Carefully pull engine cover panel off four retaining pins one after the other -arrows-.



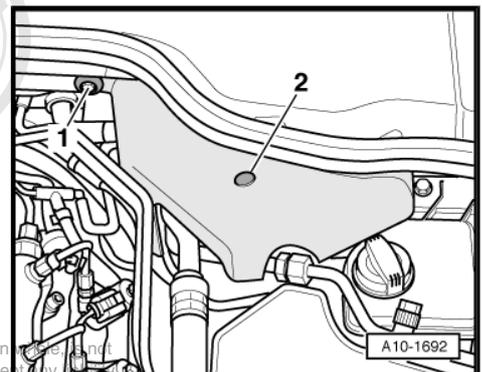
- Remove cover above coolant expansion tank -arrows-.



- Pull off rubber seal -1- on plenum chamber covers.
- Detach plenum chamber covers -2- and -3-.



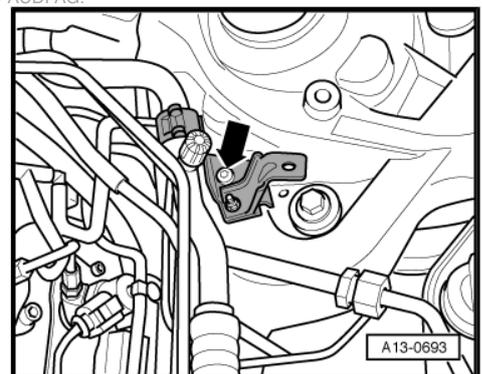
- Remove cover for suspension turret (left-side); to do so, remove nut -1- and detach spreader clip -2-.



- Remove bolt -arrow-.
- Pivot bracket for air conditioner pipe to one side.

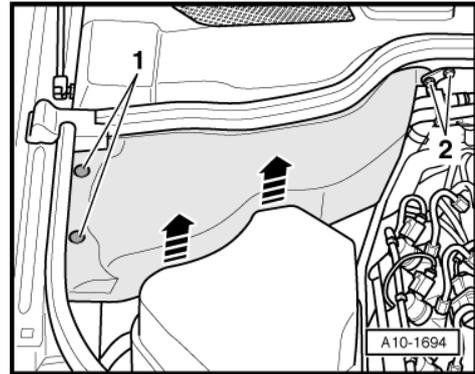
**i** Note

*To prevent damage to the air conditioner compressor and refrigerant pipes/hoses, ensure that the pipes and hoses are not stretched, kinked or bent.*





- Remove cover for right suspension turret; to do so, detach spreader clips -1- and unscrew bolted joint -2-.
- Pull cover out of retainers -arrows-.

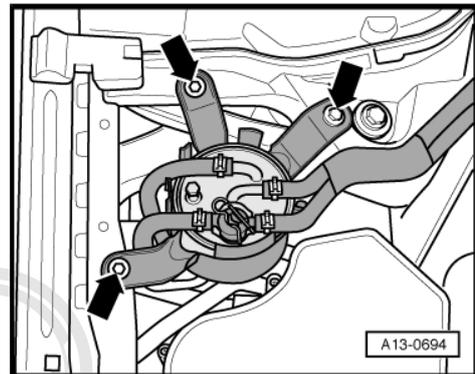


- Remove bolts -arrows- on fuel filter bracket.

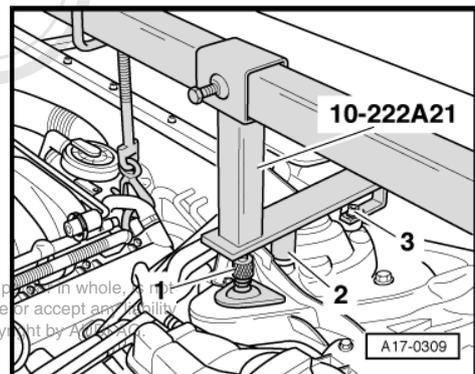


Note

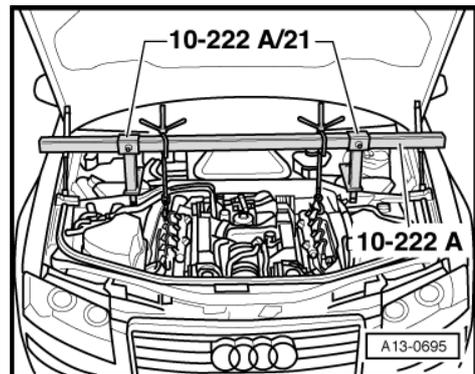
Fuel filter remains in engine compartment with fuel lines connected.



- Unscrew rear bolts -3- for body brace.
- Attach the support bracket - 10-222 A- with support - 10-222 A/21- onto the suspension turrets.
- Supports are marked for left and right side of vehicle.
- The centre resting point -2- of supports is positioned on front bolts for body brace.
- The supports - 10-222 A/21- are attached to rear securing bolts -3- for body brace.
- The knurled screw -1- must be screwed down until support plate rests on suspension turret.



- Secure spindles of support bracket - 10-222 A- to rear engine lifting eyes.
- Partly take up weight of engine with spindles of support bracket.

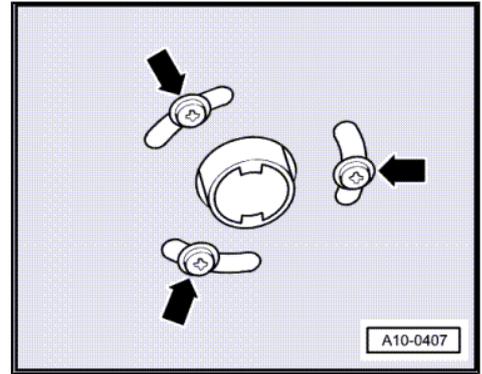


- Remove both front wheels.

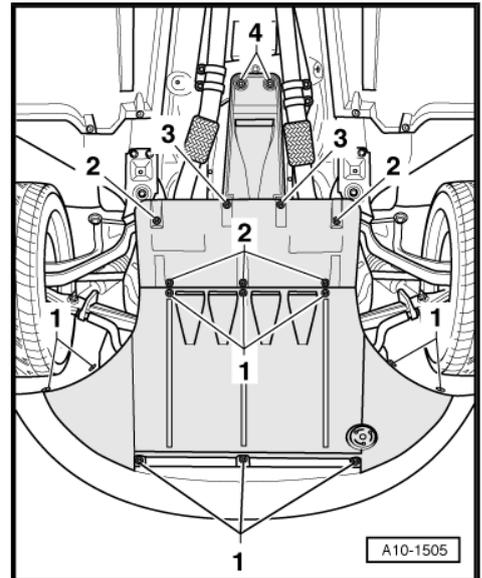
 **Note**

*Secure brake discs with wheel bolts.*

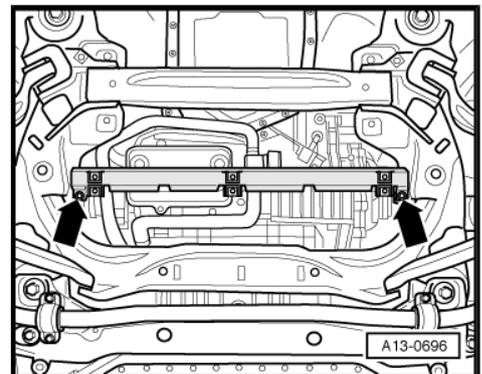
- Vehicles with auxiliary heater: remove bolts -arrows- securing exhaust pipe for auxiliary/additional heater to noise insulation.



- Release fasteners -1-, -2- and -4- and take off noise insulation panels.



- Unbolt bracket for noise insulation -arrows-.
- Remove front section of wheel housing liner (front left and front right) ⇒ General body repairs, exterior; Rep. gr. 66 .

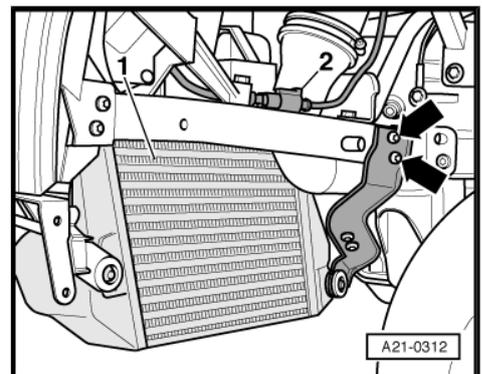


- Remove bolts -arrows- and detach bracket for charge air cooler (left-side).

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

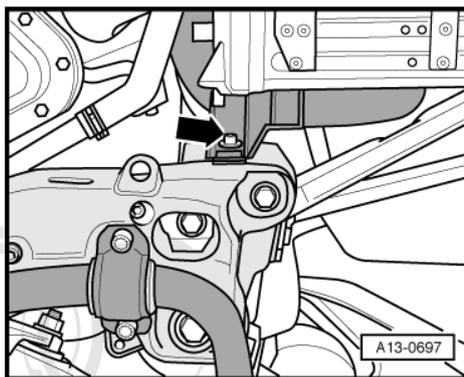
 **Note**

*Disregard items -1- and -2-.*





- Remove bolt -arrow- for air intake pipe (left-side).



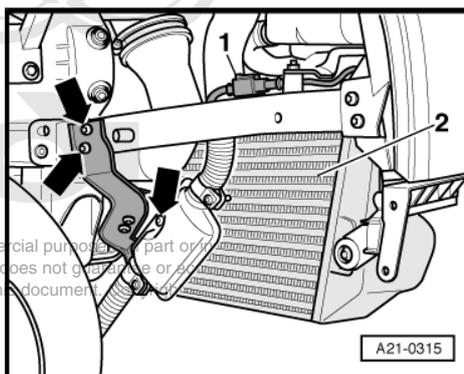
- Remove bolts -arrows- and detach bracket for charge air cooler (right-side).



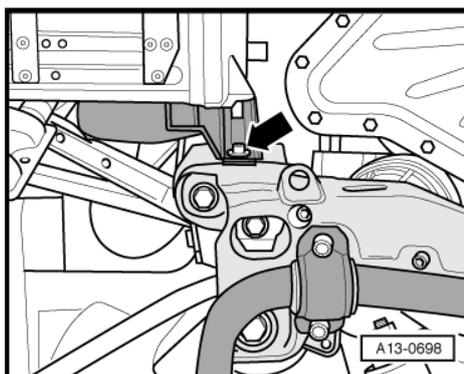
**Note**

*Disregard items -1- and -2-.*

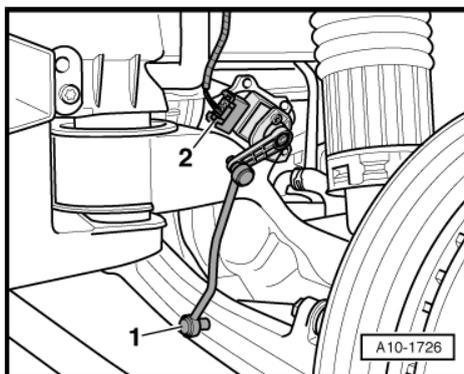
Protected by copyright. Copying for private or commercial purposes without the express written permission of Audi AG is prohibited. Audi AG does not guarantee the accuracy or completeness of the information in this document with respect to the correctness of information in the original document.



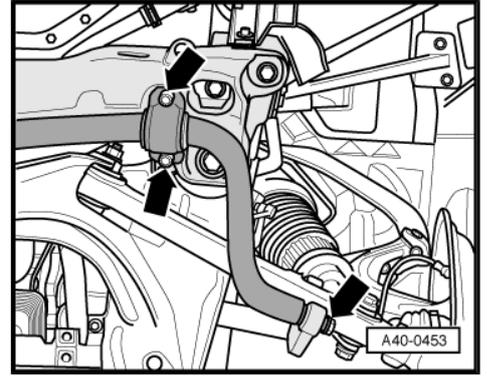
- Remove bolt -arrow- for air intake pipe (right-side).



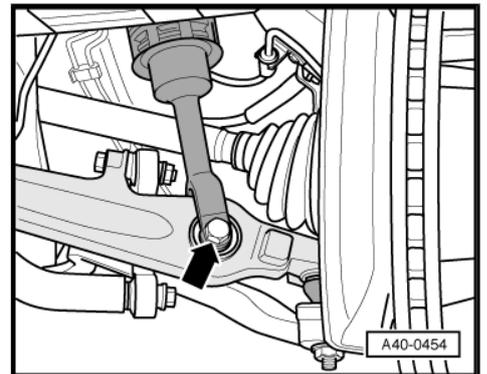
- Unplug electrical connector -2- at vehicle level sender.
- Detach coupling rod -1- at track control link.
- Repeat procedure on other side of vehicle.



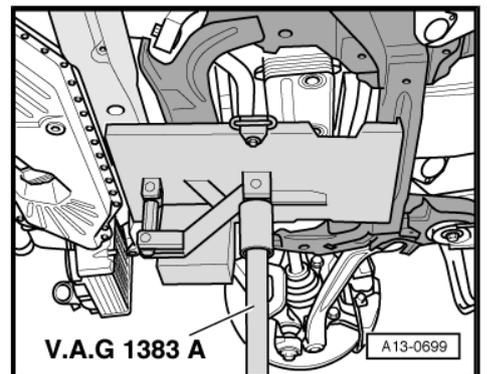
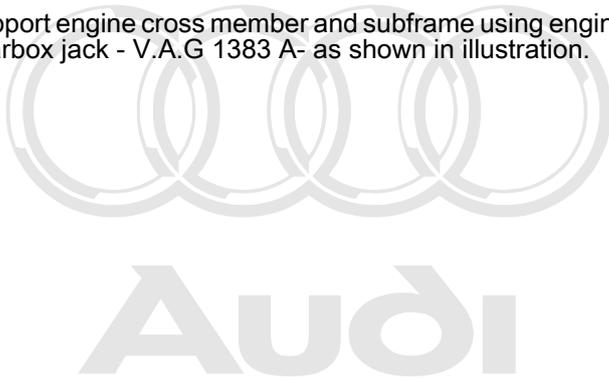
- Unscrew bolts (left and right) -arrows- evenly.
- Take out anti-roll bar.



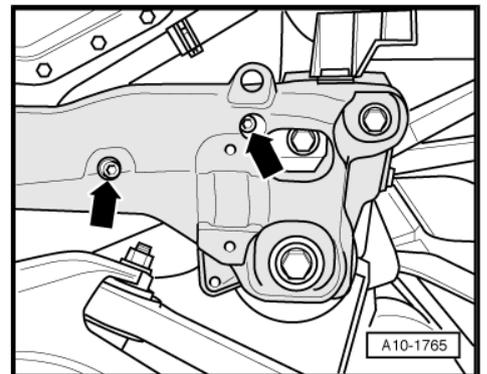
- Unbolt air spring struts (left and right) from track control links -arrow-.

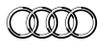


- Support engine cross member and subframe using engine and gearbox jack - V.A.G 1383 A- as shown in illustration.

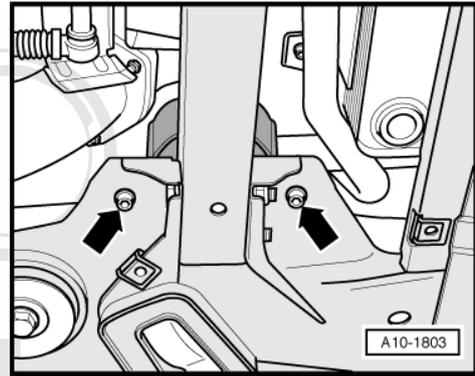


- Remove bolts -arrows- for engine mounting (left and right side)





- Remove bolts -arrows- for front gearbox mounting (left and right).



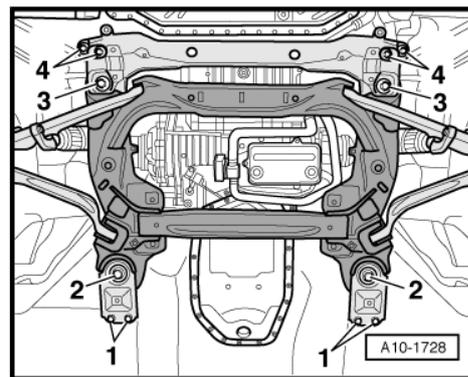
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Mark installation position of subframe on longitudinal member with felt-tip pen.
- Remove bolts -1- and -4-.
- Remove bolts -2- and -3- in a diagonal sequence and in stages.
- Slowly lower the subframe together with the engine cross member downwards.

### Installing

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

- Only tighten bolts for subframe to the specified torque (do not turn further); tighten bolts only after performing alignment check ⇒ Running gear, front-wheel and four-wheel drive; Rep. gr. 40 .



### WARNING

*The vehicle must not be driven at this stage.*

- Install anti-roll bar ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 40 .
- Install body brace ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 40 .
- Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
- Perform wheel alignment check ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 44 .



### WARNING

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

### Tightening torques

Component	Nm
Engine mounting to engine cross member	23
Engine cross member to longitudinal member	68
Gearbox mounting to subframe	23
Air pipe to engine cross member	10
Bracket for charge air cooler to body	10
Bracket for noise insulation to subframe	10
Fuel filter bracket to body	10
Bracket for refrigerant line to body	10

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

## 2 Servicing work on pulley end

⇒ [“2.1 Poly V-belt drive for alternator and air conditioner - exploded view of components”, page 54](#)

⇒ [“2.2 Poly V-belt drive for alternator and air conditioner compressor”, page 55](#)

⇒ [“2.3 Removing and installing poly V-belt”, page 55](#)

⇒ [“2.4 Removing and installing vibration damper”, page 56](#)

⇒ [“2.5 Renewing crankshaft oil seal \(pulley end\)”, page 58](#)

⇒ [“2.6 Removing and installing sealing flange \(front\)”, page 60](#)

### 2.1 Poly V-belt drive for alternator and air conditioner - exploded view of components

#### 1 - Poly V-belt

- Before removing, mark direction of rotation with chalk or felt-tip pen. If the belt runs in the opposite direction when it is refitted, this can cause breakage.
- Removing and installing ⇒ [page 55](#)
- Check for wear

#### 2 - 50 Nm

#### 3 - Bearing bush

#### 4 - O-ring

- Renew

#### 5 - Dowel sleeve

- 2x
- Check for correct seating in mounting plate

#### 6 - 25 Nm

#### 7 - Air conditioner compressor

- Removing and installing ⇒ Air conditioning system; Rep. gr. 87

#### 8 - Washer

#### 9 - O-ring

- Renew

#### 10 - Tensioning roller

- With tensioning lever

#### 11 - Compression spring

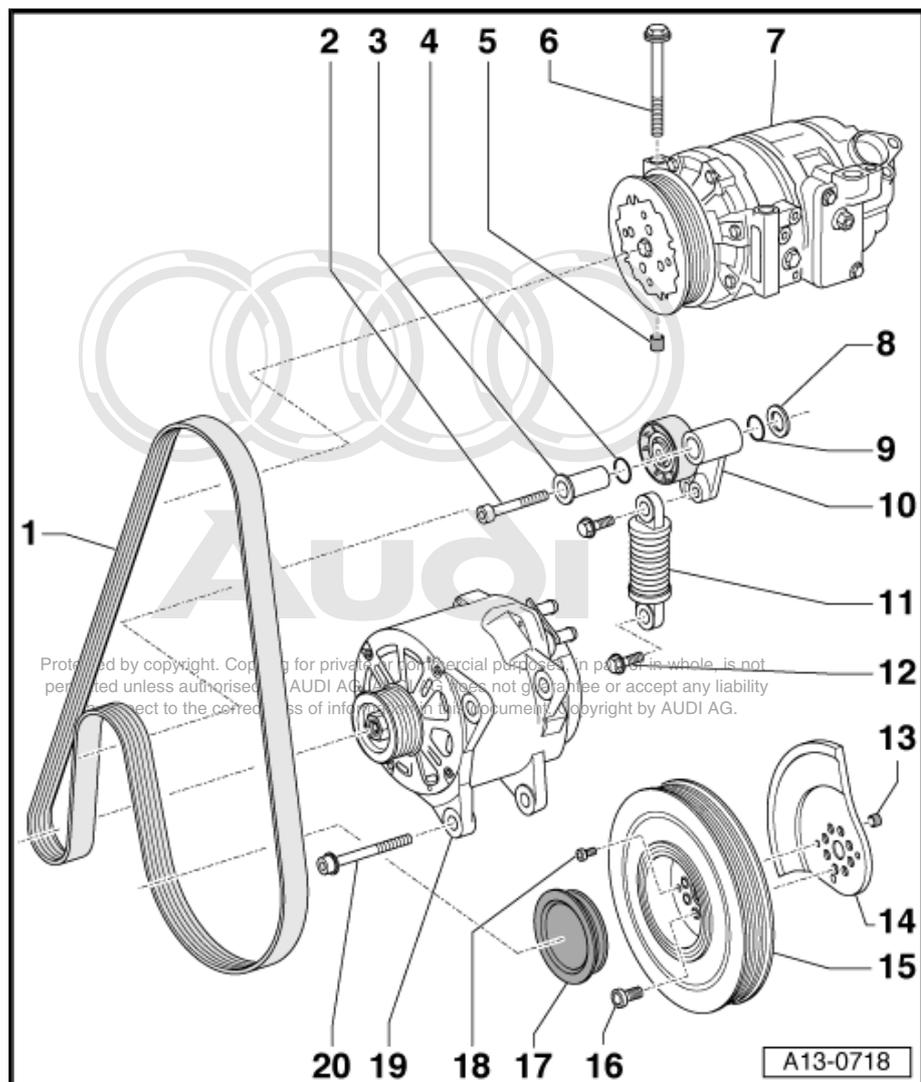
- For tensioner

#### 12 - 22 Nm

- Torque down bolts after installing poly V-belt

#### 13 - Dowel sleeve

- Check for correct seating in damper weight



14 - Damper weight

15 - Vibration damper

- With pulley for poly V-belt
- Removing and installing => [page 56](#)

16 - 22 Nm + 45° (1/8 turn) further

- Renew

17 - Cap

- Lever off with screwdriver

18 - 5 Nm

19 - Alternator

- Removing and installing => Electrical system; Rep. gr. 27

20 - 22 Nm

## 2.2 Poly V-belt drive for alternator and air conditioner compressor

**i** Note

- ◆ Before removing the poly V-belt, mark the direction of rotation with chalk or a felt-tip pen. If the belt runs in the opposite direction when it is refitted, this can cause breakage.
- ◆ Check that the belt runs properly on the pulleys when installing.

## 2.3 Removing and installing poly V-belt

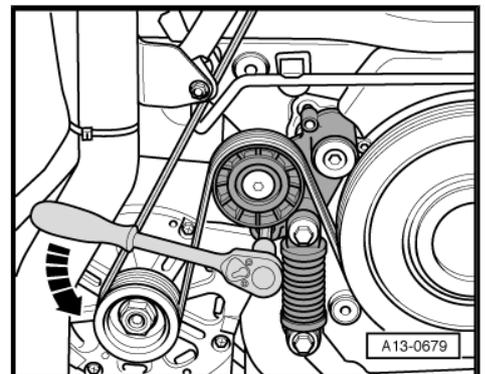
**Removing** Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability for errors or omissions in this document. Copyright by AUDI AG.

- Move lock carrier to service position => [page 42](#)

**i** Note

Before removing, mark direction of rotation of poly V-belt with chalk or felt-tip pen. If the belt runs in the opposite direction when it is refitted, this can cause breakage.

- To slacken poly V-belt, pivot belt tensioner in direction of -arrow- (use a lever with 3/8" drive).
- Remove poly V-belt from alternator pulley.





## Installing

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

- Fit poly V-belt on pulleys.
- 1.) - Alternator
- 2.) - Tensioner for poly V-belt
- 3.) - Air conditioner compressor
- 4.) - Crankshaft



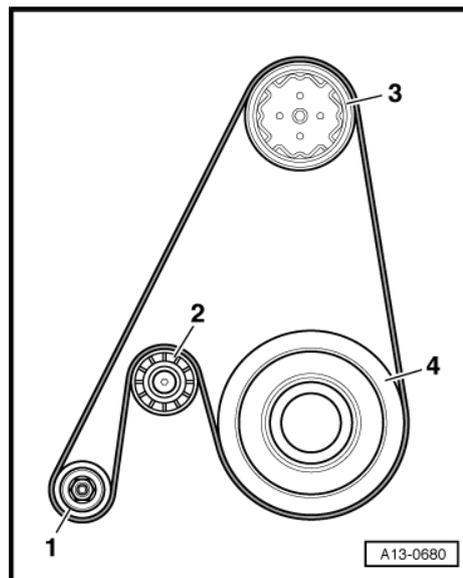
### Note

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

- After installing poly V-belt, torque down bolts  
⇒ [Item 12 \(page 54\)](#) for compression spring using torque wrench.
- Start engine and check that belt runs properly.
- Install lock carrier with attachments ⇒ General body repairs, exterior; Rep. gr. 50 .
- Install front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 .
- Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
- Check headlight adjustment ⇒ Maintenance ; Booklet 404 .

## Tightening torque

Component	Nm
Bolts for compression spring to cylinder block	22



## 2.4 Removing and installing vibration damper

### Removing

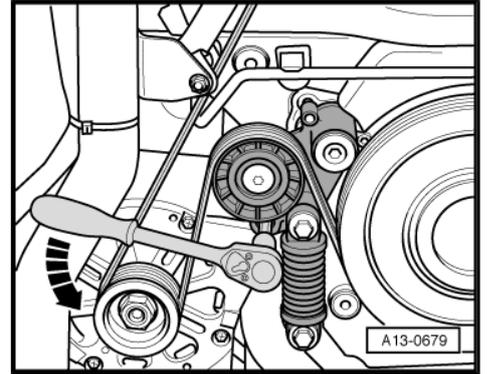
- Move lock carrier to service position ⇒ [page 42](#) .



### Note

Before removing, mark direction of rotation of poly V-belt with chalk or felt-tip pen. If the belt runs in the opposite direction when it is refitted, this can cause breakage.

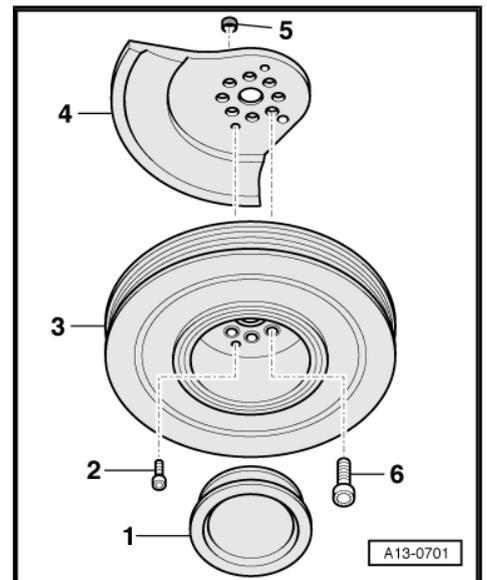
- To slacken poly V-belt, pivot belt tensioner in direction of -arrow- (use a lever with  $\frac{3}{8}$ " drive).
- Remove poly V-belt from alternator pulley.



- Lever off cap -1-.
- Unscrew bolts -6- (8x).
- Remove vibration damper -3- and damper weight -4-.

 **Note**

*The two bolts -2- must be removed before disassembling vibration damper and damper weight.*



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

- Make sure that dowel sleeve -5- is fitted.
- Install poly V-belt ⇒ [page 55](#) .
- After installing poly V-belt, torque down bolts ⇒ [Item 12 \(page 54\)](#) for compression spring using torque wrench.
- Install lock carrier with attachments ⇒ General body repairs, exterior; Rep. gr. 50 .
- Install front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 .
- Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
- Check headlight adjustment ⇒ Maintenance ; Booklet 404 .

## Tightening torques

Component	Nm
Vibration damper to crankshaft	22 + 45° <sup>7) 6)</sup>
Damper weight to vibration damper	5
Bolts for compression spring to cylinder block	22

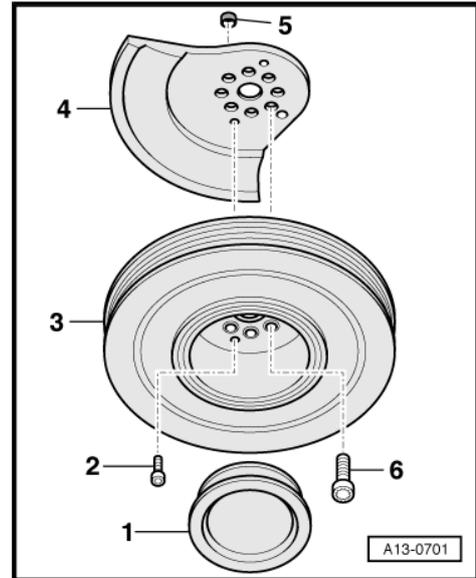
6) Renew bolts.

7) 45° equals 1/8 turn.

## 2.5 Renewing crankshaft oil seal (pulley end)

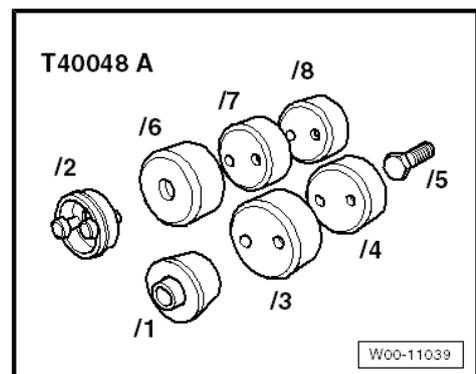
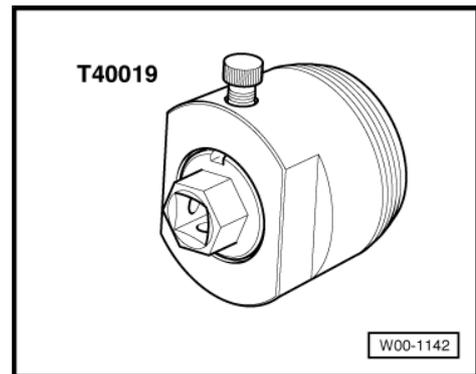
### Special tools and workshop equipment required

- ◆ Oil seal extractor - T40019-



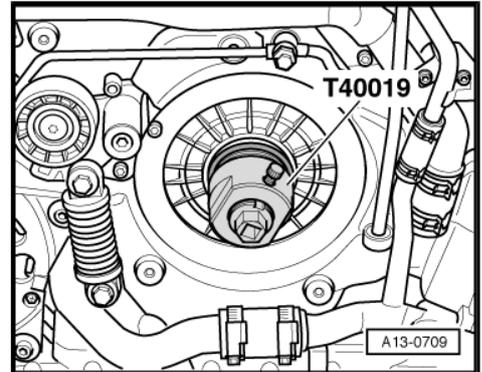
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- ◆ Assembly tool - T40048 A-



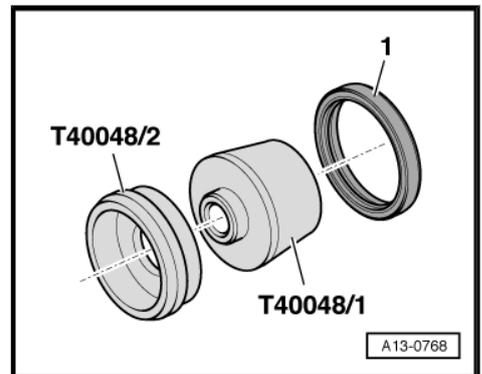
### Removing

- Move lock carrier to service position ⇒ [page 42](#) .
- Remove vibration damper ⇒ [page 56](#) .
- 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 exerting firm pressure screw it into oil seal as far as possible.
- Loosen knurled screw and turn inner part against crankshaft until the oil seal is pulled out.
- Clamp flats of oil seal extractor in vice. Remove oil seal with pliers.

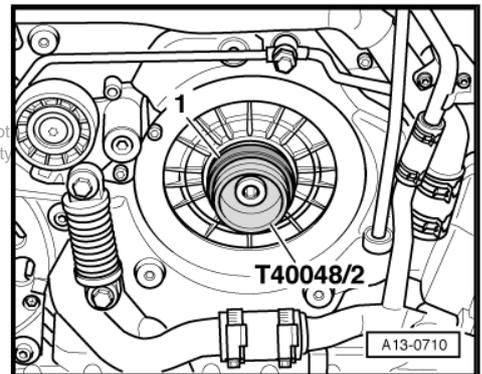


### Installing

- Clean contact surface and sealing surface.
- Fit assembly aid - T40048/1- onto assembly sleeve - T40048/2- and slide oil seal -1- onto assembly sleeve.
- Take off assembly aid.



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



**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.

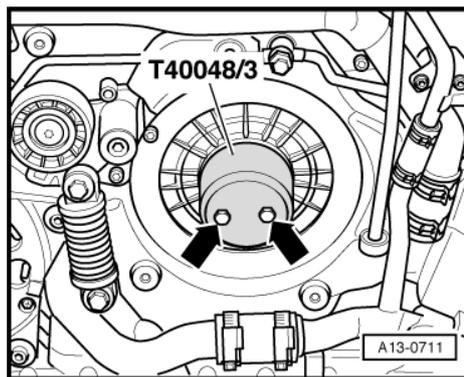
*Leave assembly sleeve - T40048/2- in position on crankshaft for pressing in seal.*



- Apply press sleeve - T40048/3- to crankshaft using M8×55 mm bolts -arrows-.
- Screw in bolts hand-tight to start with.
- Tighten bolts alternately, 1/2 turn at a time, to press in oil seal onto stop.

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

- Install vibration damper ⇒ [page 56](#) .
- Install lock carrier with attachments ⇒ General body repairs, exterior; Rep. gr. 50 .
- Install front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 .
- Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
- Check headlight adjustment ⇒ Maintenance ; Booklet 404 .



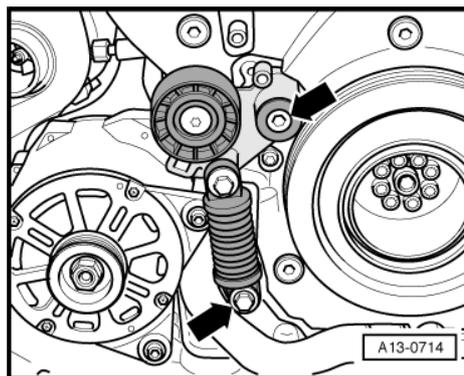
## 2.6 Removing and installing sealing flange (front)

### Special tools and workshop equipment required

- ◆ Electric drill with plastic brush attachment
- ◆ Safety goggles
- ◆ Sealant ⇒ Electronic parts catalogue

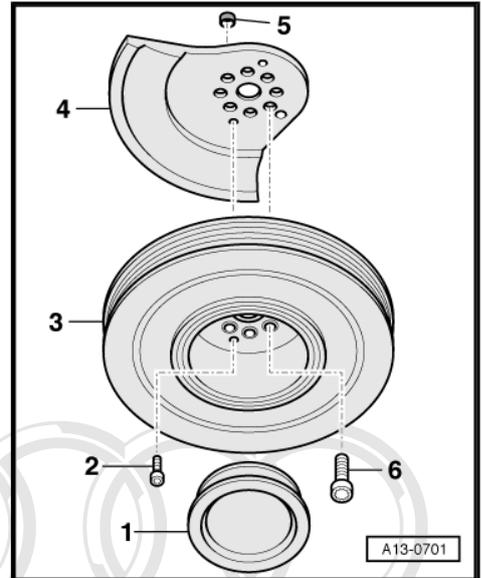
### Removing

- Drain coolant ⇒ [page 209](#) .
- Remove radiator ⇒ [page 234](#) .
- Remove radiator cowl ⇒ [page 239](#) .
- Remove coolant pipes (front) ⇒ [page 222](#) .
- Unbolt tensioner for poly V-belt -arrows-.
- Remove tensioner and washer (located behind it).



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

- Lever off cap -1-.
- Unscrew bolts -6- (8x).
- Remove vibration damper -3- and damper weight -4-.

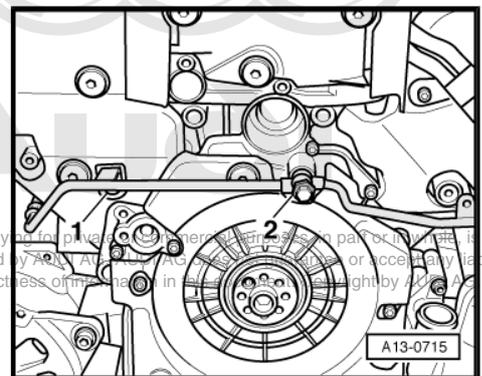


- Remove bolt -1-.
- Remove banjo bolt -2-.

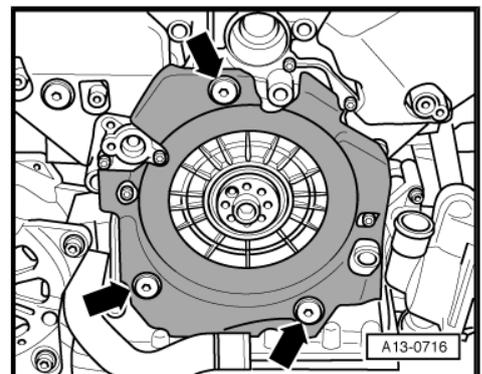
**i** Note

The oil supply lines remain attached to the engine.

Protected by copyright. Copying or reproducing or otherwise disseminating this publication or its contents in any form or by any means without the prior written permission of Audi AG is prohibited. Audi AG is not liable for any damage or injury resulting from the use of this publication.



- Remove cover for front sealing flange -arrows-.





- Remove bolts.
- Pull off front sealing flange -arrow-.
- Drive out oil seal with flange removed.

### Installing

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



### Note

*Renew gaskets, seals and O-rings.*

- Cover open area of top section of sump with a clean cloth.
- Remove old sealant from grooves in sealing flange and from sealing surfaces.

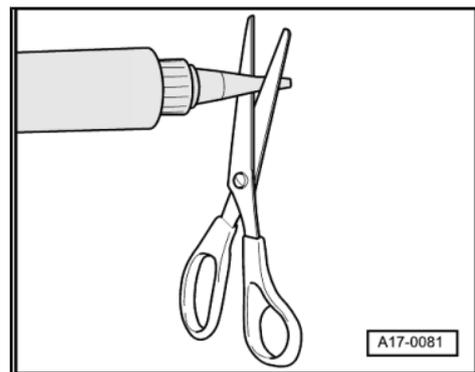
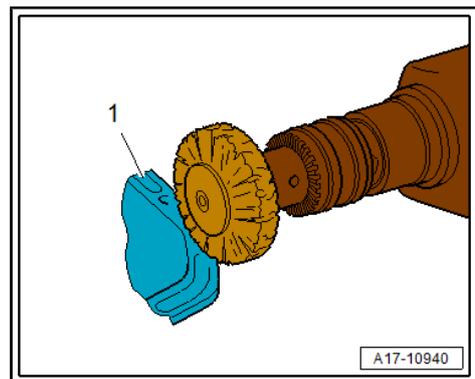
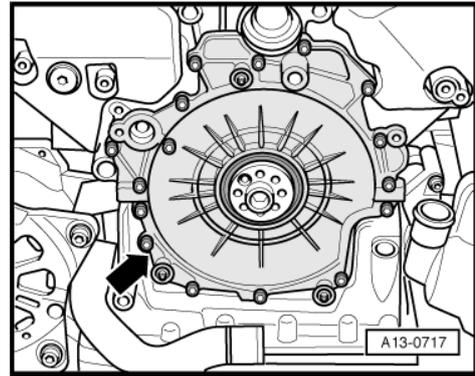


### WARNING

*Wear safety goggles.*

- Remove remaining sealant from sealing flange and cylinder block/sump (top section) with rotating plastic brush or similar.
- Clean sealing surfaces; they must be free of oil and grease.

- Cut off nozzle of tube at front marking ( $\varnothing$  of nozzle approx. 2 mm).



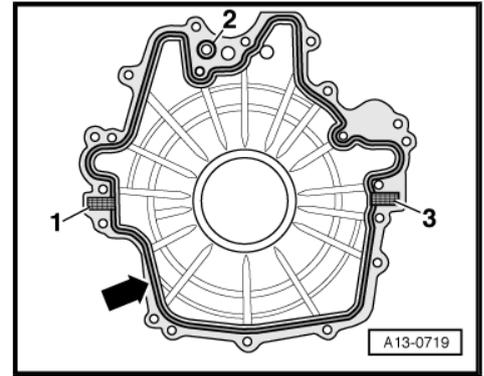
# Audi

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.

- Install sealing elements -1- and -3- and O-ring -2-.
- Apply bead of sealant -arrow- onto clean sealing surface of front sealing flange, as illustrated.
- The bead of sealant must project 1.5 ... 2.0 mm above the sealing surface.

**i** Note

- ◆ *The sealant bead must not be thicker than specified, otherwise excess sealant could enter the sump and clog the strainer in the oil pump.*
- ◆ *The front sealing flange must be installed within 5 minutes after applying sealant.*



- Tighten bolts securing front sealing flange -arrow- in diagonal sequence and in stages.
- Install crankshaft oil seal (pulley end) ⇒ [page 58](#) .
- Install vibration damper ⇒ [page 56](#) .
- Install coolant pipes (front) ⇒ [page 222](#) .
- Install radiator cowl ⇒ [page 239](#) .
- Install radiator ⇒ [page 234](#) .

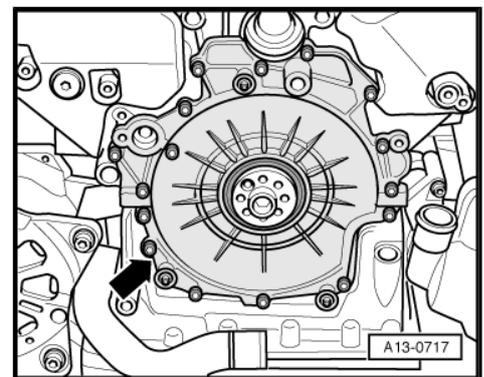
**i** Note

*Do not reuse coolant.*

- Fill cooling system ⇒ [page 211](#) .

**Tightening torques**

Component	Nm
Front sealing flange to cylinder block	10
Cover to sealing flange (front)	6
Oil supply lines to sealing flange (front)	25
Oil supply line to cylinder block	10
Tensioner to cylinder block	50
Tensioner to top section of sump	22



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 Servicing work on timing chain end

⇒ "3.1 Drive plate - exploded view", page 64

⇒ "3.2 Removing and installing drive plate", page 64

⇒ "3.3 Renewing crankshaft oil seal (timing chain end)", page 65

⇒ "3.4 Vacuum pump - exploded view", page 67

⇒ "3.5 Removing and installing vacuum pump", page 68

#### 3.1 Drive plate - exploded view

##### 1 - Drive plate

- ❑ Removing and installing  
⇒ page 64

##### 2 - Washer

- ❑ Thickness 1.5 mm

##### 3 - 30 Nm + 90° (1/4 turn) further

- ❑ Renew

##### 4 - Dowel sleeve

##### 5 - Centring sleeve

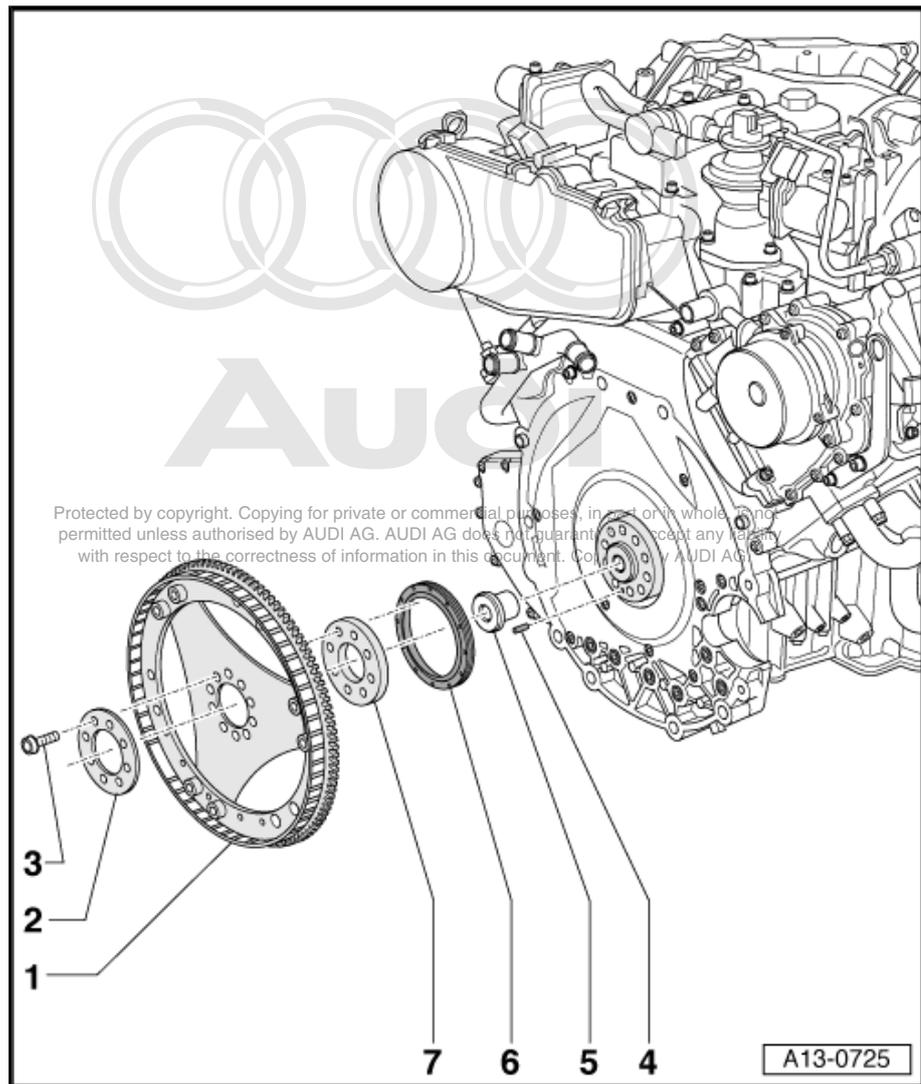
- ❑ For torque converter

##### 6 - Seal

- ❑ For crankshaft (timing chain end)
- ❑ Removing and installing  
⇒ page 65

##### 7 - Shim

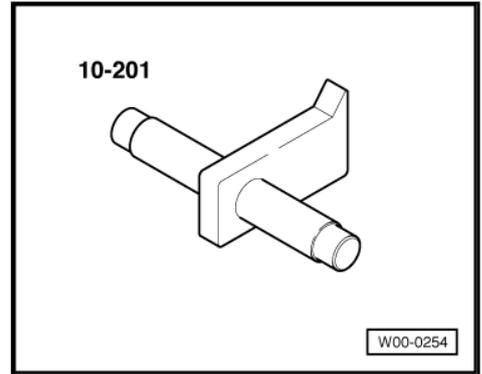
- ❑ Thickness 3.4 mm



#### 3.2 Removing and installing drive plate

Special tools and workshop equipment required

◆ Counterhold tool - 10 - 201-



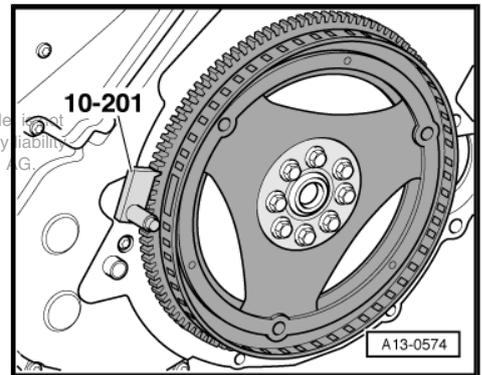
**Removing**

- Engine/gearbox removed.
- Insert counterhold tool - 10 - 201- to slacken bolts.
- Unbolt drive plate.
- Take off shim fitted behind drive plate.

**Installing**

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

- Fit shim (3.4 mm) on crankshaft.
- Install drive plate with 1.5 mm washer.
- Use new securing bolts.
- Fit counterhold tool - 10 - 201- the other way round to tighten bolts.



**Tightening torque**

Component	Nm
Drive plate to crankshaft	30 + 90° <sup>8)</sup> <sup>9)</sup>

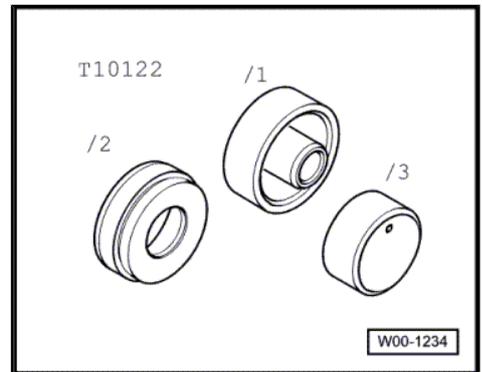
8) Renew bolts.

9) 90° equals a 1/4 turn.

**3.3 Renewing crankshaft oil seal (timing chain end)**

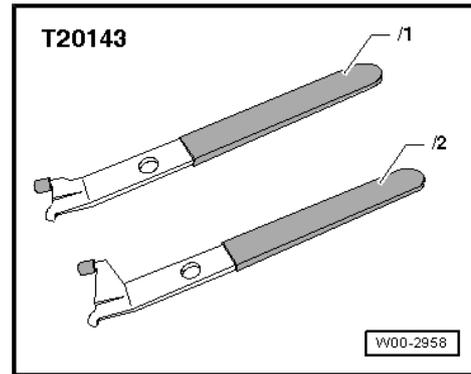
**Special tools and workshop equipment required**

◆ Fitting tool - T10122-



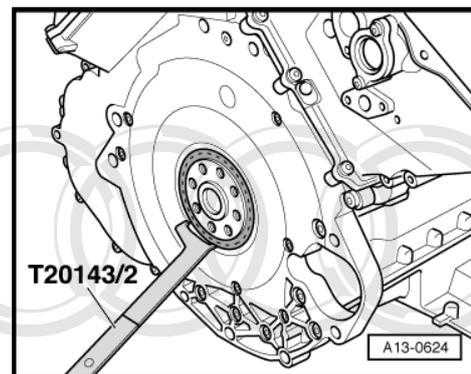


◆ Extractor tool - T20143/2-



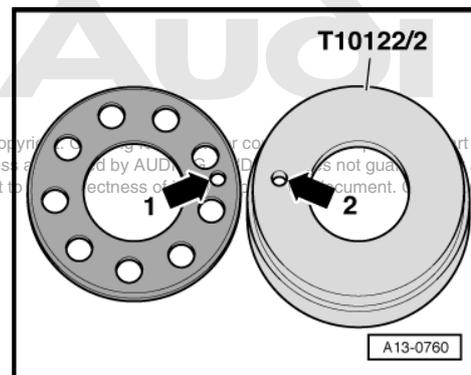
**Removing**

- Engine/gearbox removed.
- Remove drive plate => [page 64](#) .
- Pry out the oil seal using the extractor tool - T20143/2- .

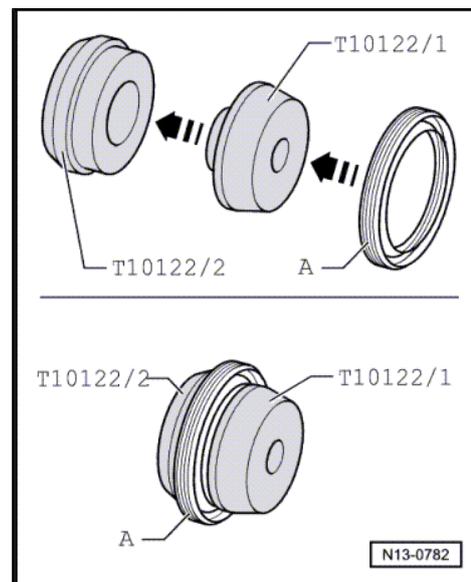


**Installing**

- Modify assembly sleeve - T10122/2- by drilling an 8 mm Ø hole -arrow 2- for the dowel sleeve.
- Use hole -arrow 1- in washer as a drilling template.



- Clean contact surface and sealing surface.
- Fit assembly aid - T10122/1- onto assembly sleeve - T10122/2- and slide oil seal -A- onto assembly sleeve.
- Take off assembly aid.



- Fit new oil seal -1- with guide sleeve - T10122/2- onto crankshaft.

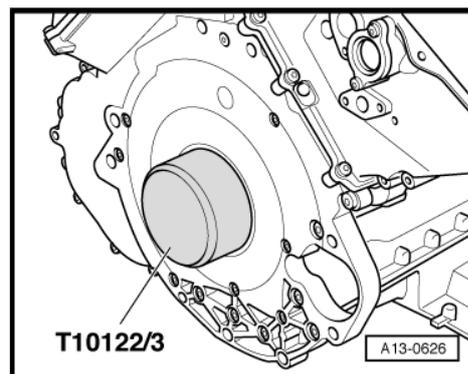
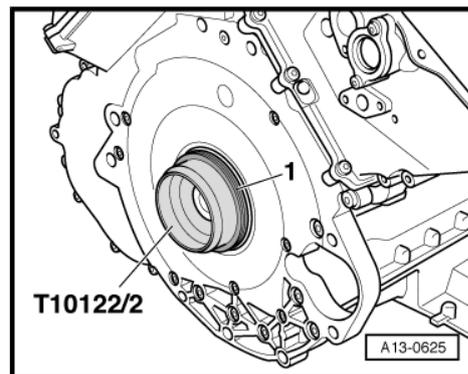


- Press in oil seal uniformly until flush all round using press sleeve - T10122/3- .

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 the accuracy of information with respect to the correctness of information in this document. Copyright by AUDI AG.

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

- Install drive plate => [page 64](#) .



### 3.4 Vacuum pump - exploded view



1 - 10 Nm

2 - Vacuum pump

- ❑ Removing and installing  
⇒ [page 68](#)

3 - Vacuum hose

- ❑ Secure with correct type of hose clips (as original equipment) ⇒ Electronic parts catalogue

4 - Hose clip

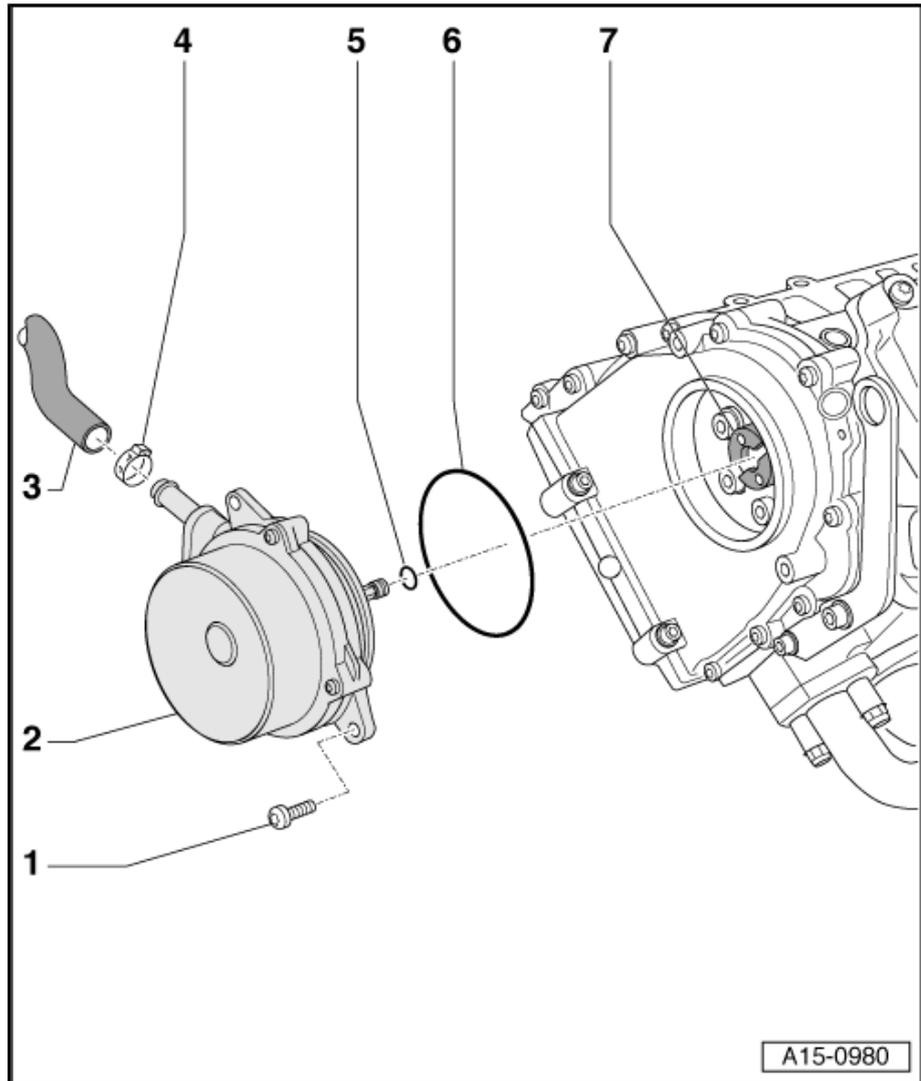
5 - O-ring

- ❑ Renew

6 - O-ring

- ❑ Renew

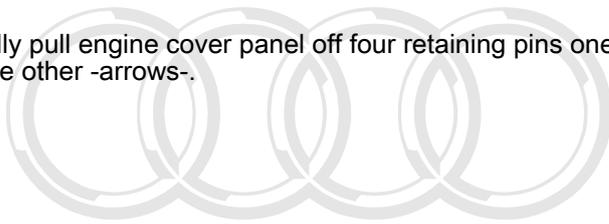
7 - Inlet camshaft



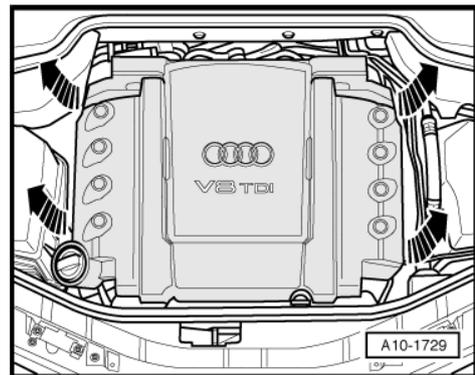
### 3.5 Removing and installing vacuum pump

#### Removing

- Carefully pull engine cover panel off four retaining pins one after the other -arrows-.



# Audi



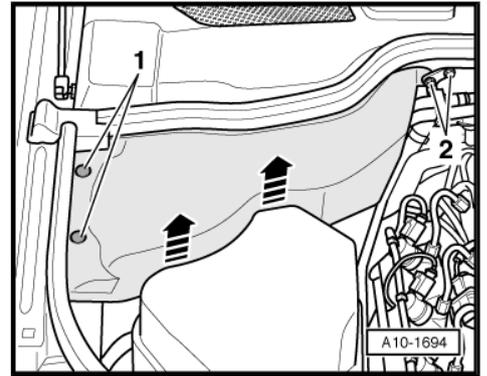
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Remove cover for right suspension turret; to do so, detach spreader clips -1- and unscrew bolted joint -2-.
- Pull cover out of retainers -arrows-.

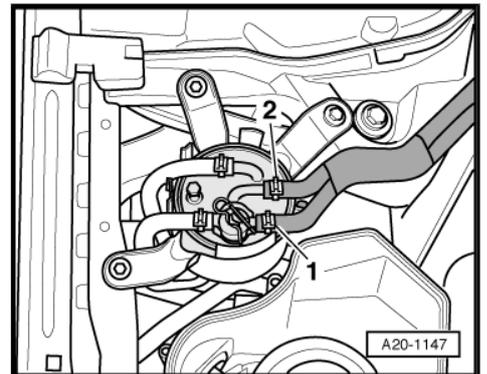


**Caution**

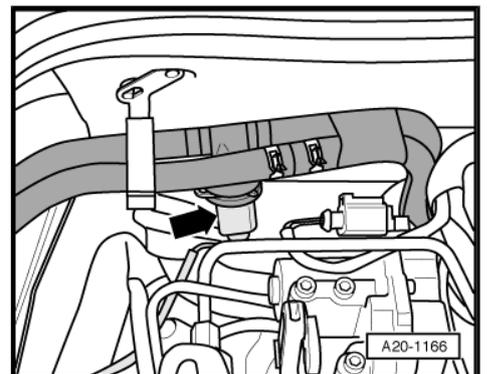
**Rules for cleanliness when working on the injection system**  
 ⇒ **page 4**.



- Disconnect fuel return line -1- and fuel supply line -2- from fuel filter.



- Unplug electrical connector -arrow- at oil temperature sender - G8- and move fuel lines clear.



- Detach vacuum hose -1- from vacuum pump.
- Remove bolts -2- and -3-.

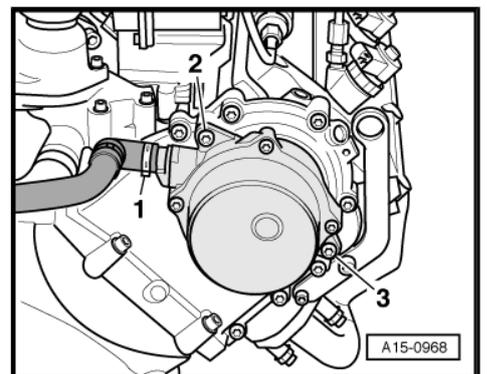
Remove vacuum pump.

**Installing**

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

 **Note**

- ◆ Renew O-rings.
- ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ *Electronic parts catalogue*.

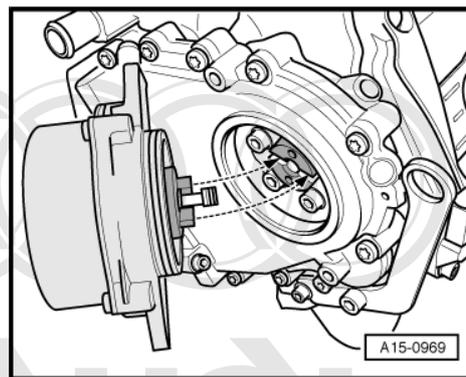




- Set drive lugs of vacuum pump so they engage in slots on camshaft when pump is fitted -arrow-.

**Tightening torque**

Component	Nm
Vacuum pump to timing chain cover	10



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 Removing and installing crankshaft

⇒ [“4.1 Crankshaft - exploded view”, page 71](#)

⇒ [“4.2 Allocation of main bearing shells for new crankshafts”, page 73](#)

⇒ [“4.3 Allocation of crankshaft bearing shells for retaining frame without visible colour coding”, page 73](#)

⇒ [“4.4 Crankshaft dimensions”, page 74](#)

⇒ [“4.5 Measuring axial clearance”, page 74](#)

⇒ [“4.6 Measuring radial clearance”, page 74](#)

### 4.1 Crankshaft - exploded view



Note

When carrying out repairs, secure engine to engine and gearbox support - VAS 6095- ⇒ [page 33](#) .

#### 1 - Cylinder block

- Matched to  
⇒ [Item 5 \(page 71\)](#)

#### 2 - Dowel sleeve for vibration damper

#### 3 - Crankshaft

- Measuring axial clearance ⇒ [page 74](#)
- Measuring radial clearance ⇒ [page 74](#)
- Do not rotate the crankshaft when checking the radial clearance
- Crankshaft dimensions ⇒ [page 74](#)

#### 4 - Dowel sleeve

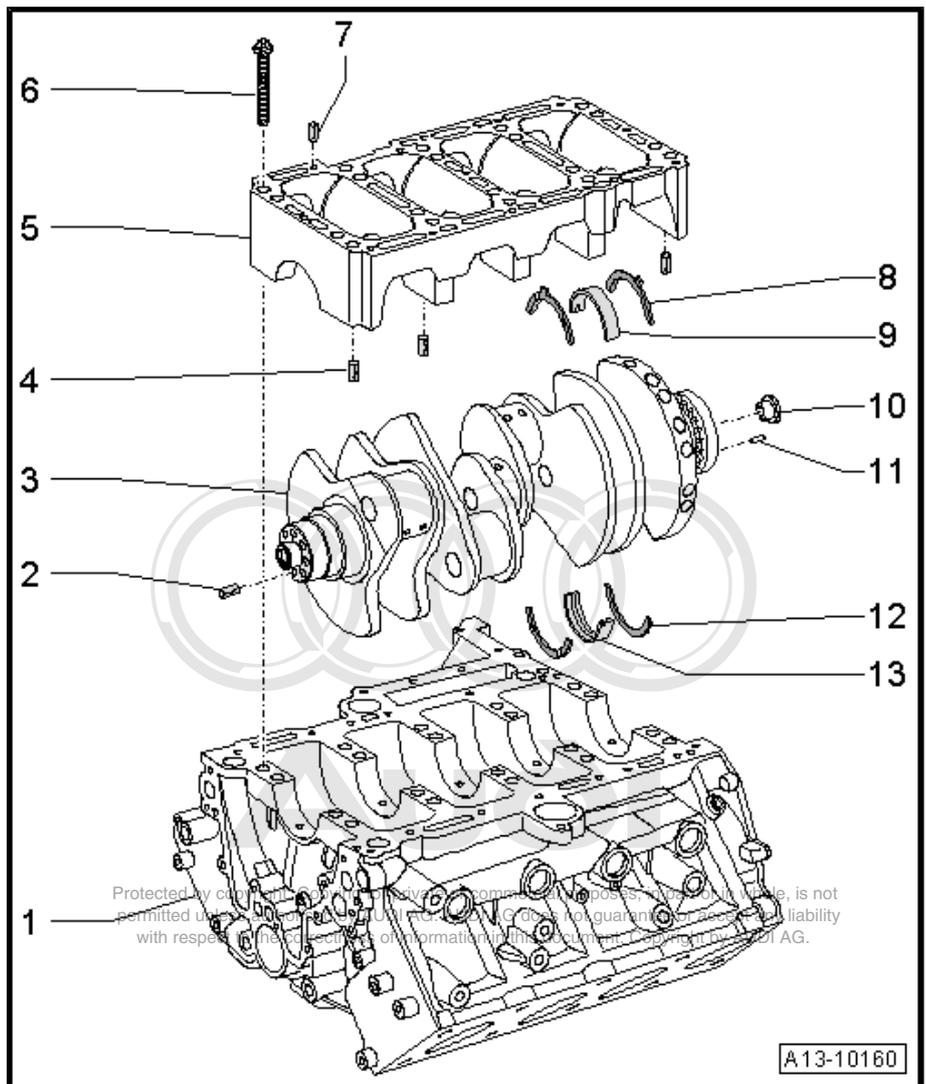
- 3x
- Insert in retaining frame
- Installation position ⇒ [page 72](#)

#### 5 - Retaining frame

- Matched to  
⇒ [Item 1 \(page 71\)](#)
- Tightening sequence for securing bolts  
⇒ [page 72](#)

#### 6 - Bolts for retaining frame

- Renew
- Use old bolts when measuring radial clearance
- Tightening sequence  
⇒ [page 72](#)



Protected by copyright. All rights reserved. Reproduction, distribution, or use in any form, is not permitted without the prior written consent of Audi AG. Audi AG does not guarantee the accuracy of the information with respect to the collection of information in this document. Copyright © Audi AG.

A13-10160

### 7 - Dowel sleeve for oil pump

### 8 - Thrust washer

- Only fitted on 4th crankshaft bearing
- Oil grooves face outwards
- Make sure it engages in retaining frame
- Measuring axial clearance of crankshaft ⇒ [page 74](#)

### 9 - Bearing shell

- For retaining frame (without oil groove)
- Renew used bearing shells
- Install new bearing shells for retaining frame with correct coloured markings ⇒ [page 73](#)

### 10 - Bearing bush for torque converter

- Ensure proper fitting in crankshaft

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 - Dowel pin

- For drive plate
- Check that pin is firmly seated in crankshaft

### 12 - Thrust washer

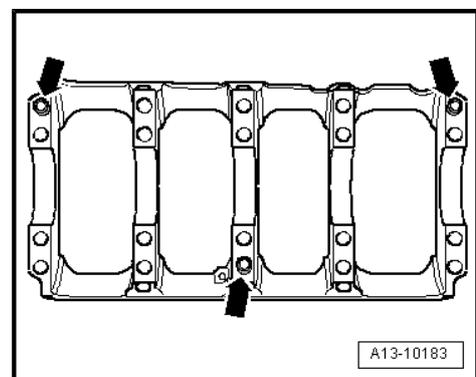
- Only fitted on 4th crankshaft bearing
- Oil grooves face outwards
- Measuring axial clearance of crankshaft ⇒ [page 74](#)

### 13 - Bearing shell

- For cylinder block (with oil groove)
- Renew used bearing shells
- Install new bearing shells for the cylinder block with the correct coloured markings ⇒ [page 73](#)

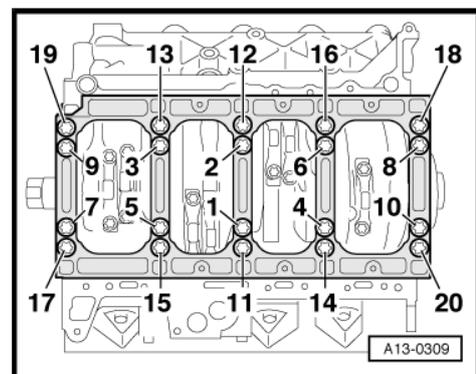
### Fitting location of dowel sleeves

- Check that dowel sleeves -arrows- are inserted in retaining frame at positions shown in illustration.



### Installing retaining frame

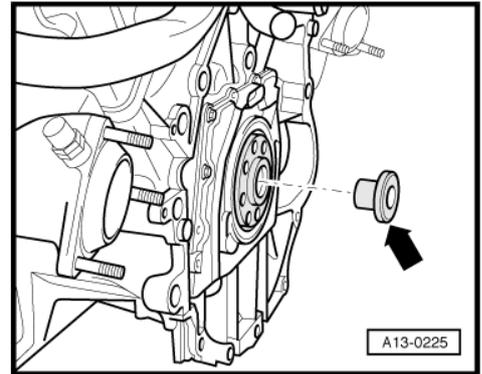
- Renew bolts -1 ... 20-
- Tighten bolts for retaining frame as follows:
  1. Tighten bolts to 30 Nm using torque wrench.
  2. Tighten bolts to 50 Nm using torque wrench.
  3. Turn bolts 90° (1/4 turn) further using a rigid wrench.



### Bearing bush for torque converter



*Short engines and reconditioned (exchange) engines, as well as new and reconditioned crankshafts, are supplied without bush -arrow-. The bush must therefore be knocked in before fitting drive plate on vehicles with automatic gearbox.*

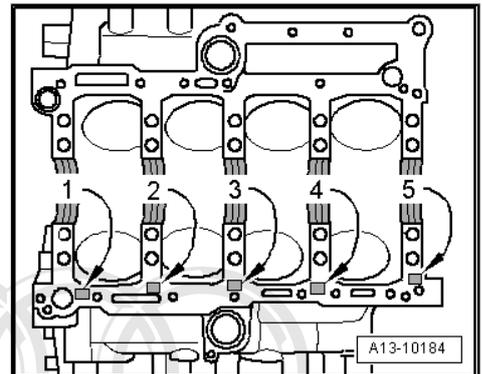


## 4.2 Allocation of main bearing shells for new crankshafts

### Matching crankshaft bearing shells to bearings in 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 identified by a code letter next to the relevant bearing.

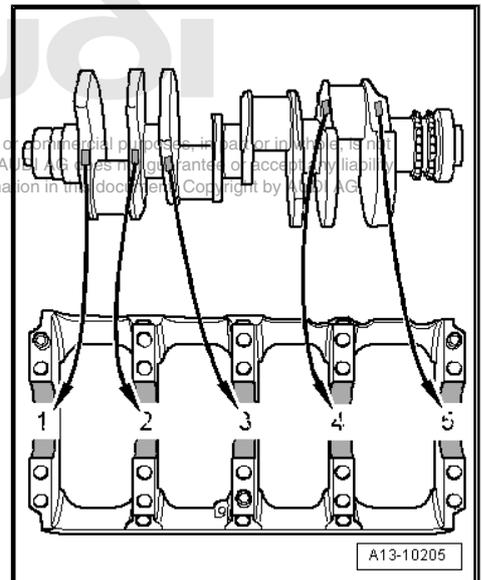
Letter on cylinder block	Colour coding of bearing
R =	Red
G =	Yellow
B =	Blue



### Matching crankshaft bearing shells to bearings in retaining frame

- ◆ 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 on the retaining frame is indicated by stamped markings or coloured dots on the crankshaft webs, as shown in illustration.

Stamped marking or coloured dot on crankshaft	Colour coding of bearing	Colour coding of bearing
R	Red	Red
G	Yellow	Yellow
B	Blue	Blue



## 4.3 Allocation of crankshaft bearing shells for retaining frame without visible colour coding

In some cases the colour coding of the crankshaft bearing shells may no longer be visible. In this case the main bearing journals must be measured to allocate the correct bearing shells.



Main bearing journal $\varnothing$	Colour code of bearing shells for retaining frame		
	Red	Yellow	Blue
Dimension (in mm)			
Basic dimension 65	64.978 ... 64.972	64.972 ... 64.965	64.965 ... 64.958

#### 4.4 Crankshaft dimensions

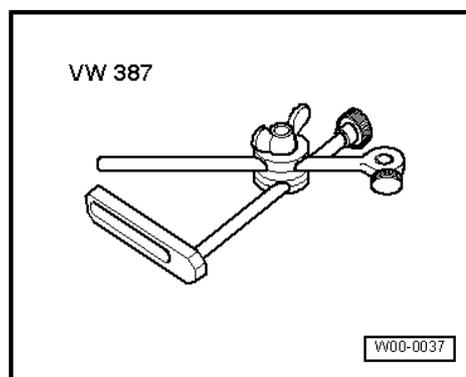
Honing dimension (in mm)	Crankshaft main bearing journal $\varnothing$	Crankshaft conrod journal $\varnothing$
Basic dimension	65.000 - 0.022 - 0.042	58.000 - 0.020 - 0.040

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without the 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.

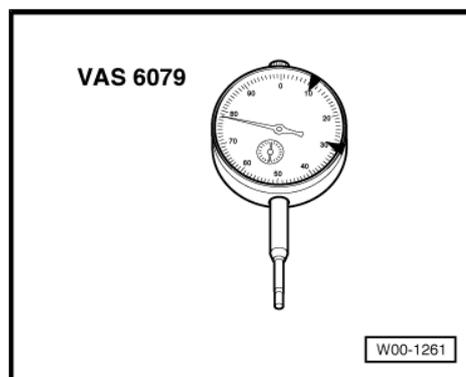
#### 4.5 Measuring axial clearance

##### Special tools and workshop equipment required

- ◆ Universal dial gauge bracket - VW 387-

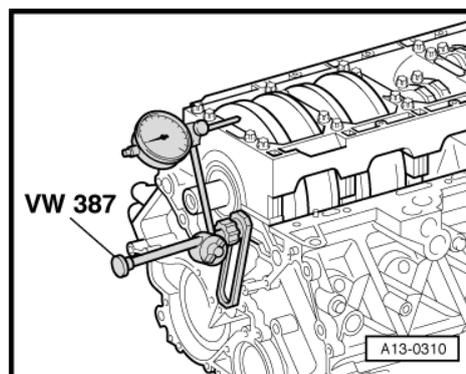


- ◆ Dial gauge - VAS 6079-



##### Procedure

- Bolt dial gauge - VAS 6079- with dial gauge bracket - VW 387- onto cylinder block and set it against 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 (new): 0.090 ... 0.251 mm
  - Axial clearance: wear limit: 0.280 mm



#### 4.6 Measuring radial clearance

##### Special tools and workshop equipment required

◆ Plastigage

**Procedure**



*Renew used bearing shells.*

- Remove retaining frame and clean bearing journals.
- Place Plastigage onto bearing journal or into bearing shells (length of Plastigage should correspond to width of bearing).
- The Plastigage must be positioned in the centre of the bearing shell
- Fit retaining frame and secure with old bolts ⇒ [page 72](#) without rotating crankshaft.
- Remove retaining frame once more.
- Compare width of Plastigage with measurement scale:
  - Radial clearance (new): 0.018 ... 0.045 mm
  - Radial clearance (wear limit): 0.100 mm
- When carrying out final assembly, renew bolts.

**Audi**

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

## 5 Dismantling and assembling pistons and conrods

⇒ ["5.1 Pistons and conrods - exploded view", page 76](#)

⇒ ["5.2 Removing and installing pistons", page 79](#)

⇒ ["5.3 Piston and cylinder dimensions", page 80](#)

⇒ ["5.4 Measuring radial clearance of conrods", page 80](#)

⇒ ["5.5 Checking piston projection at TDC", page 81](#)

### 5.1 Pistons and conrods - exploded view



#### Note

Oil spray jet for piston cooling ⇒ [page 77](#).

#### 1 - Conrod bolts, 40 Nm + 90° (1/4 turn) further

- Renew
- Use old bolts when measuring radial clearance
- Lubricate threads and contact surface

#### 2 - Conrod bearing cap

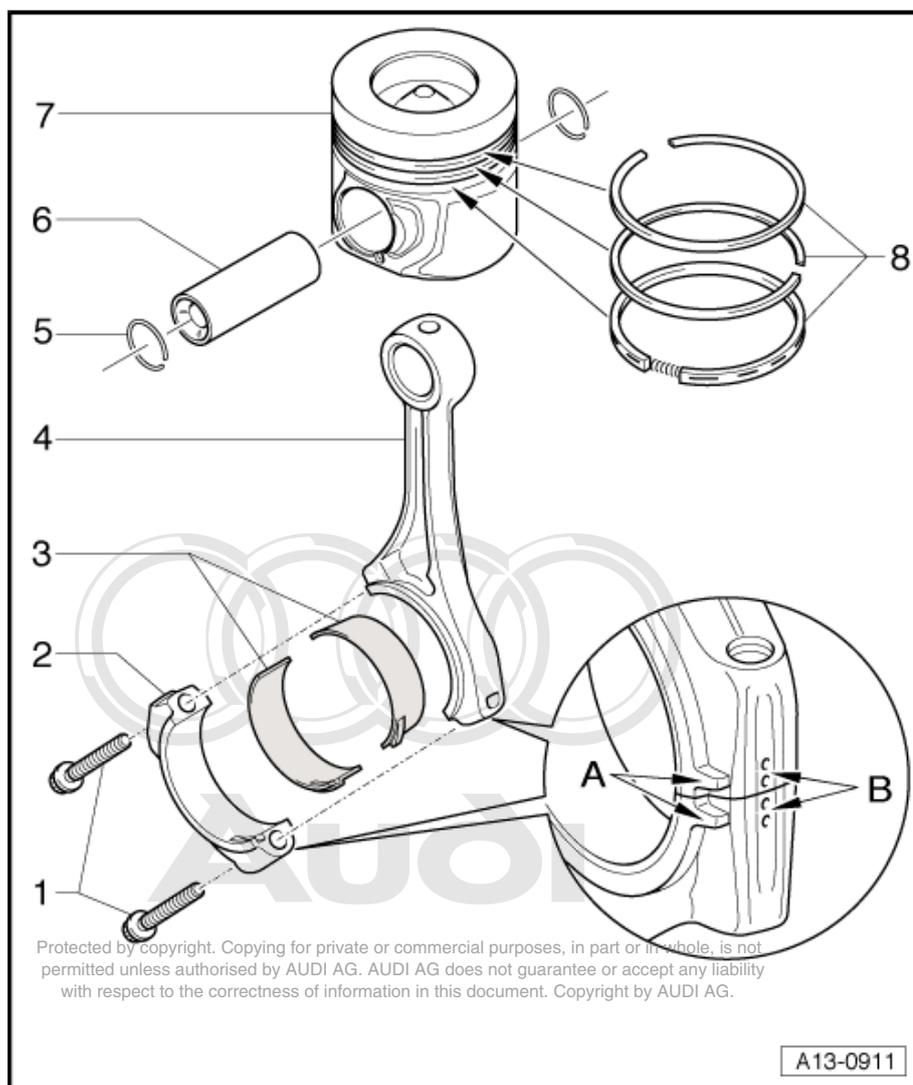
- Do not interchange
- Mark cylinder allocation with a coloured pen -B- ⇒ [page 79](#)
- Installation position: Note position of lugs on casting -A-

#### 3 - Bearing shells

- Note installation position
- Renew used bearing shells
- Axial clearance for each conrod pair (when new): 0.20 ... 0.44 mm
- Axial clearance for each conrod pair: wear limit: 0.60 mm
- Measuring radial clearance ⇒ [page 80](#)

#### 4 - Conrod

- Only renew as a complete set
- Mark cylinder allocation in colour -B- ⇒ [page 79](#)
- Installation position: Note position of lugs on casting -A-
- Installation position of conrod pairs ⇒ [page 79](#)
- Axial clearance for each conrod pair (when new): 0.20 ... 0.38 mm



- Axial clearance: wear limit: 0.60 mm
- Measuring radial clearance ⇒ [page 80](#)

### 5 - Circlip

### 6 - Piston pin

- If difficult to move, heat piston to approx. 60 °C
- Remove and install using drift - VW 222 A-

### 7 - Piston

- Removing and installing ⇒ [page 79](#)
- Piston installation position and piston/cylinder allocation ⇒ [page 78](#)
- Use chalk or waterproof felt-tip pen to mark cylinder allocation on piston crown.
- Renew piston if cracking is visible on piston crown or piston skirt
- Install using piston ring clamp
- Checking ⇒ [page 78](#)
- Measuring cylinder bore ⇒ [page 78](#)
- Measuring piston projection at TDC ⇒ [page 81](#)
- Piston and cylinder dimensions, piston allocation for cylinder bore ⇒ [page 80](#)

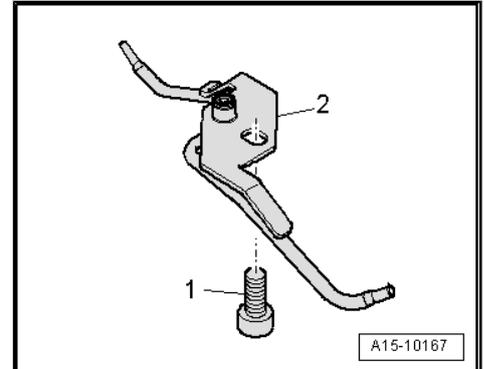
### 8 - Piston rings

- Offset gaps by 120°
- Use piston ring pliers to remove and install
- Marking "TOP" or side with identification mark must face piston crown
- Measuring ring gap ⇒ [page 77](#)
- Measuring ring-to-groove clearance ⇒ [page 78](#)

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.

### Oil spray jet for piston cooling

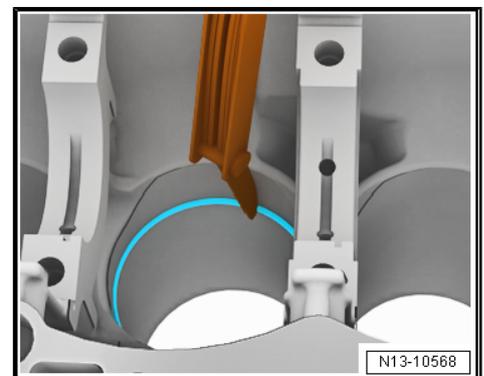
- 1 - Bolt, 9 Nm
- 2 - Oil spray jet with spray nozzle valve for piston cooling



### 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. Use a piston without rings to push ring into bore.

Piston ring (in mm)	New	Wear limit
1st compression ring	0.20 ... 0.40	0.70
2nd compression ring	0.70 ... 0.90	1.30
Oil scraper ring	0.25 ... 0.50	0.70

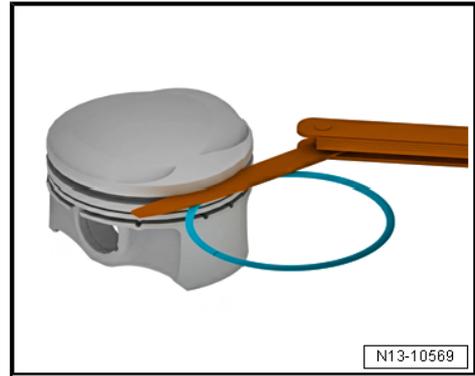




### Measuring ring-to-groove clearance

- Clean groove in piston before checking clearance.

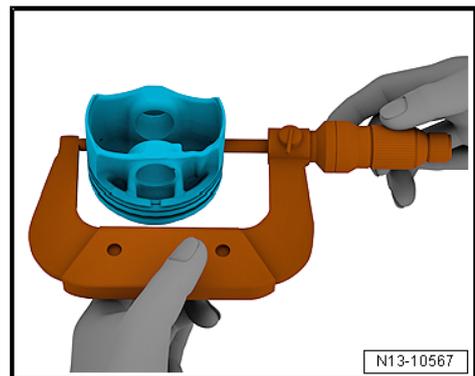
Piston ring (in mm)	New	Wear limit
1st compression ring	0.120 ... 0.160	0.175
2nd compression ring	0.050 ... 0.090	0.115
Oil scraper ring	0.030 ... 0.070	0.105



### Checking piston

- Using a micrometer (75 ... 100 mm), measure approx. 10 mm from the lower edge, perpendicular to the piston pin axis.
- Maximum deviation from nominal dimension: 0.04 mm.

Nominal dimension => [page 80](#).

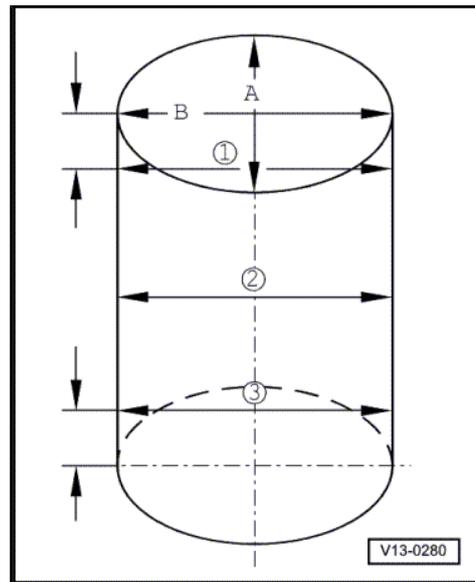


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

### Measuring cylinder bore

- Use 50 ... 100 mm internal dial gauge to take measurements at 3 points in transverse direction -A- and longitudinal direction -B-.
- Maximum deviation from nominal dimension: 0.08 mm.

Nominal dimension => [page 80](#).



