

Workshop Manual Audi A8 2010 ➤

6-cylinder direct petrol injection engine with supercharger (3.0 ltr. 4-valve)									
Engine ID	CGW A	ĊGX C	CMD A	CGW D	CTU B				

Edition 08.2013



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Service



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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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Technical data 00 -

Identification

(ARL003447; Edition 08.2013)

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1.1 Engine identification number/engine data

Engine number

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The engine cover panel must be removed to make the engine number visible.

- The engine number ("engine code" and "serial number") can be found on top of the cylinder block at the front -arrow-.
- Starting with the letter "C", the engine codes consist of 4 let-
- 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
- The 4th character indicates the power output and torque of the engine, and is determined by the engine control unit.

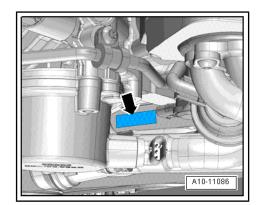


Note

- 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 .



Code letters		CGWA	CGWD	CGXC
Capacity	ltr.	2.995	2.995	2.995
Power output	kW at rpm	213/4850 6500	228/5500 6500	245/5500 6500
Torque	Nm at rpm	420/2500 4850	440/2900 4500	440/2900 5300
Bore	\varnothing mm	84.5	84.5	84.5
Stroke	mm	89.0	89.0	89.0
Compression ratio		10.5	10.5	10.5
RON	at least	95 ¹⁾	95 ¹⁾	95 ¹⁾
Injection/ignition system		Simos	Simos	Simos
Firing order		1-4-3-6-2-5	1-4-3-6-2-5	1-4-3-6-2-5
Exhaust gas recirculation		no	no	no
Turbocharging/supercharging	ng	Supercharger	Supercharger	Supercharger
Knock control		2 sensors	2 sensors	2 sensors
Charge air cooling		yes	yes	yes



Code letters	CGWA	CGWD	CGXC
Lambda control	2 probes before cat- alytic converter 2 probes after cata- lytic converter	2 probes before cat- alytic converter 2 probes after cata- lytic converter	alytic converter
Variable valve timing	Inlet	Inlet	Inlet
Intake manifold change-over	no	no	no
Secondary air system	yes	yes	yes
Valves per cylinder	4	4	4

¹⁾ Unleaded regular grade petrol (RON 91) can also be used, but this will result in a loss of power

Code letters		CMDA	CTUB	
Capacity	ltr.	2.995	2.995	
Power output	kW at rpm	245/5500 6500	245/5500 6500	
Torque	Nm at rpm	440/2900 5300	440/2900 5300	
Bore	\varnothing mm	84.5	84.5	
Stroke	mm	89.0	89.0	
Compression ratio		10.5	10.5	
RON	at least	95 ¹⁾	95 ¹⁾	
Injection/ignition system		Simos	Simos	
Firing order		1-4-3-6-2-5	1-4-3-6-2-5	
Exhaust gas recirculation		no	no	
Turbocharging/supercharging	g	Supercharger	Supercharger	
Knock control		2 sensors	2 sensors	
Charge air cooling		yes	yes	
Lambda control		2 probes before cat- alytic converter 2 probes after cata- lytic converter	2 probes before cat- alytic converter 2 probes after cata- lytic converter	
Variable valve timing		Inlet	Inlet	
Intake manifold change-over		no	no	
Secondary air system		yes	yes	
Valves per cylinder		4	4	

¹⁾ Unleaded regular grade petrol (RON 91) can also be used, but this will result in a loss of power

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2 Safety precautions

- ⇒ "2.1 Safety precautions when working on the fuel supply system", page 3
- ⇒ "2.2 Safety precautions when working on vehicles with start/ stop system", page 4
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- ⇒ "2.6 Safety precautions when working on the ignition system", page 5

2.1 Safety precautions when working on the fuel supply system

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



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. Procedure ⇒ page
- 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.
 - Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not Always switch off ignition before washing engine horised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.
- 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 when using testers and measuring instruments during a road test

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not Note the following if testers and measuring instruments have to G. AUDI AG does not guarantee or accept any liability ormation in this document. Copyright by AUDI AG. be used during a road test:



WARNING

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

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

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

2.4 Safety precautions when working on the subframe

When working on the subframe note the following warnings:



Caution

Risk of damage to running gear components.

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

in part or in whole, is not tee or accept any liability pyright by AUDI AG.

2.5 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.



Caution

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

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

2.6 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, Guided Functions Interrogate event memory, then Generate readiness 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.



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
- .4 Routing and attachment of pipes, hoses and wiring", page
- ⇒ "3.5 Installing radiators and condensers", page 8

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 supercharger:

- 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 me trues onto the fuel noses of sould that any liability occur, the fuel hoses must be sleaned again immediately ght by Audi Ag.
- 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.

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

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

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

Note the following:

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

3.4 Routing and attachment of pipes, hoses and wiring

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

3.5 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

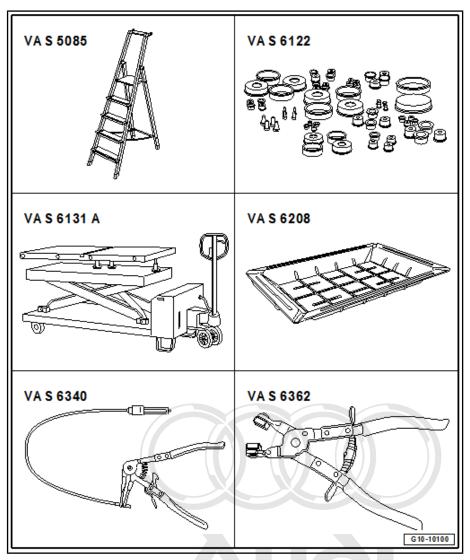
Removing and installing engine

- ⇒ "1.1 Removing engine", page 9
- ⇒ "1.2 Separating engine and gearbox", page 23
- ⇒ "1.3 Securing engine to engine and gearbox support", page 29
- ⇒ "1.4 Installing engine", page 32

1.1 Removing engine

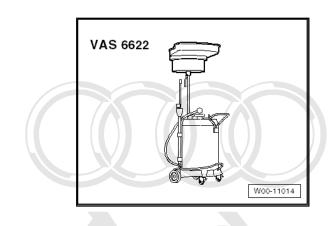
Special tools and workshop equipment required

- Stepladder VAS 5085-
- Engine bung set VAS 61Ž2-
- Scissor-type assembly platform - VAS 6131 A- with support set for Audi -VAS 6131/10- , support set -VAS 6131/11- and supple-mentary set -VAS 6131/13-
- Drip tray for workshop hoist VAS 6208-
- Hose clip pliers VAS 6340-
- Hose clip pliers VAS 6362-



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Used oil collection and extraction unit - VAS 6622A-



Procedure



Note

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not The engine is removed from underneath together with the itted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability graphov and sulframe (with lock corrier installed) with respect to the correctness of information in this document. Copyright by AUDI AG. gearbox and subframe (with lock carrier installed).

Fit cable ties in the original positions when installing.



WARNING

Make sure the vehicle cannot tip over when the engine is re-

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



Note

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.

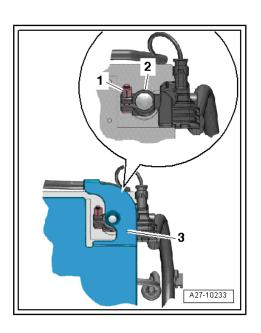
Set front wheels to straight-ahead position.



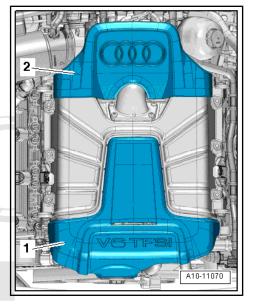
Caution

Electronic components are susceptible to damage.

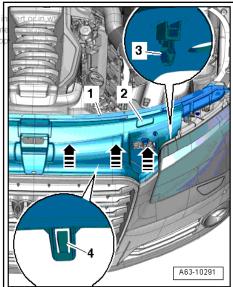
- Observe notes on procedure for disconnecting the battery.
- Switch off ignition.
- Disconnect earth wire -2- from battery terminal ⇒ Electrical system; Rep. gr. 27; Battery, Disconnecting and connecting battery.
- Discharge refrigerant system ⇒ Air conditioner with refrigerant R134a.
- Extract hydraulic fluid for power steering from reservoir using used oil collection and extraction unit - VAS 6622A-.



- Lift off engine cover panels -1- and -2-.



Remove lock carrier cover -2- ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front) Removing and installing purposes, permitted unless authorised by Abol Ad. Author Ad does not guarantee to the control of th attachments. with respect to the correctness of information in this document. C

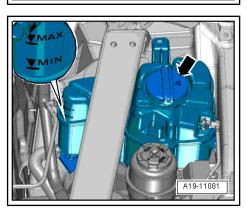




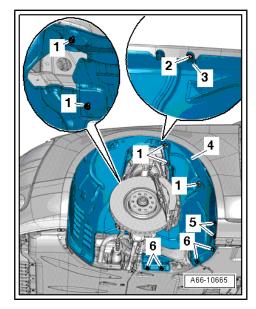
WARNING

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

- The cooling system is under pressure when the engine is
- 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).

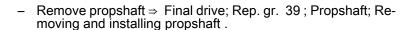


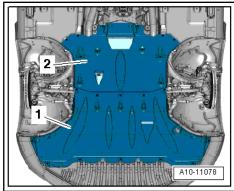
Remove noise insulation panels -1- and -2- ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.

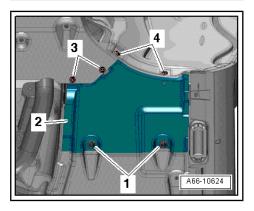


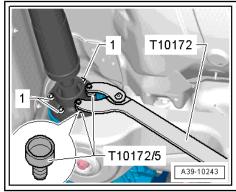
- Remove front underbody trim panels (right and left) -2- => General body repairs, exterior; Rep. gr. 66; Underbody trim; Removing and installing underbody.
- Remove longitudinal members (bottom left and right) ⇒ General body repairs, exterior; Rep. gr. 50; Lock carrier; Removing and installing lock carrier.

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Note

Collect drained coolant in a clean container for disposal.

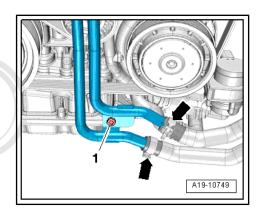
- Place drip tray for workshop hoist VAS 6208- beneath engine.
- Release hose clips -arrows-, disconnect coolant hoses from coolant pipes (front left) and drain off coolant.

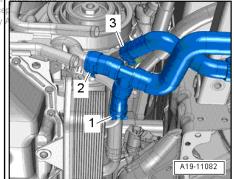


Note

Disregard -item 1-.

Release hose clips of 1/2 and 3 odisconnect coolant hoses and drain off coolant with respect to the correctness of information in this document. Copyright b





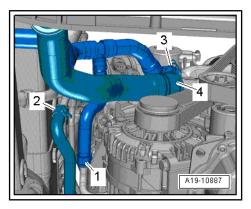
- Lift retaining clips -3 and 4-, release hose clips -1 and 2- and detach coolant hoses.
- Guide coolant hoses downwards and drain off remaining cool-



Caution

Risk of damage caused by particles of dirt.

Observe rules for cleanliness when working on the fuel supply system ⇒ page 7.

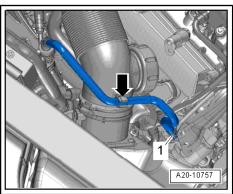




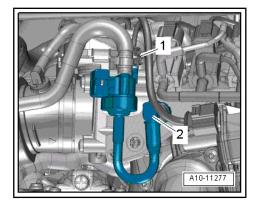
WARNING

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.
- Detach fuel supply hose -1- from high-pressure pump and move clear -arrow-.
- Seal off open lines and connections with clean plugs from engine bung set - VAS 6122- .



- Move clear line from activated charcoal filter at air pipe.
- Unplug electrical connector -1- and detach vacuum hose -2-(press release tabs).
- Detach activated charcoal filter solenoid valve 1 N80- from bracket and move it clear to the side with hose still attached.

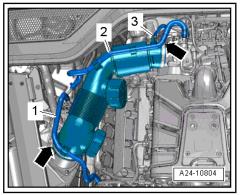


- Detach vacuum hose -3- from connection on air pipe.
- Release hose clips -arrows- and remove air pipe.

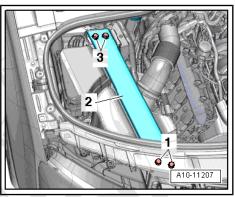


Note

Disregard -items 1, 2-.

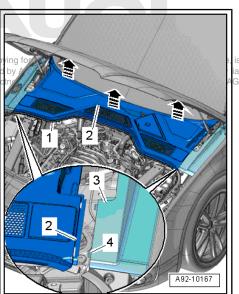


 Remove longitudinal member (top right) -2- ⇒ General body repairs, exterior; Rep. gr. 50; Lock carrier; Exploded view lock carrier.

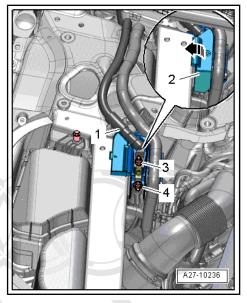


 Remove plenum chamber cover -2- ⇒ General body repairs, exterior; Rep. gr. 50; Bulkhead; Removing and installing plenum chamber cover.



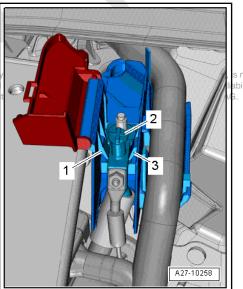


- Release cover -2- and swivel to side -arrow-.
- Remove nut -4- and move battery positive wire clear.
- Unscrew nut -3- and detach battery positive wire -1-.

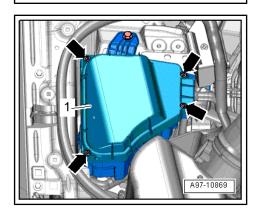


Release retaining tabs -1, 3- and swivel positive terminal -2out of mounting.





Remove bolts -arrows- and detach cover -1- for electronics box in engine compartment.



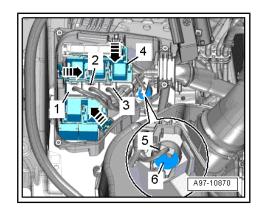
- Unplug electrical connectors -1 and 2- and move electrical wiring clear.
- Release catches -arrows- and detach relay carrier with fuse holder -4-.
- Release fastener -5- and detach condenser -6-.
- Disengage engine wiring harness at electronics box in engine compartment, move clear and place onto engine.

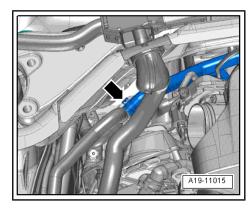


Note

Disregard -item 3-.

Detach coolant hose from T-piece -arrow-.







Caution

Danger of damage to refrigerant lines and hoses.

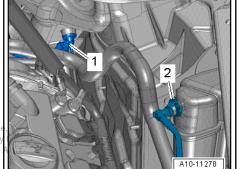
- Do NOT stretch, kink or bend refrigerant lines and hoses.
- Unscrew bolt -3- and remove refrigerant line from A/C compressor.
- Seal off open lines and connections with clean plugs from engine bung set - VAS 6122- .



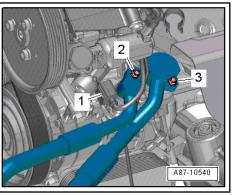
Note

Disregard -items 1, 2-.

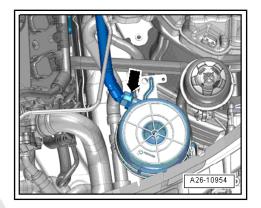
- Disconnect vacuum hose -1-.
- Disconnect coolant hose -2- from coolant expansion tank (pull out retaining clip).



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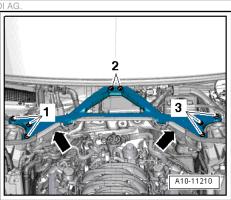
Press release tabs and detach secondary air hose -arrowfrom secondary air pump motor - V101- .



Lift retaining clip and detach coolant hose -arrow- from coolant pipe (front).



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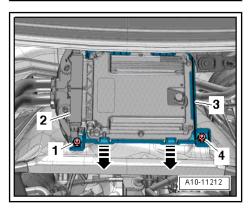
A19-10593

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

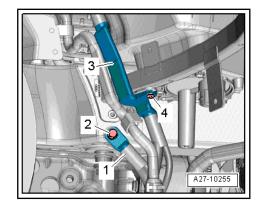


Note

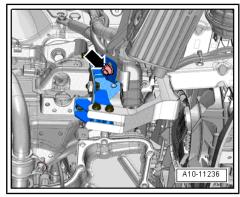
Disregard -items 1, 3, 4-.



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



If fitted, remove bolt -arrow- at bracket.



- Position used oil collection and extraction unit VAS 6622Abelow connection point.
- Release hose clip -2- and disconnect hydraulic hose.
- Seal off open lines and connections with clean plugs from engine bung set - VAS 6122- .



Note

Disregard -item 1-.



Note

Lay a cloth underneath vehicle to catch escaping hydraulic fluid.

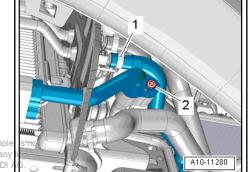
Release hose clip -1- and disconnect hydraulic hose.



Caution

Danger of damage to refrigerant lines and hoses, purposes, in part or permitted unless authorised by AUDI AC A

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



A48-10535

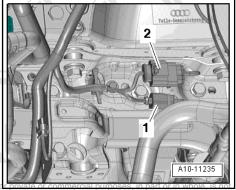
- Remove bolt -2-, disconnect refrigerant line and move clear.
- Seal off open lines and connections with clean plugs from engine bung set - VAS 6122- .

Remove electrical connector -2- for Servotronic solenoid valve - N119- from bracket and unplug connector.



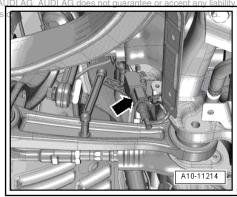
Note

Disregard -item 1-.

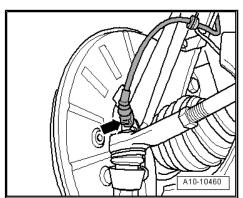


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Unplug electrical connector -arrow- on both sides at front verrectness hicle level sender -G78- / -G289- and move electrical wiring



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



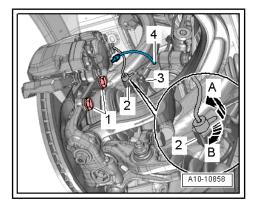
Remove brake caliper and tie up in wheel housing with wire (brake hose remains attached) ⇒ Brake system; Rep. gr. 46; Front brakes; Removing and installing brake caliper.



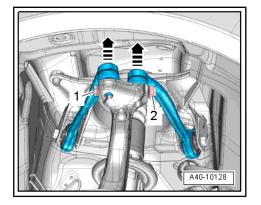
Caution

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.



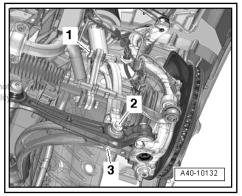
- Remove bolt -1- for anti-roll bar on both sides.
- Remove nut -3- on both sides.



Note

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The bolt -2 w.s. removed at a late! Stage on in this document. Copyright by AUDI AG.



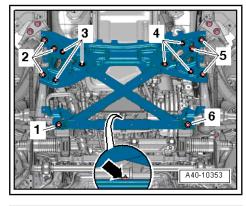
Remove subframe cross brace ⇒ Running gear, axles, steering; Rep. gr. 40; Subframe; Removing and installing subframe cross brace.

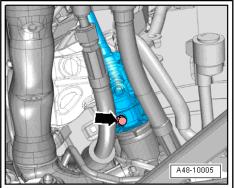


Caution

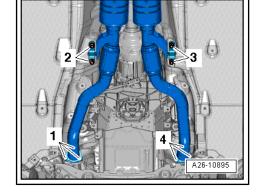
Risk of damage to running gear components.

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





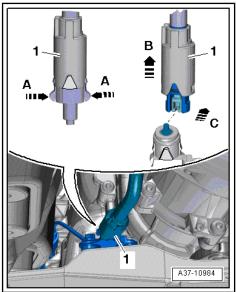
- Remove nuts -1- and bolts -2- and detach front silencer (left-
- Remove nuts -4- and bolts -3- and detach front silencer (rightside).



- 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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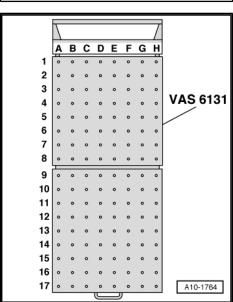


Setting up scissor-type assembly platform

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- , support 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.

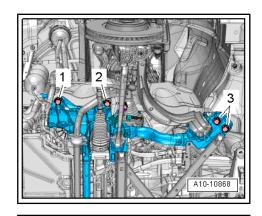


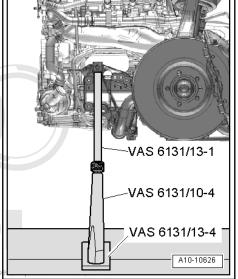


WARNING

Accident risk if subframe mountings are detached.

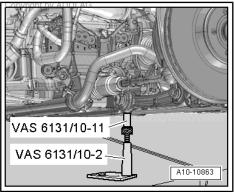
- ♦ Subframe bolts -2- and -3- must not be loosened at this stage.
- Remove subframe bolt -1- on both sides.
- Position support elements from -VAS 6131/10- and -VAS 6131/13- at front left and right of subframe as shown.
- Make sure that threaded spindles are screwed in completely.



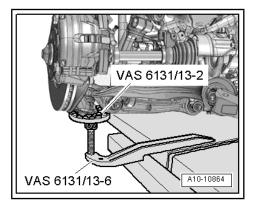


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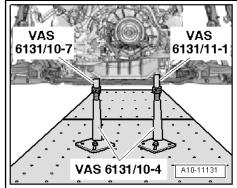
Position support elements from VAS 6131/10 (rear left and right) at front attachment points of subframe cross brace as shown.



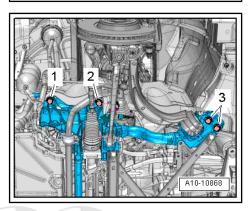
 Position support elements from -VAS 6131/13- under left and right wheel bearing housings as shown.



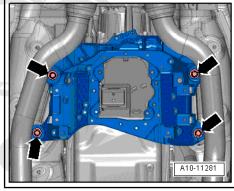
- Turn all spindles for support elements upwards until all locating lugs make contact with mounting points.
- Tighten base plates for support elements to 20 Nm on scissor-type assembly platform VAS 6131 A- $\scriptstyle .$



- 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.



- Remove bolts -arrows- for tunnel cross member.



Remove bolt -2- on both sides.

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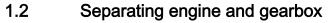


shown.

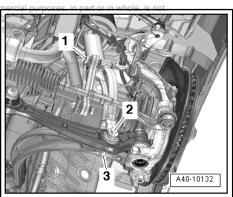
Caution

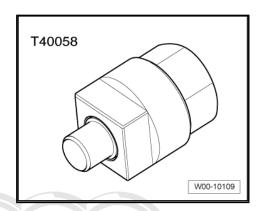
Danger of damage to hoses, pipes and wiring connections and to engine compartment.

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



Special tools and workshop equipment required





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

Procedure

- Engine/gearbox assembly removed and secured to scissortype assembly platform - VAS 6131 A-
- Remove electrical connector -3- for Lambda probe 2 after catalytic converter - G131- from bracket and unplug connector.



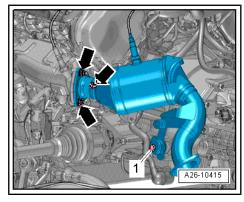
Note

Disregard -items 1, 2-.

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3 A24-10681

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

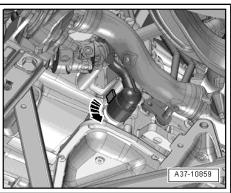




Caution

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.



Unplug electrical connector -2- at engine speed sender - G28and move electrical wiring at gearbox clear.



Note

Disregard -item 1-.

Release hose clip -2- and detach coolant hose from coolant pipe (bottom left).



Note

Disregard -item 1-.





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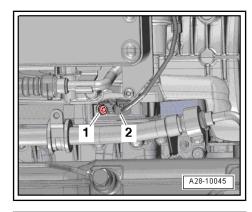
Place a cloth underneath to catch escaping ATF.

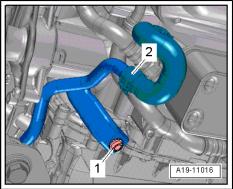
- Remove bolts -arrows- and detach ATF line -1- from gearbox.
- Seal off open lines and connections with clean plugs from engine bung set - VAS 6122- .
- Remove electrical connector -1- for Lambda probe after catalytic converter - G130- from bracket and unplug connector.

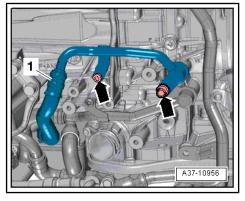


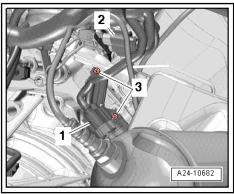
Note

Disregard -items 2, 3-.

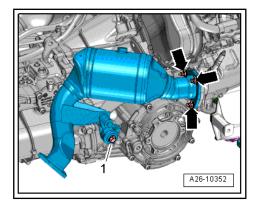




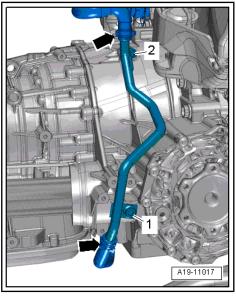




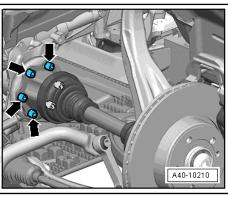
Remove nuts -arrows- and bolt -1- and detach catalytic converter (right-side).



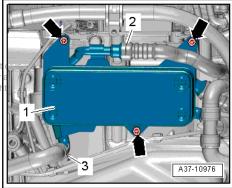
Remove bolts -1, 2-, release hose clips -arrows- and detach coolant hoses from coolant pipe (right-side) at gearbox.



Unbolt drive shaft (left and right) from gearbox flange shafts ⇒ Running gear, axles, steering; Rep. gr. 40; Drive shaft; Removing and installing drive shaft.

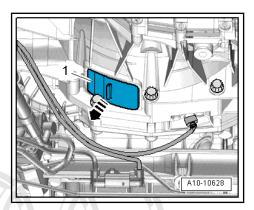


Remove bolts -arrows- and tie up ATF cooler -1- to side with hoses -2, 3- attached.



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



- Insert guide pin of adapter -T40058- as follows:
- The larger-diameter section -arrow 1- faces towards the en-
- The smaller-diameter section -arrow 2- faces the adapter.



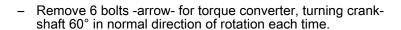
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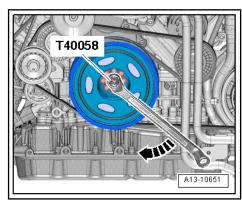
Counterhold crankshaft using adapter - T40058- and angled ring spanner when loosening bolts for torque converter.

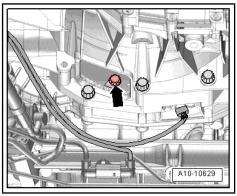


Note

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







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



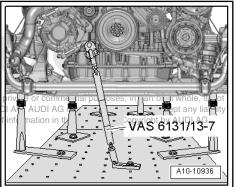
Note

The other support elements remain unchanged.

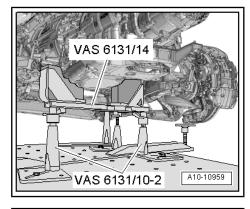
Platform coordinates	Parts from support set for Audi - VAS 6131/10- , support -VAS 6131/13-7- and gearbox support - VAS 6131/14-						
F2	/13-7						
B10	/10-1	/10-2	/10-5	/14			
G10	/10-1	/10-2	/10-5				

- BCDE FGH 2 3 VAS 6131 6 7 8 9 10 13 16 17 A10-1764
- Secure support -VAS 6131/13-7- at tapped hole at front of engine (right-side) as illustrated.
- Secure support -VAS 6131/13-7- to scissor-type assembly platform and tighten to 20 Nm.





- Position support elements from -VAS 6131/10- and gearbox support - VAS 6131/14- at front of gearbox, as illustrated.
- Screw spindles on both sides upwards until gearbox support VAS 6131/14- makes full contact with gearbox.
- Tighten base plates for support elements to 20 Nm on scissortype assembly platform - VAS 6131 A- .

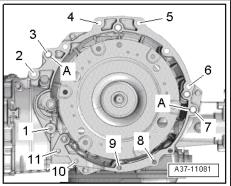


- Remove bolts -1- and -2- for starter.
- Separate starter from gearbox and leave in position.
- Unscrew remaining bolts -3 ... 11- securing engine to gearbox.

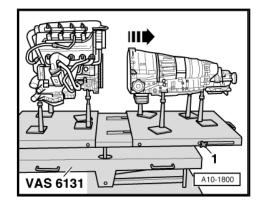


Note

Disregard -item A-.



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



1.3 Securing engine to engine and gearbox support

Special tools and workshop equipment required 2024 A VAS 6095 ◆ Lifting tackle - 2024 A-Engine and gearbox support - VAS 6095- with universal mounting - VAS 6095/1- and bracket for V6 FSI engine, Audi A6 - VAS 6095/1-5-Workshop hoist -VAS 6100-Lift arm extension (workshop hoist) - VAS 6101-VAS 6101 VAS 6100 Protected by copyr ght. Copying for private or commercial purposes, in part of in whole, is not uthorised by AUDI AG. AUDI AG does not guarantee or accept any liability ne correctness of information in this document. Copyright by AUDI AG. permitted unless a with respect to

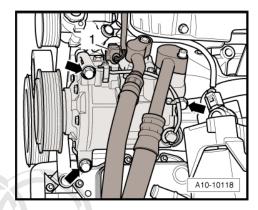
Procedure

- Engine/gearbox assembly removed and secured to scissor-type assembly platform VAS 6131 A- (with engine detached from gearbox) ⇒ page 23.
- Engine secured with support -VAS 6131/13-7-.

G10-10028

Vehicles from 07.2010 onwards:

- Detach poly V-belt from air conditioner compressor
 ⇒ "1.2.2 Removing and installing poly V-belt for ancillaries",
 page 53 .
- Remove air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket.



All vehicles (continued):

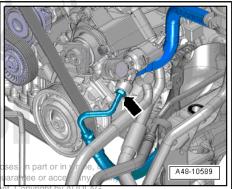


Note

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

- Unscrew connection -arrow-.
- Seal off open lines and connections with clean plugs from engine bung set VAS 6122 rotected by copyright. Copying for private or commercial put

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WARNING

Risk of accident.

- The engine can only be transported with the gearbox removed using the method described.
- Engine separated from gearbox ⇒ page 23.
- Attach lifting tackle 2024 A- to engine lifting eyes and workshop hoist VAS 6100- with lift arm extension (workshop hoist)
 VAS 6101- as shown in illustration.



Note

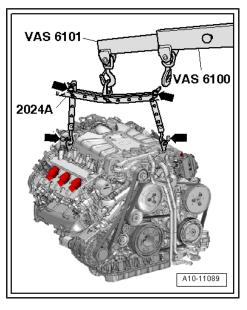
To adjust to the centre of gravity of the assembly, the perforated rails of the support hooks must be positioned as shown.



WARNING

Risk of accident.

- The support hooks and retaining pins on the lifting tackle must be secured with locking pins -arrows-.
- Take up weight of engine with workshop hoist, but do not lift.



Remove bolt -2- for engine mounting on both sides.



Note

Disregard -item 1-.

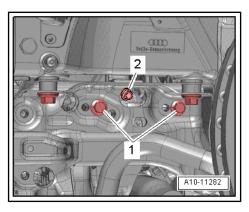
Unplug electrical connector -3- on electrohydraulic engine mounting solenoid valve -N144- / -N145- on both sides.

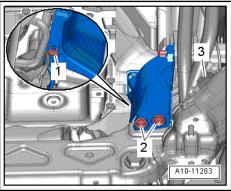


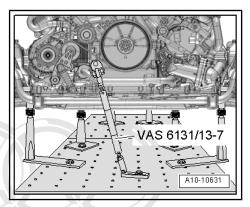
Note

Disregard -items 1, 2-.

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



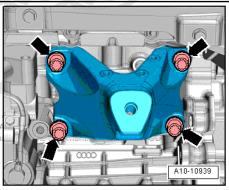




Vehicles up to 07.2010:

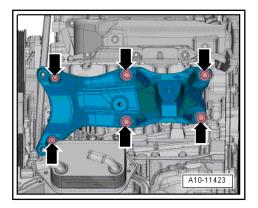
- Unscrew bolts -arrows- and remove engine support (left-side).





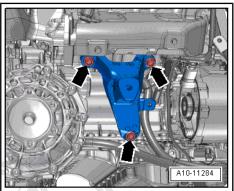
Vehicles from 07.2010 onwards:

 Remove bolts -arrows- and detach engine support (left-side) with bracket for air conditioner compressor.

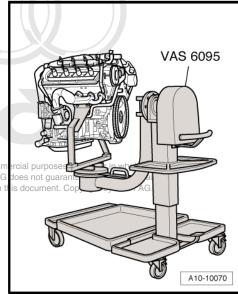


All vehicles (continued):

- Unscrew bolts -arrows- and remove engine support (rightside).
- Tie up starter on engine.



 Secure engine with universal mounting - VAS 6095/1- and support bracket for V6 FSI engine, Audi A6 - VAS 6095/1-5to engine and gearbox support - VAS 6095- as shown in illustration and tighten to 40 Nm.

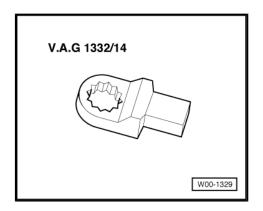


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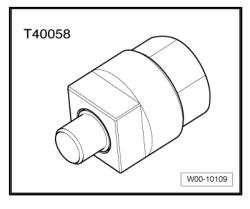
1.4 Installing engine

Special tools and workshop equipment required

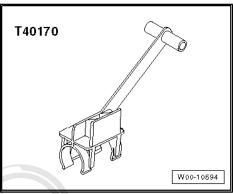
Ring spanner insert AF 16 - V.A.G 1332/14-



♦ Adapter - T40058-



Transport lock - T40170-



Tightening torques



Note

- Tightening torques apply only to lightly greased, oiled, phosphated or black-finished nuts and bolts.
- Additional lubricants such as engine or gearbox oil may be used, but do not use lubricants containing graphite.
- Do not use de-greased parts.
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 *Tolerance for tightening torques | **** 5 | % ised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

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

Component		Nm
	M12	65

- Assembly mountings
 ⇒ "2.1 Exploded view assembly mountings", page 40
- ◆ Engine to gearbox ⇒ Rep. gr. 37; Removing and installing gearbox; Tightening torques for gearbox

Procedure



Note

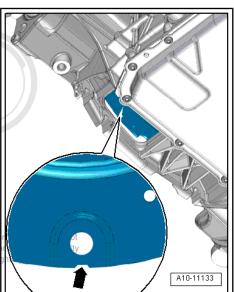
- Renew the bolts tightened with specified tightening angle.
- Renew self-locking nuts and bolts as well as seals, gaskets and O-rings.
- ♦ Do not remove plugs or protective caps until you are ready to fit the relevant line.
- Hose connections and air pipes and hoses must be free of oil and grease before assembly.
- ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.
- To secure the air hoses at their connections, spray rust remover onto the worm thread of the used hose clips before installing.
- ♦ Fit all cable ties in the original positions when installing.
- Before installing gearbox, remove residue from threaded holes for engine/gearbox bolts in cylinder block using a thread tap.
- Install engine support and engine mounting ⇒ page 40.
- The following preparations are required before joining engine and gearbox:
- Turn torque converter until hole is visible next to notch -arrow- in recess in bottom of gearbox housing, as shown in illustration.



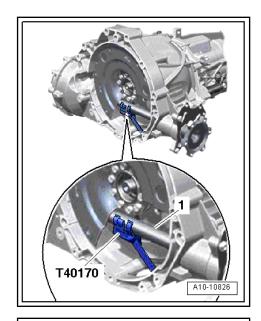
Note

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

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- 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-.

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Note

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

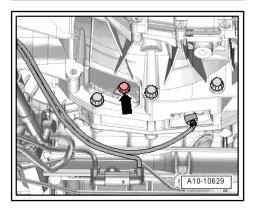
- Use assembly lever -1- to press torque converter -2- slightly against drive plate -3- in direction of -arrow-.
- A34-10497 3

Hand-tighten first bolt -arrow- (2 Nm).



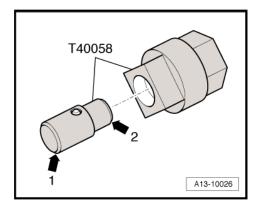
Note

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





- Insert guide pin of adapter -T40058- as follows:
- The larger-diameter section -arrow 1- faces towards the engine.
- The smaller-diameter section -arrow 2- faces the adapter.





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- Turn crankshaft 180° further in normal direction of engine rotation -arrow- with adapter - T40058- .
- 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 213.
- Install catalytic converter (right-side y copyright Caping for private or commercial purposes, in part or in whole, is not AUDI AG. AUDI A
- Install ATF lines ⇒ Rep. gr. 37; ATF circuit; Removing and installing ATF lines .
- Install catalytic converter (left-side) ⇒ page 304.
- Raise engine/gearbox assembly using scissor-type assembly platform - VAS 6131 A- .
- Align subframe and tunnel cross member on longitudinal members according to markings made before removal.
- 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.



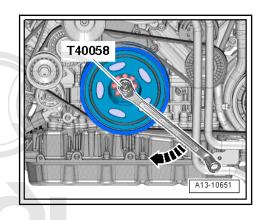
WARNING

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 silencers ⇒ page 308.
- 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 brake calipers ⇒ Brake system; Rep. gr. 46; Front brakes; Removing and installing brake caliper.



- Install silencer for auxiliary heater ⇒ Auxiliary heater, supplementary heater; Rep. gr. 82; Auxiliary/supplementary heater; Removing and installing silencer with bracket.
- Install positive wires at positive terminal ⇒ Electrical system;
 Rep. gr. 27; Jump start terminal; Exploded view jump start terminal.
- Install longitudinal members (bottom) ⇒ General body repairs, exterior; Rep. gr. 50; Lock carrier; Exploded view - lock carrier.
- Install air pipes ⇒ page 270.
- 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 refrigerant lines ⇒ Heating, air conditioning; Rep. gr. 87; Refrigerant circuit; Exploded view - condenser.
- Install lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing attachments.
- 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 fuel supply line ⇒ page 293.
- 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 ⇒ Maintenance; Booklet 410.
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 Before starting engine, top up hydraulic fluid in power steering unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability reservoir ⇒ Running gear, axles, steering; Rep. gr. 48 ; Hyespect to the correctness of information in this document. Copyright by AUDI AG. draulic power steering; Checking power steering fluid level .



Note

The power steering pump must not be run when dry.

- Connect coolant hoses with plug-in connector ⇒ page 217.
- Fill up with coolant ⇒ page 187.







Note

Do not reuse coolant.

- Charge refrigerant system ⇒ Air conditioner with refrigerant R134a.
- Align subframe ⇒ Running gear, axles, steering; Rep. gr. 40; Subframe; Removing and installing subframe with steering
- Install front wheel housing liners ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Exploded view - front wheel housing liner.
- Check wheel alignment \Rightarrow 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 panels ⇒ General body repairs, exterior; Rep. gr. 66; Underbody trim; Exploded view - underbody trim .
- Install noise insulation panels ⇒ General body repairs, exte-Protected nor Prep. Gryn66r Noise insulation Exploded View Infoise permitted miles authorised by Aubi Ac. Aubi Ac does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

2 Assembly mountings

- ⇒ "2.1 Exploded view assembly mountings", page 40
- ⇒ "2.2 Supporting engine in installation position", page 42
- ⇒ "2.3 Removing and installing engine mountings", page 44
- ⇒ "2.4 Removing and installing gearbox mounting", page 47

2.1 Exploded view - assembly mountings

1 - Engine mounting

- Left side with left electrohydraulic engine mounting solenoid valve
 N144-
- Right side with right electrohydraulic engine mounting solenoid valve - N145-
- □ Removing and installing⇒ page 44
- Renew in pairs

2 - Bolt

□ 20 Nm

3 - Bracket

- □ For engine mounting
- Renew bracket if engine mounting is defective
- Check bracket on opposite side; renew if necessary

4 - Bolt

□ 40 Nm

5 - Bolt

□ 20 Nm

6 - Engine support

☐ Illustration shows leftside version from 07.2010 onwards with bracket for air conditioner compressor

7 - Heat shield

8 - Bolt

□ 10 Nm

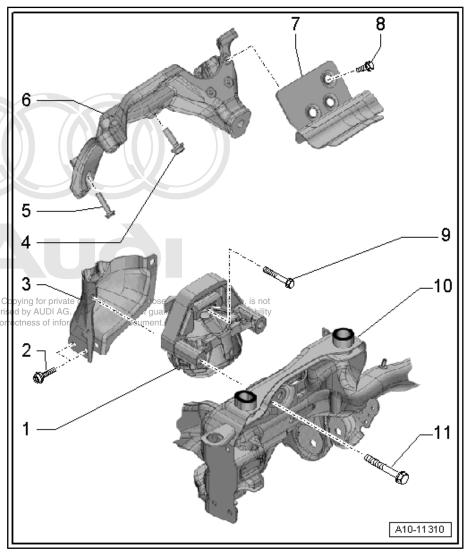
9 - Bolt

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

10 - Subframe

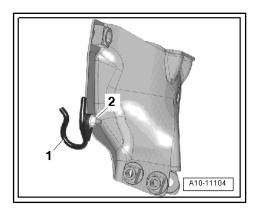
11 - Bolt

□ 55 Nm



Bracket for hydraulic hose - tightening torque

- Tighten nut -2- securing bracket -1- for hydraulic hose to 9 Nm.



Gearbox mounting

1 - Bolt

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

2 - Tunnel cross-member

□ Removing and installing
 ⇒ Rep. gr. 37; Assembly mountings; Exploded view - assembly mountings

3 - Stop plate

□ For gearbox mounting

4 - Gearbox mounting

Removing and installing⇒ page 47

5 - Bolt

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

6 - Nut

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

7 - Bolt

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

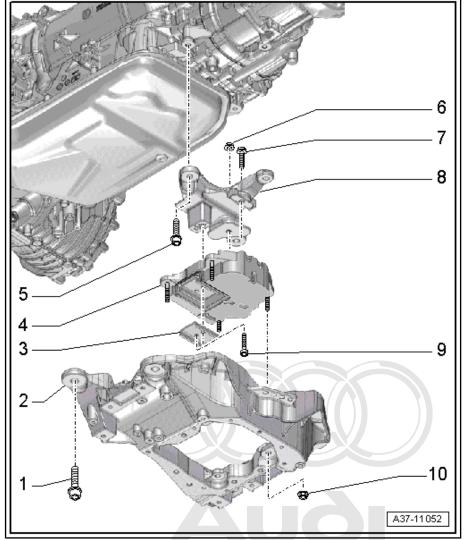
8 - Gearbox support

□ Removing and installing ⇒ page 47

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9 - Bolt

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



10 - Nut

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

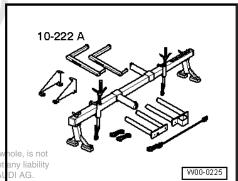
2.2 Supporting engine in installation position

Special tools and workshop equipment required

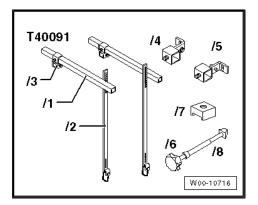
♦ Support bracket - 10 - 222 A-



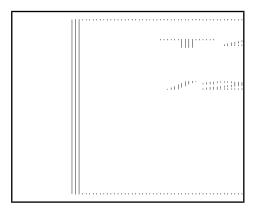
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◆ Engine support bracket (basic set) - T40091-



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



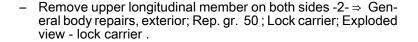
Procedure



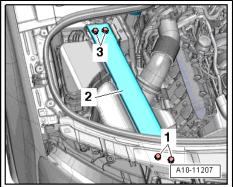
WARNING

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 lock carrier cover -2- ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing attachments.



A63-10291

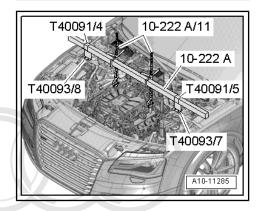


- Screw support bracket 10 222 A- with -T40091/4-, -T40091/5-, -T40093/7- and -T40093/8- onto suspension turrets (left and right) as illustrated.
- Engage spindles -10 222 A/11- on engine lifting eyes and partly take up weight of engine.

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



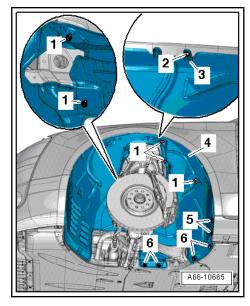


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2.3 Removing and installing engine mountings

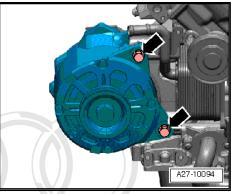
Removing

- Support engine in installation position ⇒ page 42.
- Fully remove relevant front wheel housing liner ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Removing and installing wheel housing liner (front).



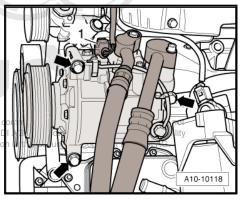
Engine mounting (right-side):

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



Engine mounting (left-side):

- Remove engine oil cooler ⇒ page 165.
- Detach poly V-belt from air conditioner compressor
 ⇒ "1.2.2 Removing and installing poly V-belt for ancillaries", page 53
- Remove air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87; Air conditioner compressor pletaching and vate or attaching air conditioner compressor at bracket authorised by AUDI AG. AU with respect to the correctness of information.



Remove subframe cross brace ⇒ Running gear, axles, steering; Rep. gr. 40; Subframe; Removing and installing subframe cross brace.



Caution

Risk of damage to running gear components.

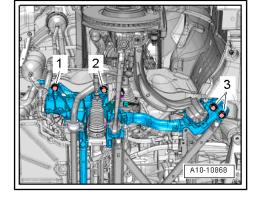
◆ The vehicle must NOT be lowered onto its wheels if the engine/gearbox mountings, steering rack or subframe of the content of the conte

- Remove bolt -2- for subframe (left-side).



Note

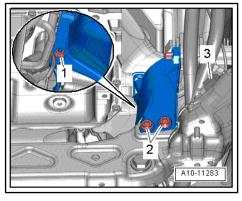
Bolts -1 and 3- on left side and all bolts for subframe on right side remain fitted.



- Remove nut -1- and move bracket for hydraulic hose clear.

Continuation for both sides:

- Unplug electrical connector -3- on electrohydraulic engine mounting solenoid valve -N144- / -N145- .
- Remove bolts -2-.



- Remove bolts -1 and 2- and place retaining plate to one side.
- Detach engine mounting on relevant side.

Installing

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



Note

- Renew the bolts tightened with specified tightening angle.
- ♦ Fit all cable ties in the original positions when installing.
- Install subframe ⇒ Running gear, axles, steering; Rep. gr.
 40; Subframe; Exploded view subframe.



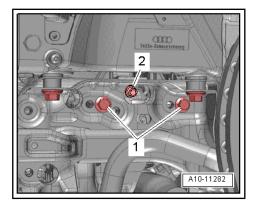
WARNING

Risk of accident because of loose bolt connections.

- ◆ Do NOT drive the vehicle unless the subframe bolts have been finally tightened.
- Install air conditioner compressor ⇒ Heating, air conditioning;
 Rep. gr. 87; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket.
- Install engine principle paying age to private or commercial purposes, in part or in whole, is not permitted unless administed by AUDI AG. AUDI AG does not guarantee or accept any liability
- Install alternator ⇒ Electrical system; Rep. gr. 27 , Alternator, Alternator, Removing and installing alternator.
- Install poly V-belt ⇒ page 53.
- Install lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing attachments.

Tightening torques

- ♦ ⇒ "2.1 Exploded view assembly mountings", page 40
- Subframe cross brace ⇒ 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



2.4 Removing and installing gearbox mounting

⇒ "2.4.1 Removing and installing gearbox support with gearbox mounting", page 47

⇒ "2.4.2 Removing and installing gearbox mounting", page 47

Removing and installing gearbox sup-2.4.1 port with gearbox mounting

Removing

- Remove tunnel cross-piece ⇒ Rep. gr. 37; Assembly mountings; Exploded view - assembly mountings.
- Remove bolts -arrows- and detach gearbox support and gearbox mounting from gearbox, copyright. Copying for private or commercial purposes,

Installing

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Install in reverse order.

Tightening torques

- ♦ ⇒ "2.1 Exploded view assembly mountings", page 40
- Tunnel cross-piece ⇒ Rep. gr. 37; Assembly mountings; Exploded view - assembly mountings

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2.4.2 Removing and installing gearbox mounting

Removing

- Remove gearbox support with gearbox mounting ⇒ page 47.
- Unscrew bolt -1- and detach stop -2- for gearbox mounting.
- Remove nut -4- and bolt -5- and detach gearbox mounting -6- from gearbox support -3-.

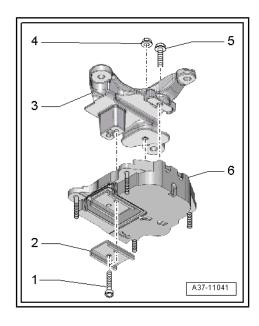
Installing

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

- Position gearbox support -3- on gearbox mounting -6-.
- Hand-tighten nut -4- and bolt -5-.
- Tighten bolt -1- for stop -2-.
- Tighten nut -4- and bolt -5-.
- Install gearbox support with gearbox mounting ⇒ page 47.

Tightening torques

⇒ "2.1 Exploded view - assembly mountings", page 40



3 Engine cover panel

⇒ "3.1 Removing and installing engine cover panel", page 48

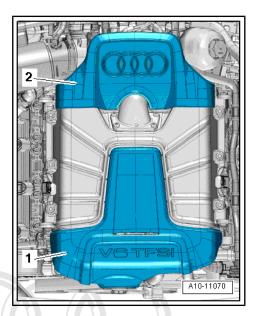
3.1 Removing and installing engine cover panel

Removing

 Lift off engine cover panel (front) -1- or engine cover panel (rear) -2-.

Installing

- To avoid damage, do not strike the engine cover panel with your fist or with any kind of tool.
- Position engine cover panel on engine and press it into retaining clips with both hands.





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Crankshaft group 13 –

Cylinder block (pulley end)

- ⇒ "1.1 Exploded view poly V-belt drive", page 49
- ⇒ "1.2 Removing and installing poly V-belt", page 52
- ⇒ "1.3 Removing and installing tensioner for poly V-belt",
- ⇒ "1.4 Removing and installing vibration damper", page 57
- ⇒ "1.5 Removing and installing sealing flange (pulley end)", page

1.1 Exploded view - poly V-belt drive

- ⇒ "1.1.1 Exploded view poly V-belt drive, poly V-belt for supercharger", page 49
- ⇒ "1.1.2 Exploded view pypoly: Vybelt drive poly. Vybelt for ancillar in whole, is not ries", page 50 ermitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

1.1.1 Exploded view - poly V-belt drive, poly V-belt for supercharger

1 - Poly V-belt

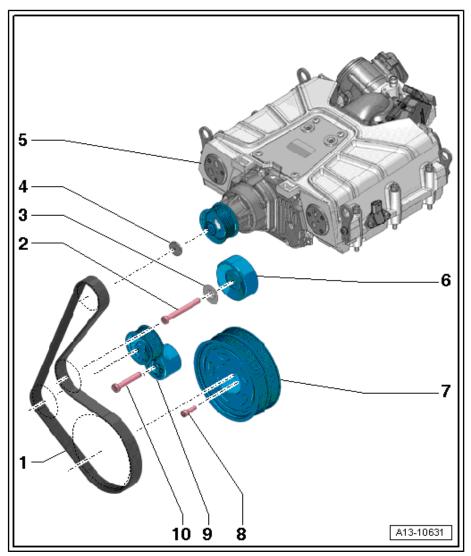
- For supercharger
- Check for wear
- □ Removing and installing ⇒ page 52
- When installing, make sure it is properly seated on pulleys
- 2 Bolt
 - □ 40 Nm
- 3 Washer
- 4 Cover
- 5 Supercharger
 - Exploded view ⇒ page 234
- 6 Idler roller
 - □ For poly V-belt

7 - Vibration damper

- With poly V-belt pulley
- Can only be installed in one position (holes are off-set).
- Removing and installing ⇒ page 57
- 8 Bolt
 - Tightening torque ⇒ Item 2 (page 50)

9 - Tensioner

- ☐ For poly V-belt
- □ Removing and installing ⇒ page 56



10 - Bolt

□ 40 Nm

1.1.2 Exploded view - poly V-belt drive, poly V-belt for ancillaries

1 - Poly V-belt

- Check for wear
- ☐ Before removing, mark direction of rotation with chalk or felt-tip pen
- □ Removing and installing⇒ page 53
- ☐ Do not kink
- ☐ When installing, make sure it is properly seated on pulleys

2 - Bolt

- ☐ Renew
- □ 20 Nm + turn 90° further

3 - Vibration damper

- With double-sided poly V-belt pulley
- □ Removing and installing⇒ page 57

4 - Cover

□ For idler roller

5 - Idler roller

- □ For poly V-belt
- □ 40 Nm

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

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8 - Bolt

□ 20 Nm

9 - Bracket

For alternator

10 - Bolt

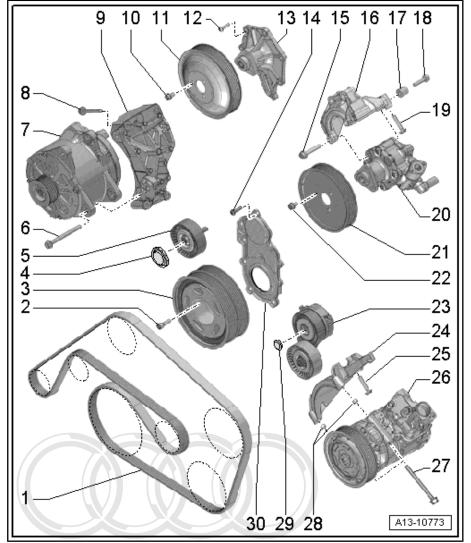
with respect to the correctness of information in this document. Copyright by AUDI AG. ☐ Tightening torque ⇒ Item 2 (page 194)

11 - Poly V-belt pulley

- □ For coolant pump
- □ Removing and installing ⇒ "2.3 Removing and installing coolant pump", page 196

12 - Bolt

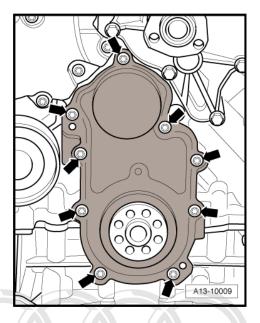
☐ Tightening torque ⇒ Item 1 (page 194)



13 - Coolant pump ☐ Removing and installing <u>⇒ page 196</u>
14 - Bolt
☐ Tightening torque and sequence <u>⇒ page 52</u>
15 - Bolt
☐ Tightening torque ⇒ Running gear, axles, steering; Rep. gr. 48; Hydraulic power steering; Exploded view - power steering pump
16 - Bracket
☐ For power steering pump
17 - Sliding bush
18 - Bolt
☐ Tightening torque ⇔ctRunning geary axles steering: Reprigres, 48 ct Hydraulic power steering; Exploded view - power steering pump authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.
19 - Bolt
□ Tightening torque ⇒ Running gear, axles, steering; Rep. gr. 48; Hydraulic power steering; Exploded view - power steering pump
20 - Power steering pump
□ Removing and installing ⇒ Running gear, axles, steering; Rep. gr. 48; Hydraulic power steering; Removing and installing power steering pump
21 - Poly V-belt pulley
☐ For power steering pump
□ Removing and installing ⇒ Running gear, axles, steering; Rep. gr. 48; Hydraulic power steering; Removing and installing power steering pump
22 - Bolt
☐ Tightening torque ⇒ Running gear, axles, steering; Rep. gr. 48; Hydraulic power steering; Exploded view - power steering pump
23 - Tensioner
☐ For poly V-belt
☐ Removing and installing ⇒ page 56
□ 40 Nm
24 - Bracket for air conditioner compressor
☐ From 07.2010 onwards: engine support (left-side) with bracket for air conditioner compressor ⇒ Item 6 (page 40)
25 - Bolt
☐ Tightening torque ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Exploded view - air conditioner compressor drive unit
26 - Air conditioner compressor
☐ Do not unscrew or disconnect refrigerant hoses or pipes.
□ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket
27 - Bolt
☐ Tightening torque ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Exploded view - air conditioner compressor drive unit
28 - Dowel sleeves
29 - Cover
☐ For tensioner
30 - Sealing flange (pulley end)
□ Renewing ⇒ page 58
- Itelieming - page oo

Sealing flange (pulley end) - tightening torque and sequence

Tighten bolts -arrows- in stages and in diagonal sequence; final torque 9 Nm.



