Workshop Manual

Audi A4 2008 ➤
Audi A5 Cabriolet 2009 ➤
Audi A5 Coupé 2008 ➤
Audi A5 Sportback 2010 ➤

6-cylinder direct petrol injection engine (3.2 ltr. 4-valve)

Engine ID	CALA								

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Edition 01.2014

List of Workshop Manual Repair Groups

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

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00 – Technical data

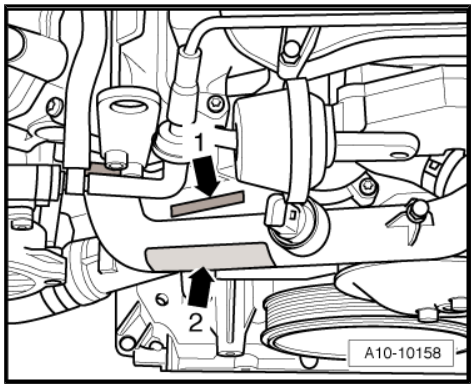
1 Identification

(ARL003591; Edition 01.2014)

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⇒ “1.1 Engine identification number/engine data”, page 2

1.1 Engine identification number/engine data



Note

Pull off engine cover panel (front) 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 1-.
- Starting with the letter “C”, the engine codes consist of 4 letters.
- The first 3 characters of the engine code stand for the engine capacity and the mechanical construction and design. They are stamped on the cylinder block, together with the serial number.
- The 4th character indicates the power output and torque of the engine, and is determined by the engine control unit.

Note

- *Disregard -arrow 2-.*
- *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 811 ; ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .*

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Code letters		CALA
Capacity	ltr.	3.197
Power output	kW at rpm	195/5000
Torque	Nm at rpm	330/3000
Bore	∅ mm	85.5
Stroke	mm	92.8
Compression ratio		12.5
RON	at least	95 1)
Injection/ignition system		Simos
Firing order		1-4-3-6-2-5
Turbocharging/supercharging		no
Knock control		2 sensors
Lambda control		4 Lambda probes
Variable valve timing		Inlet and exhaust
Intake manifold changeover		yes
Secondary air system		Emission standard EU4: no Emission standard EU5 and ULEV2: yes
Valves per cylinder		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 system”, page 4

⇒ “2.2 Safety precautions when using testers and measuring instruments during a road test”, page 5

⇒ “2.3 Safety precautions when working on the subframe”, page 6

⇒ “2.4 Safety precautions when working on the cooling system”, page 6

⇒ “2.5 Safety precautions when working on the ignition system”, page 6

2.1 Safety precautions when working on the fuel system

When working on the fuel system note the following warnings:

WARNING

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

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

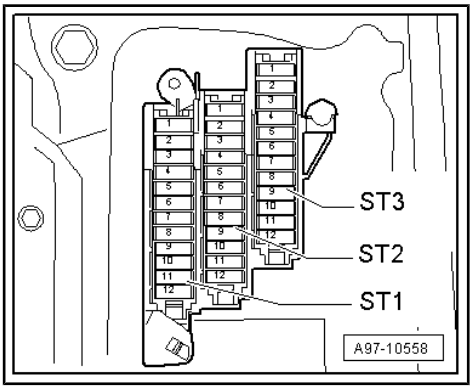
– Procedure before opening high-pressure section of injection system ⇒ page 314 .

Caution

- *Observe notes on procedure for disconnecting the battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .*

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



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

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

WARNING

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

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

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

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2.3 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.*

2.4 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.*

2.5 Safety precautions when working on the ignition system

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

- Do not touch or disconnect ignition wiring when the engine is running or being turned at cranking speed.
- Always switch off the ignition before connecting or disconnecting electrical wiring for the injection or ignition system or tester cables.
- Always switch off ignition before washing engine.
- Faults are stored in engine control unit if electrical connectors were unplugged and engine was started: “Generate readiness code” in “Guided Functions” ⇒ Vehicle diagnostic tester.
- If you want to turn the engine at cranking speed without actually starting it (e.g. compression test), first unplug the connectors from the ignition coils and the injectors. After completing the work, interrogate and erase the event memory.

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Caution

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

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

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

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3 Repair instructions

⇒ “3.1 Rules for cleanliness”, page 8

⇒ “3.3 Contact corrosion”, page 8

⇒ “3.4 Routing and attachment of pipes, hoses and wiring”, page 9

⇒ “3.4 Routing and attachment of pipes, hoses and wiring”, page 9

⇒ “3.5 Installing radiators and condensers”, page 9

⇒ “3.6 Checking vacuum system”, page 9

⇒ “3.7 General notes on self-diagnosis”, page 10

⇒ “3.8 General notes on ignition system”, page 10

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3.1 Rules for cleanliness

Even small amounts of dirt can cause malfunctions. When working on the fuel supply system and injection system, pay careful attention to the following basic rules:

- Carefully clean connection points and the surrounding area with engine cleaner or brake cleaner and dry thoroughly before opening.
- Plug open lines and connections with suitable protective caps immediately.
- 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.
- Protect unplugged electrical connectors against dirt and moisture and make sure connections are dry when attaching.

3.2 Foreign particles in engine

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

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

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

Note the following:

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

3.4 Routing and attachment of pipes, hoses and wiring

Mark hydraulic lines, vacuum lines and electrical wiring before removal so they can be re-installed in the original positions and correctly connected. Make sketches or take photographs if necessary.

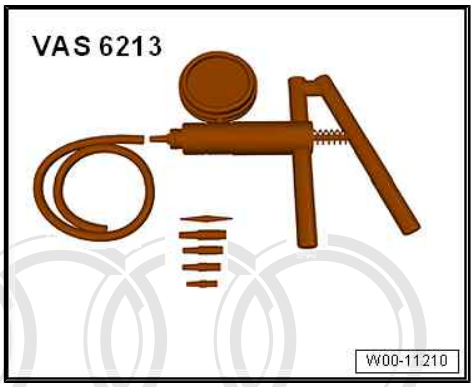
3.5 Installing radiators and condensers

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.

3.6 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

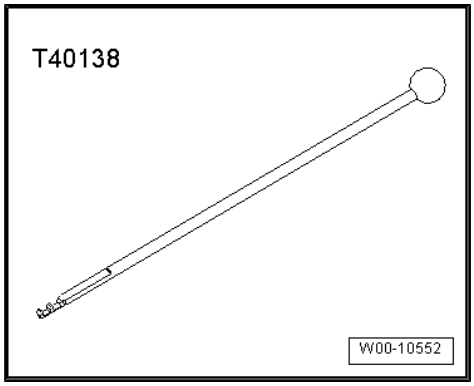
– Check vacuum line to solenoid valve and from solenoid valve to corresponding component.

– 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 pressure with the hand vacuum pump - VAS 6213- or if the pressure drops again immediately, check the hand vacuum pump and connecting hoses for leaks.

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3.7 General notes on self-diagnosis



- The engine control unit has a self-diagnosis capability. Before carrying out repairs and fault finding, the event memory must be interrogated. The vacuum hoses and connections must also be checked (unmetered air).
- Fuel hoses in engine compartment must only be secured with spring-type clips. O-type clips or screw-type clips must not be used.
- A voltage of at least 11.5 V is required for proper operation of the electrical components.
- Do not use sealants containing silicone. Particles of silicone drawn into the engine will not be burnt in the engine and will damage the Lambda probe.
- The vehicles are fitted with a crash/fuel shut-off system. This system is designed to reduce the risk of a vehicle fire after a crash by deactivating the fuel pump via the fuel pump relay.
- At the same time, this system also improves the engine's starting performance. When the driver's door is opened, the fuel pump is activated for 2 seconds in order to build up pressure in the fuel system ⇒ page 4 .
- Use release tool - T40138- to unplug connectors that cannot be accessed easily.

3.8 General notes on ignition system

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

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4 Technical data

⇒ “4.1 Technical data of injection system”, page 11

4.1 Technical data of injection system

Test data	3.2 ltr. / 4V / 195 kW engine
Idling speed Cannot be adjusted; regulated by idling speed stabilisation	650 ... 750 rpm[1)]
Fuel pressure after high-pressure pump	40 ... 110 bar
Fuel pressure before high-pressure pump	3.0 ... 6 bar
• [1)] Depending on demands placed on engine control unit.	

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10 – Removing and installing engine

1 Removing and installing engine

⇒ “1.1 Removing engine”, page 12

⇒ “1.2 Separating engine and gearbox”, page 69

⇒ “1.3 Securing engine to engine and gearbox support”, page 83

⇒ “1.4 Installing engine”, page 87

1.1 Removing engine

⇒ “1.1.1 Removing engine, vehicles with manual gearbox”, page 12

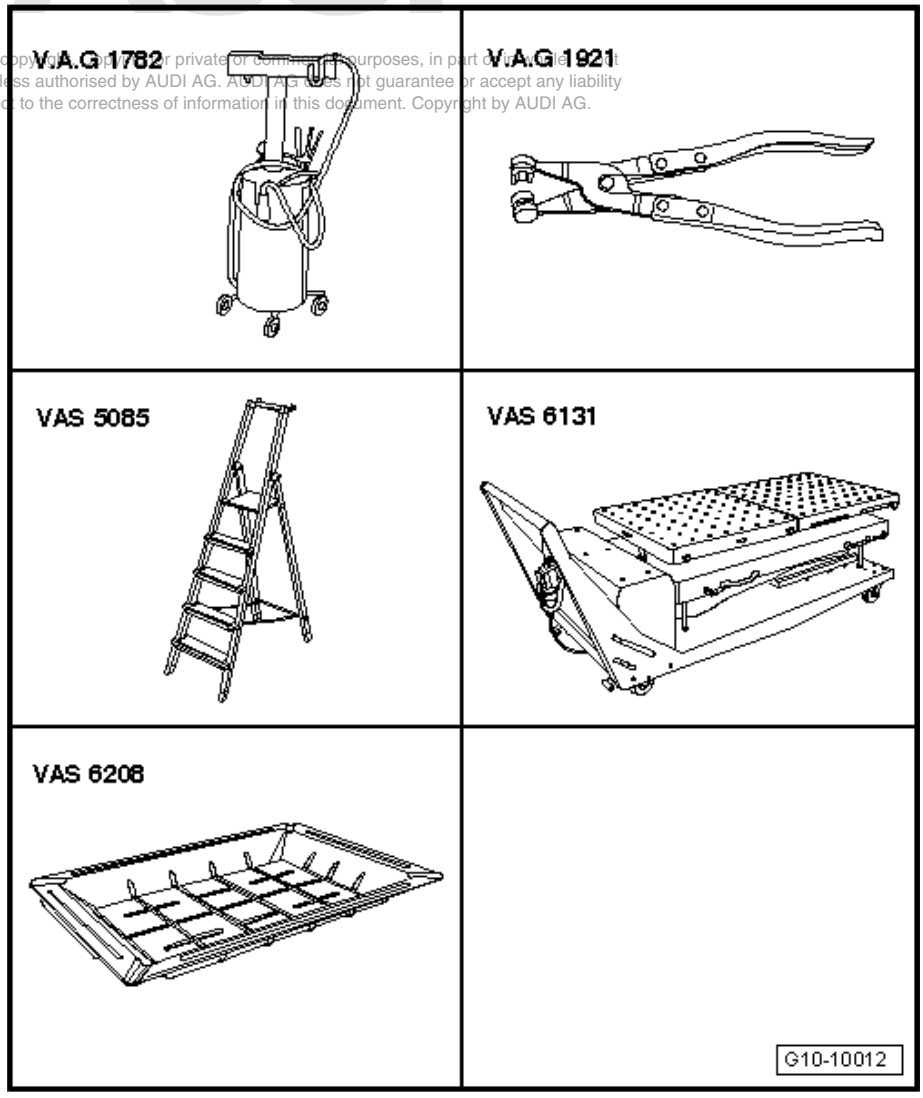
⇒ “1.1.2 Removing engine - vehicles with multitronic gearbox 0AW”, page 31

⇒ “1.1.3 Removing engine - vehicles with automatic gearbox 0B6”, page 50

1.1.1 Removing engine, vehicles with manual gearbox

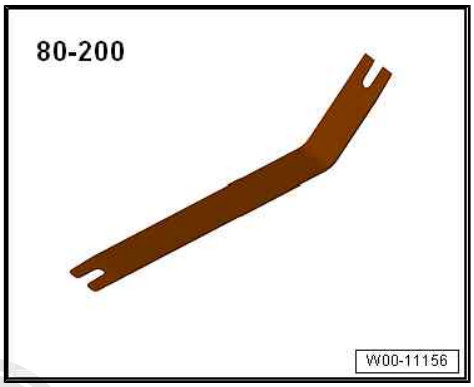
Special tools and workshop equipment required

- Used oil collection and extraction unit - V.A.G 1782-
- Hose clip pliers - V.A.G 1921-
- Stepladder - VAS 5085-
- Scissor-type assembly platform - VAS 6131 A- with support set for Audi - VAS 6131/10- and supplementary set -VAS 6131/13-
- Drip tray for workshop hoist - VAS 6208-

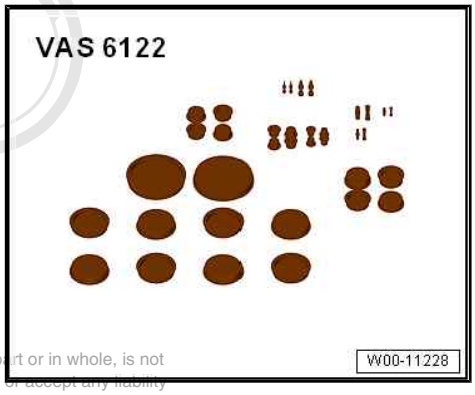


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- Removal lever - 80 - 200-

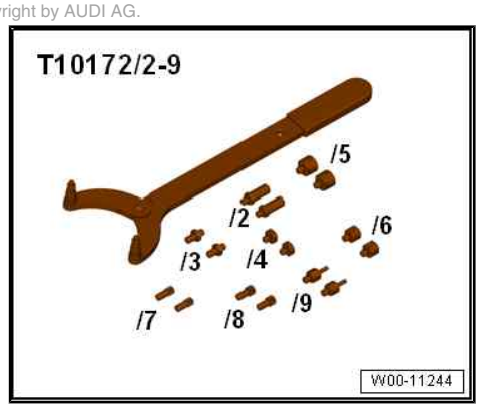


- Engine bung set - VAS 6122-

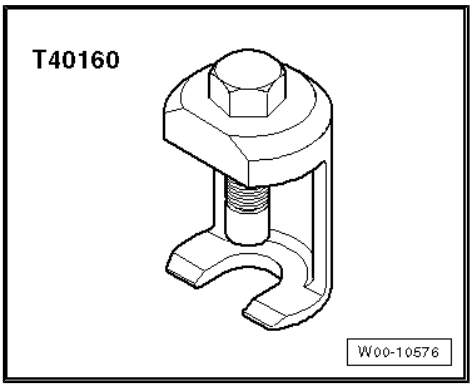


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- Counterhold tool - T10172/2-9- with -T10172/5- for vehicles with four-wheel drive



- Puller -T40160-



Note

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

Procedure

WARNING

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

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

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

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

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– Reduce fuel pressure in high-pressure section of injection system ⇒ page 314 .

– Set front wheels to straight-ahead position.

Note

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

Caution

Electronic components are susceptible to damage.

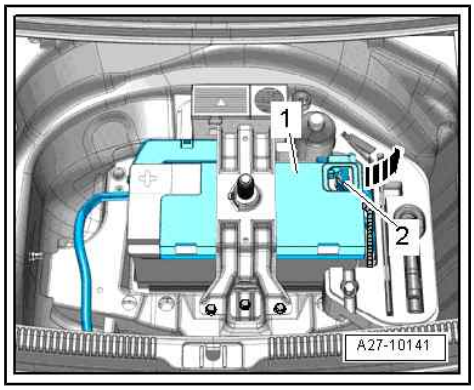
- ***Observe notes on procedure for disconnecting the battery.***

– Switch off ignition and take out ignition key.

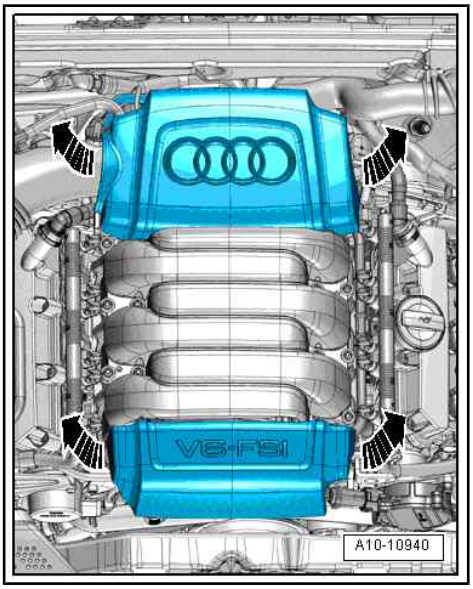
– Disconnect earth wire -2- from battery terminal ⇒ Electrical system; Rep. gr. 27 ; Battery, Disconnecting and connecting battery .

– Discharge refrigerant system ⇒ Air conditioner with refrigerant R134a; Rep. gr. 87 ; Refrigerant circuit .

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



– Pull off engine cover panels -arrows-.



WARNING

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

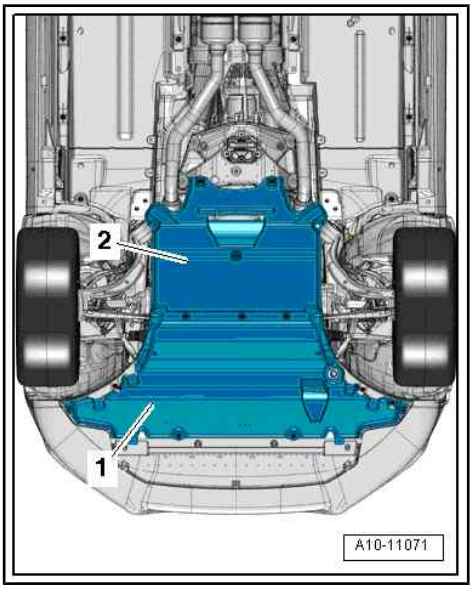
- *The cooling system is under pressure when the engine is hot.*
- *To allow pressure to dissipate, cover filler cap on coolant expansion tank with cloth and open carefully.*

– Open filler cap on coolant expansion tank.

– Remove both front wheels.

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

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

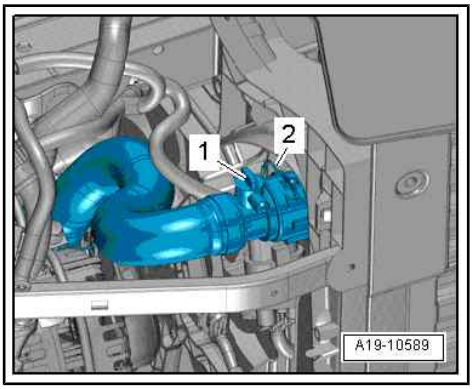


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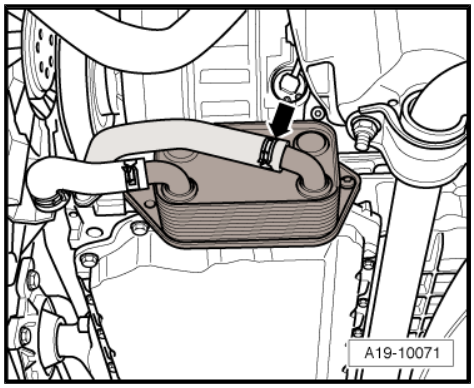
– Place drip tray for workshop hoist - VAS 6208- beneath engine.

– Remove drain plug -1- and drain off coolant.

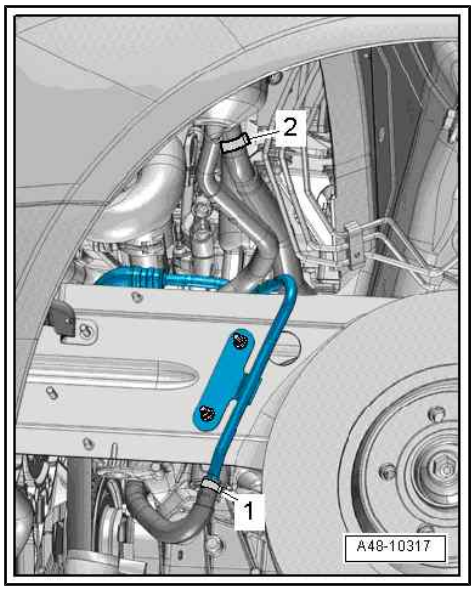
– Lift retaining clip -2- and disconnect coolant hose from radiator.



– Release hose clip -arrow-, disconnect coolant hose from engine oil cooler and drain off coolant.



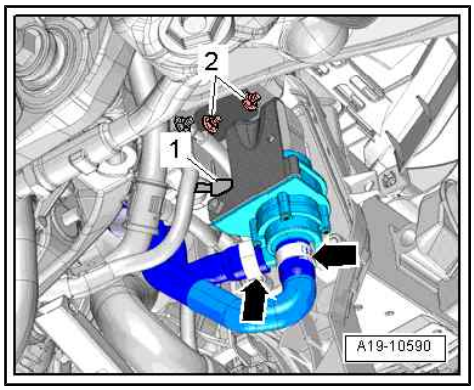
– Position used oil collection and extraction unit - V.A.G 1782- below connection point.
– Disconnect supply hose -2- and return hose -1- for power steering hydraulic fluid in front left wheel housing and move clear.
– Seal off open pipes/lines and connections with clean plugs from engine bung set -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



Vehicles with coolant circulation pump - V50- :

– Unplug electrical connector -1-.
– Place drip tray for workshop hoist - VAS 6208- beneath engine.
– Disconnect coolant hose from continued coolant circulation pump - V50- -right arrow-.

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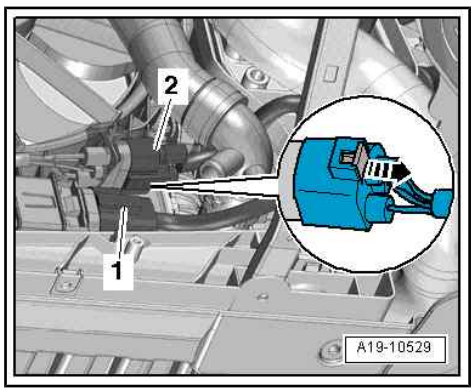


Note

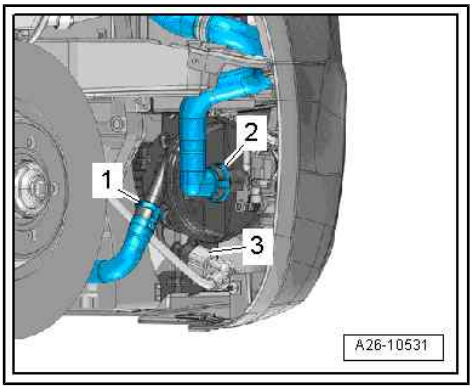
Disregard -item 2- and -left arrow-.

All vehicles (continued):

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



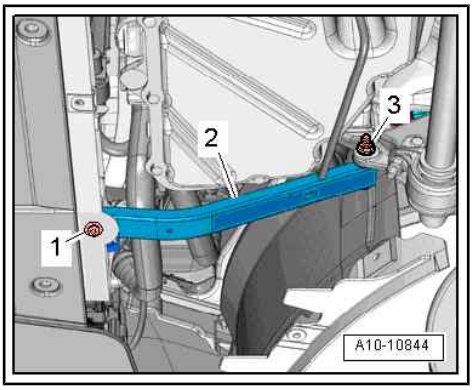
– If fitted, detach electrical connector -3- at secondary air pump motor - V101- and move electrical wire clear.



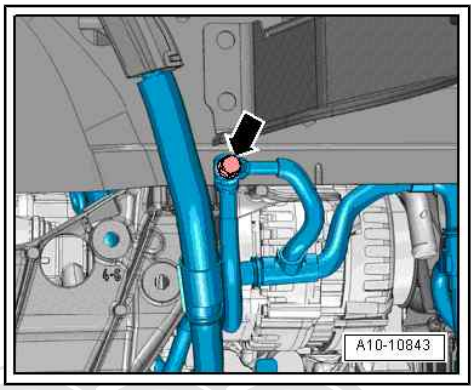
Note

Disregard -items 1, 2-.

– Remove bolt -1- and nut -3- on both sides and detach strut -2- for lock carrier.

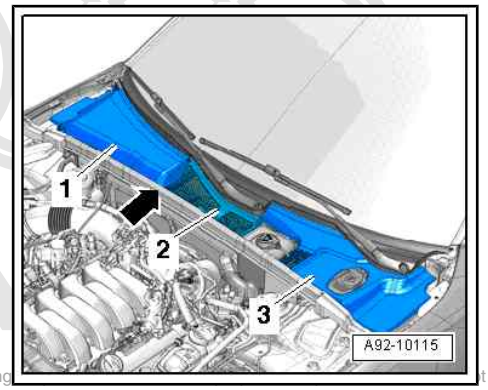


– Unscrew nut -arrow- on longitudinal member (right-side) and move earth cables clear.



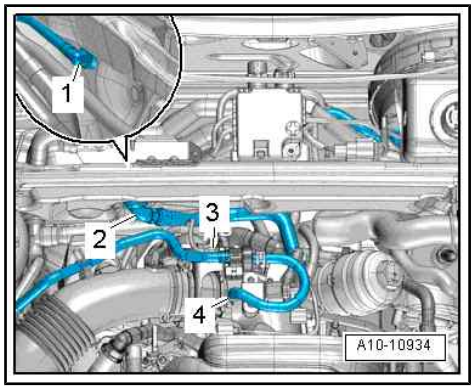
– Remove seal -arrow-.

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

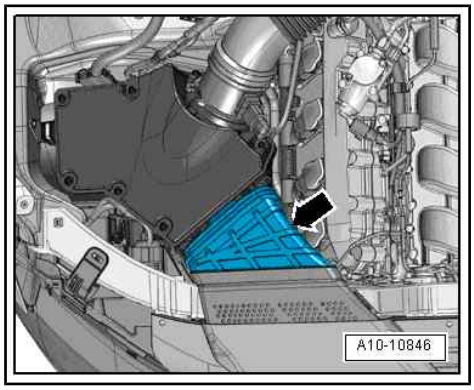


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– Disconnect vacuum hose -1- on rear side of plenum chamber partition panel and detach vacuum connection -2- from plenum chamber partition panel.
– Move fuel line and line leading to activated charcoal filter clear at air pipe.
– Unplug electrical connector -3- at activated charcoal filter solenoid valve 1 - N80- and detach vacuum hose -4-.
– Detach activated charcoal filter solenoid valve 1 - N80- from bracket and move it clear to the side with hoses still attached.



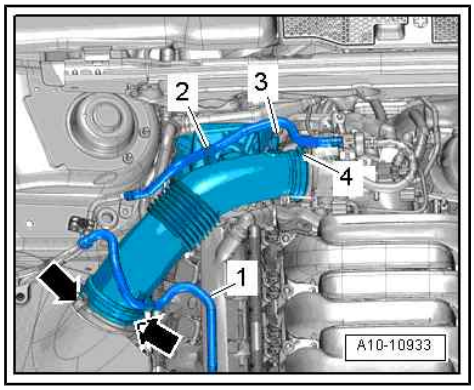
– Remove air duct -arrow-.



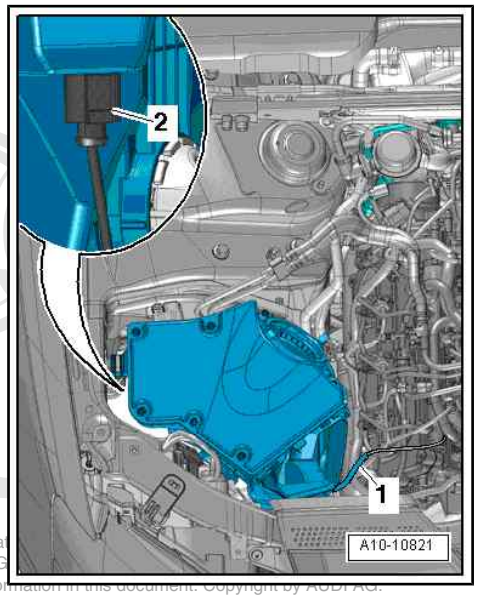
– Move fuel hose -1- clear at air pipe.
– Disconnect vacuum hose -3- from connection on air pipe.
– Remove air pipe. To do so, release hose clip -4- and clamps -arrows-.

Note

Disregard -item 2-.



– Disconnect vacuum line -1-.
– Detach air cleaner housing and, if fitted, unplug electrical connector -2- at variable intake manifold change-over valve - N335- on reverse side of air cleaner.



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WARNING

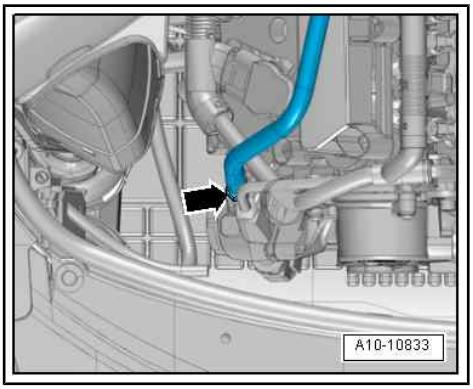
Risk of injury caused by fuel.

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

Caution

Take care to keep components clean.

- *Observe rules for cleanliness when working on the fuel supply system* *⇒ page 8* *.*

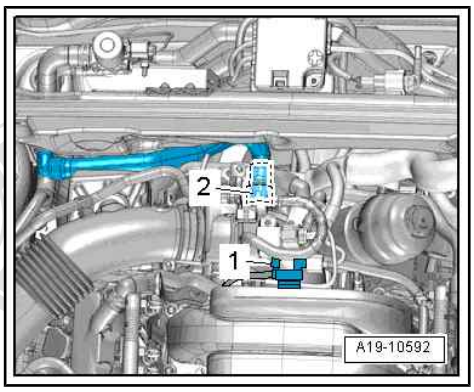


– Disconnect fuel supply hose from high-pressure pump -arrow- and move clear to one side.

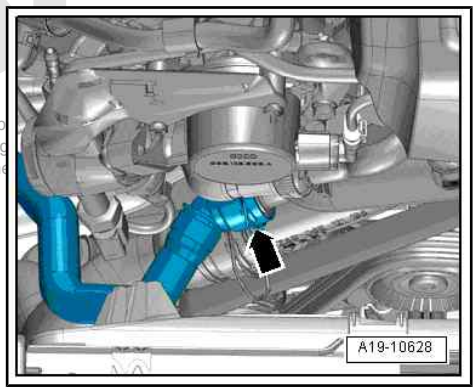
– Seal off open pipes/lines and connections with clean plugs from engine bung set - VAS 6122- .

– If fitted, disconnect vacuum hose -1- and move clear.

– Lift retaining clip and detach coolant hose -2- from coolant pipe (top).

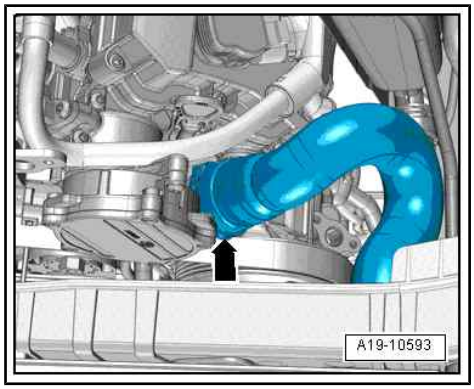


– On vehicles without coolant circulation pump - V50- , lift retaining clip -arrow- and detach coolant hose at front right of coolant pipe (front).

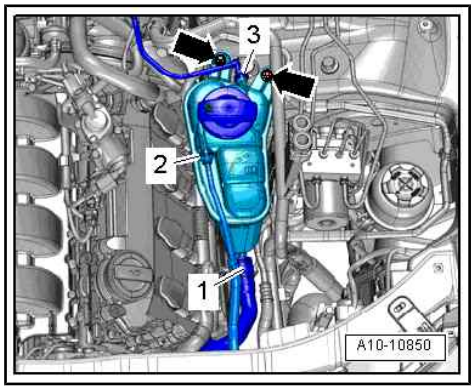


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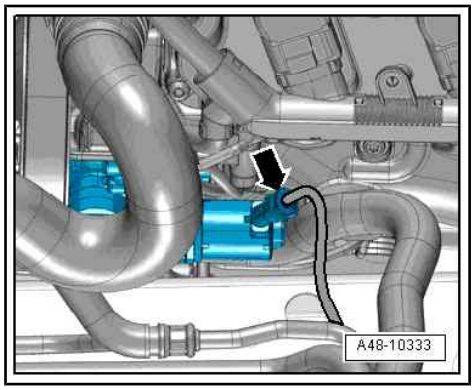
– Lift retaining clip -arrow- and detach coolant hose from coolant pipe (front).



– Disconnect coolant hose -3- from coolant expansion tank and move clear.
– Remove bolts -arrows-, unplug electrical connector at coolant shortage indicator switch - F66- and move expansion tank to one side with coolant hoses -1- and -2- attached.



– If fitted, unplug electrical connector -arrow- at power steering pump.
– Press hydraulic fluid hose to side.



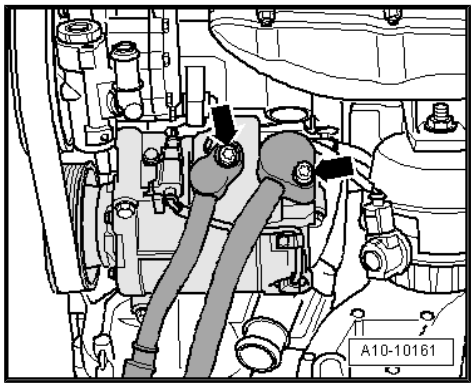
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Caution

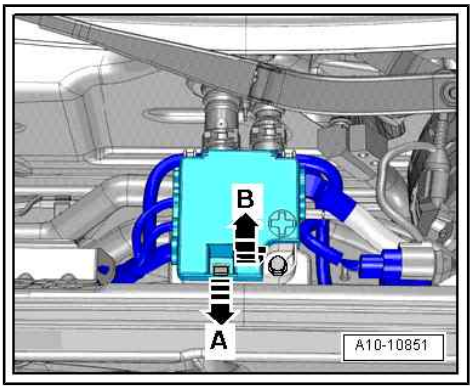
Danger of damage to refrigerant lines and hoses.

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

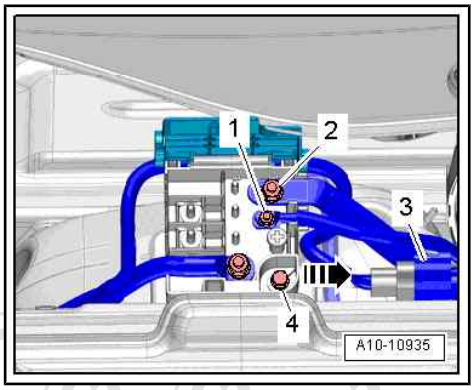
– Remove bolts -arrows- and disconnect refrigerant lines from A/C compressor.
– Seal off open pipes/lines and connections with clean plugs from engine bung set - VAS 6122- .



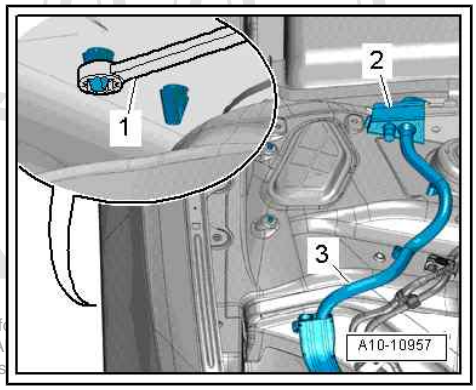
– Release retainer -arrow A- and open cover -arrow B-.



– Remove nuts -1- and -2- for electrical wiring.
– Detach electrical connector -3- from bracket and unplug.
– Remove bolt -4- and detach terminal 30 wiring junction 2 - TV22- from body brace -arrow-.

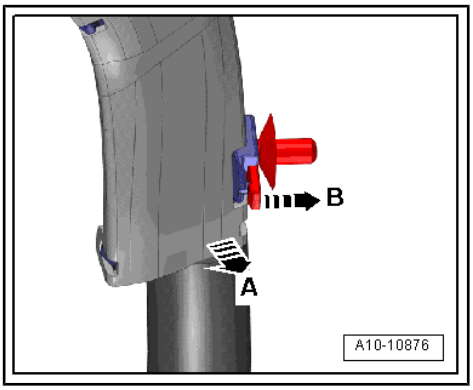


– Working from wheel housing, release catches using a 5.5 mm ring spanner -item 1- -arrow- and remove wiring protector -2- from above.
– Release wiring harness -3- leading to alternator and starter using removal lever - 80 - 200- and move clear.

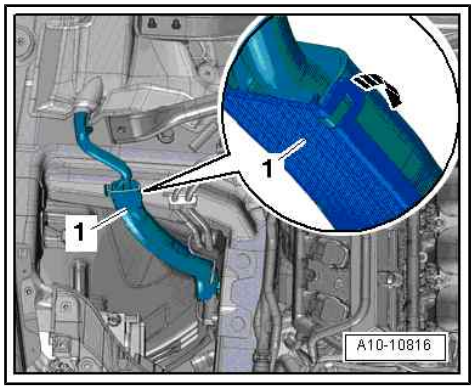


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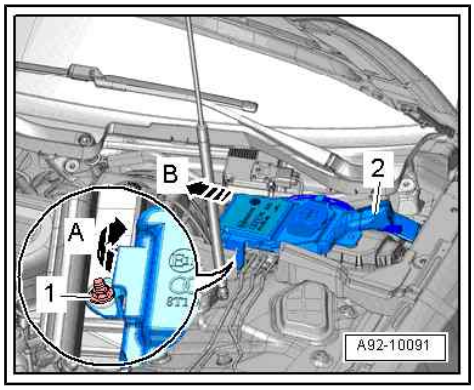
– Wiring duct (version 1): release catch -arrow B- and move wiring duct clear by pulling it towards front -arrow A-.



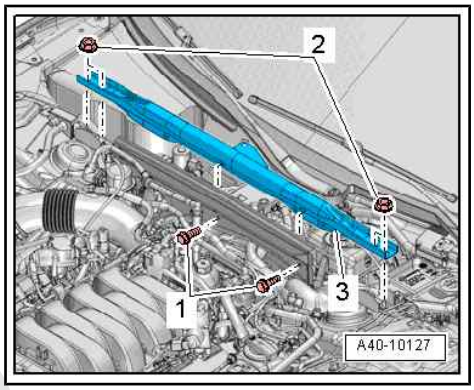
– Wiring duct (version 2): release catch -arrow- to open wiring duct -1- and move wiring harness clear.



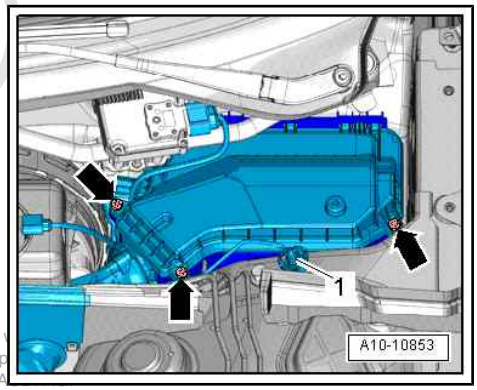
– Remove nut -1- and swivel filler neck -2- for washer fluid reservoir slightly upwards -arrow A-.
– Pull filler neck with filler pipe out of washer fluid reservoir and through opening in body -arrow B-.



– Remove bolts -1- and nuts -2- and detach body brace -3-.

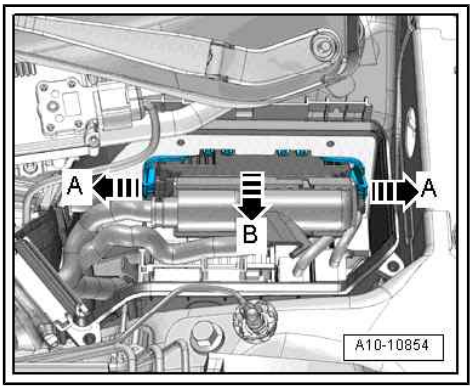


– Remove bolts -arrows- and detach cover for electronics box in engine compartment.
– Remove nut -1- and move electrical wiring clear.

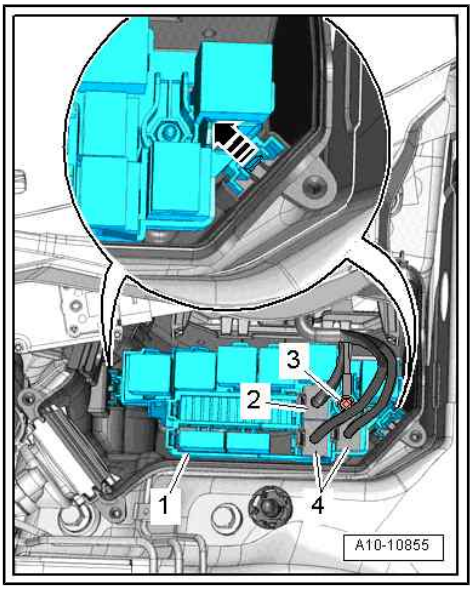


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– Release catches -arrows A- and take out engine control unit -arrow B-.

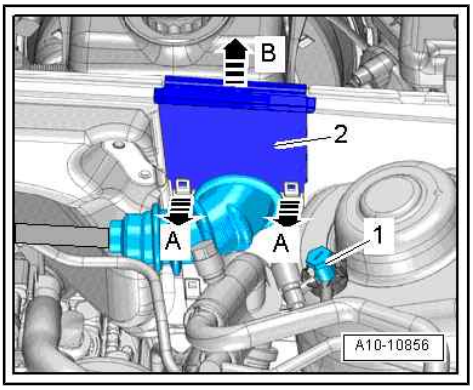


– If fitted, unplug electrical connector -2-.
– Unplug electrical connectors -4- and unscrew nut -3- for wiring.
– Release catches -arrow- and detach relay carrier with fuse holder -1-.
– Disengage engine wiring harness at electronics box in engine compartment and move clear.

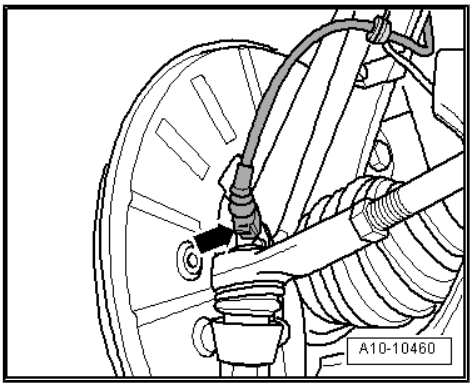


– Release catches -arrows A- and lift off wiring protector -2- -arrow B-.
– Unscrew earth stud -1- and move wiring harness clear.
– Place wiring harness on engine and secure engine control unit to prevent it from dropping.

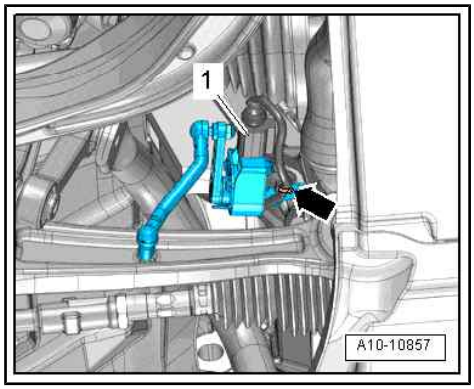
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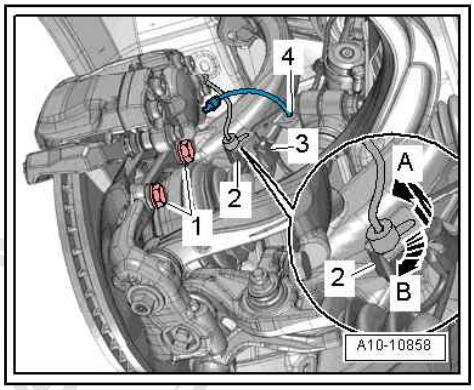
– Unplug electrical connectors -arrow- at front wheel speed sensors on both sides.



– Unplug electrical connector -1- from front left vehicle level sender - G78- and front right vehicle level sender - G289- and move wiring clear -arrow-.



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



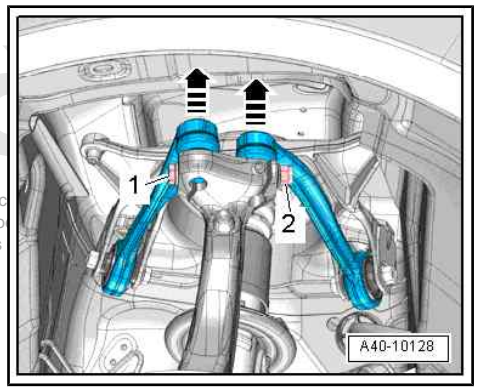
Caution

Avoid damage to brake pistons.

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

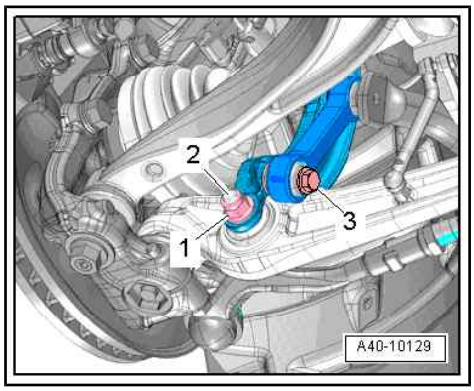
– Remove nut -2- and pull out bolt -1-.
– Pull upper suspension links upwards out of wheel bearing housing -arrows-.
– Perform the same work steps on the other side of the vehicle.

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A5 up to vehicle identification no. 8T-8-011200:

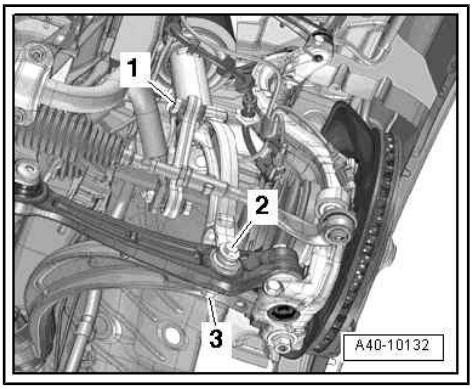
– Remove bolt -3- for anti-roll bar on both sides.
– Remove nut -1- on both sides.



Note

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

A4 (all), A5 from vehicle identification no. 8T-8-011201 onwards:



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

Note

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

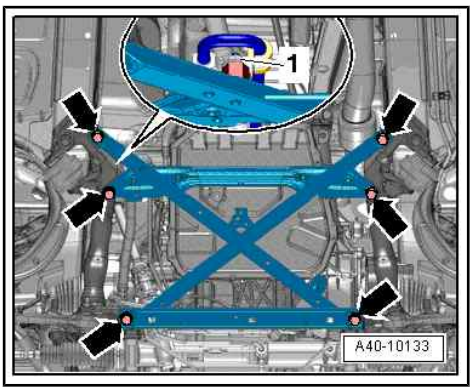
All vehicles (continued):

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.***

A4 (all), A5 Coupé:

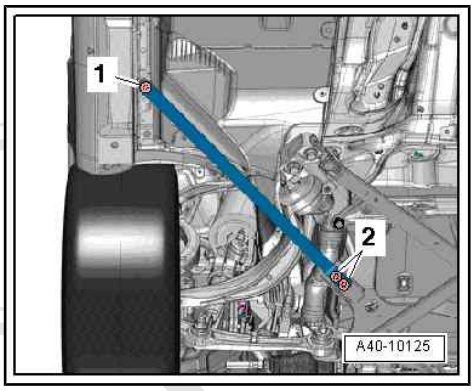


– Remove nut -1- for power steering hydraulic line.
– Remove bolts -arrows- and detach subframe cross brace.

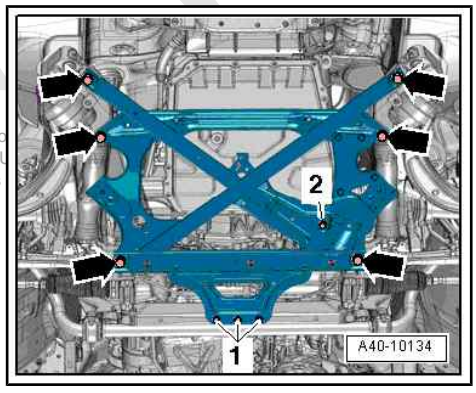
Note

Illustration shows the installation position on a vehicle with dynamic steering.

A5 Cabriolet:



– Remove bolts -1- and -2- on both sides and detach strut.

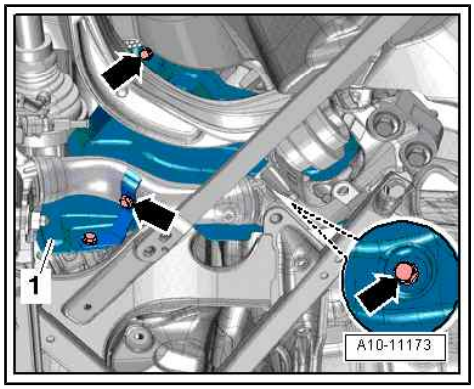


– Remove bolt -2- for power steering hydraulic line.
– Remove bolts -1- and -arrows- and detach subframe cross brace.

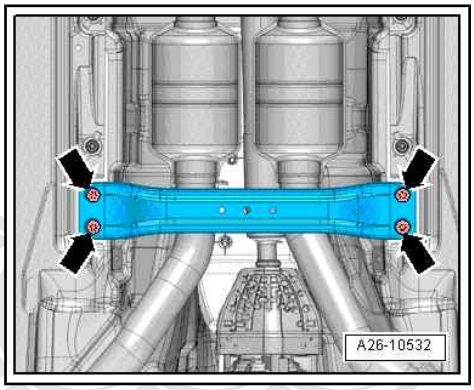
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All vehicles (continued):

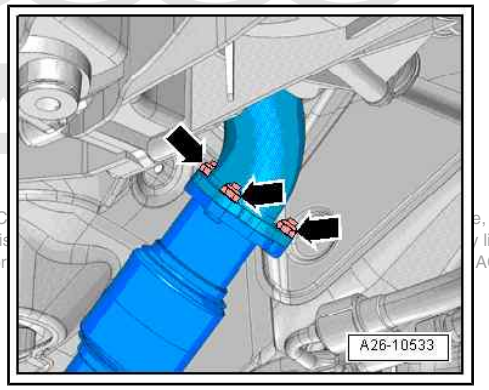
– If fitted, remove bolts -arrows- on both sides and detach heat shield -1-.



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

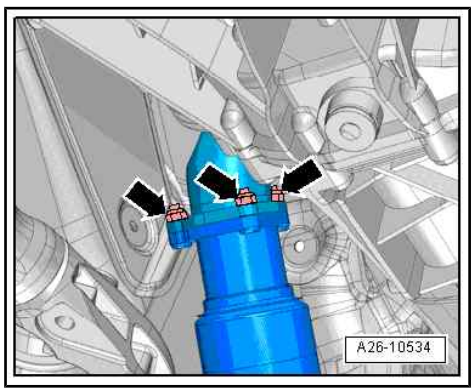


– Unscrew nuts -arrows- for front silencer (left-side).



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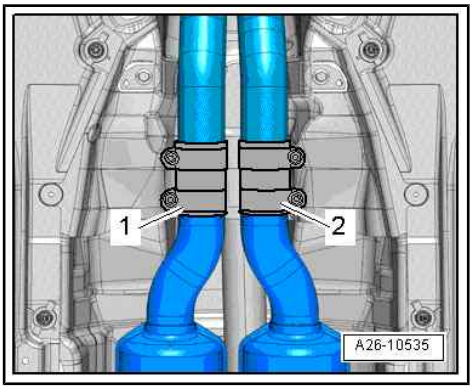
– Unscrew nuts -arrows- for front silencer (right-side).



Caution

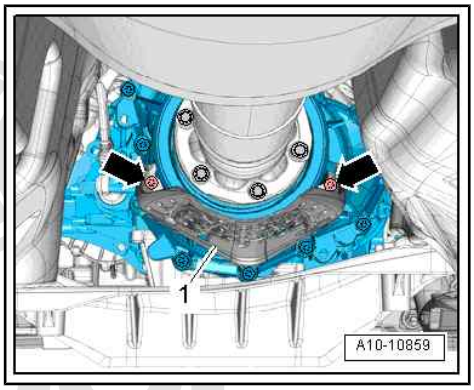
Risk of damage to flexible joints in front silencer.

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



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

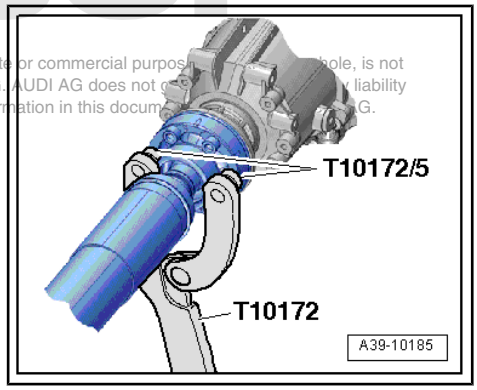
– If fitted, remove bolts -arrows- and detach heat shield -1- for propshaft.



– Remove bolts connecting propshaft to gearbox. Use counter-hold tool - T10172- with -T10172/5- to provide support.

– Slide propshaft towards rear final drive; the constant velocity joints can be moved axially.

– Tie up propshaft on one side.

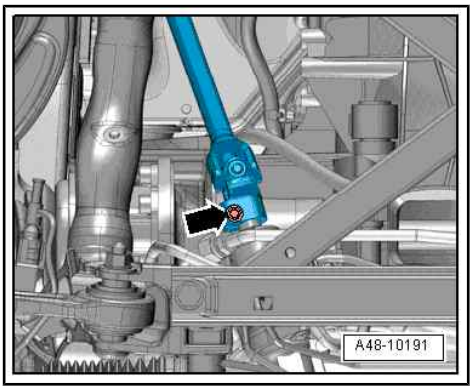


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Caution

Risk of damage to coil connector for airbag.

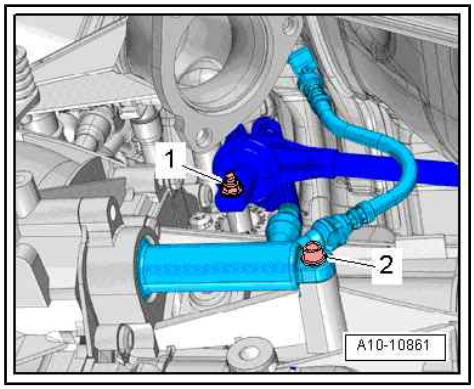
- *Make sure that front wheels are in straight-ahead position before removing universal joint from steering rack.*
- *Do not alter position of steering wheel and steering rack (locate steering wheel with adhesive tape if necessary).*



– Remove bolt -arrow- for universal joint ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Exploded view - steering column .

– Separate universal joint from steering rack and move clear to the top as far as possible.

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



Caution

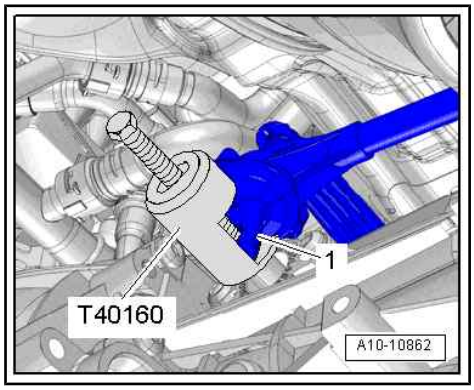
Avoid damage to clutch slave cylinder.

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

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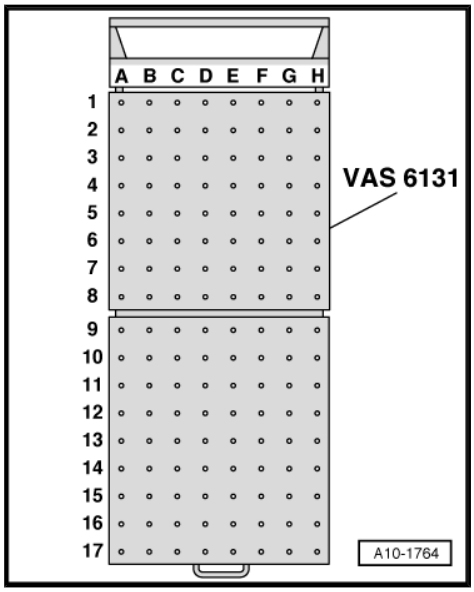
– Remove nut -1- for selector rod.

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



Set up the scissor-type assembly platform as follows:

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



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

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

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

• Take note of spirit level (bubble gauge).

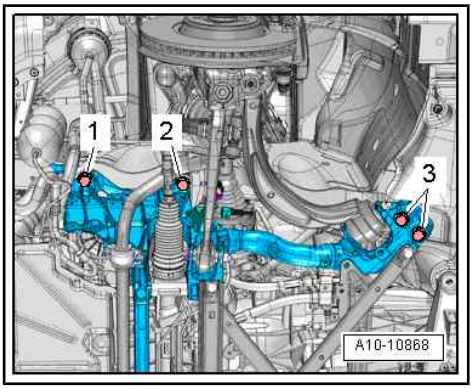
– Position scissor-type assembly platform - VAS 6131 A- below engine/gearbox assembly.

WARNING

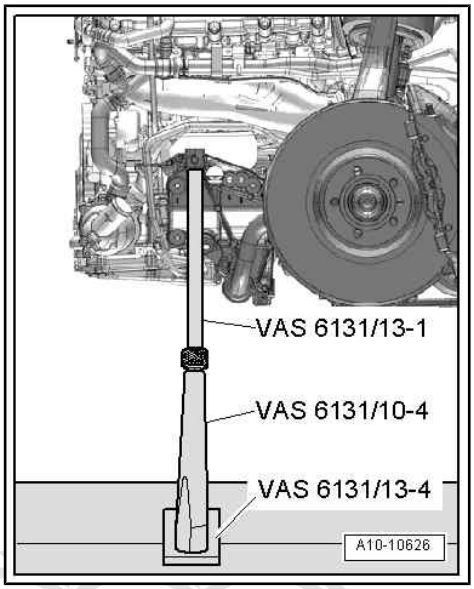
Accident risk if subframe mountings are detached.

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

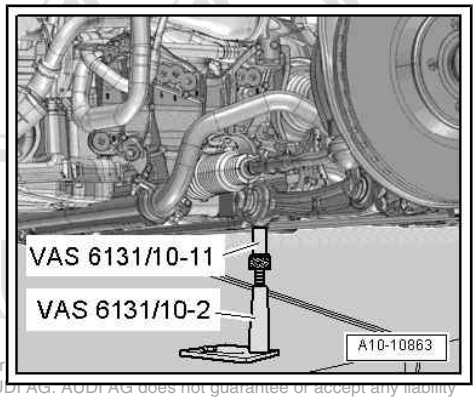
– Remove subframe bolts -1- on both sides.



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

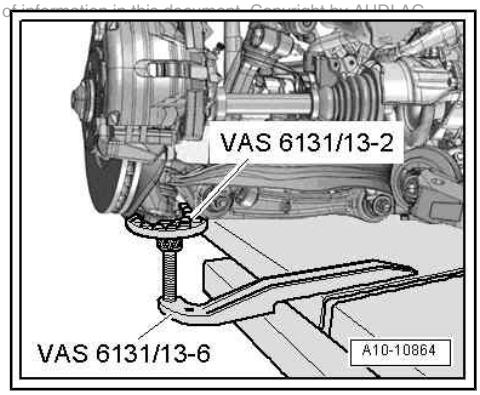


– Position support elements from -VAS 6131/10- (rear left and right) at front attachment points of subframe cross brace as shown.

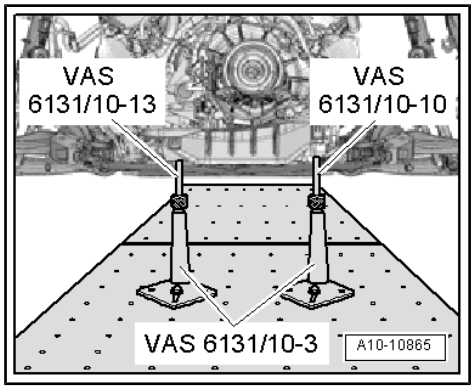


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– Position support elements from -VAS 6131/13- under left and right wheel bearing housings as shown.



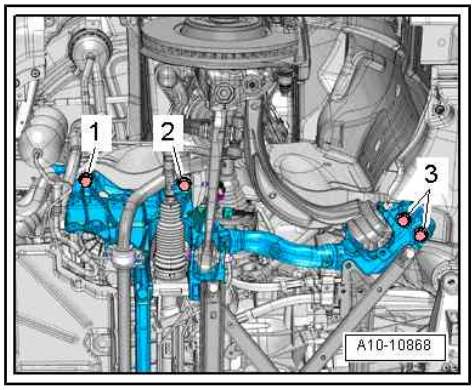
– Detach retaining clips for noise insulation from cross member.
– Position support elements from -VAS 6131/10- at rear of cross member on both sides, as shown in illustration.
– Turn all spindles for support elements upwards until all locating lugs make contact with mounting points.
– Tighten base plates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



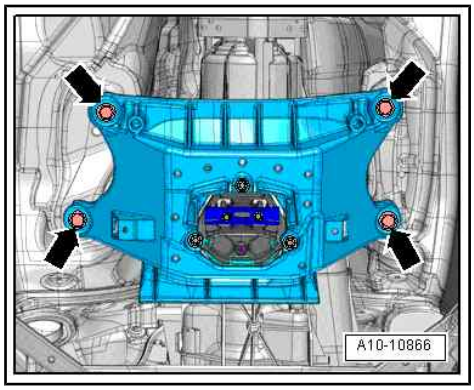
– Mark installation position of subframe and tunnel cross member on longitudinal members with felt-tip pen.
– Unscrew subframe bolts -2- and -3- on both sides in several stages and in diagonal sequence.

Note

Disregard -item 1-.

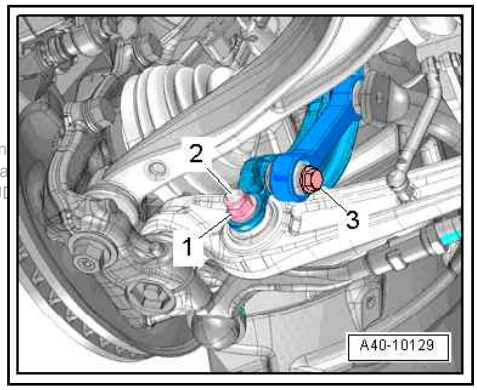


– Remove bolts -arrows- on tunnel cross member.



A5 up to vehicle identification no. 8T-8-011200:

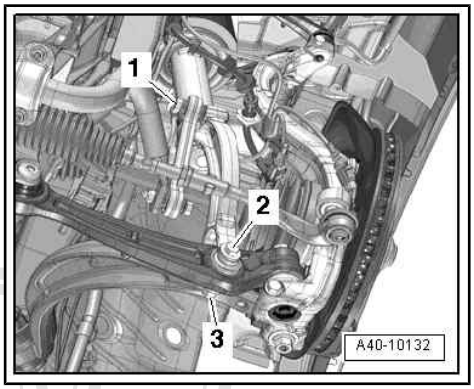
– Remove bolt -2- on both sides.



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A4 (all), A5 from vehicle identification no. 8T-8-011201 onwards:

– Remove bolt -2- on both sides.



All vehicles (continued):

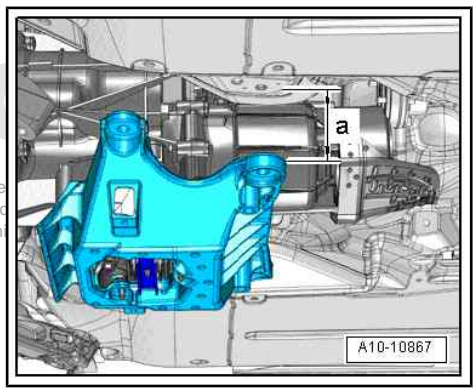
Caution

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

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

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

• Dimension -a- = 100 mm (maximum).

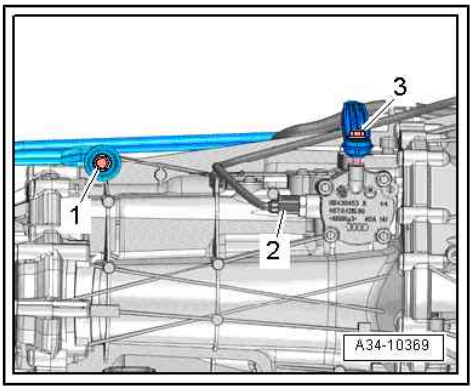


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– Remove bolts -1- and -3- for selector rod and push rod.

Note

Disregard -item 2-.



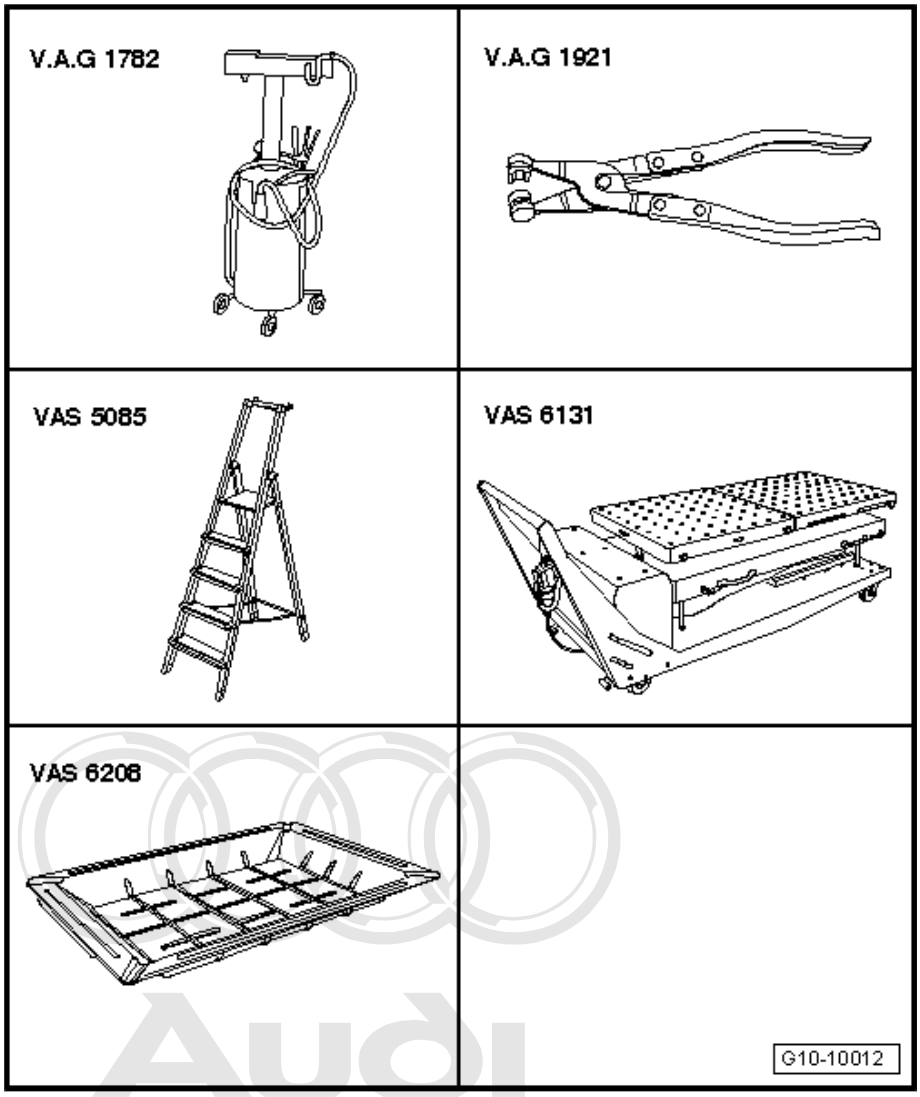
– Lower engine/gearbox assembly further.

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

1.1.2 Removing engine - vehicles with multitronic gearbox 0AW

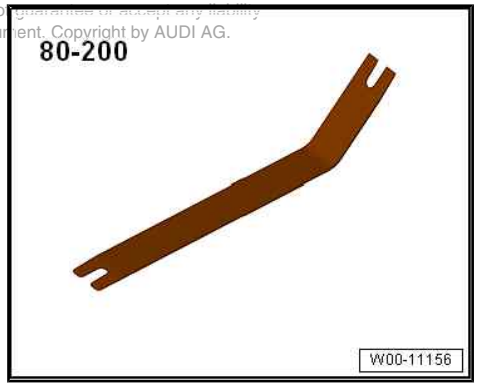
Special tools and workshop equipment required

- Used oil collection and extraction unit - V.A.G 1782-
- Hose clip pliers - V.A.G 1921-
- Stepladder - VAS 5085-
- Scissor-type assembly platform - VAS 6131 A- with support set for Audi - VAS 6131/10- , support set -VAS 6131/11- and supplementary set -VAS 6131/13-
- Drip tray for workshop hoist - VAS 6208-

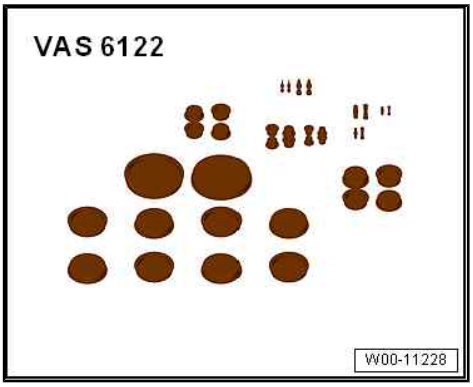


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- Removal lever - 80 - 200-



- Engine bung set - VAS 6122-



Note

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

Procedure

WARNING

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

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

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

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

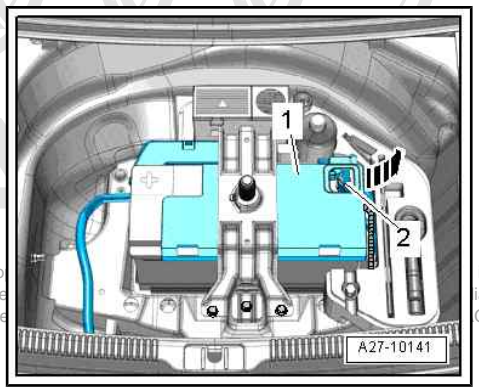
– Reduce fuel pressure in high-pressure section of injection system ⇒ page 314 .

– 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 and take out ignition key.

– 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; Rep. gr. 87 ; Refrigerant circuit .

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

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– Pull off engine cover panels -arrows-.



WARNING

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

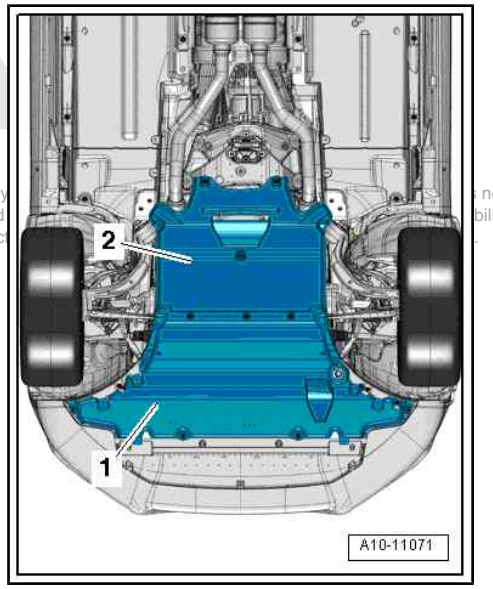
- *The cooling system is under pressure when the engine is hot.*
- *To allow pressure to dissipate, cover filler cap on coolant expansion tank with cloth and open carefully.*

– Open filler cap on coolant expansion tank.

– Remove both front wheels.

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

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

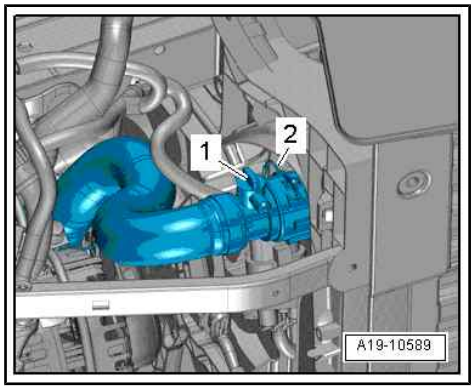


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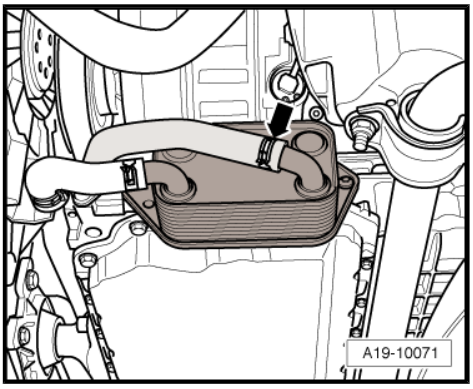
– Place drip tray for workshop hoist - VAS 6208- beneath engine.

– Remove drain plug -1- and drain off coolant.

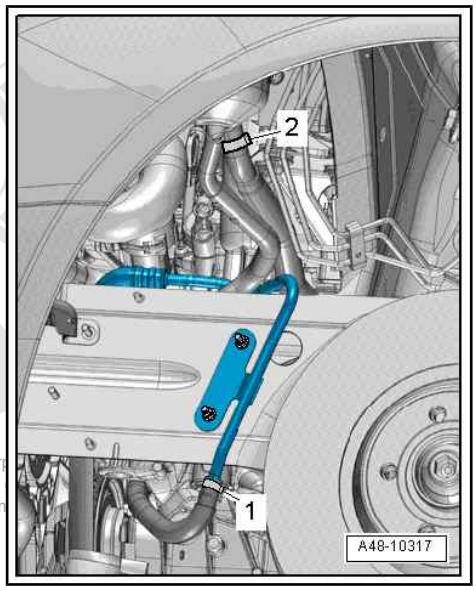
– Lift retaining clip -2- and disconnect coolant hose from radiator.



– Disconnect coolant hose -arrow- from engine oil cooler and drain off remaining coolant.

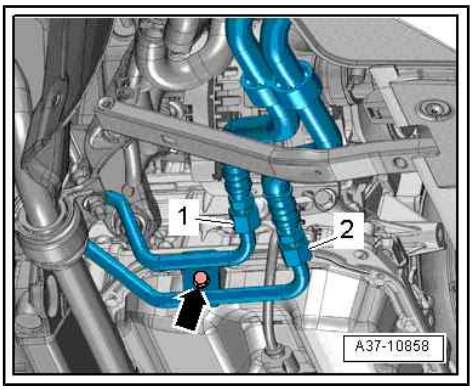


– Position used oil collection and extraction unit - V.A.G 1782- below connection point.
– Disconnect supply hose -2- and return hose -1- for power steering hydraulic fluid in front left wheel housing and move clear.
– Seal off open pipes/lines and connections with clean plugs from engine bung set -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



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– Position used oil collection and extraction unit - V.A.G 1782- below connection point.
– Mark position of ATF lines -1- and -2- for re-installation and disconnect ATF lines.
– Seal off open pipes/lines and connections with clean plugs from engine bung set - VAS 6122- .

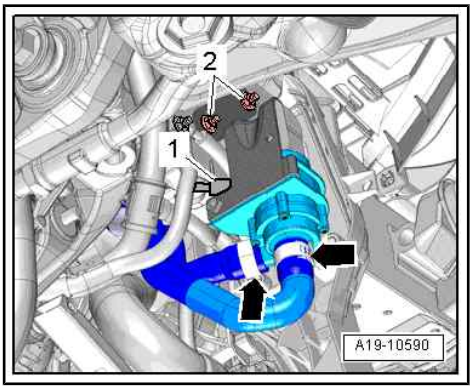


Note

Disregard -arrow-.

Vehicles with coolant circulation pump - V50- :

– Unplug electrical connector -1-.
– Place drip tray for workshop hoist - VAS 6208- beneath engine.
– Disconnect coolant hose from continued coolant circulation pump - V50- -right arrow-.



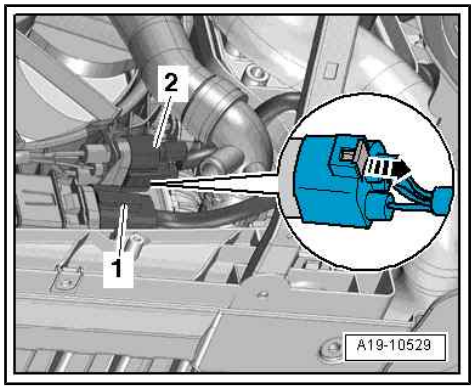
Note

Disregard -item 2- and -left arrow-.

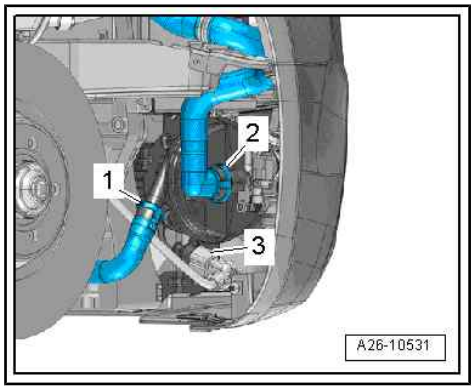
All vehicles (continued):

– Unplug electrical connectors -1- and, if fitted, -2- for radiator fan (push retainer to the rear -arrow- and press down release catch).

– Move electrical wiring clear.



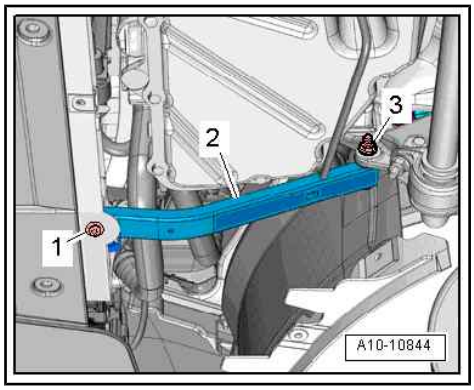
– If fitted, detach electrical connector -3- at secondary air pump motor - V101- and move electrical wire clear.



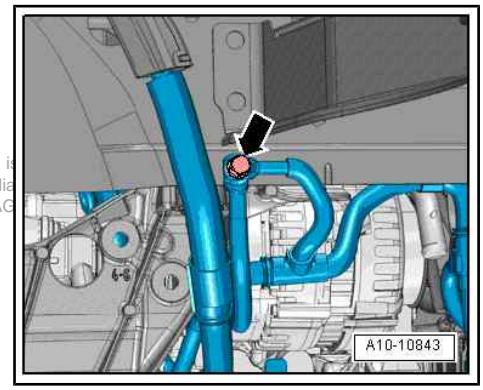
Note

Disregard -items 1, 2-.

– Remove bolt -1- and nut -3- on both sides and detach strut -2- for lock carrier.



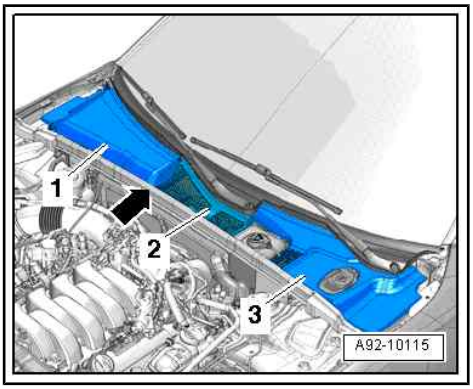
– Unscrew nut -arrow- on longitudinal member (right-side) and move earth cables clear.



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– Remove seal -arrow-.

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

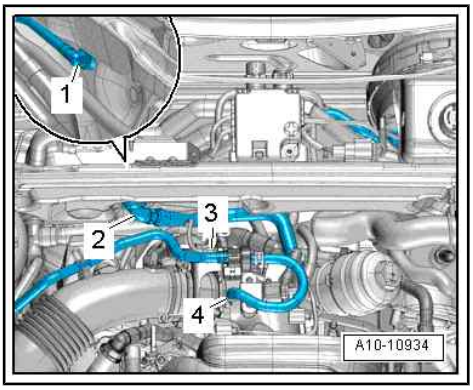


– Disconnect vacuum hose -1- on rear side of plenum chamber partition panel and detach vacuum connection -2- from plenum chamber partition panel.

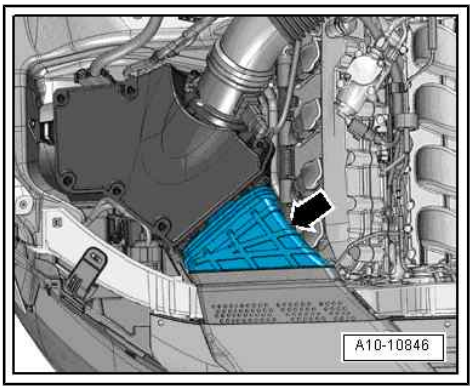
– Move fuel line and line leading to activated charcoal filter clear at air pipe.

– Unplug electrical connector -3- at activated charcoal filter solenoid valve 1 - N80- and detach vacuum hose -4-.

– Detach activated charcoal filter solenoid valve 1 - N80- from bracket and move it clear to the side with hoses still attached.



– Remove air duct -arrow-.



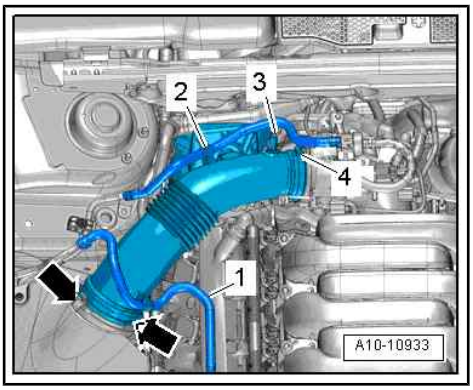
– Move fuel hose -1- clear at air pipe.

– Disconnect vacuum hose -3- from connection on air pipe.

– Remove air pipe. To do so, release hose clip -4- and clamps -arrows-.

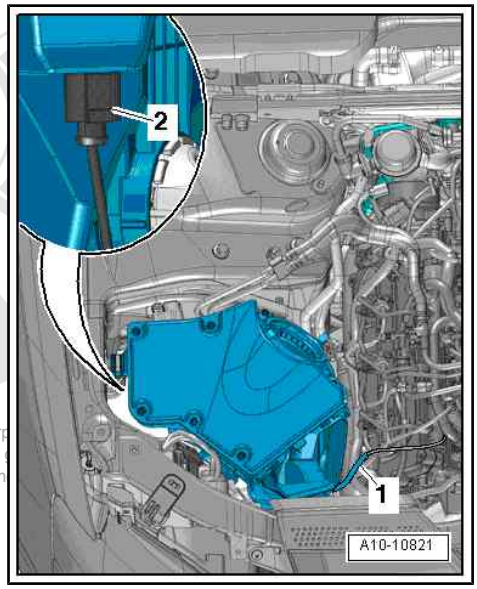
Note

Disregard -item 2-.



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– Disconnect vacuum line -1-.
– Detach air cleaner housing and, if fitted, unplug electrical connector -2- at variable intake manifold change-over valve - N335- on reverse side of air cleaner.

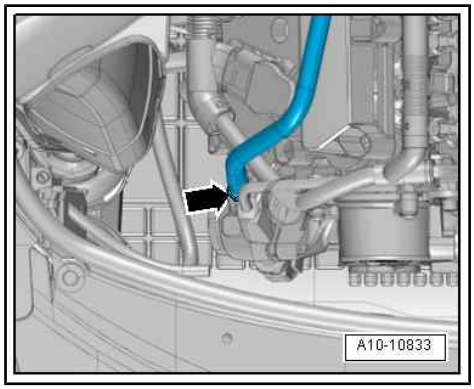


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WARNING

Risk of injury caused by fuel.

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



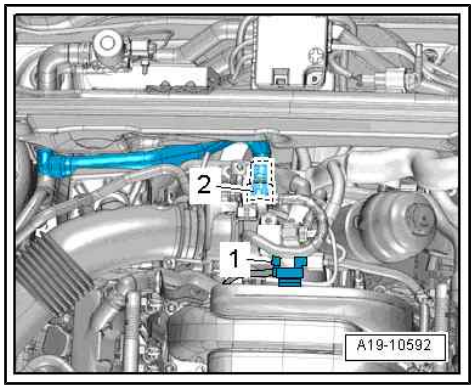
Caution

Take care to keep components clean.

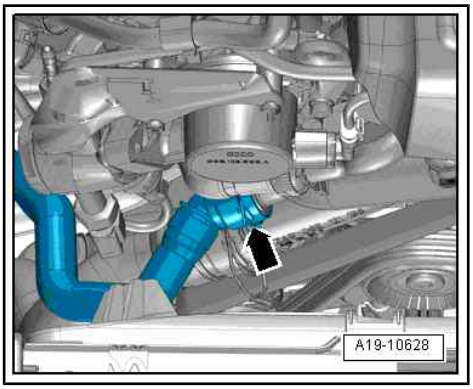
- *Observe rules for cleanliness when working on the fuel supply system ⇒ page 8 .*

– Disconnect fuel supply hose from high-pressure pump -arrow- and move clear to one side.
– Seal off open pipes/lines and connections with clean plugs from engine bung set - VAS 6122- .

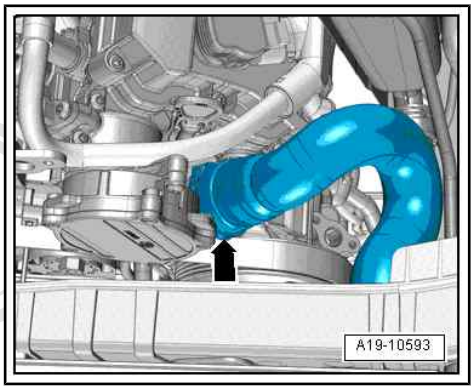
– If fitted, disconnect vacuum hose -1- and move clear.
– Lift retaining clip and detach coolant hose -2- from coolant pipe (top).



– On vehicles without coolant circulation pump - V50- and with auxiliary heater, lift retaining clip -arrow- and detach coolant hose at front right of coolant pipe (front).

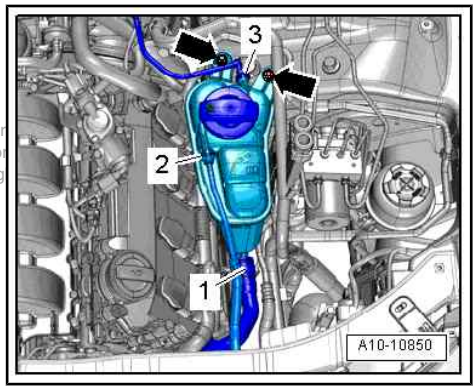


– Lift retaining clip -arrow- and detach coolant hose from coolant pipe (front).



– Disconnect coolant hose -3- from coolant expansion tank and move clear.

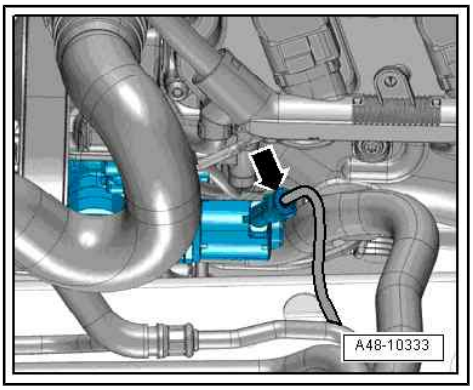
– Remove bolts -arrows-, unplug electrical connector at coolant shortage indicator switch - F66- and move expansion tank to one side with coolant hoses -1- and -2- attached.



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– If fitted, unplug electrical connector -arrow- at power steering pump.

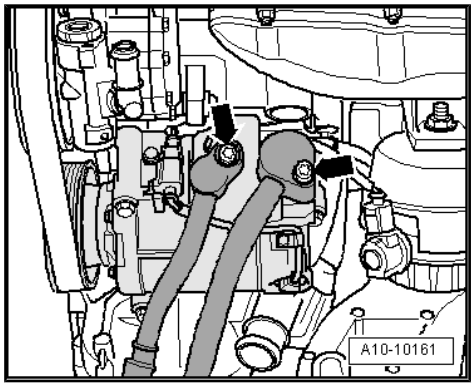
– Press hydraulic fluid hose down slightly.



Caution

Danger of damage to refrigerant lines and hoses.

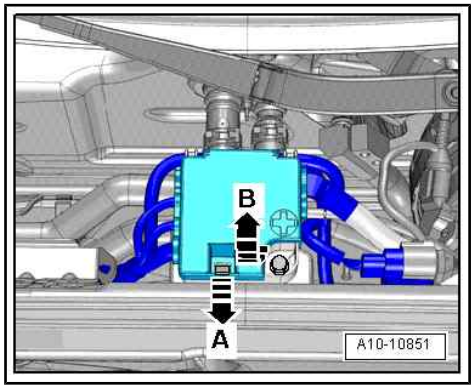
- *Do NOT stretch, kink or bend refrigerant lines and hoses.*



– Remove bolts -arrows- and disconnect refrigerant lines from A/C compressor.

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

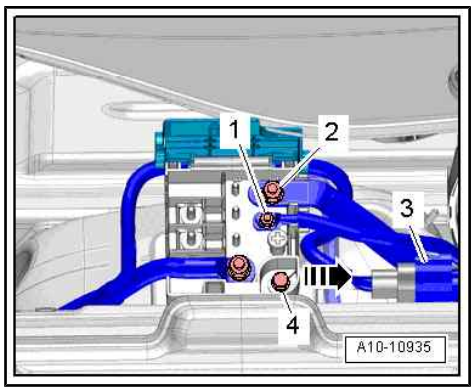
– Release retainer -arrow A- and open cover -arrow B-.



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

– Detach electrical connector -3- from bracket and unplug.

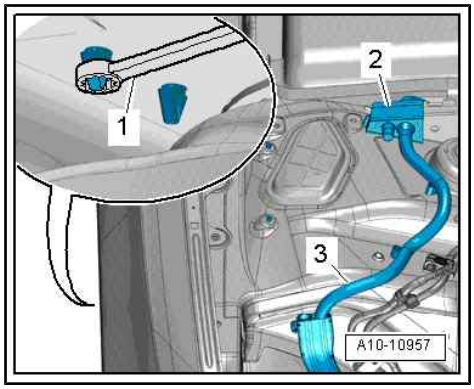
– Remove bolt -4- and detach terminal 30 wiring junction 2 - TV22- from body brace -arrow-.



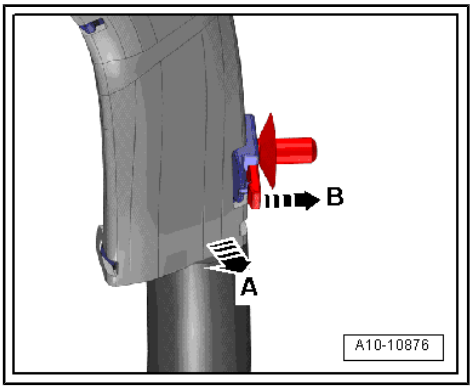
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– Working from wheel housing, release catches using a 5.5 mm ring spanner -item 1- and remove wiring protector -2- from above.

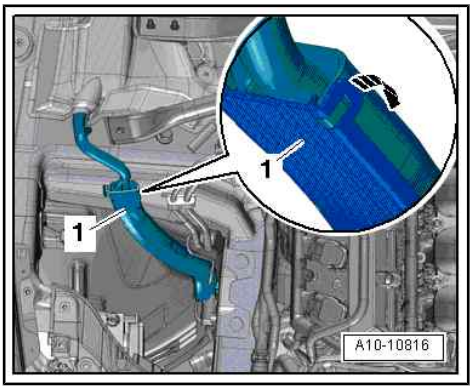
– Release wiring harness -3- leading to alternator and starter using removal lever - 80 - 200- and move clear.



– Wiring duct (version 1): release catch -arrow B- and move wiring duct clear by pulling it towards front -arrow A-.

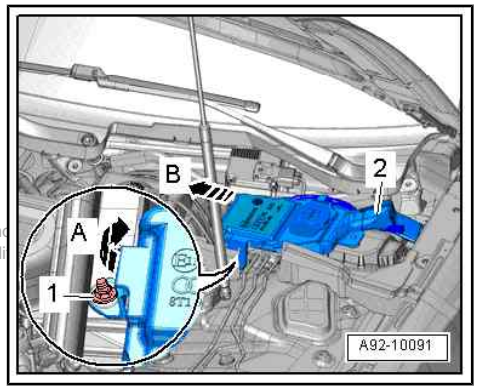


– Wiring duct (version 2): release catch -arrow- to open wiring duct -1- and move wiring harness clear.



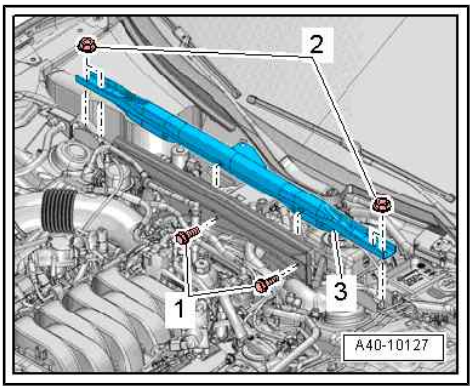
– Remove nut -1- and swivel filler neck -2- for washer fluid reservoir slightly upwards -arrow A-.

– Pull filler neck with filler pipe out of washer fluid reservoir and through opening in body -arrow B-.

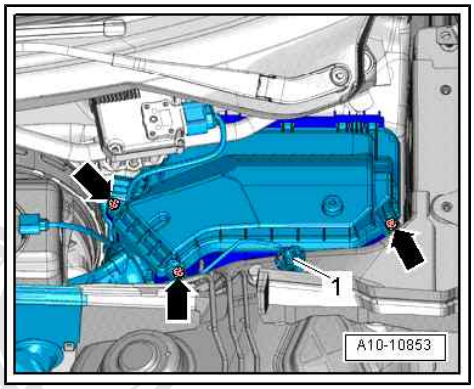


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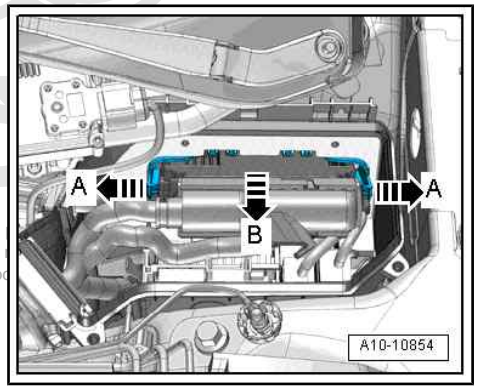
– Remove bolts -1- and nuts -2- and detach body brace -3-.



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

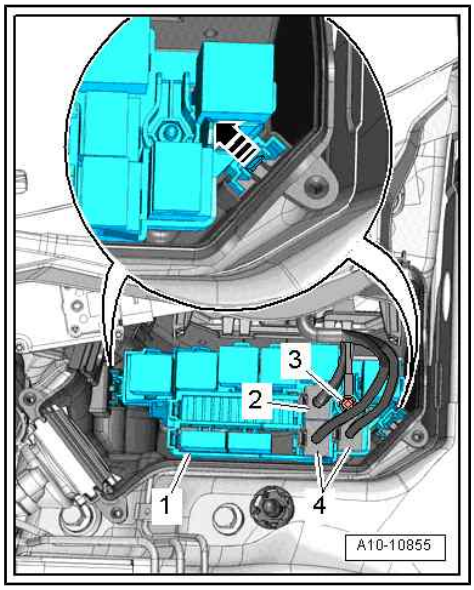


– Release catches -arrows A- and take out engine control unit -arrow B-.

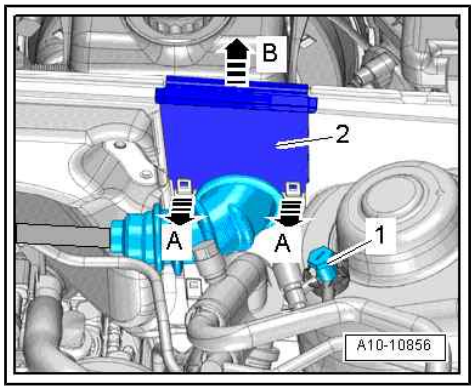


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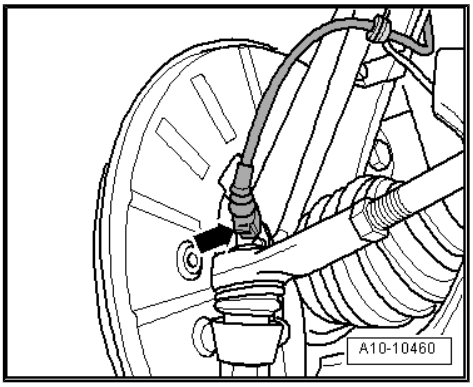
– If fitted, unplug electrical connector -2-.
– Unplug electrical connectors -4- and unscrew nut -3- for wiring.
– Release catches -arrow- and detach relay carrier with fuse holder -1-.
– Disengage engine wiring harness at electronics box in engine compartment and move clear.



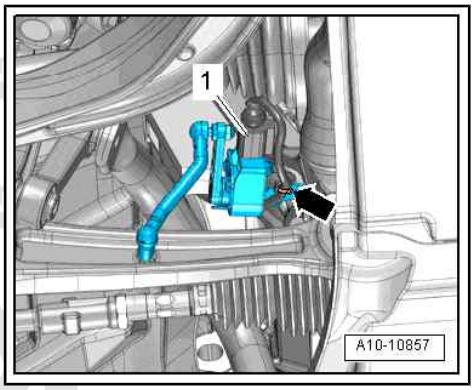
– Release catches -arrows A- and lift off wiring protector -2- -arrow B-.
– Unscrew earth stud -1- and move wiring harness clear.
– Place wiring harness on engine and secure engine control unit to prevent it from dropping.



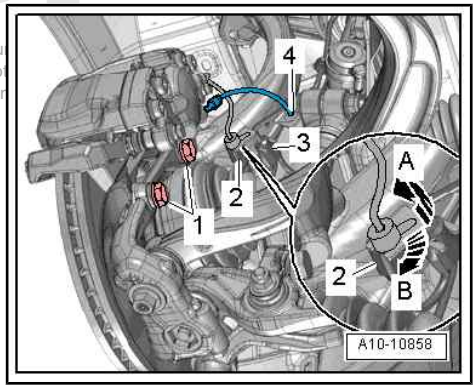
– Unplug electrical connectors -arrow- at front wheel speed sensors on both sides.



– Unplug electrical connector -1- from front left vehicle level sender - G78- and front right vehicle level sender - G289- and move wiring clear -arrow-.



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

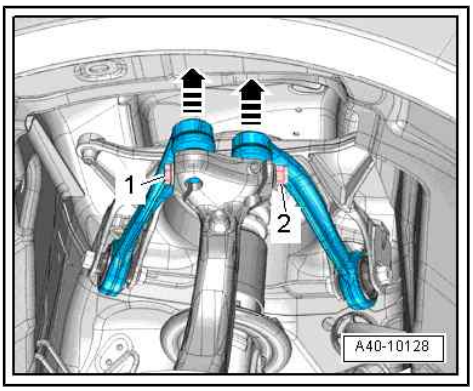


Caution

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.



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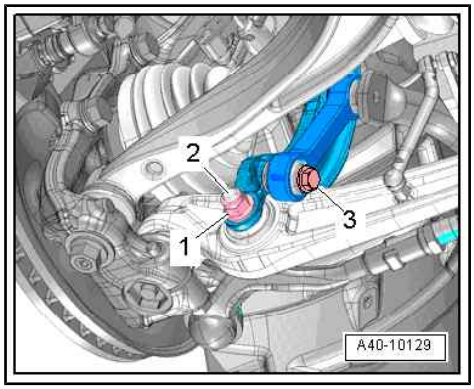
A5 up to vehicle identification no. 8T-8-011200:

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

– Remove nut -1- on both sides.

Note

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



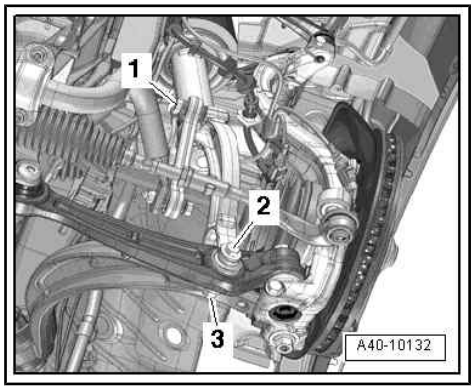
A4 (all), A5 from vehicle identification no. 8T-8-011201 onwards:

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

– Remove nut -3- on both sides.

Note

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



All vehicles (continued):

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.***

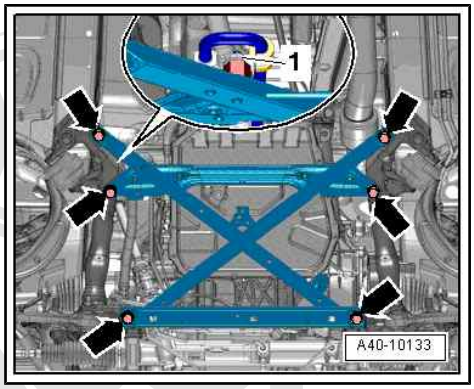
A4 (all), A5 Coupé:

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

– Remove bolts -arrows- and detach subframe cross brace.

Note

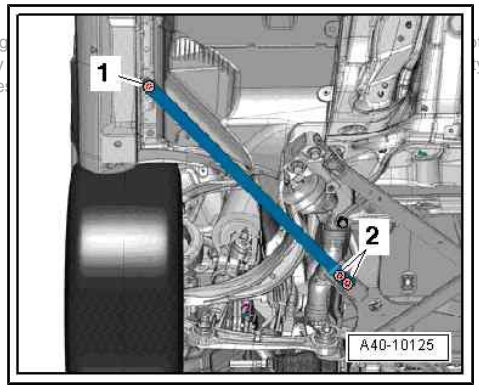
Illustration shows the installation position on a vehicle with dynamic steering.



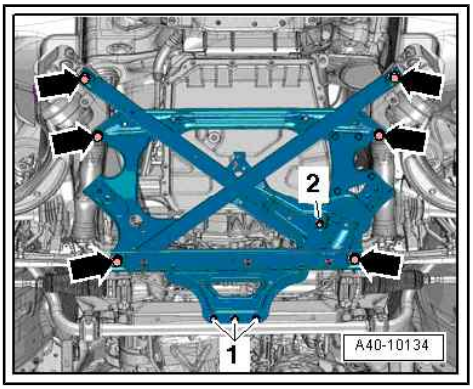
A5 Cabriolet:

– Remove bolts -1- and -2- on both sides and detach strut.

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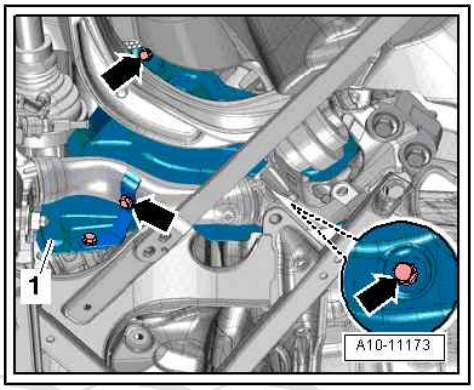


– Remove bolt -2- for power steering hydraulic line.
– Remove bolts -1- and -arrows- and detach subframe cross brace.

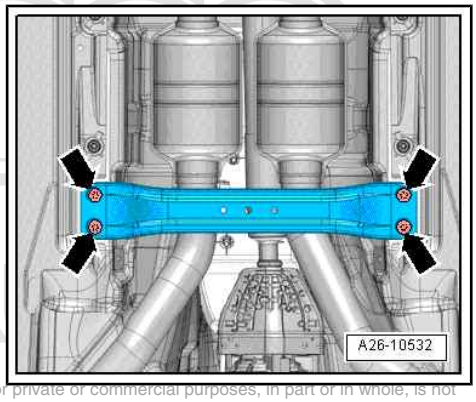


All vehicles (continued):

– If fitted, remove bolts -arrows- on both sides and detach heat shield -1-.

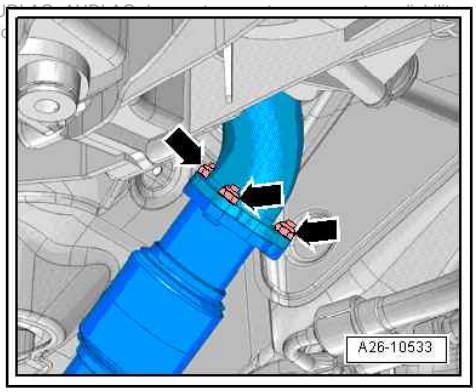


– If fitted, remove bolts -arrows- and detach front cross member.

