Workshop Manual Audi A8 2010 ≻

8-cylinder direct injection engine (4.0 ltr. 4-valve TFSI						FSI)			
Engine ID	CEU	CGT	CTFA	CTG					,

Edition 03.2014



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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.

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00 – Technical data

1 Identification

(ARL003750; Edition 03.2014)

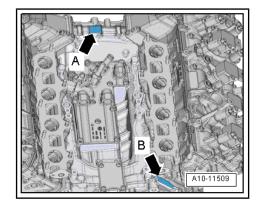
⇒ "1.1 Engine identification number/engine data", page 1

1.1 Engine identification number/engine data

Engine number



- The charge air cooler housing must be removed to make the engine number -arrow B- visible.
- The engine cover panel (front) must be pulled off to make the first three characters of the engine code -arrow A- visible.
- The engine number ("engine code" and "serial number") can be found on the cylinder block at the front left -arrow B-.
- Starting with the letter "C", the engine codes consist of 4 letters.
- The first 3 characters of the engine code stand for the engine capacity and the mechanical construction and design. They are stamped on the cylinder block, together with the serial number.
- The 4th character indicates the power output and torque of the engine, and is determined by the engine control unit.



i Note

- The 4-character engine code can be found on the type plate (in versions for some countries only) and on the vehicle data sticker and the engine control unit.
- Fitting locations of the type plate (certain countries only) and the vehicle data sticker ⇒ Maintenance ; Booklet 410.

Engine data

Code letters	Protec	ted by copyright. CEUA for private or con	mercial purpose Cigra or in whole, is no	CTFA
Capacity	ltr.	n respect to the corrogodss of information i	n this document. 309999t by AUDI AG.	3.993
Power output	kW at rpm	309/5000 6000	382/5800 6400	382/5800 6400
Torque	Nm at rpm	600/1500 4500	650/1700 5500	650/1700 5500
Bore	arnothing mm	84.5	84.5	84.5
Stroke	mm	89.0	89.0	89.0
Compression	ratio	10.1	10.1	9.3
RON	at least	98 ¹⁾	98 ¹⁾	98 ¹⁾
Injection/igniti	on system	Bosch Motronic	Bosch Motronic	Bosch Motronic
Firing order		1-5-4-8-6-3-7-2	1-5-4-8-6-3-7-2	1-5-4-8-6-3-7-2
Exhaust gas recirculation		no	no	no
Turbocharging charging	g/super-	Turbocharger (2x)	Turbocharger (2x)	Turbocharger (2x)

CEUA	CGTA	CTFA
4 sensors	4 sensors	4 sensors
yes	yes	yes
2 probes before catalytic converter 2 probes after catalytic con- verter	2 probes before catalytic converter 2 probes after catalytic con- verter	2 probes before catalytic converter 2 probes after catalytic converter
Inlet Exhaust	Inlet Exhaust	Inlet Exhaust
yes	yes	yes
yes	yes	yes
4	4	4
	4 sensors yes 2 probes before catalytic converter 2 probes after catalytic con- verter Inlet Exhaust yes	4 sensors yes4 sensors yes2 probes before catalytic converter2 probes before catalytic converter2 probes after catalytic con- verter2 probes after catalytic con- verterInlet Exhaust yesInlet Exhaust yesyesyes

¹⁾ Unleaded premium RON 95 can also be used, but results in preduced power ate or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI 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		CTGA
Capacity	ltr.	3.993
Power output kW at rpm		320/6000
Torque	Nm at rpm	600/1500 4500
Bore	arnothing mm	84.5
Stroke	mm	89.0
Compression	ratio	10.1
RON	at least	95 ¹⁾
Injection/ignition	on system	Bosch Motronic
Firing order		1-5-4-8-6-3-7-2
Exhaust gas re	ecirculation	no
Turbocharging charging	g/super-	Turbocharger (2x)
Knock control		4 sensors
Charge air coo	oling	yes
Lambda contr	ol	2 probes before catalytic converter 2 probes after catalytic con- verter
Variable valve	timing	Inlet Exhaust
Intake manifol over	d change-	yes
Secondary air	system	yes
Valves per cyl	inder	4
• ¹⁾ Unleade	d regular gr	ade petrol (RON 91) can als

2 Safety precautions

\Rightarrow "2.1 Safety precautions when working on the fuel supply system", page 3

 \Rightarrow "2.2 Safety precautions when working on vehicles with start/ stop system", page 4

⇒ "2.3 Safety precautions after working in the engine compartment", page 4

⇒ "2.4 Safety precautions when using testers and measuring instruments during a road test", page 5

⇒ "2.5 Safety precautions when working on the subframe", page 5

 \Rightarrow "2.6 Safety precautions when working on the cooling system", page 5

 \Rightarrow "2.7 Safety precautions when working on the ignition system", page 6

2.1 Safety precautions when working on the

fuel supply system teted by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability ation in this document. Copyright by AUDI AG.

Please note the following warnings when working on the fuel supply system:



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

- The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system. Procedure <u>> page 336</u>
- Wrap a clean cloth around the connection and carefully loosen the connection to allow the residual pressure to dissipate.

Escaping fuel can cause a risk.

- The power supply for the fuel system pressurisation pump - G6- must be disconnected before opening the fuel system, since -G6- will be activated briefly when the driver's door is opened with the battery still connected.
- Disconnect power supply by removing fuse for fuel pump control unit - J538- /fuel delivery unit → Current flow diagrams, Electrical fault finding and Fitting locations, or disconnect battery.

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

- Always switch off the ignition before connecting or disconnecting electrical wiring for the injection or ignition system or tester cables.
- Always switch off ignition before washing engine.
- Erase any entries in event memory resulting from testing or installation ⇒ Vehicle diagnostic tester, Interrogate event memory, then Generate readiness code



Caution

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

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

2.2 Safety precautions when working on vehicles with start/stop system

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



WARNING

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

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

2.3 Safety precautions after working in the engine compartment

After working in the engine compartment, note the following:



Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

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

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

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

WARNING

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

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

2.5 Safety precautions when working on the subframe

When working on the subframe note the following warnings:

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Risk of damage to running gear components.

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

2.6 Safety precautions when working on the cooling system

When working on the cooling system note the following warnings:

WARNING Hot steam/hot coolant can escape - risk of scalding. The cooling system is under pressure when the engine is hot. To allow pressure to dissipate, cover filler cap on coolant expansion tank with cloth and open carefully.

Risk of injury as the radiator fans may start up automatically.

Unplug electrical connectors before starting to work in the area of radiator cowl.



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

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

2.7 Safety precautions when working on the ignition system

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

- Persons wearing a cardiac pacemaker must at all times maintain a safe distance from high-voltage components such as the ignition system and xenon headlights.
- Always switch off the ignition before connecting or disconnecting electrical wiring for the injection or ignition system or tester cables.
- ♦ Erase any entries in event memory resulting from testing or installation ⇒ Vehicle diagnostic tester, <u>Guided Functions</u>, <u>Interrogate event memory</u>, then <u>Generate readiness</u> code.
- Always switch off the ignition before cleaning the engine.
- Always switch off the ignition before connecting or disconnecting the battery, otherwise the engine control unit may be damaged.
- If you want to turn over the engine at cranking speed without actually starting it (e.g. compression test), first unplug the connectors from the ignition coils. In addition, remove fuse for fuel pump control unit J538-; for identification of fuses refer to ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

$\overline{\mathbf{V}}$

Caution

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

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



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3 Repair instructions

- ⇒ "3.1 Rules for cleanliness", page 7
- ⇒ "3.2 Foreign particles in engine", page 7
- ⇒ "3.3 Contact corrosion", page 7

 \Rightarrow "3.4 Routing and attachment of pipes, hoses and wiring", page <u>8</u>

⇒ "3.5 Installing radiators and condensers", page 8

3.1 Rules for cleanliness

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

- Carefully clean connection points and the surrounding area with engine cleaner or brake cleaner and dry thoroughly before opening.
- Immediately seal open lines and connections with clean plugs, for example from engine bung set - VAS 6122-.
- Place parts that have been removed on a clean surface and cover them over. Do not use fluffy cloths.
- Carefully cover or seal open components if repairs cannot be carried out immediately.
- Only install clean components; replacement parts should only be unpacked immediately prior to installation. Do not use parts that have been previously unpacked and stored away loose (e.g. in toolboxes, etc.).
- When the system is open: Do not work with compressed air. Do not move the vehicle unless absolutely necessary.
- Make sure that no fuel runs onto the fuel hoses. Should this occur, the fuel hoses must be cleaned again immediately.
- Protect unplugged electrical connectors against dirt and moisture and make sure connections are dry when attaching.

3.2 Foreign particles in engine

- When performing assembly work on the engine, all open passages in the intake and exhaust systems must be sealed with suitable plugs (e.g. from engine bung set - VAS 6122-) to prevent foreign particles from entering the engine.
- In the event of mechanical damage to one of the cylinder banks, the intake and exhaust systems and combustion chambers of the opposite cylinder bank must always be examined for foreign particles to prevent further damage occurring later.



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If the turbocharger has suffered mechanical damage <u>⇒ page 309</u>

3.3 Contact corrosion

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

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

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

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

Note the following:

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

3.4 Routing and attachment of pipes, ho and wiring

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

3.5 Installing radiators and condensers

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

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10 – Removing and installing engine

1 Removing and installing engine

⇒ "1.1 Removing engine", page 9

⇒ "1.2 Separating engine and gearbox", page 28

 \Rightarrow "1.3 Removing engine from scissor-type assembly platform", page 35

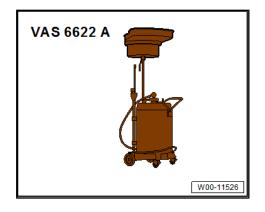
 \Rightarrow "1.4 Securing engine to engine and gearbox support", page 38

⇒ "1.5 Installing engine", page 39

1.1 Removing engine

Special tools and workshop equipment required V.A.G 1782 80-200 Stepladder - VAS 5085-Engine bung set - VAS ٠ 6122-Scissor-type assembly platform - VAS 6131 A- with support set for Audi - VAS 6131/10- , support set -VAS 6131/11- and supplementary set -VAS 6131/13-Drip tray for workshop hoist - VAS 6208-VAS 6122 VAS 5085 Hose clip pliers - VAS 6340-Hose clip pliers - VAS 6362-VAS 6208 VAS 6131 A Protected by copyright. Copying for pri permitted unless authorised by AUDI with respect to the correctness of in C10-10075

• Used oil collection and extraction unit - VAS 6622A-





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Procedure



- The engine is removed from below together with the gearbox and subframe.
- Fit cable ties in the original positions when installing.
- All bolts on running gear components with bonded rubber bushes must be tightened with suspension in unladen position (vehicle unladen).
- Bonded rubber bushes can only be turned to a limited extent. Therefore, before tightening the bolts, suspension components with bonded rubber bushes must be brought into a position corresponding to the normal position while driving (unladen position). Otherwise, bush would be subject to torsion loading and its service life shortened.
- Before starting work, use measuring tape or similar to measure distance -a- from centre of wheel to lower edge of wheel housing.
- This measurement must be taken with the suspension in the unladen position (vehicle unladen).
- Make a note of the measured value. This will be needed when tightening the bolts/nuts on the suspension.



WARNING

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

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

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

- The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system.
- Reduce fuel pressure in high-pressure section of injection system <u>> page 336</u>.



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Move the gearbox to position "N" and release the electromechanical parking brake before disconnecting the battery, so that the propshaft can be turned during removal.

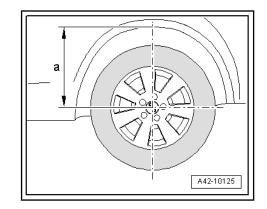
- Set front wheels to straight-ahead position.



Caution

Electronic components are susceptible to damage.

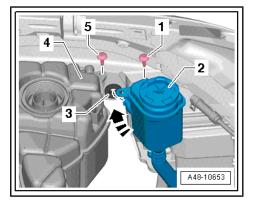
- Observe notes on procedure for disconnecting the battery.
- Switch off ignition.

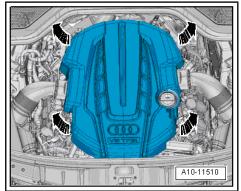


- Disconnect earth wire from battery terminal ⇒ Electrical system; Rep. gr. 27; Battery; Disconnecting and connecting battery.
- Discharge refrigerant system ⇒ Air conditioner with refrigerant R134a.

Vehicles up to model year 2013:

 Extract hydraulic fluid for power steering from reservoir -2- using used oil collection and extraction unit - VAS 6622A-.





All vehicles (continued):

- Remove engine cover panel -arrows-.

WARNING

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

Vehicles with engine codes CEUA/CTGA:

 Remove lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing attachments.

Vehicles with engine codes CGTA/CTFA:

Remove bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing bumper cover.

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All vehicles (continued):

WARNING

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

- The cooling system is under pressure when the engine is hot.
- To allow pressure to dissipate, cover filler cap on coolant expansion tank with cloth and open carefully.
- Open filler cap -arrow- on coolant expansion tank.
- Completely remove wheel housing liners (front left and front right) ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Removing and installing wheel housing liner (front).
- Remove noise insulation panels ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.
- Remove underbody trim (front left and right) ⇒ General body repairs, exterior; Rep. gr. 66; Underbody trim; Removing and installing underbody trim.
- Remove longitudinal members (bottom left and right) ⇒ General body repairs, exterior; Rep. gr. 50; Lock carrier; Removing and installing lock carrier.
- Remove propshaft ⇒ Final drive; Rep. gr. 39; Propshaft; Removing and installing propshaft.



Collect drained coolant in a clean container for disposal.

- Place drip tray for workshop hoist VAS 6208- beneath engine.
- Lift retaining clips -2- and disconnect coolant hose from radiator.



Disregard -item 1-.

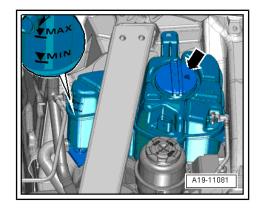
Vehicles up to model year 2013:

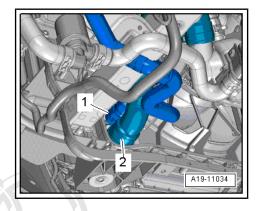
Release hose clip -1- and detach coolant hose from coolant pipe (bottom left).

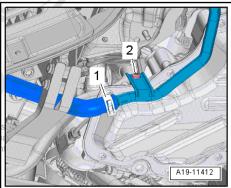


Disregard -item 2-.

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Vehicles from model year 2014 onwards:

 Release hose clip -arrow- and detach coolant hose from coolant pipe (bottom left).

All vehicles (continued):



WARNING

Risk of injury caused by fuel.

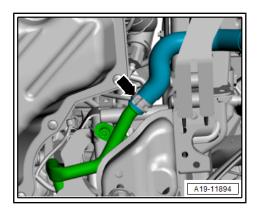
To allow the fuel pressure to dissipate, wrap a clean cloth around the connection and carefully loosen the connection before opening the fuel system.

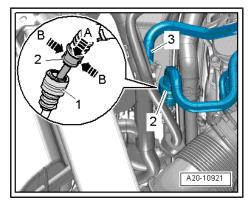


Caution

Risk of damage caused by particles of dirt.

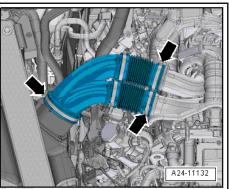
- ♦ Observe rules for cleanliness when working on the fuel supply system <u>⇒ page 7</u>.
- Push down protective sleeve -1- and disconnect fuel line.
- First press hose connector -2- downwards -arrow A-, then press release tabs -arrow B-.
- Pull off hose connector, keeping release tabs depressed.
- Release hose clip -3- and detach hose for activated charcoal filter.





Vehicles with engine codes CEUA/CTGA:

- Release hose clips -arrows- and remove air pipe.



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Vehicles with engine codes CGTA/CTFA:

Release hose clips -arrows- and remove air pipes (left and right).

All vehicles (continued):

- Remove longitudinal member (top) on both sides ⇒ General body repairs, exterior; Rep. gr. 50; Lock carrier; Exploded view lock carrier.
- Press release tabs on both sides and disconnect air hose -1-.
- Press catches down on both sides -arrow A- and push towards rear -arrow B-.
- Lift off air cleaner housing -2-.

Vehicles with engine codes CGTA/CTFA:

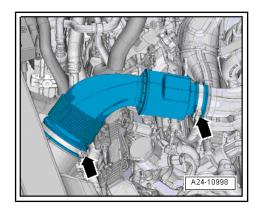
- Perform the same work steps on the other side of the vehicle.

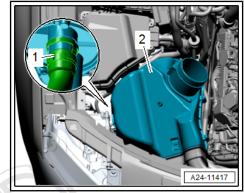
All vehicles (continued):

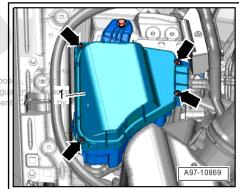
- Remove plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50; Bulkhead; Removing and installing plenum chamber cover .
- Remove bolts -arrows- and detach cover -1- for electronics box in engine compartment.

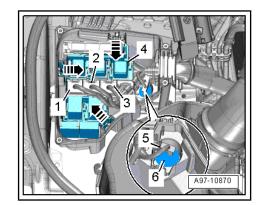
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- Unplug electrical connectors -1, 2, 3- and move electrical wiring clear.
- Release catches -arrows- and detach relay carrier with fuse holder -4-.
- Release fastener -5- and detach condenser -6-.
- Disengage engine wiring harness at electronics box in engine compartment, move clear and place onto engine.

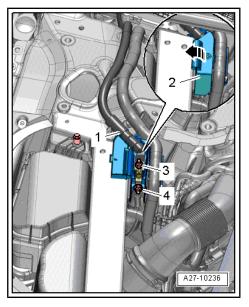




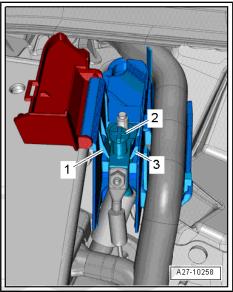




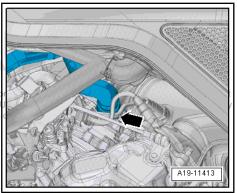
- Release cover -2- and swivel to side -arrow-.
- Remove nut -4- and move battery positive wire clear.
- Unscrew nut -3- and detach battery positive wire -1-.



 Release retaining tabs -1, 3- and swivel positive terminal -2out of mounting.



Lift retaining clip -arrow- and disconnect coolant hose.



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_

- Release hose clips -1, 2- and disconnect coolant hoses.

Lift retaining clip -1- and disconnect coolant hose (top right) from radiator.



Disregard -item 2-.

- Detach vacuum hose -1- from vacuum reservoir -2-.



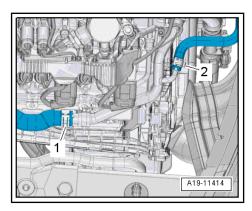
Disregard -item 3-.

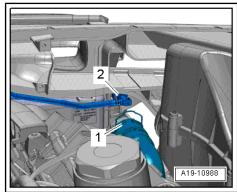
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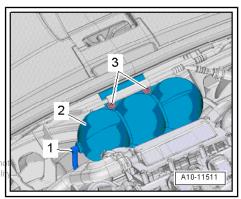
- Press release tabs -3- and disconnect secondary air hose.
- Unplug electrical connector -2-.
- Move clear secondary air hose with retaining clip -1- and push downwards.

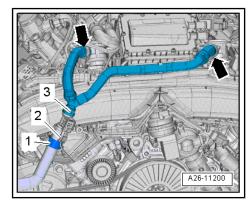


Disregard -arrows-.

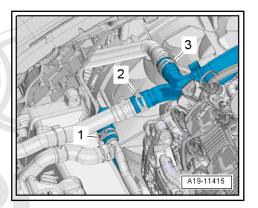


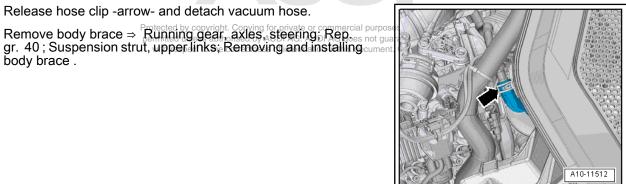






Release hose clips -1, 2, 3- and disconnect coolant hoses.





Release hose clip -arrow- and detach vacuum hose.

Release clips -arrows-, take out engine control unit - J623--item 2- and place onto engine.



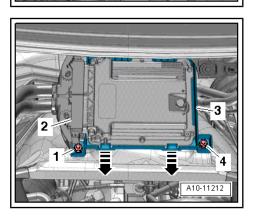
_

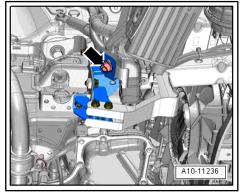
body brace .

Disregard -items 1, 3, 4-.

Vehicles with auxiliary heater:

Remove bolt -arrow- at bracket. _





All vehicles (continued):

- Remove bolt -4- for battery positive wire -3- and bolt -2- for earth wire -1- and move electrical wiring clear.

Vehicles with engine codes CGTA/CTFA:

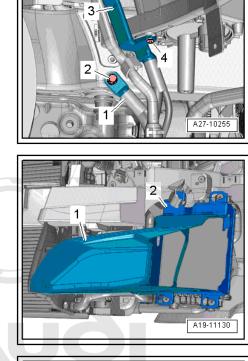
Unclip air ducts -1- on both sides.

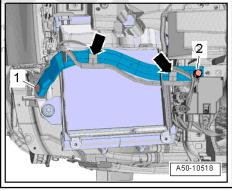


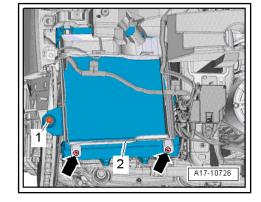
Disregard -item 2-.

- Move clear electrical wiring harness -arrows-.
- Unscrew bolts -1 and 2- and detach connecting piece right. Copying for permitted unless authorised by AUD with respect to the correctness of

- Remove bolts -arrows- and detach air duct -2-.
- Remove bolt -1-, detach engine oil cooler (right-side) and secure by tying to engine.

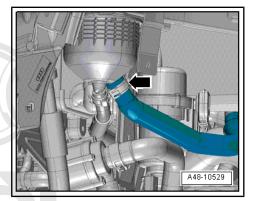






Vehicles up to model year 2013:

- _ Position used oil collection and extraction unit - VAS 6622Abelow connection point.
- Release hose clip -arrow- and detach hydraulic hose.
- Seal off open lines and connections with clean plugs from engine bung set - VAS 6122- .

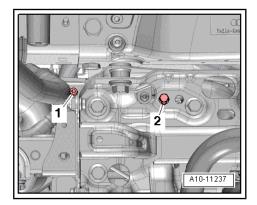




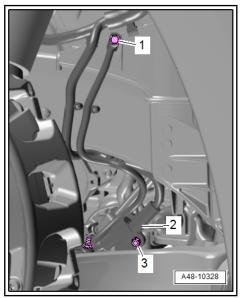
Note

Protected by copyright. Copying for private or commercia Lay a cloth underneath vehicle to catch escaping hydraulic fluid this do

- Release hose clip -arrow-, detach hydraulic hose and move clear.
- Seal off open lines and connections with clean plugs from engine bung set - VAS 6122- .
- Remove bolts -1 and 2-.



A48-10712



Vehicles from model year 2014 onwards:

- Unscrew bolt -1- and move earth wire clear at longitudinal _ member.
- Remove nut -3- and unplug electrical connector -2-. _

All vehicles (continued):

- Unplug electrical connector -3-.
- Lift retaining clip -1- and disconnect coolant hose.



Disregard -item 2-.

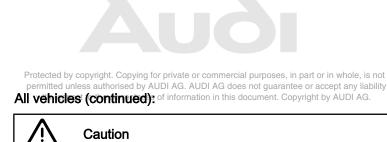
Vehicles with engine codes CEUA/CTGA:

- Unclip lower part of air duct -2- and push slightly to right side.



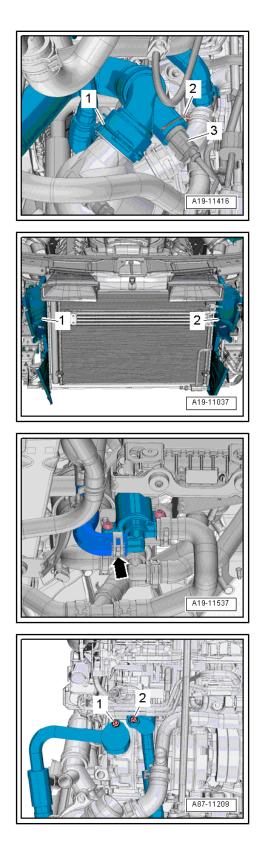
Disregard -item 1-.

- Place drip tray for workshop hoist VAS 6208- underneath.
- Release hose clip -arrow- and detach coolant hose.



Danger of damage to refrigerant lines and hoses.

- Do NOT stretch, kink or bend refrigerant lines and hoses.
- Unscrew bolts -1, 2- and remove refrigerant lines from A/C compressor.
- Seal off open lines and connections with clean plugs from engine bung set - VAS 6122-.



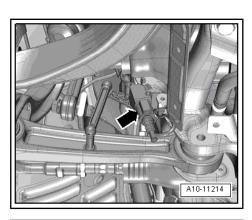
 Unplug electrical connector -arrow- on both sides at front vehicle level sender -G78- / -G289- and move electrical wiring clear.

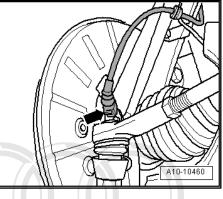
- Unplug electrical connector -arrow- at front wheel speed sensor on both sides (-G45- and -G47-).
- Remove brake caliper and tie up in wheel housing with wire (brake hose remains attached) ⇒ Brake system; Rep. gr. 46; Front brakes; Removing and installing brake caliper.

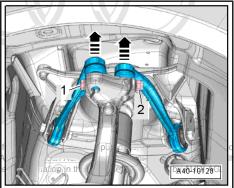


Avoid damage to brake pistons.

- Do not operate brake pedal with brake caliper removed.
- Remove nut -2- and pull out bolt -1-.
- Pull upper suspension links upwards out of wheel bearing housing -arrows-.
- Perform the same work steps on the other side of the vehicle.





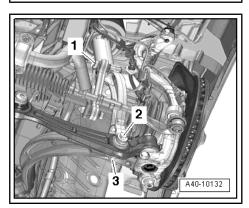


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- Remove bolt -1- for anti-roll bar on both sides.
- Remove nut -3- on both sides.

Note

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



- Remove bolt -3- on both sides.



Disregard -items 1, 2-.

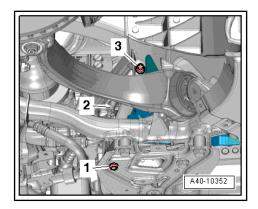
If engine is to be separated from gearbox:

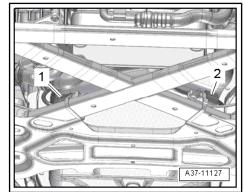
- Version 2 electrical connectors only: Unplug electrical connectors and move electrical wiring clear.
- 1 Gearbox mounting valve 1 N262-
- 2 Gearbox mounting valve 2 N263-
- Remove subframe cross brace ⇒ Running gear, axles, steering; Rep. gr. 40; Subframe; Removing and installing subframe cross brace.



Risk of damage to running gear components.

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





Note

Place a cloth underneath to catch escaping coolant.

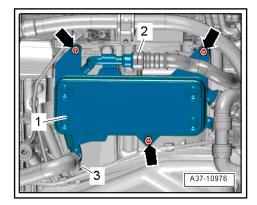
- Release hose clip -3- and detach coolant hose.
- Move clear electrical wiring harness at ATF cooler.
- Remove bolts -arrows- and tie up ATF cooler -1- to side with pipe/hose assembly -2- attached.

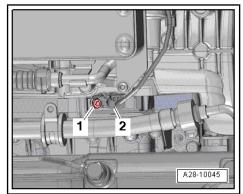
Vehicles up to model year 2013:

- Unplug electrical connector -2- for engine speed sender -G28-.
- Move clear electrical wiring harness at gearbox.



Disregard -item 1-.





All vehicles (continued):

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

- Fit turning over tool T40272- onto wrench (21 mm) T40263- .
- Position turning over tool on bolts of vibration damper.
- Semi-circular recess -arrow A- on turning over tool T40272must point to semi-circular recess -arrow B- on vibration damper.

Note

Disregard notch on turning over tool - T40272-.

 Counterhold crankshaft using turning over tool - T40272- and wrench (21 mm) - T40263- when loosening bolts for torque converter.



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

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



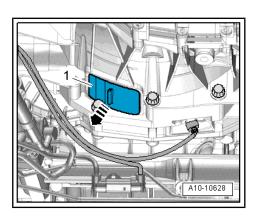
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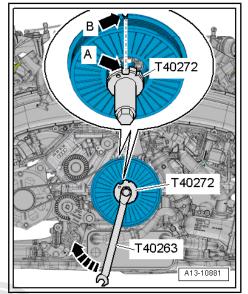
If engine is NOT to be separated from gearbox:

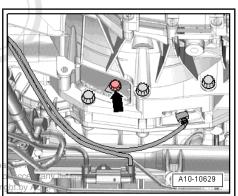
- Remove bolts -1 and 6-.

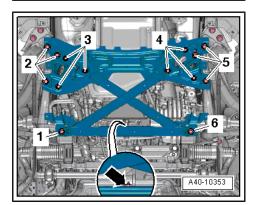
Removing engine (continued):

 Detach intermediate steering shaft from steering rack and move clear by telescoping splines together ⇒ Running gear, axles, steering; Rep. gr. 48; Steering column; Removing and installing intermediate steering shaft.









- Remove nuts -1- and bolts -2- and detach front silencer (leftside).
- Remove nuts -4- and bolts -3- and detach front silencer (rightside).

- Release catches -arrows A- and push sleeve -1- at manual release cable in direction of -arrow B-.
- Disengage rear manual release cable from front manual release cable -arrow C-.

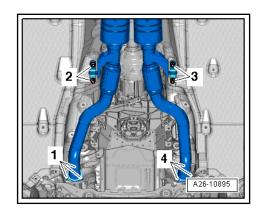


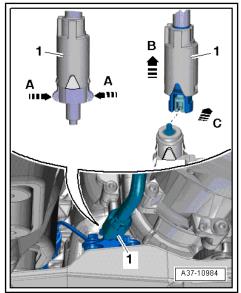
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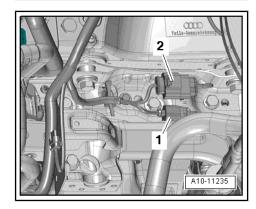
- Detach electrical connector -2- from bracket and unplug.



Disregard -item 1-.



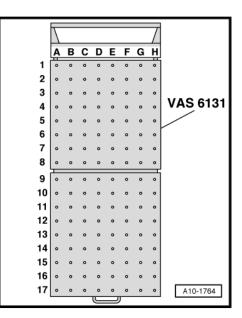




Set up the scissor-type assembly platform as follows:

 Set up scissor-type assembly platform - VAS 6131 A- with support set for Audi - VAS 6131/10- , support set -VAS 6131/11- and supplementary set -VAS 6131/13- as follows:

Platform coordinates	Parts of support set for Audi - VAS 6131/10- , sup- port set -VAS 6131/11- and supplementary set - VAS 6131/13-				
B4	/13-4	/10-4	/10-5	/13-1	
G4	/13-4	/10-4	/10-5	/13-1	
B6	/10-1	/10-2	/10-5	/10-11	
G6	/10-1	/10-2	/10-5	/10-11	
A8+C8	/13-6			/13-2	
F8+H8	/13-5			/13-2	
B14	/10-1	/10-4	/10-5	/10-7	
G14	/10-1	/10-4	/10-5	/11-1	



- Initially hand-tighten the support elements on the scissor-type assembly platform.
- Position scissor-type assembly platform VAS 6131 A- horizontally.
- Take note of spirit level (bubble gauge).
- Position scissor-type assembly platform VAS 6131 A- below engine/gearbox assembly.



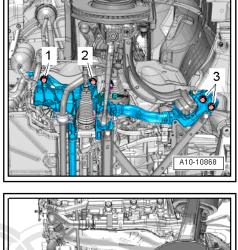
WARNING

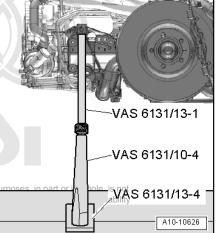
Accident risk if subframe mountings are detached.

- Subframe bolts -2- and -3- must not be loosened at this stage.
- Remove subframe bolt -1- on both sides.
- Position support elements from -VAS 6131/10- and -VAS 6131/13- at front left and right of subframe as shown.
- Make sure that threaded spindles are screwed in completely.

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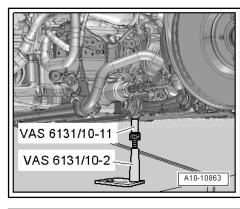


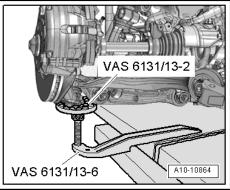
 Position support elements from -VAS 6131/10- (rear left and right) at front attachment points of subframe cross brace as shown.

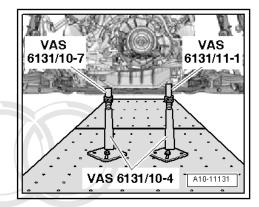
 Position support elements from -VAS 6131/13- under left and right wheel bearing housings as shown.

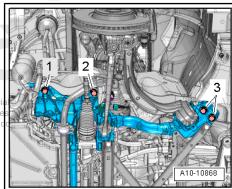
- Position support elements from -VAS 6131/10- and -VAS 6131/11- (rear left and right) at tunnel cross member as shown.
- Turn all spindles for support elements upwards until all locating lugs make contact with mounting points.
- Tighten base plates for support elements to 20 Nm on scissortype assembly platform - VAS 6131 A-.
- Mark installation position of subframe and tunnel cross member on longitudinal members with felt-tip pen.
- Unscrew subframe bolts -2, 3- on both sides in several stages.

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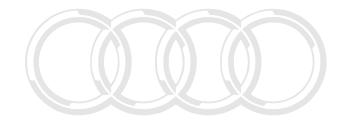








- Remove bolts -arrows- for tunnel cross member.



- Remove bolt -2- on both sides.

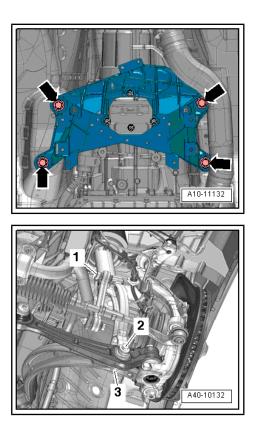
Itected Gaution t. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG. Danger of damage to hoses, pipes and wiring connections and to engine compartment.

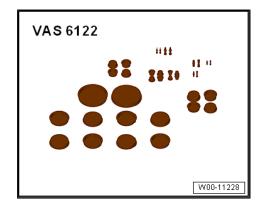
- Check that all hoses and wiring connections between engine, gearbox, subframe and body have been detached.
- Carefully guide out engine/gearbox assembly with subframe from engine compartment when lowering.
- Lower engine/gearbox assembly using scissor-type assembly platform - VAS 6131 A- .
- Pull out scissor-type assembly platform VAS 6131 A- with engine/gearbox assembly from underneath vehicle.

1.2 Separating engine and gearbox

Special tools and workshop equipment required

• Engine bung set - VAS 6122-



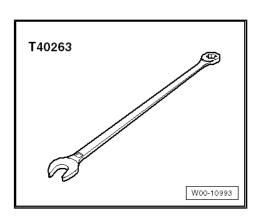


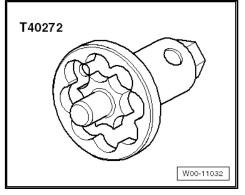
 Support set for Audi - VAS 6131/10- , supplementary set -VAS 6131/12- and support -VAS 6131/13-7• Wrench, 21 mm - T40263-



◆ Turning-over tool - T40272-

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♦ Bolt M10x65

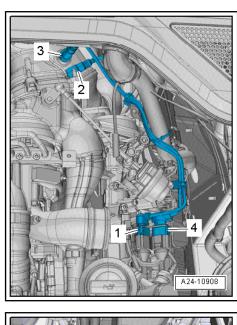
Procedure

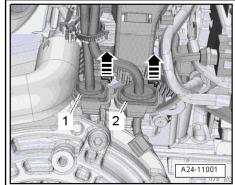
- Engine/gearbox assembly removed and secured to scissortype assembly platform - VAS 6131 A-
- Detach electrical connectors from bracket, unplug connectors and move electrical wiring clear:
- 1 For Lambda probe after catalytic converter G130-
- 4 For Lambda probe 2 G108-

Note

Disregard -items 2, 3-.

- Detach electrical connectors from bracket one after the other; release catches -arrows- to unplug connectors and move electrical wiring clear:
- 2 For Lambda probe 2 G131- (after catalytic converter)
- 1 For Lambda probe G39-







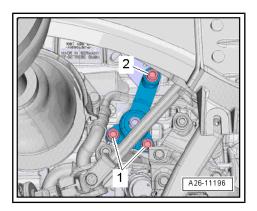
The catalytic converter for cylinder bank 1 (right-side) is located on the left side of the vehicle.

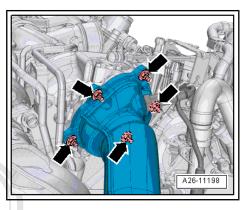
- Remove bolts -1- on mounting for catalytic converter.

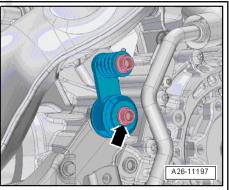


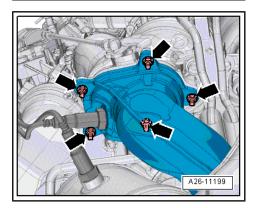
Disregard -item 2-.

 Unscrew nuts -arrows- on cylinder bank 1 (right-side) and detach catalytic converter on left side of vehicle.









i Note

The catalytic converter for cylinder bank 2 (left-side) is located on the right side of the vehicle.

- Remove bolt -arrow- on mounting for catalytic converter.

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 Unscrew nuts -arrows- on cylinder bank 2 (left-side) and detach catalytic converter on right side of vehicle. - Remove bolts -arrows- and detach heat shield -1-.

- Remove bolt -1- on bracket for hydraulic line.
- Remove bolts -arrows- and detach gearbox mounting (leftside) with gearbox support.

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Place a cloth underneath to catch escaping ATF.

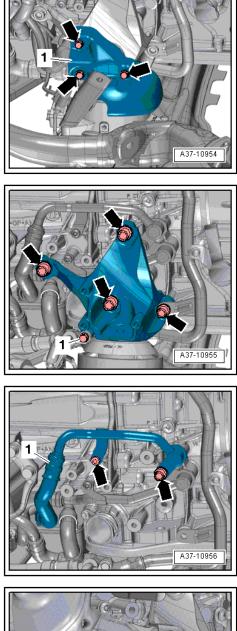
- Remove bolts -arrows- and detach ATF line -1- from gearbox.
- Seal off open lines and connections with clean plugs from engine bung set - VAS 6122-.

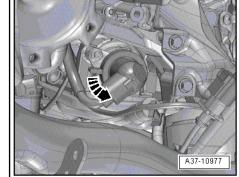


Caution

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

- Before unplugging or plugging in electrical connector, mechanic must "discharge static" by briefly touching vehicle earth, heater or lifting platform.
- Do NOT touch connector contacts in gearbox connector with your hands.
- Turn retainer catch anti-clockwise -arrow- and unplug electrical connector at gearbox.
- Move clear electrical wiring harness at gearbox.





Vehicles up to model year 2013:

- Release hose clip -2- and detach coolant hose.



Disregard -item 1-.

Vehicles from model year 2014 onwards:

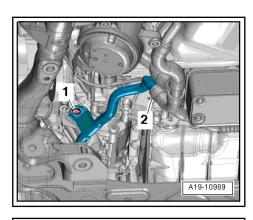
- Release hose clip -arrow- and detach coolant hose.

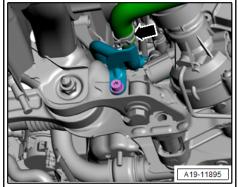
All vehicles (continued):

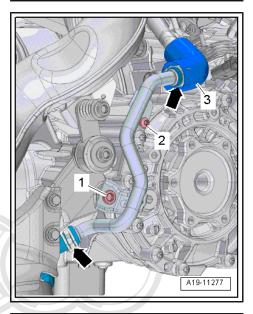
- Fold heat insulation sleeve -3- slightly upwards.
- Remove bolts -1, 2-, release hose clip -top arrow- and detach coolant hoses from coolant pipe (right-side) at gearbox.



Disregard -bottom arrow-.

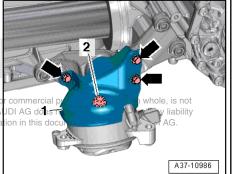






- Remove bolts -arrows- and detach heat shield -1-.
- Remove bolt -2- and detach gearbox mounting from gearbox support.
- Unbolt drive shaft (left and right) from gearbox flange shafts
 ⇒ Running gear, axles, steering; Rep. gr. 40; Drive shaft; Removing and installing drive shaft.

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

- Fit turning over tool T40272- onto wrench (21 mm) T40263-.
- Position turning over tool on bolts of vibration damper.
- Semi-circular recess -arrow A- on turning over tool T40272must point to semi-circular recess -arrow B- on vibration damper.

Note

Disregard notch on turning over tool - T40272-.

 Counterhold crankshaft using turning over tool - T40272- and wrench (21 mm) - T40263- when loosening bolts for torque converter.

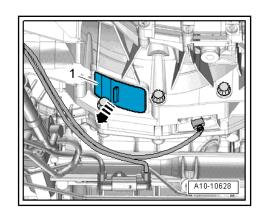


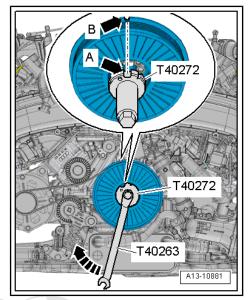
When performing the next step, turn the crankshaft only in the normal direction of rotation -arrow-.

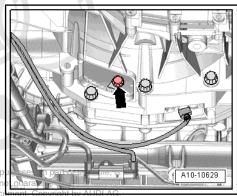
 Remove 6 bolts -arrow- for torque converter, turning crankshaft 60° in normal direction of rotation each time.



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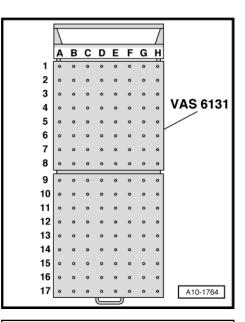
 Set up scissor-type assembly platform - VAS 6131 A- with support set for Audi - VAS 6131/10- , supplementary set -VAS 6131/12- and support -VAS 6131/13-7- as follows:

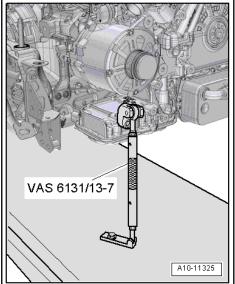


The other support elements remain unchanged.

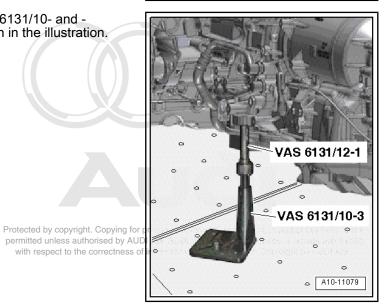
Platform coordinates	Parts from support set for Audi - VAS 6131/10- , support set -VAS 6131/12- and support - VAS 6131/13-7-				
E2	/13-7				
B10	/10-1	/10-3	/10-5	/12-1	
H10	/10-1	/10-3	/10-5	/12-1	

- Secure support -VAS 6131/13-7- at tapped hole at front of engine (right-side) with bolt M10x65, as illustrated.
- Secure support -VAS 6131/13-7- to scissor-type assembly platform and tighten to 20 Nm.





 Position the support elements from -VAS 6131/10- and -VAS 6131/12- at left of gearbox, as shown in the illustration.



- Position the support elements from -VAS 6131/10- and -VAS 6131/12- at gearbox support (right-side), as shown in illustration.
- Turn spindles (left and right) upwards until all locating lugs make contact with mounting points.
- Tighten base plates for support elements to 20 Nm on scissortype assembly platform - VAS 6131 A- .

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- Remove bolts -1, 2- for starter.
- Separate starter from gearbox and leave in position.
- Unscrew remaining bolts -3 ... 11- securing engine to gearbox.

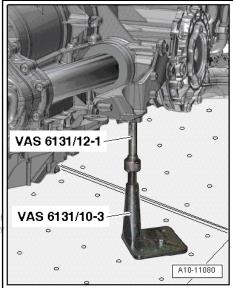


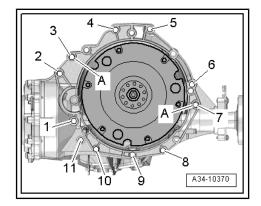
Disregard -item A-.

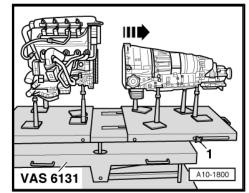
 Loosen clamping bolts -1- on sides of scissor-type assembly platform - VAS 6131 A- and pull rear section of platform together with gearbox towards rear -arrow-.

1.3 Removing engine from scissor-type assembly platform

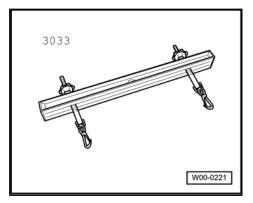
Special tools and workshop equipment required







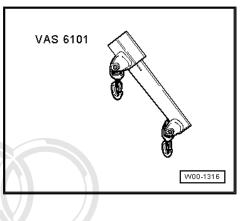
Lifting tackle - 3033-



• Workshop hoist - VAS 6100-



Lift arm extension (workshop hoist) - VAS 6101-



Procedure

- Engine/gearbox assembly removed; engine separated from gearbox ⇒ page 28.
- Engine secured with support -VAS 6131/13-7-
- Remove coolant pipe (top rear) <u>⇒ page 277</u>.

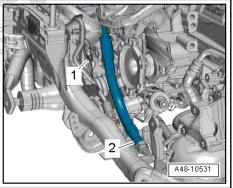
Vehicles up to model year 2013:

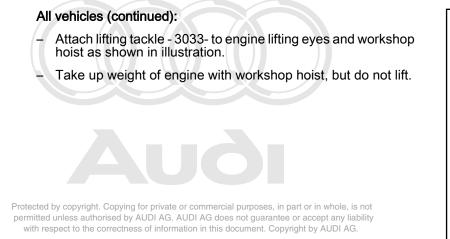
If fitted, unplug electrical connectors 1-epyright. Copying for private or commercial permitted unless authorised by AUDI AG. AUDI AG does with respect to the correctness of information in this doe

Note

Lay a cloth underneath vehicle to catch escaping hydraulic fluid.

- Disconnect hydraulic line -2- for power steering.

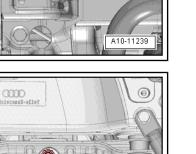




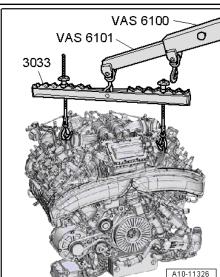
- Unplug electrical connectors (left and right) -1, 2-.

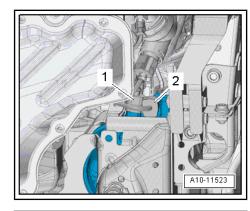
- Remove bolt -arrow- for engine mounting (left-side).

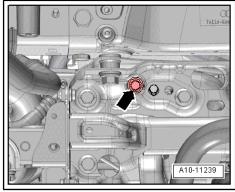
- Remove bolt -arrow- for engine mounting (right-side).



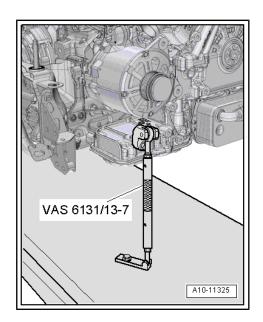
A10-11524







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



1.4 Securing engine to engine and gearbox support

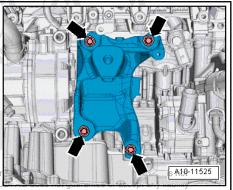
Special tools and workshop equipment required

 Engine and gearbox support - VAS 6095- with bracket -VAS 6095/1-13-



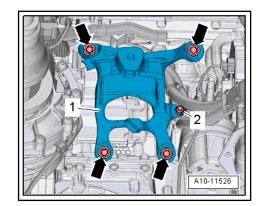
Procedure

- Remove coolant pipe (top left) <u>⇒ page 264</u>.
- Unscrew bolts -arrows- and remove engine support (left-side).

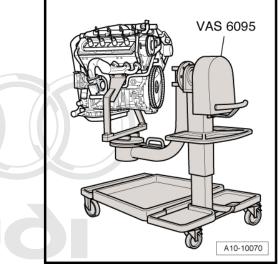


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- Remove nut -2- and move earth wire clear.
- Remove bolts -arrows- and detach engine support -1- (rightside).
- Tie up starter on engine.



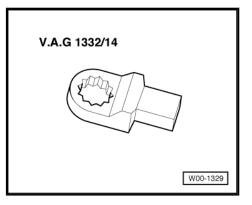
 Secure engine with bracket -VAS 6095/1-13- to engine and gearbox support - VAS 6095- as shown in illustration. Tightening torque: 55 Nm.



1.5 Installing engine engine endine endine

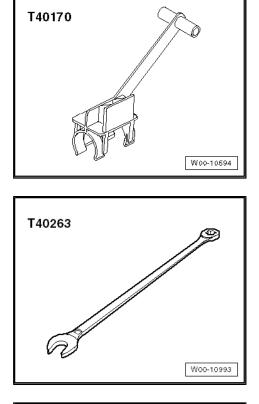
Special tools and workshop equipment required

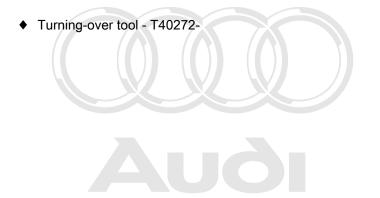
Ring spanner insert AF 16 - V.A.G 1332/14-



Transport lock - T40170-

• Wrench, 21 mm - T40263-



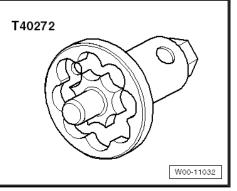


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Note

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

Component		Nm
Bolts/nuts	M6	9
	M7	15
	M8	20
	M10	40



Component		Nm
	M12	65

- ◆ ⇒ "2.1 Exploded view assembly mountings", page 47.
- Engine to gearbox ⇒ Rep. gr. 37 ; Removing and installing gearbox; Tightening torques for gearbox

Procedure



- Renew the bolts tightened with specified tightening angle.
- Renew self-locking nuts and bolts as well as seals, gaskets and O-rings.
- Hose connections and air pipes and hoses must be free of oil and grease before assembly.
- ♦ Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue. Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not
- Fit all cable ties in the original positions where installing. UDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.
- Before installing gearbox, remove residue from threaded holes for engine/gearbox bolts in cylinder block using a thread tap.

Vehicles up to model year 2013:

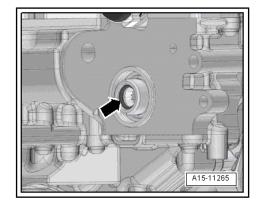
 Before installing an exchange engine, check whether flat-section O-ring -arrow- is fitted in drive shaft of power steering pump.

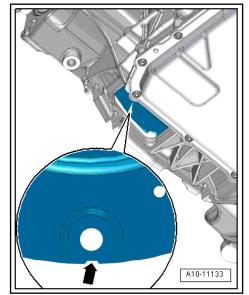
All vehicles (continued):

- If removed: Install coolant pipe (top left) <u>⇒ page 264</u>.
- Install engine support and engine mounting <u>⇒ page 47</u>.
- The following preparations are required before joining engine and gearbox.
- Turn torque converter until hole is visible next to notch -arrow- in recess in bottom of gearbox housing, as shown in illustration.



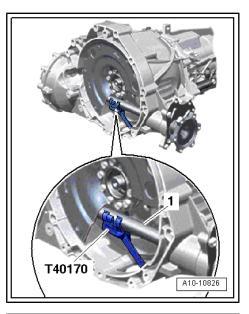
There is only one notch on the circumference; turn the torque converter accordingly.

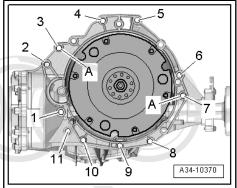




- Insert transport lock T40170- into gearbox housing from below and clamp onto flange shaft -1-.
- Hold ATF lines in installation position when joining engine and subframe.

- Check whether dowel sleeves -A- for centring engine and gearbox are fitted in cylinder block; install missing dowel sleeves.
- Check whether aluminium bolts securing engine to gearbox can be reused; if so, apply marking ⇒ Rep. gr. 37; Removing and installing gearbox; Tightening torques for gearbox.
- Bring gearbox into position on engine (pay attention to starter).
- Tighten bolts -1 ... 11-.
- Remove transport lock T40170- .







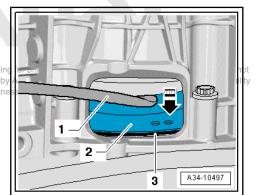
The following step is necessary to ensure that the torque converter is straight and that it makes even contact with the drive uthorised b plate.

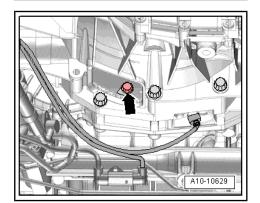
- Use assembly lever -1- to press torque converter -2- slightly against drive plate -3- in direction of -arrow-.
- Bolt torque converter onto drive plate as follows:

l Note

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

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





- Fit turning over tool T40272- onto wrench (21 mm) T40263-.
- Position turning over tool on bolts of vibration damper.
- Semi-circular recess -arrow A- on turning over tool T40272must point to semi-circular recess -arrow B- on vibration damper.



Disregard notch on turning over tool - T40272-.

- Turn crankshaft 180° further in normal direction of engine rotation -arrow- with wrench (21 mm) - T40263- and turning over tool - T40272- .
- Tighten bolt accessible in this crankshaft position to specified torque ⇒ Rep. gr. 32 ; Torque converter; Exploded view torque converter .
- Turn crankshaft by 60° each time and tighten remaining 5 bolts to specified torque ⇒ Rep. gr. 32; Torque converter; Exploded view - torque converter.
- Secure drive shafts to gearbox flange shafts ⇒ Running gear, axles, steering; Rep. gr. 40; Drive shaft; Exploded view drive shaft.
- Install ATF cooler ⇒ Rep. gr. 37 ; ATF circuit; Removing and installing ATF cooler .
- Install coolant pipe (right-side) on gearbox ⇒ page 283.
- Install catalytic converters ⇒ page 399.
- Install ATF lines ⇒ Rep. gr. 37 ; ATF circuit; Removing and installing ATF lines .

Vehicles up to model year 2013:

 Install power steering hydraulic line ⇒ Running gear, axles, steering; Rep. gr. 48; Hydraulic power steering; Exploded view - hydraulic lines, reservoir.

All vehicles (continued):

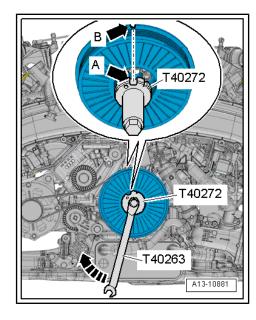
- Install gearbox mounting with gearbox support ⇒ page 68.
 Broaded by convirable Conving for private or commercial purposes, in part or in whole, is not
- Raise engine/gearbox assembly using scissor-type assembly liability platform - VAS 6131 A-.
- Align subframe and tunnel cross member on longitudinal members according to markings made before removal.
- Tighten bolts for tunnel cross-piece ⇒ Rep. gr. 37 ; Assembly mountings; Exploded view assembly mountings .
- Tighten subframe bolts only to specified torque (do not turn further); the bolts should only be fully tightened after performing the wheel alignment check ⇒ Running gear, axles, steering; Rep. gr. 40; Subframe; Exploded view - subframe.

WARNING

Risk of accident because of loose bolt connections.

 Do NOT drive the vehicle unless the subframe bolts have been finally tightened.

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



- Install manual release cable ⇒ Rep. gr. 37 ; Selector mechanism; Exploded view selector mechanism .
- Install propshaft ⇒ Final drive; Rep. gr. 39 ; Propshaft; Removing and installing propshaft .
- Install front silencer <u>⇒ page 403</u>.
- Secure intermediate steering shaft to steering rack ⇒ Running gear, axles, steering; Rep. gr. 48; Steering column; Removing and installing intermediate steering shaft.
- Install upper suspension links and suspension strut ⇒ Running gear, axles, steering; Rep. gr. 40; Suspension strut, upper links; Exploded view suspension strut, upper links.
- Install subframe cross brace and anti-roll bar ⇒ Running gear, axles, steering; Rep. gr. 40; Subframe; Exploded view - subframe.
- Install struts at gearbox mountings ⇒ page 47.
- Install brake calipers ⇒ Brake system; Rep. gr. 46; Front brakes; Removing and installing brake caliper.
- Install exhaust pipe for auxiliary heater ⇒ Auxiliary heater, supplementary heater; Rep. gr. 82; Auxiliary/supplementary heater; Removing and installing silencer with bracket.
- Install refrigerant lines ⇒ Heating, air conditioning; Rep. gr.
 87 ; Refrigerant circuit; Exploded view condenser .
- Install engine oil cooler (right-side) ⇒ page 210.
- Install longitudinal members (bottom) ⇒ General body repairs, exterior; Rep. gr. 50; Lock carrier; Exploded view - lock carrier.
- Install air cleaner housing ⇒ page 353.
- Install air pipes <u>⇒ page 352</u>.
- Install air ducts with screw-type clips ⇒ page 318.
- Install electrical wiring, fuse holder and cover for electronics box in engine compartment ⇒ Electrical system; Rep. gr. 97; Relay carriers, fuse carriers, electronics boxes; Overview of fitting locations - relay carriers, fuse carriers, electronics boxes, and ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Install lock carrier cover ⇒ General body repairs, exterior; Rep.²gic.^c(63); Bumbér'(front); Removing and installing attache, is not ments with respect to the correctness of information in this document. Copyright by AUDI AG.
- Install bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing bumper cover.
- Observe steps required after re-connecting battery ⇒ Electrical system; Rep. gr. 27; Battery; Disconnecting and connecting battery.
- Install body brace ⇒ Running gear, axles, steering; Rep. gr. 40; Suspension strut, upper links; Exploded view suspension strut, upper links.
- Install upper longitudinal member ⇒ General body repairs, exterior; Rep. gr. 50; Lock carrier; Exploded view - lock carrier
- Install plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50; Bulkhead; Removing and installing plenum chamber cover.

Caution

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

Never use battery charging equipment for boost starting.

- Fill with engine oil and check oil level \Rightarrow Maintenance ; Booklet 410 .

Vehicles up to model year 2013:

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





Note

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The power steering pump must not be run when dry.

All vehicles (continued):

Connect coolant hoses with plug-in connector <u>⇒ page 286</u>.



Do not reuse coolant.

- Fill up with coolant <u>⇒ page 236</u>.
- Charge refrigerant system ⇒ Air conditioner with refrigerant R134a .
- Align subframe ⇒ Running gear, axles, steering; Rep. gr. 40; Subframe; Removing and installing subframe with steering rack.
- Install wheel housing liners ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Exploded view - wheel housing liner (front).
- Check wheel alignment ⇒ Running gear, axles, steering; Rep. gr. 44; Wheel alignment check; Wheel alignment procedure.

WARNING

Risk of accident because of loose bolt connections.

- Tighten subframe bolts to final setting after performing wheel alignment check.
- Top up ATF ⇒ Rep. gr. 37 ; ATF; Checking ATF level .
- Install underbody trim ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Exploded view - underbody trim .
- Install noise insulation panels ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view noise insulation.
- Finally, perform basic setting of engine mountings ⇒ Vehicle diagnostic tester, <u>BA</u> <u>Engine mounting J931</u>, <u>Guided</u>
 Functions, <u>BA</u> <u>Perform basic setting</u>.

 After renewing engine, misfire adaptions must be reset. To do so, select "01 - Reset adaptions misfires" in <u>Guided Func-</u> <u>tions</u> mode of ⇒ Vehicle diagnostic tester.



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2 Assembly mountings

⇒ "2.1 Exploded view - assembly mountings", page 47

⇒ "2.2 Supporting engine in installation position", page 50

- ⇒ "2.3 Removing and installing engine mountings", page 52
- ⇒ "2.4 Removing and installing gearbox mounting", page 65

2.1 Exploded view - assembly mountings

Engine mounting

1 - Bolt

🛛 6 Nm

2 - Power unit mounting sender and power unit mounting actuator

- Right side: power unit mounting sender 1 -G748- and power unit mounting actuator 1 -N513-
- Left side: power unit mounting sender 2 -G749- and power unit mounting actuator 2 -N514-
- ❑ After installing, perform basic setting of engine mountings ⇒ Vehicle diagnostic tester

3 - Engine mounting

- □ Removing and installing \Rightarrow page 52
- ❑ After installing, perform basic setting of engine mountings ⇒ Vehicle diagnostic tester

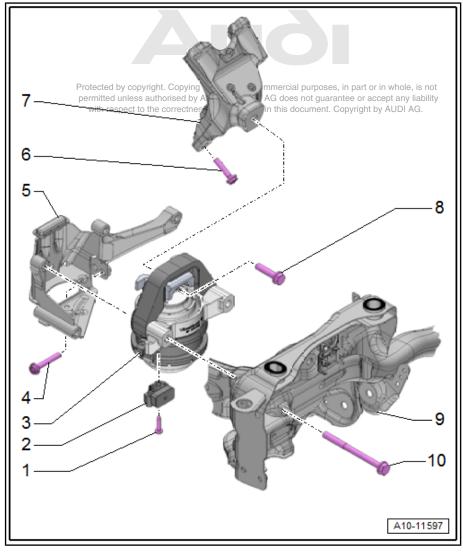
4 - Bolt

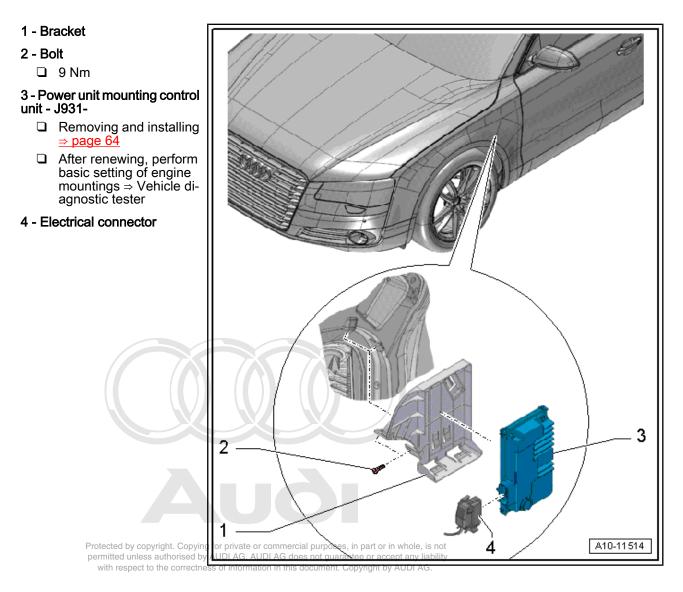
🗅 20 Nm

5 - Console for engine mounting

- 6 Bolt
 - 🗅 40 Nm
- 7 Engine support
- 8 Bolt
 - Renew
 - □ 90 Nm + turn 90° further
- 9 Subframe
- 10 Bolt
 - 🗅 55 Nm

Power unit mounting control unit - J931-





Gearbox mounting

1 - Gearbox mounting (rightside)

- With gearbox mounting valve 1 - N262-
- Removing and installing ⇒ page 67

2 - Bolt

Tightening torque ⇒ Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings

3 - Support

4 - Bolt

□ Tightening torque ⇒ Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings

5 - Gearbox support (rightside)

6 - Bolt

Tightening torque \Rightarrow Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings

7 - Bolt

□ Tightening torque ⇒ Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings

8 - Heat shield

9 - Bolt

□ Tightening torque ⇒ Rep. gr. 37; Assembly mountings; Exploded view - assembly mountings

10 - Not fitted

11 - Not fitted

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12 - Tunnel cross-member with respect to the correctness of information in this document. Copyright by AUDI AG.

 \Box Removing and installing \Rightarrow Rep. gr. 37; Assembly mountings; Exploded view - assembly mountings

13 - Gearbox support (rear)

□ Removing and installing \Rightarrow page 68

14 - Nut

- Only remove if detaching gearbox mounting from gearbox support
- □ Tightening torque ⇒ Rep. gr. 37; Assembly mountings; Exploded view assembly mountings

15 - Bolt

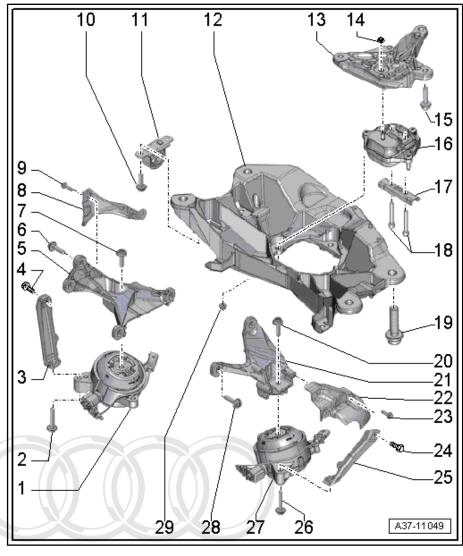
□ Tightening torque ⇒ Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings

16 - Gearbox mounting (rear)

□ Removing and installing \Rightarrow page 68

17 - Stop (bottom)

For gearbox mounting (rear)



18 - Bolts

- Only remove if detaching gearbox mounting from gearbox support
- □ Tightening torque ⇒ Rep. gr. 37 ; Assembly mountings; Exploded view assembly mountings

19 - Bolt

- □ Tightening torque \Rightarrow Rep. gr. 37; Assembly mountings; Exploded view assembly mountings 20 - Bolt
 - □ Tightening torque ⇒ Rep. gr. 37 ; Assembly mountings; Exploded view assembly mountings

21 - Gearbox support (left-side)

22 - Heat shield

23 - Bolt

□ Tightening torque ⇒ Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings

24 - Bolt

□ Tightening torque ⇒ Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings

25 - Support

26 - Bolt

□ Tightening torque ⇒ Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings

27 - Gearbox mounting (left-side)

- With gearbox mounting valve 2 N263-
- □ Removing and installing \Rightarrow page 65

28 - Bolt

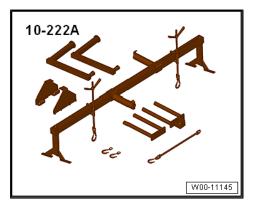
□ Tightening torque \Rightarrow Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings **29 - Nut**

□ Tightening torque ⇒ Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings

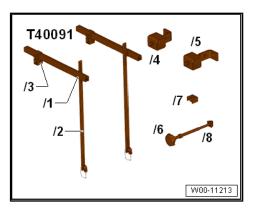
2.2 ProSupporting engine alm installation, posit in whole, is not permittee unless authorised by ODD AG. AUDI AG does not guarantee or accept any liability tion pect to the correctness of information in this document. Copyright by AUDI AG.

Special tools and workshop equipment required

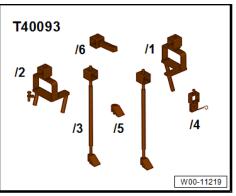
Support bracket - 10 - 222 A-



• Engine support bracket (basic set) - T40091-



 Engine support bracket (supplementary set) - T40093- with -T40093/7- and -T40093/8-



Procedure

WARNING

Risk of accident when weight of engine is shifted.

 In order to support the engine as described below, the gearbox and tunnel cross members must be installed.

- Remove engine cover panel \Rightarrow page 69.

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ted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.
- Remove longitudinal member (top) on both sides ⇒ General body repairs, exterior; Rep. gr. 50; Lock carrier; Exploded view lock carrier.

- Set up support bracket 10 222 A- on suspension turrets (left and right) as illustrated.
- Engage spindles on engine lifting eyes and partly take up weight of engine.

Assembling

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

- Install upper longitudinal member ⇒ General body repairs, exterior; Rep. gr. 50; Lock carrier; Exploded view - lock carrier
- Install engine cover panel <u>⇒ page 69</u>.

WARNING

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

2.3 Removing and installing engine mountings

 \Rightarrow "2.3.1 Removing and installing engine mounting (left-side)", page 52

 \Rightarrow "2.3.2 Removing and installing engine mounting (right-side)", page 61

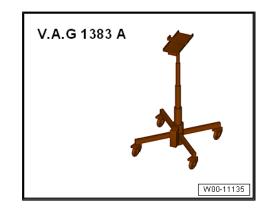
⇒ "2.3.3 Removing and installing power unit mounting sender and power unit mounting actuator G748 / G749 / N513 / N514 ", page 63

⇒ "2.3.4 Removing and installing power unit mounting control unit J931 ", page 64 Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not

2.3.1 Removing and installing engine mount full ag

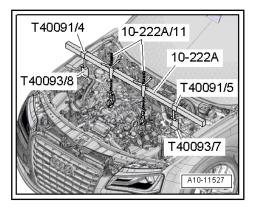
Special tools and workshop equipment required

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



Removing

Set front wheels to straight-ahead position.



Caution

Electronic components are susceptible to damage.

- Observe notes on procedure for disconnecting the battery.
- Disconnect earth wire from battery terminal ⇒ Electrical system; Rep. gr. 27; Battery; Disconnecting and connecting battery.

Vehicles with engine codes CEUA/CTGA:

- Remove lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments .
- Remove closure plate for bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing attachments.

Vehicles with engine codes CGTA/CTFA:

Remove bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing bumper cover.

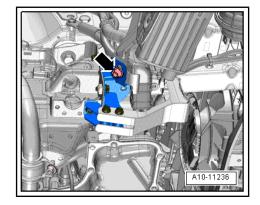
All vehicles (continued):

- Support engine in installation position ⇒ page 50.
- Remove noise insulation panels ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.
- Remove underbody trim (front left and right) ⇒ General body repairs, exterior; Rep. gr. 66; Underbody trim; Removing and installing underbody trim.
- Completely remove wheel housing liners (front left and front right) ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Removing and installing wheel housing liner (front).
- Unbolt drive shaft (left and right) from gearbox flange shafts
 ⇒ Running gear, axles, steering; Rep. gr. 40; Drive shaft; Removing and installing drive shaft.

Vehicles with auxiliary heater:

Remove bolt -arrow- at bracket.

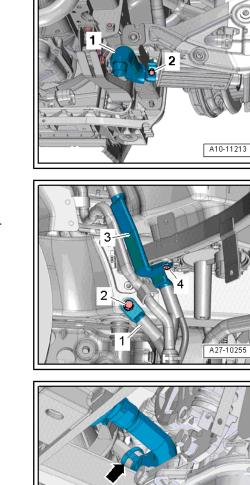


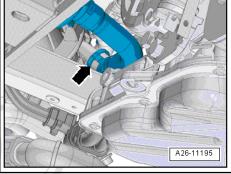


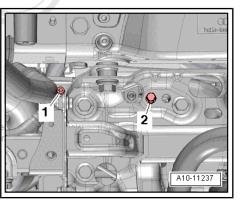
Release clamp -2- and detach exhaust pipe -1- for auxiliary heater.

All vehicles (continued):

- Remove front longitudinal member (bottom) on both sides \Rightarrow General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Exploded view - lock carrier .
- Remove bolt -4- for battery positive wire -3- and bolt -2- for earth wire -1- and move electrical wiring clear.
- Press release tabs and disconnect secondary air hose -arrow-.







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Vehicles up to model year 2013: Remove bolts -1 and 2-.

_

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

- If fitted, unplug electrical connector -2-.
- Remove bolt -1-.



Vehicles from model year 2014 onwards:

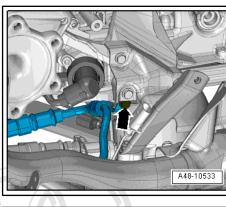
- Unscrew bolt -1- and move earth wire clear at longitudinal member.
- Remove nut -3- and unplug electrical connector -2-.

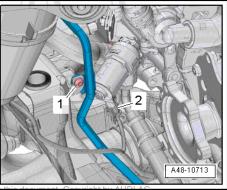
Vehicles with engine codes CGTA/CTFA:

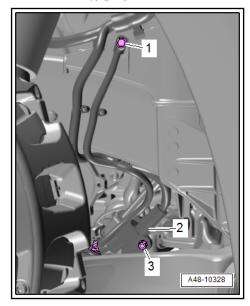
- Remove air cleaner housing (left-side) \Rightarrow page 353.

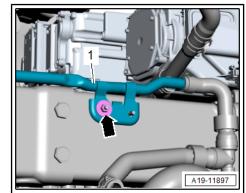
Vehicles from model year 2014 onwards:

Remove nut -arrow- and push coolant pipe -1- slightly towards front.









- Remove bolts -1, 2, 3- for coolant pipe (bottom left).



Disregard -arrows-.

All vehicles (continued):

 Unplug electrical connector -arrow- at front vehicle level sender -G78- / -G289- and move electrical wiring clear.

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



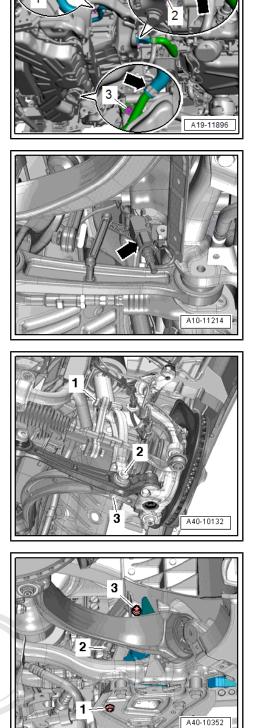
Disregard -items 2, 3-.

- Remove bolts -3- on both sides.



Disregard -items 1, 2-.





- Remove bolts -1, 2- and, if fitted, nut -arrow-.



Caution

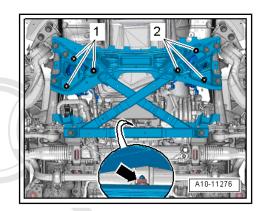
Risk of damage to running gear components.