1.2 Removing and installing poly V-belt

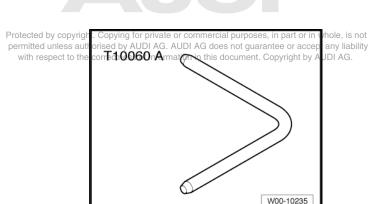
⇒ "1.2.1 Removing and installing poly V-belt for supercharger",

⇒ "1.2.2 Removing and installing poly V-belt for ancillaries", page 53

1.2.1 Removing and installing poly V-belt for supercharger

Special tools and workshop equipment required

Locking pin - T10060 A-



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.

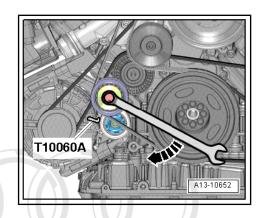
Remove engine cover panel (front) ⇒ page 48.



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 clockwise direction
- Detach poly V-belt and lock tensioner with locking pin T10060



Installing

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

- Fit poly V-belt on pulleys as shown in illustration.
- Tensioner
- 2 -Supercharger
- 3 -Idler roller
- Vibration damper



Note

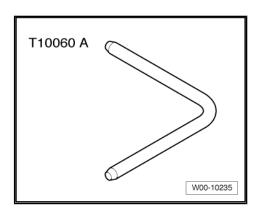
When installing poly V-belt, make sure it is properly seated on pulleys.

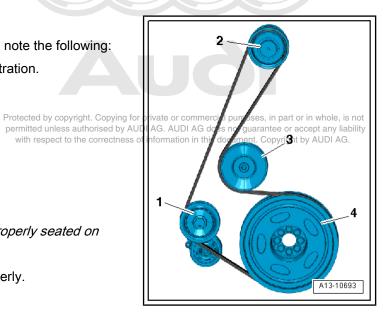
- Start engine and check that belt runs properly.
- Install engine cover panel ⇒ page 48.

1.2.2 Removing and installing poly V-belt for ancillaries

Special tools and workshop equipment required

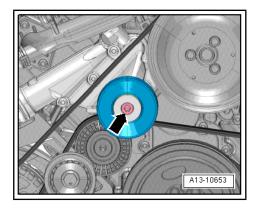
♦ Locking pin - T10060 A-



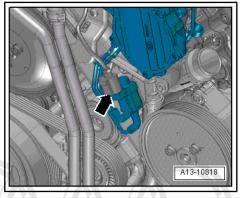


Audı

- Removing
- Remove poly V-belt for supercharger <u>⇒ page 52</u>.
- Remove bolt -arrow- and detach together with idler roller.



- Unplug electrical connector -arrow- and move clear.

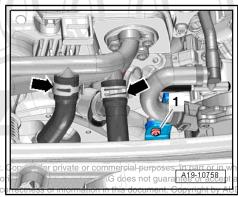


Remove bolt -1- for coolant pipes (front left).



Note

Disregard -arrows-.



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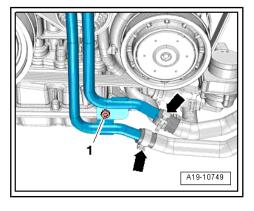
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Remove bolt -1- for coolant pipes (front left).



Note

Disregard -arrows-.





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 clockwise -arrow- and lock with locking pin - T10060 A- .
- Take off poly V-belt.

Installing

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

- Fit poly V-belt on pulleys as shown in illustration.
- Alternator 1 -
- 2 -Idler roller
- 3 -Coolant pump
- 4 -Power steering pump
- 5 -Air conditioner compressor
- Tensioner for poly V-belt 6 -
- 7 -Vibration damper



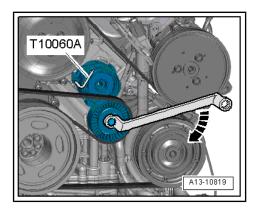
Note

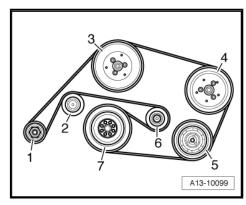
When installing poly V-belt, make sure it is properly seated on pulleys.

- Start engine and check that belt runs properly.
- Secure coolant pipes (front left) ⇒ page 200.
- Install poly V-belt for supercharger <u>⇒ page 52</u>

Tightening torques

→ "1.1.1 Exploded Niew in Doly the Topelt arrive poly 1 2 pet for gazantee or accept any liability. The structure of the period of the pe percharger", page 49 respect to the correctness of information in this document. Copyright by AUDI AG.





1.3 Removing and installing tensioner for poly V-belt

⇒ "1.3.1 Removing and installing tensioner for poly V-belt for supercharger", page 56

 \Rightarrow "1.3.2 Removing and installing tensioner for poly V-belt for ancillaries", page 56

1.3.1 Removing and installing tensioner for poly V-belt for supercharger

Removing

- Remove poly V-belt for supercharger ⇒ page 52
- Remove bolt -1- and take off poly-V-belt tensioner -2-



Note

Ignore -T10060 A- .

Installing

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

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Install poly V-belt for superchargers page 52 AUDI AG. AUDI AG does not guarantee or accept any liability
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Tightening torques

◆ ⇒ "1.1.1 Exploded view - poly V-belt drive, poly V-belt for supercharger", page 49

1.3.2 Removing and installing tensioner for poly V-belt for ancillaries

Removing



WARNING

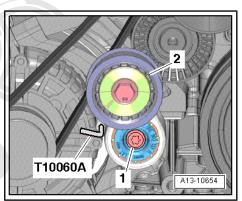
Risk of injury as the radiator fans may start up automatically.

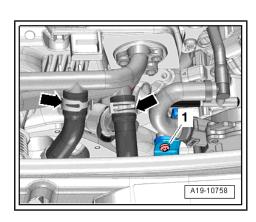
- Even when the ignition is switched off, the radiator fans can start up without warning due to accumulated heat in the engine compartment, etc.
- Remove bolt -1- for coolant pipes (front left).



Note

Disregard -arrows-.



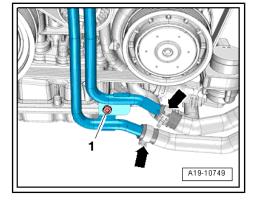


Remove bolt -1- for coolant pipes (front left).



Note

Disregard -arrows-.

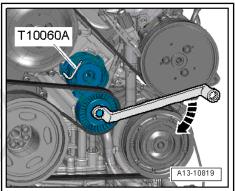


- To slacken poly V-belt turn tensioner in clockwise direction -arrow-.
- Remove poly V-belt from tensioner and release tensioner.



Note

Ignore -T10060 A-



Remove bolt -1- and detach poly V-belt tensioner -2- from cylinder block.

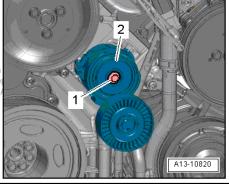
Installing

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

- Install poly V-belt page 53 prised by AUDI AG. AUDI AG does not guarantee or accommercial purposes, in part or install poly V-belt page 53 prised by AUDI AG. AUDI AG does not guarantee or accommercial purposes, in part or install poly V-belt page 53 prised by AUDI AG. AUDI AG does not guarantee or accommercial purposes, in part or install poly V-belt page 53 prised by AUDI AG. AUDI AG does not guarantee or accommercial purposes, in part or install poly V-belt page 53 prised by AUDI AG. AUDI AG does not guarantee or accommercial purposes, in part or install poly V-belt page 53 prised by AUDI AG. AUDI AG does not guarantee or accommercial purposes, in part or install poly V-belt page 53 prised by AUDI AG. AUDI AG does not guarantee or accommercial purposes, in part or install poly V-belt page 53 prised by AUDI AG. AUDI AG does not guarantee or accommercial purposes in part or install poly V-belt page 54 prised by AUDI AG. AUDI AG does not guarantee or accommercial purposes in part or install poly V-belt page 54 prised by AUDI AG. AUDI AG does not guarantee or accommercial purposes in part or install poly V-belt page 54 prised by AUDI AG. AUDI AG does not guarantee or accommercial purposes in page 54 prised by AUDI AG. AUDI AG does not guarantee or accommercial purposes in page 54 prised by AUDI AG. AUDI AG does not guarantee or accommercial purposes in page 54 prised by AUDI AG. AUDI AG does not guarantee or accommercial purpose accommendation of the page 54 prised by AUDI AG. AUDI AG does not guarantee or accommendation of the page 54 prised by AUDI AG. AUDI AG does not guarantee or accommendation or accommendation of the page 54 prised by AUDI AG. AUDI AG does not guarantee or accommendation o
- Secure coolant pipes (front left) ⇒ page 200 .

Tightening torques

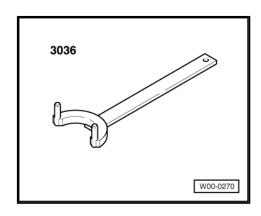
⇒ "1.1.2 Exploded view - poly V-belt drive, poly V-belt for ancillaries", page 50



1.4 Removing and installing vibration damp-

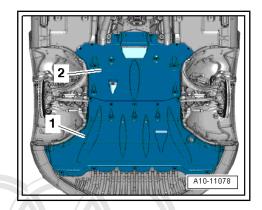
Special tools and workshop equipment required

♦ Counterhold tool - 3036-



Removing

Remove noise insulation (front) -1- ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.



- Remove poly V-belt for supercharger ⇒ page 52.
- Remove poly V-belt from tensioner and release tensioner
- Loosen bolts -1- for vibration damper using counterhold tool -3036-.
- Remove bolts and take off vibration damper.

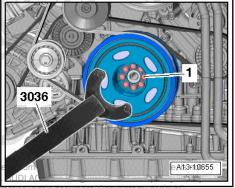
Installing

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



Note

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- Renew the bolts tightened with specified tightening angle.
- Can only be installed in one position.
- Observe dowel sleeve when installing vibration damper.
- Install poly V-belt ⇒ page 53.

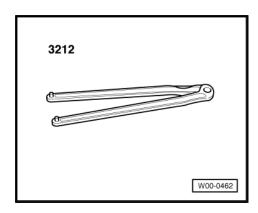
Tightening torques

- ⇒ "1.1.2 Exploded view poly V-belt drive, poly V-belt for ancillaries", page 50
- ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view - noise insulation

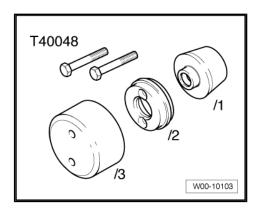
1.5 Removing and installing sealing flange (pulley end)

Special tools and workshop equipment required

Pin wrench - 3212-



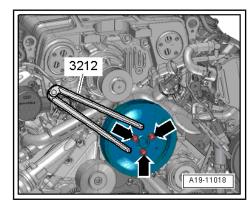
Assembly tool - T40048-



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

Procedure

- Remove poly V-belt <u>⇒ page 53</u>.
- Remove vibration damper \Rightarrow page 57.
- Loosen bolts -arrows- for coolant pump pulley (counterhold with pin wrench - 3212-).
- Remove bolts and take off poly V-belt pulley.

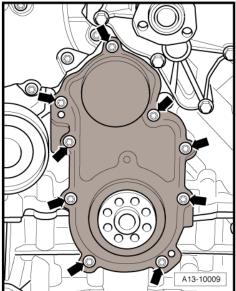


- Loosen bolts Tarrows in diagonal sequence and remove whole, is not
- permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any lial Release sealing flange (pulley end) from bonded joint and take off sealing flange.



Note

Renew sealing flange (pulley end).







Caution

Protect lubrication system against contamination.

Cover exposed parts of the engine.



WARNING

Risk of eye injury.

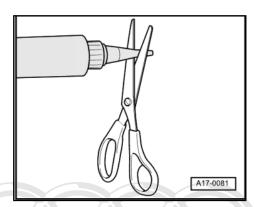
- Wear safety goggles.
- Remove sealant residue from cylinder block and sump (top section) using rotating plastic brush or similar.
- Clean sealing surfaces; they must be free of oil and grease.



Note

Note the use-by date of the sealant.

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



A13-0590



Caution

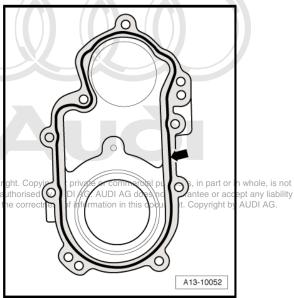
Make sure lubrication system is not clogged by excess sealant.

- The bead of sealant must not be thicker than specified.
- Apply bead of sealant -arrow- onto sealing surface of new sealing flange (pulley end) as shown in illustration.
- The groove on the sealing surface must be completely filled with sealant. Protected by copy
- mitted unless The bead of sealant must project 1.5 ... 2.0 mm above the respect to sealing surface.

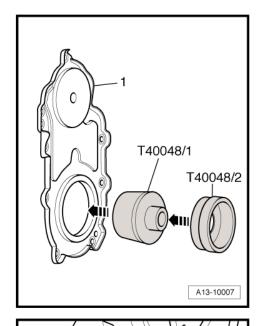


Note

The sealing flange (pulley end) must be installed within 5 minutes after applying the sealant.



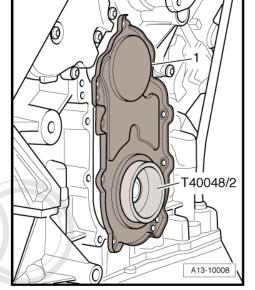
- Fit assembly aid -T40048/1- onto assembly sleeve -T40048/2and slide sealing flange -1- onto assembly sleeve.
- Detach assembly aid.



- First position sealing flange -1- (with assembly sleeve -T40048/2- inserted) on crankshaft.
- Keep sealing flange straight while pushing it onto engine sealing surface. Then bolt on \Rightarrow page 52 .

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

- Install poly V-belt pulley for coolant pump ⇒ page 194.
- Install vibration damper ⇒ page 57.





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⇒ "2.1 Exploded view - cylinder block (gearbox end)", page 62

Cylinder block (gearbox end)

- ⇒ "2.2 Removing and installing drive plate", page 62
- ⇒ "2.3 Removing and installing sender wheel", page 63
- ⇒ "2.4 Checking sender wheel", page 64
- ⇒ "2.5 Renewing crankshaft oil seal (gearbox end)", page 64

2.1 Exploded view - cylinder block (gearbox end)



2

Note

When performing assembly work, secure engine to engine and gearbox support - VAS 6095- ⇒ page 29.

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⇒ page 62

3 - Sender wheel

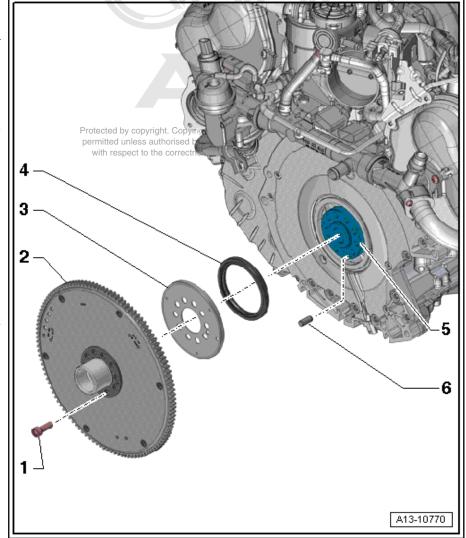
- ☐ For engine speed sender G28-
- □ Removing and installing⇒ page 63
- □ Checking ⇒ page 64

4 - Oil seal

- ☐ For crankshaft (gearbox end)
- □ Renewing ⇒ page 64

5 - Crankshaft

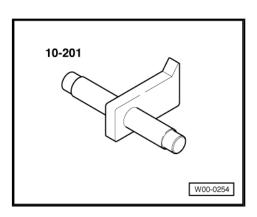
6 - Dowel pin



2.2 Removing and installing drive plate

Special tools and workshop equipment required

Counterhold tool - 10 - 201-



Removing

- Gearbox removed ⇒ Rep. gr. 37; Removing and installing gearbox; Removing gearbox.
- Insert counterhold tool 10 201- to slacken bolts.



Caution

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

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

Installing

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



Note

Renew the bolts tightened with specified tightening angle bills

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

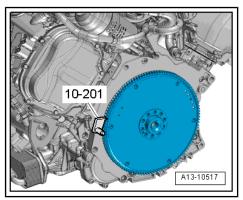
Tightening torques

⇒ "2.1 Exploded view - cylinder block (gearbox end)", <u>page 62</u>

2.3 Removing and installing sender wheel

Removing

- Gearbox removed ⇒ Rep. gr. 37; Removing and installing gearbox; Removing gearbox.
- Remove drive plate ⇒ page 62.

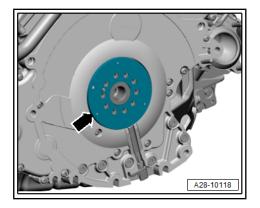


Detach sender wheel -arrow-.

Installing

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

Install drive plate ⇒ page 62.



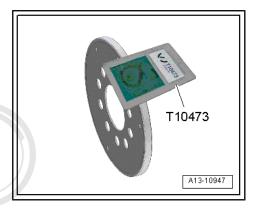
2.4 Checking sender wheel

Special tools and workshop equipment required

♦ Magnetic lens - T10473-

Procedure

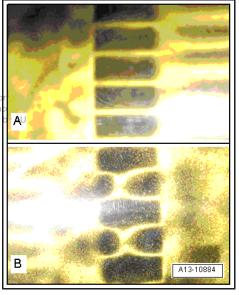
- · Sender wheel removed
- Check whole circumference of sender wheel using magnetic lens - T10473- as shown in illustration.



Inspection image of sender wheel

- A Sender wheel OK
- B Sender wheel defective

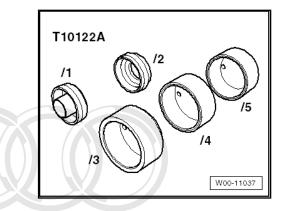
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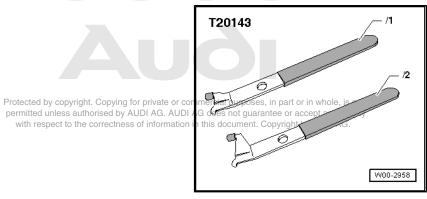
2.5 Renewing crankshaft oil seal (gearbox end)

Special tools and workshop equipment required

♦ Fitting tool - T10122-

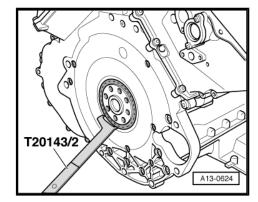


♦ Extractor tool - T20143/2-

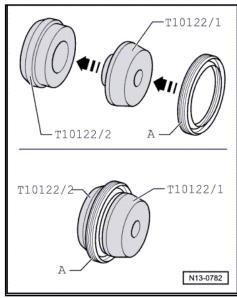


Procedure

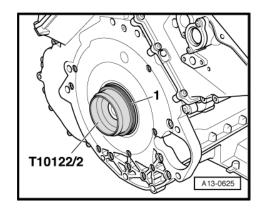
- Gearbox removed ⇒ Rep. gr. 37; Removing and installing gearbox; Removing gearbox.
- Remove drive plate ⇒ page 62.
- Pry out oil seal using extractor tool -T20143/2- .
- Clean contact surface and sealing surface.



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



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



- Drive in oil seal uniformly until flush all round using thrust piece -T10122/5-.
- Install drive plate ⇒ page 62.





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3 Crankshaft

- ⇒ "3.1 Exploded view crankshaft", page 67
- ⇒ "3.2 Crankshaft dimensions", page 70
- ⇒ "3.3 Allocation of main bearing shells", page 70
- ⇒ "3.4 Measuring axial clearance of crankshaft", page 70
- ⇒ "3.5 Measuring radial clearance of crankshaft", page 71

3.1 Exploded view - crankshaft



Note

When performing assembly work, secure engine to engine and gearbox support - VAS 6095- ⇒ page 29.

1 - Sealing flange (pulley end)

□ Renewing ⇒ page 58

2 - Bolt

☐ Tightening torque and sequence <u>⇒ page 52</u>

3 - Crankshaft

- Measuring axial clearance ⇒ page 70
- Measuring radial clearance ⇒ page 71
- Crankshaft dimensions ⇒ page 70

4 - Dowel sleeve

- □ 4x
- ☐ Inserting in retaining frame ⇒ page 69

5 - Seal

□ Renew

6 - Bolt

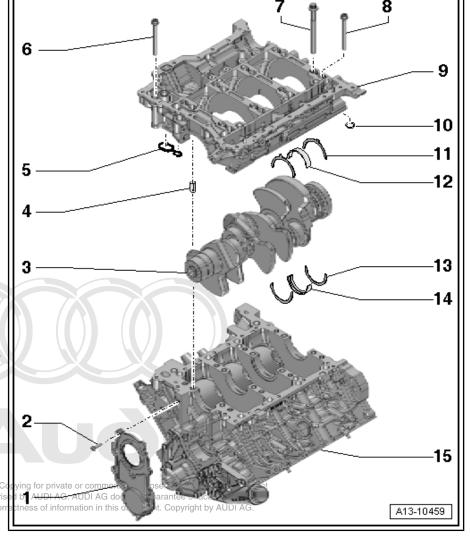
- For sealing surfaces: retaining frame to cylinder block
- Differing bolt lengths and bolt heads
- Tightening torque and sequence <u>⇒ page 69</u>

7 - Bolt

- □ Long, large collar
- ☐ For retaining frame (inner row)
- □ Renew
- ☐ Use old bolts when measuring radial clearance
- ☐ Tightening torque and sequence ⇒ page 69

8 - Bolt

- ☐ Short, small collar
- ☐ For retaining frame (outer row)



	□ Renew			
	Use old bolts when measuring radial clearance			
	Tightening torque and sequence <u>⇒ page 69</u>			
9 - Re	etaining frame			
	With valve for oil pressure control - N428- ⇒ page 69			
	To remove, detach guide rail <u>⇒ Item 1 (page 97)</u> for drive chain for valve gear			
	Applying sealant <u>⇒ page 69</u>			
	Removing and installing valve for oil pressure control - N428- ⇒ page 176			
10 - 8	Seal			
	1 Renew			
11 - 1	11 - Thrust washer			
	Only fitted on 3rd crankshaft bearing			
	Installation position: oil groove faces outwards			
	Make sure it engages in retaining frame			
12 - E	Bearing shell			
	For retaining frame (without oil groove)			
	Renew used bearing shells			
	Note installation position			
	Install new bearing shells for retaining frame with correct coloured markings <u>⇒ page 70</u>			
13 - Thrust washer				
	Only fitted on 3rd crankshaft bearing			
	Installation position: oil groove faces outwards			
	= :::=:::= -=::			
14 - E	permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability 4 - Bearing shell with respect to the correctness of information in this document. Copyright by AUDI AG.			

□ Renew used bearing shells

☐ For cylinder block (with oil groove)

■ Note installation position

☐ Install new bearing shells for the cylinder block with the correct coloured markings <u>⇒ page 70</u>

15 - Cylinder block

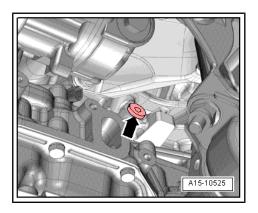
Plug for "TDC" marking - tightening torque



Note

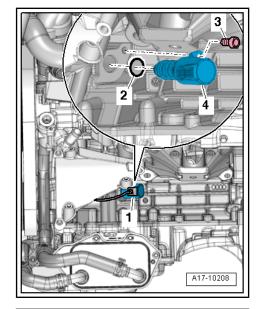
Fit new O-ring.

Tighten plug -arrow- to 14 Nm.



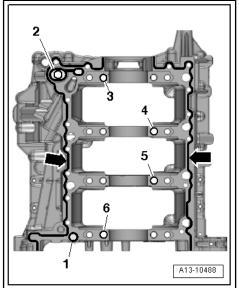
Valve for oil pressure control - N428-

- Electrical connector
- 2 -O-ring - renew
- 3 -Bolt, 9 Nm
- Valve for oil pressure control N428-



Applying sealant to retaining frame, position of dowel sleeves

- Clean sealing surfaces; they must be free of oil and grease.
- Apply beads of sealant -arrows- onto clean sealing surfaces of retaining frame as shown in illustration.
- The groove on the sealing surface must be completely filled with sealant.
- The beads of sealant must project 1.5 ... 2.0 mm above the sealing surface.
- Fit seals -1- and -2-.
- Check that dowel sleeves -3 ... 6- are inserted in retaining frame at positions shown in illustration.



Installing retaining frame



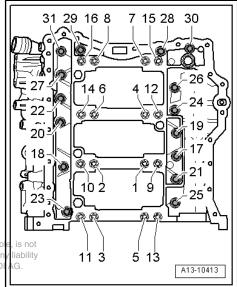
Note

Renew the bolts tightened with specified tightening angle.

- Install long bolts in inner row on retaining frame.
- Tighten bolts in stages in the sequence shown:

Stage	Bolts	Tightening torque/angle specification
1.	-1 16-	50 Nm
2.	-1 16-	Turn 90° further
3.	-17 31-	20 Nm
4.	-17 _{rotect} -31 _v con	Turn 90° further or commercial purposes in part

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3.2 Crankshaft dimensions

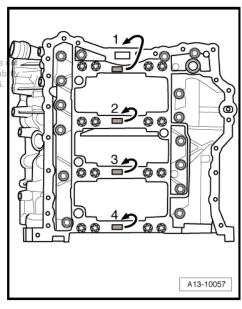
Honing dimension	Crankshaft bearing journal Ø mm	Crankshaft conrod journal Ø mm
Basic dimension	65.000 - 0.022 - 0.042	56.000 - 0.022 - 0.042

3.3 Allocation of main bearing shells

Matching crankshaft bearing shells to bearings in cylinder block

- Bearing shells of the correct thickness are matched to the in whole, is bearings in the cylinder block at the factory. Coloured dots on any lia the side of the bearing shells are used to identify the bearing shell thickness.
- The allocation of the bearing shells to the bearing positions in the cylinder block is indicated by a code letter at the relevant bearing on the retaining frame.

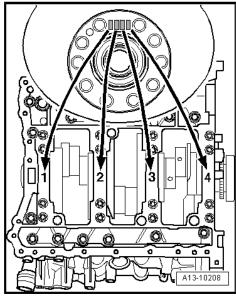
Code letter on retaining frame	Colour coding of bearing
R =	Red
G =	Yellow
B =	Blue
S =	Black



Matching crankshaft bearing shells to bearings in retaining frame

- Bearing shells of the correct thickness are matched to the bearings in the retaining frame at the factory. Coloured dots on the side of the bearing shells are used to identify the bearing shell thickness.
- ◆ The allocation of the bearing shells to the bearing positions in the retaining frame is indicated by a sequence of letters on the gearbox flange on the crankshaft. The first letter in the sequence stands for bearing "1", the second letter for bearing "2", etc.

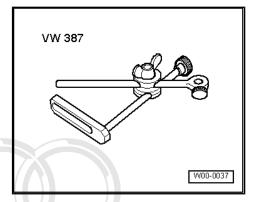
Letter on crankshaft	Colour coding of bearing
R =	Red
G =	Yellow
B =	Blue
S =	Black



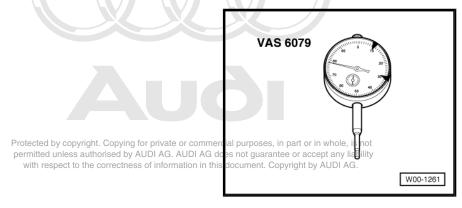
3.4 Measuring axial clearance of crankshaft

Special tools and workshop equipment required

Universal dial gauge bracket - VW 387-

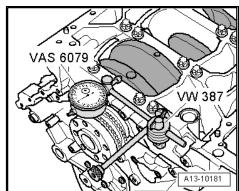


◆ Dial gauge - VAS 6079-



Procedure

- Secure dial gauge VAS 6079- with universal dial gauge bracket - VW 387- to cylinder block as shown in illustration.
- Apply dial gauge to crank web.
- Press crankshaft against dial gauge by hand and set gauge to
- Push crankshaft away from dial gauge and read off value.
- Axial clearance: 0.15 ... 0.25 mm



3.5 Measuring radial clearance of crankshaft

Special tools and workshop equipment required

◆ Plastigage

Procedure



Note

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 69</u> without rotating crankshaft.

- Remove retaining frame again.
- Compare width of Plastigage with measurement scale.

Radial clearance:

- New: 0.015 ... 0.055 mm.
- Wear limit: 0.080 mm.
- When carrying out final assembly, renew bolts.



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4 **Balance shaft**

- ⇒ "4.1 Exploded view balance shaft", page 73
- ⇒ "4.2 Removing and installing balance shaft", page 73

4.1 Exploded view - balance shaft

1 - Balance shaft

Removing and installing ⇒ page 73

2 - Bolt

- □ 60 Nm
- Use locating pin -T40116- as counterhold when loosening and tightening

3 - Balance weight (gearbox end)

- Can only be fitted on balance shaft in one position.
- 4 Bearing plate

5 - Bolt

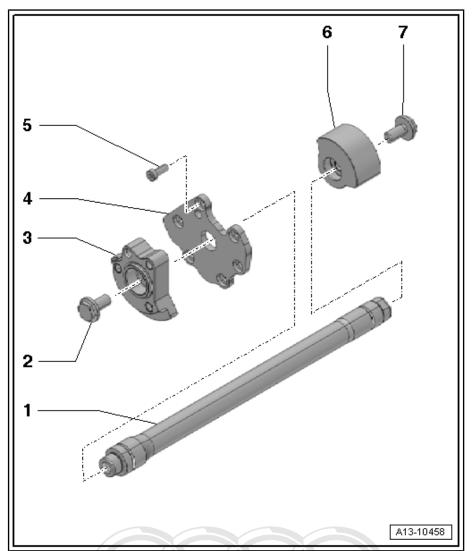
□ 13 Nm

6 - Balance weight (pulley end)

☐ Can only be fitted on balance shaft in one position.

7 - Bolt

- □ 60 Nm
- Use locating pin -T40116- as counterhold when loosening and tightening



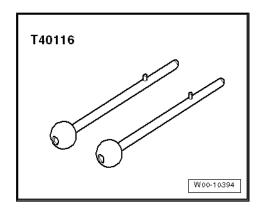
4.2 Removing and installing balance shaft

Special tools and workshop equipment required



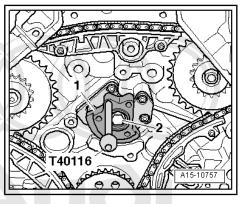
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♦ Locating pins - T40116-



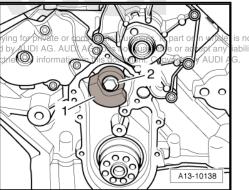
Removing

- Gearbox removed ⇒ Rep. gr. 37; Removing and installing gearbox; Removing gearbox .
- Remove sealing flange (pulley end) ⇒ page 58.
- Remove timing chain cover (bottom) ⇒ page 87.
- Remove drive chain for auxiliary drives ⇒ page 114.
- Use locating pin -T40116- to lock balance weight -1- in position at rear of engine.
- Unscrew bolt -2- and detach balance weight from balance shaft.

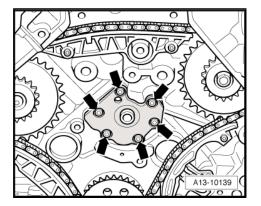


Unscrew bolt -2- (counterhold balance weight -1- with a suitable pin) and detach balance weight at front of engine from balance shaft.

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- Unscrew bolts -arrows- and detach bearing plate for balance shaft at rear of engine.
- Pull balance shaft to rear out of cylinder block.



Installing

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

Crankshaft -1- locked in "TDC" position with locking pin -



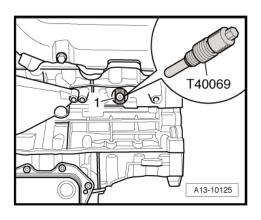
Note

Balance weights can only be fitted on balance shaft in one posi-

- Install drive chain for auxiliary drives ⇒ page 114.
- Install timing chain cover (bottom) ⇒ page 87.
- Install sealing flange (pulley end) ⇒ page 58.

Tightening torques

◆ ⇒ "4.1 Exploded view - balance shaft", page 73





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5 Pistons and conrods

- ⇒ "5.1 Exploded view pistons and conrods", page 76
- ⇒ "5.2 Removing and installing pistons", page 78
- ⇒ "5.3 Checking pistons and cylinder bores", page 79
- ⇒ "5.4 Checking radial clearance of conrod bearings", <u>page 80</u>

Exploded view - pistons and conrods 5.1



Note

- All bearing and running surfaces must be oiled before assembling.
- Oil spray jet for piston cooling ⇒ page 78.

1 - Bolts

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

2 - Conrod bearing cap

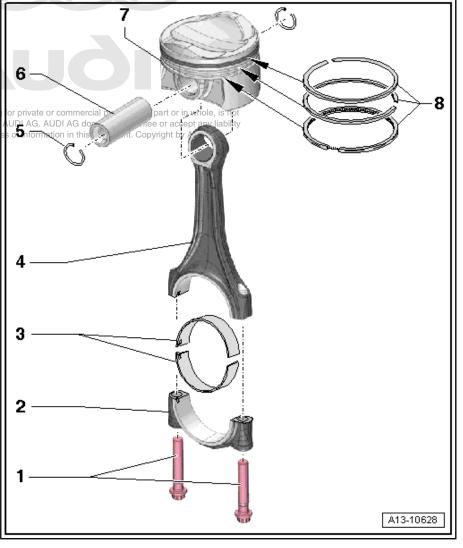
- Mark installation position for re-installation
- Mark cylinder and conrod allocation in colour ⇒ page 77
- Installation position of conrod pairs ⇒ page 77

3 - Bearing shells

- Ensure that retaining lugs are securely seated.
- Renew used bearing shells
- There are oversized bearings available for machined crankshaft conrod journals ⇒ Electronic parts catalogue
- Lugs on conrod bearings must be on the same side

4 - Conrod

- Only renew as a complete set
- ☐ Mark cylinder and conrod bearing cap allocation in colour ⇒ page 77
- □ Installation position of conrod pairs ⇒ page 77
- ☐ Axial clearance for each conrod pair (when new): 0.20 ... 0.45 mm
- Measuring radial clearance ⇒ page 80



5 - Circlip

□ Renew

6 - Piston pin

☐ Removing and installing <u>⇒ "5.2 Removing and installing pistons"</u>, page 78

7 - Piston

- ☐ Mark installation position and cylinder number <u>⇒ page 77</u>
- □ Removing and installing ⇒ page 78
- ☐ Renew piston if cracking is visible on piston crown or piston skirt
- ☐ Checking pistons and cylinder bores ⇒ page 79

8 - Piston rings

- Measuring ring gap ⇒ page 80
- Measuring ring-to-groove clearance ⇒ page 80
- ☐ 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°

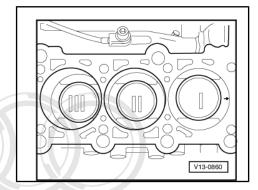
Installation position of pistons



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 attempt to mark the piston crown with a centre punch or by making a notch or similar.
- · Arrows on piston crowns point to pulley end.



Marking conrods



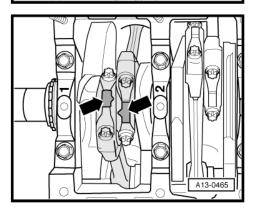
Note

- Only renew conrods as a complete set.
- tected by copyright. Copying for private or co Do not interchange conrod bearings mitted unless authorised by AUDI AG. AUDI with respect to the correctness of information
- Use a coloured pen to mark matching conrods and conrod bearing caps with cylinder numbers -arrow- for re-installation.

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Conrod installation position

The cast lugs -arrows- on the ground surfaces of the conrod pairs "1 and 2", "3 and 4", and "5 and 6" must face each other.



Oil spray jet for piston cooling

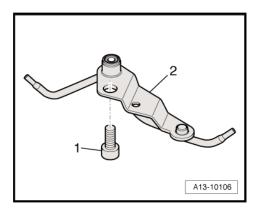
- Apply locking fluid to bolt and tighten to 9 Nm; for locking fluid refer to ⇒ Electronic parts catalogue.
- 2 Oil spray jet with spray nozzle valve (opening pressure: 2 ... 2.4 bar)



Caution

Risk of damage to oil spray jets.

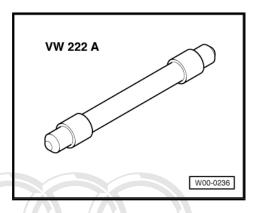
- ♦ Do not bend oil spray jets.
- ♦ Always renew bent oil spray jets.



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 29.
- Remove cylinder head ⇒ page 121.
- Remove upper section of sump ⇒ page 160.
- Mark installation position and matching of conrod bearing caps to cylinder and to conrods for reinstallation ⇒ page 77.
- Unbolt conrod bearing caps.

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- 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:



Note

Renew the bolts tightened with specified tightening angle.

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

Installation position:

- Pistons <u>⇒ page 77</u>
- Conrods ⇒ page 77
- Install conrod bearing caps according to markings.
- Install sump (upper section) ⇒ page 160.
- Install cylinder head ⇒ page 121.

Tightening torques

◆ ⇒ "5.1 Exploded view - pistons and conrods", page 76

5.3 Checking pistons and cylinder bores

Checking piston

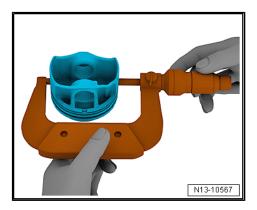
- Using a micrometer (75 ... 100 mm), measure approx. 15 mm from the lower edge, perpendicular to the piston pin axis.
- Maximum deviation from nominal dimension: 0.03 mm.

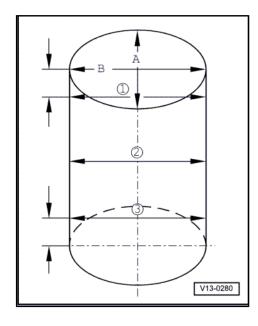
Piston Ø mm		
Nominal dimension 84.49 1)		
 1) Dimensions including coating (thickness approx. 0.02 mm). The coating will wear down in service. 		

Measuring cylinder bore

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

Cylinder bore Ø mm		
Nominal dimension 84.51 1)		
Properties at 50 mm into cylinder bore poses, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.		

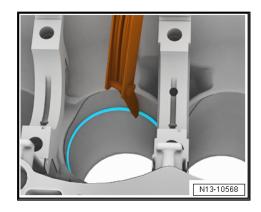




Measuring piston ring gap

- 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.

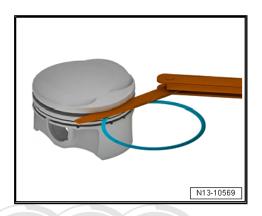
Piston ring	new mm	Wear limit mm
1st compression ring	0.20 0.30	0.80
2nd compression ring	0.50 0.70	0.80
Oil scraper ring	0.25 0.50	_ 1)
Specification not yet available.		



Measuring ring-to-groove clearance

Clean groove in piston before checking clearance.

Piston ring	new mm	Wear limit mm
1st compression ring	0.04 0.08	0.20
2nd compression ring	0.03 0.07	0.20
Oil scraper ring	0.02 0.06	0.15



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.
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- 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 76) without rotating crankshaft.
- Remove conrod bearing cap again.
- Compare width of Plastigage with measurement scale.

Radial clearance:

- New: 0.010 ... 0.052 mm.
- Wear limit: 0.120 mm.
- When carrying out final assembly, renew bolts.

15 - Cylinder head, valve gear

Timing chain cover

- ⇒ "1.1 Exploded view timing chain cover", page 81
- ⇒ "1.2 Removing and installing timing chain cover", page 83

1.1 Exploded view - timing chain cover

1 - Bolt 12 13 14 15 16 17 □ Renew Tightening torque and sequence ⇒ page 83 10 2 - Oil seal 18 ☐ For crankshaft (gearbox end) □ Renewing ⇒ page 64 3 - Bolt ☐ Renew ☐ Tightening torque and 19 sequence ⇒ page 83 6 4 - Dowel sleeve 5 □ 2x 5 - Threaded pin Tightening torque ⇒ Item 13 (page 171) 20 6 - Cylinder head gasket (leftside) 3 21 7 - Bolt 22 ☐ Renew 23 Tightening torque and 24 sequence ⇒ page 82 8 - Bracket For heat shield 25 rt or in whole, is not ivate or commercial purposes, i AUDI AG. AUDI AG does not guarante 9 - Timing chain cover (left ermitt accept any liability it by AUDI AG. ectness of information in this document. Cop side) Removing and installing 27 ⇒ page 83

- 10 Bracket
 - For wiring harness
- 11 Bolt
 - □ Renew
 - ☐ Tightening torque and sequence ⇒ page 82
- 12 Bracket
 - ☐ For electrical connectors for Lambda probes (left-side)
- 13 Bolt
 - ☐ Tightening torque and sequence ⇒ page 82
- 14 Seals
 - □ Renew

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26

15 - Bracket

☐ For electrical connectors for Lambda probes (right-side)

16 - Bolt

☐ Tightening torque and sequence ⇒ page 82

17 - Bolt

☐ Tightening torque and sequence ⇒ page 83

18 - Bracket

□ For electrical connectors

19 - Timing chain cover (right-side)

☐ Removing and installing ⇒ page 83

20 - Cylinder head gasket (right-side)

21 - Bracket

For heat shield

22 - Bolt

☐ Renew

☐ Tightening torque and sequence ⇒ page 83

23 - Dowel sleeve

□ 2x

24 - Bolt

☐ Tightening torque and sequence ⇒ page 83

25 - Timing chain cover (bottom)

□ Removing and installing ⇒ page 87

26 - Engine speed sender - G28-

□ Removing and installing ⇒ page 335

27 - Bolt

☐ Tightening torque <u>⇒ Item 14 (page 332)</u>





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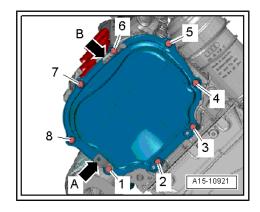
Timing chain cover (left-side) - tightening torque and tightening sequence



Note

- Renew the bolts tightened with specified tightening angle.
- The brackets -arrows A and B- are secured together with the timing chain cover (left-side).
- Tighten bolts in 2 stages in the sequence shown:

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



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



Note

- Renew the bolts tightened with specified tightening angle.
- The brackets -arrows A and B- are secured together with the timing chain cover (right-side).
- Tighten bolts in 2 stages in the sequence shown:

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

Timing chain cover (bottom) - tightening torque and tightening sequence



Note

Renew the bolts tightened with specified tightening angle.

Tighten bolts in stages as follows:

Stage	Bolts	Tightening torque/angle specification
1.	-arrows-	3 Nm
2.	-1 10-	3 Nm in diagonal sequence
3.	-1, 2, 4, 5, 7-	Turn 90° further
4.	-arrows-	9 Nm
5.	-8, 9, 10-	8 Nm
6.	-8, 9, 10-	Turn 90° further
7.	-3-	⇒ Item 13 (page 171)
8.	-6-	20 Nm
9.	-6-	Turn 180° further

1.2 Removing and installing timing chain cover

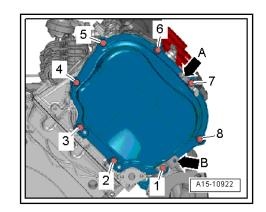
⇒ "1.2.1 Removing and installing timing chain covers (left/right)",

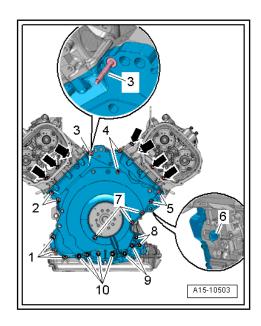
⇒ "1.2.2 Removing and installing timing chain cover (bottom)", <u>page 87</u>

1.2.1 Removing and installing timing chain covers (left/right)

Special tools and workshop equipment required

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





Removing



Note

Fit all cable ties in the original positions when installing.

- Remove engine cover panel (rear) ⇒ page 48.
- Remove corresponding combination valve for secondary air system ⇒ page 319 or ⇒ page 320.

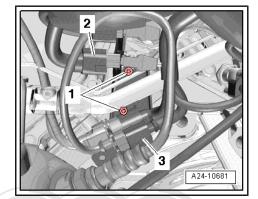
Timing chain cover (left-side):

 Remove bolts -1- and move bracket with electrical connectors to one side.

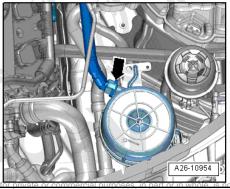


Note

Disregard -items 2, 3-.

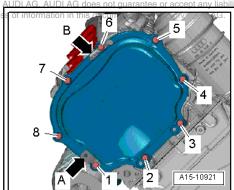


- Press release tabs and detach secondary air hose -arrowfrom secondary air pump motor - V101-.
- Move clear secondary air hose and electrical wiring harness at timing chain cover (left-side).



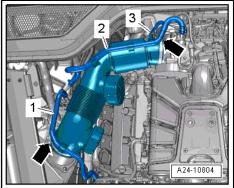
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- Unscrew bolts -1 ... 8- and detach brackets -arrows:AgoBe the correctness
- Carefully release timing chain cover (left-side) from bonded joint and detach.



Timing chain cover (right-side):

- Move fuel hose -1- and hose -2- from activated charcoal filter clear at air pipe.
- Detach vacuum hose -3- from connection on air pipe.
- Release hose clips -arrows- and remove air pipe.

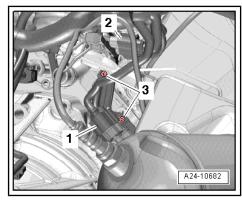


Remove bolts -3- and move bracket with electrical connectors to one side.



Note

Disregard -items 1, 2-.



- Move wiring harness clear at timing chain cover (right-side).
- Unscrew bolts -1 ... 8- and detach brackets -arrows A, B-.
- Carefully release timing chain cover (right-side) from bonded joint and detach.

Installing



Note

- Renew the bolts tightened with specified tightening angle.
- Fit new O-rings.
- Remove old sealant from sealing surfaces.



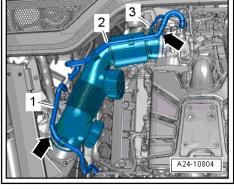
Caution

Protect lubrication system against contamination.

♦ Cover exposed parts of the engine.

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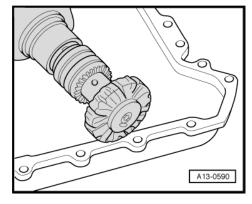
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WARNING

Risk of eye injury.

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

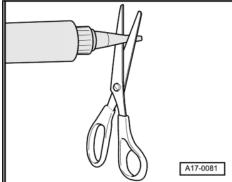




Note

Note the use-by date of the sealant.

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





Caution

Make sure lubrication system is not clogged by excess sealant.

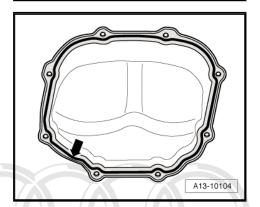
- The bead of sealant must not be thicker than specified.
- Apply sealant bead -arrow- onto clean sealing surfaces of timing chain cover as illustrated.
- Width of sealant bead: 2.5 mm.

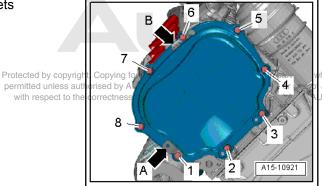


Note

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

Fit timing chain cover (left-side) together with brackets -arrows A and B- and tighten bolts ⇒ page 82.





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Fit timing chain cover (right-side) together with brackets -arrows A and B- and tighten bolts ⇒ page 83.

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



Note

- Fit new O-ring.
- 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 secure the air hoses at their connections, spray rust remover onto the worm thread of the used hose clips before installing.
- Install combination valve for secondary air ⇒ page 213.
- Install engine cover panel ⇒ page 48.

Tightening torques

- ⇒ Fig. 1995 Fig tightening sequence by AUSIAG. AUDI AG does not guarantee or accept any liab
- \Rightarrow Fig. ""Timing chain cover (right-side) tightening torque and tightening sequence"" , page 83

1.2.2 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

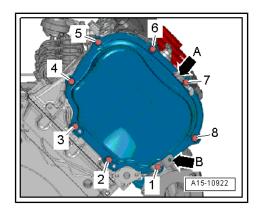
- Gearbox removed ⇒ Rep. gr. 37; Removing and installing gearbox; Removing gearbox .
- Engine oil drained ⇒ Maintenance; Booklet 410.



Note

Fit all cable ties in the original positions when installing.

- Remove coolant pipe (top) ⇒ page 211.
- Remove drive plate ⇒ page 62.
- Remove timing chain covers (left and right) ⇒ page 83.
- Remove oil filter housing ⇒ page 174.



- Unplug electrical connector -3- at starter (push retainer to the rear and press down release catch).
- Remove nut -2- for electrical wiring and detach starter.



Note

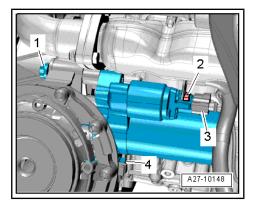
Disregard -items 1, 4-.

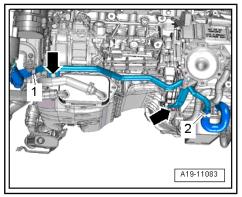
Remove bolts -arrows- at coolant pipe (bottom left).



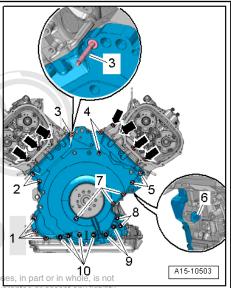
Note

Disregard -items 1, 2-.





- Remove bolts -arrows-.
- Slacken bolts -1 ... 10- 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).



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Installing

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



Note

- Renew the bolts tightened with specified tightening angle.
- Renew seals and/or gaskets.
- 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

Protect lubrication system against contamination.

◆ Cover exposed parts of the engine as authorised by AUDI AG. AUDI AG.

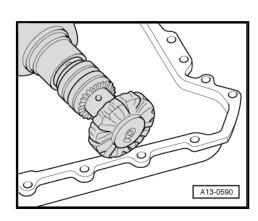
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WARNING

Risk of eye injury.

- ♦ Wear safety goggles.
- Remove remaining sealant on timing chain cover (bottom), cylinder block and cylinder head using rotating plastic brush or similar.
- Clean sealing surfaces; they must be free of oil and grease.
- Before installing gearbox, remove residue from threaded holes for engine/gearbox bolts in cylinder block using a thread tap.



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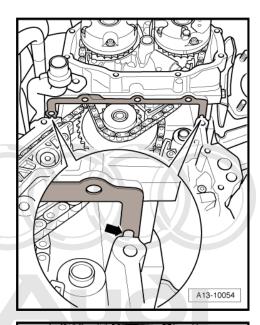
with resp

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



Note

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



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Caution

Avoid damage to cylinder head gasket.

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



Note

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

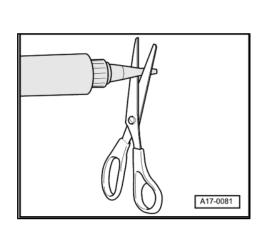
- Carefully bend the ends of the cylinder head gaskets down very slightly -arrows-, just far enough to be able to clean the upper sealing surface on the cylinder head gasket and cylinder
- Clean cylinder head gaskets (top and bottom); they must be free of oil and grease.