### Piston installation position and piston/cylinder allocation

- Use chalk or waterproof felt-tip pen to mark cylinder allocation on piston crown.



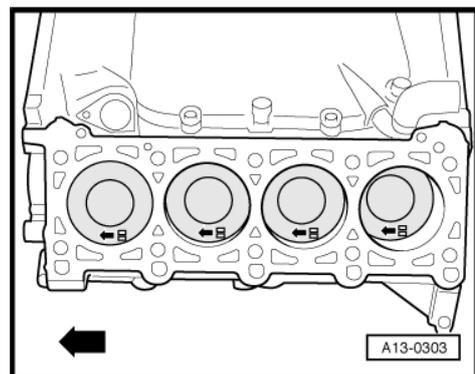
#### Note

Do not use a centre punch or scriber, as this would damage the coating of the piston crown.

Installation position:

- Arrows on piston crowns point to pulley end.

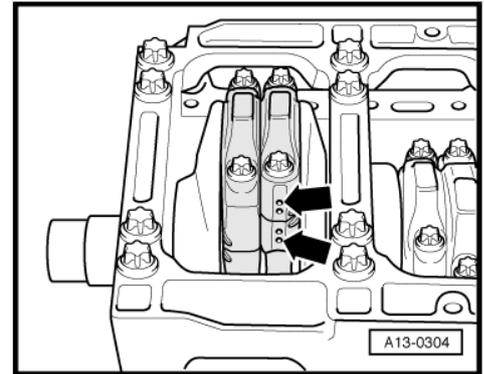
Piston identification => [page 80](#)



## Marking conrods

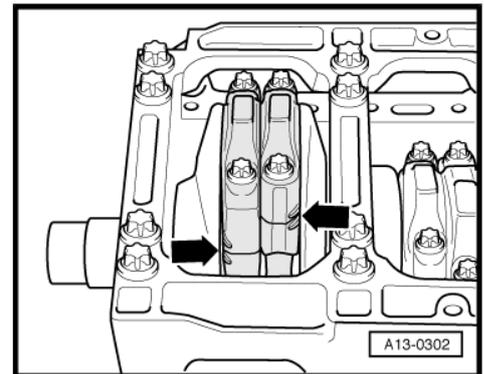
### Note

- ◆ Only renew conrods as a complete set.
- ◆ Do not interchange conrod bearings.
- Prior to removal, use a coloured pen to mark pairing of conrods with conrod bearing caps and cylinder allocation -arrows-.



## Conrod installation position

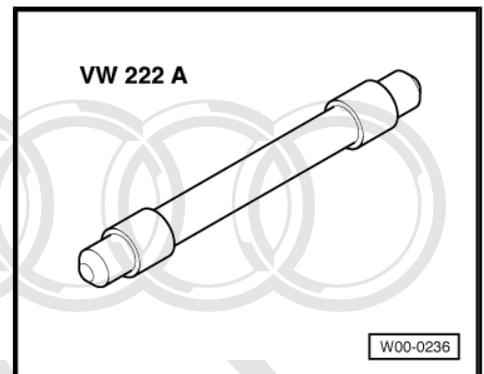
- Lugs on castings -arrows- are located as shown in illustration.



## 5.2 Removing and installing pistons

### Special tools and workshop equipment required

- ◆ Drift - VW 222 A-



- ◆ Piston ring clamp, commercially available

### Removing

- Engine secured to engine and gearbox support - VAS 6095- ⇒ [page 33](#) .
- Remove cylinder head ⇒ [page 149](#) .
- Remove upper section of sump ⇒ [page 190](#) .
- Mark installation position and matching of conrod bearing caps to cylinder and to conrods for reinstallation ⇒ [page 79](#) .
- Unbolt conrod bearing caps.
- Pull out pistons upwards with conrods.

Copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 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 torques ⇒ [page 76](#)

**Note**

Renew the bolts tightened with specified tightening angle.

- Oil running surfaces of bearing shells.
- Install pistons using commercially available piston ring clamp.

Installation position:

- Pistons ⇒ [page 78](#)
- Conrods ⇒ [page 79](#)
- Install conrod bearing caps according to markings.
- Install sump (upper section) ⇒ [page 190](#) .
- Install cylinder head ⇒ [page 149](#) .

### 5.3 Piston and cylinder dimensions

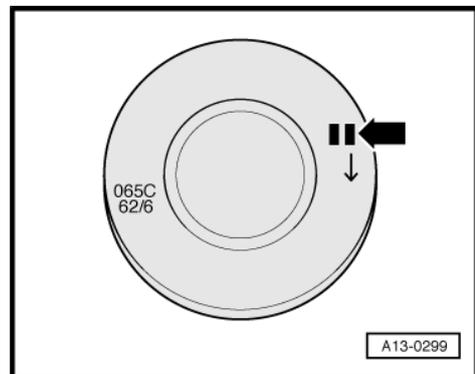
Protected by Copyright. All rights reserved. No part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

**Piston identification**

- ◆ Piston identification -arrow- is stamped on piston crown.

Piston identification	Piston Ø mm <sup>10)</sup>	Cylinder bore Ø mm
Basic dimension	I 80.948 ... 80.956	81.006 ... 81.010
	II 80.954 ... 80.962	81.010 ... 81.014
Intermediate size	I 80.988 ... 80.966	81.046 ... 81.050
	II 80.944 ... 81.002	81.050 ... 81.054

10) Dimensions not including graphite coating (thickness 0.02 mm). The graphite coating on the piston skirt wears down in service.



### 5.4 Measuring radial clearance of conrods

**Special tools and workshop equipment required**

- ◆ Plastigage

**Test sequence**

- Remove conrod bearing caps.
- Clean bearing caps and bearing journals.
- Place Plastigage onto bearing journal or into bearing shells corresponding to width of bearing.
- Fit conrod bearing caps and secure with old bolts ⇒ [Item 1 \(page 76\)](#) without rotating crankshaft.
- Remove conrod bearing caps once more.

- Compare width of Plastigage with measurement scale:
- Radial clearance (new): 0.030 ... 0.079 mm
- Radial clearance (wear limit): 0.120 mm.
- When carrying out final assembly, renew bolts.

## 5.5 Checking piston projection at TDC



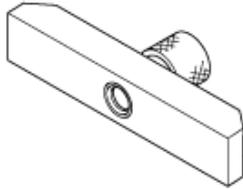
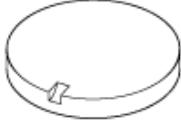
### Note

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.

- ◆ *Piston projection at TDC must be measured when installing new pistons or a short engine. Depending upon piston projection, install the corresponding cylinder head gasket according to the table below:*
- ◆ *If the measured values for piston projection are not the same for all pistons, use the highest value to determine the correct gasket size.*
- ◆ *The cylinder head gasket must be determined separately for each cylinder bank.*

### Special tools and workshop equipment required

- ◆ -VW 382/7- from measuring tool - VW 382-
- ◆ -VW 385/17- from universal measuring tool - VW 385-
- ◆ Dial gauge - VAS 6079-

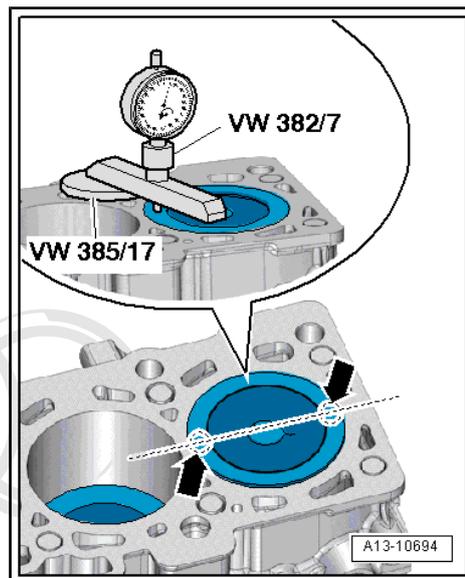
<p>VW 382/7</p> 	<p>VW 385/17</p> 
<p>VAS 6079</p> 	
	<p>G13-0064</p>



### Test sequence

- Set up dial gauge - VAS 6079- with -VW 382/7- and -VW 385/17- .
- Measure piston projection at two points -1- for each piston.

Piston projection above top surface of cylinder block	Identification (No. of holes)
0.39 ... 0.49 mm	1
0.49 ... 0.54 mm	2
0.54 ... 0.65 mm	3



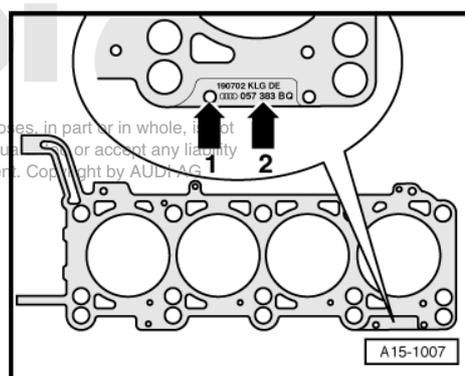
### Identification of cylinder head gasket

- Arrow 1-: holes
- Arrow 2-: Part No.

 **Note**

*The gaskets for the left and right cylinder heads have different shapes and cannot be interchanged.*

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 Timing chain covers

⇒ [“1.1 Timing chain covers - exploded view”, page 83](#)

⇒ [“1.2 Removing and installing oil seal for toothed belt sprocket on high-pressure pump”, page 84](#)

⇒ [“1.3 Removing and installing all timing chain covers”, page 86](#)

### 1.1 Timing chain covers - exploded view

#### 1 - Seal

- For crankshaft (timing chain end)
- Removing and installing ⇒ [page 65](#)

#### 2 - Dowel sleeve

- 2x

#### 3 - 10 Nm

- Note correct sequence when tightening ⇒ [page 96](#)

#### 4 - Circlip

Protected by copyright. Copying for private or commercial purposes, in part or in full, is prohibited unless authorised by AUDI 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 - Seal

- For toothed belt sprocket
- Removing and installing ⇒ [page 84](#)

#### 6 - Adapter

- For oil seal

#### 7 - O-ring

- Renew

#### 8 - 10 Nm

- Note correct sequence when tightening ⇒ [page 95](#)

#### 9 - Cover (left-side)

- For timing chain

#### 10 - 10 Nm

- Note correct sequence when tightening ⇒ [page 95](#)

#### 11 - Cover (right-side)

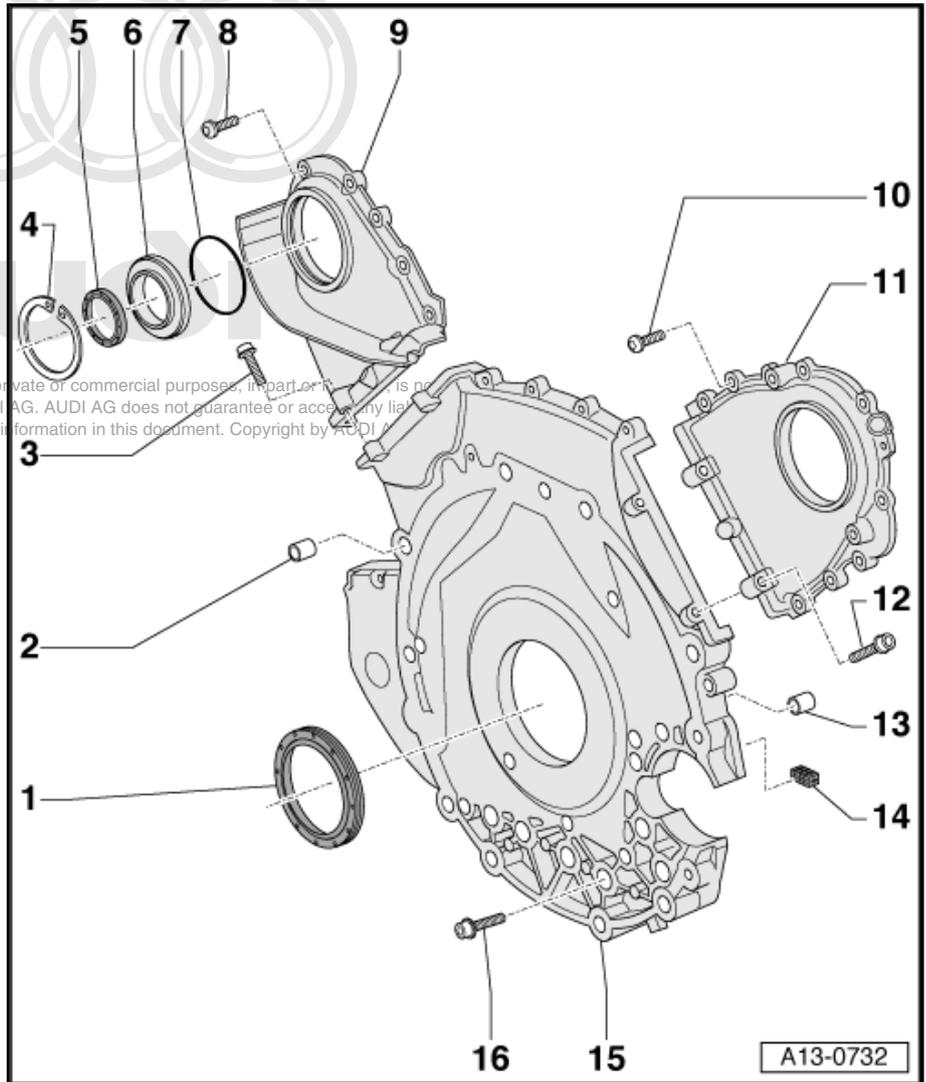
- For timing chain

#### 12 - 10 Nm

- Note correct sequence when tightening ⇒ [page 96](#)

#### 13 - Dowel sleeve

- 2x





#### 14 - Sealing plug

- 2x

#### 15 - Cover (bottom)

- For timing chain

#### 16 - M6 = 10 Nm; M8 = 22 Nm

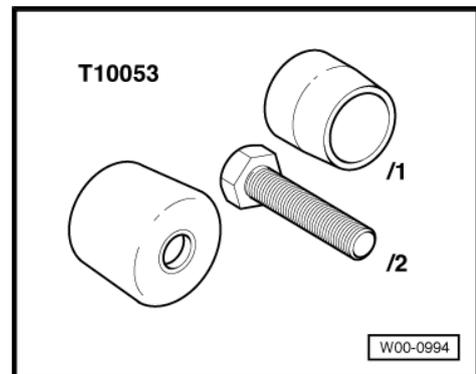
- Note correct sequence when tightening ⇒ [page 95](#)

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

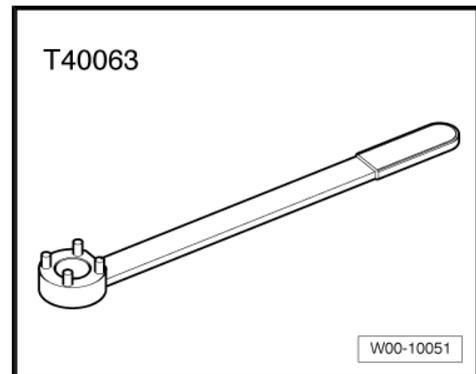
## 1.2 Removing and installing oil seal for toothed belt sprocket on high-pressure pump

### Special tools and workshop equipment required

- ◆ Assembly tool - T10053-

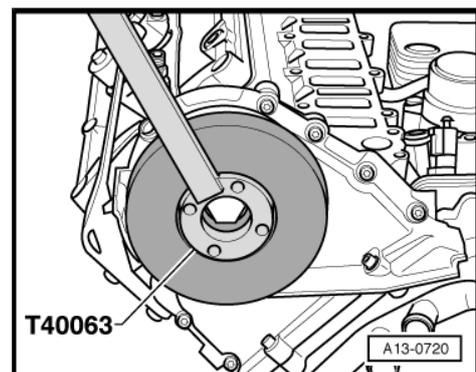


- ◆ Counterhold tool - T40063-

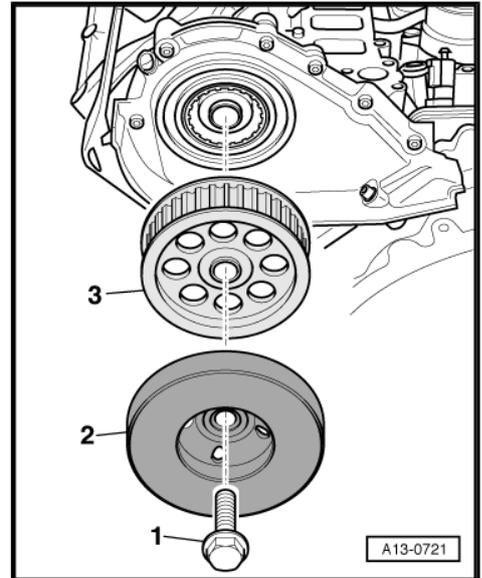


### Removing

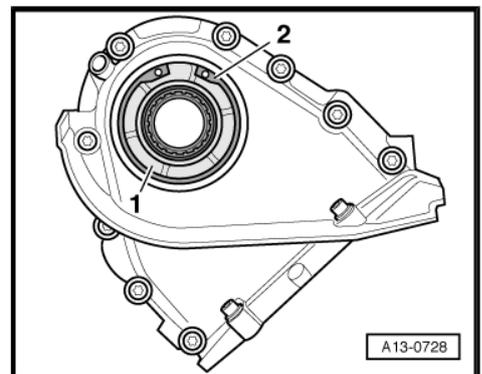
- Move lock carrier to service position ⇒ [page 42](#) .
- Remove toothed belt for high-pressure pump ⇒ Rep. gr. 23 .
- Loosen central bolt for damper weight and toothed belt sprocket (use counterhold tool - T40063- ) .



- Remove bolt -1-.
- Remove damper weight -2- and toothed belt sprocket -3- for high-pressure pump drive.



- Remove circlip -2-.
- Pull out adapter -1- for oil seal.
- Press oil seal out of adapter.



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

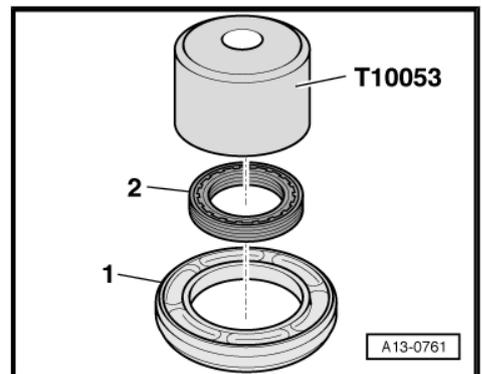
### Installing

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

#### Note

*Renew seals and O-rings.*

- Drive oil seal -2- into adapter -1- (use assembly tool - T10053- ).
- Install toothed belt for high-pressure pump ⇒ Rep. gr. 23 .
- Install lock carrier with attachments ⇒ General body repairs, exterior; Rep. gr. 50 .
- Install front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 .
- Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
- Check headlight adjustment ⇒ Maintenance ; Booklet 404 .



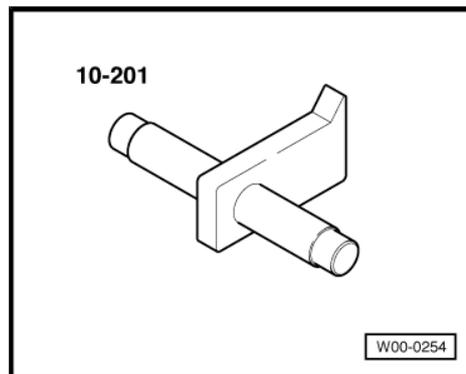
### Tightening torque

Component	Nm
Damper weight with toothed belt sprocket to camshaft	150

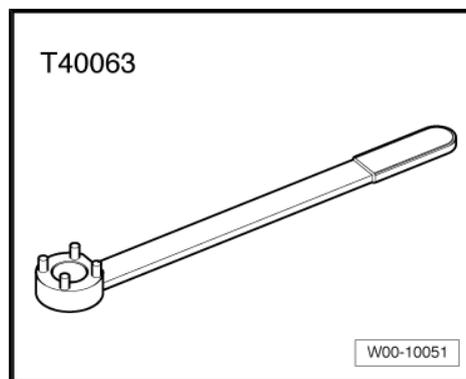
## 1.3 Removing and installing all timing chain covers

### Special tools and workshop equipment required

- ◆ Counterhold tool - 10-201-



- ◆ Counterhold tool - T40063-



- ◆ Electric drill with plastic brush attachment
- ◆ Safety goggles
- ◆ Sealant ⇒ Electronic parts catalogue

### Removing

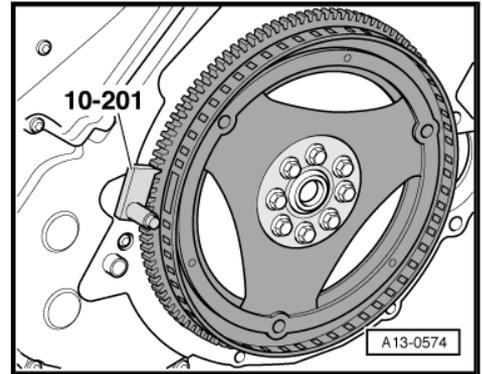


#### Note

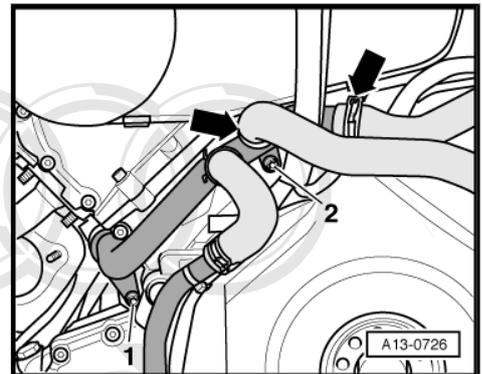
*All cable ties which are released or cut open when removing must be refitted in the same position when installing.*

- Drain off engine oil.
- Remove engine ⇒ [page 7](#) .
- Separate engine from gearbox ⇒ [page 28](#) .
- Secure engine to engine stand ⇒ [page 33](#) , or leave engine on scissor-type assembly platform - VAS 6131 A- .

- Insert counterhold tool - 10-201- to slacken bolts.
- Unbolt drive plate.
- Take off shim fitted behind drive plate.

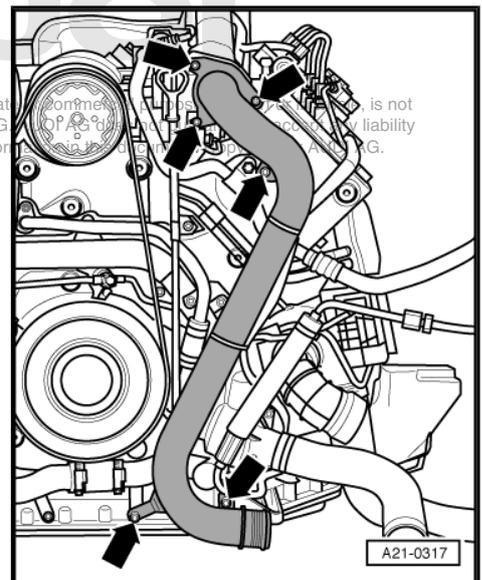


- Detach coolant hoses at the connections indicated -arrows-.
- Remove bolts -1- and -2-.
- Detach coolant pipe (rear) from coolant pipe (left-side).

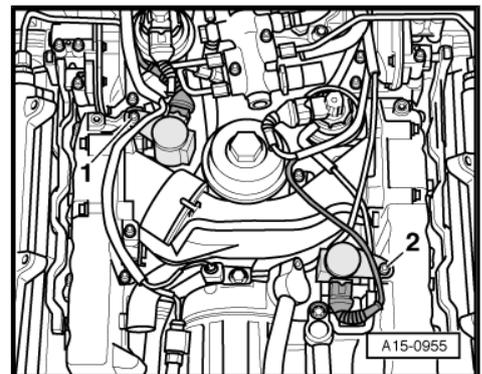


- Detach air intake pipe (front left) from engine -arrows-.

Protected by copyright. Copying for private use is permitted unless authorised by AUDI AG. Audi AG is not liable for any liability with respect to the correctness of information.

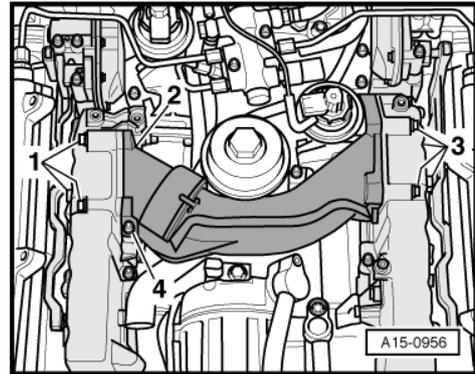


- Unbolt exhaust gas recirculation valve - N18- -item 1- and exhaust gas recirculation valve 2 - N213- -item 2- from intake manifolds.

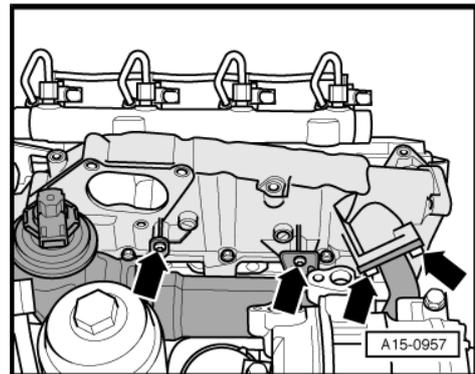




- Remove bolts -1 ... 4-.
- Take out connecting pipe between left and right intake manifolds.

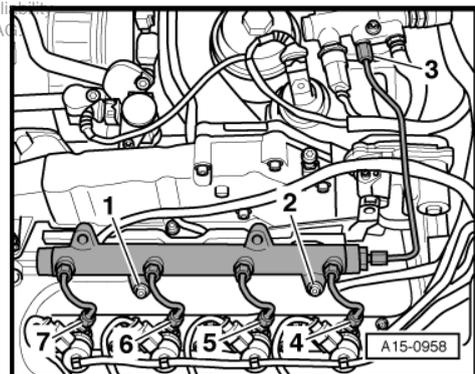


- Unscrew bolts -arrows- (on left side of engine).
- Move electrical wiring clear at rail element and injector pipes.



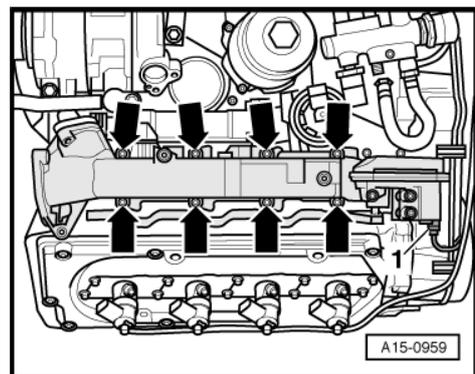
**Caution**  
*Rules for cleanliness when working on the injection system*  
 ⇒ *page 4*.

- Unscrew union nuts -3 7- (counterhold pressure pipe connections).



- Remove bolts -1- and -2-.
- Take off rail element.
- Unplug electrical connector at glow plug on No. 5 cylinder.

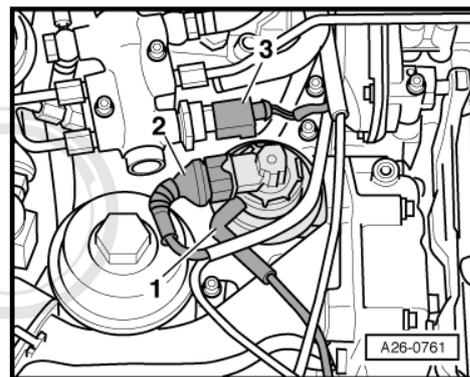
- Unplug electrical connector -1- at intake manifold flap 2 motor - V275- .
- Remove bolts -arrows-.
- Take off intake manifold together with intake manifold flap motor.



**Note**

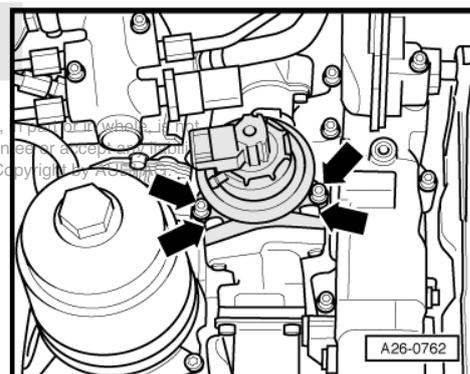
- ◆ *Watch dowel sleeves when removing intake manifold.*
- ◆ *Block off intake ports in cylinder head with clean rags.*

- Unplug electrical connectors -2- and -3-.
- Detach vacuum hose -1- from mechanical exhaust gas recirculation valve (left-side).

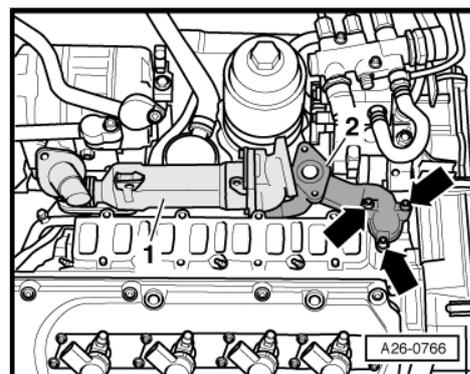


- Remove bolts -arrows- and take off mechanical exhaust gas recirculation valve (left-side).

Protected by copyright. Copying for private or commercial purposes, reproduction, distribution, or any other use is prohibited without the prior written permission of Audi AG. Audi AG does not guarantee the accuracy of the information in this document. Copyright © 2013 Audi AG



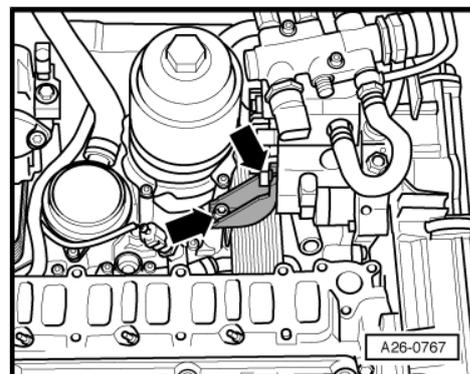
- Remove bolts -arrows-.
- Lift off cooler (left-side) for exhaust gas recirculation -1- from cylinder block.
- Disconnect cooler for exhaust gas recirculation from connecting flange -2-.



- Remove bracket for high-pressure pump -arrows-.

 **Note**

*Shown in illustration without connecting flange.*





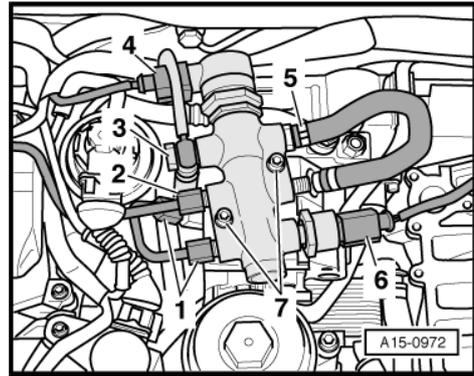
- Unplug electrical connector -4-.



**Caution**

**Rules for cleanliness when working on the injection system**  
=> **page 4**.

- Remove high-pressure pipes -1- and -2- (counter-hold at pipe connections on high-pressure pump).
- Remove banjo bolt -3-.
- Disconnect fuel return hose -5- at fuel distributor housing.
- Remove bolts -7- and take off fuel distributor housing.



**Note**

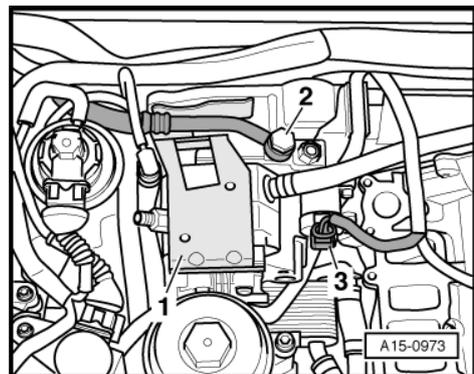
Disregard -item 6-.

- Unplug electrical connector -3-.
- Remove banjo bolt -2-.

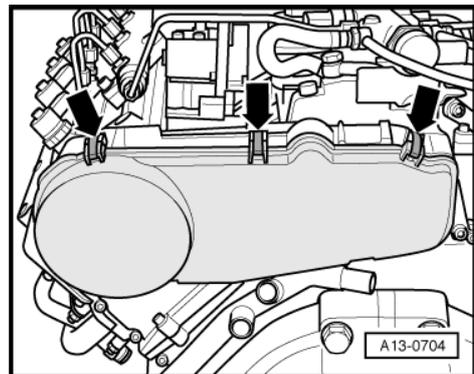


**Note**

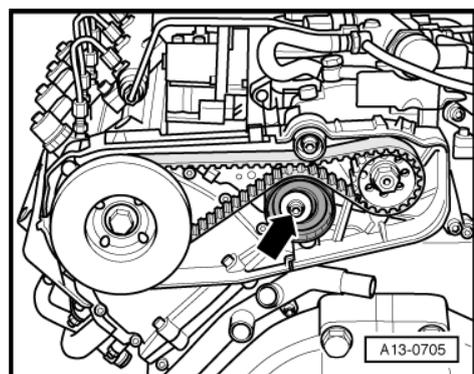
Disregard -item 1-.



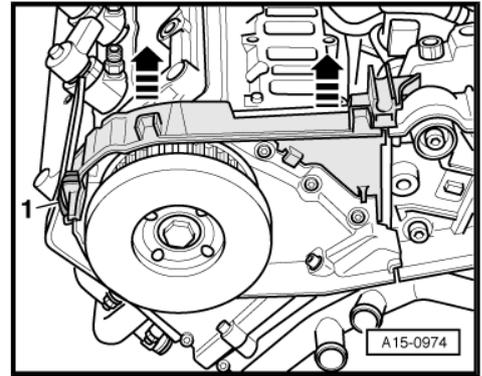
- Release clamps -arrows- and detach toothed belt cover.
- Pivot toothed belt cover to the rear and disengage retaining pegs on bottom side of toothed belt cover.



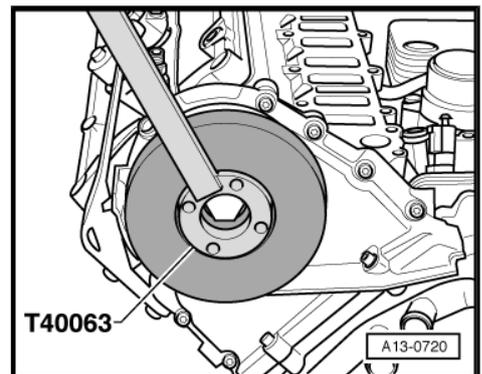
- Unscrew bolt -arrow- for tensioning roller.
- Take off tensioning roller and toothed belt for high-pressure pump.



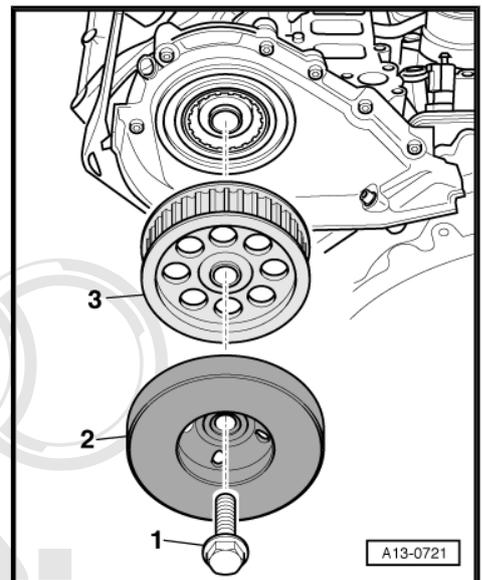
- Release clamp -1- and lift off rear toothed belt cover -arrows-.



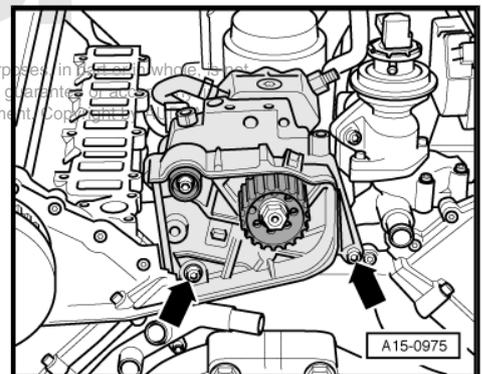
- Loosen central bolt for damper weight and toothed belt sprocket (use counterhold tool - T40063- ).



- Remove bolt -1-.
- Remove damper weight -2- and toothed belt sprocket -3- for high-pressure pump drive.



- Remove bolts -arrows-.
- Take off high-pressure pump together with front bracket



... for commercial purposes in the...  
 permitted unless authorised by AUDI AG. AUDI AG does not guarantee...  
 with respect to the correctness of information in this document. Copyright...



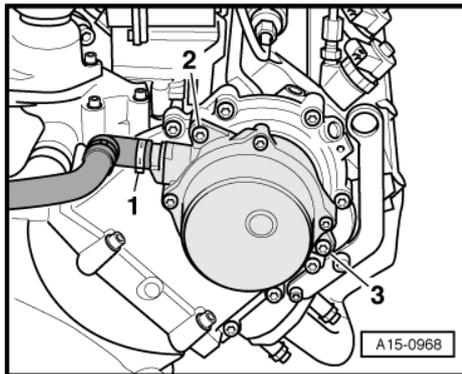
- Remove bolts -2- and -3-.
- Remove vacuum pump.



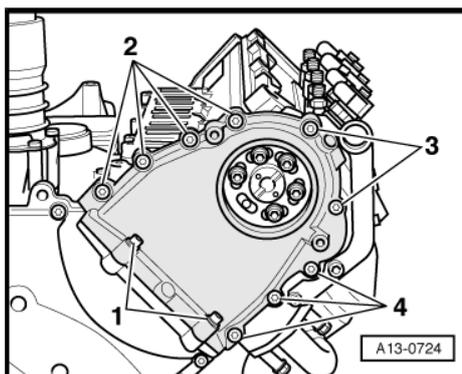
**Note**

Disregard -item 1-.

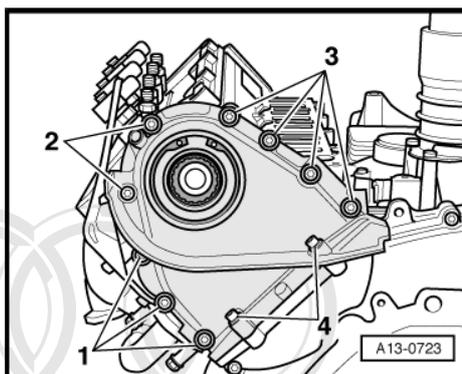
- Remove electrical connector for exhaust gas temperature sender 1 - G235- from bracket.



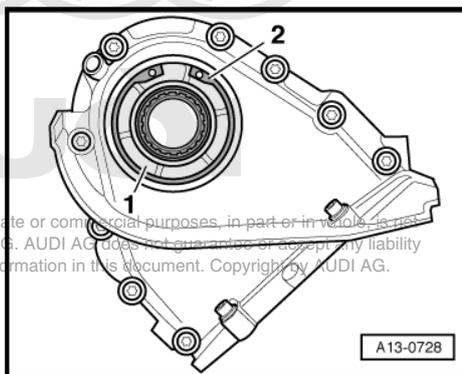
- Remove bolts -1 ... 4- and detach timing chain cover (right-side).



- Remove bolts -1 ... 4- and detach timing chain cover (left-side).



- Remove circlip -2-.
- Pull out adapter -1- for oil seal.
- Press oil seal out of adapter.
- Loosen bolted connections for turbocharger (left-side)  
=> [page 246](#) .



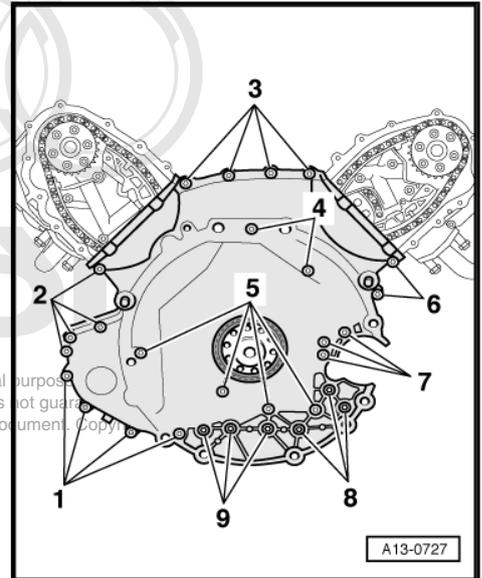
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Unscrew bolts -1 ... 9- and remove timing chain cover (bottom).
- Press out crankshaft oil seal (rear) from timing chain cover.

**Installing**

 **Note**

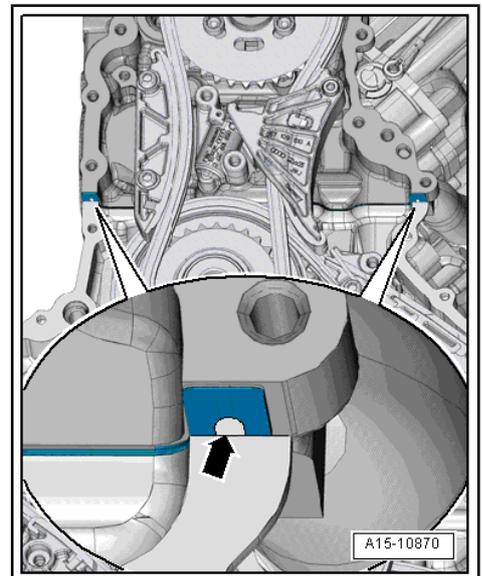
- ◆ *Renew gaskets, seals and O-rings.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- ◆ *Reinstall all cable ties in the same locations when assembling.*
- Remove old sealant from grooves in timing chain covers and from sealing surfaces.



- Clean old sealant from grooves -arrow- in cylinder head gaskets.

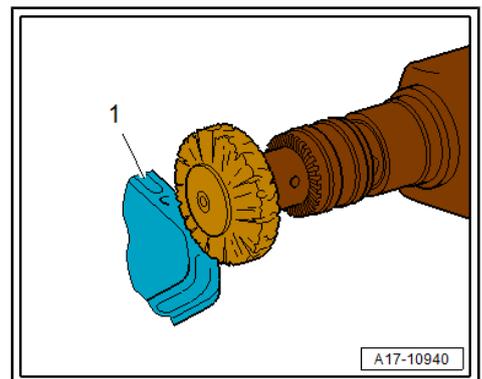
 **Note**

*With the cylinder head installed the grooves in the cylinder head gasket are only half visible.*



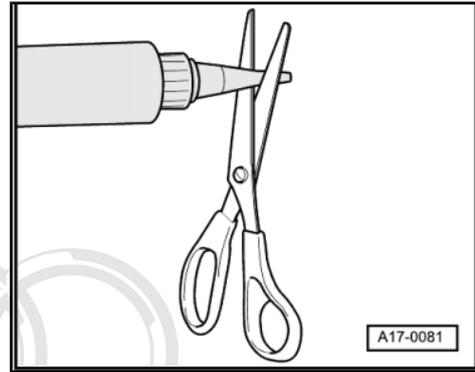
 **WARNING**  
*Wear safety goggles.*

- Remove remaining sealant on timing chain covers and cylinder block / cylinder head using rotating plastic brush or similar.
- Clean sealing surfaces; they must be free of oil and grease.

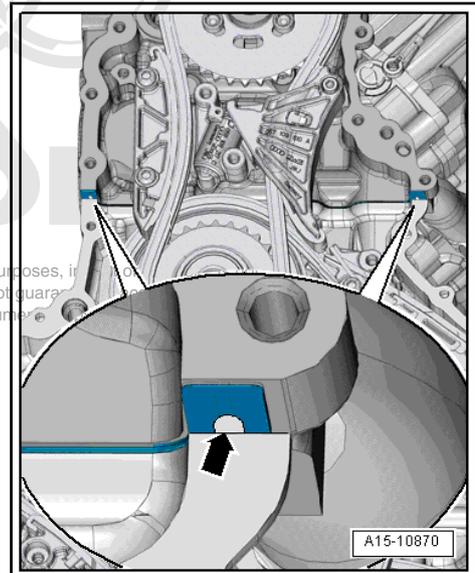




- Cut off nozzle of tube at front marking (Ø of nozzle approx. 2 mm).



- Fill grooves -arrow- in cylinder head gaskets with sealant (grooves already cleaned).

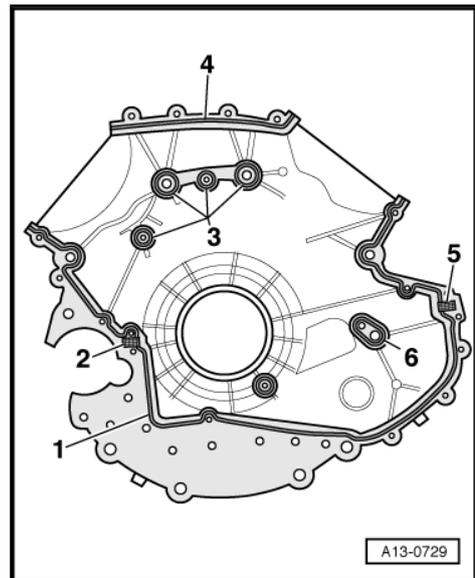


Protected by copyright. Copying for private or commercial purposes, in whole or in part, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee the accuracy of the information with respect to the correctness of information in this document.



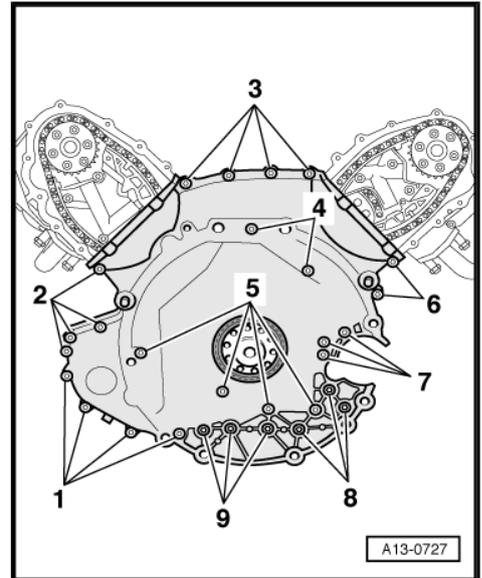
**Note**

- ◆ *The sealant beads must not be thicker than specified, otherwise excess sealant could enter the sump and clog the strainer in the oil pump.*
- ◆ *The timing chain covers must be installed within 5 minutes after applying sealant.*
- Insert sealing elements -2- and -5-
- Apply beads of sealant onto clean sealing surfaces of timing chain cover (bottom) as illustrated.
- The grooves on the sealing surfaces -1- and -4- must be completely filled with sealant.
- The bead of sealant must project 1.5 ... 2.0 mm above the sealing surface.
- The beads of sealant round drillings -3- and -6- must be 1.5 ... 2.0 mm thick

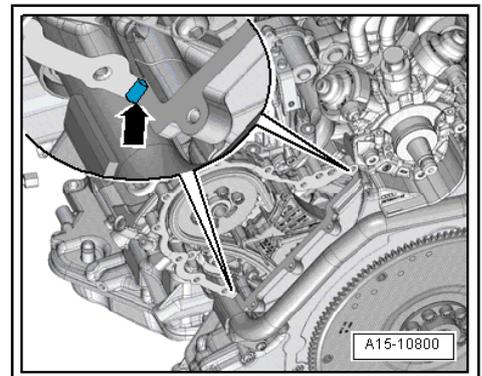


- Check whether the two dowel sleeves are fitted in the cylinder block; install if necessary.
- Fit timing chain cover (bottom) and tighten bolts as follows:

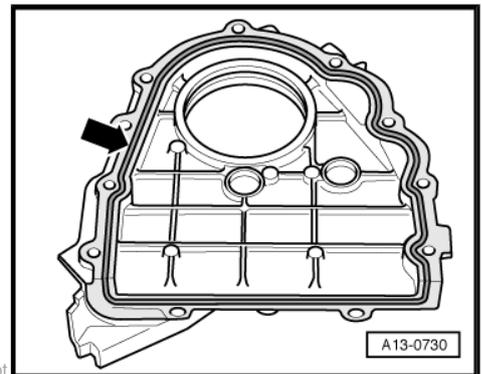
Stage	Tighten
I	- Tighten bolts -1 ... 9- to 5 Nm in diagonal sequence starting from inside and working outwards.
II	- Tighten bolts -1 ... 7- to 10 Nm in diagonal sequence starting from inside and working outwards.
III	- Tighten bolts -8- and -9- to 22 Nm.



- Apply sealant at joints between cylinder head and timing chain cover (bottom) -arrow-, as shown in illustration.

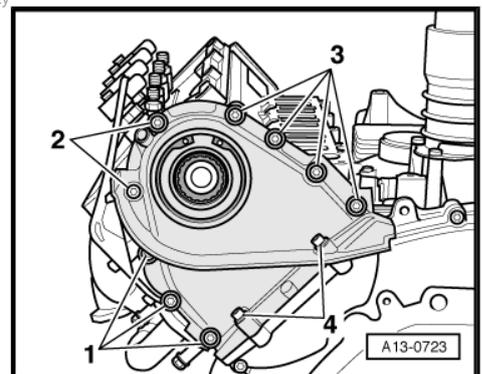


- Apply bead of sealant onto clean sealing surface of timing chain cover (left-side) as illustrated.
- The circumferential groove -arrow- on the sealing surface must be completely filled with sealant.
- The bead of sealant must project 1.5 ... 2.0 mm above the sealing surface.



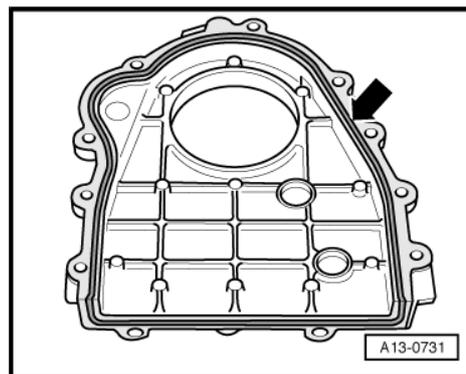
- Fit timing chain cover (left-side) and tighten bolts as follows:

Stage	Tighten
I	- Tighten bolts -1 ... 3- to 5 Nm in diagonal sequence.
II	- Tighten bolts -4- in diagonal sequence to 10 Nm.
III	- Tighten bolts -1 ... 3- to 10 Nm.





- Apply bead of sealant onto clean sealing surfaces of timing chain cover (right-side) as illustrated.
- The circumferential groove -arrow- on the sealing surface must be completely filled with sealant.
- The bead of sealant must project 1.5 ... 2.0 mm above the sealing surface.

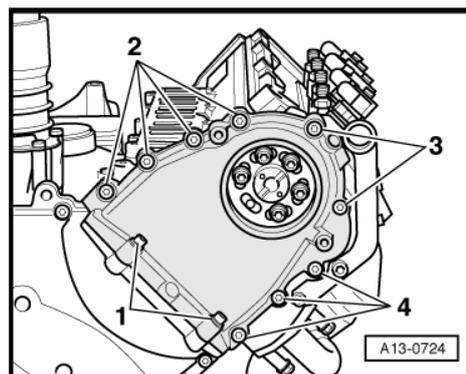


- Fit timing chain cover (right) and tighten bolts as follows:

Stage	Tighten
I	- Tighten bolts -2 ... 4- to 5 Nm in diagonal sequence.
II	- Tighten bolts -1- in diagonal sequence to 10 Nm.
III	- Tighten bolts -2 ... 4- to 10 Nm.

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

- Secure turbocharger (left-side) ⇒ [page 246](#) .
- Install vacuum pump ⇒ [page 68](#) .
- Renew oil seal on toothed belt sprocket for high-pressure pump drive ⇒ [page 84](#) .
- Fit adapter for oil seal with new O-ring ⇒ [page 84](#) .
- Install high-pressure pump ⇒ Rep. gr. 23 .
- Install toothed belt for high-pressure pump ⇒ Rep. gr. 23 .
- Install cooler (left-side) for exhaust gas recirculation ⇒ [page 299](#) .
- Install mechanical exhaust gas recirculation valve (left-side) ⇒ [page 296](#) .
- Install intake manifold (left-side) ⇒ Rep. gr. 23 .
- Install coolant pipe (rear) ⇒ [page 229](#) .
- Install crankshaft oil seal (timing chain end) ⇒ [page 65](#) .
- Install drive plate ⇒ [page 65](#) .
- Bolt gearbox to engine and install engine/gearbox assembly ⇒ [page 35](#) .
- Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 404 .



#### Tightening torques

Component		Nm
Timing chain cover (bottom) to engine	M6	10
	M8	22
Timing chain covers (left and right) to engine		10

## 2 Drive chains for camshafts and valve gear

⇒ [“2.1 Camshaft timing chain \(left-side\) - exploded view of components”, page 97](#)

⇒ [“2.2 Camshaft timing chain \(right-side\) - exploded view of components”, page 98](#)

⇒ [“2.3 Removing and installing camshaft timing chains”, page 99](#)

⇒ [“2.4 Detaching camshaft timing chains from camshafts”, page 106](#)

⇒ [“2.5 Drive chain for valve gear - exploded view”, page 117](#)

⇒ [“2.6 Removing and installing drive chain for valve gear”, page 119](#)

⇒ [“2.7 Checking drive chains for camshafts and valve gear for elongation”, page 120](#)

### 2.1 Camshaft timing chain (left-side) - exploded view of components

1 - 5 Nm + turn +90° further

- Renew

2 - Thrust washer

- For drive chain sprocket

3 - Drive chain sprocket

- For timing chain (left-side)

4 - 10 Nm

5 - Chain tensioner

- For timing chain (left-side)

6 - Chain sprocket

- For inlet camshaft
- Side with lettering faces front

7 - 24 Nm

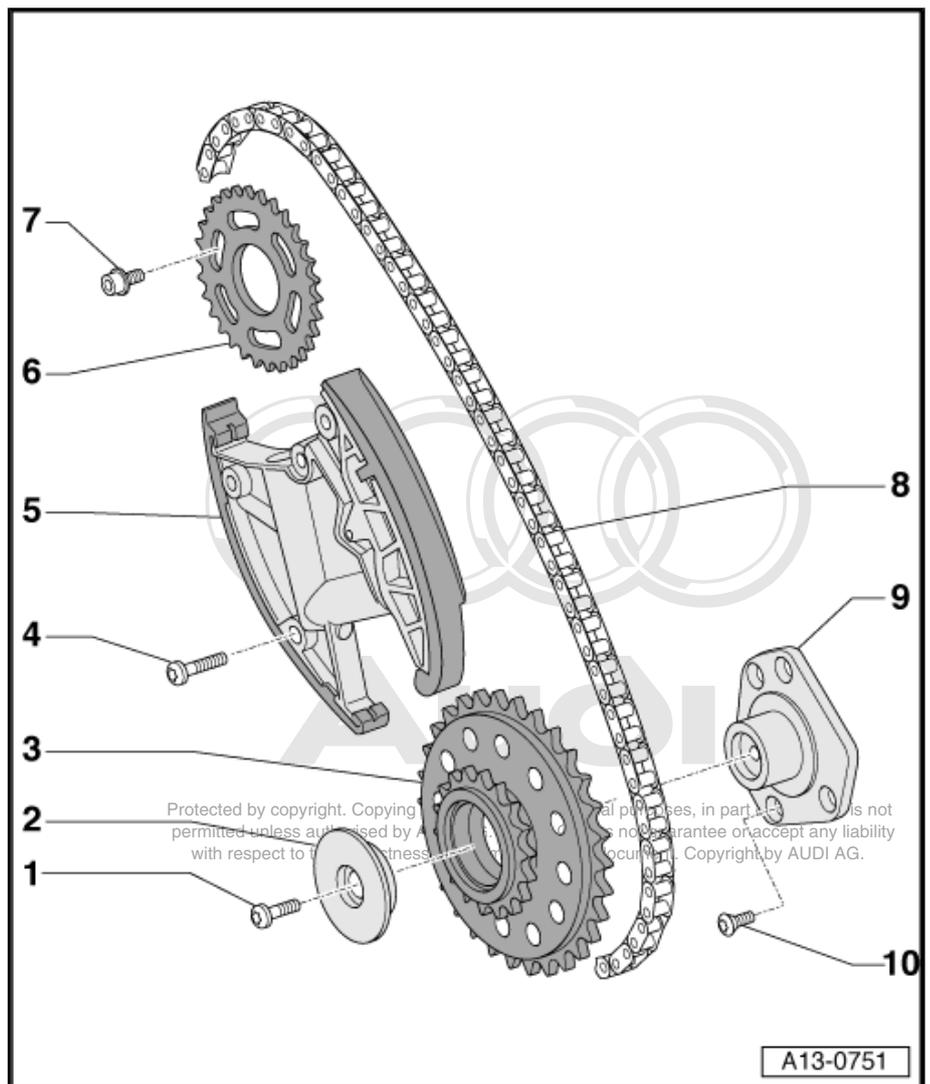
8 - Timing chain (left-side)

- Before removing, mark running direction with paint

9 - Bearing bracket

- For drive chain sprocket

10 - 10 Nm





## 2.2 Camshaft timing chain (right-side) - exploded view of components

1 - 45 Nm

2 - Bearing mounting

- For drive chain sprocket

3 - Timing chain (right-side)

- Before removing, mark running direction with paint

4 - Chain sprocket

- For inlet camshaft

5 - 24 Nm

6 - Chain tensioner

- For timing chain (right-side)

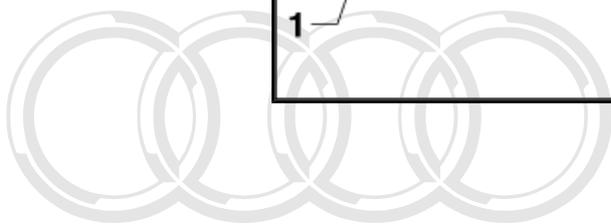
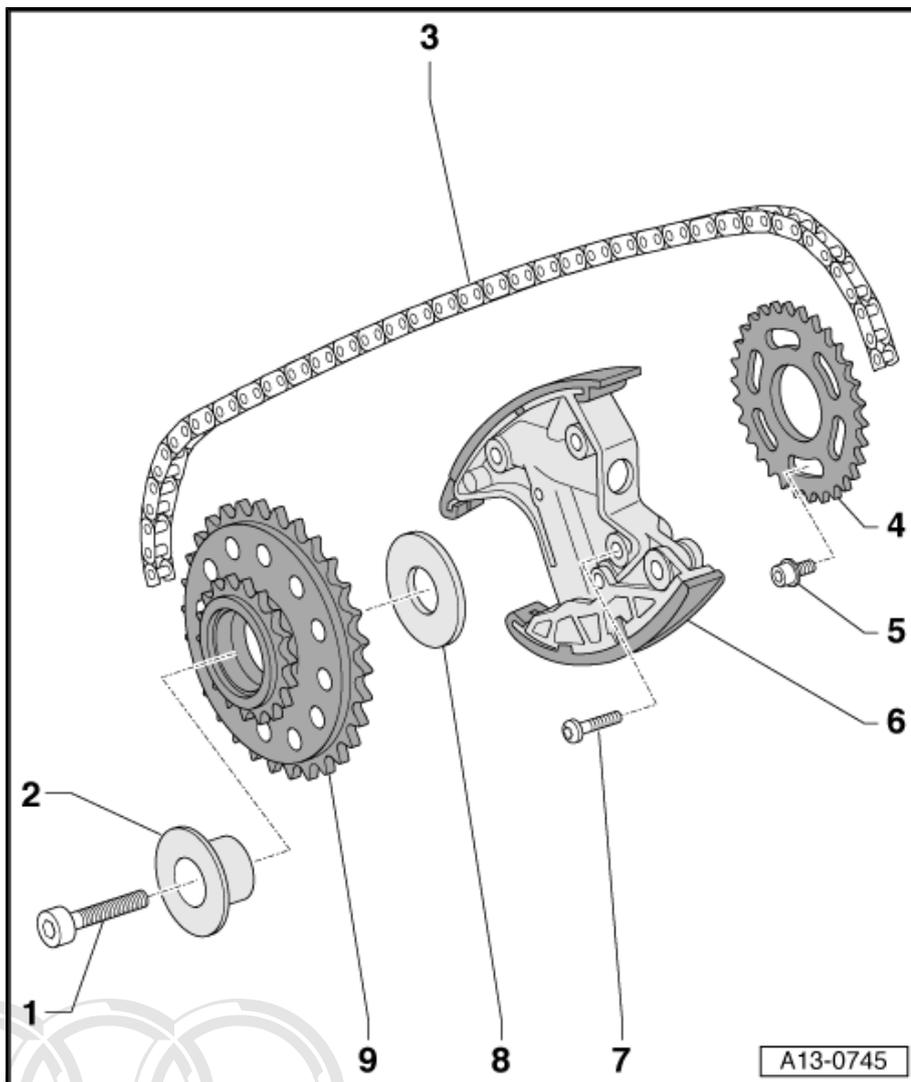
7 - 10 Nm

8 - Thrust washer

- For drive chain sprocket

9 - Drive chain sprocket

- For timing chain (right-side)



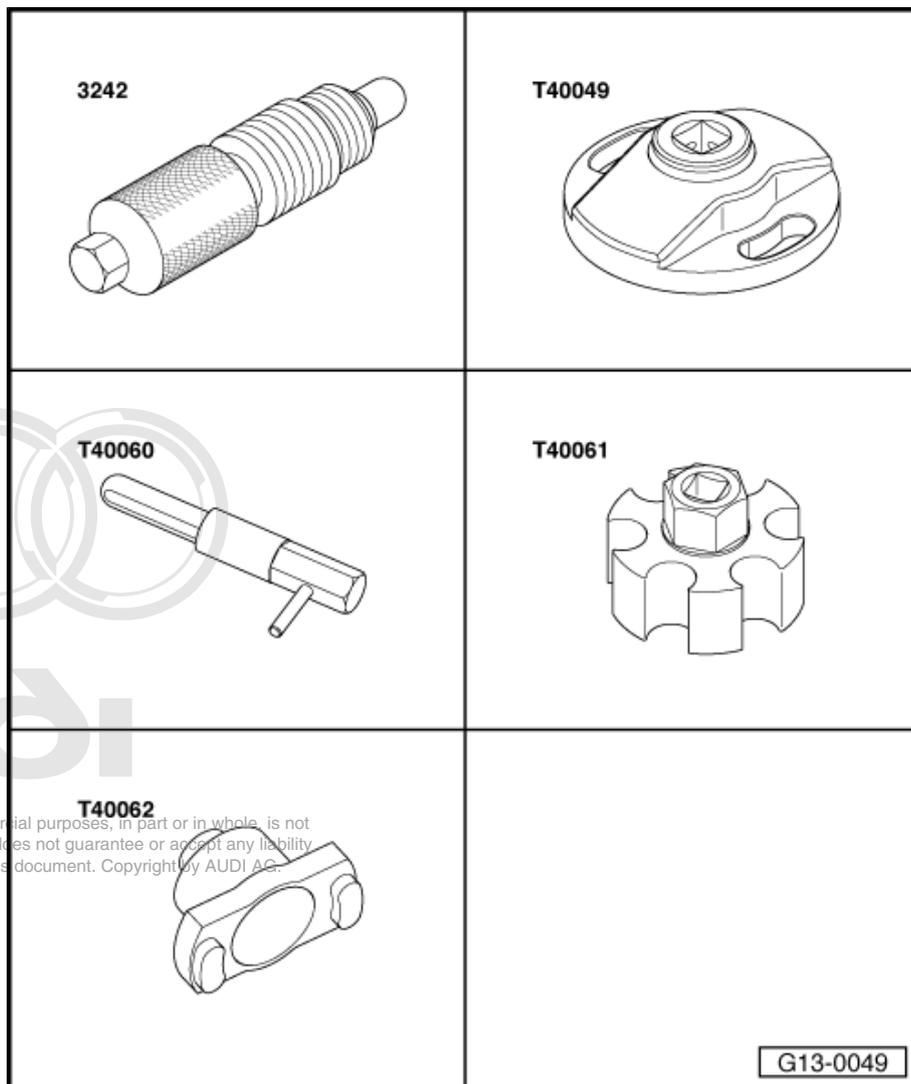
# Audi

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

## 2.3 Removing and installing camshaft timing chains

### Special tools and workshop equipment required

- ◆ Locking pin - 3242-
- ◆ Adapter - T40049-
- ◆ Locking pin - T40060- (2x)
- ◆ Adapter - T40061-
- ◆ Adapter - T40062-
- ◆ Drill bit 3.3 mm Ø (2x)
- ◆ Drip tray



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

### Removing



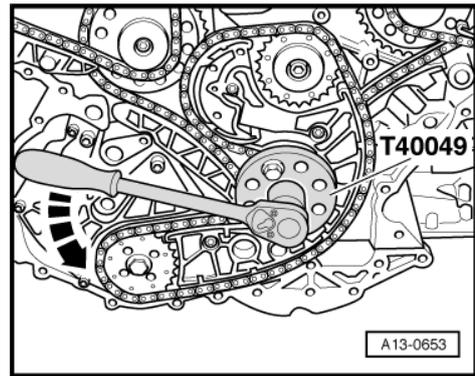
#### Note

*The crankshaft and camshafts must only be turned with the chain drive mechanism fully installed. Otherwise the valves may strike the pistons, causing damage to valves and piston crowns.*

- Drain off engine oil.
- Remove engine ⇒ [page 7](#) .
- Separate engine from gearbox ⇒ [page 28](#) .
- Secure engine to engine stand ⇒ [page 33](#) , or leave engine on scissor-type assembly platform - VAS 6131 A- .
- Remove drive plate ⇒ [page 64](#) .
- Remove timing chain covers ⇒ [page 86](#) .

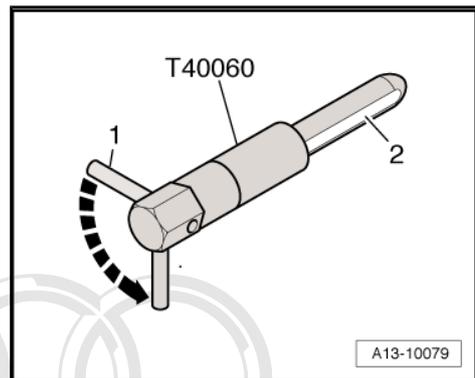


- Attach adapter - T40049- at rear end of crankshaft using two old securing bolts for drive plate.

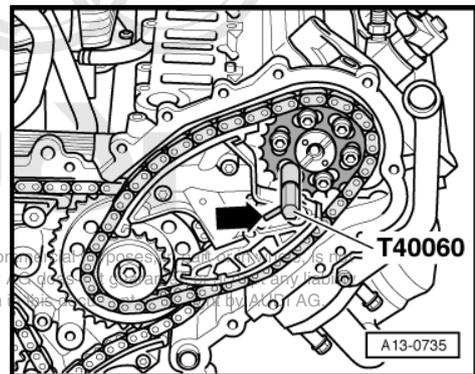


Note

- ◆ The locking pin - T40060- has a flat -2- which makes it easier to insert when the locating bores in the camshaft and cylinder head are not exactly in line.
- ◆ The adjustment pin is inserted initially so that the side pin -1- is perpendicular to the imaginary line between the adjustment pin and the centre of the camshaft.
- ◆ To obtain the correct TDC position, the side pin -1- must then be turned 90° -arrow- so it is in line with the imaginary line between the adjustment pin and the centre of the camshaft.



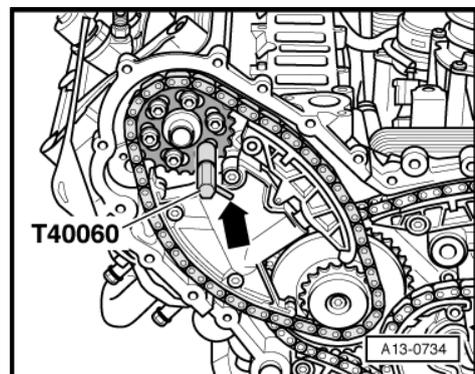
- Turn crankshaft in normal direction of rotation -arrow- to TDC position:
- It should be possible to lock camshafts with locking pins - T40060- .
- The side pin -arrow- in each locking pin - T40060- must be in line with the imaginary line between the locking pin and the centre of the camshaft.



Cylinder bank 1 (right-side):

Protected by copyright. Copying for private or commercial use is permitted unless authorised by AUDI AG. AUDI AG is not liable for any errors with respect to the correctness of information.

Cylinder bank 2 (left-side):

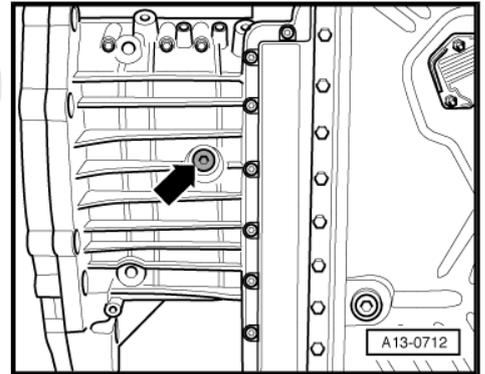


- Place a cloth under the sump to catch escaping engine oil.
- Unscrew plug -arrow- from sump (top section).

**WARNING**

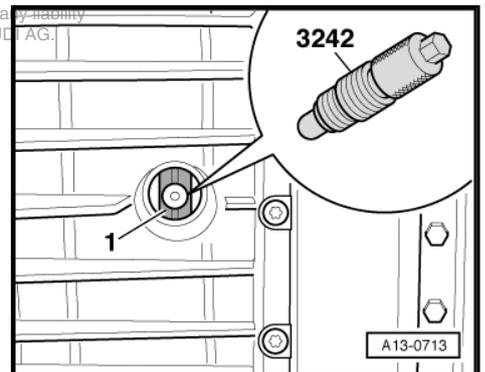
*Turn crankshaft only in direction of engine rotation.*

*If crankshaft has been turned past "TDC" position, turn crankshaft two further rotations until it is again positioned just before "TDC". Then turn further in the same direction and lock crankshaft with locking pin - 3242- .*

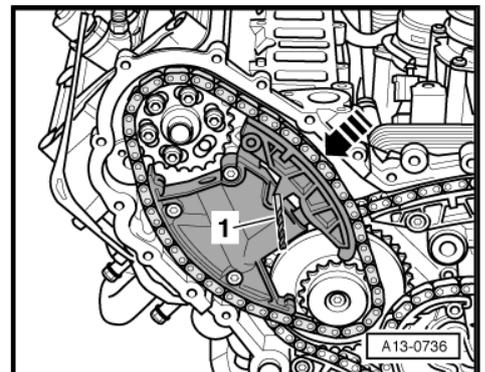


- While turning in this direction, lock crankshaft -1- with locking pin - 3242- . Tighten locking pin to 20 Nm.

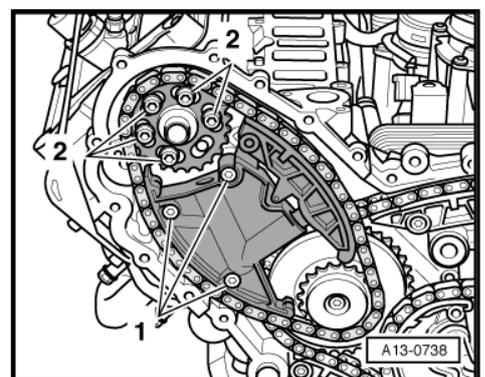
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not bear any responsibility with regard to the correctness of the information in this document. Copyright by AUDI AG.



- Press guide rail of chain tensioner for timing chain (left-side) in direction of -arrow- and lock chain tensioner by inserting a 3.3 mm Ø drill bit -item 1-.
- Mark running direction of timing chain (left-side) with paint.
- Remove locking pins - T40060- from both camshafts.

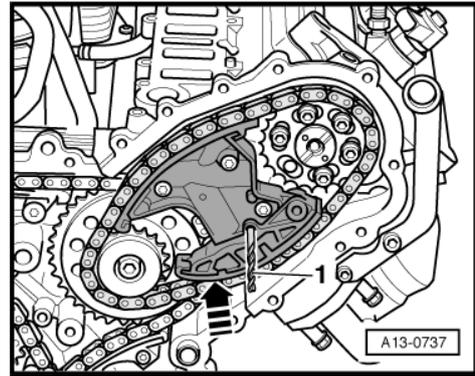


- Unscrew bolts -1- from chain tensioner and -2- from camshaft sprocket.
- Take off camshaft sprocket, chain tensioner and timing chain (left-side).

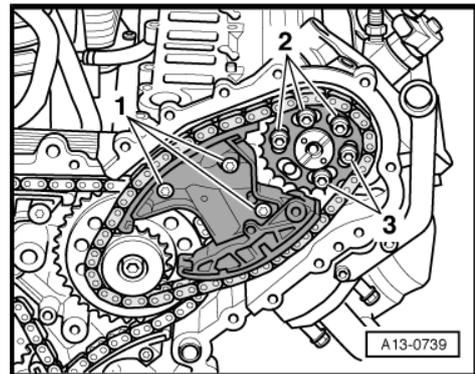




- Press guide rail of chain tensioner for timing chain (right-side) in direction of -arrow- and lock chain tensioner by inserting a 3.3 mm Ø drill bit -item 1-.
- Mark running direction of timing chain (right-side) with paint.



- Unscrew bolts -1- from chain tensioner and -2- from camshaft sprocket.
- Take off camshaft sprocket, chain tensioner and timing chain (right-side).



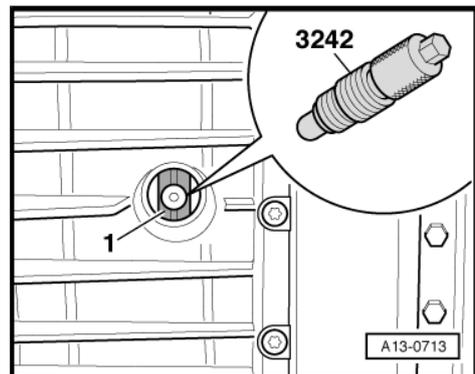
### Installing

- Crankshaft -1- locked in TDC position with locking pin - 3242- .
- Drive chain for valve gear installed ⇒ [page 119](#)



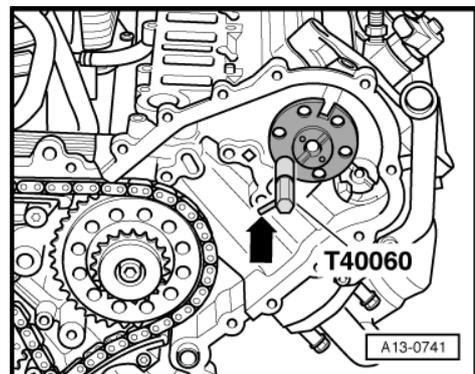
### Note

- ◆ *Renew gaskets and seals.*
- ◆ *The crankshaft must not be at TDC at any cylinder when the camshaft is turned. Otherwise, there is a risk of damage to valves and piston crowns.*



- Check that camshafts on both cylinder heads are positioned at TDC.
- It should be possible to lock camshafts with locking pins - T40060- .
- The side pin -arrow- in each locking pin - T40060- must be in line with the imaginary line between the locking pin and the centre of the camshaft.

Cylinder bank 1 (right-side):



Cylinder bank 2 (left-side):

- Remove locking pins - T40060- from both camshafts.



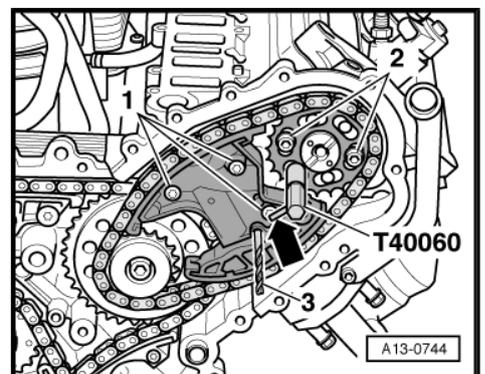
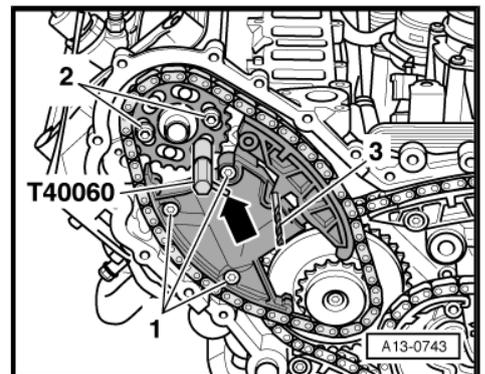
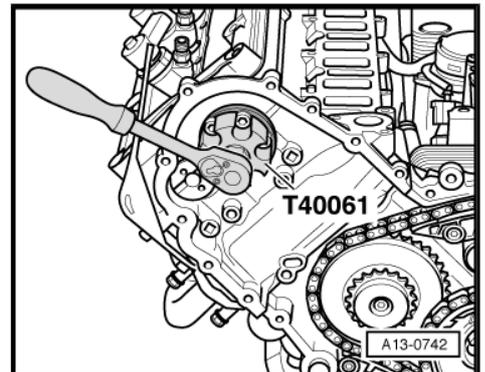
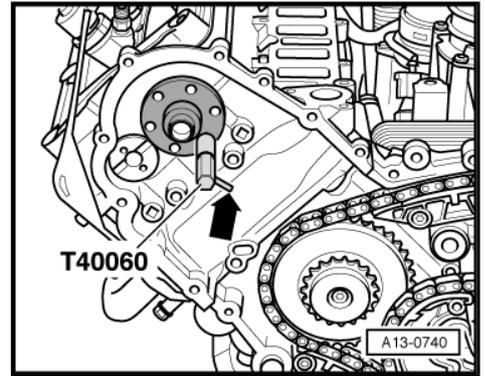
 **Note**

◆ *If the adjustment pins cannot be inserted in the camshafts, the camshafts can be turned slightly using adapter - T40061- . To do so, screw securing bolts for camshaft sprocket into camshaft.*

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 or information in this document. Copyright by Audi AG.

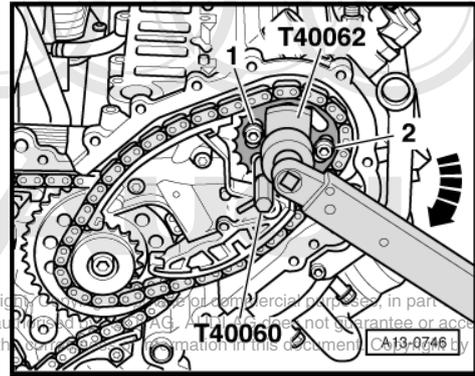
◆ *The crankshaft must not be at TDC at any cylinder when the camshaft is turned. Otherwise, there is a risk of damage to valves and piston crowns.*

- Install timing chain (left-side) with camshaft sprocket and chain tensioner.
- The elongated holes in the sprocket must be aligned centrally over the tapped holes in the camshaft.
- Tighten bolts -1- for chain tensioner.
- Screw in two bolts -2- for sprocket, but do not tighten bolts.
- It should just be possible to turn the sprocket on the camshaft without axial movement.
- Lock camshaft (left-side) with locking pin - T40060- .
- The side pin -arrow- on the locking pin - T40060- must be in line with the imaginary line between the locking pin and the centre of the camshaft.
- Pull drill bit -3- from locating hole, this releases the chain tensioner (left-side).
- Install timing chain (right-side) with camshaft sprocket and chain tensioner.
- The elongated holes in the sprocket must be aligned centrally over the tapped holes in the camshaft.
- Tighten bolts -1- for chain tensioner.
- Screw in two bolts -2- for sprocket, but do not tighten bolts.
- It should just be possible to turn the sprocket on the camshaft without axial movement.
- Lock camshaft (right-side) with locking pin - T40060- .
- The side pin -arrow- on the locking pin - T40060- must be in line with the imaginary line between the locking pin and the centre of the camshaft.
- Pull drill bit -3- out of locating hole; this releases the chain tensioner (right-side).



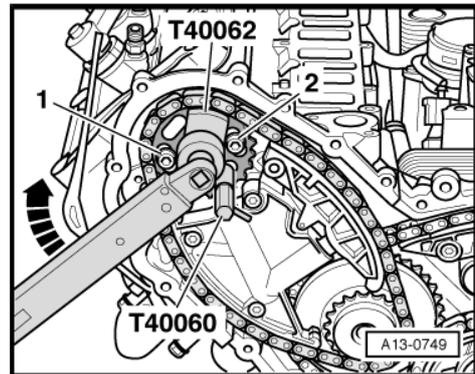


- Using a torque wrench and adapter - T40062- , apply a torque of 100 Nm to camshaft sprocket (right-side) in the direction indicated (-arrow-). Maintain this torque for the following step.
- Tighten bolts -1- and -2-.
- Take off adapter - T40062- and pull out locking pin - T40060- .
- Tighten remaining bolts for sprocket (right-side).

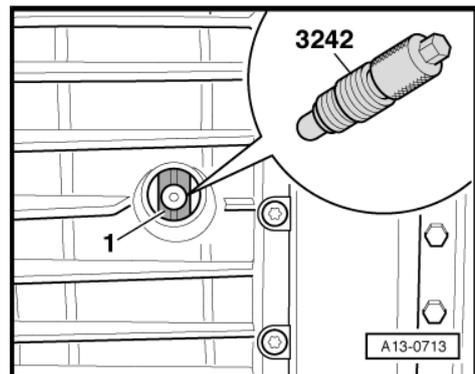


Protected by copyright. All rights reserved. No part of this document, in particular any technical drawing, may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage and retrieval system, without the prior written permission of Audi AG. Audi AG does not guarantee or accept any liability with respect to the information in this document. A13-0746

- Using a torque wrench and adapter - T40062- , apply a torque of 20 Nm to camshaft sprocket (left-side) in the direction indicated (-arrow-). Maintain this torque for the following step.
- Tighten bolts -1- and -2-.
- Take off adapter - T40062- and pull out locking pin - T40060- .
- Tighten remaining bolts for sprocket (left-side).

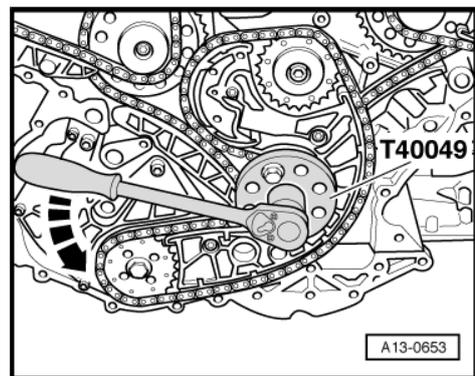


- Remove locking pin - 3242- .



### Checking valve timing

- Using adapter - T40049- , turn crankshaft two rotations in normal direction of rotation -arrow- until crankshaft is just before TDC again.

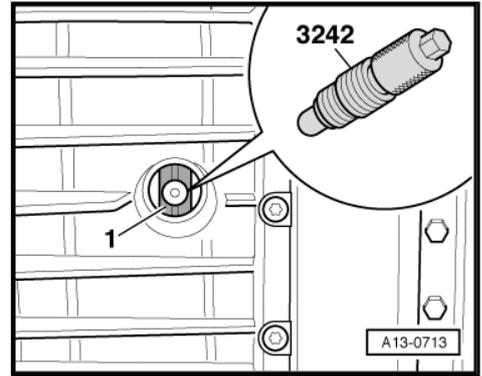


### Caution

**Turn crankshaft only in direction of engine rotation.**

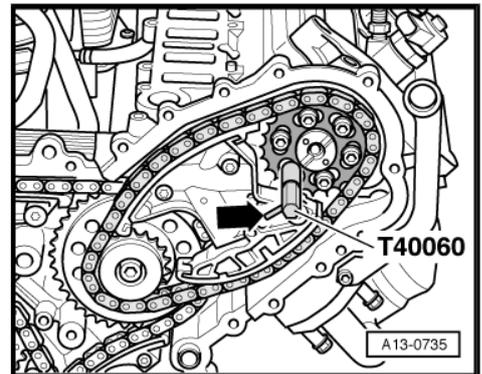
**If crankshaft has been turned past "TDC" position, turn crankshaft two further rotations until it is again positioned just before "TDC". Then turn further in the same direction and lock crankshaft with locking pin - 3242- .**

- While turning in this direction, lock crankshaft -1- with locking pin - 3242- . Tighten locking pin to 20 Nm.

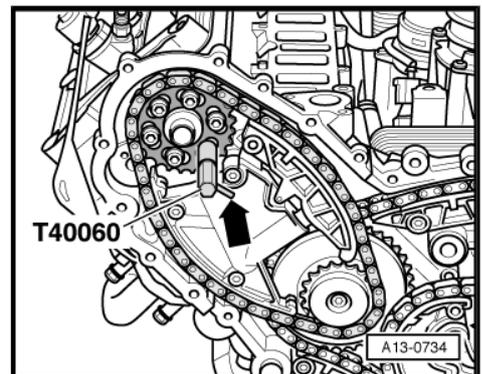


- Check that it is now possible to lock the camshafts with locking pins - T40060- .
- The side pin -arrow- in each locking pin - T40060- must be in line with the imaginary line between the locking pin and the centre of the camshaft.

Cylinder bank 1 (right-side):



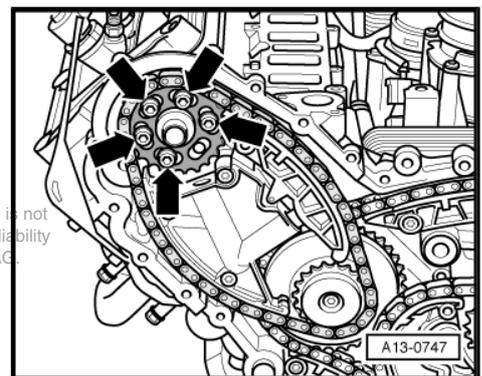
Cylinder bank 2 (left-side):



### Adjusting valve timing

If the adjustment pin cannot be inserted in one of the camshafts:

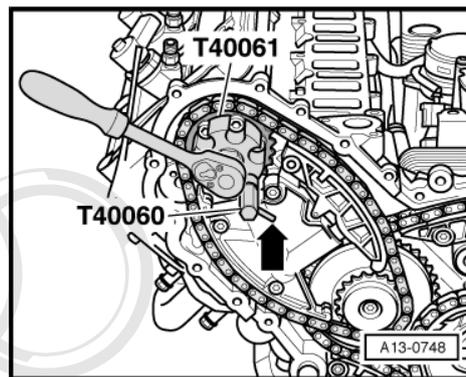
- Loosen all bolts on the relevant sprocket approx. 1 turn.