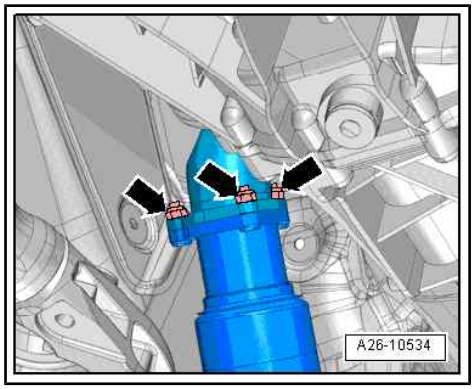


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with respect to the correctness

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



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



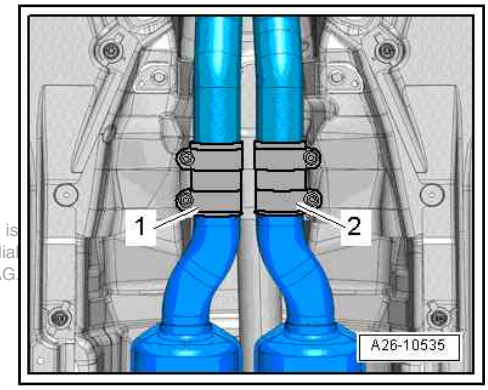
Caution

Risk of damage to flexible joints in front silencer.

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

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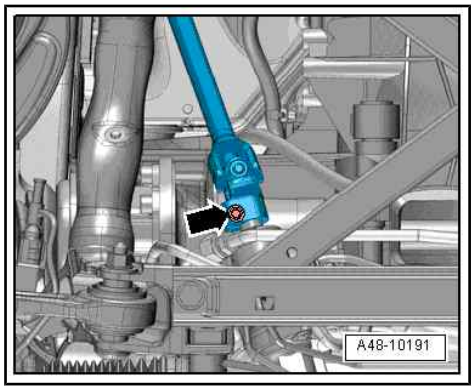
– Loosen and push back clamps -1- and -2- and detach front silencers on both sides.



Caution

Risk of damage to coil connector for airbag.

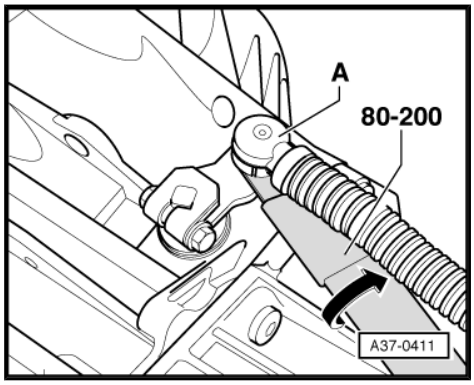
- *Make sure that front wheels are in straight-ahead position before removing universal joint from steering rack.*
- *Do not alter position of steering wheel and steering rack (locate steering wheel with adhesive tape if necessary).*



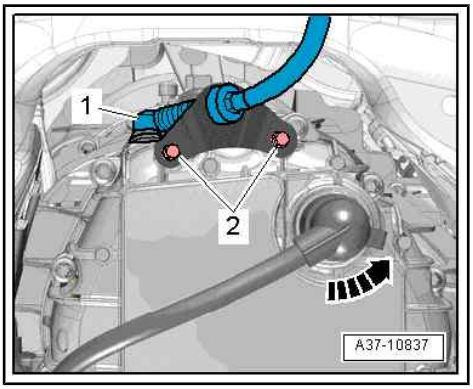
– Remove bolt -arrow- for universal joint ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Exploded view - steering column .

– Separate universal joint from steering rack and move clear to the top as far as possible.

– Pry ball socket -A- of selector lever cable off gearbox selector lever -arrow- using removal lever - 80 - 200- .



– Remove bolts -2- for cable support bracket.



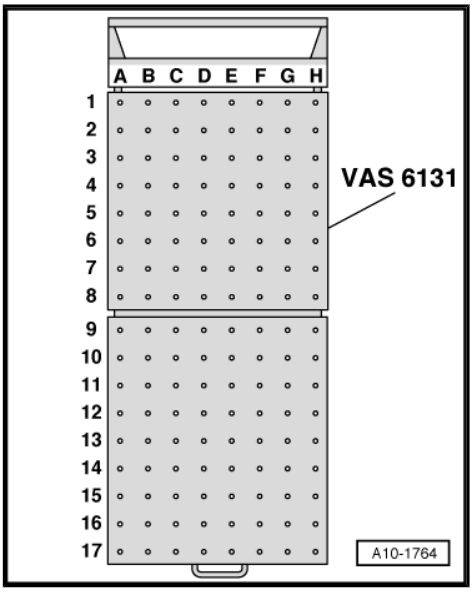
Note

- *Take care not to bend or kink selector lever cable.*
- *Disregard -item 1- and -arrow-.*

Set up the scissor-type assembly platform as follows:

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

Platform coordinates	Parts of support set for Audi - VAS 6131/10- and supplementary set -VAS 6131/13-			
B4	/13-4	/10-4	/10-5	/13-1
G4	/13-4	/10-4	/10-5	/13-1
B6	/10-1	/10-2	/10-5	/10-11
G6	/10-1	/10-2	/10-5	/10-11
A8+C8	/13-6	–	–	/13-2
F8+H8	/13-6	–	–	/13-2
C13	/10-1	/10-4	/10-5	/10-13
F13	/10-1	/10-4	/10-5	/10-10



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– 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).

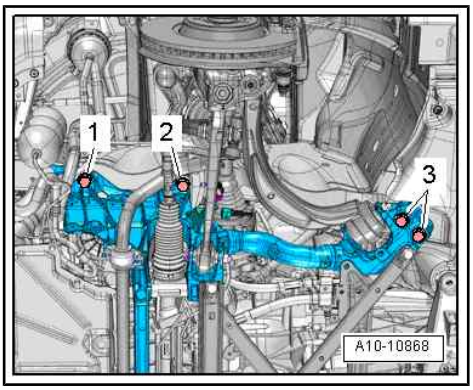
– Position scissor-type assembly platform - VAS 6131 A- below engine/gearbox assembly.

WARNING

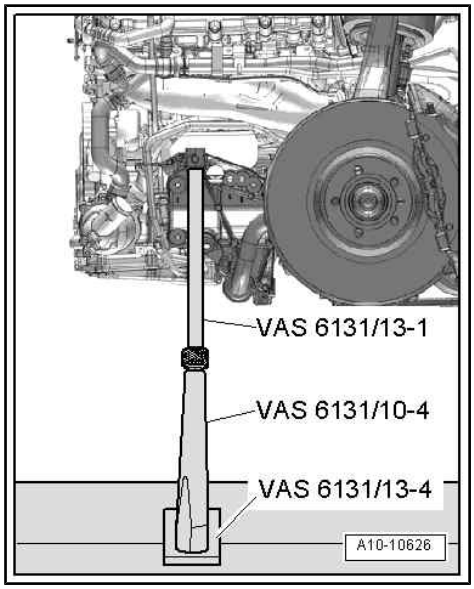
Accident risk if subframe mountings are detached.

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

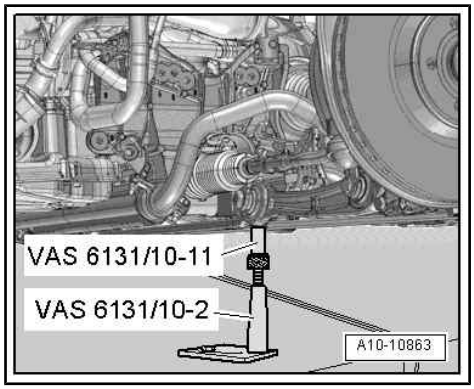
– Remove subframe bolts -1- on both sides.



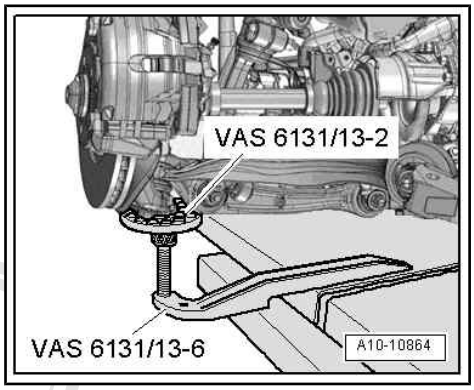
– Position support elements from -VAS 6131/10- and -VAS 6131/13- at front left and right of subframe as shown.
– Make sure that threaded spindles are screwed in completely.



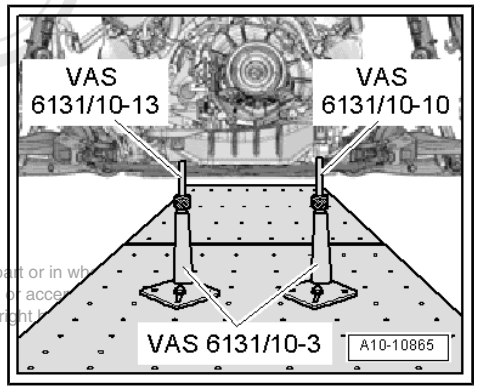
– Position support elements from -VAS 6131/10- (rear left and right) at front attachment points of subframe cross brace as shown.



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

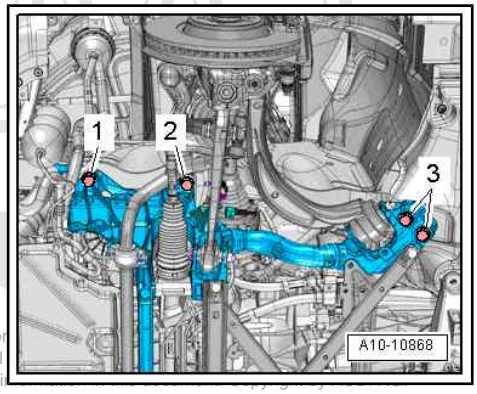


– Detach retaining clips for noise insulation from cross member.
– Position support elements from -VAS 6131/10- at rear of cross member on both sides, as shown in illustration.
– Turn all spindles for support elements upwards until all locating lugs make contact with mounting points.
– Tighten base plates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



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

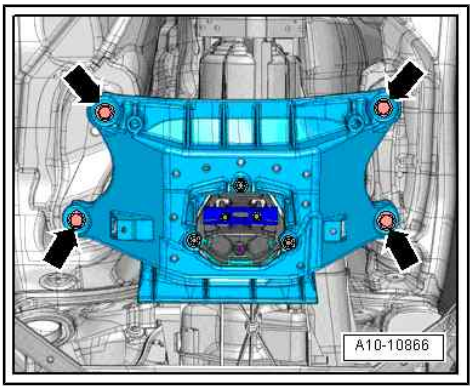


Note

Disregard -item 1-.

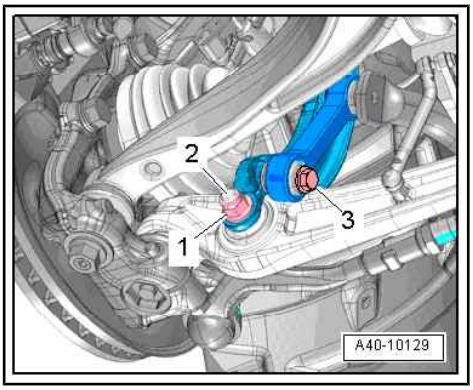
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– Remove bolts -arrows- on tunnel cross member.



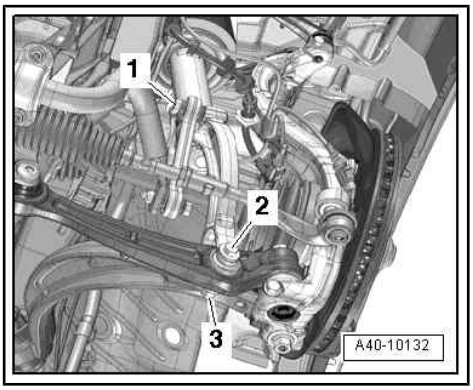
A5 up to vehicle identification no. 8T-8-011200:

– Remove bolt -2- on both sides.



A4 (all), A5 from vehicle identification no. 8T-8-011201 onwards:

– Remove bolt -2- on both sides.



All vehicles (continued):

Caution

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

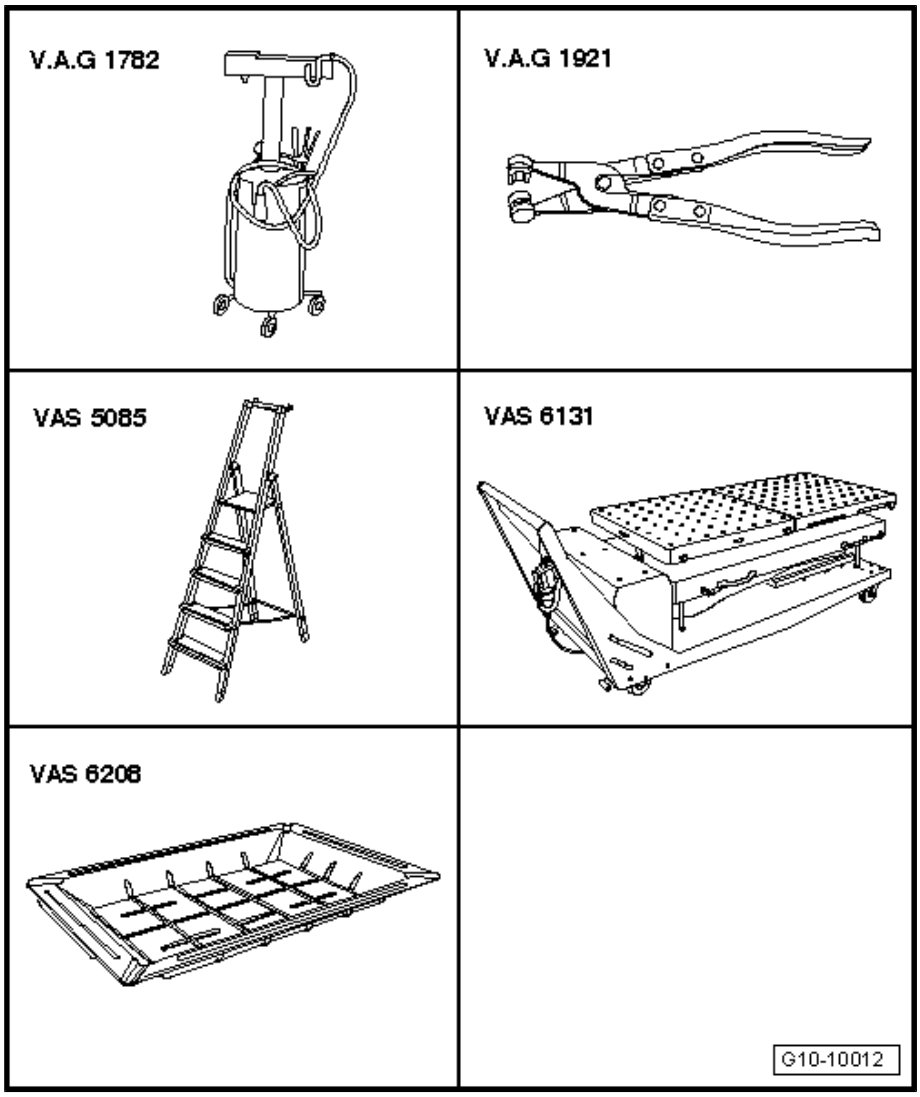
- ***Check that all hoses and wiring connections between engine, gearbox, subframe and body have been detached.***
- ***Carefully guide out engine/gearbox assembly with subframe from engine compartment when lowering.***

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

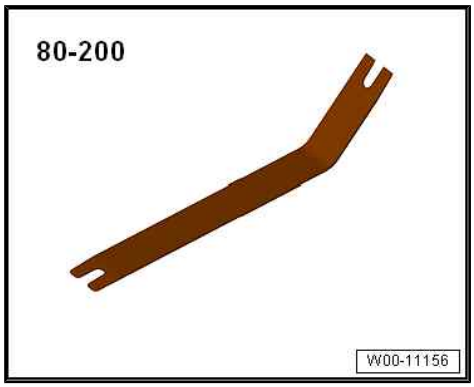
1.1.3 Removing engine - vehicles with automatic gearbox 0B6

Special tools and workshop equipment required

- Used oil collection and extraction unit - V.A.G 1782-
- Hose clip pliers - V.A.G 1921-
- Stepladder - VAS 5085-
- Scissor-type assembly platform - VAS 6131 A- with support set for Audi - VAS 6131/10- , support set -VAS 6131/11- and supplementary set -VAS 6131/13-
- Drip tray for workshop hoist - VAS 6208-

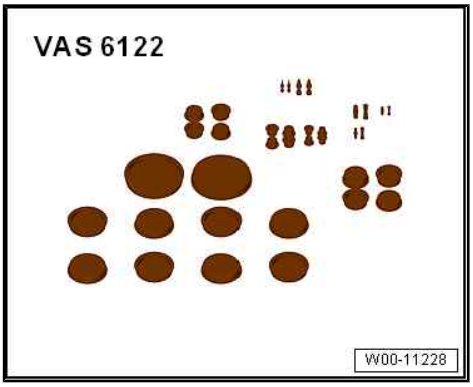


- Removal lever - 80 - 200-

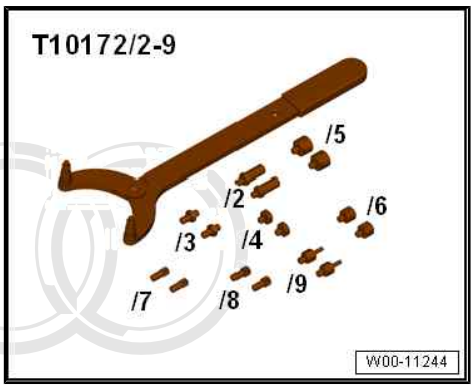


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- Engine bung set - VAS 6122-



- Counterhold tool - T10172/2-9- with -T10172/5- for vehicles with four-wheel drive



Audi
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Note

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

Procedure

WARNING

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

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

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

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

– Reduce fuel pressure in high-pressure section of injection system ⇒ page 314 .

– Set front wheels to straight-ahead position.

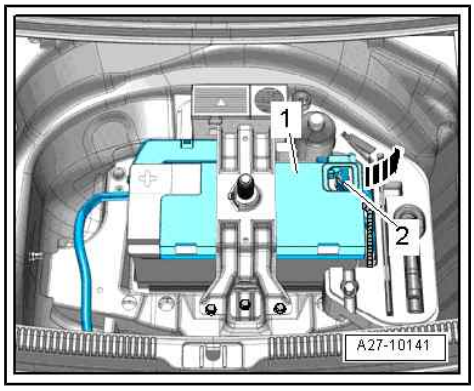
Note

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

Caution

Electronic components are susceptible to damage.

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



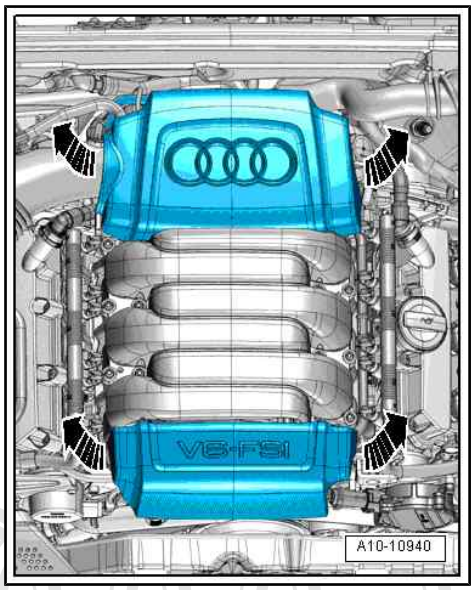
– Switch off ignition and take out ignition key.

– 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; Rep. gr. 87 ; Refrigerant circuit .

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

– Pull off engine cover panels -arrows-.



WARNING

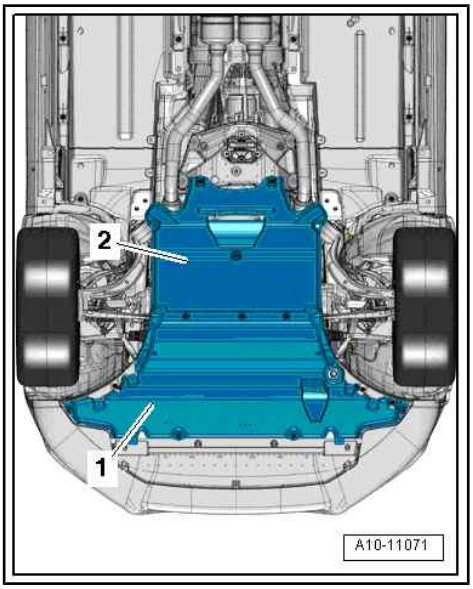
Hot steam/hot coolant can escape - risk of scalding.

- *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 on coolant expansion tank.

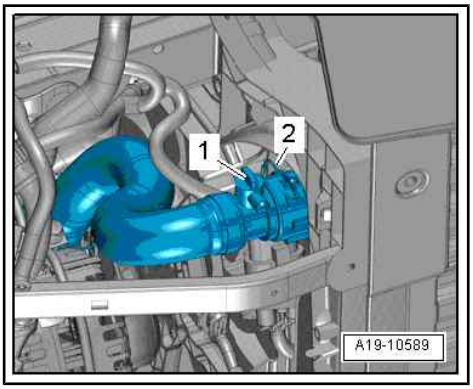
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– Remove both front wheels.
– Remove wheel spoilers (front) on both sides ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liner; Exploded view - wheel housing liner (front) .
– Remove noise insulation -1- and -2- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

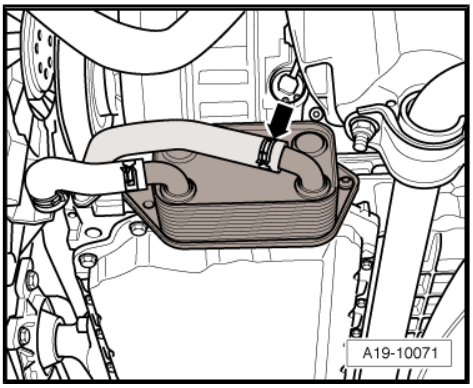


– Place drip tray for workshop hoist - VAS 6208- beneath engine.
– Remove drain plug -1- and drain off coolant.
– Lift retaining clip -2- and disconnect coolant hose from radiator.

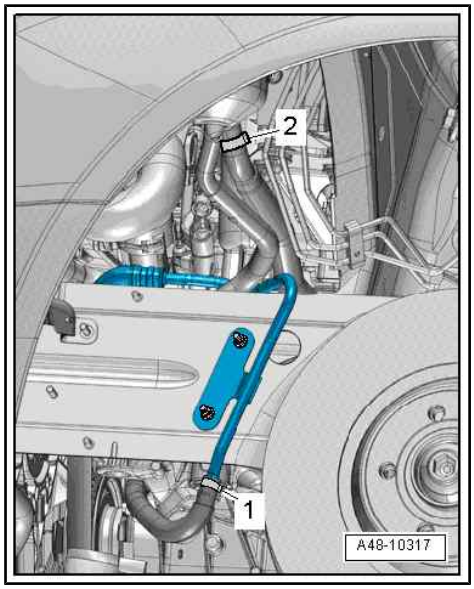
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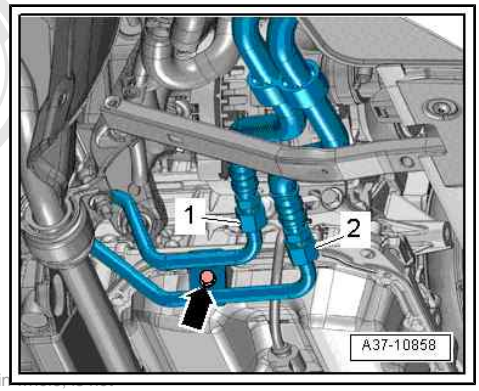
– Release hose clip -arrow-, disconnect coolant hose from engine oil cooler and drain off coolant.



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



– Position used oil collection and extraction unit - V.A.G 1782- below connection point.
– Mark position of ATF lines -1- and -2- for re-installation and disconnect ATF lines.
– Seal off open pipes/lines and connections with clean plugs from engine bung set - VAS 6122- .



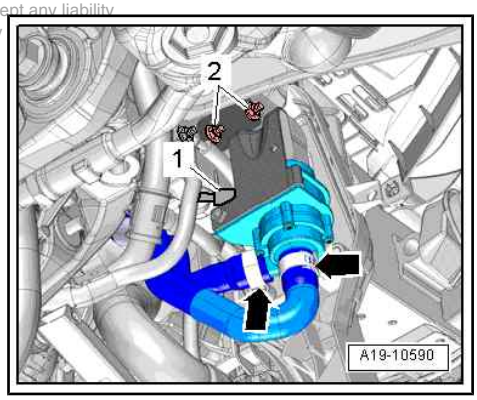
Note

Disregard -arrow-.

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Vehicles with coolant circulation pump - V50- :

– Unplug electrical connector -1-.
– Place drip tray for workshop hoist - VAS 6208- beneath engine.
– Disconnect coolant hose from continued coolant circulation pump - V50- -right arrow-.

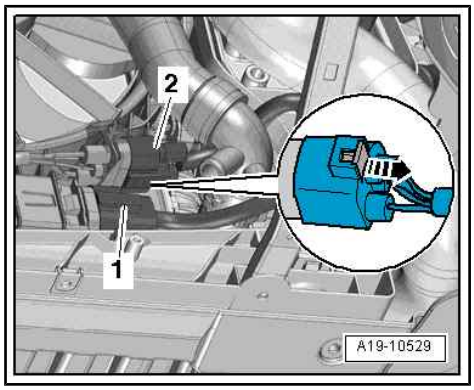


Note

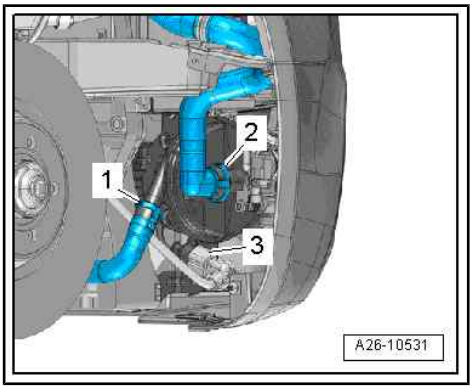
Disregard -item 2- and -left arrow-.

All vehicles (continued):

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



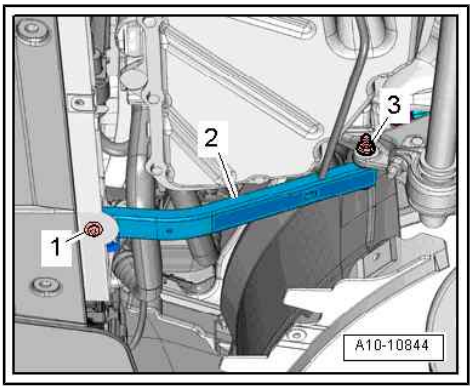
– If fitted, detach electrical connector -3- at secondary air pump motor - V101- and move electrical wire clear.



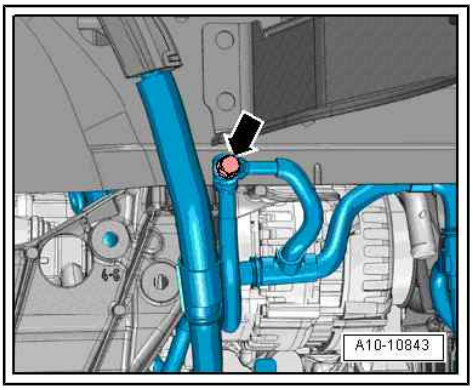
Note

Disregard -items 1, 2-.

– Remove bolt -1- and nut -3- on both sides and detach strut -2- for lock carrier.

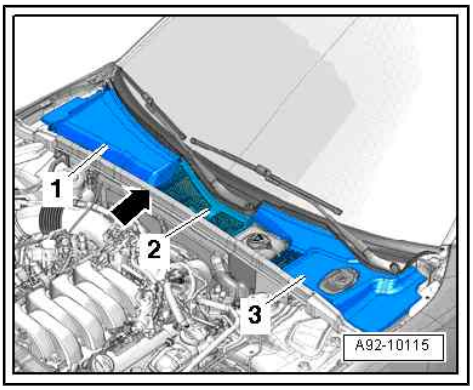


– Unscrew nut -arrow- on longitudinal member (right-side) and move earth cables clear.



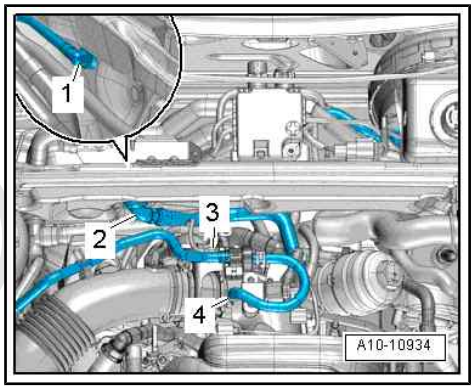
– Remove seal -arrow-.

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



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– Disconnect vacuum hose -1- on rear side of plenum chamber partition panel and detach vacuum connection -2- from plenum chamber partition panel.
– Move fuel line and line leading to activated charcoal filter clear at air pipe.

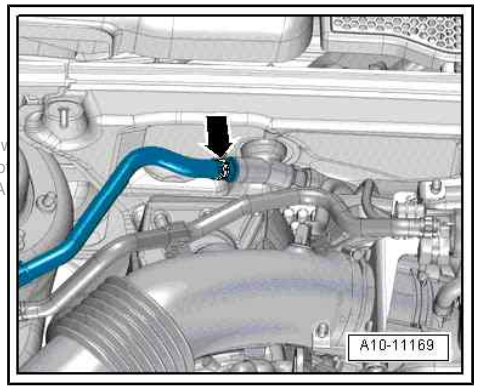


Rest-of-world vehicles:

– Unplug electrical connector -3- at activated charcoal filter solenoid valve 1 - N80- and detach vacuum hose -4-.
– Detach activated charcoal filter solenoid valve 1 - N80- from bracket and move it clear to the side with hoses still attached.

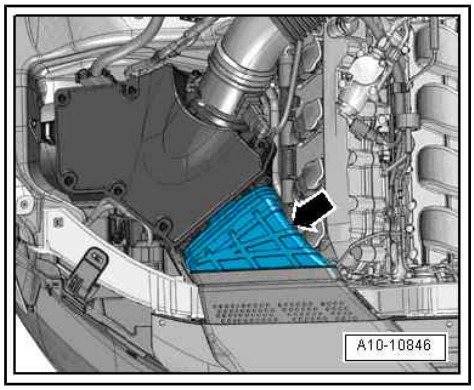
USA models:

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

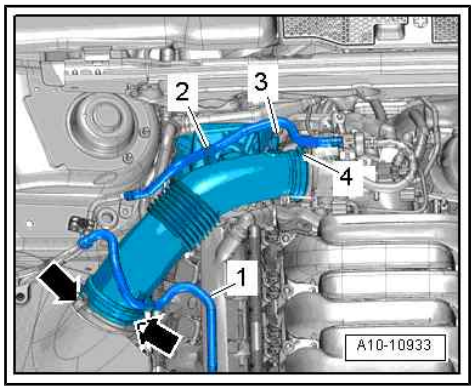


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– Remove air duct -arrow-.



– Move fuel hose -1- clear at air pipe.
– Disconnect vacuum hose -3- from connection on air pipe.
– Remove air pipe. To do so, release hose clip -4- and clamps -arrows-.

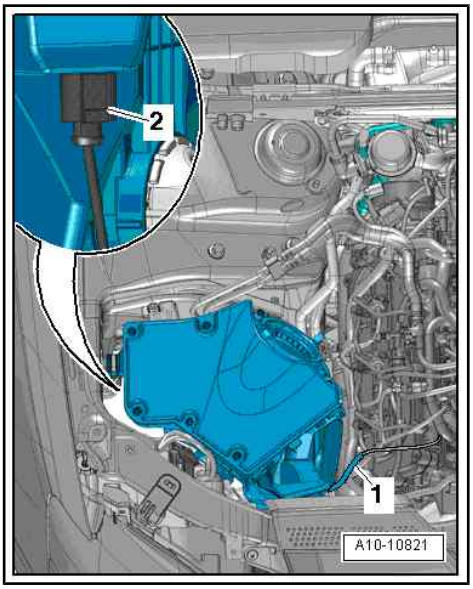


Note

Disregard -item 2-.

– Disconnect vacuum line -1-.

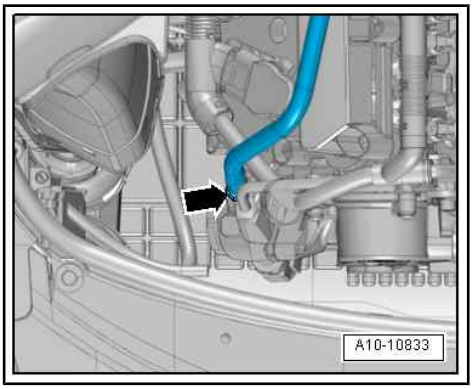
– Detach air cleaner housing and, if fitted, unplug electrical connector -2- at variable intake manifold change-over valve - N335- on reverse side of air cleaner.



WARNING

Risk of injury caused by fuel.

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



Caution

Take care to keep components clean.

- *Observe rules for cleanliness when working on the fuel supply system ⇒ page 8 .*

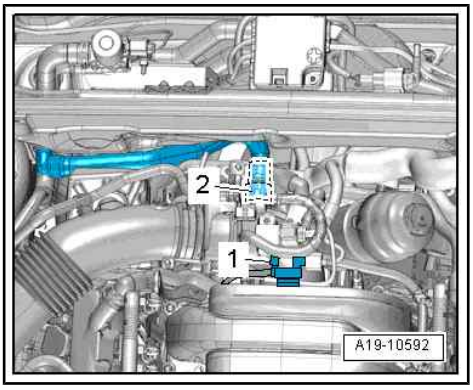
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– Disconnect fuel supply hose from high-pressure pump -arrow- and move clear to one side.

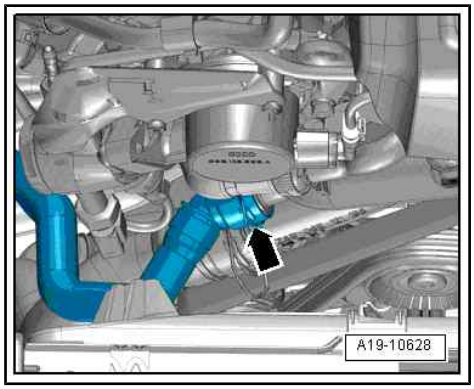
– Seal off open pipes/lines and connections with clean plugs from engine bung set - VAS 6122- .

– If fitted, disconnect vacuum hose -1- and move clear.

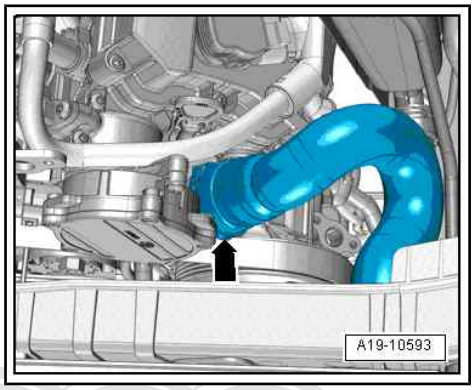
– Lift retaining clip and detach coolant hose -2- from coolant pipe (top).



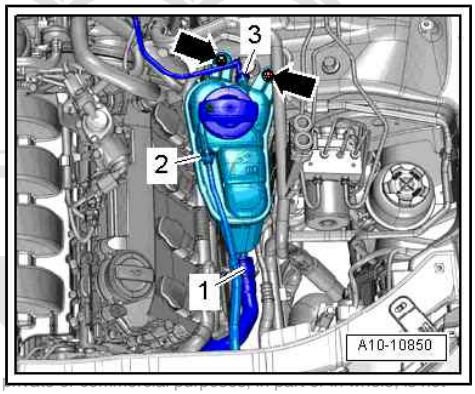
– On vehicles without coolant circulation pump - V50- , lift retaining clip -arrow- and detach coolant hose at front right of coolant pipe (front).



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

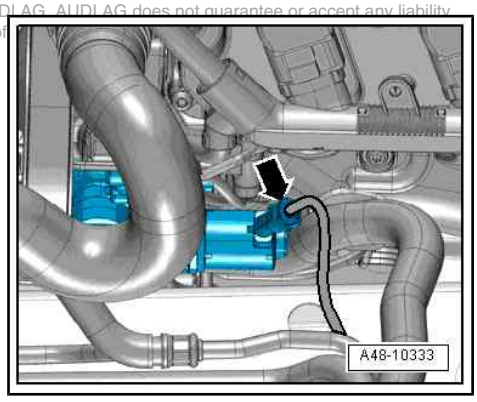


– Disconnect coolant hose -3- from coolant expansion tank and move clear.
– Remove bolts -arrows-, unplug electrical connector at coolant shortage indicator switch - F66- and move expansion tank to one side with coolant hoses -1- and -2- attached.



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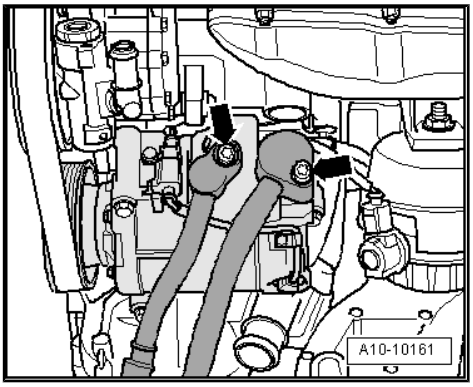
– If fitted, unplug electrical connector -arrow- at power steering pump.
– Press hydraulic fluid hose down slightly.



Caution

Danger of damage to refrigerant lines and hoses.

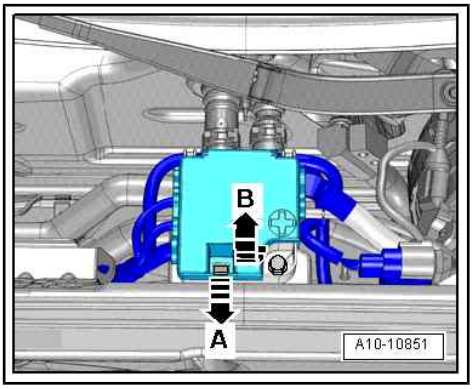
- *Do NOT stretch, kink or bend refrigerant lines and hoses.*



– Remove bolts -arrows- and disconnect refrigerant lines from A/C compressor.

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

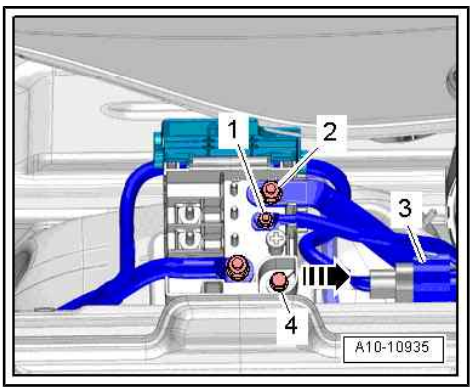
– Release retainer -arrow A- and open cover -arrow B-.



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

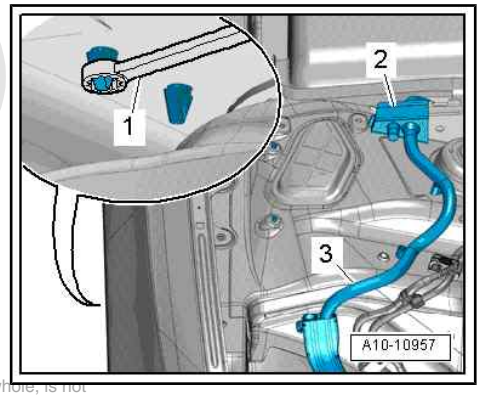
– Detach electrical connector -3- from bracket and unplug.

– Remove bolt -4- and detach terminal 30 wiring junction 2 - TV22- from body brace -arrow-.



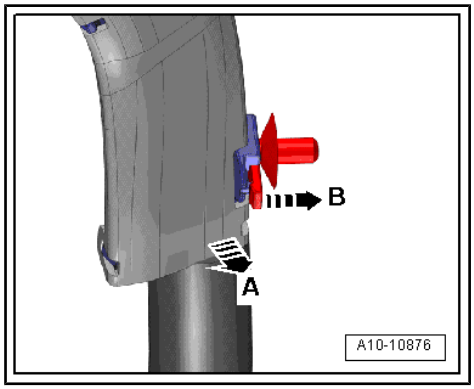
– Working from wheel housing, release catches using a 5.5 mm ring spanner -item 1- and remove wiring protector -2- from above.

– Release wiring harness -3- leading to alternator and starter using removal lever - 80 - 200- and move clear.

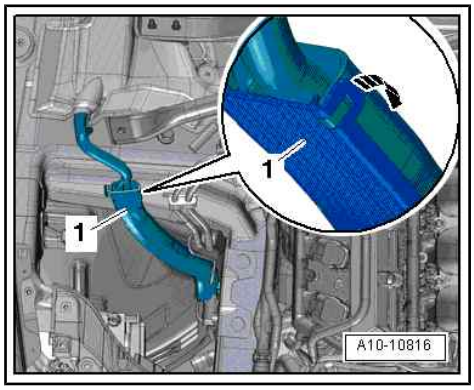


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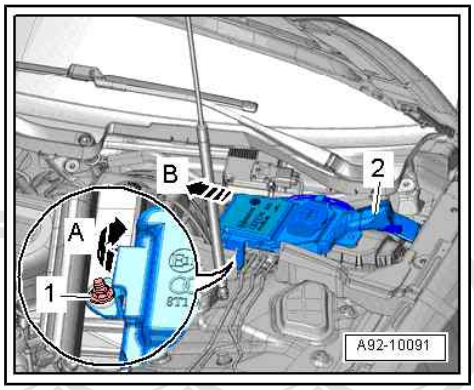
– Wiring duct (version 1): release catch -arrow B- and move wiring duct clear by pulling it towards front -arrow A-.



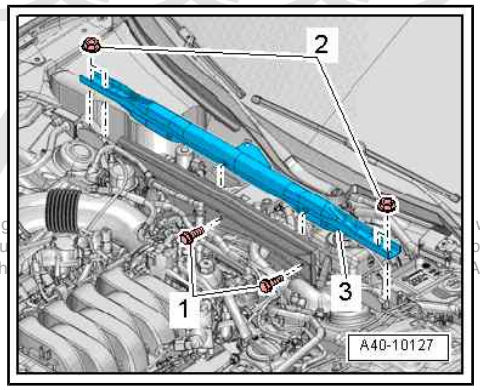
– Wiring duct (version 2): release catch -arrow- to open wiring duct -1- and move wiring harness clear.



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

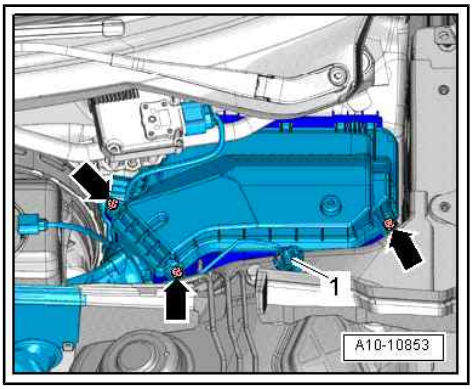


– Remove bolts -1- and nuts -2- and detach body brace -3-.

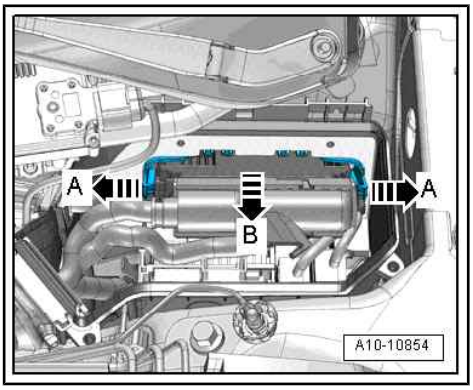


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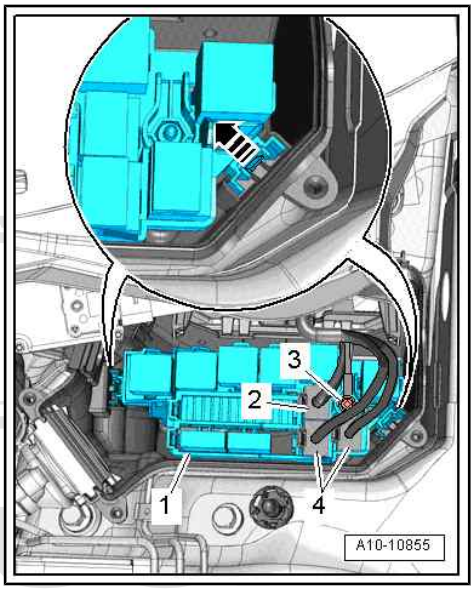
– Remove bolts -arrows- and detach cover for electronics box in engine compartment.
– Remove nut -1- and move electrical wiring clear.



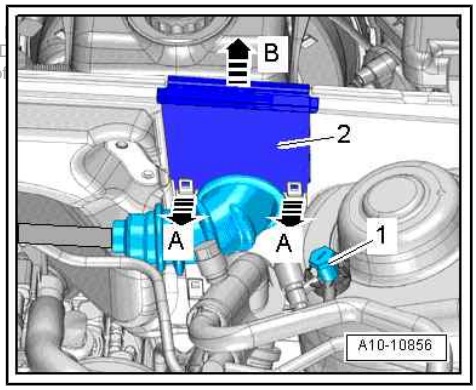
– Release catches -arrows A- and take out engine control unit -arrow B-.



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

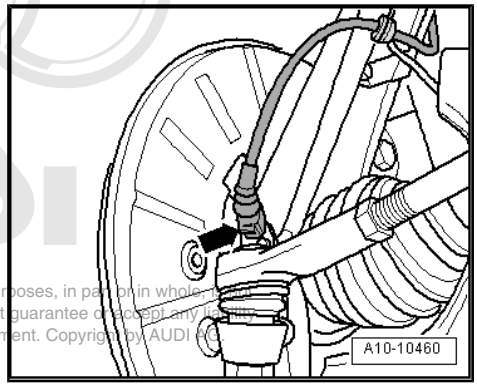


– Release catches -arrows A- and lift off wiring protector -2- -arrow B-.
– Unscrew earth stud -1- and move wiring harness clear.
– Place wiring harness on engine and secure engine control unit to prevent it from dropping.



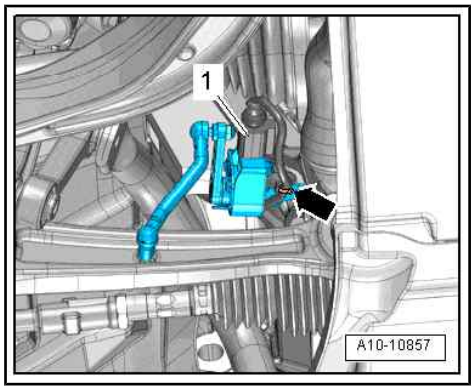
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– Unplug electrical connectors -arrow- at front wheel speed sensors on both sides.

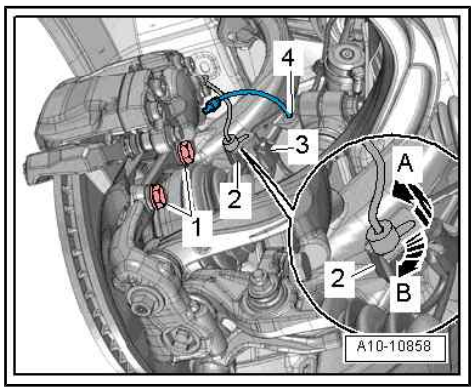


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– Unplug electrical connector -1- from front left vehicle level sender - G78- and front right vehicle level sender - G289- and move wiring clear -arrow-.



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

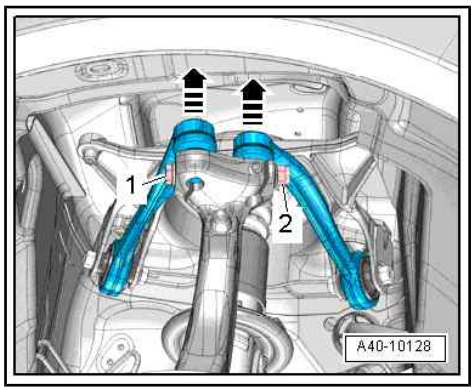


Caution

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.



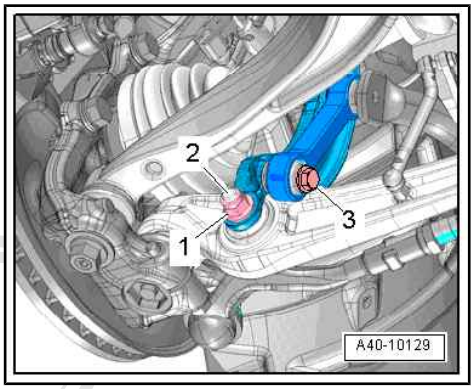
A5 up to vehicle identification no. 8T-8-011200:

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

– Remove nut -1- on both sides.

Note

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



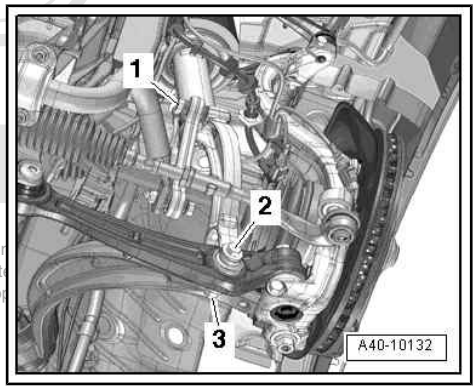
A4 (all), A5 from vehicle identification no. 8T-8-011201 onwards:

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

– Remove nut -3- on both sides.

Note

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



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All vehicles (continued):

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.***

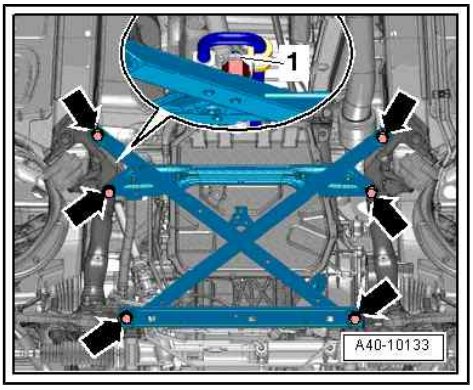
A4 (all), A5 Coupé:

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

– Remove bolts -arrows- and detach subframe cross brace.

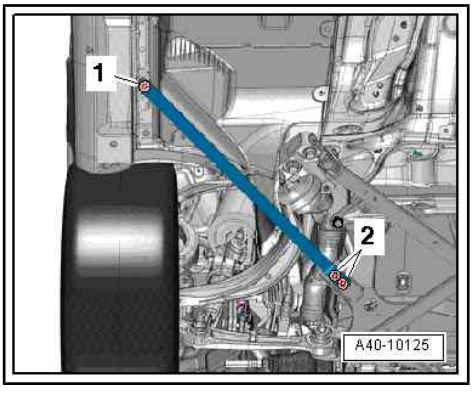
Note

Illustration shows the installation position on a vehicle with dynamic steering.

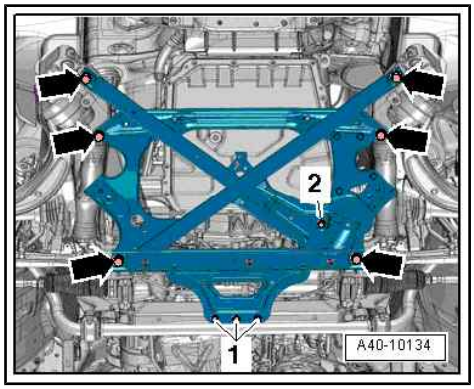


A5 Cabriolet:

– Remove bolts -1- and -2- on both sides and detach strut.

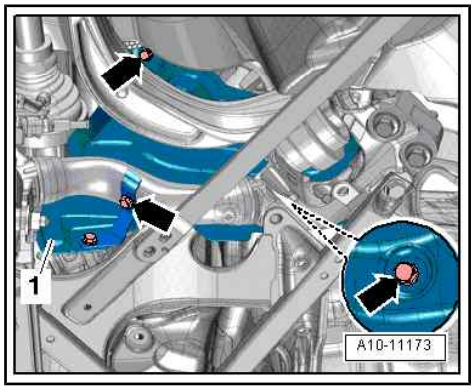


– Remove bolt -2- for power steering hydraulic line.
– Remove bolts -1- and -arrows- and detach subframe cross brace.

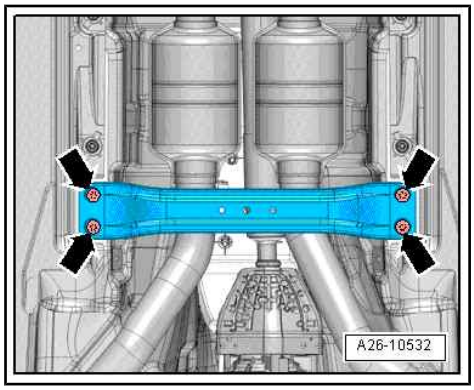


All vehicles (continued):

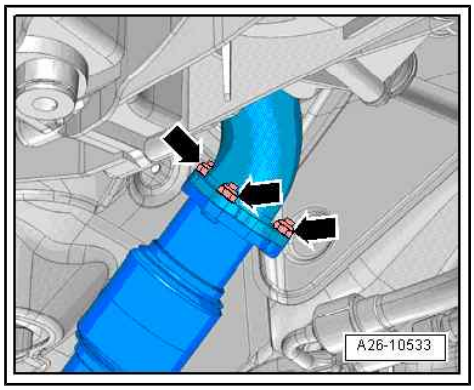
– If fitted, remove bolts -arrows- on both sides and detach heat shield -1-.



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

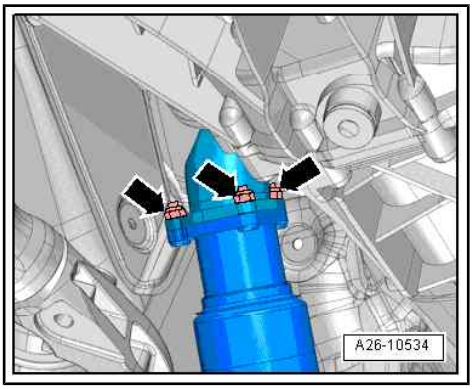


– Unscrew nuts -arrows- for front silencer (left-side).



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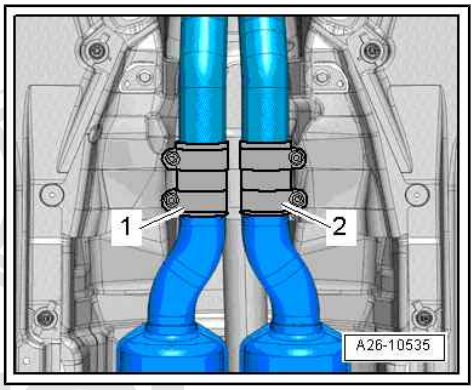
– Unscrew nuts -arrows- for front silencer (right-side).



Caution

Risk of damage to flexible joints in front silencer.

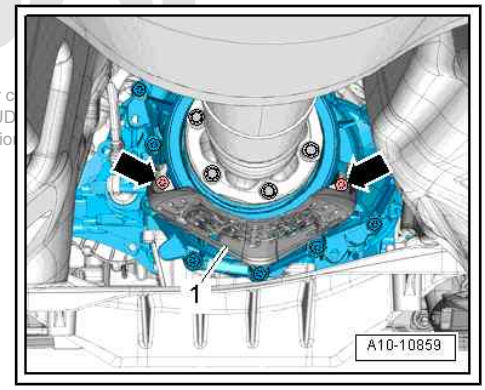
- *Do NOT bend the flexible joints in the front silencer more than 10°.*



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

– If fitted, remove bolts -arrows- and detach heat shield -1- for propshaft.

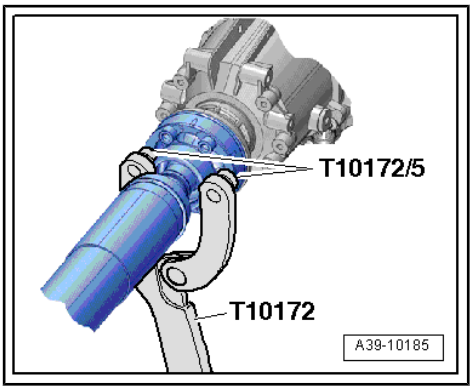
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– Remove bolts connecting propshaft to gearbox (use counter-hold tool - T10172- with -T10172/5-).

– Slide propshaft towards rear final drive; the constant velocity joints can be moved axially.

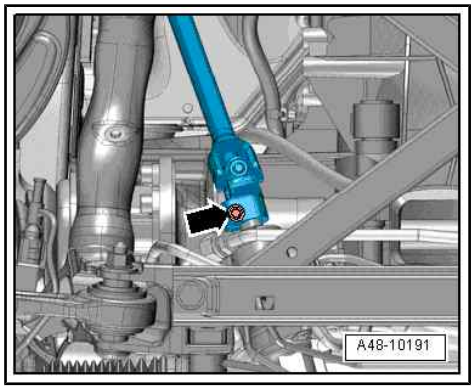
– Tie up propshaft on one side.



Caution

Risk of damage to coil connector for airbag.

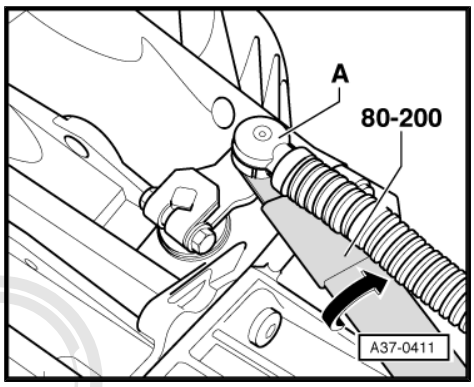
- *Make sure that front wheels are in straight-ahead position before removing universal joint from steering rack.*
- *Do not alter position of steering wheel and steering rack (locate steering wheel with adhesive tape if necessary).*



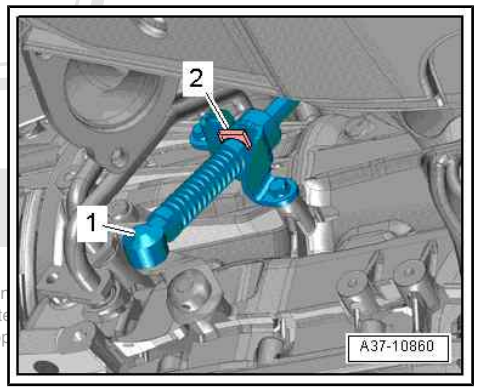
– Remove bolt -arrow- for universal joint ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Exploded view - steering column .

– Separate universal joint from steering rack and move clear to the top as far as possible.

– Pry ball socket -A- of selector lever cable off gearbox selector lever -arrow- using removal lever - 80 - 200- .



– Press off securing clip -2- and remove selector lever cable from gearbox.



Note

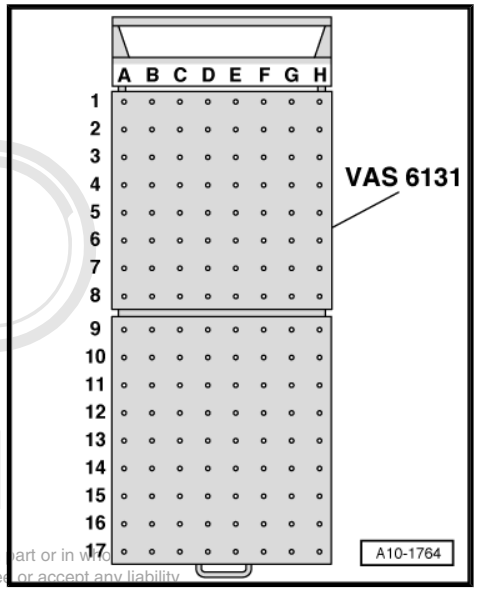
- *Take care not to bend or kink selector lever cable.*
- *Disregard -item 1-.*

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Set up the scissor-type assembly platform as follows:

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

Platform coordinates	Parts of support set for Audi - VAS 6131/10- , 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	/13-6	–	–	/13-2
C14	/10-1	/10-4	/10-5	/10-7
F14	/10-1	/10-4	/10-5	/11-1



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– 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).

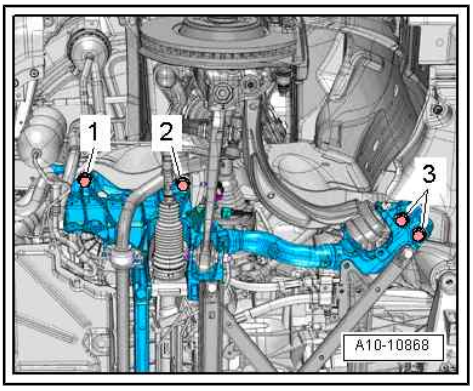
– Position scissor-type assembly platform - VAS 6131 A- below engine/gearbox assembly.

WARNING

Accident risk if subframe mountings are detached.

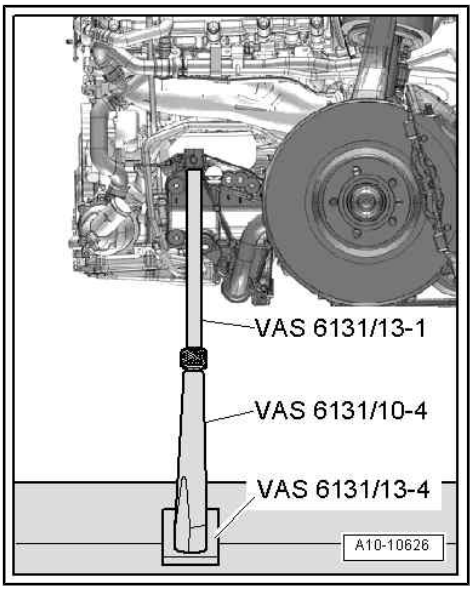
- ***Subframe bolts -2- and -3- must not be loosened.***

– Remove subframe bolts -1- on both sides.

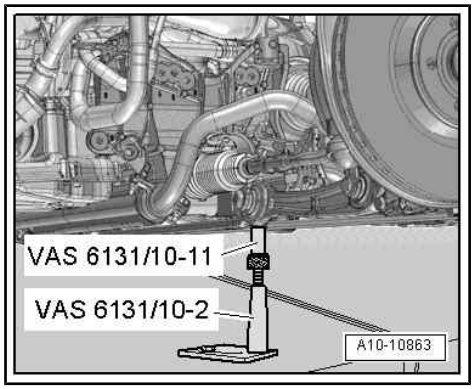


– Position support elements from -VAS 6131/10- and -VAS 6131/13- at front left and right of subframe as shown.

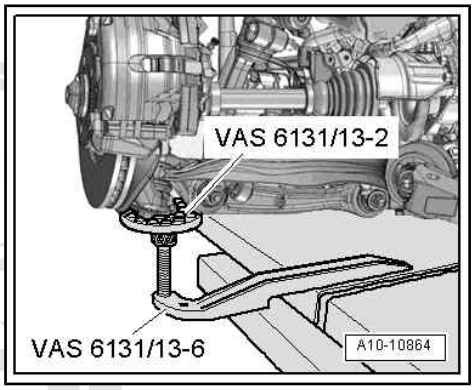
– Make sure that threaded spindles are screwed in completely.



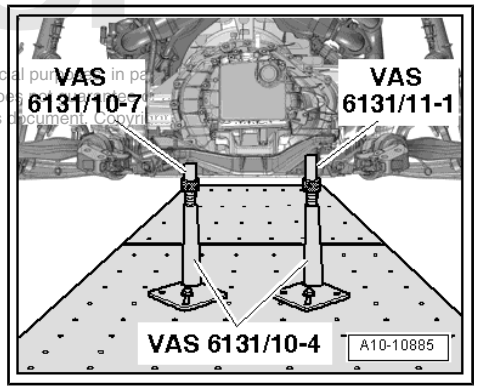
– Position support elements from -VAS 6131/10- (rear left and right) at front attachment points of subframe cross brace as shown.



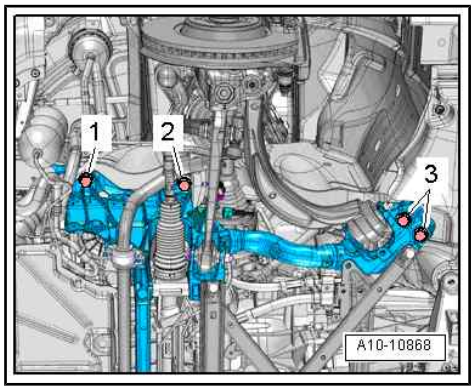
– Position support elements from -VAS 6131/13- under left and right wheel bearing housings as shown.



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



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

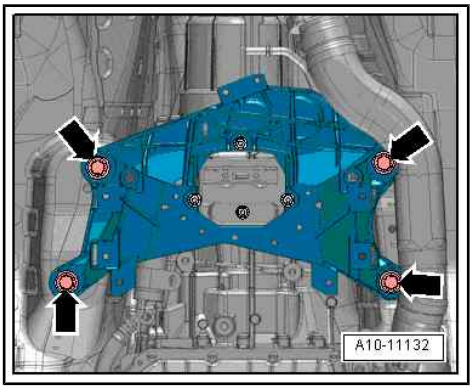


Note

Disregard -item 1-.

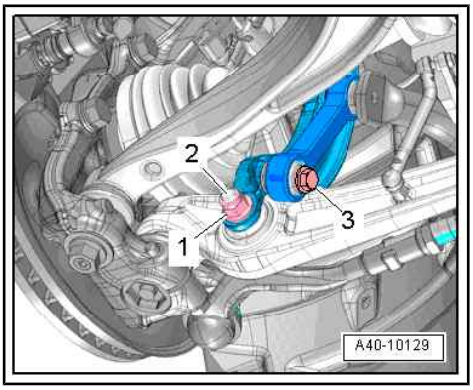
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– Remove bolts -arrows- on tunnel cross member.



A5 up to vehicle identification no. 8T-8-011200:

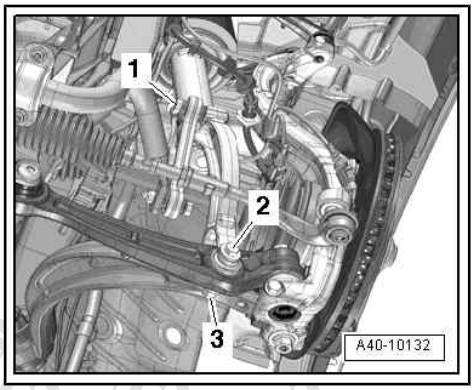
– Remove bolt -2- on both sides.



A4 (all), A5 from vehicle identification no. 8T-8-011201 onwards:

– Remove bolt -2- on both sides.

All vehicles (continued):



Caution

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

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

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

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

1.2 Separating engine and gearbox

⇒ “1.2.1 Separating engine and gearbox - vehicles with manual gearbox”, page 69

⇒ “1.2.2 Separating engine and gearbox - vehicles with multitronic gearbox 0AW”, page 74

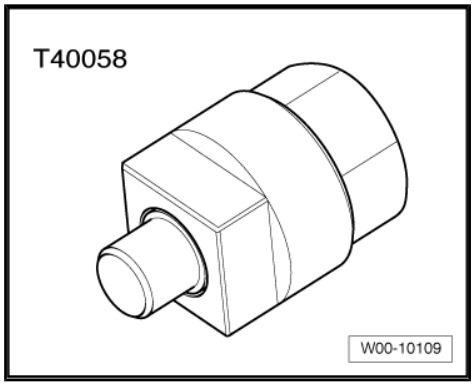
⇒ “1.2.3 Separating engine and gearbox - vehicles with automatic gearbox 0B6”, page 78

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1.2.1 Separating engine and gearbox - vehicles with manual gearbox

Special tools and workshop equipment required

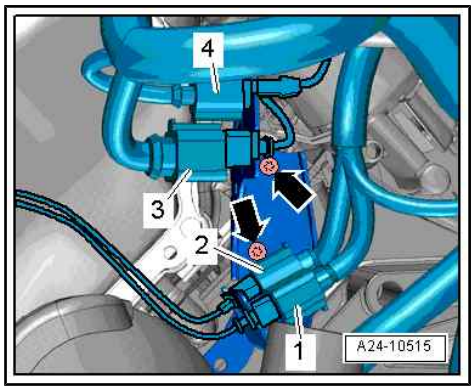
- Support set for Audi - VAS 6131/10- , supplementary set -VAS 6131/13- and gearbox support - VAS 6131/14-
- Adapter - T40058-



Procedure

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

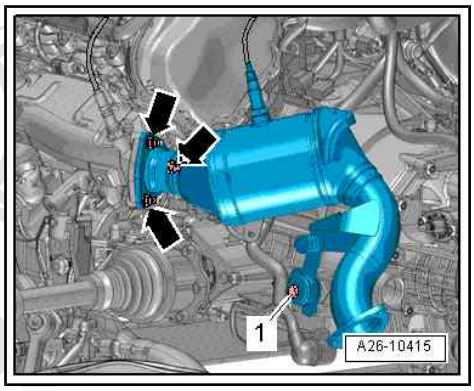
– Remove electrical connector -1- for Lambda probe 2 after catalytic converter - G131- from bracket and unplug connector.



Note

Disregard items -2, 3, 4- and -arrows-.

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

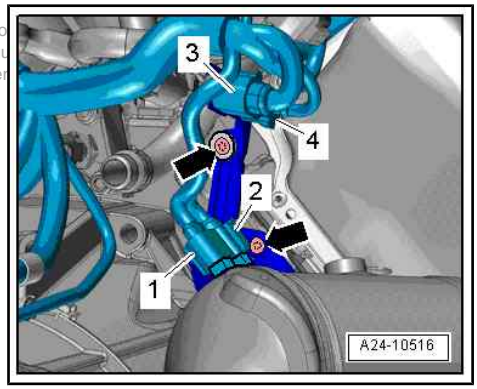


– Remove electrical connector -1- for Lambda probe after catalytic converter - G130- from bracket and unplug connector.

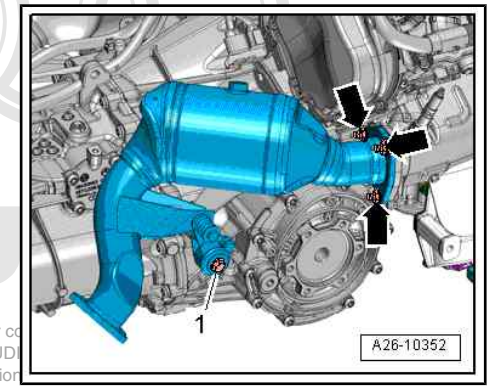
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Note

Disregard items -2, 3, 4- and -arrows-.

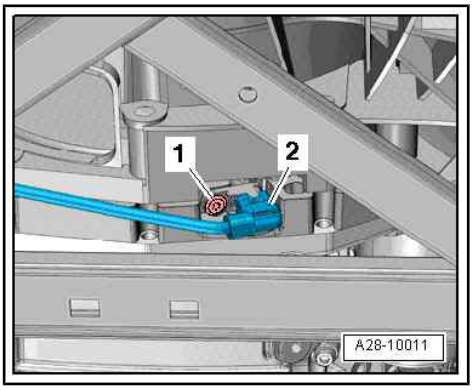


– Remove nuts -arrows- and bolt -1- and detach catalytic converter (right-side).



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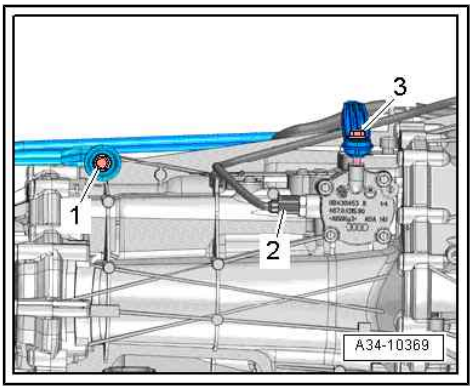
– Unplug electrical connector -2- from engine speed sender - G28- and move wiring clear.



Note

Disregard -item 1-.

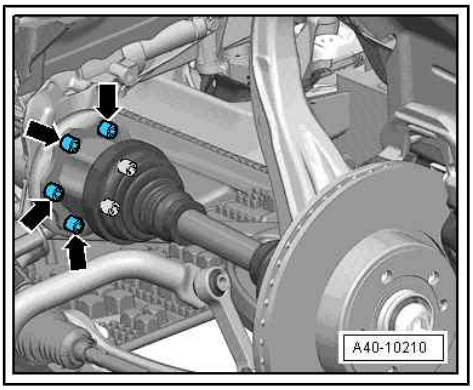
– Unplug electrical connector -2- at reversing light switch - F4- .



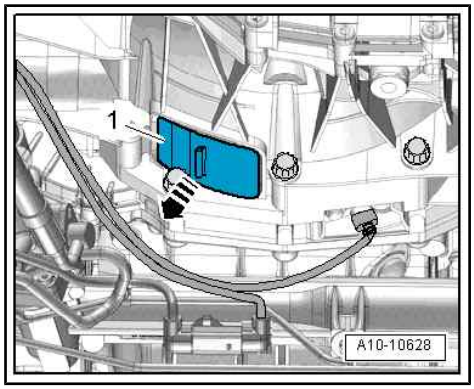
Note

Disregard -items 1, 3-.

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

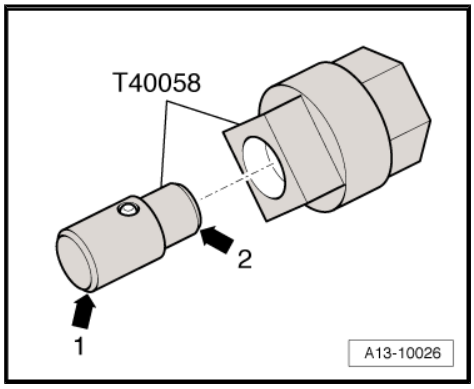


– Detach bottom cover -1- from gearbox -arrow-.



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

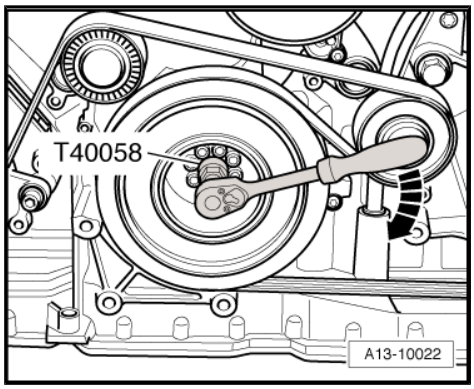
- The larger-diameter section -arrow 1- faces towards the engine.
- The smaller-diameter section -arrow 2- faces the adapter.



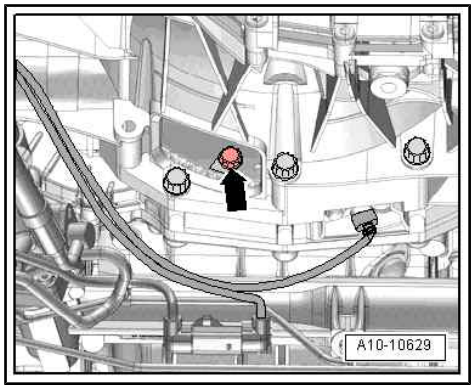
– Counterhold crankshaft using adapter - T40058- when slackening bolts for drive plate.

Note

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

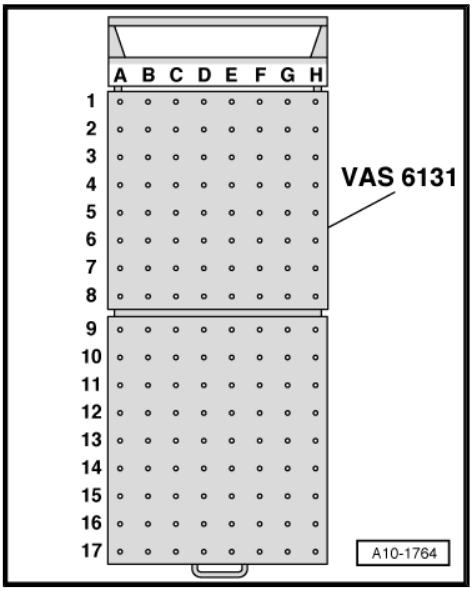


– Remove 6 bolts -arrow- for clutch module, turning crankshaft 60° in normal direction of rotation each time.



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



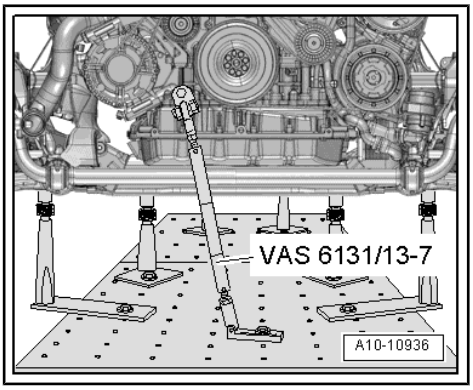
Note

The other support elements remain unchanged.

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

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

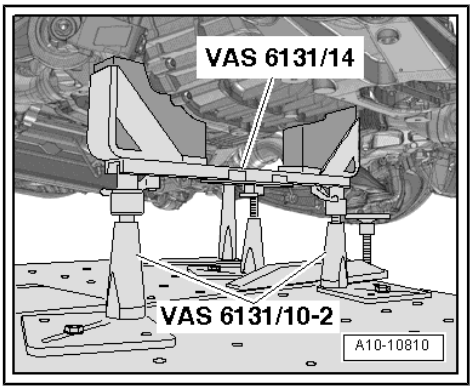
– Secure support -VAS 6131/13-7- to scissor-type assembly platform and tighten to 20 Nm.



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

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

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

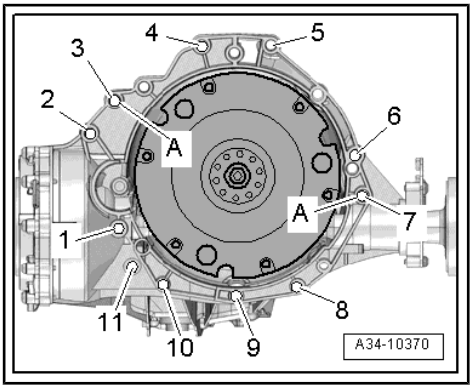


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– Remove bolts -1- and -2- for starter.

– Separate starter from gearbox and leave in position.

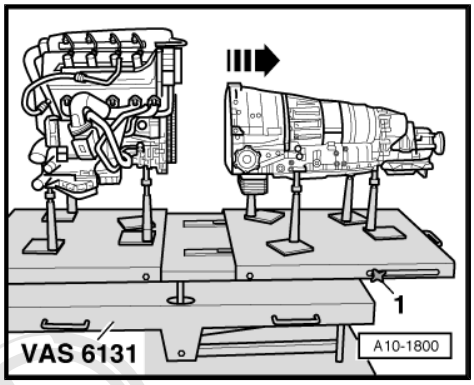
– Unscrew remaining bolts -3 ... 11- securing engine to gearbox.



Note

Disregard -item A-.

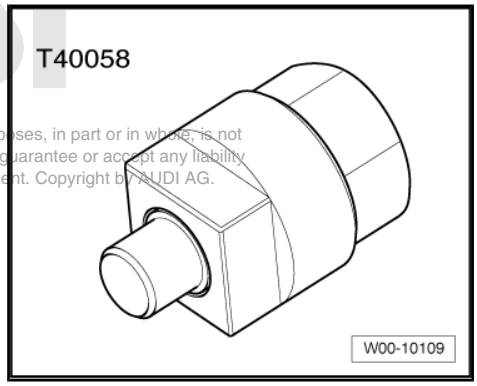
– Loosen clamping bolts -1- on sides of scissor-type assembly platform - VAS 6131 A- and pull rear section of platform together with gearbox towards rear -arrow-.



1.2.2 Separating engine and gearbox - vehicles with multitronic gearbox 0AW

Special tools and workshop equipment required

- Support set for Audi - VAS 6131/10- , supplementary set -VAS 6131/13- and gearbox support - VAS 6131/14-
- Adapter - T40058-

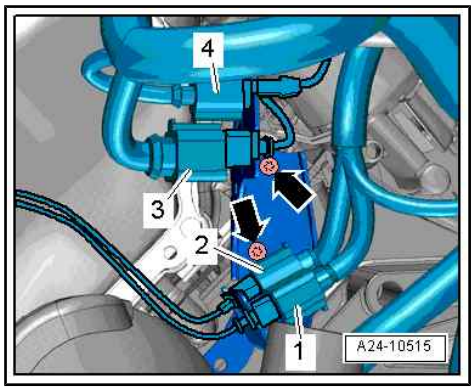


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Procedure

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

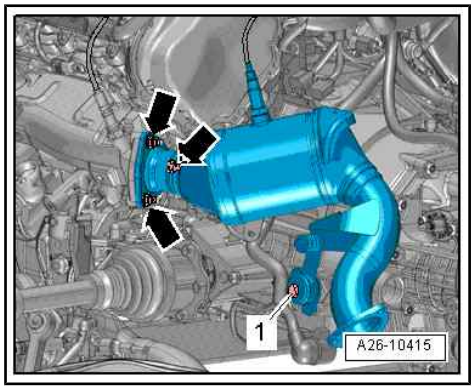
– Remove electrical connector -1- for Lambda probe 2 after catalytic converter - G131- from bracket, unplug and move wiring clear.



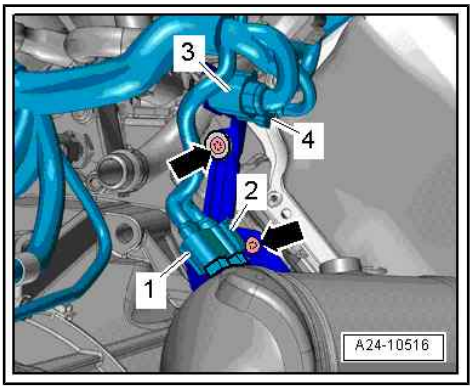
Note

Disregard items marked -2, 3, 4- and -arrows-.

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



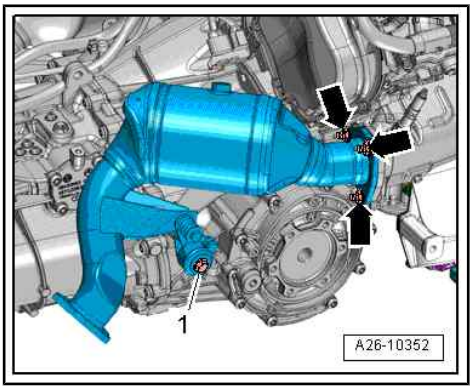
– Remove electrical connector -1- for Lambda probe after catalytic converter - G130- from bracket and unplug connector.



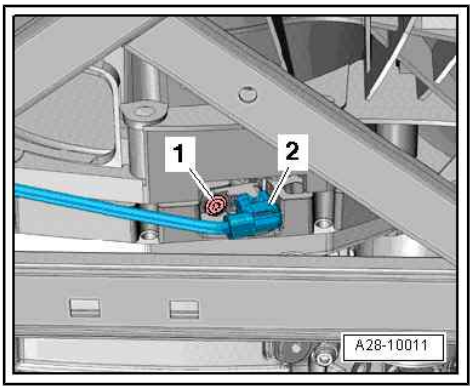
Note

Disregard items marked -2, 3, 4- and -arrows-.

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



– Unplug electrical connector -2- from engine speed sender - G28- and move wiring clear.



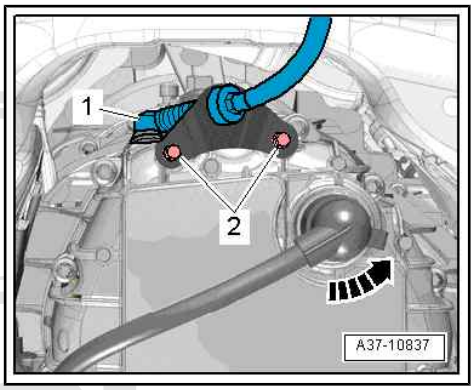
Note

Disregard -item 1-.

Caution

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

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



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

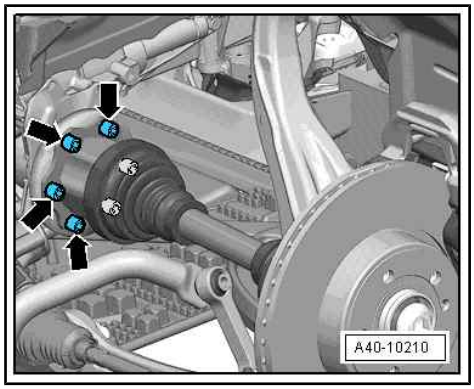
– Move electrical wiring clear.

Note

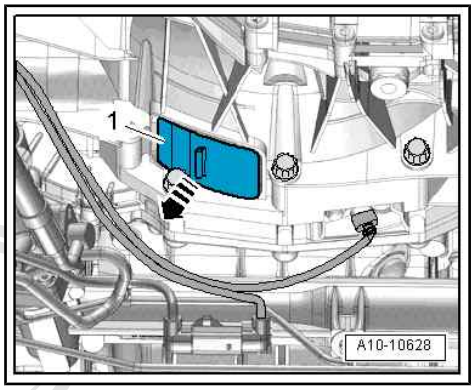
Disregard -items 1, 2-.

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

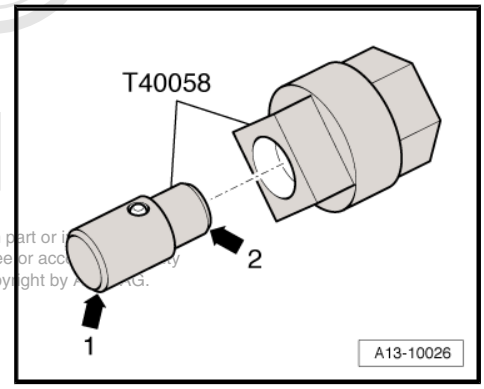


– Detach bottom cover -1- from gearbox -arrow-.



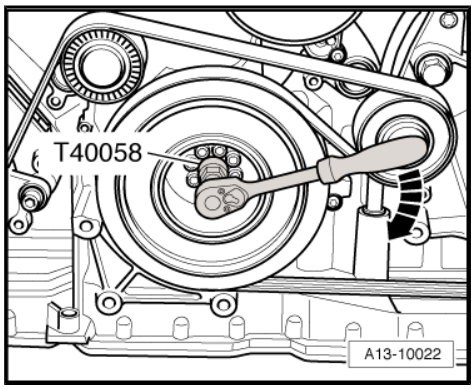
– Insert guide pin of adapter -T40058- as follows:

- The larger-diameter section -arrow 1- faces towards the engine.
- The smaller-diameter section -arrow 2- faces the adapter.



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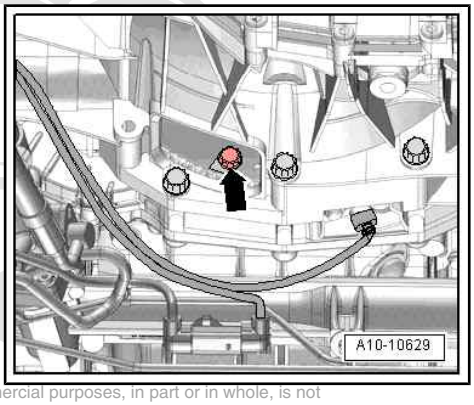
– Counterhold crankshaft using adapter - T40058- when slackening bolts for drive plate.



Note

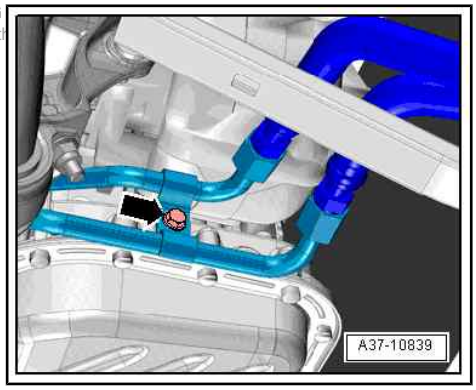
When performing the next step, turn the crankshaft only in the normal direction of rotation -arrow-.

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



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– Remove bolt -arrow- for ATF lines.

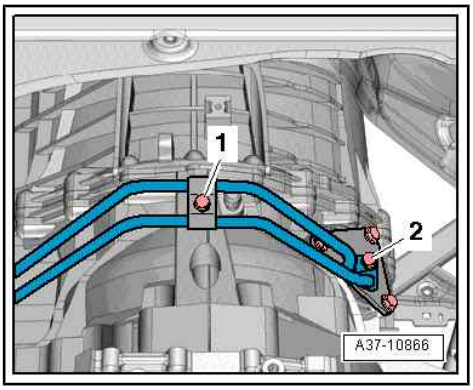


Note

Lay a cloth under the separating point to catch escaping ATF.

– Unscrew bolts -1- and -2-, detach ATF lines from gearbox and tie up ATF lines.

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

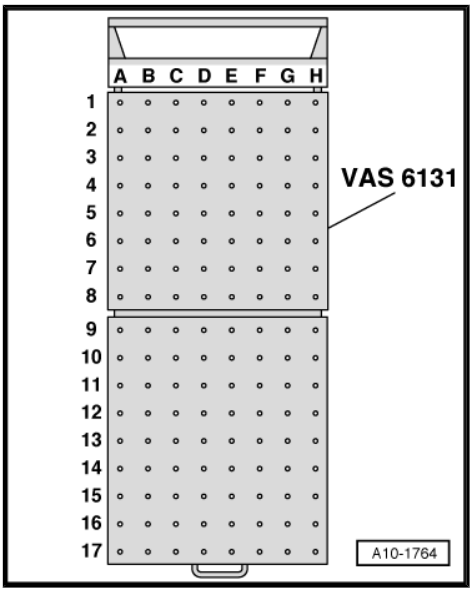


– Set up scissor-type assembly platform - VAS 6131 A- with support set for Audi - VAS 6131/10- , supplementary set -VAS 6131/13- and gearbox support - VAS 6131/14- as follows:

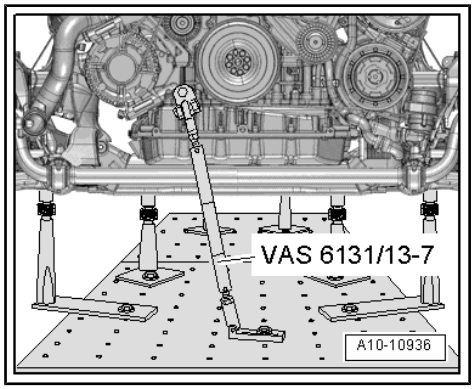
Note

The other support elements remain unchanged.

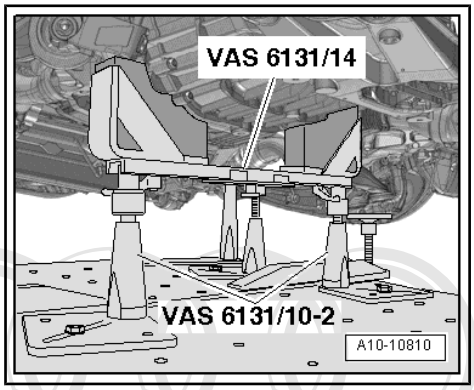
Platform coordinates	Parts of support set for Audi - VAS 6131/10- , supplementary set -VAS 6131/13- and gearbox support - VAS 6131/14-			
F2	/13-7			
B10	/10-1	/10-2	/10-5	/14
G10	/10-1	/10-2	/10-5	



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



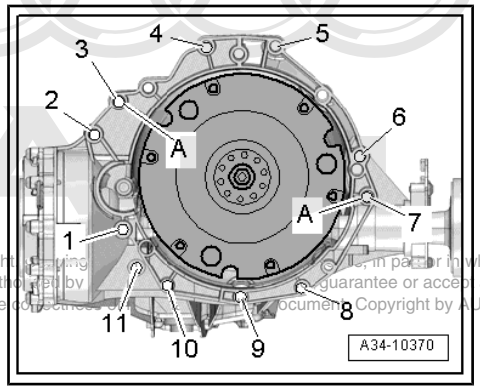
– Position support elements from -VAS 6131/10- and gearbox support - VAS 6131/14- at front of gearbox, as illustrated.
– Screw spindles on both sides upwards until gearbox support - VAS 6131/14- makes full contact with gearbox.
– Tighten base plates for support elements to 20 Nm on scissor-type assembly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



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

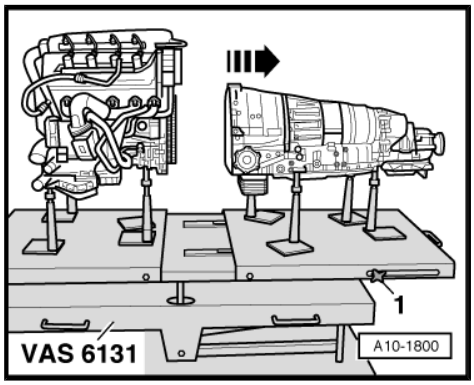
Note

Disregard -item A-.



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

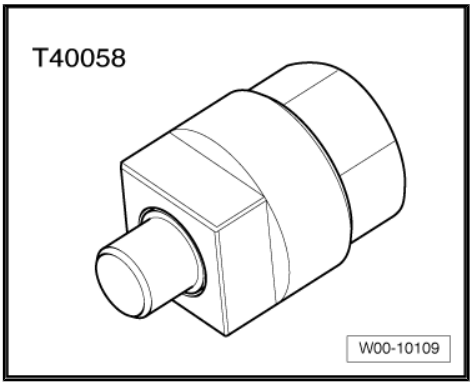


1.2.3 Separating engine and gearbox - vehicles with automatic gearbox 0B6

Special tools and workshop equipment required

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

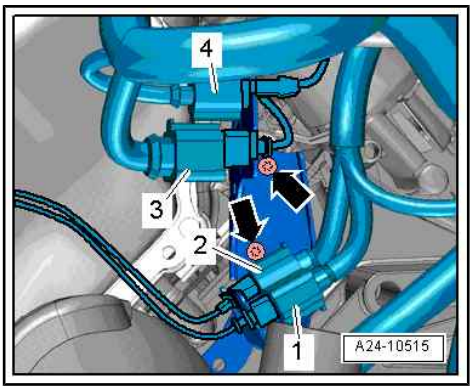
♦ Adapter - T40058-



Procedure

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

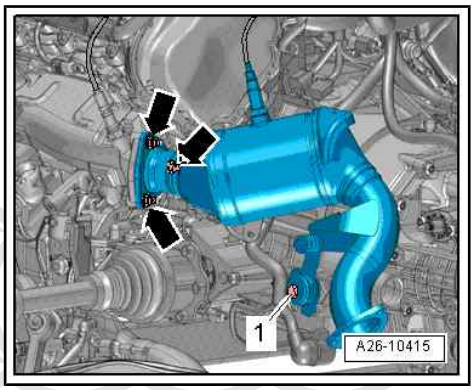
– Remove electrical connector -1- for Lambda probe 2 after catalytic converter - G131- from bracket, unplug and move wiring clear.



Note

Disregard items marked -2, 3, 4- and -arrows-.

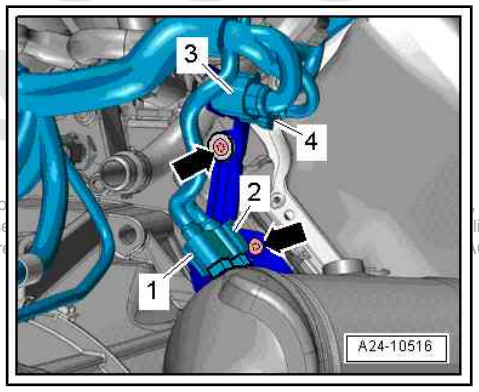
– Remove nuts -arrows- and bolt -1- and detach catalytic converter (left-side).



– Remove electrical connector -1- for Lambda probe after catalytic converter - G130- from bracket and unplug connector.

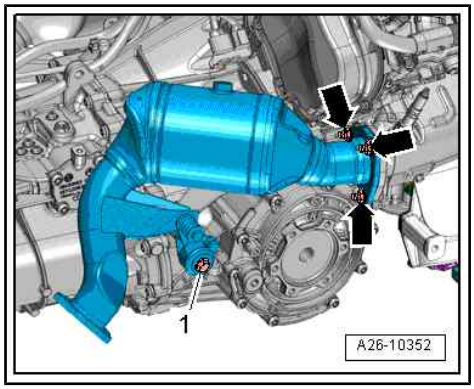
– Detach electrical connector -2- from bracket.

– Remove bolts -arrows- and move bracket with electrical connectors -3- and -4- to one side.

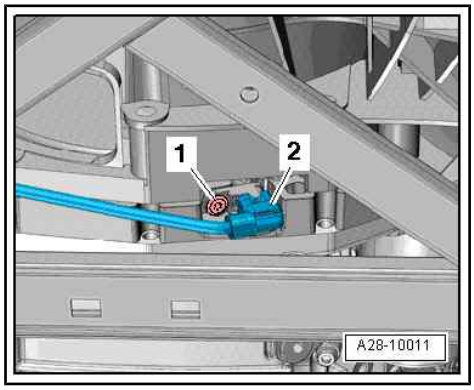


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AG.

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



– Unplug electrical connector -2- from engine speed sender - G28- and move wiring clear.



Note

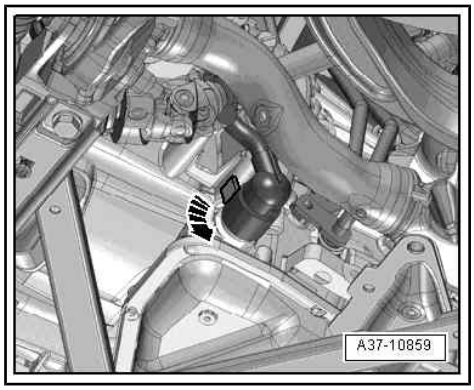
Disregard -item 1-.

Caution

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

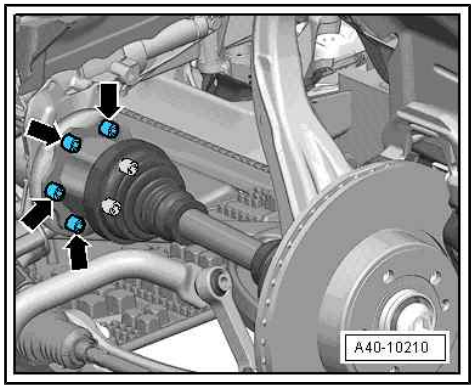
Do NOT touch connector contacts in gearbox connector with your hands.

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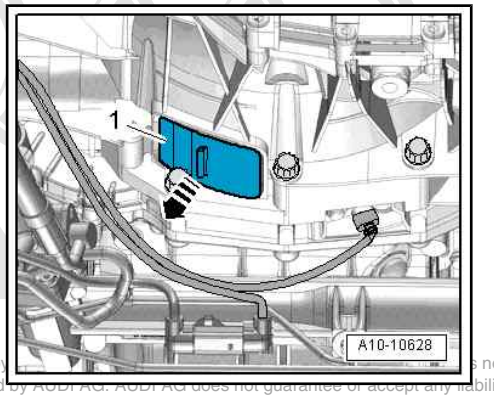


– Touch gearbox housing with your hand (without wearing gloves) to eliminate static charge.
– Turn retainer catch anti-clockwise -arrow- and unplug electrical connector at gearbox.
– Move electrical wiring clear at gearbox.

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



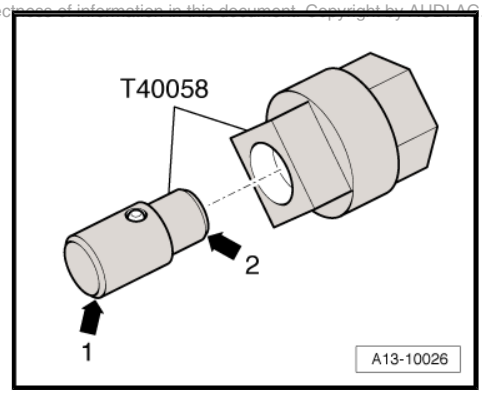
– Detach bottom cover -1- from gearbox -arrow-.



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

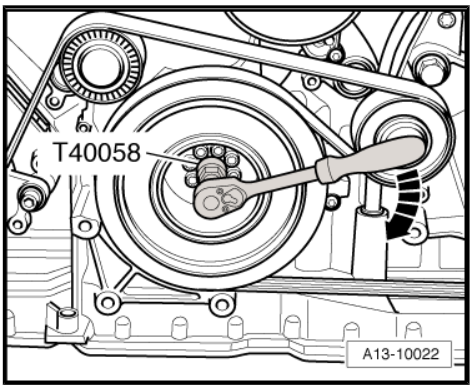
- The larger-diameter section -arrow 1- faces towards the engine.
- The smaller-diameter section -arrow 2- faces the adapter.



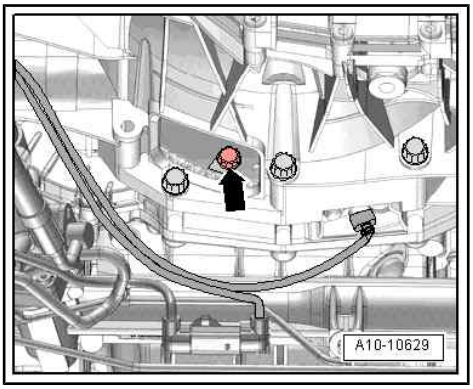
– Counterhold crankshaft using adapter - T40058- when slackening bolts for drive plate.

Note

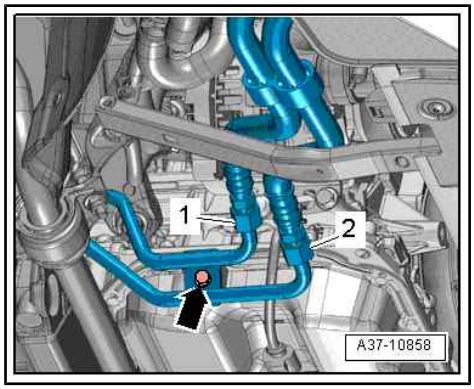
When performing the next step, turn the crankshaft only in the normal direction of rotation -arrow-.



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



– Remove bolt -arrow- for ATF lines.



Note

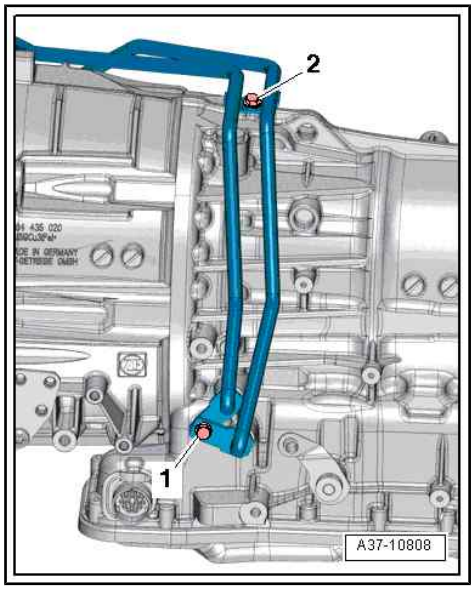
Disregard -items 1, 2-.

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Note

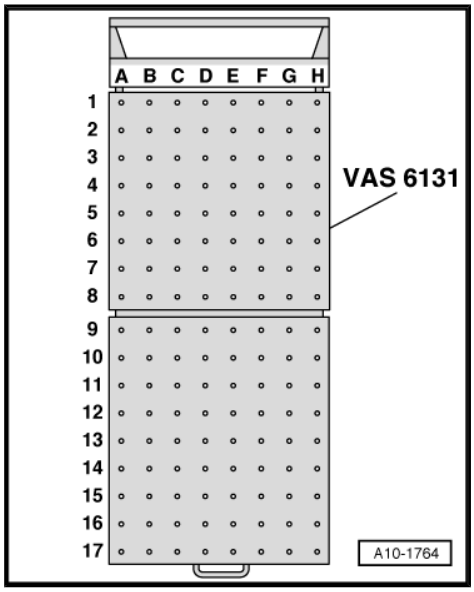
Lay a cloth under the separating point to catch escaping ATF.

– Unscrew bolts -1- and -2-, detach ATF lines from gearbox and tie up ATF lines.



