Audi A4 1995 ➤

4-Cyl. TDI®Engine, Mechanics									
Engine ID	AJM	ATJ							

Edition 01.2000

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

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

Audi A4 1995 ➤

4-Cyl. TDI®Engine, Mechanics

Repair Group

00 - Technical data
10 - Removing and installing engine
13 - Crankshaft group
15 - Cylinder head, Valve gear
17 - Lubrication
19 - Cooling system
21 - Charging
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.

Copyright © 2010 Audi AG, Ingolstadt

Contents

00 - Technical data 1
1 Technical data 1
1.1 Technical data 1
1.2 Engine number 1
1.3 Engine features 1

10 - Removing and installing engine 3
1 Removing and installing engine 3
1.1 Removing and installing engine 3
1.2 Removing 4
1.3 Attaching engine to repair stand 23
1.4 Installing 24
1.5 Tightening torques 26

13 - Crankshaft group 29
1 Dismantling and assembling engine 29
1.1 Dismantling and assembling engine 29
1.2 Moving lock carrier to service position 29
1.3 Ribbed belt drive for vane pump, alternator and viscous fan 35
1.4 Removing and installing vibration damper 42
1.5 Ribbed belt drive for air conditioner - Exploded view 44
1.6 Ribbed belt layout 47
1.7 Removing and installing ribbed belt 48
1.8 Removing and installing bracket for alternator, vane pump and viscous fan 50
1.9 Toothed belt drive 53
1.10 Removing and installing toothed belt 58
2 Removing and installing sealing flanges and flywheel / drive plate 68
2.1 Removing and installing sealing flanges and flywheel / drive plate 68
2.2 Replacing crankshaft oil seal on pulley end 72
2.3 Removing and installing front sealing flange 75
2.4 Removing and installing dual-mass flywheel/drive plate 78
3 Removing and installing crankshaft 81
3.1 Removing and installing crankshaft 81
3.2 Extracting and driving needle bearing from/into crankshaft 85
3.3 Crankshaft dimensions 87
3.4 Removing and installing chain sprocket 87
4 Dismantling and assembling pistons and conrods 89
4.1 Dismantling and assembling pistons and conrods 89
4.2 Checking piston projection at TDC 96
4.3 Piston and cylinder dimensions 98

15 - Cylinder head, Valve gear 99
1 Removing and installing cylinder head 99
1.1 Removing and installing cylinder head 99
1.2 Part I 100
1.3 Part II 104
1.4 Removing and installing cylinder head cover 107
1.5 Removing and installing intake manifold 109
1.6 Removing cylinder head 112
1.7 Installing cylinder head 121
1.8 Checking compression pressure 126
2 Servicing valve gear 128
2.1 Servicing valve gear 128

Copyright by AUDI AG. This document, or any part thereof, may not be used 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.

2.2 Checking axial clearance of camshaft 135
2.3 Removing and installing camshaft oil seal 136
2.4 Removing and installing camshaft 139
2.5 Checking hydraulic bucket tappets 145
2.6 Replacing valve stem seals 146
2.7 Reworking valve seats 150
2.8 Checking valve guides 152
2.9 Checking valves 153

17 - Lubrication 154

1 Removing and installing lubrication system components 154
1.1 Removing and installing lubrication system components 154
1.2 Part I 155
1.3 Part II 160
1.4 Removing and installing sump 163
1.5 Removing and installing oil pump 172
1.6 Checking oil pressure and oil pressure switch 173
1.7 Engine oil 175
1.8 Checking oil level 175

19 - Cooling system 177

1 Removing and installing cooling system components 177
1.1 Removing and installing cooling system components 177
1.2 Cooling system components 178
1.3 Draining and filling cooling system 183
1.4 Removing and installing coolant pump 188
1.5 Removing, installing and checking thermostat 189
1.6 Removing and installing top coolant pipe 190
1.7 Removing and installing bottom coolant pipe 192
1.8 Exploded view of radiator and radiator fan 195
1.9 Removing and installing viscous fan 200
1.10 Removing and installing bearing for viscous fan in bracket 202
1.11 Removing and installing radiator 204
1.12 Checking cooling system for leaks 208
1.13 Checking radiator fan -V7 210
1.14 Removing and installing radiator fan -V7- 211
1.15 Checking fuel cooling pump -V166 213
1.16 Removing and installing fuel cooling circuit cooler 219

21 - Charging 221

1 Checking charge air system with turbocharger 221
1.1 Checking charge air system with turbocharger 221
1.2 Test requirements for checking turbocharging 223
1.3 Effects of leakage at intake and exhaust end 223
1.4 Checking turbocharger and charge pressure control 224
1.5 Check charge pressure 224
1.6 Checking linkage and vacuum unit for charge pressure control 227
1.7 Checking vacuum actuation to turbocharger 230
1.8 Charge pressure control connection diagram 233
1.9 Checking charge pressure control solenoid valve -N75 235
1.10 Check intake manifold pressure sender -G71 240

2 Servicing charge-air system with turbocharger 244
2.1 Servicing charge-air system with turbocharger 244
2.2 Rules for cleanliness 244
2.3 Exploded view of turbocharger removal and installation 245
2.4 Removing and installing turbocharger 249
2.5 Removing and installing charge-air cooling system components 254

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

2.6 Removing and installing charge-air cooler 256

26 - Exhaust system 257

1 Removing and installing exhaust system components 257
1.1 Removing and installing exhaust system components 257
1.2 Front-wheel drive vehicles 257
1.3 Four-wheel drive vehicles 263
1.4 Separating front and rear silencer 268
1.5 Removing and installing exhaust manifold 270
1.6 Removing and installing catalytic converter and exhaust pipe 270
1.7 Stress-free alignment of exhaust system 273
1.8 Checking exhaust system for leaks 275

2 Exhaust gas recirculation system 276
2.1 Exhaust gas recirculation system 276
2.2 Removing and installing EGR system components 276
2.3 Connection diagram for exhaust gas recirculation 281
2.4 Checking mechanical EGR valve 283
2.5 Checking EGR system 284
2.6 Checking exhaust-gas recirculation valve -N18 286
2.7 Removing and installing EGR system cooler 292

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

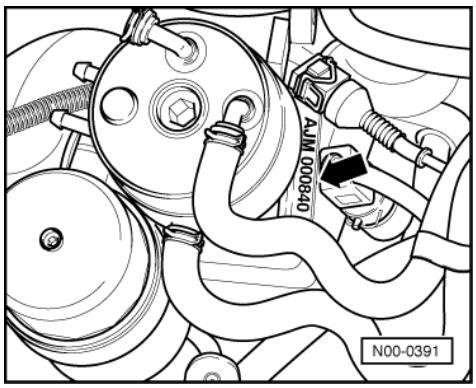
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

00 - Technical data

1 - Technical data

1.1 - Technical data

1.2 - Engine number



-> The engine number ("Engine code" and "Serial number") can be found on the rear left of the cylinder block.

The engine code and engine number are also indicated on a sticker on the toothed belt guard.

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

1.3 - Engine features

Code letters		AJM	ATJ
Capacity	l	1.9	1.9
Output	kW at rpm	85/4000	85/4000
Torque	Nm at rpm	285/1900	310/1900
Bore	ø mm	79.5	79.5
Stroke	mm	95.5	95.5

Code letters	AJM	ATJ
Compression ratio	18.0	18.0
CN min	49	49
Firing order	1-3-4-2	1-3-4-2
Catalytic converter	yes	yes
Charging	yes	yes
Exhaust-gas recirculation	yes	yes
Intercooler	yes	yes
Valve timing		
with 1 mm valve lift and valve clearance 0 mm		
Inlet opens after TDC	15.8°	15.8°

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

Code letters	AJM	ATJ
Inlet closes after BDC	25.3°	25.3°
Exhaust opens before BDC	28.2°	28.2°
Exhaust closes before TDC	8°	8°

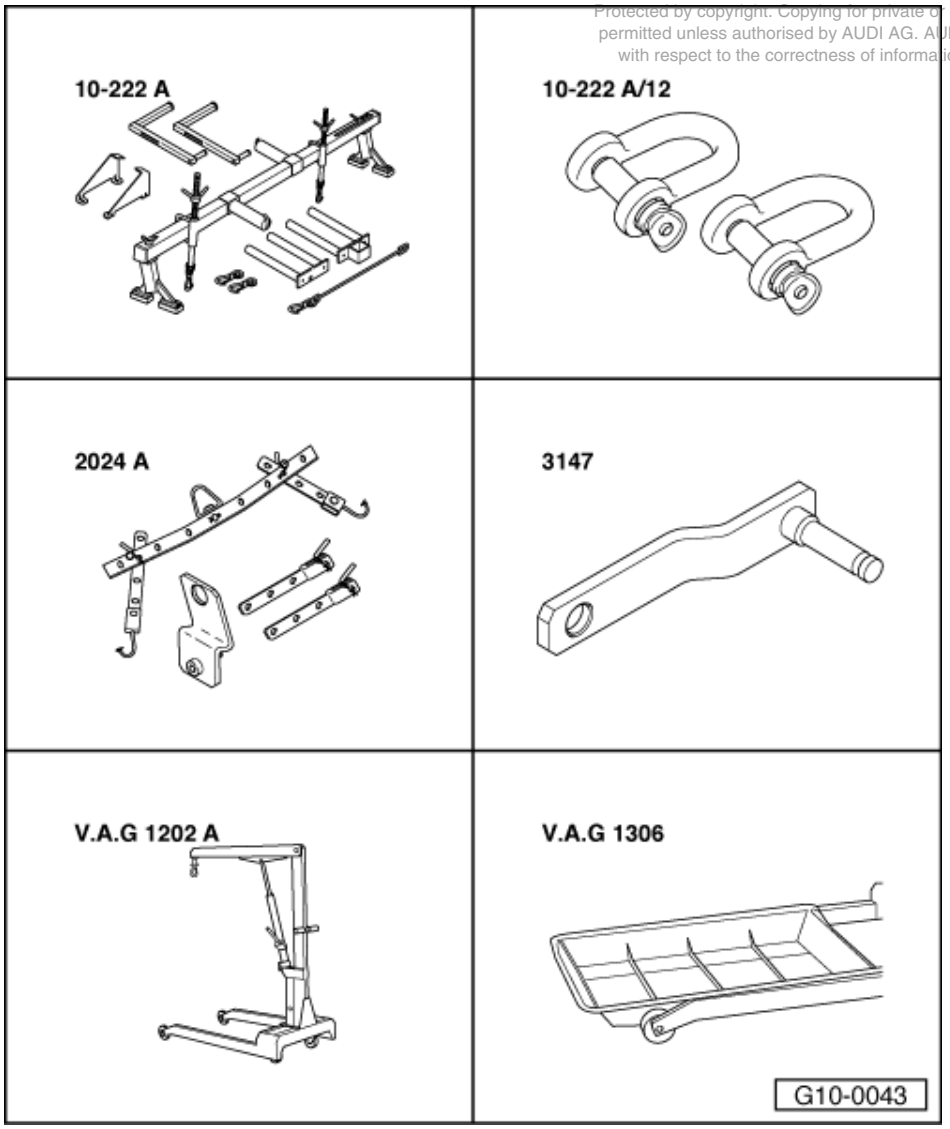
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

10 - Removing and installing engine

1 - Removing and installing engine

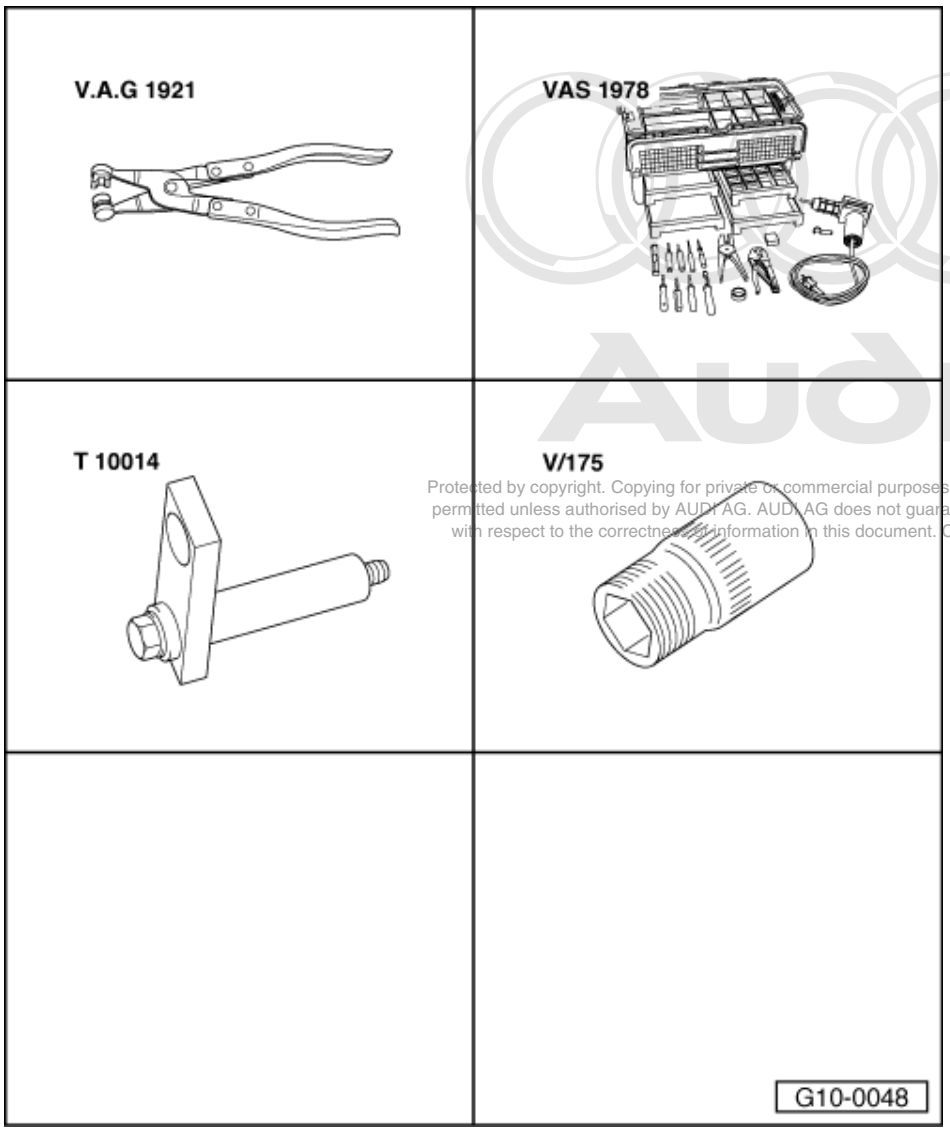
1.1 - Removing and installing engine

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 bar 10-222 A
- Shackle 10-222 A 12
- Lifting tackle 2024 A
- Gearbox support 3147
- V.A.G 1202 A
- V.A.G 1306



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

- V.A.G 1921
- VAS 1978/8
- Bracket T10014
- 15 mm A/F socket attachment Matra V/175 (on vehicles with automatic gearbox)

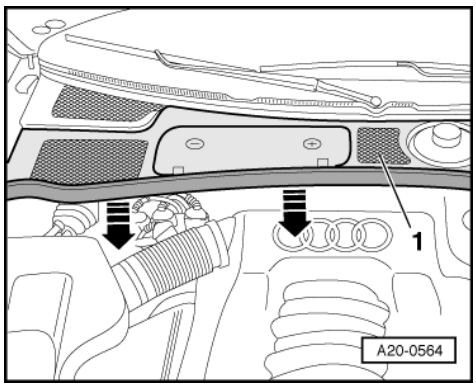
1.2 - Removing

Notes:

- Engine must be removed without transmission from front of vehicle.
- All cable ties unfastened or cut open on removing engine are to be re-attached in same position on installation.
- Coolant drained off must be collected in a clean container for disposal/re-use.

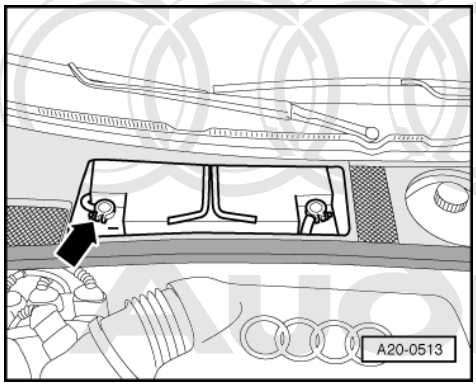
Vehicles with automatic gearbox:

- Move selector lever to position "N".



All models:

- Heed (if necessary obtain) code for vehicles with encoded radio/radio navigation system (RNS).
- -> Remove rubber seal from front of plenum chamber cover -arrows-.
- Remove plenum chamber cover -1- from the front.

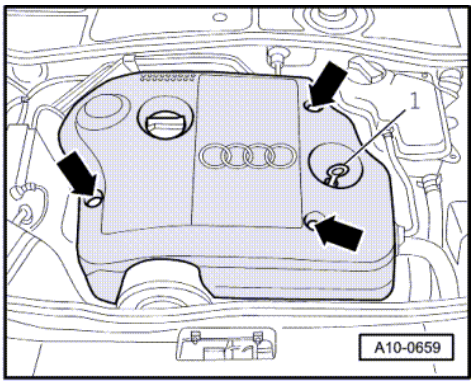


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

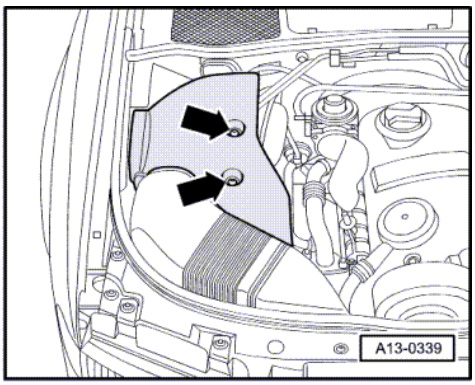
- -> Disconnect earth strap -arrow- at battery with ignition switched off.

Attention:
Hot vapour may escape when opening expansion tank. Cover cap with cloth and open carefully.

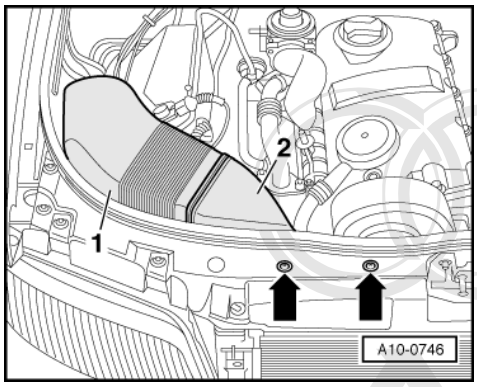
- Unscrew cap of coolant expansion tank.



- -> Pull dipstick -1- out of guide tube.
- Unclipcaps.
- Remove nuts -arrows- and detach engine cover.
- Remove insulation lying below.
- Re-insert dipstick into guide tube.

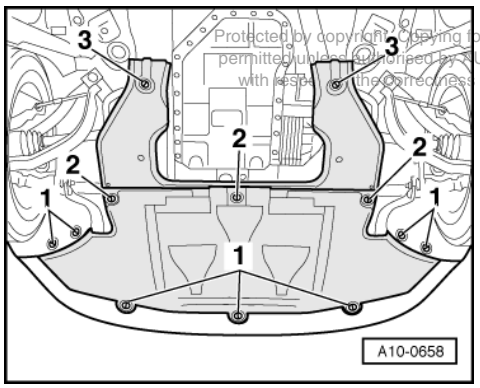


- Unclipcaps.
- -> Remove bolts -arrows- and detach air cleaner cover.



- -> Screw out bolts -arrows-.
- Remove air duct -1- and -2-.

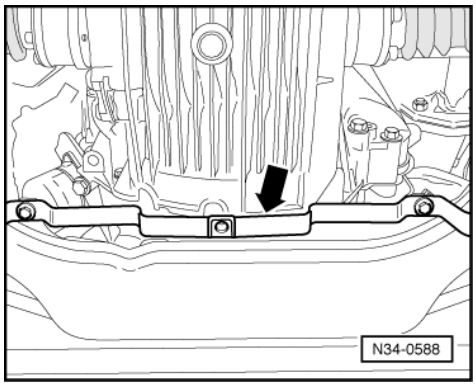
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



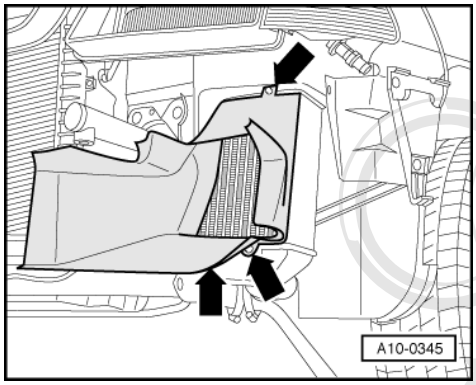
- Remove front bumper:

=> General Body Repairs, Exterior; Repair Group 63; Front Bumper; Removing and installing front bumper Front Bumper Removing and installing front bumper

- -> Release quick-release fasteners -1 ... 3- and detach noise insulation (2 pieces).

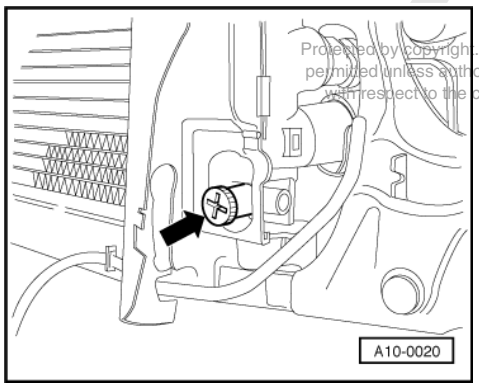


- -> Unbolt noise insulation holder -arrow-.

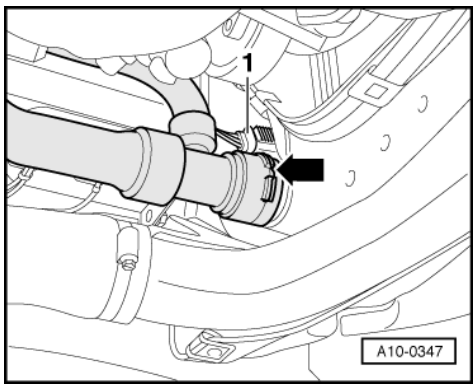


- -> Remove air duct in front of charge air cooler -arrows-.

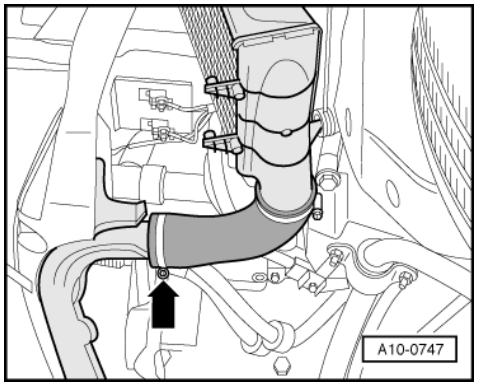
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



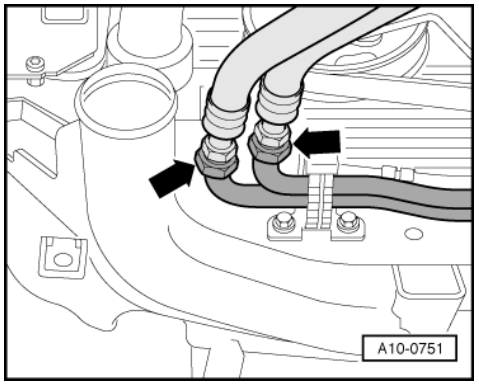
- Place drip tray V.A.G 1306 below engine.
- -> Turn drain plug -arrow- at radiator anti-clockwise; attach auxiliary hose to connection if necessary.



- -> Disconnect bottom coolant hose from radiator -arrow-.
- Detach connector -1- from radiator fan thermoswitch -F18/-F54 at bottom left of radiator and expose wire.



- -> Detach air hose -arrow- to charge air cooler at bottom left of lock carrier.
- Detach turbocharger air hose at bottom right of lock carrier.



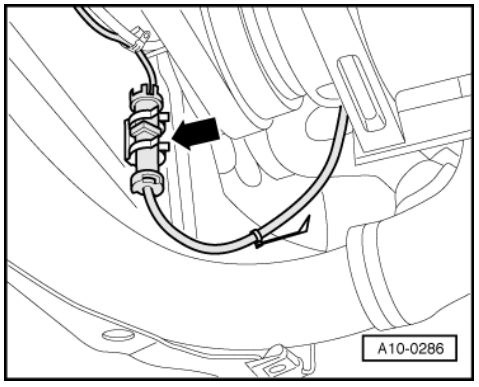
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Vehicles with automatic gearbox:

Note:

Observe rules for cleanliness when working on automatic gearbox:

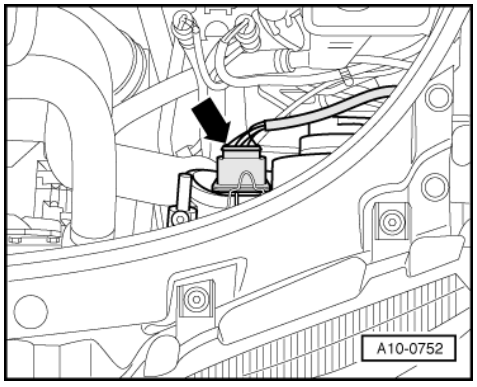
- Place drip tray in position.
- -> Disconnect ATF lines -arrows-.
- Remove bolt from holder for ATF lines at left-hand side on sump.



Vehicles with air conditioner:

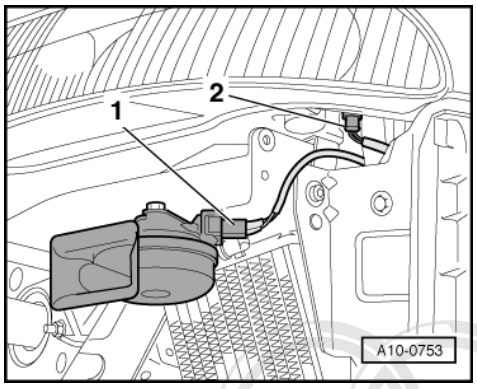
- -> Where fitted, unclip green electrical connector

-arrow- for AC compressor magnetic clutch from lock carrier at bottom right and disconnect, then expose wire.

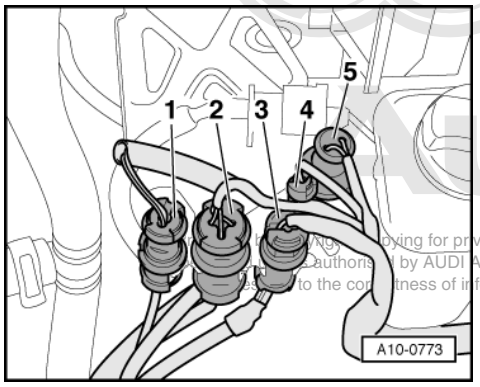


All models:

- -> Disconnect electric headlight connector -arrow- on both sides.



- -> Disconnect electric turn signal connectors -2- on both sides.
- Disconnect electrical connectors -1- from both horns.
- Expose wire on right-hand side of vehicle.

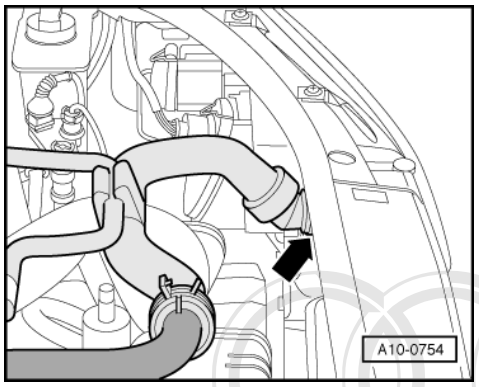


...ying for private or commercial purposes, in part or in whole, is not ... authorised by AUDI AG. AUDI AG does not guarantee or accept any liability ... to the correctness of information in this document. Copyright by AUDI AG.

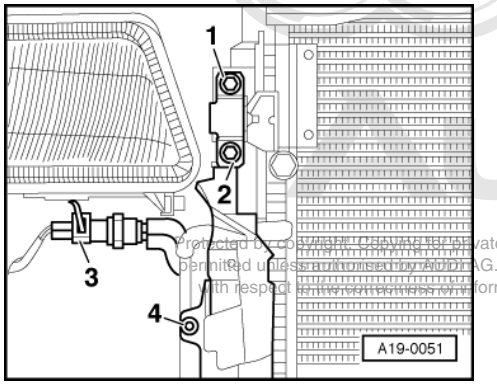
- Detach bonnet lock cable from lock carrier:

=> General body repairs, exterior; Repair Group 55; Bonnet; Removing and installing bonnet lock cable Bonnet Removing and installing bonnet lock cable

- Detach cover from power steering fluid reservoir.
- -> Disconnect connectors -1-, -2-, -3- and -5- in front of ABS unit and expose wires.



- -> Disconnect top coolant hose from radiator -arrow-.



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

Vehicles with air conditioner:

Attention: Never open refrigerant circuit of air conditioner.

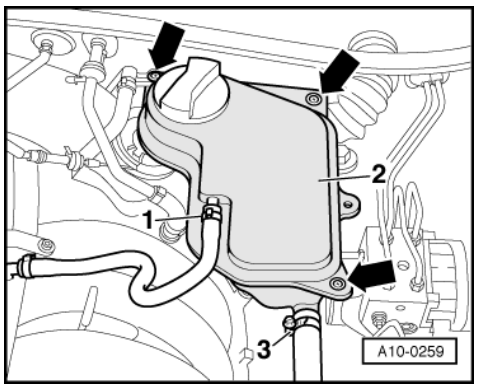
Note:

To prevent damage to condenser and refrigerant lines/hoses ensure that lines and hoses are not stretched, kinked or bent.

- -> Unbolt air ducts on left and right sides of radiator -4-.
- Remove condenser bolts -1- and -2-.
- Detach connector -3- from air conditioner low-pressure switch -F73.
- Pull condenser up out of bracket, rotate towards the side and secure in place on front right wheel with wire.

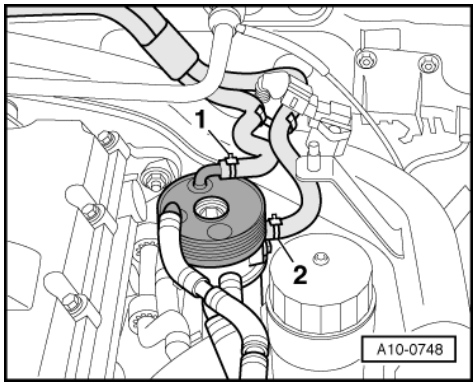
Note:

Protect wing panel from damage.



All models:

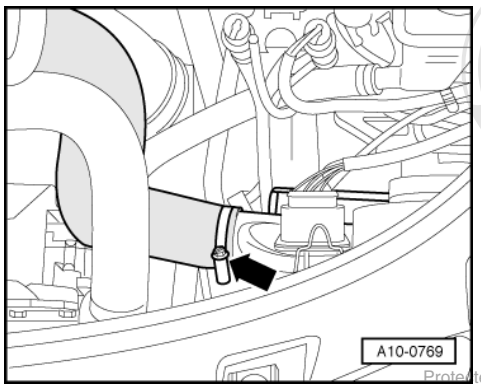
- Unbolt lock carrier and place in a secure position.
- -> Detach coolant hoses -1- and -3-.
- Unbolt coolant expansion tank -2- -arrows-.
- Disconnect wiring for coolant shortage indicator switch -F66 at bottom of coolant expansion tank .



Attention:

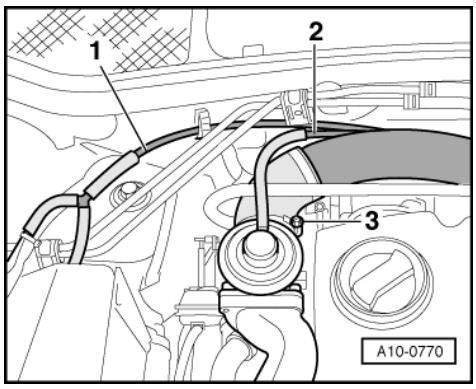
- **The fuel system is pressurised! Before opening the system, place a cloth around the join. Then carefully detach the connection to relieve the pressure.**
- **On vehicles with pump/nozzle unit engines, the temperature of the fuel lines and of the fuel may in extreme cases reach as high as 100 °C. To avoid acute danger of burns, allow fuel to cool before unfastening pipe connections.**
- **Wear protective gloves.**
- **Use safety goggles.**

- -> Disconnect fuel supply pipe -2- from filter housing and fuel return pipe -1- from fuel cooling circuit cooler element and place aside.

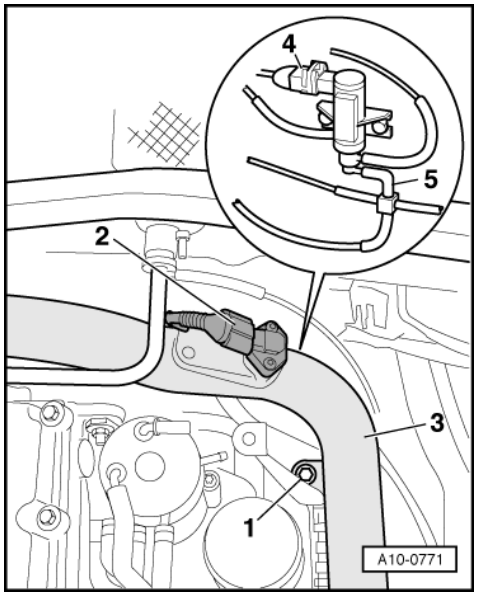


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

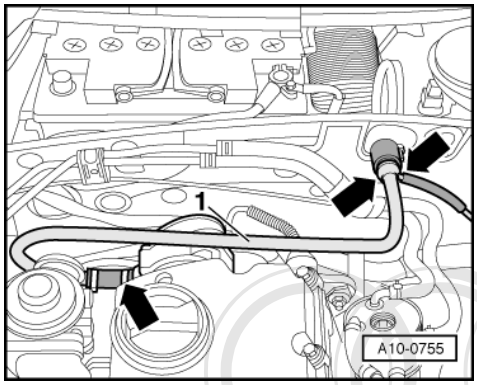
- -> Detach air hose from charge air cooler -arrow-.



- -> Disconnect vent line -1- to air cleaner and vacuum line -2- to mechanical EGR valve.
- Disconnect air hose -3- from intake manifold.

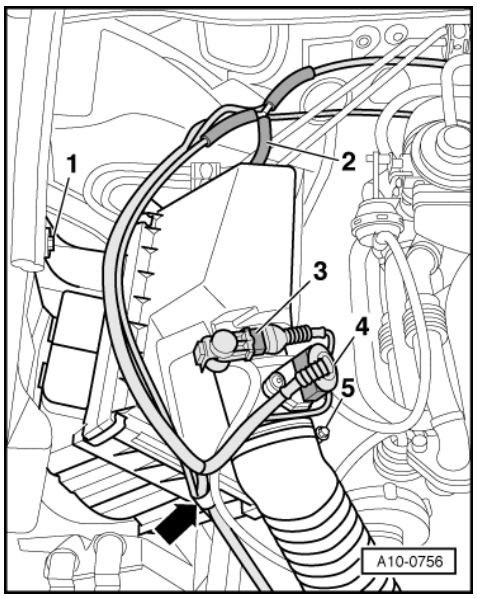


- -> Unplug connectors -2- and -4-.
- Pull off vacuum hose -5-.
- Screw out bolt -1-.
- Detach air pipe -3-.

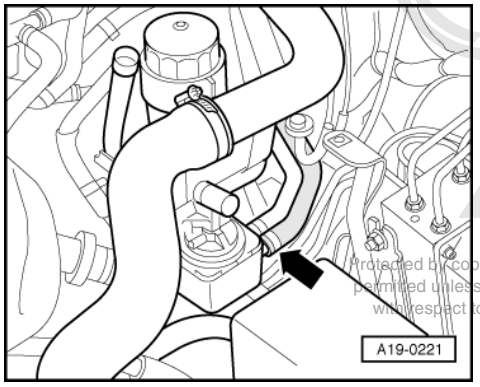


- -> Disconnect hose connections -arrows-.
- Detach vacuum line -1-.

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.

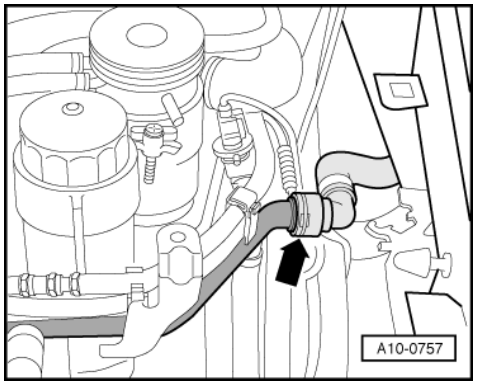


- -> Disconnect vent hose -2- from air cleaner housing.
- Unplug electrical connector -4- from air-mass meter.
- Detach EGR valve -N18 -3- from air cleaner housing and disconnect electrical connector.
- Detach wiring harness from air cleaner housing -arrow-.
- Detach air hose -5-.
- Screw out bolt -1-.
- Detach air cleaner housing.
- Place drip tray V.A.G 1306 underneath.



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

- -> To drain off the remaining coolant, disconnect coolant hose -arrow- from oil cooler.

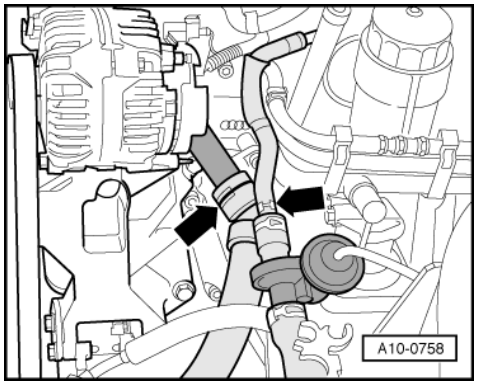


- -> Detach coolant hose to heater heat exchanger from engine -arrow-.

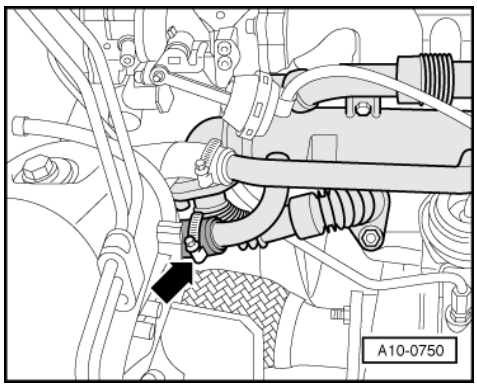
Notes:

- In illustration shown on a vehicle with automatic gearbox.

- On vehicles with manual gearbox both hoses to the heater heat exchanger must be detached.



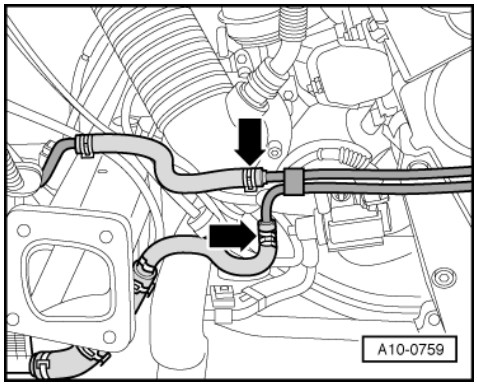
- -> Detach coolant hoses -arrows-.



Vehicles with automatic gearbox:

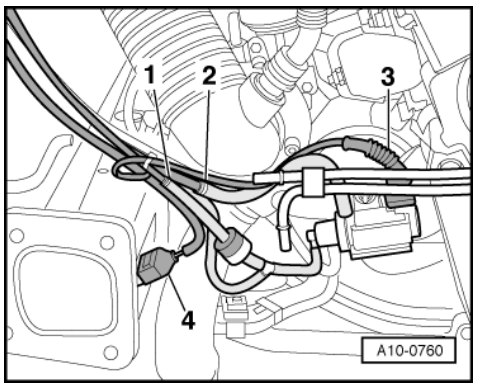
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- -> Detach coolant hose from EGR cooler -arrow-.

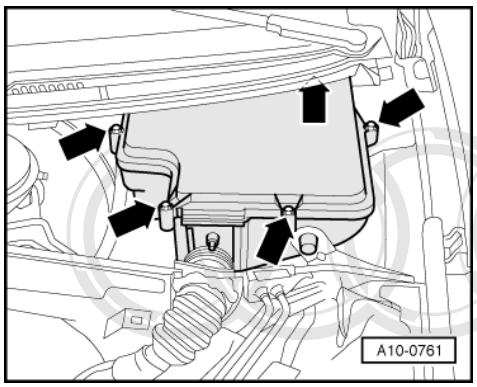


All models:

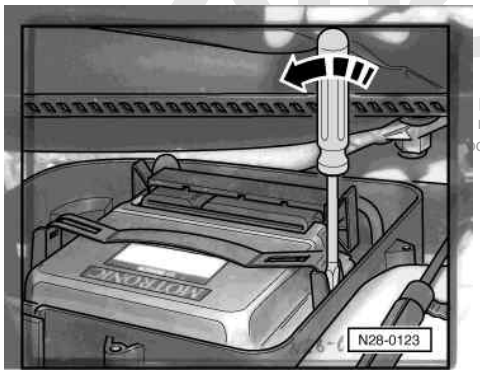
- -> Detach coolant hoses for fuel cooling circuit -arrows-.



- -> Disconnect electrical connector -4- from fuel cooling pump -V166.
- Disconnect electrical connector -3- from charge pressure control solenoid valve -N75.
- Disconnect vacuum hoses -1- and -2-.
- Move wires clear.

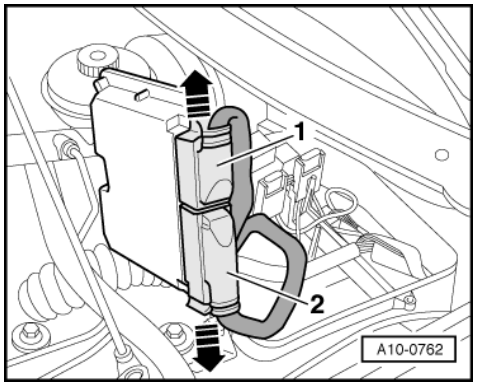


- -> Remove electronics box cover in plenum chamber -arrows-.

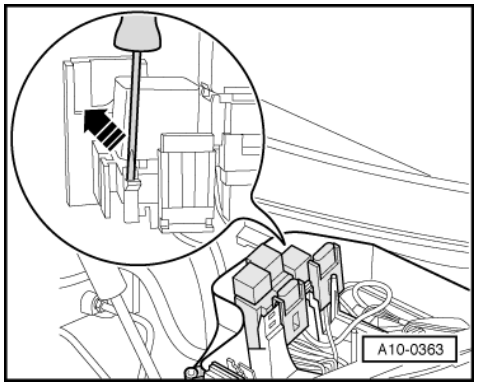


purposes, in part or in whole, is not
not guarantee or accept any liability
cument. Copyright by AUDI AG.

- -> Carefully lever off retainer bar with screwdriver -arrow-.

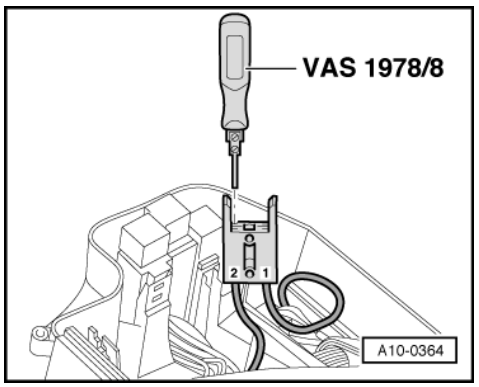


- -> Release the connector lock -arrows- and disconnect connectors -1- and -2- from the control unit.

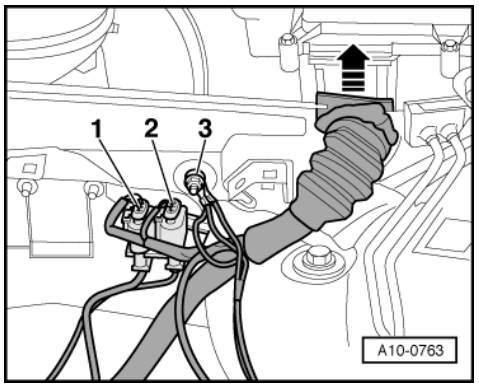


- -> Release catch -arrow- and pull auxiliary relay carrier in electronics box upwards to remove.

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



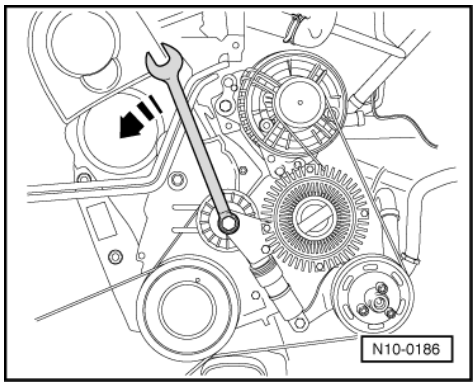
- Pull off fuse 2.
- -> Release fuse box from auxiliary relay carrier and pull upwards to remove.
- Release connector contact in connector field 2 with VAS 1978/8.
- Disconnect connector from rear of connector rail.



- -> Unscrew earth connection -3-.
- Remove connectors -1- and -2- from holder.
- Disengage wiring harness -arrow- and move clear.
- Unplug connector from speedometer sender -G22 on left of gearbox, and expose wire.

Vehicles with manual gearbox:

- Unplug connector for reversing light switch on gearbox, and move wire clear.

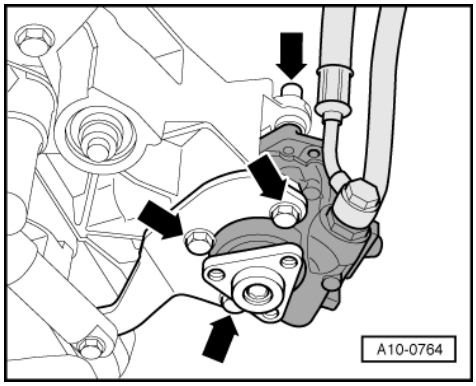


All models:

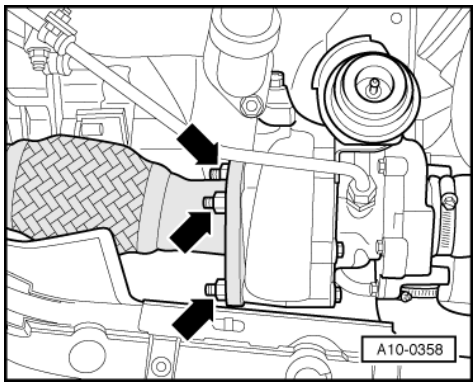
Note:

Before removing, mark direction of ribbed belt with chalk or felt-tipped pen. Running a used belt in the opposite direction could destroy it.

- -> Swivel tensioner in direction of arrow to slacken off ribbed belt.
- Detach ribbed belt from alternator pulley.



- Unbolt pulley of power steering vane pump. Use a mandrel as a brace.
- -> Unbolt power steering vane pump -arrow- and tie off. Leave pipes connected.

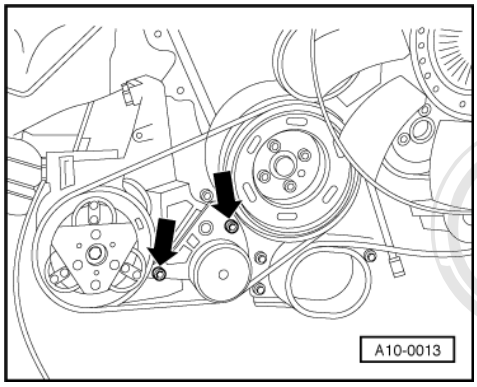


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Unbolt cable clamp for positive wire to starter on engine at right underneath exhaust manifold.
- -> Unscrew turbocharger/catalytic converter nuts -arrows-.
- Detach front exhaust system clamp.
- Push clamp back to separate exhaust system.
- Disconnect catalytic converter with exhaust pipe from turbocharger.

Note:

To avoid damage, decoupling element of exhaust system is never to be kinked by more than 10 °.



Vehicles with air conditioner:

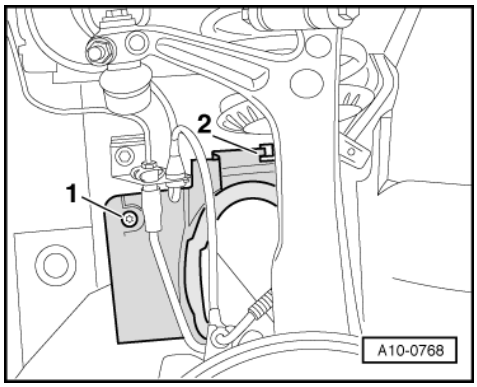
Attention:
Never open refrigerant circuit of air conditioner.

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

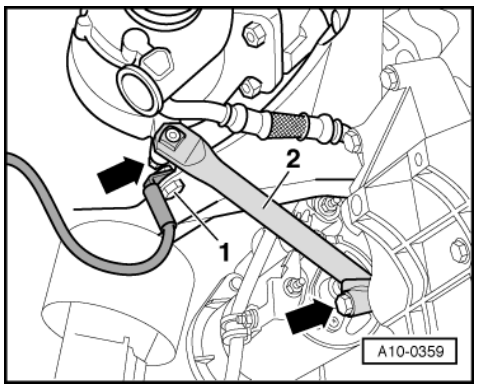
Before removing, mark direction of ribbed belt with chalk or felt-tipped pen. Running a used belt in the opposite direction could destroy it.

- -> Slacken off bolts of tensioning roller for air-conditioner compressor ribbed belt -arrows-, slacken off ribbed belt and detach.
- Detach air conditioner compressor from bracket and secure to body with wire.

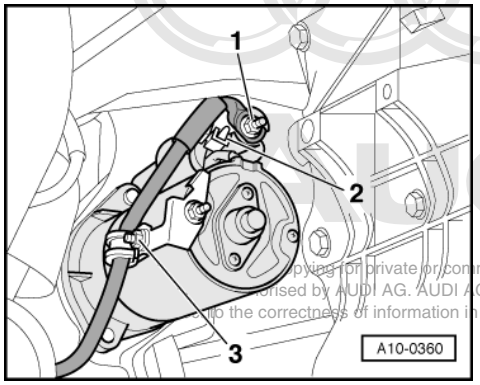


All models:

- -> Slacken bolt -1- of soundproofing cover over right side drive shaft at front.
- Unhook catch -2- and detach soundproofing cover.

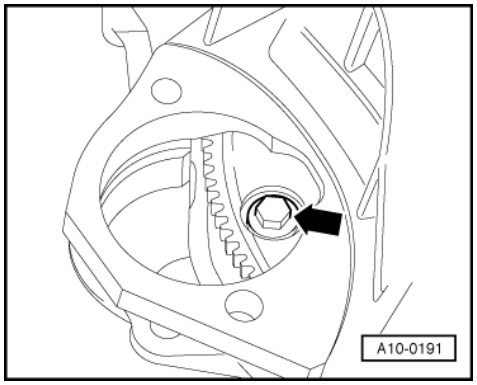


- -> Unscrew earth wire from right side engine support -1-.
- Remove bracket -2- for turbocharger -arrows-.



Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 wires -1- and -2- from starter, remove insulator from positive connection on starter.
- Unbolt cable clamp -3-.
- Unbolt start from gearbox and detach it.

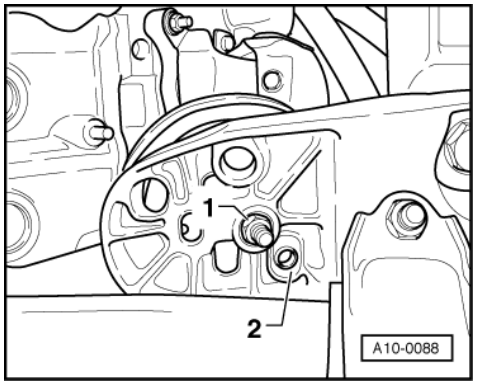


Vehicles with automatic gearbox:

- -> Remove 3 torque converter bolts through opening of removed starter using Matra V175 15 mm A/F socket attachment (rotate crankshaft by 1/3 turn each time).

Note:

When loosening torque converter bolts, counterhold crankshaft by applying spanner to central bolt on vibration damper.



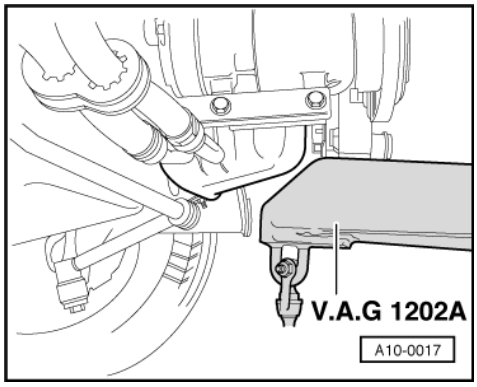
All models:

- -> Mark positions of bolted joints -1- and locating sleeves -2- underneath right and left engine mounts.

Note:

Different mounting holes are provided for different engine versions.

- Unbolt wiring harness bracket from left side engine mount.
- Slacken bottom nuts -1- on right and left side engine mounts a few turns.
- Screw out engine/gearbox connecting bolts accessible from underneath.

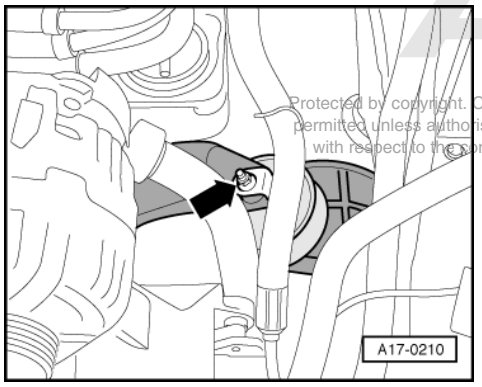


Note:

If the bolts will not unscrew:

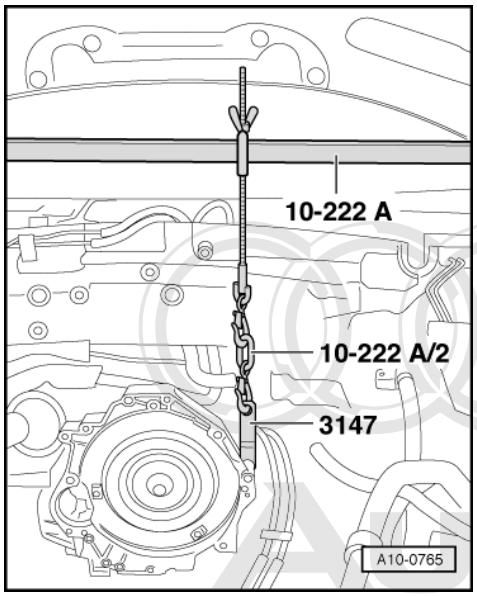
- -> Raise engine and gearbox with workshop crane V.A.G 1202 A on torque reaction support bracket.
- Make sure no wires are damaged at the top on the bulkhead.

Attention:
To avoid injury, ensure the support is secure.



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

- Lower the engine back down.
- -> Screw out the top nuts from both engine mounts.
- Screw out engine/gearbox bolts at top. Leave one bolt screwed in hand-tight.



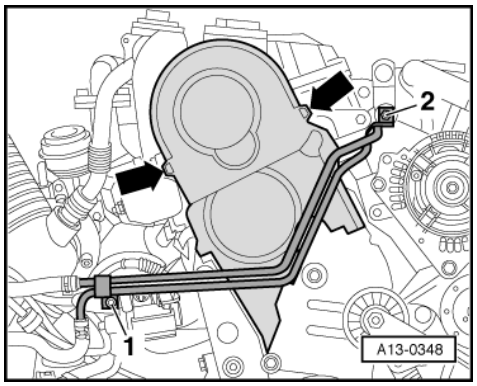
- -> Position support bar 10-222 A on wing mounting flange with spindle at front.

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

Notes:

- To maintain sufficient clearance for the lifting tackle 3033 on the engine, the support bar 10-222 A must be placed diagonally over the front bulkhead:
  The distance between the left side foot of the support bar 10-222 A and the left side bonnet hinge must be 290 mm. The distance between the right side foot of the support bar 10-222 A and the right side bonnet hinge must be 140 mm.
- In the illustration shown with the engine removed.

- Attach gearbox support 3147 in bolt hole of bell housing.
- Connect gearbox support 3147 to support bar 10-222 A using auxiliary hook 10-222 A/2.

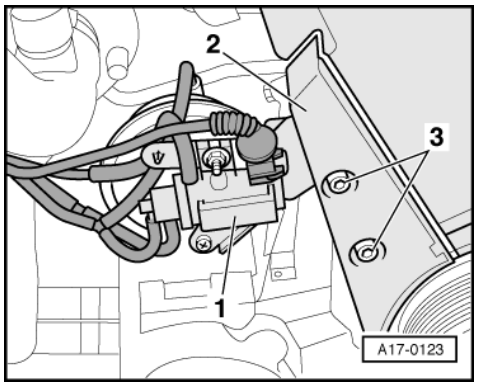


- -> Unbolt coolant pipe brackets -1- and -2-.

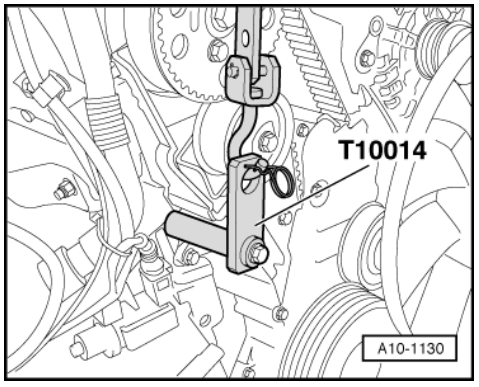
Note:

The coolant hoses can remain connected to the lines.

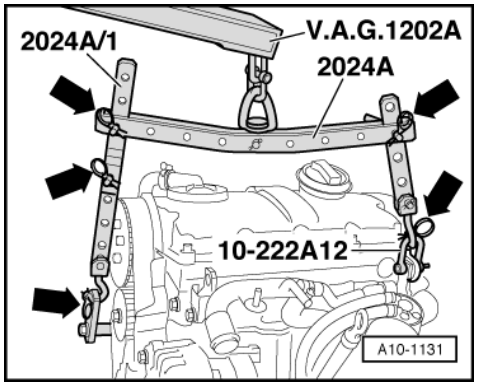
- Remove top toothed belt guard -arrows-.



- -> Screw out bolts -3- and detach cover -2-.
- Place aside charge pressure control solenoid valve -N75 -item 1- together with connected wires.



- -> Screw bracket T10014 into front of engine.



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

- -> Expose rear left lifting eye on engine and mount shackle 10-222 A 12.
- Attach lifting tackle 2024 A with 2024 A/1 on engine and to workshop crane V.A.G 1202 A.

Note:

For alignment with centre of gravity of assembly, holes of support hook rails must be positioned as shown.

Attention:
Support hooks and setting pins at lifting tackle must be secured with fasteners (arrows in Fig.).

- Screw out last bolt.

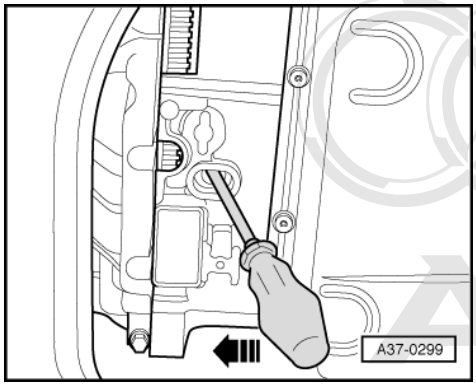
Note:

Check that all hoses and other connections between engine and body have been detached.

- Lift engine over studs out of engine mounts.
- Turn spindle of support bar 10-222 A.

Note:

Make sure no wires are damaged at the top on the bulkhead.



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

Vehicles with automatic gearbox:

- -> Separate gearbox from engine and at the same time detach torque converter from drive plate.

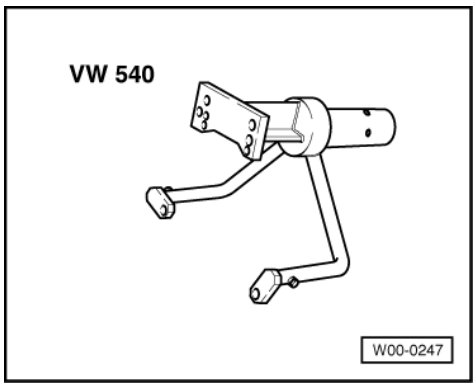
All models:

- Pull engine away from gearbox and lift engine out of engine compartment from the front.

Vehicles with automatic gearbox:

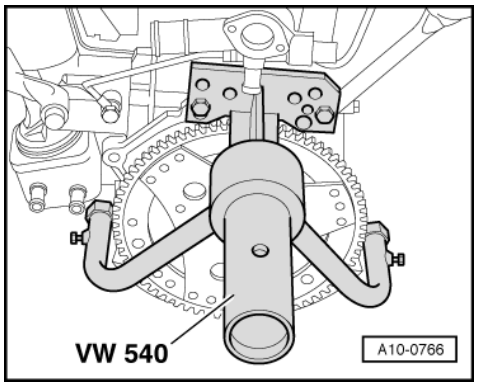
- If necessary, secure torque converter in gearbox with wire to prevent it falling out.

1.3 - Attaching engine to repair stand



Special tools and workshop equipment required

- Engine and gearbox bracket VW 540



-> For performing assembly work, engine is to be attached with engine bracket VW 540 to repair stand.

1.4 - Installing

Install in reverse order, paying attention to the following:

Notes:

- When carrying out repair work, replace oil seals and gaskets, self-locking nuts and anti-fatigue bolts tightened with an angle measuring wrench.
- Hose connections and hoses for charge-air system must be free from oil and grease before fitting.

- Check that both dowel sleeves for engine/gearbox centring are fitted in the cylinder block. If not, fit them.
- Push intermediate panel onto dowel sleeves. On vehicles with four-wheel drive and manual gearbox, the intermediate plate (plate thickness 5.5 mm) must also be fitted.

Vehicles with manual gearbox:

- Check clutch release bearing for wear and replace if necessary.
- Lubricate splines of gearbox input shaft slightly with G 000 100. Do not lubricate guide sleeve for release bearing.

- If necessary, check centring of clutch plate.
- Engines for vehicles with manual gearbox must be fitted with a needle bearing in the crankshaft. Install needle bearing if necessary => Page 13-78.

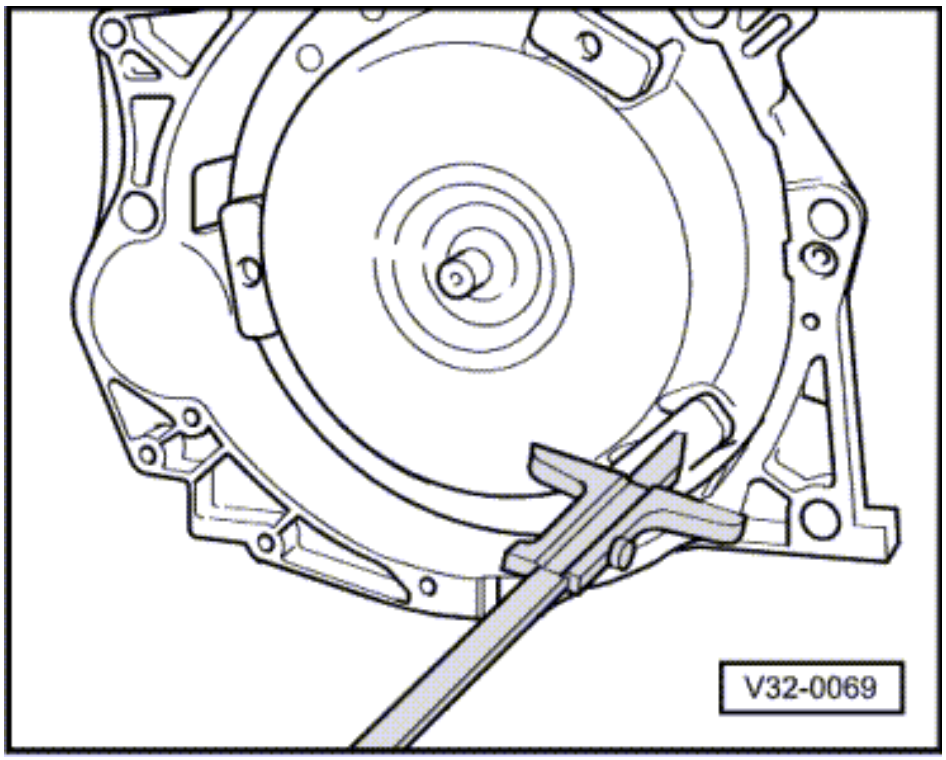
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Vehicles with automatic gearbox:

- On vehicles with automatic gearbox, no needle bearing must be fitted in crankshaft. Remove needle bearing if necessary => Page 13-78.
- To secure torque converter on drive plate, only use correct bolts:

=> Parts List

- Tighten torque converter bolts with Matra V/175 15 mm A/F socket attachment.



Checking torque converter installation dimension

-> If the torque converter has been correctly installed, the distance between bottom contact surfaces at threaded holes in torque converter and joint surface on torque converter bell housing with automatic gearbox 01V, is approx. 23 mm.

If torque converter has not been completely inserted, this distance will be approx. 11 mm.

Attention:
Incorrect insertion of converter will lead to destruction of driver of converter or ATF pump when gearbox is flanged to engine.

- Secure ATF lines:

All models:

- Install engine mounts such that they are free of mechanical stress. To do so, shake engine to align it before tightening engine mounts.
- Fit ribbed belt =>Page 13-24.
- Install lock carrier =>Page 13-1.
- Adjusting stop for torque reaction support=> Fig.13-7.
- Perform stress-free alignment of exhaust system => Page 26-23.
- Electrical connections and routing:

=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

Note:

On re-connecting battery, remember to activate vehicle equipment (radio/radio navigation system, clock, electric window lifters) in line with owner's manual.

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

Attention:
The use of a charger for boost starting could damage vehicle control units.

- Connect hoses and pipes for exhaust gas recirculation => connection diagram, page 26-33.
- Connect hoses and pipes for charge pressure control => connection diagrams, from page 21-24.
- Check oil level before starting engine.

Vehicles with automatic gearbox:

- Check ATF level.

All models:

- Fill cooling system with coolant => Page 19-11.

Notes:

- Coolant drained off is only to be re-used if neither cylinder head nor cylinder block has been replaced.
- Never re-use contaminated coolant.

- Interrogate fault memory:

=> TDI fuel-injection and preheating system (4-cyl. pump/nozzle); Repair Group 01; Interrogate and erase fault memory Interrogate and erase fault memory

Note:

Unplugging connectors causes faults to be stored. Interrogate and if necessary erase fault memory following installation.

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

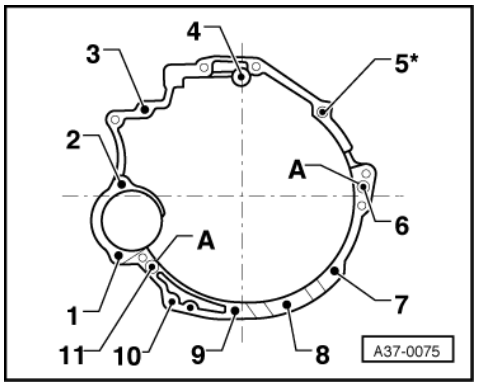
- Adjust headlights:

=> Electrical system; Repair Group 94; Servicing headlights; Adjusting headlights Servicing headlights Adjusting headlights

1.5 - Tightening torques

Notes:

- Tightening torques only apply to slightly greased, oiled, phosphated or blackened nuts and bolts.
- Additional lubricants, such as engine or gear oil are permitted, however not lubricants which contain graphite.
- Do not use degreased parts.
- Tolerance for tightening torques ±15%.

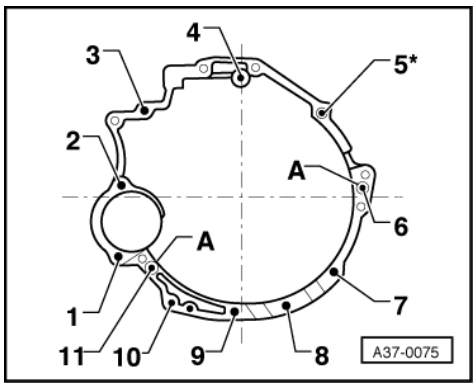


-> Engine/gearbox attachment on vehicles with manual gearbox and front-wheel drive

Item	Bolt	Nm
1, 3, 4	M12 x 67	65
2, 6	M12 x 90	65

Item	Bolt	Nm
5, 11	M12 x 110	65
7, 8, 9, 10	M10 x 45	45

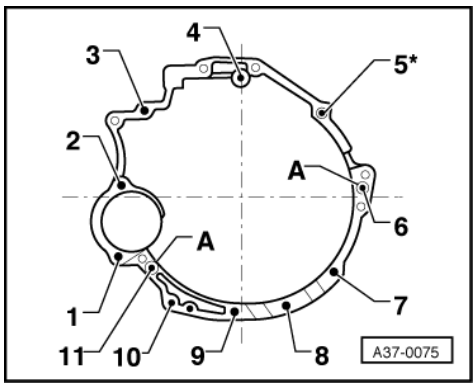
A: Dowel sleeves for centring



-> Engine/gearbox attachment on vehicles with manual gearbox and four-wheel drive (with intermediate plate)

Item	Bolt	Nm
1, 3	M12 x 75	65
2, 6	M12 x 90	65
4	M12 x 67	65
5, 11	M12 x 110	65
7	M10 x 50	45
8, 9, 10	M10 x 45	45

A: Dowel sleeves for centring



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

-> Engine/gearbox attachment with automatic gearbox

Item	Bolt	Nm
1, 8, 9, 10	M10 x 45	45
2, 3, 4, 11	M12 x 67	65
5	M12 x 110	65
6	M12 x 90	65
7	M10 x 60	45

A: Dowel sleeves for centring

Component		Nm
Bolts/nuts	M6	10
	M8	20
	M10	45
	M12	65
Exceptions:		
Engine mount to subframe		23
Engine support to engine mount		23
Drive plate to torque converter	M10 x1	85
Bracket for turbocharger to turbocharger		25
to cylinder block		25
Stop of torque reaction support to sump		28
Air conditioner compressor to bracket		25
Power steering vane pump to bracket		25
Pulley to vane pump for power steering		25
Catalytic converter to turbocharger		25
Clamps for air hoses		3.5

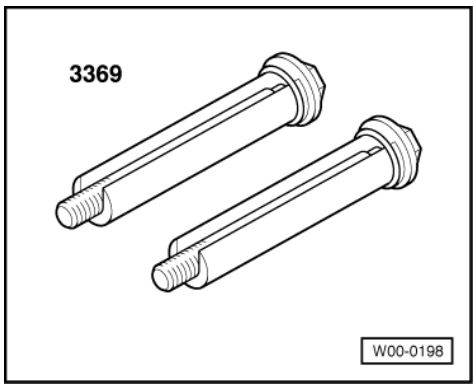
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

13 - Crankshaft group

1 - Dismantling and assembling engine

1.1 - Dismantling and assembling engine

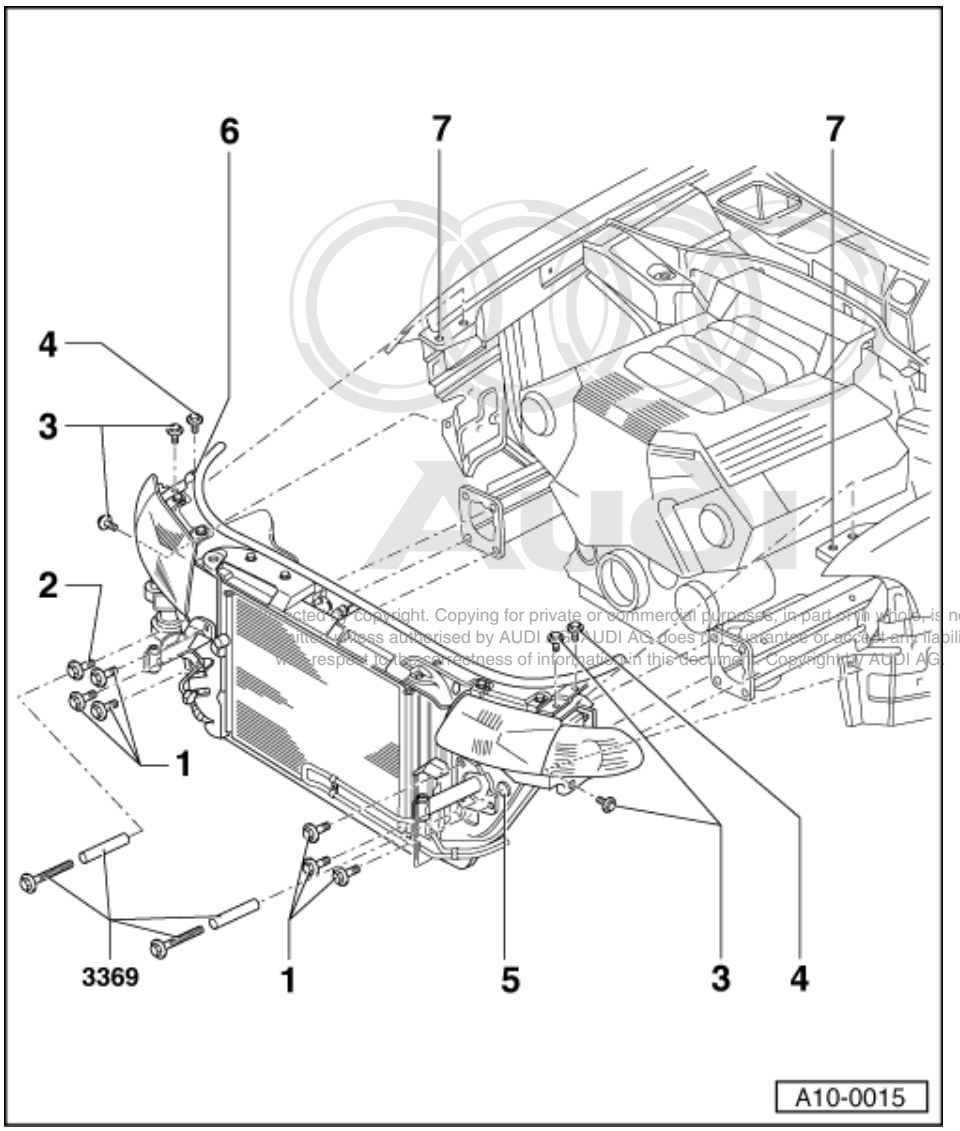
1.2 - Moving lock carrier to service position



Special tools and workshop equipment required

- Special tool 3369

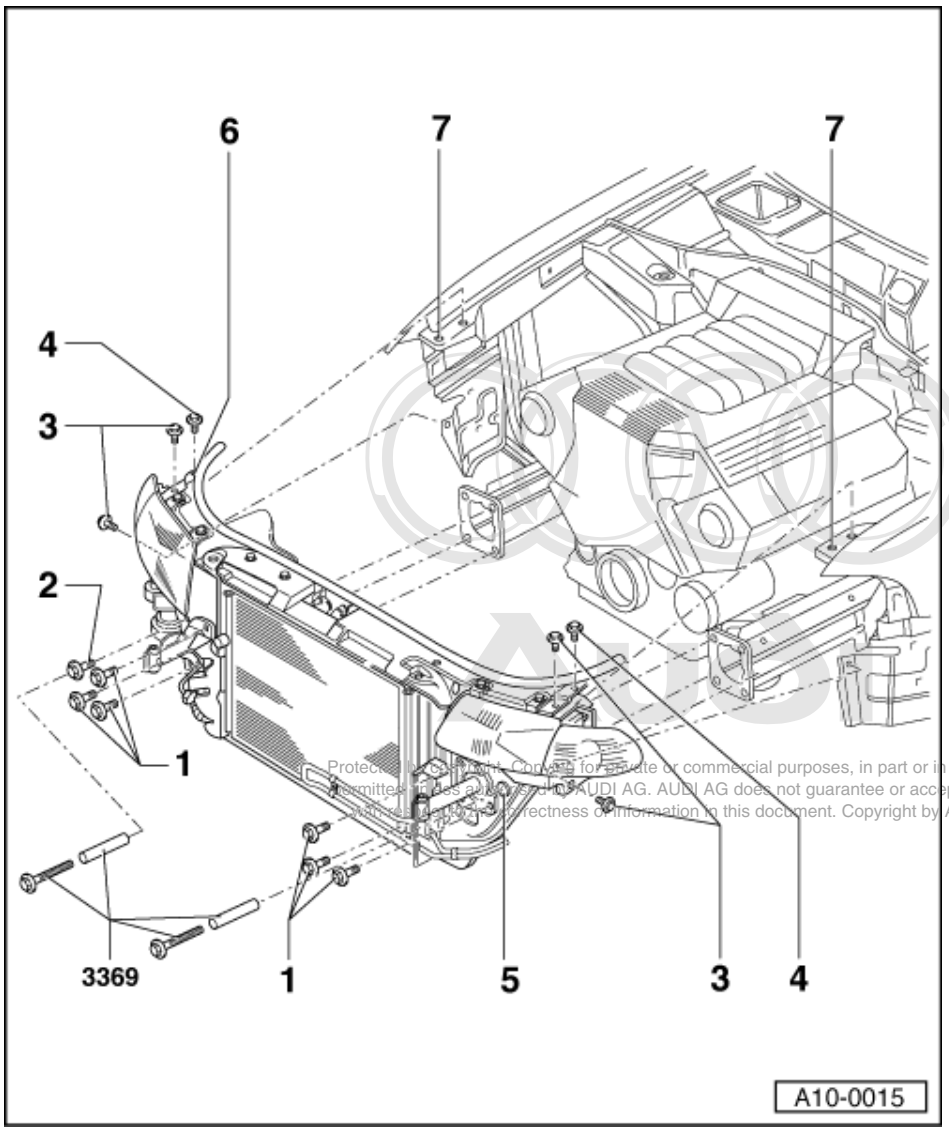
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



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

1 45 Nm
2 45 Nm
3 10 Nm
4 10 Nm
5 Bore
- For special tool 3369

6 Hole in lock carrier
7 Hole in wing



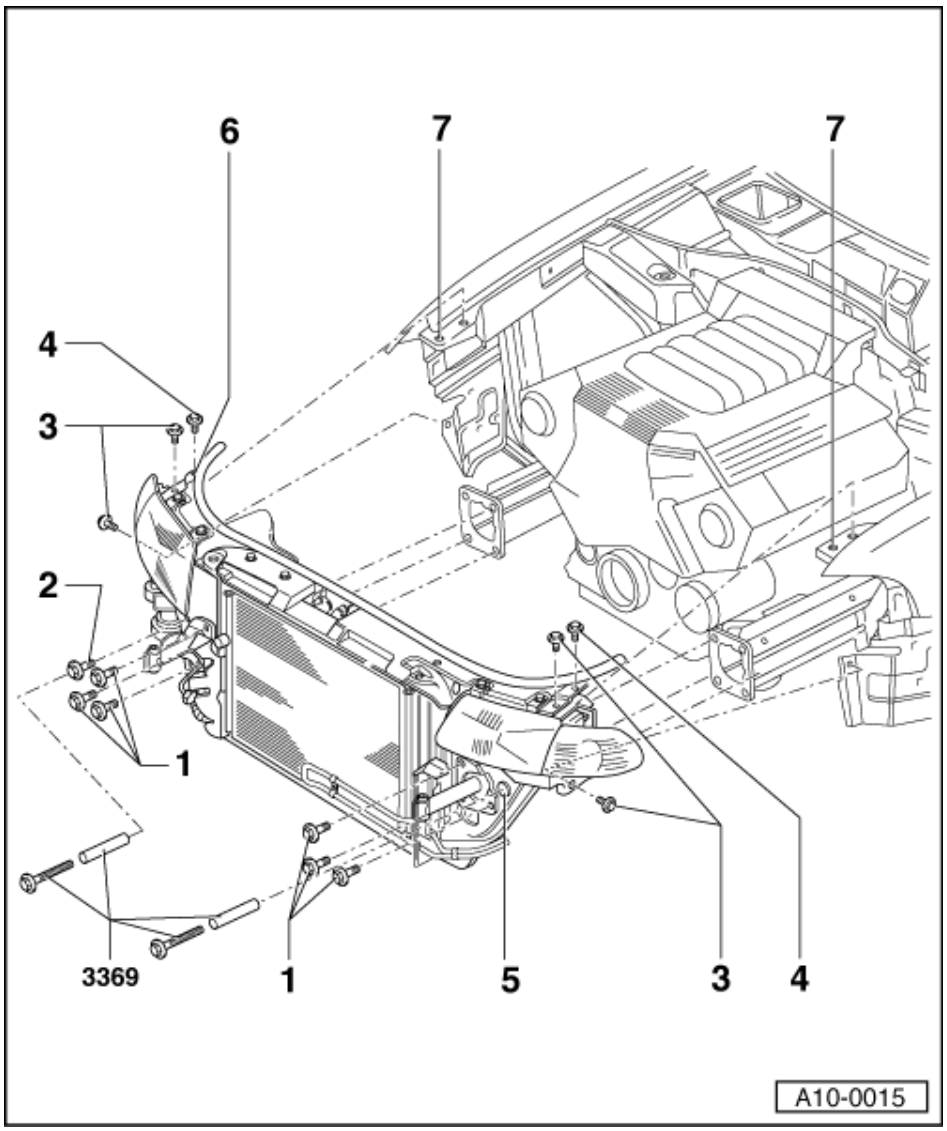
Protected by Copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorized by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Removing

- Remove front noise insulation => Fig.13-6.
- Remove front bumper.

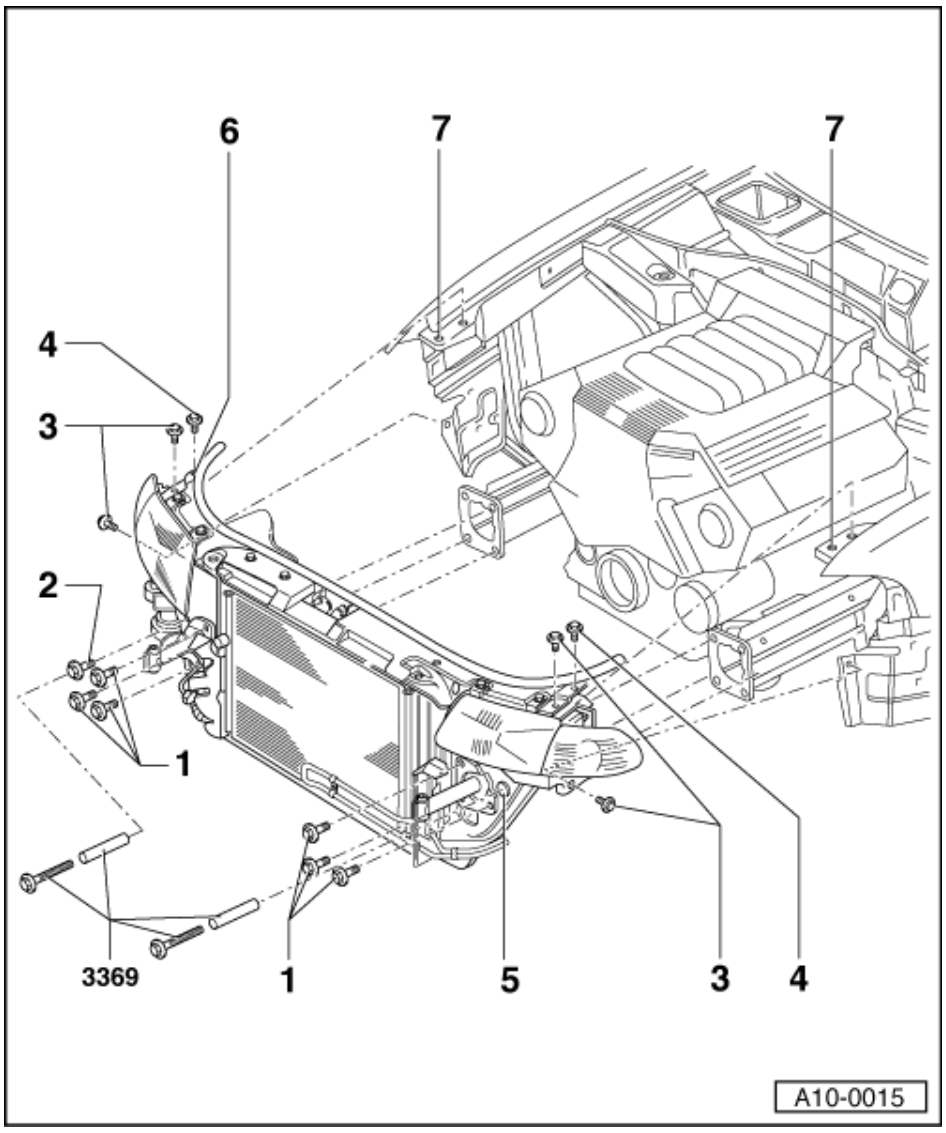
=> General Body Repairs, Exterior; Repair Group 63; Front Bumper; Removing and installing front bumper Front Bumper Removing and installing front bumper

- Disconnect air hose from bottom of charge air cooler => Fig.13-6.
- Remove air duct between lock carrier and air cleaner on lock carrier => Fig.13-7.
- Where fitted, detach wiring harness clamps on left side of radiator cowl.



- Screw out bolt -2- hand insert special tool 3369.
- Screw special tool 3369 into hole -5-.
- Remove bolts -1- and -3-.
- Screw out bolts -4-, fully withdraw lock carrier complete.
- To secure the lock carrier, insert suitable M6 bolts into the rear lock carrier holes -6- and wing holes -7-.

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

Install in reverse order, paying attention to the following:

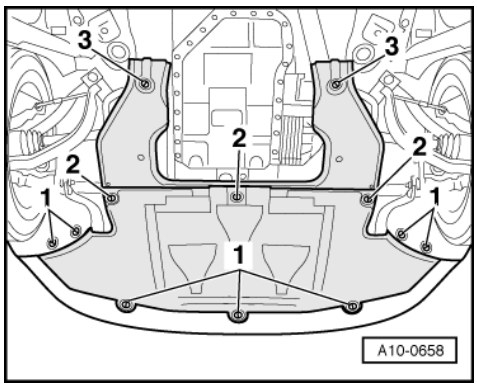
- After installing lock carrier, check wiring near coolant fan.
- Adjust stop for torque reaction support
  => Fig.13-7.
- Install front bumper:

=> General Body Repairs, Exterior; Repair Group 63; Front Bumper; Removing and installing front bumper Front Bumper Removing and installing front bumper

- Adjust headlights:

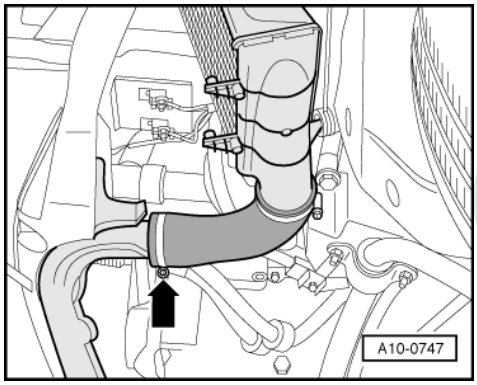
This document is copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

=> Electrical system; Repair Group 94; Servicing headlights; Adjusting headlights Servicing headlights Adjusting headlights



-> Fig.1 Removing front noise insulation

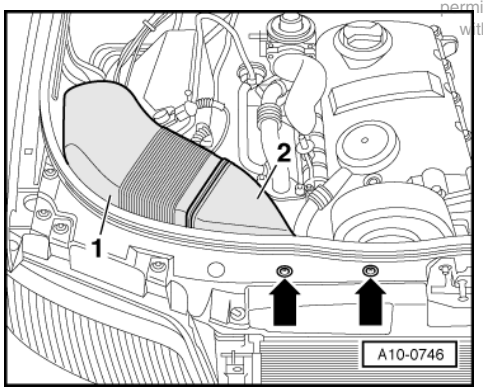
- Release quick-release fasteners -1- and -2- and detach front noise insulation. Do not remove rear noise insulation.



-> Fig.2 Removing air hose

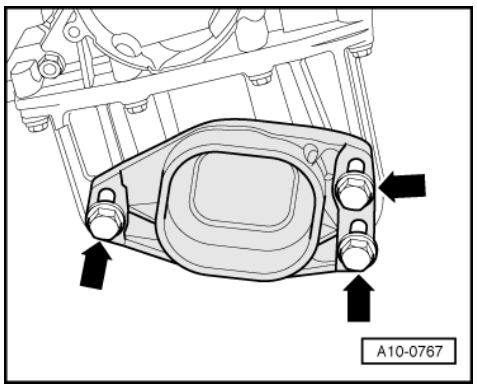
- Detach air hose to charge air cooler at bottom of lock carrier -arrow-.

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



-> Fig.3 Removing air duct between lock carrier and air cleaner

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

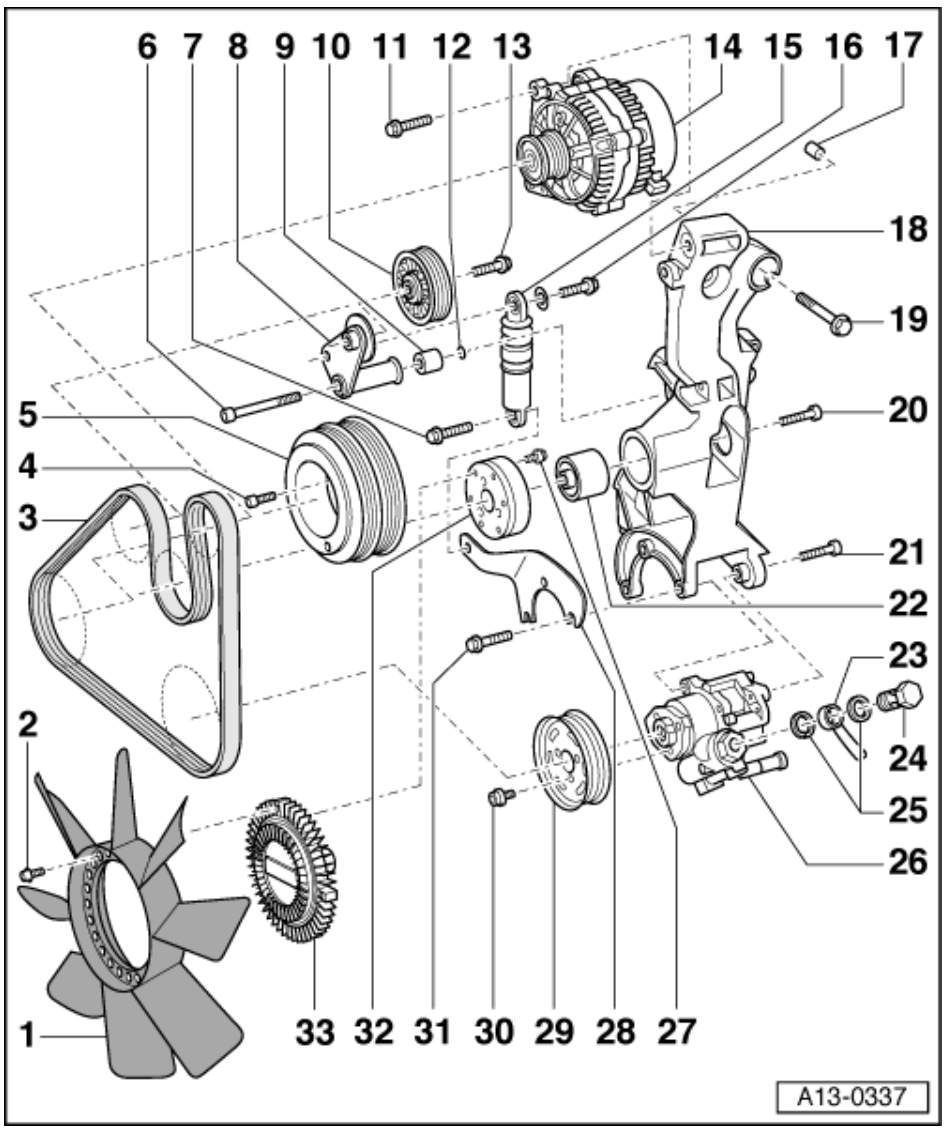


-> Fig.4 Adjusting stop for torque reaction support

- Allow stop for torque reaction support to rest on rubber buffer for torque reaction support under its own weight, and tighten bolts -arrows- to 28 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.

1.3 - Ribbed belt drive for vane pump, alternator and viscous fan

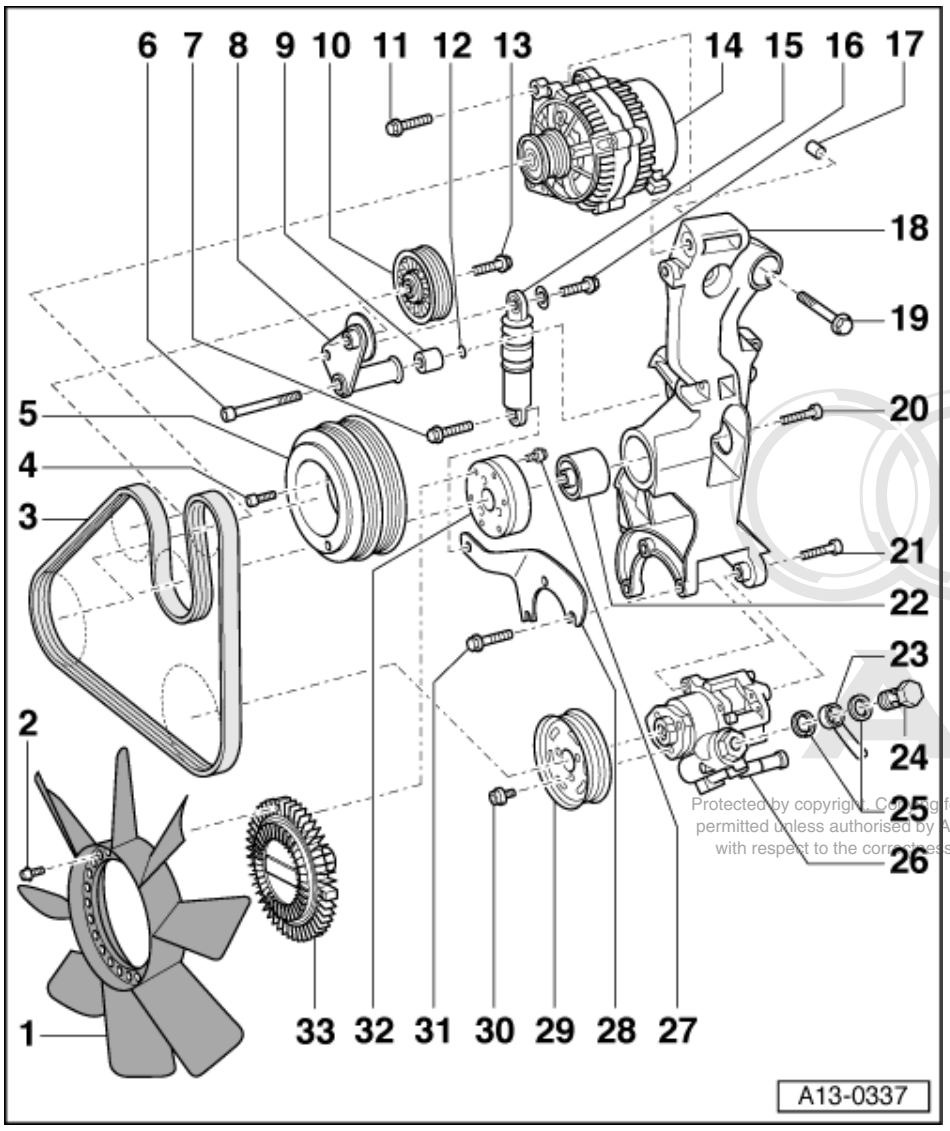


Note:

Mark direction of ribbed belt with chalk or felt-tip pen prior to removal. Running a used belt in the opposite direction could destroy it. When installing belt, make sure it is properly seated on pulleys.

1 Fan wheel
- for viscous fan
- Removing and installing=>Page 19-34

2 10 Nm
- Self-locking
- Replace



3 Ribbed belt
- Removing and installing=>Page 13-23
- Check for wear

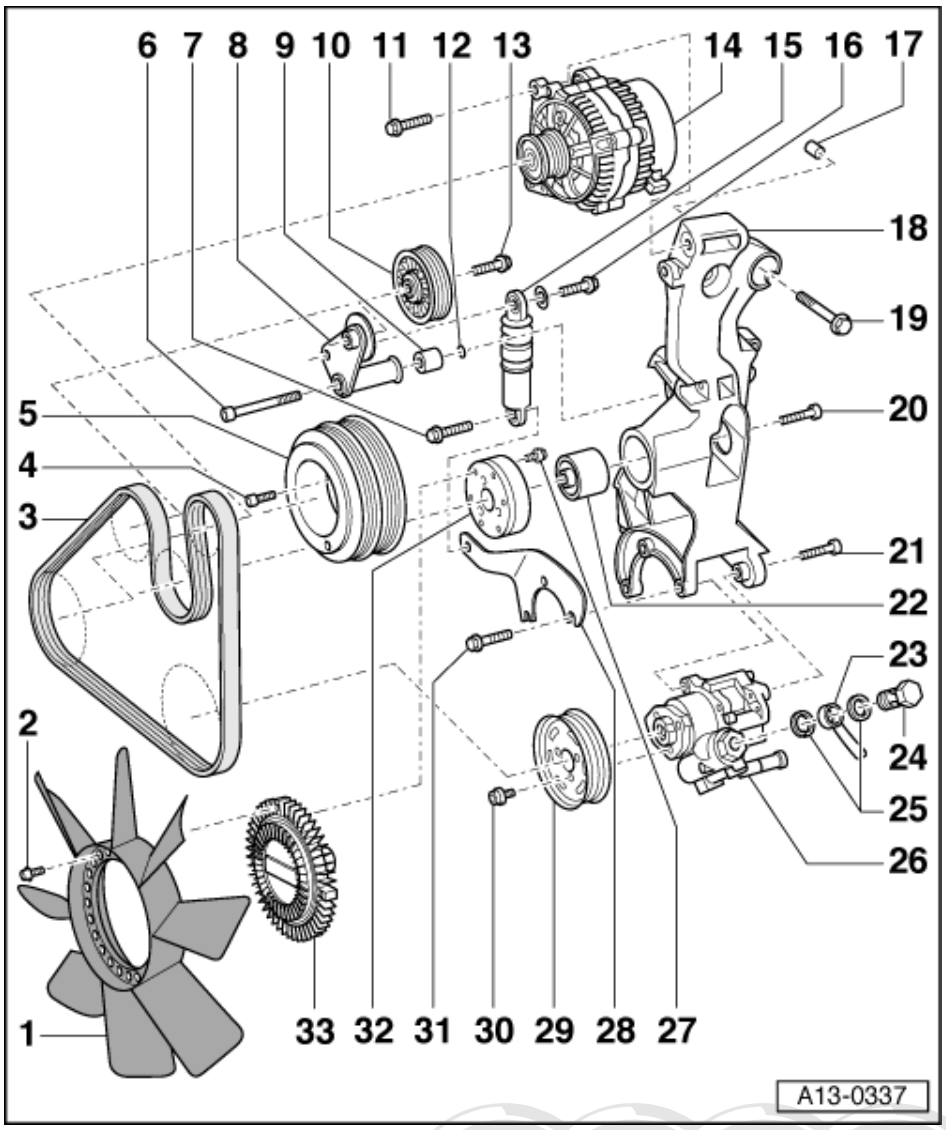
4 10 Nm + 1/4 turn (90 °)
- Replace

5 Vibration damper
- With pulley for ribbed belt
- Can only be fitted in one position

6 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.