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

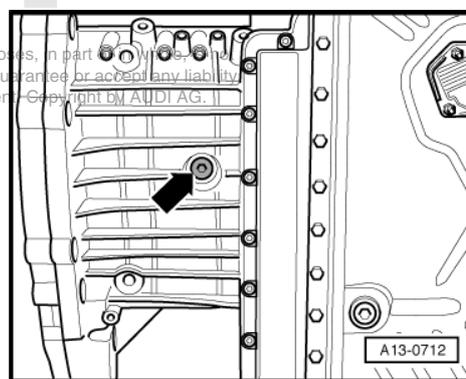


- Apply adapter - T40061- to the heads of the loosened bolts.
- Turn camshaft slightly backwards and forwards with adapter - T40061- until locking pin - T40060- can be inserted.
- The side pin -arrow- on the locking pin - T40060- must be in line with the imaginary line between the locking pin and the centre of the camshaft.
- With adapter - T40061- and locking pin - T40060- still in position, tighten bolts on sprocket to approx. 5 Nm.
- Remove locking pin - T40060- and adapter - T40061- .
- Tighten bolts on sprocket to final torque.
- Repeat this procedure on the other cylinder bank if necessary.
- Remove locking pin - 3242- .
- Check valve timing once again ⇒ [page 104](#) .



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

- Screw plug -arrow- for TDC mark into top section of sump with a new seal.
- Install timing chain covers ⇒ [page 93](#) .
- Install drive plate ⇒ [page 65](#) .
- Bolt gearbox to engine and install engine/gearbox assembly ⇒ [page 35](#) .
- Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 404 .



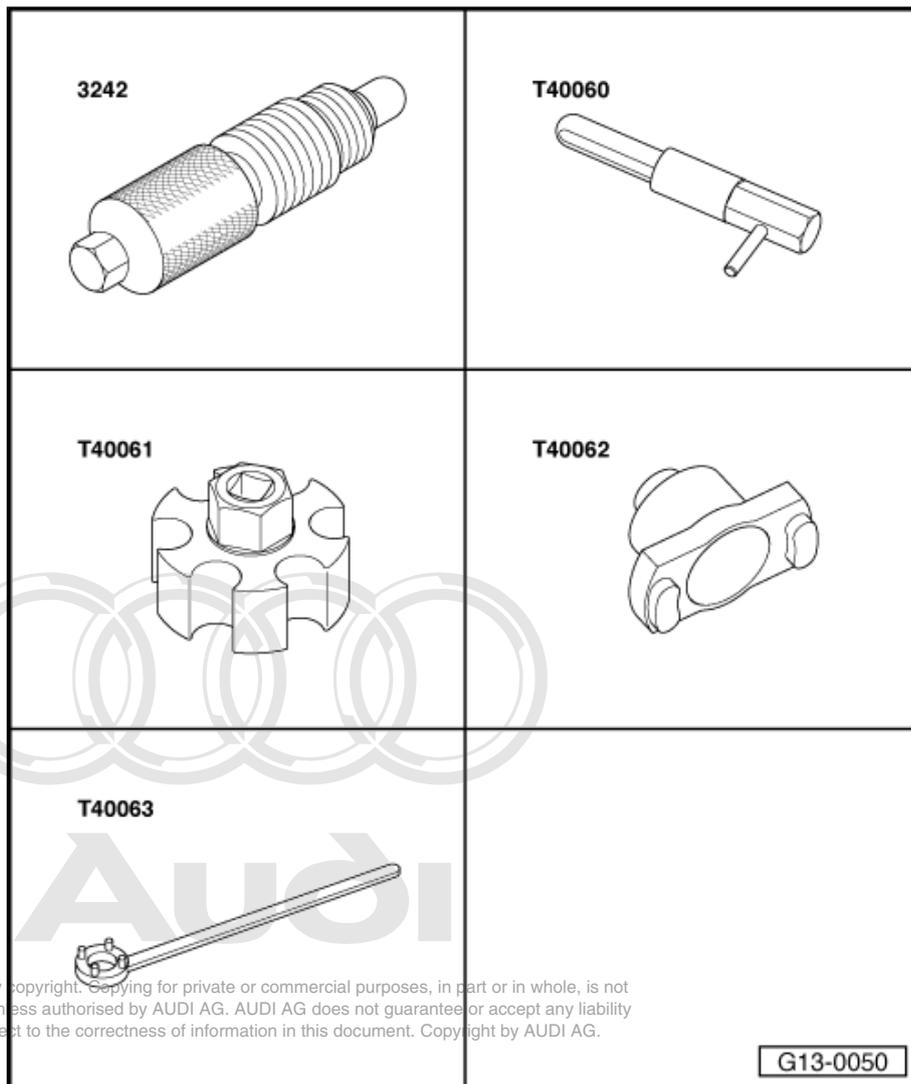
#### Tightening torques

Component	Nm
Camshaft sprocket to camshaft	24
Chain tensioner to cylinder head	10
Screw plug in top section of sump	35

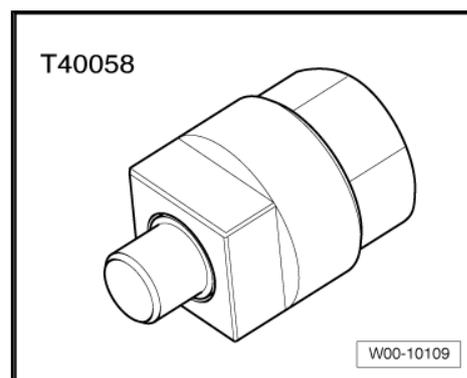
## 2.4 Detaching camshaft timing chains from camshafts

**Special tools and workshop equipment required**

- ◆ Locking pin - 3242-
- ◆ Locking pin - T40060- (2x)
- ◆ Adapter - T40061-
- ◆ Adapter - T40062-
- ◆ Counterhold tool - T40063-
- ◆ Drill bit 3.3 mm  $\varnothing$  (2x)



- ◆ Adapter - T40058-





**Note**

- ◆ *To remove the cylinder head, it is sufficient to remove the timing chains from the camshafts only. The timing chains remain on engine; the engine/gearbox assembly is not separated.*
- ◆ *You must adhere to the described procedures even if you are only working on one of the cylinder heads, since the timing adjustment must be performed for both cylinder heads when work is completed.*

**Removing**



**Note**

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

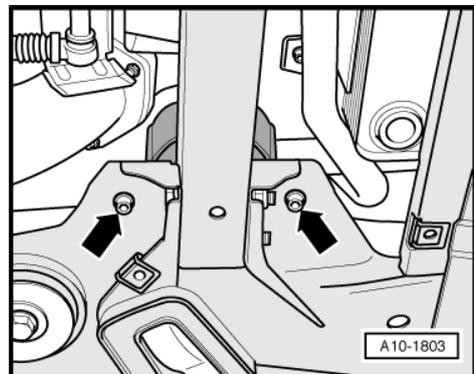
- Remove engine ⇒ [page 7](#) .



**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 engine/gearbox assembly remains on the scissor-type assembly platform - VAS 6131 A- (without detaching the gearbox) when performing the following repairs.*
- ◆ *For better accessibility the subframe is removed as follows:*
- Remove bolts -arrows- for front gearbox mounting (left and right).

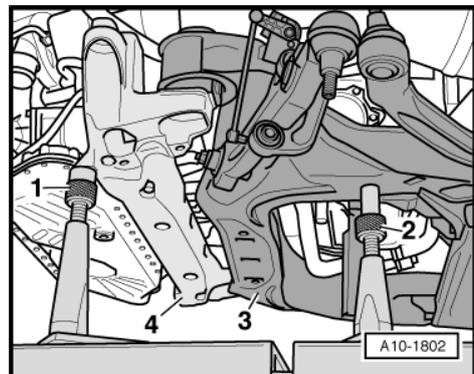


- Screw down spindles of support elements -2- (left and right) at subframe as far as possible.
- Remove locating lugs from spindles.
- Take out subframe -3- from the side.

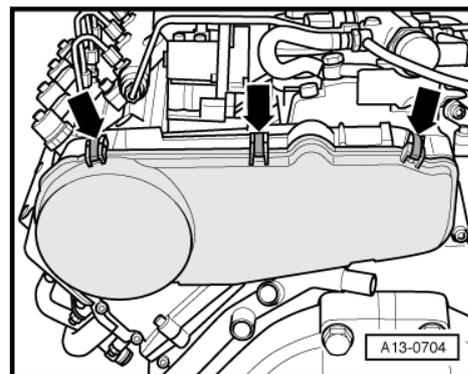


**Note**

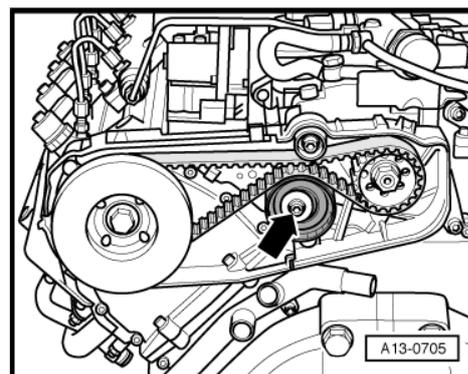
- ◆ *A second mechanic is required for removing the subframe.*
- ◆ *Engine cross member -4- is not removed, the support elements -1- for engine cross member remain fitted.*



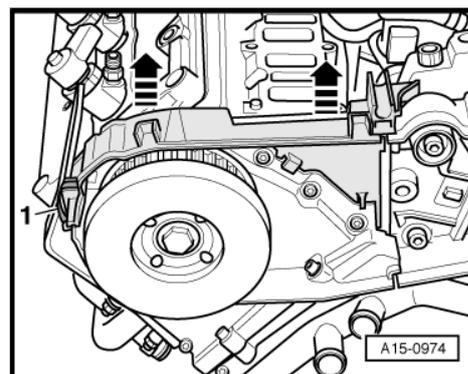
- Release clamps -arrows- and detach toothed belt cover.
- Pivot toothed belt cover to the rear and disengage retaining pegs on bottom side of toothed belt cover.



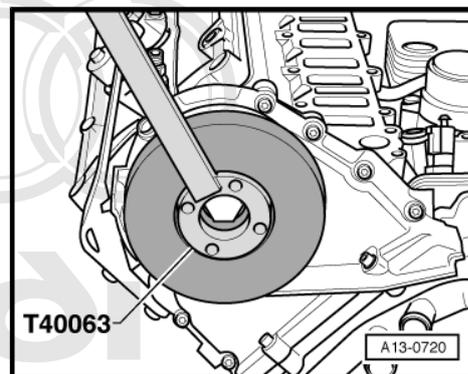
- Unscrew bolt -arrow- for tensioning roller.
- Take off tensioning roller and toothed belt for high-pressure pump.



- Release clamp -1- and lift off rear toothed belt cover -arrows-.



- Loosen central bolt for damper weight and toothed belt sprocket (use counterhold tool - T40063- ).

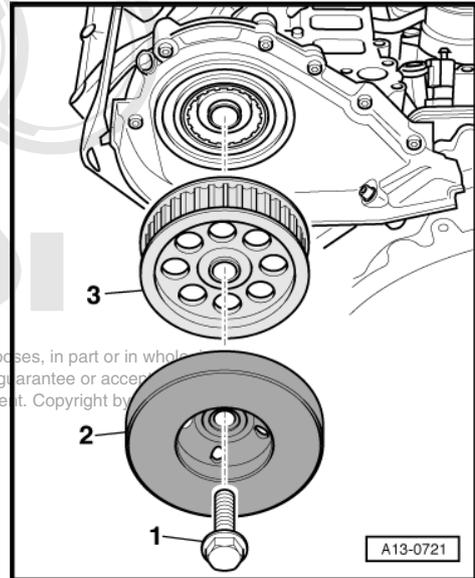


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

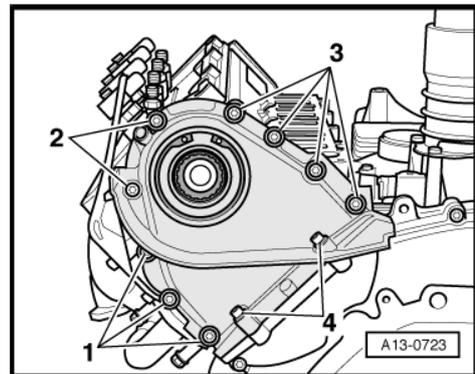


- Remove bolt -1-.
- Remove damper weight -2- and toothed belt sprocket -3- for high-pressure pump drive.

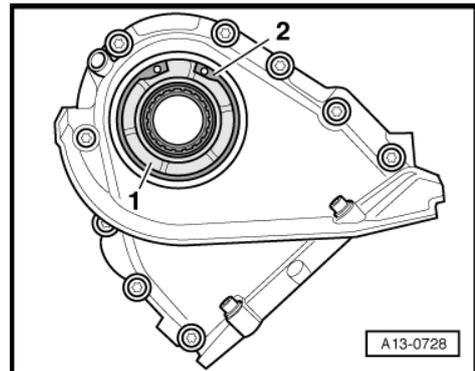
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by Audi AG.



- Remove bolts -1 ... 4- and detach timing chain cover (left-side).



- Remove circlip -2-.
- Pull out adapter -1- for oil seal.
- Press oil seal out of adapter.

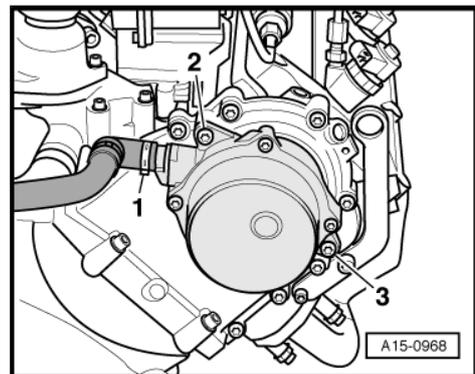


- Remove bolts -2- and -3-.
- Remove vacuum pump.

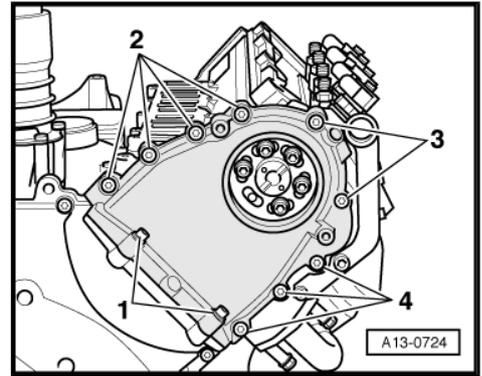


**Note**

Disregard -item 1-.



- Remove bolts -1 ... 4- and detach timing chain cover (right-side).



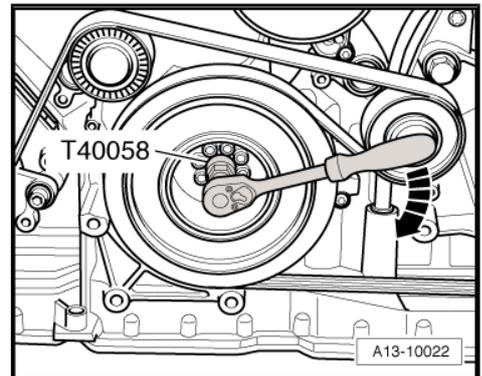
- Turn crankshaft in normal direction of rotation -arrow- to TDC position:



**WARNING**

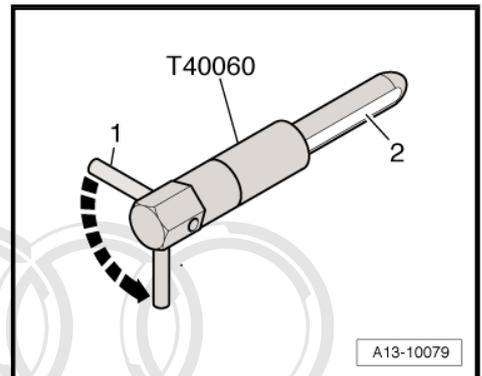
*Turn crankshaft only in direction of engine rotation.*

*If crankshaft has been turned past "TDC" position, turn crankshaft two further rotations until it is again in "TDC" position.*



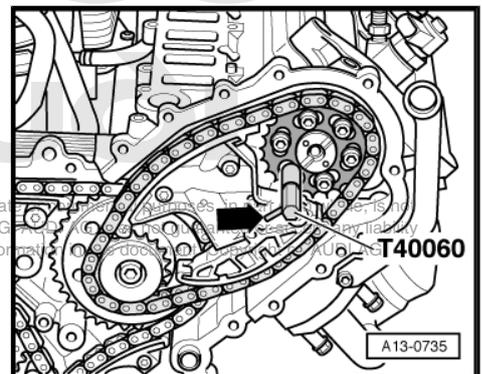
 **Note**

- ◆ *The locking pin - T40060- has a flat -2- which makes it easier to insert when the locating bores in the camshaft and cylinder head are not exactly in line.*
- ◆ *The adjustment pin is inserted initially so that the side pin -1- is perpendicular to the imaginary line between the adjustment pin and the centre of the camshaft.*
- ◆ *To obtain the correct TDC position, the side pin -1- must then be turned 90° -arrow- so it is in line with the imaginary line between the adjustment pin and the centre of the camshaft.*



- Check that camshafts on both cylinder heads are positioned at TDC.
- It should be possible to lock camshafts with locking pins - T40060- .
- The side pin -arrow- in each locking pin - T40060- must be in line with the imaginary line between the locking pin and the centre of the camshaft.

Cylinder bank 1 (right-side):



Cylinder bank 2 (left-side):

- Place a cloth under the sump to catch escaping engine oil.
- Unscrew plug -arrow- from sump (top section).

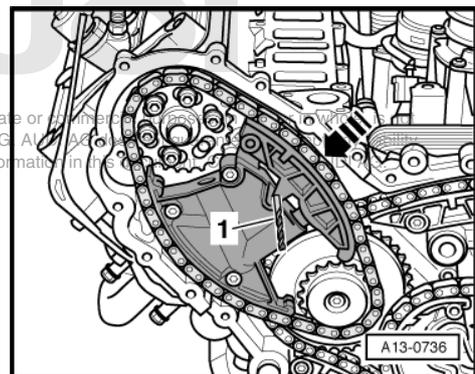
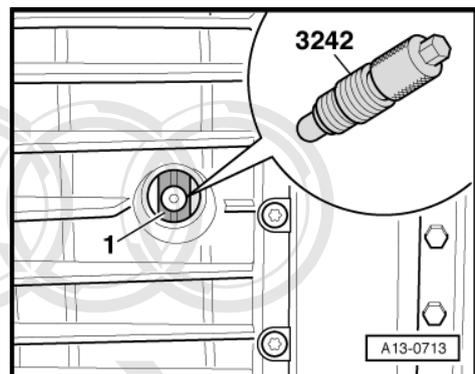
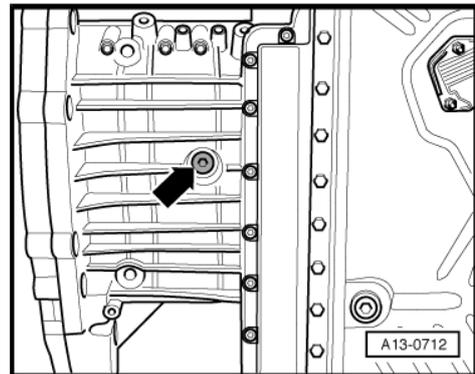
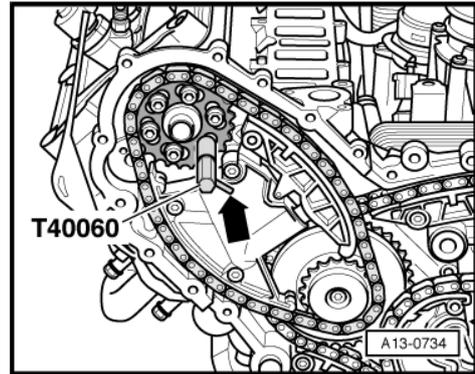
**WARNING**

*Turn crankshaft only in direction of engine rotation.*

*If crankshaft has been turned past "TDC" position, turn crankshaft two further rotations until it is again positioned just before "TDC". Then turn further in the same direction and lock crankshaft with locking pin - 3242- .*

- While turning in this direction, lock crankshaft -1- with locking pin - 3242- . Tighten locking pin to 20 Nm.

- Press guide rail of chain tensioner for timing chain (left-side) in direction of -arrow- and lock chain tensioner by inserting a 3.3 mm  $\varnothing$  drill bit -item 1-.

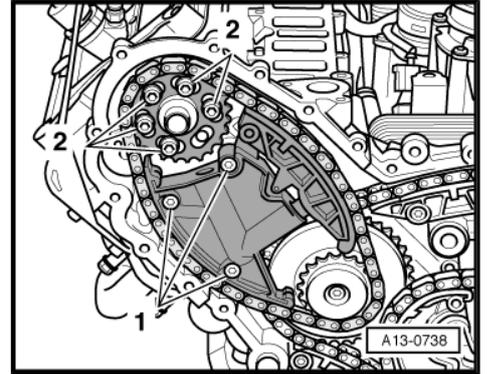


Protected by copyright. Copying for private or commercial use is not permitted unless authorised by AUDI AG. All rights reserved. Liability with respect to the correctness of information in this manual is not assumed.

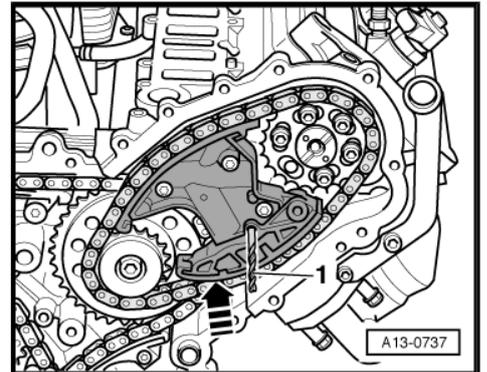
- Unscrew bolts -1- from chain tensioner and -2- from camshaft sprocket.
- Remove camshaft sprocket and chain tensioner (left-side)

 **Note**

*Cover chain tensioner opening with a cloth or similar to stop small parts dropping in.*



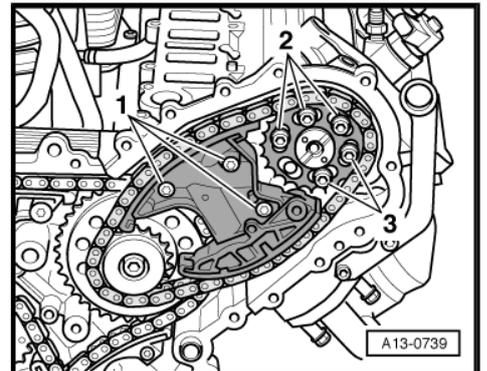
- Press guide rail of chain tensioner for timing chain (right-side) in direction of -arrow- and lock chain tensioner by inserting a 3.3 mm Ø drill bit -item 1-.



- Unscrew bolts -1- from chain tensioner and -2- from camshaft sprocket.
- Remove camshaft sprocket and chain tensioner (right-side).

 **Note**

*Cover chain tensioner opening with a cloth or similar to stop small parts dropping in.*

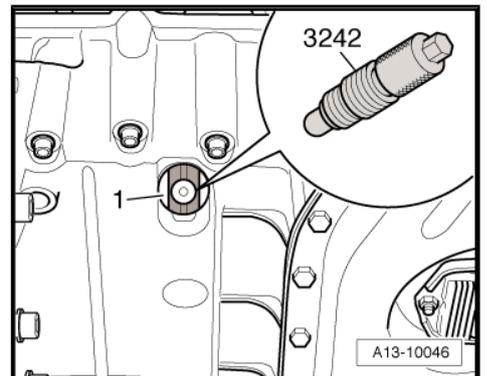


**Installing**

- Crankshaft -1- locked in TDC position with locking pin - 3242- .

 **Note**

- ◆ *Renew seals and O-rings.*
- ◆ *The crankshaft must not be at TDC at any cylinder when the camshaft is turned. Otherwise, there is a risk of damage to valves and piston crowns.*

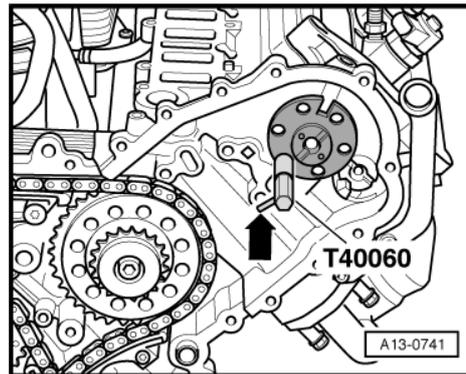


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



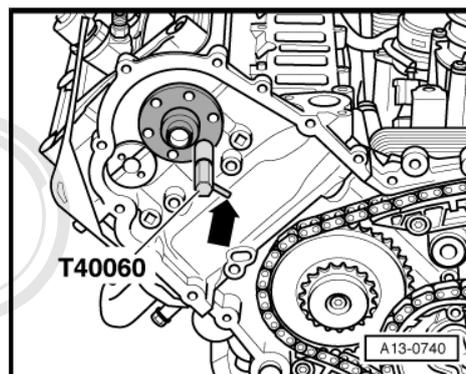
- Check that camshafts on both cylinder heads are positioned at TDC.
- It should be possible to lock camshafts with locking pins - T40060- .
- The side pin -arrow- in each locking pin - T40060- must be in line with the imaginary line between the locking pin and the centre of the camshaft.

Cylinder bank 1 (right-side):



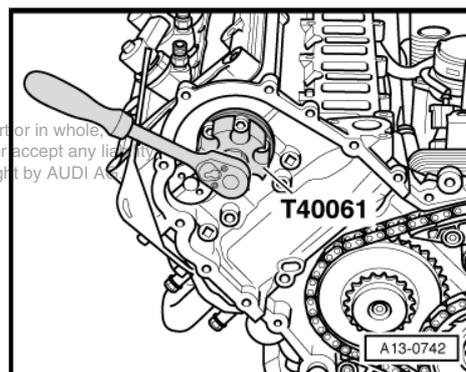
Cylinder bank 2 (left-side):

- Remove locking pins - T40060- from both camshafts.

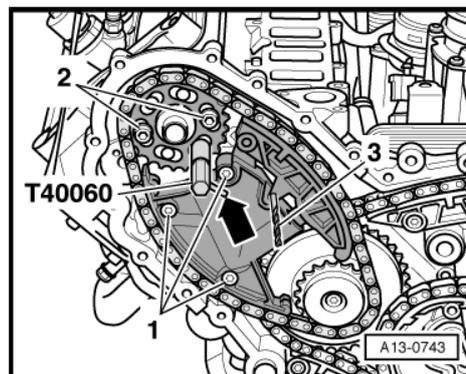


### Note

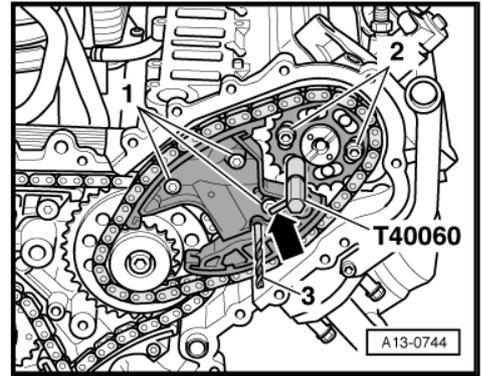
- ◆ *If the adjustment pins cannot be inserted in the camshafts, the camshafts can be turned slightly using adapter T40061. To do so, screw securing bolts for camshaft sprocket into camshaft.*
- ◆ *The crankshaft must not be at TDC at any cylinder when the camshaft is turned. Otherwise, there is a risk of damage to valves and piston crowns.*



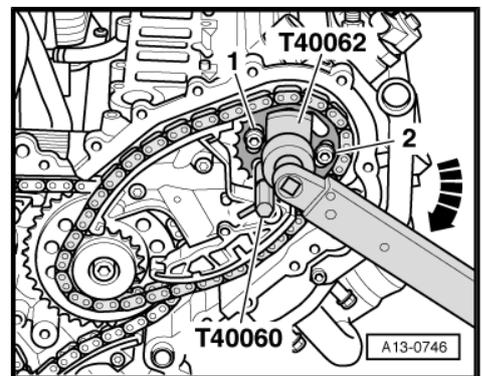
- Install timing chain (left-side) with camshaft sprocket and chain tensioner.
- The elongated holes in the sprocket must be aligned centrally over the tapped holes in the camshaft.
- Tighten bolts -1- for chain tensioner.
- Screw in two bolts -2- for sprocket, but do not tighten bolts.
- It should just be possible to turn the sprocket on the camshaft without axial movement.
- Lock camshaft (left-side) with locking pin - T40060- .
- The side pin -arrow- on the locking pin - T40060- must be in line with the imaginary line between the locking pin and the centre of the camshaft.
- Pull drill bit -3- from locating hole, this releases the chain tensioner (left-side).



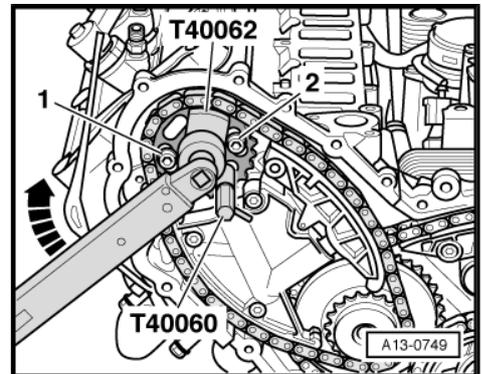
- Install timing chain (right-side) with camshaft sprocket and chain tensioner.
- The elongated holes in the sprocket must be aligned centrally over the tapped holes in the camshaft.
- Tighten bolts -1- for chain tensioner.
- Screw in two bolts -2- for sprocket, but do not tighten bolts.
- It should just be possible to turn the sprocket on the camshaft without axial movement.
- Lock camshaft (right-side) with locking pin - T40060- .
- The side pin -arrow- on the locking pin - T40060- must be in line with the imaginary line between the locking pin and the centre of the camshaft.
- Pull drill bit -3- out of locating hole; this releases the chain tensioner (right-side).



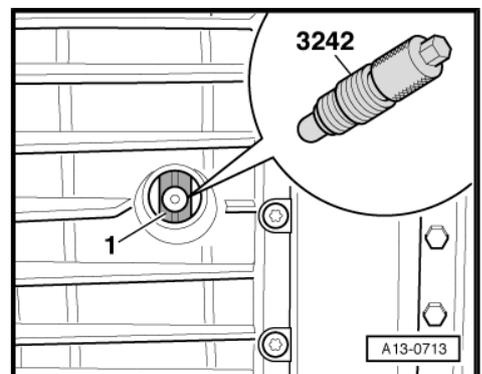
- Using a torque wrench and adapter - T40062- , apply a torque of 100 Nm to camshaft sprocket (right-side) in the direction indicated (-arrow-). Maintain this torque for the following step.
- Tighten bolts -1- and -2-.
- Take off adapter - T40062- and pull out locking pin - T40060- .
- Tighten remaining bolts for sprocket (right-side).



- Using a torque wrench and adapter - T40062- , apply a torque of 20 Nm to camshaft sprocket (left-side) in the direction indicated (-arrow-). Maintain this torque for the following step.
- Tighten bolts -1- and -2-.
- Take off adapter - T40062- and pull out locking pin - T40060- .
- Tighten remaining bolts for sprocket (left-side).



- Remove locking pin - 3242- .





### Checking valve timing

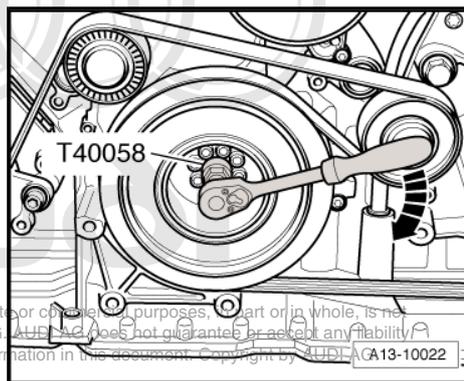
- Turn crankshaft two rotations in normal direction of rotation -arrow- until the crankshaft is just before TDC again.



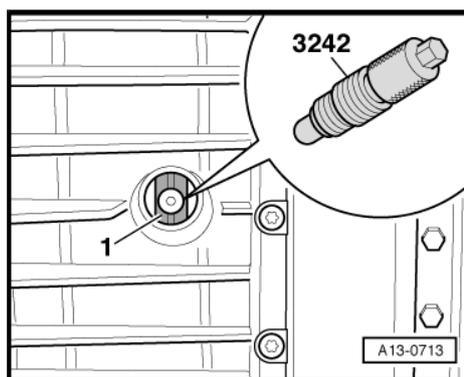
#### WARNING

**Turn crankshaft only in direction of engine rotation.**

**If crankshaft has been turned past "TDC" position, turn crankshaft two further rotations until it is again positioned just before "TDC". Then turn further in the same direction and lock crankshaft with locking pin - 3242- .**

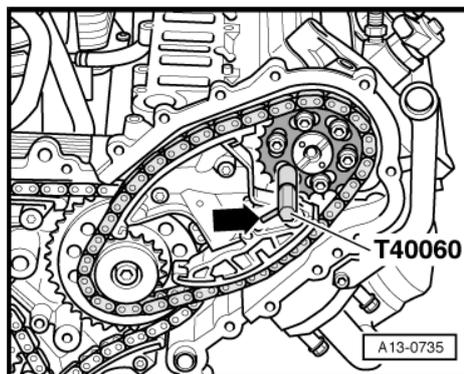


- While turning in this direction, lock crankshaft -1- with locking pin - 3242- . Tighten locking pin to 20 Nm.

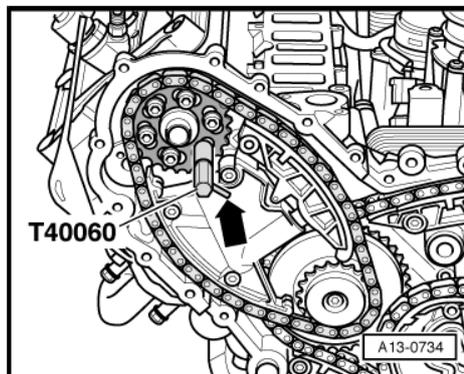


- Check that it is now possible to lock the camshafts with locking pins - T40060- .
- The side pin -arrow- in each locking pin - T40060- must be in line with the imaginary line between the locking pin and the centre of the camshaft.

Cylinder bank 1 (right-side):



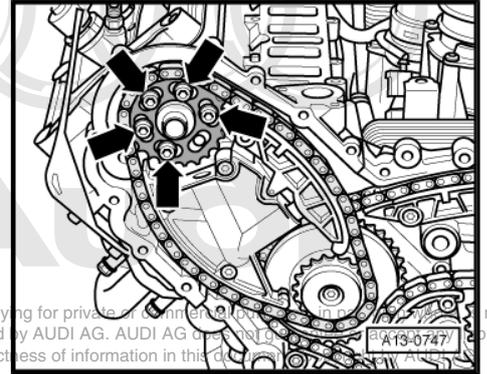
Cylinder bank 2 (left-side):



### Adjusting valve timing

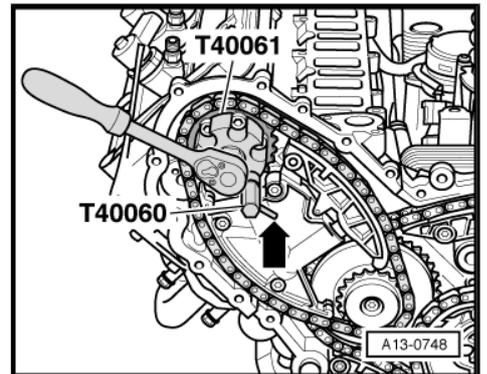
If the adjustment pin cannot be inserted in one of the camshafts:

- Loosen all bolts on the relevant sprocket approx. 1 turn.



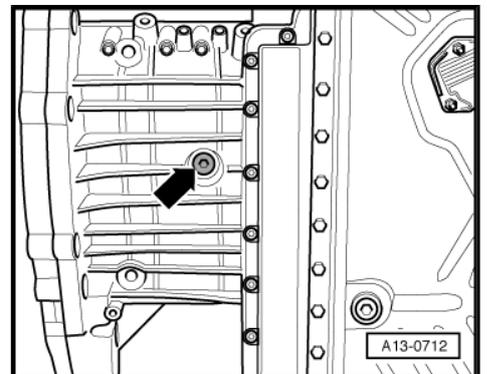
Protected by copyright. Copying for private or commercial purposes is not permitted unless authorised by AUDI AG. AUDI AG does not accept any liability with respect to the correctness of information in this document.

- Apply adapter - T40061- to the heads of the loosened bolts.
- Turn camshaft slightly backwards and forwards with adapter - T40061- until locking pin - T40060- can be inserted.
- The side pin -arrow- on the locking pin - T40060- must be in line with the imaginary line between the locking pin and the centre of the camshaft.
- With adapter - T40061- and locking pin - T40060- still in position, tighten bolts on sprocket to approx. 5 Nm.
- Remove locking pin - T40060- and adapter - T40061- .
- Tighten bolts on sprocket to final torque.
- Repeat this procedure on the other cylinder bank if necessary.
- Remove locking pin - 3242- .
- Check valve timing once again ⇒ [page 116](#) .



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

- Screw plug -arrow- for TDC mark into top section of sump with a new seal.
- Install timing chain covers ⇒ [page 93](#) .
- Install engine ⇒ [page 35](#) .



### Tightening torques

Component	Nm
Camshaft sprocket to camshaft	24
Chain tensioner to cylinder head	10
Screw plug in top section of sump	35

## 2.5 Drive chain for valve gear - exploded view



**1 - Bearing mounting for drive sprocket**

**2 - 45 Nm**

**3 - Mounting pin, 12 Nm**

- Heat with hot air blower when removing
- Apply locking fluid when installing; refer to ⇒ Electronic parts catalogue

**4 - 5 Nm + 90° (1/4 turn) further**

- Renew

**5 - Thrust washer for drive sprocket**

**6 - Drive sprocket for timing chain (left-side)**

**7 - Mounting pin, 12 Nm**

- Heat with hot air blower when removing
- Apply locking fluid when installing; refer to ⇒ Electronic parts catalogue

**8 - Drive chain for valve gear**

- Before removing, mark running direction with paint

**9 - Guide rail**

**10 - Mounting pin, 12 Nm**

- Heat with hot air blower when removing

- Apply locking fluid when installing; refer to ⇒ Electronic parts catalogue

**11 - 9 Nm**

**12 - Bearing bracket for drive sprocket**

**13 - Thrust washer**

**14 - Drive sprocket for timing chain (right-side)**

**15 - Mounting pin, 12 Nm**

- Heat with hot air blower when removing
- Apply locking fluid when installing; refer to ⇒ Electronic parts catalogue

**16 - O-ring**

- Renew

**17 - Chain tensioner**

**18 - 10 Nm**

**19 - Guide rail for chain tensioner**

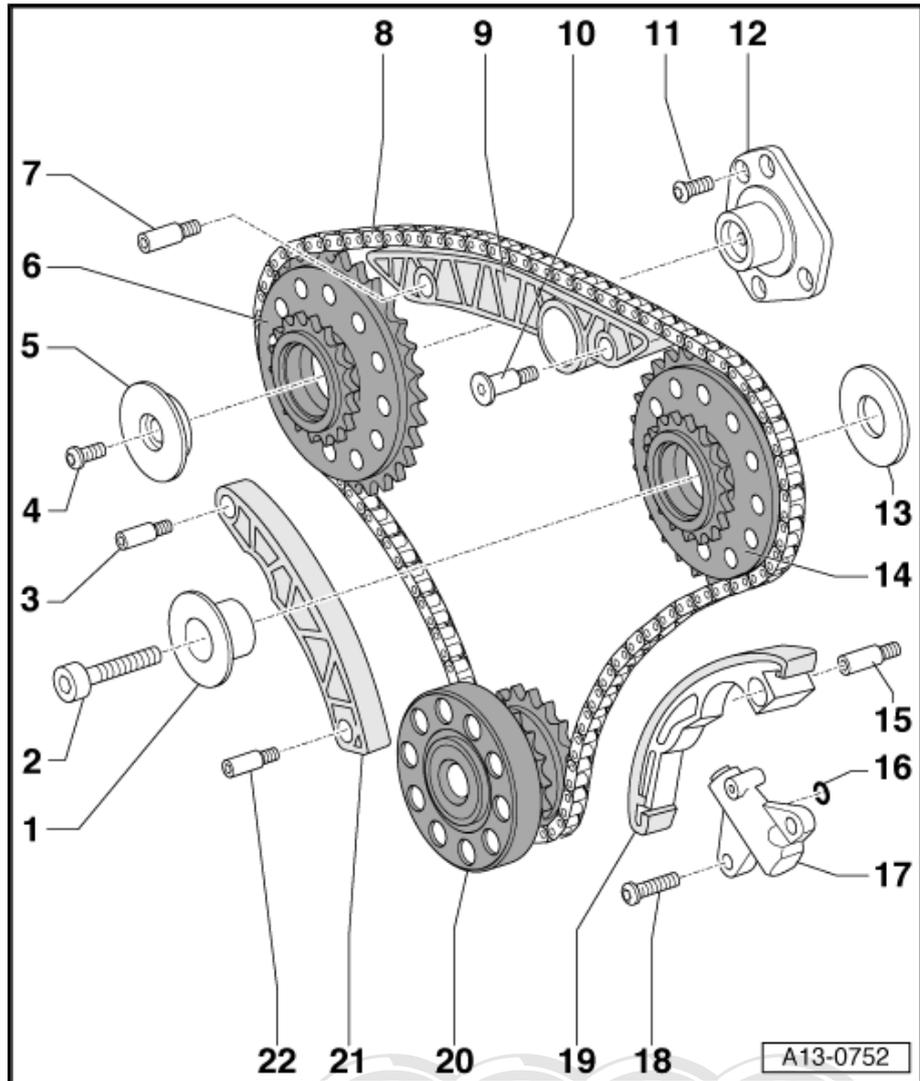
**20 - Crankshaft**

**21 - Guide rail**

- Note installation position

**22 - Mounting pin, 9 Nm**

- Heat with hot air blower when 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.

- Apply locking fluid when installing; refer to ⇒ Electronic parts catalogue

## 2.6 Removing and installing drive chain for valve gear

### Special tools and workshop equipment required

- ◆ Drill bit, Ø 3.3 mm

### Removing



#### Note

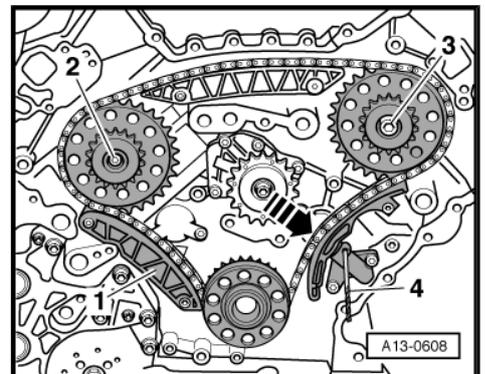
*All cable ties which are released or cut open when removing must be refitted in the same position when installing.*

- Drain off engine oil.
- Remove engine ⇒ [page 7](#) .
- Separate engine from gearbox ⇒ [page 28](#) .
- Secure engine to engine stand ⇒ [page 33](#) , or leave engine on scissor-type assembly platform - VAS 6131 A- .
- Remove drive plate ⇒ [page 64](#) .
- Remove timing chain covers ⇒ [page 86](#) .
- Remove camshaft timing chains ⇒ [page 99](#) .
- Remove chain for auxiliary drives ⇒ [page 123](#) .
- Press guide rail of chain tensioner for drive chain in direction of -arrow- and lock chain tensioner by inserting a 3.3 mm Ø drill bit -item 4-.
- **Mark running direction of chain with paint.**
- Remove bolts -2- and -3- and detach chain sprockets together with drive chain and guide rail -1-.

### Installing

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

- Install chain for auxiliary drives ⇒ [page 123](#) .
- Install camshaft timing chains ⇒ [page 99](#) .
- Install timing chain covers ⇒ [page 93](#) .
- Install drive plate ⇒ [page 65](#) .
- Bolt gearbox to engine and install engine/gearbox assembly ⇒ [page 35](#) .
- Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 404 .



### Tightening torques

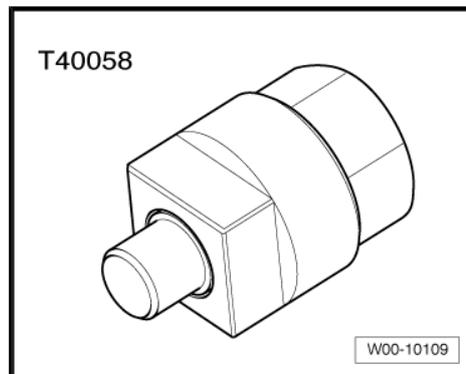
Component	Nm
Drive chain sprocket (left-side) to bearing bracket	10
Drive chain sprocket (right-side) to cylinder block	45



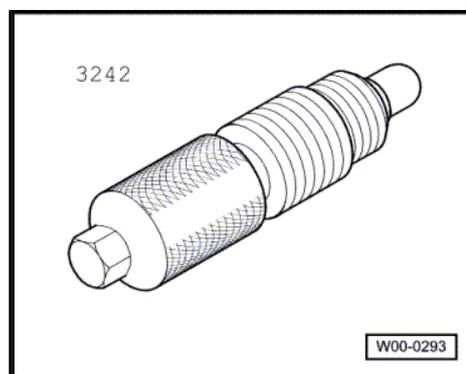
## 2.7 Checking drive chains for camshafts and valve gear for elongation

Special tools and workshop equipment required

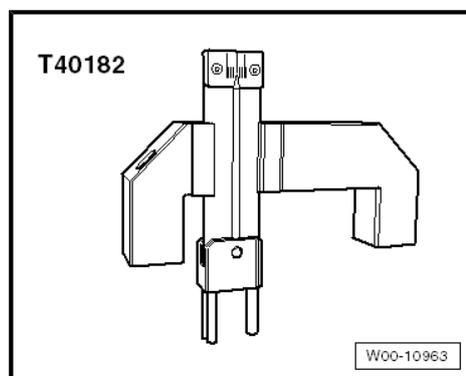
- ◆ Adapter - T40058-



- ◆ Locking pin - 3242-



- ◆ Tester for checking elongation of chain links - T40182-



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

- Remove cylinder head cover (left-side) ⇒ [page 137](#) .
- Remove cylinder head cover (right-side) ⇒ [page 141](#) .

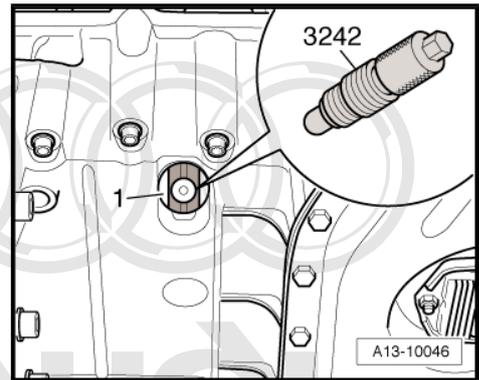


### WARNING

*Turn crankshaft only in direction of engine rotation.*

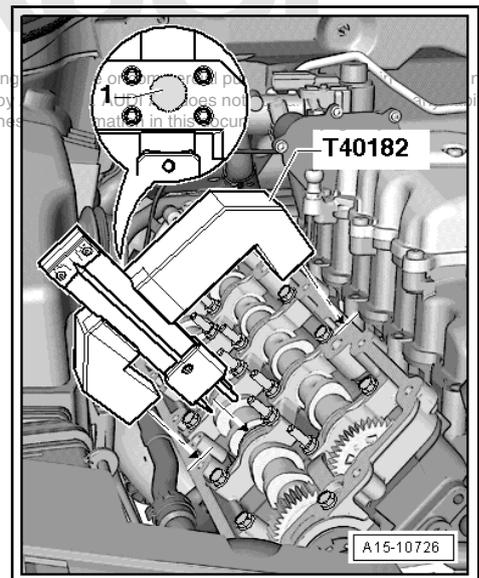
*If crankshaft has been turned past "TDC" position, turn crankshaft two further rotations until it is again positioned just before "TDC". Then turn further in the same direction and lock crankshaft with locking pin - 3242- .*

- While turning in direction of normal rotation, lock crankshaft  
-1- in TDC position with locking pin - 3242- .

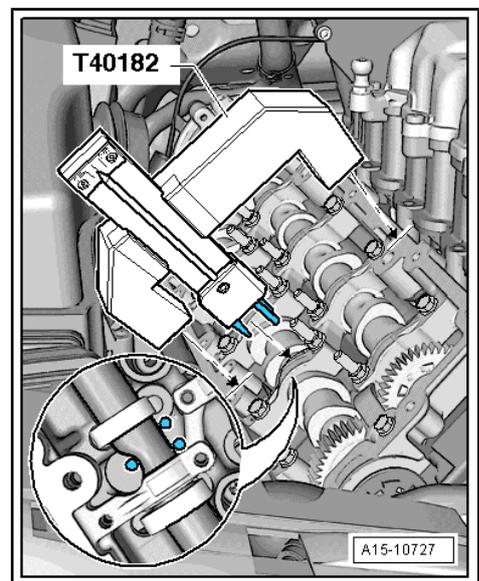


- Loosen knurled screw -1- on tester for checking elongation of chain links - T40182- .

Protected by copyright. Copying or reproduction in any form is prohibited without the written permission of the copyright holder. This document is not to be used for any other purpose than the one intended. The copyright holder does not assume any liability for the correctness of the information contained in this document.

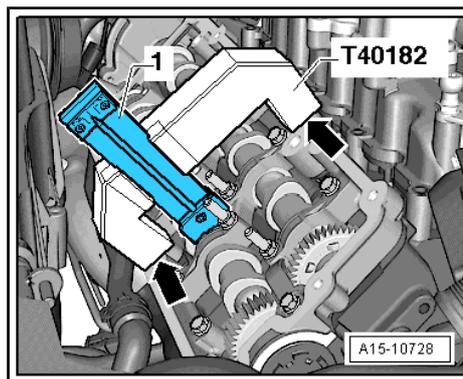


- Position tester for checking elongation of chain links - T40182- in recess in camshaft, as shown in illustration.





- Tester for checking elongation of chain links - T40182- must rest on cylinder head -arrows-.
- Slide measuring unit -1- onto camshaft as far as stop.

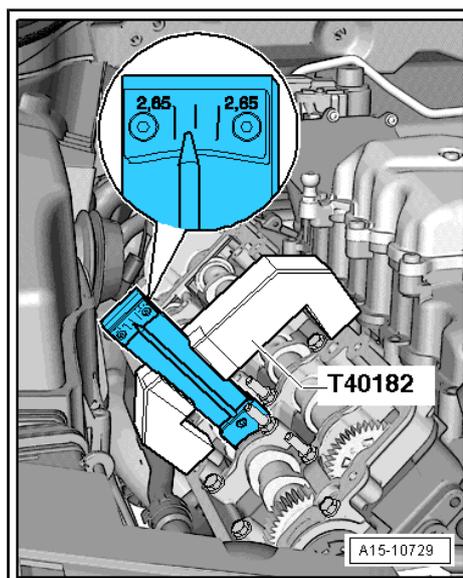


- Read off measured value from tester for checking elongation of chain links - T40182- .



**Note**

- ◆ Perform measurement on all four camshafts.
- ◆ If the displayed value for a camshaft is greater than 2.65°, renew the chain drive.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 Auxiliary drives

⇒ [“3.1 Chain for auxiliary drives - exploded view”, page 123](#)

⇒ [“3.2 Removing and installing chain for auxiliary drives”, page 123](#)

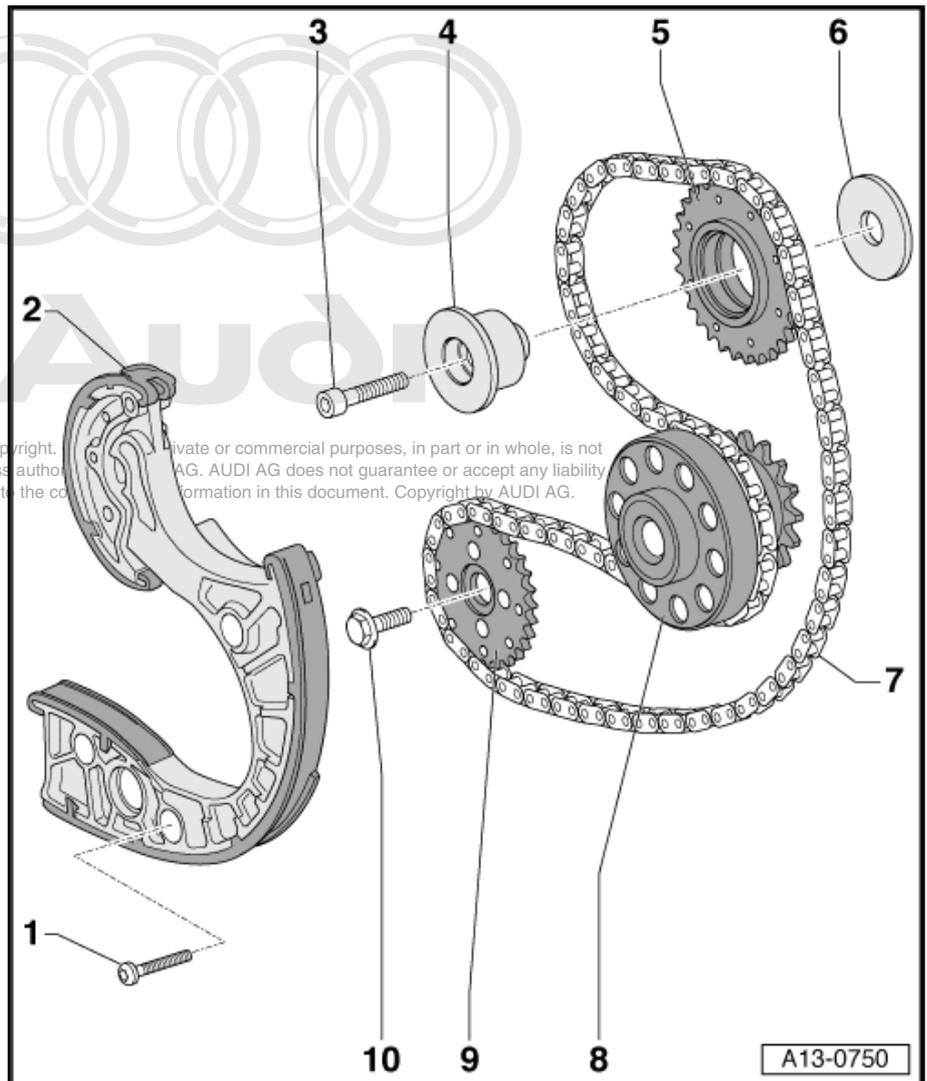
⇒ [“3.3 Auxiliary drives - exploded view”, page 124](#)

⇒ [“3.4 Renewing oil seal for power steering pump drive”, page 125](#)

⇒ [“3.5 Removing and installing spur gear drive”, page 129](#)

#### 3.1 Chain for auxiliary drives - exploded view

- 1 - 10 Nm
- 2 - Chain tensioner
  - With guide rail
- 3 - 45 Nm
- 4 - Bearing mounting
  - For idler sprocket
- 5 - Idler sprocket
  - For chain of auxiliary drives
- 6 - Thrust washer
- 7 - Chain for auxiliary drives
  - Before removing mark running direction with paint
  - Removing and installing ⇒ [page 123](#)
- 8 - Crankshaft
- 9 - Drive chain sprocket
  - For auxiliary drives
- 10 - 62 Nm



#### 3.2 Removing and installing chain for auxiliary drives

Special tools and workshop equipment required

- ◆ Drill bit,  $\varnothing$  3.3 mm

##### Removing

- Drain off engine oil.

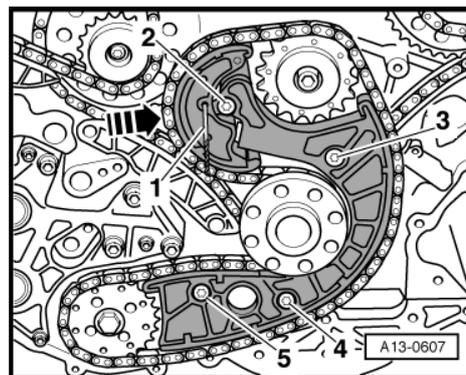
- Remove engine ⇒ [page 7](#) .
- Separate engine from gearbox ⇒ [page 28](#) .
- Secure engine to engine stand ⇒ [page 33](#) , or leave engine on scissor-type assembly platform - VAS 6131 A- .
- Remove drive plate ⇒ [page 64](#) .
- Remove timing chain covers ⇒ [page 86](#) .
- Press guide rail of chain tensioner in direction of -arrow- and lock chain tensioner by inserting a 3.3 mm Ø drill bit -item 1-



**Note**

*Should you need to remove the chain sprocket for auxiliary drives, you must first loosen the securing bolt before removing the chain.*

- Mark running direction of chain for auxiliary drives with paint.
- Unscrew bolts -2 ... 5- and remove chain tensioner.
- Remove chain for auxiliary drives.



**Installing**

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

- First fit chain for auxiliary drives.
- Fit chain tensioner (starting at top) onto engine.
- Install timing chain covers ⇒ [page 93](#) .
- Install drive plate ⇒ [page 65](#) .
- Bolt gearbox to engine and install engine/gearbox assembly ⇒ [page 35](#) .
- Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 404 .

**Tightening torque**

Component	Nm
Chain tensioner to cylinder block	10



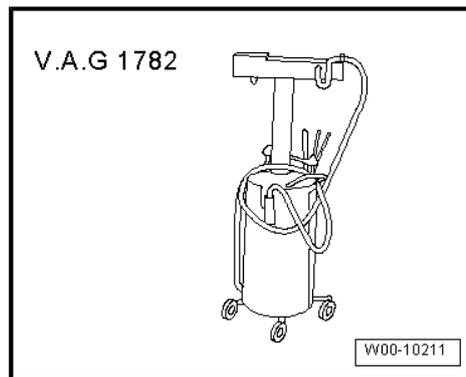
**3.3 Auxiliary drives - exploded view**

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

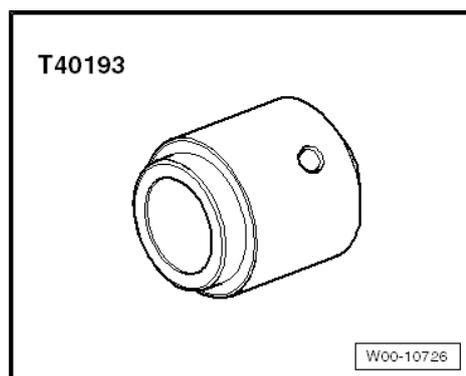




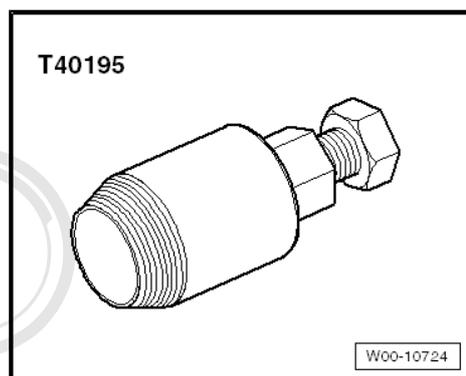
- ◆ Used oil collection and extraction unit - V.A.G 1782- or -VAS 6622A-



- ◆ Thrust piece - T40193-



- ◆ Oil seal extractor - T40195-



- ◆ Drip tray

#### Procedure

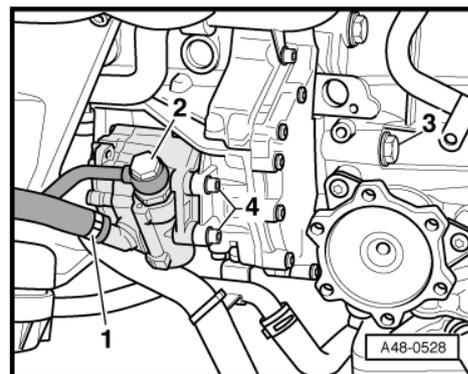
- Extract hydraulic fluid for power steering from reservoir using used oil collection and extraction unit.

- Lower subframe for repair and assembly work ⇒ [page 45](#)

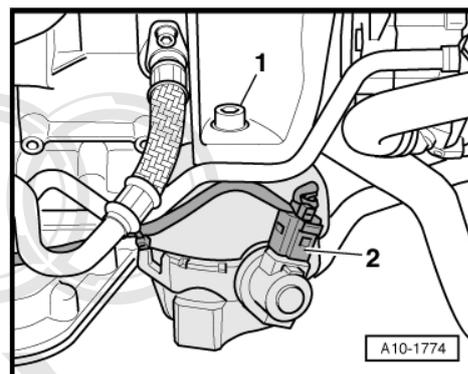
- Remove front exhaust pipe (left-side) ⇒ [page 286](#) .

- Unbolt left-side drive shaft from gearbox flange.

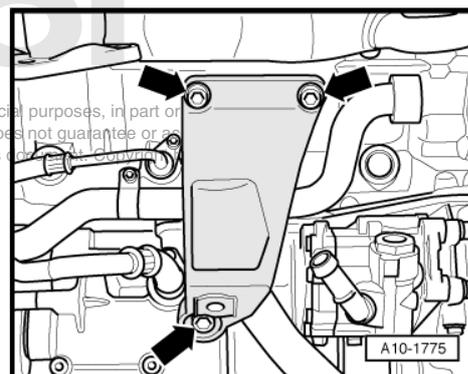
- Place used oil collection and extraction unit underneath.
- Disconnect return hose -1- from power steering pump.
- Unbolt hydraulic pressure line -2- at power steering pump.
- Remove bolts -4-.
- Remove bolt -3-.
- Remove power steering pump.



- Unplug electrical connector -2- at engine mounting (left-side).
- Remove bolt -1-.
- Remove engine mounting (left-side).



- Remove bolts -arrows-.
- Detach engine support (left-side).



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 manual.



- 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 for power steering pump drive 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.

**Installing**

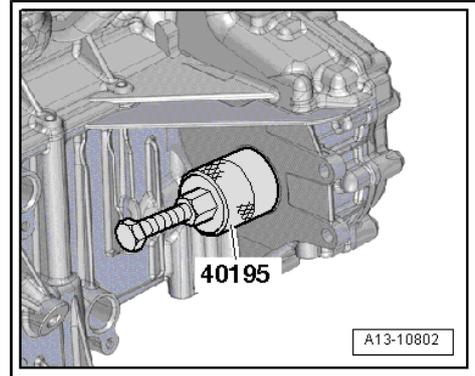
Installation is carried out in the reverse order; note the following:



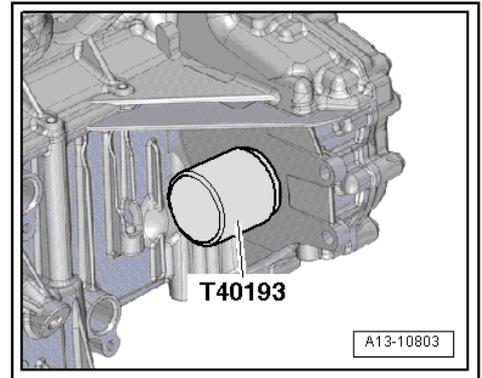
**Note**

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 seals and O-rings.**
- ◆ **Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .**
- Clean contact surface and sealing surface.



- Drive oil seal for power steering pump drive in onto stop with thrust piece -T40193- .
- Install power steering pump ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 48 .
- Install drive shaft (left-side) ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 40 .
- Install front exhaust pipe (left-side) ⇒ [page 288](#) .
- Only tighten bolts for subframe to the specified torque (do not turn further); tighten bolts only after performing alignment check ⇒ Running gear, front-wheel and four-wheel drive; Rep. gr. 40 .



 **WARNING**  
*The vehicle must not be driven at this stage.*

- Perform wheel alignment check ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 44 .

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

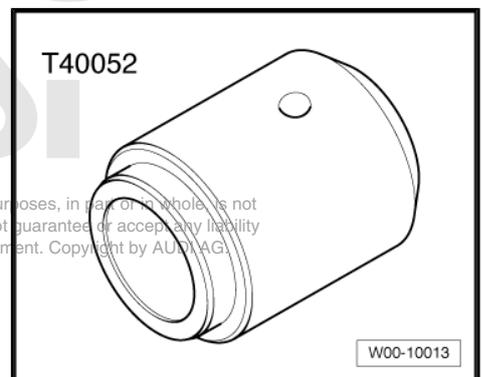
#### Tightening torques

Component	Nm
Engine support to engine	42
Engine mounting to engine support	40
Engine cross member to body	68
Engine mounting to engine cross member	23

### 3.5 Removing and installing spur gear drive

#### Special tools and workshop equipment required

- ◆ Thrust piece - T40052-



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

- ◆ Sealant ⇒ Electronic parts catalogue

#### Removing

- Drain off engine oil.
- Remove engine ⇒ [page 7](#) .
- Separate engine from gearbox ⇒ [page 28](#) .



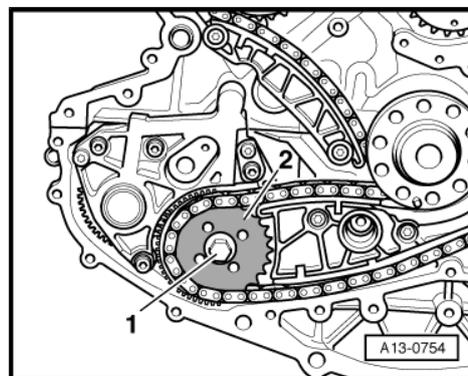
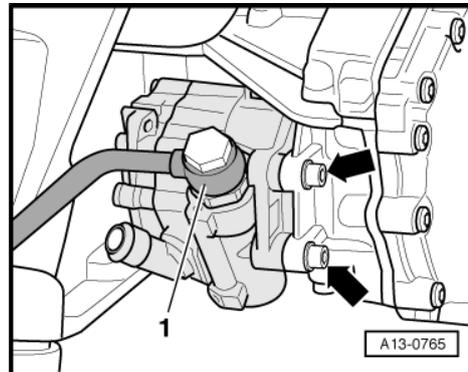
- Secure engine to engine stand => [page 33](#) , or leave engine on scissor-type assembly platform - VAS 6131 A- .
- Remove drive plate => [page 64](#) .
- Remove timing chain covers => [page 86](#) .



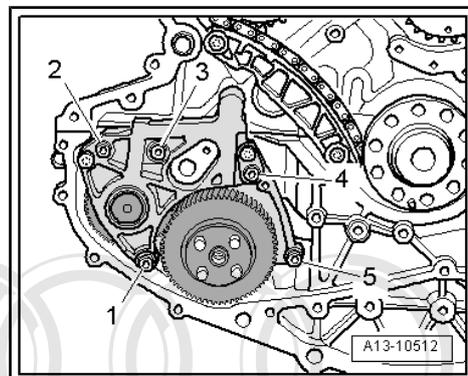
**Note**

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

- Unbolt hydraulic pressure line -1- at power steering pump.
- Unbolt power steering pump from sump (top section) -arrows-.
- Unscrew bolt -1- at drive chain sprocket -2- several turns.
- Remove chain for auxiliary drives => [page 123](#) .
- Unbolt drive chain sprocket for auxiliary drives.



- Remove bolts -1 ... 5-.
- Remove spur gear drive.



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

**Installing**

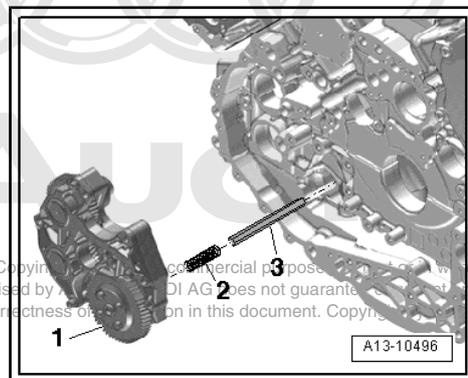
Installation is carried out in the reverse order; note the following:



**Note**

Renew O-ring in sump (top section).

- Renew oil seal for power steering pump drive => [page 125](#) .

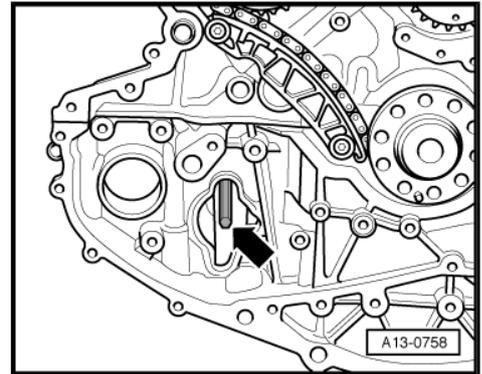


Protected by copyright. Copying for non-commercial purposes without permission is not permitted unless authorised by Audi AG. Audi AG does not guarantee the accuracy of the information with respect to the correctness of the information in this document. Copyright © Audi AG.

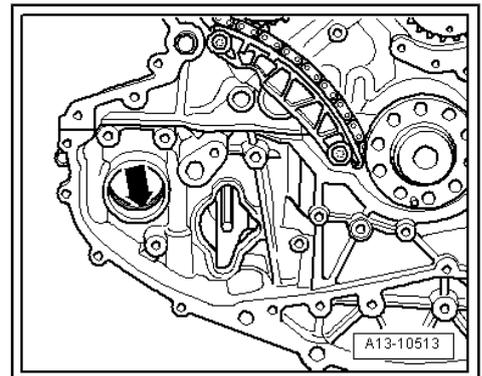
- Insert drive shaft -arrow- for oil pump into guide sleeve at oil pump.

 **Note**

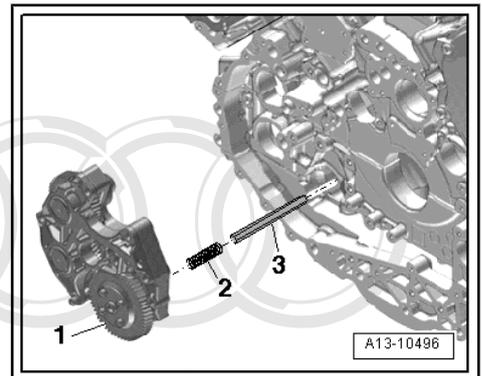
*To ensure that drive shaft engages correctly in oil pump, insert drive shaft separately into oil pump (NOT together with spur gear drive).*



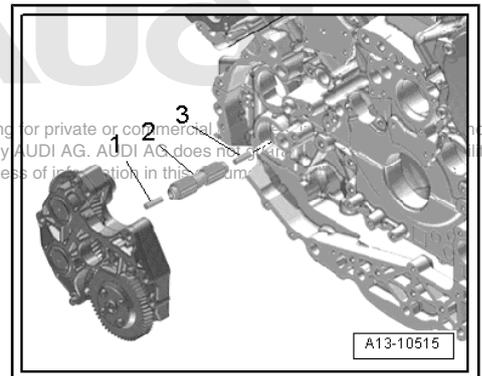
- Fit O-ring -arrow- in sump (top section).



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



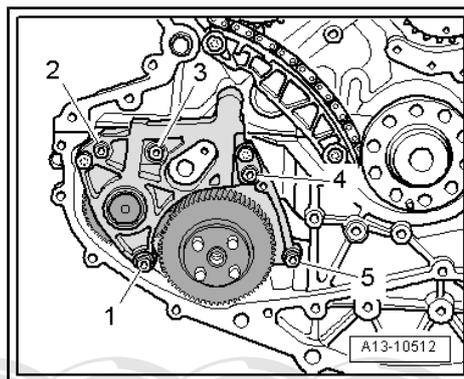
- Make sure that rubber buffers -1- and -3- are bonded into drive shaft -2- for power steering pump and drive shaft is inserted in power steering pump.



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



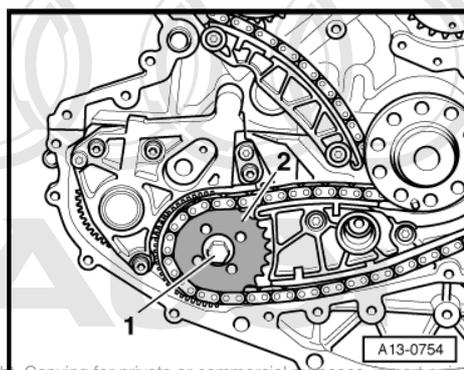
- Fit spur gear drive and tighten bolts -1 ... 5- in diagonal sequence and in stages.



- Install chain for auxiliary drives ⇒ [page 123](#) .
- Tighten bolt -1- for drive chain sprocket -2- for auxiliary drives.

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

- Renew oil seal for power steering pump ⇒ [page 128](#) .
- Install power steering pump ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 48 .
- Install timing chain covers ⇒ [page 93](#) .
- Install drive plate ⇒ [page 64](#) .
- Bolt gearbox to engine and install engine/gearbox assembly ⇒ [page 35](#) .
- Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 404 .



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.

### Tightening torques

Component	Nm
Bearing cover (front) to cylinder block	10
Bearing cover (rear) to bearing cover (front)	10
Drive chain sprocket for auxiliary drives to shaft	62

## 4 Removing and installing cylinder head

⇒ [“4.1 Cylinder head - exploded view”, page 133](#)

⇒ [“4.2 Cylinder head cover - exploded view”, page 135](#)

⇒ [“4.3 Removing and installing cylinder head cover \(left-side\)”, page 137](#)

⇒ [“4.4 Removing and installing cylinder head cover \(right-side\)”, page 141](#)

⇒ [“4.5 Removing and installing cylinder head”, page 149](#)

⇒ [“4.6 Checking compression”, page 153](#)

### 4.1 Cylinder head - exploded view



Note

Illustration shows right-side cylinder head.

#### 1 - Cylinder head gasket

- Renewing  
 ⇒ [“4.5 Removing and installing cylinder head”, page 149](#)
- Installation position:  
 Part No. towards cylinder head
- If renewed, refill system with fresh coolant

2 - 10 Nm

3 - 22 Nm

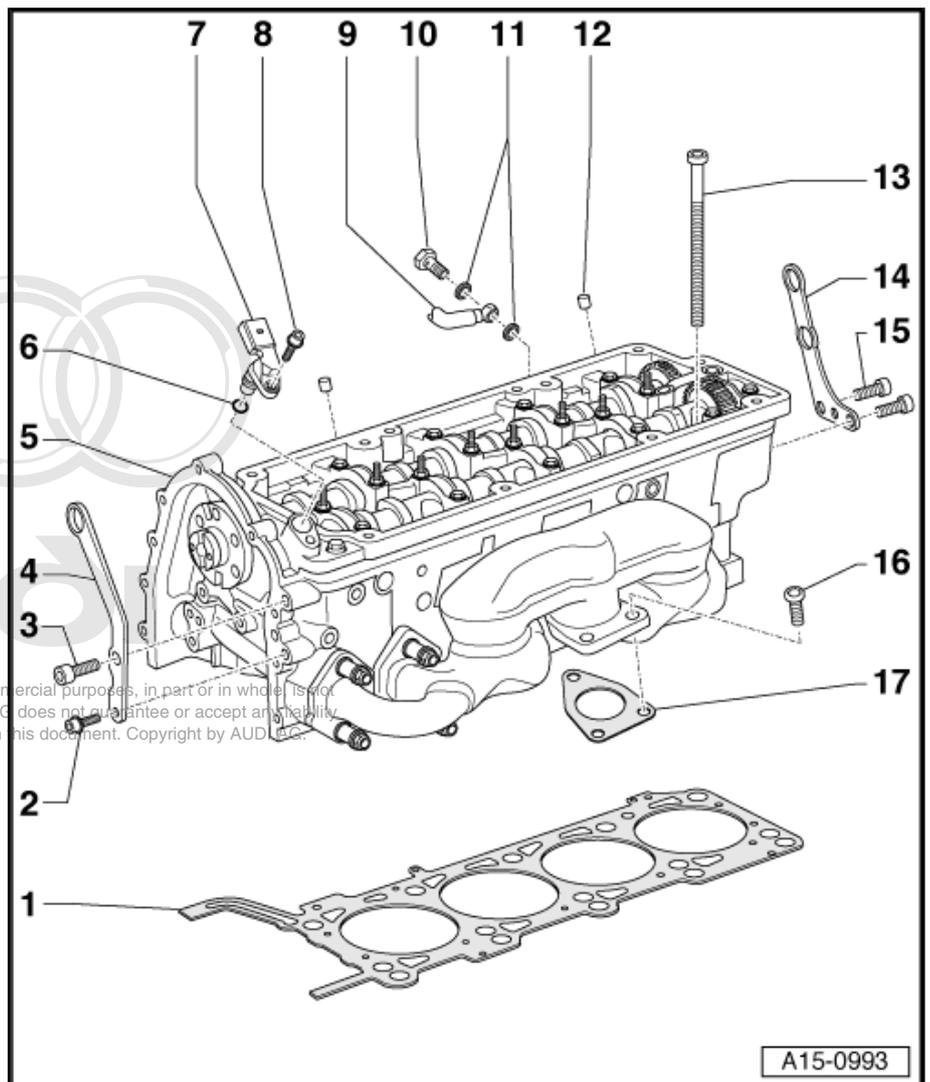
4 - Lifting eye

#### 5 - Cylinder head

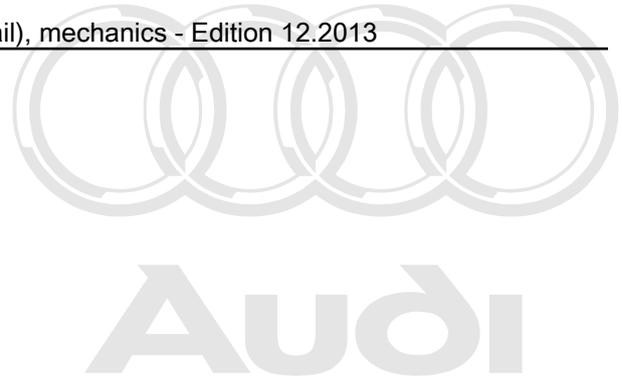
- To prevent damage to glow plugs, always place cylinder head on a soft foam surface after removal.
- Removing ⇒ [page 149](#)
- Checking for distortion ⇒ [page 134](#)
- Cylinder heads must not be machined on diesel engines
- Installing ⇒ [page 151](#)
- If renewed, refill system with fresh coolant

#### 6 - O-ring

- Renew



Protected by copyright. No part of this document may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage and retrieval system, without the prior 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.



7 - Hall sender - G40-

8 - 10 Nm

9 - Coolant pipe

10 - Banjo bolt, 15 Nm

11 - Seals

- Renew

12 - Dowel sleeve

- For intake manifold
- 2x

13 - Cylinder head bolt

- Renew
- Note correct sequence when loosening ⇒ [page 151](#)
- Note correct sequence when tightening ⇒ [page 153](#)

14 - Lifting eye

15 - 22 Nm

16 - 20 Nm + 90° (1/4 turn) further

- Renew

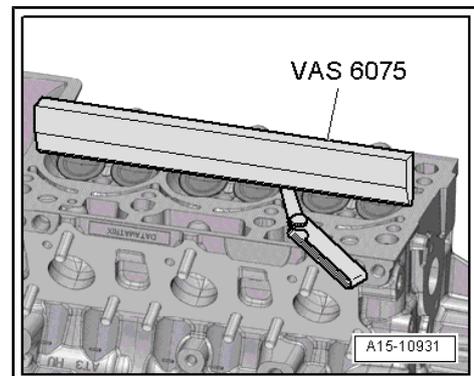
17 - Gasket

- 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.

Checking cylinder head for distortion

- Use straight edge 500 mm - VAS 6075- and feeler gauge to measure cylinder head for distortion at several points.
- Maximum permissible distortion: 0.1 mm.



Identification of cylinder head gasket

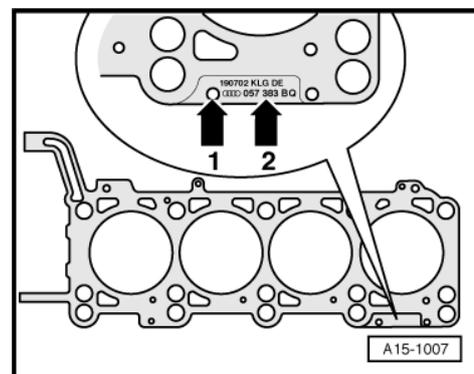
-Arrow 1-: holes

-Arrow 2-: Part No.



Note

*The gaskets for the left and right cylinder heads have different shapes and cannot be interchanged.*



## 4.2 Cylinder head cover - exploded view



### Note

Illustration shows cylinder head cover of cylinder bank (right-side).

#### 1 - Gasket for cylinder head cover

- Renew if damaged or leaking

#### 2 - Cylinder head cover

- Removing and installing: left-side  
⇒ [page 137](#) ; right-side  
⇒ [page 141](#)

#### 3 - Copper seal

- Renew

#### 4 - Special bolt, 10 Nm

- Renew if damaged or leaking
- Tighten in stages and in diagonal sequence

#### 5 - Sleeve

- With seal

- Renew if damaged or leaking

#### 6 - O-ring

- Renew

#### 7 - Injector

- Observe rules for cleanliness ⇒ [page 4](#)
- Removing and installing  
⇒ "4.3 Removing and installing cylinder head cover (left-side)", [page 137](#) or  
⇒ "4.4 Removing and installing cylinder head cover (right-side)", [page 141](#)

- When an injector is renewed, also renew the injector pipe and clamping piece at the same time.