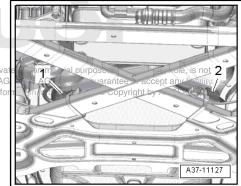
- The vehicle must NOT be lowered onto its wheels if the engine/gearbox mountings, steering rack or subframe cross brace are not properly installed.
- Move clear electrical connectors -1 and 2- for gearbox mounting valves -N262- / -N263-.
- Detach intermediate steering shaft from steering rack and move clear by telescoping upwards ⇒ Running gear, axles, steering; Rep. gr. 48; Steering column; Removing and instal for priva ling intermediate steering shaft.
- Detach electrical connector -2- from bracket and unplug:

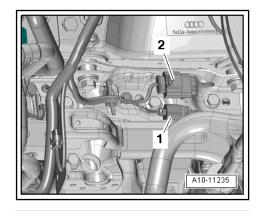


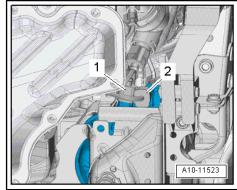
Disregard -item 1-.

- Unplug electrical connectors (left and right) -1, 2-.

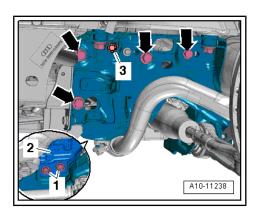




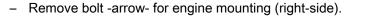




- Remove bolts -1, 3- and -arrows-.
- Push retaining plate -2- for engine mounting (left-side) to one side.



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- V.A.G 1383 A A10-10818





 Support subframe using engine and gearbox jack - V.A.G 1383 A- as illustrated.

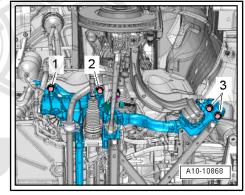
- Mark installation position of subframe on longitudinal members with felt-tip pen.
- Unscrew subframe bolts -1, 2, 3- on both sides in several stages and in diagonal sequence.



Risk of damage to running gear components.

Caution

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



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- Lower subframe using engine and gearbox lack of the total of the software of t A- only far enough to detach engine mounting (left-side). At the same time check clearance of hydraulic fluid hoses (leftside) and electrical wiring (right-side).
- Detach engine mounting (left-side).

Installing

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

Note

- Renew the bolts tightened with specified tightening angle.
- Fit new O-ring.
- Fit all cable ties in the original positions when installing.
- Align subframe on longitudinal members according to markings made before removal.
- Tighten subframe bolts only to specified torque (do not turn further); the bolts should only be fully tightened after performing the wheel alignment check ⇒ Running gear, axles, steering; Rep. gr. 40; Subframe; Exploded view - subframe.

WARNING

Risk of accident because of loose bolt connections.

- Do NOT drive the vehicle unless the subframe bolts have been finally tightened.
- Install anti-roll bar \Rightarrow Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .
- Install strut on gearbox mounting.
- Secure intermediate steering shaft to steering rack ⇒ Running gear, axles, steering; Rep. gr. 48; Steering column; Removing and installing intermediate steering shaft .

Vehicles up to model year 2013:

Install power steering hydraulic line \Rightarrow Running gear, axles, steering; Rep. gr. 48; Hydraulic power steering; Exploded view - hydraulic lines, reservoir .

All vehicles (continued):

Install exhaust pipe for auxiliary heater \Rightarrow Auxiliary heater, supplementary heater; Rep. gr. 82; Auxiliary/supplementary heater; Removing and installing silencer with bracket .

- Secure drive shafts to gearbox flange shafts ⇒ Running gear, axles, steering; Rep. gr. 40; Drive shaft; Exploded view drive shaft.
- Install air cleaner housing ⇒ page 353.
- Install electrical wiring and terminal 30 wiring junction 2 -TV22- ⇒ Electrical system; Rep. gr. 97; Relay carriers, fuse carriers, electronics boxes; Overview of fitting locations - relay carriers, fuse carriers, electronics boxes, and ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Observe steps required after re-connecting battery ⇒ Electrical system; Rep. gr. 27; Battery; Disconnecting and connecting battery.
- Check wheel alignment ⇒ Running gear, axles, steering; Rep. gr. 44; Wheel alignment check; Wheel alignment procedure.



WARNING

Risk of accident because of loose bolt connections.

- Tighten subframe bolts to final setting after performing wheel alignment check.
- Finally, perform basic setting of engine mountings ⇒ Vehicle diagnostic tester, BA Engine mounting J931, Guided Functions, BA Perform basic setting.



Tightening torques

WARNING

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

- ♦ ⇒ "2.1 Exploded view assembly mountings", page 47
- Underbody guard, upper/lower longitudinal member ⇒ General body repairs, exterior; Rep. gr. 50; Lock carrier; Exploded view lock carrier
- ♦ ⇒ General body repairs, exterior; Rep. gr. 66; Underbody trim; Exploded view underbody trim

2.3.2 Removing and installing engine mounting (right-side)

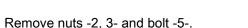
Removing



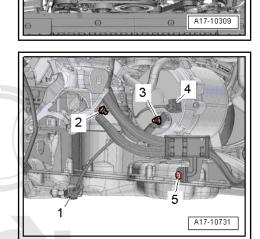
Caution

Electronic components are susceptible to damage.

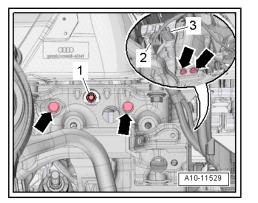
- Observe notes on procedure for disconnecting the battery.
- Switch off ignition.
- Disconnect earth wire from battery terminal ⇒ Electrical system; Rep. gr. 27; Battery; Disconnecting and connecting battery.
- Support engine in installation position \Rightarrow page 50.
- Remove front section of front wheel housing liners (both sides)
 ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Removing and installing wheel housing liner (front).
- Remove oil filter element ⇒ Maintenance ; Booklet 410.
- Remove nuts -arrows- and lower anti-roll bar.



 Unplug electrical connectors -1, 4- and push wiring harness clear to one side.



- Unplug electrical connectors -2 and 3- and move electrical wiring clear.
- Remove bolt -1- on both sides.
- Remove bolts -arrows- and move retaining plate for engine mounting (right-side) clear to the side.



- Using spindles -10 222 A /11- -item 1-, raise engine through distance -a-.
- Distance -a- = approx. 20 mm.
- Detach engine mounting (right-side).

Installing

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



- Renew the bolts tightened with specified tightening angle.
- Fit all cable ties in the original positions when installing.
- Install oil filter element \Rightarrow Maintenance ; Booklet 410.
- Install electrical wiring ⇒ Electrical system; Rep. gr. 97; Relay carriers, fuse carriers, electronics boxes; Overview of fitting locations relay carriers, fuse carriers, electronics boxes and ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Observe steps required after re-connecting battery ⇒ Electrical system; Rep. gr. 27; Battery; Disconnecting and connecting battery.
- Finally, perform basic setting of engine mountings ⇒ Vehicle diagnostic tester, <u>BA</u> - <u>Engine mounting J931</u>, <u>Guided</u> Functions, <u>BA</u> - <u>Perform basic setting</u>.



Tightening torques

WARNING

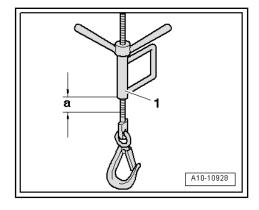
Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

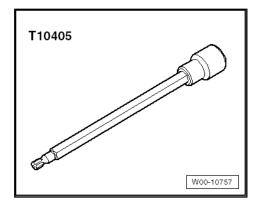
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- ♦ ⇒ "2.1 Exploded view assembly mountings", page 47
- Anti-roll bar ⇒ Running gear, axles, steering; Rep. gr. 40; Subframe; Exploded view - subframe
- ♦ ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Exploded view wheel housing liner (front)
- ◆ Upper longitudinal member ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Exploded view - lock carrier
- 2.3.3 Removing and installing power unit mounting sender and power unit mounting actuator -G748- / -G749- / -N513- / -N514-

Special tools and workshop equipment required



Socket Torx T30 - T10405-



Removing

Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.

Power unit mounting sender -G749- /power unit mounting actuator -N514- (left-side):

- Remove noise insulation (rear) ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.
- Remove wheel spoiler (front left) ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Exploded view wheel housing liner (front).

Continuation for both sides:

- Unplug electrical connector -1-.



T30 socket - T10405- is needed for left side of vehicle.

Remove bolt -2- and detach power unit mounting sender bowers authout er unit mounting actuator.

Installing

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

Finally, perform basic setting of engine mountings ⇒ Vehicle diagnostic tester, <u>BA</u> - <u>Engine mounting J931</u>, <u>Guided</u>
 Functions, <u>BA</u> - <u>Perform basic setting</u>.

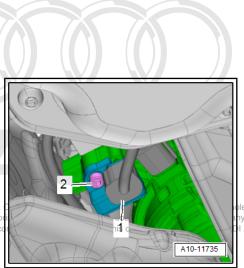
Tightening torques

- ◆ ⇒ "2.1 Exploded view assembly mountings", page 47
- ♦ ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Exploded view - wheel housing liner (front)

2.3.4 Removing and installing power unit mounting control unit - J931-

Removing

 Remove rear section of front wheel housing liner (left-side) ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Removing and installing wheel housing liner (front).



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- Unplug electrical connector -1-.
- Release fasteners -arrows- and detach power unit mounting control unit - J931- -item 2-.

Installing

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

Finally, perform basic setting of engine mountings ⇒ Vehicle diagnostic tester, BA - Engine mounting J931, Guided Functions, BA - Perform basic setting.

Tightening torques

 ♦ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Exploded view - wheel housing liner (front)

2.4 Removing and installing gearbox mounting

 \Rightarrow "2.4.1 Removing and installing gearbox mounting (left-side)", page 65

 \Rightarrow "2.4.2 Removing and installing gearbox mounting (right-side)", page 67

 \Rightarrow "2.4.3 Removing and installing gearbox support with gearbox mounting (rear)", page 68

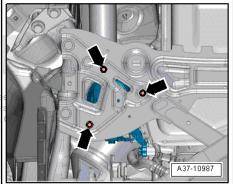
 \Rightarrow "2.4.4 Removing and installing gearbox mounting (rear)", page <u>68</u>

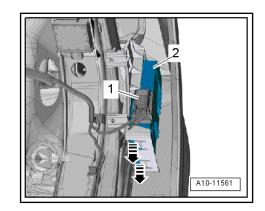
2.4.1 Removing and installing gearbox mounting (left-side)

Removing

- Remove rear section of front wheel housing liner (left-side) ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Removing and installing wheel housing liner (front).
- Remove noise insulation (rear) ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.
- Remove bolts -arrows-.







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Gearbox mounting valve 2 - N263-, version 1:

Unplug electrical connector -2- for gearbox mounting valve 2
 N263- .



Disregard -item 1-.

Gearbox mounting valve 2 - N263-, version 2:

Remove electrical connector -2- for gearbox mounting valve 2
 N263- from bracket and unplug connector.

All versions (continued):

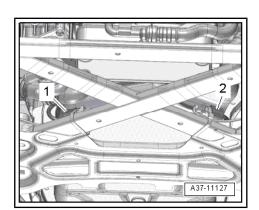
- Unscrew bolt -3- and remove strut.

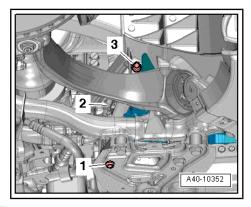


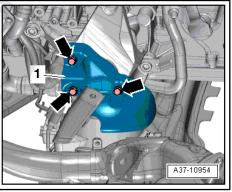
Disregard -item 1-.

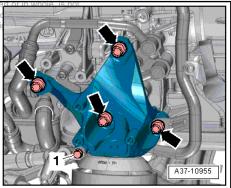
- Remove bolts -arrows- and detach heat shield -1-.

- Remove bolt -1- on bracket for hydraulic fin private or commercial purposes, in parts
 Bracket for hydraulic fin private or commercial purposes, in parts
- Remove bolts -arrows- and detach gearbox mounting (leftside) with gearbox support.









 Remove bolt -arrow- and detach gearbox mounting (left-side) from gearbox support.

Installing

Install in reverse order.

Tightening torques

- ◆ ⇒ "2.1 Exploded view assembly mountings", page 47
- ♦ ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Exploded view - wheel housing liner (front)
- ♦ ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view noise insulation

2.4.2 Removing and installing gearbox mounting (right-side)

Removing

- Remove rear section of front wheel housing liner (right-side)
 ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Removing and installing wheel housing liner (front).
- Remove subframe cross brace ⇒ Running gear, axles, steering; Rep. gr. 40; Subframe; Removing and installing subframe cross brace.



Risk of damage to running gear components.

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

Gearbox mounting valve 1 - N262-, version 2:

Unplug electrical connector -1- for gearbox mounting valve 1 - N262-.



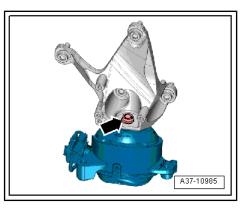
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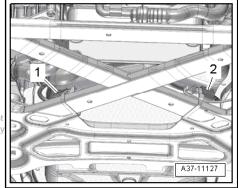
Gearbox mounting valve 1 - N262-, version 1:

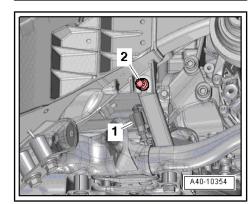
Remove electrical connector -1- for gearbox mounting valve 1
 N262- from bracket and unplug connector.

All versions (continued):

- Unscrew bolt -2- and remove strut.







- Remove bolts -arrows- and detach heat shield -1-.
- Remove bolt -2- and detach gearbox mounting from gearbox support.

Installing

Install in reverse order.

Tightening torques

- \Rightarrow "2.1 Exploded view assembly mountings", page 47
- Subframe cross brace \Rightarrow Running gear, axles, steering; Rep. gr. 40; Subframe; Exploded view - subframe
- ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Exploded view - wheel housing liner (front)

2.4.3Removing and installing gearbox support with gearbox mounting (rear)

Removing

- Remove tunnel cross-piece \Rightarrow Rep. gr. 37; Assembly mountings; Exploded view - assembly mountings .
- Remove bolts -arrows- and detach gearbox support and gearbox mounting from gearbox.

Installing

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

Tightening torques

- \Rightarrow "2.1 Exploded view assembly mountings", page 47
- Tunnel cross-piece ⇒ Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings

Removing and installing gearbox 2.4.4mounting (rear)

Removing

- Remove gearbox support with gearbox mounting (rear) \Rightarrow page 68.
- Unscrew bolts -1- and detach stop (bottom) -2- for gearbox mounting.
- Remove nut -4- and detach gearbox mounting -5- from gearbox support.

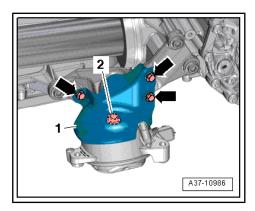
Installing

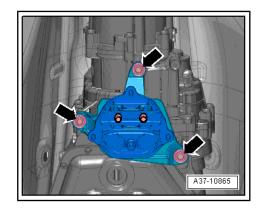
- Position gearbox support -3- on gearbox mounting -5-.
- Hand-tighten nut -4-.
- Secure stop (bottom) -2- with bolts -1-.
- Tighten nut -4-.
- Install gearbox support with gearbox mounting (rear) ⇒ page 68.

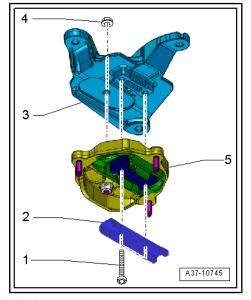
Tightening torques

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⇒ "2.1 Exploded view ≈ assembly mountings" opage 47 intee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.







3 Engine cover panel

⇒ "3.1 Removing and installing engine cover panel", page 69

3.1 Removing and installing engine cover panel

Removing

 Carefully pull engine cover panel off ball studs one after the other -arrows-. Do not jerk engine cover panel away, and do not try to pull on one side only. permitted unless authorised by AUDI AG. AUDI AG

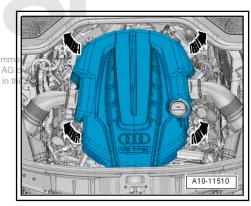
WARNING

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

Installing

- To avoid damage, do not strike the engine cover panel with your fist or with any kind of tool.
- Observe oil filler neck when positioning engine cover panel.
- First press engine cover panel with both hands onto the ball studs at the rear and then onto the ball studs at the front.



13 – Crankshaft group

1 Cylinder block (pulley end)

- \Rightarrow "1.1 Exploded view poly V-belt drive", page 70
- ⇒ "1.2 Removing and installing poly V-belt", page 71
- \Rightarrow "1.3 Removing and installing tensioner for poly V-belt", page 72
- ⇒ "1.4 Removing and installing vibration damper", page 73
- ⇒ "1.5 Renewing crankshaft oil seal (pulley end)", page 74

1.1 Exploded view - poly V-belt drive

1 - Bolt

🗅 55 Nm

2 - Bolt

22 Nm

3 - Tensioner

- □ For poly V-belt
- □ Removing and installing \Rightarrow page 72

4 - Poly V-belt

- Check for wear
- Before removing, mark direction of rotation with chalk or felt-tip pen
- □ Removing and installing \Rightarrow page 71
- Do not kink
- When installing, make sure it is properly seated on pulleys

5 - Cap

□ For idler roller

6 - Bolt

□ Tightening torque ⇒ Electrical system; Rep. gr. 27 ; Alternator; Exploded view - alternator

7 - Alternator

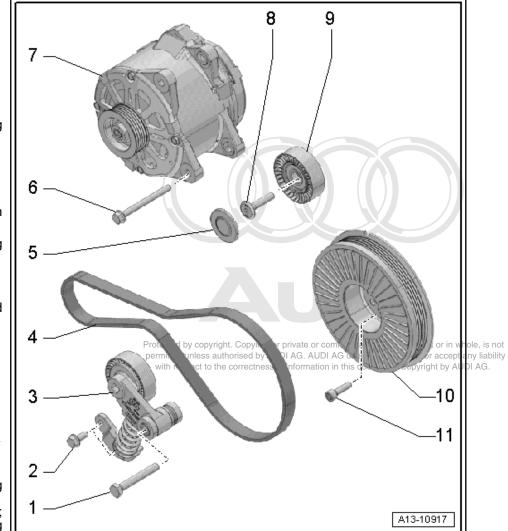
❑ Removing and installing ⇒ Electrical system; Rep. gr. 27 ; Alternator; Removing and installing alternator

8 - Bolt

22 Nm

9 - Idler roller

- G For poly V-belt
- With bolt -item 8-



10 - Vibration damper

- □ With poly V-belt pulley
- □ Removing and installing \Rightarrow page 73

11 - Bolt

- Renew
- □ Tightening torque and sequence \Rightarrow page 71

Vibration damper - tightening torque and sequence

Note

Renew the bolts tightened with specified tightening angle.

- Tighten bolts in stages as follows:

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

1.2 Removing and installing poly V-belt

Removing

Remove engine cover panel <u>⇒ page 69</u>.



WARNING

Danger of fire and damage if the engine cover panel is not fitted.

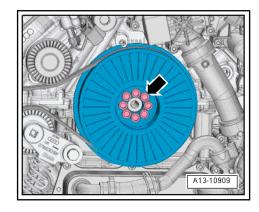
- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible cover private or commercial purposes, in part or in whole, is not to start or drive the vehicle with the bonnet closed less autorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.
- Disconnect vacuum hose -1-.
- Unscrew bolts -3- and remove vacuum reservoir -2-.

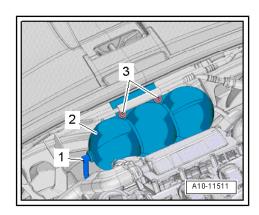


WARNING

Risk of injury as the radiator fans may start up automatically.

Even when the ignition is switched off, the radiator fans can start up without warning due to accumulated heat in the engine compartment, etc.







Caution

If a used belt runs in the opposite direction when it is refitted, this can cause breakage.

- Before removing, mark direction of rotation of poly V-belt with chalk or felt-tip pen for re-installation.
- To slacken poly V-belt, turn tensioner in direction of -arrowonly as far as necessary.
- Remove poly V-belt and release tensioner.



Ignore -T10060 A- .

Installing

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

- Fit poly V-belt -2- onto pulleys in the following sequence:
- 1 Alternator
- 3 Idler roller
- 4 Vibration damper
- 5 Tensioner

i) Note

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

- Start engine and check that belt runs properly.
- Install engine cover panel <u>⇒ page 69</u>.

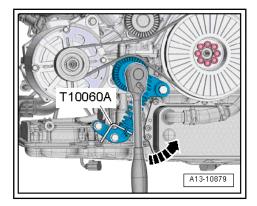
WARNING

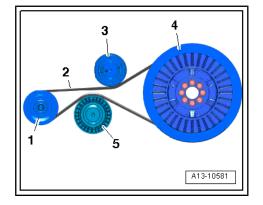
Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

1.3 Removing and installing tensioner for poly V-belt

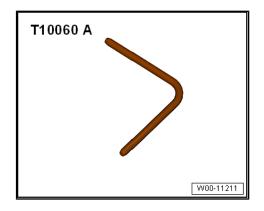
Special tools and workshop equipment required







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Removing

Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.



If a used belt runs in the opposite direction when it is refitted, this can cause breakage.

- Before removing, mark direction of rotation of poly V-belt Provide chark on felt-ting pen for re-installation.
- To slacken poly V-belt turn tensioner in direction of -arrow-.
- Detach poly V-belt from alternator and lock tensioner with locking pin - T10060 A- .
- Remove bolts -1 and 2-.
- Detach poly V-belt tensioner from sump (top section)

Installing

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

- Install poly V-belt \Rightarrow page 71.

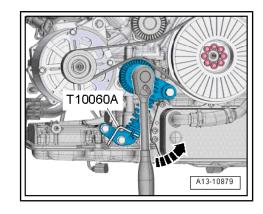
Tightening torques

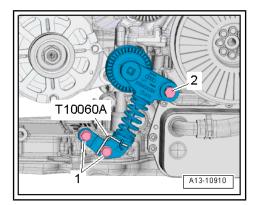
- \Rightarrow "1.1 Exploded view poly V-belt drive", page 70
- ♦ ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view noise insulation

1.4 Removing and installing vibration damper

Removing

Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.





- Slacken off bolts -arrow- on vibration damper several turns (counterhold with ring spanner on nut for poly V-belt pulley for alternator).
- Remove poly V-belt <u>⇒ page 71</u>.
- Unscrew bolts -arrow- and remove vibration damper.

Installing

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



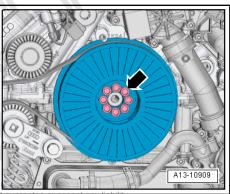
- Protected by copyright. Copying for private or commercial pu
- Renew the bolts tightened with specified tightened by AUDI AG. AUDI AG does not guarantee or accept any lia Renew the bolts tightened with specified tighteners and any lia specified tighteners any lia specified tighteners and any lia specified tighteners any lia specified tighteners and any lia specified tighteners any lia specified tighteners and any lia specified tighteners and any lia specified tighteners any lia specifie
- Apply locking fluid to bolts when installing; for locking fluid refer to ⇒ Electronic parts catalogue.
- The threaded holes for the bolts must be cleaned using a thread tap or similar.
- Observe dowel sleeve when installing vibration damper.
- Install poly V-belt ⇒ page 71.

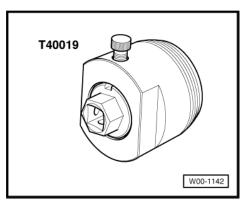
Tightening torques

- Fig. ""Vibration damper tightening torque and sequence"", page 71
- ♦ ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view noise insulation
- 1.5 Renewing crankshaft oil seal (pulley end)

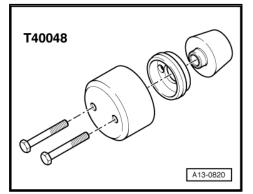
Special tools and workshop equipment required

• Oil seal extractor - T40019-





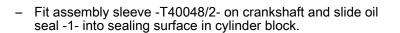
Assembly appliance - T40048- with -T40048/8-



Bolts M8x55 mm (2x)

Procedure

- Remove vibration damper ⇒ page 73.
- Adjust inner part of oil seal extractor -T40019- so that it is level with the outer part and lock in position with knurled screw.
- Lubricate threaded head of oil seal extractor, place it in position and screw it into oil seal as far as possible (applying firm pressure).
- Loosen knurled screw and turn inner part against crankshaft until the oil seal is pulled out.
- Clamp flats of oil seal extractor in vice and use pliers to remove oil seal.
- Clean contact surface and sealing surface.
- Fit assembly aid -T40048/1- onto assembly sleeve -T40048/2and slide oil seal -1- onto assembly sleeve.
- Detach assembly aid.



) Note

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

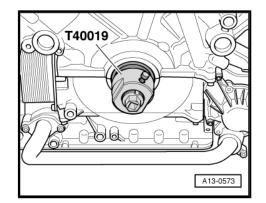
Apply press sleeve -T40048/8- to crankshaft using two M8×55 mm bolts -arrows-.

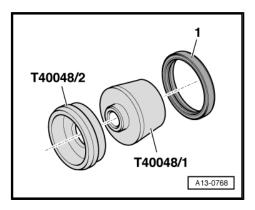
- Initially hand-tighten bolts.
- Tighten bolts alternately, ¹/₂ turn at a time, to press in oil seal onto stop.

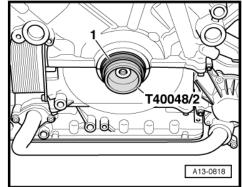
Remaining installation steps are carried out in reverse sequence; note the following:

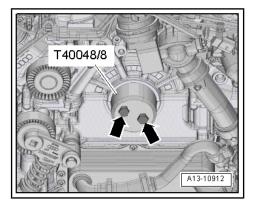
Install vibration damper ⇒ page 73.

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2 Cylinder block (gearbox end)

⇒ "2.1 Exploded view - cylinder block (gearbox end)", page 76

- ⇒ "2.2 Removing and installing drive plate", page 76
- \Rightarrow "2.3 Renewing crankshaft oil seal (gearbox end)", page 77
- 2.1 Exploded view cylinder block (gearbox end)

i Note

When performing assembly work, secure engine to engine and gearbox support - VAS 6095- <u>> page 38</u>.

1 - Bolt Renew □ 60 Nm + turn 90° further 2 - Drive plate With bearing flange Check running surface on bearing flange and holes for torque converter for cracks and scoring Removing and installing Δ <u>⇒ page 76</u> 3 - Sender wheel 3 □ For engine speed sender - G28-Removing and installing 2 <u>⇒ page 87</u> $\Box \quad Checking \Rightarrow page 87$ 4 - Oil seal For crankshaft (gearbox) end) $\Box \quad \text{Renewing} \Rightarrow \underline{\text{page 77}}$ 5 - Crankshaft 6 6 - Dowel pin A13-10913

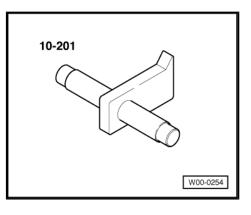
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Removing, and installing to rive dplate copyright by AUDI AG.

Special tools and workshop equipment required

2.2

• Counterhold tool - 10 - 201-



Removing

- Engine or gearbox removed.
- Insert counterhold tool 10 201- to slacken bolts.



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

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

Installing

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



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Renew the bolts tightened with specified tightening angle.

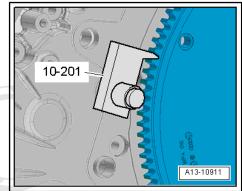
- Pay attention to dowel pin when installing drive plate.
- Fit counterhold tool 10 201- the other way round to tighten bolts.

Tightening torques

◆ ⇒ "2.1 Exploded view - cylinder block (gearbox end)", page 76

2.3 Renewing crankshaft oil seal (gearbox end)

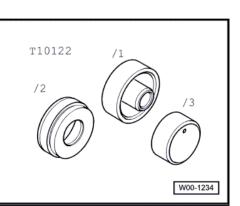
Special tools and workshop equipment required

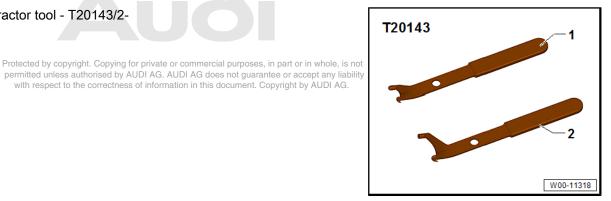


Fitting tool - T10122-



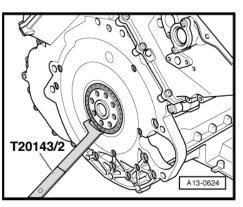
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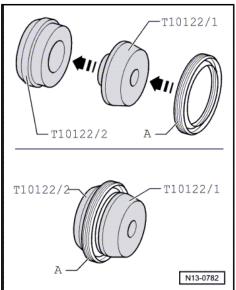




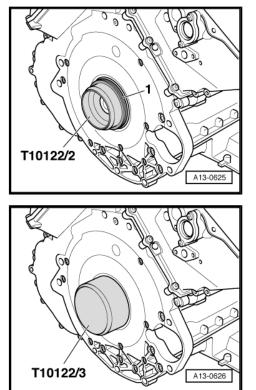
Procedure

- Engine or gearbox removed. ٠
- Remove drive plate \Rightarrow page 76. _
- Pry out oil seal using extractor tool -T20143/2- . _
- Clean contact surface and sealing surface. _
- Fit assembly aid -T10122/1- onto assembly sleeve -T10122/2- and slide oil seal -A- onto assembly sleeve.
- Detach assembly aid. _





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





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- Drive in oil seal uniformly until flush all round using thrust piece -T10122/3- .
- Install drive plate \Rightarrow page 76.

3 Crankshaft

- ⇒ "3.1 Exploded view crankshaft", page 80
- ⇒ "3.2 Crankshaft dimensions", page 83
- \Rightarrow "3.3 Allocation of main bearing shells", page 84
- ⇒ "3.4 Measuring axial clearance of crankshaft", page 86
- \Rightarrow "3.5 Measuring radial clearance of crankshaft", page 86
- ⇒ "3.6 Removing and installing sender wheel", page 87
- ⇒ "3.7 Checking sender wheel", page 87

3.1 Exploded view - crankshaft

i Note

When performing assembly work, secure engine to engine and gearbox support - VAS 6095- <u>> page 38</u>.

1 - Cylinder block

- □ Matched to -item 5-
- ❑ Applying sealant onto cylinder block (for retaining frame) ⇒ page 82

2 - Oil seal

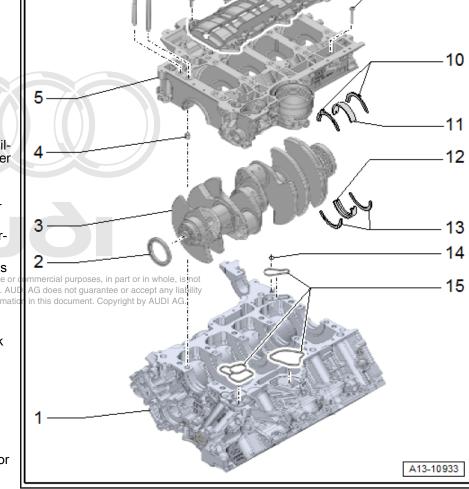
- For crankshaft (pulley end)
- $\Box \quad \text{Renewing} \Rightarrow \underline{\text{page 74}}$

3 - Crankshaft

- Different versions available; for allocation refer to ⇒ Electronic parts catalogue
- ❑ Measuring axial clearance <u>⇒ page 86</u>
- ❑ Measuring radial clearance ⇒ page 86
- Crankshaft dimensions Protected bpage 83 Copying for private or permitted unless authorised by AUDI AG. AU
- 4 Dower sleeve rrectness of information
 - \Box 2x
 - Insert in cylinder block
 - □ Installation position ⇒ page 83

5 - Retaining frame

- Matched to -item 1-
- ❑ To remove, detach guide rail
 ⇒ Item 1 (page 125) for drive chain for valve gear
- □ Before removing retaining frame, remove oil filter element ⇒ Maintenance ; Booklet 410



8

9

Bo not loosen transverse bolted connections in retaining frame.

□ Apply sealant when installing (on cylinder block) \Rightarrow page 82 ; refer to \Rightarrow Electronic parts catalogue

6 - Bolts

- □ For retaining frame
- Renew
- □ Use old bolts when measuring radial clearance
- □ Fit long bolts on inside and short bolts on outside
- □ Tightening torque and sequence \Rightarrow page 83

7 - Bolt

- Renew
- □ Tightening torque and sequence \Rightarrow page 82

8 - Baffle plate

9 - Bolt

- □ For sealing surfaces: retaining frame to cylinder block
- Different bolt lengths
- □ Tightening sequence <u>⇒ page 83</u>

10 - Thrust washers

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

11 - Bearing shell

- □ For retaining frame (without oil groove)
- Renew used bearing shells
- □ Fit new bearing shells for retaining frame with the correct colour coding: new crankshaft \Rightarrow page 84, used and machined crankshaft \Rightarrow page 85
- □ Do not interchange centrally positioned crankshaft bearing shells 1 ... 4 with off-centre crankshaft bearing shell 5; refer to ⇒ Electronic parts catalogue
- Off-centre crankshaft bearing shell 5 with offset position of locating lug

12 - Bearing shell

- □ For cylinder block (with oil groove)
- **Q** Renew used bearing shells
- □ Fit new bearing shells for cylinder block with the correct colour coding: new crankshaft \Rightarrow page 84, used and machined crankshaft \Rightarrow page 85
- □ Do not interchange centrally positioned crankshaft bearing shells 1 ... 4 with off-centre crankshaft bearing shell 5; refer to ⇒ Electronic parts catalogue
- □ Off-centre crankshaft bearing shell 5 with offset position of locating lug

13 - Thrust washers

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

14 - O-ring

Renew

15 - Gaskets

Renew

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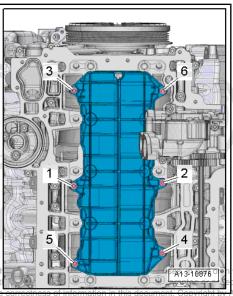
Baffle plate - tightening torque and tightening sequence



Renew the bolts tightened with specified tightening angle.

Tighten bolts in stages in the sequence shown:

Stage	Bolts	Tightening torque/angle specification
1.	-1 6-	5 Nm
2.	-1 6-	Turn 90° further



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Applying sealant onto cylinder block (for retaining frame)

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



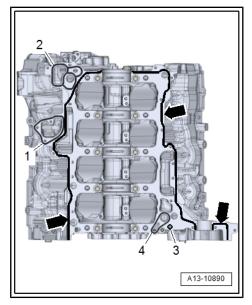
Make sure lubrication system is not clogged by excess sealant.

- The beads of sealant must not be thicker than specified.
- Apply beads of sealant -arrows- onto clean sealing surfaces as shown in illustration.
- Width of beads of sealant: 2.0 mm.
- Fit gaskets -1, 2, 4- and O-ring -3-.



Note

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



Fitting location of dowel sleeves

 Fit dowel sleeves -arrows-, if not fitted on the cylinder block at the points marked.

Retaining frame - tightening torque and sequence

- Guide rail <u>⇒ Item 1 (page 125)</u> for drive chain for valve gear detached.
- Oil filter element removed \Rightarrow Maintenance ; Booklet 410 .



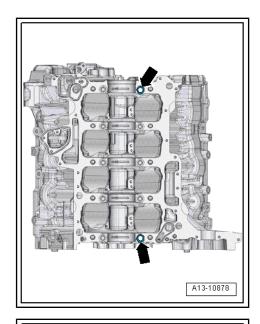
Renew the bolts tightened with specified tightening angle.

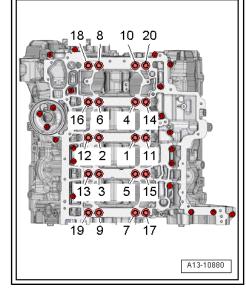
- Fit long bolts on inside and short bolts on outside.
- Tighten bolts in stages in the sequence shown:

Stage	Bolts	Tightening torque/angle specification
1.	-1 10-	30 Nm
2.	-11 20-	30 Nm
3.	-1 10-	50 Nm
4.	-1 10-	Turn 90° further
5.	-11 20-	50 Nm
6.	-11 20-	Turn 90° further
7.	No number in il- lustration	9 Nm in diagonal sequence

3.2 Crankshaft dimensions Protected by copyright. Copyright or private of commercial purposes, in part or in whole, is not

Honing dimen#h res	Crankshaft conrod journal Ø				
	Engine codes CEUA/CTGA mm	Engine codes CGTA/CTFA mm	mm		
Basic dimension	65.000 - 0.022 - 0.042	67.000 – 0.010 – 0.029	54.000 - 0.022 - 0.042		
Repair undersize	64.750 - 0.022 - 0.042	66.750 – 0.010 – 0.029	53.750 - 0.022 - 0.042		





3.3 Allocation of main bearing shells

\Rightarrow "3.3.1 Allocation of main bearing shells on new crankshafts", page 84

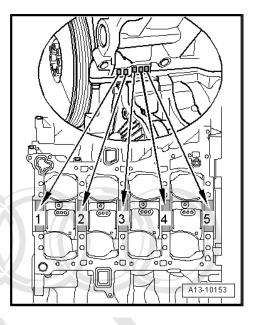
 \Rightarrow "3.3.2 Allocation of main bearing shells on used and machined crankshafts", page 85

3.3.1 Allocation of main bearing shells on new crankshafts

Allocation of crankshaft bearing shells for cylinder block

- Bearing shells of the correct thickness are matched to the bearings in the cylinder block at the factory. Coloured dots on the side of the bearing shells are used to identify the bearing shell thickness.
- The allocation of the bearing shells to the cylinder block is indicated by letters on the front left of the cylinder block (legible from outside), as shown in illustration.
- The row of letters begins with crankshaft bearing "5" (gearbox end) and ends with crankshaft bearing "1" (pulley end).

Letter on cylinder block	Colour coding of bearing		
R =	Red		
S =	Black		
G =	Yellow		
Ü =	Green		
В =	Blue		





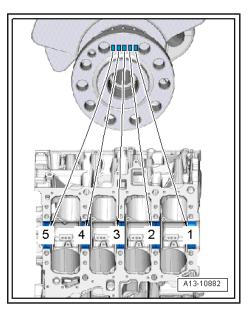
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The code letters are also stamped on the retaining frame.

Allocation of crankshaft bearing shells for retaining frame

- Bearing shells of the correct thickness are matched to the bearings in the retaining frame at the factory. Coloured dots on the side of the bearing shells are used to identify the bearing shell thickness.
- The allocation of the bearing shells to the retaining frame is indicated by letters on the front crankshaft flange, as shown in illustration.
- The row of letters begins with crankshaft bearing "5" (gearbox end) and ends with crankshaft bearing "1" (pulley end).

Letter on crankshaft flange	Colour coding of bearing		
R =	Red		
S =	Black		
G =	Yellow		
Ü =	Green		
B =	Blue		



3.3.2 Allocation of main bearing shells on used and machined crankshafts

Allocation of crankshaft bearing shells for cylinder block

- Bearing shells are allocated to the cylinder block according to the colour codes stamped on the cylinder block.
- On a used and machined crankshaft, the crankshaft bearing journals must be measured in order to allocate the correct bearing shells.
- ◆ Crankshaft dimensions <u>⇒ page 83</u>.
- Oversized (thicker) bearing shells are available for a machined crankshaft. However, these bearing shells have the same colour coding as the original-size bearing shells.

Letter on cylinder block	Colour coding of bearing		
R =	Red		
S =	Black		
G =	Yellow		
Ü =	Green		
В =	Blue		

Allocation of crankshaft bearing shells for retaining frame

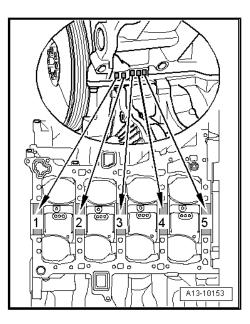
- On a used and machined crankshaft, the crankshaft bearing journals must be measured in order to allocate the correct bearing shells.
- Any markings still visible on a machined crankshaft are invalid.
- Allocate the bearing shells according to the measured diameter of the crankshaft bearing journals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

Crankshaft main bearing journal \varnothing	Colour code of bearing shells for retaining frame engine codes CEUA/CTGA				
Dimensions (in mm)	Red	Black	Yellow	Green	Blue
Basic dimension	64.978 64.97	64.974 64.97	64.970 64.96	64.966 64.96	64.962 64.95
65.000	5	1	7	3	8
Repair undersize	64.728 64.72	64.724 64.72	64.720 64.71	64.716 64.71	64.712 64.70
64.750 ¹⁾	5	1	7	3	8

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

$\begin{array}{c} \text{Crankshaft main} \\ \text{bearing journal} \ \varnothing \end{array}$	Colour code of bearing shells for retaining frame engine codes CGTA/CTFA				
Dimensions (in	Red	Black	Yellow	Green	Blue
mm)	Pro	ected by copyright. Copyir	g for private or commercia	I purposes, in part or in wh	ole, is not
Basic dimension 67.000	66.990 66.98 7	v66.986 to th 66.98	y AUDI AG. AUDI AG does e 66,1982 matio 66,197 d 9	5 not guarantee or accept a 66.9178.pyrig66.970	66.974 66.97 1
Repair undersize	66.740 66.73	66.736 66.73	66.732 66.72	66.728 66.72	66.724 66.72
66.750 ¹⁾	7	3	9	5	1

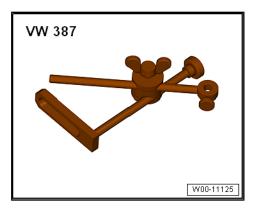
 ¹⁾ The colour codes for the oversized (thicker) bearing shells required for a machined crankshaft are the same as those on bearing shells for a new crankshaft, in spite of the greater bearing thickness.

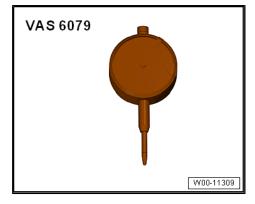


3.4 Measuring axial clearance of crankshaft

Special tools and workshop equipment required

• Universal dial gauge bracket - VW 387-





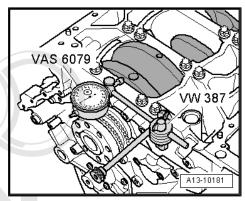
Procedure

٠

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

Dial gauge - VAS 6079-

- Press crankshaft against dial gauge by hand and set gauge to "0".
- Push crankshaft away from dial gauge and read off value.
- Axial clearance: 0.090 ... 0.251 mm



3.5 Measuring radial clearance of crankshaft

Special tools and workshop Protected by convriant. Copying for private or commercial purposes, in part or in whole, is not equiper units required by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Plastigage

Procedure



Use old bolts when measuring radial clearance.

- Remove retaining frame and clean bearing journals.
- Place a length of Plastigage corresponding to the width of the bearing on the bearing journal or in the bearing shell.

- The Plastigage must be positioned in the centre of the bearing shell.
- Fit retaining frame and secure with old bolts <u>⇒ page 83</u> without rotating crankshaft.
- Remove retaining frame again.
- Compare width of Plastigage with measurement scale.

Radial clearance:

- New: 0.017 ... 0.044 mm.
- Wear limit: 0.08 mm.
- When carrying out final assembly, renew bolts.

3.6 Removing and installing/sender/wheel ate or commercial purposes, in part or in whole, is not permitted unless authorised by AUDLAG. AUDLAG does not guarantee or accept any liability

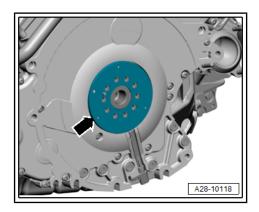
Removing

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- Gearbox removed ⇒ Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .
- Remove drive plate ⇒ page 76.
- Detach sender wheel -arrow-.

Installing

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

- Install drive plate ⇒ page 76.
- After renewing sender wheel, misfire adaptions must be reset. To do so, select "01 - Reset adaptions misfires" in <u>Guided</u> <u>Functions</u> mode of ⇒ Vehicle diagnostic tester.



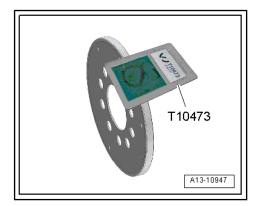
3.7 Checking sender wheel

Special tools and workshop equipment required

• Magnetic lens - T10473-

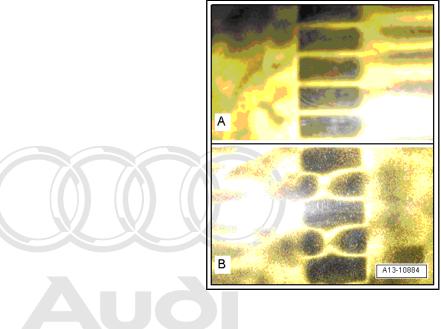
Procedure

- Sender wheel removed
- Check whole circumference of sender wheel using magnetic lens - T10473- as shown in illustration.



Inspection image of sender wheel

- A Sender wheel OK
- B Sender wheel defective



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4 Auxiliary drive

- ⇒ "4.1 Exploded view auxiliary drive", page 89
- ⇒ "4.2 Removing and installing spur gear drive", page 91

 \Rightarrow "4.3 Renewing oil seal for power steering pump drive", page 96

⇒ "4.4 Renewing oil seal for AC compressor drive", page 97

4.1 Exploded view - auxiliary drive

⇒ "4.1.1 Exploded view - auxiliary drive (vehicles up to model year 2013)", page 89

⇒ "4.1.2 Exploded view - auxiliary drive (vehicles from model year 2014 onwards)", page 91 Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not

Exploded view - auxiliary drive (venicles, up to model year 2013) to audit ag. 4.1.1

- 1 Spur gear drive
 - Do not dismantle
 - Removing and installing <u>⇒ page 91</u>

2 - Bolt

□ Tightening torque and sequence <u>⇒ page 90</u>

3 - Oil seal

- For power steering pump drive
- □ Renewing \Rightarrow page 96

4 - Flat-section O-ring

Installation position ⇒ page 90

5 - Drive shaft

- For power steering pump
- With bonded rubber buffers

6 - Oil seal

- □ For AC compressor drive
- **\Box** Renewing \Rightarrow page 96

7 - Clip

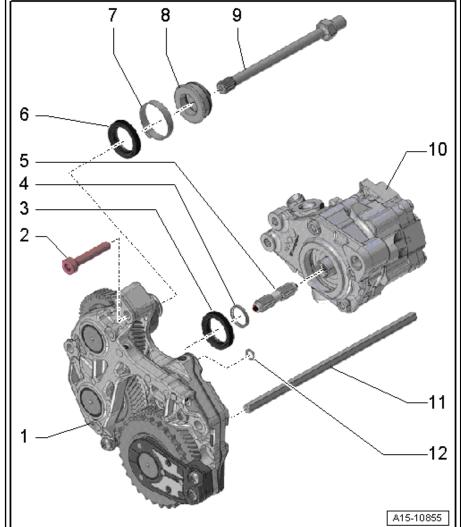
8 - Dust cap

- □ For AC compressor drive
- 9 Drive shaft
 - For air conditioner compressor
- 12 A15-10855 Tightening torque ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Exploded view
 - air conditioner compressor drive unit

10 - Power steering pump

11 - Drive shaft

□ For oil pump



12 - O-ring

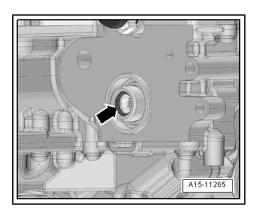
Renew

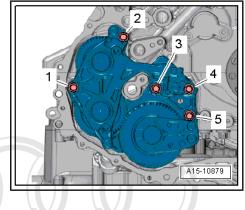
Installation position of flat-section O-ring

• In power steering pump drive -arrow-.

Spur gear drive - tightening torque and sequence

- Tighten bolts diagonally in the sequence -1 ... 5- to 22 Nm.







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4.1.2 Exploded view - auxiliary drive (vehicles from model year 2014 onwards)

1 - Spur gear drive

- Do not dismantle
- □ Removing and installing \Rightarrow page 91

2 - Bolt

□ Tightening torque and sequence ⇒ page 90

3 - Oil seal

- □ For power steering pump drive
- Also fitted on vehicles with electromechanical power steering
- \Box Renewing \Rightarrow page 96

4 - Oil seal

- For AC compressor drive
- $\Box \quad \text{Renewing} \Rightarrow \underline{\text{page 97}}$

5 - Clip

6 - Dust cap

For AC compressor drive

7 - Drive shaft

- For air conditioner compressor
- □ Tightening torque ⇒ Heating, air conditioning; Rep. gr. 87; Air conditioner compresso
- Prote Conditioner compressor: permExploded view 5 all con- A widitioner compressor informa drive unit

8 - Cover

9 - Drive shaft

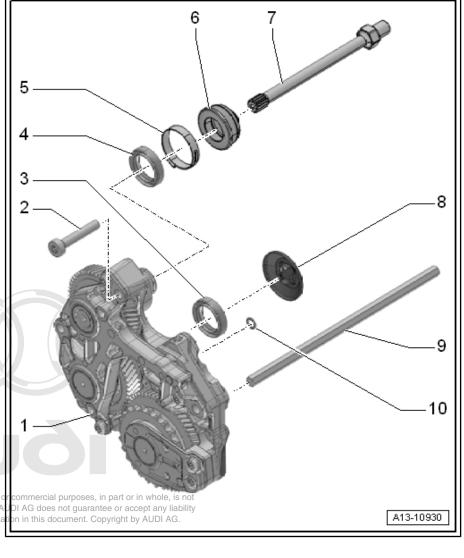
□ For oil pump

10 - O-ring

□ Renew

4.2 Removing and installing spur gear drive

Special tools and workshop equipment required



 Support bracket - 10 - 222 A- for vehicles up to model year 2013

 Engine support basic set - T40091- for vehicles up to model year 2013

- Engine support supplement set T40093- with -T40093/7- and
- -T40093/8- for vehicles up to model year 2013

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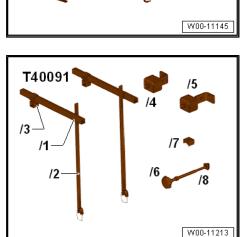
◆ Sealant ⇒ Electronic parts catalogue

Removing

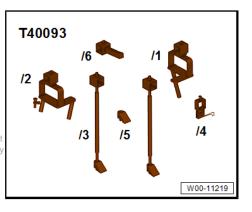
- Gearbox removed ⇒ Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .
- Remove timing chain cover (bottom) \Rightarrow page 116.

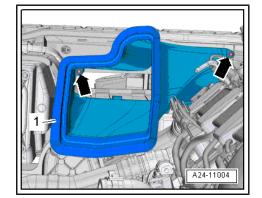
Vehicles up to model year 2013:

- Remove air cleaner housing on right side and, if fitted, on left side ⇒ page 353.
- Remove bolts -arrows- and detach air duct -1-.



10-222A





- Set up support bracket 10 222 A- on suspension turrets (left and right) as illustrated.
- Engage spindles -10 222 A /11- on rear engine lifting eyes and partly take up weight of engine.

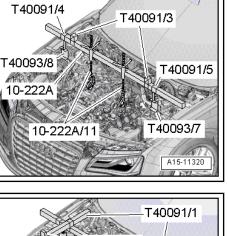
- Set up further tools as shown in illustration.

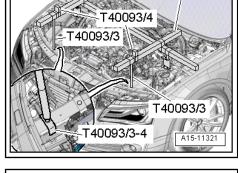
- Set up further tools as shown in illustration.
- Engage spindles -10 222 A /11- on front engine lifting eyes and partly take up weight of engine.
- Remove coolant pipe (top left) <u>⇒ page 264</u>.

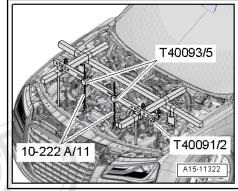
Remove bolt -arrow-, detach power steering pump or steering hydraulics pump - V119- from retaining frame and push to one side.

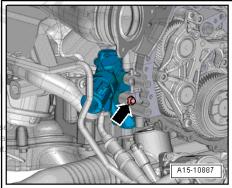
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All vehicles (continued):

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

- Remove drive chain for auxiliary drives \Rightarrow page 141.
- Slacken bolts -1 ... 5- in diagonal sequence and remove.
- Carefully release spur gear drive from bonded joint and detach.

- Pull out oil pump drive shaft -arrow-.

Installing

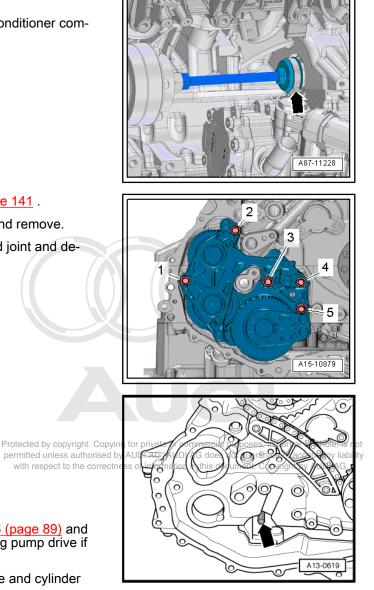


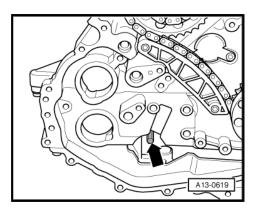
Fit new O-ring.

- Renew oil seals <u>⇒ Item 3 (page 89)</u>, <u>⇒ Item 6 (page 89)</u> and flat-section O-ring <u>⇒ page 90</u> in power steering pump drive if damaged.
- Remove sealant residues from spur gear drive and cylinder block.
- Clean surfaces; they must be free of oil and grease.
- Insert drive shaft -arrow- for oil pump into guide sleeve at oil pump.



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







Note the use-by date of the sealant.

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



Caution

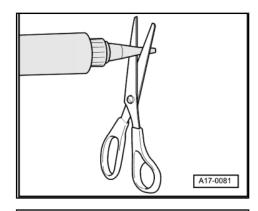
Make sure lubrication system is not clogged by excess sealant.

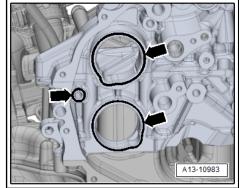
- The beads of sealant must not be thicker than specified.
- Apply beads of sealant -arrows- onto clean sealing surfaces on engine, as shown in illustration.
- Width of beads of sealant: 2.0 mm.
- Fit new O-ring -arrow- on spur gear drive and secure in position with a small amount of grease.

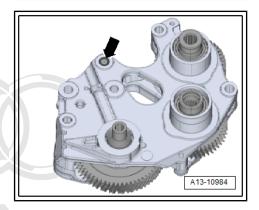


The spur gear drive must be installed within 5 minutes after applying the sealant.

- Fit spur gear drive and tighten bolts <u>⇒ page 90</u>.
- Install drive chain for auxiliary drives ⇒ page 141.
- Slide power steering pump with new O-ring onto spur gear for power steering pump drive.







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i Note

Secure with correct type of hose clip (same as original equipment) ⇒ Electronic parts catalogue .

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

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

Vehicles up to model year 2013:

- Install power steering pump or steering hydraulics pump -V119- ⇒ Running gear, axles, steering; Rep. gr. 48; Hydraulic power steering; Removing and installing power steering pump.
- Install air cleaner housing \Rightarrow page 353.

All vehicles (continued):

- Install coolant pipe (top left) \Rightarrow page 264.
- Install timing chain cover (bottom) ⇒ page 116.

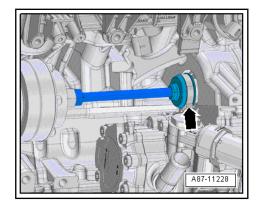
Tightening torques

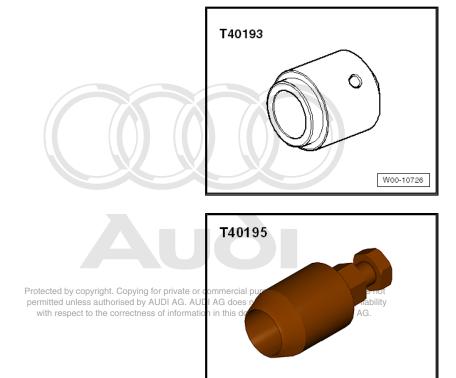
 ◆ Fig. ""Spur gear drive - tightening torque and sequence"", page 90

4.3 Renewing oil seal for power steering pump drive

Special tools and workshop equipment required

Thrust piece - T40193-





W00-11250

• Oil seal extractor - T40195-

Procedure

Vehicles up to model year 2013:

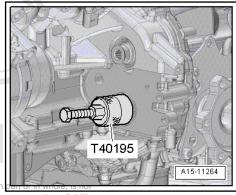
 Remove power steering pump or steering hydraulics pump -V119- ⇒ Running gear, axles, steering; Rep. gr. 48; Hydraulic power steering; Removing and installing power steering pump.

Vehicles from model year 2014 onwards:

- Remove steering rack ⇒ Running gear, axles, steering; Rep. gr. 48; Steering rack; Removing and installing steering rack.
- Remove cover <u>⇒ Item 8 (page 91)</u>.

All vehicles (continued):

- Screw spindle of oil seal extractor -T40195- all the way out.
- Lubricate threaded head of oil seal extractor, place it in position and screw it into oil seal as far as possible (applying firm pressure).
- Turn inner part of oil seal extractor against spur gear drive until the oil seal is pulled out.





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If the sections of the oil seal come apart, apply oil seal extractorent. Copyright by AUDI AG. again and pull out remaining part of oil seal.

- Clamp hexagon flats of oil seal extractor in vice and use pliers to remove oil seal.
- Clean contact surface and sealing surface.
- Drive oil seal in as far as stop using thrust piece T40193- .



For illustration purposes, the installation position is shown with the engine removed.

Vehicles up to model year 2013:

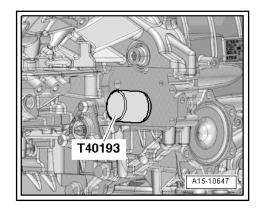
 Install power steering pump or steering hydraulics pump -V119- ⇒ Running gear, axles, steering; Rep. gr. 48; Hydraulic power steering; Removing and installing power steering pump .

Vehicles from model year 2014 onwards:

Install steering rack ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering rack; Removing and installing steering rack .

4.4 Renewing oil seal for AC compressor drive

Special tools and workshop equipment required



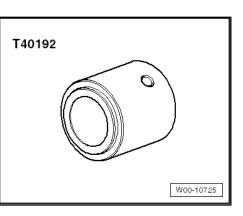
Audi A8 2010 ≻ Auði 8-cylinder direct injection engine (4.0 ltr. 4-valve TFSI) - Edition 03.2014

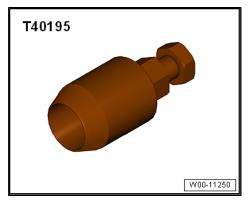
Thrust piece - T40192-

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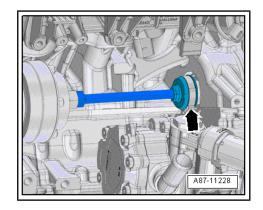
• Oil seal extractor - T40195-





Procedure

- Remove air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket.
- Detach hose clip on dust cap -arrow-.
- Pull off dust cap together with drive shaft for air conditioner compressor from stub shaft of spur gear for air conditioner compressor drive.



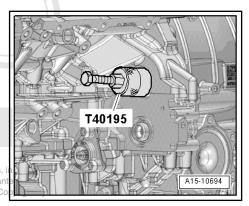


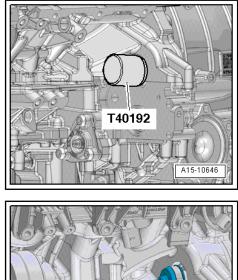
- Screw spindle of oil seal extractor -T40195- all the way out.
- Lubricate threaded head of oil seal extractor, place it in position and screw it into oil seal as far as possible (applying firm pressure).
- Turn inner part of oil seal extractor against spur gear drive until the oil seal is pulled out.

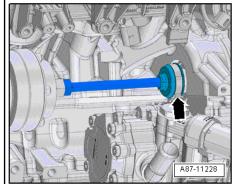


If the sections of the oil seal come apart, apply oil seal extractor guara

- Clamp hexagon flats of oil seal extractor in vice and use pliers to remove oil seal.
- Clean contact surface and sealing surface.
- Drive in oil seal for AC compressor drive using thrust piece -T40192-.









Secure with correct type of hose clip (same as original equipment) ⇒ Electronic parts catalogue .

- Press dust cap -arrow- with hose clip fitted onto stub shaft of spur gear for AC compressor drive.
- Install air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket.

5 Pistons and conrods

\Rightarrow "5.1 Exploded view - pistons and conrods", page 100

- ⇒ "5.2 Removing and installing pistons", page 102
- ⇒ "5.3 Checking pistons and cylinder bores", page 103

 \Rightarrow "5.4 Checking radial clearance of conrod bearings", page 104

5.1 Exploded view - pistons and conrods

i Note

Oil spray jet for piston cooling \Rightarrow page 102.

1 - Bolts

- Renew
- Use old bolts when measuring radial clearance
- Lubricate threads and contact surface
- □ 50 Nm + turn 90° further

2 - Conrod bearing cap

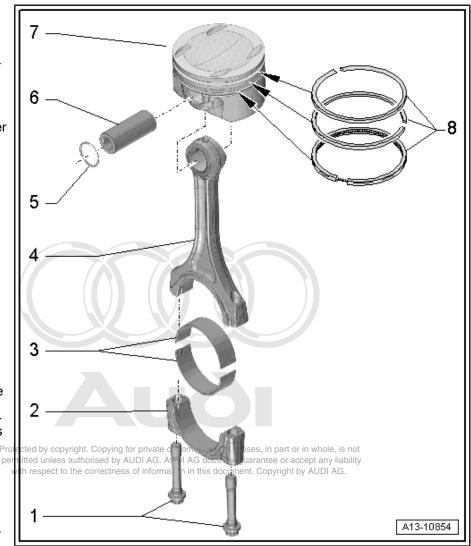
- Mark installation position for re-installation
- Mark cylinder and conrod allocation in colour ⇒ page 101
- □ Installation position of conrod pairs ⇒ page 101

3 - Bearing shells

- Ensure that retaining lugs are securely seated.
- Renew used bearing shells
- Oversized bearings are available for machined crankshaft conrod journals ⇒ Electronic parts catalogue

4 - Conrod

- Only renew as a complete set
- Mark cylinder and conrod bearing cap allocation in colour ⇒ page 101



- □ Installation position of conrod pairs \Rightarrow page 101
- □ Axial clearance for each conrod pair (when new): 0.16 ... 0.40 mm
- □ Measuring radial clearance \Rightarrow page 104

5 - Circlip

□ 2x

- Renew
- 6 Piston pin
 - □ Removing and installing ⇒ "5.2 Removing and installing pistons", page 102

7 - Piston

- □ Mark installation position and cylinder number \Rightarrow page 101
- □ Removing and installing \Rightarrow page 102
- **D** Renew piston if cracking is visible on piston crown or piston skirt
- □ Checking pistons and cylinder bores \Rightarrow page 103

8 - Piston rings

- □ Measuring ring gap \Rightarrow page 104
- □ Measuring ring-to-groove clearance <u>⇒ page 104</u>
- □ Use piston ring pliers (commercially available) to remove and install
- □ Installation position: marking "TOP" or side with lettering faces towards piston crown
- □ Offset gaps by 120°

Installation position of pistons



Caution

Do not damage the coating of the piston crown.

If you intend to reinstall used pistons, mark the cylinder number on the piston crown using paint. Do not mark piston crown by means of centre punch, notch or the like.

Installation position:

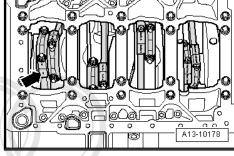
Arrows on piston crowns point to pulley end.

Marking conrods



Only renew conrods as a complete set.

 Use a coloured pen to mark matching conrods and conrod bearing caps with cylinder numbers -arrow- for re-installation.

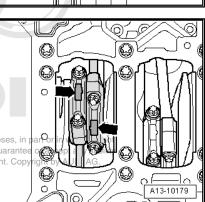


13-10314

Installation position of conrods

 The cast lugs -arrows- on the ground surfaces of the conrod pairs must face each other.

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Oil spray jet for piston cooling

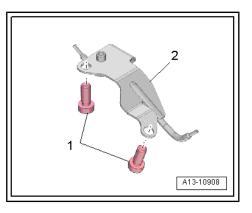
- 1 Apply locking fluid to bolts and tighten to 9 Nm; for locking fluid refer to \Rightarrow Electronic parts catalogue .
- 2 Oil spray jet



Caution

Risk of damage to oil spray jets.

- Do not bend oil spray jets.
- Check that oil spray jets adequate clearance after re-installing pistons.
- Always renew bent oil spray jets immercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



5.2 Removing and installing pistons

Special tools and workshop equipment required

Drift - VW 222 A-



• Piston ring clamp, commercially available

Removing

- Engine secured to engine and gearbox support VAS 6095-⇒ page 38
 .
- Remove cylinder head:

- Remove upper section of sump \Rightarrow page 199.

- Remove bolts -1 ... 6- and detach baffle plate.
- Mark installation position and matching of conrod bearing caps to cylinder and to conrods for re-installation <u>⇒ page 101</u>.
- Unbolt conrod bearing caps.
- Pull out pistons upwards with conrods.

Note

If piston pin is difficult to remove, heat piston to approx. 60 °C.

- Take circlip out of piston pin boss.
- Use drift VW 222 A- to drive out piston pin.

Installing

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



Renew the bolts tightened with specified tightening angle.

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

Installation position:

- Pistons ⇒ page 101
- Conrods ⇒ page 101
- Install conrod bearing caps according to markings.
- Install baffle plate ⇒ page 82.
- Install sump (upper section) ⇒ page 199.
- Install cylinder head ⇒ page 152.

Tightening torques

• \Rightarrow "5.1 Exploded view - pistons and conrods", page 100

5.3 Checking pistons and cylinder bores

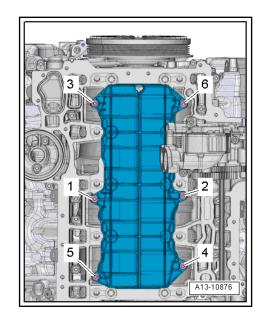
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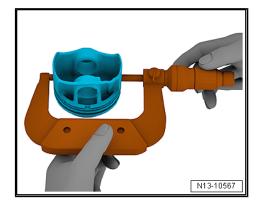
- with respect to the correctness of information in this document. Copyright by AUDI AG.
 Using a micrometer (75 ... 100 mm), measure approx. 15 mm from the lower edge, perpendicular to the piston pin axis.
- Maximum deviation from nominal dimension: 0.03 mm.

There are different piston sizes specifically matched to the varying bore dimensions for the cylinder block.

Piston Ø mm			
Engine code CEUA/CTGA CGTA/CTFA			
Nominal dimension	84.470 ¹⁾	84.490 ¹⁾	
Repair oversize	84.580 ¹⁾	84.590 ¹⁾	
4			

 ¹⁾ Dimensions including coating (thickness 0.018 mm). The coating will wear down in service.

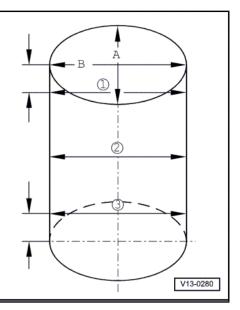




Measuring cylinder bore

- Use a cylinder gauge VAS 6078- to take measurements at 3 points in transverse direction -A- and in longitudinal direction -B-.
- Maximum deviation from nominal dimension: 0.08 mm.

Cylinder bore \varnothing mm		
Nominal dimension	84.510 ± 0.005 ¹⁾	
Repair oversize	84.610 ± 0.005 ¹⁾	
• ¹⁾ Measure at 50 mm into cylinder bore.		



Measuring piston ring gap

- Insert ring at right angle to cylinder wall from above and push down into lower cylinder opening approx. 15 mm from bottom of cylinder.
- To do so, use a piston without rings.

Piston ring	new mm	Wear limit mm
1st compression ring	0.20 0.35	0.80
2nd compression ring	0.20 0.40	0.80
Oil scraper ring	0.20 0.40	0.80

Measuring ring-to-groove clearance

- Clean groove in piston before checking clearance.

Piston ring	new mm	Wear limit mm
1st compression ring	0.035 0.085	0.200
2nd compression ring	0.005 0.045	0.150
Oil scraper ring	0.020 0.055	0.200

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5.4 Checking radial clearance of conrod bearings

Special tools and workshop equipment required

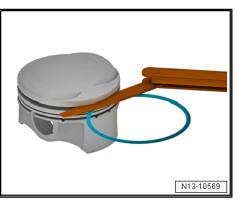
♦ Plastigage

Procedure

Note

Use old bolts when measuring radial clearance.

- Remove conrod bearing cap.



N13-10568

- Clean bearing cap and bearing journal.
- Place a length of Plastigage corresponding to the width of the bearing on the bearing journal or in the bearing shell.
- Fit conrod bearing cap and secure with old bolts
 ⇒ Item 1 (page 100) without rotating crankshaft.
- Remove conrod bearing cap again.
- Compare width of Plastigage with measurement scale.

Radial clearance:

- New: 0.020 ... 0.069 mm.
- Wear limit: 0.120 mm.
- When carrying out final assembly, renew bolts.



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15 – Cylinder head, valve gear

1 Timing chain cover

⇒ "1.1 Exploded view - timing chain cover", page 106

⇒ "1.2 Removing and installing timing chain cover", page 109

1.1 Exploded view - timing chain cover

1 - Bolt

- Renew
- □ Tightening torque and sequence ⇒ page 108

2 - Oil seal

- For crankshaft (gearbox end)
- $\Box \quad \text{Renewing} \Rightarrow \underline{\text{page 77}}$

3 - Dowel sleeve

🛛 2x

4 - Timing chain cover (bottom)

□ Removing and installing ⇒ page 116

5 - Cylinder head gasket (leftside)

6 - Bolt

□ Tightening torque ⇒ Item 13 (page 261)

7 - Coolant pipe (top rear)

- With an additional securing bolt on some versions
- Removing and installing ⇒ page 277

8 - Nut

- Only for certain engines
- 🛛 9 Nm

9 - Centre hex stud

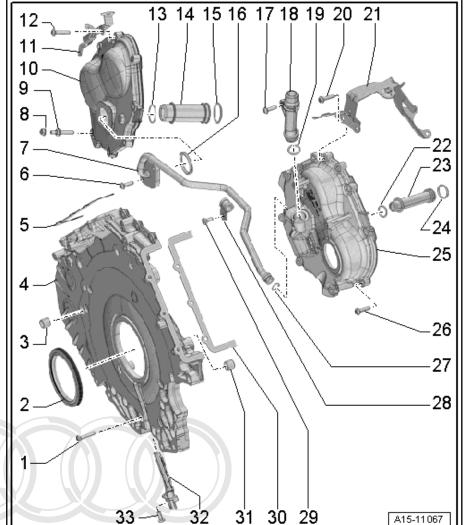
- Only for certain engines
- Renew
- □ Tightening torque and sequence \Rightarrow page 108

10 - Timing chain cover (left-side)

□ Removing and installing <u>⇒ page 109</u>

11 - Bracket

- 12 Bolt
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- Renew
- □ Tightening torque and sequence \Rightarrow page 108
- 13 O-ring
 - Renew



14 - Intermediate pipe (left-side)

- Drive out with drift
- 15 O-ring

Renew

- 16 O-ring
- Renew
- 17 Bolt
 - **9** Nm

18 - Connection

For coolant

19 - O-ring

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Renew

 \Box Tightening torque and sequence \Rightarrow page 108

21 - Bracket

- 22 O-ring
 - Renew

23 - Intermediate pipe (right-side)

Drive out with drift

24 - O-ring

Renew

25 - Timing chain cover (right-side)

Removing and installing \Rightarrow page 113

26 - Bolt

- Renew
- \Box Tightening torque and sequence \Rightarrow page 108

27 - O-rina

Renew

28 - Retaining clamp

- 29 Bolt
 - □ Tightening torque \Rightarrow Item 11 (page 261)

30 - Cylinder head gasket (right-side)

31 - Dowel sleeve

□ 2x

- 32 Engine speed sender G28-
 - □ Removing and installing \Rightarrow page 436

33 - Bolt

□ Tightening torque \Rightarrow Item 12 (page 416)

Timing chain cover (left-side) - tightening torque and sequence

Note

Renew the bolts tightened with specified tightening angle.

- Tighten bolts in stages in the sequence shown:

Stage	Bolts	Tightening torque/angle specification	
1.	-1 8-	5 Nm	
2.	-1 8-	Turn 90° further	

Note

The bracket -arrow- is secured together with the timing chain cover.

Timing chain cover (right-side) - tightening torque and sequence

i Note

Renew the bolts tightened with specified tightening angle.

- Tighten bolts in stages in the sequence shown:

Stage	Bolts	Tightening torque/angle specification
permitted	inless authorise8by AUDI	5 3 Nm PI AG does not guarantee or accept any liability
2.	-1 8-	Turn 90° further

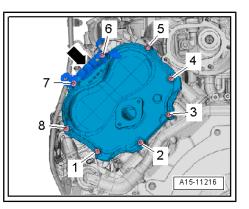
Timing chain cover (bottom) - tightening torque and sequence

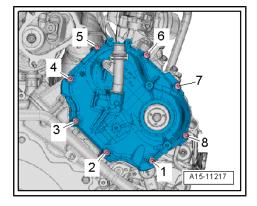
i Note

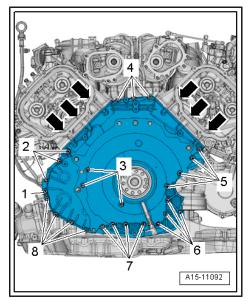
Renew the bolts tightened with specified tightening angle.

- Tighten bolts in stages as follows:

Stage	Bolts	Tightening torque/angle specification	
1.	-arrows-	5 Nm	
2.	-2 8-	8 Nm in diagonal sequence	
3.	-arrows-	10 Nm	
4.	-2 8-	Turn 90° further in diagonal sequence	
5.	-arrows-	Turn 90° further	
6.	-1-	 Vehicles up to model year 2013 ⇒ Running gear, axles, steering; Rep. gr. 48 ; Hydraulic power steering; Exploded view - power steering pump 	
		 Vehicles from model year 2014 on- wards: Not fitted 	







1.2 Removing and installing timing chain cover

 \Rightarrow "1.2.1 Removing and installing timing chain cover (left-side)", page 109

 \Rightarrow "1.2.2 Removing and installing timing chain cover (right-side)", page 113

 \Rightarrow "1.2.3 Removing and installing timing chain cover (bottom)", page 116

1.2.1 Removing and installing timing chain cover (left-side)

Special tools and workshop equipment required

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

Removing

Remove engine cover panel <u>⇒ page 69</u>.