Note

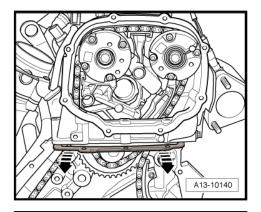
Note the use-by date of the sealant.

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

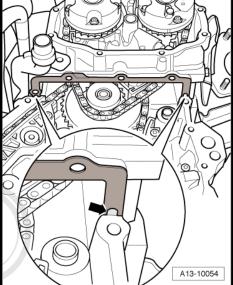




- Apply a small amount of sealant to sealing surfaces of cylinder head gaskets (top and bottom). To do so, you again have to bend cylinder head gaskets down very slightly -arrows-.
- Use a flat object (e.g. a feeler gauge) to apply sealant to the area between cylinder head and gasket.



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





Note

Depending on version, a second sleeve -2- may be fitted between sealing flange and cylinder block on left side of engine.

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Caution

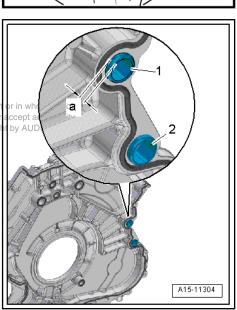
Risk of sealant entering hole for gearbox bolt.

- ♦ Appropriate sleeve -1- ⇒ Electronic parts catalogue must be fitted before installing timing chain cover (bottom).
- ◆ Projection of sleeve -a- = 3 mm above the sealing surface.



Note

Sleeves -1- and -2- have different diameters and are not interchangeable.



Timing chain cover (bottom), version 1



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 ... 4- onto the clean sealing surfaces of the timing chain cover (bottom) as illustrated.
- The groove on the sealing surface must be completely filled with sealant.
- The beads of sealant must project 1.5 ... 2.0 mm above the sealing surface.
- Apply sealant -3- in a continuous bead as shown in illustration (although groove is not continuous).



Note

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

Insert seals -arrows- in grooves on timing chain cover (bottom).

Timing chain cover (bottom), version 2



Caution

Make sure lubrication system is not clogged by excess sealant.

- ♦ The beads of sealant must not be thicker than specified.
- Apply sealant beads -1 ... 4- onto the clean sealing surfaces of the timing chain cover (bottom) as illustrated.
- The groove on the sealing surface must be completely filled with sealant.
- The beads of sealant must project 1.5 ... 2.0 mm above the sealing surface.
- Apply sealant -3- in a continuous bead as shown in illustration (although groove is not continuous).

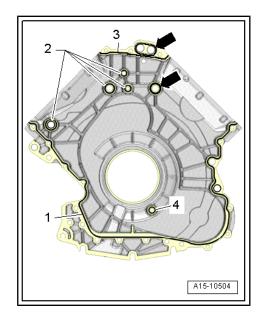


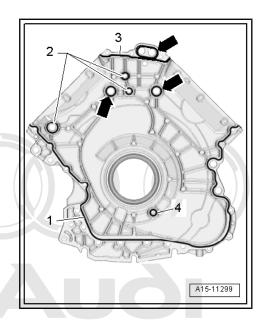
Note

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not **The timing chain cover must be installed within 5 minutes after** less authorised by AUDI AG. AUDI AG does not guarantee or accept any liability applying the sealant.

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Insert seals -arrows- in grooves on timing chain cover (bottom).





All versions (continued):

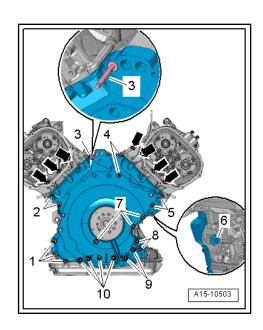
- Fit timing chain cover (bottom), guiding it towards the sealing surface on cylinder block and cylinder head at an angle and from below.
- Take care not to damage the cylinder head gaskets when fitting the cover.
- Tighten bolts <u>⇒ page 83</u>.

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

- Install crankshaft oil seal (gearbox end) ⇒ page 64.
- Secure coolant pipe (bottom left) ⇒ page 200.
- Install coolant pipe (top) ⇒ page 211.
- Install starter ⇒ Electrical system; Rep. gr. 27; Starter; Exploded view - starter .
- Install oil filter housing ⇒ page 174.
- Install timing chain covers (left and right) ⇒ page 83.
- Install drive plate ⇒ page 62.
- Install coolantypipe (top) page 211 commercial purposes, in part or in whole, is not
- Fill with engine oil and check oil level Maintenance Bookleto AG. 410.

Tightening torques

⇒ Fig. ""Timing chain cover (bottom) - tightening torque and tightening sequence", page 83



2 Chain drive

- ⇒ "2.1 Exploded view camshaft timing chains", page 94
- ⇒ "2.2 Exploded view drive chain for valve gear", page 97
- ⇒ "2.3 Exploded view drive chain for balance shaft and oil pump", page 99
- ⇒ "2.4 Removing camshaft timing chain from camshafts", page 100
- ⇒ "2.5 Removing and installing camshaft timing chain", page 111
- ⇒ "2.6 Removing and installing drive chain for valve gear", page 113
- ⇒ "2.7 Removing and installing drive chain for balance shaft and oil pump", page 114

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 chain sprocket

- □ For exhaust camshaft
- □ Removing and installing ⇒ "2.5 Removing and installing camshaft timing chain", page 111

4 - Camshaft adjuster

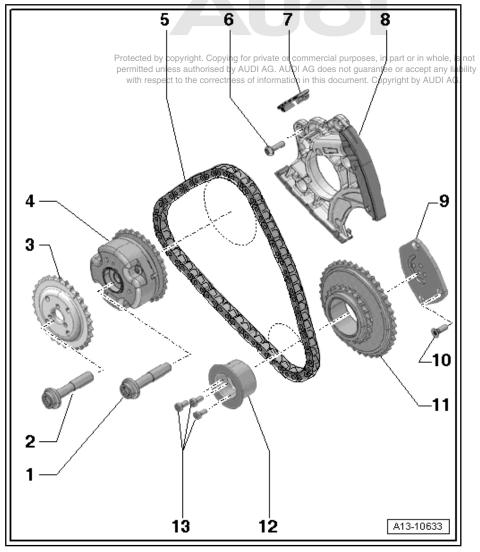
- For inlet camshaft
- ☐ Identification "Intake"
- □ Different versions available with 3 or 4 recesses; for allocation refer to ⇒ Electronic parts catalogue
- □ Removing and installing ⇒ "2.5 Removing and installing camshaft timing chain", page 111

5 - Camshaft timing chain (left-side)

- Mark direction of rotation for re-installation with a paint marker
- □ Removing from camshafts ⇒ page 100
- □ Removing and installing ⇒ page 111

6 - Bolt

□ 9 Nm



7 - Slide

8 - Chain tensioner

- ☐ For camshaft timing chain (left-side)
- □ Removing and installing ⇒ "2.5 Removing and installing camshaft timing chain", page 111

9 - Bearing plate

□ For drive chain sprocket

10 - Bolt

☐ Tightening torque <u>⇒ Item 10 (page 97)</u>

11 - Drive chain sprocket

☐ For camshaft timing chain (left-side)

12 - Bearing mounting

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

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□ Tightening torque ⇒ Item 3 (page 97)

Camshaft timing chain (right-side)

1 - Bolt

- □ Renew
- 80 Nm + turn 90° further

2 - Camshaft chain sprocket

- □ For exhaust camshaft
- □ Removing and installing 2.5 Removing and installing camshaft timing chain", page 111

3 - Bolt

- ☐ Renew
- 80 Nm + turn 90° further

4 - Camshaft adjuster

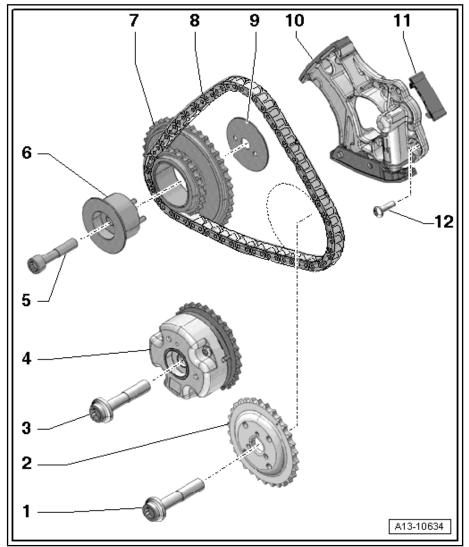
- □ For inlet camshaft
- □ Identification "Intake"
- □ Different versions available with 3 or 4 recesses; for allocation refer to ⇒ Electronic parts catalogue
- □ Removing and installing ⇒ "2.5 Removing and installing camshaft timing chain", page 111

5 - Bolt

Tightening torque ⇒ Item 15 (page 97)

6 - Bearing mounting

- For drive chain sprocket for camshaft timing chain (right-side)
- □ Asymmetric version
- ☐ Installation position ⇒ page 98



7 - Drive chain sprocket
☐ For camshaft timing chain (right-side)
☐ Installation position ⇒ page 98
8 - Camshaft timing chain (right-side)
☐ Mark direction of rotation for re-installation with a paint marker
☐ Removing from camshafts <u>⇒ page 100</u>
☐ Removing and installing <u>⇒ page 111</u>
9 - Thrust washer
☐ For drive chain sprocket for camshaft timing chain (right-side)
☐ Asymmetric version
☐ Installation position ⇒ page 98
10 - Chain tensioner
For camshaft timing chain (right side) yright. Copying for private or 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 ⇒ "2.5 Removing and installing camshaft timing chain Apage 111
11 - Slide
12 - Bolt
□ 9 Nm

2.2 Exploded view - drive chain for valve gear

1 - Guide rail 2 - Bolt

☐ Renew

□ 10 Nm + turn 90° further

3 - Bolts

□ Renew

□ 5 Nm + turn 60° further

4 - Bearing mounting

□ For drive chain sprocket

5 - Drive chain sprocket

For camshaft timing chain (left-side)

6 - Bolt

□ Renew

□ 10 Nm + turn 90° further

7 - Drive chain

For timing drive

Mark direction of rotation for re-installation with a paint marker

□ Removing and installing ⇒ page 113

8 - Bolt

□ Renew

□ 10 Nm + turn 90° further

9 - Guide rail

10 - Bolt

☐ Renew Protected by copyright. (

10 11 6 8 9 12 13 14 15 16 17 18 A13-10673 8 Nm + turm 45° further orded by AUDI AG. AUDI AG account guarantees or acceptant with respect to the correctness of information in this document. Copyright by AUDI AG.

11 - Bearing plate

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

12 - Drive chain sprocket

☐ For camshaft timing chain (right-side)

☐ Installation position ⇒ page 98

13 - Thrust washer

□ Asymmetric version

☐ Installation position ⇒ page 98

14 - Bearing mounting

☐ For drive chain sprocket for camshaft timing chain (right-side)

□ Asymmetric version

☐ Installation position ⇒ page 98

15 - Bolt

□ 30 Nm + turn 90° further

16 - Seal

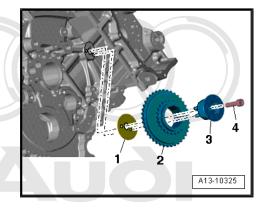
□ Renew

Audi A8 2010 ➤

- 17 Chain tensioner
 - Removing and installing ⇒ "2.6 Removing and installing drive chain for valve gear", page 113
- 18 Bolt
 - □ 9 Nm
- 19 Crankshaft
- 20 Bolt
 - ☐ Renew
 - ☐ 10 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



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Exploded view - drive chain for balance shaft and oil pump 2.3

1 - Crankshaft

2 - Drive chain

- ☐ For balance shaft and oil pump
- Mark direction of rotation for re-installation with a paint marker
- □ Removing and installing ⇒ page 114

3 - Drive chain sprocket

- □ For oil pump
- ☐ Installation position: Side with lettering faces engine

4 - Bolt

- ☐ Renew
- □ 30 Nm + turn 90° further

5 - Compression spring

6 - Bolt

- Renewited by copyright. Copying
- ☐ 15 Nm + turn 90° furthers

7 - Chain sprocket

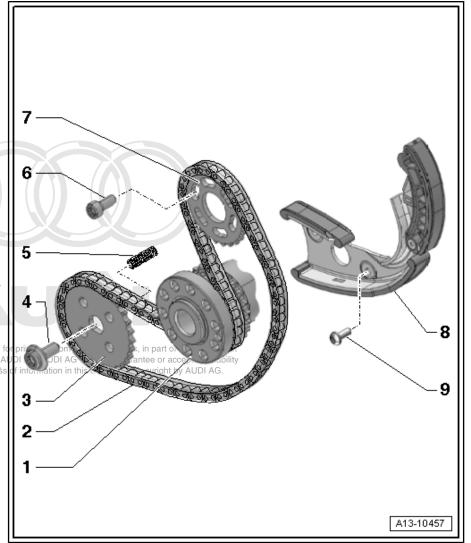
- ☐ For balance shaft
- Installation position: Side with lettering faces gearbox

8 - Chain tensioner

■ With guide rail

9 - Bolt

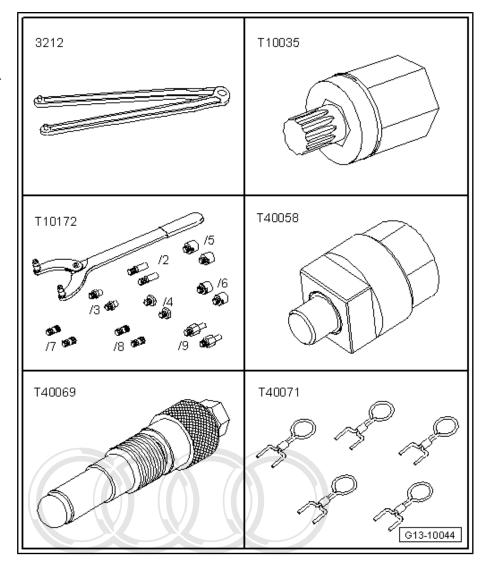
- ☐ Renew
- ☐ 10 Nm + turn 45° further



Removing camshaft timing chain from camshafts 2.4

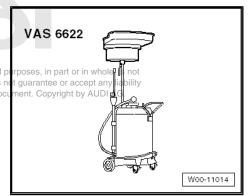
Special tools and workshop equipment required

- Pin wrench 3212-
- Special wrench T10035-
- Adapter T40058-
- Locking pin T40069-
- 2x Locking pin T40071-

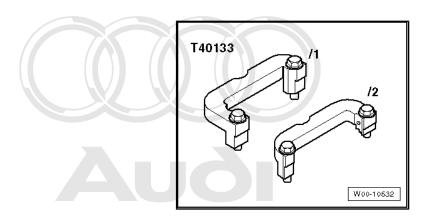


Used oil collection and extraction unit - VAS 6622A-

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♦ 2x Camshaft clamp - T40133-

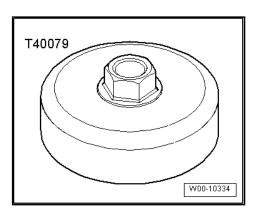


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Special wrench - T40269- for camshaft adjuster with 3 recess AG. AG.



Special wrench - T40079- for camshaft adjuster with 4 recesses



Removing

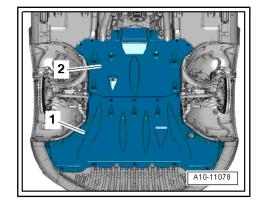


Note

- In the following procedure the camshaft timing chains remain on the engine.
- When working on one cylinder head only, it is not necessary to remove the timing chain cover on the opposite cylinder head as well.
- Remove relevant timing chain cover <u>⇒ page 83</u>.
- Remove corresponding cylinder head cover \Rightarrow page 129.

installing noise insulation.

Remove noise insulation panels -1- and -2- \Rightarrow General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and

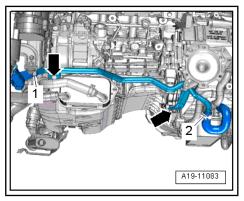


Remove bolts -arrows- and push coolant pipe (bottom left) upwards.

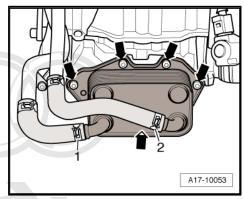


Note

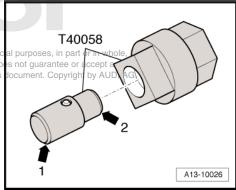
Disregard -items 1, 2-.



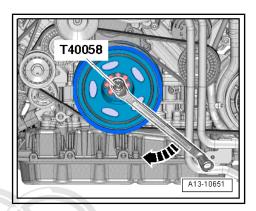
- Position used oil collection and extraction unit VAS 6622Abelow engine.
- Remove bolts -arrows- and tie up engine oil cooler to one side with coolant hoses -1- and -2- attached.



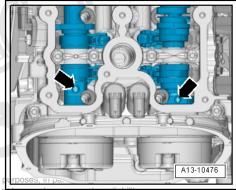
- Insert guide pin of adapter -T40058- as follows:
- The larger-diameter section -arrow 1- faces towards the engine. Protected by copyright. Copying for private or commer
- The smaller-diameter section -arrow 2 defaces the adapter. AUDI AG do with respect to the correctness of information in this



Use adapter - T40058- and angled ring spanner to turn crankshaft in direction of engine rotation -arrow- to "TDC".



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



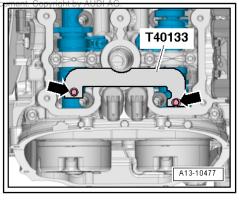
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Fit camshaft clamps - T40133- onto both cylinder heads and tighten bolts -arrows- to 25 Nm.

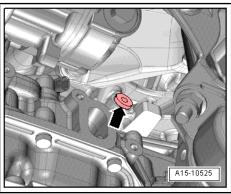


Note

The illustration shows the cylinder head on the left side.

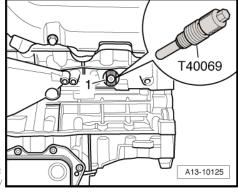


Remove plug -arrow- for crankshaft "TDC" marking from cylinder block.



Screw locking pin - T40069- into hole (20 Nm); if necessary, turn crankshaft -1- backwards and forwards slightly to fully centralise locking pin.

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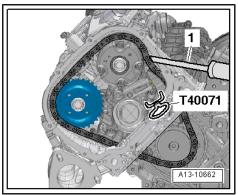


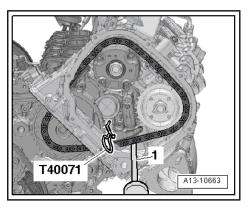


Note

Chain tensioners for camshaft timing chain are oil-damped and can only be compressed slowly by applying constant pressure.

- 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-.
- 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-.





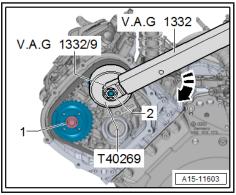
Camshaft adjusters with three recesses:



Caution

Avoid damage to camshafts.

- Do NOT use camshaft clamp T40133- to counterhold when loosening bolt for camshaft adjuster or camshaft chain sprocket.
- Counterhold at corresponding camshaft adjuster by applying special wrench - T40269- with torque wrench - V.A.G 1332and open ring spanner insert - V.A.G 1332/9-, and loosen bolt -2-.





Note

Disregard -item 1- and -arrow-.

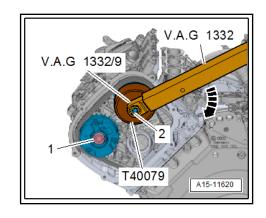
Camshaft adjusters with four recesses:



Caution

Avoid damage to camshafts.

- ◆ Do NOT use camshaft clamp T40133- to counterhold when loosening bolt for camshaft adjuster or camshaft chain sprocket.
- Counterhold at corresponding camshaft adjuster by applying special wrench - T40079- with torque wrench - V.A.G 1332and open ring spanner insert - V.A.G 1332/9-, and loosen bolt





Note

Disregard -item 1- and -arrow-.

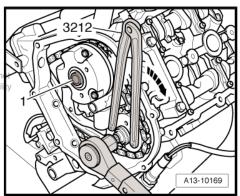
All vehicles (continued):

Fit pin wrench - 3212- to counterhold on corresponding camshaft sprocket and loosen bolt with special wrench - T10035-.



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Disregard -item 1- and -arrow-.



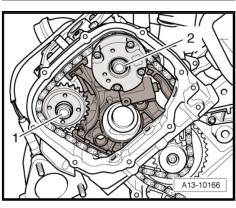
Mark position of camshaft adjuster and camshaft sprocket with paint for re-installation.



Caution

Risk of irreparable damage to engine.

- Block off the opening in the valve timing housing with a clean cloth to prevent small items from dropping into the engine.
- Unscrew bolts -1- and -2- on cylinder head (left-side) and remove camshaft adjuster and camshaft sprocket.



- Mark position of camshaft adjuster and camshaft sprocket with paint for re-installation.
- Unscrew bolts -1- and -2- on cylinder head (right-side) and remove camshaft adjuster and camshaft sprocket.

Installing



Note

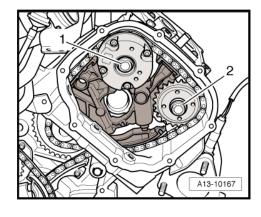
Renew the bolts tightened with specified tightening angle.

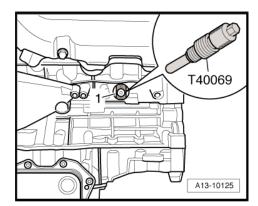


Caution

Avoid damage to valves and piston crowns.

- The crankshaft must not be at "TDC" at any cylinder when the camshafts are turned.
- Drive chain for valve gear installed <u>⇒ page 113</u>
- Crankshaft -1- locked in "TDC" position with locking pin -T40069-.





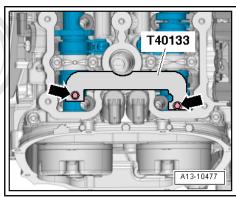
Camshafts on both cylinder heads locked in "TDC" position -arrows- with camshaft clamp - T40133- (25 Nm).



Note

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



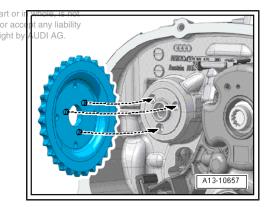




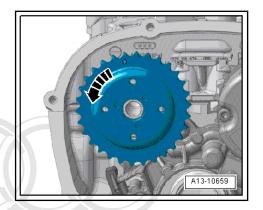
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Risk of damage to engine.

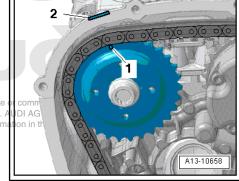
- The camshaft sprockets MUST be installed as described in the following work steps:
- Fit camshaft sprockets according to marks applied when removing.
- When fitting camshaft sprockets, make sure that the lugs on the camshaft sprockets engage in the slots on the camshafts -arrows-.



Turn camshaft sprocket on camshaft anti-clockwise onto stop -arrow-.



Dot -1- should align with adjustment window -2-.



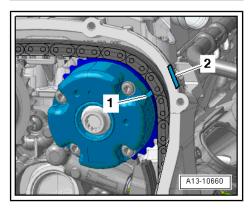
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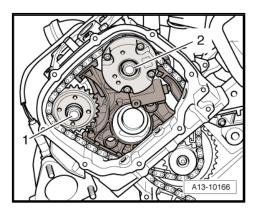


Caution

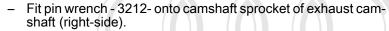
Risk of damage to engine.

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





- Re-install camshaft adjuster on cylinder head (right-side) in the same position as before (pay attention to marks applied when removing).
- Fit camshaft timing chain (right-side) onto drive sprocket, camshaft adjuster and camshaft sprocket and fit bolts -1- and -2without tightening.
- It should just be possible to turn the camshaft adjuster and camshaft sprocket on the camshaft without axial movement.
- Remove locking pin T40071- .



- Have a 2nd mechanic apply tension to camshaft timing chain by pressing camshaft sprocket in direction of -arrow-.
- Tighten bolts as follows while keeping camshaft sprocket under tension:

Stage	Bolt	Tightening torque
1.		on exhaust camshaft: 80 Nm
1.	-1-	on inlet camshaft: 80 Nm

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- Fit special wrench T40269- onto camshaft adjuster of inlet camshaft (left-side).
- Apply torque wrench V.A.G 1332- with open ring spanner insert - V.A.G 1332/9- to key - T40269- .
- Have a second mechanic apply approx. 40 Nm of tension to camshaft timing chain by pressing torque wrench - V.A.G 1332- in direction of -arrow-.

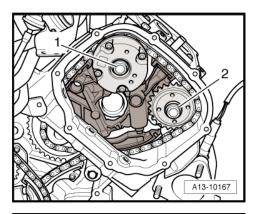
Camshaft adjusters with four recesses:

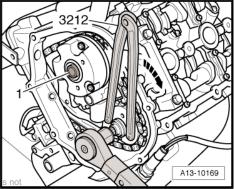
- Fit special wrench T40079- onto camshaft adjuster of inlet camshaft (left-side).
- Apply torque wrench V.A.G 1332- with open ring spanner insert - V.A.G 1332/9- to key - T40079- .
- Have a second mechanic apply approx. 40 Nm of tension to camshaft timing chain by pressing torque wrench - V.A.G 1332- in direction of -arrow-.

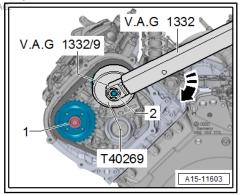
All vehicles (continued):

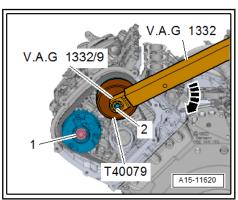
Tighten bolts as follows while keeping camshaft adjuster under tension:

Stage	Bolt	Tightening torque
1.	-1-	on exhaust camshaft: 80 Nm
1.		on inlet camshaft: 80 Nm



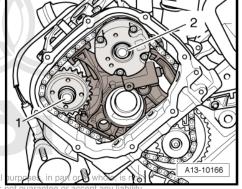






Tighten bolts securing camshaft adjuster and camshaft sprocket on cylinder head (left-side) as follows:

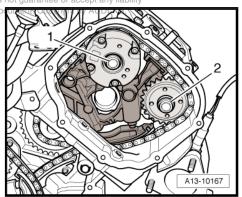
Stage	Bolt	Tightening torque
2.	-1-	Tighten on exhaust camshaft to final tightening torque ⇒ Item 2 (page 94)
2.	-2-	Tighten on inlet camshaft to final tightening torque ⇒ Item 1 (page 94)



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Tighten bolts securing camshafft adjuster and class haft mation in this do sprocket on cylinder head (right-side) as follows:

Stage	Bolt	Tightening torque
2.	-1-	Tighten on inlet camshaft to final tightening torque ⇒ Item 3 (page 95)
2.	-2-	Tighten on exhaust camshaft to final tightening torque ⇒ Item 1 (page 95)

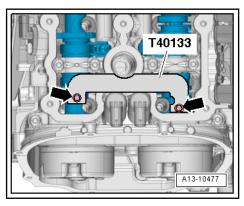


Remove camshaft clamps - T40133- from both cylinder heads -arrows-.

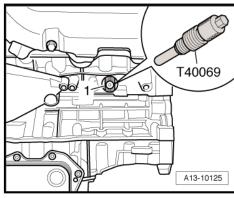


Note

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



- Remove locking pin - T40069- .

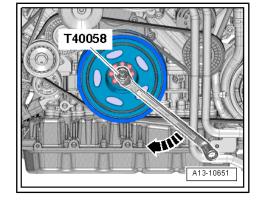


Using adapter - T40058- and angled ring spanner, turn crankshaft 2 revolutions in normal direction of rotation -arrow- until crankshaft is at "TDC" again.

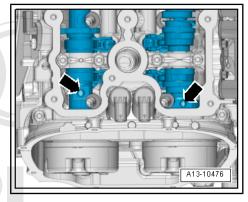


Note

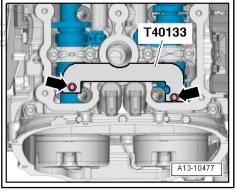
If you turn the crankshaft beyond "TDC" by mistake, turn it back approx. 30° and set to "TDĆ" again.



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



Fit camshaft clamps - T40133- onto both cylinder heads and tighten bolts -arrows- to 25 Nm copyright. Copying for private or commercial purpose permitted unless authorised by AUDI AG. AUDI AG does not guar with respect to the correctness of information in this document



- The locking pin T40069- must engage in the locating hole in crankshaft -1-. If it does not, reset valve timing.
- Remove camshaft clamps from both cylinder heads.
- Remove locking pin.

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

- Install engine oil cooler ⇒ page 165.
- Secure coolant pipe (bottom left) ⇒ page 200.
- Install cylinder head cover ⇒ page 129.
- Install timing chain covers (left and right) ⇒ page 83.

Tightening torques

- ♦ ± "2.1 Exploded view camshaft timing chains", page 94
- Plug for "TDC" marking on crankshaft ⇒ page 68
- ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view - noise insulation

2.5 Removing and installing camshaft timing chain

Removing

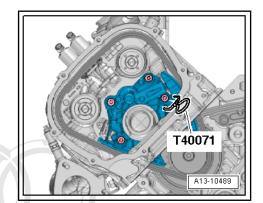
- Gearbox removed ⇒ Rep. gr. 37; Removing and installing gearbox; Removing gearbox .
- Remove timing chain cover (bottom) ⇒ page 87.
- Remove timing chain from camshafts on relevant side ⇒ page 100



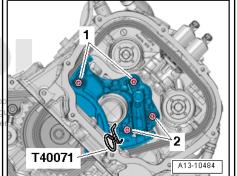
Caution

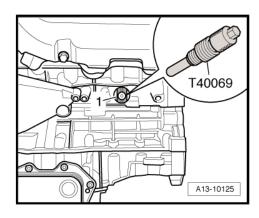
If a used timing chain rotates in the opposite direction when it is refitted, this can cause breakage.

- ◆ Mark running direction of timing chains (left and right) with paint for re-installation. Do not attempt to mark the timing chain with a centre punch or by making a notch or similar.
- Remove locking pin T40071- and detach camshaft timing chain (left-side).
- Remove bolts -1- and -2- and take off chain tensioner (rightside).



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- Press guide rail of chain tensioner for drive chain for valve gear in direction of -arrow- and lock chain tensioner by inserting locking pin - T40071-.
- Remove bolt -1- securing bearing mounting for drive chain sprocket.
- Pull off drive sprocket with bearing mounting and lift off camshaft timing chain (right-side).

Installing



Note

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



Caution

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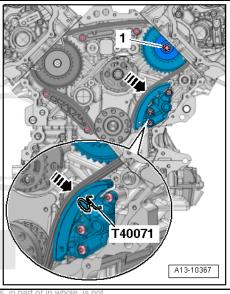
Avoid damage to valves and piston crowns.

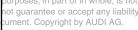
- The crankshaft must not be at "TDC" at any cylinder when the camshafts are turned.
- Fit camshaft timing chain (left-side) on drive chain sprocket according to marks made upon removal and guide chain upwards to cylinder head.
- Press down guide rail of chain tensioner for timing chain (leftside) and lock chain tensioner by inserting locking pin -T40071-.
- T40071 A13-10489
- Fit camshaft timing chain (right-side) on drive chain sprocket according to marks made upon removal and guide chain upwards to cylinder head.
- Install drive sprocket ⇒ page 98.
- Tighten bolt -1- securing bearing mounting for drive chain sprocket.
- Remove locking pin T40071-.

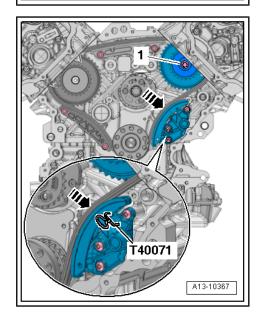


Note

Disregard -arrow-.







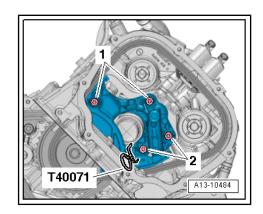
- Fit chain tensioner on cylinder head (right-side).
- Tighten bolts -1- and -2-.

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

- Fit timing chains on camshafts ⇒ page 106.
- Install timing chain cover (bottom) ⇒ page 87.

Tightening torques

⇒ "2.1 Exploded view - camshaft timing chains", page 94

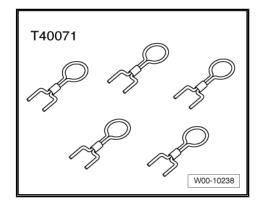


2.6 Removing and installing drive chain for valve gear

Special tools and workshop equipment required

♦ Locking pin - T40071-

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Removing

- Gearbox removed ⇒ Rep. gr. 37; Removing and installing gearbox; Removing gearbox.
- Remove timing chain cover (bottom) ⇒ page 87.
- Remove timing chains <u>⇒ page 111</u>.
- Remove drive chain for auxiliary drives ⇒ page 114.

 Press guide rail of chain tensioner for drive chain in direction of -arrow- and lock chain tensioner by inserting locking pin -T40071- .



Caution

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

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

Installing

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



Note

Renew the bolts tightened with specified tightening angle.

- Position drive chain for valve gear onto drive chain sprockets (according to marks applied during removal).
- Install guide rail and tighten bolts -1-.
- Install chain tensioner and tighten bolts -2-.
- Press guide rail of chain tensioner for drive chain in direction of -arrow- and pull locking pin - T40071- out of chain tensioner.
- Install drive chain for auxiliary drives ⇒ page 114.
- Install camshaft timing chains ⇒ page 111.
- Install timing chain cover (bottom) ⇒ page 87.

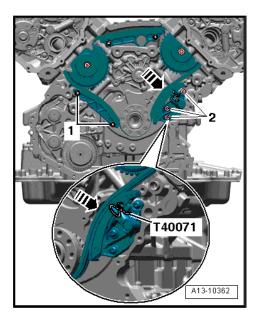
Tightening torques

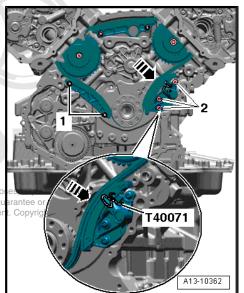
♦ "2.2 Exploded view - drive chain for valve gear" page 97

recial purp

**Trickle of the chain for valve gear and the chain for the chai

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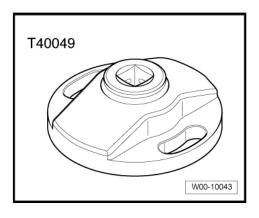




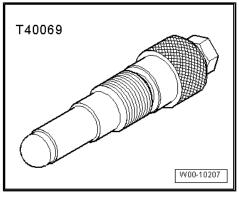
2.7 Removing and installing drive chain for balance shaft and oil pump

Special tools and workshop equipment required

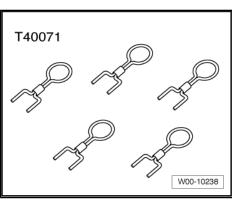
Special wrench - T40049-



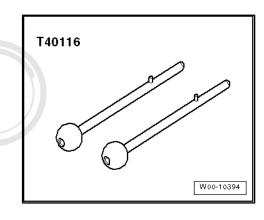
♦ Locking pin - T40069-



◆ Locking pin - T40071-



◆ Locating pins - T40116-



Removing

- Gearbox removed leste Repopgish 37 py Removing and installings, in part or in whole, is not gearbox; Removing earbox; Removing earbox and installings and constallings. It is not guarantee or accept any liability gearbox; Removing earbox are correctness of information in this document. Copyright by AUDI AG.
- Remove timing chain cover (bottom) ⇒ page 87.

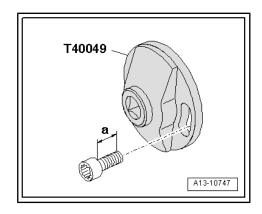


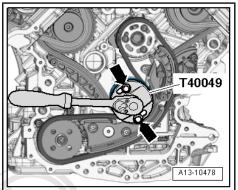


Caution

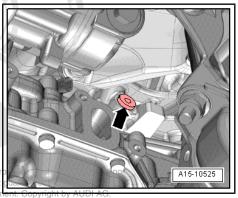
Risk of damage to drive chain if thread of bolt exceeds specified length.

- Use bolts with a maximum thread length -a- of 22 mm to attach special wrench -T40049-.
- If no suitable bolts are available, position suitable washer (s) under bolt head so that remaining thread length does not exceed 22 mm.
- Attach special wrench T40049- at rear end of crankshaft using 2 bolts -arrows-.



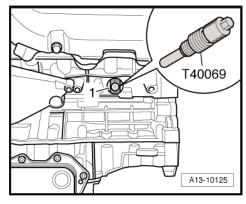


- Remove plug -arrow- for crankshaft "TDC" marking from cylinder block.
- Rotate crankshaft in normal direction of rotation to "TDC".



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Screw locking pin - T40069- into hole (20 Nm); if necessary, turn crankshaft -1- backwards and forwards slightly to fully centralise locking pin.



T40071

A13-10479

Press guide rail of chain tensioner in direction of -arrow- and lock chain tensioner by inserting locking pin - T40071-.



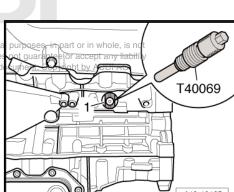
Caution

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 paint for re-installation. Do not attempt to mark the drive chain with a centre punch or by making a notch or similar.
- Unscrew bolts -3- and detach chain sprocket from balance shaft.
- Remove bolts -1- and -2- and take off chain tensioner with chain.



Crankshaft -1- locked in "TDC per position with locking ping. AUDI AG do T40069- . with respect to the correctness of information in this



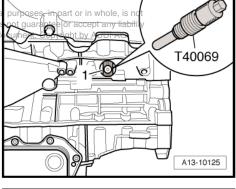
- Install chain tensioner with chain and balance shaft sprocket.
- Lock balance shaft in "TDC" position using locating pin -T40116-.
- The elongated holes in the balance shaft sprocket must be aligned centrally over the threaded holes in the balance shaft. If necessary move chain one tooth further.
- Tighten bolts for chain tensioner.
- Fit bolts -1- for chain sprocket without tightening.
- It should just be possible to turn the sprocket on the balance shaft without axial movement.
- Pull out locking pin T40071- to release chain tensioner.
- Press against guide rail of chain tensioner -arrow- using a screwdriver, and at the same time tighten bolts -1- securing chain sprocket.
- Pull locating pin -T40116- out of balance shaft.

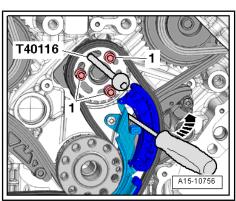
Remaining installation steps are carried out in reverse sequence; note the following:

Install timing chain cover (bottom) ⇒ page 87.

Tightening torques

- ⇒ "2.3 Exploded view drive chain for balance shaft and oil <u>pump", page 99</u>
- ◆ Plug for "TDC" marking on crankshaft ⇒ page 68





3 Cylinder head

- ⇒ "3.1 Exploded view cylinder head", page 118
- ⇒ "3.2 Removing and installing cylinder head", page 121
- ⇒ "3.3 Removing and installing cylinder head cover", page 129
- ⇒ "3.4 Checking compression", page 131

3.1 Exploded view - cylinder head



Note

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

1 - Cylinder head gasket

- Renewing "3.2 Removing and installing cylinder head", page 121
- ☐ Installation position: part number must face cylinder head
- ☐ If renewed, change coolant and engine oil

2 - Cylinder head

- Removing and installing <u>⇒ page 121</u>
- Checking for distortion ⇒ page 120
- Machining limit ⇒ page 120
- ☐ If renewed, change coolant and engine oil

3 - O-ring

□ Renew

4 - Hall sender

- Cylinder bank 1 (rightside): Hall sender - G40-
- Cylinder bank 2 (leftside): Hall sender 2 -G163-
- Removing and installing ⇒ page 334

5 - Bolt

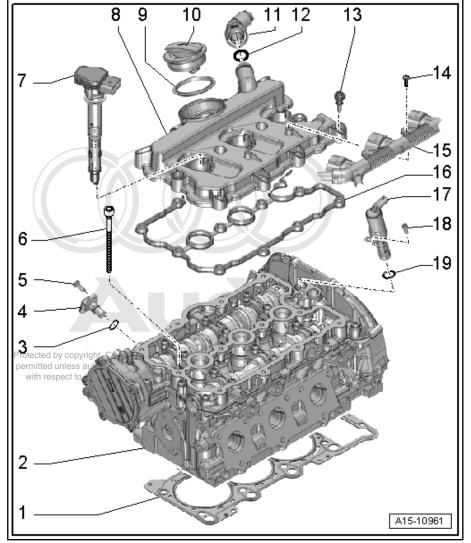
□ Tightening torque ⇒ Item 1 (page 331)

6 - Bolt

- □ Renew
- □ Note correct sequence when loosening <u>⇒ page 127</u>
- ☐ Tightening torque and sequence ⇒ page 120

7 - Ignition coil

□ Removing and installing ⇒ page 332



8 - Cylinder head cover

□ Removing and installing ⇒ page 129

9 - Seal

- □ Renew if damaged or leaking
- 10 Filler cap
- 11 Hose
 - ☐ For crankcase breather
 - ☐ Removing and installing ⇒ page 169

12 - O-ring

☐ Renew

13 - Bolt

- □ Renew if seal is damaged
- \Box Tightening torque and tightening sequence: cylinder head cover (left-side) \Rightarrow page 119, cylinder head cover (right-side) ⇒ page 120

14 - Bolt

☐ Tightening torque ⇒ Item 8 (page 331)

15 - Connector rail

For ignition coils

16 - Gasket

- □ For cylinder head cover
- ☐ Renew if damaged or leaking

17 - Camshaft control valve

- ☐ Cylinder bank 1 (right-side): camshaft control valve 1 N205-
- ☐ Cylinder bank 2 (left-side): camshaft control valve 2 N208-

18 - Bolt

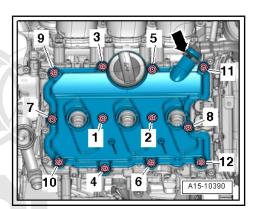
□ 5 Nm

19 - O-ring

□ Renew

Cylinder head cover (left-side) - tightening torque and sequence

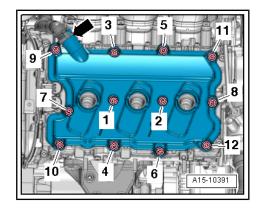
- Tighten bolts in the sequence -1 ... 12- to 9 Nm.



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Cylinder head cover (right-side) - tightening torque and sequence

- Tighten bolts in the sequence -1 ... 12- to 9 Nm.



Cylinder head - tightening torque and sequence

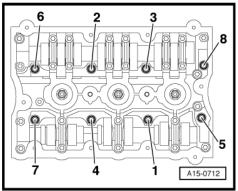


Note

Renew the bolts tightened with specified tightening angle.

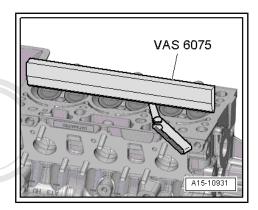
Tighten bolts in 4 stages in the sequence shown:

Stage	Bolts	Tightening torque/angle specification
1.	-1 8-	Screw in by hand until contact is made
2.	-1 8-	40 Nm
3.	-1 8-	Turn 90° further
4.	-1 8-	Turn 90° further



Checking cylinder head for distortion

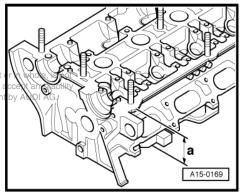
- Use straight edge 500 mm VAS 6075- and feeler gauge to measure cylinder head for distortion at several points.
- Maximum distortion: 0.05 mm



Cylinder head machining limit

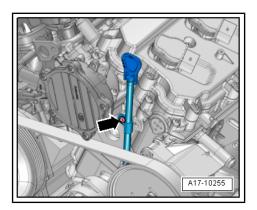
Machining of the cylinder head (surface grinding) is only permissible down to the minimum dimension -a-.

Minimum dimension: a-type plant 20 mm for private or commercial purposes, in part permitted unless authorised by AUDI AG. AUDI AG does not guarantee or with respect to the correctness of information in this document. Copyright



Guide tube for oil dipstick - tightening torque

- Tighten bolt -arrow- to 9 Nm.



Removing and installing cylinder head 3.2

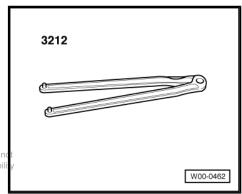
Special tools and workshop equipment required

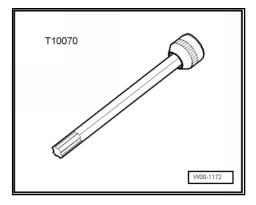
♦ Pin wrench - 3212-



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For vehicles up to July 2011: special wrench, long reach -T10070-





♦ For vehicles from July 2011 onwards: bit XZN 10 - T40270-

Removing

· Engine in vehicle.



Note

- The following chapter describes how to remove both cylinder heads together.
- ♦ If only one of the cylinder heads is to be removed, refer to the corresponding procedure described in this chapter.
- Fit all cable ties in the original positions when installing.



WARNING

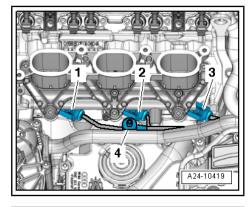
The fuel system operates at extremely high pressure. This can cause injury.

- The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system. Procedure ⇒ page 264
- Remove coolant pipe (front) ⇒ page 202.
- Remove coolant pipe (top) ⇒ page 211.
- Remove poly V-belt ⇒ page 53.
- Remove corresponding intake manifold (bottom section)
- Unplug electrical connectors -1, 2, 3- at injectors.

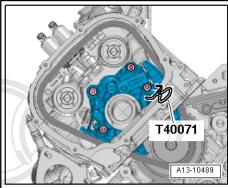


Note

Disregard -item 4-.



- Remove timing chain from camshafts on relevant side ⇒ page 100 .
- Remove locking pin T40071- from cylinder head (left-side).



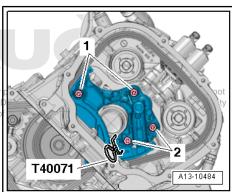
Remove bolts -1- and -2- and detach chain tensioner from cylinder head (right-side).



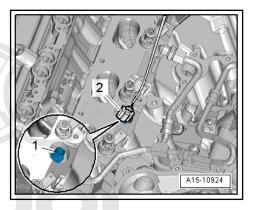
Note

Locking pin - T40071- remains in place.

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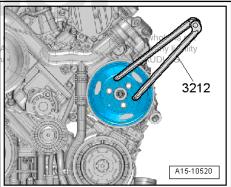


Unplug electrical connector -arrow- for coolant valve for cylinder head - N489- .



Remove bolts for power steering pump pulley (counterhold with pin wrench - 3212-).

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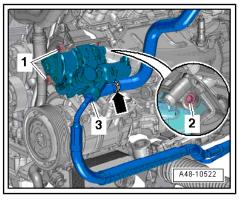


Remove bolts -1 and 2- and move power steering pump to one side.



Note

Disregard -item 3- and -arrow-.

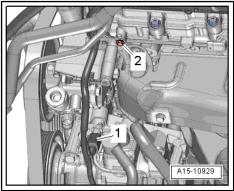


- Remove bolt -2- for earth connection.



Note

Disregard -item 1-.

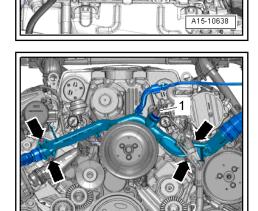


- Unplug electrical connectors on cylinder head (left-side):
- 1 For Hall sender 2 G163-
- 3 For camshaft control valve 2 N208-
- Move electrical wiring harness clear to side.

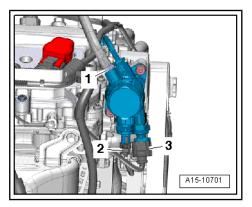


Ignore items marked -2- and -arrows-.

- Unplug electrical connector -1- for coolant temperature sender - G62- .
- Remove bolts -arrows- at coolant pipe (front).



- Unscrew connection -1- and move fuel supply hose clear to one side.
- Unplug electrical connectors -2- and -3-.



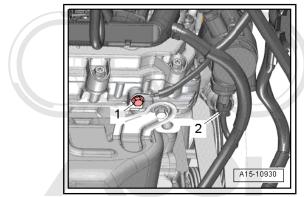
A15-10923

Remove bolt -1- for earth connection.



Note

Disregard -item 2-.



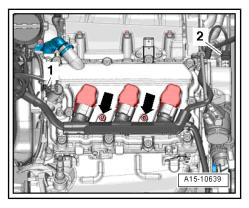
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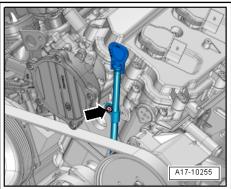
- Unplug electrical connectors on cylinder head (right-side):
- Camshaft control valve 1 N205-
- Hall sender G40-
- Move electrical wiring harness clear to side.



Disregard -arrows-.

- Remove bolt -arrow- and pull out guide tube for oil dipstick.



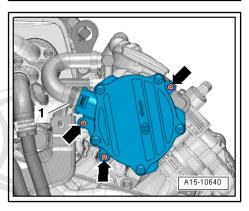


Release hose clip -1-, detach vacuum hose from vacuum pump and move vacuum hose clear.



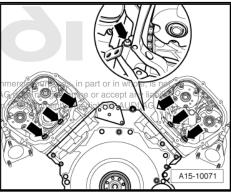
Note

Disregard -arrows-.



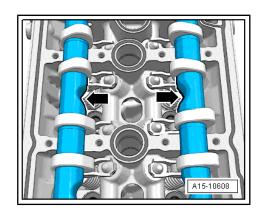
- Remove bolts -arrows- at rear of cylinder head.
- ◆ Cylinder head (left-side): 3 bolts
- ◆ Cylinder head (right-side): 4 bolts

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- Different types of camshafts are fitted depending on version.
- Camshafts with assembly clearance feature have tool recesses -arrows-; the cylinder head bolts can be removed without any further preparation.
- Camshafts without tool recesses must be removed ⇒ page 137 before the cylinder head bolts can be removed.





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- Use special wrench, long reach T10070- / bit XZN 12 -T40270- to slacken cylinder head bolts in the sequence
- Unscrew bolts, detach cylinder head and set it down on a soft surface (foam plastic).

Installing



Caution

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.

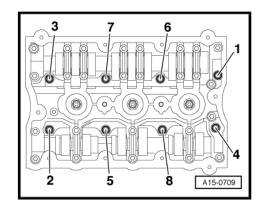
- Carefully remove any sealant residue from the cylinder head and cylinder block. Ensure that no long scores or scratches are made on the surfaces.
- Carefully remove any remaining emery and abrasive ma-
- Do not remove new cylinder head gasket from packaging until it is ready to be fitted.
- Handle 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 cted by copyright. Copying for private or commen

♦ 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.

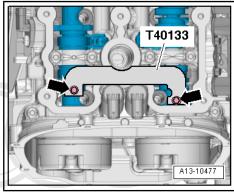
Turn the engine carefully at least 2 rotations to ensure that none of the valves make contact when the starter is operated.



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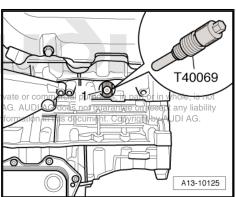


- Renew the bolts tightened with specified tightening angle.
- Renew self-locking nuts as well as seals, gaskets and O-rings.
- Note the different sealants for sealing surfaces and cylinder head bolts ⇒ Electronic parts catalogue .
- When installing an exchange cylinder head, the contact surfaces between the hydraulic compensation elements, roller rocker fingers and cams must be oiled before installing the cylinder head cover.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .
- After renewing the cylinder head or cylinder head gasket, change the coolant and engine oil.
- Camshafts on both cylinder heads locked in "TDC" position -arrows- with camshaft clamp - T40133- (25 Nm).
- The camshaft clamp T40133- is positioned correctly if the holes for the cylinder head bolts remain free.

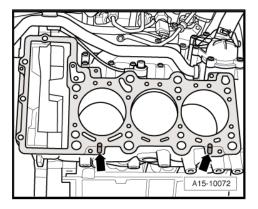


Crankshaft -1- locked in "TDC" position with locking pin -T40069-.

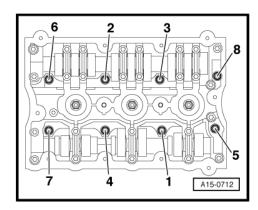




- Fit new seals for coolant pipe (front).
- Place cylinder head gasket in position.
- Installation position: the word "oben" (top) or the Part No. should be visible.
- Pay attention to dowel sleeves -arrows- in cylinder block.
- Fit cylinder head.



Tighten cylinder head bolts ⇒ page 120.



- Tighten bolts -arrows- for timing chain cover (bottom) ⇒ page 83 .
- ◆ Cylinder head (left-side): 3 bolts
- Cylinder head (right-side): 4 bolts



Note

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

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

- Install coolant pipe (front) ⇒ page 202.
- Install coolant pipe (top) ⇒ page 211.
- Install power steering pump ⇒ Running gear, axles, steering; Rep. gr. 48; Hydraulic power steering; Removing and installing power steering pump.
- Install camshaft timing chains ⇒ page 111.
- Install intake manifold (bottom sections) ⇒ page 279.
- Install poly V-belt <u>⇒ page 53</u>
- Install coolant pipe (top) ⇒ page 211.
- Change engine oil ⇒ Maintenance; Booklet 410.
- Fill cooling system with fresh coolant ⇒ page 185.

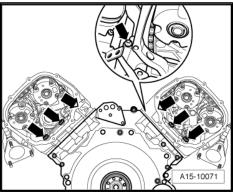
Tightening torques

- ⇒ Fig. ""Cylinder head tightening torque and sequence", <u>page 120</u>
- ⇒ Fig. ""Timing chain cover (bottom) tightening torque and tightening sequence"" , page 83
- ⇒ Figetet® Guidertube for/oil dipstick ctightening torque to in whole, is not page 170 pd unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability page 17 page unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liat with respect to the correctness of information in this document. Copyright by AUDI AG.