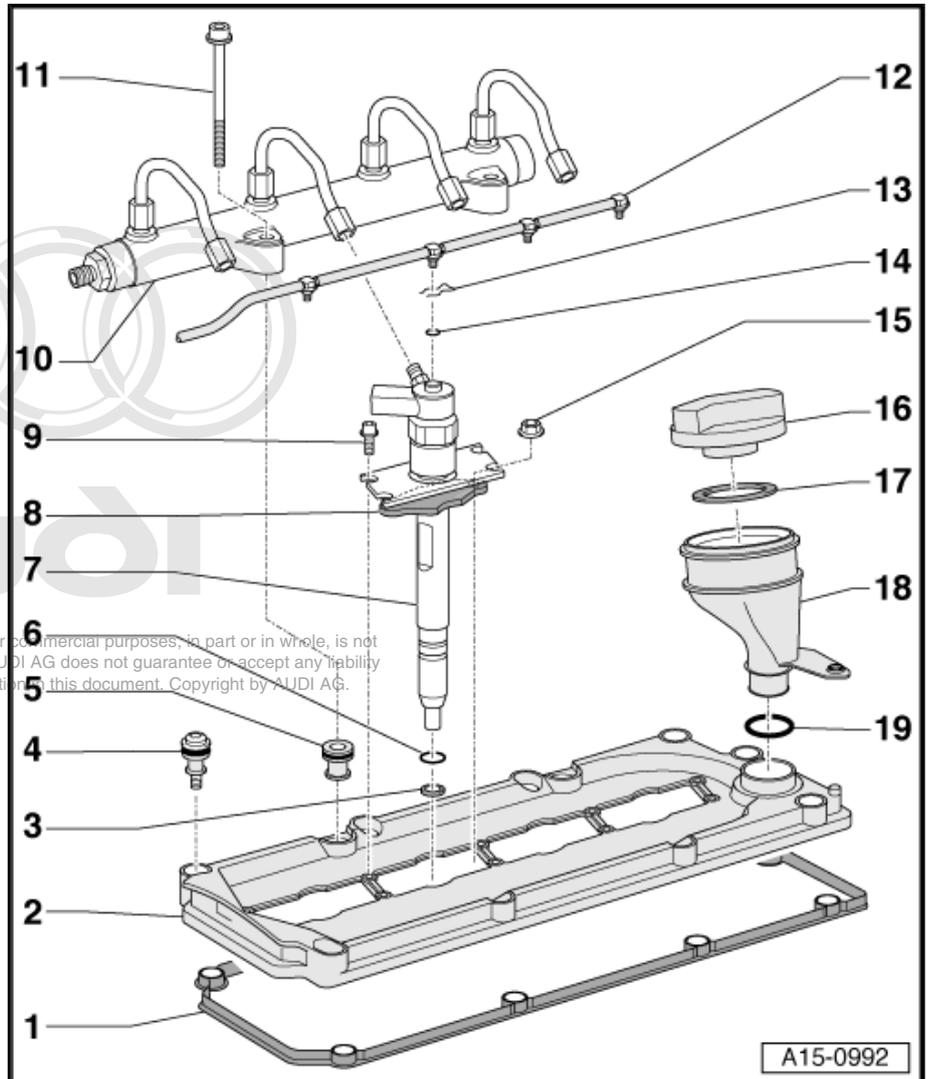
#### 8 - Clamping piece

- Must be renewed if injector is renewed

#### 9 - 5 Nm

#### 10 - Rail element

- With injector pipes
- Observe rules for cleanliness ⇒ [page 4](#)
- Tighten injector pipes ⇒ [page 136](#)
- Do not attempt to bend injector pipes to a different shape



**11 - 22 Nm****12 - Return line**

- Observe rules for cleanliness ⇒ [page 4](#)

**13 - Retaining clip**

- For return line

**14 - O-ring**

- Renew

**15 - 10 Nm****16 - Filler cap****17 - Seal**

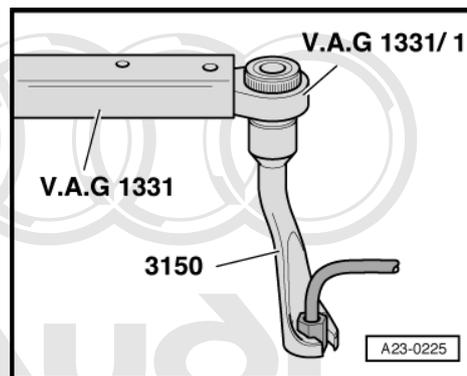
Renew if damaged or leaking

**18 - Oil filler neck****19 - O-ring**

- Renew

**Tightening injector pipes**

- Tighten union nuts on high-pressure pipes hand-tight initially.
- Ensure that high-pressure pipes are not under tension.
- To tighten unions of high-pressure pipes, use torque wrench
  - V.A.G 1331- with ratchet - V.A.G 1331/1- and socket, 14 mm
  - 3150- .
- Tightening torque: 25 Nm

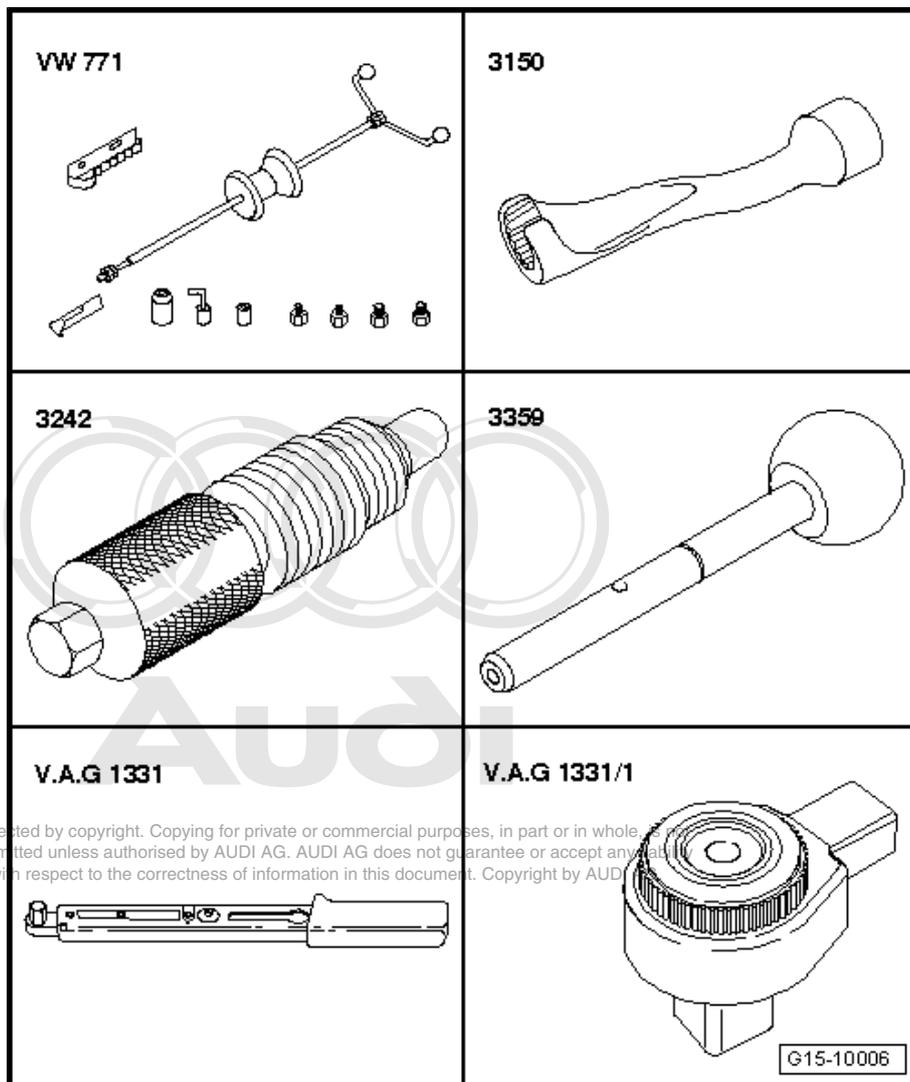


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

### 4.3 Removing and installing cylinder head cover (left-side)

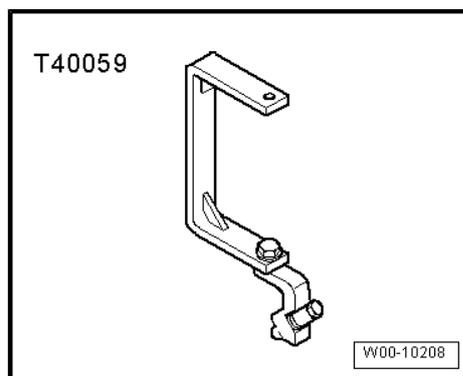
**Special tools and workshop equipment required**

- ◆ Multi-purpose tool - VW 771-
- ◆ Socket, 14 mm - 3150-
- ◆ Locking pin - 3242-
- ◆ Diesel injection pump locking pin - 3359-
- ◆ Torque wrench - V.A.G 1331-
- ◆ Ratchet - V.A.G 1331/1-



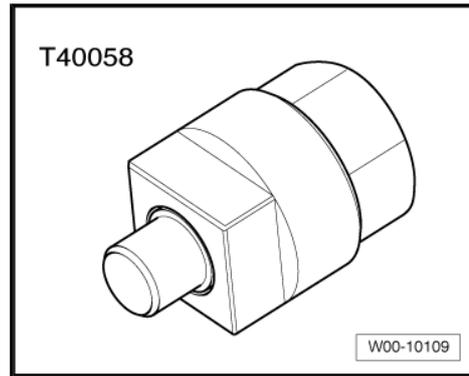
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- ◆ Puller - T40059-





◆ Adapter - T40058-



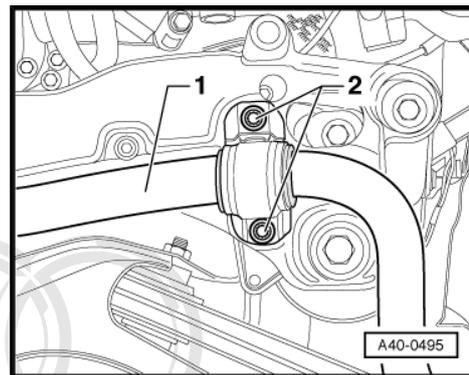
Removing



**Caution**

*Crankshaft must be at TDC position when removing injectors for cylinders 5 ... 8 (cylinder head, left-side)*

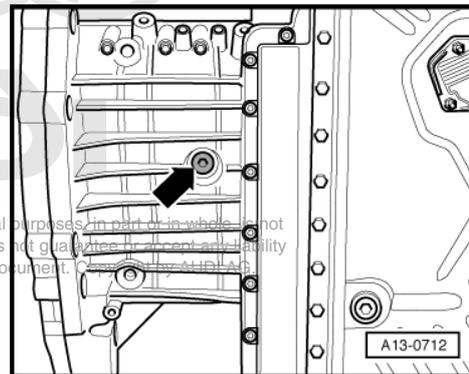
- Move lock carrier to service position ⇒ [page 42](#) .
- Unscrew bolts -2- on anti-roll bar clamps uniformly and remove.
- Pivot anti-roll bar -1- down.



**Note**

*Place a cloth under the engine to catch escaping engine oil.*

- Unscrew plug from sump (top section).

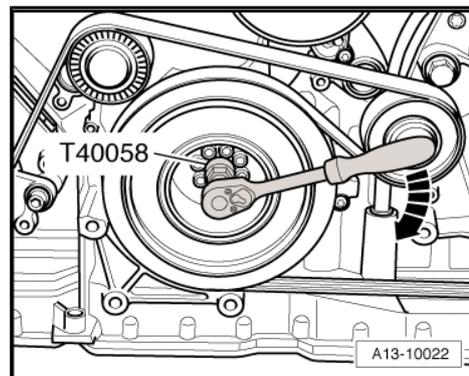


**WARNING**

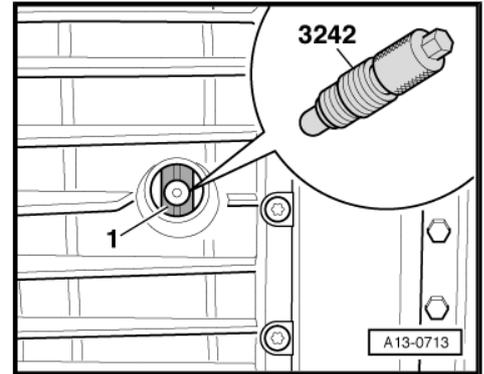
*Turn crankshaft only in direction of engine rotation.*

*If crankshaft has been turned past "TDC" position, turn crankshaft two further rotations until it is again positioned just before "TDC". Then turn further in the same direction and lock crankshaft with locking pin - 3242- .*

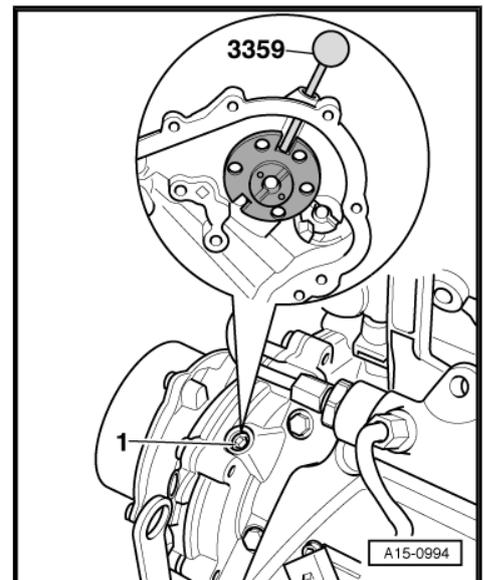
- Turn crankshaft in normal direction of rotation -arrow- until TDC bore in crank web is visible through inspection hole in top section of sump.



- While turning in this direction, lock crankshaft -1- with locking pin - 3242-. Tighten locking pin to 20 Nm.



- Unscrew sealing plug -1- from inspection hole for camshaft TDC position from cylinder head (right-side).
- Insert locking pin - 3359- to check whether TDC slot is located below inspection hole.
- If locking pin - 3359- can be inserted approx. 40 mm, camshaft is at TDC position.
- If locking pin - 3359- can only be inserted 30 mm, camshaft has not reached TDC position. In this case, pull out locking pin - 3359- , turn crankshaft one complete revolution further and re-insert pin.



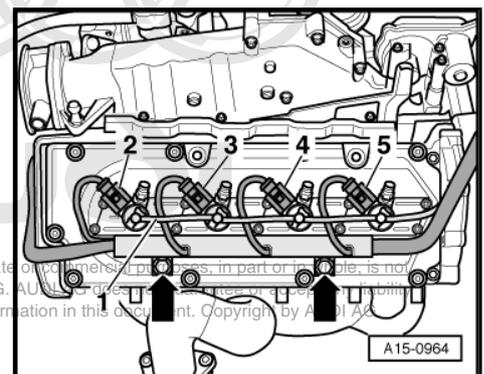
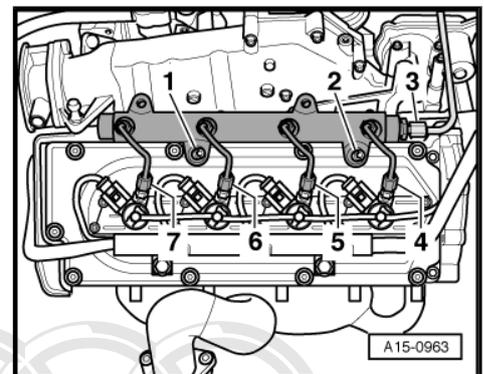
- Move electrical wiring at rail element clear.



**Caution**

*Rules for cleanliness when working on the injection system  
=> page 4 .*

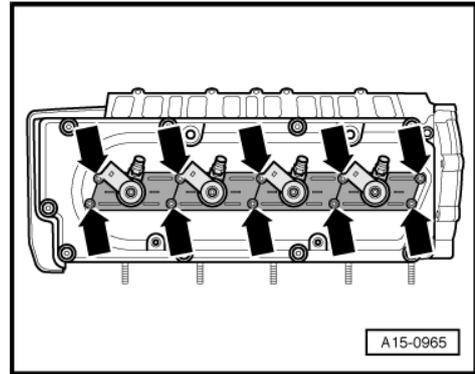
- Unscrew union nut -3- on rail element.
- Unscrew union nuts -4 ... 7- (counterhold pressure pipe connections).
- Remove bolts -1- and -2-.
- Take off rail element.
- Unplug electrical connectors -2 ... 5-.
- Unscrew wire guide -arrows-.
- Pull off retaining clips for return line -1-.
- Pull return line off injectors.



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



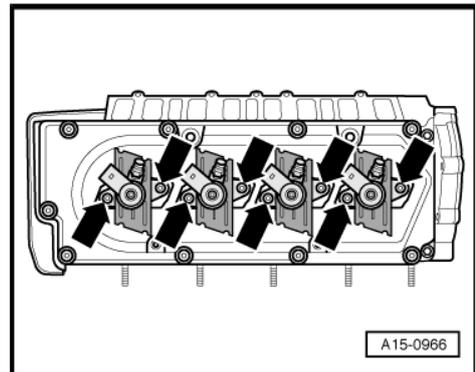
- Unbolt covers for injectors -arrows-.
- Pull covers upwards and turn them 1/4 turn (90°).



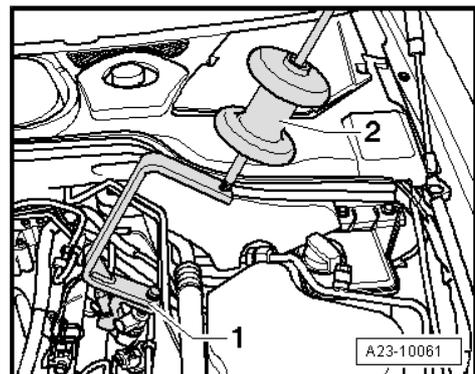
- Unbolt injectors -arrows-.

**Caution**

- ◆ Identify cylinder numbers on injectors.
- ◆ Used injectors must always be re-installed on the same cylinder.



- Screw puller - T40059- -item 1- onto the injector that is being removed and knock out the injector using multi-purpose tool - VW 771- -item 2-.



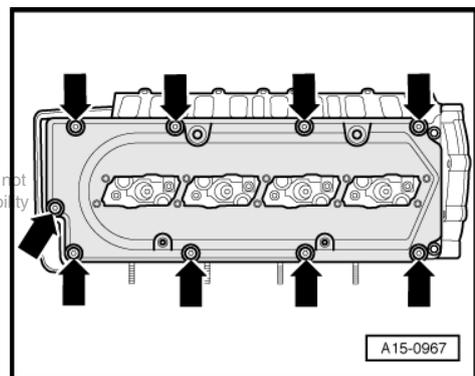
- Loosen bolts -arrows- on cylinder head cover in diagonal sequence and remove cylinder head cover.

**Installing**

**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.

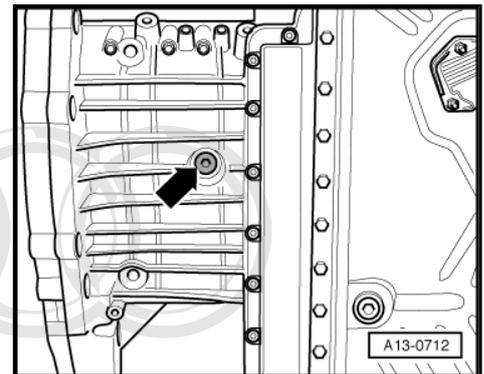
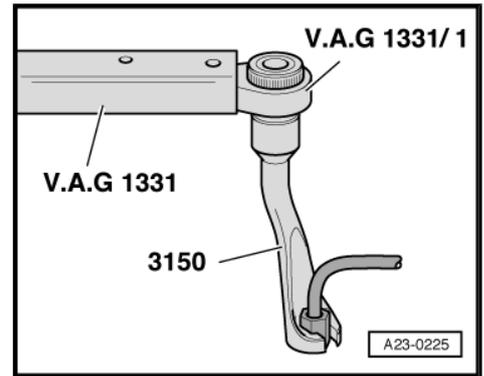
- ◆ Renew cylinder head cover gaskets if damaged.
- ◆ Renew seals and O-rings.

- Tighten bolts for cylinder head cover in diagonal sequence and in stages.



**Instructions for installing injectors:**

- Before installation, make sure the injectors and their surroundings are clean. If necessary use a clean cloth to wipe out the injector slot, taking care not to cause damage (do not use sharp-edged tools).
  - Always install new seals and gaskets. Lubricate all seals and gaskets lightly with engine oil or assembly oil before installing.
  - The injectors must be completely undamaged. To remove the old copper seal from the injector, clamp the seal carefully in a vice so that it is just held between the jaws without turning. Then carefully pull and twist the injector out of the copper seal by hand.
  - When an injector is renewed, also renew the injector pipe and clamping piece at the same time.
  - Tighten union nuts on injector pipes finger-tight to start with.
  - Ensure that injector pipes are not under tension.
  - To tighten unions of injector pipes, use torque wrench - V.A.G 1331- with ratchet - V.A.G 1331/1- and socket, 14 mm - 3150- .
  - Used injectors and injector pipes may only be re-installed on the same cylinder.
- Install injectors ⇒ Rep. gr. 23 .
  - Remove locking pin - 3242- .
  - Screw plug -arrow- for TDC mark into top section of sump with a new seal.
  - Remove locking pin - 3359- .
  - Screw in plug for camshaft TDC inspection hole.
  - Install anti-roll bar ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 40 .
  - Install lock carrier with attachments ⇒ General body repairs, exterior; Rep. gr. 50 .
  - Install front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 .
  - Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
  - Check headlight adjustment ⇒ Maintenance ; Booklet 404 .
  - Check fuel system for leaks ⇒ [page 4](#).



#### Tightening torques

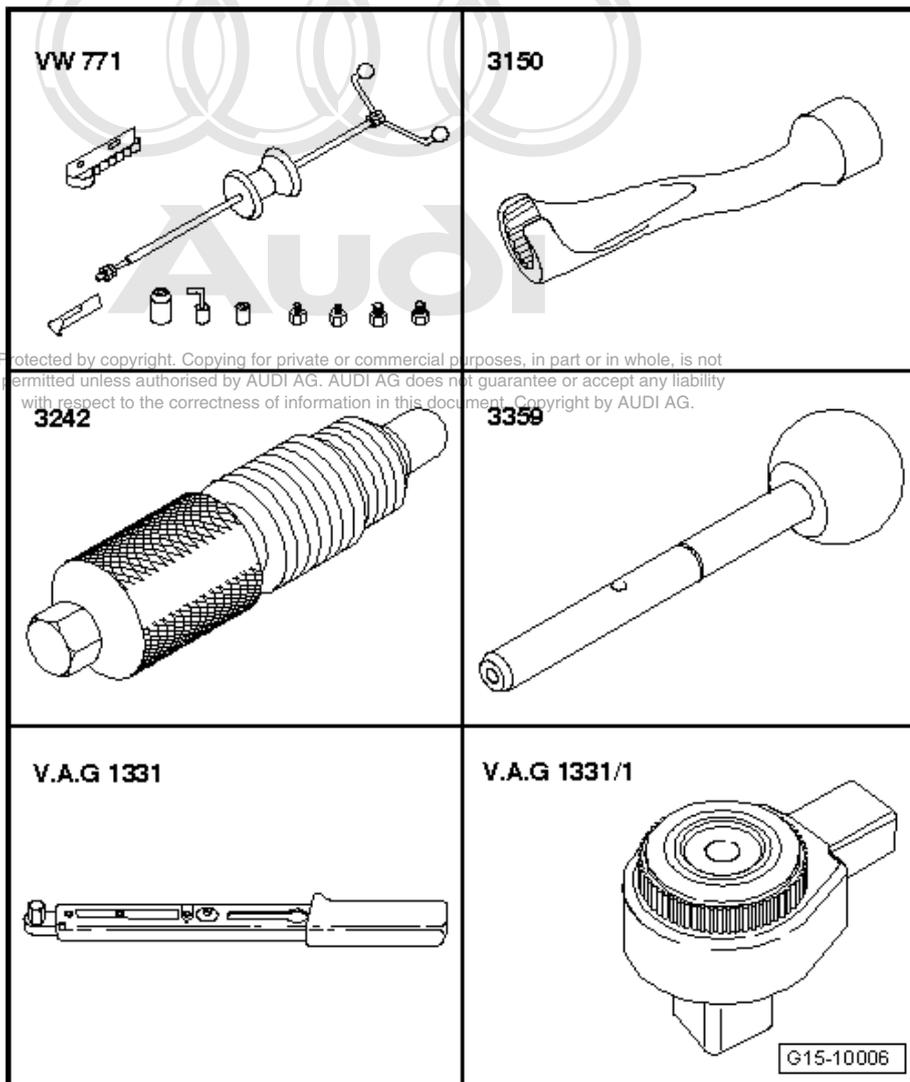
Component	Nm
Cylinder head cover to cylinder head	10
Injector in cylinder head	10
Cover for injector to cylinder head	5
Rail element to cylinder head	22
Injector pipes	25
Screw plug in top section of sump	35
Screw plug in cylinder head	18

## 4.4 Removing and installing cylinder head cover (right-side)

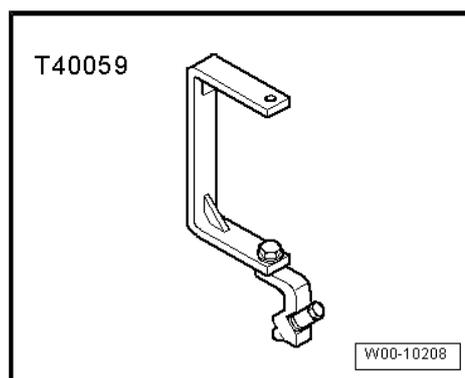


**Special tools and workshop equipment required**

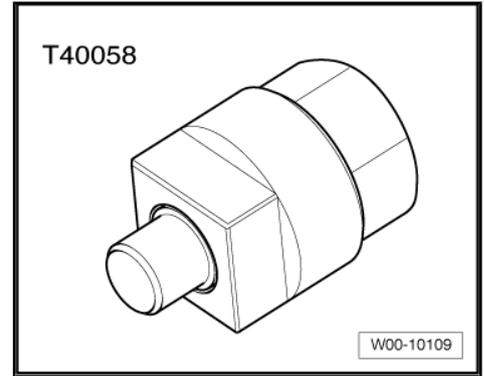
- ◆ Multi-purpose tool - VW 771-
- ◆ Socket, 14 mm - 3150-
- ◆ Locking pin - 3242-
- ◆ Diesel injection pump locking pin - 3359-
- ◆ Torque wrench - V.A.G 1331-
- ◆ Ratchet - V.A.G 1331/1-



- ◆ Puller - T40059-



◆ Adapter - T40058-



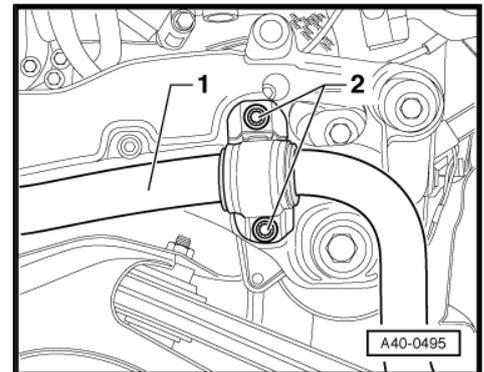
Removing



Caution

- ◆ *Crankshaft must be at TDC position when removing injectors for cylinders 1, 2 and 4 (cylinder head, right-side)*
- ◆ *When removing the injector for cylinder 3 the crankshaft must be turned 90° (1/4 turn) further.*

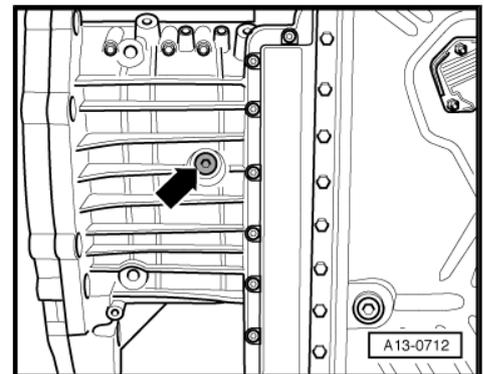
- Move lock carrier to service position ⇒ [page 42](#) .
- Unscrew bolts -2- on anti-roll bar clamps uniformly and remove.
- Pivot anti-roll bar -1- down.



Note

*Place a cloth under the engine to catch escaping engine oil.*

- Unscrew plug from sump (top section).



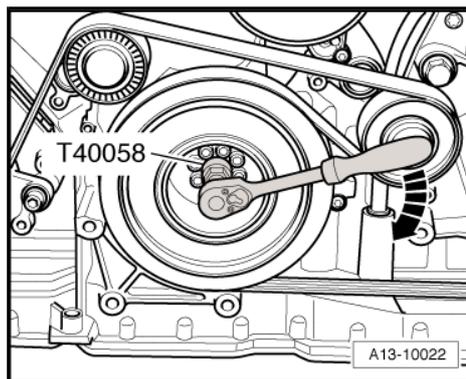
WARNING

*Turn crankshaft only in direction of engine rotation.*

*If crankshaft has been turned past "TDC" position, turn crankshaft two further rotations until it is again positioned just before "TDC". Then turn further in the same direction and lock crankshaft with locking pin - 3242- .*

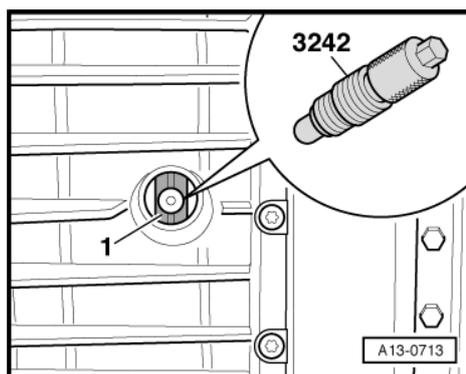


- Turn crankshaft in normal direction of rotation -arrow- until TDC bore in crank web is visible through inspection hole in top section of sump.

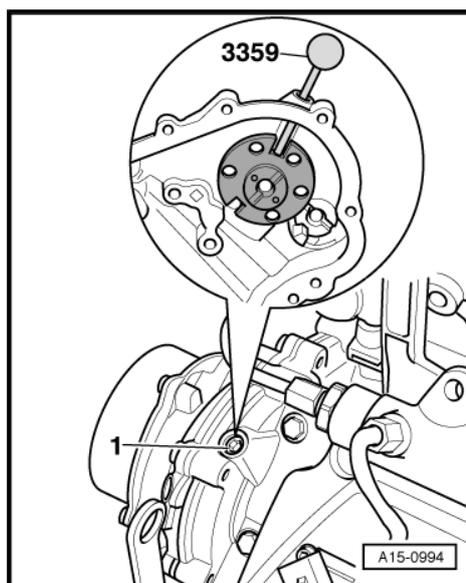


- While turning in this direction, lock crankshaft -1- with locking pin - 3242- . Tighten locking pin to 20 Nm.

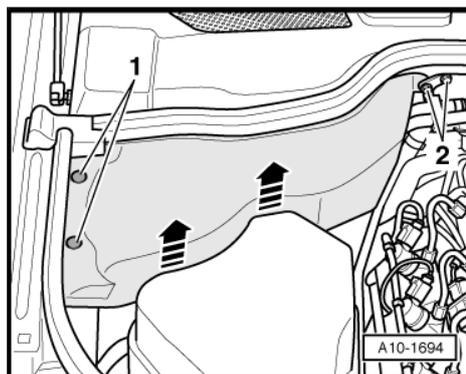
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



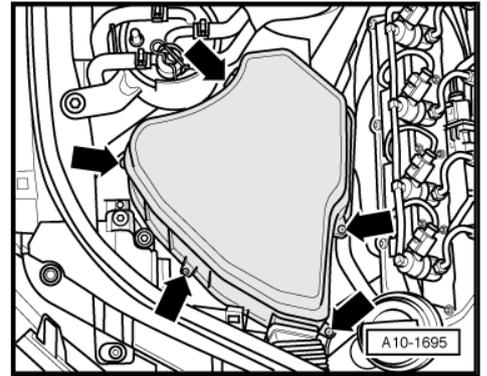
- Unscrew sealing plug -1- from inspection hole for camshaft TDC position from cylinder head (right-side).
- Insert locking pin - 3359- to check whether TDC slot is located below inspection hole.
- If locking pin - 3359- can be inserted approx. 40 mm, camshaft is at TDC position.
- If locking pin - 3359- can only be inserted 30 mm, camshaft has not reached TDC position. In this case, pull out locking pin - 3359- , turn crankshaft one complete revolution further and re-insert pin.



- Remove cover for right suspension turret; to do so, detach spreader clips -1- and unscrew bolted joint -2-.
- Pull cover out of retainers -arrows-.



- Remove bolts -arrows-.
- Detach top section of air cleaner housing (right-side).

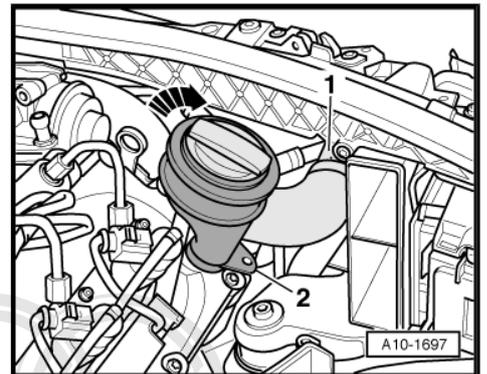


- Remove oil filler neck. To do so, lift tab -2- and turn oil filler neck clockwise -arrow-.

 **Note**

Disregard -item 1-.

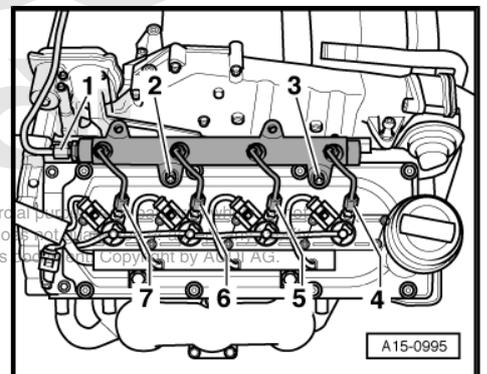
- Move electrical wiring at rail element clear.



 **Caution**

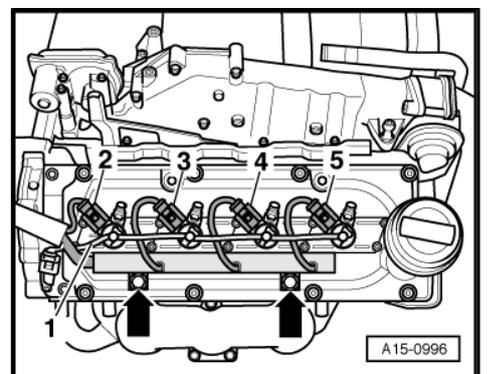
**Rules for cleanliness when working on the injection system**  
 ⇒ **page 4**.

- Unscrew union nut -1- on rail element.
- Unscrew union nuts -4 ... 7- (counterhold pressure pipe connections).
- Remove bolts -2- and -3-.
- Take off rail element.



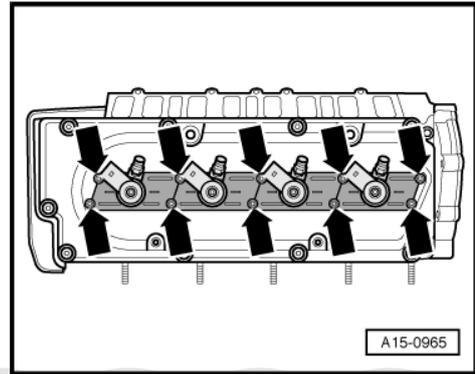
Protected by copyright. Copying for private or commercial use is not permitted unless authorised by AUDI AG. AUDI AG does not accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Unplug electrical connectors -2 ... 5-.
- Unscrew wire guide -arrows-.
- Pull off retaining clips for return line -1-.
- Pull return line off injectors.





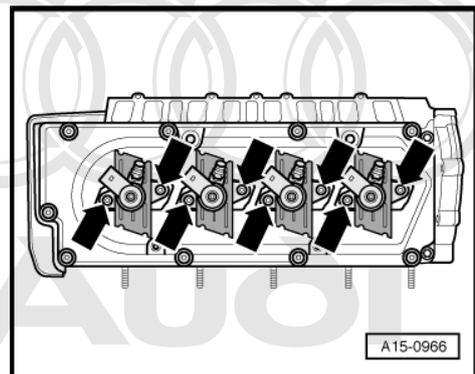
- Unbolt covers for injectors -arrows-.
- Pull covers upwards and turn them 1/4 turn (90°).



- Unbolt injectors -arrows-.

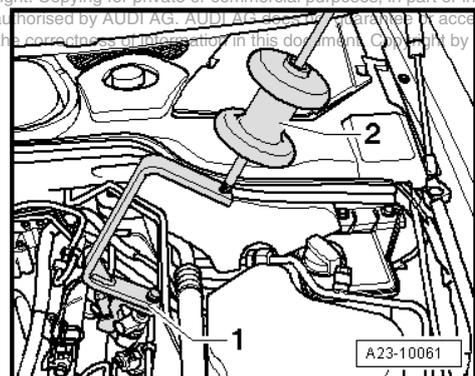
**⚠ Caution**

- ◆ *Identify cylinder numbers on injectors.*
- ◆ *Used injectors must always be re-installed on the same cylinder.*

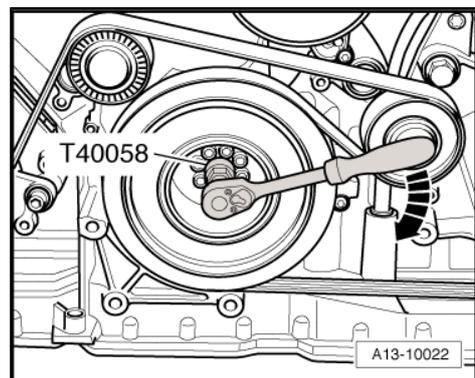


- Screw puller - T40059- -item 1- onto the injector that is being removed and knock out the injector using multi-purpose tool - VW 771- -item 2-.

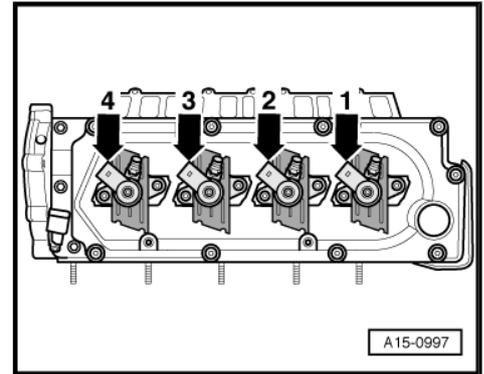
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not allowed unless authorised by AUDI AG. AUDI AG does not accept any liability with respect to the correctness of the information in this document. Copyright by AUDI AG.



- Remove locking pin - 3242- .
- Turn crankshaft 90° (1/4 revolution) in normal direction of rotation -arrow-.



- Pull out injector for No. 3 cylinder.



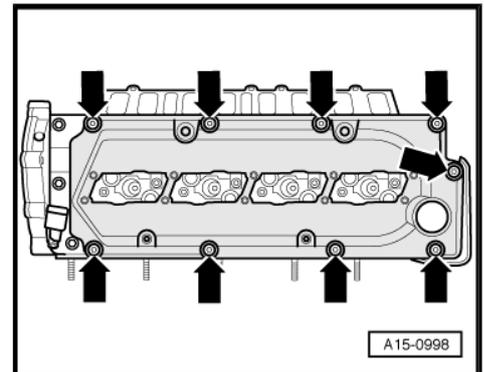
- Loosen bolts -arrows- on cylinder head cover in diagonal sequence and remove cylinder head cover.

### Installing



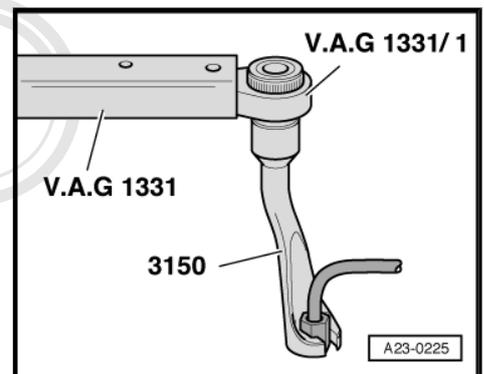
- ◆ *Renew cylinder head cover gaskets if damaged.*
- ◆ *Renew seals and O-rings.*

- Tighten cylinder head cover bolts diagonally.



### Instructions for installing injectors:

- Before installation, make sure the injectors and their surroundings are clean. If necessary use a clean cloth to wipe out the injector slot, taking care not to cause damage (do not use sharp-edged tools).
- Always install new seals and gaskets. Lubricate all seals and gaskets lightly with engine oil or assembly oil before installing.
- The injectors must be completely undamaged. To remove the old copper seal from the injector, clamp the seal carefully in a vice so that it is just held between the jaws without turning. Then carefully pull and twist the injector out of the copper seal by hand.
- When an injector is renewed, also renew the injector pipe and clamping piece **at the same time**.
- Tighten union nuts on injector pipes **finger-tight to start with**.
- Ensure that injector pipes are not under tension.
- To tighten unions of injector pipes, use torque wrench - V.A.G 1331- with ratchet - V.A.G 1331/1- and socket, 14 mm - 3150- .
- Used injectors and injector pipes may only be re-installed on the same cylinder.



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

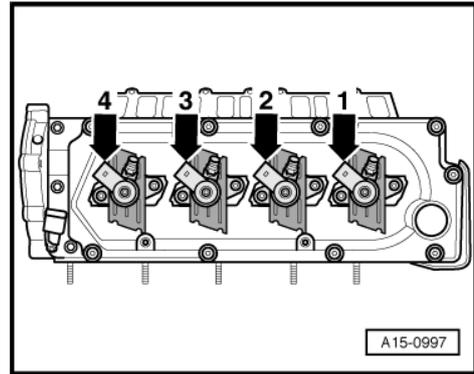


- Install injector for No. 3 cylinder.

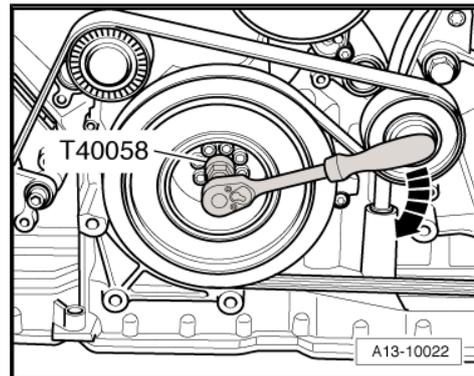
**WARNING**

*Turn crankshaft only in direction of engine rotation.*

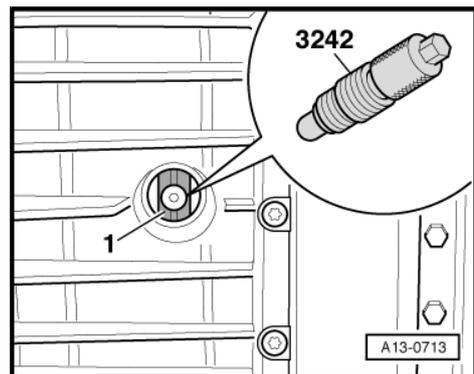
*If crankshaft has been turned past "TDC" position, turn crankshaft two further rotations until it is again positioned just before "TDC". Then turn further in the same direction and lock crankshaft with locking pin - 3242- .*



- Turn crankshaft 1 <sup>3</sup>/<sub>4</sub> turns in normal direction of rotation -arrow- until TDC bore in crank web is visible through inspection hole in top section of sump for the second time.

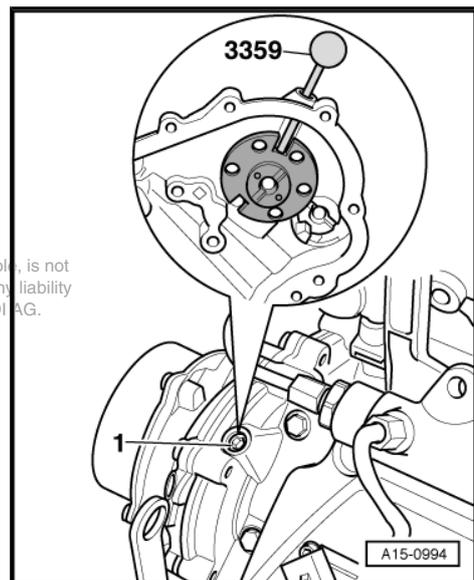


- While turning in this direction, lock crankshaft -1- with locking pin - 3242- . Tighten locking pin to 20 Nm.

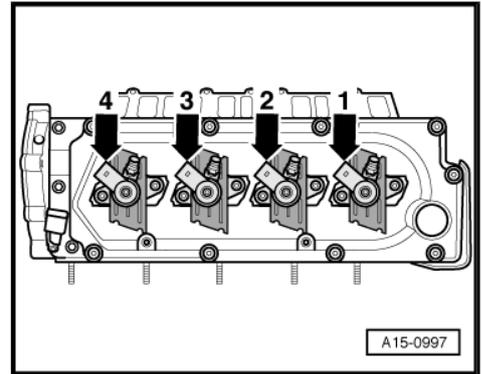


- Insert locking pin - 3359- to check whether TDC slot is located below inspection hole.
- If locking pin - 3359- can be inserted approx. 40 mm, camshaft is at TDC position.
- If locking pin - 3359- can only be inserted 30 mm, camshaft has not reached TDC position. In this case, pull out locking pin - 3359- , turn crankshaft one complete revolution further and re-insert pin.

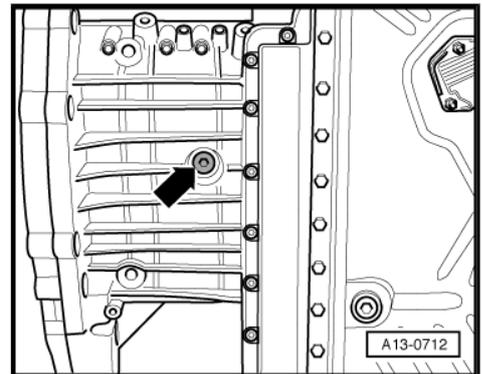
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- Install injectors for cylinders No. 1, 2 and 4.
- Remove locking pin - 3242- .



- Screw plug -arrow- for TDC mark into top section of sump with a new seal.
- Remove locking pin - 3359- .
- Screw in plug for camshaft TDC inspection hole.
- Install anti-roll bar ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 40 .
- Install lock carrier with attachments ⇒ General body repairs, exterior; Rep. gr. 50 .
- Install front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 .
- Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
- Check headlight adjustment ⇒ Maintenance ; Booklet 404 .
- Check fuel system for leaks ⇒ [page 4](#) .



#### Tightening torques

Component	Nm
Cylinder head cover to cylinder head	10
Injector in cylinder head	10
Cover for injector to cylinder head	5
Rail element to cylinder head	22
Injector pipes	25
Screw plug in top section of sump	35
Screw plug in cylinder head	18

## 4.5 Removing and installing cylinder head

### Removing

- Remove engine ⇒ [page 7](#) .



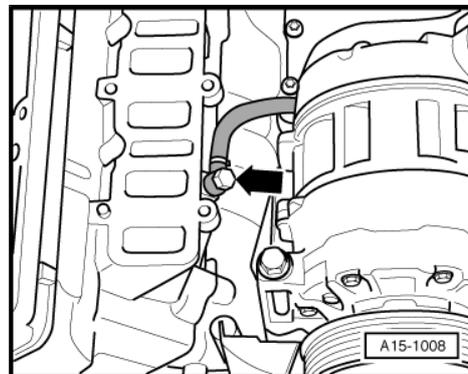
#### Note

*The engine/gearbox assembly remains on the scissor-type assembly platform - VAS 6131 A- (without detaching the gearbox) when performing the following repairs.*

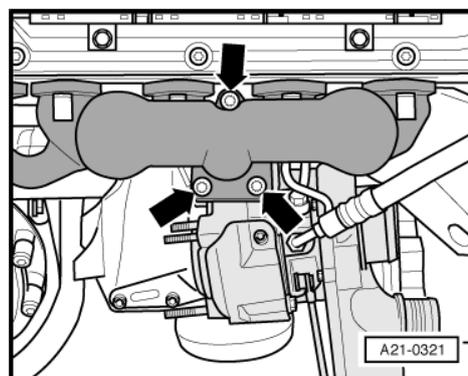
- Remove cylinder head cover: left-side ⇒ [page 137](#) ; right-side ⇒ [page 141](#) .
- Remove timing chains from camshafts ⇒ [page 99](#) .



- Detach electrical connectors at glow plugs.
- Remove relevant intake manifold ⇒ Rep. gr. 23 .
- Remove mechanical exhaust gas recirculation valve: left-side ⇒ [page 296](#) ; right-side ⇒ [page 297](#) .
- Remove exhaust gas recirculation cooler: left-side ⇒ [page 298](#) ; right-side ⇒ [page 300](#) .
- Disconnect coolant line -arrow-.
- Remove covers from cylinder head located at front left/front right.



- Remove bolts -arrows- at top of turbocharger (left/right side).



**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.

- Observe correct sequence when loosening cylinder head bolts.
- Take off cylinder head carefully.

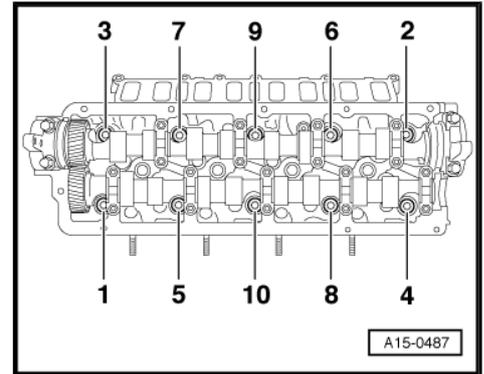
**i** Note

*To prevent damage to glow plugs, always place cylinder head on a soft foam surface after removal.*

**Installing**

**i** Note

- ◆ *The cylinder heads of diesel engines must not be machined.*
- ◆ *Renew the cylinder head bolts.*
- ◆ *Renew self-locking nuts and bolts when performing assembly work.*
- ◆ *Renew bolts which are tightened to a specified angle as well as oil seals and gaskets.*
- ◆ *If repairing, carefully remove any remaining gasket material 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.*
- ◆ *No oil or coolant must be allowed to remain in the blind holes for the cylinder head bolts in the cylinder block.*
- ◆ *Do not remove new cylinder head gasket from packaging until it is ready to be fitted.*
- ◆ *Handle gasket very carefully. Damage to the silicone coating or the indented area will lead to leaks.*
- ◆ *Position cylinder head gasket on dowel sleeves. The word - oben- (top) or the Part No. must face towards cylinder head.*
- ◆ *The plastic protectors fitted to protect the open valves should not be removed until the cylinder head is ready to be fitted.*
- ◆ *When installing an exchange cylinder head with fitted camshafts, oil the contact surfaces between the roller rocker fingers and cams.*
- ◆ *After working on the valve gear, turn the engine carefully at least 2 rotations to ensure that none of the valves make contact when the starter is operated.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- ◆ *When fitting a new cylinder head or cylinder head gasket, drain off all the old coolant and refill with new coolant.*



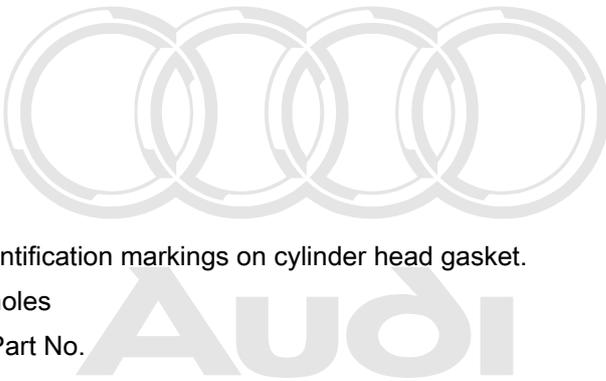
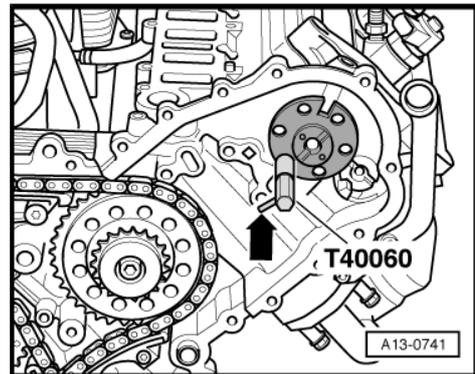
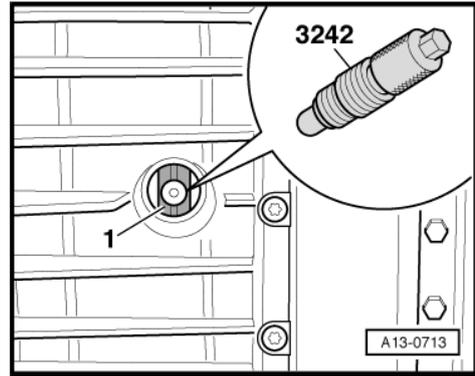
Audi

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.

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

- Before installing cylinder head, set crankshaft and camshafts to TDC:

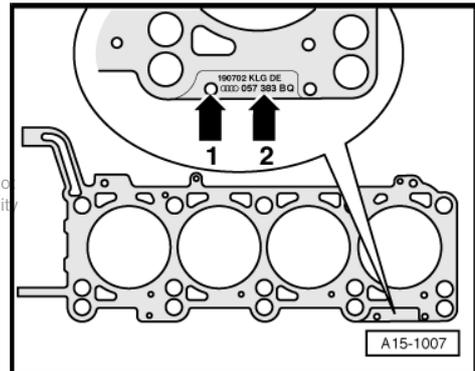
- Locking pin - 3242- must be screwed in with engine at TDC position.
- The camshafts on both cylinder heads must be locked with adjustment pins - T40060- .



- Note identification markings on cylinder head gasket.

-Arrow 1-: holes

-Arrow 2-: Part No.

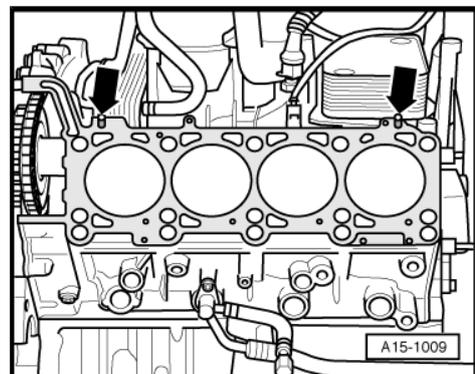


**Note**

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.

- ◆ *If the cylinder head gasket or cylinder head have been replaced, select the new cylinder head gasket according to the number of holes on the old gasket.*
- ◆ *If parts of the crankshaft drive have been renewed, the new cylinder head gasket must be selected by measuring the piston projection at TDC ⇒ [page 81](#) .*
- ◆ *The gaskets for the left and right cylinder heads have different shapes and cannot be interchanged.*

- Place cylinder head gasket in position.
- Pay attention to dowel sleeves -arrows- in cylinder block.
- Check installation position of cylinder head gasket: the word "oben" (top) or the Part No. should face towards the cylinder head.
- Fit cylinder head.
- Insert new cylinder head bolts and tighten hand-tight.

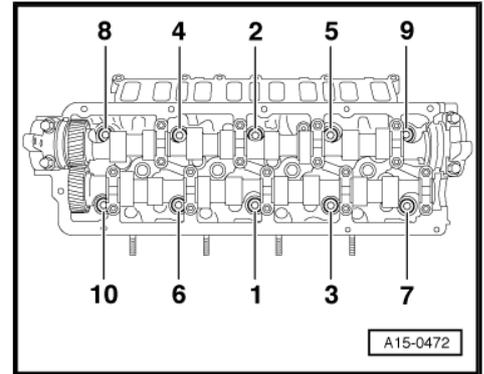


– Tighten cylinder head bolts as follows in the sequence shown:

1. Tighten with torque wrench to 35 Nm.
2. Tighten with torque wrench to 60 Nm.
3. Turn 90° (1/4 turn) further using a rigid wrench.
4. Turn 90° (1/4 turn) further using a rigid wrench.

 **Note**

*Cylinder head bolts do not have to be torqued down again later after repair work.*



- Install cylinder head cover: left-side ⇒ [page 137](#) ; right-side ⇒ [page 141](#) .
- Install exhaust gas recirculation cooler: left-side ⇒ [page 298](#) , right-side ⇒ [page 300](#) .
- Install mechanical exhaust gas recirculation valve: left-side ⇒ [page 296](#) ; right-side ⇒ [page 297](#) .
- Install intake manifold ⇒ Rep. gr. 23 .
- Install engine ⇒ [page 35](#) .
- Fill cooling system with fresh coolant ⇒ [page 211](#) .

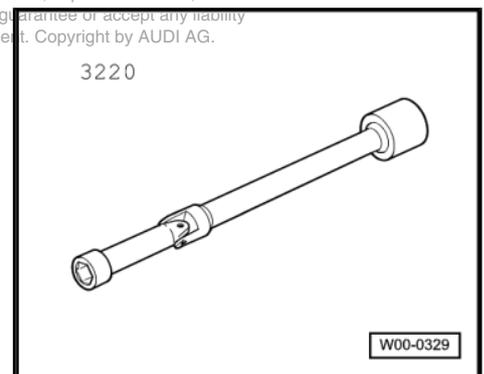
**Tightening torque**

Component	Nm
Coolant line to cylinder head	15

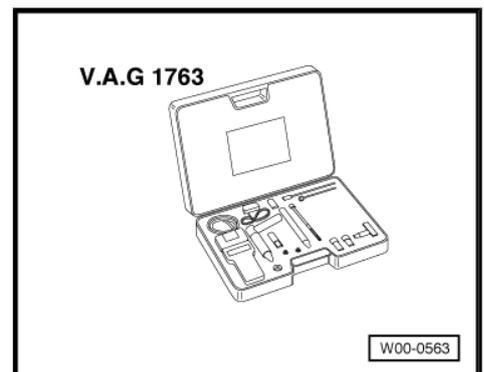
## 4.6 Checking compression

### Special tools and workshop equipment required

- ◆ U/J extension and socket, 10 mm - 3220-



- ◆ Compression tester - V.A.G 1763- with adapter - V.A.G 1763/5-





### Test requirements

- Engine oil temperature at least 30 °C
- Battery voltage at least 12.5 V

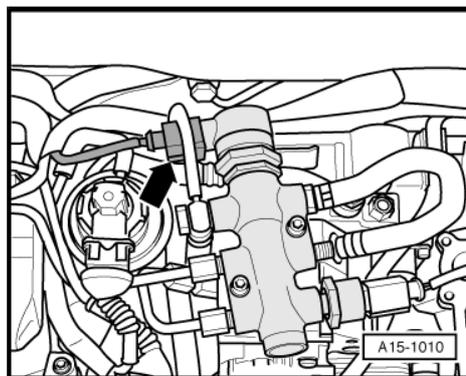
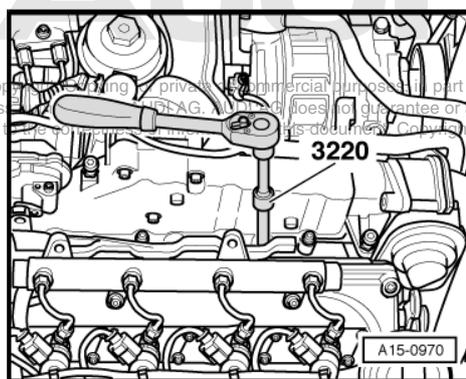
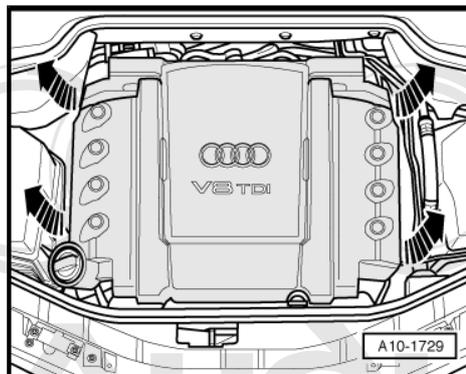
### Test sequence



#### Note

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

- Carefully pull engine cover panel off four retaining pins one after the other -arrows-.
- Unplug electrical connectors from glow plugs.
- Remove all glow plugs using U/J extension and socket, 10 mm - 3220- .
- Unplug electrical connector -arrow- at fuel pressure regulating valve - N276- .



Protected by copyright. This document is intended for private use only. No part of this document may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage and retrieval system, without the prior written permission of AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the content of this document. Copyright © 2013 by AUDI AG.

- Screw in adapter - V.A.G 1763/5- in place of the glow plugs.
- Check compression pressure with compression tester - V.A.G 1763- .

 **Note**

*Using the compression tester => operating instructions .*

- Operate starter until pressure reading on tester no longer rises.

**Compression pressure:**

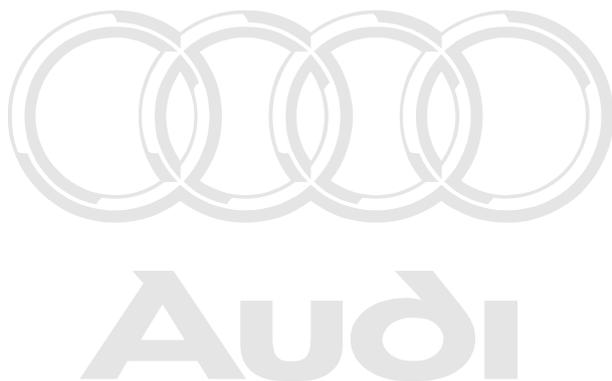
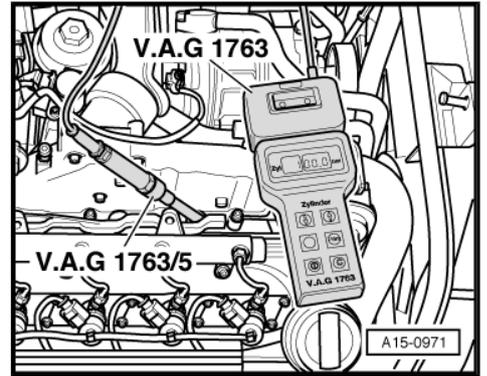
New pressure in bar	Wear limit bar	Permissible difference between cylinders bar
28 ... 33	21	5 (maximum)

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

- Erase any entries in event memory resulting from testing => Vehicle diagnostic tester.

**Tightening torque**

Component	Nm
Glow plugs in cylinder head	18



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 Servicing valve gear

⇒ [“5.1 Valve gear - exploded view”, page 156](#)

⇒ [“5.2 Checking axial clearance of camshafts”, page 158](#)

⇒ [“5.3 Removing and installing camshafts”, page 159](#)

⇒ [“5.4 Renewing valve stem oil seals with cylinder head installed”, page 163](#)

⇒ [“5.5 Renewing valve stem oil seals with cylinder head removed”, page 166](#)

⇒ [“5.6 Checking hydraulic valve compensation elements”, page 169](#)

⇒ [“5.7 Valve dimensions”, page 170](#)

⇒ [“5.8 Machining valve seats”, page 170](#)

⇒ [“5.9 Checking valve guides”, page 171](#)

⇒ [“5.10 Checking valves”, page 171](#)

### 5.1 Valve gear - exploded view



#### Note

- ◆ *After working on the valve gear, turn the engine carefully at least 2 rotations by hand to ensure that none of the valves make contact when the starter is operated.*
- ◆ *The following illustration shows the cylinder head (right-side).*



# Audi

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

### 1 - Valve

- Do not machine, only grinding-in is permitted
- Mark installation position for re-installation
- Valve dimensions  
⇒ [page 170](#)
- Checking valve guides  
⇒ [page 171](#)

### 2 - Cylinder head

- See note ⇒ [page 156](#)
- Checking valve guides  
⇒ [page 171](#)
- Machining valve seats  
⇒ [page 170](#)

### 3 - Valve stem oil seal

- Renewing with cylinder head installed  
⇒ [page 163](#)
- Renewing with cylinder head removed  
⇒ [page 166](#)

### 4 - Valve spring

### 5 - Valve spring plate

### 6 - Valve cotters

### 7 - 9 Nm

- Observe correct tightening sequence  
⇒ [page 163](#)

### 8 - 9 Nm

- Observe correct tightening sequence  
⇒ [page 163](#)

### 9 - Retaining frame

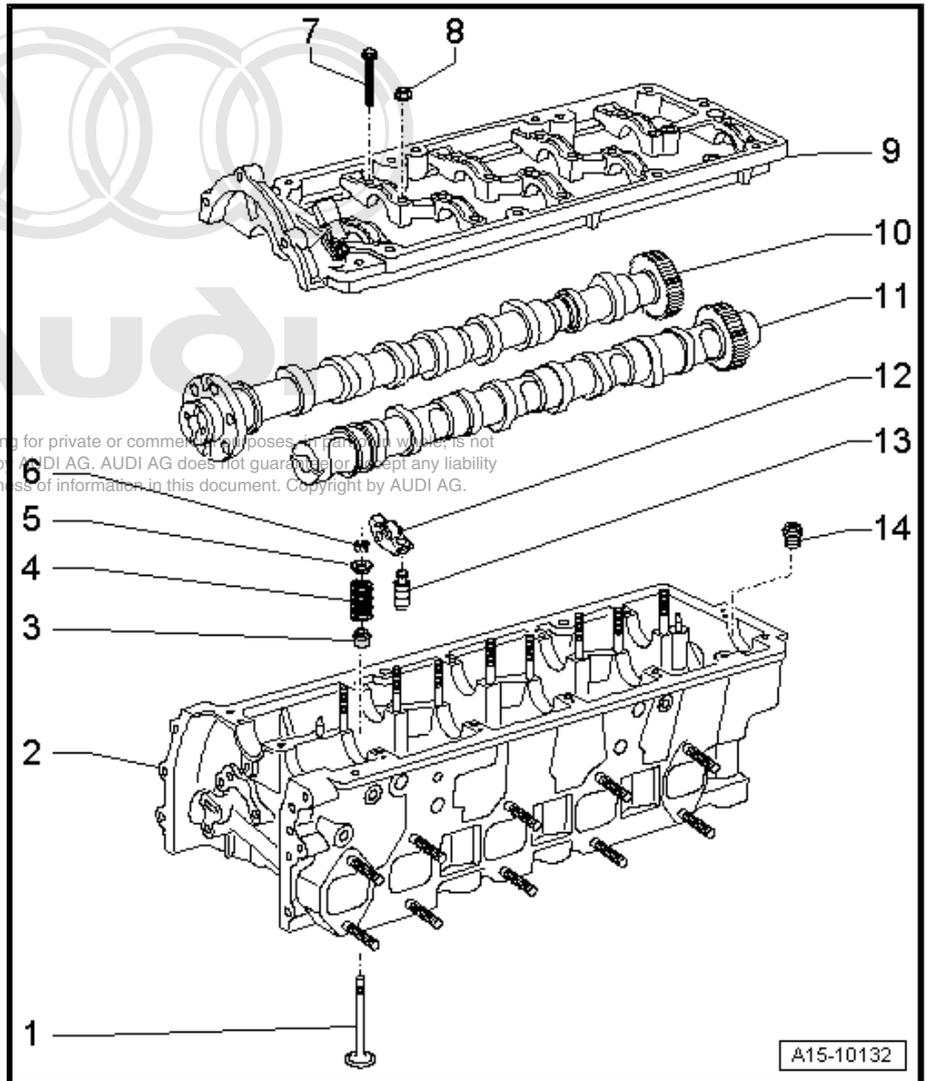
- With integrated camshaft bearings
- Removing and installing ⇒ ["5.3 Removing and installing camshafts", page 159](#)

### 10 - Inlet camshaft

- Removing and installing ⇒ [page 159](#)
- Checking axial clearance ⇒ [page 158](#)
- Check radial clearance with Plastigage (roller rocker fingers removed)
- Radial clearance (new): 0.035 ... 0.085 mm
- Radial clearance: wear limit: 0.1 mm
- Runout: max. 0.01 mm

### 11 - Exhaust camshaft

- Removing and installing ⇒ [page 159](#)
- Checking axial clearance ⇒ [page 158](#)
- Check radial clearance with Plastigage (roller rocker fingers removed)
- Radial clearance (new): 0.035 ... 0.085 mm
- Radial clearance: wear limit: 0.1 mm
- Runout: max. 0.01 mm



## 12 - Roller rocker finger

- Mark installation position with a coloured pen
- Do not interchange
- Check roller bearings for ease of movement
- Lubricate contact surface

## 13 - Hydraulic valve compensation element

- Mark installation position with a coloured pen
- Checking ⇒ [page 169](#)
- Lubricate contact surfaces before installing

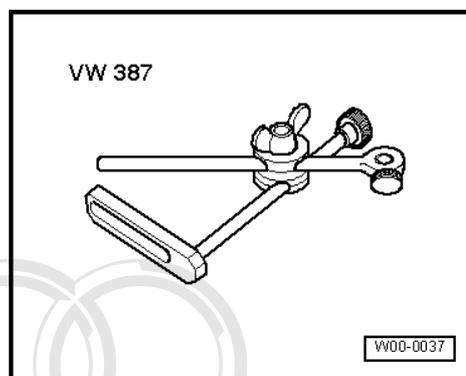
## 14 - Pressure limiting valve 2.7 bar, 25 Nm

- For lubricating points in cylinder head

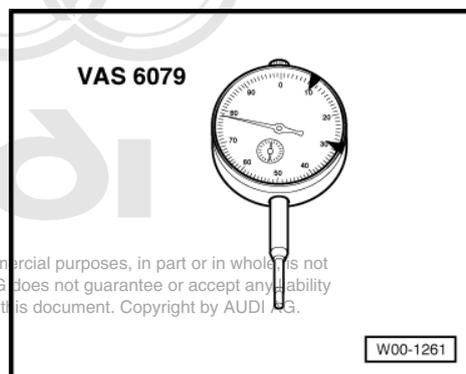
## 5.2 Checking axial clearance of camshafts

### Special tools and workshop equipment required

- ◆ Universal dial gauge bracket - VW 387-



- ◆ Dial gauge - VAS 6079-



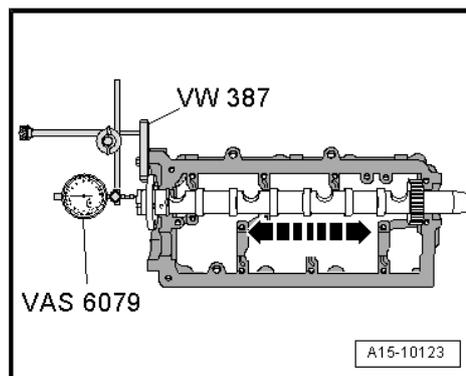
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

### Test sequence

- Perform measurement with retaining frame removed.

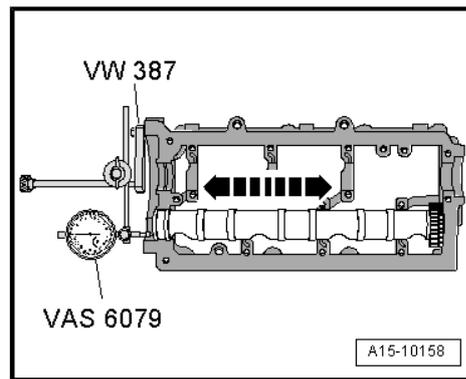
#### Inlet camshaft

- Specification: 0.03 ... 0.06 mm.
- Wear limit: 0.10 mm.



Exhaust camshaft

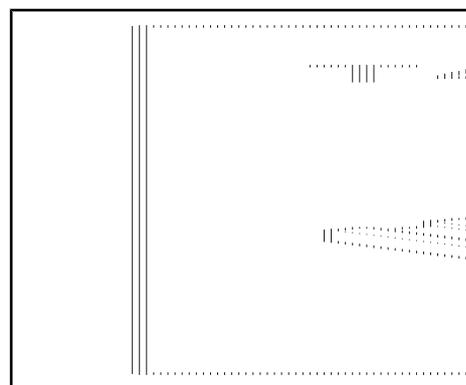
- Specification: 0.03 ... 0.06 mm.
- Wear limit: 0.10 mm.



### 5.3 Removing and installing camshafts

Special tools and workshop equipment required

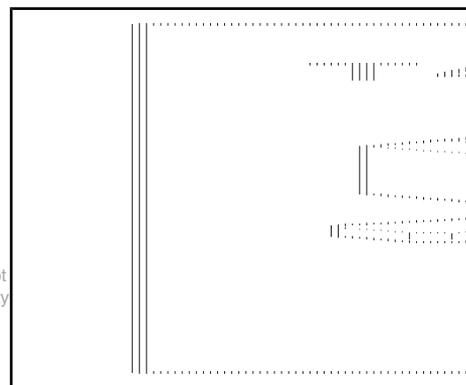
- ◆ Camshaft fitting tool - T40094-



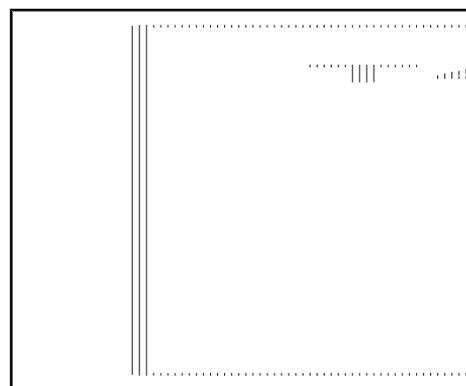
- ◆ Bracket - T40095-



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



- ◆ Tensioner - T40096-



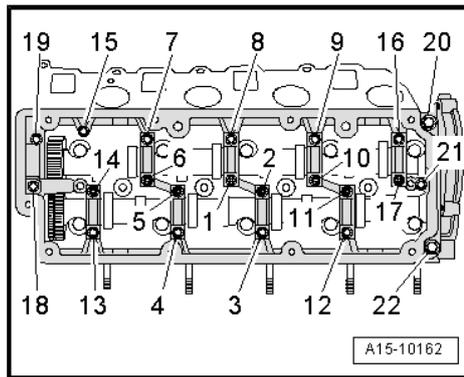
- ◆ Electric drill with plastic brush attachment
- ◆ Safety goggles



◆ Sealant ⇒ Electronic parts catalogue

### Removing

- Remove engine ⇒ [page 7](#) .
- Remove camshaft timing chains ⇒ [page 99](#) .
- Remove relevant cylinder head cover: left-side ⇒ [page 137](#) , right-side ⇒ [page 141](#) .
- Unscrew retaining frame bolts and nuts in the sequence -22 ... 1-.



### Note

*Make sure you do not damage roller rocker fingers and compensation elements when removing camshafts.*

- Carefully remove retaining frame and camshafts.

### Installing



### Caution

*The camshafts **MUST** be installed using the camshaft fitting tool - T40094- as described in the following, as the thrust bearings in the retaining frame would otherwise be destroyed. The cylinder head would then have to be renewed.*

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

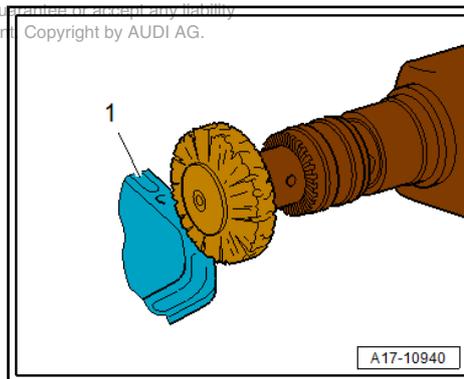
*Wear safety goggles.*

- Remove remaining sealant from cylinder head and retaining frame using rotating plastic brush or similar.



### Caution

*Make sure that no sealant residue gets into the cylinder head or the bearings.*



- Clean sealing surfaces; they must be free of oil and grease.
- Lubricate running surfaces of camshafts.

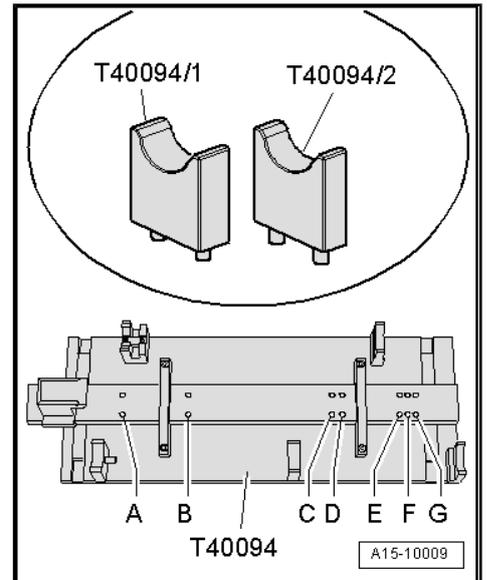
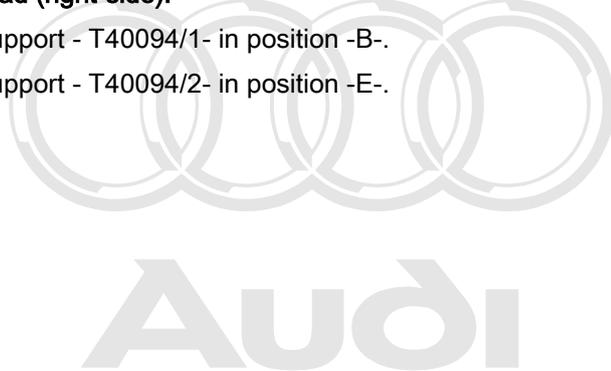
Set up camshaft fitting tool - T40094- as follows:

**Cylinder head (left-side):**

- Insert support - T40094/1- in position -A-.
- Insert support - T40094/2- in position -F-.

**Cylinder head (right-side):**

- Insert support - T40094/1- in position -B-.
- Insert support - T40094/2- in position -E-.



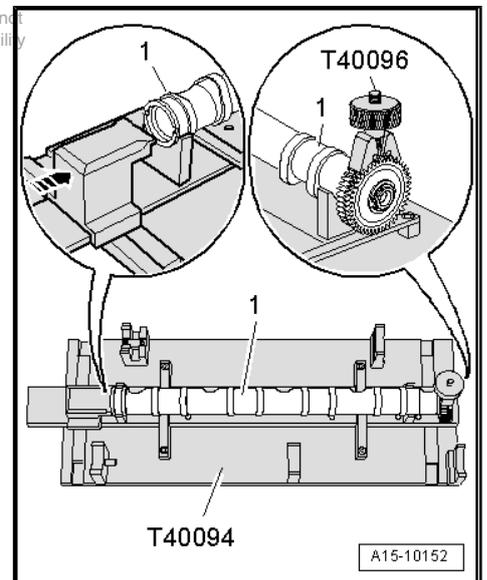
**Continuation for both sides:** This document is not to be used for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

 **Note**

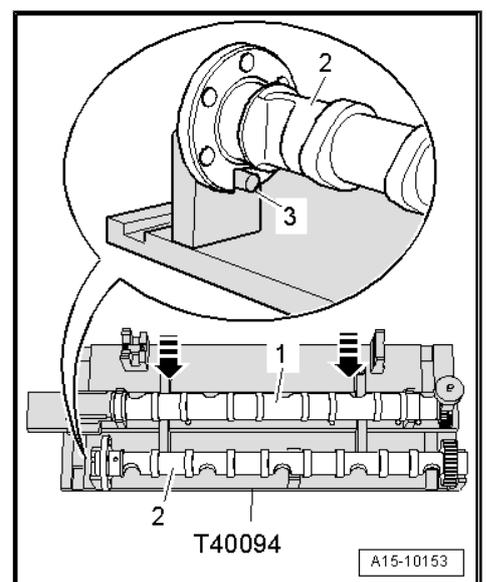
◆ *In the following the procedure is described for the left cylinder head.*

◆ *The procedure for the right cylinder head is similar and is performed in the same sequence.*

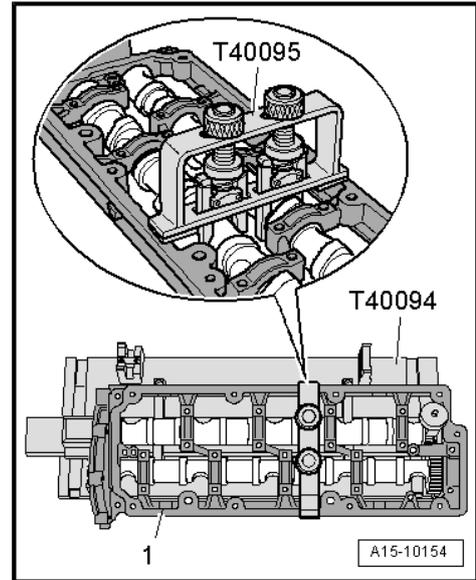
- Place exhaust camshaft -1- in support - T40094/1- and support - T40094/2- .
- Turn camshaft in such a way that it can be locked in TDC position using locking device -arrow-.
- Place tensioner - T40096- on teeth of camshaft gear in such a way that the two arms of the tool engage on the two halves of the gear (one in each half, as shown in illustration).
- Tighten the clamp using the knurled wheel so that the faces of the gear teeth are in alignment.



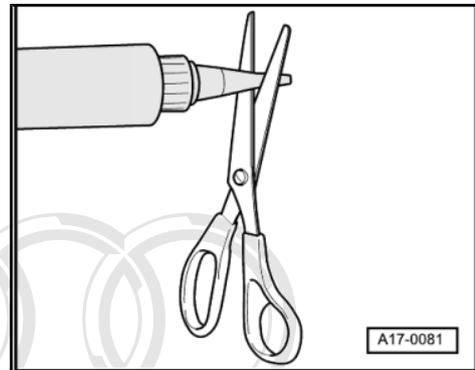
- Place inlet camshaft -2- in camshaft fitting tool - T40094- .
- The locating pin -3- must engage in the slot on the camshaft.
- Slide exhaust camshaft -1- towards inlet camshaft until gear teeth engage.



- Fit retaining frame -1- onto camshafts.
- All camshaft bearings must be seated on the camshafts.
- Attach bracket - T40095- to camshafts (align arms of bracket as required and tighten knurled nuts).
- Note the different shapes for inlet and exhaust camshaft.

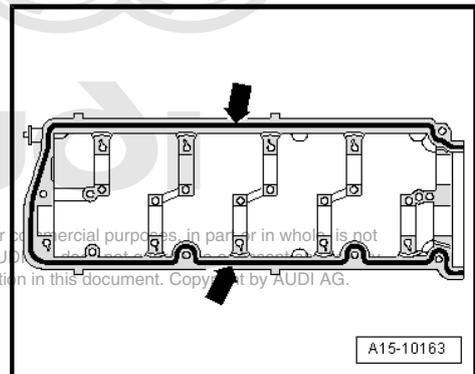


- Cut off nozzle of tube at front marking ( $\varnothing$  of nozzle approx. 1 mm).

**Note**

The retaining frame is shown without camshafts for illustration purposes.

- Turn retaining frame upside down.
- Apply the beads of sealant -arrows- onto the clean sealing surfaces of the retaining frame as illustrated.
- The grooves -arrows- on the sealing surface must be completely filled with sealant.
- The beads of sealant must project 1.5 ... 2.0 mm above the sealing surface.

**Note**

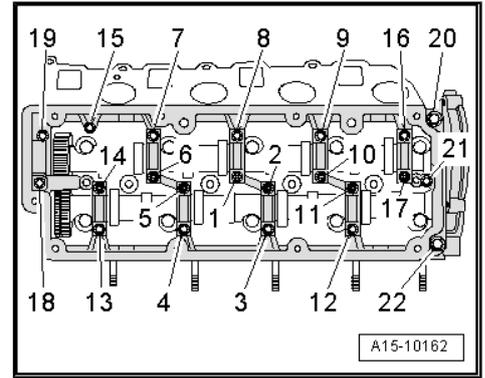
The sealant beads must not be thicker than specified, otherwise excess sealant could enter the camshaft bearings.

- Ensure that all roller rocker fingers contact the valve ends and compensation elements correctly.

- Fit retaining frame together with both camshafts and bracket - T40095- onto cylinder head immediately.

 **Note**

- ◆ *The retaining frame should be fitted and secured without delay, as the sealant starts hardening immediately.*
- ◆ *After installing the retaining frame, wait about 30 minutes for the sealant to dry.*
- Tighten retaining frame bolts in the sequence -1 ... 22- evenly, initially only hand-tight.
- The retaining frame should make contact with the cylinder head over the full surface.
- Tighten retaining frame bolts to final torque in the sequence -1 ... 22-.
- Detach bracket - T40095- and tensioner - T40096- .



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

 **Note**

*After working on the valve gear, turn the engine carefully at least 2 rotations by hand to ensure that none of the valves make contact when the starter is operated.*

- Install cylinder head cover: left-side ⇒ [page 137](#) ; right-side ⇒ [page 141](#) .
- Install camshaft timing chains ⇒ [page 99](#) .
- Install engine ⇒ [page 35](#) .

**Tightening torque**

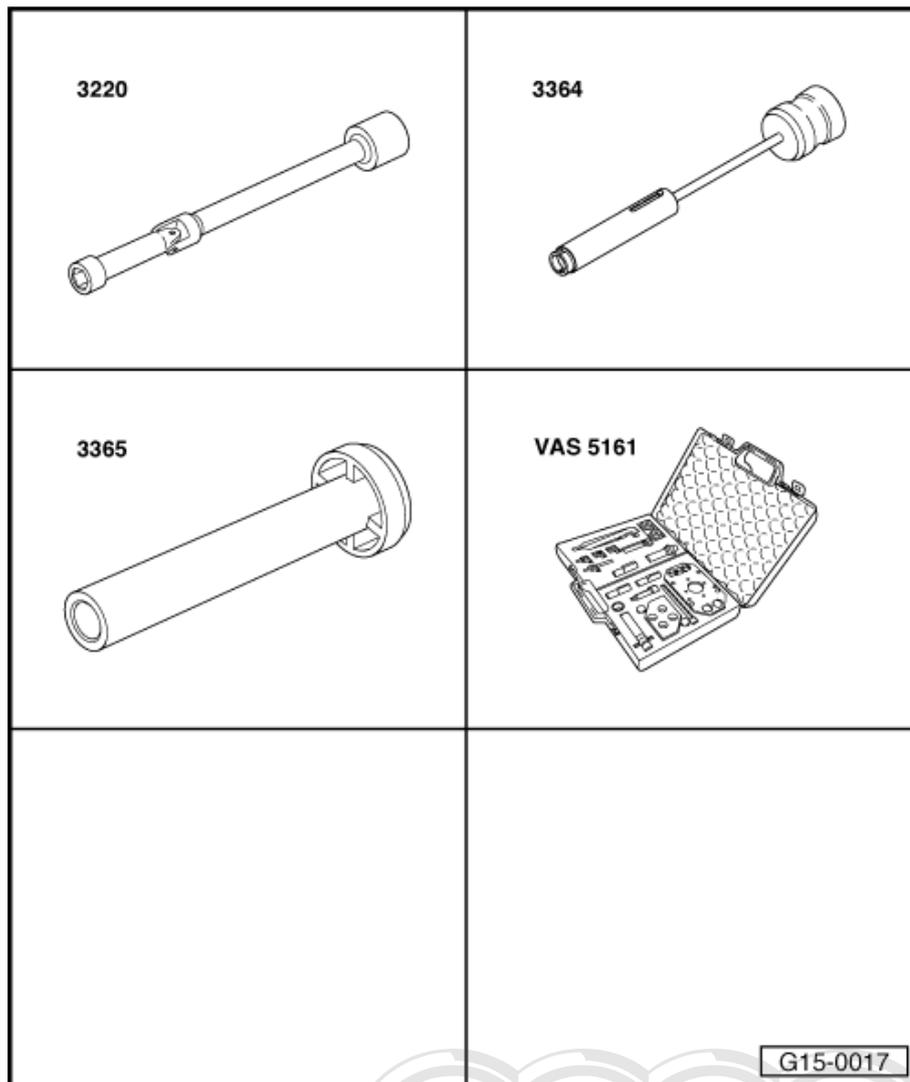
Component	Nm
Retaining frame to cylinder head	9

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.

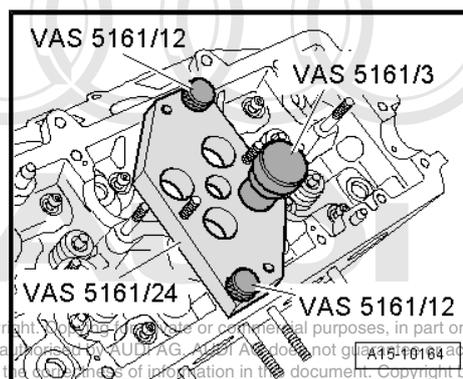
## 5.4 Renewing valve stem oil seals with cylinder head installed

**Special tools and workshop equipment required**

- ◆ U/J extension and socket, 10 mm - 3220-
- ◆ Valve stem seal puller - 3364-
- ◆ Valve stem seal fitting tool - 3365-
- ◆ Removal and installation device for valve cotters - VAS 5161 A- with guide plate - VAS 5161/24- and knurled spacer ring - VAS 5161/24-1-

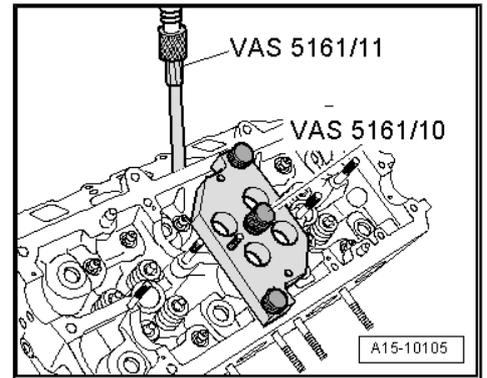
**Procedure**

- Remove camshafts ⇒ [page 159](#) .
- Mark fitting location of roller rocker fingers for re-installation and remove.
- Remove all glow plugs using U/J extension and socket, 10 mm - 3220- .
- Fit guide plate - VAS 5161/24- onto cylinder head.
- Secure guide plate using the knurled screws - VAS 5161/12- .
- Insert drift - VAS 5161/3- into guide plate and knock valve cotters loose using a plastic hammer.

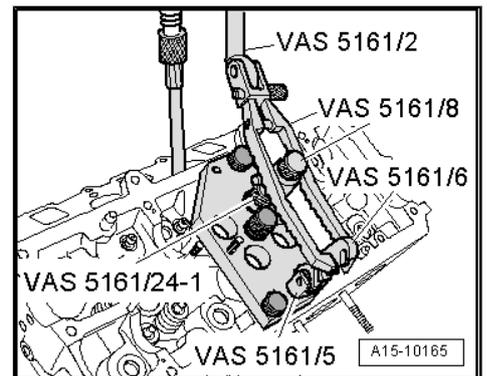


Protected by copyright. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage and retrieval system, without the prior written permission of Audi AG. Audi AG does not give any warranty or accept any liability with respect to the accuracy of the information in this document. Copyright by Audi AG.