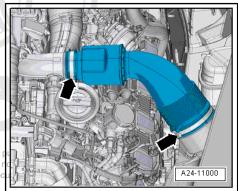
WARNING

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.
- Drain coolant <u>⇒ page 234</u>.
- Remove front silencer (left-side) <u>⇒ page 403</u>.
- Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50; Bulkhead; Exploded view plenum chamber partition panel.

Vehicles with engine codes CGTA/CTFA:

- Release hose clips -arrows- and remove air pipe (left-side).



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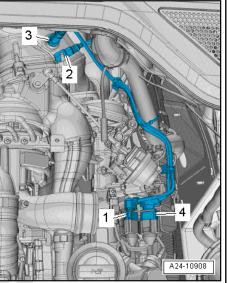
All vehicles (continued):

 Take electrical connector -1- for Lambda probe after catalytic converter - G130- -item 3- out of bracket, unplug and move wiring clear.



Disregard -items 2, 4-.



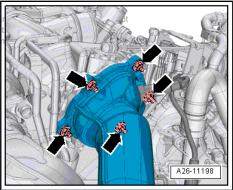


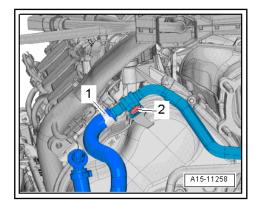


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The catalytic converter for cylinder bank 1 (right-side) is located on the left side of the vehicle.

- Move clear electrical wiring for Lambda probe G39- .
- Unscrew nuts -arrows- on cylinder bank 1 (right-side) and push catalytic converter on left side of vehicle towards rear.
- Release hose clip -1- and detach air hose.
- Remove bolt -2-.
- Move vacuum line clear and push towards rear.





Remove bolts -1 and 2-.



Caution

- Avoid damage to coolant pipe.
- Do not bend coolant pipe.
- Pull off coolant pipe (top rear) from timing chain cover (rightside) -arrow- and move to one side.



Shown in illustrations with catalytic converters and support for turbocharger removed.

- Slacken and remove bolts in the sequence: -8 ... 1-.
- Press bracket -arrow- with wiring harness clear to the side.
- Carefully release timing chain cover (left-side) from bonded joint and detach. mercial permitted unless authorised by AUDI AG. AUDI AG does

Installing



Fit new O-rings.

Remove old sealant from sealing surfaces.

Caution

Protect lubrication system against contamination.

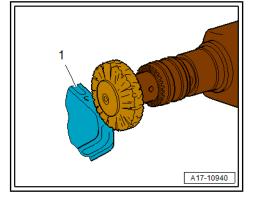
Cover exposed parts of the engine.

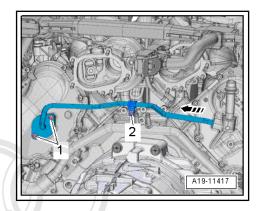


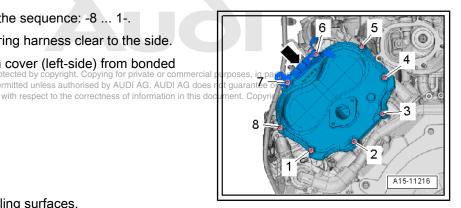
WARNING

Risk of eye injury.

- Wear safety goggles.
- Remove remaining sealant on timing chain cover -1- and cylinder head using rotating plastic brush or similar.
- Clean surfaces; they must be free of oil and grease.



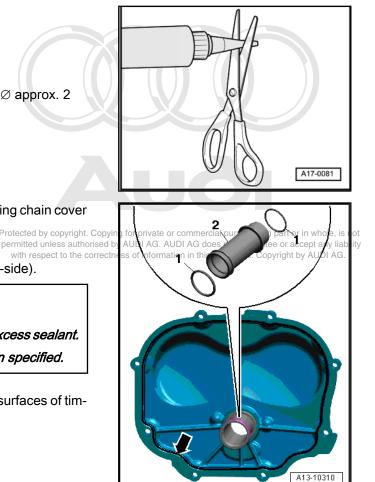






Note the use-by date of the sealant.

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



- Use drift to drive intermediate pipe -2- out of timing chain cover (left-side).
- Fit O-rings -1- on intermediate pipe.
- Fit intermediate pipe in timing chain cover (left-side).



Caution

Make sure lubrication system is not clogged by excess sealant.

- The bead of sealant must not be thicker than specified.
- Apply sealant bead -arrow- onto clean sealing surfaces of timing chain cover (left-side) as illustrated.
- Width of sealant bead: 2.5 mm.



The timing chain cover must be installed within 5 minutes after applying the sealant.

 Fit timing chain cover (left-side) together with bracket -arrowand tighten bolts <u>⇒ page 108</u>.



On certain engines, -item 1- is a centre hex stud.

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

- Install coolant pipe (top rear) ⇒ page 261
- Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50; Bulkhead; Exploded view plenum chamber partition panel by copyright. Copying for private or commercial purposes, in part or in whole, is not
- Install catalytic converter and front silencero print of a converter and front silencero
- Install air ducts with screw-type clips ⇒ page 318.



Do not reuse coolant.

- Fill up with coolant \Rightarrow page 236.

Tightening torques

 ⇒ Fig. ""Timing chain cover (left-side) - tightening torque and sequence"", page 108

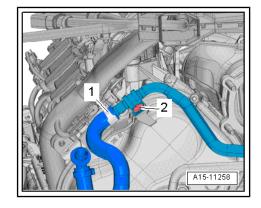
1.2.2 Removing and installing timing chain cover (right-side)

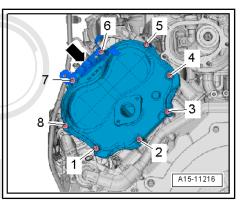
Special tools and workshop equipment required

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

Removing

- Drain coolant <u>⇒ page 234</u>.
- Remove vacuum pump ⇒ Brake system; Rep. gr. 47; Vacuum system; Removing and installing vacuum pump.
- Release hose clip -1- and detach air hose.
- Remove bolt -2-.
- Move vacuum line clear and place to one side.





Remove bolts -1 and 2-.



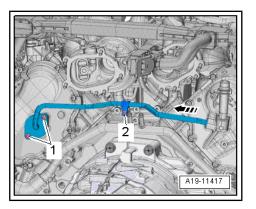
Caution Avoid damage to coolant pipe.

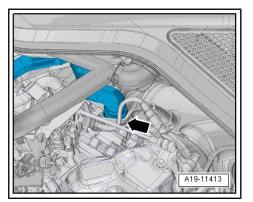
- Do not bend coolant pipe.
- Pull off coolant pipe (top rear) from timing chain cover (rightside) -arrow- and move to one side.



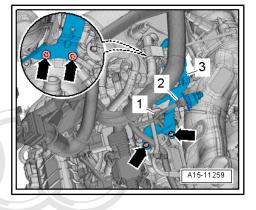
Shown in illustrations with catalytic converters and support for turbocharger removed.

_ Lift retaining clip -arrow- and disconnect coolant hose.





- Unplug electrical connectors -1, 2-. _
- Remove bolts -arrows- and move bracket -3- with electrical wiring harness to one side.





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- Slacken and remove bolts in the sequence: -8 ... 1-.
- Carefully release timing chain cover (right-side) from bonded joint and detach.

Installing



- Fit new O-rings.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.
- Remove old sealant from sealing surfaces.



Caution

Protect lubrication system against contamination.

• Cover exposed parts of the engine.



Risk of eye injury.

Wear safety goggles.

- Remove remaining sealant on timing chain cover -1- and cylinder head using rotating plastic brush or similar.

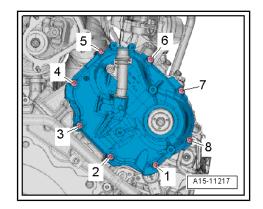
Clean surfaces; they must be free of oil and grease.

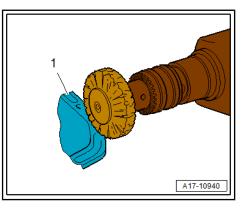


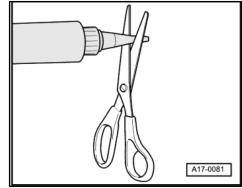
Note the use-by date of the sealant.

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

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- Use drift to drive intermediate pipe -2- out of timing chain cover (right-side).
- Fit O-rings -1- on intermediate pipe.
- Fit intermediate pipe in timing chain cover (right-side).

Caution

Make sure lubrication system is not clogged by excess sealant.

- The bead of sealant must not be thicker than specified.
- Apply sealant bead -arrow- onto clean sealing surfaces of timing chain cover (right-side) as illustrated.
- Width of sealant bead: 2.5 mm.



Ţ

The timing chain cover must be installed within 5 minutes after applying the sealant.

Install timing chain cover (right-side) and tighten bolts
 ⇒ page 108

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

- Install coolant pipe (top rear) ⇒ page 261.
- Install vacuum pump ⇒ Brake system; Rep. gr. 47; Vacuum system; Removing and installing vacuum pump.
- Connect coolant hoses with plug-in connector <u>⇒ page 286</u>.



Do not reuse coolant.

Fill up with coolant <u>⇒ page 236</u>.

Tightening torques

- ♦ ⇒ Fig. ""Timing chain cover (right-side) tightening torque and sequence"", page 108
- ◆ ⇒ "1.1 Exploded view timing chain cover", page 106

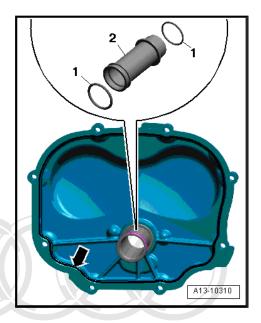
1.2.3 Removing and installing timing chain cover (bottom)

Special tools and workshop equipment required

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

Removing

- Gearbox removed ⇒ Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .
- Remove drive plate ⇒ page 76.
- Remove coolant pipe (top rear) ⇒ page 277.



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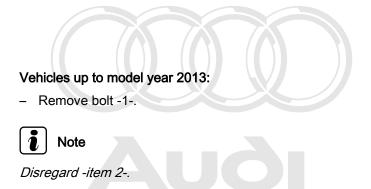
- Remove coolant circulation pump 2 V178- ⇒ page 248.
- Remove timing chain covers (left and right) <u>⇒ page 109</u>.

Vehicles from model year 2014 onwards:

 Unplug electrical connector -2- for engine speed sender -G28- .



Disregard -item 1-.

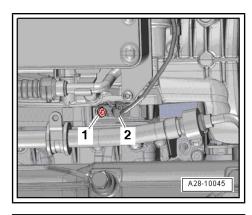


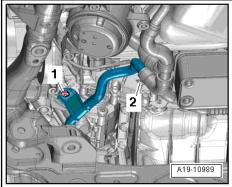
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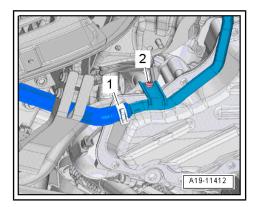
Remove bolt -2- and press coolant pipe (bottom left) to the side.



Disregard -item 1-.



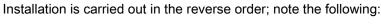




Remove bolt -1-.

All vehicles (continued):

- Remove bolts -arrows-.
- Slacken bolts -2 ... 8- in diagonal sequence and remove.
- Carefully release timing chain cover (bottom) from bonded joint and remove cover.
- Press crankshaft oil seal (gearbox end) out of timing chain cover (bottom).



Installing

Note

Renew the bolts tightened with specified tightening angle.

- Pull dowel sleeve at top right out of cylinder block.
- Bevel the dowel sleeve with a file, as illustrated.
- Dimension -x- = 6.5 mm.
- Dimension -y- = 8 mm.
- Fit dowel sleeve on cylinder block in such a way that the bevelled side points upwards.



Note

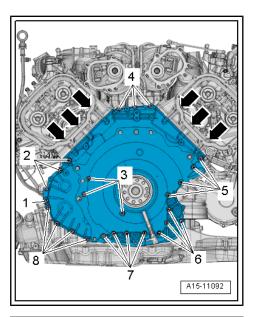
Bevelling the dowel sleeve makes it easier to fit the timing chain cover (bottom) with the cylinder head installed.

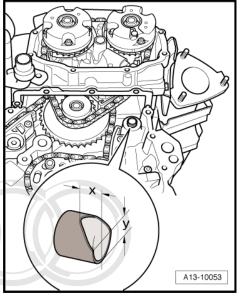


Caution

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Cover exposed parts of the engine.



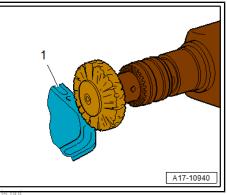


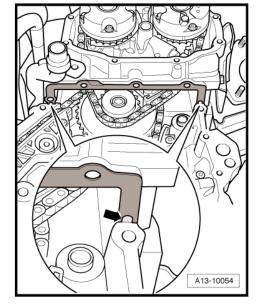


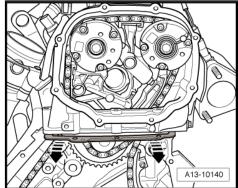
- Remove remaining sealant on timing chain cover (bottom)
 -1-, cylinder block and cylinder head using rotating plastic brush or similar.
- Clean surfaces; they must be free of oil and grease.
- Before installing gearbox, remove residue from threaded holes cept any liability for engine/gearbox bolts in cylinder block using a thread tap, by AUDI AG.
- Clean old sealant from holes -arrow- in cylinder head gaskets.



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









Caution

Avoid damage to cylinder head gasket.

 Only bend the ends of the cylinder head gaskets slightly and do not kink.



If the cylinder head gasket has been bent and kinked it must be renewed.

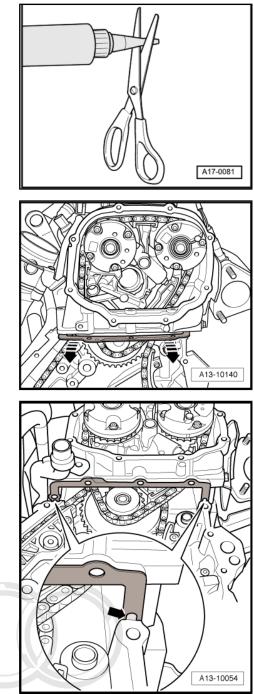
- Carefully bend the ends of the cylinder head gaskets down very slightly -arrows-, just far enough to be able to clean the upper sealing surface on the cylinder head gasket and cylinder head.
- Clean cylinder head gaskets (top and bottom); they must be free of oil and grease.



Note the use-by date of the sealant.

- Cut off nozzle of tube at front marking (nozzle \varnothing approx. 2.5 mm).
- Apply a small amount of sealant to sealing surfaces of cylinder head gaskets (top and bottom). To do so, you again have to bend cylinder head gaskets down very slightly -arrows-.
- Use a flat object (e.g. a feeler gauge) to apply sealant to the area between cylinder head and gasket.

- Clean holes -arrow- in cylinder head gaskets and fill them with sealant.





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Caution

Make sure lubrication system is not clogged by excess sealant.

- The bead of sealant must not be thicker than specified.
- Apply sealant beads -1 ... 9- onto the clean sealing surfaces of the timing chain cover (bottom) as illustrated.
- Width of beads of sealant: 2.0 mm.

Note

The timing chain cover must be installed within 5 minutes after applying the sealant.

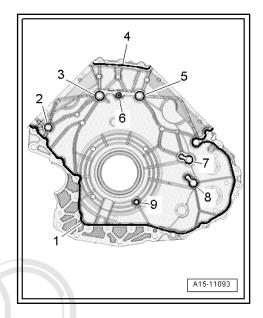
- Fit timing chain cover (bottom), guiding it towards the sealing surface on cylinder block and cylinder head at an angle and from below.
- Take care not to damage the cylinder head gaskets when fitting the cover.
- Tighten bolts \Rightarrow page 108.

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

- Install crankshaft oil seal (gearbox end) \Rightarrow page 77. _
- Install coolant pipe (bottom left) > page 261
- Install timing chain cover the page of the
- Install coolant circulation pump 2 V178- ⇒ page 248.
- Install coolant pipe (top rear) \Rightarrow page 277.
- Install drive plate \Rightarrow page 76.

Tightening torques

- ⇒ Fig. ""Timing chain cover (bottom) tightening torque and sequence"", page 108
- ⇒ "1.1 Exploded view timing chain cover", page 106



2 Chain drive

⇒ "2.1 Exploded view - camshaft timing chains", page 122

⇒ "2.2 Exploded view - drive chain for valve gear", page 125

 \Rightarrow "2.3 Exploded view - drive chain for auxiliary drive", page 126

 \Rightarrow "2.4 Removing camshaft timing chain from camshafts", page 127

 \Rightarrow "2.5 Removing and installing camshaft timing chain", page 139

 \Rightarrow "2.6 Removing and installing chain tensioner for camshaft timing chain", page 139

 \Rightarrow "2.7 Removing and installing drive chain for valve gear", page 140

 \Rightarrow "2.8 Removing and installing drive chain for auxiliary drive", page 141

2.1 Exploded view - camshaft timing chains

Camshaft timing chain (left-side)

1 - Bolt

- Renew
- □ 80 Nm + turn 90° further

2 - Bolt

- □ Renew
- □ 80 Nm + turn 90° further

3 - Camshaft adjuster

- For inlet camshaft
- Identification: "IN"
- □ Removing and installing ⇒ "2.5 Removing and installing camshaft timing chain", page 139

4 - Camshaft adjuster

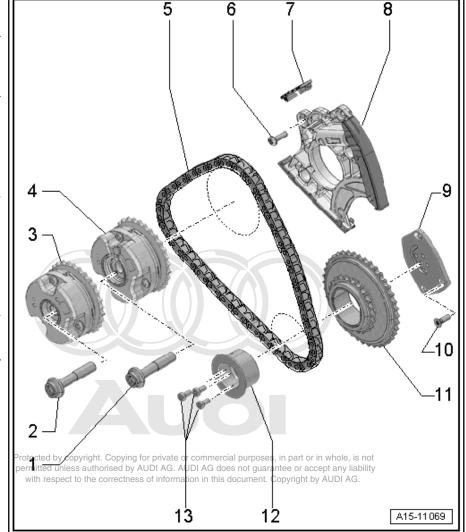
- For exhaust camshaft
- Identification: "EX"
- □ Removing and installing ⇒ "2.5 Removing and installing camshaft timing chain", page 139

5 - Camshaft timing chain (left-side)

- Mark direction of rotation for re-installation with a paint marker
- □ Removing from camshafts <u>⇒ page 139</u>
- □ Removing and installing \Rightarrow page 139

6 - Bolt

- Renew
- □ 5 Nm + turn 90° further



7 - Slide

8 - Chain tensioner

- □ For camshaft timing chain (left-side)
- □ Removing and installing \Rightarrow page 139

9 - Bearing plate

For drive chain sprocket

10 - Bolt

🗅 9 Nm

11 - Drive chain sprocket

□ For camshaft timing chain (left-side)

12 - Bearing mounting

□ For drive chain sprocket for camshaft timing chain (left-side)

13 - Bolts

- Renew
- □ 5 Nm + turn 90° further

Camshaft timing chain (right-side)

1 - Bolt

- With follower for vacuum pump
- Renew
- □ 80 Nm + turn 90° further

2 - Camshaft adjuster

- For inlet camshaft
- Identification: "IN"
- □ Removing and installing ⇒ "2.5 Removing and installing camshaft timing chain", page 139

3 - Bolt

- Renew
- □ 80 Nm + turn 90° further

4 - Camshaft adjuster

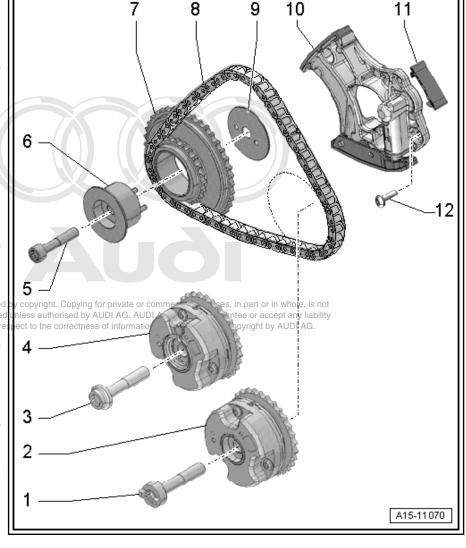
- For exhaust camshaft
- □ Identification: "EX"^{Protected}
- □ Removing and installing ⇒ "2.5 Removing and installing camshaft timing chain", page 139

5 - Bolt

- Renew
- 20 Nm + turn 45° further

6 - Bearing mounting

- For drive chain sprocket for camshaft timing chain (right-side)
- Asymmetric version
- □ Installation position \Rightarrow page 124



7 - Drive chain sprocket

- □ For camshaft timing chain (right-side)
- □ Installation position \Rightarrow page 124

8 - Camshaft timing chain (right-side)

- Mark direction of rotation for re-installation with a paint marker
- □ Removing from camshafts <u>⇒ page 139</u>
- □ Removing and installing \Rightarrow page 139

9 - Thrust washer

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- Asymmetric version
- □ Installation position \Rightarrow page 124

10 - Chain tensioner

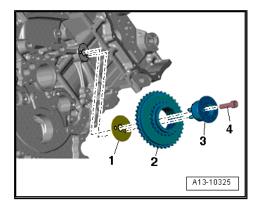
- □ For camshaft timing chain (right-side)
- □ Removing and installing <u>⇒ page 139</u>

11 - Slide

- 12 Bolt
 - Renew
 - □ 5 Nm + turn 90° further

Installation position: bearing mounting for drive sprocket for camshaft timing chain (right-side)

- Dowel pins in bearing mounting -3- for drive sprocket for camshaft timing chain (right-side) must engage in drillings in thrust washer -1- and in cylinder block drillings.
- 2 Drive sprocket for camshaft timing chain (right-side)
- 4 Bolt



2.2 Exploded view - drive chain for valve gear

- 1 Guide rail
- 2 Bolt
 - Renew
 - □ 17 Nm + turn 90° further
- 3 Bolt
 - Tightening torque ⇒ Item 5 (page 123)
- 4 Bolts
 - Tightening torque \Rightarrow Item 13 (page 123)
- 5 Bearing mounting
 - For drive chain sprocket for camshaft timing chain (left-side)
- 6 Drive chain sprocket
 - □ For camshaft timing chain (left-side)
- 7 Bolt
 - Tightening torque ⇒ Item 10 (page 123)
- 8 Bearing plate
 - For drive chain sprocket for camshaft timing chain (left-side)
 - Asymmetric version

9 - Drive chain

- For timing drive
- Before removing, mark running direction with paint
- Removing and installing \Rightarrow page 140
- 10 Guide rail

11 - Bolt

- Renew
- □ 17 Nm + turn 90° further

12 - Thrust washer

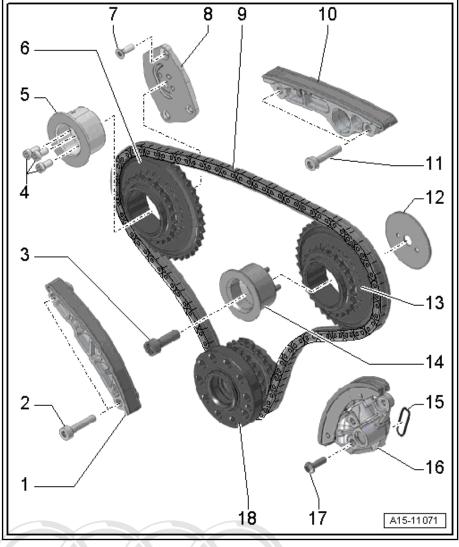
- Asymmetric version
- □ Installation position \Rightarrow page 124
- 13 Drive chain sprocket Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not
 For camshaft timing Chain (right side) d by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

14 - Bearing mounting

- □ For drive chain sprocket for camshaft timing chain (right-side)
- Asymmetric version
- □ Installation position \Rightarrow page 124

15 - Seal

Renew



- 16 Chain tensioner
- 17 Bolt
 - Renew
 - 5 Nm + turn 90° further
- 18 Crankshaft

2.3 Exploded view - drive chain for auxiliary drive

1 - Bolt

- Renew
- □ 5 Nm + turn 90° further

2 - Chain tensioner

- With guide rail
- 3 Seal

Renew

4 - Drive chain sprocket

- □ For auxiliary drives
- □ Part of spur gear drive

5 - Bolt

🗅 42 Nm

6 - Bearing mounting

For idler sprocket

7 - Bolt

- Renew
- □ 5 Nm + turn 90° further

8 - Gasket

Renew

9 - Mounting bracket

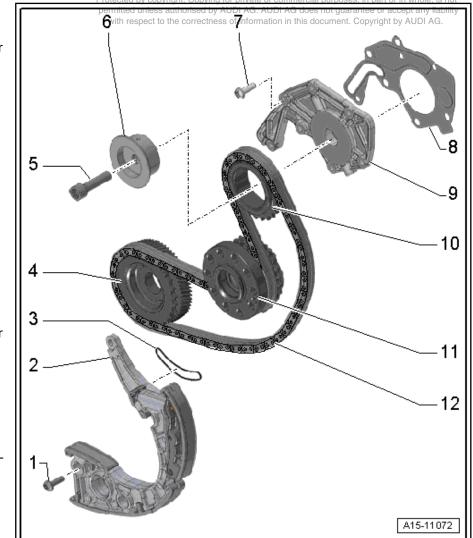
G For idler sprocket

10 - Idler sprocket

□ For drive chain for auxiliary drives

11 - Crankshaft

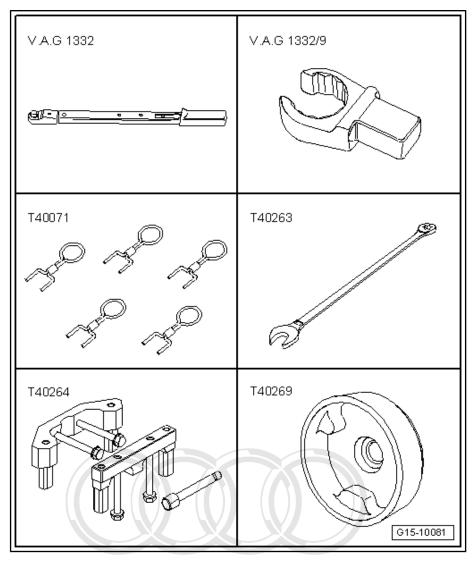
- 12 Drive chain
 - For auxiliary drives
 - □ Removing and installing ⇒ page 141



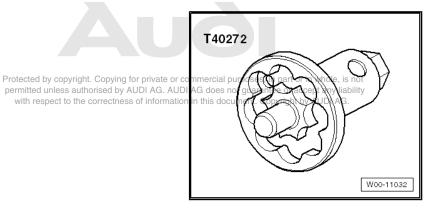
2.4 Removing camshaft timing chain from camshafts

Special tools and workshop equipment required

- Torque wrench V.A.G 1332-
- Open ring spanner insert -V.A.G 1332/9-
- 2x Locking pin T40071-
- Wrench, 21 mm T40263-
- Camshaft clamp T40264-
- Special wrench T40269-



Turning-over tool - T40272-



Removing



In the following procedure the camshaft timing chains remain on the engine.

- Remove relevant timing chain cover <u>⇒ page 109</u>.

Cylinder bank 1 (right-side):

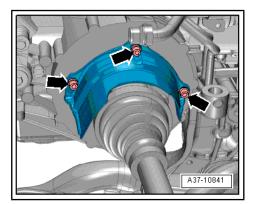
- Remove rear section of front wheel housing liner (right-side)
 ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Removing and installing wheel housing liner (front).
- Remove bolts -arrows- and detach heat shield for drive shaft (right-side).
- Unbolt drive shaft (right-side) from gearbox flange shaft ⇒ Running gear, axles, steering; Rep. gr. 40; Drive shaft; Removing and installing drive shaft.

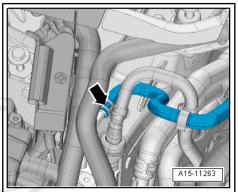
- Release hose clip -arrow- and disconnect hose for activated charcoal filter system.
- Move hose clear.

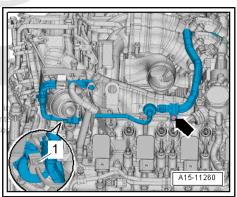


- Unplug electrical connector -1- at activated charcoal filter system solenoid valve 1 N80-.
- Remove bolt -arrow-.

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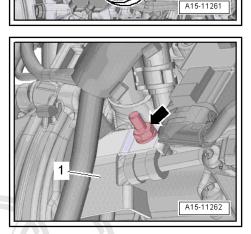






 Remove nuts -1, 2- and bolt -3-, move wiring guide clear and push to one side.

- Unscrew centre hex stud -arrow- and remove guard plate -1-.





- Unplug electrical connectors -1, 2- and push wiring harness clear to one side.

Remove bolts -arrows- and place vacuum unit for turbocharg-



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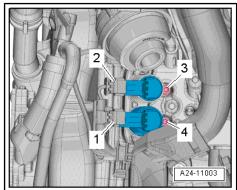
Disregard -items 3, 4-.

- Disconnect vacuum hose -1-.

Do not detach ball head -item 2-.

er to one side.

Note



 Release plugs -arrows- on right side of camshaft housing by turning anti-clockwise and remove plugs.

Cylinder bank 2 (left-side):

- Remove ignition coil for cylinder "7" \Rightarrow page 419.
- Release plugs -arrows- on left side of camshaft housing by turning anti-clockwise and remove plugs.

Continued for both cylinder banks:

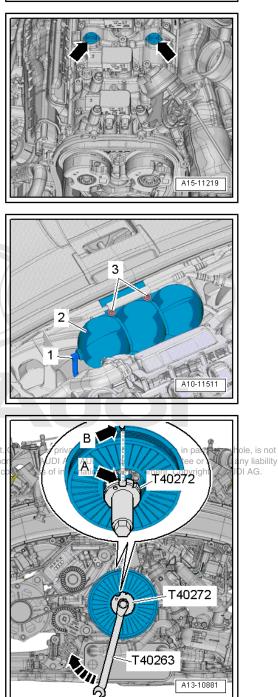
- Disconnect vacuum hose -1-.
- Unscrew bolts -3- and remove vacuum reservoir -2-.

- Fit turning over tool T40272- onto wrench (21 mm) T40263- .
- Position adapter on bolts of vibration damper.
- Position adapter on boits of vibration damper.
 Semi-circular recess -arrow A- on turning over tool 140222 to the must point to semi-circular recess -arrow B- on vibration damper.

i Note

Disregard notch on turning over tool - T40272-.

 Rotate crankshaft in normal direction of rotation -arrow- to "TDC".



A15-11218

Threaded holes -arrows- in camshafts must be visible through holes in camshaft housings previously sealed by plugs.



Note

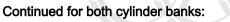
- The illustration shows the camshaft housing (right-side).
- If the threaded holes are not visible, rotate the camshaft one turn further.

Cylinder bank 1 (right-side):

- Fit camshaft clamp -T40264/1- on cylinder head (right-side) and tighten -arrows-; to do so, turn crankshaft slightly backwards and forwards if necessary.
- Tightening torque: 12 Nm

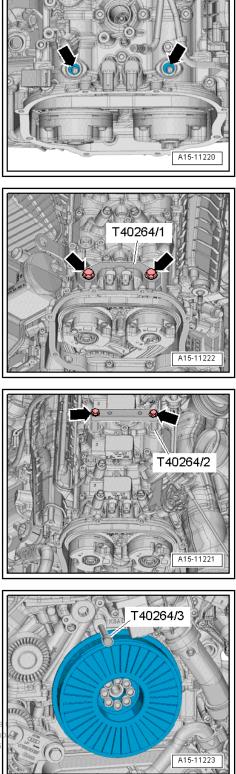
Cylinder bank 2 (left-side):

- Fit camshaft clamp -T40264/2- on cylinder head (left-side) and tighten -arrows-; to do so, turn crankshaft slightly backwards and forwards if necessary.
- Tightening torque: 12 Nm



Screw camshaft clamp -T40264/3- through bore at vibration damper into cylinder block by hand until it makes contact; to do so, turn crankshaft slightly backwards and forwards if necessary.

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Cylinder bank 1 (right-side):

Press guide rail of chain tensioner for camshaft timing chain (right-side) inwards as far as the stop using a screwdriver -1-. Then lock chain tensioner by inserting locking pin -T40071-.



The chain tensioner is oil-damped and can therefore only be compressed slowly by applying constant pressure.

Cylinder bank 2 (left-side):

Press guide rail of chain tensioner for camshaft timing chain (left-side) inwards as far as the stop using a screwdriver -1-. Then lock chain tensioner by inserting locking pin - T40071- .



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The chain tensioner is oil-damped and can therefore only be compressed slowly by applying constant pressure.

Continued for both cylinder banks:

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Avoid damage to camshafts.

Caution

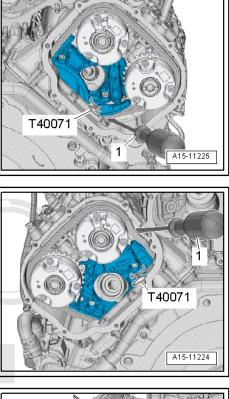
- Do NOT use camshaft clamp -T40264/1- or -T40264/2- to counterhold when loosening bolt for camshaft adjuster or camshaft chain sprocket.
- Counterhold at corresponding camshaft adjuster by applying special wrench - T40269- and loosening bolt -1-.
- Mark position of camshaft adjusters with paint for re-installation.

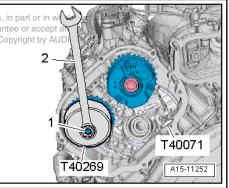


Caution

Risk of irreparable damage to engine.

Block off the opening in the valve timing housing with a clean cloth to prevent small items from dropping into the engine.





Cylinder bank 1 (right-side):

- Unscrew bolts -1 and 2- and detach both camshaft adjusters.
- Place camshaft timing chain on slide.



Cylinder bank 2 (left-side):

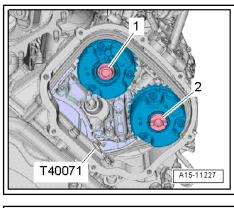
- Unscrew bolts -1 and 2- and detach both camshaft adjusters.
- Place camshaft timing chain on slide.

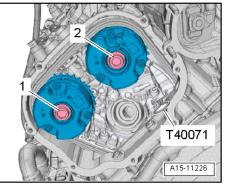
Installing

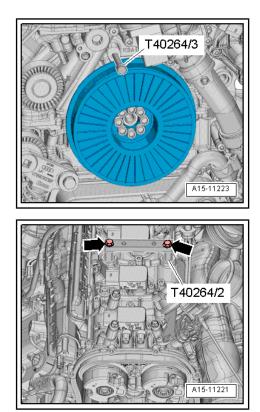
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- Renew the bolts tightened with specified tightening angle.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.
- Drive chain for valve gear installed <u>⇒ page 140</u>
- Crankshaft locked in "TDC position" with camshaft clamp -T40264/3-.







- Camshaft clamp -T40264/2- installed on cylinder head (leftside) and tightened to 12 Nm -arrows-.
- Camshaft clamp -T40264/1- installed on cylinder head (rightside) and tightened to 12 Nm -arrows-.

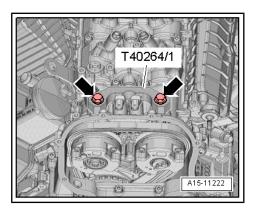
Cylinder bank 1 (right-side):

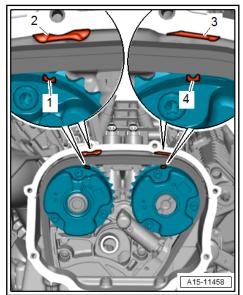


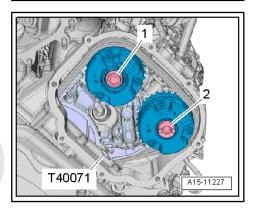
Caution

Risk of damage to engine.

- The camshaft adjusters MUST be installed as described ٠ in the following work steps:
- Fit camshaft adjusters according to marks applied during removal.
- Groove -1- or -4- on camshaft adjuster should align with corresponding adjustment window -2- or -3-.
- Fit camshaft adjusters according to marks applied during re-_ moval.
- Fit timing chain onto drive chain sprocket and camshaft adjusters and fit bolts -1 and 2- without tightening.
- It should just be possible to turn both camshaft adjusters on the camshaft without axial movement.
- Remove locking pin T40071- .









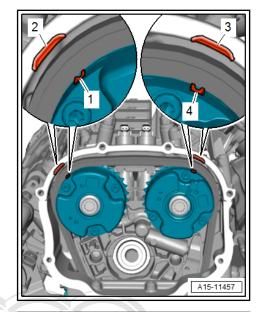
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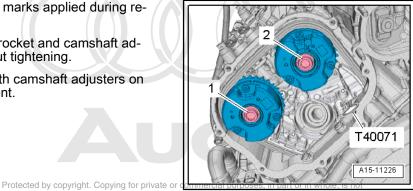
Cylinder bank 2 (left-side):

Caution

Risk of damage to engine.

- The camshaft adjusters MUST be installed as described in the following work steps:
- Fit camshaft adjusters according to marks applied during removal.
- Groove -1- or -4- on camshaft adjuster should align with corresponding adjustment window -2- or -3-.
- Fit camshaft adjusters according to marks applied during removal.
- Fit timing chain onto drive chain sprocket and camshaft adjusters and fit bolts -1 and 2- without tightening.
- It should just be possible to turn both camshaft adjusters on the camshaft without axial movement.
- Remove locking pin T40071- .



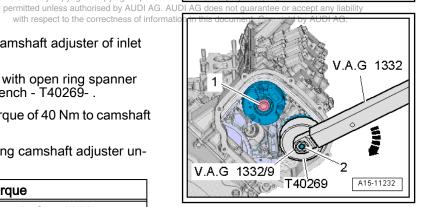


Cylinder bank 1 (right-side):

- Fit special wrench T40269- onto camshaft adjuster of inlet camshaft.
- Apply torque wrench V.A.G 1332- with open ring spanner insert - V.A.G 1332/9- to special wrench - T40269- .
- Have a second mechanic apply a torque of 40 Nm to camshaft adjuster in direction of -arrow-.
- Tighten bolts as follows while keeping camshaft adjuster under tension:

Stage	Bolt	Tightening torque	
1.	-1-	Tighten on camshaft to 60 Nm	
1.	-2-	Tighten on camshaft to 60 Nm	

- Remove special wrench - T40269- .



- Remove camshaft clamp -T40264/1- -arrows-.

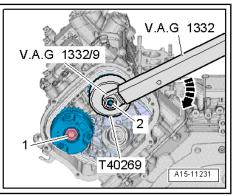
Cylinder bank 2 (left-side):

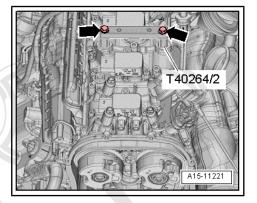
- Fit special wrench T40269- onto camshaft adjuster of exhaust camshaft.
- Apply torque wrench V.A.G 1332- with open ring spanner insert - V.A.G 1332/9- to special wrench - T40269- .
- Have a second mechanic apply a torque of 40 Nm to camshaft adjuster in direction of -arrow-.
- Tighten bolts as follows while keeping camshaft adjuster under tension:

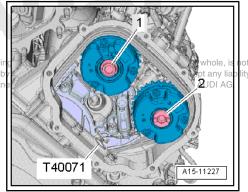
Stage	Bolt	Tightening torque	
1.	-1-	Tighten on camshaft to 60 Nm	
1.	-2-	Tighten on camshaft to 60 Nm	

- Remove special wrench T40269- .
- Remove camshaft clamp -T40264/2- -arrows-.









Cylinder bank 1 (right-side):

 Tighten camshaft adjuster bolts on cylinder head (right-side) as follows:

Stage	Bolt	Tightening torque	Protected by copyrigh permitted unless aut	
2.	-1-	Tighten on camshaft to torque <u>⇒ page 122</u>	o final tightening	correct
2.	-2-	Tighten on camshaft to torque <u>⇒ page 122</u>	final tightening	

Cylinder bank 2 (left-side):

Tighten camshaft adjuster bolts on cylinder head (left-side) as follows:

Stage	Bolt	Tightening torque
2.	-1-	Tighten on camshaft to final tightening torque \Rightarrow page 122
2.	-2-	Tighten on camshaft to final tightening torque \Rightarrow page 122

Continued for both cylinder banks:

Remove camshaft clamp -T40264/3-_

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Turn crankshaft two rotations back to TDC in normal direction of engine rotation -arrow- using wrench (21 mm) - T40263- and turning over tool - T40272- .



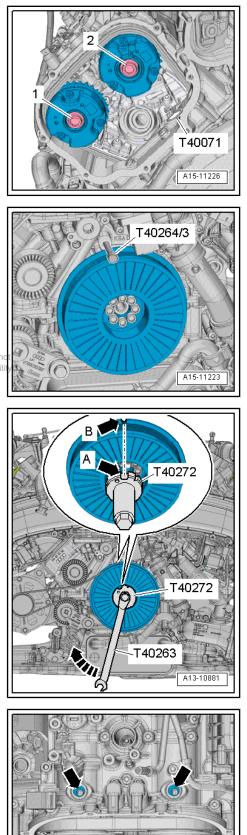
If you turn the crankshaft beyond "TDC" by mistake, turn it back approx. 30° and set to "TDC" again.

The threaded holes -arrows- in the camshafts must face upwards.



Note

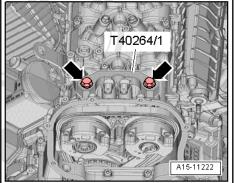
The illustration shows the camshaft housing (right-side).



A15-11220

Cylinder bank 1 (right-side):

- Fit camshaft clamp -T40264/1- on cylinder head (right-side) and tighten -arrows-.
- Tightening torque: 12 Nm



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Cylinder bank 2 (left-side):

- Fit camshaft clamp -T40264/2- on cylinder head (left-side) and tighten -arrows-.
- Tightening torque: 12 Nm

Continued for both cylinder banks:

- Screw camshaft clamp -T40264/3- through bore at vibration damper into cylinder block by hand until it makes contact.
- Camshaft clamp -T40264/3- must engage in locating hole in cylinder block. If it does not, reset valve timing.
- Remove camshaft clamps -T40264/1- and -T40264/2- .
- Remove camshaft clamp -T40264/3- .

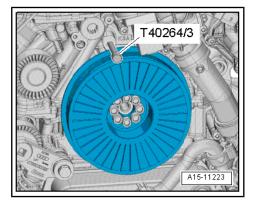
Remaining installation steps are carried out in reverse sequence; note the following:

- Install ignition coil for cylinder "7" ⇒ page 419.
- Install high-pressure pipe <u>⇒ page 390</u>.
- Install electrical wiring ⇒ Electrical system; Rep. gr. 97; Relay carriers, fuse carriers, electronics boxes; Overview of fitting locations relay carriers, fuse carriers, electronics boxes and ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Install vacuum unit for turbocharger ⇒ page 306.
- Install timing chain cover ⇒ page 109.

Tightening torques

- \Rightarrow "2.1 Exploded view camshaft timing chains", page 122
- Drive shaft (right-side) and heat shield ⇒ Running gear, axles, steering; Rep. gr. 40; Drive shaft; Exploded view - drive shaft
- ♦ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Exploded view - wheel housing liner (front)

T40264/2



2.5 Removing and installing camshaft timing chain

Procedure

- Remove timing chain cover (bottom) \Rightarrow page 116.
- Remove timing chains from camshafts \Rightarrow page 127.

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Caution
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If a used timing chain rotates in the opposite direction when it whole, is not AG. AUDI AG does not guarantee or accept any liability formation in this document. Copyright by AUDI AG. is refitted, this can cause breakage AG. AUDI AG does not guarantee or acce

- Mark running direction of timing chain with coloured arrows for re-installation.
- Camshaft timing chains can be removed without removing chain tensioners.
- To remove, camshaft timing chain (right-side) must be guided perfectly straight past guide rail for chain tensioner.

2.6 Removing and installing chain tensioner for camshaft timing chain

Removing

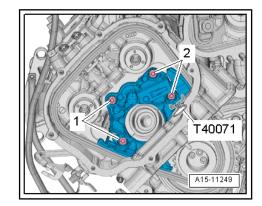
- Remove timing chains from camshafts \Rightarrow page 127.
- Remove bolts -1- and -2- and take off chain tensioner (leftside) and camshaft timing chain (left-side).

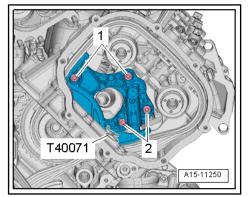
Remove bolts -1- and -2- and take off chain tensioner (rightside) and timing chain (right-side).

Installing



- Note the correct installation position if the tensioning element has been removed from the chain tensioner: drilling in base of housing faces chain tensioner and piston faces tensioner rail.
- Renew the bolts tightened with specified tightening angle.





 Press tensioning rail of chain tensioner for camshaft timing chain (left or right) inwards -arrow- as far as the stop. Then lock chain tensioner by inserting locking pin - T40071-.

- Install chain tensioner on cylinder head (left-side) and fit timing chain as shown in illustration.
- Tighten bolts -1- and -2-.

- Install chain tensioner on cylinder head (right-side) and fit timing chain as shown in illustration.
- Tighten bolts -1- and -2-.

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

- Fit timing chains on camshafts \Rightarrow page 127.

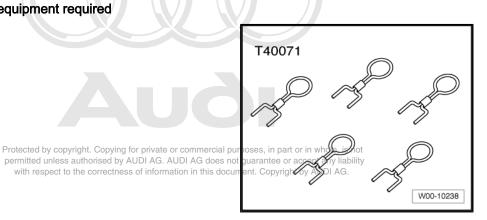
Tightening torques

◆ ⇒ "2.1 Exploded view - camshaft timing chains", page 122

2.7 Removing and installing drive chain for valve gear

Special tools and workshop equipment required

Locking pin - T40071-



Removing

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

T40071

- Remove timing chains from camshafts \Rightarrow page 127.
- Remove chain tensioners for camshaft timing chains ⇒ page 139 .
- Remove drive chain for auxiliary drives \Rightarrow page 141.
- Press guide rail of chain tensioner for drive chain in direction of -arrow- and lock chain tensioner by inserting locking pin -T40071-.



Caution

If a used drive chain rotates in the opposite direction when it is refitted, this can cause breakage.

- Mark running direction of drive chain with coloured arrows for re-installation.
- Unscrew bolts -1- and remove guide rail.
- Remove bolts -2- and take off chain tensioner.

Installing



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

Note

Renew the bolts tightened with specified tightening angle.

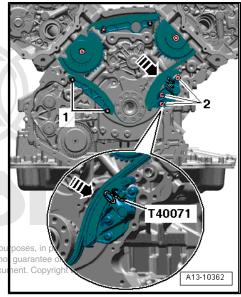
- Position drive chain for valve gear onto drive chain sprockets (according to marks applied during removal).
- Install guide rail and tighten bolts -1-.
- Install chain tensioner and tighten bolts -2-.
- Press guide rail of chain tensioner for drive chain in direction of -arrow- and pull locking pin - T40071- out of chain tensioner.
- Install drive chain for auxiliary drives \Rightarrow page 141.
- Install chain tensioners for camshaft timing chains ⇒ page 139 .
- Fit timing chains on camshafts ⇒ page 127.

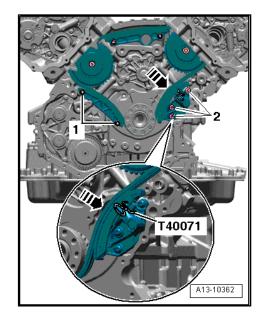
Tightening torques

 \Rightarrow "2.2 Exploded view - drive chain for valve gear", page 125

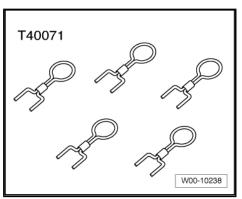
2.8 Removing and installing drive chain for auxiliary drive

Special tools and workshop equipment required





Locking pin - T40071-



Removing

- Gearbox removed ⇒ Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .
- Remove timing chain cover (bottom) ⇒ page 116

Caution

If a used drive chain rotates in the opposite direction when it is refitted, this can cause breakage.

- Mark running direction of drive chain for auxiliary drives with coloured arrows for re-installation.
- Press tensioning rail in direction of -arrow- and lock chain tensioner in place using locking pin - T40071-.

permitted unle

- Unscrew bolt -1- and remove idler sprocket.
- Remove bolts -2, 3, 4- and take off chain tensioner.
- Detach drive chain for auxiliary drives.

Installing

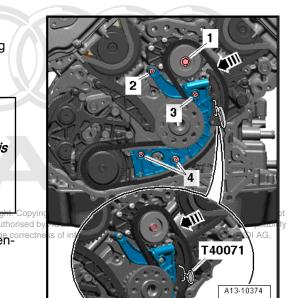
Installation is carried out in the reverse order; note the following:

i Note

- Renew gasket.
- Renew the bolts tightened with specified tightening angle.
- Install timing chain cover (bottom) \Rightarrow page 116.

Tightening torques

♦ ⇒ "2.3 Exploded view - drive chain for auxiliary drive", page 126

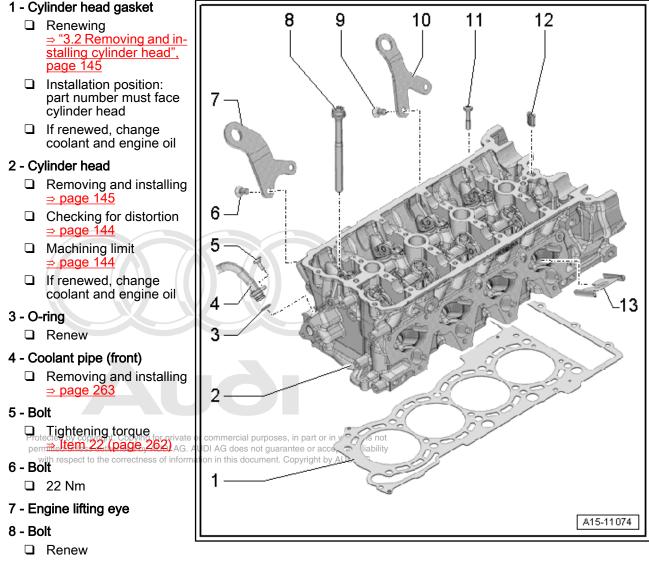


3 Cylinder head

- ⇒ "3.1 Exploded view cylinder head", page 143
- ⇒ "3.2 Removing and installing cylinder head", page 145
- ⇒ "3.3 Checking compression", page 154
- 3.1 Exploded view cylinder head

i Note

Illustration shows the cylinder head for cylinder bank 2 (left-side).



- $\Box \quad \text{Correct sequence when slackening} \Rightarrow \underline{\text{page 151}}$
- □ Tightening torque and sequence \Rightarrow page 144
- 9 Bolt
 - 22 Nm

10 - Engine lifting eye

11 - Bolt

- Renew
- □ Correct sequence when slackening \Rightarrow page 151
- □ Tightening torque and sequence \Rightarrow page 144

12 - Oil strainer

- Clean
- 13 Separating plate

Cylinder head - tightening torque and sequence

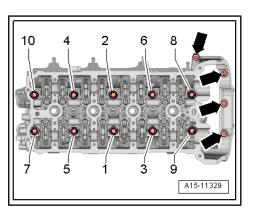
i Note

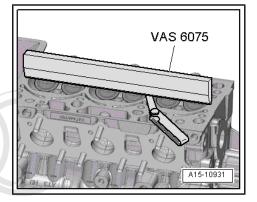
- Renew the bolts tightened with specified tightening angle.
- Illustration shows the cylinder head for cylinder bank 2 (leftside).
- Tighten bolts in stages in the sequence shown:

Stage	Bolts	Tightening torque/angle specification
1.	-1 10-	Screw in by hand until contact is made
2.	-1 10-	30 Nm
3.	-1 10-	60 Nm
4.	-1 10-	Turn 90° further
5.	-1 10-	Turn 90° further
6.	-arrows-	10 Nm
7.	-arrows-	Turn 90° further

Checking cylinder head for distortion

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



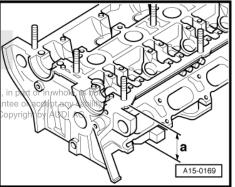


Cylinder head machining limit

Machining of the cylinder head (surface grinding) is only permissible down to the minimum dimension -a-.

Minimum dimension: -a- = 139.5 mm

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3.2 Removing and installing cylinder head

 \Rightarrow "3.2.1 Removing cylinder head, bank 1 (right-side)", page 145

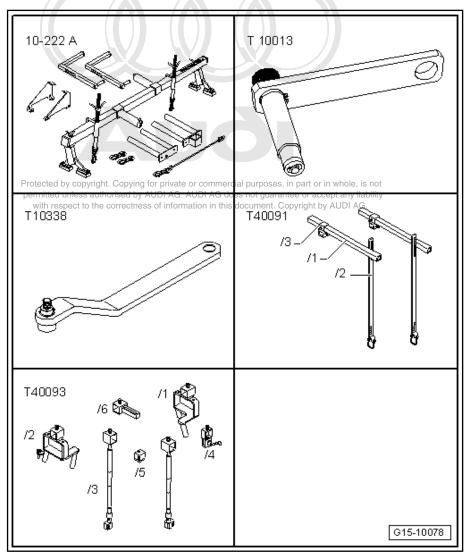
⇒ "3.2.2 Removing cylinder head, bank 2 (left-side)", page 148

⇒ "3.2.3 Installing cylinder head", page 152

3.2.1 Removing cylinder head, bank 1 (right-side)

Special tools and workshop equipment required

- Support bracket 10 222 A-
- Retainer T10013-
- ♦ Stud for bracket T10338-
- Engine support bracket (basic set) - T40091-
- Engine support bracket (supplementary set) -T40093- with -T40093/7and -T40093/8-
- Socket XZN M12 (at least 75 mm), commercially available
- ♦ Sealant ⇒ Electronic parts catalogue



Procedure

- Remove turbocharger (right-side) ⇒ page 309
- Remove camshafts (right-side) ⇒ page 161.
- Remove bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing bumper cover.

Unplug electrical connector -2-.



_

Disregard -item 1-.

Detach coolant valve for cylinder head - N489- from bracket _ and push towards front.

- Set up support bracket 10 222 A- on suspension turrets (left and right) as illustrated.
- A15-11324 A 115 10-222A T40091/4 -T40091/3 T40093/8 T40091/5 T40093/7 A15-11323 T40091/4 10-222A/11 T40093/3 Protected by copyright. Copying for priv or commercial pur permitted unless authorised by AUDI AG document. Copyright by

A19-11418

Set up further tools as shown in illustration.

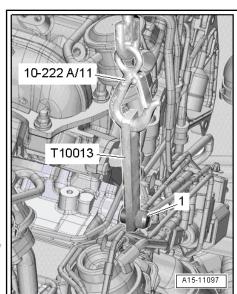
- Secure retainer T10013- in threaded hole (front left) in cylinder block using stud -1- for bracket - T10338- as shown in illustration.
- Engage hook of spindle 10 222 A /11- in retainer T10013and partly take up weight of engine.
- Remove alternator ⇒ Electrical system; Rep. gr. 27; Alternator; Removing and installing alternator.
- Remove engine mounting (right-side) ⇒ page 61.

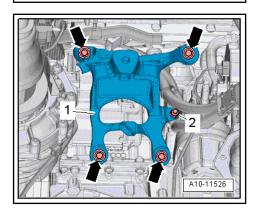
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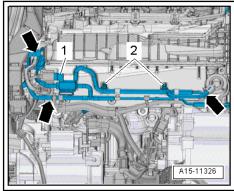
- Remove nut -2- and move earth wire clear.
- Remove bolts -arrows- and detach engine support -1- (rightside).

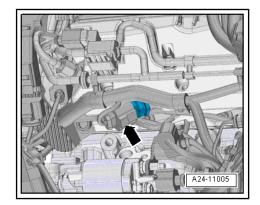
- Disconnect vacuum hoses -arrows-.
- Take intake manifold flap valve N316- -item 1- out of bracket and move electrical wiring clear at intake manifold (right-side) -2-.

 Unplug electrical connector -arrow- for fuel pressure sender -G247-.









Unplug electrical connector -2- for intake manifold flap potentiometer - G336- .



Disregard -item 1-.

- Press noise insulation -1- to the side.
- Unplug electrical connector -arrow- at injectors.

Remove locking pin - T40071- .

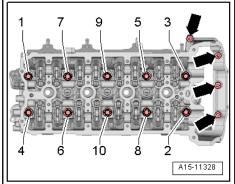
Ĺ

Note

The illustration shows the procedure with the camshafts installed.

A24-11006 1 A15-1132 T40071 B Protected by co 0A\$54,1i225a permitted unles with respect

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Remove bolts -arrows-.

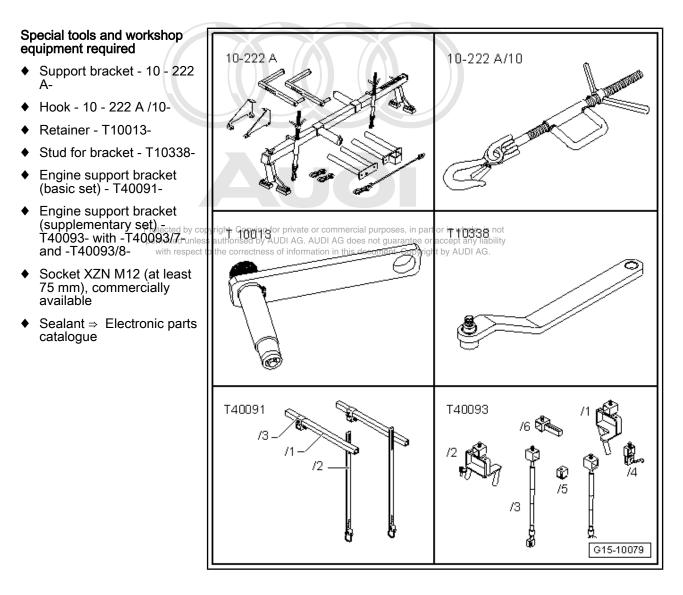
Slacken cylinder head bolts in the sequence -1 ... 10-. _



Illustration shows the cylinder head for cylinder bank 2 (left-side).

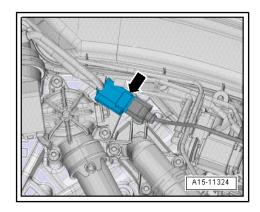
- Remove bolts and carefully take off cylinder head. _
- Place cylinder head onto soft surface (foam plastic).

3.2.2 Removing cylinder head, bank 2 (left-side)



Procedure

- Remove turbocharger (left-side) <u>⇒ page 309</u>.
- Remove camshafts (left-side) ⇒ page 161.
- Remove bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing bumper cover.
- Detach coolant valve for cylinder head N489- -arrow- from bracket and push towards front.



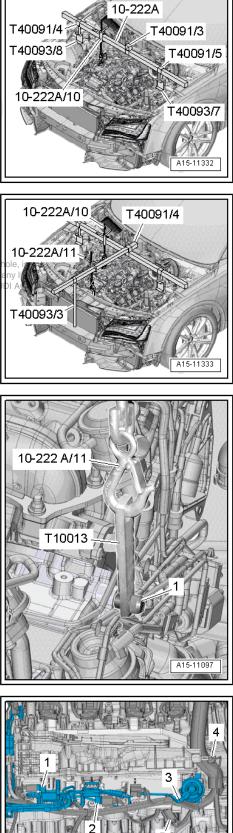
- Set up support bracket 10 222 A- on suspension turrets (left and right) as illustrated.
- Attach hook 10 222 A /10- to engine lifting eye (rear right) and partly take up weight of engine.

- Set up further tools as shown in illustration.

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- Secure retainer T10013- in threaded hole (front left) in cylinder block using stud -1- for bracket - T10338- as shown in illustration.
- Engage hook of spindle 10 222 A /11- in retainer T10013and partly take up weight of engine.
- Remove knock sensor 3 G198- (front left) ⇒ page 425.

- Disconnect vacuum hose -3- and move clear.
- Detach secondary air inlet valves from bracket and move clear to one side:
- 1 Secondary air inlet valve 2 N320-
- 2 Secondary air inlet valve N112-
- Unplug electrical connectors -4, 5- and move clear wiring harness at intake manifold.



A15-11334

 Unplug electrical connector -2- for intake manifold flap potentiometer 2 - G512-.



Disregard -item 1-.

- Press noise insulation to the side.
- Unplug electrical connector -arrow- at injectors.



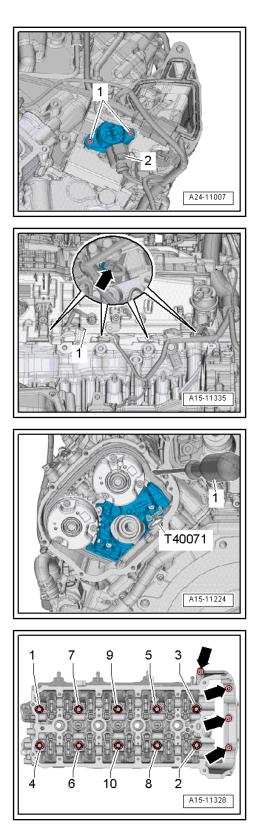
Disregard -item 1-.

- Place subframe in installation position and tighten bolts by hand.
- Remove locking pin T40071- .



The illustration shows the procedure with the camshafts installed.

- Remove bolts -arrows-.
- Slacken cylinder head bolts in the sequence -1 ... 10-.
- Remove bolts and carefully take off cylinder head.
- Place cylinder head onto soft surface (foam plastic).



3.2.3 Installing cylinder head

Procedure





Avoid damage to sealing surfaces.

- Carefully remove sealant residue from cylinder head and cylinder block.
- Ensure that no long scores or scratches are made on the surfaces.

Avoid damage to cylinder block.

No oil or coolant must be allowed to remain in the blind holes for the cylinder head bolts in the cylinder block.

Risk of leaks at cylinder head gasket.

- Carefully remove any sealant residue from the cylinder head and cylinder block. Ensure that no long scores or scratches are made on the surfaces.
- Carefully remove any remaining emery and abrasive material.
- Do not remove new cylinder head gasket from packaging until it is ready to be fitted.
- Handle the cylinder head gasket very carefully to prevent damage to the silicone coating or the indented area of the gasket.

Avoid damage to open valves.

When installing an exchange cylinder head, the plastic protectors fitted to protect the open valves should not be removed until the cylinder head is ready to be fitted.

Avoid damage to valves and piston crowns after working on valve gear.

 Turn the engine carefully at least 2 rotations to ensure that none of the valves make contact when the starter is operated.

Note

- Renew the bolts tightened with specified tightening angle.
- Renew gaskets, seals and O-rings.
- When installing an exchange cylinder head, the contact surfaces between the hydraulic compensation elements, roller rocker fingers and cams must be oiled.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.
- After fitting a new cylinder head or cylinder head gasket, change the engine oil and the coolant in the entire cooling system.

i Note

Illustration shows the cylinder head for cylinder bank 2 (left-side).

- Fit dowel sleeves -arrows-, if not fitted on the cylinder block at the points marked.
- Fit cylinder head gasket onto dowel sleeves in cylinder block.
- Installation position of cylinder head gasket: the word "oben" (top) or the part number should face towards the cylinder head.
- Fit cylinder head.
- Screw in cylinder head bolts by hand until they make contact.
- Tighten cylinder head bolts \Rightarrow page 144.



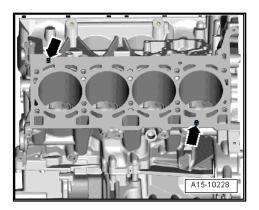
Cylinder head bolts do not have to be torqued down again later after repair work.

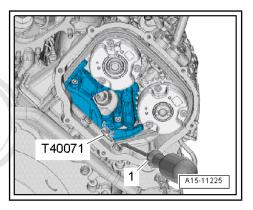
Cylinder bank 1 (right-side):

 Press guide rail of chain tensioner for camshaft timing chain (right-side) inwards as far as the stop using a screwdriver
 -1-. Then lock chain tensioner by inserting locking pin -T40071-.



- The chain tensioner is oil-damped and can therefore only be compressed slowly by applying constant pressure.
- The illustration shows the procedure with the camshafts installed.





Cylinder bank 2 (left-side):

 Press guide rail of chain tensioner for camshaft timing chain (left-side) inwards as far as the stop using a screwdriver -1-. Then lock chain tensioner by inserting locking pin - T40071-.

i Note

- The chain tensioner is oil-damped and can therefore only be compressed slowly by applying constant pressure.
- The illustration shows the procedure with the camshafts installed.

Continuation for both sides:

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

- Install engine support and engine mounting \Rightarrow page 47.
- Install electrical wiring ⇒ Electrical system; Rep. gr. 97; Relay carriers, fuse carriers, electronics boxes; Overview of fitting locations relay carriers, fuse carriers, electronics boxes and ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Install knock sensor 3 G198- ⇒ page 425.
- Install camshafts ⇒ page 161.
- Install turbocharger <u>⇒ page 309</u>.
- Install bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing bumper cover.
- Change engine oil ⇒ Maintenance ; Booklet 410.
- Fill cooling system with fresh coolant <u>⇒ page 236</u>.

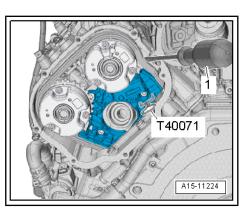
Tightening torques

- ♦ ⇒ Fig. ""Cylinder head tightening torque and sequence with copying for private or commercial purposes, in part or in whole, is not page 144
 ♦ ⇒ Fig. ""Cylinder head tightening torque and sequence with respect to the correctness of information in this document. Copyright by AUDI AG.
- ♦ ⇒ Electrical system; Rep. gr. 27 ; Alternator; Exploded view
 alternator

3.3 Checking compression

Special tools and workshop equipment required

Spark plug socket and extension - 3122 B-





Compression tester - V.A.G 1763-



Procedure

- Engine oil temperature at least 30 °C.
- Battery voltage at least 12.5 V.
- Remove fuse for fuel pump control unit J538- ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Remove ignition coils \Rightarrow page 417.
- Remove spark plugs with spark plug socket and extension -3122 B- .
- Check compression pressure with compression tester V.A.G 1763- .



Using the compression tester \Rightarrow Operating instructions .

- Have a 2nd mechanic press down the accelerator pedal completely and at the same time operate the starter until the pressure on the tester display no longer increases.
- Repeat procedure on each cylinder.

Compression pressure	bar	
	Engine codes CEUA/CTGA	Engine codes CGTA/CTFA
When new	10.0 15.0	9.0 14.0
Wear limit	9.0	8.0
Maximum difference between cylinders	3.0	3.0

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

- Install spark plugs ⇒ Maintenance ; Booklet 410.
- Install ignition coils ⇒ page 417.
- Insert fuse for fuel pump control unit J538- ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Erase any entries in event memory resulting from testing ⇒ Vehicle diagnostic tester, Guided Functions, Interrogate event memory, then Generate readiness code.

4 Valve gear

- ⇒ "4.1 Exploded view valve gear", page 156
- \Rightarrow "4.2 Measuring axial clearance of camshaft", page 160
- ⇒ "4.3 Measuring radial clearance of camshaft", page 161
- ⇒ "4.4 Removing and installing camshaft", page 161
- ⇒ "4.5 Removing and installing cam actuator", page 177
- ⇒ "4.6 Removing and installing camshaft control valves",
- page 179
- ⇒ "4.7 Removing and installing valve stem oil seals", page 181

4.1 Exploded view - valve gear



- Cylinder heads which have cracks between the valve seats or between a valve seat insert and the spark plug thread can be re-installed without reducing service life, provided the cracks are only slight and do not exceed a maximum of 0.3 mm in width, and no more than the first 4 turns of the spark plug threads are cracked.
- Illustration shows the cylinder head for cylinder bank 2 (left-side).



1 - Cylinder head

Checking valve guides ⇒ page 190

2 - Valve stem oil seal

■ Removing and installing ⇒ page 181

3 - Valve spring

□ Allocation \Rightarrow page 159

4 - Valve spring plate

5 - Valve cotters

6 - Hydraulic valve compensation element

- Clipped into roller rocker fingerd_itemy 8th. Copying for pri permitted unless authorised by AUDI.
- Markrinstallation posite of tion for re-installation with a coloured pen
- Lubricate contact surfaces before installing

7 - Securing clip

- Not supplied separately
- Check for firm attachment

8 - Roller rocker finger

- Mark installation position for re-installation with a coloured pen
- Check roller bearings for ease of movement
- Lubricate contact surfaces before installing
- ❑ Allocation to cylinders ⇒ page 159
- □ Attach to hydraulic compensation element -item 6- using securing clip -item 7-

9 - Exhaust camshaft

- □ Removing and installing \Rightarrow page 161
- $\Box \quad \text{Measuring axial clearance} \Rightarrow \underline{\text{page 160}}$
- □ Measuring radial clearance <u>⇒ page 161</u>
- Runout: max. 0.04 mm

10 - Camshaft housing

□ With integrated camshaft bearings

11 - Bolt

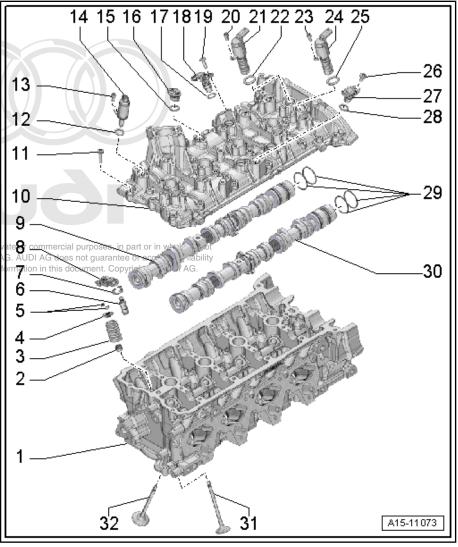
- Renew
- $\hfill\square$ Use old bolts when measuring radial clearance
- $\Box \quad \text{Tightening sequence} \Rightarrow \underline{page 160}$

12 - O-ring

Renew

13 - Bolt

- 5 Nm
- 14 Inlet/exhaust cam actuators -F452- ... -F479-
 - □ Removing and installing \Rightarrow page 177



□ Bringing into installation position <u>⇒ page 159</u>

15 - O-ring

Renew

16 - Sealing plug

Turn anti-clockwise with screwdriver to remove

17 - O-ring

Renew

18 - Hall sender 4 - G301-

- Cylinder bank 1 (right-side): Hall sender 2 G163-
- □ Removing and installing ⇒ page 431

19 - Bolt

□ Tightening torque \Rightarrow page 415

20 - Bolt

□ 5 Nm

21 - Exhaust camshaft control valve 2 - N319-

- Cylinder bank 1 (right-side): exhaust camshaft control valve 1 N318-
- □ Removing and installing <u>⇒ page 179</u>

22 - O-ring

Renew

23 - Bolt

D 5 Nm

24 - Camshaft control valve 2 - N208-

- Cylinder bank 1 (right-side): camshaft control valve 1 N205-
- □ Removing and installing <u>⇒ page 179</u>

25 - O-ring

Renew

26 - Bolt

□ Tightening torque \Rightarrow page 415

27 - Hall sender 3 - G300-

- □ Removing and installing \Rightarrow page 435

28 - O-ring

Renew

29 - Rectangular section seals

- For camshaft adjuster
- □ Renew

30 - Inlet camshaft

- □ Removing and installing <u>⇒ page 161</u>
- □ Measuring axial clearance \Rightarrow page 160
- □ Measuring radial clearance ⇒ page 161
- Runout: max. 0.04 mm

31 - Exhaust valve

- Do not machine, only grinding-in is permitted
- Mark installation position for re-installation
- □ Valve dimensions \Rightarrow page 191
- □ Checking valve guides ⇒ page 190



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32 - Inlet valve

- Do not machine, only grinding-in is permitted
- Mark installation position for re-installation
- □ Valve dimensions \Rightarrow page 191
- □ Checking valve guides \Rightarrow page 190

Bringing actuators for camshaft adjustment into installation position

Caution

Risk of damage to engine.

- Pins of all actuators for camshaft adjustment must be brought into installation position.
- Press down pins of actuators for camshaft adjustment -arrow- by hand.
- Pins of all actuators must not be in extended position.

Allocation of roller rocker fingers to cylinders

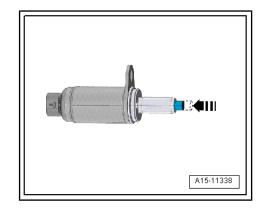
Caution

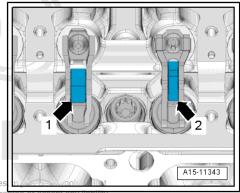
Risk of damage to engine.

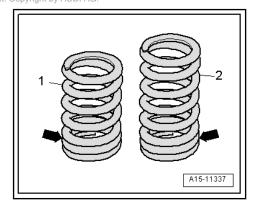
- Note allocation of roller rocker fingers to cylinders
- Roller rocker fingers with wide rollers -arrow 1- correspond to cylinders without cylinder shut-off.
- Roller rocker fingers with narrow rollers -arrow 2- correspond to cylinders with cylinder shut of authorised by AUDI AG. AUDI AG does not guarantee or accept any fla with respect to the correctness of information in this document. Copyright by AUDI AG

Allocation of valve springs

- 1 Short version for inlet valve
- 2 Long version for exhaust valve
- Closely spaced spring coils -arrows- face towards cylinder head.







Camshaft housing - tightening torque and sequence

i Note

Renew the bolts tightened with specified tightening angle.