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

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

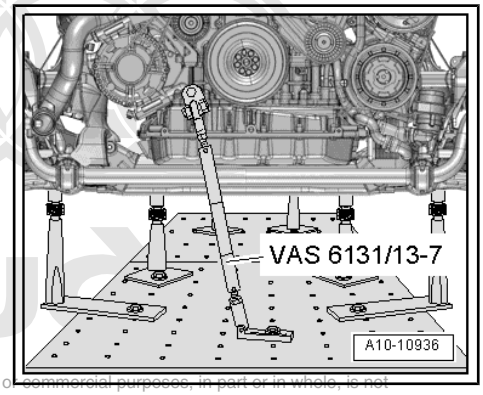


Note

The other support elements remain unchanged.

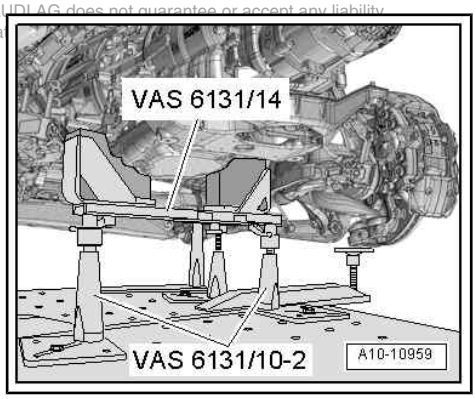
Platform coordinates	Parts of support set for Audi - VAS 6131/10- , supplementary set -VAS 6131/13- and gearbox support - VAS 6131/14-			
F2	/13-7			
B10	/10-1	/10-2	/10-5	/14
G10	/10-1	/10-2	/10-5	

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



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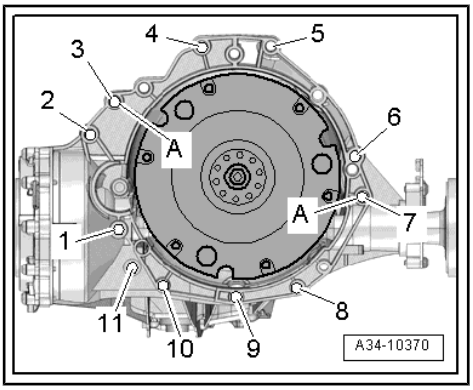
– Position support elements from -VAS 6131/10- and gearbox support - VAS 6131/14- at front of gearbox, as illustrated.
– Screw spindles on both sides upwards until gearbox support - VAS 6131/14- makes full contact with gearbox.
– Tighten base plates for support elements to 20 Nm on scissor-type assembly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



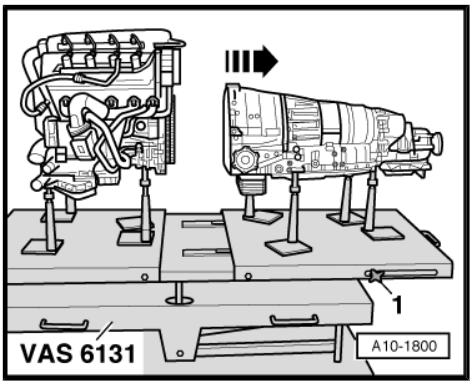
– Remove bolts -1- and -2- for starter.
– Separate starter from gearbox and leave in position.
– Unscrew remaining bolts -3 ... 11- securing engine to gearbox.

Note

Disregard -item A-.



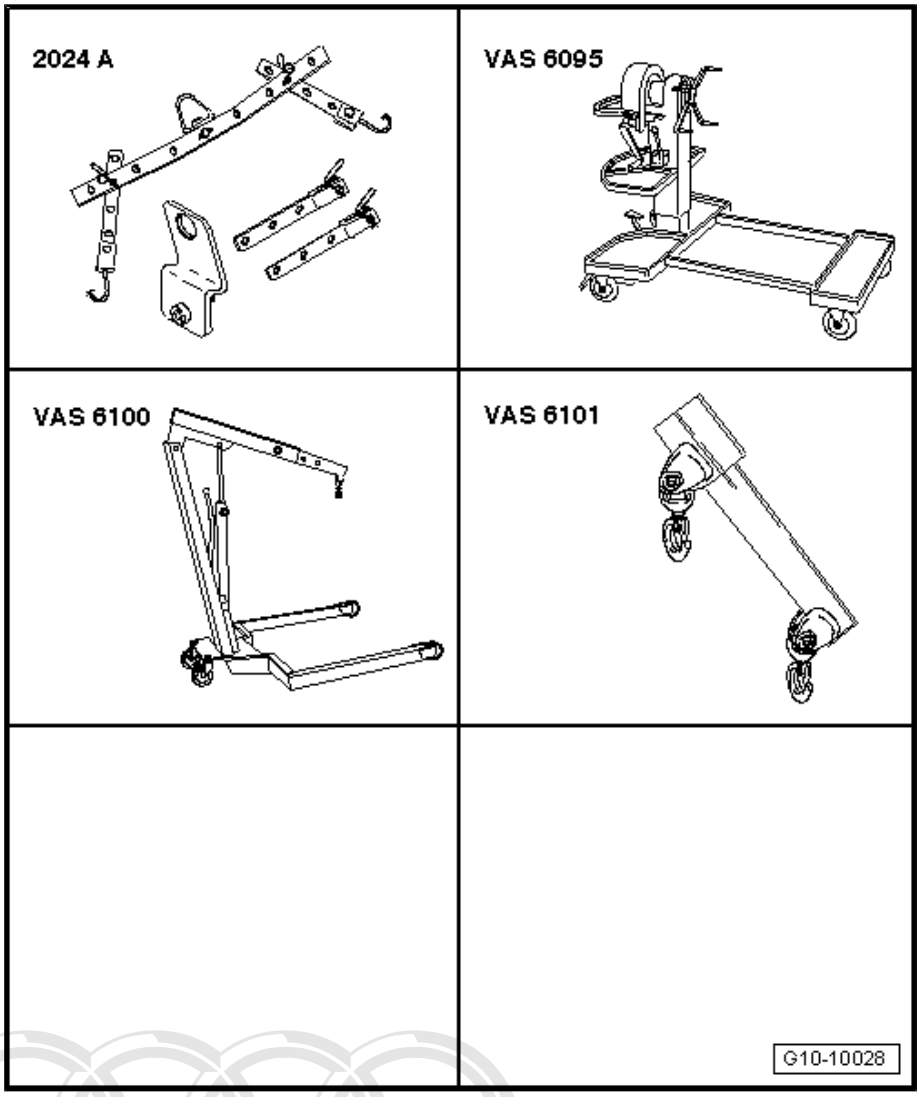
– Loosen clamping bolts -1- on sides of scissor-type assembly platform - VAS 6131 A- and pull rear section of platform together with gearbox towards rear -arrow-.



1.3 Securing engine to engine and gearbox support

Special tools and workshop equipment required

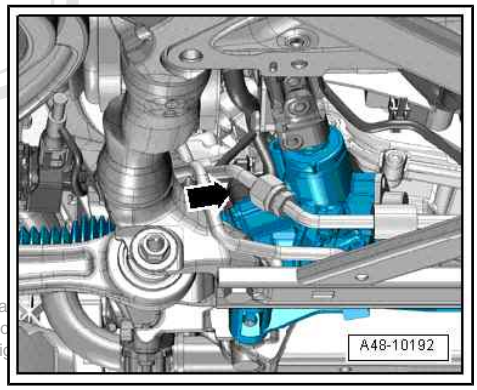
- Lifting tackle - 2024 A-
- Engine and gearbox support - VAS 6095- with bracket for V6 FSI engine - VAS 6095/1-5-
- Workshop hoist - VAS 6100-
- Lift arm extension (workshop hoist) - VAS 6101-



Procedure

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

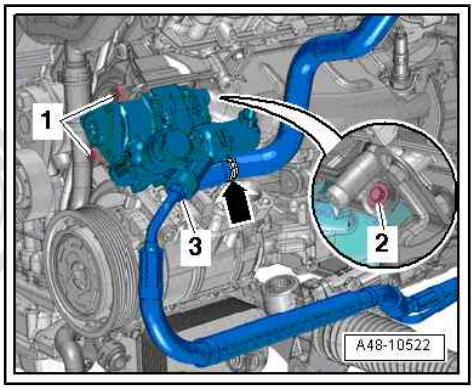
– Unplug electrical connector -arrow- on steering rack.



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Note

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



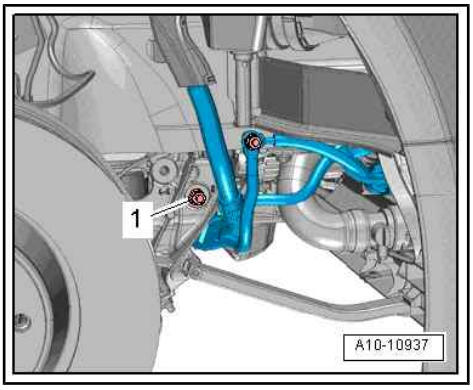
– Unscrew connection -3-.
– Seal off open pipes/lines and connections with clean plugs from engine bung set - VAS 6122- .

Note

- *The illustration shows the installation position on a vehicle with dynamic steering.*
- *Disregard -items 1, 2- and -arrow-.*

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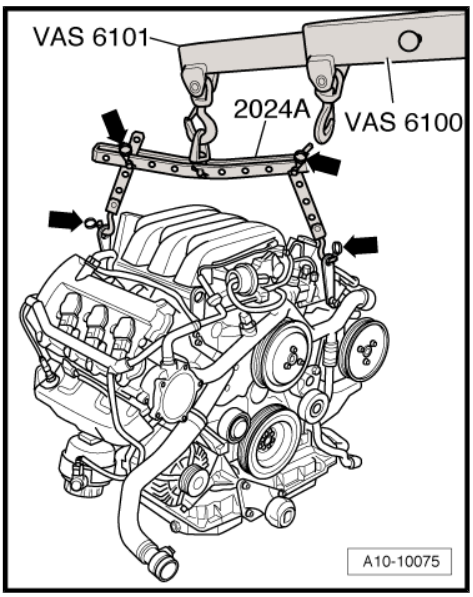
– Unscrew nut -1- and detach bracket with electrical wiring from subframe.



Note

The illustration shows the installation position with the engine installed.

– Attach lifting tackle - 2024 A- to engine lifting eyes and workshop hoist 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.

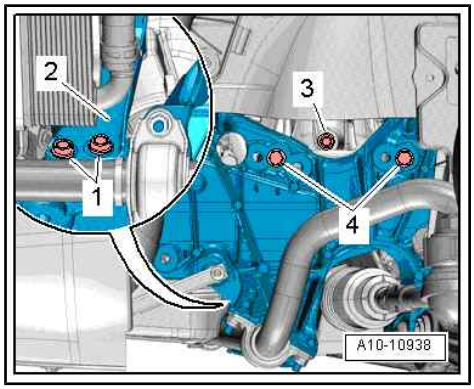
WARNING

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.

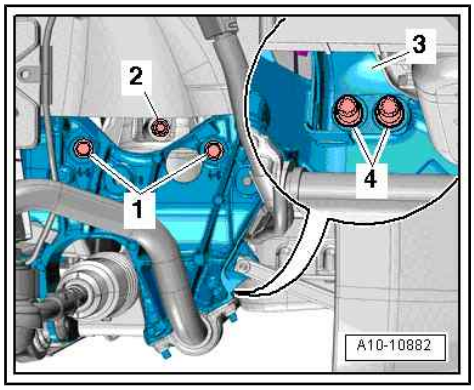
– Remove bolt -3- for engine mounting (left-side).



Note

- *The illustration shows the installation position with the engine installed.*
- *Disregard -items 1, 2, 4-.*

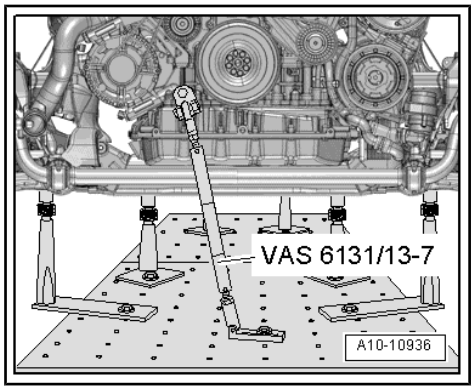
– Remove bolt -2- for engine mounting (right-side).



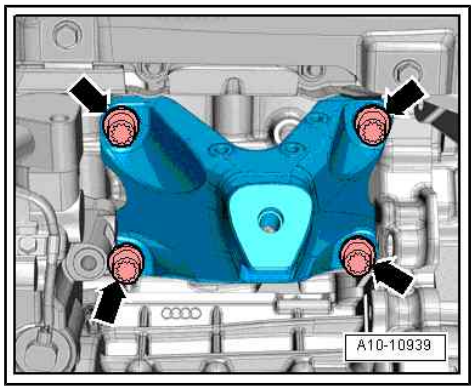
Note

- *The illustration shows the installation position with the engine installed.*
- *Disregard -items 1, 3, 4-.*

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

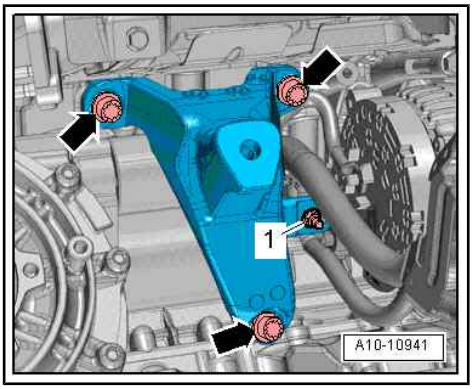


– Unscrew bolts -arrows- and remove engine support (left-side).

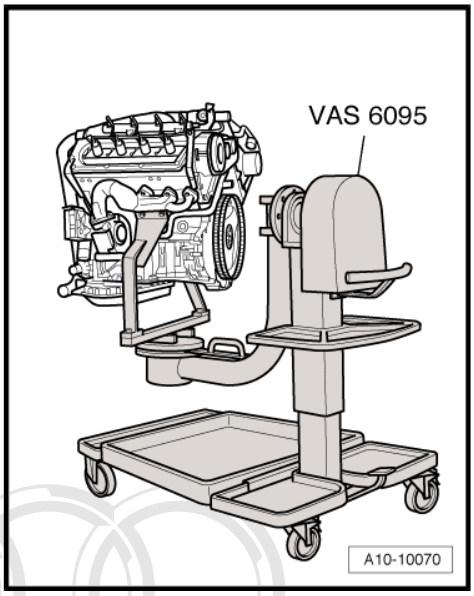


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– Remove nut -1- and move earth wire clear at engine support.
– Unscrew bolts -arrows- and remove engine support (right-side).
– Tie up starter on engine.



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



1.4 Installing engine

⇒ “1.4.1 Installing engine, vehicles with manual gearbox”, page 87

⇒ “1.4.2 Installing engine - vehicles with multitronic gearbox 0AW”, page 95

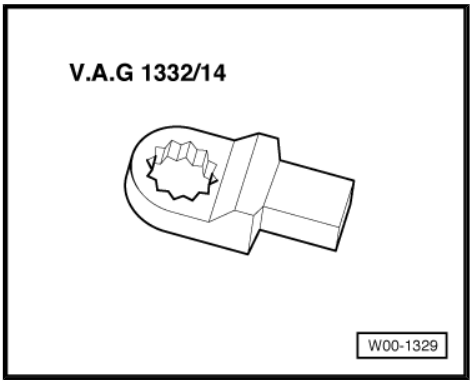
⇒ “1.4.3 Installing engine - vehicles with automatic gearbox 0B6”, page 102

1.4.1 Installing engine, vehicles with manual gearbox

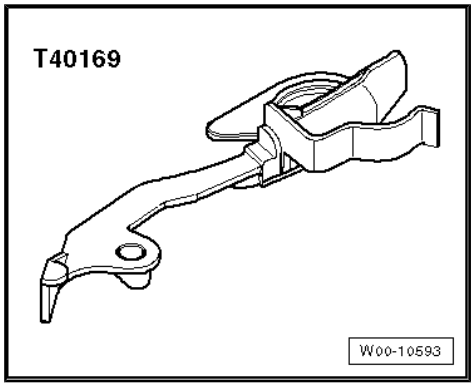
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Special tools and workshop equipment required

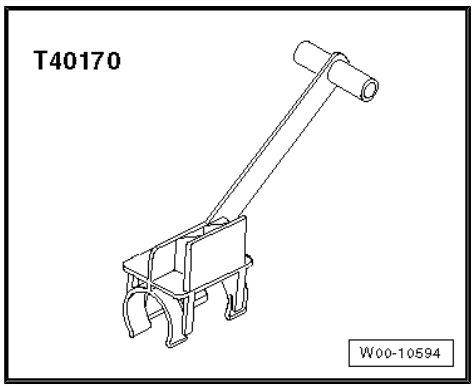
♦ Ring spanner insert AF 16 - V.A.G 1332/14-



- Assembly aid - T40169-



- 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.*
- *Tolerance for tightening torques: ± 15 %.*

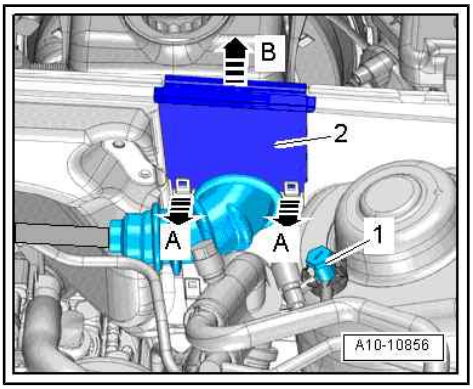
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Component		Nm
Bolts/nuts	M6	9
	M7	15
	M8	20
	M10	40
	M12	65

Assembly mountings ⇒ page 110

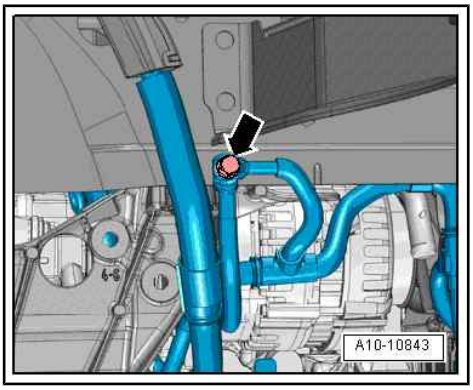
Earth stud at suspension turret - tightening torque

– Tighten earth stud -1- to 9 Nm.



Earth wiring at longitudinal member - tightening torque

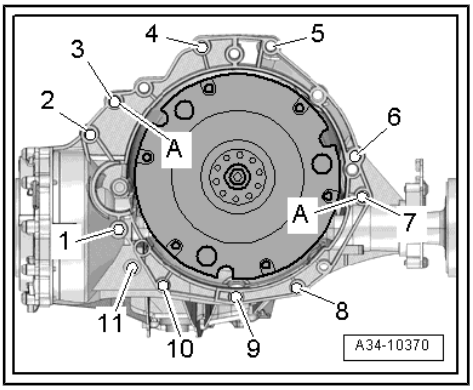
– Tighten nut -arrow- to 9 Nm.



Engine to manual gearbox

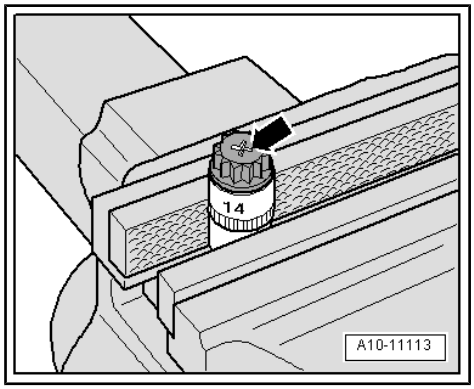
Item	Bolt	Nm
1	M10x50 1)	65
2 … 6	M12x100 2)3)	30 + 90°
7	M12x125 2)3)	30 + 90°
8, 11	M10x60 2)3)	15 + 90°
9, 10	M10x95 2)3)	15 + 90°
A	Dowel sleeves for centralising	

- 1) Property class 10.9. The steel bolt may be re-used as often as necessary.
- 2) Audi A4 up to vehicle identification number 8K-9-066499, Audi A5 up to vehicle identification number 8T-9-007999: renew aluminium bolts.
- 3) Audi A4 from vehicle identification number 8K-9-066500 onwards, Audi A5 from vehicle identification number 8T-9-008000 onwards: aluminium bolts may be used twice ⇒ page 90 .



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- Audi A4 from vehicle identification number 8K-9-066500 onwards, Audi A5 from vehicle identification number 8T-9-008000 onwards: aluminium bolts -2 ... 11- must not be used more than twice. After first use, bolts must therefore be identified with an “X” made by two chisel marks -arrow-.
- To avoid damaging the bolts when making this mark, do not clamp them directly in a vice. Clamp a 14 mm socket with 1/2" drive in a vice and insert the bolt as shown.
- Bolts already marked with an “X” must not be used again.



Procedure

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Note

- *Renew the bolts tightened with specified tightening angle.*
- *Renew self-locking nuts and bolts as well as seals, gaskets and O-rings.*
- *On vehicles with manual gearbox, a needle bearing is fitted in the drive plate. Before installing, check that the needle bearing is fitted. Removing and installing needle bearing in drive plate (pressing in and out)* ⇒ page 126 .
- *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.*
- *Fit all cable ties in the original positions when installing.*

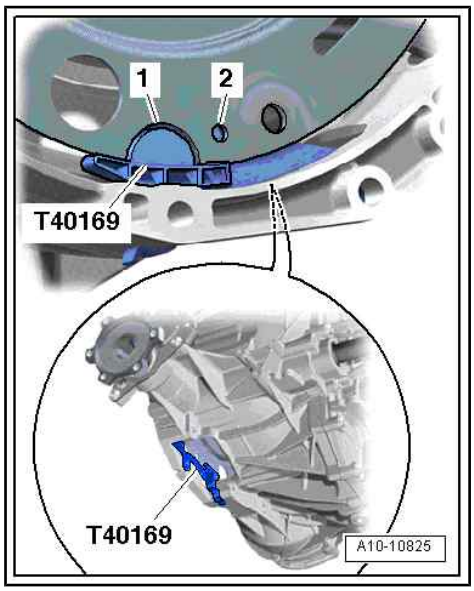
– Install engine supports and engine mountings ⇒ page 110 .

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

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

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

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

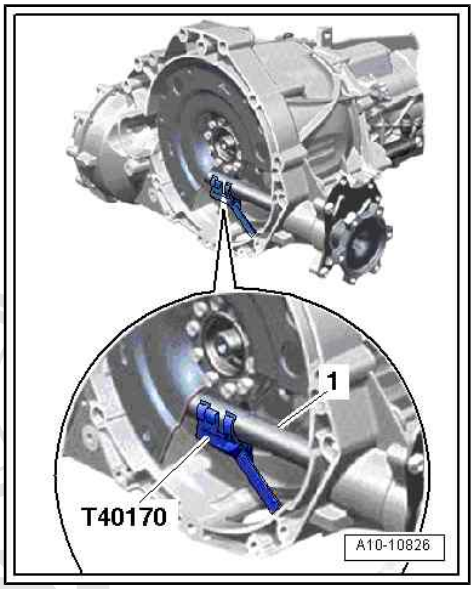


Note

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

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

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

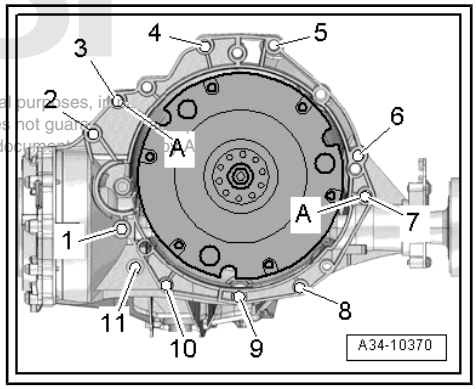


– Check whether dowel sleeves -A- for centring engine and gearbox are fitted in cylinder block; install missing dowel sleeves.

– Check whether aluminium bolts securing engine to gearbox can be reused; if so, apply marking ⇒ page 90.

– Bring gearbox into position on engine and tighten bolts -1 … 11-.

– Remove transport lock - T40170- and assembly aid - T40169- .



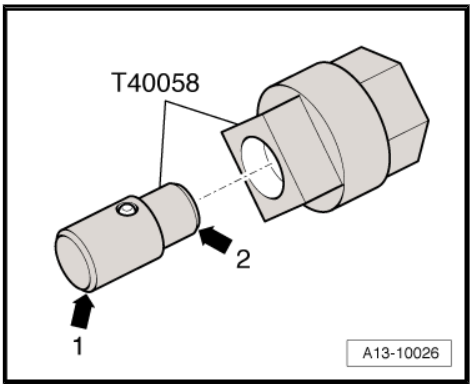
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Note

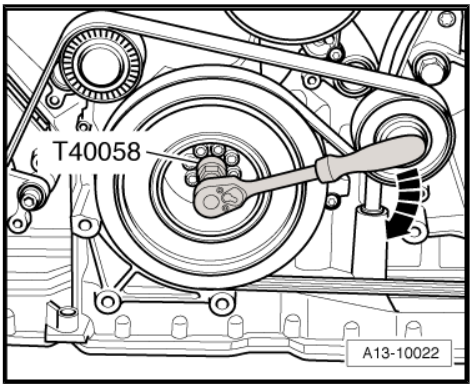
The following step is necessary to ensure that the clutch module is straight and that it makes even contact with the drive plate.

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

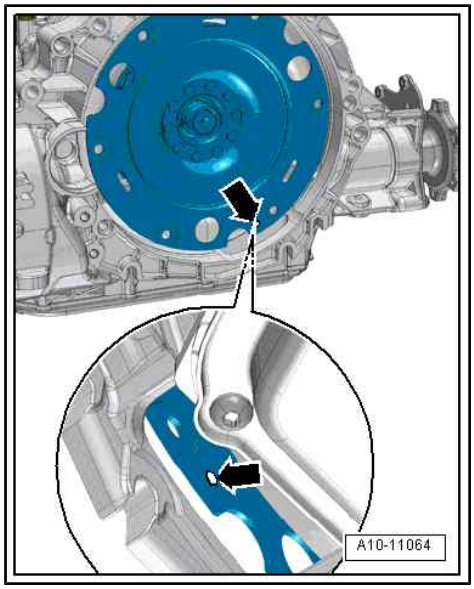
- The larger-diameter section -arrow 1- faces towards the engine.
- The smaller-diameter section -arrow 2- faces the adapter.



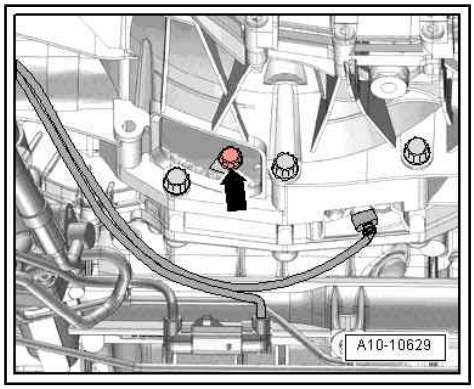
– Use adapter - T40058- to turn crankshaft one full turn (360°) in direction of engine rotation -arrow-.



- The inspection hole -arrow- should be visible again in the recess on the gearbox housing.



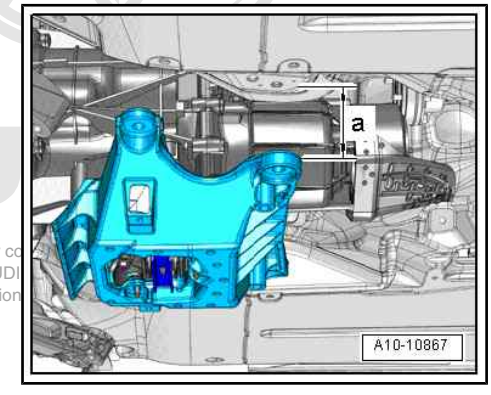
– Bolt clutch module onto drive plate as follows:



Note

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

– Hand-tighten first bolt -arrow- (2 Nm).
– Turn crankshaft 180° further in normal direction of engine rotation -arrow- with adapter - T40058- .
– Tighten bolt accessible in this position to specified torque ⇒ Rep. gr. 30 ; Clutch; Exploded view - clutch module .
– Turn crankshaft by 60° each time and tighten remaining 5 bolts to specified torque ⇒ Rep. gr. 30 ; Clutch; Exploded view - clutch module .
– Install power steering hydraulic lines ⇒ Running gear, axles, steering; Rep. gr. 48 ; Hydraulic power steering; Exploded view - hydraulic lines, reservoir .
– Install catalytic converters: left-side ⇒ page 374 , right-side ⇒ page 377 .
– Secure drive shafts (left and right) to gearbox flange shafts ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft .
– Raise engine/gearbox assembly using scissor-type assembly platform - VAS 6131 A- only until distance between subframe and body is -a-.
- Dimension -a- = min. 100 mm.
– Install selector rod and push rod ⇒ Rep. gr. 34 ; Selector mechanism; Exploded view - selector mechanism .
– Raise engine/gearbox assembly further using scissor-type assembly platform - VAS 6131 A- .
– Align subframe and gearbox carrier on longitudinal members according to markings made before removal.



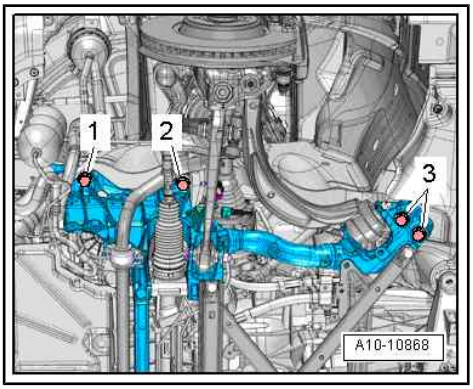
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– Tighten subframe bolts only to specified torque (do not turn further); the bolts should only be fully tightened after performing the wheel alignment check ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .

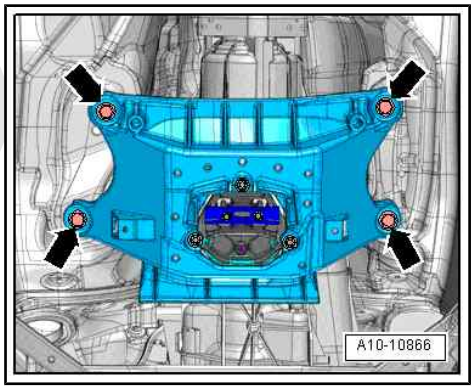
WARNING

Risk of accident because of loose bolt connections.

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



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

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

– Install clutch slave cylinder ⇒ Rep. gr. 30 ; Clutch mechanism; Exploded view - clutch hydraulics .
– Secure universal joint to steering rack ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Exploded view - steering column .
– Install propshaft ⇒ Rear final drive; Rep. gr. 39 ; Propshaft; Exploded view - propshaft .
– Install front silencers ⇒ page 370 .
– Align the exhaust system so it is free of stress ⇒ page 372 .
– Install front cross member ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim panels .
– Install subframe cross brace and anti-roll bar ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .
– Install upper suspension links and secure suspension strut to track control link ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Exploded view - suspension strut, upper links .
– Install brake calipers ⇒ Brake system; Rep. gr. 46 ; Front brakes; Exploded view - front brakes .
– Install engine control unit ⇒ page 341 .
– Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
– Install electrical wiring, terminal 30 wiring junction 2 - TV22- and cover for electronics box in engine compartment ⇒ page 89 , ⇒ page 89 ⇒ Electrical system; Rep. gr. 97 ; Relay carriers, fuse carriers, electronic boxes; Overview of fitting locations - relay carriers, fuse carriers, electronic boxes .
– Install body brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Removing and installing body brace .
– Install filler neck for washer fluid reservoir ⇒ Electrical system; Rep. gr. 92 ; Windscreen washer system; Removing and installing washer fluid reservoir .
– Install refrigerant lines ⇒ Heating, air conditioning; Rep. gr. 87 ; Overview of fitting locations - air conditioner; Overview of fitting locations - components not located in passenger compartment .
– Observe steps required after re-connecting battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .

Caution

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

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

– Install air cleaner housing ⇒ page 324 .

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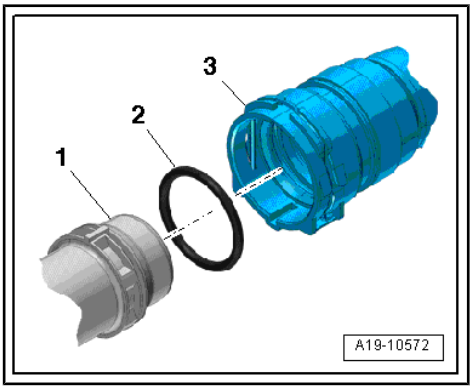
– Install lock carrier braces ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier .
– Fill up with engine oil and check oil level ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .
– Before starting engine, top up hydraulic fluid in power steering reservoir ⇒ Running gear, axles, steering; Rep. gr. 48 ; Hydraulic power steering; Checking power steering fluid level .

Note

The power steering pump must not be run when dry.

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– Connect coolant hose with plug-in connector ⇒ page 284 .
– Fill up with coolant ⇒ page 263 .



Note

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

– Charge refrigerant system ⇒ Air conditioner with refrigerant R134a; Rep. gr. 87 ; Refrigerant circuit .
– Install wheel housing liners ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liner; Exploded view - wheel housing liner (front) .
– Fit front wheels and perform wheel alignment ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheel alignment .

WARNING

Risk of accident because of loose bolt connections.

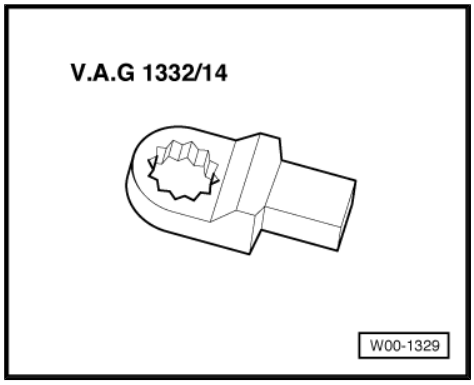
- ***Tighten subframe bolts to final setting after performing wheel alignment check.***

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

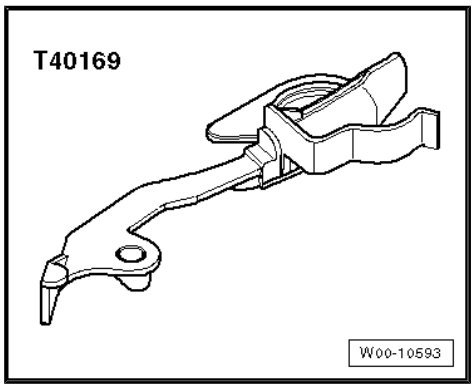
1.4.2 Installing engine - vehicles with multitronic gearbox 0AW

Special tools and workshop equipment required

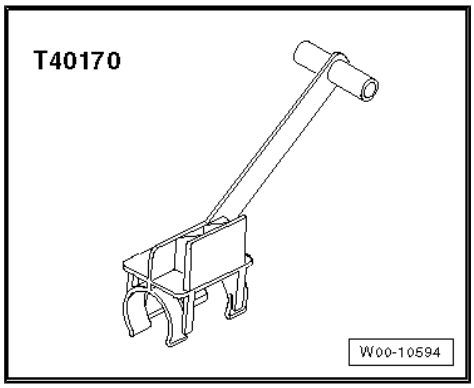
- Ring spanner insert AF 16 - V.A.G 1332/14-



- Assembly aid - T40169-



- Transport lock - T40170-



Tightening torques

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Note

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

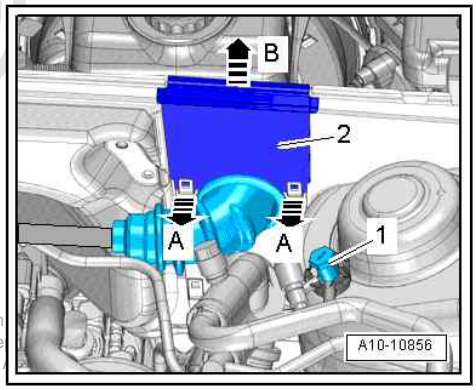
Component		Nm
Bolts/nuts	M6	9
	M7	15
	M8	20
	M10	40

Component	Nm
M12	65

Assembly mountings ⇒ page 110

Earth stud at suspension turret - tightening torque

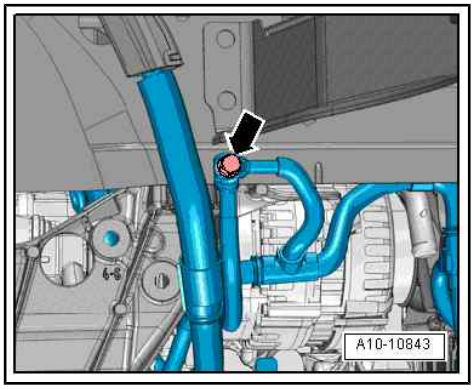
– Tighten earth stud -1- to 9 Nm.



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Earth wiring at longitudinal member - tightening torque

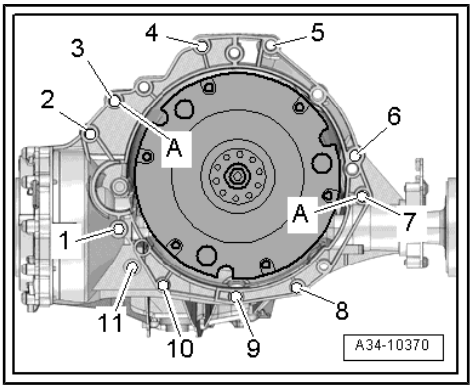
– Tighten nut -arrow- to 9 Nm.



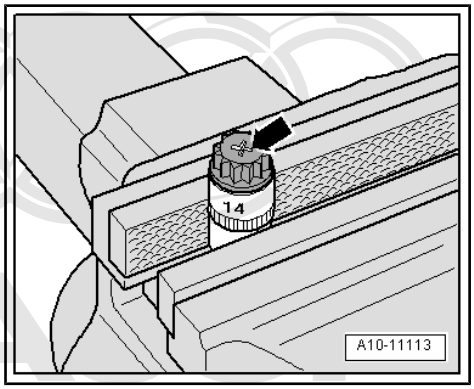
Engine to multitronic gearbox 0AW

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

- 1) Property class 10.9. The steel bolt may be re-used as often as necessary.
- 2) Audi A4 up to vehicle identification number 8K-9-066499, Audi A5 up to vehicle identification number 8T-9-007999: renew aluminium bolts.
- 3) Audi A4 from vehicle identification number 8K-9-066500 onwards, Audi A5 from vehicle identification number 8T-9-008000 onwards: aluminium bolts must not be used more often than twice ⇒ page 98 .



- Audi A4 from vehicle identification number 8K-9-066500 onwards, Audi A5 from vehicle identification number 8T-9-008000 onwards: aluminium bolts -2 ... 11- must not be used more often than twice. After the first use, the bolts must therefore be identified with an “X” made by two chisel marks -arrow-.
- To avoid damaging the bolts when making this mark, do not clamp them directly in a vice. Clamp a 14 mm socket with 1/2" drive in a vice and insert the bolt as shown.
- Bolts already marked with an “X” must not be used again.



Procedure

Note

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- *Renew the bolts tightened with specified tightening angle.*
- *Renew self-locking nuts and bolts as well as seals, gaskets and O-rings.*
- *On vehicles with multitronic gearbox 0AW, a needle bearing is fitted in the drive plate. Before installing, check that the needle bearing is fitted. Removing and installing needle bearing in drive plate (pressing in and out)* ⇒ page 126 .
- *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.*
- *Fit all cable ties in the original positions when installing.*

– Install engine supports and engine mountings ⇒ page 110 .

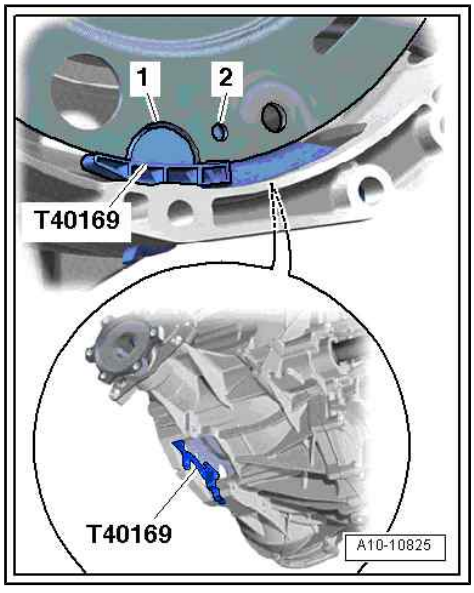
– Hold ATF lines in installation position when joining engine and subframe.

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

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

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

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

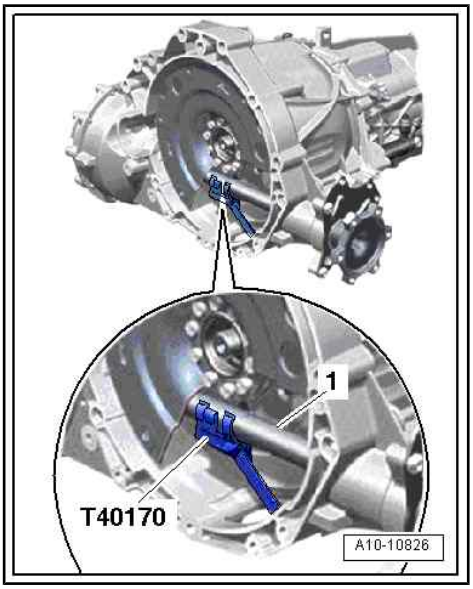


Note

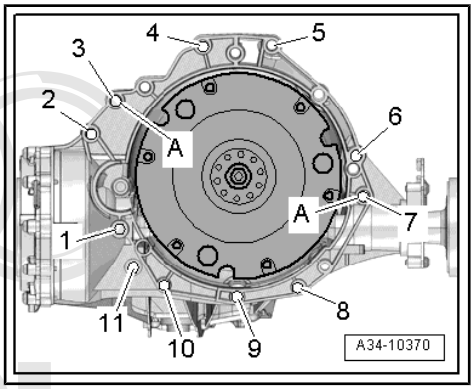
There is only one inspection hole on the circumference; turn the flywheel accordingly.

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

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



– Check whether dowel sleeves -A- for centring engine and gearbox are fitted in cylinder block; install missing dowel sleeves.
– Check whether aluminium bolts securing engine to gearbox can be reused; if so, apply marking ⇒ page 98 .
– Bring gearbox into position on engine and tighten bolts -1 … 11-.
– Remove transport lock - T40170- and assembly aid - T40169- .

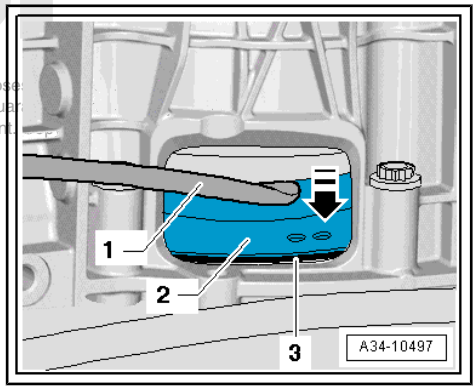


Note

The following step is necessary to ensure that the dual-mass flywheel is straight and that it makes even contact with the drive plate.

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– Use assembly lever -1- to press dual-mass flywheel -2- slightly against drive plate -3- in direction of -arrow-.

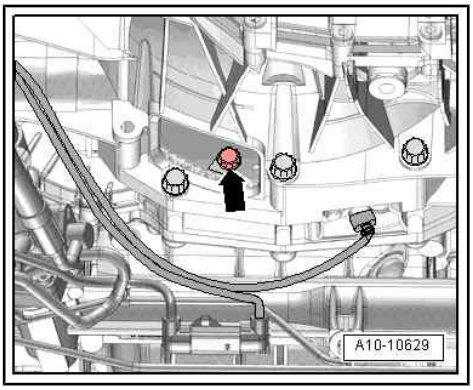


– Bolt dual-mass flywheel onto drive plate as follows:

Note

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

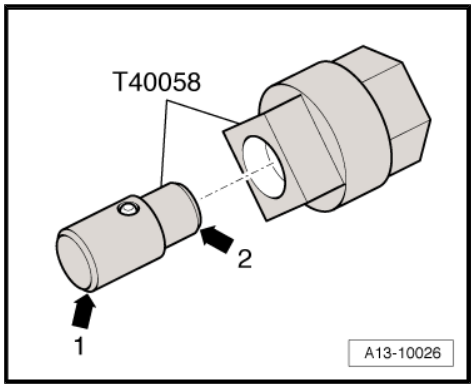
– Hand-tighten first bolt -arrow- (2 Nm).



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

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

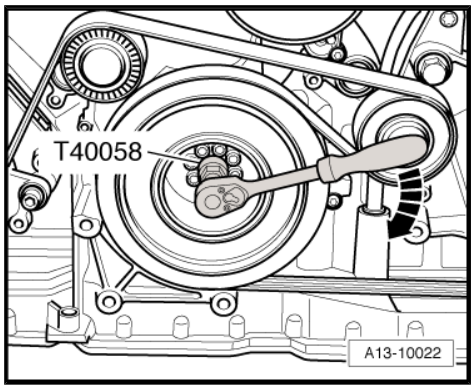
• The smaller-diameter section -arrow 2- faces the adapter.



– 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. 30 ; Clutch; Exploded view - clutch module .

– Turn crankshaft by 60° each time and tighten remaining 5 bolts to specified torque ⇒ Rep. gr. 30 ; Clutch; Exploded view - clutch module .



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

– Secure drive shafts (left and right) to gearbox flange shafts ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft .

– Install catalytic converters: left-side ⇒ page 376 , right-side ⇒ page 377 .

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

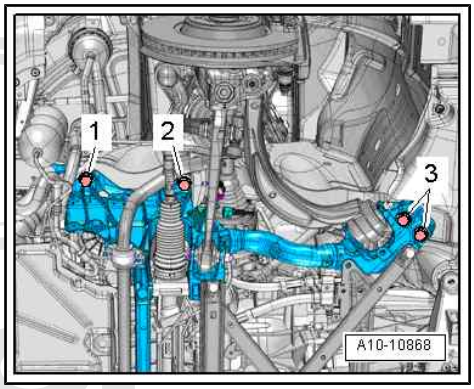
– Align subframe and gearbox carrier on longitudinal members according to markings made before removal.

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

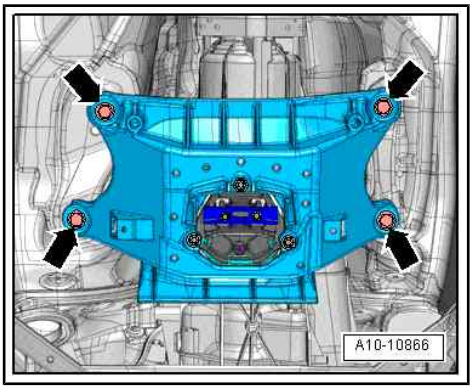
WARNING

Risk of accident because of loose bolt connections.

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



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– Tighten bolts for tunnel cross-piece ⇒ Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings .

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

– Secure universal joint to steering rack ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Exploded view - steering column .
– Install front silencers ⇒ page 370 .
– Align the exhaust system so it is free of stress ⇒ page 372 .
– Install front cross member ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim panels .
– Install subframe cross brace and anti-roll bar ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .

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– Install upper suspension links and secure suspension strut to track control link ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Exploded view - suspension strut, upper links .
– Install brake calipers ⇒ Brake system; Rep. gr. 46 ; Front brakes; Exploded view - front brakes .
– Install engine control unit ⇒ page 341 .
– Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
– Install electrical wiring, terminal 30 wiring junction 2 - TV22- and cover for electronics box in engine compartment ⇒ page 97 , ⇒ page 97 ⇒ Electrical system; Rep. gr. 97 ; Relay carriers, fuse carriers, electronic boxes; Overview of fitting locations - relay carriers, fuse carriers, electronic boxes .
– Install body brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Removing and installing body brace .
– Install filler neck for washer fluid reservoir ⇒ Electrical system; Rep. gr. 92 ; Windscreen washer system; Removing and installing washer fluid reservoir .
– Install refrigerant lines ⇒ Heating, air conditioning; Rep. gr. 87 ; Overview of fitting locations - air conditioner; Overview of fitting locations - components not located in passenger compartment .
– Observe steps required after re-connecting battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .

Caution

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

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

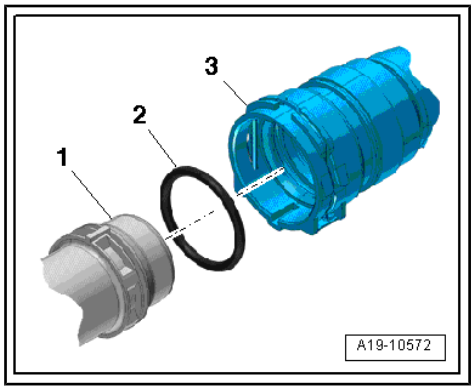
– Install air cleaner housing ⇒ page 324 .
– Install lock carrier braces ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier .
– Fill up with engine oil and check oil level ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .

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

Note

The power steering pump must not be run when dry.

– Connect coolant hose with plug-in connector ⇒ page 284 .
– Fill up with coolant ⇒ page 263 .



Note

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

– Charge refrigerant system ⇒ Air conditioner with refrigerant R134a; Rep. gr. 87 ; Refrigerant circuit .
– Align subframe ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .
– Install wheel housing liners ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liner; Exploded view - wheel housing liner (front) .
– Fit front wheels and perform wheel alignment ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheel alignment .

WARNING

Risk of accident because of loose bolt connections.

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

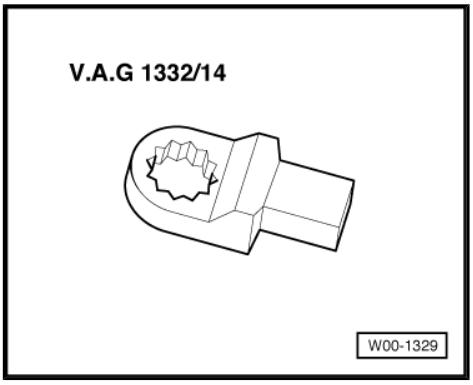
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– Fill up ATF ⇒ Rep. gr. 37 ; ATF; Draining and filling ATF .
– Install noise insulation panels ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

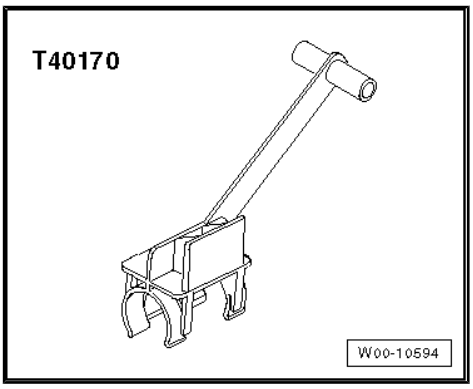
1.4.3 Installing engine - vehicles with automatic gearbox 0B6

Special tools and workshop equipment required

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



- 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.*
- *Tolerance for tightening torques: ± 15 %.*

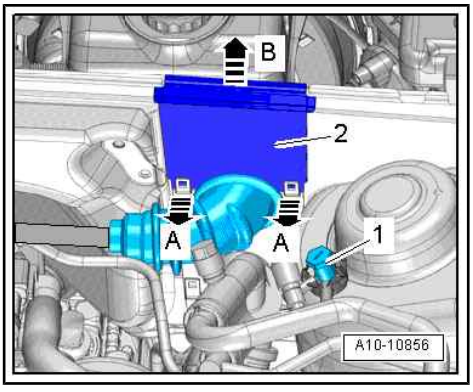
Component		Nm
Bolts/nuts	M6	9
	M7	15
	M8	20
	M10	40
	M12	65

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Assembly mountings ⇒ page 110

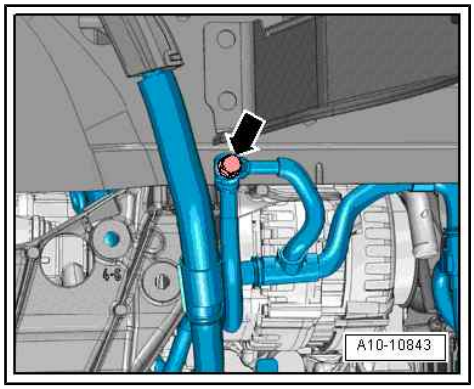
Earth stud at suspension turret - tightening torque

– Tighten earth stud -1- to 9 Nm.



Earth wiring at longitudinal member - tightening torque

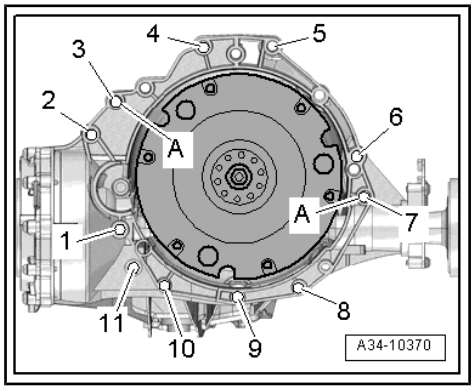
– Tighten nut -arrow- to 9 Nm.



Engine to automatic gearbox 0B6

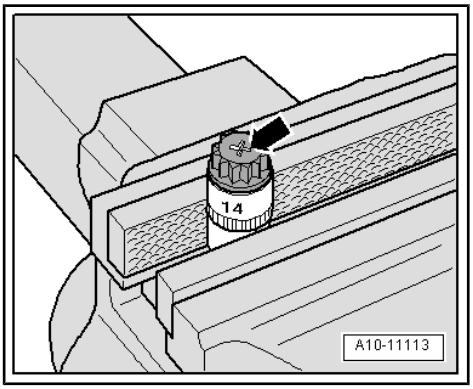
Item	Bolt	Nm
1	M10x50 1)	65
2 … 6	M12x100 2)3)	30 + 90°
7	M12x125 2)3)	30 + 90°
8, 11	M10x60 2)3)	15 + 90°
9, 10	M10x95 2)3)	15 + 90°
A	Dowel sleeves for centralising	

- 1) Property class 10.9. The steel bolt may be re-used as often as necessary.
- 2) Audi A4 up to vehicle identification number 8K-9-066499, Audi A5 up to vehicle identification number 8T-9-007999: renew aluminium bolts.
- 3) Audi A4 from vehicle identification number 8K-9-066500 onwards, Audi A5 from vehicle identification number 8T-9-008000 onwards: aluminium bolts must not be used more often than twice ⇒ page 105 .



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- Audi A4 from vehicle identification number 8K-9-066500 onwards, Audi A5 from vehicle identification number 8T-9-008000 onwards: aluminium bolts -2 ... 11- must not be used more often than twice. After the first use, the bolts must therefore be identified with an “X” made by two chisel marks -arrow-.
- To avoid damaging the bolts when making this mark, do not clamp them directly in a vice. Clamp a 14 mm socket with 1/2" drive in a vice and insert the bolt as shown.
- Bolts already marked with an “X” must not be used again.



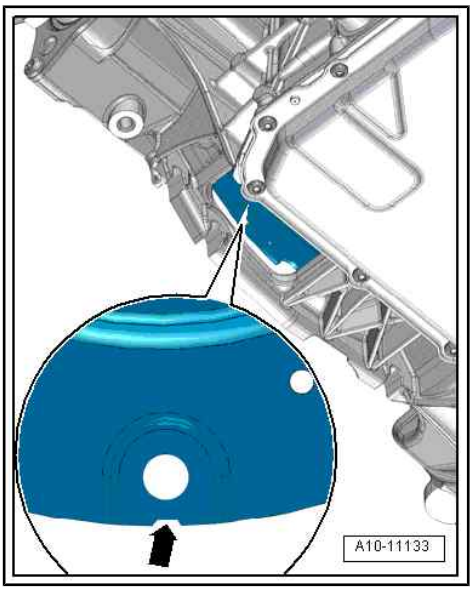
Procedure

Note

- *Renew the bolts tightened with specified tightening angle.*
- *Renew self-locking nuts and bolts as well as seals, gaskets and O-rings.*
- *On vehicles with automatic gearbox 0B6, no needle bearing should be fitted in the drive plate. Before installing, check whether a needle bearing is fitted. Press needle bearing out of drive plate ⇒ page 126 .*
- *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.*
- *Fit all cable ties in the original positions when installing.*

– Install engine supports and engine mountings ⇒ page 110 .
– Hold ATF lines in installation position when joining engine and subframe.
– Before installing gearbox, remove residue from threaded holes for engine/gearbox bolts in cylinder block using a thread tap.

– 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.

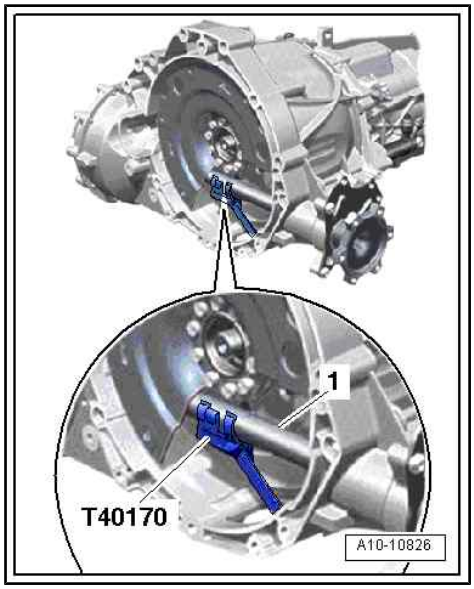


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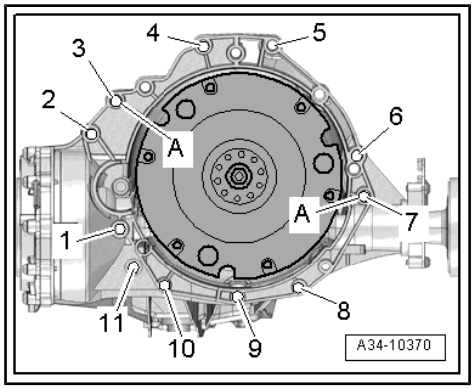
Note

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

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



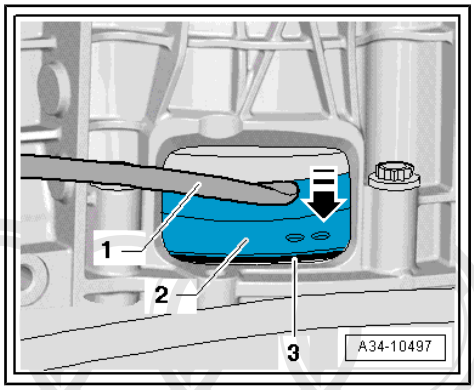
– Check whether dowel sleeves -A- for centring engine and gearbox are fitted in cylinder block; install missing dowel sleeves.
– Check whether aluminium bolts securing engine to gearbox can be reused; if so, apply marking ⇒ page 105 .
– Bring gearbox into position on engine and tighten bolts -1, 6 … 11-.
– Remove transport lock - T40170- .



Note

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

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

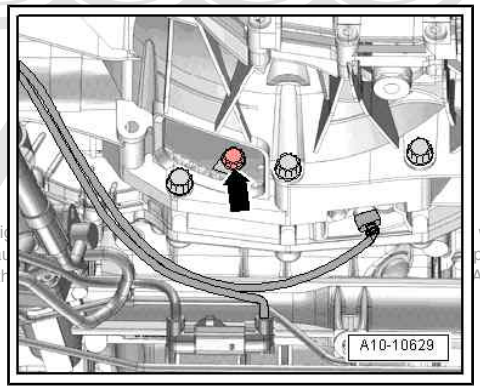


– Bolt torque converter onto drive plate as follows:

Note

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

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

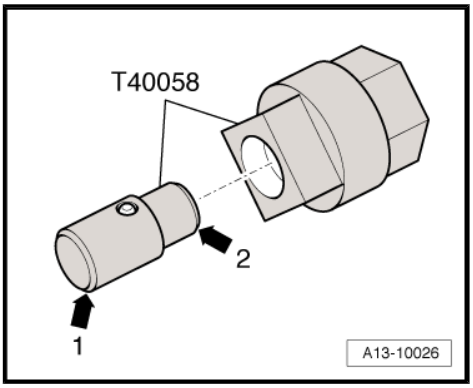


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– Insert guide pin of adapter -T40058- as follows:

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

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



– 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. 30 ; Clutch; Exploded view - clutch module .

– Turn crankshaft by 60° each time and tighten remaining 5 bolts to specified torque ⇒ Rep. gr. 30 ; Clutch; Exploded view - clutch module .

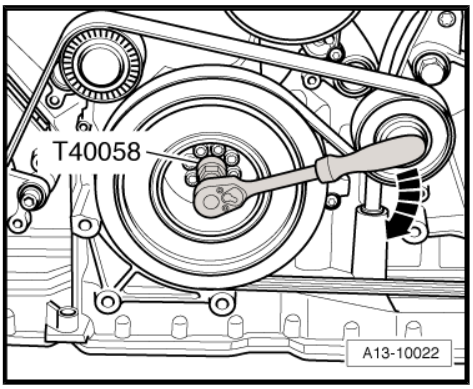
– Install hydraulic lines for power steering ⇒ Running gear, axles, steering; Rep. gr. 48 ; Hydraulic power steering; Checking power steering fluid level .

– Secure drive shafts (left and right) to gearbox flange shafts ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft .

– Install catalytic converters: left-side ⇒ page 376 , right-side ⇒ page 378 .

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

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



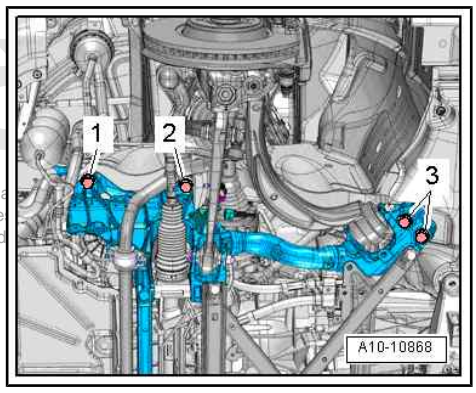
– Tighten subframe bolts only to specified torque (do not turn further); the bolts should only be fully tightened after performing the wheel alignment check ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .

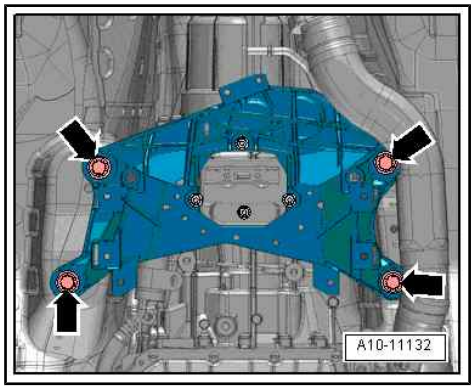
WARNING

Risk of accident because of loose bolt connections.

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

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

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

– Secure universal joint to steering rack ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Exploded view - steering column .
– Install propshaft ⇒ Rear final drive; Rep. gr. 39 ; Propshaft; Exploded view - propshaft .
– Install front silencers ⇒ page 370 .
– Align the exhaust system so it is free of stress ⇒ page 372 .
– Install front cross member ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim panels .
– Install subframe cross brace and anti-roll bar ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .
– Install upper suspension links and secure suspension strut to track control link ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Exploded view - suspension strut, upper links .
– Install brake calipers ⇒ Brake system; Rep. gr. 46 ; Front brakes; Exploded view - front brakes .
– Install engine control unit ⇒ page 341 .
– Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
– Install electrical wiring, terminal 30 wiring junction 2 - TV22- and cover for electronics box in engine compartment ⇒ page 103 , ⇒ page 104 ⇒ Electrical system; Rep. gr. 97 ; Relay carriers, fuse carriers, electronic boxes; Overview of fitting locations - relay carriers, fuse carriers, electronic boxes .
– Install body brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Removing and installing body brace .
– Install filler neck for washer fluid reservoir ⇒ Electrical system; Rep. gr. 92 ; Windscreen washer system; Removing and installing washer fluid reservoir .
– Install refrigerant lines ⇒ Heating, air conditioning; Rep. gr. 87 ; Overview of fitting locations - air conditioner; Overview of fitting locations - components not located in passenger compartment .
– Observe steps required after re-connecting battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .

Caution

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

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

– Install air cleaner housing ⇒ page 324 .
– Install lock carrier braces ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier .

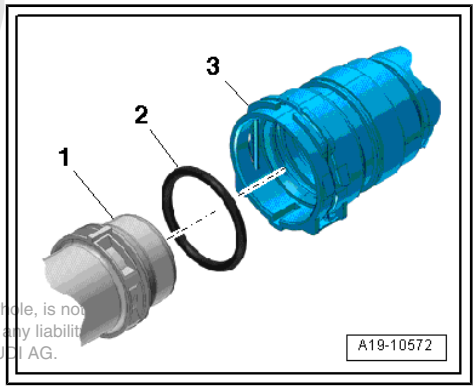
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– Fill up with engine oil and check oil level ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .
– Before starting engine, top up hydraulic fluid in power steering reservoir ⇒ Running gear, axles, steering; Rep. gr. 48 ; Hydraulic power steering; Checking power steering fluid level .

Note

The power steering pump must not be run when dry.

– Connect coolant hose with plug-in connector ⇒ page 284 .
– Fill up with coolant ⇒ page 263 .



Note

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

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– Charge refrigerant system ⇒ Air conditioner with refrigerant R134a; Rep. gr. 87 ; Refrigerant circuit .
– Align subframe ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .
– Install wheel housing liners ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liner; Exploded view - wheel housing liner (front) .
– Fit front wheels and perform wheel alignment ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheel alignment .

WARNING

Risk of accident because of loose bolt connections.

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

– Fill up ATF ⇒ Rep. gr. 37 ; ATF; Draining and filling ATF .
– Install noise insulation panels ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

2 Assembly mountings

⇒ “2.1 Exploded view - assembly mountings”, page 110

⇒ “2.2 Removing and installing engine mounting (left-side)”, page 110

⇒ “2.3 Removing and installing engine mounting (right-side)”, page 113

2.1 Exploded view - assembly mountings

1 - Bolt
- ❑ 20 Nm

2 - Bracket
- ❑ For engine mounting
- ❑ Always renew when renewing engine mountings

3 - Bolt
- ❑ 40 Nm

4 - Engine support

5 - Bolt
- ❑ 10 Nm

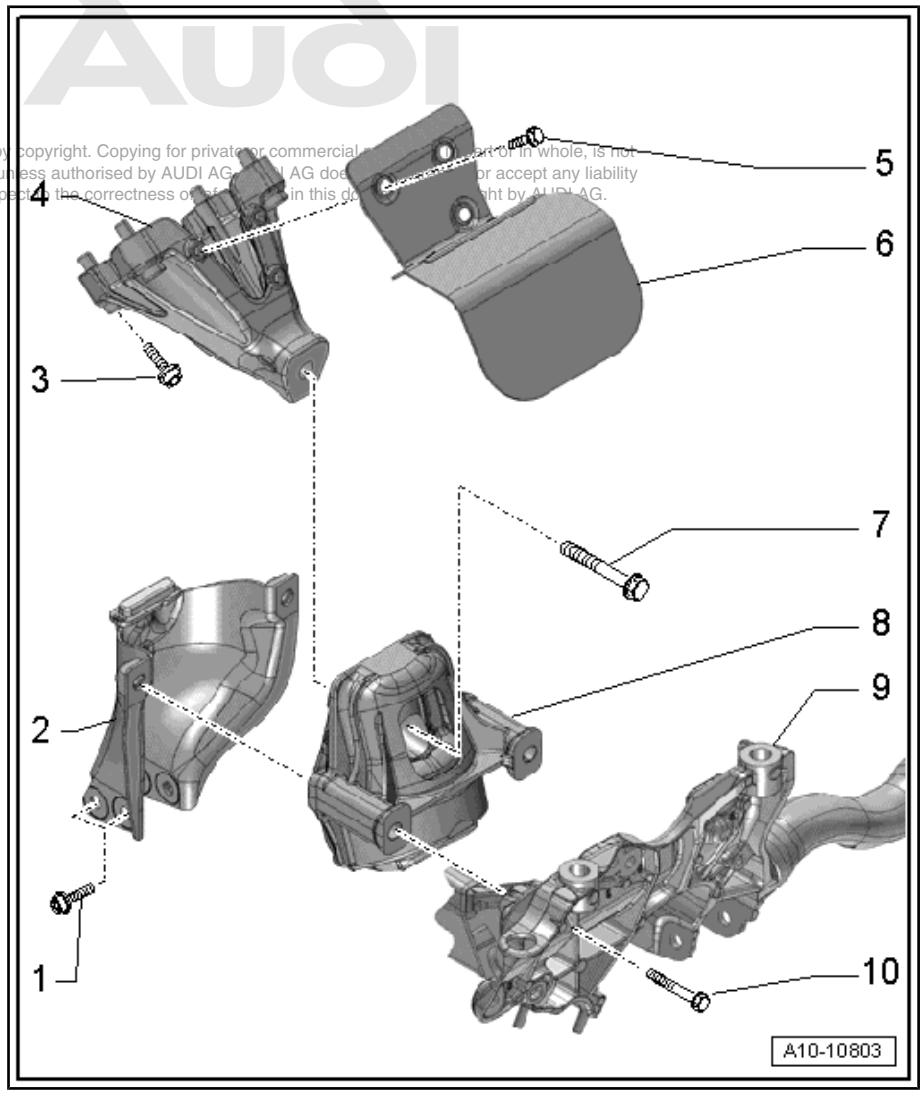
6 - Heat shield

7 - Bolt
- ❑ Renew
- ❑ 90 Nm + turn 90° further

8 - Engine mounting
- ❑ Removing and installing: left-side ⇒ page 110 , right-side ⇒ page 113
- ❑ Always renew on both sides together

9 - Subframe

10 - Bolt
- ❑ 55 Nm



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2.2 Removing and installing engine mounting (left-side)

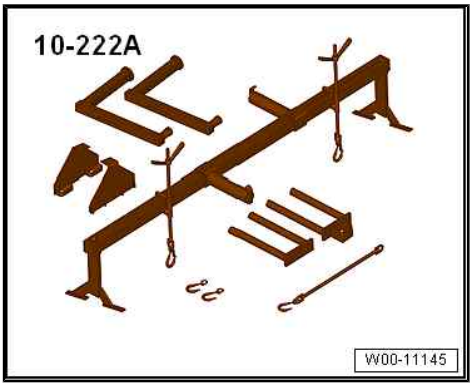
Note

- *Renew engine mountings on both sides together.*
- *Also renew corresponding brackets.*

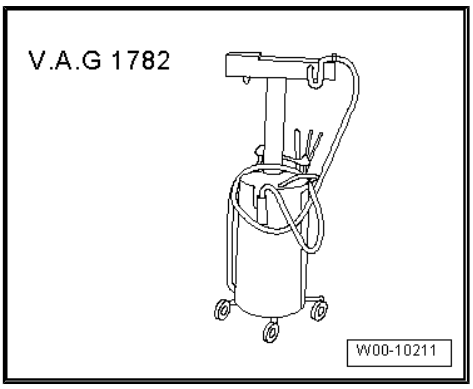
Special tools and workshop equipment required

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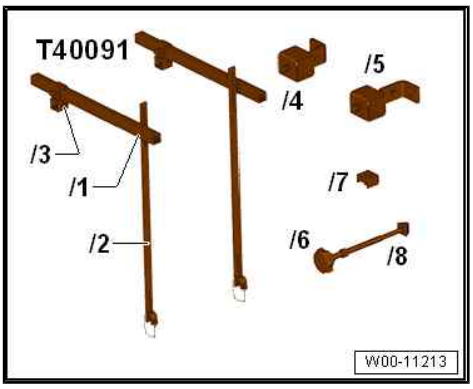
- Support bracket - 10 - 222 A-



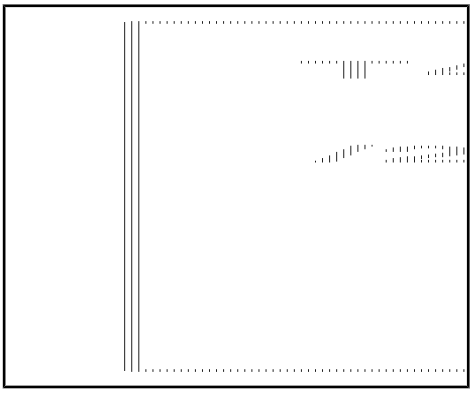
- Used oil collection and extraction unit - V.A.G 1782-



- Engine support bracket (basic set) - T40091-



- Engine support bracket (supplementary set) - T40093-

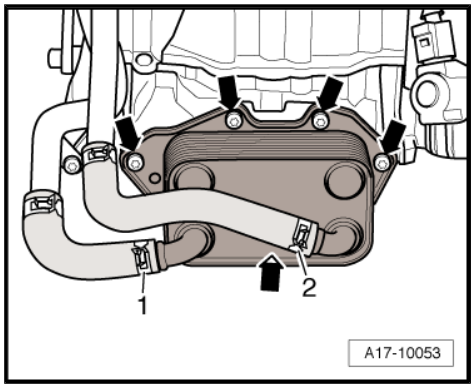


Removing

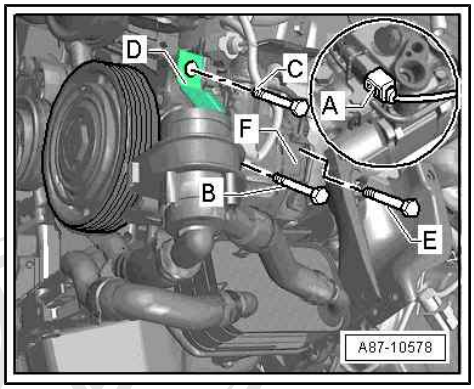
– Position used oil collection and extraction unit - V.A.G 1782- below engine.

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

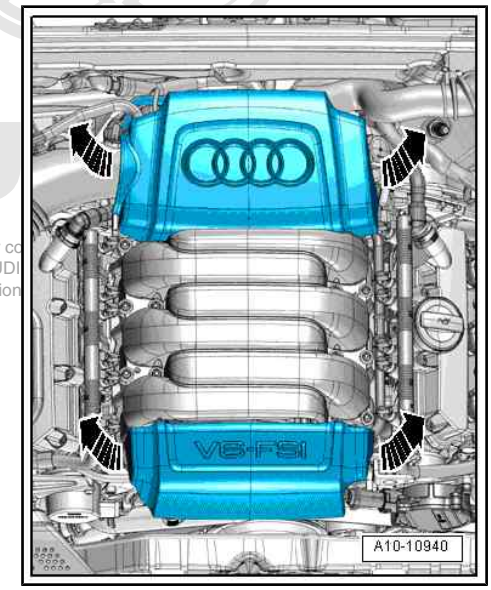
– On vehicles with continued coolant circulation pump - V51- , remove -V51- ⇒ page 269 and engine oil cooler ⇒ page 243 .



– Remove air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Removing and installing air conditioner compressor .



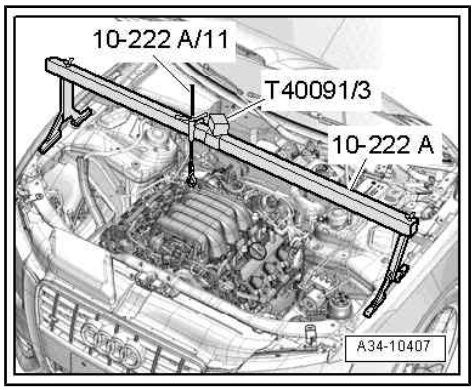
– Pull off rear engine cover panel -top arrows-.



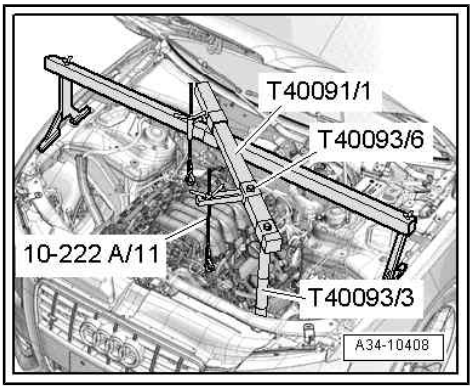
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– Set up support bracket - 10 - 222 A- with connecting piece - T40091/3- on suspension turrets (left and right) as illustrated.

– Attach spindle -10 - 222 A /11- to engine lifting eye (right-side).



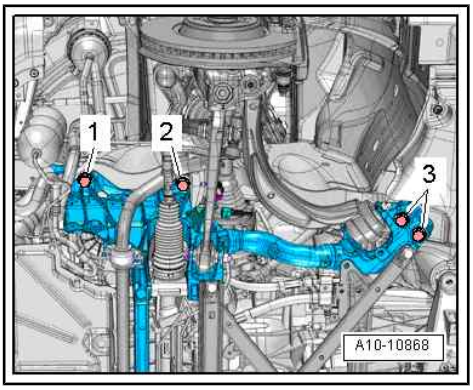
– Attach further components of support bracket - 10 - 222 A- as shown in illustration. Position support -T40093/3- onto flange of longitudinal member.
– Attach spindle -10 - 222 A /11- to engine lifting eye (left-side).
– Partly take up weight of engine with spindles.



– 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.

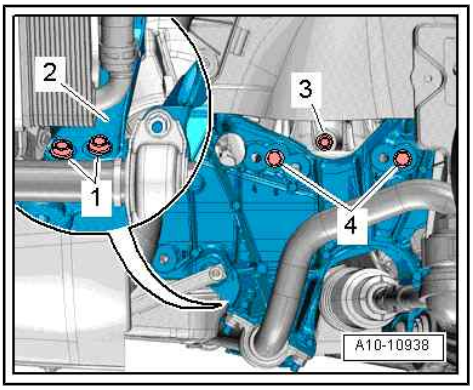


– Remove bolts -1-, -3- and -4- for engine mounting (left-side).
– Move retaining plate -2- for engine mounting (left-side) clear to the side.
– Detach engine mounting (left-side).

Installing

• Tightening torques ⇒ page 110

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



Note

Renew the bolts tightened with specified tightening angle.

– Secure subframe ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .
– Install engine oil cooler ⇒ page 243 .
– Install air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Removing and installing air conditioner compressor .
– Install continued coolant circulation pump - V51- ⇒ page 269 .

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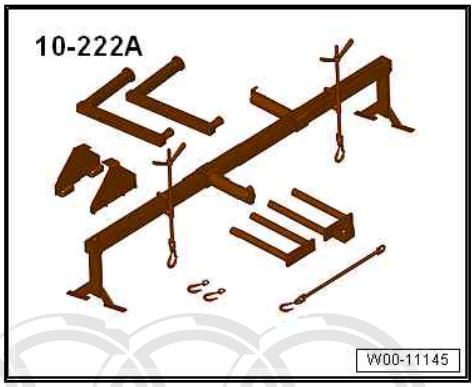
2.3 Removing and installing engine mounting (right-side)

Note

♦ *Renew engine mountings on both sides together.*
♦ *Also renew corresponding brackets.*

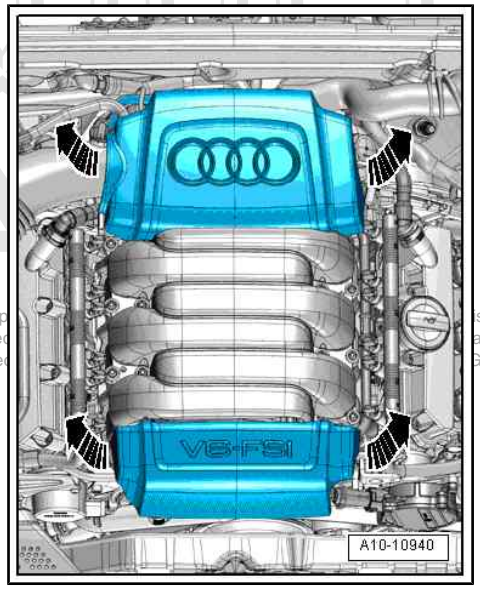
Special tools and workshop equipment required

- Support bracket - 10 - 222 A-



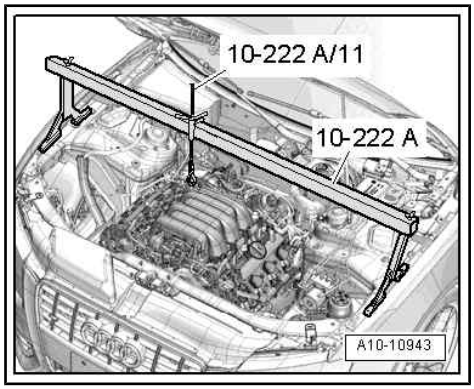
Removing

– Pull off rear engine cover panel -top arrows-.

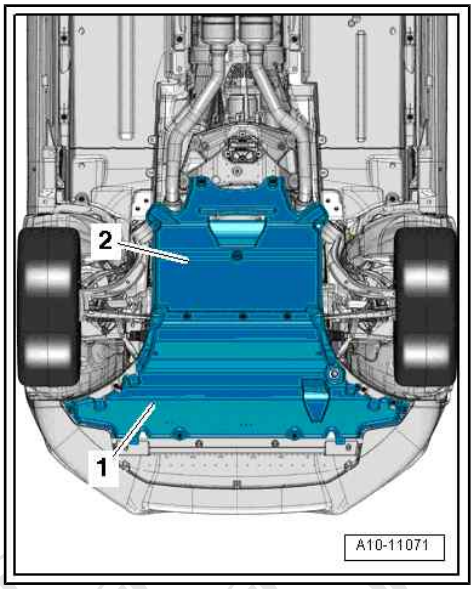


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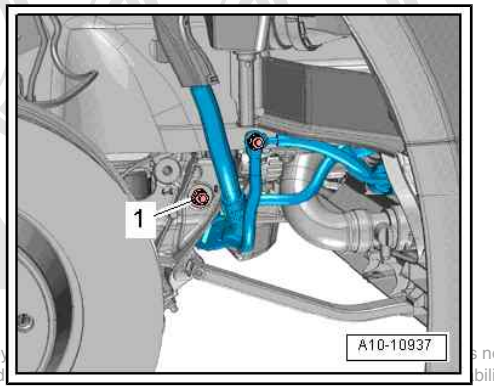
– Set up support bracket - 10 - 222 A- on suspension turrets (left and right) as illustrated.
– Attach spindle - 10 - 222 A /11- to engine lifting eye (right-side) and apply slight tension.



– Remove front right wheel.
– Remove wheel housing liner (front right) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liner; Exploded view - front wheel housing liner .
– Remove front noise insulation -1- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

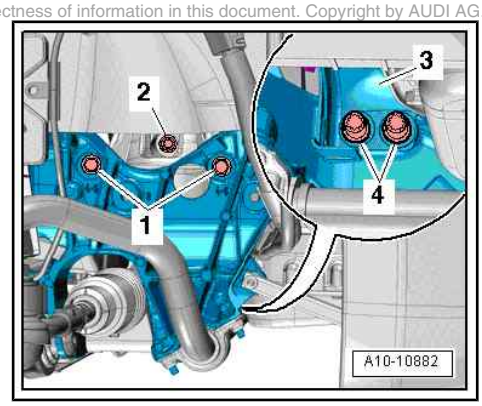


– Unscrew nut -1- and detach bracket with electrical wiring from subframe.

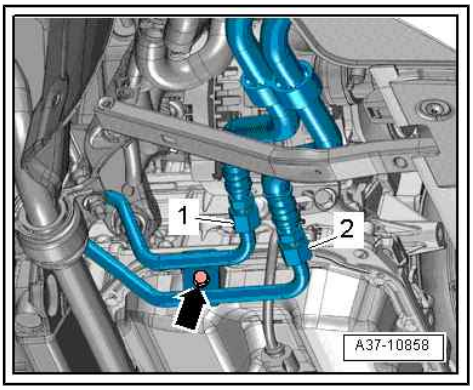


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– Remove bolts -1, 2, 4- and move clear retaining plate -3- for engine mounting (right-side).



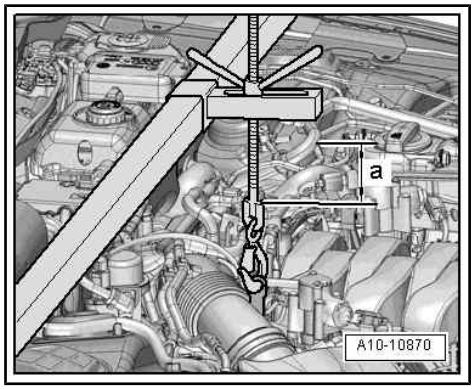
– Vehicles with multitronic gearbox 0AW/automatic gearbox 0B6: remove bolt -arrow- at bracket for ATF lines.



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

• Distance -a- = approx. 20 mm.

– Detach engine mounting (right-side).



Installing

• Tightening torques ⇒ page 110

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

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

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

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

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13 – Crankshaft group

1 Cylinder block (pulley end)

⇒ "1.1 Exploded view - poly V-belt drive", page 117

⇒ "1.2 Removing and installing poly V-belt", page 119

⇒ "1.3 Removing and installing tensioner for poly V-belt", page 120

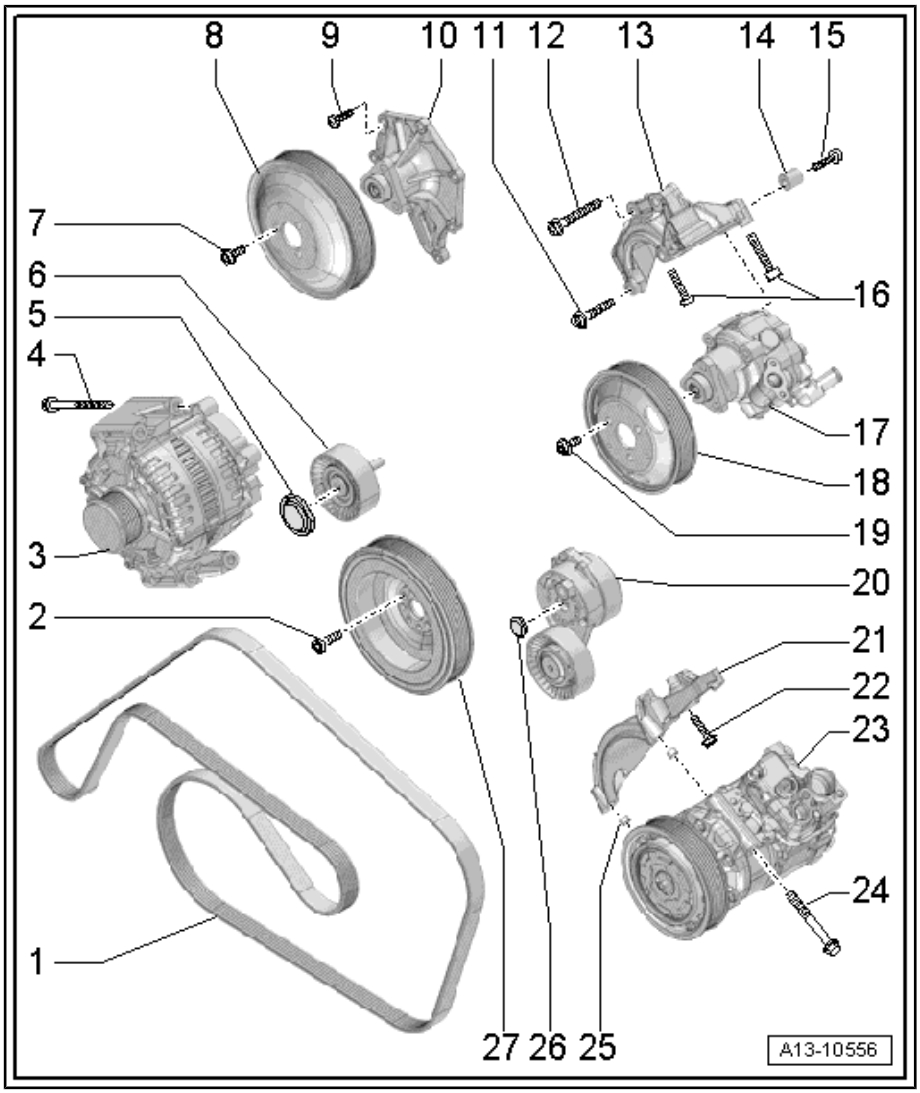
⇒ "1.4 Removing and installing vibration damper", page 121

⇒ "1.5 Removing and installing sealing flange (pulley end)", page 121

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1.1 Exploded view - poly V-belt drive



1 - Poly V-belt

- ❑ Check for wear
- ❑ Before removing, mark direction of rotation with chalk or felt-tip pen
- ❑ Removing and installing ⇒ page 119
- ❑ Do not kink
- ❑ When installing, make sure it is properly seated on pulleys

2 - Bolt

- ❑ Renew
- ❑ 20 Nm + turn 90° further

3 - Alternator

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

4 - Bolt

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

5 - Cover for idler roller

6 - Idler roller for poly V-belt

- ❑ 40 Nm

7 - Bolt

- ❑ Tightening torque ⇒ page 268

8 - Poly V-belt pulley for coolant pump

9 - Bolt

- ❑ Tightening torque ⇒ page 268

10 - Coolant pump

- ❑ Removing and installing ⇒ page 271

11 - Bolt

- ❑ Tightening torque ⇒ Running gear, axles, steering; Rep. gr. 48 ; Hydraulic power steering; Exploded view - power steering pump

12 - Bolt

- ❑ Tightening torque ⇒ Running gear, axles, steering; Rep. gr. 48 ; Hydraulic power steering; Exploded view - power steering pump

13 - Bracket for power steering pump

14 - Sliding bush

15 - Bolt

- ❑ Tightening torque ⇒ Running gear, axles, steering; Rep. gr. 48 ; Hydraulic power steering; Exploded view - power steering pump

16 - Bolt

- ❑ Tightening torque ⇒ Running gear, axles, steering; Rep. gr. 48 ; Hydraulic power steering; Exploded view - power steering pump

17 - Power steering pump

- ❑ Removing and installing ⇒ Running gear, axles, steering; Rep. gr. 48 ; Hydraulic power steering; Exploded view - power steering pump

18 - Poly V-belt pulley for power steering pump

- ❑ Removing and installing ⇒ Running gear, axles, steering; Rep. gr. 48 ; Hydraulic power steering; Exploded view - power steering pump

19 - Bolt

- ❑ Tightening torque ⇒ Running gear, axles, steering; Rep. gr. 48 ; Hydraulic power steering; Exploded view - power steering pump

20 - Poly V-belt tensioner

- ❑ Removing and installing ⇒ page 120
- ❑ 40 Nm

21 - Bracket for air conditioner compressor

- ❑ Pay attention to dowel sleeves when installing

22 - Bolt

- ❑ 20 Nm

23 - Air conditioner compressor

- ❑ Do not unscrew or disconnect refrigerant hoses or pipes
- ❑ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Removing and installing air conditioner compressor
- ❑ When installing check dowel sleeves -item 25-

24 - Bolt

- ❑ Tightening torque ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Exploded view - air conditioner compressor drive unit

25 - Dowel sleeve

- ❑ 2x

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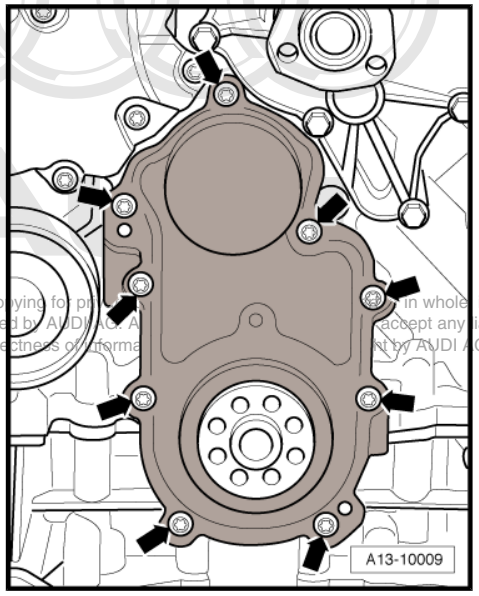
26 - Cover for tensioner

27 - Vibration damper

- ❑ With pulley for poly V-belt
- ❑ Can only be installed in one position (holes are off-set).
- ❑ Removing and installing ⇒ page 121

Sealing flange (pulley end) - tightening torque and sequence

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

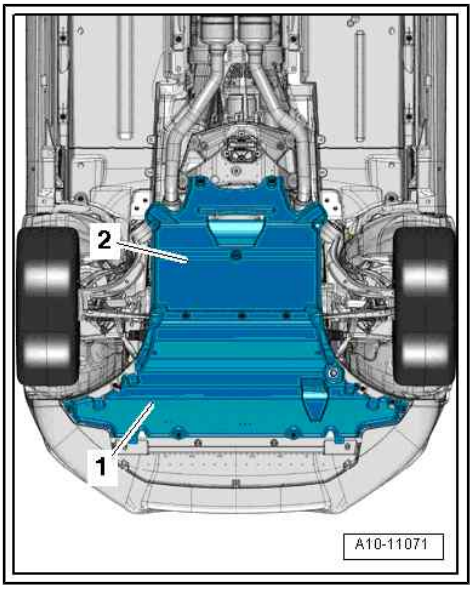


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1.2 Removing and installing poly V-belt

Removing

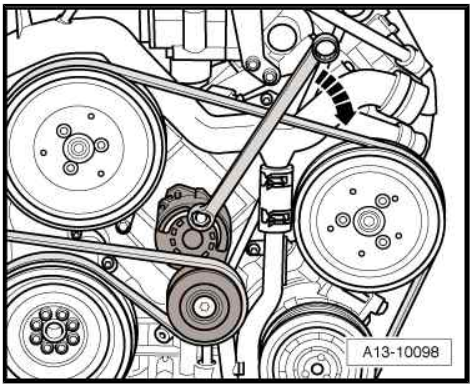
– Remove front noise insulation -1- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .



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 -arrow-.

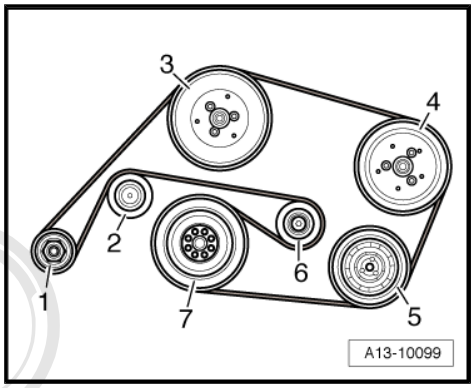
– Remove poly V-belt and release tensioner.

Installing

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

– Fit poly V-belt onto pulleys in the sequence indicated.

1 - Alternator
2 - Idler roller
3 - Coolant pump
4 - Power steering pump
5 - Air conditioner compressor
6 - Poly V-belt tensioner
7 - Vibration damper with poly V-belt pulley



Note

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

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– Start engine and check that belt runs properly.
– Install noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

1.3 Removing and installing tensioner for poly V-belt

Removing

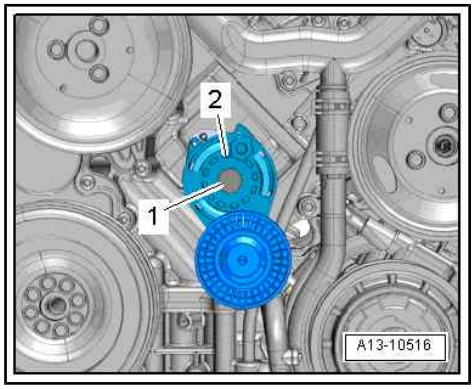
– Remove poly V-belt ⇒ page 119 .
– Detach cover and remove bolt -1- behind it.
– Detach poly V-belt tensioner -2- from cylinder block.

Installing

• Tightening torque ⇒ page 117

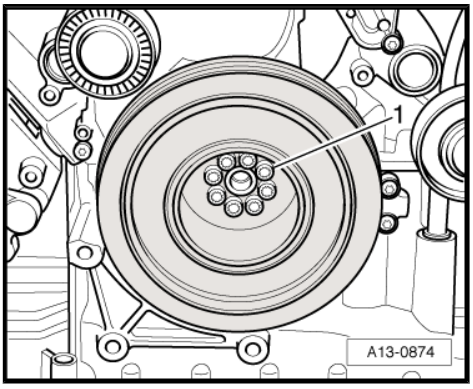
Installation is carried out in the reverse order; note the following:

– Install poly V-belt ⇒ page 119 .



1.4 Removing and installing vibration damper

Removing



– Remove poly V-belt ⇒ page 119 .

– Remove bolts -1- and detach vibration damper with poly V-belt pulley.

Installing

• Tightening torque ⇒ page 117

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

Note

♦ *Renew bolts for vibration damper.*

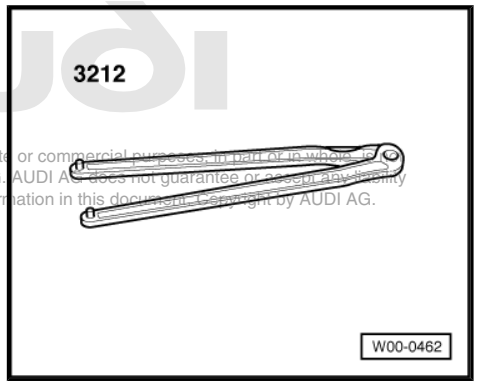
♦ *Can only be installed in one position (holes are off-set)*

– Install poly V-belt ⇒ page 119 .

1.5 Removing and installing sealing flange (pulley end)

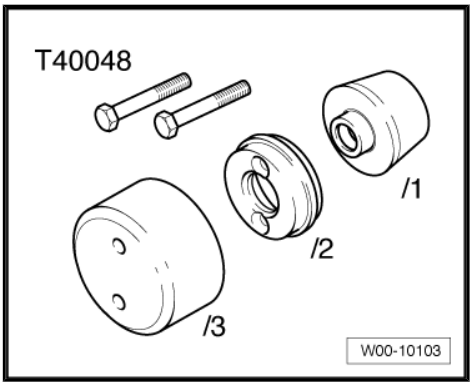
Special tools and workshop equipment required

♦ Pin wrench - 3212-



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♦ Assembly tool - T40048-



♦ Electric drill with plastic brush attachment

♦ Safety goggles

♦ Sealant ⇒ Electronic parts catalogue

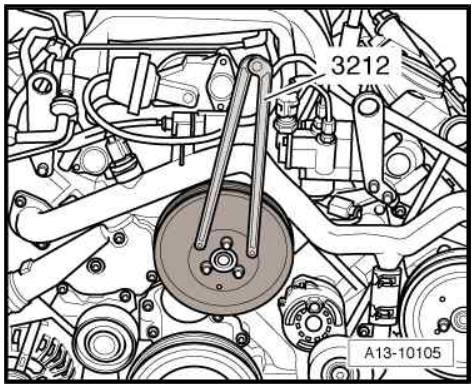
Procedure

– Pull off front part of engine cover panel -bottom arrows-.

– Remove vibration damper with poly V-belt pulley ⇒ page 121 .



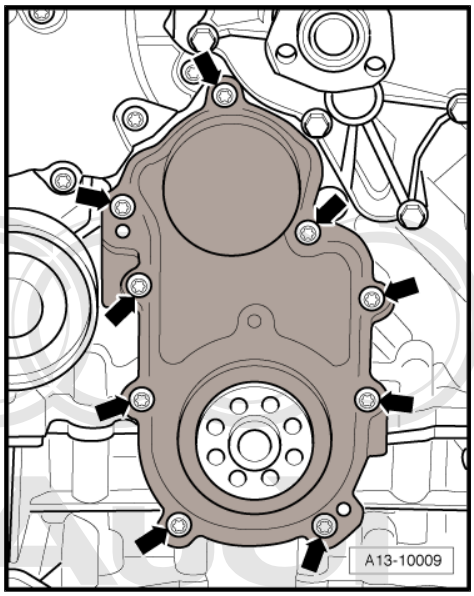
– Remove bolts for coolant pump pulley (counterhold with pin wrench - 3212-).



– Remove bolts -arrows- and detach sealing flange (pulley end).

Note

Renew sealing flange (pulley end).



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Caution

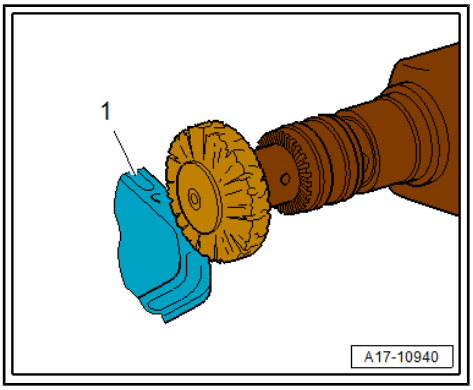
Protect lubrication system against contamination.

- *Cover exposed parts of the engine.*

WARNING

Risk of eye injury.

- *Wear safety goggles.*



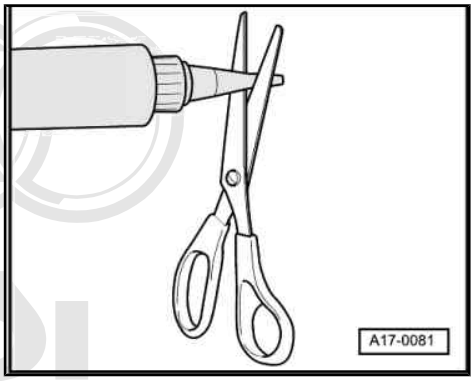
– Remove sealant residue from cylinder block and sump (top section) using rotating plastic brush or similar.

– 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 ∅ approx. 1.5 mm).



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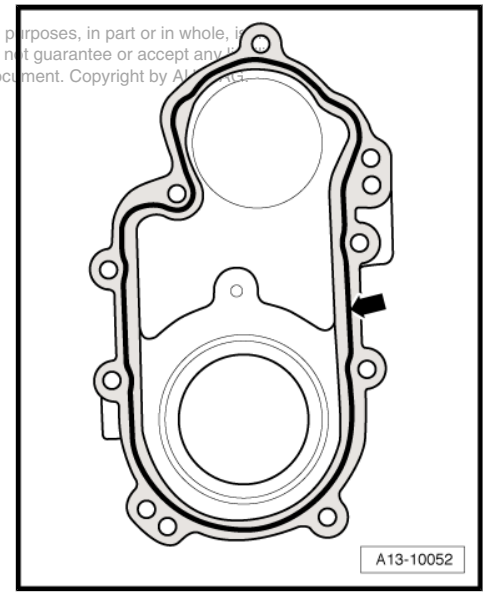
Caution

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 sealing surface of new sealing flange (pulley end) as shown in illustration.

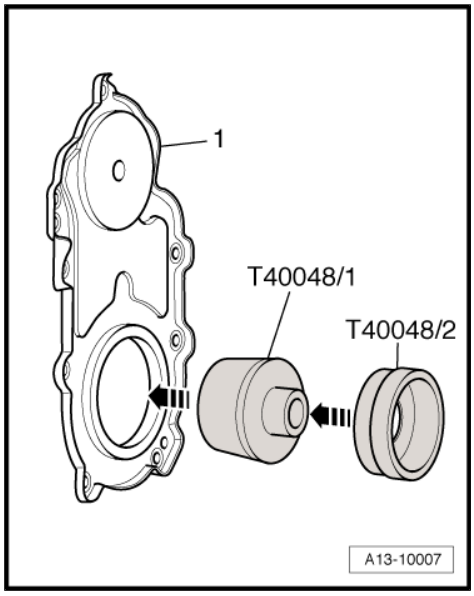
- The groove on the sealing surface must be completely filled with sealant.
- The bead of sealant must project 1.5 … 2.0 mm above the sealing surface.



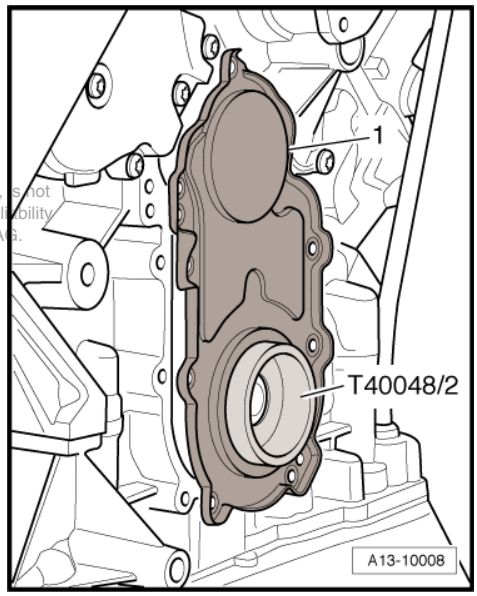
Note

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

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



– First position sealing flange (with assembly sleeve -T40048/2- inserted) on crankshaft.
– Keep sealing flange straight while pushing it onto engine sealing surface. Then bolt on ⇒ page 119 .



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

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– Install poly V-belt pulley for coolant pump ⇒ page 268 .
– Install vibration damper with poly V-belt pulley ⇒ page 121 .