- Screw sealing pin - VAS 5161/10- into guide plate.
- Screw adapter - VAS 5161/11- hand-tight into the glow plug hole of the relevant cylinder.

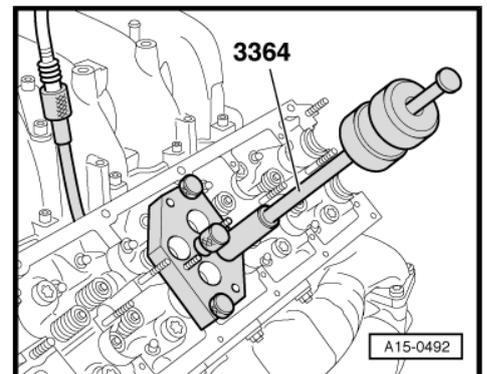


- Screw snap-in device - VAS 5161/6- with engaging fork - VAS 5161/5- into guide plate .
- Slide knurled spacer ring - VAS 5161/24-1- onto assembly cartridge - VAS 5161/8- .
- Connect adapter to compressed air line using a commercially available connection piece, and apply constant air pressure.
  - Minimum pressure: 6 bar
- 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.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without the prior 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.

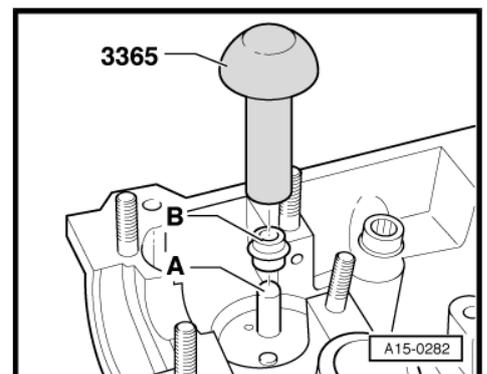
- **Release pressure fork.**
- Take out assembly cartridge with knurled spacer ring, valve spring plate and valve spring.
- Remove valve stem oil seals using the valve stem seal puller - 3364- .



### Note

*A plastic sleeve -A- is included with the new valve stem oil seals.*

- Fit plastic sleeve -A- onto the valve stem to prevent damage to the new valve stem oil seal -B-.
- Lightly lubricate sealing lip of valve stem oil seal.
- Slip valve stem oil seal over 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 need to be put into valve insertion device - VAS 5161/18- first.



**Note**

*Larger diameter of valve cotters faces upwards.*

- Press assembly cartridge onto insertion device from above and take up 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.

- Re-insert assembly cartridge - VAS 5161/8- into guide plate .
- Push pressure fork down 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.

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

- Install camshafts => [page 159](#) .

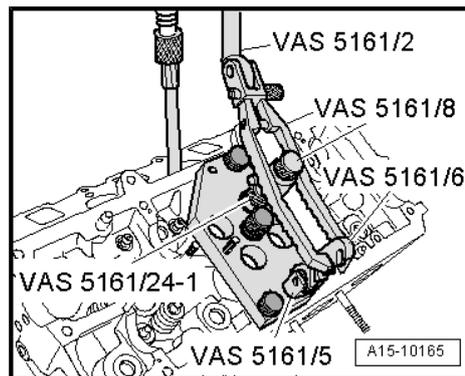
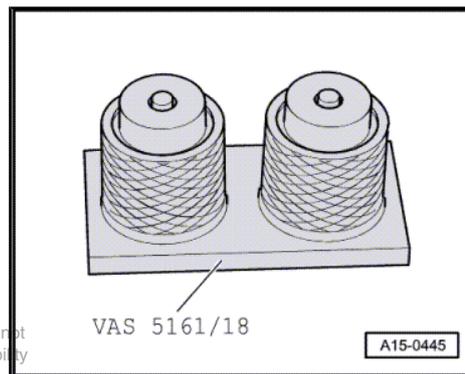


**Note**

*After working on the valve gear, turn the engine carefully at least 2 rotations to ensure that none of the valves make contact when the starter is operated.*

**Tightening torque**

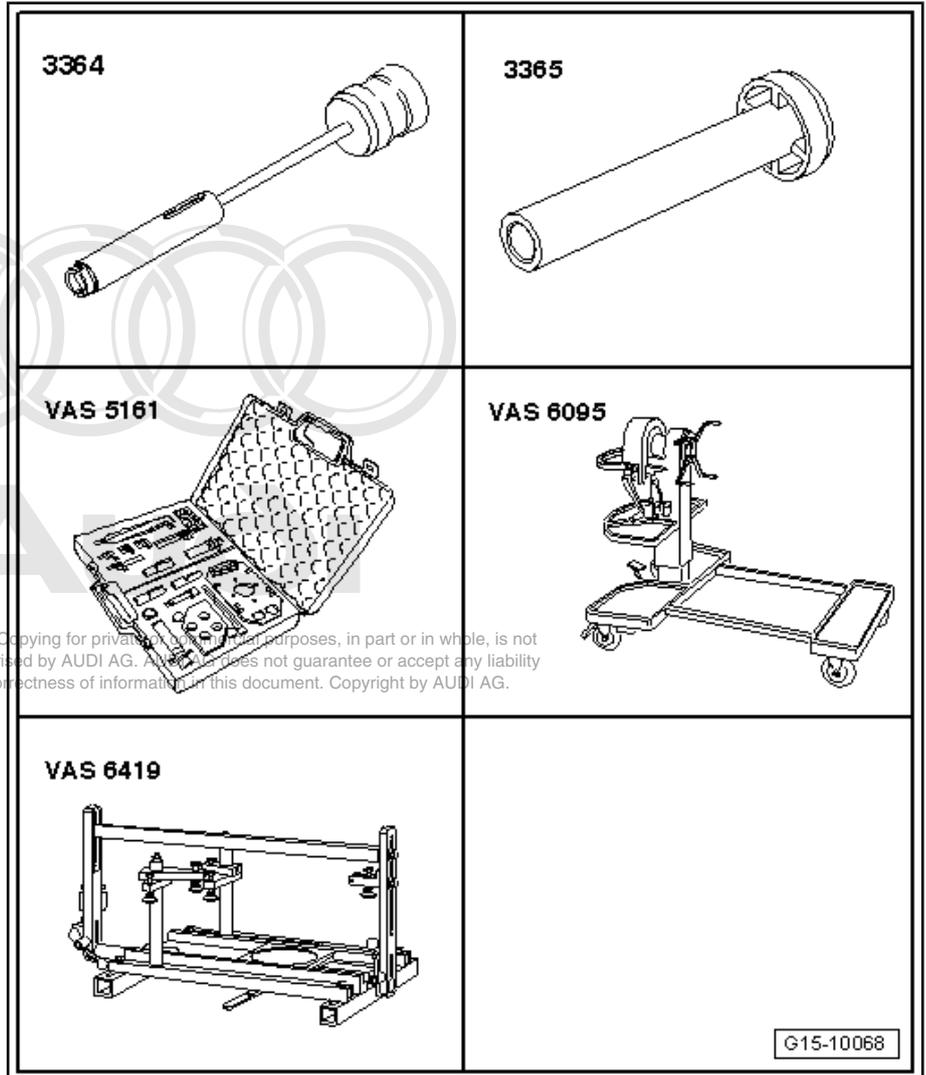
Component	Nm
Glow plugs in cylinder head	18



## 5.5 Renewing valve stem oil seals with cylinder head removed

**Special tools and workshop equipment required**

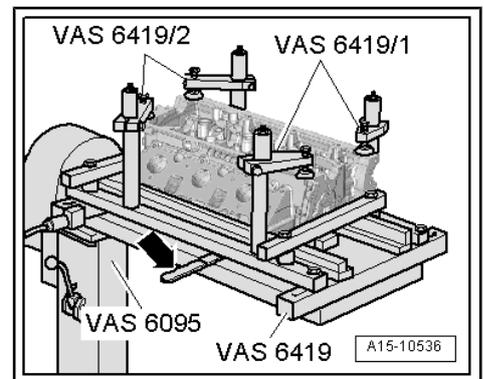
- ◆ Valve stem seal puller - 3364-
- ◆ Valve stem seal fitting tool - 3365-
- ◆ Removal and installation device for valve cotters - VAS 5161-
- ◆ Engine and gearbox support - VAS 6095-
- ◆ Cylinder head tensoning device - VAS 6419-



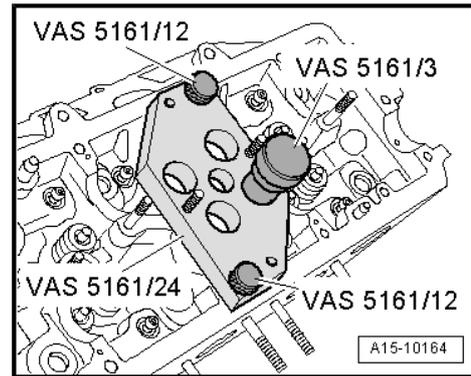
Protected by copyright. Copying for private or internal purposes, in part or in whole, is not permitted unless authorised by AUDI AG. Audi AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

**Procedure**

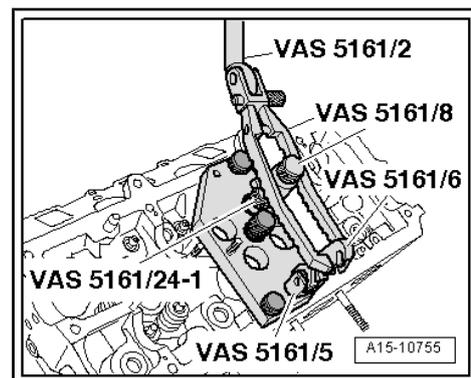
- Remove camshafts ⇒ [page 159](#) .
- Mark fitting location of roller rocker fingers for re-installation and remove.
- Insert cylinder head tensoning device - VAS 6419- into engine and gearbox support - VAS 6095- .
- Secure cylinder head in cylinder head tensoning device, as shown in illustration.
- Connect cylinder head tensoning device to compressed air.
- 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.



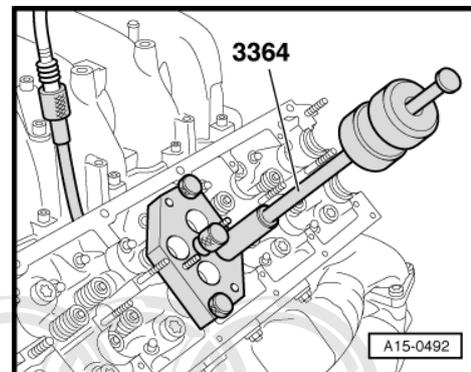
- Fit guide plate -VAS 5161/24- onto cylinder head.
- Secure guide plate using knurled screws -VAS 5161/12- .
- Insert punch -VAS 5161/3- into guide plate and knock sticking valve cotters loose using a plastic hammer.



- Screw snap-in device -VAS 5161/6- with engaging fork -VAS 5161/5- into guide plate.
- Slide knurled spacer ring -VAS 5161/24-1- onto assembly cartridge -VAS 5161/8- .
- Hook pressure fork -VAS 5161/2- into snap-in device and press assembly cartridge downwards.
- 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 with knurled spacer ring, valve spring plate and valve spring.



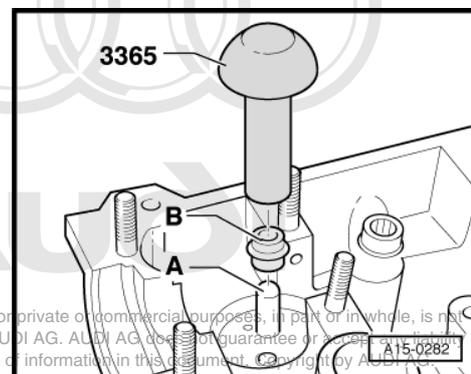
- Remove valve stem oil seals using the valve stem seal puller - 3364- .



**i** Note

*A plastic sleeve -A- is included with the new valve stem oil seals.*

- Fit plastic sleeve -A- onto the valve stem to prevent damage to the new valve stem oil seal -B-.
- Lightly lubricate sealing lip of valve stem oil seal.
- Slip valve stem oil seal over 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-.

**i** Note

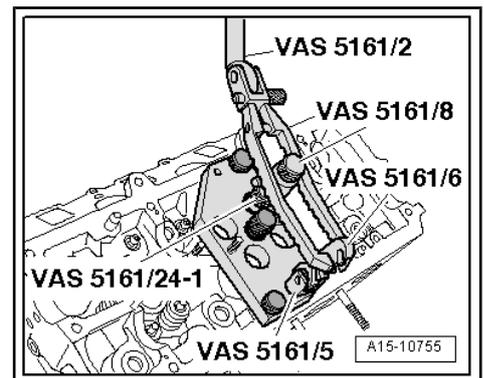
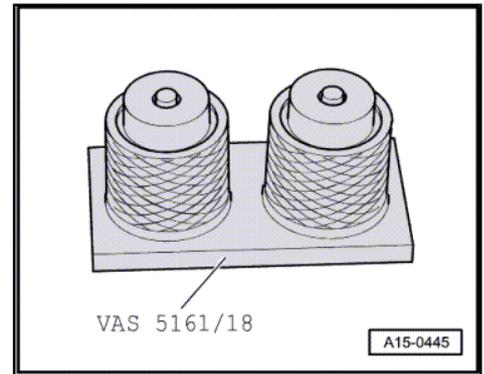
*Larger diameter of valve cotters faces upwards.*

- Press assembly cartridge onto insertion device from above and take up valve cotters.
- Insert valve spring and valve spring plate.
- Re-insert assembly cartridge -VAS 5161/8- into guide plate.
- Push pressure fork down 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.

**Assembling**

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 159](#) .



## 5.6 Checking hydraulic valve compensation elements

### Special tools and workshop equipment required

- ◆ Feeler gauge

**i** Note

- ◆ *Hydraulic valve compensation elements cannot be serviced.*
- ◆ *Irregular valve noises when starting engine are normal.*

### Procedure

- Start engine and run until coolant temperature reaches approx. 80 °C.
- Increase engine speed to approx. 2500 rpm for 2 minutes (perform road test if necessary).

**i** Note

- ◆ *If the irregular valve noise stops but repeatedly re-occurs when driving short distances, then the oil retention valve is defective.*
- ◆ *The oil retention valve is integrated in the mounting plate ⇒ [Item 2 \(page 194\)](#) and cannot be replaced on its own.*

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

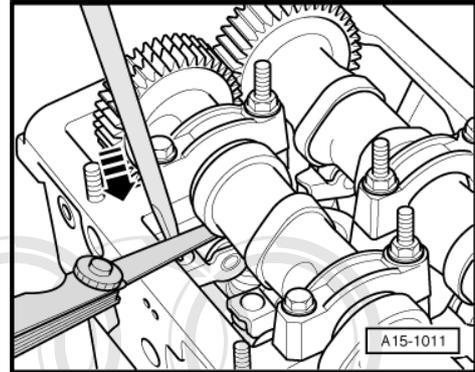
If the hydraulic tappets are still noisy, locate defective tappet as follows:



- Remove relevant cylinder head cover: left-side => [page 137](#) , right-side => [page 141](#) .
- Rotate crankshaft until cam of hydraulic compensation element to be checked faces upwards (rotate crankshaft clockwise via central bolt for vibration damper).
- Determine clearance between cam and roller rocker finger.
- Press roller rocker finger down -arrow- using a screwdriver.

If it is possible to insert a feeler gauge of 0.20 mm between camshaft and roller rocker finger:

- Renew hydraulic compensation element => ["5.3 Removing and installing camshafts"](#), [page 159](#) .



## 5.7 Valve dimensions

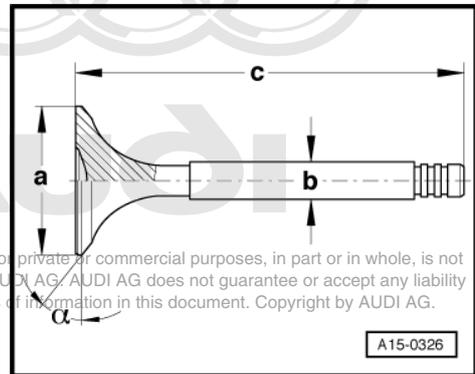


### Note

*Inlet and exhaust valves must not be machined. Only grinding-in is permitted.*

Dimension		Inlet valve	Exhaust valve
∅ a	mm	27.0 ... 27.2	24.0 ... 24.2
∅ b	mm	5.90 ... 5.94	5.90 ... 5.94
c	mm	99.15 ... 99.45 <sup>11)</sup>	99.15 ... 99.45 <sup>11)</sup>
α	∠°	45° 10'	45° 10'

11) Measured in the centre.



### WARNING

- ◆ *Care must be taken when disposing of old sodium-cooled exhaust valves.*
- ◆ *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. After preparing the valves, throw a maximum of ten into a bucket of water. Then step away immediately, since a chemical reaction will occur in which the sodium filling burns.*
- ◆ *After performing these steps the valves can be disposed of in the normal way.*

## 5.8 Machining valve seats



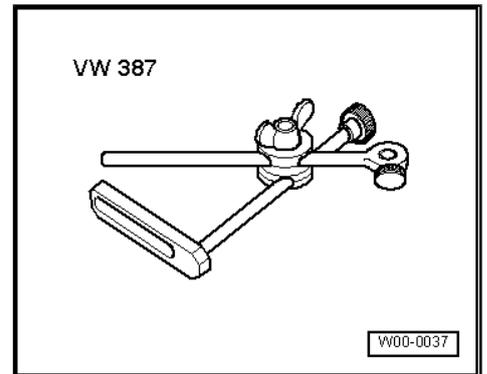
### Note

*Valve seats may not be machined due to the very small tolerances.*

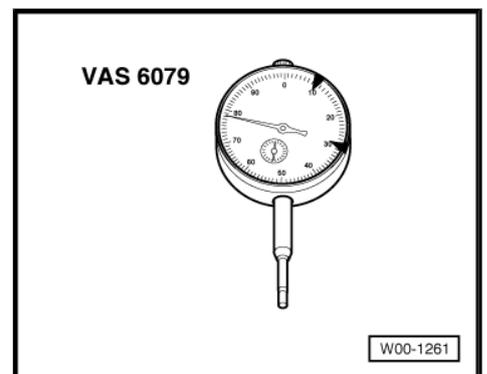
## 5.9 Checking valve guides

### Special tools and workshop equipment required

- ◆ Universal dial gauge bracket - VW 387-



- ◆ Dial gauge - VAS 6079-



### Test sequence

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

- Insert valve into valve guide.
  - End of valve stem must be flush with valve guide.

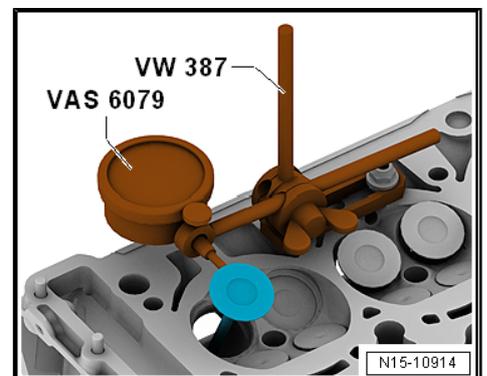
#### Note

*Only insert inlet valve into inlet guide and exhaust valve into exhaust guide, as the stem diameters are different.*

- Determine amount of sideways play.
  - Wear limit (sideways play) for inlet and exhaust valve guide: 1.0 mm.

#### Note

- ◆ *If the wear limit is exceeded, repeat the measurement with new valves. Renew cylinder head if wear limit is still exceeded. Valve guides cannot be renewed.*
- ◆ *If the valve has to be renewed as part of a repair, use a new valve for the measurement.*



## 5.10 Checking valves

- Visually inspect for scoring on valve stem and on seating surface.

If scoring is clearly visible:



- Renew the relevant valve.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 – Lubrication

### 1 Removing and installing parts of lubrication system

⇒ [“1.1 Oil pump, sump \(bottom section\), sump \(centre section\) - exploded view”, page 173](#)

⇒ [“1.2 Removing and installing oil level and oil temperature sender G266”, page 175](#)

⇒ [“1.3 Removing and installing sump \(bottom section\)”, page 175](#)

⇒ [“1.4 Removing and installing sump \(centre section\)”, page 178](#)

⇒ [“1.5 Removing and installing oil pump”, page 187](#)

⇒ [“1.6 Sump \(top section\) - exploded view”, page 189](#)

⇒ [“1.7 Removing and installing sump \(top section\)”, page 190](#)

⇒ [“1.8 Oil cooler, pressure control valve, oil filter housing and spray nozzle valve - exploded view”, page 193](#)

⇒ [“1.9 Removing and installing oil cooler”, page 195](#)

⇒ [“1.10 Removing and installing oil filter housing”, page 196](#)

⇒ [“1.11 Removing and installing pressure control valve for crankcase breather system”, page 198](#)

⇒ [“1.12 Removing and installing mounting plate for oil cooler, pressure control valve and oil filter housing”, page 199](#)

⇒ [“1.13 Removing and installing spray nozzle valve”, page 203](#)

⇒ [“1.14 Removing and installing oil pressure switch F1”, page 203](#)

⇒ [“1.15 Removing and installing oil temperature sender G8”, page 204](#)

⇒ [“1.16 Checking oil pressure”, page 206](#)

⇒ [“1.17 Engine oil”, page 207](#)

⇒ [“1.18 Checking oil level”, page 207](#)

#### 1.1 Oil pump, sump (bottom section), sump (centre section) - exploded view



##### Note

- ◆ *If large quantities of metal shavings or particles are found in the engine oil when repairing the engine, the oil passages must be cleaned carefully, and the oil cooler must be renewed in order to prevent further damage occurring later.*
- ◆ *Oil spray jet for piston cooling ⇒ [page 175](#).*



**1 - 10 Nm**

- Tighten in stages and in diagonal sequence

**2 - Sump (bottom section)**

- Removing and installing ⇒ [page 175](#)
- With oil level and oil temperature sender - G266-
- Removing and installing oil level and oil temperature sender - G266- ⇒ [page 175](#)

**3 - 10 Nm**

**4 - Retaining ring**

**5 - Intake connecting pipe**

**6 - Oil strainer**

- Clean if dirty

**7 - 10 Nm**

**8 - 10 Nm**

**9 - Oil pipe**

**10 - O-ring**

- Renew

**11 - 10 Nm**

**12 - Seal**

- Renew

**13 - Suction duct**

**14 - Drive shaft**

- For coolant pump

**15 - Dowel sleeve**

- 2x

**16 - Gasket**

- Renew

**17 - Oil pump**

- Do not dismantle
- With pressure control valve: 5.1 bar
- Removing and installing ⇒ [page 187](#)

**18 - Drive shaft**

- For oil pump

**19 - 10 Nm**

**20 - Gasket**

- Renew

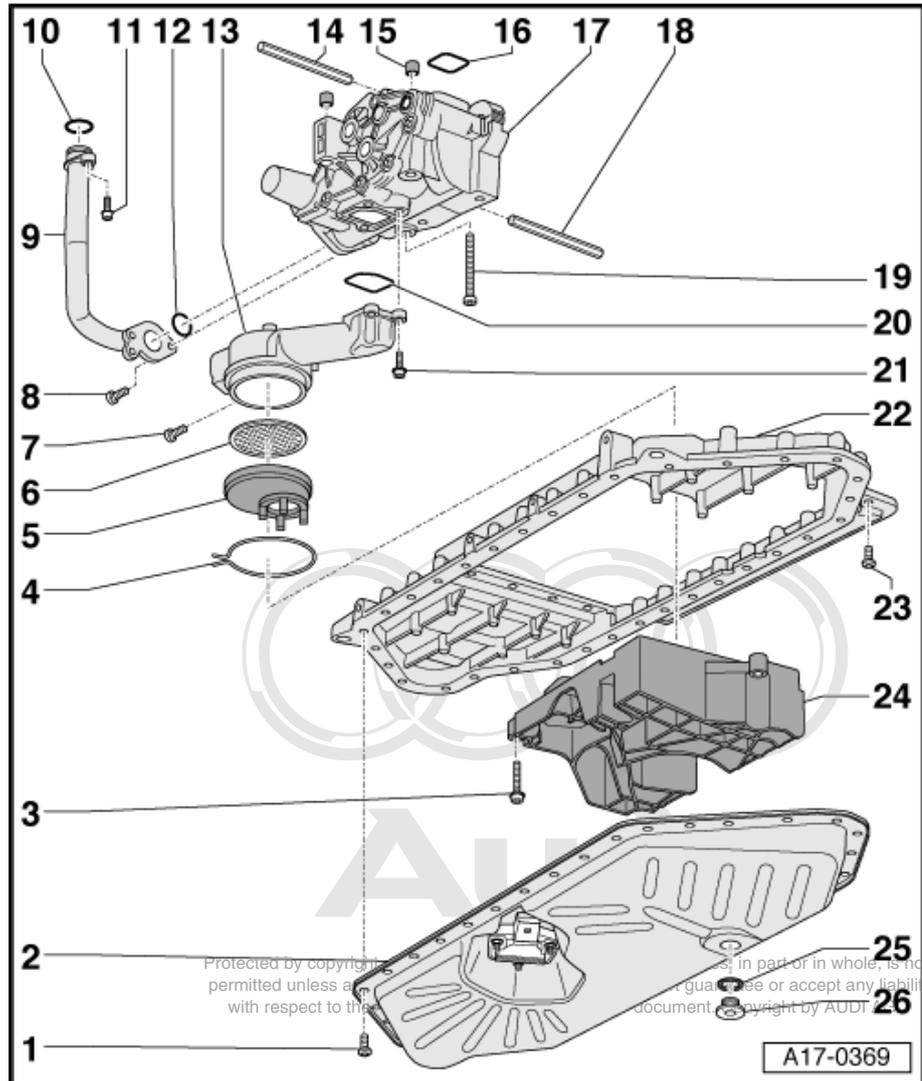
**21 - 10 Nm**

**22 - Sump (centre section)**

- Removing and installing ⇒ [page 178](#)

**23 - 10 Nm**

- Tighten in stages and in diagonal sequence



**24 - Baffle plate**

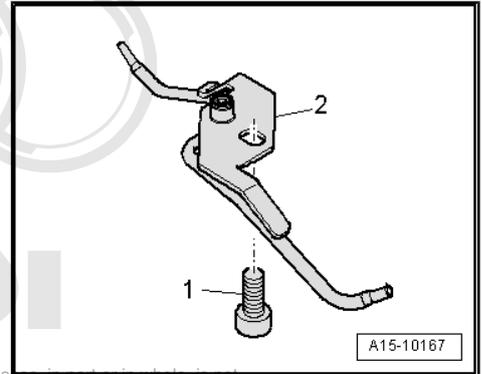
**25 - Seal**

- Renew

**26 - Oil drain plug, 50 Nm**

**Oil spray jet for piston cooling**

- 1 - Bolt, 9 Nm
- 2 - Oil spray jet for piston cooling



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability for errors or omissions in this document. Copyright by AUDI AG.

**1.2 Removing and installing oil level and oil temperature sender - G266-**

**Removing**

- Drain off engine oil ⇒ Maintenance ; Booklet 404 .
- Unplug electrical connector -3-.
- Remove nuts -1- and detach oil level and oil temperature sender - G266- -item 4-.

**Installing**

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

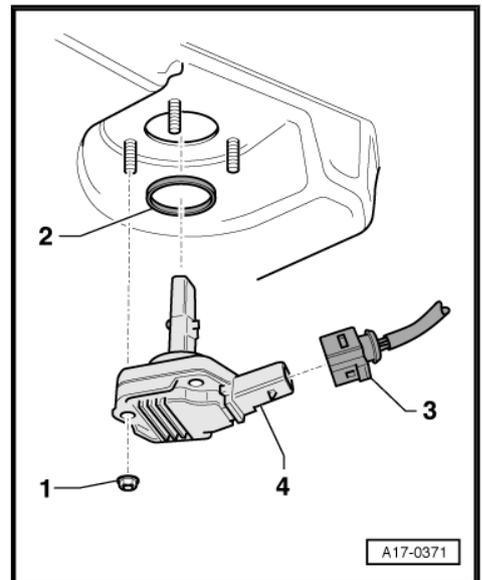


*Renew seal -2-.*

- Fill up with engine oil and check engine oil level ⇒ Maintenance ; Booklet 404 .

**Tightening torque**

Component	Nm
Oil level and oil temperature sender - G266- to sump (bottom section)	9

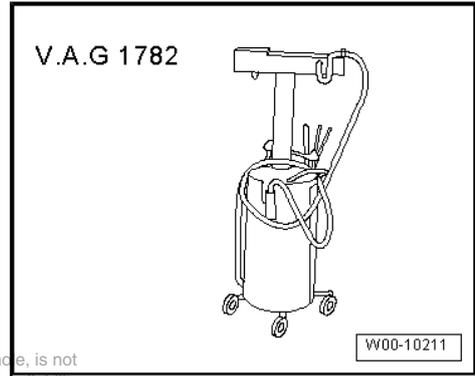
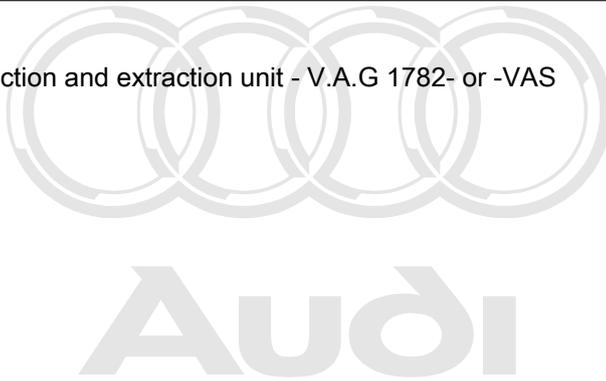


**1.3 Removing and installing sump (bottom section)**

Special tools and workshop equipment required



- ◆ Used oil collection and extraction unit - V.A.G 1782- or -VAS 6622A-

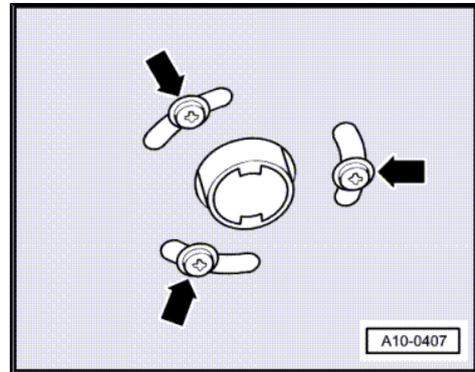


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

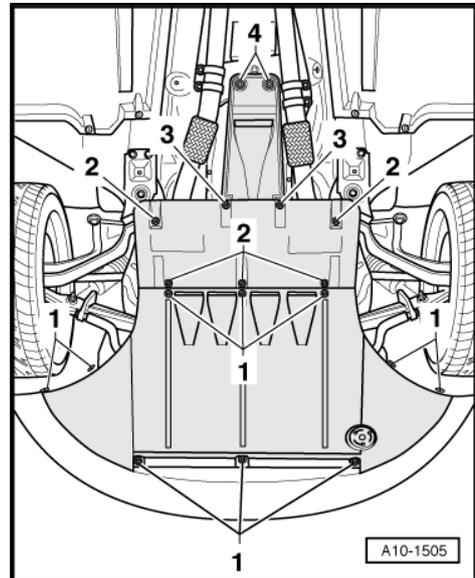
- ◆ Electric drill with plastic brush attachment
- ◆ Safety goggles
- ◆ Sealant → Electronic parts catalogue

### Removing

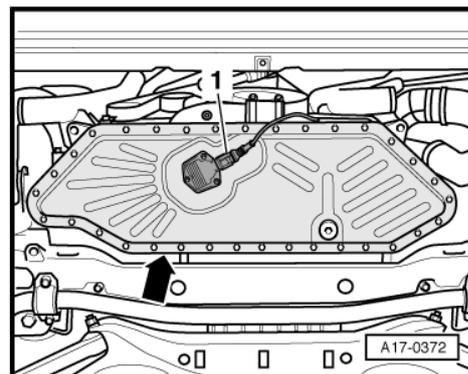
- Activate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
- Remove bolts -arrows- securing exhaust pipe for auxiliary/ supplementary heater to noise insulation.



- Open quick-release fasteners -1- and remove noise insulation (front).
- Position used oil collection and extraction unit below engine.
- Drain off engine oil.



- Unplug electrical connector at oil level and oil temperature sender - G266- -item 1-.
- Unbolt sump (bottom section) -arrow-.



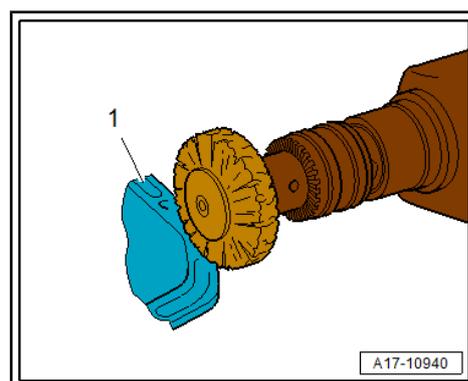
### Installing

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

**i** Note

*Renew seals.*

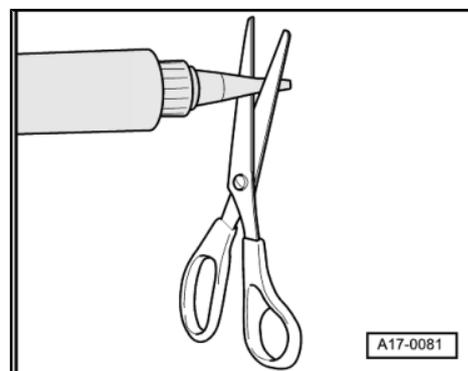
- Remove remaining sealant on bottom and centre sections of sump with a rotating plastic brush or similar.



**!** WARNING

*Wear safety goggles.*

- Clean sealing surfaces; they must be free of oil and grease.
- Cut off nozzle of tube at front marking ( $\varnothing$  of nozzle approx. 2 mm).



**Audi**

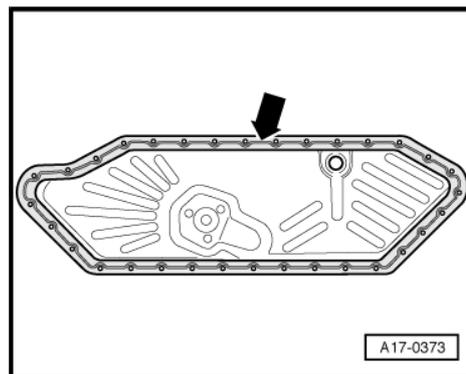
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- Apply bead of sealant onto clean sealing surface of sump (bottom section) as illustrated.
- The bead of sealant should be 2 mm wide -arrow-.

**Note**

- ◆ *The bead of sealant must not be thicker than specified, otherwise excess sealant can enter the sump (bottom section) and obstruct the strainer in the oil intake pipe.*
- ◆ *The sump (bottom section) must be installed within 5 minutes after applying sealant.*
- Fit sump (bottom section) and tighten all bolts initially to 5 Nm in diagonal sequence.
- Tighten bolts securing sump (bottom section) to 10 Nm in diagonal sequence.
- Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 404 .
- Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .

**Tightening torques**

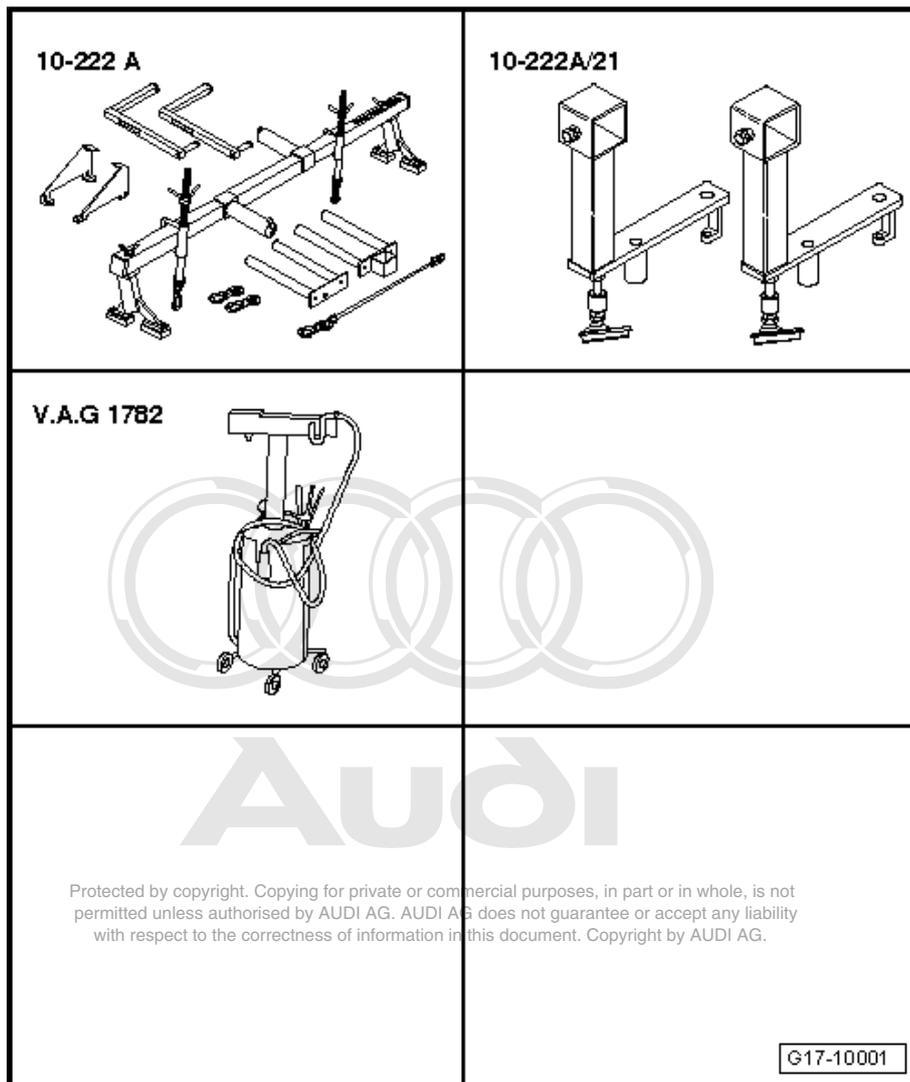
Component	Nm
Bottom section of sump to centre section of sump	10
Oil drain plug	50

**1.4 Removing and installing sump (centre section)**

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

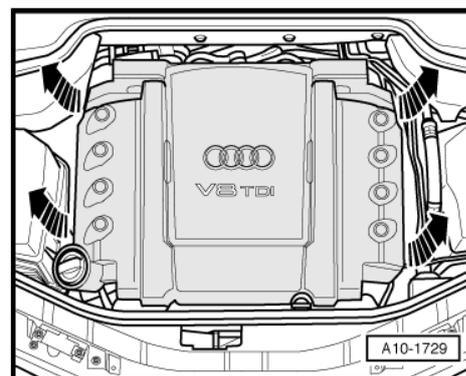
**Special tools and workshop equipment required**

- ◆ Support bracket - 10-222 A-
- ◆ Support - 10-222 A/21-
- ◆ Used oil collection and extraction unit - V.A.G 1782- or -VAS 6622A-
- ◆ Sealant ⇒ Electronic parts catalogue
- ◆ Electric drill with plastic brush attachment
- ◆ Safety goggles



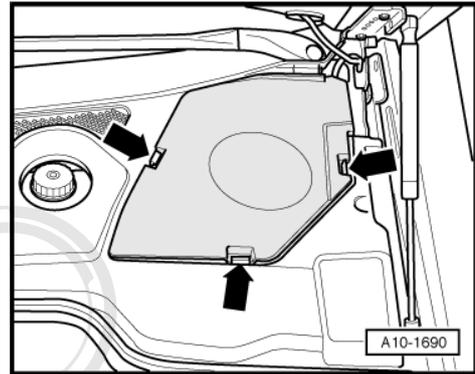
**Removing**

- Activate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
- Carefully pull engine cover panel off four retaining pins one after the other -arrows-.

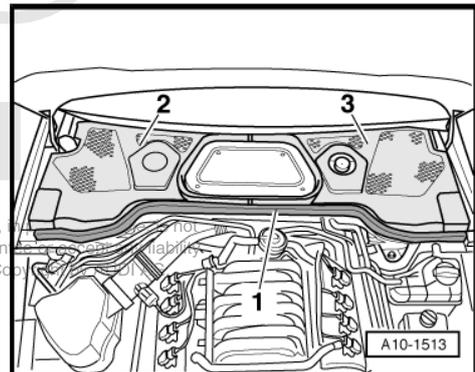




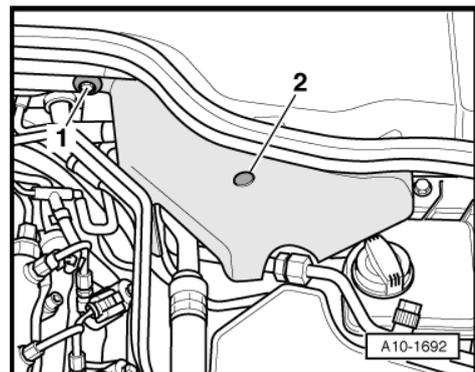
- Remove cover above coolant expansion tank -arrows-.



- Pull off rubber seal -1- on plenum chamber covers.
- Detach plenum chamber covers -2- and -3-.



- Remove cover for suspension turret (left-side); to do so, remove nut -1- and detach spreader clip -2-.

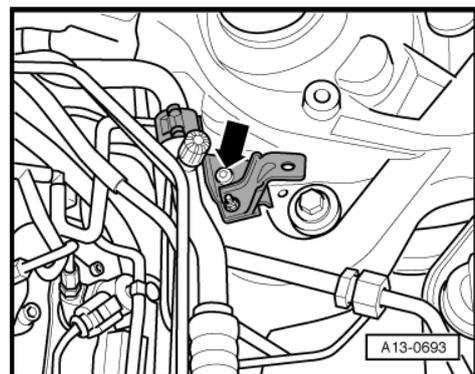


- Remove bolt -arrow-.
- Pivot bracket for air conditioner pipe to one side.

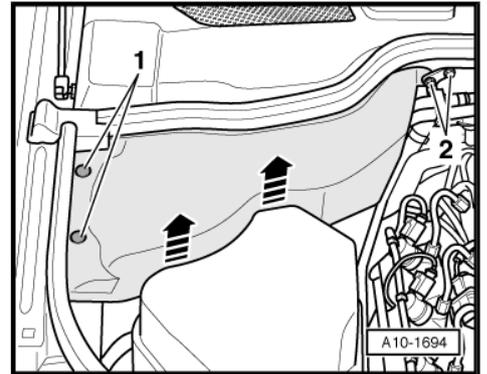


**Note**

*To prevent damage to the air conditioner compressor and refrigerant pipes/hoses, ensure that the pipes and hoses are not stretched, kinked or bent.*



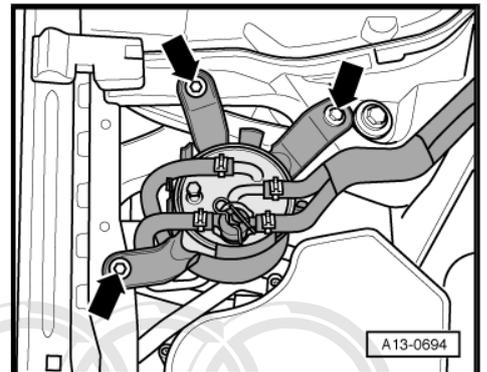
- Remove cover for right suspension turret; to do so, detach spreader clips -1- and unscrew bolted joint -2-.
- Pull cover out of retainers -arrows-.



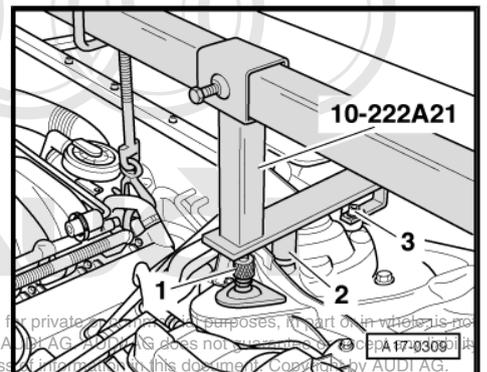
- Remove bolts -arrows- on fuel filter bracket.

 **Note**

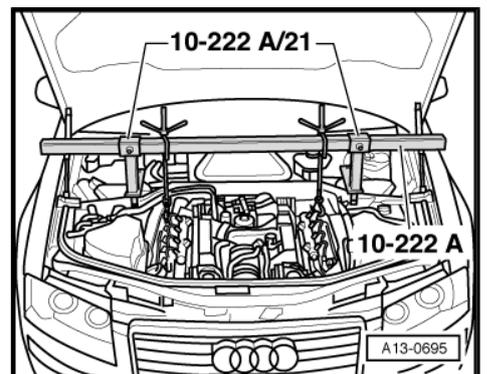
*Fuel filter remains in engine compartment with fuel lines connected.*



- Unscrew rear bolts -3- for body brace.
- Attach the support bracket - 10-222 A- with support - 10-222 A/21- onto the suspension turrets.
- Supports are marked for left and right side of vehicle.
- The centre resting point -2- of supports is positioned on front bolts for body brace.
- The supports - 10-222 A/21- are attached to rear securing bolts -3- for body brace.
- The knurled screw -1- must be screwed down until support plate rests on suspension turret.



- Secure spindles of support bracket - 10-222 A- to rear engine lifting eyes.
- Take up weight of engine on spindles of support bracket (considerable weight has to be supported).

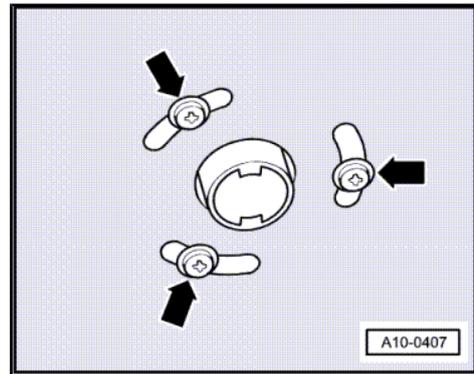


- Remove both front wheels.

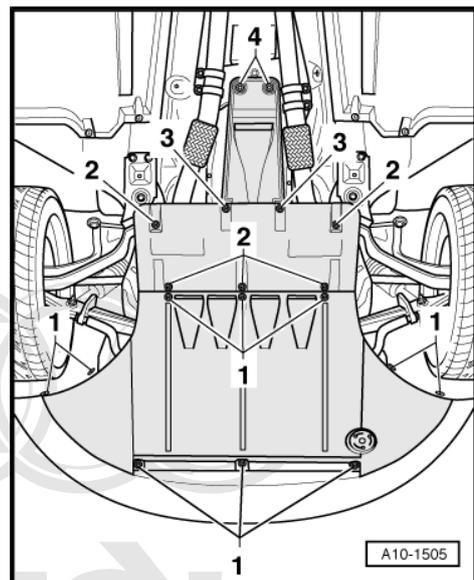
**Note**

Secure brake discs with wheel bolts.

- Vehicles with auxiliary heater: remove bolts -arrows- securing exhaust pipe for auxiliary/additional heater to noise insulation.



- Release fasteners -1-, -2- and -4- and take off noise insulation panels.
- Remove front section of wheel housing liner (front left and front right) ⇒ General body repairs, exterior; Rep. gr. 66 .

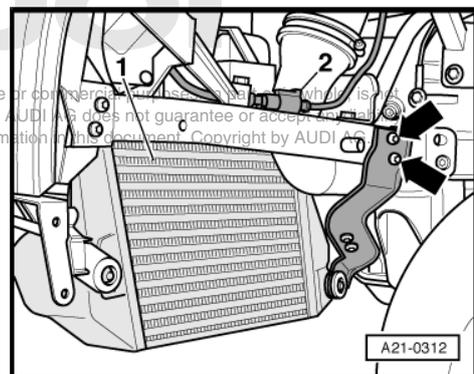


- Remove bolts -arrows- and detach bracket for charge air cooler (left-side).

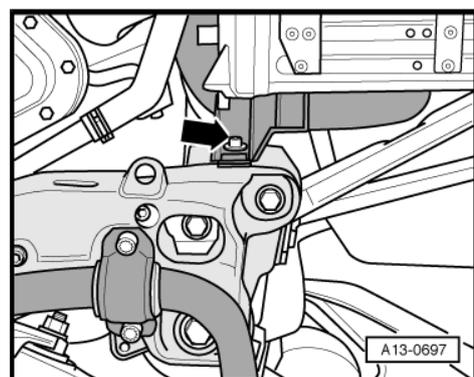
**Note**

Disregard items -1- and -2-.

Protected by copyright. Copying for private or commercial use without the written permission of Audi AG is prohibited. Audi AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by Audi AG.



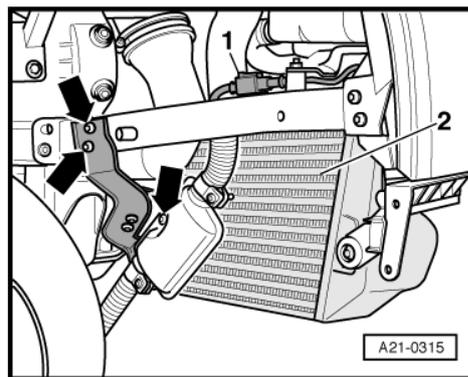
- Remove bolt -arrow- for air intake pipe (left-side).



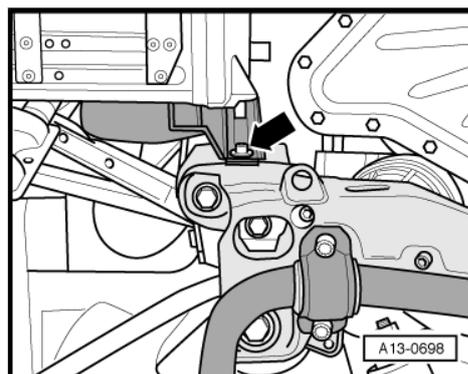
- Remove bolts -arrows- and detach bracket for charge air cooler (right-side).

 **Note**

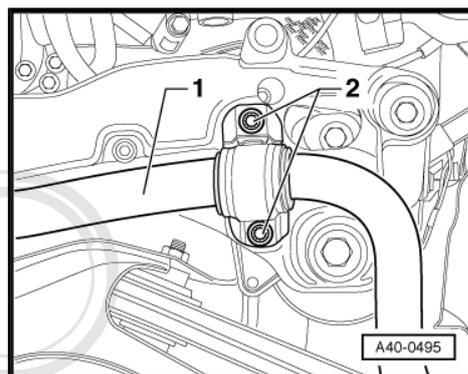
*Disregard items -1- and -2-.*



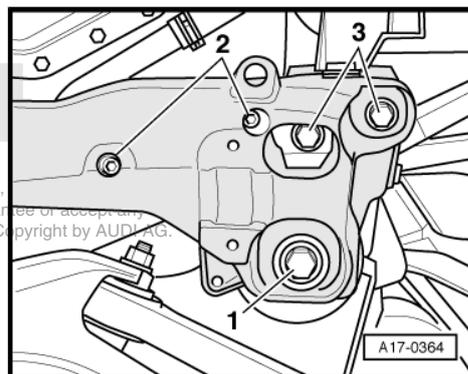
- Remove bolt -arrow- for air intake pipe (right-side).



- Unscrew bolts -2- on anti-roll bar clamps uniformly and remove.
- Pivot anti-roll bar -1- down.



- Remove bolts -1 ... 3-.
- Take out engine cross member.



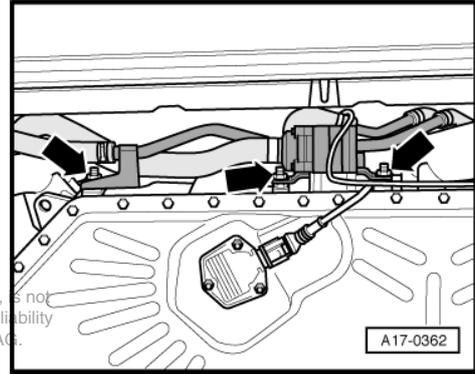
Protected by copyright. Copying for private or commercial purposes, permitted unless authorised by AUDI AG. AUDI AG does not guarantee the accuracy, completeness or acceptability of the information in this document. Copyright by AUDI AG.



- Unscrew nuts -arrows-.
- Pivot fuel cooling pump forwards with pipes/hoses attached.



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



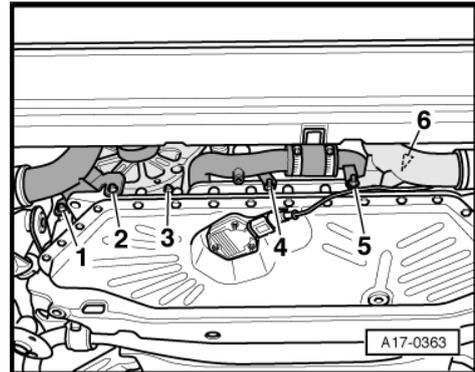
- Then unscrew alternator bolt -3- approx. 2 turns.



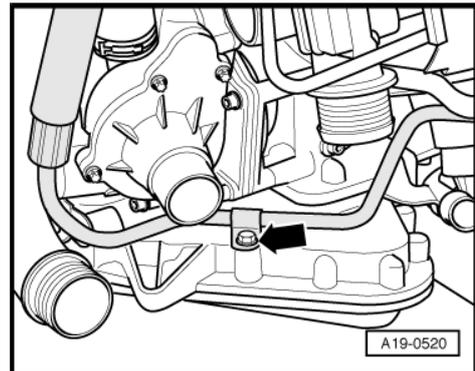
**Note**

*Tap carefully on bolt head with flat side of hammer to release threaded bush of alternator mount.*

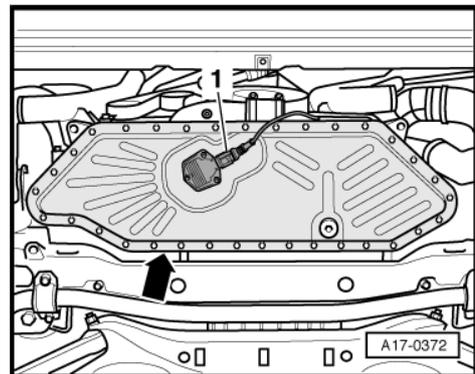
- Remove bolts -1 ... 6-.



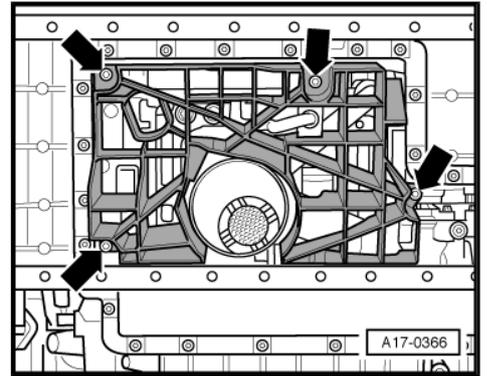
- Unscrew retaining clip -arrow- for power steering hydraulic line at sump (centre section).



- Position used oil collection and extraction unit below engine.
- Drain off engine oil.
- Unplug electrical connector at oil level and oil temperature sender - G266- -item 1-.
- Unbolt sump (bottom section) -arrow-.



- Detach baffle plate -arrows-.



- Unbolt sump (centre section) -1-.

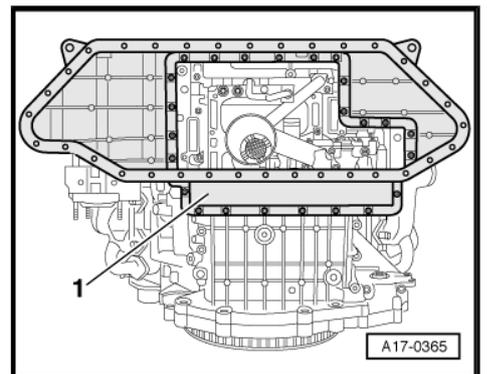
**Installing**

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



*Renew gaskets and seals.*

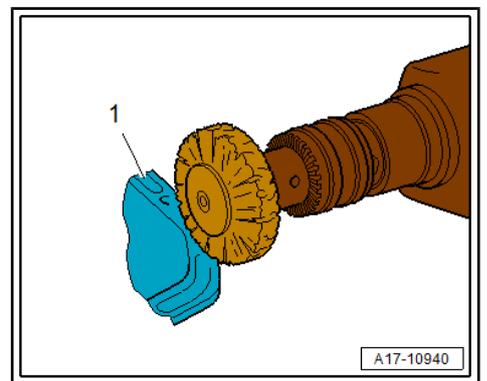
- Also remove old sealant from grooves in sump (top section).



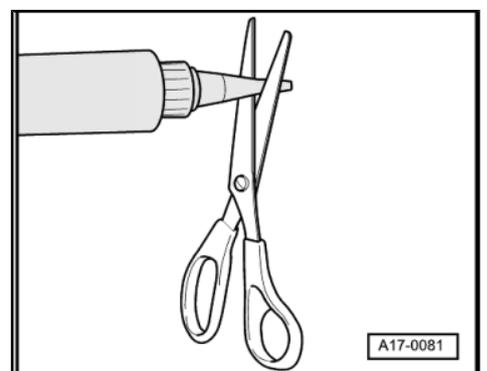


**WARNING**  
*Wear safety goggles.*

- Remove remaining sealant on centre and top section of sump with a rotating plastic brush or similar.
- Clean sealing surfaces; they must be free of oil and grease.



- Cut off nozzle of tube at front marking ( $\varnothing$  of 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.

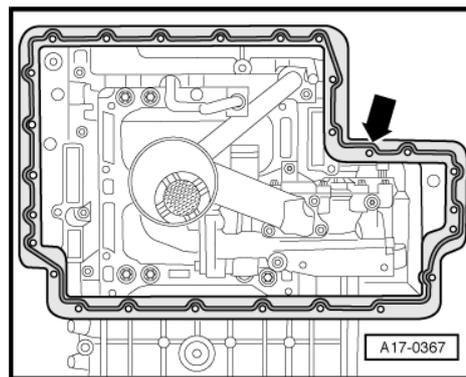


- Apply bead of sealant onto clean sealing surface of sump (top section) as illustrated.
- The circumferential groove -arrow- on the sealing surfaces must be completely filled with sealant.
- The bead of sealant must project 1.5 ... 2.0 mm above the sealing surface.



**Note**

- ◆ *The sealant beads must not be thicker than specified, otherwise excess sealant could enter the sump and clog the strainer in the oil pump.*
- ◆ *The sump (centre section) must be installed within 5 minutes after applying sealant.*



- Fit sump (centre section) and tighten all bolts initially to 5 Nm in diagonal sequence.
- Tighten bolts securing sump (centre section) to 10 Nm in diagonal sequence.
- Install baffle plate.
- Install sump (bottom section) ⇒ [page 175](#) .
- Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 404 .
- Only tighten bolts for subframe to the specified torque (do not turn further); tighten bolts only after performing alignment check ⇒ Running gear, front-wheel and four-wheel drive; Rep. gr. 40 .



**WARNING**

***The vehicle must not be driven at this stage.***

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability for errors or omissions in this document. Copyright by AUDI AG.

- Install anti-roll bar ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 40 .
- Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
- Install body brace ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 47 .
- Perform wheel alignment check ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 44 .



**WARNING**

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

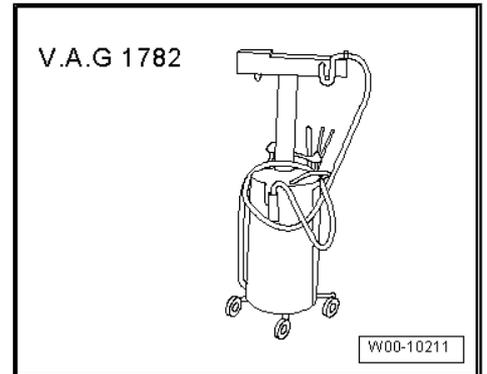
## Tightening torques

Component	Nm
Engine cross member to longitudinal member	68
Sump (bottom section) to sump (top section)	10
Baffle plate to engine	10
Oil drain plug	50

## 1.5 Removing and installing oil pump

### Special tools and workshop equipment required

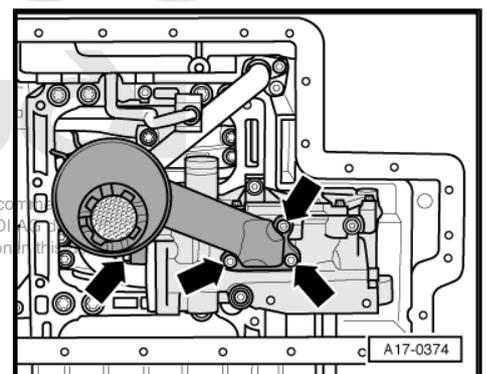
- ◆ Used oil collection and extraction unit - V.A.G 1782- or -VAS 6622A-



- ◆ Long-nose grip pliers - VAS 6226-

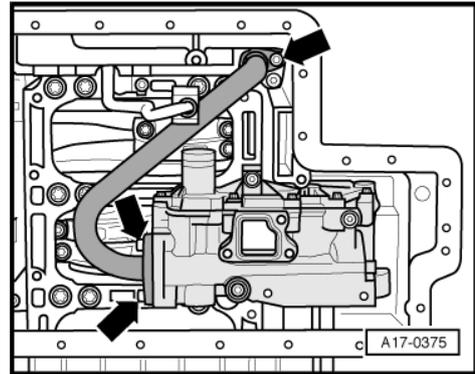
### Removing

- Drain coolant ⇒ [page 209](#) .
- Remove radiator ⇒ [page 234](#) .
- Remove radiator cowl ⇒ [page 239](#) .
- Remove coolant pipes (front) ⇒ [page 222](#) .
- Remove coolant pump ⇒ [page 217](#) .
- Remove centre section of sump ⇒ [page 178](#) .
- Position used oil collection and extraction unit below engine.
- Remove bolts -arrows-.
- Remove intake connecting pipe.

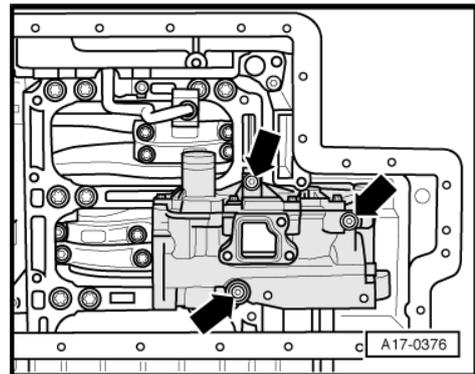


Protected by copyright. Copying for private or commercial use is not permitted unless authorised by AUDI AG. AUDI AG is not liable for any damage with respect to the correctness of information.

- Unscrew bolts -arrows- and remove oil pipe.



- Unscrew bolts -arrows- and remove oil pump.



- Hold oil pump drive shaft -1- firmly with long-nose grip pliers -VAS 6226- and push back against spring pressure.

**Installing**

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

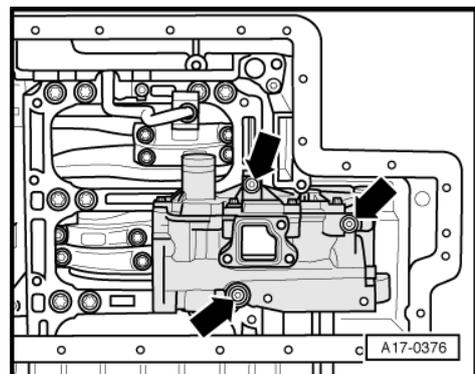
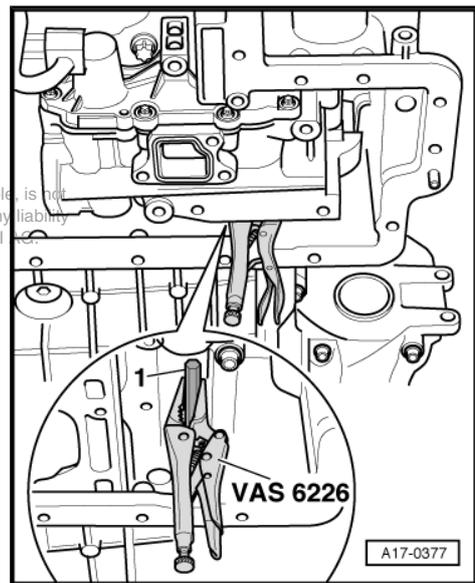


**Note**

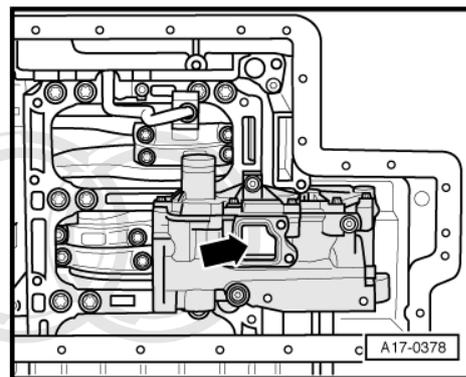
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

*Renew seals and O-rings.*

- Check whether the two dowel sleeves are fitted in the cylinder block; install if necessary.
- Hold oil pump drive shaft -1- firmly with long-nose grip pliers -VAS 6226- and push back against spring pressure.
- Fit oil pump to sump (top section); insert drive shaft into drive mechanism on oil pump when doing so.
- Release the long-nose grip pliers -VAS 6226- and let the drive shaft -1- slide into oil pump.
- Secure the oil pump -arrows-.



- Check to ensure that the drive shaft is positively engaged in the oil pump. Try to turn the oil pump gears by reaching into the opening in the intake pipe -arrow- of oil pump.
- You should not be able to turn the gears.
- Install sump (centre section) ⇒ [page 178](#) .
- Install coolant pump ⇒ [page 217](#) .
- Install coolant pipes (front) ⇒ [page 222](#) .
- Install radiator cowl ⇒ [page 239](#) .
- Install radiator ⇒ [page 234](#) .



**i Note**

*Do not reuse coolant.*

- Fill cooling system ⇒ [page 211](#) .
- Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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**

Component	Nm
Oil pump to cylinder block	10
Oil pipe to sump (top section) and oil pump	10
Intake connecting pipe to oil pump	10

**1.6 Sump (top section) - exploded view**

**1 - Sump (top section)**

- Removing and installing  
⇒ [page 190](#)

**2 - 10 Nm**

- Tighten in stages and in diagonal sequence

**3 - Oil seal**

- For crankshaft (pulley end)
- Renewing ⇒ [page 58](#)

**4 - Sealing flange (front)**

- Removing and installing  
⇒ [page 60](#)

**5 - Sealing element**

- 2x

**6 - 10 Nm**

- Apply locking fluid when fitting
- Locking fluid ⇒ Electronic parts catalogue

**7 - O-ring**

- Renew

**8 - Oil return line**

**9 - 10 Nm**

- Apply locking fluid when fitting
- Locking fluid ⇒ Electronic parts catalogue

**10 - O-ring**

- Renew

**11 - O-ring**

- Renew

**12 - 15 Nm**

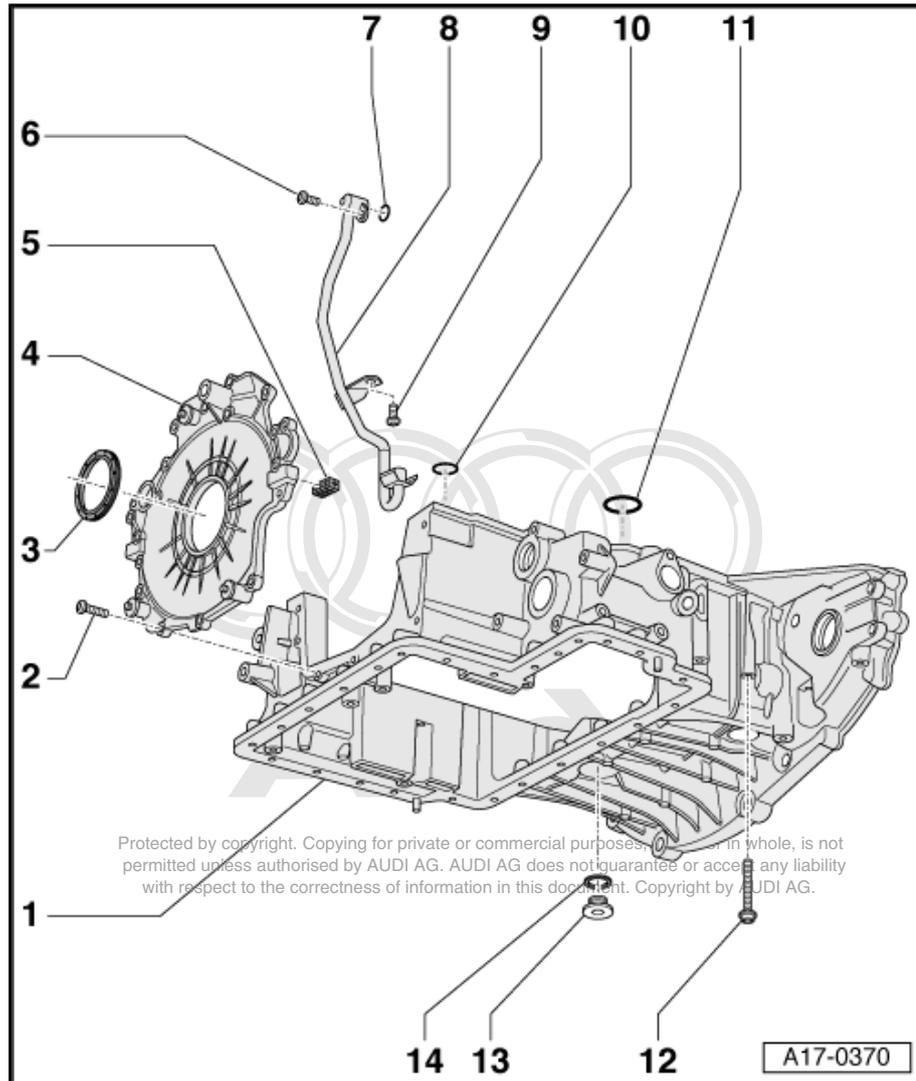
- Tighten in stages and in diagonal sequence

**13 - Screw plug, 35 Nm**

- For TDC bore

**14 - Seal**

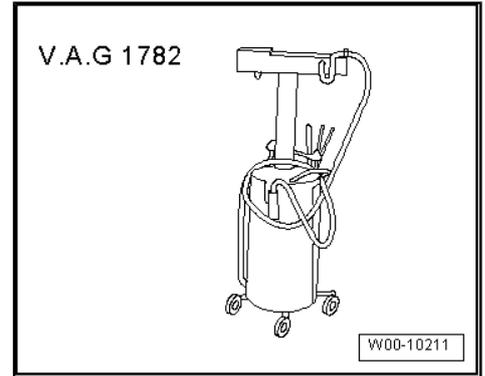
- Renew



## 1.7 Removing and installing sump (top section)

Special tools and workshop equipment required

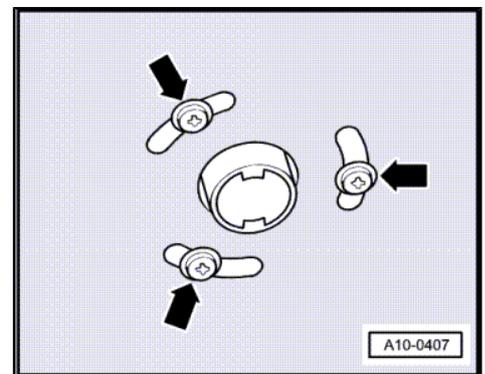
- ◆ Used oil collection and extraction unit - V.A.G 1782- or -VAS 6622A-



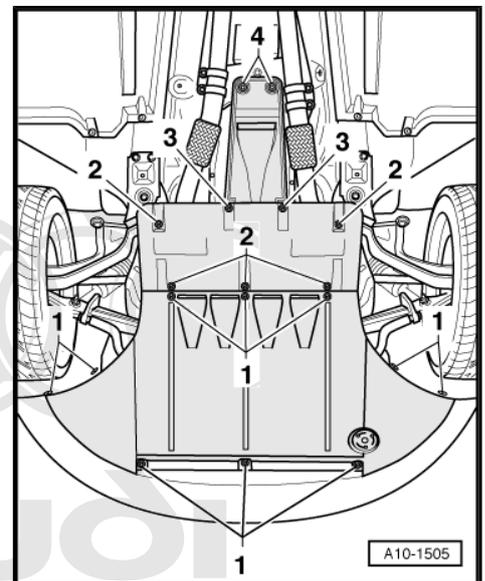
- ◆ Safety goggles
- ◆ Electric drill with plastic brush attachment
- ◆ Sealant → Electronic parts catalogue

### Removing

- Vehicles with auxiliary heater: remove bolts -arrows- securing exhaust pipe for auxiliary/additional heater to noise insulation.



- Release fasteners -1-, -2- and -4- and take off noise insulation panels.
- Position used oil collection and extraction unit below engine.
- Drain off engine oil.
- Remove engine ⇒ [page 7](#) .
- Separate engine from gearbox ⇒ [page 28](#) .
- Remove coolant pipes: front ⇒ [page 222](#) ; left-side ⇒ [page 227](#) ; right-side ⇒ [page 229](#) .
- Remove alternator ⇒ Electrical system; Rep. gr. 27
- Secure engine to engine stand ⇒ [page 33](#) .
- Remove drive plate ⇒ [page 64](#) .
- Remove timing chain covers ⇒ [page 86](#) .
- Remove timing chains from camshafts ⇒ [page 106](#) .
- Remove coolant pump ⇒ [page 217](#) .
- Remove sealing flange (front) ⇒ [page 60](#) .
- Remove sump (bottom section) ⇒ [page 175](#) .
- Remove centre section of sump ⇒ [page 178](#) .
- Remove oil pump ⇒ [page 187](#) .



protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 ... 4- for sump (top section).
- Press sump (top section) off spring pins on cylinder block.

**Installing**



**Note**

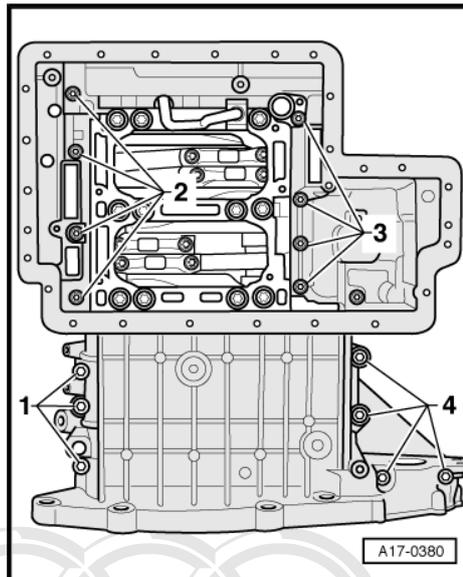
*Renew gaskets, seals and O-rings.*

- Remove old sealant from grooves in sump (top section) and from sealing surfaces.

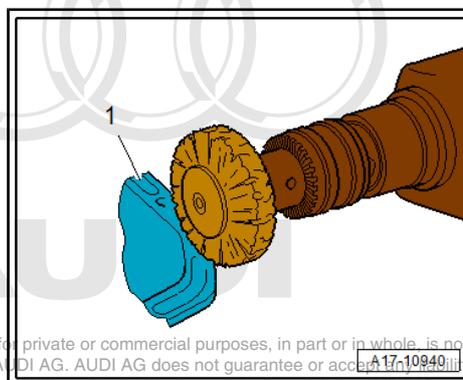


**WARNING**

*Wear safety goggles.*

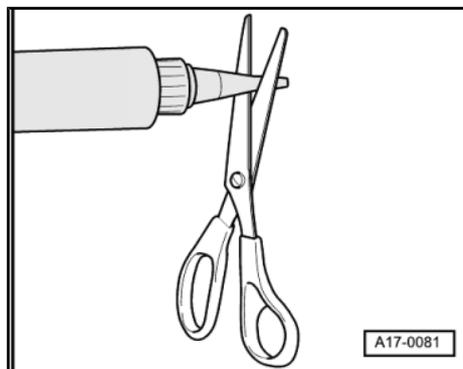


- Remove remaining sealant on sump (top section) and cylinder block using rotating plastic brush or similar.
- Clean sealing surfaces; they must be free of oil and grease.



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

- Cut off nozzle of tube at front marking ( $\varnothing$  of nozzle approx. 2 mm).

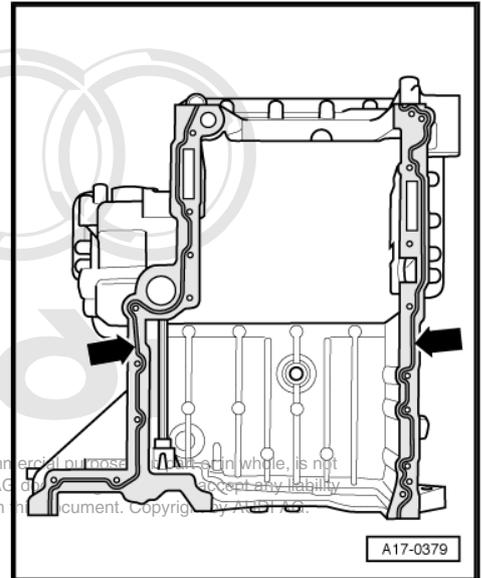


- Apply beads of sealant -arrows- onto clean sealing surface of sump (top section) as illustrated.
- The grooves -arrows- on the sealing surfaces must be completely filled with sealant.
- The beads of sealant must project 1.5 ... 2.0 mm above the sealing surface.

 **Note**

- ◆ *The sealant beads must not be thicker than specified, otherwise excess sealant could enter the sump and clog the strainer in the oil pump.*
- ◆ *The sump (top section) must be installed within 5 minutes after applying sealant.*

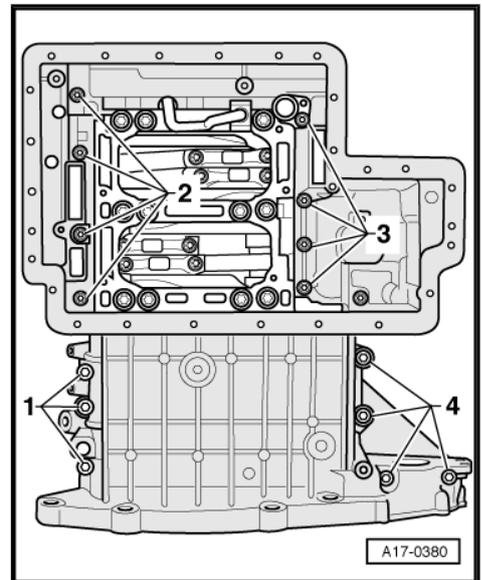
Protected by copyright. Copying for private or commercial purposes, in whole or in part, is not permitted unless authorised by AUDI AG. AUDI AG does not accept any liability with respect to the correctness of information in this document. Copyright by Audi AG



- Fit sump (top section) and tighten bolts -1 ... 4- in diagonal sequence to 5 Nm.
- Tighten bolts 1 ... 4 in diagonal sequence to 15 Nm.

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

- Install oil pump ⇒ [page 187](#) .
- Install sump (centre section) ⇒ [page 178](#) .
- Install sump (bottom section) ⇒ [page 175](#) .
- Install sealing flange (front) ⇒ [page 60](#) .
- Install coolant pump ⇒ [page 217](#) .
- Install camshaft timing chains ⇒ [page 106](#) .
- Install timing chain covers ⇒ [page 86](#) .
- Install drive plate ⇒ [page 64](#) .
- Install alternator ⇒ Electrical system; Rep. gr. 27
- Install coolant pipes: right-side ⇒ [page 229](#) ; left-side ⇒ [page 227](#) ; front ⇒ [page 222](#) .
- Bolt gearbox to engine and install engine/gearbox assembly ⇒ [page 35](#) .
- Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 404 .



**Tightening torque**

Component	Nm
Oil pipes to sump (top section)	10

## 1.8 Oil cooler, pressure control valve, oil filter housing and spray nozzle valve - exploded view

**1 - Gasket**

- Renew

**2 - Mounting plate**

- For oil cooler, pressure control valve of crankcase breather system, oil filter housing and spray nozzle valve
- Removing and installing ⇒ ["1.13 Removing and installing spray nozzle valve", page 203](#)

**3 - O-ring**

- Renew

**4 - Retaining clip****5 - Retaining ring****6 - 10 Nm****7 - Coolant temperature sender - G62-**

- Removing and installing ⇒ [page 233](#)

**8 - Gasket**

- Renew

**9 - Oil cooler**

- See note ⇒ [page 173](#)
- Removing and installing ⇒ [page 195](#)

**10 - 10 Nm****11 - Seal**

- Renew

**12 - Oil temperature sender - G8-**

- Removing and installing ⇒ [page 204](#)
- Tighten to 10 Nm

**13 - Pressure control valve**

- For crankcase breather
- Removing and installing ⇒ [page 198](#)

**14 - 6 Nm****15 - Seal**

- Renew

**16 - O-ring**

- Renew

**17 - Sealing cap, 35 Nm**

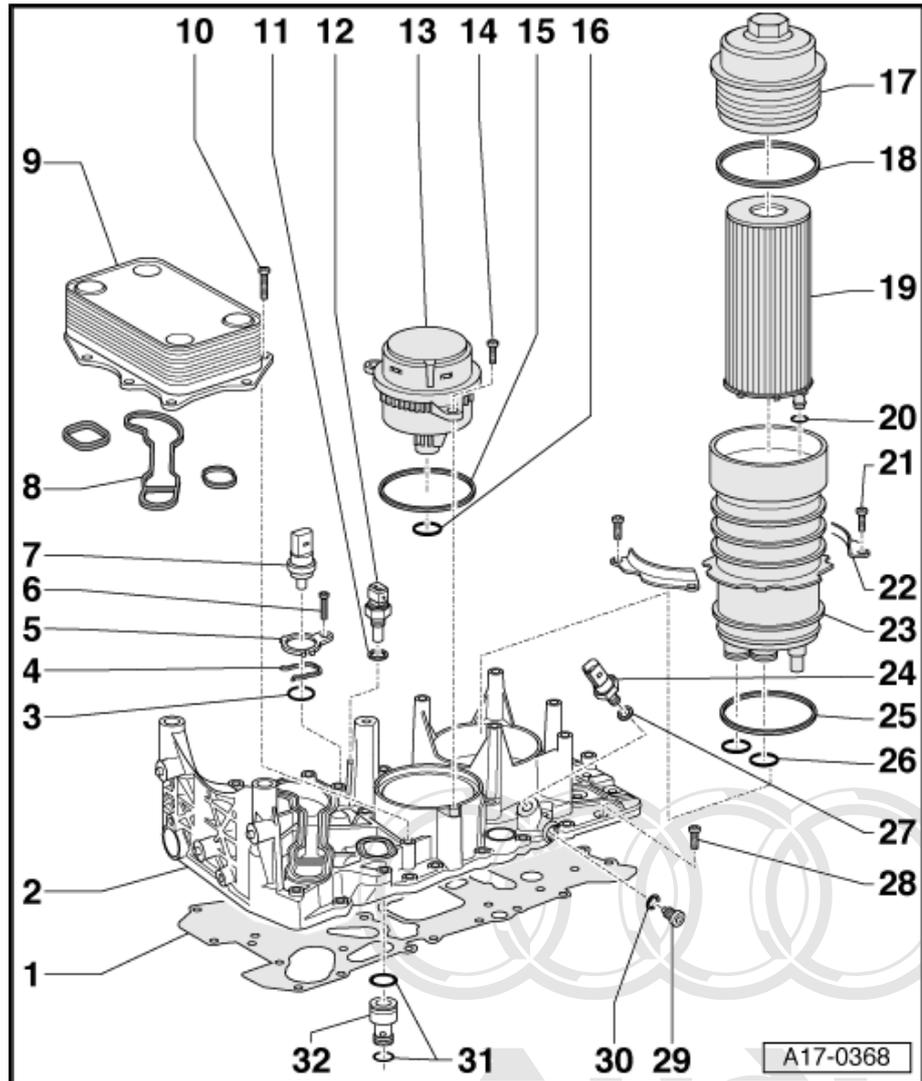
- Loosen and tighten with 32 mm socket

**18 - Seal**

- Renew

**19 - Oil filter element**

- When removing, pull out of sealing cap ⇒ [Item 17 \(page 194\)](#)
- When installing, fit connection at bottom of oil filter element in bore in oil filter housing
- Observe change intervals ⇒ maintenance table



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 - 10 Nm**

**22 - Retaining clip**

**23 - Oil filter housing**

- Removing and installing ⇒ [page 196](#)

**24 - Oil pressure switch - F1- , 0.9 bar**

- Grey insulation
- Removing and installing ⇒ [page 203](#)
- Tighten to 25 Nm
- Checking ⇒ [page 206](#)

**25 - Seal**

- Renew

**26 - O-rings**

- Renew

**27 - Seal**

- Renew

**28 - 10 Nm**

- Tightening sequence: work from inside outwards

**29 - Screw plug, 10 Nm**

**30 - Seal**

- Renew

**31 - O-rings**

- Renew

**32 - Spray nozzle valve**

- Removing and installing ⇒ [page 203](#)



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

## 1.9 Removing and installing oil cooler

### Removing

- Drain coolant ⇒ [page 209](#) .
- Move lock carrier to service position ⇒ [page 42](#) .
- Discharge the refrigerant system ⇒ Air conditioner system - with refrigerant R134a .
- Remove air conditioner compressor ⇒ Air conditioning system; Rep. gr. 87 .
- Remove intake manifold ⇒ Rep. gr. 23 .
- Remove mechanical exhaust gas recirculation valve: left-side ⇒ [page 296](#) ; right-side ⇒ [page 297](#) .
- Remove exhaust gas recirculation cooler: left-side ⇒ [page 298](#) , right-side ⇒ [page 300](#) .



- Spread out rags round oil cooler to catch escaping oil.
- Remove bolts -arrows-.