- Tighten bolts in stages in the sequence shown:

Stage	Bolts	Tightening torque/angle specification
1.	-1 22-	 Screw in by hand until contact is made The camshaft housing should make contact with the cylinder head over the full surface.
2.	-1 22-	8 Nm
3.	-1 22-	Turn 90° further

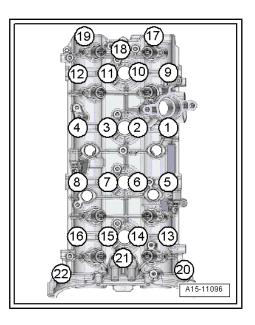
4.2 Measuring axial clearance of camshaft

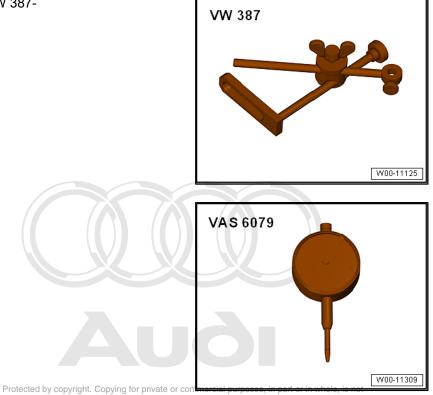
Special tools and workshop equipment required

• Universal dial gauge bracket - VW 387-

Dial gauge - VAS 6079-

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Procedure

- Remove camshaft housing \Rightarrow "4.4 Removing and installing camshaft", page 161
- Fit camshaft to be tested in camshaft housing.
- Attach dial gauge VAS 6079- with dial gauge bracket VW 387- to camshaft housing.
- Press camshaft against dial gauge by hand.
- Set dial gauge to "0".
- Press camshaft away from dial gauge and read off value:
- Axial clearance: 0.100 ... 0.191 mm

4.3 Measuring radial clearance of camshaft

Special tools and workshop equipment required

Plastigage

Procedure



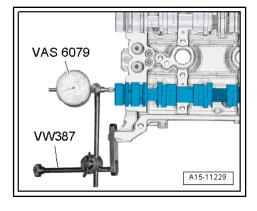
Note by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability Use old bolts when measuring radial clearance. Copyright by AUDI AG.

- Remove camshafts <u>⇒ page 161</u>.
- Mark allocation of roller rocker fingers for re-installation.
- Carefully remove roller rocker fingers and place them on a clean surface.
- Clean bearings and bearing journals.
- Place a length of Plastigage corresponding to the width of the bearing on the bearing journal or bearing shell to be measured.
- The Plastigage must be positioned in the centre of the bearing.
- Re-insert camshafts, fit camshaft housing and secure with old bolts without rotating camshafts \Rightarrow page 160.
- Remove camshaft housing and camshafts again.
- Compare width of Plastigage with measurement scale.

Radial clearance:

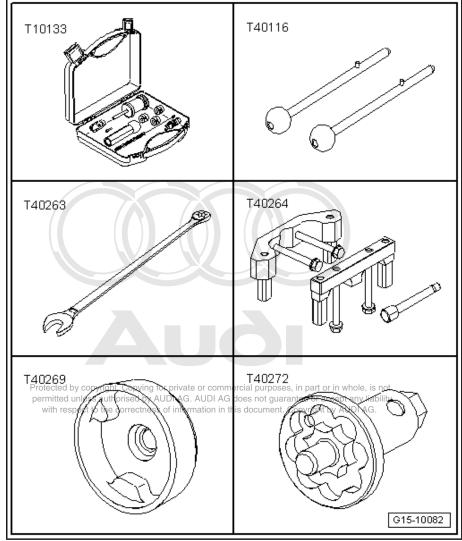
- 24 mm bearing Ø: 0.024 ... 0.066 mm
- 36 mm bearing Ø: 0.032 ... 0.078 mm
- When carrying out final assembly, renew bolts.

4.4 Removing and installing camshaft



Special tools and workshop equipment required

- Impact extractor attachment -T10133/3- from tool set for FSI engines -T10133-
- Locating pins T40116-
- Wrench, 21 mm T40263-
- Camshaft clamp T40264-
- Special wrench T40269-
- Turning-over tool T40272-



- Bolts M6x30
- Electric drill with plastic brush attachment
- Safety goggles
- ◆ Sealant ⇒ Electronic parts catalogue

Removing

- Remove corresponding ignition coils \Rightarrow page 417.
- Remove corresponding high-pressure pump ⇒ page 382.
- Remove corresponding high-pressure pipe ⇒ page 386.
- Remove timing chain from camshafts on relevant side ⇒ page 127 .

- Detach noise insulation -arrow- on relevant side.



Prot Remove camshaft clamp: T40264/3 μαρoses, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



Caution

Avoid damage to valves and piston crowns.

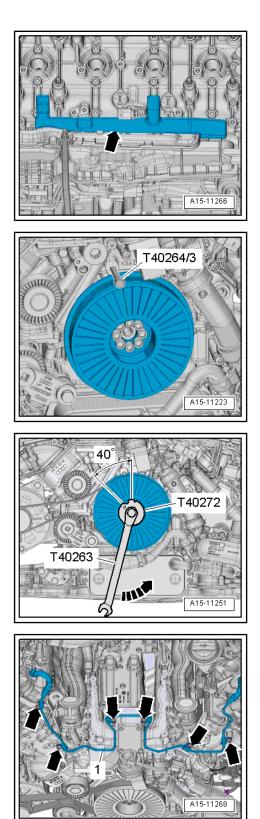
- When performing the following steps, the crankshaft must not be at "TDC" position at any cylinder.
- Using wrench, 21 mm T40263- and turning over tool -T40272-, turn crankshaft back through 40° out of "TDC" position in opposite direction to normal rotation -arrow-.

Cylinder bank 1 (right-side):

- Remove coolant pipe (right-side) ⇒ page 276.
- Remove bolts -arrows- and push fuel line -1- towards front.



Do not attempt to bend fuel line to a different shape.



 Unplug electrical connectors -1, 2- and move electrical wiring harness clear.

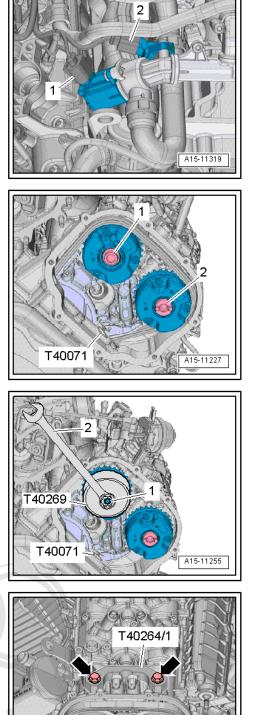
 Attach both camshaft adjusters to cylinder head without camshaft timing chain, fit bolts -1, 2- without tightening.

- Fit special wrench T40269- onto camshaft adjuster of exhaust camshaft (right-side) and counterhold with a ring spanner -2-.
- Hand-tighten bolt -1-.



To loosen bolt for camshaft clamp -T40264/1- , secure exhaust camshaft so that it cannot turn.

- Hold exhaust camshaft in position with ring spanner.
- Remove bolt (left-side) -left arrow- at camshaft clamp -T40264/1- .
- Release ring spanner.
- Exhaust camshaft will then turn slightly in a clockwise direction.



A15-11222



- Fit special wrench T40269- onto camshaft adjuster of inlet camshaft (left-side) and counterhold with a ring spanner -2-.
- Hand-tighten bolt -1-.



To loosen bolt for camshaft clamp -T40264/1-, secure inlet camshaft so that it cannot turn.

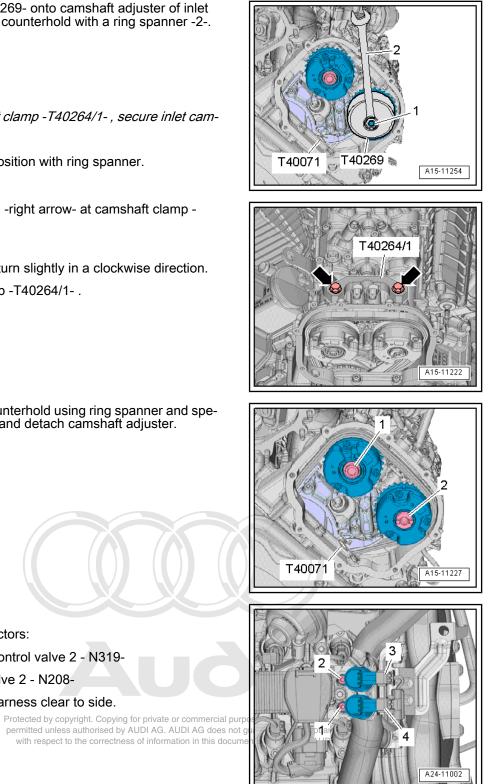
- Hold inlet camshaft in position with ring spanner. _
- Remove bolt (right-side) -right arrow- at camshaft clamp -T40264/1-.
- Release ring spanner.
- Inlet camshaft will then turn slightly in a clockwise direction.
- Remove camshaft clamp -T40264/1- .
- Remove bolts -1, 2- (counterhold using ring spanner and special wrench - T40269-) and detach camshaft adjuster.



- Unplug electrical connectors:
- 3 For exhaust camshaft control valve 2 N319-
- 4 For camshaft control valve 2 N208-
- Move electrical wiring harness clear to side.



Disregard -items 1, 2-.



Remove bolts -arrows- and pivot vacuum unit to one side.



- Do not detach ball head -item 2-.
- Disregard -item 1-.
- Remove bolts -arrows- and push fuel line towards front. _



Note

Do not attempt to bend fuel line to a different shape.

Attach both camshaft adjusters to cylinder head without camshaft timing chain, fit bolts -1, 2- without tightening.



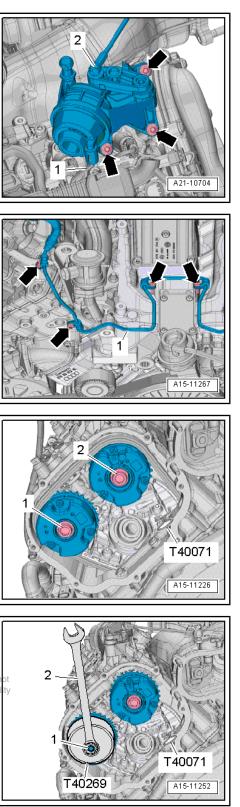
- Fit special wrench T40269- onto camshaft adjuster of inlet _ camshaft (left-side) and counterhold with a ring spanner -2-.
- Hand-tighten bolt -1-.



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To loosen bolt for camshaft clamp -T40264/2- , secure inlet camshaft so that it cannot turn.

Hold inlet camshaft in position with ring spanner. _



- Remove bolt (left-side) -left arrow- at camshaft clamp -T40264/2-.
- Release ring spanner.
- Inlet camshaft will then turn slightly in a clockwise direction.

- Fit special wrench T40269- onto camshaft adjuster of exhaust camshaft (left-side) and counterhold with a ring spanner -2-.
- Hand-tighten bolt -1-.

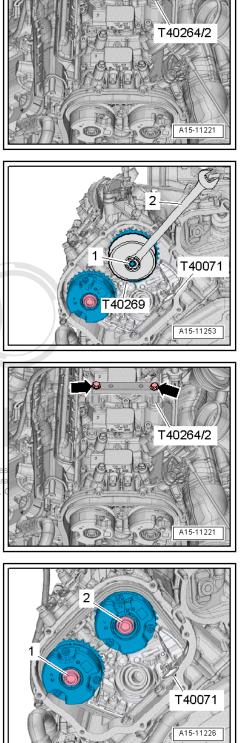


To loosen bolt for camshaft clamp -T40264/2-, secure exhaust camshaft so that it cannot turn.

- Hold exhaust camshaft in position with ring spanner.
- Remove bolt (right-side) -right arrow- at camshaft clamp -T40264/2-.
- Release ring spanner.
- Exhaust camshaft will then turn slightly in a clockwise direction.

Remove camshaft clamp_T40264/2_ potected by Copyright. Copying for private or commercial purpos permitted unless authorised by AUDI AG. AUDI AG does not gue with respect to the correctness of information in this documer

Remove bolts -1, 2- (counterhold using ring spanner and special wrench - T40269-) and detach camshaft adjuster.



Continued for both cylinder banks:

- Slacken and remove bolts in the sequence: -22 ... 1-.



- The illustration shows the camshaft housing (left-side).
- Perform the same procedure (symmetrically opposed) on camshaft housing (right-side).

 Carefully release camshaft housing from bonded joint; to do so, screw bolts M6x30 evenly into threaded holes -arrows-.

i Note

- The illustration shows the camshaft housing (left-side).
- Perform the same procedure (symmetrically opposed) on camshaft housing (right-side).
- Mark allocation of camshafts for re-installation.
- Carefully remove camshafts and place them on a clean surface.

Installing

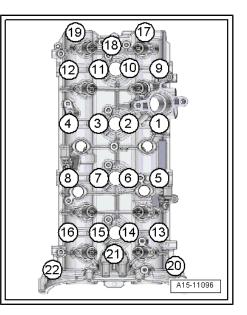
i Note

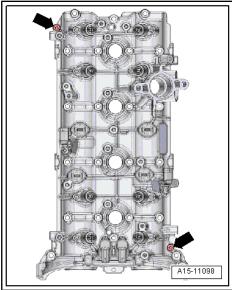
- Renew rectangular section seals.
- Renew the bolts tightened with specified tightening angle.

Caution

Protect lubrication system and bearings against contamination.

Cover exposed parts of the engine.









Risk of eye injury.

- Wear safety goggles.
- Remove remaining sealant from cylinder head and camshaft housing -1- using rotating plastic brush or similar.
- Clean surfaces; they must be free of oil and grease.



Caution

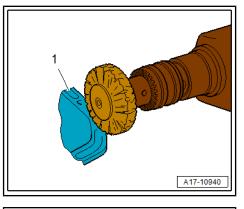
Risk of damage to engine.

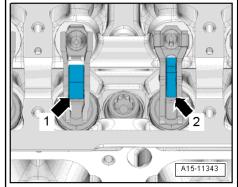
- Note allocation of roller rocker fingers to cylinders
- Install hydraulic compensation elements with roller rocker fingers. Allocation:
- Roller rocker fingers with wide rollers -arrow 1- correspond to cylinders without cylinder shut-off.
- Roller rocker fingers with narrow rollers -arrow 2- correspond to cylinders with cylinder shut-off.
- Oil running surfaces of both camshafts.
- Insert camshafts in cylinder head; note position of camshafts to make sure camshaft housing is fitted free of stress.

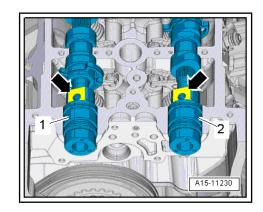
Cylinder bank 1 (right-side):

- 1 Exhaust camshaft
- 2 Inlet camshaft
- Surfaces with threaded holes -arrows- must face slightly to the left (towards centre of engine).
- · The camshafts will settle into the specified position.











Caution

Risk of damage to engine.

- Camshaft sliders must be brought into installation position.
- Bring camshaft sliders into installation position -arrows-:
- Sliders must be moved towards both ends of each camshaft.



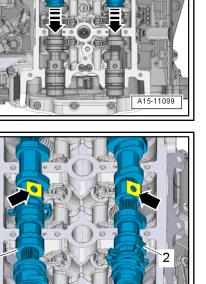
- 1 Inlet camshaft
- 2 Exhaust camshaft
- Surfaces with threaded holes -arrows- must face slightly to the right (towards centre of engine).
- The camshafts will settle into the specified position.

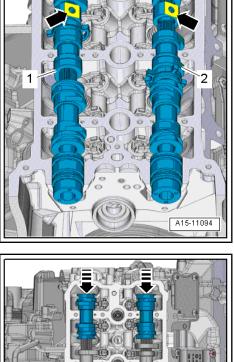


Risk of damage to engine.

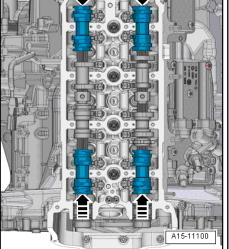
Caution

- Camshaft sliders must be brought into installation position.
- Bring camshaft sliders into installation position -arrows-:
- · Sliders must be moved towards centre of each camshaft.









not bility

Continued for both cylinder banks:

- Check position of ends of rectangular section seals.
- The ends of the rectangular section seals -1 and 2- must point up or down, never to the side.

Risk period by copyright. Copying for private or commercial purposes, in part or in whole, i

 Pins of all actuators for camshaft adjustment must be brought into installation position.

Press down pins of actuators for camshaft adjustment

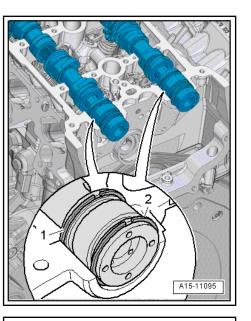
Pins of all actuators must not be in extended position.

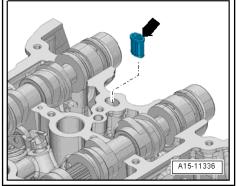
- Clean oil strainer -arrow- and install.

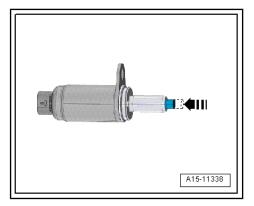
Caution

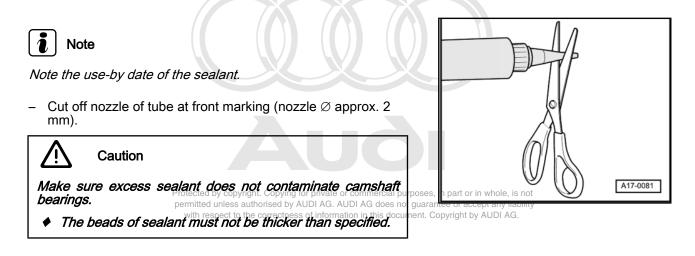
-arrow- by hand.

<u>/!`</u>



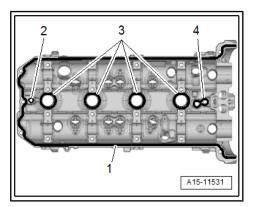






Cylinder bank 1 (right-side):

- Apply beads of sealant -1, 2, 3, 4- onto clean sealing surfaces of camshaft housing, as shown in illustration.
- Width of beads of sealant: 2.5 mm.



Cylinder bank 2 (left-side):

- Apply beads of sealant -1, 2, 3- onto clean sealing surfaces of _ camshaft housing as shown in illustration.
- Width of beads of sealant: 2.5 mm. .

Continued for both cylinder banks:



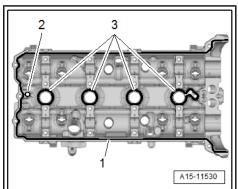
The camshaft housing must be installed within 5 minutes after applying the sealant.

Fit camshaft housing on cylinder head.



Note

Make sure that camshafts can be inserted into axial bearings of camshaft housing without applying force.



Insert locating pins - T40116- in camshaft housing and cylinder head.

After installing the camshaft housing, the sealant must dry for approx. 30 minutes.

Tighten camshaft housing bolts \Rightarrow page 160.

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Note

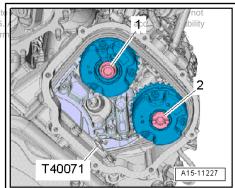
- T40116 T40116 1 1 11 A15-11256 A15-11096
- T10133/3 T40116 T40116 A15-11257

Cylinder bank 1 (right-side):

ing pins - T40116- .

linder bank 1 (right-side): Protected by copyright. Copying for privat permitted unless authorised by AUDI AG Attach both camshaft adjusters to cylinder head without came of infor shaft timing chain, fit bolts -1, 2- without tightening.

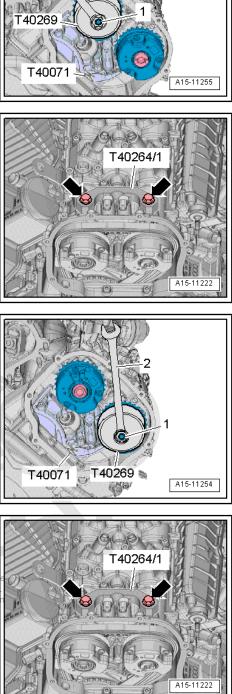
Use impact extractor attachment -T10133/3- to pull out locat-



- Fit special wrench T40269- onto camshaft adjuster of exhaust camshaft (right-side) and counterhold with a ring spanner -2-.
- Hand-tighten bolt -1-.
- Using ring spanner, turn exhaust camshaft clockwise until thread for camshaft clamp is centred at bottom of hole in camshaft housing.
- Tighten bolt (left-side) -left arrow- at camshaft clamp -T40264/1- .

- Fit special wrench T40269- onto camshaft adjuster of inlet camshaft (right-side) and counterhold with a ring spanner -2-.
- Hand-tighten bolt -1-.
- Using ring spanner, turn inlet camshaft clockwise until thread for camshaft clamp is centred at bottom of hole in camshaft housing.
- Tighten bolt (right-side) -right arrow- at camshaft clamp -T40264/1-.

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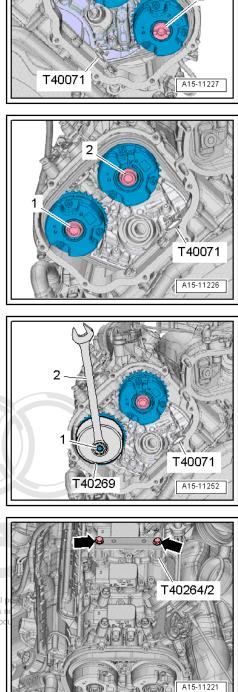
 Remove bolts -1, 2- (counterhold using ring spanner) and detach camshaft adjuster.

Cylinder bank 2 (left-side):

 Attach both camshaft adjusters to cylinder head without camshaft timing chain, fit bolts -1, 2- without tightening.

- Fit special wrench T40269- onto camshaft adjuster of inlet camshaft (left-side) and counterhold with a ring spanner -2-.
- Hand-tighten bolt -1-.
- Using ring spanner, turn inlet camshaft anti-clockwise until thread for camshaft clamp is centred at bottom of hole in camshaft housing.
- Tighten bolt (left-side) -left arrow- at camshaft clamp -T40264/2- .

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BREAK

- Fit special wrench T40269- onto camshaft adjuster of exhaust camshaft (left-side) and counterhold with a ring spanner -2-.
- Hand-tighten bolt -1-.
- Using ring spanner, turn exhaust camshaft anti-clockwise until thread for camshaft clamp is centred at bottom of hole in camshaft housing.

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 Tighten bolt (right-side) -right arrow- at camshaft clamp -T40264/2-.

 Remove bolts -1, 2- (counterhold using ring spanner and special wrench - T40269-) and detach camshaft adjuster.

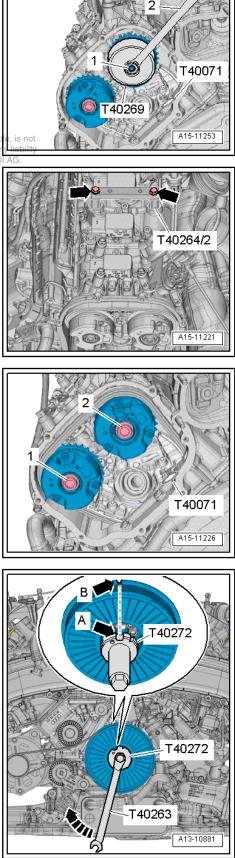
Continued for both cylinder banks:

- Fit turning over tool T40272- onto wrench (21 mm) T40263- .
- Position turning over tool on bolts of vibration damper.
- Semi-circular recess -arrow A- on turning over tool T40272must point to semi-circular recess -arrow B- on vibration damper.

Note

Disregard notch on turning over tool - T40272-.

 Rotate crankshaft in normal direction of rotation -arrow- to "TDC".



 Screw camshaft clamp -T40264/3- through bore at vibration damper into cylinder block by hand until it makes contact; to do so, turn crankshaft slightly backwards and forwards if necessary.

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

- Install vacuum unit for turbocharger <u>⇒ page 306</u>.
- Install coolant pipe (right-side) ⇒ page 261.

Protect Fib_timinghchain on camshafts mipages127 part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability -with Install high-pressure pipeom/page386t. Copyright by AUDI AG.

- Install high-pressure pump <u>⇒ page 382</u>.
- Install ignition coils <u>⇒ page 417</u>.



Avoid damage to valves and piston crowns after working on valve gear.

- The hydraulic tappets have to settle; wait for approx. 30 minutes after installing camshafts before starting engine.
- Turn the engine carefully at least 2 rotations to ensure that none of the valves make contact when the starter is operated.

Tightening torques

- ♦ ⇒ Fig. ""Camshaft housing tightening torque and sequence"", page 160
- ◆ <u>⇒ "3.1 Exploded view coolant pipes", page 261</u>

4.5 Removing and installing cam actuator

Removing

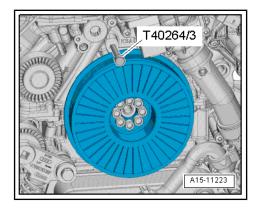
Cylinder bank 1 (right-side):

Remove engine cover panel <u>⇒ page 69</u>.

WARNING

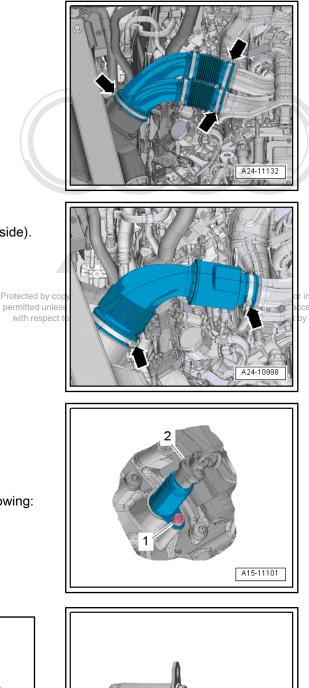
Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.



Vehicles with engine codes CEUA/CTGA:

- Release hose clips -arrows- and remove air pipe.



in whole, is not cept any liability y AUDI AG.

Vehicles with engine codes CGTA/CTFA:

- Release hose clips -arrows- and remove air pipe (right-side).

Continuation for both sides:

- Unplug relevant electrical connector -2-.
- Remove bolt -1- and pull off cam actuator.

Installing

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



Fit new	O-rings
---------	---------

Note



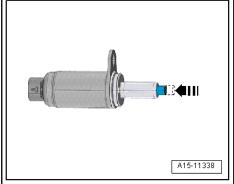
Caution

Risk of damage to engine.

- Pins of all actuators for camshaft adjustment must be brought into installation position.
- Press down pins of actuators for camshaft adjustment -arrow- by hand.
- · Pins of all actuators must not be in extended position.
- Install air ducts with screw-type clips \Rightarrow page 318.

Tightening torques

◆ ⇒ "4.1 Exploded view - valve gear", page 156



4.6 Removing and installing camshaft control valves

 \Rightarrow "4.6.1 Removing and installing camshaft control valves N205 / N318 , cylinder bank 1 (right-side)", page 179

 \Rightarrow "4.6.2 Removing and installing camshaft control valves N208 / N319 , cylinder bank 2 (left-side)", page 180

4.6.1 Removing and installing camshaft control valves -N205- / -N318- , cylinder bank 1 (right-side)

Removing

Remove engine cover panel <u>⇒ page 69</u>.



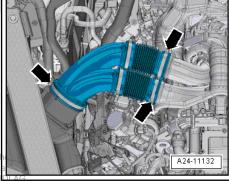
Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

Vehicles with engine codes CEUA/CTGA:

- Release hose clips -arrows- and remove air pipe.





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All vehicles (continued):

- Unplug relevant electrical connector -1-.
- Unscrew bolt -2- and detach valve.

Installing

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

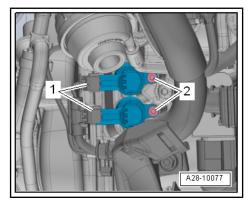


Fit new O-rings.

- Install air ducts with screw-type clips \Rightarrow page 318.

Tightening torques

• \Rightarrow "4.1 Exploded view - valve gear", page 156



4.6.2 Removing and installing camshaft control valves -N208- / -N319- , cylinder bank 2 (left-side)

Removing

Remove engine cover panel <u>⇒ page 69</u>.

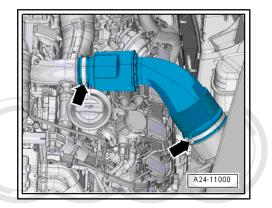
WARNING

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

Vehicles with engine codes CGTA/CTFA:

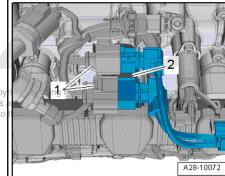
- Release hose clips -arrows- and remove air pipe (left-side).



All vehicles (continued):

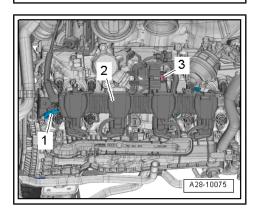
- Take electrical connectors -1- out of bracket -2-, unplug them and move electrical wiring clear.
- Unclip bracket upwards.

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n whole, is not ept any liability / AUDI AG.

 Remove bolt -1- and centre hex stud -3- and press cable guide -2- slightly upwards.



- Unplug electrical connectors -2- and move electrical wiring harness -arrows- clear.
- Press wiring harness to front.
- Unscrew bolt -1- and detach valve.

Installing

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

Fit new O-rings.

Install air ducts with screw-type clips <u>⇒ page 318</u>.

Tightening torques

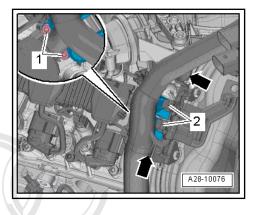
• \Rightarrow "4.1 Exploded view - valve gear", page 156

4.7 Removing and installing valve stem oil seals

⇒ "4.7.1 Removing and installing valve stem oil seals (cylinder) AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

 \Rightarrow "4.7.2 Removing and installing valve stem oil seals (cylinder head removed)", page 185

4.7.1 Removing and installing valve stem oil seals (cylinder head installed)



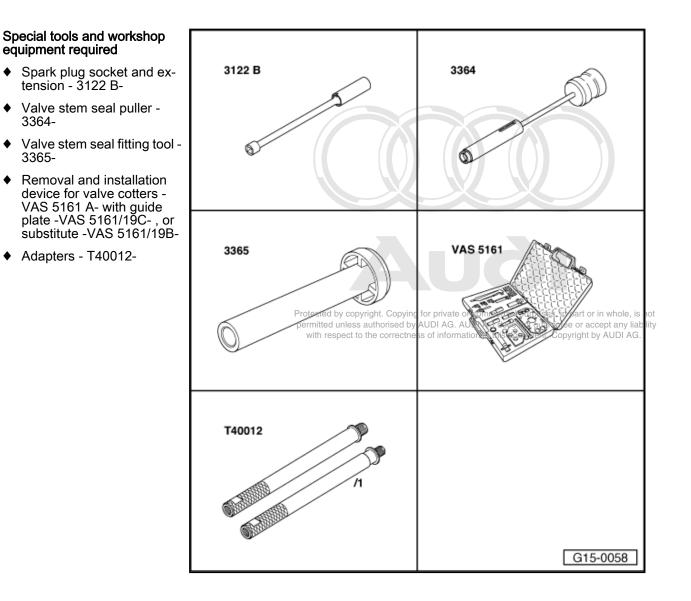
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Modifying guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B- :

i Note

Guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19Bmay also be used instead of guide plate -VAS 5161/19C-. To do so, it must be modified as follows:

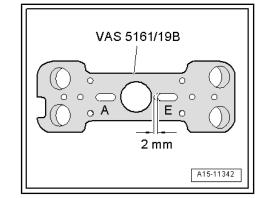
- Lengthen elongated hole by 2 mm, as shown in the illustration.

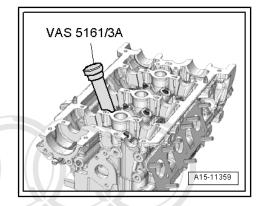
i Note

In this case, the guide plate is only secured on cylinder head with one knurled screw.

Procedure

- Remove both camshafts on both sides ⇒ page 161.
- Mark original positions of roller rocker fingers and hydraulic compensation elements for reinstallation.
- Remove roller rocker fingers together with hydraulic compensation elements and put down on a clean surface.
- Remove spark plugs with spark plug socket and extension -3122 B- .
- Set piston of appropriate cylinder to "bottom dead centre".
- Apply drift -VAS 5161/3A- to valve spring plate and use plasticheaded hammer to release sticking valve cotters.





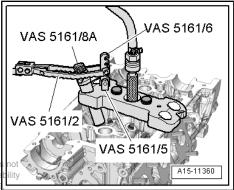
- al and installation nder head. S 5161/12- . Int into the corre-Ing a commercially ant air/ pressure oving for protected or corrections of the correction of the correcti
- Fit guide plate -VAS 5161/19C- from removal and installation device for valve cotters - VAS 5161- on cylinder head.
- Secure guide plate with knurled screws -VAS 5161/12-.
- Screw adapter T40012- with seal hand-tight into the corresponding spark plug thread.
- Connect adapter to compressed air line using a commercially available connection piece, and apply constant air pressure print of pressure pressure print of pressure pressure print of pressure print of pressure pressure print of pressure pressure print of pressure pressure print of pressure pressure print of pressure pressure pressure print of pressure pressure print of pressure pressure pressure pressure pressure print of pressure press
- Minimum pressure: 6 bar

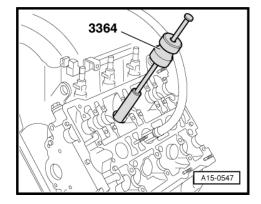
- Screw snap-in device -VAS 5161/6- with engaging fork -VAS 5161/5- into guide plate.
- Insert assembly cartridge -VAS 5161/8A- in guide plate.
- Attach pressure fork -VAS 5161/2- to snap-in device and push assembly cartridge down.
- At the same time, turn knurled screw of assembly cartridge clockwise until tips engage in valve cotters.
- Move knurled screw back and forth slightly; the valve cotters are thus forced apart and taken up by the assembly cartridge.
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- Release pressures fork orised by AUDIAG. AUDIAG does not guarantee or accept any list with respect to the correctness of information in this document. Copyright by AUDIAG
- Take out assembly cartridge.

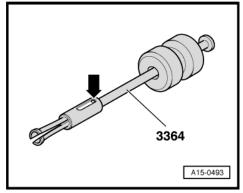
follows:

extractor attachment.

- Detach guide plate and turn to one side.
- The compressed air hose remains connected.
- Detach valve spring with valve spring plate.
- Pull off valve stem oil seal with valve stem seal puller 3364-.





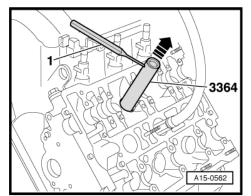


- Apply bottom section of puller -3364- to valve stem oil seal.

If the valve stem seal puller - 3364- cannot be used on some of the valve stem oil seals due to the confined space, proceed as

Knock out pin -arrow- of puller using a drift and remove impact

- Secure puller with a punch or roll-pin drift -1-, as shown in illustration.
- Apply assembly lever to puller and pull out valve stem oil seal -arrow-.





Caution

Make sure valve stem oil seals are not damaged when installing.

New valve stem oil seals -B- are supplied with plastic sleeve; fit plastic sleeve -A- onto valve stem.

- Lightly oil sealing lip of valve stem oil seal.
- Slide valve stem oil seal onto plastic sleeve.
- Carefully press valve stem oil seal onto valve guide using valve stem seal fitting tool - 3365-.
- Remove plastic sleeve.

If valve cotters have been removed from assembly cartridge, they must first be inserted in insertion device -VAS 5161/18- .

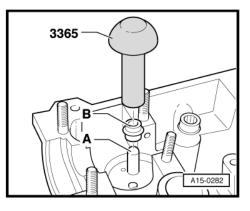
- · Larger diameter of valve cotters faces upwards.
- Press assembly cartridge onto insertion device from above and pick up valve cotters.
- Insert valve spring and valve spring plate; for allocation, refer to <u>⇒ page 159</u>.
- Secure guide plate -VAS 5161/19C- back onto cylinder head.
- Insert assembly cartridge in guide plate.
- Press down pressure fork and pull knurled screw upwards while turning screw in both directions - this will insert the valve cotters.
- Release pressure fork with knurled screw still in pulled position.
- Repeat procedure for each valve.

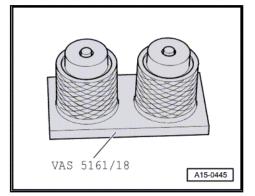
Assembling

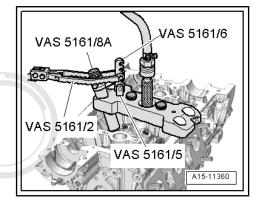
- Ensure that all roller rocker fingers make contact with the ends of the valve stems correctly and are clipped onto their respective hydraulic compensation elements.
- Install spark plugs ⇒ Maintenance ; Booklet 410 .
- Install camshafts <u>⇒ page 161</u>.

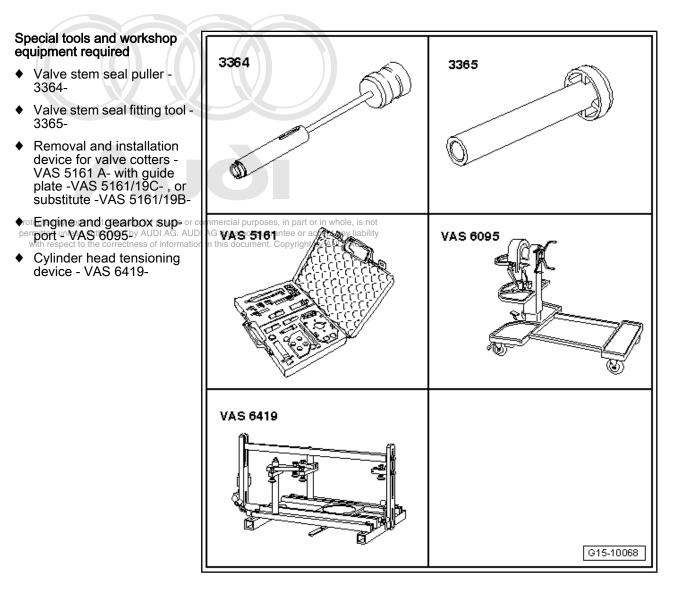
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4.7.2 Removing and installing valve stem oil seals (cylinder head removed)









Modifying guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B- :



Guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19Bmay also be used instead of guide plate -VAS 5161/19C-. To do so, it must be modified as follows:

- Lengthen elongated hole by 2 mm, as shown in the illustration.

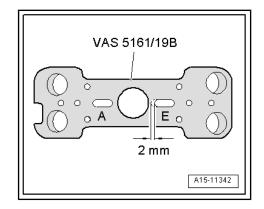
Note

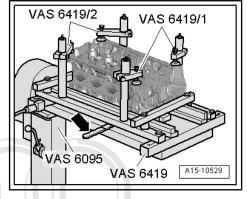
In this case, the guide plate is only secured on cylinder head with one knurled screw.

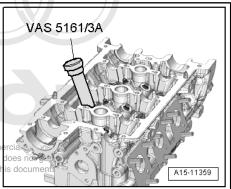
Procedure

- Remove camshafts ⇒ page 161.
- Mark original positions of roller rocker fingers and hydraulic compensation elements for reinstallation.
- Remove roller rocker fingers together with hydraulic compensation elements and put down on a clean surface.
- Insert cylinder head tensioning device VAS 6419- into engine and gearbox support - VAS 6095-.
- Secure cylinder head in cylinder head tensioning device, as shown in illustration.
- Connect cylinder head tensioning device to compressed air.
- Using lever -arrow-, slide air pad under combustion chamber where valve stem oil seal is to be removed.
- Apply just enough compressed air to bring air pad into contact with valve heads.
- Apply drift -VAS 5161/3A- to valve spring plate and use plasticheaded hammer to release sticking valve cotters.

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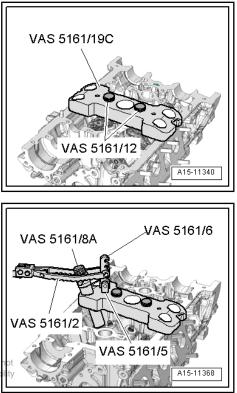


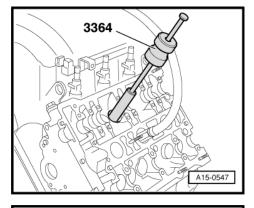


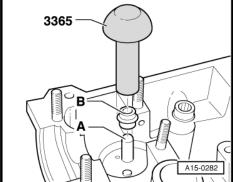


- Fit guide plate -VAS 5161/19C- from removal and installation device for valve cotters - VAS 5161- on cylinder head.
- Secure guide plate with knurled screws -VAS 5161/12-.

- Screw snap-in device -VAS 5161/6- with engaging fork -VAS 5161/5- into guide plate.
- Insert assembly cartridge -VAS 5161/8A- in guide plate.
- Attach pressure fork -VAS 5161/2- to snap-in device and push assembly cartridge down.
- At the same time, turn knurled screw of assembly cartridge clockwise until tips engage in valve cotters.
- Move knurled screw back and forth slightly; the valve cotters are thus forced apart and taken up by the assembly cartridge.
- Release pressure sources of horized by AUDI AG. AUDI AG does not guarantee or accept any liab pressure sources of information in this document. Copyright by AUDI AG.
- Take out assembly cartridge.
- Detach guide plate and turn to one side.
- Detach valve spring with valve spring plate.
- Pull off valve stem oil seal with valve stem seal puller 3364-.







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Caution

Make sure valve stem oil seals are not damaged when installing.

- New valve stem oil seals -B- are supplied with plastic sleeve; fit plastic sleeve -A- onto valve stem.
- Lightly oil sealing lip of valve stem oil seal.
- Slide valve stem oil seal onto plastic sleeve.
- Carefully press valve stem oil seal onto valve guide using valve stem seal fitting tool 3365-.
- Remove plastic sleeve.

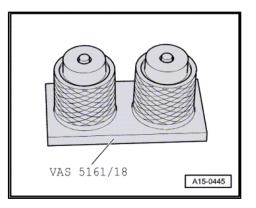
If valve cotters have been removed from assembly cartridge, they must first be inserted in insertion device -VAS 5161/18- .

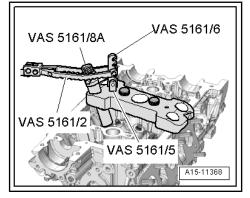
- · Larger diameter of valve cotters faces upwards.
- Press assembly cartridge onto insertion device from above and pick up valve cotters.
- Insert valve spring and valve spring plate; for allocation, refer to <u>⇒ page 159</u>.
- Secure guide plate -VAS 5161/19C- back onto cylinder head.
- Insert assembly cartridge in guide plate.
- Press down pressure fork and pull knurled screw upwards while turning screw in both directions - this will insert the valve cotters.
- Release pressure fork with knurled screw still in pulled position.
- Repeat procedure for each valve.

Assembling

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

- Ensure that all roller rocker fingers make contact with the ends of the valve stems correctly and are clipped onto their respective hydraulic compensation elements.
- Install camshafts ⇒ page 161.







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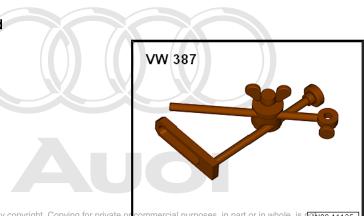
5 Inlet and exhaust valves

⇒ "5.1 Checking valve guides", page 190

- ⇒ "5.2 Checking valves", page 191
- ⇒ "5.3 Valve dimensions", page 191
- 5.1 Checking valve guides

Special tools and workshop equipment required

Universal dial gauge bracket - VW 387-



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Dial gauge - VAS 6079-٠



Procedure



- Note
- If the valve has to be renewed as part of a repair, use a new valve for the measurement.
- Only insert inlet valve into inlet valve guide and exhaust valve into exhaust valve guide, as the stem diameters are different.

- Secure dial gauge VAS 6079- to cylinder head with universal dial gauge bracket - VW 387- as shown in illustration.
- Insert valve into guide.
- End of valve stem must be flush with valve guide.
- Measure the amount of sideways play.
- Wear limit: 0.8 mm.
- If the wear limit is exceeded, repeat the measurement with new valves.
- Renew cylinder head if wear limit is still exceeded.



Valve guides cannot be renewed.

5.2 Checking valves

- Visually inspect for scoring on valve stems and valve seat surfaces.
- Renew valve if scoring is clearly visible.

5.3 Valve dimensions



Note

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not Inlet and exhaust valves must not be machined. Only grinding, in is permitted the correctness of information in this document. Copyright by AUDI AG.

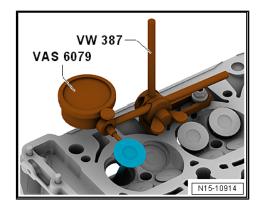
Dimension		Inlet valve	Exhaust valve
Ø a	mm	33.85 ± 0.10	28.0 ± 0.1
Ø b	mm	5.98 ± 0.007	5.935 ± 0.007
с	mm	103.97 ± 0.20	101.87 ± 0.2
α	∠°	45	45

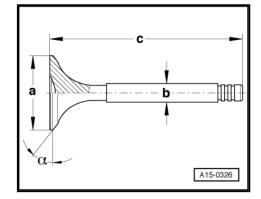


WARNING

Care must be taken when disposing of old sodium-cooled exhaust valves - risk of injury.

- The valves must be sawn in two with a metal saw between the centre of the stem and valve head. When doing so, the valves must not come into contact with water.
- Then throw a maximum of ten valves into a bucket of water and step away immediately.
- A sudden chemical reaction will occur upon contact with water in which the sodium filling burns.
- After performing these steps the valves can be disposed of in the normal way.





17 – Lubrication

1 Sump/oil pump

- ⇒ "1.1 Exploded view sump/oil pump", page 192
- ⇒ "1.2 Engine oil", page 196
- \Rightarrow "1.3 Removing and installing sump (bottom section)", page 196
- ⇒ "1.4 Removing and installing sump (top section)", page 199
- ⇒ "1.5 Removing and installing oil pump", page 203

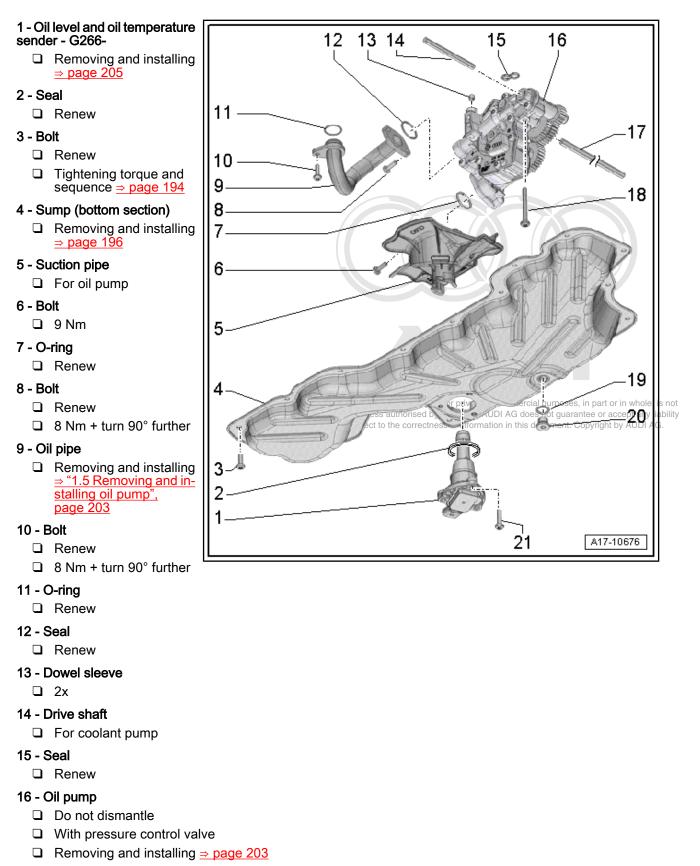
 \Rightarrow "1.6 Removing and installing oil level and oil temperature sender G266 ", page 205

1.1 Exploded view - sump/oil pump

🚺 Note

If large quantities of metal shavings or abrasion are found when performing engine repairs, this may be an indication of damage to the crankshaft or conrod bearings. To prevent further damage, the following steps are required after completion of repair work: clean the oil passages carefully and renew the oil spray jets, engine oil cooler and oil filter element.

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17 - Drive shaft

□ For oil pump

18 - Bolt

Renew

- □ 8 Nm + turn 90° further
- 19 Seal
 - Renew
- 20 Oil drain plug
 - 20 Nm
- 21 Bolt
 - 🗅 9 Nm

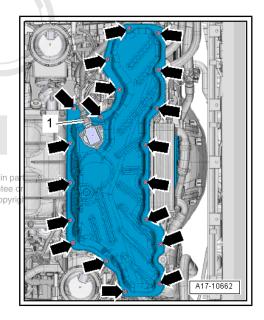
Sump (bottom section) - tightening torque and sequence



Renew the bolts tightened with specified tightening angle.

- Tighten bolts in stages as follows:

Stage	Bolts	Tightening torque/angle specification	
1.		Screwin by hand until contact is made	
2.	-arrows- ^{permin} with	ted unless authorised by AUDI AG, AUDI AG does not gua Respective to the competition of the spectra of the spec	rant Co
3.	-arrows-	Turn 90° further	



Sump (top section)

1 - O-ring

- For vehicles with engine codes CGTA/CTFA
- Renew

2 - Temperature regulator

- For vehicles with engine codes CGTA/CTFA
- Comprised of thermal element, spring and cap

3 - Circlip

- For temperature regulator
- □ For vehicles with engine codes CGTA/CTFA

4 - Sump (top section)

□ Removing and installing ⇒ page 199

5 - Oil lines

□ For vehicles with engine codes CGTA/CTFA

6 - Bolts

- □ For vehicles with engine codes CGTA/CTFA
- 9 Nm

7 - O-rings

- □ For vehicles with engine codes CGTA/CTFA
- Renew

8 - O-ring

Renew

9 - Gaskets

Renew

10 - O-ring

Renew

11 - Engine oil cooler (front)

- □ Removing and installing \Rightarrow page 208
- □ If renewed, refill system with fresh coolant

12 - Bolt

□ Tightening torque <u>⇒ Item 2 (page 206)</u>

13 - Bolt

🛛 8 Nm

14 - Cover

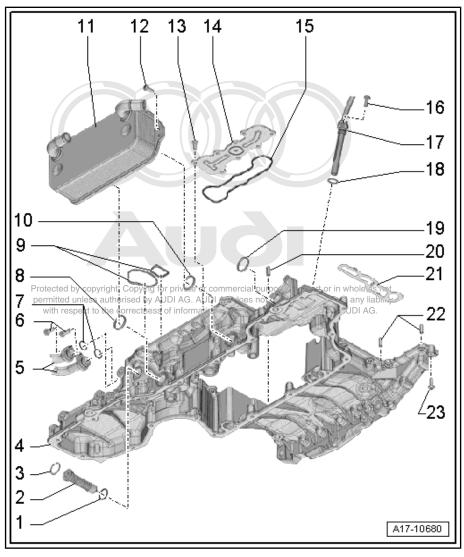
- 15 Gasket
 - Renew

16 - Bolt

🗅 9 Nm

17 - Guide tube

For oil dipstick



- 18 O-ring
 - Renew
- 19 O-ring
 - Renew
- 20 Dowel pin
- 21 Gasket
 - Renew
- 22 Dowel pins
- 23 Bolt
 - □ Tightening torque and sequence \Rightarrow page 196

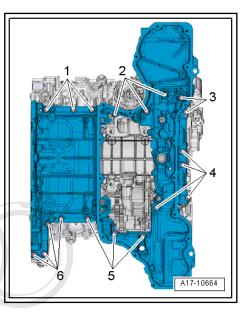
Sump (top section) - tightening torque and sequence



Renew the bolts tightened with specified tightening angle.

- Tighten bolts in stages as follows:

Stage	Bolts	Tightening torque/angle specification
1.	-1 6-	Screw in by hand until contact is made
2.	-1 6-	5 Nm in diagonal sequence
3.	-1 6-	Turn 90° further in diagonal sequence



1.2 Engine oil

Refer to \Rightarrow Maintenance tables for engine oil capacity, oil specifications and viscosity grades.



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The oil level must not be above the "MAX" mark on the dipstick.

1.3 Removing and installing sump (bottom section)

Special tools and workshop equipment required

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

Removing

Engine oil drained \Rightarrow Maintenance ; Booklet 410.

- Remove noise insulation (rear) ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.
- Remove bolt -2- at coolant pipe (bottom left).



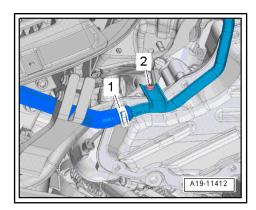
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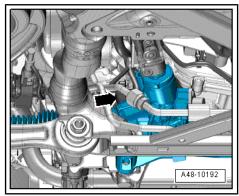
- Unplug electrical connector -arrow- on steering rack.

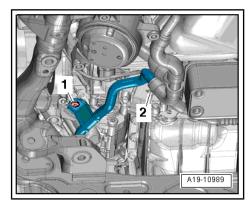




Disregard -item 2-.







Unplug electrical connector -1- at oil level and oil temperature sender - G266-.



Caution

Take care to keep components clean.

- There will still be some oil in the sump (bottom section).
- Loosen bolts -arrows- in diagonal sequence and remove.

i Note

A thin spatula is a suitable tool for releasing the sump (bottom section).

Carefully release sump (bottom section) from bonded joint and detach.

Installing



Protect lubrication system and bearings against contamination.

• Cover exposed parts of the engine.

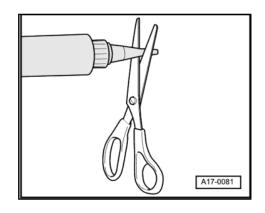
ted by WARPINGED for private or commercial purposes, in part or in whole, is no ted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG. Risk of eye injury.

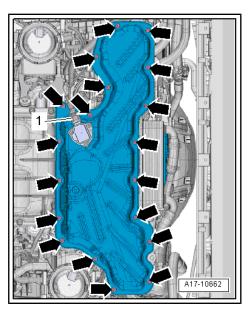
- Wear safety goggles.
- Remove remaining sealant on bottom section -1- and top section of sump with a rotating plastic brush or similar.
- Clean surfaces; they must be free of oil and grease.

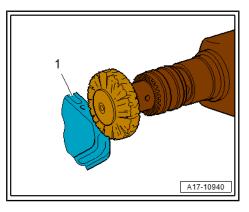


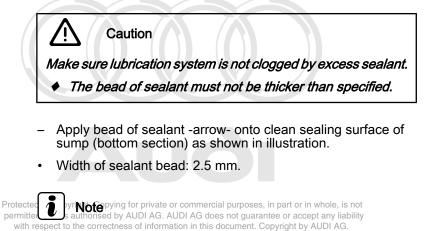
Note the use-by date of the sealant.

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









The sump (bottom section) must be installed within 5 minutes after applying the sealant.

- Fit sump (bottom section) and tighten bolts \Rightarrow page 194.

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

- Install coolant pipe (bottom left) <u>⇒ page 261</u>.
- Fill with engine oil and check oil level \Rightarrow Maintenance ; Booklet 410 .

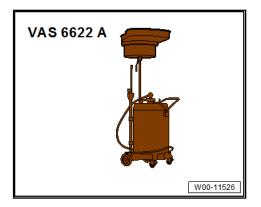
Tightening torques

- ♦ ⇒ Fig. "Sump (bottom section) tightening torque and sequence", page 194
- ♦ ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view noise insulation

1.4 Removing and installing sump (top section)

Special tools and workshop equipment required

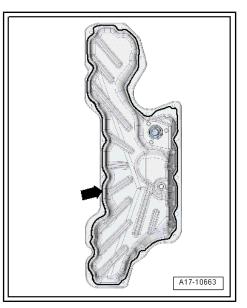
Used oil collection and extraction unit - VAS 6622A-



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

Removing

 Engine removed and secured to engine and gearbox support ⇒ page 38

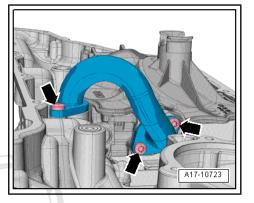


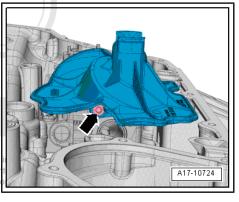
- Engine oil drained ⇒ Maintenance ; Booklet 410 .
- Remove timing chain cover (bottom) ⇒ page 116.
- Remove sump (bottom section) <u>⇒ page 196</u>.
- Remove coolant pump <u>⇒ page 251</u>.
- Place used oil collection and extraction unit VAS 6622A- under engine and leave in position for the following procedure.



Some oil will come out when oil pipe is removed.

- Remove bolts -arrows- and take out oil pipe.
- Remove bolt -arrow- and take out intake connecting pipe.
- Remove poly V-belt tensioner <u>⇒ page 72</u>.

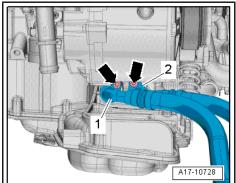




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Vehicles with engine oil cooler (right-side):

- Remove bolts -arrows- and disconnect oil lines -1, 2-.



All vehicles (continued):

- Move clear electrical wiring at guide tube for oil dipstick.
- Remove bolt -1-, unclip guide tube -2- for oil dipstick from intake manifold and detach.

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- Unplug electrical connector -1-.

Note

Disregard -item 2-.

- Slacken bolts -1 ... 6- in diagonal sequence and remove.
- Carefully release sump (top section) from bonded joint, pry sump off dowel sleeves and detach.

Installing



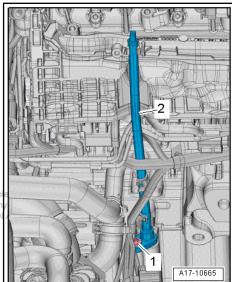
- Renew gaskets and O-rings.
- Renew the bolts tightened with specified tightening angle.

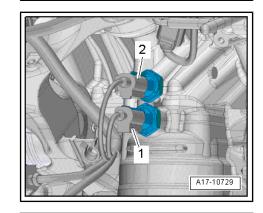


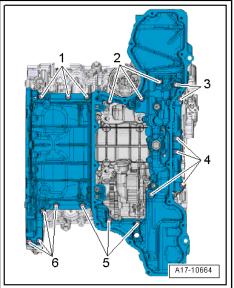
Caution

Protect lubrication system and bearings against contamination.

• Cover exposed parts of the engine.









WARNING

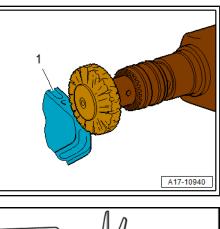
Risk of eye injury.

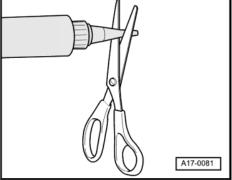
- Wear safety goggles.
- Remove remaining sealant from sump (top section) and retaining frame -1- using rotating plastic brush or similar.
- Clean surfaces; they must be free of oil and grease.

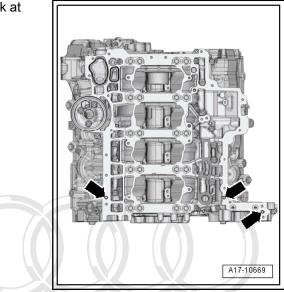


Note the use-by date of the sealant.

- Cut off nozzle of tube at front marking (nozzle \varnothing approx. 1.5 mm).
- Fit dowel sleeves -arrows-, if not fitted on the cylinder block at the points marked.









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- Fit new gaskets -3, 4- in grooves on retaining frame.
- Secure steel gasket -5- on retaining frame.

Caution

Make sure lubrication system is not clogged by excess sealant.

- The bead of sealant must not be thicker than specified.
- Apply beads of sealant -1, 2- onto clean sealing surface of sump (top section) as shown in illustration.
- Width of sealant bead: 2.0 mm.



Note

The sump (top section) must be installed within 5 minutes after applying the sealant.

- Fit sump (top section) and tighten bolts \Rightarrow page 196.

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

- Install poly V-belt tensioner \Rightarrow page 72.
- Install coolant pump \Rightarrow page 251.
- Install sump (bottom section) \Rightarrow page 196.
- Install timing chain cover (bottom) <u>⇒ page 116</u>.

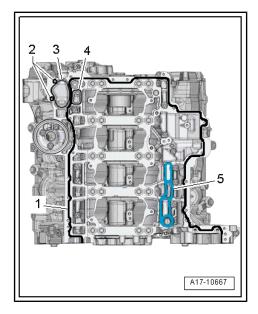
Tightening torques

 \Rightarrow Fig. ""Sump (top section) - tightening torque and sequence"", page 196

1.5 Removing and installing oil pump

Special tools and workshop equipment required

 Used oil collection and extraction unit VAS 6622A-Copying for private oil collection and extraction unit of the second private of the second rised by AUDI AG. AU with respect to the correctness of informati





Removing

- Gearbox removed ⇒ Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .
- Remove spur gear drive ⇒ page 91.
- Remove coolant pump <u>⇒ page 251</u>.
- Remove sump (bottom section) <u>⇒ page 196</u>.
- Detach coolant pump drive shaft -arrow- from oil pump.
- Place used oil collection and extraction unit VAS 6622A- under engine and leave in position for the following procedure.

i Note

Some oil will come out when oil pipe is removed.

- Remove bolts -arrows- and take out oil pipe.
- Remove bolt -arrow- and take out intake connecting pipe.

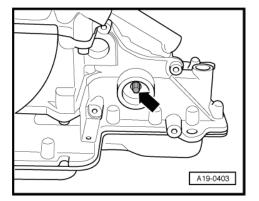
- Remove bolts -arrows- and detach oil pump.

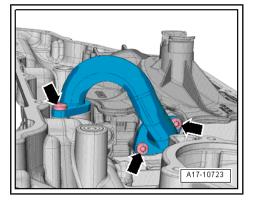
Installing

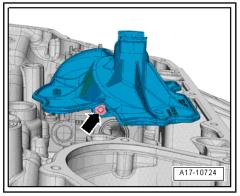
Installation is carried out in the reverse order; note the following:

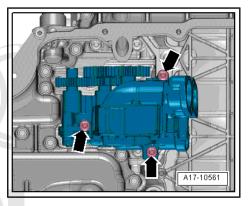
Note

- Renew gaskets and O-ring.
- Renew the bolts tightened with specified tightening angle.









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- Fit gasket -1- for oil pump.
- Fit gasket onto connections -arrow A- next to spur gears.
- No gasket is fitted on second connection -arrow B-.
- − Install sump (bottom section) \Rightarrow page 196.
- Install coolant pump ⇒ page 251.
- Install spur gear drive ⇒ page 91.
- Fill with engine oil and check oil level \Rightarrow Maintenance ; Booklet 410 .

i Note

Do not reuse coolant.

Fill up with coolant <u>⇒ page 236</u>.

Tightening torques

1.6 Removing and installing oil level and oil temperature sender - G266-

Removing

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- Engine oil drained → Mainteenance or Becklet inft fution in this document. Copylight by AUDI AG. (1)
- Unplug electrical connector -3-.
- Remove bolts -1- and detach oil level and oil temperature sender - G266- -item 4-.

Installing

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

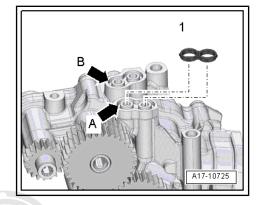
Note

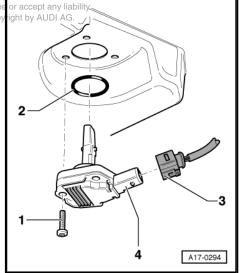
Renew seal -2-.

- Fill with engine oil and check oil level \Rightarrow Maintenance ; Booklet 410 .

Tightening torques

◆ ⇒ "1.1 Exploded view - sump/oil pump", page 192





2 Engine oil cooler

- ⇒ "2.1 Exploded view engine oil cooler", page 206
- ⇒ "2.2 Removing and installing engine oil cooler", page 208
- 2.1 Exploded view engine oil cooler
- ⇒ "2.1.1 Exploded view engine oil cooler (front)", page 206

 \Rightarrow "2.1.2 Exploded view - engine oil cooler (right-side)", page 207

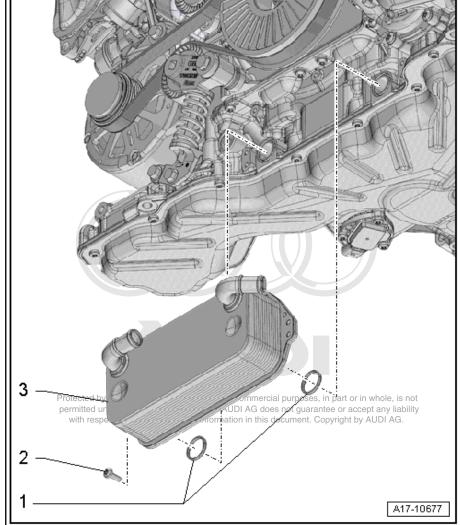
2.1.1 Exploded view - engine oil cooler (front)

1 - O-rings

- Renew
- 2 Bolt
 - □ Tightening torque and sequence <u>⇒ page 207</u>

3 - Engine oil cooler (front)

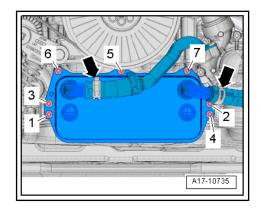
- □ Removing and installing ⇒ page 208
- □ If renewed, refill system with fresh coolant



Engine oil cooler (front) - tightening torque and sequence

- Tighten bolts in stages as follows:

Stage	Bolts	Tightening torque
1.	-1 7-	3 Nm
2.	-1 7-	9 Nm



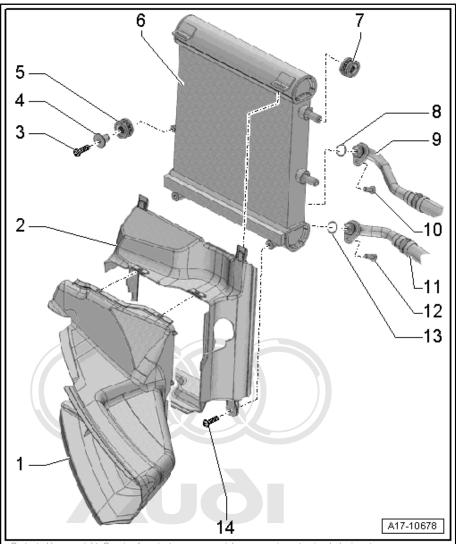
2.1.2 Exploded view - engine oil cooler (right-side)



The engine oil cooler (right-side) is fitted on vehicles with engine codes CGTA/CTFA.

1 - Front air duct

- Clipped onto engine oil cooler
- Move to side to unclip and remove
- 2 Rear air duct
- 3 Bolt
 - 🗅 9 Nm
- 4 Spacer sleeve
- 5 Grommet
- 6 Engine oil cooler (right-side) □ Removing and installing ⇒ page 210
- 7 Grommet
- 8 O-ring
 - Renew
- 9 Oil supply line
- **10 Bolt** 9 Nm
- 11 Oil return line
- 12 Bolt
- 🗅 9 Nm
- 13 O-ring
- Renew
- 14 Bolt
 - 9 Nm



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2.2 Removing and installing engine oil cooler

 \Rightarrow "2.2.1 Removing and installing engine oil cooler (front)", page 208

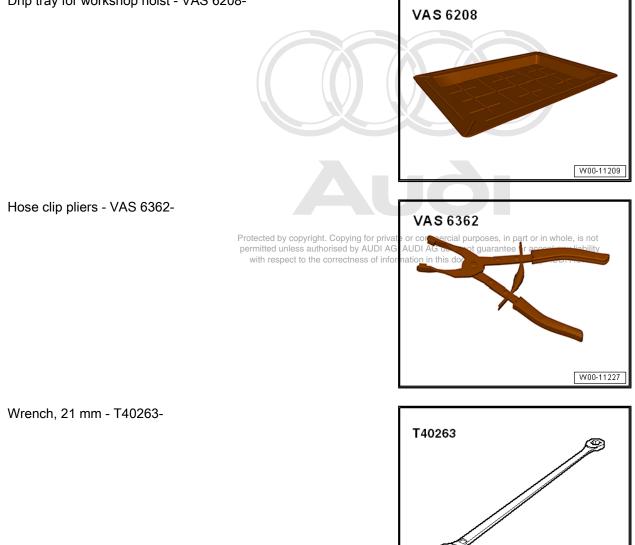
 \Rightarrow "2.2.2 Removing and installing engine oil cooler (right-side)", page 210

2.2.1 Removing and installing engine oil cooler (front)

Special tools and workshop equipment required

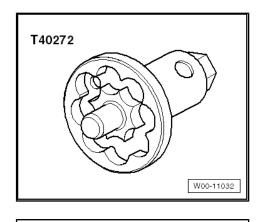
• Drip tray for workshop hoist - VAS 6208-

۲



W00-10993

• Turning-over tool - T40272-



Removing

- Drain coolant \Rightarrow page 234.
- Fit turning over tool T40272- onto wrench (21 mm) T40263-.
- Position turning over tool on bolts of vibration damper.
- Semi-circular recess -arrow A- on turning over tool T40272must point to semi-circular recess -arrow B- on vibration damper.

Note

Disregard notch on turning over tool - T40272-.

 Rotate crankshaft in normal direction of rotation until recess -arrow- on vibration damper is aligned opposite bolt -1- for engine oil cooler.

Imp - T40263-.

amper.

tool - T40272

vibration **Forected by copyright. Copy permitted unless authorised with respect to the correct of th**

- Place drip tray for workshop hoist VAS 6208- underneath.
- Remove bolts in the sequence -7 ... 1-.
- Open hose clips -arrows- and disconnect coolant hoses from engine oil cooler.
- Detach engine oil cooler.

Installing

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



- ♦ Fit new O-rings.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.
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Do not reuse coolant.

- Fill up with coolant \Rightarrow page 236.

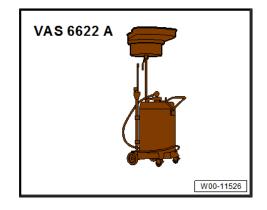
Tightening torques

♦ ⇒ Fig. ""Engine oil cooler (front) - tightening torque and sequence"", page 207

2.2.2 Removing and installing engine oil cooler (right-side)

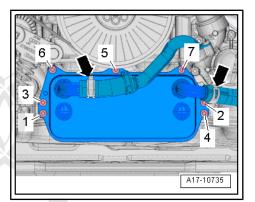
Special tools and workshop equipment required

Used oil collection and extraction unit - VAS 6622A-



Removing

Remove bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing bumper cover.



– Unclip air duct -arrow-.

- Move clear electrical wiring harness -arrows-.
- Unscrew bolts -1 and 2- and detach connecting piece.

- Place used oil collection and extraction unit VAS 6622A- underneath.
- Protected by copyright. Copying for private or commercia
 Remove bolts -arrows- and disconnect oil lines 41/2 from engines
 oil cooler.

- Remove bolts -arrows- and detach air duct -2-.
- Unscrew bolt -1- and remove engine oil cooler (right-side).

Installing

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

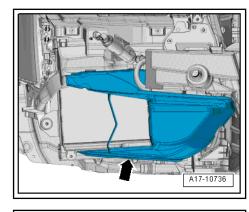


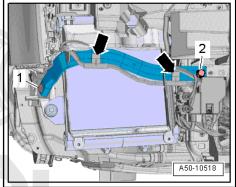
Fit new O-rings.

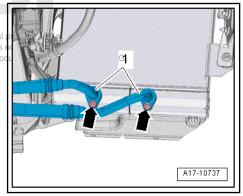
- Install connecting piece ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Exploded view - bumper cover .
- Install bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing bumper cover.
- Check oil level \Rightarrow Maintenance ; Booklet 410 .

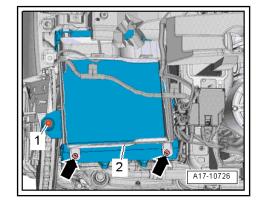
Tightening torques

◆ ⇒ "2.1 Exploded view - engine oil cooler", page 206









3 Crankcase breather

\Rightarrow "3.1 Exploded view - crankcase breather system", page 212

⇒ "3.2 Removing and installing oil separator", page 213

3.1 Exploded view - crankcase breather system

1 - Bolt

□ Tightening torque ⇒ Item 2 (page 316)

- 2 Charge air cooler housing
 - U With air ducts
 - □ Removing and installing \Rightarrow page 318

3 - Grommet

- 4 Bolt
 - □ Tightening torque ⇒ Item 32 (page 317)

5 - Seal

- Renew
- □ Installation position \Rightarrow page 213

6 - Bolt

🗅 3.2 Nm

7 - Hose

G For crankcase breather

8 - Oil separator

□ Removing and installing \Rightarrow page 213

9 - Seals

Renew

10 - O-ring

Renew

11 - Pipe

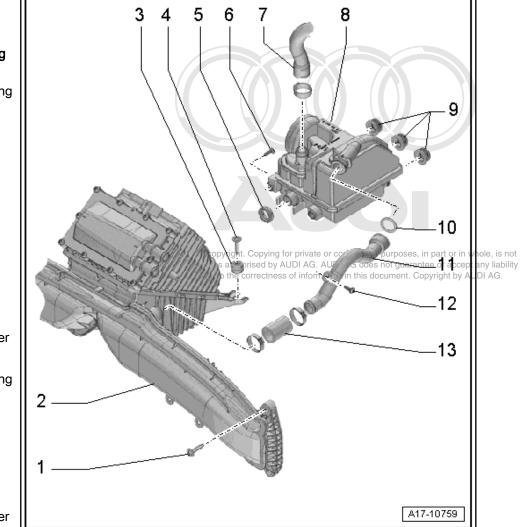
G For crankcase breather

12 - Bolt

□ 3.2 Nm

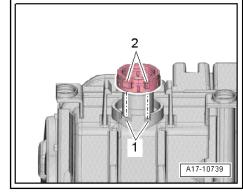
13 - Hose

□ For crankcase breather



Installation position of seal for oil separator

 Fit wide lugs -2- into wide notches -1- and narrow lugs into narrow notches.



3.2 Removing and installing oil separator

Removing

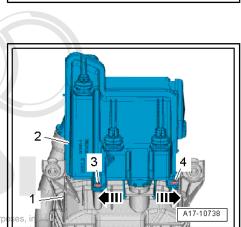
- Remove charge air cooler housing <u>⇒ page 318</u>.
- Remove bolts -3 and 4-.
- Release catches -arrows- and detach oil separator -2- from charge air cooler housing -1-.

Installing

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



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Renew gasket, seal and O-ring.

- Note installation position of seal \Rightarrow page 213.
- Install charge air cooler housing \Rightarrow page 318.