2 Cylinder block (gearbox end)

⇒ "2.1 Exploded view - drive plate", page 125

⇒ "2.2 Removing and installing drive plate", page 125

⇒ "2.3 Renewing needle bearing in drive plate", page 126

⇒ "2.4 Renewing crankshaft oil seal (gearbox end)", page 128

2.1 Exploded view - drive plate

Note

When carrying out repairs, secure engine to engine and gearbox support - VAS 6095- using bracket for V6 FSI engine -VAS 6095/1-5- ⇒ page 83 .

1 - Drive plate

- ❑ With bearing flange
- ❑ Check running surface on bearing flange and holes for clutch module for cracks and scoring.
- ❑ Removing and installing ⇒ page 125

2 - Bolt

- ❑ Renew
- ❑ 60 Nm + turn 90° further

3 - Needle bearing

- ❑ Only for vehicles with manual gearbox/multi-tronic gearbox 0AW
- ❑ Installation position: closed side towards engine
- ❑ Removing and installing ⇒ page 126

4 - Sender wheel

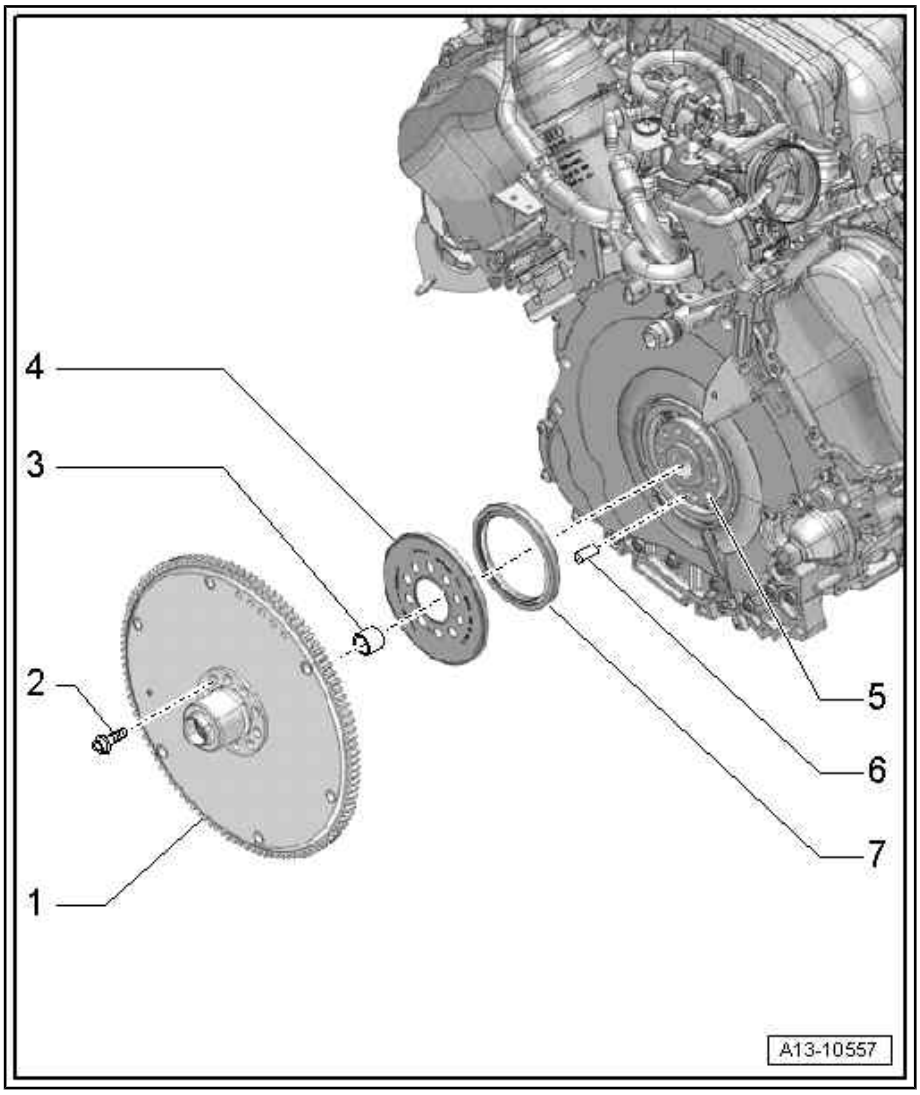
- ❑ For engine speed sender - G28-

5 - Crankshaft

6 - Dowel pin

7 - Crankshaft oil seal (gearbox end)

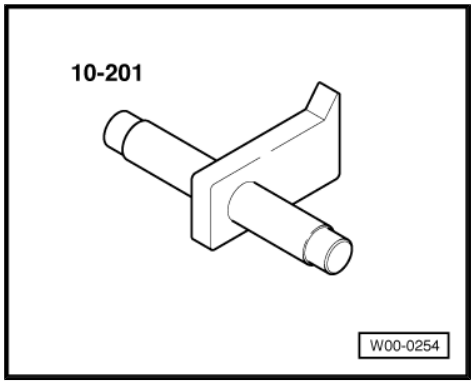
- ❑ Renewing ⇒ page 128



2.2 Removing and installing drive plate

Special tools and workshop equipment required

♦ Counterhold tool - 10 - 201-



Removing

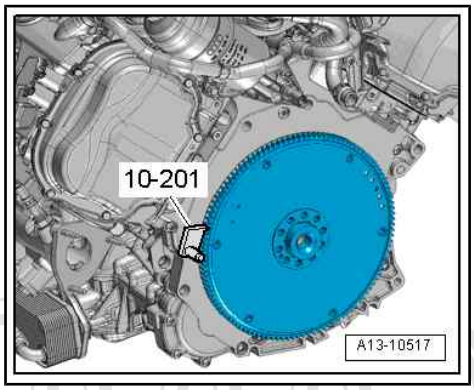
- Gearbox removed.

– 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

- Tightening torque ⇒ page 125

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

Note

♦ *Renew bolts for drive plate.*

♦ *On vehicles with manual gearbox or multitronic gearbox 0AW, a needle bearing is fitted in the drive plate. On vehicles with automatic gearbox 0B6, no needle bearing should be fitted. Before installing, check that the needle bearing is fitted. Removing and installing needle bearing in drive plate (pressing in and out)* ⇒ page 126 .

– Pay attention to dowel pin when installing drive plate.

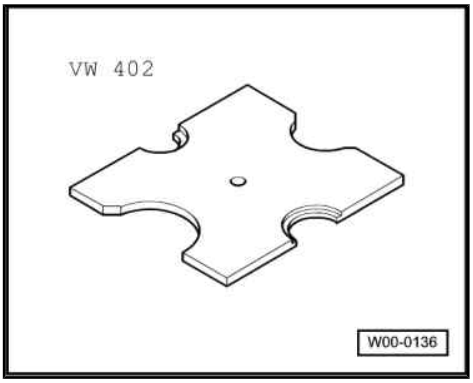
– Fit counterhold tool - 10 - 201- the other way round to tighten bolts.

2.3 Renewing needle bearing in drive plate

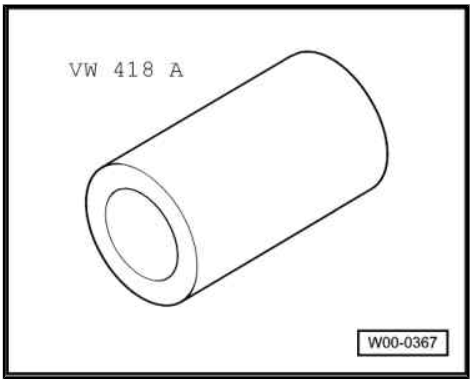
Special tools and workshop equipment required

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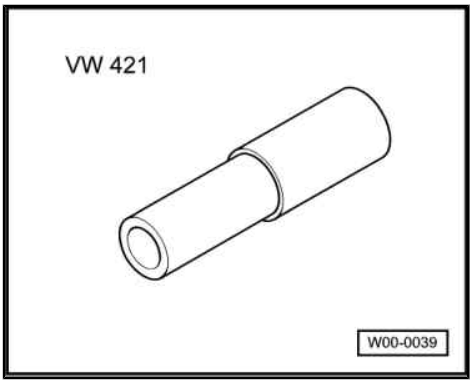
- Thrust plate - VW 402-



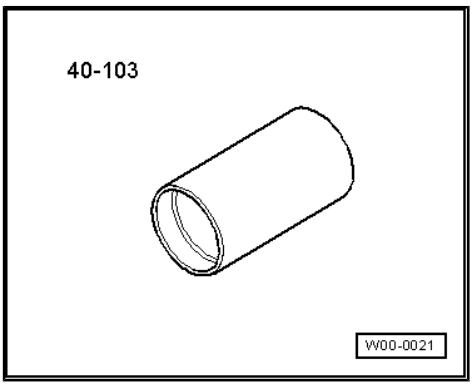
- Tube - VW 418 A-



- Tube - VW 421-



- Support - 40 - 103-



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Procedure

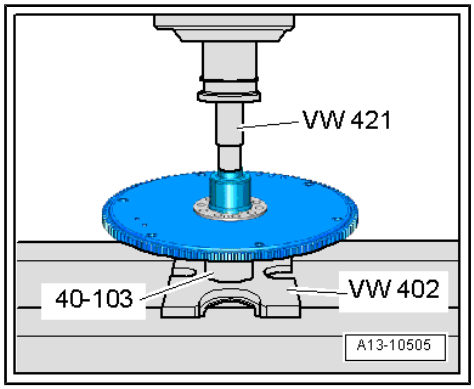
- Gearbox removed.

– Remove drive plate ⇒ page 125 .

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

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

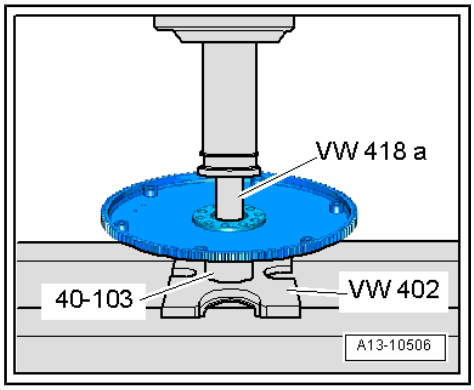
- Smaller diameter of tube -VW 421- faces drive plate.



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

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

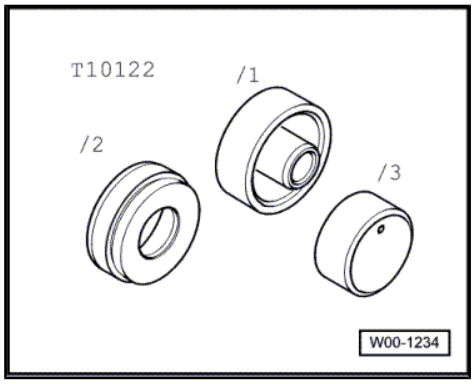
– Install drive plate ⇒ page 125 .



2.4 Renewing crankshaft oil seal (gearbox end)

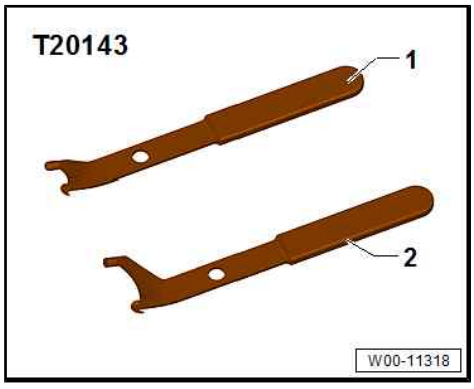
Special tools and workshop equipment required

♦ Fitting tool - T10122-



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♦ Extractor tool - T20143/2-



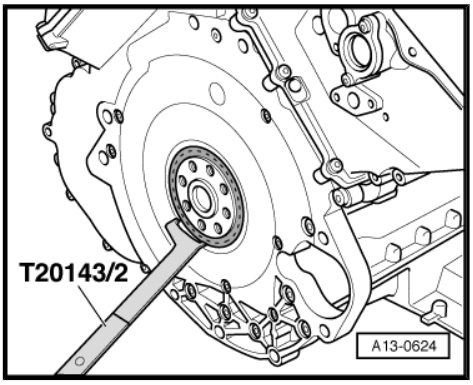
Procedure

- Gearbox removed.

– Remove drive plate ⇒ page 125 .

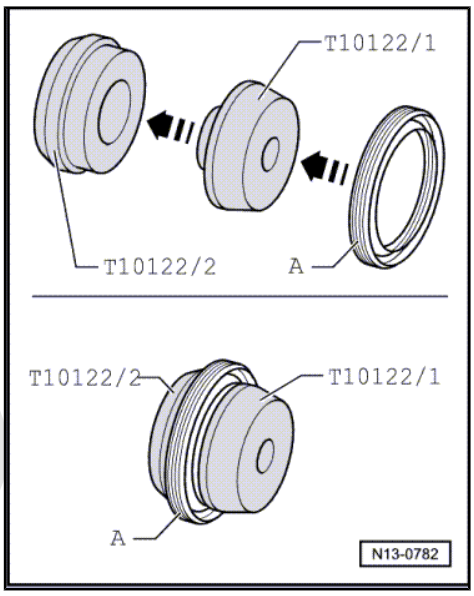
– Pry out oil seal using extractor tool -T20143/2- .

– Clean contact surface and sealing surface.



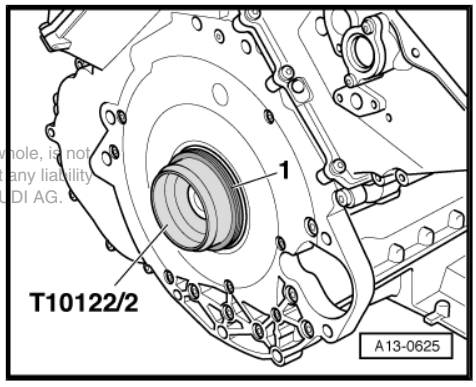
– Fit assembly aid -T10122/1- onto assembly sleeve -T10122/2- and slide oil seal -A- onto assembly sleeve.

– Detach assembly aid.



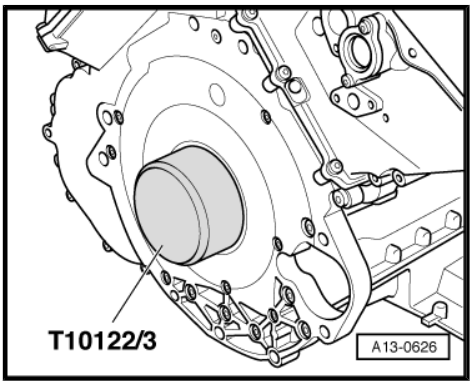
– Fit assembly sleeve -T10122/2- with oil seal -1- onto crankshaft.

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– Press in oil seal uniformly until flush all round using thrust piece -T10122/3- .

– Install drive plate ⇒ page 125 .



3 Crankshaft

⇒ “3.1 Exploded view - crankshaft”, page 130

⇒ “3.2 Crankshaft dimensions”, page 133

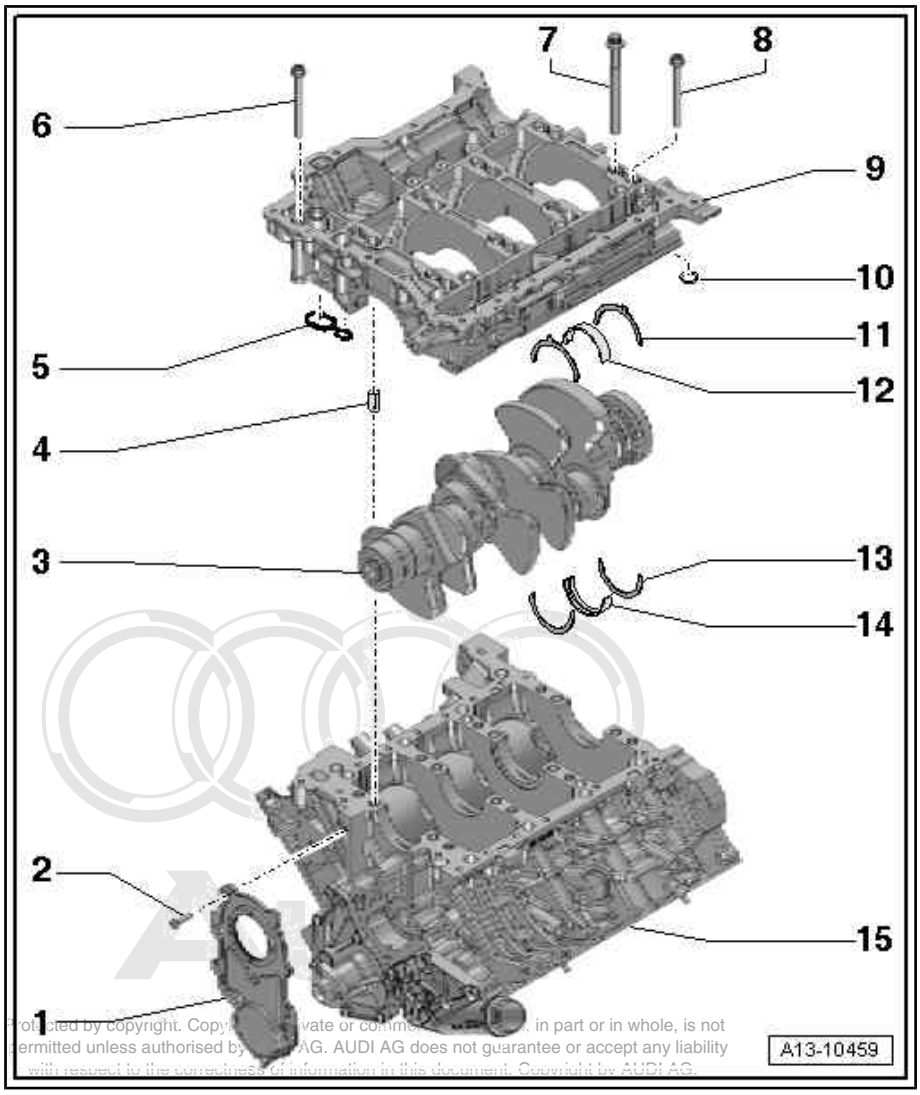
⇒ “3.3 Measuring axial clearance of crankshaft”, page 133

⇒ “3.4 Measuring radial clearance of crankshaft”, page 134

3.1 Exploded view - crankshaft

Note

When carrying out repairs, secure engine to engine and gearbox support - VAS 6095- using bracket for V6 FSI engine -VAS 6095/1-5- ⇒ page 83 .



1 - Sealing flange (pulley end)
- ❑ Removing and installing ⇒ page 121

2 - Bolt
- ❑ Tightening torque ⇒ page 119

3 - Crankshaft
- ❑ Measuring axial clearance ⇒ page 133
- ❑ Measuring radial clearance ⇒ page 134
- ❑ Crankshaft dimensions ⇒ page 133

4 - Dowel sleeve
- ❑ 4x
- ❑ Inserting in retaining frame ⇒ page 132

5 - Gasket
- ❑ Renew

6 - Bolt
- ❑ For sealing surfaces: retaining frame to cylinder block
- ❑ Differing bolt lengths and bolt heads
- ❑ Tightening sequence ⇒ page 132

7 - Bolt (long, large collar)
- ❑ For retaining frame (inner row)
- ❑ Tightening sequence ⇒ page 132
- ❑ Use old bolts when measuring radial clearance

8 - Bolt (short, small collar)
- ❑ For retaining frame (outer row)
- ❑ Tightening sequence ⇒ page 132

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9 - Retaining frame

- ❑ With valve for oil pressure control - N428- ⇒ page 132
- ❑ To remove, detach guide rail ⇒ Item 1 (page 190) for drive chain for valve gear
- ❑ Applying sealant ⇒ page 132
- ❑ Removing and installing valve for oil pressure control - N428- ⇒ page 254

10 - Seal

- ❑ Renew

11 - Thrust washer

- ❑ Only fitted on 3rd crankshaft bearing
- ❑ Installation position: oil groove faces outwards
- ❑ Make sure it engages in retaining frame

12 - Bearing shell

- ❑ For retaining frame (without oil groove)
- ❑ Mark used bearing shells for re-installation but not on bearing surface
- ❑ Bearing shells worn down to base layer must be renewed
- ❑ Note installation position
- ❑ Install new bearing shells for retaining frame with correct coloured markings ⇒ page 133

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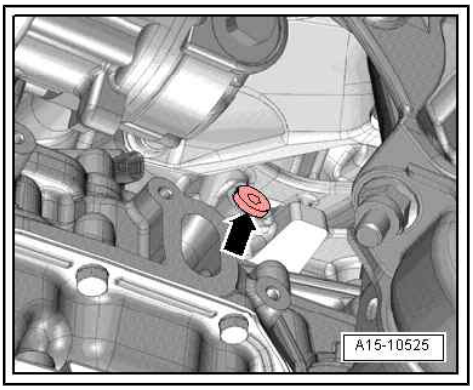
13 - Not fitted

14 - Bearing shell

- ❑ For cylinder block (with oil groove)
- ❑ Mark used bearing shells for re-installation but not on bearing surface
- ❑ Bearing shells worn down to base layer must be renewed
- ❑ Note installation position
- ❑ Install new bearing shells for the cylinder block with the correct coloured markings ⇒ page 133

15 - Cylinder block

Plug for “TDC” marking - tightening torque



Note

Fit new O-ring.

– Tighten plug -arrow- to 14 Nm.

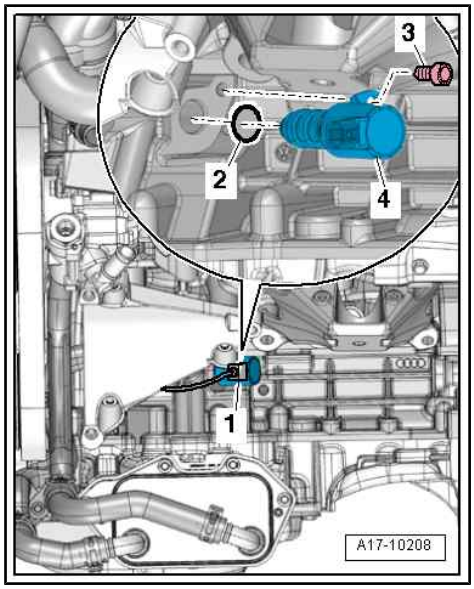
Valve for oil pressure control - N428-

1 - Electrical connector

2 - O-ring - renew

3 - Bolt, 9 Nm

4 - 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.

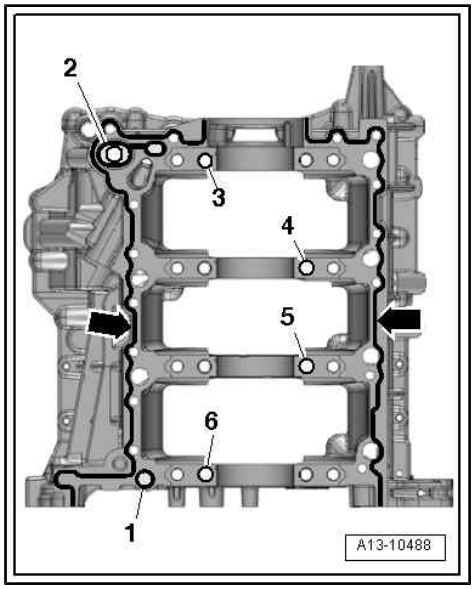
– Apply beads of sealant -arrows- onto clean sealing surfaces of retaining frame as shown in illustration.

• 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.



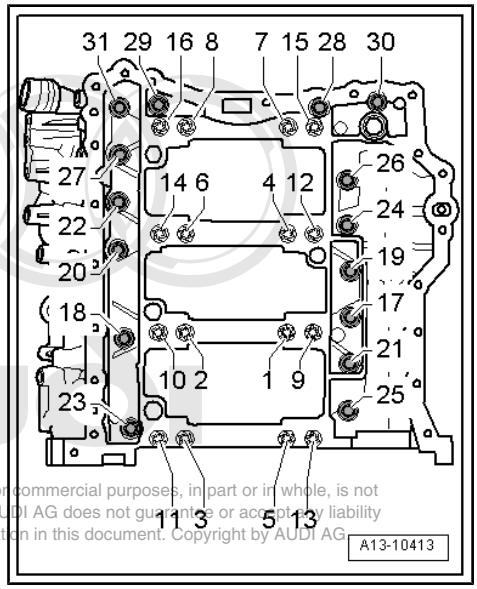
Installing retaining frame

– Renew bolts for retaining frame.

– Install long bolts in inner row on retaining frame.

– Tighten bolts -1 … 31- in 3 stages as follows:

1. Tighten bolts in the sequence -1 ... 16- to 50 Nm.
2. Turn bolts 90° further in the sequence -1 ... 16-.
3. Tighten bolts for sealing surfaces (retaining frame / cylinder block) in the sequence -17 ... 31- to 23 Nm.

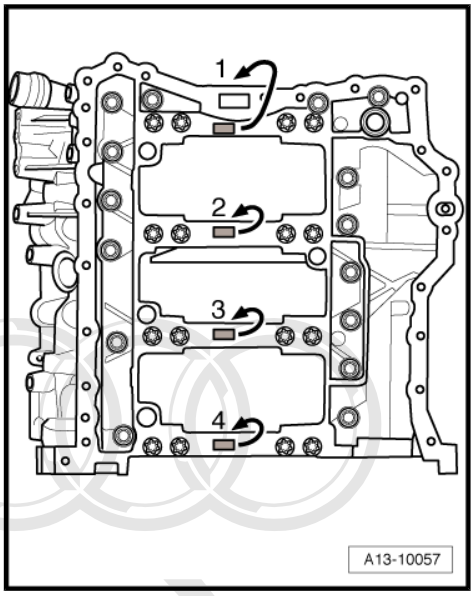


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Matching crankshaft bearing shells to bearings in cylinder block

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

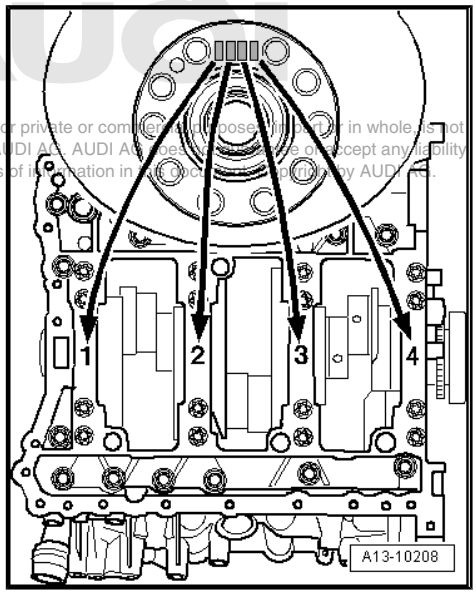
Code letter on retaining frame	Colour coding of bearing
R =	Red
G =	Yellow
B =	Blue
S =	Black



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 flywheel 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



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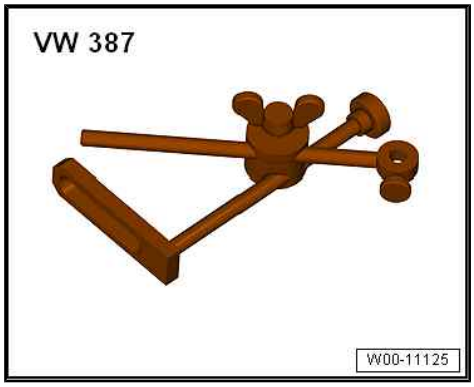
3.2 Crankshaft dimensions

Honing dimension	Main bearing journal ∅ mm	Conrod journal ∅ mm
Basic dimension	65.000 – 0.022 – 0.042	56.000 – 0.022 – 0.042

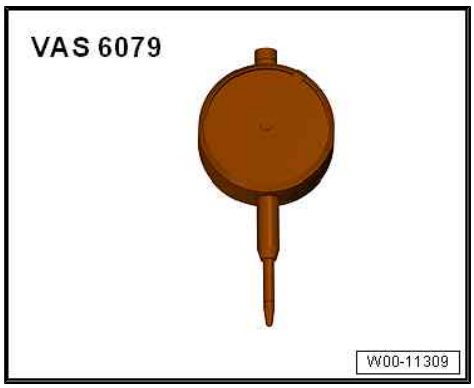
3.3 Measuring axial clearance of crankshaft

Special tools and workshop equipment required

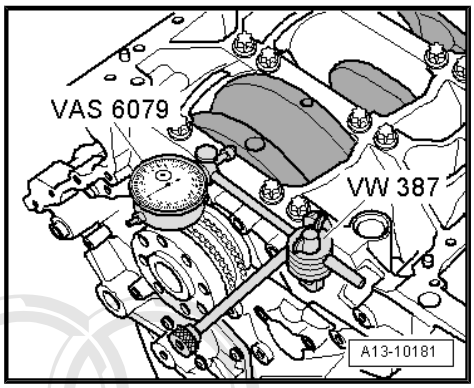
- Universal dial gauge bracket - VW 387-



- 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 “0”.
– Push crankshaft away from dial gauge and read off value.

• Axial clearance: 0.15 ... 0.25 mm

3.4 Measuring radial clearance of crankshaft

Special tools and workshop equipment required

- Plastigage

Procedure

Note

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- *Mark used bearing shells for re-installation (but do not mark bearing surface).*
- *Bearing shells worn down to the base layer must be renewed.*

– 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 ⇒ page 132 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 136

⇒ “4.2 Removing and installing balance shaft”, page 136

4.1 Exploded view - balance shaft

1 - Balance shaft

- ❑ Removing and installing ⇒ page 136

2 - Bolt

- ❑ 60 Nm
- ❑ Use ∅ 8 mm drill bit 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

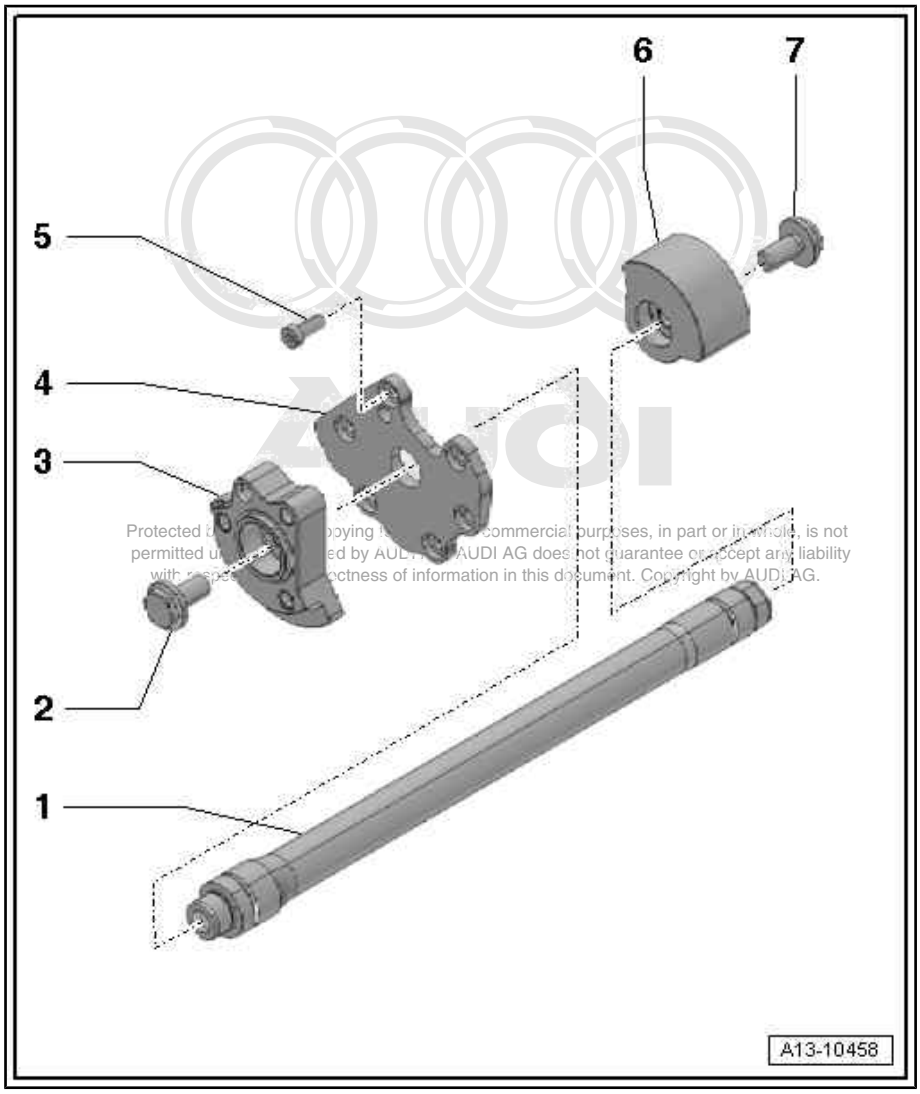
- ❑ 13 Nm

6 - Balance weight (pulley end)

- ❑ Can only be fitted on balance shaft in one position.

7 - Bolt

- ❑ 60 Nm
- ❑ Use ∅ 8 mm drill bit as counterhold when loosening and tightening

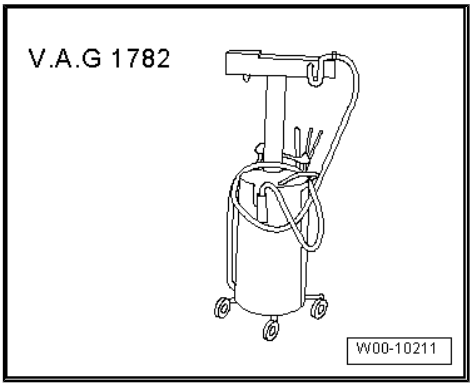


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4.2 Removing and installing balance shaft

Special tools and workshop equipment required

♦ Used oil collection and extraction unit - V.A.G 1782-



Removing

- Gearbox removed.

– Remove sealing flange (pulley end) ⇒ page 121 .

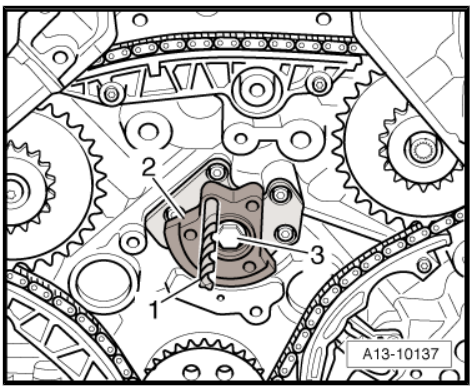
– Remove timing chain cover (bottom) ⇒ page 182 .

– Remove drive chain for auxiliary drives ⇒ page 205 .

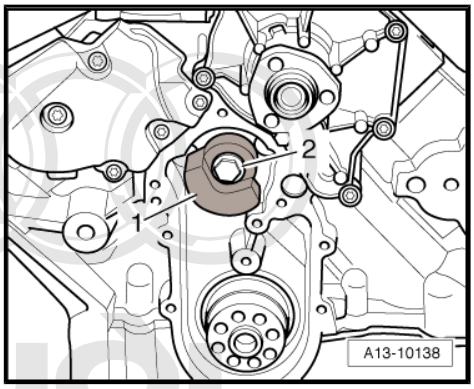
– Wrap insulating tape around tip and shaft of 8 mm ∅ drill bit to avoid cuts.

– Hold balance weight -2- in position at rear of engine using ∅ 8 mm drill bit -item 1-.

– Unscrew bolt -3- and detach balance weight from balance shaft.

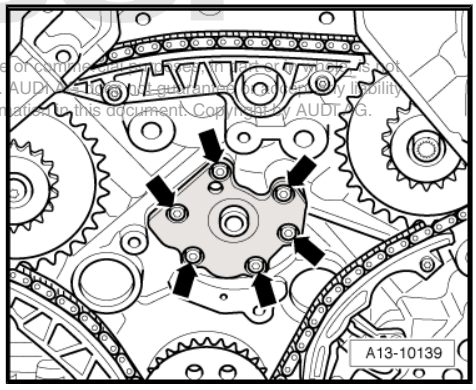


– Unscrew bolt -2- (counterhold balance weight -1- with a suitable pin) and detach balance weight at front of engine from balance shaft.



– Unscrew bolts -arrows- and detach bearing plate for balance shaft at rear of engine.

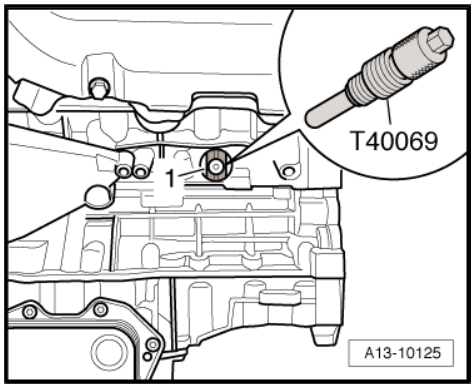
– Pull balance shaft to rear out of cylinder block.



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Installing

- Tightening torques ⇒ page 136 , ⇒ page 131 .
- Crankshaft -1- locked in “TDC” position with locking pin - T40069- .



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

Note

Balance weights can only be fitted on balance shaft in one position.

– Install drive chain for auxiliary drives ⇒ page 205 .
– Install timing chain cover (bottom) ⇒ page 182 .
– Install sealing flange (pulley end) ⇒ page 121 .
– Fill with engine oil and check oil level ⇒ page 234 .

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5 Pistons and conrods

⇒ "5.1 Exploded view - pistons and conrods", page 139

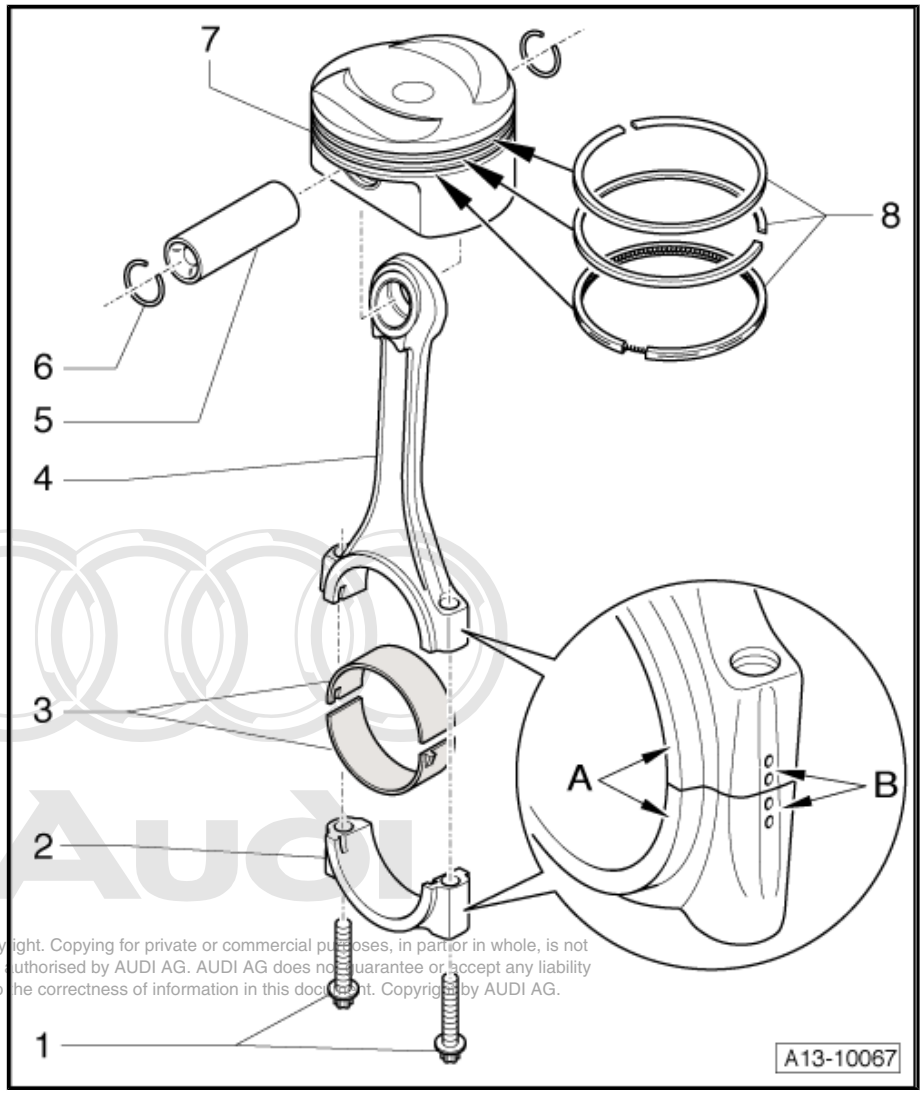
⇒ "5.2 Piston and cylinder dimensions", page 142

⇒ "5.3 Checking radial clearance of conrod bearings", page 142

5.1 Exploded view - pistons and conrods

Note

Oil spray jet for piston cooling ⇒ page 142 .



1 - Bolts

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

2 - Conrod bearing cap

- ❑ Mark installation position for re-installation
- ❑ Mark cylinder allocation in colour -B- ⇒ page 141
- ❑ Note when fitting bearing cap: the wide contact shoulder -A- must point towards same side on conrod and conrod bearing cap
- ❑ Installation position of conrod pairs ⇒ page 142

3 - Bearing shell

- ❑ Ensure that retaining lugs are securely seated.
- ❑ Mark used bearing shells for re-installation but not on bearing surface
- ❑ Bearing shells worn down to base layer must be renewed

4 - Conrod

- ❑ Only renew as a complete set
- ❑ Mark cylinder allocation in colour -B- ⇒ page 141
- ❑ Note when fitting bearing cap: the wide contact shoulder -A- must point towards same side on conrod and conrod bearing cap
- ❑ Installation position of conrod pairs ⇒ page 142
- ❑ Measuring radial clearance ⇒ page 142

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5 - Piston pin

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

6 - Circlip

- ❑ Renew

7 - Piston

- ❑ Mark installation position and cylinder number ⇒ page 141
- ❑ Arrow on piston crown points to pulley end
- ❑ Checking ⇒ page 141
- ❑ Renew piston if cracking is visible on piston crown or piston skirt
- ❑ Install using piston ring clamp
- ❑ Piston and cylinder dimensions ⇒ page 142
- ❑ Measuring cylinder bore ⇒ page 141

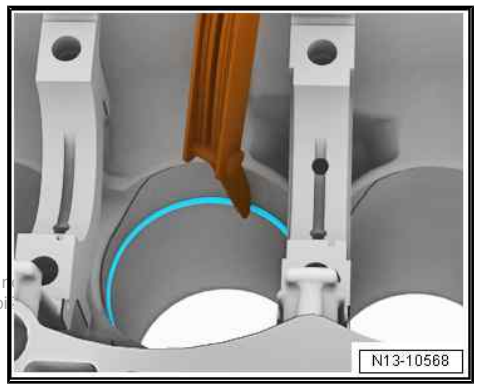
8 - Piston rings

- ❑ Offset gaps by 120°
- ❑ Use piston ring pliers to remove and install
- ❑ Installation position: marking “TOP” or side with lettering faces towards piston crown
- ❑ Measuring ring gap ⇒ page 140
- ❑ Measuring ring-to-groove clearance ⇒ page 140

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.

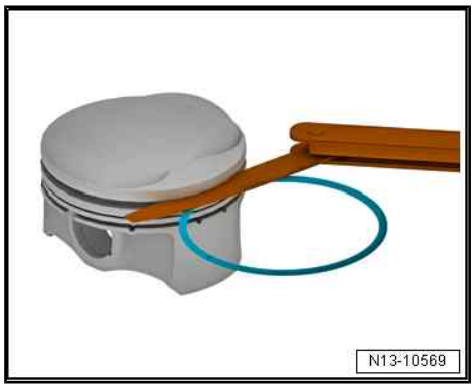


Piston ring	new mm	Wear limit mm
1st compression ring	0.35 … 0.50	0.8
2nd compression ring	0.60 … 0.80	1.0
Oil scraper ring	0.25 … 0.50	0.8

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Measuring ring-to-groove clearance

– Clean groove in piston before checking clearance.



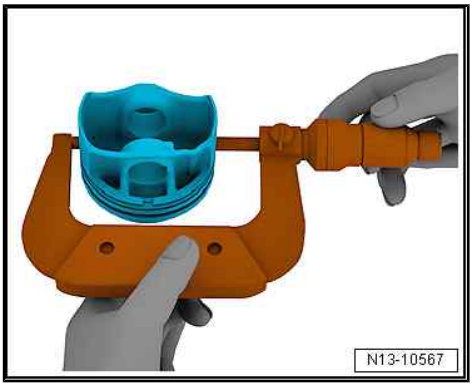
Piston ring	new mm	Wear limit mm
Compression rings	0.02 … 0.08	0.20
Oil scraper ring	0.02 … 0.08	0.15

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: 0.04 mm.

Nominal dimension
⇒ “5.2 Piston and cylinder dimensions”, page 142 .

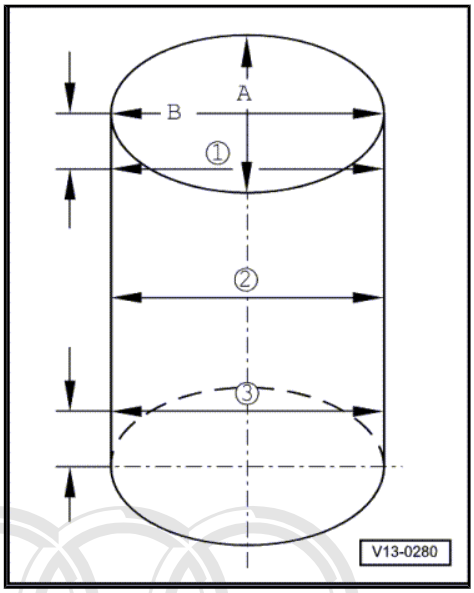


Measuring cylinder bore

– Use a cylinder gauge - VAS 6078- to take measurements at 3 points in transverse direction -A- and in longitudinal direction -B-.

• Maximum deviation from nominal dimension: 0.08 mm.

Nominal dimension
⇒ “5.2 Piston and cylinder dimensions”, page 142 .

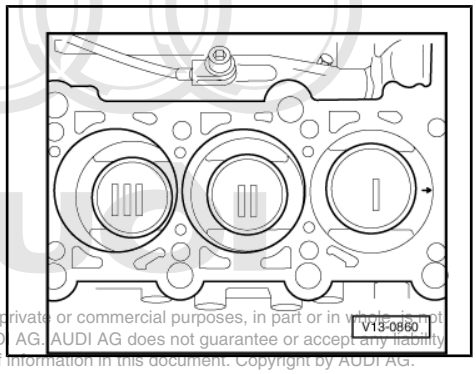


Installation position of pistons

Caution

Do not damage the coating of the piston crown.

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



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Installation position:

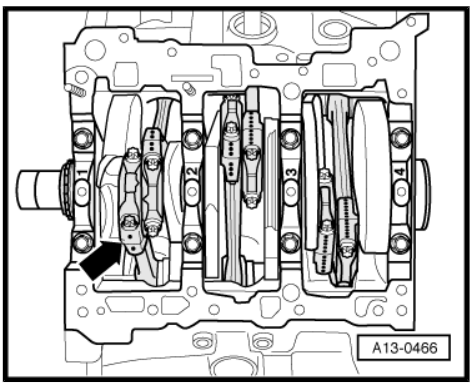
• Arrows on piston crowns point to pulley end.

Marking conrods

Note

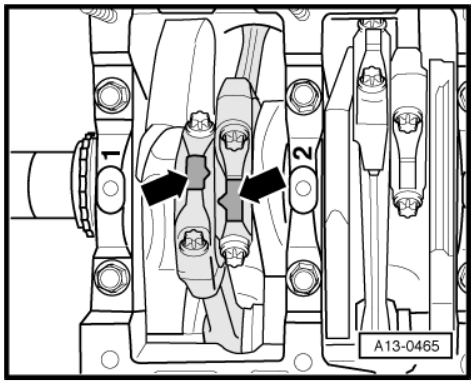
Only renew conrods as a complete set.

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



Installation position of conrods

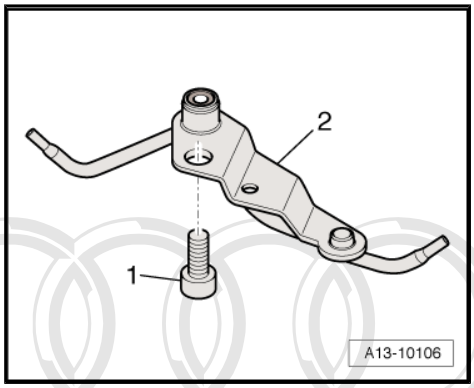
- The cast lugs -arrows- on the ground surfaces of the conrod pairs “1 and 2”, “3 and 4”, and “5 and 6” must face each other.



Oil spray jet for piston cooling

1 - 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)



Note

- *Take care not to bend oil spray jets.*
- *Always renew bent oil spray jets.*

5.2 Piston and cylinder dimensions

Honing dimension	Piston Ø mm	Cylinder bore Ø mm
Basic dimension	85.49	85.51
• Dimensions including coating (thickness 0.02 mm). The coating will wear down in service.		

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5.3 Checking radial clearance of conrod bearings

Special tools and workshop equipment required

- Plastigage

Procedure

– Remove conrod bearing cap.

– 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 tighten with old bolts ⇒ Item 1 (page 139) . Do not rotate 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.

– Renew conrod bolts.

15 – Cylinder head, valve gear

1 Cylinder head

⇒ “1.1 Exploded view - cylinder head”, page 143

⇒ “1.2 Removing and installing cylinder head”, page 146

⇒ “1.3 Removing and installing cylinder head cover (left-side)”, page 165

⇒ “1.4 Removing and installing cylinder head cover (right-side)”, page 168

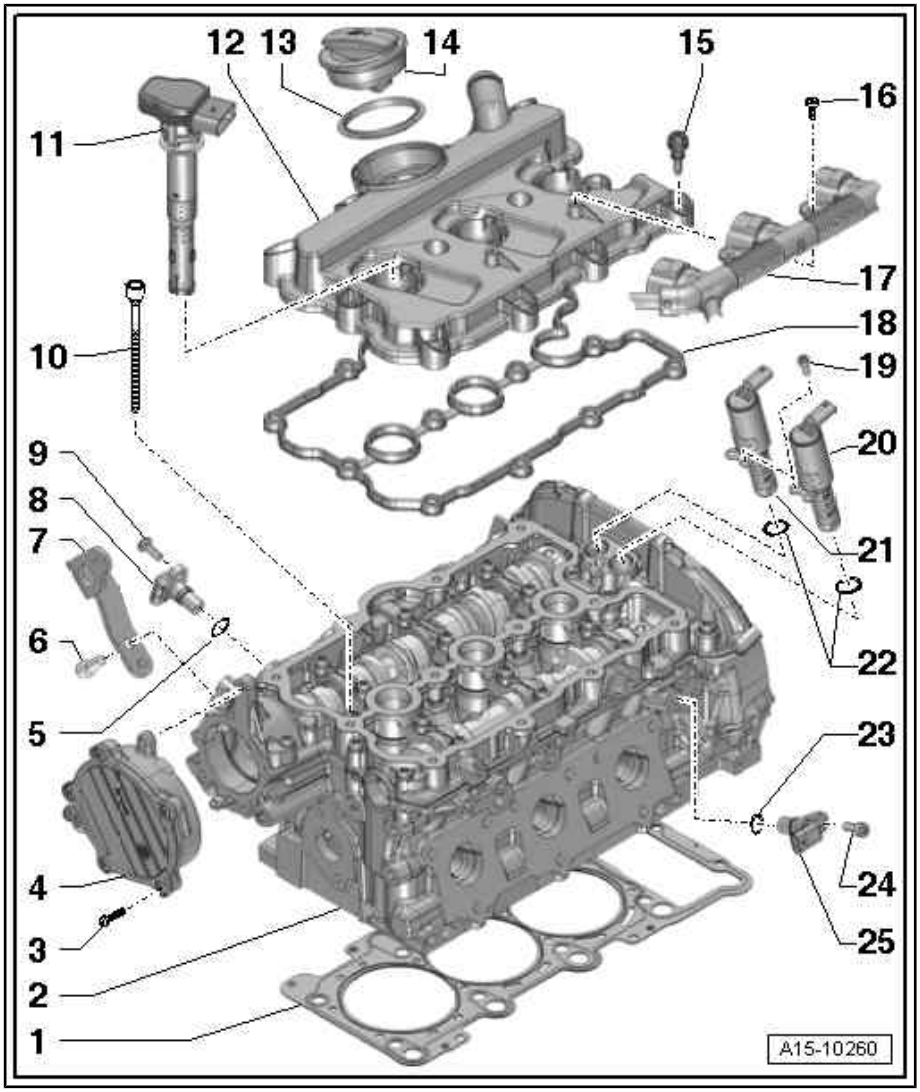
⇒ “1.5 Checking compression”, page 171

1.1 Exploded view - cylinder head

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Note

The diagram shows the cylinder head on cylinder bank 2 (left-side).



1 - Cylinder head gasket

- ❑ Renewing ⇒ “1.2 Removing and installing cylinder head”, page 146
- ❑ Installation position: part number must face cylinder head
- ❑ If renewed, change coolant and engine oil

2 - Cylinder head

- ❑ Removing ⇒ page 146
- ❑ ⇒ Fig. ““Checking cylinder head for distortion”“, page 145
- ❑ ⇒ Fig. ““Cylinder head machining limit”“, page 146
- ❑ Installing ⇒ page 158
- ❑ If renewed, change coolant and engine oil

3 - Bolt

- ❑ Tightening torque ⇒ Brake system; Rep. gr. 47 ; Vacuum system; Exploded view - vacuum pump

4 - Vacuum pump

- ❑ Removing and installing ⇒ Brake system; Rep. gr. 47 ; Vacuum system; Exploded view - vacuum pump

5 - O-ring

- ❑ Renew

6 - Bolt

- ❑ 20 Nm

7 - Engine lifting eye

8 - Hall sender for inlet camshaft

- ❑ Cylinder bank 1 (right-side): Hall sender - G40-
- ❑ Cylinder bank 2 (left-side): Hall sender 2 - G163-

9 - Bolt

- ❑ 9 Nm

10 - Bolt

- ❑ Procedure when loosening ⇒ page 152 .
- ❑ Renew
- ❑ Procedure when tightening ⇒ page 159 .
- ❑ Tighten in three stages:

1. Tighten to 40 Nm
2. Turn 90° further
3. Turn 90° further

11 - Ignition coil

- ❑ Remove with puller - T40039-

12 - Cylinder head cover

- ❑ Removing and installing: left-side ⇒ page 165 , right-side ⇒ page 168

13 - Seal

- ❑ Renew if damaged or leaking

14 - Filler cap

15 - Bolt

- ❑ Renew if seal is damaged
- ❑ Tightening torque
  ⇒ Fig. ""Cylinder head cover (left-side) - tightening torque and sequence"" , page 145 and
  ⇒ Fig. ""Cylinder head cover (right-side) - tightening torque and sequence"" , page 145

16 - Bolt

- ❑ Tightening torque ⇒ page 406

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17 - Connector rail

- ❑ For ignition coils

18 - Gasket for cylinder head cover

- ❑ Renew if damaged or leaking

19 - Bolt

- ❑ 2.5 Nm
- ❑ Apply sealant when installing; refer to ⇒ Electronic parts catalogue

20 - Solenoid valve for camshaft control (exhaust side)

- ❑ Cylinder bank 1 (right-side): exhaust camshaft control valve 1 - N318-
- ❑ Cylinder bank 2 (left-side): exhaust camshaft control valve 2 - N319-

21 - Solenoid valve for camshaft control (inlet side)

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

22 - O-rings

- ❑ Renew

23 - O-ring

- ❑ Renew

24 - Bolt

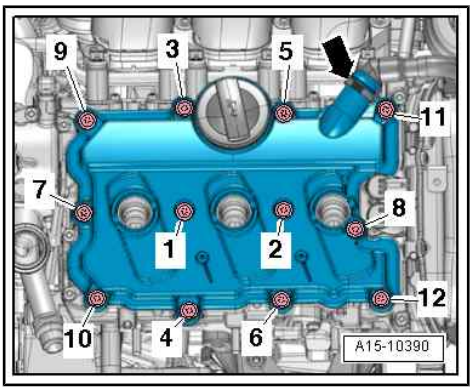
- ❑ 9 Nm

25 - Hall sender for exhaust camshaft

- ❑ Cylinder bank 1 (right-side): Hall sender 3 - G300-
- ❑ Cylinder bank 2 (left-side): Hall sender 4 - G301-

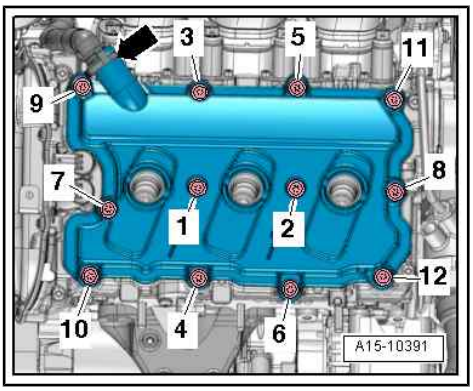
Cylinder head cover (left-side) - tightening torque and sequence

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



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

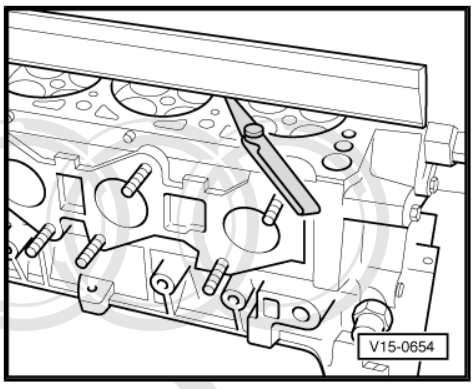
– Tighten bolts in the sequence -1 ... 12- to 9 Nm.



Checking cylinder head for distortion

– Use straight edge and feeler gauge to measure cylinder head for distortion at several points.

• Max. distortion: 0.05 mm.

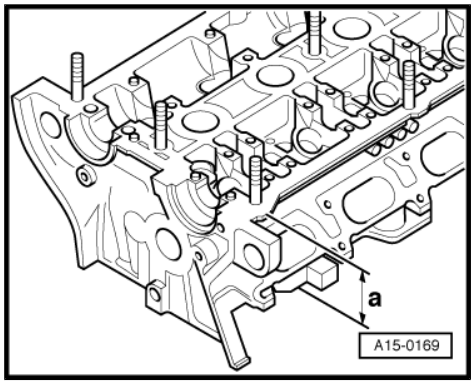


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Cylinder head machining limit

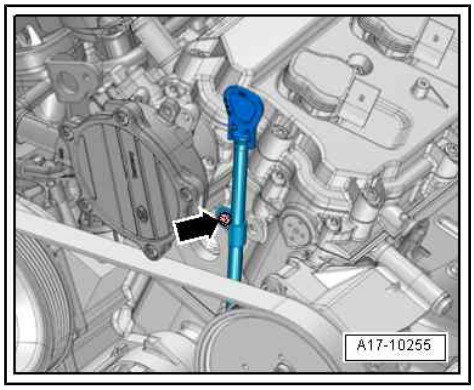
Machining of the cylinder head (surface grinding) is only permissible down to the minimum dimension -a-.

- Minimum dimension: -a- = 139.20 mm



Guide tube for oil dipstick - tightening torque

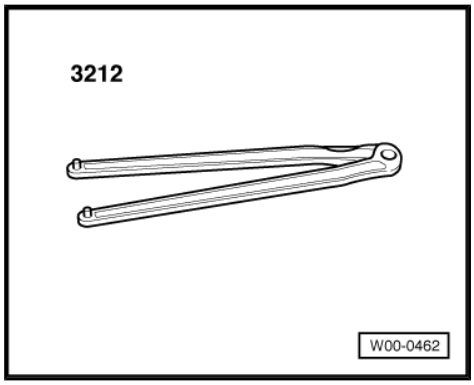
– Tighten bolt -arrow- to 9 Nm.



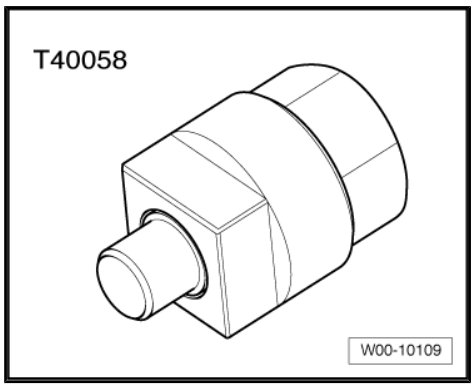
1.2 Removing and installing cylinder head

Special tools and workshop equipment required

♦ Pin wrench - 3212-

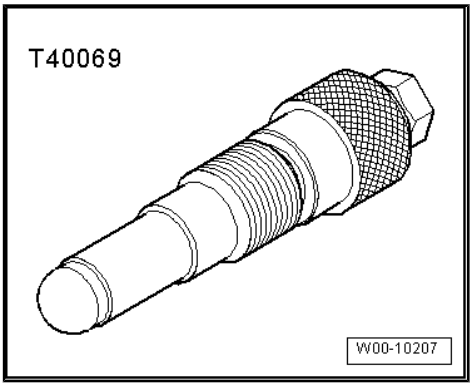


♦ Adapter - T40058-

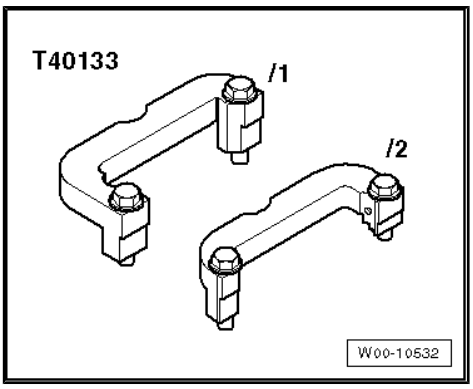


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♦ Locking pin - T40069-



♦ Camshaft clamp - T40133-



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.*

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.***

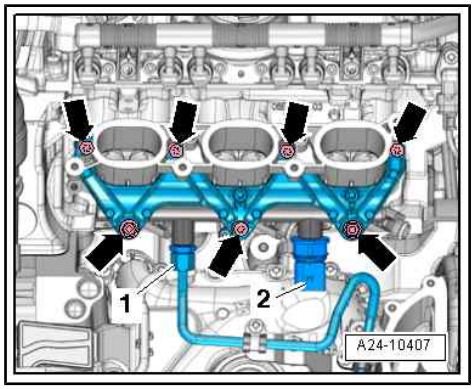
– Reduce fuel pressure in high-pressure section of injection system ⇒ page 314 .

– Remove coolant pipe (top) ⇒ page 280 .

– Remove poly V-belt ⇒ page 119 .

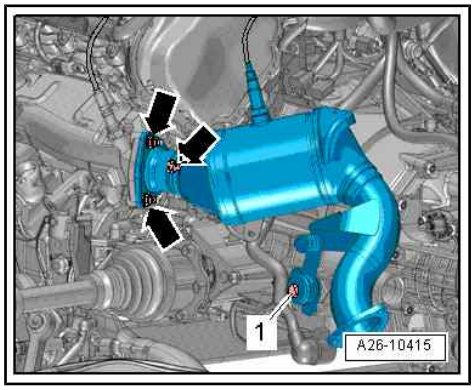
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– Remove intake manifold bottom sections ⇒ page 333 .
– Unplug electrical connectors at injectors.
– Remove timing chain covers (left and right) ⇒ page 178 .



Vehicles without secondary air system:

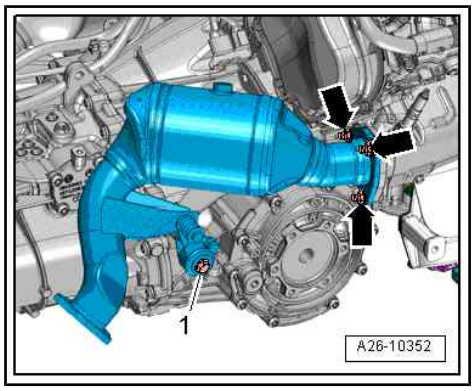
– Remove front silencer (left-side) ⇒ page 370 .
– Remove nuts -arrows- and bolt -1-.
– Detach catalytic converter (left-side) from exhaust manifold and move clear to the side.



Note

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

– Remove front silencer (right-side) ⇒ page 370 .
– Remove nuts -arrows- and bolt -1- and move catalytic converter to one side.



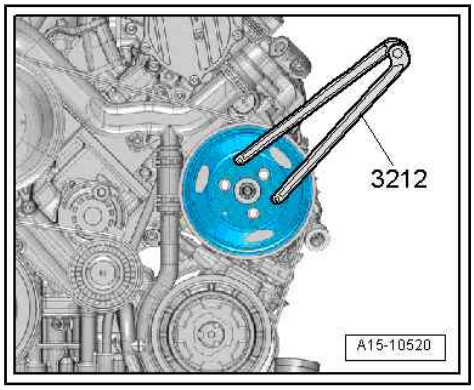
Note

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

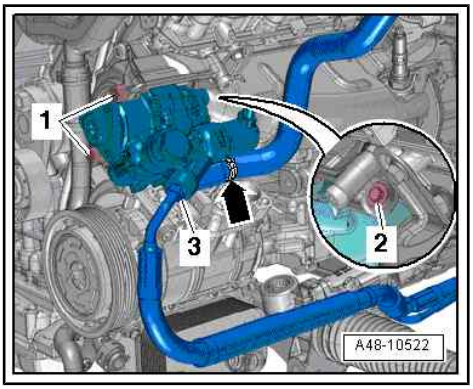
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All vehicles (continued):

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



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

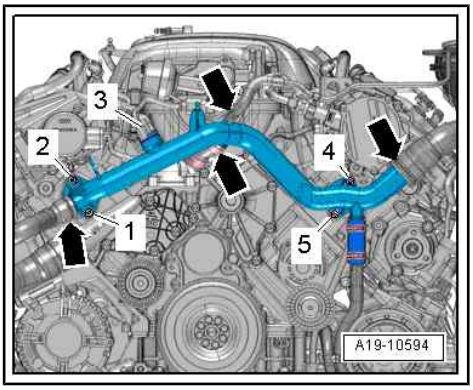


Note

- *The illustration shows the installation position on a vehicle with dynamic steering.*
- *Disregard -item 3- and -arrow-.*

– Unplug electrical connector -3- for coolant temperature sender - G62- .

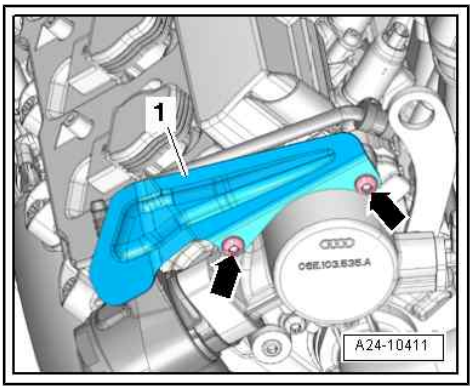
– Unscrew bolts -1, 2, 4, 5- on front coolant pipe.



Note

Disregard -arrows-.

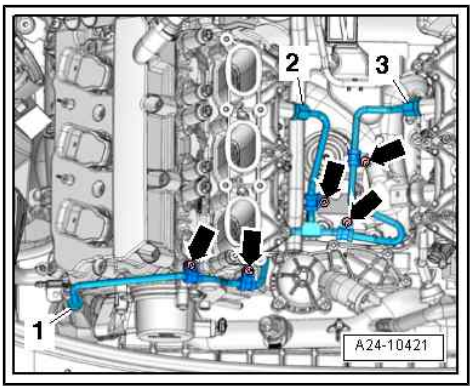
– Remove guard plate -1- for high-pressure pipe -arrows-.



WARNING

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

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



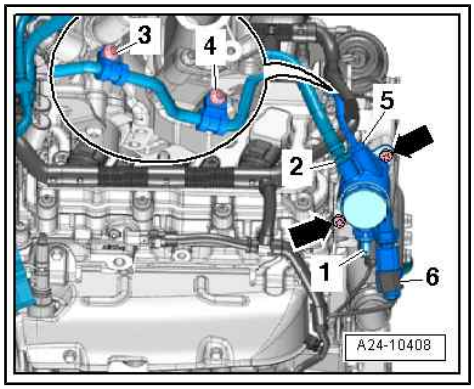
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– Reduce fuel pressure in high-pressure section of injection system ⇒ page 314 .

– Unscrew connection -1- and union nuts -2- and -3-.

– Unscrew bolts -arrows- on retaining clips and detach high-pressure pipe.

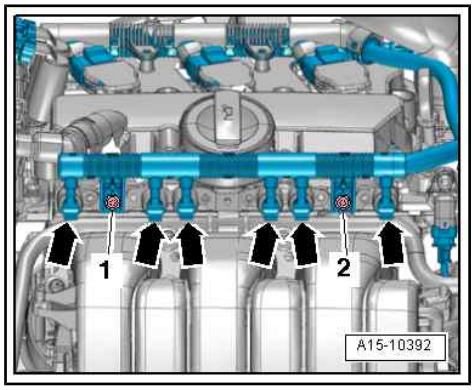
– Unscrew connection -2- and move fuel supply hose clear to one side.
– Unplug electrical connectors -1- and -6-.



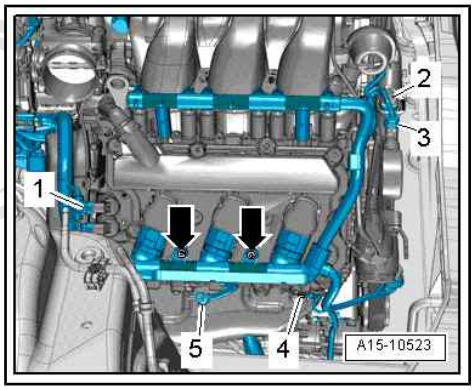
Note

Disregard items marked -3, 4, 5- and -arrows-.

– Unplug electrical connectors (left and right) -arrows- at actuators for camshaft adjustment.
– Remove bolts -1- and -2- and move wiring harness clear.
– Remove cylinder head cover: left-side ⇒ page 165 ; right-side ⇒ page 168 .



– Unplug electrical connector -3- at Hall sender - G40- on cylinder head (right-side).
– Remove bolt -4- for earth connection.



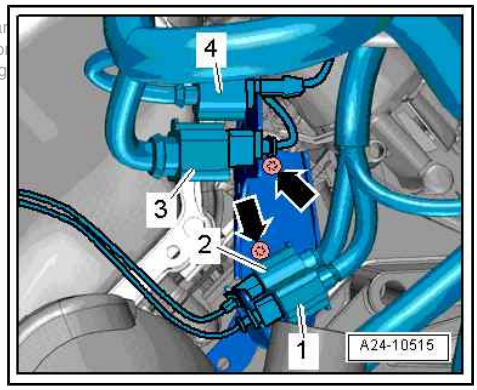
Note

Disregard -items 1, 2, 5-.

– Remove timing chain covers (left and right) ⇒ page 178 .

– Remove bolts -arrows- and detach bracket (left-side) for connectors.

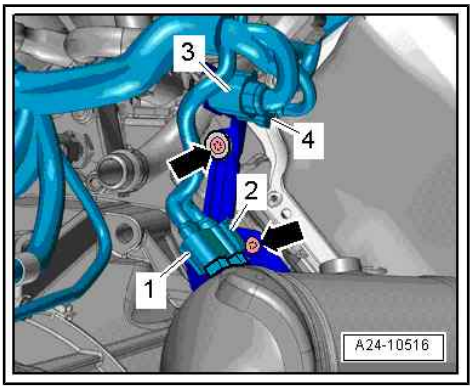
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Note

Disregard items -1 ... 4-.

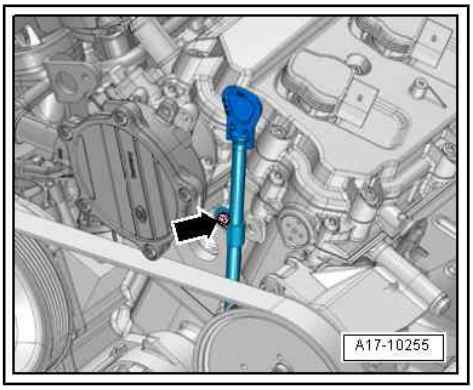
– Remove bolts -arrows- and detach bracket (right-side) for connectors.



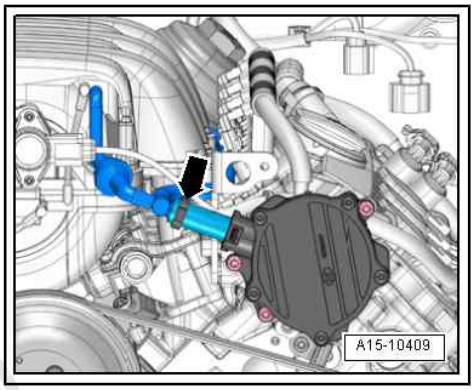
Note

Disregard items marked -1 ... 4-.

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



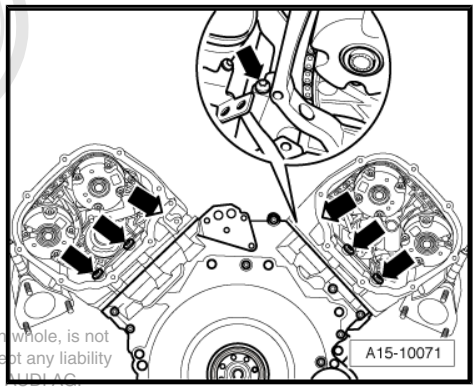
– Detach vacuum hose from vacuum pump -arrow- and move clear.



– Remove bolts -arrows- at rear of cylinder head.

♦ Cylinder head (left-side): 3 bolts

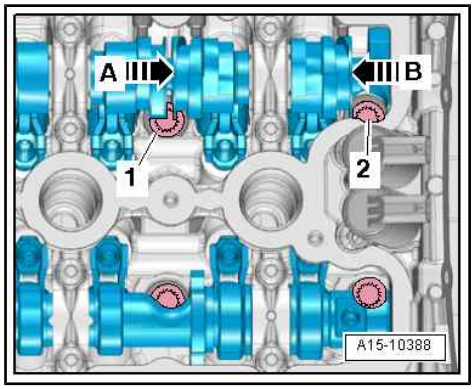
♦ Cylinder head (right-side): 4 bolts



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Note

- *The cams on the inlet camshaft prevent access to some of the cylinder head bolts – in this example bolts -1- and -2-.*
- *Use a plastic wedge to press the slider on the camshaft in direction of -arrow A- to remove bolt -1-.*
- *Use a plastic wedge to press the slider on the camshaft in direction of -arrow B- to remove bolt -2-.*



Caution

Risk of damage.

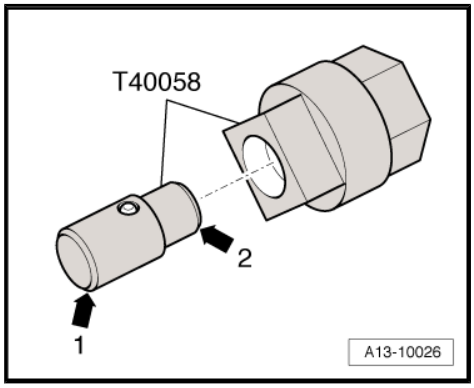
- ***Move the sliders only when the rocker fingers are not under load from the cams (i.e. when they are in contact only with the base of the cam). For this reason it is important to keep to sequence described in the following when loosening the cylinder head bolts.***

Risk of breakage

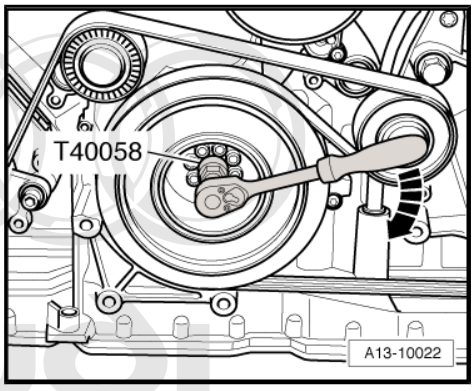
- ***Do not apply pressure to the thin webs when moving the sliders.***

– 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.

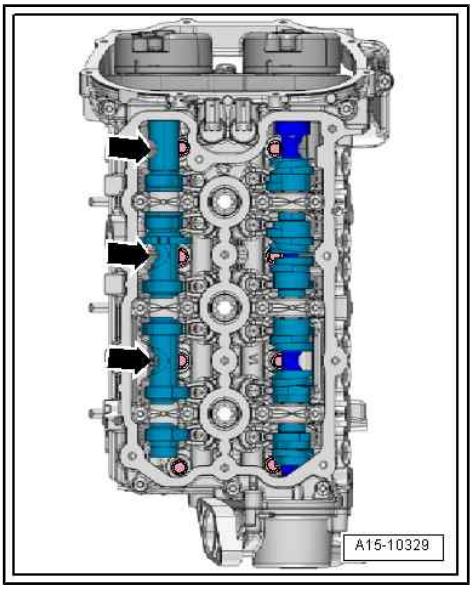


– Use adapter - T40058- to turn crankshaft in direction of engine rotation -arrow- until the camshaft position shown in the following illustration is attained.



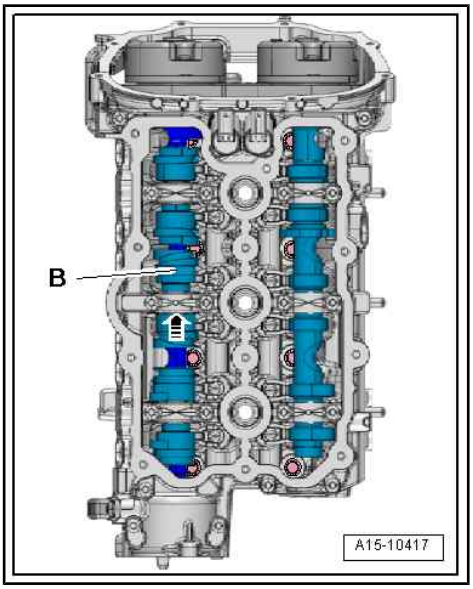
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- The recesses -arrows- on the exhaust camshaft must point towards the outside of the engine as shown in the illustration.



Cylinder head (left-side):

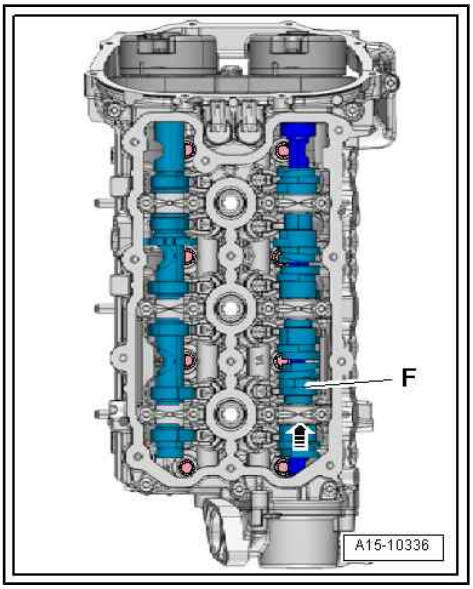
– Press slider -B- as far as stop in direction of -arrow- (slider should not be under load).



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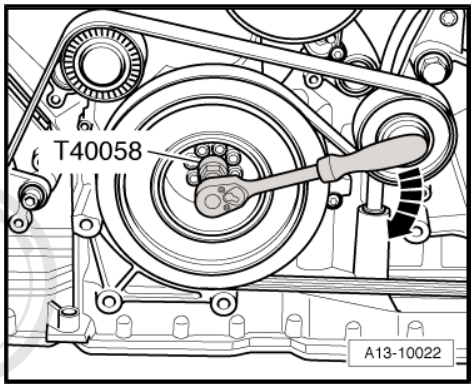
Cylinder head (right-side):

– Press slider -F- as far as stop in direction of -arrow- (slider should not be under load).

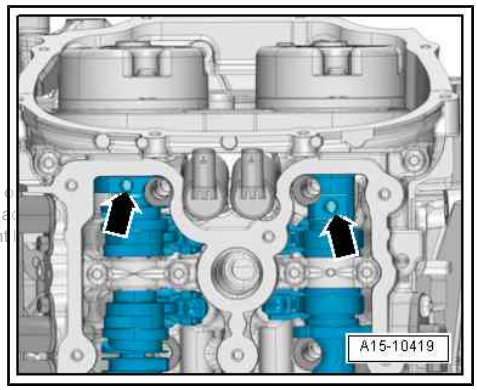


Continued for both cylinder heads:

– Use adapter - T40058- to turn crankshaft one full turn (360°) in direction of engine rotation -arrow-.



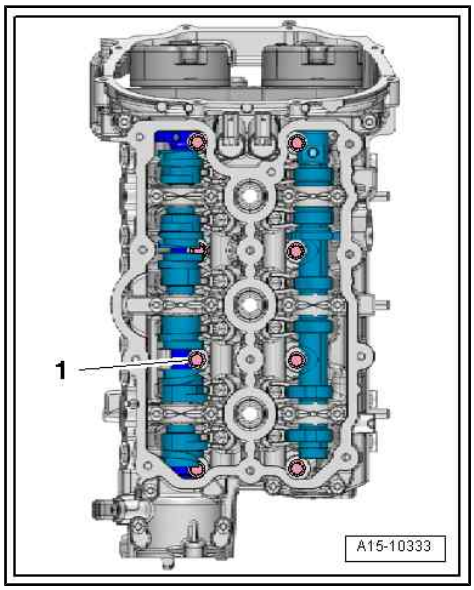
• The threaded holes -arrows- in the camshafts must face upwards.



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Cylinder head (left-side):

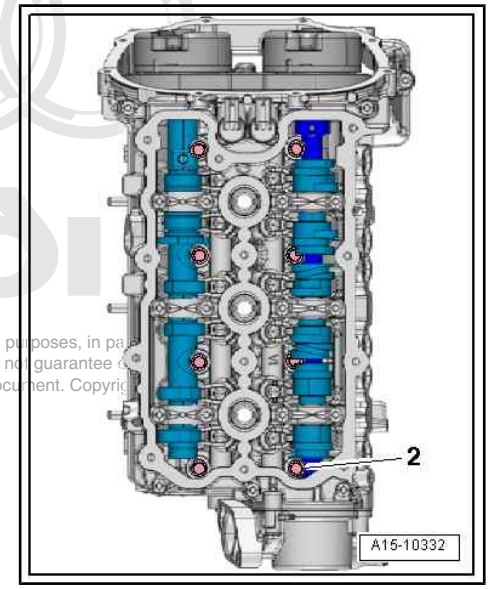
– Unscrew bolt -1- and remove.



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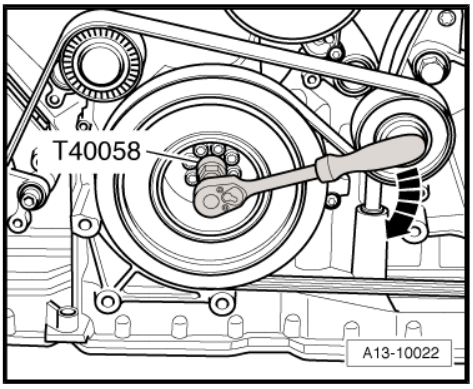
Cylinder head (right-side):

– Unscrew bolt -2- and remove.

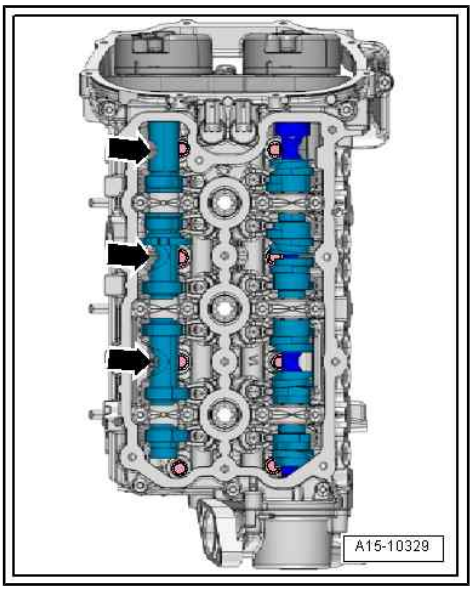


Continued for both cylinder heads:

– Use adapter - T40058- to turn crankshaft one full turn (360°) in direction of engine rotation -arrow-.

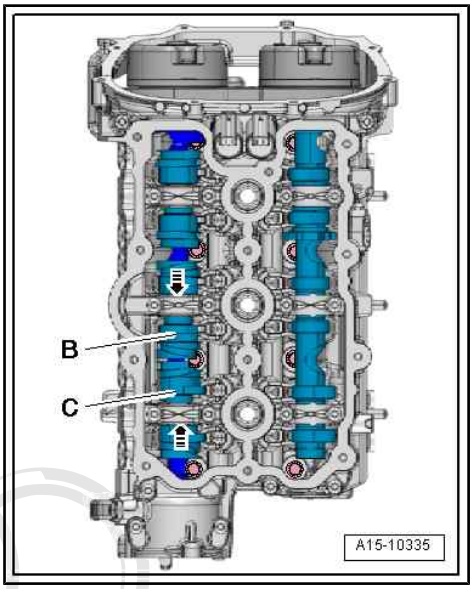


• The recesses -arrows- on the exhaust camshaft must point towards the outside of the engine.



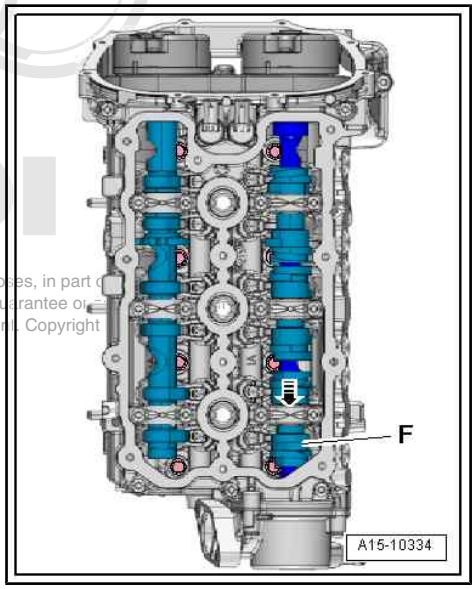
Cylinder head (left-side):

– Press sliders -B- and -C- as far as stop in direction of -arrow- (sliders should not be under load).



Cylinder head (right-side):

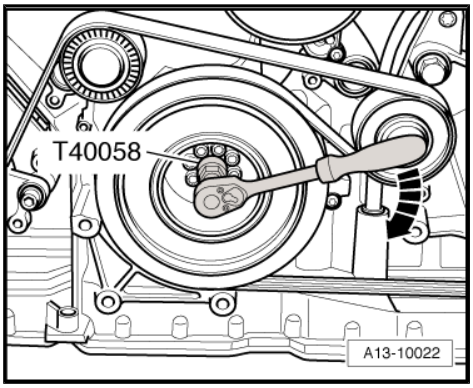
– Press slider -F- as far as stop in direction of -arrow- (slider should not be under load).



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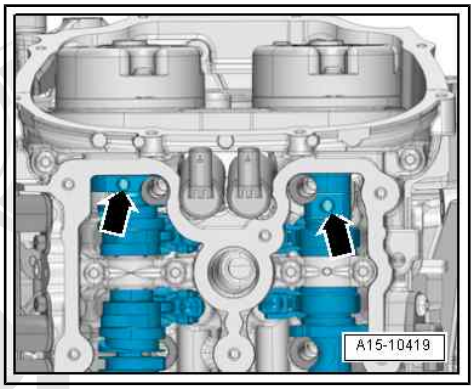
Continued for both cylinder heads:

– Use adapter - T40058- to turn crankshaft one full turn (360°) in direction of engine rotation -arrow-.



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

– Remove timing chains from camshafts ⇒ page 194 .



Caution

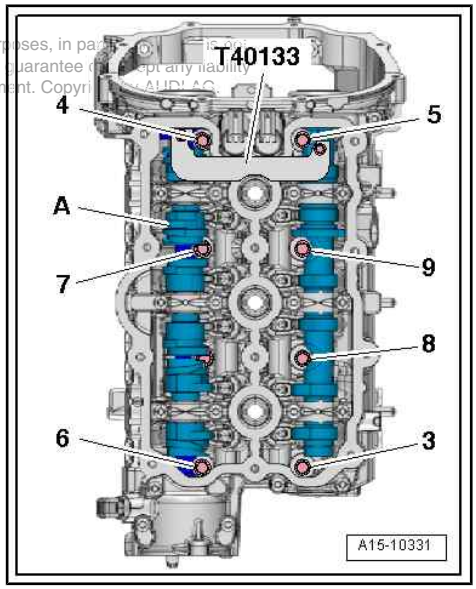
Avoid damage to valves and piston crowns.

- *Do not turn crankshaft if one or both of the camshaft timing chains has been removed from the cylinder head(s).*

Cylinder head (left-side):

– Move slider -A- as required (slider should not be under load) and unscrew and remove bolts -3 ... 9-.

– Take off cylinder head.

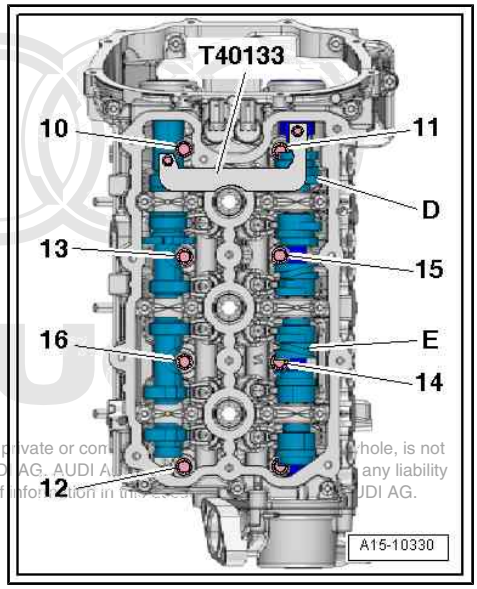


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Cylinder head (right-side):

– Move sliders -D- and -E- as required (sliders should not be under load) and unscrew and remove bolts -10 ... 16-.

– Take off cylinder head.



Installing

- Tightening torques ⇒ page 143

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.*

Ensure that cylinder head gasket seals properly:

- *Carefully remove any remaining emery and abrasive material.*
- *Do not remove new cylinder head gasket from packaging until it is ready to be fitted.*
- *Handle the cylinder head gasket very carefully to prevent damage to the silicone coating or the indented area of the gasket.*

Avoid damage to open valves.

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

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

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

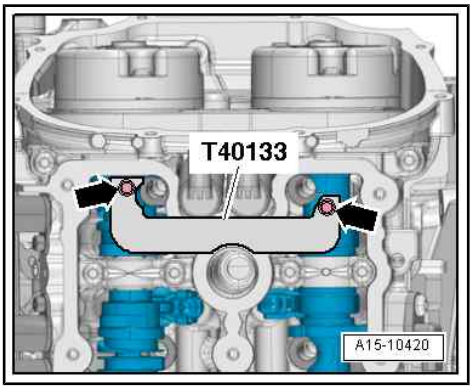
Note

- *Renew the bolts tightened with specified tightening angle.*
- *Renew self-locking nuts as well as seals, gaskets and O-rings.*
- *Note the different sealants for sealing surfaces and cylinder head bolts.*
- *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.*

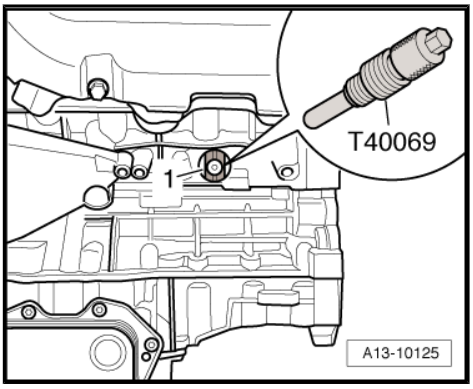
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– Before fitting cylinder head set crankshaft and camshafts to “TDC”. To do so, fit camshaft clamps - T40133- to both cylinder heads and tighten to 25 Nm -arrows-.

• The camshaft clamp - T40133- is positioned correctly if the holes for the cylinder head bolts remain free.



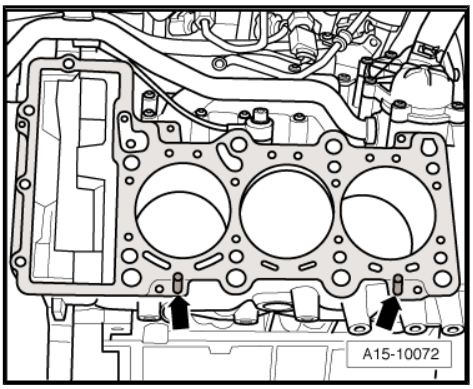
• The locking pin - T40069- must be screwed into the crankshaft.



– Place cylinder head gasket in position.

• Note position of centring pins -arrows- in cylinder block.

• Installation position of cylinder head gasket: the word “oben” (top) or the part number should face towards the cylinder head.



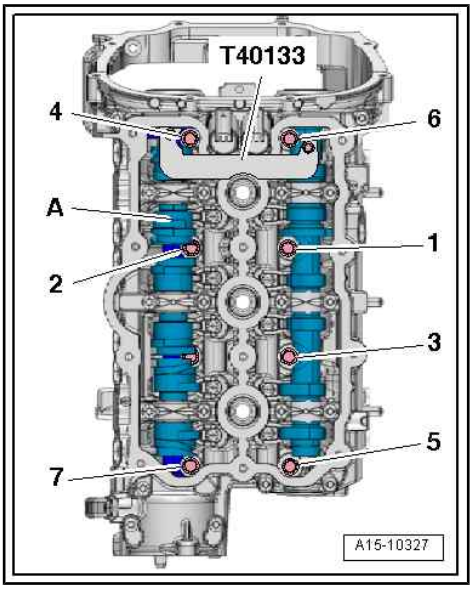
– Fit cylinder head.

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Cylinder head (left-side):

– Move slider -A- as required (slider should not be under load) and fit bolts -1 ... 7-.

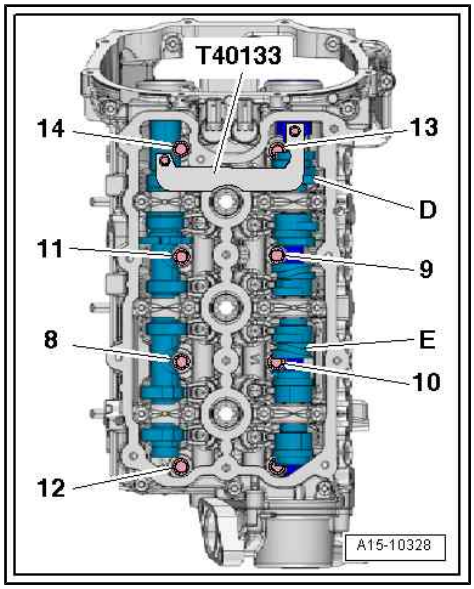
– Tighten bolts in the sequence -1 ... 7- in 3 stages ⇒ page 143 .



Cylinder head (right-side):

– Move sliders -D- and -E- as required (sliders should not be under load) and fit bolts -8 ... 14-.

– Tighten bolts in the sequence -8 ... 14- in 3 stages ⇒ page 143 .



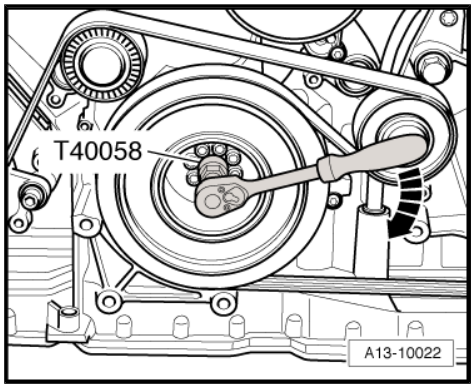
Continued for both cylinder heads:

– Fit timing chains on camshafts ⇒ page 200 .

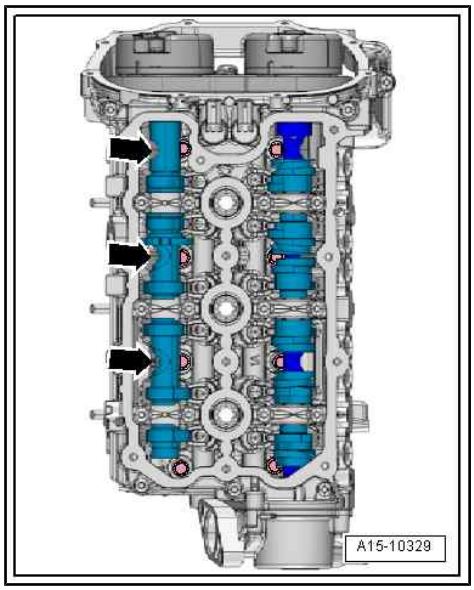
– Remove camshaft clamp - T40133- and locking pin - T40069- .

– Use adapter - T40058- to turn crankshaft one full turn (360°) in direction of engine rotation -arrow-.

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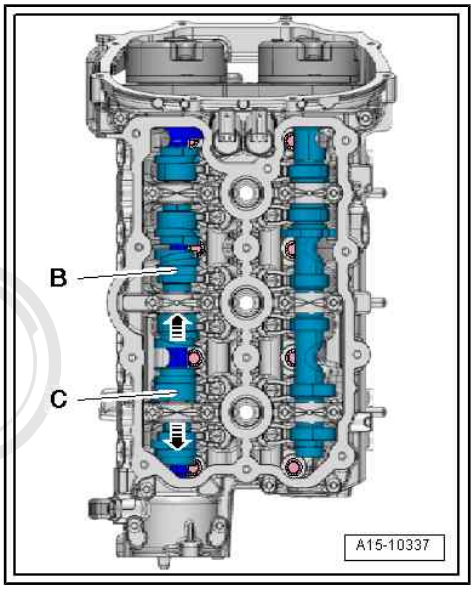


• The recesses -arrows- on the exhaust camshaft must point towards the outside of the engine.



Cylinder head (left-side):

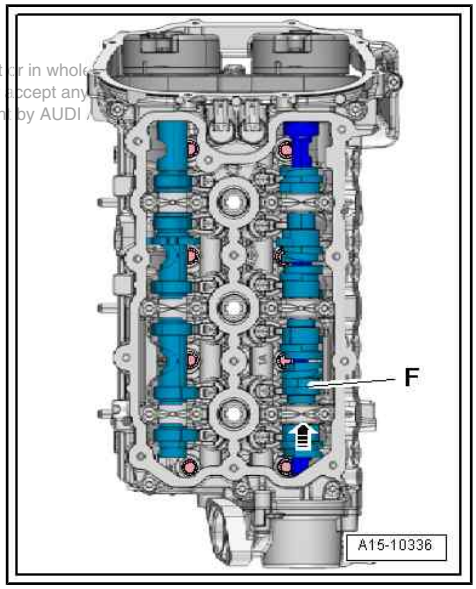
– Press sliders -B- and -C- as far as stop in direction of -arrow- (sliders should not be under load).



Cylinder head (right-side):

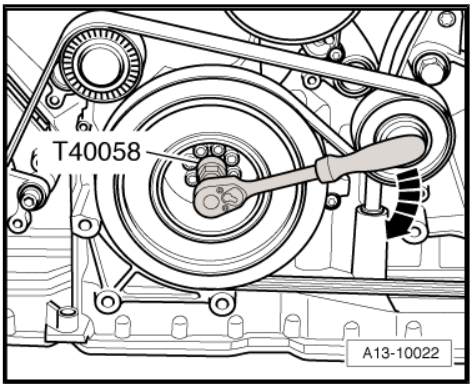
– Press slider -F- as far as stop in direction of -arrow- (slider should not be under load).

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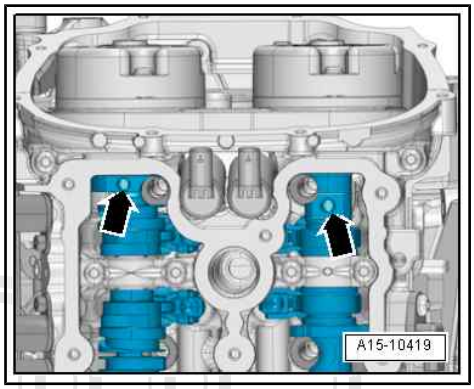


Continued for both cylinder heads:

– Use adapter - T40058- to turn crankshaft one full turn (360°) in direction of engine rotation -arrow-.

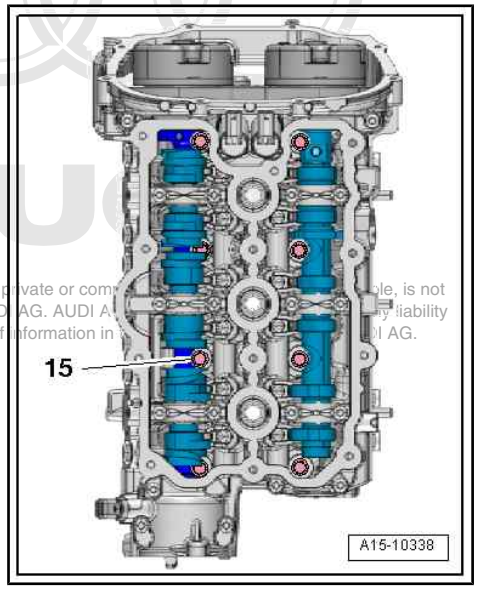


- The threaded holes -arrows- in the camshafts must face upwards.



Cylinder head (left-side):

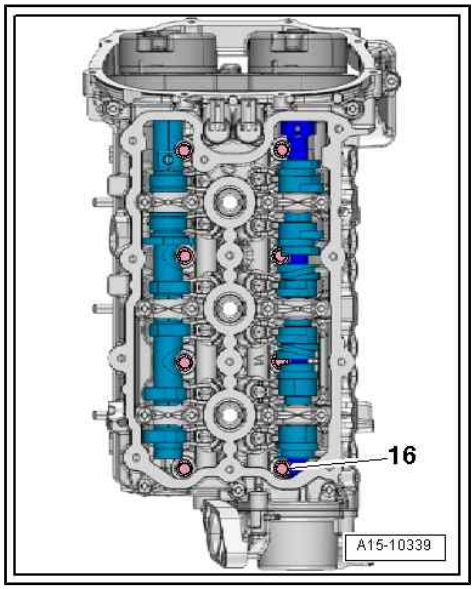
– Fit bolt -15- and tighten in three stages ⇒ page 143 .



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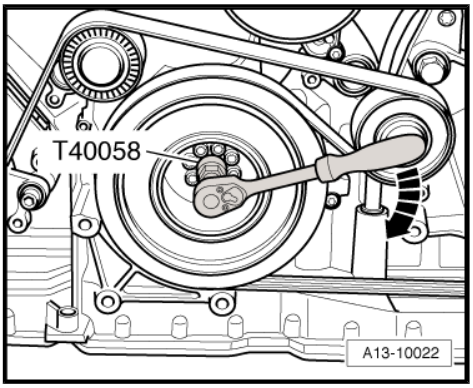
Cylinder head (right-side):

– Fit bolt -16- and tighten in three stages ⇒ page 143 .

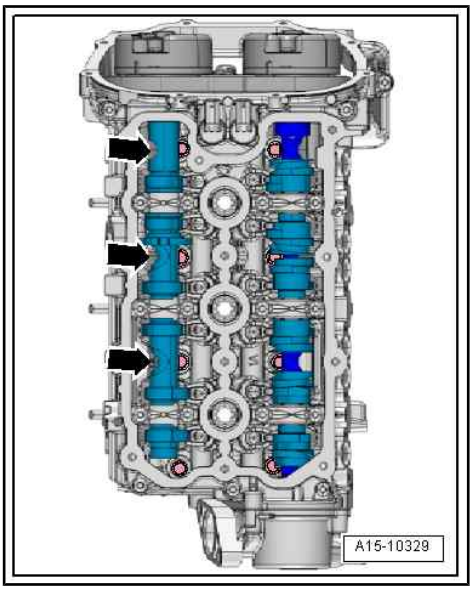


Continued for both cylinder heads:

– Use adapter - T40058- to turn crankshaft one full turn (360°) in direction of engine rotation -arrow-.

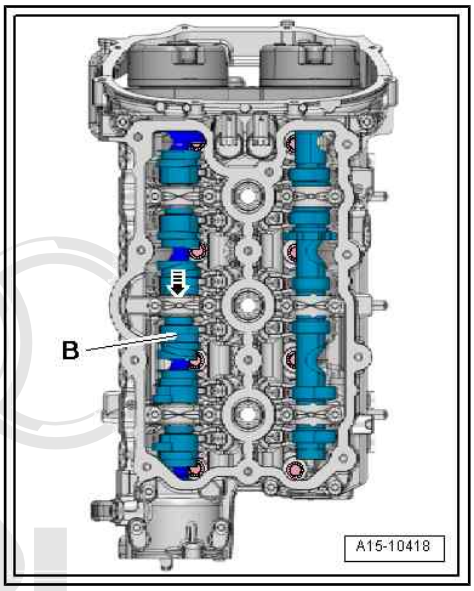


• The recesses -arrows- on the exhaust camshaft must point towards the outside of the engine.