### Installing

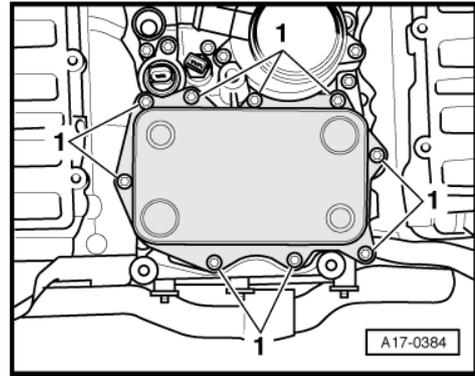
Installation is carried out in the reverse order; note the following:



#### Note

*Renew seals and gaskets.*

- Install exhaust gas recirculation cooler: left-side ⇒ [page 298](#) , right-side ⇒ [page 300](#) .
- Install mechanical exhaust gas recirculation valve: left-side ⇒ [page 296](#) ; right-side ⇒ [page 297](#) .
- Install intake manifold ⇒ Rep. gr. 23 .
- Install air conditioner compressor ⇒ Air conditioning system; Rep. gr. 87 .
- Charge the refrigerant system ⇒ Air conditioner system - with refrigerant R134a .
- Install lock carrier with attachments ⇒ General body repairs, exterior; Rep. gr. 50 .
- Install front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 .
- Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
- Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 404 .



#### Note

*Do not reuse coolant.*

- Fill cooling system ⇒ [page 211](#) .
- Check headlight adjustment ⇒ Maintenance ; Booklet 404 .

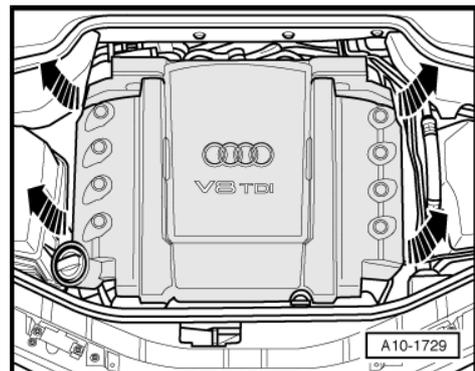
**Tightening torque** Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Component	Nm
Oil cooler to mounting plate	10

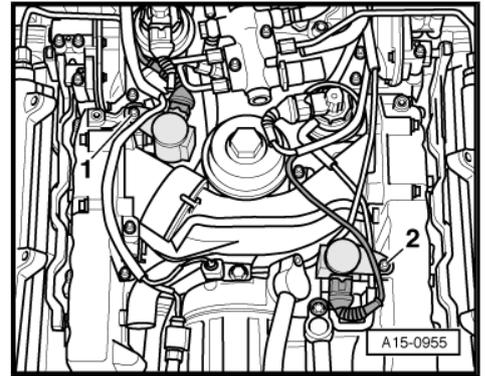
## 1.10 Removing and installing oil filter housing

### Removing

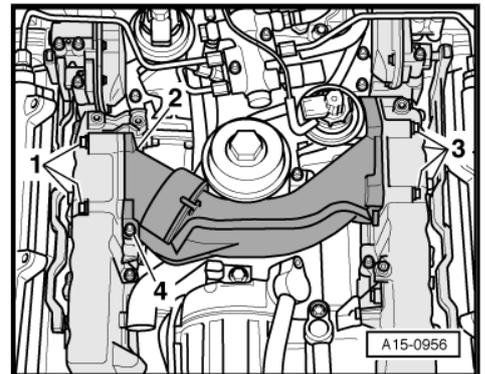
- Carefully pull engine cover panel off four retaining pins one after the other -arrows-.



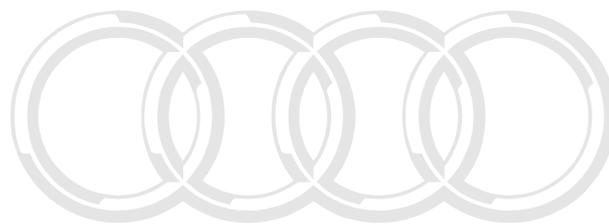
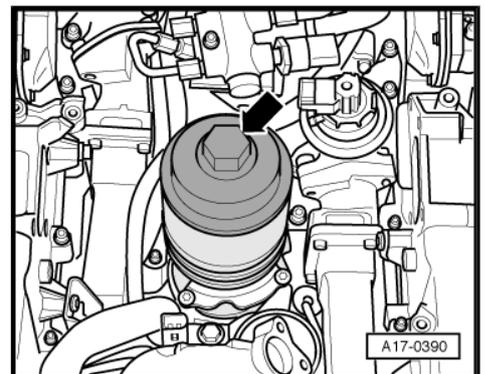
- Unbolt exhaust gas recirculation valve - N18- -item 1- and exhaust gas recirculation valve 2 - N213- -item 2- from intake manifolds.



- Remove bolts -1 ... 4-.
- Take out connecting pipe between left and right intake manifolds.



- Loosen sealing cap -arrow- with 32 mm socket.
- Remove sealing cap together with oil filter element.
- Pull oil filter element off sealing cap.



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.



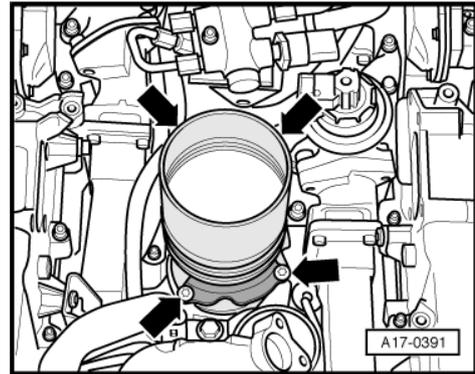
- Unbolt retaining clips -arrows-.
- Spread out rags round oil filter housing to catch escaping oil.
- Pull out oil filter housing.

**Installing**

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

**Note**

*Renew seals and O-rings.*

**Tightening torques**

Component	Nm
Oil filter housing to mounting plate	10
Screw plug to mounting plate	35
Connecting pipe to mounting plate	10
Exhaust gas recirculation valve to intake manifold	10

## 1.11 Removing and installing pressure control valve for crankcase breather system

**Removing**

- Drain coolant ⇒ [page 209](#) .
- Move lock carrier to service position ⇒ [page 42](#) .
- Remove intake manifold (left-side) ⇒ Rep. gr. 23 .
- Remove mechanical exhaust gas recirculation valve (left-side) ⇒ [page 296](#) .
- Remove cooler (left-side) for exhaust gas recirculation ⇒ [page 298](#) .

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

- Detach hose -3- from pressure control valve for crankcase breather system.
- Remove bolts -1- and -2-.
- Take out pressure control valve for crankcase breather system.

### Installing

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

#### 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 cooler (left-side) for exhaust gas recirculation ⇒ [page 298](#) .
- Install mechanical exhaust gas recirculation valve (left-side) ⇒ [page 296](#) .
- Install intake manifold (left-side) ⇒ Rep. gr. 23 .
- Install lock carrier with attachments ⇒ General body repairs, exterior; Rep. gr. 50 .
- Install front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 .
- Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .

#### Note

*Do not reuse coolant.*

- Fill cooling system ⇒ [page 211](#) .
- Check headlight adjustment ⇒ Maintenance ; Booklet 404 .

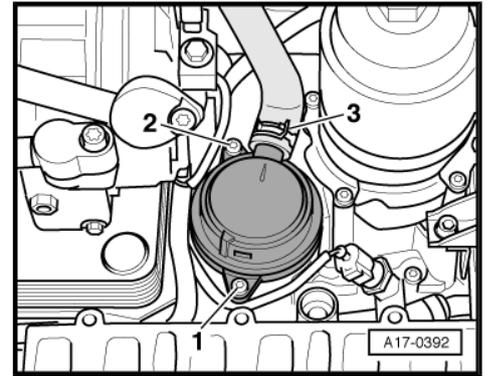
### Tightening torque

Component	Nm
Pressure control valve for crankcase breather system to mounting plate	10

## 1.12 Removing and installing mounting plate for oil cooler, pressure control valve and oil filter housing

### Removing

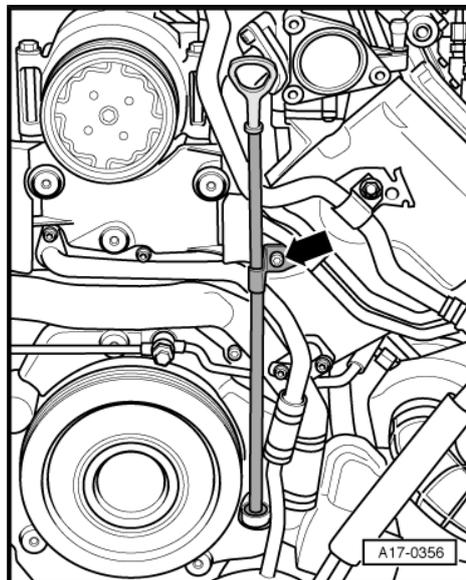
- Drain coolant ⇒ [page 209](#) .
- Move lock carrier to service position ⇒ [page 42](#) .
- Discharge the refrigerant system ⇒ Air conditioner system - with refrigerant R134a .
- Remove air conditioner compressor ⇒ Air conditioning system; Rep. gr. 87 .
- Remove intake manifold ⇒ Rep. gr. 23 .



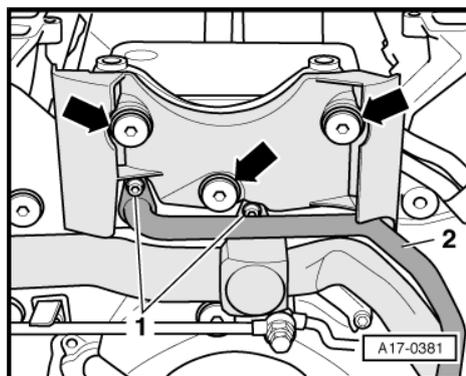
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



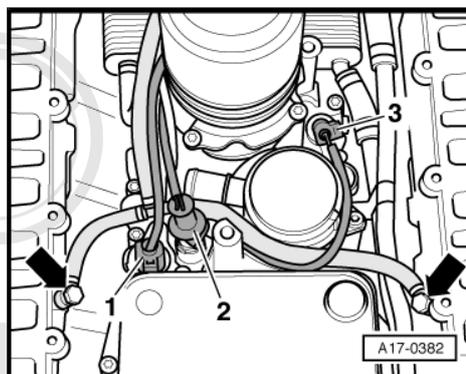
- Remove mechanical exhaust gas recirculation valve: left-side ⇒ [page 296](#) ; right-side ⇒ [page 297](#) .
- Remove exhaust gas recirculation cooler: left-side ⇒ [page 298](#) , right-side ⇒ [page 300](#) .
- Remove toothed belt for high-pressure pump ⇒ Rep. gr. 23 .
- Remove high-pressure pump ⇒ Rep. gr. 23 .
- Remove bolt -arrow-.
- Pull guide tube for oil dipstick out upwards with dipstick still inserted.



- Remove bolts -arrows-.
- Detach mounting plate cover.
- Remove bolts -1-.
- Detach coolant pipe -2- from mounting plate.

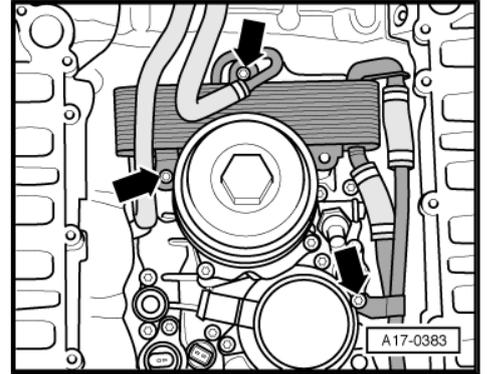


- Unplug electrical connectors -1 ... 3-.
- Unscrew banjo bolts -arrows-.



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.

- Remove bolts -arrows-.
- Move fuel cooler to side (hoses remain attached).

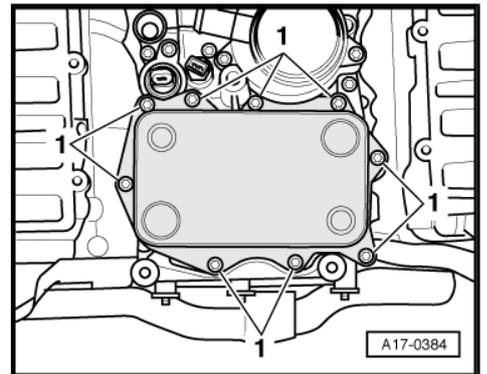


- Spread out rags round oil cooler to catch escaping oil.
- Unscrew bolts -1- and remove oil cooler.



**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.





- Unbolt mounting plate -arrow- at cylinder block.
- Lift off mounting plate.

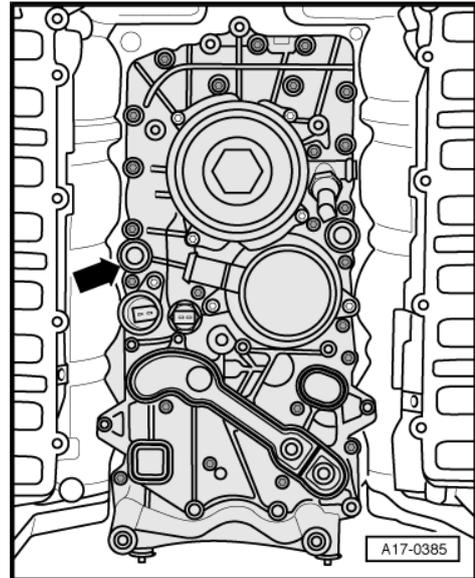
**Installing**

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

**Note**

*Renew gaskets, seals and O-rings.*

- Tighten bolts securing mounting plate from the inside outwards.
- Install high-pressure pump ⇒ Rep. gr. 23 .
- Install toothed belt for high-pressure pump ⇒ Rep. gr. 23 .
- Install exhaust gas recirculation cooler: left-side ⇒ [page 298](#) , right-side ⇒ [page 300](#) .
- Install mechanical exhaust gas recirculation valve: left-side ⇒ [page 296](#) ; right-side ⇒ [page 297](#) .
- Install intake manifold ⇒ Rep. gr. 23 .
- Install air conditioner compressor ⇒ Air conditioning system; Rep. gr. 87 .
- Charge the refrigerant system ⇒ Air conditioner system - with refrigerant R134a .
- Install lock carrier with attachments ⇒ General body repairs, exterior; Rep. gr. 50 .
- Install front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 .
- Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
- Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 404 .

**Note**

*Do not reuse coolant.*

- Fill cooling system ⇒ [page 211](#) .
- Check headlight adjustment ⇒ Maintenance ; Booklet 404 .

**Tightening torques**

Component	Nm
Mounting plate to cylinder block	10
Oil cooler to mounting plate	10
Fuel cooler to mounting plate	10
Coolant pipes for fuel cooler to cylinder block	10
Coolant line to cylinder head	15
Coolant pipes to mounting plate	10
Front cover to mounting plate	6
Guide tube for oil dipstick to bracket	10

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.

## 1.13 Removing and installing spray nozzle valve

### Removing

- Remove mounting plate ⇒ [page 199](#) .
- Pull spray nozzle valve -2- out of cylinder block.
- Remove O-rings -1- and -3- from spray nozzle valve.

### Installing

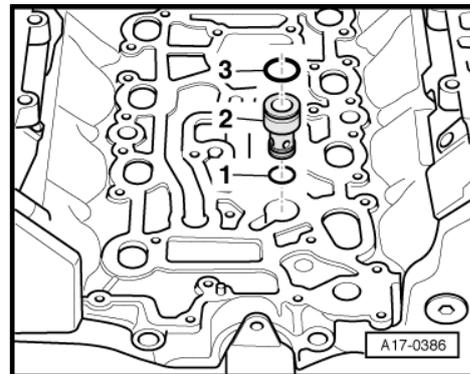
Installation is carried out in the reverse order; note the following:



#### Note

*Renew O-rings.*

- Press spray nozzle valve with new O-rings into cylinder block.
- Install mounting plate ⇒ [page 199](#) .



## 1.14 Removing and installing oil pressure switch - F1-

### Removing

- Drain coolant ⇒ [page 209](#) .
- Move lock carrier to service position ⇒ [page 42](#) .
- Remove intake manifold (left-side) ⇒ Rep. gr. 23 .
- Remove mechanical exhaust gas recirculation valve (left-side) ⇒ [page 296](#) .
- Remove cooler (left-side) for exhaust gas recirculation ⇒ [page 298](#) .



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 -arrow-.
- Unscrew oil pressure switch - F1- .

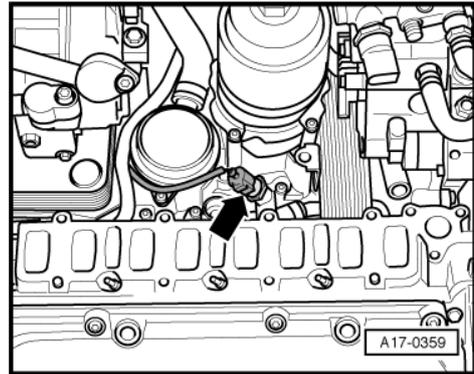
**Installing**

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

**Note**

*Renew seal.*

- Install cooler (left-side) for exhaust gas recirculation  
⇒ [page 298](#) .
- Install mechanical exhaust gas recirculation valve (left-side)  
⇒ [page 296](#) .
- Install intake manifold (left-side) ⇒ Rep. gr. 23 .
- Install lock carrier with attachments ⇒ General body repairs, exterior; Rep. gr. 50 .
- Install front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63
- Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .

**Note**

*Do not reuse coolant.*

- Fill cooling system ⇒ [page 211](#) .
- Check headlight adjustment ⇒ Maintenance ; Booklet 404 .

**Tightening torque**

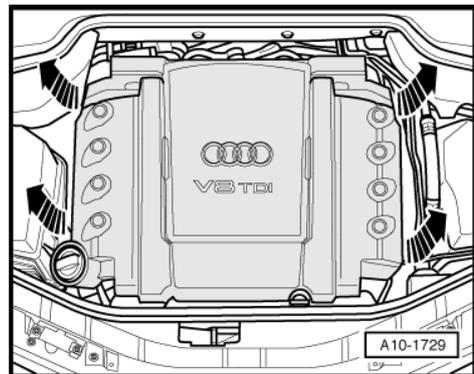
Component	Nm
Oil pressure switch to engine	25

## 1.15 Removing and installing oil temperature sender - G8-

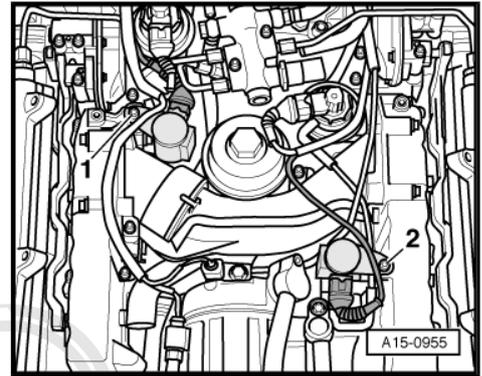
**Removing****Note**

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

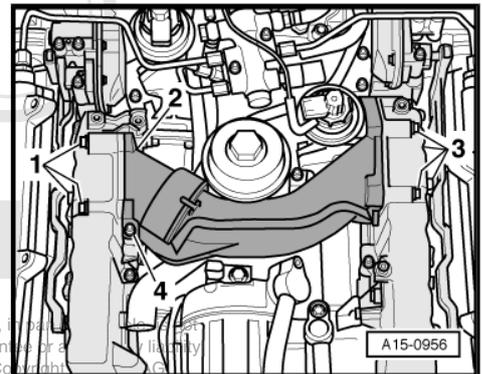
- Carefully pull engine cover panel off four retaining pins one after the other -arrows-.



- Unbolt exhaust gas recirculation valve - N18- -item 1- and exhaust gas recirculation valve 2 - N213- -item 2- from intake manifolds.

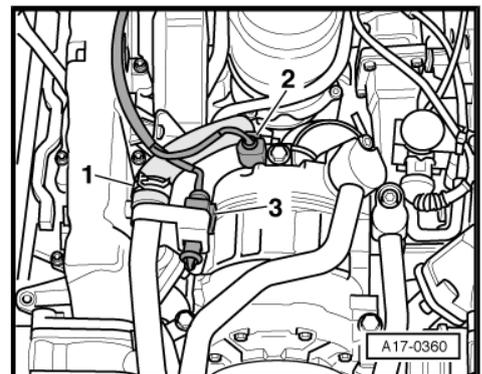


- Remove bolts -1 ... 4-.
- Take out connecting pipe between left and right intake manifolds.



Protected by copyright. Copying for private or commercial purposes, in whole or in part, is prohibited without the written permission of Audi AG. Audi AG does not guarantee the accuracy of the information in this document. Copyright © Audi AG 2013.

- Detach hose -1- from crankcase breather.
- Unplug electrical connectors -2- and -3-.





- Unplug electrical connector -arrow- at oil temperature sender - G8- .
- Remove oil temperature sender.

**Note**

Shown in illustration with air conditioner compressor removed.

**Installing**

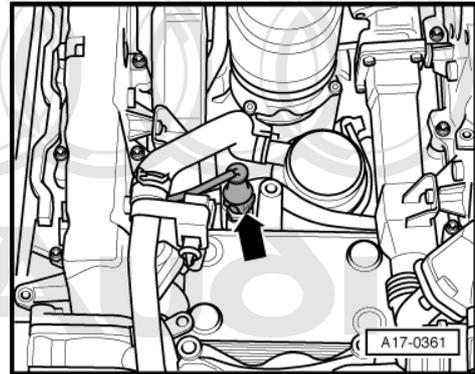
Installation is carried out in the reverse order; note the following:

**Note**

- ◆ *Renew seal.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- ◆ *Reinstall all cable ties in the same locations when assembling.*

**Tightening torques**

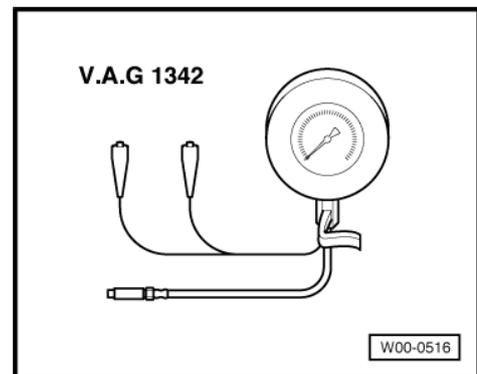
Component	Nm
Connecting pipe to intake manifold	10
Exhaust gas recirculation valve to intake manifold	10



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

**1.16 Checking oil pressure****Special tools and workshop equipment required**

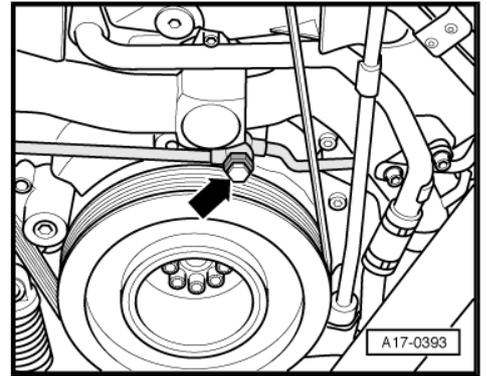
- ◆ Oil pressure tester - V.A.G 1342- with adapter for oil pressure tester - V.A.G 1342/17-

**Test requirements**

- Oil level OK
- Engine oil temperature approx. 80 °C

### Checking oil pressure

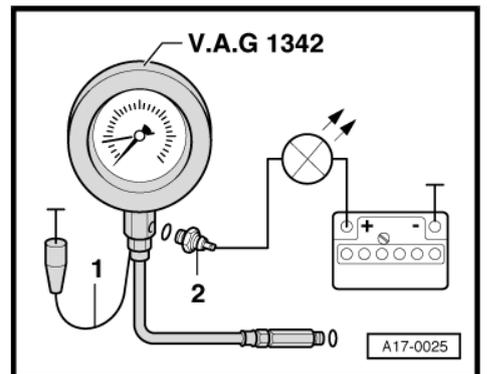
- Move lock carrier to service position ⇒ [page 42](#) .
- Remove screw plug -arrow-.
- Fit adapter - V.A.G 1342/17- .



- Connect oil pressure tester - V.A.G 1342- to adapter.
- Screw oil pressure switch -2- into oil pressure tester - V.A.G 1342- .
- Start engine (engine oil temperature approx. 80 °C).
- Oil pressure at idling speed: at least 0.8 bar
- Oil pressure at 2000 rpm: at least 2.0 bar
- Oil pressure at higher engine speeds: max. 7.0 bar

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

- If the specifications are not obtained:**
- Pressure relief valve or oil pump defective, renew oil pump ⇒ [page 187](#) .



### Assembling

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



#### Note

*Renew seals.*

- Install lock carrier with attachments ⇒ General body repairs, exterior; Rep. gr. 50 .
- Install front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 .
- Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
- Check headlight adjustment ⇒ Maintenance ; Booklet 404 .

### Tightening torques

Component	Nm
Screw plug in banjo bolt	22

## 1.17 Engine oil

Refer to ⇒ Maintenance tables for engine oil capacity, oil specifications and viscosity grades.

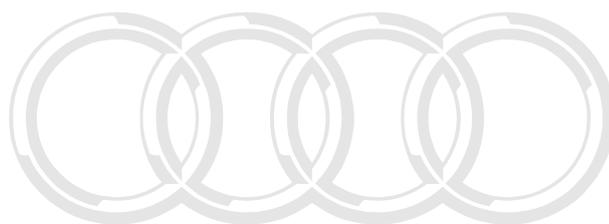
## 1.18 Checking oil level

Check oil level ⇒ Maintenance ; Booklet 404 .



**Note**

*The oil level must not be above the max. mark – otherwise the catalytic converter can be damaged.*



**Audi**

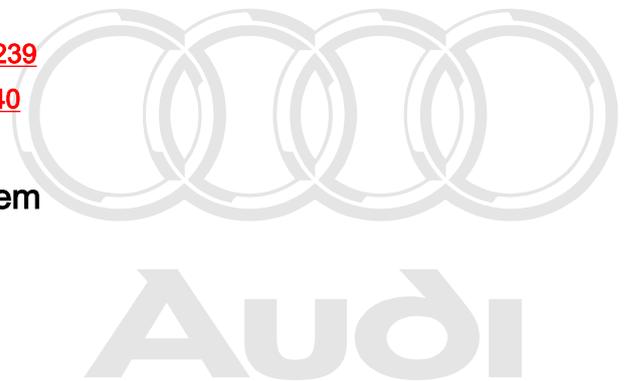
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

## 19 – Cooling

### 1 Removing and installing parts of cooling system

- ⇒ [“1.1 Draining and filling cooling system”, page 209](#)
- ⇒ [“1.2 Coolant pump and thermostat - exploded view”, page 215](#)
- ⇒ [“1.3 Removing and installing coolant pump”, page 217](#)
- ⇒ [“1.4 Removing, installing and checking thermostat”, page 220](#)
- ⇒ [“1.5 Checking thermostat”, page 221](#)
- ⇒ [“1.6 Removing and installing coolant pipes \(front\)”, page 222](#)
- ⇒ [“1.7 Removing and installing coolant pipe \(left-side\)”, page 227](#)
- ⇒ [“1.8 Removing and installing coolant pipe \(right-side\)”, page 229](#)
- ⇒ [“1.9 Removing and installing coolant pipe \(rear\)”, page 229](#)
- ⇒ [“1.10 Removing and installing coolant temperature sender G62”, page 233](#)
- ⇒ [“1.11 Radiator and radiator fans - exploded view of components”, page 233](#)
- ⇒ [“1.12 Removing and installing radiator”, page 234](#)
- ⇒ [“1.13 Removing and installing radiator cowl”, page 239](#)
- ⇒ [“1.14 Removing and installing radiator fan”, page 240](#)
- ⇒ [“1.15 Checking cooling system for leaks”, page 241](#)

#### 1.1 Draining and filling cooling system

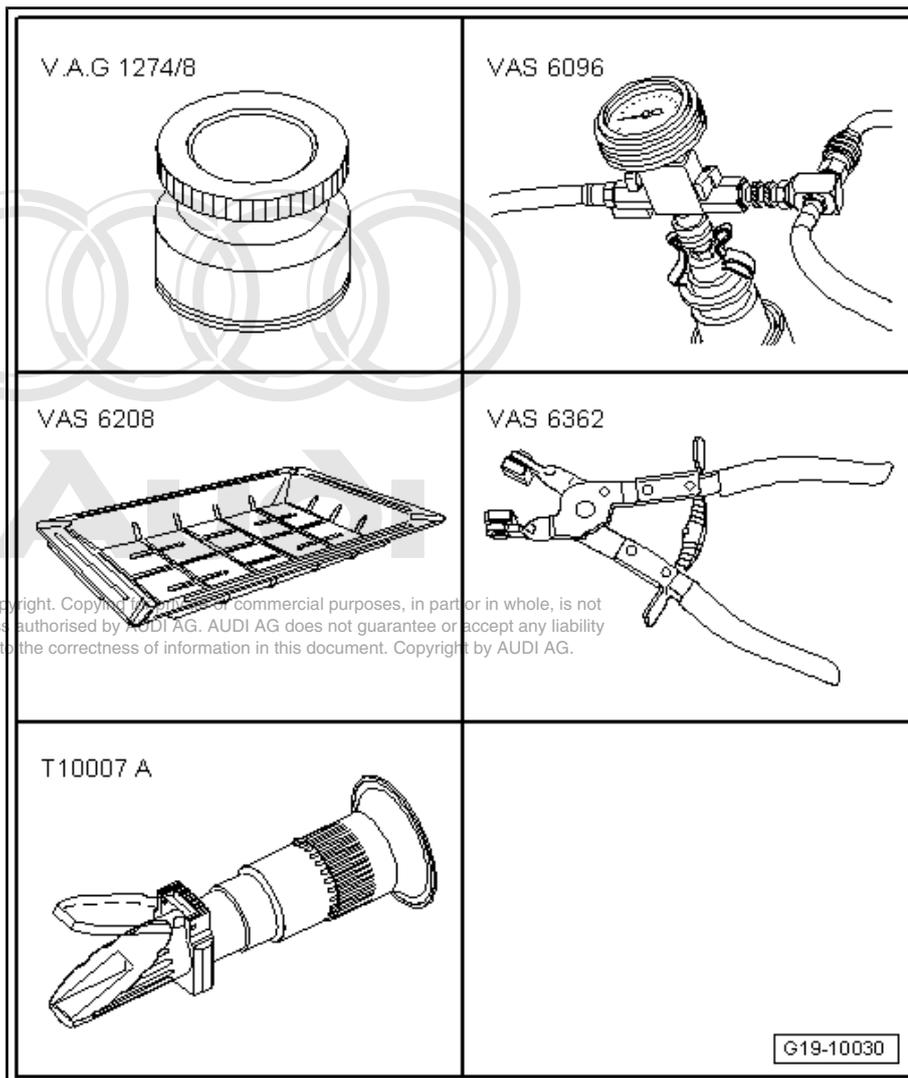


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



### Special tools and workshop equipment required

- ◆ Adapter for cooling system tester - V.A.G 1274/8-
- ◆ Cooling system charge unit - VAS 6096-
- ◆ Drip tray for workshop hoist - VAS 6208-
- ◆ Hose clip pliers - VAS 6362-
- ◆ Refractometer - T10007 A-
- ◆ Safety goggles
- ◆ Protective gloves



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

### Draining

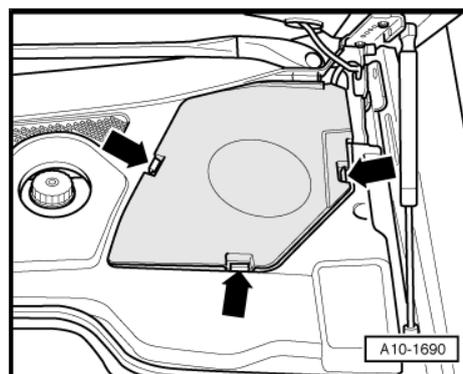
- Activate jacking mode => Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
- Remove cover above coolant expansion tank -arrows-



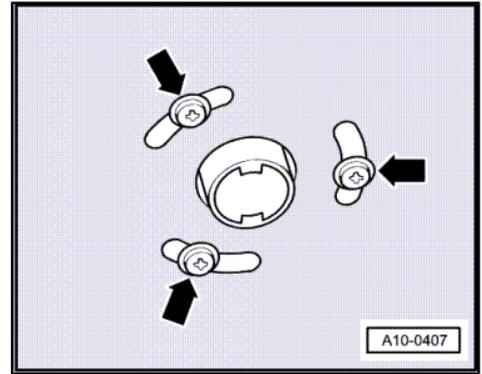
**WARNING**

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

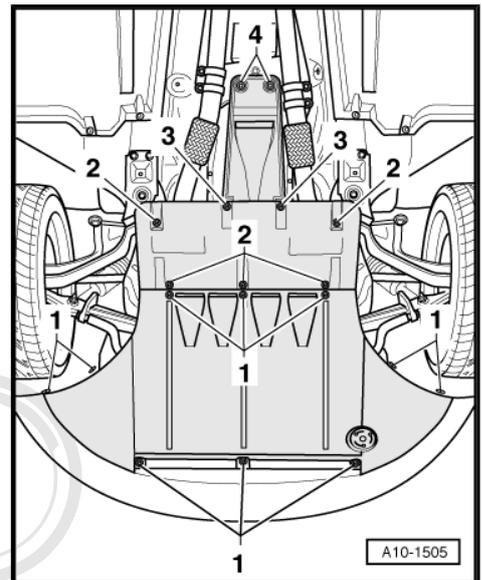
- Open filler cap on coolant expansion tank.



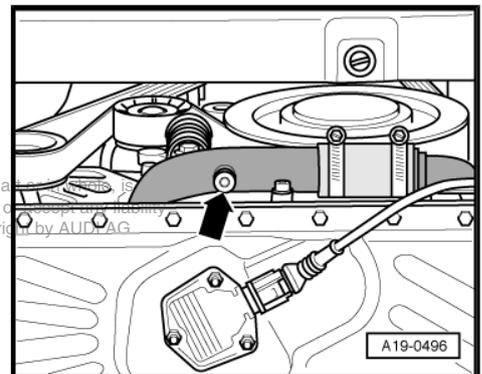
- Vehicles with auxiliary heater: remove bolts -arrows- securing exhaust pipe for auxiliary/additional heater to noise insulation.



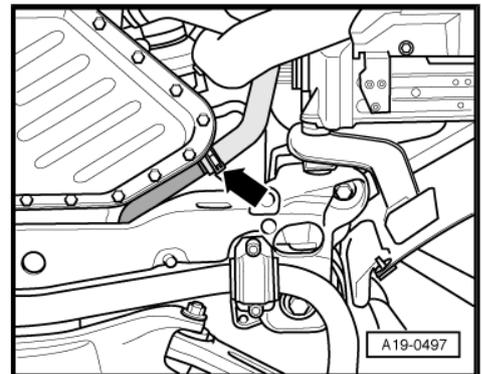
- Open quick-release fasteners -1- and remove noise insulation (front).
- Place drip tray for workshop hoist - VAS 6208- beneath engine.



- Remove drain plug -arrow- and let coolant drain.

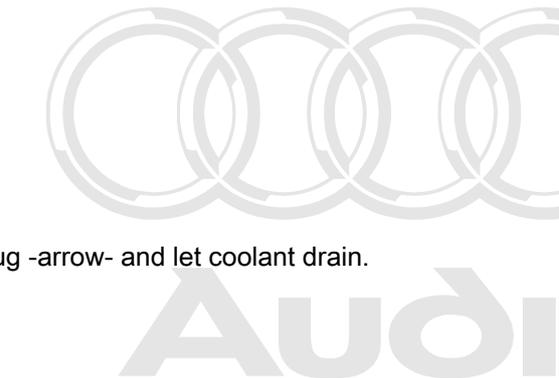


- Disconnect coolant hose -arrow- from coolant pipe and drain off remaining coolant from engine.



**Filling**

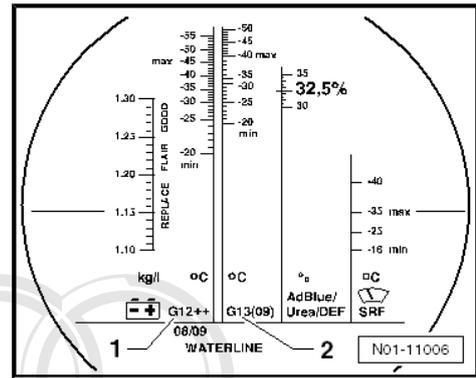
 **Caution**  
*Always use distilled water for mixing coolant additives as this ensures optimum corrosion protection.*



Protected by copyright. Copying for private or commercial purposes, in part or in full, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee the accuracy of the information with respect to the correctness of information in this document. Copyright 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) . Other coolant additives could seriously impair in particular the anti-corrosion properties. 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 -25 °C (in countries with arctic climate: down to -36 °C). The amount of antifreeze can only be increased if greater frost protection is required in very cold climates. This must only be up 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.*

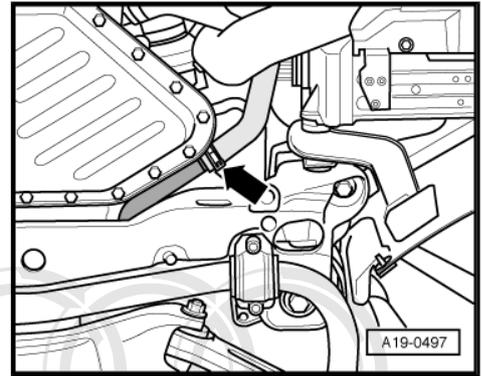


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted, unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

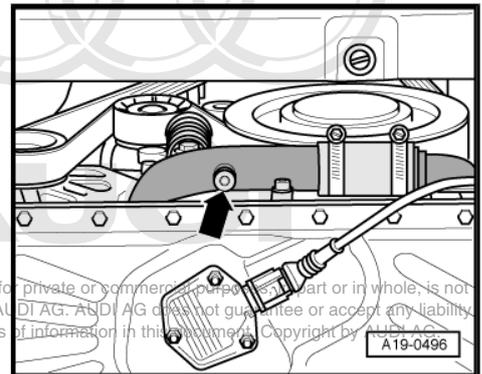
**Recommended mixture ratio for coolant**

- Coolant (40 %) and water (60 %) for frost protection to -25 °C
- Coolant (50 %) and water (50 %) for frost protection to -36 °C
- Coolant: ⇒ Electronic parts catalogue (ETKA)

- Fit coolant hose -arrow- onto coolant pipe.

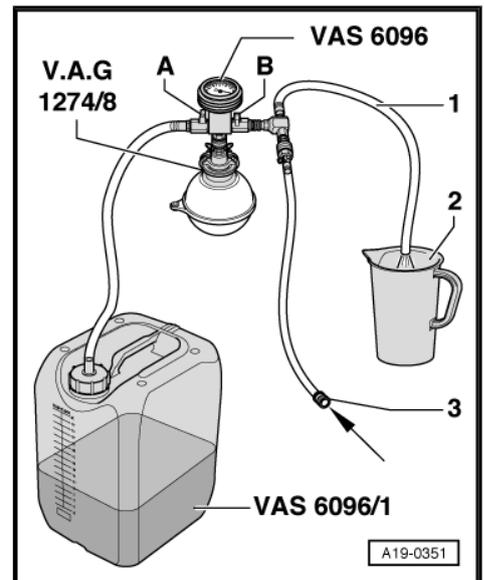


- Install drain plug -arrow- with new seal.



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

- Fill reservoir - VAS 6096/1- with at least 17 litres of premixed coolant (based on recommended ratio).
- Screw adapter for cooling system tester - V.A.G 1274/8- onto coolant expansion tank.
- Attach cooling system charge unit - VAS 6096- onto adapter - V.A.G 1274/8- .
- Run vent hose -1- into a small container -2-. (The vented air draws along a small amount of coolant, which should be collected.)
- Close the two valves -A- and -B- by setting lever at right angle to direction of flow.
- Connect hose -3- to compressed air.
- Pressure: 6 ... 10 bar.





- 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 - VAS 6096/1- can fill with coolant.
- Close valve -A- again.
- Leave valve -B- open for another 2 minutes.
- The suction jet pump will continue generating a vacuum in the cooling system.
- The needle on the gauge should remain in the green zone.
- Close valve -B-.
- The needle on the gauge should stop in the green zone. The vacuum level in the cooling system is then sufficient for subsequent filling.

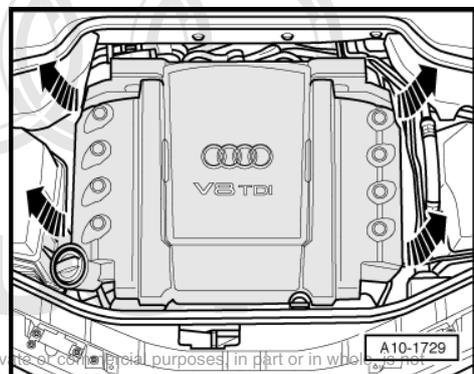
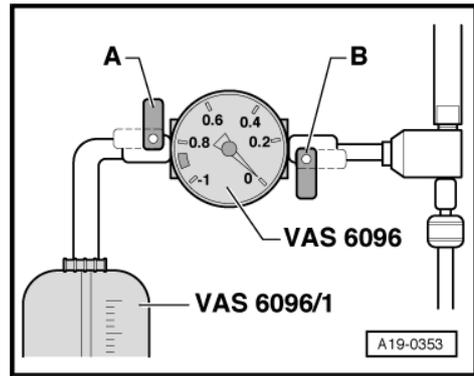
If the needle does not reach the green zone, repeat the process.

If the vacuum level drops, there is a leak in the cooling system.

- Detach compressed air hose.
- Open valve -A-.

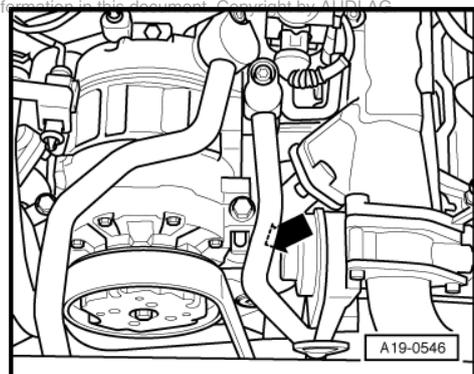
The partial vacuum in the cooling system causes the coolant to be drawn up out of the reservoir - VAS 6096/1- ; the cooling system is then filled.

- Detach cooling system charge unit - VAS 6096- from expansion tank.
- Carefully pull engine cover panel off four retaining pins one after the other -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.

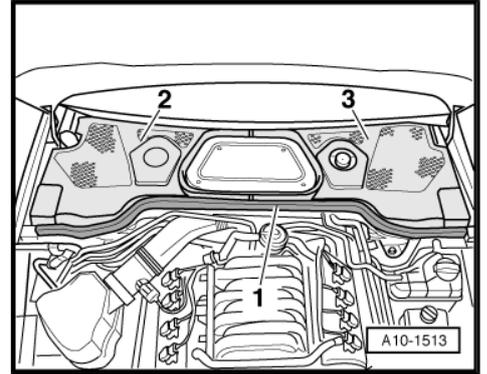
- Unscrew bleeder screw -arrow- for fuel cooling system.
- Fill up with coolant until it flows out at bleeder hole free of bubbles.
- Close the bleeder screw.
- If fitted, unscrew bleeder screw on radiator and fill up with coolant until it comes out at bleeder screw.



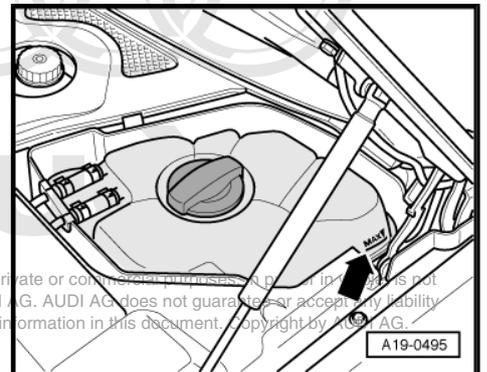
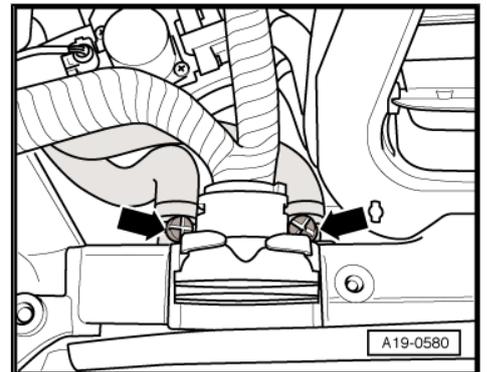
- Pull off rubber seal -1- on plenum chamber covers.
- Detach plenum chamber cover -2-.

 **Note**

*Disregard -item 3-.*



- Open bleeder screws -arrows-.
- Fill up with coolant until it flows out at bleeder holes in coolant hoses.
- Close the bleeder screws.
- On vehicles with auxiliary heater, switch heater on (for about 30 seconds) and then off again.
- Tighten filler cap on expansion tank.
- Start engine.
- Set heater/air conditioner on both sides to "HI".
- Run the engine for 3 minutes at 2000 rpm.
- Allow the engine to run at idling speed until the two large coolant hoses at main radiator become warm.
- Run the engine for 1 minute at 2000 rpm.
- Switch off ignition and allow engine to cool down.
- 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.
- Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .



**Tightening torque**

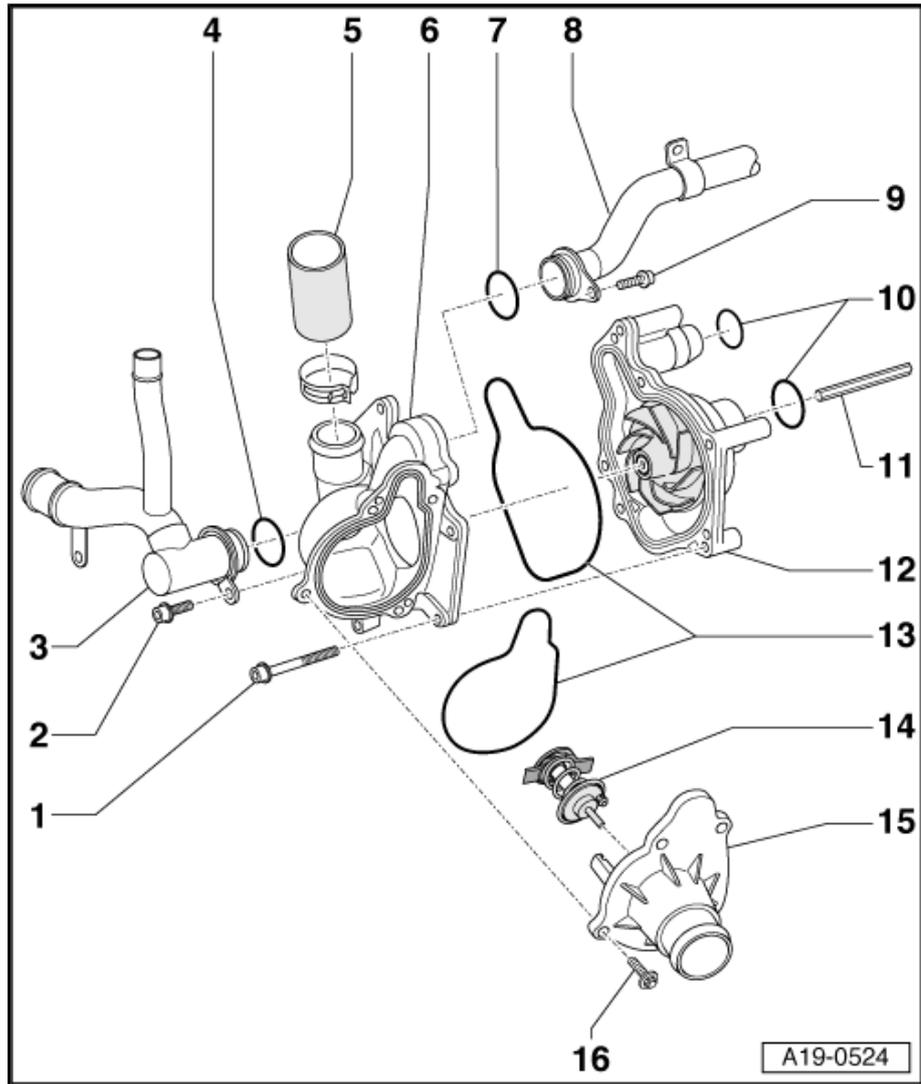
Component	Nm
Bleeder screw to coolant pipe	8

**1.2 Coolant pump and thermostat - exploded view**

 **Note**

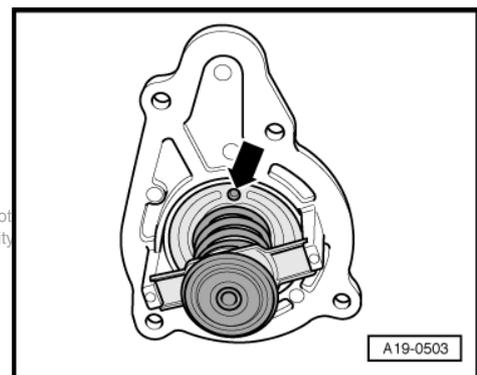
*The arrow markings on coolant pipes and on ends of hoses must align.*

- 1 - 9 Nm
- 2 - 9 Nm
- 3 - Coolant pipe (front)
  - Removing and installing ⇒ [page 222](#)
- 4 - O-ring
  - Renew
- 5 - Coolant hose
- 6 - Housing
  - For coolant pump
  - Removing and installing ⇒ [page 217](#)
- 7 - O-ring
  - Renew
- 8 - Coolant pipe (left-side)
  - Removing and installing ⇒ [page 227](#)
- 9 - 10 Nm
- 10 - O-rings
  - Renew
- 11 - Drive shaft
  - For coolant pump
- 12 - Coolant pump
  - Removing and installing ⇒ [page 217](#)
- 13 - Seals
  - Renew
- 14 - Thermostat
  - Spare part available only with ⇒ [Item 15 \(page 216\)](#)
  - Removing and installing ⇒ [page 220](#)
  - Installation position ⇒ [page 216](#)
- 15 - Housing
  - Spare part available only with ⇒ [Item 14 \(page 216\)](#)
  - For thermostat
  - Removing and installing ⇒ [page 220](#)
- 16 - 9 Nm



**Installation position of thermostat**

- Bleed valve -arrow- facing upwards

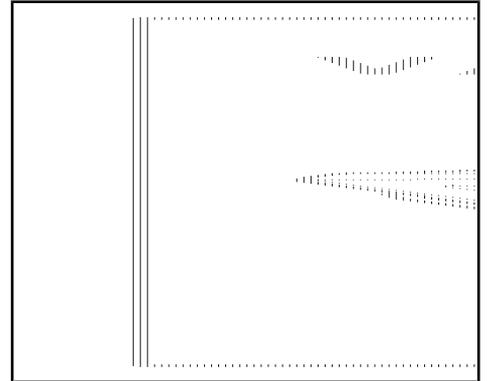


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

### 1.3 Removing and installing coolant pump

#### Special tools and workshop equipment required

- ◆ Drip tray for workshop hoist - VAS 6208-



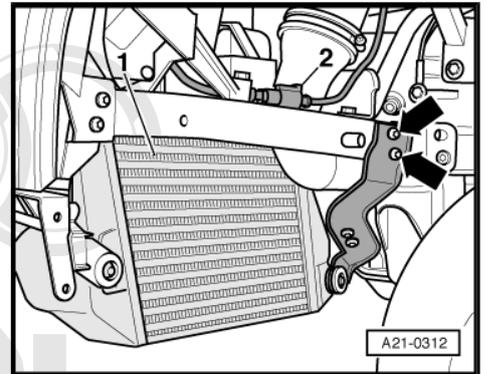
#### Removing



#### Note

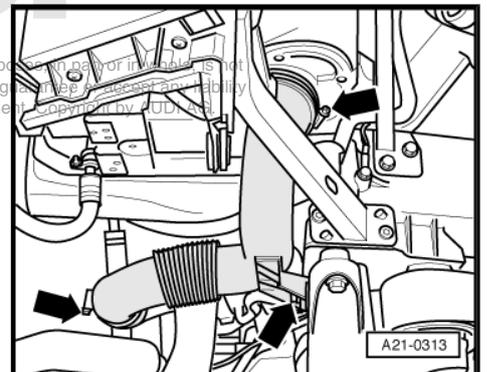
*All cable ties which are released or cut open when removing must be refitted in the same position when installing.*

- Drain coolant ⇒ [page 209](#) .
- Remove radiator ⇒ [page 234](#) .
- Remove radiator cowl ⇒ [page 239](#) .
- Remove coolant pipes (front) ⇒ [page 222](#) .
- Unplug electrical connector -2-.
- Remove bolts -arrows- and detach bracket for charge air cooler.
- Take off charge air cooler -1- (left-side).



- Remove air intake hose between air cleaner and turbocharger (left-side) -arrows-.

Protected by copyright. Copying for private or commercial purposes without the prior written permission of Audi AG is not permitted unless authorised by AUDI AG. AUDI AG does not give any warranty or liability with respect to the correctness of information in this document. Copyright by AUDI AG.



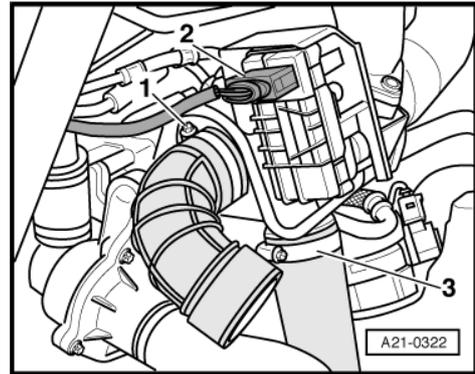


- Detach air intake hoses -1- and -3- at turbocharger (left-side).

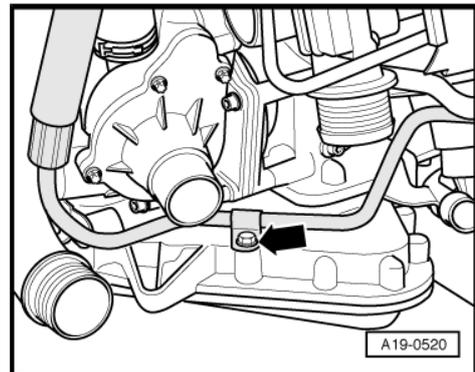


**Note**

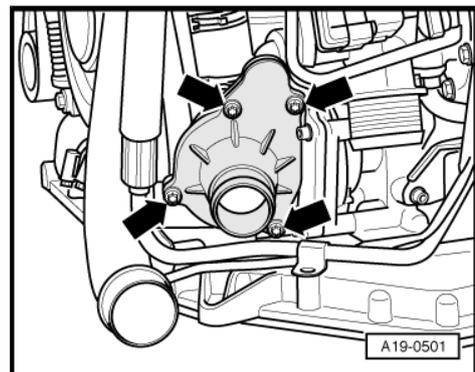
*The electrical connector -2- remains connected.*



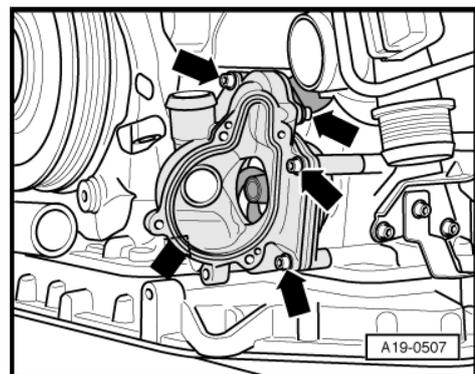
- Unscrew retaining clip -arrow- for power steering hydraulic line at sump.



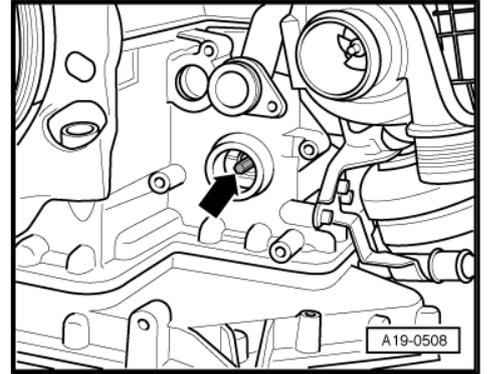
- Remove bolts -arrows-.
- Remove thermostat housing.



- Remove bolts -arrows-.
- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Pull off coolant pump housing forwards (note the drive shaft for coolant pump).



- Remove drive shaft -arrow- for coolant pump from the guide on oil pump.



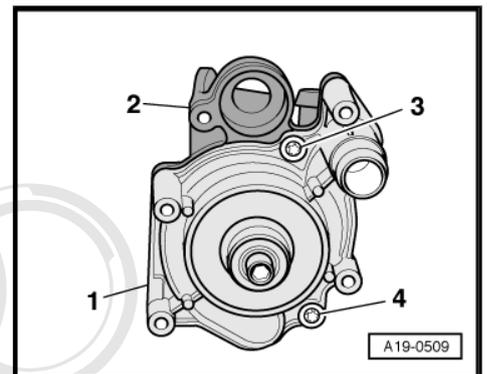
- Remove bolts -3- and -4-.
- Remove coolant pump -1- from housing -2-.

### Installing

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

#### Note

- ◆ *Renew seals and O-rings.*
- ◆ *Hose connections and hoses for charge air system must be free of oil and grease before assembly.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- ◆ *Reinstall all cable ties in the same locations when assembling.*



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

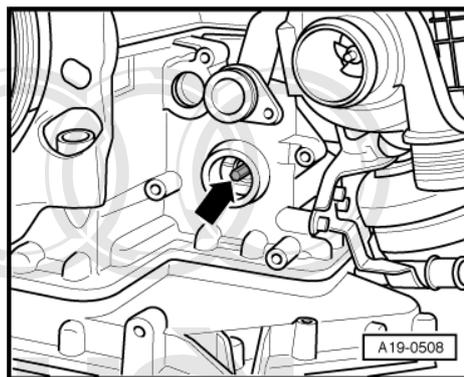


- Insert drive shaft -arrow- for coolant pump in the mounting for the oil pump on engine.
- Fit coolant pump in mounting on sump (top section).

**Note**

To fit the drive flange onto the hexagon flats of the drive shaft, use your finger to turn the impeller of coolant pump until the coolant pump can be pressed on all the way.

- Install thermostat ⇒ [page 220](#) .
- Install coolant pipes (front) ⇒ [page 222](#) .
- Install poly V-belt ⇒ [page 55](#) .
- Install radiator cowl ⇒ [page 239](#) .
- Install radiator ⇒ [page 234](#) .



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 reuse coolant.

- Fill cooling system ⇒ [page 211](#) .

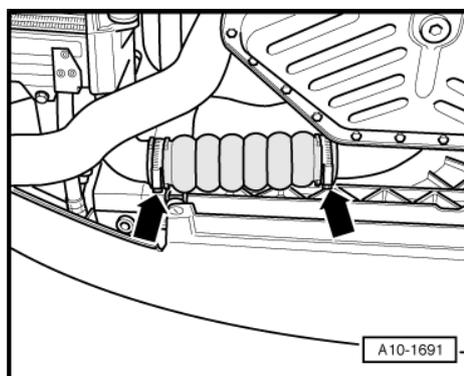
**Tightening torques**

Component	Nm
Coolant pump to housing	10
Coolant pump housing to sump (top section)	10
Coolant pipe (left-side) to coolant pump	10
Thermostat housing to coolant pump housing	10
Retaining clip for hydraulic line to sump	10
Bracket for charge air cooler to body	10
Air duct to charge air cooler	10
Hose clips (9 mm wide)	3
Hose clips (13 mm wide)	5.5

## 1.4 Removing, installing and checking thermostat

**Removing**

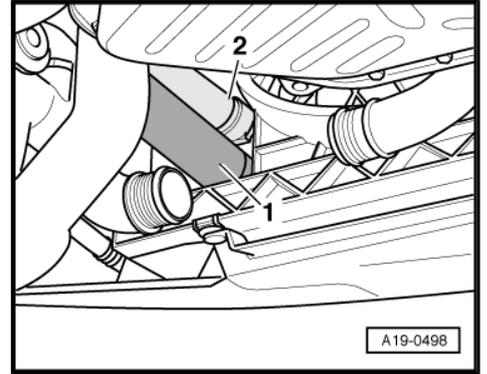
- Drain coolant ⇒ [page 209](#) .
- Remove air hose (front left) -arrows-.



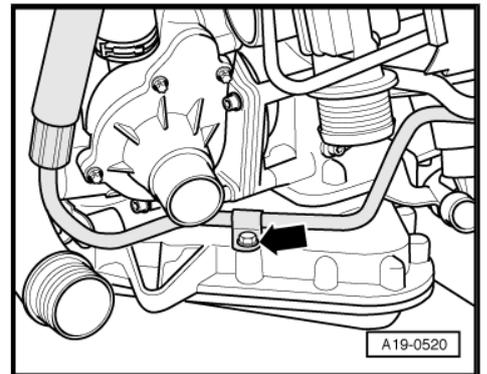
- Remove bottom coolant hose -1- going to thermostat housing from radiator by pulling off retaining clip.

 **Note**

*Disregard -item 2-.*



- Unscrew retaining clip -arrow- for power steering hydraulic line at sump.



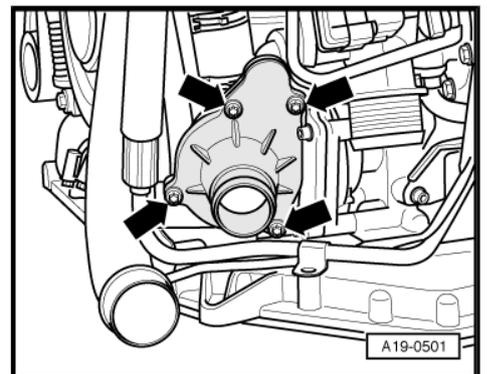
- Remove bolts -arrows-.
- Remove thermostat housing with thermostat.

**Installing**

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

 **Note**

- ◆ *Renew seals.*
- ◆ *Hose connections and hoses for charge air system must be free of oil and grease before assembly.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- Clean and smoothen sealing surface.



 **Note**

*Do not reuse coolant.*

- Fill cooling system ⇒ [page 211](#) .

**Tightening torques**

Component	Nm
Thermostat housing to coolant pump housing	10
Retaining clip for hydraulic line to sump	10

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

**1.5 Checking thermostat**

- Heat thermostat in water bath.



Starts to open	Fully open	Opening travel
approx. 87 °C	approx. 102 °C <sup>12)</sup>	at least 8 mm <sup>13)</sup>

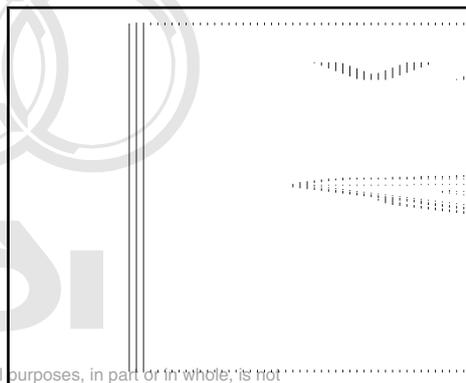
12) Cannot be tested.

13) At a temperature of 95 C.

## 1.6 Removing and installing coolant pipes (front)

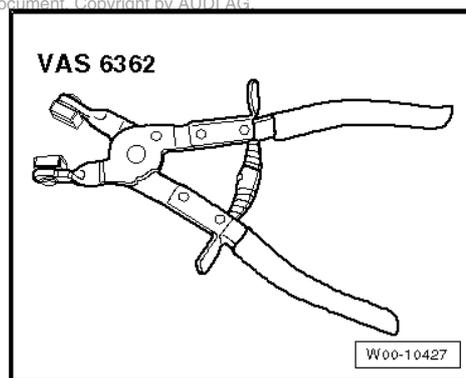
### Special tools and workshop equipment required

- ◆ Drip tray for workshop hoist - VAS 6208-



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



### Removing



#### Note

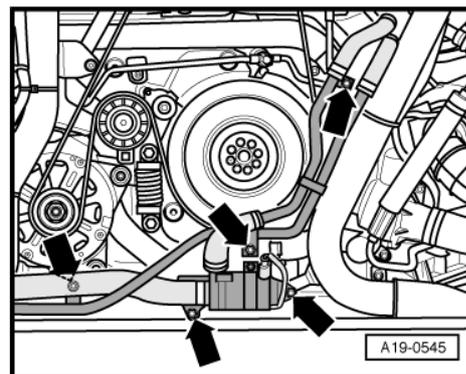
*All cable ties which are released or cut open when removing must be refitted in the same position when installing.*

- Drain coolant ⇒ [page 209](#) .
- Remove radiator ⇒ [page 234](#) .
- Remove radiator cowl ⇒ [page 239](#) .

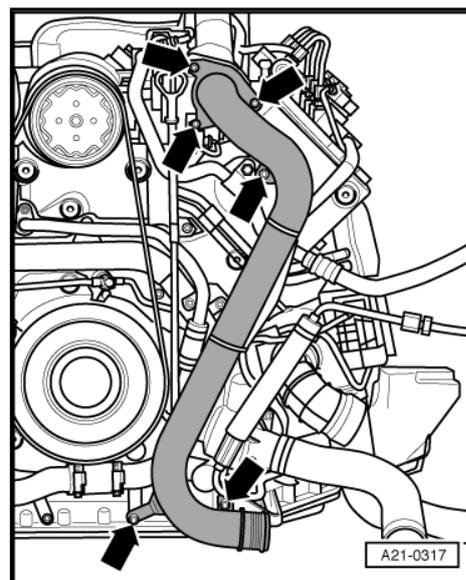
- Remove fuel cooling pump with coolant hoses attached from engine -arrows-.

 **Note**

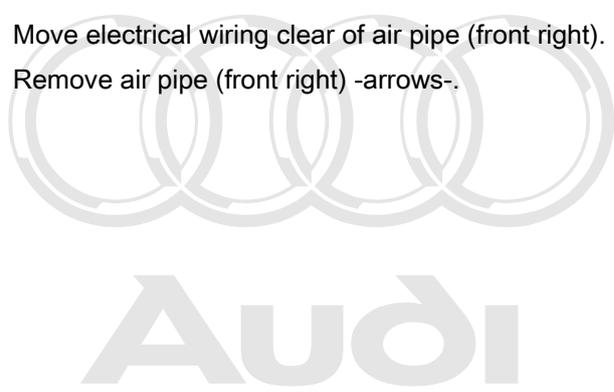
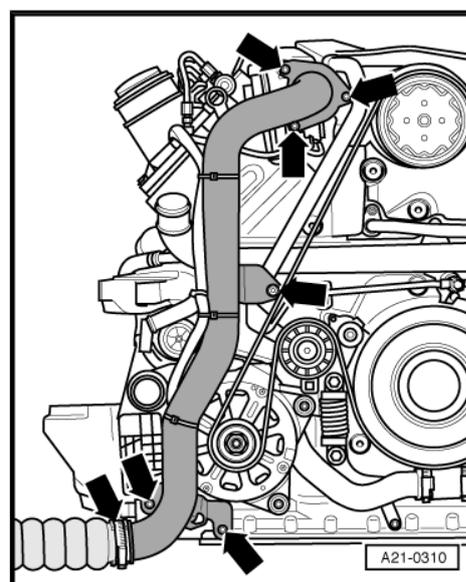
*The coolant hoses remain connected.*



- Move electrical wiring clear of air pipe (front left).
- Remove air pipe (front left) -arrows-.



- Move electrical wiring clear of air pipe (front right).
- Remove air pipe (front right) -arrows-.



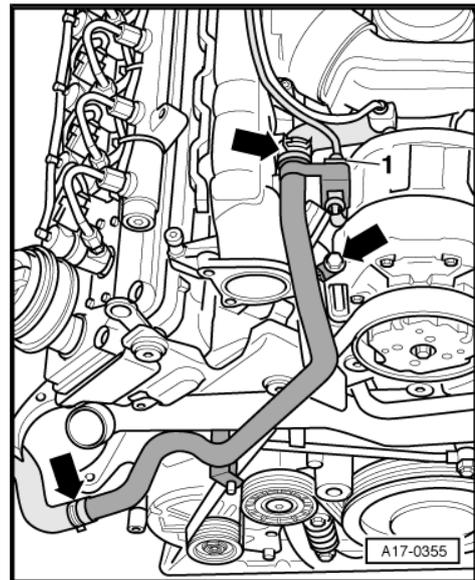
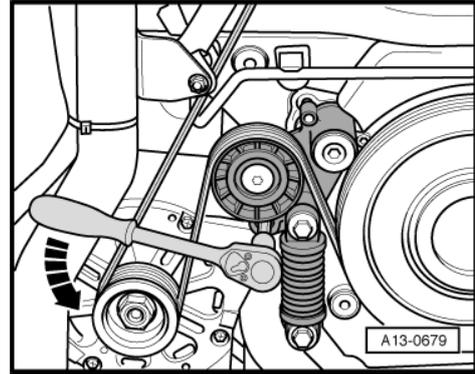
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



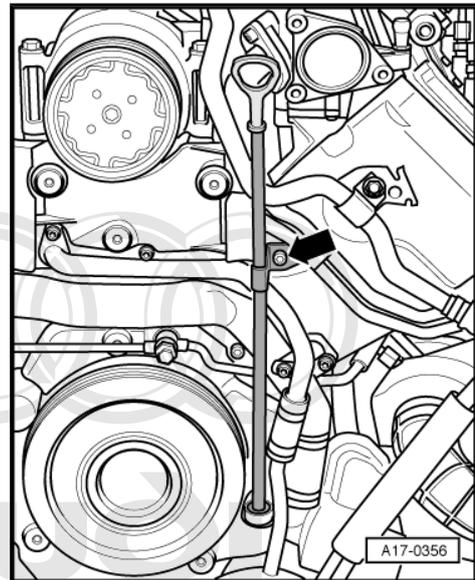
**Note**

*Before removing, mark direction of rotation of poly V-belt with chalk or felt-tip pen. If the belt runs in the opposite direction when it is refitted, this can cause breakage.*

- To slacken poly V-belt, pivot belt tensioner in direction of -arrow- (use a lever with  $\frac{3}{8}$ " drive).
- Remove poly V-belt from alternator pulley.
  
- Unclip electrical connector -1- at crankcase breather pipe.
- Remove crankcase breather pipe -arrows-.

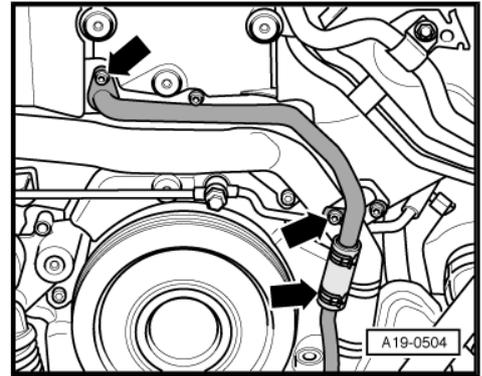


- Remove bolt -arrow-.
- Pull guide tube for oil dipstick out upwards with dipstick still inserted.

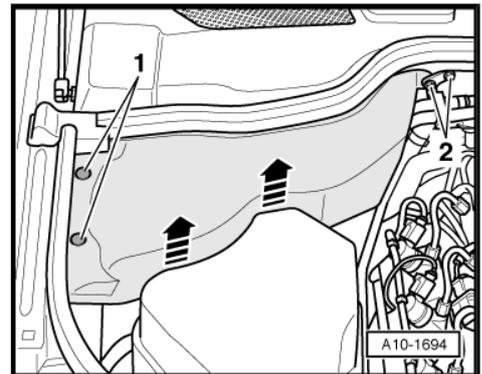
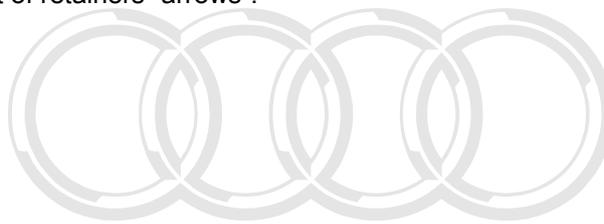


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Remove coolant pipe -arrows-.

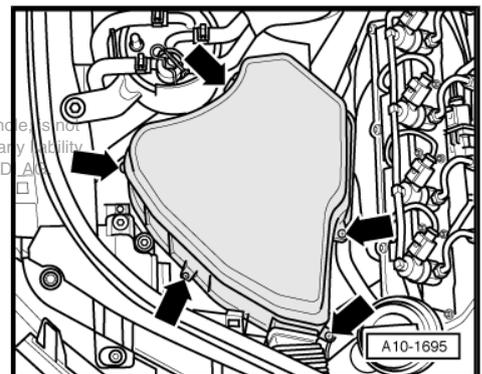


- Remove cover for right suspension turret; to do so, detach spreader clips -1- and unscrew bolted joint -2-.
- Pull cover out of retainers -arrows-.

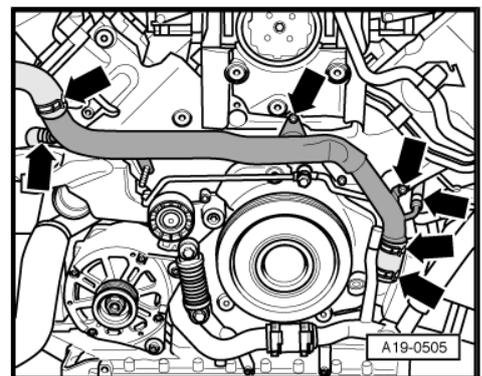


- Remove bolts -arrows-.
- Detach top section of air cleaner housing (right-side).

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.

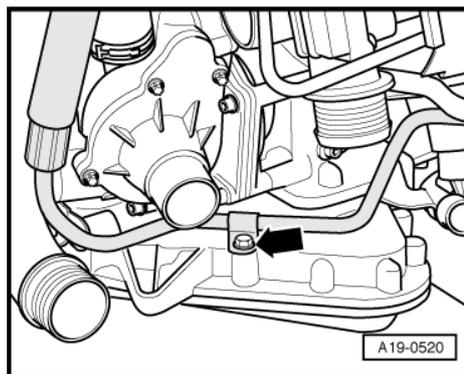


- Fit two M6 nuts onto stud on cylinder head (right-side) and counter-lock.
- Unscrew stud.
- Remove coolant pipe -arrows-.





- Unscrew retaining clip -arrow- for power steering hydraulic line at sump.



- Remove coolant pipe -arrows-.

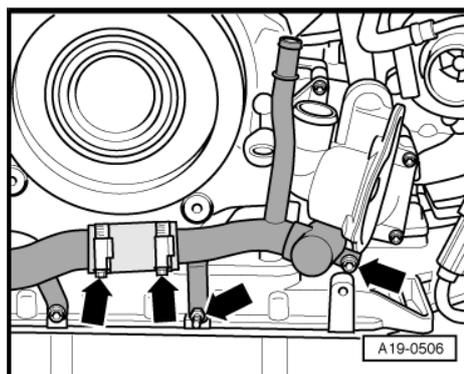
### Installing

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



#### Note

- ◆ Renew seals and O-rings.
- ◆ Hose connections and hoses for charge air system must be free of oil and grease before assembly.
- ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ *Electronic parts catalogue*.
- ◆ Reinstall all cable ties in the same locations when assembling.



- Before installing, clean and smoothen sealing surface for O-ring.
- Lubricate new O-ring with coolant and slide onto coolant pipe.
- Install poly V-belt ⇒ [page 55](#).
- Install radiator cowl ⇒ [page 239](#).
- Install radiator ⇒ [page 234](#).



#### Note

Do not reuse coolant.

- Fill cooling system ⇒ [page 211](#).

### Tightening torques

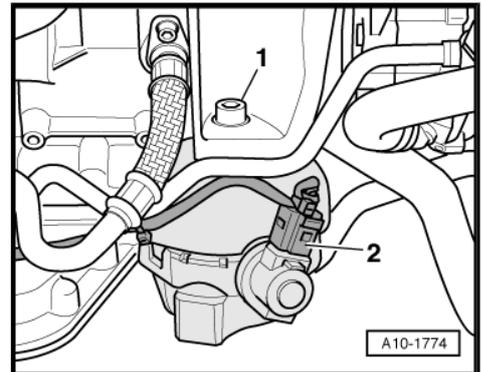
Component	Nm
Coolant pipes to engine	10
Guide tube for dipstick to cylinder head (left-side)	10
Crankcase breather pipe to A/C compressor	25
Air pipe to engine	10
Hose clips (9 mm wide)	3
Hose clips (13 mm wide)	5.5

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

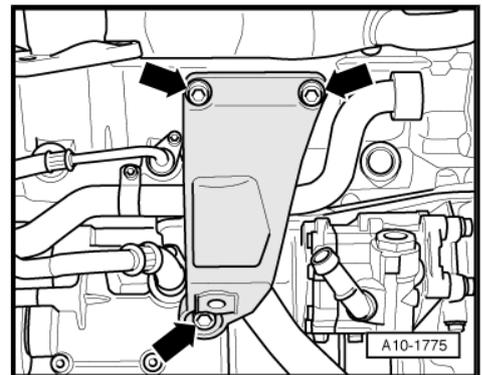
## 1.7 Removing and installing coolant pipe (left-side)

### Removing

- Drain coolant ⇒ [page 209](#) .
- Remove radiator ⇒ [page 234](#) .
- Remove radiator cowl ⇒ [page 239](#) .
- Lower subframe ⇒ [page 45](#) .
- Remove front exhaust pipe (left-side) ⇒ [page 286](#) .
- Remove turbocharger (left-side) ⇒ [page 246](#) .
- Unplug electrical connector -2- at engine mounting (left-side).
- Unscrew bolt -1- and remove engine mounting left-side).



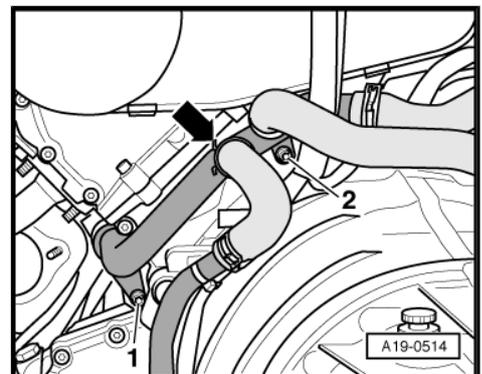
- Remove bolts -arrows-.
- Detach engine support (left-side).



- Remove bolts -1- and -2-.
- Detach coolant pipe (rear) from coolant pipe (left-side).

 **Note**

*Leave coolant hose -arrow- connected.*





- Disconnect coolant hose -3-.
- Remove bolts -1- and -2-.
- Detach coolant pipe (left-side) from coolant pump.

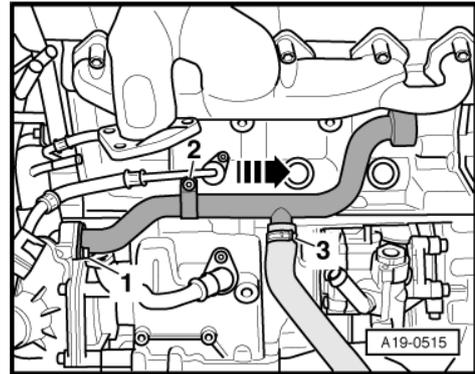
### Installing

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



#### Note

- ◆ *Renew O-rings.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- Before installing, clean and smoothen sealing surface for O-ring.
- Lubricate new O-ring with coolant and slide onto coolant pipe.
- Install coolant pipe (rear) ⇒ [page 229](#) .
- Install turbocharger (left-side) ⇒ [page 246](#) .
- Install front exhaust pipe (left-side) ⇒ [page 286](#) .
- Install radiator cowl ⇒ [page 239](#) .
- Install radiator ⇒ [page 234](#) .
- Only tighten bolts for subframe to the specified torque (do not turn further); tighten bolts only after performing alignment check ⇒ Running gear, front-wheel and four-wheel drive; Rep. gr. 40 .



#### WARNING

*The vehicle must not be driven at this stage.*

- Install anti-roll bar ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 40 .
- Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .

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



#### Note

*Do not reuse coolant.*

- Fill cooling system ⇒ [page 211](#) .
- Perform wheel alignment check ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 44 .



#### WARNING

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

### Tightening torques

Component	Nm
Coolant pipe to engine	10
Engine support to engine	42
Engine mounting to engine support	40
Hose clips (9 mm wide)	3
Hose clips (13 mm wide)	5.5

## 1.8 Removing and installing coolant pipe (right-side)

### Removing

- Remove alternator ⇒ Electrical system; Rep. gr. 27
- Remove bolts -1-, -2- and -3-.
- Loosen hose clip -arrow- and pull coolant pipe (right-side) out of cylinder block.

### Installing

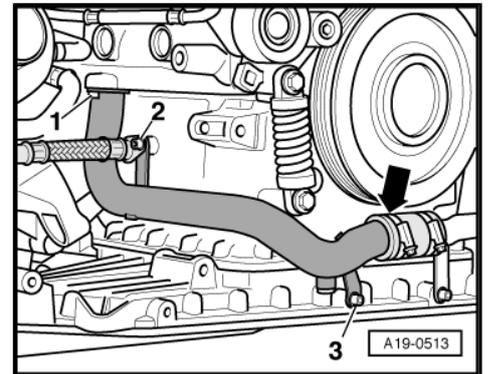
Installation is carried out in the reverse order; note the following:

#### Note

- ◆ *Renew O-rings.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- Before installing, clean and smoothen sealing surface for O-ring.
- Lubricate new O-ring with coolant and slide onto coolant pipe.
- Install alternator ⇒ Electrical system; Rep. gr. 27

### Tightening torques

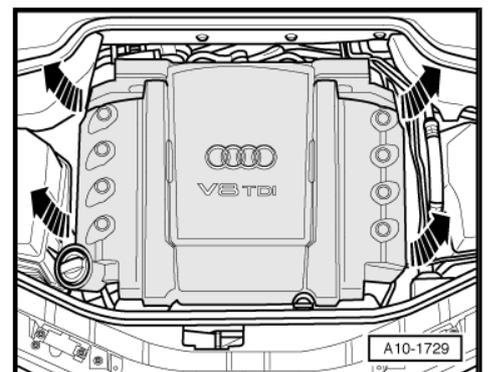
Component	Nm
Coolant pipe to engine	10
Hose clips (9 mm wide)	3
Hose clips (13 mm wide)	5.5



## 1.9 Removing and installing coolant pipe (rear)

### Removing

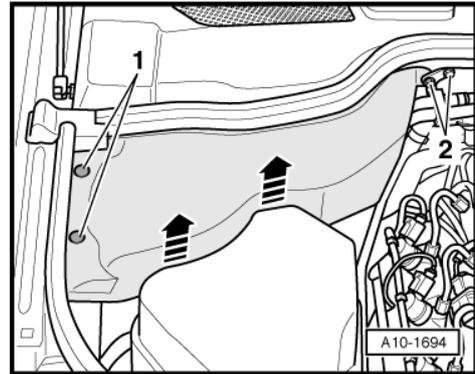
- Drain coolant ⇒ [page 209](#) .
- Carefully pull engine cover panel off four retaining pins one after the other -arrows-.



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.



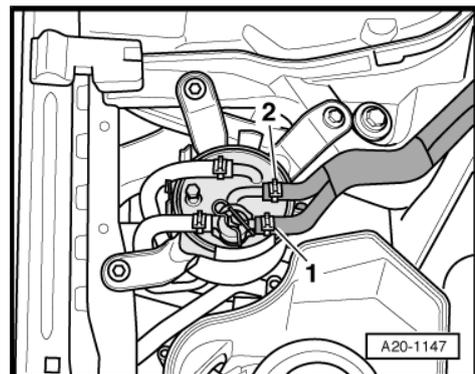
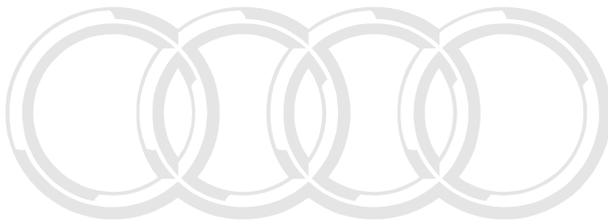
- Remove cover for right suspension turret; to do so, detach spreader clips -1- and unscrew bolted joint -2-.
- Pull cover out of retainers -arrows-.



**Caution**

*Rules for cleanliness when working on the injection system*  
 => **page 4**.

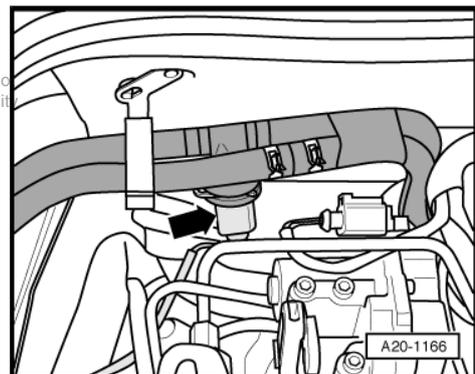
- Disconnect fuel return line -1- and fuel supply line -2- from fuel filter.



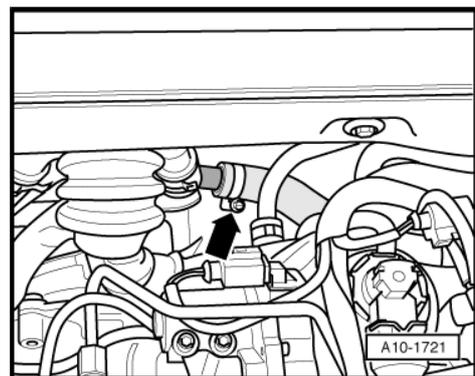
- Unplug electrical connector -arrow- at oil temperature sender - G8- .