Removing and installing cylinder head 3.3 cover

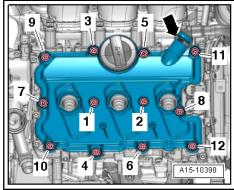
Removing

Remove ignition coils ⇒ page 332.



Cylinder head cover (left-side):

- Disconnect crankcase breather hose -arrow- by pressing release tabs.
- Unscrew bolts in the sequence -12 ... 1- and remove cylinder head cover.



Cylinder head cover (right-side):

- Disconnect crankcase breather hose -arrow- by pressing release tabs.
- Unscrew bolts in the sequence -12 ... 1- and remove cylinder head cover.

Installing

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



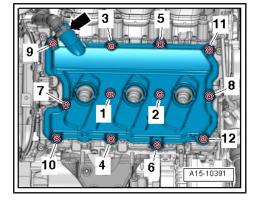
Note

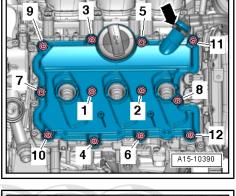
Fit new O-ring.

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- Renew gasket for cylinder head cover if damaged pect to the correctness of information in this document. Copyright by AUDI AG.
- Renew bolts for cylinder head cover if seals on bolts are damaged.
- Clean sealing surfaces; they must be free of oil and grease.
- Tighten bolts for cylinder head cover (left-side) ⇒ page 119.
- Tighten bolts for cylinder head cover (right-side) ⇒ page 120.
- Install ignition coils ⇒ page 332.

Tightening torques

- ⇒ Fig. ""Cylinder head cover (left-side) tightening torque and sequence" ⁶, page 119
- ⇒ Fig. ""Cylinder head cover (right-side) tightening torque and sequence", page 120

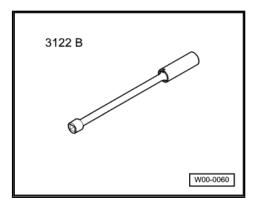




Checking compression 3.4

Special tools and workshop equipment required

♦ Spark plug socket and extension - 3122 B-

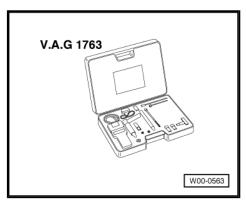


Compression tester - V.A.G 1763-



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- Remove ignition coils ⇒ page 332.



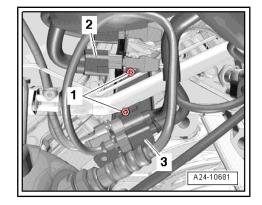
 Unplug electrical connector -2- for injectors at rear of cylinder head (left and right).



Note

Disregard -items 1, 3-.

- Remove spark plugs with spark plug socket and extension -3122 B- .
- Check compression pressure with compression tester -V.A.G 1763- .





Note

Using the compression tester ⇒ Operating instructions .

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

Compression pressure	bar
When new	11.0 14.0
Wear limit	10.0
Maximum difference between cylinders	3.0

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

- Install spark plugs ⇒ Maintenance; Booklet 410.
- Install ignition coils ⇒ page 332.
- Entries are stored in the event memory of the engine control unit because electrical connectors have been unplugged and the engine started:
 [Generate readiness code] in Guided Functions ⇒ Vehicle diagnostic tester.



4 Valve gear

- ⇒ "4.1 Exploded view valve gear", page 133
- ⇒ "4.2 Measuring axial clearance of camshaft", page 135
- ⇒ "4.3 Measuring radial clearance of camshaft", page 136
- ⇒ "4.4 Removing and installing camshaft", page 137
- ⇒ "4.5 Checking hydraulic valve compensation elements", page 143
- ⇒ "4.6 Removing and installing valve stem oil seals", page 145

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 - Sealing plug

Apply sealant when installing; refer to ⇒ Electronic parts catalogue

2 - Cylinder head

Protected by cop Checking valve guides ⇒ page 15

3 - Valve stem oil seal

 Removing and installing ⇒ page 145

4 - Valve spring

□ Installation position ⇒ page 135

5 - Hydraulic valve compensation element

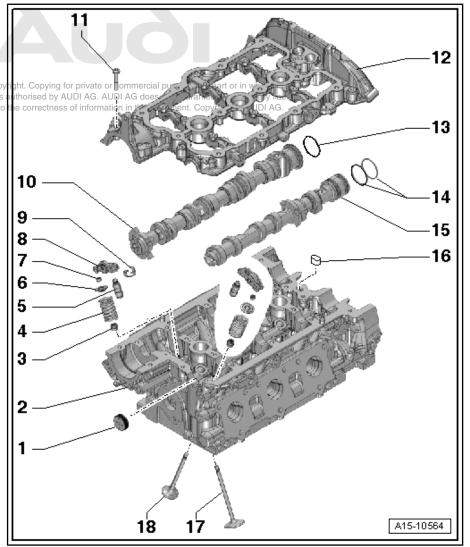
- Clipped into roller rocker finger -item 8-
- Checking ⇒ page 143
- Mark installation position for re-installation
- Lubricate contact surface before installing

6 - Valve spring plate

7 - Valve cotters

8 - Roller rocker finger

- Mark installation position for re-installation
- Check roller bearings for ease of movement
- Lubricate contact surface before installing

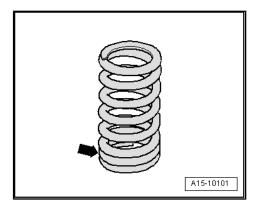


Audi A8 2010 ➤
6-cylinder direct petrol injection engine with supercharger (3.0 ltr. 4-valve) - Edition 08.2013

	Assembly: attach to hydraulic compensation element -item 5- using securing clip -item 9-
9 - S	ecuring clip
	Not supplied separately
	Check for firm attachment
10 - I	nlet camshaft
	Removing and installing ⇒ page 137
	Measuring axial clearance ⇒ page 135
	Measuring radial clearance <u>⇒ page 136</u>
	Runout: max. 0.04 mm
11 - E	3olt
	Renew
	Tightening torque and sequence <u>⇒ page 135</u>
	Use old bolts when measuring radial clearance
12 - F	Retaining frame
	With integrated camshaft bearings
	Removing and installing ⇒ "4.4 Removing and installing camshaft", page 137
13 - 0	Compression ring
14 - F	Rectangular section seals
15 - E	Exhaust camshaft
	Removing and installing ⇒ page 137
	Measuring axial clearance ⇒ page 135
	Measuring radial clearance <u>⇒ page 136</u>
	Runout: max. 0.04 mm
16 - 0	Dill strainer Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability
17 - I	nlet valve with respect to the correctness of information in this document. Copyright by AUDI AG.
	Must not be machined; only grinding-in is permissible
	Mark installation position for re-installation
	Checking ⇒ page 153
	Valve dimensions <u>⇒ page 153</u>
	Checking valve guides <u>⇒ page 152</u>
18 - E	Exhaust valve
	Must not be machined; only grinding-in is permissible
	Mark installation position for re-installation
	Checking ⇒ page 153
	Valve dimensions ⇒ page 153
	Checking valve guides ⇒ page 152

Installation position of valve spring

Closely spaced spring coils -arrow- face towards cylinder head.



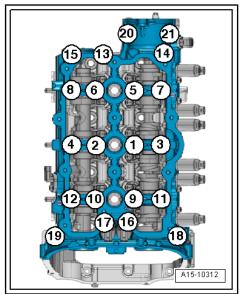
Retaining frame for camshafts - tightening torque and sequence



Note

- The illustration shows the retaining frame for the camshafts of the left-hand cylinder head. The procedure is symmetrically opposite on the right-hand cylinder head.
- Renew the bolts tightened with specified tightening angle.
- Tighten bolts in 3 stages in the sequence shown:

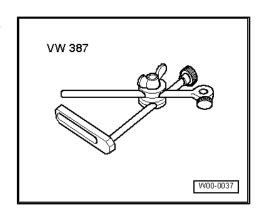
Stage	Bolts	Tightening torque/angle specification
1.	-1 21-	Screw in by hand until they make contact. The retaining frame should make contact with the cylinder head over the full surface
2.	-1 21-	8 Nm
3.	-1 21-	Turn 90° further



4.2 Measuring axial clearance of camshaft

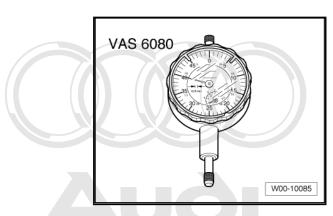
Special tools and workshop equipment required

 Universal dial gauge bracket. AVWA387es not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.



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♦ Dial gauge - VAS 6080-



Procedure

- Remove camshafts ⇒ page 137.
- Mark allocation of roller rocker fingers for re-installation.
- Carefully remove roller rocker fingers and place them on a clean surface.
- Re-insert camshafts, install retaining frame ⇒ page 135 and tighten with old bolts to 8 Nm.
- Secure universal dial gauge bracket VW 387- with dial gauge
 VAS 6079- to cylinder head as shown in illustration.
- 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

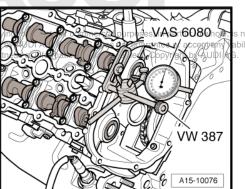
Plastigage

Procedure

- Remove camshafts ⇒ page 137.
- 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 retaining frame and secure with old bolts without rotating camshafts ⇒ page 135.
- Remove retaining frame and camshafts again.
- Compare width of Plastigage with measurement scale.

Radial clearance:

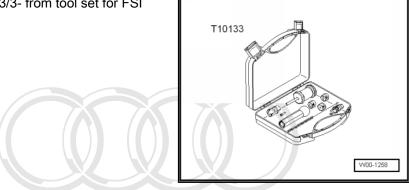
- 24 mm bearing diameter: 0.024 ... 0.066 mm
- 36 mm bearing diameter: 0.032 ... 0.078 mm
- When carrying out final assembly, use new bolts
 ⇒ Item 11 (page 134)



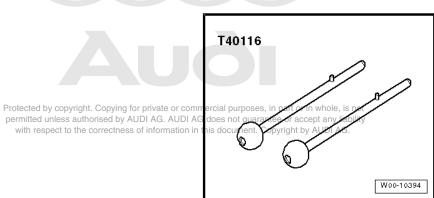
4.4 Removing and installing camshaft

Special tools and workshop equipment required

♦ Impact extractor attachment -T10133/3- from tool set for FSI engines - T10133-



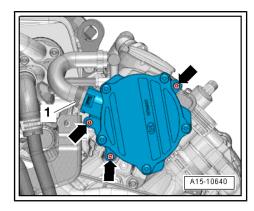
♦ Locating pins - T40116-



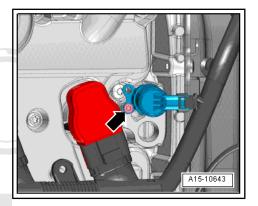
- ◆ Electric drill with plastic brush
- Safety goggles
- ◆ Sealant ⇒ Electronic parts catalogue

Removing

- Remove timing chains from camshafts ⇒ page 100.
- To remove camshafts in cylinder head (left-side), remove vacuum pump ⇒ Brake system; Rep. gr. 47; Vacuum system; Removing and installing vacuum pump.
- To remove camshafts in cylinder head (right-side), first remove high-pressure pump and housing for high-pressure pump drive ⇒ page 291.



Remove bolt -arrow- and detach camshaft control valve -N205- / -N208- .



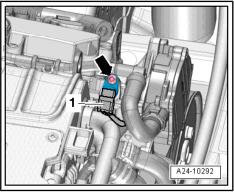
- Unplug electrical connector -1- at Hall sender -G40- / -G163- .



Note

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Disregard -arrow-.

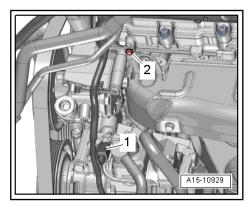


Remove bolt -2- for earth connection.

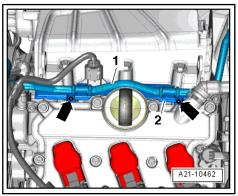


Note

Disregard -item 1-.



- Move clear vacuum hose -1- on cylinder bank 2 (left-side).
- Remove bolts -arrows- and detach cover -2-.



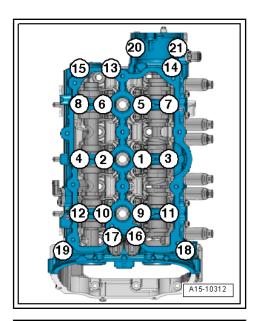
Slacken retaining frame bolts in the sequence -21 ... 1-.



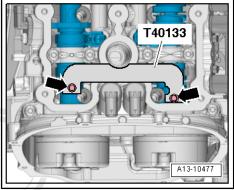
Note

Perform the same procedure (laterally reversed) on retaining frame (right-side).

Remove bolts, carefully release retaining frame from bonded joint and set it down with camshafts on a soft surface on workbench.



- Remove camshaft clamp T40133- -arrows-.
- Mark camshafts, remove and place on a clean surface.





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Audi A8 2010 ➤

Installing



Note

Renew seals/gaskets and sealing plugs.

- Crankshaft -1- locked in "TDC" position with locking pin -T40069-.
- Hydraulic compensation elements and roller rocker fingers installed.



Caution

Protect lubrication system and bearings against contamination.

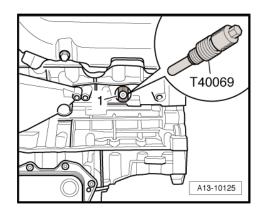
◆ Cover exposed parts of the engine.

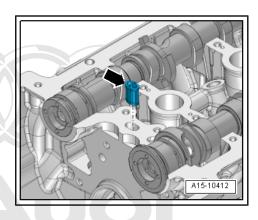


WARNING

Risk of eye injury.

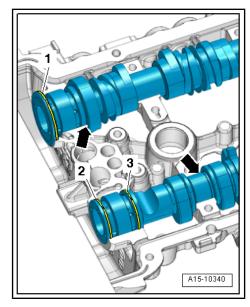
- Wear safety goggles.
- Remove remaining sealant from cylinder head and retaining frame using rotating plastic brush or similar.
- Clean sealing surfaces; they must be free of oil and grease.
- Check strainer -arrow- for dirt and clean as necessary.
- Oil running surfaces of both camshafts.



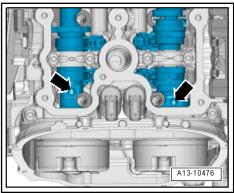


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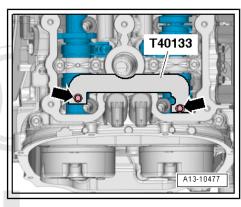
- Fit camshafts in retaining frame.
- Camshafts must be in correct position in axial bearings -arrows- in retaining frame.
- The ends of the rectangular section seals -1, 2, 3- must point up or down. The ends of the rectangular section seals must never point to the side.
- Turn retaining frame over with camshafts fitted, holding camshafts firmly in position.



- Turn camshafts until threaded holes -arrows- point upwards.
- Check that camshafts are still in correct position in axial bearings in retaining frame.



Fit camshaft clamps - T40133- onto both cylinder heads and tighten bolts -arrows- to 25 Nm.

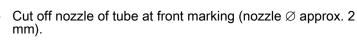


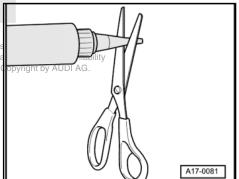


Note

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Note the use-by date of the sealants authorised by AUDI AG. AUDI AG does not guar
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- Turn retaining frame upside down again.



Caution

Make sure excess sealant does not contaminate camshaft bearings.

- ◆ The beads of sealant must not be thicker than specified.
- Apply beads of sealant -4 ... 8- onto clean sealing surfaces of retaining frame as shown in illustration.
- · Width of sealant beads: 2.0 mm.
- Apply beads of sealant -1 ... 3- onto clean sealing surfaces of retaining frame as shown in illustration.
- · Width of sealant beads: 2.5 mm.

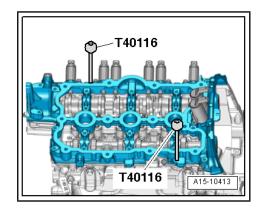


Note

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

- Fit retaining frame onto cylinder head.
- Insert locating pins -T40116- in retaining frame and cylinder head.



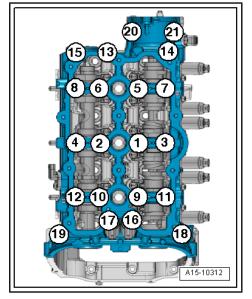
A15-10246

Tighten bolts securing retaining frame for camshafts
 ⇒ page 135

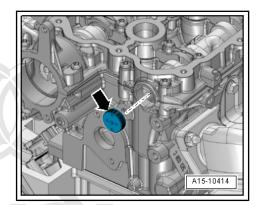


Note

After installing the retaining frame, wait about 30 minutes for the sealant to dry.



- Clean bore for outer sealing plug in cylinder head (left and right); it must be free of oil and grease.
- Coat outer circumference of sealing plug -arrow- with sealant; for sealant refer to > Electronic parts catalogue.
- Drive in sealing plug until flush.



Use impact extractor attachment -T40116- to pull out locating pins -T10133/3-.

Remaining installation steps are carried out in reverse sequence; Protected by copyright. Copying for private of permitted unless authorised by AUDI AG. A note the following:

- Install housing for high-pressure pump drive and high-pres-of information sure pump <u>⇒ page 291</u> .
- Install camshaft control valves -N205- / -N208- ⇒ page 118.
- Install vacuum pump ⇒ Brake system; Rep. gr. 47; Vacuum system; Removing and installing vacuum pump.
- Fit timing chains on camshafts ⇒ page 111.



Caution

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

- ⇒ "4.1 Exploded view valve gear", page 133
- ⇒ Fig. ""Retaining frame for camshafts tightening torque and sequence", page 135

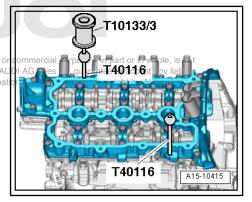
4.5 Checking hydraulic valve compensation elements



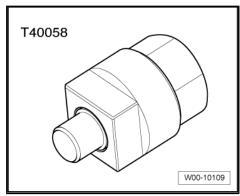
Note

- The hydraulic compensation elements cannot be serviced.
- Irregular valve noises when starting engine are normal.

Special tools and workshop equipment required



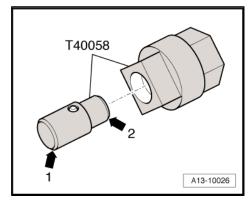




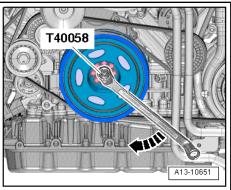
♦ Feeler gauge

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

- Start engine and prunountib radiator fan has istarted rup, once the by AUDI AG.
- Increase engine speed to approx. 2500 rpm for 2 minutes (perform road test if necessary).
- If the compensation elements are still noisy, locate the defective compensation element as follows:
- Remove cylinder head cover ⇒ page 129.
- Insert guide pin of adapter -T40058- as follows:
- The larger-diameter section -arrow 1- faces towards the engine.
- The smaller-diameter section -arrow 2- faces the adapter.



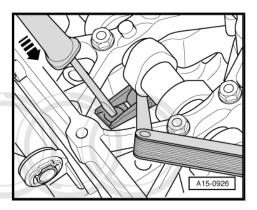
 Use adapter - T40058- and angled ring spanner to turn crankshaft in direction of engine rotation -arrow-.



- If it is possible to insert a feeler gauge of 0.20 mm between cam and roller rocker finger, renew hydraulic compensation element
 - ⇒ "4.4 Removing and installing camshaft", page 137

Additional steps required

Install cylinder head cover ⇒ page 129.



4.6 Removing and installing valve stem oil seals

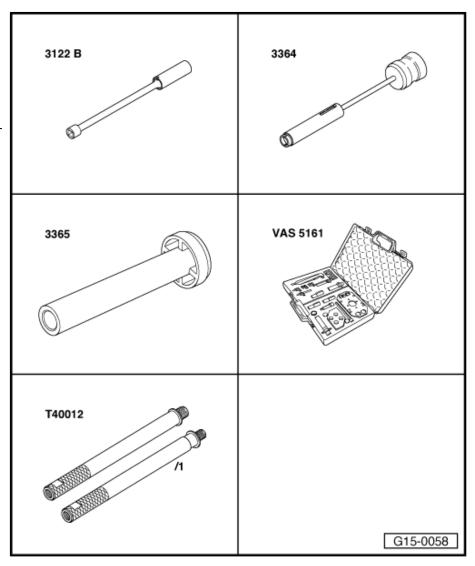
⇒ "4.6.1 Removing and installing valve stem oil seals (cylinder head installed)", page 145

⇒ "4.6.2 Removing and installing valve stem of seals (coving private or commercial purposes, in part or in whole, is not beed removed)" page 149. head removed)", page 148 with respect to the correctness of information in this document. Copyright by AUDI AG.

Removing and installing valve stem oil seals (cylinder head installed) 4.6.1

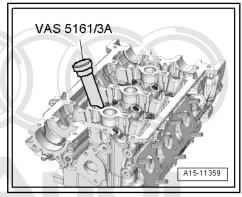
Special tools and workshop equipment required

- Spark plug socket and extension - 3122 B-
- Valve stem seal puller -3364-
- Valve stem seal fitting tool -3365-
- Removal and installation device for valve cotters -VAS 5161 A- with guide plate -VAS 5161/19C-, or substitute -VAS 5161/19B-
- ♦ Adapters T40012-

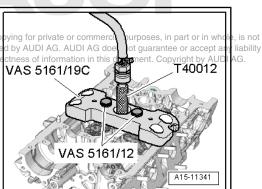


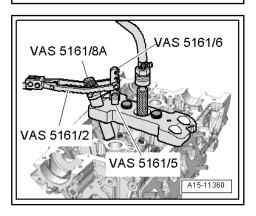
Procedure

- Remove camshafts \Rightarrow page 137.
- 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.

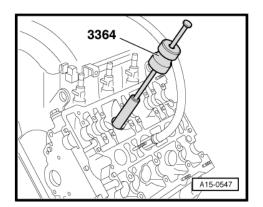


- Fit guide plate -VAS 5161/19C- from removal and installation device for valve cotters VAS 5161 A- on cylinder head.
- Secure guide plate with knurled screws -VAS 5161/112ted unless author
- Screw adapter T40012- with seal hand-tight into the corresponding spark plug thread.
- Connect adapter to compressed air line using a commercially available connection piece, and apply constant air pressure.
- Minimum pressure: 6 bar
- Screw snap-in device -VAS 5161/6- with engaging fork -VAS 5161/5- into guide plate.
- Insert assembly cartridge -VAS 5161/8A- 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 fork.
- Take out assembly cartridge.
- Detach guide plate and turn to one side.
- The compressed air hose remains connected.
- Detach valve spring with valve spring plate.



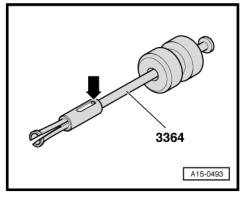


Pull off valve stem oil seal with valve stem seal puller - 3364-.

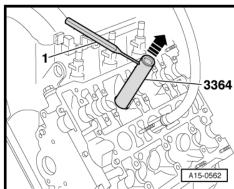


If the valve stem seal puller - 3364- cannot be used on some of the valve stem oil seals due to the confined space, proceed as follows:

Knock out pin -arrow- of puller using a drift and remove impact extractor attachment.



- Apply bottom section of puller -3364- to valve stem oil seal.
- Secure puller with a punch or roll-pin drift -1-, as shown in illustration.
- Apply assembly lever to puller and pull out valve stem oil seal -arrow-.

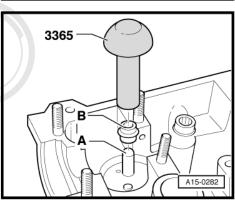




Caution

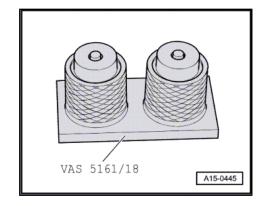
Make sure valve stem oil seals are not damaged when installing.

- 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 seaf-onto valve guide using roses, in part or in whole, is not valve stem seal fitting to please of accept any liability valve stem seal fitting it in the correctness of information in this document. Copyright by AUDI AG.
- Remove plastic sleeve.

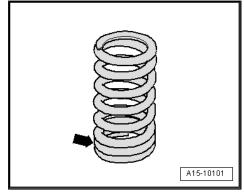


If valve cotters have been removed from assembly cartridge, they must first be inserted in insertion device -VAS 5161/18-.

- · Larger diameter of valve cotters faces upwards.
- Press assembly cartridge onto insertion device from above and take up valve cotters.



- Insert valve spring and valve spring plate.
- The closely spaced spring coils -arrow- face the cylinder head.



- 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

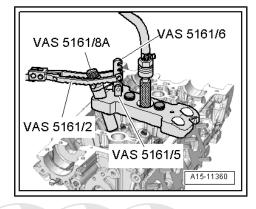
- Ensure that all roller rocker fingers make contact with the ends of the valve stems correctly and are clipped onto their respective hydraulic compensation elements.
- Install spark plugs ⇒ Maintenance; Booklet 410.
- Install camshafts ⇒ page 137.



Caution

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 op the contact when the starter is op the contact with respect to the core

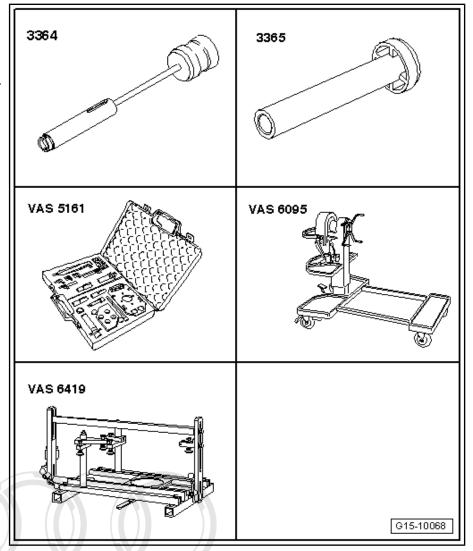


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4.6.2 Removing and installing valve stem oil seals (cylinder head removed)

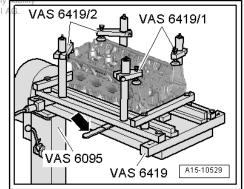
Special tools and workshop equipment required

- Valve stem seal puller -3364-
- Valve stem seal fitting tool -3365-
- Removal and installation device for valve cotters -VAS 5161 A- with guide plate -VAS 5161/19C-, or substitute -VAS 5161/19B-
- Engine and gearbox support - VAS 6095-
- Cylinder head tensioning device VAS 6419-

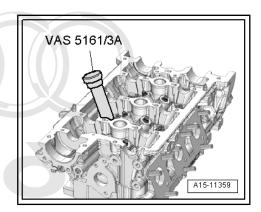


Procedure

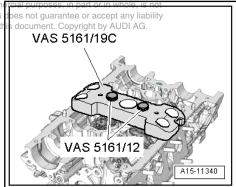
- Remove camshafts ⇒ page 137.
- Mark original positions of roller rocker fingers and hydraulic compensation elements for reinstallation.
- Remove roller rocker fingers together with hydraulic compensation elements and put down on a clean surface poses, in part or in whole, is not
- Insert cylinder head tensioning device and AS 6419 minto engine, AUDI 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.



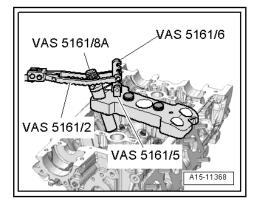
Apply drift -VAS 5161/3A- to valve spring plate and use plasticheaded hammer to release sticking valve cotters.

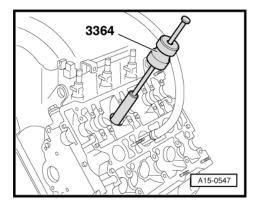


- Fit guide plate -VAS 5161/19C- Ponto cylinder heading for private or compermitted unless authorised by AUDI AG. AUDI AG.
- Secure guide plate with knurled screws -VAS 5161712-f. information in



- 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 fork.
- 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-.





3365

A15-0282



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 take up valve cotters.
- VAS 5161/18 A15-0445

- Insert valve spring and valve spring plate.
- The closely spaced spring coils -arrow- face the cylinder head.



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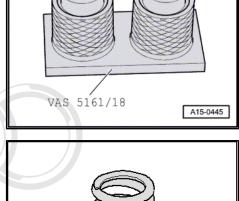


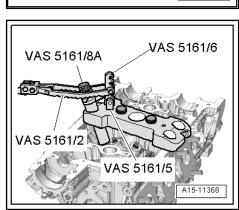
- Insert assembly cartridge in guide plate.
- Press down pressure fork and pull knurled screw upwards while turning screw in both directions - this will insert the valve cotters.
- Release pressure fork with knurled screw still in pulled posi-
- Repeat procedure for each valve.

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 137.





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A15-10101

5 Inlet and exhaust valves

⇒ "5.1 Checking valve guides", page 152

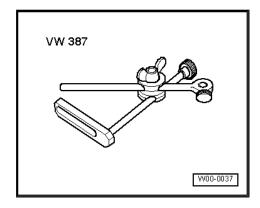
⇒ "5.2 Checking valves", page 153

⇒ "5.3 Valve dimensions", page 153

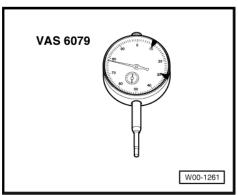
5.1 Checking valve guides

Special tools and workshop equipment required

◆ Universal dial gauge bracket - VW 387-



♦ Dial gauge - VAS 6079-



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.



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- 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 ted by copyright. Copying new valves. permitted unless authorised by A
- Renew cylinder head if wear limit is still exceeded. Spect to the correctness





Note

Valve guides cannot be renewed.

5.2 Checking valves

- Visually inspect for scoring on valve stems and valve seat surfaces.
- Renew valve if scoring is clearly visible.

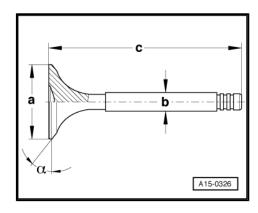
5.3 Valve dimensions



Note

Inlet and exhaust valves must not be machined. Only grinding-in is permitted.

Dimension		Inlet valve	Exhaust valve
Ø a	mm	33.85 ± 0.10	28.0 ± 0.10
Ø b	mm	5.98 ± 0.01	5.96 ± 0.01
С	mm	104.00 ± 0.20	101.9 ± 0.20
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 154
- ⇒ "1.2 Engine oil", page 157
- ⇒ "1.3 Removing and installing sump (bottom section)", page 157
- ⇒ "1.4 Removing and installing sump (top section)", page 160
- ⇒ "1.5 Removing and installing oil pump", page 163
- ⇒ "1.6 Removing and installing oil level and oil temperature sender G266", page 164

1.1 Exploded view - sump/oil pump

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Note

- ♦ If large quantities of metal shavings or abrasion are found when performing engine repairs, this may be an indication of damage to the crankshaft or conrod bearings. To prevent further damage, the following steps are required after completion of repair work: clean the oil passages carefully and renew the oil spray jets, engine oil cooler and oil filter.
- Refer to ⇒ Maintenance tables for engine oil capacity, oil specifications and viscosity grades.
- ♦ Oil spray jet for piston cooling <u>⇒ page 78</u>.



□ 9 Nm

2 - Oil level and oil temperature sender - G266-

- Removing and installing ⇒ page 164
- 3 Seal
 - ☐ Renew

4 - Sump (bottom section)

□ Removing and installing ⇒ page 157

5 - Bolt

□ Steel bolts:



□ Aluminium bolts:

- ♦ Renew
- ♦ 3 Nm + turn 90° further
- 6 Baffle plate (bottom)

7 - Bolt

- ☐ Renew
- □ Tightening torque and sequence ⇒ page 157

8 - Sump (top section)

□ Removing and installing ⇒ page 160

9 - Dowel sleeve

□ 2x

10 - O-ring

- Insert in retaining frame
- ☐ Renew

11 - Bolt

- Clean threaded holes for bolts
- ☐ Apply locking fluid when installing; refer to ⇒ Electronic parts catalogue
- □ Steel bolts:
- 9 Nm
 - □ Aluminium bolts:
- ♦ Renew
- ♦ 3 Nm + turn 90° further
- 12 Baffle plate (top)

13 - Seal

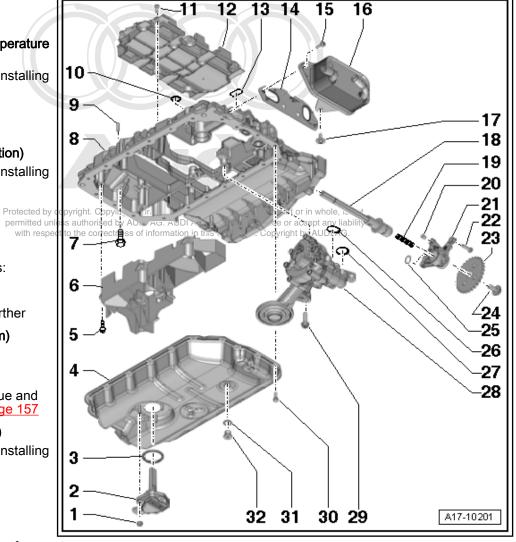
- Insert in retaining frame
- □ Renew

14 - Gasket

□ Renew

15 - Bolt

- □ Renew
- □ 3 Nm + turn 90° further



16 - Engine oil cooler □ See note ⇒ page 154 □ Removing and installing ⇒ page 165 □ With oil cooler bypass valve
17 - Bolt
□ 9 Nm
18 - Oil pump drive shaft
19 - Compression spring
20 - Sleeve
□ 2x
21 - Bearing bracket
22 - Bolt
□ 9 Nm
23 - Chain sprocket for oil pump ☐ Can only be fitted in one position on drive shaft
24 - Bolt
Renew
□ 30 Nm + turn 90° further
☐ To loosen and tighten, use pin wrench - 3212- to counterhold chain sprocker
25 - O-ring
Renew
26 - Seal Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not Renewitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability
27 - O-ring with respect to the correctness of information in this document. Copyright by AUDI AG.
□ Renew
28 - Oil pump
□ Do not dismantle
□ Removing and installing ⇒ page 163
29 - Bolt
□ 20 Nm
30 - Bolt
Renew
☐ Tightening torque and sequence <u>⇒ page 157</u>
31 - Seal ☐ Renew
32 - Oil drain plug ☐ 30 Nm
- OUTHI

Sump (bottom section) - tightening torque and sequence



Note

Renew the bolts tightened with specified tightening angle.

Tighten bolts in 2 stages as follows:

Stage	Tightening torque/angle specification		
1.	8 Nm in diagonal sequence		
2.	Turn 90° further in diagonal sequence		

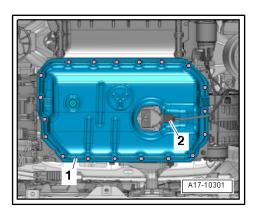
Sump (top section) - tightening torque and sequence

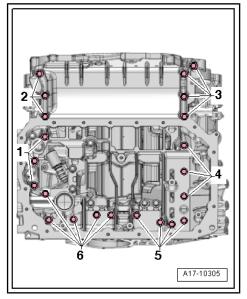


Note

Renew bolts.

Tighten bolts -1 ... 6- in diagonal sequence and in stages to 20 Nm:





Engine oil 1.2

Refer to ⇒ Maintenance tables for engine oil capacity, oil specifications and viscosity grades.



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Risk of damage to catalytic converter.

The oil level must not be above the "MAX" mark on the dipstick.

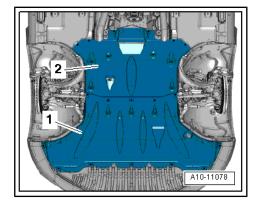
1.3 Removing and installing sump (bottom section)

Special tools and workshop equipment required

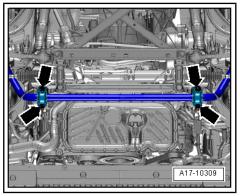
- ♦ Electric drill with plastic brush attachment
- Safety goggles
- Sealant ⇒ Electronic parts catalogue

Removing

- Engine oil drained ⇒ Maintenance; Booklet 410.
- Remove additional rear noise insulation -2- ⇒ General body repairs, exterior; Rep. gr. $\,$ 66 ; Noise insulation; Removing and installing noise insulation .



Remove nuts -arrows- and lower anti-roll bar.

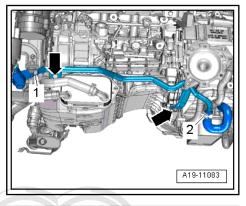


Remove bolts -arrows- and push coolant pipe (bottom left) upwards.



Note

Disregard -items 1, 2-.

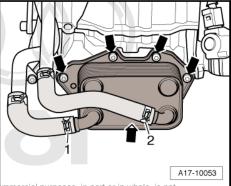




Note

Lay a cloth under the separating point to catch escaping engine

Remove bolts -arrows- and tie up engine oil cooler to one side with coolant hoses -1, 2- attached.



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

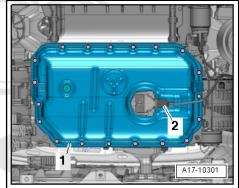


Caution

Take care to keep components clean.

- ◆ There will still be some oil in the sump (bottom section).
- Loosen bolts for sump (bottom section) -1- in diagonal sequence and remove bolts.
- Release sump (bottom section) from bonded joint, taking care not to bend sump. permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability

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Installing



Note

- Renew seals.
- The sump (bottom section) must be renewed if its coating is damaged or if it is bent.



Caution

Protect lubrication system and bearings against contamina-

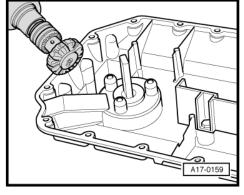
Cover exposed parts of the engine.



WARNING

Risk of eye injury.

- ♦ Wear safety goggles.
- Remove sealant residue from sump (bottom section) and sump (top section) using rotating plastic brush or similar.
- Clean sealing surfaces; they must be free of oil and grease.

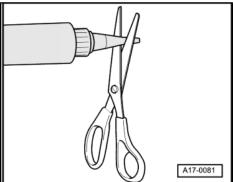


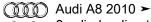


Note

Note the use-by date of the sealant.

Cut off nozzle of tube at front marking (nozzle \infty approx. 1 mm).





\mathbb{N}

Caution

Make sure lubrication system is not clogged by excess sealant.

- ◆ The bead of sealant must not be thicker than specified.
- Apply bead of sealant -arrow- onto clean sealing surface of sump (bottom section) as shown in illustration.
- Width of sealant bead: approx. 1.5 mm.



Note

The sump (bottom section) must be installed within 5 minutes after applying the sealant.

Fit sump (bottom section) and tighten bolts.

→ page 1570 and nite or a attach electrical connector 2-correctness of information in this document. Copyright

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

- Install engine oil cooler ⇒ page 165.
- Secure coolant pipe (bottom left) ⇒ page 200.
- Fill with engine oil and check oil level ⇒ Maintenance; Booklet 410.

Tightening torques

- ♦ ⇒ Fig. ""Sump (bottom section) tightening torque and sequence"", page 157
- 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

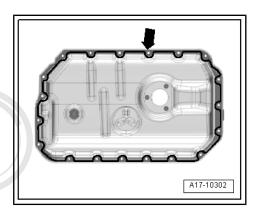
1.4 Removing and installing sump (top section)

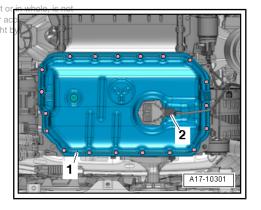
Special tools and workshop equipment required

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

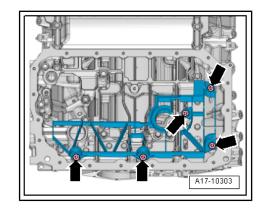
Removing

- Engine secured to engine and gearbox support ⇒ page 29.
- Remove timing chain cover (bottom) ⇒ page 87.
- Remove oil pump ⇒ page 163.

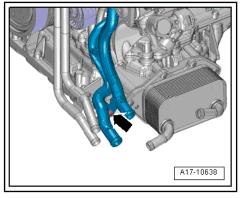




Remove bolts -arrows- and detach baffle plate (bottom).



- Remove bolt -arrow- for coolant pipes (left-side).



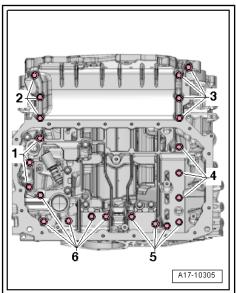
- Slacken bolts -1 ... 6- for sump (top section) in diagonal sequence and remove.
- Carefully release sump (top section) from bonded joint and pry sump off dowel pins on cylinder block.

Installing



Note

Renew gasket and O-ring.





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Caution

Protect lubrication system and bearings against contamination.

- Cover exposed parts of the engine.
- Remove old sealant from grooves on sump (top section) and from sealing surface.



WARNING

Risk of eye injury.

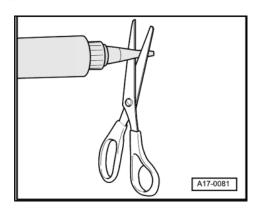
- Wear safety goggles.
- Remove remaining sealant from sump (top section) and cylinder block using rotating plastic brush or similar.
- Clean sealing surfaces; they must be tree of oil and grease accept any liability



Note

Note the use-by date of the sealant.

Cut off nozzle of tube at front marking (nozzle Ø approx. 1.5



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Caution

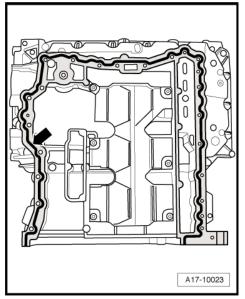
Make sure lubrication system is not clogged by excess sealant.

- The bead of sealant must not be thicker than specified.
- Apply bead of sealant -arrow- onto clean sealing surface of sump (top section) as shown in illustration.
- The grooves on the sealing surfaces must be completely filled with sealant.
- The bead of sealant must project 1.5 ... 2.0 mm above the sealing surface.

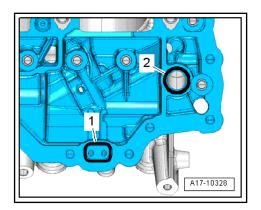


Note

The sump (top section) must be installed within 5 minutes after applying the sealant.



Fit seal -1- and O-ring -2- in retaining frame.



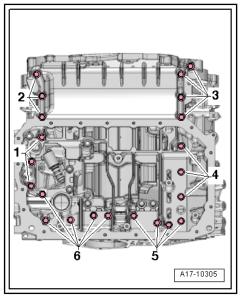
 Check that dowel sleeves are fitted, fit sump (top section) and tighten bolts ⇒ page 157.

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

- Secure coolant pipes (left-side) ⇒ page 200 .
- Install oil pump ⇒ page 163 .
- Install timing chain cover (bottom) ⇒ page 87.

Tightening torques

- ◆ ⇒ "1.1 Exploded view sump/oil pump", page 154
- ♦ ⇒ Fig. ""Sump (top section) tightening torque and sequence"", page 157



1.5 Removing and installing oil pump

Removing

- Remove sump (bottom section) ⇒ page 157.
- Remove bolts -arrows-.
- Pull oil pump forwards off drive shaft.

Installing

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



Note

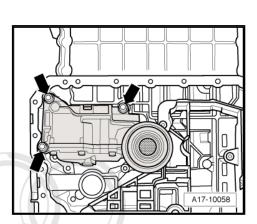
Fit new O-rings.

- Fit oil pump onto drive shaft and tighten bolts.
- Install sump (bottom section) ⇒ page 157.
- Fill with engine oil and check oil level ⇒ Maintenance; Booklet 410.

Tightening torques

◆ "1.1 Exploded view - sump/oil pump", page 154

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1.6 Removing and installing oil level and oil temperature sender - G266-

Removing

- Engine oil drained ⇒ Maintenance ; Booklet 410 .
- Unplug electrical connector -3-.
- Remove nuts -1- and detach oil level and oil temperature sender - G266- -item 4-.

Installing

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



Note

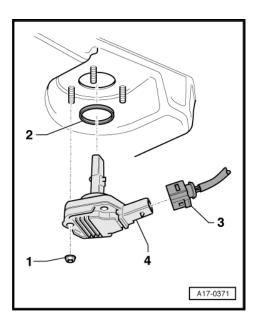
Renew seal -2-.

 Fill with engine oil and check oil level ⇒ Maintenance; Booklet 410.

Tightening torques

♦

† 1.1 Exploded view - sump/oil pump", page 154





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2 Engine oil cooler

⇒ "2.1 Removing and installing engine oil cooler", page 165

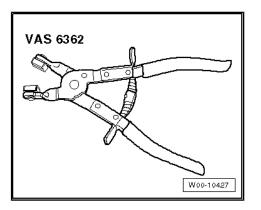
2.1 Removing and installing engine oil cool-

Special tools and workshop equipment required

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

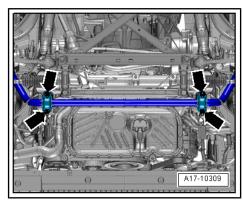


♦ Hose clip pliers - VAS 6362-



Removing

- Drain coolant <u>⇒ page 185</u>.
- Remove nuts -arrows- and lower anti-roll bar.

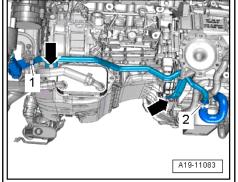


Remove bolts -arrows- and push coolant pipe (bottom left) upwards.



Note

Disregard -items 1, 2-.



- Release hose clips -1, 2- and disconnect coolant hoses from engine oil cooler.
- Position used oil collection and extraction unit VAS 6622Abelow engine.
- Unscrew bolts -arrows- and detach engine oil cooler.

Installing

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

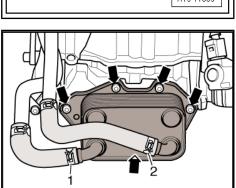


Note

- Renew the bolts tightened with specified tightening angle.
- Renew gasket.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .
- Secure coolant pipe (bottom left) ⇒ page 200.
- Check oil level ⇒ Maintenance; Booklet 410.
- Fill up with coolant ⇒ page 187.

Tightening torques

- ⇒ "1.1 Exploded view sump/oil pump", page 154
- Anti-roll bar ⇒ Running gear, axles, steering; Rep. gr. 40; Subframe; Exploded view - subframe



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3 Crankcase breather

- ⇒ "3.1 Exploded view crankcase breather system", page 167
- ⇒ "3.2 Removing and installing oil separator", page 168
- \Rightarrow "3.3 Removing and installing crankcase breather hoses", page $\underline{169}$

3.1 Exploded view - crankcase breather system

1 - Screw plug

□ 20 Nm

2 - Gasket

□ Renew

3 - Cover with oil separator

- With connection for crankcase breather
- Removing and installing ⇒ page 168
- 4 Bolt
 - □ 9 Nm

5 - O-ring

- □ Renew
- 2x on USA versions

6 - Connection

- □ For crankcase breather
- Installation position ⇒ page 168

7 - O-ring

- ☐ Renew
- □ 2x on USA versions

8 - Bolt

☐ 2.5 Nm Protected by copyright. C permitted unless authori

9 - Bolt

□ 2.5 Nm

10 - Crankcase breather hoses

- □ To cylinder head covers
- □ Removing and installing

11 - O-rings

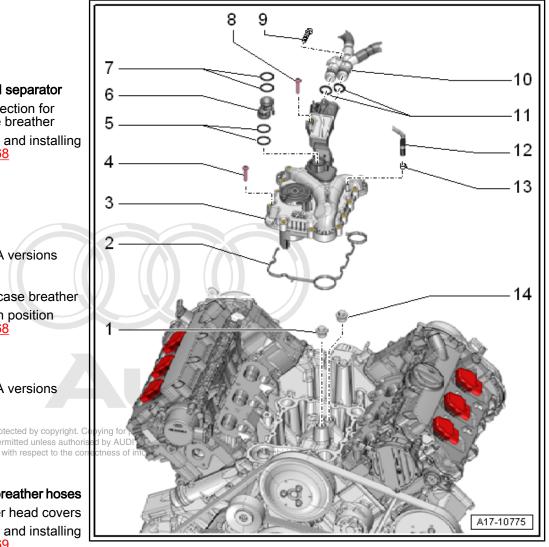
☐ Renew

12 - Crankcase breather hose

- □ To air pipe
- 13 Hose clip

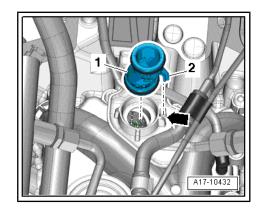
14 - Screw plug

□ 20 Nm



Installing connection for crankcase breather

- Insert connection -1- for crankcase breather with new O-rings in cover for oil separator.
- Installation position: lug -2- must engage in guide -arrow-.



3.2 Removing and installing oil separator

Removing

- Remove crankcase breather hoses ⇒ page 169.
- Remove coolant pipe (top) ⇒ page 211.
- Remove intake manifold bottom section (left-side) ⇒ page 279 .
- Remove bolts -arrows-.
- Detach bracket for high-pressure pipes and cover -1- with oil separator.

Installing

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



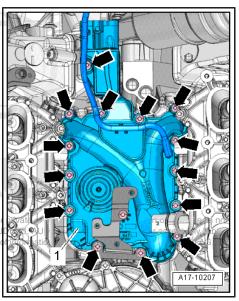
Note

Renew gasket.

- Install intake manifold bottom section (left-side) ⇒ page 279.
- Protected by copyright. Copying f Install coolant pipe (top) ⇒ page 211. permitted unless authorised by A
- Install crankcase breather hoses ⇒ page 169 with respect to the correctness

Tightening torques

⇒ "3.1 Exploded view - crankcase breather system", page 167



3.3 Removing and installing crankcase breather hoses

Removing



Note

Fit all cable ties in the original positions when installing.

- Remove supercharger ⇒ page 236.
- Detach crankcase breather hoses -arrows- from cylinder head covers.



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On USA models, it is not possible to detach crankcase breather hoses from cylinder head covers without damaging hoses. Renew crankcase breather hoses after removal.

- Move crankcase breather hoses clear.
- Remove bolt -1- and detach connection with crankcase breather hoses.

Installing

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



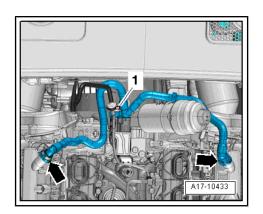
Note

Fit new O-rings.

Install supercharger ⇒ page 236.

Tightening torques

⇒ "3.1 Exploded view - crankcase breather system", page 167

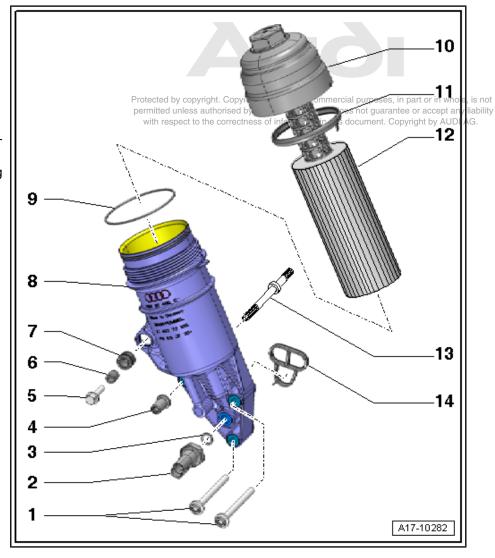


4 Oil filter/oil pressure switches

- ⇒ <mark>"4.1 Exploded view oil filter housing/oil pressure switch", page</mark> 170
- ⇒ "4.2 Removing and installing oil pressure switch F22 ", page 171
- ⇒ "4.3 Removing and installing oil pressure switch for reduced oil pressure F378", page 172
- ⇒ "4.4 Checking oil pressure", page 173
- ⇒ "4.5 Removing and installing oil filter housing", page 174
- ⇒ "4.6 Removing and installing valve for oil pressure control N428 ", page 176

4.1 Exploded view - oil filter housing/oil pressure switch

- 1 Bolt
 - □ 13 Nm
- 2 Oil pressure switch F22-
 - ☐ Opening/closing pressure 2.5 ... 3.2 bar
 - Grey insulation
 - ☐ Checking in Guided
 Fault Finding ⇒ Vehicle diagnostic tester
 - □ Removing and installing⇒ page 171
 - □ 20 Nm
- 3 Seal
 - ☐ Renew
- 4 Flange nut
 - □ 13 Nm
- 5 Bolt
 - □ 9 Nm
- 6 Sleeve
- 7 Rubber grommet
- 8 Oil filter housing
 - With filter bypass valve
 - With oil retention valve
 - The oil retention valve cannot be renewed
- 9 O-ring
 - ☐ Renew
 - ☐ Installing ⇒ page 171
- 10 Sealing cap
 - □ 25 Nm
- 11 Seal
 - ☐ Renew
 - ☐ Removing and installing ⇒ page 171



12 - Oil filter element

☐ Removing and installing ⇒ Maintenance; Booklet 410

13 - Threaded pin

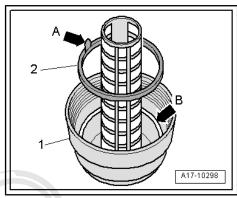
□ 16 Nm

14 - Seal

□ Renew

Renewing seal on sealing cap

- Take hold of tab -arrow A- and pull seal -2- out of sealing cap
- Install new seal so that semi-circular profile fits in groove -arrow B- in sealing cap.
- The tab -arrow A- must face upwards.



Installing O ring on oil filter housing

- Install O-ring -2- in groove -arrow- on oil filter housing -1-.



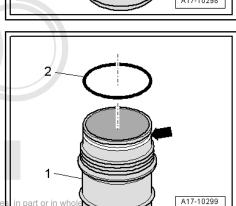
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Oil pressure switch for reduced oil pressure - F378-

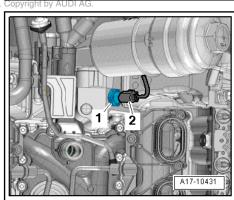
- 1 Oil pressure switch for reduced oil pressure F378-
- Electrical connector
- ♦ Opening/closing pressure 0.75 ... 1.05 bar
- Grey insulation
- Checking in Guided Fault Finding ⇒ Vehicle diagnostic
- Removing and installing ⇒ page 172
- 20 Nm

4.2 Removing and installing oil pressure switch - F22-

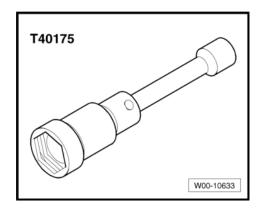
Special tools and workshop equipment required



in part or in wh



Articulated wrench, 24 mm - T40175-



Removing

Remove engine cover panel (rear) ⇒ page 48.