Cylinder head (left-side):

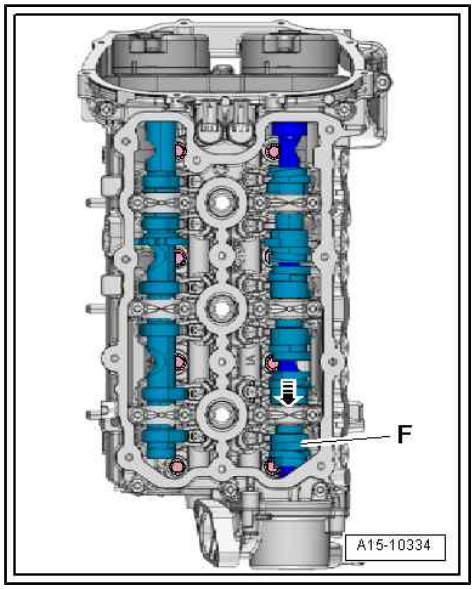
– Press slider -B- as far as stop in direction of -arrow- (slider should not be under load).



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Cylinder head (right-side):

– Press slider -F- as far as stop in direction of -arrow- (slider should not be under load).



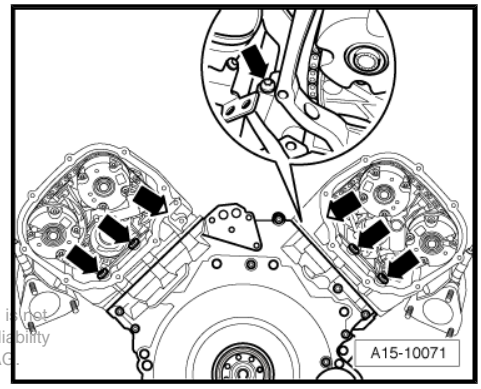
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Continued for both cylinder heads:

– Tighten bolts -arrows-.

♦ 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.

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

– Install dipstick guide tube ⇒ page 146 .

– Fit timing chains on camshafts ⇒ page 200 .

– Install cylinder head cover: left-side ⇒ page 165 ; right-side ⇒ page 168 .

– Install coolant pipe (front) ⇒ page 275 .

– Install power steering pump ⇒ Running gear, axles, steering; Rep. gr. 48 ; Hydraulic power steering; Exploded view - power steering pump

– Install catalytic converter (left-side): vehicles with manual gearbox ⇒ page 374 , vehicles with multitronic gearbox 0AW/ automatic gearbox 0B6 ⇒ page 376 .

– Install catalytic converter (right-side): vehicles with manual gearbox/multitronic gearbox 0AW ⇒ page 377 , vehicles with automatic gearbox 0B6 ⇒ page 378

– Install front silencers ⇒ page 370 .

– Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - bulkhead .

– Install high-pressure pipe, fuel supply hose and intake manifold (bottom sections) ⇒ page 330 .

– Install poly V-belt ⇒ page 119 .

– Install coolant pipe (top) ⇒ page 280 .

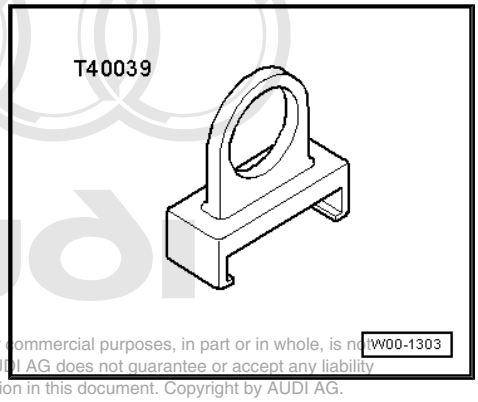
– Change engine oil ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .

– Fill cooling system with fresh coolant ⇒ page 261 .

1.3 Removing and installing cylinder head cover (left-side)

Special tools and workshop equipment required

♦ Puller - T40039-



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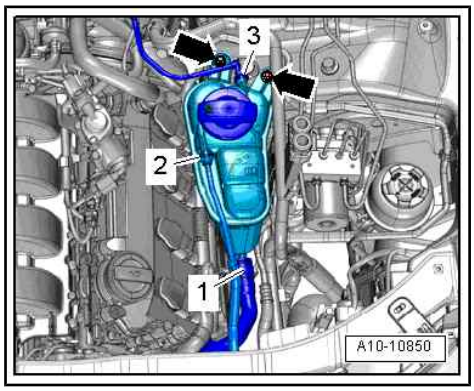
Removing

– Pull off engine cover panels -arrows-.

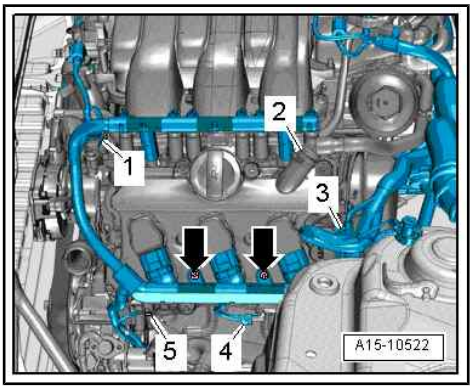


– Remove bolts -arrows-.

– Unplug electrical connector at coolant shortage indicator switch - F66- and move expansion tank to one side with coolant hoses -1, 2, 3- attached.



– Remove bolts -arrows- on cylinder head (left-side) and unplug electrical connectors at ignition coils.
– Unplug electrical connectors -1- on Hall sender 2 - G163- and -4- on Hall sender 4 - G301- .
– Remove bolt -5- for earth connection.



Note

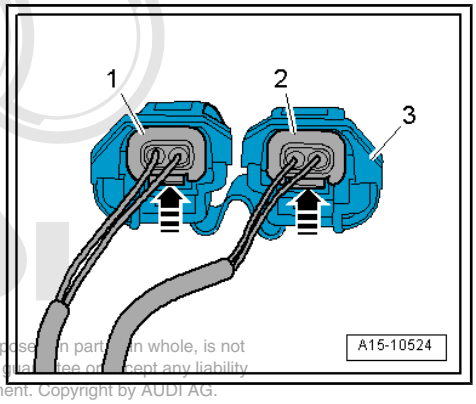
Disregard -item 2-.

– Press both catches and pull both connectors -1- off camshaft control valve 1 - N205- and exhaust camshaft control valve 1 - N318- .

Note

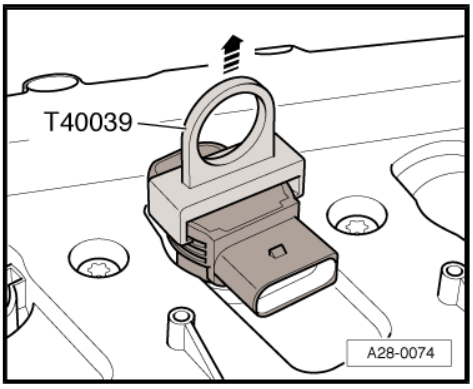
The connecting piece -3- (only on some versions) on the electrical connectors -1- and -2- for the camshaft control valves is intended to prevent the connectors from being interchanged by mistake; it should therefore not be separated from the connectors.

– Move electrical wiring harness clear to side.



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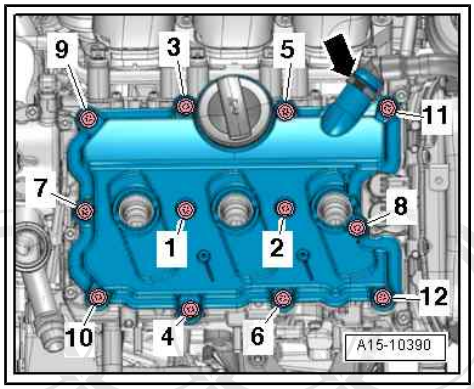
– Remove ignition coils using puller - T40039- .



Rest-of-world vehicles:

– Disconnect crankcase breather hose -arrow- by pressing release tabs.

– Remove bolts in the sequence -12 ... 1- and remove cylinder head cover (left-side).



USA models:

Caution

Risk of violating emission legislation applying to USA models.

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

– Remove bolts in the sequence -12 ... 1- and move cylinder head cover (left-side) clear to one side with crankcase breather hose -arrow- still connected.

Installing

- Tightening torque ⇒ page 145

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

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Note

- *Renew gasket for cylinder head cover if damaged.*
- *Renew bolts for cylinder head cover if seals on bolts are damaged.*

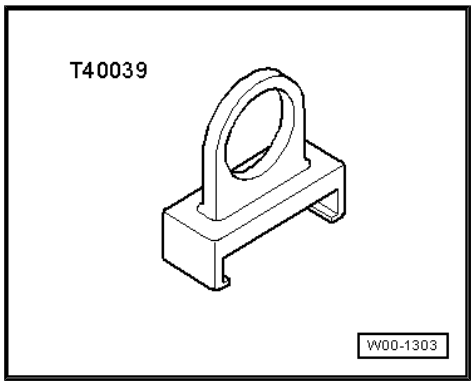
– Clean sealing surfaces; they must be free of oil and grease.

– Tighten bolts for cylinder head cover (left-side) ⇒ page 145 .

1.4 Removing and installing cylinder head cover (right-side)

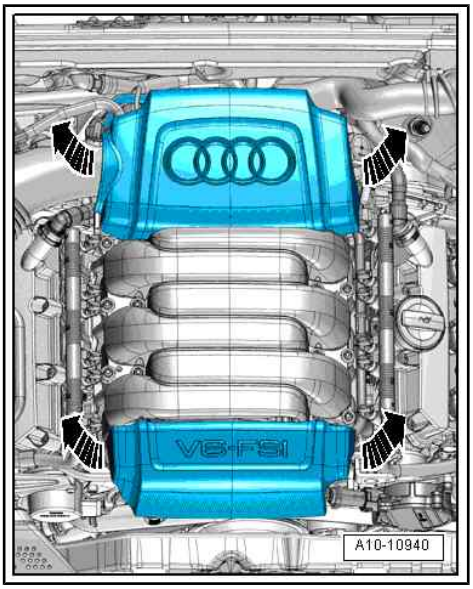
Special tools and workshop equipment required

- Puller - T40039-

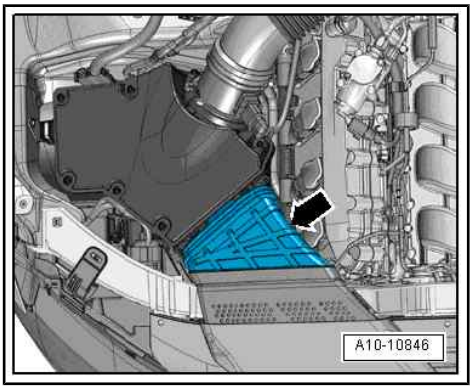


Removing

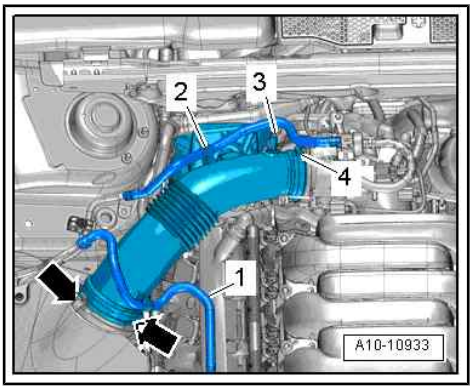
– Pull off engine cover panels -arrows-.



– Remove air duct -arrow-.



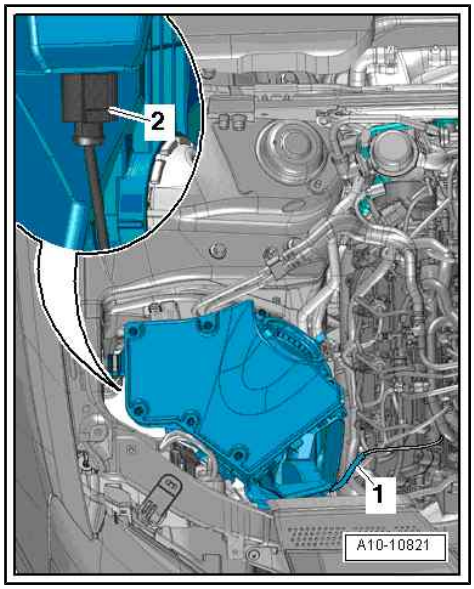
– Move fuel line -1- and line -2- (leading to activated charcoal filter) clear at air pipe.
– Disconnect vacuum hose -3- from connection on air pipe.
– Remove air pipe. To do so, release hose clip -4- and clamps -arrows-.



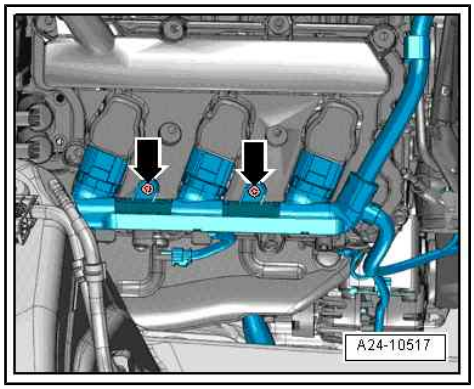
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– Disconnect vacuum line -1-.

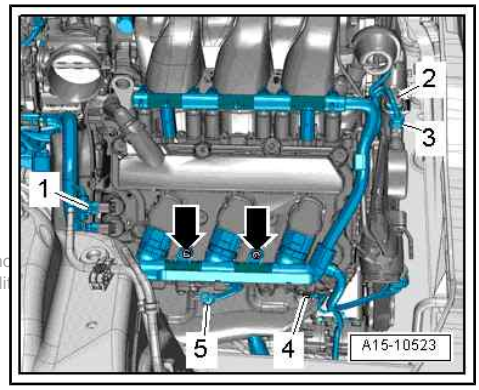
– Detach air cleaner housing and, if fitted, unplug electrical connector -2- at variable intake manifold change-over valve - N335- on reverse side of air cleaner.



– Remove bolts -arrows- on cylinder head (right-side) and unplug electrical connectors at ignition coils.



– Unplug electrical connector -5- at Hall sender 3 - G300- .



Note

Disregard -items 2, 3, 4-.

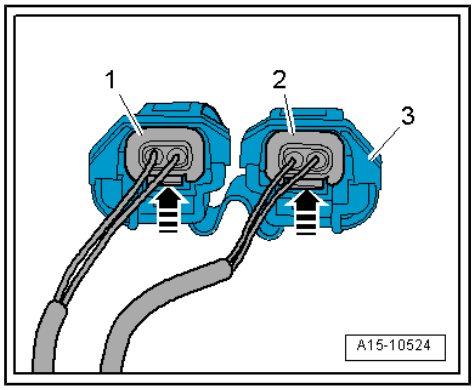
– Press both catches and pull both connectors -1- off camshaft control valve 1 - N205- and exhaust camshaft control valve 1 - N318-.

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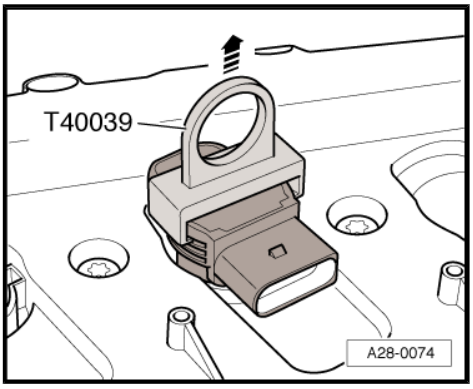
Note

The connecting piece -3- (only on some versions) on the electrical connectors -1- and -2- for the camshaft control valves is intended to prevent the connectors from being interchanged by mistake; it should therefore not be separated from the connectors.

– Move wiring harness clear to the side.



– Remove ignition coils using puller - T40039- .



Rest-of-world vehicles:

– Disconnect crankcase breather hose -arrow- by pressing release tabs.

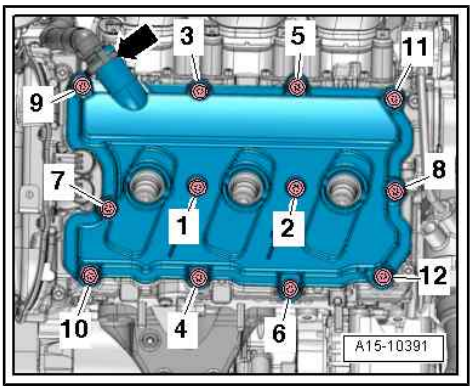
– Remove bolts in the sequence -12 ... 1- and remove cylinder head cover (right-side).

USA models:

Caution

Risk of violating emission legislation applying to USA models.

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



– Remove bolts in the sequence -12 ... 1- and move cylinder head cover (right-side) clear to one side with crankcase breather hose -arrow- still connected.

Installing

- Tightening torque ⇒ page 145

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

Note

- *Renew gasket for cylinder head cover if damaged.*
- *Renew bolts for cylinder head cover if seals on bolts are damaged.*

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

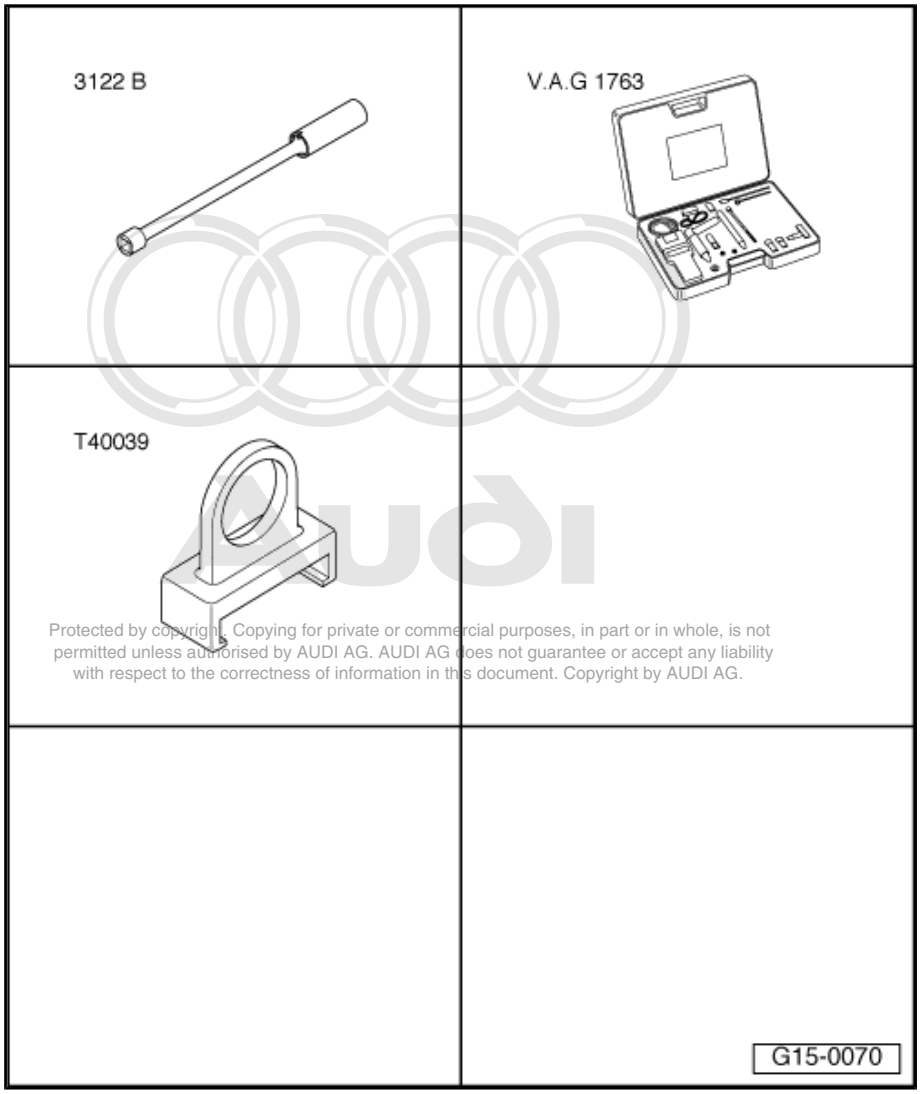
– Tighten bolts for cylinder head cover (right-side) ⇒ page 145 .

1.5 Checking compression

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Special tools and workshop equipment required

- Spark plug socket and extension - 3122 B-
- Compression tester - V.A.G 1763-
- Puller - T40039-



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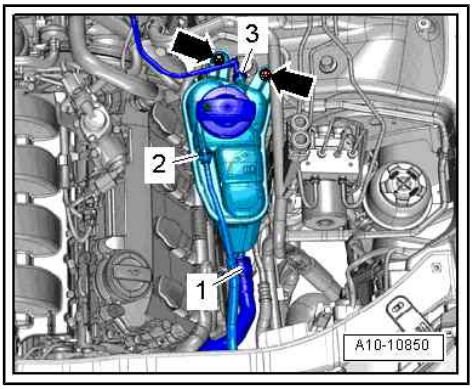
Procedure

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

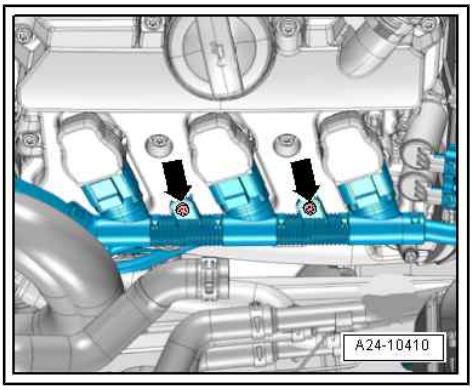
– Pull off rear engine cover panel -top arrows-.



– Remove bolts -arrows-.
– Unplug electrical connector at coolant shortage indicator switch - F66- and move expansion tank to one side with coolant hoses -1, 2, 3- attached.



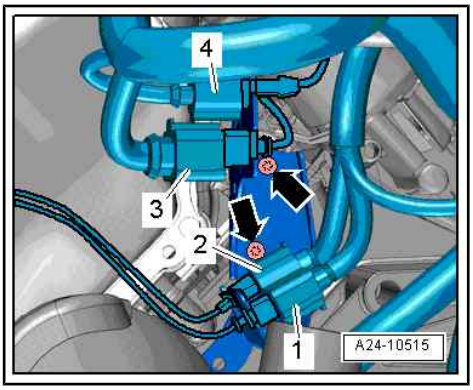
– Remove bolts -arrows- and unplug electrical connectors at ignition coils on cylinder head (left-side).
– Press electrical wiring harness down slightly.



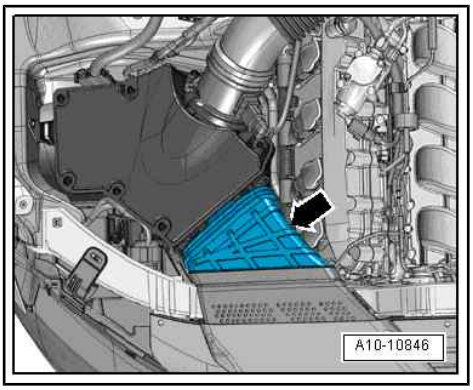
– Unplug electrical connector -3- for injectors at rear of cylinder head (left-side).

Note

Disregard items marked -1, 2, 4- and -arrows-.

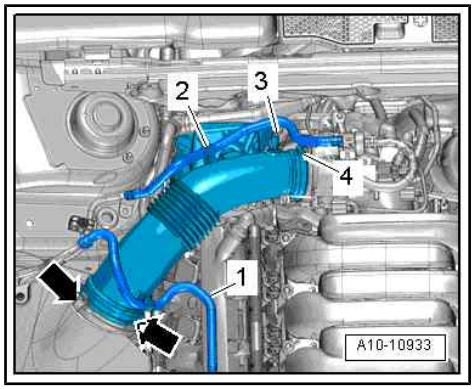


– Remove air duct -arrow-.

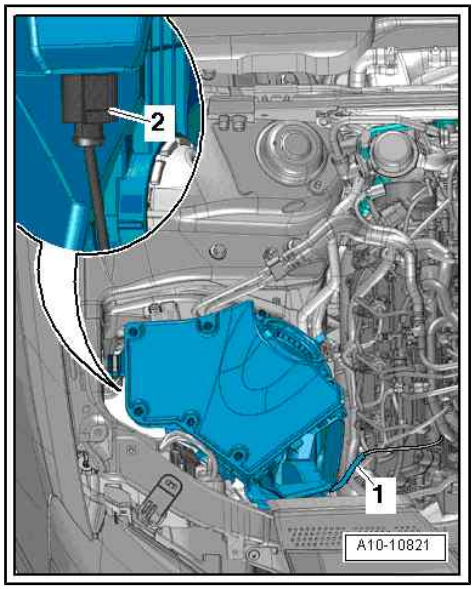


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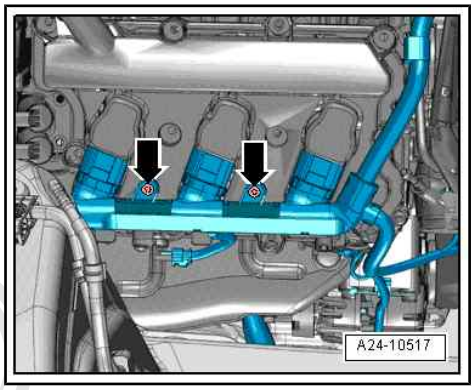
– Move fuel line -1- and line -2- (leading to activated charcoal filter) clear at air pipe.
– Disconnect vacuum hose -3- from connection on air pipe.
– Remove air pipe. To do so, release hose clip -4- and clamps -arrows-.



– Disconnect vacuum line -1-.
– Detach air cleaner housing and, if fitted, unplug electrical connector -2- at variable intake manifold change-over valve - N335- on reverse side of air cleaner.



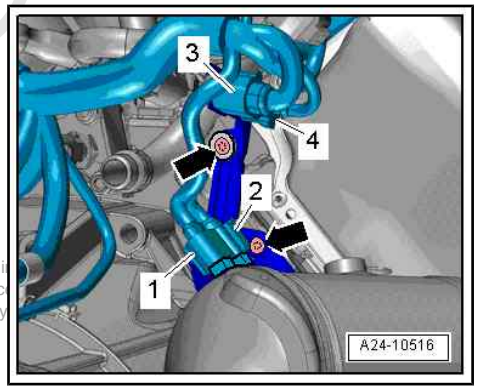
– Remove bolts -arrows- and unplug electrical connectors at ignition coils on cylinder head (right-side).
– Move wiring harness clear to the side.



– Unplug electrical connector -3- for injectors at rear of cylinder head (right-side).

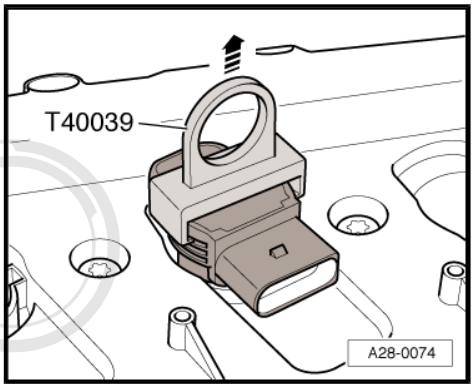
Note

Disregard items marked -1, 2, 4- and -arrows-.



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– Remove all ignition coils using puller - T40039- .
– 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.

Compression pressure	bar
When new	14.5 … 21.0
Wear limit	14.0
Maximum difference between cylinders	3.0

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Assembling

- Tightening torque ⇒ page 143

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 spark plugs ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .
– Install air cleaner housing ⇒ page 324 .
– Faults are stored in engine control unit because electrical connectors were unplugged and engine was started: “Generate readiness code” in “Guided Functions” ⇒ Vehicle diagnostic tester.

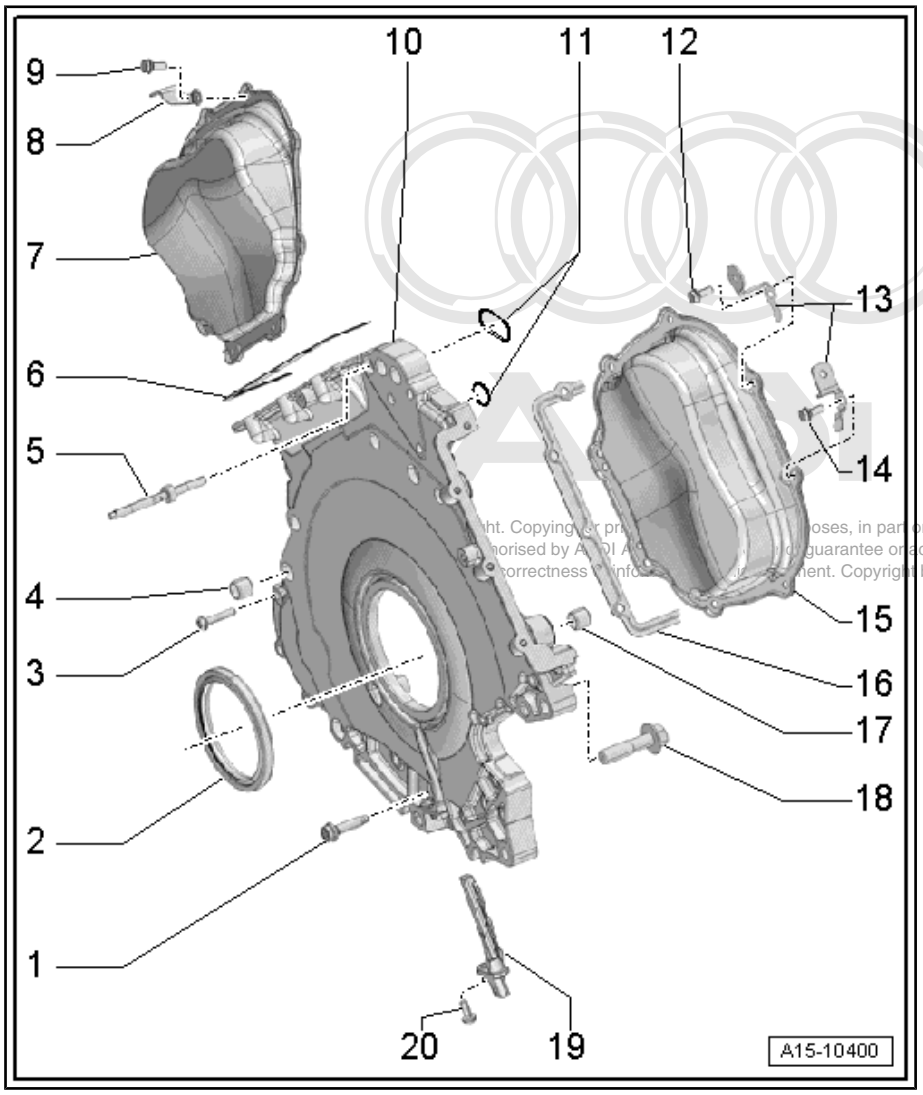
2 Timing chain cover

⇒ “2.1 Exploded view - timing chain cover”, page 176

⇒ “2.2 Removing and installing timing chain covers (left and right)”, page 178

⇒ “2.3 Removing and installing timing chain cover (bottom)”, page 182

2.1 Exploded view - timing chain cover



1 - Bolt
- ❑ Tightening torque and sequence ⇒ page 178

2 - Crankshaft oil seal (gearbox end)
- ❑ Renewing ⇒ page 128

3 - Bolt
- ❑ Tightening torque and sequence ⇒ page 178

4 - Dowel sleeve
- ❑ 2x

5 - Bolt
- ❑ Tightening torque ⇒ Item 13 (page 249)

6 - Cylinder head gasket (left-side)

7 - Timing chain cover (left-side)
- ❑ Removing and installing ⇒ page 178

8 - Bracket
- ❑ For wiring harness

9 - Bolt
- ❑ Renew
- ❑ Tightening torque and sequence ⇒ page 177

10 - Timing chain cover (bottom)
- ❑ Removing and installing ⇒ page 182

11 - Seals
- ❑ Renew

12 - Bolt
- ❑ Tightening torque and sequence ⇒ page 177

13 - Bracket
- ❑ For electrical connectors

14 - Bolt
- ❑ Renew
- ❑ Tightening torque and sequence ⇒ page 177

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15 - Timing chain cover (right-side)

- ❑ Removing and installing ⇒ page 178

16 - Cylinder head gasket (right-side)

17 - Dowel sleeve

- ❑ 2x

18 - Bolt

- ❑ Tightening torque and sequence ⇒ page 178

19 - Engine speed sender - G28-

- ❑ Removing and installing ⇒ page 408

20 - Bolt

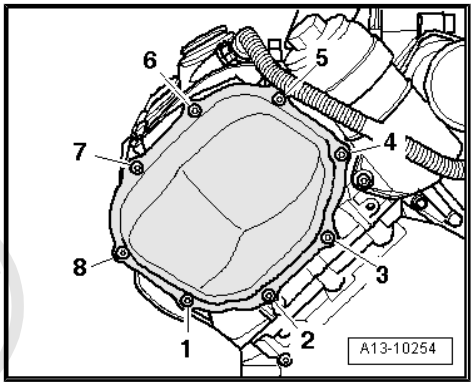
- ❑ Tightening torque ⇒ page 403

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

– Renew bolts for timing chain cover (left-side).

– Tighten bolts in the sequence -1 ... 8- in 2 stages as follows:

1. Tighten to 5 Nm.
2. Turn 90° further.

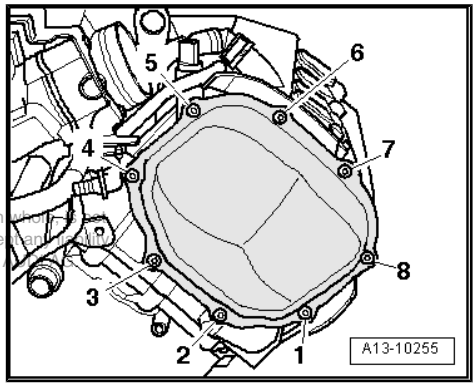


Timing chain cover (right-side) - tightening torque and sequence

– Renew bolts for timing chain cover (right-side).

– Tighten bolts in the sequence -1 ... 8- in 2 stages as follows:

1. Tighten to 5 Nm.
2. Turn 90° further.



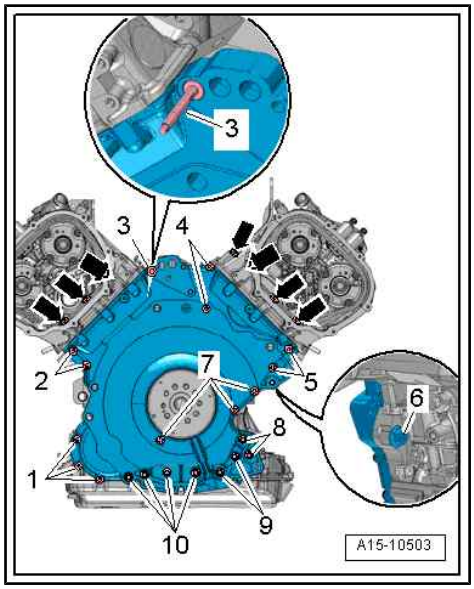
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Timing chain cover (bottom) - tightening torque and sequence

– Tighten bolts in 6 stages as follows:

1. Fit bolts -arrows- and initially tighten to 5 Nm.
2. Tighten bolts -1 ... 10- to 9 Nm in diagonal sequence.
3. Tighten bolts -arrows- to 9 Nm.
4. Tighten bolts -8, 9, 10- to 22 Nm.
5. Tighten bolt -3- to 16 Nm.
6. Tighten bolt -6- to 70 Nm.

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2.2 Removing and installing timing chain covers (left and right)

Special tools and workshop equipment required

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

Removing

Note

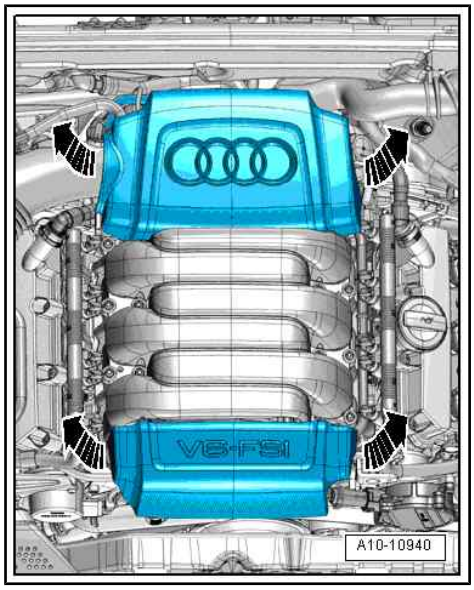
Fit all cable ties in the original positions when installing.

– Pull off rear engine cover panel -top arrows-.

– Vehicles without secondary air system: Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - bulkhead .

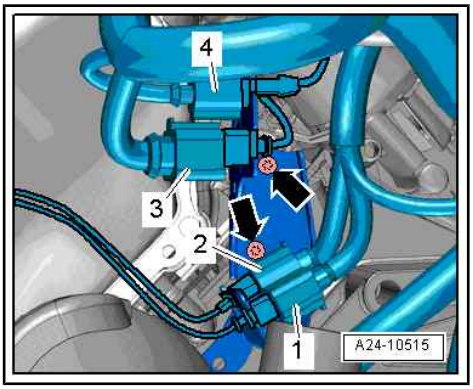
– Vehicles with secondary air system: remove corresponding combination valve for secondary air system:

- Country-specific version 1: left-side ⇒ page 387 ; right-side ⇒ page 388 .
- Country-specific version 2: left-side ⇒ page 390 ; right-side ⇒ page 392 .



Timing chain cover (left-side):

– Detach electrical connectors -1 … 4- from bracket and move clear to side.

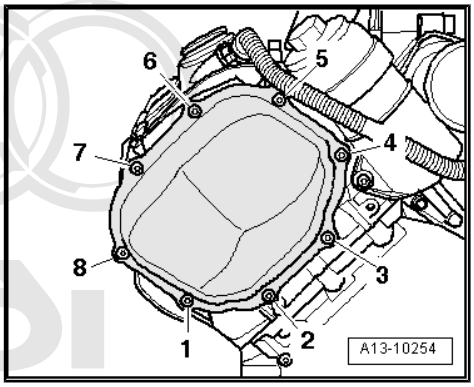


Note

Disregard -arrows-.

– Move electrical wiring clear.

– Unscrew bolts -1 ... 8- and remove timing chain cover (left-side).



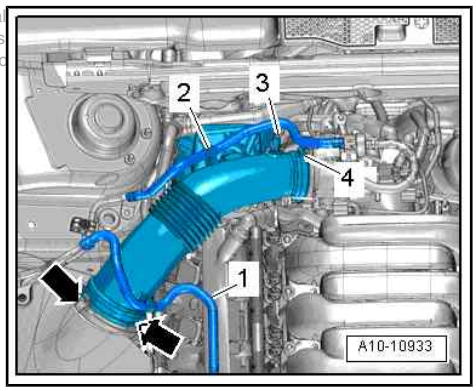
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Timing chain cover (right-side):

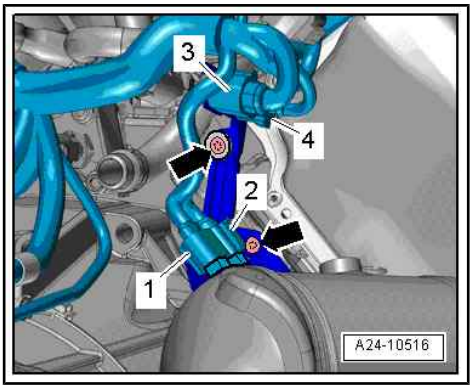
– Move fuel line -1- and line -2- (leading to activated charcoal filter) clear at air pipe.

– Disconnect vacuum hose -3- from connection on air pipe.

– Remove air pipe. To do so, release hose clip -4- and clamps -arrows-.



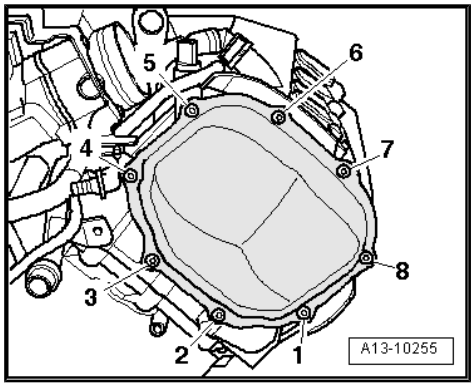
– Detach electrical connectors -1 … 4- from bracket and move clear to side.



Note

Disregard -arrows-.

– Unscrew bolts -1 ... 8- and remove timing chain cover (right-side).



Installing

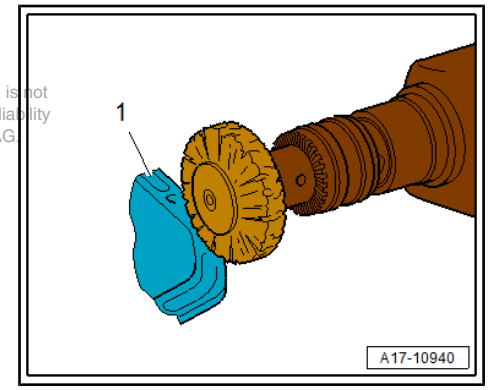
- Tightening torques ⇒ page 177 , ⇒ page 177 .

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Caution

Protect lubrication system against contamination.

- *Cover exposed parts of the engine.*



WARNING

Risk of eye injury.

- *Wear safety goggles.*

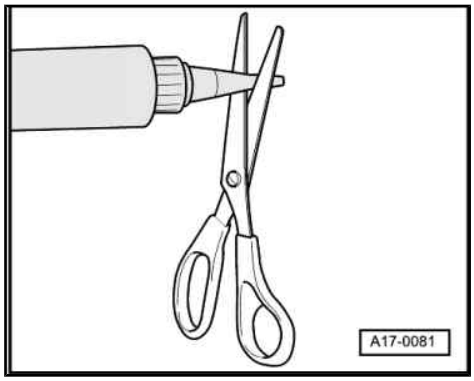
– Remove remaining sealant on timing chain covers, cylinder block and cylinder head using rotating plastic brush or similar.

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

Note

Note the use-by date of the sealant.

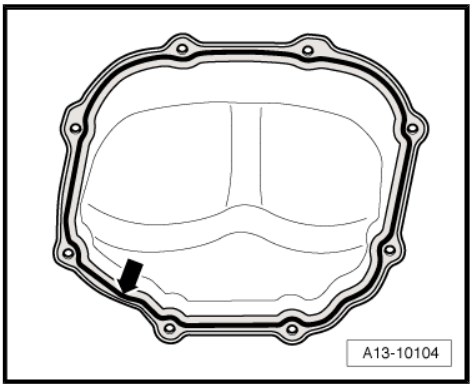
– Cut off nozzle of tube at front marking (nozzle ∅ approx. 2 mm).



Caution

Make sure lubrication system is not clogged by excess sealant.

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



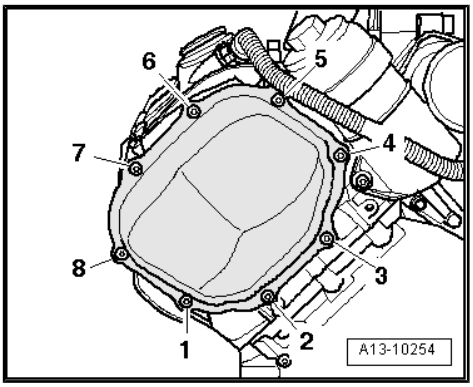
– Apply sealant bead -arrow- onto the clean sealing surface of the timing chain cover (left-side) as illustrated.

• Width of sealant bead: 2.5 mm.

Note

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

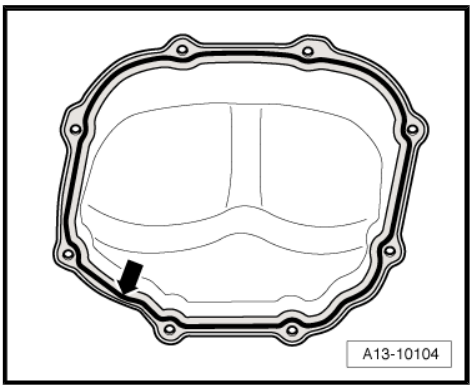
– Install timing chain cover (left-side) and tighten bolts ⇒ page 177 .



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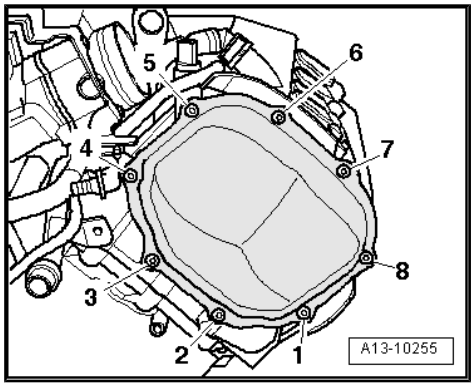
– Apply sealant bead -arrow- onto the clean sealing surface of the timing chain cover (right-side) as illustrated.

• Width of sealant bead: 2.5 mm.



– Install timing chain cover (right-side) and tighten bolts ⇒ page 177 .

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



Note

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

– Vehicles without secondary air system: Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - bulkhead .

– Vehicles with secondary air system: install corresponding combination valve for secondary air system:

♦ Country-specific version 1: left-side ⇒ page 387 ; right-side ⇒ page 388 .

♦ Country-specific version 2: left-side ⇒ page 390 ; right-side ⇒ page 392 .

2.3 Removing and installing timing chain cover (bottom)

Special tools and workshop equipment required

♦ Electric drill with plastic brush attachment

♦ Safety goggles

♦ Sealant ⇒ Electronic parts catalogue

Removing

• Gearbox removed.

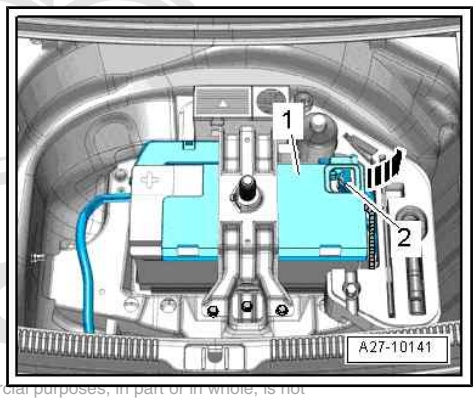
Note

Fit all cable ties in the original positions when installing.

Caution

Electronic components are susceptible to damage.

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



– Switch off ignition and take out ignition key.

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

– Remove drive plate ⇒ page 125 .

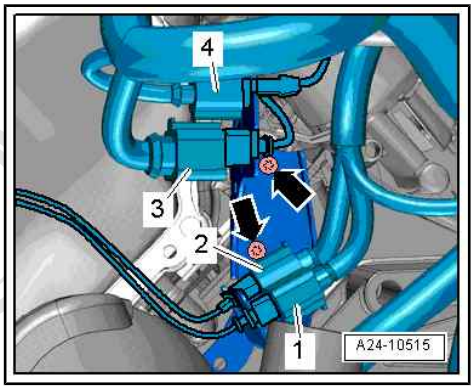
– Remove timing chain covers (left and right) ⇒ page 178 .

– Remove oil filter housing ⇒ page 252 .

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

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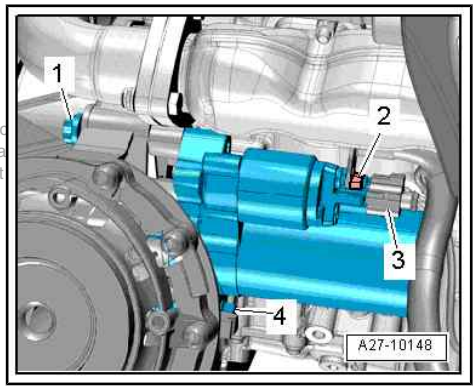
– Remove bolts -arrows- (left and right) and detach bracket for electrical connectors.



Note

Disregard items marked -1 ... 4-.

– 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.

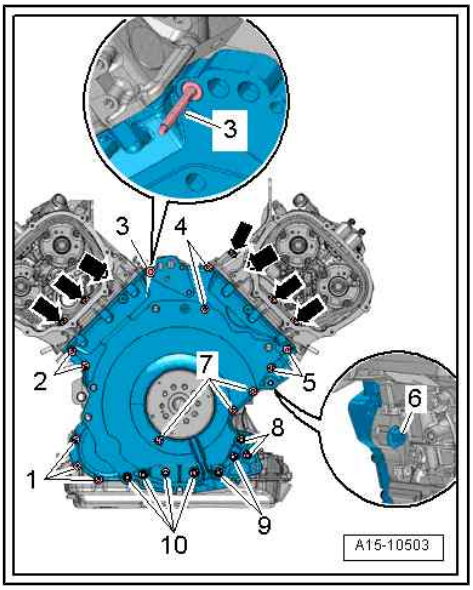


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Note

Disregard -items 1, 4-.

– Remove bolts -arrows-.
– Unscrew bolts -1 ... 10- and remove timing chain cover (bottom).
– Press crankshaft oil seal (gearbox end) out of timing chain cover (bottom).



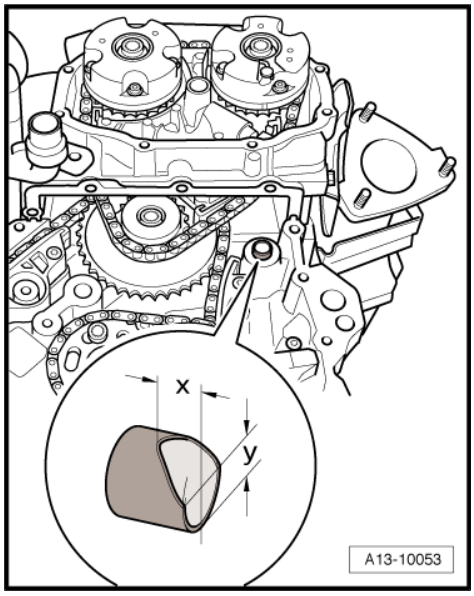
Installing

- Tightening torques ⇒ page 178

Note

Renew gaskets, seals and O-rings.

– 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.



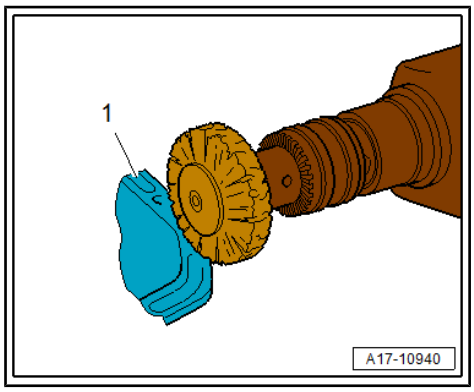
Note

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.***



WARNING

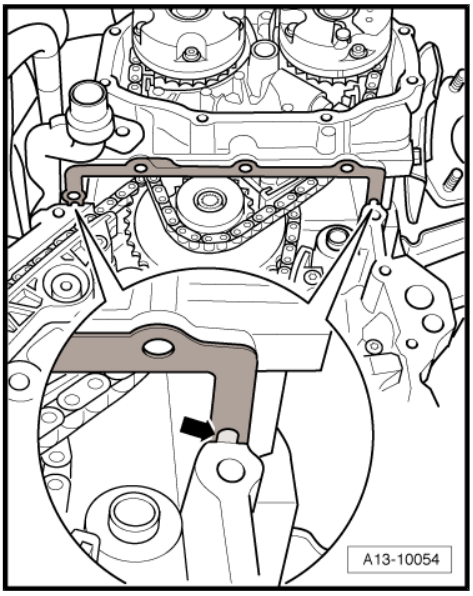
Risk of eye injury.

- ***Wear safety goggles.***

– Remove remaining sealant on timing chain cover, 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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– Clean old sealant from holes -arrow- in cylinder head gaskets.



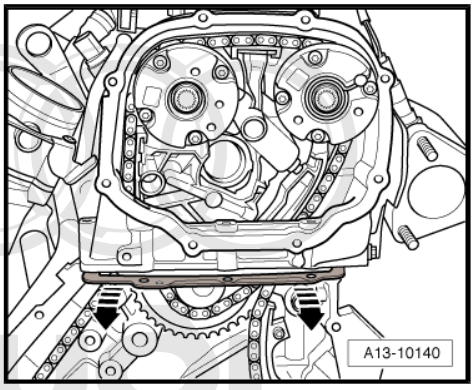
Note

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

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.

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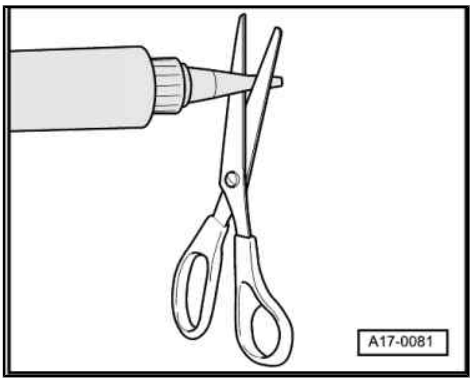
– Carefully bend the ends of the cylinder head gaskets down very slightly -arrows-, just far enough to be able to clean the upper sealing surface on the cylinder head gasket and cylinder head.

– Clean cylinder head gaskets (top and bottom); they must be free of oil and grease.

Note

Note the use-by date of the sealant.

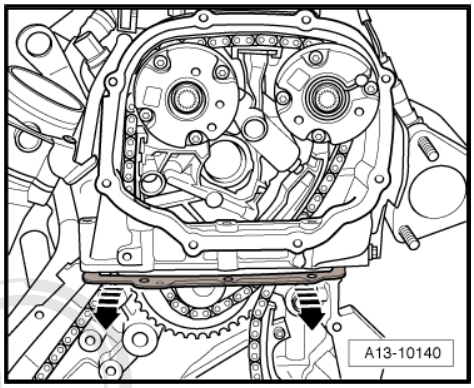
– Cut off nozzle of tube at front marking (nozzle ∅ approx. 2 mm).



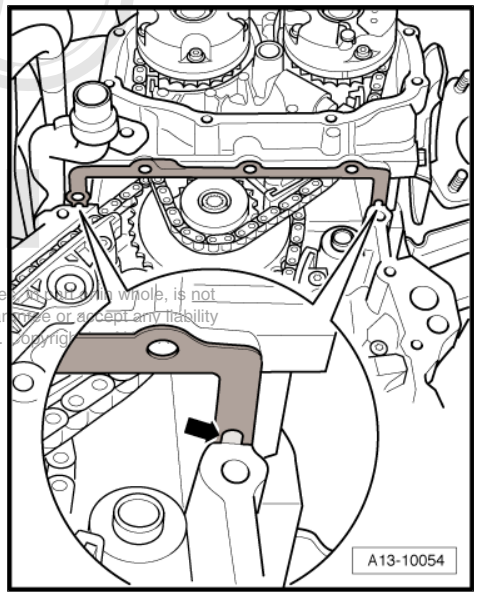
Note

The sealant must be applied at several points on the engine as described below.

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



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

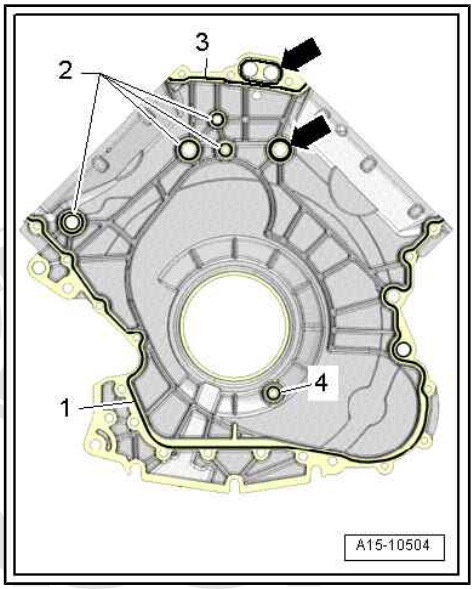


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Caution

Make sure lubrication system is not clogged by excess sealant.

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



– Apply sealant beads -1 ... 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.
- The sealant -2- must be applied in a continuous bead as shown in the illustration (although the groove is not continuous).

Note

The minimum time required for the sealant to harden is only approx. 5 minutes after being applied.

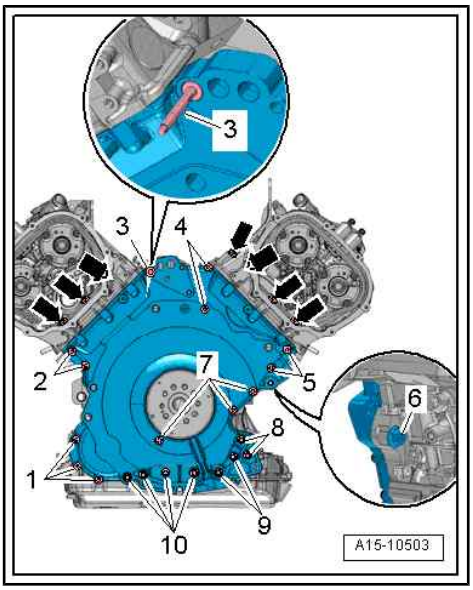
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– Insert seals -arrows- in grooves on timing chain cover (bottom).

– 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 for timing chain cover (bottom) ⇒ page 178 .



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

– Install starter ⇒ Electrical system; Rep. gr. 27 ; Starter; Removing and installing starter .

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

– Install oil filter housing ⇒ page 252 .

– Install timing chain covers (left and right) ⇒ page 180 .

– Install crankshaft oil seal (gearbox end) ⇒ page 128 .

– Install drive plate ⇒ page 125 .

– Fill with engine oil and check oil level ⇒ page 234 .

3 Chain drive

⇒ “3.1 Exploded view - camshaft timing chains”, page 188

⇒ “3.2 Exploded view - drive chain for valve gear”, page 190

⇒ “3.3 Exploded view - drive chain for balance shaft and oil pump”, page 192

⇒ “3.4 Removing and installing camshaft timing chain”, page 192

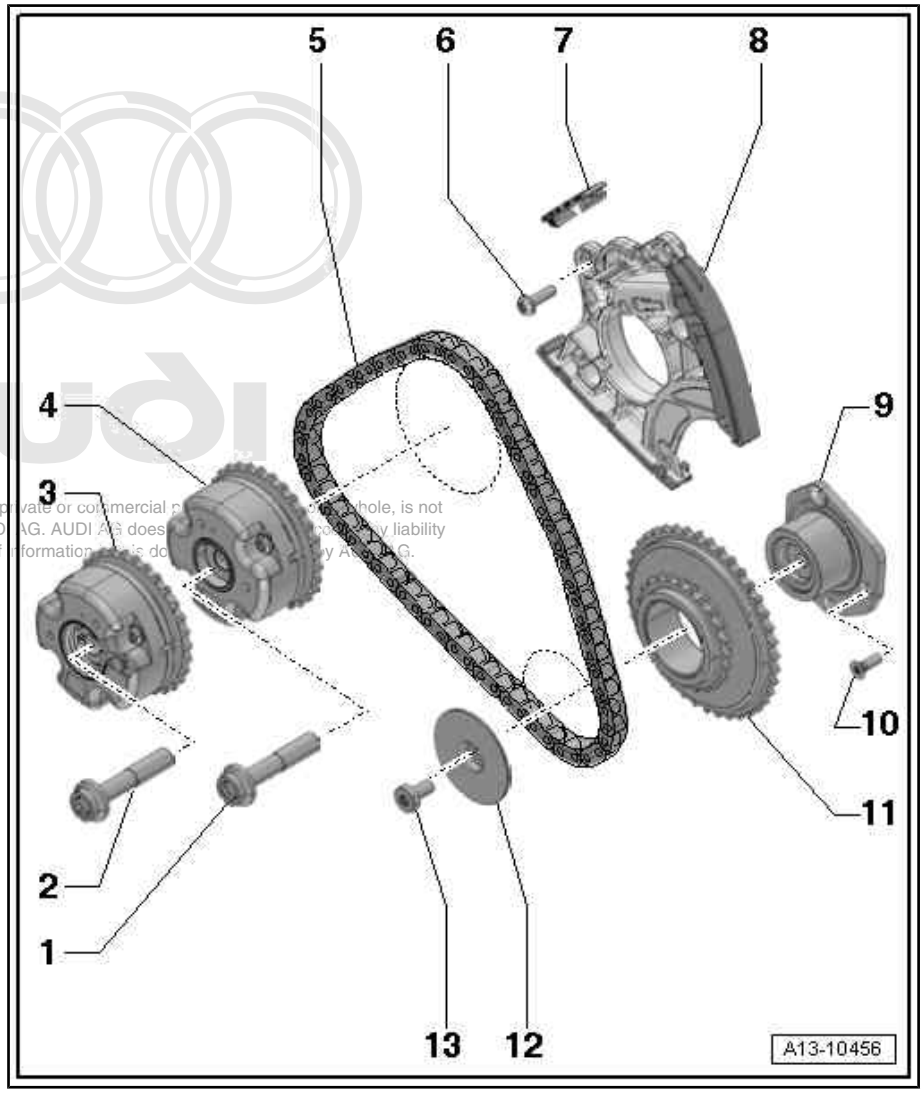
⇒ “3.5 Removing camshaft timing chain from camshafts”, page 194

⇒ “3.6 Removing and installing drive chain for valve gear”, page 204

⇒ “3.7 Removing and installing drive chain for auxiliary drive”, page 205

3.1 Exploded view - camshaft timing chains

Camshaft timing chain (left-side)



1 - Bolt

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

2 - Bolt

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

3 - Camshaft adjuster for exhaust camshaft

- ❑ Identification “Exhaust”
- ❑ Removing and installing ⇒ “3.5 Removing camshaft timing chain from camshafts”, page 194

4 - Camshaft adjuster for inlet camshaft

- ❑ Identification “Intake”
- ❑ Removing and installing ⇒ “3.5 Removing camshaft timing chain from camshafts”, page 194

5 - Camshaft timing chain (left-side)

- ❑ Before removing, mark running direction with paint
- ❑ Removing and installing ⇒ page 194

6 - Bolt

- ❑ 9 Nm

7 - Slide

8 - Chain tensioner for camshaft timing chain (left-side)

- ❑ Removing and installing ⇒ “3.5 Removing camshaft timing chain from camshafts”, page 194

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9 - Bearing bracket for drive sprocket

10 - Bolt

- ❑ Renew
- ❑ 8 Nm + turn 45° further

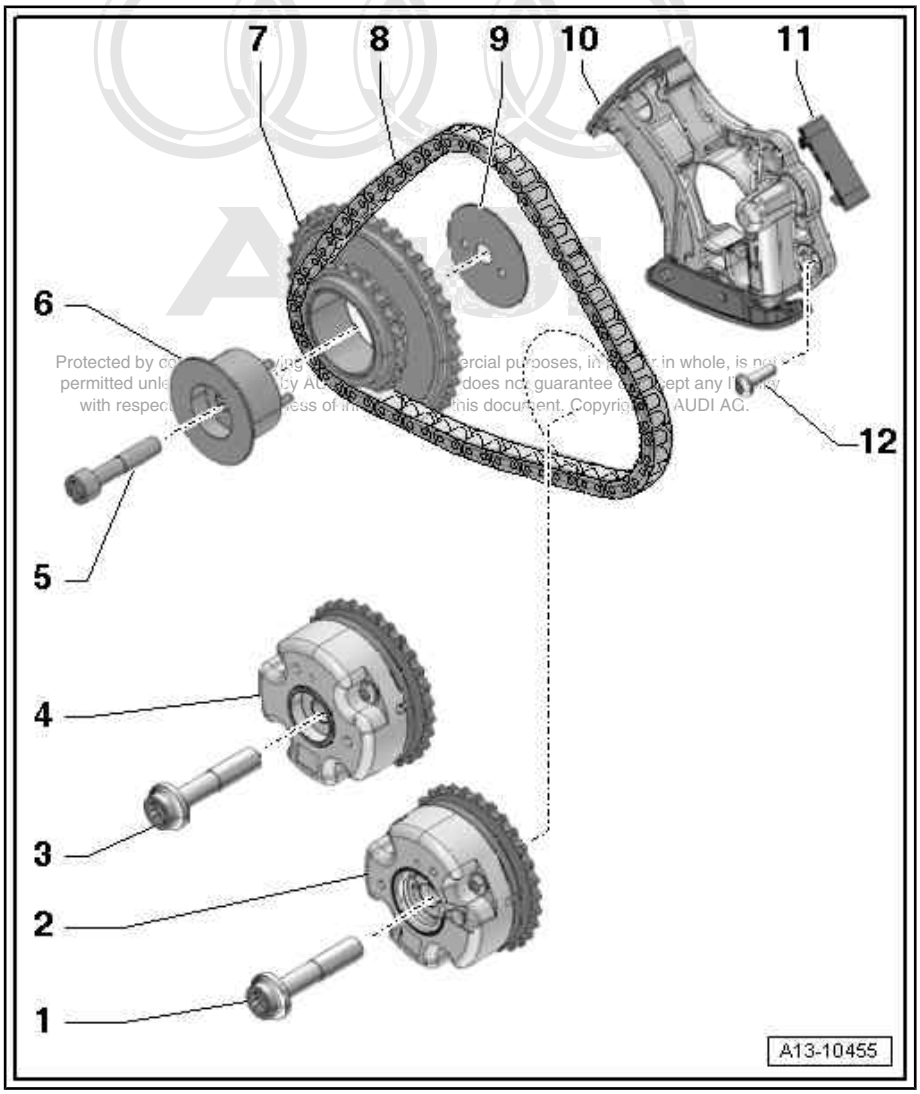
11 - Drive sprocket for camshaft timing chain (left-side)

12 - Thrust washer for drive sprocket

13 - Bolt

- ❑ Renew
- ❑ 6 Nm + turn 60° further

Camshaft timing chain (right-side)



1 - Bolt

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

2 - Camshaft adjuster for exhaust camshaft

- ❑ Identification “Exhaust”
- ❑ Removing and installing ⇒ “3.5 Removing camshaft timing chain from camshafts”, page 194

3 - Bolt

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

4 - Camshaft adjuster for inlet camshaft

- ❑ Identification “Intake”
- ❑ Removing and installing ⇒ “3.5 Removing camshaft timing chain from camshafts”, page 194

5 - Bolt

- ❑ Renew
- ❑ 30 Nm + turn 90° further

6 - Bearing mounting for drive sprocket

- ❑ For camshaft timing chain (right-side)
- ❑ Asymmetric version
- ❑ Installation position ⇒ page 191

7 - Drive sprocket for camshaft timing chain (right-side)

- ❑ Installation position ⇒ page 191

8 - Camshaft timing chain (right-side)

- ❑ Before removing, mark running direction with paint
- ❑ Removing and installing ⇒ page 194

9 - Thrust washer for drive sprocket

- ❑ For camshaft timing chain (right-side)

- ❑ Asymmetric version
- ❑ Installation position ⇒ page 191

10 - Chain tensioner for camshaft timing chain (right-side)

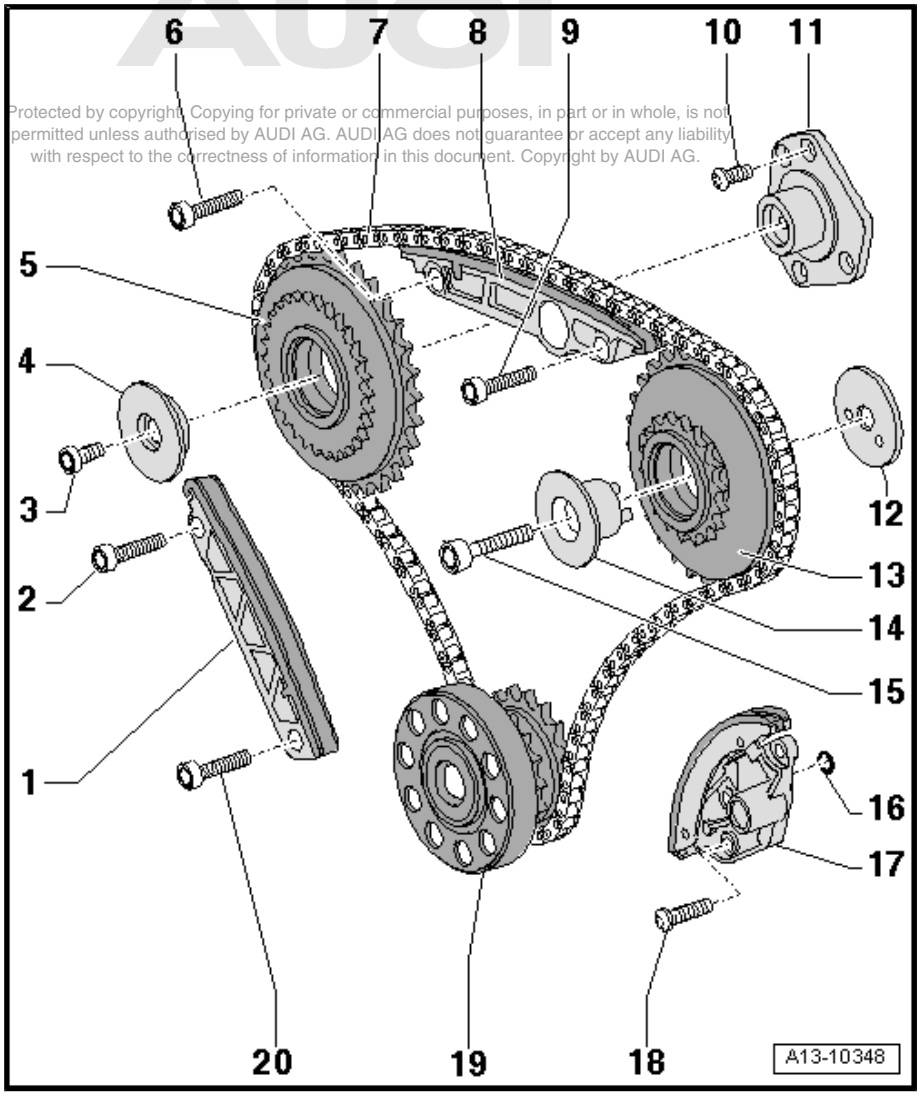
- ❑ Removing and installing ⇒ “3.5 Removing camshaft timing chain from camshafts”, page 194

11 - Slide

12 - Bolt

- ❑ 9 Nm

3.2 Exploded view - drive chain for valve gear



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1 - Guide rail

2 - Bolt

- ❑ Renew
- ❑ 10 Nm + turn 90° further

3 - Bolt

- ❑ Tightening torque ⇒ Item 13 (page 189)

4 - Thrust washer for drive sprocket

5 - Drive sprocket for timing chain (left-side)

6 - Bolt

- ❑ Renew
- ❑ 10 Nm + turn 90° further

7 - Drive chain for valve gear

- ❑ Before removing, mark running direction with paint
- ❑ Removing and installing ⇒ page 204

8 - Guide rail

9 - Bolt

- ❑ Renew
- ❑ 10 Nm + turn 90° further

10 - Bolt

- ❑ Tightening torque ⇒ Item 10 (page 189)

11 - Bearing bracket for drive sprocket

- ❑ For camshaft timing chain (right-side)
- ❑ Asymmetric version
- ❑ Installation position ⇒ page 191

12 - Thrust washer

- ❑ Asymmetric version
- ❑ Installation position ⇒ page 191

13 - Drive sprocket for timing chain (right-side)

- ❑ Installation position ⇒ page 191

14 - Bearing mounting for drive sprocket

- ❑ Asymmetric version
- ❑ Installation position ⇒ page 191

15 - Bolt

- ❑ Tightening torque ⇒ Item 5 (page 189)

16 - O-ring

- ❑ Renew

17 - Chain tensioner

18 - Bolt

- ❑ 9 Nm

19 - Crankshaft

20 - Bolt

- ❑ Renew
- ❑ 10 Nm + turn 90° further

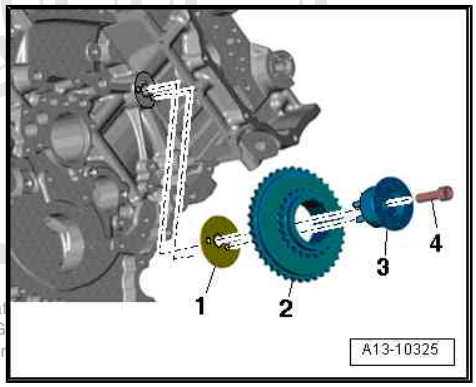
Installation position: bearing mounting for drive sprocket for camshaft timing chain (right-side)

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

1 - Crankshaft

2 - Drive chain for auxiliary drives

- ❑ Before removing, mark running direction with paint
- ❑ Removing and installing ⇒ page 205

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

- ❑ Renew
- ❑ 15 Nm + turn 90° further

7 - Chain sprocket for balance shaft

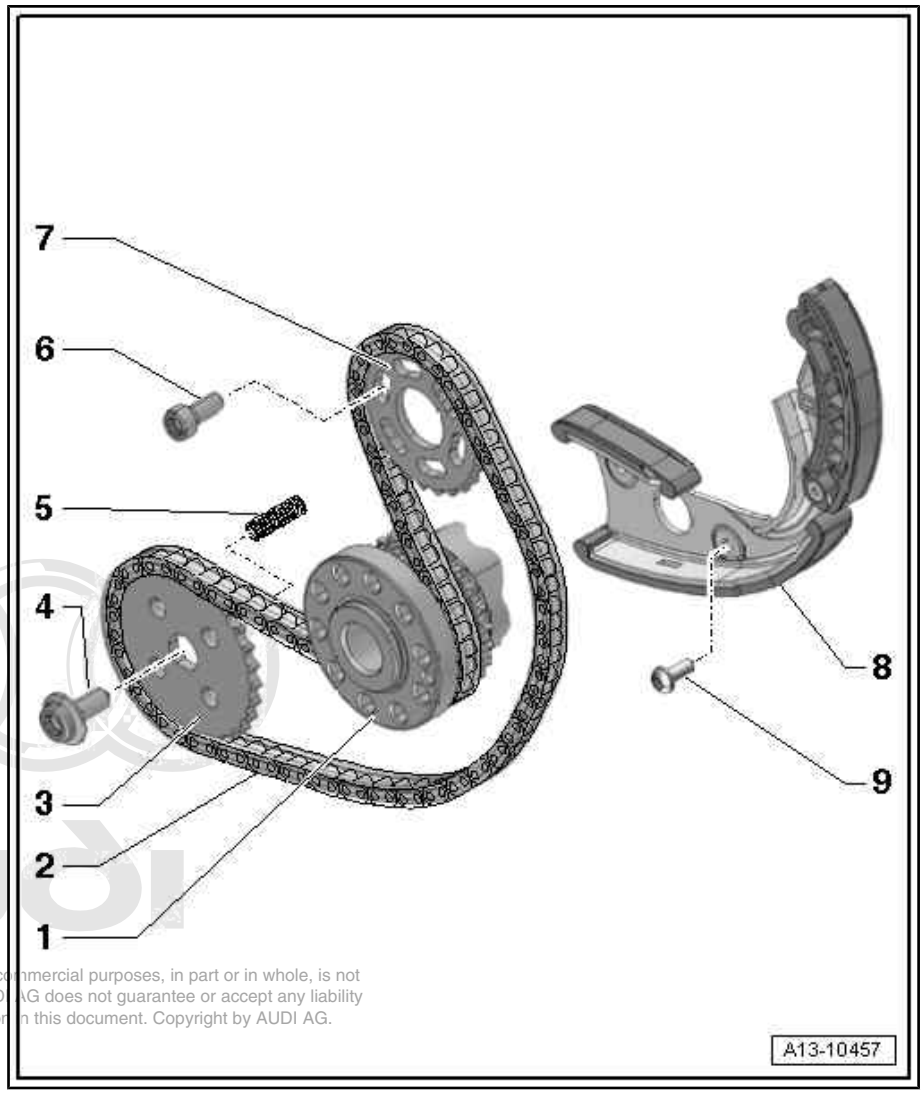
- ❑ Installation position: Side with lettering faces gearbox

8 - Chain tensioner

- ❑ With guide rail

9 - Bolt

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



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3.4 Removing and installing camshaft timing chain

Removing

- Gearbox removed.

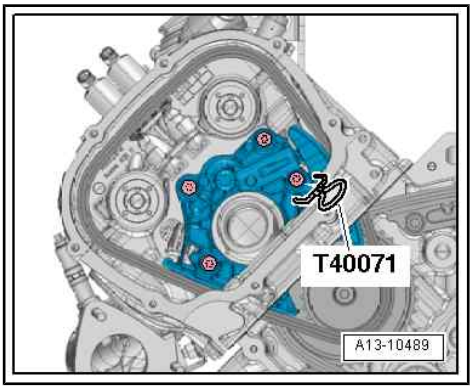
– Remove timing chain cover (bottom) ⇒ page 182 .

– Remove timing chains from camshafts ⇒ page 194 .

Caution

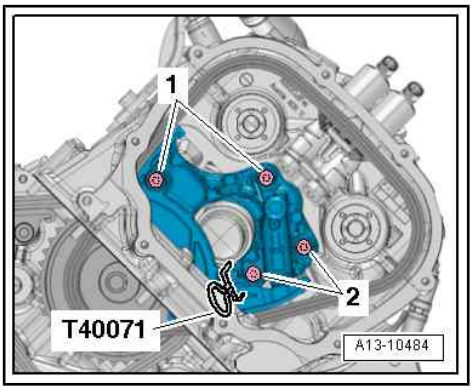
If a used timing chain rotates in the opposite direction when it is refitted, this can cause breakage.

- ***Mark running direction of timing chains (left and right) with paint for re-installation. Do not mark timing chain by means of centre punch, notch or the like.***



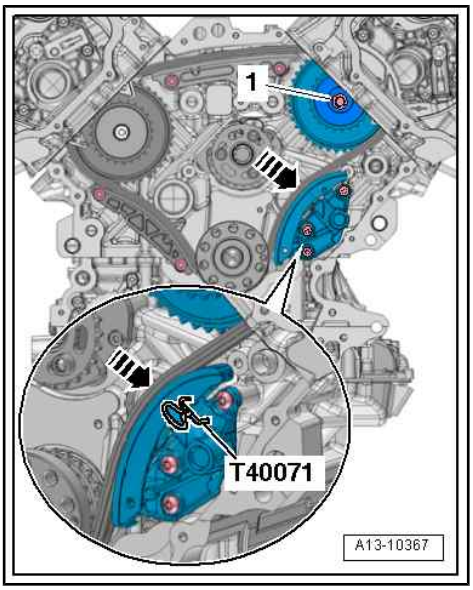
– Remove locking pin - T40071- and detach camshaft timing chain (left-side).

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



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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- .



– Slacken off bolt -1- for drive sprocket approx. 1 turn.

– Tilt drive sprocket with bearing mounting slightly to one side and lift off camshaft timing chain (right-side).

Installing

- Tightening torque ⇒ page 188

Note

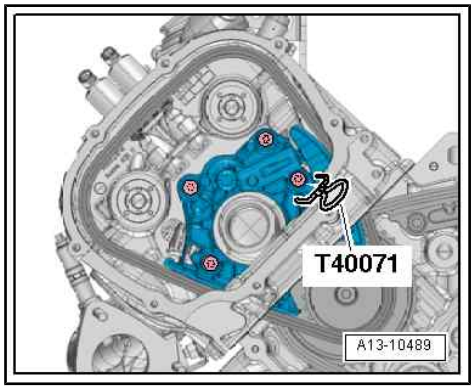
- *Note the correct installation position if the tensioning element has been removed from the chain tensioner: drilling in base of housing faces chain tensioner and piston faces tensioner rail.*
- *Renew the bolts tightened with specified tightening angle.*

Caution

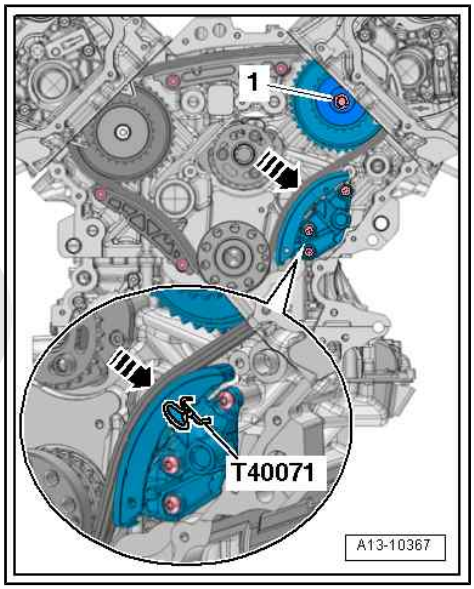
Avoid damage to valves and piston crowns.

- ***The crankshaft must not be at "TDC" at any cylinder when the camshafts are turned.***

– Position timing chain (left-side) as shown in the illustration (according to marks applied during removal).
– Press down guide rail of chain tensioner for timing chain (left-side) and lock chain tensioner by inserting locking pin - T40071- .

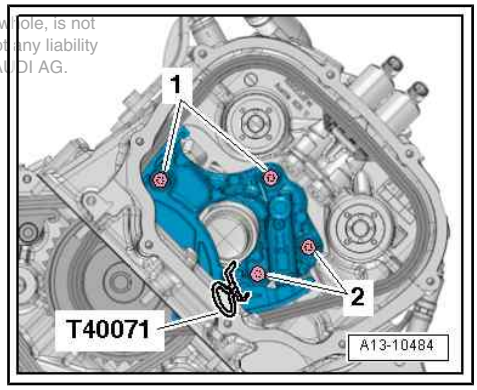


– Guide timing chain (right-side) past bearing mounting for drive sprocket (note marks applied when removing).
– Tighten bolt -1- for bearing mounting.
– Remove locking pin - T40071- .



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



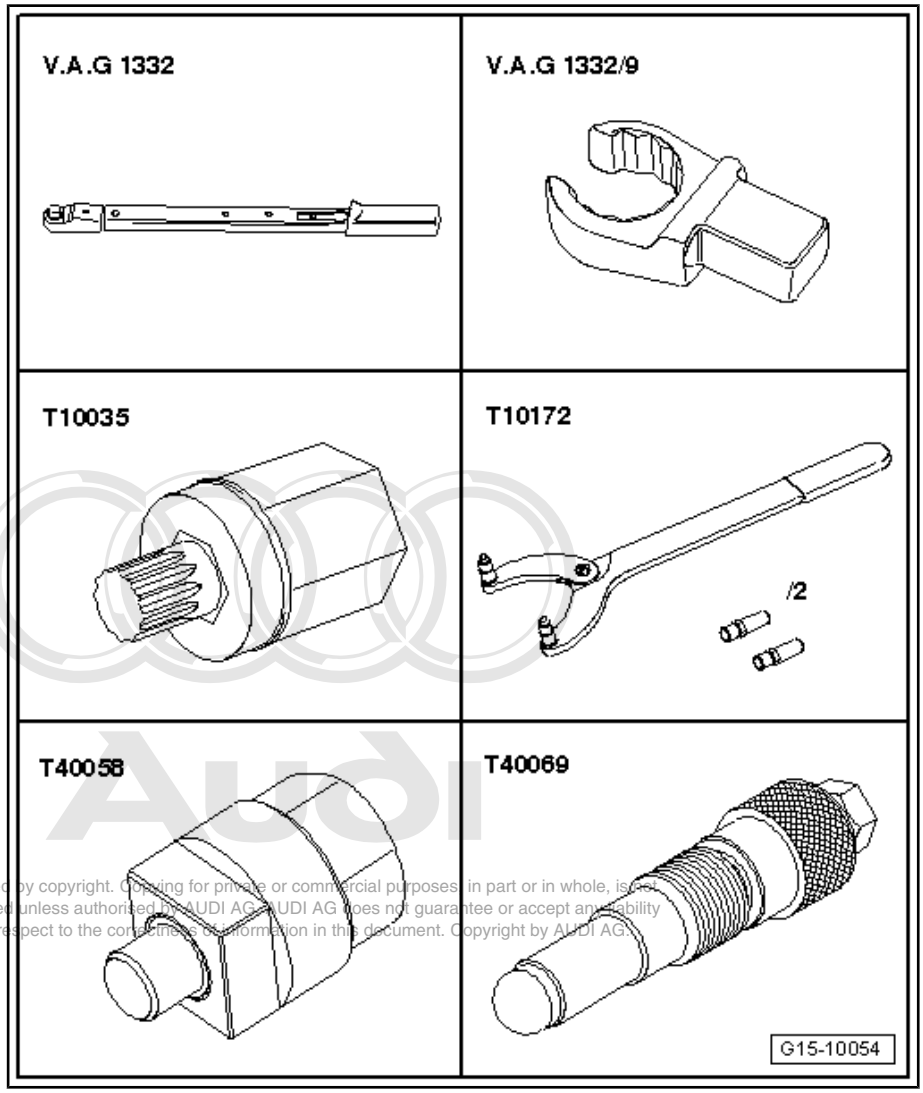
Remaining installation steps are carried out in reverse sequence; note the following:

– Fit timing chains on camshafts ⇒ page 200 .
– Install timing chain cover (bottom) ⇒ page 182 .
– Fill with engine oil and check oil level ⇒ page 234 .

3.5 Removing camshaft timing chain from camshafts

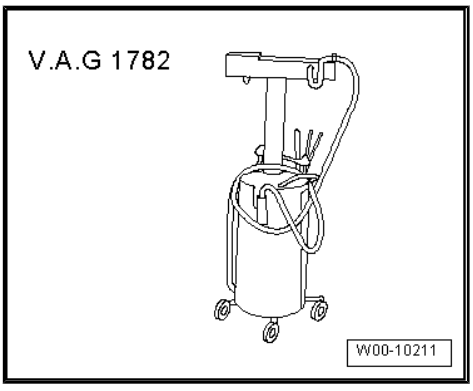
Special tools and workshop equipment required

- Torque wrench - V.A.G 1332-
- Open ring spanner insert - V.A.G 1332/9-
- Special wrench - T10035-
- Counterhold tool - T10172-
- Adapter - T40058-
- Locking pin - T40069-

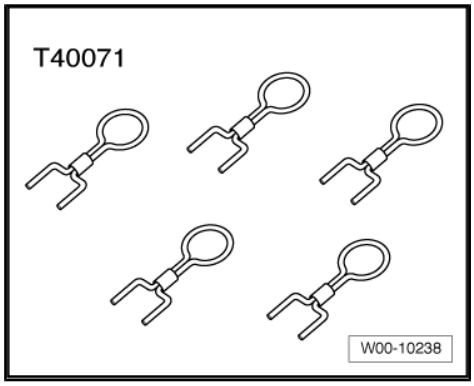


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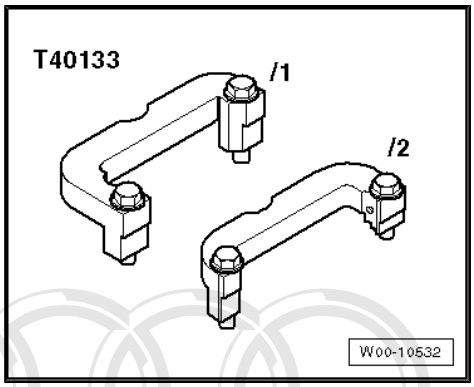
- Used oil collection and extraction unit - V.A.G 1782-



♦ 2x Locking pin - T40071-



♦ 2x Camshaft clamp - T40133-

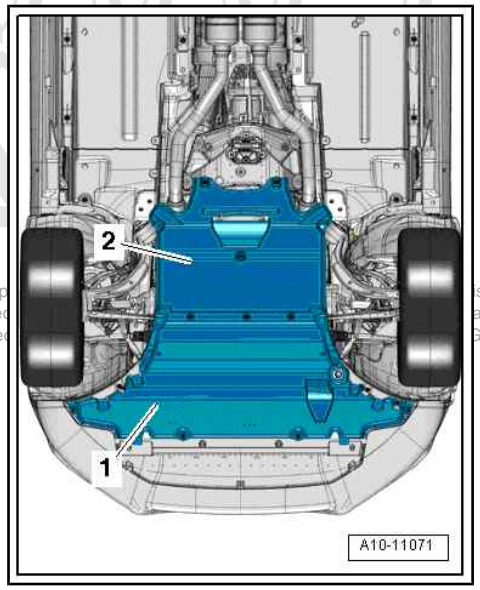


Removing

Note

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

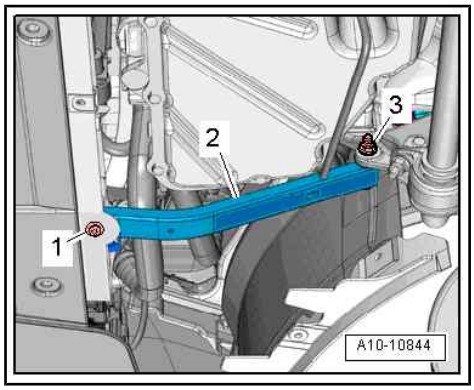
– Remove relevant cylinder head cover: left-side ⇒ page 165 ; right-side ⇒ page 168 .
– Remove timing chain covers (left and right) ⇒ page 178 .
– Remove noise insulation -1- and -2- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .



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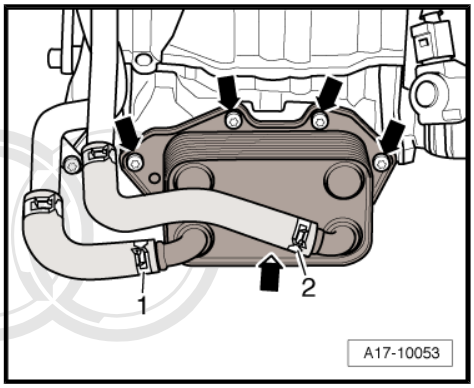
Vehicles not equipped with continued coolant circulation pump - V51- :

– Remove bolt -1- and nut -3- and detach strut -2- (left-side) for lock carrier.



– Position used oil collection and extraction unit - V.A.G 1782- below engine.

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



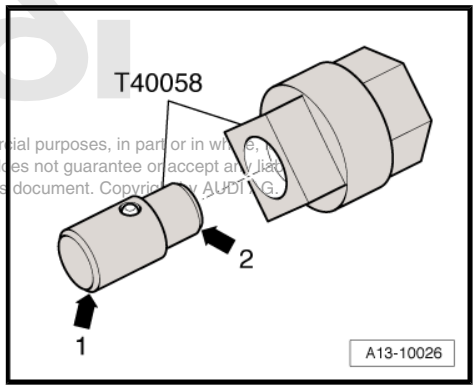
Vehicles with continued coolant circulation pump - V51- :

– Remove continued coolant circulation pump - V51- ⇒ page 269 and engine oil cooler ⇒ page 243 .

All vehicles (continued):

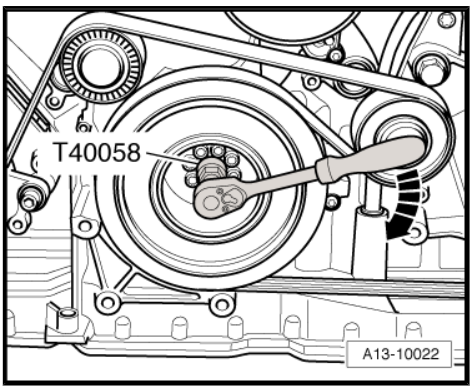
– Insert guide pin of adapter -T40058- as follows:

- The larger-diameter section -arrow 1- faces towards the engine.
- The smaller-diameter section -arrow 2- faces the adapter.

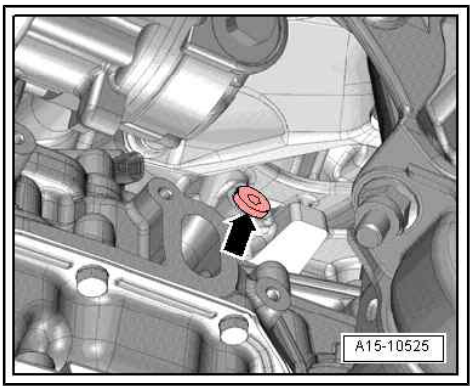


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– Turn crankshaft with adapter - T40058- in normal direction of rotation -arrow- to “TDC position”.

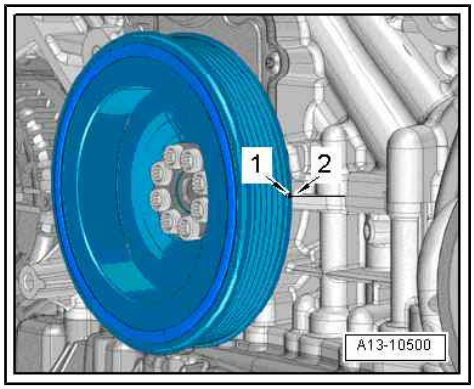


– Unscrew plug -arrow- for “TDC” marking from cylinder block.



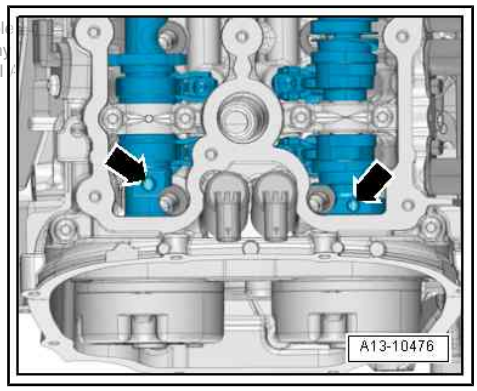
Note

- *The bore provided for locking the crankshaft is difficult to see when the engine is installed.*
- *Therefore, turn the engine until the small notch -1- on the vibration damper is in line with the housing joint -2- between the cylinder block and the retaining frame on the left side (as seen in direction of travel). This makes it easier to screw in locking pin - T40069- .*
- *The marking on the vibration damper is only a visual aid. The exact "TDC" position can only be obtained by screwing in the locking pin - T40069- .*

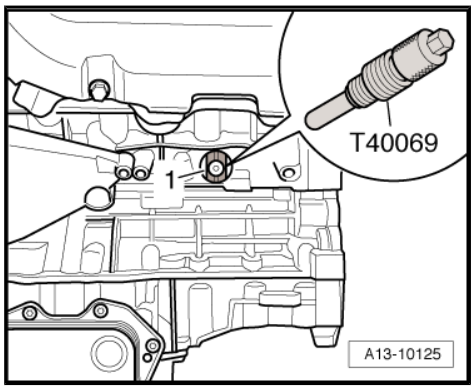


- The threaded holes -arrows- in the camshafts must face upwards.

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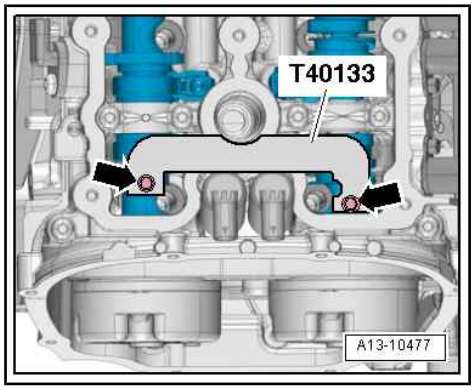
– Screw locking pin - T40069- into bore (tightening torque: 20 Nm); if necessary, turn crankshaft backwards and forwards slightly to fully centralise locking pin.



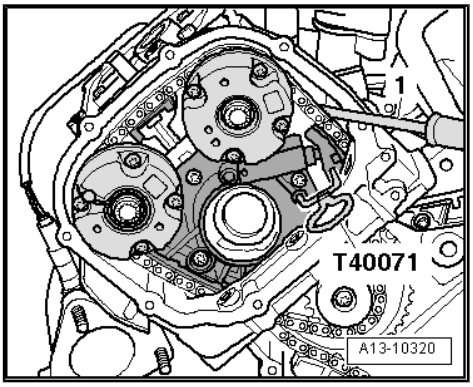
– Fit camshaft clamps - T40133- onto both cylinder heads and tighten bolts -arrows- to 25 Nm.

Note

The illustration shows the left-side cylinder head.



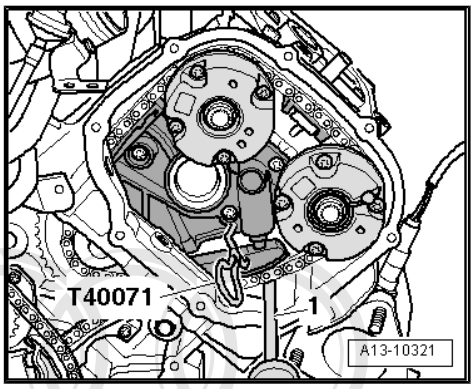
– Press guide rail of chain tensioner for camshaft timing chain (left-side) inwards as far as the stop using a screwdriver -1-. Then lock chain tensioner by inserting locking pin - T40071- .



Note

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

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



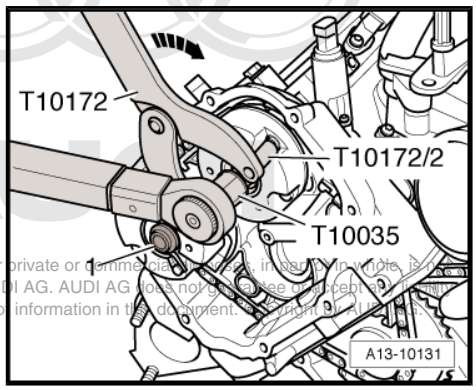
Note

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

Caution

Avoid damage to camshaft.

- ***Do NOT use camshaft clamp - T40133- as a counterhold tool when loosening camshaft adjuster bolts -1-.***



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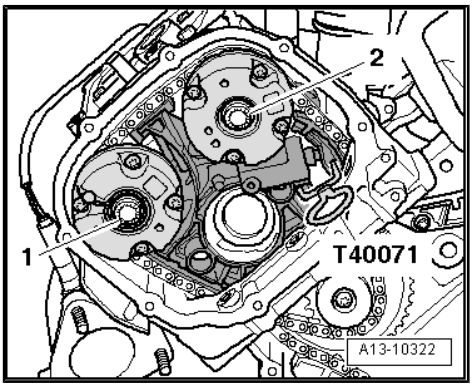
– Fit counterhold tool - T10172- with pin -T10172/2- to counterhold on corresponding camshaft adjuster and loosen with special wrench - T10035- .

– Mark position of camshaft adjusters with paint for re-installation.

Caution

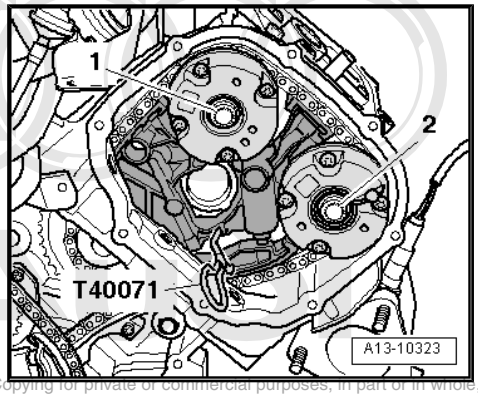
Risk of irreparable damage to engine.

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



– Unscrew bolts -1- and -2- on cylinder head (left-side) and remove both camshaft adjusters.

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



Installing

- Tightening torques ⇒ page 188 , ⇒ page 131 .

Note

♦ *Renew the bolts tightened with specified tightening angle.*
♦ *Renew the O-ring on the screw plug for the "TDC" marking.*

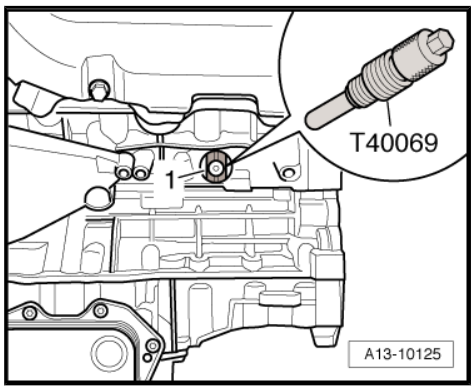
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Caution

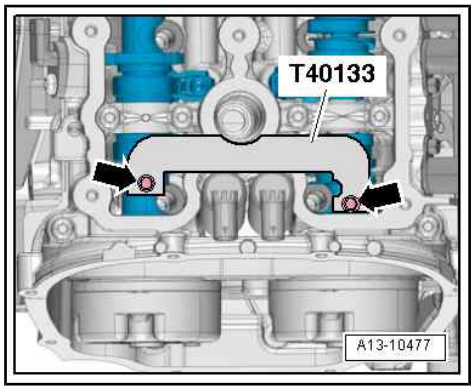
Avoid damage to valves and piston crowns.

♦ *The crankshaft must not be at "TDC" at any cylinder when the camshafts are turned.*

- Drive chain for valve gear installed ⇒ page 204
- Crankshaft locked in "TDC" position with locking pin - T40069- .



- Camshaft clamps - T40133- installed on both cylinder heads and tightened to 25 Nm -arrows-.



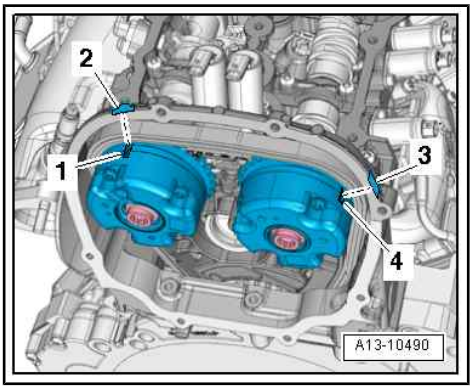
Note

The illustration shows the left-side cylinder head.

Caution

Risk of damage to engine.

- *When performing the following steps, make sure to fit camshaft adjusters so that the grooves -1- and -4- are aligned with the adjustment areas (ground surfaces) -2- and -3-.*



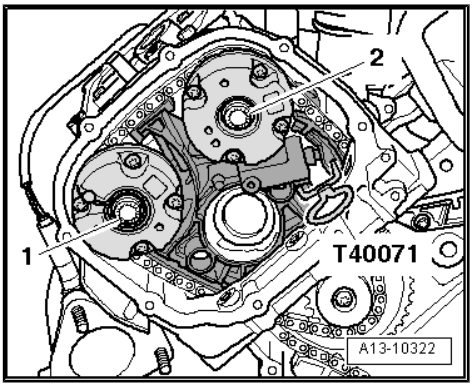
Note

Re-install camshaft adjusters on cylinder head (left-side) in the same position as before (pay attention to marks applied when removing).

– Fit timing chain (left-side) onto drive chain sprocket and camshaft adjusters and fit bolts -1- and -2- without tightening.

• It should just be possible to turn both camshaft adjusters on the camshaft without axial movement.

– Remove locking pin - T40071- .



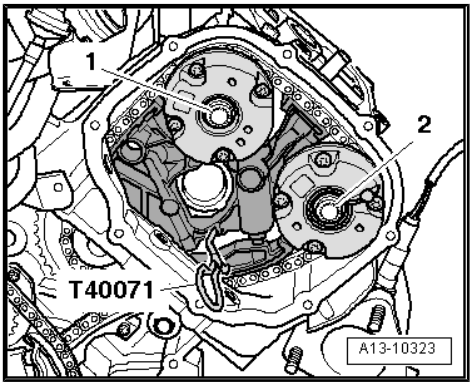
Note

Re-install camshaft adjusters on cylinder head (right-side) in the same position as before (pay attention to marks applied when removing).

– Fit timing chain (right-side) onto drive chain sprocket and camshaft adjusters and fit bolts -1- and -2- without tightening.

• It should just be possible to turn both camshaft adjusters on the camshaft without axial movement.

– Remove locking pin - T40071- .



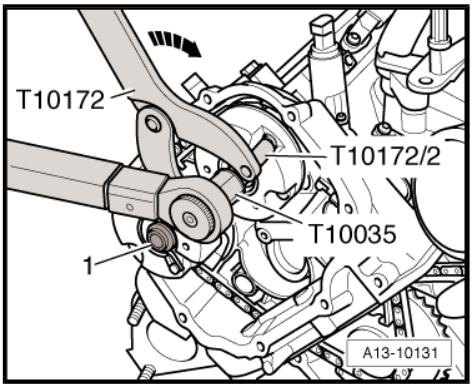
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– Apply counterhold tool - T10172- with pin - T10172/2- onto camshaft adjuster of inlet camshaft (left-side).

– Have a 2nd mechanic apply tension to camshaft timing chain by pressing counterhold tool in direction of -arrow-.