Tightening torques

♦ ⇒ "4.2 Exploded view - oil pressure switches/oil pressure control", page 215

4 Oil filter/oil pressure switches

⇒ "4.1 Exploded view - oil filter", page 214

⇒ "4.2 Exploded view - oil pressure switches/oil pressure control", page 215

⇒ "4.3 Removing and installing oil pressure switches F22 / F378 ", page 217

⇒ "4.4 Removing and installing stage 3 oil pressure switch F447 <u>", page 218</u>

⇒ "4.5 Removing and installing oil temperature sender 2 G664 ", page 219

⇒ "4.6 Checking oil pressure", page 219

 \Rightarrow "4.7 Removing and installing valve for oil pressure control N428 <u>", page 220</u>

4.1 Exploded view - oil filter

1 - Drain plug

□ 4 Nm

2 - O-ring

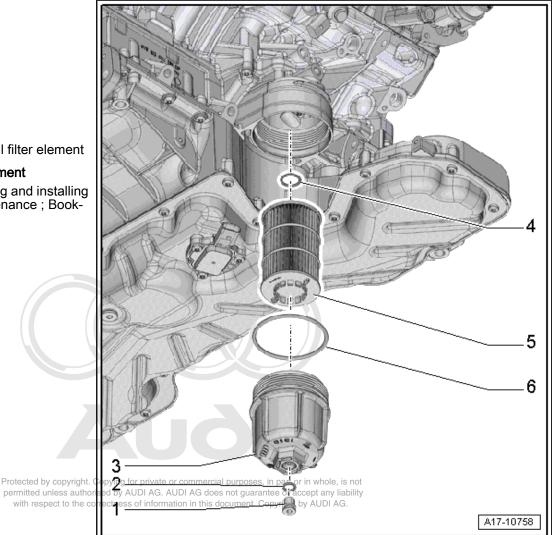
- Renew
- 3 Sealing cap
 - 🗅 25 Nm

4 - O-ring

- Part of oil filter element
- 5 Oil filter element
 - □ Removing and installing ⇒ Maintenance ; Booklet 410

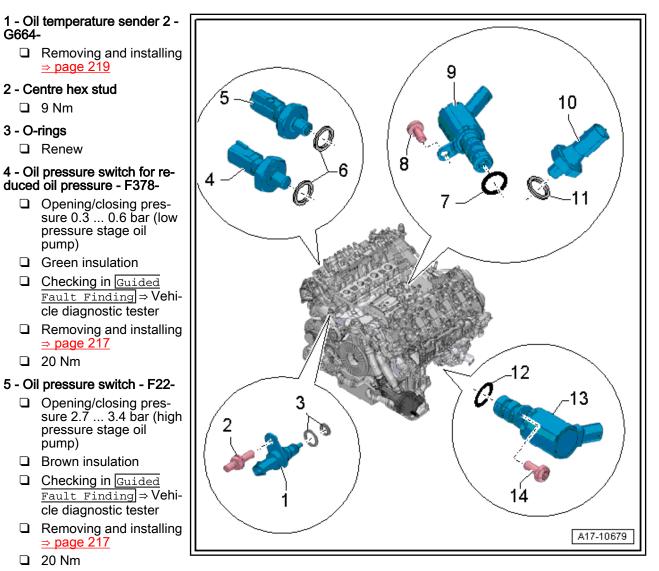
6 - O-ring

Renew



4.2 Exploded view - oil pressure switches/oil pressure control

Oil pressure switches, oil pressure control



- 6 Seals
 - Renew
- 7 O-ring

Renew

- 8 Bolt
 - □ Tightening torque <u>⇒ Item 7 (page 216)</u>
- 9 Piston cooling jet control valve N522-
 - □ Removing and installing \Rightarrow page 222

10 - Stage 3 oil pressure switch - F447-

- □ Checking in <u>Guided Fault Finding</u> ⇒ Vehicle diagnostic tester
- **\Box** Removing and installing \Rightarrow page 218
- □ Tightening torque ⇒ Item 9"(page > 216) jght. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability
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- 11 Seal
 - Renew

12 - O-ring

Renew

13 - Valve for oil pressure control - N428-

- □ Removing and installing \Rightarrow page 220

14 - Bolt

🗅 9 Nm

Mechanical switching valve and non-return valve for hydraulic compensation elements

1 - O-ring

- Renew
- 2 Non-return valve
 - □ Removing and installing ⇒ page 223
- **3 Oil strainer** Protected by copyright. permitted unless authors
 - □ Fit in cover witem p4 1 to the co
 - □ Removing and installing \Rightarrow page 221

4 - Gasket

- Renew
- 5 Bolt
 - □ Renew
 - □ 5 Nm + turn 90° further

6 - O-ring

- Renew
- 7 Bolt
 - 🛛 9 Nm

8 - Piston cooling jet control valve - N522-

□ Removing and installing \Rightarrow page 222

9 - Stage 3 oil pressure switch - F447-

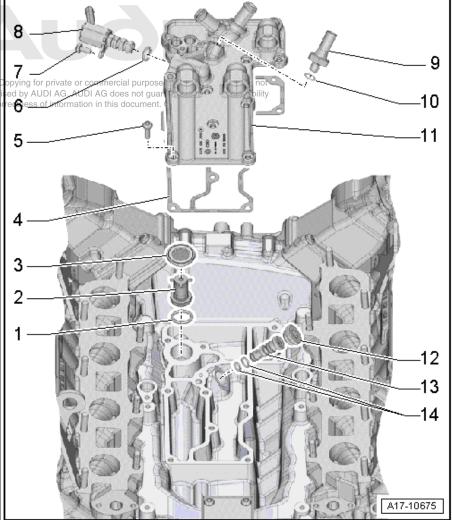
- Opening/closing pressure 0.3 ... 0.6 bar
- Green insulation
- □ Checking in <u>Guided</u> <u>Fault Finding</u> ⇒ Vehicle diagnostic tester
- □ Removing and installing \Rightarrow page 218
- 🗅 20 Nm

10 - Seal

□ Renew

11 - Cover

- □ In inner V of engine
- □ Removing and installing \Rightarrow page 221



- 12 Screw plug
 - 🗅 30 Nm
- 13 Mechanical switching valve
 - $\Box \quad \text{Removing and installing} \Rightarrow \underline{\text{page 223}}$
- 14 O-rings
 - Renew

4.3 Removing and installing oil pressure switches -F22- / -F378-

Special tools and workshop equipment required

Articulated wrench, 24 mm - T40175-

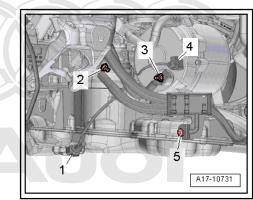


Removing

Caution

Electronic components are susceptible to damage.

- Observe notes on procedure for disconnecting the battery.
- Disconnect earth wire from battery terminal ⇒ Electrical system; Rep. gr. 27; Battery; Disconnecting and connecting battery.
- Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.
- Remove nuts -2, 3- and bolt -5-.
- Unplug electrical connectors -1, 4- and push wiring harness clear to one side.



- Unplug electrical connector:
- 1 -For oil pressure switch for reduced oil pressure - F378-
- For oil pressure switch F22-2 -
- Use articulated wrench, 24 mm T40175- to remove relevant oil pressure switch.

Installing

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



Renew seal.

- Install electrical wiring \Rightarrow Electrical system; Rep. gr. 97; Relay carriers, fuse carriers, electronics boxes; Overview of fitting locations - relay carriers, fuse carriers, electronics boxes and ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Check oil level \Rightarrow Maintenance ; Booklet 410.
- Observe steps required after re-connecting battery > Electrical system; Rep. gr. 27; Battery; Disconnecting and connect-

 Ing battery
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- ⇒ "4.2 Exploded view oil pressure switches/oil pressure control", page 215
- ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view - noise insulation

4.4 Removing and installing stage 3 oil pressure switch - F447-

Removing

- Remove charge air cooler housing <u>⇒ page 318</u>.
- Unplug electrical connector -arrow-.
- Unscrew stage 3 oil pressure switch F447- .

Installing

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

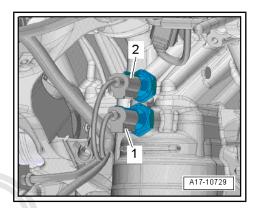


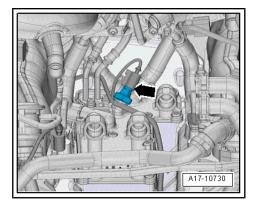
Renew seal.

Install charge air cooler housing \Rightarrow page 318.

Tightening torques

⇒ "4.2 Exploded view - oil pressure switches/oil pressure control", page 215





4.5 Removing and installing oil temperature sender 2 - G664-

Removing

- Disconnect vacuum hose -1-.
- Unscrew bolts -3- and remove vacuum reservoir -2-.

- Move clear retaining clip -arrow- with electrical wiring harness.
- Unplug electrical connector -1-.
- Unscrew centre hex stud -2- and remove oil temperature sender 2 - G664-.

Note

If O-ring remains lodged in cylinder block, lift out O-ring with a piece of wire.

Installing

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



Fit new O-ring.

Tightening torques

♦ ⇒ "4.2 Exploded view - oil pressure switches/oil pressure control", page 215

4.6 Checking oil pressure

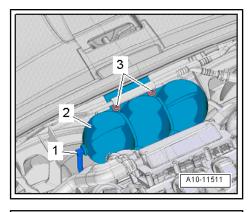
Special tools and workshop equipment information of the data and interview of the data and inter

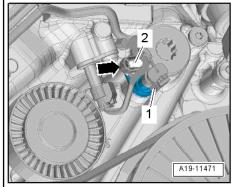
• Oil pressure tester - V.A.G 1342-



Procedure

Oil level OK





- Engine oil temperature approx. 80 °C
- Remove oil pressure switch F22- ⇒ page 217.
- Connect oil pressure tester V.A.G 1342- to bore for oil pressure switch.
- Screw oil pressure switch F22- into oil pressure tester.
- Start engine.
- Oil pressure at idling speed: at least 1.3 ± 0.3 bar
- Oil pressure at 2000 rpm: at least 1.6 ± 0.3 bar

Assembling

Install oil pressure switch - F22- ⇒ page 217.

4.7 Removing and installing valve for oil pressure control - N428-

Removing

- Remove air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket.
- Unplug electrical connector -2-.
- Remove bolt -1-.
- Detach valve for oil pressure control N428- from retaining frame.

Installing

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



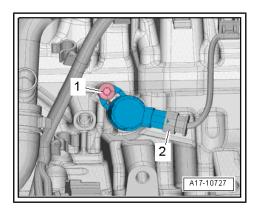
Fit new O-ring.

 Install air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket.

Tightening torques

♦ ⇒ "4.2 Exploded view - oil pressure switches/oil pressure control", page 215





5 Oil circuit

\Rightarrow "5.1 Oil spray jets/valves", page 221

5.1 Oil spray jets/valves

 \Rightarrow "5.1.1 Removing and installing cover in inner V of engine", page 221

 \Rightarrow "5.1.2 Removing and installing piston cooling jet control valve N522 ", page 222

⇒ "5.1.3 Removing and installing non-return valve", page 223

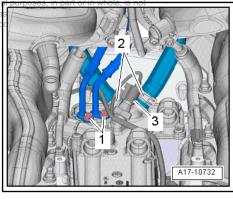
 \Rightarrow "5.1.4 Removing and installing mechanical switching valve", page 223

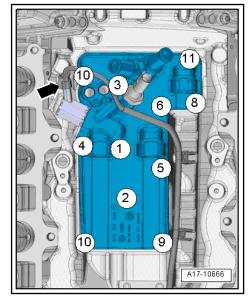
5.1.1 Removing and installing cover in inner V of engine

Removing

Protected by copyright. Copying for private or commercial permitted unless authorised by AUDI AG. AUDI AG does

- Remove charge air cooler housing ⇒ page 318
- Unplug electrical connector -3-.
- Remove bolts -1- and disconnect hoses.
- Release hose clips -2- and detach oil return hoses.
- Remove bolts in the sequence -11 ... 1- and remove cover in inner V of engine.
- Unplug electrical connector -arrow- and move wiring clear.





Installing

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



- Renew gasket and O-rings.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.
- Clean oil strainer -arrow- and install in cover.
- Install charge air cooler housing <u>⇒ page 318</u>.

Tightening torques

- ◆ ⇒ "4.2 Exploded view oil pressure switches/oil pressure control", page 215

5.1.2 Removing and installing piston cooling jet control valve - N522-

Removing

- Remove cover in inner V of engine <u>⇒ page 221</u>.
- Remove bolt -2- and detach piston cooling jet control valve -N522- -item 1-.

Installing

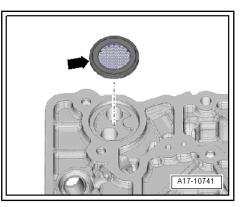
Installation is carried out in the reverse order; note the following:

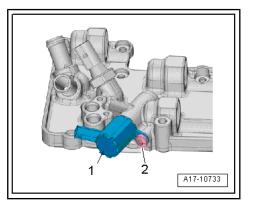


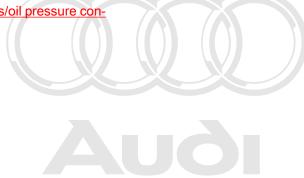
Fit new O-ring.

- Install cover in inner V of engine \Rightarrow page 221.

Tightening torques







5.1.3 Removing and installing non-return

valve

Removing

- Remove cover in inner V of engine <u>⇒ page 221</u>.
- Pull non-return valve -1- out of cylinder block.

Installing

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



Fit new O-ring.tected by copyright. Copying for private or commercial purposes, in part or in whole permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any with respect to the correctness of information in this document. Copyright by AUDI A

- Install cover in inner V of engine \Rightarrow page 221.

Tightening torques

◆ ⇒ "4.2 Exploded view - oil pressure switches/oil pressure control", page 215

5.1.4 Removing and installing mechanical switching valve

Removing

- Remove cover in inner V of engine <u>⇒ page 221</u>.
- Remove screw plug -arrow-.

 Using a hook -1-, push mechanical switching valve outwards through hole, as shown in illustration; at the same time, pull valve with a magnetic rod -arrow-.

Installing

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

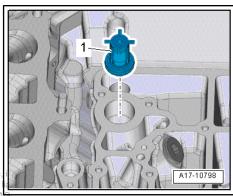


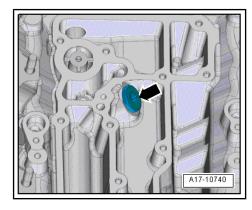
Fit new O-rings.

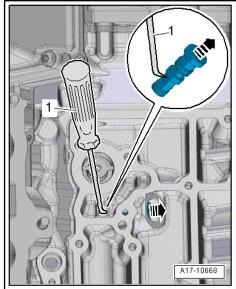
- Install cover in inner V of engine \Rightarrow page 221.

Tightening torques

◆ ⇒ "4.2 Exploded view - oil pressure switches/oil pressure control", page 215







19 – Cooling

1 Cooling system/coolant

 \Rightarrow "1.1 Connection diagram - coolant hoses", page 224

 \Rightarrow "1.2 Checking cooling system for leaks", page 232

⇒ ***1.3 Draining and filling cooling system**", page 234 Protected by convridit. Cooving for private or commercial purposes, in part or in whole, is not

1.1 Connection diagram for Coolant, hoses, yield and the accept any lability

 \Rightarrow "1.1.1 Connection diagram - coolant hoses, vehicles with engine codes CEUA/CTGA without auxiliary heater", page 224

 \Rightarrow "1.1.2 Connection diagram - coolant hoses, vehicles with engine codes CEUA/CTGA with auxiliary heater", page 227

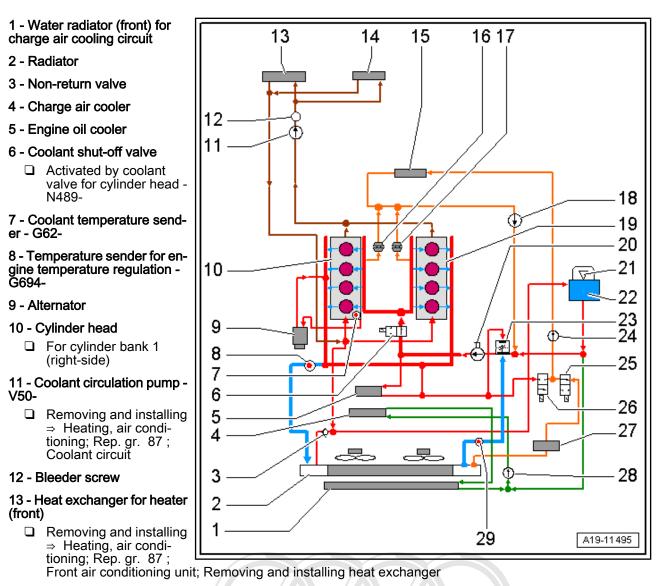
 \Rightarrow "1.1.3 Connection diagram - coolant hoses, vehicles with engine codes CGTA/CTFA without auxiliary heater", page 229

⇒ "1.1.4 Connection diagram - coolant hoses, vehicles with engine codes CGTA/CTFA with auxiliary heater", page 231

1.1.1 Connection diagram - coolant hoses, vehicles with engine codes CEUA/ CTGA without auxiliary heater

Note

- Blue = Large coolant circuit.
- Red = Small coolant circuit.
- Orange = Coolant circuit for ATF.
- Brown = Heating circuit.
- Green = Charge air cooling circuit.



14 - Heat exchanger for heater (rear)

□ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87; Rear air conditioning unit; Removing and installing heat exchanger

15 - ATF cooler

16 - Turbocharger

□ For cylinder bank 1 (right-side)

17 - Turbocharger

□ For cylinder bank 2 (left-side)

18 - Coolant circulation pump 2_{PTOTELEOD} copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Cylinder bank 2 (left-side)

20 - Coolant pump

21 - Filler cap

 $\Box \quad Checking \text{ pressure relief valve } \Rightarrow page 234$

1. Cooling system/coolant 225

- 22 Coolant expansion tank
- 23 Map-controlled engine cooling system thermostat F265-
- 24 Continued coolant circulation pump V51-
- 25 Coolant valve for gearbox N488-
- 26 Gearbox oil cooling valve N509-
- 27 Water radiator (left-side) for charge air cooling circuit
- 28 Charge air cooling pump V188-
- 29 Radiator outlet coolant temperature sender G83-



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1.1.2 Connection diagram - coolant hoses, vehicles with engine codes CEUA/ CTGA with auxiliary heater



- Blue = Large coolant circuit.
- Red = Small coolant circuit.
- Orange = Coolant circuit for ATF.
- Brown = Heating circuit.
- Green = Charge air cooling circuit.

1 - Water radiator (front) for charge air cooling circuit

- 2 Radiator
- 3 Non-return valve
- 4 Charge air cooler
- 5 Engine oil cooler

6 - Coolant shut-off valve

- Activated by coolant valve for cylinder head -N489-
- 7 Coolant temperature sender - G62-

8 - Temperature sender for engine temperature regulation -G694-

9 - Alternator

10 - Cylinder head

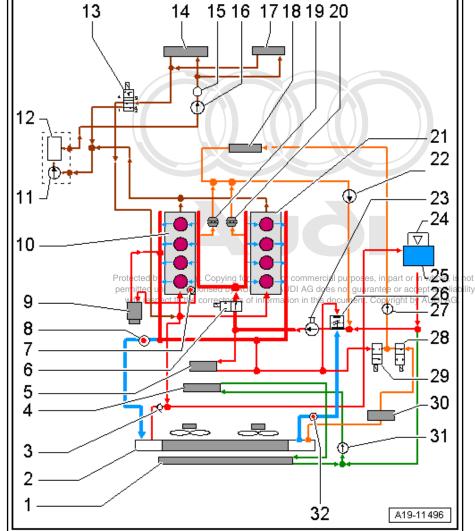
For cylinder bank 1 (right-side)

11 - Circulation pump - V55-

□ Removing and installing ⇒ Auxiliary heater, supplementary heater; Rep. gr. 82; Auxiliary/supplementary heater; Removing and installing circulation pump - V55-

12 - Auxiliary heater

□ Removing and installing ⇒ Auxiliary heater, supplementary heater; Rep. gr. 82; Auxiliary/supplementary heater; Rem



plementary heater; Removing and installing auxiliary/supplementary heater

13 - Heater coolant shut-off valve - N279-

□ Removing and installing ⇒ Auxiliary heater, supplementary heater; Rep. gr. 82; Coolant circuit with auxiliary/supplementary heater; Removing and installing heater coolant shut-off valve

14 - Heat exchanger for heater (front)

□ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87; Front air conditioning unit; Removing and installing heat exchanger

15 - Bleeder screw

16 - Coolant circulation pump - V50-

□ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87; Coolant circuit

17 - Heat exchanger for heater (rear)

□ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87; Rear air conditioning unit; Removing and installing heat exchanger

18 - ATF cooler

19 - Turbocharger

Given Service For cylinder bank 1 (right-side)

20 - Turbocharger

- □ For cylinder bank 2 (left-side)
- 21 Coolant circulation pump 2 V178-
- 22 Cylinder head
 - □ Cylinder bank 2 (left-side)
- 23 Coolant pump
- 24 Filler cap
 - □ Checking pressure relief valve \Rightarrow page 234
- 25 Coolant expansion tank
- 26 Map-controlled engine cooling system thermostat F265-
- 27 Continued coolant circulation pump V51-
- 28 Coolant valve for gearbox N488-
- 29 Gearbox oil cooling valve N509-
- 30 Water radiator (left-side) for charge air cooling circuit
- 31 Charge air cooling pump V188-
- 32 Radiator outlet coolant temperature sender G83-



1.1.3 Connection diagram - coolant hoses, vehicles with engine codes CGTA/ CTFA without auxiliary heater



- Blue = Large coolant circuit.
- Red = Small coolant circuit.
- Orange = Coolant circuit for ATF.
- Brown = Heating circuit.
- Green = Charge air cooling circuit.

1 - Water radiator (front) for charge air cooling circuit

- 2 Radiator
- 3 Non-return valve
- 4 Charge air cooler
- 5 Engine oil cooler
- 6 Coolant shut-off valve
 - Activated by coolant valve for cylinder head -N489-

7 - Coolant temperature sender - G62-

8 - Temperature sender for engine temperature regulation -G694-

9 - Alternator

10 - Cylinder head

□ For cylinder bank 1 (right-side)

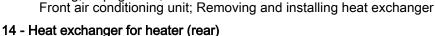
11 - Coolant circulation pump - V50-

❑ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87; Coolant circuit

12 - Bleeder screw

13 - Heat exchanger for heater (front)

□ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87; Front air conditioning unit:

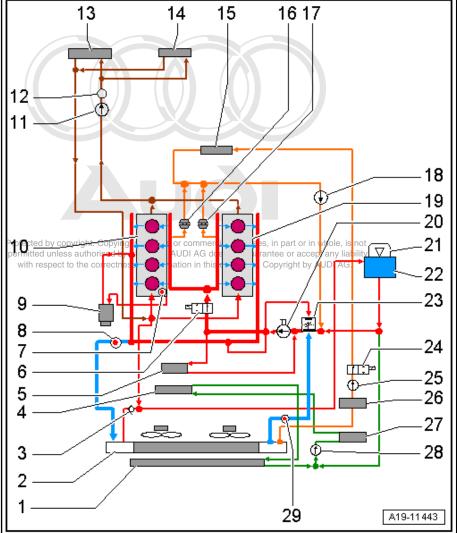


□ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87; Rear air conditioning unit; Removing and installing heat exchanger

15 - ATF cooler

16 - Turbocharger

□ For cylinder bank 1 (right-side)



- 17 Turbocharger
 - □ For cylinder bank 2 (left-side)
- 18 Coolant circulation pump 2 V178-
- 19 Cylinder head
 - Cylinder bank 2 (left-side)
- 20 Coolant pump
- 21 Filler cap
 - □ Checking pressure relief valve \Rightarrow page 234
- 22 Coolant expansion tank
- 23 Map-controlled engine cooling system thermostat F265-
- 24 Gearbox oil cooling valve N509-
- 25 Continued coolant circulation pump V51-
- 26 Cooler for ATF coolant circuit
- 27 Water radiator (left-side) for charge air cooling circuit
- 28 Charge air cooling pump V188-
- 29 Radiator outlet coolant temperature sender G83-



1.1.4 Connection diagram - coolant hoses, vehicles with engine codes CGTA/ CTFA with auxiliary heater

Note

- Blue = Large coolant circuit.
- Red = Small coolant circuit.
- Orange = Coolant circuit for ATF.
- Brown = Heating circuit.
- Green = Charge air cooling circuit.

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1 - Water radiator (front) for charge air cooling circuit

- 2 Radiator
- 3 Non-return valve
- 4 Charge air cooler
- 5 Engine oil cooler

6 - Coolant shut-off valve

- Activated by coolant valve for cylinder head -N489-
- 7 Coolant temperature sender - G62-

8 - Temperature sender for engine temperature regulation -G694-

9 - Alternator

10 - Cylinder head

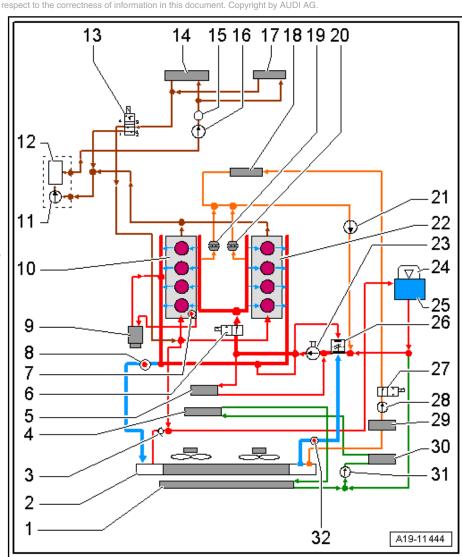
For cylinder bank 1 (right-side)

11 - Circulation pump - V55-

□ Removing and installing ⇒ Auxiliary heater, supplementary heater; Rep. gr. 82; Auxiliary/supplementary heater; Removing and installing circulation pump - V55-

12 - Auxiliary heater

□ Removing and installing ⇒ Auxiliary heater, supplementary heater; Rep. gr. 82; Auxiliary/supplementary heater; Rem



plementary heater; Removing and installing auxiliary/supplementary heater

13 - Heater coolant shut-off valve - N279-

□ Removing and installing ⇒ Auxiliary heater, supplementary heater; Rep. gr. 82; Coolant circuit with auxiliary/supplementary heater; Removing and installing heater coolant shut-off valve

14 - Heat exchanger for heater (front)

□ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87; Front air conditioning unit; Removing and installing heat exchanger

15 - Bleeder screw

- 16 Coolant circulation pump V50-
 - □ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87; Coolant circuit

17 - Heat exchanger for heater (rear)

□ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87; Rear air conditioning unit; Removing and installing heat exchanger

18 - ATF cooler

19 - Turbocharger

Given Service For cylinder bank 1 (right-side)

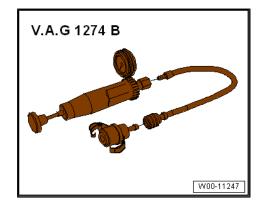
20 - Turbocharger

- For cylinder bank 2 (left-side)
- 21 Coolant circulation pump 2 V178-
- 22 Cylinder head
 - Cylinder bank 2 (left-side)
- 23 Coolant pump
- 24 Filler cap
 - □ Checking pressure relief valve <u>⇒ page 234</u>
- 25 Coolant expansion tank
- 26 Map-controlled engine cooling system thermostat F265- not
- 27 Gearbox oil cooling valvernan509 his document. Copyright by AUDI AG.
- 28 Continued coolant circulation pump V51-
- 29 Cooler for ATF coolant circuit
- 30 Water radiator (left-side) for charge air cooling circuit
- 31 Charge air cooling pump V188-
- 32 Radiator outlet coolant temperature sender G83-

1.2 Checking cooling system for leaks

Special tools and workshop equipment required

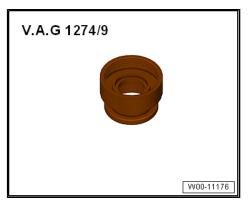
Cooling system tester - V.A.G 1274 B-



• Adapter for cooling system tester - V.A.G 1274/8-



Adapter for cooling system tester - V.A.G 1274/9-



Procedure

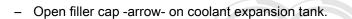
• Engine must be warm.

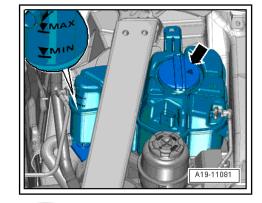


WARNING

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

- The cooling system is under pressure when the engine is hot.
- Cover filler cap on coolant expansion tank with a cloth and open carefully to dissipate pressure.

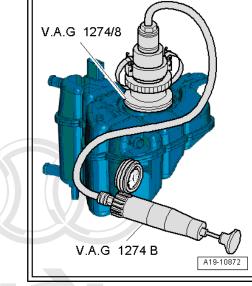






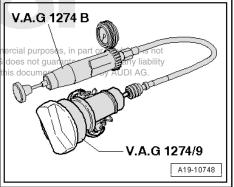
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- Fit cooling system tester V.A.G 1274 B- with adapter -V.A.G 1274/8- onto coolant expansion tank.
- Using hand pump on cooling system tester, build up a pressure of approx. 1.0 bar.
- If this pressure is not maintained, locate and rectify leaks.



Checking pressure relief valve in filler cap

- Fit cooling system tester V.A.G 1274 B- with adapter -V.A.G 1274/9- onto filler cap.
- Build up pressure with hand pumpeont cooling system testers. AUDI AC
- The pressure relief valve should open at a pressure of 1.4 ... 1.6 bar.
- Renew filler cap if pressure relief valve does not open as described.



1.3 Draining and filling cooling system

Special tools and workshop equipment required

- Adapter for cooling system tester - V.A.G 1274/8-
- Pipe for cooling system tester - V.A.G 1274/10-
- Cooling system charge unit - VAS 6096-
- Drip tray for workshop hoist
 VAS 6208-
- Hose clip pliers VAS 6362-
- Refractometer T10007 A-

 V.A.G 1274/8
 V.A.G 1274/10

 VAS 6096
 VAS 6208

 VAS 6362
 T10007 A

 VAS 6362
 C110007 A

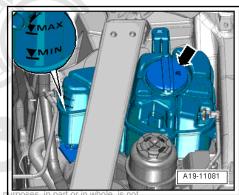
 CONTRACTOR
 C119-10029

Draining



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

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



- Open filler cap -arrow- on coolant expansion tank 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
- Remove noise insulation (front) Section and installing noise insulation.

- Place drip tray for workshop hoist VAS 6208- underneath.
- Pull out retaining clip -2- and disconnect coolant hose from radiator.



Disregard -item 1-.

Vehicles up to model year 2013:

 Release hose clip -1- and detach coolant hose from coolant pipe (bottom left).



Disregard -item 2-.

Vehicles from model year 2014 onwards:

 Release hose clip -arrow- and detach coolant hose from coolant pipe (bottom left).

Filling

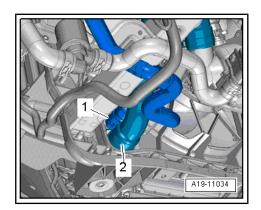
• Ignition off.

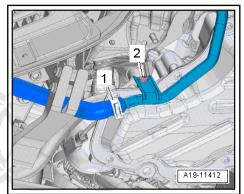
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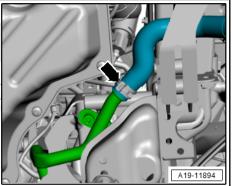


Caution

Always use distilled water for mixing coolant additives as this ensures optimum corrosion protection.





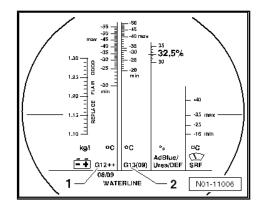


Note

- The effectiveness of the coolant is greatly influenced by the quality of the water with which it is mixed. Because water may contain different substances depending on the country or even the region, the water quality to be used for cooling systems has been specified. Distilled water meets all the requirements and is therefore recommended for use when topping up or filling up with coolant.
- ◆ Use only coolant additives listed in the ⇒ Electronic parts catalogue (ETKA). Other coolant additives could seriously impair in particular the anti-corrosion properties. The resulting damage could lead to loss of coolant and consequently to serious engine damage.
- Coolant with the recommended mixture ratio prevents frost and corrosion damage and stops scaling. At the same time it raises the boiling point of the fluid in the system. For this reason the cooling system must be filled all year round with the correct coolant additive.
- Because of its high boiling point, the coolant improves engine reliability under heavy loads, particularly in countries with tropical climates.
- The refractometer T10007A- MUST be used to determine the current level of frost protection.
- The mixture must guarantee frost protection down to -25 °C (in countries with arctic climate: down to -36 °C). The amount of antifreeze can only be increased if greater frost protection is required in very cold climates. This must only be up to -48 °C, however, as otherwise the cooling efficiency of the coolant is impaired.
- The coolant concentration must not be reduced by adding water even in warmer seasons and in warmer countries. Frost protection must be provided to at least -25 °C.
- Read off the level of frost protection on the scale for the relevant coolant additive.
- Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not The temperature indicated on the refractometer by 10007A+DI AG does not guarantee or accept any liability corresponds to the temperature at which the first ice crystals in this document. Copyright by AUDI AG. can form in the coolant.
- Do not reuse coolant.
- Only use water/coolant additive as a lubricant for coolant hoses.

Recommended mixture ratio for coolant

- Coolant (40 %) and water (60 %) for frost protection to –25 $^\circ$ C
- Coolant (50 %) and water (50 %) for frost protection to -35 $^\circ\!\mathrm{C}$
- Coolant ⇒ Electronic parts catalogue

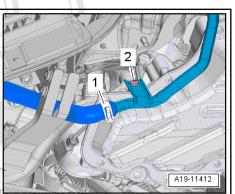




Procedure

Vehicles up to model year 2013:

Connect coolant hose to coolant pipe (bottom left) with hose clip -1-.



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Vehicles from model year 2014 onwards:

 Connect coolant hose to coolant pipe (bottom left) with hose clip -arrow-.

All vehicles (continued):

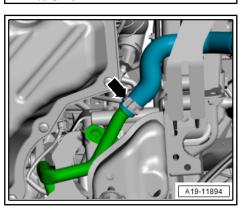
 Connect coolant hose with plug-in connector to radiator ⇒ page 286

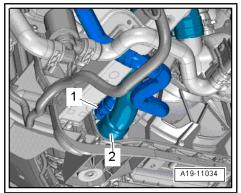
- Fill reservoir of -VAS 6096- with at least 15 litres of premixed coolant (according to recommended ratio).
- Fit adapter for cooling system tester V.A.G 1274/8- onto coolant expansion tank.
- Attach cooling system charge unit VAS 6096- to adapter V.A.G 1274/8-.
- Run vent hose -1- into a small container -2-.

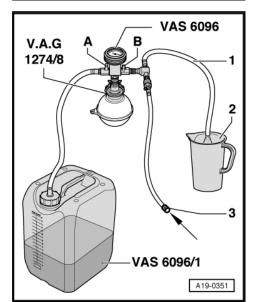
i Note

The vented air draws along a small amount of coolant, which should be collected.

- Close both valves -A- and -B- (turn lever at right angles to direction of flow).
- Connect hose -3- to compressed air.
- Pressure: 6 ... 10 bar.



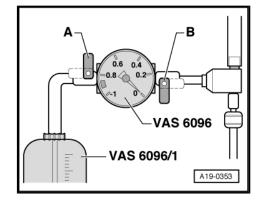


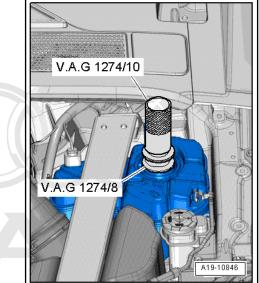


- Open valve -B- by setting lever in direction of flow.
- The suction jet pump generates a partial vacuum in the cooling system; the needle on the gauge should move into the green zone.
- Also briefly open valve -A- (turn lever in direction of flow) so that hose on reservoir of -VAS 6096- can fill with coolant.
- Close valve -A- again.
- Leave valve -B- open for another 2 minutes.
- The suction jet pump continues to generate a partial vacuum in the cooling system; the needle on the gauge should remain in the green zone.
- Close valve -B-.
- The needle on the gauge should stop in the green zone. The vacuum level in the cooling system is then sufficient for subsequent filling.



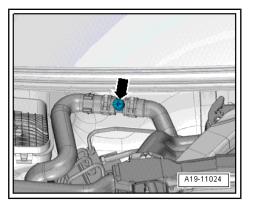
- If the needle does not reach the green zone, repeat the process.
- Check cooling system for leaks if the vacuum is not maintained.
- Detach compressed air hose.
- Open valve -A-.
- The vacuum in the cooling system causes the coolant to be drawn out of the reservoir of -VAS 6096-; the cooling system is then filled.
- Detach cooling system charge unit VAS 6096- from adapter
 -V.A.G 1274/8- on coolant expansion tank.
- Attach pipe -V.A.G 1274/10- onto adapter -V.A.G 1274/8- .
- Remove plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50; Bulkhead; Removing and installing plenum chamber cover .





Vehicles up to model year 2013:

- Open bleeder screw -arrow-.
- Fill up with coolant until it flows out at bleeder hole in coolant hose.
- Close bleeder screw.



2 A19-11834

Vehicles from model year 2014 onwards:

- Open bleeder screw -1-.
- Fill up with coolant until it flows out at bleeder hole in coolant hose.
- Close bleeder screw.



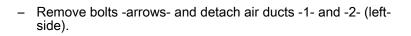
Disregard -item 2-.

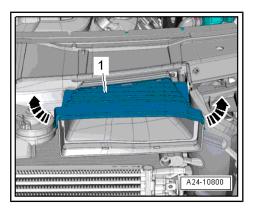
All vehicles (continued):

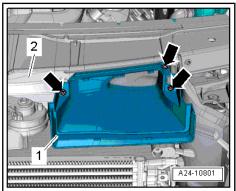
 Remove lock carrier cover ⇒ General body repairs bexterior, Copying for private or commercial purposes, in part or in whole, is not Rep. gr. 63; Bumper (front); Removing and installing attached by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Vehicles with engine codes CGTA/CTFA:

- Unclip cover -1- (left-side) -arrows- and remove.

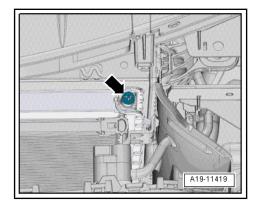






All vehicles (continued):

- Open bleeder screw -arrow-.
- Fill up with coolant until it flows out at bleeder hole in coolant hose.
- On vehicles with auxiliary heater, switch heater on (for about 30 seconds) and then off again.
- Close bleeder screw.
- Close filler cap on coolant expansion tank (make sure it engages).
- Start engine.

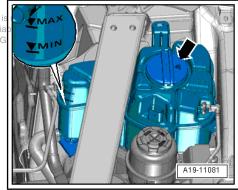


Time period	Engine speed	Air conditioner / heater setting
3 minutes	2000 rpm	 Air conditioning system "OFF", LED in <u>AC</u> button not lit
		 Heating at "HI", select lowest possible blower speed (= 0)
Until both large coolant hoses at radiator be- come warm	Idling	Air conditioning system "OFF"
		Heating at "HI"
2 minutes	2000 rpm	Air conditioning system "OFF"
		Heating at "HI"

- Switch off ignition and allow engine to cool down.
- Install noise insulation panels ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view noise insulation.
- Check coolant level.
- Protected by copyright. Copying for private or commercial purposes, in part or in whole, is
 The coolant level-must be at the MAX marking when the energinal is gine is cold h respect to the correctness of information in this document. Copyright by AUDI AG
- The coolant level can be above the MAX marking when the engine is warm.
- Install air duct <u>⇒ page 352</u>.
- Install lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments .
- Install plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50; Bulkhead; Removing and installing plenum chamber cover.

Tightening torques

- \Rightarrow "3.1 Exploded view coolant pipes", page 261



2 Coolant pump/thermostat assembly

 \Rightarrow "2.1 Exploded view - coolant pump and thermostat", page 242

⇒ "2.2 Exploded view - electric coolant pump", page 244

 \Rightarrow "2.3 Exploded view - coolant temperature senders", page 246

 \Rightarrow "2.4 Removing and installing electrical coolant pump", page 246

⇒ "2.5 Removing and installing coolant pump", page 251

⇒ "2.6 Checking thermostat", page 252

 \Rightarrow "2.7 Removing and installing map-controlled engine cooling system thermostat F265 ", page 252

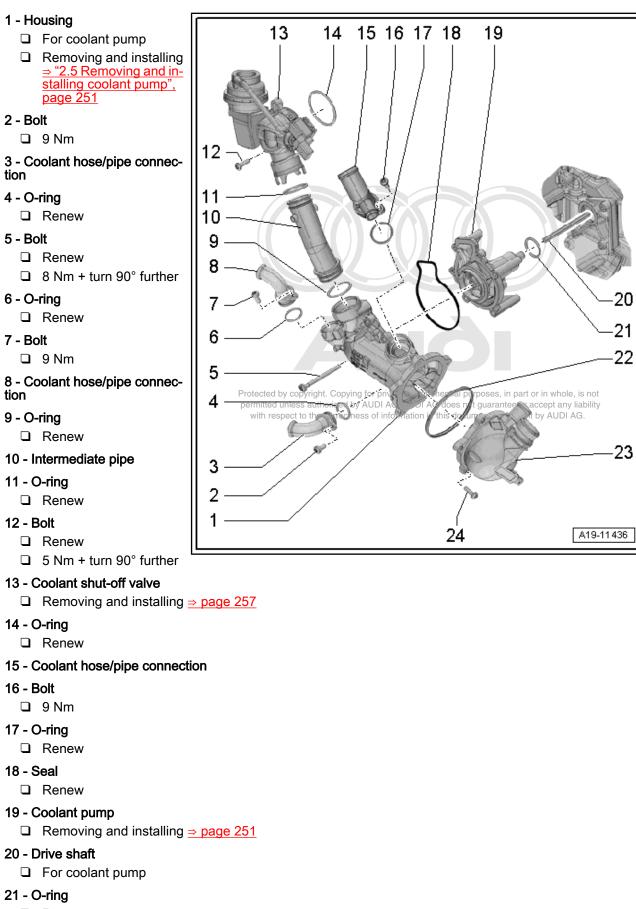
⇒ "2.8 Removing and installing coolant temperature sender G62 ", page 253

 \Rightarrow "2.9 Removing and installing radiator outlet coolant temperature sender G83 ", page 254

 \Rightarrow "2.10 Removing and installing temperature sender for engine temperature regulation G694 ", page 255

⇒ "2.11 Removing and installing coolant valves", page 257

2.1 Exploded view - coolant pump and thermostat



□ Renew

22 - Seal

Renew

- 23 Map-controlled engine cooling system thermostat F265-
 - $\Box \quad \text{Removing and installing} \Rightarrow \underline{\text{page 252}}$

24 - Bolt

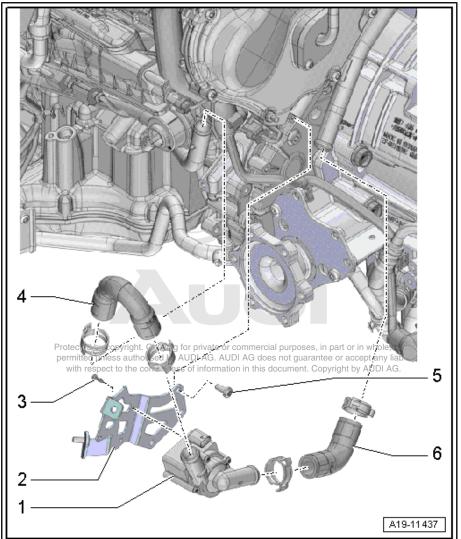
🛛 9 Nm

2.2 Exploded view - electric coolant pump

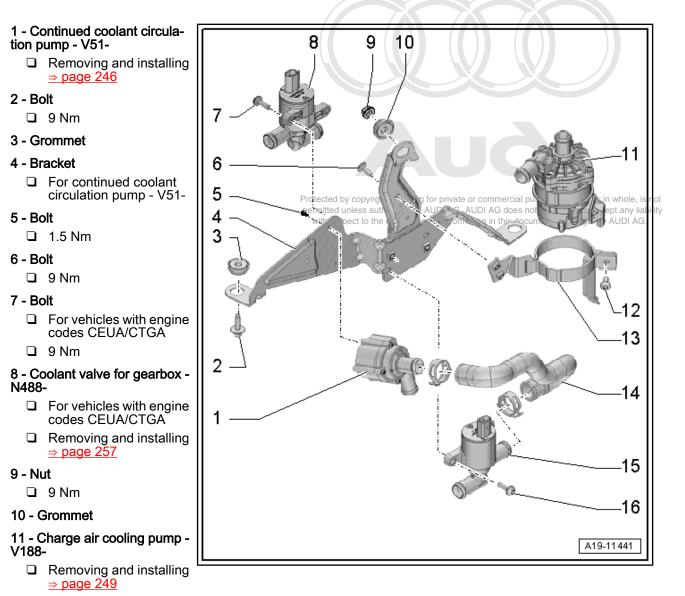
Coolant circulation pump 2 - V178-

1 - Coolant circulation pump 2 - V178-

- □ Removing and installing <u>⇒ page 248</u>
- 2 Bracket
 - For coolant circulation pump 2 - V178-
- 3 Bolt
 - 🗅 1.5 Nm
- 4 Coolant hose
- 5 Bolt
 - 🛛 9 Nm
- 6 Coolant hose



Continued coolant circulation pump - V51- , charge air cooling pump - V188- , coolant valves



12 - Bolt

9 Nm

13 - Bracket

□ For charge air cooling pump - V188-

14 - Coolant hose

15 - Gearbox oil cooling valve - N509-

□ Removing and installing \Rightarrow page 259

16 - Bolt

🗅 9 Nm

2.3 Exploded view - coolant temperature senders

1 - Bolt

- 🛛 9 Nm
- 2 Coolant temperature sender - G62-
 - Black insulation
 - □ Removing and installing ⇒ page 253

3 - O-rings

- Renew
- 4 Bolt
 - 🗅 9 Nm

5 - Temperature sender for engine temperature regulation -G694-

- Black insulation
- □ Removing and installing ⇒ page 255

6 - O-rings

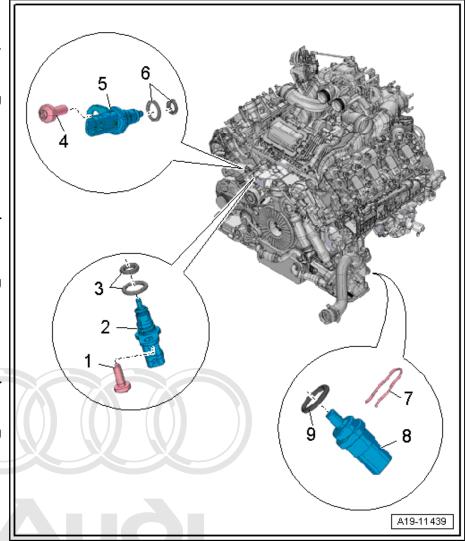
- Renew
- 7 Retaining clip

8 - Radiator outlet coolant temperature sender - G83-

- Grey insulation
- □ Removing and installing \Rightarrow page 254

9 - O-ring

Renew



2.4 Removing and installing relectrical pool-in part or in whole, is not permitted unless authonsed by AUDA G. AUDI AG does not guarantee or accept any liability ant pump spect to the correctness of information in this document. Copyright by AUDI AG.

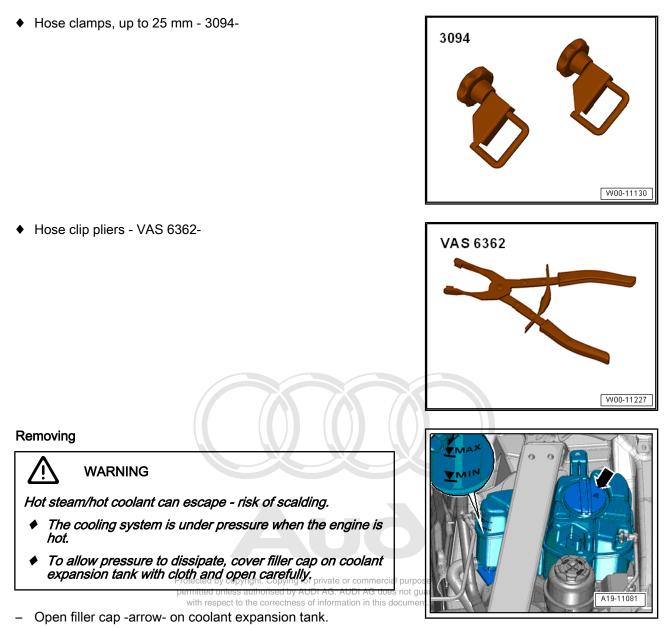
\Rightarrow "2.4.1 Removing and installing continued coolant circulation pump V51 ", page 246

\Rightarrow "2.4.2 Removing and installing coolant circulation pump 2 V178 ", page 248

⇒ "2.4.3 Removing and installing charge air cooling pump V188 ", page 249

2.4.1 Removing and installing continued coolant circulation pump - V51-

Special tools and workshop equipment required



Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.

Vehicles with engine codes CGTA/CTFA:

- Remove bolt -1- and press bracket -2- slightly towards rear.

All vehicles (continued):

- Unplug electrical connector -4-.
- Remove bolts -3- and detach continued coolant circulation pump - V51-.



Place a cloth underneath to catch escaping coolant.

 Clamp off coolant hoses using hose clamps -3094-, release hose clips -arrows- and disconnect hoses.

Installing

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



Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.

- Check coolant level \Rightarrow page 241.

Tightening torques

- <u>⇒ "2.2 Exploded view electric coolant pump", page 244
 </u>
- ♦ ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view noise insulation

2.4.2 Removing and installing coolant circulation pump 2 - V178-

Special tools and workshop equipment required

Hose clip pliers - VAS 6362-



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VAS 6362

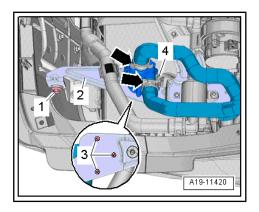
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Removing



Secure the heat insulation sleeve in the original position when installing.

– Drain coolant <u>⇒ page 234</u>.



- Remove rear section of front wheel housing liner (left-side) ⇒
 General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Removing and installing wheel housing liner (front).
- Remove bolts -arrows- and detach heat shield for drive shaft (left-side).
- Unbolt drive shaft (left-side) from gearbox flange shaft ⇒ Running gear, axles, steering; Rep. gr. 40; Drive shaft; Removing and installing drive shaft.

- Remove nut -1- and move retaining clip clear.
- Unplug electrical connector -2-.
- Unscrew bolts -4 and detach heat insulation sleeve -3-.
- Release hose clips -arrows- and detach coolant hoses.
- Move clear electrical wiring harness and detach coolant circulation pump 2 V178- with bracket.

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Remove bolts -arrows- and detach coolant circulation pump 2
 V178- -item 2- from bracket -1-.

Installing

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



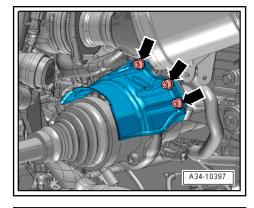
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.
- Do not reuse coolant.
- Fill up with coolant <u>⇒ page 236</u>.

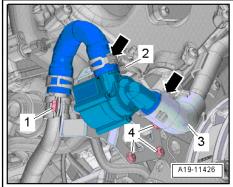
Tightening torques

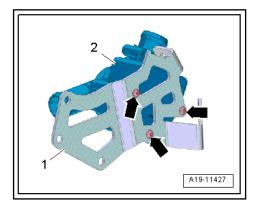
- ◆ ⇒ "2.2 Exploded view electric coolant pump", page 244
- ◆ ⇒ "3.1 Exploded view coolant pipes", page 261
- Drive shaft and heat shield ⇒ Running gear, axles, steering; Rep. gr. 40; Drive shaft; Exploded view - drive shaft

2.4.3 Removing and installing charge air cooling pump - V188-

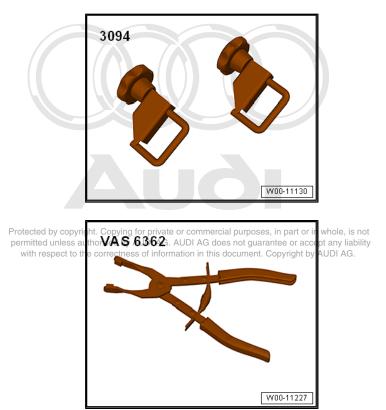
Special tools and workshop equipment required







Hose clamps, up to 25 mm - 3094-



Hose clip pliers - VAS 6362-

Removing

- Remove front section of front wheel housing liner (left-side) ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Removing and installing wheel housing liner (front).
- Unplug electrical connector -3-.
- Unscrew bolt -2- and remove bracket.
- Clamp off coolant hoses at charge air cooling pump V188using hose clamps -3094-, release hose clips -1- and disconnect coolant hoses.

Installing

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

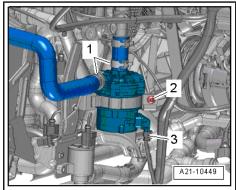


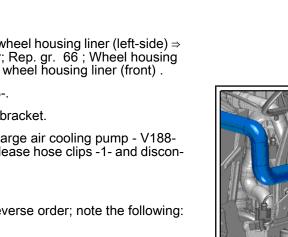
Secure all hose connections with the correct type of hose clips (same as original equipment) \Rightarrow Electronic parts catalogue.

Check coolant level ⇒ page 236.

Tightening torques

- ◆ ⇒ "2.2 Exploded view electric coolant pump", page 244
- ♦ ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Exploded view - wheel housing liner (front)





2.5 Removing and installing coolant pump

Removing

- Remove map-controlled engine cooling thermostat F265-⇒ page 252.
- Remove bolts -1, 2 and 3- from below and pull off coolant connections.
- Remove engine oil cooler (front) \Rightarrow page 208.
- Remove bolts -4, 6 and 7-.
- Use screwdriver -1- to press coolant pump housing -2- off coolant pump -3- -arrow-.
- Carefully detach housing (pay attention to intermediate pipe -5-).
- Pull off coolant pump -1- forwards (note the drive shaft for coolant pump).



Disregard -item 2-.

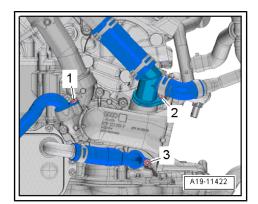
Installing

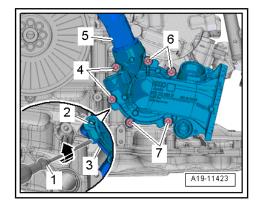


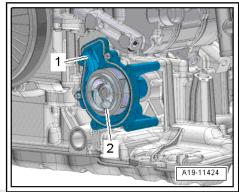
Note

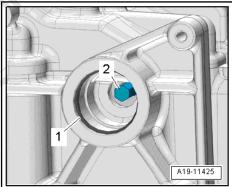
Renew gasket and O-rings.

- Fit O-ring -1-.
- Insert drive shaft -2- for coolant pump in mounting for oil pump as far as stop.









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Slide coolant pump -1- into mountings on sump (top section).



Note

To fit the drive flange onto the hexagon flats of the drive shaft, turn the impeller -2- until the coolant pump can be pressed on all the way.

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

- Install engine oil cooler (front) <u>⇒ page 208</u>.
- Install map-controlled engine cooling thermostat F265-<u>⇒ page 252</u> .

Tightening torques

⇒ "2.1 Exploded view - coolant pump and thermostat", page 242





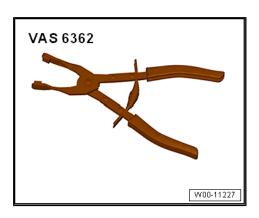
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The thermostat cannot be tested with workshop equipment.

2.7 Removing and installing map-controlled engine cooling system thermostat -F265-

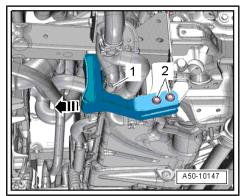
Special tools and workshop equipment required

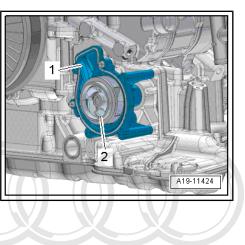
Hose clip pliers - VAS 6362-



Removing

- Drain coolant \Rightarrow page 234.
- Remove bolts -2- and detach underbody guard towards front -arrow-.





- Unplug electrical connector -3-.
- Lift retaining clip -1- and disconnect coolant hose.



Disregard -item 2-.

- Unplug electrical connector -1-.
- Remove bolts -arrows-.
- Release hose clip -3- and detach coolant hose from map controlled engine cooling system thermostat - F265- permitted unless authorised by with respect to the confidence

Installing

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



- Renew seal.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.
- Do not reuse coolant.
- Connect coolant hose with plug-in connector <u>⇒ page 286</u>.
- Fill up with coolant \Rightarrow page 236.

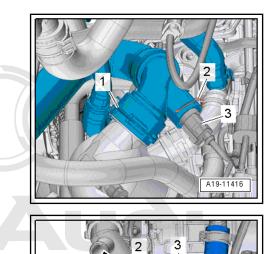
Tightening torques

- ♦ ⇒ "2.1 Exploded view coolant pump and thermostat", page 242
- Underbody guard ⇒ General body repairs, exterior; Rep. gr. 50; Lock carrier; Exploded view lock carrier

2.8 Removing and installing coolant temperature sender - G62-

Removing

- Engine cold.
- Open filler cap -arrow- on coolant expansion tank briefly to relieve residual pressure in cooling system.

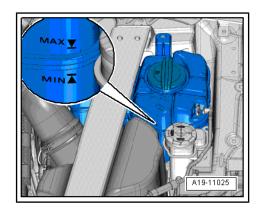


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- Disconnect vacuum hose -1-.
- Unscrew bolts -3- and remove vacuum reservoir -2-.

- Unplug electrical connector -1-.

i Note

Place a cloth underneath to catch escaping coolant.

 Unscrew bolt -2- and pull off coolant temperature sender -G62-.

i Note

If an O-ring remains lodged in cylinder block, lift out O-ring with a piece of wire.

Installing

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



- Fit new O-rings.
- Protected by copyright. Copyring for private or commercial purposes, in part or in whole, is not Insert new coclant temperature sender into connection immerant liability diately to avoid loss of coolant information in this document. Copyright by AUDI AG.
- Check coolant level <u>⇒ page 241</u>.

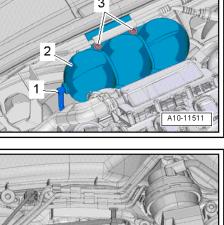
Tightening torques

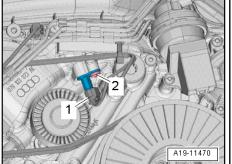
 [⇒] "2.3 Exploded view - coolant temperature senders", <u>page 246</u>

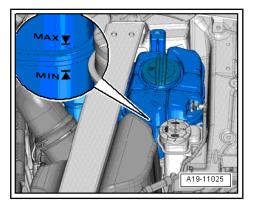
2.9 Removing and installing radiator outlet coolant temperature sender - G83-

Removing

- · Engine cold.
- Open filler cap -arrow- on coolant expansion tank briefly to relieve residual pressure in cooling system.
- Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.







- Unplug electrical connector -3-.

Place a cloth underneath to catch escaping coolant.

 Pull off retaining clip -2- and detach radiator outlet coolant temperature sender - G83-.



Disregard -item 1-.

Installing

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



- ♦ Fit new O-ring.
- Insert new coolant temperature sender G62- immediately into connection to avoid loss of coolant.
- Check coolant level <u>→ page 241</u>.

Tightening torques

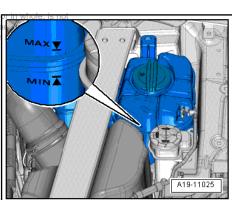
♦ ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view - noise insulation

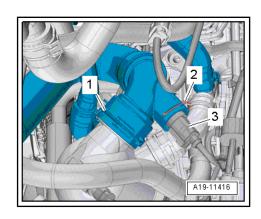
2.10 Removing and installing temperature sender for engine temperature regulation - G694-

Removing

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- Engine cold.
- Open filler cap -arrow- on coolant expansion tank briefly to relieve residual pressure in cooling system.





- Disconnect vacuum hose -1-.
- Unscrew bolts -3- and remove vacuum reservoir -2-.

- Unplug electrical connector -2-.

i Note

Place a cloth underneath to catch escaping coolant.

 Unscrew bolt -1- and detach temperature sender for engine temperature regulation - G694-.

i) Note

If an O-ring remains lodged in cylinder block, lift out O-ring with a piece of wire.

Installing

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

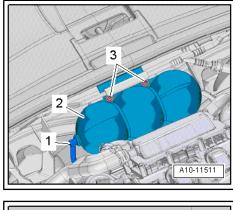


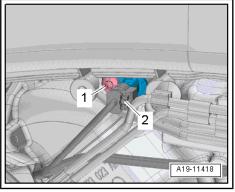
- Fit new O-rings.
- Insert new coolant temperature sender into connection immediately to avoid loss of coolant.
- Check coolant level \Rightarrow page 241.

Tightening torques



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2.11 Removing and installing coolant valves

 \Rightarrow "2.11.1 Removing and installing coolant shut-off valve", page 257

 \Rightarrow "2.11.2 Removing and installing coolant valve for gearbox N488 ", page 257

 \Rightarrow "2.11.3 Removing and installing gearbox oil cooling valve N509 ", page 259

2.11.1 Removing and installing coolant shut-off valve

Removing

- Drain coolant <u>⇒ page 234</u>.
- Disconnect vacuum hose -1-.
- Unscrew bolts -3- and remove vacuum reservoir -2-.

- Unplug electrical connector -3-.
- Disconnect vacuum hose -2-.
- Remove bolts -arrows-.
- Remove coolant shut-off valve -1- (pay attention to intermediate pipe -4-).

Installing

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

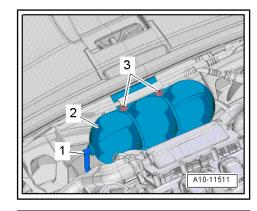
i Note

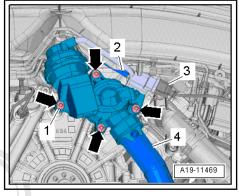
- Renew gasket and O-rings.
- Do not reuse coolant.
- Fill up with coolant \Rightarrow page 236.

Tightening torques

- [⇒] "2.1 Exploded view coolant pump and thermostat", <u>page 242</u>
- 2.11.2 Removing and installing coolant valveses, in part or in whole, is not permitted unless authorised by AUFI AG. AUDI AG does not guarantee or accept any liability for gearboxed N488 inters of information in this document. Copyright by AUDI AG.

Special tools and workshop equipment required

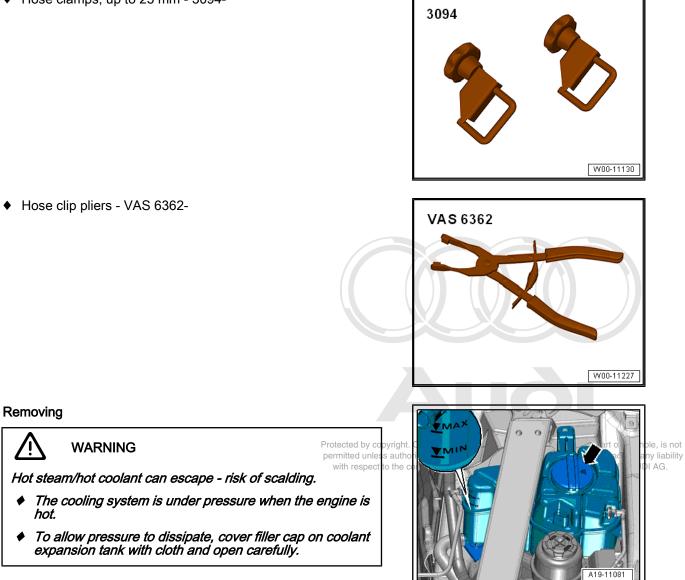




Hose clamps, up to 25 mm - 3094-

٠

•



- Open filler cap -arrow- on coolant expansion tank.
- Remove noise insulation (front) \Rightarrow General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation .

i Note

Place a cloth underneath to catch escaping coolant.

- Clamp off coolant hoses using hose clamps -3094- , release hose clips -1- and disconnect coolant hoses.
- Remove bolts -arrows- and detach coolant valve for gearbox
 N488- .
- Unplug electrical connector -2-.

i Note

Disregard -item 3-.

Installing

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



) Note

Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.

- Check coolant level \Rightarrow page 241.

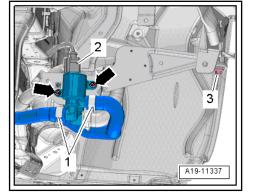
Tightening torques

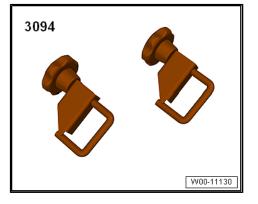
- ◆ ⇒ "2.2 Exploded view electric coolant pump", page 244
- General body repairs, exterior by copyright Copying for private or commercial purposes, in part or in whole, is not tion; Exploded view noise insulation per to the correctness of information in this document. Copyright by AUDI AG.

2.11.3 Removing and installing gearbox oil cooling valve - N509-

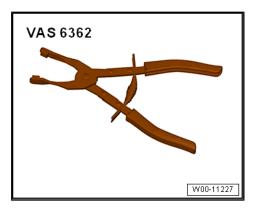
Special tools and workshop equipment required

♦ Hose clamps, up to 25 mm - 3094-





Hose clip pliers - VAS 6362-



Removing



WARNING

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

- The cooling system is under pressure when the engine is hot.
- To allow pressure to dissipate, cover filler cap on coolant expansion tank with cloth and open carefully.
- Open filler cap -arrow- on coolant expansion tank.
- Remove noise insulation (front) \Rightarrow General body repairs, ex-terior; Rep. gradiec 66° Noise insulation when noving and installing or in whole, is not the second state of the secon noise insulation, respect to the correctness of information in this document. Copyright by AUDI AG



Place a cloth underneath to catch escaping coolant.

- Clamp off coolant hoses using hose clamps -3094-, release hose clips -1- and disconnect coolant hoses.
- Unscrew bolts -arrows- and remove gear oil cooling valve -N509- .
- Unplug electrical connector -2-.

Installing

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



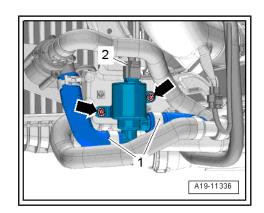
Note

Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .

Check coolant level \Rightarrow page 241.

Tightening torques

- ⇒ "2.2 Exploded view electric coolant pump", page 244
- ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view - noise insulation



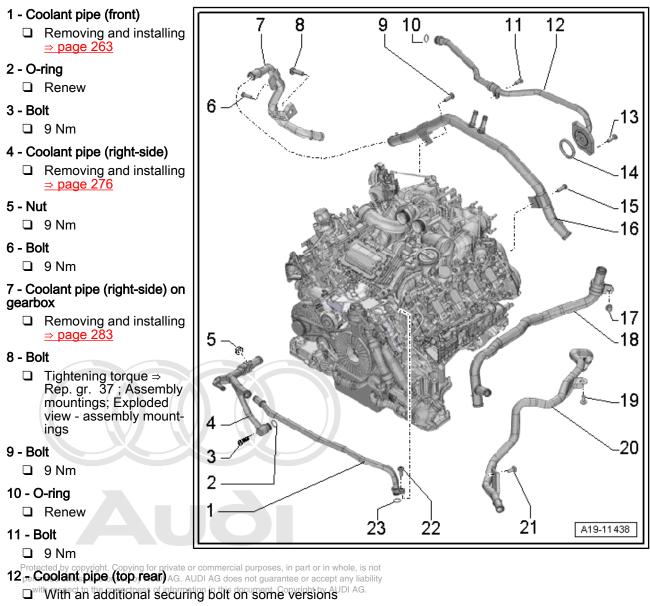
A19-11081

3 Coolant pipes

- ⇒ "3.1 Exploded view coolant pipes", page 261
- ⇒ "3.2 Removing and installing coolant pipes", page 263
- 3.1 Exploded view coolant pipes

i Note

The arrow markings on coolant pipes and on ends of hoses must align.



- $\Box \quad \text{Removing and installing} \Rightarrow \underline{\text{page 277}}$
- 13 Bolt
 - 🛛 9 Nm
- 14 O-ring
 - Renew

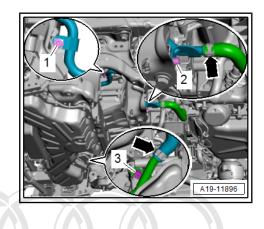
- 15 Bolt
- 🗅 9 Nm
- 16 Coolant pipe (bottom rear)
 - □ Removing and installing \Rightarrow page 280
- 17 Nut
 - 🛛 9 Nm
- 18 Coolant pipe (top left)
 - $\Box \quad \text{Removing and installing} \Rightarrow \underline{\text{page 264}}$
- 19 Bolt
- 🗅 9 Nm

20 - Coolant pipe (bottom left)

- **G** Removing and installing:
- ◆ ⇒ "3.2.3 Removing and installing coolant pipe (bottom left) vehicles up to model year 2013", page 271
- 21 Bolt
 - 🛛 9 Nm
- 22 Bolt
 - 🛛 9 Nm
- 23 O-ring
 - Renew

Coolant pipe (bottom left) for vehicles from model year 2014 onwards - tightening torques

- Tighten bolts -1, 2, 3- to 23 Nm.





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3.2 Removing and installing coolant pipes

 \Rightarrow "3.2.1 Removing and installing coolant pipe (front)", page 263

 \Rightarrow "3.2.2 Removing and installing coolant pipe (top left)", page 264

 \Rightarrow "3.2.3 Removing and installing coolant pipe (bottom left) - vehicles up to model year 2013", page 271

 \Rightarrow "3.2.4 Removing and installing coolant pipe (bottom left) - vehicles from model year 2014 onwards", page 274

 \Rightarrow "3.2.5 Removing and installing coolant pipe (right-side)", page 276

 \Rightarrow "3.2.6 Removing and installing coolant pipe (top rear)", page 277

 \Rightarrow "3.2.7 Removing and installing coolant pipe (bottom rear)", page 280

 \Rightarrow "3.2.8 Removing and installing coolant pipe (right-side) on gearbox", page 283

3.2.1 Removing and installing coolant pipe (front)

Removing

- Drain coolant <u>⇒ page 234</u>.
- Remove engine cover panel <u>⇒ page 69</u>.

WARNING

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

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- Release hose clip -2-, detach secondary air hose and push hose to one side.
- Move clear electrical wiring harness -arrow-.
- Remove bolt -4-, disconnect coolant pipe (front) -3- from cylinder head (left-side) and detach from coolant pipe (right-side) -1-.

Installing

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

i Note

- ♦ Fit new O-ring.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.
- Do not reuse coolant.
- Lubricate O-ring with coolant and fit O-ring.
- Fill up with coolant <u>⇒ page 236</u>.

Tightening torques

◆ ⇒ "3.1 Exploded view - coolant pipes", page 261

3.2.2 Removing and installing coolant pipe (top left)

Special tools and workshop equipment required

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



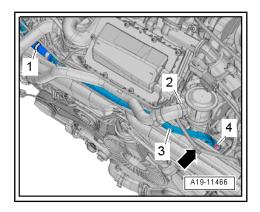
V.A.G 1383 A

Hose clip pliers - VAS 6362-



Drain coolant \Rightarrow page 234.

Removing



Vehicles with engine codes CEUA/CTGA:

- Remove lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments .
- Remove closure plate for bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing attachments.

Vehicles with engine codes CGTA/CTFA:

Remove bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing bumper cover.

All vehicles (continued):

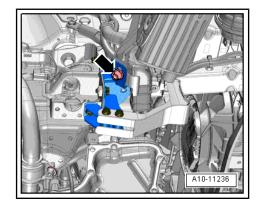
Caution

Electronic components are susceptible to damage.

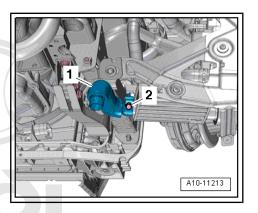
- Observe notes on procedure for disconnecting the battery.
- Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not
 Disconnect earth wire from battery terminal sure lectrical sysual AG. AUDI AG does not guarantee or accept any liability
 tem; Rep. gr. 27; Battery; Disconnecting and connecting and connecting and connecting battery.
 battery.
- Support engine in installation position ⇒ page 50.
- Remove noise insulation panels ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.
- Remove underbody trim (front left and right) ⇒ General body repairs, exterior; Rep. gr. 66; Underbody trim; Removing and installing underbody trim.
- Completely remove wheel housing liners (front left and front right) ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Removing and installing wheel housing liner (front).
- Unbolt drive shaft (left and right) from gearbox flange shafts
 ⇒ Running gear, axles, steering; Rep. gr. 40; Drive shaft; Removing and installing drive shaft.

Vehicles with auxiliary heater:

- Remove bolt -arrow- at bracket.

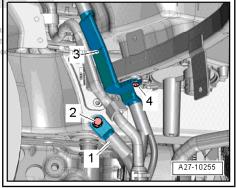


Release clamp -2- and detach exhaust pipe -1- for auxiliary heater.



All vehicles (continued):

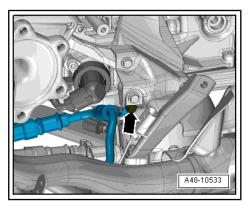
- Remove bolt -4- for battery positive wire -3- and bolt -2- for earth wire -1- and move electrical wiring clear.

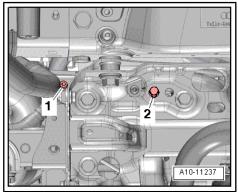


Vehicles up to model year 2013:

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

- Remove bolts -1 and 2-.





- Unplug electrical connector -2-.
- Remove bolt -1-.

Vehicles from model year 2014 onwards:

- Unscrew bolt -1- and move earth wire clear at longitudinal member.
- Remove nut -3- and unplug electrical connector -2-.



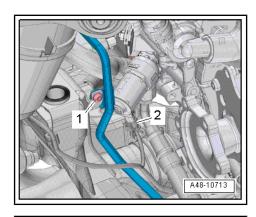
- Release hose clip -arrow- and detach coolant hose.

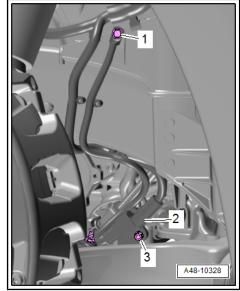


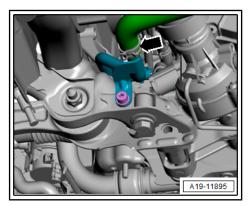
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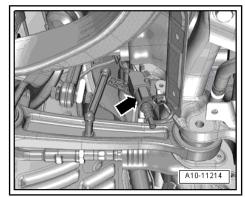
All vehicles (continued):

- Unplug electrical connector -arrow- at front vehicle level sender -G78- / -G289- and move electrical wiring clear.









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

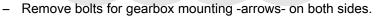


Disregard -items 2, 3-.

- Remove bolts -3- on both sides.



Disregard -items 1, 2-.