Note

Place a cloth beneath the oil filter housing to catch escaping oil.

- Unplug electrical connector -arrow-.
- Use articulated wrench, 24 mm T40175- to unscrew oil pressure switch - F22- .

Installing

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



Note

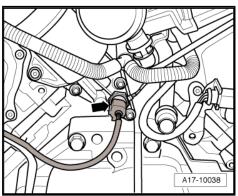
- Renew seal.
- Fit the new oil pressure switch F22- into the connection immediately to avoid loss of engine oil.
- Install engine cover panel ⇒ page 48
- Check oil level ⇒ Maintenance; Booklet 410.

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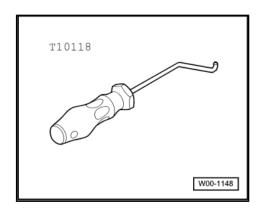
⇒ "4.1 Exploded view - oil filter housing/oil pressure switch". page 170

4.3 Removing and installing oil pressure switch for reduced oil pressure - F378-

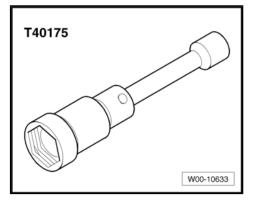
Special tools and workshop equipment required



Assembly tool - T10118-



◆ Articulated wrench, 24 mm - T40175-



Removing

- Remove engine cover panel (rear) ⇒ page 48.
- Take out noise insulation.
- Use assembly tool T10118- to unplug electrical connector
- Use articulated wrench (24 mm) T40175- to unscrew oil pressure switch for reduced oil pressure - F378- -item 1-.



Note

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



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



Note

Renew seal.

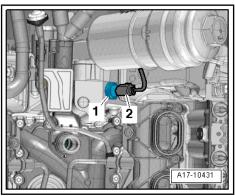
Install engine cover panel ⇒ page 48.

Tightening torques

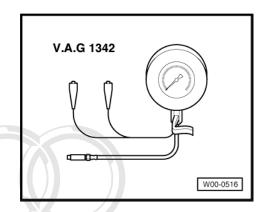
⇒ Fig. "" Oil pressure switch for reduced oil pressure -F378 <u>, page 171</u>

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Special tools and workshop equipment required



♦ Oil pressure tester - V.A.G 1342-



Procedure

- · Oil level OK
- Engine oil temperature approx. 80 °C.
- Remove oil pressure switch F22- ⇒ page 171 .
- Connect oil pressure tester V.A.G 1342- to bore for oil pressure switch.
 Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability
- Screw oil pressure switch F22 winto poil pressure tester formation in this document. Copyright by AUDI AG.
- Start engine.
- · Minimum oil pressure at idling speed: 1.2 bar.
- Minimum oil pressure at 2000 rpm: 1.5 bar.

Assembling

Install oil pressure switch - F22- ⇒ page 171.

4.5 Removing and installing oil filter housing

Special tools and workshop equipment required

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



Removing

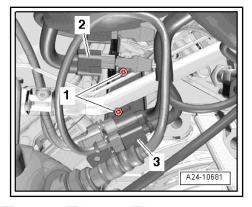
- Remove engine cover panel (rear) ⇒ page 48.
- Remove oil filter element ⇒ Maintenance ; Booklet 410 .
- Extract engine oil from oil filter housing using used oil collection and extraction unit VAS 6622A-.
- Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50; Bulkhead; Exploded view bulkhead.

- Move clear electrical wiring.
- Remove bolts -1- and move bracket with electrical connectors to one side.

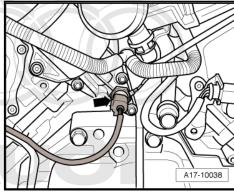


Note

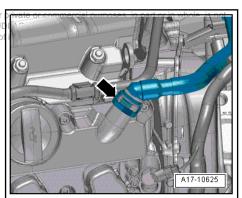
Disregard -items 2, 3-.



Unplug electrical connector -arrow- on oil pressure switch -F22- .



Press release tabs and disconnect crankcase breather hose pying for permitted unless authorised by AU -arrow-. with respect to the correctness

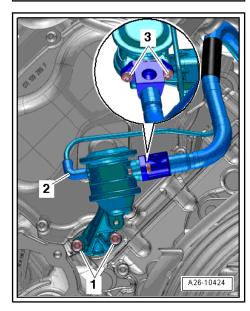


- Remove bolts -3- and push secondary air hose to rear.



Note

Disregard -items 1, 2-.





Note

Place a cloth beneath the oil filter housing to catch escaping oil.

- Remove bolts -arrows-.
- Remove nut -1- and detach oil filter housing.

Installing

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



Note

Renew seals, gasket and O-ring.

- Secure secondary air hose ⇒ page 315.
- Install bracket on timing chain cover (left-side) ⇒ page 82.
- Electrical connections and routing ⇒ Current flow diagrams,
 Electrical fault finding and Fitting locations.
- Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50; Bulkhead; Exploded view bulkhead.
- Install oil filter element, fill up with engine oil and check oil level
 ⇒ Maintenance; Booklet 410.
- Install engine cover panel ⇒ page 48.

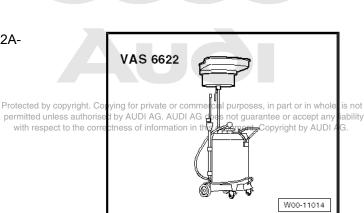
Tightening torques

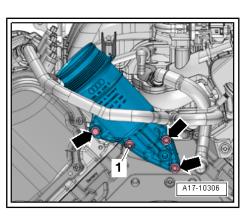
♦ "4.1 Exploded view - oil filter housing/oil pressure switch", page 170

4.6 Removing and installing valve for oil pressure control - N428-

Special tools and workshop equipment required

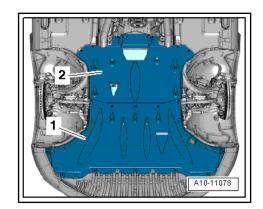
◆ Used oil collection and extraction unit - VAS 6622A-



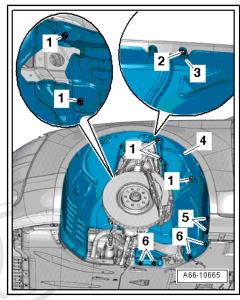


Removing

Remove noise insulation (front) -1- ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.



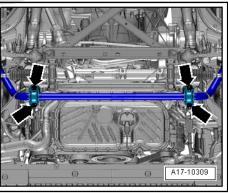
Remove front wheel housing liner (left-side) completely ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Removing and installing front wheel housing liner.



Remove nuts -arrows- and lower anti-roll bar.



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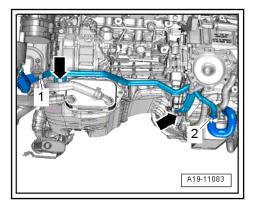


Remove bolts -arrows- and push coolant pipe (bottom left) upwards.

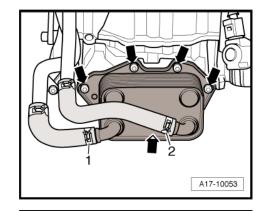


Note

Disregard -items 1, 2-.



- Position used oil collection and extraction unit VAS 6622Abelow engine.
- Remove bolts -arrows- and tie up engine oil cooler to one side with coolant hoses -1, 2- attached.



- Unplug electrical connector -1-.
- Remove bolt -3- and detach valve for oil pressure control -N428- -item 4-.

Installing

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



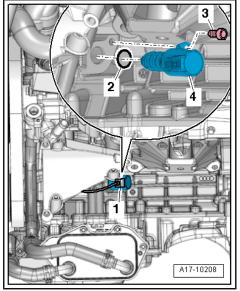
Note

Fit new O-ring -2-.

- Install engine oil cooler ⇒ page 165.
- Secure coolant pipe (bottom left) ⇒ page 200.

Tightening torques

- ⇒ Fig. "" Valve for oil pressure control -N428- "", page 69
- 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)
- ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view - noise insulation





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Cooling 19 –

Cooling system/coolant

- ⇒ "1.1 Diagram coolant hose connections", page 179
- ⇒ "1.2 Checking cooling system for leaks", page 183
- ⇒ "1.3 Draining and filling cooling system", page 185

1.1 Diagram - coolant hose connections

⇒ "1.1.1 Connection diagram for coolant hoses - vehicles without auxiliary heater", page 179

⇒ "1.1.2 Connection diagram for coolant hoses - vehicles with auxiliary heater", page 182

Connection diagram for coolant hoses - vehicles without auxiliary heater 1.1.1



Note

- Blue = Large coolant circuit.
- Red = Small coolant circuit.
- Orange = Coolant circuit for charge air cooler.
- Brown = Heating circuit.
- Arrows show direction of coolant flow.

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1 - Water radiator (front) for charge air cooling circuit

☐ If renewed, refill system with fresh coolant

2 - Radiator

- ☐ If renewed, refill system with fresh coolant
- 3 Coolant temperature sender - G62-
- 4 Thermostat
- 5 Coolant pump
- 6 Alternator

7 - Charge air cooler (right-side)

- ☐ In supercharger housing
- ☐ If renewed, refill system with fresh coolant

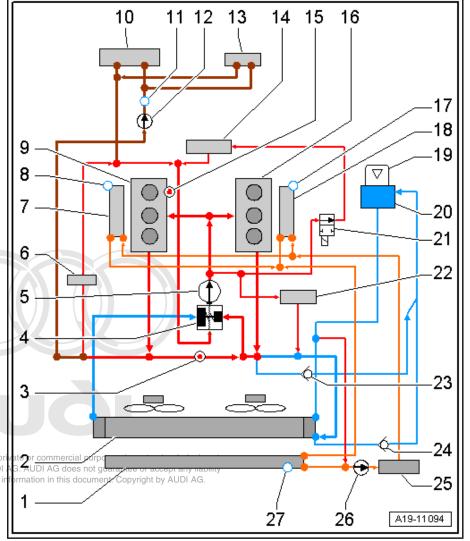
8 - Bleeder screw

9 - Cylinder head

- ☐ Cylinder bank 1 (right-side)
- ☐ If renewed, refill system with fresh coolant

10 - Heat exchanger for heater (front) Protected by copyright. Copying for p

□ Removing and installing
 ⇒ Heating, air conditioning; Rep. gr. 87;
 Front air conditioning
 unit; Removing and installing heat exchanger



☐ If renewed, refill system with fresh coolant

11 - Bleeder screw

12 - Coolant circulation pump - V50-

13 - Heat exchanger for heater (rear)

- □ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87; Rear air conditioning unit; Removing and installing heat exchanger
- ☐ If renewed, refill system with fresh coolant

14 - ATF cooler

- ☐ Removing and installing ⇒ Rep. gr. 37; ATF circuit; Removing and installing ATF cooler
- ☐ If renewed, refill system with fresh coolant

15 - Temperature sender for engine temperature regulation - G694-

16 - Cylinder head

- ☐ Cylinder bank 2 (left-side)
- ☐ If renewed, refill system with fresh coolant

17 - Bleeder screw

18 - Charge air cooler (left-side)

- In supercharger housing
- ☐ If renewed, refill system with fresh coolant

- 19 Filler cap
 - ☐ Checking pressure relief valve <u>⇒ page 185</u>
- 20 Coolant expansion tank
- 21 Gearbox oil cooling valve N509-
- 22 Engine oil cooler
 - ☐ If renewed, refill system with fresh coolant
- 23 Non-return valve
 - □ Located in coolant hose
- 24 Non-return valve
 - □ Located in coolant hose
- 25 Water radiator (left-side) for charge air cooling circuit
 - ☐ If renewed, refill system with fresh coolant
- 26 Charge air cooling pump V188-
- 27 Bleeder scheduled by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

1.1.2 Connection diagram for coolant hoses - vehicles with auxiliary heater



Note

- Blue = Large coolant circuit.
- Red = Small coolant circuit.
- Orange = Coolant circuit for charge air cooler.
- Brown = Heating circuit.
- Arrows show direction of coolant flow.

1 - Water radiator (front) for charge air cooling circuit

☐ If renewed, refill system. with fresh coolant

2 - Radiator

☐ If renewed, refill system with fresh coolant

3 - Coolant temperature sender - G62-

4 - Thermostat

5 - Auxiliary heater

- With circulation pump -V55-
- □ Removing and installing ⇒ Auxiliary heater, supplementary heater; Rep. gr. 82; Auxiliary/supplementary heater; Removing and installing auxiliary/supplementary heater

6 - Alternator

7 - Coolant pump

8 - Charge air cooler (rightside)

- In supercharger hous-
- If renewed, refill system with fresh coolant

9 - Bleeder screw

10 - Cylinder head

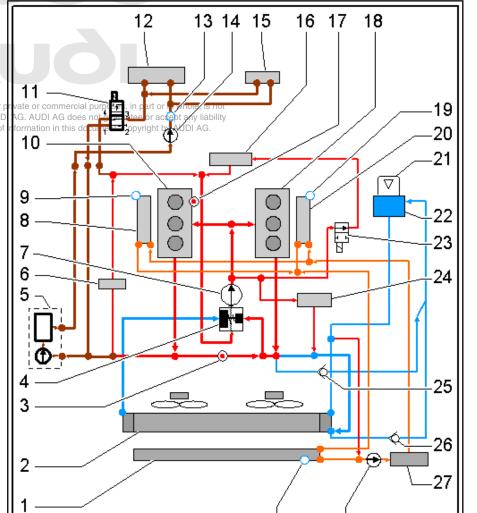
- Cylinder bank 1 (right-
- ☐ If renewed, refill system with fresh coolant

11 - 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

12 - Heat exchanger for heater (front)

- □ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87; Front air conditioning unit; Removing and installing heat exchanger
- ☐ If renewed, refill system with fresh coolant



29

28

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13 - Bleeder screw
14 - Coolant circulation pump - V50-
□ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87; Coolant circuit
15 - Heat exchanger for heater (rear)
□ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87; Rear air conditioning unit; Removing and installing heat exchanger
☐ If renewed, refill system with fresh coolant
16 - ATF cooler
 □ Removing and installing ⇒ Rep. gr. 37; ATF circuit; Removing and installing ATF cooler □ If renewed, refill system with fresh coolant
17 - Temperature sender for engine temperature regulation - G694-
18 - Cylinder head ☐ Cylinder bank 2 (left-side) ☐ If renewed, refill system with fresh coolant
19 - Bleeder screw
 20 - Charge air cooler (left-side) In supercharger housing If renewed, refill system with fresh coolant
21 - Filler cap ☐ Checking pressure relief valve ⇒ page 185
22 - Coolant expansion tank
23 - Gearbox oil cooling valve - N509-
24 - Engine oil cooler ☐ If renewed, refill system with fresh coolant
25 - Non-return valve Located in coolant hose
26 - Non-return valve Located in coolant hose
27 - Water radiator (left-side) for charge air cooling circuit ☐ If renewed, refill system with fresh coolant
28 - Charge air cooling numn - V188-

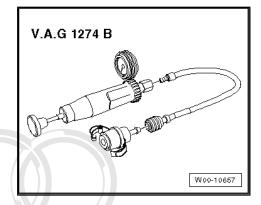
Checking cooling system for leaks 1.2

Special tools and workshop equipment required

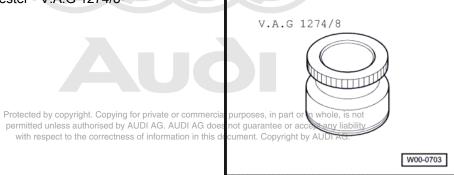
29 - Bleeder screw

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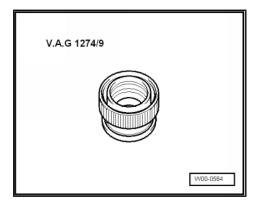
Cooling system tester - V.A.G 1274 B-



Adapter for cooling system tester - V.A.G 1274/8-



Adapter for cooling system tester - V.A.G 1274/9-



Procedure

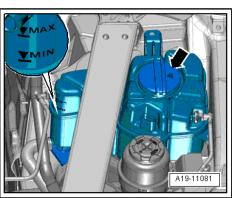
Engine must be warm.



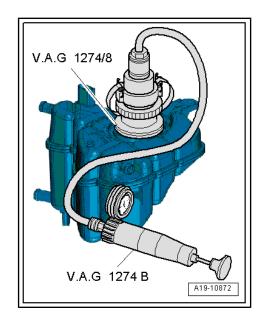
WARNING

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

- The cooling system is under pressure when the engine is
- Cover filler cap on coolant expansion tank with a cloth and open carefully to dissipate pressure.
- Open filler cap -arrow- on coolant expansion tank.



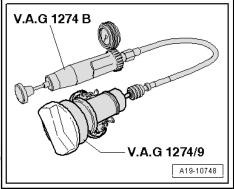
- Fit cooling system tester V.A.G 1274 B- with adapter -V.A.G 1274/8- onto coolant expansion tank.
- Using hand pump on cooling system tester, build up a pressure of approx. 1.0 bar.
- If this pressure is not maintained, locate and rectify leaks.



Checking pressure relief valve in filler cap

- Fit cooling system tester V.A.G 1274 B- with adapter V.A.G 1274/9- onto filler cap.
- Build up pressure with hand pump on cooling system tester.
- The pressure relief valve should open at a pressure of 1.4 ... 1.6 bar.
- Renew filler cap if pressure relief valve does not open as de-

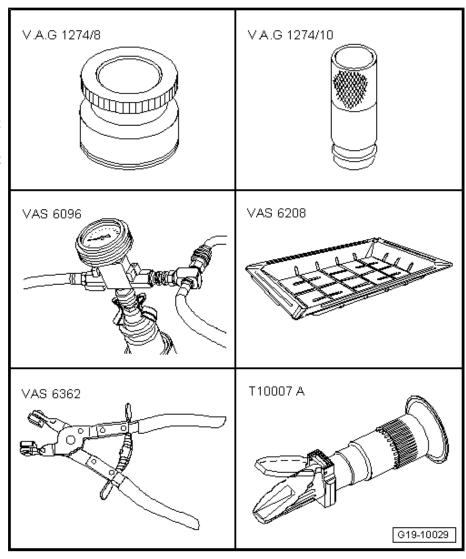
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1.3 Draining and filling cooling system

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-



Draining



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.

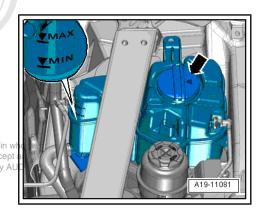


WARNING

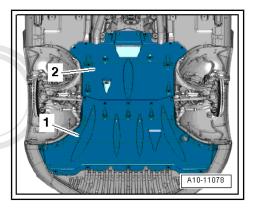
Hot steam/hot coolant can escape - risk of scalding.

- 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) -1- ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.



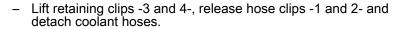


Note

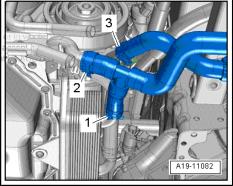
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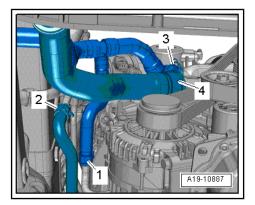
Collect drained coolant in a clean container for re-use or disposal.

- Place drip tray for workshop hoist VAS 6208- beneath en-
- Release hose clips -1, 2 and 3-, disconnect coolant hoses and drain off coolant.









Release hose clips -arrows-, disconnect coolant hoses from coolant pipes (front left) and drain off remaining coolant.



Note

Disregard -item 1-.

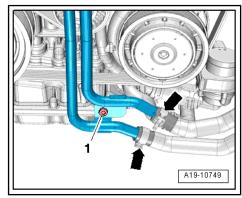
Filling

Ignition off.



Caution

Always use distilled water for mixing coolant additives as this ensures optimum corrosion protection.

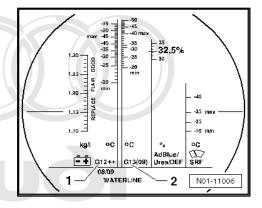




Note

- ♦ 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.

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 Coolant with the recommended mixture ratio prevents frost and corrosion damage and stops scaling. At the same time it raises the boiling point of the fluid in the system. For this reason the cooling system must be filled all year round with the correct coolant additive.
- Because of its high boiling point, the coolant improves engine reliability under heavy loads, particularly in countries with tropical climates.
- ◆ The refractometer T10007A- MUST be used to determine the current level of frost protection.
- ◆ The mixture must guarantee frost protection down to -25 °C (in countries with arctic climate: down to -36 °C). The amount of antifreeze can only be increased if greater frost protection is required in very cold climates. This must only be up to -48 °C, however, as otherwise the cooling efficiency of the coolant is impaired.
- ♦ The coolant concentration must not be reduced by adding water even in warmer seasons and in warmer countries. Frost protection must be provided to at least -25 °C.
- Read off the level of frost protection on the scale for the relevant coolant additive.
- ♦ The temperature indicated on the refractometer T10007Acorresponds to the temperature at which the first ice crystals can form in the coolant.
- ♦ Do not reuse coolant.
- Only use water/coolant additive as a lubricant for coolant hoses.

Recommended mixture ratio for coolant

- Coolant (40 %) and water (60 %) for frost protection to -25 °C
- Coolant (50 %) and water (50 %) for frost protection to -36 °C
- Coolant: ⇒ Electronic parts catalogue (ETKA)

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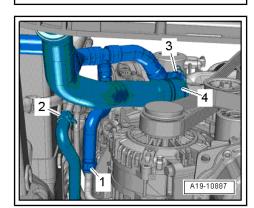
Procedure

Fit coolant hoses with hose clips -arrows- onto coolant pipes (front left).

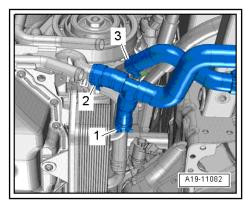


- Connect coolant hoses with hose clips -1 and 2-.
- Connect coolant hoses -3 and 4- with plug-in connectors ⇒ page 217 ...

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- Connect coolant hoses with hose clips -1, 2 and 3-.



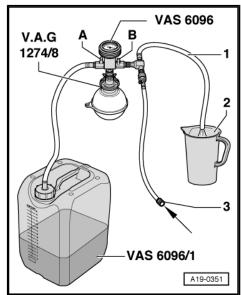
- Fill reservoir of -VAS 6096- with at least 15 litres of premixed coolant (according to recommended ratio).
- Fit adapter for cooling system tester V.A.G 1274/8- onto coolant expansion tank.
- Attach cooling system charge unit VAS 6096- to adapter -V.A.G 1274/8- .
- Run vent hose -1- into a small container -2-.



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.

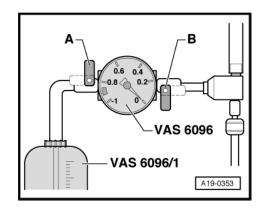


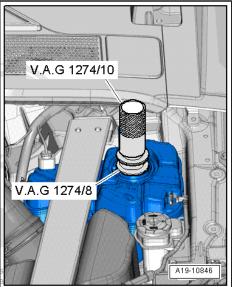
- Open valve -B- by setting lever in direction of flow.
- The suction jet pump generates a partial vacuum in the cooling system; the needle on the gauge should move into the green zone.
- Also briefly open valve -A- (turn lever in direction of flow) so that hose on reservoir of -VAS 6096- can fill with 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.



Note

- If the needle does not reach the green zone, repeat the process.
- Check cooling system for leaks if the vacuum is not maintained.
- Detach compressed air hose.
- Open valve -A-.
- The vacuum in the cooling system causes the coolant to be drawn out of the reservoir of -VAS 6096-; the cooling system is then filled.
- Detach cooling system charge unit VAS 6096- from adapter
 -V.A.G 1274/8- on coolant expansion tank.
- Attach pipe -V.A.G 1274/10- onto adapter -V.A.G 1274/8- .
- Fill up with coolant until pipe for cooling system tester is filled.
 If required, add further coolant when performing bleeding procedure.
- Remove engine cover panel (rear) ⇒ page 48.





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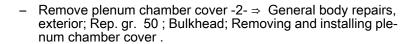
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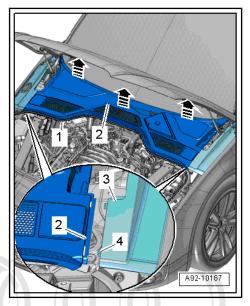
Note

Place a cloth underneath to catch escaping coolant.

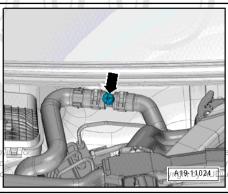
- Open bleeder screws -1- and -2- on charge air coolers one after the other until coolant comes out.
- Close bleeder screws.



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- Open bleeder screw -arrow- on coolant hose until coolant comes out.
- Close bleeder screw.



is not ability Remove lock carrier cover -2- \Rightarrow General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing attachments .

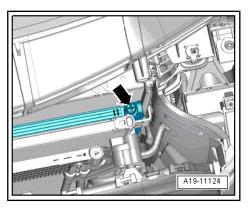
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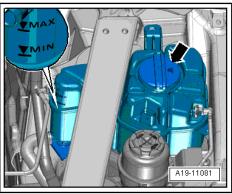
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- Open bleeder screw -arrow- on water radiator (front) for charge air cooling circuit until coolant comes out.
- Close bleeder screw.
- On vehicles with auxiliary heater, switch heater on (for about 30 seconds) and then off again.



- Close filler cap -arrow- on coolant expansion tank (make sure it engages).
- Start engine.



Time period	Engine speed	Air conditioner / heater setting
1 minute	2500 rpm	• A/C "ON"
		Heating for all zones at "HI"
Until radiator fan cuts in	ldling	A/C "OFF" for rest of bleeding procedure; LED in Ac button not lit
		Heating at "22 °C"
1 minute	2500 rpm	AC "OFF"
		Heating at "HI"

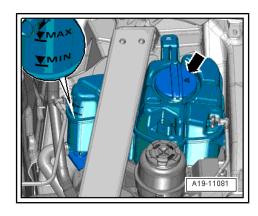
Time period	Engine speed	Air conditioner / heater setting
2 minutes	2500 rpm	• AC "OFF"
		Heating "OFF"
1 minute	ldling	AC "OFF"
		Heating "OFF"
1 minute	Engine switched off	• AC "OFF"
		Heating "OFF"
1 minute	2500 rpm	• AC "OFF"
		Heating at "HI"
2 minutes	2500 rpm	AC "OFF"
		Heating "OFF"
1 minute	Idling	AC "OFF"
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- Switch off ignition and allow engine to cool down.
- Install lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing attachments.
- Install engine cover panel <u>⇒ page 48</u>.
- Check coolant level.
- The coolant level must be at the MAX marking when the engine is cold.
- The coolant level can be above the MAX marking when the engine is warm.

Tightening torques

- ♦ 3 "4.1 Exploded view radiator/radiator fans", page 216
- ⇒ "1.1 Exploded view supercharger", page 234
- ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view - noise insulation



2 Coolant pump/thermostat assembly

- ⇒ "2.1 Exploded view coolant pump and thermostat", page 194
- ⇒ "2.2 Removing and installing electrical coolant pump", page 195
- ⇒ "2.3 Removing and installing coolant pump", page 196
- ⇒ "2.4 Removing and installing thermostat", page 197
- ⇒ "2.5 Checking thermostat", page 198
- ⇒ "2.6 Removing and installing coolant temperature sender G62", page 198
- ⇒ "2.7 Removing and installing temperature sender for engine temperature regulation G694", page 199

2.1 Exploded view - coolant pump and thermostat

- 1 Bolt

 □ 9 Nm

 2 Bolt

 □ 20 Nm

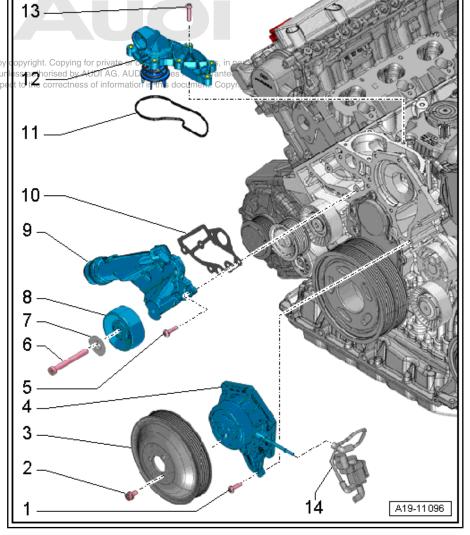
 3 Poly V-belt pulley
 □ For coolant pump

 4 Coolant pump
 □ With seal
 □ Removing and installing
 ⇒ page 196

 5 Bolt
- 6 Bolt
 - ☐ Tightening torque
 ⇒ Item 2 (page 49)
- 7 Washer
- 8 Idler roller

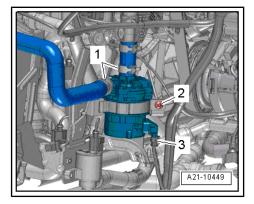
□ 9 Nm

- □ For poly V-belt
- 9 Connection
 - For coolant hose
- 10 Gasket
 - ☐ Renew
- 11 Seal
 - □ Renew
- 12 Thermostat
 - □ Removing and installing⇒ page 197
 - □ Checking ⇒ page 198
- 13 Bolt
 - □ 9 Nm
- 14 Coolant valve for cylinder head N489-



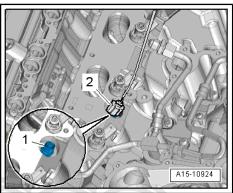
Charge air cooling pump - V188- - tightening torque

- Tighten bolt -2- to 9 Nm.



Temperature sender for engine temperature regulation - G694- tightening torque

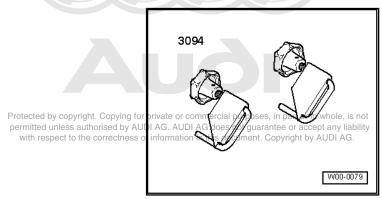
Tighten temperature sender for engine temperature regulation - Ğ694- -item 1- to 3 Nm.



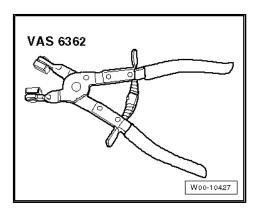
2.2 Removing and installing electrical coolant pump

Special tools and workshop equipment required

♦ Hose clamps, up to 25 mm - 3094-

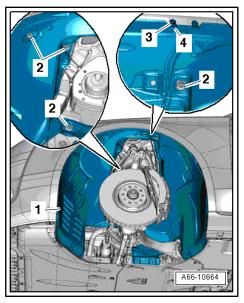


♦ Hose clip pliers - VAS 6362-



Removing

Remove front section -1- 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:



Note

Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.

Check coolant level ⇒ page 187.

Tightening torques

- ⇒ Fig. "" Charge air cooling pump -V188- tightening torque"", page 195
- ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Exploded view wheel housing liner (front)

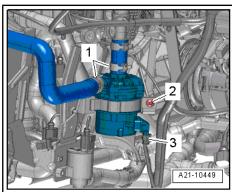
2.3 Removing and installing coolant pump

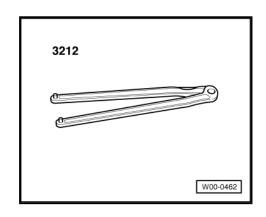
Special tools and workshop equipment required

♦ Pin wrench - 3212-



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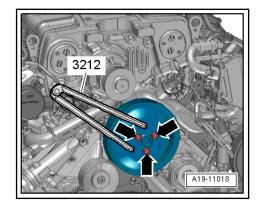




A19-11125

Removing

- Drain coolant <u>⇒ page 185</u>.
- Remove poly V-belt <u>⇒ page 53</u>.
- Loosen bolts -arrows- for coolant pump pulley (counterhold with pin wrench - 3212-).
- Remove bolts and take off poly V-belt pulley.



Disconnect vacuum hose -1-.



Note

Place a cloth underneath to catch escaping coolant.

Remove bolts -arrows- and detach coolant pump.

Installing

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

- Clean sealing surfaces; they must be free of oil and grease.
- Install poly V-belt ⇒ page 53.
- Fill up with coolant ⇒ page 187.

Tightening torques

⇒ "2.1 Exploded view - coolant pump and thermostat", page 194



Removing and installing thermostat copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability 2.4 with respect to the correctness of information in this document. Copyright by AUDI AG. Removing

- Drain coolant ⇒ page 185 .
- Remove supercharger <u>⇒ page 236</u>.
- Remove coolant pipe (front) ⇒ page 202.



Note

Place a cloth underneath to catch any escaping coolant.

- Remove bolts -arrows-.
- Detach coolant thermostat with hose connection.

Installing

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



Note

Renew seal.

- Install coolant pipe (front) ⇒ page 202.
- Install supercharger ⇒ page 236.
- Fill up with coolant ⇒ page 187.

Tightening torques

⇒ "2.1 Exploded view - coolant pump and thermostat", page 194

2.5 Checking thermostat

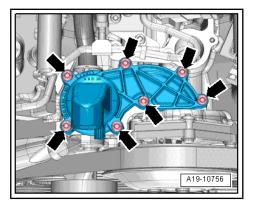
Heat removed thermostat in water bath.

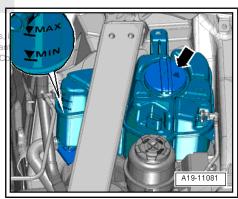
Starts to open	Fully open	Opening travel		
approx. 87 °C	approx. 102 °C ¹⁾	at least 8 mm		
Cannot be tested.				

Removing and installing coolant temper-2.6 ature sender - G62-

Removing

- Protected by copyright. Copying for private or commercial purposes permitted unless authorised by AUDI AG. AUDI AG does not guara Engine cold.
- To relieve residual pressure in cooling system in open filler cap ment. -arrow- on coolant expansion tank briefly and then close cap again (it should click into place).
- Remove engine cover panel (front) <u>⇒ page 48</u>.





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Unplug electrical connector -1-.



Note

Place a cloth underneath to catch escaping coolant.

 Pull off retaining clip -2- and detach coolant temperature sender - G62- .



Note

Disregard -arrow-.

Installing

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



Note

Fit new O-ring.
To avoid loss of coolant, insert new coolant temperature send-

Install engine cover panel ⇒ page 48.

er - G62- immediately in coolant pipe (front).

Check coolant level ⇒ page 187.

2.7 Removing and installing temperature sender for engine temperature regulation - G694-

Removing

- Remove intake manifold (bottom section, right-side)
 ⇒ page 279
- Unplug electrical connector -2-.
- Unscrew temperature sender for engine temperature regulation G694- -item 1-

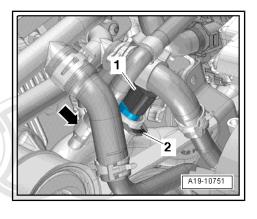
Installing

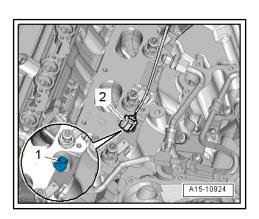
Installation is carried out in the reverse order; note the following:

Install intake manifold (bottom section, right-side)
 ⇒ page 279

Tightening torques

♦ ⇒ Fig. "" Temperature sender for engine temperature regulation -G694- - tightening torque"", page 195





3 Coolant pipes

- ⇒ "3.1 Exploded view coolant pipes", page 200
- ⇒ "3.2 Removing and installing coolant pipes", page 202

3.1 Exploded view - coolant pipes

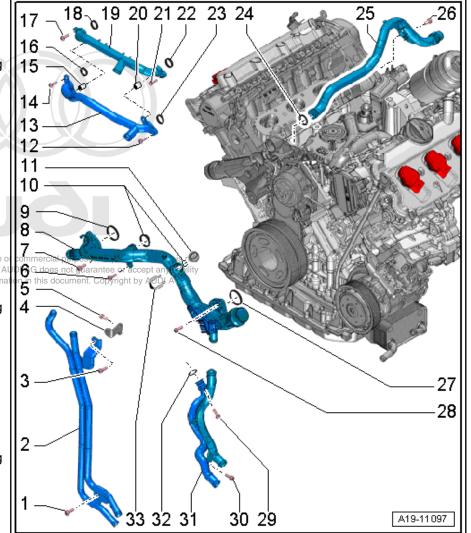


Note

The arrow markings on coolant pipes and on ends of hoses must align.

Coolant pipes on engine

- 1 Bolt
 - □ 9 Nm
- 2 Coolant pipes (front left)
 - □ Removing and installing ⇒ page 204
- 3 Bolt
 - □ 9 Nm
- 4 Bracket
- 5 Bolt
 - □ 22 Nm
- 6 Bolt
 - □ 2.5 Nm
- 7 Bolt
 - Protected by copyright. Copying for private permitted these authorised by AUDI AG.
- 8 Coolant pipe (front)
 - □ Removing and installing ⇒ page 202
- 9 Seal
 - ☐ Renew
- 10 O-rings
 - ☐ Renew
- 11 Coolant temperature sender - G62-
 - Removing and installing ⇒ page 198
- 12 Bolt
 - □ 5 Nm
- 13 Coolant pipe (bottom) on supercharger
 - ☐ Remove and install together with -item 19- ⇒ page 211
- 14 Bolt
 - □ 5 Nm
- 15 Dowel sleeve
- 16 Seal
 - ☐ Renew

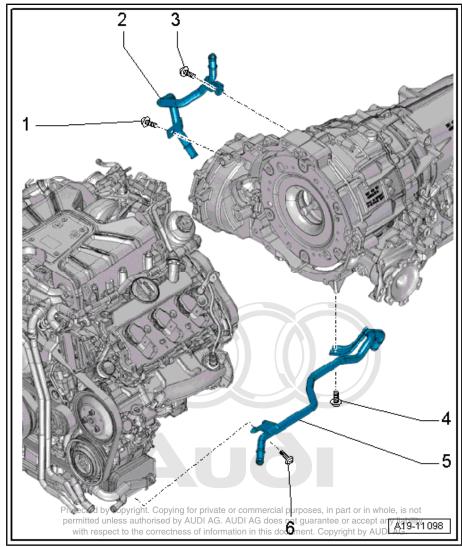


17 - Bolt
□ 5 Nm
18 - Seal
Renew
19 - Coolant pipe (top) on supercharger□ Remove and install together with -item 13- ⇒ page 211
20 - Dowel sleeve
21 - Bolt
□ 5 Nm
22 - Seal
☐ Renew
23 - Seal
☐ Renew
24 - O-ring
Renew
25 - Coolant pipe (top)
□ Removing and installing ⇒ page 211
26 - Bolt
□ 9 Nm
27 - Seal
Renew
28 - Bolt
□ 9 Nm
29 - Bolt Renew
□ 3 Nm + turn 90° further
30 - Bolt
Renew
□ 3 Nm + turn 90° further
31 - Coolant pipes (left-side)
☐ Removing and installing <u>⇒ page 206</u>
32 - O-ring
□ Renew
33 - Retaining clip

Coolant pipes on gearbox

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- 1 Bolt
 - □ 9 Nm
- 2 Coolant pipe (right-side) on gearbox
 - Removing and installing ⇒ page 213
- 3 Bolt
 - □ 9 Nm
- 4 Bolt
 - □ 9 Nm
- 5 Coolant pipe (bottom left)
 - □ Removing and installing <u>⇒ page 208</u>
- 6 Bolt
 - □ 9 Nm



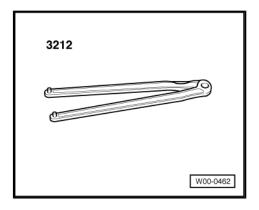
3.2 Removing and installing coolant pipes

- ⇒ "3.2.1 Removing and installing coolant pipe (front)", page 202
- ⇒ "3.2.2 Removing and installing coolant pipes (front left)", page 204
- ⇒ "3.2.3 Removing and installing coolant pipes (left-side)", page 206
- "3.2.4 Removing and installing coolant pipe (bottom left)", page
- ⇒ "3.2.5 Removing and installing coolant pipe (top)", page 211
- ⇒ "3.2.6 Removing and installing coolant pipes on supercharger", page 211
- ⇒ "3.2.7 Removing and installing coolant pipe (right-side) on gearbox", page 213

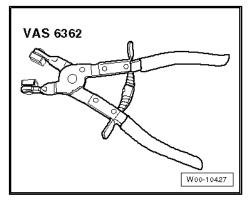
3.2.1 Removing and installing coolant pipe (front)

Special tools and workshop equipment required

♦ Pin wrench - 3212-

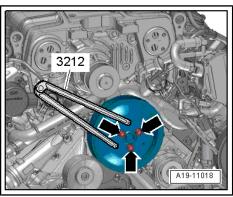


♦ Hose clip pliers - VAS 6362-

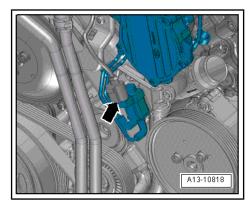


Removing

- Drain coolant ⇒ page 185.
- Remove coolant pipes (front left) ⇒ page 204.
- Remove poly V-belt <u>⇒ page 53</u>.
- Loosen bolts -arrows- for coolant pump pulley (counterhold with pin wrench 3212-).
- Remove bolts and take off poly V-belt pulley.



Protected by Detach coolant valve for cylinder head at N489 plearrow- from permitted unbrackets and move if Clear to the side te or accept any liat with respect to the correctness of information in this document. Copyright by AUDI AG.



- Unplug electrical connector -3- at coolant temperature sender - G62- .
- Lift retaining clips and disconnect coolant hoses -1 and 4-.
- Release hose clip -2- and detach coolant hose (top).
- Loosen hose clip -5-.
- Unscrew bolts -arrows- and remove coolant pipe (front).

Installing

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



Note

- Renew seals and O-rings.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .
- Clean or smoothen sealing surfaces for seals and O-rings.
- Lubricate seals and O-rings with coolant and slide onto coolant
- Connect coolant hoses with plug-in connector ⇒ page 217.
- Install poly V-belt pulley for coolant pump ⇒ page 194.
- Install poly V-belt <u>⇒ page 53</u>.
- Install coolant pipes (front left) ⇒ page 204.
- Fill up with coolant ⇒ page 187.

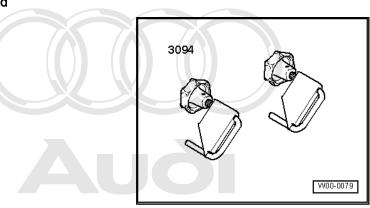
Tightening torques

⇒ "3.1 Exploded view - coolant pipes", page 200

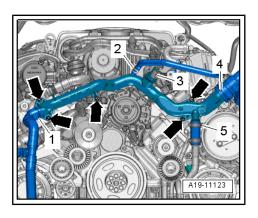
3.2.2 Removing and installing coolant pipes (front left)

Special tools and workshop equipment required

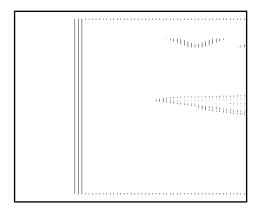
♦ Hose clamps, up to 25 mm - 3094-



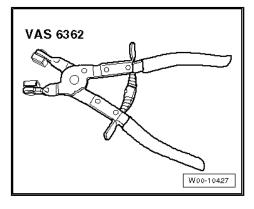
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Drip tray for workshop hoist - VAS 6208-



♦ Hose clip pliers - VAS 6362-



Removing



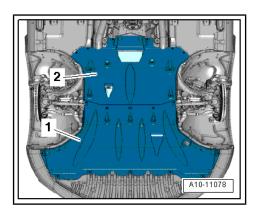
WARNING

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 engine cover panel (front) ⇒ page 48.
- Remove noise insulation (front) -1- ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.



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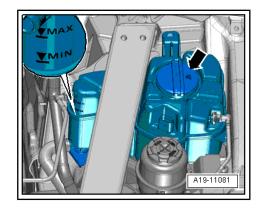




WARNING

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

- The cooling system is under pressure when the engine is
- 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.
- Place drip tray for workshop hoist VAS 6208- beneath en-

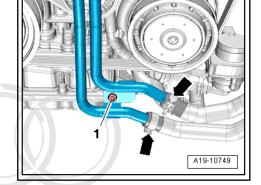




Note

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

- Clamp off coolant hoses using hose clamps -3094-, release hose clips -arrows- and disconnect coolant hoses from coolant pipes (front left).
- Remove bolt -1-.



- Release hose clips -1- and detach coolant hoses from coolant pipes at supercharger.
- Remove bolt -2-.
- Detach coolant pipes (front left) from below.

Installing

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Installation is carried out in the reverse order, note the following: AG do



Note

Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .

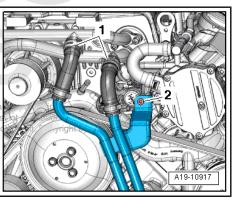
- Fill up with coolant ⇒ page 187.
- Install engine cover panel ⇒ page 48.

Tightening torques

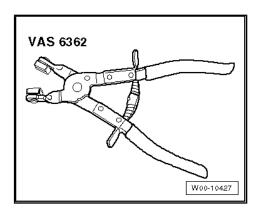
- ⇒ "3.1 Exploded view coolant pipes", page 200
- ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view - noise insulation

3.2.3 Removing and installing coolant pipes (left-side)

Special tools and workshop equipment required

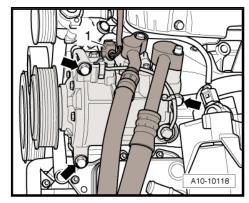


♦ Hose clip pliers - VAS 6362-



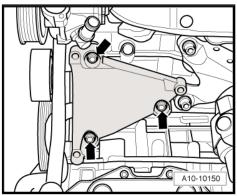
Removing

- Drain coolant <u>⇒ page 185</u>.
- Detach poly V-belt from air conditioner compressor ⇒ "1.2.2 Removing and installing poly V-belt for ancillaries", page 53
- Remove air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket.



Vehicles up to 07.2010:

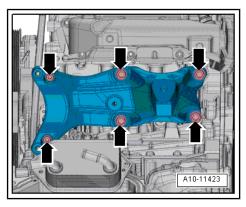
Unscrew bolts -arrows- and detach bracket for air conditioner compressor.



Vehicles from 07.2010 onwards:

- Remove engine mounting (left-side) ⇒ page 44.
- Remove bolts -arrows- and detach engine support with bracket for air conditioner compressor.

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All vehicles (continued):

- Remove bolts -arrows-.
- Release hose clips -1 and 2- and disconnect coolant hoses from coolant pipes.



Note

For illustration purposes, the installation position is shown with the power steering pump removed.

Installing

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



Note

- Fit new O-ring.
- 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 .
- Clean and smoothen sealing surface for O-ring.
- Lubricate O-ring with coolant and slide onto coolant pipe.
- Vehicles up to 07.2010: Install bracket for air conditioner compressor ⇒ page 50.
- Vehicles from 07.2010 onwards: Install engine support with bracket for air conditioner compressor and engine mounting (left-side) \Rightarrow page 40.
- Install air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket.
- Install poly V-belt <u>⇒ page 53</u>.
- Fill up with coolant ⇒ page 187.

Tightening torques

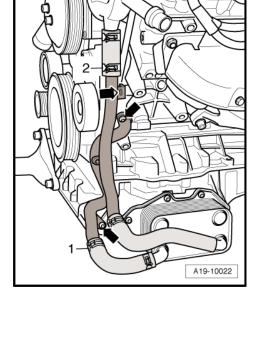
⇒ "3.1 Exploded view - coolant pipes", page 200

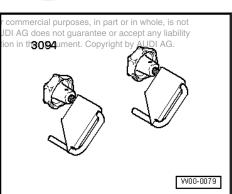
3.2.4 Removing and installing coolant pipe (bottom left)

Special tools and workshop equipment required

Hose clamps, up to 25 mm - 3094-

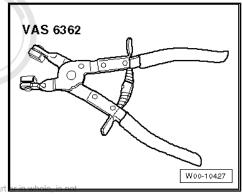
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Hose clip pliers - VAS 6362-

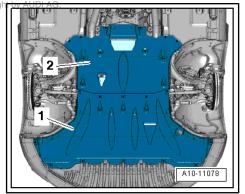




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Removing

Remove noise insulation (front) -1- ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.



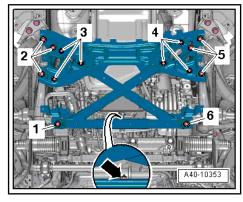
Remove subframe cross brace ⇒ Running gear, axles, steering; Rep. gr. 40; Subframe; Removing and installing subframe cross brace.

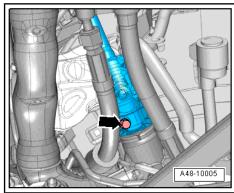


Caution

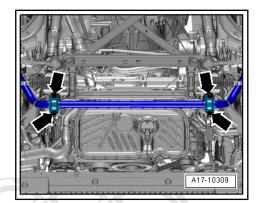
Risk of damage to running gear components.

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

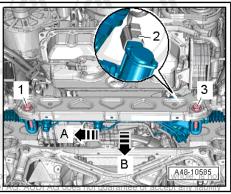




Remove nuts -arrows- and lower anti-roll bar.



- Unplug electrical connector -2- on steering rack.
- Remove bolts -1 and 3-.
- Push steering rack towards right side of vehicle -arrow A- and then lower -arrow B-.
- Secure steering rack with cable ties.



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Note

Place a cloth under the connection to catch escaping coolant.

- Clamp off coolant hoses using hose clamps -3094-, release hose clips -1 and 2- and disconnect coolant hoses from coolant pipe (bottom left).
- Remove bolts -arrows- and detach coolant pipe (bottom left).

Installing

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



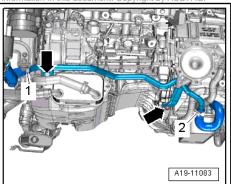
Note

Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.

- Install steering rack ⇒ Running gear, axles, steering; Rep. gr. 48; Steering rack; Removing and installing steering rack.
- Secure intermediate steering shaft to steering rack ⇒ Running gear, axles, steering; Rep. gr. 48; Steering column; Removing and installing intermediate steering shaft.
- Check coolant level ⇒ page 187.

Tightening torques

- ⇒ "3.1 Exploded view coolant pipes", page 200
- Subframe cross brace and anti-roll bar ⇒ Running gear, axles, steering; Rep. gr. 40; Subframe; Exploded view - subframe



3.2.5 Removing and installing coolant pipe

Removing



Note

Fit all cable ties in the original positions when installing.

- Drain coolant ⇒ page 185.
- Remove intake manifold (bottom section, right-side) ⇒ page 279
- Remove high-pressure pipe ⇒ page 293.
- Move clear electrical wiring and air pipe.



Note

Place a cloth under the connection to catch escaping coolant.

- Lift retaining clip and disconnect coolant hose -2-from coolant cumen pipe.
- Remove bolt -1- and pull coolant pipe rearwards out of cylinder block -arrow-.

Installing

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



Note

Fit new O-ring.

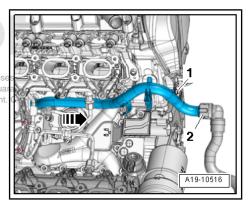
- Clean and smoothen sealing surface for O-ring.
- Lubricate O-ring with coolant and slide onto coolant pipe.
- Connect coolant hose with plug-in connector ⇒ page 217.
- Install high-pressure pipe ⇒ page 293.
- Install intake manifold (bottom section, right-side) ⇒ page 279 .
- Fill up with coolant ⇒ page 187.

Tightening torques

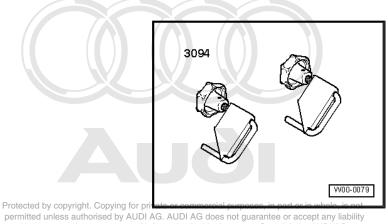
♦ ⇒ "3.1 Exploded view - coolant pipes", page 200

3.2.6 Removing and installing coolant pipes on supercharger

Special tools and workshop equipment required

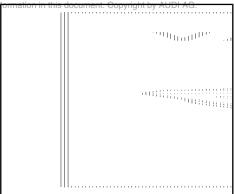


Hose clamps, up to 25 mm - 3094-

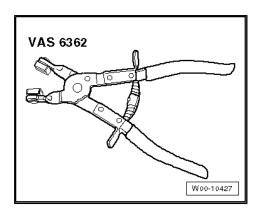


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Drip tray for workshop hoist - VAS 6208-



Hose clip pliers - VAS 6362-



Removing

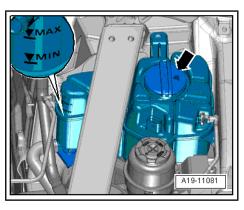
Remove engine cover panel (front) ⇒ page 48.



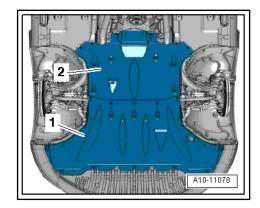
WARNING

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

- The cooling system is under pressure when the engine is
- 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) -1- ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.



- Place drip tray for workshop hoist VAS 6208- beneath engine.
- Clamp off coolant hoses using hose clamps -3094-, release hose clips -1- and detach coolant hoses from coolant pipes on supercharger.



Note

Disregard -item 2-.

Remove bolts -1 and 2- and detach coolant pipes from supercharger.

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 engine cover panel ⇒ page 48.
- Check coolant level ⇒ page 187.

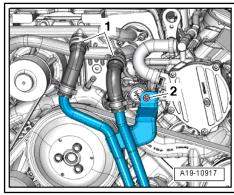
Tightening torques

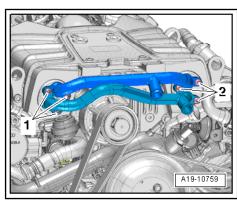
- ⇒ "3.1 Exploded view coolant pipes", page 200
- ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view noise insulation

Removing and installing coolant pipe 3.2.7 (right-side) on gearbox

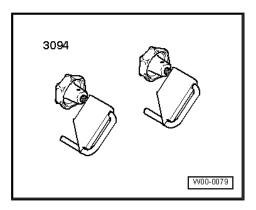
Special tools and workshop equipment required

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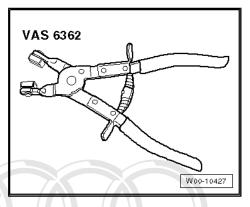




Hose clamps, up to 25 mm - 3094-

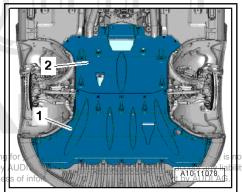


♦ Hose clip pliers - VAS 6362-



Removing

- Remove rear noise insulation -2- \Rightarrow General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.
- Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view bulkhead.