- When installing, pay attention to O-ring -item 12-



7 25 Nm

8 Lever

- For tensioning roller

9 Spacer sleeve

- Pay attention to installation position
- Secured by O-ring -item 12-

10 Tensioning roller

11 25 Nm

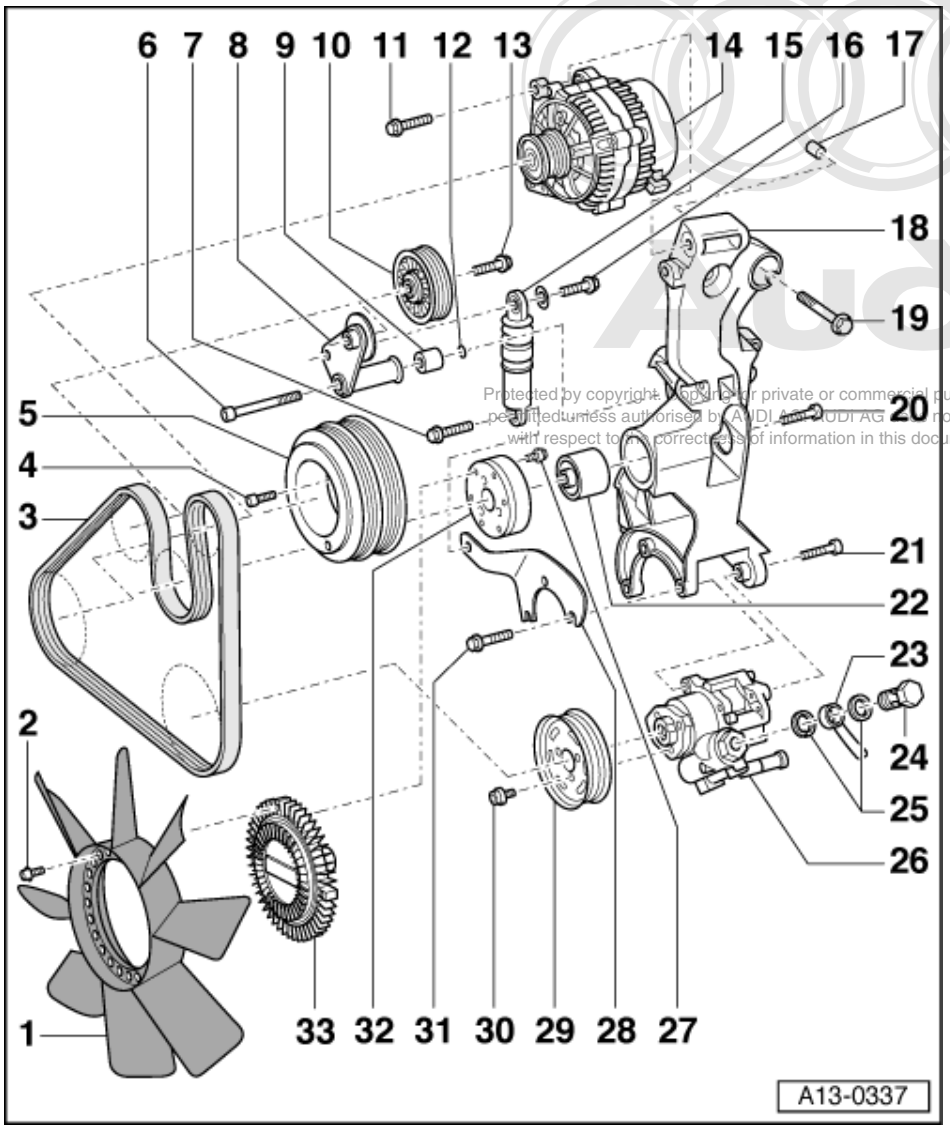
12 O-ring

- Replace if damaged

13 25 Nm

- Self-locking
- Replace

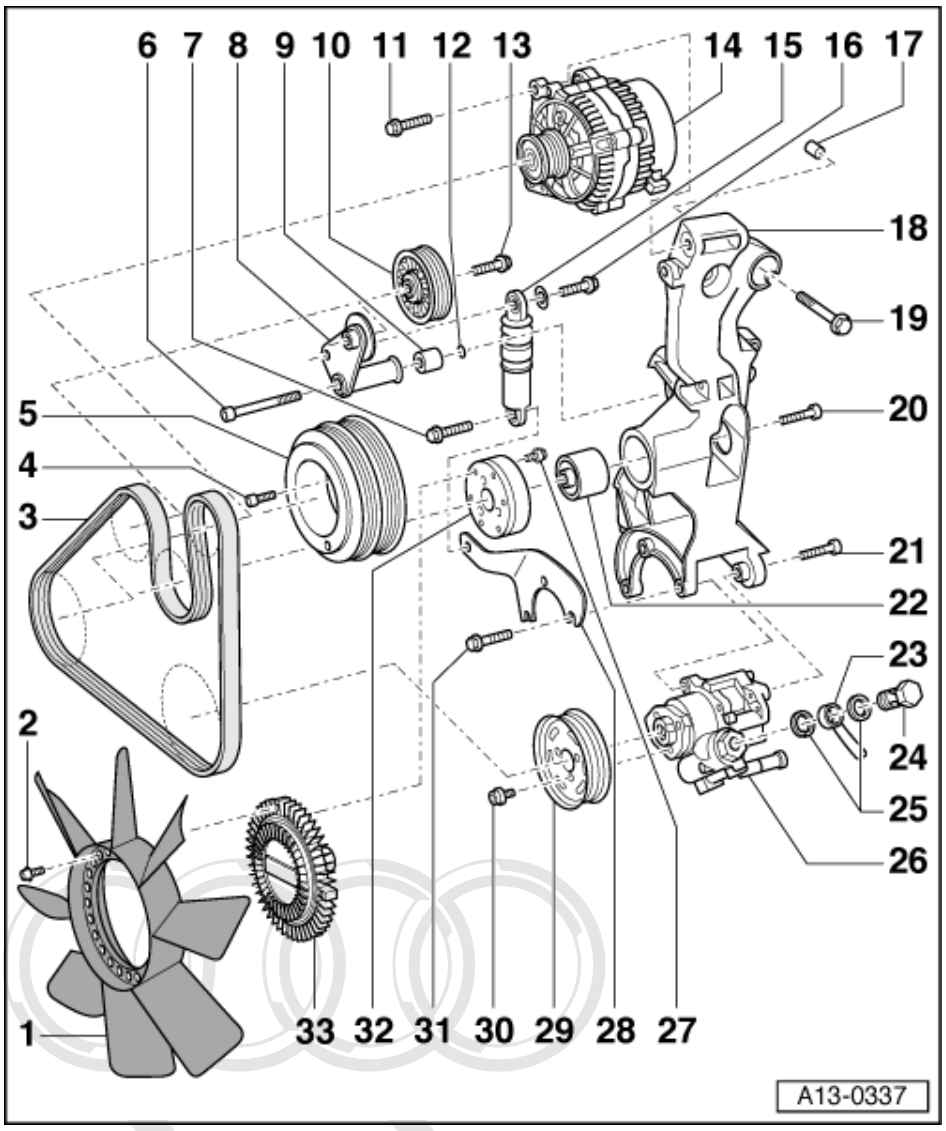
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



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

14 Alternator

- ◆ Removing:
- Disconnect battery earth strap-.
- Detach engine cover and noise insulation underneath.
- Slacken off ribbed belt and detach from alternator => Page 13-23.
- Remove viscous fan and place in radiator cowl.
- Unscrew wire from alternator.
- Disconnect connector, expose wire.
- Screw top and bottom bolts out of bracket.
- Remove alternator.
- ◆ To help align alternator on bracket, drive bush forr retaining screw back slightly



15 Tensioning element

- For ribbed belt

16 25 Nm

17 Dowel sleeve

- Check correct fit in bracket

18 Holder

- For alternator, vane pump and viscous fan
- Removing- and installing=>Page 13-25

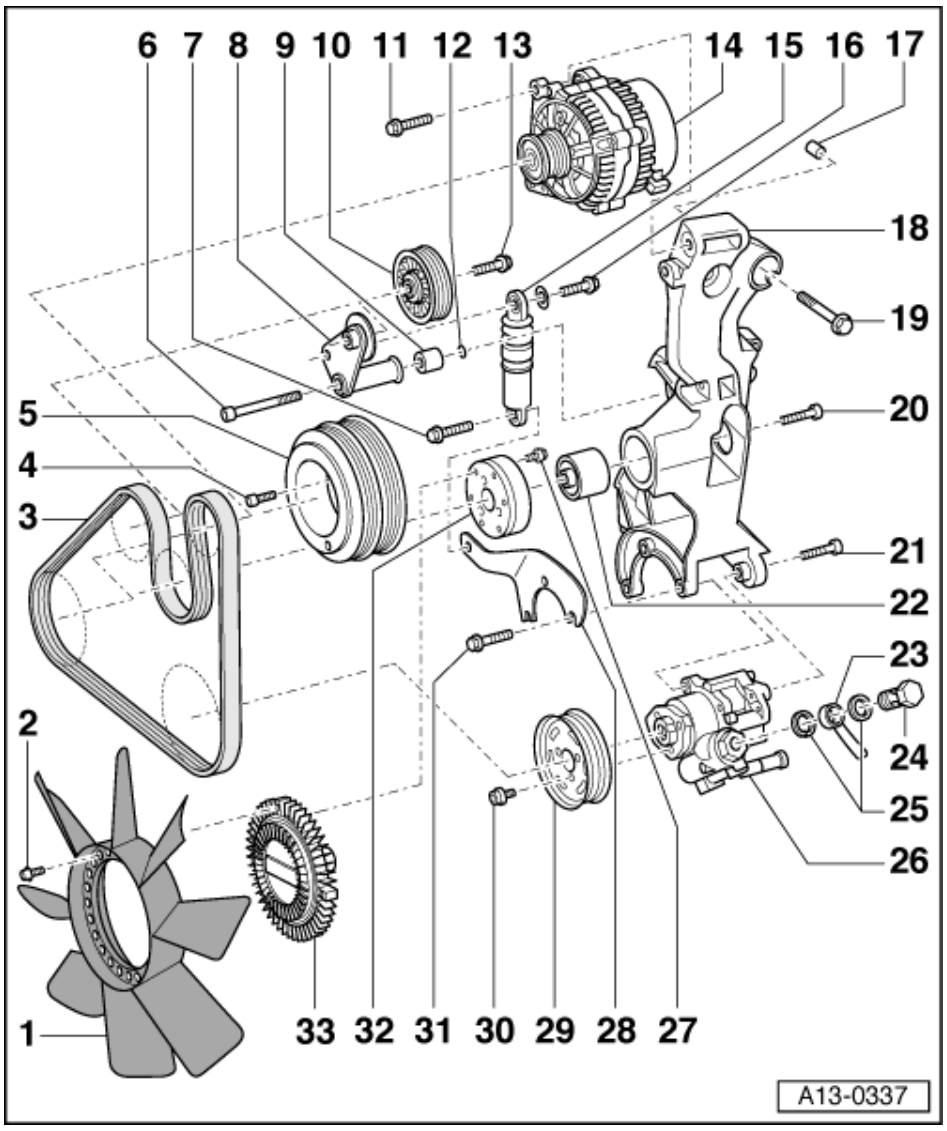
19 45 Nm

- Tightening sequence => Fig.13-15

20 45 Nm

21 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.



22 Bearings

- for viscous fan
- Removing and installing=>Page 19-36

23 Pressure pipe

24 Banjo bolt, 50 Nm

25 Oil seal

- Replace

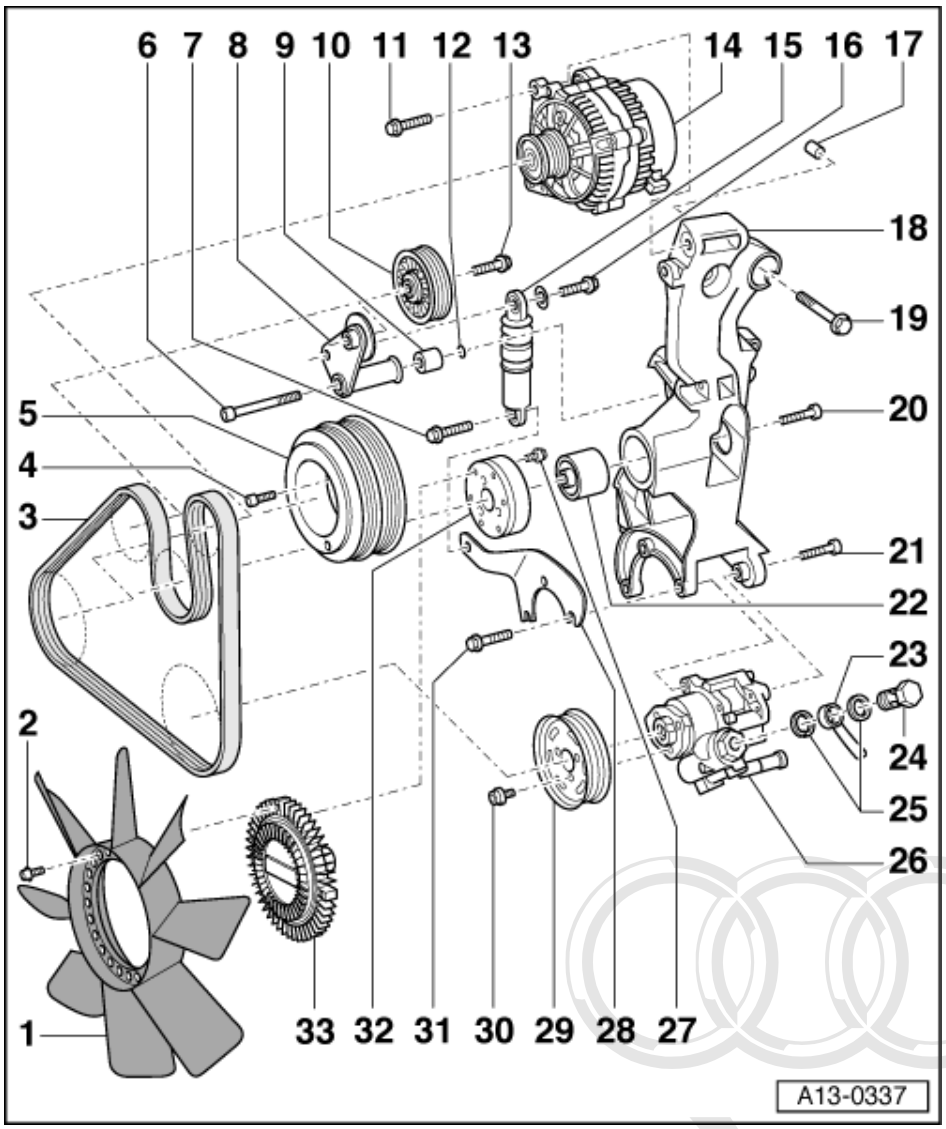
26 Vane pump

- For power steering
- Removing and installing:

27 Ribbed bolt- 28 Nm

- Replace

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



28 Holder

- for tensioning element

29 Pulley

- For vane pump
- Brace with mandrel to unbolt

30 25 Nm

31 25 Nm

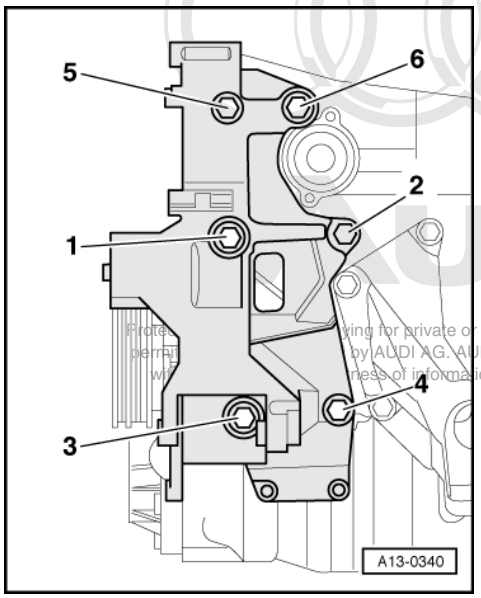
32 Pulley

- for viscous fan
- Removing and installing=>Page 19-34

33 Viscous coupling

- Removing and installing=>Page 19-34

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



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

-> Fig.1 Tightening sequence of bracket for alternator, vane pump and viscous fan

Note:

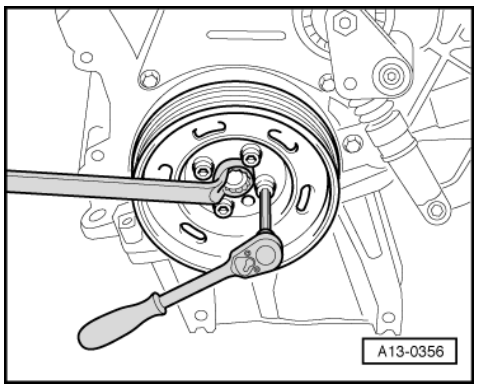
When installing, pay attention to dowel sleeve at top right between bracket and cylinder block.

- Tighten bolts -1 ... 6- hand-tight.
- Tighten the bolts in the order as numbered -1 ... 6- to 45 Nm.

1.4 - Removing and installing vibration damper

Removing

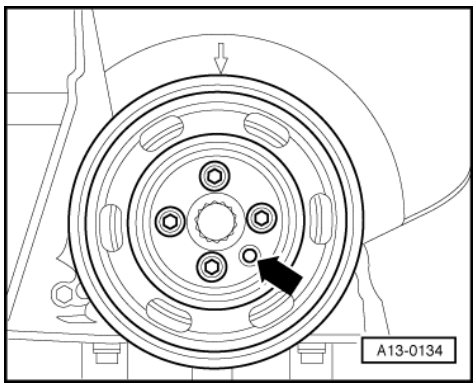
- Lock carrier in service position =>Page 13-1.
- Ribbed belt removed =>Page 13-23.



- Lift trim cap off of vibration damper.
- -> Unscrew vibration damper.

Note:

Provide support with box wrench at central bolt when unfastening and tightening vibration damper.



Installing

Install in reverse order, paying attention to the following:

- Use new bolts for attachment.
- -> Always use genuine bolts when installing vibration damper.

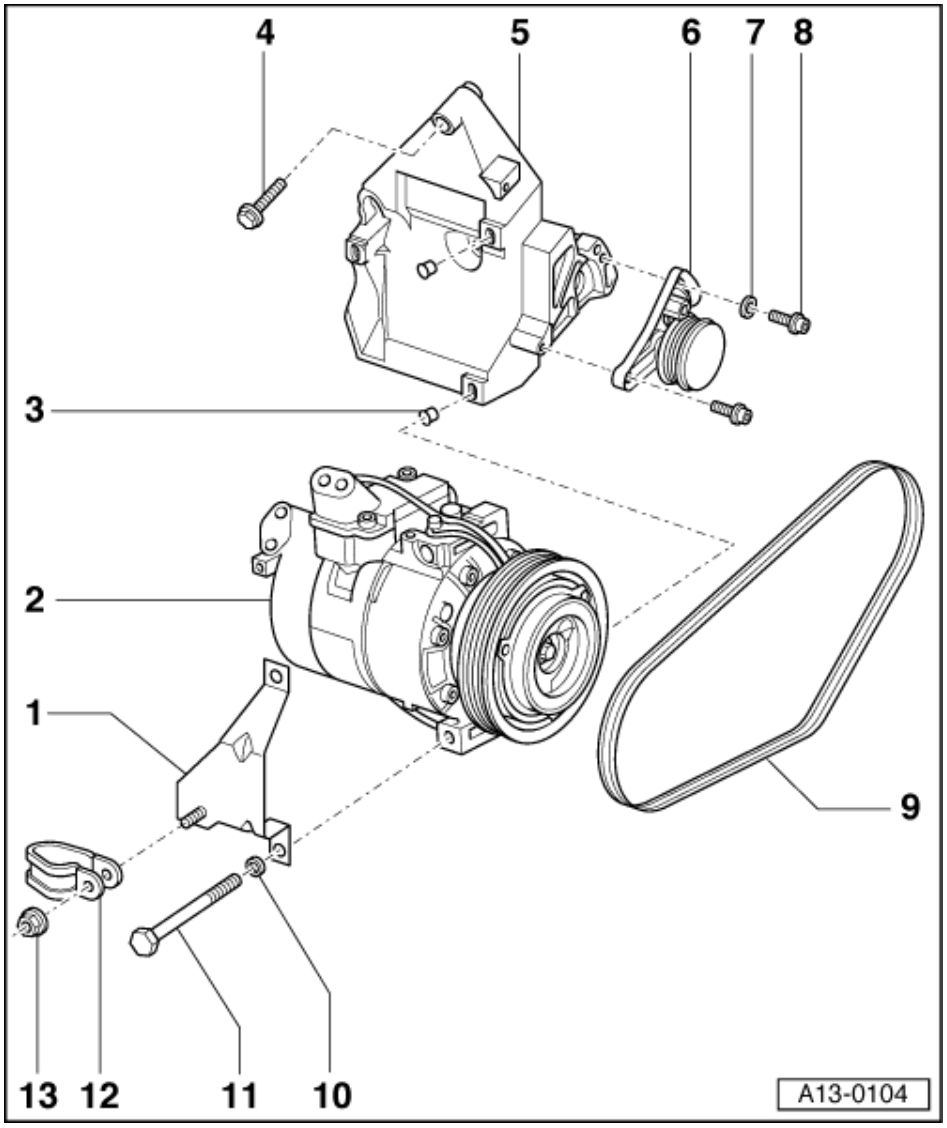
=> Parts List

- Vibration damper can only be installed in one position: Hole -arrow- in vibration damper must fit over projection on toothed belt sprocket.

Tighten vibration damper bolts to 10 Nm + 90° (1/4 turn).
Install lock carrier =>Page 13-1.

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

1.5 - Ribbed belt drive for air conditioner - Exploded view



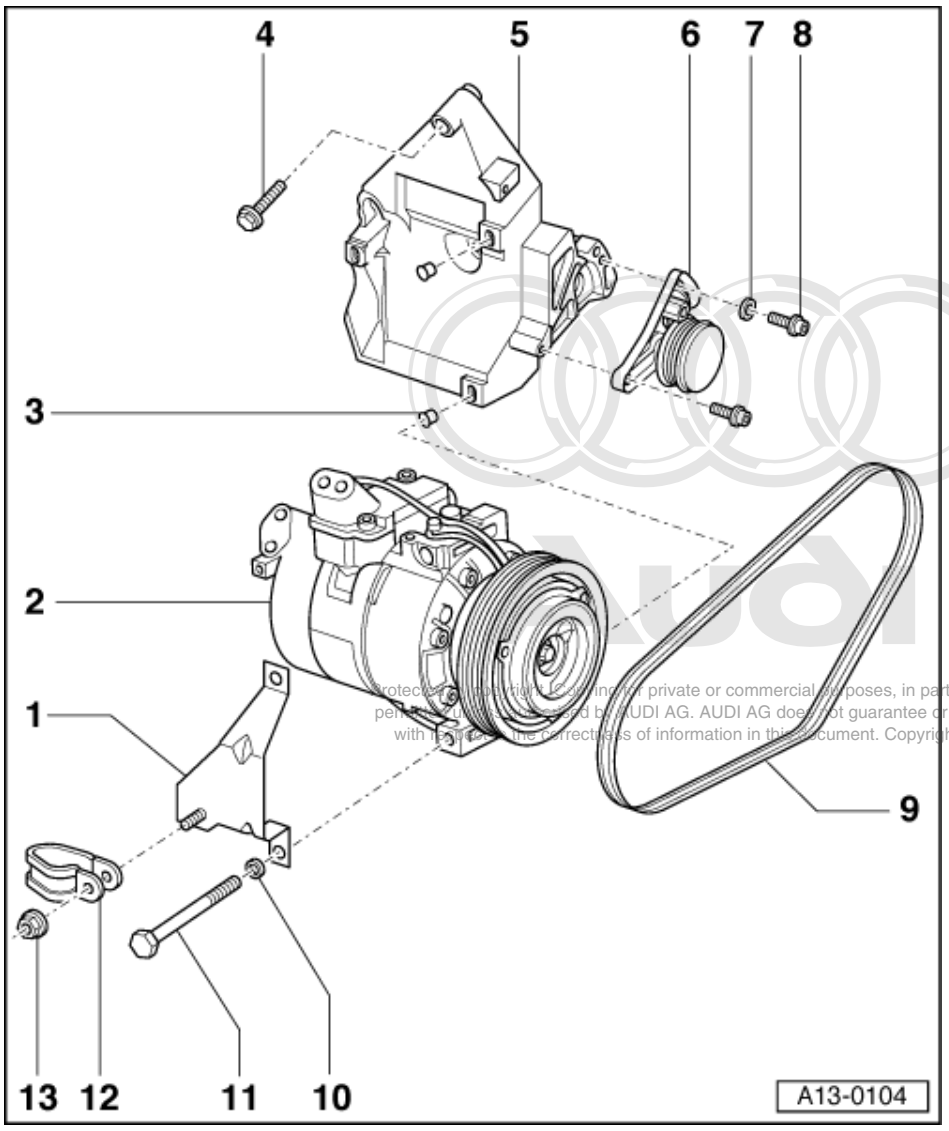
Attention:
Never open refrigerant circuit of air conditioner.

Note:

Mark direction of ribbed belt with chalk or felt-tip pen prior to removal. Running a used belt in the opposite direction could destroy it. When installing belt, make sure it is properly seated on pulleys.

1 Bracket

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



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

- After detaching, attach compressor to longitudinal member, e.g. using a piece of wire; never leave hanging from refrigerant pipes
- Do not unscrew/detach refrigerant pipes

3 Dowel sleeve

- Check correct fit in bracket

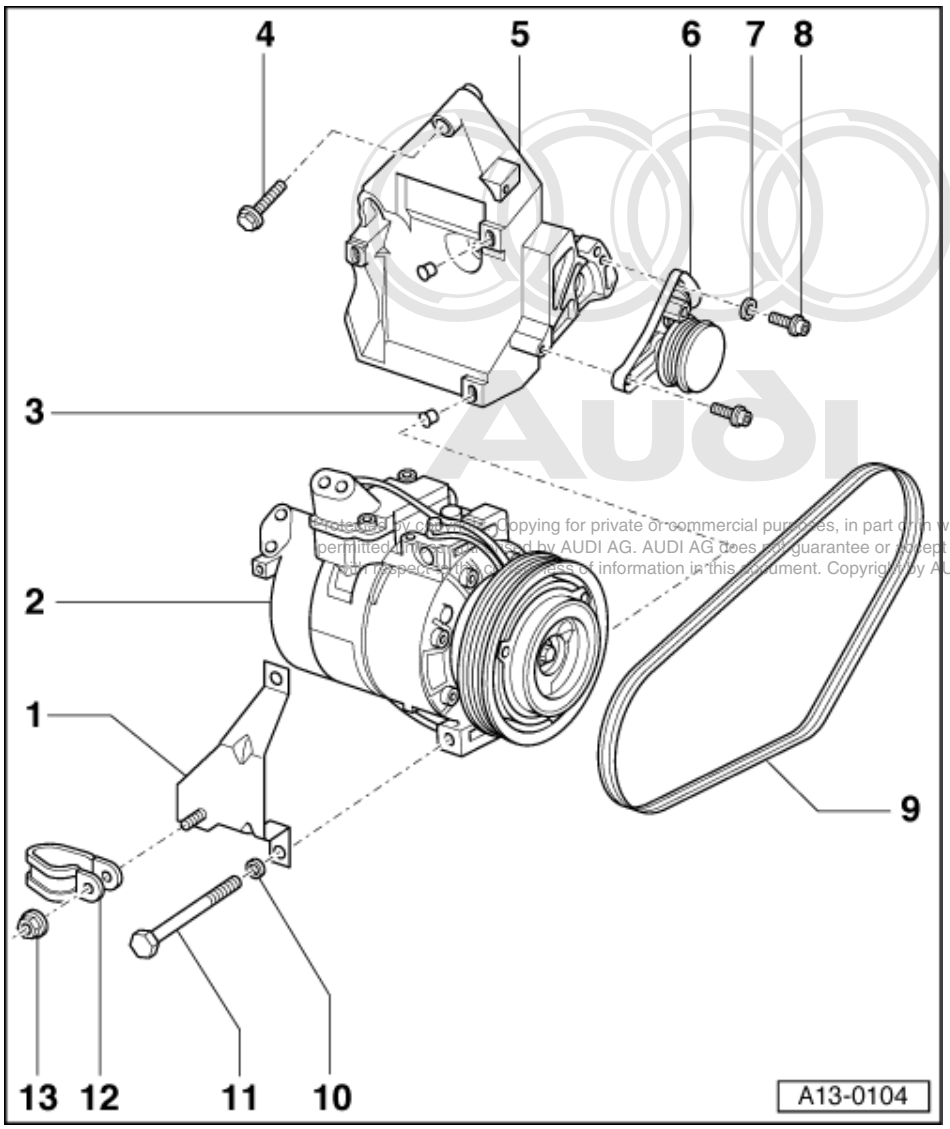
4 25 Nm

5 Bracket

- For air-conditioner compressor

6 Tensioning roller

- For ribbed belt
- Removing and installing ribbed belt => Page 13-23



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.

7 Washer

8 25 Nm

9 Ribbed belt

- Removing and installing=>Page 13-23
- Check for wear
- Do not kink
- Position of ribbed belt =>Page 13-21

10 Washer

11 25 Nm

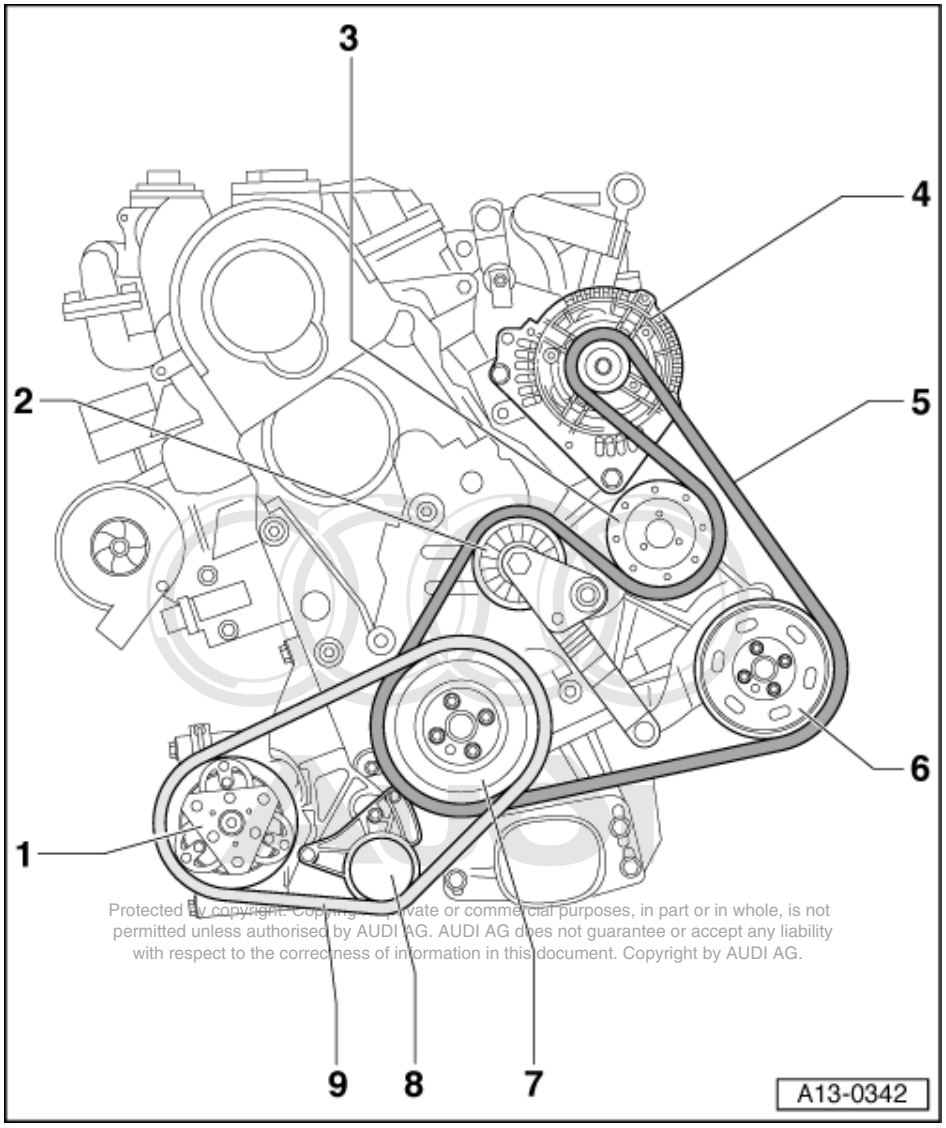
- Make exclusive use of genuine bolts (bolt strength 10.9)

=> Parts List

12 Retaining clip

13 10 Nm

1.6 - Ribbed belt layout



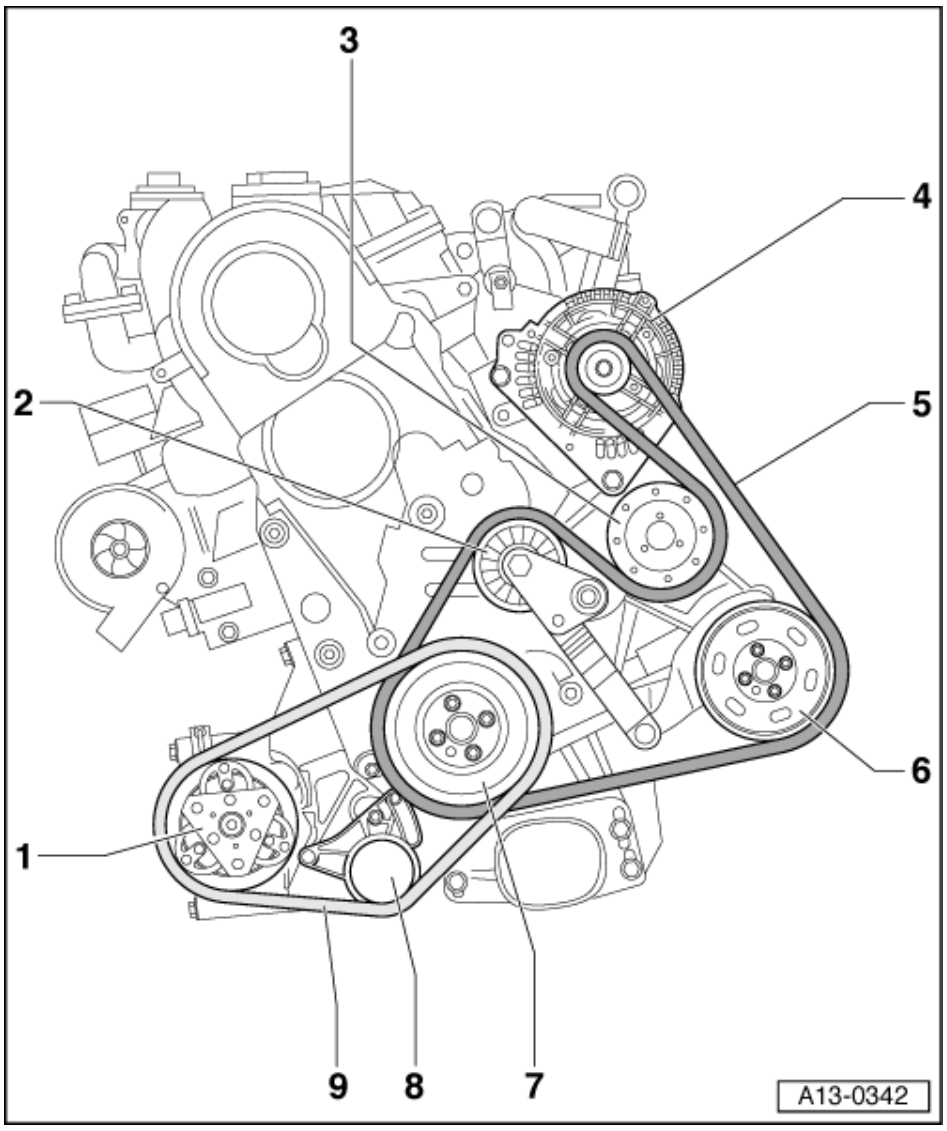
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

1 Air conditioner compressor
2 Tensioning roller
- For ribbed belt

3 Pulley
- for viscous fan

4 Alternator
5 Ribbed belt
- For alternator, vane pump and viscous fan
- Removing and installing=>Page 13-23

6 Vane pump



7 Vibration damper

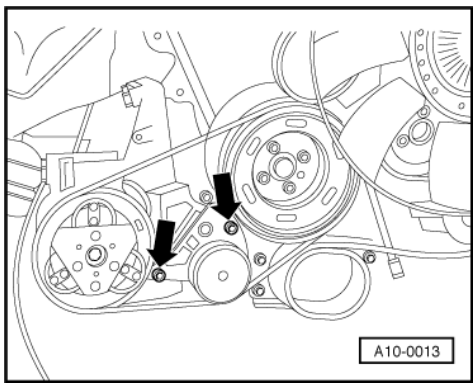
8 Tensioner for ribbed belt
- For air-conditioner compressor

9 Ribbed belt
- For air-conditioner compressor
- Removing and installing=>Page 13-23

1.7 - Removing and installing ribbed belt

- Lock carrier in service position =>Page 13-1.

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.



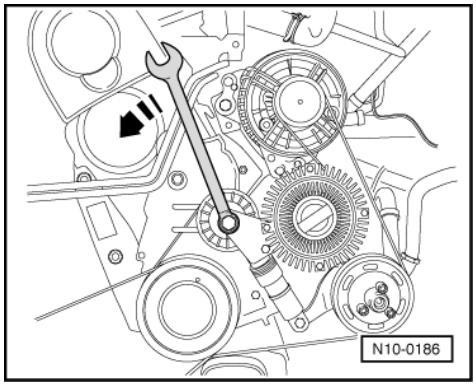
Removing

Note:

Before removing, mark direction of ribbed belt with chalk or felt-tipped pen. Running a used belt in the opposite direction could destroy it.

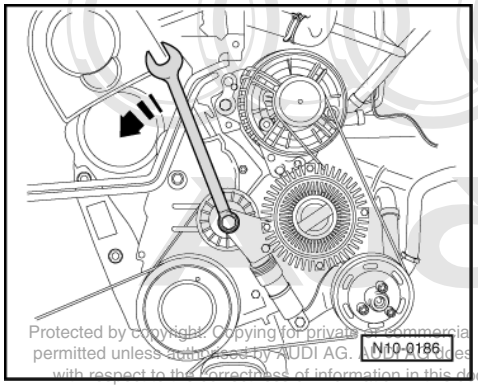
Vehicles with air conditioner:

- -> Slacken off bolts of tensioning roller for air-conditioner compressor ribbed belt -arrows-, slacken off ribbed belt and detach.



All models:

- -> Swivel tensioner in direction of arrow to slacken off ribbed belt.
- Detach ribbed belt, slacken off tensioner.



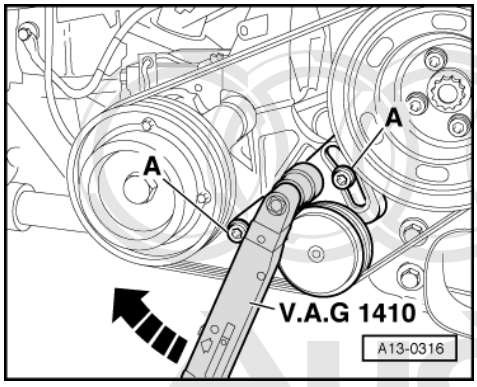
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Installing

Notes:

- Make sure the ribbed belt is properly seated.
- Ribbed belt layout => Page 13-21.

- Mount ribbed belt on pulleys of crankshaft, vane pump, tensioning roller and viscous fan.
- -> Swivel ribbed belt tensioner in direction of arrow.
- As a final step, position ribbed belt on alternator pulley and slacken off tensioner.



Vehicles with air conditioner:

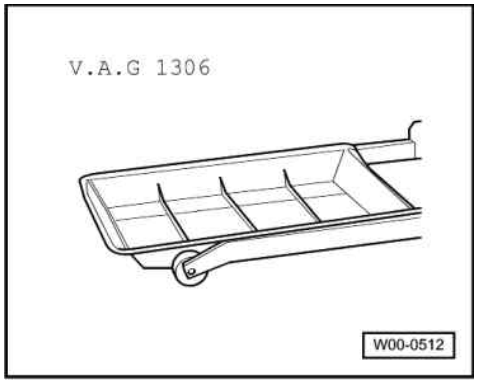
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not
permitted without the written consent of AUDI AG. AUDI AG does not guarantee or accept any liability
with respect to the correctness of information in this document. Copyright by AUDI AG.

- Fit ribbed belt for air-conditioner compressor.
- -> Position torque wrench, as shown at the 7 o'clock position, at hexagon of tensioning roller and pre-tension to 25 Nm.
- Simultaneously tighten bolts -A- to 20 Nm.

All models:

- Start engine and check belt routing.
- Install lock carrier =>Page 13-1.

1.8 - Removing and installing bracket for alternator, vane pump and viscous fan



Special tools and workshop equipment required

- Drip tray V.A.G 1306

Removing

Note:

All cable ties unfastened or cut open on removal are to be re-attached in same position on installation.

- Heed (if necessary obtain) code for vehicles with encoded radio/radio navigation system (RNS).
- Disconnect battery earth strap with ignition switched off.
- Drain off coolant => Page 19-7.
- Remove ribbed belt => Page 13-23.

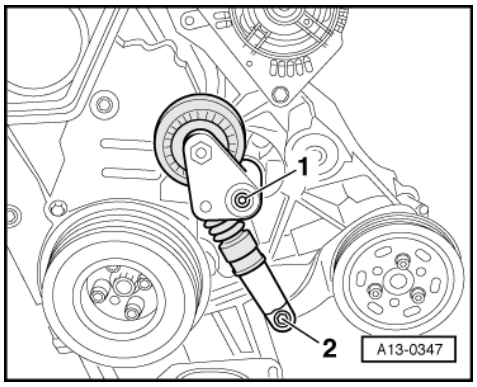
Note:

The air conditioner ribbed belt remains fitted.

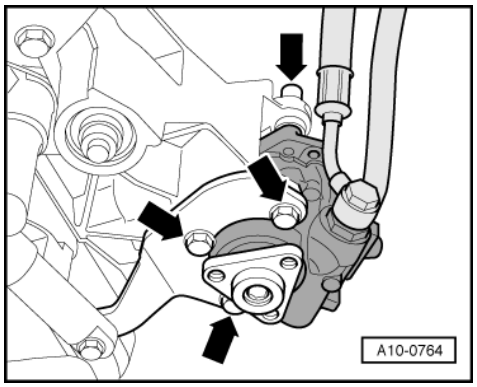
- Remove viscous fan => Page 19-34.

- Remove alternator => Page 13-11.
- Place drip tray V.A.G 1306 below engine.
- Remove thermostat connection together with thermostat =>Page 19-19.

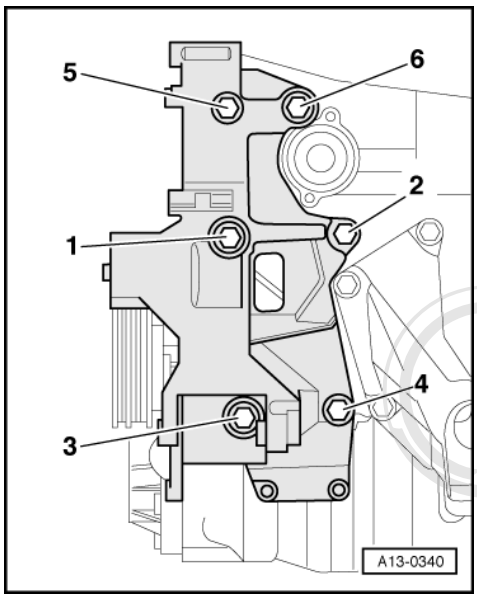
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- -> Screw out bolts -1- and -2- and detach ribbed belt tensioner.

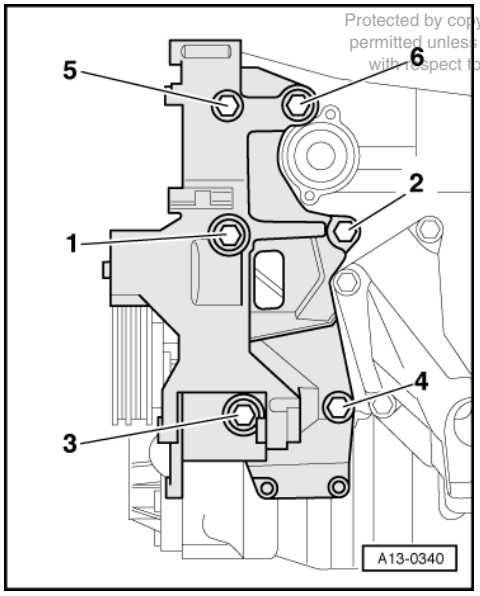


- Unbolt pulley of power steering vane pump. Use a mandrel as a brace.
- -> Unbolt power steering vane pump -arrow- and tie off. Leave pipes connected.



- -> Screw out bolts -1 ... 6-.
- Detach bracket for alternator, vane pump and viscous fan.

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

Install in reverse order, paying attention to the following:

Note:

When installing, pay attention to dowel sleeve at top right between bracket and cylinder block.

- -> Screw bolts -1 ... 6- hand-tight.
- Tighten the bolts in the order as numbered -1 ... 6- to 45 Nm.
- Install thermostat connection together with thermostat =>Page 19-19.
- Install viscous fan =>Page 19-34.
- Install ribbed belt =>Page 13-24.
- Fill cooling system with coolant => Page 19-11.

Note:

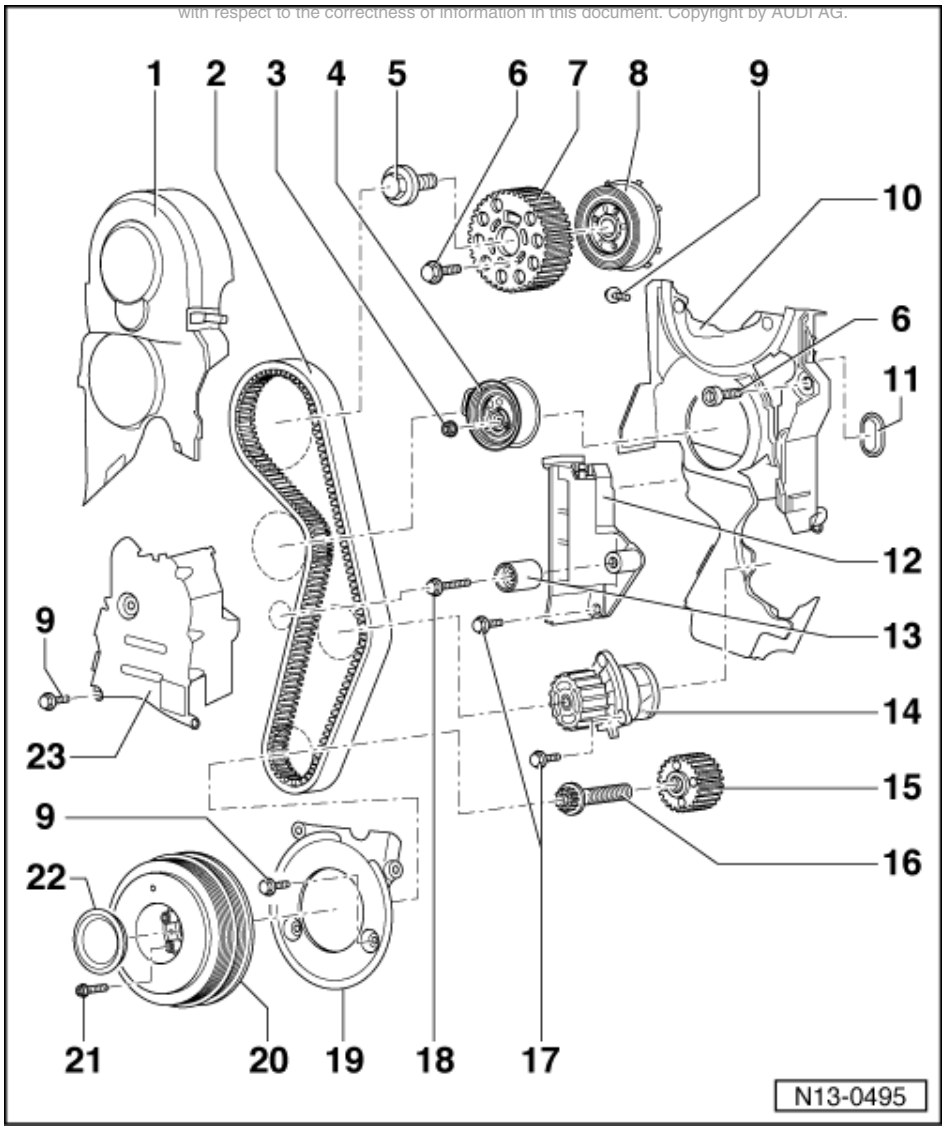
On re-connecting battery, remember to activate vehicle equipment (radio/radio navigation system, clock, electric window lifters) in line with owner's manual.

Tightening torques

Component	Nm
Bracket for alternator, vane pump and viscous fan to cylinder block	45
Alternator to bracket for alternator, vane pump and viscous fan	25
Ribbed belt tensioner	25
Vane pump to bracket for alternator, vane pump and viscous fan	25
Pulley to vane pump	25
Battery terminal to battery post	6

1.9 - Toothed belt drive

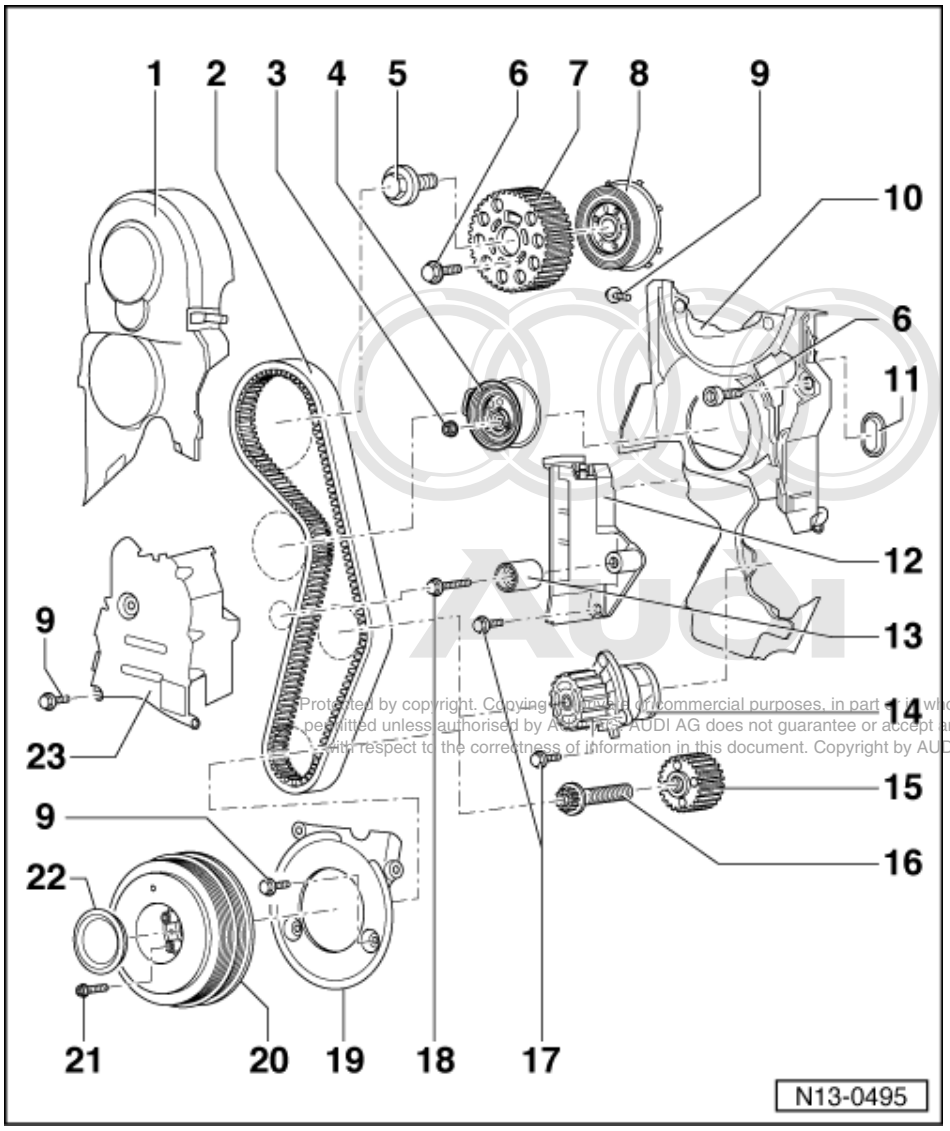
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



Note:
Mark direction of toothed belt with chalk or felt-tip pen prior to removal. Running a used belt in the opposite direction could destroy it.

1 Top toothed belt guard
- To remove, take out air duct and slacken bracket for coolant pipes
- Engage carefully in lower toothed belt guard on installation

2 Toothed belt
- Mark direction with chalk or felt-tip pen before removing
- Check for wear
- Removing => Page 13-36
- Installing (adjusting valve timing) => Page 13-44



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 20 Nm + further 45° (1/8 turn)

4 Tensioning roller

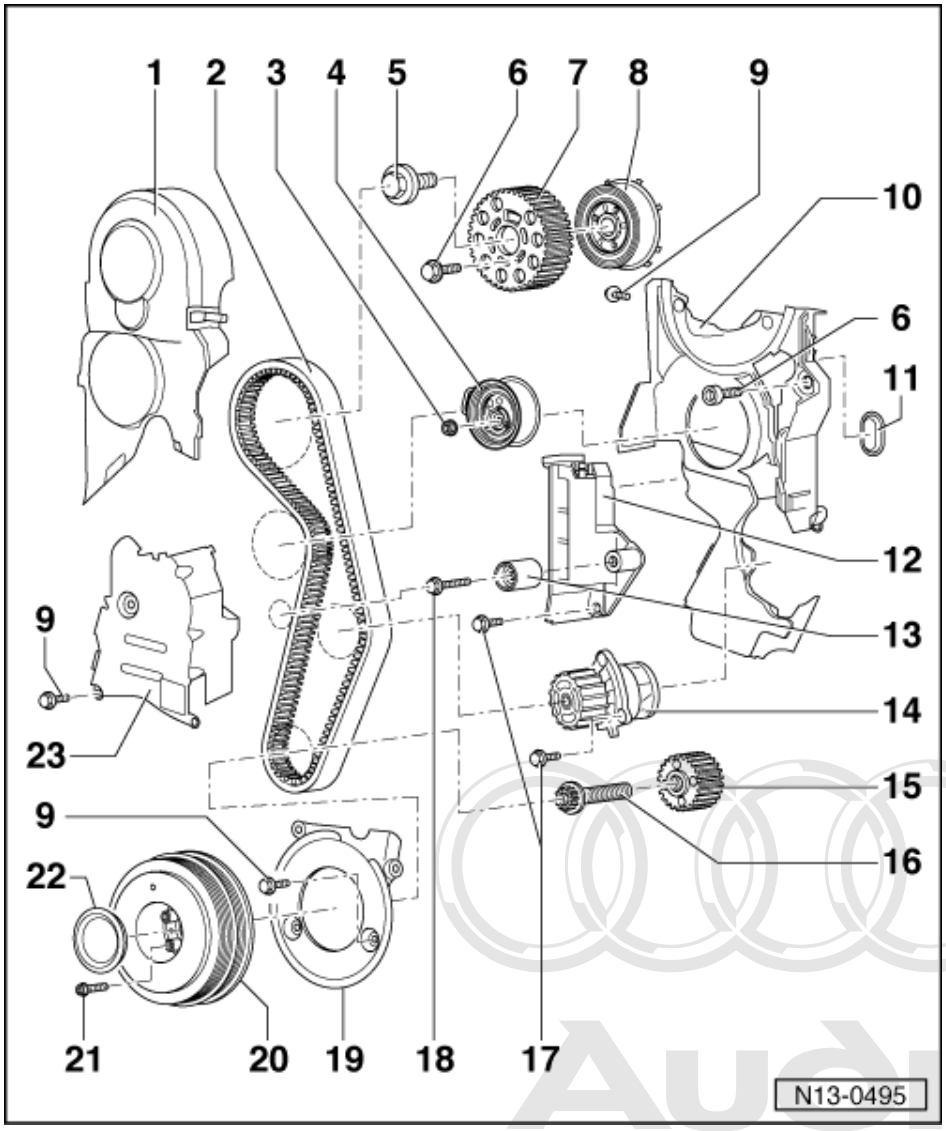
5 100 Nm
- To slacken and tighten, use counterhold T10051

6 25 Nm

7 Camshaft sprocket
- Mark installation position

8 Hub

- With sender wheel for Hall sender -G40
- To slacken and tighten, use counterhold T10051
- To remove, use puller T10052
- Detaching => Page 15-32



9 10 Nm

- Apply locking fluid when fitting
- Locking fluid

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

=> Parts List

10 Rear toothed belt guard

11 Rubber grommet

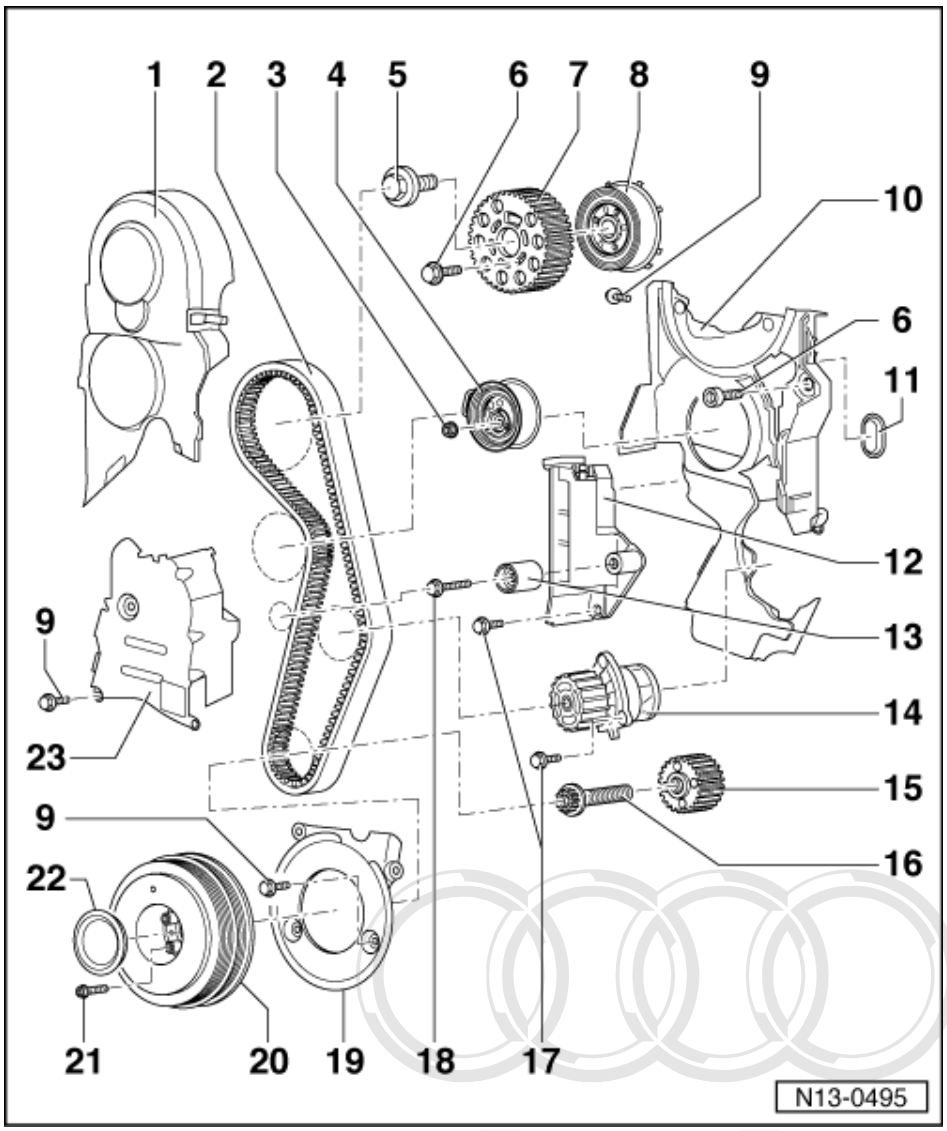
- Replace if damaged

12 Tensioner for toothed belt

13 Idler wheel

14 Coolant pump

- Removing and installing=>Page 19-17
- Check for smooth running



15 Crankshaft toothed belt sprocket

- There must not be any oil on contact surface between toothed belt sprocket and crankshaft
- Can only be fitted in one position

16 120 Nm + further 90° (1/4) turn

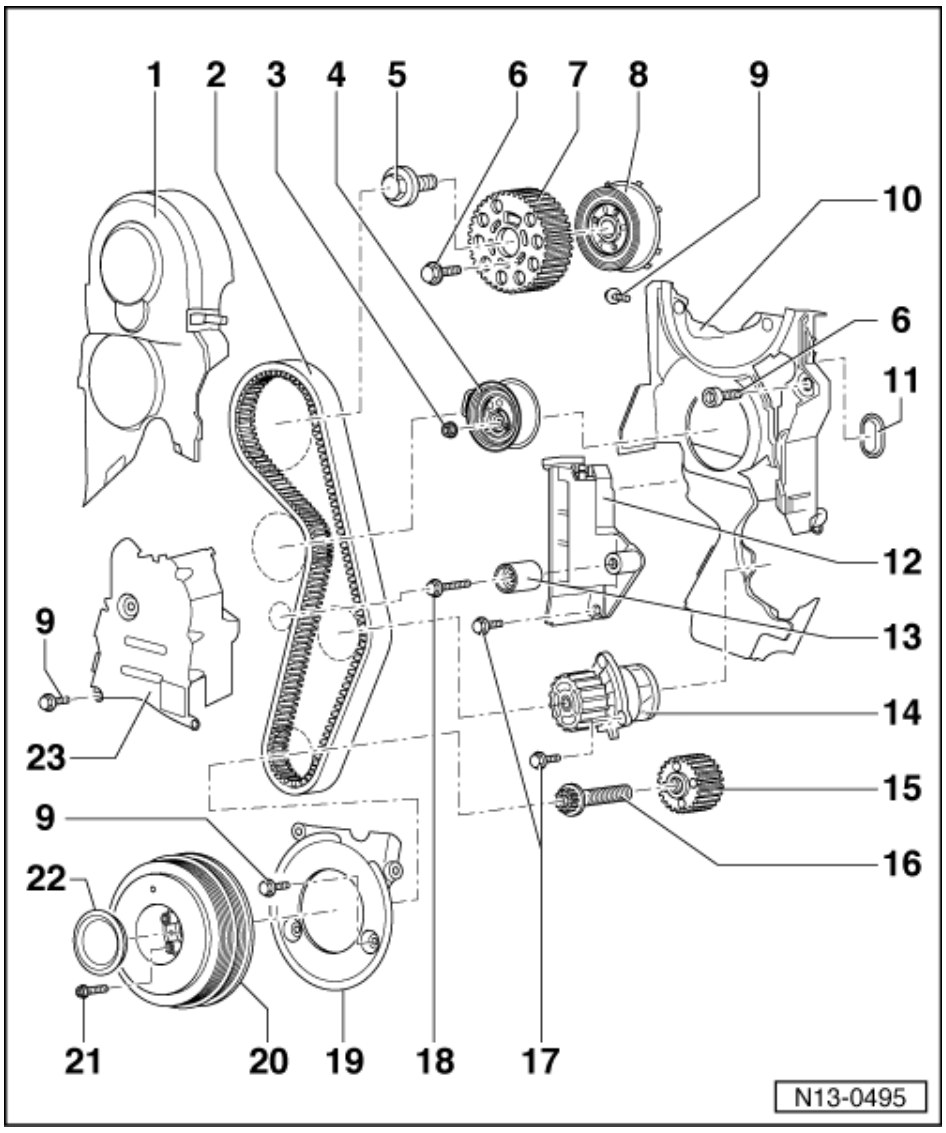
- Replace
- Do not lubricate
- To slacken and tighten, use counterhold 3415=> Fig.13-35

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 13 Nm

18 20 Nm

19 Lower toothed belt guard



20 Pulley/vibration damper

- Can only be fitted in one position -offset holes-

21 10 Nm + further 90° (1/4) turn

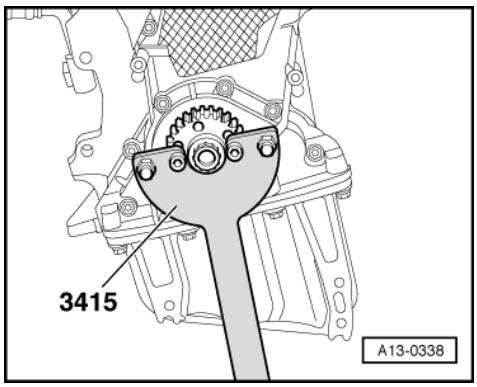
- Replace

22 Cover

23 Centre toothed belt guard

- To remove, take out top toothed belt guard and unbolt ribbed belt tensioner

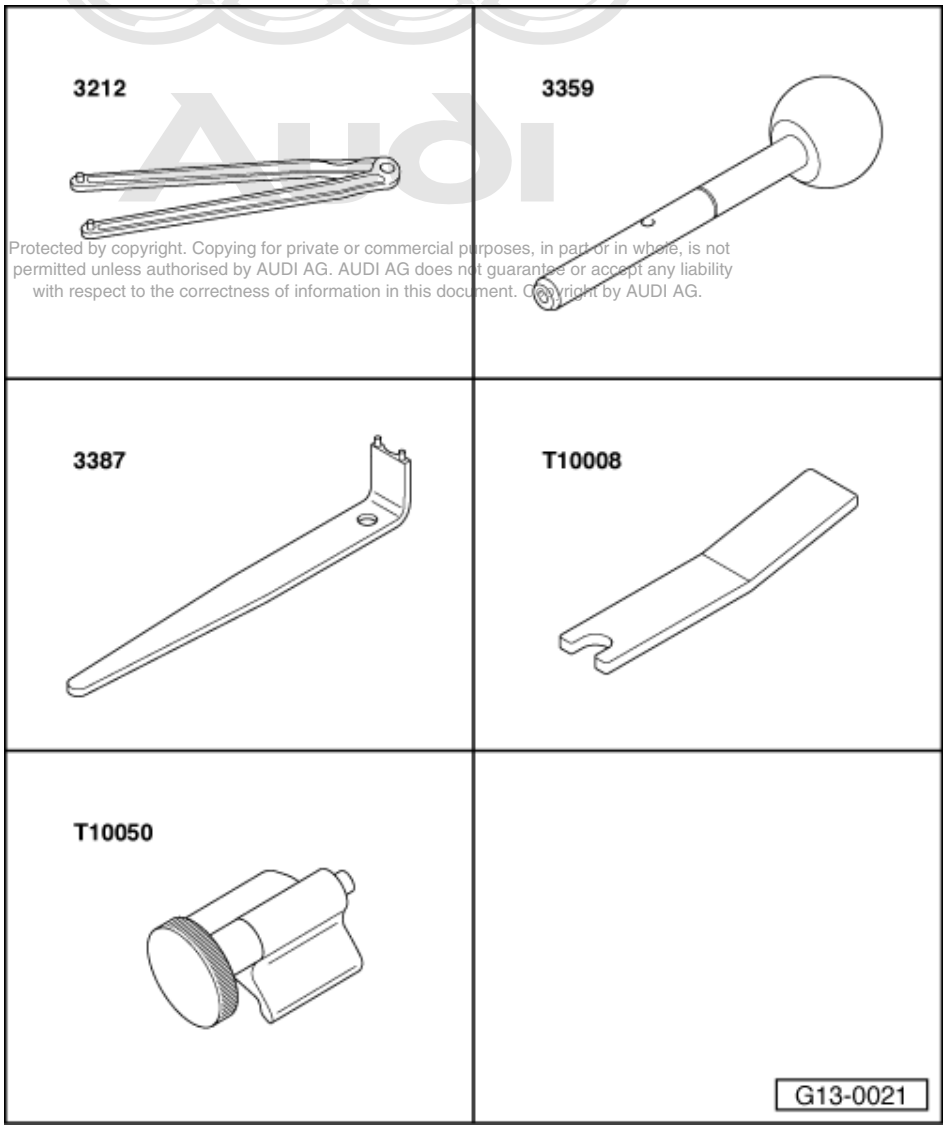
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



-> Fig.1 Removing and installing crankshaft toothed belt sprocket

- Use counterhold 3415 when slackening off and tightening central bolt.

1.10 - Removing and installing toothed belt

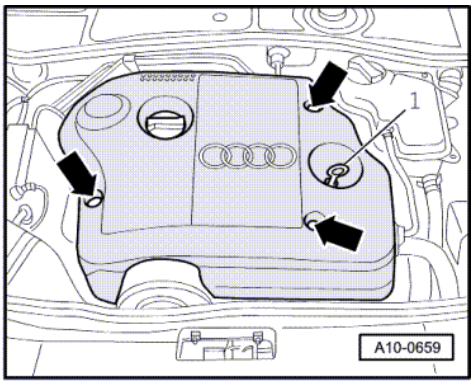


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Special tools and workshop equipment required

- Pin wrench 3212
- Rig pin 3359
- Pin wrench 3387
- Locking plate T10008
- Crankshaft stop T10050
- Drill ø4 mm
- Locking fluid

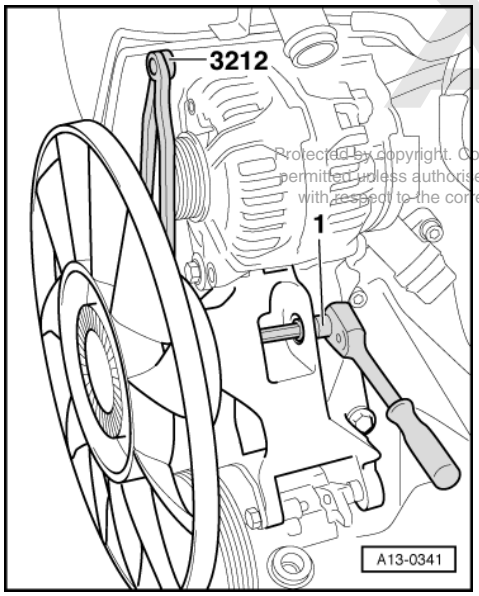
=> Parts List



Removing

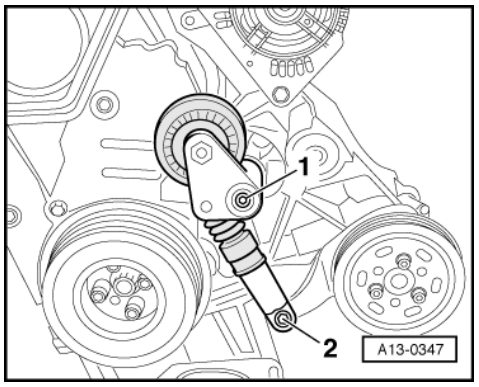
- Engine in position
- Lock carrier in service position =>Page 13-1.

- -> Pull dipstick -1- out of guide tube.
- Unclipcaps.
- Remove nuts -arrows- and detach engine cover.
- Remove insulation lying below.
- Re-insert dipstick into guide tube.
- Remove ribbed belt => Page 13-23.

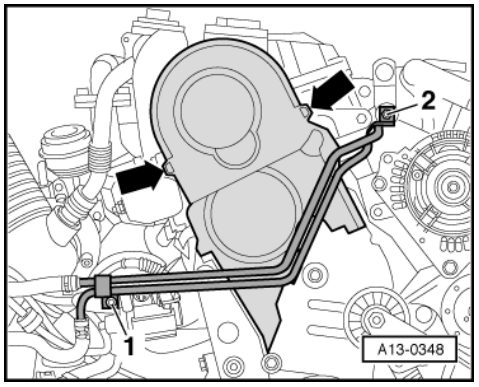


- -> Counter hold pulley for viscous fan with 2-hole pin wrench 3212 and unscrew from bracket with 8 mm Allen key -1-.
- Detach viscous fan.

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



- -> Screw out bolts -1- and -2- and detach ribbed belt tensioner.

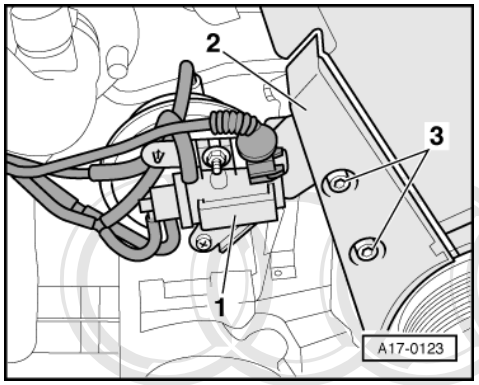


- -> Unbolt coolant pipe brackets -1- and -2-.

Note:

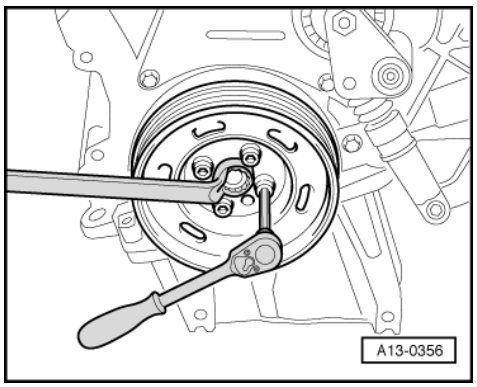
The coolant hoses can remain connected to the lines.

- Remove top toothed belt guard -arrows-.



- -> Screw out bolts -3- and detach cover -2-.
- Place aside charge pressure control solenoid valve -1- with connected 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.

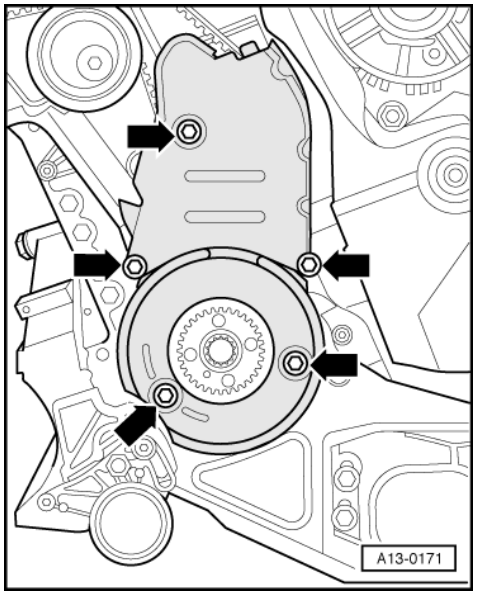


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

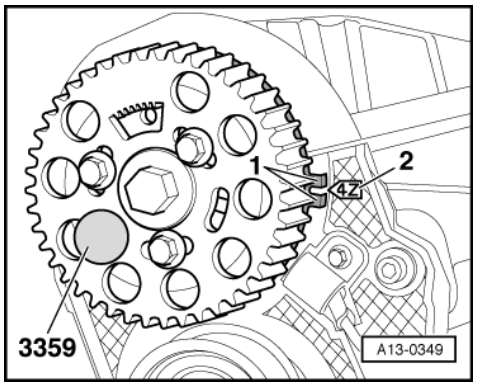
- Lift trim cap off of vibration damper.
- -> Unscrew vibration damper.

Note:

Provide support with box wrench at central bolt when unfastening and tightening vibration damper.



- -> Unbolt centre and bottom toothed belt guards -arrows-.



Attention:
Engine is only to be cranked by turning crankshaft in direction of engine rotation (clockwise).

Note:

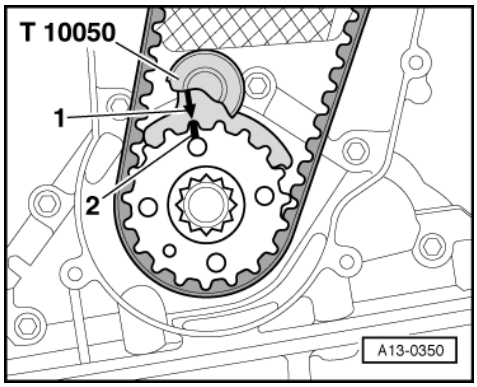
Use central bolt of crankshaft as application point for cranking engine.

- -> Rotate crankshaft to cylinder 1 TDC.

Notes:

- The gap between the two lugs -1- on the camshaft sender wheel must be positioned opposite the "4Z" marking -item 2- on the toothed belt guard.
- The illustration shows the camshaft sprocket without the toothed belt.

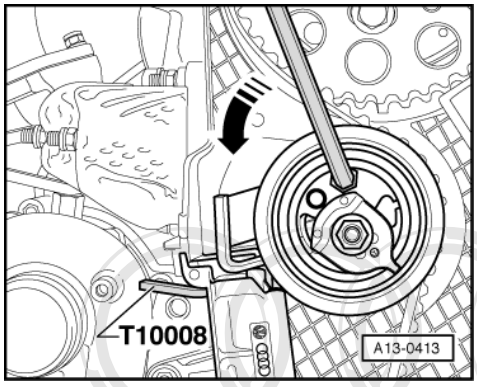
- Lock hub with rig pin 3359.



- -> Lock crankshaft toothed belt sprocket with crankshaft stop T10050.

Notes:

- The markings on the toothed belt sprocket -2- and on the crankshaft stop -1- must face each other. The journal of the crankshaft stop must engage in the sealing flange hole.
- The crankshaft stop can only be pushed onto the toothed belt sprocket from the front face of the splines.

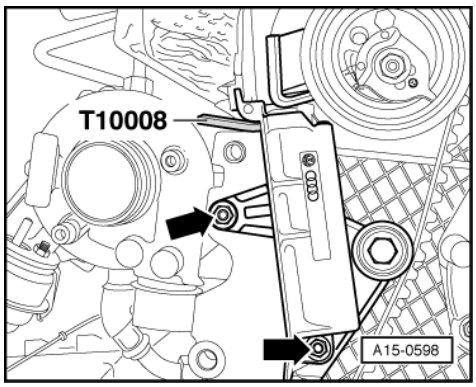


- -> Insert an Allen key all the way into the hex socket and use it to push the tensioning roller anti-clockwise -direction of arrow- until you can lock the toothed belt tensioner with locking plate T10008.

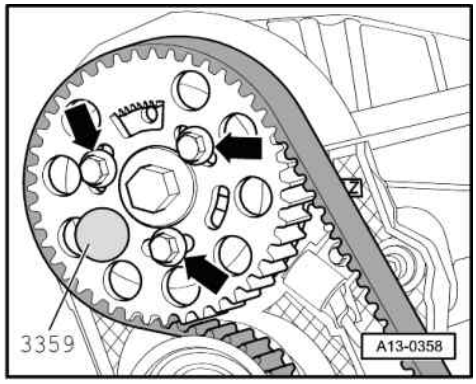
Notes:

- Insert the Allen key all the way, to avoid damage.
- The toothed belt tensioning element is oil-damped, and can only be pushed back slowly, applying force smoothly and evenly.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 direction of toothed belt with chalk or felt-tip pen.
- Slacken tensioning roller nut.
- -> Remove toothed belt tensioner bolts -arrows- and detach tensioner.
- Detach toothed belt.



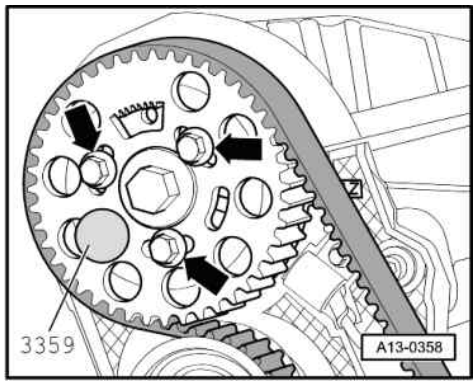
Installing (adjusting valve timing)

- Camshaft locked with rig pin 3359.
- Crankshaft locked with crankshaft stop T10050.
- Toothed belt tensioner locked with locking plate T10008.

Notes:

- Only carry out adjustments to the toothed belt when the engine is cold.
- When the camshaft is rotated, no crankshaft piston must be positioned at TDC, as this could result in valve/ piston crown damage.

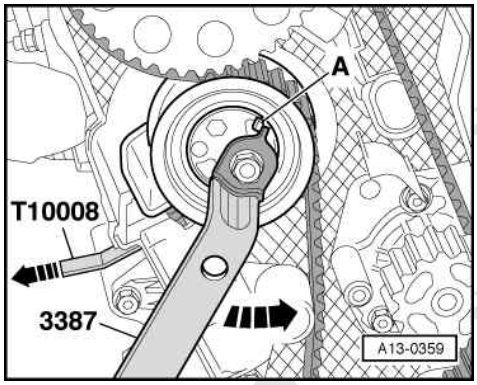
- -> Slacken camshaft sprocket bolts -arrows-.



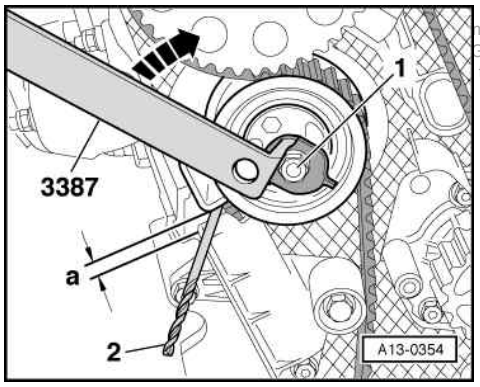
- -> Screw bolts -arrows- in hand-tight.
  - The camshaft sprocket must just about still turn, and must not tilt.
- Rotate the camshaft sprocket in its slots clockwise all the way to the limit.
- Position toothed belt on camshaft sprocket, tensioning roller, crankshaft toothed belt sprocket and, lastly, on water pump toothed belt.

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

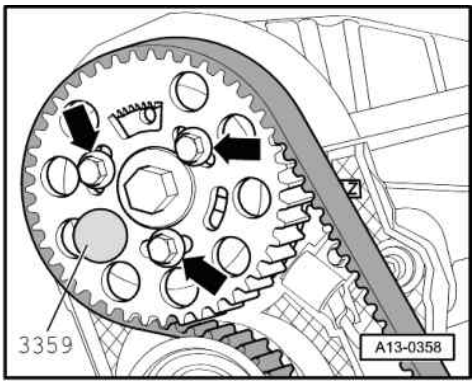


- Adjust toothed belt tension as follows:
- -> Turn eccentric disk fully anti-clockwise using nut driver 3387 -A-.
- Withdraw locking plate T10008.

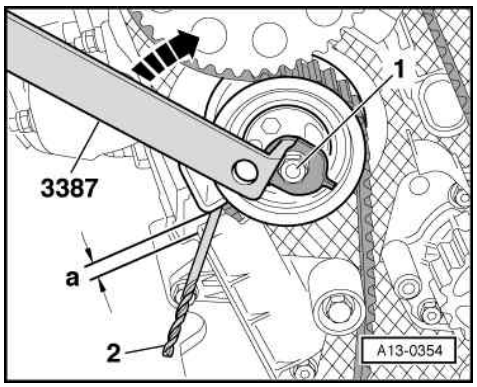


mercial purposes, in part or in whole, is not
G does not guarantee or accept any liability
this document. Copyright by AUDI AG.

- -> Slowly lower your resistance to the clockwise counterforce of the tensioner until a drill ø 4.0 mm -item 2- can be drawn easily between the tensioning lever and the housing of the tensioner by the shaft.
  - Dimension a = 4.0 ± 1.0 mm
- Hold tensioning roller firm in that position and tighten nut of tensioning roller -1- to 20 Nm + 45° (1/8 turn).

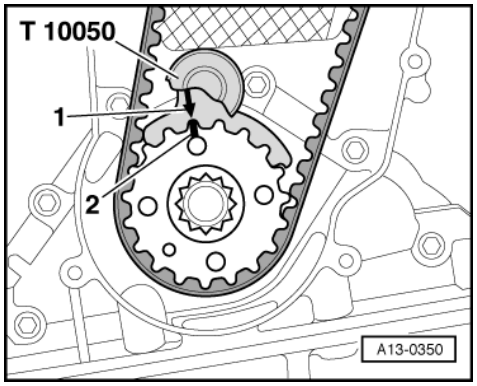


- -> Tighten camshaft sprocket bolts -arrows- to 25 Nm.
- Remove rig pin 3359 and crankshaft stop T10050.



Attention:
Engine is only to be cranked by turning crankshaft in direction of engine rotation (clockwise).

- Rotate the crankshaft two turns in the direction the engine is turning until it is again positioned at TDC.
- -> Check again that dimension -a- is reached between tensioning lever and tensioner housing.
  - Dimension a = 4.0 ± 1.0 mm
- If dimension -a- is not reached, retension tensioning roller as follows:
- Hold tensioning roller firm with nut driver 3387, slacken nut -1- and lower resistance to counterforce of tensioner -arrows- until dimension -a- is reached.
  - Dimension a = 4.0 ± 1.0 mm
- Hold tensioning roller firm in that position and tighten nut of tensioning roller -1- to 20 Nm + 45° (1/8 turn).



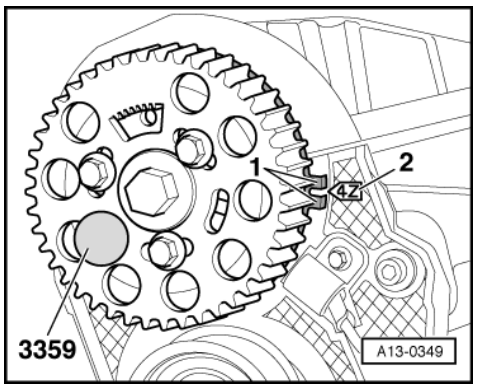
Checking valve timing

- -> Lock crankshaft toothed belt sprocket again as a check with crankshaft stop T10050.

Notes:

- The markings on the toothed belt sprocket -2- and on the crankshaft stop -1- must face each other.- The journal of the crankshaft stop must engage in the sealing flange hole.
- The journal of the crankshaft stop must engage in the hole in the sealing flange as it rotates.
- If the crankshaft has been rotated beyond cylinder 1 TDC, turn it a quarter turn back to reset it to cylinder 1 TDC in the direction of rotation of the engine. No corrections against the direction of rotation of the engine to reset the crankshaft stop must be made.

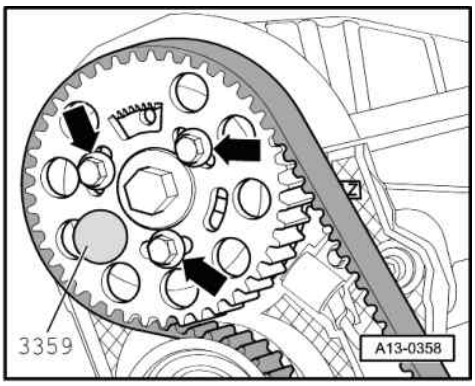
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- -> Check with rig pin 3359 that hub can be locked.

Notes:

- The gap between the two lugs -1- on the camshaft sender wheel must be positioned opposite the "4Z" marking -item 2- on the toothed belt guard.
- The illustration shows the camshaft sprocket without the toothed belt.



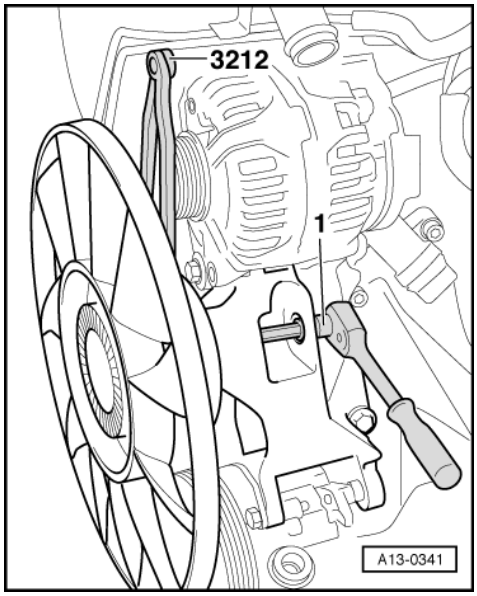
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

If hub cannot be locked:

- -> Slacken camshaft sprocket bolts -arrows-.
- Position a box wrench at the camshaft centre bolt.
- Turn hub until rig pin 3359 can be pushed in.
- Tighten camshaft sprocket bolts -arrows- to 25 Nm.
- Remove rig pin 3359 and crankshaft stop T10050.

Attention:
Engine is only to be cranked by turning crankshaft in direction of engine rotation (clockwise).

- Rotate the crankshaft two turns in the direction the engine is turning until it is again positioned at TDC.
- Repeat check of valve timing =>Page 13-47.



- -> Bolt viscous fan onto mount -1-, bracing viscous fan pulley with pin wrench 3212 to do so.
- Install ribbed belt =>Page 13-24.
- Install lock carrier =>Page 13-1.

Tightening torques

Component		Nm
Tensioner for toothed belt to cylinder block		13
Toothed belt tensioner to cylinder head		20 + 45° 1)
Camshaft sprocket to hub		25
Lower toothed belt guard to cylinder block		10 2)
Centre toothed belt guard to cylinder block		10 2)
Vibration damper on crankshaft sprocket		10 + 90°3)4)
Coolant pipe to	engine lifting eye	22
	Holder	10
Viscous fan to bearing		45
Ribbed belt tensioner		25

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

1) 45°corresponds to one eighth of a turn

2) Insert with locking fluid1;
For locking fluid refer to

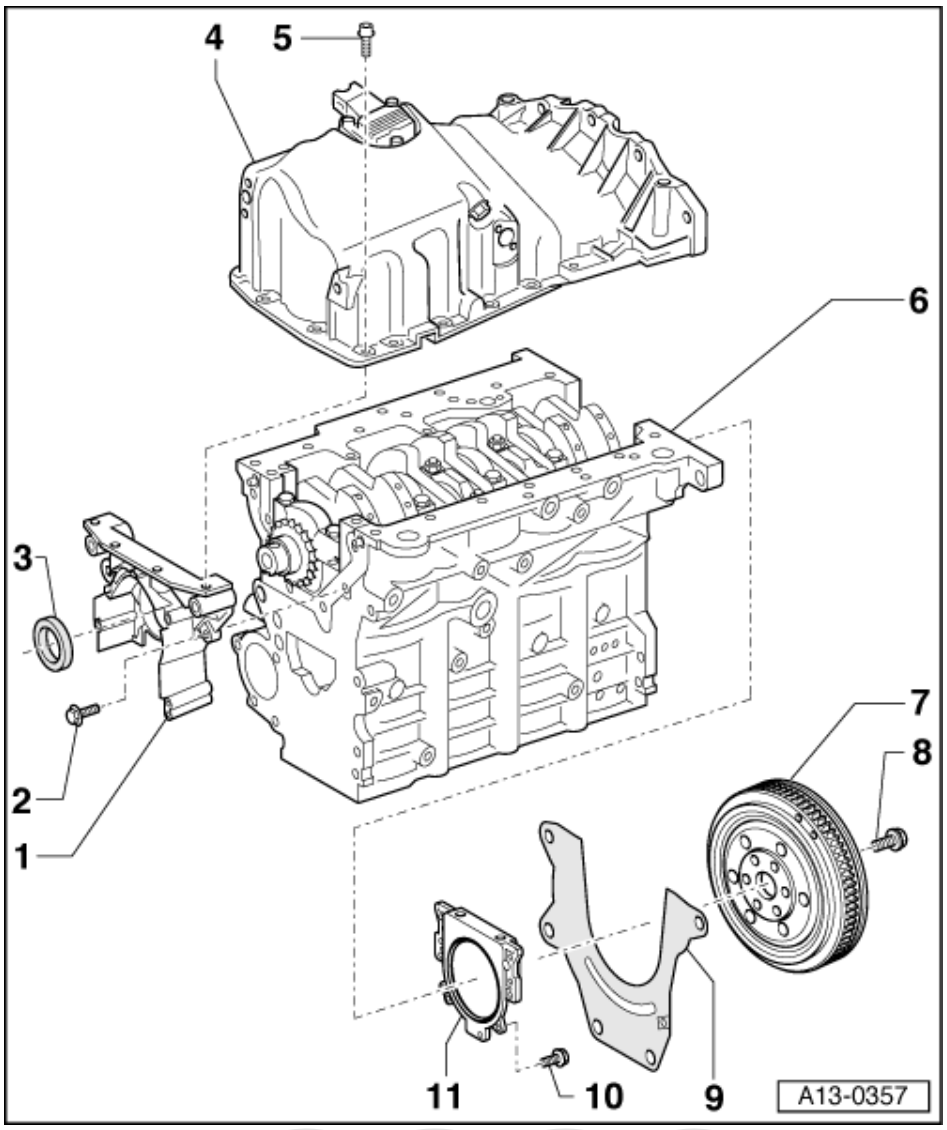
=> Parts List

3) Replace bolts

4) 90°corresponds to quarter of a turn

2 - Removing and installing sealing flanges and flywheel / drive plate

2.1 - Removing and installing sealing flanges and flywheel / drive plate



Note:

Servicing clutch:

=> 5-speed manual gearbox 012/01W Front-wheel drive; Repair Group 30; Servicing clutch Servicing clutch

=> 6-speed manual gearbox 01/E Four-wheel drive; Repair Group 30; Servicing clutch Servicing clutch

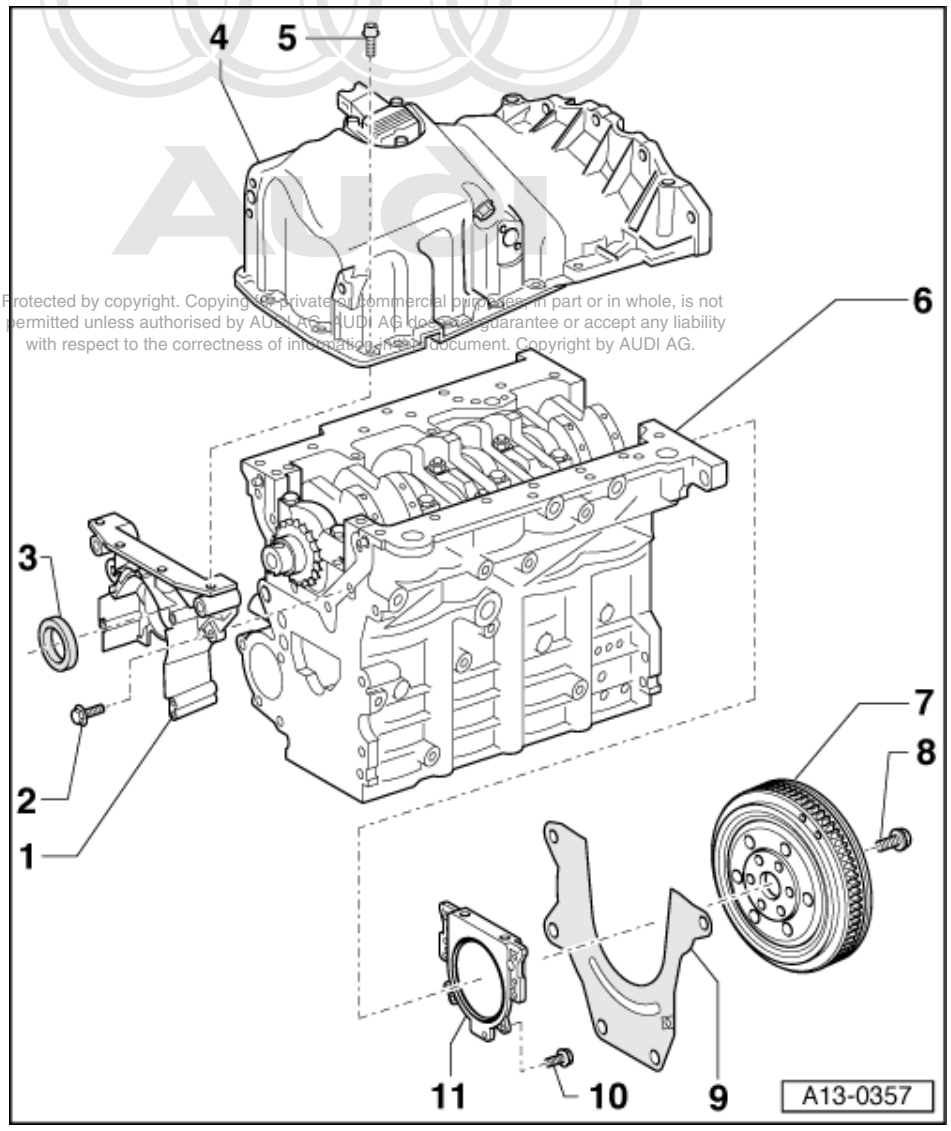
1 Front sealing flange

- Must rest on dowel sleeves
- Apply silicone sealant on installation
- Sealant => Parts catalogue
- Removal and installation involve taking out sump => Page 17-10
- Removing and installing=>Page 13-61

2 15 Nm

Reproduction or distribution 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.

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

- Replacing => Page 13-56
- Do not oil sealing lip of sealing ring

4 Sump

- Removing and installing=>Page 17-10

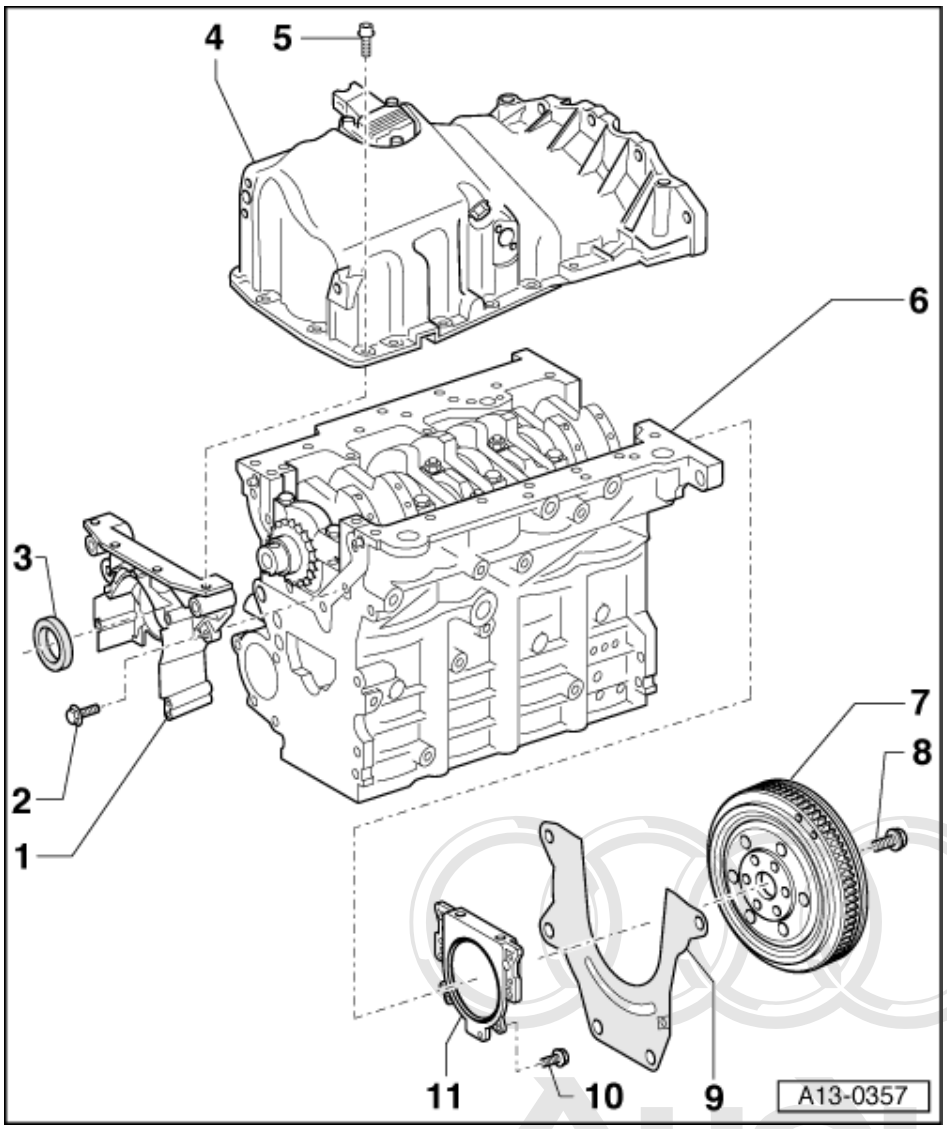
5 15 Nm

6 cylinder block

- Removing and installing crankshaft => Page 13-72
- Dismantling and assembling piston and conrod => Page 13-84

7 Dual-mass flywheel/drive plate

- Removing and installing dual-mass flywheel => Page 13-67
- Removing and installing drive plate => Page 13-69



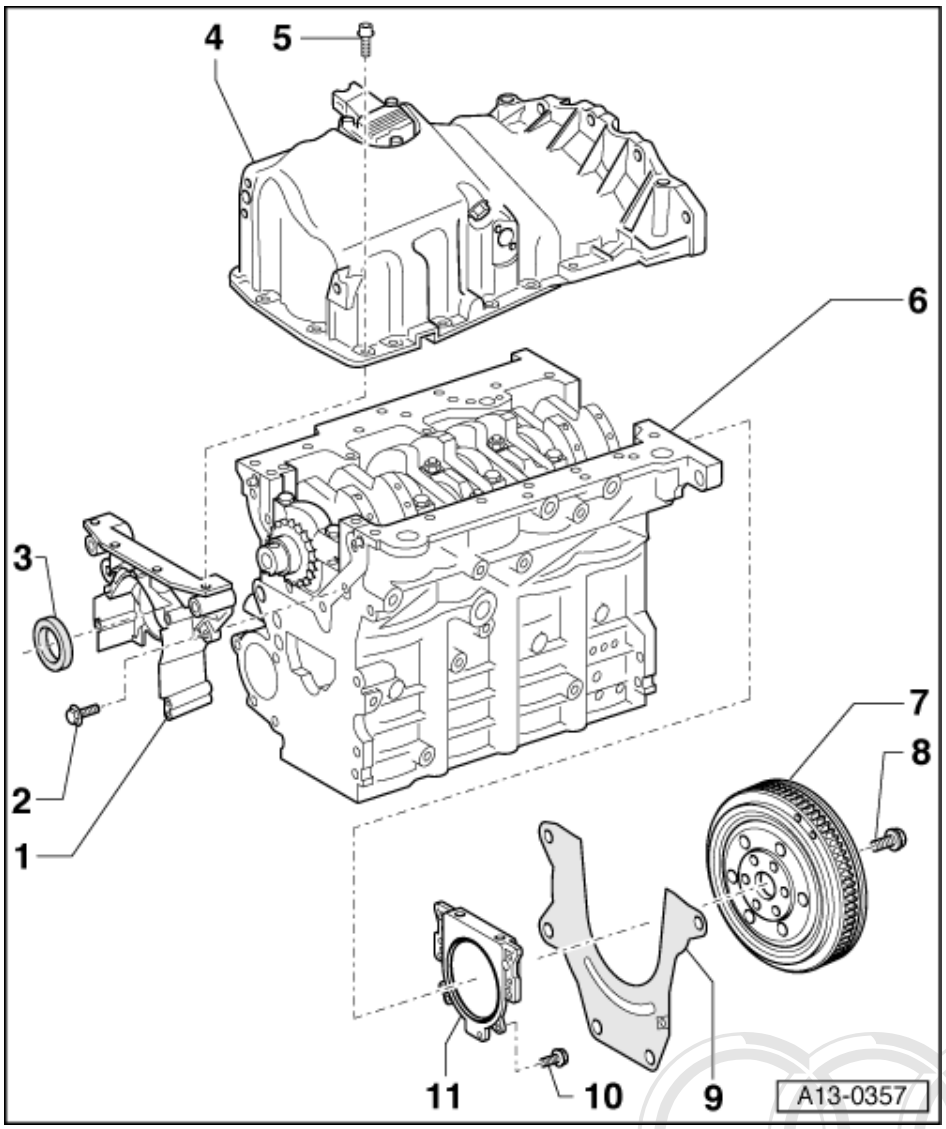
8 Bolt for dual-mass flywheel/drive plate

- Replace
- Tightening torque for dual-mass flywheel=>Page 13-68
- Tightening torque for drive plate (vehicles with automatic gearbox) => Page 13-71

9 Intermediate plate

- Must rest on dowel sleeves
- Take care not to damage/bend on assembly
- On vehicles with manual gearbox and four-wheel drive, an intermediate (plate thickness 5.5 mm) must additionally be fitted

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



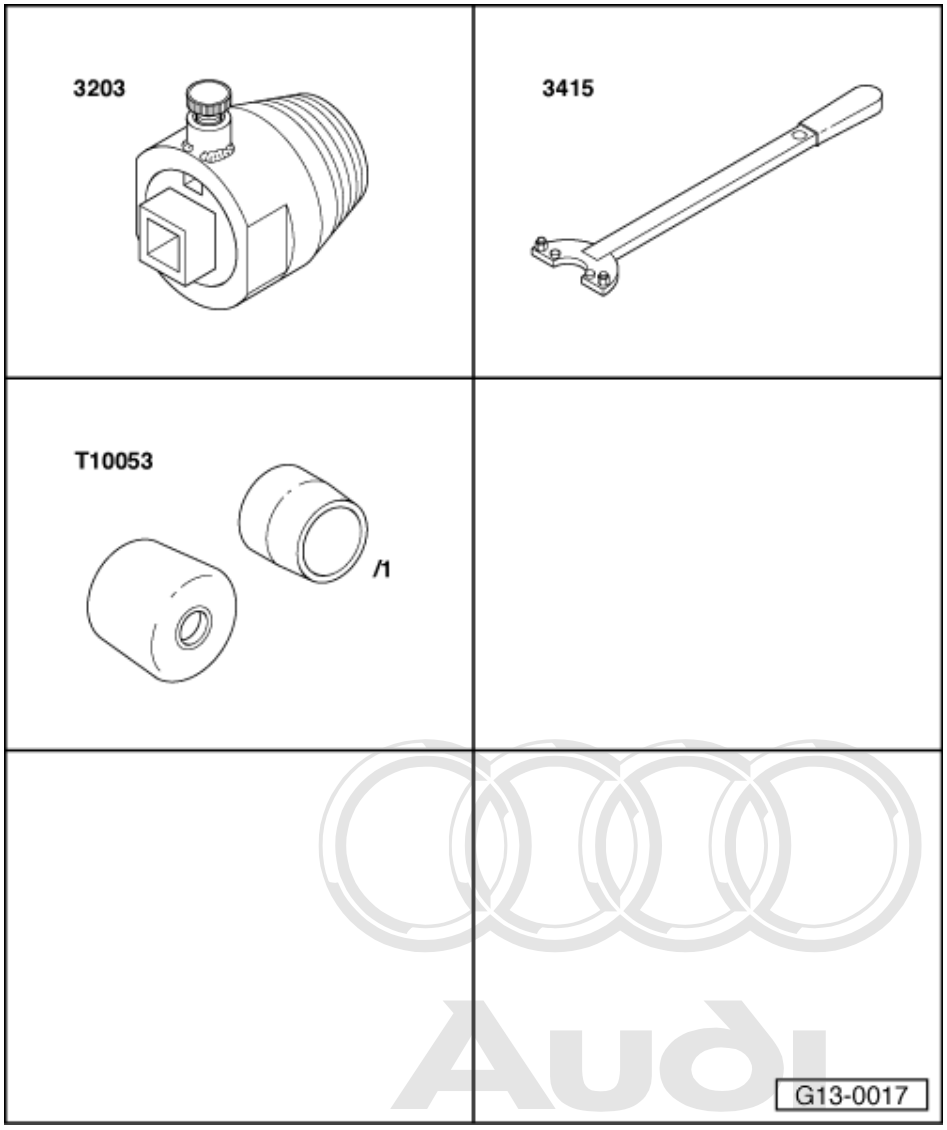
10 15 Nm

11 Rear sealing flange with oil seal

- With gasket for cylinder block
- Do not oil sealing lip of sealing ring
- A sealing flange with an offset oil seal is supplied as a spare
- Removal and installation involve taking out sump => Page 17-10
- On fitting, slip guide sleeve from installation set over 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.