- **Move fuel lines clear.**

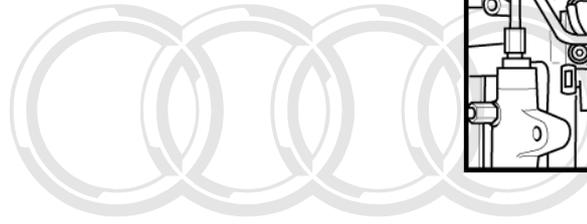
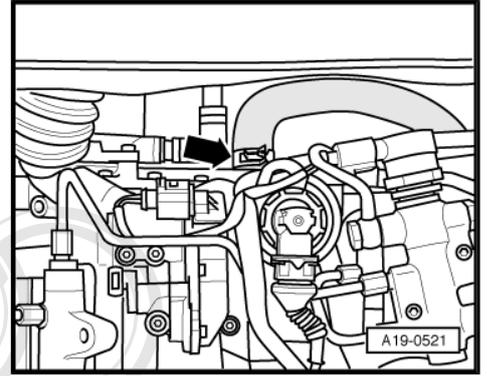
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- Disconnect coolant hose at bulkhead -arrow-.



- Detach coolant hose from left of cylinder head.
- Lower subframe ⇒ [page 45](#) .
- Remove front exhaust pipe (left-side) ⇒ [page 286](#) .



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.



- Detach coolant hose at the connection indicated -arrow-.
- Remove bolts -1- and -2-.
- Detach coolant pipe (rear) from coolant pipe (left-side).

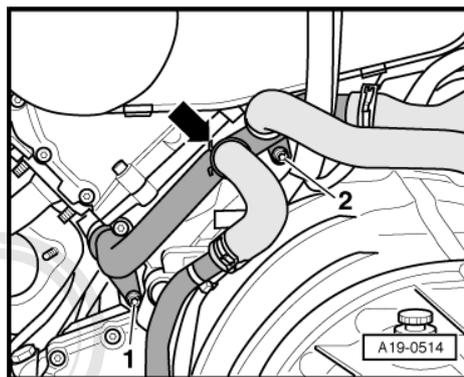
### Installing

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



#### Note

- ◆ Renew O-rings.
- ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ *Electronic parts catalogue*.
- Before installing, clean and smoothen sealing surface for O-ring.
- Lubricate new O-ring with coolant and slide onto coolant pipe.
- Install front exhaust pipe (left-side) ⇒ [page 288](#).
- Only tighten bolts for subframe to the specified torque (do not turn further); tighten bolts only after performing alignment check ⇒ Running gear, front-wheel and four-wheel drive, Rep. gr. 40.



#### WARNING

*The vehicle must not be driven at this stage.*

- Install anti-roll bar ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 40.
- Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension.



#### Note

*Do not reuse coolant.*

- Fill cooling system ⇒ [page 211](#).
- Perform wheel alignment check ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 44.



#### WARNING

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

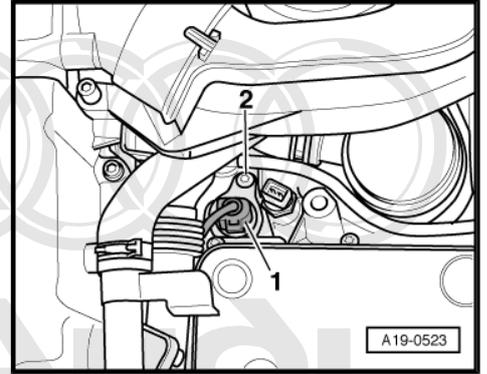
### Tightening torques

Component	Nm
Coolant pipe to engine	10
Hose clips (9 mm wide)	3
Hose clips (13 mm wide)	5.5

## 1.10 Removing and installing coolant temperature sender - G62-

### Removing

- Discharge the refrigerant system ⇒ Air conditioner system - with refrigerant R134a .
- Remove air conditioner compressor ⇒ Air conditioning system; Rep. gr. 87 .
- Unplug electrical connector -1- at coolant temperature sender.
- Remove bolt -2-.
- Lift off coolant temperature sender - G62- together with retainer.



### Installing

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



*Renew seal.*

- Install air conditioner compressor ⇒ Air conditioning system; Rep. gr. 87 .
- Charge the refrigerant system ⇒ Air conditioner system - with refrigerant R134a .

### Tightening torque

Component	Nm
Coolant temperature sender - G62- to engine	10

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

## 1.11 Radiator and radiator fans - exploded view of components



**1 - Radiator fan - V7-**

- Removing and installing => [page 240](#)
- With radiator fan control unit - J293-

**2 - Coolant hose**

- To detach, release retaining clip

**3 - O-ring**

- Renew

**4 - Coolant hose**

- To detach, release retaining clip

**5 - Radiator**

- Removing and installing => [page 234](#)
- If renewed, change coolant in entire system

**6 - 6 Nm**

**7 - Bracket**

- For radiator

**8 - O-ring**

- Renew

**9 - Coolant hose**

- To detach, release retaining clip

**10 - Radiator fan 2 - V177-**

- Removing and installing => [page 240](#)
- With radiator fan control unit 2 - J671-

**11 - Retaining pin**

**12 - Rubber buffer**

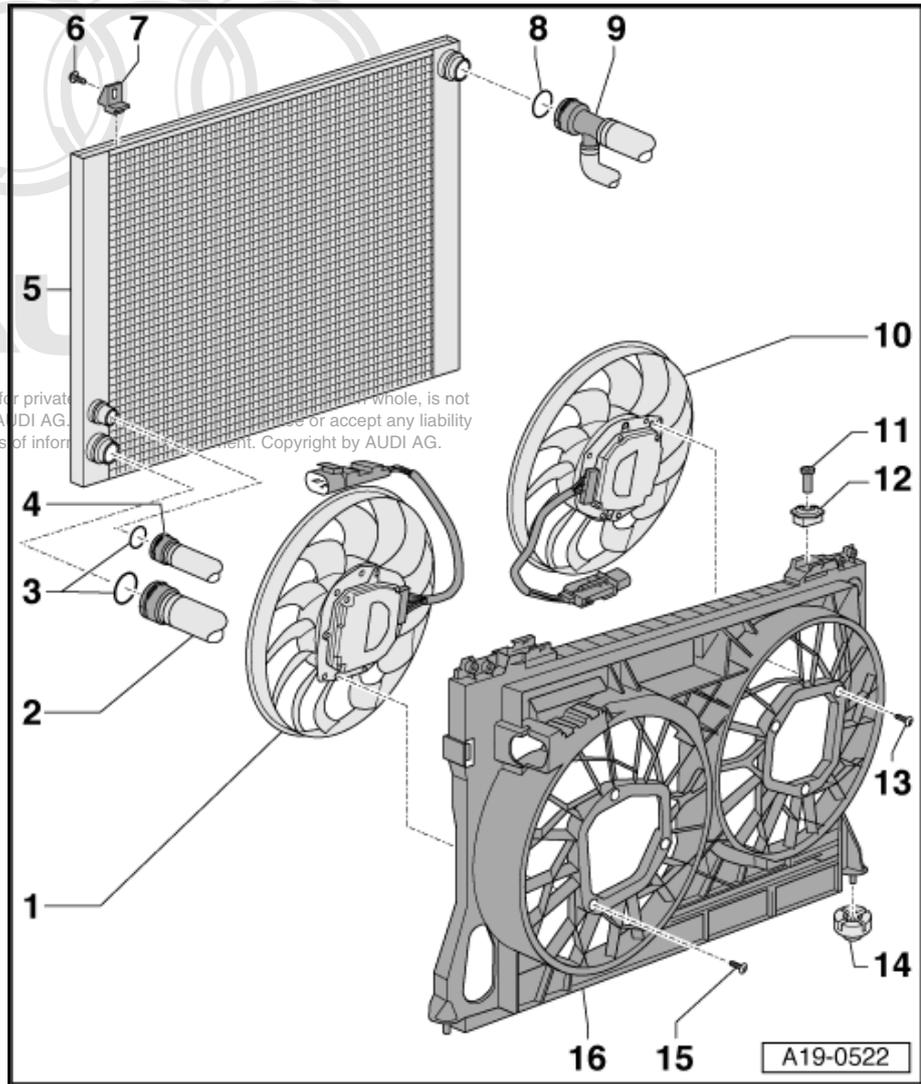
- Use screwdriver to release and pull off

**13 - 10 Nm**

**14 - Rubber bush**

**15 - 10 Nm**

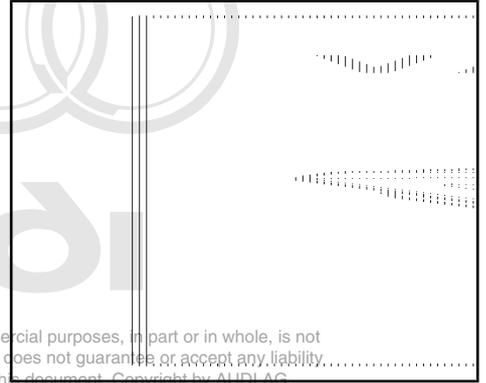
**16 - Radiator cowl**



## 1.12 Removing and installing radiator

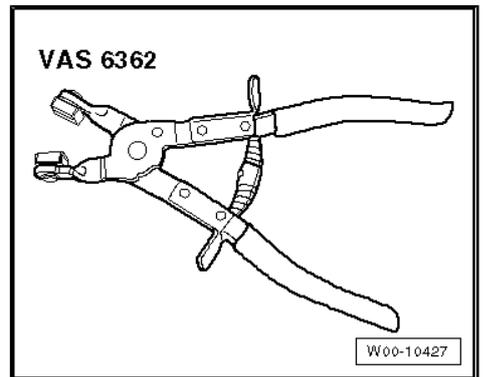
Special tools and workshop equipment required

- ◆ Drip tray for workshop hoist - VAS 6208-



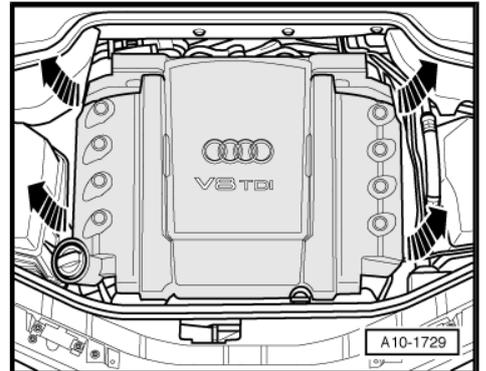
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- ◆ Hose clip pliers - VAS 6362-



### Removing

- Activate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
- Carefully pull engine cover panel off four retaining pins one after the other -arrows-.



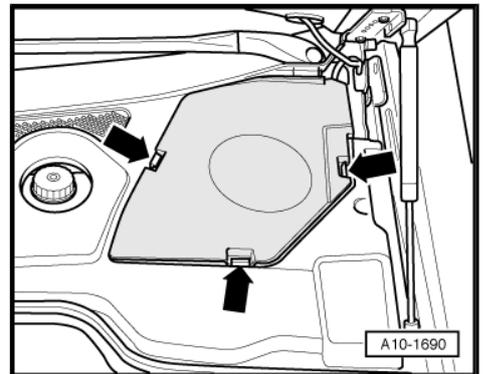
- Remove cover above coolant expansion tank -arrows-.



**WARNING**

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

- Open filler cap on coolant expansion tank.





- Remove both front wheels.

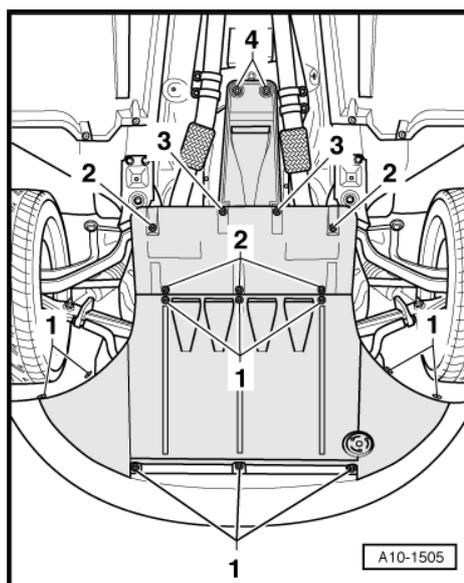
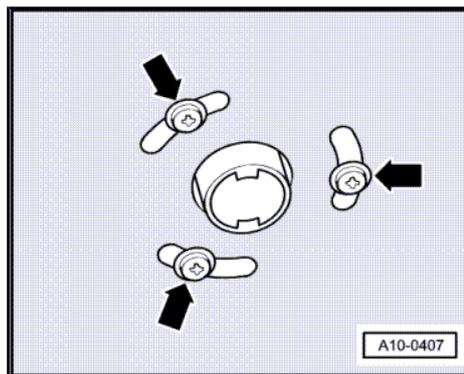


**Note**

*Secure brake discs with wheel bolts.*

- Vehicles with auxiliary heater: remove bolts -arrows- securing exhaust pipe for auxiliary/additional heater to noise insulation.

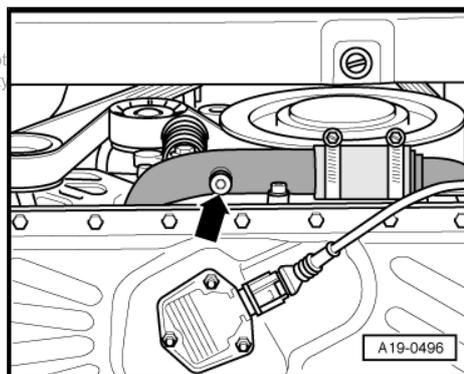
- Open quick-release fasteners -1- and remove noise insulation (front).



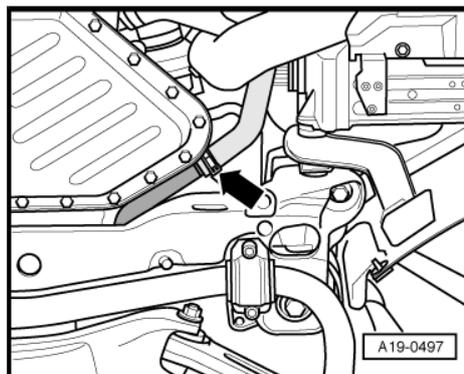
- Place drip tray for workshop hoist - VAS 6208- beneath engine.

- Remove drain plug -arrow- and let coolant drain.

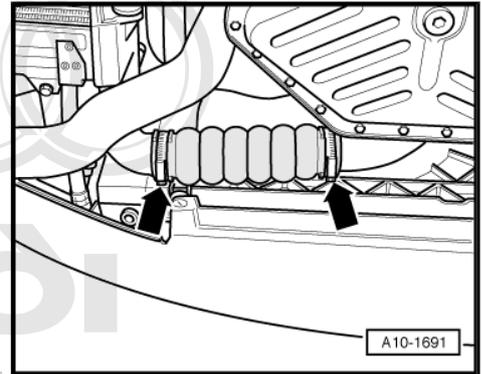
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



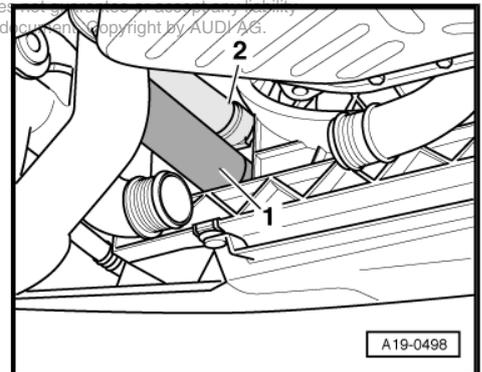
- Disconnect coolant hose -arrow- from coolant pipe and drain off remaining coolant from engine.



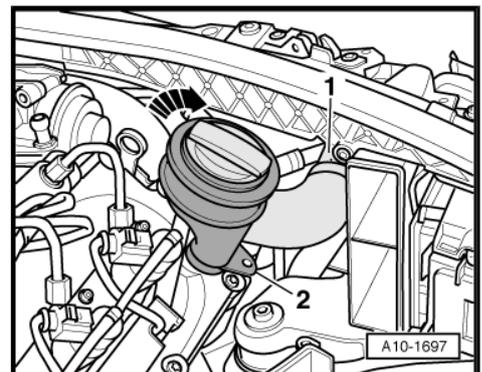
- Remove air hose (front left) -arrows-.



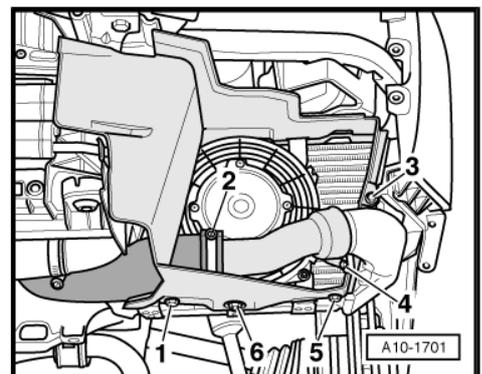
- Release retaining clips and disconnect coolant hoses -1- and -2- at radiator.
- Disconnect both coolant hoses leading to cooler for fuel cooling system.
- Remove front section of wheel housing liner (front left and front right) ⇒ General body repairs, exterior; Rep. gr. 66 .
- Remove front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 .



- Remove oil filler neck. To do so, lift tab -2- and turn oil filler neck clockwise -arrow-.
- Remove upper coolant hose -1- from radiator by pulling off retaining clip.
- Re-fit oil filler neck.

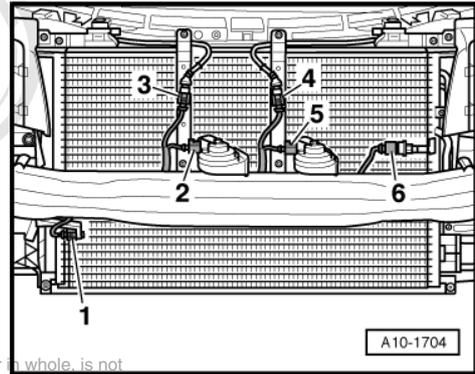


- Remove bolt -4- and nut -6-.
- Slacken hose clip -2- and detach air pipe.
- Remove bolts -1-, -3- and -5-.
- Detach air duct from charge air cooler (left-side).

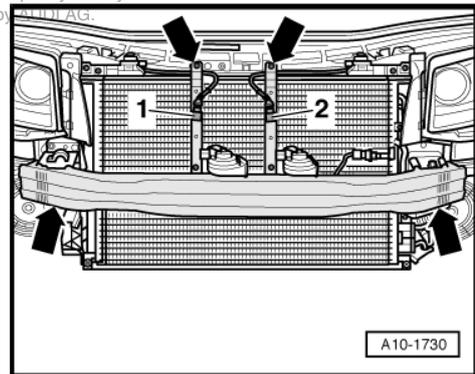




- Unplug electrical connectors -1 ... 6-.
- Move wiring clear.
- Remove bracket for ambient temperature sensor - G17- by turning bracket 90° in clockwise direction and then detaching it.



- Unplug electrical connectors -1 and -2- from struts.
- Remove bolts -arrows-.
- Remove bumper together with struts.
- Place drip tray for workshop hoist - VAS 6208- beneath engine.



**WARNING**

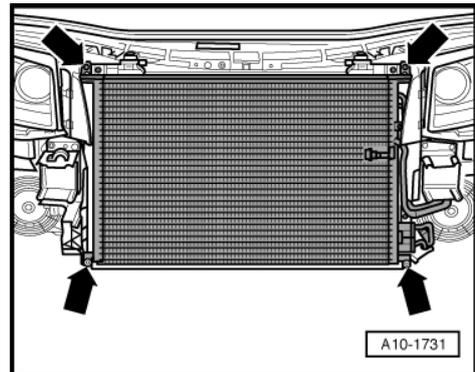
*The air conditioner refrigerant circuit must not be opened.*



**Note**

*To prevent damage to the air conditioner compressor and refrigerant pipes/hoses, ensure that the pipes and hoses are not stretched, kinked or bent.*

- Remove bolts -arrows-.
- Pivot condenser downwards together with cooler for power steering.
- Tie up condenser on engine.



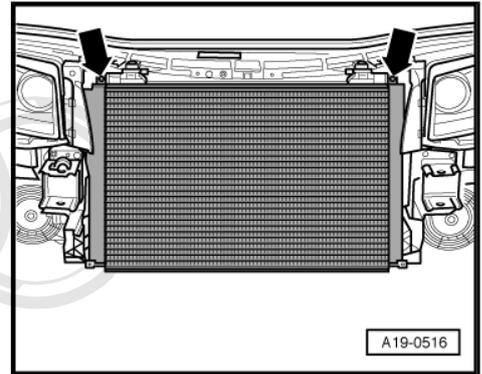
- Remove the two brackets for radiator -arrows-.
- Tilt top of radiator forwards slightly and lift out of lock carrier.

### Installing

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

#### Note

- ◆ *Hose connections and hoses for charge air system must be free of oil and grease before assembly.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- Install front bumpers ⇒ General body repairs, exterior; Rep. gr. 63 .
- Deactivate jacking mode ⇒ **Running gear, front-wheel drive** and four-wheel drive; Rep. gr. 43, **Operating the air suspension** .



#### Note

*Do not reuse coolant.*

- Fill cooling system ⇒ [page 211](#) .

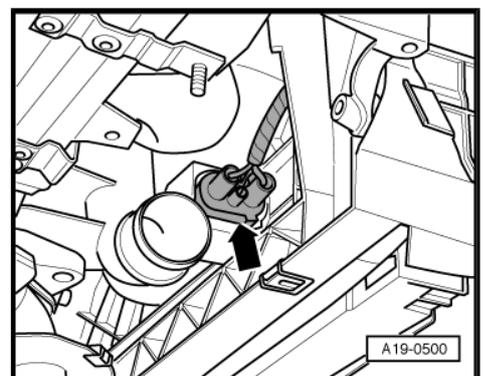
### Tightening torques

Component	Nm
Bracket for radiator to lock carrier	6
Condenser to lock carrier	6
Struts to lock carrier	9
Bumper to impact damper	23
Bracket for charge air cooler to body	10
Air pipe to charge air cooler	10
Air duct to charge air cooler	10
Hose clips (9 mm wide)	3
Hose clips (13 mm wide)	5.5

## 1.13 Removing and installing radiator cowl

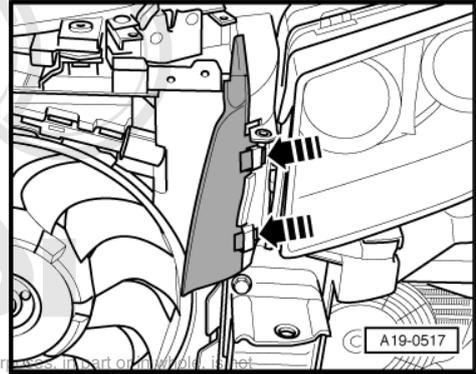
### Removing

- Drain coolant ⇒ [page 209](#) .
- Remove radiator ⇒ [page 234](#) .
- Unplug electrical connector -arrow- for radiator fans.
- Move wires clear at rear of lock carrier.

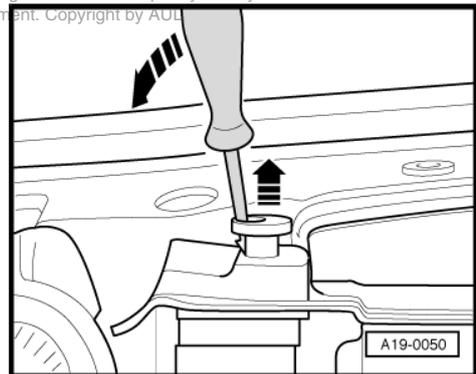




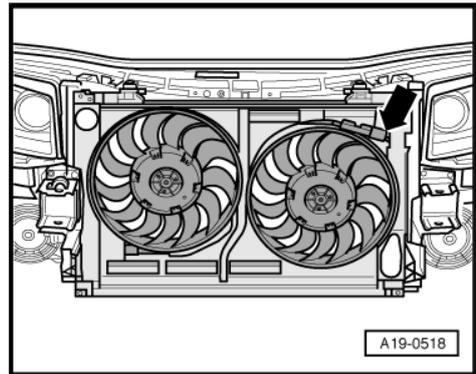
- Remove air duct (left-side) -arrows-.



- Release both retaining pins for radiator cowl and pull out upwards -arrows-.
- Tilt top edge of radiator cowl forwards.



- Reach behind radiator cowl and unplug electrical connector -arrow- for radiator fans.
- Remove radiator cowl.



### Installing

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

- Install radiator ⇒ [page 234](#) .



### Note

*Do not reuse coolant.*

- Fill cooling system ⇒ [page 211](#) .

## 1.14 Removing and installing radiator fan

### Removing

- Drain coolant ⇒ [page 209](#) .
- Remove radiator ⇒ [page 234](#) .
- Remove radiator cowl ⇒ [page 239](#) .

- Remove bolts -arrows-.
- Unclip electrical connectors and lay wiring aside.
- Remove radiator fans.

### Installing

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

- Install radiator cowl ⇒ [page 239](#) .
- Install radiator ⇒ [page 234](#) .

### Note

*Do not reuse coolant.*

- Fill cooling system ⇒ [page 211](#) .

### Tightening torque

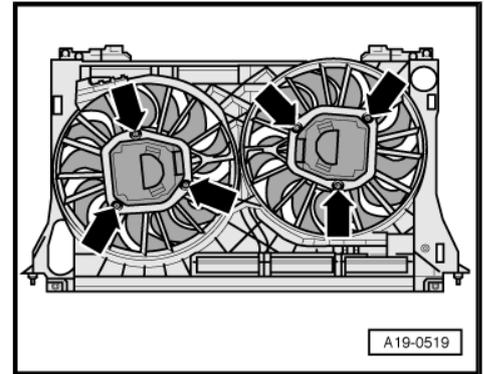
Component	Nm
Radiator fan to radiator cowl	10 <sup>14)</sup>

14) Renew bolt.

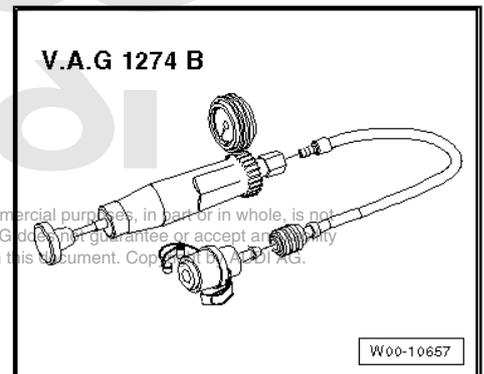
## 1.15 Checking cooling system for leaks

### Special tools and workshop equipment required

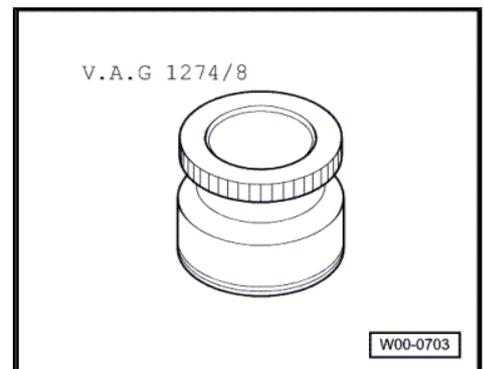
- ◆ Cooling system tester - V.A.G 1274 B-



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 © 2013 AUDI AG.



- ◆ 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.

**Test condition**

- Engine must be warm.

**Test sequence**

- Remove cover above coolant expansion tank -arrows-.



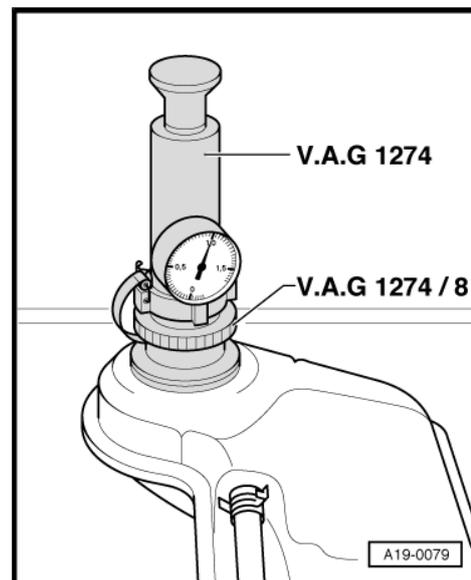
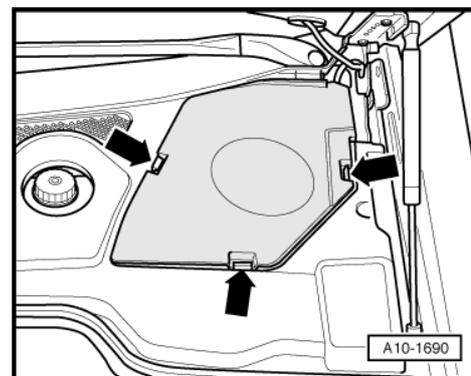
**WARNING**

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

- Open filler cap on coolant expansion tank.
- Attach cooling system tester - V.A.G 1274 B- with adapter - V.A.G 1274/8- to expansion tank.
- Use hand pump on cooling system tester to create a pressure of approx. 1.0 bar.

If the pressure drops:

- Trace leak and repair.

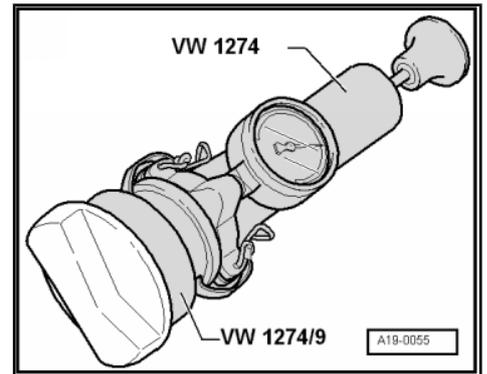


### Checking pressure relief valve in filler cap

- Attach cooling system tester - V.A.G 1274- with adapter - V.A.G 1274/9- to filler cap.
- Use hand pump on cooling system tester to create pressure.
- The pressure relief valve should open at a pressure of 1.4 ... 1.6 bar.

If the pressure relief valve does not open as described:

- Renew filler cap.



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

## 21 – Turbocharging/supercharging

### 1 Servicing charge air system with turbocharger

⇒ [“1.1 Turbocharger - exploded view”, page 244](#)

⇒ [“1.2 Removing and installing turbocharger \(left-side\)”, page 246](#)

⇒ [“1.3 Removing and installing turbocharger \(right-side\)”, page 252](#)

⇒ [“1.4 Charge air cooling - exploded view”, page 267](#)

⇒ [“1.5 Removing and installing charge air cooler \(left-side\)”, page 268](#)

⇒ [“1.6 Removing and installing charge pressure sender G31 ”, page 270](#)

⇒ [“1.7 Removing and installing charge air cooler \(right-side\)”, page 272](#)

#### 1.1 Turbocharger - exploded view



#### Note

*Illustration shows turbocharger of 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 - Air hose**

- From air cleaner
- Must be free of oil and grease when installing

**2 - Turbocharger**

- Removing and installing: left-side [⇒ page 246](#) ; right-side [⇒ page 252](#)

**3 - Seal**

- Renew

**4 - Threaded connection, 28 Nm**

**5 - Coolant pipe**

- Tighten union nut to 25 Nm

**6 - 10 Nm**

**7 - Screw plug, 22 Nm**

**8 - Seal**

- Renew

**9 - Banjo bolt, 25 Nm**

**10 - Seals**

- Renew

**11 - Oil supply line**

- From cylinder block

**12 - Banjo bolt, 15 Nm**

**13 - Seals**

- Renew

**14 - O-ring**

- Renew

**15 - 10 Nm**

**16 - Exhaust manifold**

- Removing and installing: left-side [⇒ page 292](#) ; right-side [⇒ page 292](#)

**17 - 20 Nm + 1/4 turn (90°) further**

- Renew

**18 - Gasket**

- Renew

**19 - Exhaust gas temperature sender**

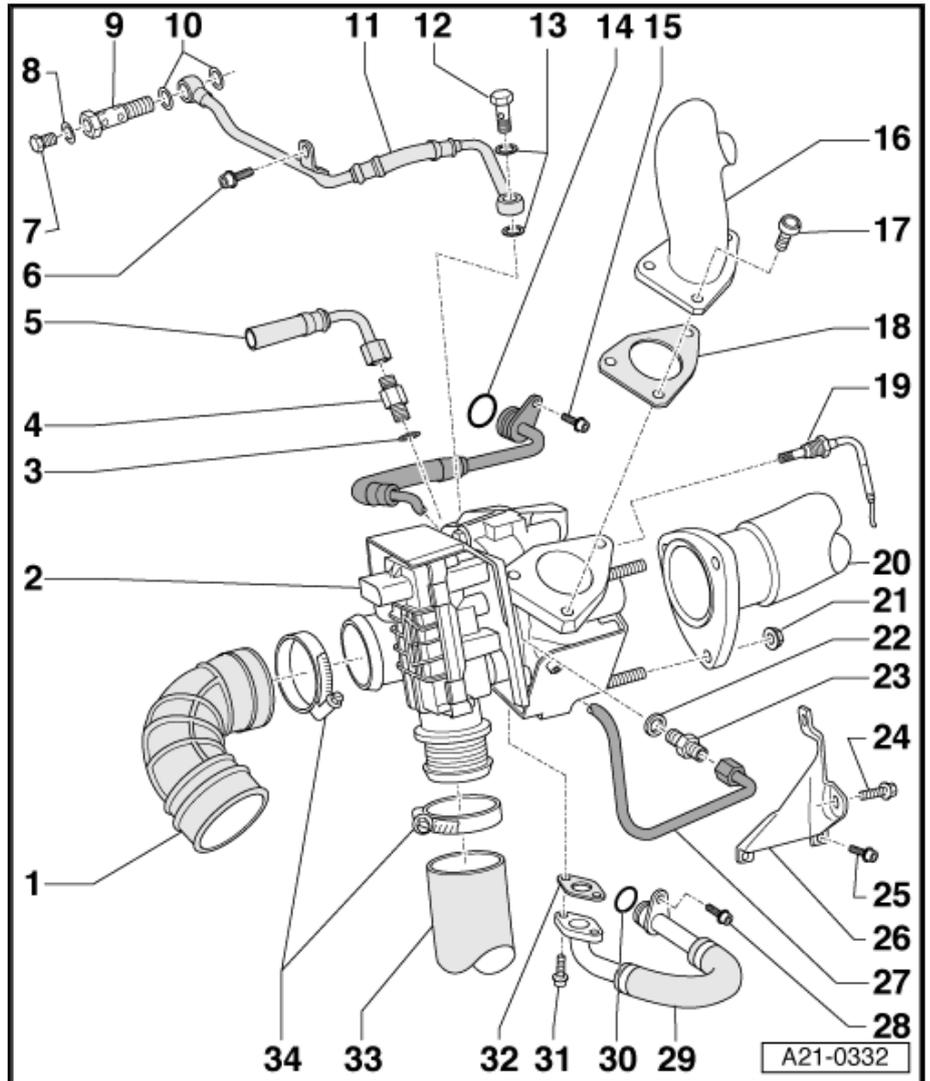
- Exhaust gas temperature sender 1 for bank 2 - G236- (left-side), exhaust gas temperature sender 1 - G235- (right-side)
- Coat thread with high-temperature paste; for high-temperature paste refer to [⇒ Electronic parts catalogue](#)
- Removing and installing: left-side [⇒ page 280](#) , right-side [⇒ page 279](#)
- 45 Nm

**20 - Front exhaust pipe**

- Removing and installing: left-side [⇒ page 286](#) ; right-side [⇒ page 289](#)

**21 - 25 Nm**

- Renew





**22 - Seal**

- Renew

**23 - Threaded connection, 28 Nm**

**24 - 22 Nm**

**25 - 10 Nm**

**26 - Bracket**

**27 - Coolant pipe**

- Tighten union nut to 25 Nm

**28 - 10 Nm**

**29 - Oil return line**

- To cylinder block

**30 - O-ring**

- Renew

**31 - 10 Nm**

**32 - Gasket**

- Renew

**33 - Air hose**

- To charge air cooler
- Must be free of oil and grease when installing

**34 - Retaining clip, 5.5 Nm**

- Reinforced

## 1.2 Removing and installing turbocharger (left-side)



### Caution

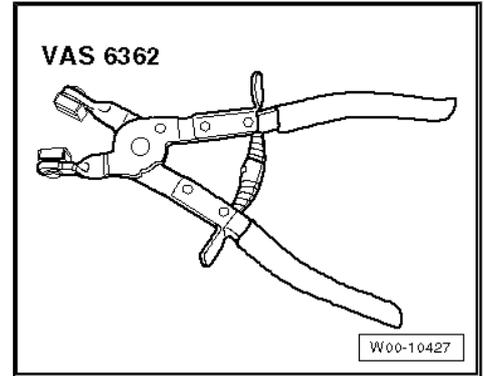
*If the turbocharger has suffered mechanical damage (e.g. damaged compressor wheel), it is not sufficient merely to fit a new turbocharger. The following work must be performed in order to avoid further damage:*

- ◆ *Check air cleaner housing, air filter element and air hoses for dirt and foreign particles.*
- ◆ *Check the entire charge air system (including the charge air cooler) for foreign matter.*
- ◆ *If foreign matter is found in the charge air system, clean all relevant ducts and hoses and renew charge air cooler if necessary.*

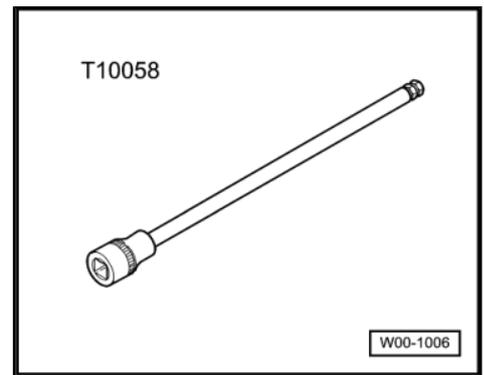
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

**Special tools and workshop equipment required**

- ◆ Hose clip pliers - VAS 6362-



- ◆ Allen key, long reach - T10058-



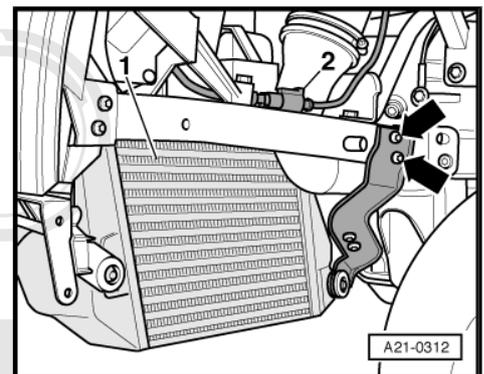
## Removing



### Note

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

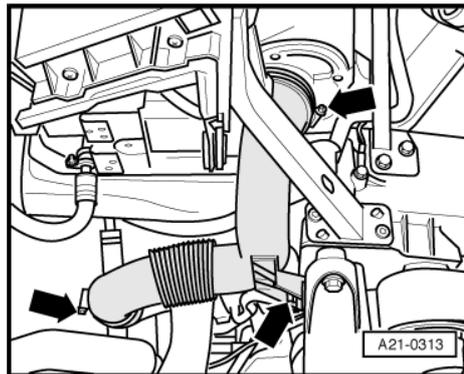
- Drain coolant ⇒ [page 209](#) .
- Remove radiator ⇒ [page 234](#) .
- Remove radiator cowl ⇒ [page 239](#) .
- Unplug electrical connector -2-.
- Remove bolts -arrows- and detach bracket for charge air cooler.
- Take off charge air cooler -1- (left-side).



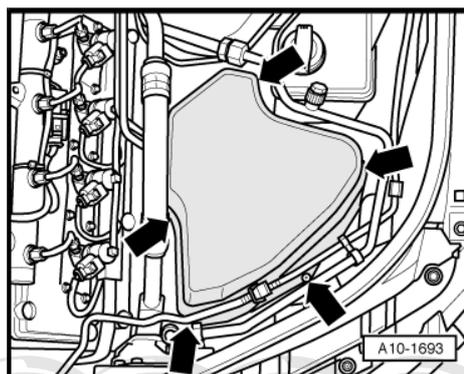
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



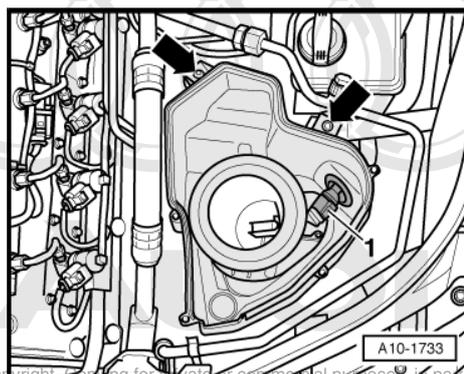
- Remove air intake hose between air cleaner and turbocharger (left-side) -arrows-.



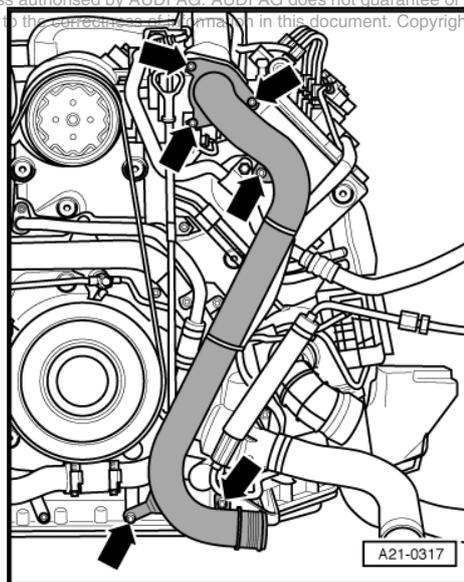
- Remove bolts -arrows-.
- Detach top section of air cleaner housing (left-side).



- Detach electrical connector -1- at air mass meter.
- Remove bolts -arrows-.
- Detach bottom section of air cleaner housing (left-side).
- Lower subframe ⇒ [page 45](#) .
- Remove front exhaust pipe (left-side) ⇒ [page 286](#) .

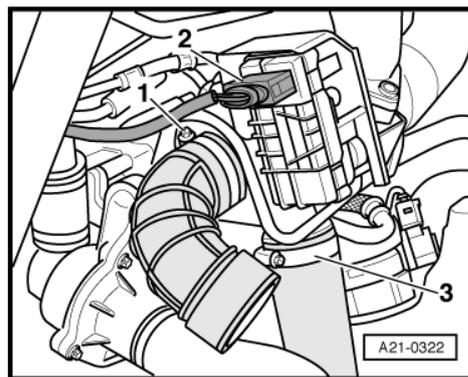


- Move electrical wiring clear of air pipe (front left).
- Remove air pipe (front left) -arrows-.

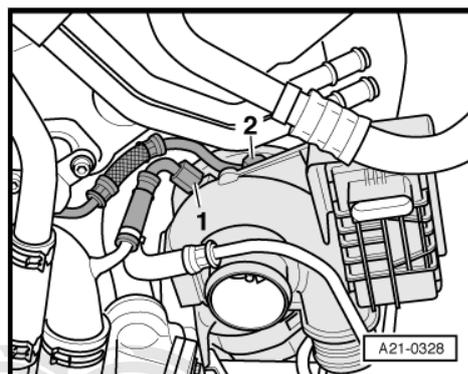


Protected by copyright. All rights reserved. This document, in whole or in part, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of the information in this document. Copyright by AUDI AG.

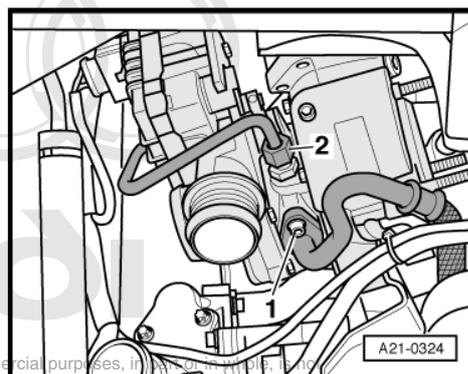
- Detach air intake hoses -1- and -3- at turbocharger.
- Unplug electrical connector -2-.



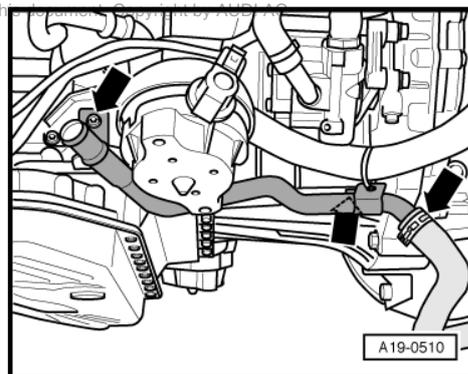
- Unbolt coolant line -1- and oil supply line -2- at turbocharger.



- Detach coolant line -2- at side of turbocharger.
- Unbolt oil return line -1- from turbocharger using Allen key, long reach - T10058- .



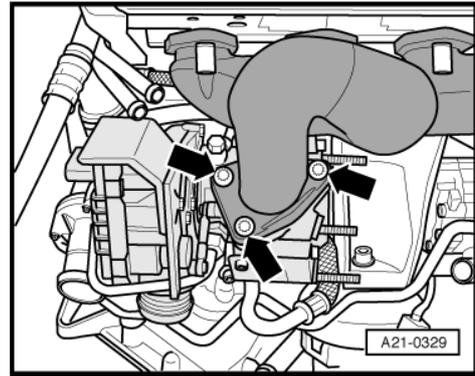
- Remove coolant pipe -arrows-.



Protected by copyright. Copying for private or commercial purposes, in any form or by any means, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright © Audi AG 2013



- Unscrew bolts -arrows- at top of turbocharger.



**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.

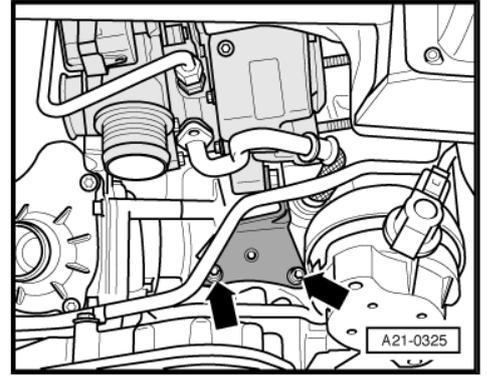
- Detach turbocharger with bracket -arrows-.

### Installing

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

#### Note

- ◆ Always renew seals, gaskets and self-locking nuts.
- ◆ Hose connections and hoses for charge air system must be free of oil and grease before assembly.
- ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ *Electronic parts catalogue* .
- ◆ Charge air system must be free of leaks.
- ◆ Reinstall all cable ties in the same locations when assembling.
- ◆ Fill turbocharger with engine oil at connection for oil supply line.
- ◆ After installing turbocharger, allow engine to idle for approx. 1 minute and do not rev up immediately to ensure turbocharger is supplied with oil.



- Install front exhaust pipe (left-side) ⇒ [page 288](#) .
- Only tighten bolts for subframe to the specified torque (do not turn further); tighten bolts only after performing alignment check ⇒ Running gear, front-wheel and four-wheel drive; Rep. gr. 40 .

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



#### WARNING

***The vehicle must not be driven at this stage.***

- Install anti-roll bar ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 40 .
- Install radiator cowl ⇒ [page 239](#) .
- Install radiator ⇒ [page 234](#) .
- Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
- Check oil level ⇒ Maintenance ; Booklet 404 .

#### Note

*Do not reuse coolant.*

- Fill cooling system ⇒ [page 211](#) .
- Perform wheel alignment check ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 44 .



#### WARNING

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



## Tightening torques

Component	Nm
Bracket for turbocharger to sump (top section)	10
Turbocharger to exhaust manifold	20 + 90° <sup>15) 16)</sup>
Coolant pipe to top section of sump	10
Oil return line to turbocharger	10
Coolant line to turbocharger	25
Oil supply line to turbocharger	15
Air pipe (front left) to engine	10
Bracket for charge air cooler to body	10
Hose clips (9 mm wide)	3
Hose clips (13 mm wide)	5.5

15) Renew bolts.

16) 90° equals a 1/4 turn.

## 1.3 Removing and installing turbocharger (right-side)



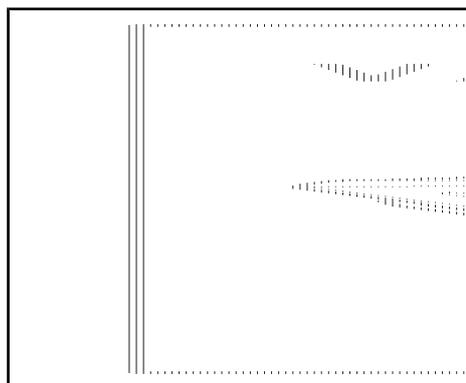
### Caution

*If the turbocharger has suffered mechanical damage (e.g. damaged compressor wheel), it is not sufficient merely to fit a new turbocharger. The following work must be performed in order to avoid further damage:*

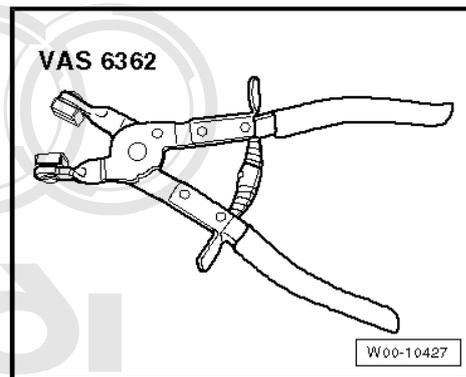
- ◆ *Check air cleaner housing, air filter element and air hoses for dirt and foreign particles.*
- ◆ *Check the entire charge air system (including the charge air cooler) for foreign matter.*
- ◆ *If foreign matter is found in the charge air system, clean all relevant ducts and hoses and renew charge air cooler if necessary.*

### Special tools and workshop equipment required

- ◆ Drip tray for workshop hoist - VAS 6208-

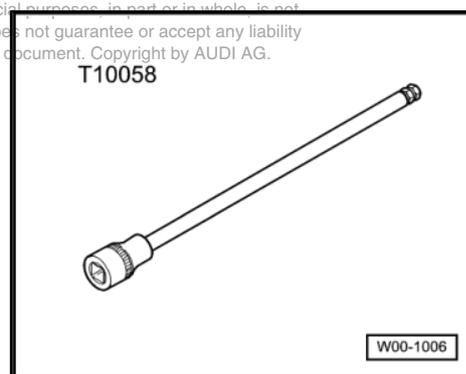


- ◆ Hose clip pliers - VAS 6362-



- ◆ Allen key, long reach - T10058

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



## Removing



### Note

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

- Activate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .



### Caution

*Observe notes on procedure for disconnecting the battery ⇒ Electrical system; Rep. gr. 27 .*

- Switch off ignition.

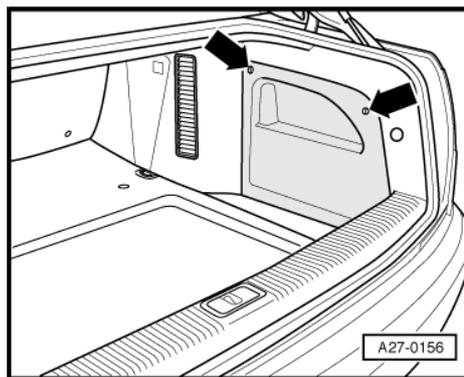


### Note

*To make sure you can still move the front wheels when the battery has been disconnected, only disconnect the battery with the ignition key inserted.*



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

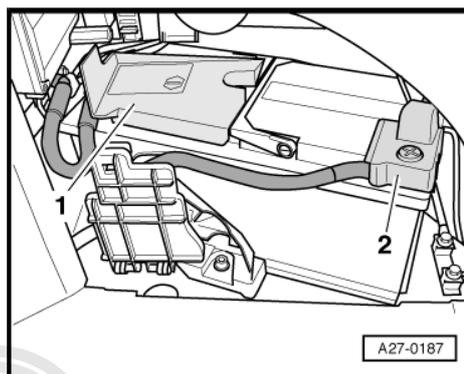


- Remove cover -1- over battery.

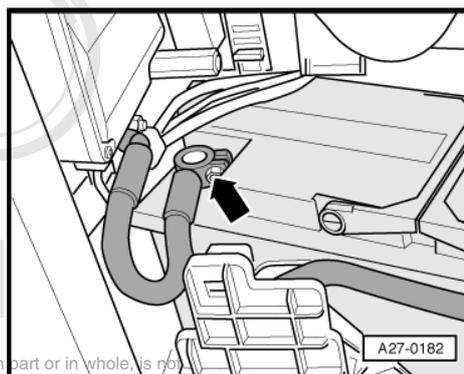


**Note**

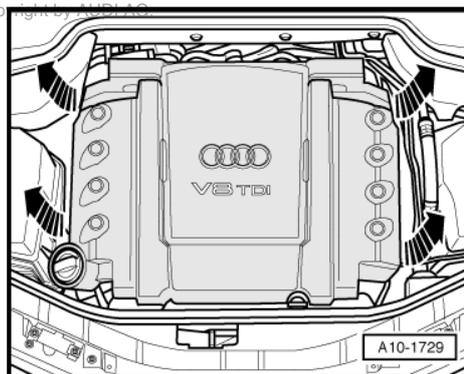
Disregard -item 2-.



- Disconnect earth cable -arrow- at battery.



- Carefully pull engine cover panel off four retaining pins one after the other -arrows-.



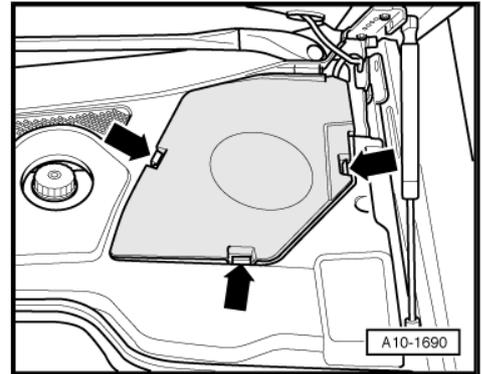
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Remove cover above coolant expansion tank -arrows-.



**WARNING**

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



- Open filler cap on coolant expansion tank.

- Remove both front wheels.

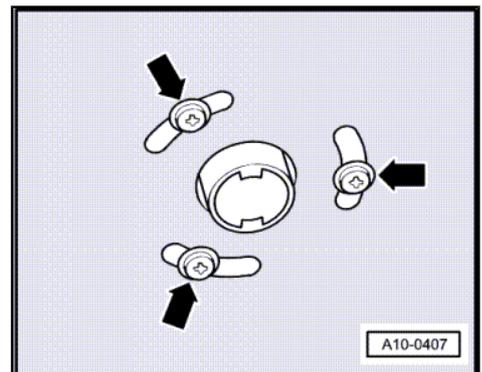


**Note**

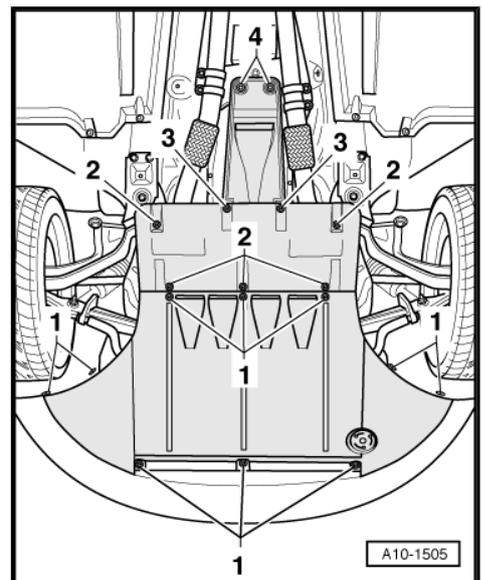
*Secure brake discs with wheel bolts.*

- Vehicles with auxiliary heater: remove bolts -arrows- securing exhaust pipe for auxiliary/additional heater to noise insulation.

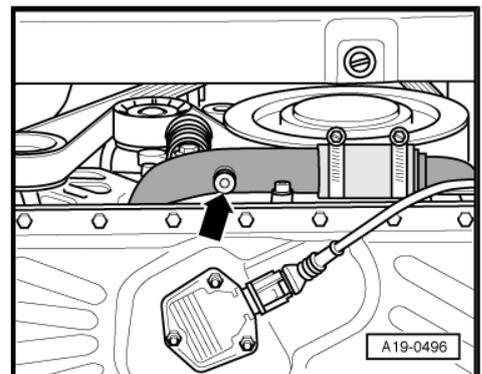
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- Open quick-release fasteners -1- and remove noise insulation (front).

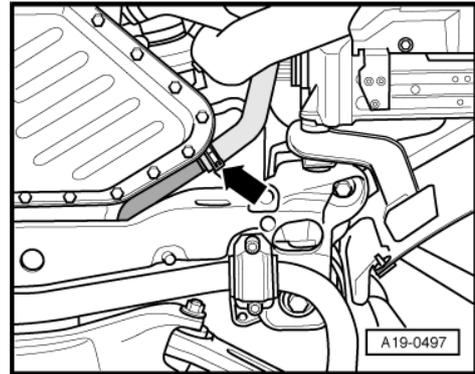


- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Remove drain plug -arrow- and let coolant drain.

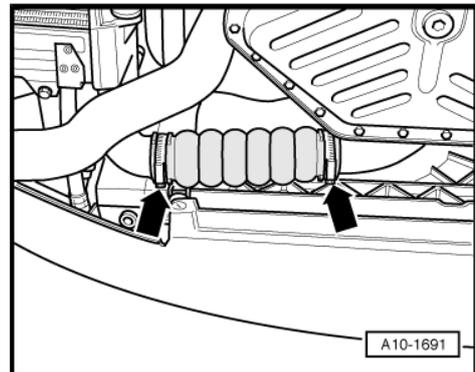
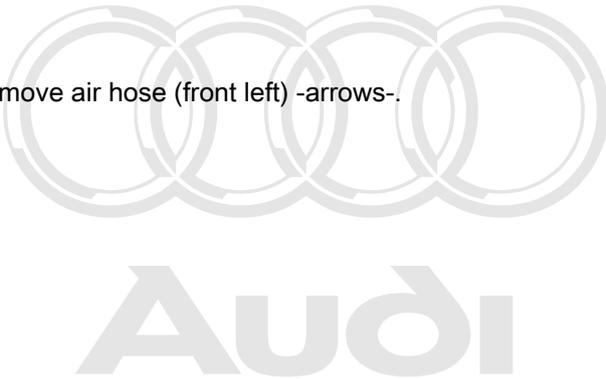




- Disconnect coolant hose -arrow- from coolant pipe and drain off remaining coolant from engine.



- Remove air hose (front left) -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.

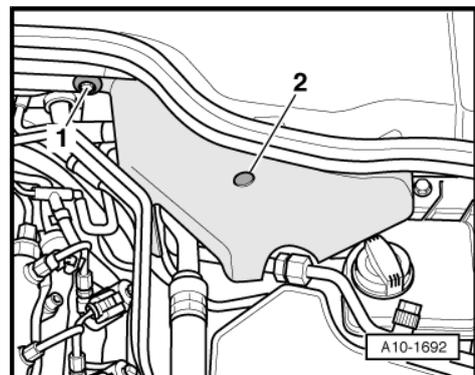
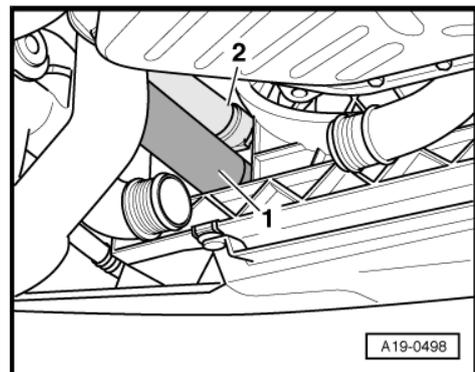
- Pull off retaining clip for bottom coolant hose and detach coolant hose -1- from radiator.



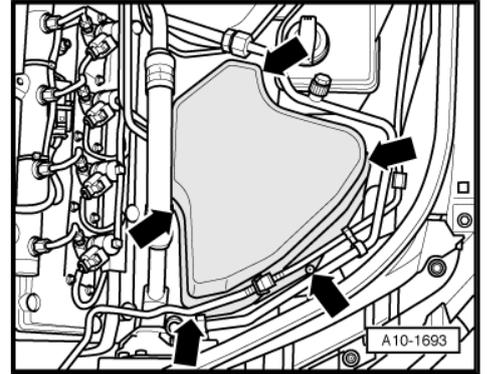
**Note**

*Disregard -item 2-.*

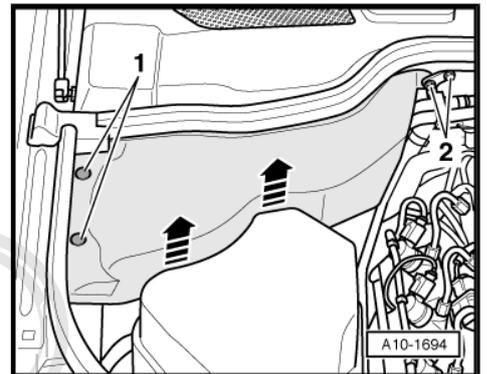
- Disconnect both coolant hoses leading to cooler for fuel cooling system.
- Remove front section of wheel housing liner (front left and front right) ⇒ General body repairs, exterior; Rep. gr. 66 .
- Remove front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 .
- Remove cover for suspension turret (left-side); to do so, remove nut -1- and detach spreader clip -2-.



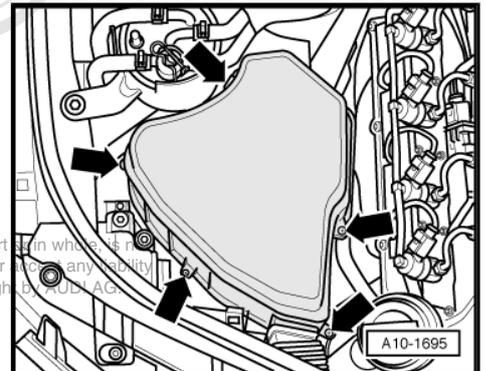
- Remove bolts -arrows-.
- Detach top section of air cleaner housing (left-side).



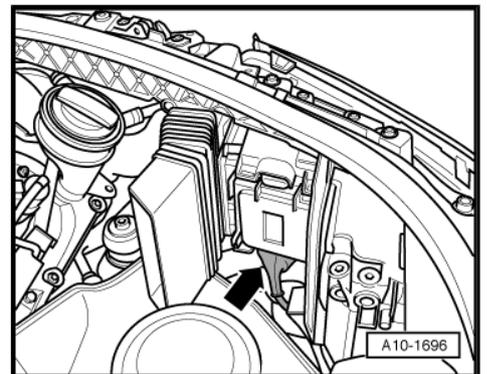
- Remove cover for right suspension turret; to do so, detach spreader clips -1- and unscrew bolted joint -2-.
- Pull cover out of retainers -arrows-.



- Remove bolts -arrows-.
- Detach top section of air cleaner housing (right-side).



- Unplug electrical connector -arrow- for headlights 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 © AUDI AG.

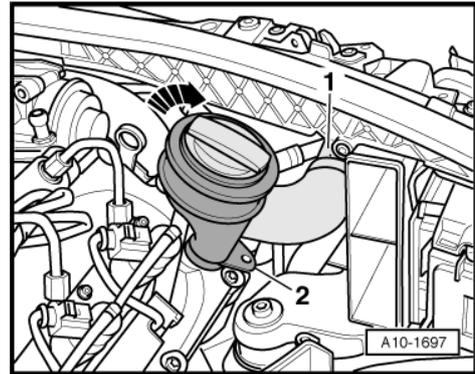


- Remove oil filler neck. To do so, lift tab -2- and turn oil filler neck clockwise -arrow-.
- Remove upper coolant hose -1- from radiator by pulling off retaining clip.
- Re-fit oil filler neck.



**WARNING**

*The air conditioner refrigerant circuit must not be opened.*



**Note**

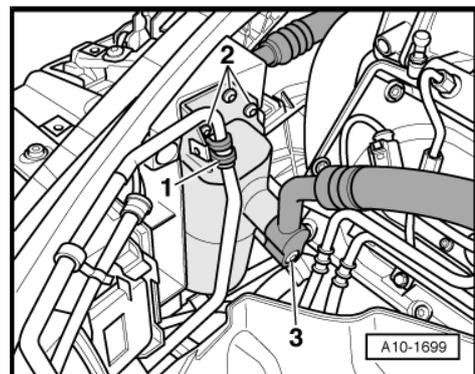
*To prevent damage to the air conditioner compressor and refrigerant pipes/hoses, ensure that the pipes and hoses are not stretched, kinked or bent.*

- Detach clamp -1- on reservoir.
- Remove bolts -2-.



**Note**

*Refrigerant line -3- must not be unscrewed.*

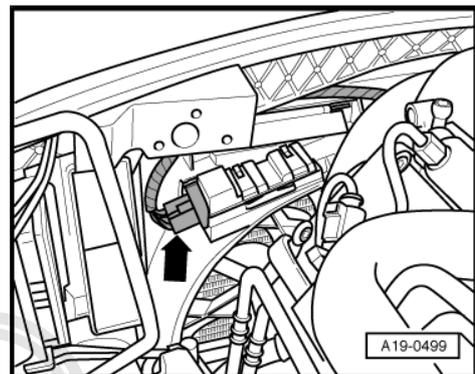


- Unplug electrical connector -arrow- going to radiator fan 2 - V177- .



**Note**

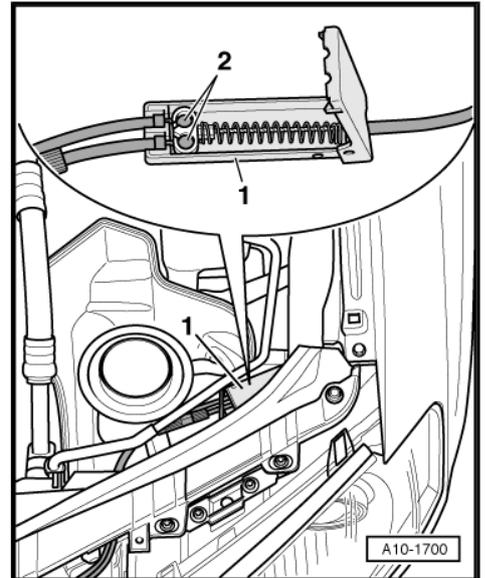
*Shown in illustration with reservoir removed.*



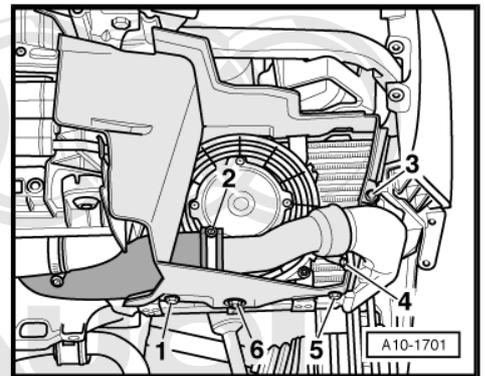
**Audi**

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.

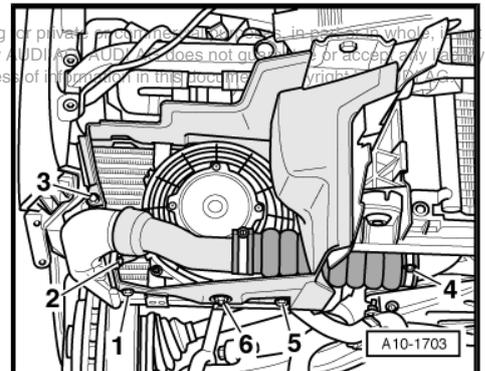
- Detach cable junction for bonnet lock cables -1- from lock carrier.
- Open cable junction and detach both bonnet lock cables -2-.



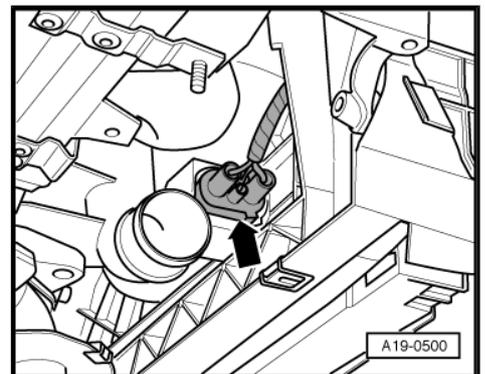
- Remove bolt -4- and nut -6-.
- Slacken hose clip -2- and detach air pipe.
- Remove bolts -1-, -3- and -5-.
- Detach air duct from charge air cooler (left-side).



- Remove bolt -2- and nut -6-.
- Slacken hose clip -4- and detach air pipe with hose.
- Remove bolts -1-, -3- and -5-.
- Detach air duct from charge air cooler (right-side).

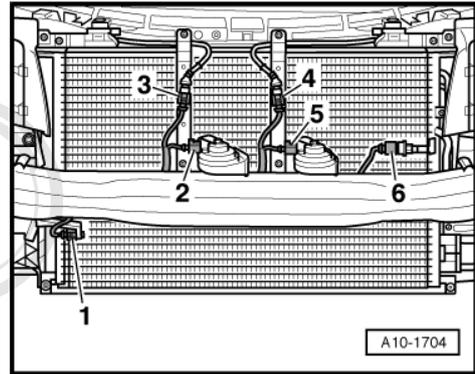


- Unplug electrical connector -arrow- going to radiator fan - V7- .
- Move wire clear.





- Unplug electrical connectors -1 ... 6-.
- Move wiring clear.
- Remove bracket for ambient temperature sensor - G17- by turning bracket 90° in clockwise direction and then detaching it.



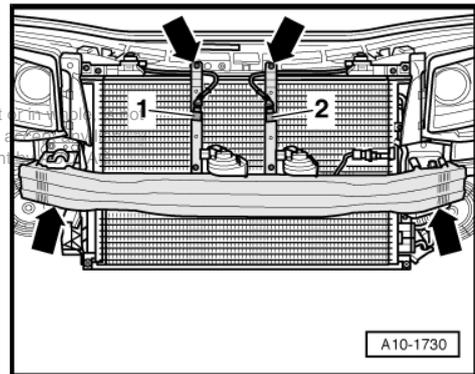
- Unplug electrical connectors -1- and -2- from struts.
- Remove bolts -arrows-.
- Remove bumper together with struts.

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



**WARNING**

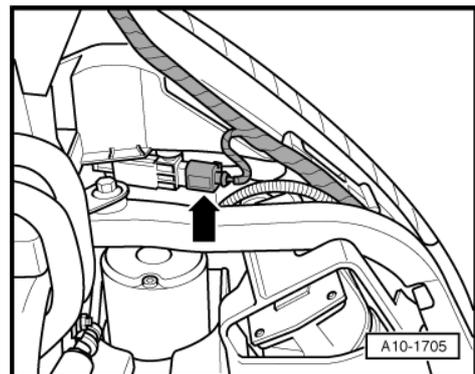
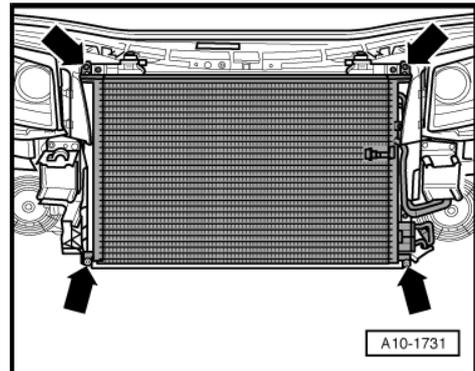
*The air conditioner refrigerant circuit must not be opened.*



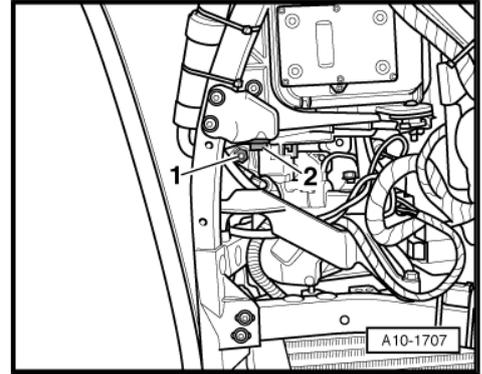
 **Note**

*To prevent damage to the air conditioner compressor and refrigerant pipes/hoses, ensure that the pipes and hoses are not stretched, kinked or bent.*

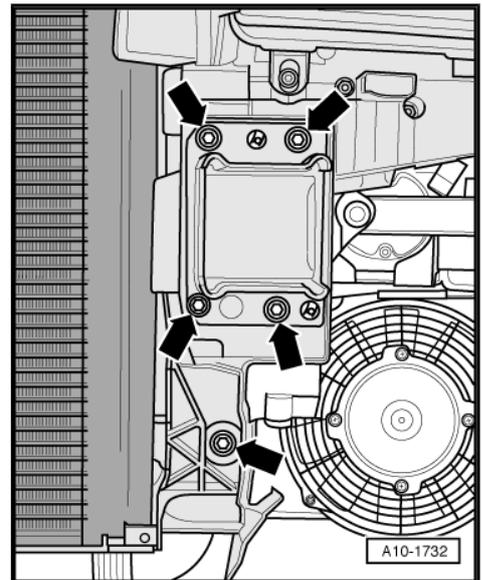
- Remove bolts -arrows-.
- Pivot condenser downwards together with cooler for power steering.
- Tie up condenser on underside of engine.
- Unplug electrical connector -arrow- at front airbag crash sensors for front passenger side - G283- and -G284- on both sides.
- Move wiring harnesses clear at rear of lock carrier.



- Working from wheel housing, remove one nut -1- and one bolt -2- for lock carrier on each side.



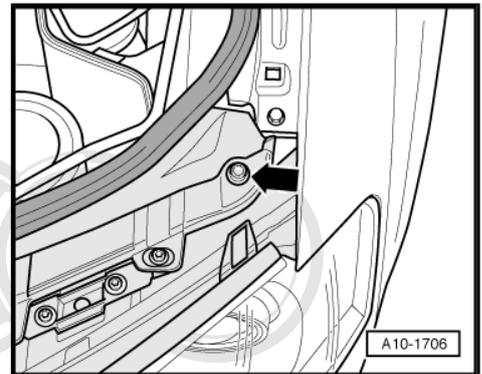
- Unscrew bolts -1 ... 5- on both sides of vehicle.



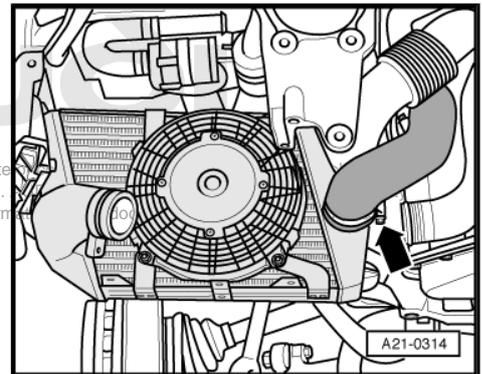
- Pull off bonnet seal at both wing panels.
- Remove one bolt -arrow- on each side from top of lock carrier.
- Detach lock carrier.

 **Note**

*A second mechanic is required for removing the lock carrier.*



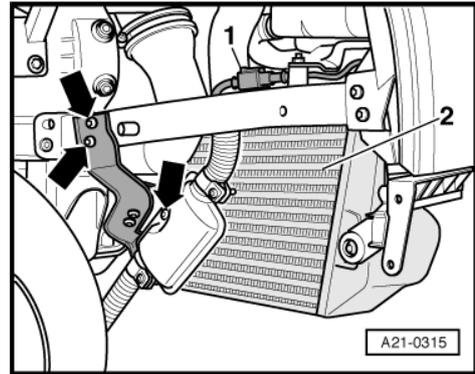
- Detach air intake hose -arrow- from charge air cooler (right-side).



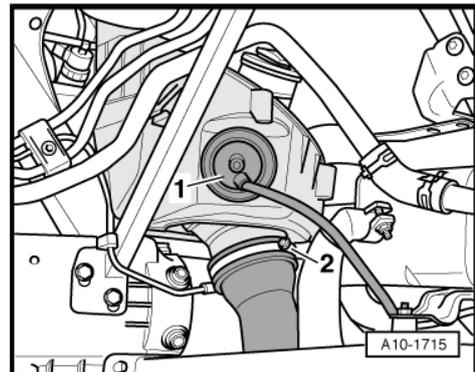
Protected by copyright. Copying for private use is permitted unless authorised by AUDI AG. In no event shall we be liable with respect to the correctness of information.



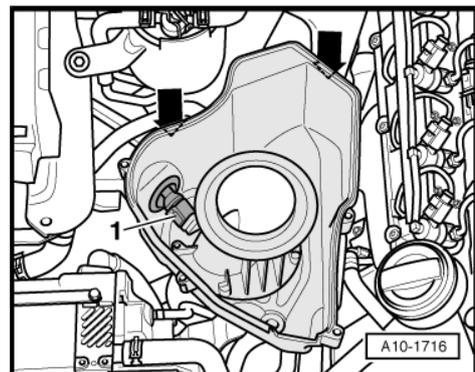
- Unplug electrical connector -1-.
- Remove bolts -arrows- and detach bracket for charge air cooler.
- Take off charge air cooler -2- (right-side).



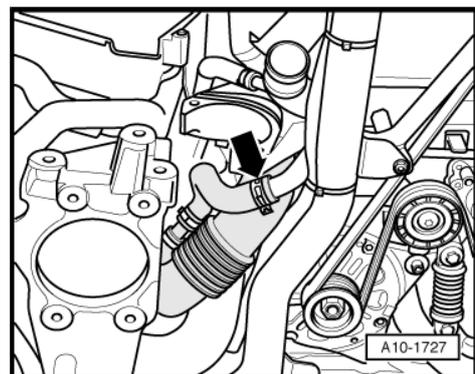
- Working from wheel housing (right-side), pull rubber grommet -1- off bottom section of air cleaner housing.
- Disconnect air intake hose -2- from bottom section of air cleaner housing.



- Detach electrical connector -1- at air mass meter.
- Remove bolts -arrows-.
- Detach bottom section of air cleaner housing (right side).



- Detach crankcase breather hose -arrow-.



- Unplug electrical connector for heater element for crankcase breather - N79- -item 1-.
- Remove air intake hose between air cleaner and turbocharger -arrows-.
- Lower subframe => [page 45](#) .
- Remove front exhaust pipe (right-side) => [page 289](#) .

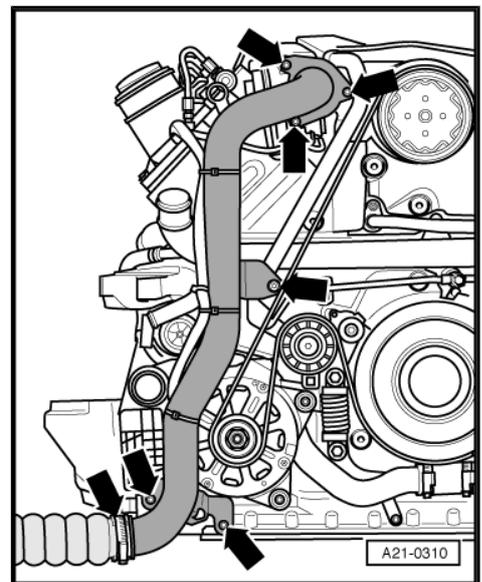
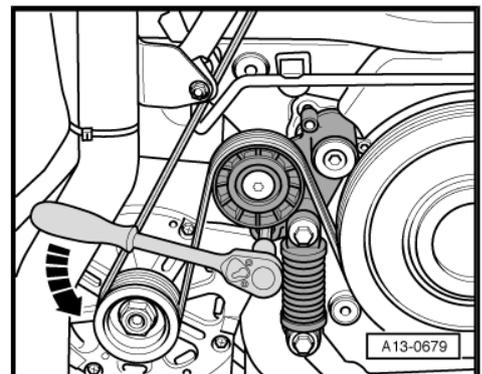
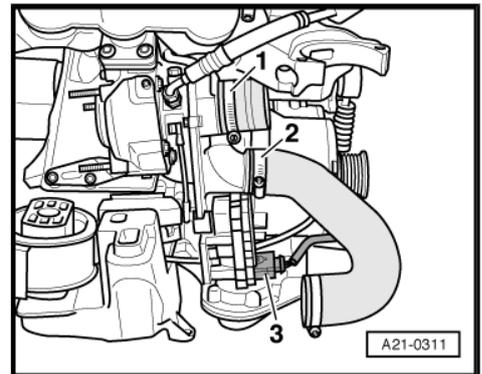
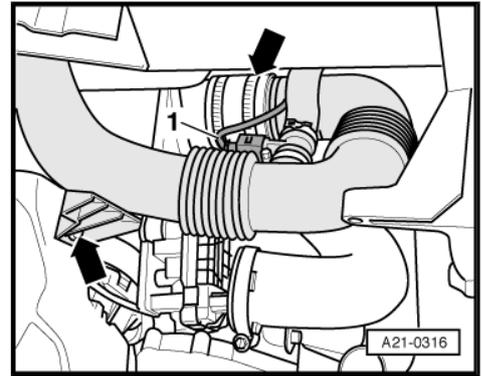
- Detach air hoses -1- and -2- from turbocharger.
- Unplug electrical connector -3-.

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.

**i** Note

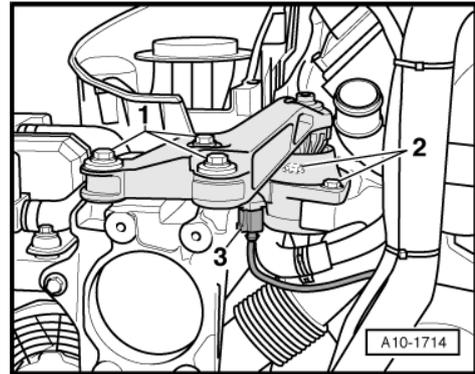
*Before removing, mark direction of rotation of poly V-belt with chalk or felt-tip pen. If the belt runs in the opposite direction when it is refitted, this can cause breakage.*

- To slacken poly V-belt, pivot belt tensioner in direction of -arrow- (use a lever with  $\frac{3}{8}$ " drive).
- Remove poly V-belt from alternator pulley.
- Move electrical wiring clear of air pipe (front).
- Remove air pipe (front right) -arrows-.

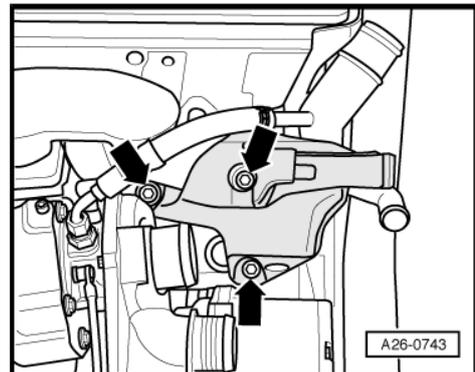




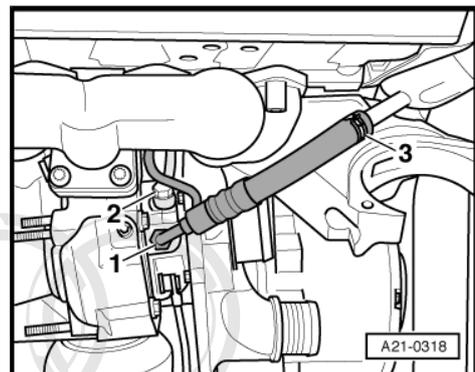
- Unplug electrical connector -3-.
- Remove bolts -1- and -2-.
- Remove bracket and mounting for torque reaction support.



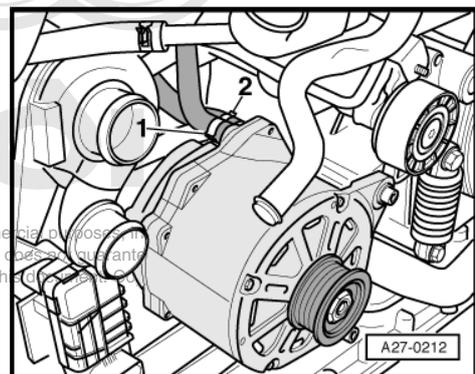
- Remove torque reaction support -arrows-.



- Unbolt coolant line -1- from turbocharger and detach coolant hose -3- from coolant pipe.
- Unscrew oil supply line -2- at turbocharger.



- Disconnect coolant hoses -1- and -2- at rear of alternator.
- Unscrew electrical wire at alternator.
- Unplug electrical connector.

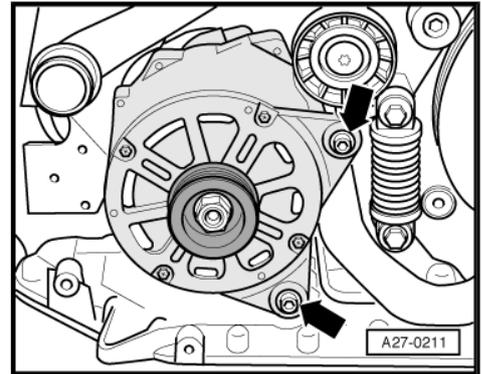


Protected by copyright. Copying for private or commercial purposes is not permitted unless authorised by AUDI AG. AUDI AG does not accept any liability with respect to the correctness of information in this manual.

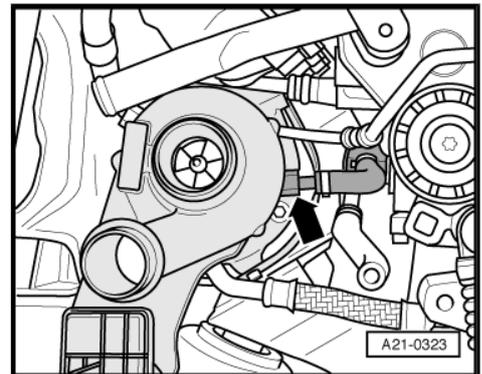
- Remove bolts -arrows-.
- Remove alternator.

 **Note**

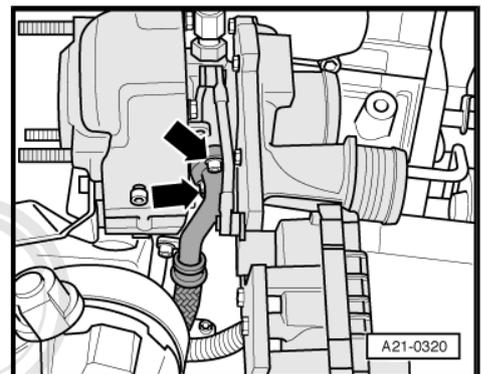
- ◆ *If alternator sticks in its bracket, screw bolt back in again down to the last 2 turns.*
- ◆ *Tap carefully on bolt heads with flat side of hammer to release threaded bushes of alternator mount.*



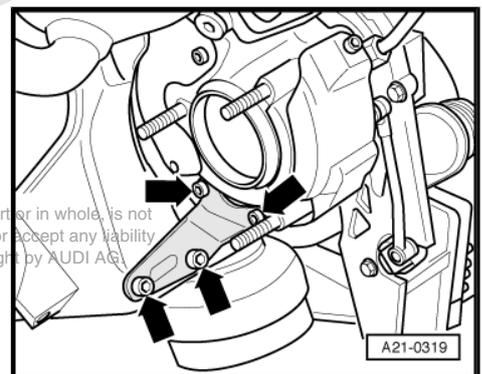
- Detach coolant line -arrow- at side of turbocharger.