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Note

Place a cloth under coolant pipe to catch escaping coolant.

- Clamp off coolant hoses using hose clamps -3094-, release hose clips -arrows- and disconnect coolant hoses from coolant pipe on gearbox (right-side).
- Unscrew bolts -1 and 2- and detach coolant pipe from gearbox (right-side).

Installing

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



Note

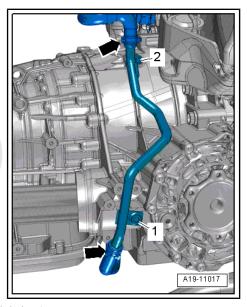
Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.

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- Install plenum chamber partition planel A General body re- or accept any liability pairs, exterior, Rep. gr. 50 , Bulkhead, Exploded View copyright by AUDI AG. bulkhead.
- Check coolant level ⇒ page 187.

Tightening torques

- ◆ ⇒ "3.1 Exploded view coolant pipes", page 200
- ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view - noise insulation



4 Radiator/radiator fans

- ⇒ "4.1 Exploded view radiator/radiator fans", page 216
- ⇒ "4.2 Exploded view auxiliary radiator", page 219
- ⇒ "4.3 Removing and installing radiator", page 219
- ⇒ "4.4 Removing and installing water radiator for charge air cooling circuit", page 225
- ⇒ "4.5 Removing and installing radiator cowl", page 231
- ⇒ "4.6 Removing and installing radiator fans", page 232

4.1 Exploded view - radiator/radiator fans

1 - Air duct

2 - Coolant hose

- ☐ Lift retaining clip to detach
- Connecting ⇒ page 217

3 - O-ring

□ Renew

4 - Radiator

- Removing and installing ⇒ page 219
- If renewed, refill system with fresh coolant

5 - O-ring

☐ Renew

6 - Coolant hose

- ☐ Lift retaining clip to detach
- Connecting ⇒ page 217

7 - Coolant hose

- □ To coolant expansion tank
- ☐ Press release ring to detach
- Connecting ⇒ page 217

8 - O-ring

□ Renew

9 - Air duct

10 - Water radiator (front) for charge air cooling circuit

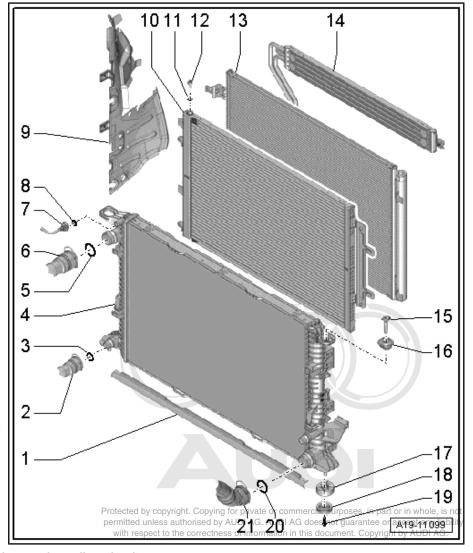
□ Removing and installing ⇒ page 225

11 - O-ring

12 - Bleeder screw

13 - Condenser

□ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87; Refrigerant circuit; Removing and installing condenser



14 - Hydraulic fluid cooler

- For power steering
- ☐ Removing and installing ⇒ Running gear, axles, steering; Rep. gr. 48; Hydraulic power steering; Removing and installing hydraulic fluid cooler

15 - Retaining pin

- Use screwdriver to release and pull off
- 16 Rubber buffer

17 - Rubber mounting

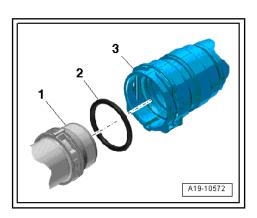
- For radiator
- 18 Washer
- 19 Bolt
 - □ 3.5 Nm
- 20 O-ring
 - □ Renew

21 - Coolant hose

- ☐ Lift retaining clip to detach
- ☐ Connecting ⇒ page 217

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 audi-
- Press coolant hose in again and then pull to check that plugin connector is correctly engaged.





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1 - Radiator fan 2 - V177-

- ☐ With radiator fan control unit 2 - J671-
- □ Removing and installing ⇒ page 232

2 - Radiator fan - V7-

- ☐ With radiator fan control unit - J293-
- □ Removing and installing ⇒ page 232

3 - Radiator cowl

□ Removing and installing ⇒ page 231

4 - Bolt

□ 3.5 Nm

5 - Air duct (left-side)

6 - Fan wheel

☐ Pin must engage in hole

7 - Bolt

□ 5 Nm

8 - Fan wheel

☐ Pin must engage in hole

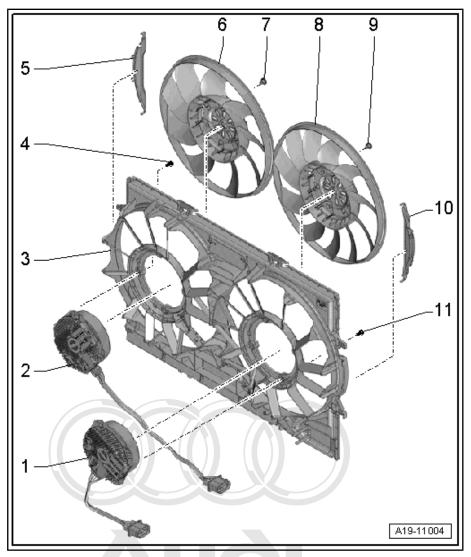
9 - Bolt

□ 5 Nm

10 - Air duct (right-side)

11 - Bolt

□ 3.5 Nm



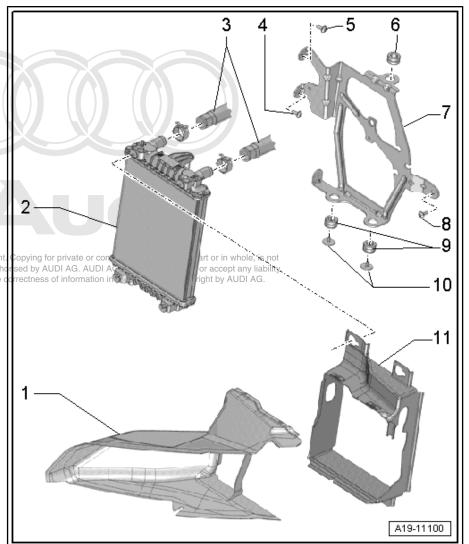
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4.2 Exploded view - auxiliary radiator

1 - Air duct

2 - Water radiator (left-side) for charge air cooling circuit

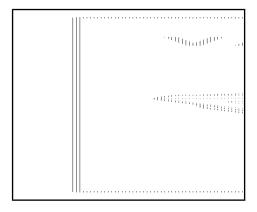
- Removing and installing ⇒ page 228
- 3 Coolant hoses
- 4 Bolt
 - □ 9 Nm
- 5 Bolt
 - □ 9 Nm
- 6 Grommet
- 7 Bracket
 - □ For water radiator (leftside) for charge air cooling circuit with respect to the
- 8 Bolt
 - □ 9 Nm
- 9 Grommet
- 10 Bolt
 - □ 9 Nm
- 11 Air duct

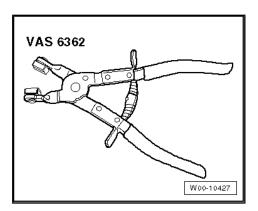


Removing and installing radiator 4.3

Special tools and workshop equipment required

♦ Drip tray for workshop hoist - VAS 6208-





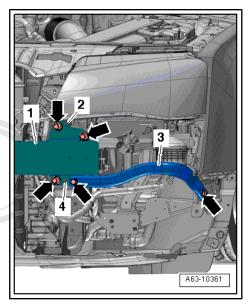
Removing



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 bar -1- \Rightarrow General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing impact bar.



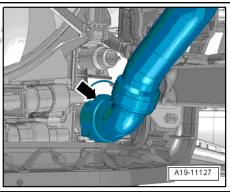


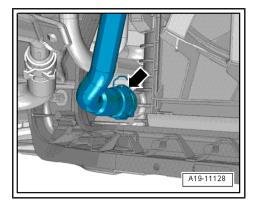
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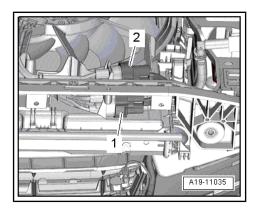
Collect drained coolant in a clean container for re-use or disposal.

- Place drip tray for workshop hoist VAS 6208- beneath engine.
- Lift retaining clip, disconnect coolant hose (bottom right) -arrow- from radiator and drain off coolant.
- Lift retaining clip, disconnect coolant hose (bottom left) -arrow- from radiator and drain off coolant.

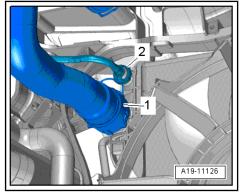




Unplug electrical connectors -1, 2- for radiator fan.



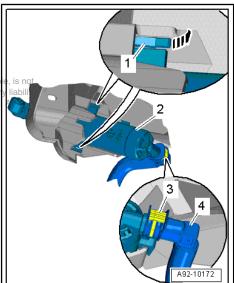
Lift retaining clips -1 and 2- and disconnect coolant hoses (top left) from radiator.



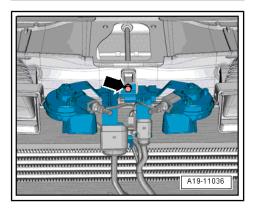
Pull off retaining clip -3- and disconnect headlight washer hose



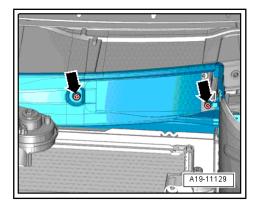
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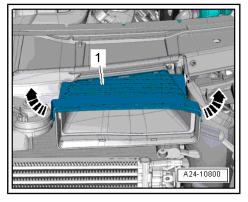
Remove bolt -arrow-, leave bracket with horns suspended.



Unscrew bolts -arrows- for air duct at lock carrier.

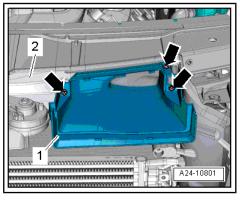


- Unclip cover -1- (right-side) -arrows- and remove.

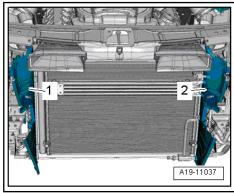


Remove bolts -arrows- (right-side) and detach air ducts -1 and 2-.

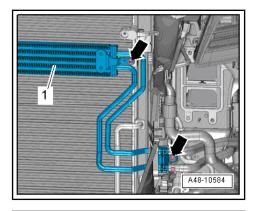
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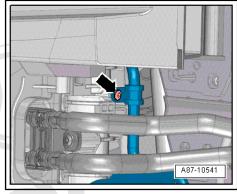
Unclip air ducts -1 and 2-.



Remove bolts -arrows-, detach hydraulic fluid cooler -1- for power steering to the left and hook it up on one side.

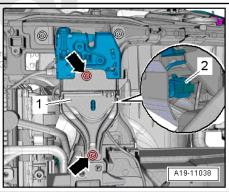


- Remove bolt -arrow- on refrigerant line.

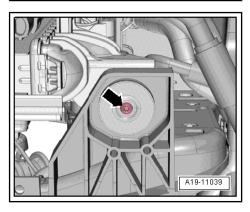


- Move clear electrical connector -2-.
- Remove lock carrier -1- (both sides) for bonnet lock ⇒ General body repairs, exterior; Rep. gr. 50; Lock carrier; Exploded view - lock carrier . permitted unless authorised by AUDI AG. AUDI

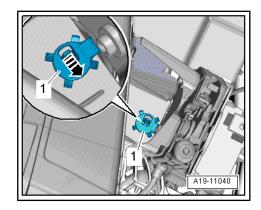
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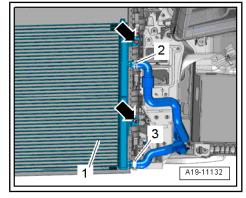
- Remove bolt -arrow- at bottom left and bottom right of radiator.



Release retaining pins -1- for radiator on both sides -arrowand pull out upwards.



- Release hose clips -2, 3- and disconnect coolant hoses.
- Remove bolts -arrows- for water radiator (front) for charge air cooling circuit -1-.



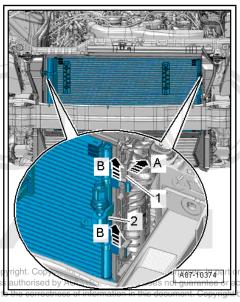
- Have a second mechanic release retaining clips -1- on both sides in direction of -arrow A-.
- Pull condenser -2- upwards out of its mountings on radiator -arrows B-.



Caution

Risk of damage to condenser, refrigerant lines and refrigerant

- ◆ 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.



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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:



Note

- ♦ If there are slight impressions on the fins, refer to ⇒ page 8.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.
- Install lock carrier for bonnet lock ⇒ General body repairs, exterior; Rep. gr. 50; Lock carrier; Exploded view - lock car-
- Install refrigerant line ⇒ Heating, air conditioning; Rep. gr. 87; Refrigerant circuit; Exploded view - condenser.
- Install hydraulic fluid cooler ⇒ Running gear, axles, steering; Rep. gr. 48; Hydraulic power steering; Removing and installing hydraulic fluid cooler.
- Install air ducts ⇒ page 270.
- Connect coolant hoses with plug-in connector ⇒ page 217.



Note

The coolant in the entire system must be changed if the radiator is renewed.

Fill up with coolant ⇒ page 187.

Tightening torques

- ♦ ⇒ "4.1 Exploded view radiator/radiator fans", page 216
- 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

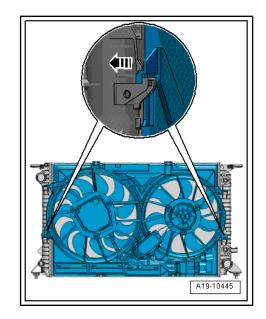
4.4 Removing and installing water radiator for charge air cooling circuit

⇒ "4.4.1 Removing and installing water radiator (front) for charge. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability air cooling circuit", page 225 with respect to the correctness of information in this document. Copyright by AUDI AG.

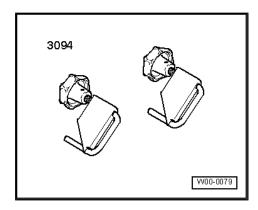
⇒ "4.4.2 Removing and installing water radiator (left-side) for charge air cooling circuit", page 228

4.4.1 Removing and installing water radiator (front) for charge air cooling circuit

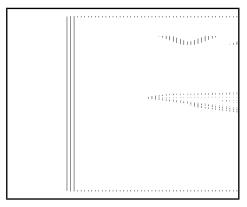
Special tools and workshop equipment required



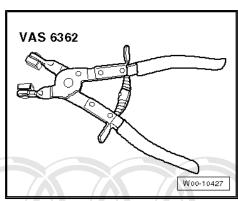
Hose clamps, up to 25 mm - 3094-



Drip tray for workshop hoist - VAS 6208-

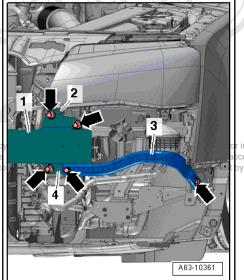


Hose clip pliers - VAS 6362-



Removing

Remove impact bar -1- \Rightarrow General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing impact bar .

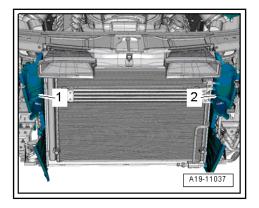


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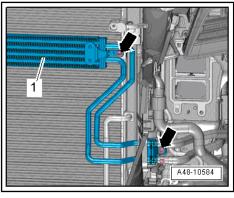
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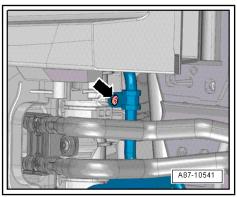
in whole, is not ccept any liability by AUDI AG. Unclip air ducts -1 and 2-.



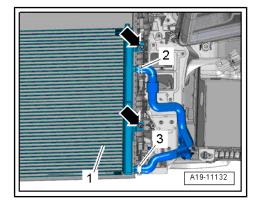
Remove bolts -arrows-, detach hydraulic fluid cooler -1- for power steering to the left and hook it up on one side.



- Remove bolt -arrow- on refrigerant line.



- 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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- 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:



Note

- If there are slight impressions on the fins, refer to ⇒ page 8.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .
- Install refrigerant line ⇒ Heating, air conditioning; Rep. gr. 87; Refrigerant circuit; Exploded view - condenser.
- Install hydraulic fluid cooler ⇒ Running gear, axles, steering; Rep. gr. 48; Hydraulic power steering; Removing and installing hydraulic fluid cooler .
- Check coolant level ⇒ page 187.

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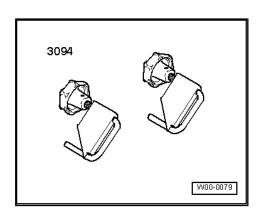
Tightening torques

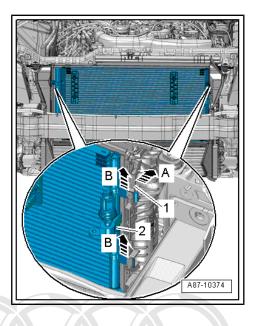
- ⇒ "4.1 Exploded view radiator/radiator fans", page 216
- ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Exploded view - impact bar

4.4.2 Removing and installing water radiator (left-side) for charge air cooling circuit

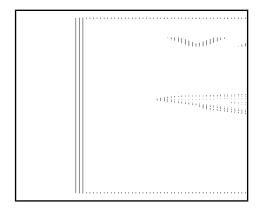
Special tools and workshop equipment required

Hose clamps, up to 25 mm - 3094-

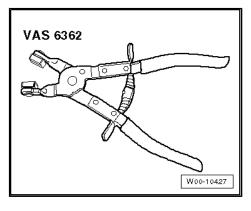




◆ Drip tray for workshop hoist - VAS 6208-



♦ Hose clip pliers - VAS 6362-



Removing

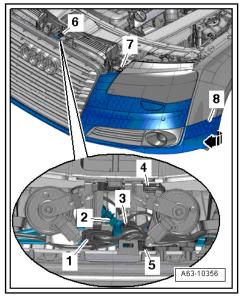


Note

If there are slight impressions on the fins, refer to ⇒ page 8.

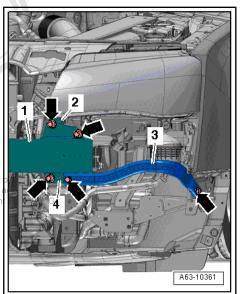
Remove bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing bumper cover .

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Remove connecting piece -3- for impact bar ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Exploded view - impact bar .

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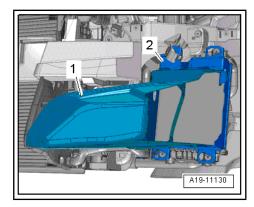


Unclip air duct -2- for water radiator (left-side) for charge air cooling circuit towards left side of vehicle and remove.



Note

Disregard -item 1-.



- 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.

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



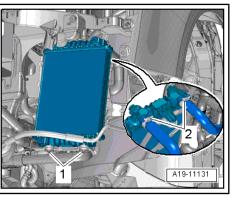
Note

Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .

- Install bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing bumper cover.
- Check coolant level ⇒ page 187.

Tightening torques

- ⇒ "4.1 Exploded view radiator/radiator fans", page 216
- ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Exploded view - impact bar .



4.5 Removing and installing radiator cowl

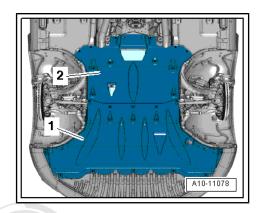
Removing

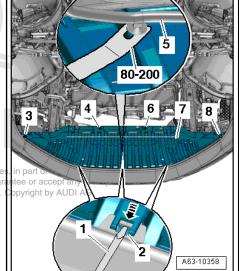


WARNING

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

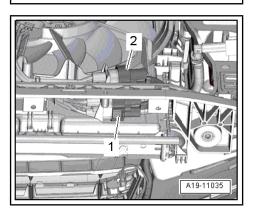
- ♦ Even when the ignition is switched off, the radiator fans can start up without warning due to accumulated heat in the engine compartment, etc.
- Remove noise insulation (front) -1- ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.
- Remove closure plate for bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing attachments.



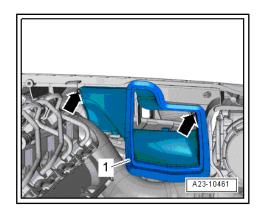




- Unplug electrical connectors -1, 2- for radiator fan.
- Remove air cleaner housing ⇒ page 271.



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



- Move clear electrical wiring harness.
- Press locking tabs on left and right sides of radiator cowl -arrow- and at the same time lift radiator cowl off radiator.

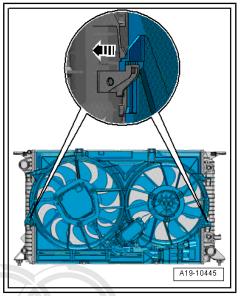
Installing

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

- Install air cleaner housing ⇒ page 271.
- Install closure plate for bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing attachments.

Tightening torques

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



4.6 Removing and installing radiator fans

Removing



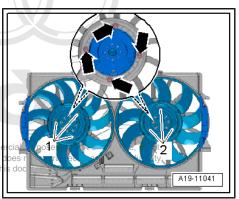
Note

Fit all cable ties in the original positions when installing

- Remove radiator cowl ⇒ page 231.
- Remove bolts -1- or -2- and detach corresponding fan wheel or common the corresponding of the common terms of the corresponding of the
- Remove bolts -arrows- on radiator fan spect to the correctness of information in
- Move electrical wiring harness clear and detach radiator fan.

Installing

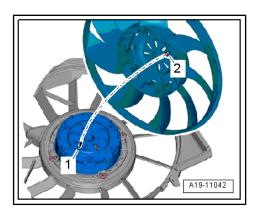
Installation is carried out in the reverse order; note the following:



- Note installation position of fan wheel:
- Pin -2- must engage in hole -1-.
- Install radiator cowl ⇒ page 231 .

Tightening torques

◆ ⇒ "4.1 Exploded view - radiator/radiator fans", page 216





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21 – Turbocharging/supercharging

1 Supercharger

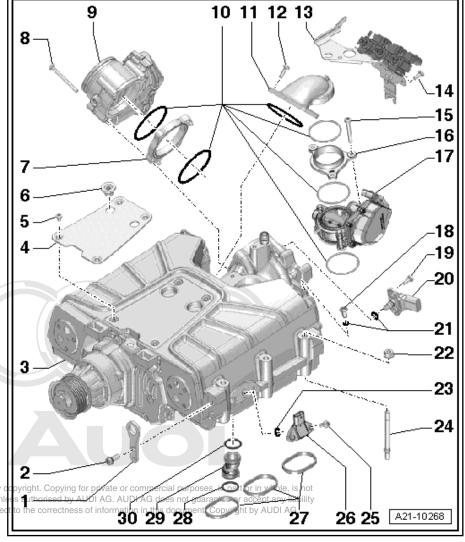
- ⇒ "1.1 Exploded view supercharger", page 234
- ⇒ "1.2 Exploded view drive unit", page 236
- ⇒ "1.3 Removing and installing supercharger", page 236
- ⇒ "1.4 Checking supercharger for leaks", page 240
- ⇒ "1.5 Removing and installing drive unit and damper spring", page 242
- ⇒ "1.6 Securing supercharger to engine and gearbox support", page 245

1.1 Exploded view - supercharger

- 1 Engine lifting eye
- 2 Bolt
 - □ 27 Nm
- 3 Supercharger
 - With charge air coolers
 - Removing and installing supercharger
 - ⇒ page 236
 - ☐ Charge air coolers exploded view
 - ⇒ page 248
 - Secure to engine and gearbox support - VAS 6095- when performing assembly work
 - ⇒ page 245
 - Secure to engine and gearbox support - VAS 6095- when checking for leaks ⇒ page 246
- 4 Insulating plate
- 5 Bolt
 - □ 5 Nm
- 6 Rubber grommet
 - □ 2x
- 7 Intermediate flange
- 8 Bolt
 - ☐ Tightening torque

 ⇒ page 274

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- 9 Throttle valve module and respect J338-
 - Removing and installing⇒ page 281
- 10 O-rings
 - □ Renew



11 - Connection
12 - Bolt
☐ Tightening torque and sequence <u>⇒ page 275</u>
13 - Bracket
☐ For change-over valves
14 - Bolt
□ 9 Nm
15 - Bolt
☐ Tightening torque and sequence <u>⇒ page 275</u>
16 - Intermediate flange
17 - Regulating flap control unit - J808-
☐ Removing and installing <u>⇒ page 283</u>
18 - Bleeder screw Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability.
For charge air cooler (left-side) espect to the correctness of information in this document. Copyright by AUDI AG.
□ 1.5 3.0 Nm
19 - Bolt Tightening tergue + page 274
☐ Tightening torque ⇒ page 274
20 - Intake air temperature sender - G42- / intake manifold pressure sender - G71- □ Removing and installing ⇒ page 289
21 - O-rings Renew
22 - Nut
□ 20 Nm
23 - O-ring
□ Renew
24 - Threaded pin
□ 17 Nm
25 - Bolt
☐ Self-locking
☐ Renew
☐ Before assembly, always remove residues from threaded holes using a thread tap
□ 10 Nm
26 - Charge pressure sender
☐ Cylinder bank 1 (right-side): charge pressure sender - G31-
 Cylinder bank 2 (left-side): charge pressure sender 2 - G447- Removing and installing ⇒ page 252
27 - Seals ☐ Renew
28 - O-ring 2x on USA versions
Renew
29 - Connection
□ For crankcase breather
☐ Installation position ⇒ page 168
30 - O-ring
☐ 2x on USA versions

1.2 Exploded view - drive unit

1 - Bolt

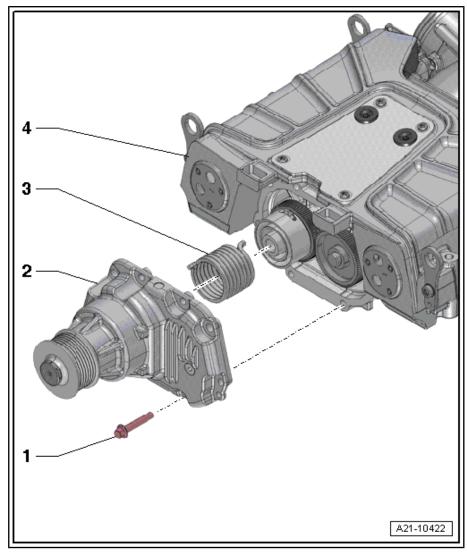
- □ Self-locking
- ☐ Renew
- ☐ Before assembly, always remove residues from threaded holes using a thread tap
- □ 25 Nm

2 - Drive unit

Removing and installing

3 - Damper spring

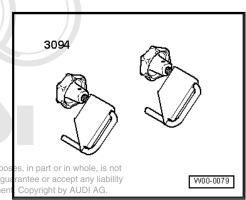
- □ Removing and installing ⇒ page 242
- 4 Supercharger housing



1.3 Removing and installing supercharger

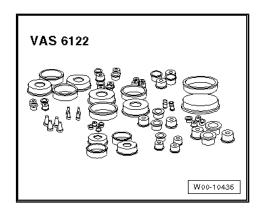
Special tools and workshop equipment required

♦ Hose clamps, up to 25 mm - 3094-

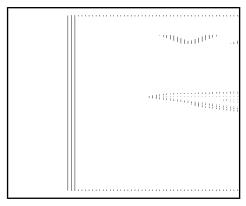


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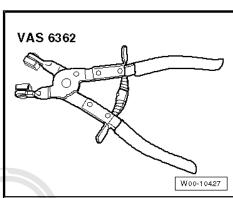
♦ Engine bung set - VAS 6122-



♦ Drip tray for workshop hoist - VAS 6208-



♦ Hose clip pliers - VAS 6362-

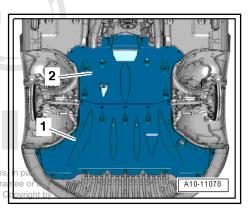


Removing



Note

- Observe rules for cleanliness ⇒ page 7.
- Check that all air pipes and hoses and vacuum lines are correctly fitted and that there are no leaks before carrying out tests or repairs.
- Remove poly V-belt for supercharger Sprage 52ate or commercial purpose
 permitted unless authorised by AUDI AG. AUDI AG does not guar
- Remove noise insulation (front) in the General body repairs, cument exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.



ss of information in this

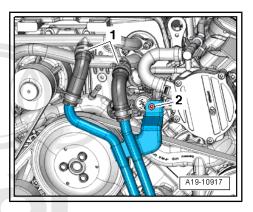
- Place drip tray for workshop hoist VAS 6208- beneath en-
- Clamp off coolant hoses using hose clamps -3094-, release hose clips -1- and detach coolant hoses from coolant pipes on supercharger.

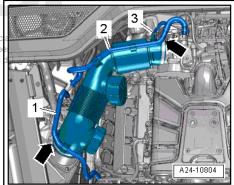


Note

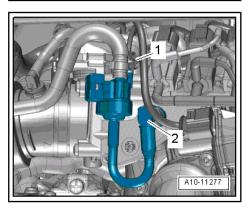
Disregard -item 2-.

- Move fuel hose -1- and hose -2- from activated charcoal filter clear at air pipe.
- Detach vacuum hose -3- from Connection of all pipe for private or commer connections and all pipe for private or commer connections and all pipe for private or commercial for the pipe for private or commercial for the pipe for private or commercial for pipe for private or commercial for the pipe for private or commercial for pipe for pip
- Release hose clips -arrows- and remove air pipe.

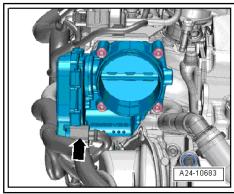




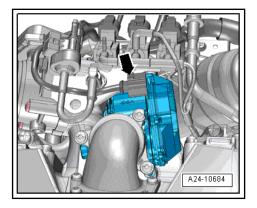
- Unplug electrical connector -1- and detach vacuum hose -2-(press release tabs).
- Detach activated charcoal filter solenoid valve 1 N80- from bracket and move it clear to the side with hose still attached.



Unplug electrical connector -arrow- at throttle valve module -



Unplug electrical connector -arrow- at regulating flap control unit - J808- .



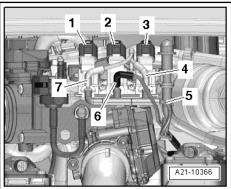
- Unplug electrical connectors -1, 2, 3-.



Note

Mark position of vacuum hoses for re-installation.

- Disconnect vacuum hoses -4 ... 7-.

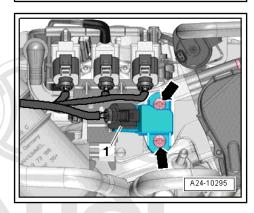


Unplug electrical connector -1- at intake air temperature sender - G42- / intake manifold pressure sender - G71- .



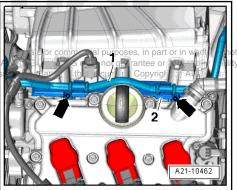
Note

Disregard -arrows-.

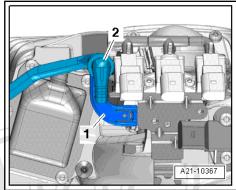


- Move clear vacuum hose -1- on cylinder bank 2 (left-side).
- Remove bolts -arrows- on both sides and detach cover -2-.

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 Move clear vacuum hose -2- leading to brake servo at bracket -1-.



- Unplug electrical connectors -1- and -2-.
- Remove nuts -arrows- and lift off supercharger with charge air coolers.
- Seal openings on supercharger and all relevant ducts and hoses of the charge air system using plugs from engine bung set
 VAS 6122- or clean cloths.
- Detach noise insulation panels.

Installing

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



Note

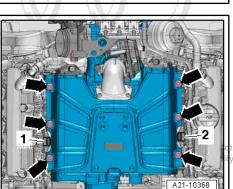
- Renew gaskets, seals and O-rings.
- Do not remove plugs or protective caps until you are ready to fit the relevant line.
- Hose connections and air pipes and hoses must be free of oil and grease before assembly.
- ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.
- To secure the air hoses at their connections, spray rust remover onto the worm thread of the used hose clips before installing.
- Fit noise insulation panels.
- Ensure that crankcase breather connection is positioned correctly when fitting supercharger ⇒ page 168.
- Electrical connections and routing ⇒ Current flow diagrams,
 Electrical fault finding and Fitting locations.
- Install poly V-belt for supercharger ⇒ page 52.
- Fill up with coolant ⇒ page 187.

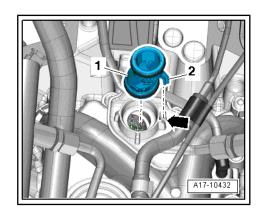
Tightening torques

- ♦ ⇒ "1.1 Exploded view supercharger", page 234
- General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view noise insulation

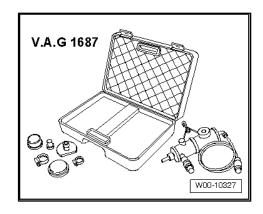
1.4 Checking supercharger for leaks

Special tools and workshop equipment required





Charge air system tester - V.A.G 1687- with adapters -V.A.G 1687/10- , -V.A.G 1687/13-1- , -V.A.G 1687/13-2- and -V.A.G 1687/13-3-



Procedure

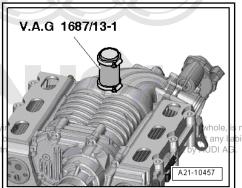
- Supercharger secured to engine and gearbox support VAS 6095- for leak test \Rightarrow page 245.
- Regulating flap control unit J808- installed ⇒ page 283.
- Secure -V.A.G 1687/13-1- to bottom of supercharger housing.
- Secure hose connections with hose clips.



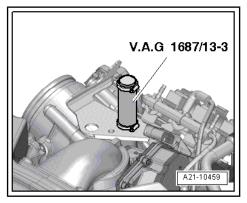
Note

For illustration purposes the supercharger is shown without the gearbox support.

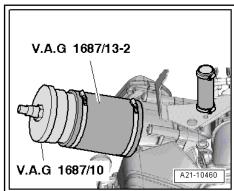
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- Secure -V.A.G 1687/13-3- to top of supercharger housing.
- Secure hose connections with hose clips.

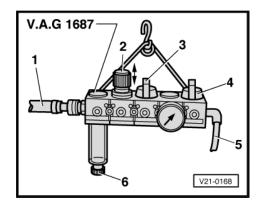


- Secure -V.A.G 1687/13-2- to supercharger housing with adapter - V.A.G 1687/10-.
- Secure hose connections with hose clips.

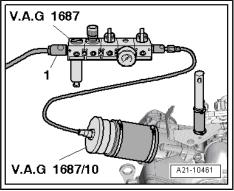


Prepare charge air system tester - V.A.G 1687- as follows:

- Unscrew pressure control valve -2- completely and close valves -3- and -4-.
- Make sure knob is pulled out before turning pressure control valve.



 Connect charge air system tester - V.A.G 1687- as shown in illustration, and connect to compressed air line using a commercially available connection piece -1-.



- If there is water in sight glass, remove drain plug -6- and drain water.
- Open valve -3-.



Caution

Risk of damage if pressure is set too high.

◆ The pressure must not exceed 0.5 bar.

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- Open valve -4- and wait until test system is pressurised. If necessary, adjust pressure to 0.5 bar again.
- Close valve -3-.
- Pressure must not drop by more than 0.1 bar for 30 seconds.
- Check charge air system for audible leaks or leaks that can be felt with the hand; apply commercially available leak detecting spray or use ultrasonic tester - V.A.G 1842- .

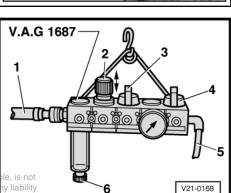


Note

- ♦ For operation of ultrasonic tester -V.A.G 1842- , refer to ⇒ Operating instructions .
- Release pressure in test circuit by detaching hose coupling from adapter before removing adapter.

1.5 Removing and installing drive unit and damper spring

Special tools and workshop equipment required



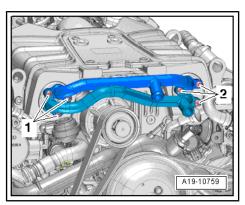
◆ Used oil collection and extraction unit - VAS 6622A-



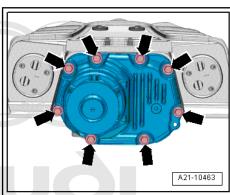
- ◆ Sealant ⇒ Electronic parts catalogue
- ♦ Oil for supercharger drive ⇒ Electronic parts catalogue
- ◆ Spreader tool (commercially available)

Removing

- Supercharger secured to engine and gearbox support VAS 6095- ⇒ page 245.
- Detach coolant pipes from supercharger ⇒ page 211.
- Position supercharger vertically in engine and gearbox support.
- Drive unit faces upwards.



Remove bolts -arrows-.

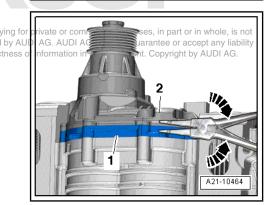




Caution

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- ♦ To make sure bearing cover -1- does not come loose and remains properly sealed, always use spreader tool -arrows- to press off drive unit -2- as shown in illustration (do not use a hammer).
- Carefully press off drive unit from bearing cover and detach.
- Detach damper spring.



 With the aid of used oil collection and extraction unit - VAS 6622A-, extract all oil for supercharger drive from bearing cover (including oil chambers -arrows- between ribs).

Installing



Note

- ♦ Renew the drive unit bolts.
- ◆ Fit self-locking bolts or insert bolts with locking fluid ⇒ Electronic parts catalogue.
- Clean sealing surfaces; they must be free of oil and grease.
- Before assembly, always remove residues from threaded holes for drive unit in bearing cover using a thread tap.
- Fill bearing cover with oil for supercharger drive.



Note

The container is filled with the required amount of oil. It is not possible to check the oil level at a later stage.

- Insert damper spring in damper element.
- The end of the damper spring -1- must engage in the hole -arrow- in the damper element at the rear.
- Apply a thin layer of sealant to sealing surface of drive unit.
- Fit drive unit to supercharger housing (pay attention to dowel sleeves).



Caution

Avoid damage to drive shaft.

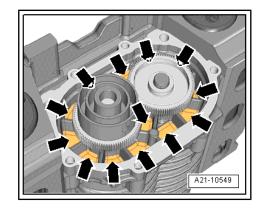
- The drive unit must not be pulled in by screwing in the bolts.
- Simultaneously turn drive pulley until opposite end of damper spring engages in hole in drive unit.

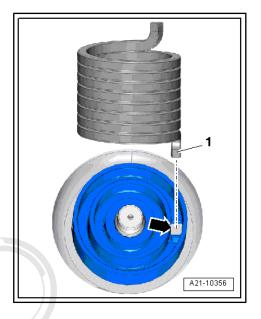
Remaining installation steps are carried out in reverse sequence; note the following:

- Check supercharger for leaks ⇒ page 240.
- Install coolant pipes on supercharger ⇒ page 211.

Tightening torques

♦ ± "1.2 Exploded view - drive unit", page 236





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1.6 Securing supercharger to engine and gearbox support

 \Rightarrow "1.6.1 Securing supercharger to engine and gearbox support for assembly work", page 245

 \Rightarrow "1.6.2 Securing supercharger to engine and gearbox support for leak test", page 246

1.6.1 Securing supercharger to engine and gearbox support for assembly work



Note

When performing assembly work, the openings in the bottom of the supercharger housing make it possible for you to see and access the charge air coolers.

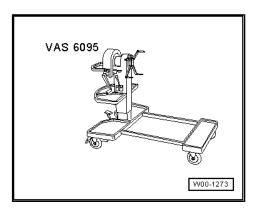
Special tools and workshop equipment required

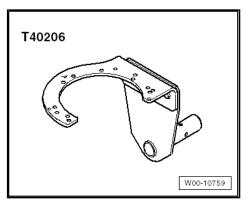
◆ Engine and gearbox support - VAS 6095-



Gearbox support - T40206- with -T40206/1- and -T40206/2-

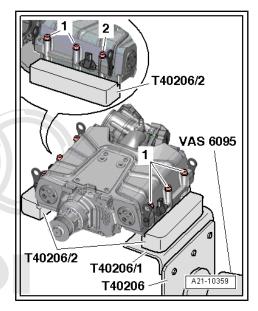
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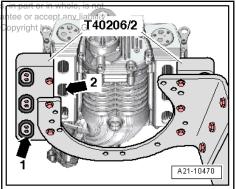
Procedure

- Supercharger removed ⇒ page 236.
- Insert gearbox support T40206- with -T40206/1- into engine and gearbox support - VAS 6095-.
- Secure supercharger to gearbox support, as shown in illustration (use holes "1", "4", "9", "11" and "13" for bolted connections -1-).
- Secure mounting T40206 /2- directly to supercharger housing at front right with bolt -2-.



Installation position of mountings 4740206/2 wing for private or commercial purpos permitted unless authorised by AUDI AG. AUDI AG does not guaranteed unless authorised by AUDI AG.

- Seals -arrow 1- of mountings should point downwards. in this document
- Openings -arrow 2- in supercharger housing make it possible for you to see and access charge air coolers.



1.6.2 Securing supercharger to engine and gearbox support for leak test

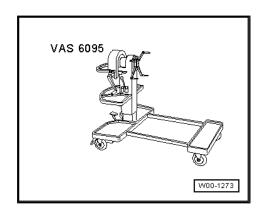


Note

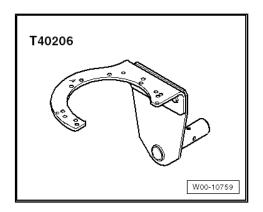
When checking for leaks, the seals on the mountings -T40206/2should seal off the openings in the supercharger housing.

Special tools and workshop equipment required

◆ Engine and gearbox support - VAS 6095-

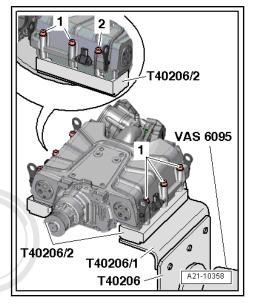


Gearbox support - T40206- with -T40206/1- and -T40206/2-



Procedure

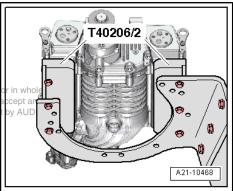
- Supercharger removed ⇒ page 236.
- Insert gearbox support -T40206- with -T40206/1- into engine and gearbox support - VAS 6095- .
- Secure supercharger to gearbox support, as shown in illustration (use holes "1", "4", "9", "11" and "13" for bolted connections -1-).
- Attach mounting -T40206/2- directly to supercharger housing at front right with bolt -2-.



Installation position of mountings -T40206/2-

Seals of mountings should seal off openings in supercharger housing.





2 Charge air system

- ⇒ "2.1 Exploded view charge air system", page 248
- ⇒ "2.2 Removing and installing charge air cooler", page 249
- ⇒ "2.3 Removing and installing charge pressure sender G31 / G447", page 252

2.1 Exploded view - charge air system

ate or commercial purposes, in part or in whole, is not s authorised by AUDI AG. AUDI AG does not guarantee or accept any liability

1 - Gasket

□ Renew

2 - O-ring

- □ Renew
- ☐ Coat with engine oil when installing charge air cooler

3 - O-ring

- ☐ Renew
- □ Coat with engine oil when installing charge air cooler

4 - Supercharger housing

5 - Gasket

□ Renew

6 - Charge air cooler (rightside)

 Removing and installing ⇒ page 249

7 - Bolt

- □ Self-locking
- ☐ Renew
- □ 10 Nm

8 - Seal

- Not supplied separately
- Must not be detached from charge air cooler
- Coat with engine oil when installing charge air cooler

9 - Bolt

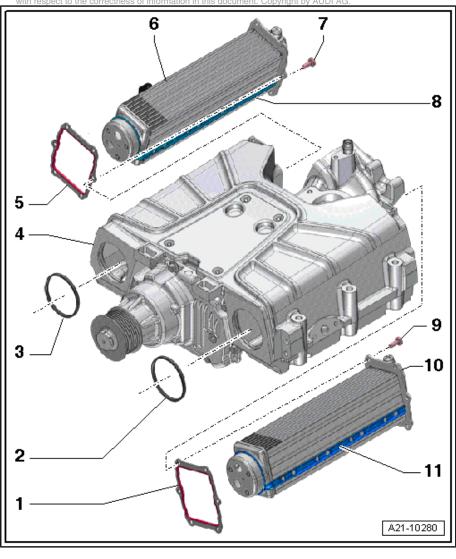
- Self-locking
- □ Renew
- □ 10 Nm

10 - Charge air cooler (left-side)

□ Removing and installing ⇒ page 249

11 - Seal

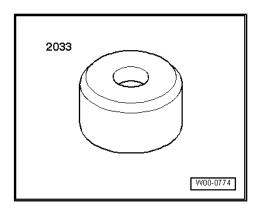
- Not supplied separately
- Must not be detached from charge air cooler
- Coat with engine oil when installing charge air cooler



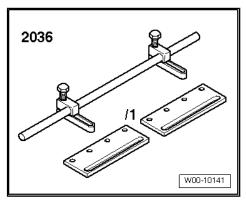
2.2 Removing and installing charge air cool-

Special tools and workshop equipment required

♦ Fitting sleeve - 2033-



Assembly device for valves - 2036-



◆ Tyre lever for aluminium rims - V.A.G 1942-

Removing

Supercharger secured to engine and gearbox support - VAS 6095- for assembly work ⇒ page 245.

Charge air cooler (left-side):

Unclip bracket -1- for vacuum hose.



Note

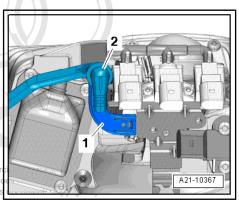
Disregard -item 2-.

Remove charge pressure sender 2 - G447- ⇒ page 252.

Charge air cooler (right-side):

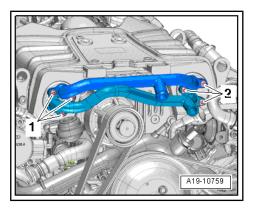
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- Remove throttle valve module J338 page 281 ness of information in this
- Remove charge pressure sender G31- ⇒ page 252.

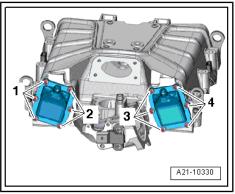


Continuation for both sides:

Remove bolts -1- and -2- and detach coolant pipes from supercharger.



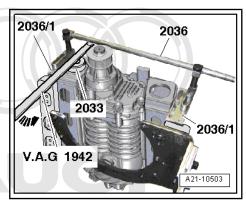
Remove bolts -1, 2- for charge air cooler (left-side) and bolts -3, 4- for charge air cooler (right-side).



- Attach valve assembly device 2036- with -2036/1- to supercharger, as shown in illustration.
- Apply fitting sleeve 2033- at front of charge air cooler.
- Using tyre lever V.A.G 1942-, apply moderate pressure and slowly press charge air cooler out of supercharger housing.

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with respect to the correctness

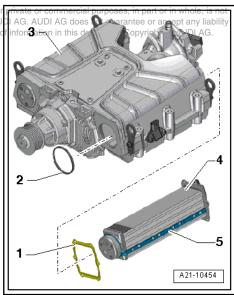


Installing

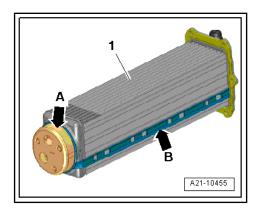


Note

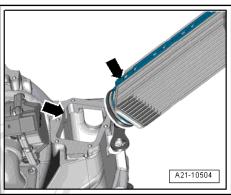
- Renew seals, gaskets, O-rings and self-locking bolts.
- Before assembly, always remove residues from threaded holes in supercharger housing using a thread tap.
- Check gasket -5- on charge air cooler -4-.
- The gasket must not be cracked or damaged.
- Slide gasket -1- onto charge air cooler.
- Insert O-ring -2- into opening in supercharger housing -3-.



- Coat sealing surface -arrow A- and gasket -arrow B- of charge air cooler -1- with engine oil.
- Also coat sealing surface inside supercharger housing with engine oil.



When fitting charge air cooler, make sure that seals align with recesses in supercharger housing -arrows-.





Note

To make it easier to insert and press in the charge air cooler, position the supercharger housing vertically in engine and gearbox support - VAS 6095- .

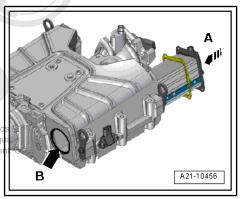


Caution

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with respect to the correctness of information in this

Risk of damage to charge air cooler.

- ♦ Only insert charge air cooler by hand.
- Insert charge air cooler in supercharger housing -arrow A- by hand as far as stop, letting charge air cooler slide into hole -arrow B- in front of supercharger housing.



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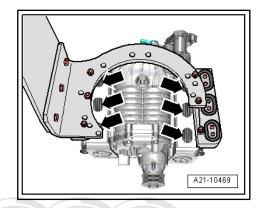
- If necessary, guide charge air cooler by hand via openings -arrows- in supercharger housing when inserting cooler.
- As soon as possible (due to length of bolts), screw in 2 bolts loosely by hand to guide charge air cooler additionally.



Caution

Risk of damage to charge air cooler.

- The charge air cooler must not be pulled in by screwing in the securing bolts.
- Insert charge air cooler by hand (without using tools) until sealing flange with gasket make's contact with supercharger housing (maximum: 1 mm distance). Only then tighten bolts, as described in the following.



Tighten bolts -1, 2- for charge air cooler (left-side) and bolts -3, 4- for charge air cooler (right-side) in diagonal sequence and in small steps.

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

- Install coolant pipes on supercharger ⇒ page 211.
- Install throttle valve module J338- ⇒ page 281 .
- Install charge pressure sender ⇒ page 252 permitted unless authorised by AUI
- Check supercharger for leaks ⇒ page 240.

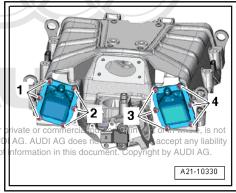
Tightening torques

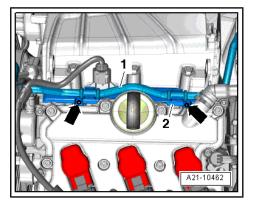
⇒ "2.1 Exploded view - charge air system", page 248

Removing and installing charge pres-2.3 sure sender -G31- / -G447-

Removing

- Move clear vacuum hose -1- on cylinder bank 2 (left-side).
- Remove bolts -arrows- and detach cover -2-.





- Unplug electrical connector -1-.
- Unscrew bolts -arrows- and detach charge pressure sender -G31- or -G447- .

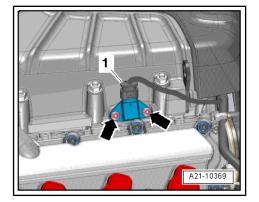
Installing

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



Note

- ♦ Renew self-locking bolts and O-ring.
- ♦ Before assembly, always remove residues from threaded holes for charge pressure senders in supercharger housing billity using a thread Jap ectness of information in this document. Copyright by AUDI AG.