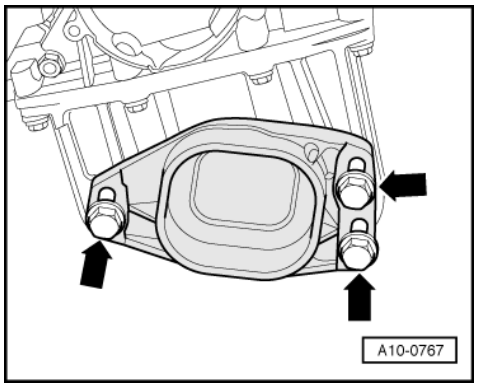
2.2 - Replacing crankshaft oil seal on pulley end



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.

Special tools and workshop equipment required

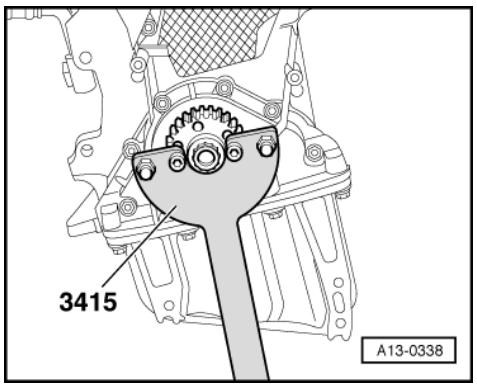
- Oil seal extractor 3203
- Counterhold 3415
- Assembly device T10053



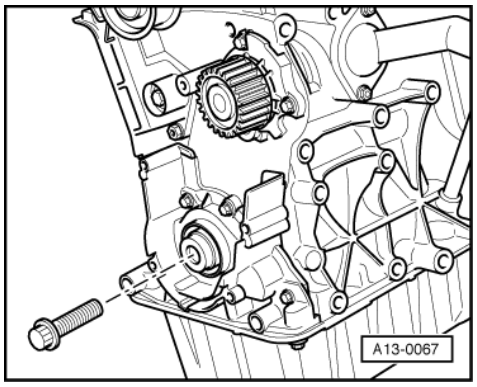
Removing

- Engine in position
- Lock carrier in service position =>Page 13-1.

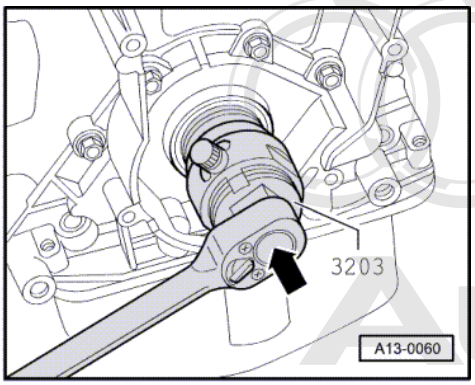
- Remove toothed belt =>Page 13-36.
- -> Unbolt stop for torque reaction support -arrows-.



- -> Remove crankshaft toothed belt. To do so, lock toothed belt sprocket with counterhold 3415.

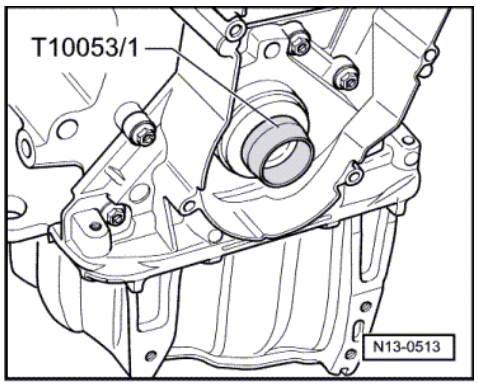


- -> Before applying oil seal extractor, screw central bolt of toothed belt sprocket as far as it will go into crankshaft.



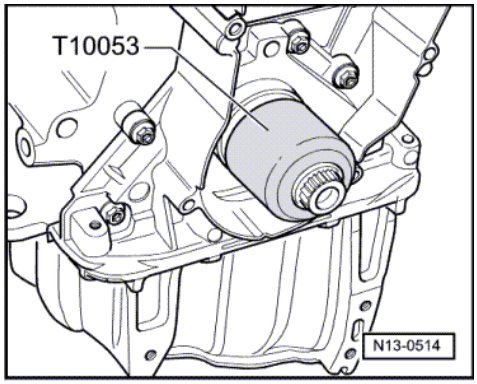
- Turn inner section of oil seal extractor 3203 eight turns out of outer section and lock with a knurled screw.
- -> Lubricate threaded end of oil seal extractor, fit in position and screw firmly into oil seal as far as possible.
- Slacken off knurled screw and turn inner section against crankshaft until oil seal is pulled out.
- Clamp flats of oil seal extractor in vice. Use pliers to remove oil seal.
- Clean contact and sealing surface.

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

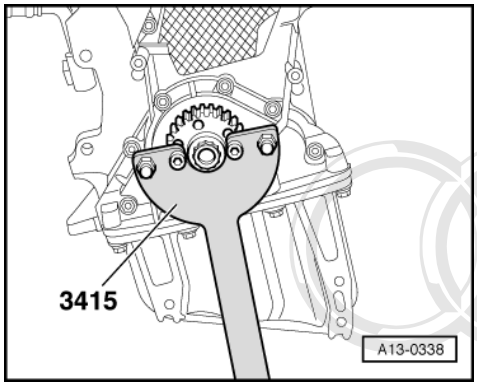


Installing

- Do not lubricate sealing lip of oil seal.
- -> Fit guide sleeve T10053/1 onto crankshaft journal.
- Slip oil seal over guide sleeve.



- -> Press in oil seal with central bolt of toothed belt sprocket and thrust sleeve from T10053 such that it is flush.
- Replace bolt for toothed belt sprocket.



- -> Fit crankshaft toothed belt sprocket. To do so, support toothed belt sprocket with counterhold 3415.

Notes:

- There must not be any oil on contact surface between toothed belt sprocket and crankshaft.
- Do not lubricate bolt for crankshaft toothed belt sprocket.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 toothed belt (adjust valve timing) => Page 13-44.
- Install lock carrier =>Page 13-1.

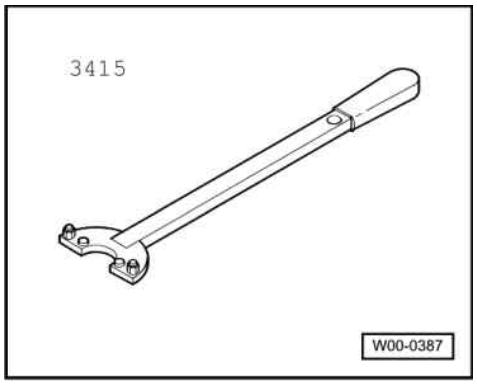
Tightening torque

Component	Nm
Toothed belt sprocket to crankshaft	120 + 90°1)2)

1) Replace bolt

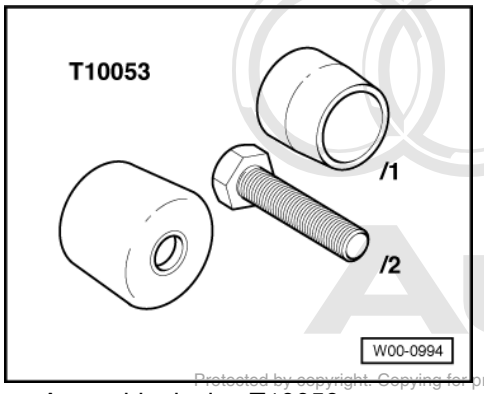
2) 90°corresponds to quarter of a turn

2.3 - Removing and installing front sealing flange



Special tools and workshop equipment required

- Counterhold 3415



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 device T10053
- Silicone sealant D 176 404 A2
- Hand drill with plastic brush attachment
- Protective goggles

Notes:

- The following describes removal and installation- in vehicles with front-wheel drive.
- On vehicles with four-wheel drive, in order to take out the sump the engine must be removed and the dual-mass flywheel detached. Further procedure =>Page 13-63.

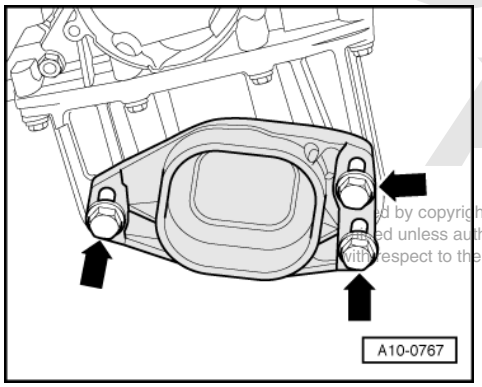
Removing

- Engine in position
- Lock carrier in service position =>Page 13-1.

- Remove toothed belt =>Page 13-36.

Vehicles with air conditioner:

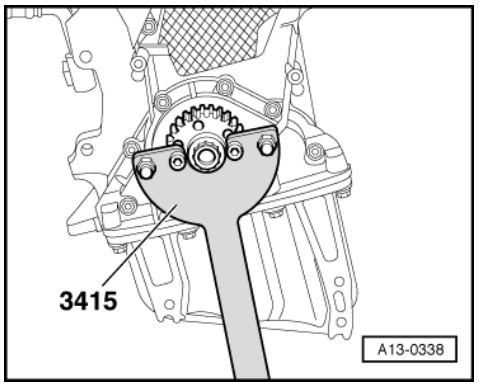
- Detach air conditioner compressor from bracket and secure to body with wire.
- Unbolt air conditioner compressor bracket -Item 13-19.



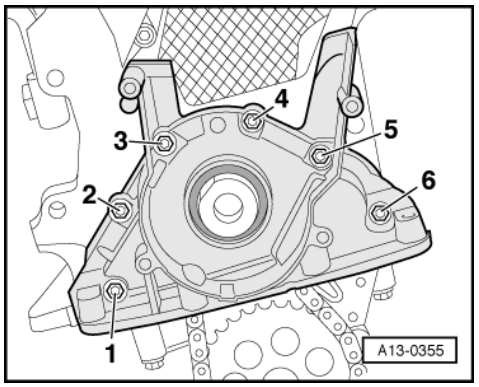
...d by copyright. Copying for private or commercial purposes, in part or in whole, is not ...ed unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability ...with respect to the correctness of information in this document. Copyright by AUDI AG.

All models:

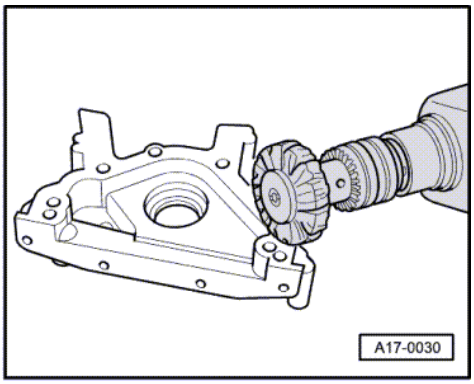
- -> Unbolt stop for torque reaction support -arrows-.



- -> Remove crankshaft toothed belt. To do so, lock toothed belt sprocket with counterhold 3415.
- Remove sump => Page 17-11.



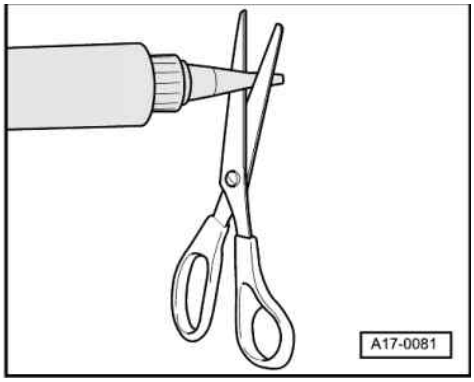
- -> Screw out bolts -1 ... 6-.
- Lever off sealing flange and detach.
- Carefully remove sealant remaining on cylinder block.



- -> Use rotating plastic brush, for example, to remove residual sealant at sealing flange.

Attention: Use safety goggles.

- Clean sealing surfaces; they must be free from oil and grease.

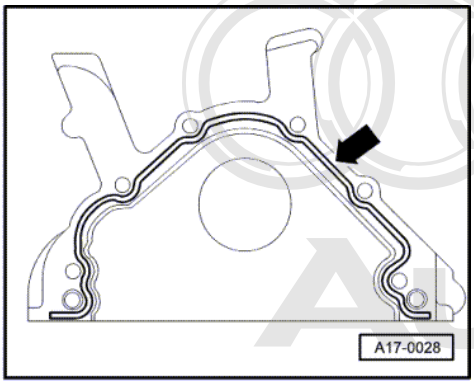


Installing

Note:

Sealing flange must be fitted within 5 minutes after applying silicone sealant.

- -> Cut off nozzle of tube at front mark (ø of nozzle approx. 3 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 silicone sealant bead -arrow- as shown to clean sealing surface of sealing flange.
  - Thickness of sealant bead -arrow-: 2 ... 3 mm

Note:

Sealant bead must not be thicker than 3 mm, as otherwise excess sealant could ingress into sump and clog strainer in oil intake pipe.

- Fit sealing flange immediately and tighten all bolts slightly.

Note:

Use guide sleeve T10053/1 to fit sealing flange with oil seal already fitted.

- Tighten sealing flange bolts diagonally.
- Install sump => Page 17-22.

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.

Note:

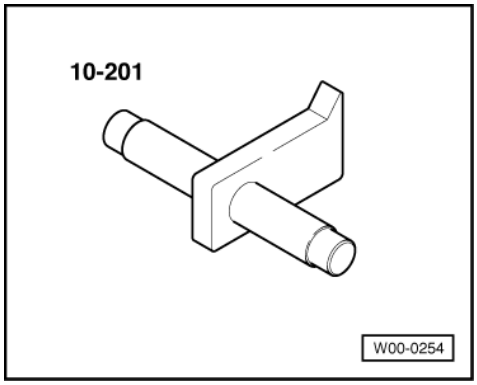
After installing, wait for approx. 30 minutes for sealant to dry before pouring in engine oil.

- Install crankshaft oil seal on pulley end => Page 13-56.
- Unbolt air conditioner compressor bracket -item 13-19.
- Install AC compressor =>Page 13-19.
- Install toothed belt (adjust valve timing) => Page 13-44.
- Install lock carrier =>Page 13-1.

Tightening torque

Component	Nm
Sealing flange to cylinder block	15

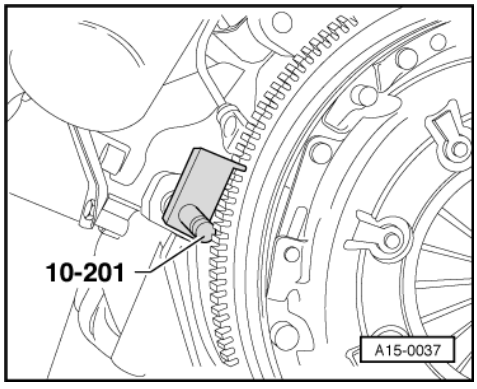
2.4 - Removing and installing dual-mass flywheel/drive plate



Dual-mass flywheel

Special tools and workshop equipment required

- Counterhold 10-201



Removing

- -> Re-position counterhold 10-201 for slackening off and securing bolts.
- Mark flywheel with respect to engine.
- Unscrew flywheel.

Installing

Install in reverse order, paying attention to the following:

- Replace bolts.

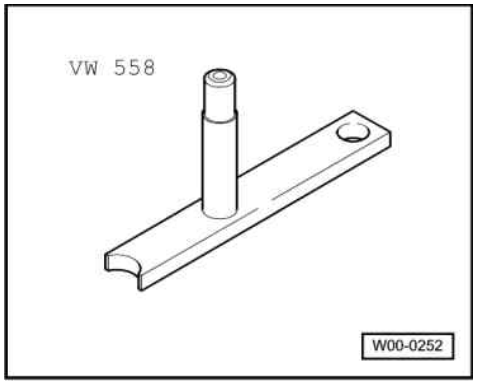
Tightening torque

Component		Nm
Dual-mass flywheel	22.5 mm 1)	60 + 90°2)
to crankshaft	43 mm 1)	60 + 180°3)

1) Bolt length

2) 90°corresponds to quarter of a turn

3) 180°corresponds to half a turn

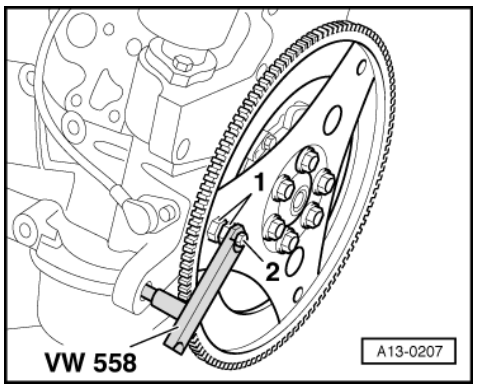


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Drive plate

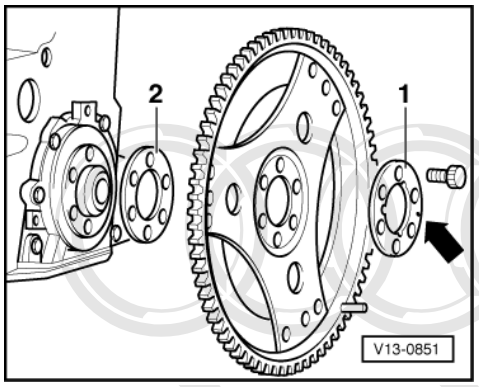
Special tools and workshop equipment required

- Counterhold VW 558
- Hexagon bolt M8 x 45 and two M10 hexagon nuts
- Calliper gauge or depth gauge



Removing

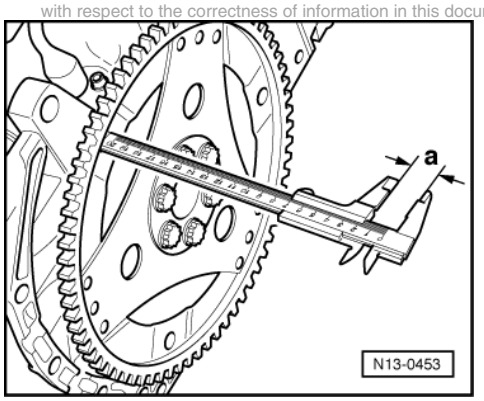
- -> Secure counterhold tool VW 558 to drive plate with hexagon bolt M8 x 45 -Item 2- . Place two M10 hexagon nuts -1- between counterhold and drive plate.
- Mark drive plate with respect to engine.
- Unbolt drive plate.



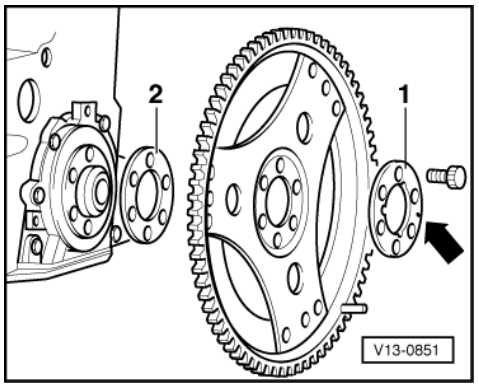
Installing

- -> Fit drive plate with shim -2- and packing plate -1-. Lug -arrow- must face torque converter.
- Insert at least 3 old securing bolts and tighten to 30 Nm.

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



- -> Check dimension -a- at three positions and calculate mean value.
  - Specification: 18.9 ... 20.5 mm



If reading exceeds specification:

- -> Remove drive plate again and fit without shim -2-. Tighten bolts to 30 Nm again.
- Repeat measurement procedure.

If reading matches specification:

- Replace and tighten bolts.

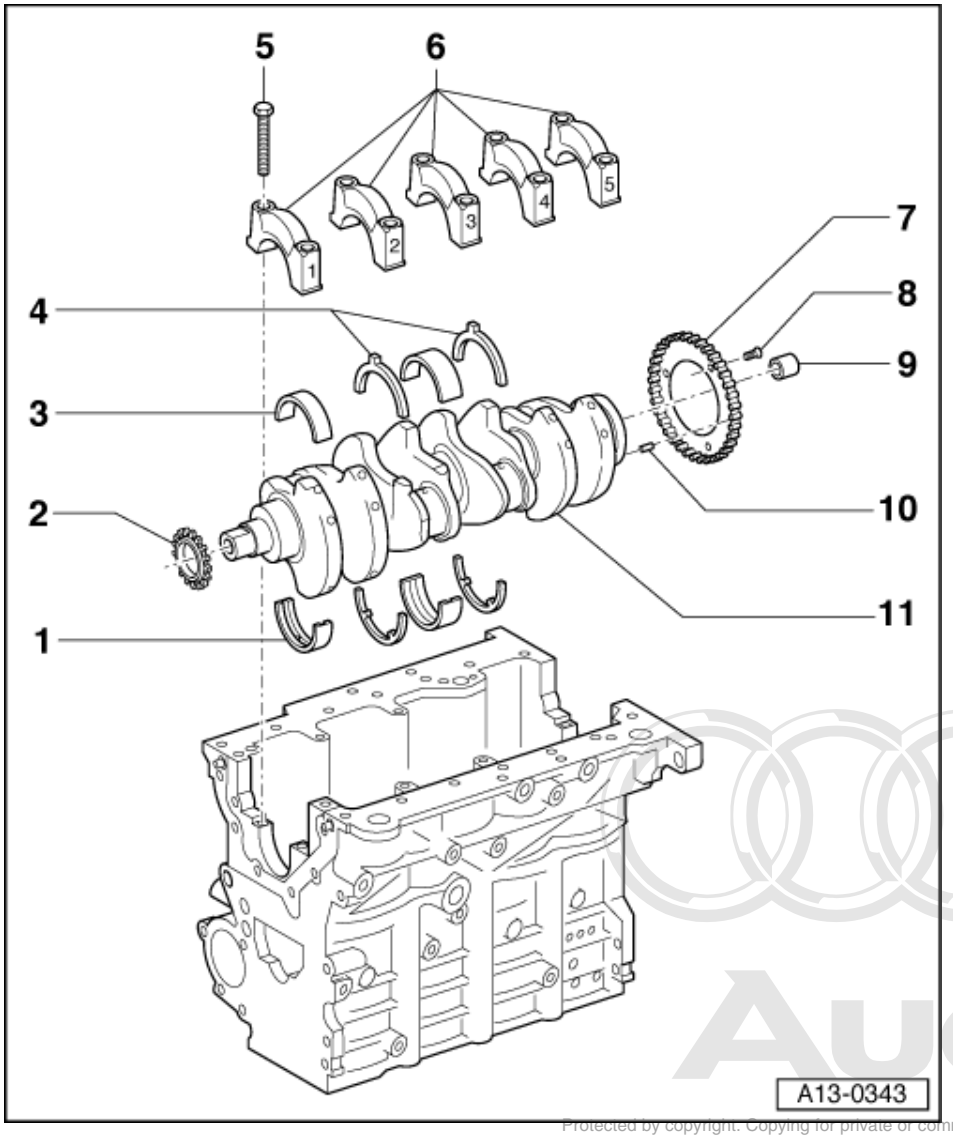
Tightening torque

Component	Nm
Drive plate to crankshaft	60 + 90°1)

1) 90°corresponds to quarter of a turn

3 - Removing and installing crankshaft

3.1 - Removing and installing 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.

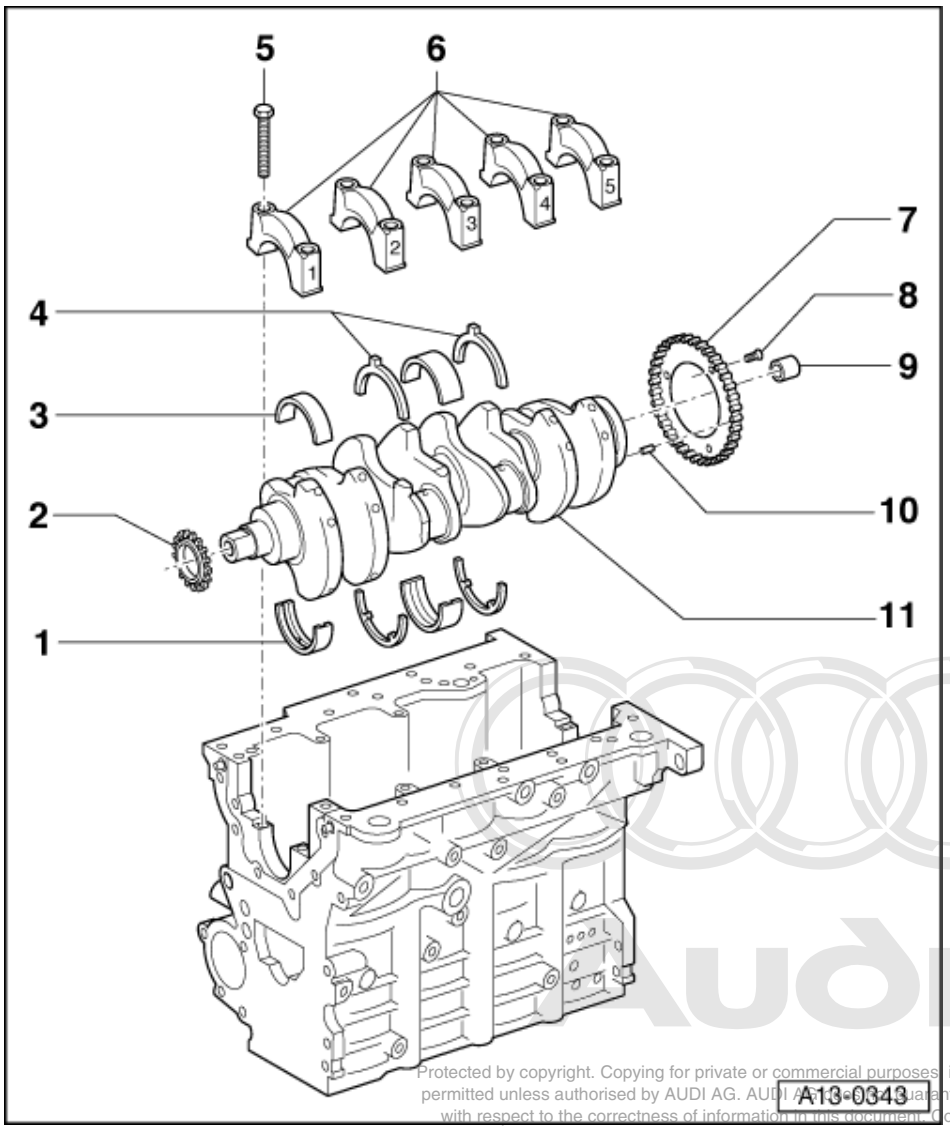
Note:

For performing assembly work, engine is to be attached with engine holder VW 540 to repair stand => Page 10-33.

1 Bearing shell
- For cylinder block with oil groove
- Do not interchange used bearing shells (mark)

2 Chain sprocket
- For oil pump chain
- Replacing => Page 13-82

3 Bearing shell
- For bearing cap without oil groove
- Do not interchange used bearing shells (mark)



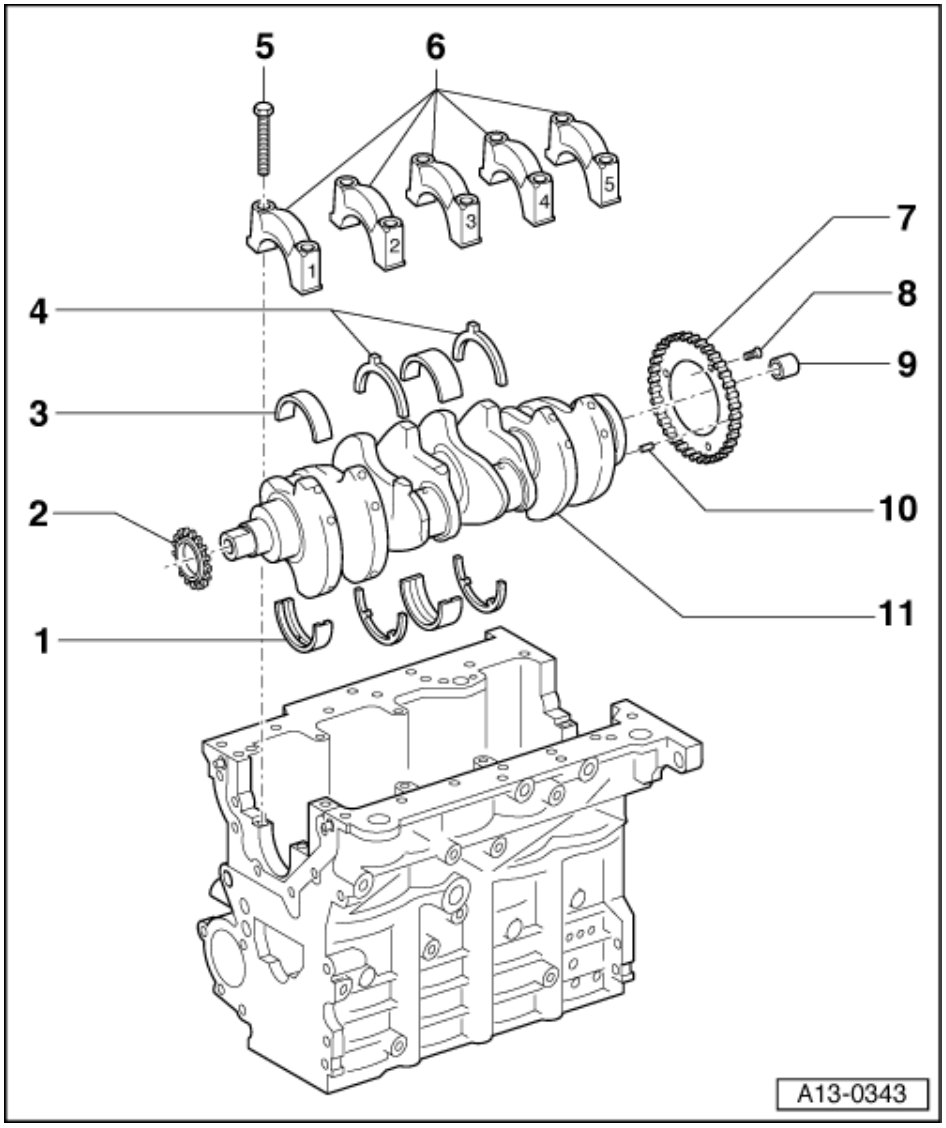
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

4 Thrust washers
- For bearing 3
- Different versions for cylinder block and bearing cap
- Note position

5 65 Nm + further 90° (1/4) turn
- Replace
- For measuring radial clearance of crankshaft tighten to 65 Nm but do not give further turn

6 Bearing cap
- Bearing cap 1: Pulley end
- Bearing cap 3 with recesses for thrust washers

- Retainer tabs of cylinder block/bearing cap bearing shells must coincide



7 Sender wheel

- For engine speed sender -G28
- Can only be fitted in one position -offset holes-
- Always replace sender wheel if bolts have been unscrewed
- Removing and installing => Fig.13-76

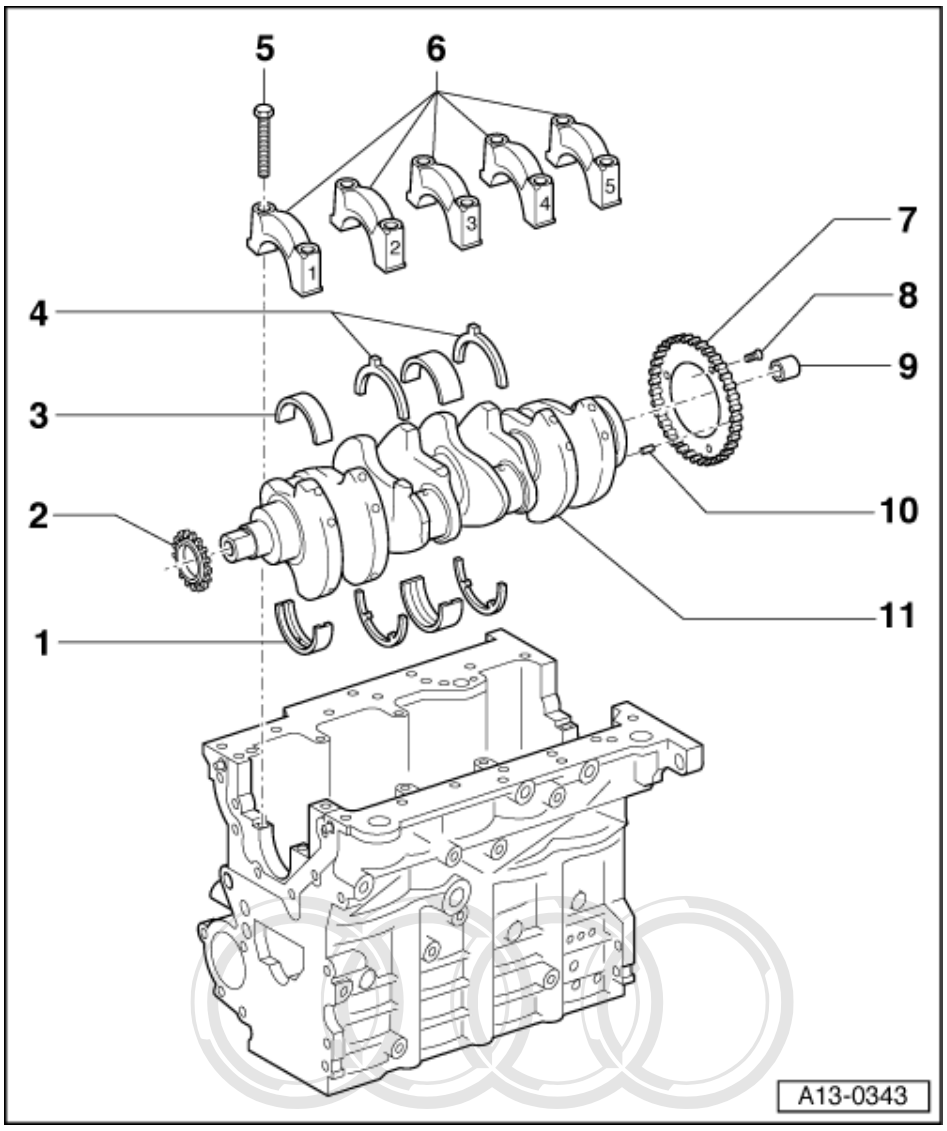
8 10 Nm + further 90° (1/4) turn

- Replace
- Always replace sender wheel if bolts have been unscrewed => Fig.13-76

9 Needle bearing

- On vehicles with manual gearbox
- Extracting and driving in => Page 13-78

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



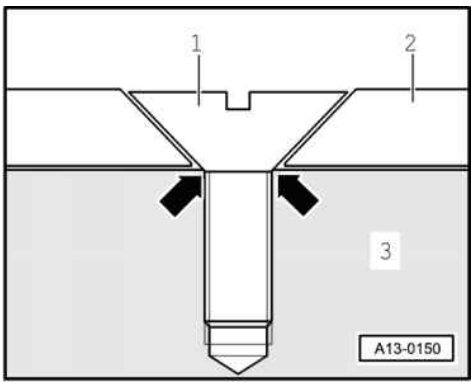
10 Fitted pin

- Check projection from crankshaft
  => Fig.13-77

11 Crankshaft

- Axial clearance, new: 0,07...00.23 mm
  Wear limit: 0.30 mm
- Measure radial clearance with Plastigage
  New: 0,02...0,04 mm
  Wear limit: 0.15 mm
- Do not turn crankshaft when measuring radial clearance
- Crankshaft dimensions=> Page 13-81

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



-> Fig.1 Removing and installing sender wheel

- Always replace sender wheel -2- if bolts -1- have been unscrewed.

Notes:

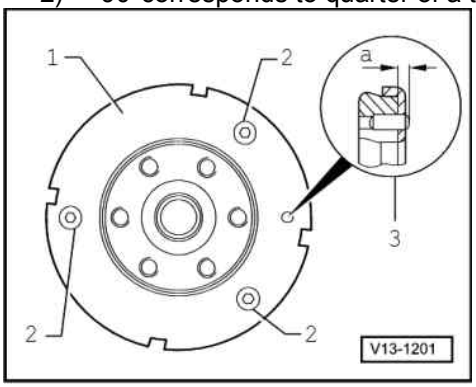
- If the securing bolts are tightened a second time, seats for countersunk bolt heads in sender wheel will be distorted to such an extent that bolt heads will come into direct contact with crankshaft -3- -arrows- and sender wheel will only fit loosely under bolts.
- It is only possible to install sender wheel in one position, mounting holes are offset.

Tightening torque

Component	Nm
Sender wheel to crankshaft	10 + 90° 1)2)

1) Replace bolts
2) 90°corresponds to quarter of a 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.

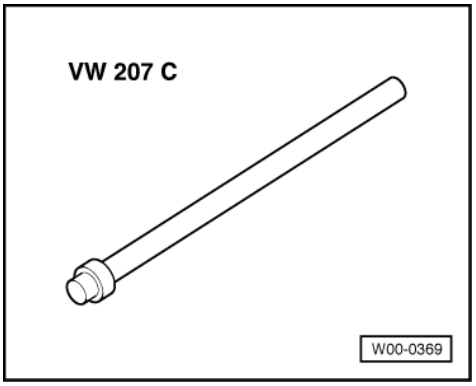


-> Fig. 2 Checking projection of fitted pin from crankshaft

Projection of fitted pin -3- from crankshaft

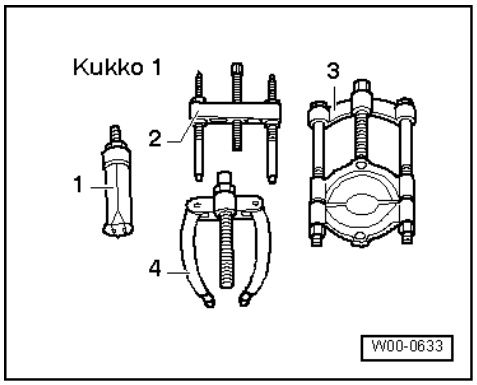
- a =2.5...3.0 mm

3.2 - Extracting and driving needle bearing from/into crankshaft

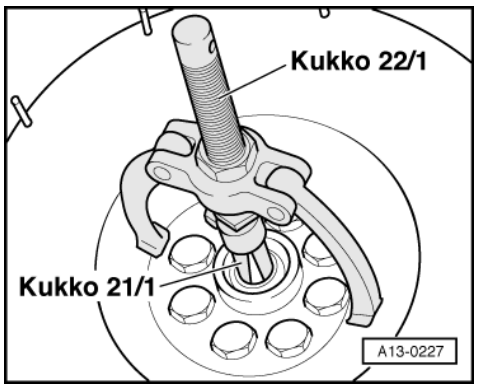


Special tools and workshop equipment required

- Special tool VW 207 C



- Special tools Kukko 21/1 (item 1) and Kukko 22/1 (item 4)
- Depth gauge



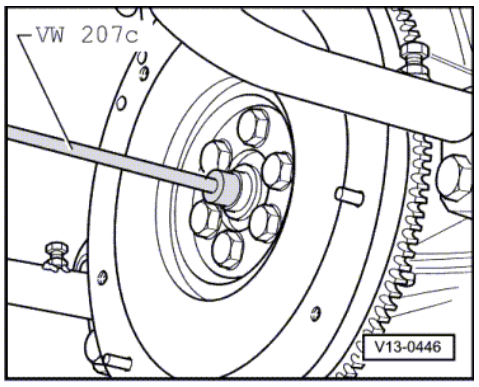
Notes:

- Engines for vehicles with manual gearbox must be fitted with a needle bearing in the crankshaft. Install needle bearing if necessary.
- On vehicles with automatic gearbox, no needle bearing must be fitted in crankshaft. Remove needle bearing 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.

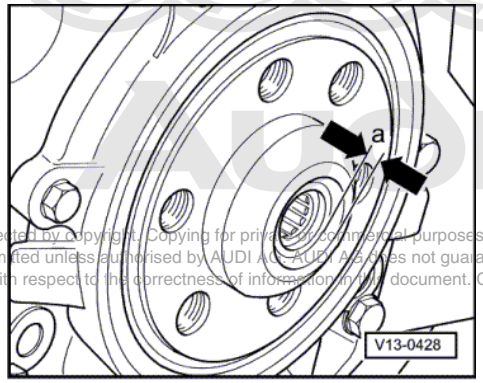
Removing

- -> Use Kukko 21/1 and Kukko 22/1 to extract needle bearing.



Installing

- -> Drive in with punch VW 207C or centring mandrel 3176.
  - Labelled side of needle bearing must be legible when installed



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

-> Installation depth of needle bearing

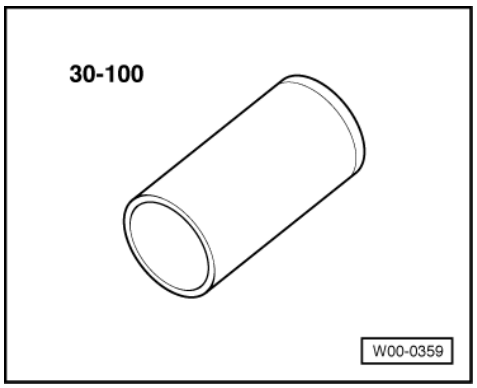
- Dimension a = 1.5 mm

3.3 - Crankshaft dimensions

(dimensions in mm)

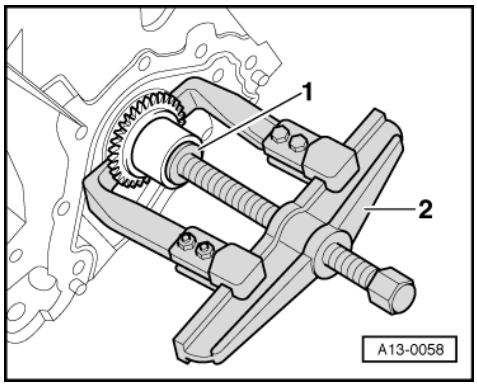
Grinding dimension	Crankshaft bearing Journal ø	Conrod bearing Journal ø
Basic dimension	-0.022 54.00 -0.042	-0.022 47.80 -0.042
Stage I	-0.022 53.75 -0.042	-0.022 47.55 -0.042
Stage II	-0.022 53.50 -0.042	-0.022 47.30 -0.042
Stage III	-0.022 53.25 -0.042	-0.022 47.05 -0.042

3.4 - Removing and installing chain sprocket



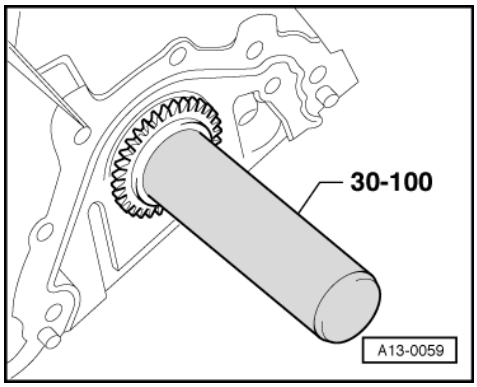
Special tools and workshop equipment required

- Fitting sleeve 30-100
- Commercially available two-arm puller
- Protective gloves



Removing

- Remove sump => Page 17-11.
- Remove front sealing flange => Page 13-61.
- Remove chain sprocket of oil pump, chain tensioner and chain => Page 17-2.
- -> Pull chain sprocket off crankshaft with puller -2-, use suitable washer -1- to protect end of crankshaft.



Installing

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

Install in reverse order, paying attention to the following:

Attention: Wear protective gloves.

- Heat chain sprocket in oven to 220°C for approx. 15 minutes.

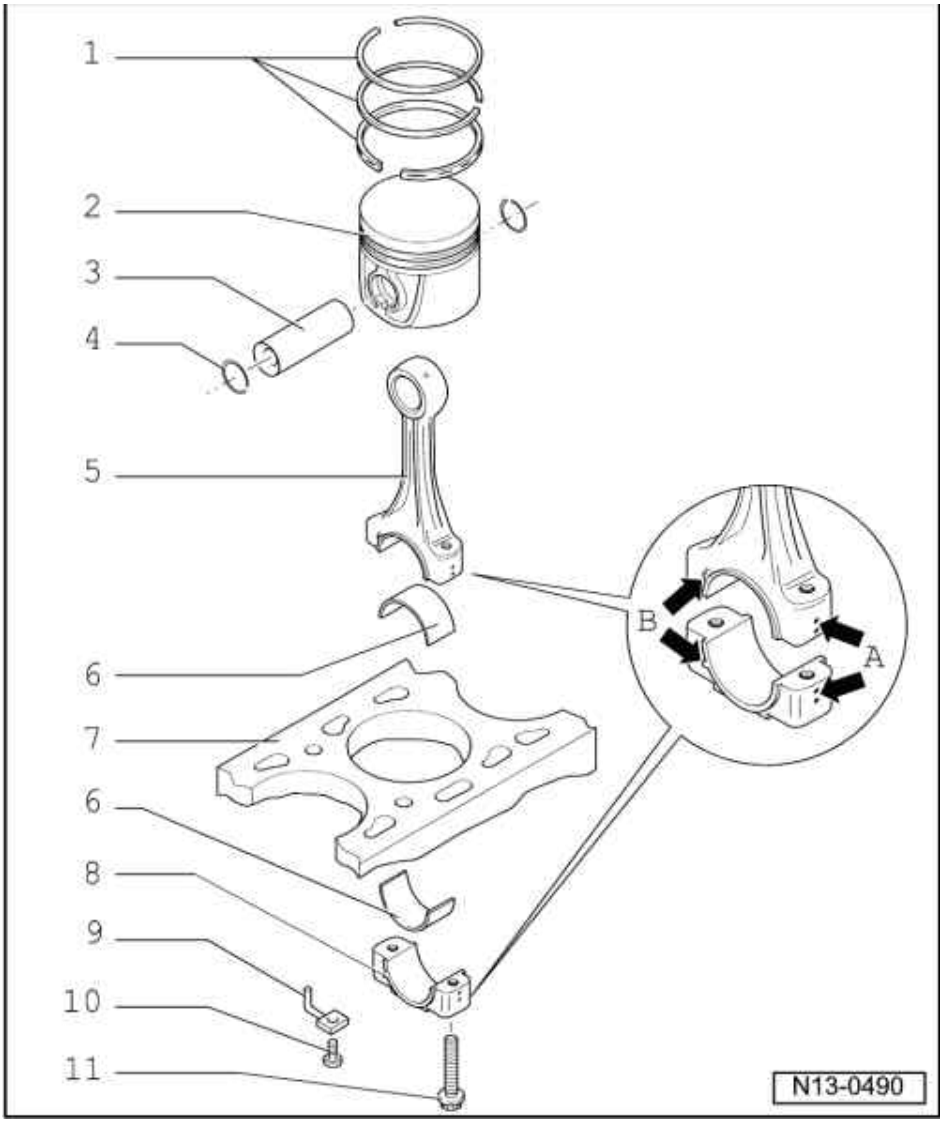
Note:

Installation position: Large shoulder of chain sprocket must point to engine.

- -> Use pliers to position chain sprocket on end of shaft and press home on crankshaft with fitting sleeve 30-100.

4 - Dismantling and assembling pistons and conrods

4.1 - Dismantling and assembling pistons and conrods



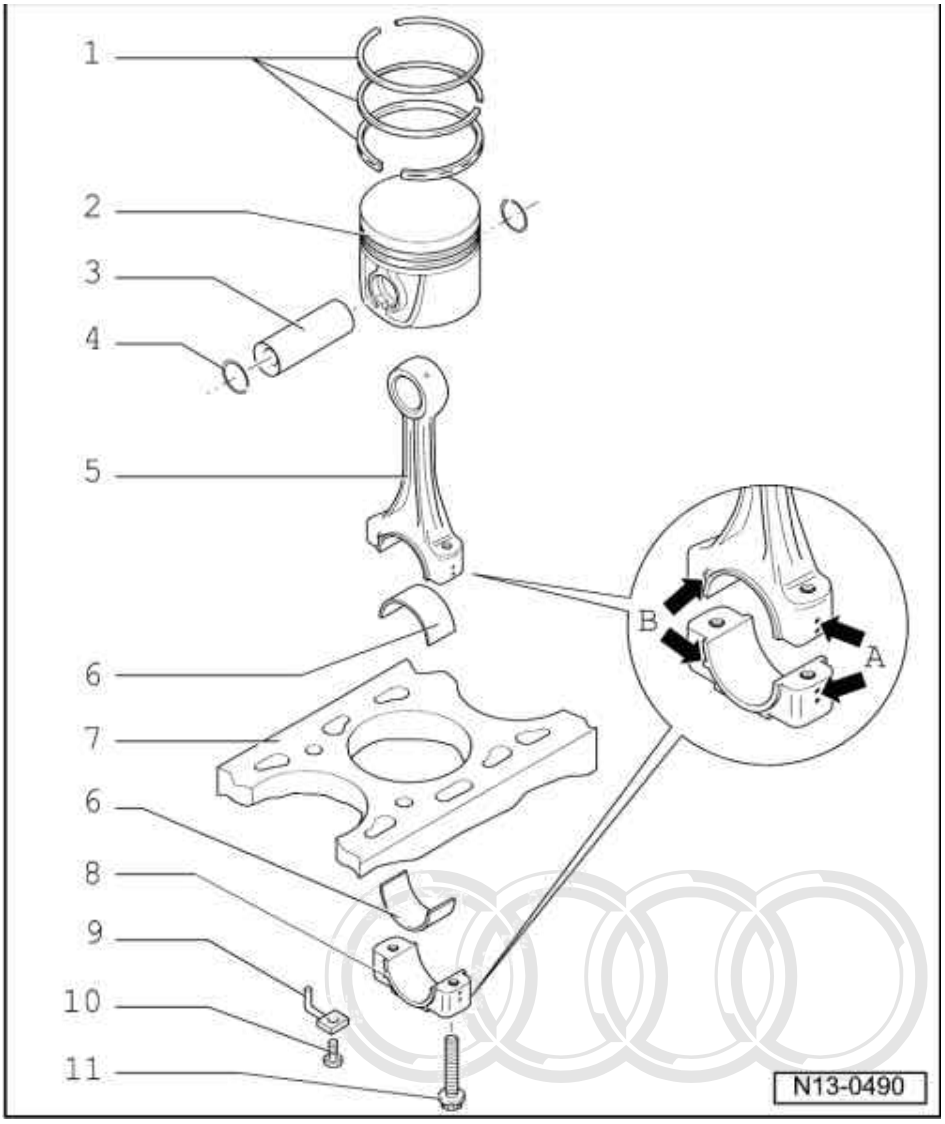
1 Piston rings

- Offset gap by 120 °
- Use piston ring pliers for removal and installation
- "TOP" mark or label must point towards piston crown
- Checking end clearance=> Fig.13-89
- Checking side clearance=> Fig.13-89

2 Piston

- with combustion chamber
- Mark installation position and cylinder assignment
- Installation position and piston/cylinder assignment=>Fig.13-90

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



- If cracks develop on piston shaft, replace piston
- Arrow on piston crown must point to pulley end
- Install using piston ring strap wrench
- Checking piston projection at TDC
  =>Page 13-93
- Piston and cylinder dimensions
  =>Page 13-95
- Checking => Fig.13-91

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

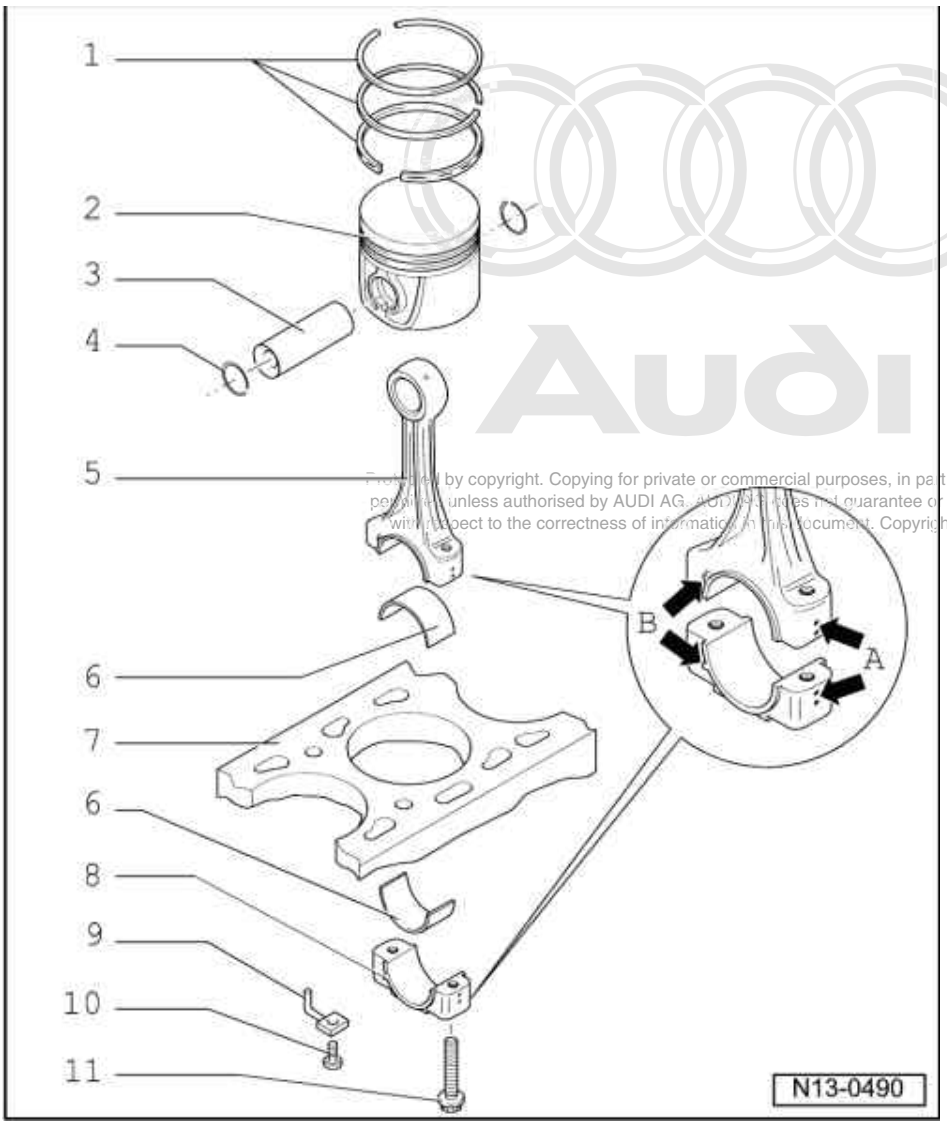
3 Piston pin

- Heat piston to approx. 60°C if pin stiff
- Use VW 222a for removing and installing

4 Circlip

5 Conrod

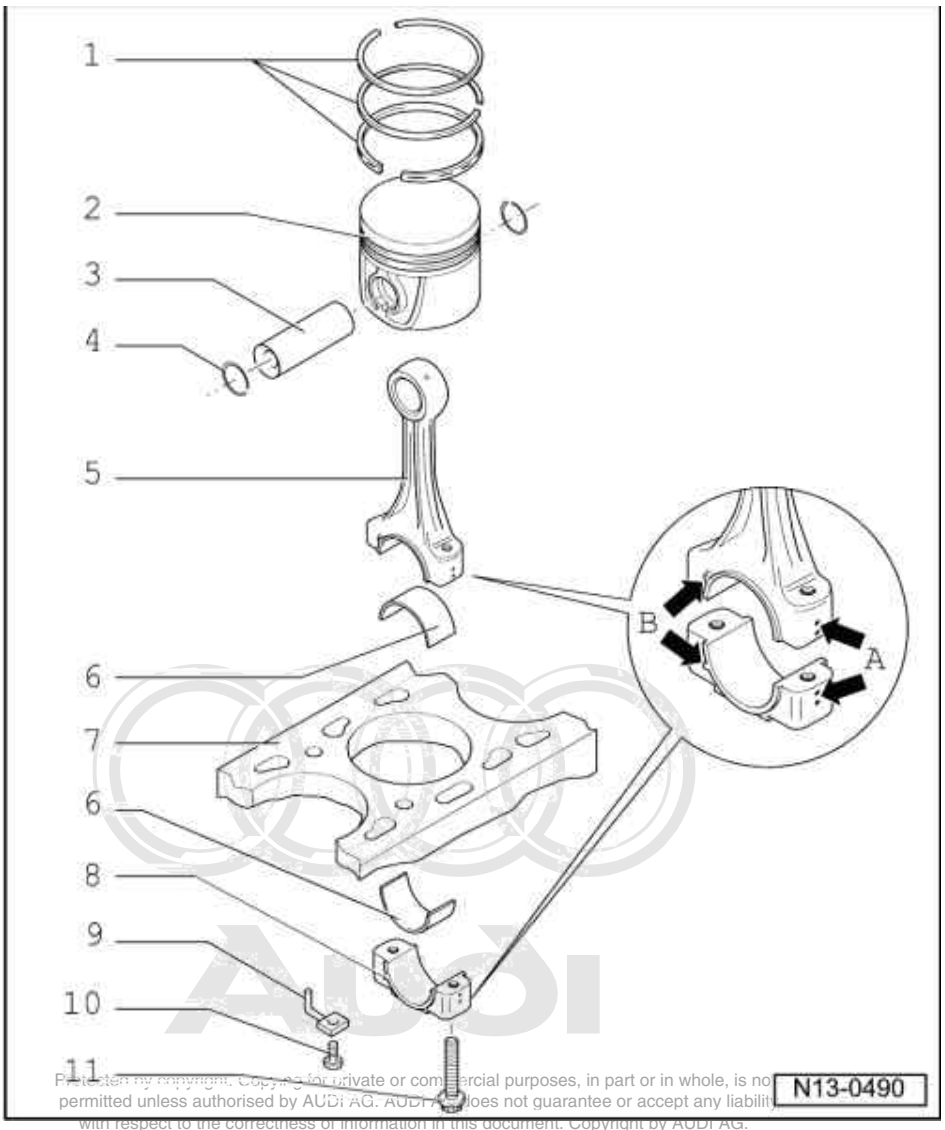
- Replace only as a set
- Mark cylinder assignment -A-
- Installation position:
  -B- marks point towards pulley side



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.

6 Bearing shell

- Installation position =>Fig.13-92
- Do not interchange used bearing shells (mark)
- Pay attention to design:
  Upper bearing shell (towards piston) of more wear-resistant material
  Distinguishing feature of new bearing shells:
  Black line on contact surface in area of cutting point
- Insert bearing shells centrally
- Make sure fastener is firmly attached
- Axial clearance:
  Wear limit: 0.37 mm
- Measure radial clearance with Plastigage:
  Wear limit: 0.08 mm
  Do not turn crankshaft when measuring radial clearance



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

- Checking cylinder bore =>Fig.13-91
- Piston and cylinder dimensions =>Page 13-95

8 Conrod bearing cap

- Mark cylinder assignment -A-
- Installation position: -B- marks point towards pulley side

9 Oil spray jet

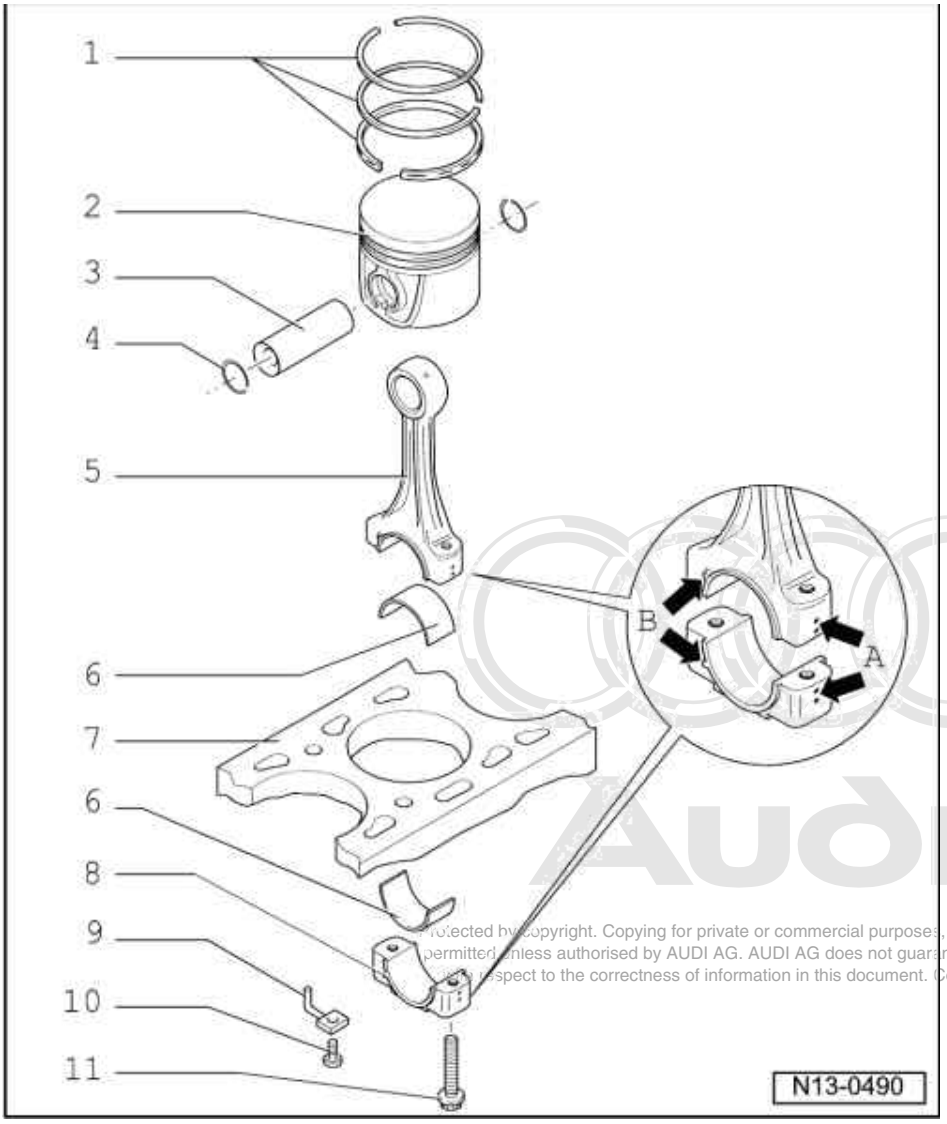
- For piston cooling

10 Pressure relief valve - 27 Nm

- Opens at: 1.3 ... 1.6 bar
- Different versions
- Assignment

=> Parts List

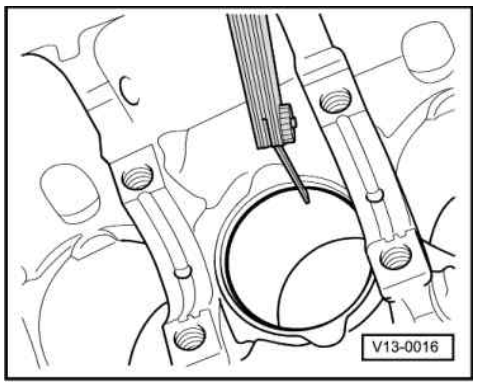
- Insert without locking fluid



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 Conrod bolt- 30 Nm + 90° (1/4 turn) turn

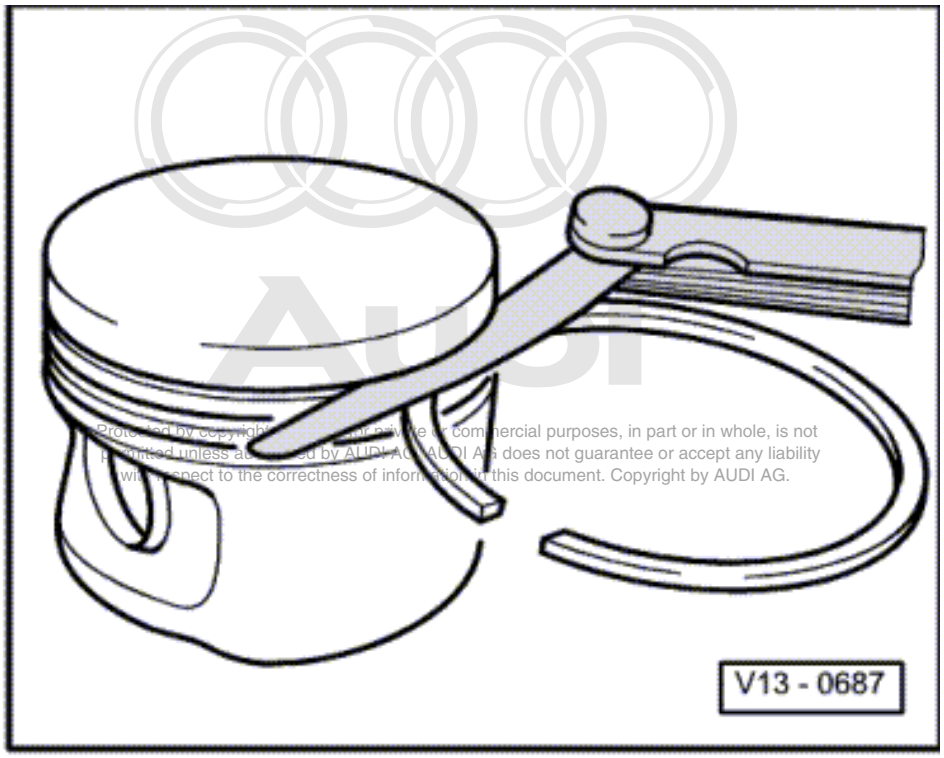
- Replace
- Lubricate thread and contact surface
- Use old bolt for measuring radial clearance



-> Fig. 1 Checking piston ring end clearance

- Push ring squarely from above down into lower cylinder bore, approx. 15 mm from cylinder edge.

Piston ring Dimensions in mm	New	Wear limit
1. compression ring	0.25...0.40	1.0
2. compression ring	0.25...0.40	1.0
Oil scraper ring	0.25...0.50	1.0

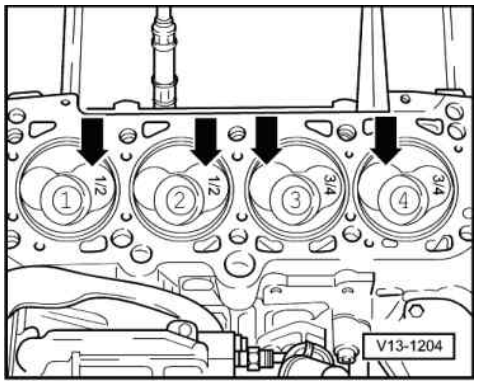


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

-> Fig. 2 Checking ring to groove clearance

- Clean annular groove of piston before checking.

Piston ring Dimensions in mm	New	Wear limit
1. compression ring	0.06...0.09	0.25
2. compression ring	0.05...0.08	0.25
Oil scraper ring	0.03...0.06	0.15



-> Fig.3 Piston installation position and piston/cylinder assignment

- Mark installation position and assignment on inside of piston (not on piston crown) with an electric marker or felt-tip pen.

Piston into cylinders 1 and 2:

Large valve pocket for inlet valve to flywheel side -arrows-

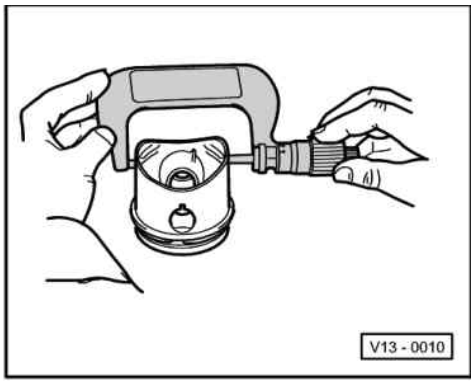
Piston into cylinders 3 and 4:

Large valve pocket for inlet valve to pulley side -arrows-

Note:

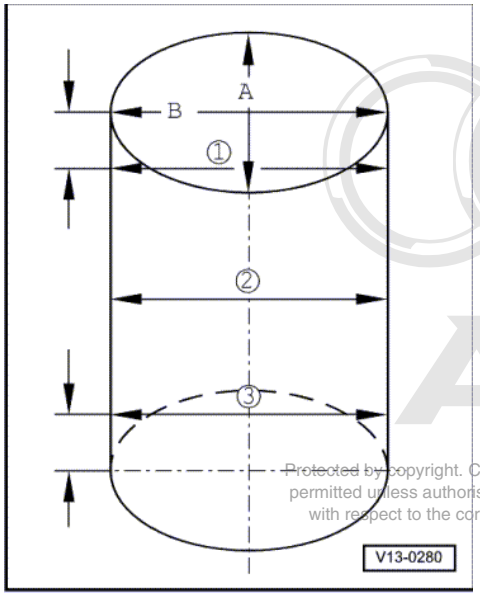
On new pistons the cylinder assignment is stamped in colour on the piston crown.

- Piston for cylinders 1 and 2:
  Marking 1/2
- Piston for cylinders 3 and 4:
  Marking 3/4



-> Fig. 4 Checking piston

- Measure approx. 10 mm from lower edge at a 90° angle to axis of piston pin.
  - Deviations from specified dimension
    max. 0.04 mm



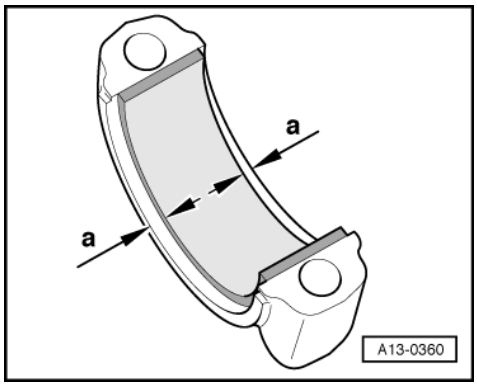
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

-> Fig. 5 Checking cylinder bore

Special tools and workshop equipment required

- Internal dial gauge 50...100 mm

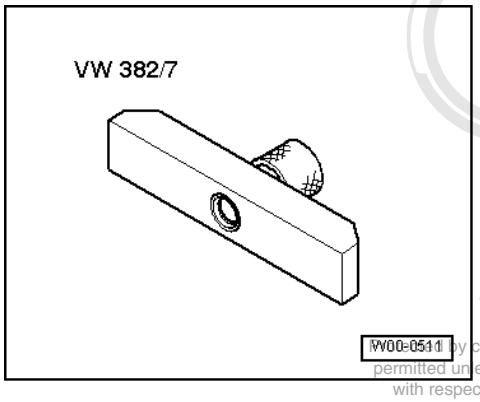
- Measure alternately at 3 positions in transverse direction -A- and longitudinal direction -B-.
  - Deviations from specified dimension
    max. 0.10 mm



-> Fig.6 Bearing shell installation position

- Insert bearing shell centrally into conrod and conrod bearing cap.
  - Dimension a = 2.5 mm

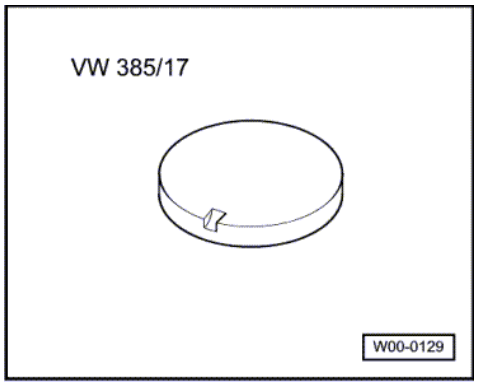
4.2 - Checking piston projection at TDC



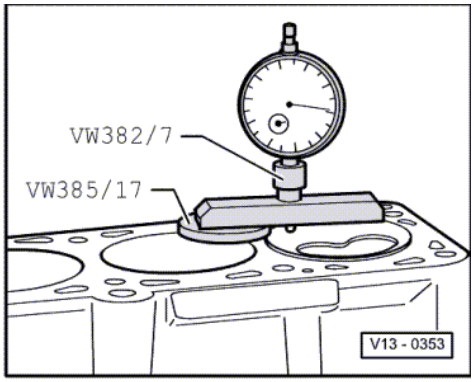
Copyright by AUDI AG.
This document is protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright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

Special tools and workshop equipment required

- Special tool VW 382/7

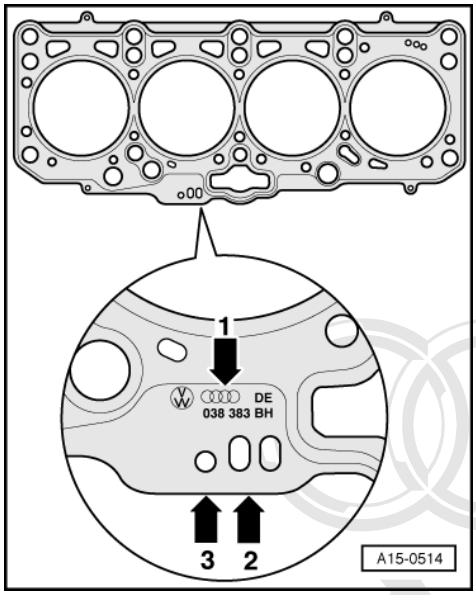


- Special tool VW 385/17



-> When installing new pistons or a short engine, the piston projection at TDC should be checked. The appropriate cylinder head gasket based on the piston projection should be fitted according to the table below:

Piston projection over cylinder block top rim	Marking of holes
0.91 mm ... 1.00 mm	1
1.01 mm ... 1.10 mm	2
1.11 mm ... 1.20 mm	3



-> Marking of cylinder head gasket

- Part no. = arrow 1-
- Control code = arrow 2 (Ignore!)
- Holes = arrow 3

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

Note:

If varying piston projection measurements are recorded, the maximum value is applied to the gasket assignment process.

4.3 - Piston and cylinder dimensions

Grinding dimension		Piston ø	Cylinder bore ø
Basic dimension	mm	79.47	79.51
Stage I	mm	79.72	79.76
Stage II	mm	79.97	80.01

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

1.1 - Removing and installing cylinder head

Notes:

- Cylinder heads with cracks between the valve seats can continue to be used without shortening their useful lives provided the cracks are only slight - max. 0.5 mm wide.
- The entire coolant is to be renewed on replacing cylinder head or cylinder head gasket.
- Reworking diesel cylinder heads is not permitted.
- When installing a replacement cylinder head with the camshaft fitted, the contact faces between the bucket tappet and the cam slideway must be oiled after installing the head.
- The plastic pads supplied for protection of the open valves are not to be removed until immediately prior to fitting cylinder head.
- Heed current information on the use of sealants.

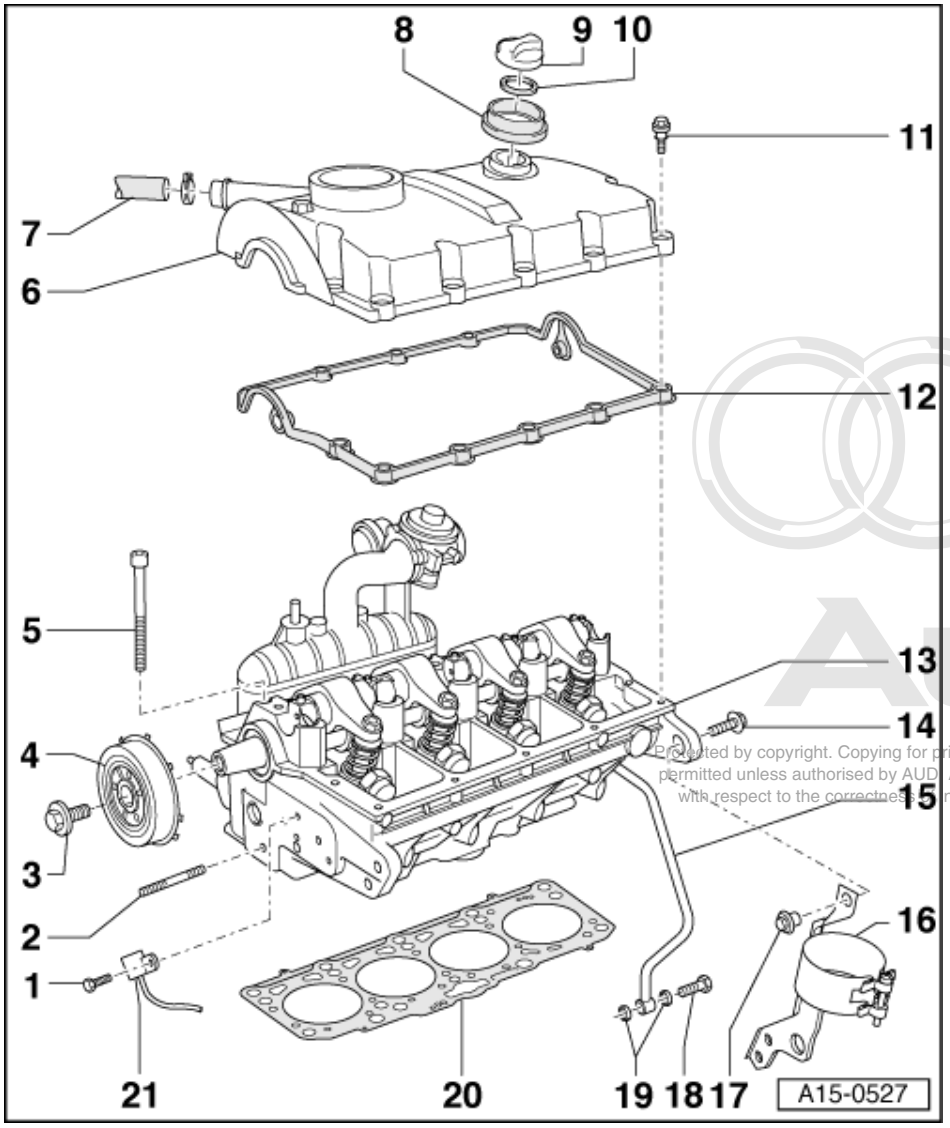
=> Parts List

- Removing and installing tandem pump:

=> Fuel supply - Diesel engines; Repair Group 20

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

1.2 - Part I



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 10 Nm
- Apply locking fluid when fitting
- Locking fluid

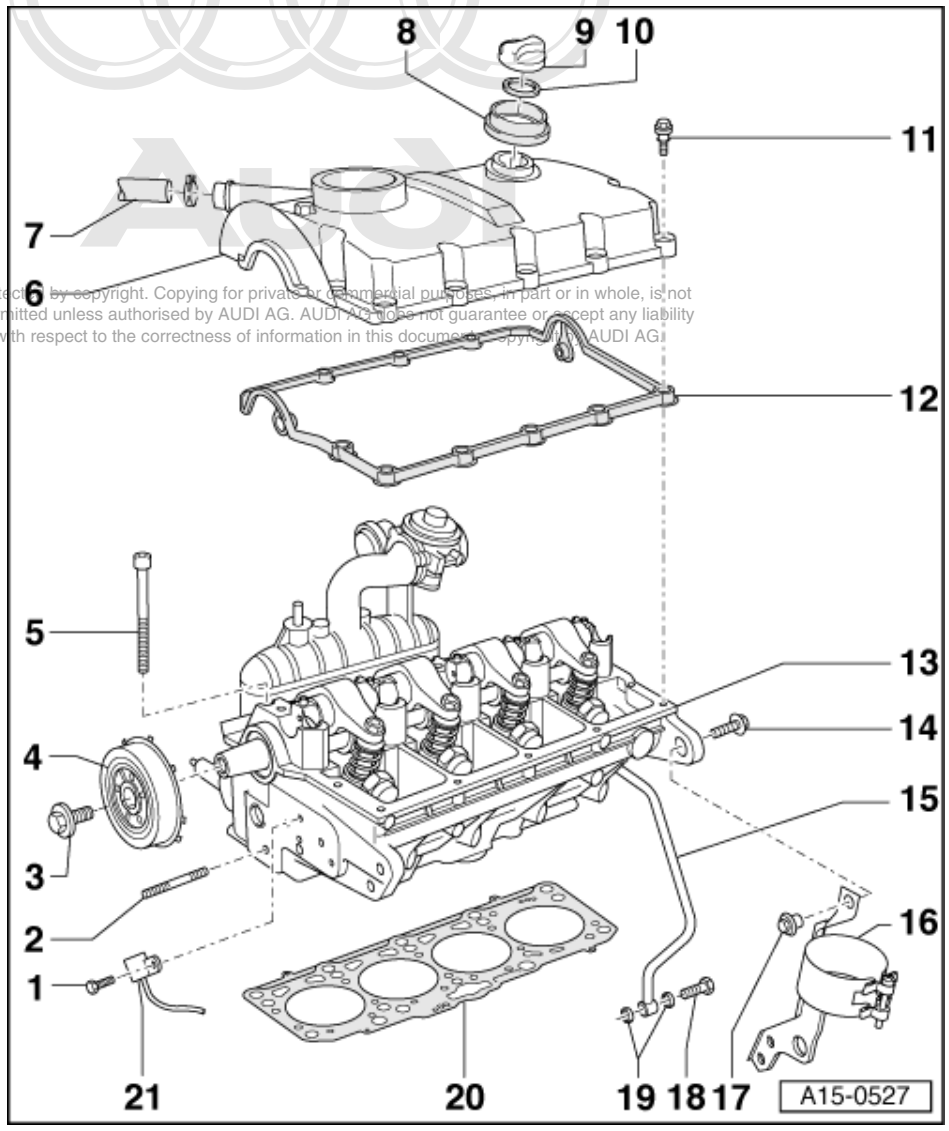
=> Parts List

2 15 Nm

3 100 Nm
- To slacken and tighten, use counterhold T10051

4 Hub
- With sender wheel for Hall sender -G40
- To slacken and tighten, use counterhold T10051
- To remove, use puller T10052
- Detaching => Page 15-32

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



5 Cylinder head bolt

- Replace
- Heed slackening off sequence
  => Page 15-33
- Heed tightening sequence
  => Page 15-37
- Make sure the washers -item 15-49 are inserted in the cylinder head

6 Cylinder head cover

- Removing and installing=>Page 15-10

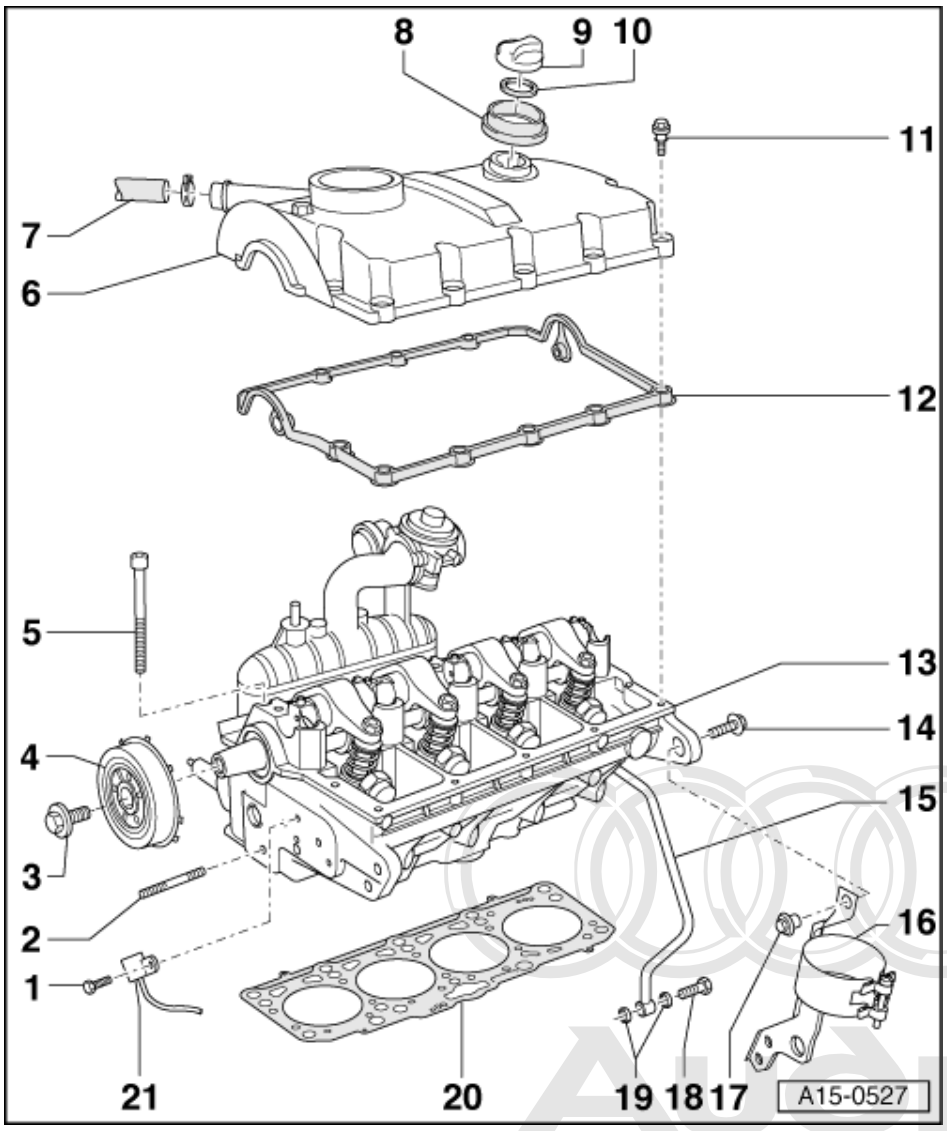
7 Breather hose

8 Trim cap

9 Cap

10 Gasket

- Replace if damaged or leaking



11 10 Nm

- With gasket
- Follow tightening sequence =>Removing and installing cylinder head cover, page 15-10

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.

12 Gasket for cylinder head cover

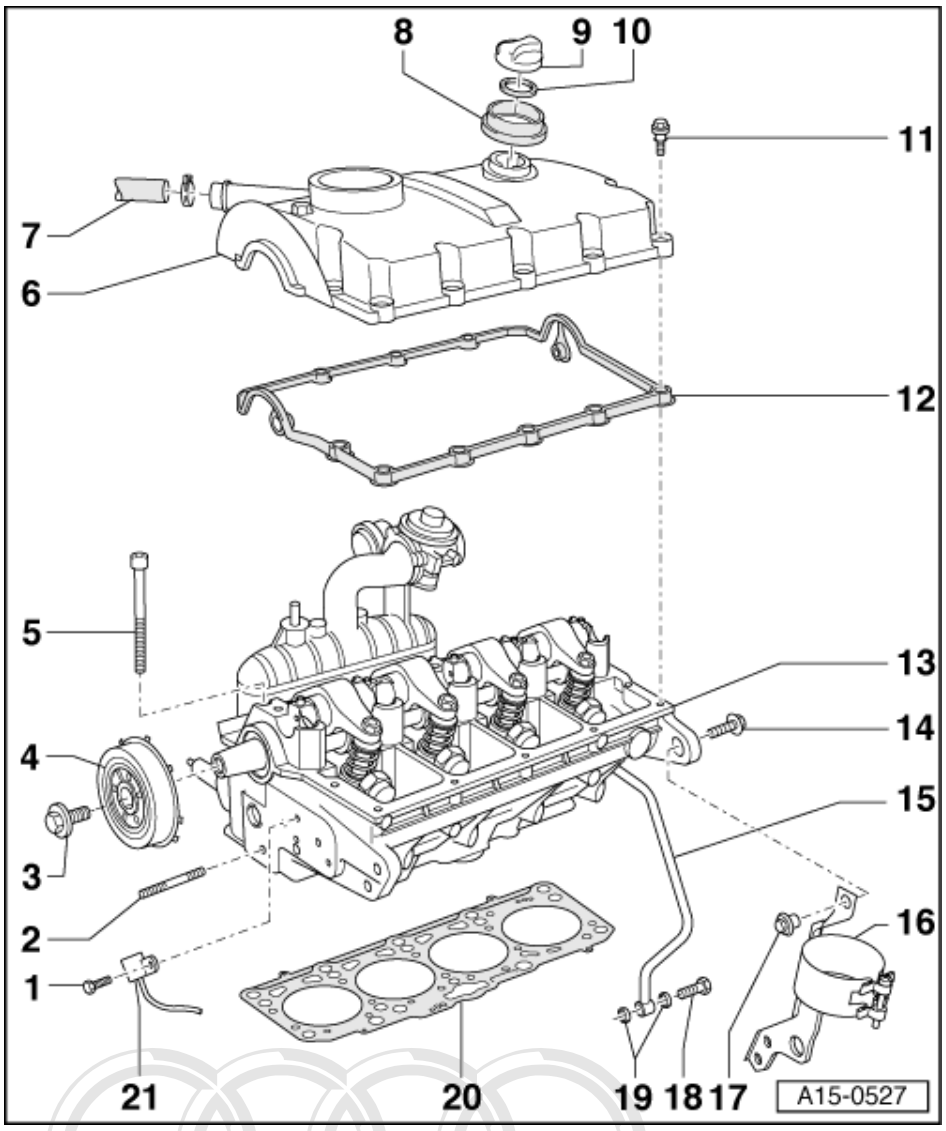
- Replace if damaged or leaking
- Only available with cylinder head cover
- Before mounting, seal joints with sealant => Fig.15-9
- Sealant

=> Parts List

- Insert lugs into holes on cylinder head

13 Cylinder head

- Removing => Page 15-18
- Checking for torsion => Fig.15-8
- Installing =>Page 15-34
- After replacing, fill with fresh coolant



14 20 Nm

15 Oil supply pipe

- To turbocharger

16 Holder

- For fuel filter and fuel cooling circuit cooler

17 Threaded bush

18 Banjo bolt, 25 Nm

19 Oil seal

- Replace

20 Cylinder head gasket

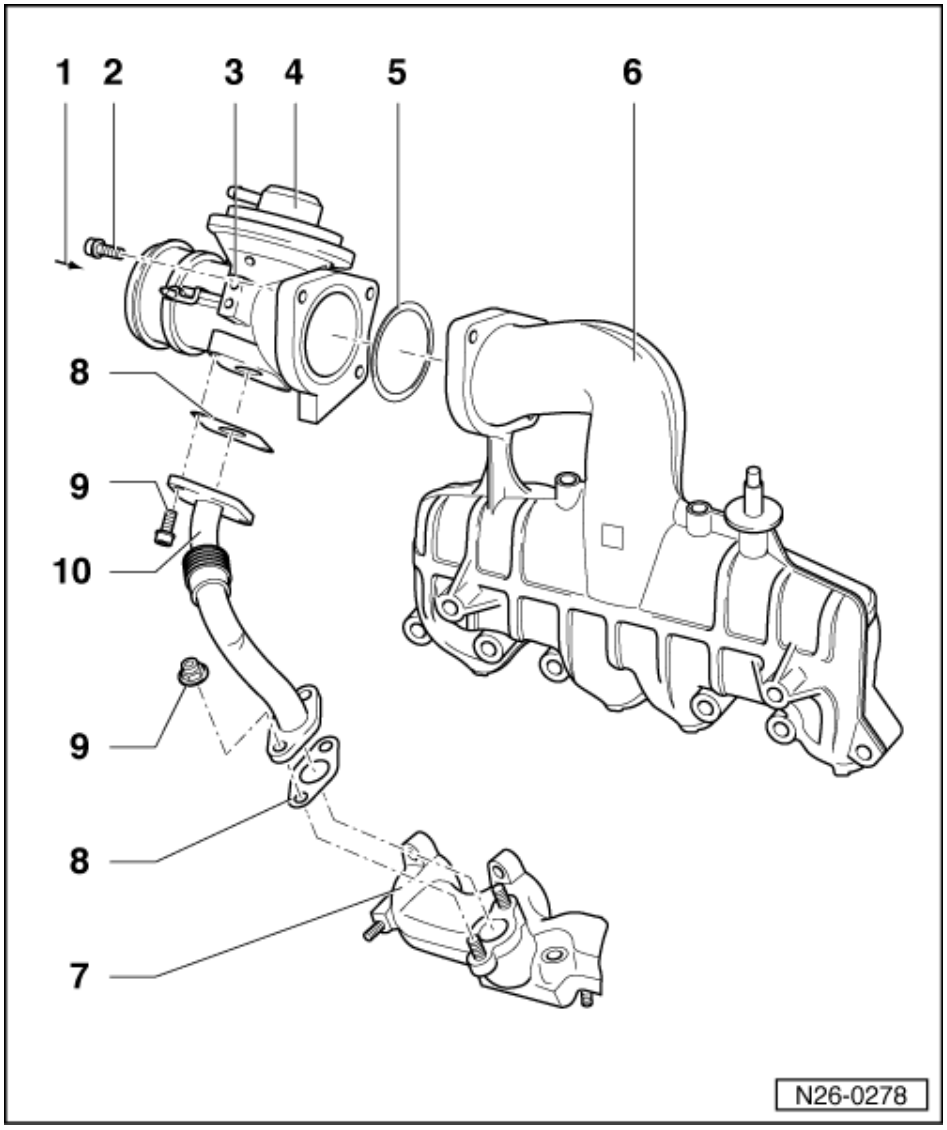
- Replacing=>Removing cylinder head , Page 15-18
- Note marking =>Fig.15-8
- After replacing, fill with fresh coolant

21 Hall sender -G40

- For camshaft position

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

1.3 - Part II

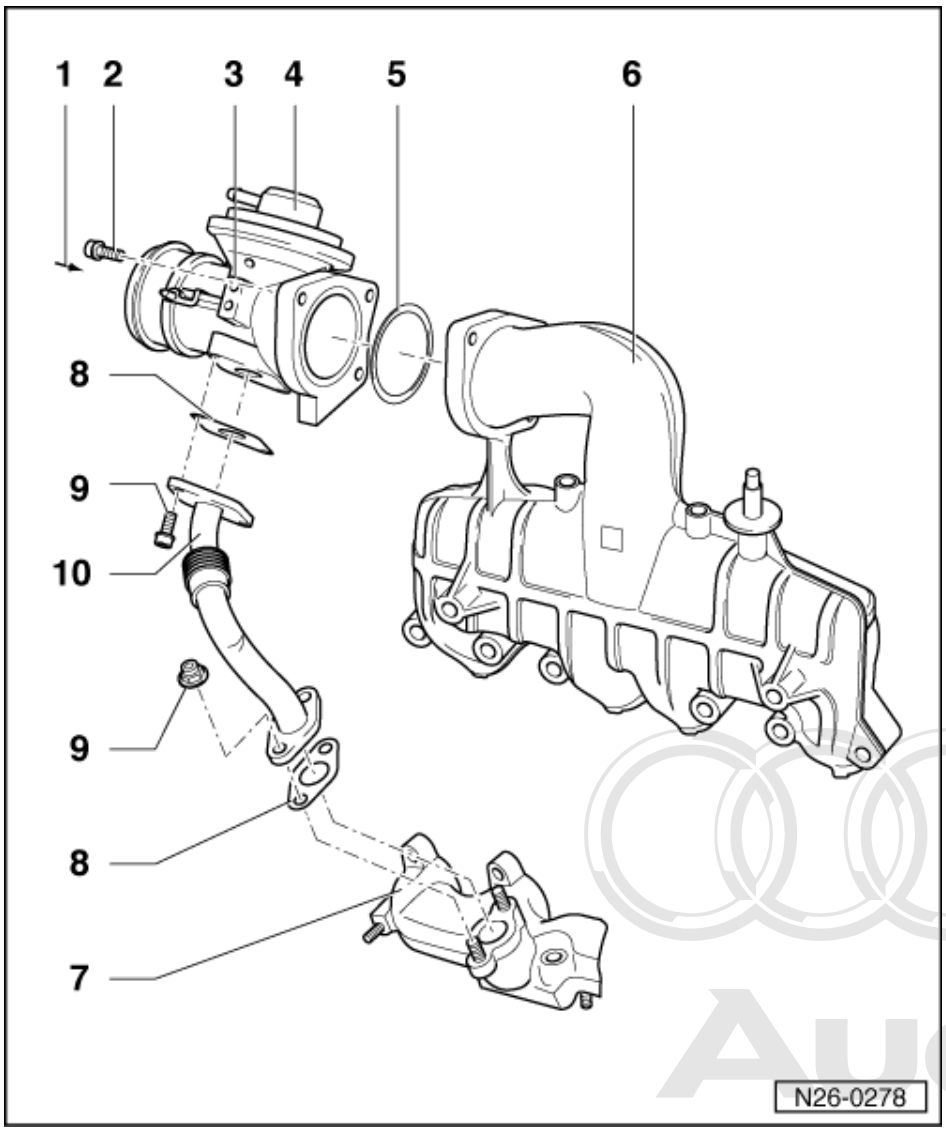


1 From charge-air cooler
2 10 Nm
3 Intake manifold
4 Mechanical EGR valve
- Can only be replaced complete with intake manifold

5 O-ring
- Replace

6 Intake manifold
- Removing and installing=>Page 15-14

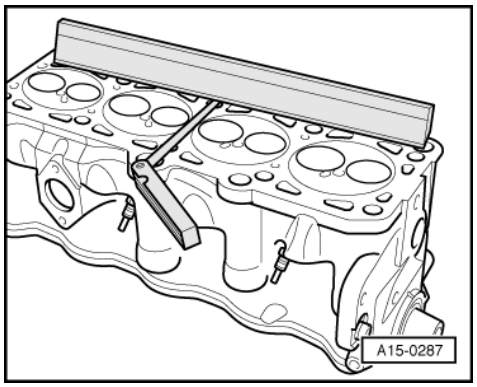
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



7 Exhaust manifold
8 Gasket
- Replace

9 25 Nm
10 Connecting pipe

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

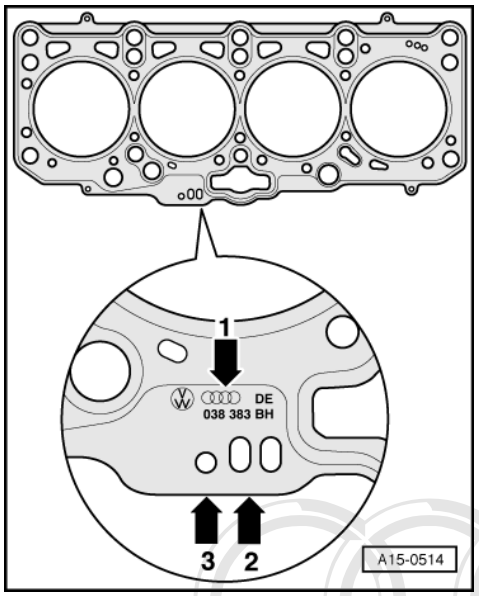


-> Fig. 1 Checking cylinder head for torsion

- Check cylinder head for torsion at several locations using bevelled straightedge and feeler gauge.
  - Max. perm. torsion: 0.1 mm

Note:

Reworking diesel cylinder heads is not permitted.