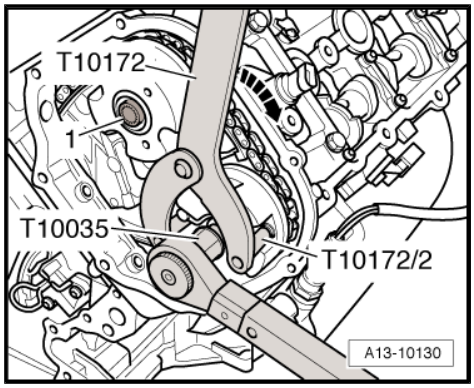
– Tighten bolts as follows while keeping camshaft adjuster under tension:

1. Pre-tighten bolt on inlet camshaft to 80 Nm.
2. Pre-tighten bolt -1- on exhaust camshaft to 80 Nm.



– Apply counterhold tool - T10172- with pin -T10172/2- onto camshaft adjuster of exhaust camshaft (right-side).
– Have a 2nd mechanic apply tension to camshaft timing chain by pressing counterhold tool in direction of -arrow-.
– Tighten bolts as follows while keeping camshaft adjuster under tension:

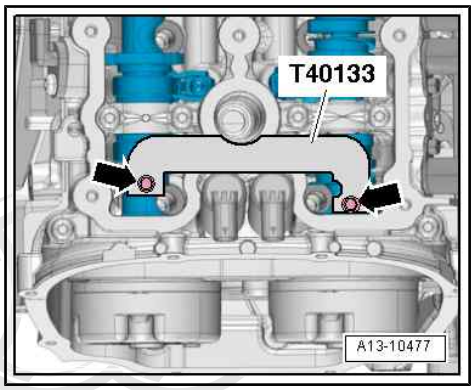
1. Pre-tighten bolt on exhaust camshaft to 80 Nm.
2. Pre-tighten bolt -1- on inlet camshaft to 80 Nm.



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

Note

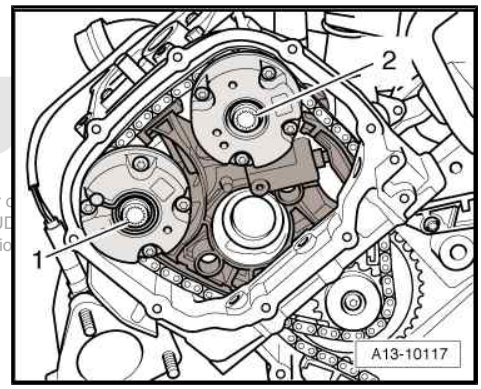
The illustration shows the left-side cylinder head.



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

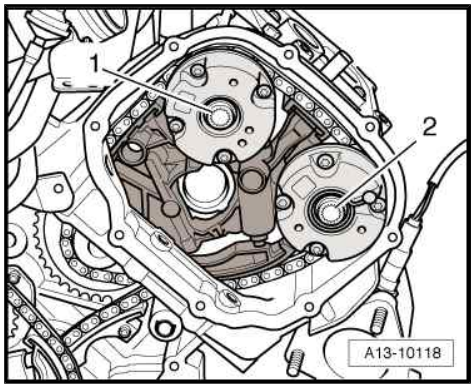
1. Tighten bolt -1- on inlet camshaft to final tightening torque.
2. Tighten bolt -2- on exhaust camshaft to final tightening torque.

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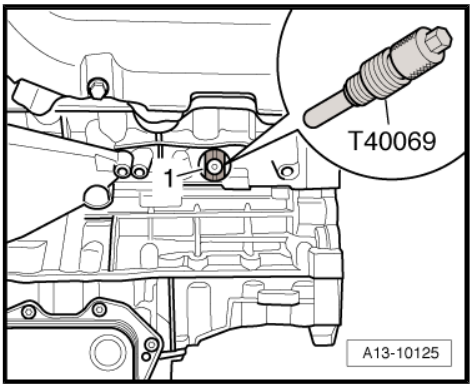


– Tighten camshaft adjuster bolts on cylinder head (right-side) as follows:

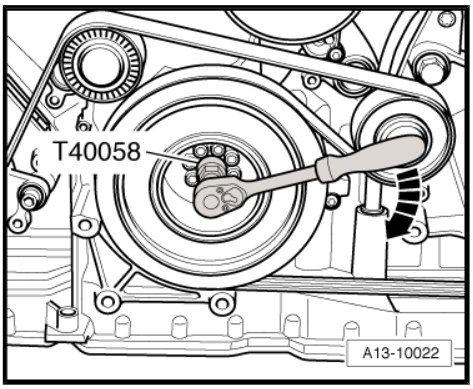
1. Tighten bolt -1- on inlet camshaft to final tightening torque.
2. Tighten bolt -2- on exhaust camshaft to final tightening torque.



– Remove locking pin - T40069- .



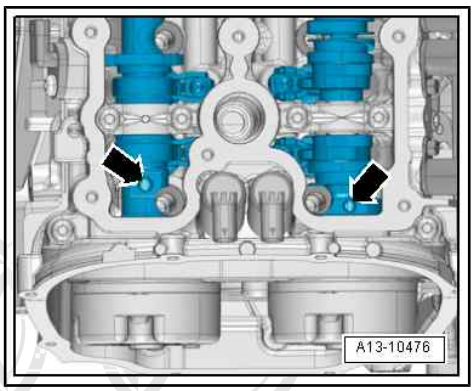
– Using adapter - T40058- , turn crankshaft 2 revolutions in normal direction of rotation -arrow- until crankshaft is at “TDC” again.



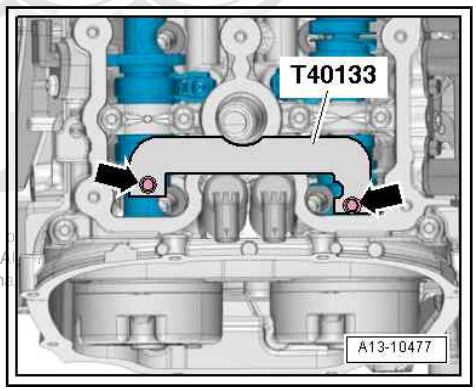
Note

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



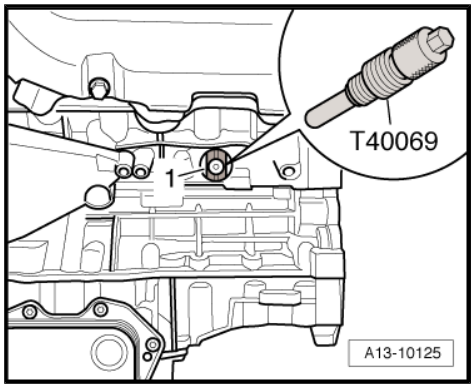
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– Screw the locking pin - T40069- directly into the hole.

• 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 - T40069- .



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

– Install timing chain covers (left and right) ⇒ page 178 .

– Install cylinder head covers: left-side ⇒ page 165 ; right-side ⇒ page 168 .

– Install continued coolant circulation pump - V51- ⇒ page 269 .

– Install engine oil cooler ⇒ page 243 .

– Install lock carrier brace ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier .

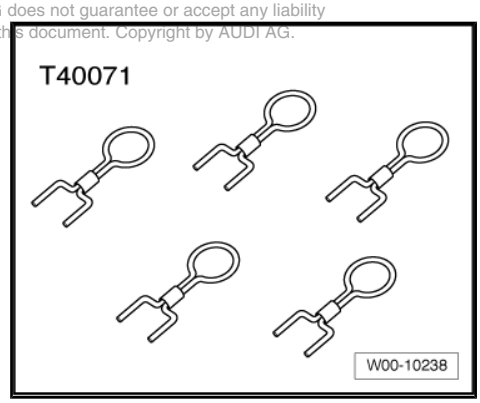
– Install noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

3.6 Removing and installing drive chain for valve gear

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Special tools and workshop equipment required

◆ Locking pin - T40071-



Removing

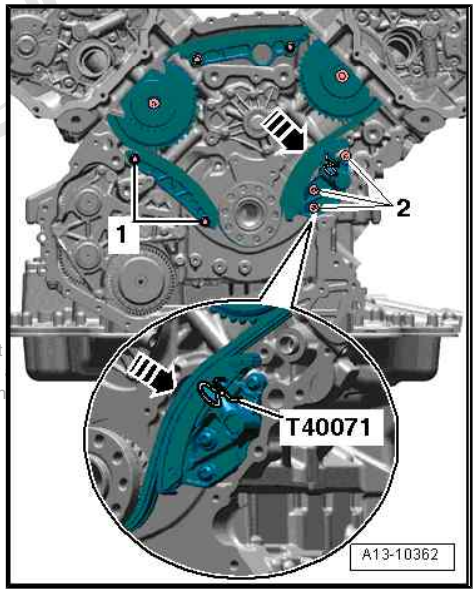
• Gearbox removed.

– Remove timing chain cover (bottom) ⇒ page 182 .

– Remove timing chains from camshafts ⇒ page 194 .

– Remove drive chain for auxiliary drives ⇒ page 205 .

– 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 paint for re-installation. Do not mark drive chain by means of centre punch, notch or the like.***

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– Unscrew bolts -1- and remove guide rail.
– Remove bolts -2- and take off chain tensioner.
– Detach drive chain for valve gear.

Installing

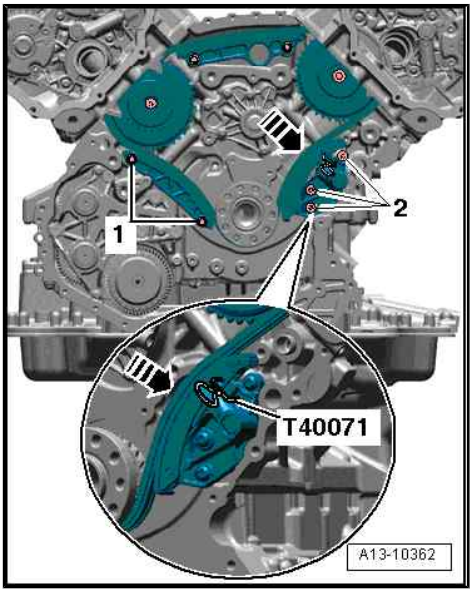
• Tightening torques ⇒ page 190

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).

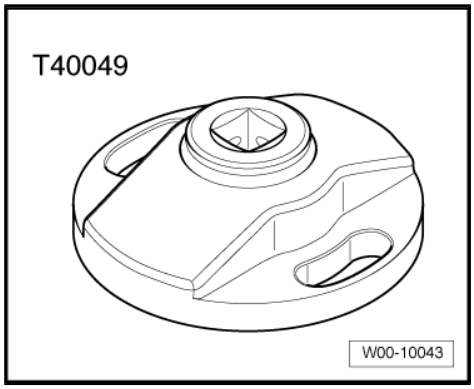


– Install guide rail and tighten bolts -1-.
– Install chain tensioner and tighten bolts -2-.
– Press guide rail of chain tensioner for drive chain in direction of -arrow- and pull locking pin - T40071- out of chain tensioner.
– Install drive chain for auxiliary drives ⇒ page 205 .
– Fit timing chains on camshafts ⇒ page 200 .
– Install timing chain cover (bottom) ⇒ page 182 .
– Fill with engine oil and check oil level ⇒ page 234 .

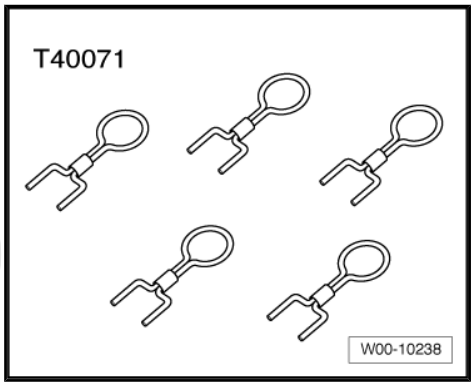
3.7 Removing and installing drive chain for auxiliary drive

Special tools and workshop equipment required

♦ Special wrench - T40049-



♦ Locking pin - T40071-



♦ Drill bit, ∅ 8 mm

Removing

- Gearbox removed.

– Remove timing chain cover (bottom) ⇒ page 182.

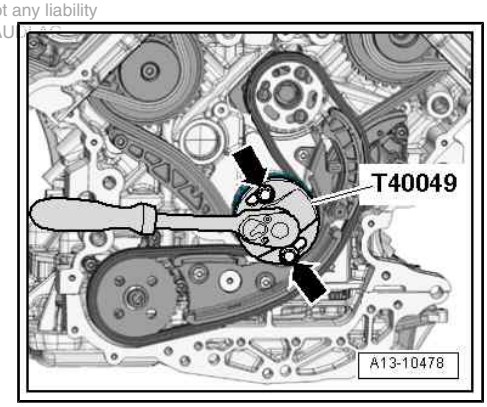
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Caution

Make sure drive chain is not damaged.

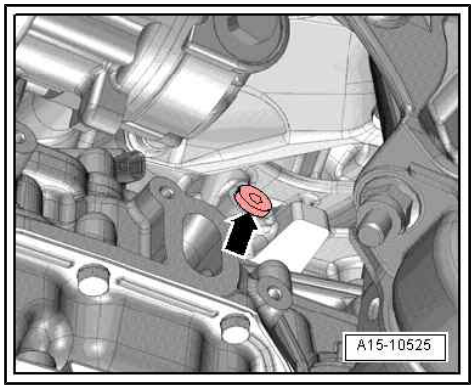
- *Place a washer under the bolt heads to make sure the drive chain does not get trapped by the bolts.*

– Attach special wrench - T40049- at rear end of crankshaft using 2 old securing bolts -arrows- for drive plate.



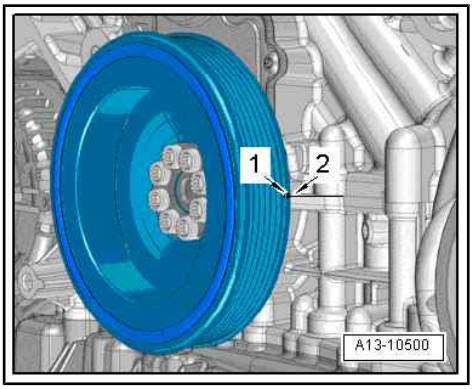
– Unscrew plug -arrow- for “TDC” marking from cylinder block.

– Rotate crankshaft in normal direction of rotation to “TDC”.

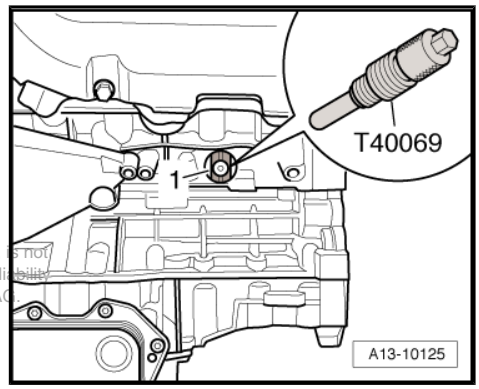


Note

- *The bore provided for locking the crankshaft is difficult to see when the engine is installed.*
- *Therefore, turn the engine until the small notch -1- on the vibration damper is in line with the housing joint -2- between the cylinder block and the retaining frame on the left side (as seen in direction of travel). This makes it easier to screw in locking pin - T40069- .*
- *The marking on the vibration damper is only a visual aid. The exact "TDC" position can only be obtained by screwing in the locking pin - T40069- .*



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



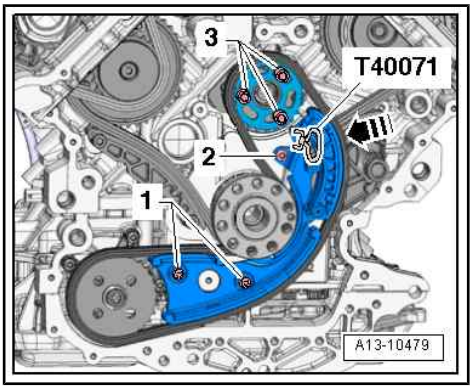
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– Press guide rail of chain tensioner in direction of -arrow- and lock chain tensioner by inserting locking pin - T40071- .

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 mark drive chain by means of centre punch, notch or the like.***

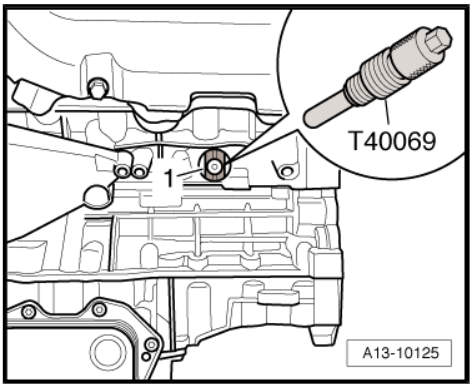


– Unscrew bolts -3- and detach chain sprocket from balance shaft.

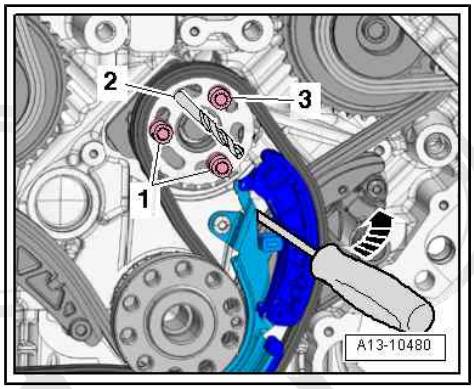
– Remove bolts -1- and -2- and take off chain tensioner with drive chain.

Installing

- Tightening torques ⇒ page 190 , ⇒ page 131 .
- Crankshaft -1- locked in "TDC" position with locking pin - T40069- .



– Install chain tensioner with drive chain and balance shaft sprocket.
– Wrap insulating tape around tip and shaft of 8 mm ∅ drill bit to avoid cuts.
– Lock balance shaft in “TDC” position using 8 mm ∅ drill bit -item 2-.
• 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- and -3- for chain sprocket but do not tighten.
• 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- and -3- securing chain sprocket.
– Pull drill bit -2- out of balance shaft.



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

– Install timing chain cover (bottom) ⇒ page 182 .
– Fill with engine oil and check oil level ⇒ page 234 .

4 Valve gear

⇒ “4.1 Exploded view - valve gear”, page 209

⇒ “4.2 Measuring axial clearance of camshaft”, page 212

⇒ “4.3 Measuring radial clearance of camshaft”, page 212

⇒ “4.4 Removing and installing camshaft”, page 213

⇒ “4.5 Checking hydraulic valve compensation elements”, page 218

⇒ “4.6 Removing and installing valve stem oil seals”, page 220

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4.1 Exploded view - valve gear

Caution

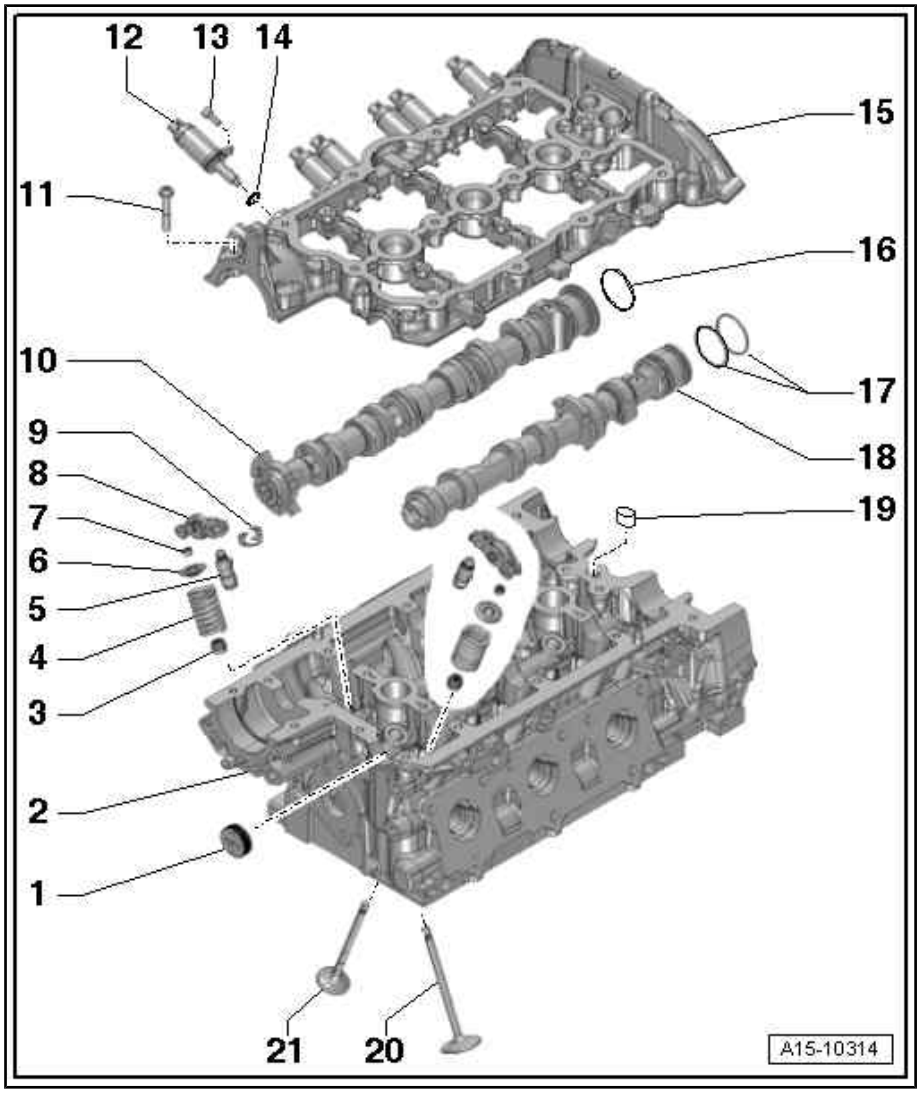
Avoid damage to valves and piston crowns after working on valve gear.

Note

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

Note

The diagram shows the cylinder head on cylinder bank 2 (left-side).



1 - Sealing plugs

- ❑ Apply sealant when installing; refer to ⇒ Electronic parts catalogue

2 - Cylinder head

- ❑ Checking valve guides ⇒ page 228

3 - Valve stem oil seal

- ❑ Renewing with cylinder head installed ⇒ page 220
- ❑ Renewing with cylinder head removed ⇒ page 224

4 - Valve spring

- ❑ Installation position ⇒ page 212

5 - Hydraulic valve compensation element

- ❑ Checking ⇒ page 218
- ❑ Mark installation position for re-installation with a coloured pen
- ❑ Lubricate contact surfaces before installing

6 - Valve spring plate

7 - Valve cotter

8 - Roller rocker finger

- ❑ Different versions for inlet side and exhaust side, do not interchange
- ❑ Check roller bearings for ease of movement
- ❑ Lubricate contact surfaces before installing
- ❑ Attach to hydraulic compensation element -item 5- using securing clip -item 9-

9 - Securing clip

- ❑ Different versions for inlet side and exhaust side, do not interchange
- ❑ Check for firm attachment

10 - Inlet camshaft

- ❑ With 3 sliders
- ❑ Do not dismantle
- ❑ Measuring axial clearance ⇒ page 212
- ❑ Removing and installing ⇒ page 213
- ❑ Measuring radial clearance ⇒ page 212
- ❑ Runout: max. 0.04 mm

11 - Bolt

- ❑ Renew
- ❑ Tightening sequence ⇒ page 211

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12 - Actuator for variable valve timing

13 - Bolt

- ❑ 5 Nm

14 - O-ring

- ❑ Renew

15 - Retaining frame

- ❑ With integrated camshaft bearings
- ❑ Removing and installing ⇒ “4.4 Removing and installing camshaft”, page 213

16 - Compression ring

17 - Rectangular section seals

18 - Exhaust camshaft

- ❑ Measuring axial clearance ⇒ page 212
- ❑ Removing and installing ⇒ page 213
- ❑ Measuring radial clearance ⇒ page 212
- ❑ Runout: max. 0.04 mm

19 - Oil strainer

20 - Inlet valve

- ❑ Do not machine, only grinding-in is permitted
- ❑ Mark installation position for re-installation
- ❑ Valve dimensions ⇒ page 230
- ❑ Checking valve guides ⇒ page 228

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21 - Exhaust valve

- ❑ Do not machine, only grinding-in is permitted
- ❑ Mark installation position for re-installation
- ❑ Valve dimensions ⇒ page 230
- ❑ Checking valve guides ⇒ page 228

Retaining frame for camshafts - tightening torque and sequence

Note

The illustration shows the retaining frame for cylinder head (left-side).

– Renew bolts for retaining frame.

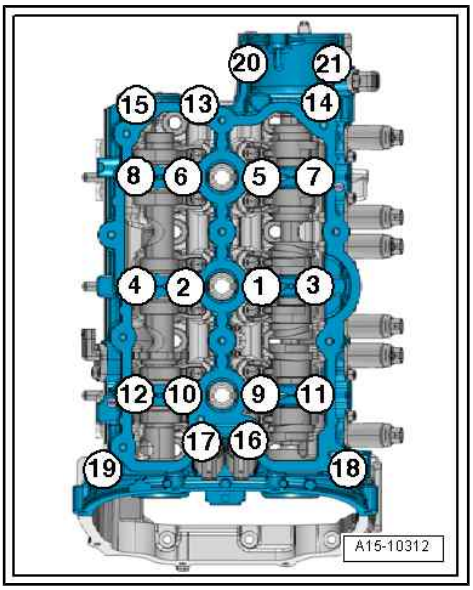
– Tighten bolts in the sequence -1 ... 21- in 3 stages as follows:

1. Screw in bolts by hand until they make contact.

• The retaining frame should make contact with the cylinder head over the full surface.

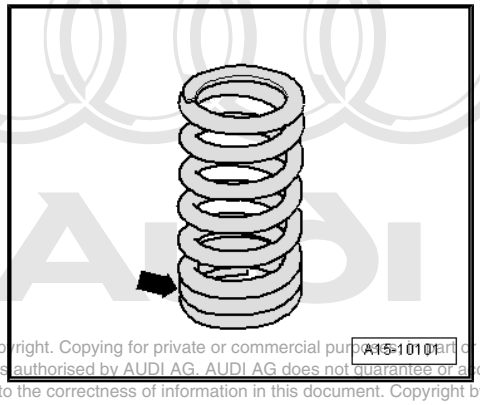
2. Tighten to 8 Nm.

3. Turn 90° further.



Installation position of valve spring

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

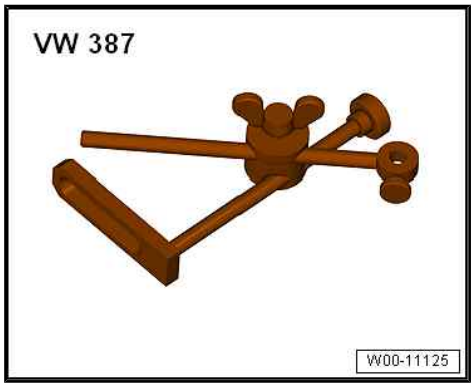


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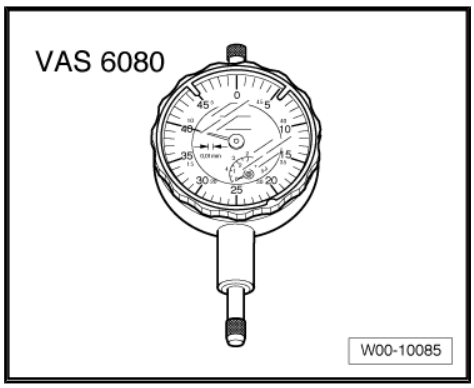
4.2 Measuring axial clearance of camshaft

Special tools and workshop equipment required

♦ Universal dial gauge bracket - VW 387-



♦ Dial gauge - VAS 6080-



Procedure

– Remove camshafts ⇒ page 213 .

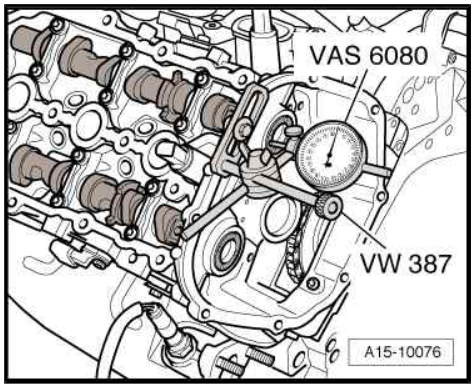
– Mark original positions of roller rocker fingers and hydraulic compensation elements for reinstallation.

– Remove roller rocker fingers together with hydraulic compensation elements and put down on a clean surface.

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

– Measure axial clearance.

• Axial clearance: 0.100 ... 0.191 mm



4.3 Measuring radial clearance of camshaft

Special tools and workshop equipment required

♦ Plastigage

Procedure

– Remove camshafts ⇒ page 213 .

– 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.

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• The Plastigage must be positioned in the centre of the bearing.

– Re-insert camshafts, fit retaining frame and tighten to 8 Nm without rotating camshafts ⇒ page 211 .

– Remove retaining frame and camshafts again.

– Compare width of Plastigage with measurement scale.

Radial clearance:

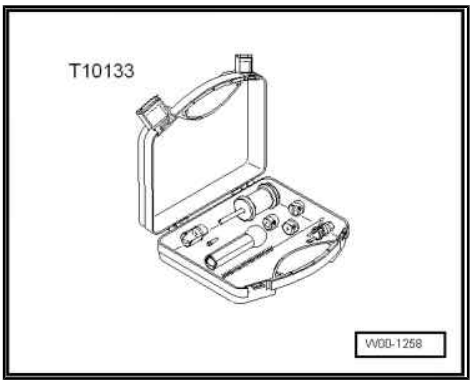
• 24 mm bearing diameter: 0.024 ... 0.066 mm

• 36 mm bearing diameter: 0.032 ... 0.078 mm

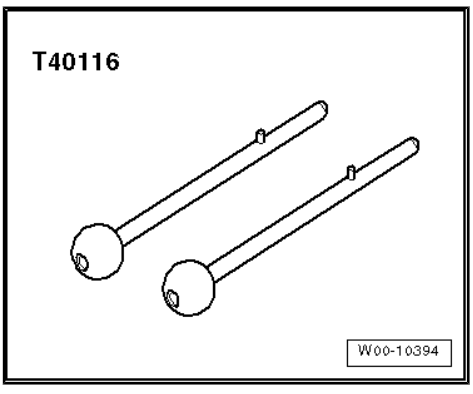
4.4 Removing and installing camshaft

Special tools and workshop equipment required

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



♦ Locating pins 1 set = 2x - T40116-



♦ Electric drill with plastic brush attachment

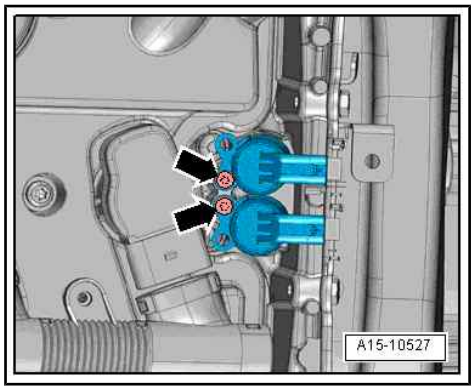
♦ Safety goggles

♦ Sealant ⇒ Electronic parts catalogue

Removing

– Remove timing chains from camshafts ⇒ page 194 .

– To remove camshafts in cylinder head (left-side), first remove vacuum pump for brake servo ⇒ Brake system; Rep. gr. 47 ; Vacuum system; Exploded view - vacuum pump .
– To remove camshafts in cylinder head (right-side), first remove high-pressure pump and housing for high-pressure pump drive ⇒ page 345 .
– Remove bolts -arrows- and detach camshaft control valves.

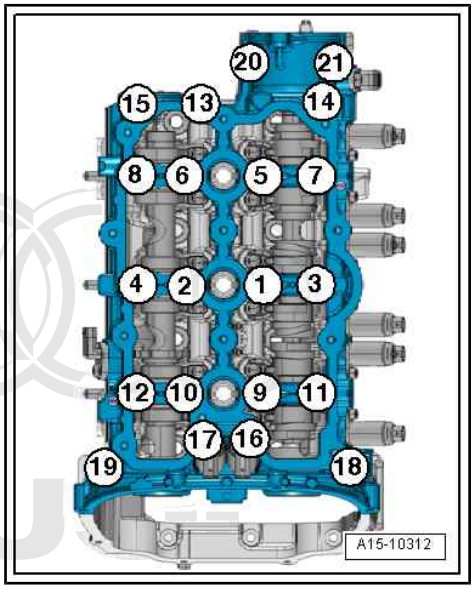


– Slacken retaining frame bolts in the sequence -21 ... 1-.

Note

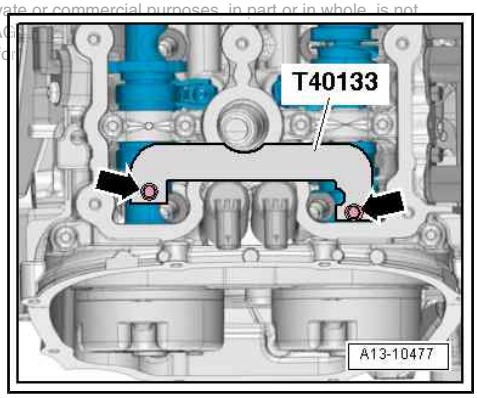
The illustration shows the retaining frame for cylinder head (left-side).

– Carefully remove retaining frame and set it down on a soft surface on workbench.



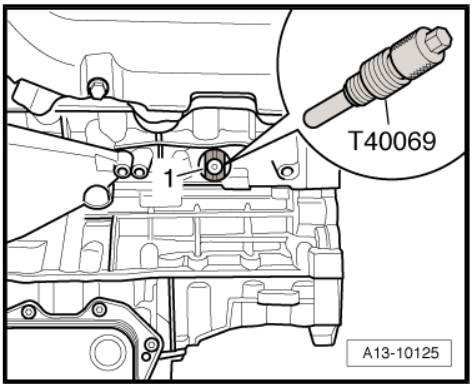
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– Remove camshaft clamp - T40133- .
– Mark and remove camshafts.



Installing

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



Note

Renew all seals and gaskets.

Caution

Protect lubrication system and bearings against contamination.

- ***Cover exposed parts of the engine.***

WARNING

Risk of eye injury.

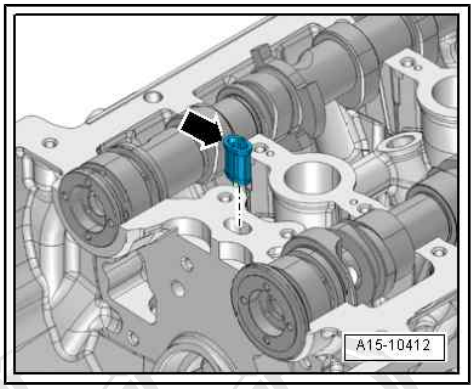
- ***Wear safety goggles.***

– 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.

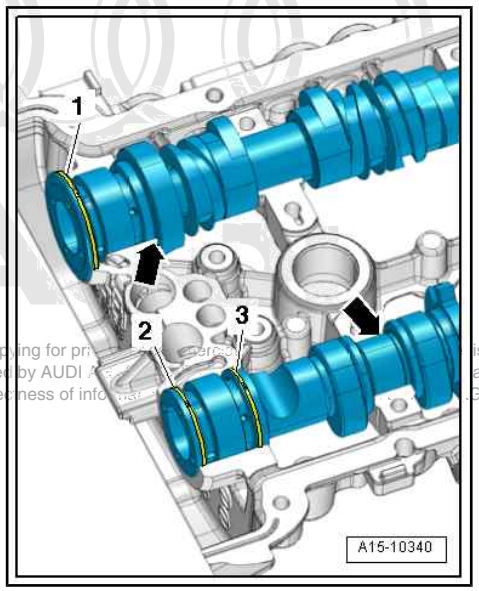
– Oil running surfaces of both camshafts.



– Fit camshafts in retaining frame.

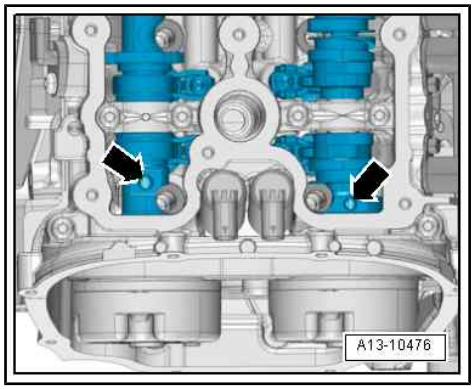
- Camshafts must be in correct position in axial bearings -arrows- in retaining frame.
- The ends of the rectangular section seals -1, 2, 3- must point up or down, never to the side.

– Turn retaining frame over with camshafts fitted, holding camshafts firmly in position.

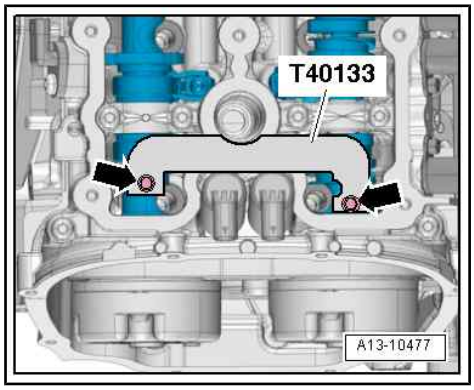


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– Turn camshafts until threaded holes -arrows- point upwards.
– Check that camshafts are still in correct position in axial bearings in retaining frame.



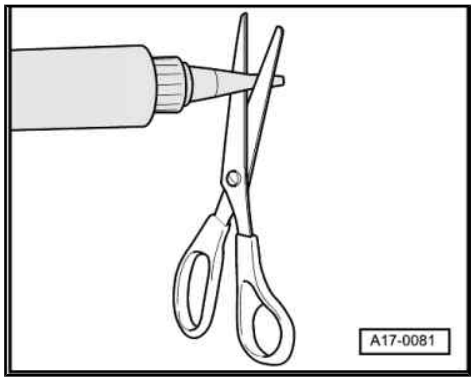
– Fit camshaft clamp - T40133- and tighten bolts -arrows- to 25 Nm.



Note

Note the use-by date of the sealant.

– Cut off nozzle of tube at front marking (nozzle ∅ approx. 2.0 mm).



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– Turn retaining frame upside down again.

Caution

Make sure lubrication system is not clogged by excess sealant.

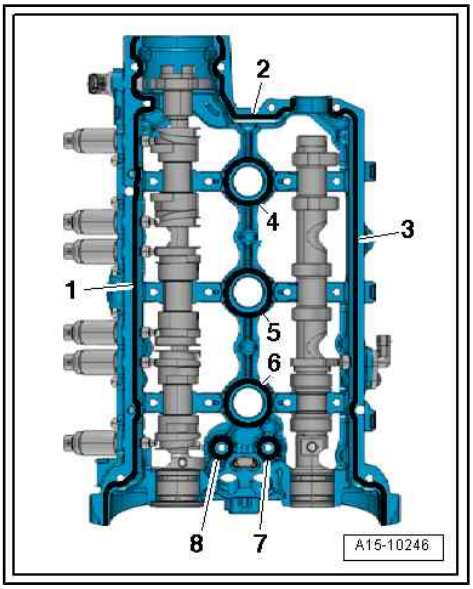
- ***The sealant beads must not be thicker than specified.***

– Apply beads of sealant -4 ... 8- onto sealing surfaces of retaining frame as shown in illustration.

• Width of sealant bead: 2.0 mm.

– Apply beads of sealant -1 ... 3- onto sealing surfaces of retaining frame as shown in illustration.

• Width of sealant bead: 2.5 mm.



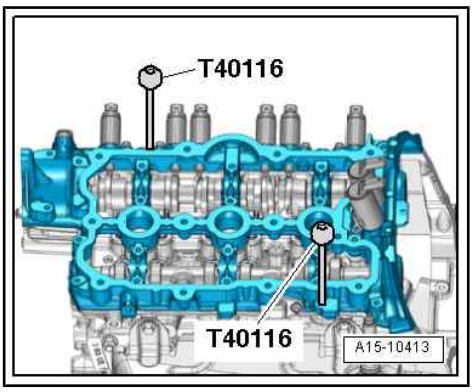
Note

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Fit and secure the retaining frame without delay, as the sealant starts hardening immediately.

– Fit retaining frame onto cylinder head.

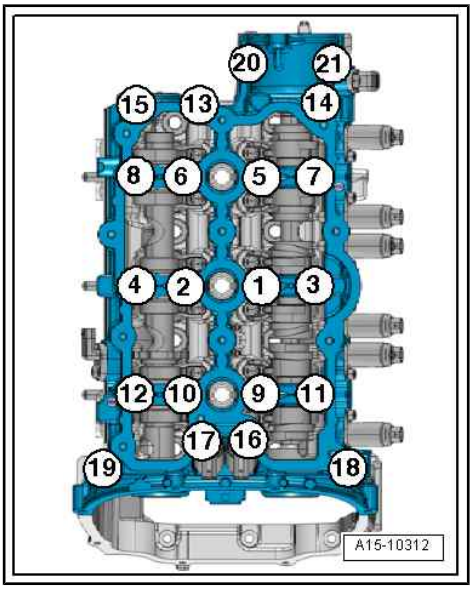
– Insert locating pins -T40116- in retaining frame and cylinder head.



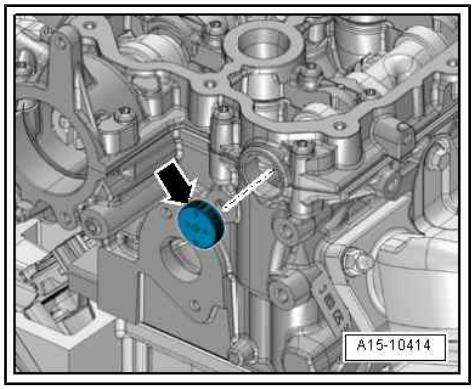
Note

After installing the retaining frame, the sealant must dry for approx. 30 minutes.

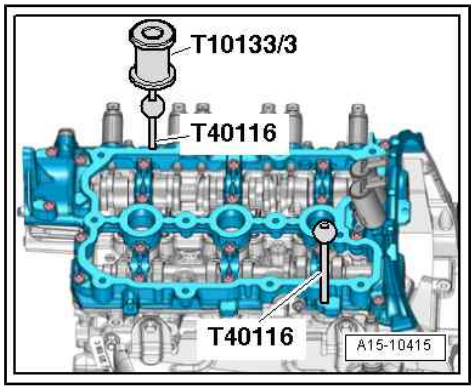
– Tighten retaining frame bolts in the sequence -1 ... 21- ⇒ page 211 .



– Clean bore for sealing plug in cylinder head; 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; note the following:

– Install camshaft control valves ⇒ page 143 .
– Install vacuum pump for brake servo ⇒ Brake system; Rep. gr. 47 ; Vacuum system; Exploded view - vacuum pump .
– Install housing for high-pressure pump drive and high-pressure pump ⇒ page 345 .
– Fit timing chains on camshafts ⇒ page 200 .

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.***

4.5 Checking hydraulic valve compensation elements

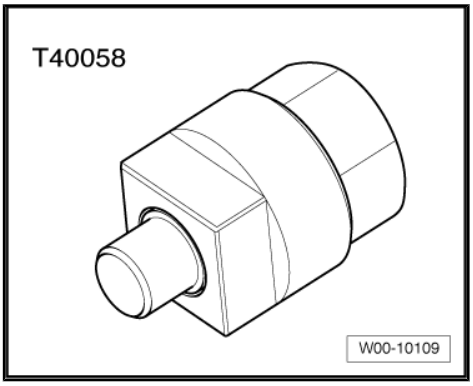
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Note

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

Special tools and workshop equipment required

♦ Feeler gauge



♦ Adapter - T40058- for vehicles with multitronic gearbox 0AW/ automatic gearbox 0B6

Procedure

– Start engine and run until radiator fan has started up once.

– Increase engine speed to approx. 2500 rpm for 2 minutes (perform road test if necessary).

– If the compensation elements are still noisy, locate the defective compensation element as follows:

– Remove cylinder head cover: left-side ⇒ page 165 ; right-side ⇒ page 168 .

– Turn crankshaft as follows until cams of compensation element to be tested are at top:

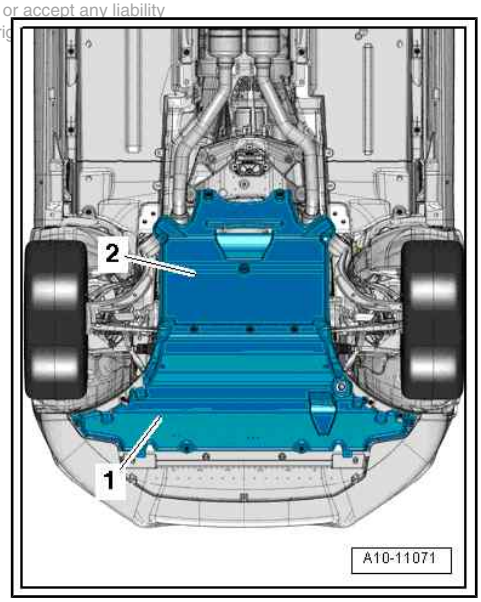
Vehicles with manual gearbox:

– Push vehicle forwards with 4th gear engaged and ignition switched off.

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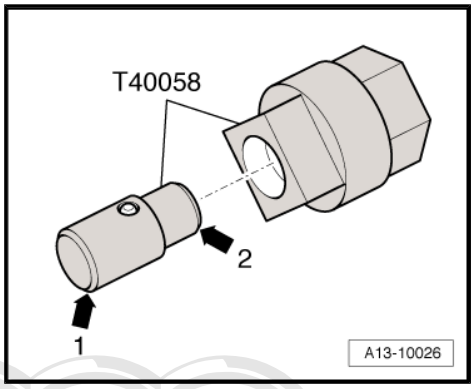
Vehicles with multitronic gearbox 0AW/automatic gearbox 0B6:

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

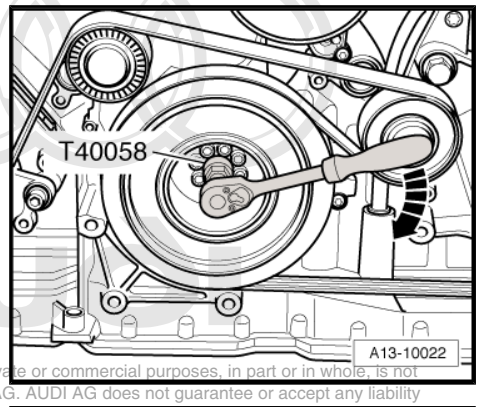


– Insert guide pin of adapter -T40058- as follows:

- The larger-diameter section -arrow 1- faces towards the engine.
- The smaller-diameter section -arrow 2- faces the adapter.



– Turn crankshaft with adapter - T40058- in normal direction of rotation -arrow-.

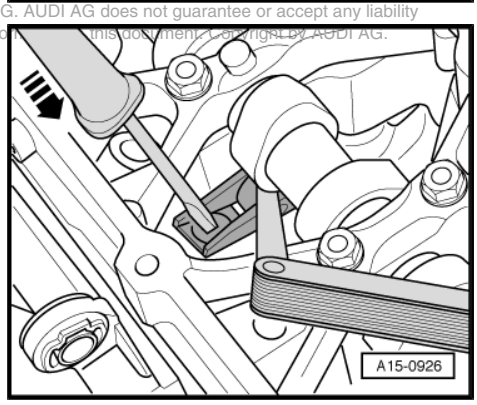


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All vehicles (continued):

– Press roller rocker finger down -arrow- to determine clearance between cam and roller rocker finger.

– If it is possible to insert a feeler gauge of 0.20 mm between cam and roller rocker finger, renew hydraulic compensation element
⇒ “4.4 Removing and installing camshaft”, page 213 .



Additional steps required

– Install cylinder head cover: left-side ⇒ page 165 ; right-side ⇒ page 168 .

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

4.6 Removing and installing valve stem oil seals

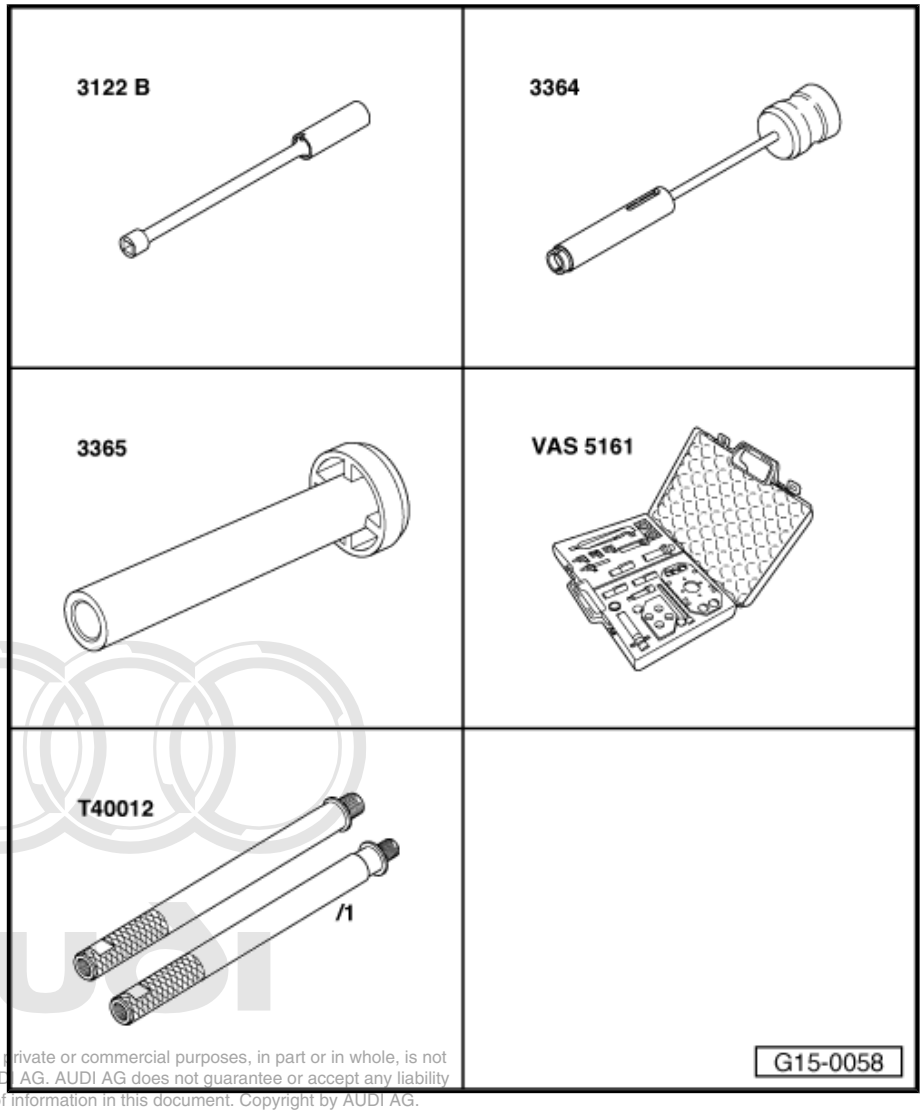
⇒ “4.6.1 Renewing valve stem oil seals with cylinder head installed”, page 220

⇒ “4.6.2 Renewing valve stem oil seals with cylinder head removed”, page 224

4.6.1 Renewing valve stem oil seals with cylinder head installed

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- with guide plate -VAS 5161/19B-
- Adapters - T40012-

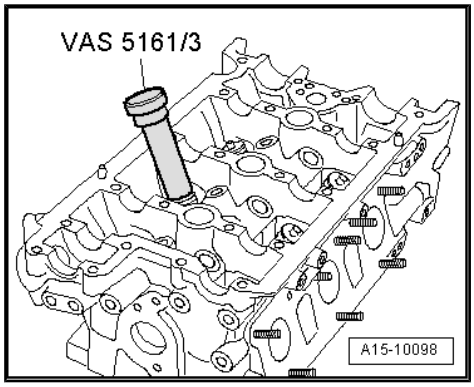


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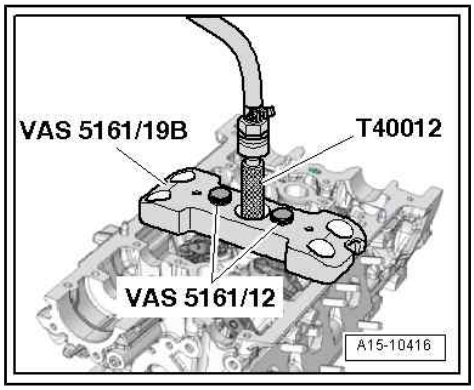
Procedure

– Remove camshafts ⇒ page 213 .
– 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”.

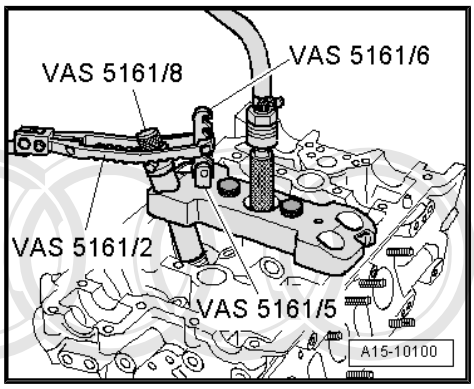
– Apply drift -VAS 5161/3- to valve spring plate and use plastic-headed hammer to release sticking valve cotters.



– Fit guide plate -VAS 5161/19B- onto cylinder head.
– Secure guide plate with knurled screws -VAS 5161/12- .
– Screw adapter - T40012- with seal hand-tight into the corresponding spark plug thread.
– Connect adapter to compressed air line using a commercially available connection piece, and apply constant air pressure.
• Minimum pressure: 6 bar

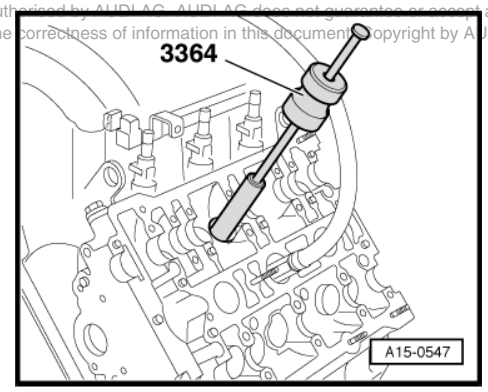


– Screw snap-in device -VAS 5161/6- with engaging fork -VAS 5161/5- into guide plate.
– Insert assembly cartridge -VAS 5161/8- in guide plate.
– Attach pressure fork -VAS 5161/2- to snap-in device and push assembly cartridge down.
– At the same time, turn knurled screw of assembly cartridge clockwise until tips engage in valve cotters.
– Move knurled screw back and forth slightly; the valve cotters are thus forced apart and taken up by the assembly cartridge.
– Release pressure fork.
– Take out assembly cartridge.
– Detach guide plate and turn to one side.
• The compressed air hose remains connected.
– Detach valve spring with valve spring plate.



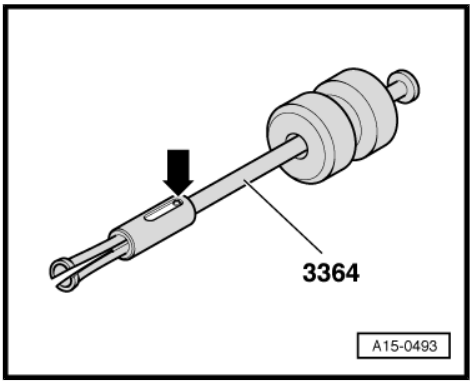
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– Pull off valve stem oil seal with valve stem seal puller - 3364-.

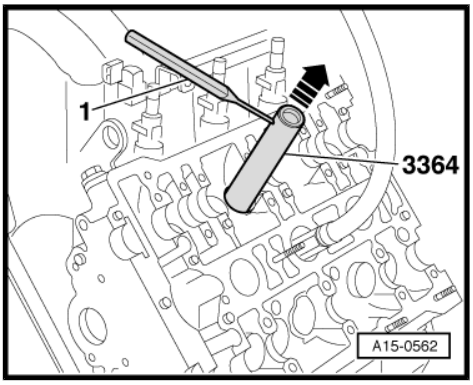


If the puller -3364- cannot be used on some of the valve stem oil seals due to the confined space, proceed as follows:

– 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-.

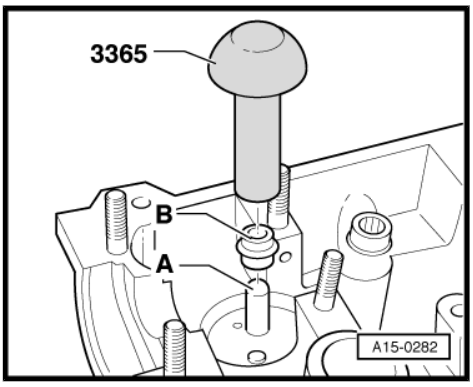


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Caution

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

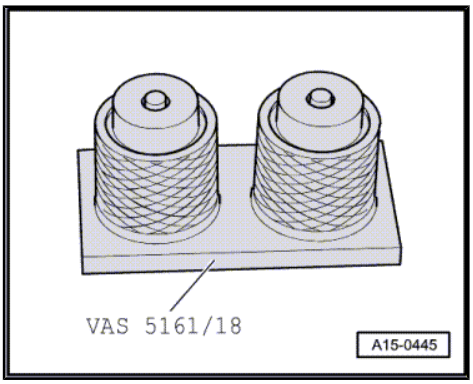
- ***New valve stem oil seals -B- are supplied with plastic sleeve; fit plastic sleeve -A- onto valve stem.***



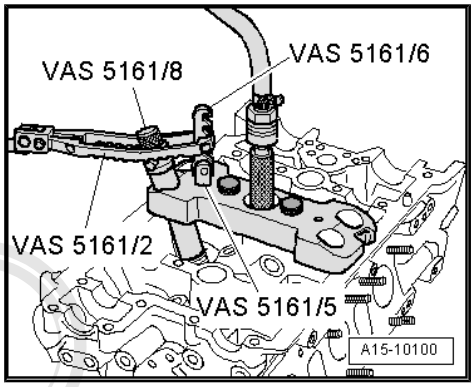
– Lightly oil sealing lip of valve stem oil seal.
– Slide valve stem oil seal onto plastic sleeve.
– Carefully press valve stem oil seal onto valve guide using valve stem seal fitting tool - 3365- .
– Remove plastic sleeve.

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

• Larger diameter of valve cotters faces upwards.
– Press assembly cartridge onto insertion device from above and take up valve cotters.
– Insert valve spring and valve spring plate.
• Installation position of valve spring ⇒ page 212 .



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



Assembling

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

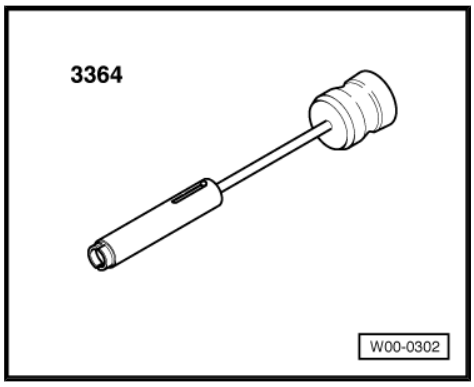
– Ensure that all roller rocker fingers make contact with the ends of the valve stems correctly and are clipped onto their respective hydraulic compensation elements.
– Install camshafts ⇒ page 213 .
– Install spark plugs ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .

4.6.2 Renewing valve stem oil seals with cylinder head removed

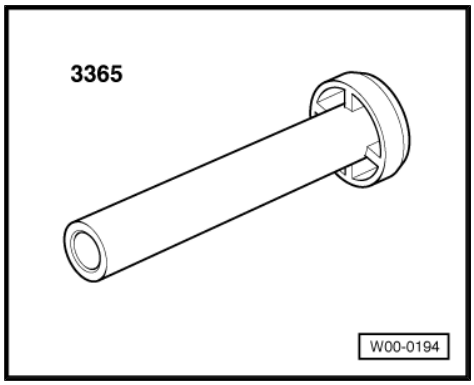
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Special tools and workshop equipment required

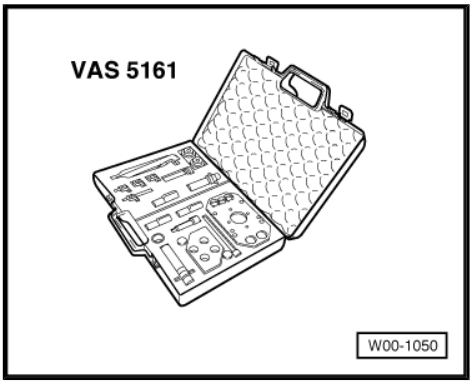
♦ Valve stem seal puller - 3364-



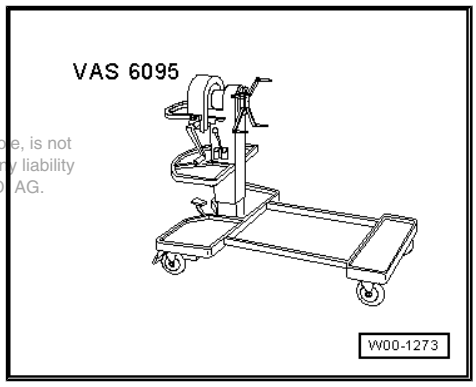
♦ Valve stem seal fitting tool - 3365-



- Removal and installation device for valve cotters - VAS 5161- with guide plate -VAS 5161/19B-



- Engine and gearbox support - VAS 6095-



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- Cylinder head tensioning device - VAS 6419-

Procedure

– Remove camshafts ⇒ page 213 .

– Mark original positions of roller rocker fingers and hydraulic compensation elements for reinstallation.

– Remove roller rocker fingers together with hydraulic compensation elements and put down on a clean surface.

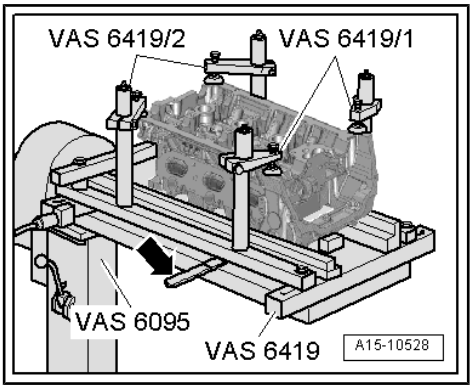
– Insert cylinder head tensioning device - VAS 6419- into engine and gearbox support - VAS 6095- .

– Secure cylinder head in cylinder head tensioning device, as shown in illustration.

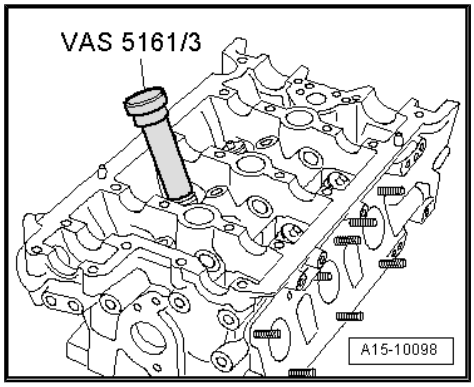
– Connect cylinder head tensioning device to compressed air.

– Using lever -arrow-, slide air pad under combustion chamber where valve stem oil seals are to be removed.

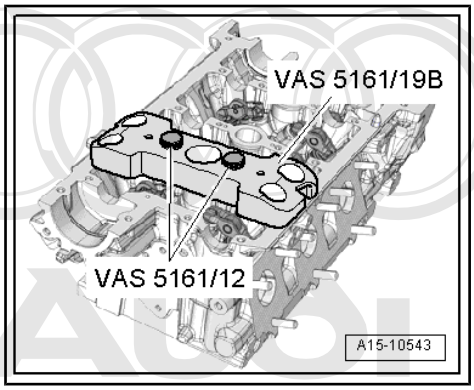
– Apply just enough compressed air to bring air pad into contact with valve heads.



– Apply drift -VAS 5161/3- to valve spring plate and use plastic-headed hammer to release sticking valve cotters.

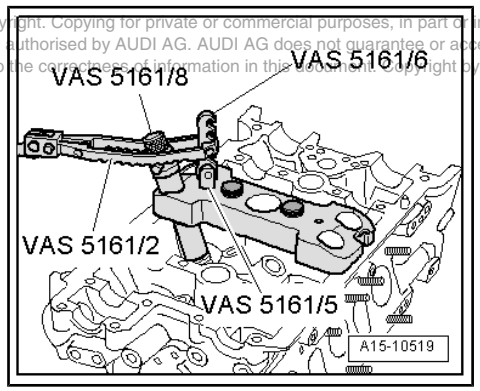


– Fit guide plate -VAS 5161/19B- from removal and installation device for valve cotters - VAS 5161- on cylinder head.
– Secure guide plate with knurled screws -VAS 5161/12- .

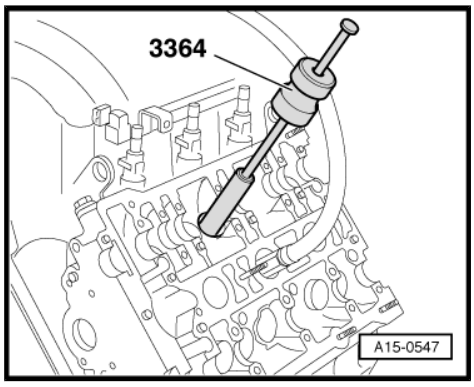


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– Screw snap-in device -VAS 5161/6- with engaging fork -VAS 5161/5- into guide plate.
– Insert assembly cartridge -VAS 5161/8- in guide plate.
– Attach pressure fork -VAS 5161/2- to snap-in device and push assembly cartridge down.
– At the same time, turn knurled screw of assembly cartridge clockwise until tips engage in valve cotters.
– Move knurled screw back and forth slightly; the valve cotters are thus forced apart and taken up by the assembly cartridge.
– Release pressure fork.
– Take out assembly cartridge.
– Detach guide plate and turn to one side.
– Detach valve spring with valve spring plate.



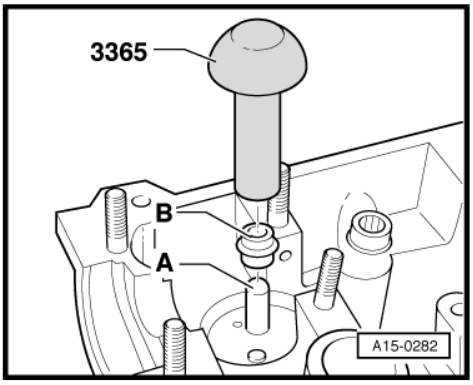
– Pull off valve stem oil seal with valve stem seal puller - 3364- .
– Apply assembly lever to puller and pull out valve stem oil seal -arrow-.



Caution

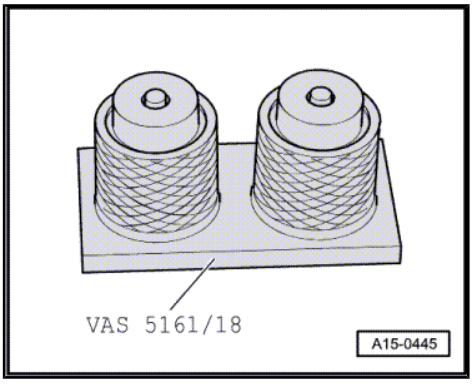
Make sure valve stem oil seals are not damaged when installing.

- ***New valve stem oil seals -B- are supplied with plastic sleeve; fit plastic sleeve -A- onto valve stem.***

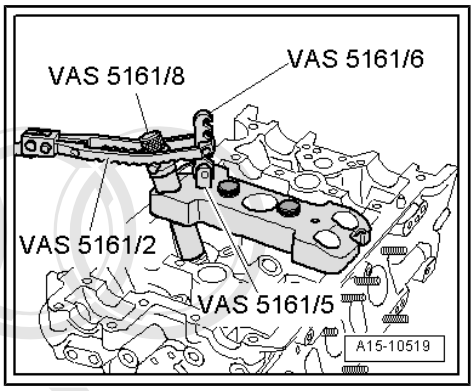


– Lightly oil sealing lip of valve stem oil seal.
– Slide valve stem oil seal onto plastic sleeve.
– Carefully press valve stem oil seal onto valve guide using valve stem seal fitting tool - 3365- .
– Remove plastic sleeve.

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



• Larger diameter of valve cotters faces upwards.
– Press assembly cartridge onto insertion device from above and take up valve cotters.
– Insert valve spring and valve spring plate.
• Installation position of valve spring ⇒ page 212 .



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

Assembling

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

– Ensure that all roller rocker fingers make contact with the ends of the valve stems correctly and are clipped onto their respective hydraulic compensation elements.
– Install camshafts ⇒ page 213 .

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5 Inlet and exhaust valves

⇒ “5.1 Checking valve guides”, page 228

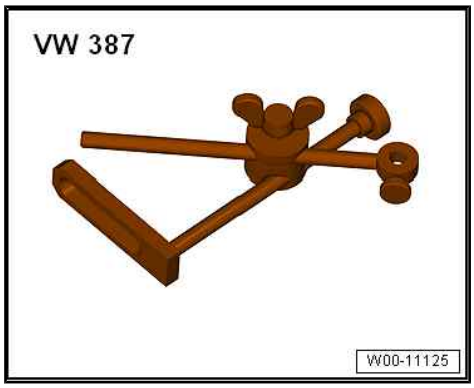
⇒ “5.2 Checking valves”, page 229

⇒ “5.3 Valve dimensions”, page 230

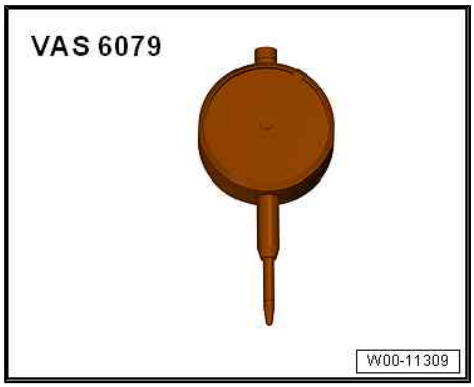
5.1 Checking valve guides

Special tools and workshop equipment required

- Universal dial gauge bracket - VW 387-

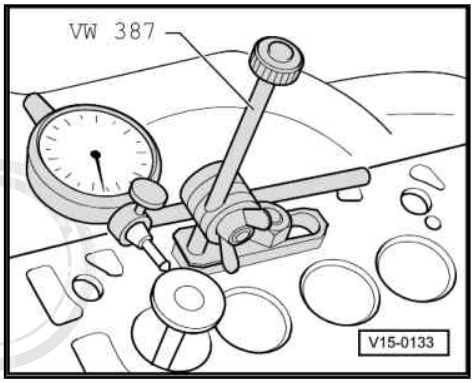


- Dial gauge - VAS 6079-



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Procedure



Note

- *If the valve has to be renewed as part of a repair, use a new valve for the measurement.*
- *Only insert inlet valve into inlet valve guide and exhaust valve into exhaust valve guide, as the stem diameters are different.*

– Insert valve into guide.

• End of valve stem must be flush with valve guide.

– Measure the amount of sideways play.

• Wear limit: 0.8 mm.

– If the wear limit is exceeded, repeat the measurement with new valves.

– Renew cylinder head if wear limit is still exceeded.

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Note

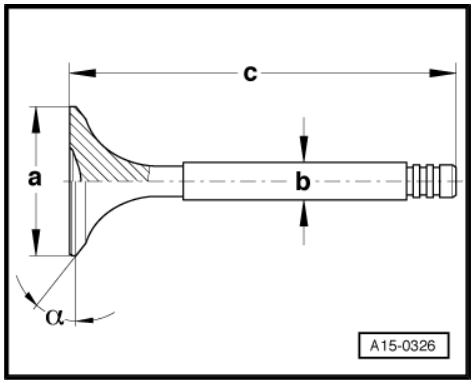
Valve guides cannot be renewed.

5.2 Checking valves

– Visually inspect for scoring on valve stems and contact surfaces.

– Renew valve if scoring is clearly visible.

5.3 Valve dimensions



Note

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

Dimension		Inlet valve	Exhaust valve
∅ a	mm	33.85 ± 0.10	28.0 ± 0.1
∅ b	mm	5.98 ± 0.01	5.96 ± 0.01
c	mm	104.0 ± 0.2	101.9 ± 0.2
α	∠°	45	45

WARNING

Care must be taken when disposing of old sodium-cooled exhaust valves - risk of injury.

- ***The valves must be sawn in two with a metal saw between the centre of the stem and valve head. When doing so, the valves must not come into contact with water.***
- ***Then throw a maximum of ten valves into a bucket of water and step away immediately.***
- ***A sudden chemical reaction will occur upon contact with water in which the sodium filling burns.***
- ***After performing these steps the valves can be disposed of in the normal way.***

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17 – Lubrication

1 Sump/oil pump

⇒ “1.1 Exploded view - sump/oil pump”, page 231

⇒ “1.2 Engine oil”, page 234

⇒ “1.3 Checking engine oil level”, page 234

⇒ “1.4 Removing and installing sump (bottom section)”, page 234

⇒ “1.5 Removing and installing sump (top section)”, page 237

⇒ “1.6 Removing and installing oil pump”, page 240

⇒ “1.7 Removing and installing oil level and oil temperature sender G266 ”, page 240

1.1 Exploded view - sump/oil pump

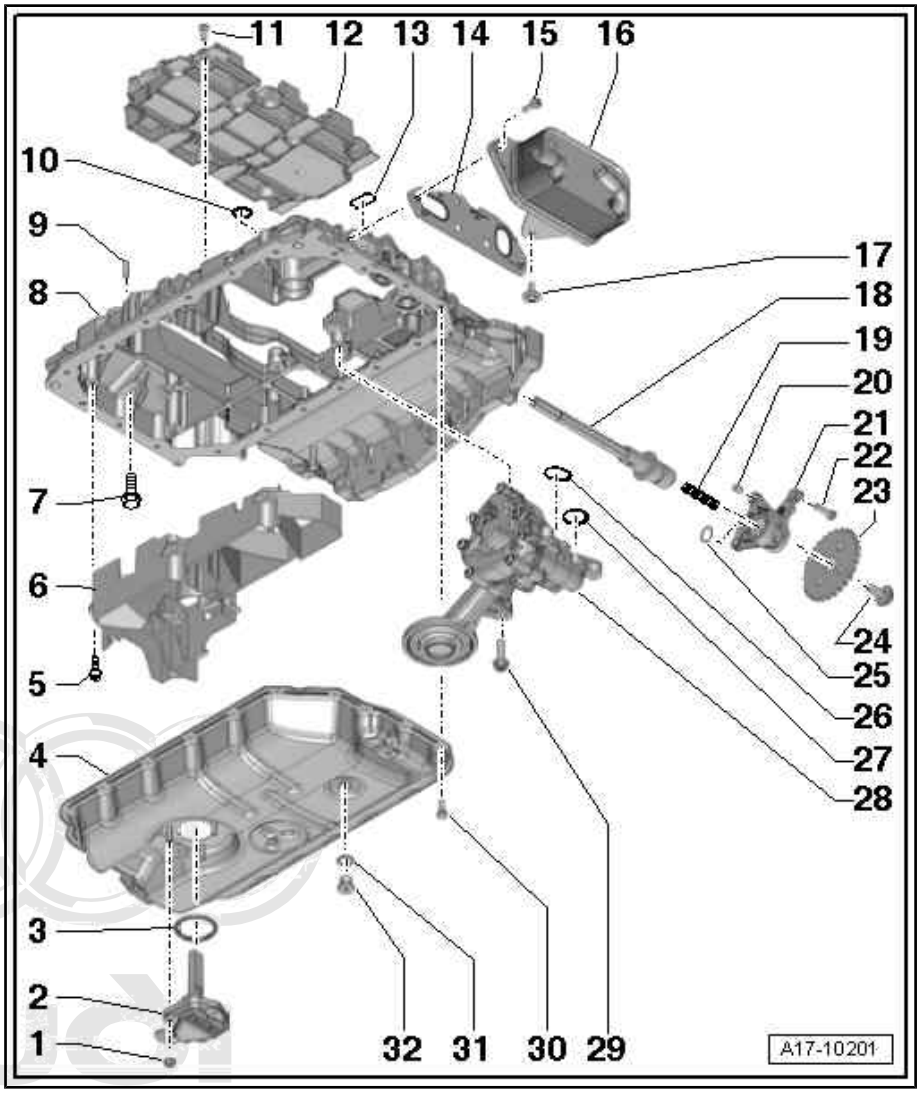
Caution

Risk of damage to catalytic converter.

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 galleries 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 ⇒ page 142 .*

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1 - Nut
- ❑ 9 Nm

2 - Oil level and oil temperature sender - G266-
- ❑ Removing and installing ⇒ page 240

3 - Seal
- ❑ Renew

4 - Sump (bottom section)
- ❑ Removing and installing ⇒ page 234

5 - Bolt
- ❑ 9 Nm

6 - Baffle plate (bottom)

7 - Bolt
- ❑ Tightening torque and sequence ⇒ page 234

8 - Sump (top section)
- ❑ Removing and installing ⇒ page 237

9 - Dowel sleeve
- ❑ 2x

10 - O-ring
- ❑ Insert in retaining frame
- ❑ Renew

11 - Bolt
- ❑ Apply locking fluid when installing; refer to ⇒ Electronic parts catalogue
- ❑ 9 Nm

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12 - Baffle plate (top)

13 - Seal
- ❑ Insert in retaining frame
- ❑ Renew

14 - Gasket
- ❑ Renew

15 - Bolt
- ❑ 9 Nm

16 - Engine oil cooler
- ❑ See note ⇒ page 231
- ❑ Removing and installing ⇒ page 243
- ❑ 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

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24 - Bolt

- ❑ Renew
- ❑ 30 Nm + turn 90° further
- ❑ To loosen, use pin wrench - 3212- to counterhold chain sprocket

25 - O-ring

- ❑ Renew

26 - Seal

- ❑ Renew

27 - O-ring

- ❑ Renew

28 - Oil pump

- ❑ Do not dismantle
- ❑ Removing and installing ⇒ page 240

29 - Bolt

- ❑ 20 Nm

30 - Bolt

- ❑ Renew
- ❑ Tightening torque and sequence ⇒ page 233

31 - Seal

- ❑ Renew

32 - Oil drain plug

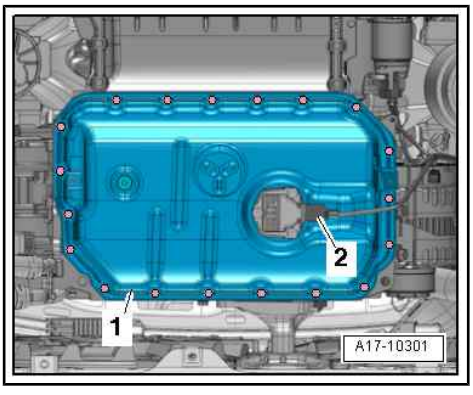
- ❑ 30 Nm

Sump (bottom section) - tightening torque and sequence

– Renew bolts for sump (bottom section) -1-.

– Tighten bolts in 2 stages and in diagonal sequence as follows:

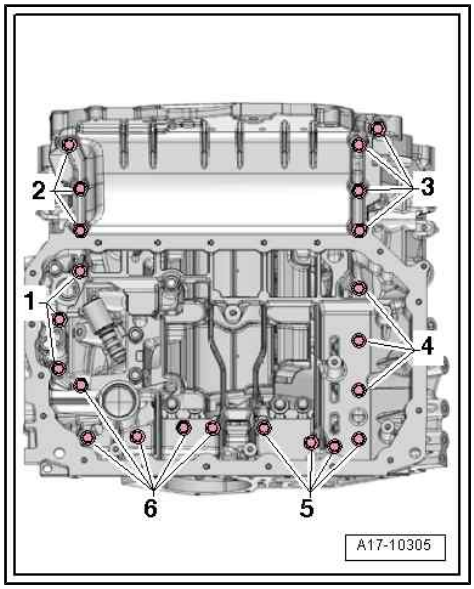
1. Initially tighten to 5 Nm.
2. Turn 90° further.



Sump (top section) - tightening torque and sequence

– Tighten bolts -1 ... 6- for sump (top section) in 2 stages and in diagonal sequence as follows:

1. Initially tighten to 5 Nm.
2. Tighten to 16 Nm.



1.2 Engine oil

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

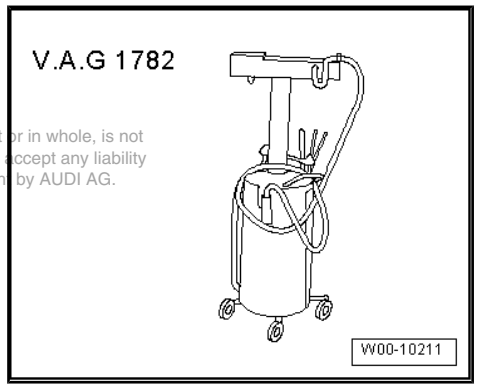
1.3 Checking engine oil level

- Depending on equipment, the engine oil level is displayed on the MMI or the sound system. Procedure ⇒ Owner's Manual .
- Checking engine oil level using oil gauge tester - T40178- ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .

1.4 Removing and installing sump (bottom section)

Special tools and workshop equipment required

- Used oil collection and extraction unit - V.A.G 1782-



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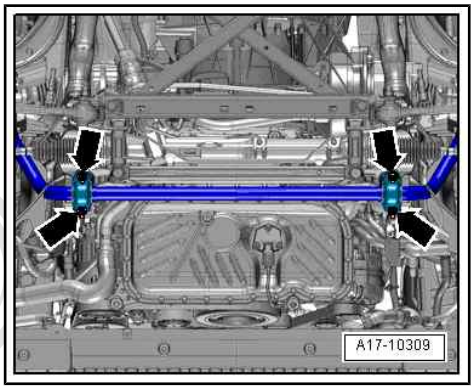
- Electric drill with plastic brush attachment
- Safety goggles
- Sealant ⇒ Electronic parts catalogue

Removing

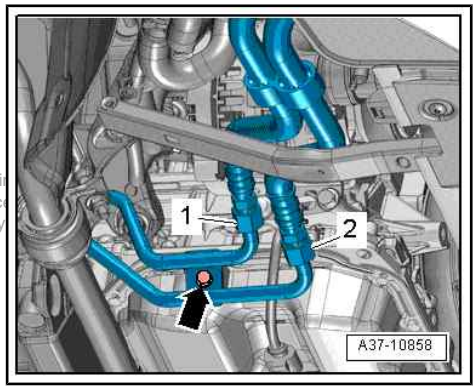
– Remove engine oil cooler ⇒ page 243 .

– Drain engine oil ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .

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



– Vehicles with multitronic gearbox 0AW/automatic gearbox 0B6: remove bolt -arrow- for ATF lines.



Note

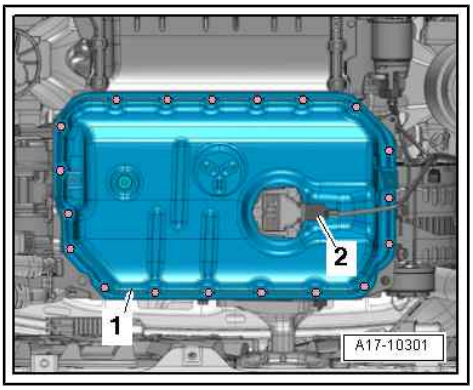
Disregard -items 1, 2-.

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

– Remove bolts for sump (bottom section) -1-.

– Release sump (bottom section) from bonded joint, taking care not to bend sump.



Installing

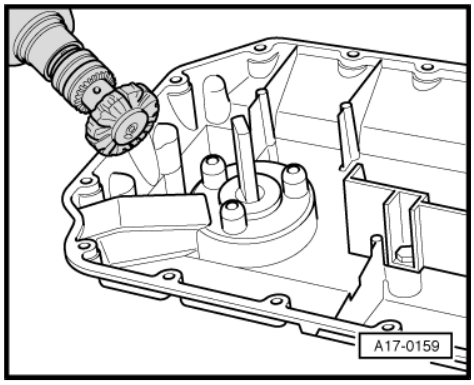
Note

- *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 contamination.

- *Cover exposed parts of the engine.*



WARNING

Risk of eye injury.

- *Wear safety goggles.*

– Remove remaining sealant on bottom and top sections of sump with a rotating plastic brush or similar.

Note

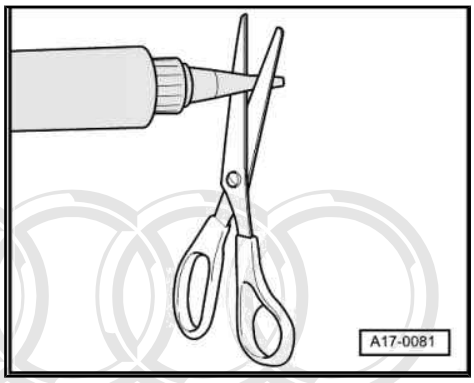
Take care not to damage the coating on the sump (bottom section).

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

Note

Note the use-by date of the sealant.

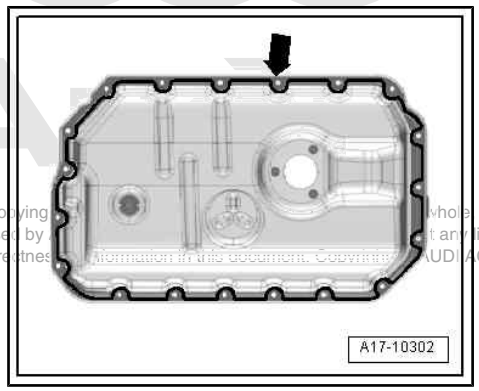
– Cut off nozzle of tube at front marking (nozzle ∅ approx. 1 mm).



Caution

Make sure lubrication system is not clogged by excess sealant.

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



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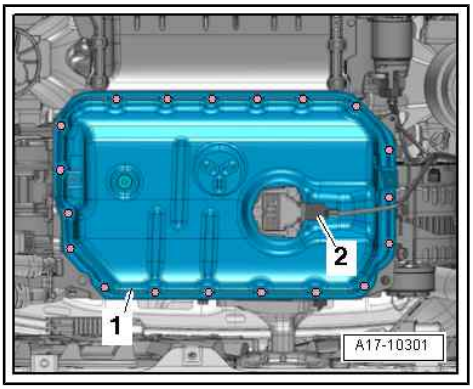
– Apply bead of sealant -arrow- onto clean sealing surface of sump (bottom section) as illustrated.

- 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 233 .



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

– Vehicles with multitronic gearbox 0AW/automatic gearbox 0B6: install ATF lines ⇒ Rep. gr. 37 ; ATF circuit; Exploded view - ATF circuit .
– Install anti-roll bar ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Removing and installing anti-roll bar .
– Install engine oil cooler ⇒ page 243 .
– Fill up with engine oil and check oil level ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .

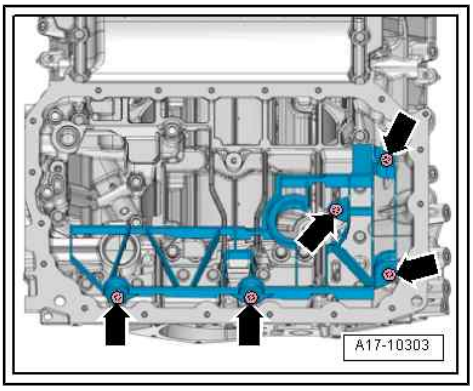
1.5 Removing and installing sump (top section)

Special tools and workshop equipment required

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

Removing

• Engine secured to engine and gearbox support ⇒ page 83 .
– Remove timing chain cover (bottom) ⇒ page 182 .
– Remove oil pump ⇒ page 240 .
– Remove bolts -arrows- and detach baffle plate (bottom).

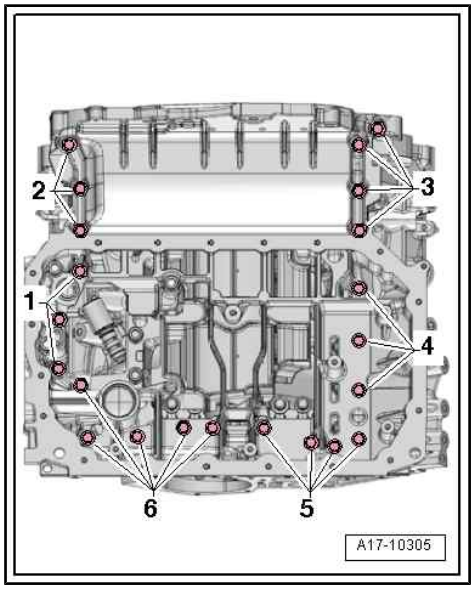


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– Remove bolts -1 ... 6- for sump (top section).
– Press sump (top section) off dowel pins on cylinder block.

Installing

• Tightening torques ⇒ page 231 , ⇒ page 234 .



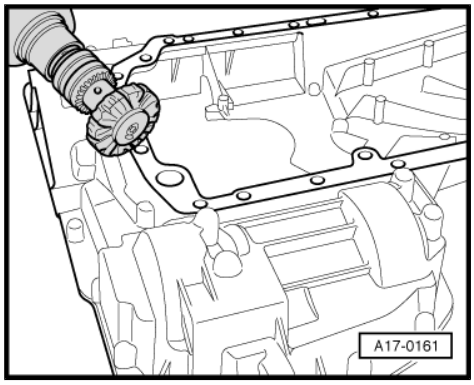
Note

Renew seals and O-rings.

Caution

Protect lubrication system and bearings against contamination.

- ***Cover exposed parts of the engine.***



WARNING

Risk of eye injury.

- ***Wear safety goggles.***

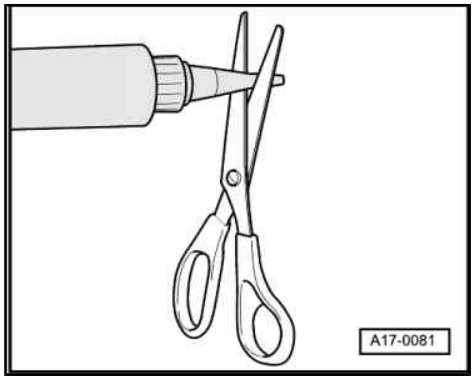
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– Remove remaining sealant from sump (top section) and cylinder block using rotating plastic brush or similar.
– Clean sealing surfaces; they must be free of oil and grease.

Note

Note the use-by date of the sealant.

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



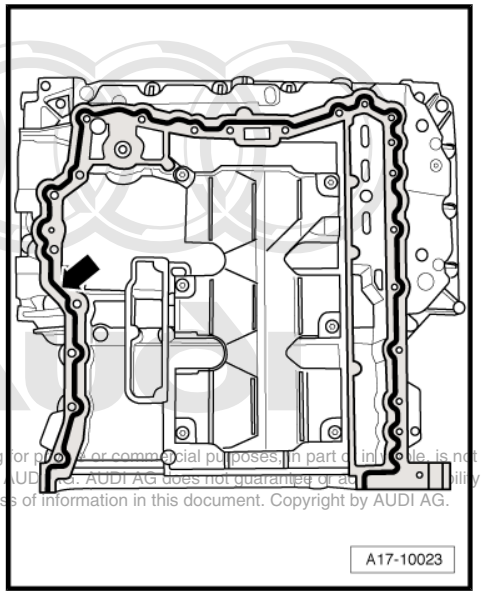
Caution

Make sure lubrication system is not clogged by excess sealant.

- ***The sealant bead 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.

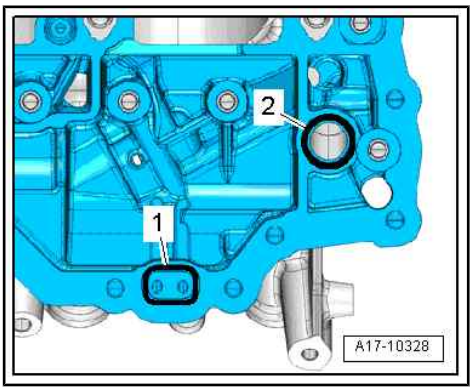


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Note

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

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

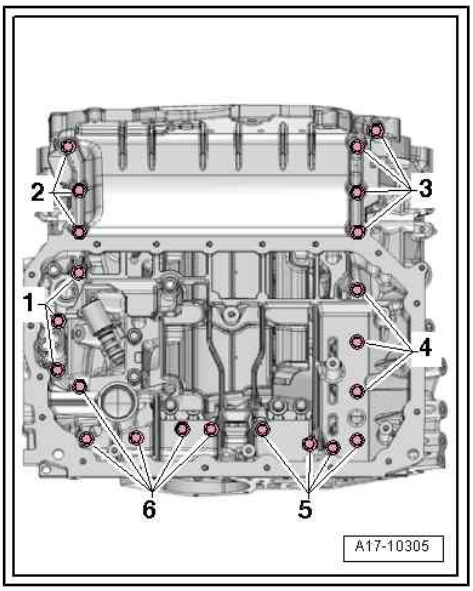


– Fit sump (top section) and tighten bolts ⇒ page 234 .

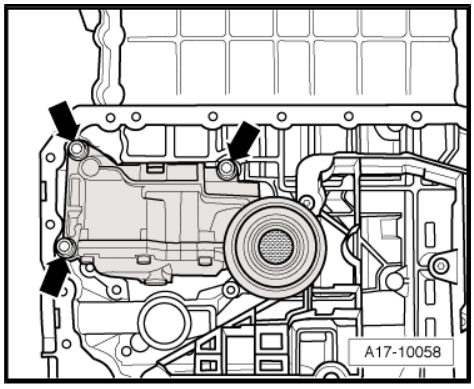
Remaining installation steps are carried out in reverse sequence; note the following:

– Install oil pump ⇒ page 240 .

– Install timing chain cover (bottom) ⇒ page 182 .



1.6 Removing and installing oil pump



Removing

– Remove sump (bottom section) ⇒ page 234 .

– Remove bolts -arrows-.

– Pull oil pump forwards off drive shaft.

Installing

• Tightening torque ⇒ page 231

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

Note

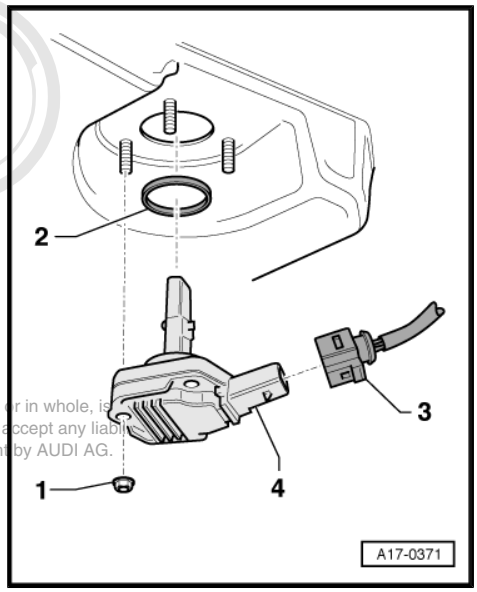
Fit new O-rings.

– Fit oil pump onto drive shaft and tighten bolts.

– Install sump (bottom section) ⇒ page 235 .

– Fill up with engine oil and check oil level ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .

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



Removing

– Drain engine oil ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .

– Unplug electrical connector -3-.

– Remove nuts -1- and detach oil level and oil temperature sender - G266- -item 4-.

Installing

• Tightening torque ⇒ page 231

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

Note

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Renew seal -2-.

– Fill up with engine oil and check oil level ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .

2 Engine oil cooler

⇒ "2.1 Exploded view - engine oil cooler", page 241

⇒ "2.2 Removing and installing engine oil cooler", page 243

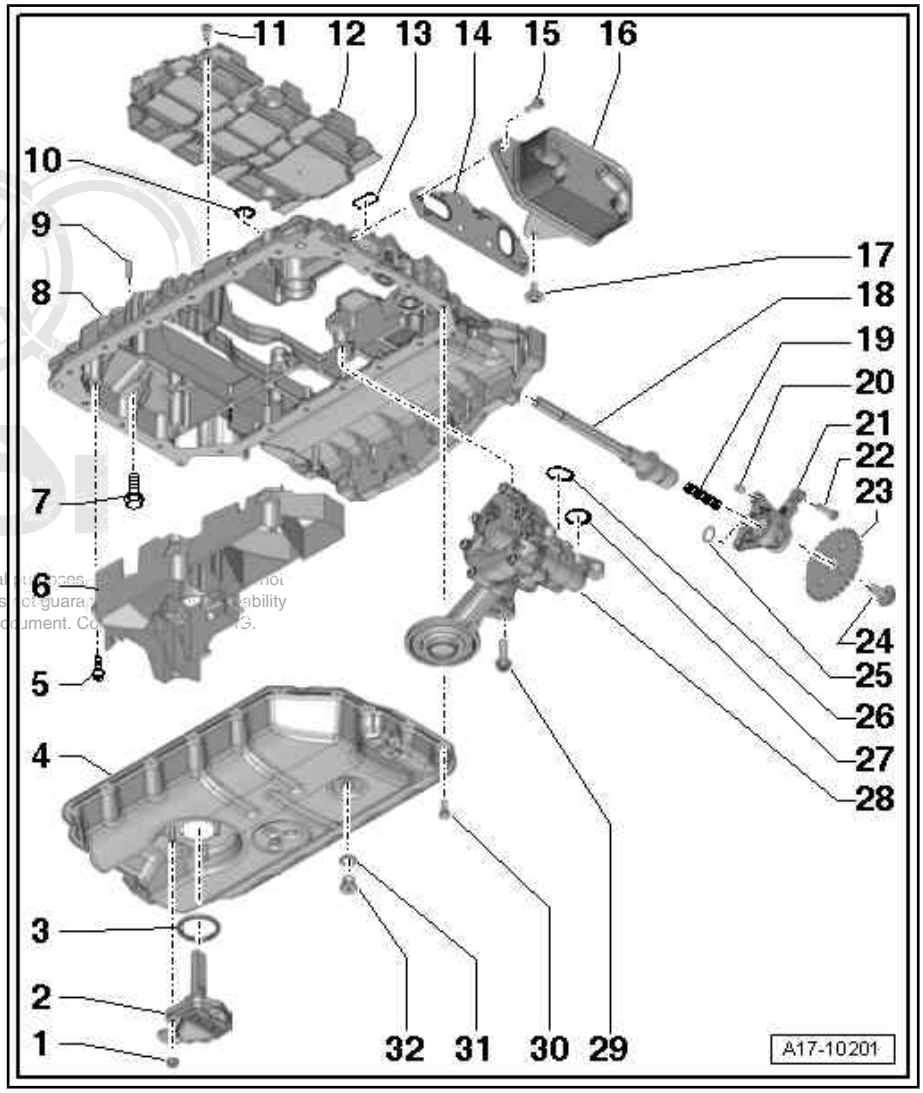
2.1 Exploded view - engine oil cooler

Caution

Risk of damage to catalytic converter.

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 galleries 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 ⇒ page 142 .*



1 - Nut
- ❑ 9 Nm

2 - Oil level and oil temperature sender - G266-
- ❑ Removing and installing ⇒ page 240

3 - Seal
- ❑ Renew

4 - Sump (bottom section)
- ❑ Removing and installing ⇒ page 234

5 - Bolt
- ❑ 9 Nm

6 - Baffle plate (bottom)

7 - Bolt
- ❑ Tightening torque and sequence ⇒ page 234

8 - Sump (top section)
- ❑ Removing and installing ⇒ page 237

9 - Dowel sleeve
- ❑ 2x

10 - O-ring
- ❑ Insert in retaining frame
- ❑ Renew

11 - Bolt
- ❑ Apply locking fluid when installing; refer to ⇒ Electronic parts cata-

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logue
- ❑ 9 Nm

12 - Baffle plate (top)

13 - Seal
- ❑ Insert in retaining frame
- ❑ Renew

14 - Gasket
- ❑ Renew

15 - Bolt
- ❑ 9 Nm

16 - Engine oil cooler
- ❑ See note ⇒ page 231
- ❑ Removing and installing ⇒ page 243
- ❑ 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, use pin wrench - 3212- to counterhold chain sprocket

25 - O-ring
- ❑ Renew

26 - Seal
- ❑ Renew

27 - O-ring
- ❑ Renew

28 - Oil pump
- ❑ Do not dismantle
- ❑ Removing and installing ⇒ page 240

29 - Bolt
- ❑ 20 Nm

30 - Bolt
- ❑ Renew
- ❑ Tightening torque and sequence ⇒ page 233

31 - Seal
- ❑ Renew

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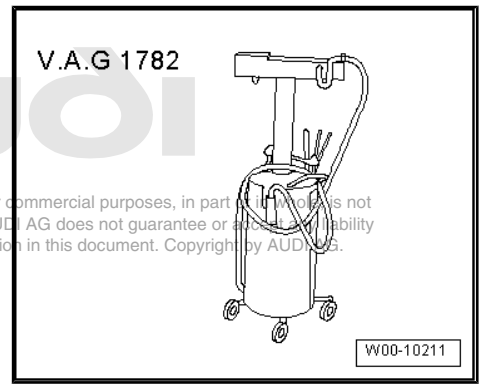
32 - Oil drain plug

❑ 30 Nm

2.2 Removing and installing engine oil cooler

Special tools and workshop equipment required

♦ Used oil collection and extraction unit - V.A.G 1782-

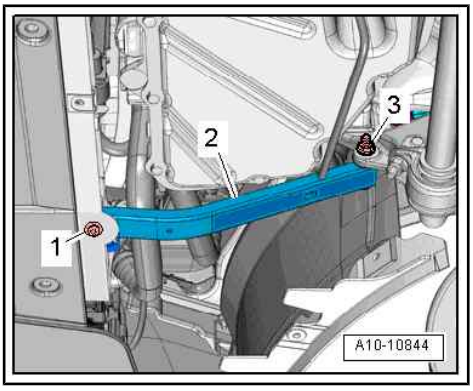


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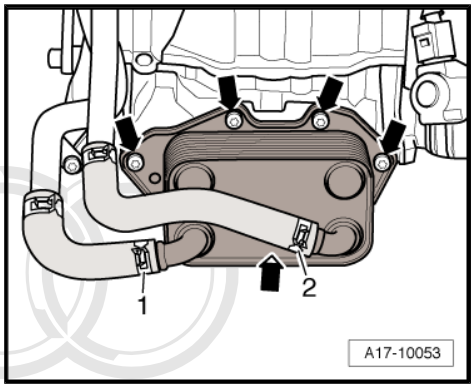
Removing

– Drain coolant ⇒ page 261 (or in vehicles equipped for a hot climate: remove continued coolant circulation pump - V51- ⇒ page 269).

– Remove bolt -1- and nut -3- and detach strut -2- (left-side) for lock carrier.



– Detach coolant hose -1- and, if necessary, -2- from engine oil cooler; release hose clip to do so.
– Position used oil collection and extraction unit - V.A.G 1782- below engine.
– Unscrew bolts -arrows- and detach engine oil cooler.



Installing

• Tightening torque ⇒ page 231

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

Note

♦ *Renew seals and gaskets.*
♦ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

– Install continued coolant circulation pump - V51- ⇒ page 269 .
– Install lock carrier brace ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier .
– Check oil level ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .
– Fill up with coolant ⇒ page 263 .