Tightening torques

◆ ⇒ "1.1 Exploded view - supercharger", page 234

24 – Mixture preparation - injection

1 Injection system

⇒ "1.1 Overview of fitting locations - injection system", page 254

 \Rightarrow "1.2 Reducing pressure in high-pressure section of injection system", page 264

⇒ "1.3 Filling and bleeding fuel system", page 265

⇒ "1.4 Checking fuel system for leaks", page 266

1.1 Overview of fitting locations - injection system

Engine compartment (right-side)

- 1 Charge pressure sender G31- / intake manifold temperature sender G72-
 - ☐ Fitting location

 ⇒ page 261

2 - Ignition coils for cylinder bank 1

- ☐ Ignition coil 1 with output stage N70-
- ☐ Ignition coil 2 with output stage N127-
- Ignition coil 3 with output stage - N291-
- □ Removing and installing⇒ page 332
- 3 Right electrohydraulic engine mounting solenoid valve N145-
 - ☐ Fitting location

 ⇒ page 264

4 - Lambda probe - G39-

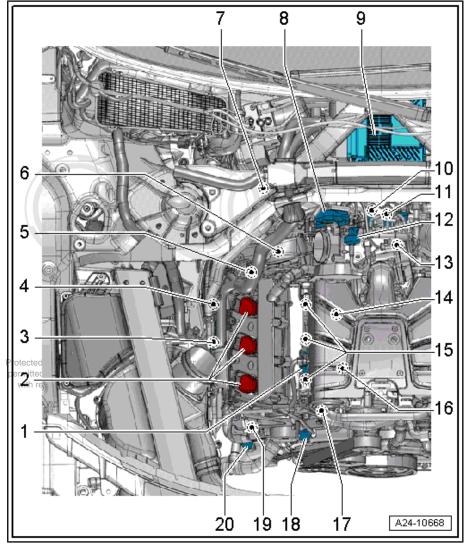
- With Lambda probe heater Z19-
- ☐ Fitting location ⇒ page 259
- ☐ Fitting location of connector ⇒ page 258
- □ Removing and installing⇒ page 297
- 5 Camshaft control valve 1 N205-
 - ☐ Fitting location⇒ page 262

6 - Electrical connectors

Assignment of connectors ⇒ page 259

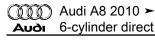
7 - Lambda probe after catalytic converter - G130-

- ☐ With Lambda probe 1 heater after catalytic converter Z29-
- ☐ Fitting location <u>⇒ page 259</u>
- ☐ Fitting location of connector ⇒ page 258



	Removing and installing <u>⇒ page 297</u>			
8 - Th	nrottle valve module - J338-			
	Fitting location ⇒ page 260			
	Removing and installing <u>⇒ page 281</u>			
	ngine control unit - J623-			
	Fitting location <u>⇒ page 257</u> Removing and installing <u>⇒ page 302</u>			
_	ntake air temperature sender - G42- / intake manifold pressure sender - G71-			
	Fitting location ⇒ page 261			
	Removing and installing <u>⇒ page 289</u>			
11 - 8	Sender 1 for secondary air pressure - G609-			
	USA version only			
	Fitting location <u>⇒ page 264</u>			
12 - Activated charcoal filter solenoid valve 1 - N80-				
	Engine speed sender - G28-			
	Fitting location ⇒ page 263			
44 4	Removing and installing <u>⇒ page 335</u>			
14 - r	Knock sensor 1 - G61- Fitting location <u>⇒ page 260</u>			
	Fitting location of connector ⇒ page 258			
15 - Iı	njectors, cylinder bank 1			
□ F	r Injector co cylinde ny h g f N30 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 INJECTOR SUITINGER AS SAME TRANSPORT OF THE PROPERTY OF THE PROPER			
	3 3			
.	Removing and installing <u>⇒ page 284</u>			
	Femperature sender for engine temperature regulation - G694-			
	Fitting location ⇒ page 260 ptoke manifold flap potentiometer. G336			
	ntake manifold flap potentiometer - G336- Fitting location <u>⇒ page 261</u>			
18 - Hall sender - G40-				
	Fitting location ⇒ page 262			
19 - F	Fuel metering valve - N290-			
	Fitting location <u>⇒ page 259</u>			
20 - Fuel pressure sender for low pressure - G410-				
	Fitting location <u>⇒ page 259</u>			

Engine compartment (left-side)



1 - Coolant temperature sender - G62-

- □ Fitting location
- 2 Intake manifold flap potentiometer 2 - G512-
 - Fitting location ⇒ page 261
- 3 Fuel pressure sender -G247-
 - □ Fitting location ⇒ page 260
 - Lubricate threads
 - □ 22 Nm

4 - Knock sensor 2 - G66-

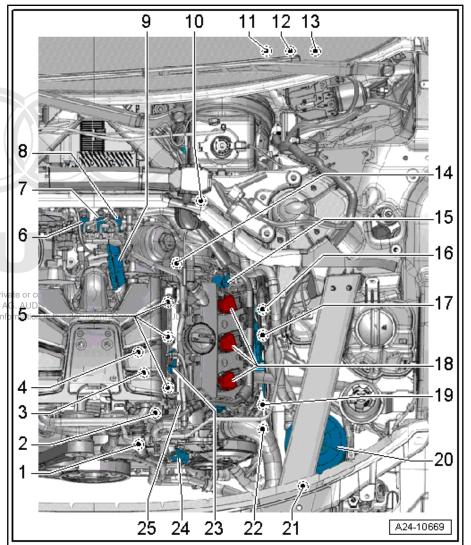
- Fitting location ⇒ page 260
- ☐ Fitting location of con⊎DI nector page 259 ness of in

5 - Injectors, cylinder bank 2

- □ Injector, cylinder 4 -N33-
- Injector, cylinder 5 -N83-
- ☐ Injector, cylinder 6 -N84-
- □ Removing and installing

6 - Secondary air inlet valve -N112-

□ Fitting location <u>⇒ page 263</u>



7 - Intake manifold flap valve - N316-

☐ Fitting location ⇒ page 263

8 - Secondary air inlet valve 2 - N320-

☐ Fitting location ⇒ page 263

9 - Regulating flap control unit - J808-

- ☐ Fitting location ⇒ page 261
- □ Removing and installing ⇒ page 283

10 - Lambda probe 2 after catalytic converter - G131-

- ☐ With Lambda probe 2 heater after catalytic converter Z30-
- ☐ Fitting location <u>⇒ page 259</u>
- ☐ Fitting location of connector <u>⇒ page 259</u>
- □ Removing and installing ⇒ page 298

11 - Engine fault warning lamp

☐ In instrument cluster

12 - Accelerator position sender - G79- and accelerator position sender 2 - G185-

□ In accelerator pedal module; fitting location ⇒ page 258

13 - Brake light switch - F-

☐ Fitting location ⇒ page 258

14 - Electrical connectors

- ☐ Assignment of connectors <u>⇒ page 259</u>
- 15 Camshaft control valve 2 N208-

Fitting location ⇒ page 262

16 - Lambda probe 2 - G108-

- ☐ With Lambda probe heater 2 Z28-
- ☐ Fitting location ⇒ page 259
- ☐ Fitting location of connector ⇒ page 259
- □ Removing and installing ⇒ page 298

17 - Left electrohydraulic engine mounting solenoid valve - N144-

☐ Fitting location <u>⇒ page 264</u>

18 - Ignition coils for cylinder bank 2

- ☐ Ignition coil 4 with output stage N292-
- ☐ Ignition coil 5 with output stage N323-
- ☐ Ignition coil 6 with output stage N324-
- □ Removing and installing ⇒ page 332

19 - Valve for oil pressure control - N428-

- ☐ Fitting location ⇒ page 262
- 20 o Secondary air pump motor cv161al purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability
 - □vithFittingdoeationsspager264 in this document. Copyright by AUDI AG.

21 - Charge air cooling pump - V188-

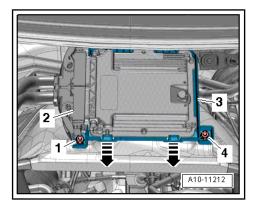
- ☐ Fitting location ⇒ page 263
- 22 Continued coolant circulation pump V51-
 - Equipment version or country-specific version
 - ☐ Fitting location ⇒ page 263

23 - Hall sender 2 - G163-

- □ Fitting location ⇒ page 262
- 24 Intake manifold temperature sender 2 G430- / charge pressure sender 2 G447-
 - □ Fitting location ⇒ page 261
- 25 Coolant valve for cylinder head N489-

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-

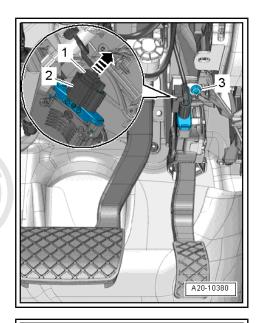
In accelerator pedal module



Note

The accelerator position sender - G79- and accelerator position sender 2 - G185- are integrated in the accelerator pedal module and cannot be renewed individually.

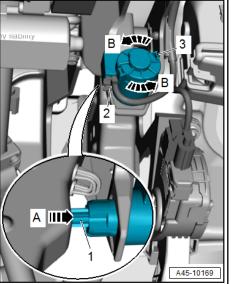
Removing and installing ⇒ Fuel supply system, petrol engines; Rep. gr. 20; Accelerator mechanism; Removing and installing accelerator pedal module with accelerator position sender -G79-/ -G185- .



Fitting location of brake light switch - F-

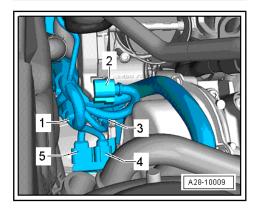
♦ In footwell on brake pedalt. Copying for private or commercial purposes, in part or in we permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept

Removing and installing ⇒ Brake system, Rep. gr. 45 TSensors, t by AL Removing and installing brake light switch



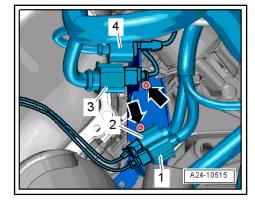
Electrical connectors at rear right of engine

- For injectors on cylinder bank 1
- 2 -For throttle valve module - J338-
- For knock sensor 1 G61-3 -
- For Lambda probe G39- with Lambda probe heater Z19-
- 5 -For Lambda probe after catalytic converter - G130- with Lambda probe 1 heater after catalytic converter - Z29-



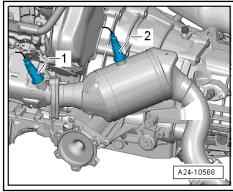
Electrical connectors at rear left of engine

- For Lambda probe 2 after catalytic converter G131- with Lambda probe 2 heater after catalytic converter - Z30-
- For Lambda probe 2 G108- with Lambda probe heater 2 -
- 3 -For injectors on cylinder bank 2 and for fuel pressure sender - G247-
- To knock sensor 2 G66-



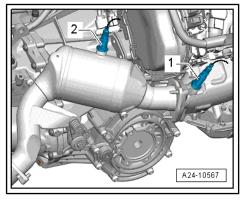
Fitting location of Lambda probes on cylinder bank 1 (right-side)

- 1 Lambda probe G39- with Lambda probe heater Z19-
- Lambda probe after catalytic converter G130- with Lambda probe 1 heater after catalytic converter - Z29-



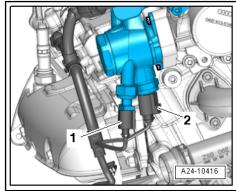
Fitting location of Lambda probes on cylinder bank 2 (left-side)

- Lambda probe 2 G108- with Lambda probe heater 2 Z28-
- Lambda probe 2 after catalytic converter G131- with Lambda probe 2 heater after catalytic converter - Z30-



Fitting locations at high-pressure pump

- ♦ On right side of cylinder head
- Fuel pressure sender for low pressure G410-
- Fuel metering valve N290-

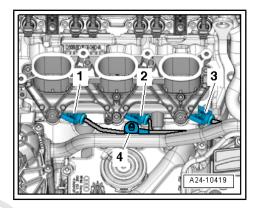




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Fitting locations below intake manifold (bottom section) on cylinder bank 1 (right-side)

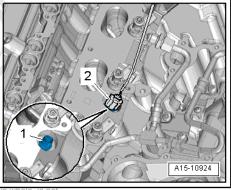
- Injector, cylinder 1 N30-
- 2 -Injector, cylinder 2 - N31-
- Injector, cylinder 3 N32-
- Knock sensor 1 G61-



Fitting location of temperature sender for engine temperature regulation - G694-

-Item 1- below intake manifold (bottom section) on cylinder bank 1 (right-side)

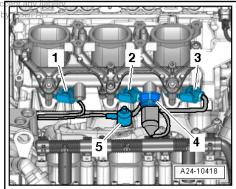
Removing and installing ⇒ page 199



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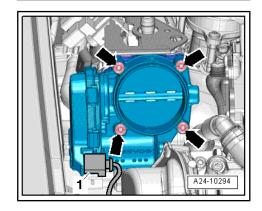
Fitting locations below intake manifold (bottom section) on cylin-tee or a der bank 2 (left-side)

- Injector, cylinder 6 N84-1 -
- Injector, cylinder 5 N83-2 -
- 3 -Injector, cylinder 4 - N33-
- Fuel pressure sender G247-
- Knock sensor 2 G66-



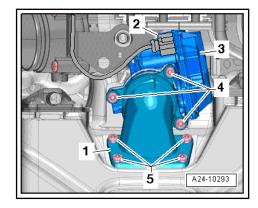
Fitting location of throttle valve module - J338-

At rear of supercharger



Fitting location of regulating flap control unit - J808-

- 3 Regulating flap control unit J808-
- At rear of supercharger



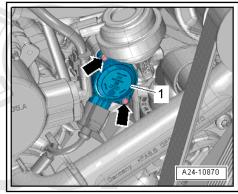
Fitting location of intake manifold flap potentiometer - G336-

At front of intake manifold (bottom section, right-side)



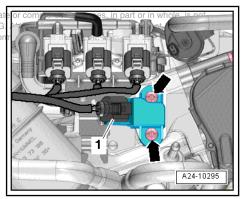
Note

The fitting location of the intake manifold flap potentiometer 2 -G512- is symmetrically reversed.



Fitting location of intake air temperature sender of G42 right intake of private sender of G42 right intake of the private sender of the sende manifold pressure sender - G71permitted unless authorised by AUDI AG with respect to the correctness of info

- At rear of supercharger with charge air cooler
- Electrical connector for intake air temperature sender -G42- / intake manifold pressure sender - G71-



Fitting location of charge pressure sender - G31-/intake manifold temperature sender - G72-

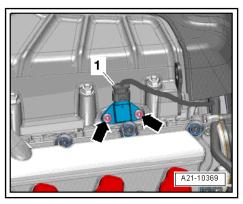
- ◆ At right side of supercharger with charge air cooler
- Electrical connector for charge pressure sender G31- / intake manifold temperature sender - G72-



Note

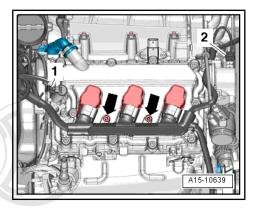
Intake manifold temperature sender 2 - G430- / charge pressure sender 2 - G447- are located symmetrically reversed.

Removing and installing <u>⇒ page 252</u>



Fitting location of Hall sender and camshaft control valve on cylinder bank 1 (right-side)

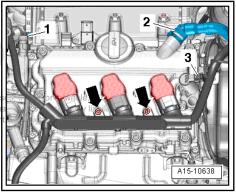
- Camshaft control valve 1 N205-
- Hall sender G40-



Fitting location of Hall sender and camshaft control valve on cylinder bank 2 (left-side)

- Hall sender 2 G163-
- Camshaft control valve 2 N208-

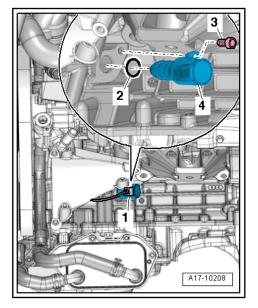
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Fitting location of valve for oil pressure control - N428-

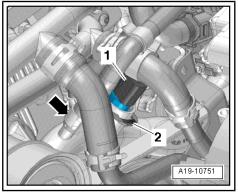
- On engine (bottom left)
- 4 Valve for oil pressure control N428-

Removing and installing ⇒ page 176



Fitting location of coolant temperature sender - G62-

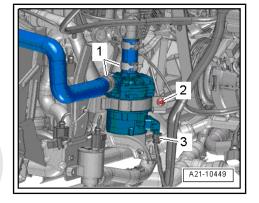
- ◆ At front of engine
- Electrical connector for coolant temperature sender G62-



Fitting location of charge air cooling pump - V188-

♦ Beneath longitudinal member (front left)

Removing and installing ⇒ page 195

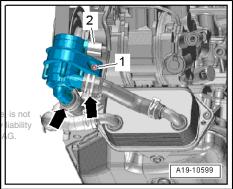


Fitting location of continued coolant circulation pump - V51-

◆ At front left of engine

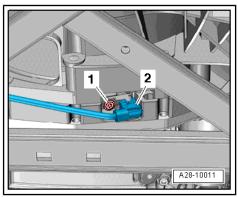


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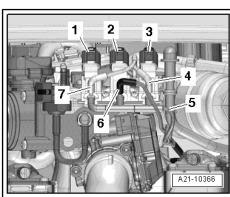
Fitting location of engine speed sender - G28-

2 - Electrical connector for engine speed sender - G28-



Fitting location of secondary air inlet valves and intake manifold flap valve - N316-

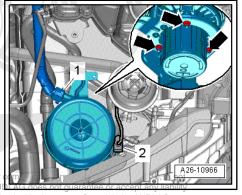
- ◆ At rear of supercharger with charge air cooler
- Secondary air inlet valve N112-
- 2 -Intake manifold flap valve - N316-
- Secondary air inlet valve 2 N320-



Fitting location of secondary air pump motor - V101-

◆ In engine compartment (front left)

Removing and installing ⇒ page 317

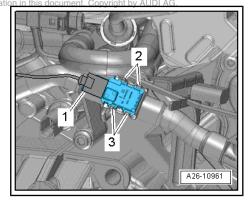


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Fitting location of sender 1 for secondary air pressure - G609-

♦ At rear of engine

Removing and installing ⇒ page 322

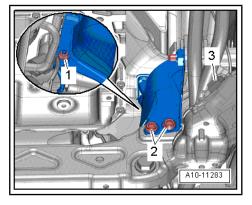


Fitting location of electrohydraulic engine mounting solenoid valves

- At engine mountings:
- 3 Electrical connector for left electrohydraulic engine mounting solenoid valve N144-

Right-side: right electrohydraulic engine mounting solenoid valve - N145-

Removing and installing ⇒ page 44



1.2 Reducing pressure in high-pressure section of injection system

Special tools and workshop equipment required

Vehicle diagnostic tester



WARNING

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.



WARNING

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.

Additional steps required

Erase any entries in event memory resulting from work performed ⇒ Vehicle diagnostic tester, Guided Functions, Interrogate event memory, then Generate readiness code.

1.3 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.



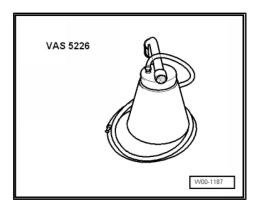
Note

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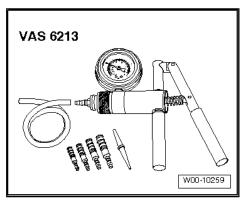
On vehicles with auxiliary heater, it is important to bleed the fuel supply line leading to the metering pump after working on the fuel delivery unit.

Special tools and workshop equipment required

Diesel extractor - VAS 5226-

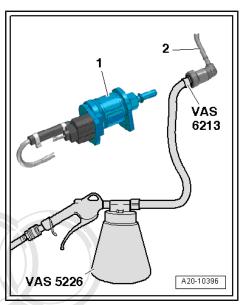


Hand vacuum pump - VAS 6213-



Procedure

- Auxiliary heater switched off.
- 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.



1.4 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 tight mercial purposes, in part or in whole, is not ened to the correct torque, the relevant component must be I AG does not guarantee or accept any liability renewed.
- Road-test vehicle and accelerate with full throttle at least once.
- Then inspect high-pressure section again for leaks.

2 Vacuum system

- ⇒ "2.1 Connection diagram vacuum system", page 267
- ⇒ "2.2 Checking vacuum system", page 268

2.1 Connection diagram - vacuum system



Caution

Risk of engine malfunctions

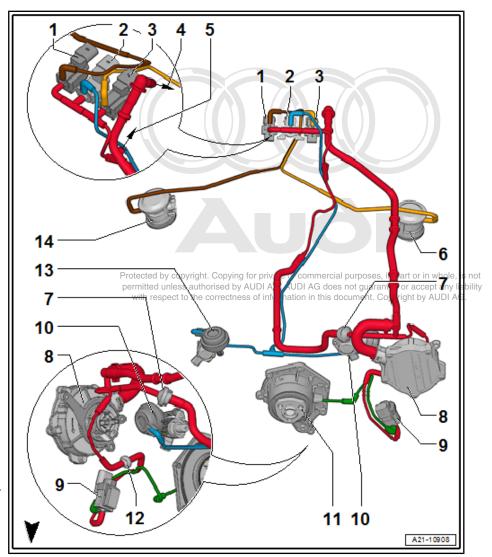
When routing vacuum lines, make sure they are not kinked, twisted or crushed.



Note

- ♦ 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 (left-side), in part or in whole, is not
- ♦ Brown = Control pipe to combination walve for secondary air system (1901, Side) operate or accept any liab
- ♦ Green = Control pipe to switchable coolant pump

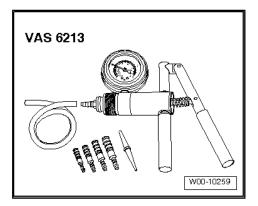
- 1 Secondary air inlet valve -N112-
- 2 Intake manifold flap valve -N316-
- 3 Secondary air inlet valve 2 - N320-
- 4 To brake servo
- 5 Connecting piece
 - With sealing cap
- 6 Combination valve for secondary air system (left-side)
- 7 Non-return valve
- 8 Vacuum pump
- 9 Coolant valve for cylinder head - N489-
- 10 Vacuum unit
 - □ For intake manifold flap on cylinder bank 2 (leftside)
- 11 Coolant pump
- 12 Non-return valve
- 13 Vacuum unit
 - □ For intake manifold flap on cylinder bank 1 (right-side)
- 14 Combination valve for secondary air system (right-side)



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 to corresponding component.
- 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.



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3 Air cleaner

- ⇒ "3.1 Exploded view air cleaner housing", page 270
- ⇒ "3.2 Removing and installing air cleaner housing", page 271

3.1 Exploded view - air cleaner housing

1 - Air duct

 Clean out salt deposits, dirt and leaves, etc.

2 - Bolt

□ 1.5 Nm

3 - Cover

For air duct

4 - Air duct

Clean out salt deposits. dirt and leaves, etc.

5 - Bolt

□ 1.5 Nm

6 - Sealing element

7 - Air cleaner (top section)

- Clean out salt deposits, dirt and leaves, etc.
- Removing and installing ⇒ Maintenance ; Booklet 410

8 - O-ring

□ Renew if damaged

9 - Air pipe

10 - Adapter

11 - Bolt

□ 1.5 Nm

12 - Bolt

□ 2.5 Nm

13 - Air filter element

- ☐ Use genuine air filter element ⇒ Electronic parts catalogue
- ☐ Change intervals ⇒ Maintenance tables
- ☐ Removing and installing ⇒ Maintenance; Booklet 410

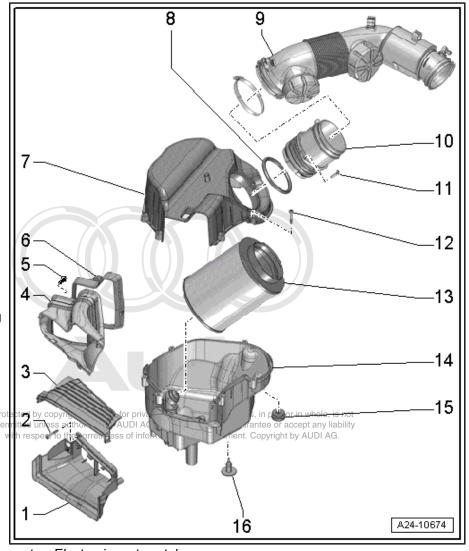
14 - Air cleaner (bottom section)

- ☐ Clean out salt deposits, dirt and leaves, etc.
- □ Removing and installing ⇒ page 271

15 - Rubber grommet

16 - Mounting

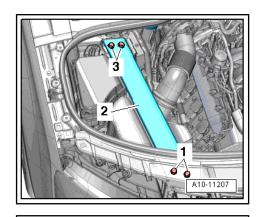
For air cleaner housing



3.2 Removing and installing air cleaner housing

Removing

Remove longitudinal member (top right) -2- \Rightarrow General body repairs, exterior; Rep. gr. 50; Lock carrier; Exploded view lock carrier.



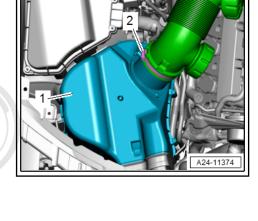
- Release hose clip -2- and detach air pipe.
- Lift off air cleaner housing -1-.

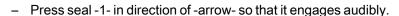
Installing



Note

- The air cleaner housing MUST be clean.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .
- To prevent malfunctions, cover all critical parts of the engine air intake tract (intake pipes, etc.) with a clean cloth when blowing out the air cleaner housing with compressed air.
- 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-. permitted unless authorised by AUDI AG. AUDI AG does not guarantee or acce
- Move air cleaner housing into installation position and press into mountings on longitudinal member.



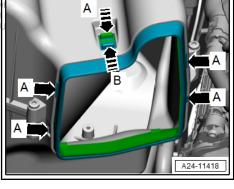


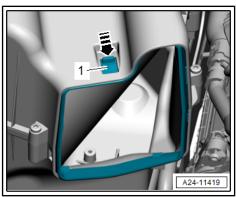
Remaining installation steps are carried out in reverse sequence: note the following:

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

Tightening torques

- ⇒ "3.1 Exploded view air cleaner housing", page 270
- Upper longitudinal member ⇒ General body repairs, exterior; Rep. gr. 50; Lock carrier; Exploded view - lock carrier





4 Intake manifold

- ⇒ "4.1 Exploded view intake manifold (bottom section) with fuel <u>rail", page 272</u>
- ⇒ "4.2 Removing and installing vacuum unit", page 275
- ⇒ "4.3 Removing and installing intake manifold (bottom section) with fuel rail", page 279
- ⇒ "4.4 Removing and installing throttle valve module J338", page
- ⇒ "4.5 Removing and installing regulating flap control unit J808", page 283

4.1 Exploded view - intake manifold (bottom section) with fuel rail



Note

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

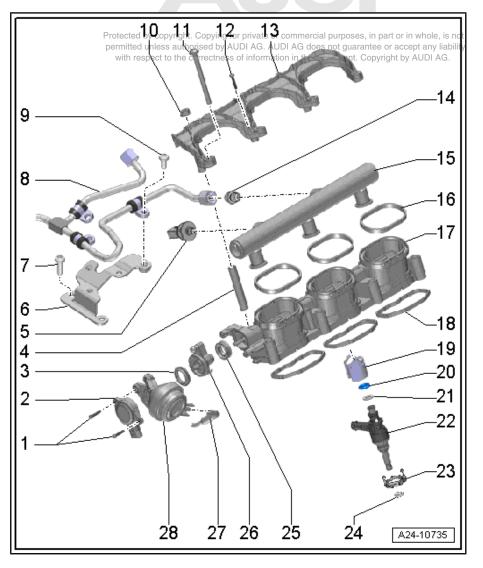
- 1 Bolts
 - □ 2.5 Nm
- 2 Intake manifold flap potentiometer 2 - G512-
 - Cylinder bank 1 (rightside): intake manifold flap potentiometer -G336-
- 3 Seal
 - □ Renew if damaged
 - □ When renewing lever out with screwdriver
 - Press in by hand
- 4 Sleeve
- 5 Fuel pressure sender -G247-
 - Lubricate threads
 - □ 22 Nm
- 6 Bracket
- 7 Bolt
 - □ 9 Nm
- 8 High-pressure pipe



WARNING

The fuel system operates at extremely high This pressure. 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 264 Removing and installing ⇒ page 293 Do not alter shape Check for damage before re-installing To loosen and tighten high-pressure pipe, counterhold at pipe connection Lubricate threads of union nuts with fuel 		
□ 25 Nm		
9 - Bolt		
□ 9 Nm		
10 - Nut		
☐ Tightening torque and sequence <u>⇒ page 274</u>		
11 - Bolt		
☐ Tightening torque and sequence <u>⇒ page 274</u>		
12 - Bolt		
□ 2.5 Nm		
13 - Retaining clip		
☐ For fuel rail		
14 - Threaded connection ☐ 40 Nm		
15 - Fuel rail		
16 - Seal		
□ Renew		
17 - Intake manifold (bottom section)		
☐ Removing and installing <u>⇒ page 279</u>		
18 - Seal		
☐ Renew		
19 - 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		
20 - O-ring		
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Lubricate lightly with clean engine in lised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.		
21 - Spacer ring		
☐ Renew if damaged		
22 - Injector		
Removing and installing <u>⇒ page 284</u>		
23 - Sealing element		
☐ Renew		
24 - Combustion chamber ring seal		
□ Renewing ⇒ "5.1 Removing and installing injectors", page 284		
☐ Do not apply grease or use any other lubricants		
25 - Seal		
☐ Renew if damaged		
□ When renewing lever out with screwdriver		
☐ Press in by hand		

26 - Operating lever

☐ For vacuum unit

27 - Vacuum hose

☐ To intake manifold flap valve - N316-

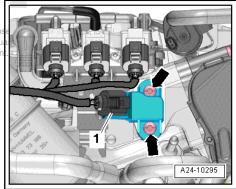
28 - Vacuum unit

- □ For actuating intake manifold flaps
- □ Removing and installing ⇒ page 275

Intake air temperature sender - G42- / intake manifold pressure sender - G71- - tightening torque

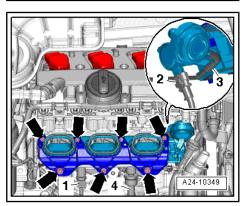
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— Tighten bolts -arrows- top40iNmnless authorised by AUDI AG. AUDI AG does not grow with respect to the correctness of information in this docume



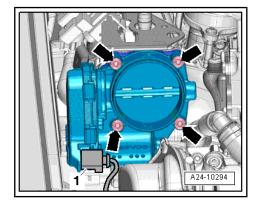
Intake manifold (bottom section) - tightening torque

Tighten bolts and nuts -arrows- in stages and in diagonal sequence; final torque 9 Nm.



Throttle valve module - J338- - tightening torque

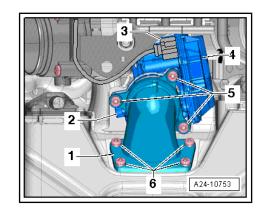
- Tighten bolts -arrows- in diagonal sequence to 10 Nm.



Regulating flap control unit - J808- - tightening torque and sequence

Tighten bolts in 3 stages as follows:

Stage	Bolts	Tightening torque
1.	-5, 6-	Screw in by hand until contact is made
2.	-6-	10 Nm
3.	-5-	10 Nm



4.2 Removing and installing vacuum unit

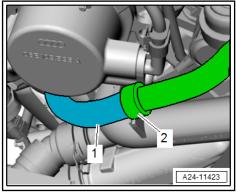
⇒ "4.2.1 Removing and installing vacuum unit for cylinder bank 1 (right-side)", page 275

 \Rightarrow "4.2.2 Removing and installing vacuum unit for cylinder bank 2 (left-side)", page 276

Removing and installing vacuum unit for 4.2.1 cylinder bank 1 (right-side)

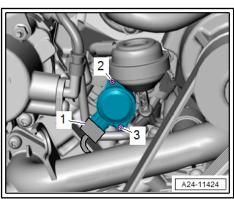
Removing

- Remove engine cover panel (front) ⇒ page 48.
- Disconnect secondary air hose at connection point -1- and move clear at retainer -2-.



Remove bolts -2, 3- and detach intake manifold flap potentiometer - G336- .





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- Unclip operating rod -2- of vacuum unit from ball head.
- Disconnect vacuum hose -1- and detach vacuum unit.

Installing

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



Note

- Renew seals.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .
- Install engine cover panel ⇒ page 48.

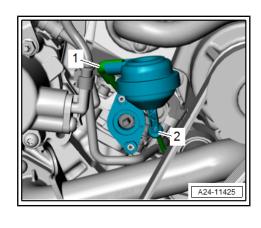
Tightening torques

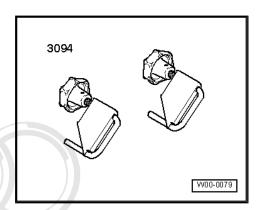
⇒ "4.1 Exploded view - intake manifold (bottom section) with fuel rail", page 272.

4.2.2 Removing and installing vacuum unit for cylinder bank 2 (left-side)

Special tools and workshop equipment required

♦ Hose clamps, up to 25 mm - 3094-

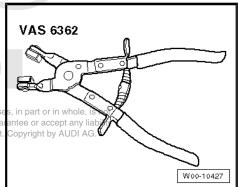




Hose clip pliers - VAS 6362-



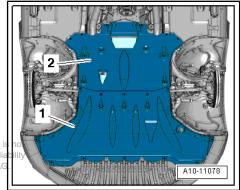
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Removing

Remove noise insulation (front) -1- ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.







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.
- Clamp off coolant hoses -arrows- with hose clamps -3094- .
- Remove bolt -1-.



Note

The coolant hoses remain connected.

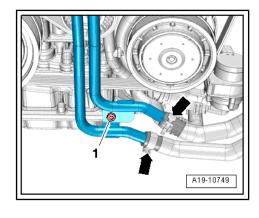
- Remove engine cover panel (front) ⇒ page 48.
- Release hose clip -1-, detach vacuum hose from vacuum pump and move vacuum hose clear.

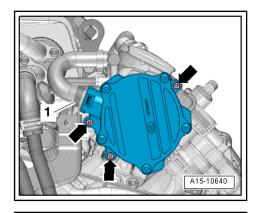


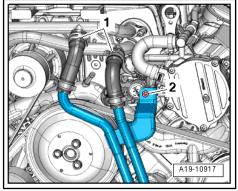
Note

Disregard -arrows-.

- Clamp off coolant hoses -1- using hose clamps -3094-, release hose clips and detach coolant hoses from coolant pipes on supercharger.
- Remove bolt -2-.





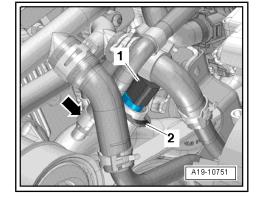


Unplug electrical connector -1- at coolant temperature sender



Note

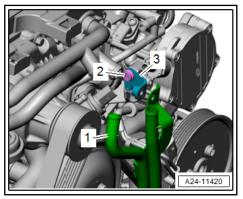
Disregard -item 2- and -arrow-.

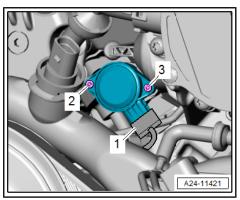


- Remove bolt -2- and detach bracket -3-.
- Swivel coolant pipe -1- to side.



Remove bolts -2, 3- and detach intake manifold flap potenti-ometer 1 by 55 12 it. Copying for private or commercial purposes, in part or in whole, is not ometer 1 by 55 12 it. Copying for private or commercial purposes, in part or in whole, is not ometer 1 by 55 12 it. Copying for private or commercial purposes, in part or in whole, is not with respect to the correctness of information in this document. Copyright by AUDI AG.





- Unclip operating rod -1- of vacuum unit -2- from ball head.
- Disconnect vacuum hose -3- and detach vacuum unit.

Installing

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



Note

- Renew seals.
- Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue.
- Install engine cover panel ⇒ page 48.
- Check coolant level ⇒ page 193.

Tightening torques

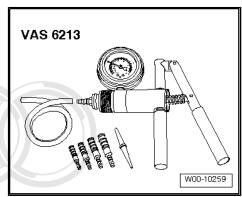
- ⇒ "4.1 Exploded view intake manifold (bottom section) with fuel rail", page 272
- ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view - noise insulation

4.3 Removing and installing intake manifold (bottom section) with fuel rail

Special tools and workshop equipment required

- ◆ Tool inserts V.A.G 1331/2-
- Hand vacuum pump VAS 6213-





Removing



Note

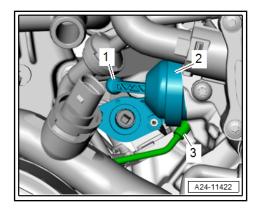
The removal and installation procedures parely described to commercial purposes, in part or in whole, is not done bonk 2 (left girls). der bank 2 (left-side). with respect to the correctness of information in this document. Copyright by AUDI AG.



WARNING

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

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



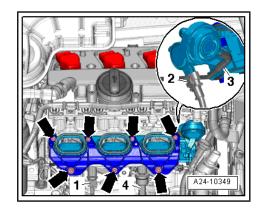
- Reduce fuel pressure in high-pressure section of injection system ⇒ page 264.
- Remove supercharger ⇒ page 236 .
- Push vacuum hoses to one side.
- Unplug electrical connector -4- at fuel pressure sender -G247- .
- Unscrew union nut -1- (counterhold threaded connection).
- Remove bolts and nuts -arrows- and detach intake manifold (bottom section) with fuel rail.
- Unplug electrical connector -2- at intake manifold flap potentiometer and pull off vacuum hose -3-.



Caution

Risk of irreparable damage to engine.

 Block off the intake ports with clean cloths to prevent small objects from dropping into the engine through the intake ports in the cylinder heads.



Installing

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



Note

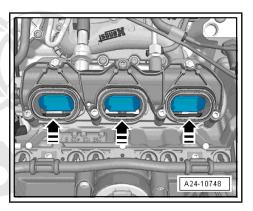
- If an injector has been pulled out of the cylinder head, the teflon ring seal must be renewed.
- ♦ Renew seals and O-rings.
- ◆ Lubricate O-rings of injectors lightly with clean engine oil.



Caution

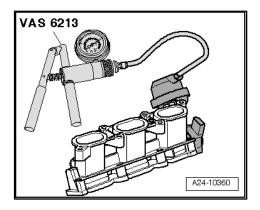
Risk of damage to intake manifold flaps.

◆ To prevent the intake manifold flaps from catching on the guide plates in the cylinder head, the flaps must be in the power mode position -arrows- (intake passage fully open) when the intake manifold (bottom section) is installed.



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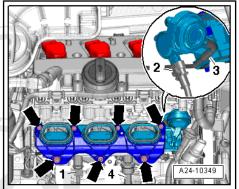
- Connect hand vacuum pump VAS 6213- to vacuum unit for actuating intake manifold flaps, as shown in illustration.
- Use vacuum pump to generate a vacuum.
- This will cause the intake manifold flaps to open.
- Press intake manifold (bottom section) with fuel rail evenly onto injectors.



- Tighten bolts and nuts for intake manifold (bottom section) ⇒ page 274 .
- Disconnect hand vacuum pump from vacuum unit for actuating intake manifold flaps.
- Install high-pressure pipe ⇒ page 293.
- Install supercharger ⇒ page 236.

Tightening torques

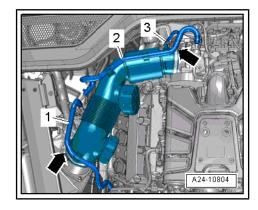
- \Rightarrow "4.1 Exploded view intake manifold (bottom section) with fuel rail", page 272 .
- ⇒ Fig. ""Intake manifold (bottom section) tightening torque"" page 274 .



Removing and installing throttle valve vate or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG. 4.4

Removing

- Remove engine cover panel (rear) ⇒ page 48.
- Move clear fuel line -1- and line -2- from activated charcoal filter at air pipe.
- Detach vacuum hose -3- from connection on air pipe.
- Release hose clips -arrows- and remove air pipe.



- Unplug electrical connector -1-.
- Remove bolts -arrows- and detach throttle valve module -J338- with intermediate flange.



Caution

Risk of irreparable damage to engine.

Block off the intake port with a clean cloth to prevent small items from dropping into the supercharger ial purposes, in part or in

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Installing

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

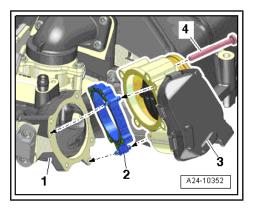


Note

- Fit new 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 .
- To secure the air hoses at their connections, spray rust remover onto the worm thread of the used hose clips before installing.
- Insert intermediate flange -2- with O-rings into supercharger -1- -left arrows-.
- Fit throttle valve module J338--item 3- on intermediate flange -right arrows-.
- Install engine cover panel ⇒ page 48.
- After renewing throttle valve module, perform Adaption in Guided Functions mode of ⇒ vehicle diagnostic tester.

Tightening torques

⇒ Fig. "" Throttle valve module -J338- - tightening torque"", page 274



4.5 Removing and installing regulating flap control unit - J808-

Removing

- Remove engine cover panel (rear) ⇒ page 48.
- Unplug electrical connector -3-.
- Remove bolts -5- and -6-.
- Detach bypass elbow -1- with adapter (intermediate flange) -2- and regulating flap control unit - J808- -4-.

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



Note

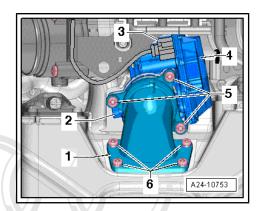
Fit new O-rings.

- Install engine cover panel ⇒ page 48.
- After renewing regulating flap control unit, perform Adaption in Guided Functions > vehicle diagnostic tester.



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♦ ⇒ Fig. "" Regulating flap control unit -J808 — tighten in or for our guarantee or accept any liability and sequence"", page 275



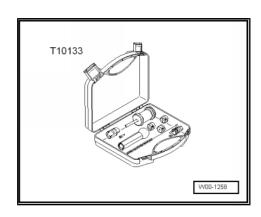
5 **Injectors**

- ⇒ "5.1 Removing and installing injectors", page 284
- ⇒ "5.2 Cleaning injectors", page 287

5.1 Removing and installing injectors

Special tools and workshop equipment required

◆ Tool set for FSI engines - T10133-



Removing



WARNING

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

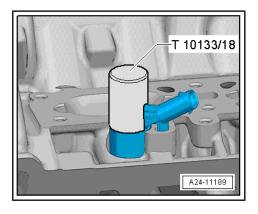
- The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system.
- Reduce fuel pressure in high-pressure section of injection system ⇒ page 264.
- Remove supercharger ⇒ page 236.
- Remove corresponding intake manifold (bottom section)

Removing any injectors lodged in fuel rail

Carefully pull injectors out of fuel rail.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not Removing any injectors lodged in cylinder head intee or accept any liability

- Cover open inlet ports with a clean cloth.
- Unplug electrical connector at injector that is to be removed.
- Slide stop sleeve -T10133/18- over injector.

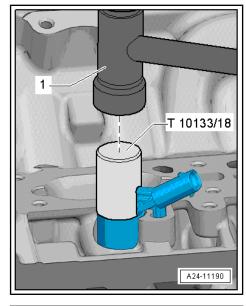


Carefully knock against stop sleeve several times to loosen injector.

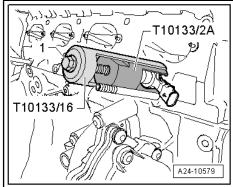


Note

- Use a torque wrench to pull out injector.
- Adjust torque wrench to 5 Nm.



- Apply puller -T10133/2A- to groove on injector.
- Attach removal tool -T10133/16- and pull out injector by turning bolt -1-.



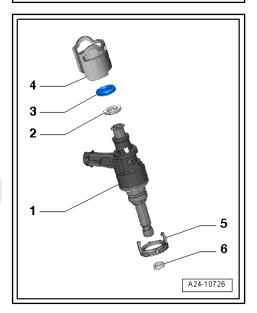
Dismantling injector

- Pull support ring -4-, O-ring -3- and spacer ring -2- off injector
- 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.



Note

Take care not to damage groove on injector. The injector must be renewed if the groove is damaged.



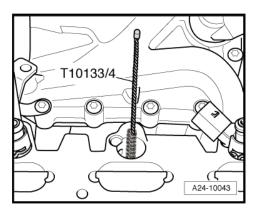
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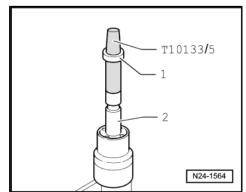
Installing

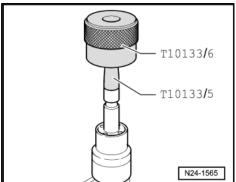


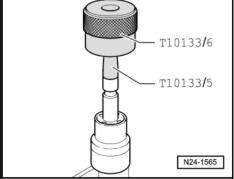
Note

- 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-.











- Using assembly sleeve -T10133/6-, push combustion chamber ring seal onto assembly cone -T10133/5- as far as it will
- Turn round assembly sleeve -T10133/6- and slide combustion chamber ring seal into groove.

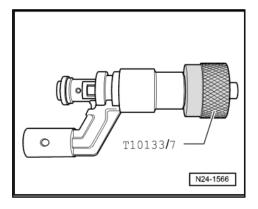
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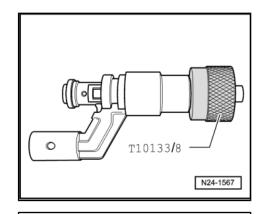
Note

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.

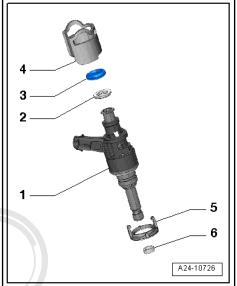


- Fit parts from repair kit onto injector -1-:
- 2 Spacer ring
- 3 O-ring
- 4 Support ring
- 5 Sealing element
- To make it easier to install injector in fuel rail, lubricate new Oring lightly with clean engine oil before installing it.



Note

The combustion chamber ring seal -6- must not be lubricated.



- 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.



Note

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It should be possible to insert the injector easily! If necessary wait war and until the combustion chamber ring seal has contracted sufficientent of

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

- Install intake manifold (bottom section) ⇒ page 279.
- Install supercharger ⇒ page 236.

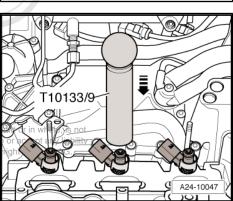


Special tools and workshop equipment required

- ◆ Ultrasonic cleaning unit VAS 6418-
- Mounting plate for injection modules VAS 6418/1-
- ◆ Cleaning fluid ⇒ Electronic parts catalogue

Cleaning

Remove injectors ⇒ page 284.





Note

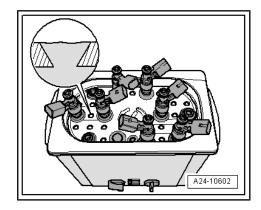
Observe safety precautions and operating instructions for ultrasonic unit.

Ultrasonic unit must be filled with cleaning fluid.



Note

Ultrasonic unit must be filled with cleaning fluid up to top edge of apertures (see detail in illustration).



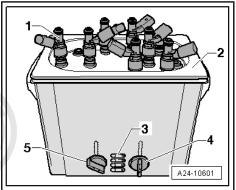
- Insert injectors -1- all the way into mounting plate for injection modules - VAS 6418/1- -2-.
- Set rotary knob -4- to a temperature of 50°C.
- Select a cleaning time of 30 minutes with rotary knob -5-.
- Switch on ultrasonic unit with button -3-.



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 284 .



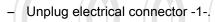
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⇒ "6.1 Removing and installing intake air temperature sender G42 / intake manifold pressure sender G71 ", page 289

Removing and installing intake air tem-6.1 perature sender - G42- / intake manifold pressure sender - G71-

Removing

- Remove engine cover panel (rear) ⇒ page 48.
- Move clear line going to activated charcoal filter at air pipe.
- Unplug electrical connector -1- and detach vacuum hose -2-(press release tabs).
- Detach activated charcoal filter solenoid valve 1 N80- from bracket and move it clear to the side with hose still attached.



Unscrew bolts -arrows- and detach intake air temperature sender - G42- / intake manifold pressure sender - G71- .

Installing

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

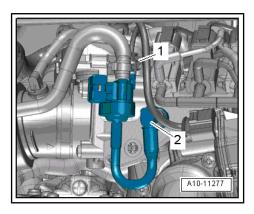


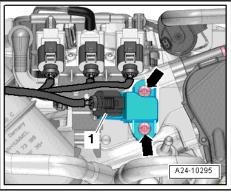
Note

Fit new O-rings. pying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with metall engine cover panel is toage 48 t. Copyright by AUDI AG.

Tightening torques

⇒ Fig. "" Intake air temperature sender -G42- / intake manifold pressure sender -G71- - tightening torque", page 274





7 High-pressure pump

- ⇒ "7.1 Exploded view high-pressure pump", page 290
- ⇒ "7.2 Removing and installing high-pressure pump", page 291
- ⇒ "7.3 Removing and installing high-pressure pipe", page 293

7.1 Exploded view - high-pressure pump

1 - Fuel pressure sender for low pressure - G410-

- □ 15 Nm
- 2 Not fitted
- 3 Bolt
 - ☐ Tightening torque and sequence ⇒ page 291

4 - High-pressure pump

- With fuel metering valveN290-
- □ Removing and installing⇒ page 291
- Do not dismantle

5 - Threaded connection

- Connections must not be damaged
- □ 27 Nm

6 - Fuel supply hose

□ Low-pressure section

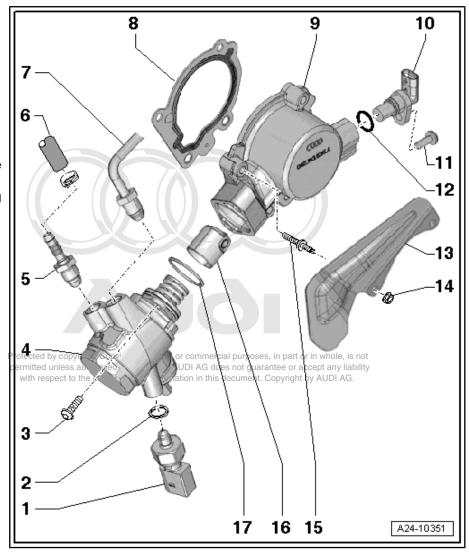
7 - High-pressure pipe



WARNING

Risk of injury - fuel system operates under high pressure.

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 264
- ☐ Removing and installing ⇒ page 293
- □ Do not alter shape
- ☐ Check for damage before re-installing
- ☐ Lubricate thread of union nut with fuel
- □ 25 Nm

8 - Gasket

☐ Renew

9 - Housing

10 - Hall sender - G40-

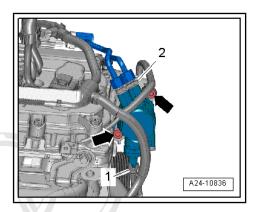
□ Removing and installing ⇒ page 334

- 11 Bolt
 - □ 9 Nm
- 12 O-ring
 - ☐ Renew
- 13 Protective plate
 - ☐ For high-pressure pipe
- 14 Nut
 - □ 9 Nm
- 15 Threaded pin
 - □ 9 Nm
- 16 Roller tappet
 - ☐ Can only be installed in one position
 - ☐ Lubricate lightly with clean engine oil before installing
- 17 O-ring
 - ☐ Renew
 - ☐ Lubricate lightly with clean engine oil before installing

High-pressure pump - tightening torque and sequence

- Tighten bolts in 2 stages as follows:

Stage	Bolts	Tightening torque
1.	-arrows-	Screw in by hand until contact is made
2.	-arrows-	Tighten in stages; final torque 20 Nm

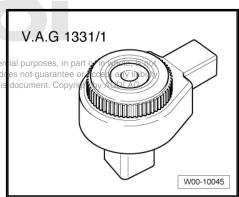


7.2 Removing and installing high-pressure pump

Special tools and workshop equipment required

♦ Ratchet - V.A.G 1331/1-

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Socket insert AF 14, flared ring spanner - V.A.G 1331/8-

Removing



WARNING

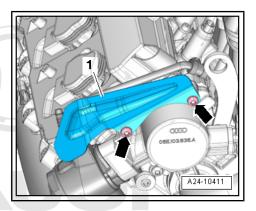
The fuel system operates at extremely high pressure. This can cause injury.

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



Note

- The high-pressure pump should only be removed and installed when the engine is cold.
- When installing the high-pressure fuel pump, it is essential to ensure that no dirt enters the fuel system.
- Use a cloth to catch escaping fuel.
- Reduce fuel pressure in high-pressure section of injection system <u>⇒ page 264</u>.
- Unscrew nuts -arrows- and remove guard plate -1-.



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- Unplug electrical connectors -1- and -6-.
- Remove bolt -3- on retaining clip.
- Unscrew connections -2- and -5-.
- Remove bolts -arrows-.
- Carefully pull out high-pressure pump. It is possible that the roller tappet may remain lodged inside.



Note

- Do not attempt to bend high-pressure pipe to a different shape.
- ◆ Disregard -item 4-.

Installing

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



Note

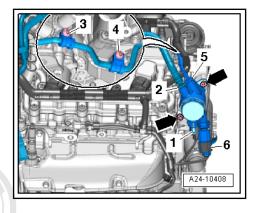
- Fit new O-ring.
- The connections of the high-pressure pipe must not be damart or in whole, is not aged. with respect to the correctness of information in this document. Copyright by AUDI AG.
- Do not attempt to bend high-pressure pipe to a different shape.
- Check roller tappet -1- for damage and renew if necessary.
- Lightly lubricate roller tappet with oil and insert it so that lug -arrow A- slides into guide notch -arrow B-.
- Rotate crankshaft in direction of engine rotation by turning bolt for vibration damper, and at the same time press roller tappet into cylinder head until it reaches its lowest point.
- Only lift high-pressure pipe slightly to fit high-pressure pump.
- Press high-pressure pump down by hand as far as possible onto stop.
- At the same time, tighten securing bolts by hand.
- Then tighten securing bolts alternately to 5 Nm (do not tilt highpressure pump).
- Now tighten securing bolts alternately to final torque.
- Install high-pressure pipe ⇒ page 293.
- Check fuel system for leaks ⇒ page 266.

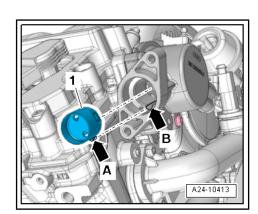
Tightening torques

- \Rightarrow Fig. ""High-pressure pump tightening torque and sequence"" , page 291
- ⇒ "7.1 Exploded view high-pressure pump", page 290

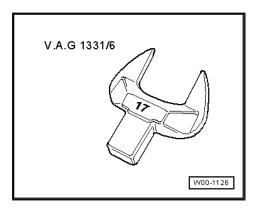
7.3 Removing and installing high-pressure pipe

Special tools and workshop equipment required





◆ Open end spanner insert, AF 17 - V.A.G 1331/6-



Removing

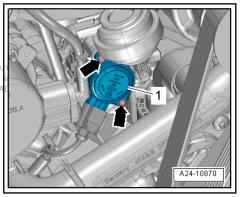


WARNING

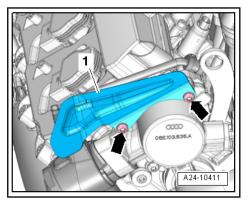
The fuel system operates at extremely high pressure. This can cause injury.

- 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 264.
- Remove supercharger ⇒ page 236 .
- Remove bolts -arrows- and move intake manifold flap potentiometer G336- (right-side) -item 1- with vacuum unit for intake manifold flap clear to one side.

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- Unscrew nuts -arrows- and remove guard plate -1-.



Unscrew union nuts -2- and -3- (counterhold threaded connection).



Note

Do not attempt to bend high-pressure pipe to a different shape.

Installing

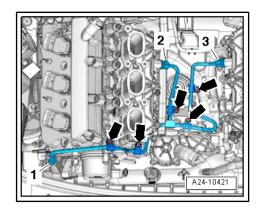


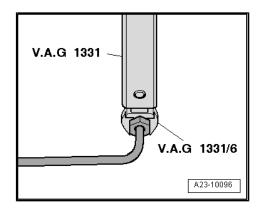
Note

- The connections of the high-pressure pipe must not be dam-
- Do not attempt to bend high-pressure pipe to a different shape.
- First tighten union nut by hand until it makes contact, making sure that high-pressure pipe is not under tension.
- Tighten union nut with torque wrench V.A.G 1331- and tool insert, AF 17 - V.A.G 1331/6-; to do so, counterhold at hexagon flats of threaded connection on fuel rail with an open-end spanner.
- Do not tighten bolt for retainer until high-pressure pipe has been tightened.
- Install supercharger ⇒ page 236.