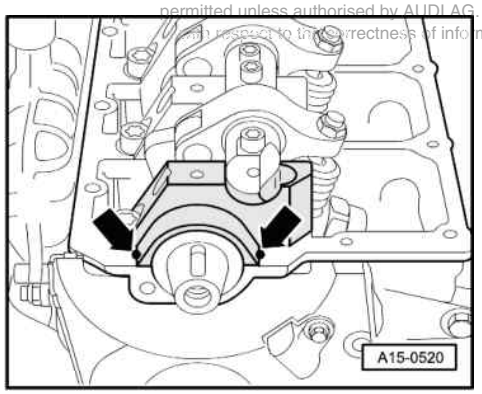
-> Fig.2 Cylinder head gasket marking

- Part no. = arrow 1
- Control code = arrow 2 (Ignore!)
- Holes = arrow 3

Note:

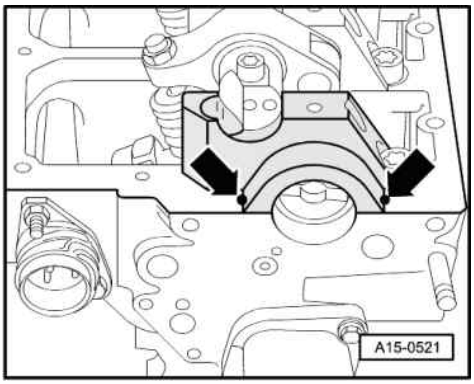
Differing thicknesses of cylinder head gasket are fitted depending on the piston projection => Page 13-93. If only the gasket is replaced, fit gasket with same marking.

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



-> Fig.3 Sealing bearing cap/cylinder head transitions

- Seal the two edges on the bearing cover/cylinder head sealing faces -arrows- at the front ...

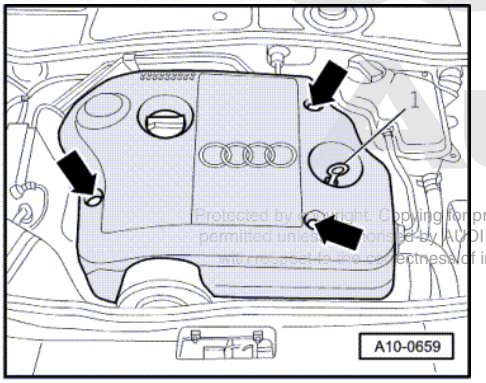


- -> ... and rear with a drop of sealant (øapprox. 5 mm) -arrows-.

◆ Sealant

=> Parts List

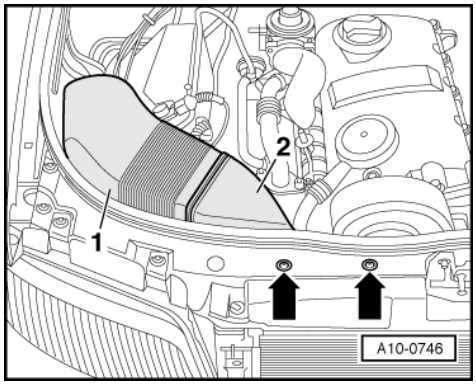
1.4 - Removing and installing cylinder head cover



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

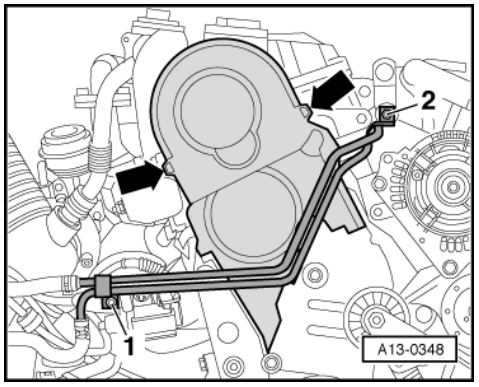
Removing

- -> Pull dipstick -1- out of guide tube.
- Unclipcaps.
- Remove nuts -arrows- and detach engine cover.
- Remove insulation lying below.
- Re-insert dipstick into guide tube.



- -> Screw out bolts -arrows-.

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

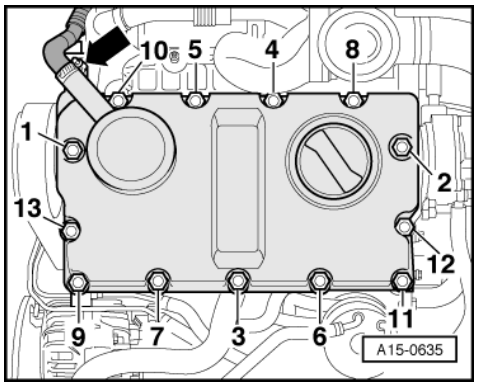


- -> Unbolt coolant line brackets -1- and -2-.

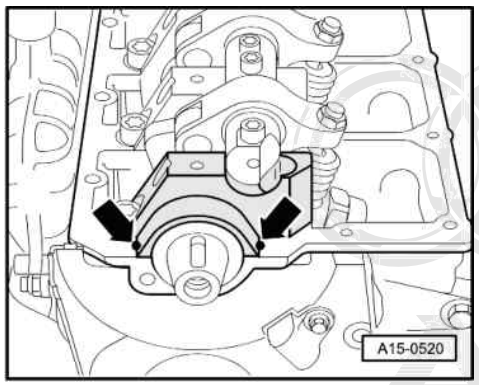
Note:

The coolant hoses can remain connected to the lines.

- Remove top toothed belt guard -arrows-.



- -> Detach hose of crankcase breather from pressure control valve -arrow-.
- Remove cylinder head coverbolts in sequence: -13 ... 1- and remove cylinder head cover.



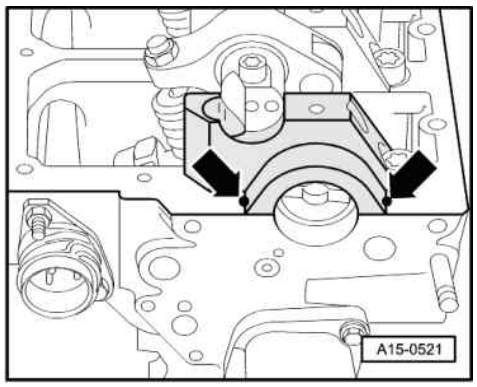
Installing

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

Install in reverse order, paying attention to the following:

Note:
If the cylinder head cover gasket is damaged, you must replace the complete cylinder head cover. If the bolt gasket is damaged, replace the bolt.

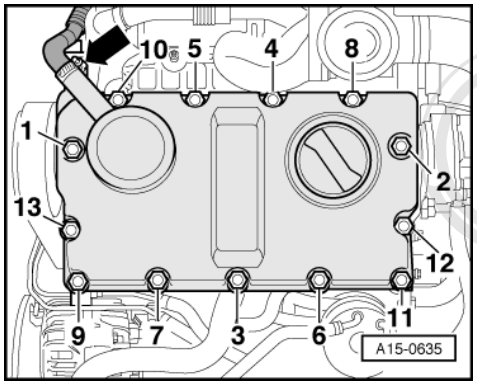
- -> Seal the two edges on the bearing cover/cylinder head sealing faces -arrows- at the front ...



- -> ... and rear with a drop of sealant (øapprox. 5 mm) -arrows-.

◆ Sealant

=> Parts List



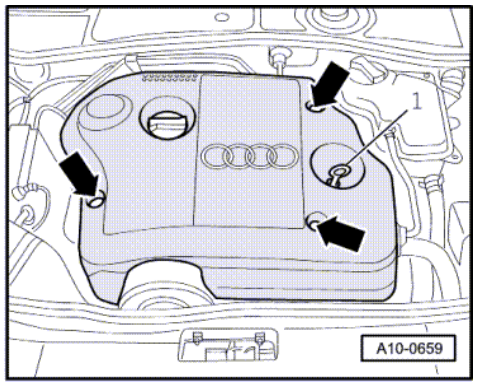
- -> Fit cylinder head cover bolts in sequence: -1 ... 13- hand-tight.
- Tighten bolts in sequence: -1 ... 13-.

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

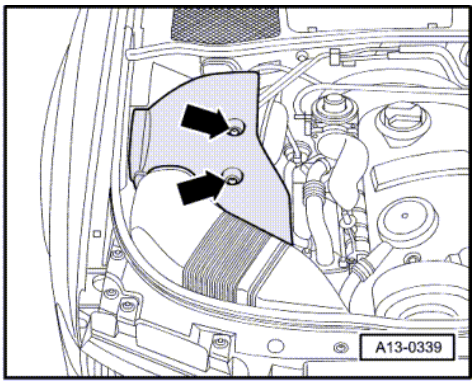
Component	Nm
Cylinder head cover to cylinder head	10

1.5 - Removing and installing intake manifold



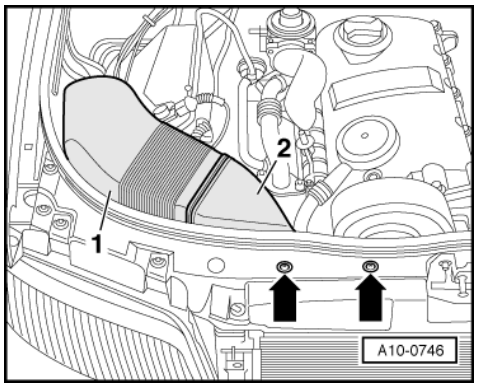
Removing

- -> Pull dipstick -1- out of guide tube.
- Unclipcaps.
- Remove nuts -arrows- and detach engine cover.
- Remove insulation lying below.
- Re-insert dipstick into guide tube.

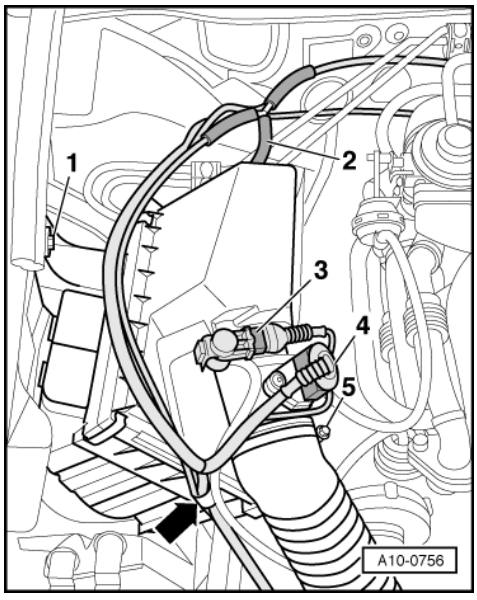


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Unclipcaps.
- -> Remove bolts -arrows- and detach air cleaner cover.



- -> Screw out bolts -arrows-.
- Remove air duct -1- and -2-.



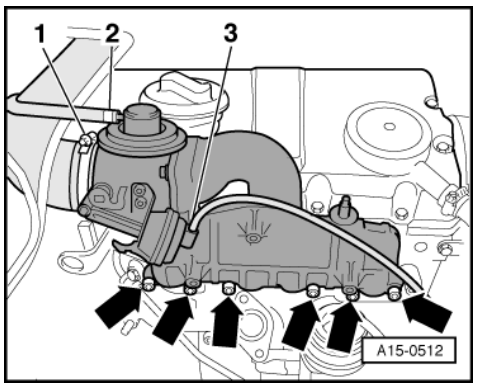
- -> Disconnect vent hose -2- from air cleaner housing.
- Unplug electrical connector -4- from air-mass meter.
- Detach EGR valve -N18 from air cleaner housing -3-.
- Detach wiring harness from air cleaner housing -arrow-.
- Pull off air hose -5-.
- Screw out bolt -1-.
- Detach air cleaner housing.

Vehicles with manual gearbox

- Remove EGR connecting pipe -item26-29.

Vehicles with automatic gearbox:

- Remove EGR system cooler => Page 26-48.



All models:

- -> Detach air hose -1-.
- Disconnect vacuum hoses -2- and -3-.
- Screw out bolts -arrows-.
- Detach intake manifold.

Installing

Install in reverse order, paying attention to the following:

Notes:

- Always replace gaskets and self-locking nuts.
- Pay attention to fitting position of intake manifold gasket.
- Hose connections and hoses for charge-air system must be free from oil and grease before fitting.

Vehicles with automatic gearbox:

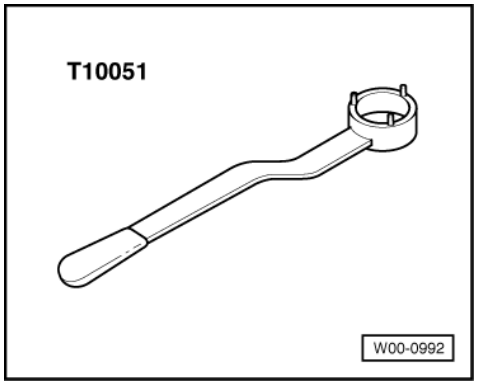
- Install EGR system cooler => Page 26-53.

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

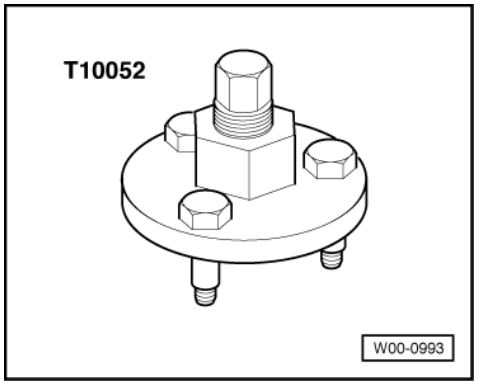
Component		Nm
Intake manifold to cylinder head		25
EGR connecting pipe to	Intake manifold	25
	Exhaust manifold	25
Clamps for air hoses		3.5

1.6 - Removing cylinder head



Special tools and workshop equipment required

- Puller T10051



- Counterhold T10052

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

Sequence of operations

- Engine in position
- Lock carrier in service position =>Page 13-1.

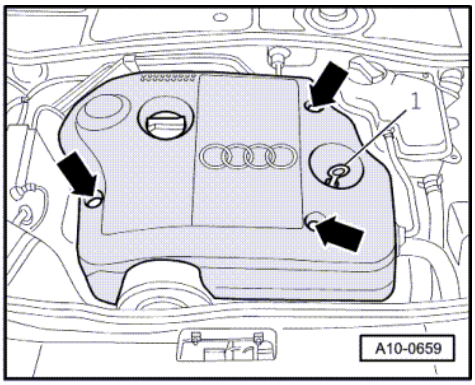
Note:

All cable ties unfastened or cut open on removal are to be re-attached in same position on installation.

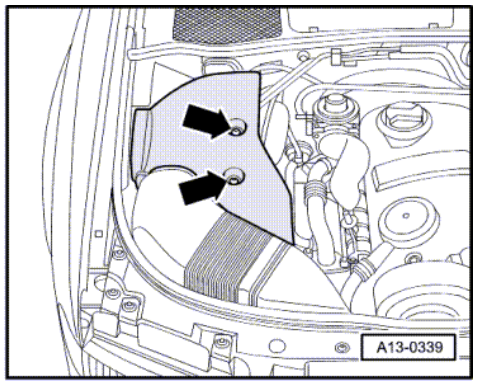
- Heed (if necessary obtain) code for vehicles with encoded radio/radio navigation system (RNS).
- Disconnect battery earth strap with ignition switched off.

Attention:
Hot vapour may escape when opening expansion tank. Cover cap with cloth and open carefully.

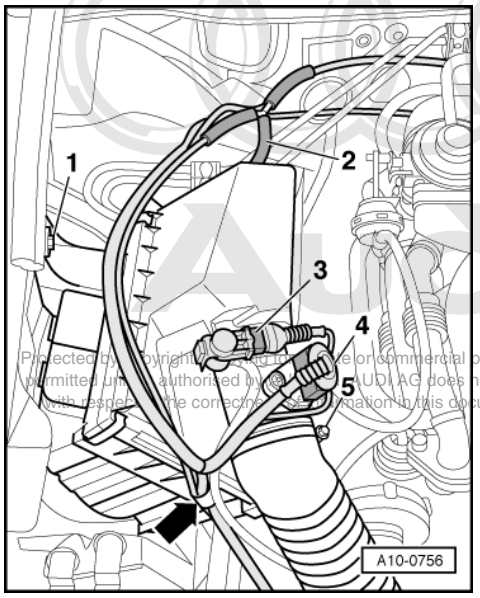
- Unscrew cap of coolant expansion tank.



- -> Pull dipstick -1- out of guide tube.
- Unclipcaps.
- Remove nuts -arrows- and detach engine cover.
- Remove insulation lying below.
- Re-insert dipstick into guide tube.

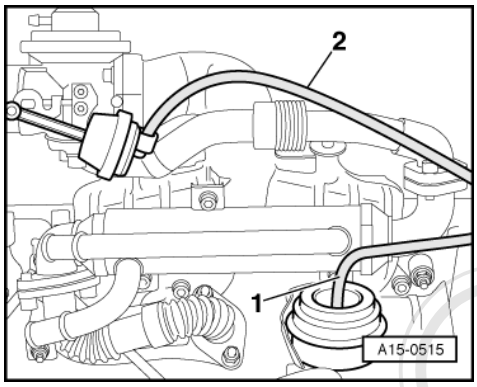


- Unclipcaps.
- -> Remove bolts -arrows- and detach air cleaner cover.

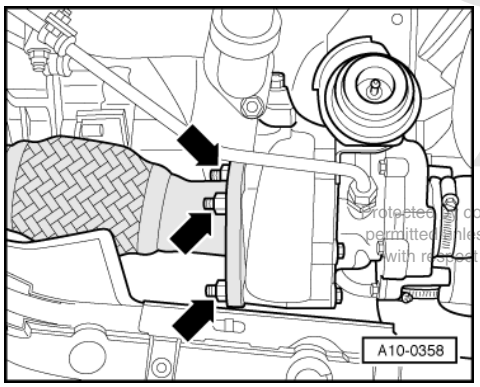


Protected by Copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- -> Disconnect vent hose -2- from air cleaner housing.
- Unplug electrical connector -4- from air-mass meter.
- Detach EGR valve -N18-3- from air cleaner housing.
- Detach wiring harness from air cleaner housing -arrow-.
- Pull off air hose -5-.
- Screw out bolt -1-.
- Detach air cleaner housing.



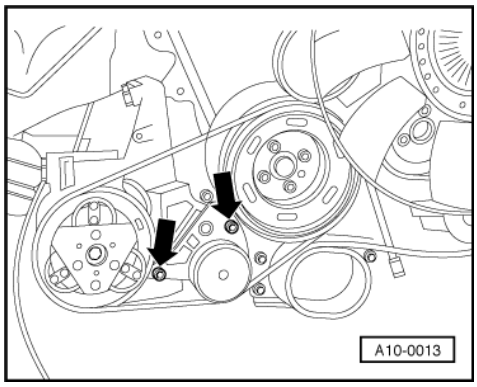
- -> Detach vacuum hose -1- from charge pressure control vacuum unit.
- Detach vacuum hose -2- from intake manifold flap vacuum unit.



- -> Screw out turbocharger/catalytic converter nuts -arrows-.
- Detach front exhaust system clamp.
- Push clamp back to separate exhaust system.
- Disconnect catalytic converter with exhaust pipe from turbocharger.

Note:

To avoid damage, decoupling element of exhaust system is never to be tilted by more than 10 °.



Vehicles with air conditioner:

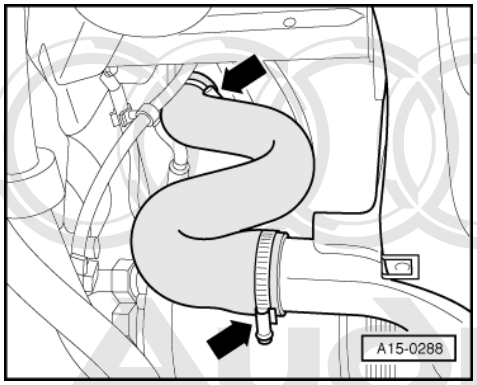
Attention: Never open refrigerant circuit of air conditioner.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 ribbed belt with chalk or felt-tipped pen. Running a used belt in the opposite direction could destroy it.

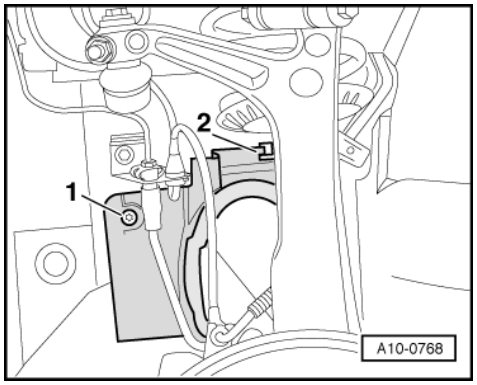
- -> Slacken off bolts of tensioning roller for air-conditioner compressor ribbed belt -arrows-, slacken off ribbed belt and detach.
- Detach air conditioner compressor from bracket and secure to body with wire.



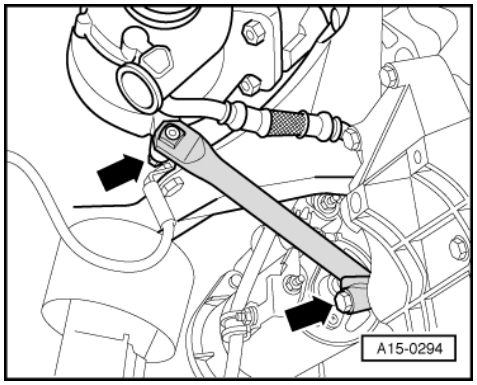
All models:

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

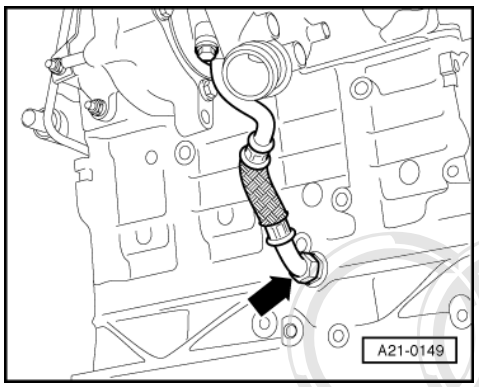
- -> Remove right side air hose -arrows-.



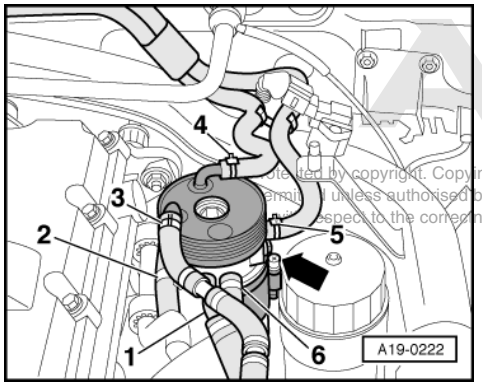
- -> Slacken bolt -1- of soundproofing cover over right side drive shaft at front.
- Unhook catch -2- and detach soundproofing cover.



- -> Remove bracket for turbocharger -arrows-.

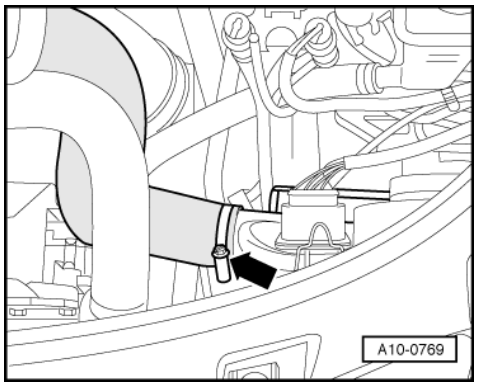


- -> Detach oil return pipe from cylinder block -arrow-.

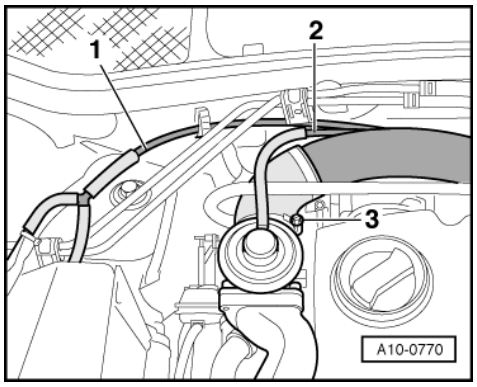


...otected by copyright. Copying for private or commercial purposes, in part or in whole, is not ...rmitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability ...espect to the correctness of information in this document. Copyright by AUDI AG.

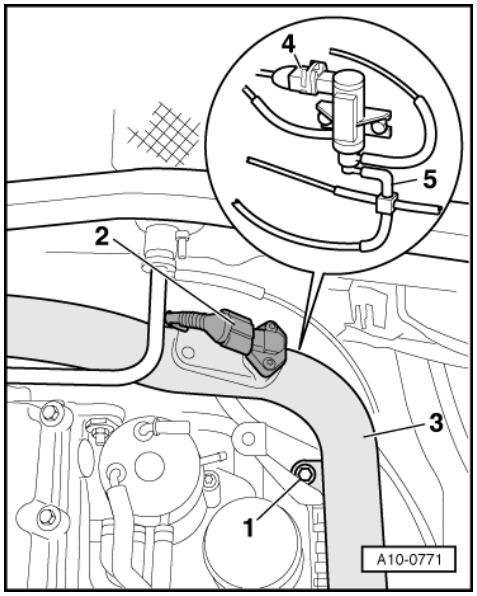
- Drain off coolant => Page 19-7.
- Detach coolant hoses to expansion tank and to radiator from coolant pipe at top.
- -> Detach coolant hoses and fuel hoses -1 ... 6-.
- Screw out bolt -arrow-.
- Pull fuel filter upwards out of holder.



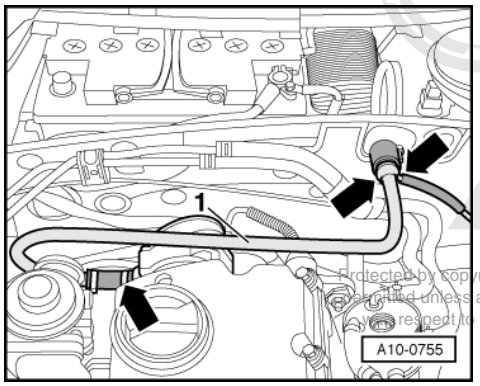
- -> Detach air hose from charge air cooler-arrow-.



- -> Disconnect vent line -1- to air cleaner and vacuum line -2- to mechanical EGR valve.
- Detach air hose -3- from intake manifold.

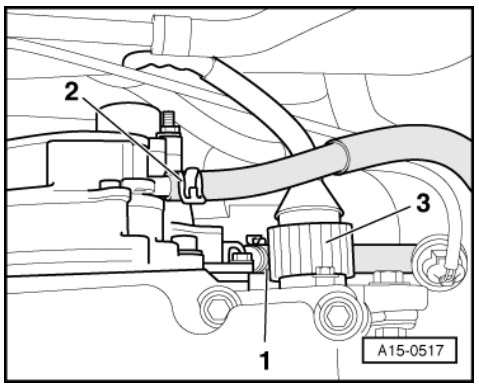


- -> Unplug connectors -2- and -4-.
- Pull off vacuum hose -5-.
- Screw out bolt -1-.
- Detach air pipe -3-.

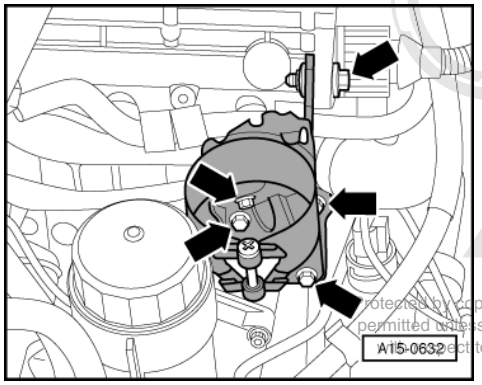


- -> Disconnect hose connections -arrows-.
- Detach vacuum line -1-.

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.

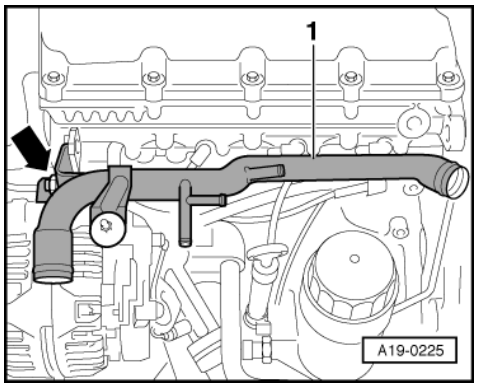


- -> Turn knurled screw -3- for centre connector anti-clockwise.
- Detach centre connector.
- Disconnect fuel hoses -1- and -2-.

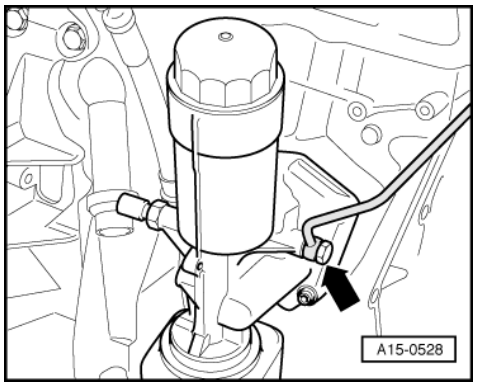


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

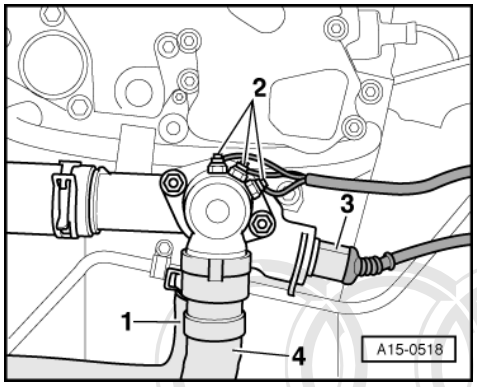
- -> Unbolt fuel filter holder -arrows-.



- Detach coolant hoses from upper coolant pipe.
- -> Unscrew nut -arrow-.
- Detach coolant pipe -1-.
- Disconnect connectors from glow plugs.



- -> Unbolt oil supply pipe from oil filter holder -arrow-.

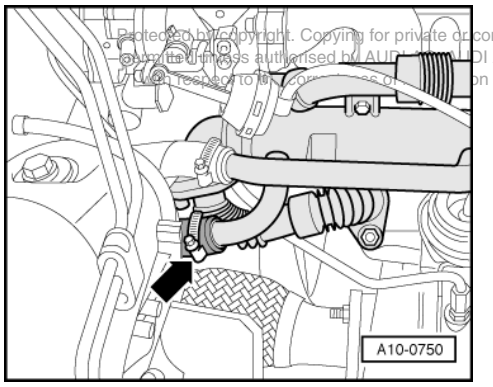


- -> Detach coolant hose -1- from rear of cylinder head.
- Unplug connector -3-.

Vehicles with manual gearbox:

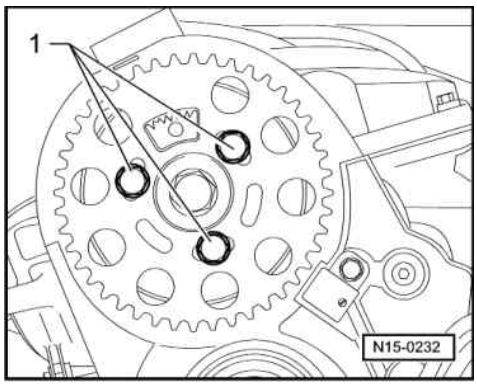
- Detach coolant hose -4-.
- Unscrew electric wires -2- from heating elements of supplementary heater.

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



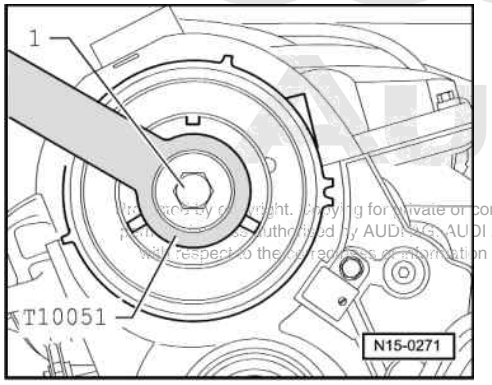
Vehicles with automatic gearbox:

- -> Detach coolant hose from EGR cooler -arrow-.



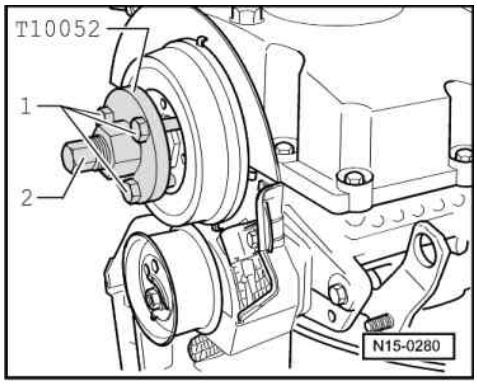
All models:

- Remove toothed belt => Page 13-36.
- -> Screw out camshaft sprocket bolts -1-.
- Detach camshaft sprocket from hub.



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

- -> Slacken hub bolt -1-. Use counterhold T10051.
- Screw out hub bolt approx. 2 turns.

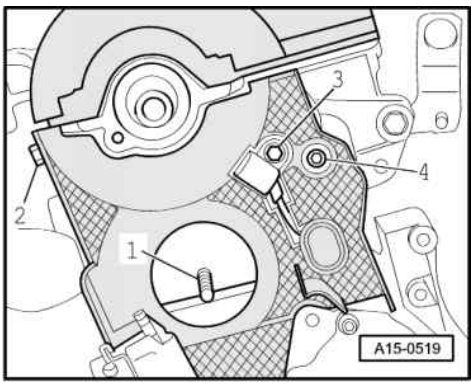


- -> Position puller T10052 in alignment with holes on hub.
- Screw bolts -1- into hub.
- Tension the hub by steadily tightening centre bolt -2- until hub separates from camshaft cone.

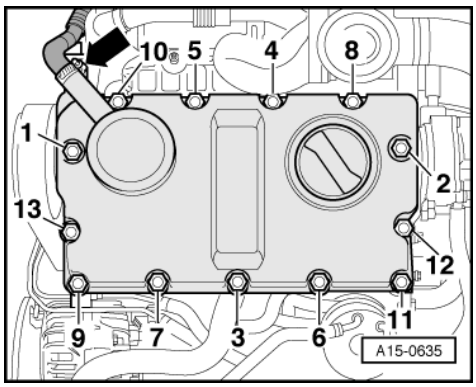
Note:

Hold the puller firm with a A/F 30 mm spanner while doing so.

- Detach hub from camshaft cone.

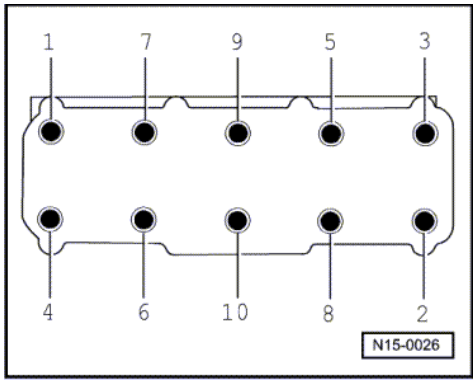


- Removing toothed belt tensioning roller.
- -> Screw out bolts -2 ... 4-.
- Screw out stud bolt -1- with two locked M8 nuts.



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 of crankcase breather from pressure control valve -arrow-.
- Remove cylinder head coverbolts in sequence: -13 ... 1- and remove cylinder head cover.



- -> Heed slackening off sequence for cylinder head bolts.
- Raise cylinder head with the assistance of a second mechanic and lift out.

1.7 - Installing cylinder head

Notes:

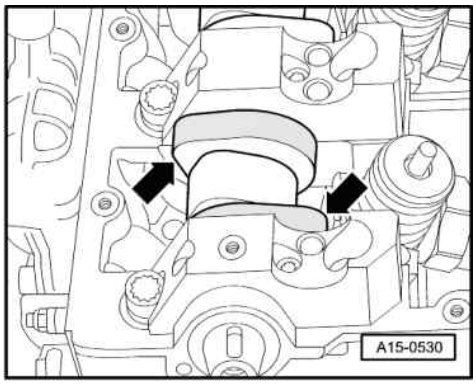
- Replace cylinder head bolts.
- When carrying out repair work, replace oil seals and gaskets, self-locking nuts and anti-fatigue bolts tightened with an angle measuring wrench.
- Hose connections and hoses for charge-air system must be free from oil and grease before fitting.

- Secure all hose connections with standard hose clamps:

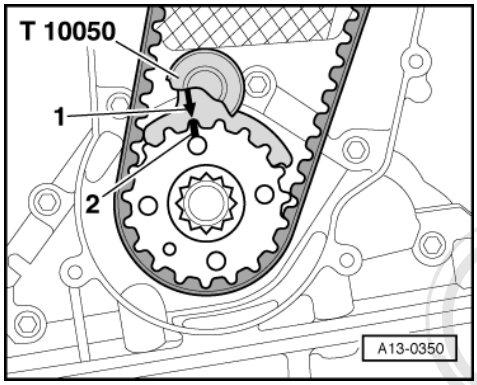
=> Parts List

- When performing repair work, carefully remove remnants of gasket from cylinder head and cylinder block. Take care to avoid scoring or scratches.
- Carefully remove abrasive and grinding residue.
- Do not remove new cylinder head gasket from wrapping until immediately prior to installation.
- Gasket is to be handled with extreme care. Damage to silicone coat and in bead area will lead to leakage.
- There must not be any oil or coolant in blind holes for cylinder head bolts in cylinder block.

Install in reverse order, paying attention to the following:



- Before mounting cylinder head, position crankshaft and camshaft to cylinder 1 TDC:
  - -> On the camshaft the cams for cylinder 1 must all point uniformly upwards -arrows- ...

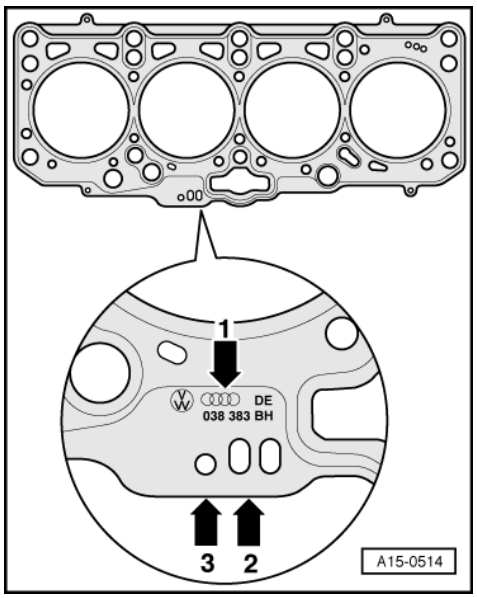


  - -> ... and the crankshaft toothed belt must be locked with crankshaft stop T10050.

Note:

The markings on the toothed belt sprocket -2- and on the crankshaft stop -1- must face each other. The journal of the crankshaft stop must engage in the sealing flange hole.

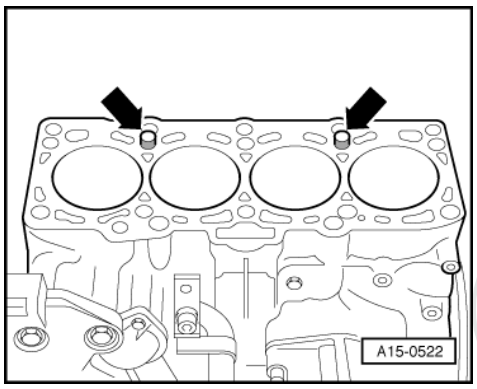
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- -> Pay attention to marking of cylinder head gasket.
  - Part no. = arrow 1
  - Control code = arrow 2 (Ignore!)
  - Holes = arrow 3

Notes:

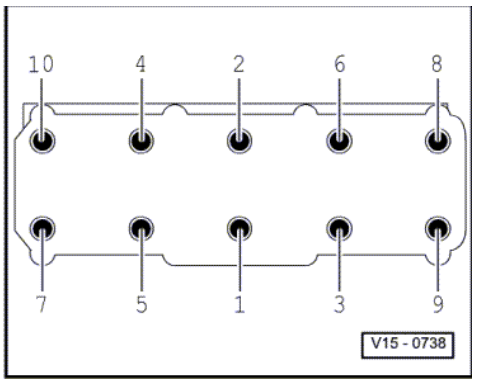
- If the cylinder head gasket or cylinder head is replaced, select the new cylinder head gasket according to the number of holes in the old gasket.
- If parts of the crank gear have been replaced, the new cylinder head gasket must be redefined by measurement of the piston projection at TDC => Page 13-93.



- -> Fit cylinder head gasket.
  - Pay attention to centring bushes -arrows- in cylinder block
  - Heed installation position of cylinder head gasket; "top" mark/part no. must face cylinder head

- Fit cylinder head.
- Check that all cylinder head bolt washers are inserted in cylinder head.
- Insert cylinder head bolts and screw in hand-tight.

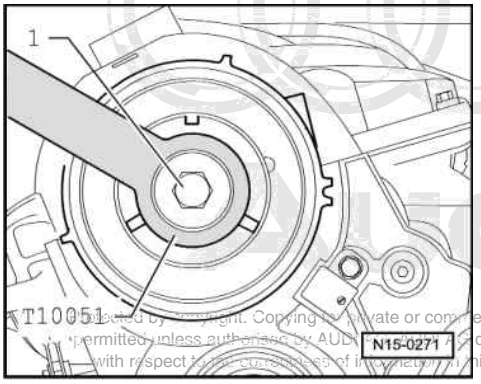
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- -> Tighten the cylinder head in four stages as follows, in the order shown:
- Use torque wrench to tighten:
  - 1. stage: 40Nm
  - 2. stage: 60 Nm
- Use fixed wrench to tighten:
  - 3. stage: 90°(1/4 turn) more)
  - 4. stage: 90°(1/4 turn) more)

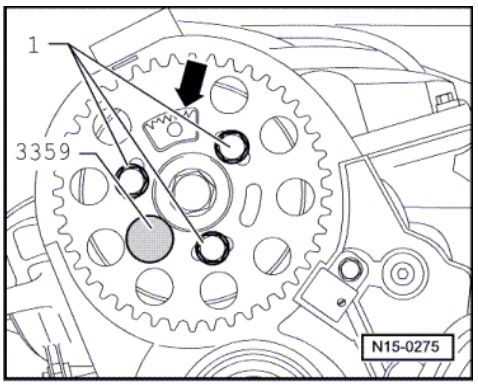
Note:

It is not necessary to re-tighten cylinder head bolts after repairs have been performed.



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

- Mount hub on camshaft.
- -> Tighten bolt -1- to 100 Nm, bracing with counterhold T10051.



- -> Push camshaft sprocket onto hub.

Note:

The tooth segment -arrow- of the camshaft sprocket must be at the top.

- Screw bolts -1- in hand-tight.

- Arrest hub with rig pin 3359.

- Install toothed belt (adjust valve timing) => Page 13-44.

Note:

Follow all instructions for removing and installing the toothed belt

=>from page 13-36.

- Install cylinder head cover => Page 15-12.
- Install ribbed belt =>Page 13-24.
- Install lock carrier =>Page 13-1.
- Perform stress-free alignment of exhaust system => Page 26-23.
- Check oil level.

Note:

Change oil if engine oil is contaminated.

=> Maintenance

- Replace coolant=> Page 19-11.

Note:

On re-connecting battery, remember to activate vehicle equipment (radio/radio navigation system, clock, electric window lifters) in line with owner's manual.

Tightening torques

Component		Nm
Stud bolt to cylinder head		15
Rear toothed belt guard to cylinder head	M6	10 1)
	M8	25
Hall sender to cylinder head		10 1)
Hub to camshaft		100
Oil supply pipe to oil filter holder		25
Oil return pipe to cylinder block		30
Top coolant pipe to lifting eye		20
Fuel filter holder to cylinder head/cylinder block	M6	10
	M7	15
	M8	20

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

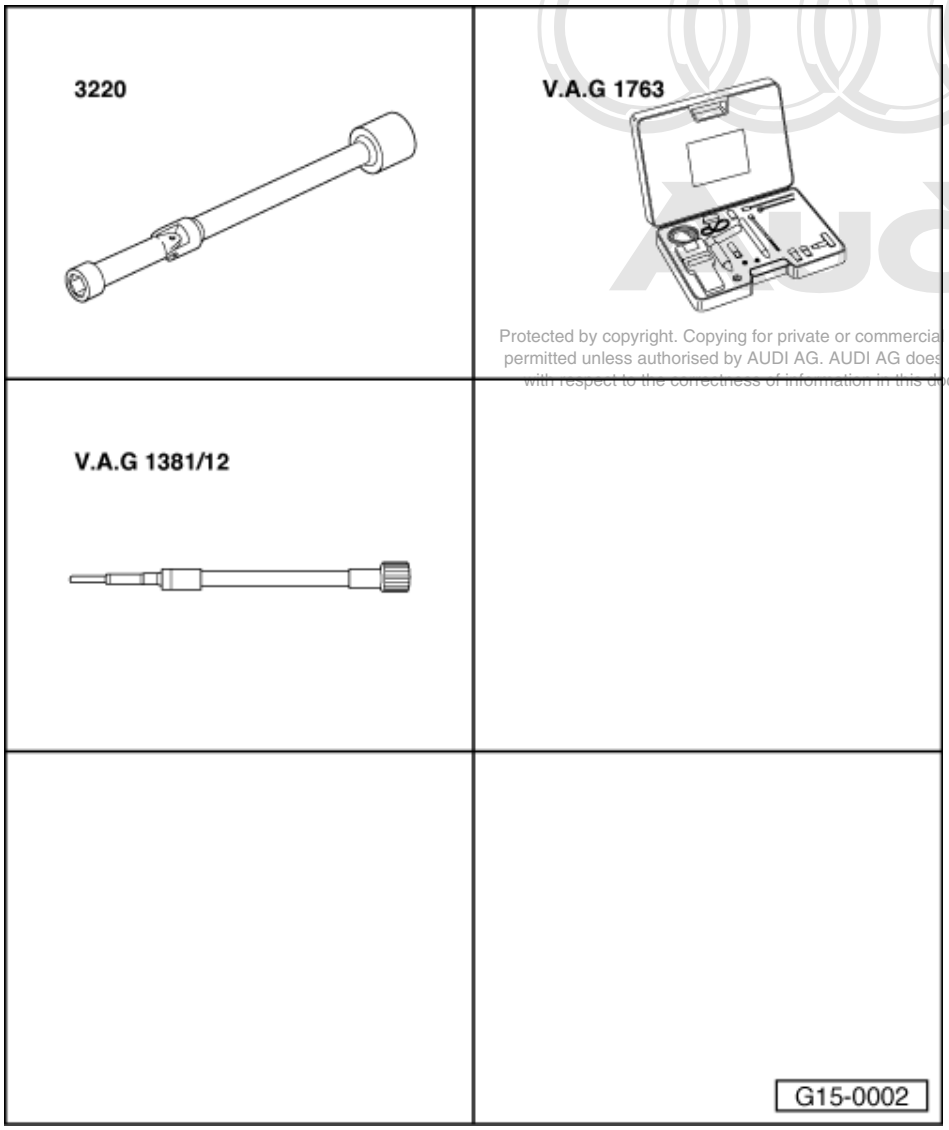
1) Insert with locking fluid1;
For locking fluid refer to

=> Parts List

Component		Nm
Bracket for turbocharger to		
	Turbocharger	20
	cylinder block	40
Catalytic converter to turbocharger		25 2)
Clamps for air hoses		3.5
Battery terminal to battery post		6

2) Replace self-locking nuts

1.8 - Checking compression pressure



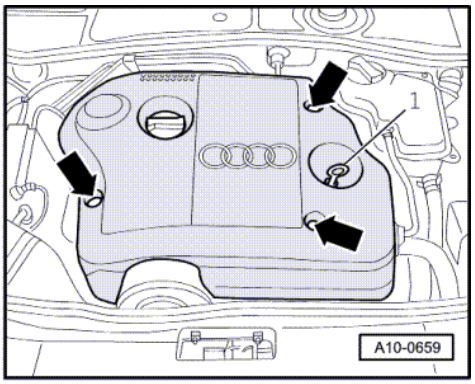
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Special tools and workshop equipment required

- Jointed spanner 3220
- V.A.G 1763
- V.A.G 1381/12

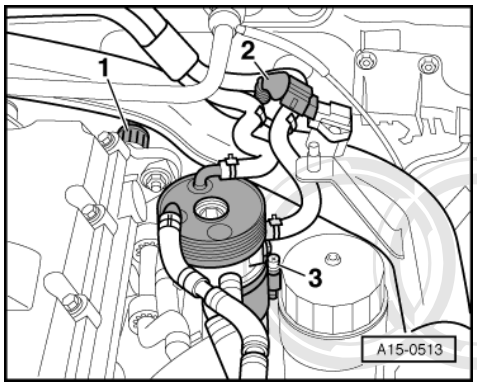
Test requirements:

- Engine oil temperature at least 30 °C
- Battery voltage at least 12.7 V



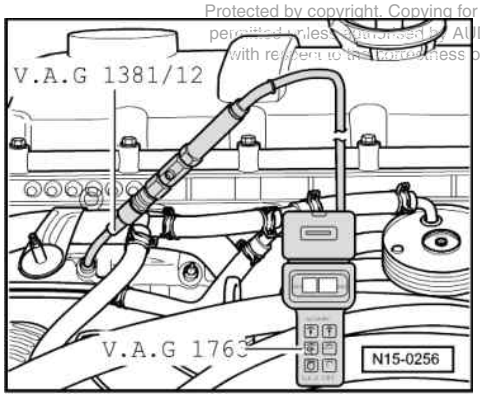
Test sequence

- -> Pull dipstick -1- out of guide tube.
- Unclipcaps.
- Remove nuts -arrows- and detach engine cover.
- Remove insulation lying below.
- Re-insert dipstick into guide tube.



- -> Unplug connector -2-.
- Screw out bolt -3-.
- Lift fuel filter out of holder and place aside together with connected fuel hoses.
- Turn knurled screw -1- for centre connector anti-clockwise.
- Detach centre connector.
- Remove all glow plugs with jointed spanner 3220.

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



- -> Screw in adapter V.A.G 1381/12 in place of glow plugs.
- Use compression tester V.A.G 1381 or V.A.G 1763 to check compression pressure.

Note:

How to use tester:

=> Operating instructions

- Operate starter until no further increase in pressure is indicated by tester.

Compression pressure:

New (bar)	Wear limit (bar)	Difference between cylinders (bar)
25 ... 31	19	max. 5

- Fit glow plugs with jointed spanner 3220.
- Interrogate and erase fault memory:

=> TDI fuel-injection and preheating system (4-cyl. pump/nozzle); Repair Group 01; Interrogate and erase fault memory Interrogate and erase fault memory

Printed by: [illegible] Copyright by AUDI AG. [illegible]
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.

Note:

Unplugging connectors causes faults to be stored. Interrogate and if necessary erase fault memory after completing check.

Tightening torques

Component		Nm
Glow plugs in cylinder head		15
Fuel filter holder to	M6	10
cylinder head/cylinder block	M7	15
	M8	20

2 - Servicing valve gear

2.1 - Servicing valve gear

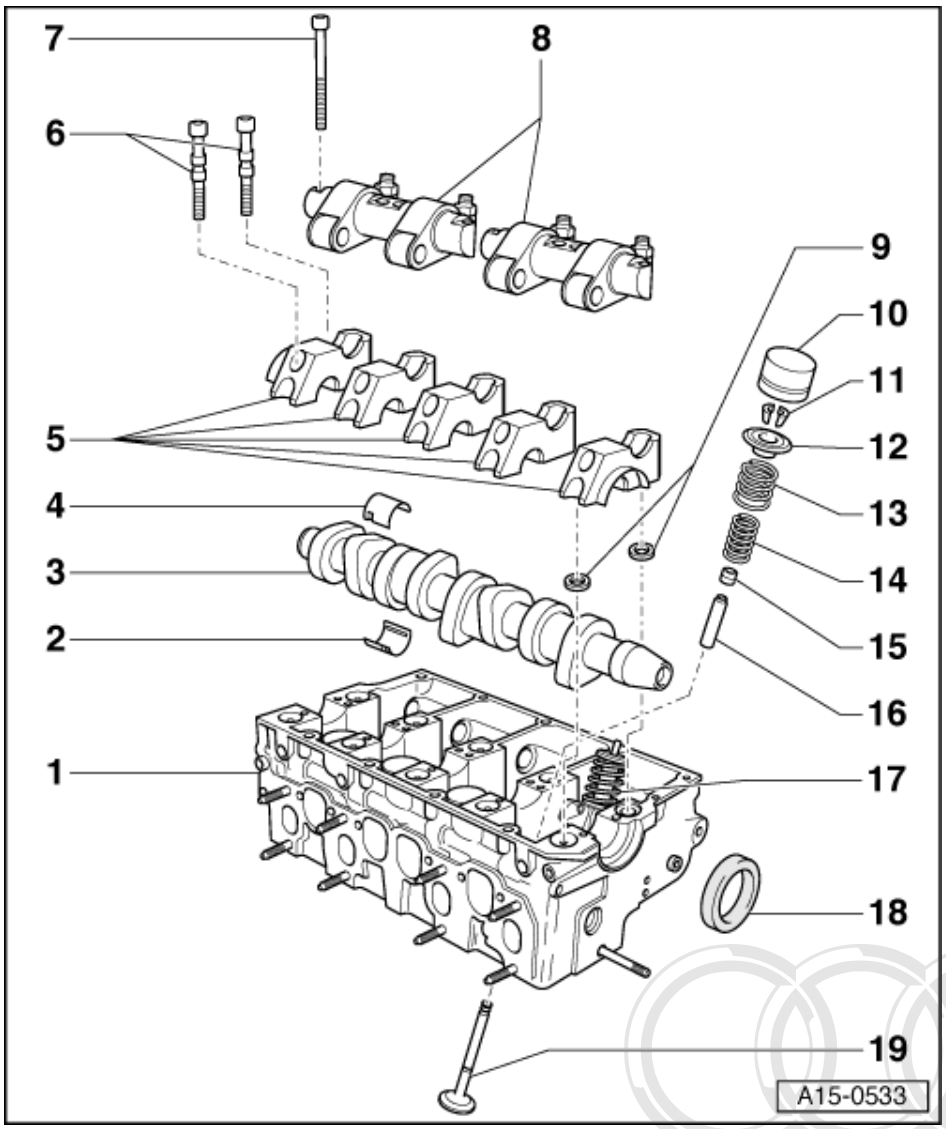
Notes:

- Engine is not to be started for approx. 30 minutes after installing camshaft, so as to allow hydraulic valve lifters to settle (valves would otherwise strike piston).
- After working on valve gear, carefully crank engine through at least 2 revolutions to ensure that no valves make contact on starting.
- Always replace gaskets and sealing rings.
- Heed current information on the use of sealants.

=> Parts List

- Removing and installing tandem pump:

=> Fuel supply - Diesel engines; Repair Group 20



1 Cylinder head

- Checking valve guides => Page 15-85
- Reworking valve seats=> Page 15-81

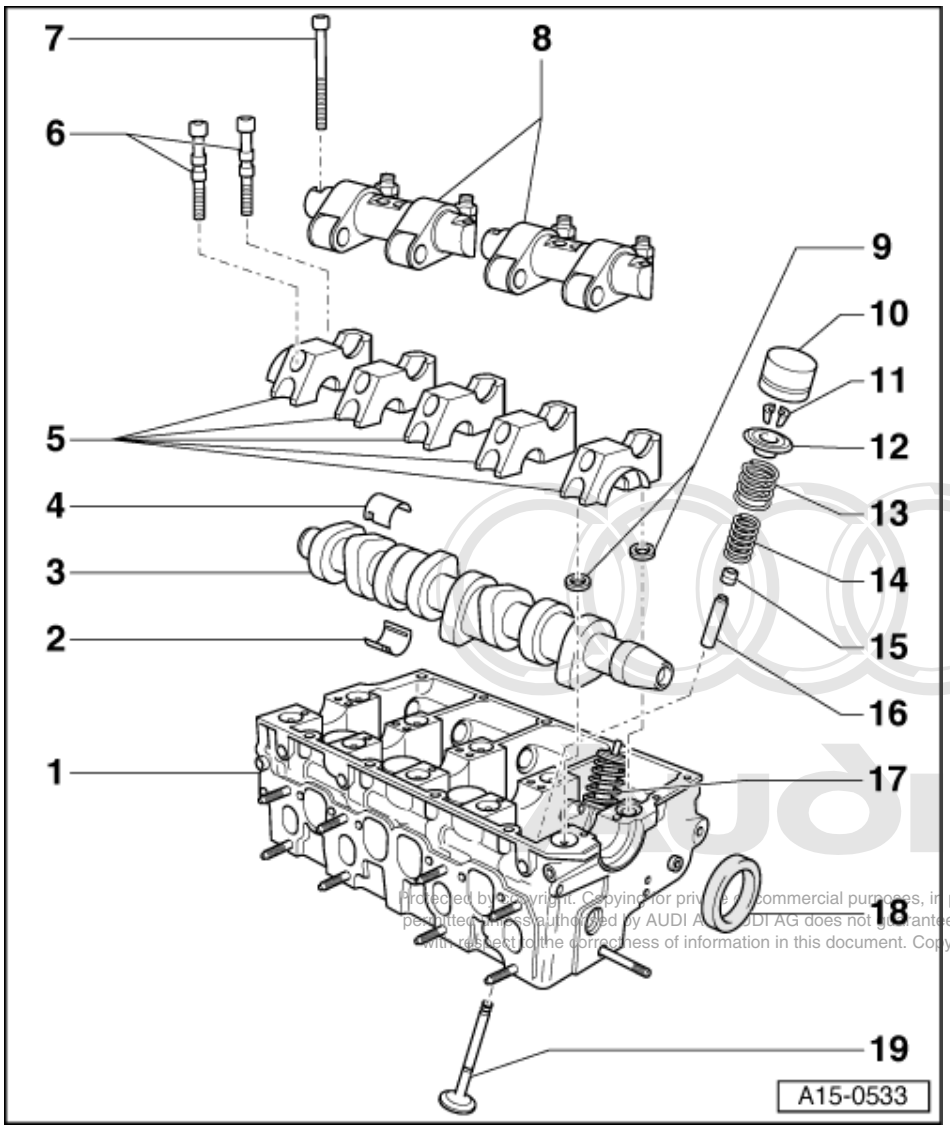
2 Bearing shell

- Pay attention to installation position
- Do not interchange used bearing shells (mark)
- Make sure tabs are correctly seated in bearing covers and cylinder head

3 Camshaft

- Checking axial clearance=>Page 15-54
- Removing and installing=>Page 15-61
- Check radial clearance with Plastigage
  Wear limit: 0.11 mm
- Run-out: max. 0.04 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.



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.

4 Bearing shell

- Pay attention to installation position
- Do not interchange used bearing shells (mark)
- Make sure tabs are correctly seated in bearing covers and cylinder head

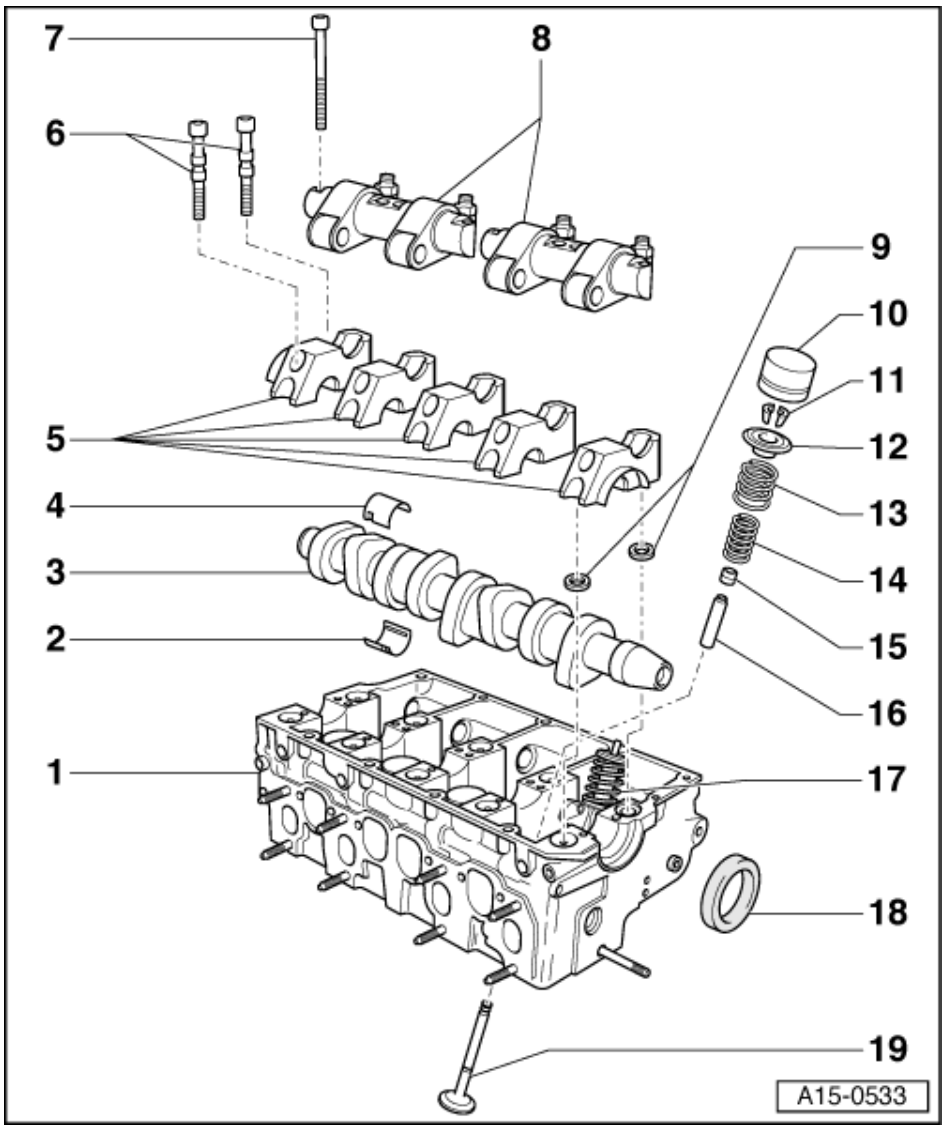
5 Bearing cap

- Installation sequence=>Installing camshaft, Page 15-64
- Seal bearing covers 1 and 5 with sealant =>Fig.15-53
- Sealant

=> Parts List

6 8 Nm + further 90° (1/4) turn

- Replace



7 20 Nm + further 90° (1/4 turn.) turn

- Replace
- Heed slackening off sequence => Page 15-63
- Heed tightening sequence => Page 15-67

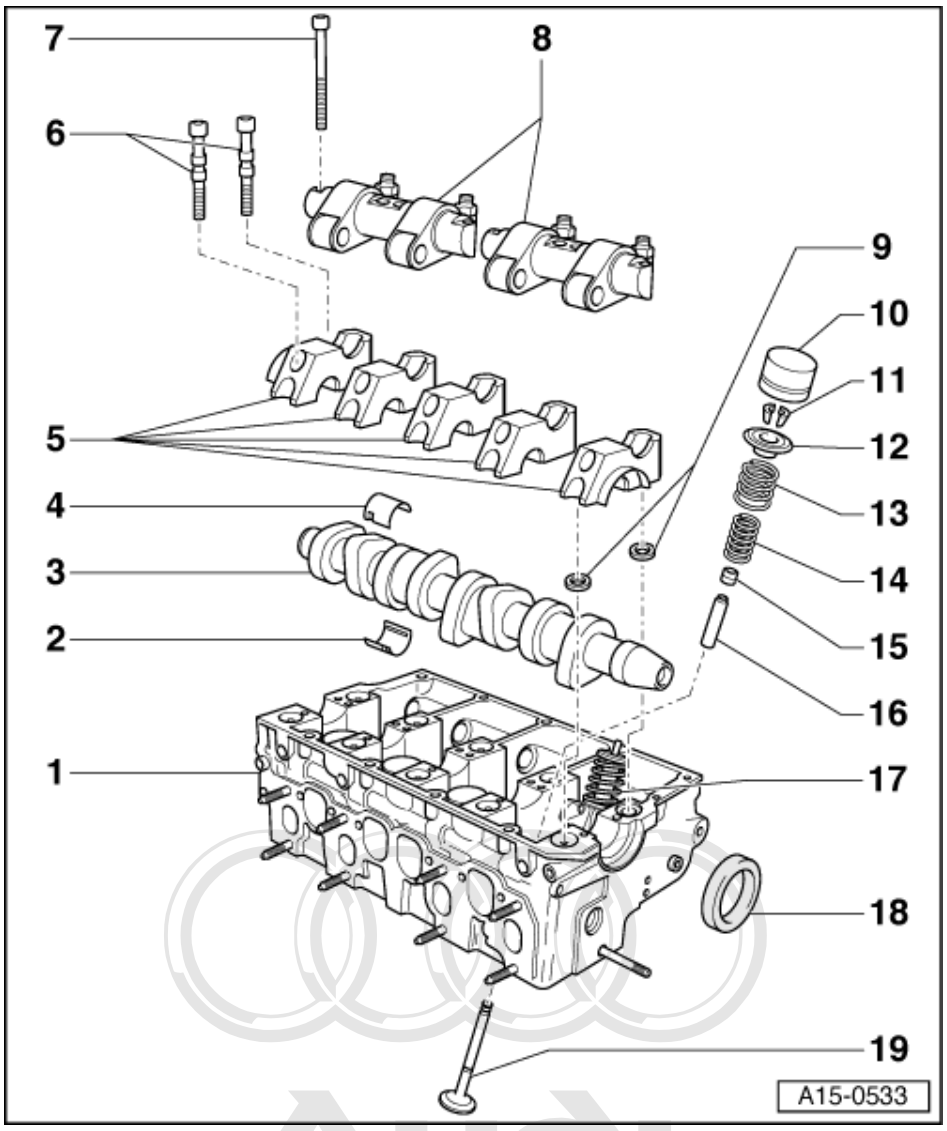
8 Valve lever shaft

- Mark
- Not to be interchanged
- Heed slackening off sequence => Page 15-63
- Heed tightening sequence => Page 15-67

9 Washer

- For cylinder head bolts
- Insert in cylinder head before mounting bearing covers

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



10 Hydraulic bucket tappet

- Checking => Page 15-70
- Removing and installing=>Page 15-73
- Not to be interchanged
- Set down with bearing surface downwards
- Check axial clearance of camshaft before installing => Page 15-54
- Lubricate contact surface

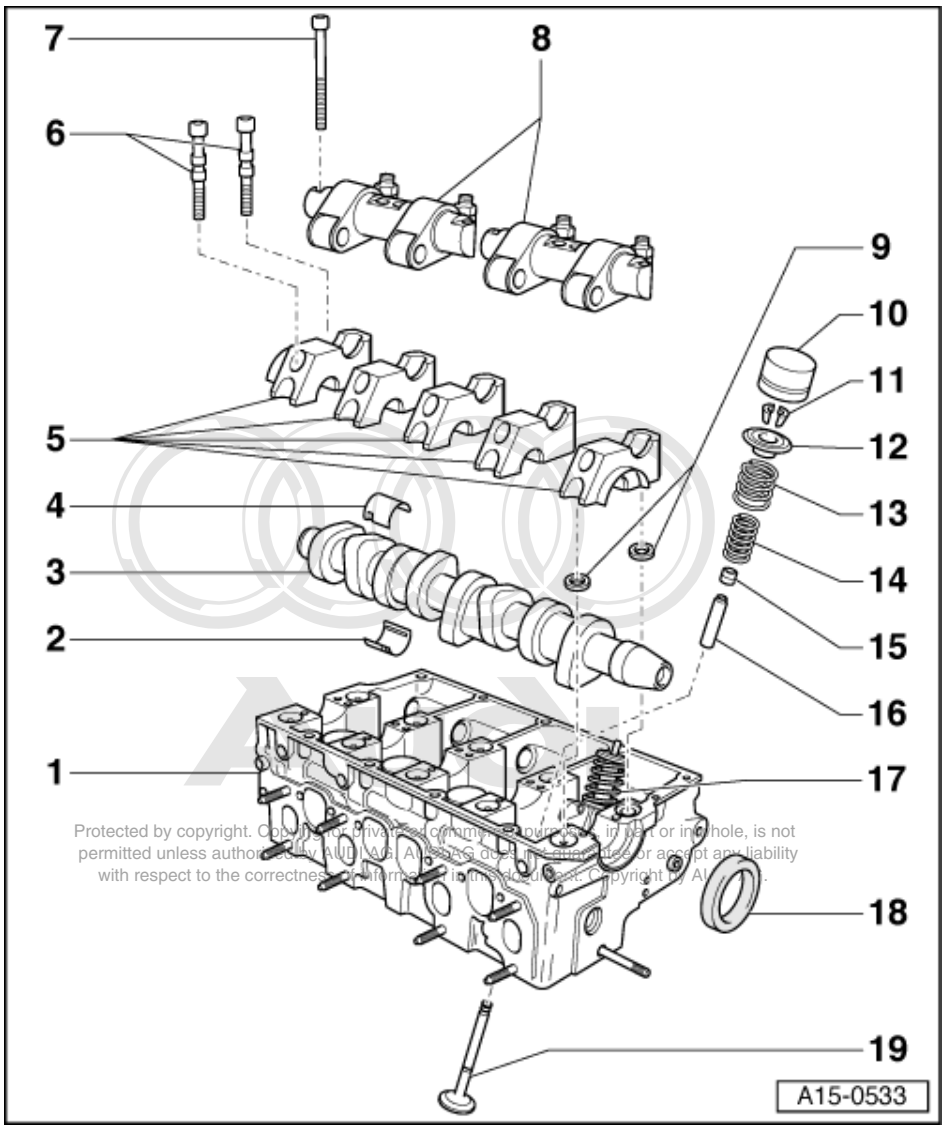
11 Valve cotters

12 Upper valve spring plate

13 Outer valve spring

- Remove and install with cylinder head fitted=>Page 15-73
- Remove and install with cylinder head removed using 2037

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



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

14 Inner valve spring

- Remove and install with cylinder head fitted=>Page 15-73
- Remove and install with cylinder head removed using 2037

15 Valve stem seal

- Replacing => Page 15-73

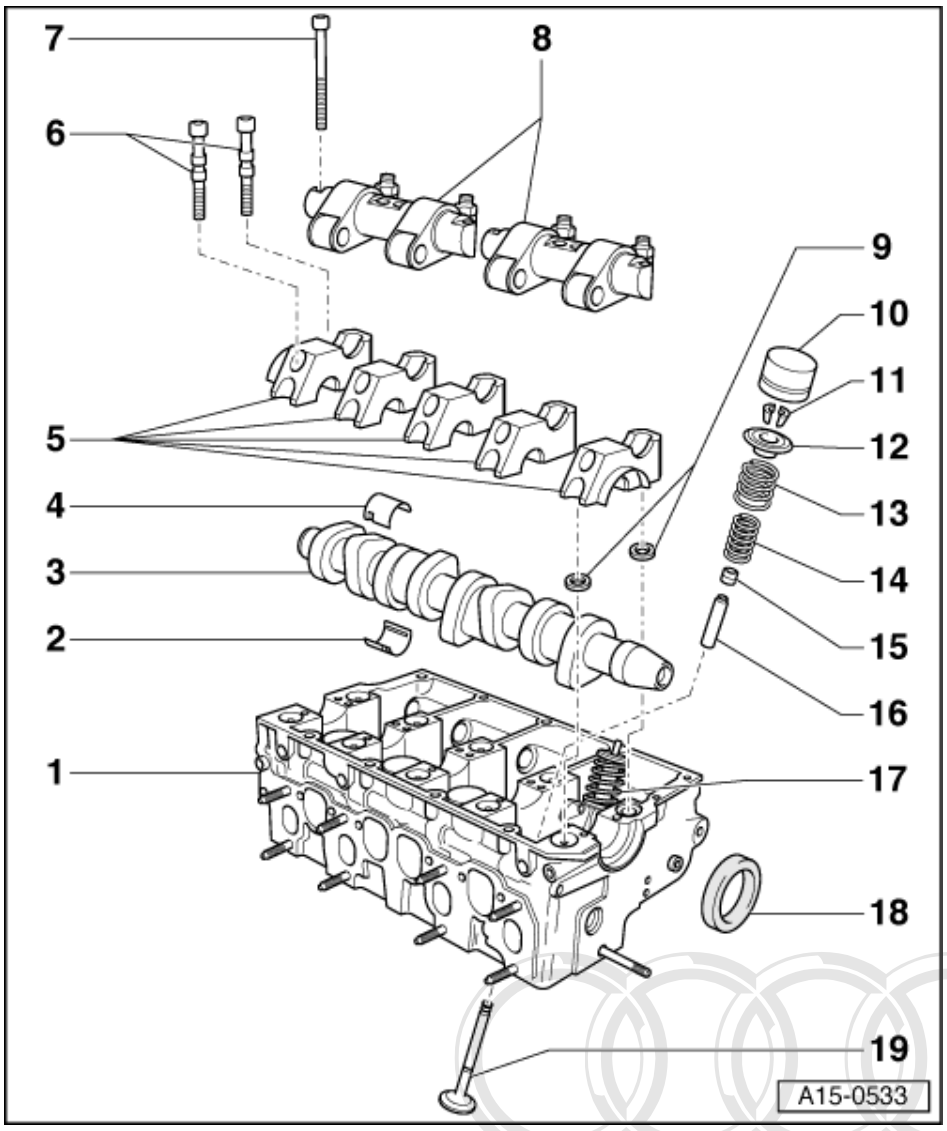
16 Valve guide

- Checking => Page 15-85
- If wear limit is exceeded replace cylinder head

17 Pump/nozzle unit

- Removing and installing:

=> TDI fuel-injection and preheating system (4-cyl. pump/nozzle unit); Repair Group 23; Servicing diesel direct injection system; Removing and installing pump/nozzle unit Servicing diesel direct injection system Removing and installing pump/nozzle unit

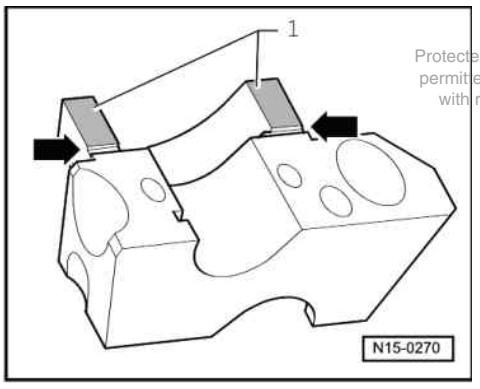


18 Sealing ring

- Removing and installing=>Page 15-55

19 Valves

- Not to be reworked; only grinding-in permissible
- Valve dimensions=>Fig.15-53



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

-> Fig.1 Sealing bearing covers 1 and 5

- Apply a thin, even coat of sealant to the surfaces -1-.

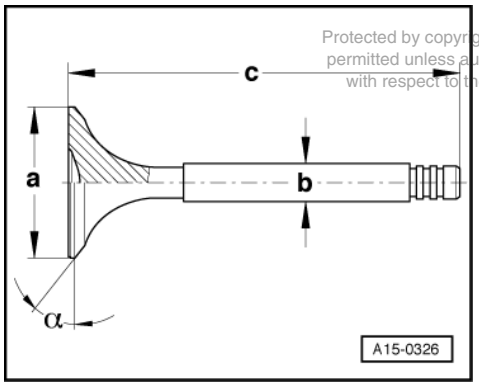
- Sealant

=> Parts List

Note:

Make sure no sealant gets into the grooves -arrows- or onto the other surfaces.

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



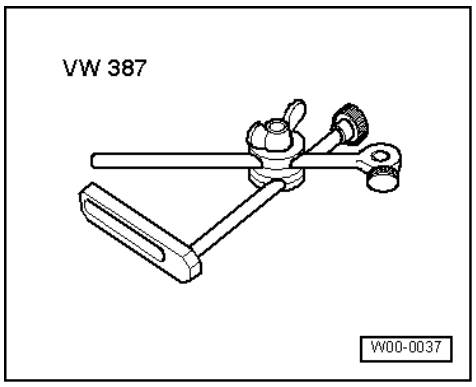
-> Fig. 2 Valve dimensions

Note:

Valves are not to be reworked. Only grinding-in is permitted.

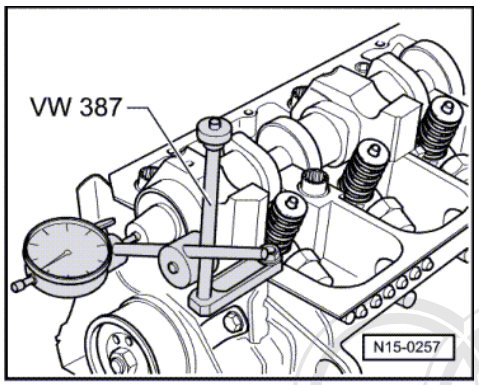
Dimension		Inlet valve	Exhaust valve
ø a	mm	35.95	31.45
ø b	mm	6.980	6.956
c	mm	89.95	89.95
α	<°	45	45

2.2 - Checking axial clearance of camshaft



Special tools and workshop equipment required

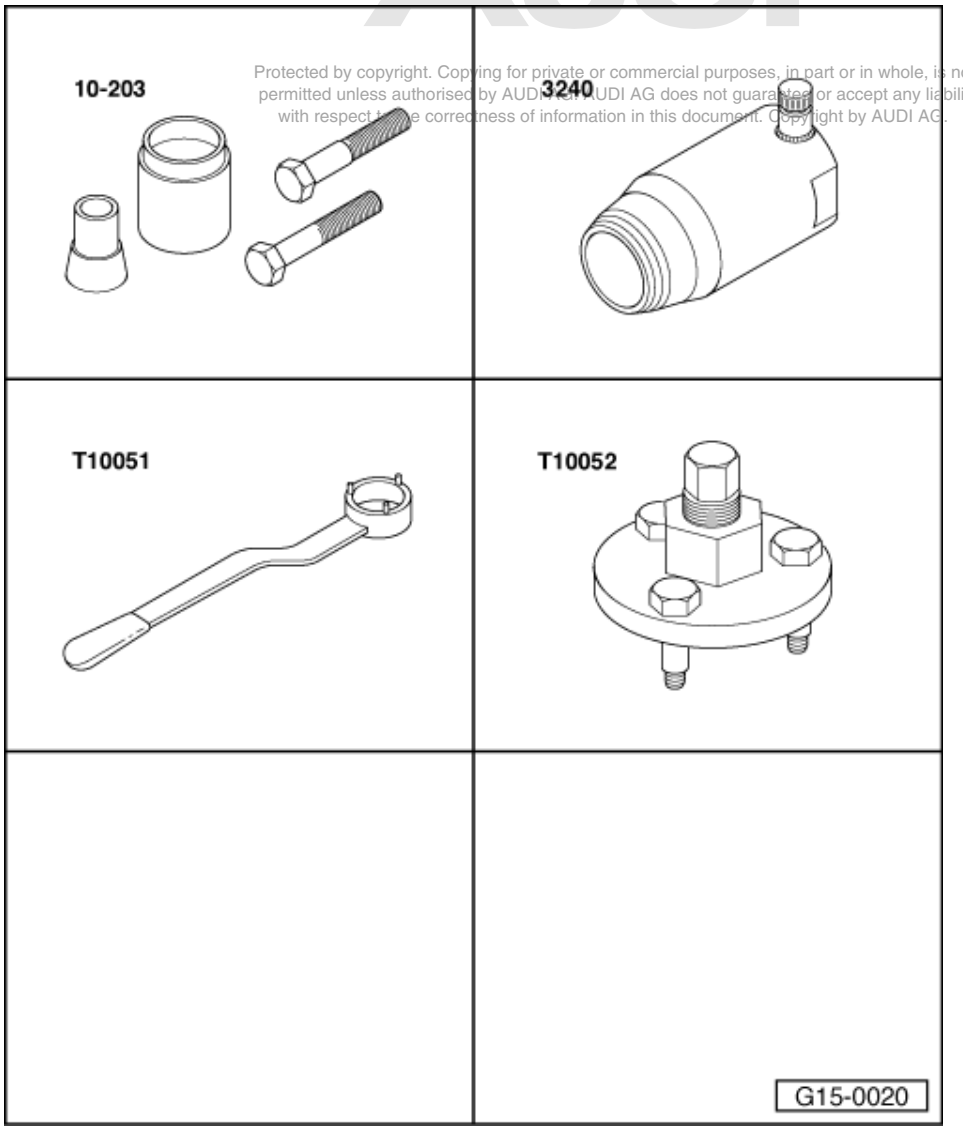
- Universal dial gauge holder VW 387
- Dial gauge



Test sequence

- -> Measure with bucket tappets removed and first and last bearing covers mounted.
  - Wear limit: max. 0.15 mm

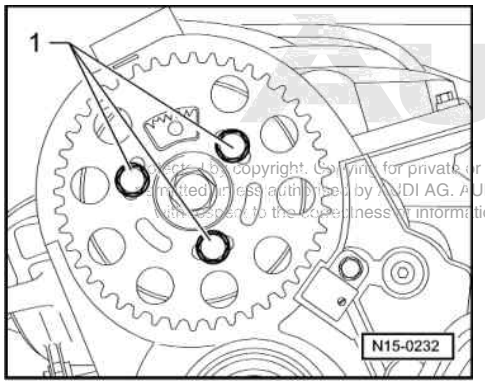
2.3 - Removing and installing camshaft oil seal



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.

Special tools and workshop equipment required

- Inserter 10-203
- Oil seal extractor 3240
- Counterhold T10051
- Puller T10052
- Bolt M12x65

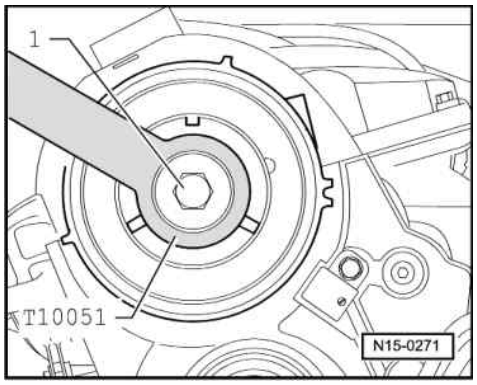


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

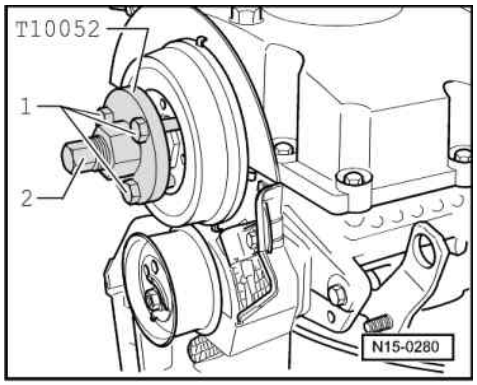
Removing

- Engine in position
- Lock carrier in service position =>Page 13-1.

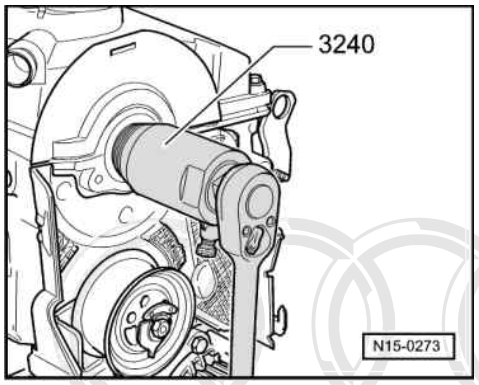
- Remove toothed belt => Page 13-36.
- -> Screw out camshaft sprocket bolts -1-.
- Detach camshaft sprocket from hub.



- -> Slacken hub bolt -1-. Use counterhold T10051.
- Screw out hub bolt approx. 2 turns.



- -> Position puller T10052 and screw bolts -1- into hub.
- Detach hub by bracing against hexagon (A/F 30) of puller and screw in bolt -2-.
- Detach hub from camshaft cone.



- Position inner section of oil seal extractor 3240 flush with outer section and lock with knurled screw.
- -> Lubricate threaded end of oil seal extractor, fit in position and screw firmly into oil seal as far as possible.
- Slacken off knurled screw and turn inner section against camshaft until oil seal is pulled out.
- Clamp flats of oil seal extractor in vice. Use pliers to remove oil seal.
- Clean contact and sealing surface.

Installing

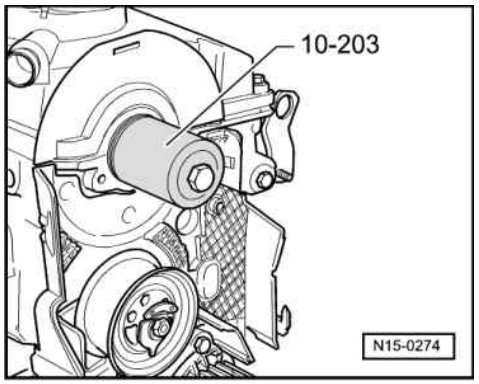
Install in reverse order, paying attention to the following:

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

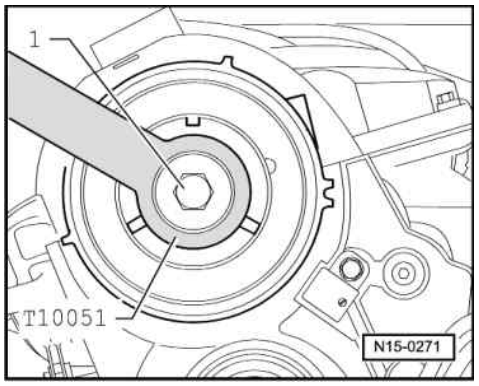
Note:

The sealing lip of the oil seal must not be additionally oiled or greased.

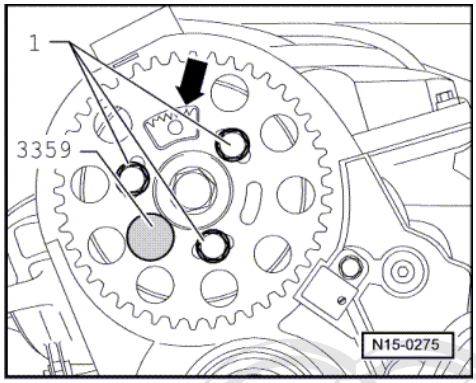
- Remove oil residues from the camshaft journal using a clean cloth.
- Seal off the groove on the camshaft cone (e.g. with adhesive tape).
- Fit oil seal carefully on camshaft.



- -> Press oil seal all the way in using thrust piece of inserter 10-203 and bolt M12x65.



- Mount hub on camshaft.
- -> Tighten bolt -1- to 100 Nm, bracing with counterhold T10051.



- -> Push camshaft sprocket onto hub.

Note:

The tooth segment -arrow- of the camshaft sprocket must be at the top.

- Screw bolts -1- in hand-tight.
- Arrest hub with rig pin 3359.

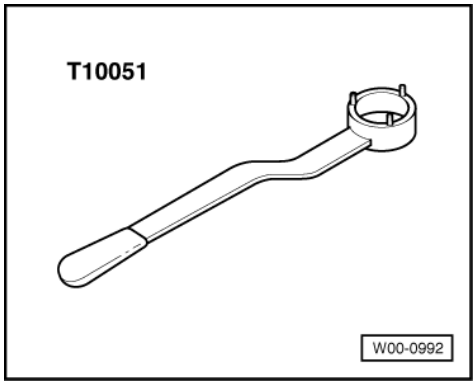
- Fit toothed belt (adjust valve timing) => Page 13-44.

Tightening torque

Component	Nm
Hub to camshaft	100

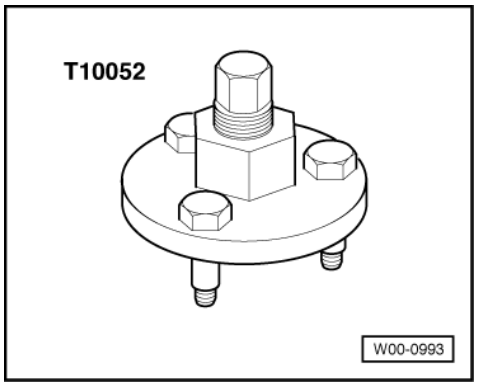
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

2.4 - Removing and installing camshaft

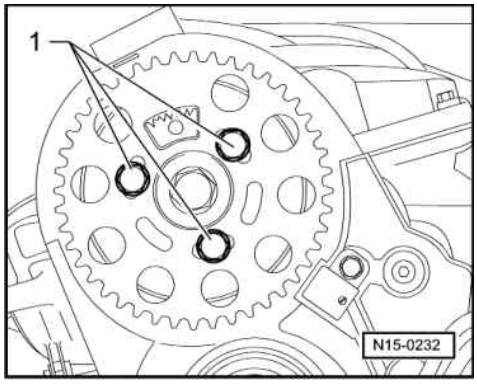


Special tools and workshop equipment required

- Counterhold T10051



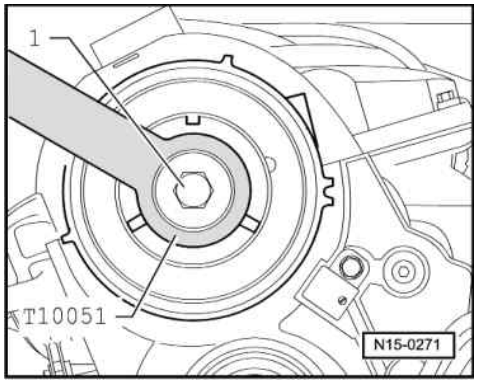
- Puller T10052



Removing

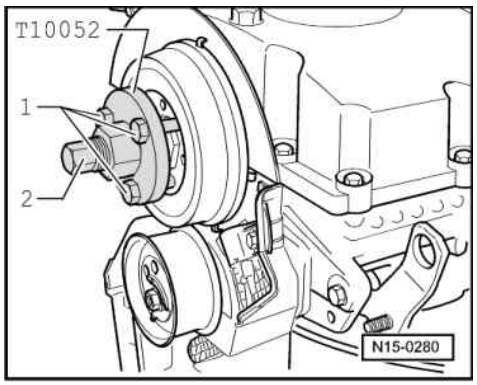
- Cylinder head fitted
- Lock carrier in service position =>Page 13-1.

- Remove toothed belt => Page 13-36.
- -> Screw out camshaft sprocket bolts -1-.
- Detach camshaft sprocket from hub.

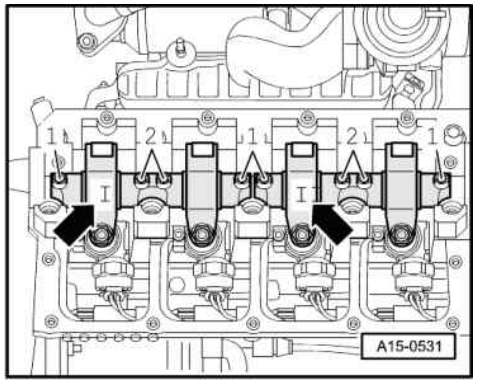


- -> Slacken hub bolt -1-. Use counterhold T10051.
- Screw out hub bolt approx. 2 turns.

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

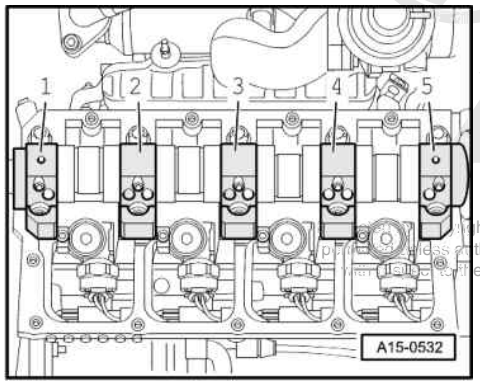


- -> Position puller T10052 and screw bolts -1- into hub.
- Detach hub by bracing against hexagon (A/F 30) of puller and screw in bolt -2-.
- Detach hub from camshaft cone.
- Remove cylinder head cover => Page 15-10.



- -> Mark the valve lever shafts with a waterproof marker to avoid them being interchanged and consequently having to reset the pump/nozzle unit -arrows-.
- First slacken the two outer bolts -1- on the valve lever shafts, then the inner bolts -2-.
- Detach valve lever shafts.
- Remove tandem pump:

=> Fuel supply - Diesel engines; Repair Group 20



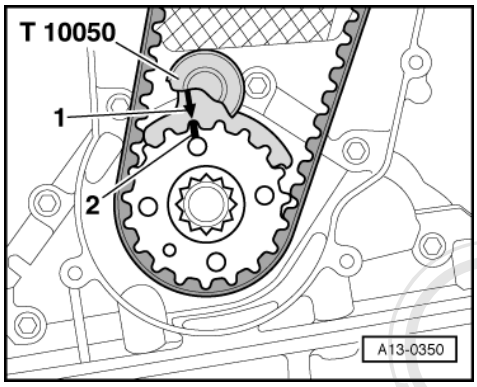
ght. Copying for private or commercial purposes, in part or in whole, is not
pp thorised by AUDI AG. AUDI AG does not guarantee or accept any liability
e correctness of information in this document. Copyright by AUDI AG.

- -> First remove bearing covers 1, 3 and 5. Unfasten bearing caps 2 and 4 alternately and diagonally.

Notes:

- Take care not to interchange camshaft bearing shells.
- Use waterproof felt-tip pen to mark assignment of camshaft bearing shells on back.

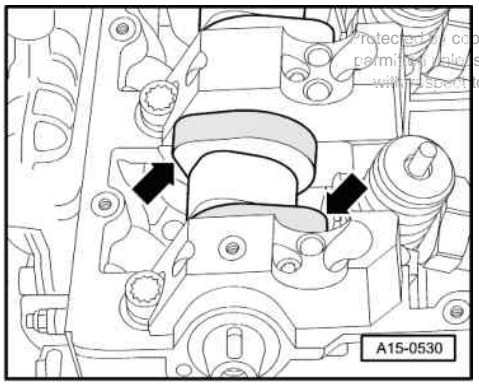
- Take out camshaft.



Installing

Install in reverse order, paying attention to the following:

- -> Crankshaft toothed belt locked at cylinder 1 TDC with crankshaft stop T10050.

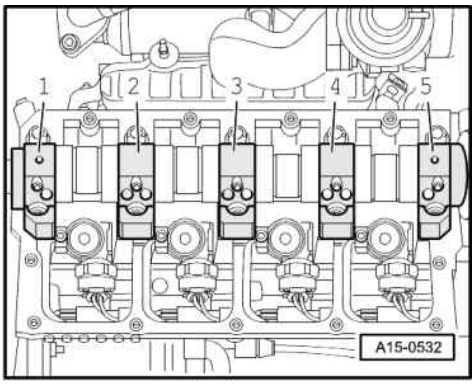


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

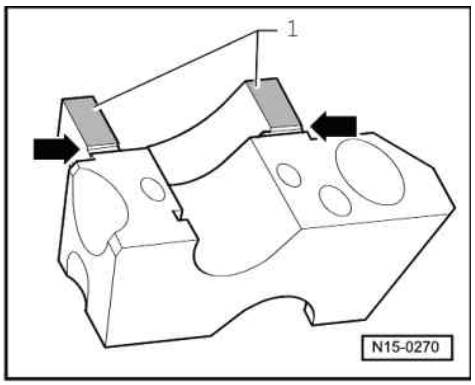
Notes:

- Do not interchange used bearing shells (pay attention to marking).
- When installing camshaft, make sure tabs of bearing shells are correctly seated in bearing covers and cylinder head.

- Lubricate camshaft contact surfaces.
- Mount camshaft at cylinder 1 TDC position:
  - -> On the camshaft the cams for cylinder 1 must all point uniformly upwards -arrows-



- -> Tighten bearing caps 2 and 4 alternately and diagonally.



- -> Apply a thin, even coat of sealant to the surfaces -1- of bearing covers 1 and 5.

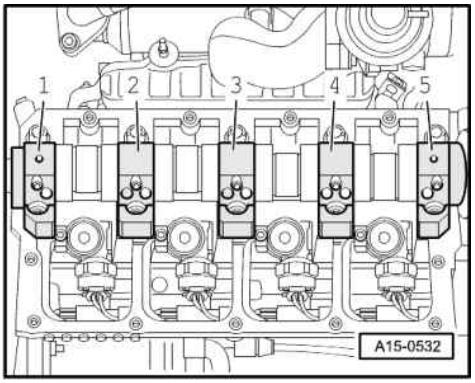
◆ Sealant

=> Parts List

Note:

Make sure no sealant gets into the grooves -arrows- or onto the other surfaces.

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.

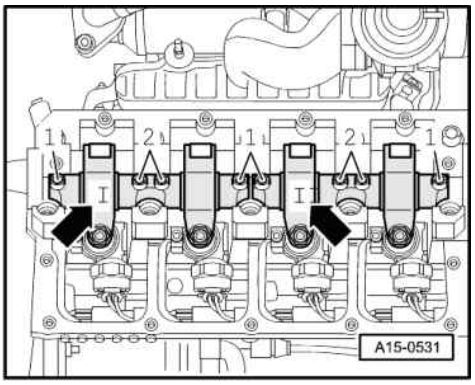


- -> Install bearing covers 1, 3 and 5 in place, and tighten them too.

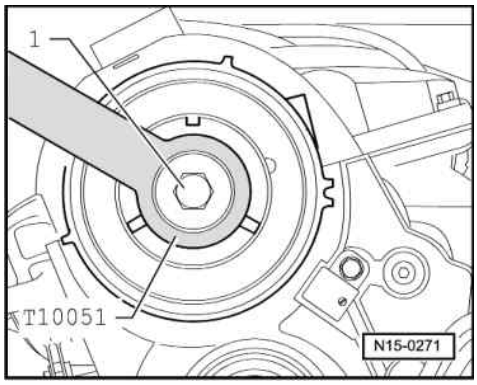
Note:

Bearing cover 5 must abut flush with the outer edge of the cylinder head, otherwise the tandem pump may leak.

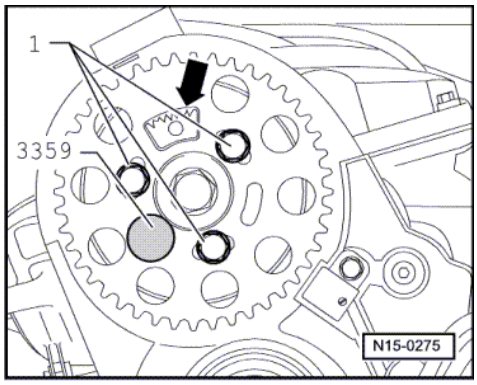
- Install camshaft oil seal => Page 15-55.



- -> Insert valve lever shafts. Refit to markings made during removal -arrows-.
- First tighten the inner bolts -2- and then the outer bolts -1- in several alternating stages.



- Mount hub on camshaft.
- -> Tighten bolt -1-, bracing with counterhold T10051.



- -> Push camshaft sprocket onto hub.

Note:

The tooth segment -arrow- of the camshaft sprocket must be at the top.

- Screw bolts -1- in hand-tight.
  - The camshaft sprocket must just about still turn, and must not tilt.
- Arrest hub with rig pin 3359.
- Install toothed belt (adjust valve timing) => Page 13-44.
- Install tandem pump:

=> Fuel supply - Diesel engines; Repair Group 20-

Notes:

- Engine is not to be started for approx. 30 minutes after installing camshaft, so as to allow hydraulic valve lifters to settle (valves would otherwise strike piston).
- After working on valve gear, carefully crank engine through at least 2 revolutions to ensure that no valves make contact on starting.

- If the valve lever shafts or ball pins and adjuster screws were replaced, you must adjust the pump/nozzle unit:

=> TDIfuel-injection and preheating system(4-cyl. pump/nozzle unit); Repair Group 23; Servicing diesel direct injection system; Removing and installing pump/nozzle unit Servicing diesel direct injection system Removing and installing pump/nozzle unit

- Install cylinder head cover => Page 15-12.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 cap to cylinder head	8 + 90°1)2)
Valve lever shaft	20 + 90°1)2)
Hub to camshaft	100

1) 90°corresponds to quarter of a turn
2) Replace bolts

2.5 - Checking hydraulic bucket tappets

Special tools and workshop equipment required

- Feeler gauge
- Wooden or plastic wedge

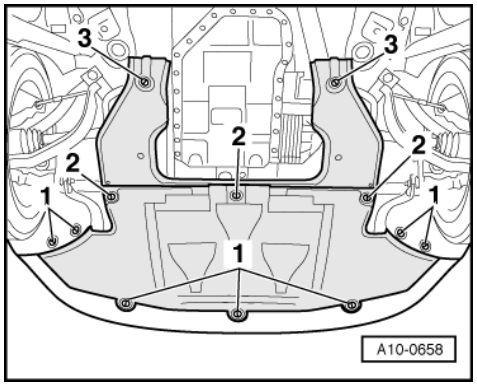
Notes:

- Hydraulic bucket tappets cannot be serviced.
- Irregular valve noise on starting is normal.

- Start engine and leave it running until coolant temperature is approx. 80 °C.
- Increase engine speed for 2 minutes to approx. 2500 rpm; perform test drive if necessary.