- Unbolt oil return line from turbocharger -arrows- using Allen key, long reach - T10058- .



- Unscrew bracket for turbocharger -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.



- Remove bolts -arrows-.
- Detach turbocharger.

### Installing

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



#### Note

- ◆ Renew gaskets, seals, O-rings and self-locking nuts.
- ◆ Hose connections and hoses for charge air system must be free of oil and grease before assembly.
- ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ *Electronic parts catalogue* .
- ◆ Charge air system must be free of leaks.
- ◆ Reinstall all cable ties in the same locations when assembling.
- ◆ Fill turbocharger with engine oil at connection for oil supply line.
- ◆ After installing turbocharger, allow engine to idle for approx. 1 minute and do not rev up immediately to ensure turbocharger is supplied with oil.

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

- Install alternator ⇒ Electrical system; Rep. gr. 27
- Install poly V-belt ⇒ [page 55](#) .
- Install front exhaust pipe (right-side) ⇒ [page 289](#) .
- Only tighten bolts for subframe to the specified torque (do not turn further); tighten bolts only after performing alignment check ⇒ Running gear, front-wheel and four-wheel drive; Rep. gr. 40 .



#### WARNING

***The vehicle must not be driven at this stage.***

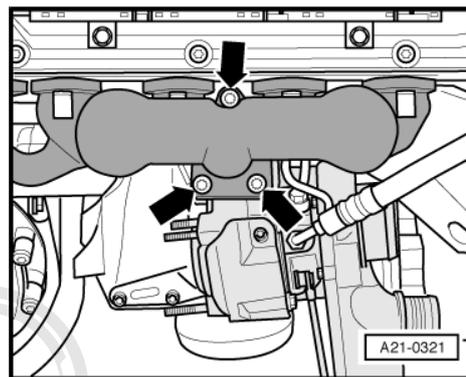
- Install anti-roll bar ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 40 .
- Install lock carrier with attachments ⇒ General body repairs, exterior; Rep. gr. 50 .
- Install front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 .
- Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .



#### Note

*Do not reuse coolant.*

- Fill cooling system ⇒ [page 211](#) .
- Check oil level ⇒ Maintenance ; Booklet 404 .
- Perform wheel alignment check ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 44 .



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

– Check headlight adjustment ⇒ Maintenance ; Booklet 404 .

**Tightening torques**

Component	Nm
Turbocharger to exhaust manifold	20 + 90° <sup>17)</sup> <sup>18)</sup>
Bracket for Turbocharger	10
Turbocharger to: Engine support	10
Oil return line to turbocharger	10
Coolant line to turbocharger	25
Oil supply line to turbocharger	15
Torque reaction support to engine	42
Mounting for torque reaction support to torque reaction support	23
Bracket for torque reaction support to longitudinal member	40
Front right air intake pipe to engine	10
Coolant pipe to top section of sump	10
Bracket for charge air cooler to body	10
Condenser to lock carrier	6
Hose clips (9 mm wide)	3
Hose clips (13 mm wide)	5.5

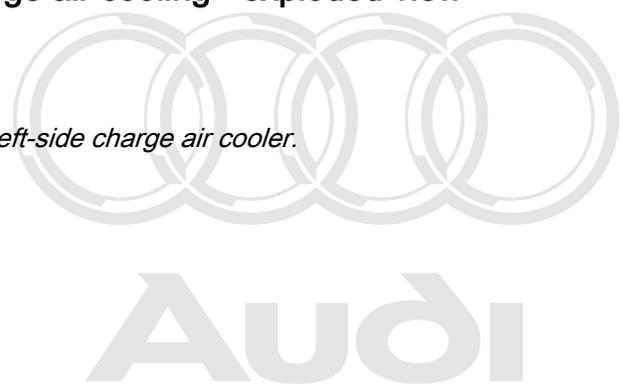
17) Renew bolts.

18) 90° = a quarter of a turn.

## 1.4 Charge air cooling - exploded view

 **Note**

*Illustration shows left-side charge air cooler.*



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

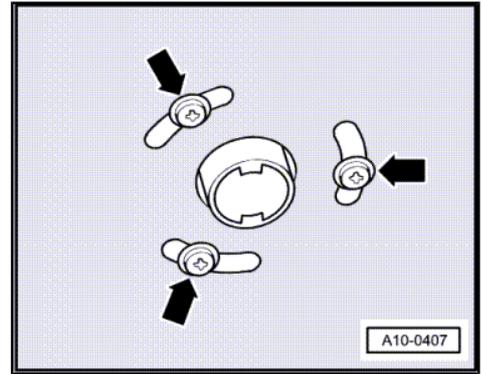


- Remove both front wheels.

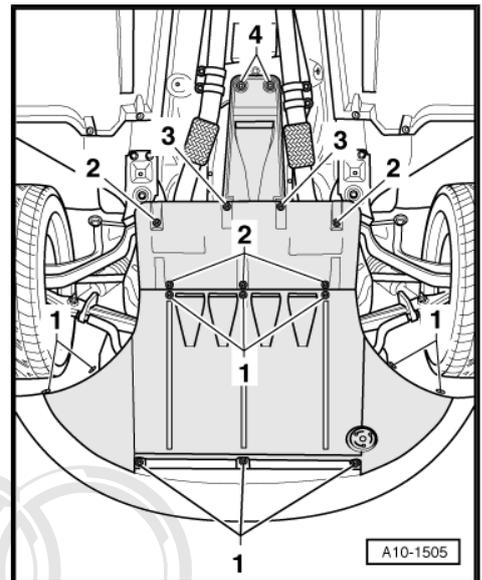
 **Note**

*Secure brake discs with wheel bolts.*

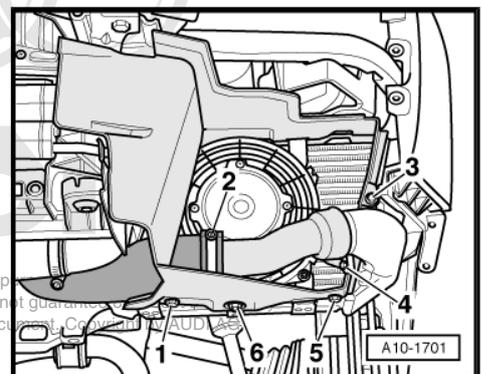
- Vehicles with auxiliary heater: remove bolts -arrows- securing exhaust pipe for auxiliary/additional heater to noise insulation.



- Open quick-release fasteners -1- and remove noise insulation (front).
- Remove front section of wheel housing liner (front left and front right) ⇒ General body repairs, exterior; Rep. gr. 66 .
- Remove front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 .

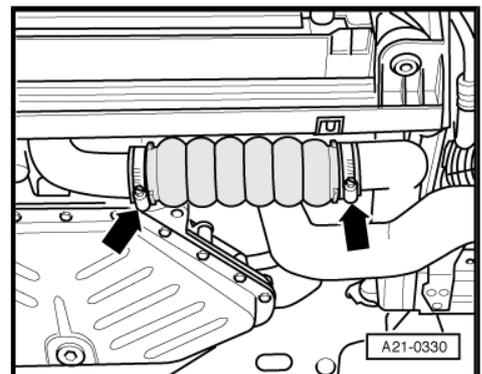


- Remove bolt -4- and nut -6-.
- Slacken hose clip -2- and detach air pipe.
- Remove bolts -1-, -3- and -5-.
- Detach air duct from charge air cooler (left-side).



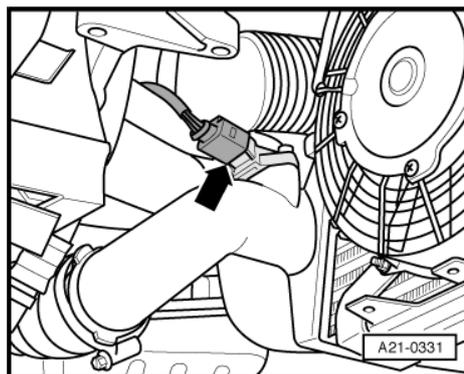
Protected by copyright. Copying for private or commercial purposes is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee the correctness of information in this document. Copyright © AUDI AG

- Remove air hose (front left) -arrows-.





- Unplug electrical connector -arrow- at charge pressure sender - G31- .



- Unplug electrical connector -2-.
- Remove bolts -arrows- and detach bracket for charge air cooler.
- Take off charge air cooler -1- (left-side).

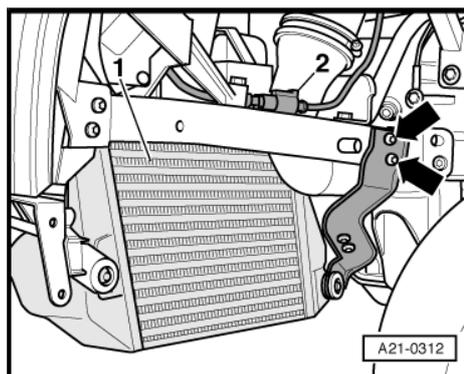
### Installing

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



#### Note

- ◆ *Renew O-rings.*
- ◆ *Hose connections and hoses for charge air system must be free of oil and grease before assembly.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- Install front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 .
- Install front section of wheel housing liner (front left and front right) ⇒ General body repairs, exterior; Rep. gr. 66 .
- Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .



### Tightening torques

Component	Nm
Bracket for charge air cooler to body	10
Air pipe to charge air cooler	10
Air duct to charge air cooler	10
Hose clips (9 mm wide)	3
Hose clips (13 mm wide)	5.5

## 1.6 Removing and installing charge pressure sender - G31-

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

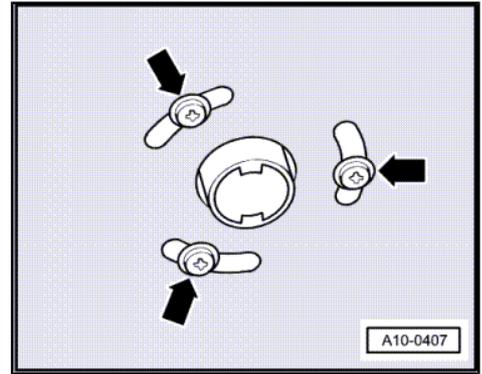
- Activate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .

- Remove both front wheels.

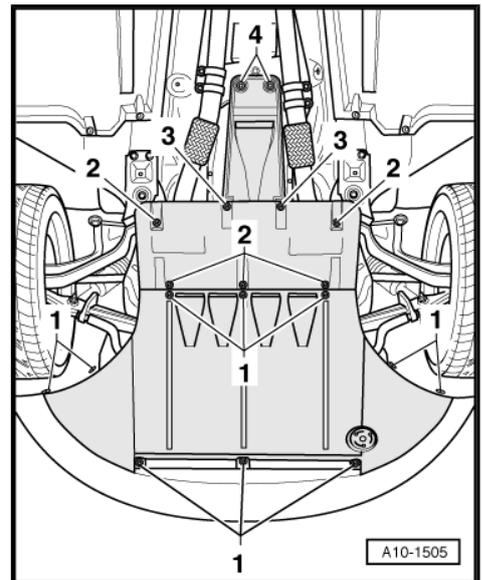
**i** Note

Secure brake discs with wheel bolts.

- Vehicles with auxiliary heater: remove bolts -arrows- securing exhaust pipe for auxiliary/additional heater to noise insulation.

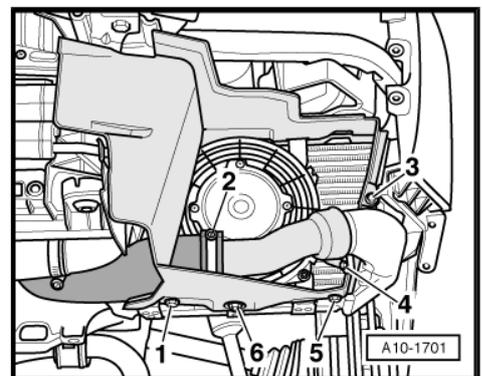


- Open quick-release fasteners -1- and remove noise insulation (front).
- Remove front section of wheel housing liner (front left and front right) ⇒ General body repairs, exterior; Rep. gr. 66 .
- Remove front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 .



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 -4- and nut -6-.
- Slacken hose clip -2- and detach air pipe.
- Remove bolts -1-, -3- and -5-.
- Detach air duct from charge air cooler (left-side).





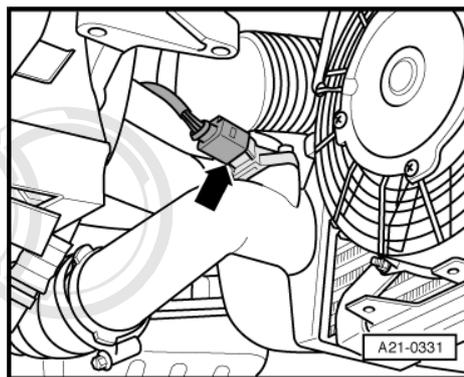
- Unplug electrical connector -arrow- at charge pressure sender - G31- .
- Unscrew bolts and remove charge pressure sender.

**Installing**

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

**Note**

- ◆ Renew O-rings.
  - ◆ Hose connections and hoses for charge air system must be free of oil and grease before assembly.
  - ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ *Electronic parts catalogue* .
- 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.
- Install front bumper cover ⇒ **General body repairs, exterior; Rep. gr. 63** .
  - Install front section of wheel housing liner (front left and front right) ⇒ **General body repairs, exterior; Rep. gr. 66** .
  - Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .

**Tightening torques**

Component	Nm
Air pipe to charge air cooler	10
Air duct to charge air cooler	10
Hose clips (9 mm wide)	3
Hose clips (13 mm wide)	5.5

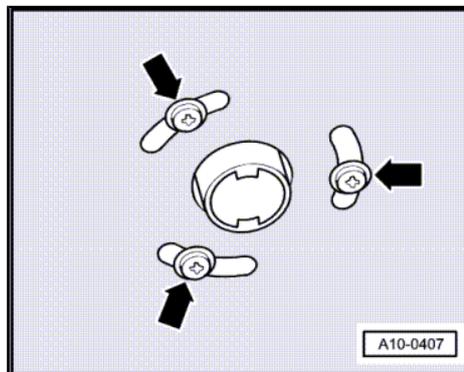
**1.7 Removing and installing charge air cooler (right-side)****Removing**

- Activate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
- Remove both front wheels.

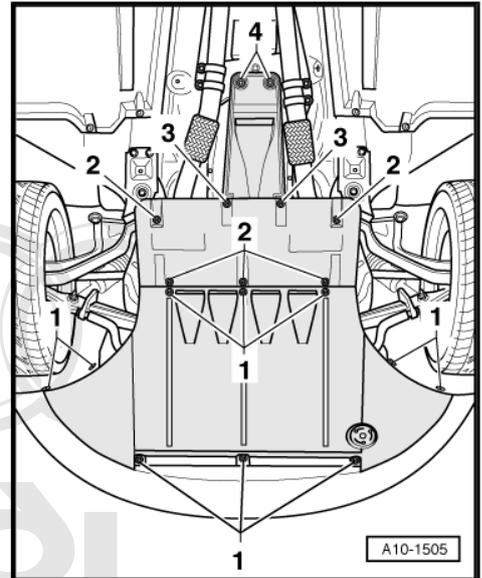
**Note**

Secure brake discs with wheel bolts.

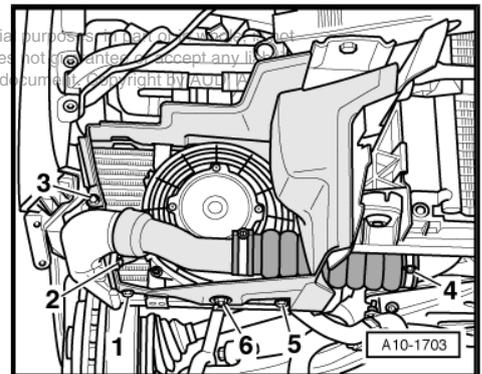
- Vehicles with auxiliary heater: remove bolts -arrows- securing exhaust pipe for auxiliary/additional heater to noise insulation.



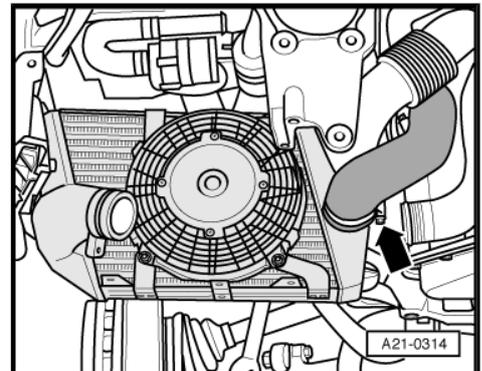
- Open quick-release fasteners -1- and remove noise insulation (front).
- Remove front section of wheel housing liner (front left and front right) ⇒ General body repairs, exterior; Rep. gr. 66 .
- Remove front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 .



- Remove bolt -2- and nut -6-.
- Slacken hose clip -4- and detach air pipe with hose.
- Remove bolts -1-, -3- and -5-.
- Detach air duct from charge air cooler (right-side).



- Detach air intake hose -arrow- from charge air cooler (right-side).





- Unplug electrical connector -1-.
- Remove bolts -arrows- and detach bracket for charge air cooler.
- Take off charge air cooler -2- (right-side).

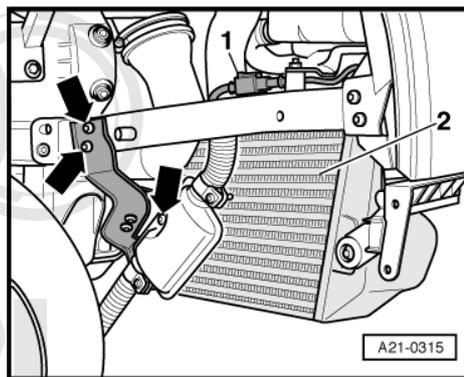
### Installing

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



#### Note

- ◆ *Renew O-rings.*
- ◆ *Hose connections and hoses for charge air system must be free of oil and grease before assembly.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- Install front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 .
- Install front section of wheel housing liner (front left and front right) ⇒ General body repairs, exterior; Rep. gr. 66 .
- Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .



### Tightening torques

Component	Nm
Bracket for charge air cooler to body	10
Air pipe to charge air cooler	10
Air duct to charge air cooler	10
Hose clips (9 mm wide)	3
Hose clips (13 mm wide)	5.5

## 26 – Exhaust system

### 1 Removing and installing parts of exhaust system

- ⇒ [“1.1 Exhaust system - exploded view”, page 275](#)
- ⇒ [“1.2 Removing and installing exhaust gas temperature sender 1 G235”, page 279](#)
- ⇒ [“1.3 Removing and installing exhaust gas temperature sender 1 for bank 2 G236”, page 280](#)
- ⇒ [“1.4 Separating centre and rear silencers”, page 281](#)
- ⇒ [“1.5 Removing and installing main catalytic converter \(left-side\)”, page 282](#)
- ⇒ [“1.6 Removing and installing main catalytic converter \(right-side\)”, page 284](#)
- ⇒ [“1.7 Removing and installing front exhaust pipe \(left-side\) with starter catalytic converter”, page 286](#)
- ⇒ [“1.8 Removing and installing front exhaust pipe \(right-side\) with starter catalytic converter”, page 289](#)
- ⇒ [“1.9 Exhaust manifold - exploded view”, page 291](#)
- ⇒ [“1.10 Removing and installing exhaust manifold \(left-side\)”, page 292](#)
- ⇒ [“1.11 Removing and installing exhaust manifold \(right-side\)”, page 292](#)
- ⇒ [“1.12 Stress-free alignment of exhaust system”, page 293](#)
- ⇒ [“1.13 Aligning tailpipes”, page 294](#)
- ⇒ [“1.14 Checking exhaust system for leaks”, page 294](#)

#### 1.1 Exhaust system - exploded view

 Note

- ◆ *After working on the exhaust system, ensure that the system is not under stress and that it has sufficient clearance from the body. If necessary, loosen clamps and align silencers and exhaust pipes so that sufficient clearance is maintained to the body at all points and the mountings are evenly loaded.*
- ◆ *To avoid damage, the flexible joints in the front exhaust pipes must not be bent more than 10°.*

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 - Rear silencer**

- For left side of vehicle
- Combined in one unit with centre silencer as original equipment. Can be renewed individually for repair purposes
- Cutting point  
⇒ [page 282](#)
- Align exhaust system so it is free of stress  
⇒ [page 293](#)

**2 - 25 Nm**

- Renew

**3 - 25 Nm**

- Renew

**4 - Front exhaust pipe with starter catalytic converter**

- For right side of vehicle
- Removing and installing  
⇒ [page 289](#)
- Mounting components  
⇒ [page 278](#)
- Align exhaust system so it is free of stress  
⇒ [page 293](#)

**5 - Gasket**

- Renew

**6 - Stud****7 - Bracket**

- Mounting components  
⇒ [page 279](#)

**8 - 25 Nm**

- Renew

**9 - 25 Nm**

- Renew

**10 - Front exhaust pipe with starter catalytic converter**

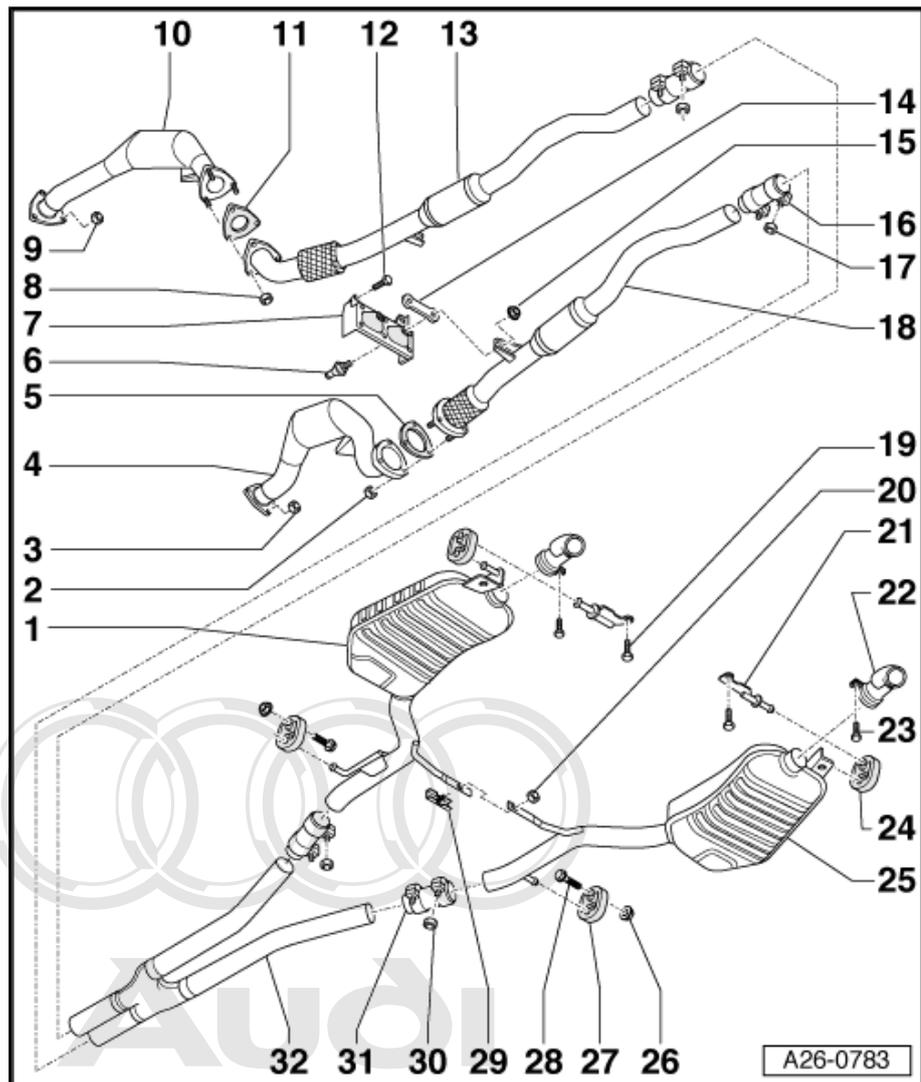
- For left side of vehicle
- Removing and installing ⇒ [page 286](#)
- Mounting components ⇒ [page 278](#)
- Align exhaust system so it is free of stress ⇒ [page 293](#)

**11 - Gasket**

- Renew

**12 - 22 Nm****13 - Main catalytic converter**

- For left side of vehicle
- With flexible joint
- Do not bend flexible joint more than 10° – otherwise it can be damaged
- Align exhaust system so it is free of stress ⇒ [page 293](#)



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

#### 14 - Bracket

#### 15 - 18 Nm

- Renew

#### 16 - Clamp (front)

- Align exhaust system so it is free of stress before tightening clamp ⇒ [page 293](#)
- Installation position ⇒ [page 278](#)
- Tighten bolt connections evenly.

#### 17 - 23 Nm

#### 18 - Main catalytic converter

- For right side of vehicle
- With flexible joint
- Do not bend flexible joint more than 10° – otherwise it can be damaged
- Align exhaust system so it is free of stress ⇒ [page 293](#)

#### 19 - 22 Nm

#### 20 - 23 Nm

- Renew

#### 21 - Mounting

#### 22 - Tailpipe

- Align exhaust system so it is free of stress ⇒ [page 293](#)

#### 23 - 23 Nm

#### 24 - Rubber mounting

- Check preload ⇒ [“1.12 Stress-free alignment of exhaust system”, page 293](#)

#### 25 - Rear silencer

- For right side of vehicle
- Combined in one unit with centre silencer as original equipment. Can be renewed individually for repair purposes
- Cutting point ⇒ [page 282](#)
- Align exhaust system so it is free of stress ⇒ [page 293](#)

#### 26 - 23 Nm

#### 27 - Rubber mounting

- Check preload ⇒ [“1.12 Stress-free alignment of exhaust system”, page 293](#)

#### 28 - Bolt

#### 29 - Connecting bracket

#### 30 - 23 Nm

#### 31 - Clamp (rear)

- For separate replacement of centre and rear silencers
- Align exhaust system so it is free of stress before tightening clamp ⇒ [page 293](#)
- Installation position ⇒ [page 278](#)
- Tighten bolt connections evenly.

#### 32 - Centre silencer

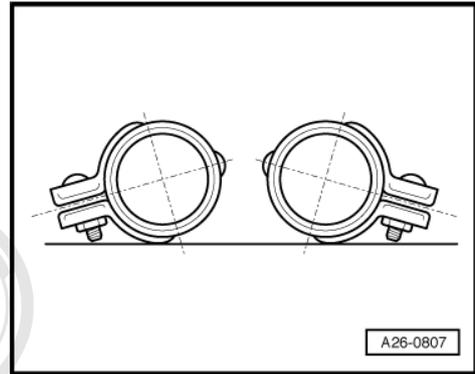
- Combined in one unit with rear silencer as original equipment. Can be renewed individually for repair purposes
- Cutting point ⇒ [page 282](#)
- Align exhaust system so it is free of stress ⇒ [page 293](#)

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



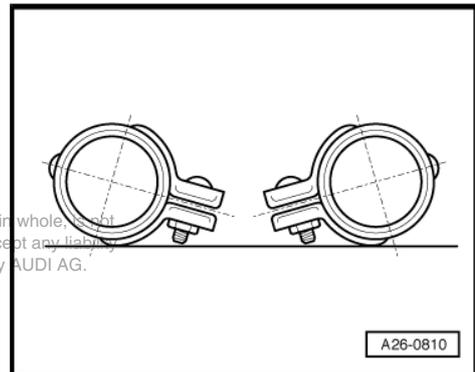
### Installation position of front clamps

- Install clamps so that the bolt ends do not protrude beyond bottom of clamp.
- Bolt connections face outwards



### Installation position of rear clamps

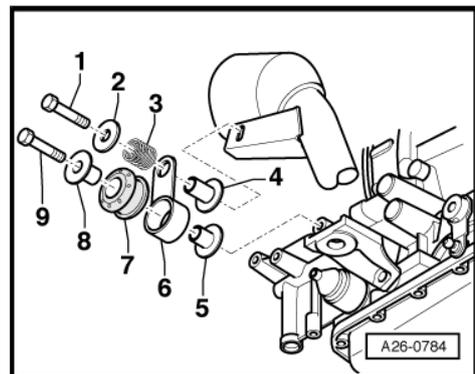
- Install clamps so that the bolt ends do not protrude beyond bottom of clamp.
- Bolt connections facing each other



Protected by copyright. Copying for private or commercial purposes, in part or in whole, without permission is prohibited. All rights reserved. Audi AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by Audi AG.

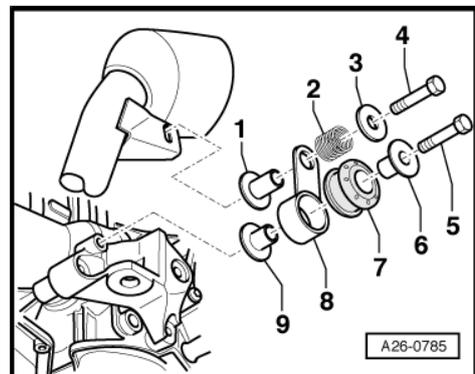
### Components of exhaust pipe mountings (left-side)

- 1 - Bolt, 25 Nm
- 2 - Washer
- 3 - Compression spring
- 4 - Spacer sleeve
- 5 - Spacer sleeve
- 6 - Bracket
- 7 - Buffer
- 8 - Spacer sleeve
- 9 - Bolt, 25 Nm



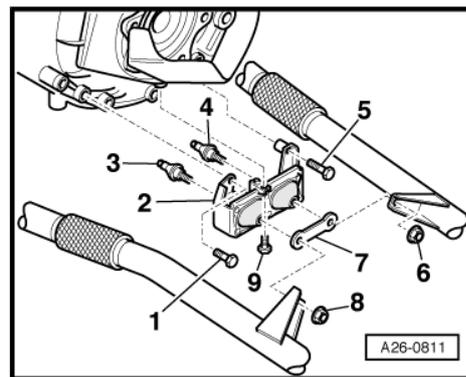
### Components of exhaust pipe mountings (right-side)

- 1 - Spacer sleeve
- 2 - Compression spring
- 3 - Washer
- 4 - Bolt, 25 Nm
- 5 - Bolt, 25 Nm
- 6 - Spacer sleeve
- 7 - Buffer
- 8 - Bracket
- 9 - Spacer sleeve



### Components of bracket (centre)

- 1 - Bolt, 22 Nm
- 2 - Bracket
- 3 - Stud
- 4 - Stud
- 5 - Bolt, 22 Nm
- 6 - Nut, self-locking, 18 Nm
- 7 - Bracket
- 8 - Nut, self-locking, 18 Nm
- 9 - Bolt, 22 Nm

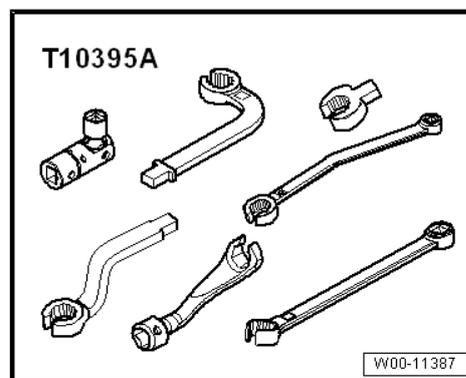


## 1.2 Removing and installing exhaust gas temperature sender 1 - G235-

### Special tools and workshop equipment required

- ◆ Tool set - T10395 A- , tool set, 17 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.





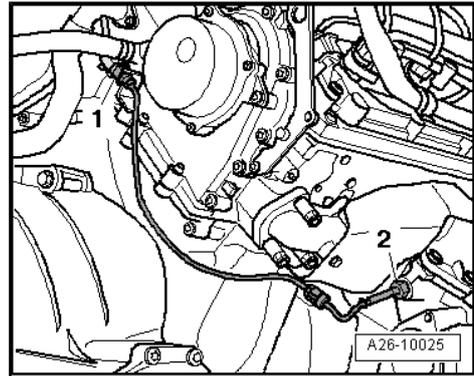
## Removing



### Note

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

- Remove starter catalytic converter ⇒ [page 289](#) .
- Unplug electrical connector -1- and unscrew exhaust gas temperature sender 1 - G235- -item 2-.



## Installing

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



### Note

Fit all cable ties in the original positions when installing.

- Note correct installation position of exhaust gas temperature sender 1 - G235- :
- The electrical connection must point downwards in vertical direction.
- Install starter catalytic converter ⇒ [page 289](#) .

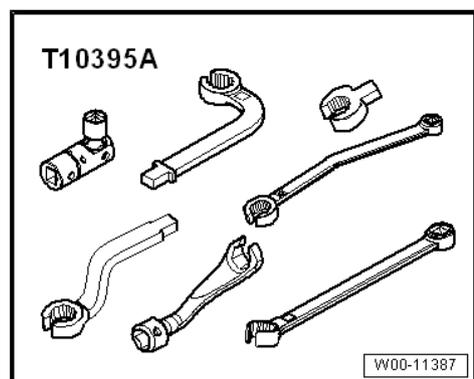
## Tightening torque

Component	Nm
Exhaust gas temperature sender 1 - G235- to turbocharger	45 <sup>1)</sup>
<ul style="list-style-type: none"> <li>• <sup>1)</sup> Coat thread with high-temperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue .</li> </ul>	

## 1.3 Removing and installing exhaust gas temperature sender 1 for bank 2 - G236-

### Special tools and workshop equipment required

- ◆ Tool set - T10395 A- , tool set, 17 mm



## Removing



### Note

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

- Remove charge air cooler (left-side) ⇒ [page 268](#) .
- Unplug electrical connector -1- and unscrew exhaust gas temperature sender 1, bank 2 - G236- -item 2-.

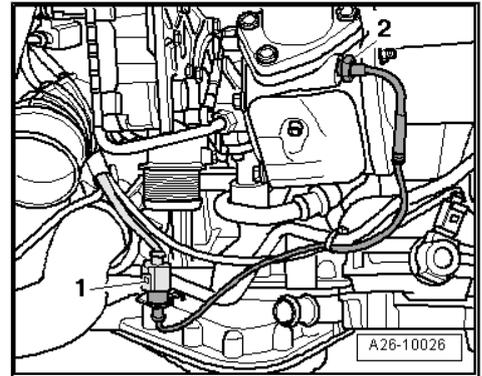
**Installing**

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

 **Note**

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

- Note correct installation position of exhaust gas temperature sender 1, bank 2 - G236- :
- The electrical connection must point downwards in vertical direction.
- Install charge air cooler (left-side) ⇒ [page 268](#) .



**Tightening torque**

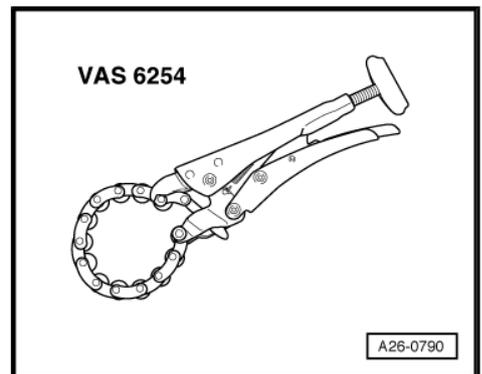
Component	Nm
Exhaust gas temperature sender 1, bank 2 - G236- to turbocharger	45 <sup>1)</sup>
<ul style="list-style-type: none"> <li>• <sup>1)</sup> Coat thread with high-temperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue .</li> </ul>	

**1.4 Separating centre and rear silencers**

- ◆ The connecting pipe can be cut through at the cutting point in order to renew the centre and rear silencers separately.
- ◆ The cutting point is marked by an indentation on the outside of the exhaust pipe.

**Special tools and workshop equipment required**

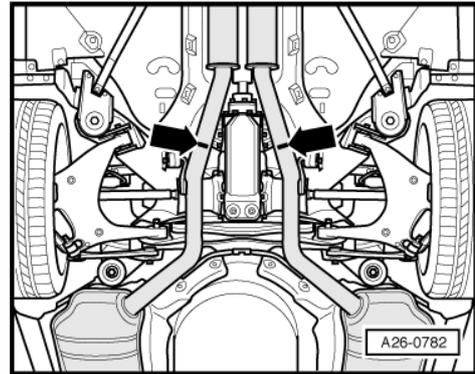
- ◆ Chain pipe cutter - VAS 6254-



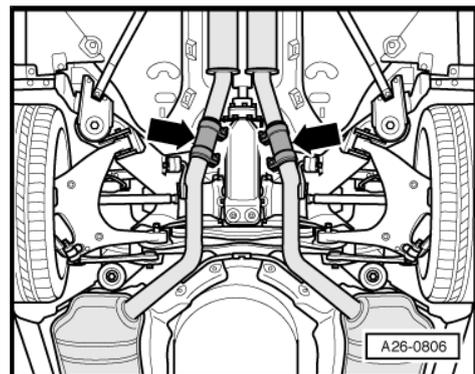


### Procedure

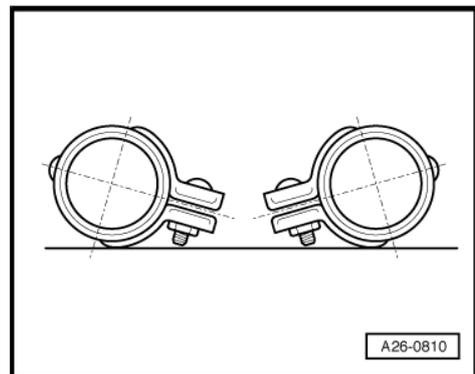
- Activate jacking mode => Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
- Cut through relevant exhaust pipe at right angles at the position marked -arrows- using chain-type pipe cutter - VAS 6254-



- When installing, position centre of clamp -arrows- over cutting location.



- Install clamps so that the bolt ends do not protrude beyond bottom of clamp.
- Bolt connections facing each other
- Align exhaust system so it is free of stress => [page 293](#) .
- Deactivate jacking mode => Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .



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

## 1.5 Removing and installing main catalytic converter (left-side)

### Removing

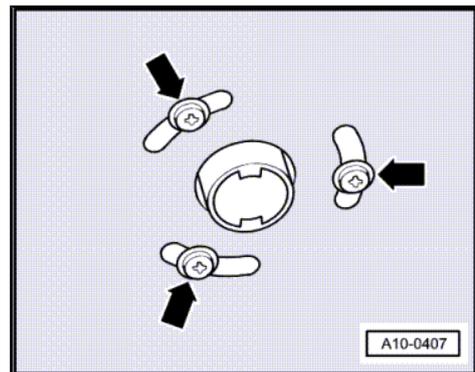
- Activate jacking mode => Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
- Remove front left wheel.



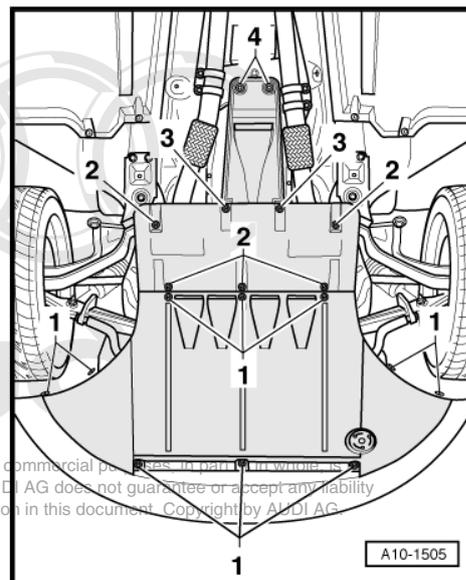
### Note

Secure brake disc with wheel bolts.

- Vehicles with auxiliary heater: remove bolts -arrows- securing exhaust pipe for auxiliary/additional heater to noise insulation.

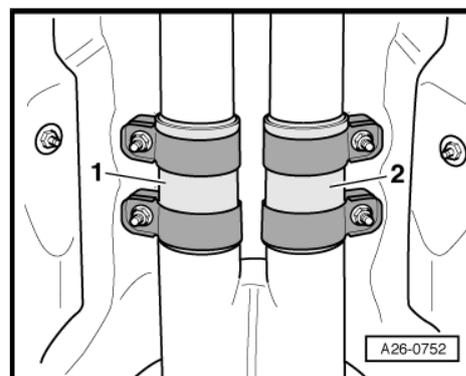


- Release fasteners -1-, -2- and -4- and take off noise insulation panels.

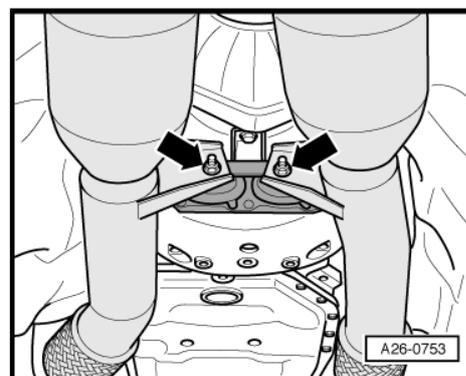


Protected by copyright. Copying for private or commercial purposes is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG

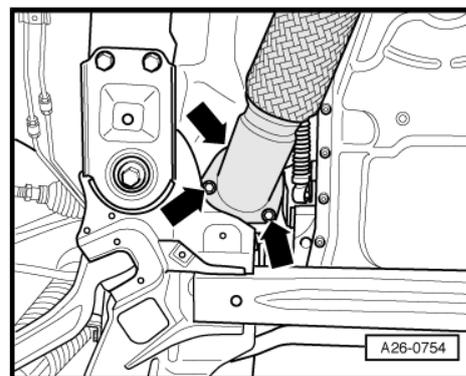
- Loosen clamp (left-side) -1-.



- Unscrew nut -left arrow- at mounting bracket for main catalytic converter (left-side).



- Unbolt main catalytic converter (left-side) from front exhaust pipe -arrows-.
- Detach the main catalytic converter (left-side).



## Installing

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



### Note

Renew seals, gaskets and self-locking nuts.

– Note installation position of centre bracket -2-.

1 - Bolt, 22 Nm

3 - Stud

4 - Stud

5 - Bolt, 22 Nm

6 - Nut, self-locking, 18 Nm

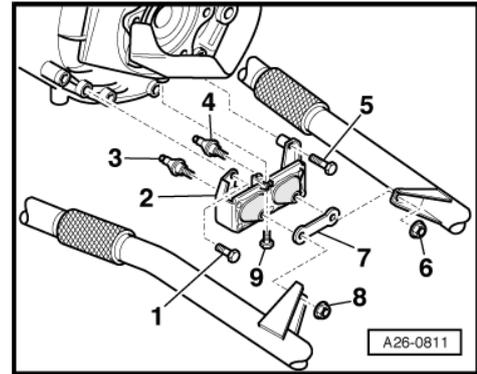
7 - Bracket

8 - Nut, self-locking, 18 Nm

9 - Bolt, 22 Nm

– Align exhaust system so it is free of stress [page 293](#)

– Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .



## Tightening torques

Component	Nm
Main catalytic converter to front exhaust pipe	25 <sup>19)</sup>
Mounting bracket for main catalytic converter to bracket	25

19) Renew nuts.

## 1.6 Removing and installing main catalytic converter (right-side)

### Removing

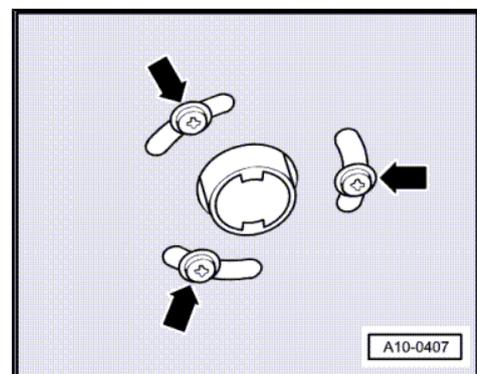
- Activate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
- Remove front right wheel.



### Note

Secure brake disc with wheel bolts.

- Vehicles with auxiliary heater: remove bolts -arrows- securing exhaust pipe for auxiliary/additional heater to noise insulation.

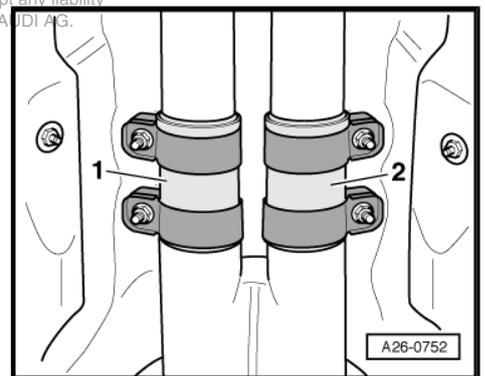
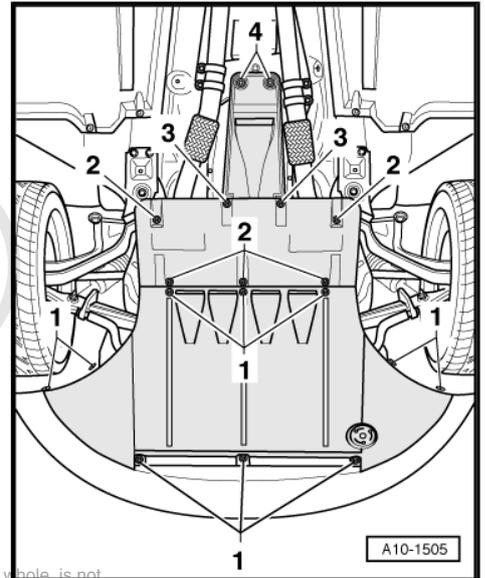


- Release fasteners -1-, -2- and -4- and take off noise insulation panels.

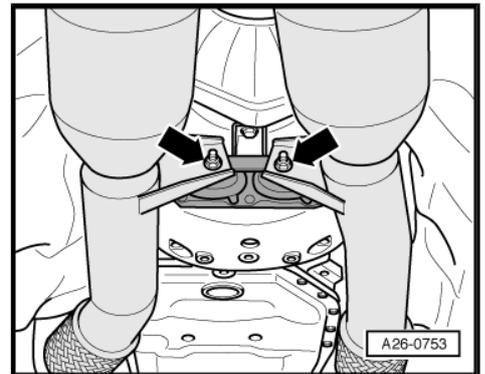


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability for the correctness of information in this document. Copyright by AUDI AG.

- Loosen clamp (right-side) -2-



- Unscrew nut -right arrow- at mounting bracket for main catalytic converter (right-side).



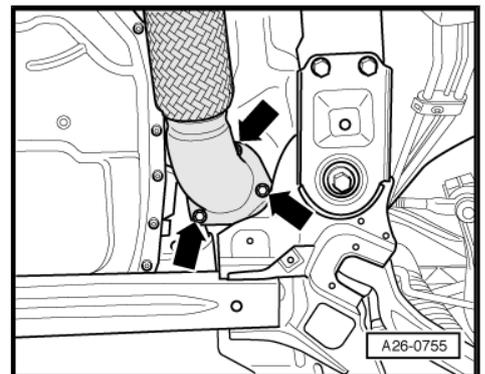
- Unbolt main catalytic converter (right-side) from front exhaust pipe -arrows-.
- Detach the main catalytic converter (right-side).

### Installing

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

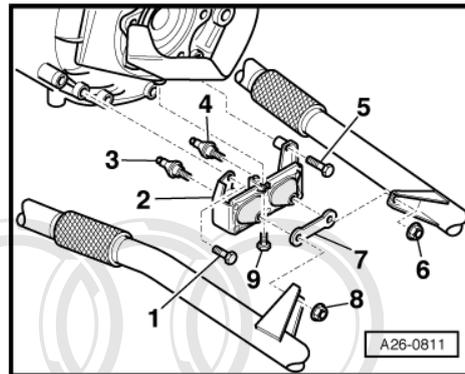


*Renew seals, gaskets and self-locking nuts.*



- Note installation position of centre bracket -2-.

- 1 - Bolt, 22 Nm
- 3 - Stud
- 4 - Stud
- 5 - Bolt, 22 Nm
- 6 - Nut, self-locking, 18 Nm
- 7 - Bracket
- 8 - Nut, self-locking, 18 Nm
- 9 - Bolt, 22 Nm



- Align exhaust system so it is free of stress => [page 293](#) .

- Deactivate jacking mode => Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .

**Tightening torques**

Component	Nm
Main catalytic converter to front exhaust pipe	25
Mounting plate to bracket	25

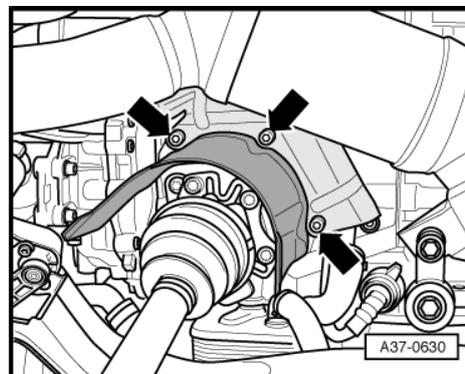
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted without the express authorisation by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

20) Renew nuts.

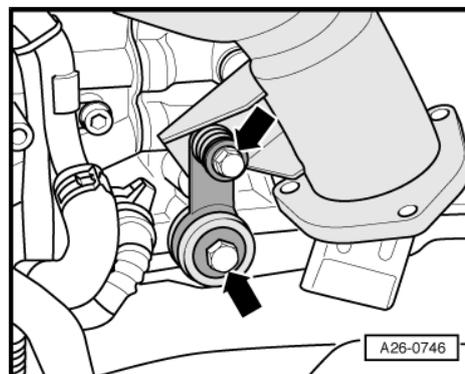
## 1.7 Removing and installing front exhaust pipe (left-side) with starter catalytic converter

**Removing**

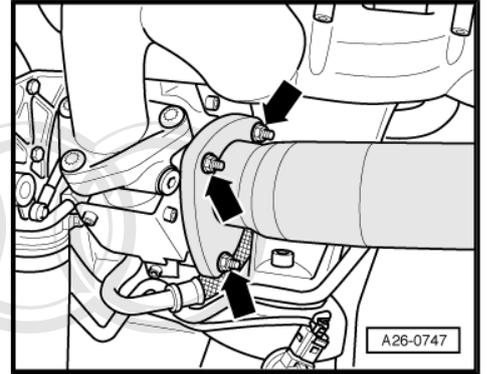
- Lower subframe => [page 45](#) .
- Remove main catalytic converter (left-side) => [page 282](#) .
- Remove heat shield panels for drive shaft (left-side) -arrows-.



- Unbolt bracket for front exhaust pipe -arrows-.



- Unscrew nuts -arrows- at front exhaust pipe/turbocharger.
- Remove front exhaust pipe (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.

## Installing

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



### Note

*Renew self-locking nuts.*

– Note installation position of individual mounting components (left-side).

- 1 - Bolt, 25 Nm
- 2 - Washer
- 3 - Compression spring
- 4 - Spacer sleeve
- 5 - Spacer sleeve
- 6 - Bracket
- 7 - Buffer
- 8 - Spacer sleeve
- 9 - Bolt, 25 Nm

– Only tighten bolts for subframe to the specified torque (do not turn further); tighten bolts only after performing alignment check ⇒ Running gear, front-wheel and four-wheel drive; Rep. gr. 40 .



### WARNING

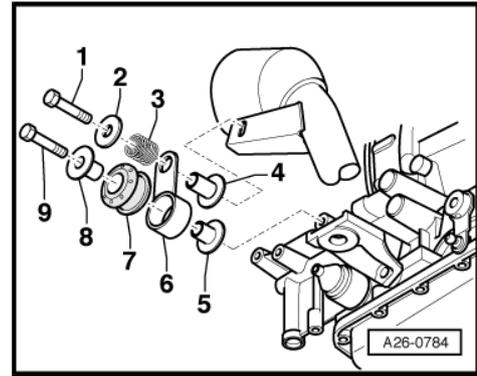
*The vehicle must not be driven at this stage.*

- Install anti-roll bar ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 40 .
- Install the main catalytic converter (left-side) ⇒ [page 282](#) .
- Align exhaust system so it is free of stress ⇒ [page 293](#) .
- Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
- Perform wheel alignment check ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 44 .



### WARNING

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



### Tightening torques

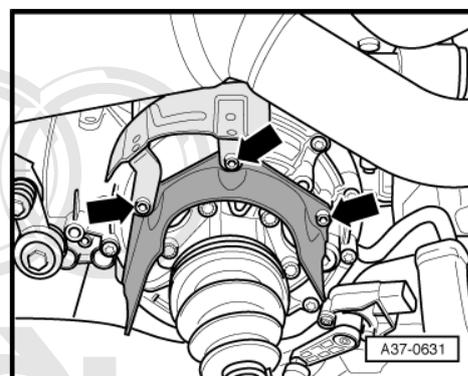
Component	Nm
Front exhaust pipe to turbocharger	25 <sup>21)</sup>
Front exhaust pipe to mounting bracket	25
Mounting plate to gearbox	25
Heat shield panels to gearbox	23
Engine cross member to longitudinal member	68

21) Renew nuts.

## 1.8 Removing and installing front exhaust pipe (right-side) with starter catalytic converter

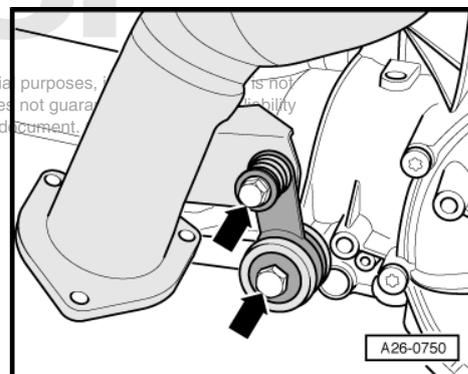
### Removing

- Lower subframe ⇒ [page 45](#) .
- Remove main catalytic converter (right-side) ⇒ [page 284](#) .
- Remove heat shield panels for drive shaft (right-side) -arrows-.
- Unbolt drive shaft (right-side) from gearbox flange.

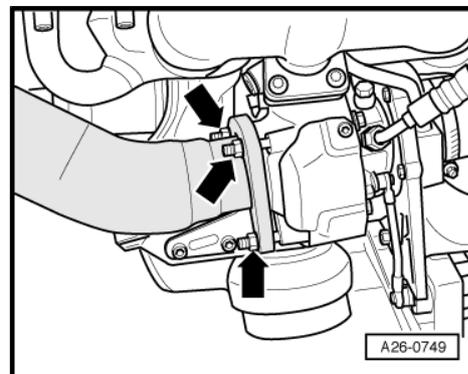


- Unbolt bracket for front exhaust pipe -arrows-.

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



- Unscrew nuts -arrows- at front exhaust pipe/turbocharger.
- Remove front exhaust pipe.



## Installing

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



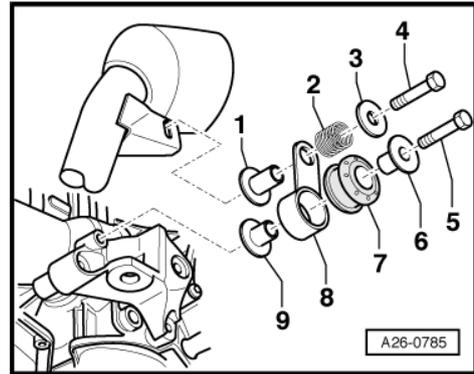
### Note

*Renew self-locking nuts.*

- Note installation position of individual mounting components (right-side)

- 1 - Spacer sleeve
- 2 - Compression spring
- 3 - Washer
- 4 - Bolt, 25 Nm
- 5 - Bolt, 25 Nm
- 6 - Spacer sleeve
- 7 - Buffer
- 8 - Bracket
- 9 - Spacer sleeve

- Only tighten bolts for subframe to the specified torque (do not turn further); tighten bolts only after performing alignment check => Running gear front-wheel and four-wheel drive; Rep. gr. 40 .



### WARNING

*The vehicle must not be driven at this stage.*

- Install anti-roll bar => Running gear, front-wheel drive and four-wheel drive; Rep. gr. 40 .
- Install main catalytic converter (right-side) => [page 284](#) .
- Align exhaust system so it is free of stress => [page 293](#) .
- Deactivate jacking mode => Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .
- Perform wheel alignment check => Running gear, front-wheel drive and four-wheel drive; Rep. gr. 44 .



### WARNING

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

### Tightening torques

Component	Nm
Front exhaust pipe to turbocharger	25 <sup>22)</sup>
Front exhaust pipe to mounting bracket	25
Mounting plate to gearbox	25
Heat shield panels to gearbox	23
Engine cross member to longitudinal member	68

22) Renew nuts.

## 1.9 Exhaust manifold - exploded view



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

*Illustration shows exhaust manifold of left cylinder bank.*

### 1 - Turbocharger

- Removing and installing: left-side  
 ⇒ [page 246](#) ; right-side  
 ⇒ [page 252](#)

### 2 - Gasket

- Renew

### 3 - Exhaust manifold

- Removing and installing: left-side  
 ⇒ [page 292](#) ; right-side  
 ⇒ [page 292](#)

### 4 - Cylinder head

### 5 - Gasket

- Renew

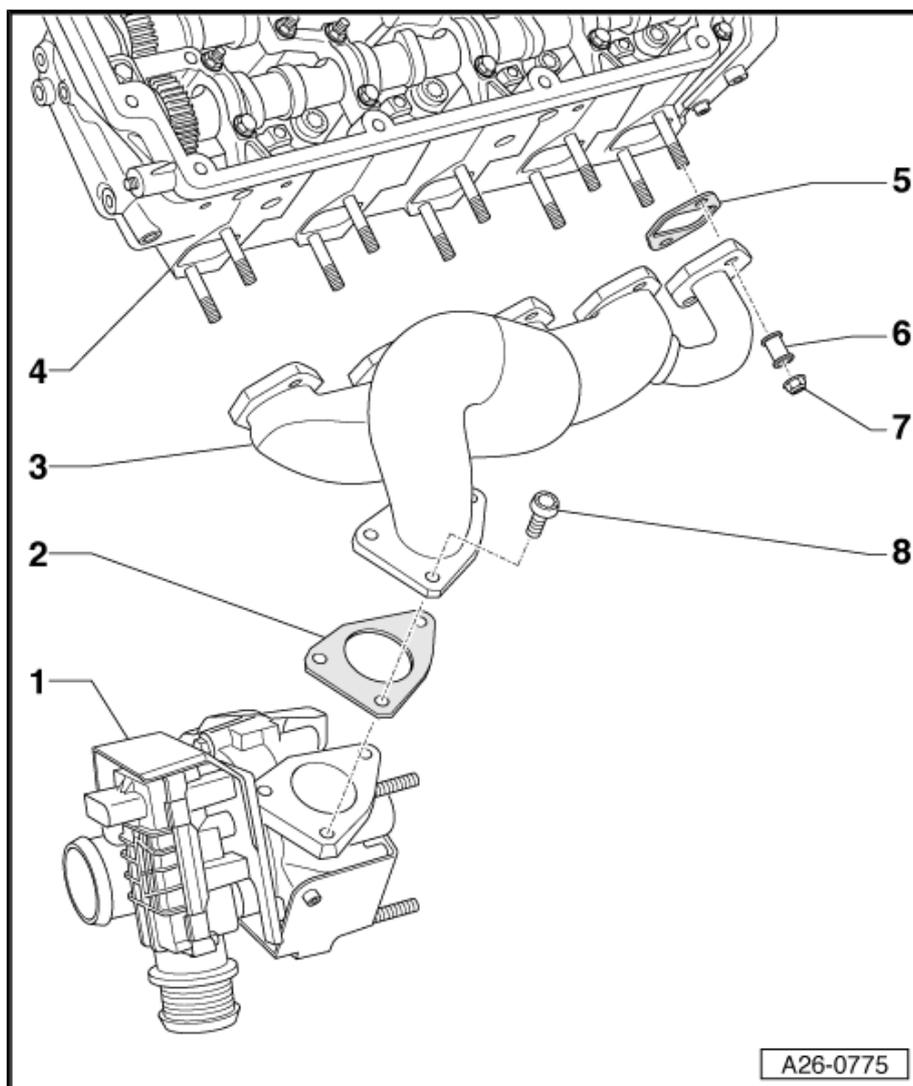
### 6 - Spacer sleeve

### 7 - 25 Nm

- Renew

### 8 - 20 Nm + 1/4 turn (90°) further

- Renew



A26-0775

## 1.10 Removing and installing exhaust manifold (left-side)

### Removing

- Remove turbocharger (left-side) ⇒ [page 246](#) .
- Unscrew nuts -1 ... 10-.
- Detach exhaust manifold.

### Installing

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



#### Note

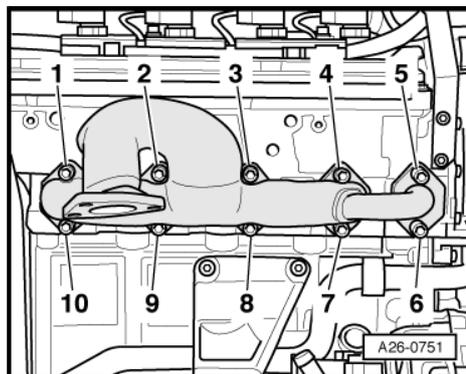
*Renew seals, gaskets and self-locking nuts.*

- Install turbocharger (left-side) ⇒ [page 246](#) .

### Tightening torque

Component	Nm
Exhaust manifold to cylinder head	25 <sup>23)</sup>

23) Renew nuts.



## 1.11 Removing and installing exhaust manifold (right-side)

### Removing

- Remove turbocharger (right-side) ⇒ [page 252](#) .
- Unscrew nuts -1 ... 10-.
- Detach exhaust manifold.

### Installing

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



#### Note

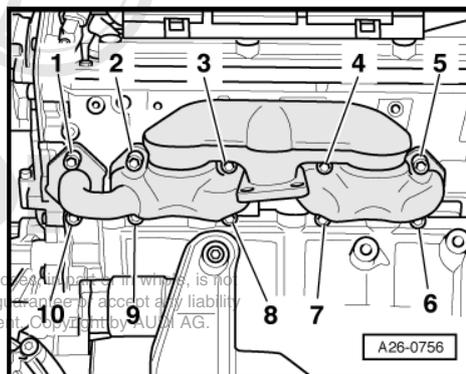
*Renew seals, gaskets and self-locking nuts.*

- Install turbocharger (right-side) ⇒ [page 252](#) .

### Tightening torque

Component	Nm
Exhaust manifold to cylinder head	25 <sup>24)</sup>

24) Renew nuts.



Protected by copyright. Copying for private or commercial purposes without permission is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

## 1.12 Stress-free alignment of exhaust system

### Procedure

**i** Note

*The exhaust system must be aligned when it is cool.*

- Loosen bolt connections of all exhaust system clamps.
- Push rear silencers forwards -arrow- until preload at rubber mountings is as follows:
  - Rubber mounting (front): -a- = 11 mm.
  - Rubber mounting (rear): -a- = 14 mm.
- Align rear silencers so they are horizontal.

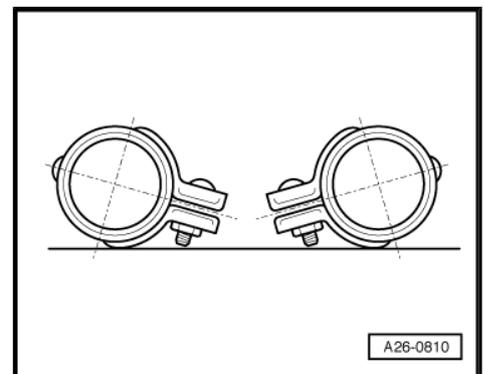
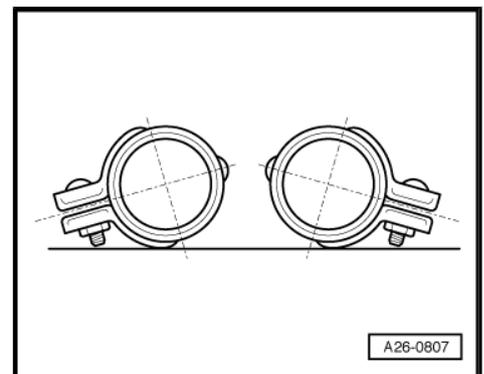
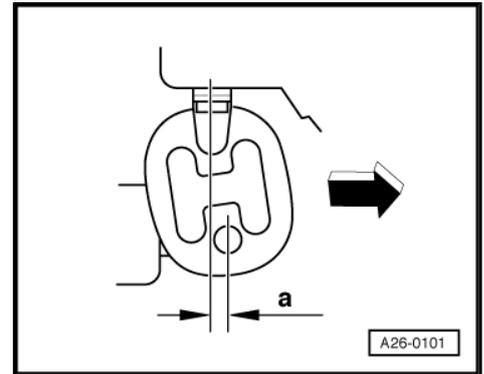
Position clamps so that they align with centre of cutting locations.

- Align front clamps so that ends of bolts do not protrude beyond bottom of clamps.
- Tighten bolt connections of clamps evenly to 23 Nm.

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.

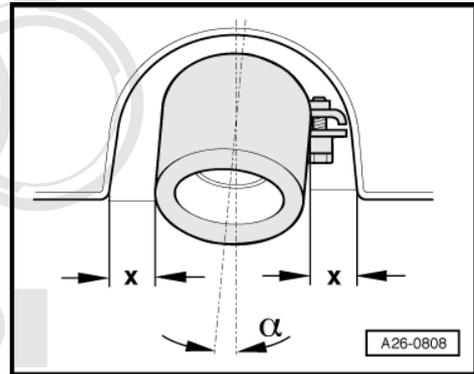
- Align rear clamps so that ends of bolts do not protrude beyond bottom of clamps.
- Tighten bolt connections of clamps evenly to 23 Nm.



## 1.13 Aligning tailpipes

### Procedure

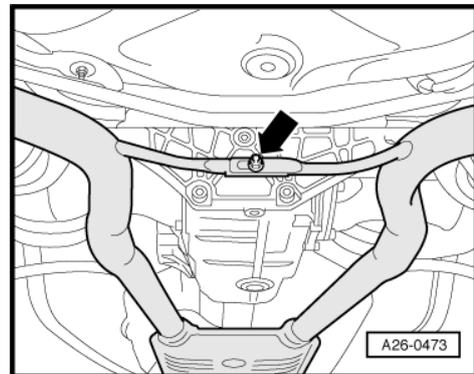
- Check clearance between tailpipes and bumper on both sides.
- Dimension -x- (left-side) = dimension -x- (right-side); tolerance max. 2 mm.
- Check alignment angle of left and right-side tailpipes (side-ways inclination)
- Angle  $-\alpha-$  =  $5^\circ$
- If necessary, correct angle  $-\alpha-$  as follows:
- Loosen clamping bolt on tailpipe and turn tailpipe as required.
- Tighten clamping bolt to 30 Nm.



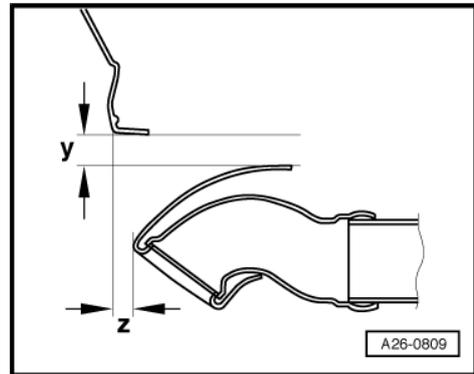
If necessary, correct dimension -x- as follows:

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.

- Slacken nut -arrow- on brace between exhaust pipes.
- Adjust the distance between the rear silencers.
- Tighten nut to 23 Nm.



- Check distances -y- and -z- between tailpipes and bumper.
- Dimension -y- = 10 ... 14 mm
- Dimension -z- = 13 ... 17 mm



## 1.14 Checking exhaust system for leaks

- Start engine and run at idling speed.
- Plug tailpipes during leak test (e.g. with cloth or plug).
- Listen for leaks at joints between cylinder head/exhaust manifold, exhaust manifold/turbocharger, turbocharger/front exhaust pipe etc.
- Rectify any leaks that are found.

## 2 Exhaust gas recirculation system

⇒ [“2.1 Exhaust gas recirculation system - exploded view of components”, page 295](#)

⇒ [“2.2 Removing and installing mechanical exhaust gas recirculation valve \(left-side\)”, page 296](#)

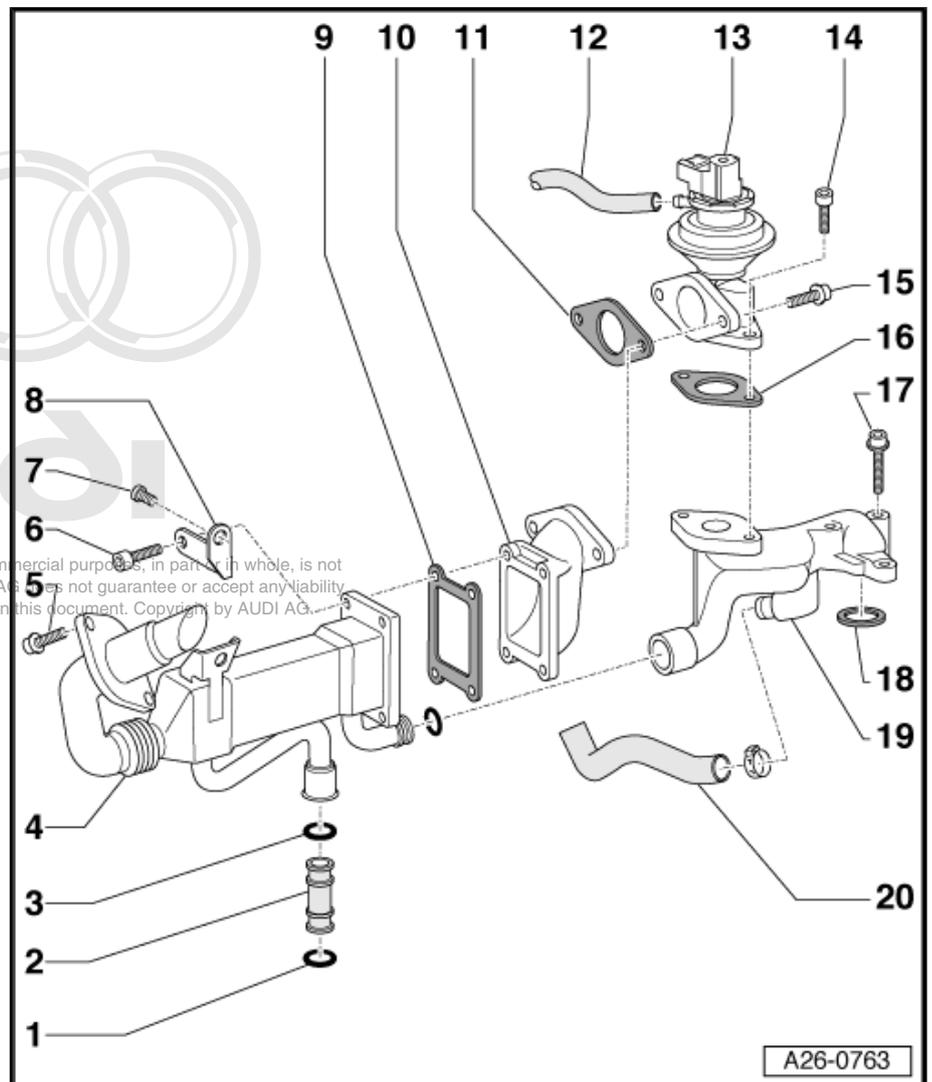
⇒ [“2.3 Removing and installing mechanical exhaust gas recirculation valve \(right-side\)”, page 297](#)

⇒ [“2.4 Removing and installing exhaust gas recirculation cooler \(left-side\)”, page 298](#)

⇒ [“2.5 Removing and installing exhaust gas recirculation cooler \(right-side\)”, page 300](#)

### 2.1 Exhaust gas recirculation system - exploded view of components

- 1 - O-ring
  - Renew
- 2 - Coolant pipe
- 3 - O-ring
  - Renew
- 4 - Exhaust gas recirculation cooler
  - Removing and installing: left-side ⇒ [page 298](#) ; right-side ⇒ [page 300](#)
- 5 - 10 Nm
- 6 - 10 Nm
- 7 - 10 Nm
- 8 - Bracket
  - Renew
- 9 - Gasket
  - Renew
- 10 - Intermediate flange
- 11 - Gasket
  - Renew
- 12 - Vacuum hose
  - Leading from exhaust gas recirculation valve - N18- or exhaust gas recirculation valve 2 - N213-
- 13 - Mechanical exhaust gas recirculation valve
  - Removing and installing: left-side ⇒ [page 296](#) ; right-side ⇒ [page 297](#)
- 14 - 10 Nm
- 15 - 10 Nm
- 16 - Gasket
  - Renew





17 - 10 Nm

18 - Gasket

☐ Renew

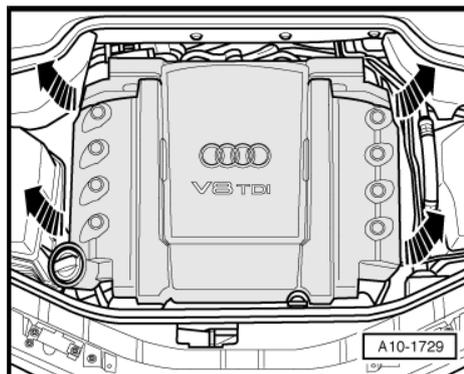
19 - Connecting flange

20 - Coolant hose

## 2.2 Removing and installing mechanical exhaust gas recirculation valve (left-side)

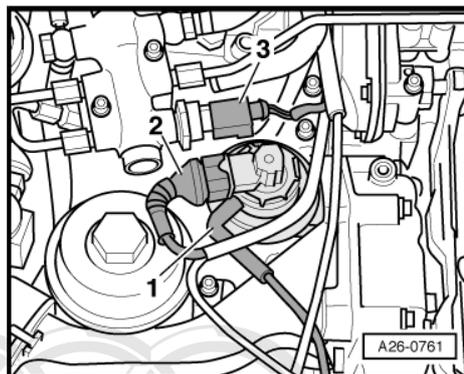
### Removing

– Carefully pull engine cover panel off four retaining pins one after the other -arrows-.

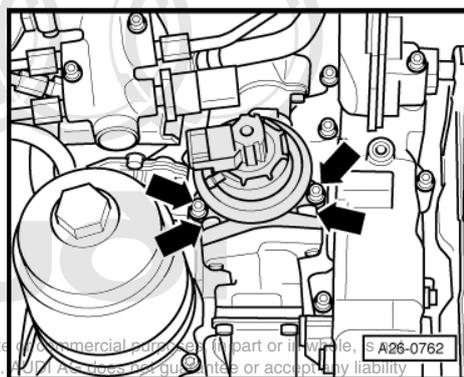


– Unplug electrical connectors -2- and -3-.

– Detach vacuum hose -1- from mechanical exhaust gas recirculation valve (left-side).



– Remove bolts -arrows- and take off mechanical exhaust gas recirculation valve (left-side).



### Installing

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

 **Note**

*Renew seals and gaskets.*

### Tightening torques

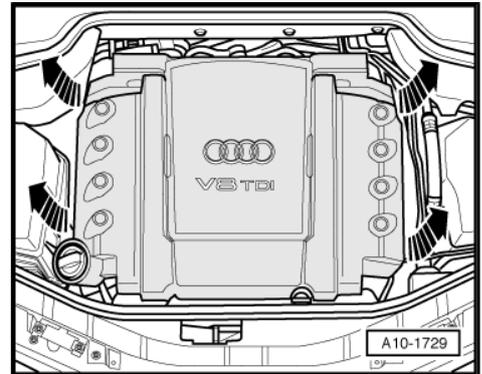
Component		Nm
Mechanical exhaust gas recirculation valve	M6	10
to connection piece	M8	22

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.

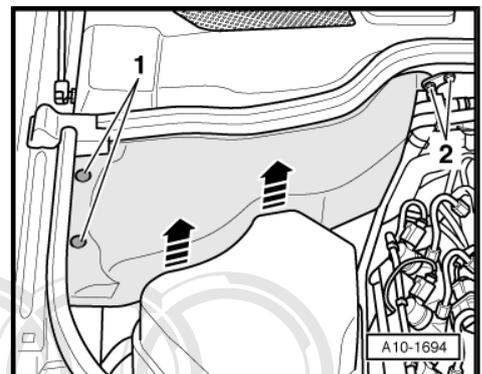
## 2.3 Removing and installing mechanical exhaust gas recirculation valve (right-side)

### Removing

- Carefully pull engine cover panel off four retaining pins one after the other -arrows-.



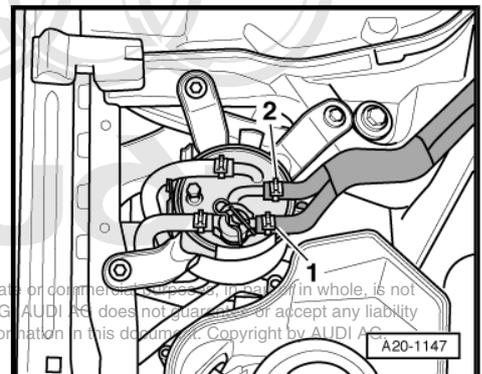
- Remove cover for right suspension turret; to do so, detach spreader clips -1- and unscrew bolted joint -2-.
- Pull cover out of retainers -arrows-.



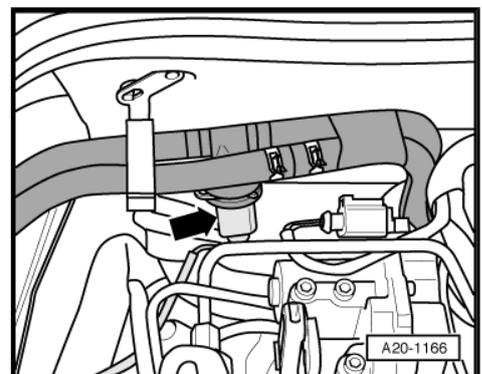
 **Caution**

*Rules for cleanliness when working on the injection system  
⇒ page 4 .*

- Disconnect fuel return line -1- and fuel supply line -2- from fuel filter.

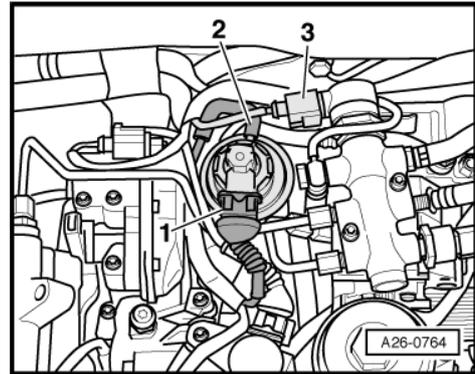


- Unplug electrical connector -arrow- at oil temperature sender - G8- .
- Move fuel lines to the side.



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

- Unplug electrical connectors -1- and -3-.
- Detach vacuum hose -2- from mechanical exhaust gas recirculation valve (right-side).



- Remove bolts -arrows- and take off mechanical exhaust gas recirculation valve (right-side).

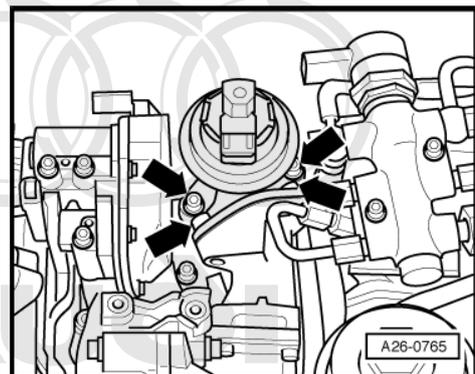
### Installing

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



#### Note

- ◆ *Renew seals and gaskets.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*



### Tightening torques

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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
Mechanical exhaust gas recirculation valve	M6	10
to connection piece	M8	22

## 2.4 Removing and installing exhaust gas recirculation cooler (left-side)

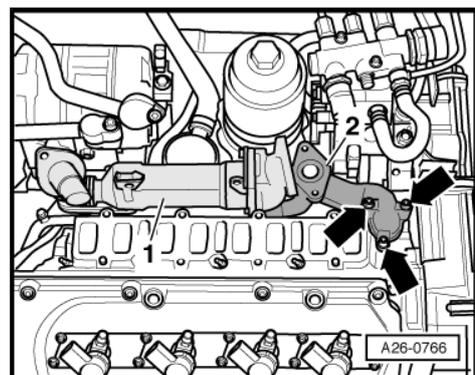
### Removing

- Drain coolant ⇒ [page 209](#) .
- Move lock carrier to service position ⇒ [page 42](#) .
- Remove intake manifold (left-side) ⇒ Rep. gr. 23 .
- Remove mechanical exhaust gas recirculation valve (left-side) ⇒ [page 296](#) .
- Remove bolts -arrows-.
- Lift off cooler (left-side) for exhaust gas recirculation -1- from cylinder block.
- Disconnect cooler for exhaust gas recirculation from connecting flange -2-.



#### Note

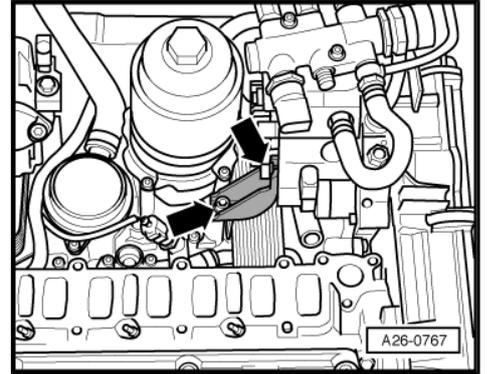
*The connection piece remains on the engine at this stage.*



- Remove bracket for high-pressure pump -arrows-.

 **Note**

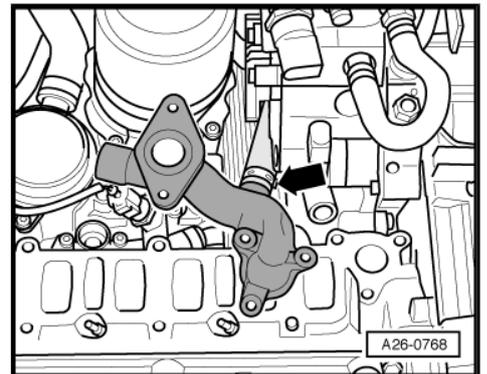
*Shown in illustration without connecting flange.*



- Detach coolant hose -arrow- from connecting flange.

 **Note**

*Remove connecting flange when renewing bottom connecting flange seal.*



**Installing**

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

 **Note**

- ◆ *Renew gaskets, seals and O-rings.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- Install mechanical exhaust gas recirculation valve (left-side) ⇒ [page 296](#) .
- Install intake manifold (left-side) ⇒ Rep. gr. 23 .
- Install lock carrier with attachments ⇒ General body repairs, exterior; Rep. gr. 50 .
- Install front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 .
- Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .

 **Note**

*Do not reuse coolant.*

- Fill cooling system ⇒ [page 211](#)
- Check headlight adjustment ⇒ Maintenance ; Booklet 404 .

**Tightening torques**

Component	Nm
Bracket for High-pressure pump	22
High-pressure pump to: Mounting plate	22
Connecting flange to cylinder head	10

## 2.5 Removing and installing exhaust gas recirculation cooler (right-side)

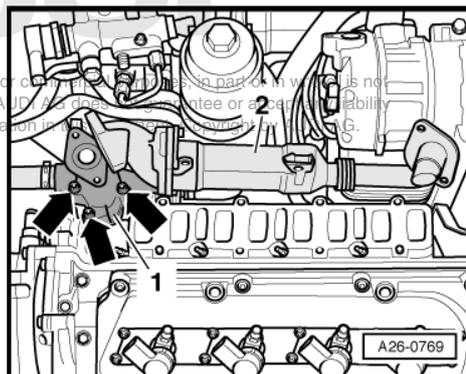
### Removing

- Drain coolant ⇒ [page 209](#) .
- Move lock carrier to service position ⇒ [page 42](#) .
- Remove intake manifold (right-side) ⇒ Rep. gr. 23 .
- Remove mechanical exhaust gas recirculation valve ⇒ [page 297](#) .
- Remove bolts -arrows-.
- Lift off cooler (left-side) for exhaust gas recirculation -2- from cylinder block.
- Disconnect cooler for exhaust gas recirculation from connecting flange -1-.



### Note

*The connection piece remains on the engine at this stage.*



- Detach coolant hoses -arrows- from connecting flange.

 **Note**

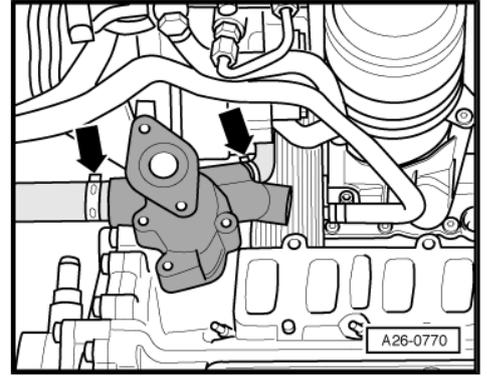
*Remove connecting flange when renewing bottom connecting flange seal.*

**Installing**

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

 **Note**

- ◆ *Renew gaskets, seals and O-rings.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- Install mechanical exhaust gas recirculation valve (right-side) ⇒ [page 297](#) .
- Install intake manifold (right-side) ⇒ Rep. gr. 23 .
- Install lock carrier with attachments ⇒ General body repairs, exterior; Rep. gr. 50 .
- Install front bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 .
- Deactivate jacking mode ⇒ Running gear, front-wheel drive and four-wheel drive; Rep. gr. 43 ; Operating the air suspension .



 **Note**

*Do not reuse coolant.*

- Fill cooling system ⇒ [page 211](#) .
- Check headlight adjustment ⇒ Maintenance ; Booklet 404 .

**Tightening torques**

Component	Nm
Bracket for High-pressure pump	22
High-pressure pump to: Mounting plate	22
Connecting flange to cylinder head	10



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