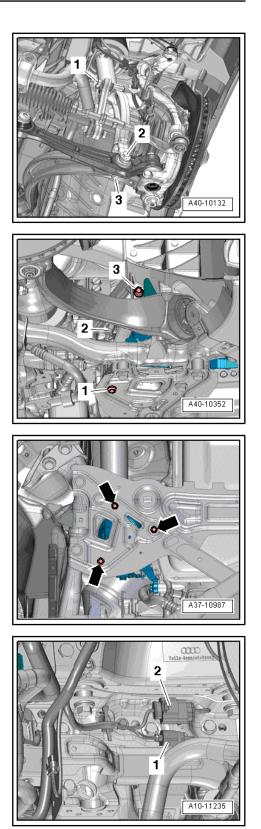
 Detach intermediate steering shaft from steering rack and move clear by telescoping upwards ⇒ Running gear, axles, steering; Rep. gr. 48; Steering column; Removing and installing intermediate steering shaft.

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- Detach electrical connector -2- from bracket and unplug:

Note

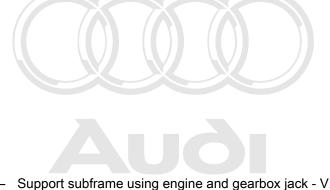
Disregard -item 1-.



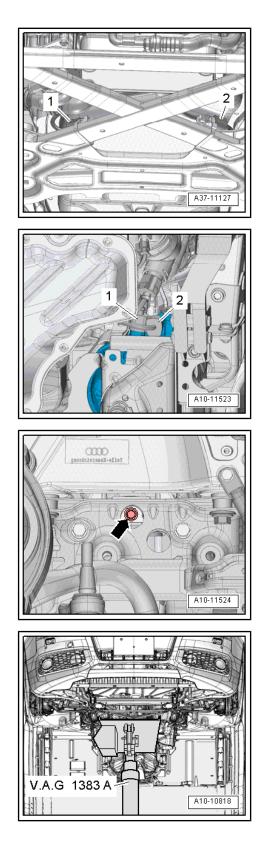
- Move electrical connectors and wiring clear:
- 1 Gearbox mounting valve 1 N262-
- 2 Gearbox mounting valve 2 N263-

- Unplug electrical connectors (left and right) -1, 2-.

- Remove bolt for engine mountings -arrow- on both sides.





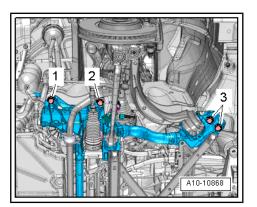


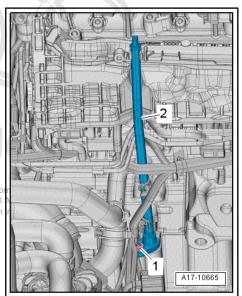
- Mark installation position of subframe on longitudinal members with felt-tip pen.
- Unscrew subframe bolts -1, 2, 3- on both sides in several stages and in diagonal sequence.



Risk of damage to running gear components.

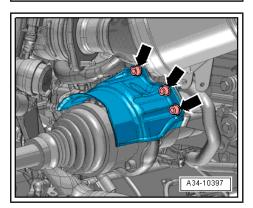
- The vehicle must NOT be lowered onto its wheels if the engine/gearbox mountings, steering rack or subframe cross brace are not properly installed.
- Lower subframe using engine and gearbox jack V.A.G 1383
 A- just far enough for access to coolant pipe (top left), ensuring sufficient clearance for hydraulic fluid hoses (left-side) and electrical wiring (right-side).
- Remove bolt -1-, unclip guide tube -2- for oil dipstick from intake manifold and detach.





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 Remove bolts -arrows- and detach heat shield for drive shaft (left-side).



- Move clear electrical wiring harness.
- Remove nut -3- and move retaining clip clear.
- Release hose clips -arrows- and disconnect coolant hoses from coolant pipe (top left).
- Unclip coolant pipe (top left) -2- from bracket -1-.

Installing

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

Note

- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.
- Do not reuse coolant.
- Install engine mountings <u>⇒ page 52</u>.
- Fill up with coolant \Rightarrow page 236.

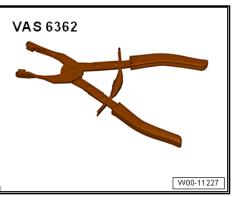
Tightening torques

- ★ "3.1 Exploded view coolant pipes", page 261

3.2.3 Removing and installing coolant pipe (bottom left) - vehicles up to model year 2013

Special tools and workshop equipment required

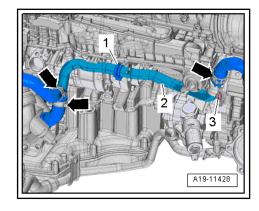
Hose clip pliers - VAS 6362-



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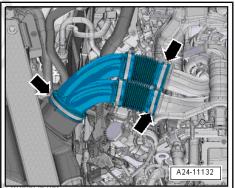
Removing

- Drain coolant <u>⇒ page 234</u>.
- Remove noise insulation (rear) ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.
- Support engine in installation position \Rightarrow page 50.



Vehicles with engine codes CEUA/CTGA:

- Release hose clips -arrows- and remove air pipe.



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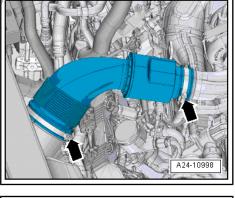
Vehicles with engine COTA/CTFA. finformation in this document. Copyright

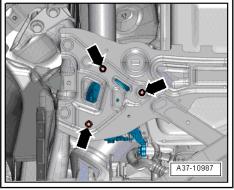
- Release hose clips -arrows- and remove air pipes (left and right).
- Remove wheel housing liners (front left and front right) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liner; Removing and installing wheel housing liner (front).
- Remove bolts for gearbox mounting -arrows- on both sides.
- Detach intermediate steering shaft from steering rack and move clear by telescoping upwards ⇒ Running gear, axles, steering; Rep. gr. 48; Steering column; Removing and installing intermediate steering shaft.

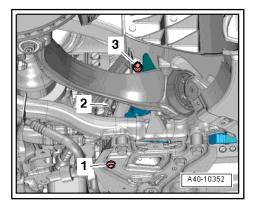
- Remove bolt -3- on both sides.



Disregard -items 1, 2-.







Remove bolt for engine mountings -arrow- on both sides. _

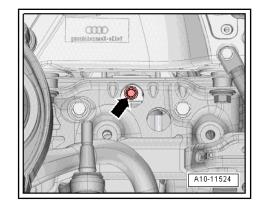
Using spindle - 10 - 222 A /11- -item 1-, raise engine through distance -a- on left side. _

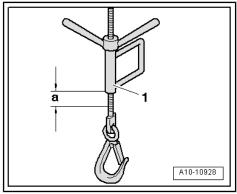
Release hose clip -2- and detach coolant hose.

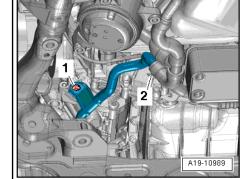
Dimension -a- = 30 mm ٠

- Remove bolt -1-.

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3. Coolant pipes 273

- Remove bolt -2- and detach coolant pipe (bottom left).



Disregard -item 1-.

Installing

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



- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.
- Do not reuse coolant.
- Install engine mountings \Rightarrow page 52.
- Install air ducts with screw-type clips ⇒ page 318.
- Fill up with coolant \Rightarrow page 236.

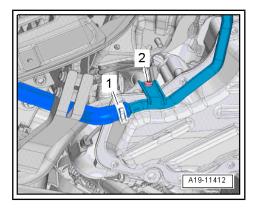
Tightening torques

◆ ⇒ "3.1 Exploded view - coolant pipes", page 261

3.2.4 Removing and installing coolant pipe (bottom left) - vehicles from model year 2014 onwards

Special tools and workshop equipment required

Hose clamps, up to 25 mm - 3094-



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Removing

Vehicles with engine code CTFA:

- Remove air cleaner housing (left-side) \Rightarrow page 353.

All vehicles (continued):

Remove nut -arrow- and push coolant pipe -1- slightly towards front.

- Remove bolt -1- at top.
- Remove noise insulation panels ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.

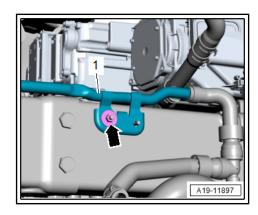
- Remove nuts -arrows- and lower anti-roll bar.

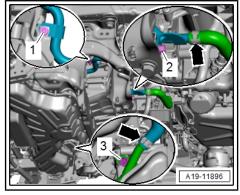
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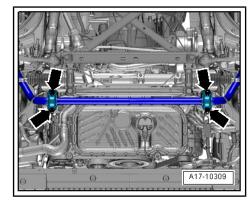
- Remove nut -1-.
- If fitted, cut through cable tie -2-, move bracket with electrical connector clear and push slightly to one side.

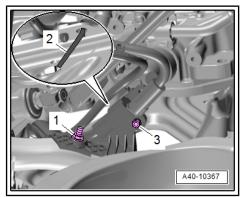


Disregard -item 3-.









Note

Place a cloth underneath to catch escaping coolant.

- Clamp off coolant hoses using hose clamps -3094-, release hose clips -arrows- and disconnect hoses.
- Remove bolts -2 and 3- and detach coolant pipe (bottom left) towards front.

Installing

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

i Note

Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.

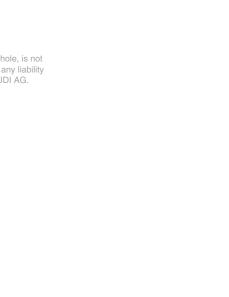
- Install air cleaner housing b page 353 ivate or commercial purposes, in part or in whole, is not
 permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability
- Check coolant level se page 244 these of information in this document. Copyright by AUDI AG.

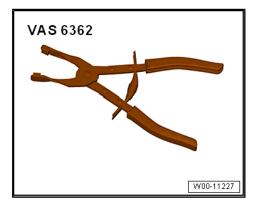
Tightening torques

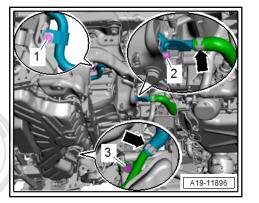
- ♦ ⇒ Fig. ""Coolant pipe (bottom left) for vehicles from model year 2014 onwards - tightening torques"", page 262
- Anti-roll bar ⇒ Running gear, axles, steering; Rep. gr. 40; Subframe; Exploded view - subframe
- ♦ ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view noise insulation
- 3.2.5 Removing and installing coolant pipe (right-side)

Special tools and workshop equipment required

• Hose clip pliers - VAS 6362-







Removing

- Remove charge air cooler housing ⇒ page 318.
- Release hose clip -1- and detach coolant hose.
- Remove bolt -3- and nut -2- and disconnect coolant pipe (rightside) from cylinder head.

Installing

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



- ♦ Fit new O-ring.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.
- Install charge air cooler housing \Rightarrow page 318.

Tightening torques

◆ <u>⇒ "3.1 Exploded view - coolant pipes", page 261</u>

3.2.6 Removing and installing coolant pipe (top rear)

Removing

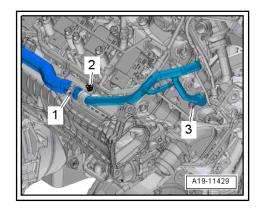
- Drain coolant <u>⇒ page 234</u>.
- Remove front silencers on both sides <u>⇒ page 403</u>.
- Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50; Bulkhead; Exploded view plenum chamber partition panel.

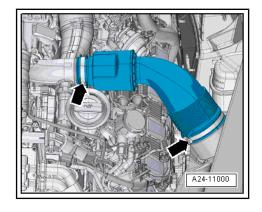
Vehicles with engine codes CGTA/CTFA:

- Release hose clips -arrows- and remove air pipe (left-side).



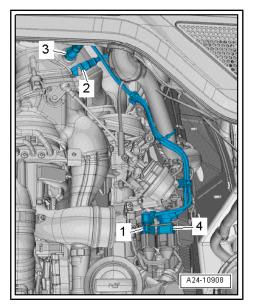
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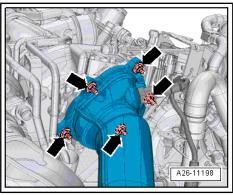


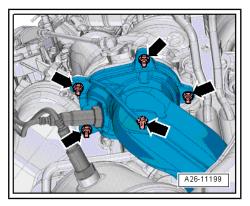


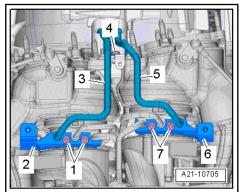
All vehicles (continued):

- _ Detach electrical connectors from bracket, unplug connectors and move electrical wiring clear:
- 1 For Lambda probe after catalytic converter G130- -item 3-
- 4 For Lambda probe G39- -item 2-
- Move clear electrical wiring harness for Lambda probe 2 -G108- and Lambda probe 2 after catalytic converter - G131- .











The catalytic converter for cylinder bank 1 (right-side) is located on the left side of the vehicle.

Unscrew nuts -arrows- on cylinder bank 1 (right-side) and push catalytic converter on left side of vehicle towards rear.



Note

v copyright. Copying for private or commercial purposes, in part or in whole, is not The catalytic converter for cylinder bank 2 (left-side) is located on the right side of the vehicle.

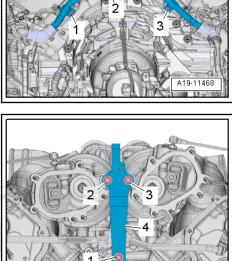
- Unscrew nuts -arrows- on cylinder bank 2 (left-side) and push catalytic converter on right side of vehicle towards rear.
- Unscrew bolts -1, 4, 7- and remove brackets -2, 6-.
- Disconnect coolant lines -3, 5- from turbocharger on both sides.

- Release hose clip -1- and detach air hose.
- Remove bolt -2-.
- Move vacuum line clear and push towards rear.

- Remove bolts -1, 3- and press coolant pipe (bottom rear) -2- towards rear.

 Unscrew bolts -1, 2, 3- and detach support -4- for turbocharger.





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A21-10706



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A further bolt is fitted for coolant pipe (right-side) on some versions.



Caution

Avoid damage to coolant pipe.

- Do not bend coolant pipe.
- Pull off coolant pipe (top rear) from timing chain cover (rightside) -arrow- and detach.

Installing

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

Note

- Renew gaskets, seals and O-rings.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.
- Install air ducts with screw-type clips ⇒ page 318.
- Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50; Bulkhead; Exploded view plenum chamber partition panel.



Do not reuse coolant.

Fill up with coolant <u>⇒ page 236</u>.

Tightening torques

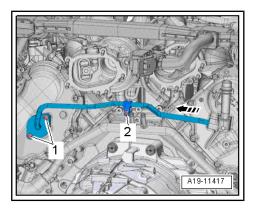
- ◆ ⇒ "1.1 Exploded view turbocharger", page 306
- ◆ ⇒ "1.1 Exploded view silencers", page 399

3.2.7 Removing and installing coolant pipe (bottom rear)

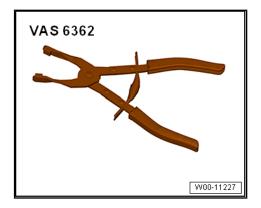
Special tools and workshop equipment required



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♦ Hose clip pliers - VAS 6362-



Removing



Secure the heat insulation sleeves in the original position when installing.

- Drain coolant <u>⇒ page 234</u>.
- Remove front silencers on both sides \Rightarrow page 403.
- Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50; Bulkhead; Exploded view plenum chamber partition panel.

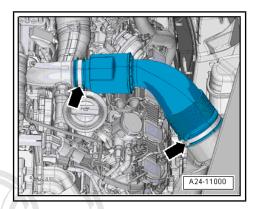
Vehicles with engine codes CGTA/CTFA:

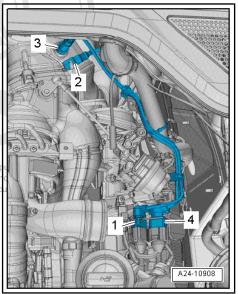
- Release hose clips -arrows- and remove air pipe (left-side).

All vehicles (continued):

- Detach electrical connectors from bracket, unplug connectors and move electrical wiring clear:
- 1 For Lambda probe after catalytic converter G130- -item 3-
- 4 For Lambda probe G39- -item 2-
- Move clear electrical wiring harness for Lambda probe 2 -G108- and Lambda probe 2 after catalytic converter - G131-.

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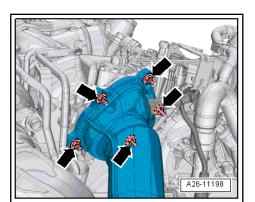
The catalytic converter for cylinder bank 1 (right-side) is located on the left side of the vehicle.

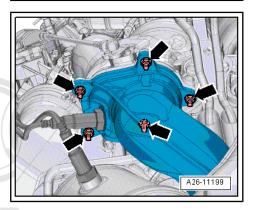
Unscrew nuts -arrows- on cylinder bank 1 (right-side) and push catalytic converter on left side of vehicle towards rear.

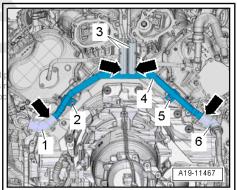


The catalytic converter for cylinder bank 2 (left-side) is located on the right side of the vehicle.

Unscrew nuts -arrows- on cylinder bank 2 (left-side) and push catalytic converter on right side of vehicle towards rear.







- Detach heat insulation sleeves -1, 6-.
- Push heat insulation sleeves -3- upwards.
- Remove bolts -2 and 5-.
- Release hose clips -arrows-, disconnect coolant hoses from merci coolant pipe (bottom rear) -4- and detach coolant pipe (bottom rear) -4- and detach coolant pipe

Installing

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



Note

Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .

- Lubricate O-ring with coolant.
- Install air ducts with screw-type clips \Rightarrow page 318.
- Install plenum chamber partition panel \Rightarrow General body repairs, exterior; Rep. gr. 50; Bulkhead; Exploded view plenum chamber partition panel .



Do not reuse coolant.

Fill up with coolant \Rightarrow page 236.

Tightening torques

- ⇒ "3.1 Exploded view coolant pipes", page 261
- ⇒ "1.1 Exploded view silencers", page 399
- 282 Rep. gr.19 Cooling

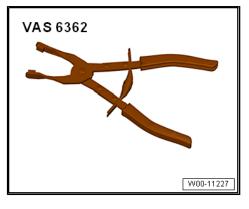
3.2.8 Removing and installing coolant pipe (right-side) on gearbox

Special tools and workshop equipment required

Drip tray for workshop hoist - VAS 6208-



Hose clip pliers - VAS 6362-



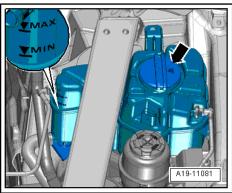


Note

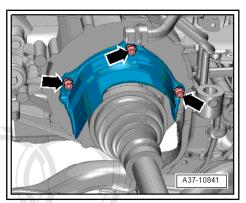
Secure the heat insulation sleeve in the original position when installing.

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

- The cooling system is under pressure when the engine is hot.
- To allow pressure to dissipate, cover filler cap on coolant expansion tank with cloth and open carefully.
- Open filler cap -arrow- on coolant expansion tank.
- Remove noise insulation (rear) ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.
- Remove rear section of front wheel housing liner (right-side)
 ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Removing and installing wheel housing liner (front).



 Remove bolts -arrows- and detach heat shield for drive shaft (right-side).



- Fold heat insulation sleeve -3- slightly upwards.
- Remove bolts -1 and 2-.
- Place drip tray for workshop hoist VAS 6208- under connection.
- Release hose clips -arrows-, disconnect coolant hoses from coolant pipe at gearbox (right-side) and detach coolant pipe.

Installing

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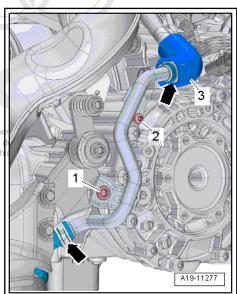
Installation is carried out in the reverse order; note the following: tion in the

i Note

- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.
- Do not reuse coolant.
- Fill up with coolant <u>⇒ page 236</u>.

Tightening torques

- ★ "3.1 Exploded view coolant pipes", page 261
- Heat shield for drive shaft ⇒ Running gear, axles, steering; Rep. gr. 40; Drive shaft; Exploded view - drive shaft
- ♦ ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view noise insulation



4 Radiators/radiator fans

⇒ "4.1 Exploded view - radiators/radiator fans", page 285

⇒ "4.2 Exploded view - auxiliary radiator", page 288

⇒ "4.3 Removing and installing radiator", page 289

 \Rightarrow "4.4 Removing and installing water radiator for charge air cooling circuit", page 295

- ⇒ "4.5 Removing and installing radiator cowl", page 302
- ⇒ "4.6 Removing and installing radiator fans", page 305

4.1 Exploded view - radiators/radiator fans

Radiator, water radiator (front) for charge air cooling circuit, condenser and hydraulic fluid cooler

1 - Air duct

- 2 O-ring
 - Renew

3 - Coolant hose

- To coolant expansion tank
- Lift retaining clip to detach
- □ Connecting ⇒ page 286

4 - O-ring

□ Renew

5 - Coolant hose

- Lift retaining clip to detach
- □ Connecting ⇒ page 286

6 - Coolant hose

- Lift retaining clip to detach
- □ Connecting ⇒ page 286

7 - O-ring

Renew

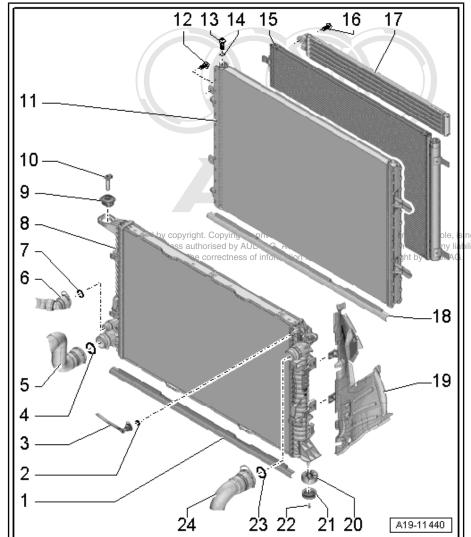
8 - Radiator

□ Removing and installing ⇒ page 289

9 - Rubber buffer

10 - Retaining pin

 Use screwdriver to release and pull off



11 - Water radiator (front) for charge air cooling circuit

$\Box \quad \text{Removing and installing} \Rightarrow \underline{\text{page 295}}$

- 12 Bolt
 - 🗅 5 Nm

13 - Bleeder screw

14 - O-ring

Renew

15 - Condenser

□ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87; Refrigerant circuit; Removing and installing condenser

16 - Bolt

🗅 5 Nm

17 - Hydraulic fluid cooler

- □ For hydraulic power steering
- □ Removing and installing ⇒ Running gear, axles, steering; Rep. gr. 48; Hydraulic power steering; Removing and installing hydraulic fluid cooler
- 18 Air duct
- 19 Air duct
- 20 Rubber bush
 - For radiator

21 - Washer

22 - Bolt

🗅 4.5 Nm

23 - O-ring

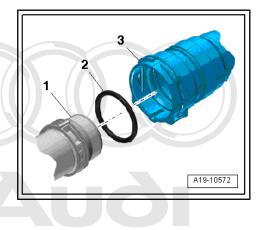
Renew

24 - Coolant hose

- Lift retaining clip to detach
- $\Box \quad Connecting \Rightarrow page 286$

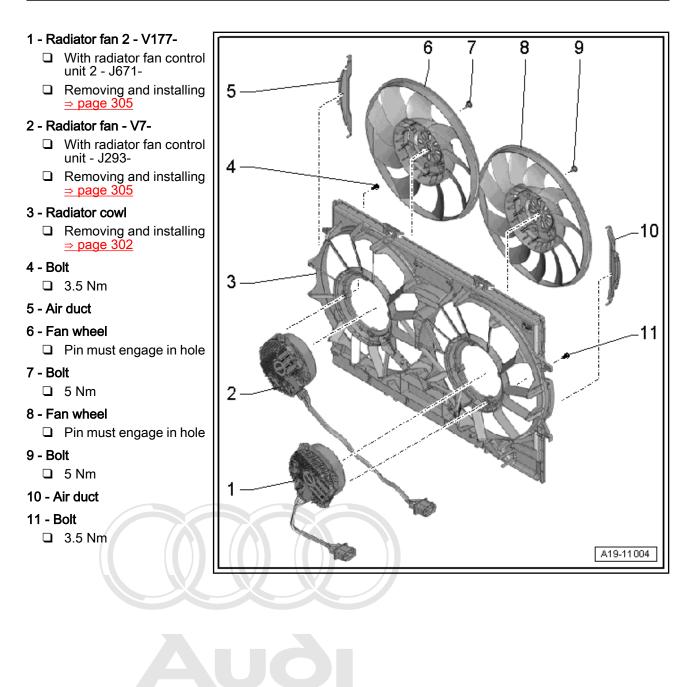
Connecting coolant hose with plug-in connector

- Remove old O-ring -2- from coolant hose -3-.
- Lightly lubricate new O-ring with coolant and fit O-ring in coolant hose.
- Press coolant hose onto connection -1- until it engages audibly.
- Press coolant hose in again and then pull to check that plugin connector is correctly engaged.



Radiator cowl and radiator fans

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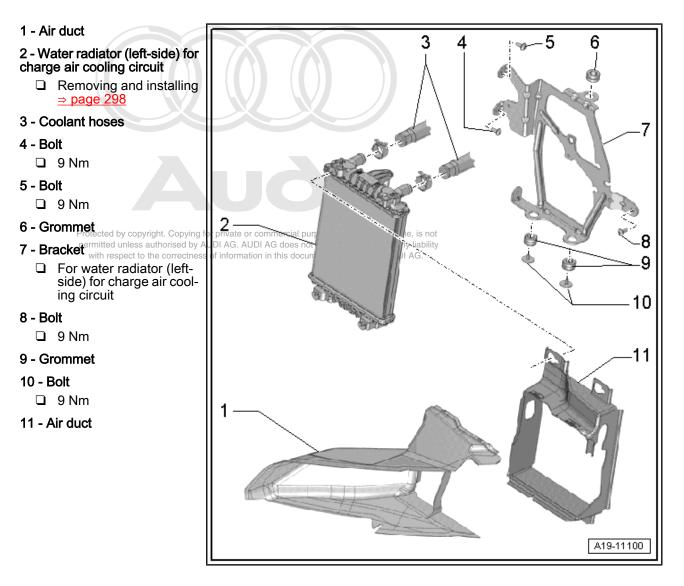
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4.2 Exploded view - auxiliary radiator

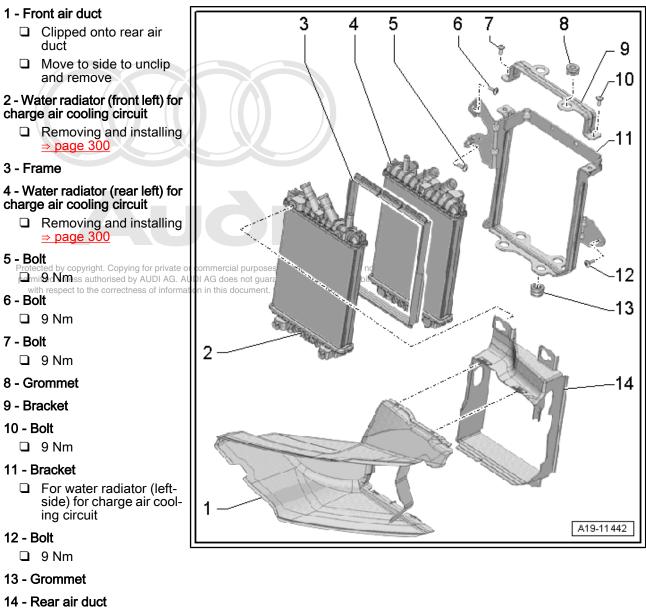
 \Rightarrow "4.2.1 Exploded view - auxiliary radiator, vehicles with engine codes CEUA/CTGA", page 288

 \Rightarrow "4.2.2 Exploded view - auxiliary radiators, vehicles with engine codes CGTA/CTFA", page 289

4.2.1 Exploded view - auxiliary radiator, vehicles with engine codes CEUA/CTGA



4.2.2 Exploded view - auxiliary radiators, vehicles with engine codes CGTA/CTFA



- Clipped onto charge air cooler
- □ Move to side to unclip and remove

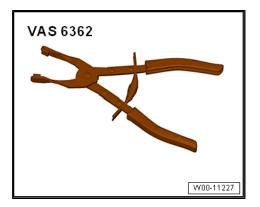
4.3 Removing and installing radiator

Special tools and workshop equipment required

Drip tray for workshop hoist - VAS 6208-

VAS 6208

• Hose clip pliers - VAS 6362-



Removing

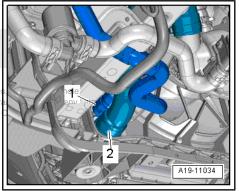


WARNING

Risk of injury as the radiator fans may start up automatically.

- Even when the ignition is switched off, the radiator fans can start up without warning due to accumulated heat in the engine compartment, etc.
- Remove impact absorber ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing impact absorber .
- Place drip tray for workshop hoist VAS 6208- underneath.
- Lift retaining clips -1, 2-, disconnect coolant hoses from radiator and drain off coolant.

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- Unplug electrical connectors -1, 2- for radiator fan.



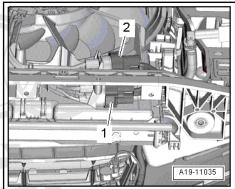
 Lift retaining clips -1 and 2- and disconnect coolant hoses (top right) from radiator.
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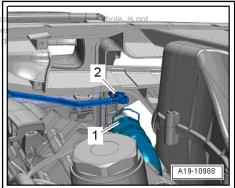
 Pull off retaining clip -3- and disconnect headlight washer hose -4-.

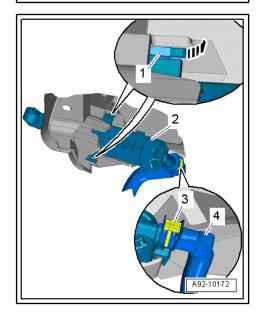


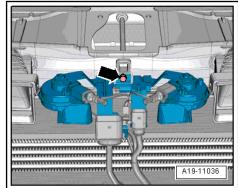
Disregard -items 1, 2- and -arrow-.

- Remove bolt -arrow-, leave bracket with horns suspended.









 Unclip cover -1- on right side and, if fitted, on left side -arrows- and remove.

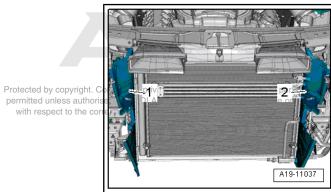
- Remove bolts -arrows- on right-side and, if fitted, on left side, and detach air ducts -1 and 2-.

Vehicles with engine codes CEUA/CTGA:

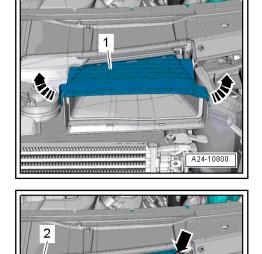
- Unscrew bolts -arrows- for air duct at lock carrier.

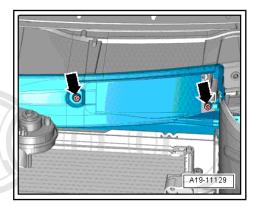
All vehicles (continued):

– Unclip air ducts -1 and 2-.



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Vehicles up to model year 2013:

- Remove bolts -arrows-, detach hydraulic fluid cooler -1- for power steering to the left and hook it up on one side.

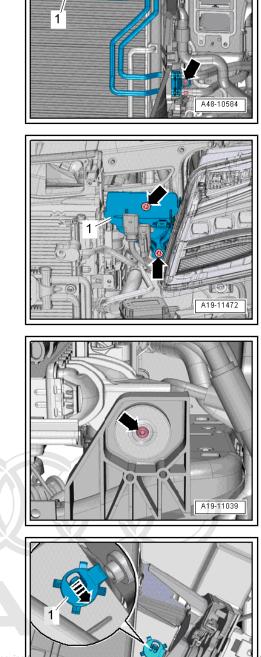
All vehicles (continued):

 Remove bolts -arrows- on both sides and detach support -1from lock carrier and move to one side.

- Remove bolt -arrow- at bottom left and bottom right of radiator.

 Release retaining pins -1- for radiator on both sides -arrowand pull out upwards.

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A19-11040

- Release hose clips -2, 3- and disconnect coolant hoses.
- Remove bolts -arrows- for water radiator (front) for charge air cooling circuit -1-.

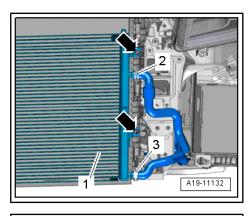


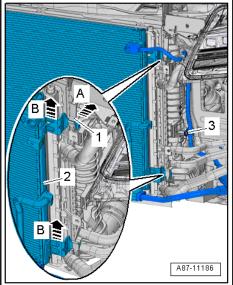
- Remove bolt -3-.
- Have a second mechanic release retaining clips -1- on both sides in direction of -arrow A-.
- Pull condenser -2- upwards out of its mountings on radiator -arrows B-.

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Risk of damage to condenser, refrigerant lines and refrigerant hoses.

- Do NOT stretch, kink or bend refrigerant lines and hoses.
- Pivot condenser forwards with pipes/hoses attached.
- Pull off water radiator (front) for charge air cooling circuit towards left side of vehicle and remove.
- Take off radiator.





 Press locking tabs on left and right sides of radiator cowl -arrow- and at the same time lift radiator cowl off radiator.

Installing

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



- If there are slight impressions on the fins, refer to <u>⇒ page 8</u>.
- Fit new O-rings.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.

Vehicles up to model year 2013:

 Install hydraulic fluid cooler ⇒ Running gear, axles, steering; Rep. gr. 48; Hydraulic power steering; Removing and installing hydraulic fluid cooler.

All vehicles (continued):

- Install air ducts ⇒ page 352.
- Install support on lock carrier ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Exploded view - lock carrier .
- Connect coolant hoses with plug-in connector ⇒ page 286.



Do not reuse coolant.

- Fill up with coolant \Rightarrow page 236.

Tightening torques

- ♦ Bracket for horns ⇒ Electrical system; Rep. gr. 90; Horn; Exploded view - horn
- ♦ General body repairs, exterior; Rep. gr. 63; Bumper (front); Exploded view - impact bar.

4.4 Removing and installing water radiator for charge air cooling circuit

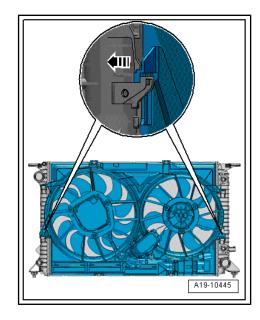
 \Rightarrow "4.4.1 Removing and installing water radiator (front) for charge air cooling circuit", page 295

 \Rightarrow "4.4.2 Removing and installing water radiator (left-side) for charge air cooling circuit - vehicles with engine codes CEUA/ CTGA", page 298

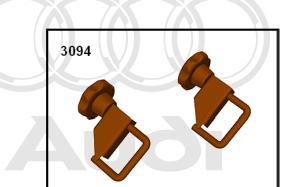
⇒ "4.4.3 Removing and installing water radiator (left-side) for s not chargetair cooling circuit uvehicles with engine codes CGTA/ability CTFA™, page 300 correctness of information in this document. Copyright by AUDI AG.

4.4.1 Removing and installing water radiator (front) for charge air cooling circuit

Special tools and workshop equipment required



Hose clamps, up to 25 mm - 3094-

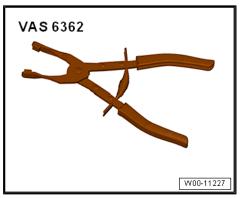


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Drip tray for workshop hoist - VAS 6208-



♦ Hose clip pliers - VAS 6362-



Removing



WARNING

Risk of injury as the radiator fans may start up automatically.

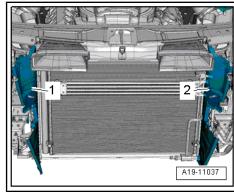
- Even when the ignition is switched off, the radiator fans can start up without warning due to accumulated heat in the engine compartment, etc.
- Remove impact absorber ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing impact absorber .

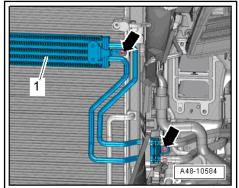
- Unclip air ducts -1 and 2-.

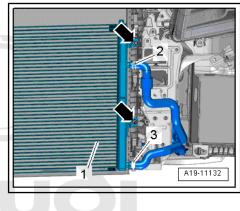
Remove bolts -arrows-, detach hydraulic fluid cooler -1- for power steering to the left and hook it up on one side. _

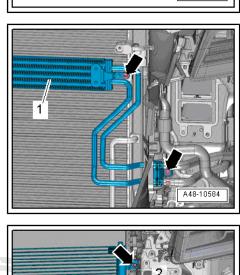
- Place drip tray for workshop hoist VAS 6208- beneath water radiator (front) for charge air cooling circuit.
- Clamp off coolant hoses using hose clamps -3094- , release hose clips -2 and 3- and disconnect hoses from water radiator (front) for charge air cooling circuit.
- Remove bolts -arrows- for water radiator (front) for charge air _ cooling circuit -1-.

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- Remove bolt -3-.
- Have a second mechanic release retaining clips -1- on both sides in direction of -arrow A-.
- Pull condenser -2- upwards out of its mountings on radiator -arrows B-.

Caution

Risk of damage to condenser, refrigerant lines and refrigerant hoses.

- Do NOT stretch, kink or bend refrigerant lines and hoses.
- Push condenser forwards with pipes/hoses attached.
- Pull off water radiator (front) for charge air cooling circuit towards left side of vehicle and remove from below.

Installing

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



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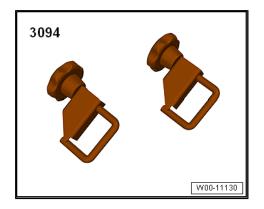
- ◆ If there are slight impressions on the fins, refer to <u>⇒ page 8</u>.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.
- Install hydraulic fluid cooler ⇒ Running gear, axles, steering; Rep. gr. 48 ; Hydraulic power steering; Removing and installing hydraulic fluid cooler .
- Check coolant level <u>⇒ page 236</u>.

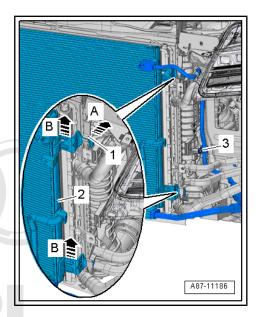
Tightening torques

- ♦ General body repairs, exterior; Rep. gr. 63; Bumper (front); Exploded view - impact bar.
- 4.4.2 Removing and installing water radiator (left-side) for charge air cooling circuit vehicles with engine codes CEUA/ CTGA

Special tools and workshop equipment required

♦ Hose clamps, up to 25 mm - 3094-

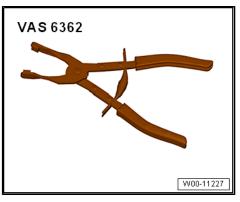




• Drip tray for workshop hoist - VAS 6208-



• Hose clip pliers - VAS 6362-



Removing

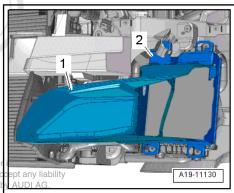


If there are slight impressions on the fins, refer to \Rightarrow page 8.

- Remove bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing bumper cover.
- Remove connecting piece for impact bar ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Exploded view impact bar.
- Unclip air duct -2- for water radiator (left-side) for charge air cooling circuit towards left side of vehicle and remove.

Note

Disregard -item 1-.



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- Place drip tray for workshop hoist VAS 6208- beneath water radiator (left-side) for charge air cooling circuit.
- Clamp off coolant hoses using hose clamps -3094-, release hose clips -2- and disconnect hoses from water radiator (leftside) for charge air cooling circuit.
- Remove bolts -1-, lift to disengage water radiator (left-side) for charge air cooling circuit and detach.

Installing

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



Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.

- Install bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing bumper cover.
- Check coolant level <u>⇒ page 236</u>.

Tightening torques

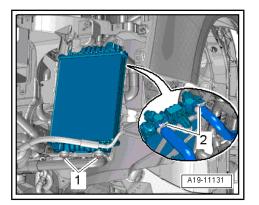
- ◆ ⇒ "4.2.1 Exploded view auxiliary radiator, vehicles with engine codes CEUA/CTGA", page 288
- ♦ ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Exploded view - impact bar.
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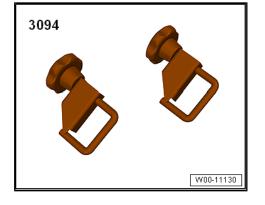
Removing and installing water radiator

4.4.3 Removing and installing water radiator (left-side) for charge air cooling circuit vehicles with engine codes CGTA/CTFA

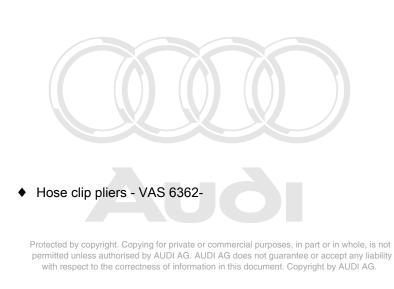
Special tools and workshop equipment required

♦ Hose clamps, up to 25 mm - 3094-

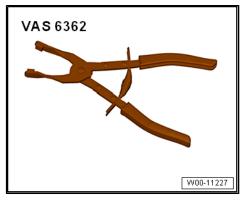




Drip tray for workshop hoist - VAS 6208-





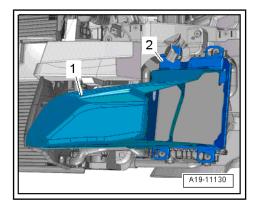


Removing

- Remove bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing bumper cover.
- Remove air cleaner housing (left-side) <u>⇒ page 353</u>.
- Remove connecting piece for impact bar ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Exploded view impact bar.
- Unclip air duct -2- for water radiator (left-side) for charge air cooling circuit towards left side of vehicle and remove.



Disregard -item 1-.



- Place drip tray for workshop hoist VAS 6208- underneath.
- Clamp off coolant hoses using hose clamps -3094-, release hose clips -2- and disconnect hoses from water radiator (front left) for charge air cooling circuit.
- Unscrew bolts -arrows- and detach bracket -3-.
- Lift to disengage water radiator (front left) for charge air cooling circuit and detach.



Some coolant remains in the water radiator (front left) for charge air cooling circuit.

- A19-11473
- Place drip tray for workshop hoist VAS 6208- underneath.
- Lift to disengage water radiator -1- (rear left) for charge air cooling circuit and pivot towards front.
- Clamp off coolant hoses using hose clamps -3094-, release hose clips -2- and disconnect hoses from water radiator (rear left) for charge air cooling circuit.



Note

Some coolant remains in the water radiator (rear left) for charge air cooling circuit.

Installing

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

Note

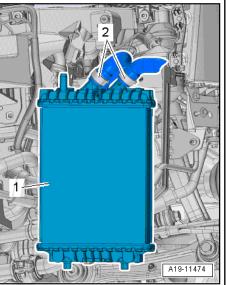
- If there are slight impressions on the fins, refer to \Rightarrow page 8.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.
- Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not Install bumper cover (front) = General body, repairs of AUDI AG, AUDI AG does not guarantee or accept any liability authorised by AUDI AG. AUDI AG does not guarantee or accept any liability authorised by AUDI AG. Rep. gr. 63; Bumper (front); Removing and installing bumper cover.
- Install air cleaner housing \Rightarrow page 353.
- Check coolant level \Rightarrow page 236. _

Tightening torques

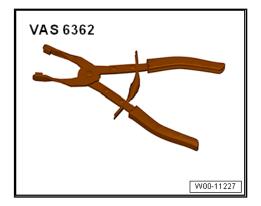
- ⇒ "4.2.2 Exploded view auxiliary radiators, vehicles with engine codes CGTA/CTFA", page 289
- ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Exploded view - impact bar .

4.5 Removing and installing radiator cowl

Special tools and workshop equipment required



♦ Hose clip pliers - VAS 6362-



Removing

Remove engine cover panel ⇒ page 69.

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.
- Remove air cleaner housing on right side and, if fitted, on left side <u>⇒ page 353</u>.
- Remove closure plate for bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing attachments.

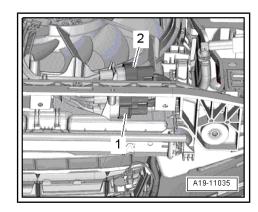


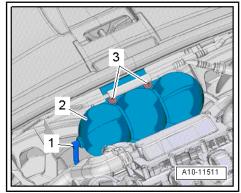
Risk of injury as the radiator fans may start up automatically.

Unplug electrical connectors before starting to work in the area of radiator cowl.

- Unplug electrical connectors -1, 2- for radiator fan.
- Drain coolant ⇒ page 234.
- Disconnect vacuum hose -1-.
- Unscrew bolts -3- and remove vacuum reservoir -2-.

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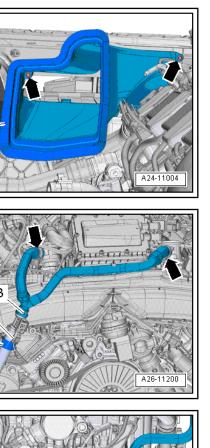




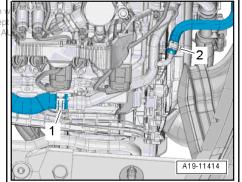
Lift retaining clips -1 and 2- and disconnect coolant hoses (top right) from radiator.

 Remove bolts -arrows- on right-side and, if fitted, on left side, detach air duct -1-.

- Press release tabs -3-, release hose clips -arrows- and disconnect secondary air hose.
- Unplug electrical connector -2-.
- Move clear secondary air hose with retaining clip -1- and push downwards.



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Release hose clip -2- and detach coolant hose.
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Note

Disregard -item 1-.

- Move clear electrical wiring harness at radiator cowl.

 Press locking tabs on left and right sides of radiator cowl -arrow- and at the same time lift radiator cowl off radiator.

Installing

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



Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.

- Install electrical wiring ⇒ Electrical system; Rep. gr. 97; Relay carriers, fuse carriers, electronics boxes; Overview of fitting locations relay carriers, fuse carriers, electronics boxes and ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Install closure plate for bumper cover ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing attachments.
- Connect coolant hose with plug-in connector \Rightarrow page 286.



Do not reuse coolant.

- Fill up with coolant \Rightarrow page 236.

Tightening torques

- ◆ ⇒ "4.1 Exploded view radiators/radiator fans", page 285
- ♦ ⇒ "3.1 Exploded view air cleaner housing", page 352

4.6 Removing and installing radiator fans

Removing



Fit all cable ties in the original positions when installing.

- Remove radiator cowl <u>⇒ page 302</u>.
- Remove bolts -1- or -2- and detach corresponding fan wheel.
- Remove bolts -arrows- on radiator fan.
- Move electrical wiring harness clear and detach radiator fan or private

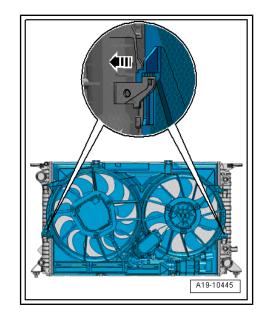
Installing

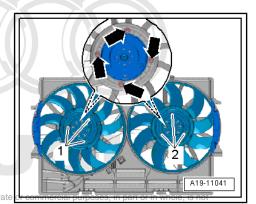
Installation is carried out in the reverse order; note the following:

- Note installation position of fan wheel:
- Pin -2- must engage in hole -1-.
- Install radiator cowl <u>⇒ page 302</u>.

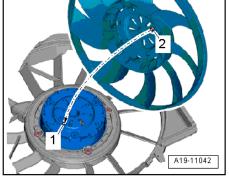
Tightening torques

• \Rightarrow "4.1 Exploded view - radiators/radiator fans", page 285





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21 – Turbocharging/supercharging

1 Turbocharger

⇒ "1.1 Exploded view - turbocharger", page 306

 \Rightarrow "1.2 Removing and installing turbocharger", page 309

 \Rightarrow "1.3 Removing and installing temperature sender for engine cover panel G765 ", page 315

1.1 Exploded view - turbocharger

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The illustration shows the turbocharger for cylinder bank 2 (left-side).

1 - Air pipe

Note

□ To turbocharger

2 - Bolt

🗅 9 Nm

3 - O-ring

Renew

4 - Nut

- □ Self-locking
- Renew
- Tightening torque and sequence:
- ◆ Fig. ""Turbocharger (leftside) - tightening torque and sequence"", page 308
- ◆ Fig. ""Turbocharger (right-side) - tightening torque and sequence"", page 308

5 - Turbocharger

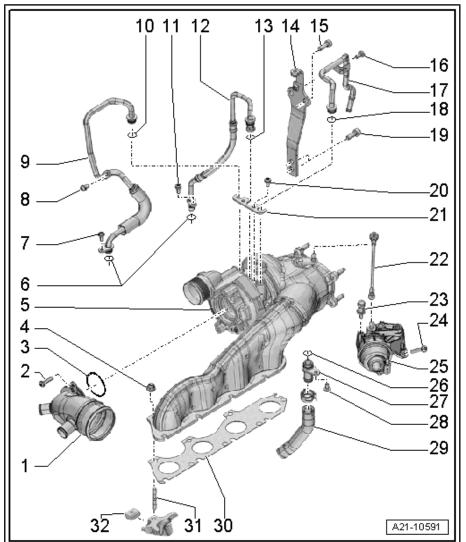
□ Removing and installing ⇒ page 309

6 - O-rings

- Renew
- 7 Bolt
 - 🗅 9 Nm
- 8 Bolt
- 🛛 9 Nm
- 9 Coolant supply line

10 - O-ring

- Renew
- 11 Bolt
 - 🛛 9 Nm



12 - Oil supply line

13 - O-ring

- Renew
- 14 Support
 - □ For turbocharger

15 - Bolt

□ Tightening torque and sequence \Rightarrow page 308

16 - Bolt

□ Tightening torque and sequence \Rightarrow page 308

17 - Coolant return hose/pipe

18 - O-ring

- Renew
- 19 Bolt
 - \Box Tightening torque and sequence \Rightarrow page 308

20 - Bolt

🛛 9 Nm

21 - Retaining plate

For coolant lines and oil lines

22 - Operating rod

□ Always renew after removing

23 - Ball stud

- □ For engine cover
- 2.5 Nm

24 - Bolt

🗅 9 Nm

25 - Vacuum unit

□ For turbocharger

26 - O-ring

Renew

27 - Connection

For oil return hose

28 - Bolt

🛛 9 Nm

29 - Oil return hose

30 - Gasket

Renew

31 - Stud

□ Screw into square nut -item 32- as far as stop

32 - Square nut

- For stud
- On inner side of engine only



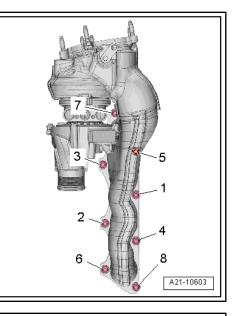


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Turbocharger (left-side) - tightening torque and sequence

- Tighten nuts in stages in the sequence shown:

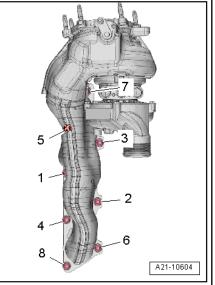
Stage	Bolts	Tightening torque
1.	-1 8-	16 Nm
2.	-1 8-	25 Nm



Turbocharger (right-side) - tightening torque and sequence

- Tighten nuts in stages in the sequence shown:

Stage	Bolts	Tightening torque
1.	-1 8-	16 Nm
2.	-1 8-	25 Nm

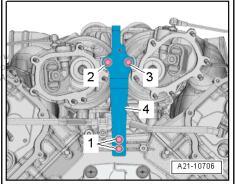


Support for turbocharger - tightening torque and tightening sequence

- Tighten bolts in stages in the sequence shown:

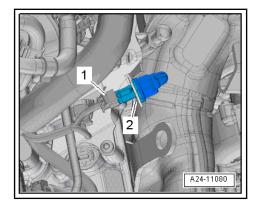
Stage	Bolts Bolts	r <u>copyright.</u> Copying for private or commercial purposes, in pi lightening:torque G. AUDI AG does not guarante	e or acce
1.	-1 3-	5 Nm	right by i
2.	-1 3-	25 Nm	

4 - Support for turbocharger



Temperature sender for engine cover panel - G765- - tightening torque

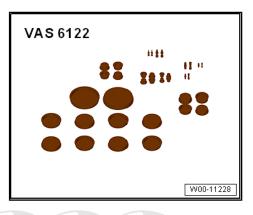
- Tighten bolt -2- to 9 Nm.

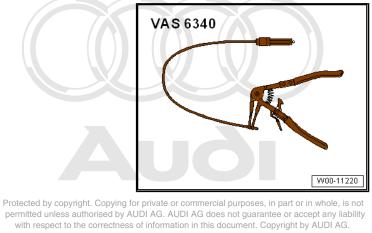


1.2 Removing and installing turbocharger

Special tools and workshop equipment required

Engine bung set - VAS 6122-





Hose clip pliers - VAS 6340-

Removing

i Note

Observe rules for cleanliness \Rightarrow page 7.

1. Turbocharger 309



Caution

If the turbocharger has suffered mechanical damage (e.g. damaged compressor wheel), it is not sufficient merely to fit a new turbocharger. The following work must be performed in order to avoid further damage:

- Check air cleaner housing, air filter element and air hoses for dirt and foreign particles.
- Check the entire charge air system (including the charge air cooler) for foreign matter.
- If foreign matter is found in the charge air system, clean all relevant ducts and hoses and renew charge air cooler if necessary.

Turbocharger (left-side):

Remove charge air cooler housing <u>⇒ page 318</u>.

Turbocharger (right-side):

Remove combination valve for secondary air (right-side)
 ⇒ page 414

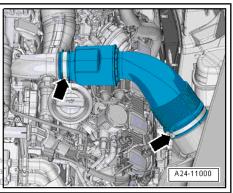
Continuation for both sides:

- Remove front silencers on both sides <u>⇒ page 403</u>.
- Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50; Bulkhead; Exploded view plenum chamber partition panel.

Vehicles with engine codes CGTA/CTFA:

- Release hose clips -arrows- and remove air pipe (left-side).

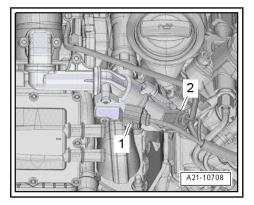




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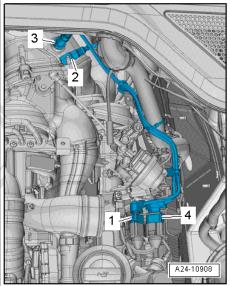
All vehicles (continued):

- Unplug electrical connectors (left and right) -1, 2-.



- Detach electrical connectors from bracket, unplug connectors and move electrical wiring clear:
- 1 For Lambda probe after catalytic converter G130- -item 3-
- 4 For Lambda probe G39- -item 2-
- Move clear electrical wiring harness for Lambda probe 2 -G108- and Lambda probe 2 after catalytic converter - G131-.







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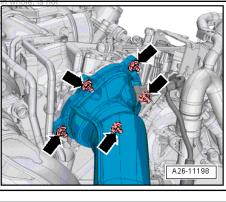
The catalytic converter for cylinder bank 1 (right-side) is located on the left side of the vehicle.

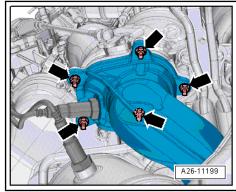
 Unscrew nuts -arrows- on cylinder bank 1 (right-side) and push catalytic converter on left side of vehicle towards rear.

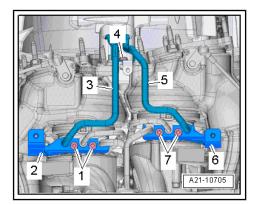


The catalytic converter for cylinder bank 2 (left-side) is located on the right side of the vehicle.

- Unscrew nuts -arrows- on cylinder bank 2 (left-side) and push catalytic converter on right side of vehicle towards rear.
- Unscrew bolts -1, 4, 7- and remove brackets -2, 6-.
- Disconnect coolant lines -3, 5- from turbocharger on both sides.





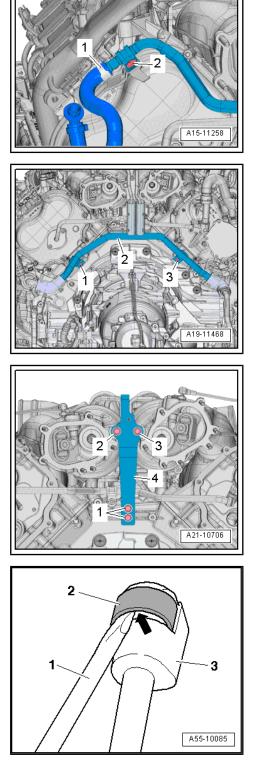


- Release hose clip -1- and detach air hose.
- Remove bolt -2-.
- Move vacuum line clear and push towards rear.

 Remove bolts -1, 3- and press coolant pipe (bottom rear) -2towards rear opyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

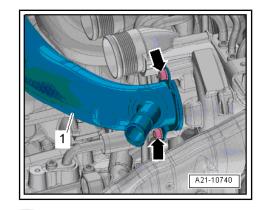
 Unscrew bolts -1, 2, 3- and detach support -4- for turbocharger.

 Remove relevant operating rod for turbocharger; to do so, use small screwdriver to lift retaining spring -2- and pull operating rod -3- off ball-head pin.



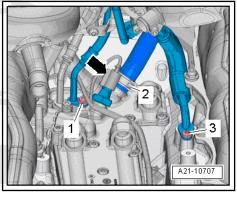
Vehicles with engine codes CEUA/CTGA:

- Unscrew bolts -arrows- and detach air pipe -1-.

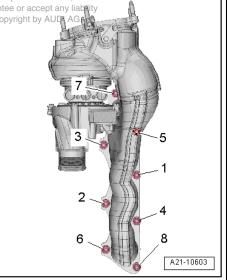


Turbocharger (left-side):

- Unplug electrical connector -arrow-.
- Remove bolts -1, 3- and disconnect hoses.
- Release hose clip -2- and detach oil return hose.

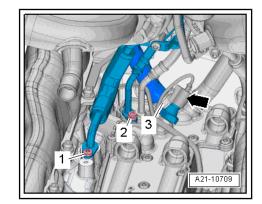


Remove nuts in the sequence y-8pyright and detach turbochard purposes in permitted unless authonsed by AUDI AG. AUDI AG does not guarantee of with respect to the correctness of information in this document. Oppyright and the permitted unless authonsed by AUDI AG. AUDI AG does not guarantee of with respect to the correctness of information in this document.



Turbocharger (right-side):

- Unplug electrical connector -arrow-.
- Remove bolts -1, 2- and disconnect hoses.
- Release hose clip -3- and detach oil return hose.



 Remove nuts in the sequence: -8 ... 1- and detach turbocharger.

Installing

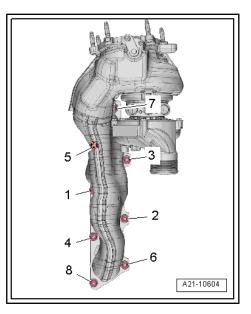
Installation is carried out in the reverse order; note the following:



- Renew gaskets and O-rings.
- Renew operating rod for turbocharger.
- Fill turbochargers with engine oil at connections for oil supply line.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.
- After installing the turbocharger, allow the engine to idle for approx. 1 minute without pressing the accelerator to ensure that the turbocharger is supplied with oil.
- Coat thread of threaded pins for turbocharger with high-temperature paste.
- Fit gaskets.
- Fit turbocharger.
- Coat thread of bolts of support for turbocharger with high-temperature paste.
- Fit support for turbocharger and tighten bolts to pre-tightening torque <u>⇒ page 308</u>.
- Support for turbocharger must make full contact with both turbochargers so that there is no play.
- Tighten turbocharger nuts to pre-tightening torque and final tightening torque
 ⇒ Fig. ""Turbocharger (left-side) tightening torque and sequence"", page 308.
- Tighten support for turbocharger to final tightening torque
 ⇒ page 308
- Install electrical wiring ⇒ Electrical system; Rep. gr. 97; Relay carriers, fuse carriers, electronics boxes; Overview of fitting locations relay carriers, fuse carriers, electronics boxes and ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Install air ducts with screw-type clips ⇒ page 318.
- Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50; Bulkhead; Exploded view plenum chamber partition panel.
- Install charge air cooler housing ⇒ page 318.

Tightening torques

- ♦ ⇒ Fig. ""Turbocharger (left-side) one tightening, torque, and ser or commercial purposes, in part or in whole, is not quence", page 308
 Prince "", page 308
 permitted unless authorised by AUDI 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. ""Turbocharger (right-side) tightening torque and sequence"", page 308
- ♦ ⇒ "3.1 Exploded view coolant pipes", page 261
- ◆ ⇒ "1.1 Exploded view silencers", page 399
- \Rightarrow "3.1 Exploded view secondary air system", page 410



1.3 Removing and installing temperature sender for engine cover panel - G765-

Removing

Remove engine cover panel \Rightarrow page 69.

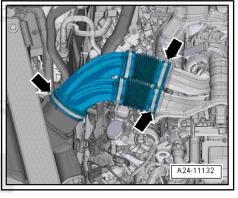
WARNING

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

Engine codes CEUA/CTGA:

- Release hose clips -arrows- and remove air pipe.



- All vehicles (continued): Protected by copyright. Copying for private or commercial purpose Unplug electrical connection of the spect to the correctness of information in this document.
- Unscrew bolt -2- and detach temperature sender for engine cover panel - G765- .

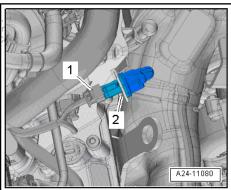
Installing

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

- Install air ducts with screw-type clips \Rightarrow page 318.

Tightening torques

 \Rightarrow Fig. "" Temperature sender for engine cover panel -G765- - tightening torque"" , page 309



2 Charge air system

⇒ "2.1 Exploded view - charge air system", page 316

 \Rightarrow "2.2 Exploded view - hose connections for charge air system", page 318

 \Rightarrow "2.3 Removing and installing charge air cooler housing", page 318

⇒ "2.4 Removing and installing charge air cooler", page 321

 \Rightarrow "2.5 Removing and installing charge pressure sender G31 ", page 323

⇒ "2.6 Removing and installing charge pressure sender 2 G447
 <u>nage 324</u>
 ⇒ "2.7 Removing and installing turbocharger air recirculation valve N249 ", page 324
 ⇒ "2.8 Turbocharger air recirculation valve, cylinder bank 2 N427

", pag<mark>e 325</mark>

2.1 Exploded view - charge air system

- 1 Charge air cooler housing
 - With air ducts
 Permitte
 - Removing and installing ⇒ page 318

2 - Bolt

- 🛛 9 Nm
- 3 Gasket
 - Renew

4 - Gasket

- Renew
- 5 Charge air cooler
 - □ Removing and installing \Rightarrow page 321
- 6 Bolt
 - □ 3.2 Nm

7 - Gasket

- □ For charge air cooler
- Renew

8 - Bolt

□ Tightening torque ⇒ Item 13 (page 358)

9 - Air hose

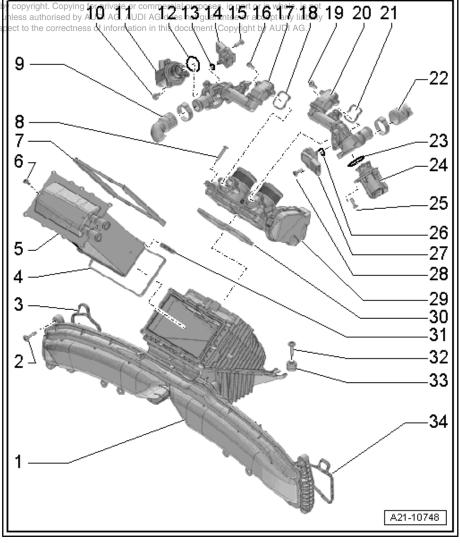
 To air pipe at turbocharger

10 - Bolt

🛛 9 Nm

11 - Turbocharger air recirculation valve - N249-

□ Removing and installing ⇒ page 324



12 - O-ring

Renew

13 - O-ring

Renew

14 - Charge pressure sender - G31-

□ Removing and installing \Rightarrow page 323

15 - Bolt

🗅 9 Nm

16 - Bolt

🛛 9 Nm

17 - Air duct

18 - Gasket

Renew

19 - Bolt

🗅 9 Nm

20 - Air duct

21 - Gasket

Renew

22 - Air hose

□ To air pipe at turbocharger

23 - O-ring

Renew



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24 - Turbocharger air recirculation valve, cylinder bank 2 - N427-

□ Removing and installing \Rightarrow page 325

25 - Bolt

🛛 9 Nm

26 - O-ring

Renew

27 - Charge pressure sender 2 - G447-

□ Removing and installing \Rightarrow page 324

28 - Bolt

🗅 9 Nm

29 - Throttle valve module - J338-

□ Removing and installing \Rightarrow page 365

30 - Gasket

Renew

31 - Buffer

□ For charge air cooler

32 - Bolt

🗅 9 Nm

33 - Grommet

34 - Gasket

Renew

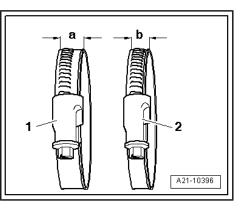
2.2 Exploded view - hose connections for charge air system



- Hose connections and air pipes and hoses must be free of oil and grease before assembly.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.
- To ensure that the air hoses can be properly secured at their connections, spray rust remover onto the worm thread of used hose "clips" before installing 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.

Tightening torque for

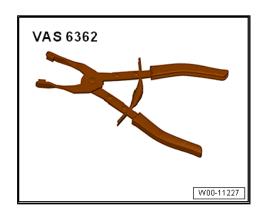
- 1 Hose clip -a- = 13 mm wide: 5.5 Nm
- 2 Hose clip -b- = 9 mm wide: 3.4 Nm



2.3 Removing and installing charge air cooler housing

Special tools and workshop equipment required

♦ Hose clip pliers - VAS 6362-



Removing



Observe rules for cleanliness \Rightarrow page 7.

- Remove coolant pipe (front) <u>⇒ page 263</u>.
- Remove air cleaner housing on right side and, if fitted, on left side <u>⇒ page 353</u>.
- Remove throttle valve module J338- ⇒ page 365.

- Disconnect vacuum hose -1-.
- Unscrew bolts -3- and remove vacuum reservoir -2-.

- Release hose clip -2- and detach coolant hose.



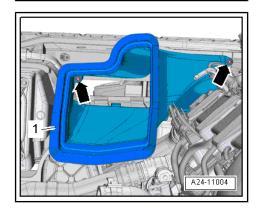
Disregard -item 1-.

Lift retaining clip -1- and disconnect coolant hose (top right) from radiator.

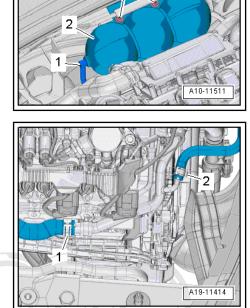


Disregard -item 2-.

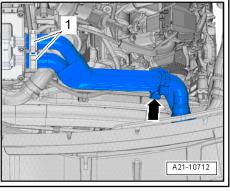
- nt hose (top right)
- Remove bolts -arrows- on right-side and, if fitted, on left side, detach air duct -1-.



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- Press release tabs -3-, release hose clips -arrows- and disconnect secondary air hose.
- Unplug electrical connector -2-.
- Move clear secondary air hose with retaining clip -1- and push downwards.



- Release hose clips -1-, detach coolant hoses and move coolant hoses clear -arrow-.



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- Unplug electrical connector -3-.
- Move vacuum lines clear -arrow-.
- Release hose clips -4, 5- and detach air hoses.
- Remove bolts -1, 2, 6-, pull charge air cooler housing slightly towards front so that eyes on fork attachments are released, and lift housing upwards to remove.

Caution

Risk of contamination by escaping engine oil.

When the charge air cooler housing is removed, up to 0.5 litres of engine oil can escape from the oil separator and run into the area between the cylinder heads. Extract any engine oil that escapes and clean the engine.

Installing

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

Note

- Renew seals and/or gaskets.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .
- Install throttle valve module $J338 \rightarrow page 365$.
- Install air ducts with screw-type clips \Rightarrow page 318.
- Connect coolant hoses with plug-in connector \Rightarrow page 286

Note

Do not reuse coolant.

- Fill up with coolant \Rightarrow page 236.

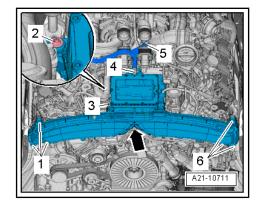
Tightening torques

- <u>⇒ "2.1 Exploded view charge air system", page 316</u>
 .
- ♦ ⇒ "3.1 Exploded view coolant pipes", page 261.
- \Rightarrow "3.1 Exploded view air cleaner housing", page 352

2.4 Removing and installing charge air cool-

er

Special tools and workshop equipment required







Removing



Observe rules for cleanliness \Rightarrow page 7.

Remove engine cover panel <u>⇒ page 69</u>.

WARNING

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

Note

Place a cloth underneath to catch escaping coolant.

- Clamp off coolant hoses using hose clamps -3094-, release hose clips -1- and disconnect coolant hoses.
- Remove bolts -arrows- and pull charge air cooler out of charge air cooler housing.

Installing

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



- If there are slight impressions on the fins, refer to \Rightarrow page 8.
- Renew gasket.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .
- The coolant in the entire system must be changed if the radiator is renewed. Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability Check coolant level \Rightarrow page 236.

Tightening torques

 \Rightarrow "2.1 Exploded view - charge air system", page 316

Removing and installing charge pres-2.5 sure sender - G31-

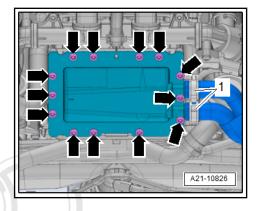
Removing

Remove engine cover panel \Rightarrow page 69.

WARNING

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.



- Unplug electrical connector -2-.
- Unscrew bolts -1- and remove charge pressure sender G31-.

Installing

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



Fit new O-ring.

Tightening torques

- [→] "2.1 Exploded view charge air system", page 316
- 2.6 Removing and installing charge pressure sender 2 - G447-

Removing

Remove engine cover panel <u>⇒ page 69</u>.



WARNING

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.
- Unplug electrical connector -2-.
- Unscrew bolts -1- and remove charge pressure sender 2 -G447- .

Installing

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



Renew gasket and O-ring.

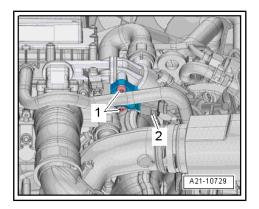
Tightening torques

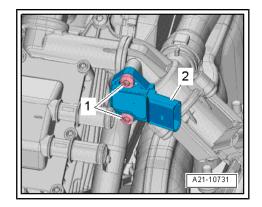
- 2.7 Removing and installing turbocharger air recirculation valve N249-

Removing

Remove engine cover panel ⇒ page 69.

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Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.
- Unplug electrical connectors -2-.
- Move air hose -3- clear.
- Unscrew bolts -arrows- and move clear turbocharger air recirculation valve - N249- with air duct.



Disregard -item 1-.

Unscrew bolts -arrows- and disconnect turbocharger air recirculation valve - N249- -item 1- from air duct -2-.

Installing

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



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

Tightening torques

• \Rightarrow "2.1 Exploded view - charge air system", page 316



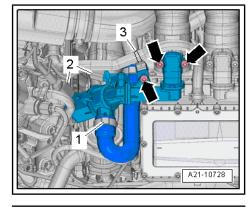
Removing

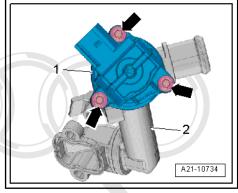
Remove engine cover panel <u>⇒ page 69</u>.

WARNING

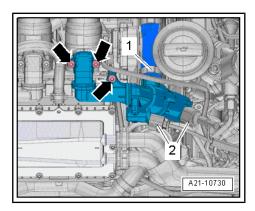
Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.





- Unplug electrical connectors -2-.
- Remove bolts -arrows-.
- Release hose clip -1- and detach air duct with turbocharger air recirculation valve - N249- from air hose.



Unscrew bolts -arrows- and disconnect turbocharger air recirculation valve - N249- -item 1- from air duct -2-.