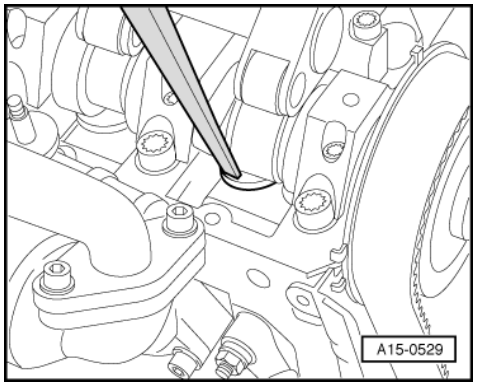
If hydraulic bucket tappets are still noisy, determine defective tappet as follows:
- Remove cylinder head cover => Page 15-10.
- Turn crankshaft until cams at bucket tappet to be tested are at top.

Vehicles with manual gearbox:
- Push vehicle forwards with 4th gear engaged and ignition switched off.



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

Vehicles with automatic gearbox:
- -> Release quick-release fasteners -1- and -2- and detach front noise insulation.
- Turn crankshaft clockwise by centre bolt of crankshaft toothed belt sprocket.



All models:

- Determine clearance between cam and bucket tappet.
- -> Press bucket tappet down with a wooden or plastic wedge. Replace tappet if a 0.20 mm feeler gauge can be inserted between camshaft and bucket tappet.

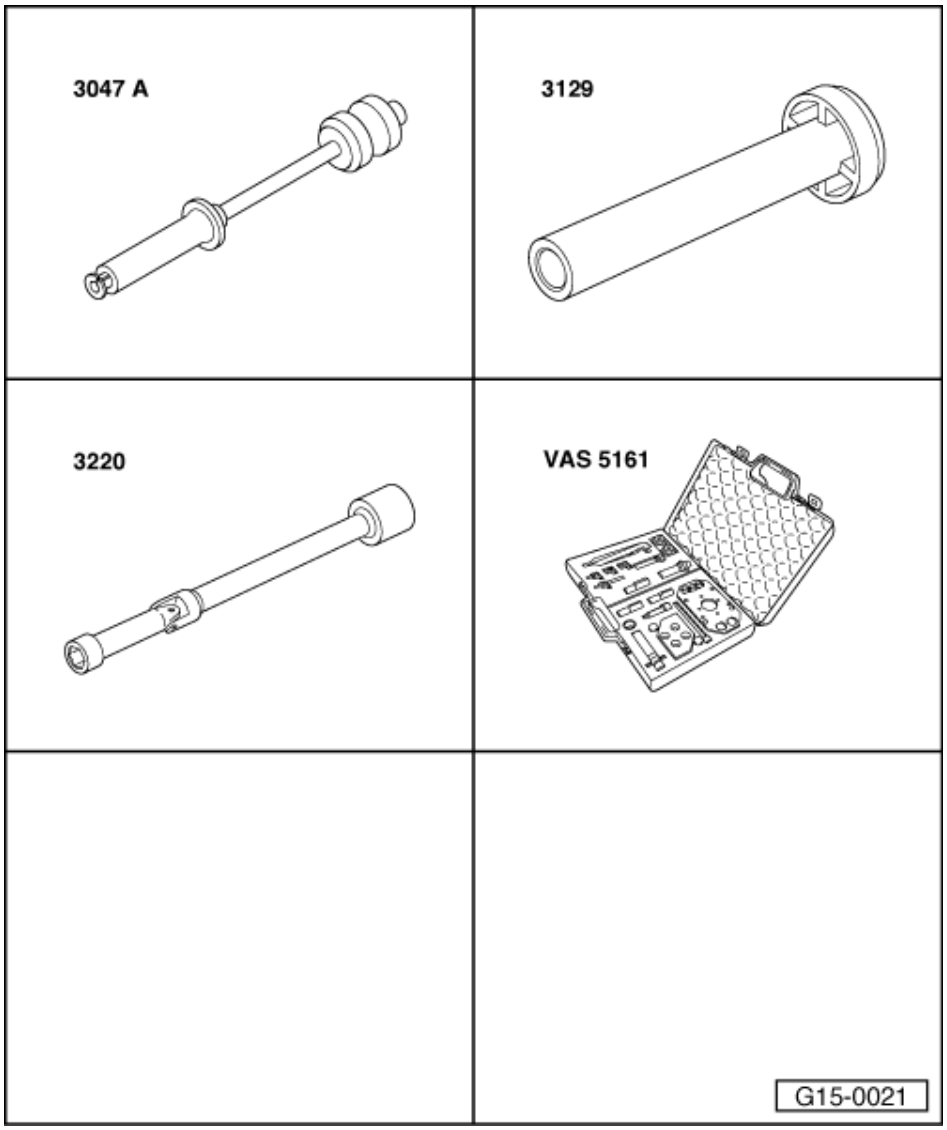
- Replacing bucket tappet => Removing camshaft, Page 15-61.

Notes:

- Engine is not to be started for approx. 30 minutes after installing camshaft, so as to allow hydraulic valve lifters to settle (valves would otherwise strike piston).
- After working on valve gear, carefully crank engine through at least 2 revolutions to ensure that no valves make contact on starting.

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

2.6 - Replacing valve stem seals



Special tools and workshop equipment required

- Puller 3047 A
- Pressing-on tool 3129
- Jointed spanner 3220

- Dismantling and assembly tool kit VAS 5161

Removing

- Cylinder head fitted

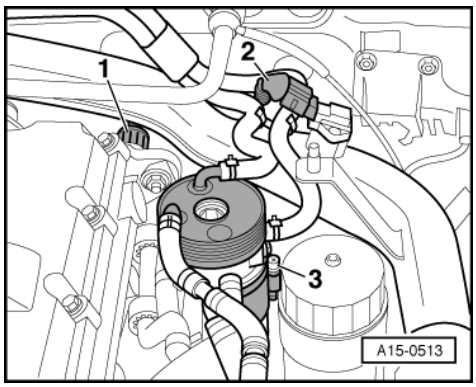
Note:

With the cylinder head removed, the valve stem seals can be replaced using special tool 2037.

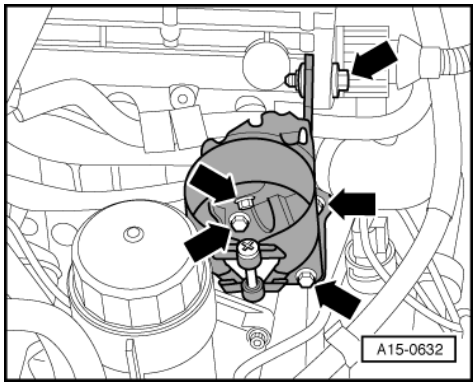
- Remove camshaft => Page 15-61.
- Take camshaft bearing shells out of cylinder head.

Notes:

- Take care not to interchange camshaft bearing shells.
- Use waterproof felt-tip pen to mark assignment of camshaft bearing shells on back.



- -> Unplug connector -2-.
- Screw out bolt -3-.
- Lift fuel filter out of holder and place aside together with connected fuel hoses.



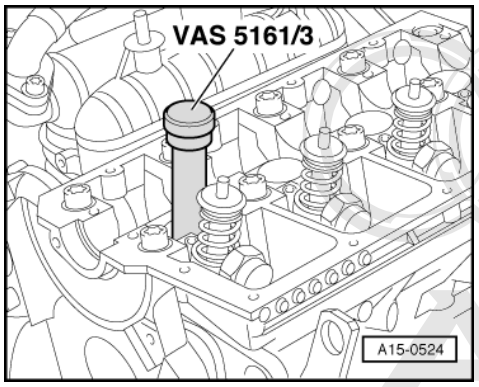
- -> Unbolt fuel filter holder -arrows-.

Notes:

- Take care not to interchange bucket tappets.
- Use waterproof felt-tip pen to mark assignment of bucket tappets on back.

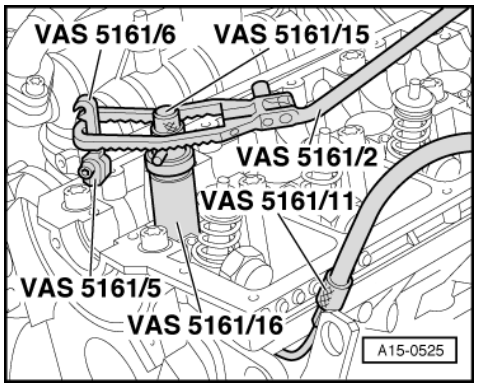
- Take bucket tappets out of guides and set them down with bearing surface facing downwards.

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

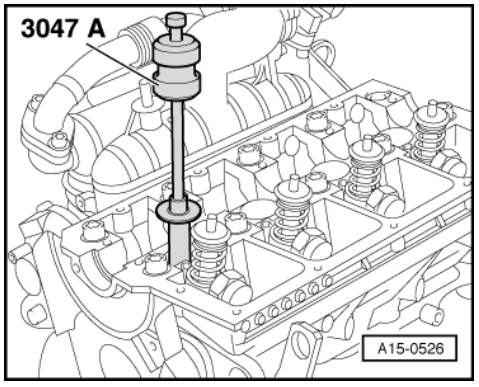


- -> Insert tool VAS 5161/3 in bucket tappet guide.
- Release the sticking valve keys from all valves by hitting them with a plastic hammer.
- Disconnect connectors from glow plugs.
- Remove all glow plugs with jointed spanner 3220.

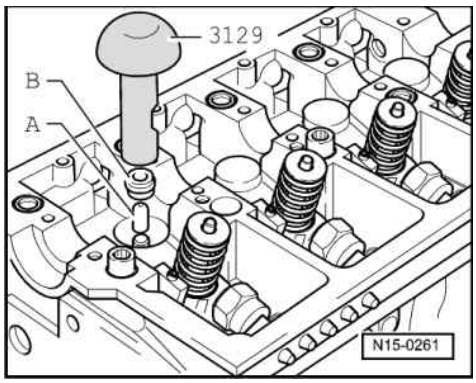
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- -> Screw adapter VAS 5161/11 hand-tight into respective glow plug thread.
- Screw locking element VAS 5161/6 with locking fork (M6) VAS 5161/5 into a tapped hole on cylinder head.
- Push guide bush VAS 5161/16 all the way into bucket tappet guide on valve being removed.
  - Installation position: Ribbed surfaces are oriented transverse to direction of travel
- Slot assembly cartridge VAS 5161/15 into guide bush.



- -> Connect adapter VAS 5161/11 to compressed air port by a standard commercially available intermediate section.
  - Minimum pressure: 6 bar
- Engage VAS 5161/2 at VAS 5161/6 and press down assembly cartridge.
- At the same time, turn knurled screw of assembly cartridge clockwise until ends engage in valve keys.
- Move knurled screw back and forth slightly; valve keys are thus forced apart and enter into cartridge.
- Release VAS 5161/2.
- Take out assembly cartridge, guide bush, valve disk and valve springs.
- Detach valve stem seals with 3047 A.

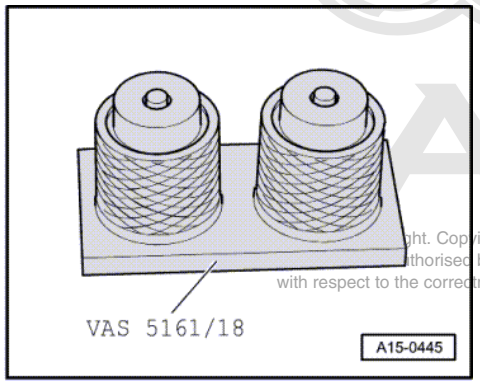


Installing

Note:

A plastic sleeve -A- is included with the new valve stem seals.

- -> So as not to damage new valve stem seals -B-, attach plastic sleeve -A- to valve stem.
- Lubricate sealing lip of valve stem seal slightly.
- Slip valve stem seal over plastic sleeve.
- Press valve stem seal carefully onto valve guide using press-on tool 3129.
- Detach plastic sleeve again.



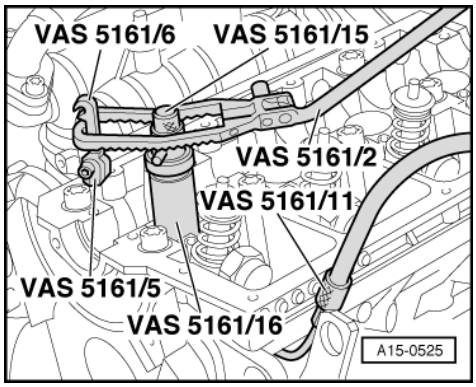
ght. Copying for private or commercial purposes, in part or in whole, is not
thorised by AUDI AG. AUDI AG does not guarantee or accept any liability
with respect to the correctness of information in this document. Copyright by AUDI AG.

- -> If valve keys are removed from assembly cartridge, they must first be placed in insertion tool VAS 5161/18.

Note:

Large valve key diameter faces upwards.

- Press assembly cartridge VAS 5161/15 from above onto insertion tool and insert into valve keys.



- -> Re-insert assembly cartridge VAS 5161/15 into guide bush VAS 5161/16.
- Press down tool VAS 5161/2 and pull up knurled screw by twisting it in both directions, thus inserting the valve keys.

- Release tool VAS 5161/2 with knurled screw still pulled.

- Insert bucket tappets.
- Fit camshaft => Page 15-64.

Notes:

- Engine is not to be started for approx. 30 minutes after installing camshaft, so as to allow hydraulic valve lifters to settle (valves would otherwise strike piston).
- After working on valve gear, carefully crank engine through at least 2 revolutions to ensure that no valves make contact on starting.

Tightening torques

Component		Nm
Glow plugs in cylinder head		15
Fuel filter holder to	M6	10
cylinder head/cylinder block	M7	15
	M8	20

2.7 - Reworking valve seats

Note:

Rework valve seats if grinding-in does not yield proper surface appearance.

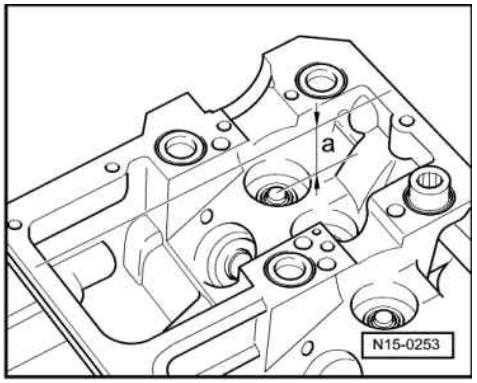
Special tools and workshop equipment required

- Depth gauge
- Valve seat grinding tool

Notes:

- When repairing engines with leaking valves, it is not sufficient to reface valve seats and renew valve. Particularly in the case of high-mileage engines, it is necessary to check the valve guides for wear => Page 15-85.
- Valve seats should only be reworked just enough to produce a perfect seating pattern.
- Calculate the maximum permissible reworking dimension before reworking.
- If max. perm. reworking dimension is 0 mm or less than 0 mm, repeat measurement with new valve. Replace cylinder head if result obtained is still 0 mm or less than 0 mm.

Printed by Audi of America, Copyright by AUDI AG. 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.



Calculating max. perm. reworking dimension

- Insert valve and press it firmly against valve seat.

Note:

Use new valve for measurement purposes if valve is replaced as part of repair work.

- -> Use depth gauge to measure distance -a- between end of valve stem (upper edge) and upper surface of cylinder head.
- Calculate max. perm. reworking dimension from distance measured and minimum dimension.

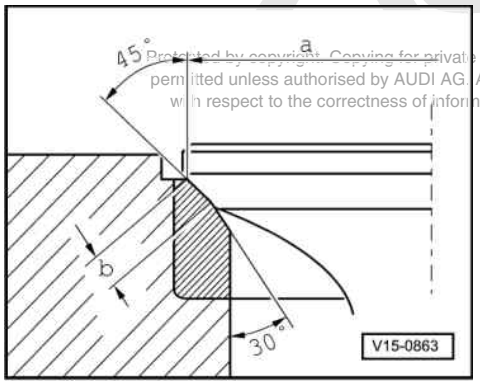
Minimum dimensions	
Inlet valve	Exhaust valve
43.4 mm	43.2 mm

Measured distance minus minimum dimension
= max. perm. reworking dimension

Example of inlet valve:		
	Measured distance	44.1 mm
-	Minimum dimension	- 43.4 mm
=	max. perm. reworking dimension	= 0.7 mm

Note:

If max. perm. reworking dimension is 0 mm or less than 0 mm, repeat measurement with new valve. Replace cylinder head if result obtained is still 0 mm or less than 0 mm.



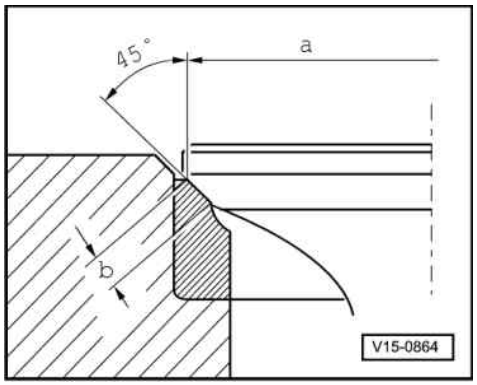
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

-> Reworking inlet valve seat

Dimension		Inlet valve seat
ø a	mm	35.7
b	mm	1.6
	45°	Valve seat angle

Note:

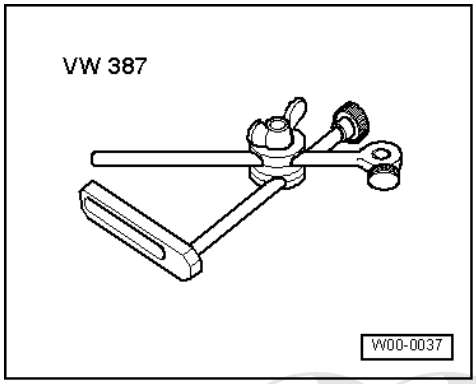
The 30 ° relief-milling of the valve seat is essential because of the flow conditions in the intake duct.



-> Reworking exhaust valve seat

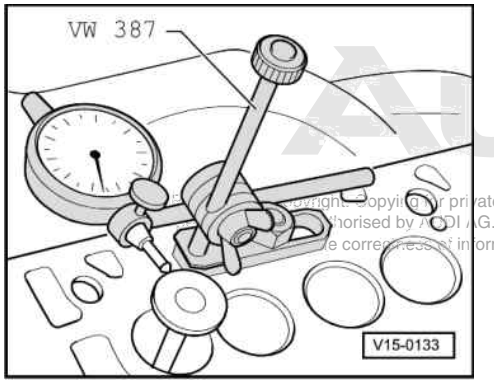
Dimension		Exhaust valve seat
ø a	mm	31.4
b	mm	2.7
	45°	Valve seat angle

2.8 - Checking valve guides



Special tools and workshop equipment required

- Universal dial gauge holder VW 387
- Dial gauge



Copyright. Copying for private or commercial purposes, in part or in whole, is not 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.

- -> Insert valve in guide. The valve stem end must abut flush with the guide.

- Determine lateral play.

Wear limit

Inlet valve guide	Exhaust valve guide
1.30 mm	1.30 mm

Notes:

- If wear limit is exceeded, repeat measurement with new valves. If wear limit is still exceeded, replace cylinder head. The valve guides cannot be replaced.
- Use new valve for measurement purposes if valve is replaced as part of repair work.

2.9 - Checking valves

- Visually inspect for scoring at stem and surface of seat. Replace valves in the event of distinct scoring.

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

1.1 - Removing and installing lubrication system components

Notes:

- If large quantities of metal swarf or abrasion particles are found in the engine oil in the course of engine repair work, the oil ducts are to be carefully cleaned and the oil cooler replaced so as to prevent further damage.
- Oil level must not be above max. mark, otherwise catalytic converter could be damaged.
- Oil spray jet and pressure relief valve
  => Fig.17-6
- Heed current information on the use of sealants.

=> Parts List

Viscosity classes and oil specifications:

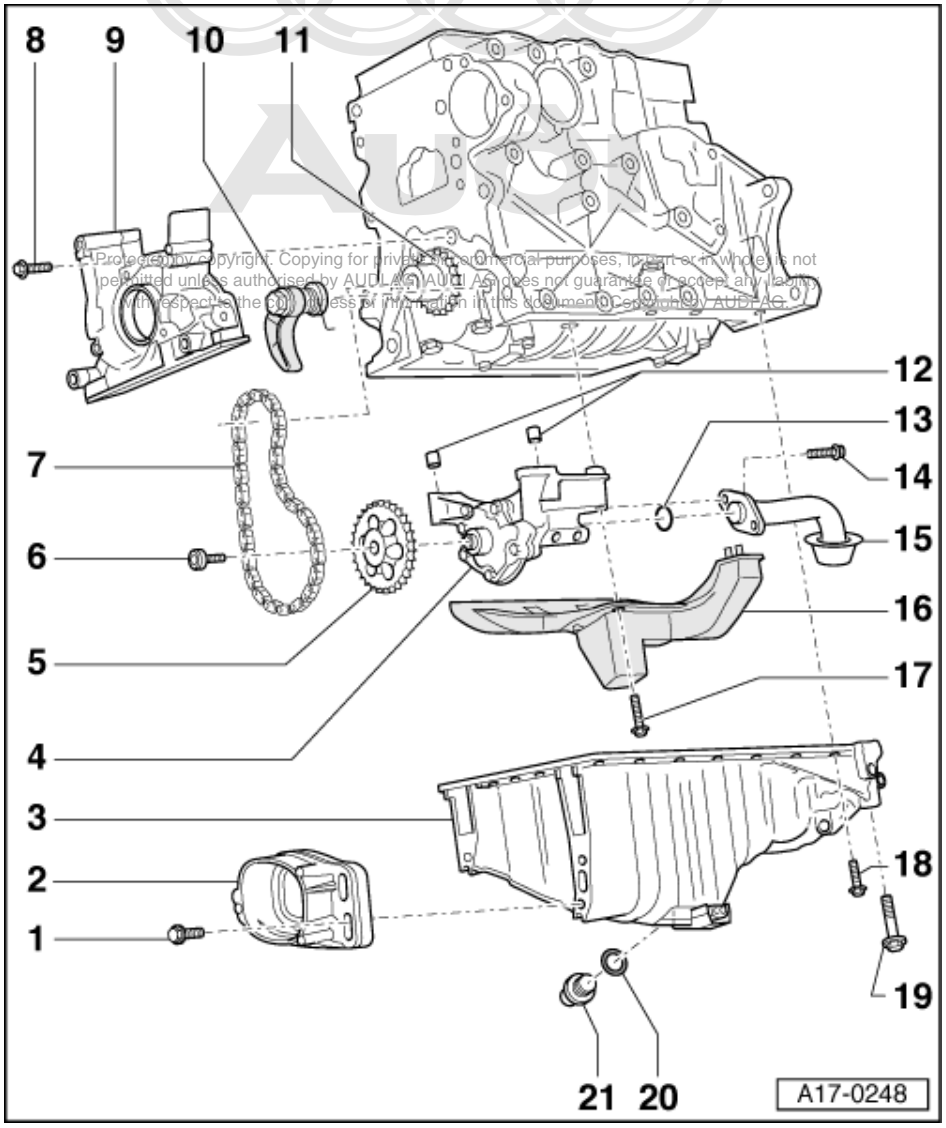
=> Maintenance

Oil capacities:

=> Exhaust Emission Test binder

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

1.2 - Part I



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 28 Nm

2 Stop for torque reaction support

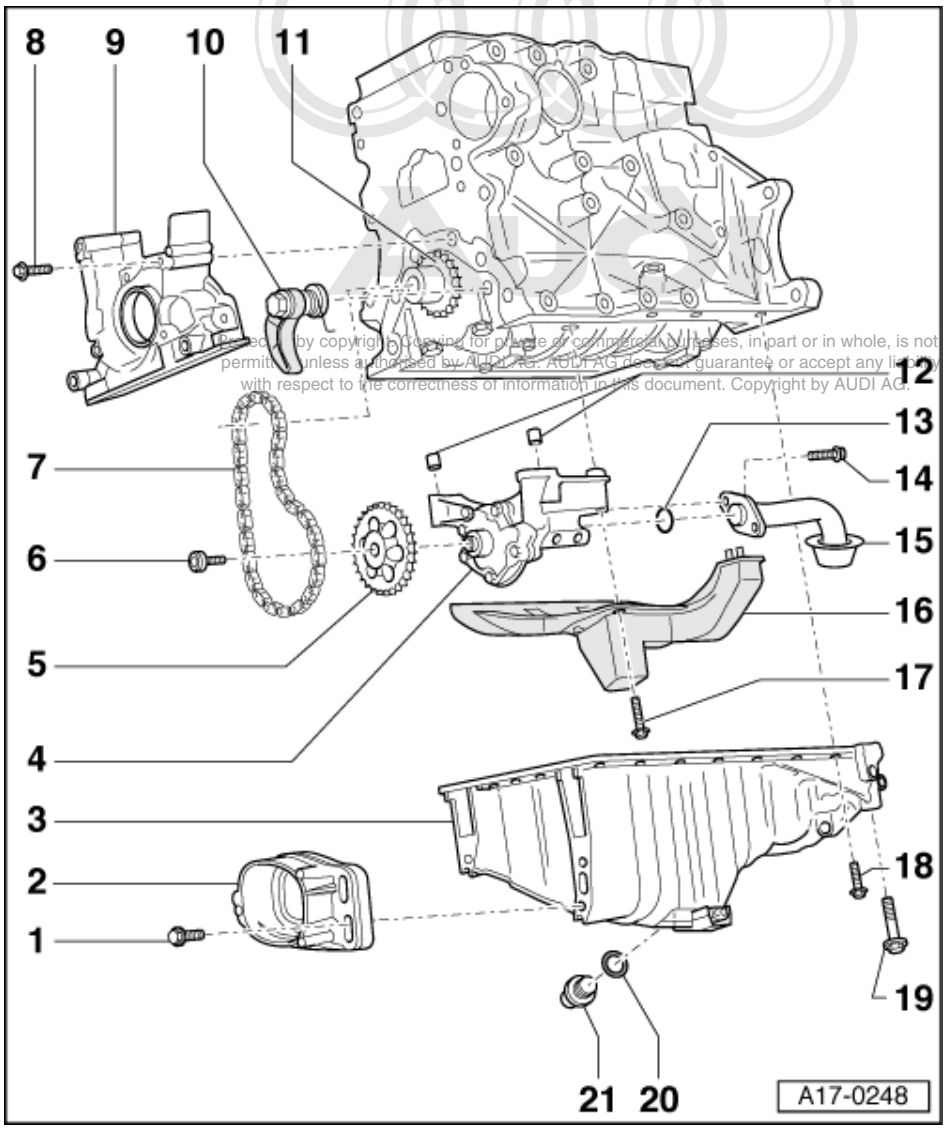
3 Sump

- Removing and installing=>Page 17-10
- Apply silicone sealant on installation
- Sealant

=> Parts List

4 Oil pump

- With pressure relief valve, 12 bar
- Removing and installing=>Page 17-27
- Before installing, check whether the two dowel sleeves -Item 12- for centring oil pump/cylinder block have been fitted



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

- Replace pump if there is scoring on moving surfaces and gear teeth
- Tightening torque for oil pump cover to oil pump housing: 10 Nm

5 Chain sprocket for oil pump

- Sprocket can only be fitted on oil pump shaft in one position

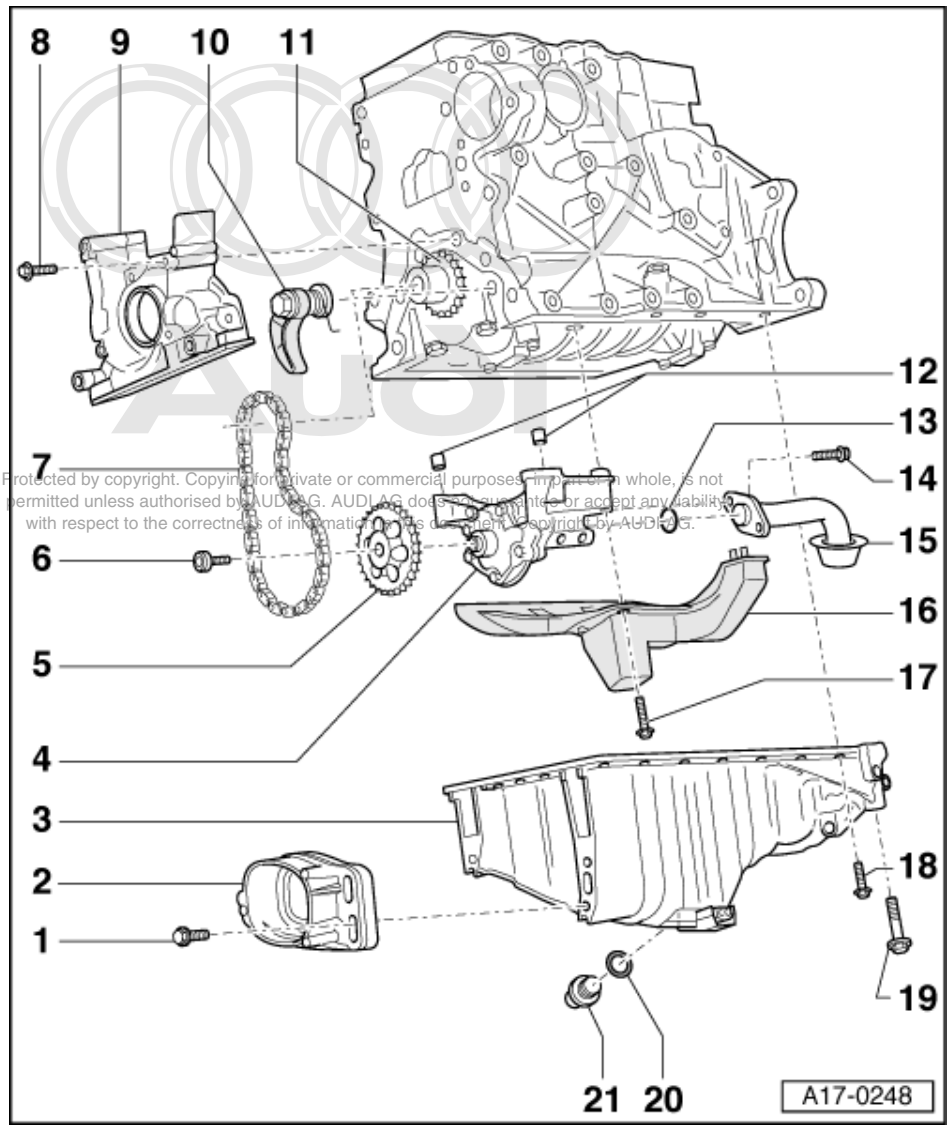
6 20 Nm + further 90° (1/4 turn.) turn

- Replace

7 Drive chain for oil pump

- Mark DOR before removing
- Check for wear

8 15 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.

9 Front sealing flange

- Apply silicone sealant on installation => Page 13-61
- Sealant

=> Parts List

- Replacing crankshaft oil seal -pulley end => Page 13-56

10 Chain tensioner

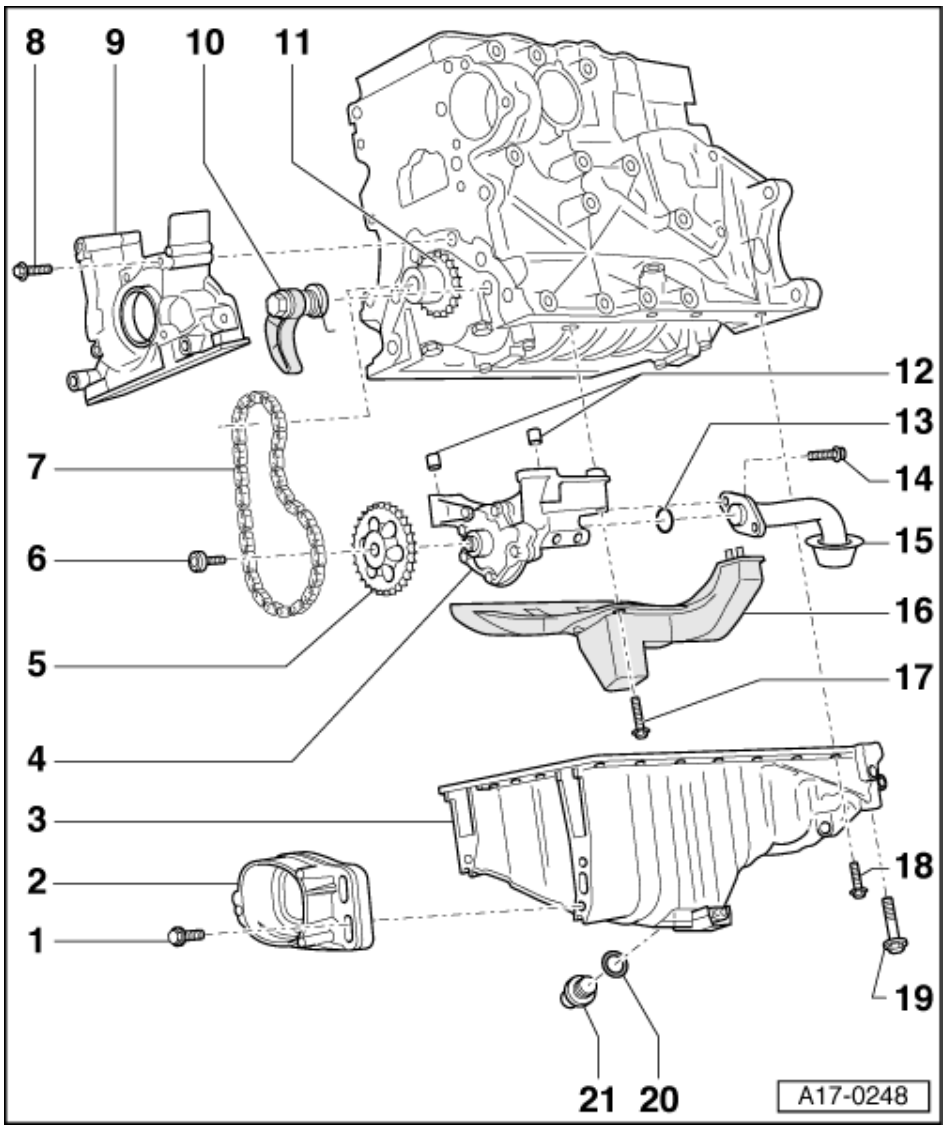
- Tighten to 16 Nm
- Do not dismantle
- Replace only as complete assembly
- Pay attention to installation position
- Pre-tension spring and engage before installing

11 Chain sprocket for oil pump

- Removing and installing=>Page 13-82

12 Dowel sleeve

- 2x



13 O-ring
- Replace

14 16 Nm

15 Suction pipe
- Clean strainer if dirty

16 Baffle plate

17 16 Nm

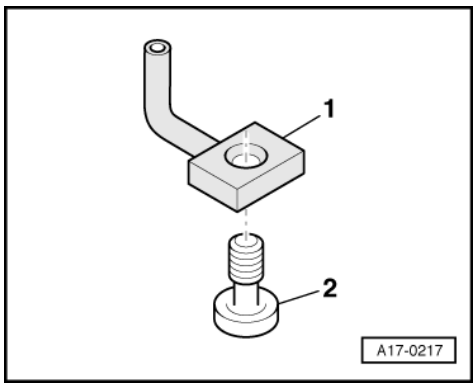
18 15 Nm
- Tighten diagonally in stages
- Observe tightening sequence
  => Page 17-24

19 40 Nm

20 Sealing ring
- Replace

21 Oil drain plug, 30 Nm

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



-> Fig.1 Oil spray jet and pressure relief valve

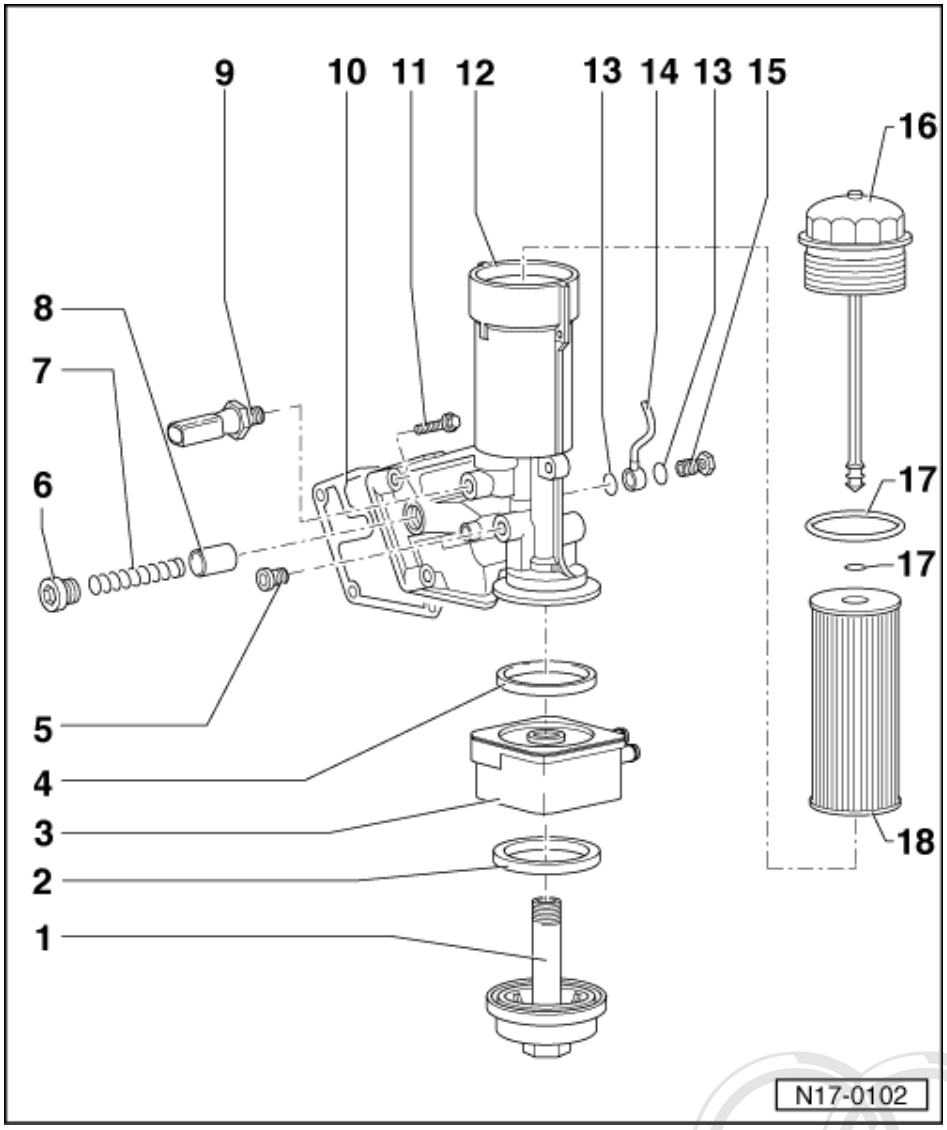
1 - Oil spray jet (for piston cooling)
-Different versions
-Assignment

=> Parts List

2 - Bolt with pressure relief valve - 27 Nm
-Opening pressure 1.3 ... 1.6 bar

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

1.3 - Part II



1 Screw plug, 25 Nm
2 Gasket
- Replace

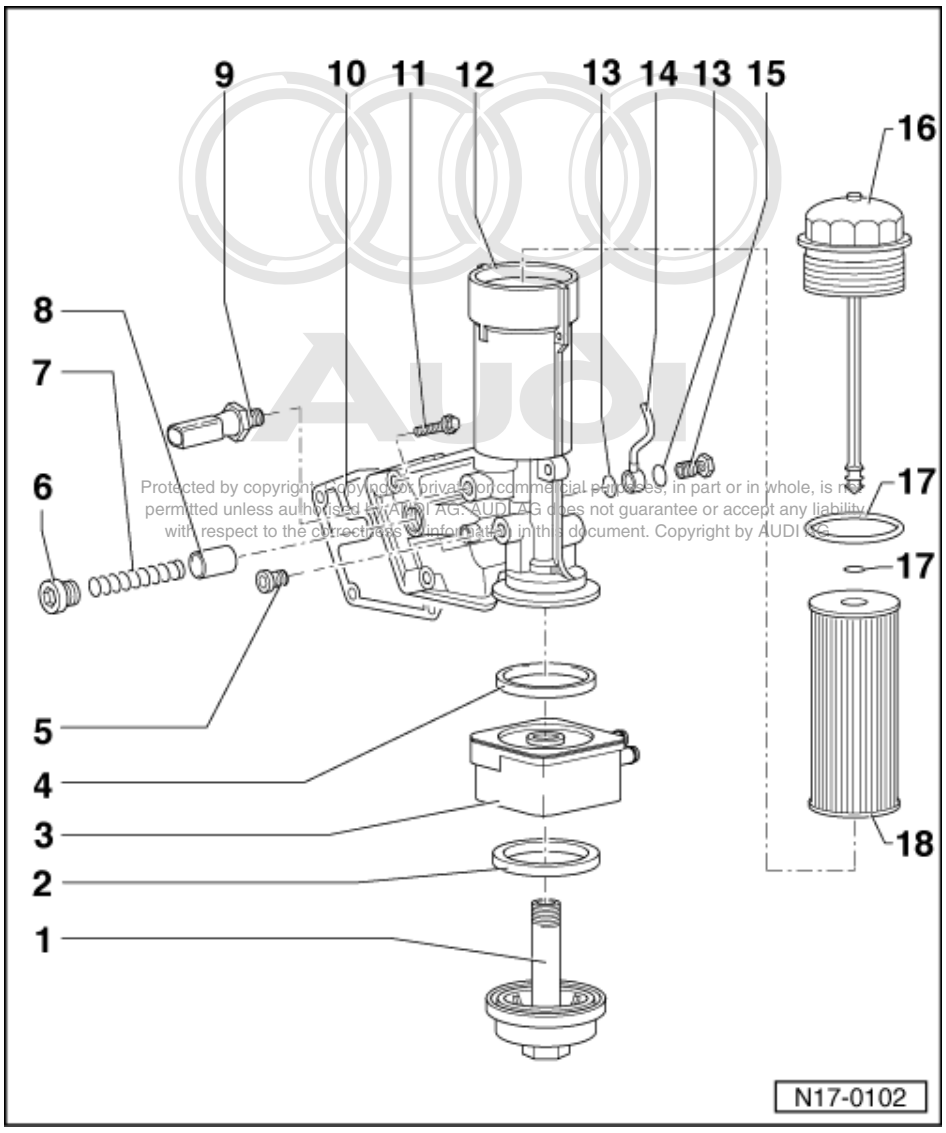
3 Oil cooler
- Ensure clearance to adjacent components
- See note => Page 17-1

4 Gasket
- Replace

5 Screw plug - 10 Nm
- In case of leakage, cut open oil seal and replace

6 Screw plug - 40 Nm
7 Spring
- For pressure relief valve approx. 5 bar

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



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

- For pressure relief valve approx. 5 bar

9 Oil pressure switch -F1 - 20 Nm

- 0.9 bar - grey or
  0,7 bar - brown
- Checking => Page 17-29
- In case of leakage, cut open oil seal and replace

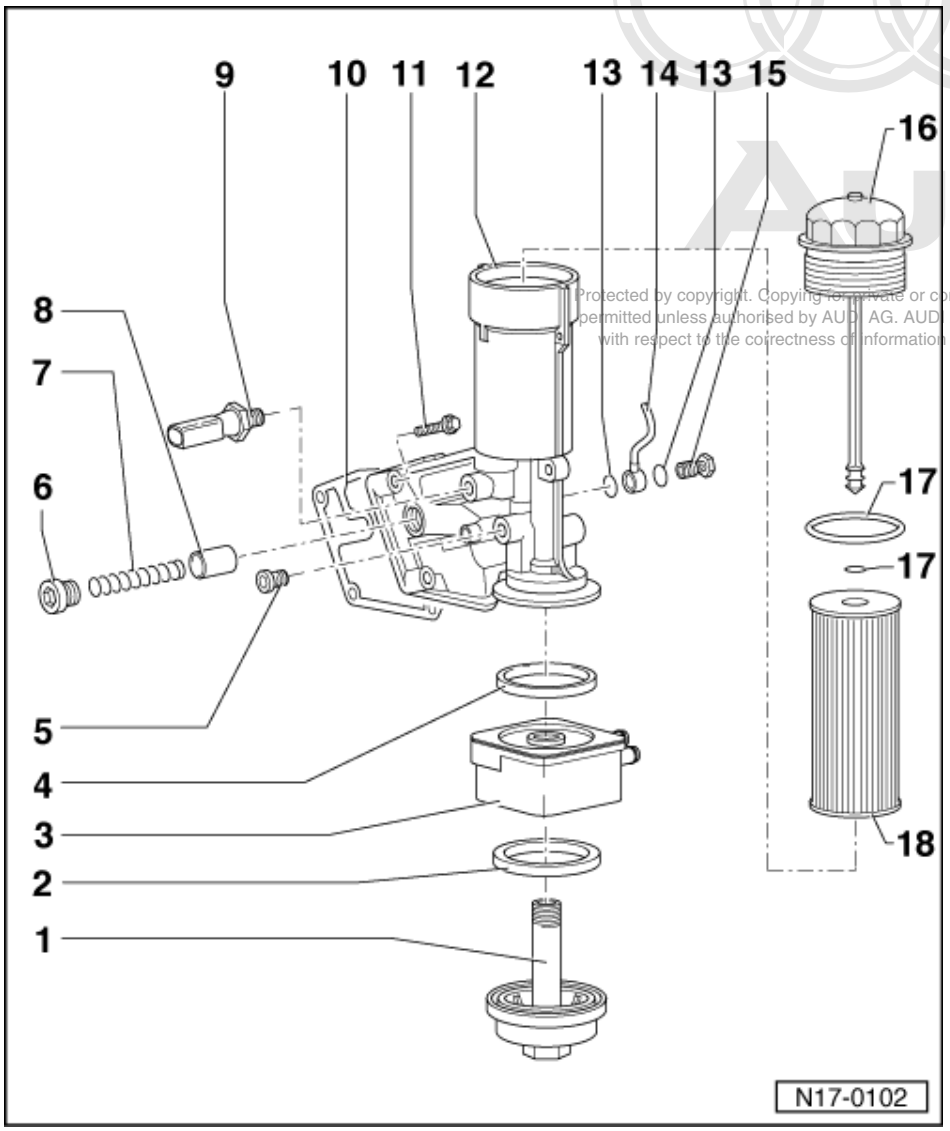
10 Gasket

- Replace

11 14 Nm + further 90° (1/4 turn.) turn

- Replace
- First fit top left and bottom right bolts, then tighten all four bolts diagonally

12 Oil filter holder



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

13 Oil seal

- Replace

14 Oil supply pipe

- To turbocharger

15 Banjo bolt, 25 Nm

16 Cap - 25 Nm

- Release and tighten with oil filter key 3417

17 O-ring

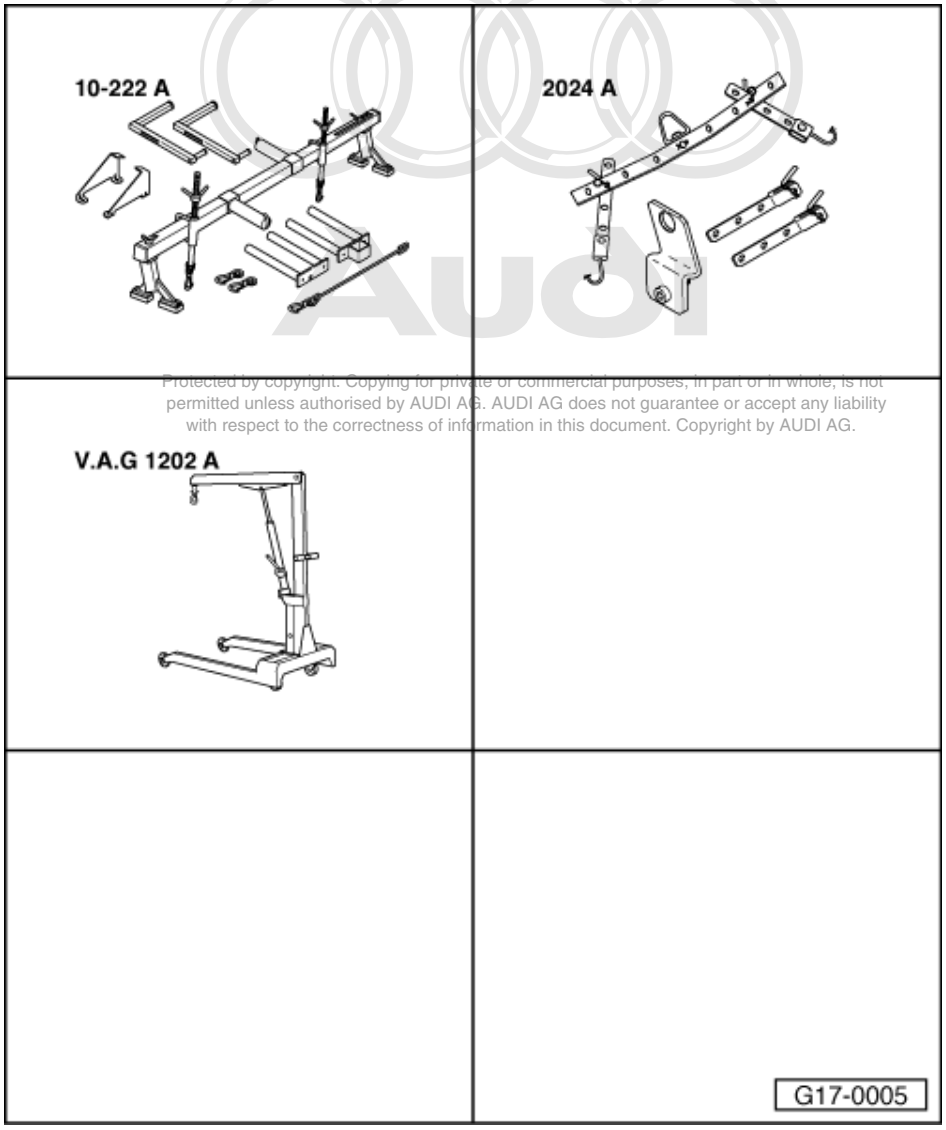
- Replace

18 Oil filter element

- Detach from cap -Item 16-
- When replacing filter, replace O-rings -Item 17-
- Pay attention to installation position: "Top" marked
- Heed replacement intervals

=> Maintenance

1.4 - Removing and installing sump



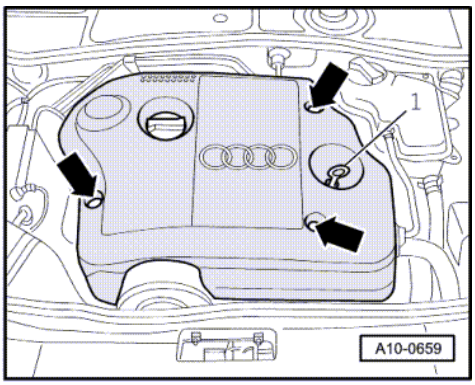
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Special tools and workshop equipment required

- Support bar 10-222 A
- Lifting tackle 2024 A
- Workshop crane V.A.G 1202 A
- Silicone sealant D 176 404 A2
- Hand drill with plastic brush attachment
- Protective goggles

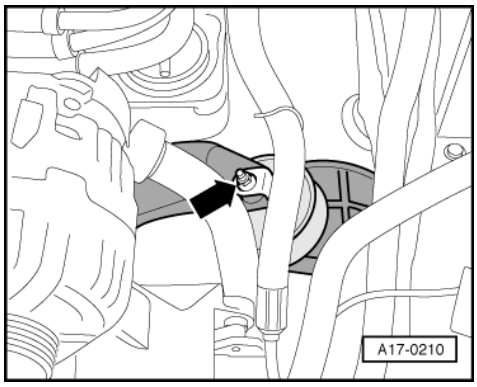
Notes:

- The following describes removal and installation in vehicles with front-wheel drive.
- On vehicles with four-wheel drive, the engine must be removed and the dual-mass flywheel detached. Further procedure =>Page 17-20.



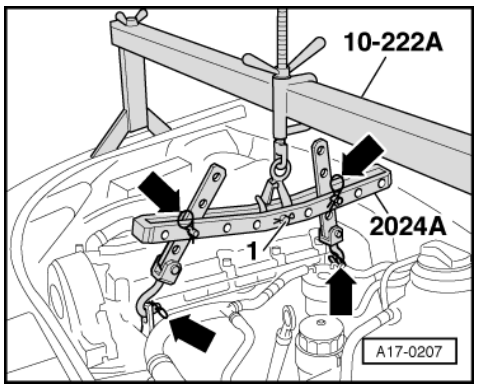
Removing

- Disconnect bottom left air hose from charge air cooler.
- -> Pull dipstick -1- out of guide tube.
- Unclipcaps.
- Remove nuts -arrows- and detach engine cover.
- Remove insulation lying below.
- Re-insert dipstick into guide tube.



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

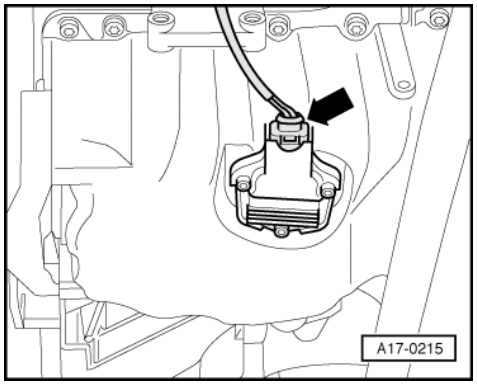
- -> Remove top nut -arrow- on left engine mount.
- Unscrew bolt connection on rear engine lifting eye.



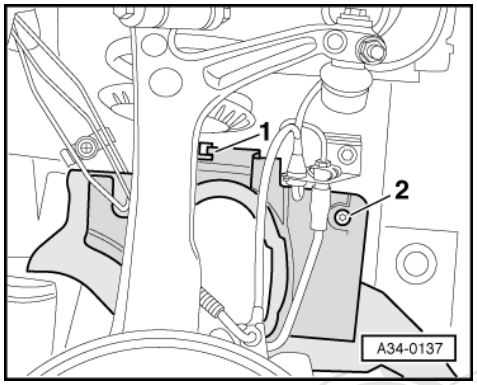
- -> Position support bar 10-222 A on wing mounting flange.
- Remove eye of lifting tackle 2024 A.
- Insert pin -1- back into centre hole of lifting tackle and secure it using cotter pin.
- Engage pin of lifting tackle 2024 A at spindle of support bar 10-222 A.
- Attach lifting tackle 2024 A to lifting eyes at front and rear of engine.

Attention:
Support hooks and setting pins at lifting tackle must be secured with fasteners (arrows in Fig.).

- Pre-tension engine with spindle of engine support bar , do not lift.
- Drain off engine oil.



- -> Unplug connector at oil level sender -arrow-.

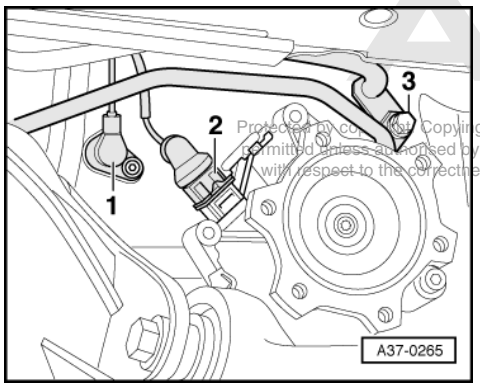


Vehicles with automatic gearbox:

- -> Slacken bolt -2- of soundproofing cover over left side drive shaft at front.
- Unhook catch -1- and detach soundproofing cover.

Note:

Observe rules for cleanliness when working on automatic gearbox:



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

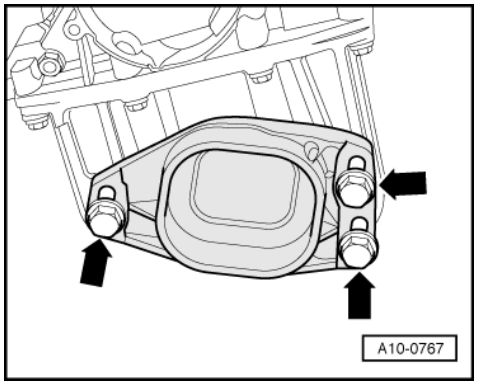
- -> Unscrew bolt -3- and disconnect ATF lines from gearbox.

Note:

Ignore -1- and -2-.

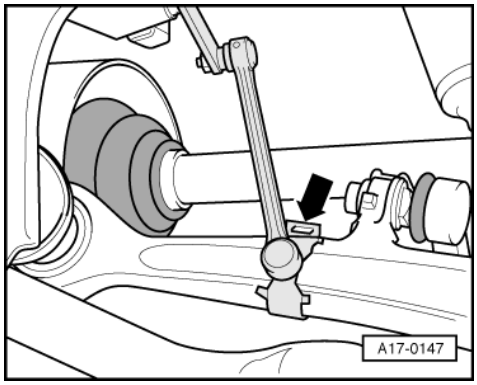
- Unbolt holder for ATF line from engine.

- Move ATF lines clear to one side.



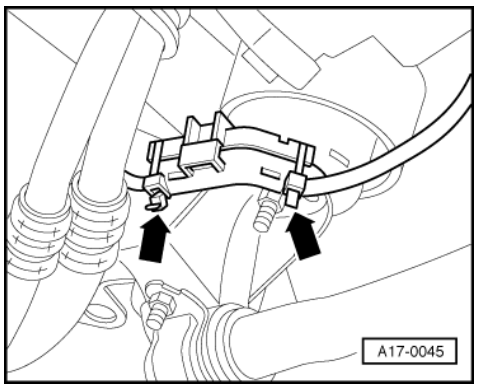
All models:

- -> Unbolt stop for torque reaction support -arrows-.

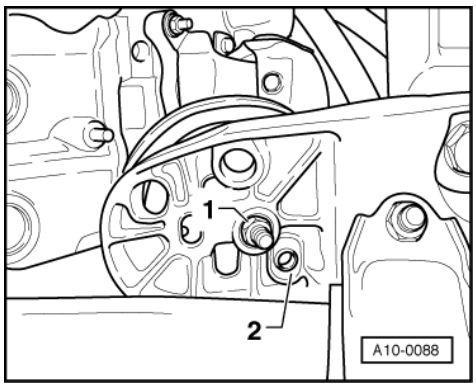


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- -> If fitted, unclip operating rod for vehicle levelling sender at bottom transverse link -arrow-.



- -> Cut through cable ties -arrows-. Open retainer for starter cable and take out cable.

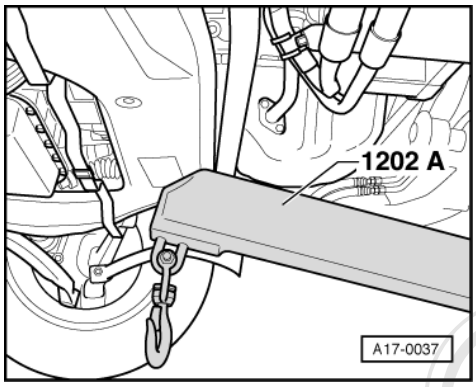


- Unbolt wiring harness bracket from left side engine mount.
- -> Mark positions of bolted joints -1- and locating sleeves -2- underneath right and left engine mounts.

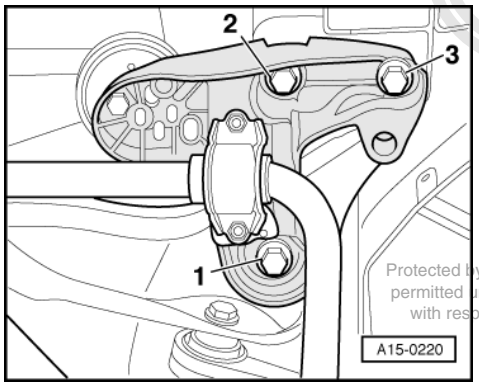
Note:

Different mounting holes are provided for different engine versions.

- Slacken bottom nuts -1- on right and left side engine mounts a few turns.



- -> Support subframe with workshop crane V.A.G 1202 A.

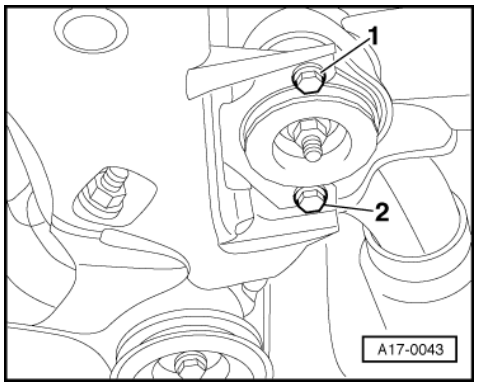


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

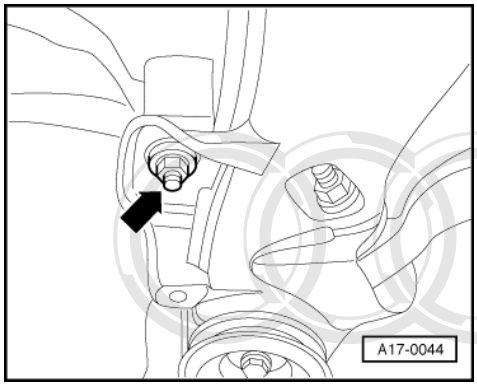
- -> First remove front bolts -2- and -3- from left and right subframe. Then remove bolts -1-.

Note:

The subframe should be detached and lowered only at front, otherwise it will be necessary to check wheel alignment.

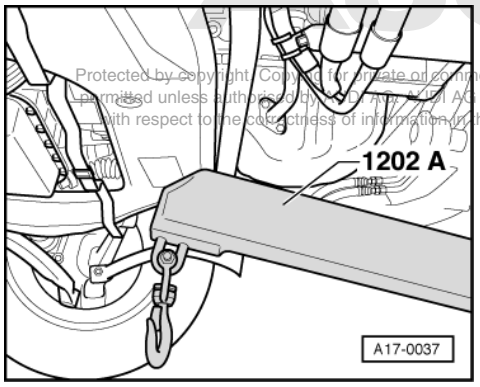


- -> Loosen rear bolt -2- on right gearbox mount a few turns, unscrew front bolt -1- on right gearbox mount.

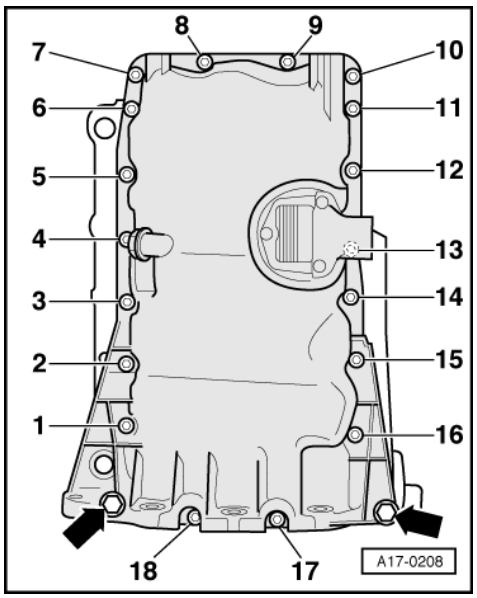


- -> Loosen nuts -arrow- on left gearbox mount until it is flush with end of bolt (approx. 4 turns on thread).

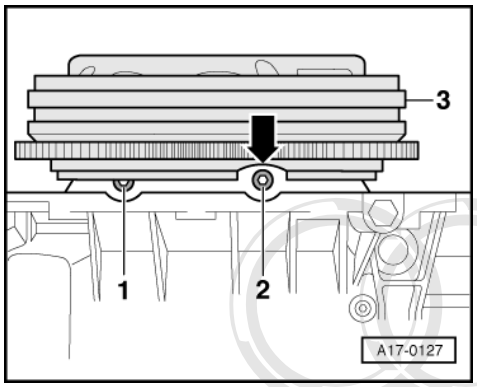
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- -> Lower subframe slowly using workshop crane V.A.G 1202 A.
- Move workshop crane V.A.G 1202 A out and pull down stabiliser.



- Screw out gearbox/sump bolts.
- -> Remove M10 bolts -arrows-.
- Slacken off bolts -1... 18- in diagonal sequence.

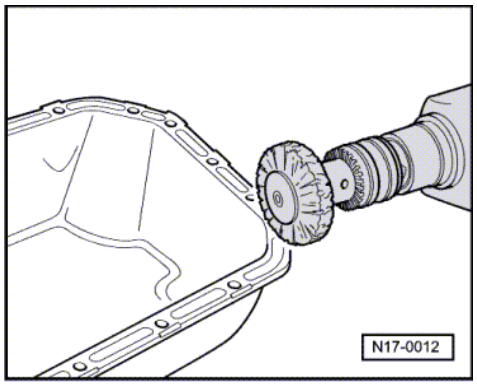


Notes:

- -> On vehicles with manual gearbox, the two rear sump bolts -1- and -2- are accessed through the cutout -arrow- in the flyhwheel -3-, by rotating the flywheel to the appropriate position.
- Press subframe down to remove sump/gearbox bolts.
- Remove any bolts which will not unscrew together with the sump.
- When installing, make sure the bolts are refitted at the same location together with the sump.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted. Unauthorized duplication may be prosecuted. Data contained in the electronic parts catalog and its export are subject to the export regulations of the country of origin.

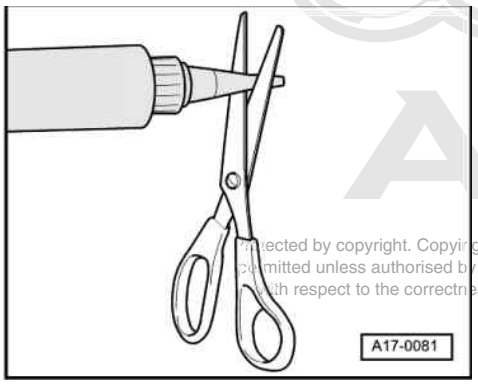
- Detach sump; if necessary, release by tapping gently with a rubber-headed hammer.
- Carefully remove remnants of sealant at cylinder block (this involves removing baffle plate).



- -> Use rotating plastic brush, for example, to remove residual sealant at sump.

Attention: Use safety goggles.

- Clean sealing surfaces; they must be free from oil and grease.



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

Installing

Install in reverse order, paying attention to the following:

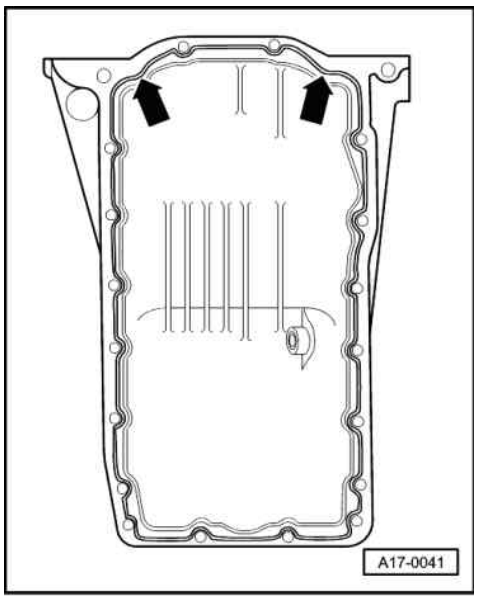
Note:

Sump must be fitted within 5 minutes after applying silicone sealant.

- -> Cut off nozzle of tube at front mark (ø of nozzle approx. 3 mm).
  - Thickness of sealant bead: 2 ... 3 mm

Note:

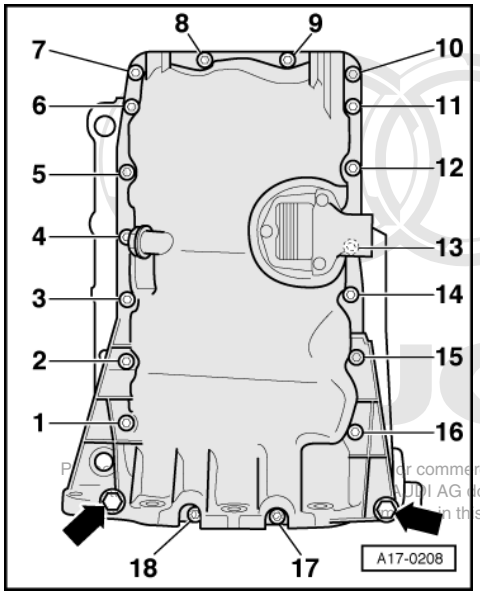
Sealant bead must not be thicker than 3 mm, as otherwise excess sealant could ingress into sump and clog strainer in oil intake pipe.



- -> Apply silicone sealant to clean sealing surface of sump, as illustrated. (Illustration shows position of sealant bead on cylinder block.)

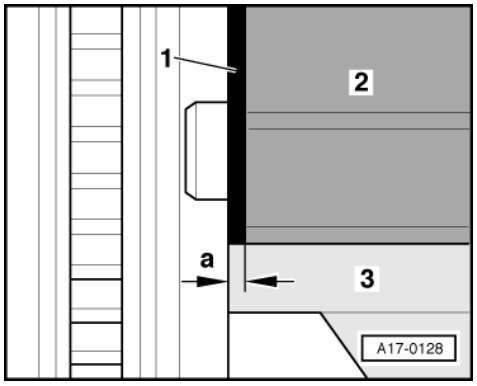
Note:

Take particular care when applying sealant bead in area of rear sealing flange -arrows in Fig.-.



Reproduction for commercial purposes, in part or in whole, is not permitted. AUDI AG does not guarantee or accept any liability with respect to this document. Copyright by AUDI AG.

- Fit sump immediately and tighten bolts in stated sequence.
  - -> Pre-tighten bolts -1 ... 18- diagonally to 5 Nm.
  - Tighten sump/gearbox bolts to 45 Nm.
  - Tighten M10 bolts -arrows- to 40 Nm.
  - Tighten bolts -1 ... 18- diagonally to 15 Nm.



Notes:

- Replace gaskets and sealing rings.
- -> When installing sump -3- with engine removed, ensure that sump is positioned flush with intermediate plate -1- at flywheel end, i.e. sump should protrude by dimension "a" = 0.8 mm from cylinder block -2-.
- After installing sump, wait for approx. 30 minutes for sealant to dry before pouring in engine oil.

- Install subframe.

=> Running gear, Front-wheel drive and Four-wheel drive; Repair Group 40; Removing and installing subframe Removing and installing subframe

- Secure ATF lines:

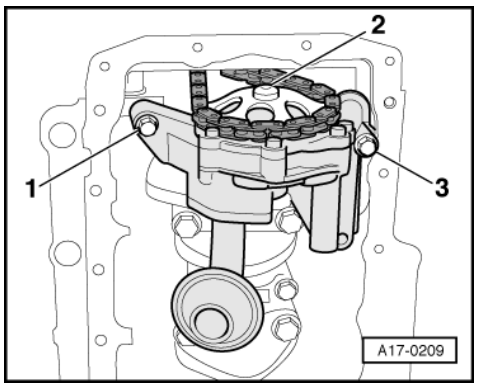
- Install lock carrier =>Page 13-1.
- Pour in engine oil and check oil level.

- Check ATF level.

Tightening torques

Component		Nm
Baffle plate to cylinder block		16
Sump to cylinder block	M7	15
	M10	40
Sump to gearbox		45
Engine mount to subframe		23
Engine mount to engine support		23
Gearbox support to gearbox mount	M10	40
Gearbox mount to subframe	M8	25
Oil drain plug		30
Clamps for air hoses		3.5

1.5 - Removing and installing oil pump



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

Removing

- Remove sump and baffle plate => Page 17-10.
- -> Screw out bolt -2-.
- Pull chain sprocket off oil pump shaft.
- Screw out bolts -1- and -3- and detach oil pump.

Installing

Install in reverse order, paying attention to the following:

- Insert dowel sleeves in top of oil pump.
  - Installation position of oil pump shaft/chain sprocket: Can only be fitted in one position
- Install sump => Page 17-22.
- Pour in engine oil and check oil level.

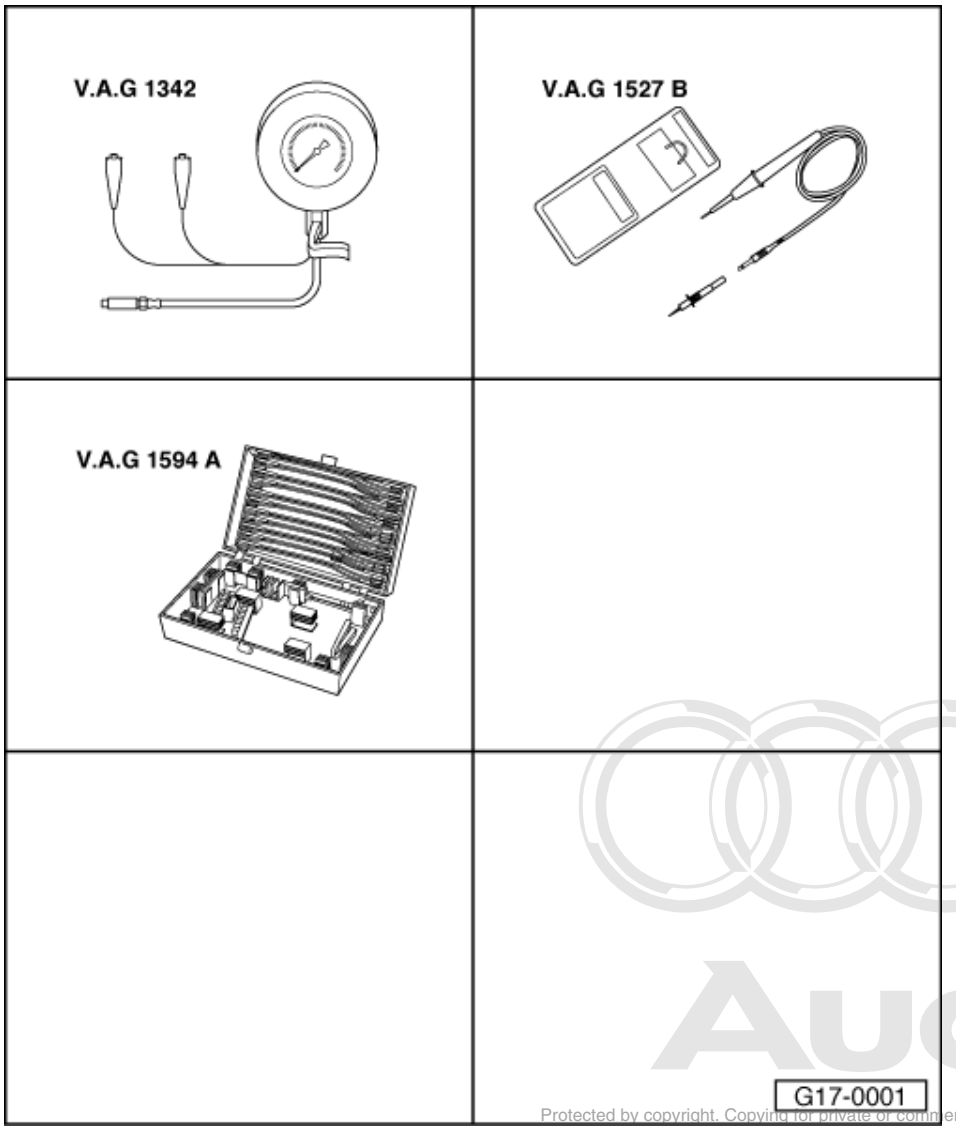
Tightening torques

Component	Nm
Chain sprocket to oil pump shaft	20 + 90°1)2)
Oil pump to cylinder block	16

1) Replace bolt

2) 90°corresponds to quarter of a turn

1.6 - Checking oil pressure and oil pressure switch



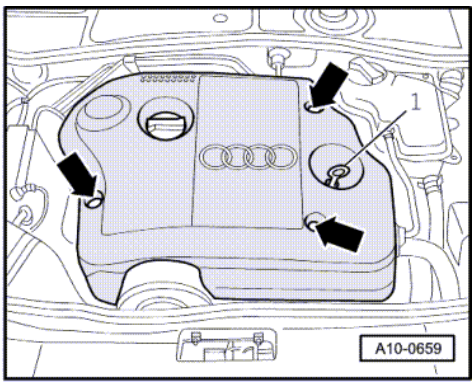
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Special tools and workshop equipment required

- V.A.G 1342
- V.A.G 1527 B
- V.A.G 1594 A

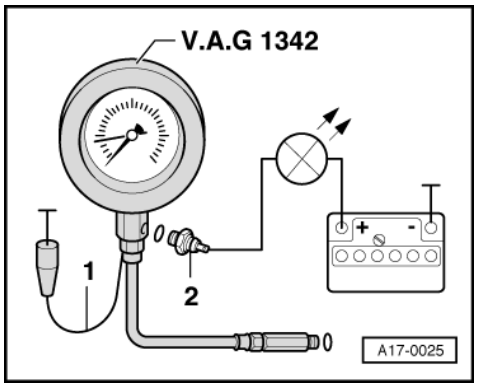
Test requirements:

- Oil level OK
- Engine oil temperature approx. 80°C
- Oil pressure warning lamp -K3 must light with ignition on
- On vehicles with driver information system, "OK" display must light



Test sequence

- -> Pull dipstick -1- out of guide tube.
- Unclipcaps.
- Remove nuts -arrows- and detach engine cover.
- Remove insulation lying below.
- Re-insert dipstick into guide tube.



Checking oil pressure switch

- Pull wire off oil pressure switch.
- -> Unscrew oil pressure switch and screw in oil pressure tester V.A.G 1342.
- Screw oil pressure switch -2- intoV.A.G 1342.
- Connect brown wire -1- of tester to earth (-).
- Connect voltage tester V.A.G 1527 B with test leads from V.A.G 1594 A to oil pressure switch and battery positive (+).
  - LED must not light
- If LED lights, replace oil pressure switch.
- Start engine.

Note:

Observe tester and LED on starting, as switching point of oil pressure switch may already be exceeded when starting.

Oil pressure switch, grey:

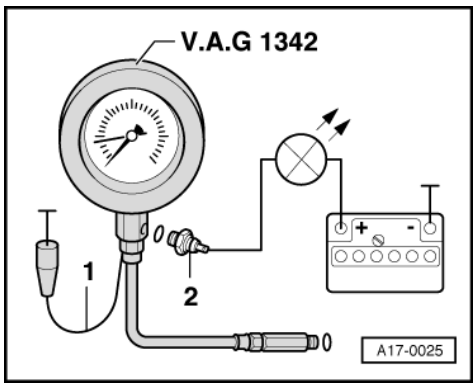
- LED must light at 0.75 ... 1.05 bar

Oil pressure switch, brown:

- LED must light at 0.55 ... 0.85 bar

If LED does not light, replace oil pressure switch.

Copyright by AUDI AG. 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.



Checking oil pressure

- Pull wire off oil pressure switch.
- -> Unscrew oil pressure switch and screw in oil pressure tester V.A.G 1342.
- Screw oil pressure switch -2- intoV.A.G 1342.
- Start engine (engine oil temperature approx. 80°C).
  - Oil pressure at idling speed: min. 0,8 bar
  - Oil pressure at 2000 rpm: min. 2.0 bar
  - Oil pressure at higher engine speed: max. 7.0 bar

If readings do not match specifications:

- Pressure relief valve/oil pump defective; replace oil pump=>Page 17-27.

1.7 - Engine oil

The vehicle is filled at the factory with a high quality multi-grade oil which can be used all year round except in extremely cold climates.

Viscosity classes and oil specifications

=> Maintenance

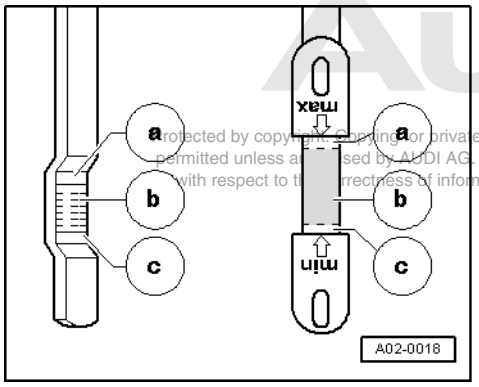
1.8 - Checking oil level

Test requirements:

- Engine oil temperature at least 60 ° C
- Vehicle on a flat surface
- Wait a few minutes after switching off engine to allow oil to flow back into sump

Test sequence

- Pull out dipstick, wipe off with a clean cloth and insert it again as far as it will go.
- Then pull out dipstick again and read off oil level.



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

-> Markings on dipstick:

a - Donot top up oil.
b - Oil can be topped up. Oil level may then rise as far as area -a-.
c - Oilmustbe topped up. After topping up, it is sufficient for oil level to be somewhere in area -b- (hatched area).

Note:

Oil level must not be above mark -a- on dipstick.

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

1 - Removing and installing cooling system components

1.1 - Removing and installing cooling system components

Attention:
Hot vapour may escape when opening expansion tank. Cover cap with cloth and open carefully.

Notes:

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

- Cooling system is pressurised when engine is warm. Release pressure if necessary before starting repair work.
- Secure all hose connections with standard hose clamps:

=> Parts List

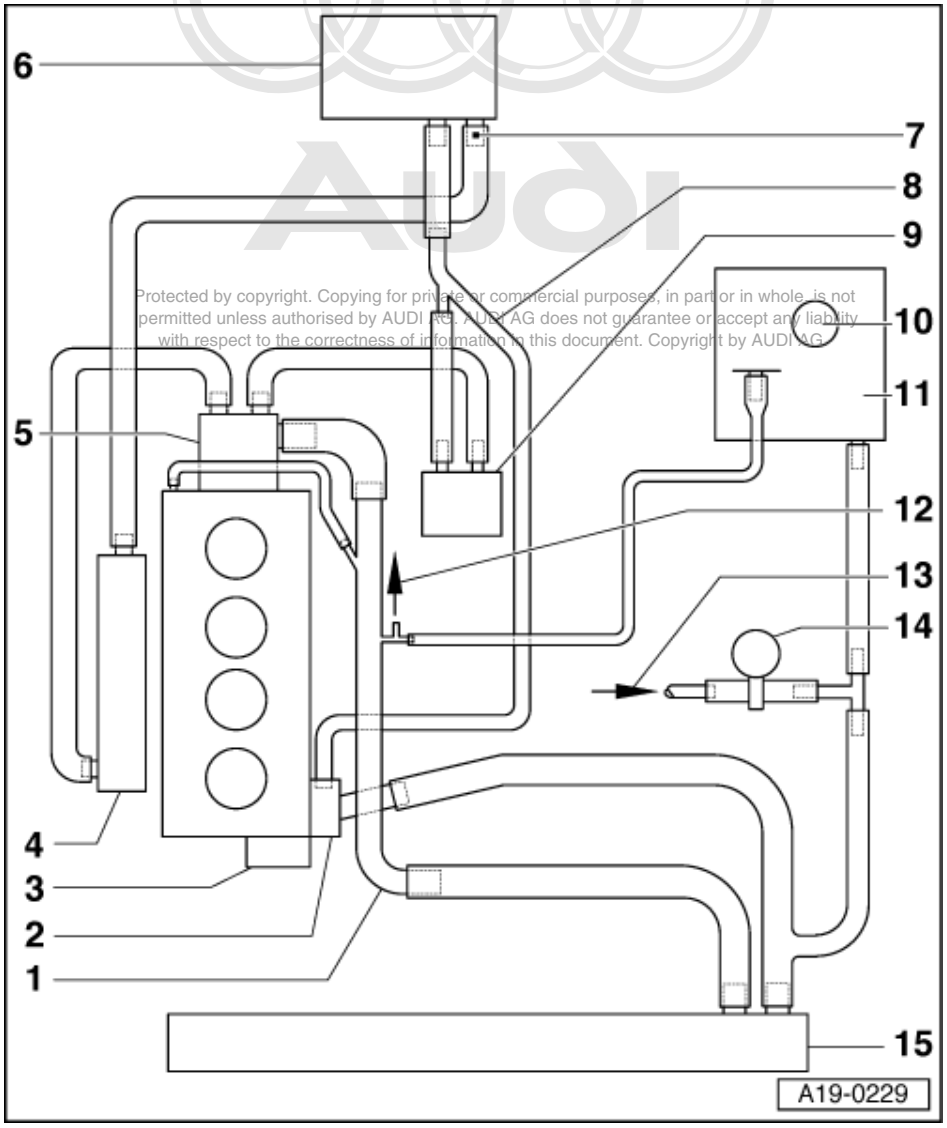
- Special tool V.A.G 1921 is recommended for fitting spring clips.
- Always replace gaskets and sealing rings.
- The arrows on the coolant pipes and the ends of the coolant hoses must be aligned.

Function

The cooling system is divided into a master cooling circuit and a low-temperature fuel cooling circuit. Function and mode of operation:

=> Self-study programme no. 209

1.2 - Cooling system components



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

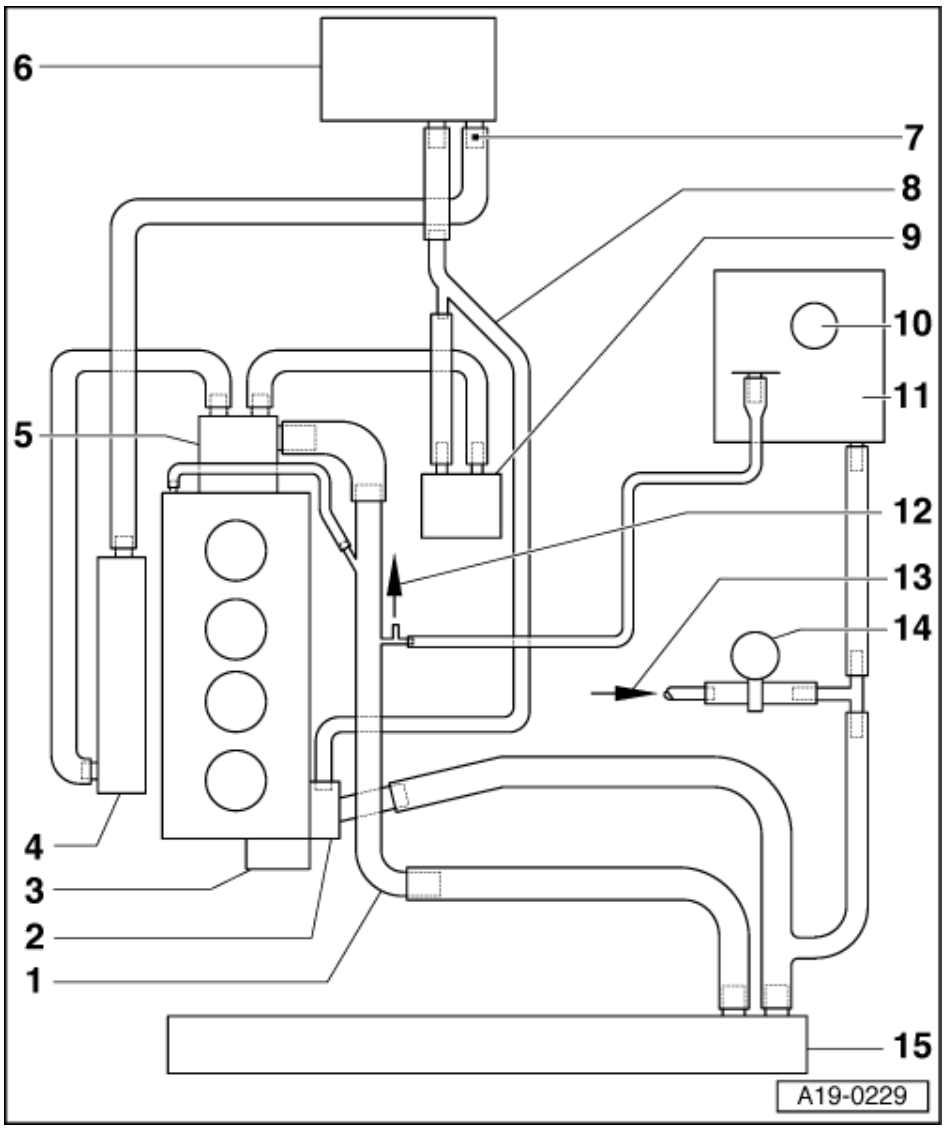
Master cooling circuit - connection diagram for coolant hoses

1 **Top coolant pipe**
- Removing and installing=>Page 19-22

2 **Connection**
- for thermostat
- Removing and installing thermostat => Page 19-19
- Checking => Page 19-21

3 **Coolant pump**
- Removing and installing=>Page 19-17
- Check for smooth running

4 **EGR system cooler**
- for vehicles with automatic gearbox
- Removing and installing=>Page 26-48



5 Connection

- On vehicles with manual gearbox with glow plug coolant -Q7

6 Heat exchanger for heater

- After replacing, fill with fresh coolant

7 Vent hole

- In return pipe from heater heat exchanger

8 Coolant pipe (bottom)

- Removing and installing=>Page 19-25

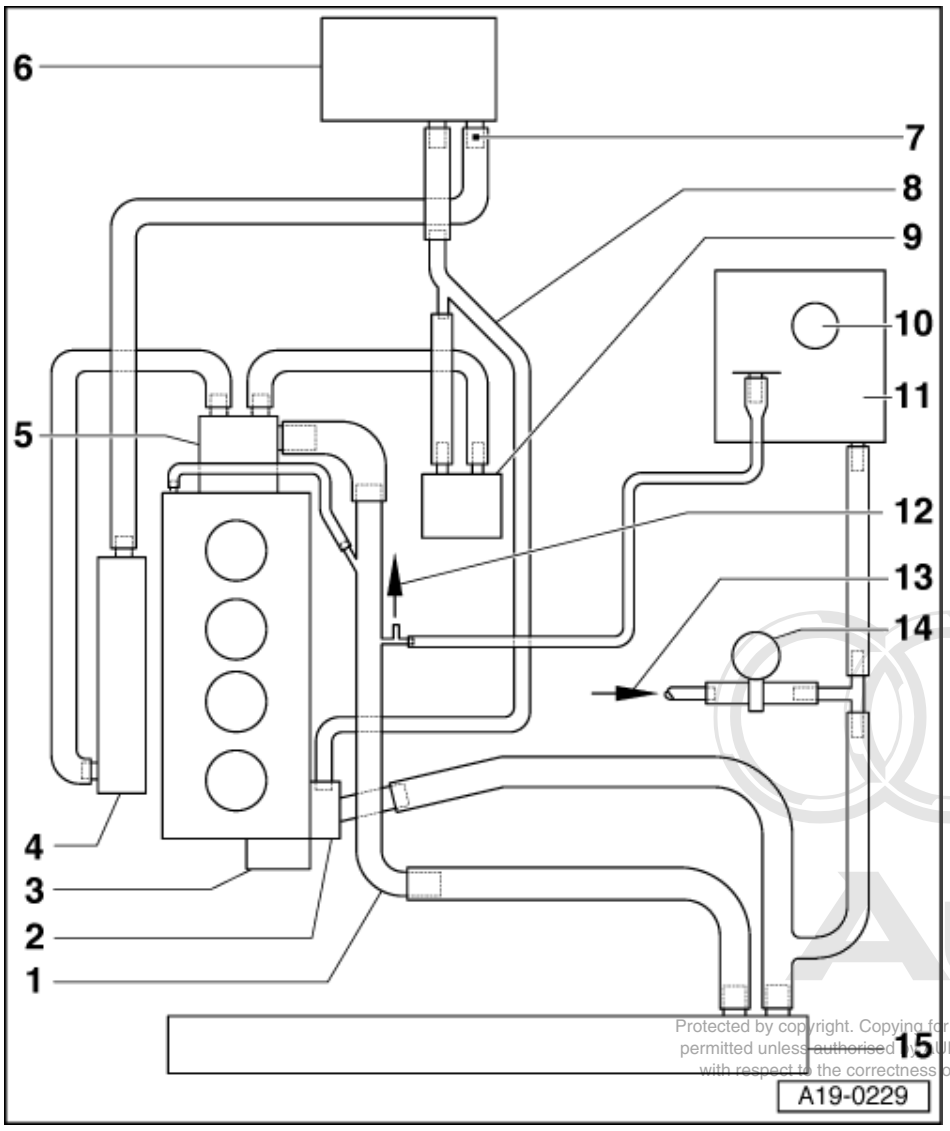
9 Oil cooler

- Removing and installing => Item 17-7

10 Cap

- With pressure relief valve
- Checking pressure relief valve
=> Page 19-47

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



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

11 Expansion tank

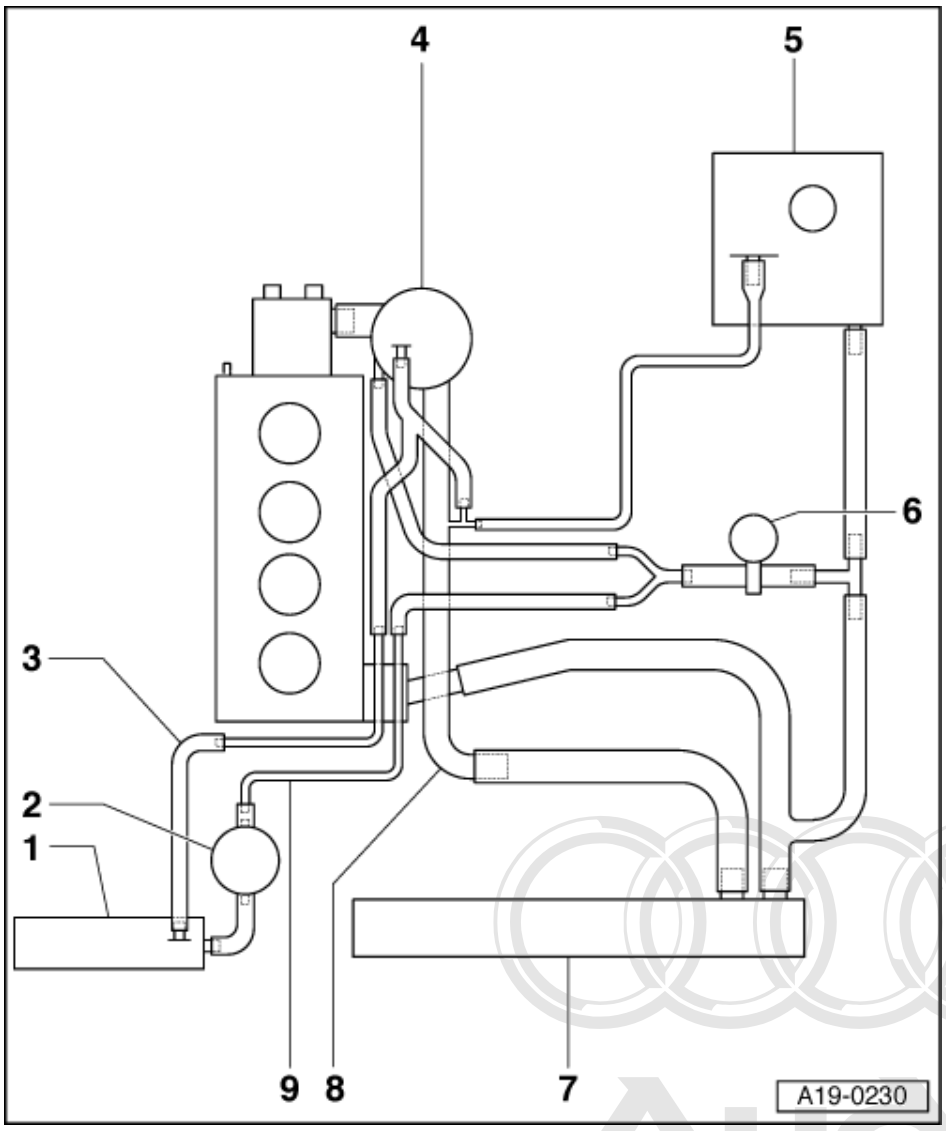
12 To fuel cooling circuit cooling element

13 From fuel cooling circuit cooling element

14 Cut-off valve for fuel cooling circuit-

15 Radiator

- Removing and installing=>Page 19-40
- After replacing, fill with fresh coolant



Fuel cooling circuit -connection diagram for coolant hoses

1 Cooler for fuel cooling circuit
- Removing and installing=>Page 19-62

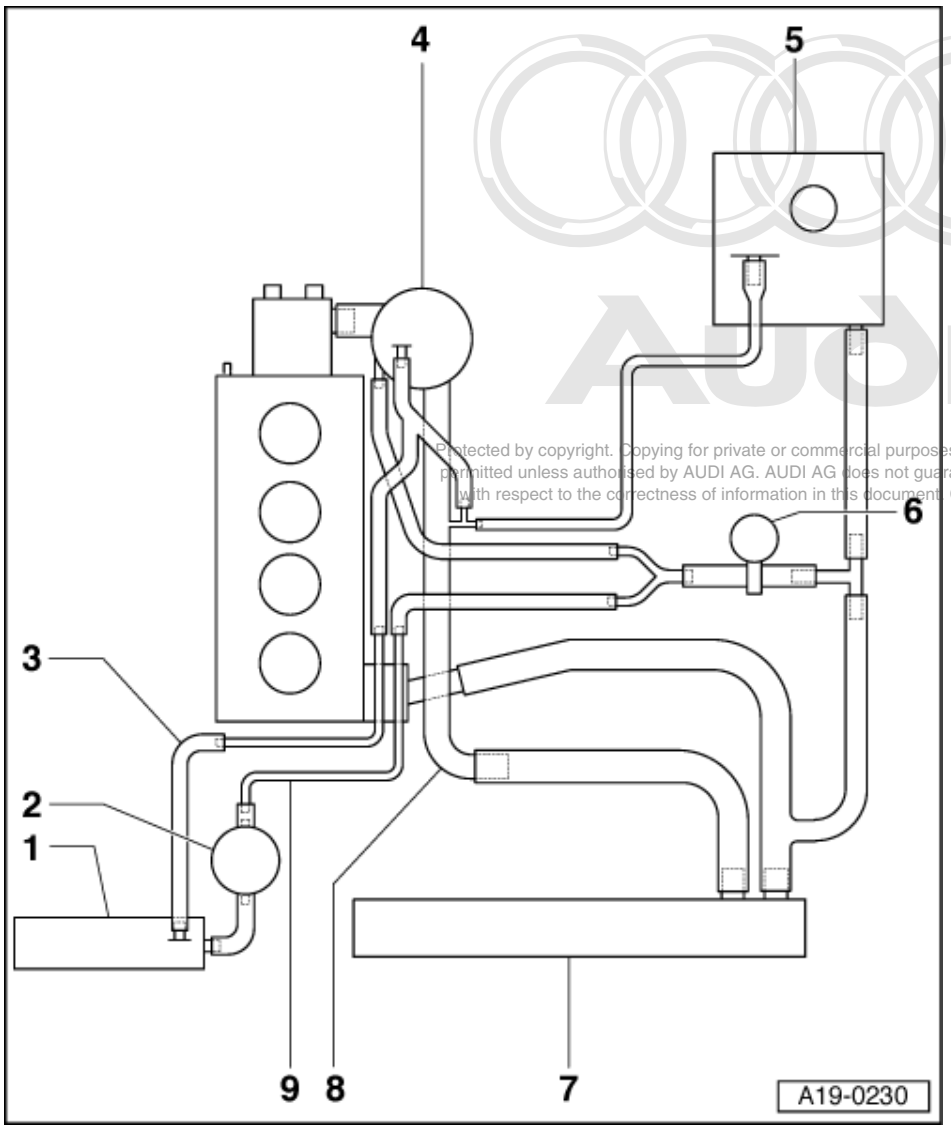
2 Pump for fuel cooling circuit -V166
- Checking => Page 19-51

3 Coolant supply pipe
- To fuel cooling circuit pump

4 Cooling element
- On fuel filter

5 Expansion tank

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



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

6 Cut-off valve for fuel cooling circuit

7 Radiator

- Removing and installing=>Page 19-40
- After replacing, fill with fresh coolant

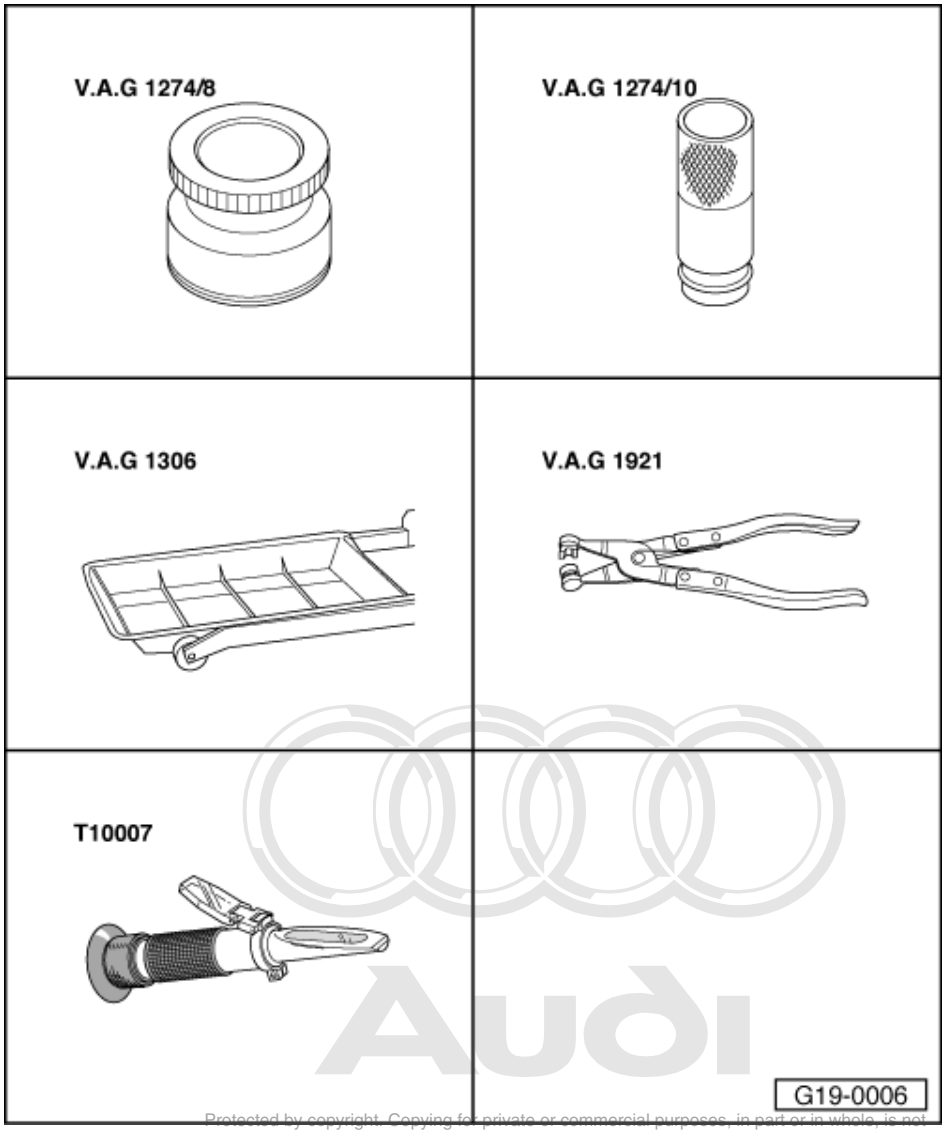
8 Coolant pipe (top)

- Removing and installing=>Page 19-22

9 Coolant return pipe

- From fuel cooling circuit cooler

1.3 - Draining and filling cooling system



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

Special tools and workshop equipment required

- Adapter V.A.G 1274/8
- Pipe V.A.G 1274/10
- Drip tray V.A.G 1306
- Hose clamp fitting tool V.A.G 1921
- Special tool T10007

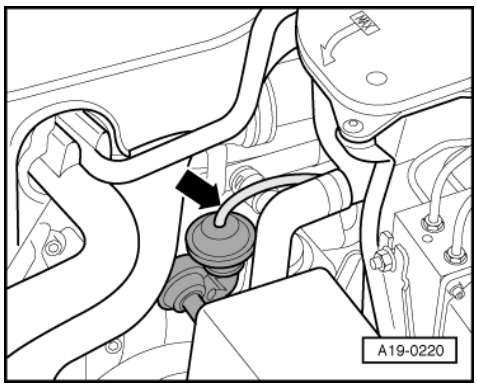
Draining

Note:

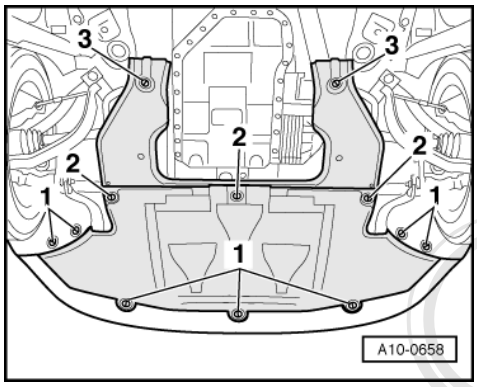
Coolant drained off must be collected in a clean container for disposal/re-use.