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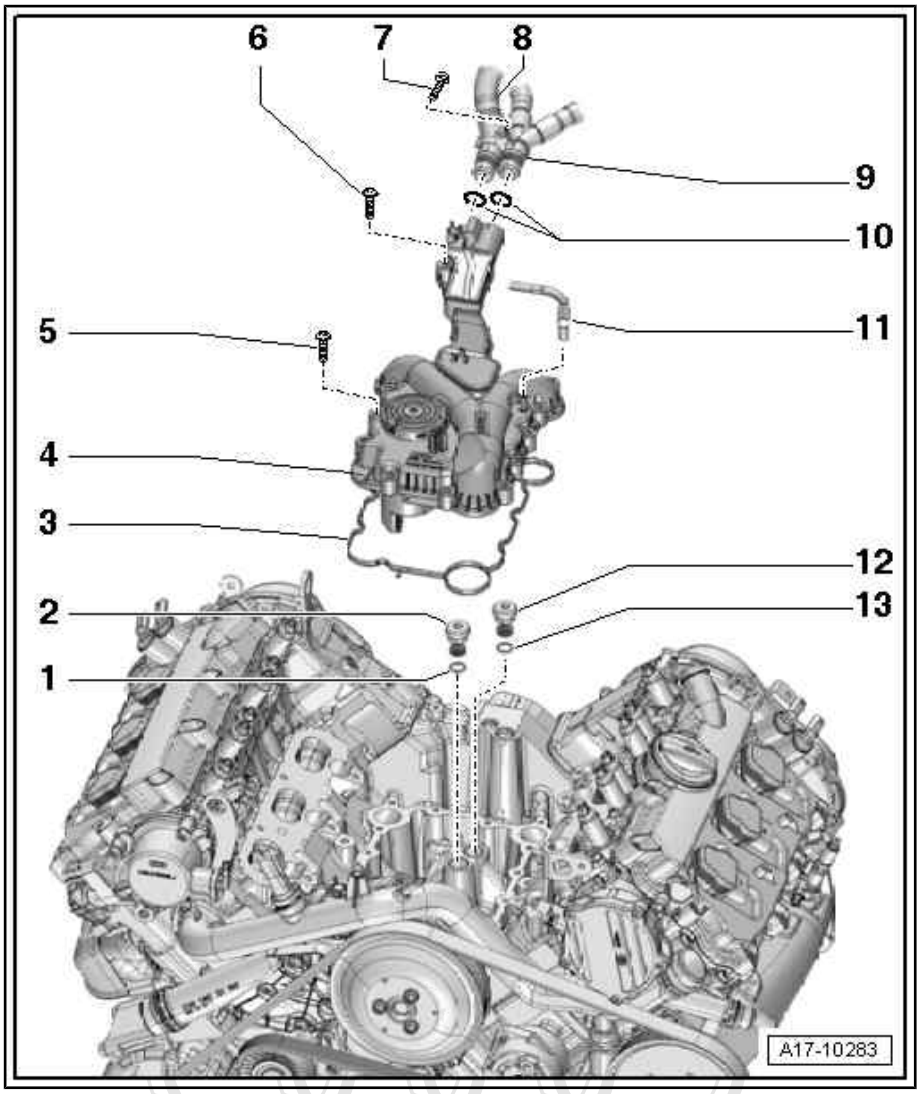
3 Crankcase breather

⇒ "3.1 Exploded view - crankcase breather system", page 245

⇒ "3.2 Removing and installing crankcase breather hoses", page 246

⇒ "3.3 Removing and installing oil separator", page 247

3.1 Exploded view - crankcase breather system



1 - O-ring
- ❑ Renew

2 - Oil retention valve
- ❑ For oil supply to cylinder head (right-side)
- ❑ 20 Nm

3 - Gasket
- ❑ Renew

4 - Cover with oil separator
- ❑ With connection for crankcase breather
- ❑ Removing and installing ⇒ page 247

5 - Bolt
- ❑ 9 Nm

6 - Bolt
- ❑ 9 Nm

7 - Bolt
- ❑ 3 Nm

8 - Crankcase breather hose
- ❑ To intake manifold
- ❑ Removing and installing ⇒ page 246

9 - Crankcase breather hoses
- ❑ To cylinder head covers
- ❑ Removing and installing ⇒ page 246

10 - O-rings
- ❑ Renew

11 - Crankcase breather hose
- ❑ To air pipe

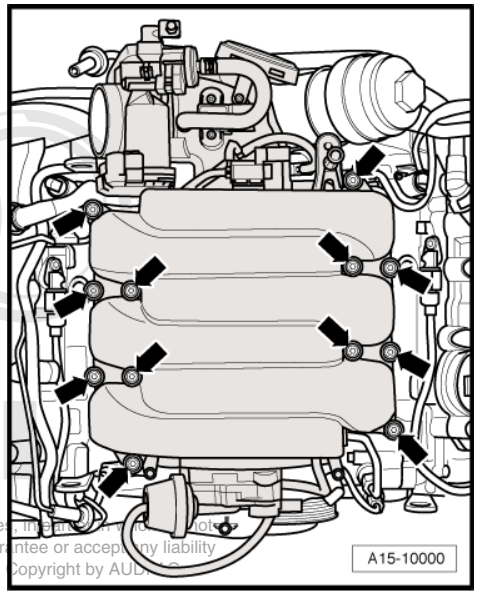
12 - Oil retention valve
- ❑ For oil supply to cylinder head (left-side)
- ❑ 20 Nm

13 - O-ring
- ❑ Renew

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3.2 Removing and installing crankcase breather hoses

Removing



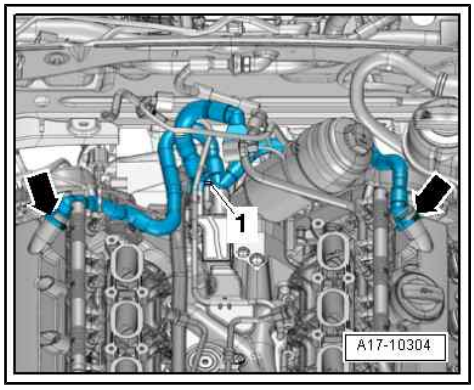
Note

Fit all cable ties in the original positions when installing.

– Remove intake manifold (top section) ⇒ page 335 .

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– Detach crankcase breather hoses -arrows- from cylinder head covers.



Note

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

• Tightening torque ⇒ page 245

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

Note

Renew gaskets and O-rings.

– Install intake manifold (top section) ⇒ page 338 .

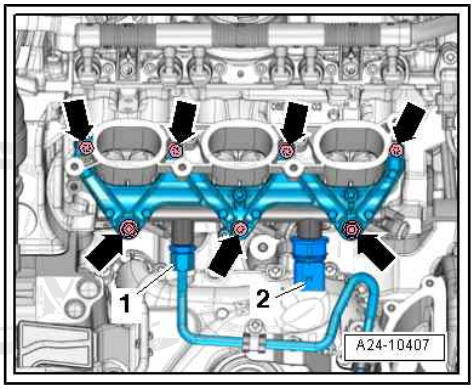
3.3 Removing and installing oil separator

Removing

– Remove crankcase breather hoses ⇒ page 246 .

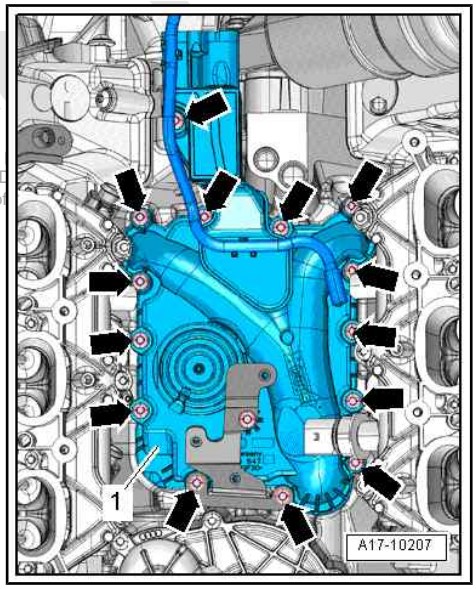
– Remove intake manifold bottom section (left-side) ⇒ page 335 .

– Remove coolant pipe (top) ⇒ page 280 .



– Remove bolts -arrows-.

– Detach bracket for high-pressure pipes and oil separator -1-.



Installing

• Tightening torque ⇒ page 245

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

Note

Renew gasket.

– Install coolant pipe (top) ⇒ page 280 .

– Install intake manifold bottom section (left-side) ⇒ page 335 .

– Install crankcase breather hoses ⇒ page 246 .

4 Oil filter/oil pressure switch

⇒ “4.1 Exploded view - oil filter/oil pressure switches”, page 248

⇒ “4.2 Removing and installing oil pressure switch F22 ”, page 250

⇒ “4.3 Removing and installing oil pressure switch for reduced oil pressure F378 ”, page 251

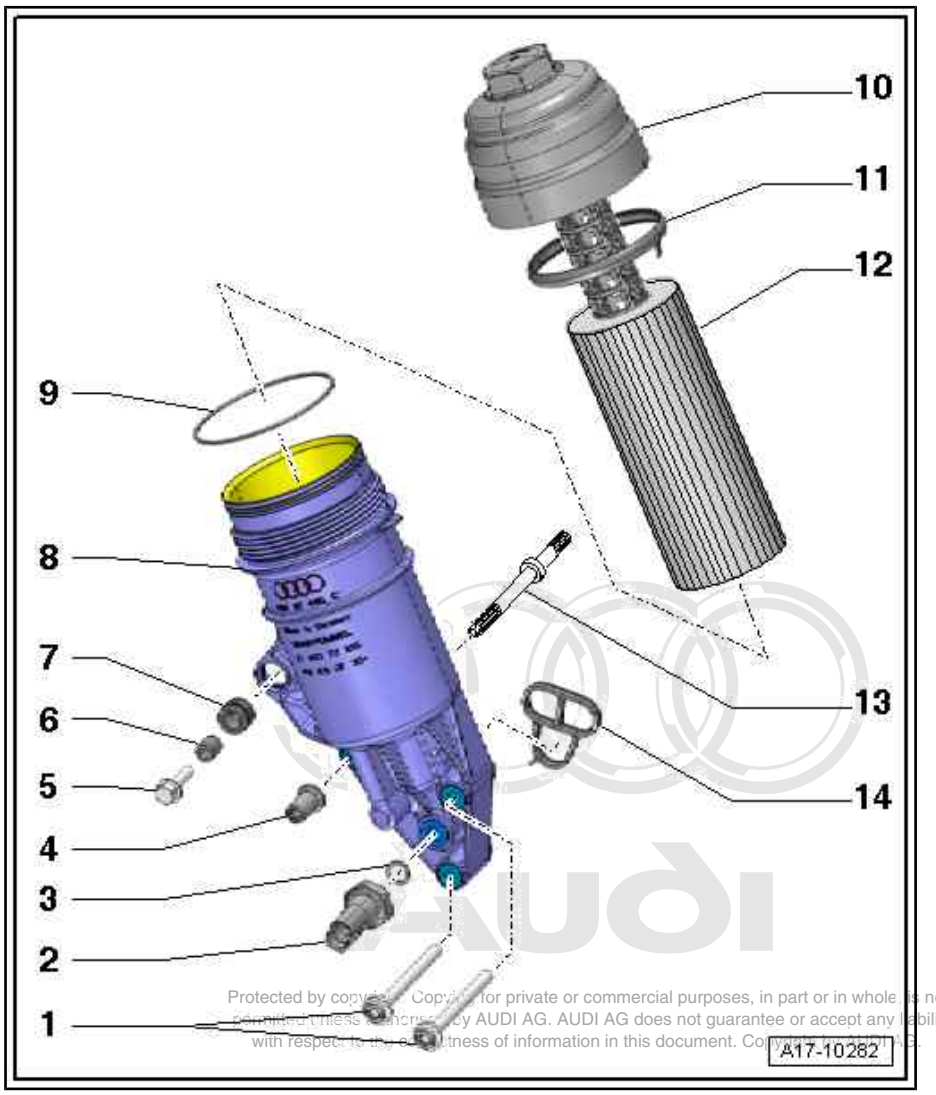
⇒ “4.4 Checking oil pressure and oil pressure switch”, page 251

⇒ “4.5 Checking oil pressure”, page 251

⇒ “4.6 Removing and installing oil filter housing”, page 252

⇒ “4.7 Removing and installing valve for oil pressure control N428 ”, page 254

4.1 Exploded view - oil filter/oil pressure switches



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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 250
- ❑ 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 249

10 - Sealing cap
- ❑ 25 Nm

11 - Seal
- ❑ Renew

❑ Removing and installing ⇒ page 249

12 - Oil filter element

❑ Removing and installing ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818

13 - Bolt

❑ 16 Nm

14 - Gasket

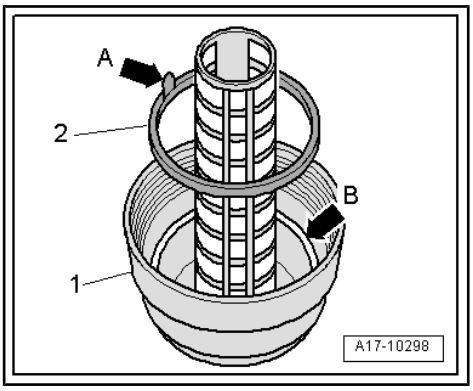
❑ Renew

Renewing seal on sealing cap

– Take hold of tab -arrow A- and pull seal -2- out of sealing cap -1-.

– Install new seal so that semi-circular profile fits in groove -arrow B- in sealing cap.

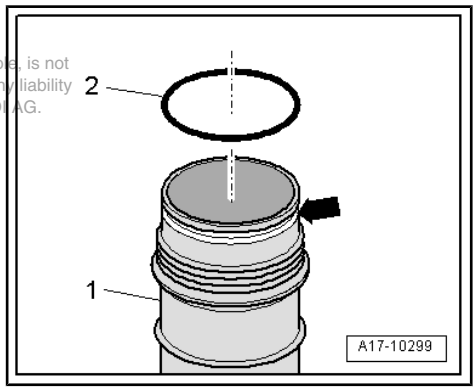
• The tab -arrow A- must face upwards.



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-

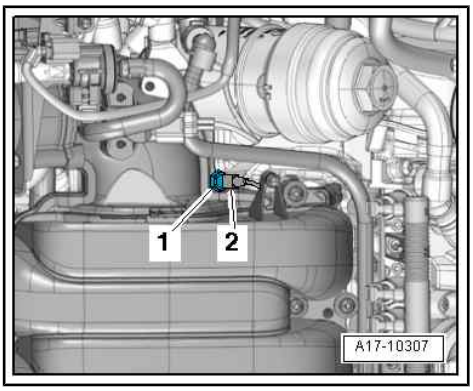
♦ Opening/closing pressure 0.75 ... 1.05 bar

♦ Grey insulation

♦ Checking in “Guided Fault Finding” ⇒ Vehicle diagnostic tester

♦ Removing and installing ⇒ page 251

♦ 20 Nm



4.2 Removing and installing oil pressure switch - F22-

Removing

– Pull off rear engine cover panel -top arrows-.

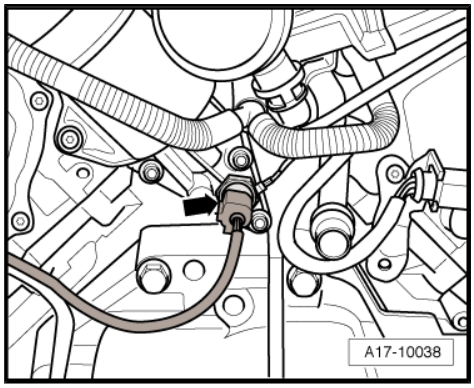


Note

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

– Unplug electrical connector -arrow-.

– Unscrew oil pressure switch - F22- .



Installing

• Tightening torque ⇒ page 248

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 oil.*

– Check oil level ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .

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

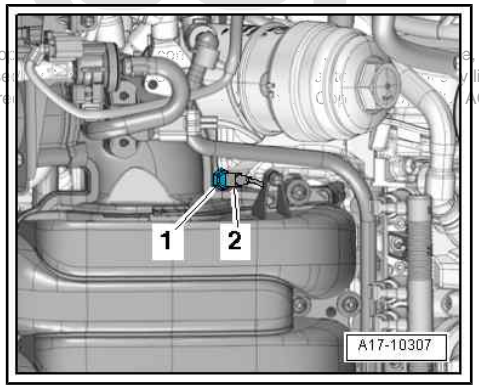
Removing

– Pull off rear engine cover panel -top arrows-.



– Unplug electrical connector -2-.

– Unscrew oil pressure switch for reduced oil pressure - F378- -item 1-.



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Installing

• Tightening torque ⇒ page 249

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

Note

Renew seal.

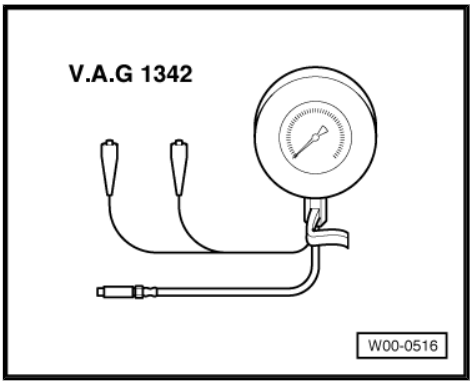
4.4 Checking oil pressure and oil pressure switch

Checking oil pressure switch - F22- / oil pressure switch for reduced oil pressure - F378- in “Guided Fault Finding” ⇒ Vehicle diagnostic tester.

4.5 Checking oil pressure

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 250 .

– Connect oil pressure tester - V.A.G 1342- to bore for oil pressure switch.

– Screw oil pressure switch - F22- into oil pressure tester.

– Start engine.

- Minimum oil pressure at idling speed: 1.2 bar.
- Minimum oil pressure at 2000 rpm: 1.5 bar.

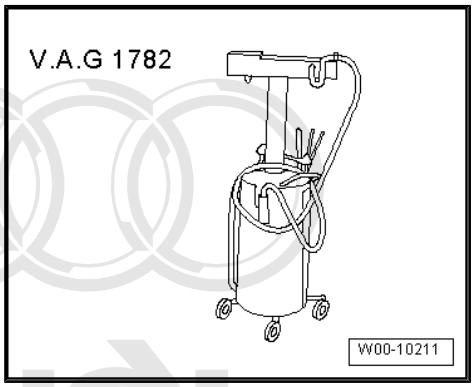
Assembling

– Install oil pressure switch - F22- ⇒ page 250 .

4.6 Removing and installing oil filter housing

Special tools and workshop equipment required

♦ Used oil collection and extraction unit - V.A.G 1782-



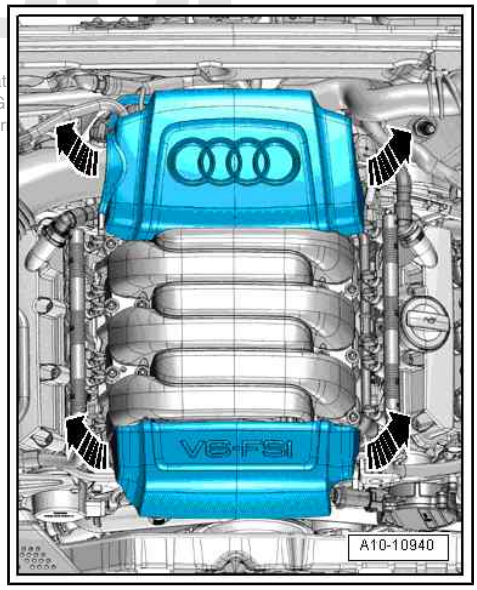
Removing

– Pull off rear engine cover panel -top arrows-.

– Remove oil filter element ⇒ Maintenance ; Booklet 811 ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .

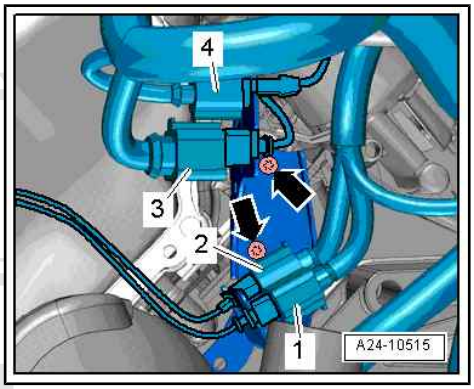
– Extract engine oil from oil filter housing using used oil collection and extraction unit - V.A.G 1782- .

– Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - bulkhead .



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– Detach electrical connectors -1 … 4- from bracket and move clear to side.
– Remove bolts -arrows-, disengage bracket and remove.

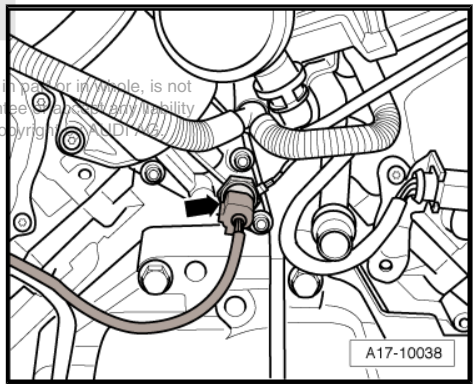


Note

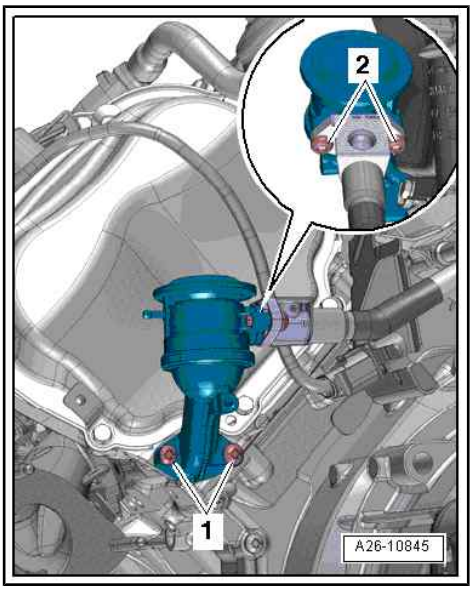
Place a cloth beneath the oil filter housing to catch escaping oil.

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



– Vehicles with secondary air system: remove bolts -2- and push secondary air pipe to rear.

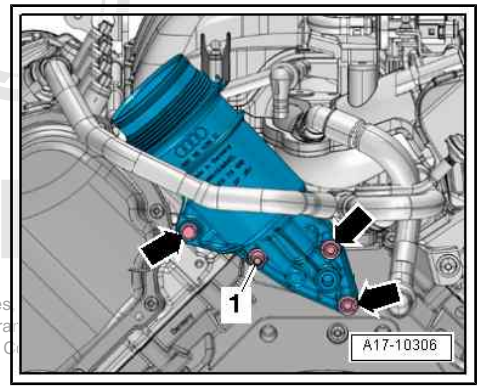


Note

Disregard -item 1-.

– Remove bolts -arrows-.

– Remove nut -1- and centre hex stud, and detach oil filter housing.



Installing

• Tightening torques ⇒ page 248

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

Note

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Renew gaskets, seals and O-rings.

– Install secondary air hose: country-specific version 1 ⇒ page 380 , country-specific version 2 ⇒ page 382 .

– Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - bulkhead .

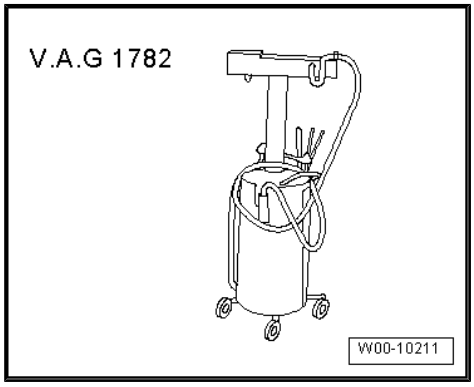
– Install oil filter element ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .

– Fill up with engine oil and check oil level ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .

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

Special tools and workshop equipment required

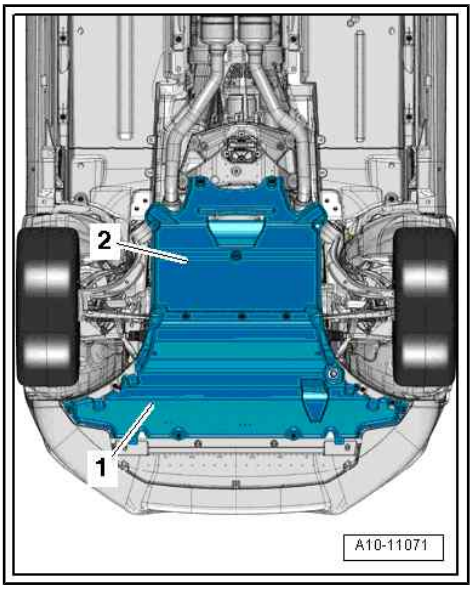
♦ Used oil collection and extraction unit - V.A.G 1782-



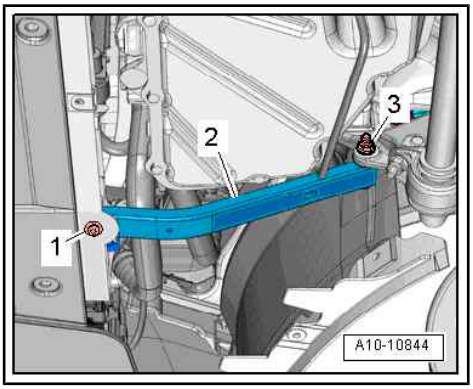
Removing

Vehicles not equipped with continued coolant circulation pump - V51- :

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

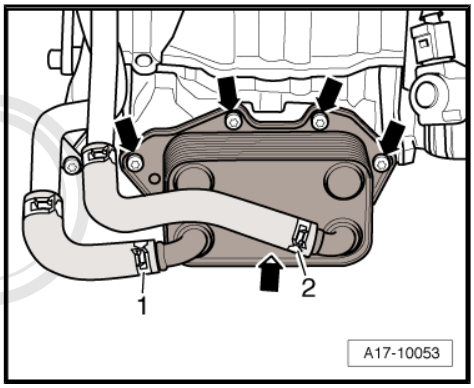


– Remove bolt -1- and nut -3- and detach strut -2- (left-side) for lock carrier.



– Position used oil collection and extraction unit - V.A.G 1782- below engine.

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



Vehicles with continued coolant circulation pump - V51- :

– Remove continued coolant circulation pump - V51- ⇒ page 269 and engine oil cooler ⇒ page 243 .

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All vehicles (continued):

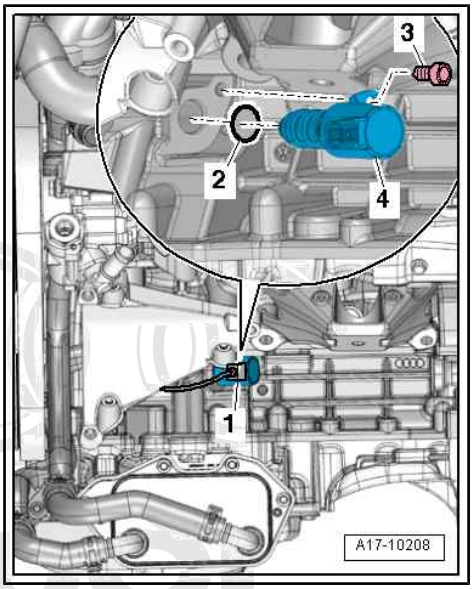
– Unplug electrical connector -1-.

– Remove bolt -3- and detach valve for oil pressure control - N428- -item 4-.

Installing

• Tightening torque ⇒ page 132

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



Note

Fit new O-ring -2-.

– Install continued coolant circulation pump - V51- ⇒ page 269 .

– Install engine oil cooler ⇒ page 243 .

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19 – Cooling

1 Cooling system/coolant

⇒ "1.1 Connection diagram - coolant hoses", page 257

⇒ "1.2 Checking cooling system for leaks", page 259

⇒ "1.3 Draining and filling cooling system", page 261

1.1 Connection diagram - coolant hoses

WARNING

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

Note

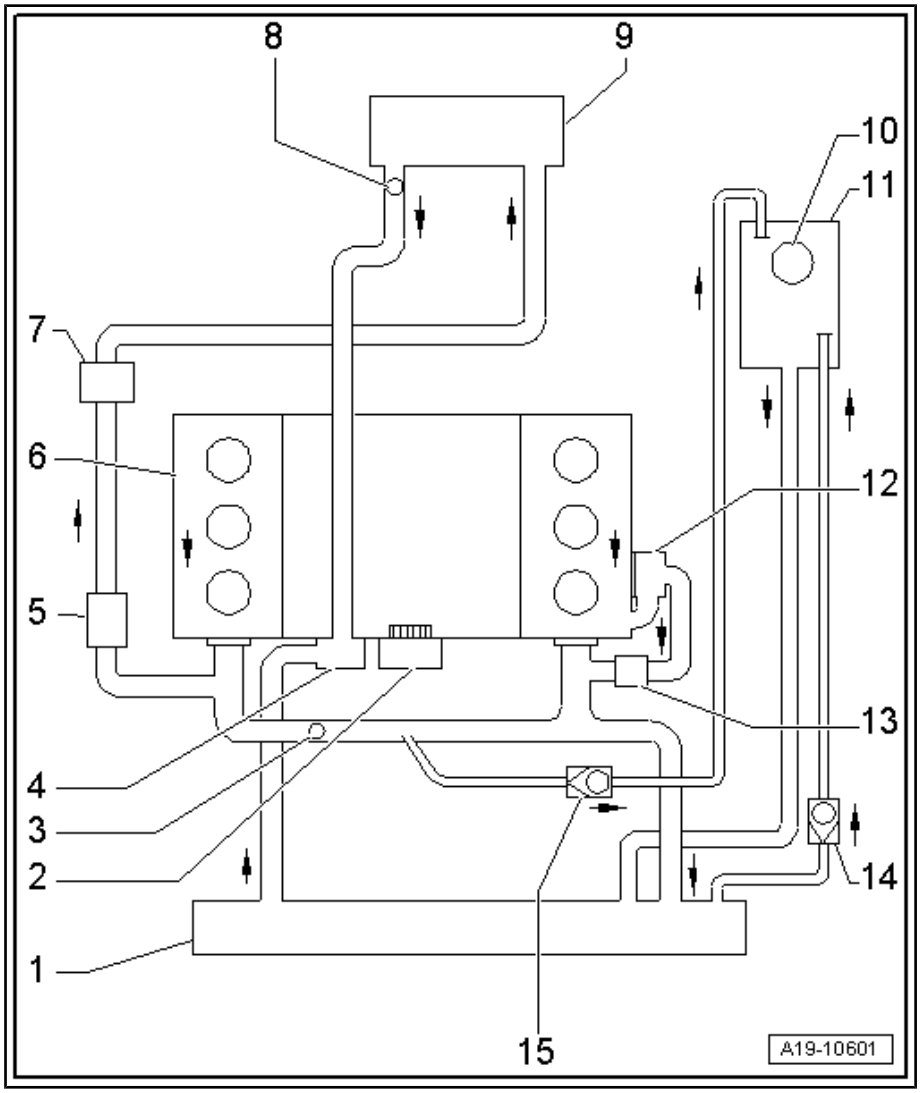
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *The arrow markings on coolant pipes and on ends of hoses must align.*

Vehicles without auxiliary heater

Note

Arrows show direction of coolant flow.

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1 - Radiator

- ❑ If renewed, refill system with fresh coolant

2 - Coolant pump

3 - Coolant temperature sender - G62-

4 - Thermostat

5 - Coolant circulation pump - V50-

- ❑ Activated by circulation pump relay - J160-
- ❑ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Coolant circuit

6 - Cylinder head and cylinder block

- ❑ If renewed, refill system with fresh coolant

7 - Coolant shut-off valve

- ❑ Activated via Climatronic coolant shut-off valve - N422-
- ❑ Climatronic coolant shut-off valve - N422- is activated via Climatronic control unit - J255-
- ❑ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Coolant circuit

8 - Bleeder hole

9 - Heat exchanger for heater

- ❑ 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

10 - Filler cap for expansion tank

- ❑ Checking pressure relief valve ⇒ page 261

11 - Coolant expansion tank

12 - Engine oil cooler

- ❑ If renewed, refill system with fresh coolant

13 - Continued coolant circulation pump - V51-

- ❑ For vehicles equipped for a hot climate

14 - Non-return valve

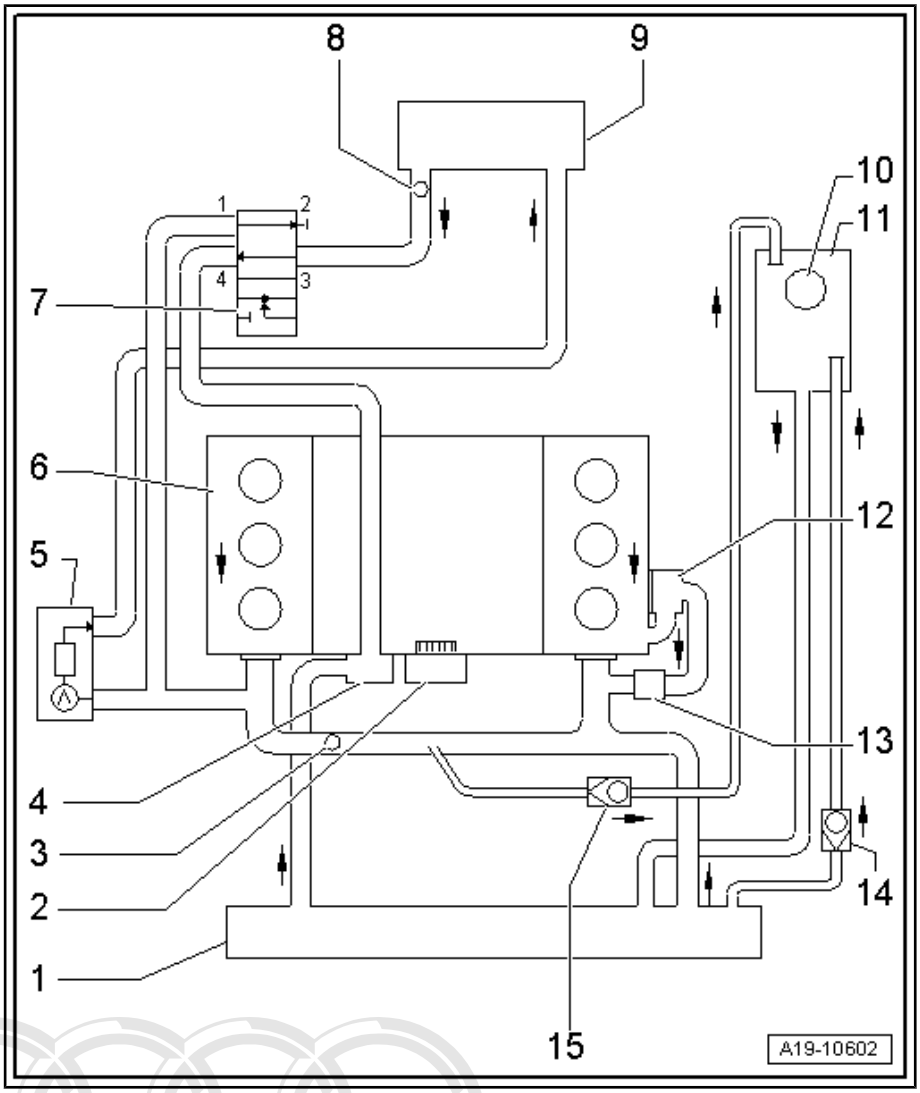
15 - Non-return valve

Vehicles with auxiliary heater

Note

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Arrows show direction of coolant flow.



1 - Radiator

- ❑ If renewed, refill system with fresh coolant

2 - Coolant pump

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 - Cylinder head and cylinder block

- ❑ If renewed, refill system with fresh coolant

7 - Climatronic coolant shut-off valve - N422-

- ❑ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Coolant circuit
- ❑ Activated via Climatronic control unit - J255-

8 - Bleeder hole

9 - Heat exchanger for heater

- ❑ 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

10 - Filler cap for expansion tank

- ❑ Checking pressure relief valve ⇒ page 261

11 - Coolant expansion tank

12 - Engine oil cooler

- ❑ If renewed, refill system with fresh coolant

13 - Continued coolant circulation pump - V51-

- ❑ For vehicles equipped for a hot climate

14 - Non-return valve

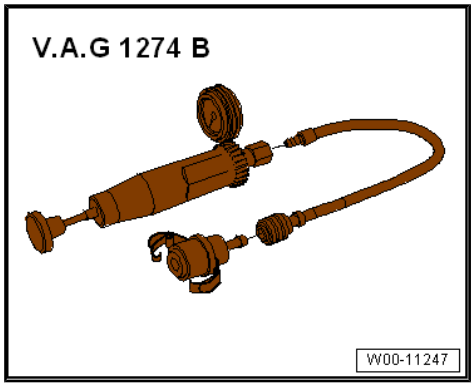
15 - Non-return valve

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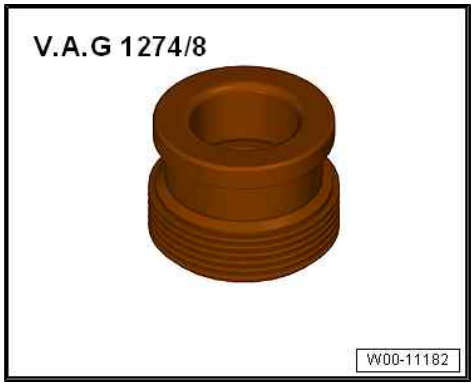
1.2 Checking cooling system for leaks

Special tools and workshop equipment required

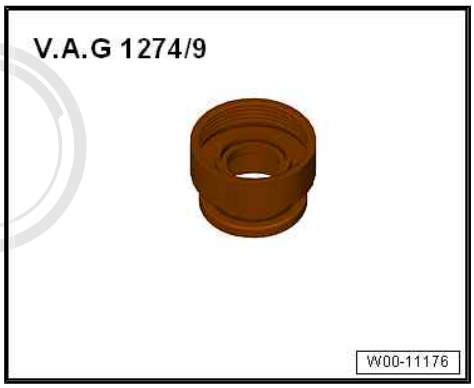
- Cooling system tester - V.A.G 1274 B-



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



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



Procedure

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- Engine must be warm.

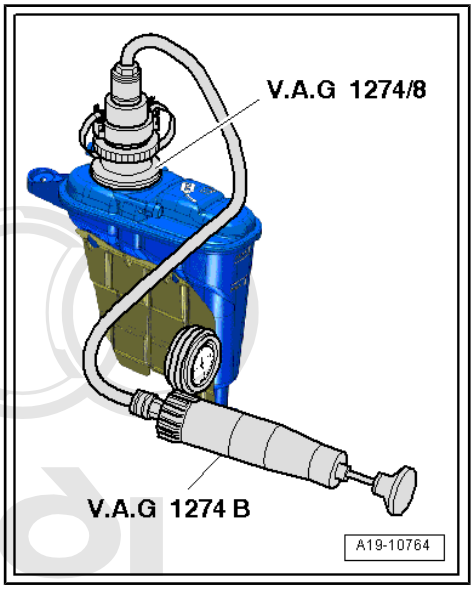
WARNING

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

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

– Open filler cap on coolant expansion tank.

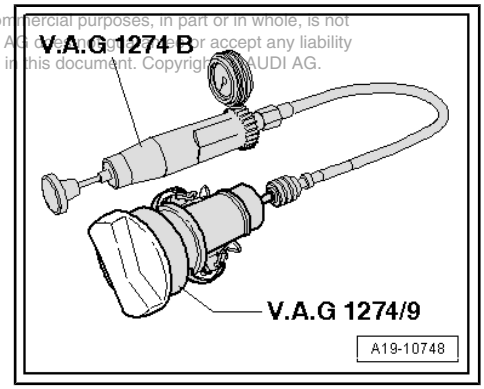
– Fit cooling system tester - V.A.G 1274 B- with adapter - V.A.G 1274/8- onto coolant expansion tank.
– Using hand pump on cooling system tester, build up a pressure of approx. 1.0 bar.
– If this pressure is not maintained, locate and rectify leaks.



Checking pressure relief valve in filler cap

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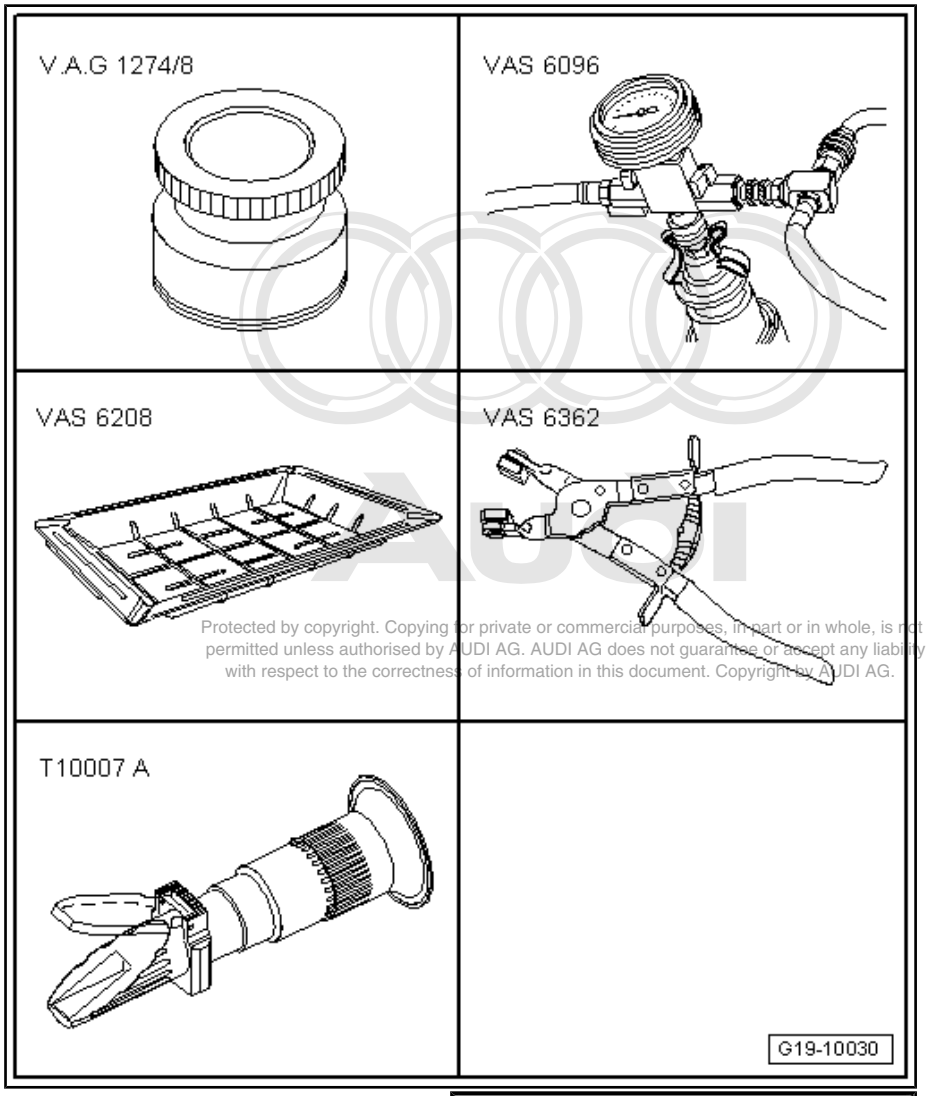
– Fit cooling system tester - V.A.G 1274 B- with adapter - V.A.G 1274/9- onto filler cap.
– Build up pressure with hand pump on cooling system tester.
• The pressure relief valve should open at a pressure of 1.4 ... 1.6 bar.
– Renew filler cap if pressure relief valve does not open as described.

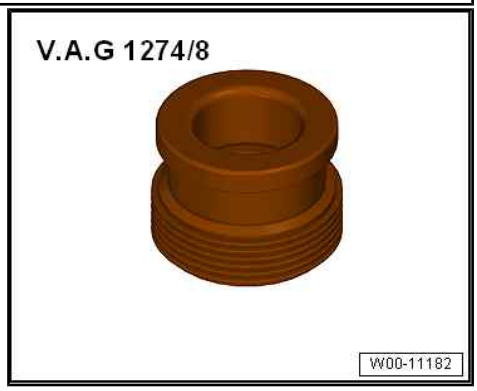


1.3 Draining and filling cooling system

Special tools and workshop equipment required

- Adapter for cooling system tester - V.A.G 1274/8-
- Cooling system charge unit - VAS 6096-
- Drip tray for workshop hoist - VAS 6208-
- Hose clip pliers - VAS 6362-
- Refractometer - T10007 A-
- Pipe for cooling system tester - V.A.G 1274/10-
- Safety goggles
- Protective gloves





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Draining

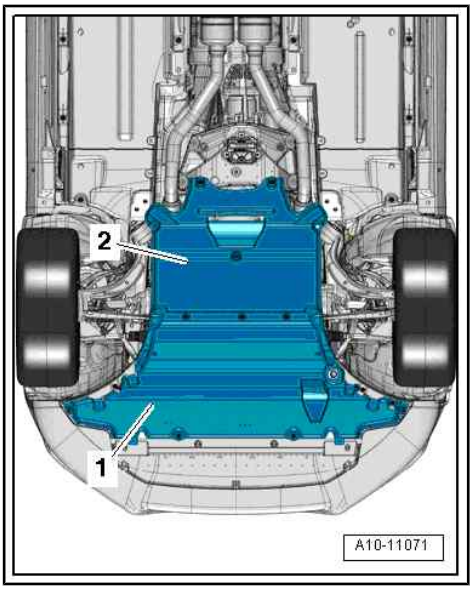
WARNING

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.*

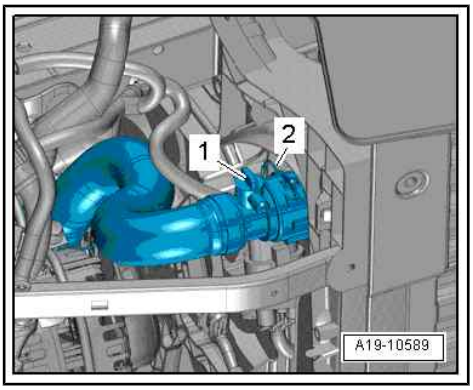
– Open filler cap on coolant expansion tank.

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



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

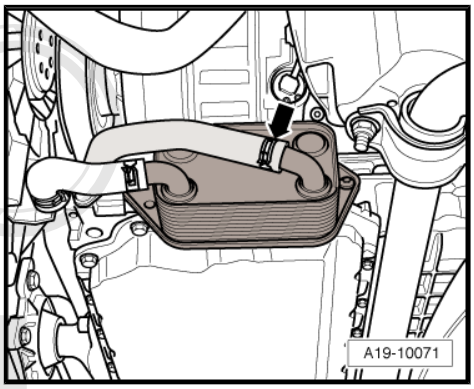
– Remove drain plug -1- and drain off coolant.



Note

Disregard -item 2-.

– Disconnect coolant hose -arrow- from engine oil cooler and drain off coolant.



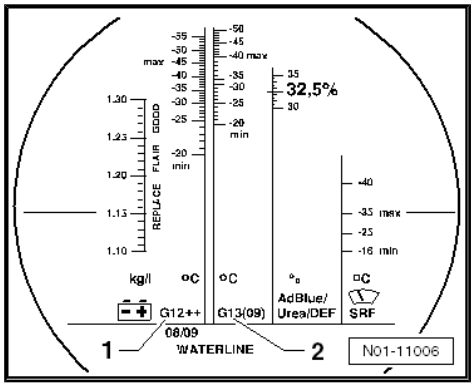
Filling

- Ignition off.

Caution

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

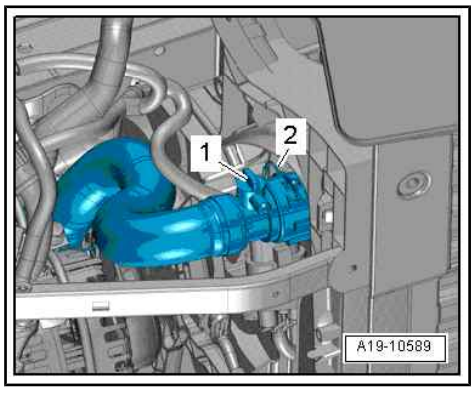
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Note

- *The effectiveness of the coolant is greatly influenced by the quality of the water with which it is mixed. Because water may contain different substances depending on the country or even the region, the water quality to be used for cooling systems has been specified. Distilled water meets all the requirements and is therefore recommended for use when topping up or filling up with coolant.*
- *Use only coolant additives listed in the ⇒ Electronic parts catalogue (ETKA) . Other coolant additives could seriously impair in particular the anti-corrosion properties. The resulting damage could lead to loss of coolant and consequently to serious engine damage.*
- *Coolant with the recommended mixture ratio prevents frost and corrosion damage and stops scaling. At the same time it raises the boiling point of the fluid in the system. For this reason the cooling system must be filled all year round with the correct coolant additive.*
- *Because of its high boiling point, the coolant improves engine reliability under heavy loads, particularly in countries with tropical climates.*
- *The refractometer - T10007A- MUST be used to determine the current level of frost protection.*
- *The mixture must guarantee frost protection down to -25 °C (in countries with arctic climate: down to -36 °C). The amount of antifreeze can only be increased if greater frost protection is required in very cold climates. This must only be up to -48 °C, however, as otherwise the cooling efficiency of the coolant is impaired.*
- *The coolant concentration must not be reduced by adding water even in warmer seasons and in warmer countries. Frost protection must be provided to at least -25 °C.*
- *Read off the level of frost protection on the scale for the relevant coolant additive.*
- *The temperature indicated on the refractometer - T10007A- corresponds to the temperature at which the first ice crystals can form in the coolant.*
- *Do not reuse coolant.*
- *Only use water/coolant additive as a lubricant for coolant hoses.*

– Close drain plug -1-.

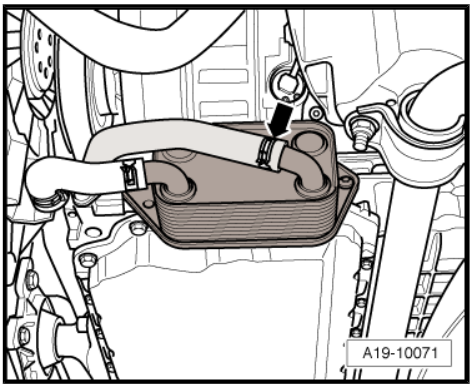


Note

Disregard -item 2-.

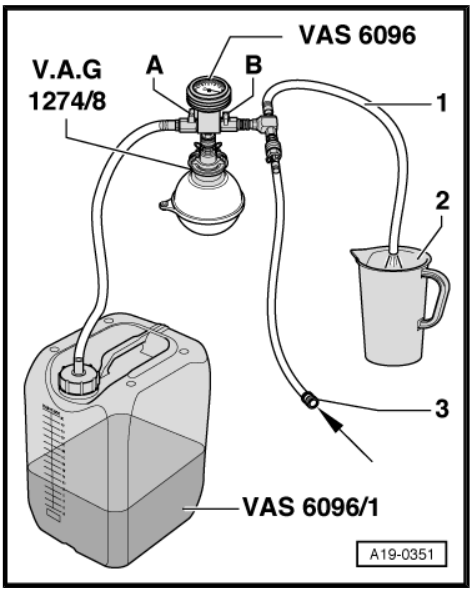
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– Connect coolant hose to engine oil cooler -arrow-.



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– Fill reservoir of cooling system charge unit - VAS 6096- with 12 litres of premixed coolant (according to recommended ratio):



Recommended mixture ratio for coolant

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

– Fit 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.

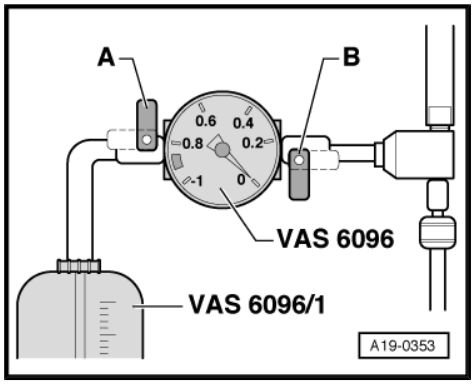
– Close valve -A- again.

– 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.

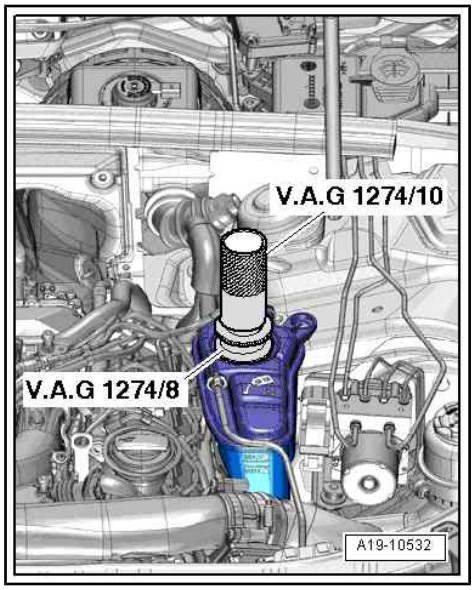
– Open valve -A-.

• 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.

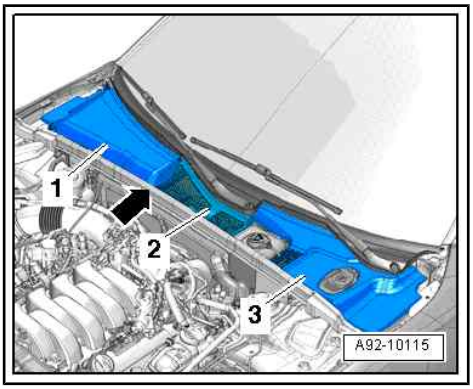
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– Detach cooling system charge unit - VAS 6096- from adapter -V.A.G 1274/8- on coolant expansion tank.

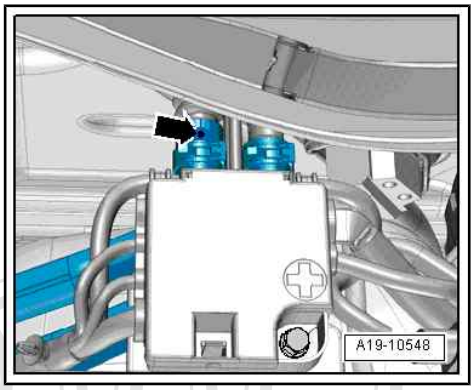
– Attach pipe -V.A.G 1274/10- onto adapter -V.A.G 1274/8- .



– Depending on version, remove centre part of plenum chamber cover -2- or entire plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .



– Release coolant hose going to heat exchanger for heater and pull back hose until bleeder hole -arrow- in hose is no longer blocked by connection.



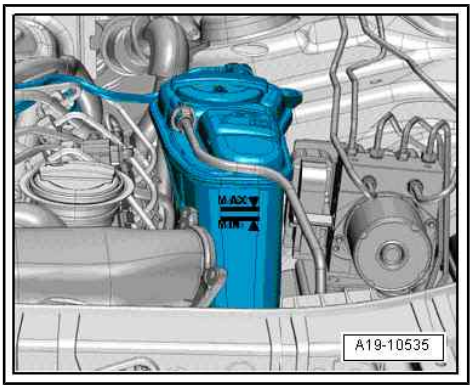
– Fill up with coolant until it flows out at bleeder hole in coolant hose.
– Push coolant hose back onto connection and secure with spring-type hose clip.
– On vehicles with auxiliary heater, switch heater on (for about 30 seconds) and then off again.
– Close filler cap on expansion tank.
– Start engine.
– Set temperature to “HI” for all zones and select lowest possible blower speed (= 0).
– Switch off air conditioner compressor (press AC button).

• LED in button should not light up.

– Run engine for 3 minutes at 2000 rpm.
– Allow engine to run at idling speed until both large coolant hoses at radiator become warm.
– Run engine for 2 minutes at 2000 rpm.
– Switch off ignition and allow engine to cool down.
– Install noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

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– Check coolant level.



• The coolant level must be at the MAX marking when the engine is cold.
• The coolant level can be above the MAX marking when the engine is warm.

2 Coolant pump/thermostat assembly

⇒ “2.1 Exploded view - coolant pump and thermostat”, page 268

⇒ “2.2 Exploded view - electric coolant pump”, page 269

⇒ “2.3 Removing and installing electrical coolant pump”, page 269

⇒ “2.4 Removing and installing coolant pump”, page 271

⇒ “2.5 Removing and installing thermostat”, page 272

⇒ “2.6 Checking thermostat”, page 272

⇒ “2.7 Removing and installing coolant temperature sender G62”, page 273

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 271

5 - Bolt
- ❑ 9 Nm

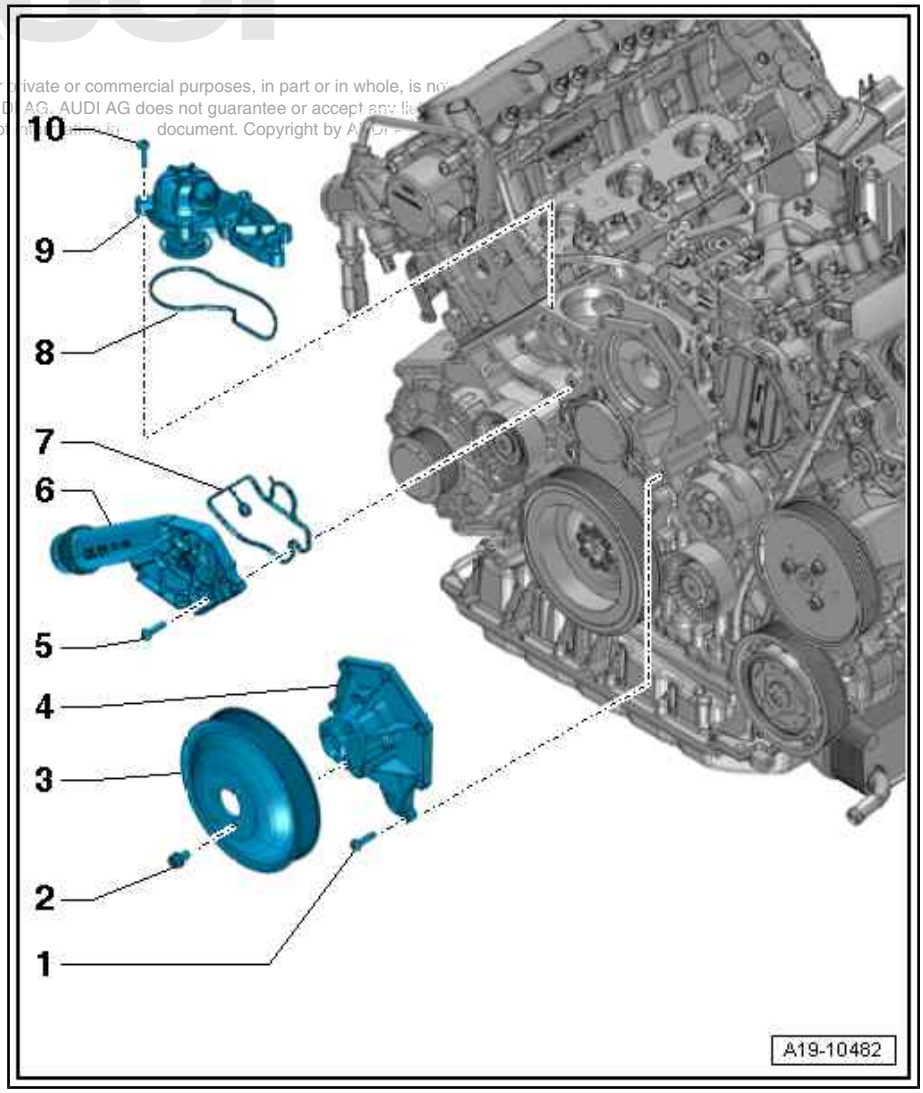
6 - Connection
- ❑ For coolant hose

7 - Gasket
- ❑ Renew

8 - Gasket
- ❑ Renew

9 - Thermostat
- ❑ Removing and installing ⇒ page 272
- ❑ Checking ⇒ page 272

10 - Bolt
- ❑ 9 Nm



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2.2 Exploded view - electric coolant pump

1 - Coolant hose

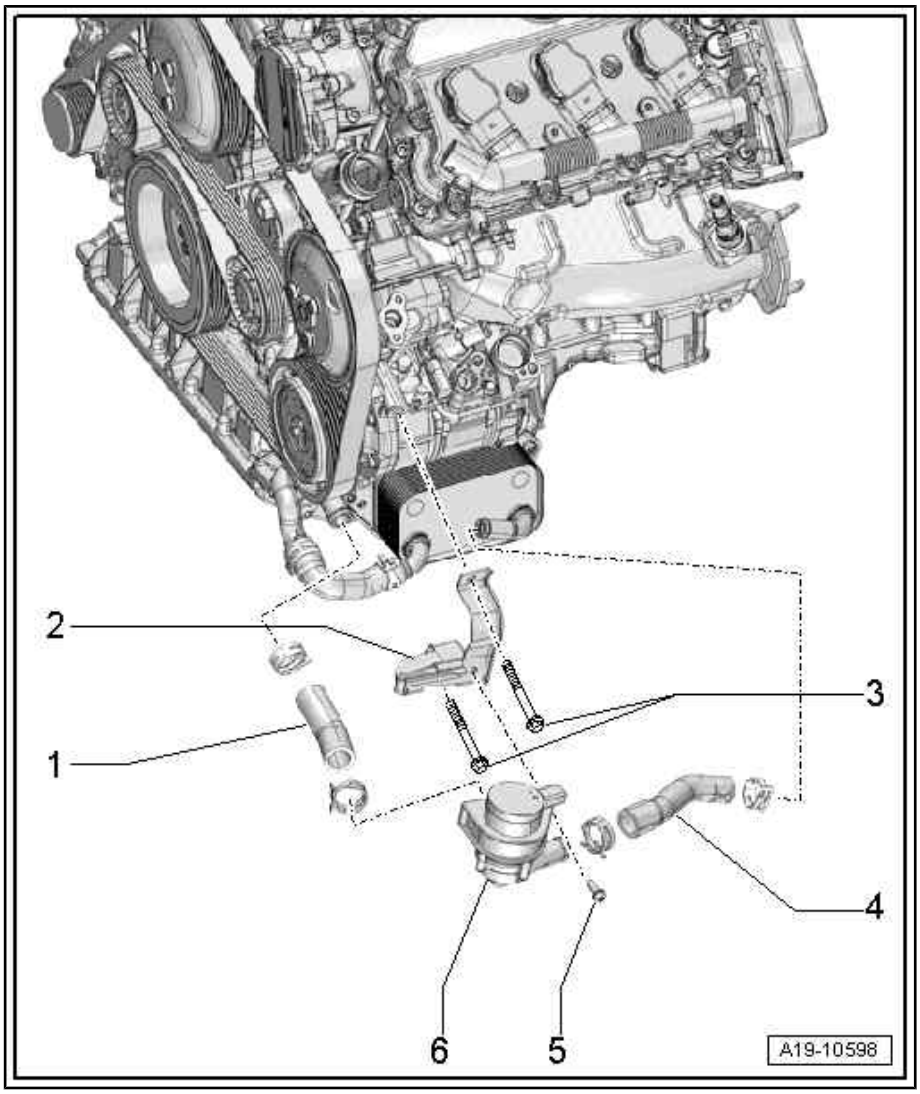
2 - Bracket

3 - Bolts
- ❑ 9 Nm

4 - Coolant hose

5 - Bolt
- ❑ 4 Nm

6 - Continued coolant circulation pump - V51-
- ❑ Removing and installing ⇒ page 269



2.3 Removing and installing electrical coolant pump

⇒ "2.3.1 Removing and installing continued coolant circulation pump V51 ", page 269

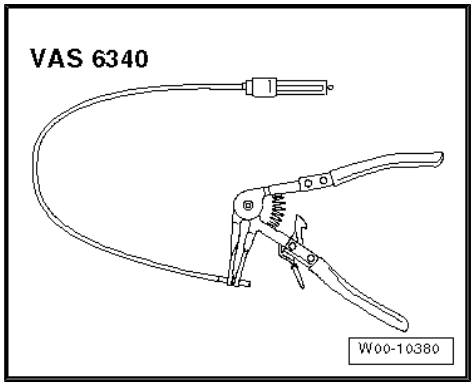
2.3.1 Removing and installing continued coolant circulation pump - V51-

Special tools and workshop equipment required

- Drip tray for workshop hoist - VAS 6208-



- Hose clip pliers - VAS 6340-



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Removing

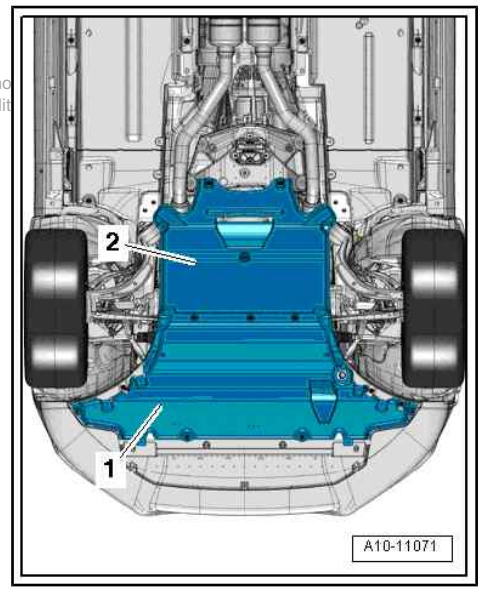
WARNING

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

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

– Open filler cap on coolant expansion tank.

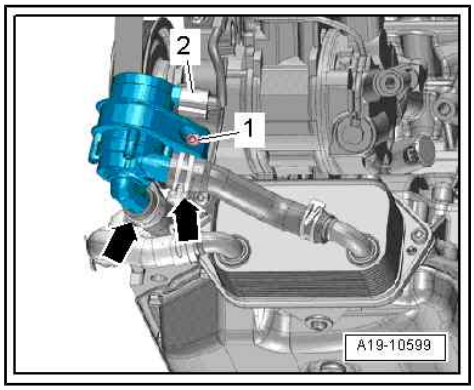
– Remove front noise insulation -1- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .



– Remove bolt -1- and unplug electrical connector -2-.

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

– Disconnect continued coolant circulation pump - V51- from coolant hoses -arrows-.



Installing

- Tightening torque ⇒ page 269

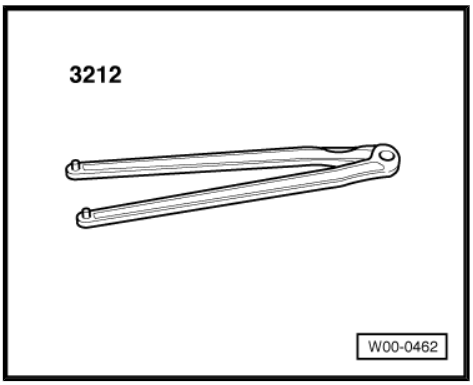
Installation is carried out in the reverse order; note the following:

– Fill up with coolant ⇒ page 263 .

2.4 Removing and installing coolant pump

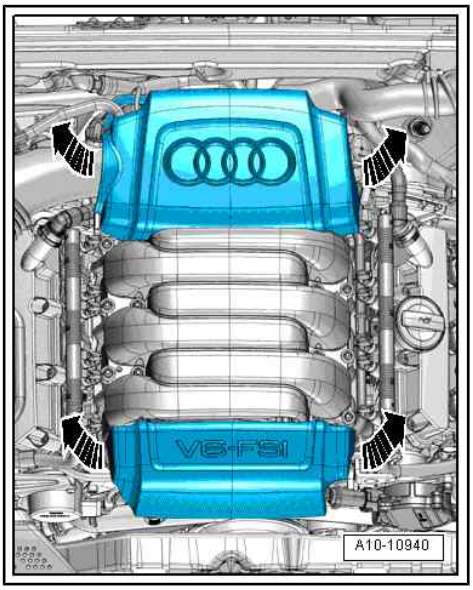
Special tools and workshop equipment required

- Pin wrench - 3212-

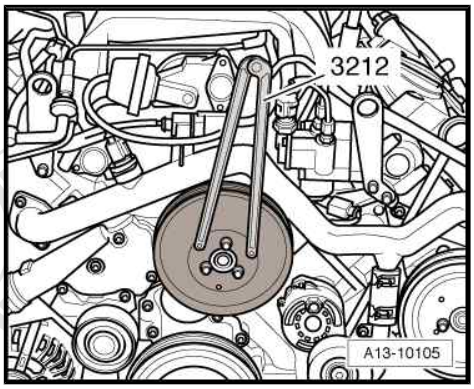


Removing

– Pull off front part of engine cover panel -bottom arrows-.



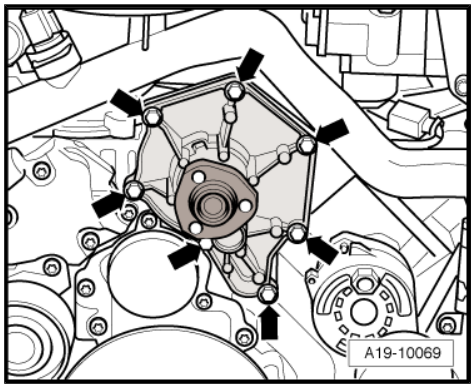
– Drain coolant ⇒ page 261 .
– Remove poly V-belt ⇒ page 119 .
– Remove bolts for coolant pump pulley (counterhold with pin wrench - 3212-).



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Note

Place a cloth underneath to catch escaping coolant.



– Remove securing bolts -arrows- for coolant pump and detach coolant pump.

Installing

• Tightening torques ⇒ page 268

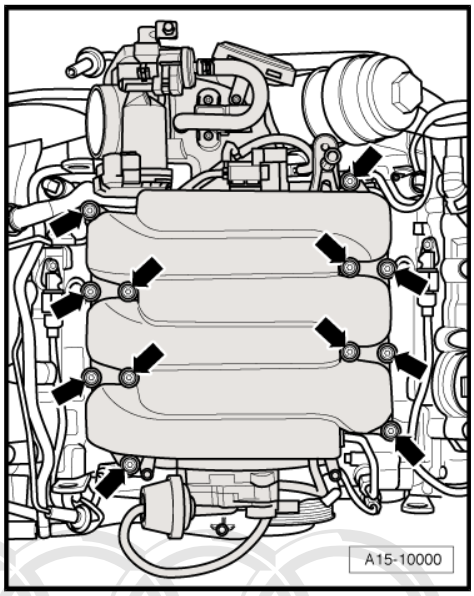
Installation is carried out in the reverse order; note the following:

– Clean sealing surfaces; they must be free of oil and grease.
– Install poly V-belt ⇒ page 119 .
– Fill up with coolant ⇒ page 263 .

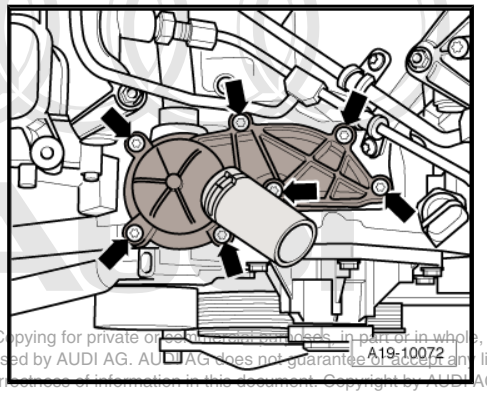
2.5 Removing and installing thermostat

Removing

– Drain coolant ⇒ page 261 .
– Remove intake manifold (top section) ⇒ page 338 .
– Remove coolant pipe (front) ⇒ page 275 .



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



Installing

• Tightening torque ⇒ page 268

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

Note

Renew seals and/or gaskets.

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– Install coolant pipe (front) ⇒ page 275 .
– Install intake manifold (top section) ⇒ page 338 .
– Fill up with coolant ⇒ page 263 .

2.6 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
• 1) Cannot be tested.		

2.7 Removing and installing coolant temperature sender - G62-

Removing

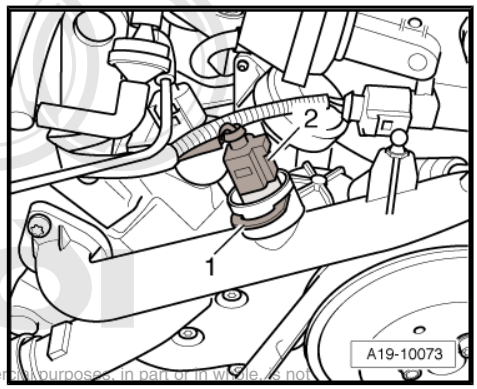
- Engine cold.

– Open filler cap on coolant expansion tank briefly to dissipate residual pressure in cooling system.

– Pull off front part of engine cover panel -bottom arrows-.



– Unplug electrical connector -2- at coolant temperature sender - G62- .



Note

Place a cloth underneath to catch escaping coolant.

– Pull off retaining clip -1- and detach coolant temperature sender - G62- .

Installing

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

Audi
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Note

- *Fit new O-ring.*
- *Insert new coolant temperature sender - G62- immediately into connection to avoid loss of coolant.*

– Check coolant level ⇒ page 267 .

3 Coolant pipes

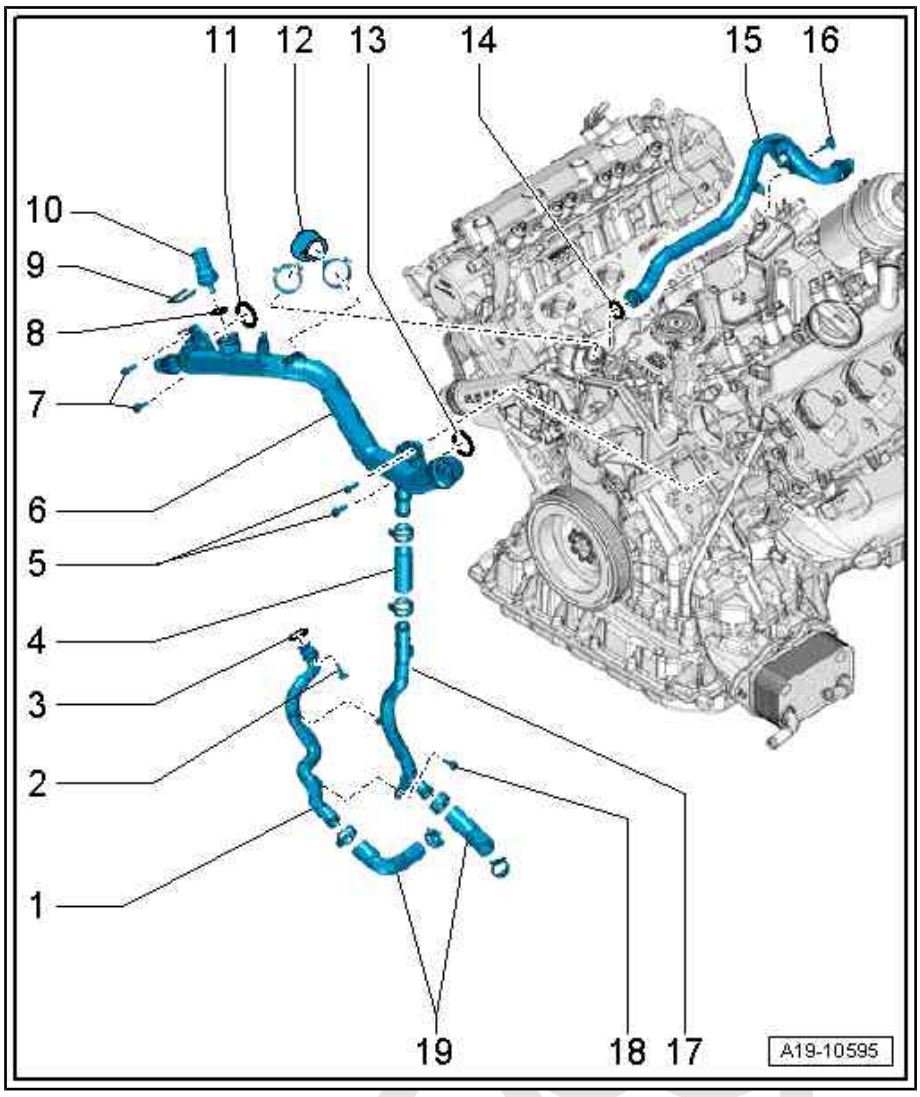
⇒ “3.1 Exploded view - coolant pipes”, page 274

⇒ “3.2 Removing and installing coolant pipes (front)”, page 275

⇒ “3.3 Removing and installing coolant pipes (left-side)”, page 278

⇒ “3.4 Removing and installing coolant pipes (top)”, page 280

3.1 Exploded view - coolant pipes



1 - Coolant pipe (left-side)
- ❑ Remove and install together with -item 17- ⇒ page 278

2 - Bolt
- ❑ 9 Nm

3 - O-ring
- ❑ Renew

4 - Connecting hose

5 - Bolts
- ❑ 9 Nm

6 - Coolant pipe (front)
- ❑ Removing and installing ⇒ page 275

7 - Bolts
- ❑ 9 Nm

8 - O-ring
- ❑ Renew

9 - Retaining clip

10 - Coolant temperature sender - G62-
- ❑ Removing and installing ⇒ page 273

11 - Seal
- ❑ Renew

12 - Coolant hose

13 - Seal
- ❑ Renew

14 - O-ring
- ❑ Renew

15 - Coolant pipe (top)
- ❑ Removing and installing ⇒ page 280

16 - Bolt
- ❑ 9 Nm

17 - Coolant pipe (left-side)
- ❑ Remove and install together with -item 1- ⇒ page 278

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18 - Bolt

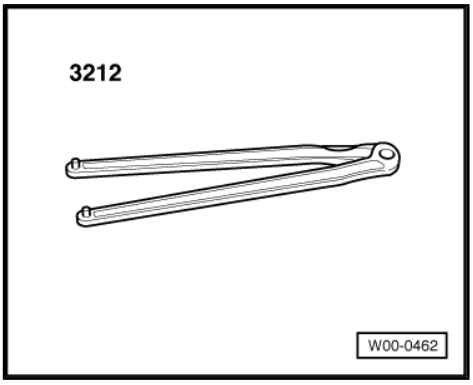
- ❑ 9 Nm

19 - Coolant hoses

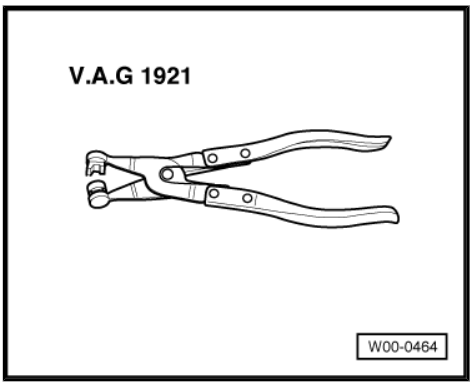
3.2 Removing and installing coolant pipes (front)

Special tools and workshop equipment required

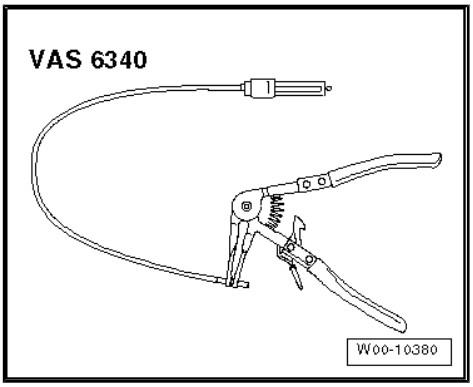
- ♦ Pin wrench - 3212-



Hose clip pliers - V.A.G 1921-



Hose clip pliers - VAS 6340-

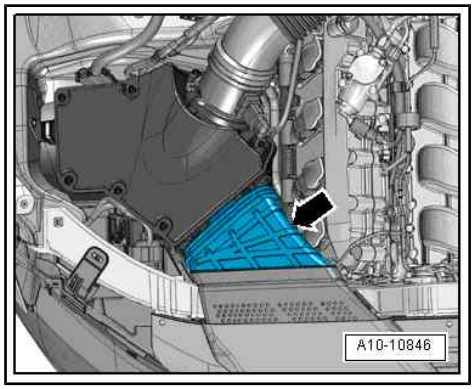


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Removing

– Drain coolant ⇒ page 261 (or in vehicles equipped with continued coolant circulation pump - V51- remove continued coolant circulation pump -V51- ⇒ page 269).

– Remove air duct -arrow-.

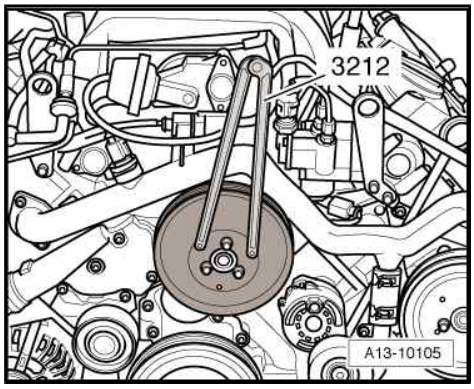


– Remove poly V-belt ⇒ page 119 .

– Remove bolts for coolant pump pulley (counterhold with pin wrench - 3212-).

– Remove front left wheel.

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



WARNING

Risk of injury caused by refrigerant.

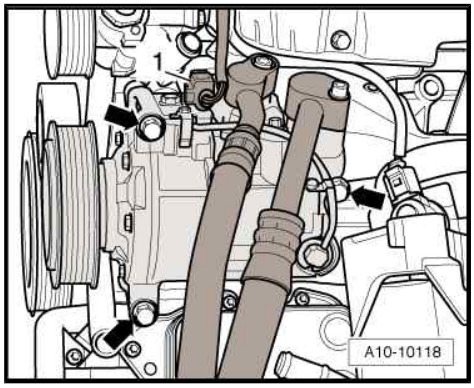
- *The air conditioner refrigerant circuit must not be opened.*

Caution

Danger of damage to refrigerant lines and hoses.

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

– Remove bolts -arrows-, detach air conditioner compressor from bracket and move clear to one side.

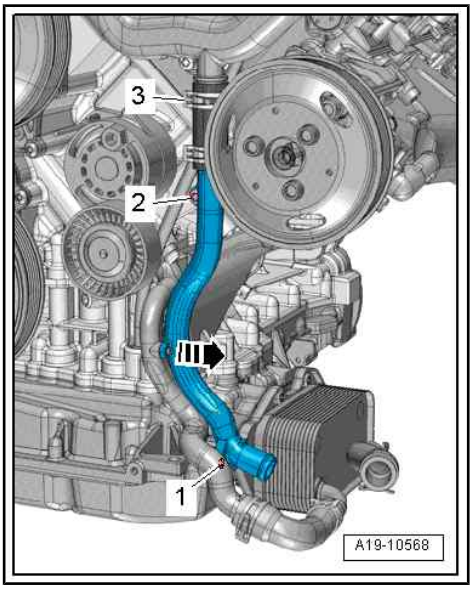


Note

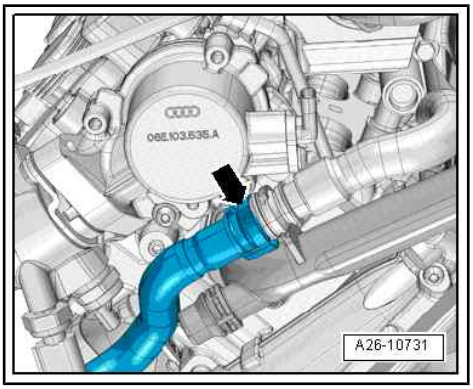
Disregard -item 1-.

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– Release hose clip -3- and remove bolts -1- and -2- for coolant pipes (left-side).
– Swivel coolant pipe slightly to the left -arrow- and pull it upwards out of coolant pipe (top).



– Vehicles with secondary air system: press release tabs and detach secondary air hose -arrow- from bracket towards front.

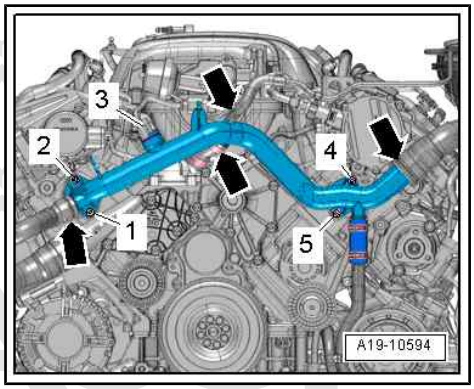


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– Unplug electrical connector -3- for coolant temperature sender - G62- .

– Remove bolts -1, 2, 4, 5-.

– Disconnect coolant pipe (front) from coolant hoses -arrows-.



Installing

- Tightening torque ⇒ page 274

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

Note

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

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– Clean and smoothen sealing surfaces for seals.

– Lubricate seals with coolant and slide onto coolant pipe.

– Install coolant pipes (left-side) ⇒ page 278 .

– Install air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Removing and installing air conditioner compressor .

– Install poly V-belt pulley for power steering pump ⇒ Running gear, axles, steering; Rep. gr. 48 ; Hydraulic power steering; Exploded view - power steering pump

– Install continued coolant circulation pump - V51- ⇒ page 269 .

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

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

– Install poly V-belt pulley for coolant pump ⇒ page 268 .

– Install poly V-belt ⇒ page 119 .

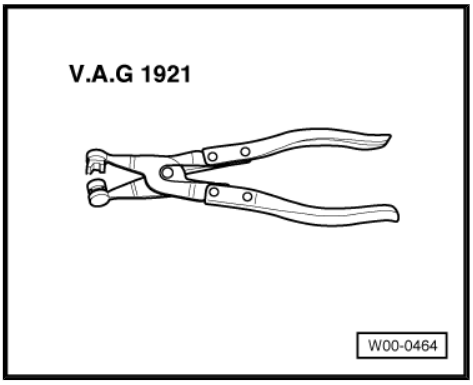
– Install continued coolant circulation pump - V51- ⇒ page 269 .

– Fill up with coolant ⇒ page 263 .

3.3 Removing and installing coolant pipes (left-side)

Special tools and workshop equipment required

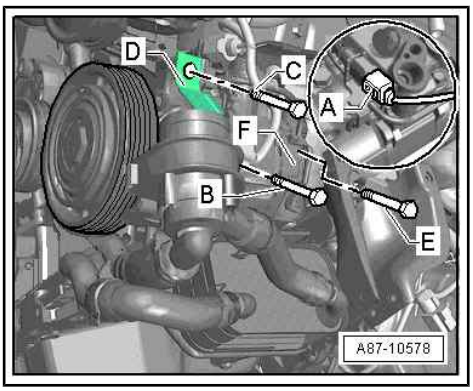
♦ Hose clip pliers - V.A.G 1921-



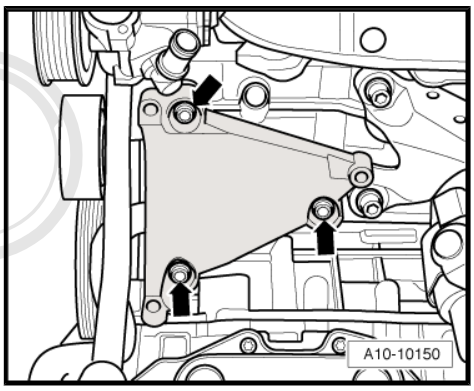
Removing

– Drain coolant ⇒ page 261 (or in vehicles equipped for a hot climate: remove continued coolant circulation pump - V51- ⇒ page 269).

– Remove air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Removing and installing air conditioner compressor .

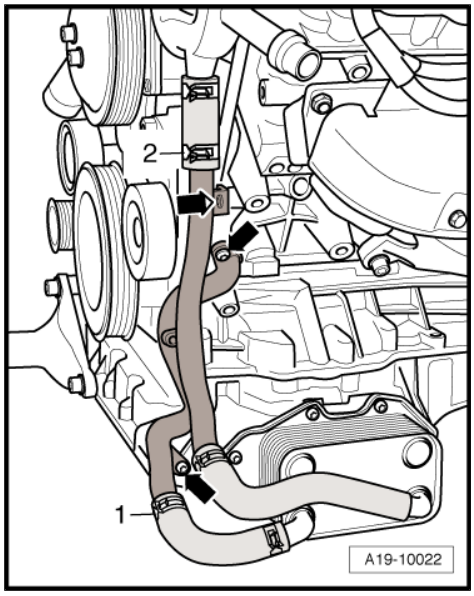


– Remove bolts -arrows- and detach bracket for air conditioner compressor.



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– Remove bolts -arrows-.
– Disconnect coolant pipes from coolant hoses -1- and -2-.



Note

For illustration purposes, the installation position is shown with the power steering pump removed.

Installing

• Tightening torque ⇒ page 274

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

Note

♦ *Fit new O-rings.*
♦ *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.
– Install bracket for air conditioner compressor ⇒ page 117 .
– Install air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Removing and installing air conditioner compressor .
– Install continued coolant circulation pump - V51- ⇒ page 269 .
– Fill up with coolant ⇒ page 263 .

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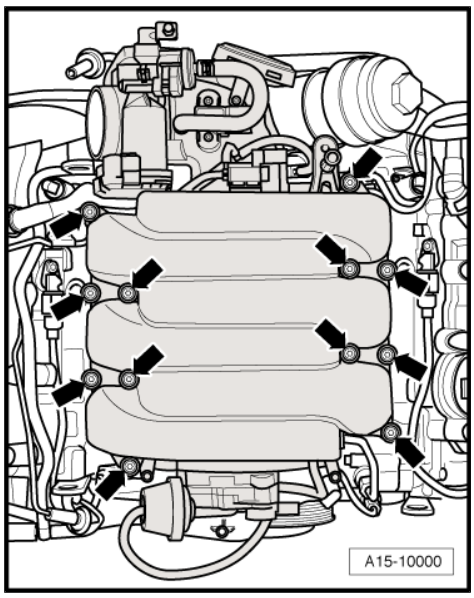
3.4 Removing and installing coolant pipes (top)

Removing

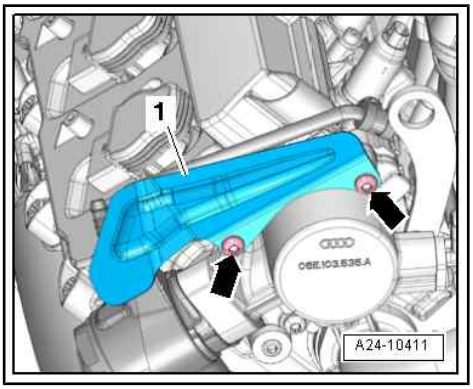
Note

Fit all cable ties in the original positions when installing.

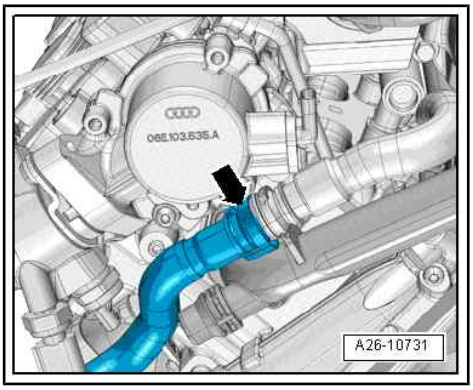
– Drain coolant ⇒ page 261 .
– Remove intake manifold (top section) ⇒ page 338 .



– Remove bolts -arrows- and detach guard plate -1- for high-pressure pipe.



– Vehicles with secondary air system: press release tabs and detach secondary air hose -arrow- from bracket towards front.



WARNING

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

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

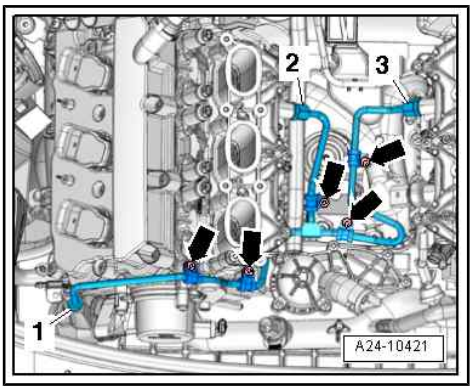
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– Reduce fuel pressure in high-pressure section of injection system ⇒ page 314 .

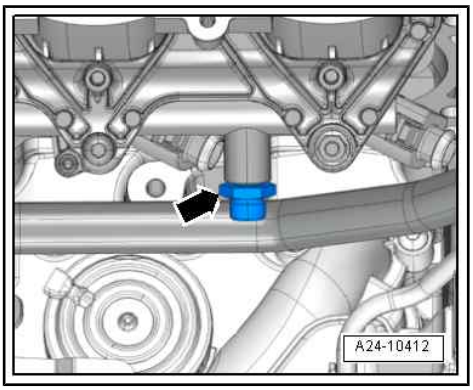
– Unscrew connection -1-.

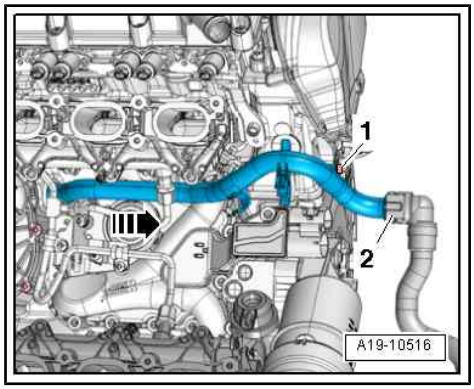
– Unscrew union nuts -2- and -3- (counterhold connection).

– Unscrew bolts -arrows- on retaining clips and detach high-pressure pipe.



– Detach connection -arrow- for high-pressure pipe.





Note

Place a cloth under coolant pipe to catch escaping coolant.

– Detach coolant hose -2- from coolant pipe.
– Remove bolt -1- and pull coolant pipe rearwards out of cylinder block -arrow-.

Installing

• Tightening torque ⇒ page 274

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

Note

Fit new O-rings.

– Clean and smoothen sealing surface for O-ring.
– Lubricate O-ring with coolant and slide onto coolant pipe.
– Install high-pressure pipe ⇒ page 350 .
– Install intake manifold (top section) ⇒ page 338 .
– Fill up with coolant ⇒ page 263 .

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4 Radiator/radiator fans

⇒ “4.1 Exploded view - radiator/radiator fans”, page 283

⇒ “4.2 Removing and installing radiator”, page 285

⇒ “4.3 Removing and installing radiator cowl”, page 296

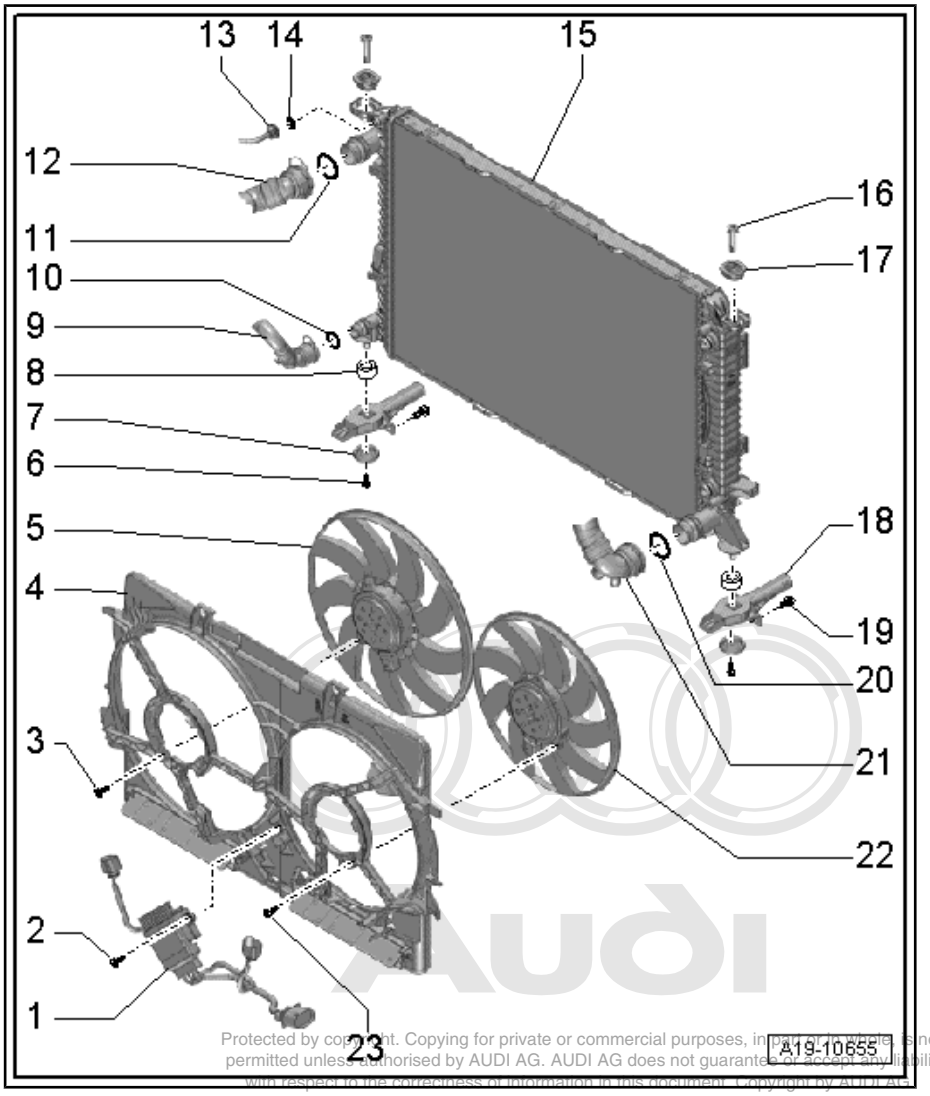
⇒ “4.4 Removing and installing radiator fan control unit J293 ”, page 300

⇒ “4.5 Removing and installing radiator fans”, page 301

4.1 Exploded view - radiator/radiator fans

WARNING

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



1 - Radiator fan control unit - J293-

- Supplied as separate unit or in combination with radiator fan - V7- (depending on equipment version)
- Removing and installing radiator fan control unit - J293- (separate unit) ⇒ page 300

2 - Bolt

- 4.5 Nm

3 - Bolt

- 5 Nm

4 - Radiator cowl

- Removing and installing: on A4, together with radiator ⇒ page 285 , A5 ⇒ page 296

5 - Radiator fan - V7-

- Supplied as separate unit or as part of radiator fan control unit - J293- (depending on equipment version)
- Removing and installing radiator fan - V7- ⇒ page 301

6 - Bolt

- 3.5 Nm

7 - Washer

8 - Rubber mounting

- For radiator

9 - Coolant hose

- Lift retaining clip to detach

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- ❑ Connecting to radiator ⇒ page 284

10 - O-ring
- ❑ Renew

11 - O-ring
- ❑ Renew

12 - Coolant hose
- ❑ Lift retaining clip to detach
- ❑ Connecting to radiator ⇒ page 284

13 - Coolant hose
- ❑ To coolant expansion tank

14 - O-ring
- ❑ Renew

15 - Radiator
- ❑ Removing and installing: on A4, together with radiator cowl ⇒ page 285 , A5 ⇒ page 291
- ❑ If renewed, change coolant in entire system

16 - Retaining pin
- ❑ Use screwdriver to release and pull off

17 - Rubber buffer

18 - Radiator bracket

19 - Bolt

20 - O-ring
- ❑ Renew

21 - Coolant hose
- ❑ Lift retaining clip to detach
- ❑ Connecting to radiator ⇒ page 284

22 - Radiator fan 2 - V177-
- ❑ Not fitted if fan runs with 400 W
- ❑ Supplied as separate unit or as part of radiator fan control unit (depending on equipment version)
- ❑ Removing and installing ⇒ page 301

23 - Bolt
- ❑ 5 Nm

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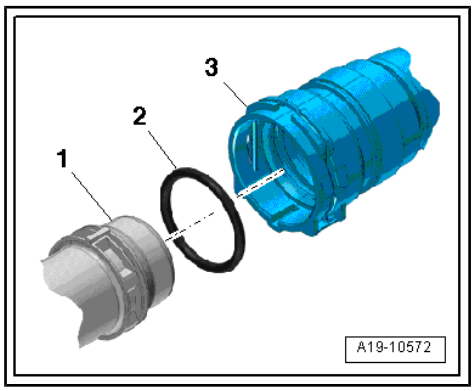
Connecting coolant hose with plug-in connector

– Remove old O-ring -2- from coolant hose -3-.

– Lightly lubricate new O-ring with coolant and fit O-ring in coolant hose.

– Press coolant hose onto connection -1- until it engages audibly.

– Press coolant hose in again and then pull to check that plug-in connector is correctly engaged.



4.2 Removing and installing radiator

⇒ “4.2.1 Removing and installing radiator - Audi A4”, page 285

⇒ “4.2.2 Removing and installing radiator - Audi A5”, page 291

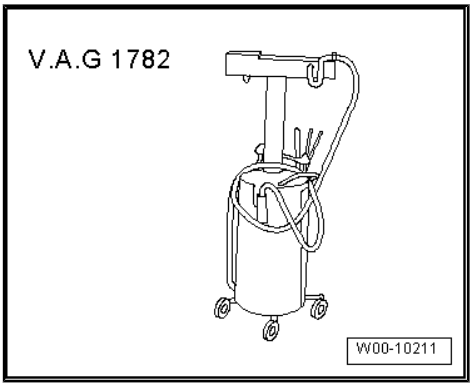
4.2.1 Removing and installing radiator - Audi A4

Note

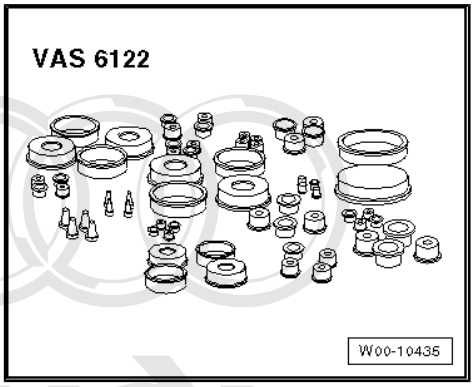
Radiator and radiator cowl can only be removed and installed together as one unit.

Special tools and workshop equipment required

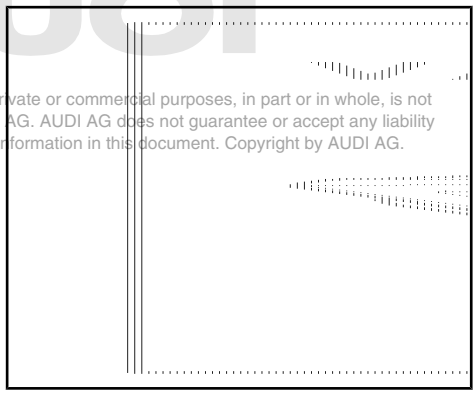
- Used oil collection and extraction unit - V.A.G 1782- for vehicles with multitronic gearbox 0AW/automatic gearbox 0B6



- Engine bung set - VAS 6122- for vehicles with multitronic gearbox 0AW/automatic gearbox 0B6



- Drip tray for workshop hoist - VAS 6208-



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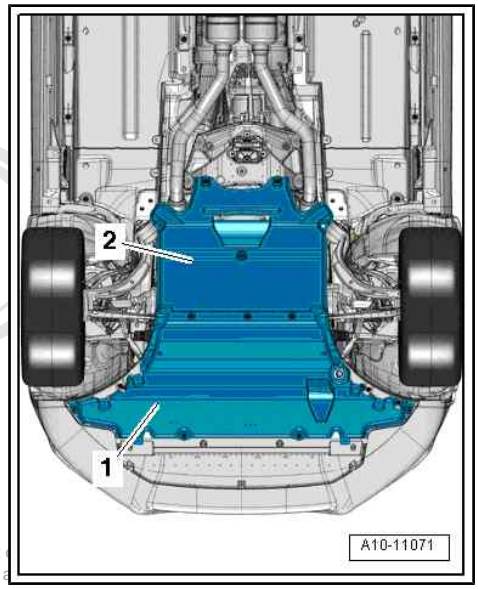
Removing

Note

If there are slight impressions on the fins, refer to ⇒ page 9 .

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

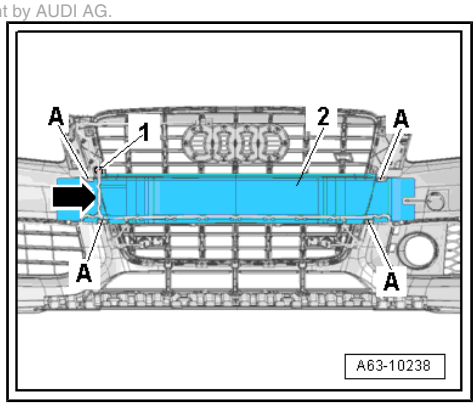
– Remove bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Exploded view - bumper cover



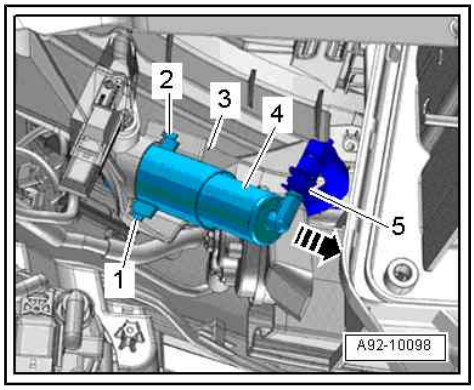
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– Remove impact absorber ⇒ General body repairs, exterior; Rep. gr. 63 ; Impact absorber (front) .

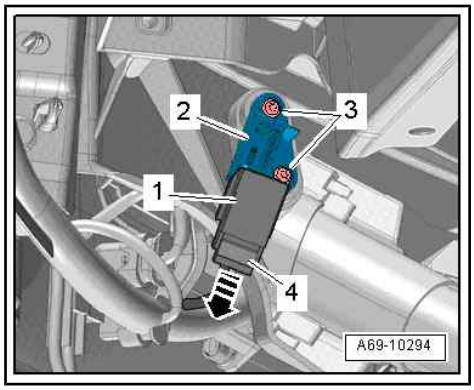
– Remove headlight (right-side) ⇒ Electrical system; Rep. gr. 94 ; Headlights; Removing and installing headlights .



– Remove headlight washer jet (right-side) (if applicable) ⇒ Electrical system; Rep. gr. 92 ; Headlight washer system; Exploded view - headlight washer system .



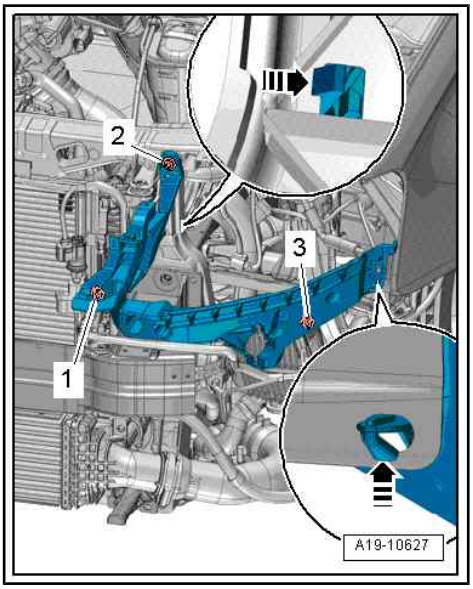
– Unplug electrical connector -1- at crash sensor ⇒ General body repairs, interior; Rep. gr. 69 ; Crash sensors for airbags; Overview of fitting locations - crash sensors for airbags .