Installing

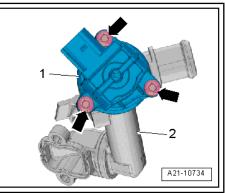
Installation is carried out in the reverse order; note the following:



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

Tightening torques

 ÷ "2.1 Exploded view - charge air system", page 316





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24 – Mixture preparation - injection

1 Injection system

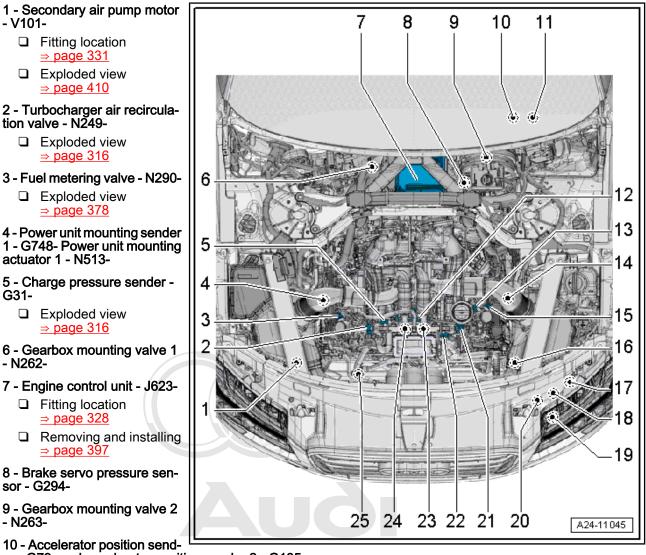
 \Rightarrow "1.1 Overview of fitting locations - injection system", page 327

⇒ "1.2 Filling and bleeding fuel system", page 336

 \Rightarrow "1.3 Checking fuel system for leaks", page 338

1.1 Overview of fitting locations - injection system

Fitting locations in engine compartment



- er G79- and accelerator position sender 2 G185-commercial purposes, in part or in whole, is not Fitting location permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability Fitting location - page 329 ne correctness of information in this document. Copyright by AUDI AG.
- 11 Brake light switch F-
 - □ Fitting location <u>⇒ page 329</u>

12 - Throttle valve module - J338-

- Including throttle valve drive for electric throttle G186- , throttle valve drive angle sender 1 for electric throttle G187- and throttle valve drive angle sender 2 for electric throttle G188-
- $\Box \quad \text{Exploded view} \Rightarrow \underline{\text{page 356}}$

13 - Fuel pressure sender for low pressure - G410-

 $\Box \quad \text{Exploded view} \Rightarrow page 378$

14 - Power unit mounting actuator 2 - N514- Power unit mounting sender 2 - G749-

- 15 Fuel metering valve 2 N402-
 - □ Exploded view <u>⇒ page 378</u>

16 - Radiator outlet coolant temperature sender - G83-

- □ Fitting location \Rightarrow page 329
- $\Box \quad \text{Exploded view} \Rightarrow \underline{\text{page 246}}$

17 - Continued coolant circulation pump - V51-

- □ Fitting location \Rightarrow page 330
- $\Box \quad \text{Exploded view} \Rightarrow \underline{\text{page 244}}$

18 - Gearbox oil cooling valve - N509-

- □ Fitting location <u>⇒ page 330</u>
- $\Box \quad \text{Exploded view} \Rightarrow \underline{\text{page 244}}$

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- Fitting location ⇒ page 330
- □ Exploded view \Rightarrow page 244

20 - Charge air cooling pump - V188-

- □ Fitting location \Rightarrow page 330
- $\Box \quad \text{Exploded view} \Rightarrow \underline{\text{page 244}}$

21 - Turbocharger air recirculation valve, cylinder bank 2 - N427-

 $\Box \quad \text{Exploded view} \Rightarrow \underline{\text{page 316}}$

22 - Charge pressure sender 2 - G447-

 $\Box \quad \text{Exploded view} \Rightarrow page 316$

23 - Temperature sender 2 for charge air cooler - G764-

- □ Fitting location \Rightarrow page 331
- $\Box \quad \text{Exploded view} \Rightarrow \underline{\text{page 356}}$

24 - Temperature sender 1 for charge air cooler - G763-

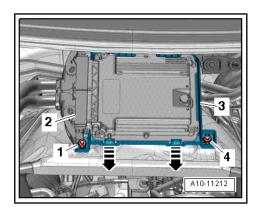
- □ Fitting location \Rightarrow page 331
- $\Box \quad \text{Exploded view} \Rightarrow page 356$

25 - Sender 1 for secondary air pressure - G609-

- □ Fitting location \Rightarrow page 331
- $\Box \quad \text{Exploded view} \Rightarrow page 410$

Fitting location of engine control unit - J623-

-Item 2- in centre of plenum chamber



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

• In accelerator pedal module

Note

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

Removing and installing $\Rightarrow\,$ Fuel supply system, petrol engines; Rep. gr. 20 ; Accelerator mechanism; Removing and installing accelerator pedal module with accelerator position sender -G79- / -G185-

Fitting location of brake light switch - F-

In footwell on mounting bracket

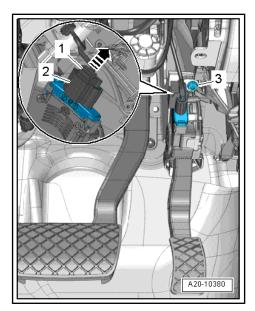
Removing and installing \Rightarrow Brake system; Rep. gr. 45; Sensors; Removing and installing brake light switch

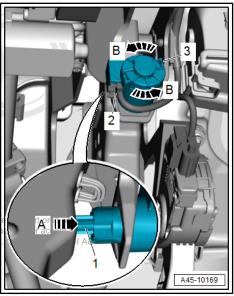


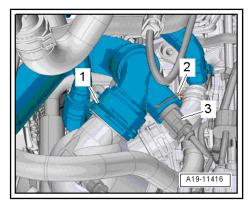
Fitting location of radiator outlet coolant temperature sender - G83-

• In bottom coolant hose (left-side) on radiator.

Removing and installing <u>⇒ page 254</u>







Fitting location of continued coolant circulation pump - V51-

• At front left, beneath headlight

Removing and installing \Rightarrow page 246

Fitting location of charge air cooling pump - V188-

• At front left, beneath headlight

Removing and installing <u>⇒ page 249</u>

Fitting location of coolant valve for gearbox - N488-

• At front left, beneath headlight

Removing and installing \Rightarrow page 257

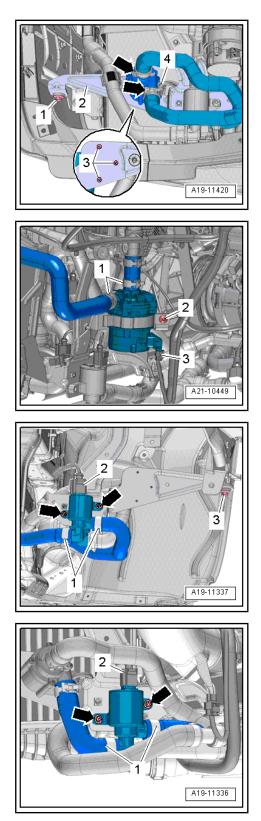


Fitting location of gearbox oil cooling valve - N509-

• At front left, beneath headlight

Removing and installing <u>⇒ page 259</u>

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Fitting location of temperature sender 1 for charge air cooler -G763- / temperature sender 2 for charge air cooler - G764-

On throttle valve module - J338- (bottom)

Fitting location of fuel pump control unit - J538- -1-

 At side of fuel tank; accessible after detaching underbody trim (rear right) \Rightarrow General body repairs, exterior; Rep. gr. 66; Underbody trim; Removing and installing underbody trim

Removing and installing \Rightarrow Fuel supply system - petrol engines; Rep. gr. 20; Fuel pump; Removing and installing fuel pump control unit - J538-

Fitting location of secondary air pump motor - V101-

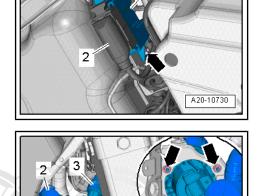
At front right, beneath air cleaner housing

Removing and installing \Rightarrow page 411

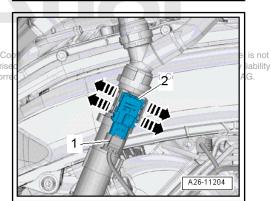
Fitting location of sender 1 for secondary air pressure - G609-

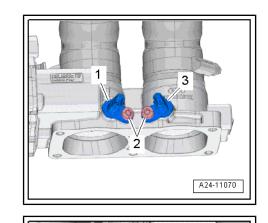
• In engine compartment (front right) in secondary air pipe Removing and installing \Rightarrow page 414

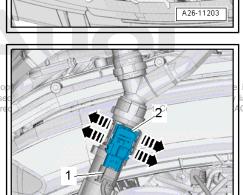
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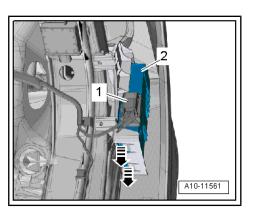




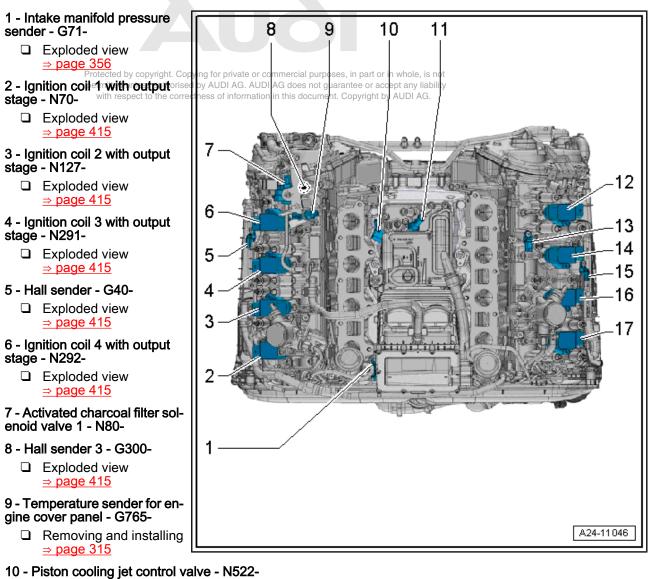
Fitting location of power unit mounting control unit - J931-

- At rear of wheel housing (front left)
- Removing and installing \Rightarrow page 64





Fitting locations on engine (from above)



□ Exploded view \Rightarrow page 215

11 - Stage 3 oil pressure switch - F447-

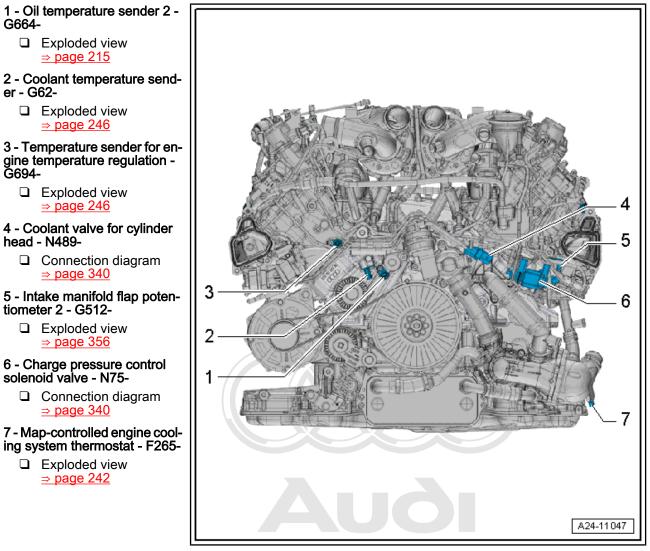
 $\Box \quad \text{Exploded view} \Rightarrow \underline{\text{page 215}}$

12 - Ignition coil 8 with output stage - N326-

 $\Box \quad \text{Exploded view} \Rightarrow \underline{\text{page 415}}$

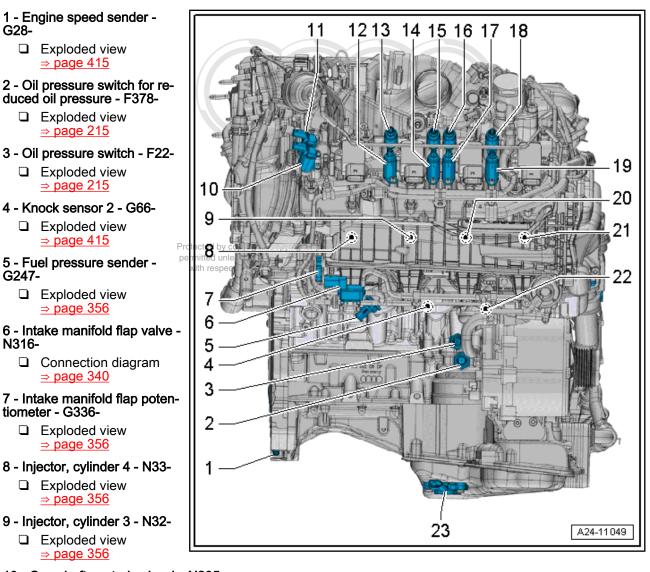
- 13 Hall sender 4 G301-
 - □ Exploded view \Rightarrow page 415
- 14 Ignition coil 7 with output stage N325-
 - □ Exploded view \Rightarrow page 415
- 15 Hall sender 2 G163-
 - □ Exploded view \Rightarrow page 415
- 16 Ignition coil 6 with output stage N324-
 - $\Box \quad \text{Exploded view} \Rightarrow page 415$
- 17 Ignition coil 5 with output stage N323-
 - □ Exploded view \Rightarrow page 415

Fitting locations on engine (from front)



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Fitting locations on engine (from right side) to the correctness of information in this document. Copyright by AUDI AG.



- 10 Camshaft control valve 1 N205-
 - $\Box \quad \text{Exploded view} \Rightarrow \underline{\text{page 156}}$

11 - Exhaust camshaft control valve 1 - N318-

- $\Box \quad \text{Exploded view} \Rightarrow \underline{\text{page 156}}$
- 12 Inlet cam actuator 2 for cylinder 3 F457-
 - $\Box \quad \text{Exploded view} \Rightarrow \underline{\text{page 156}}$
 - Actuator for switching to full lift
- 13 Exhaust cam actuator 2 for cylinder 3 F459 Actuator for switching to full lift
- 14 Inlet cam actuator 1 for cylinder 3 F456-
 - Actuator for switching to zero lift
- 15 Exhaust cam actuator 1 for cylinder 3 F458-
 - Actuator for switching to zero lift
- 16 Exhaust cam actuator 1 for cylinder 2 F454-
 - Actuator for switching to zero lift
- 17 Inlet cam actuator 1 for cylinder 2 F452-
 - Actuator for switching to zero lift

- 18 Exhaust cam actuator 2 for cylinder 2 F455-
 - □ Actuator for switching to full lift
- 19 Inlet cam actuator 2 for cylinder 2 F453-
 - □ Actuator for switching to full lift
- 20 Injector, cylinder 2 N31-
 - $\Box \quad \text{Exploded view} \Rightarrow \underline{\text{page 356}}$
- 21 Injector, cylinder 1 N30-
 - $\Box \quad \text{Exploded view} \Rightarrow \underline{\text{page 356}}$
- 22 Knock sensor 1 G61-
 - $\Box \quad \text{Exploded view} \Rightarrow \underline{\text{page 415}}$
- 23 Oil level and oil temperature sender G266-
 - $\Box \quad \text{Exploded view} \Rightarrow \underline{\text{page 192}}$

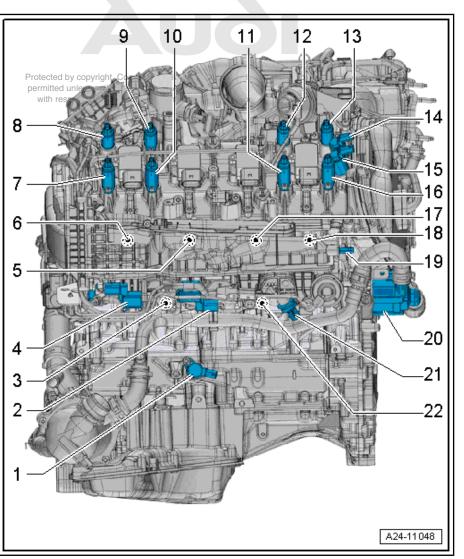
Fitting locations on engine (from left side)

1 - Valve for oil pressure control - N428-

- □ Exploded view ⇒ page 215
- 2 Secondary air inlet valve N112-
 - □ Connection diagram ⇒ page 340
- 3 Knock sensor 3 G198-Exploded view
 - ⇒ page 415
- 4 Secondary air inlet valve 2 - N320-
 - ❑ Connection diagram ⇒ page 340
- 5 Injector, cylinder 6 N84-
 - □ Exploded view ⇒ page 356
- 6 Injector, cylinder 5 N83-
 - □ Exploded view ⇒ page 356

7 - Inlet cam actuator 2 for cylinder 5 - F465-

- □ Exploded view ⇒ page 156
- Actuator for switching to full lift
- 8 Exhaust cam actuator 2 for cylinder 5 F467-
 - Actuator for switching to full lift
- 9 Exhaust cam actuator 1 for ¹ cylinder 5 F466-
 - Actuator for switching to zero lift



- 10 Inlet cam actuator 1 for cylinder 5 F464-
 - Actuator for switching to zero lift
- 11 Inlet cam actuator 1 for cylinder 8 F476-
 - Actuator for switching to zero lift
- 12 Exhaust cam actuator 1 for cylinder 8 F478-
 - Actuator for switching to zero lift
- 13 Exhaust cam actuator 2 for cylinder 8 F479-
 - Actuator for switching to full lift
- 14 Exhaust camshaft control valve 2 N319- $\Box \quad \text{Exploded view} \Rightarrow \underline{\text{page 156}}$
- 15 Camshaft control valve 2 N208-
 - $\Box \quad \text{Exploded view} \Rightarrow \underline{\text{page 156}}$
- 16 Inlet cam actuator 2 for cylinder 8 F477-
 - Actuator for switching to full lift
- 17 Injector, cylinder 7 N85-
 - $\Box \quad \text{Exploded view} \Rightarrow \underline{\text{page 356}}$
- 18 Injector, cylinder 8 N86-
 - $\Box \quad \text{Exploded view} \Rightarrow \underline{\text{page 356}}$
- 19 Intake air temperature sender G42-
 - $\Box \quad \text{Exploded view} \Rightarrow \underline{\text{page 356}}$
- 20 Coolant circulation pump 2 V178-
 - \Box Exploded view \Rightarrow page 244
- 21 Fuel pressure sender 2 G624-
 - $\Box \quad \text{Exploded view} \Rightarrow \underline{\text{page 356}}$
- 22 Knock sensor 4 G199-
 - $\Box \quad \text{Exploded view} \Rightarrow \underline{\text{page 415}}$

1.2 Filling and bleeding fuel system

⇒ "1.2.1 Reducing pressure in high-pressure section of injection system", page 336

⇒ "1.2.2 Filling and bleeding fuel system", page 337

1.2.1 Reducing pressure in high-pressure section of injection system

Special tools and workshop equipment required Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not Vehicle diagnostic tester with respect to the correctness of information in this document. Copyright by AUDI AG.



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

- The injection system consists of a high-pressure section and a low-pressure section.
- Prior to opening the high-pressure section (e.g. when removing the high-pressure pump, fuel rail, injectors, fuel pipes or fuel pressure sender - G247-), the fuel pressure in the high-pressure section must be reduced to a specified level. The procedure is described below.

Procedure

- Connect vehicle diagnostic tester, select function "Reducing fuel pressure in fuel rail" in "Guided Functions" and follow onscreen instructions.
- Fuel pressure will drop to a specified value.
- Switch off ignition.

The fuel rail is still filled with fuel, however it is no longer under high pressure.



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

- Wear safety goggles and protective clothing when opening the fuel system.
- Before opening the high-pressure section of the fuel system, place a clean cloth around the connection to catch escaping fuel.
- The high-pressure system must be opened »immediately« after reducing the fuel pressure; wrap a clean cloth around the connection. Catch the escaping fuel.



Note

- The pressure will increase again due to the effect of residual heat if the high-pressure system is not opened immediately.
- The ignition must not be switched on again from this point on as this would increase the pressure again,

permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability Additional steps required

- Erase any entries in event memory resulting from work per-
- formed \Rightarrow Vehicle diagnostic tester, Guided Functions, Interrogate event memory, then Generate readiness code.

1.2.2 Filling and bleeding fuel system

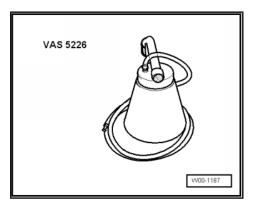
- Due to the design of the engine, with a fuel system pressurisation pump located in the fuel tank, it is not necessary to bleed the fuel system.
- The fuel system bleeds itself when the starter is operated.

Note

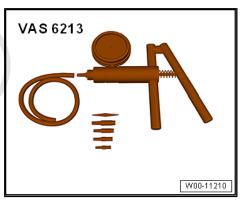
On vehicles with auxiliary heater, it is important to bleed the fuel supply line leading to the metering pump after working on the fuel delivery unit.

Special tools and workshop equipment required

Diesel extractor - VAS 5226-

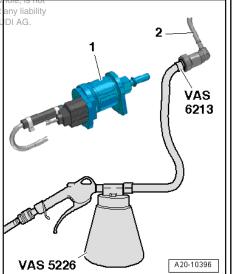


Hand vacuum pump - VAS 6213-



Procedure Protected by copyright. Copying for private or commercial purposes, in part or in whole, is a permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liabi

- Auxiliary heater'switchedtoff.
- Connect diesel extractor VAS 5226- to compressed air.
- Remove fuel supply line -2- from fuel tank at metering pump -1-.
- Connect diesel extractor VAS 5226- to fuel supply line with adapter from hand vacuum pump - VAS 6213- and bleed fuel supply line by operating extractor briefly.
- Re-attach fuel supply line to metering pump.
- Switch auxiliary heating on and run at full load for approx. 10 minutes.



1.3 Checking fuel system for leaks

- Allow engine to run for several minutes at moderate rpm.
- Switch off ignition.
- Check complete fuel system for leaks.

- If leaks are found although the connections have been tightened to the correct torque, the relevant component must be renewed.
- Road-test vehicle and accelerate with full throttle at least once.
- Then inspect high-pressure section again for leaks.



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2 Vacuum system

⇒ "2.1 Connection diagram - vacuum system", page 340

⇒ "2.2 Checking vacuum system", page 341

 \Rightarrow "2.3 Removing and installing charge pressure control solenoid valve N75 ", page 342

 \Rightarrow "2.4 Removing and installing secondary air inlet valve N112 / N320 ", page 342

 \Rightarrow "2.5 Removing and installing intake manifold flap value N316 ", page 350

 \Rightarrow "2.6 Removing and installing coolant valve for cylinder head N489 ", page 351

2.1 Connection diagram - vacuum system

Caution

Risk of engine malfunctions

 When routing vacuum lines, make sure they are not kinked, twisted or crushed.



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- Red = Vacuum supply line
- Blue = Control pipe to vacuum unit for actuating intake manifold flaps
- Orange = Control pipe to combination valve for secondary air system (right-side)
- Brown = Control pipe to combination valve for secondary air system (left-side)
- Green = Control pipe to vacuum units for turbocharger

1 - Non-return valve

2 - To coolant shut-off valve

3 - Combination valve for secondary air system (left-side)

4 - Vacuum unit

 For intake manifold flap on cylinder bank 1 (right-side)

5 - Combination valve for secondary air system (right-side)

- 6 Intake manifold flap valve -N316-
 - □ Removing and installing \Rightarrow page 350
- 7 Non-return valve
- 8 Vacuum unit
 - □ For turbocharger, cylinder bank 1 (right-side)
- 9 To intake manifold

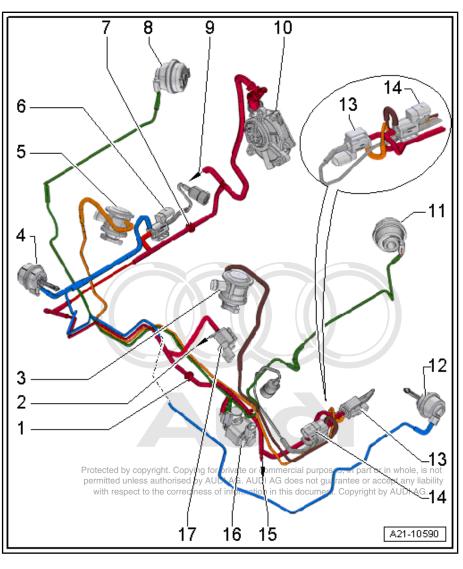
10 - Vacuum pump

11 - Vacuum unit

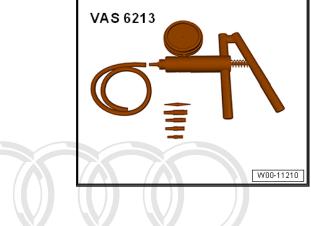
- For turbocharger, cylinder bank 2 (left-side)
- 12 Vacuum unit
 - For intake manifold flap on cylinder bank 2 (leftside)
- 13 Secondary air inlet valve N112-
 - □ Removing and installing ⇒ page 342
- 14 Secondary air inlet valve 2 N320-
 - $\Box \quad \text{Removing and installing} \Rightarrow \underline{\text{page 342}}$
- 15 To vacuum reservoir
- 16 Charge pressure control solenoid valve N75- \square Removing and installing \Rightarrow page 342
- 17 Coolant valve for cylinder head N489-
 - \Box Removing and installing \rightarrow page 351

2.2 Checking vacuum system

Special tools and workshop equipment required



Hand vacuum pump - VAS 6213-



Procedure

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

2.3 Removing and installing charge pressure control solenoid valve - N75-

Removing

- Remove engine cover panel <u>⇒ page 69</u>.
- Unplug electrical connector -2-.
- Mark positions of vacuum hoses -1- for re-installation.
- Pull charge pressure control solenoid valve N75- upwards out of bracket and detach vacuum hoses.

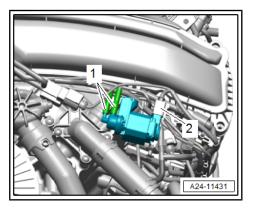
Installing

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

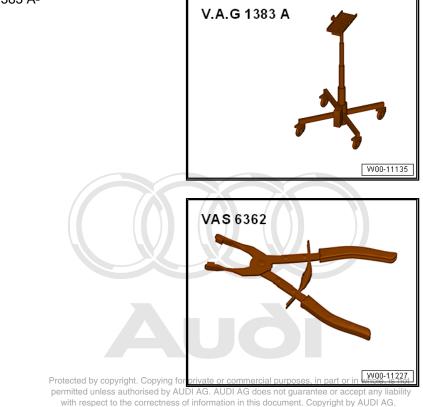
- Install engine cover panel \Rightarrow page 69.

2.4 Removing and installing secondary air inlet valve -N112- / -N320-

Special tools and workshop equipment required



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



Removing

– Drain coolant <u>⇒ page 234</u>.

Hose clip pliers - VAS 6362-

Vehicles with engine codes CEUA/CTGA:

- Remove lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments .
- Remove closure plate for bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing attachments.

Vehicles with engine codes CGTA/CTFA:

Remove bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing bumper cover.

All vehicles (continued):

Caution

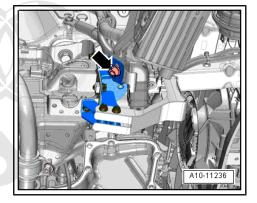
Electronic components are susceptible to damage.

- Observe notes on procedure for disconnecting the battery.
- Disconnect earth wire from battery terminal ⇒ Electrical system; Rep. gr. 27; Battery; Disconnecting and connecting battery.
- Support engine in installation position ⇒ page 50.
- Remove noise insulation panels ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.

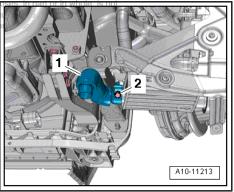
- Remove underbody trim (front left and right) ⇒ General body repairs, exterior; Rep. gr. 66; Underbody trim; Removing and installing underbody trim.
- Completely remove wheel housing liners (front left and front right) ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Removing and installing wheel housing liner (front).
- Unbolt drive shaft (left and right) from gearbox flange shafts
 ⇒ Running gear, axles, steering; Rep. gr. 40; Drive shaft; Removing and installing drive shaft.

Vehicles with auxiliary heater:

- Remove bolt -arrow- at bracket.

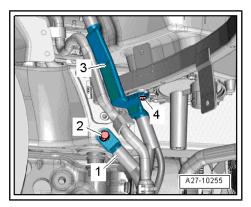


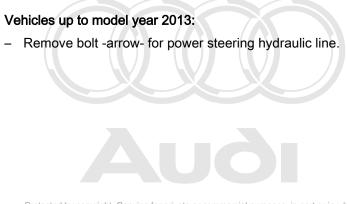
Release clamp -2- and defacted by convict to the second defacted by convict to the second defacted by AUDI AG AUDIAX does not a heater.



All vehicles (continued):

- Remove front longitudinal member (bottom) on both sides ⇒ General body repairs, exterior; Rep. gr. 50; Lock carrier; Exploded view - lock carrier.
- Remove bolt -4- for battery positive wire -3- and bolt -2- for earth wire -1- and move electrical wiring clear.





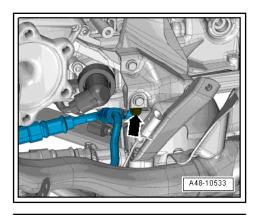
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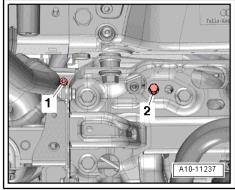
- Unplug electrical connector -2-.
- Remove bolt -1-.

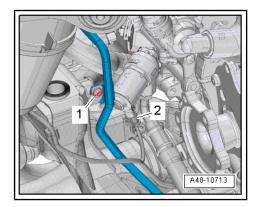
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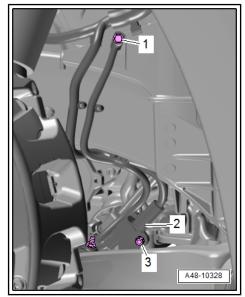
Vehicles from model year 2014 onwards:

- Unscrew bolt -1- and move earth wire clear at longitudinal member.
- Remove nut -3- and unplug electrical connector -2-.









- Release hose clip -arrow- and detach coolant hose.

All vehicles (continued):

 Unplug electrical connector -arrow- at front vehicle level sender -G78- / -G289- and move electrical wiring clear.

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

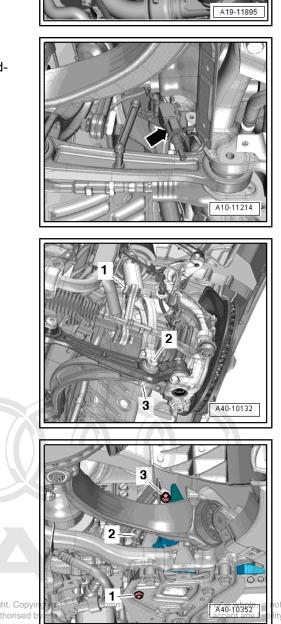


Disregard -items 2 and 3-.

- Remove bolts -3- on both sides.



Disregard -items 1, 2-.



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- Remove bolts for gearbox mounting -arrows- on both sides.
- Detach intermediate steering shaft from steering rack and move clear by telescoping upwards ⇒ Running gear, axles, steering; Rep. gr. 48; Steering column; Removing and installing intermediate steering shaft.

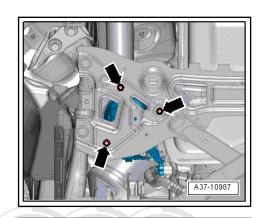
- Detach electrical connector -2- from bracket and unplug:

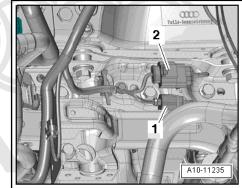


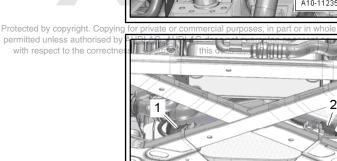
Disregard -item 1-.

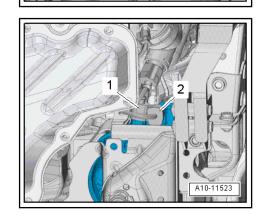
- Move electrical connectors and wiring clear: permited unless authorised by
- 1 Gearbox mounting valve 1 N262-
- 2 Gearbox mounting valve 2 N263-

- Unplug electrical connectors (left and right) -1, 2-.









A37-11127

- Remove bolt for engine mountings -arrow- on both sides.

 Support subframe using engine and gearbox jack - V.A.G 1383 A- as illustrated.

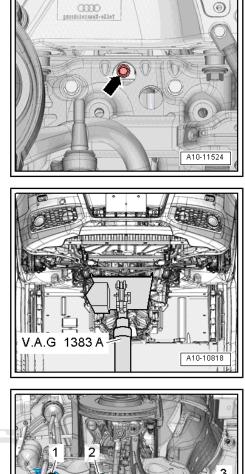
- Mark installation position of subframe on longitudinal members with felt-tip pen.
- Unscrew subframe bolts -1, 2, 3- on both sides in several stages and in diagonal sequence.

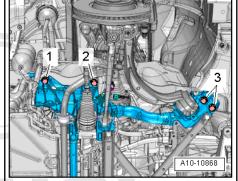


Caution

Risk of damage to running gear components.

- The vehicle must NOT be lowered onto its wheels if the engine/gearbox mountings, steering rack or subframe cross brace are not properly installed.
- Using engine and gearbox jack V.A.G 1383 A-, lower subframe just far enough for access to secondary air inlet valves
 -N112- / -N320-, ensuring sufficient clearance for hydraulic fluid hoses (left-side) and electrical wiring (right-side), authorised by AUDIAG. AUDIAG does not guarantee or accept any liability

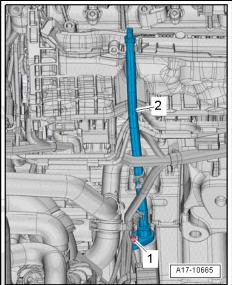




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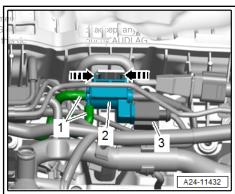
Remove bolt -1-, unclip guide tube -2- for oil dipstick from in-take manifold and detach.





- Secondary air inlet valve N112-:
 Unplug electrical connector -3-.

 Protected by copyright. Copying for private or compermitted unless authorised by AUDI AG. AUDI AG. with respect to the correctness of information in
- Mark positions of vacuum hoses -1- for re-installation.
- Release catches -arrows- and detach secondary air inlet valve - N112- -item 2- from bracket and to left side.
- Disconnect vacuum hoses.



Secondary air inlet valve 2 - N320- :

- Unplug electrical connector -1-.
- Mark positions of vacuum hoses -3- for re-installation.
- Release catches -arrows- and detach secondary air inlet valve
 2 N320- -item 2- from bracket and to left side.
- Disconnect vacuum hoses.

Installing

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

i Note

- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.
- Do not reuse coolant.
- Install gearbox mountings <u>⇒ page 65</u>.
- Install intermediate steering shaft ⇒ Running gear, axles, steering; Rep. gr. 48; Steering column; Removing and installing intermediate steering shaft.
- Install longitudinal members (bottom front) ⇒ General body repairs, exterior; Rep. gr. 50; Lock carrier; Exploded view lock carrier.
- Secure drive shafts ⇒ Running gear, axles, steering; Rep. gr. 40; Drive shaft; Exploded view drive shaft.
- Install front wheel housing liners ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Exploded view front wheel housing liner.
- Install underbody trim (front) ⇒ General body repairs, exterior; Rep. gr. 66; Underbody trim; Exploded view - underbody trim.
- Install noise insulation panels ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view noise insulation.
- Observe notes on procedure for connecting the battery ⇒ Electrical system; Rep. gr. 27; Battery; Disconnecting and connecting battery.
- Install lock carrier cover, bumper cover and closure plate for bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Exploded view - bumper cover.
- Fill up with coolant \Rightarrow page 236.

Tightening torques

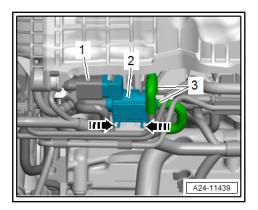
◆ ⇒ "1.1 Exploded view - sump/oil pump", page 192

2.5 Removing and installing intake manifold flap valve - N316-

Removing

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Remove rear section of front wheel housing liner (right-side)
 ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Removing and installing wheel housing liner (front).



- Remove bolts -arrows- and detach heat shield for drive shaft (right-side).
- Unbolt drive shaft (right-side) from gearbox flange shaft ⇒ Running gear, axles, steering; Rep. gr. 40; Drive shaft; Removing and installing drive shaft .

- Unplug electrical connector -2-.
- Mark positions of vacuum hoses -3- for re-installation.
- Release catches -arrows- and detach intake manifold flap valve - N316- -item 1- from bracket and to left side.

Installing

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

Tightening torques

- ♦ ⇒ Running gear, axles, steering; Rep. gr. 40; Drive shaft; Exploded view - drive shaft
- ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Exploded view - wheel housing liner (front)

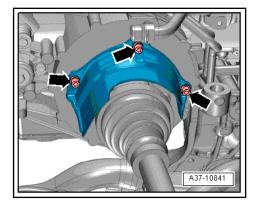
2.6 Removing and installing coolant valve for cylinder head - N489-

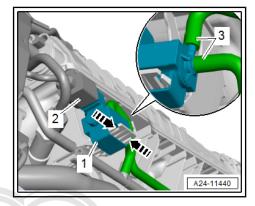
Removing

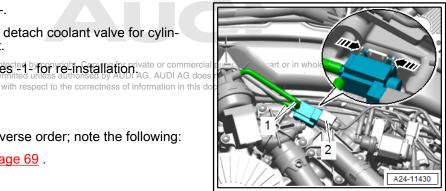
- Remove engine cover panel \Rightarrow page 69.
- Unplug electrical connector -2-.
- Release catches -arrows- and detach coolant valve for cylinder head - N489- from bracket.
- Mark positions of vacuum host and permitted unless automsed by ADDI AG. AUDI AG doe
- Disconnect vacuum hoses.

Installing

- Installation is carried out in the reverse order; note the following:
- Install engine cover panel \Rightarrow page 69.







3 Air cleaner

⇒ "3.1 Exploded view - air cleaner housing", page 352

⇒ "3.2 Removing and installing air cleaner housing", page 353

3.1 Exploded view - air cleaner housing

i Note

The illustration shows the air cleaner housing (right-side) for vehicles with engine codes CGTA/CTFA; it is similar on other vehicles.

- 1 Air duct
 - Clean out salt deposits, dirt and leaves, etc.
- 2 Bolt
- 🗅 2.5 Nm

3 - Air duct

Clean out salt deposits: pread difficult eaves, etc. by AUDIAG with rescale to be correctioness of inforwith rescale to be correctioness of infor-

4 - Air duct

- Clean out salt deposits, dirt and leaves, etc.
- 5 Bolt
 - 🗅 2.5 Nm
- 6 Sealing element

7 - Air cleaner (top section)

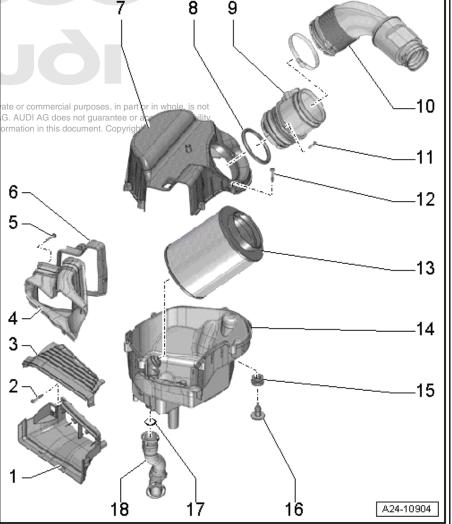
- Clean out salt deposits, dirt and leaves, etc.
- 8 O-ring
 - Renew if damaged
- 9 Air duct
- 10 Air pipe
- 11 Bolt
 - 🗅 3.5 Nm
- 12 Bolt
- 🖵 2.5 Nm

13 - Air filter element

- ❑ Use genuine air filter element ⇒ Electronic parts catalogue
- $\Box \quad Change intervals \Rightarrow Maintenance tables$
- **Q** Removing and installing \Rightarrow Maintenance ; Booklet 410

14 - Air cleaner (bottom section)

- □ Clean out salt deposits, dirt and leaves, etc.
- $\Box \quad \text{Removing and installing} \Rightarrow \underline{\text{page 353}}$



15 - Rubber grommet

16 - Retainer

- For air cleaner housing
- 17 O-ring
 - □ Renew

18 - Hose

- □ For secondary air
- Leading to secondary air pump motor V101-
- 3.2 Removing and installing ain cleaners, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability housing bet to the correctness of information in this document. Copyright by AUDI AG.

Removing

- Remove engine cover panel \Rightarrow page 69.

WARNING

Danger of fire and damage if the engine cover panel is not fitted.

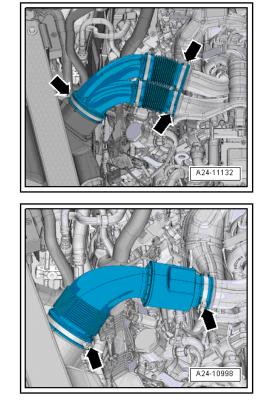
- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.
- Remove relevant longitudinal member (top) ⇒ General body repairs, exterior; Rep. gr. 50; Lock carrier; Exploded view lock carrier.

Engine codes CEUA/CTGA:

- Release hose clips -arrows- and remove air pipe.

Vehicles with engine codes CGTA/CTFA:

- Release hose clips -arrows- and remove relevant air pipe.



Air cleaner housing on right side:

- Remove front section of front wheel housing liner (right-side)
 ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Removing and installing wheel housing liner (front).
- Press release tabs and disconnect secondary air hose -1-.

Continuation for both sides:

- Lift off air cleaner housing -2-.

Installing

i Note

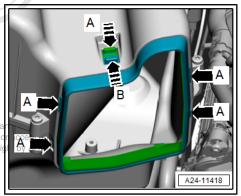
- The air cleaner housing MUST be clean.
- To prevent malfunctions, cover critical parts of the engine air intake (such as air pipes, etc.) with a clean cloth when blowing out the air cleaner housing with compressed air.
- Hose connections and air pipes and hoses must be free of oil and grease before assembly.
- Use a silicone-free lubricant when installing the air hoses.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.

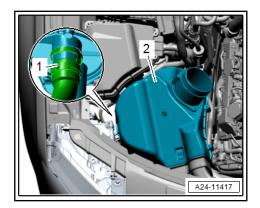
WARNING

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.
- Check for salt residue, dirt and leaves in air pipe (engine intake side).
- Check for dirt and leaves in air duct going from lock carrier to air cleaner housing.
- Release catches -arrows A- and press seal inwards -arrow B-.
- Move air cleaner housing into installation position and press into mountings on longitudinal member.

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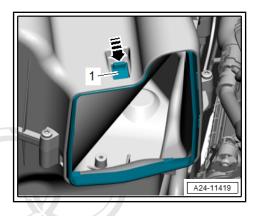
- Press seal -1- in direction of -arrow- so that it engages audibly.

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

- Install air ducts with screw-type clips \Rightarrow page 318.

Tightening torques

- \Rightarrow "3.1 Exploded view air cleaner housing", page 352
- ◆ Upper longitudinal member ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Exploded view - lock carrier



AUOI

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4 Intake manifold

⇒ "4.1 Exploded view - intake manifold", page 356
⇒ "4.2 Removing and installing intake manifold with fuel rail", page 359
⇒ "4.3 Removing and installing throttle valve module J338 ", page 365
⇒ "4.4 Removing and installing intake manifold flap potentiometer G336 ", page 366
⇒ "4.5 Removing and installing intake manifold flap potentiometer 2 G512 ", page 366

4.1 Exploded view - intake manifold

Intake manifold



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The illustration shows the intake manifold on the left side; it is similar on the right side.

1 - Gasket

Renew

2 - Intake manifold flap potentiometer 2 - G512-

- Cylinder bank 1 (rightside): intake manifold flap potentiometer -G336-
- Removing and installing ⇒ page 366

3 - Bolt

□ 2.5 Nm

4 - Seal

- Renew if damaged
- When renewing lever out with screwdriver
- Press in by hand

5 - Coupling

6 - Gaskets

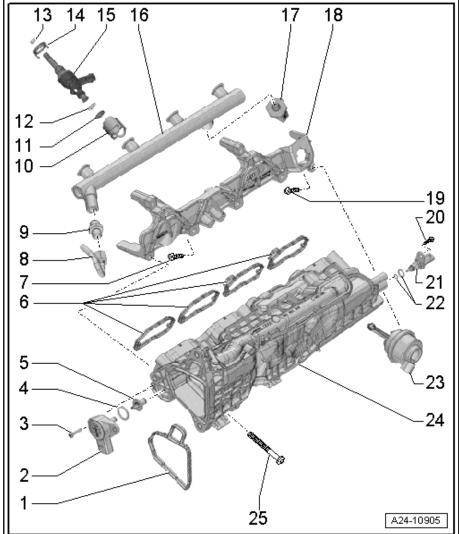
- For intake manifold
- Renew

7 - Bolt

3 Nm

8 - Union nut

- □ For high-pressure pipe
- To loosen connection -item 9-, counterhold at fuel rail
- ❑ Observe all instructions for installing high-pressure pipes <u>⇒ page 390</u>
- 25 Nm



9 - Threaded connection

🖵 40 Nm

10 - Support ring

- Make sure it is correctly seated
- □ Via this support ring, the fuel rail exerts the force which holds the injector in the cylinder head

11 - O-ring

- Renew
- Lubricate lightly with clean engine oil

12 - Spacer ring

Renew if damaged

13 - Combustion chamber ring seal

□ Renewing ⇒ "5.1 Removing and installing injectors", page 367

14 - Sealing element

15 - Injector

Removing and installing \Rightarrow page 367

16 - Fuel rail

17 - Fuel pressure sender 2 - G624-

- Cylinder bank 1 (right-side): fuel pressure sender G247-
- □ Removing and installing \Rightarrow page 374
- Lubricate threads lightly with clean engine oil
- 🗅 25 Nm

18 - Retaining clip

For fuel rail

19 - Bolt

🗅 3 Nm

20 - Bolt

🗅 2.5 Nm

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21 - Intake air temperature sender - G42-

□ Removing and installing \Rightarrow page 376

22 - O-rings

Renew

23 - Vacuum unit

□ For actuating intake manifold flaps

24 - Intake manifold

□ Removing and installing \Rightarrow page 359

25 - Bolt

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

Throttle valve module

1 - Charge air cooler housing

- With air ducts
- □ Removing and installing ⇒ page 318

2 - O-ring

Renew

3 - Intake manifold pressure sender - G71-

□ Removing and installing \Rightarrow page 377

4 - Bolt

3 Nm

5 - Gasket

- □ For throttle valve module - J338-
- Renew

6 - Bolt

🗅 9 Nm

7 - Temperature sender 1 for charge air cooler - G763-

□ Removing and installing \Rightarrow page 376

8 - O-rings

Renew

9 - Air duct

With turbocharger air recirculation valve - N249-

10 - Bolt

🛛 9 Nm

11 - Bolt

9 Nm

12 - Gasket

Renew

13 - Bolt

🗅 5 Nm

14 - Air hoses

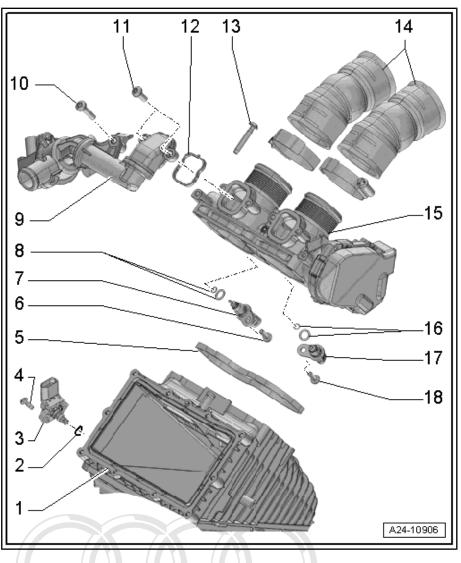
- To turbochargers
- 15 Throttle valve module J338^{te}cted by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability
 □ Removing and installing ⇒ page 365 the correctness of information in this document. Copyright by AUDI AG.

16 - O-rings

- Renew
- 17 Temperature sender 2 for charge air cooler G764-
 - $\Box \quad \text{Removing and installing} \Rightarrow \underline{\text{page 376}}$

18 - Bolt

🛛 9 Nm





4.2 Removing and installing intake manifold with fuel rail

 \Rightarrow "4.2.1 Removing and installing intake manifold with fuel rail, cylinder bank 1 (right-side)", page 359

 \Rightarrow "4.2.2 Removing and installing intake manifold with fuel rail, cylinder bank 2 (left-side)", page 362

4.2.1 Removing and installing intake manifold with fuel rail, cylinder bank 1 (right-side)

Special tools and workshop equipment required

Hand vacuum pump - VAS 6213-



Removing

Engine/gearbox assembly removed <u>⇒ page 9</u>.



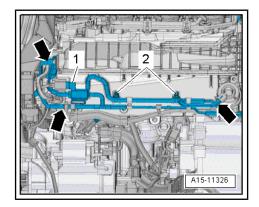
The fuel system operates at extremely high pressure. This can

cause injury.

WARNING

rote the fuel pressure in the high-pressure section of the inermitted jection system must be reduced to a residual pressure y with reprior to opening the system his document. Copyright by AUDI AG.

- Reduce fuel pressure in high-pressure section of injection system ⇒ page 336
- Remove charge air cooler housing <u>⇒ page 318</u>.
- Disconnect vacuum hoses -arrows-.
- Unplug electrical connector at intake manifold flap valve -N316- -item 1-.
- Take intake manifold flap valve out of bracket and move electrical wiring clear at intake manifold (right-side) -2-.



 Unplug electrical connector -arrow- for fuel pressure sender -G247-.

 Remove nuts -1, 2- and bolt -3-, move wiring guide clear and push to one side.

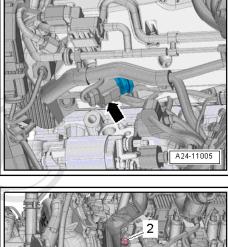
Unscrew centre hex stud -arrow- and remove guard plate -1-.

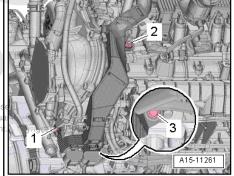
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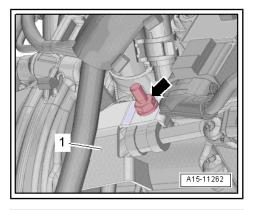
- Remove nut -3-, move retaining clip clear and remove centre hex stud.
- Remove bolts -2 and 5-.
- Unscrew union nuts -arrows- and push high-pressure pipe to one side.
 - Note

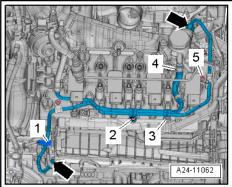
_

- Do not attempt to bend high-pressure pipe to a different shape.
- Disregard -items 1, 4-.









 Unplug electrical connector -2- for intake manifold flap potentiometer - G336- .



Disregard -item 1-.

- Detach noise insulation panels.
- Remove bolts -arrows- and detach intake manifold with fuel rail.



Caution

Risk of irreparable damage to engine.

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

Installing

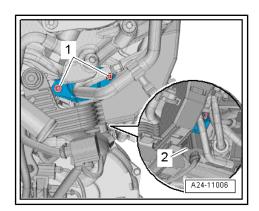


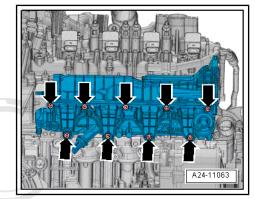
- Renew seals and/or gaskets.
- Secure all hose connections with the correct type of hose clips. (same as original equipment) SurParts catalogue JDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Caution

Risk of damage to intake manifold flaps.

To prevent the intake manifold flaps from catching on the guide plates in the cylinder head, the flaps must be in the open position when the intake manifold is installed.





- Connect hand vacuum pump VAS 6213- to vacuum unit for actuating intake manifold flaps, as shown in illustration.
- Use vacuum pump to generate a vacuum.
- · This will cause the intake manifold flaps to open.
- Press intake manifold with fuel rail evenly onto injectors.
- Tighten bolts for intake manifold in diagonal sequence and in stages.
- Disconnect hand vacuum pump from vacuum unit for actuating intake manifold flaps.

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

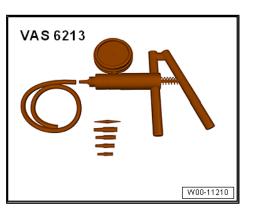
- Install high-pressure pipe ⇒ page 386.
- Install charge air cooler housing \Rightarrow page 318.

Tightening torques

- 4.2.2 Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not with fuel rail, cylinder bank 2 (left-side)

Special tools and workshop equipment required

Hand vacuum pump - VAS 6213-



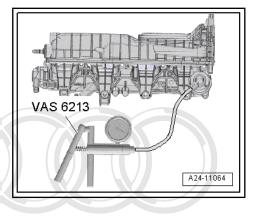
Removing

Engine/gearbox assembly removed ⇒ page 9.

WARNING

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

- The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system.
- Reduce fuel pressure in high-pressure section of injection system ⇒ page 336.
- Remove charge air cooler housing ⇒ page 318.
- Remove coolant pipe (top left) <u>⇒ page 264</u>.



Audi A8 2010 ➤ () 8-cylinder direct injection engine (4.0 ltr. 4-valve TFSI) - Edition 03.2014 Auði

- Disconnect vacuum hose -3- and move clear.
- Detach secondary air inlet valves from bracket and move clear to one side:
- 1 Secondary air inlet valve 2 N320-
- 2 Secondary air inlet valve N112-
- Unplug electrical connectors -4, 5- and move clear wiring harness at intake manifold.
- Unplug electrical connector -2- for intake manifold flap potentiometer 2 - G512-.

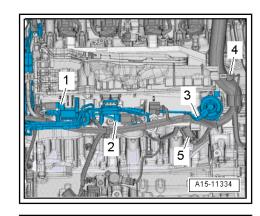


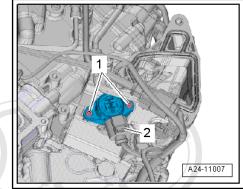
Disregard -item 1-.

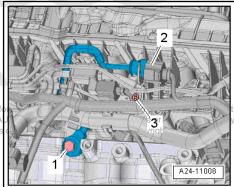
 Remove bolt -3- and move bracket with electrical connector -2- to one side.

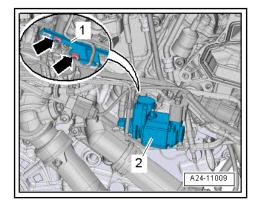
Disregard -item 1-.

- Protected by copyright. Copying f permitted unless authorised by A with respect to the correctness
- Detach charge pressure control solenoid valve N75--item 2- from bracket -1- and push it clear to one side.
- Remove bolts -arrows- and push bracket towards front of vehicle.





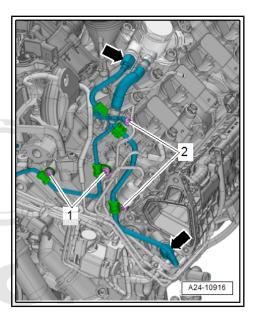




- Remove bolts -2-.
- Unscrew union nuts -arrows-.

Note

- Do not attempt to bend high-pressure pipe to a different shape.
- Disregard -item 1-.



- Detach noise insulation panelsProtected by copyright. Copying for private or comm
- Remove bolts -arrows- and detachintake manifold with fue tion in thi rail.



Caution

Risk of irreparable damage to engine.

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

Installing

i) Note

- Renew seals and/or gaskets.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Parts catalogue.



Caution

Risk of damage to intake manifold flaps.

To prevent the intake manifold flaps from catching on the guide plates in the cylinder head, the flaps must be in the open position when the intake manifold is installed.

- Connect hand vacuum pump VAS 6213- to vacuum unit for actuating intake manifold flaps, as shown in illustration.
- Use vacuum pump to generate a vacuum.
- · This will cause the intake manifold flaps to open.
- Press intake manifold with fuel rail evenly onto injectors.
- Tighten bolts for intake manifold in diagonal sequence and in stages.
- Disconnect hand vacuum pump from vacuum unit for actuating intake manifold flaps.

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

- Install high-pressure pipe ⇒ page 390.
- Install coolant pipe (top left) <u>⇒ page 264</u>.
- Install charge air cooler housing ⇒ page 318.

Tightening torques

◆ ⇒ "4.1 Exploded view - intake manifold", page 356

4.3 Removing and installing throttle valve module - J338-

Removing

- Release hose clip -1- and detach air hose.
- Unplug electrical connector -2- and move wiring clear.
- Remove bolts -arrows- and move turbocharger air recirculation valve - N249- and turbocharger air recirculation valve, cylinder bank 2 - N427- clear to one side.

Unscrew bolts -arrows- and release hose clips -1-.

Detach throttle valve module - J338- and unplug electrical connectors -2-.

Installing

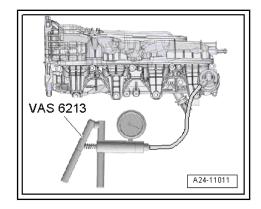
Installation is carried out in the reverse order; note the following:

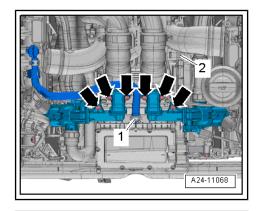


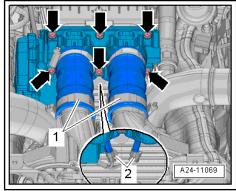
- Protected by Renew gasket, private or commercial purposes, in part or in whole, is not
- permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with ♠sp.Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.
 - Install air ducts with screw-type clips ⇒ page 318.
 - After renewing throttle valve module, perform "Adaption" in "Guided Functions" mode using a vehicle diagnostic tester.

Tightening torques

♦ ⇒ "4.1 Exploded view - intake manifold", page 356







4.4 Removing and installing intake manifold flap potentiometer - G336-

Removing

- Remove catalytic converters ⇒ page 406.
- Unbolt drive shaft (right-side) from gearbox flange shaft ⇒ Running gear, axles, steering; Rep. gr. 40; Drive shaft; Removing and installing drive shaft.
- Unplug electrical connector -2-.
- Remove bolts -1- and detach intake manifold flap potentiometer - G336-.

Installing

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

Install catalytic converters <u>⇒ page 406</u>.

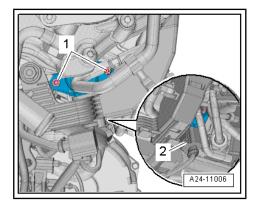
Tightening torques

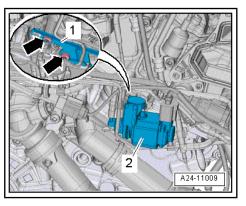
- ◆ ⇒ "4.1 Exploded view intake manifold", page 356
- Running gear, axles, steering; Rep. gr. 40; Drive shaft; Exploded view - drive shaft

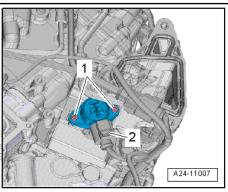
4.5 Removing and installing intake manifold flap potentiometer 2 - G512-

Removing

- Remove charge air cooler housing \Rightarrow page 318.
- Detach charge pressure control solenoid valve N75--item 2- from bracket -1-.
- Remove bolts -arrows- and push bracket to one side.







- Unplug electrical connector -2-.
- Remove bolts -1- and detach intake manifold flap potentiometer 2 - G512- .

Installing

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

- Install charge air cooler housing ⇒ page 318.
- **Tightening torques** by copyright. Copying for private or commercial purposes, in part or in whole, permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any I
- ♦ ⇒ "4.1 Exploid ed view intake mainfold on page 356 ent. Copyright by AUDI

5 Injectors

\Rightarrow "5.1 Removing and installing injectors", page 367

⇒ "5.2 Cleaning injectors", page 370

5.1 Removing and installing injectors

Special tools and workshop equipment required

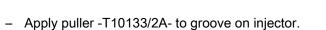
Tool set for FSI engines - T10133 C-



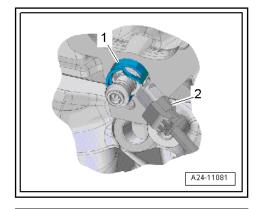


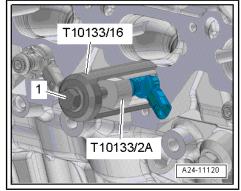
Removing

- Engine/gearbox assembly removed <u>⇒ page 9</u>.
- Remove intake manifold \Rightarrow page 359.
- Unplug relevant electrical connector -2- and remove support ring -1-.



 Apply puller -T10133/16A- and pull out injector by turning bolt -1-.



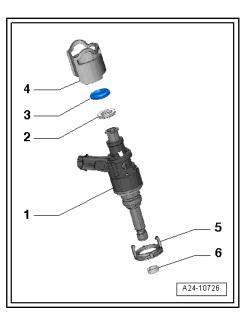


Dismantling injector

- Pull O-ring -3- and spacer ring -2- off injector -1-.
- Unclip sealing element -5-.
- Carefully remove old combustion chamber ring seal -6-. To do so, cut open combustion chamber ring seal using knife or prise open with small screwdriver and then pull off forwards.

i Note

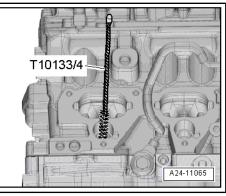
Take care not to damage groove on injector. The injector must be renewed if the groove is damaged.

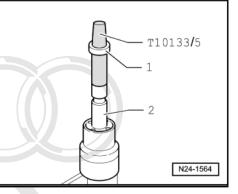




i Note

- Renew sealing element, combustion chamber ring seal and O-ring.
- Renew spacer ring if damaged.
- Lubricate O-rings of injectors lightly with clean engine oil.
- Clean bore in cylinder head with nylon cylinder brush -T10133/4- .
- Fit assembly cone -T10133/5- with new combustion chamber ring seal -1- from repair kit onto injector -2-.





N24-1565

- Using assembly sleeve -T10133/6- , push combustion chamber ring seal onto assembly cone -T10133/5- as far as it will go.
- Turn round assembly sleeve -T10133/6- and slide combustion chamber ring seal into groove. Protected by copyright. Copying for private or commercial purposes, in part whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or a trany liability with respect to the correctness of information in this document. Copyright by AUDI AG. T10133/5

i Note

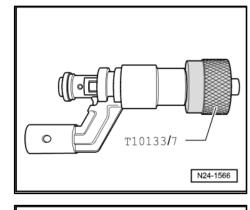
The combustion chamber ring seal is widened when it is pushed onto the injector. After pushing it on, it therefore has to be compressed again. This is done in two stages, as described below.

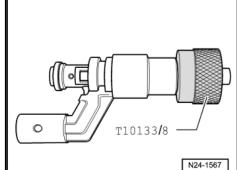
- Push calibration sleeve -T10133/7- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).
- Pull calibration sleeve -T10133/7- off again by turning it in the opposite direction.
- Push calibration sleeve -T10133/8- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).
- Pull calibration sleeve -T10133/8- off again by turning it in the opposite direction.

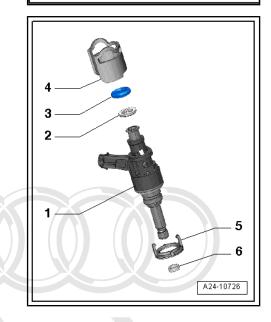
- Fit parts from repair kit onto injector -1-:
- 2 Spacer ring
- 3 O-ring
- 4 Support ring
- 5 Sealing element
- To make it easier to install injector in fuel rail, lubricate new Oring lightly with clean engine oil before installing it.

i Note

The combustion chamber ring seal -6- must not be lubricated.







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- Use assembly tool -T10133/9- to insert injector as far as it will go into hole in cylinder head; note correct installation position.
- Electrical connector of injector must engage in recess in cylinder head.

i Note

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

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

- Install intake manifold \Rightarrow page 359.

5.2 Cleaning injectors

Special tools and workshop equipment required

- Ultrasonic cleaning unit VAS 6418-
- Mounting plate for injection modules VAS 6418/1-
- ◆ Cleaning fluid ⇒ Electronic parts catalogue

Cleaning

– Remove injectors ⇒ page 367

Note

Observe safety precautions and operating instructions for ultrasonic unit.

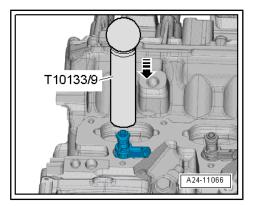
Ultrasonic unit must be filled with cleaning fluid.

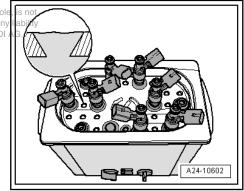


Note

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Ultrasonic unit must be filled with cleaning fluid up to top edge of apertures (see detail in illustration).





- Insert injectors -1- all the way into mounting plate for injection modules - VAS 6418/1- -2-.
- Set rotary knob -4- to a temperature of 50°C.
- Select a cleaning time of 30 minutes with rotary knob -5-.
- Switch on ultrasonic unit with button -3-.

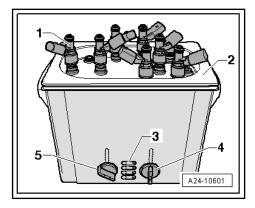
i Note

The time set starts to elapse as soon as a cleaning temperature of 50°C has been reached.

Install injectors with new combustion chamber seal
 ⇒ page 367



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6 Senders and sensors

⇒ "6.1 Removing and installing actuator for structure-borne sound", page 372

 \Rightarrow "6.2 Removing and installing control unit for structure-borne sound", page 372

 \Rightarrow "6.3 Removing and installing fuel pressure sender G247 ", page 373

 \Rightarrow "6.4 Removing and installing fuel pressure sender 2 G624 ", page 374

 \Rightarrow "6.5 Removing and installing fuel pressure sender for low pressure G410 ", page 374

 \Rightarrow "6.6 Removing and installing temperature sender for charge air cooler G763 / G764 ", page 376

 \Rightarrow "6.7 Removing and installing intake air temperature sender G42 ", page 376

 \Rightarrow "6.8 Removing and installing intake manifold pressure sender G71 ", page 377

6.1 Removing and installing actuator for structure-borne sound

Removing

- Remove windscreen ⇒ General body repairs, exterior; Rep. gr. 64 ; Windscreen; Removing and installing windscreen .
- Remove nut -2-.
- Detach actuator for structure-borne sound R214- and disconnect electrical connector -1-.

Installing

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

 Install windscreen ⇒ General body repairs, exterior; Rep. gr.
 64 ; Windscreen; Removing and installing windscreen . Protected by copyright. Copying for private or commercial purposes, in part or in whole, is in

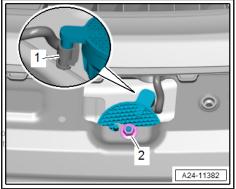
Tightening torques authorised by AUDI AG. AUDI AG does not guarantee or accept any liabil with respect to the correctness of information in this document. Copyright by AUDI AG.

Components	Nm
Actuator for structure-borne sound - R214- to windscreen flange	9

6.2 Removing and installing control unit for structure-borne sound

Removing

- Remove front seat ⇒ General body repairs, interior; Rep. gr. 72; Front seats; Removing and installing front seat.
- Remove sill panel trim (front) ⇒ General body repairs, interior; Rep. gr. 70; Passenger compartment trim panels; Removing and installing sill panel trim.
- Lift floor cover, if necessary, and remove B-pillar trim (bottom)
 ⇒ General body repairs, interior; Rep. gr. 70; Passenger compartment trim panels; Removing and installing B-pillar trim.



- Unplug electrical connector -1-.
- Unscrew nuts -arrows- and detach control unit for structureborne sound - J869-.

Installing

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

- Install B-pillar trim (bottom) ⇒ General body repairs, interior; Rep. gr. 70; Passenger compartment trim panels; Removing and installing B-pillar trim.
- Install sill panel trim (front) ⇒ General body repairs, interior; Rep. gr. 70; Passenger compartment trim panels; Removing and installing sill panel trim.
- Install front seat ⇒ General body repairs, interior; Rep. gr. 72;
 Front seats; Removing and installing front seat.

Tightening torques

Components	Nm
Control unit for structure-borne sound - J869- to underbody	2.5

6.3 Removing and installing fuel pressure sender - G247-

Removing

- Remove engine mounting (right-side) ⇒ page 61.
- Remove nut -2- and move earth wire clear.
- Remove bolts -arrows- and detach engine support -1- (rightside).

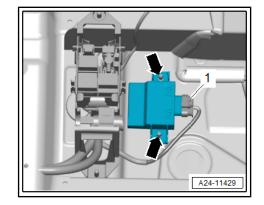
- Unplug electrical connector -arrow-.
- Unscrew fuel pressure sender G247- .

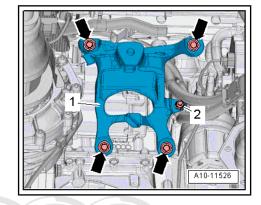
Installing

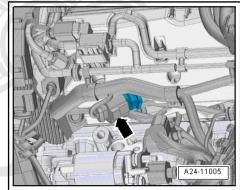
Installation is carried out in the reverse order; note the following:

Tightening torques

- \Rightarrow "4.1 Exploded view intake manifold", page 356
- ◆ ⇒ "2.1 Exploded view assembly mountings", page 47







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6.4 Removing and installing fuel pressure sender 2 - G624-

Removing

Vehicles up to model year 2013:

Remove coolant pipe (top left) <u>⇒ page 264</u>.

Vehicles from model year 2014 onwards:

 Remove steering rack ⇒ Running gear, axles, steering; Rep. gr. 48; Steering rack; Removing and installing steering rack.

All vehicles (continued):

- Unplug electrical connector -arrow-.
- Unscrew fuel pressure sender 2 G624- .

Installing

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

Vehicles up to model year 2013:

- Install coolant pipe (top left) \Rightarrow page 264.

Vehicles from model year 2014 onwards:

Install steering rack ⇒ Running gear, axles, steering; Rep. gr. 48; Steering rack; Removing and installing steering rack.

Tightening torques

 [→] "4.1 Exploded view - intake manifold", page 356

6.5 Removing and installing fuel pressure sender for low pressure - G410-

Removing



Caution

Risk of damage caused by particles of dirt.

♦ Observe <u>⇒ page 7</u>.

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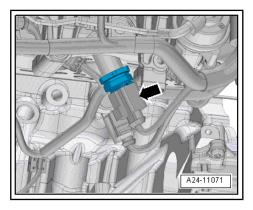
Remove engine cover panel <u>⇒ page 69</u>.

\triangle

WARNING

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.



Vehicles with engine codes CGTA/CTFA:

- Release hose clips -arrows- and remove air pipe (left-side).

- Unplug electrical connector -arrow-.
- Unscrew fuel pressure sender for low pressure G410- .

Installing

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

- Install air ducts with screw-type clips \Rightarrow page 318.
- Check fuel system for leaks <u>⇒ page 338</u>.

WARNING

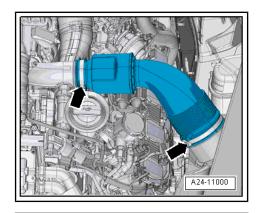
Danger of fire and damage if the engine cover panel is not fitted.

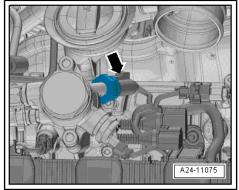
- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

Tightening torques



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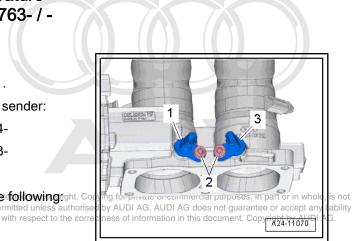
6.6 Removing and installing temperature sender for charge air cooler -G763- / - G764-

Removing

- Remove throttle valve module J338- ⇒ page 365.
- Unscrew relevant bolt -2- and detach temperature sender:
- 1 Temperature sender 2 for charge air cooler G764-
- 3 Temperature sender 1 for charge air cooler G763-

Installing

Installation is carried out in the reverse order; note the following fight. Co



Fit new O-rings.

Note

Install throttle valve module - J338- ⇒ page 365.

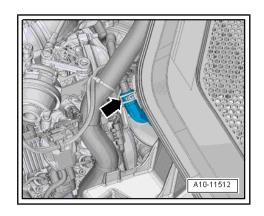
Tightening torques

◆ ⇒ "4.1 Exploded view - intake manifold", page 356

6.7 Removing and installing intake air temperature sender - G42-

Removing

- Remove engine cover panel <u>⇒ page 69</u>.
- Release hose clip -arrow- and detach vacuum hose from plenum chamber partition panel.



- Remove bolt -1-.
- Pull off intake air temperature sender G42- and unplug electrical connector -2-.

Installing

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



- Fit new O-ring.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.



WARNING

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

Tightening torques

• \Rightarrow "4.1 Exploded view - intake manifold", page 356

6.8 Removing and installing intake manifold pressure sender - G71-

Removing

- Remove charge air cooler housing <u>⇒ page 318</u>.
- Unscrew bolts -arrows- and pull intake manifold pressure sender - G71- -item 1- out of air pipe.

Installing

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

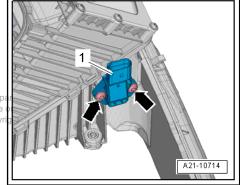


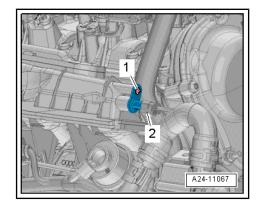
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Fit new O-ring.

- Install charge air cooler housing \Rightarrow page 318.

Tightening torques





7 High-pressure pump

- ⇒ "7.1 Exploded view high-pressure pump", page 378
- ⇒ "7.2 Exploded view fuel pipes and fuel rail", page 379
- ⇒ "7.3 Removing and installing high-pressure pump", page 382
- ⇒ "7.4 Removing and installing high-pressure pipe", page 386
- 7.1 Exploded view high-pressure pump

1 - Hose clip

2 - Fuel hose (low-pressure section)

3 - Union nut

- □ For high-pressure pipe
- Counterhold connection on high-pressure pump to loosen
- ❑ Observe all instructions for installing high-pressure pipes ⇒ page 390
- 🗅 25 Nm

4 - High-pressure pump

- Do not hold onto or pull on plunger of high-pressure pump
- Cylinder bank 1 (rightside) with fuel metering valve - N290-
- Cylinder bank 2 (leftside) with fuel metering valve 2 - N402-
- □ Removing and installing \Rightarrow page 382

5 - Bolt

- Renew
- □ 20 Nm + turn 45° further

6 - Fuel pressure sender for low pressure - G410-

- □ Removing and installing ⇒ page 374
- 15 Nm

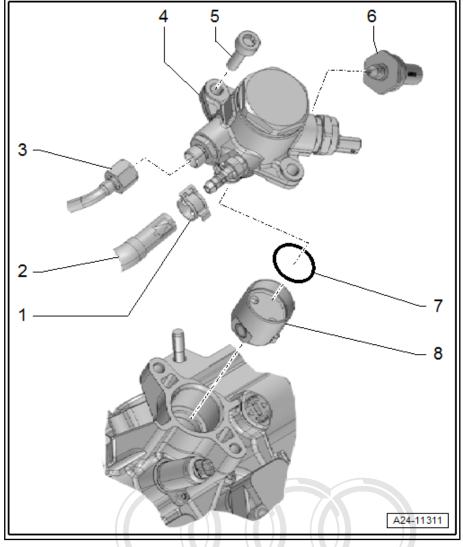
7 - O-ring

- Renew
- Lubricate lightly with clean engine oil before installing

8 - Roller tappet

- Can only be installed in one position
- Lubricate lightly with clean engine oil before installing

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7.2 Exploded view - fuel pipes and fuel rail

Cylinder bank 1 (right-side)

- 1 Centre hex stud
- 🗅 9 Nm
- 2 Bolt or centre hex stud 9 Nm
- 3 High-pressure pipe

WARNING The fuel system operates at extremely high pressure. This can cause injury. The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system.