Attention: Hot vapour may escape when opening expansion tank. Cover cap with cloth and open carefully.

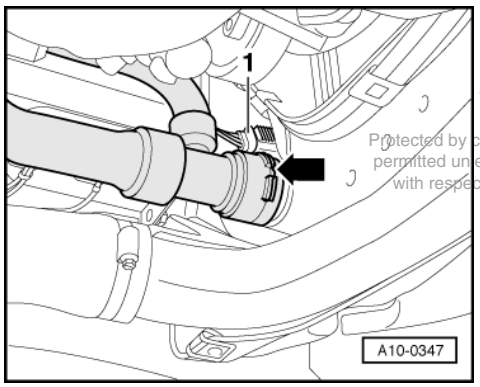
- Unscrew cap of coolant expansion tank.



- -> Detach vacuum hose -arrow- from vacuum unit of fuel cooling circuit cut-off valve.

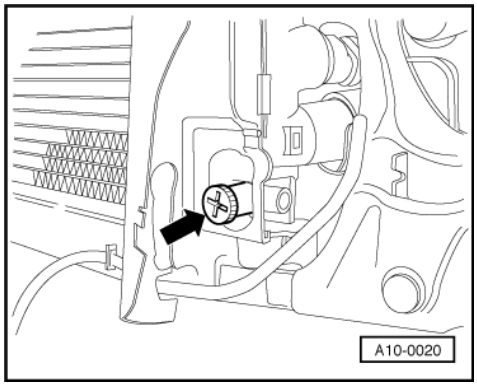


- -> Release quick-release fasteners -1- and -2- and detach front noise insulation. Do not remove rear noise insulation.



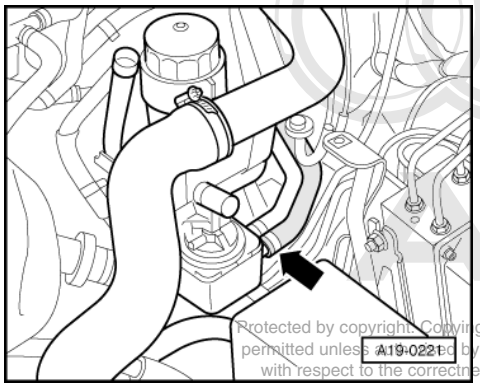
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Place drip tray V.A.G 1306 below engine.
- -> Disconnect bottom coolant hose from radiator -arrow-.



Note:

-> When the bumper is removed, the coolant can also be drained from the radiator via the drain plug -arrow-.



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.

- -> To drain off the remaining coolant, disconnect coolant hose -arrow- from oil cooler.

Filling

Notes:

- The cooling system is filled all year round with a mixture of water and radiator anti-freeze/anti-corrosion agent.
- Exclusive use is to be made as coolant additive of G 012 A8 D as per TL VW 774 D.
  Identifiable by: red colour

Attention: Use only coolant additive G

- If fluid in expansion tank is brown, G 012 A8 D has been mixed with a different type of coolant. In this case, flush out cooling system and replace coolant. To flush out, fill cooling system with clean water and allow engine to run for approx. 2 minutes. This should remove virtually all the old coolant.

- G 012 A8 D and coolant additives marked "meeting specification TL VW 774 D" prevent frost and corrosion damage, stop scale forming and at the same time raise the boiling point of the coolant. The cooling system must therefore be filled all year round with anti-freeze and anti-corrosion additive.
- On account of the higher boiling point, the coolant helps to enhance engine reliability under heavy loads particularly in countries with tropical climates.
- Frost protection must be guaranteed to around -25 °C (in countries with arctic climate to around -35 °C).
- The coolant concentration must not be reduced by adding water even in warmer seasons and in warmer countries. The anti-freeze ratio must be at least 40 %.
- If greater frost protection is required in very cold climates, the amount of G 012 A8 D can be increased, however only up to 60 % (giving frost protection to around -40 °C), otherwise frost protection decreases again and cooling efficiency is also impaired.
- Exclusive use is to be made of clean drinking water for mixing coolant.
- If the radiator, heat exchanger, cylinder head, cylinder head gasket or cylinder block has been replaced, do not re-use used coolant.
- Always replace gaskets and sealing rings.

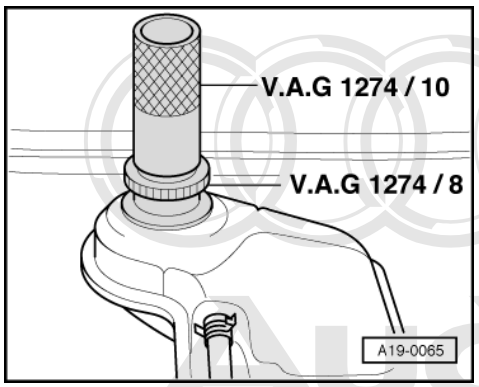
- For checking anti-freeze protection in cooling system, use must be made for coolant additive G012 A8 D of the special tool T10007.

Recommended mixing ratios:

Frost protection to	Anti-freeze part	G 012A8 D 1)	Water 1)
-25 °C -35 °C	40 % 50 %	3.0 l 3.5 l	4.0 l 3.5 l

1) Coolant 7.0 litres; may vary depending on vehicle specification.

- Fit and secure coolant hoses.
- Close drain plug at radiator.

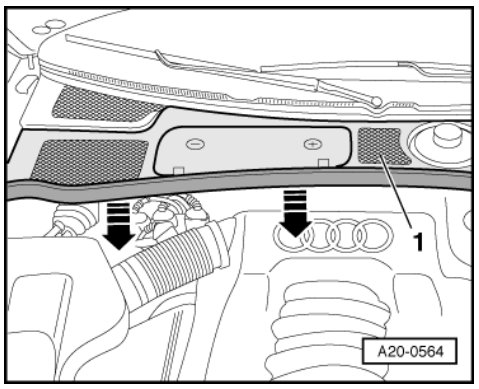


- -> Screw adapter V.A.G 1274/8 onto coolant expansion tank.
- Fit special tool V.A.G 1274/10 onto adapter.

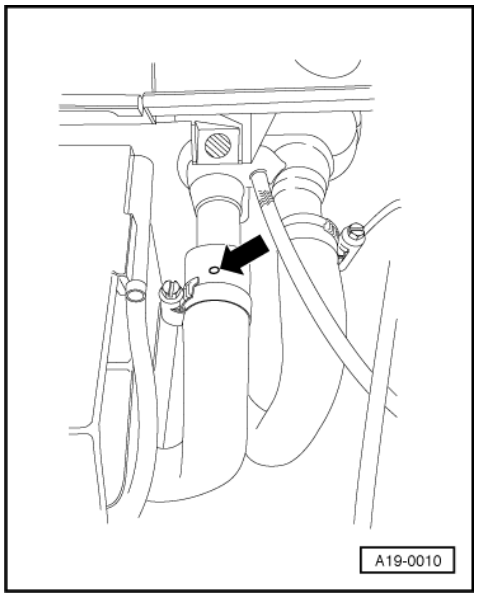
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Note:

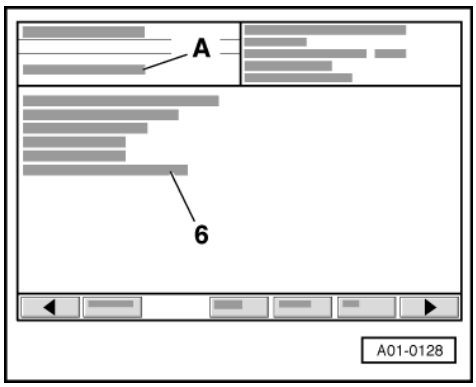
To charge without using the special tool, detach the expansion tank and raise it approx. 100 mm.



- -> Remove rubber seal from front of plenum chamber cover -arrows-.
- Remove plenum chamber cover -1- from the front.



- Fold back bellows at heater heat exchanger connection in plenum chamber.
- -> Detach coolant hose from heat exchanger and pull it back until vent hole in coolant hose -arrow- is no longer concealed by connection.
- Charge coolant until it emerges from vent hole in coolant hose.
- Push coolant hose onto connection and secure it.
- Seal expansion tank.



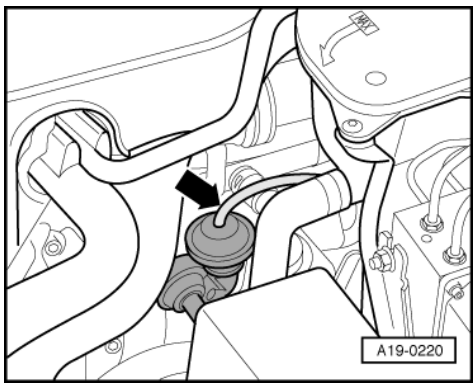
- Start final control diagnosis and activate fuel cooling pump relay -J445.

-> Readout on VAS 5051:

A - 6th control element in test
6 - Fuel cooling pump relay -J445

- The fuel cooling pump relay -V166 is switched on and off at intervals over a period of about 30 seconds (audible at right in engine compartment).

- Terminate function "03 - Final control diagnosis" by touching ◂ key.



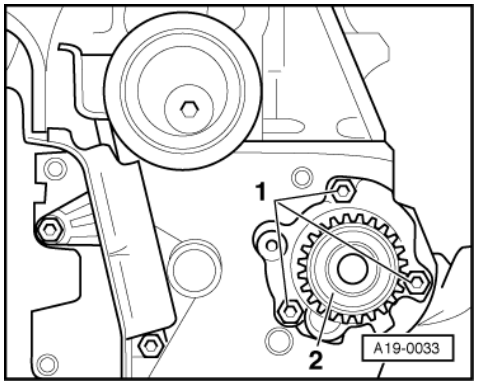
- -> Refit vacuum hose -arrow- onto vacuum unit of fuel cooling circuit cut-off valve.
- Start engine and maintain engine speed of approx. 2000 rpm for approx. 3 minutes.
- Then allow engine to run at idling speed until lower hose on radiator becomes hot.

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

Attention:
Hot vapour may escape when opening expansion tank. Cover cap with cloth and open carefully.

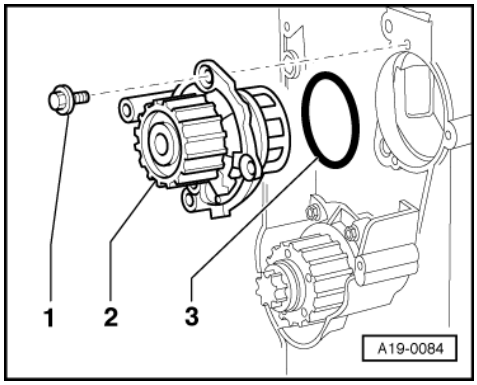
- Check coolant level and top up coolant if necessary. Coolant level must be on max. mark with warm engine and between min. and max. mark for cold engine.
- Switch off engine.

1.4 - Removing and installing coolant pump



Removing

- Drain off coolant => Page 19-7.
- Remove toothed belt =>Page 13-36.
- -> Screw out bolts -1- of coolant pump and remove coolant pump -2-.



Installing

Install in reverse order, paying attention to the following:

Note:

Always replace gaskets and sealing rings.

- Clean/smooth sealing surface for O-ring.
- -> Moisten new O-ring -3- with coolant G 012 A8 D.
- Insert coolant pump -2-.
  - Installation position: Plug in housing facing downwards

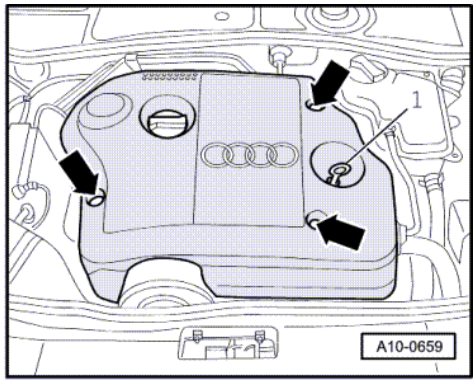
- Tighten fuel pump bolts -1-.
- Install toothed belt (adjust valve timing) => Page 13-44.
- Fill cooling system with coolant => Page 19-11.

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

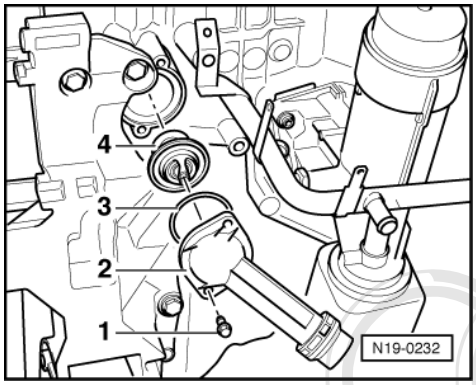
Component	Nm
Coolant pump to cylinder block	13

1.5 - Removing, installing and checking thermostat

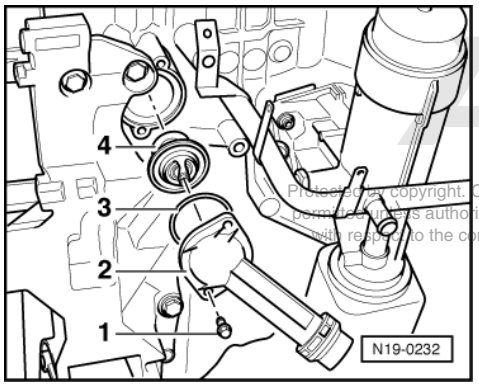


Removing

- -> Pull dipstick -1- out of guide tube.
- Unclipcaps.
- Remove nuts -arrows- and detach engine cover.
- Remove insulation lying below.
- Re-insert dipstick into guide tube.
- Drain off coolant => Page 19-7.



- -> Detach bottom coolant hose from connection -2-.
- Screw out connection bolts -1- and detach connection with thermostat -4-.
- Turn thermostat a quarter turn (90 °) anti-clockwise and take out of connection.



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

Installing

Install in reverse order, paying attention to the following:

Note:

Always replace gaskets and sealing rings.

- Clean/smooth sealing surface for O-ring.
- -> Fit thermostat -4- with new O-ring -3- in connection -2- and turn a quarter turn (90 °) clockwise.

Note:

The bar on the thermostat must be pointing virtually straight up.

- Fit connection with thermostat into cylinder block.
- Tighten bolts -1-.
- Fill cooling system with coolant => Page 19-11.

Tightening torque

Component	Nm
Thermostat connection to cylinder block	13

Checking thermostat

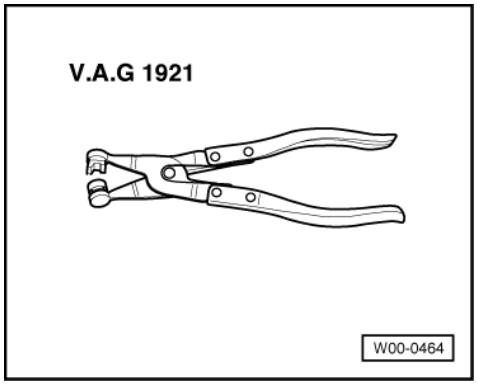
- Heat thermostat in water bath.

Start of opening	End of opening	Opening stroke
approx. 87°C	approx. 102°C 1)	min. 8 mm

1) Not testable

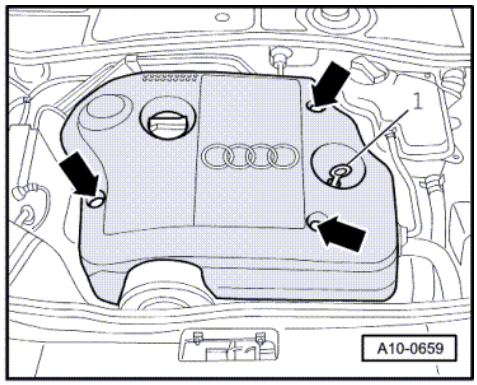
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

1.6 - Removing and installing top coolant pipe



Special tools and workshop equipment required

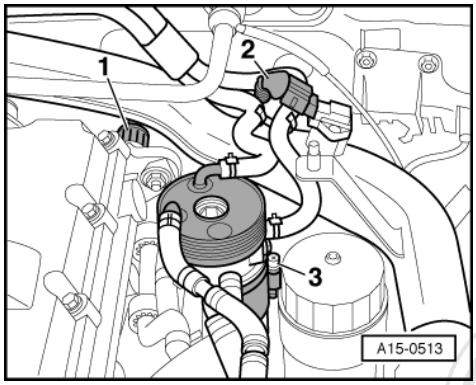
- Pliers for spring clips V.A.G 1921



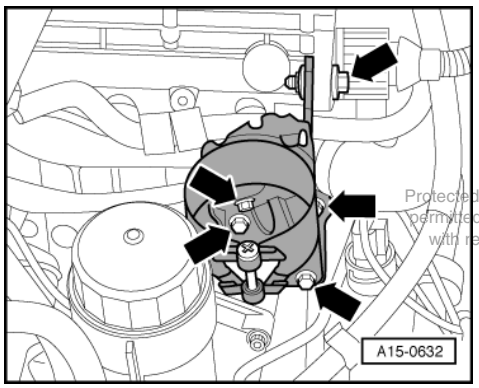
Removing

- Drain off coolant => Page 19-7.
- -> Pull dipstick -1- out of guide tube.
- Unclipcaps.
- Remove nuts -arrows- and detach engine cover.
- Remove insulation lying below.

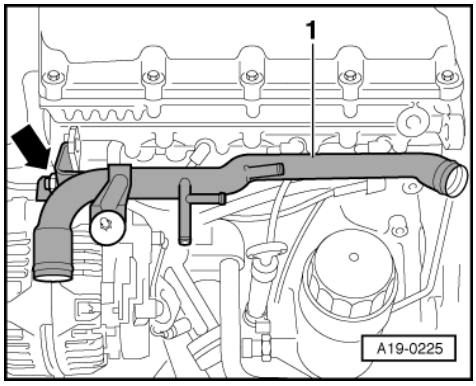
- Re-insert dipstick into guide tube.



- -> Unplug connector -2-.
- Screw out bolt -3-.
- Lift fuel filter out of holder and place aside together with connected fuel hoses.



- -> Unbolt fuel filter holder -arrows-.
- Detach coolant hoses from coolant pipe.



- -> Screw out nut- arrow 1-.
- Detach coolant pipe -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.

Installing

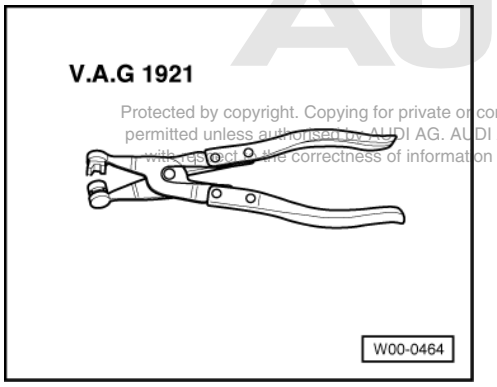
Install in reverse order, paying attention to the following:

- Fill cooling system with coolant => Page 19-11.

Tightening torques

Component		Nm
Top coolant pipe to lifting eye		20
Fuel filter holder to cylinder head/cylinder block	M6	10
	M7	15
	M8	20

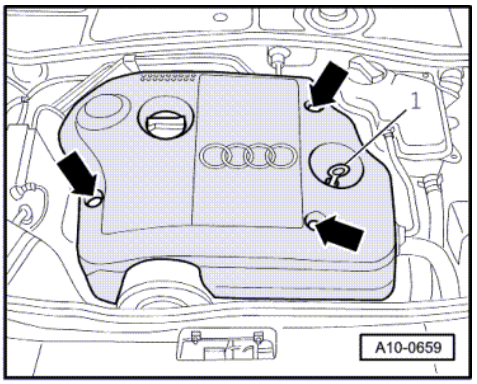
1.7 - Removing and installing bottom coolant pipe



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

Special tools and workshop equipment required

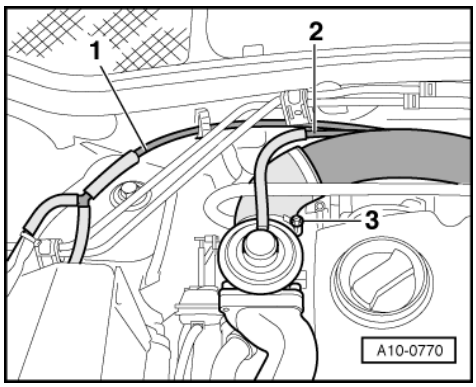
- Pliers for spring clips V.A.G 1921



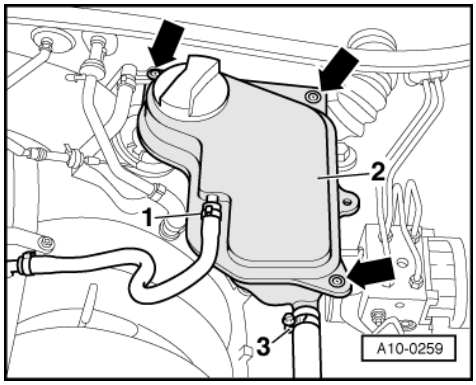
Removing

- Drain off coolant => Page 19-7.
- -> Pull dipstick -1- out of guide tube.
- Unclip caps.
- Screw out nuts -arrows- and detach engine cover.
- Remove insulation underneath.

- Re-insert dipstick into guide tube.

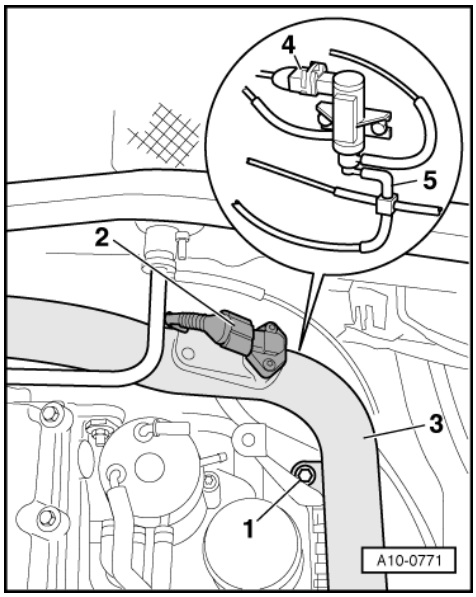


- -> Disconnect vent line -1- to air cleaner and vacuum line -2- to mechanical EGR valve.
- Detach air hose -3- from intake manifold.

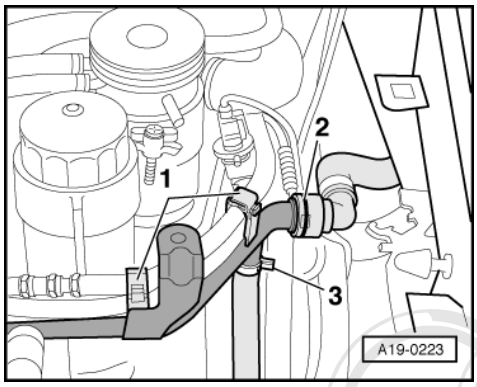


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

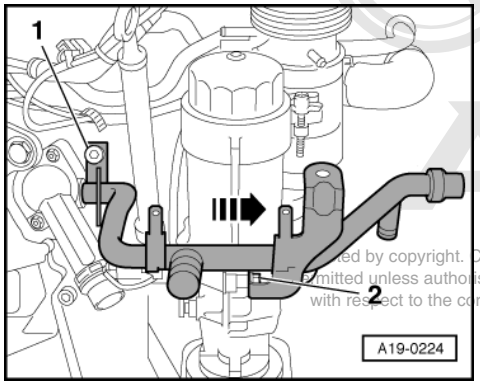
- -> Detach coolant hoses -1- and -3-.
- Unbolt coolant expansion tank -2- -arrows-.
- Disconnect wiring for coolant shortage indicator switch -F66 at bottom of coolant expansion tank.



- -> Unplug connectors -2- and -4-.
- Pull off vacuum hose -5-.
- Screw out bolt -1-.
- Detach air pipe -3-.



- -> Unclip holder -1- for fuel lines from bottom coolant pipe.
- Detach coolant hoses -2- and -3-.



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

- -> Screw out bolts -1- and -2- and withdraw coolant pipe from cylinder block -arrow-.

Installing

Install in reverse order, paying attention to the following:

Note:

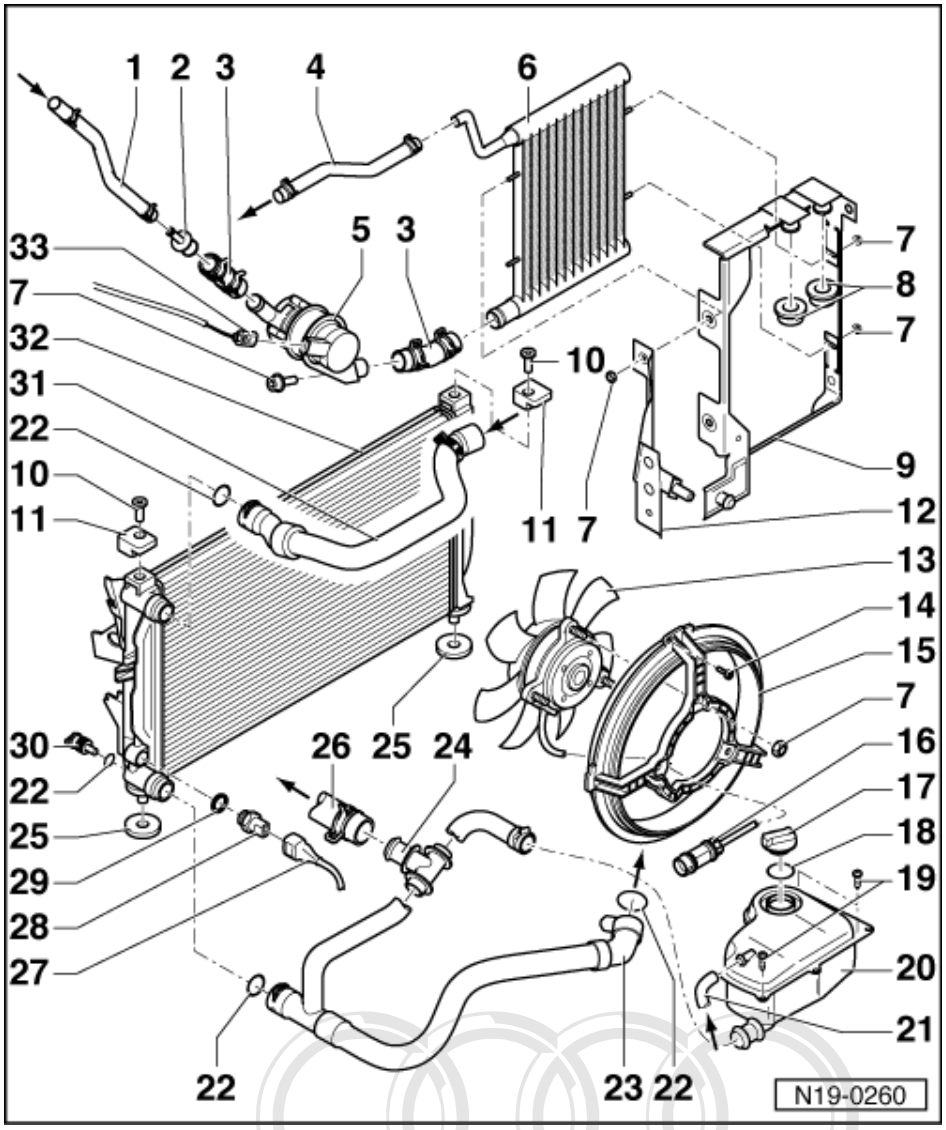
Replace O-ring.

- Clean/smooth sealing surface for O-ring.
- Coat new O-ring with G 012 A8 D and push it onto coolant pipe.
- Fill cooling system with coolant => Page 19-11.

Tightening torque

Component		Nm
Coolant pipe to	Oil filter holder	10
	cylinder block	40

1.8 - Exploded view of radiator and radiator fan



1 **Coolant hose**
- From fuel cooling element

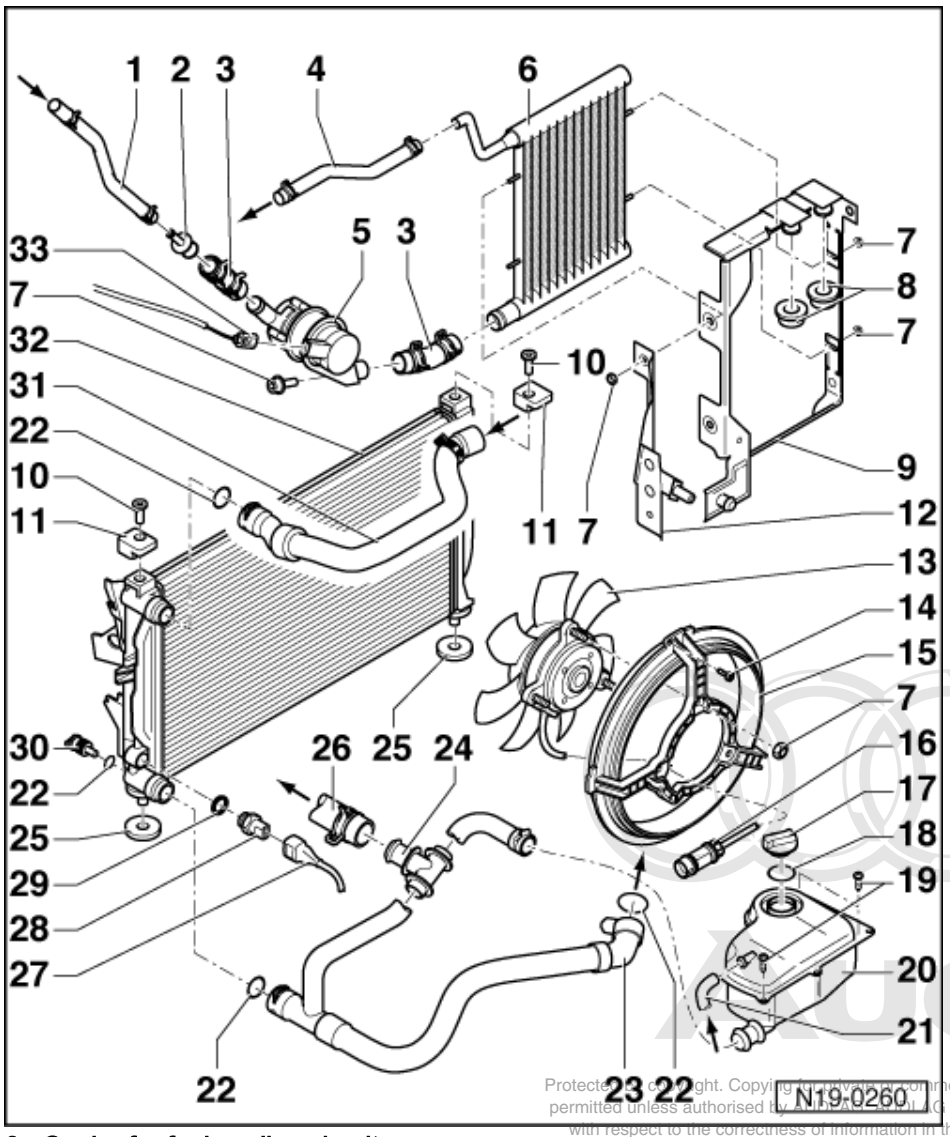
2 **Adapter**

3 **Connecting hose**

4 **Coolant hose**
- To fuel cooling element

5 **Fuel cooling pump -V166**
- Activates at a fuel temperature of approx. 70 °C
- Checking => Page 19-51

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



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

6 Cooler for fuel cooling circuit-

- Fitting location: in front of right side wheel housing
- Removing and installing=>Page 19-62

7 10 Nm

8 Rubber grommet

9 Holder frame

- For fuel cooling circuit pump

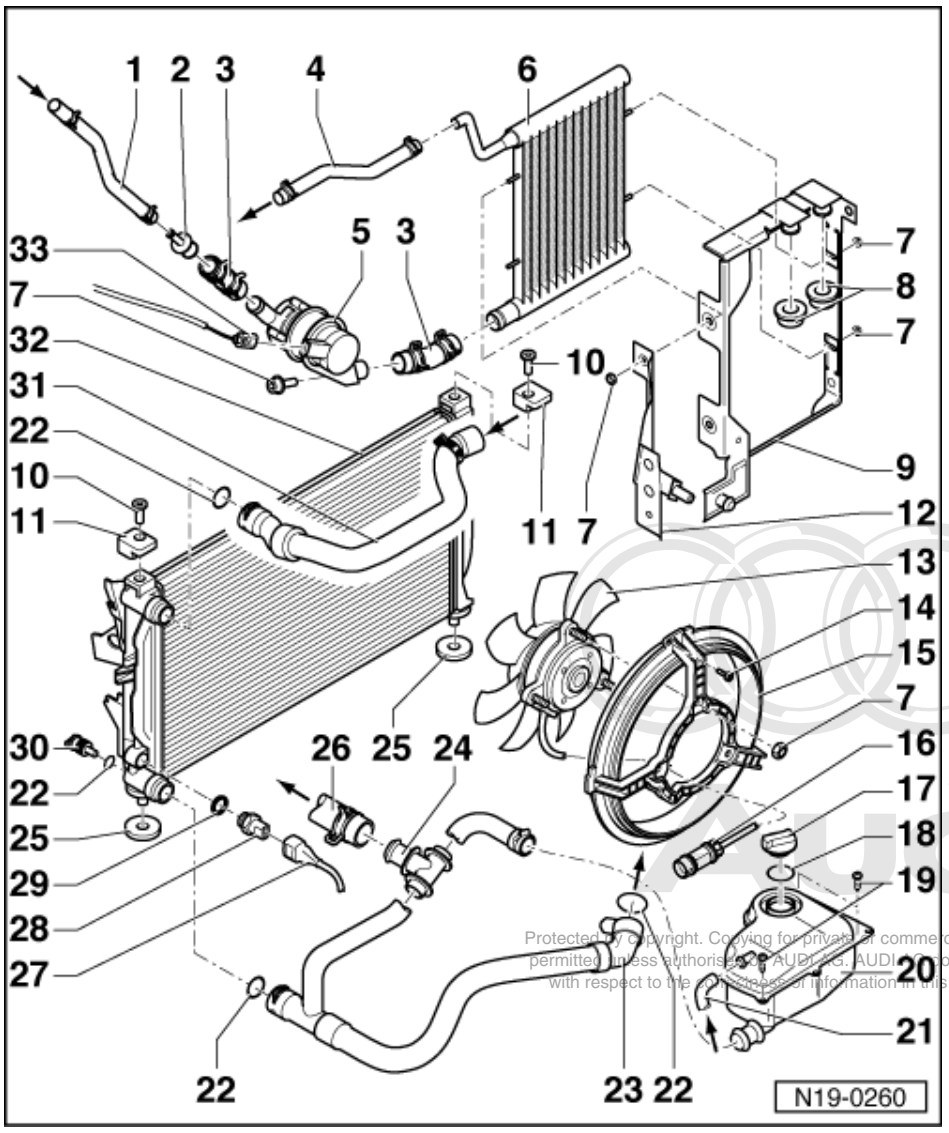
10 Retaining bolt

11 Fixing rubber

12 Holder

13 Radiator fan -V7

- Checking => Page 19-48
- Removing and installing=>Page 19-50



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

15 Radiator cowl

16 Multi-pin connector

17 Cap

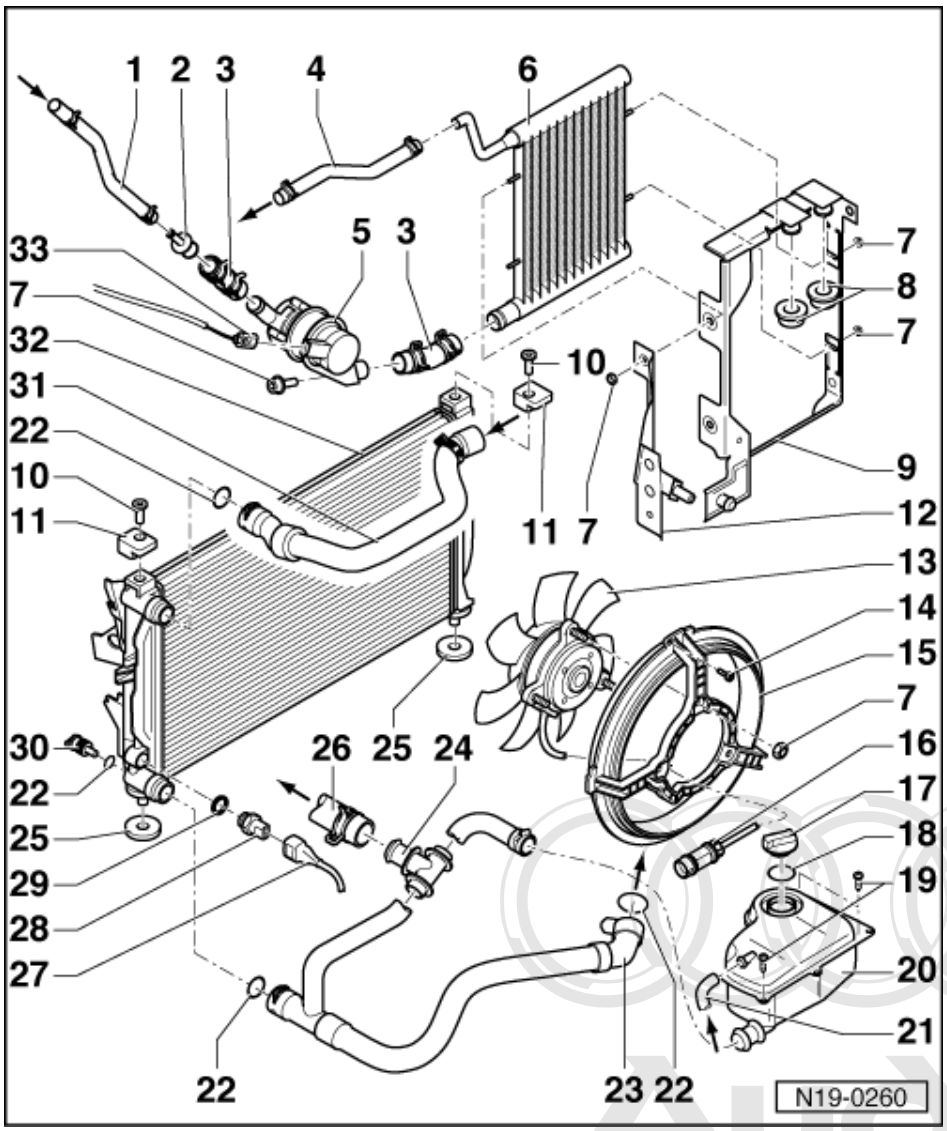
- With pressure relief valve
- Checking pressure relief valve
  => Page 19-47

18 O-ring

- Replace if damaged or leaking

19 3 Nm

20 Expansion tank



21 Coolant hose

- From top coolant hose

22 O-ring

- Replace

23 Lower coolant hose

- To thermostat connection

24 Manifold

25 Rubber disc

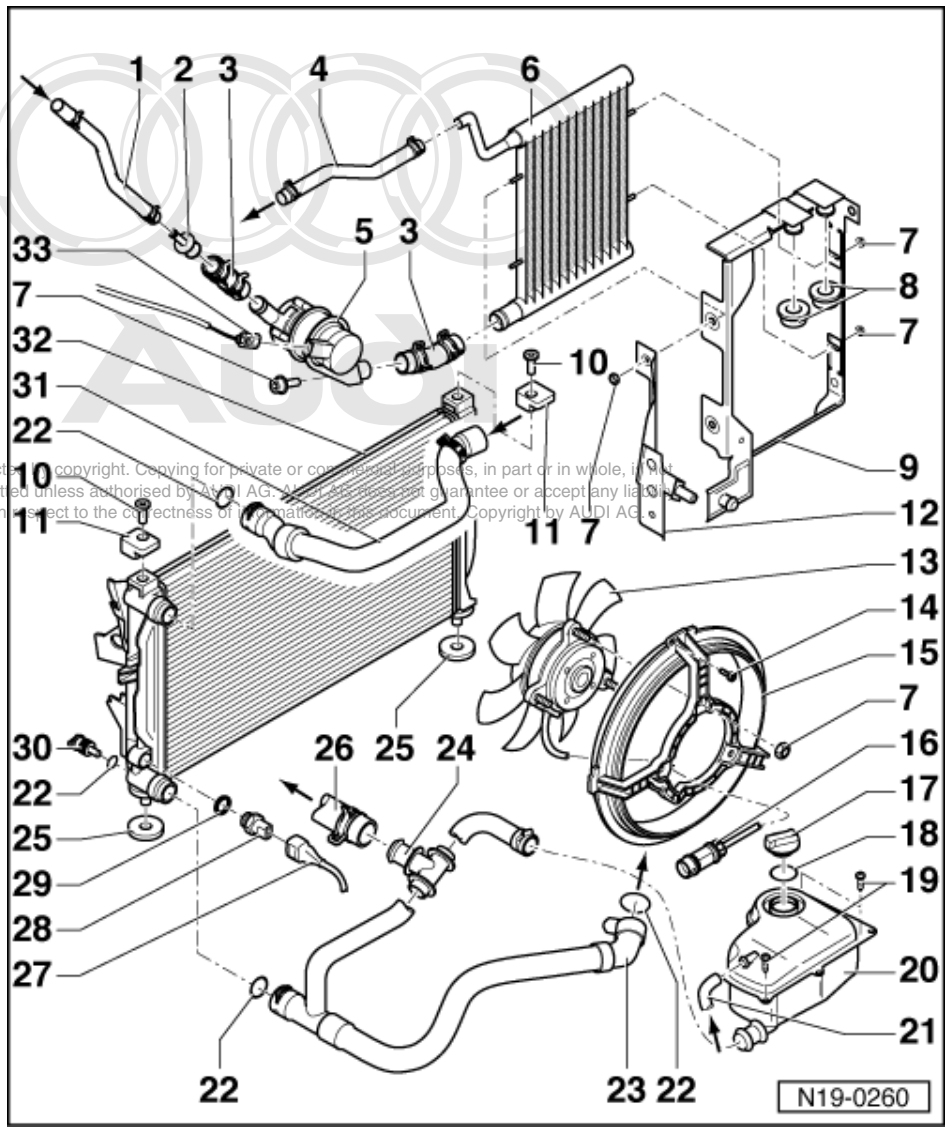
26 Coolant hose

- To cut-off valve

27 3-pin connector

- Black
- For radiator fan thermoswitch

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



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

28 Radiator fan thermoswitch -F18/ -F54, 35 Nm

- Switching temperatures:
  1st stage:
  On: 92...97 °C
  Off: 84...91 °C
  2nd stage
  On: 99...105 °C
  Off: 91...98 °C

29 Sealing ring

- Replace

30 Drain plug

31 Upper coolant hose

- From top coolant hose

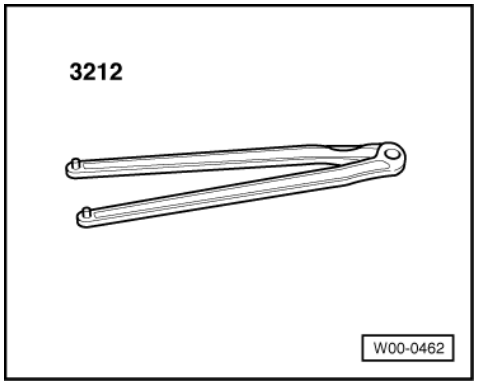
32 Radiator

- Removing and installing=>Page 19-40
- Renew entire coolant after replacement

33 Connector

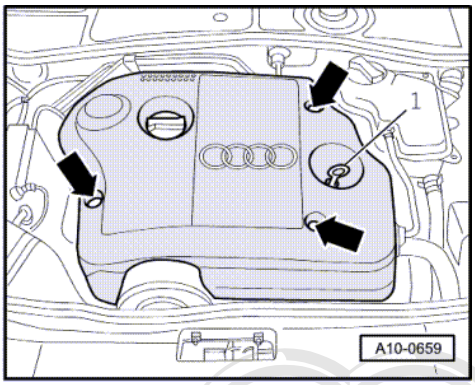
- For fuel cooling pump

1.9 - Removing and installing viscous fan



Special tools and workshop equipment required

- Pin wrench 3212



Removing

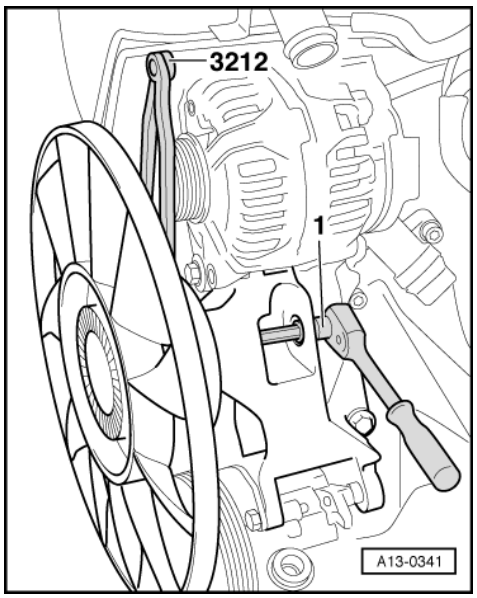
- Lock carrier in service position =>Page 13-1.

- -> Pull dipstick -1- out of guide tube.
- Unclipcaps.
- Remove nuts -arrows- and detach engine cover.
- Remove insulation lying below.
- Re-insert dipstick into guide tube.
- Detach ribbed belt from viscous fan pulley => Page 13-23.

Note:

The air conditioner ribbed belt remains fitted.

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



- -> Counter hold pulley for viscous fan with 2-hole pin wrench 3212 and unscrew from bracket with 8 mm Allen key -1-.
- Detach viscous fan.

Installing

Install in reverse order, paying attention to the following:

- Install ribbed belt =>Page 13-24.
- Install lock carrier =>Page 13-1.

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.

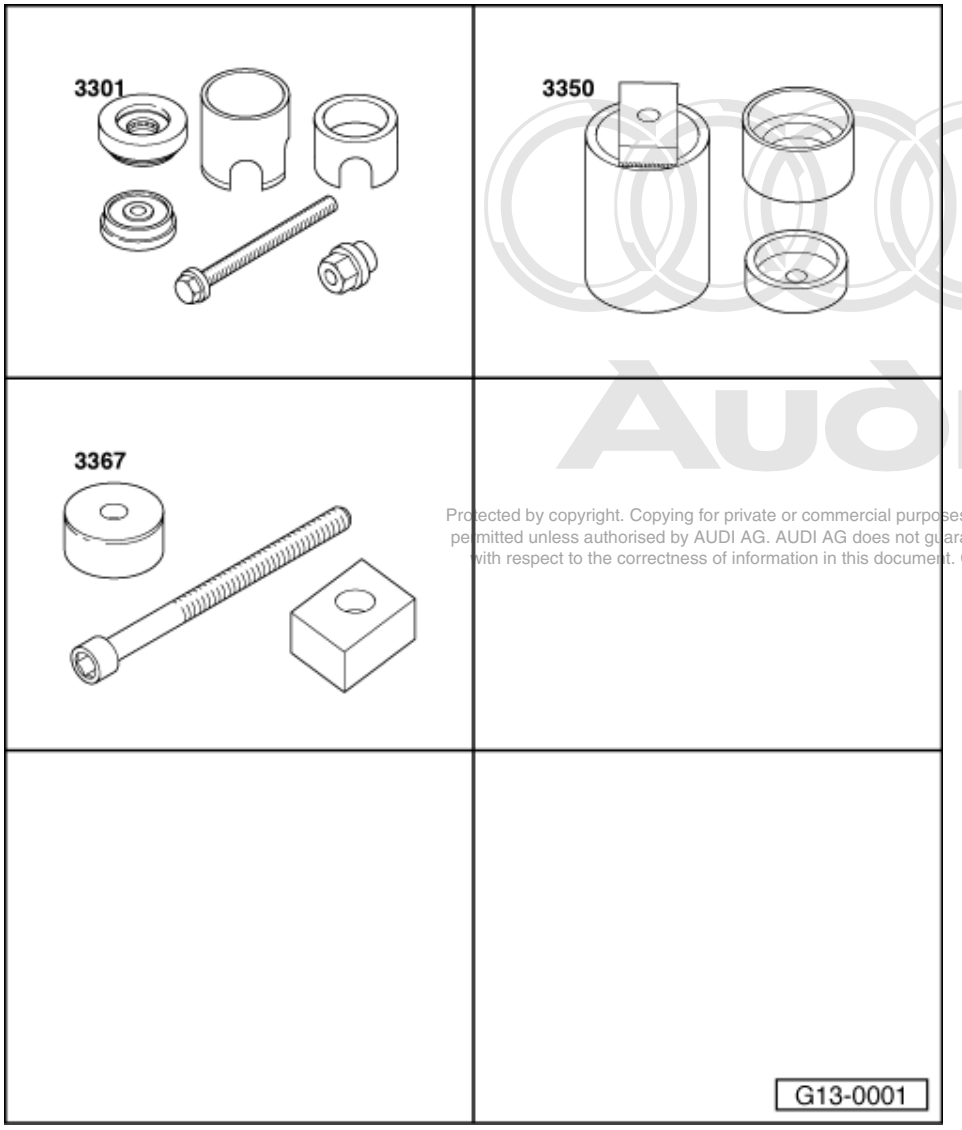
Tightening torques

Component	Nm
Viscous fan to bearing	45
Van wheel to viscous coupling	10 1)
Viscous fan to belt sprocket	28 2)

1) Replace self-locking bolts

2) Replace ribbed bolt

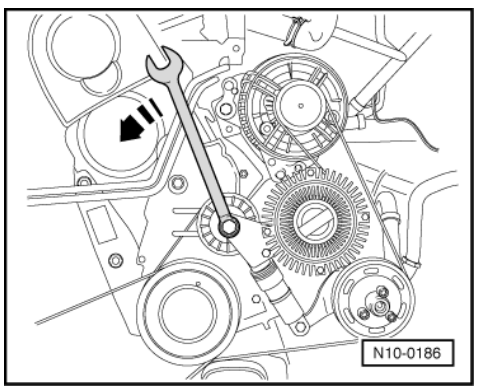
1.10 - Removing and installing bearing for viscous fan in bracket



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

Special tools and workshop equipment required

- Special tool 3301
- Special tool 3350
- Special tool 3367



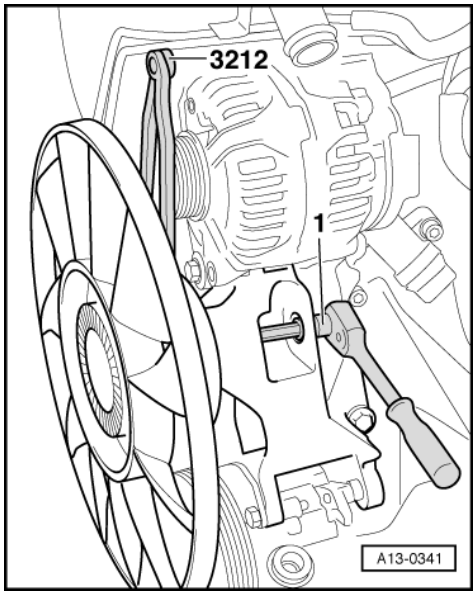
Removing

- Lock carrier in service position =>Page 13-1.

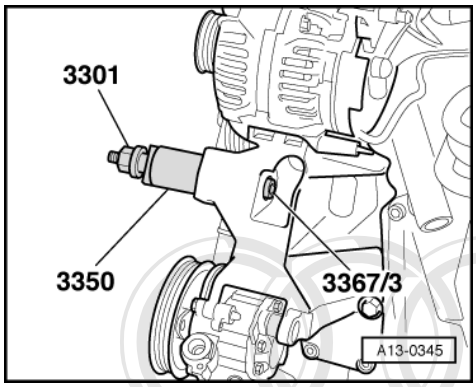
- -> Swivel tensioner in direction of arrow to slacken off ribbed belt.
- Detach ribbed belt from alternator belt pulley.
- Release tensioning element.

Note:

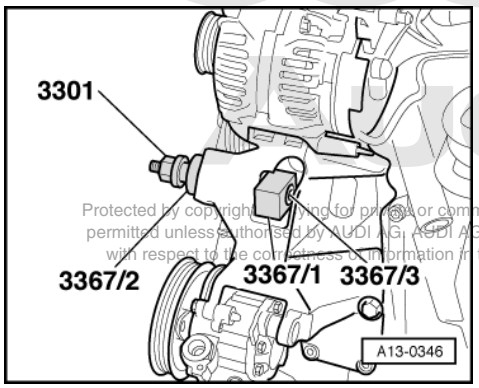
The air conditioner ribbed belt remains fitted.



- -> Counter hold pulley for viscous fan with 2-hole pin wrench 3212 and unscrew from bracket with 8 mm Allen key -1- .



- -> Pull bearing out of bracket using nut from assembly tool 3301, bolt 3367/3 and tube 3350.

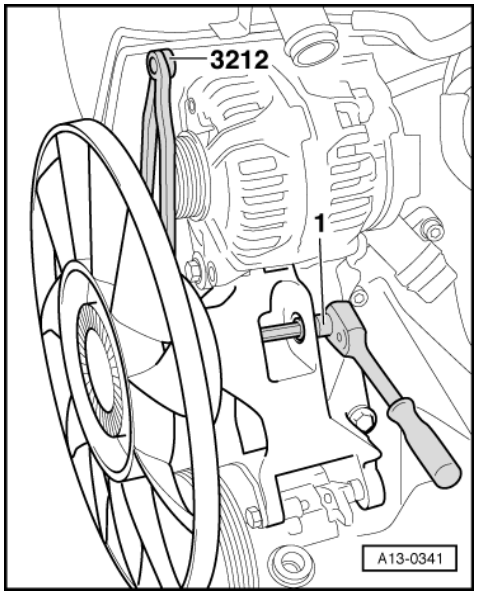


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Installing

Install in reverse order, paying attention to the following:

- -> Press in bearing with press tool 3367 and nut from assembly tool 3301.

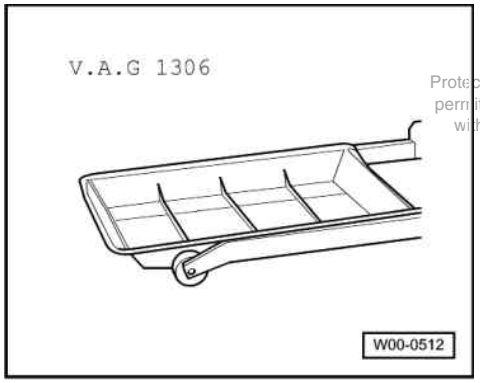


- -> Bolt viscous fan onto mount -1-, bracing viscous fan pulley with pin wrench 3212 to do so.
- Install ribbed belt =>Page 13-24.
- Install lock carrier =>Page 13-1.

Tightening torque

Component	Nm
Viscous fan to bearing	45

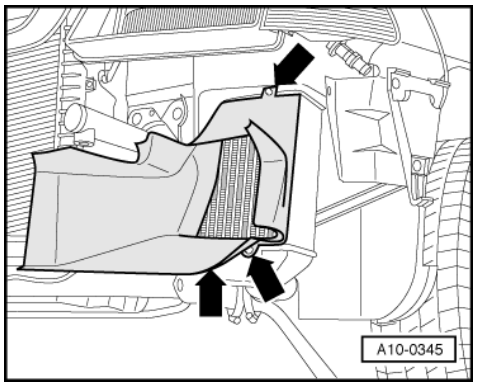
1.11 - Removing and installing radiator



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

- Drip tray V.A.G 1306

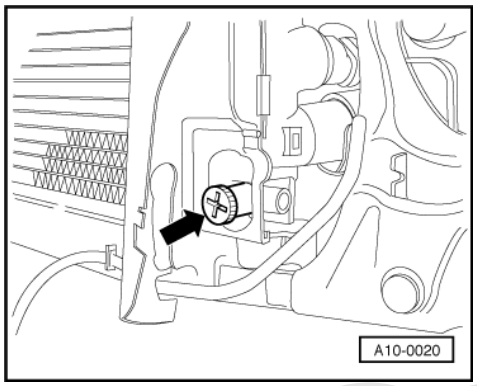


Removing

- Remove front bumper:

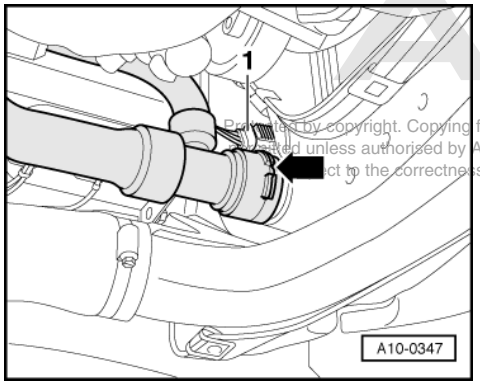
=> General Body Repairs, Exterior; Repair Group 63; Front Bumper; Removing and installing front bumper Front Bumper Removing and installing front bumper

- -> Remove air duct in front of charge air cooler -arrows-.



Attention:
Hot vapour may escape when opening expansion tank. Cover cap with cloth and open carefully.

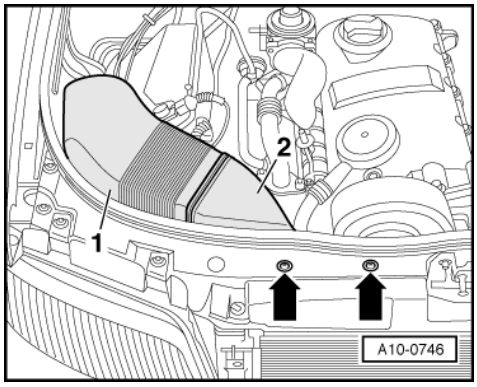
- Unscrew cap of coolant expansion tank.
- Place drip tray V.A.G 1306 below engine.
- -> Turn drain plug -arrow- at radiator anti-clockwise; attach auxiliary hose to connection if necessary.



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.

- -> Disconnect bottom coolant hose from radiator -arrow-.

- Detach connector -1- from radiator fan thermoswitch -F18/-F54 at bottom left of radiator and move wire clear.



Vehicles with automatic gearbox:

- -> Screw out bolts -arrows-.
- Remove air duct -1- and -2-.

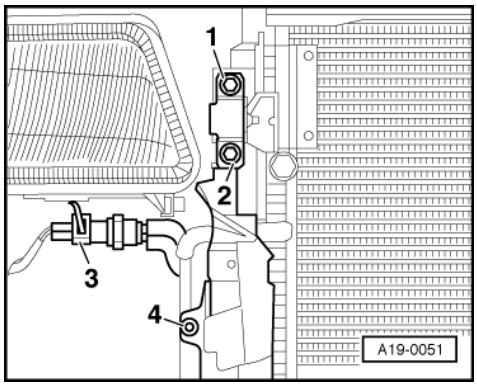
Note:

Observe rules for cleanliness when working on automatic gearbox:

- Place drip tray in position.
- Removing ATF lines from radiator:

=> Automatic gearbox 01V front- and four-wheel drive; Repair Group 37; Removing and installing ATF-lines
Removing and installing ATF-lines

- Tie ATF lines up on longitudinal member to avoid any escape of fluid.



Vehicles with air conditioner:

Attention: Never open refrigerant circuit of air conditioner.

Note:

To prevent damage to condenser and refrigerant lines/hoses ensure that lines and hoses are not stretched, kinked or bent.

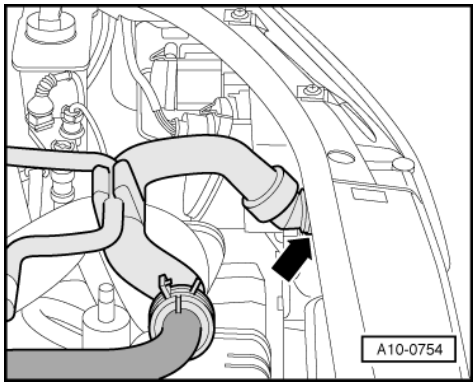
- -> Unbolt air ducts on left and right sides of radiator -4-.
- Remove condenser bolts -1- and -2-.
- Detach connector -3- from air conditioner pressure switch -F129.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 condenser up out of bracket, rotate towards the side and secure in place on front right wheel with wire.

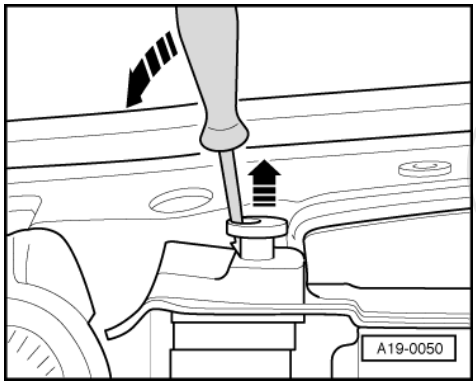
Note:

Protect wing panel from damage.



All models:

- -> Disconnect top coolant hose from radiator -arrow-.



- -> Release two retaining bolts for radiator and pull out upwards -arrows-.
- Swivel radiator forwards and lift off.

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

Installing

Install in reverse order, paying attention to the following:

- Fit front bumper.

=> General Body Repairs, Exterior; Repair Group 63; Front Bumper; Removing and installing front bumper Front Bumper Removing and installing front bumper

- Fill cooling system with coolant => Page 19-11.

Vehicles with automatic gearbox:

- Secure ATF lines:

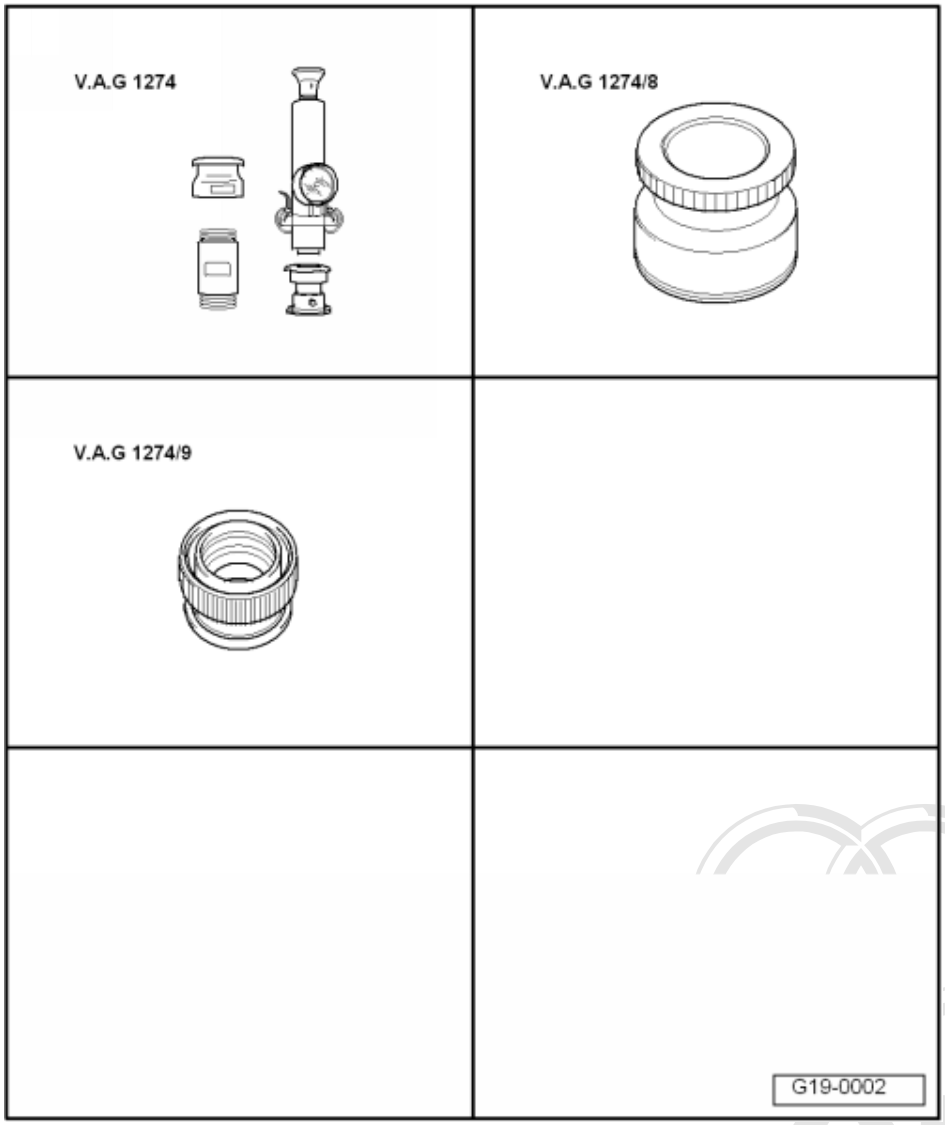
- Check ATF level.

Tightening torque

Component	Nm

Condenser to radiator	10

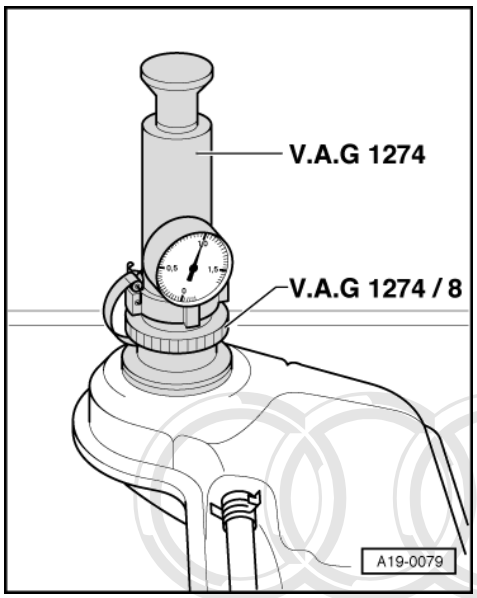
1.12 - Checking cooling system for leaks



Special tools and workshop equipment required

- V.A.G 1274
- Adapter V.A.G 1274/8
- Adapter 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.



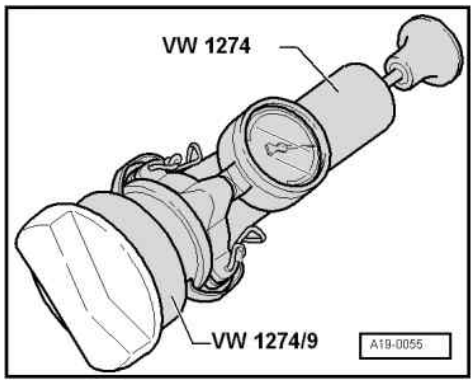
Test requirement:

- Engine warm

Attention:
Hot vapour may escape when opening expansion tank. Cover cap with cloth and open carefully.

Passing on or copying of this document for purposes not permitted by AUDI AG is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

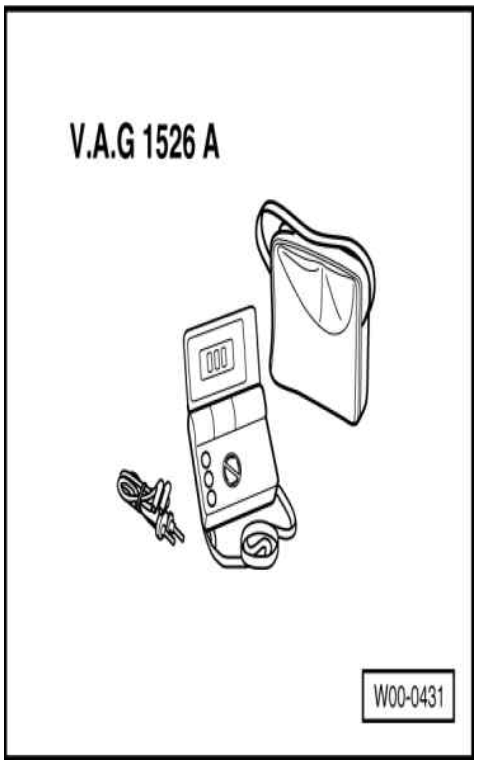
- Unscrew cap of coolant expansion tank.
- -> Fit tester V.A.G 1274 with adapter V.A.G 1274/8 onto expansion tank.
- Use hand pump of tester to generate a pressure of approx. 1.0 bar.
- Locate leak and eliminate fault if there is a drop in pressure.



Checking pressure relief valve in cap

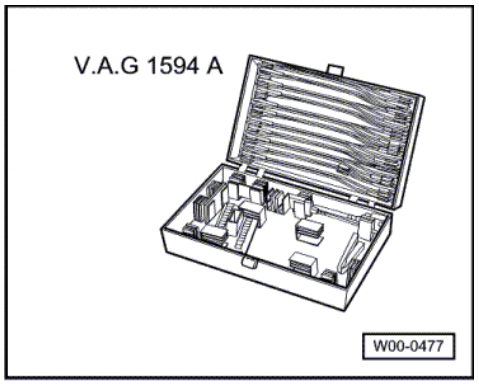
- -> Fit tester V.A.G 1274 with adapter V.A.G 1274/9 onto cap.
- Operate hand pump.
  - Pressure relief valve must open at pressure of 1.4 ... 1.6 bar.

1.13 - Checking radiator fan -V7



Special tools and workshop equipment required

- Portable multimeter V.A.G 1526 A

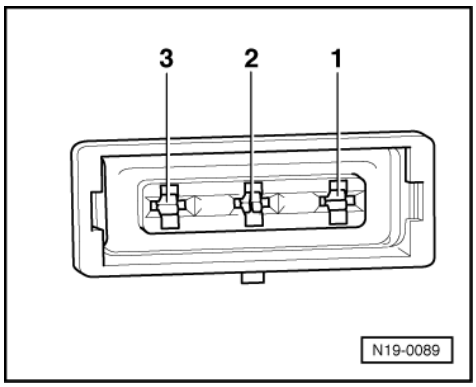


- Adapter set V.A.G 1594 A

Test requirements:

- Radiator fan fuse OK
- Radiator fan thermoswitch -F18/-F54 OK

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

- Unplug connector from radiator fan thermoswitch -F18/-F54.
- Switch on ignition.
- -> Jumper the following connector contacts:

Connector Contact	Specification
1 + 2	Stage 1 of -V7 must start up
1 + 3	Stage 2 of -V7 must start up

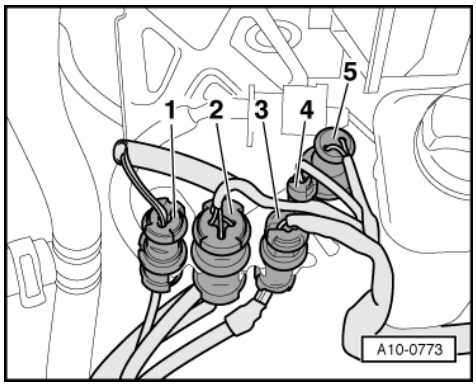
If reading does not match specification:

- Use current flow diagram to eliminate open circuit in wiring.

If no fault is found:

- Replace radiator fan -V7.

1.14 - Removing and installing radiator fan -V7-



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

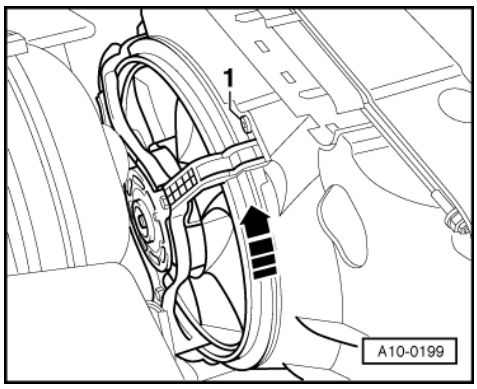
All cable ties unfastened or cut open on removal are to be re-attached in same position on installation.

Removing

- Lock carrier in service position =>Page 13-1.

- Detach cover from power steering fluid reservoir.
- -> Disconnect brown electrical connector -3- to radiator fan.

- Expose wire.



- -> Screw out securing screw -1-.
- Rotate electric fan in direction of arrow and detach.

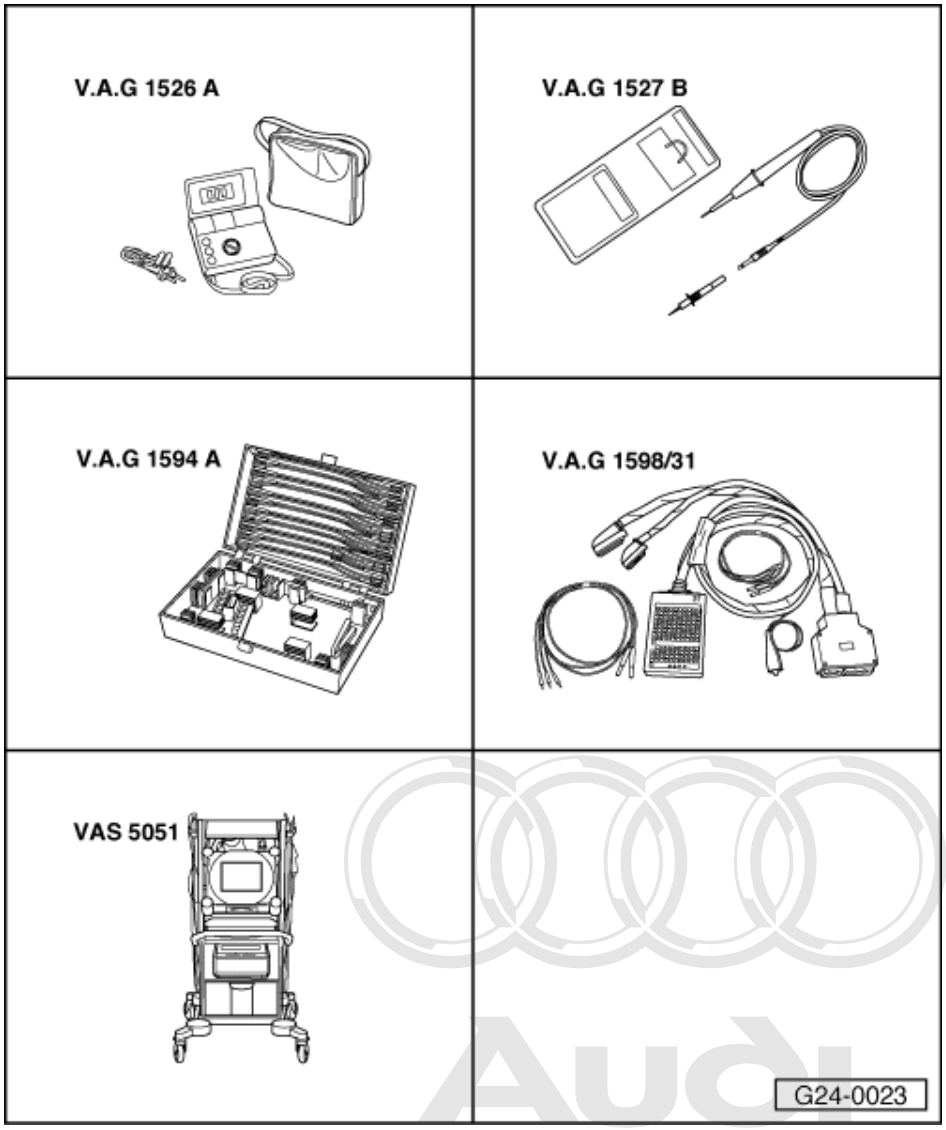
Installing

Install in reverse order, paying attention to the following:

- Install lock carrier =>Page 13-1.

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

1.15 - Checking fuel cooling pump -V166



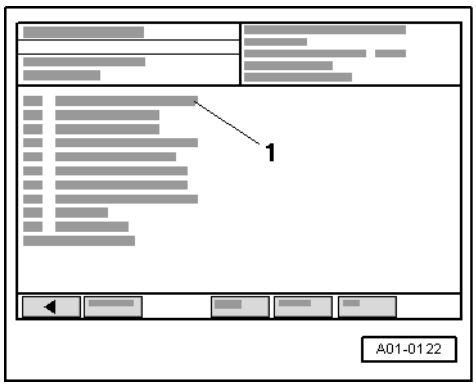
Data storage, copying for commercial or private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Special tools and workshop equipment required

- V.A.G 1526 A
- V.A.G 1527 B
- V.A.G 1594 A
- V.A.G 1598/31
- VAS 5051 with VAS 5051/1

Test requirements:

- Fuse of fuel cooling pump -V166 OK (in relay carrier inside electronics box in plenum chamber)
- Vehicle diagnostic, testing and information system VAS 5051 connected; vehicle self-diagnosis and vehicle system "01 - Engine electronics" selected
- Fault memory interrogated

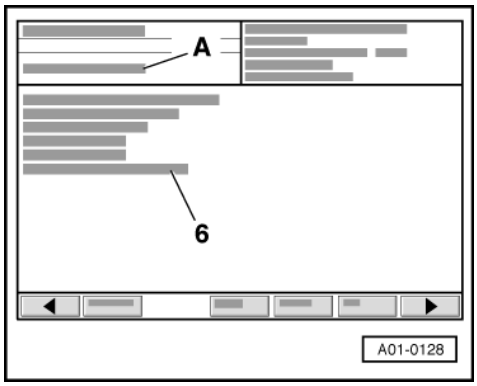


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Test sequence

-> Readout on VAS 5051:

- Enter diagnostic function "03 - Final control diagnosis" in selection -1-.



- Actuate fuel cooling pump relay -J445.

-> Readout on VAS 5051:

A - 6th control element in test
6 - Fuel cooling pump relay -J445

- The fuel cooling pump relay (in the electronics box in the plenum chamber, socket 2b) switches the fuel cooling pump -V166 on and off at intervals over a period of about 30 seconds (audible at right in engine compartment).

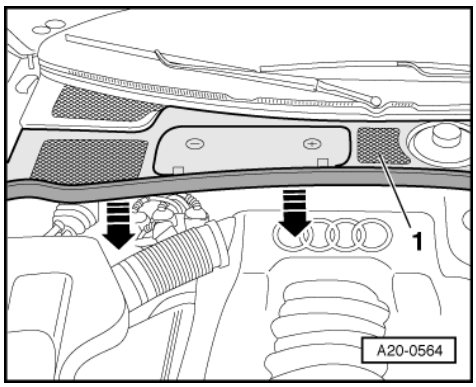
- Terminate function "03 - Final control diagnosis" by touching ◂ key.

A - If relay is not energised:

- Check power supply to fuel cooling pump relay => Page 19-54.
- Check actuation of fuel cooling pump relay => Page 19-55.

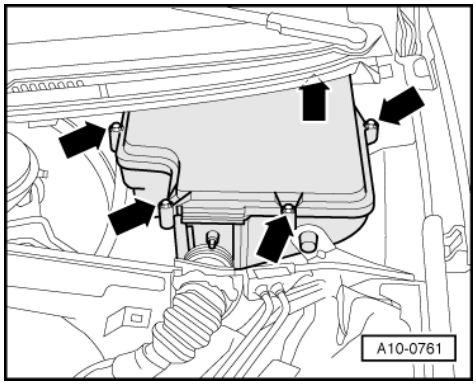
B - If relay operates but fuel cooling pump does not run:

- Check power supply to fuel cooling pump -V166 =>Page 19-58.

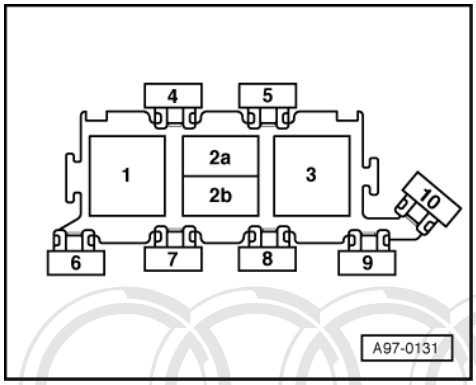


Check power supply to fuel cooling pump relay

- -> Remove rubber seal from front of plenum chamber cover -arrows-.
- Remove plenum chamber cover -1- from the front.



- -> Remove electronics box cover in plenum chamber -arrows-.



- -> Withdraw fuel cooling pump relay from plug-in position 2b.
- Switch on ignition.
- Connect up multimeter for voltage measurement as follows.

Relay socket Contact	Specification
1 + earth	Approx. battery voltage
3 + earth	Approx. battery voltage

If reading does not match specification:

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

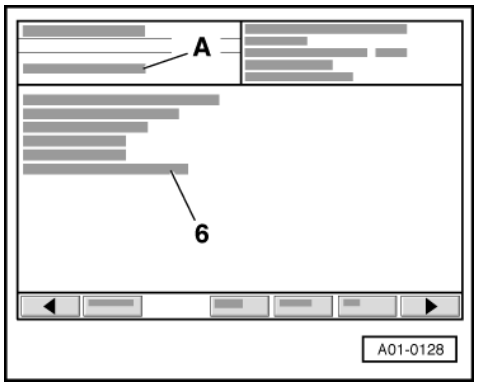
- Check for open circuit in appropriate wiring and repair if necessary.

=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

Check actuation of fuel cooling pump relay

- Connect up voltage tester V.A.G 1527 B as follows.

Relay socket Contact	Measure to
5	Battery positive



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

- Start final control diagnosis and activate fuel cooling pump relay -J445.

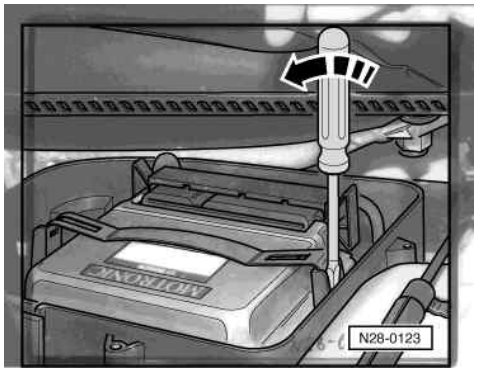
-> Readout on VAS 5051:

A - 6th control element in test
6 - Fuel cooling pump relay -J445
- The LED must flash (does not go out entirely)

- Terminate function "03 - Final control diagnosis" by touching ◂ key.

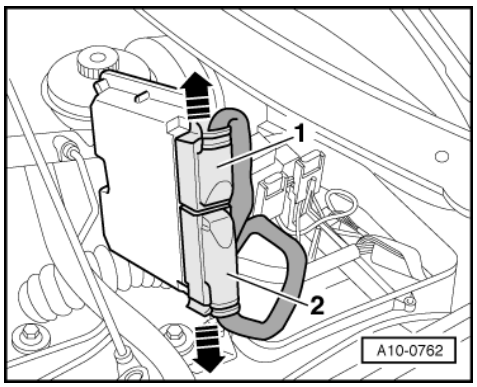
If LED flashes but relay does not operate:

- Replace fuel cooling pump relay-J445.

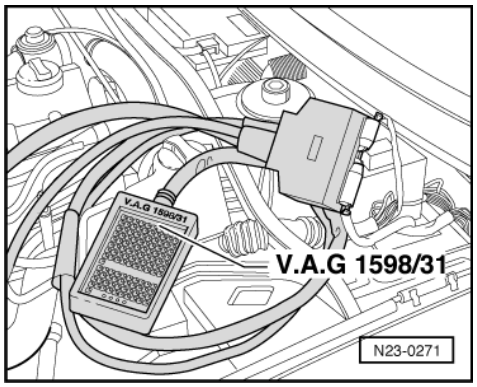


If LED does not flash:

- Switch off ignition.
- -> Carefully lever off retainer bar with screwdriver -arrow-.



- -> Release connector lock -arrow- and unplug connectors -1- and -2- from control unit.



- -> Connect test box V.A.G 1598/31 to cable harness connector. Actual engine control unit is not to be connected. Clip test box earthing clip onto chassis (not shown in diagram).

Attention:
So as not to destroy electronic components, select required measuring range before connecting test leads and observe test conditions.

- Check for open circuit and short to earth/positive in the following wiring.

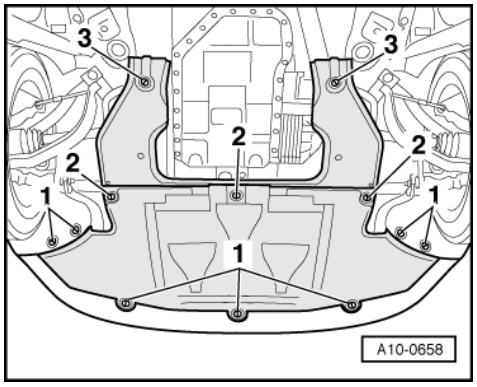
Relay socket Contact	Test box V.A.G 1598/31 Socket
5	43

- If necessary, eliminate open circuit in wiring/short circuit.

=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

If no fault is found in wiring:

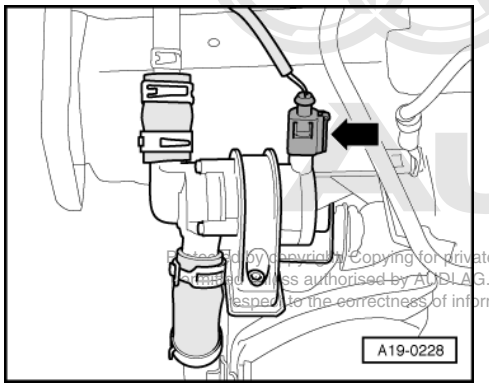
- Replace engine control unit.



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

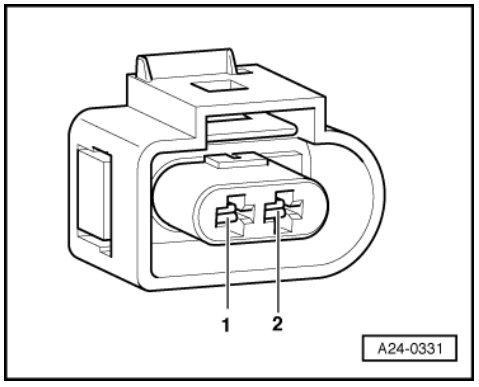
Checking power supply to fuel cooling pump

- -> Release quick-release fasteners -1- and -2- and detach front noise insulation. Do not remove rear noise insulation.

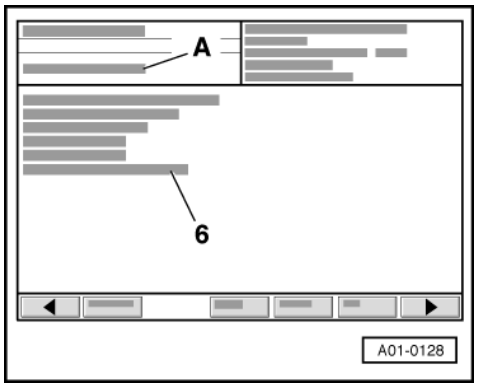


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- -> Unplug electrical connector -arrow- from fuel cooling pump.



- -> Connect up voltage tester V.A.G 1527 B between contacts 1 and 2.



- Start final control diagnosis and activate fuel cooling pump relay -J445.

-> Readout on VAS 5051:

A - 6th control element in test
6 - Fuel cooling pump relay -J445
- LED must flash

- Terminate function "03 - Final control diagnosis" by touching ◂ key.

If LED does not flash:

- Perform the following checks marked with a dot.

• Check wiring from connector on fuel cooling pump to fuel cooling pump relay -J445 (in electronics box in plenum chamber) for open circuit:

=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

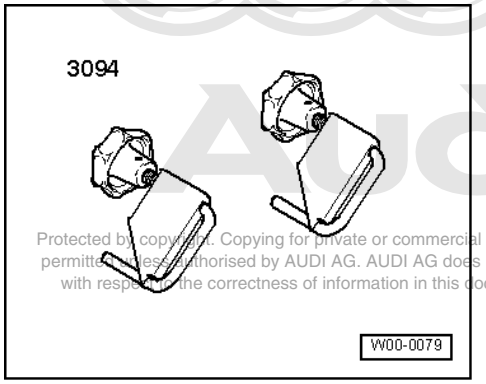
• Check wiring from connector on fuel cooling pump to earth point for open circuit:

=> Current Flow Diagrams, Electrical Fault-finding and Fitting Locations binder

If no fault is found:

- Replace fuel cooling pump -V166.

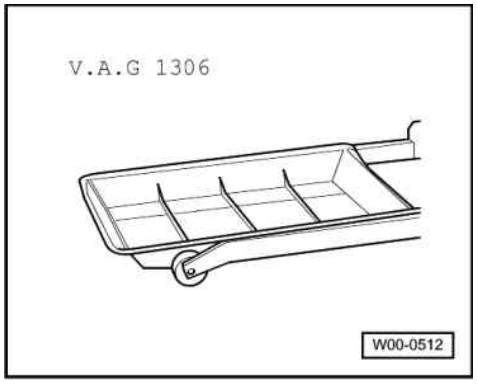
1.16 - Removing and installing fuel cooling circuit cooler



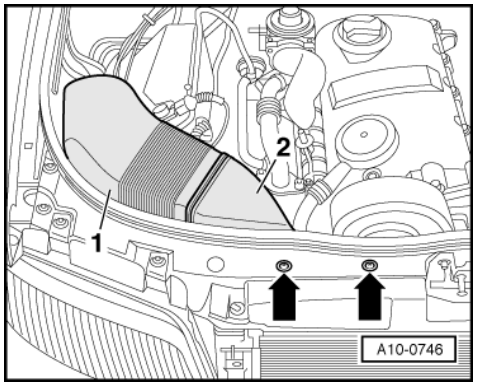
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Special tools and workshop equipment required

◆ Hose clamps 3094

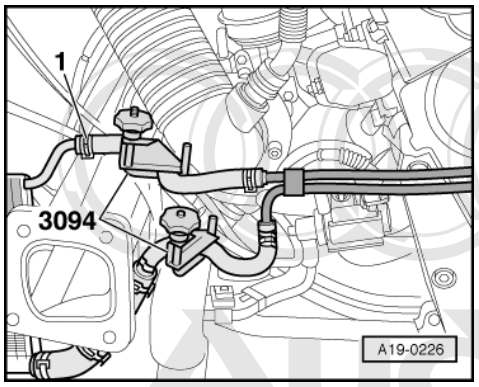


◆ Drip tray V.A.G 1306



Removing

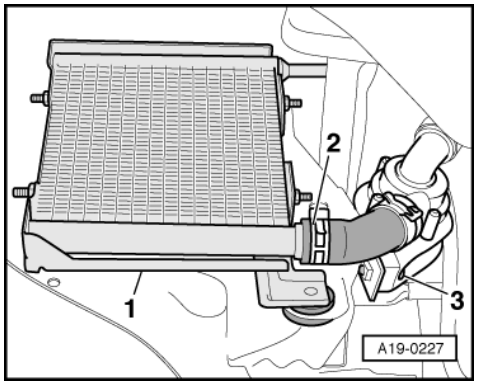
- -> Screw out 5 bolts -arrows-.
- Remove air duct -1- and -2-.



- -> Clamp off coolant hoses to cooling circuit fuel cooler with hose clamps 3094.
- Detach top coolant hose -1-.
- Remove front bumper;

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

=> General Body Repairs, Exterior; Repair Group 63; Front Bumper; Removing and installing front bumper Front Bumper Removing and installing front bumper



- Place drip tray V.A.G 1306 below engine.
- -> Disconnect -bottom-2- coolant hose from fuel cooling circuit cooler -1.
- Unbolt fuel cooling circuit pump -3-.
- Detach fuel cooling circuit cooler.

Installing

Install in reverse order, paying attention to the following:

- Fit front bumper.

=> General Body Repairs, Exterior; Repair Group 63; Front Bumper; Removing and installing front bumper Front Bumper Removing and installing front bumper

- Fill cooling system with coolant => Page 19-11.

Tightening torque

Component	Nm
Fuel pump to fuel cooling circuit cooler	10

21 - Charging

1 - Checking charge air system with turbocharger

1.1 - Checking charge air system with turbocharger

Notes:

- Observe rules for cleanliness => Page 21-40.
- Secure all hose connections with standard hose clamps:

=> Parts List

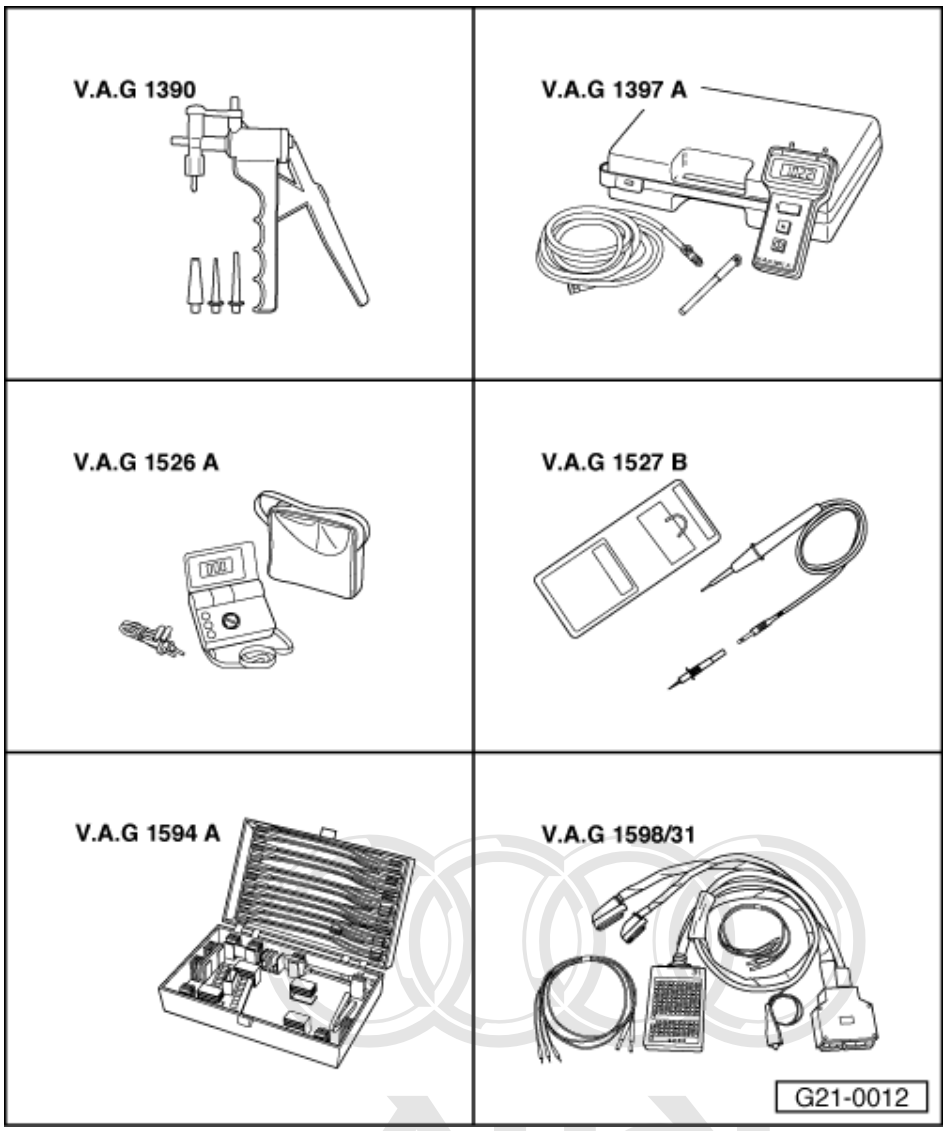
- Charge-air system must be free from leaks.
- Always replace gaskets, sealing rings and self-locking nuts.

Safety precautions

Pay attention to the following if testers and measuring instruments have to be used in the course of a test drive:

Attention:
- **Always attach testers and measuring instruments to back seat and have them operated from there by a second person.**
- **If testers and measuring instruments were to be operated from front passenger's seat, person sitting there could suffer injury in the event of an accident due to triggering of front passenger's airbag.**

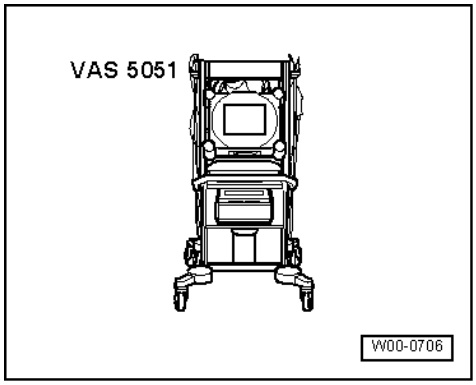
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



Special tools and workshop equipment required

- V.A.G 1390
- V.A.G 1397 A
- V.A.G 1526 A
- V.A.G 1527 B
- V.A.G 1594 A
- V.A.G 1598/31

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



- VAS 5051 with VAS 5051/1

1.2 - Test requirements for checking turbocharging

1. - Coolant temperature min. 85 °C.
2. - Fault memory of engine control unit interrogated.
3. - EGR system OK; checking => From page 26-37.

Note:

In the event of a defect in the exhaust gas recirculation system, no reliable values can be obtained in testing of the turbocharging.

4. - No leaks on intake and exhaust end.- effects of leaks=>Page 21-5
5. - Control line to charge pressure control valve not clogged, loose or leaking.
6. - No faults in engine or fuel-injection system, e.g. compression or pump/nozzle units.

1.3 - Effects of leakage at intake and exhaust end

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

A - Leakage downstream of air-mass meter

Possible faults:

1 - Connecting hose between air-mass meter and turbocharger
2 - Connecting hose to crankcase breather

Consequence:

- Lack of power

B - Leakage downstream of turbocharger (intake end)

Possible faults:

1 - Connecting hoses between air pipe in lock carrier and turbocharger/charge-air cooler
2 - Air hoses and pipes between charge-air cooler and intake manifold
3 - Charge-air cooler
4 - Seal under intake manifold pressure sender -G71/intake manifold temperature sender -G72
5 - Seal between intake manifold connection and pipe
6 - Seal between intake manifold and cylinder head

Consequence:

- Charge pressure too low

C - Leakage downstream of turbocharger (exhaust end)

Possible faults:

1 - EGR system components
2 - Turbocharger/exhaust manifold connection
3 - Exhaust manifold/cylinder head connection

Consequence:

- Charge pressure too low, possibly exhaust smoking, traces of soot in engine compartment

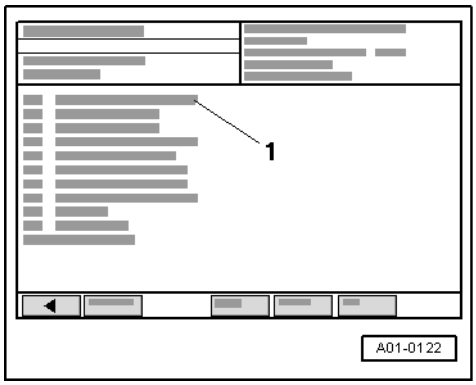
1.4 - Checking turbocharger and charge pressure control

Test requirements:

- Vehicle diagnostic, testing and information system VAS 5051 connected; vehicle self-diagnosis and vehicle system "01 - Engine electronics" selected
- Check all hoses, pipes and lines are firmly fitted and not leaking.
- Fault memory interrogated
- No leaks on intake and exhaust end
- No faults in engine or fuel-injection system, e.g. compression or pump/nozzle units.
- Coolant temperature at least 80 °C

1.5 - Check charge pressure

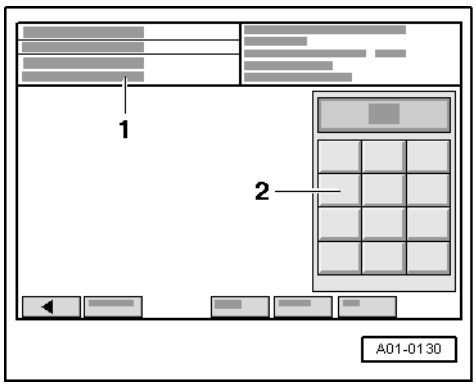
Attention:
To avoid the risk of accident on test drives, please follow the safety instructions => Page 21-1.