Tightening torques

- ⇒ "4.1 Exploded view intake manifold (bottom section) with fuel rail", page 272
- ⇒ "7.1 Exploded view high-pressure pump", page 290 .







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8 Lambda probe

- ⇒ "8.1 Exploded view Lambda probe", page 296
- ⇒ "8.2 Removing and installing Lambda probe", page 297

8.1 Exploded view - Lambda probe



Note

- New Lambda probes are coated with an assembly paste.
- In the case of a used Lambda probe, coat only the thread with high-temperature paste; refer to ⇒ Electronic parts catalogue for high-temperature paste.
- The assembly paste / high-temperature paste must not make contact with the slots on the Lambda probe body.

1 - Lambda probe 2 after catalytic converter - G131-

- With Lambda probe 2 heater after catalytic converter - Z30-
- Removing and installing ⇒ page 2:
- □ 55 Nm

2 - Lambda probe 2 - G108-

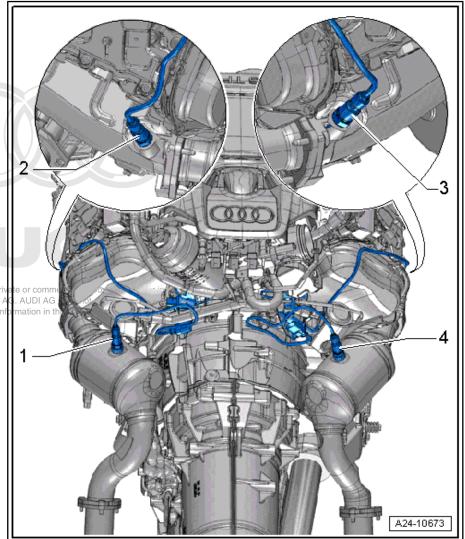
- □ With Lambda probe heater 2 - Z28-
- Removing and installing ⇒ page 298
- □ 55 Nm

3 - Lambda probe - G39-

- With Lambda probe heater - Z19-
- Removing and installing ⇒wpagee297the correctness of in
- □ 55 Nm

4 - Lambda probe after catalytic converter - G130-

- With Lambda probe 1 heater after catalytic converter - Z29-
- Removing and installing ⇒ page 297
- □ 55 Nm



8.2 Removing and installing Lambda probe

6-cylinder direct petrol injection engine with supercharger (3.0 ltr. 4-valve) - Edition 08.2013

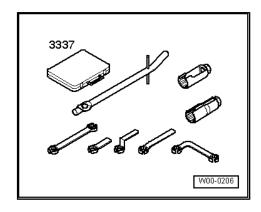
⇒ "8.2.1 Removing and installing Lambda probe G39 / G130",

⇒ "8.2.2 Removing and installing Lambda probe G108 / G131", page 298

8.2.1 Removing and installing Lambda probe -G39- / -G130-

Special tools and workshop equipment required

◆ Lambda probe open ring spanner set - 3337-



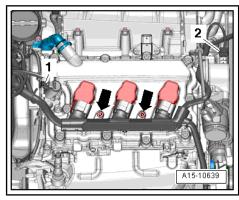
Removing

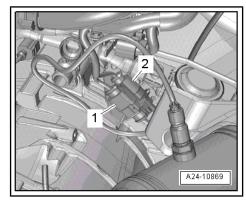
- Remove throttle valve module J338- ⇒ page 281.
- Remove bolts -arrows- and unplug electrical connectors at ignition coils.
- Press electrical wiring harness up slightly.



Disregard -items 1, 2-.

- PrUnplug relevant electrical connector and move electrical wirpermitted by the same of the correctness of information in this document. Copyright by AUDI AG.
- 1 For Lambda probe after catalytic converter G130-
- For Lambda probe G39-





- Unscrew relevant Lambda probes:
- 1 Lambda probe G39- using ring spanner -3337/7-
- 2 Lambda probe after catalytic converter G130- using ring spanner -3337/2-



Note

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

Installing

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



Note

- ♦ New Lambda probes are coated with an assembly paste.
- ♦ If reinstalling the old Lambda probes, coat the threads with high-temperature paste ⇒ Electronic parts catalogue.
- The assembly paste/high-temperature paste must not get into the slots on the Lambda probe body.
- 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.
- Install throttle valve module J338- ⇒ page 281.

Tightening torques

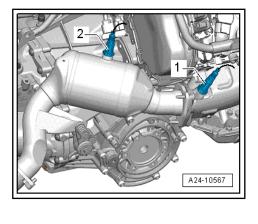
◆ ⇒ "8.1 Exploded view - Lambda probe", page 296

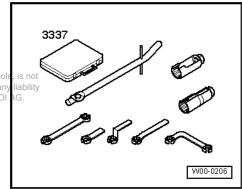
8.2.2 Removing and installing Lambda probe -G108- / -G131-

Special tools and workshop equipment required

Lambda probe open ring spanner set - 3337-

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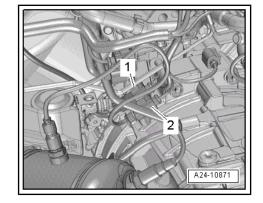


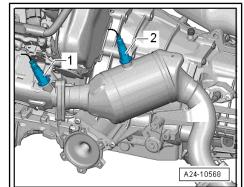


Removing

- Remove engine cover panel (rear) ⇒ page 48.
- Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50; Bulkhead; Exploded view bulkhead.

- Unplug relevant electrical connector and move electrical wiring clear:
- For Lambda probe 2 G108-
- For Lambda probe 2 G131- (after catalytic converter)





- Unscrew relevant Lambda probe using ring spanner -3337/7-:
- 1 -Lambda probe 2 - G108-
- Lambda probe 2 after catalytic converter G131-



Note

For illustration purposes, the installation position is shown with the engine removed of information in this documer

Installing

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



Note

- New Lambda probes are coated with an assembly paste.
- If reinstalling the old Lambda probes, coat the threads with high-temperature paste ⇒ Electronic parts catalogue .
- The assembly paste/high-temperature paste must not get into the slots on the Lambda probe body.
- 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.
- Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50; Bulkhead; Exploded view bulkhead .
- Install engine cover panel ⇒ page 48.

Tightening torques

♦ ⇒ "8.1 Exploded view - Lambda probe", page 296

9 Engine control unit

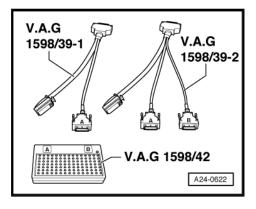
⇒ "9.1 Wiring and component check", page 300

 \Rightarrow "9.2 Removing and installing engine control unit J623 ", page 302

9.1 Wiring and component check

Special tools and workshop equipment required

- ◆ Adapter cable V.A.G 1598/39-1-
- ♦ Adapter cable V.A.G 1598/39-2-
- ♦ Test box V.A.G 1598/42-



Vehicle diagnostic tester



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Note

- The test box V.A.G 1598/42- has 105 sockets. It can be connected to the engine control unit via 2 different adapter cables.
- The engine control unit is connected to the vehicle's wiring harness via two connectors, one of which has 60 pins, the other has 94 pins.
- To carry out tests on the 60-pin wiring harness connector, the adapter cable - V.A.G 1598/39-1- is connected to connector -A- on the test box. For components connected to 60-pin wiring harness connector ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- To carry out tests on the 94-pin wiring harness connector, the adapter cable - V.A.G 1598/39-2- must be connected to connectors -A- and -B- on the test box. For components connected to 94-pin wiring harness connector ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- The test box V.A.G 1598/42- is designed so it can be connected both to the wiring harness for the engine control unit and to the engine control unit itself at the same time. The advantage of this is that the electronic engine control system remains fully functional when the test box is connected (for example, for measuring signals when the engine is running).
- Always use auxiliary measuring set V.A.G 1527B- to connect test equipment (e.g. voltage tester - V.A.G 1526E-, hand-held multimeter - V.A.Ğ 1594Č- etc.).

The engine control unit has to be removed before connectors can be unplugged from engine control unit ⇒ page 302.



Caution

Electronic components are susceptible to damage.

- Select the appropriate measuring range before connecting the test leads and observe test requirements.
- Remove engine control unit ⇒ page 302.
- Connect test box V.A.G 1598/42- to wiring harness connector. The earth clip on the test box must be connected to the negative battery terminal. The instructions for performing the individual tests indicate whether or not the engine control unit itself also needs to be connected to the test box.
- Carry out test as described in appropriate repair procedures.

Installing engine control unit

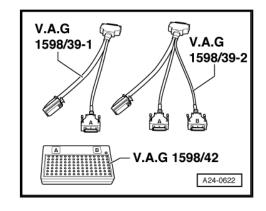
Installation is performed in the reverse sequence es, in part or in whole, is not

The procedure required after connecting the new engine control unit is described in the Guided Fault Finding or Guided Functions.



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.

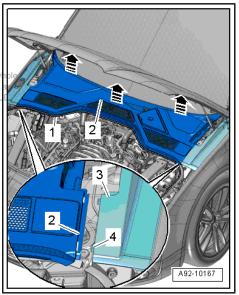


9.2 Removing and installing engine control unit - J623-

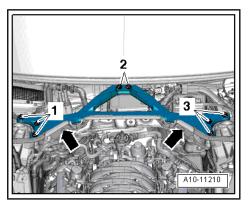
Removing

- If engine control unit is renewed, select test sequence/function Replace engine control unit in Guided Functions mode ⇒ vehicle diagnostic tester.
- Switch off ignition.
- Remove plenum chamber cover -2- ⇒ General body repairs, exterior; Rep. gr. 50; Bulkhead; Removing and installing plenum chamber cover .

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



Release clips -arrows- and detach engine control unit - J623--item 2-.



Note

Disregard -items 1, 3, 4-.

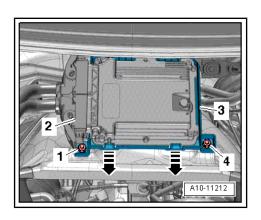
Installing

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 using ⇒ 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 304
- ⇒ "1.2 Separating exhaust pipes/silencers", page 307
- ⇒ "1.3 Removing and installing front silencers", page 308
- ⇒ "1.4 Stress-free alignment of exhaust system", page 310
- ⇒ "1.5 Checking exhaust system for leaks", page 310

1.1 Exploded view - silencers

1 - Centre silencer

- Combined in one unit with rear silencers as original equipment. Can be renewed individually for repair purposes
- ☐ Cutting point ⇒ page 307
- ☐ Align exhaust system so it is free of stress⇒ page 310

2 - Rear silencer

- Combined as one unit with centre silencer and tailpipe as original equipment
- Centre silencer and rear silencer can be renewed separately
- ☐ Cutting point: centre silencer / rear silencer⇒ page 307
- Align exhaust system so it is free of stress
 ⇒ page 310
- With exhaust flap and exhaust flap 1 valve N321- ⇒ page 307
- Removing and installing exhaust flap 1 valve -N321- ⇒ page 314

3 - Gasket

☐ Renew

4 - Gasket

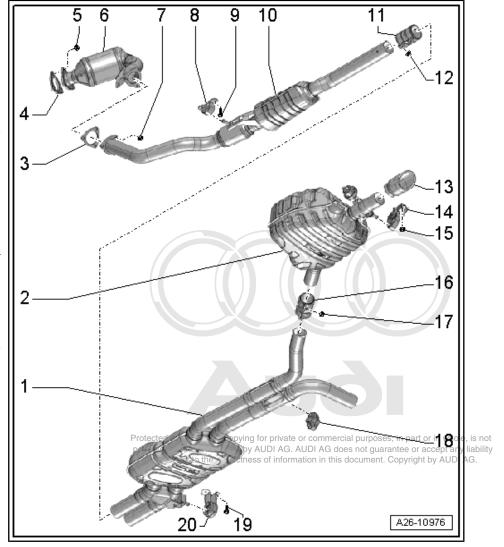
□ Renew

5 - Nut

- □ Renew
- ☐ Coat thread with high-temperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue
- □ 20 Nm

6 - Catalytic converter

Protect against knocks and impact

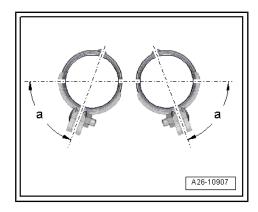


		Removing and installing <u>⇒ page 311</u> Mounting components: left-side <u>⇒ page 306</u> , right-side <u>⇒ page 307</u>
7 -	- Nı	ut
		Coat thread with high-temperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue Renew 20 Nm
8 -	- М	ounting
		Renew if damaged Check preload ⇒ "1.4 Stress-free alignment of exhaust system", page 310
9 -	- Bo	Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.
10 - F		Front silencer
		With flexible joint; do not bend flexible joint more than 10° – otherwise it can be damaged
		Removing and installing ⇒ page 308 Align subgust system as it is free of stress × page 310
4 4		Align exhaust system so it is free of stress <u>⇒ page 310</u>
11		Clamp (front) Installation position ⇒ page 306 Before tightening, align exhaust system so it is free of stress ⇒ page 310 Tighten bolt connections evenly
12	! - N	Nut
		23 Nm
		Frim For tailpipe Slide onto tailpipe as far as stop
		Mounting Renew if damaged Check preload ⇒ "1.4 Stress-free alignment of exhaust system", page 310
15	i - N	
		23 Nm
16		Clamp (rear) For separate replacement of centre and rear silencers Installation position ⇒ page 306 Before tightening, align exhaust system so it is free of stress ⇒ page 310 Tighten bolt connections evenly
17	' - N	Nut
		23 Nm
18		Mounting Renew if damaged Check preload ⇒ "1.4 Stress-free alignment of exhaust system", page 310
19) - E	Bolt
		23 Nm
20	- N	Mounting Mounting
		Renew if damaged
	1	Check preload → "1.4 Stress-free alignment of exhaust system", page 310

Audi A8 2010 ➤

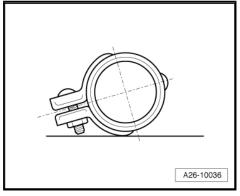
Installation position of front clamps

- Installation position: bolt connections face outwards.
- Angle $-\alpha$ = 45°



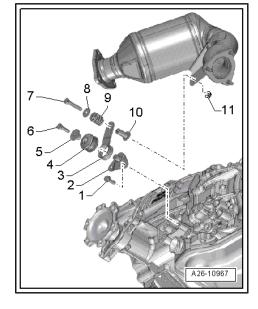
Installation position of rear clamps

- Install clamps so that the bolt ends do not protrude beyond bottom of clamp.
- Installation position: bolt connections face forwards.



Components of mountings for catalytic converter (left-side)

- Bolt, 23 Nm
- 2 -**Bracket**
- 3 -**Bracket**
- 4 -Rubber buffer
- 5 -Spacer sleeve
- Bolt, 23 Nm
- 7 -Bolt, 23 Nm
- 8 -Washer
- Compression spring
- 10 Spacer sleeve
- 11 Nut

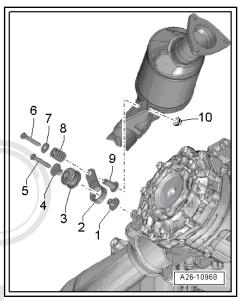




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Components of mountings for catalytic converter (right-side)

- 1 Spacer sleeve
- 2 Bracket
- 3 Rubber buffer
- 4 Spacer sleeve
- 5 Bolt, 23 Nm
- 6 Bolt, 23 Nm
- 7 Washer
- 8 Compression spring
- 9 Spacer sleeve
- 10 Nut



Exhaust flap and exhaust flap 1 valve - N321-

- 1 Vacuum unit for exhaust flap
- 2 Bolts, 5.5 Nm

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- 3 Exhaust flap 1 valve N321-
- 4 Vacuum hose to vacuum unit
- 5 Vacuum hose from engine
- 6 Cable tie



Note

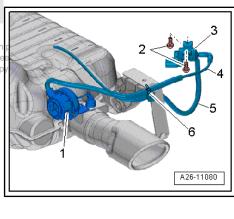
- ♦ Fit cable tie as high as possible on bracket.
- ♦ Secure vacuum line with cable tie at coloured marking.
- ♦ Vacuum hose must be pulled taut between vacuum unit and cable tie.

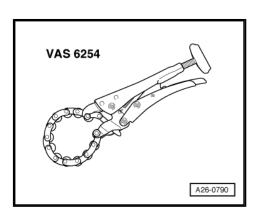
1.2 Separating exhaust pipes/silencers

- ♦ The connecting pipe can be cut through at the cutting location 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

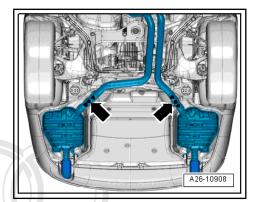
♦ Chain pipe cutter - VAS 6254-



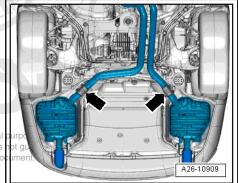


Procedure

Cut through exhaust pipes at right angle at the position marked -arrows- using chain pipe cutter - VAS 6254- .

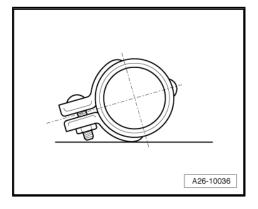


Position centre of clamps -arrows- over cutting location.



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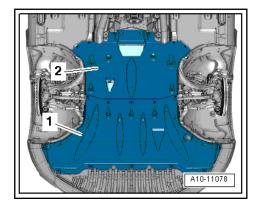
- Install clamps so that the bolt ends do not protrude beyond bottom of clamp.
- Installation position: bolt connections face forwards.
- Align the exhaust system so it is free of stress ⇒ page 310.



1.3 Removing and installing front silencers

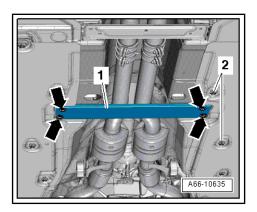
Removing

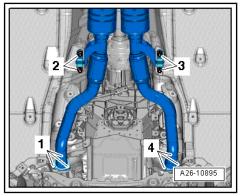
Remove rear noise insulation -2- ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.



Remove tunnel cross-piece -1- ⇒ General body repairs, exterior; Rep. gr. 66; Underbody trim; Removing and installing tunnel cross-piece.

- Front silencer (left-side): remove nuts -1- and bolts -2-.
- Front silencer (right-side). remove nuts -4- and bolisy 3-ily







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:



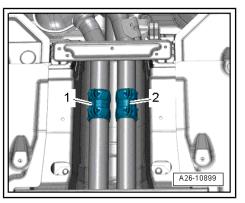
Note

Renew gaskets and self-locking nuts.

Align the exhaust system so it is free of stress ⇒ page 310.

Tightening torques

- ⇒ "1.1 Exploded view silencers", page 304
- Tunnel cross-piece ⇒ General body repairs, exterior; Rep. gr. 66; Underbody trim; Exploded view underbody trim
- ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view - noise insulation



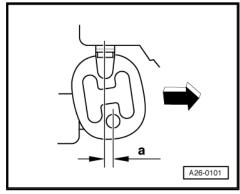
1.4 Stress-free alignment of exhaust system

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



Note

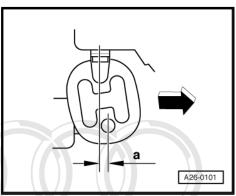
On a vehicle with clamps fitted between the centre silencer and rear silencers, it is also necessary to align the centre silencer.

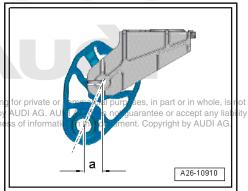
- Loosen bolt connections on front and rear clamps.
- Push exhaust system towards front of vehicle -arrow- until mountings in front of centre silencer are preloaded by -a- = 6 ... 10 mm.
- Tighten bolt connections on front clamps evenly.
- Push rear section of exhaust system towards front of vehicle -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 304

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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 connection points (cylinder head/exhaust manifold, exhaust manifold/catalytic converter, etc.) to locate any leaks.
- Rectify any leaks that are found.

2 **Emission control system**

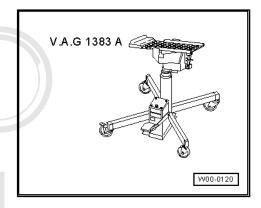
⇒ "2.1 Removing and installing catalytic converter", page 311

<u> '2.2 Removing and installing exhaust flap 1 valve N321 ", page</u>

2.1 Removing and installing catalytic converter

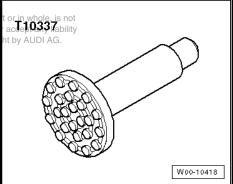
Special tools and workshop equipment required

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



Gearbox support - T10337-

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Removing



Fit all cable ties in the original positions when installing.

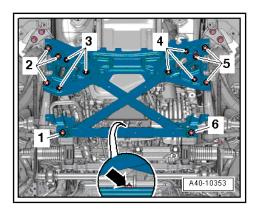
- Remove front silencer on relevant side <u>⇒ page 308</u>.
- Remove subframe cross brace ⇒ Running gear, axles, steering; Rep. gr. 40; Subframe; Removing and installing subframe cross brace.



Caution

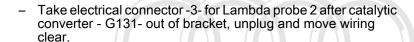
Risk of damage to running gear components.

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



Catalytic converter (left-side):

- Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50; Bulkhead; Exploded view bulkhead.
- 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.



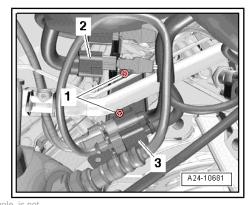


Note

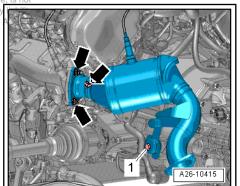
Disregard -items 1, 2-.



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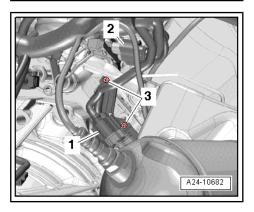
Catalytic converter (right-side):

- Remove throttle valve module J338- ⇒ page 281.
- Take electrical connector -1- for Lambda probe after catalytic converter - G130- out of bracket, unplug and move wiring clear.

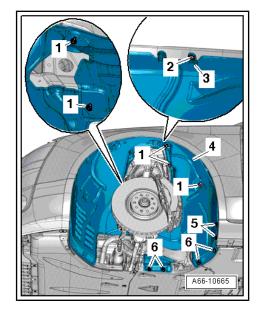


Note

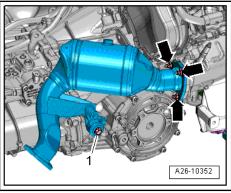
Disregard -items 2, 3-.



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 nuts -arrows- and bolt -1-.



Continuation for both sides:

- Position gearbox support T10337- on engine and gearbox jack - V.A.G 1383 A- .
- Position gearbox support T10337- underneath gearbox.



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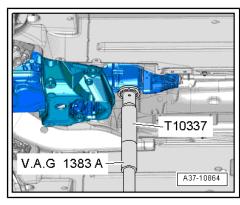
Raise gearbox slightly using engine and gearbox jack.

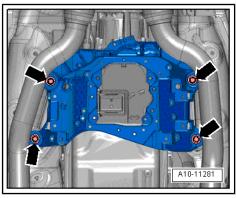


WARNING

Risk of accident.

- ◆ Engine and gearbox jack V.A.G 1383 A- must remain in position when work is being carried out and must not be left unattended.
- Remove bolts -arrows- for tunnel cross member.





- Audi A8 2010 ➤
- Lower tunnel cross member as far as distance -a- using engine and gearbox jack - V.A.G 1383 A- .
- Dimension -a- = 70 mm (maximum).
- Detach catalytic converter on relevant side.

Installing

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



Note

Renew gaskets and nuts.

- Install throttle valve module J338- ⇒ page 281.
- Secure intermediate steering shaft to steering rack ⇒ Running gear, axles, steering; Rep. gr. 48; Steering column; Removing and installing intermediate steering shaft.
- Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50; Bulkhead; Exploded view bulkhead.
- Install front silencers ⇒ page 308.

Tightening torques

- ♦ "1.1 Exploded view silencers", page 304
- Tunnel cross-piece ⇒ Rep. gr. 37; Assembly mountings; Exploded view assembly mountings
- Subframe cross brace ⇒ 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)

2.2 Removing and installing exhaust flap urboses, in part or in whole, is not valve - N32 purless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability valve - N32 pect to the correctness of information in this document. Copyright by AUDI AG.

Removing

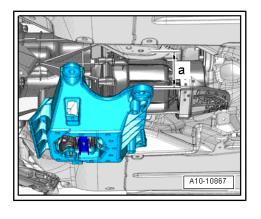
- Remove cover for spare wheel well (rear) ⇒ General body repairs, exterior; Rep. gr. 66; Underbody trim panels; Exploded view - underbody trim.
- Mark vacuum hoses -1, 5- for re-installation and disconnect hoses.
- Unplug electrical connector -4-.
- Remove bolts -3- and detach exhaust flap 1 valve N321--item 2-.

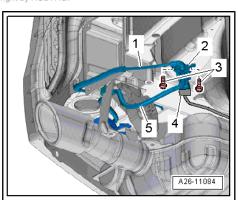
Installing

Install in reverse order.

Tightening torques

- ♦ ⇒ Fig. "Exhaust flap and exhaust flap 1 valve -N321-"", page 307
- ♦ General body repairs, exterior; Rep. gr. 66; Underbody trim; Exploded view - underbody trim





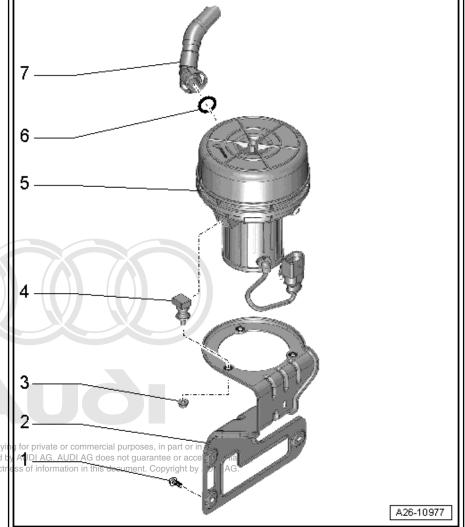
- ⇒ "3.1 Exploded view secondary air system", page 315
- ⇒ "3.2 Removing and installing secondary air pump motor V101 <u>", page 317</u>
- ⇒ "3.3 Checking combination valve", page 317
- ⇒ "3.4 Removing and installing combination valve", page 319
- ⇒ "3.5 Removing and installing sender 1 for secondary air pressure G609 ", page 322

3.1 Exploded view - secondary air system

Secondary air pump motor - V101-

- 1 Bolt
 - □ 9 Nm
- 2 Bracket
 - For secondary air pump motor - V101-
- 3 Nut
 - □ 9 Nm
- 4 Bonded rubber bush
 - □ 3x
- 5 Secondary air pump motor - V101-
 - ☐ Fitting location: At front left of engine compartment below longitudinal member
 - □ Removing and installing ⇒ page 317
 - ☐ Checking in Guided Fault Finding ⇒ Vehicle diagnostic tester
- 6 O-ring
 - □ Renew
- 7 Hose
 - For secondary air
 - To combination valves for secondary air inleton

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Combination valves for secondary air system

1 - Hose

□ From secondary air pump motor - V101-

2 - Gasket

□ Renew

3 - Bolts

□ 9 Nm

4 - Vacuum hose

5 - Combination valve for secondary air system (right-side)

- Check operation and check for leaks ⇒ page 317
- Removing and installing ⇒ page 320

6 - Bolt

□ 9 Nm

7 - O-ring

□ Renew

8 - Sender 1 for secondary air pressure - G609-

- USA version only
- Removing and installing ⇒ page 322

9 - Bolt

□ 9 Nm

10 - Combination valve for secondary air system (left-side)

Wth Sheck toperation and check for leaks

<u>⇒ page 317</u>

□ Removing and installing ⇒ page 319

11 - Vacuum hose

12 - Bolts

□ 9 Nm

13 - Gasket

☐ Renew

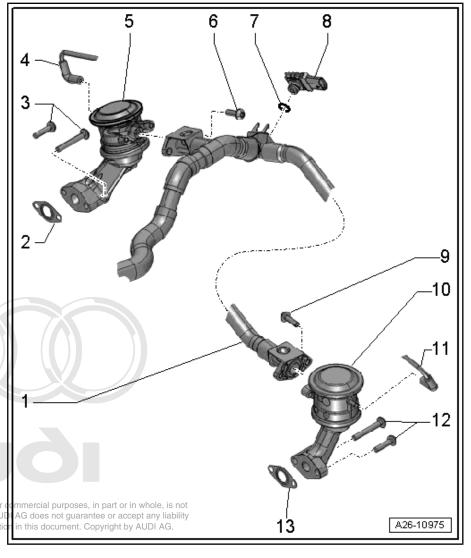
Heat shield for combination valve for secondary air system - tightening torque

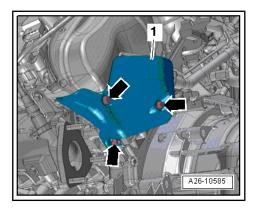
Tighten bolts -arrows- for heat shield -1- to 9 Nm.



Note

The illustration shows the heat shield on the left side of the vehicle.





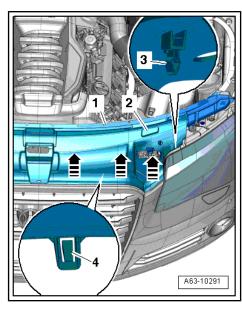
3.2 Removing and installing secondary air pump motor - V101-

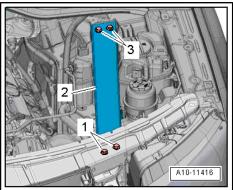
Removing

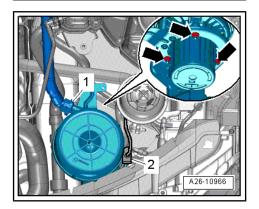
Remove lock carrier cover -2- ⇒ General body repairs, exterior; Rep. gr. 63; Bumper (front); Removing and installing attachments.



Protected by Remove longitudinal member (top-left) = 2 = w/General body permitted unirepairs, exterior, Replige 50 , Lock carrier, Exploded view with respect to the carrier







- Detach electrical connector -2- from bracket and unplug.
- Press release tabs and disconnect secondary air hose -1-.
- Remove nuts -arrows- and detach secondary air pump motor - V101- .

Installing

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

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

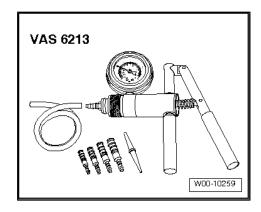
Tightening torques

- ⇒ "3.1 Exploded view secondary air system", page 315
- Upper longitudinal member ⇒ General body repairs, exterior; Rep. gr. 50; Lock carrier; Exploded view - lock carrier

3.3 Checking combination valve

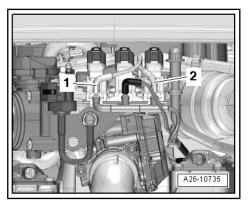
Special tools and workshop equipment required

Hand vacuum pump - VAS 6213-

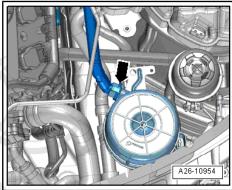


Procedure

- Vacuum hoses and hose connections do not leak.
- Vacuum hoses are not clogged.
- Remove engine cover panels ⇒ page 48.
- Detach vacuum hose -1- or -2- from combination valve to be checked.
- Connect hand vacuum pump VAS 6213- to vacuum hose of combination valve to be checked.



- Press release tabs and detach secondary air hose -arrowfrom secondary air pump motor - V101-.
- 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: left-side <u>⇒ page 319</u>, right-side <u>⇒ page 320</u>.



Assembling

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

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Note

Fit new O-ring.

Install engine cover panels ⇒ page 48.

3.4 Removing and installing combination valve

⇒ "3.4.1 Removing and installing combination valve (left-side)",

 \Rightarrow "3.4.2 Removing and installing combination valve (right-side)", page 320

3.4.1 Removing and installing combination valve (left-side)

Removing



Note

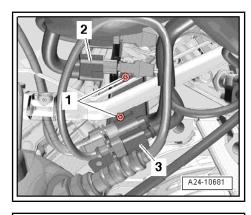
Fit all cable ties in the original positions when installing.

- Remove front silencer (left-side) ⇒ page 308.
- Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50; Bulkhead; Exploded view bulkhead .
- Take electrical connector -3- for Lambda probe 2 after catalytic converter - G131- out of bracket, unplug and move wiring

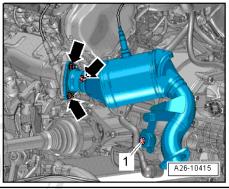


Note

Disregard -items 1, 2-.



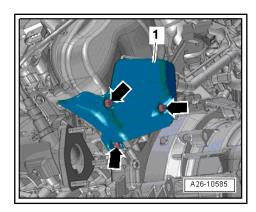
Remove bolt -1- and nuts -arrows-, detach catalytic converter (left-side) from exhaust manifold and move to rear.





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



- Remove bolts -3- for secondary air system hose.
- Detach vacuum hose -2- from combination valve for secondary air system.
- Unscrew bolts -1- and detach combination valve for secondary air system.

Installing

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



Note

Renew gasket.

- Secure catalytic converter (left-side) <u>⇒ page 304</u>.
- Install front silencer (left-side) ⇒ page 308.
- Install plenum chamber partition panel a General body replaced AG. AU pairs, exterior; Rep. gr. 50; Bulkhead; Exploded view bulkhead.

Tightening torques

- ⇒ "3.1 Exploded view secondary air system", page 315.
- ⇒ Fig. ""Heat shield for combination valve for secondary air system - tightening torque"", page 316.

3.4.2 Removing and installing combination valve (right-side)

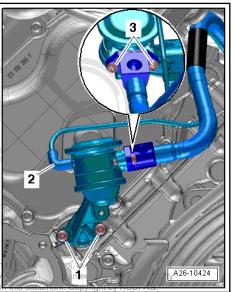
Removing



Note

Fit all cable ties in the original positions when installing.

- Remove front silencer (right-side) ⇒ page 308.
- Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50; Bulkhead; Exploded view bulkhead.



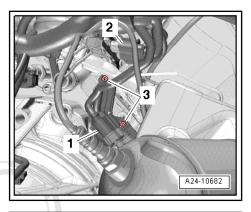
Take electrical connector -1- for Lambda probe after catalytic converter - G130- out of bracket, unplug and move wiring clear.



Note

Disregard -items 2, 3-.

Remove bolt -1- and nuts -arrows-, detach catalytic converter (right-side) from exhaust manifold and move to rear.

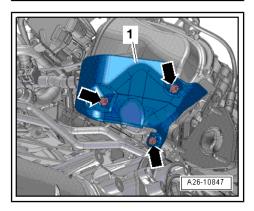




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- Remove bolts -arrows- and detach heat shield -1-.



- Detach vacuum hose -2- from combination valve for secondary air system.
- Remove bolts -3- and detach combination valve (right-side) for secondary air system and bolts -1- for secondary air hose.

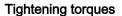
Installing

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



Note

- Renew gasket.
- 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 secure the air hoses at their connections, spray rust remover onto the worm thread of the used hose clips before installing.
- Secure catalytic converter (right-side) ⇒ page 304.
- Install front silencer (right-side) ⇒ page 308.
- Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50; Bulkhead; Exploded view bulkhead .

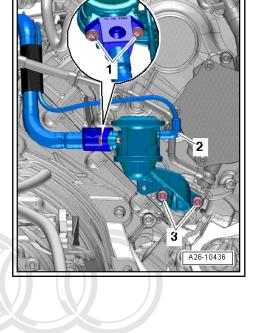


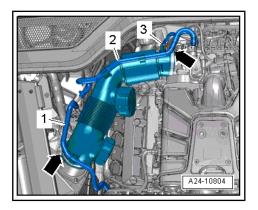
- ⇒ "3.1 Exploded view secondary air system" page 315 ing for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability
- ⇒ Fig. ""Heat shield for combination valve for secondary all soft information in this document. Copyright by AUDI AG. system - tightening torque"", page 316

3.5 Removing and installing sender 1 for secondary air pressure - G609-

Removing

- Remove engine cover panel (rear) \Rightarrow page 48.
- Move fuel hose -1- and hose -2- from activated charcoal filter clear at air pipe.
- Detach vacuum hose -3- from connection on air pipe.
- Release hose clips -arrows- and remove air pipe.





- 6-cylinder direct petrol injection engine with supercharger (3.0 ltr. 4-valve) Edition 08.2013
- Unplug electrical connector -1-.
- Release catches -2 and 3- and detach sender 1 for secondary air pressure - G609- .

Installing

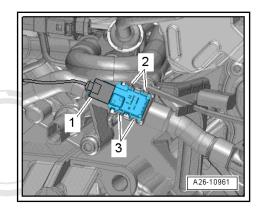
Installation is carried out in the reverse order; note the following:



Note

- Fit new O-ring.
- 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, copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability

Install engine cover panel ⇒ page 48.



4 Exhaust manifolds

- ⇒ "4.1 Exploded view exhaust manifold", page 324
- ⇒ "4.2 Removing and installing exhaust manifold", page 325

4.1 Exploded view - exhaust manifold

1 - Nut

- ☐ Renew
- Coat thread with hightemperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue
- ☐ Tightening torque and tightening sequence: left-side ⇒ page 325; right-side ⇒ page 325

2 - Bracket

For heat shield

3 - Exhaust manifold

- Removing and installing: left-side
 ⇒ page 325 , right-side
 ⇒ page 327
- 4 Gasket
 - □ Renew
- 5 Heat shield
- 6 Bolt
 - □ 9 Nm

7 - Lambda probe

- ☐ Before catalytic convert-
- □ Removing and installing⇒ page 297

8 - Catalytic converter

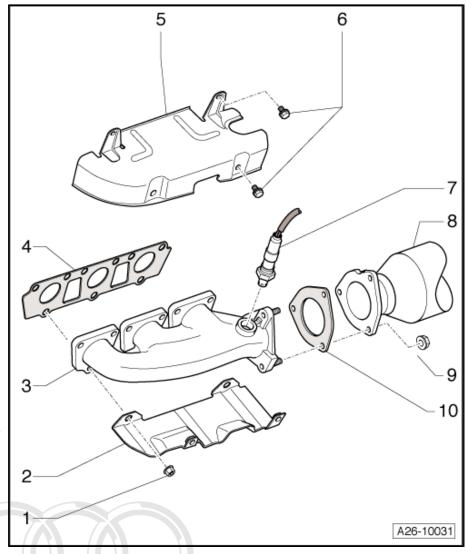
□ Exploded view⇒ page 304

9 - Nut

- □ Renew
- ☐ Coat thread with high-temperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue
- □ 23 Nm

10 - Gasket

□ Renew



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Exhaust manifold (left-side) - tightening torque and sequence



Note

- Renew the nuts.
- Coat threads of nuts with high-temperature paste; for high temperature paste refer to ⇒ Electronic parts catalogue.
- Tighten nuts in 3 stages in the sequence shown:

Stage	Nuts	Tightening torque	
1.	-1 9-	Screw in by hand until contact is made	
2.	-1 9-	15 Nm	
3.	-1 9-	25 Nm	

A26-10142

Exhaust manifold (right-side) - tightening torque and sequence



Note

- Renew the nuts.
- Coat threads of nuts with high-temperature paste; for high temperature paste refer to ⇒ Electronic parts catalogue or commerce

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Tighten nuts in 3 stages in the sequence shown:

Stage	Nuts	Tightening torque
1.	-1 9-	Screw in by hand until contact is made
2.	-1 9-	15 Nm
3.	-1 9-	25 Nm

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4.2 Removing and installing exhaust manifold

⇒ "4.2.1 Removing and installing exhaust manifold (left-side)", page 325

⇒ "4.2.2 Removing and installing exhaust manifold (right-side)", page 327

4.2.1 Removing and installing exhaust manifold (left-side)

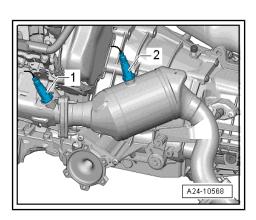
Removing



Note

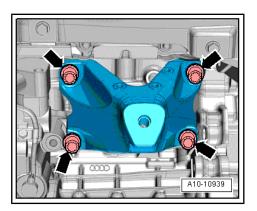
Fit all cable ties in the original positions when installing.

- Remove front silencer (left-side) ⇒ page 308.
- Remove Lambda probe 2 G108- ⇒ page 298.
- Remove engine mounting (left-side) ⇒ page 44.



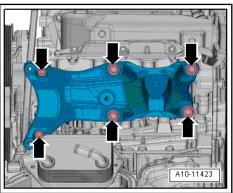
Vehicles up to 07.2010:

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



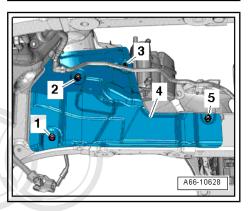
Vehicles from 07.2010 onwards:

Remove bolts -arrows- and detach engine support (left-side) with bracket for air conditioner compressor.

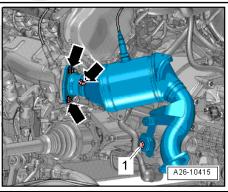


All vehicles (continued):

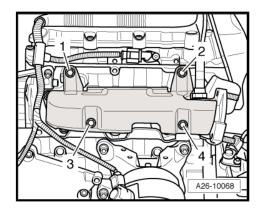
Remove heat shield for longitudinal member (left-side) ⇒ General body repairs, exterior; Rep. gr. 66 ; Strips / trim panels / extensions; Exploded view - heat shield .



Remove bolt -1- and nuts -arrows- and push catalytic converter towards rear of vehicle.



Protected by copyright. Copying for private or commercial permitted unless authorised by AUDI AG. AUDI AG does with respect to the correctness of information in this de Remove bolts -1 ... 4- and detach heat shield.



- Remove nuts -1- and -8- and detach bracket for heat shield.
- Remove nuts -2 ... 7- and -9- and detach exhaust manifold.

Installing

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



Note

- Renew gaskets and nuts.
- Coat threads of nuts with high-temperature paste; for high temperature paste refer to ⇒ Electronic parts catalogue.
- Fit exhaust manifold with gasket for catalytic converter and Protected fighterin has ying page 325 commercial purposes, in part or in whole, is not permitted unless authorised by Auth AG. AdDI AG does not guarantee or accept any liability
 - with resecture catalytic cionverter (lieft-side) <u>Sepage 304</u> . AG.
 - Install engine support (or engine support with bracket for air conditioner compressor) and engine mounting (left-side)
 - Install Lambda probe 2 G108- ⇒ page 298.
 - Install front silencer (left-side) ⇒ page 308.

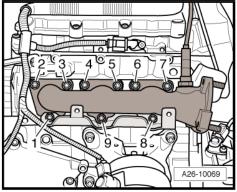
Tightening torques

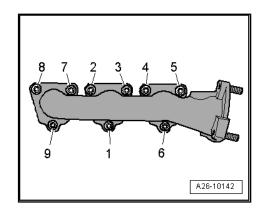
- ⇒ "4.1 Exploded view exhaust manifold", page 324.
- \Rightarrow Fig. ""Exhaust manifold (left-side) tightening torque and sequence"" , page 325 .
- ◆ Heat shield for longitudinal member ⇒ General body repairs, exterior; Rep. gr. 66; Strips / trim panels / extensions; Exploded view - heat shield

4.2.2 Removing and installing exhaust manifold (right-side)

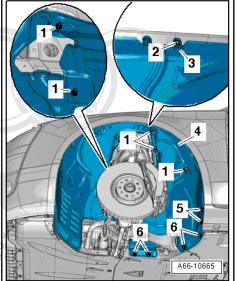
Removing

- Drain coolant <u>⇒ page 185</u>.
- Remove air cleaner housing ⇒ page 271.
- Remove throttle valve module J338- ⇒ page 281.



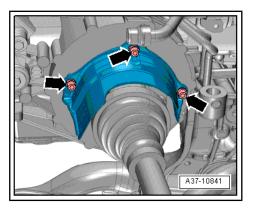


- Remove front wheel housing liner (right-side) completely ⇒ General body repairs, exterior; Rep. gr. 66; Wheel housing liner; Removing and installing front wheel housing liner.
- Remove front silencer (right-side) ⇒ page 308.

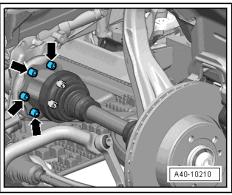


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Remove bolts -arrows- and detach heat shield for drive shaft (right-side).



Unbolt drive shaft (right-side) from gearbox flange shaft ⇒ Running gear, axles, steering; Rep. gr. 40; Drive shaft; Removing and installing drive shaft.

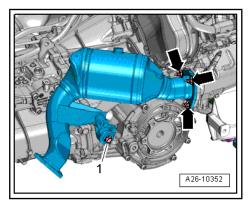


Remove bolt -1- and nuts -arrows- and push catalytic converter towards rear of vehicle.

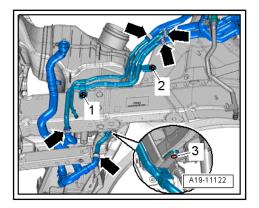


Note

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



- Remove nuts -1 and 2- and bolt -3-.
- Release hose clips -arrows-, disconnect coolant hoses from coolant pipes and detach coolant pipes.

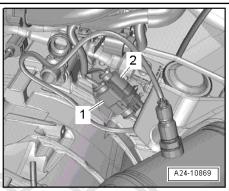


Take electrical connector -2- for Lambda probe - G39- out of bracket, unplug and move wiring clear.

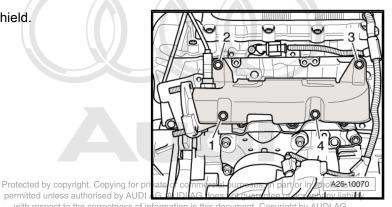


Note

Disregard -item 1-.



- Remove bolts -1 ... 4- and detach heat shield.



- Remove nuts -7- and -9- and detach bracket for heat shield.
- Remove nuts -1 ... 6- and -8- and detach exhaust manifold.

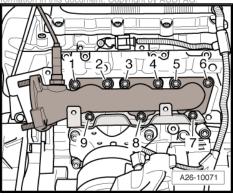
Installing

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



Note

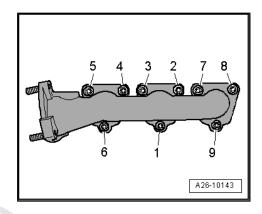
- Renew gaskets and nuts.
- Coat threads of nuts with high-temperature paste; for high temperature paste refer to ⇒ Electronic parts catalogue.



- Fit exhaust manifold with gasket for catalytic converter and tighten nuts <u>⇒ page 325</u>.
- Secure catalytic converter (right-side) <u>⇒ page 304</u>.
- Install front silencer (right-side) ⇒ page 308.
- Install throttle valve module J338- ⇒ page 281.
- Install air cleaner housing ⇒ page 271.
- Fill up with coolant ⇒ page 187.

Tightening torques

- ⇒ "4.1 Exploded view exhaust manifold", page 324.
- ⇒ Fig. ""Exhaust manifold (right-side) tightening torque and sequence", page 325.
- Drive shaft 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)





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28 – **Ignition system**

Ignition system

- ⇒ "1.1 Exploded view ignition system", page 331
- ⇒ "1.2 Test data, spark plugs", page 332
- ⇒ "1.3 Removing and installing ignition coils with output stages", page 332
- ⇒ "1.4 Removing and installing knock sensor", page 333
- ⇒ "1.5 Removing and installing Hall senders", page 33.4 Copying for private or commercial purposes, in part or in whole, is not
- ⇒ "1.6 Removing and installing engine speed sender G28e page information in this document. Copyright by AUDI AG.

Exploded view - ignition system 1.1

- 1 Bolt
 - □ 9 Nm
- 2 Hall sender G40-
 - □ Removing and installing ⇒ page 334
- 3 O-ring
 - □ Renew

4 - Knock sensor

- ☐ Cylinder bank 1 (rightside): knock sensor 1 -G61-
- ☐ Cylinder bank 2 (leftside): knock sensor 2 -
- □ Removing and installing ⇒ page 333
- 5 Bolt
 - □ 20 Nm

6 - Spark plug

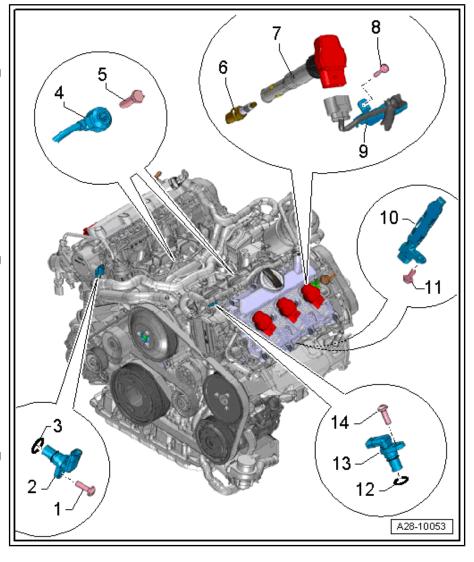
- Change interval ⇒ Maintenance tables
- Tightening torque ⇒ Maintenance ; Booklet 410

7 - Ignition coil

- □ Removing and installing ⇒ page 332
- 8 Bolt
 - □ 5 Nm
- 9 Electrical wiring harness
- 10 Bolt
 - □ 9 Nm

11 - Engine speed sender - G28-

□ Removing and installing ⇒ page 335



☐ Renew

13 - Hall sender 2 - G163-

□ Removing and installing ⇒ page 334

14 - Bolt

□ 9 Nm

1.2 Test data, spark plugs

3.0 ltr. TFSI engine			
Idling speed		Cannot be adjusted; regulated by idling speed stabilisation	
Ignition timing		Not adjustable (determined by control unit)	
Ignition system		Multi-coil system with 6 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		1-4-3-6-2-5	

Removing and installing ignition coils 1.3 with output stages

Special tools and workshop equipment required

♦ Puller - T40039-

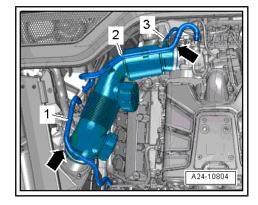


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T40039 W00-1303

Removing

- Remove engine cover panels ⇒ page 48.
- Move fuel line -1- and line -2- from activated charcoal filter clear on air cleaner housing and air pipe.
- Detach vacuum hose -3- from connection on air pipe.
- Release hose clips -arrows- and remove air pipe.



- Remove bolts -arrows- from cylinder bank 1 and unplug electrical connectors at ignition coils.
- Move electrical wiring harness down slightly.



Note

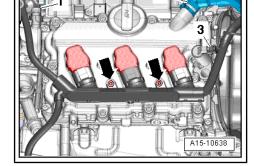
Disregard -items 1, 2-.

- Remove bolts -arrows- from cylinder bank 2 and unplug electrical connectors at ignition coils.
- Move electrical wiring harness down slightly.



Note

Disregard -items 1, 2, 3-.



Remove ignition coils using puller - T40039- .

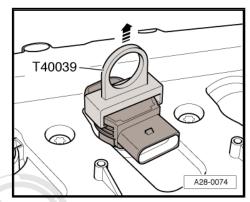
Installing

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

Install engine cover panels ⇒ page 48.

Tightening torques

- ⇒ "3.1 Exploded view air cleaner housing", page 270.
- ⇒ "1.1 Exploded view ignition system", page 331.



1.4 Removing and installing knock sensor

Removing

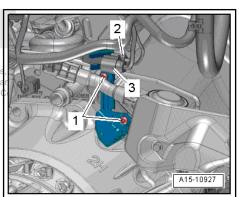
- Remove supercharger ⇒ page 236
- Remove corresponding intake manifold (bottom section) ⇒ page 279 .
- Take electrical connector -3- (cylinder bank 1) out of bracket.
- Remove electrical connector -2- for knock sensor 1 G61from bracket and unplug connector.



Note

Disregard -item 1-.

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Take electrical connector -2- (cylinder bank 2) for knock sensor 2 - G66- out of bracket and unplug connector.



Note

Disregard -items 1, 3-.

 Remove bolt -1- for knock sensor 1 - G61- or bolt -2- for knock sensor 2 - G66- and detach knock sensor.

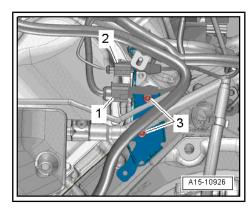
Installing

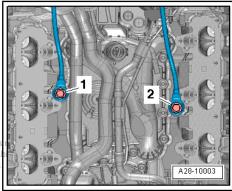
Installation is carried out in the reverse order; note the following:

- Install intake manifold bottom section (left and right)
 ⇒ page 279
- Install supercharger ⇒ page 236.

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♦ #1.1 Exploded view - ignition system, page 331

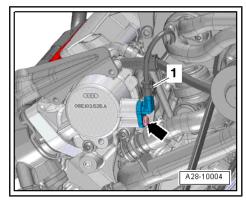




1.5 Removing and installing Hall senders

Removing

- Remove engine cover panel (front) ⇒ page 48.
- Unplug electrical connector -1- (cylinder bank 1).
- Unscrew bolt -arrow- and remove Hall sender G40- .



- Unplug electrical connector -1- (cylinder bank 2).
- Remove bolt -arrow- and detach Hall sender 2 G163- .

Installing

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



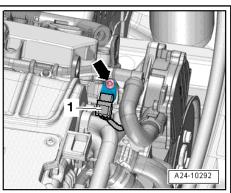
Note

Fit new O-rings.

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

Tightening torques

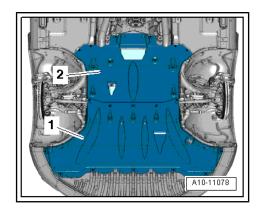
♦ ⇒ "1.1 Exploded view - ignition system", page 331



1.6 Removing and installing engine speed sender - G28-

Removing

Remove rear noise insulation -2- ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Removing and installing noise insulation.



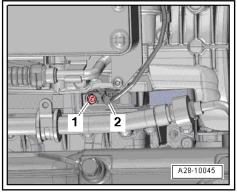
- Unplug electrical connector -2-.
- Unscrew bolt -1- and pull out engine speed sender G28- .

Installing

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

Tightening torques

- ⇒ "1.1 Exploded view ignition system", page 331
- ⇒ General body repairs, exterior; Rep. gr. 66; Noise insulation; Exploded view - noise insulation



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