- □ Reducing fuel pressure in high-pressure section of injection system ⇒ page 336
- □ Removing and installing \Rightarrow page 391
- Counterhold at connection on high-pressure pump/fuel rail when loosening union nuts
- Observe all instructions for installing high-prestot sure pipes <u>> page 390</u>
- □ Tightening torque for union nuts \Rightarrow Item 8 (page 356), \Rightarrow Item 3 (page 378)
- 4 Centre hex stud
 - 🛛 9 Nm
- 5 Fuel supply hose
- 6 Fuel hose (low-pressure section)

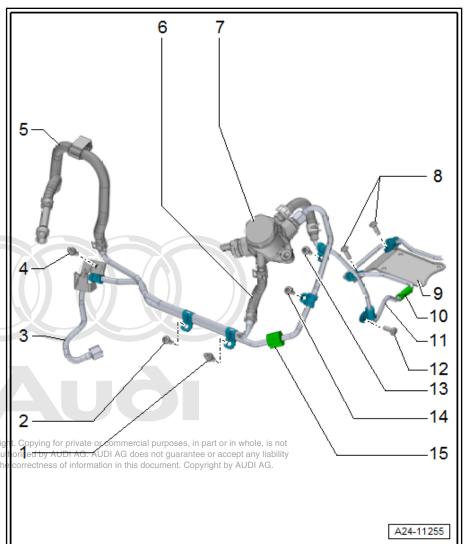
7 - High-pressure pump

8 - Bolts

- For retaining clips
- 🛛 9 Nm
- 9 Bracket
 - □ For low-pressure line
- 10 Rubber damper
 - Must make contact with cylinder block

11 - Low-pressure line

□ Note minimum clearance from bracket for low-pressure line <u>⇒ page 382</u>



12 - Bolt

- □ For retaining clip
- 🗅 9 Nm

13 - Bolt

- □ For retaining clip
- 🗅 9 Nm

14 - Bolt

- □ For retaining clip
- 🗅 9 Nm
- 15 Rubber damper
 - Must make contact with cylinder head cover

Cylinder bank 2 (left-side)

1 - Bolt

- □ For retaining clip
- □ 9 Nm

2 - Bolt

- □ For retaining clip
- 🛛 9 Nm

3 - Bolt

□ For retaining clip

🛛 9 Nm

4 - Bracket

□ For low-pressure line

5 - Low-pressure line

❑ Note minimum clearance from bracket for low-pressure line ⇒ page 382

6 - Bolts

- For retaining clips
- 🛛 9 Nm

7 - Rubber damper

Must make contact with bracket for adjacent low-pressure line

8 - High-pressure pump

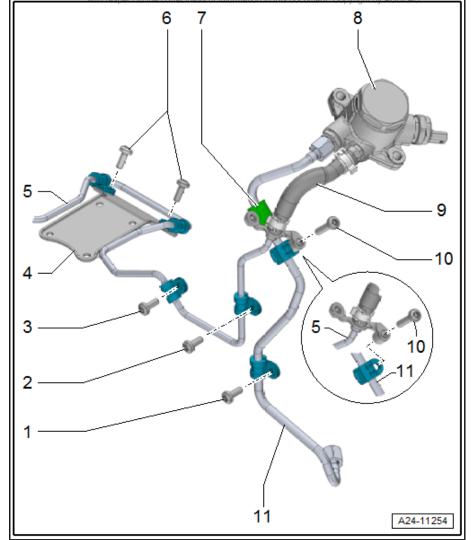
9 - Fuel hose (low-pressure section)

❑ Note installation position ⇒ page 381

10 - Bolt

🛛 9 Nm





11 - High-pressure pipe

WARNING The fuel system operates at extremely high pressure. This can cause injury. The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system.

- □ Reducing fuel pressure in high-pressure section of injection system \Rightarrow page 336
- □ Removing and installing <u>⇒ page 391</u>
- □ Counterhold at connection on high-pressure pump/fuel rail when loosening union nuts
- □ Observe all instructions for installing high-pressure pipes <u>> page 390</u>
- □ Tightening torque for union nuts \Rightarrow Item 8 (page 356), \Rightarrow Item 3 (page 378)

Installation position of fuel hose (low-pressure section)

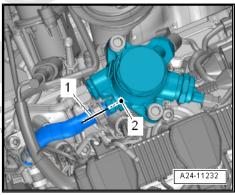
 Marking -1- on fuel hose (low-pressure section) must be aligned with marking -2- on high-pressure pump.

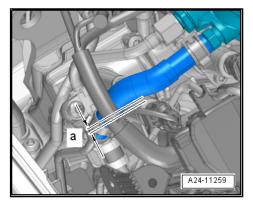


Illustration shows the installation position for cylinder bank 2 (left+oes not side).

Minimum clearance between fuel hose (low-pressure section) and exhaust cam actuator 2 for cylinder 5 - F467-

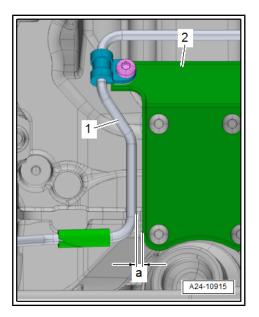
 Minimum clearance -a- = 2 mm must be maintained between fuel hose (low-pressure section) and exhaust cam actuator 2 for cylinder 5 - F467-.





Minimum clearance between low-pressure line and bracket for low-pressure line

• Minimum clearance -a- = 2 mm must be maintained between low-pressure line -1- and bracket -2- for low-pressure line.

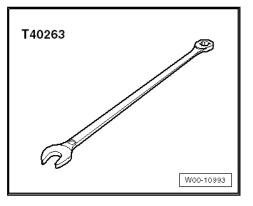


7.3 Removing and installing high-pressure pump

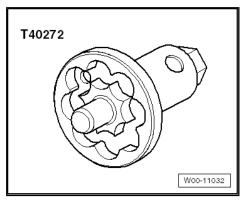
Special tools and workshop equipment required

• Wrench, 21 mm - T40263-

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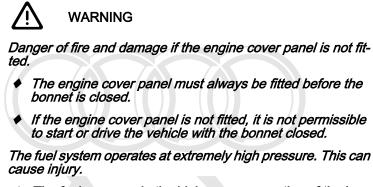


◆ Turning-over tool - T40272-



Removing

Remove engine cover panel <u>⇒ page 69</u>.



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

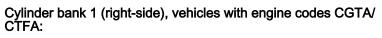
Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitte Reduce fuel pressure in high pressure section of injection syswith rtemt to page 336s of information in this document. Copyright by AUDI AG.



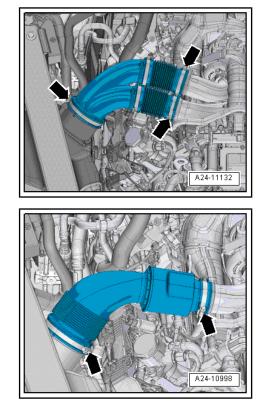
Do not hold onto or pull on plunger of high-pressure pumps.

Cylinder bank 1 (right-side), vehicles with engine codes CEUA/ CTGA:

- Release hose clips -arrows- and remove air pipe.



- Release hose clips -arrows- and remove air pipe (right-side).



Cylinder bank 1 (right-side), all engines:

Remove bolts -arrows- and push wiring guide -1- slightly to right side.

- Unplug electrical connector -1-.
- Release hose clips -2 and 4- and detach fuel hoses.
- Unscrew union nut -3- and bolts -arrows-.
- Remove bolts -arrows-.

Cylinder bank 2 (left-side):

- Unplug electrical connectors -3-.
- Release hose clip -4- and detach fuel hose.
- Unscrew union nut -2- and bolts -1- and -arrows-.

Continuation for both sides:

Carefully pull out high-pressure pump. It is possible that the roller tappet may remain lodged inside.

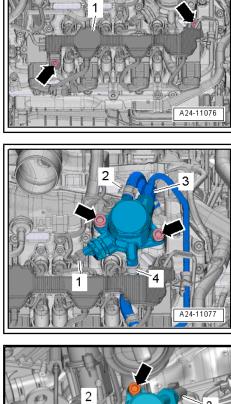
i Note

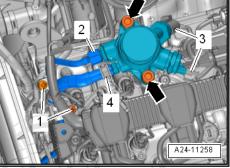
Do not attempt to bend high-pressure pipe to a different shape.

Installing

i Note

- Do not hold onto or pull on plunger of high-pressure pump.
- Fit new O-ring.
- Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not
 Secure all hose connections with the correct type of hose clips AUDI AG. AUDI AG does not guarantee or accept any liability (same as original equipment) ⇒ Electronic parts clatalogue to the context of the correct secure and the context of the correct secure and the context of the context
- The connections of the high-pressure pipe must not be damaged.
- Do not attempt to bend high-pressure pipe to a different shape.



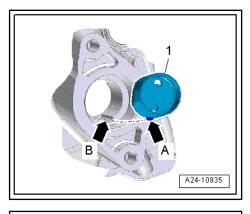


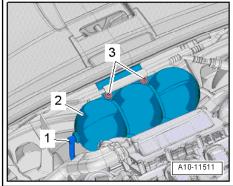
- Check roller tappet -1- for damage and renew if necessary.
- Lightly lubricate roller tappet with oil and insert it so that lug -arrow A- slides into guide notch -arrow B-.

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- Unscrew bolts -3- and remove vacuum reservoir -2-.





- Fit turning over tool T40272- onto wrench (21 mm) T40263-.
- Position adapter on bolts of vibration damper.
- Semi-circular recess -arrow A- on turning over tool T40272must point to semi-circular recess -arrow B- on vibration damper.



Disregard notch on turning over tool - T40272-.

 Rotate crankshaft in direction of normal engine rotation
 -arrow- using wrench (21 mm) - T40263- and turning over tool
 - T40272-, and at the same time press roller tappet into cylinder head until it reaches lowest point.

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

- Install high-pressure pipe <u>⇒ page 391</u>.
- Install air ducts with screw-type clips ⇒ page 318.
- Check fuel system for leaks <u>⇒ page 338</u>.

WARNING

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

Tightening torques

 → "7.1 Exploded view - high-pressure pump", page 378

7.4 Removing and installing high-pressure pipe

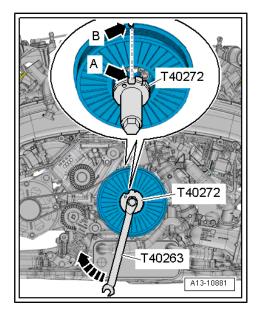
⇒ "7.4.1 Removing high-pressure pipe, cylinder bank 1 (rightside)", page 386

⇒ "7.4.2 Removing high-pressure pipe, cylinder bank 2 (leftside)", page 388

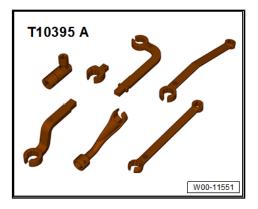
⇒ "7.4.3 Installing high-pressure pipe", page 390

7.4.1 Removing high-pressure pipe, cylinder bank 1 (right-side)

Special tools and workshop equipment required



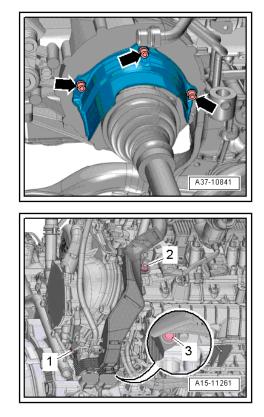
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Removing

- Remove air cleaner housing (right-side) \Rightarrow page 353.
- Remove rear section of front wheel housing liner (right-side)
 ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Removing and installing wheel housing liner (front).
- Remove bolts -arrows- and detach heat shield for drive shaft (right-side).
- Unbolt drive shaft (right-side) from gearbox flange shaft ⇒ Running gear, axles, steering; Rep. gr. 40; Drive shaft; Removing and installing drive shaft.
- Remove ignition coil "cylinder 4" ⇒ page 417.
- Remove nuts -1, 2- and bolt -3-, move wiring guide clear and push to one side.

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- Unscrew centre hex stud -arrow- and remove guard plate -1-.



WARNING

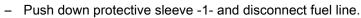
Risk of injury caused by fuel.

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

Caution

Risk of damage caused by particles of dirt.

◆ Observe <u>⇒ "3.1 Rules for cleanliness", page 7</u>.



- First press hose connector -2- downwards -arrow A-, then press release tabs -arrow B-.
- Pull off hose connector, keeping release tabs depressed.



Disregard -item 3-.

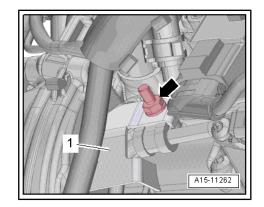
- Disconnect vacuum hose -1-.
- Remove nut -3-, move retaining clip clear and remove centre hex stud.
- Remove bolts -2 and 5-.
- Release hose clip -4- and detach fuel hose.
- Unscrew union nuts -arrows- (counterhold hexagon flats of each connection with an open-end spanner when loosening).
- Detach high-pressure pipe.

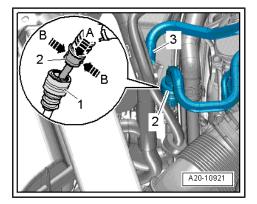
i Note

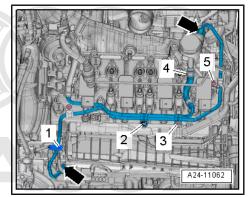
- Depending on version, a centre hex stud may be fitted in place of bolt -2-.
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- Do not attempt to bend high-pressure pipe to a different shape.

7.4.2 Removing high-pressure pipe, cylinder bank 2 (left-side)

Special tools and workshop equipment required







Socket - T40055-

Removing

- Remove charge air cooler housing \Rightarrow page 318. _
- Detach charge pressure control solenoid valve N75--item 2- from bracket -1- and push it clear to one side.
- Remove bolts -arrows- and push bracket towards front of vehicle.



WARNING

Risk of injury caused by fuel.

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



Caution

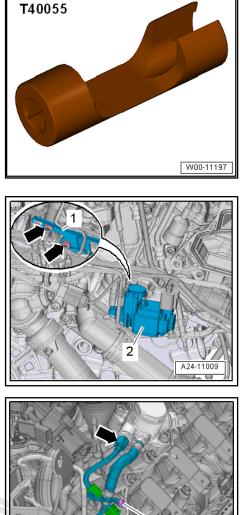
Risk of damage caused by particles of dirt.

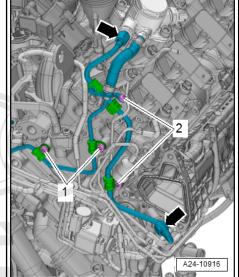
- ◆ Observe <u>⇒ "3.1 Rules for cleanliness", page 7</u>.
- Remove bolts -1 and 2-.
- Unscrew union nuts -arrows- (counterhold hexagon flats of each connection with an open-end spanner when loosening).

nmercial purposes, in part or in whole, is not Detach high-pressure pipe. permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



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





7.4.3 Installing high-pressure pipe

Installing



Risk of leaks.

The connections of the high-pressure pipe must not be damaged.

i Note

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

- Position retaining clips and rubber dampers as shown in illustrations <u>⇒ page 379</u>.
- Lubricate threads of union nuts with clean engine oil.
- First tighten union nut by hand until it makes contact, making sure that high-pressure pipe is not under tension.
- Tighten union nut initially to 5 Nm using torque wrench.
- Tighten bolts for retaining clips.
- Tighten union nut to final tightening torque using torque wrench; to do so, counterhold hexagon flats of each connection with an open-end spanner.

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

Cylinder bank 1 (right-side):

- Install ignition coil "cylinder 4" ⇒ page 417.
- Install air cleaner housing <u>⇒ page 353</u>.

Cylinder bank 2 (left-side):

– Install charge air cooler housing ⇒ page 318 Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not



WARNING

permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

Tightening torques

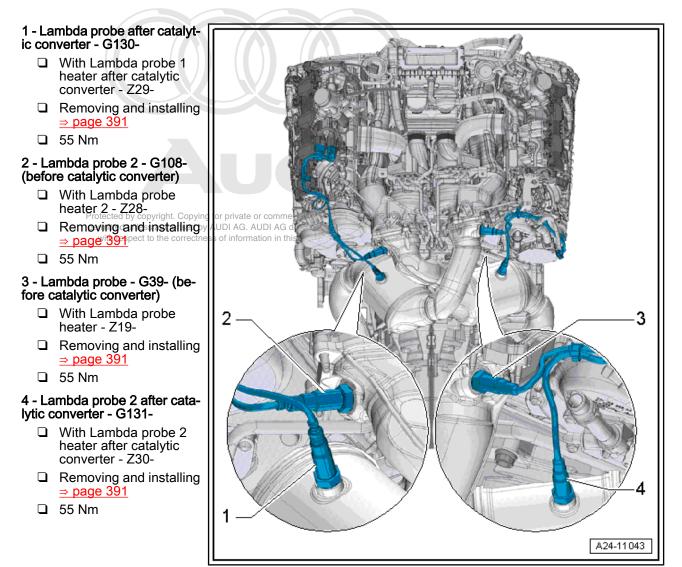
- <u>⇒ "4.1 Exploded view intake manifold"</u>, page 356
- [→] "7.1 Exploded view high-pressure pump", page 378
- ◆ ⇒ "7.2 Exploded view fuel pipes and fuel rail", page 379
- Drive shaft (right-side) and heat shield ⇒ Running gear, axles, steering; Rep. gr. 40; Drive shaft; Exploded view - drive shaft

8 Lambda probe

⇒ "8.1 Exploded view - Lambda probe", page 391

⇒ "8.2 Removing and installing Lambda probe", page 391

8.1 Exploded view - Lambda probe



8.2 Removing and installing Lambda probe

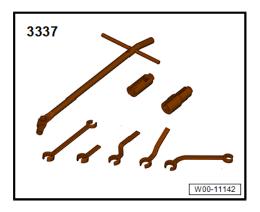
 \Rightarrow "8.2.1 Removing and installing Lambda probe G39 / G131 ", page 391

 \Rightarrow "8.2.2 Removing and installing Lambda probe G108 / G130 ", page 393

8.2.1 Removing and installing Lambda probe -G39- / -G131-

Special tools and workshop equipment required

Lambda probe open ring spanner set - 3337-

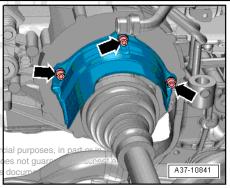


Removing



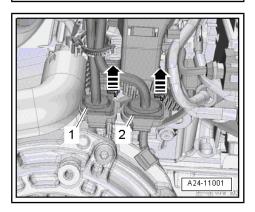
All cable ties which are released or cut open when removing must be fitted in the same position when installing.

- Remove rear section of front wheel housing liner (right-side)
 ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Removing and installing wheel housing liner (front).
- Remove bolts -arrows- and detach heat shield for drive shaft (right-side).



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- Detach electrical connectors from bracket in the sequence shown; release catches -arrows- to unplug connectors and move electrical wiring clear:
- 2 For Lambda probe G39-
- 1 For Lambda probe 2 G131- (after catalytic converter)



- Unscrew Lambda probes using ring spanner -3337/7- :
- 1 Lambda probe 2 after catalytic converter G131-
- 2 Lambda probe G39-

Installing

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



- Threads of new Lambda probes are already coated with assembly paste; the paste must not get into the slots on the probe body.
- ♦ In the case of a used Lambda probe grease only the thread with high-temperature paste. The paste must not get into the slots on the Lambda probe body. High-temperature paste ⇒ Electronic parts catalogue
- When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.
- Fit all cable ties in the original positions when installing.

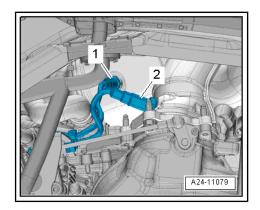
Tightening torques

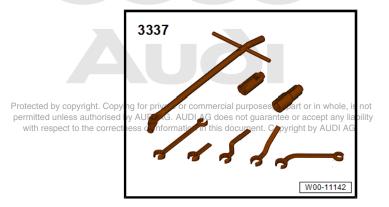
- ♦ ⇒ "8.1 Exploded view Lambda probe", page 391
- Heat shield for drive shaft ⇒ Running gear, axles, steering; Rep. gr. 40; Drive shaft; Exploded view - drive shaft

8.2.2 Removing and installing Lambda probe -G108- / -G130-

Special tools and workshop equipment required

• Lambda probe open ring spanner set - 3337-





Removing

Remove engine cover panel <u>⇒ page 69</u>.



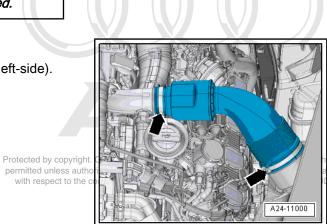
WARNING

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

Vehicles with engine codes CGTA/CTFA:

- Release hose clips -arrows- and remove air pipe (left-side).



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All vehicles (continued):

- Detach electrical connectors one after the other from bracket, unplug connectors and move electrical wiring clear:
- 1 For Lambda probe after catalytic converter G130-
- 4 For Lambda probe 2 G108-
- Unscrew Lambda probes using ring spanner -3337/7- :
- 2 Lambda probe 2 G108-
- 3 Lambda probe after catalytic converter G130-

Installing

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

Note

- Threads of new Lambda probes are already coated with assembly paste; the paste must not get into the slots on the probe body.
- ♦ In the case of a used Lambda probe grease only the thread with high-temperature paste. The paste must not get into the slots on the Lambda probe body. High-temperature paste ⇒ Electronic parts catalogue
- When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.
- Fit all cable ties in the original positions when installing.
- Install air ducts with screw-type clips <u>⇒ page 318</u>.

WARNING

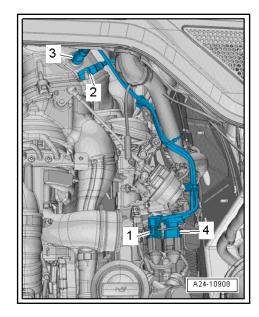
Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

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Tightening torques

◆ <u>⇒ "8.1 Exploded view - Lambda probe", page 391</u>



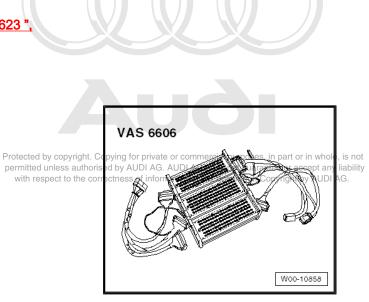
9 Engine control unit

 ⇒ "9.1 Wiring and component check", page 396
 ⇒ "9.2 Removing and installing engine control unit J623 " page 397

9.1 Wiring and component check

Special tools and workshop equipment required

◆ Isolator box, 198-pin - VAS 6606/1-1-



- Isolator box, 198-pin VAS 6606/1-2-
- Isolator box, 198-pin VAS 6606/1-3-
- Sheets -VAS 6606/1-1-
- Sheets -VAS 6606/2-1-
- Sheets -VAS 6606/3-1-
- Set of cables -VAS 6606/7-1- and -VAS 6606/7-2-

Note

- Always make sure that the cables are properly connected.
- Do not use damaged or worn tools and accessories.
- Observe operating instructions.
- Connect both cable sets -VAS 6606/7-1- and -VAS 6606/7-2to the three isolator boxes -VAS 6606-.
- Use the following sheets:
- -VAS 6606/1-1- for isolator box, 198-pin VAS 6606/1-1-
- -VAS 6606/2-1- for isolator box, 198-pin VAS 6606/1-2-
- -VAS 6606/3-1- for isolator box, 198-pin VAS 6606/1-3-

i Note

Make sure that all plug-in bridges are inserted completely in all isolator boxes.

- Connect earth strap to an isolator box and to an earth point on the vehicle.
- Remove engine control unit <u>⇒ page 397</u>.
- Connect engine control unit to cable set -VAS 6606/7-1- .

- Connect vehicle wiring harness to cable set -VAS 6606/7-2-.

The connection on the engine control unit consists of a large and a small connector.

The large connector has 105 pins and is assigned to the sheets for the isolator box marked "A 1 to A 105".

The small connector has 91 pins and is assigned to the sheets for the isolator box marked "B 1 to B 91".

When a push-in bridge is pulled out, the corresponding wiring connection is disconnected.

i) Note

- The "In" contact -1- (red socket) leads to the engine control unit.
- The "Out" contact -2- (blue socket) leads to the wiring harness.
- Carry out test as described in appropriate repair procedures.

Installing engine control unit

Installation is performed in the reverse sequence.

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

i Note

After completion of the Guided Fault Finding routine, the tester will attempt to erase the event memories of all control units. If this is not successful, the remaining events saved in the memories must be dealt with so that all event memory entries can be erased.

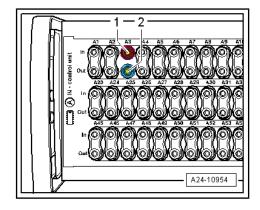
9.2 Removing and installing engine control unit - J623-

Removing

- When renewing engine control unit, select diagnosis object "Replace engine control unit" in "Guided Functions" mode of vehicle diagnostic tester.
- Switch off ignition.

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 Remove body brace ⇒ Running gear, axles; steering; Reps of information in this document. Copyright by AUDI AG. gr. 40; Suspension strut, upper links; Removing and installing body brace.





 Release clips -arrows- and detach engine control unit - J623--item 2-.



Disregard -items 1, 3, 4-.

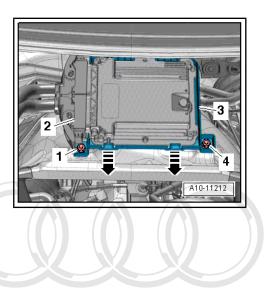
Installing

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

- Install plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50; Bulkhead; Removing and installing plenum chamber cover.
- Activate engine control unit via a vehicle diagnostic tester in "Guided Functions" mode, "Replace engine control unit".

Tightening torques

 ♦ Body brace ⇒ Running gear, axles, steering; Rep. gr. 40; Suspension strut, upper links; Exploded view - suspension strut, upper links



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26 – Exhaust system

1 Exhaust pipes/silencers

- ⇒ "1.1 Exploded view silencers", page 399
- ⇒ "1.2 Separating exhaust pipes/silencers", page 402
- ⇒ "1.3 Removing and installing front silencer", page 403
- ⇒ "1.4 Stress-free alignment of exhaust system", page 404
- ⇒ "1.5 Checking exhaust system for leaks", page 405

1.1 Exploded view - silencers

i Note

The exhaust manifold and the turbocharger are combined as one unit; removing and installing <u>⇒ "1.2 Removing and installing turbocharger", page 309</u>.

1 - Centre silencer

- Combined in one unit with rear silencers as original equipment. Can be renewed individually for repair purposes
- □ Cutting point ⇒ page 402
- ❑ Align exhaust system so it is free of stress ⇒ page 404

2 - Rear silencer

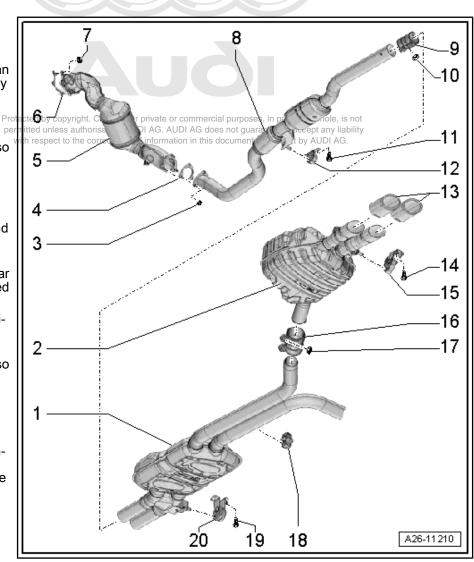
- Combined as one unit with centre silencer and tailpipes as original equipment
- Centre silencer and rear silencer can be renewed separately
- □ Cutting point: centre silencer / rear silencer ⇒ page 402
- ❑ Align exhaust system so it is free of stress ⇒ page 404

3 - Nut

- □ Renew
- Coat threads with hightemperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue
- 🗅 23 Nm

4 - Gasket

Renew



5 - Catalytic converter

- Protect against knocks and impact
- □ Removing and installing \Rightarrow page 406

6 - Gasket

Renew

7 - Nut

- □ Renew
- □ Coat threads with high-temperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue
- 23 Nm

8 - Front silencer

- □ With flexible joint; do not bend flexible joint more than 10° otherwise it can be damaged
- □ Removing and installing \Rightarrow page 403
- Mounting components:
- ◆ ⇒ Fig. ""Components of exhaust pipe mountings (left-side)"", page 401
- ◆ ⇒ Fig. ""Components of exhaust pipe mountings (right-side)"", page 402
 - □ Align exhaust system so it is free of stress ⇒ page 404

9 - Clamp (front)

- □ Installation position \Rightarrow page 401
- □ Before tightening, align exhaust system so it is free of stress <u>⇒ page 404</u>
- Tighten bolt connections evenly

10 - Nut

- 🗅 23 Nm
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 - DOMermitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any ilabitian with respect to the correctness of information in this document. Copyright by AUDI AG.
 - □ 23 Nm

12 - Mounting

- □ Renew if damaged
- □ Check preload <u>⇒ "1.4 Stress-free alignment of exhaust system", page 404</u>

13 - Trim

- For tailpipes
- □ Fitted depending on vehicle model and version; for allocation refer to ⇒ Electronic parts catalogue
- □ Slide onto tailpipes as far as stop

14 - Bolt

🗅 23 Nm

15 - Mounting

- Renew if damaged
- □ Check preload <u>⇒ "1.4 Stress-free alignment of exhaust system", page 404</u>

16 - Clamp (rear)

- For separate replacement of centre and rear silencers
- □ Installation position \Rightarrow page 401
- □ Before tightening, align exhaust system so it is free of stress \Rightarrow page 404
- □ Tighten bolt connections evenly

17 - Nut

🗅 23 Nm

18 - Mounting

- Renew if damaged
- □ Check preload ⇒ "1.4 Stress-free alignment of exhaust system", page 404

19 - Bolt

🗅 23 Nm

20 - Mounting

- Renew if damaged
- □ Check preload \Rightarrow "1.4 Stress-free alignment of exhaust system", page 404

Installation position of front clamps

Installation position of rear clamps

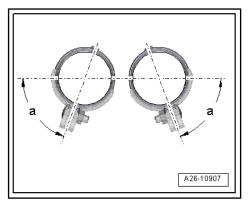
bottom of clamp.

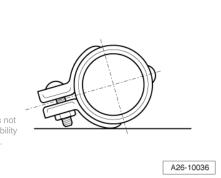
 Install clamps so that the bolt ends do not protrude beyond bottom of clamp.

Install clamps so that the bolt ends do not protrude beyond

Installation position: bolted connections face forwards.

- Installation position: bolt connections face outwards.
- Angle -α- = 45°

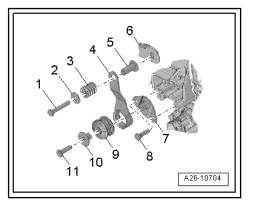




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Components of exhaust pipe mountings (left-side)

- 1 Bolt, 23 Nm
- 2 Washer
- 3 Compression spring
- 4 Bracket
- 5 Spacer sleeve
- 6 Front silencer (left-side)
- 7 Bracket
- 8 Bolt, 23 Nm
- 9 Buffer
- 10 Spacer sleeve
- 11 Bolt, 23 Nm

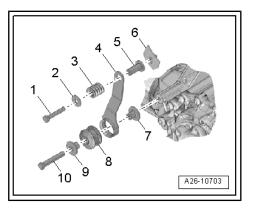


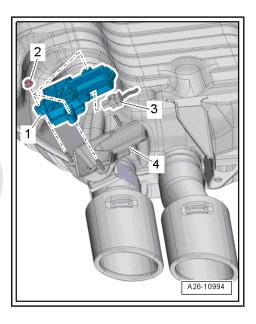
Components of exhaust pipe mountings (right-side)

- 1 Bolt, 23 Nm
- 2 Washer
- 3 Compression spring
- 4 Bracket
- 5 Spacer sleeve
- 6 Front silencer (right-side)
- 7 Spacer sleeve
- 8 Buffer
- 9 Spacer sleeve
- 10 Bolt, 23 Nm

Exhaust flap control unit - tightening torque

- Tighten nuts -2- to 3 Nm.



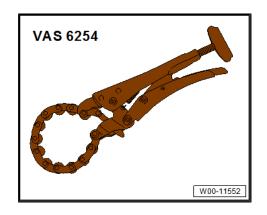


1.2 Separating exhaust pipes/silencers in part or in whole, is not

- The connecting pipe can be cut through at the cutting location by AUDI AG.
 in order to renew the centre or rear silencer separately.
- The cutting point is marked by an indentation on the circumference of the exhaust pipe.

Special tools and workshop equipment required

• Chain pipe cutter - VAS 6254-

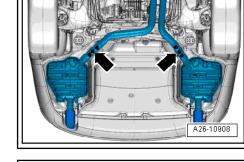


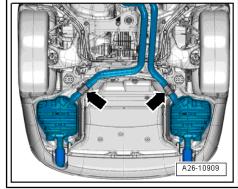
Procedure

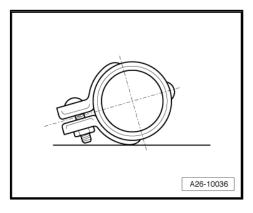
- Cut through exhaust pipes at right angle at the position marked -arrows- using chain pipe cutter - VAS 6254- .

- Position centre of clamps -arrows- over cutting location.

- Install clamps so that the bolt ends do not protrude beyond bottom of clamp.
- Installation position: bolted connections face forwards.
- Align the exhaust system so it is free of stress <u>⇒ page 404</u>.







1.3 Removing and installing front silencer

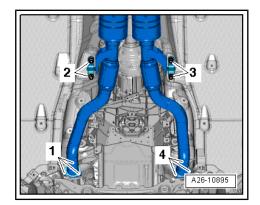
Removing

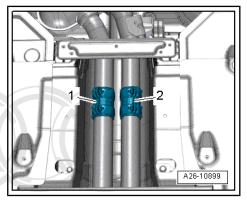
- Remove noise insulation (rear) ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.
- Remove tunnel cross-piece ⇒ General body repairs, exterior; Rep. gr. 66; Underbody trim; Removing and installing tunnel cross-piece.



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- Front silencer (left-side): remove nuts -1- and bolts -2-.
- Front silencer (right-side): remove nuts -4- and bolts -3-.







Caution

Avoid damage to flexible joint.

- ♦ Do not bend flexible joint more than 10°.
- Install flexible joint so that it is not under tension.
- Take care not to damage wire mesh on flexible joint.
- Release and push back clamp -1- or -2- and detach relevant front silencer.

Installing

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



Renew gaskets and self-locking nuts.

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Align the exhaust system so it is free of stress <u>⇒ page 404</u>.

Tightening torques

- ◆ ⇒ "1.1 Exploded view silencers", page 399
- Tunnel cross-piece ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim; Exploded view - underbody trim

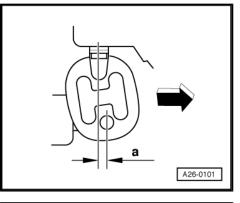
1.4 Stress-free alignment of exhaust system

Procedure

• The exhaust system must be aligned when it is cool.

Vehicles without clamps between centre silencer and rear silencers

- Loosen bolt connections on front clamps.
- Push exhaust system towards front of vehicle -arrow- until mountings in front of centre silencer are preloaded by -a- = 6 ... 10 mm.
- Tighten bolt connections on clamps evenly.



Vehicles with clamps between centre silencer and rear silencers



On a vehicle with clamps fitted between the centre silencer and rear silencers, it is also necessary to align the centre silencer.

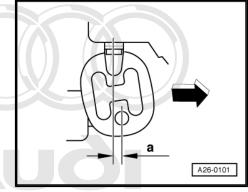
- Loosen bolt connections on front and rear clamps.
- Push exhaust system towards front of vehicle -arrow- until mountings in front of centre silencer are preloaded by -a- = 6 ... 10 mm.
- Tighten bolt connections on front clamps evenly.
- Push rear section of exhaust system towards front of venicle by AUDI -arrow-, so that mountings (rear) for rear silencers are preloaded by -a- = 11 ... 15 mm.
- Align rear silencers so they are horizontal.
- Tighten bolt connections on rear clamps evenly.

Tightening torques

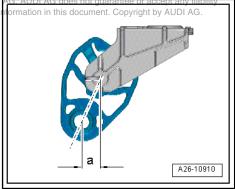
♦ ⇒ "1.1 Exploded view - silencers", page 399

1.5 Checking exhaust system for leaks

- Start the engine and run at idling speed.
- Plug tailpipes during leak test (e.g. with cloth or plugs).
- Listen for noise at connections between cylinder head/exhaust manifold, exhaust manifold/front exhaust pipe, etc. to locate any leaks.
- Rectify any leaks that are found.



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2 Emission control system

⇒ "2.1 Removing and installing catalytic converter", page 406

<mark>⇒ "2.2 Removing and installing exhaust flap control unit J883 /</mark> J945 ", page 408

2.1 Removing and installing catalytic converter

i Note

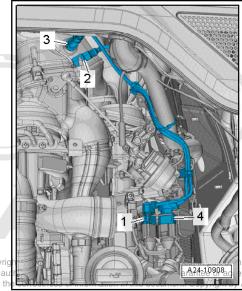
- The catalytic converter for cylinder bank 1 (right-side) is located on the left side of the vehicle.
- The catalytic converter for cylinder bank 2 (left-side) is located on the right side of the vehicle.

Removing

- Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50; Bulkhead; Exploded view plenum chamber partition panel.
- Remove front silencer on both sides \Rightarrow page 403.
- Remove Lambda probe 2 G108- ⇒ page 391.
- Take electrical connector -1- for Lambda probe after catalytic converter - G130- -item 3- out of bracket, unplug and move wiring clear.



Disregard -items 2, 4-.



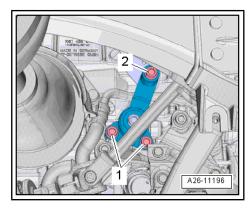
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 Remove bolt -2- on mounting for catalytic converter on left side of vehicle.



Disregard -item 1-.



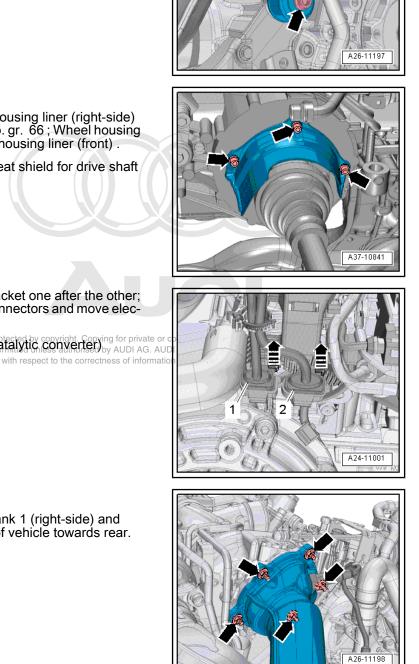
 Remove bolt -arrow- on mounting for catalytic converter on right side of vehicle.

Catalytic converter, cylinder bank 2:

- Remove rear section of front wheel housing liner (right-side)
 ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Removing and installing wheel housing liner (front).
- Remove bolts -arrows- and detach heat shield for drive shaft (right-side).
- Detach electrical connectors from bracket one after the other; release catches -arrows- to unplug connectors and move electrical wiring clear:
- 2 For Lambda probe 2 G131- (after Catalytic Copyright Copyrigh
- 1 For Lambda probe G39-

Continuation for both sides:

 Unscrew nuts -arrows- on cylinder bank 1 (right-side) and push catalytic converter on left side of vehicle towards rear.



- Unscrew nuts -arrows- on cylinder bank 2 (left-side) and push catalytic converter on right side of vehicle towards rear.
- First detach catalytic converter on left side of vehicle, then on right side of vehicle.

Installing

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



Renew gaskets and self-locking nuts.

- Install electrical wiring ⇒ Electrical system; Rep. gr. 97; Relay carriers, fuse carriers, electronics boxes; Overview of fitting locations relay carriers, fuse carriers, electronics boxes and ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Install Lambda probe 2 G108- ⇒ page 391.
- Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50; Bulkhead; Exploded view plenum chamber partition panel.

Tightening torques

- ♦ ⇒ "1.1 Exploded view silencers", page 399
- Heat shield for drive shaft ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft

2.2 Removing and installing exhaust flap control unit -J883- / -J945-

Removing



The following instructions describe the removal and installation procedures for the exhaust flap control unit on the left side. The procedure for the right side is similar.

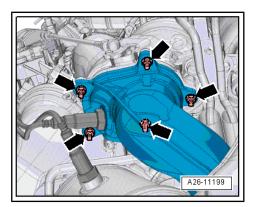
- Unplug electrical connector -3-.
- Protected by copyright. Copying for private or commercial purposes r Lower rear exhaust systemed these authorised by AUDI AG. AUDI AG does not guarante with respect to the correctness of information in this document. Correctness of a second seco
- Remove nuts -2- and detach exhaust flap control unit -1-.

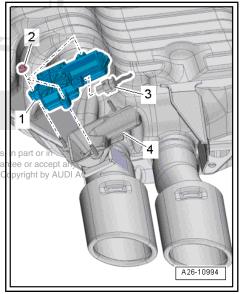
Installing

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



Renew the nuts.



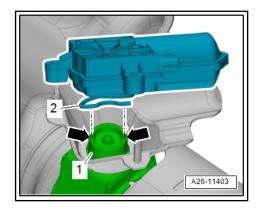


- Move exhaust flap control unit into installation position.
- Spring -2- must engage in grooves -arrows- on exhaust flap -1-.

Tightening torques

 ◆ Fig. ""Exhaust flap control unit - tightening torque"", page 402





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3 Secondary air system

⇒ "3.1 Exploded view - secondary air system", page 410

- \Rightarrow "3.2 Removing and installing secondary air pump motor V101 ", page 411
- \Rightarrow "3.3 Checking combination valve", page 412
- ⇒ "3.4 Removing and installing combination valve", page 414

 \Rightarrow "3.5 Removing and installing sender 1 for secondary air pressure G609 ", page 414

3.1 Exploded view - secondary air system

1 - Nut

🛛 9 Nm

2 - Bracket

□ For secondary air pump motor - V101-

3 - Bolt

🛛 8 Nm

4 - Bonded rubber bush

- 5 Secondary air pump motor - V101-
 - Fitting location: At front right in engine compartment below longitudinal member
 - □ Removing and installing ⇒ page 411
 - □ Checking in <u>Guided</u> <u>Fault Finding</u> ⇒ Vehicle diagnostic tester

6 - O-ring

Renew

7 - Hose

For secondary air

8 - O-ring

Renew

9 - Bolt

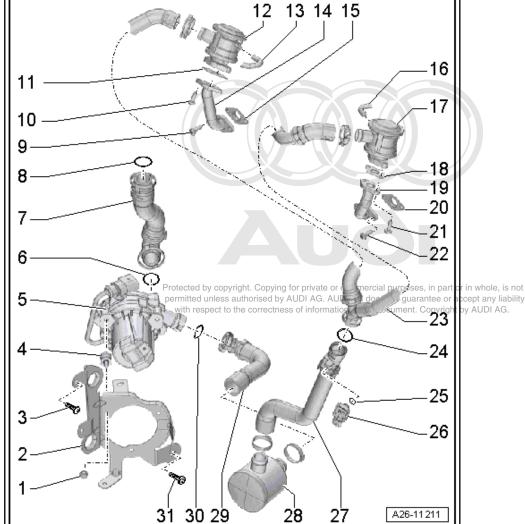
🗅 9 Nm

10 - Bolt

- 🗅 9 Nm
- 11 Gasket
 - Renew

12 - Combination valve for secondary air system (right-side)

- □ Fitting location: at front of cylinder head
- □ Checking <u>⇒ page 412</u>
- □ Removing and installing \Rightarrow page 414



- 13 Vacuum hose
- 14 Connecting flange
- 15 Gasket
 - Renew
- 16 Vacuum hose
- 17 Combination valve for secondary air system (left-side)
 - Fitting location: at front of cylinder head
 - $\Box \quad \text{Checking} \Rightarrow \underline{\text{page 412}}$
 - □ Removing and installing \Rightarrow page 414

18 - Gasket

- Renew
- 19 Connecting flange permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability 20 - Gasket with respect to the correctness of information in this document. Copyright by AUDI AG.
 - Renew

21 - Bolt

9 Nm

22 - Bolt

9 Nm

23 - Hose

- For secondary air
- To combination valves for secondary air inlet

24 - O-ring

Renew

25 - O-ring

Renew

26 - Sender 1 for secondary air pressure - G609-

□ Removing and installing <u>⇒ page 414</u>

27 - Hose

For secondary air

28 - Resonator

- 29 Hose
 - □ For secondary air

30 - O-ring

Renew

31 - Bolt

□ 5 Nm

3.2 Removing and installing secondary air pump motor - V101-

Removing

- Remove noise insulation (front) \Rightarrow General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation .
- Remove air cleaner housing (right-side) \Rightarrow page 353.

- Disconnect hoses -2, 3- for secondary air system.
- Unplug electrical connector -1- at secondary air pump motor -V101-.
- Remove nuts -arrows- and detach secondary air pump.

Installing

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



Fit new O-rings.

- Install air cleaner housing \Rightarrow page 353.

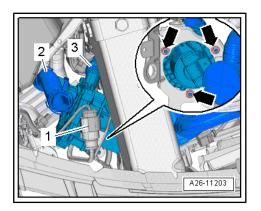
Tightening torques

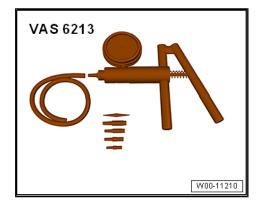
- ◆ ⇒ "3.1 Exploded view secondary air system", page 410.
- ♦ ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view noise insulation

3.3 Checking combination valve

Special tools and workshop equipment required

Hand vacuum pump - VAS 6213-







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Procedure

- Vacuum hoses and hose connections do not leak.
- · Vacuum hoses are not clogged.
- Detach vacuum hose -1- or -2- leading to relevant combination valve.



Illustration shows the hose to combination valve (right-side).

 Connect hand vacuum pump - VAS 6213- to vacuum hose of combination valve to be checked.

PretectPressprelease/tabs and detach secondary air hose-tarrow- to permit front from bracket UDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

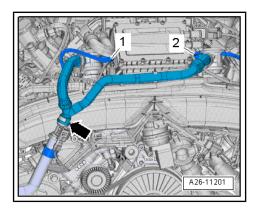
- Blow lightly into secondary air hose with your mouth (do not use compressed air). Fit auxiliary hose if secondary air hose is not long enough.
- The combination valves for secondary air should be closed; it should not be possible to blow through the hose.
- Operate hand vacuum pump.
- The combination valve should open; it should now be possible to blow through the hose.
- Renew combination valve for secondary air system if it does not open <u>⇒ page 414</u>.

Assembling

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



Fit new O-ring.



3.4 Removing and installing combination valve

Removing



The removal and installation procedures are described for cylinder bank 2 (left-side).

- Remove charge air cooler housing \Rightarrow page 318.
- Disconnect vacuum hose -1-.
- Unscrew bolts -2- and detach combination valve for secondary air system.

Installing

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



Renew gasket.

Install charge air cooler housing ⇒ page 318.

Tightening torques

- ◆ ⇒ "3.1 Exploded view, rot secondary, air system", page 410 cial purposes, in part or in whole, is not
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- 3.5 Removing and installing sender 1 for secondary air pressure G609-

Removing

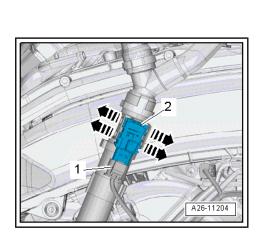
- Unplug electrical connector -1-.
- Release catches -arrows- and detach sender 1 for secondary air pressure - G609- -item 2-.

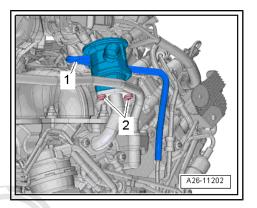
Installing

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



Fit new O-ring.





28 – Ignition system

1 Ignition system

- ⇒ "1.1 Exploded view ignition system", page 415
- ⇒ "1.2 Test data, spark plugs", page 416
- \Rightarrow "1.3 Removing and installing ignition coils with output stages", page 417
- ⇒ "1.4 Removing and installing knock sensor", page 422
- ⇒ "1.5 Removing and installing Hall senders", page 431
- \Rightarrow "1.6 Removing and installing engine speed sender G28 ", page 436

1.1 Exploded view - ignition system

- 1 Knock sensor
 - Cylinder bank 1 (rightside)
 - Knock sensor 1 G61-(front)
 - Knock sensor 2 G66-(rear)
 - □ Removing and installing \Rightarrow page 422

2 - Bolt

- 🗅 20 Nm
- The tightening torque influences the function of the knock sensor
- 3 O-ring
 - Renew

4 - Hall sender

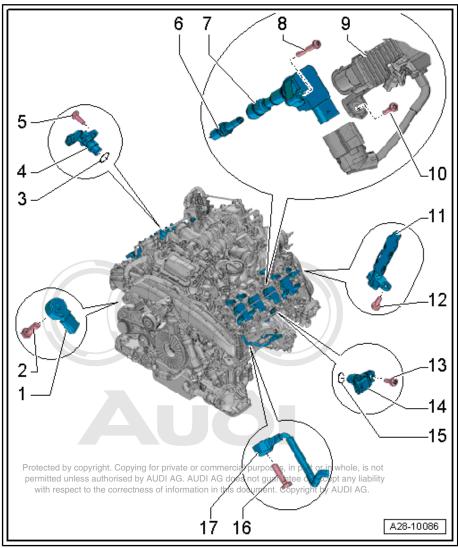
- □ Inlet side: Hall sender -G40-
- □ Removing and installing \Rightarrow page 431
- Exhaust side: Hall sender 3 - G300-
- □ Removing and installing \Rightarrow page 432

5 - Bolt

□ 9 Nm

6 - Spark plug

- □ Change interval ⇒ Maintenance tables
- ❑ Tightening torque ⇒ Maintenance ; Booklet 410
- 7 Ignition coil
 - □ Removing and installing \Rightarrow page 417



- 8 Bolt
 - 🗅 9 Nm
- 9 Cable guide

10 - Bolt

- 🗅 5 Nm
- 11 Engine speed sender G28-
 - □ Removing and installing \Rightarrow page 436

12 - Bolt

- 🗅 9 Nm
- 13 Bolt
- 🛛 9 Nm

14 - Hall sender

- □ Inlet side: Hall sender 2 G163-
- □ Removing and installing \Rightarrow page 435
- Exhaust side: Hall sender 4 G301-
- □ Removing and installing \Rightarrow page 435

15 - O-ring

Renew

16 - Bolt

- □ The tightening torque influences the function of the knock sensor
- 🗅 20 Nm

17 - Knock sensor

- Cylinder bank 2 (left-side)
- Giran Knock sensor 3 G198- (front)
- □ Knock sensor 4 G199- (rear)
- □ Removing and installing \Rightarrow page 422

1.2 Test data, spark plugs

Test data		4.0 ltr. TFSI engine
Idling speed		Cannot be adjusted; regulated by idling speed sta- bilisation
Ignition timing		Not adjustable (determined by control unit)
Ignition system		Multi-coil system with 8 ignition coils (output stages integrated) connected directly to spark plugs via spark plug connectors
Spark plugs	Designations	⇒ Electronic parts catalogue
	Tightening torque	⇒ Maintenance ; Booklet 410
Firing order		1-5-4-8-6-3-7-2



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1.3 Removing and installing ignition coils with output stages

 \Rightarrow "1.3.1 Removing and installing ignition coils with output stages, cylinder bank 1 (right-side)", page 417

 \Rightarrow "1.3.2 Removing and installing ignition coils with output stages, cylinder bank 2 (left-side)", page 419

1.3.1 Removing and installing ignition coils with output stages, cylinder bank 1 (right-side)

Removing

Remove engine cover panel <u>⇒ page 69</u>.



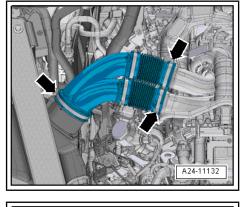
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 The engine cover panel must always be fitted before the or accept any liability with respect to the correctness or mormation in this document. Copyright by AUDI AG.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

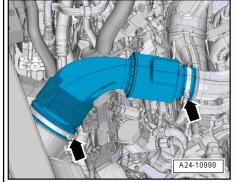
Vehicles with engine codes CEUA/CTGA:

- Release hose clips -arrows- and remove air pipe.

Vehicles with engine codes CGTA/CTFA:

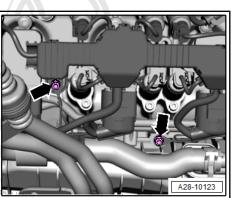
- Release hose clips -arrows- and remove air pipe (right-side).





Vehicles from model year 2014 onwards:

- Remove nuts -arrows- and move earth wires clear.



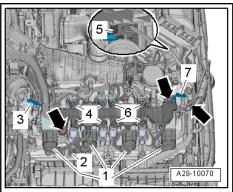
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All vehicles (continued):

- Unplug electrical connectors and move wiring clear:
- 1 For ignition coils -N70- , -N127- , -N291- , -N292-
- 2 For Hall sender G40-
- 4 For inlet and exhaust cam actuators -F456- , -F457- , -F458- , -F459-
- 5 For intake air temperature sender G42-

6 - For inlet and exhaust cam actuators -F452- , -F453- , -F454- , -F455-

- Disconnect vacuum hoses -3, 7-.
- Remove bolts -arrows-.
- Move earth wire clear and pivot wiring guide towards rear.



- Remove bolt -arrow- and pull off relevant ignition coil -1-.

Installing

i Note

Secure all hose connections with the correct type of hose clips (same as original equipment) \Rightarrow Electronic parts catalogue.

- Align ignition coils with recesses in cylinder head cover.
- Press ignition coils onto spark plugs by hand (do NOT use tool).

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

Install air ducts with screw-type clips ⇒ page 318.



WARNING

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

Tightening torques

- ◆ ⇒ "1.1 Exploded view ignition system", page 415
- 1.3.2 Removing and installing ignition coils with output stages, cylinder bank 2 (left-side)

Removing

Remove engine cover panel <u>⇒ page 69</u>.



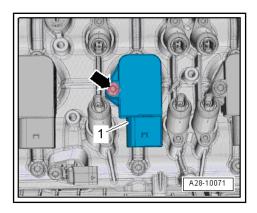
WARNING

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.



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Vehicles with engine codes CGTA/CTFA:

- Release hose clips -arrows- and remove air pipe (left-side).

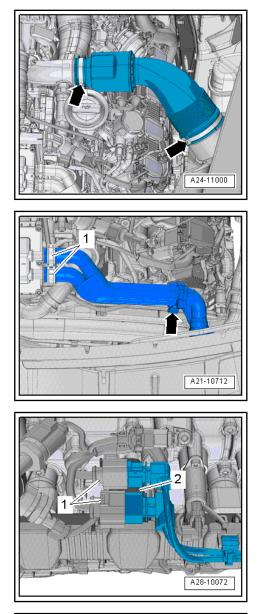
All vehicles (continued):

- Move coolant hoses clear -arrow-.

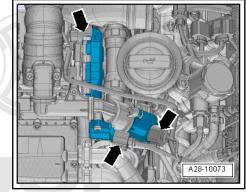


Disregard -item 1-.

- Take electrical connectors -1- out of bracket -2-, unplug them and move electrical wiring clear.
- Lift out bracket.



- Unplug electrical connectors -arrows- and move clear.



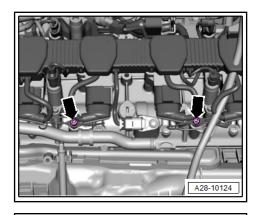
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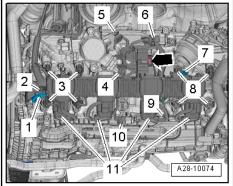
Vehicles from model year 2014 onwards:

- Remove nuts -arrows- and move earth wires clear.

All vehicles (continued):

- Unplug electrical connectors and move wiring clear:
- 3 For inlet and exhaust cam actuators -F464- , -F465- , -F466- , -F467-
- 4 For fuel metering valve 2 N402-
- 5 For fuel pressure sender for low pressure G410-
- 6 For Hall sender 4 G301-
- Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not p8milteourible and exhaust camractuators of 47/6e and 47/8e, interfa7/8e, fr4/79 pect to the correctness of information in this document. Copyright by AUDI AG.
- 10 For Hall sender 2 G163-
- 11 For ignition coils -N323- , -N324- , -N325- , -N326-
- Disconnect vacuum hoses -1, 7-.
- Remove bolts -2, 9- and centre hex stud -arrow-, move earth wire clear and pivot wiring guide towards rear.





- Remove bolt -arrow- and pull off relevant ignition coil -1-.

Installing

l Note

Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.

- Align ignition coils with recesses in cylinder head cover.
- Press ignition coils onto spark plugs by hand (do NOT use tool).

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Install air ducts with screw-type clips ⇒ page 318.



WARNING

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

Tightening torques

• \Rightarrow "1.1 Exploded view - ignition system", page 415

1.4 Removing and installing knock sensor

 \Rightarrow "1.4.1 Removing and installing knock sensor 1 G61 ", page 422

 \Rightarrow "1.4.2 Removing and installing knock sensor 2 G66 ", page 423

 \Rightarrow "1.4.3 Removing and installing knock sensor 3 G198 ", page 425

 \Rightarrow "1.4.4 Removing and installing knock sensor 4 G199 - vehicles up to model year 2013", page 425

 \Rightarrow "1.4.5 Removing and installing knock sensor 4 G199 - vehicles from model year 2014 onwards", page 430

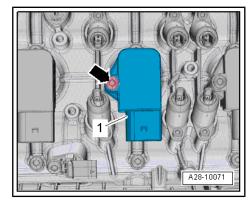
1.4.1 Removing and installing knock sensor 1 - G61-

Fitting locations

 \Rightarrow "1.1 Overview of fitting locations - injection system", page 327

Removing

Remove oil pressure switch -F22- / -F378- ⇒ page 217.



or commercial p

- Remove bolt for coolant pipe (front).
- Remove poly V-belt tensioner <u>> page 72</u>.

- Unscrew bolts -arrows- for alternator approx. 6 turns.
- Tap carefully on bolt heads with a hammer to release sliding does not a bushes of alternator mountings.
- Remove bolts completely.
- If fitted, remove silencer for auxiliary heater ⇒ Auxiliary heater, supplementary heater; Rep. gr. 82; Auxiliary/supplementary heater; Removing and installing silencer with bracket.
- Press alternator as far as possible towards front.
- Unscrew bolt -2- and remove knock sensor 1 G61- .
- Unplug electrical connector -1-.

Installing

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



The tightening torque influences the function of the knock sensor.

- Install oil pressure switch -F22- / -F378- ⇒ page 217.
- Install poly V-belt tensioner <u>⇒ page 72</u>.

Tightening torques

- ◆ <u>⇒ "1.1 Exploded view ignition system", page 415</u>
- ◆ ⇒ "3.1 Exploded view coolant pipes", page 261
- ♦ ⇒ Electrical system; Rep. gr. 27 ; Alternator; Exploded view
 alternator
- ♦ ⇒ Auxiliary heater, supplementary heater; Rep. gr. 82; Auxiliary/supplementary heater; Exploded view - internal auxiliary/ supplementary heater

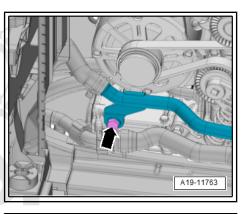
1.4.2 Removing and installing knock sensor 2 - G66-

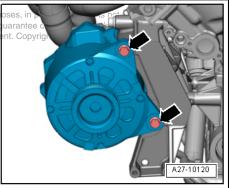
Fitting locations

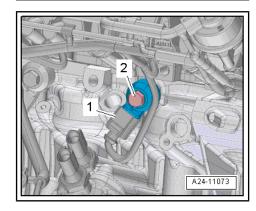
 \Rightarrow "1.1 Overview of fitting locations - injection system", page 327

Removing

Remove rear section of front wheel housing liner (right-side)
 ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Removing and installing wheel housing liner (front).



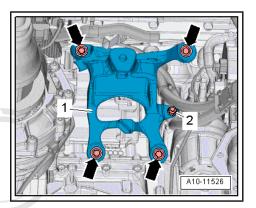


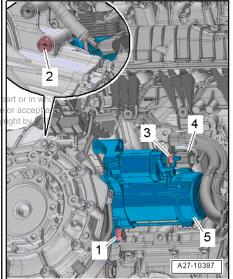


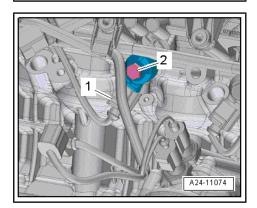
- Remove engine mounting (right-side) <u>⇒ page 61</u>.
- Remove nut -2- and move earth wire clear.
- Remove bolts -arrows- and detach engine support -1- (rightside).

- Unplug electrical connector -4- from starter (push retainer to rear and press down release catch).
- Unfasten nut -3- and detach battery positive wire from solenoid switch.

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- Unplug electrical connector -1-.
- Unscrew bolt -2- and remove knock sensor 2 G66- .

Installing

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



The tightening torque influences the function of the knock sensor.

Install engine support and engine mounting (right-side)
 ⇒ page 61

Tightening torques

1.4.3 Removing and installing knock sensor 3 - G198-

Removing

- Remove air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket.
- Detach electrical connector -2- from bracket and unplug.
- Unscrew bolt -1- and remove knock sensor 3 G198- .



Disregard -item 3-.

Installing

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



The tightening torque influences the function of the knock sensor.

 Install air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracketProtected by copyright. Copying for private or commercial purposes, in part or in whole, is not

Tightening torques

• \Rightarrow "1.1 Exploded view - ignition system", page 415

1.4.4 Removing and installing knock sensor 4 - G199- - vehicles up to model year 2013

Special tools and workshop equipment required

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



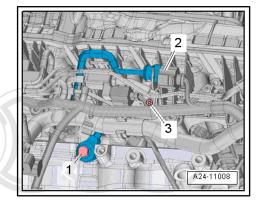
Removing

- Set front wheels to straight-ahead position.



Electronic components are susceptible to damage.

• Observe notes on procedure for disconnecting the battery.



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- Disconnect earth wire from battery terminal ⇒ Electrical system; Rep. gr. 27; Battery; Disconnecting and connecting battery.
- Support engine in installation position \Rightarrow page 50.

Vehicles with engine codes CGTA/CTFA:

Remove bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing bumper cover.

All vehicles (continued):

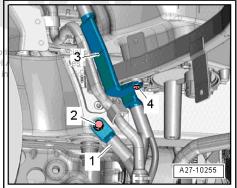
- Remove noise insulation panels ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.
- Remove front underbody trim panels (right and left) ⇒ General body repairs, exterior; Rep. gr. 66; Underbody trim; Exploded view - underbody trim.
- Remove longitudinal member (bottom left and right) ⇒ General body repairs, exterior; Rep. gr. 50; Lock carrier; Exploded view lock carrier.
- Completely remove wheel housing liners (front left and front right) ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Removing and installing wheel housing liner (front).
- Unbolt drive shaft (left and right) from gearbox flange shafts
 ⇒ Running gear, axles, steering; Rep. gr. 40; Drive shaft; Removing and installing drive shaft.

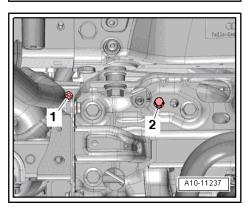
All vehicles (continued):

 Remove bolt -4- for battery positive wire -3- and bolt -2- for earth wire -1- and move electrical wiring clear. Protected by copyright. Copying for

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- Remove bolts -1 and 2-.

Unplug electrical connector -arrow- at front vehicle level sender -G78- / -G289- and move electrical wiring clear.

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



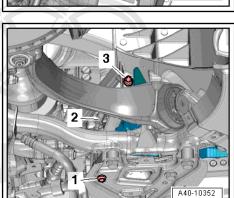
Disregard -items 2, 3-.

- Remove bolts -3- on both sides.



Disregard -items 1, 2-.

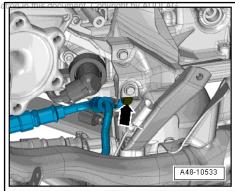




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 Remove bolt -arrow- for power steering hydraulic line.



- Remove bolts for gearbox mounting -arrows- on both sides.
- Detach intermediate steering shaft from steering rack and move clear by telescoping splines together ⇒ Running gear, axles, steering; Rep. gr. 48; Steering column; Removing and installing intermediate steering shaft.

- Unplug electrical connector -2-.
- Remove bolt -1-.

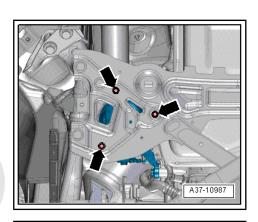


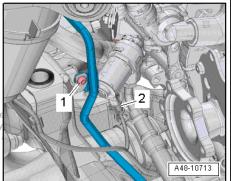
Remove electrical connector -2- for Servotronic solenoid valve
 N119- from bracket and unplug connector:

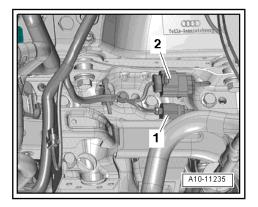


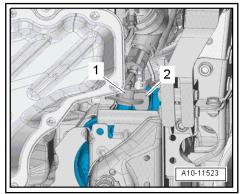
Disregard -item 1-.

- Unplug electrical connectors (left and right) -1, 2-.









- Remove bolt for engine mountings -arrow- on both sides.

 Support subframe using engine and gearbox jack - V.A.G 1383 A- as illustrated.

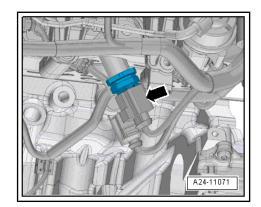
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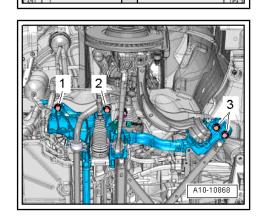
- Mark installation position of subframe on longitudinal members with felt-tip pen.
- Unscrew subframe bolts -1, 2, 3- on both sides in several stages and in diagonal sequence.

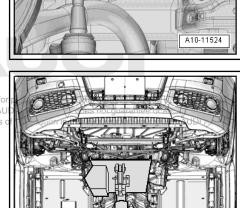
Caution

Risk of damage to running gear components.

- The vehicle must NOT be lowered onto its wheels if the engine/gearbox mountings, steering rack or subframe cross brace are not properly installed.
- Lower subframe using engine and gearbox jack V.A.G 1383
 A- just far enough for access to knock sensor 4 G199-, ensuring sufficient clearance for hydraulic fluid hoses (left-side) and electrical wiring (right-side).
- Unplug electrical connector -arrow-.







V.A.G 1383 A

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- Remove bolt -2-.
- Detach knock sensor 4 G199- and unplug electrical connector -1-.

Installing

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



The tightening torque influences the function of the knock sensor.

Install engine mounting (left-side) ⇒ page 52.



WARNING

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

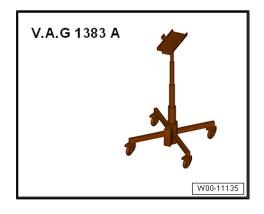
Tightening torques

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1.4.5 Removing and installing knock sensor 4 - G199- - vehicles from model year 2014 onwards

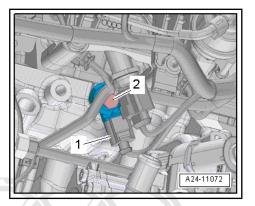
Special tools and workshop equipment required

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



Removing

 Remove steering rack ⇒ Running gear, axles, steering; Rep. gr. 48; Steering rack; Removing and installing steering rack.



Unplug electrical connector -arrow-.



 Automatic

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- Remove bolt -2-.
- Detach knock sensor 4 G199- and unplug electrical connector -1-.

Installing

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



The tightening torque influences the function of the knock sensor.

- Install engine mounting (left-side) ⇒ page 52.
- Install steering rack ⇒ Running gear, axles, steering; Rep. gr. 48; Steering rack; Removing and installing steering rack.

Tightening torques

• \Rightarrow "1.1 Exploded view - ignition system", page 415

1.5 Removing and installing Hall senders

 \Rightarrow "1.5.1 Removing and installing Hall sender G40 , cylinder bank 1 (right-side)", page 431

 \Rightarrow "1.5.2 Removing and installing Hall sender 3 G300 , cylinder bank 1 (right-side)", page 432

 \Rightarrow "1.5.3 Removing and installing Hall senders G163 / G301 , cyl-inder bank 2 (left-side)", page 435

1.5.1 Removing and installing Hall sender -G40-, cylinder bank 1 (right-side)

Fitting locations

 \Rightarrow "1.1 Overview of fitting locations - injection system", page 327

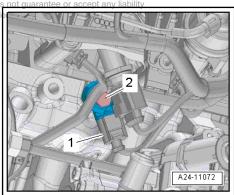
Removing

- Remove engine cover panel \Rightarrow page 69.

WARNING

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

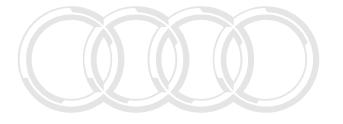


Vehicles with engine codes CEUA/CTGA:

- Release hose clips -arrows- and remove air pipe.

Vehicles with engine codes CGTA/CTFA:

- Release hose clips -arrows- and remove air pipe (right-side).



All vehicles (continued):

- Unplug electrical connectors:
- 1 For Ignition coil 4 with output stage N292-
- 2 For Hallesenderigh G40, ing for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability
- Unscrewtboltearrow-oanderemovedtalh sendement. Copyright by AUDI AG.

Installing

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

WARNING

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

Tightening torques

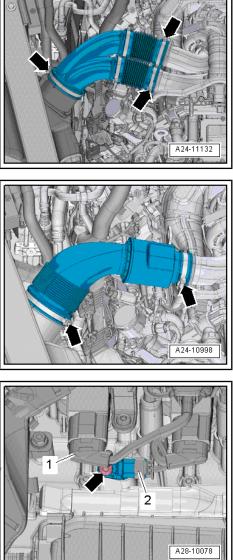
- 1.5.2 Removing and installing Hall sender 3 -G300-, cylinder bank 1 (right-side)

Fitting locations

 \Rightarrow "1.1 Overview of fitting locations - injection system", page 327

Removing

Remove engine cover panel <u>⇒ page 69</u>.





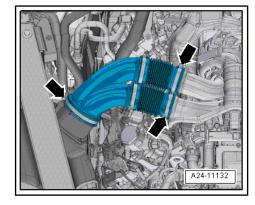
Danger of fire and damage if the engine cover panel is not fitted.

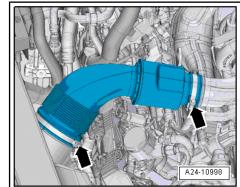
- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

Vehicles with engine codes CEUA/CTGA:

Vehicles with engine codes CGTA/CTFA:

- Release hose clips -arrows- and remove air pipe.



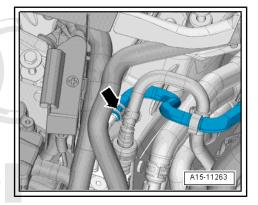


All vehicles (continued):

 Release hose clip -arrow- and disconnect hose for activated charcoal filter system.

- Release hose clips -arrows- and remove air pipe (right-side).

- Move hose clear.

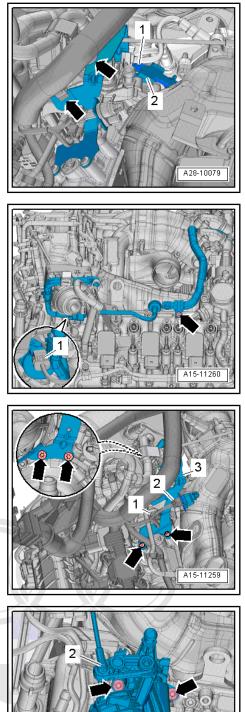


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- Move clear electrical wiring harness -arrows-.
- Move clear vacuum pipe -1- at bracket -2-. _

- Unplug electrical connector -1- at activated charcoal filter system solenoid valve 1 N80- . _
- Remove bolt -arrow-. _

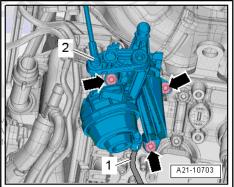
- Unplug electrical connectors -1, 2-. _
- Remove bolts -arrows- and move bracket -3- with electrical wiring harness to one side.



- Disconnect vacuum hose -1-. _
- Remove bolts -arrows- and place vacuum unit for turbocharg-_ er to one side.

Disregard -item 2-.

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- Unscrew bolt -arrow- and remove Hall sender -1-.

Installing

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

WARNING

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.

Tightening torques

- 1.5.3 Removing and installing Hall senders -G163- / -G301- , cylinder bank 2 (leftside)

Fitting locations

 \Rightarrow "1.1 Overview of fitting locations - injection system", page 327

Removing

Remove engine cover panel <u>⇒ page 69</u>.



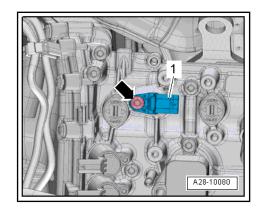
WARNING

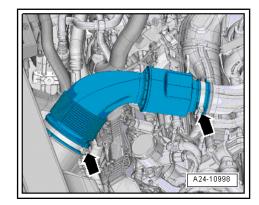
Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible right. Copying for private or commercial purposes, in part or in whole, is not to start or drive the vehicle with the bonnet closed with respect to the correctness of information in this document. Copyright by AUDI AG.

Vehicles with engine codes CGTA/CTFA:

- Release hose clips -arrows- and remove air pipe (right-side).





All vehicles (continued):

- Unplug relevant electrical connector -1-.
- Unscrew bolt -2- and detach relevant Hall sender.

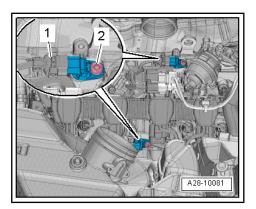
Installing

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

WARNING

Danger of fire and damage if the engine cover panel is not fitted.

- The engine cover panel must always be fitted before the bonnet is closed.
- If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.





Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.

Tightening torques

• \Rightarrow "1.1 Exploded view - ignition system", page 415

1.6 Removing and installing engine speed sender - G28-

Removing

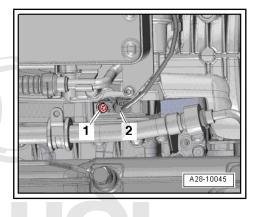
- Remove noise insulation panels ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.
- Unplug electrical connector -2-.
- Unscrew bolt -1- and detach engine speed sender G28- .

Installing

Install in reverse order.

Tightening torques

- ◆ ⇒ "1.1 Exploded view ignition system", page 415
- ♦ ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view noise insulation



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