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.

-> Readout on VAS 5051:

- Enter diagnostic function "04 - Basic setting" in selection -1-.

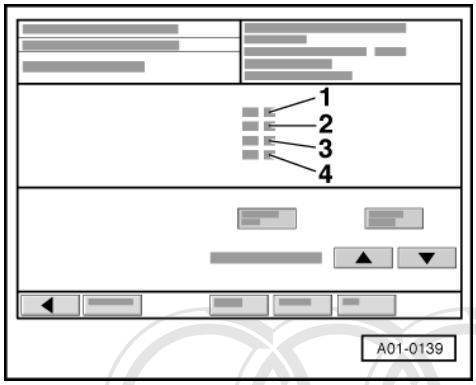


-> Readout on VAS 5051:

1 - Enter display group
max. input value = 255

- Use keypad-2- to enter "011" for "Display group number 011" and confirm by touching Q key.
  - The idle speed is increased to 1380 ... 1420 rpm

- The charge pressure control vacuum unit is actuated at intervals

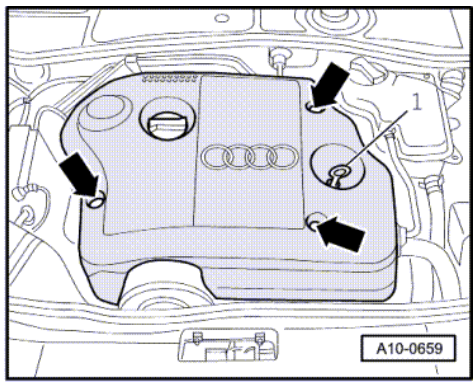


-> Readout on VAS 5051:

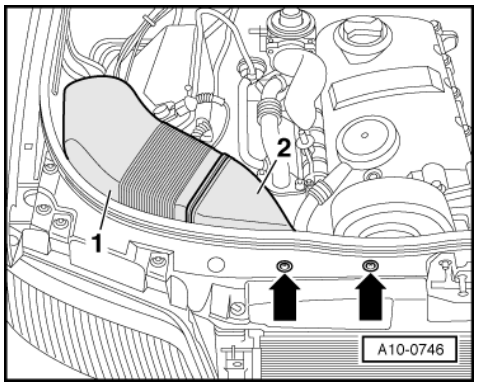
- Check display in display zones -2- and -3-.

	Display zones			
	1	2	3	4
Display group 011: Charge pressure at 1400 rpm:				
Reading	xxxx rpm	---	xxxx mbar	xxx %
Display	Engine speed	Operation of charge pressure control solenoid valve -N75	Intake manifold pressure (charge pressure)	Duty cycle of charge pressure control solenoid valve -N75
Specification	1400 rpm	Off	approx. atmospheric pressure (ambient air pressure)	98 ... 100 %
		CON	Approx. 100 ... 200 mbar above atmospheric pressure	0 ... 2 %
Note			Alternating high and low values in on/off cycle	

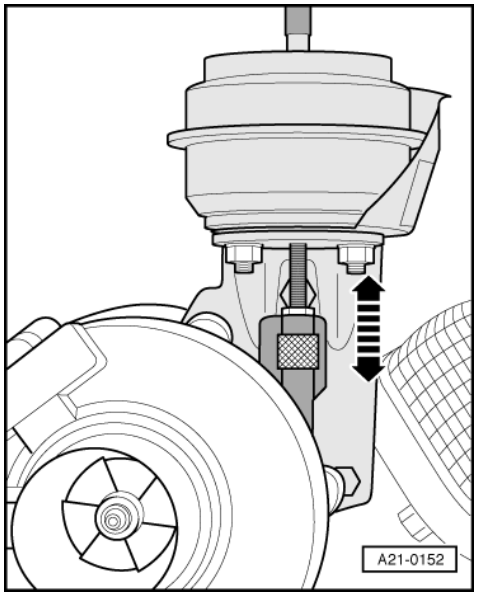
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- -> Pull dipstick -1- out of guide tube.
- Unclipcaps.
- Remove nuts -arrows- and detach engine cover.
- Remove insulation lying below.
- Re-insert dipstick into guide tube.

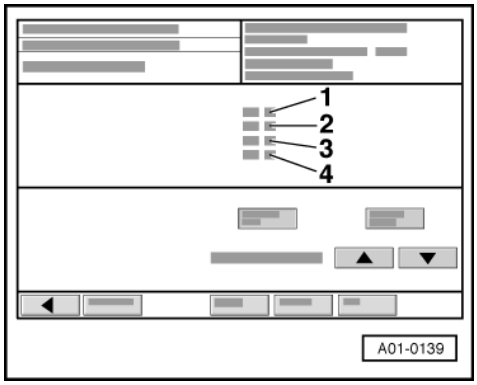


- -> Screw out bolts -arrows-.
- Remove air duct -1- and -2-.



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.

- -> Also check whether the operating rod on the turbocharger moves -arrows-.



-> Readout on VAS 5051:

If the specification in display zone 3 is not reached or if the operating rod on the turbocharger does not move, or moves only jerkily:

- Check linkage and vacuum unit for charge pressure control => Page 21-15.

- Check vacuum actuation to turbocharger => Page 21-19.

Continue test as follows:

- Switch to "Read measured value block".
- Accelerate the vehicle in third gear at full throttle from 2000 rpm and observe the tachometer.
- At approx. 3000 rpm press the "Print - Save result" key on the VAS 5051.

	Display zones			
	1	2	3	4
Display group 011: Intake manifold pressure (charge pressure) at 3000 rpm				
Reading	**xxxx rpm**	xxxx mbar	**xxxx mbar**	xxxx mbar
Display	**Engine speed**	Specified charge pressure	**Actual charge pressure**	Atmospheric pressure
Specification	**3000 rpm**	2080 mbar	**1750 ... 2150 mbar**	---

Reproduction, duplication or translation of this document, either in part or in whole, is not permitted unless authorised by AUDI 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 charge pressure is not in the specified range:

- Check charge-air system for leaks.
- Check linkage and vacuum unit for charge pressure control => Page 21-15.
- Check charge pressure control solenoid valve -N75 => Page 21-26.

If both are OK but the charge pressure is too low:

- Replace turbocharger => Page 21-46.
- Quit "08 - Reading measured value block" function by touching ◂ key.

-> Readout on VAS 5051:

- Enter diagnostic function "06 - End output" in selection -1-.

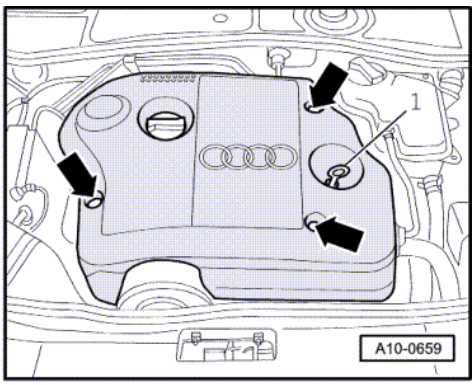
1.6 - Checking linkage and vacuum unit for charge pressure control

Note:

A defect in the linkage or the charge pressure control vacuum unit will result in the following faults:

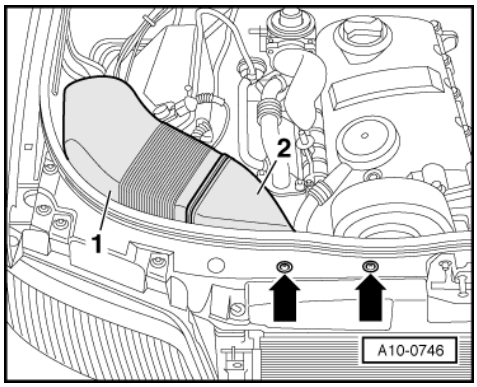
- Specified charge pressure values not reached.
- Lack of power
- Irregular power output in part-load range.
- Bucking on acceleration/deceleration.

- Check vacuum hoses are complete and not leaking => Page 21-24.

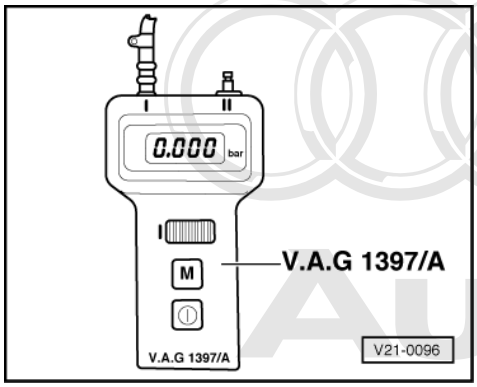


Test sequence

- -> Pull dipstick -1- out of guide tube.
- Unclipcaps.
- Remove nuts -arrows- and detach engine cover.
- Remove insulation lying below.
- Re-insert dipstick into guide tube.

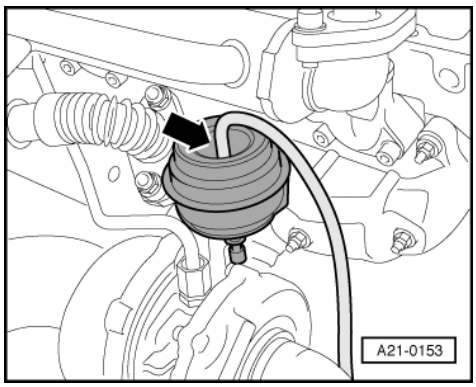


- -> Screw out bolts -arrows-.
- Remove air duct -1- and -2-.

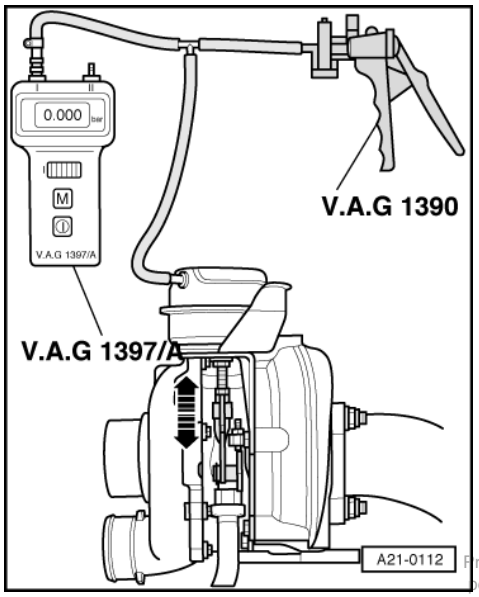


- -> Switch on turbocharger tester and set range switch to position -I- (absolute pressure).
- Attach measurement hose to connection -I-.

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

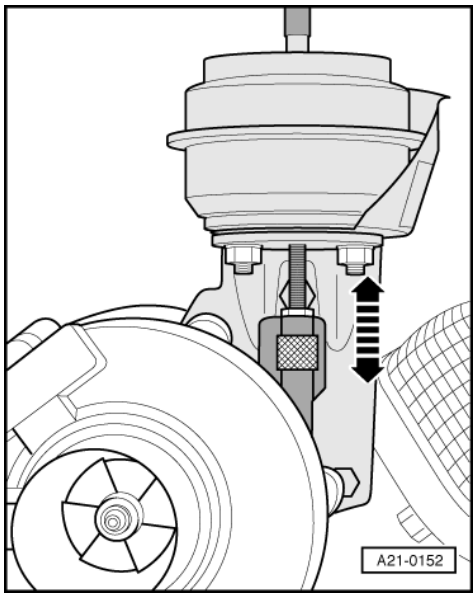


- -> Detach hose arrow- from charge pressure control vacuum unit.



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

- -> Connect vacuum hand pump V.A.G 1390 and turbocharger tester V.A.G 1397 A using auxiliary hoses, as shown in the diagram.
- Operate vacuum pump.
- Read vacuum value from turbocharger tester V.A.G 1397 A.



- -> Observe turbocharger linkage while doing so:
  - Specification at 50 ... 100 mbar: Linkage must start moving upwards
  - Specification at 550 ... 620 mbar: Linkage must be at upper stop limit

Note:

The absolute pressure indicated on the V.A.G 1397 A must fall by the specified amounts.

- Aerate vacuum hand pump.
  - Linkage must move downwards

Note:

Check the movement of the linkage across the full adjustment range: It must move smoothly and continuously.

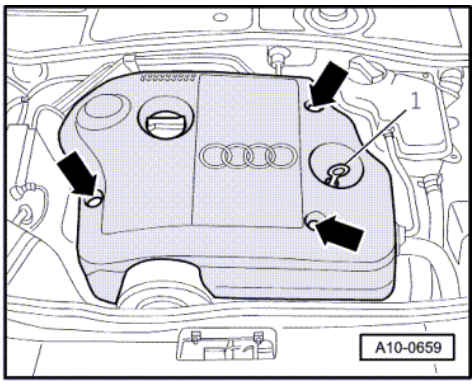
If the specified values are not obtained, or if the linkage moves jerkily:

- Replace turbocharger => Page 21-46.

1.7 - Checking vacuum actuation to turbocharger

Test requirements:

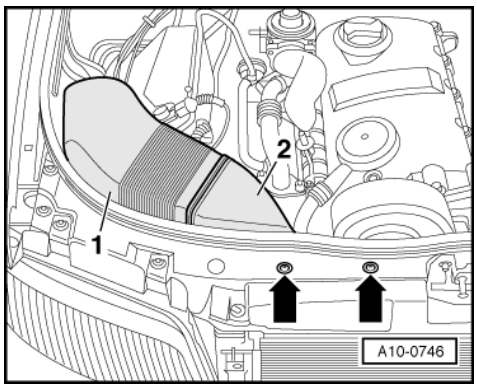
- Engine must be idling.
- Vehicle diagnostic, testing and information system VAS 5051 connected; vehicle self-diagnosis and vehicle system "01 - Engine electronics" selected



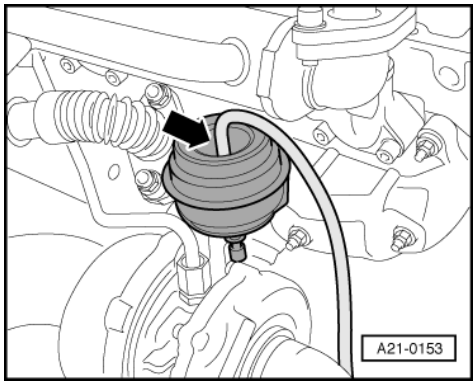
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Test sequence

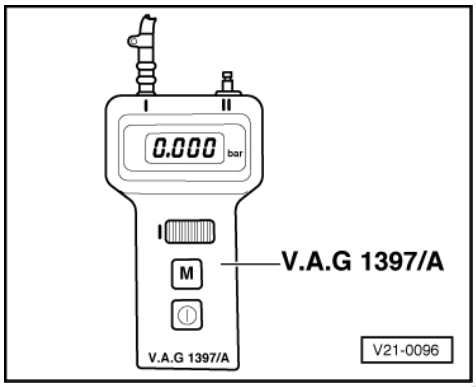
- -> Pull dipstick -1- out of guide tube.
- Unclipcaps.
- Remove nuts -arrows- and detach engine cover.
- Remove insulation lying below.
- Re-insert dipstick into guide tube.



- -> Screw out bolts -arrows-.
- Remove air duct -1- and -2-.



- -> Detach hose -arrow- from charge pressure control vacuum unit.

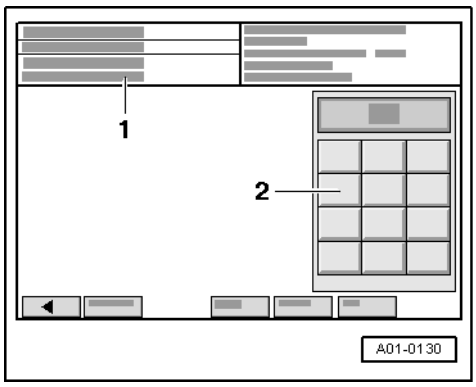


- -> Switch on turbocharger tester and set range switch to position -I- (absolute pressure).
- Attach measurement hose to connection -I-.
- Connect measurement hose to detached vacuum hose.

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

-> Readout on VAS 5051:

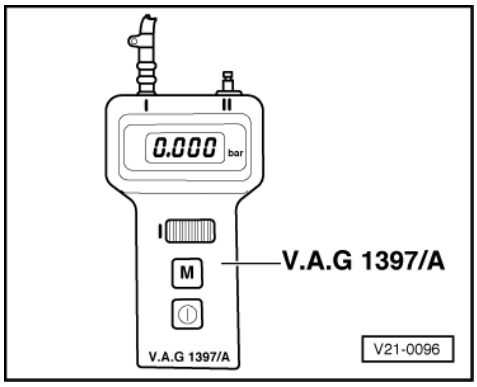
- Enter diagnostic function "04 - Basic setting" in selection -1-.



-> Readout on VAS 5051:

1 - Enter display group
max. input value = 255

- Use keypad-2- to enter "033" for "Display group number 033" and confirm by touching Q key.
  - The idle speed is increased to 1400 rpm
  - The charge pressure control vacuum unit is actuated at intervals



- -> Specification on V.A.G 1397 A:
  Greater than 650 mbar on actuation of vacuum unit

Note:

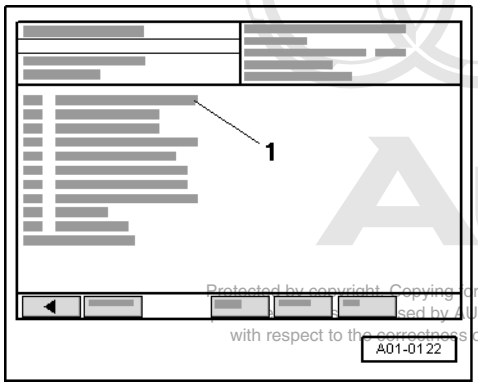
The absolute pressure indicated on the V.A.G 1397 A must fall by the specified amounts.

If reading does not match specification:

- Check whether charge pressure control hose has dropped off or is clogged => Page 21-24.
- Check charge pressure control solenoid valve -N75 => Page 21-26.

If vacuum does not drop when actuation finishes:

- Check vent lines => Page 21-24.
- End function "04 - Basic setting" by pressing ◂ key.

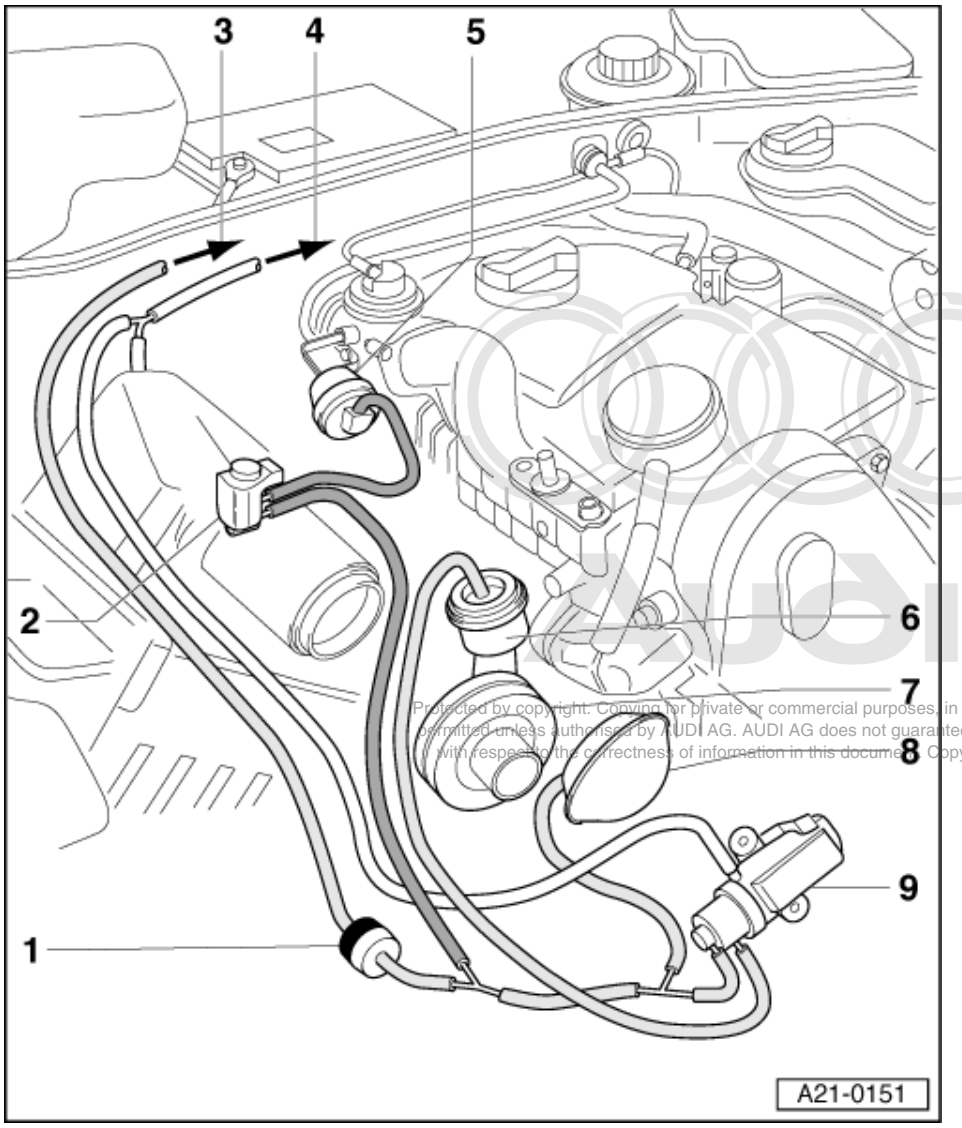


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

-> Readout on VAS 5051:

- Enter diagnostic function "06 - End output" in selection -1-.

1.8 - Charge pressure control connection diagram



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

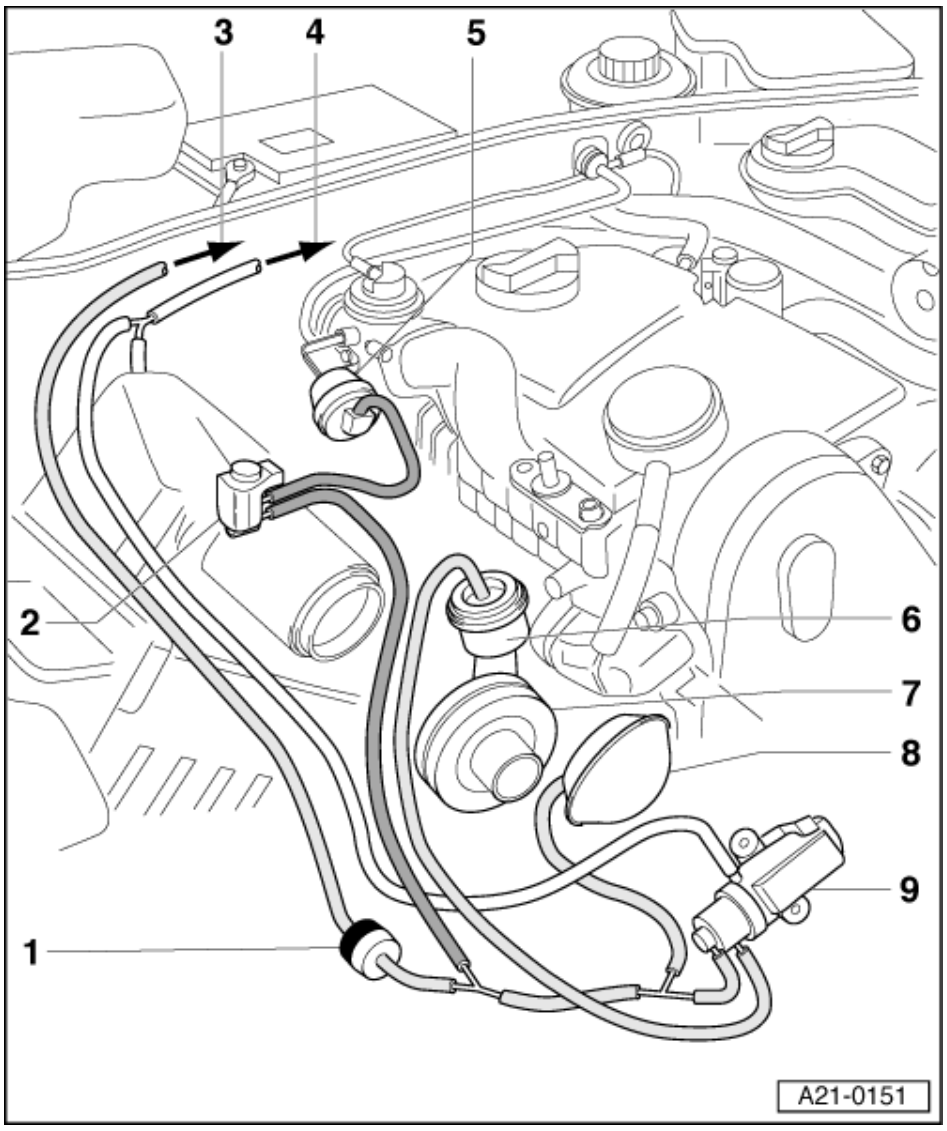
1 **Non-return valve**
- Installation position (light/dark side): As shown in diagram

2 **Intake manifold change-over valve -N239**

3 **To EGR valve -N18**

4 **Vent line into air cleaner housing**
- To EGR valve -N18

5 **Intake manifold change-over vacuum unit**



6 Vacuum unit for charge pressure control

- Checking => Page 21-15
- Cannot be replaced separately

7 Turbocharger

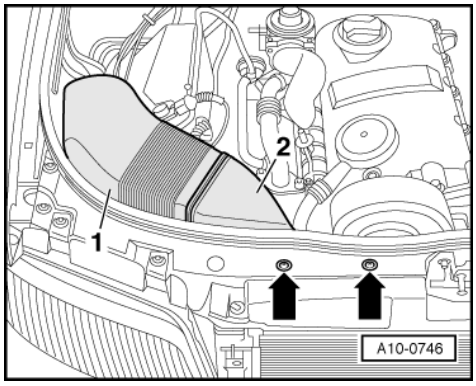
8 Vacuum reservoir

9 Charge pressure control solenoid valve -N75

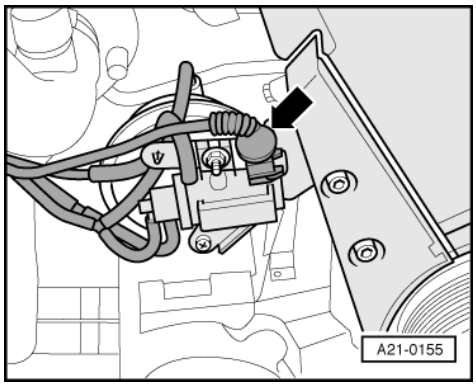
- Installation position: at front right in engine compartment
- Checking => Page 21-26

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 - Checking charge pressure control solenoid valve -N75

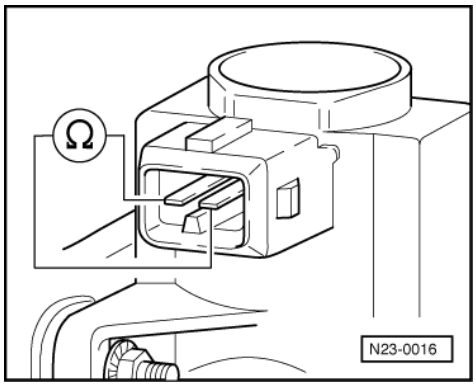


- -> Screw out bolts -arrows-.
- Remove air duct -1- and -2-.



Checking internal resistance

- Switch off ignition.
- -> Unplug connector -arrows- from charge pressure control solenoid valve.

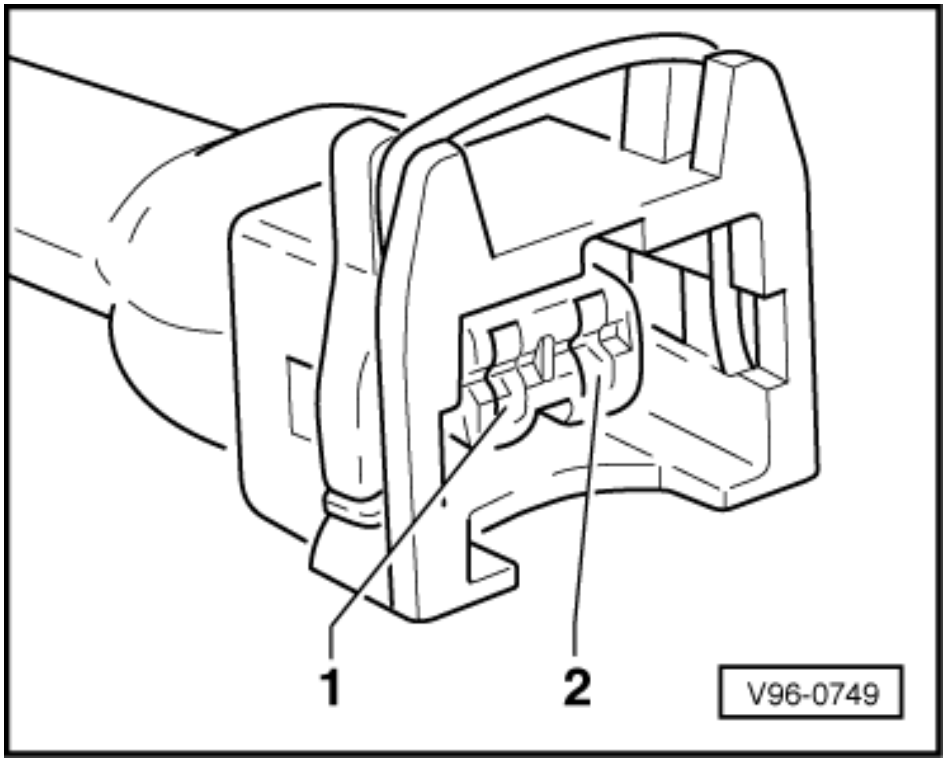


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- -> Connect multimeter to valve for resistance measurement.
  - Specification: 14 ... 20 ω

If reading does not match specification:

- Replace charge pressure control solenoid valve -N75.

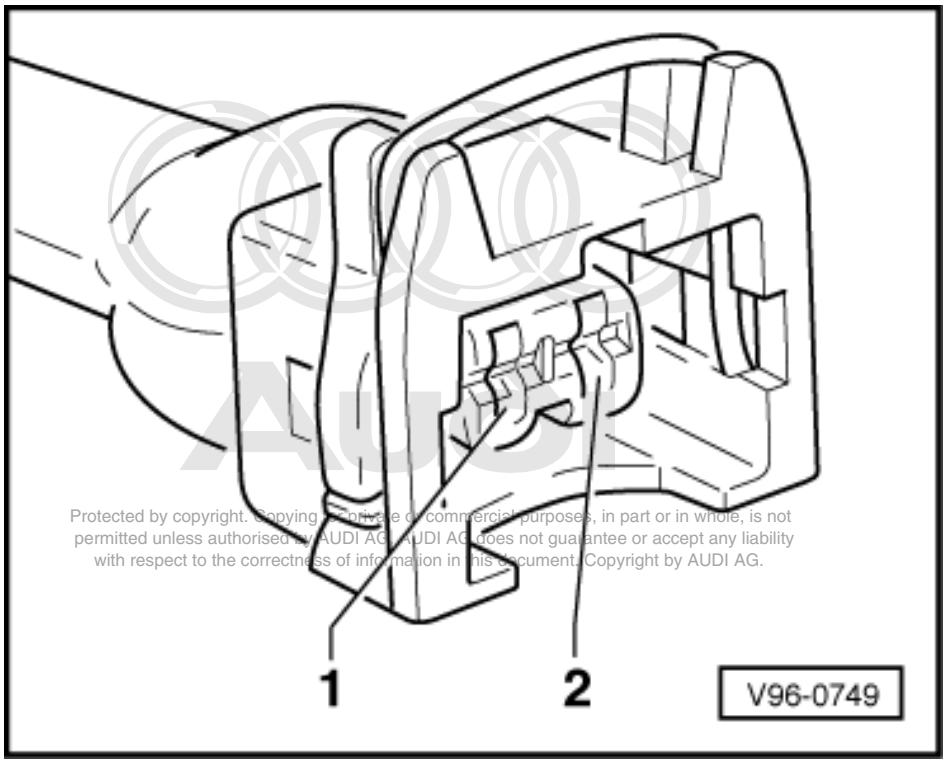


Checking power supply

- -> Connect multimeter to measure voltage between contact 2 and earth.
- Switch on ignition.
  - Specification: Approx. battery voltage

If reading does not match specification:

- Check for open circuit in wiring and repair if necessary.



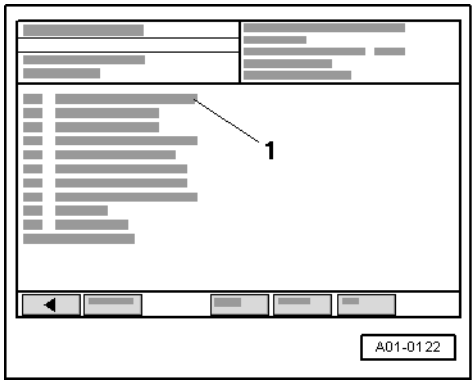
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Checking actuation

Test requirement:

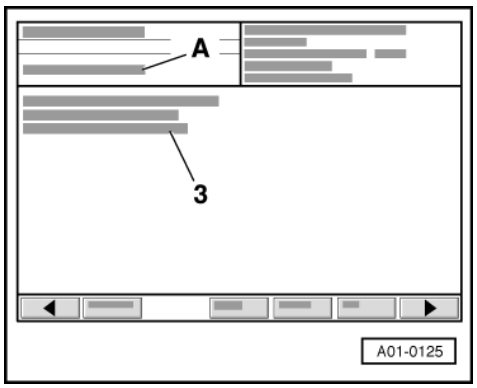
- Vehicle diagnostic, testing and information system VAS 5051 connected; vehicle self-diagnosis and vehicle system "01 - Engine electronics" selected

- -> Connect up voltage tester V.A.G 1527 B between contacts 1 and 2.



-> Readout on VAS 5051:

- Enter diagnostic function "03 - Final control diagnosis" in selection -1-.



- Actuate charge pressure control solenoid valve -N75.

-> Readout on VAS 5051:

A - 3. control element being tested
3 - Charge pressure control solenoid valve-N75

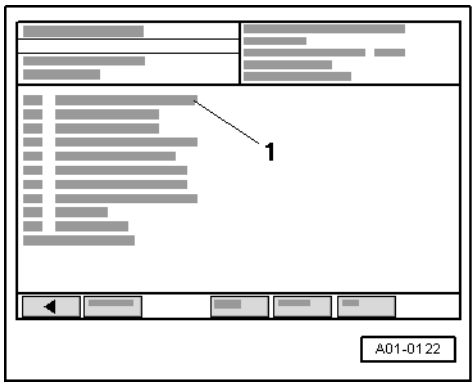
- LED must flash slowly

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

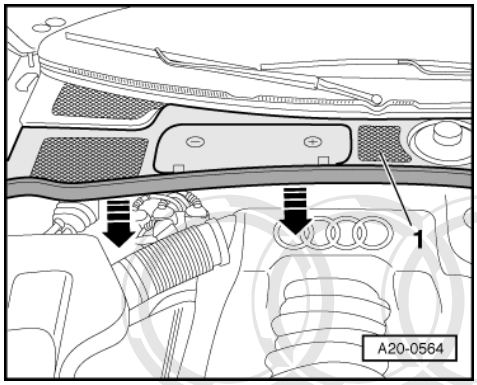
Voltage testers with a low current input do not go out completely between actuation of engine control unit, but rather continue to glow slightly and become distinctly brighter on actuation.

- Terminate function "03 - Final control diagnosis" by touching ◂ key.



-> Readout on VAS 5051:

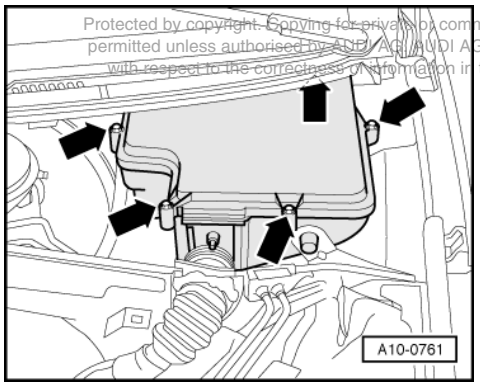
- Enter diagnostic function "06 - End output" in selection -1-.



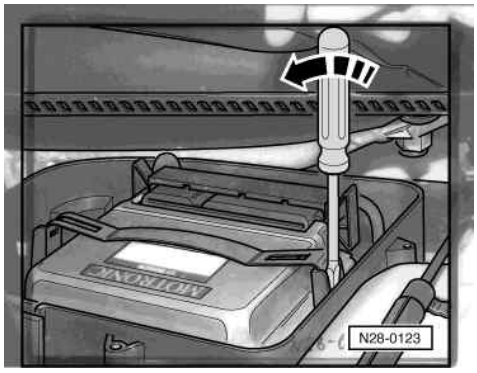
If LED does not respond as described:

- -> Remove rubber seal from plenum chamber cover in direction of arrow.
- Remove plenum chamber cover -1- from the front.

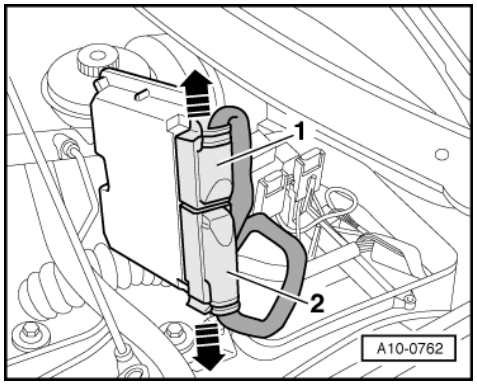
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



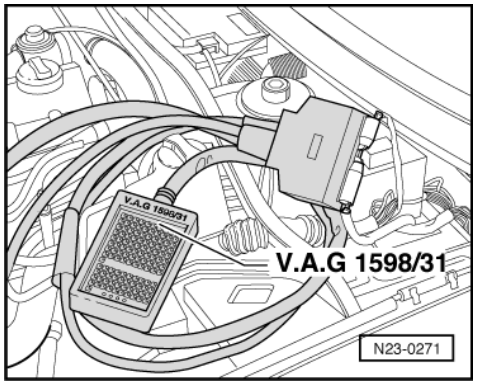
- -> Remove electronics box cover in plenum chamber -arrows-.



- -> Carefully lever off retainer bar with screwdriver -arrow-.



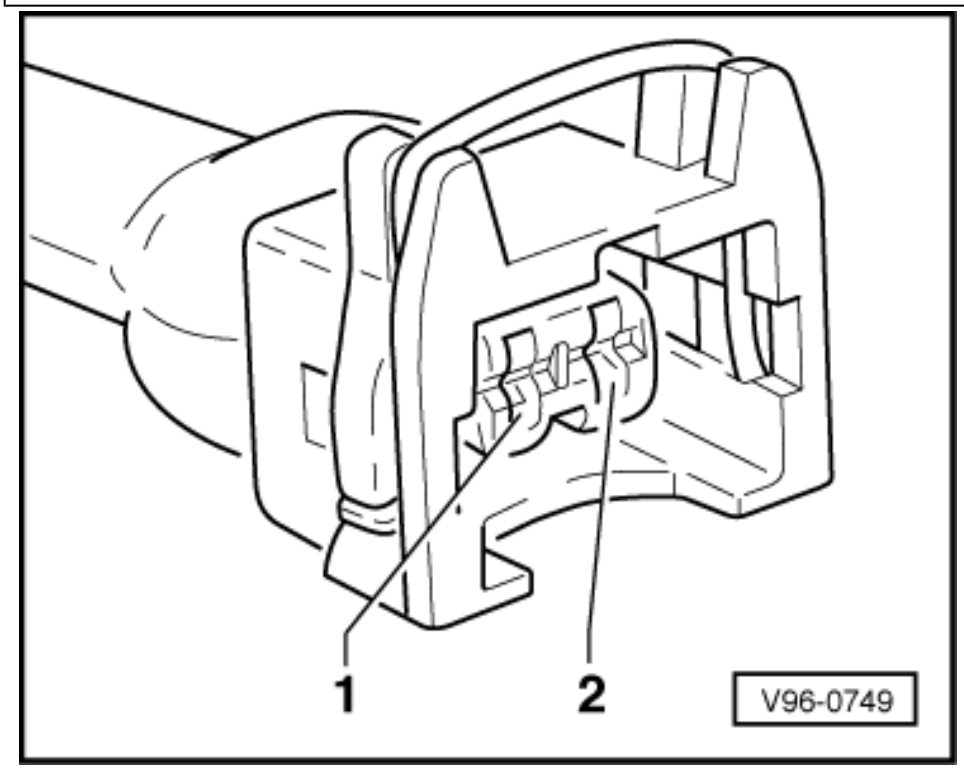
- -> Release connector lock -arrow- and unplug connectors -1- and -2- from control unit.



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

- -> Connect test box V.A.G 1598/31 to cable harness connector. Actual engine control unit is not to be connected. Clip test box earthing clip onto chassis (not shown in diagram).

Attention:
So as not to destroy electronic components, select required measuring range before connecting test leads and observe test conditions.

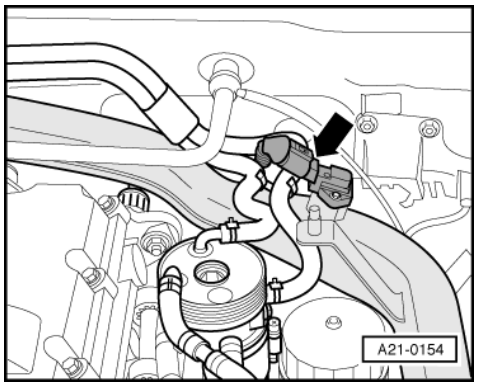


- -> Check for open circuit and short to earth/positive in the following wiring.

Connector Contact	Test box V.A.G 1598/31 Socket
1	62

- If necessary, eliminate open circuit in wiring/short circuit.

1.10 - Check intake manifold pressure sender -G71

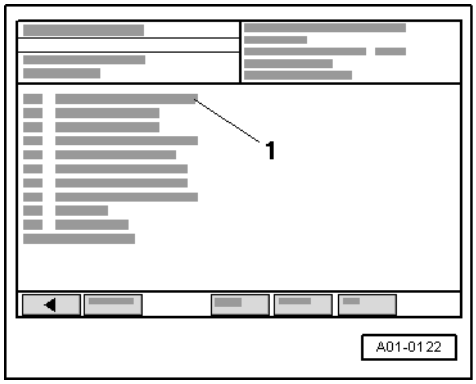


Notes:

- The intake manifold pressure sender is accommodated in one housing together with the intake manifold temperature sender.
- -> Fitting location of intake manifold pressure sender -arrow-: In rear air pipe.

Test requirements:

- Vehicle diagnostic, testing and information system VAS 5051 connected; vehicle self-diagnosis and vehicle system "01 - Engine electronics" selected
- Engine stopped, ignition on

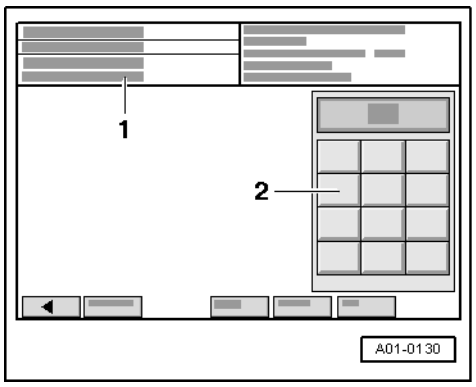


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Test sequence

-> Readout on VAS 5051:

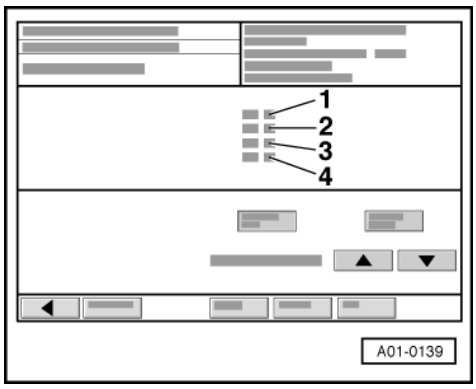
- In list -1-, touch diagnostic function "08 - Reading measured value block".



-> Readout on VAS 5051:

1 - Enter display group
max. input value = 255

- Use keypad-2- to enter "010" for "Display group number 010" and confirm by touching Q key.

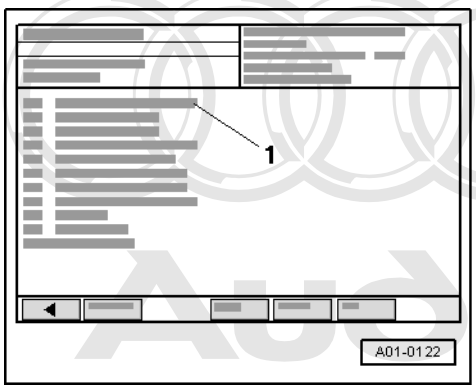


-> Readout on VAS 5051:

- Check display in display zones -2- and -3-.
  - Specification: Coinciding pressures
    Tolerance ± 30 mbar

If reading does not match specification:

- Check wiring.

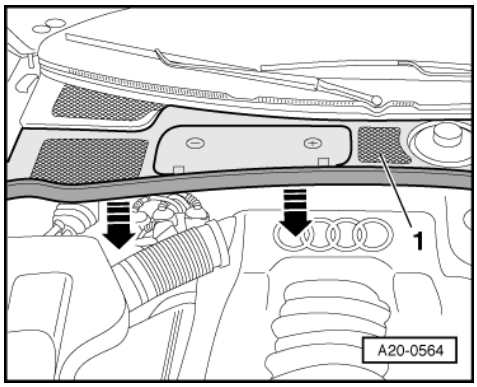


Quit "08 - Reading measured value block" function by touching ◂ key.

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

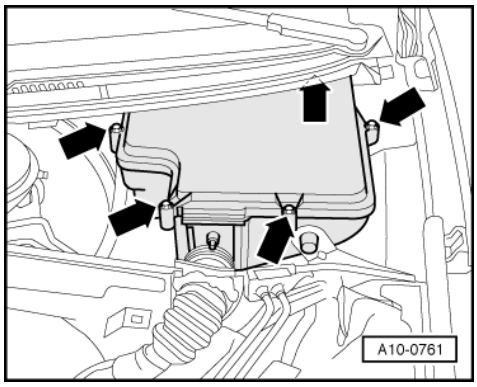
-> Readout on VAS 5051:

- Enter diagnostic function "06 - End output" in selection -1-.



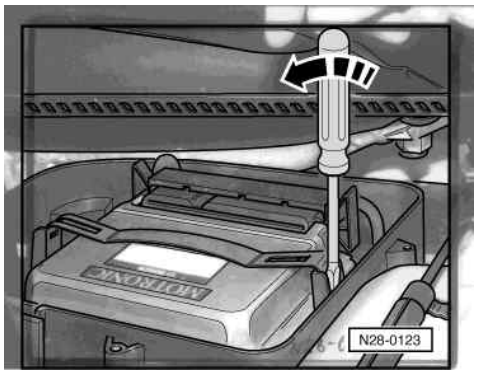
Check wiring

- -> Remove rubber seal from plenum chamber cover in direction of arrow.
- Remove plenum chamber cover -1- from the front.

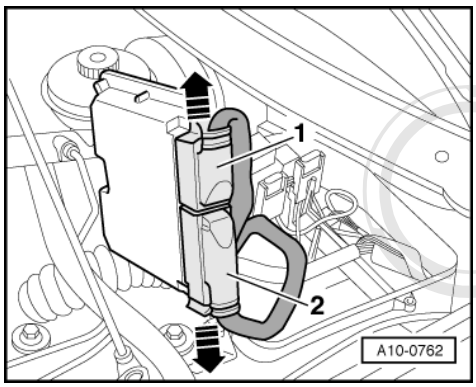


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- -> Remove electronics box cover in plenum chamber -arrows-.

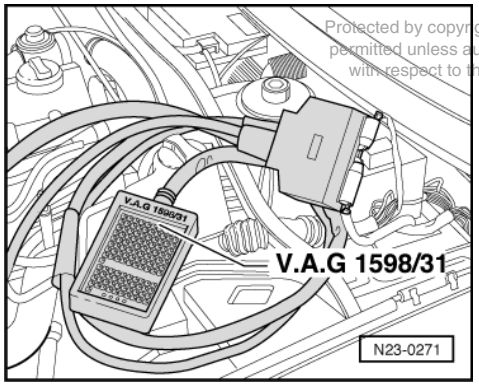


- -> Carefully lever off retainer bar with screwdriver -arrow-.



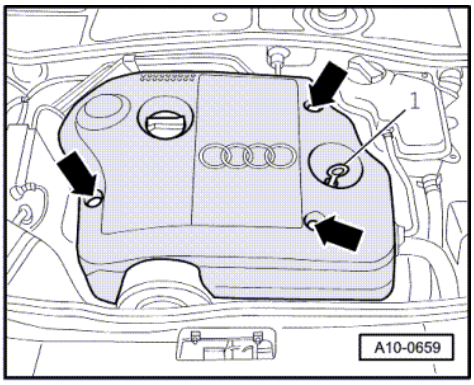
- -> Release connector lock -arrow- and unplug connectors -1- and -2- from control unit.

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

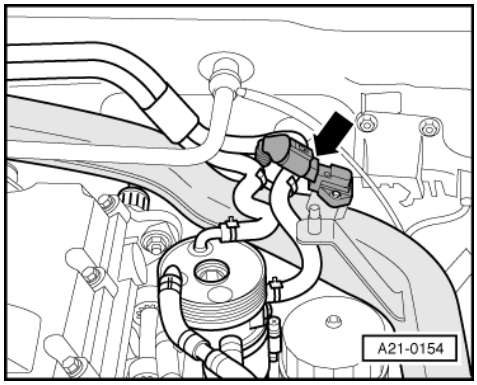


- -> Connect test box V.A.G 1598/31 to cable harness connector. Actual engine control unit is not to be connected. Clip test box earthing clip onto chassis (not shown in diagram).

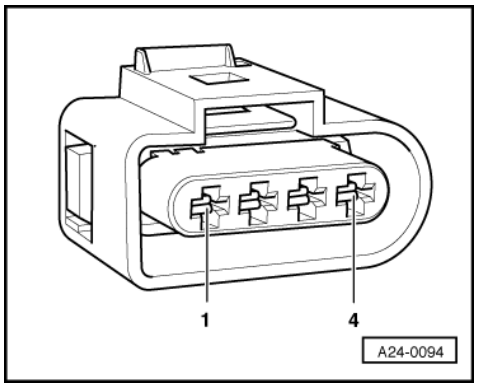
Attention:
So as not to destroy electronic components, select required measuring range before connecting test leads and observe test conditions.



- -> Pull dipstick -1- out of guide tube.
- Unclipcaps.
- Remove nuts -arrows- and detach engine cover.
- Remove insulation lying below.
- Re-insert dipstick into guide tube.



- -> Unplug electrical connector from intake manifold pressure sender -arrow-.



- -> Check for open circuit and short to earth/positive in the following wiring.

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

Connector Contact	Test box V.A.G 1598/31 Socket
1	52
3	31
4	71

- If necessary, eliminate open circuit in wiring/short circuit.

If no fault is found:

- Replace intake manifold pressure sender.

2 - Servicing charge-air system with turbocharger

2.1 - Servicing charge-air system with turbocharger

2.2 - Rules for cleanliness

Pay careful attention to the following rules for cleanliness when working on turbocharger:

- Carefully clean all joints and adjacent areas before disconnecting.
- Place parts removed on a clean surface and cover them over. Do not use fluffy cloths.
- Carefully cover or seal opened components if repairs are not to be performed immediately.
- Only install clean components:
  Do not remove replacement parts from wrapping until immediately prior to installation.

Do not use parts that have been stored loose (e.g. in tool boxes).
- When system is open:
  Do not work with compressed air if at all possible.
  Do not move vehicle unless absolutely necessary.

2.3 - Exploded view of turbocharger removal and installation

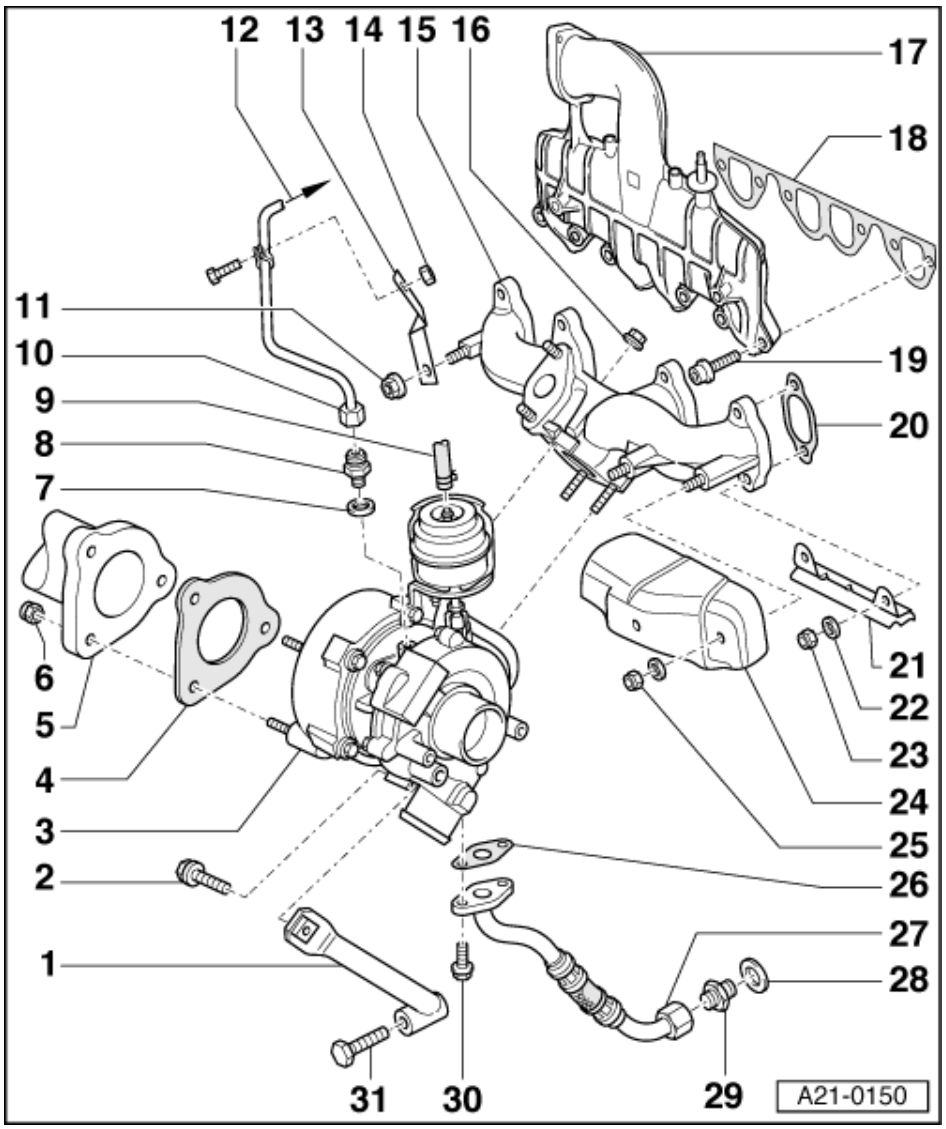
Notes:

- All cable ties unfastened or cut open on removal are to be re-attached in same position on installation.
- Secure all hose connections with standard hose clamps:

=> Parts List

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 connections and hoses must be free from oil and grease before fitting.
- Always replace gaskets, sealing rings and self-locking nuts.



1 Holder
2 20 Nm
3 Turbocharger
- Checking => Page 21-7
- Removing and installing=>Page 21-46

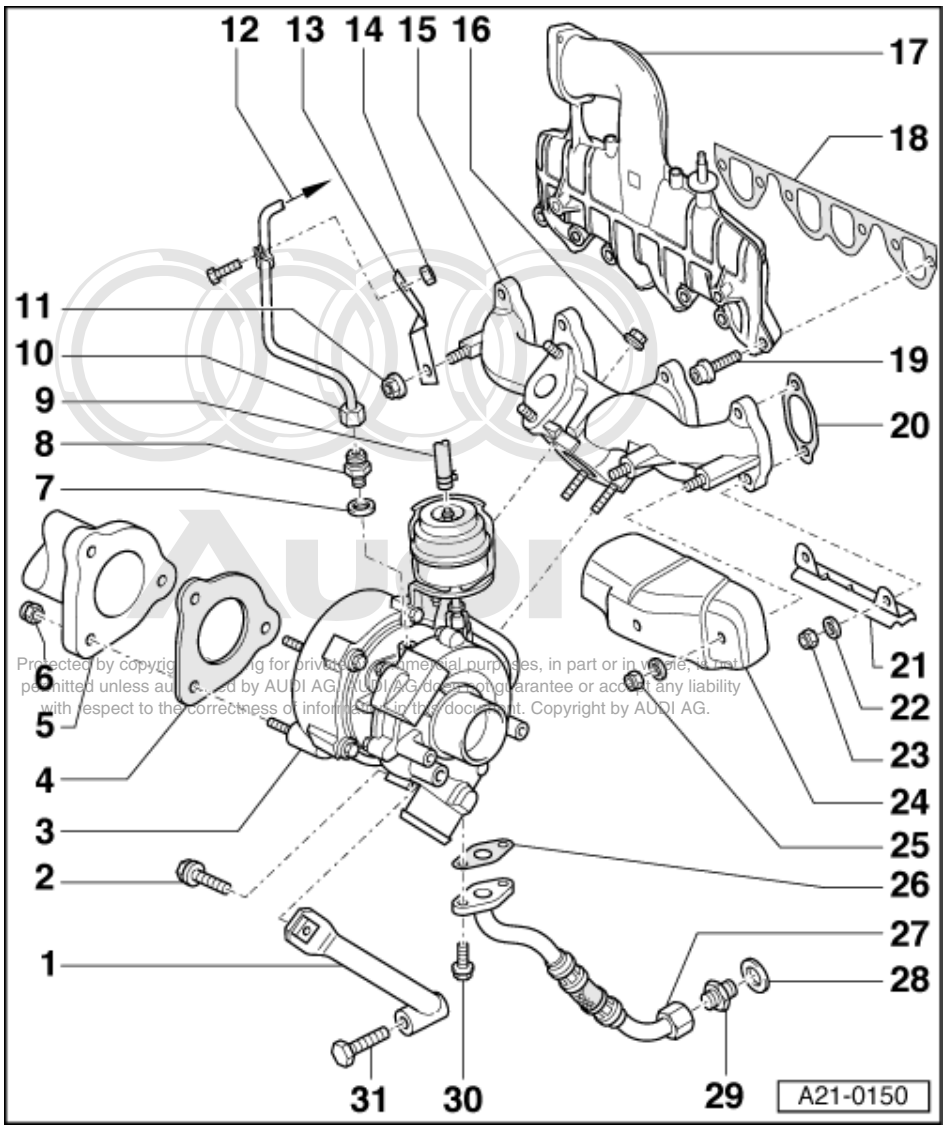
4 Gasket
- Replace

5 Catalytic converter
- With exhaust pipe

6 25 Nm
- Replace

7 Sealing ring
- Replace

8 Bolted joint - 30 Nm



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

9 Hose
- From charge pressure control solenoid valve -N75

10 Oil supply pipe
- Tighten union nut to 22 Nm

11 25 Nm

12 To oil filter holder

13 Holder

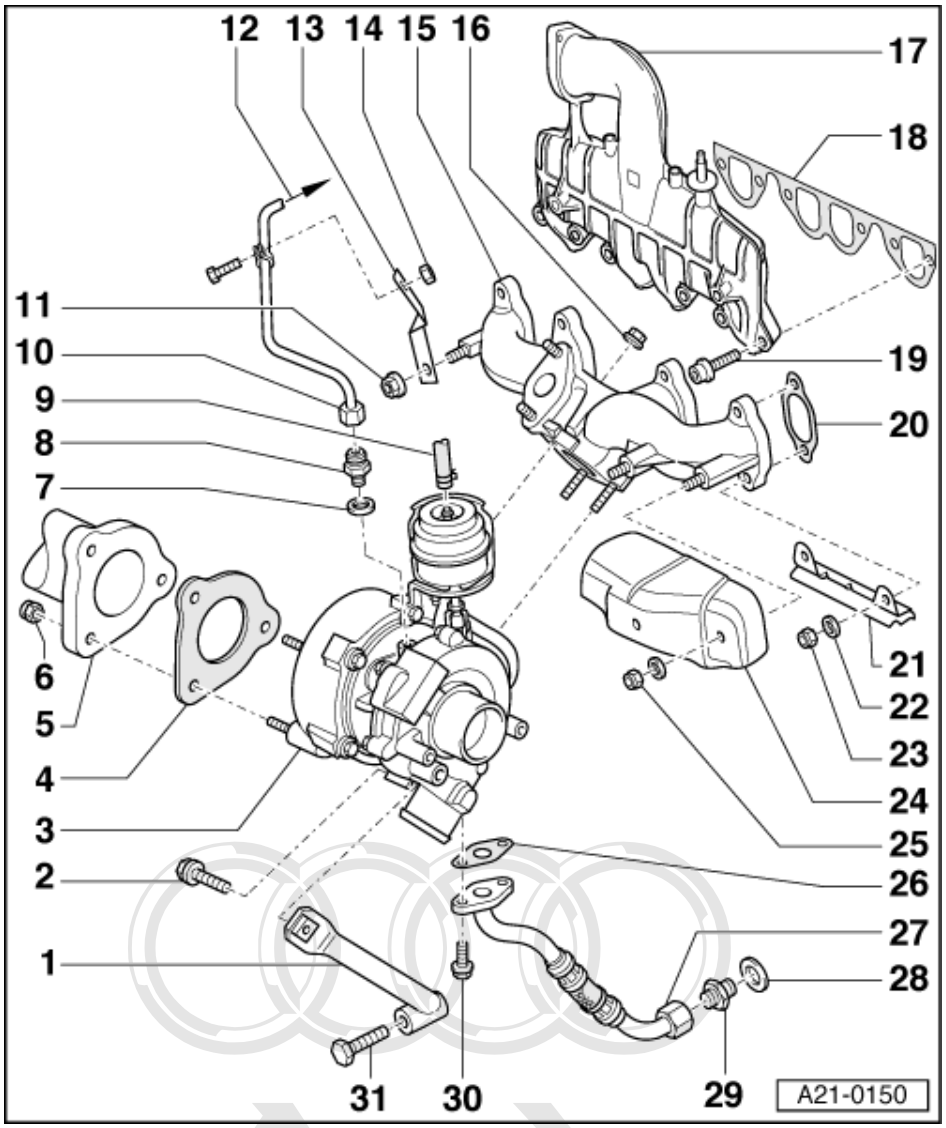
14 10 Nm

15 Exhaust manifold
- Removing and installing=>Page 26-17

16 25 Nm

- Replace
- Apply hot bolt paste to thread and head resting surface
- Hot bolt paste

=> Parts List



17 Intake manifold

- Removing and installing=>Page 15-14

18 Gasket

- Replace
- Pay attention to installation position

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.

19 22 Nm

20 Gasket

- Replace
- Pay attention to installation position

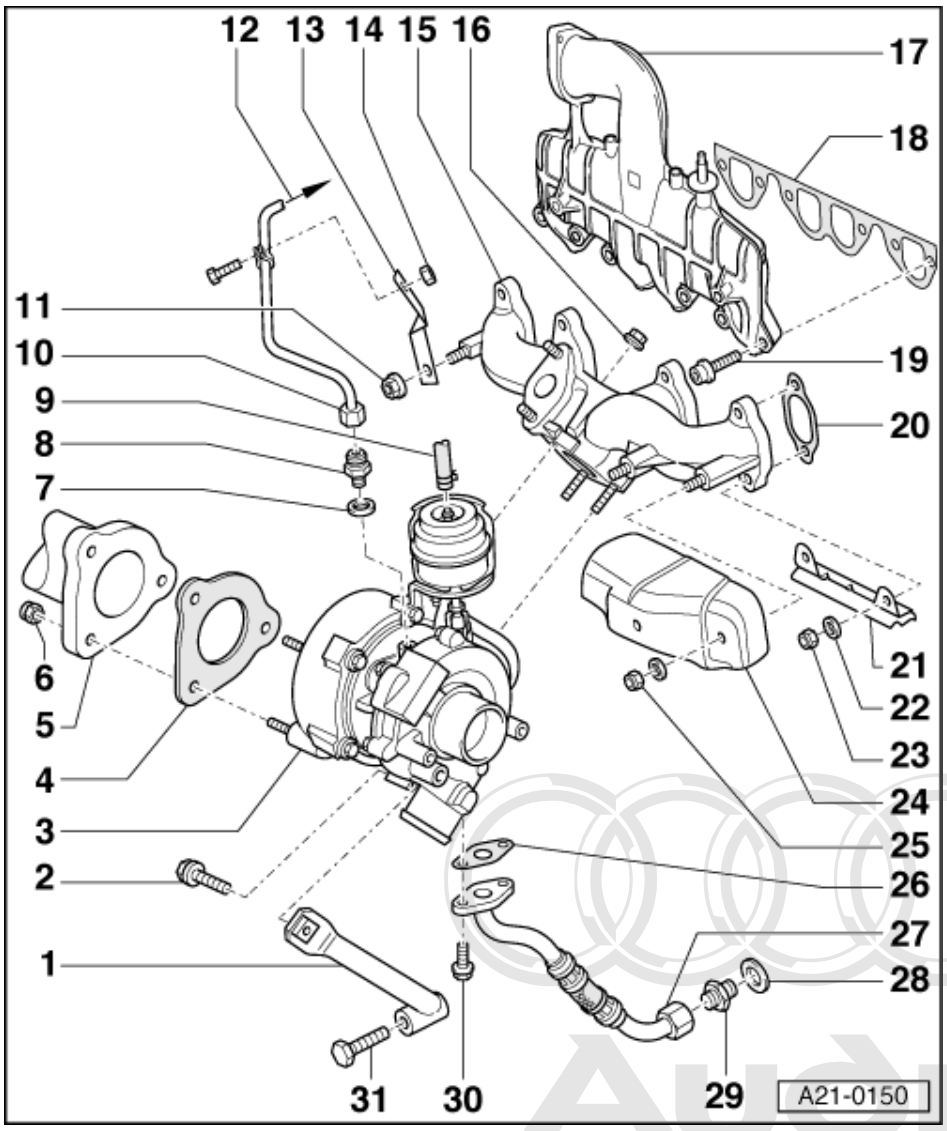
21 Bracket

- For heat shield -Item 24-

22 Washer

23 25 Nm

- Replace



24 Heat shield

- Attach in holder -Item 21-

25 25 Nm

- Replace

26 Gasket

- Replace

27 Oil return pipe

- To cylinder block
- Tighten union nut to 30 Nm

28 Sealing ring

- Replace

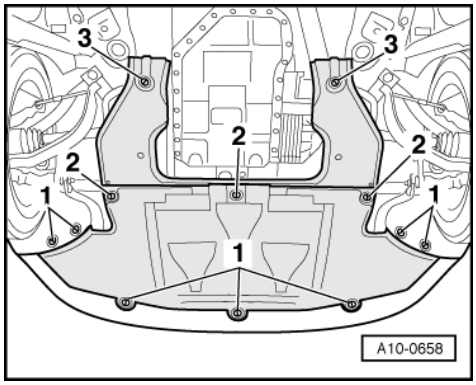
29 Bolted joint - 40 Nm

30 15 Nm

31 40 Nm

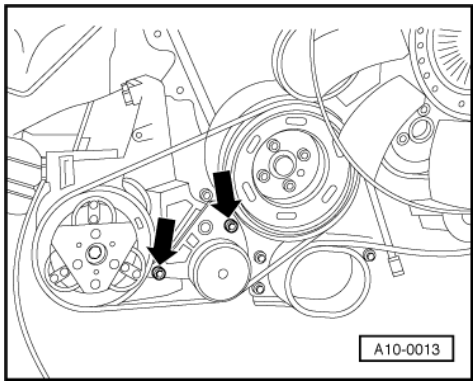
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

2.4 - Removing and installing turbocharger



Removing

- -> Release quick-release fasteners -1- and -2- and detach front noise insulation.



Vehicles with air conditioner:

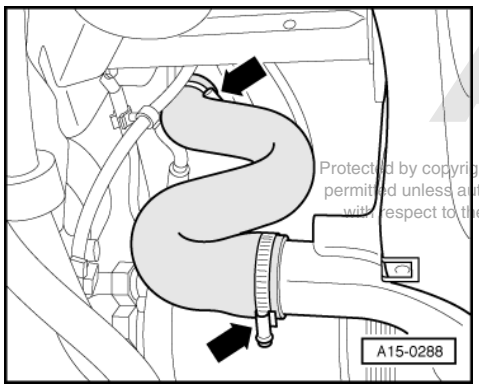
Note:

Before removing, mark direction of ribbed belt with chalk or felt-tipped pen. Running a used belt in the opposite direction could destroy it.

- -> Slacken off bolts of tensioning roller for air-conditioner compressor ribbed belt -arrows-, slacken off ribbed belt and detach.

Attention:
Never open refrigerant circuit of air conditioner.

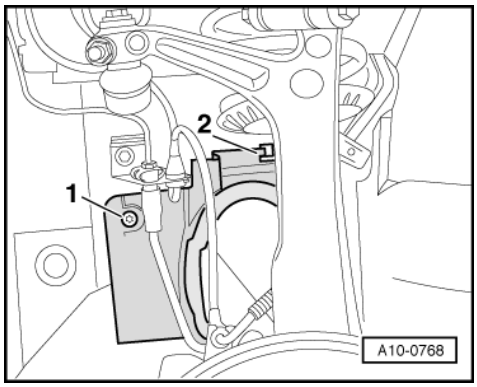
- Detach air conditioner compressor from bracket and secure to body with wire.



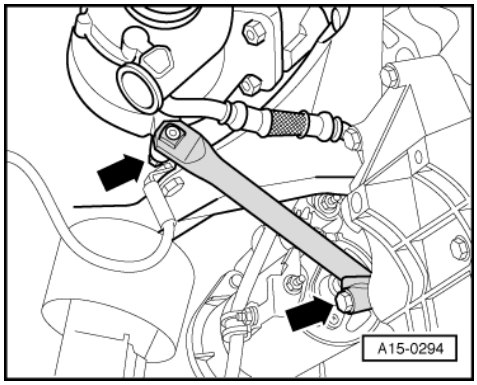
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

All models:

- -> Remove right side air hose -arrows-.

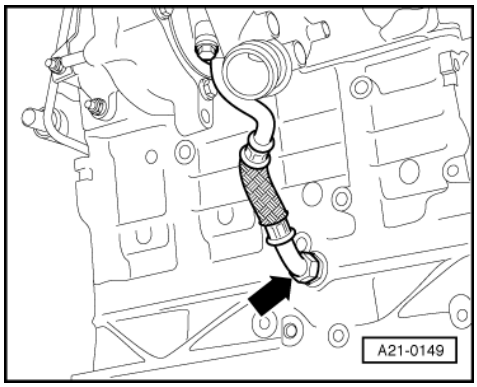


- -> Slacken bolt -1- of soundproofing cover over right side drive shaft at front.
- Unhook catch -2- and detach soundproofing cover.

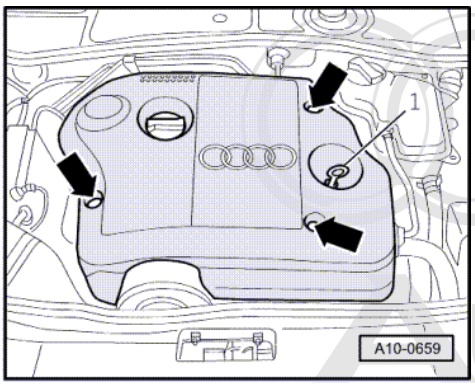


- -> Remove bracket for turbocharger -arrows-.

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.

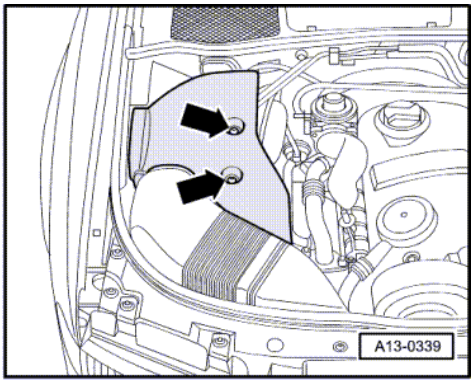


- -> Detach oil return pipe from cylinder block -arrow-.
- Screw out turbocharger/exhaust manifold nut accessible from underneath.

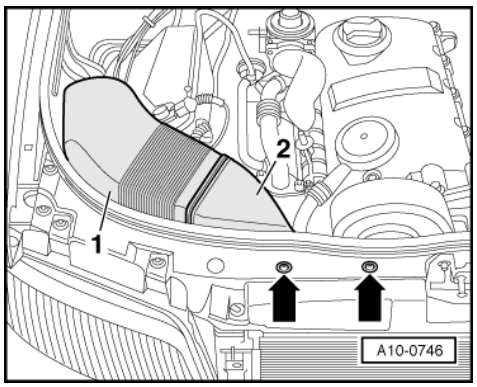


- -> Pull dipstick -1- out of guide tube.
- Unclipcaps.
- Remove nuts -arrows- and detach engine cover.
- Remove insulation lying below.
- Re-insert dipstick into guide tube.

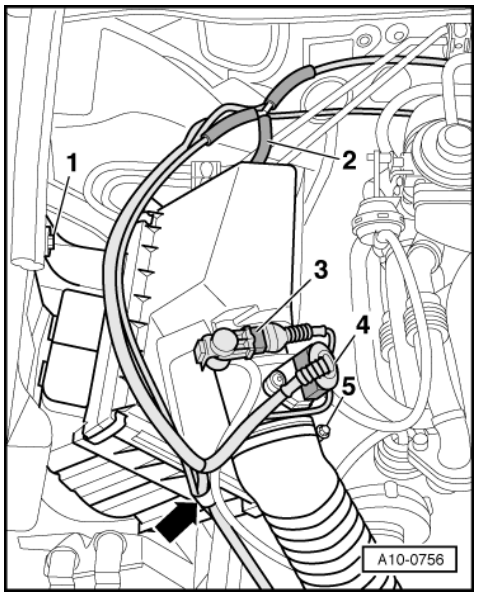
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



- Unclipcaps.
- -> Screw out bolts -arrows- and detach air cleaner cover.



- -> Screw out bolts -arrows-.
- Remove air duct -1- and -2-.



- -> Disconnect vent hose -2- from air cleaner housing.
- Unplug electrical connector -4- from air-mass meter.
- Detach EGR valve -N18 -3- from air cleaner housing.
- Detach wiring harness from air cleaner housing -arrow-.
- Detach air hose -5-.
- Screw out bolt -1-.
- Detach air cleaner housing.

Vehicles with manual gearbox:

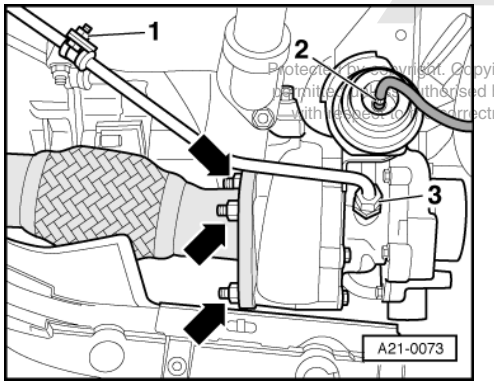
- Remove EGR connecting pipe -Item26-29.

Vehicles with automatic gearbox:

- Remove EGR system cooler =>Page 26-48.

All models:

- Detach heat shield from exhaust manifold.



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

- -> Detach hose -2- from charge pressure control vacuum unit.
- Slacken bolt -1- on holder of oil supply pipe.
- Unbolt oil supply pipe -3- from turbocharger.
- Screw out turbocharger/exhaust manifold nuts -arrows-.
- Screw out top turbocharger nuts.
- Remove turbocharger.

Installing

Install in reverse order, paying attention to the following:

Notes:

- Secure all hose connections with standard hose clamps:

=> Parts List

- Hose connections and hoses for charge-air system must be free from oil and grease before fitting.
- Always replace gaskets, sealing rings and self-locking nuts.
- Pay attention to installation position of exhaust manifold/turbocharger gasket.
- Fill turbocharger with engine oil at oil supply pipe connection.
- Charge-air system must be free from leaks.

- Install EGR system cooler =>Page 26-53.
- Perform stress-free alignment of exhaust system => Page 26-23.
- Check oil level => Page 17-33.

Tightening torques

Component	Nm
Turbocharger to exhaust manifold	25 1)2)
Turbocharger to catalytic converter	25 1)
Bracket for turbocharger to turbocharger	20
Bracket for turbocharger to cylinder block	40
Oil supply pipe to cylinder block	30
Oil supply pipe to turbocharger	22
Oil supply pipe to holder	10
EGR connecting pipe to exhaust manifold	25
EGR connecting pipe to intake manifold	25
Heat shield to exhaust manifold	25

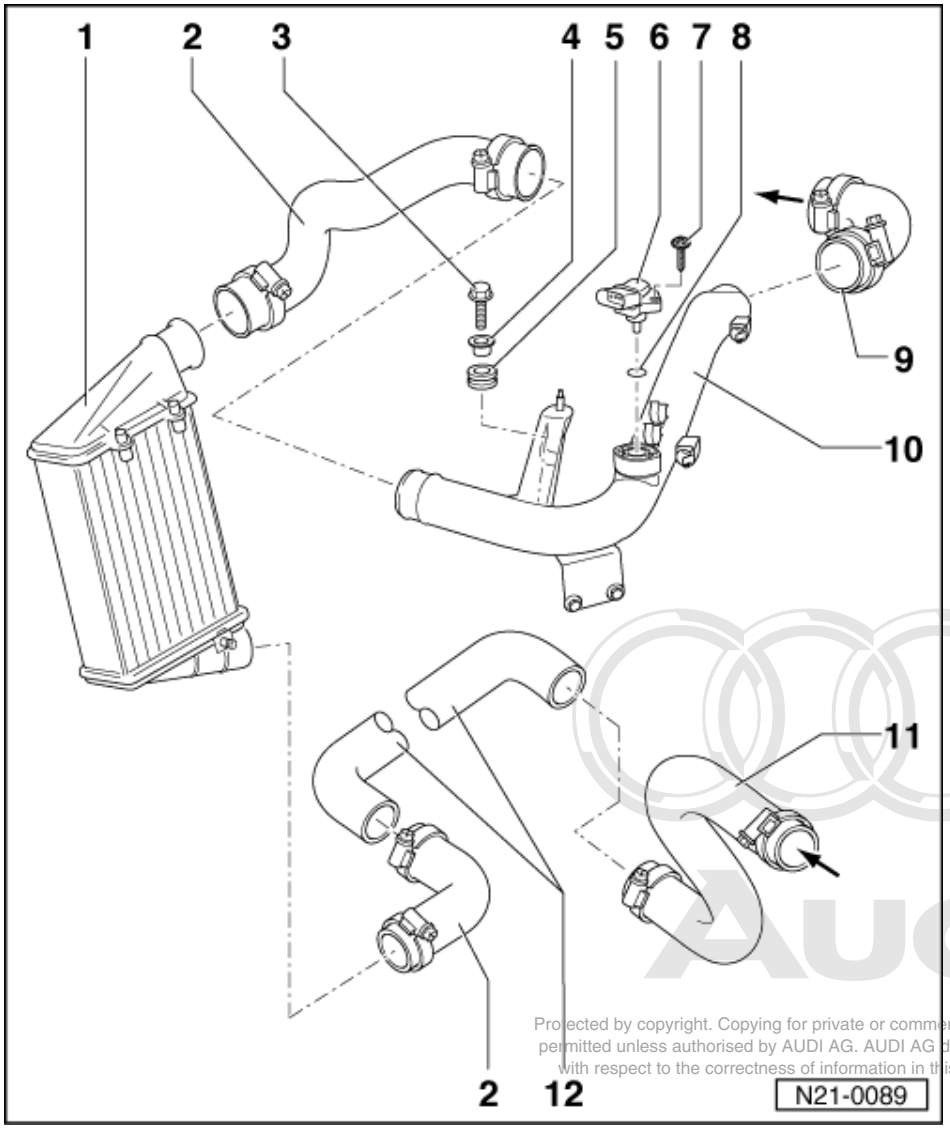
1) Replace nuts

2) Coat thread and head resting surface with hot bolt paste.
Hot bolt paste

=> Parts List

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

2.5 - Removing and installing charge-air cooling system components



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

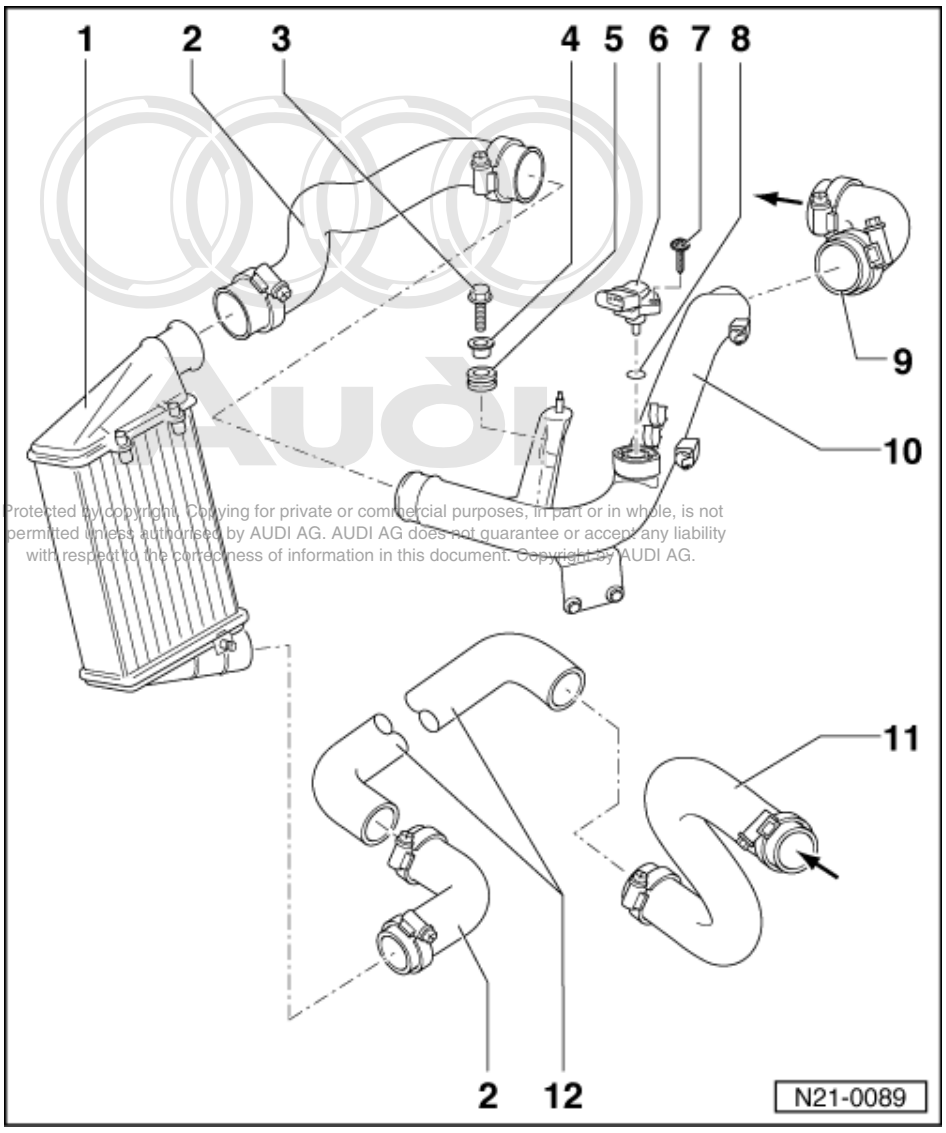
Notes:

- Secure all hose connections with standard hose clamps:

=> Parts List

- Charge-air system must be free from leaks.

1 Charge-air cooler
2 Air hose
3 10 Nm
4 Socket
5 Rubber grommet
6 Intake-manifold temperature sender -G72



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 3 Nm

8 O-ring

- Replace if damaged

9 Air hose

- To intake manifold

10 Air pipe

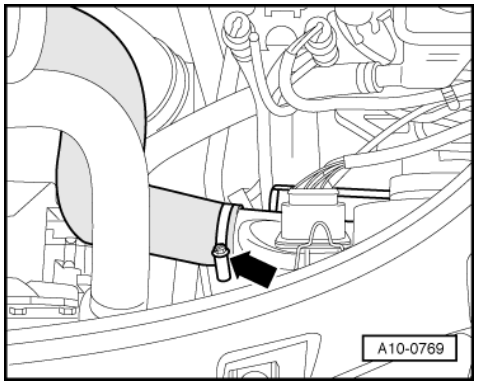
11 Air hose

- From turbocharger

12 Transverse pipe

- At bottom in lock carrier

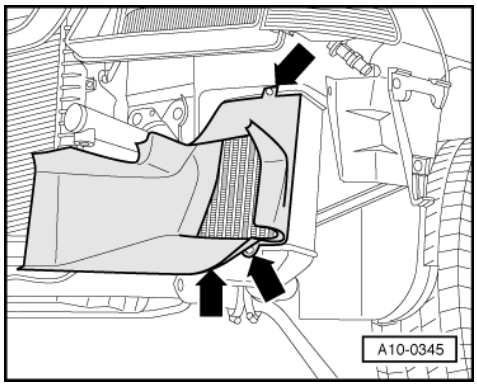
2.6 - Removing and installing charge-air cooler



Removing

- Lock carrier in service position =>Page 13-1.

- -> Detach air hose from charge air cooler-arrow-.



- -> Remove air duct in front of charge air cooler -arrows-.
- Detach bottom left air hose from charge air cooler.
- Detach the intercooler and remove it downwards.

Installing

Install in reverse order, paying attention to the following:

- Install lock carrier =>Page 13-1.

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.

26 - Exhaust system

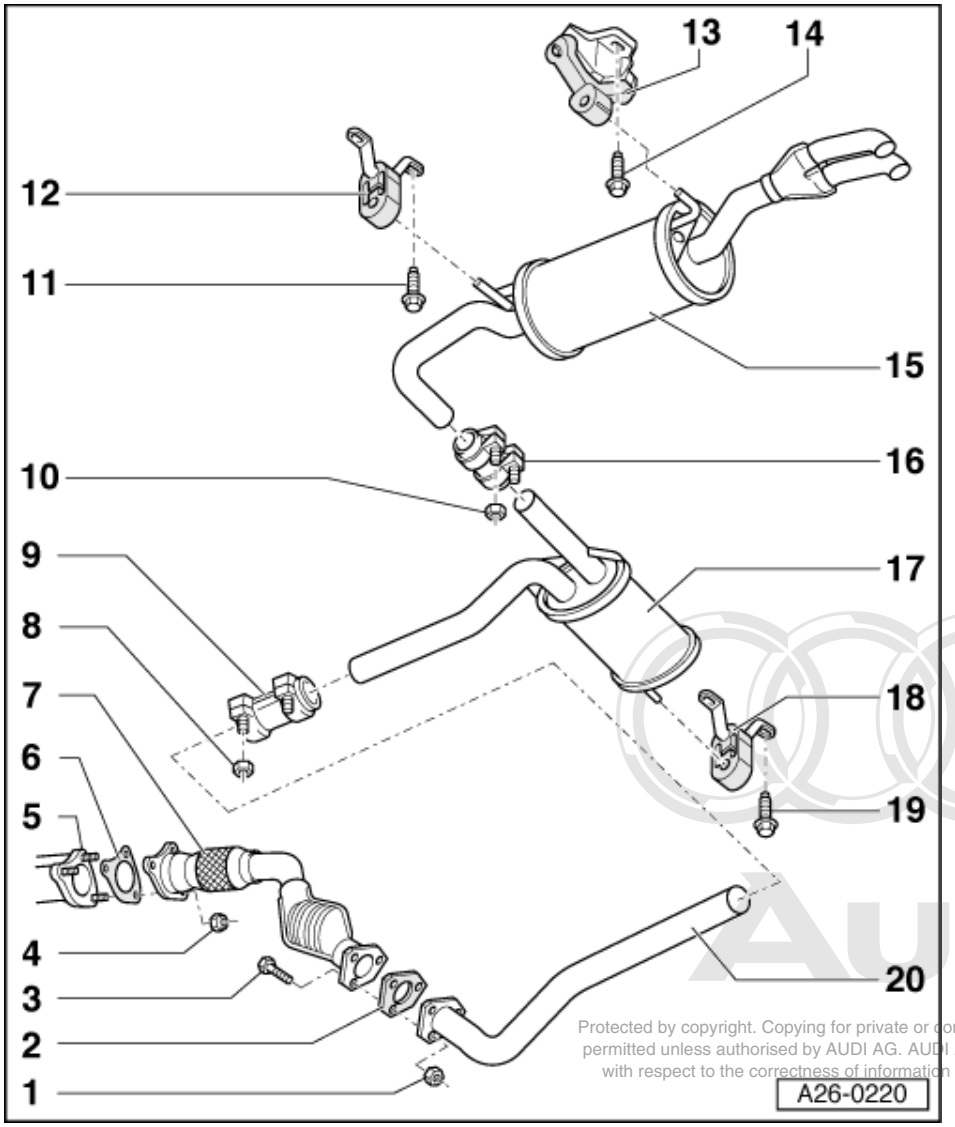
1 - Removing and installing exhaust system components

1.1 - Removing and installing exhaust system components

Notes:

- Always replace gaskets and self-locking nuts.
- Following exhaust system assembly work, make sure exhaust system is not subject to torsion and that there is an adequate gap between exhaust system and body. If necessary, unfasten clamp and align silencer and exhaust pipe such that there is sufficient distance from body all round and that mountings are subject to uniform load.
- To avoid damage, decoupling element of exhaust system is never to be kinked by more than 10 °.

1.2 - Front-wheel drive vehicles



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 25 Nm
- Replace

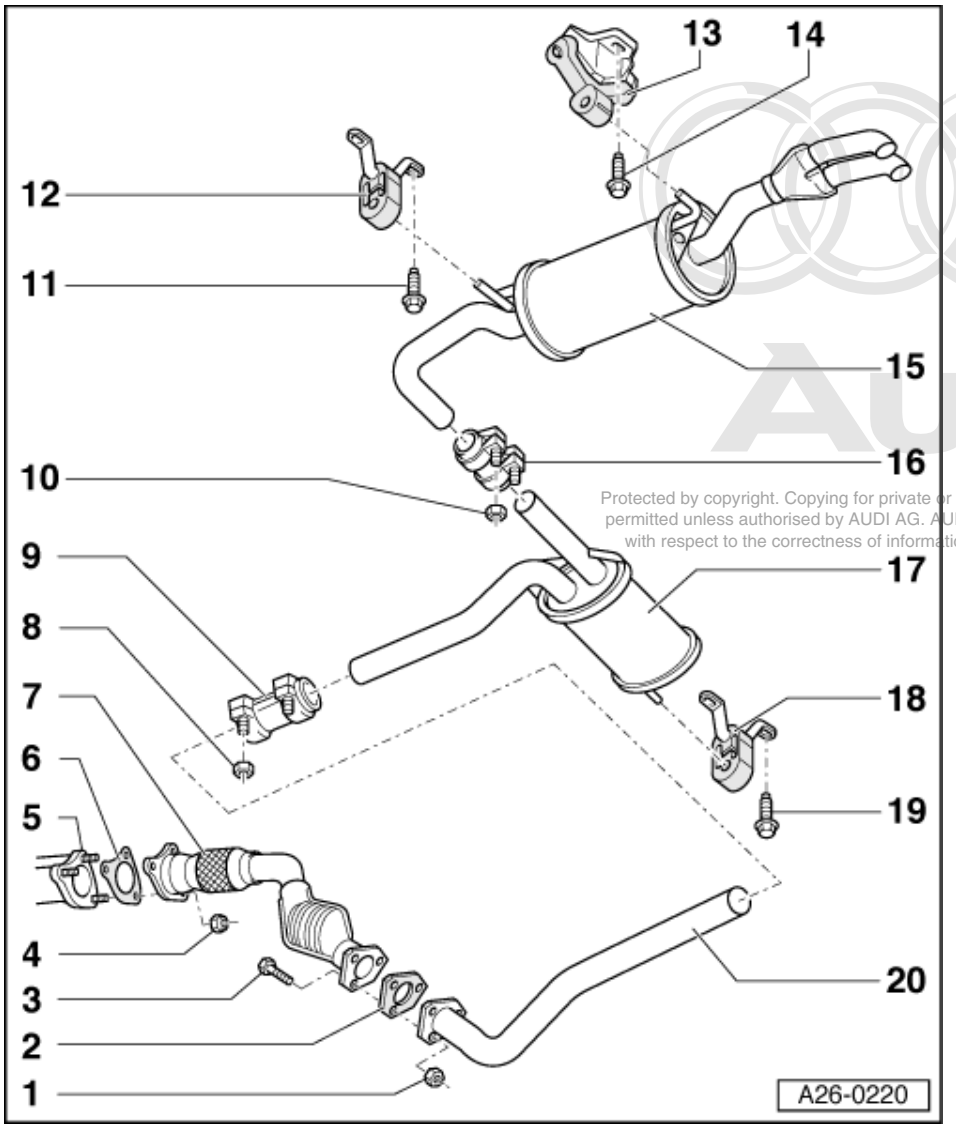
2 Gasket
- Replace

3 25 Nm

4 25 Nm
- Replace

5 Turbocharger

6 Gasket
- Replace



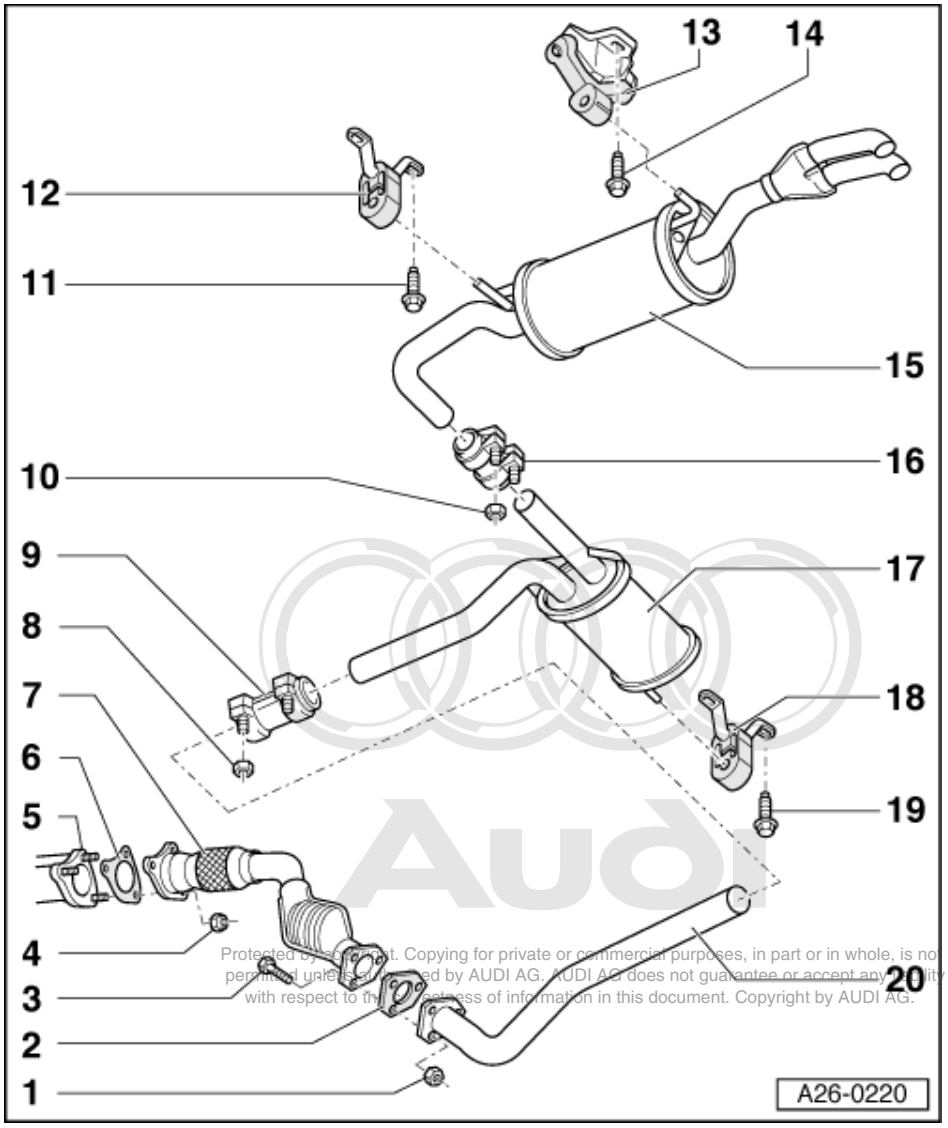
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

7 Catalytic converter
- With decoupling element
- The diagram shows the version for vehicles with manual gearbox
- To avoid damage, do not bend decoupling element by more than 10°
- Protect against jolts and impact
- Removing and installing=>Page 26-19

8 40 Nm

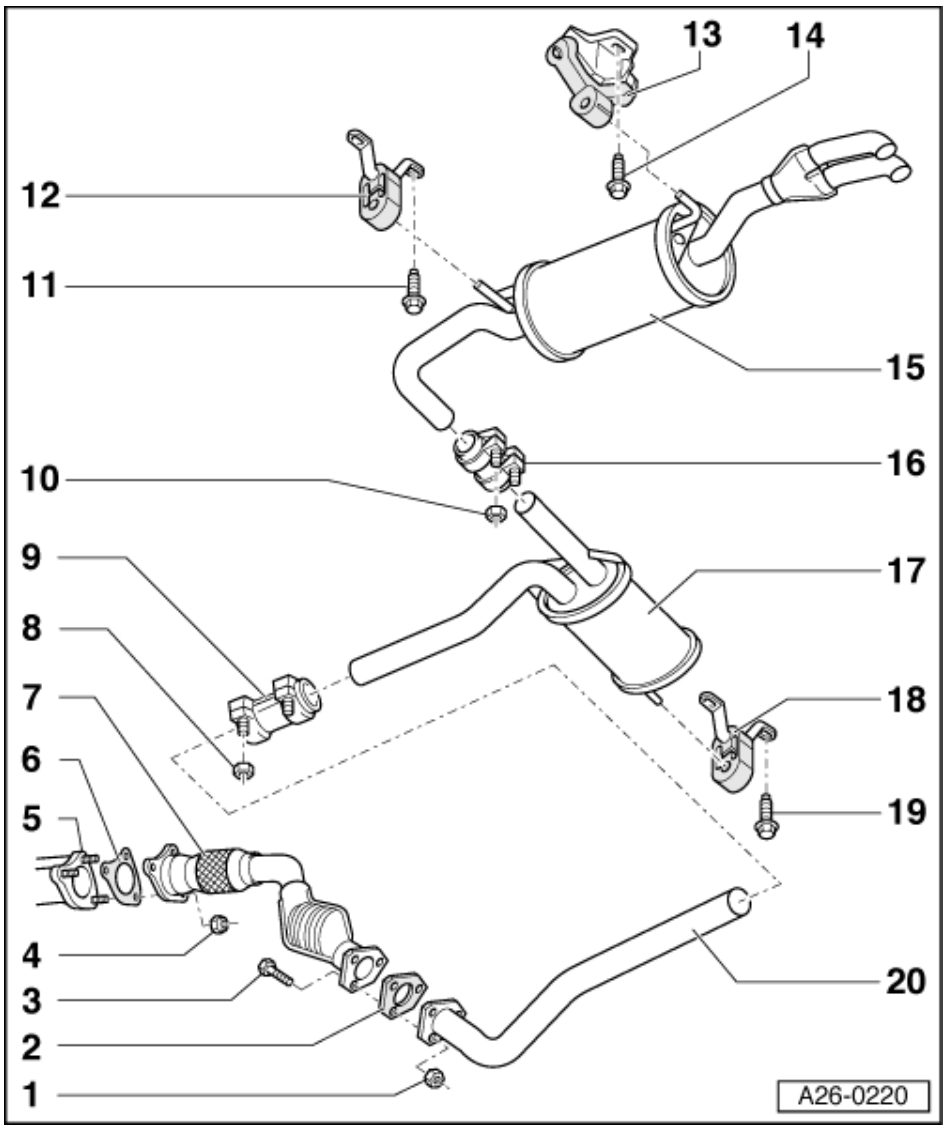
9 Front clamp
- Before tightening, perform stress-free alignment of exhaust system => Page 26-23
- Installation position: Bolted joint pointing to left
- Installation position of bolt ends

=> Fig.26-7
- Tighten bolted joints evenly



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.

10 40 Nm
11 25 Nm
12 Mounting
13 Mounting
14 25 Nm
15 Rear silencer
- Combined with front silencer as original equipment; replace separately when performing repair work
- Cutting point => Page 26-15
- Stress-free alignment of exhaust system => Page 26-23



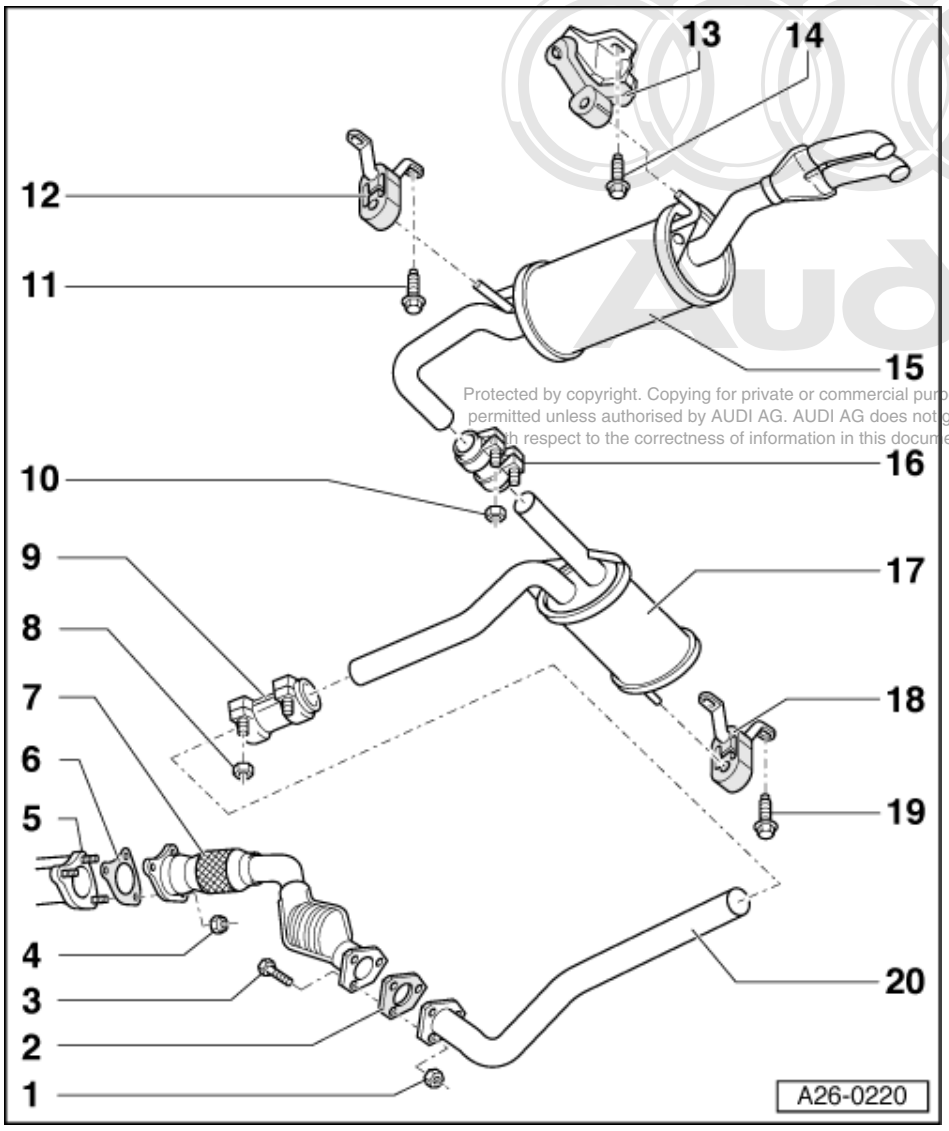
16 Rear clamp

- For separate replacement of front and rear silencer-
- Before tightening, perform stress-free alignment of exhaust system => Page 26-23
- Installation position: Bolted joint pointing towards rear
- Installation position => Fig.26-7
- Tighten bolted joints evenly

17 Front silencer

- Combined with rear silencer as original equipment; replace separately when performing repair work
- Cutting point => Page 26-15
- Stress-free alignment of exhaust system => Page 26-23

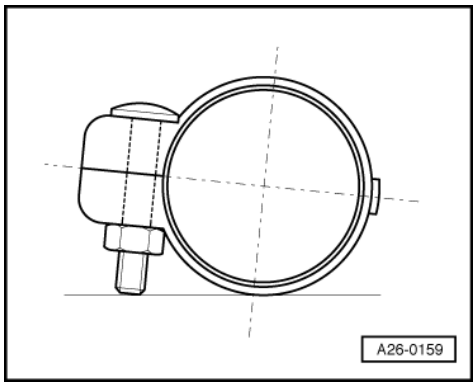
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



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

18 Mounting
19 25 Nm
20 Exhaust pipe

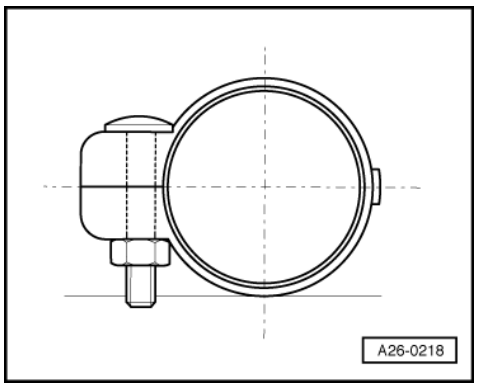
- Removing and installing=>Page 26-19



-> Fig.1 Installation position of front clamp

- Fit clamp such that end of bolt does not protrude beyond bottom edge of clamp.

- Bolted joint on left

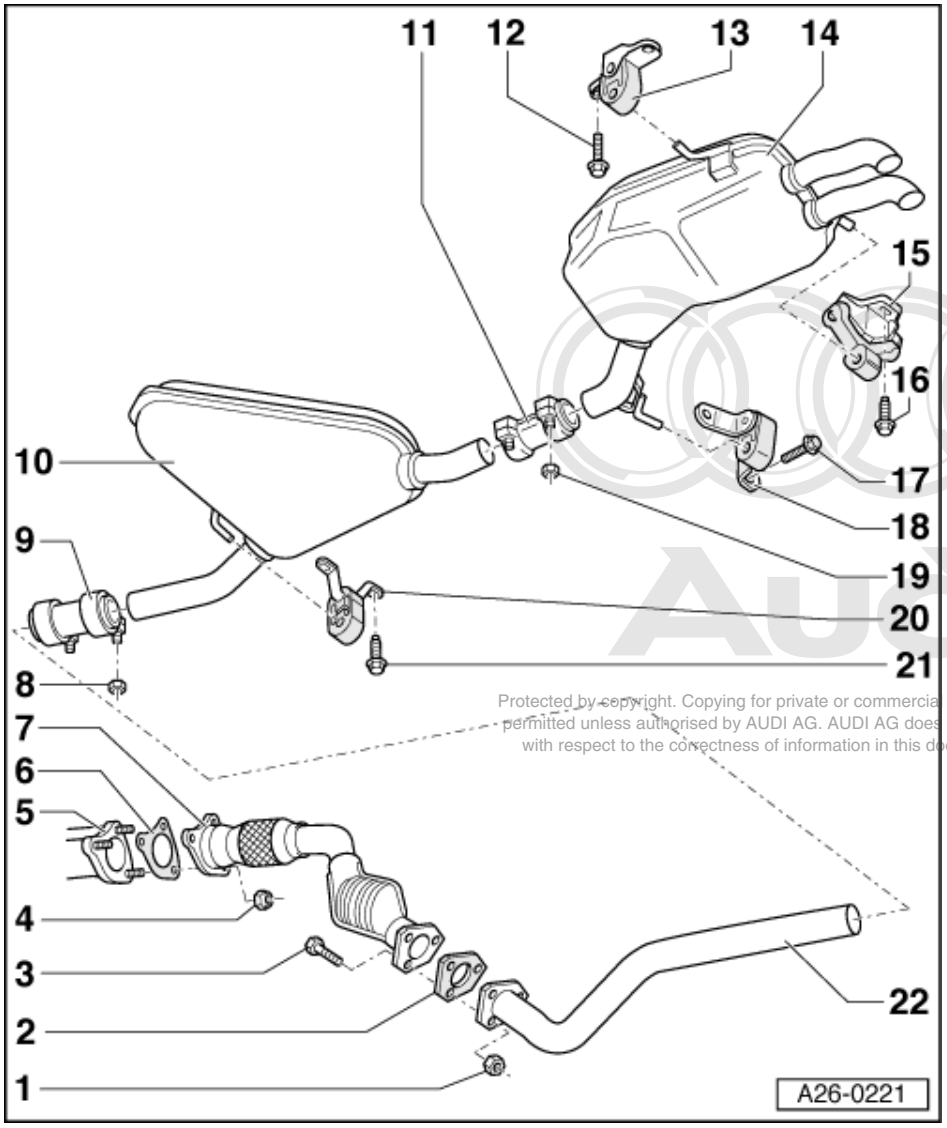


-> Fig.2 Installation position of rear clamp

- Fit clamp such that it is horizontal.
  - Bolted joint pointing towards rear

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



Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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 **25 Nm**
- Replace

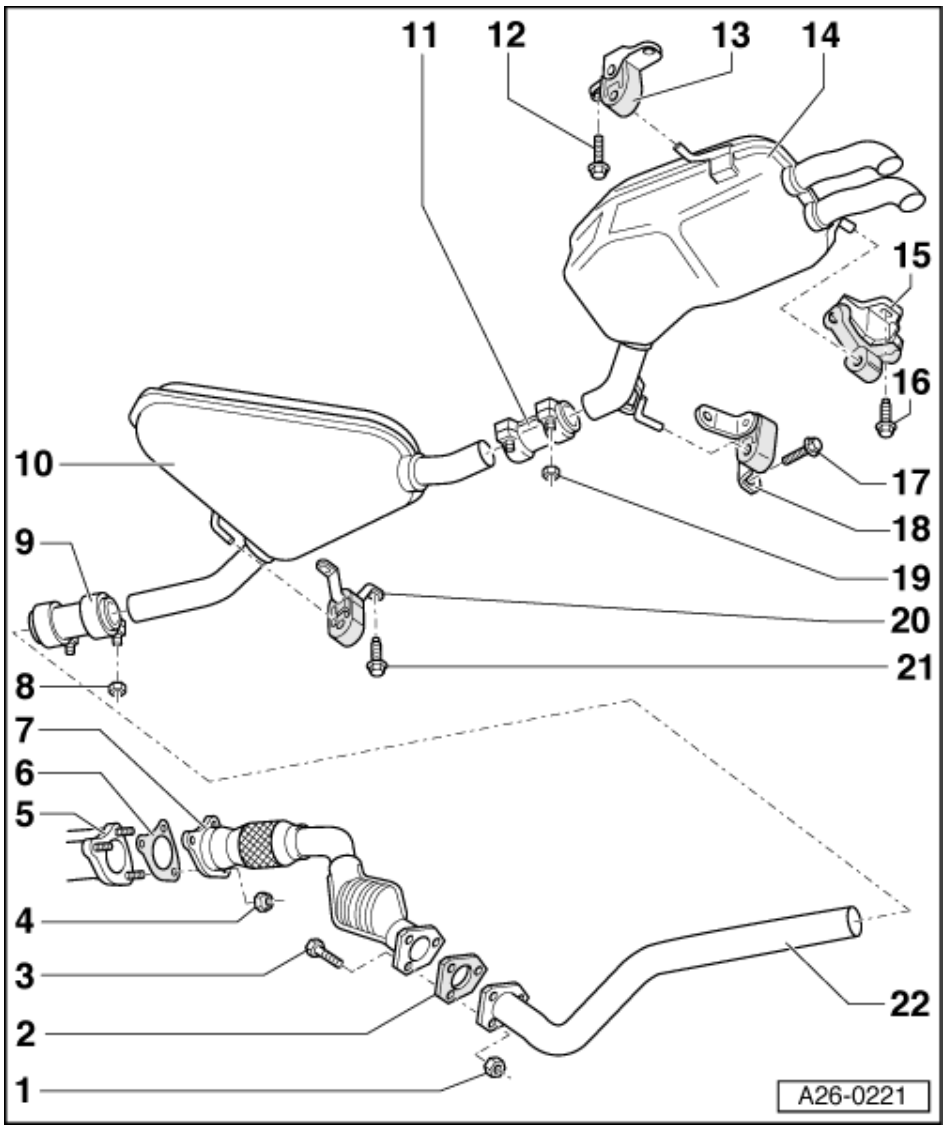
2 **Gasket**
- Replace

3 **25 Nm**

4 **25 Nm**
- Replace

5 **Turbocharger**

6 **Gasket**
- Replace



7 Catalytic converter

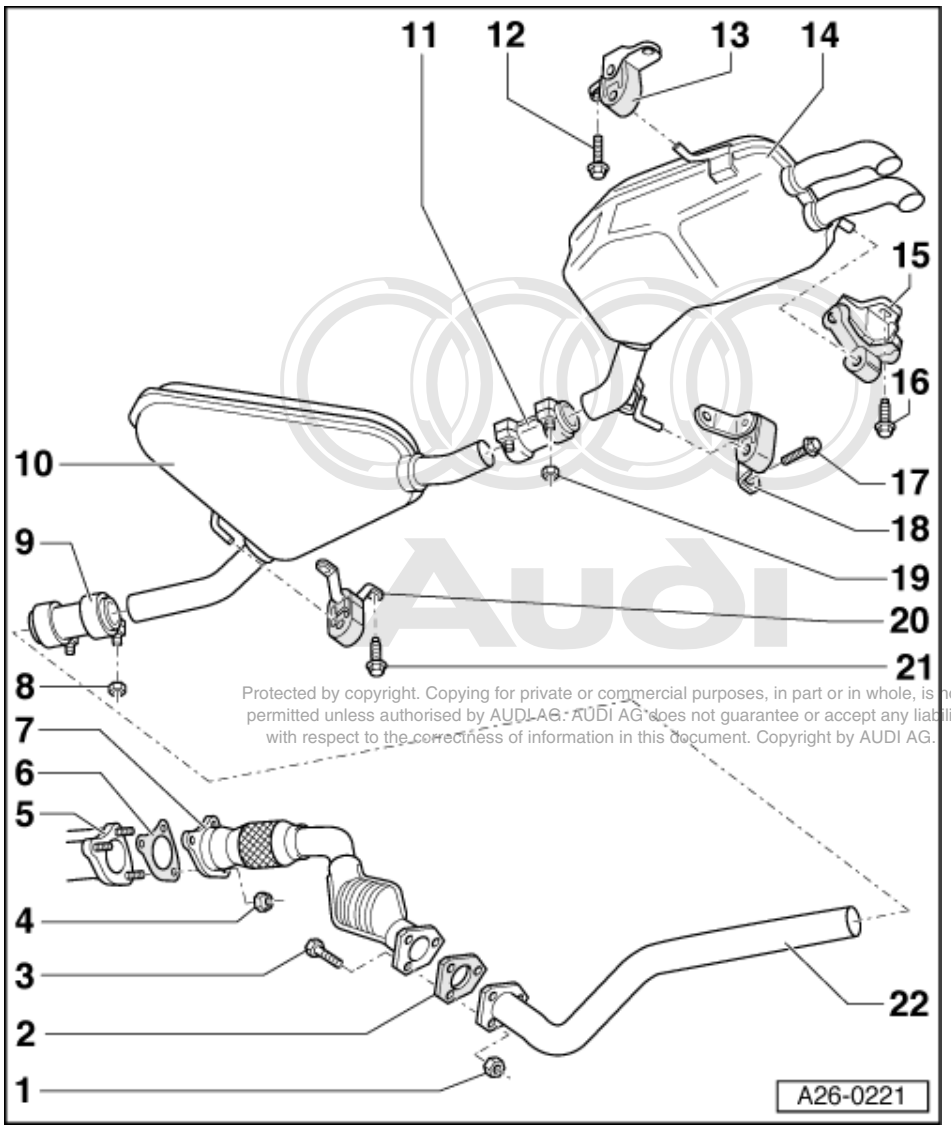
- With decoupling element
- To avoid damage, do not bend decoupling element by more than 10°
- Protect against jolts and impact
- Removing and installing=>Page 26-19

8 40 Nm

9 Front clamp

- Before tightening, perform stress-free alignment of exhaust system => Page 26-23
- Installation position: Bolted joint pointing to right
- Installation position of bolt ends => Fig.26-13
- Tighten bolted joints evenly

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



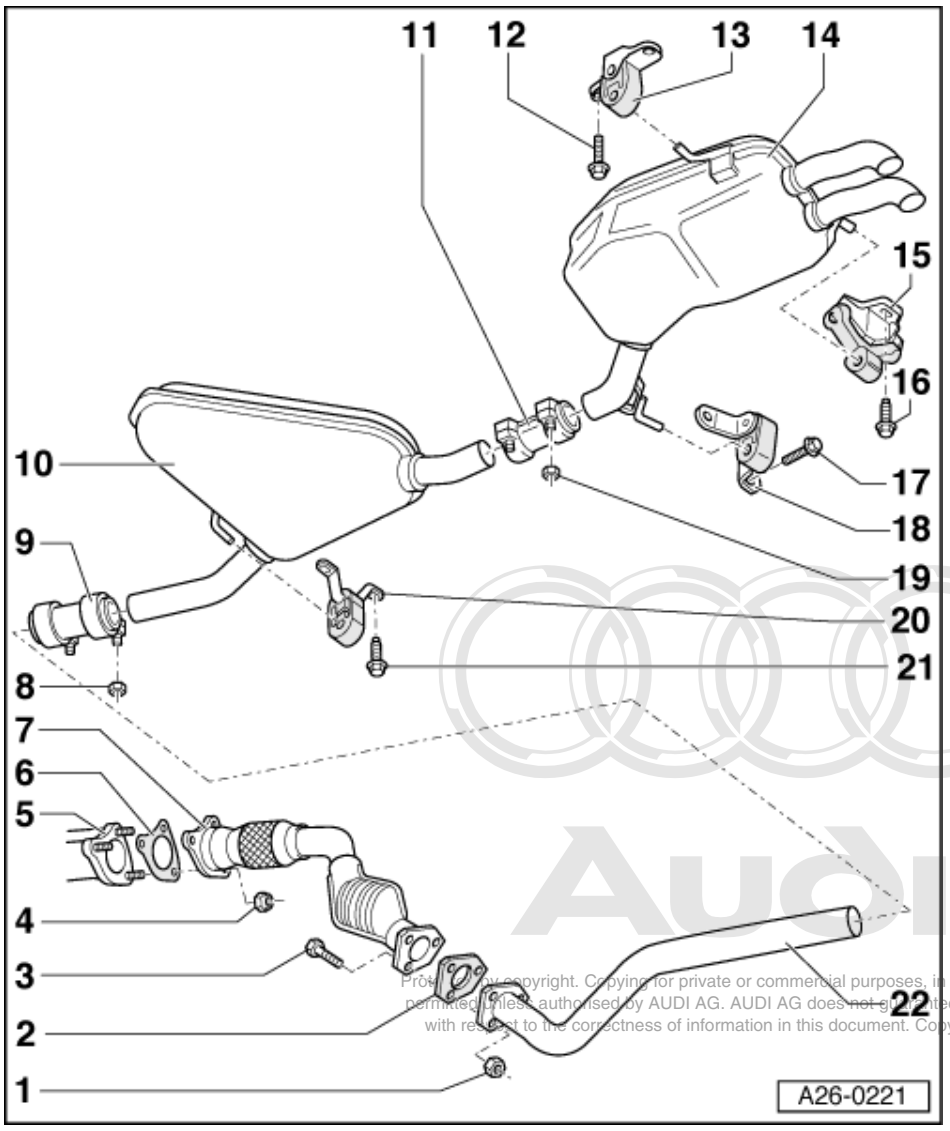
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

10 Front silencer

- Combined with rear silencer as original equipment; replace separately when performing repair work
- Cutting point => Page 26-16
- Stress-free alignment of exhaust system => Page 26-23

11 Rear clamp

- For separate replacement of front and rear silencer-
- Before tightening, perform stress-free alignment of exhaust system => Page 26-23
- Installation position: Bolted joint pointing to left
- Installation position => Fig.26-13
- Tighten bolted joints evenly



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

12 25 Nm

13 Mounting

14 Rear silencer

- Combined with front silencer as original equipment; replace separately when performing repair work
- Cutting point => Page 26-16
- Stress-free alignment of exhaust system => Page 26-23

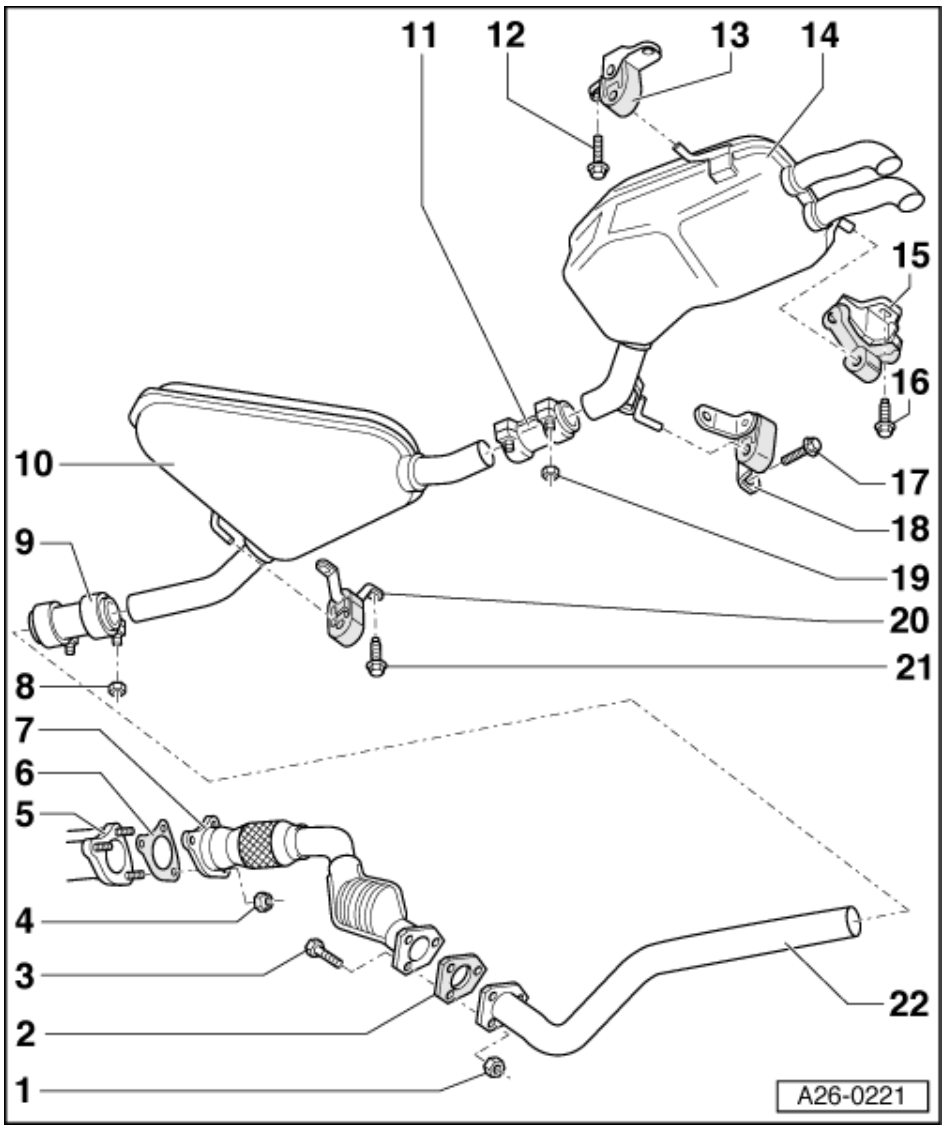
15 Mounting

16 25 Nm

17 25 Nm

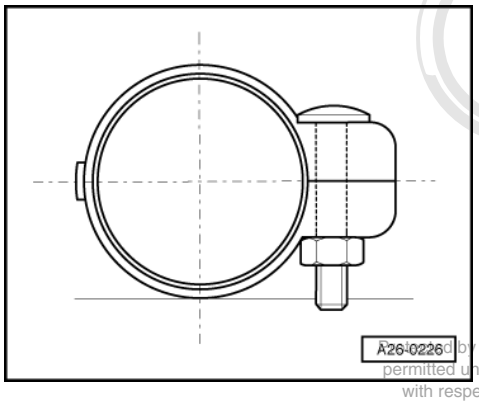
18 Mounting

19 40 Nm



20 Mounting
21 25 Nm
22 Exhaust pipe

- Removing and installing=>Page 26-19

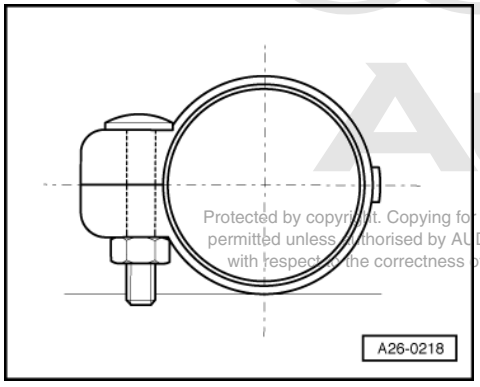


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

-> Fig.1 Installation position of front clamp

- Fit clamp such that it is horizontal.

- Bolted joint faces right



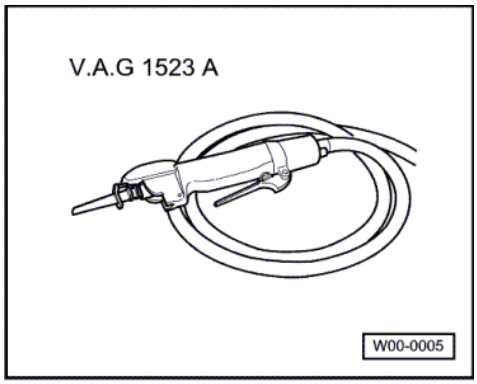
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

-> Fig.2 Installation position of rear clamp

- Fit clamp such that it is horizontal.
  - Bolted joint on left

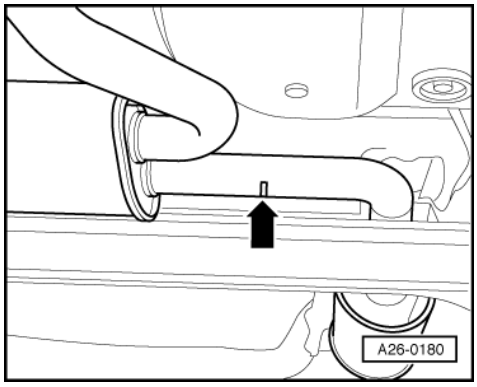
1.4 - Separating front and rear silencer

- For separate replacement of the front and rear silencers, a prepared cutting point is provided in the connecting pipe.
- Cutting point is marked by an indentation on circumference of exhaust pipe



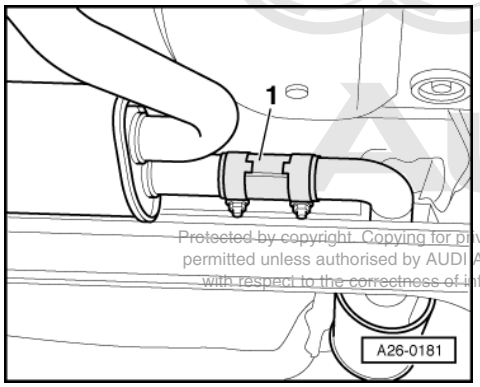
Special tools and workshop equipment required

- Body saw V.A.G 1523 A
- Protective goggles



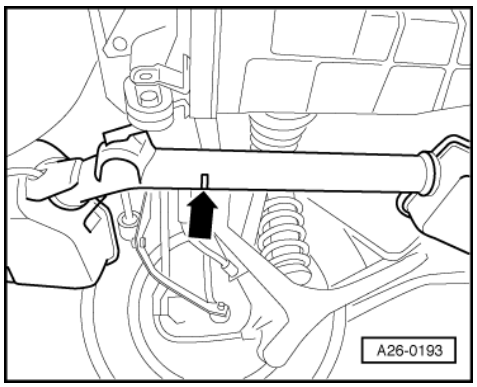
Front-wheel drive vehicles:

- -> Cut through exhaust pipe at right angles with body saw, e.g. V.A.G 1523A, at position marked -arrow-.



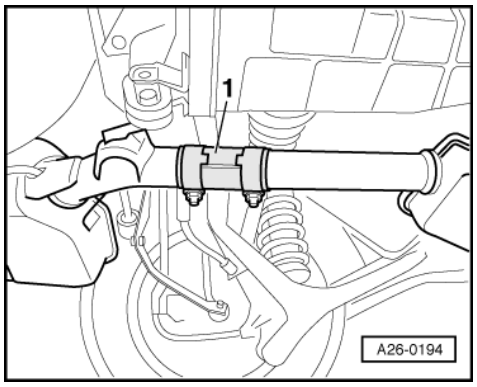
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- Position clamp centrally to cut when installing.
  - -> Installation position of clamp -1-: Horizontal, bolted joints pointing towards rear => Fig.26-7
- Perform stress-free alignment of exhaust system => Page 26-23.
- Tighten bolted joints of clamp evenly to 40 Nm.



Four-wheel drive vehicles:

- -> Cut through exhaust pipe at right angles with body saw, e.g. V.A.G 1523A, at positions marked -arrow-.

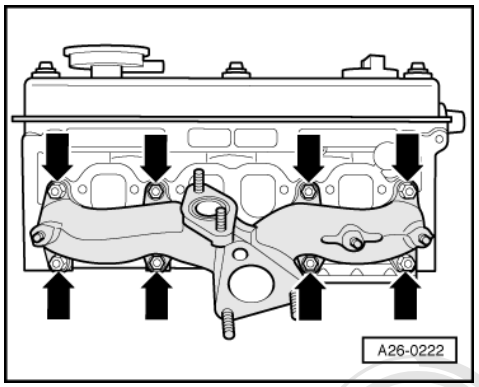


- Position clamp centrally to cut when installing.
  - -> Installation position of clamp -1-: Horizontal, bolted joints pointing towards rear left wheel => Fig.26-13
- Perform stress-free alignment of exhaust system => Page 26-23.
- Tighten bolted joints of clamp evenly to 40 Nm.

1.5 - Removing and installing exhaust manifold

Removing

- Remove turbocharger => Page 21-46.
- Detach front exhaust system clamp.
- Push clamp back to separate exhaust system.
- Turn catalytic converter with exhaust pipe aside or towards front.



- -> Unscrew all nuts -arrows- of exhaust manifold.
- Detach washers, heat shield bracket (where fitted) and exhaust manifold.

Installing

Install in reverse order, paying attention to the following:

Note:

Replace gaskets and self-locking nuts.

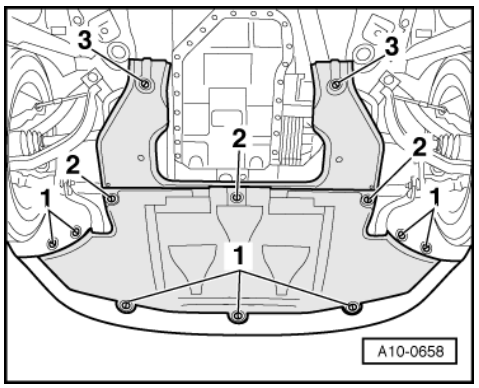
- Install catalytic converter with exhaust pipe.
- Install turbocharger => Page 21-52.
- Perform stress-free alignment of exhaust system => Page 26-23.

Audi
Reproduction or duplication of this Service Manual, in part or in whole, is not permitted unless authorised by AUDI 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
Exhaust manifold to cylinder head	25
Heat shield to exhaust manifold	25

1.6 - Removing and installing catalytic converter and exhaust pipe

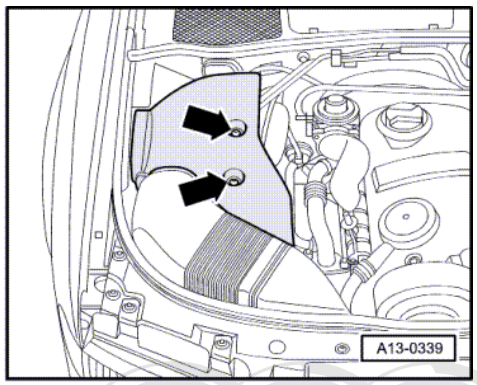


Removing

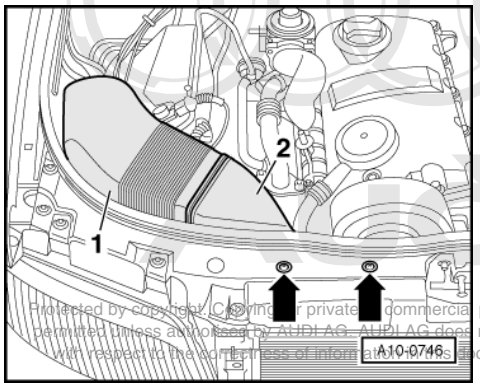
Note:

To avoid damage, decoupling element of exhaust system is never to be tilted by more than 10 °.

- -> Release quick-release fasteners -2- and -3- and detach rear section of noise insulation.
- Detach front exhaust system clamp.
- Push clamp back to separate exhaust system.

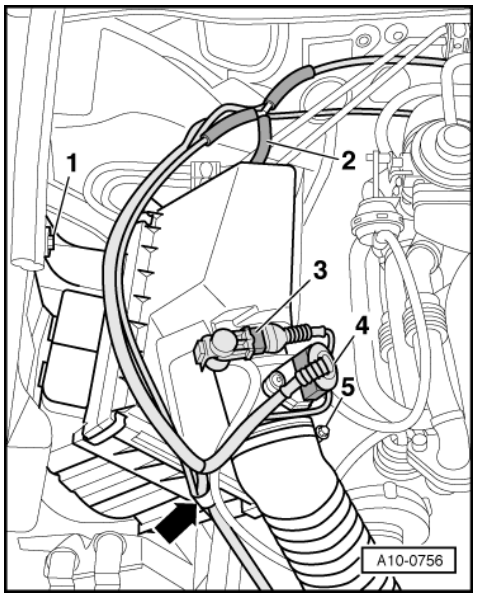


- Unclipcaps.
- -> Screw out bolts -arrows- and detach air cleaner cover.



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

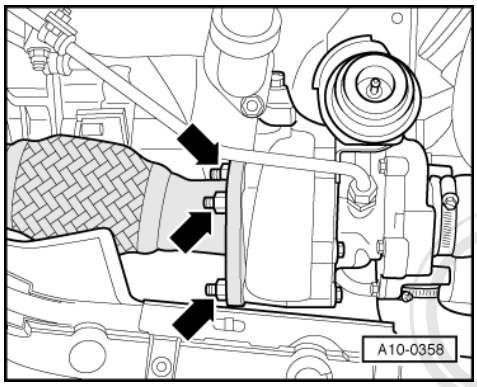
- -> Screw out bolts -arrows-.
- Remove air duct -1- and -2-.
- Remove air intake duct to air cleaner.



- -> Disconnect vent hose -2- from air cleaner housing.
- Unplug electrical connector -4- from air-mass meter.
- Detach EGR valve -N18 from air cleaner housing -3-.
- Detach wiring harness from air cleaner housing -arrow-.
- Pull off air hose -5-.
- Screw out bolt -1-.
- Detach air cleaner housing.

Vehicles with automatic gearbox:

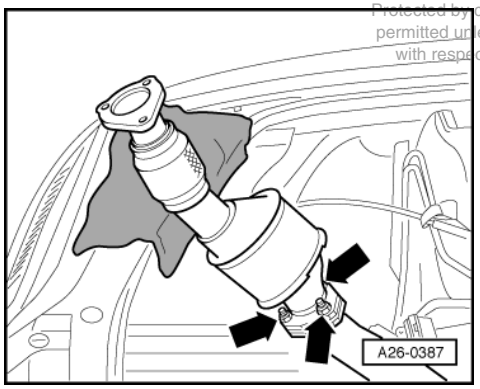
- Remove EGR system cooler =>Page 26-48.



All models:

- -> Screw out turbocharger/catalytic converter bolts -arrows-.
- Raise vehicle approx 550 mm, measured at bottom edge of bumper.
- Turn exhaust pipe to left slightly, at the same time lifting it slightly.

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



- -> To prevent damage, place a cloth at the front right over the lock carrier.
- Place catalytic converter decoupling element on cloth.
- To separate flange connection, screw out nuts -arrows-.
- Take out catalytic converter and exhaust pipe separately.

Installing

Install in reverse order, paying attention to the following:

Note:

Replace gaskets and self-locking nuts.

Vehicles with automatic gearbox:

- Install EGR system cooler =>Page 26-53.

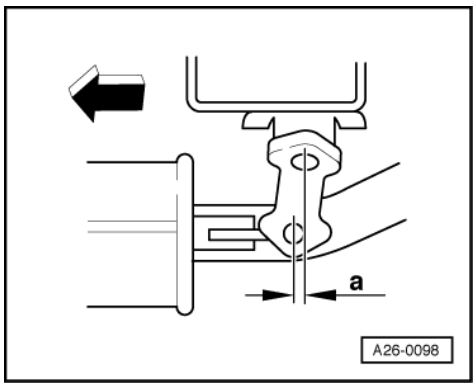
All models:

- Perform stress-free alignment of exhaust system => Page 26-23.

Tightening torques

Component	Nm
Catalytic converter to turbocharger	25
Exhaust pipe to catalytic converter	25
Clamp for exhaust pipe	40

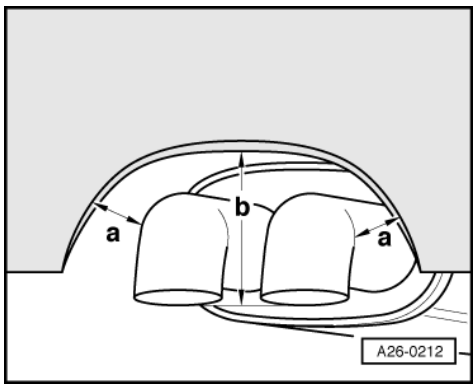
1.7 - Stress-free alignment of exhaust system



Front-wheel drive vehicles:

- Exhaust system must be aligned when cold.

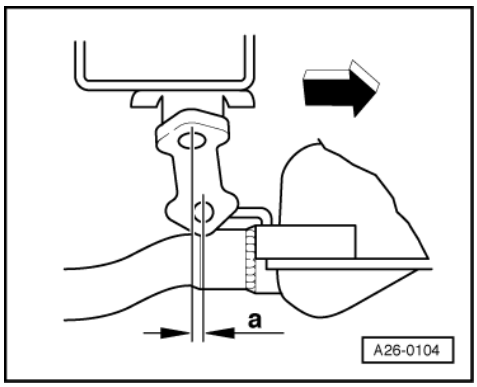
- Slacken bolted joints on front clamp -26-3.
- -> Push exhaust system forwards -arrow- until pre-tension on rear mounting of rear silencer a = 7 ... 9 mm.
- Tighten bolts on front clamp -Item 26-3 evenly to 40 Nm.



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.

Tailpipe alignment

- -> Align tailpipes such that gap -a- on left is equal to gap -a- on right.
- At the same time, gap -b- between bumper cutout and bottom edge of tailpipes must be established.
  - Dimension b = 97 ... 103 mm

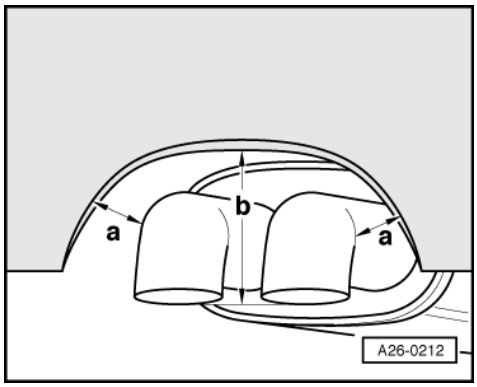


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Four-wheel drive vehicles:

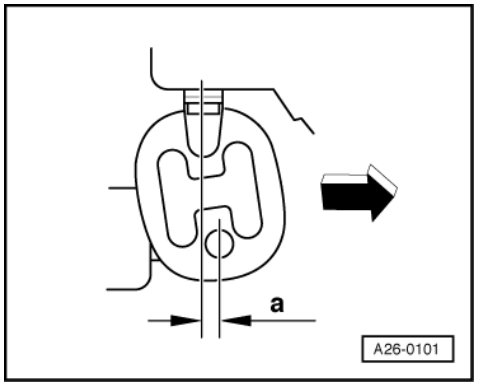
- **Vehicles without clamp between front and rear silencers-**

- Unfasten bolted joints of clamp -Item 26-9.
- -> Push exhaust system forwards -arrow- until pre-tension on rear right retaining strap on rear silencer a = 9 ... 11 mm.
- Tighten bolted joints of clamp evenly to 40 Nm.



Tailpipe alignment

- -> Align tailpipes such that gap -a- on left is equal to gap -a- on right.
- At the same time, gap -b- between bumper cutout and bottom edge of tailpipes must be established.
  - Dimension b = 97 ... 103 mm

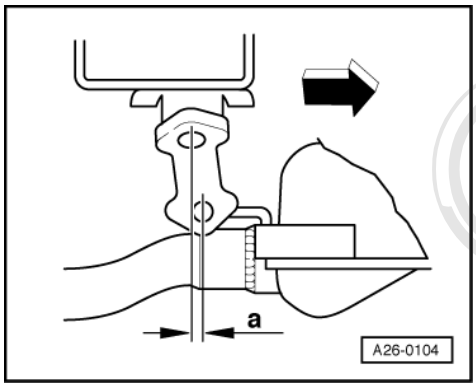


- **Vehicles with clamp between front and rear silencers**

Note:

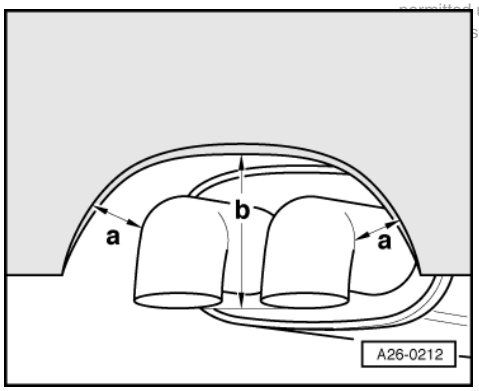
On vehicles with a clamp between the front and rear silencers only, the front silencer must be additionally set up.

- Slacken off bolted joints of clamps -Item 26-10.
- -> Push exhaust system forwards -arrow- until pre-tension on rear left retaining strap on front silencer a = 7 ... 9 mm.
- Tighten bolts on front clamp -Item 26-9 evenly to 40 Nm.



- -> Push rear silencer forwards -arrow- until pre-tension on rear right retaining strap on rear silencer a = 7 ... 11 mm.
- Tighten bolts on rear clamp -Item 26-10 evenly to 40 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.



Tailpipe alignment

- -> Align tailpipes such that gap -a- on left is equal to gap -a- on right.
- At the same time, gap -b- between bumper cutout and bottom edge of tailpipes must be established.
  - Dimension b = 97 ... 103 mm

1.8 - Checking exhaust system for leaks

- Start engine and leave it idling.
- Seal tailpipes for duration of leak test, e.g. cloths, plugs.
- Listen for noise at connection points cylinder head/manifold, manifold/turbocharger, turbocharger/catalytic converter etc., to locate any leaks.
- Eliminate any leaks found.

2 - Exhaust gas recirculation system

2.1 - Exhaust gas recirculation system

Notes:

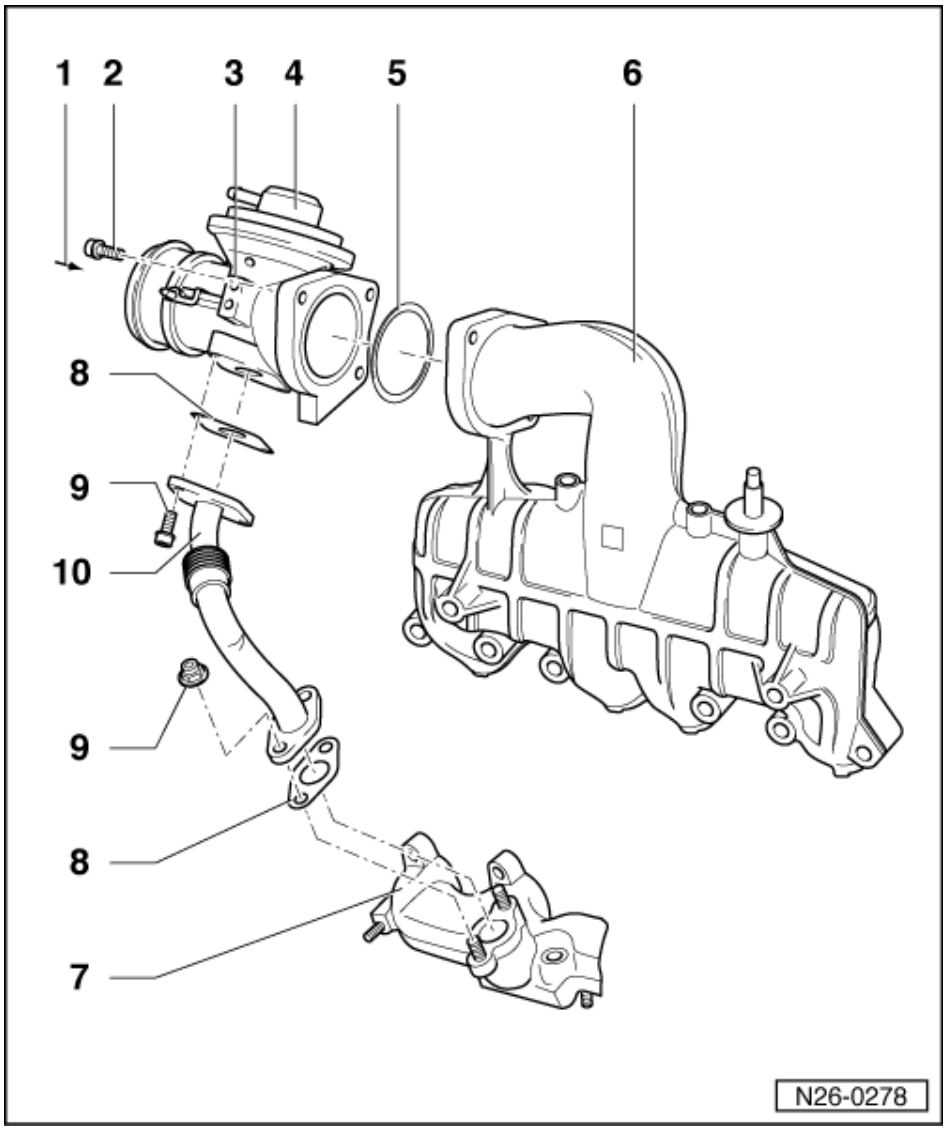
- The exhaust gas recirculation (EGR) system is actuated from the diesel direct injection system control unit -J248 by way of the EGR valve -N18 to the mechanical EGR valve.
- The mechanical EGR valve with its conical valve tappet permits varying opening cross-sections with varying valve lift.
- Clocked actuation means any valve position is possible.
- The EGR system is shut off after approximately 10 minutes' idling.
- For lengthier measurements, restart engine or briefly increase engine speed above idling speed. Then repeat measurement.
- Secure all hose connections with standard hose clamps:

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

=> Parts List

- Always replace gaskets and self-locking nuts.

2.2 - Removing and installing EGR system components



Vehicles with manual gearbox

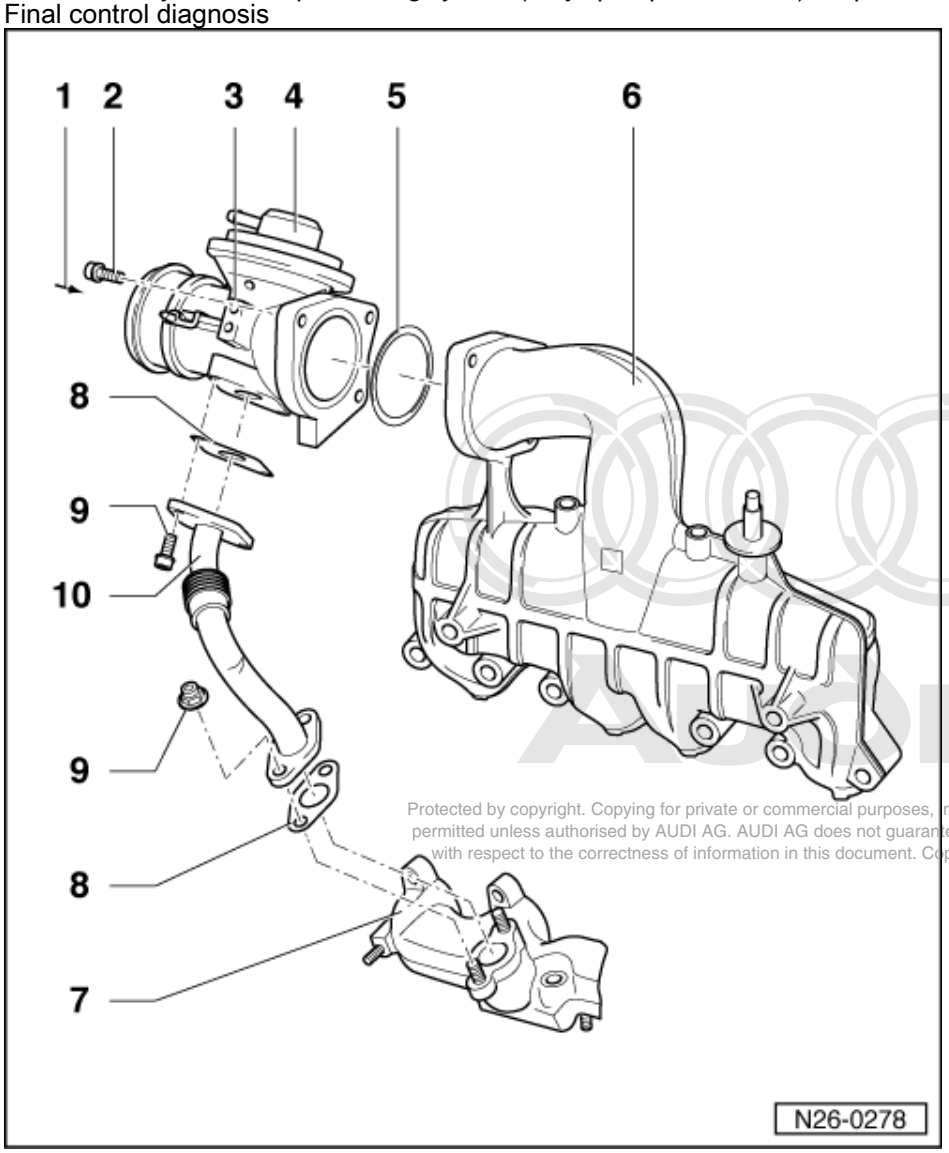
1 From charge-air cooler

2 10 Nm

3 Intake manifold
- With mechanical EGR valve and intake manifold change-over valve

4 Mechanical EGR valve
- Can only be replaced complete with intake manifold
- Checking => Page 26-35
- Checking actuation

=> TDI fuel-injection and preheating system (4-cyl. pump/nozzle unit); Repair Group 01; Final control diagnosis
Final control diagnosis



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

6 Intake manifold
- Removing and installing=>Page 15-14

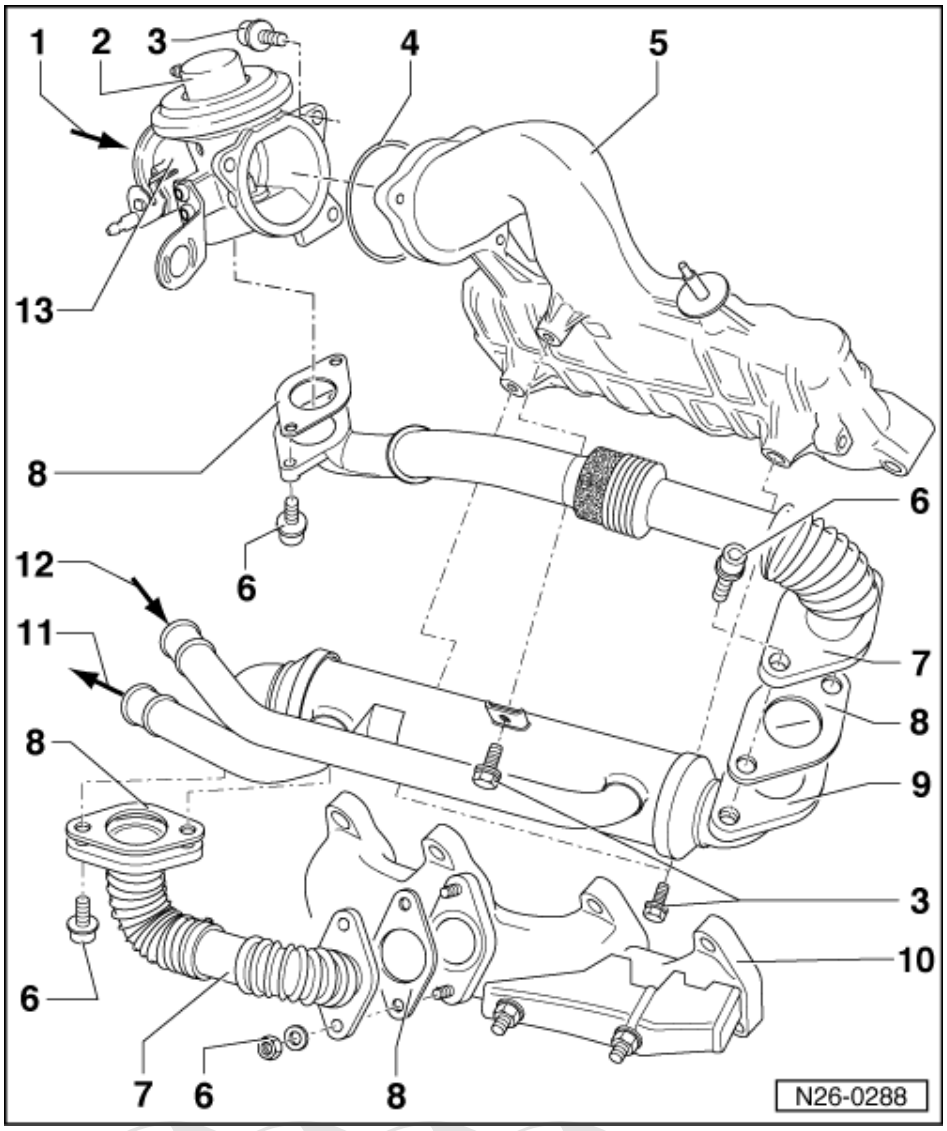
7 Exhaust manifold
- Removing and installing=>Page 26-17

8 Gasket
- Replace

9 25 Nm

10 Connecting pipe

- When installing,counter-tighten all bolted joints lightly (components must just still move slightly relative to each other). Only then should joints be tightened, without straining



Vehicles with automatic gearbox

1 From charge-air cooler

2 Mechanical EGR valve

- Can only be replaced complete with intake manifold
- Checking => Page 26-35
- Checking actuation

=> TDI fuel-injection and preheating system (4-cyl. pump/nozzle unit); Repair Group 01; Final control diagnosis Final control diagnosis

3 10 Nm

4 O-ring

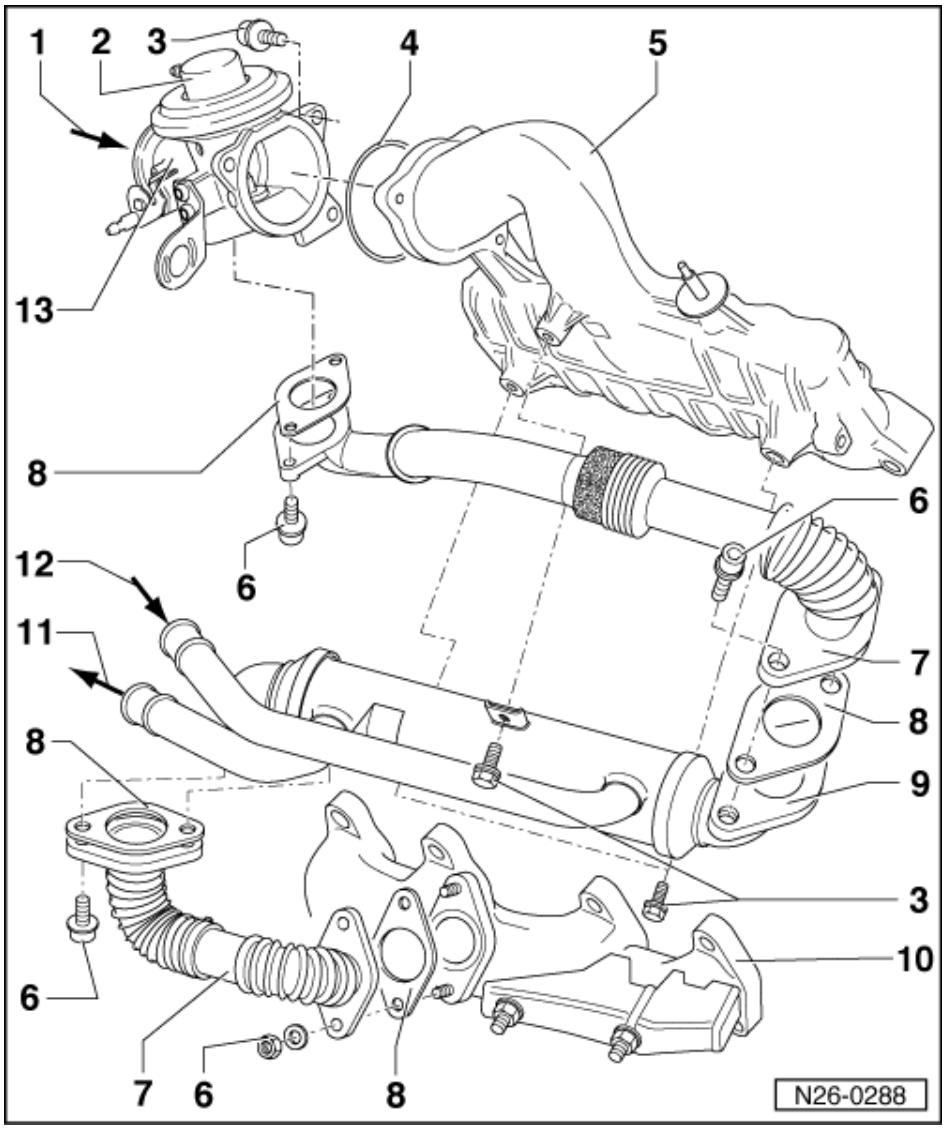
- Replace

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

5 Intake manifold

- Removing and installing=>Page 15-14

6 25 Nm



7 Connecting pipe

- When installing,counter-tighten all bolted joints lightly (components must just still move slightly relative to each other). Only then should joints be tightened, without straining

8 Gasket

- Replace

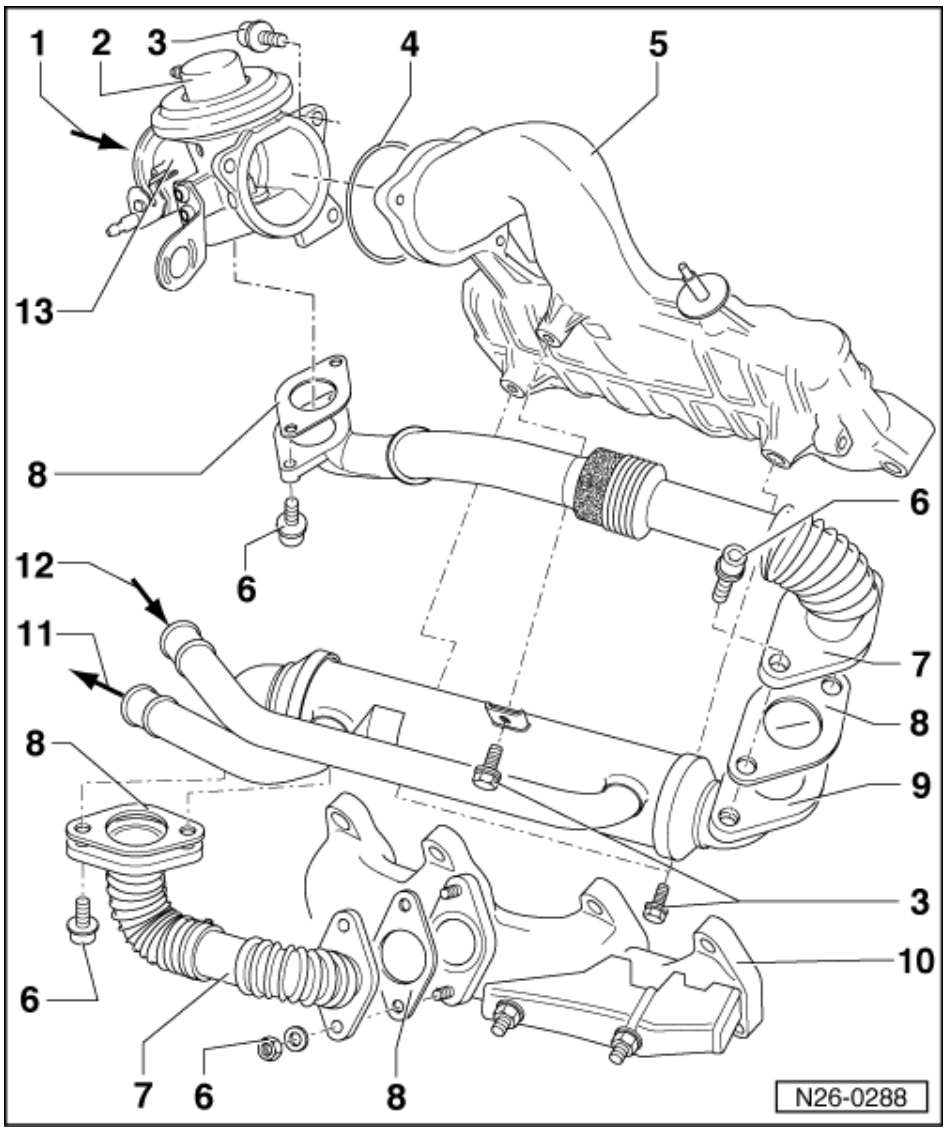
9 Cooler

- For EGR system
- Removing and installing=>Page 26-48

10 Exhaust manifold

- Removing and installing=>Page 26-17

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

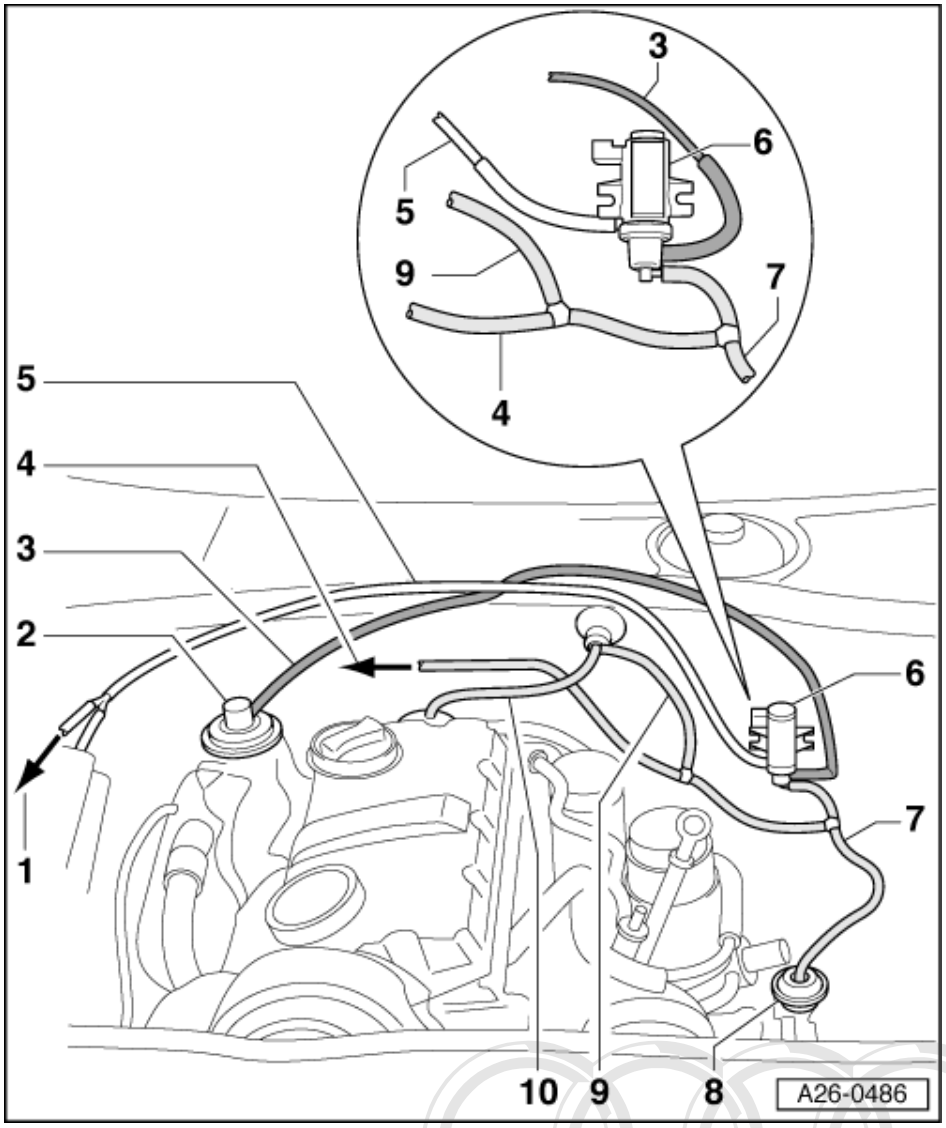


11 To heat exchanger
12 From connection
13 Intake manifold

- With mechanical EGR valve and intake manifold change-over 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.

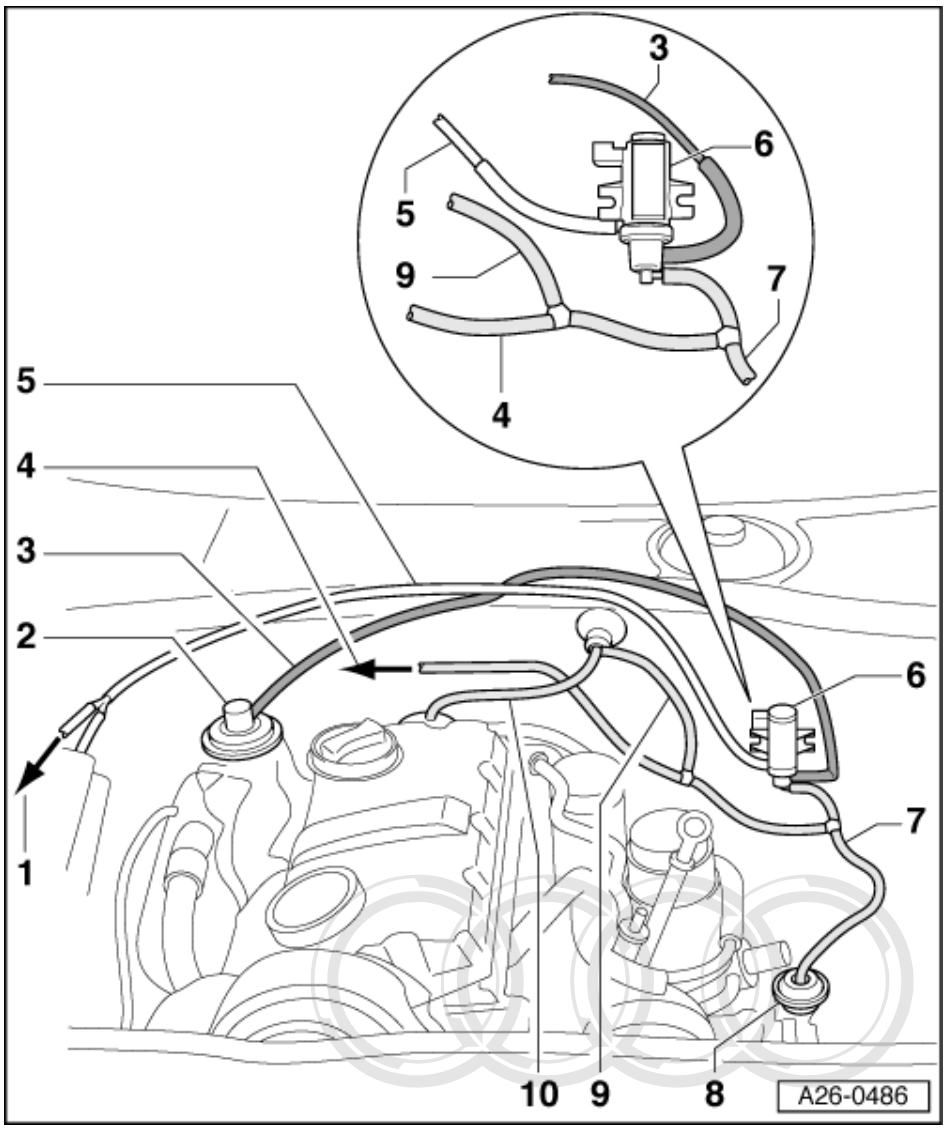
2.3 - Connection diagram for exhaust gas recirculation



1 To vent port on charge pressure control solenoid valve -N75
2 Mechanical EGR valve
3 Vacuum hose
- From EGR valve -N18 to mechanical EGR valve

4 To charge pressure control solenoid valve -N75
5 Vacuum hose
- To vent connection on air cleaner housing

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



6 EGR valve -N18
- Fitting location: on rear of air pipe

7 Vacuum hose
- To fuel cooling circuit cut-off valve

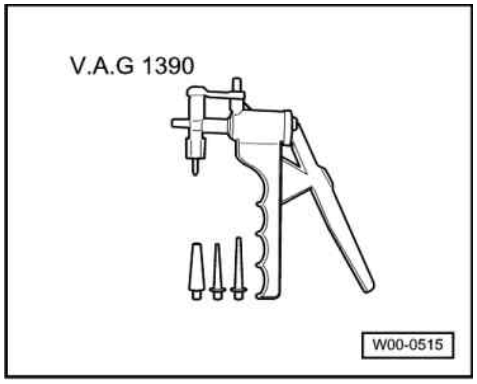
8 Cut-off valve for fuel cooling circuit

9 Vacuum hose
- From tandem pump

10 Vacuum hose
- From tandem pump

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

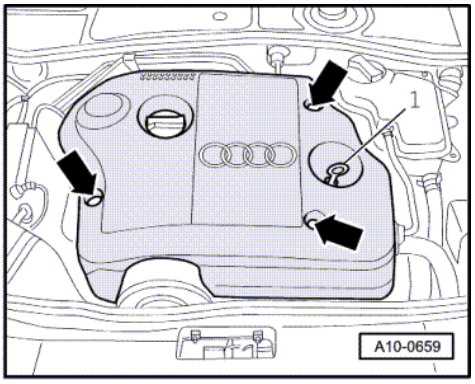
2.4 - Checking mechanical EGR valve



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.

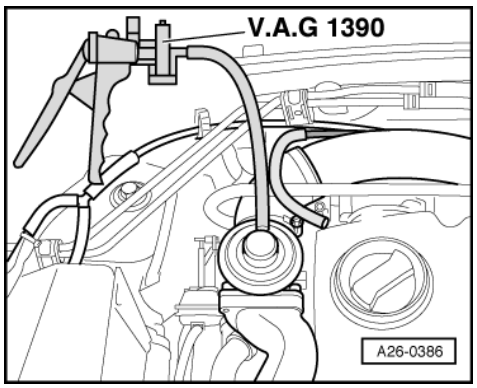
Special tools and workshop equipment required

- Vacuum hand pump V.A.G 1390

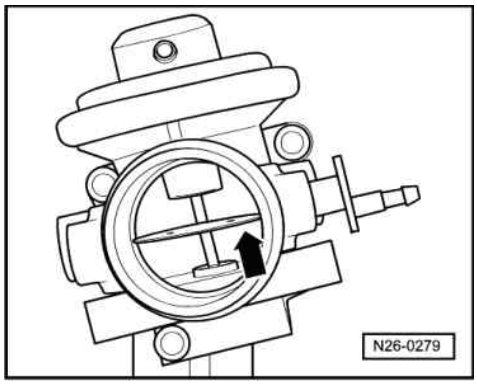


Test sequence

- -> Pull dipstick -1- out of guide tube.
- Unclipcaps.
- Remove nuts -arrows- and detach engine cover.
- Remove insulation lying below.
- Re-insert dipstick into guide tube.



- Pull off vacuum hose at mechanical EGR valve.
- -> Connect vacuum hand pump V.A.G 1390 to valve.
- Operate vacuum pump.
- Detach the hose from the hand-operated vacuum pump from the EGR valve.
  - The closing of the valve must be clearly audible. The diaphragm rod moves towards the intake pipe.

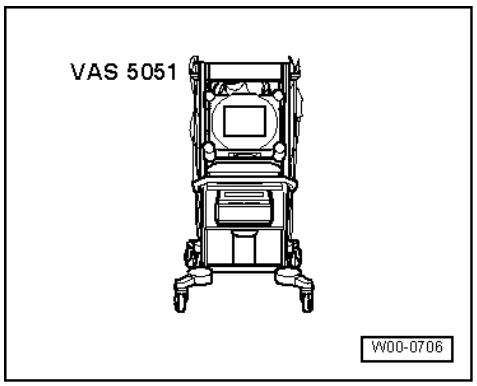


Note:

-> With the air hose removed, the movement of the diaphragm rod in the intake manifold can be observed.

2.5 - Checking EGR system

The functioning of the exhaust gas recirculation system is checked in the "Basic setting" function. This procedure samples the EGR valve every 10 seconds, so the extreme values for the EGR system (air-mass meter) can be read from display group 003.



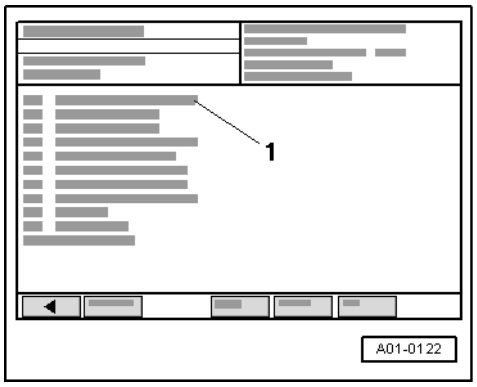
Special tools and workshop equipment required

- VAS 5051 with VAS 5051/1

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.

Test requirements:

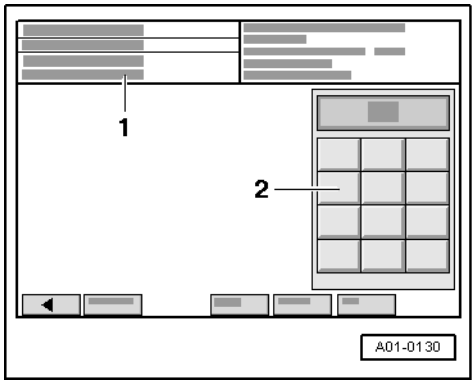
- Engine must be idling.
- Vehicle diagnostic, testing and information system VAS 5051 connected; vehicle self-diagnosis and vehicle system "01 - Engine electronics" selected
- Coolant temperature at least 80 °C



Test sequence

-> Readout on VAS 5051:

- Enter diagnostic function "04 - Basic setting" in selection -1-.

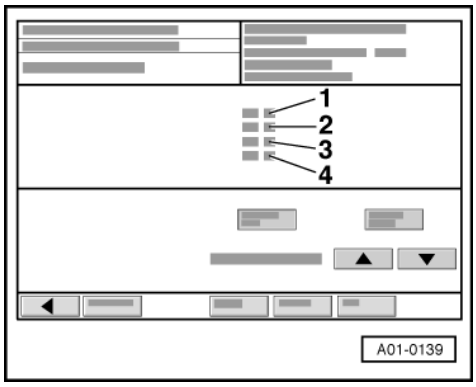


-> Readout on VAS 5051:

1 - Enter display group
max. input value = 255

- Use keypad-2- to enter "003" for "Display group number 03" and confirm by touching Q key.

◆ The idle speed is increased to 1380 ... 1420 rpm



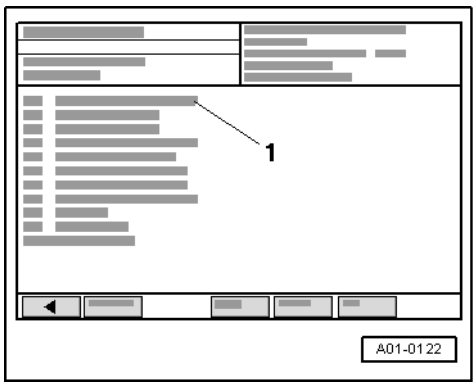
-> Readout on VAS 5051:

- Check readout in display zone -2-.
  - Specification: "EGR n.active" and "EGR active" alternating every 10 seconds
- Check readout in display zone -3-.
  - Specification: Intake air mass readout "... mg/H" must change substantially every 10 seconds
- Check readout in display zone -4-.
  - Specification: Intake air mass readout "... mg/H" must change substantially every 10 seconds

If readings do not match specifications:

- Check mechanical EGR valve => Page 26-35.
- Check vacuum hoses => Page 26-33.
- Check EGR valve -N18 => Page 26-41.

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

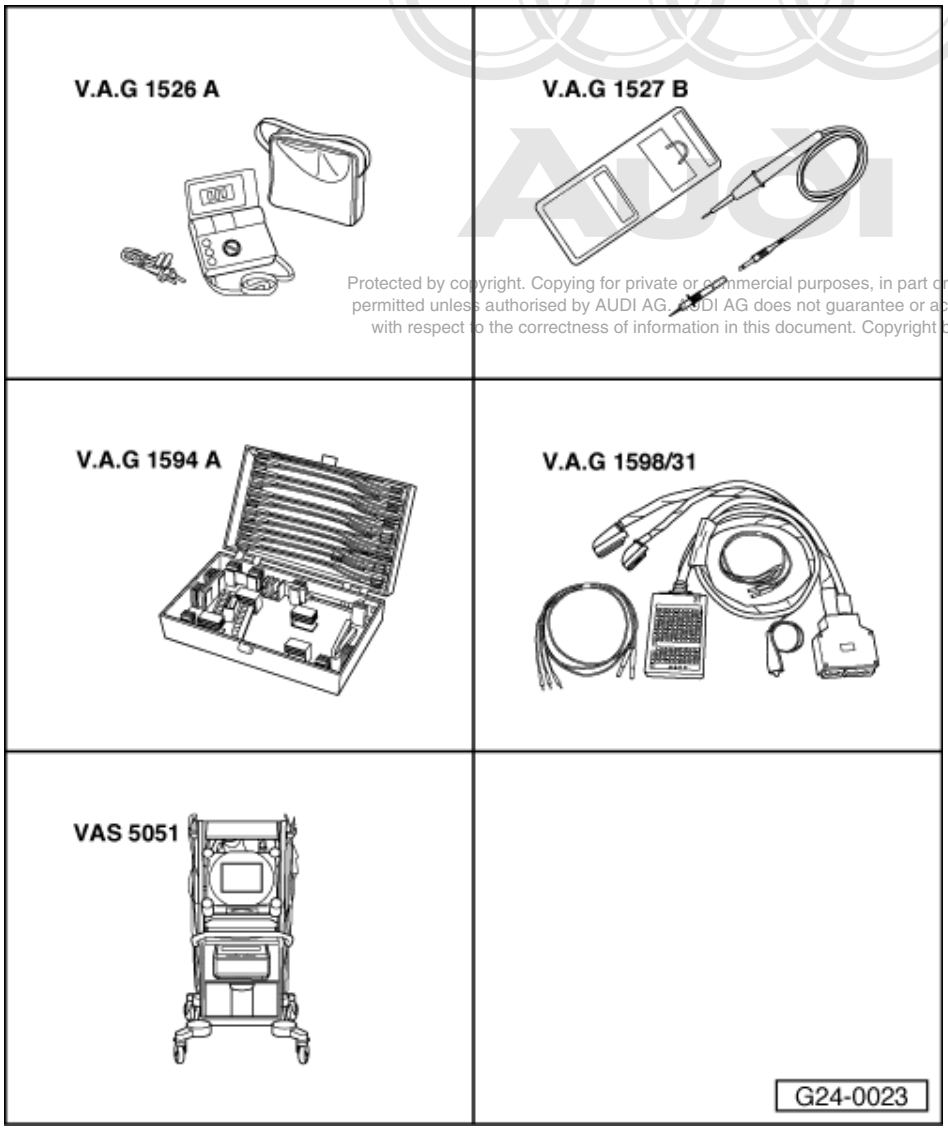


- End function "04 - Basic setting" by pressing ◂ key.

-> Readout on VAS 5051:

- Enter diagnostic function "06 - End output" in selection -1-.

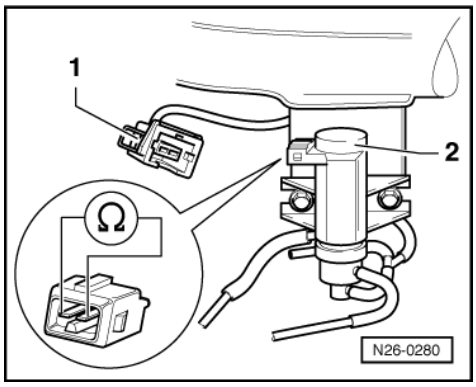
2.6 - Checking exhaust-gas recirculation valve -N18



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

- V.A.G 1526 A
- V.A.G 1527 B
- V.A.G 1594 A
- V.A.G 1598/31
- VAS 5051 with VAS 5051/1



Checking internal resistance

- -> Unplug connector -1- of EGR valve -2-.
- Connect up multimeter for resistance measurement to valve.
  - Specification: 14 ... 20 ω

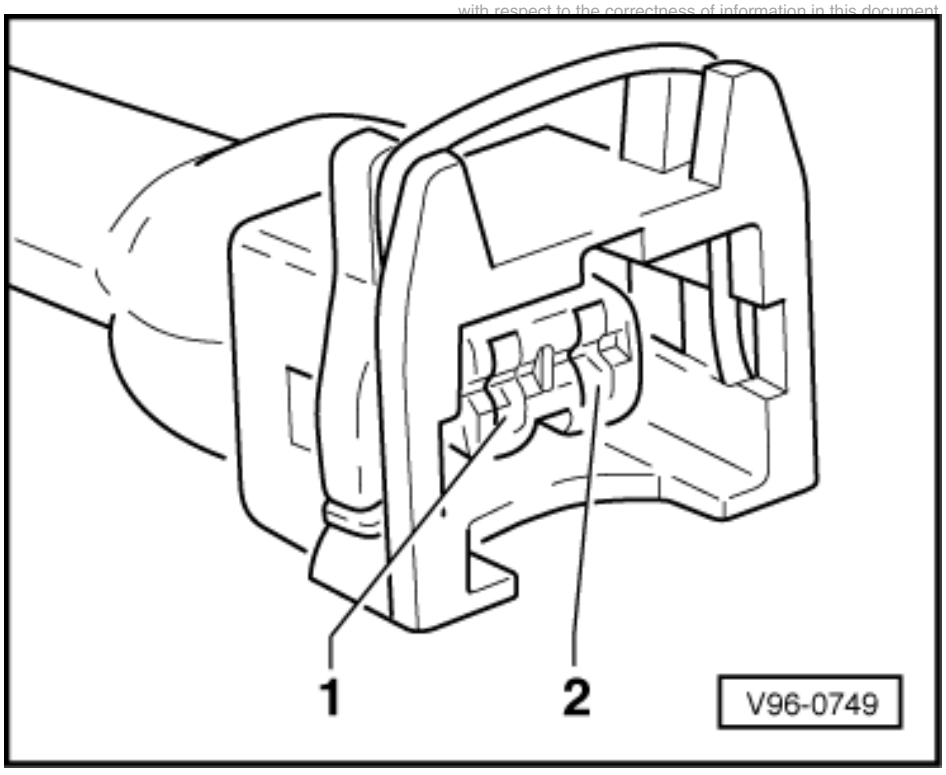
Note:

At room temperature the resistance is in the lower tolerance range; at operating temperature it is in the upper tolerance range.

If reading does not match specification:

- Replace EGR valve -N18.

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

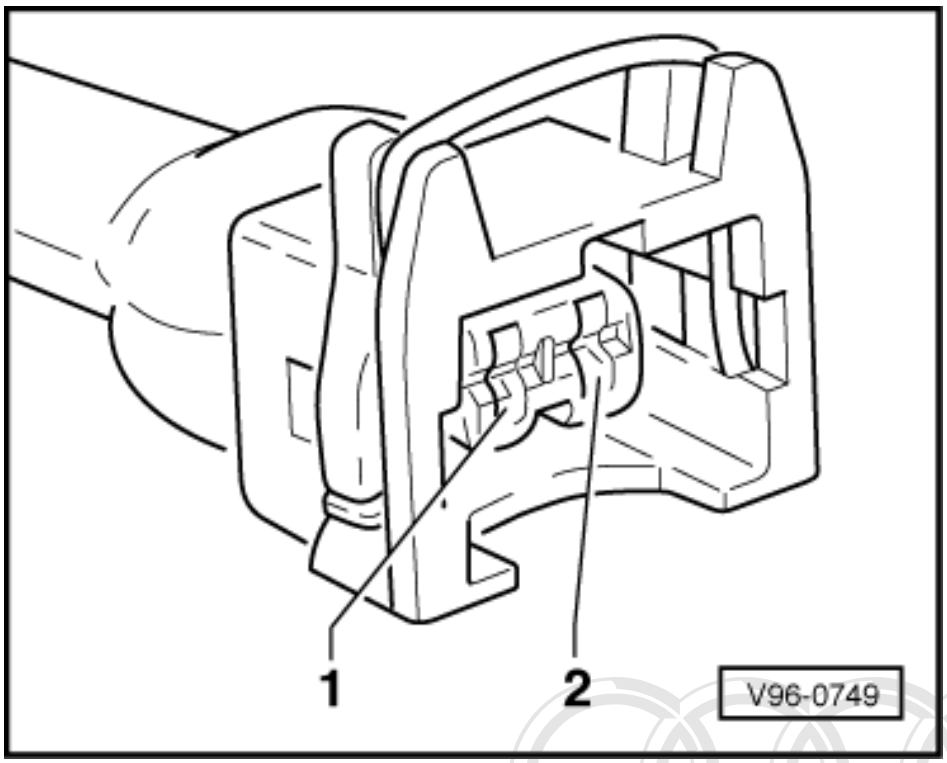


Checking power supply

- -> Connect multimeter to measure voltage at contact 2 and earth.
- Switch on ignition.
  - Specification: Approx. battery voltage

If reading does not match specification:

- Check for open circuit in wiring and repair if necessary.



Checking actuation

Test requirement:

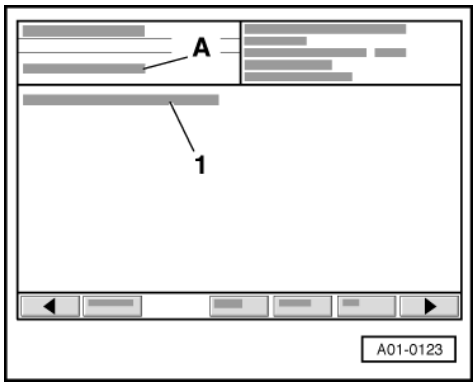
- Vehicle diagnostic, testing and information system VAS 5051 connected; vehicle self-diagnosis and vehicle system "01 - Engine electronics" selected

- -> Connect up voltage tester V.A.G 1527 B between contacts 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.

-> Readout on VAS 5051:

- Enter diagnostic function "03 - Final control diagnosis" in selection -1-.
- Actuate EGR valve -N18.



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

-> Readout on VAS 5051:

A - 1. control element being tested
1 - EGR valve -N18

- LED must flash slowly

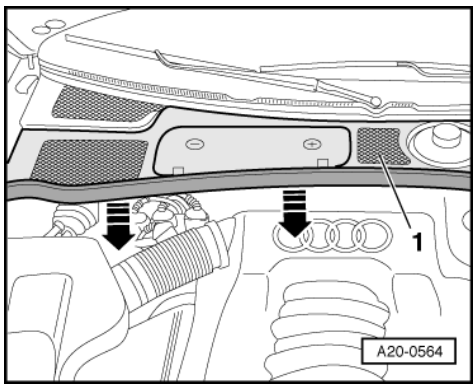
Note:

Voltage testers with a low current input do not go out completely between actuation of engine control unit, but rather continue to glow slightly and become distinctly brighter on actuation.

- Terminate function "03 - Final control diagnosis" by touching ◂ key.

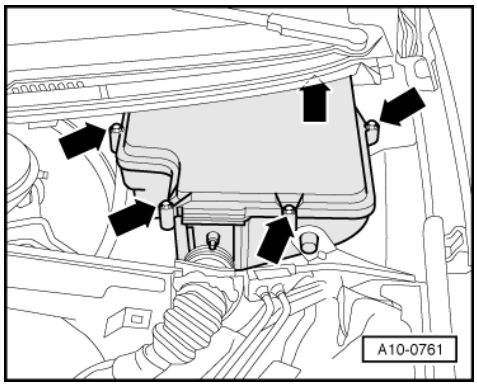
-> Readout on VAS 5051:

- Enter diagnostic function "06 - End output" in selection -1-.

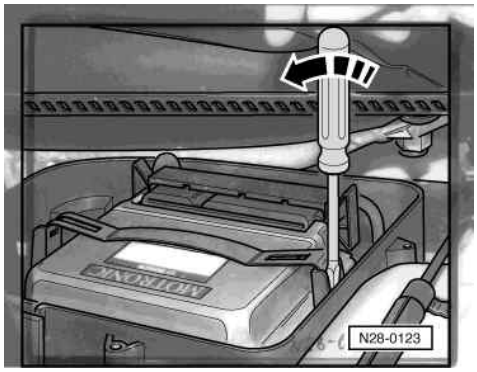


If LED does not respond as described:

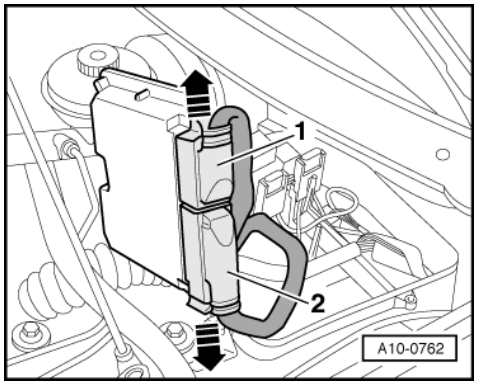
- -> Remove rubber seal from plenum chamber cover in direction of arrow.
- Remove plenum chamber cover -1- from the front.



- -> Remove electronics box cover in plenum chamber -arrows-.

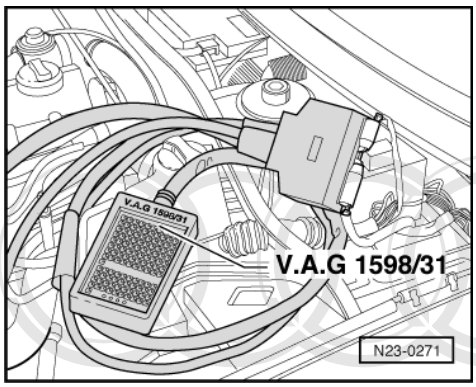


- -> Carefully lever off retainer bar with screwdriver -arrow-.



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

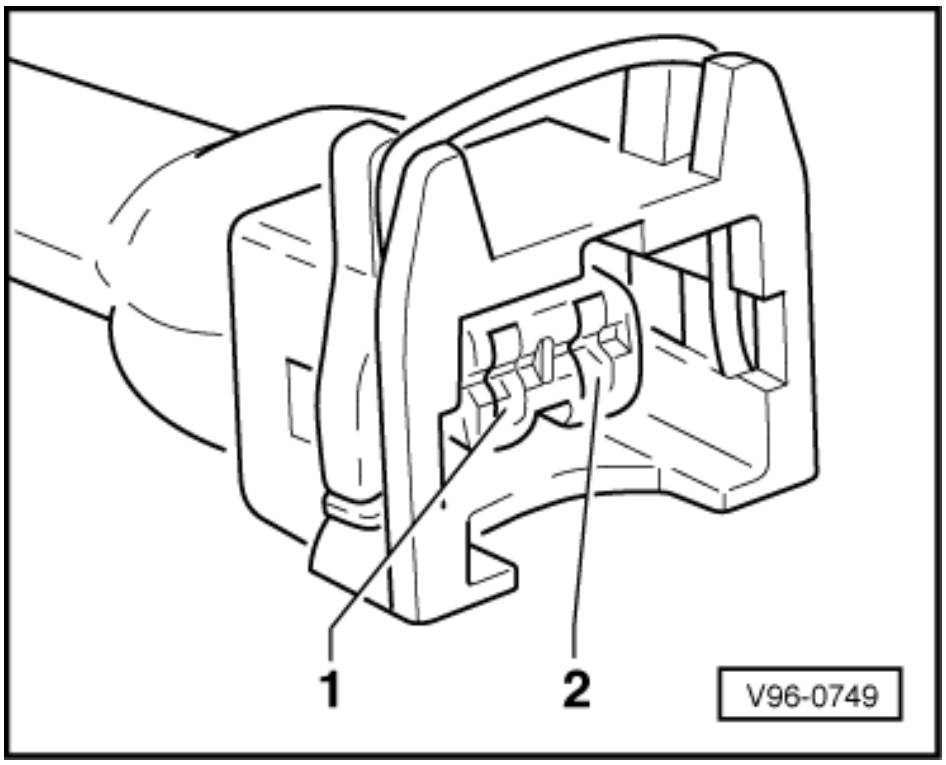
- -> Release connector lock -arrow- and unplug connectors -1- and -2- from control unit.



- -> Connect test box V.A.G 1598/31 to cable harness connector. Actual engine control unit is not to be connected. Clip test box earthing clip onto chassis (not shown in diagram).

Attention:
So as not to destroy electronic components, select required measuring range before connecting test leads and observe test conditions.

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

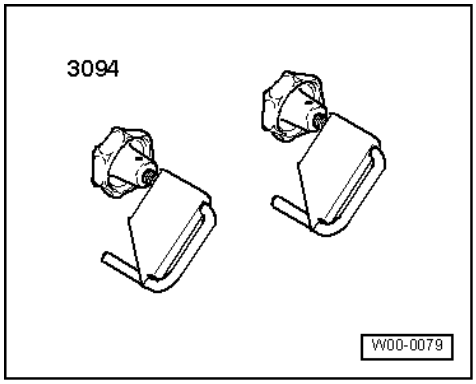


- -> Check for open circuit in the following wiring.

Connector Contact	Test box V.A.G 1598/31 Socket
1	61
2	1 or 2

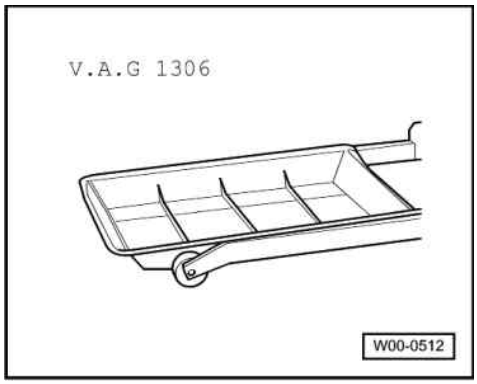
- If necessary, eliminate open circuit in wiring/short circuit.

2.7 - Removing and installing EGR system cooler

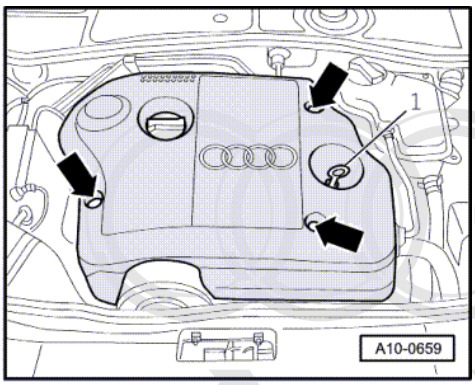


Special tools and workshop equipment required

- Hose clamps 3094



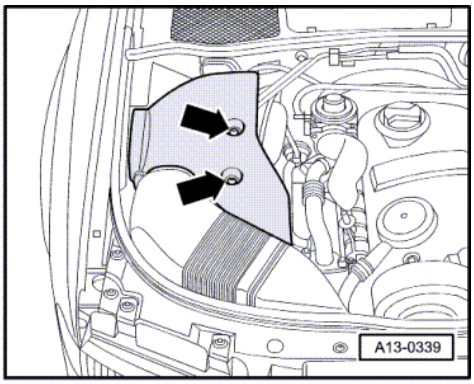
- Drip tray V.A.G 1306



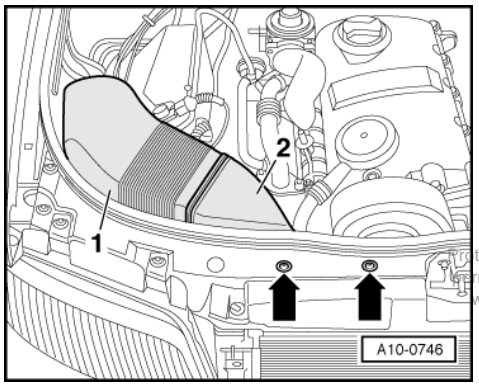
Removing

- -> Pull dipstick -1- out of guide tube.
- Unclipcaps.
- Remove nuts -arrows- and detach engine cover.
- Remove insulation lying below.
- Re-insert dipstick into guide tube.

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

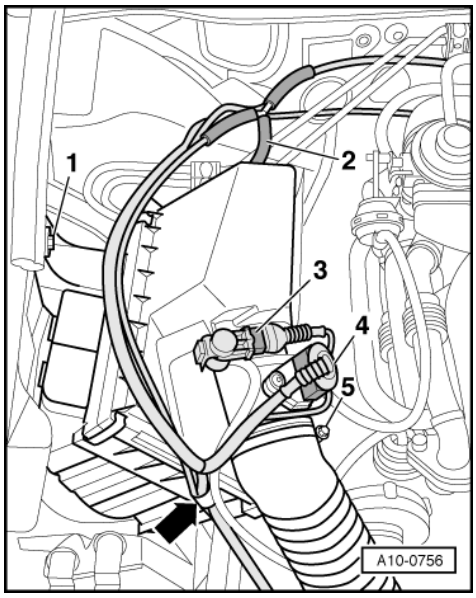


- Unclipcaps.
- -> Remove bolts -arrows- and detach air cleaner cover.

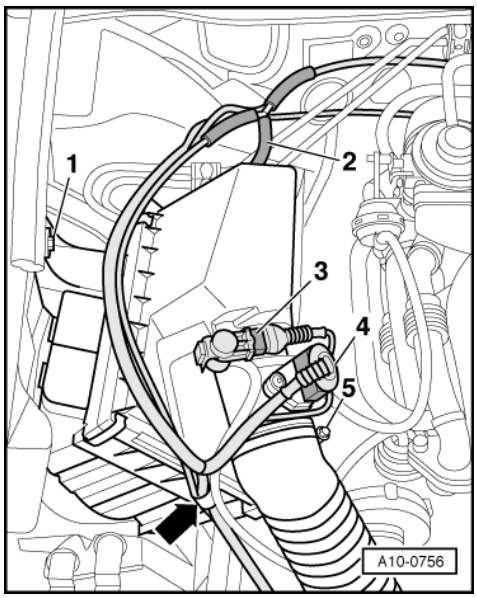


Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- -> Screw out bolts -arrows-.
- Remove air duct -1- and -2-.

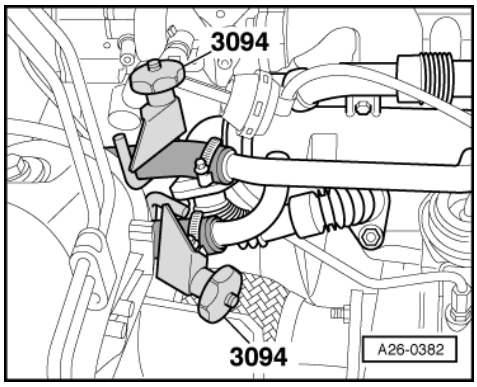


- -> Disconnect vent hose -2- from air cleaner housing.
- Unplug electrical connector -4- from air-mass meter.
- Detach EGR valve -N18 from air cleaner housing -3-.
- Unplug electrical connector.
- Detach wiring harness from air cleaner housing -arrow-.



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

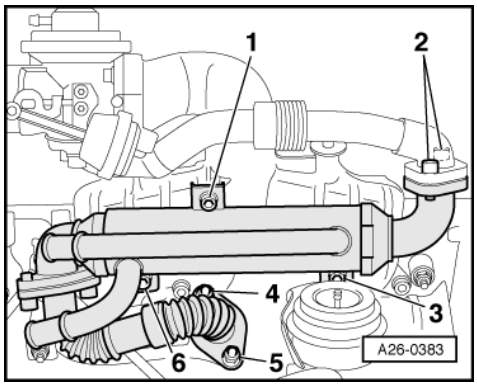
- -> Detach air hose -5-.
- Screw out bolt -1-.
- Detach air cleaner housing.



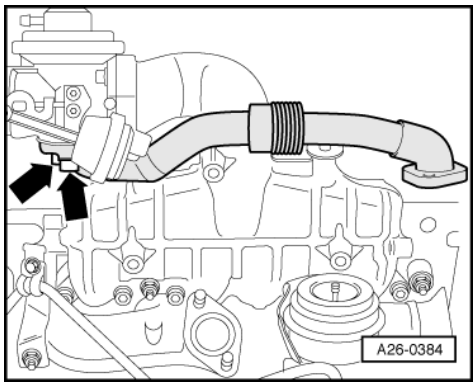
- -> Clamp off coolant hoses on EGR system cooler with hose clamps 3094 and detach coolant hoses.

Note:

When coolant hoses are detached small quantities of coolant may escape.



- -> Screw out bolts and nuts -1 ... 6-.
- Detach EGR system cooler.



- -> Unbolt connecting pipe from intake manifold -arrows-.

Installing

Install in reverse order, paying attention to the following:

Note:

Replace gaskets.

Tightening torques

Component	Nm
EGR system cooler to intake pipe	10
EGR connecting pipe to exhaust manifold	25
EGR connecting pipe to intake manifold	25
EGR connecting pipe to EGR system cooler	25

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