– Remove bolts -1- and -2-.
– Unclip mounting for headlight (right-side) -arrows- and remove.

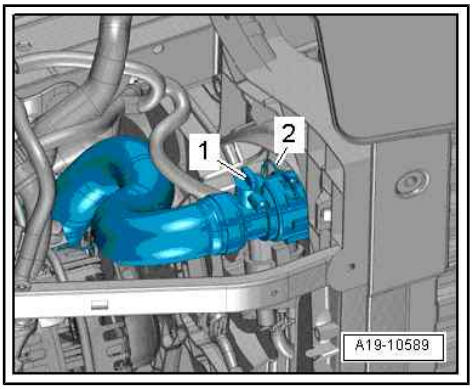
Note

Disregard -item 3-.

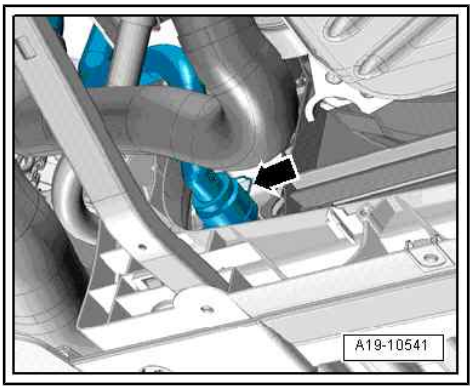


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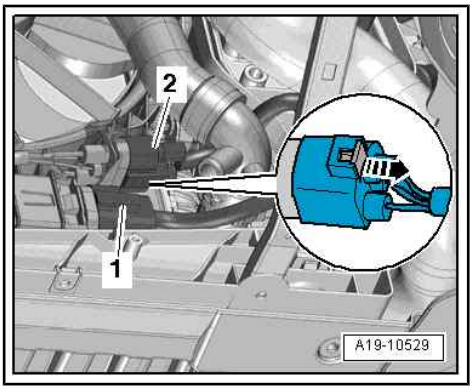
– Place drip tray for workshop hoist - VAS 6208- beneath engine.
– Remove drain plug -1- and drain off coolant.
– Then disconnect coolant hose -2- from radiator (pull out retaining clip).



– Detach connection -arrow- from radiator (lift retaining clip).



– Unplug electrical connector -1- and, if fitted, -2- for radiator fan (push retainer to the rear -arrow- and press down release catch).



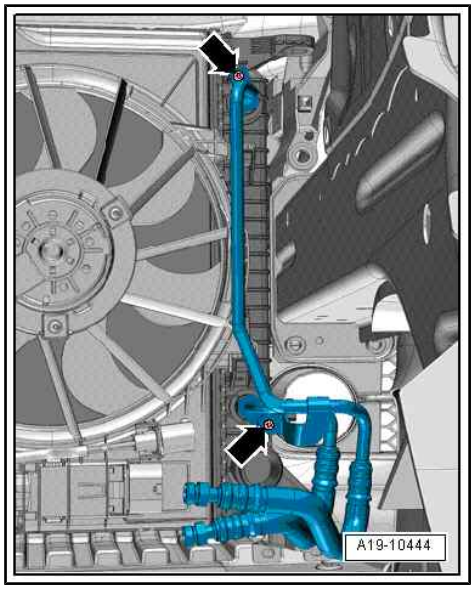
Vehicles with multitronic gearbox 0AW/automatic gearbox 0B6:

– Position used oil collection and extraction unit - V.A.G 1782- below connection point.

Note

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

– Unscrew bolts -arrows- and detach ATF lines from radiator.



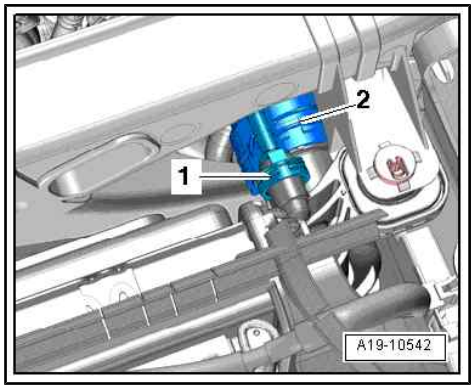
Note

Tie ATF lines up onto longitudinal member to prevent fluid escaping.

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

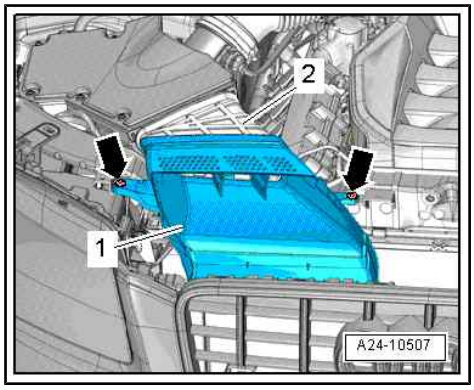
All vehicles (continued):

– Lift retaining clips -1- and -2- and detach connection from radiator.



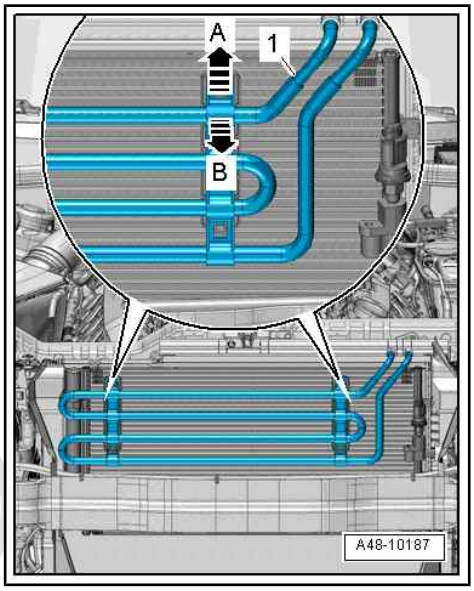
– Remove bolts -arrows-.

– Detach air duct -1- from intermediate flange -2- for air cleaner housing.

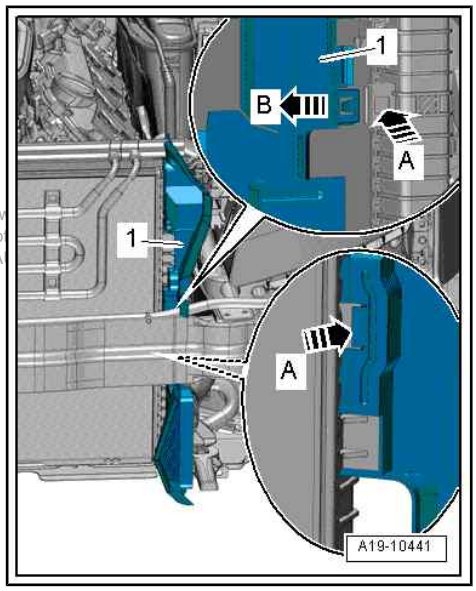


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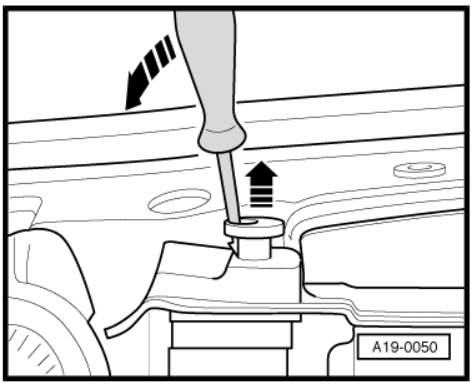
– If fitted, release retaining clips -arrow A- and swivel power steering cooling pipe -1- to front -arrow B-.
– Lift power steering cooling pipe away from condenser and place onto engine.



– Release catches -arrows A- and detach air duct -1- on left and right -arrow B-.

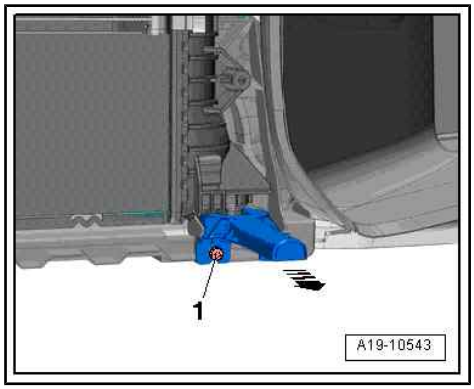


– Release retaining pins for radiator on both sides and pull out upwards -arrows-.



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– Remove bolts -1- on both sides and detach radiator bracket with radiator from lock carrier -arrow-.
– Slightly lower radiator.

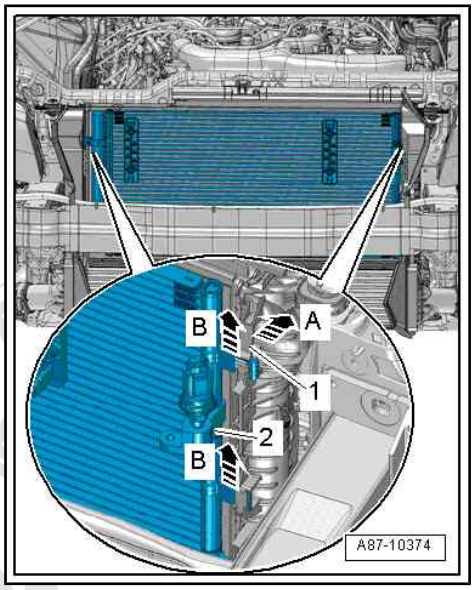


– Have a second mechanic release retaining clips -1- in direction of -arrow A- and lift condenser -2- out of mounts on radiator -arrows B-.

Caution

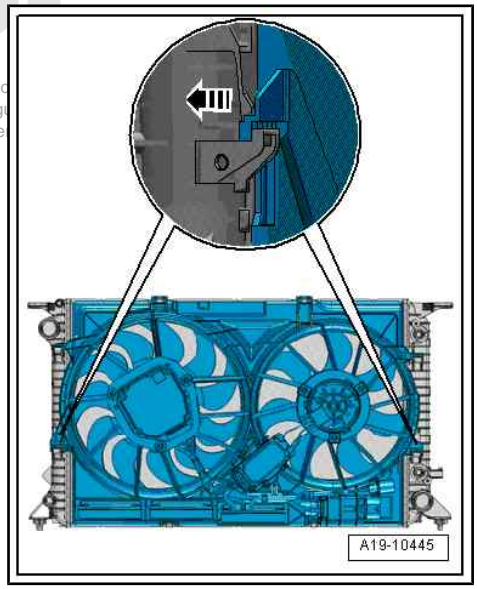
Risk of damage to condenser, refrigerant lines and refrigerant hoses.

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



– Pivot condenser forwards with pipes/hoses attached.
– Detach radiator.

– Press locking tabs on left and right sides of radiator cowl -arrow- and at the same time lift radiator cowl off radiator.



Installing

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- Tightening torque ⇒ page 283

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

– Attach air duct to intermediate flange for air cleaner housing ⇒ page 324 .
– Vehicles with multitronic gearbox 0AW/automatic gearbox 0B6: install ATF lines ⇒ Rep. gr. 37 ; ATF circuit; Exploded view - ATF circuit .
– Install impact absorber ⇒ General body repairs, exterior; Rep. gr. 63 ; Impact absorber (front) .
– Install bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing bumper cover .

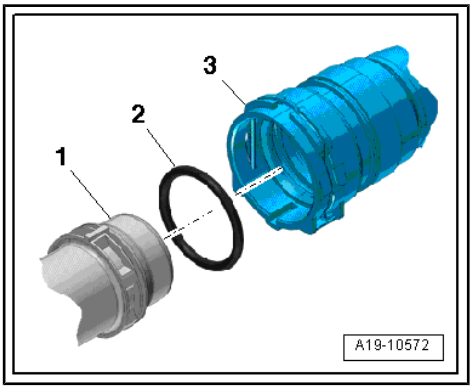
– Connect coolant hose with plug-in connector ⇒ page 284 .

– Fill up with coolant ⇒ page 263 .

Note

The coolant in the entire system must be changed if the radiator is renewed.

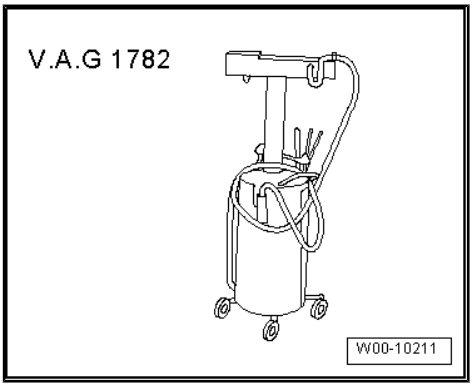
– Vehicles with multitronic gearbox 0AW/automatic gearbox 0B6: check ATF level ⇒ Rep. gr. 37 ; ATF; Checking ATF level .



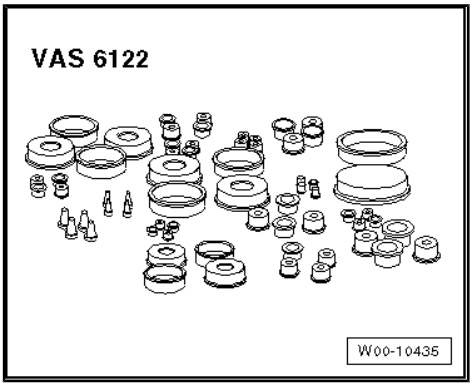
4.2.2 Removing and installing radiator - Audi A5

Special tools and workshop equipment required

♦ Used oil collection and extraction unit - V.A.G 1782- for vehicles with multitronic gearbox 0AW/automatic gearbox 0B6



♦ Engine bung set - VAS 6122- for vehicles with multitronic gearbox 0AW/automatic gearbox 0B6



♦ Drip tray for workshop hoist - VAS 6208-



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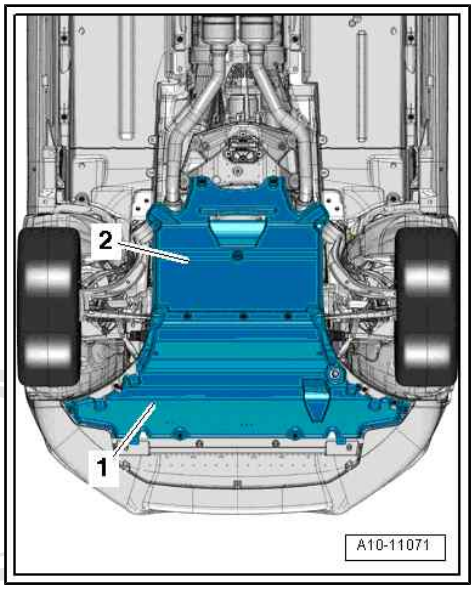
Removing

Note

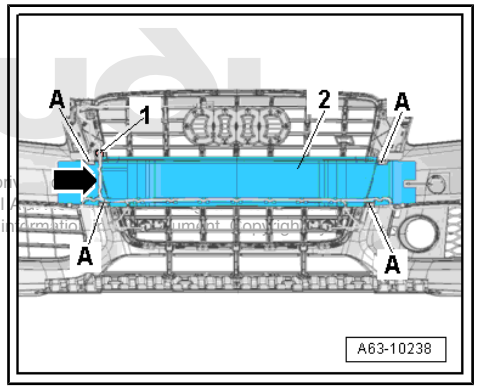
If there are slight impressions on the fins, refer to ⇒ page 9 .

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

– Remove bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Exploded view - bumper cover



– Remove impact absorber ⇒ General body repairs, exterior; Rep. gr. 63 ; Impact absorber (front) .

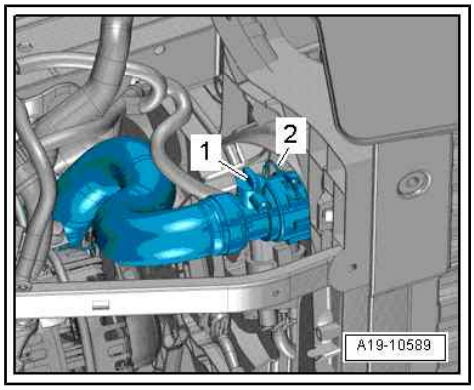


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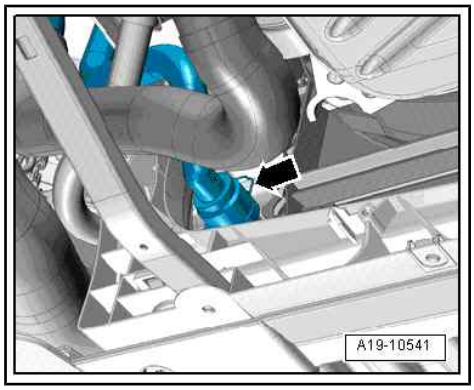
– Place drip tray for workshop hoist - VAS 6208- beneath engine.

– Remove drain plug -1- and drain off coolant.

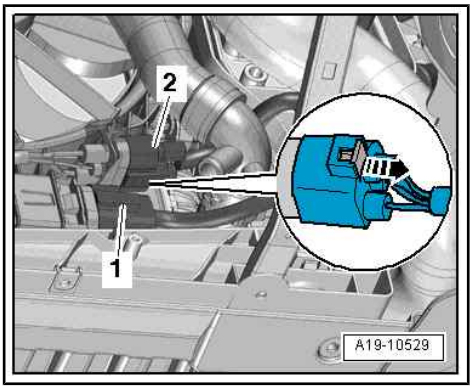
– Then disconnect coolant hose -2- from radiator (pull out retaining clip).



– Detach connection from radiator (lift retaining clip -arrow-).



– Unplug electrical connector -1- and, if fitted, -2- for radiator fan (push retainer to the rear -arrow- and press down release catch).



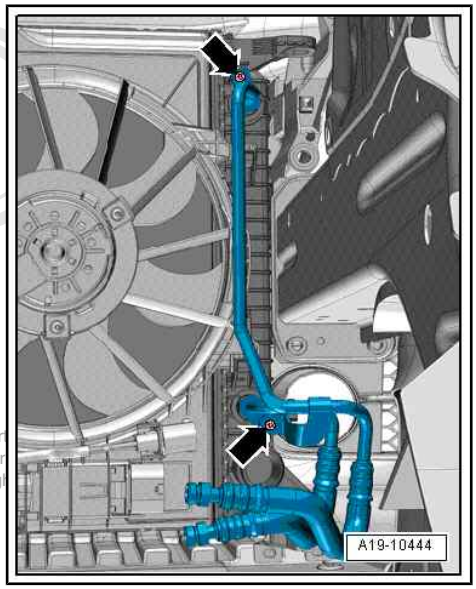
Vehicles with multitronic gearbox 0AW/automatic gearbox 0B6:

– Position used oil collection and extraction unit - V.A.G 1782- below connection point.

Note

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

– Unscrew bolts -arrows- and detach ATF lines from radiator.



Note

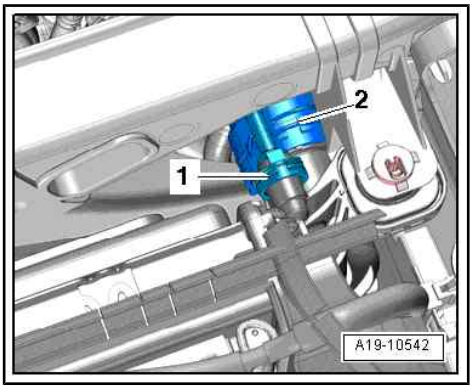
Tie ATF lines up onto longitudinal member to prevent fluid escaping.

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

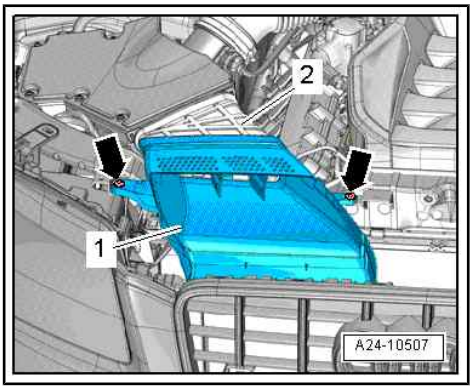
All vehicles (continued):

– Lift retaining clips -1- and -2- and detach connection from radiator.

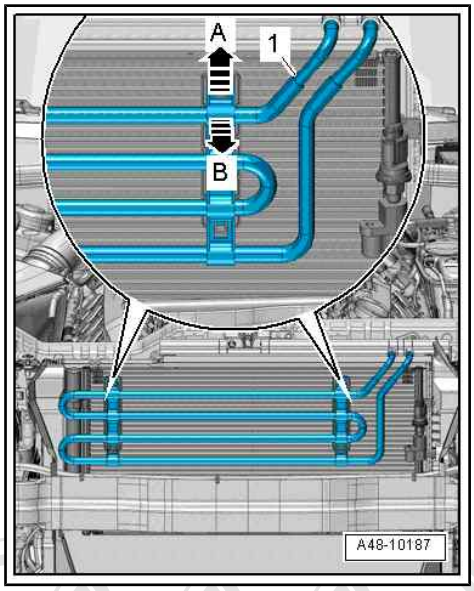


– Remove bolts -arrows-.

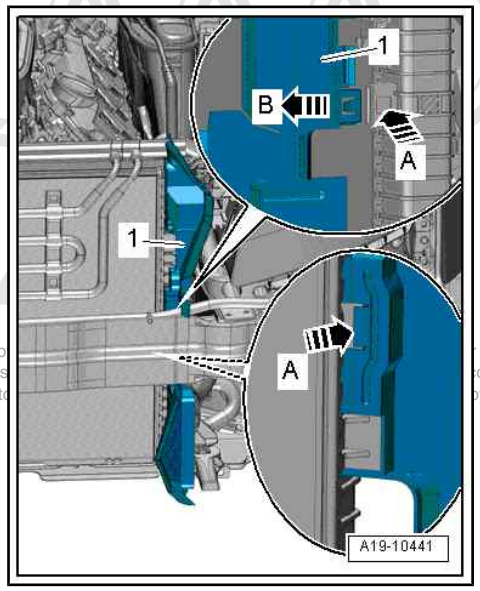
– Detach air duct -1- from intermediate flange -2- for air cleaner housing.



– If fitted, release retaining clips -arrow A- and swivel power steering cooling pipe -1- to front -arrow B-.
– Lift power steering cooling pipe away from condenser and place onto engine.

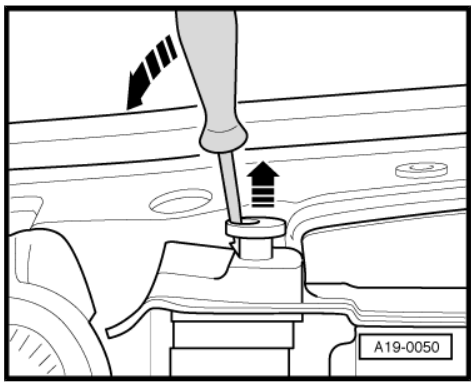


– Release catches -arrows A- and detach air duct -1- on left and right -arrow B-.

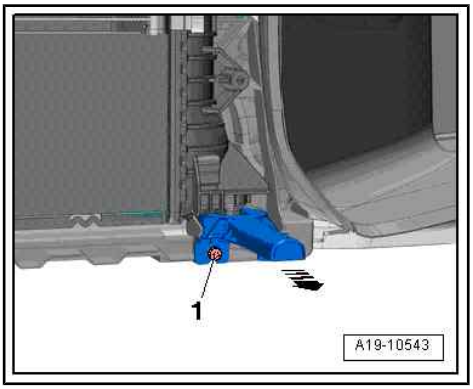


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– Release retaining pins for radiator on both sides and pull out upwards -arrows-.



– Remove bolts -1- on both sides and detach radiator bracket with radiator from lock carrier -arrow-.
– Slightly lower radiator.

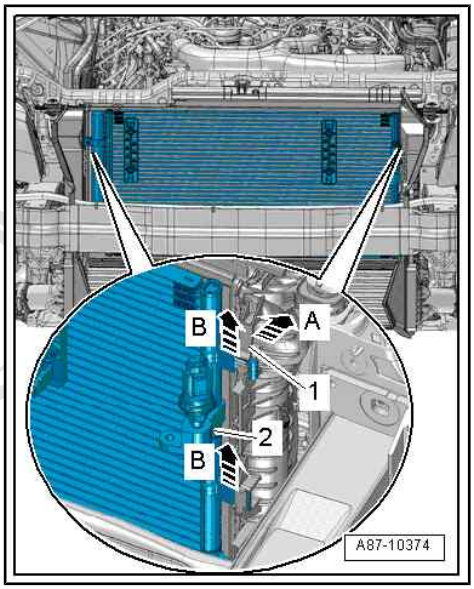


– Have a second mechanic release retaining clips -1- in direction of -arrow A- and lift condenser -2- out of mounts on radiator -arrows B-.

Caution

Risk of damage to condenser, refrigerant lines and refrigerant hoses.

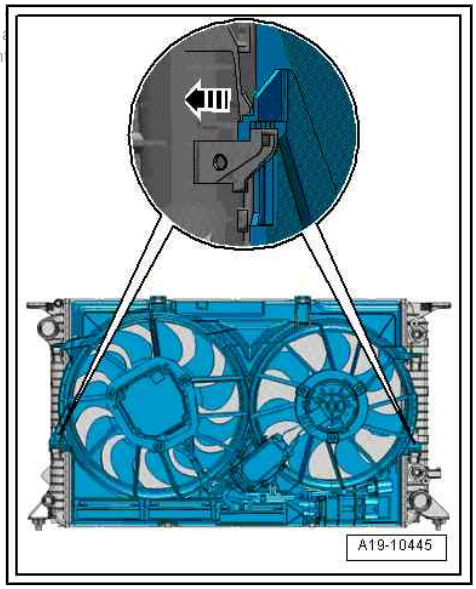
- ***Do NOT stretch, kink or bend refrigerant lines and hoses.***



– Pivot condenser forwards with pipes/hoses attached.
– Detach radiator.

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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.



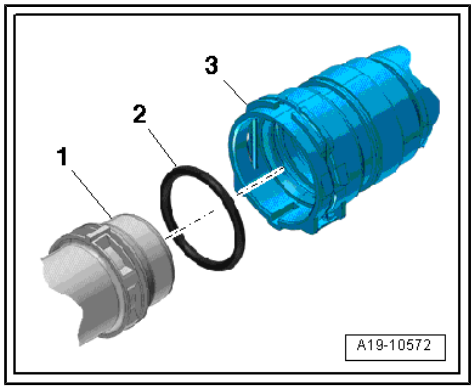
Installing

- Tightening torque ⇒ page 283

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

– Install ATF lines ⇒ Rep. gr. 37 ; ATF circuit; Exploded view - ATF circuit .
– Attach air duct to intermediate flange for air cleaner housing ⇒ page 324 .
– Install impact absorber ⇒ General body repairs, exterior; Rep. gr. 63 ; Impact absorber (front) .
– Install bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing bumper cover .

– Connect coolant hose with plug-in connector ⇒ page 284 .
– Fill up with coolant ⇒ page 263 .



Note

The coolant in the entire system must be changed if the radiator is renewed.

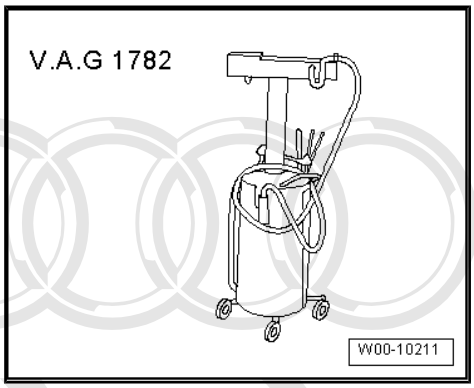
– Vehicles with multitronic gearbox 0AW/automatic gearbox 0B6: check ATF level ⇒ Rep. gr. 37 ; ATF; Checking ATF level .

4.3 Removing and installing radiator cowl

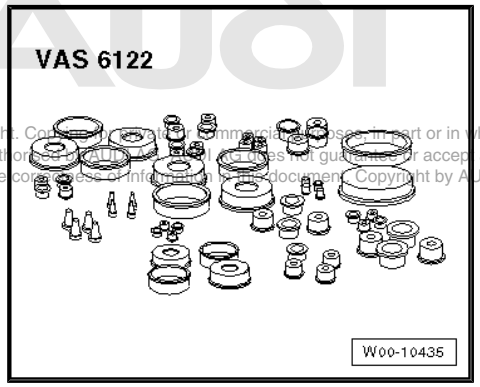
Note

The radiator cowl can be removed separately on the Audi A5. On the Audi A4, the radiator cowl is removed together with the radiator ⇒ page 285 .

Used oil collection and extraction unit - V.A.G 1782- for vehicles with multitronic gearbox 0AW/automatic gearbox 0B6



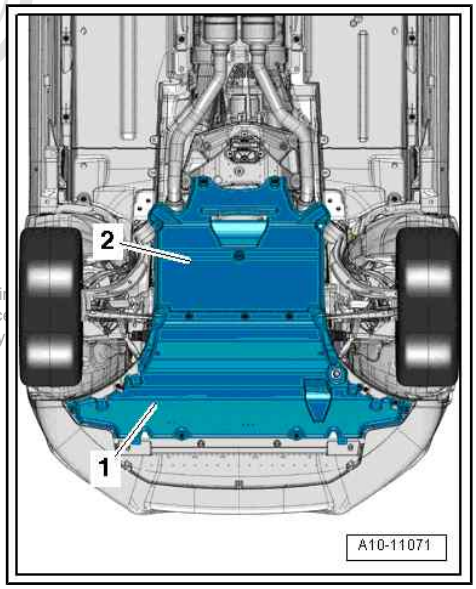
Engine bung set - VAS 6122- for vehicles with multitronic gearbox 0AW/automatic gearbox 0B6



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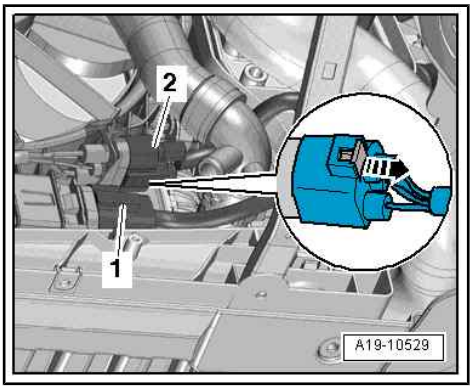
Removing

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



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– Unplug electrical connectors -1- and, if fitted, -2- for radiator fan (push retainer to the rear -arrow- and press down release catch).



Vehicles with multitronic gearbox 0AW/automatic gearbox 0B6:

– Position used oil collection and extraction unit - V.A.G 1782- below connection point.

Note

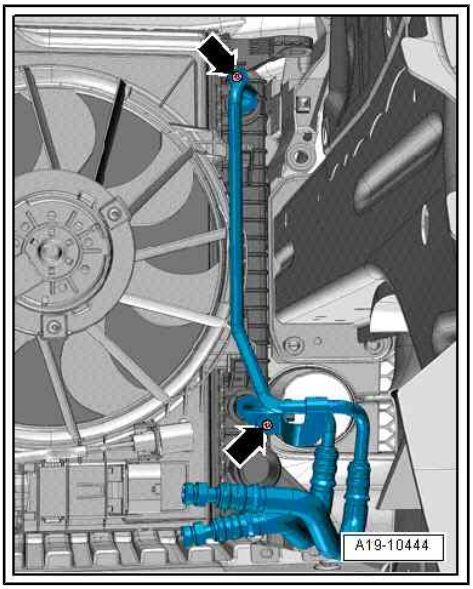
Observe rules for cleanliness when working on gearbox ⇒ Rep. gr. 00 ; Repair instructions; Rules for cleanliness .

– Unscrew bolts -arrows- and detach ATF lines from radiator.

Note

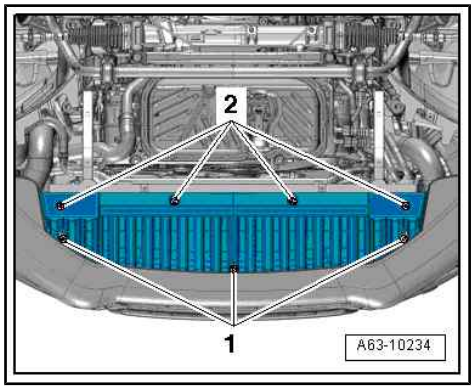
Tie ATF lines up onto longitudinal member to prevent fluid escaping.

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

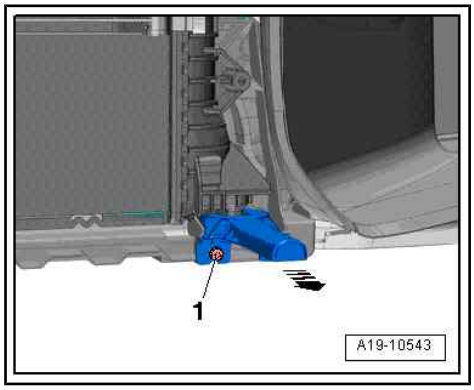


All vehicles (continued):

– Loosen bolts -1- and -2- and detach end plate at bumper cover towards rear.



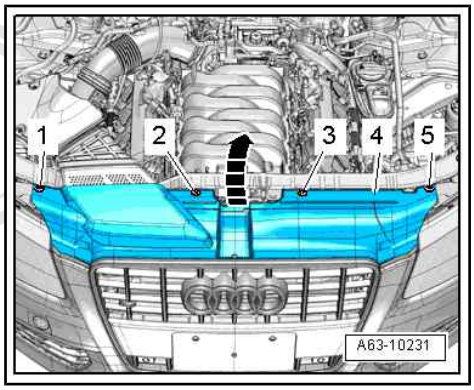
– Remove bolts -1- on both sides.



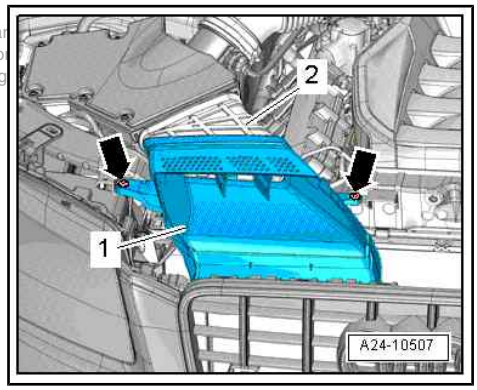
Note

Disregard -arrow-.

– Remove bolts -1, 2, 3, 5-.
– Lift cover -4- at lock carrier and detach from radiator grille.

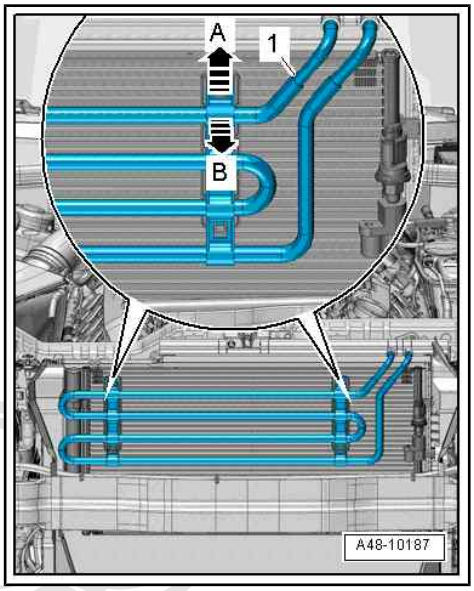


– Remove bolts -arrows-.
– Detach air duct -1- from intermediate flange -2- for air cleaner housing.

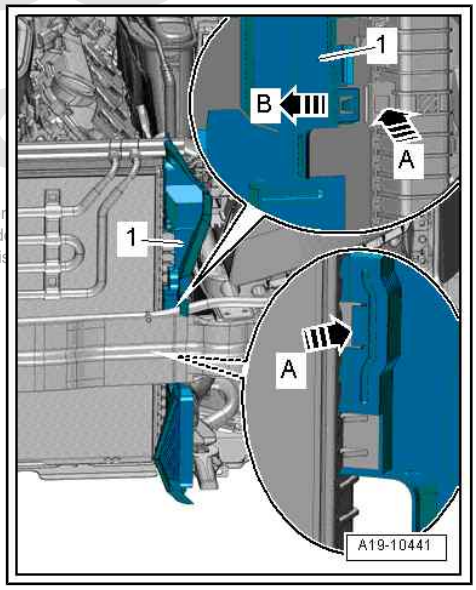


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– If fitted, release retaining clips -arrow A- and swivel power steering cooling pipe -1- to front -arrow B-.

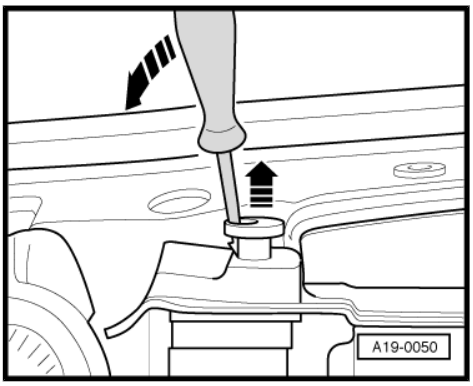


– Release catches -arrows A- and swivel air duct -1- on left and right to centre of vehicle -arrow B-.

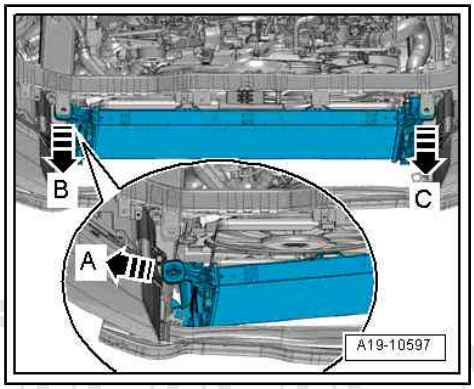


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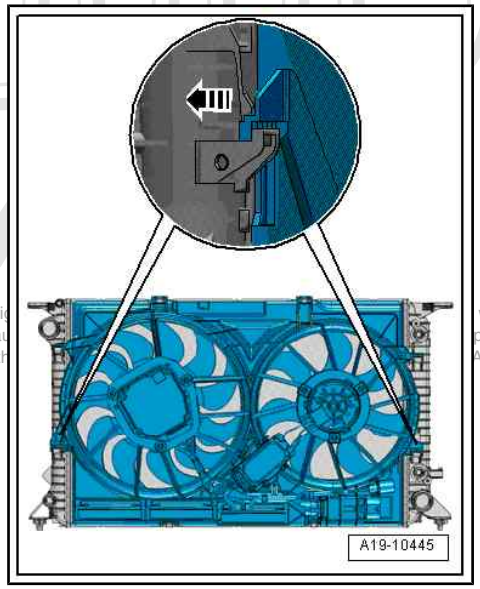
– Release retaining pins for radiator on both sides and pull out upwards -arrows-.



– Pull right side of radiator towards the front -arrow B-, then press to the right -arrow A- and then pull left side towards the front -arrow C-.



– Press locking tabs on left and right sides of radiator cowl -arrow- and at the same time lift radiator cowl off radiator.



Installing

- Tightening torque ⇒ page 283

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

– Attach air duct to intermediate flange for air cleaner housing ⇒ page 324 .

– Install lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Exploded view - bumper cover .

– Install closure plate at bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Exploded view - bumper cover

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

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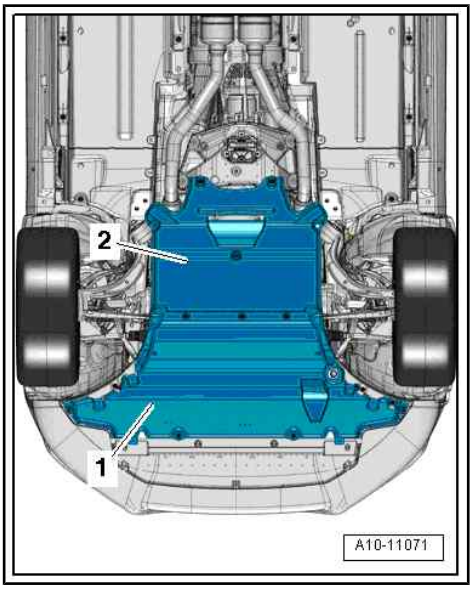
4.4 Removing and installing radiator fan control unit - J293-

Note

The following procedure refers to the radiator fan with separate radiator fan control unit - J293- .

Removing

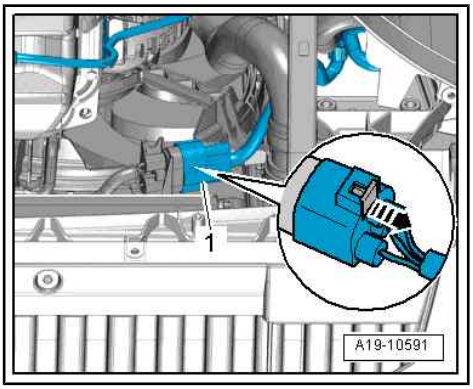
– Remove front noise insulation -1- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .



– Take electrical connector -1- for radiator fan out of bracket and unplug connector (push retainer to the rear -arrow- and press down release catch).

– Move electrical wiring harness going to radiator fan control unit clear.

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– Unplug electrical connectors -2- and -3-.

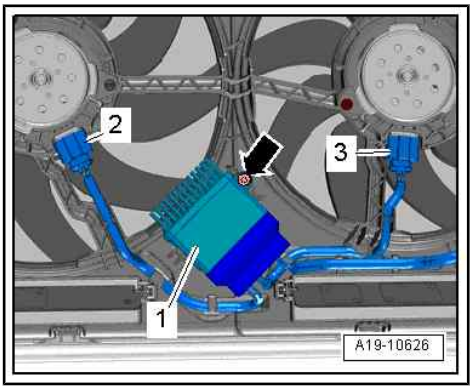
– Unscrew bolt -arrow- and remove radiator fan control unit -1-.

Installing

• Tightening torque ⇒ page 283

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

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



4.5 Removing and installing radiator fans

Removing

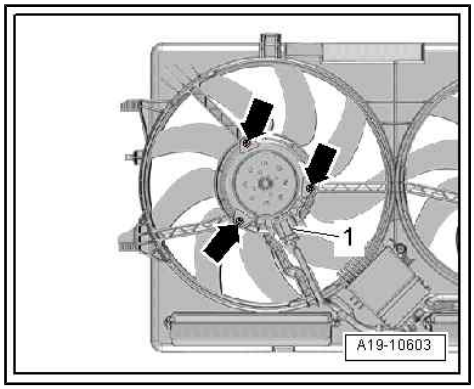
Note

Fit all cable ties in the original positions when installing.

– A4: remove radiator with radiator cowl ⇒ page 285 .

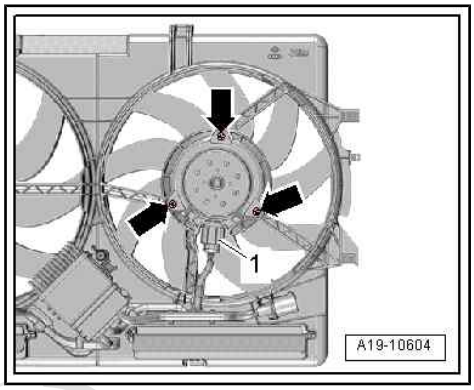
– A5: remove radiator cowl ⇒ page 296 .

– Unplug electrical connector -1-.
– Remove bolts -arrows- and detach radiator fan - V7- (left-side).



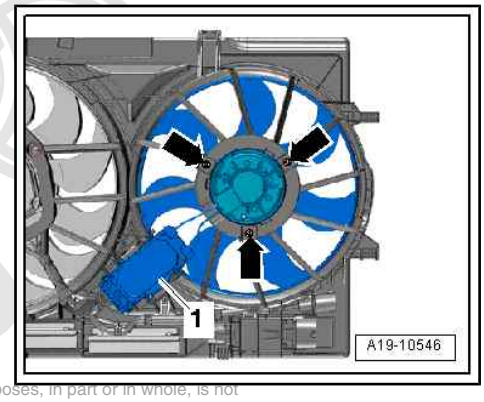
Radiator fan 2 - V177- with separate radiator fan control unit 2:

– Unplug electrical connector -1-.
– Remove bolts -arrows- and detach radiator fan 2 - V177- (right-side).



Radiator fan 2 - V177- with radiator fan control unit:

– Remove bolts -arrows- on radiator fan 2 - V177- (right-side).
– Move electrical wiring clear.
– Unclip radiator fan control unit -1- from radiator cowl and detach radiator fan with control unit.



Installing

- Tightening torque ⇒ page 283

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

– A4: install radiator with radiator cowl ⇒ page 285 .
– A5: install radiator cowl ⇒ page 296 .

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24 – Mixture preparation - injection

1 Injection system

⇒ “1.1 Overview of fitting locations - injection system”, page 303

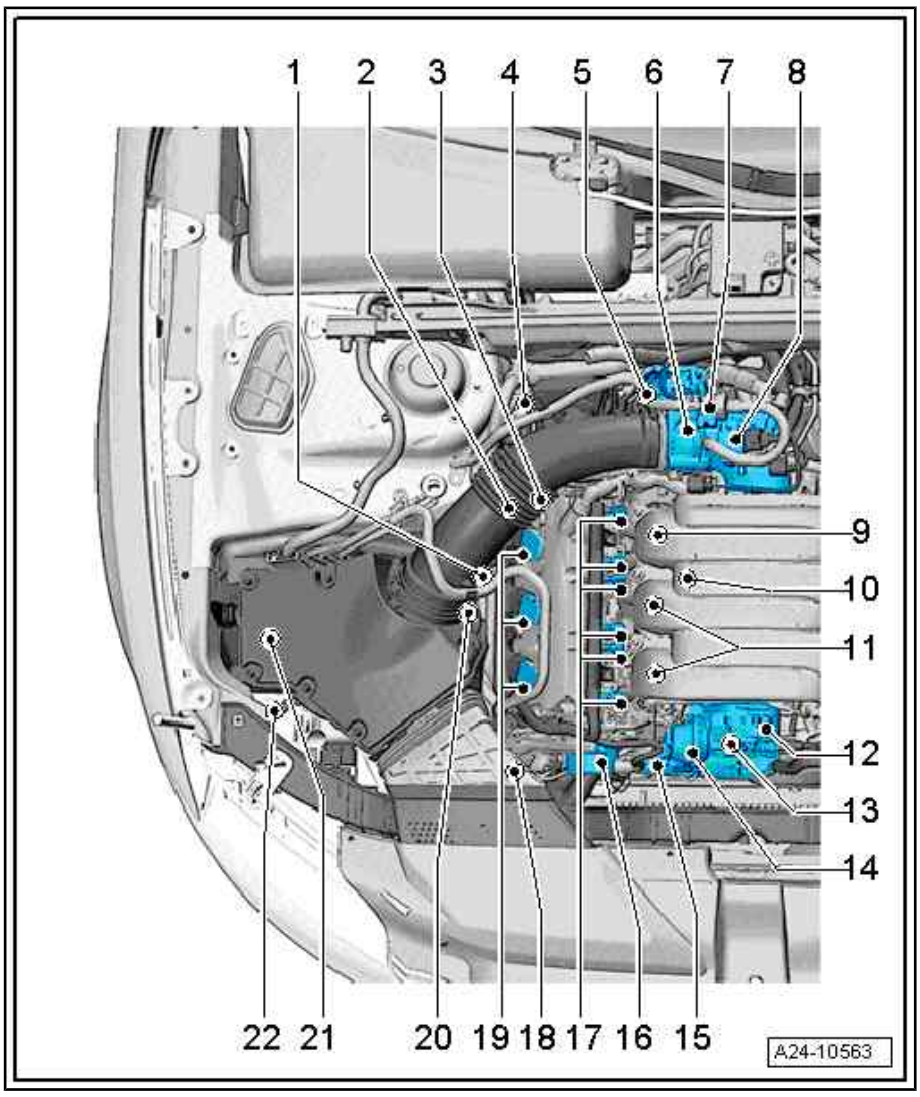
⇒ “1.2 Reducing pressure in high-pressure section of injection system”, page 313

⇒ “1.3 Procedure before opening high-pressure section of injection system”, page 314

⇒ “1.4 Checking fuel system for leaks”, page 318

1.1 Overview of fitting locations - injection system

Engine compartment (right-side)



1 - Lambda probe - G39-

- ❑ Fitting location ⇒ page 313
- ❑ Fitting location of electrical connector ⇒ page 312
- ❑ Removing and installing ⇒ page 357
- ❑ 55 Nm

2 - Exhaust camshaft control valve 1 - N318-

- ❑ Fitting location ⇒ page 309
- ❑ Renew O-ring
- ❑ 2.5 Nm

3 - Camshaft control valve 1 - N205-

- ❑ Fitting location ⇒ page 309
- ❑ Renew O-ring
- ❑ 2.5 Nm

4 - Lambda probe after catalytic converter - G130-

- ❑ Fitting location ⇒ page 313
- ❑ Fitting location of connector ⇒ page 312
- ❑ Removing and installing ⇒ page 358
- ❑ 55 Nm

5 - Connectors

- ❑ For injectors, cylinder bank 1
- ❑ For throttle valve module - J338-
- ❑ For knock sensor 1 - G61-
- ❑ For Lambda probe - G39-
- ❑ For Lambda probe after catalytic converter - G130-

- ❑ Fitting locations of connectors ⇒ page 312

6 - Throttle valve module - J338-

- ❑ Including throttle valve drive for electric throttle - G186- , throttle valve drive angle sender 1 for electric throttle - G187- and throttle valve drive angle sender 2 for electric throttle - G188-
- ❑ After renewing, perform adaption in “Guided Functions”, option “Adapt throttle valve module”
- ❑ Fitting location ⇒ page 312

7 - Activated charcoal filter solenoid valve 1 - N80-

8 - Intake air temperature sender - G42- / intake manifold pressure sender - G71-

- ❑ Fitting location ⇒ page 312

9 - Injector, cylinder bank 1

- ❑ Injector, cylinder 3 - N32-
- ❑ Fitting location ⇒ page 310
- ❑ Removing and installing ⇒ page 320

10 - Knock sensor 1 - G61-

- ❑ Fitting location ⇒ page 310
- ❑ Fitting location of electrical connector ⇒ page 312
- ❑ Removing and installing ⇒ page 406

11 - Injectors, cylinder bank 1

- ❑ Injector, cylinder 1 - N30-
- ❑ Injector, cylinder 2 - N31-
- ❑ Fitting location ⇒ page 310
- ❑ Removing and installing ⇒ page 320

12 - Variable intake manifold position sender - G513-

13 - Variable intake manifold change-over valve - N156-

- ❑ Fitting location ⇒ page 311

14 - Actuator for intake manifold changeover

- ❑ Vacuum unit

15 - Coolant temperature sender - G62-

- ❑ Fitting location ⇒ page 311

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16 - Hall sender - G40-

- ❑ Fitting location ⇒ page 309
- ❑ Renew O-ring
- ❑ 9 Nm
- ❑ Removing and installing ⇒ page 407

17 - Actuators for camshaft adjustment

- ❑ Actuator 1 for camshaft adjustment - F366-
- ❑ Actuator 2 for camshaft adjustment - F367-
- ❑ Actuator 3 for camshaft adjustment - F368-
- ❑ Actuator 4 for camshaft adjustment - F369-
- ❑ Actuator 5 for camshaft adjustment - F370-
- ❑ Actuator 6 for camshaft adjustment - F371-
- ❑ Fitting location ⇒ page 309

18 - High-pressure pump

- ❑ With fuel pressure sender, low pressure - G410- and fuel metering valve - N290-
- ❑ Fitting location ⇒ page 311
- ❑ Removing and installing ⇒ page 347

19 - 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 404

20 - Hall sender 3 - G300-

- ❑ Fitting location ⇒ page 309
- ❑ Renew O-ring
- ❑ 9 Nm
- ❑ Removing and installing ⇒ page 407

21 - Secondary air pump motor - V101-

- ❑ Not installed in all vehicles (only EU 5)
- ❑ Removing and installing ⇒ page 383

22 - Variable intake manifold change-over valve - N335-

- ❑ Not installed in all vehicles

Engine compartment (left-side)

1 - Bracket (left-side) for connectors

- ❑ For knock sensor 2 - G66-
- ❑ For injectors, cylinder bank 2
- ❑ For fuel pressure sender - G247-
- ❑ Fitting locations of connectors ⇒ page 312

2 - Lambda probe 2 after catalytic converter - G131-

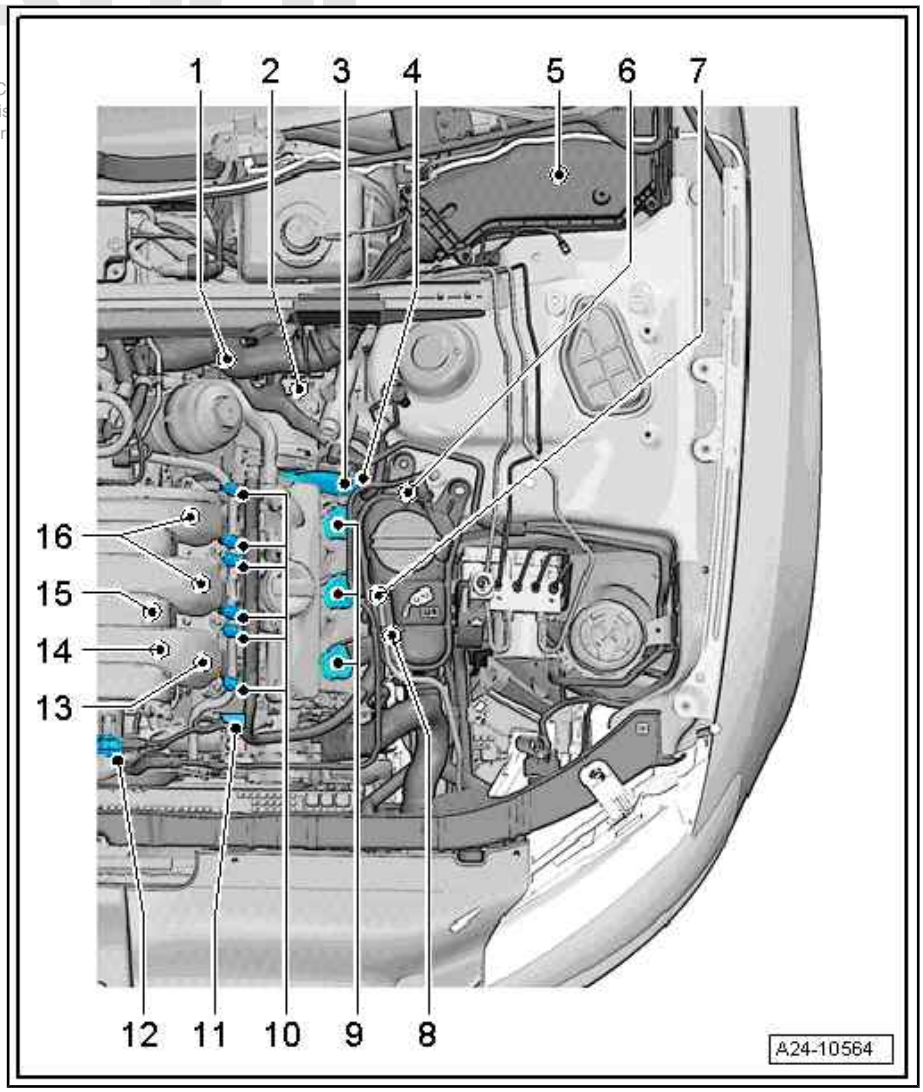
- ❑ Fitting location ⇒ page 313
- ❑ Fitting location of electrical connector ⇒ page 312
- ❑ Removing and installing ⇒ page 362
- ❑ 55 Nm

3 - Camshaft control valve 2 - N208-

- ❑ Fitting location ⇒ page 309
- ❑ Renew O-ring
- ❑ 2.5 Nm

4 - Exhaust camshaft control valve 2 - N319-

- ❑ Fitting location



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⇒ page 309

- ❑ Renew O-ring
- ❑ 2.5 Nm

5 - Engine control unit - J623-

- ❑ Fitting location ⇒ page 307
- ❑ Removing and installing ⇒ page 341

6 - Lambda probe 2 - G108-

- ❑ Fitting location ⇒ page 313
- ❑ Fitting location of electrical connector ⇒ page 312
- ❑ Removing and installing ⇒ page 360
- ❑ 55 Nm

7 - Hall sender 4 - G301-

- ❑ Fitting location ⇒ page 309
- ❑ Renew O-ring
- ❑ 9 Nm
- ❑ Removing and installing ⇒ page 407

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8 - Valve for oil pressure control - N428-

- ❑ Fitting location ⇒ page 311
- ❑ Removing and installing ⇒ page 254

9 - 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 404

10 - Actuators for camshaft adjustment

- ❑ Actuator 7 for camshaft adjustment - F372-
- ❑ Actuator 8 for camshaft adjustment - F373-
- ❑ Actuator 9 for camshaft adjustment - F374-
- ❑ Actuator 10 for camshaft adjustment - F375-
- ❑ Actuator 11 for camshaft adjustment - F376-
- ❑ Actuator 12 for camshaft adjustment - F377-
- ❑ Fitting location ⇒ page 309

11 - Hall sender 2 - G163-

- ❑ Fitting location ⇒ page 309
- ❑ Renew O-ring
- ❑ 9 Nm
- ❑ Removing and installing ⇒ page 407

12 - Variable intake manifold position sender - G513-

- ❑ Fitting location ⇒ page 311

13 - Injector, cylinder bank 2

- ❑ Injector, cylinder 4 - N33-

14 - Fuel pressure sender - G247-

- ❑ Fitting location ⇒ page 310

15 - Knock sensor 2 - G66-

- ❑ Fitting location ⇒ page 310
- ❑ Fitting location of connector ⇒ page 312
- ❑ Removing and installing ⇒ page 406

16 - Injectors, cylinder bank 2

- ❑ Injector, cylinder 5 - N83-
- ❑ Injector, cylinder 6 - N84-
- ❑ Fitting location ⇒ page 310
- ❑ Removing and installing ⇒ page 320

A - Engine speed sender - G28-

- ❑ Fitting location ⇒ page 311
- ❑ Removing and installing ⇒ page 408
- ❑ 9 Nm

B - Fuel pump control unit - J538-

- ❑ Fitting location ⇒ page 308
- ❑ Removing and installing ⇒ Fuel supply system; Rep. gr. 20 ; Fuel pump; Removing and installing fuel pump control unit - J538-

C - Accelerator position sender - G79- and accelerator position sender 2 - G185-

- ❑ In footwell on accelerator pedal (both senders are accommodated in one housing)
- ❑ Fitting location ⇒ page 308
- ❑ Removing and installing ⇒ Fuel supply system; Rep. gr. 20 ; Accelerator mechanism; Removing and installing accelerator pedal module with accelerator position sender -G79- / -G185-

D - Brake light switch - F- / brake pedal switch - F47-

- ❑ In footwell on brake pedal
- ❑ Removing and installing ⇒ Brake system; Rep. gr. 45 ; Sensors; Removing and installing brake light sensor
- ❑ Fitting location ⇒ page 309

E - Clutch position sender - G476-

- ❑ Only fitted on vehicles with manual gearbox
- ❑ Fitting location ⇒ page 309

F - Oil pressure switch - F22-

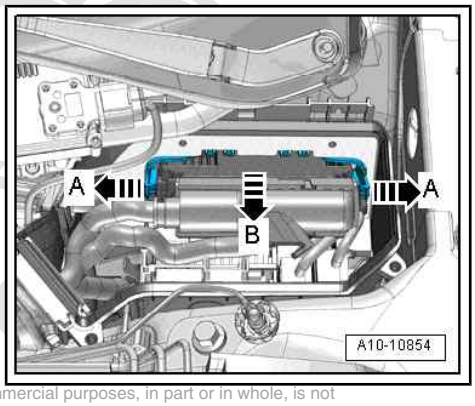
- ❑ Fitting location ⇒ page 310
- ❑ Removing, installing and testing ⇒ page 248

G - Oil pressure switch for reduced oil pressure - F378-

- ❑ Fitting location ⇒ page 310

Fitting location of engine control unit - J623-

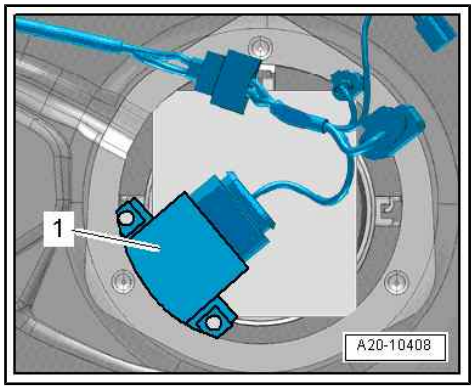
- ♦ In left electronics box in engine compartment



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Fuel pump control unit - J538- -1-

Removing and installing ⇒ Fuel supply system; Rep. gr. 20 ; Fuel pump; Removing and installing fuel pump control unit - J538-



Relay and fuse holder in electronics box in plenum chamber (left-side)

A - Current supply relay for engine components - J757-

B - Starter motor relay - J53- (black/purple socket)

B - Starter motor relay 2 - J695- (black/blue socket)

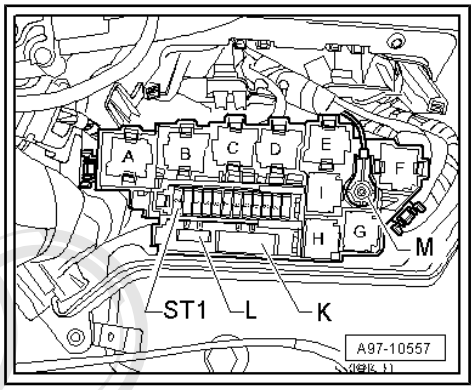
C - Secondary air pump relay - J299-

D - Motronic current supply relay - J271-

E - Continued coolant circulation relay - J151- (brown/blue socket)

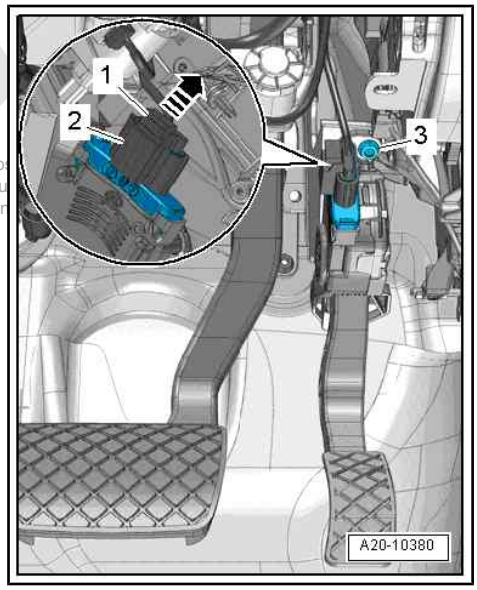
E - Brake servo relay - J569- (brown/purple socket)

Refer to ⇒ Current flow diagrams, Electrical fault finding and Fitting locations



Accelerator position sender - G79- and accelerator position sender 2 - G185-

2 - Electrical connector

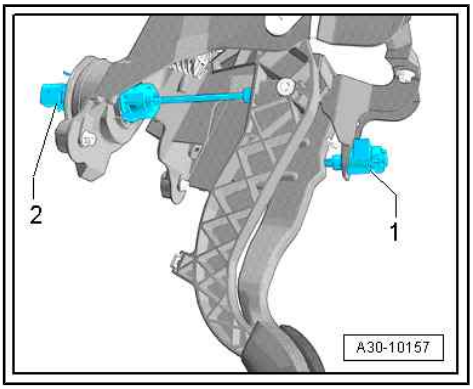


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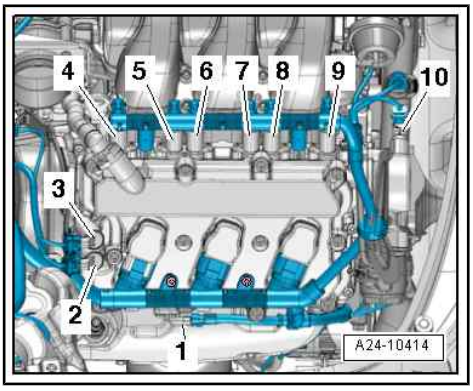
Clutch position sender - G476- -2-

Integrated functions: clutch pedal switch for engine start - F194- and clutch pedal switch - F36-

1 - Brake light switch - F- and brake pedal switch - F47-



Fitting location on cylinder bank 1 (right-side)



1 - Hall sender 3 - G300-

2 - Exhaust camshaft control valve 1 - N318-

3 - Camshaft control valve 1 - N205-

4 - Actuator 6 for camshaft adjustment - F371- (camshaft adjuster B, cylinder 3)

5 - Actuator 5 for camshaft adjustment - F370- (camshaft adjuster A, cylinder 3)

6 - Actuator 4 for camshaft adjustment - F369- (camshaft adjuster B, cylinder 2)

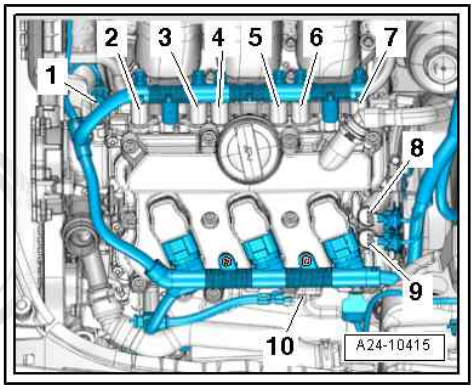
7 - Actuator 3 for camshaft adjustment - F368- (camshaft adjuster A, cylinder 2)

8 - Actuator 2 for camshaft adjustment - F367- (camshaft adjuster B, cylinder 1)

9 - Actuator 1 for camshaft adjustment - F366- (camshaft adjuster A, cylinder 1)

10 - Hall sender - G40-

Fitting locations on cylinder bank 2 (left-side)



1 - Hall sender 2 - G163-

2 - Actuator 7 for camshaft adjustment - F372- (camshaft adjuster A, cylinder 4)

3 - Actuator 8 for camshaft adjustment - F373- (camshaft adjuster B, cylinder 4)

4 - Actuator 9 for camshaft adjustment - F374- (camshaft adjuster A, cylinder 5)

5 - Actuator 10 for camshaft adjustment - F375- (camshaft adjuster B, cylinder 5)

6 - Actuator 11 for camshaft adjustment - F376- (camshaft adjuster A, cylinder 6)

7 - Actuator 12 for camshaft adjustment - F377- (camshaft adjuster B, cylinder 6)

8 - Camshaft control valve 2 - N208-

9 - Exhaust camshaft control valve 2 - N319-

10 - Hall sender 4 - G301-

Audi
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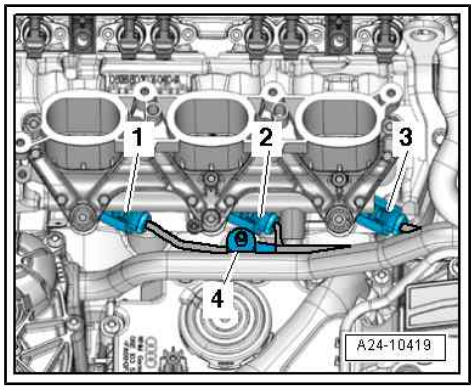
Fitting locations: components on inside of right cylinder bank 1

1 - Injector, cylinder 1 - N30-

2 - Injector, cylinder 2 - N31-

3 - Injector, cylinder 3 - N32-

4 - Knock sensor 1 - G61-



Fitting locations: components on inside of left cylinder bank 2

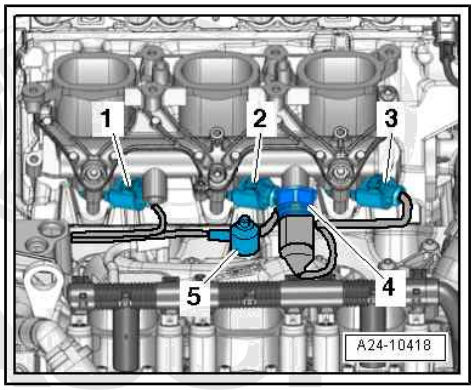
1 - Injector, cylinder 6 - N84-

2 - Injector, cylinder 5 - N83-

3 - Injector, cylinder 4 - N33-

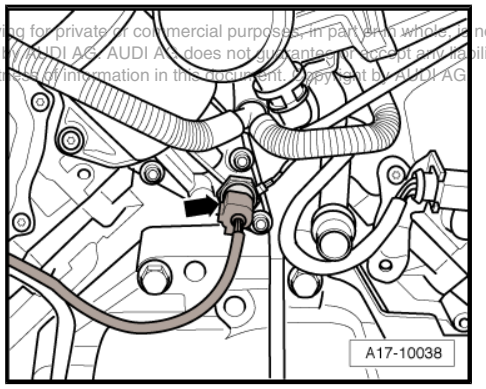
4 - Fuel pressure sender - G247-

5 - Knock sensor 2 - G66-

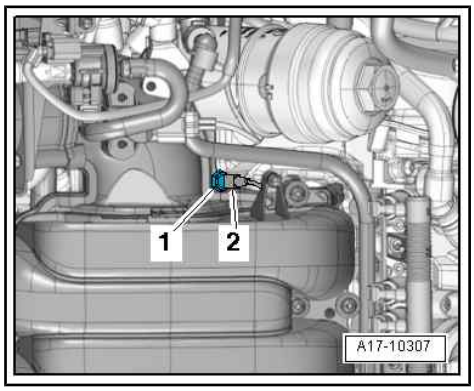


Oil pressure switch - F22- -arrow-

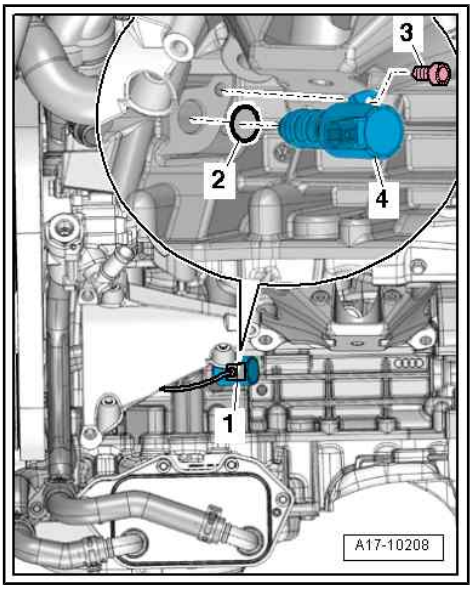
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Oil pressure switch for reduced oil pressure - F378-



Valve for oil pressure control - N428-

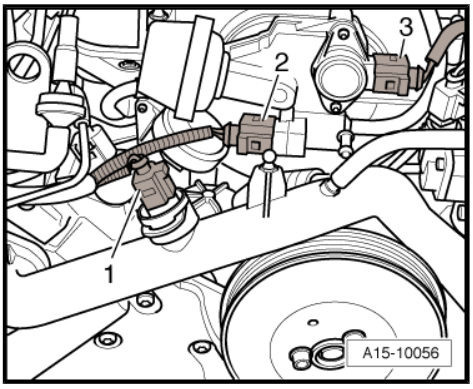


Fitting location: at front of engine

1 - Coolant temperature sender - G62-

2 - Variable intake manifold change-over valve - N156-

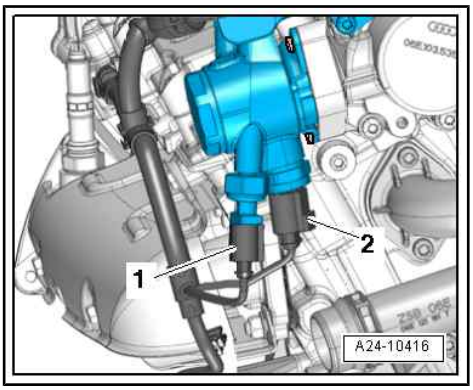
3 - Variable intake manifold position sender - G513-



Fitting locations at high-pressure pump

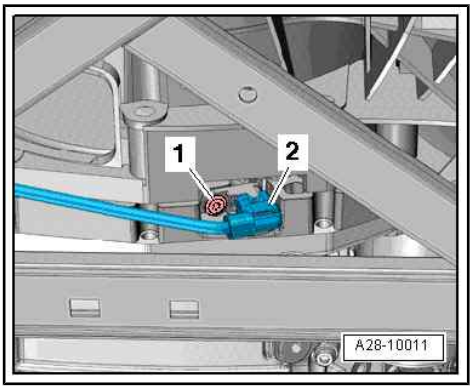
1 - Fuel pressure sender for low pressure - G410-

2 - Fuel metering valve - N290-



Fitting location of engine speed sender - G28-

♦ Bolted into gearbox from below



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Electrical connectors

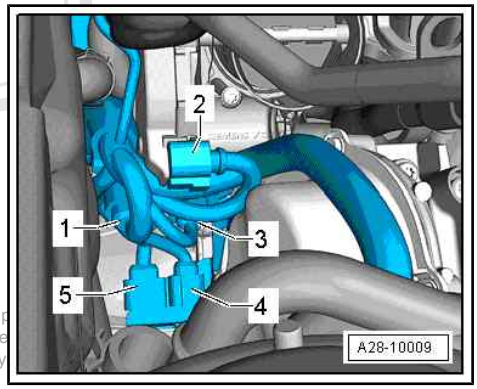
1 - Injectors, cylinder bank 1

2 - Throttle valve module - J338-

3 - Knock sensor 1 - G61-

4 - Lambda probe - G39-

5 - Lambda probe after catalytic converter - G130-



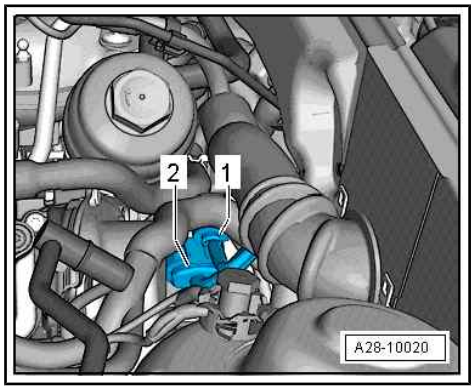
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Electrical connectors

1 - Knock sensor 2 - G66-

2 - Injectors on cylinder bank 2

2 - Fuel pressure sender - G247-



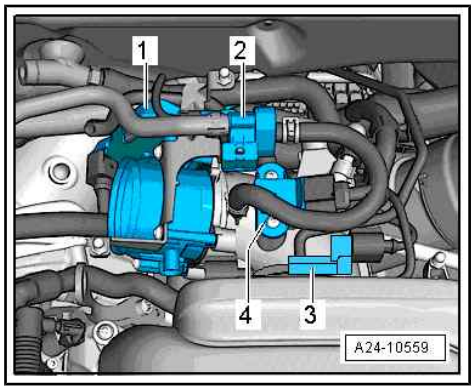
Fitting location: at rear of intake manifold

1 - Throttle valve module - J338-

2 - Activated charcoal filter solenoid valve 1 - N80-

3 - Climatronic coolant shut-off valve - N422- (not fitted on vehicles with auxiliary heater)

4 - Intake air temperature sender - G42- / intake manifold pressure sender - G71-



Electrical connectors for Lambda probes on cylinder bank 2

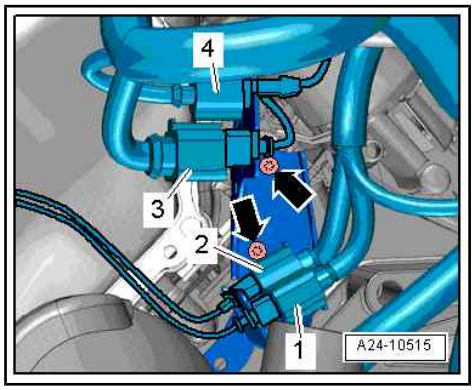
1 - Lambda probe 2 after catalytic converter - G131-

2 - Lambda probe 2 - G108-

3 - Injectors on cylinder bank 2

3 - Fuel pressure sender - G247-

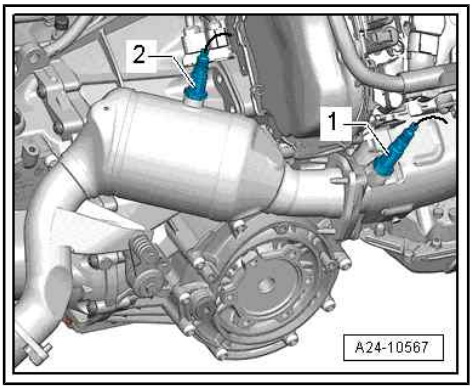
4 - Knock sensor 2 - G66-



Fitting location of Lambda probes on cylinder bank 1 (right-side)

1 - Lambda probe - G39-

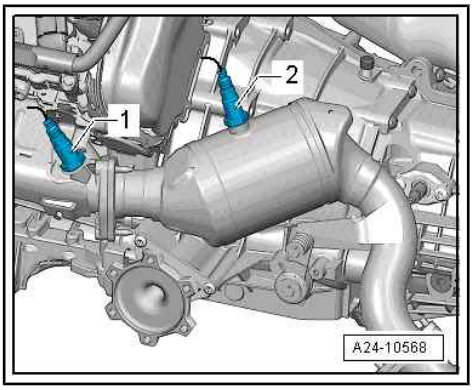
2 - Lambda probe after catalytic converter - G130-



Fitting location of Lambda probes on cylinder bank 2 (left-side)

1 - Lambda probe 2 - G108-

2 - Lambda probe 2 after catalytic converter - G131-



1.2 Reducing pressure in high-pressure section of injection system

Caution

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

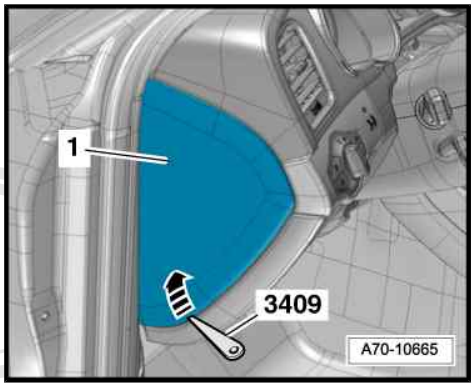
Prior to opening the high-pressure section (e.g. when removing the high-pressure pump, fuel rail, injectors, fuel pipes, etc.) the fuel pressure in the high-pressure section must be reduced. The procedure is described below.

Reducing fuel pressure in high-pressure section

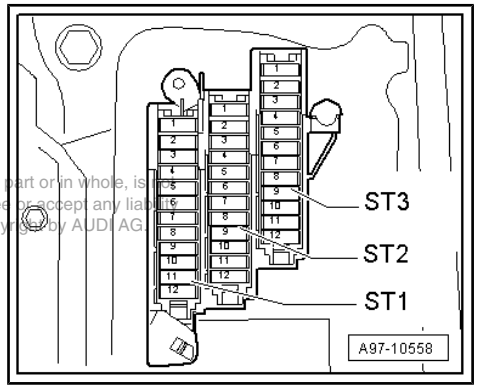
– Connect a vehicle diagnostic tester.
– Start engine and run at idling speed.
– Select “Engine electronics” in vehicle self-diagnosis.
– Then select “Measured values”.
– Select “Fuel pressure” from the list.
– With the engine idling, the fuel pressure displayed will be between 30 and 40 bar.

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



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



– Observe fuel pressure.

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

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

Note

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

♦ *The measuring unit "kPA" is also used in addition to the measuring unit "bar": 1 bar = 1 kPA.*

WARNING

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

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

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

The following operations must be performed after completing repair work:

– Refit fuse.

– Erase event memory and generate readiness code in engine control unit in "Guided Functions" mode.

1.3 Procedure before opening high-pressure section of injection system

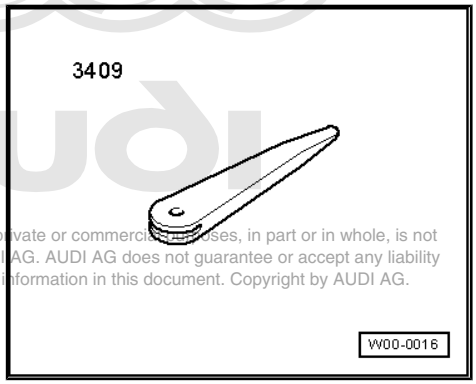
♦ The injection system consists of a high-pressure section (maximum approx. 120 bar) and a low-pressure section (approx. 6 bar).

♦ Before removing a component in the high-pressure section of the injection system, the fuel pressure in the high-pressure

section must be reduced to a residual pressure of approx. 6 bar; follow the procedure outlined below.

Special tools and workshop equipment required

- Removal wedge - 3409-



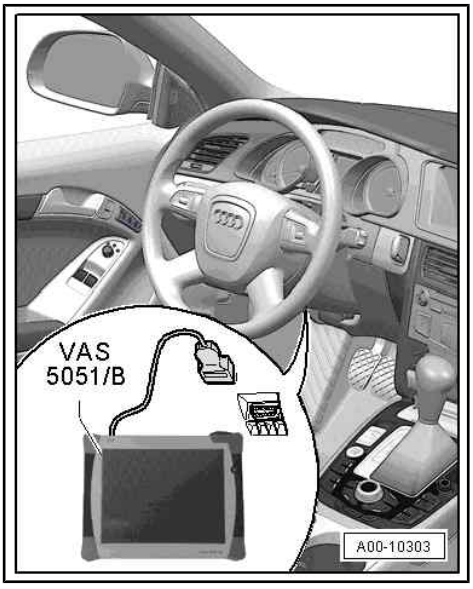
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- Vehicle diagnostic, testing and information system - VAS 5051B-

Procedure

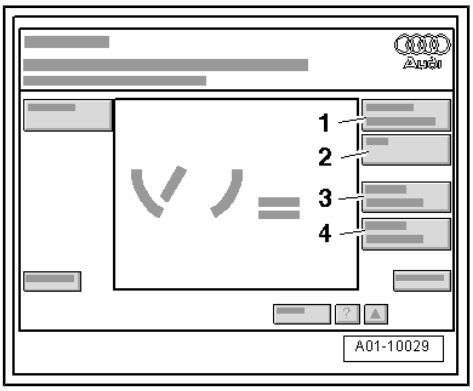
– With ignition switched off, connect vehicle diagnostic, testing and information system - VAS 5051B- with diagnosis lead to diagnosis connection.

– Start engine and run at idling speed.



Display on -VAS 5051B- :

– Select `Vehicle self-diagnosis` from the list -item 1-.



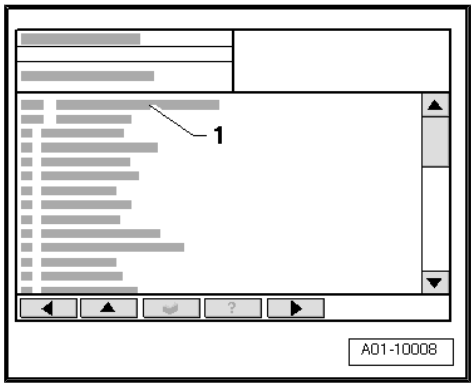
Display on -VAS 5051B- :

– From menu -1-, select “Self-diagnosis” system and press → key to continue.



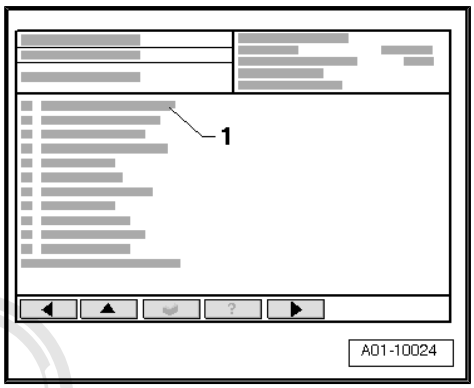
Display on -VAS 5051B- :

– From menu -1-, select vehicle system “Engine electronics” and press → key to continue.



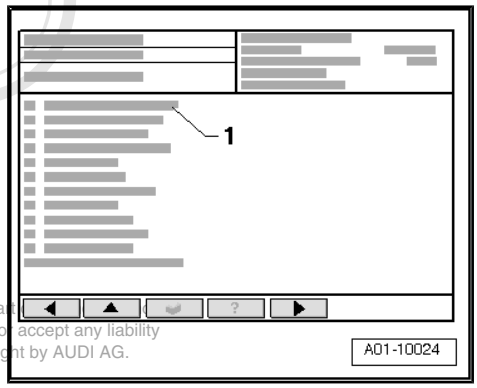
Display on -VAS 5051B- :

– From menu -1-, select function “Measured values” and press → key to continue.



Display on -VAS 5051B- :

– From menu -1-, select measured value “fuel pressure” and press → key to continue.

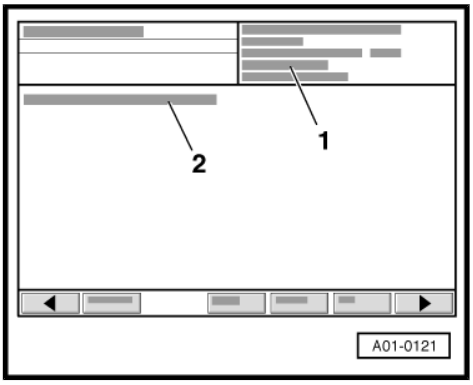


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Display on -VAS 5051B- :

– Check display -2- indicating fuel pressure in fuel rail.

• With engine idling the figure displayed will be approx. 35 kPa. This is the actual pressure generated by the high-pressure pump in the fuel system.



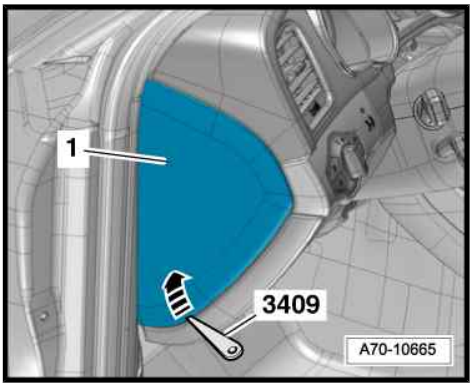
Note

"kPa" is also used as a unit for measuring pressure in addition to "bar": 1 bar = 1 kPa.

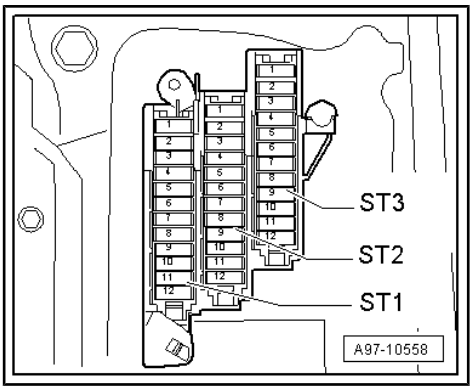
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1 - Control unit identification

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



– Pull out fuse number 3 -SC3- (3rd from the top) in brown fuse holder -ST2- in dash panel (driver's side).

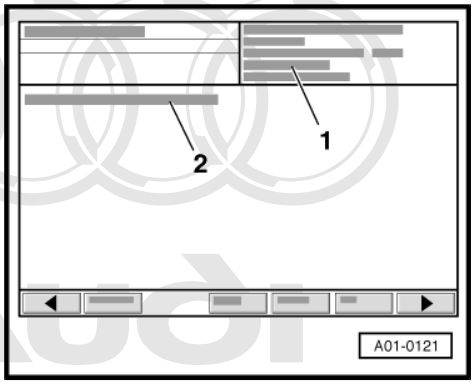


Display on -VAS 5051B- :

– With engine still running, check display -2- for fuel pressure in fuel system.

• The fuel pressure will decrease very quickly because the mechanical high-pressure pump is no longer being supplied with fuel from the fuel tank by the electric fuel pump.

– Switch off ignition as soon as fuel pressure has dropped to just below 8 kPa.



Note

The fuel pressure must not drop below 6 kPa, otherwise the engine will stall (this could damage the catalytic converter).

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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.***

– Disconnect a fuel line connection without delay.

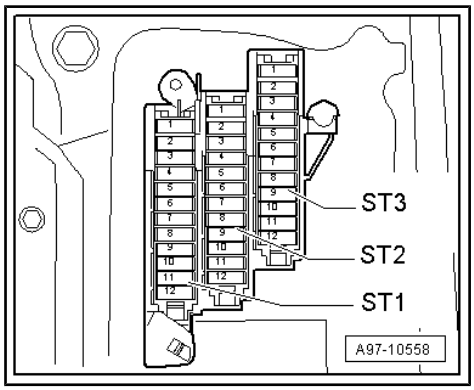
Note

The pressure will increase again due to the effect of residual heat if the high-pressure system is not opened immediately.

Additional steps required

– Insert fuse number 3 -SC3- (3rd from the top) in brown fuse holder -ST2- in dash panel (driver's side).

– Faults are stored in engine control unit because electrical connectors were unplugged and engine was started: “Generate readiness code” in “Guided Functions” ⇒ Vehicle diagnostic tester.



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 tightened to the correct torque, the relevant component must be renewed.

– Road-test vehicle and accelerate with full throttle at least once.
– Then inspect high-pressure section of fuel system again for leaks.

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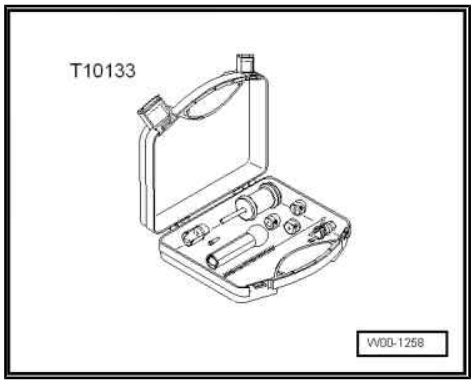
2 Injectors

⇒ “2.1 Removing and installing injectors”, page 320

2.1 Removing and installing injectors

Special tools and workshop equipment required

- Tool set for FSI engines - T10133-



Note

Special tool T10133/2 (puller) has been modified and now has the designation puller T10133/2 A . If you have not yet received the new tool you can make the modification yourself.

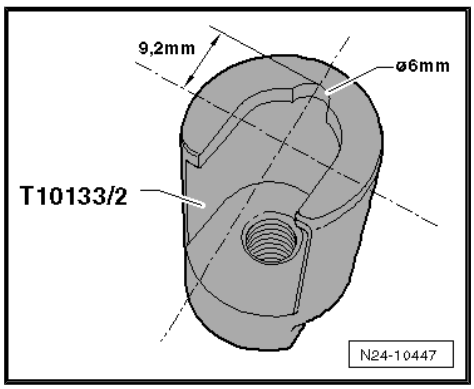
Modifying special tool T10133/2 (puller) to make it equivalent to puller T10133/2 A

Special tools and workshop equipment required

- Round file, approx. 6 mm

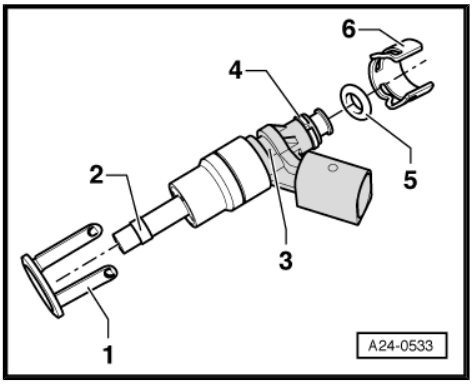
– File out a semi-circular recess as shown in the illustration. The recess allows the tool to be pushed further onto the injector so the contact surface is increased.

– For identification purposes, mark the modified tool with the letter “A” after the tool number.



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High-pressure injector - exploded view



1 - Radial compensation element (renew if damaged)

2 - Combustion chamber ring seal (teflon ring seal) - renew; when fitting, do not grease ring or use any other lubricant.

3 - Groove on injector

4 - Spacer ring (renew if damaged)

5 - O-ring (renew; apply thin coating of clean engine oil prior to installation)

6 - Support ring (via the support ring the fuel rail exerts force which secures injector in cylinder head)

Removing

WARNING

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

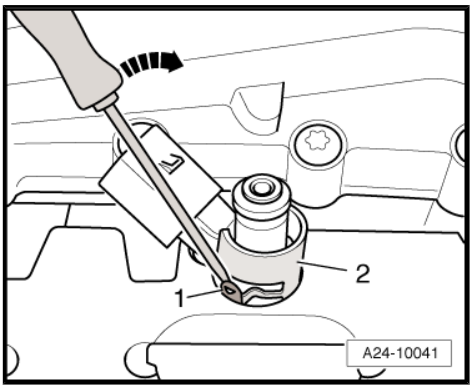
- *The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 313 .*
- *Wrap a clean cloth around the connection and carefully loosen the connection to allow the residual pressure to dissipate.*

– Remove intake manifold (top section) ⇒ page 335 .

– Remove intake manifold (bottom section) on relevant side ⇒ page 333 .

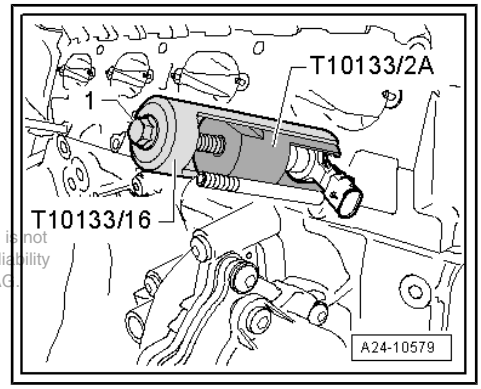
If injectors cannot be pulled out of cylinder head by hand, proceed as follows:

– Use a screwdriver to bend retainer tabs -1- of radial compensation element to side -arrow- and pull support ring -2- off injector.



– Guide puller -T10133/2A- into groove on injector.

– Then attach removal tool -T10133/16- and pull out injector by turning bolt -1-.

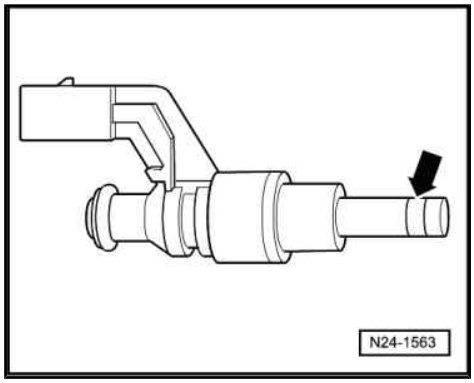


Note

When inserting the puller, there is a risk of destroying the radial compensation element due to the retainer tabs breaking.

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– Carefully remove old combustion chamber ring seal -arrow-. To do so, cut open ring using knife or prise open ring with small screwdriver and then pull off forwards.
– Take care not to damage groove on injector. The injector must be renewed if the groove is damaged.

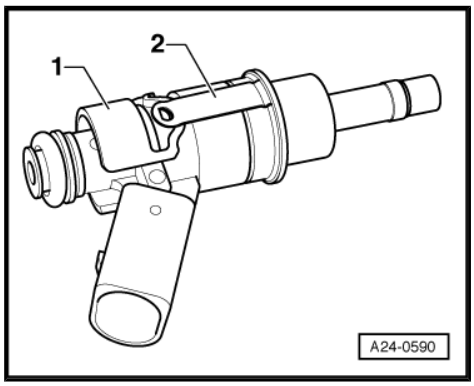


Installing

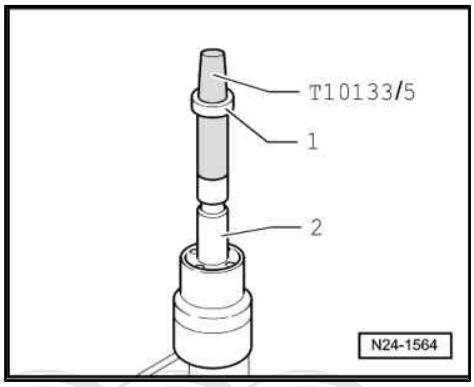
Note

- *Renew combustion chamber ring seals and O-rings.*
- *Renew spacer ring and radial compensation element if damaged.*
- *Lightly lubricate O-rings for injectors with clean engine oil.*
- *The injector pipes must be re-installed on the same cylinders.*

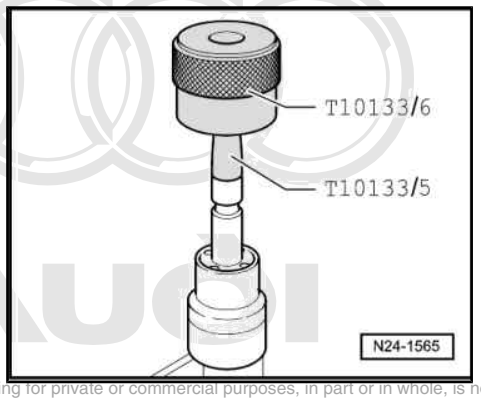
– Clip radial compensation element -1- into support ring -2-.
– When re-installing an injector, clean any combustion residue off groove for combustion chamber ring seal and injector stem with a clean cloth.



– Fit assembly cone -T10133/5- with new combustion chamber ring seal -1- onto injector -2-.



– Push combustion chamber ring seal onto assembly cone -T10133/6- as far as it will go using assembly sleeve -T10133/5- .
– Turn assembly sleeve -T10133/6- upside down and push combustion chamber ring seal into sealing ring groove.



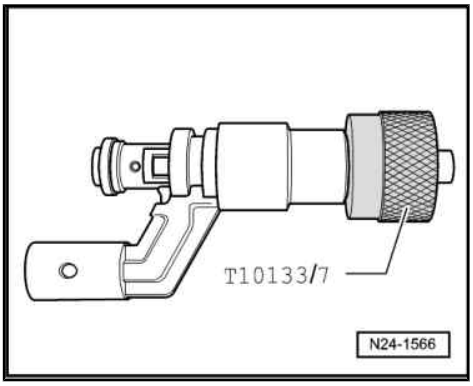
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Note

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°).

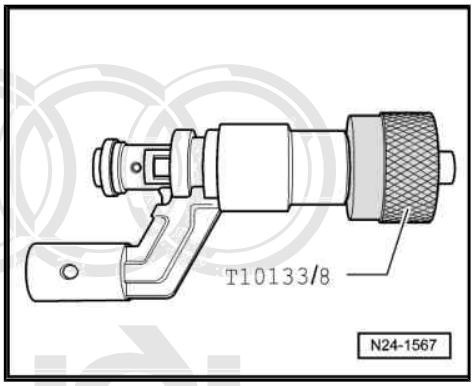
– Pull calibration sleeve -T10133/7- off again by turning it in the opposite direction.



– 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.

– Lubricate new O-ring lightly with clean engine oil before installing.



Note

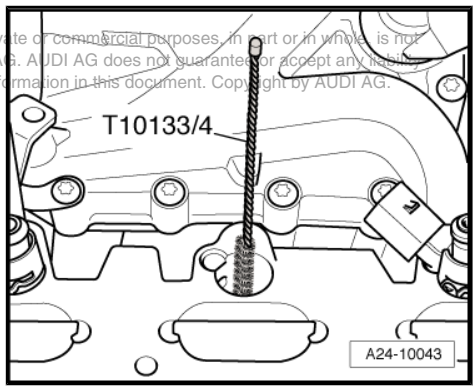
The combustion chamber ring seal must not be lubricated.

Installing injectors

– Clean bore in cylinder head with nylon cylinder brush - T10133/4- .

– Push injector by hand as far as it will go into aperture in cylinder head (do not use oil or grease). Ensure that the injector is properly seated in the cylinder head.

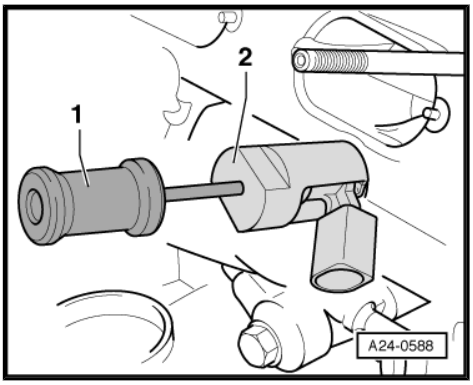
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Note

- *It should be possible to insert injector easily. If necessary wait until the combustion chamber ring seal has contracted sufficiently.*
- *Note correct installation position and ensure that injectors are properly seated in cylinder head.*
- *If the injector cannot be pushed in by hand, use puller - T10133/2A- -2- with striker - T10133/3- to insert the injector.*

• Electrical connector of injector must engage in recess in cylinder head.



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

– Install intake manifold (bottom section) ⇒ page 333 .

– Install intake manifold (top section) ⇒ page 335 .

3 Air cleaner

⇒ “3.1 Exploded view - air cleaner housing”, page 324

⇒ “3.2 Removing and installing air filter element”, page 325

⇒ “3.3 Removing air cleaner (bottom section)”, page 327

3.1 Exploded view - air cleaner housing

1 - Hose clip

2 - Air hose

- ❑ To throttle valve module - J338-
- ❑ Pay attention to marking when installing (arrow points towards bolt of throttle valve module - J338-)

3 - Air filter element

- ❑ Always use genuine part for air filter element
- ❑ Maintenance intervals ⇒ Maintenance ; Booklet 812
- ❑ Removing and installing ⇒ page 325
- ❑ Also clean snow screen (if fitted)

4 - Air duct

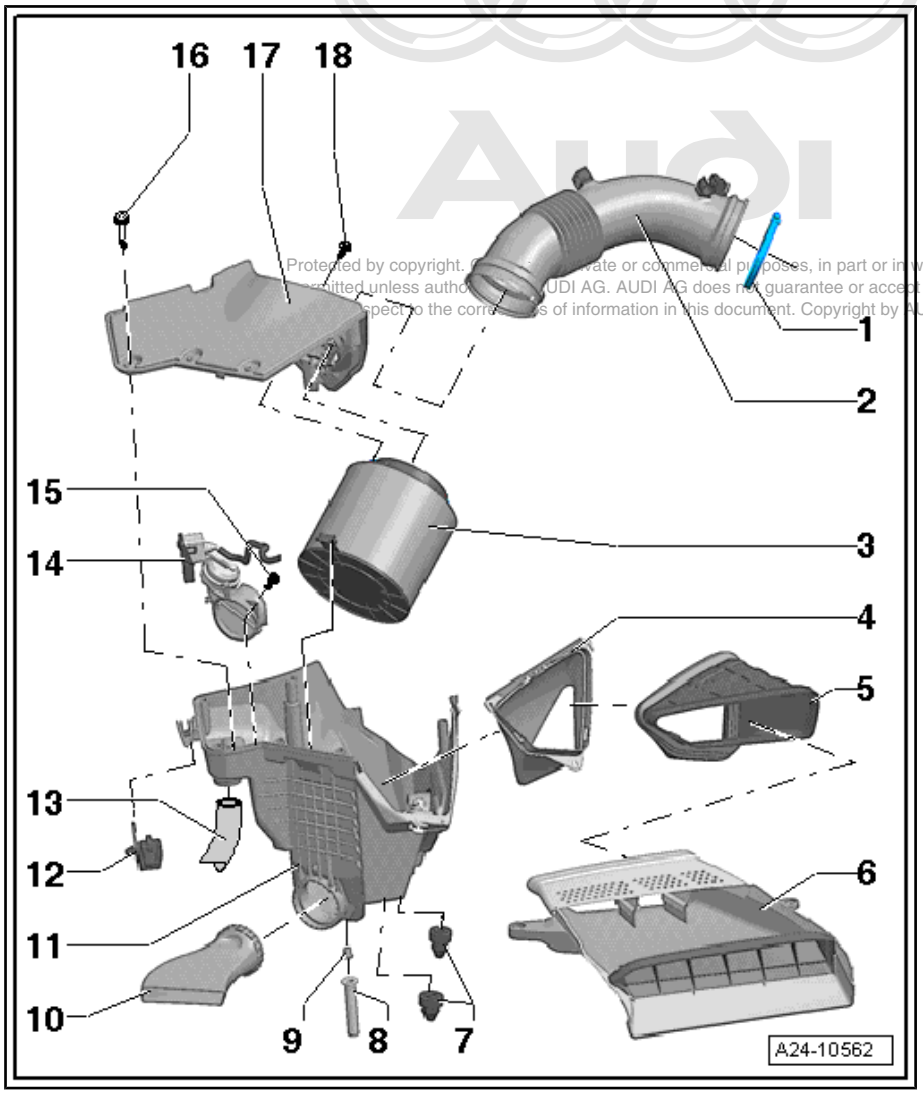
- ❑ Clipped into air cleaner (top section)
- ❑ Clean dirt and leaves out of air duct

5 - Air duct

- ❑ Clean dirt and leaves out of air duct

6 - Air duct

- ❑ To lock carrier
- ❑ Clean dirt and leaves



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out of air duct

7 - Rubber grommet

8 - Water drain hose

- ❑ Clean any leaves and dirt out of water drain hose (important)

9 - Guide for water drain hose

10 - Hot air intake (countries with cold climates only)

- ❑ Slide hot air intake into air cleaner as far as stop; then turn clockwise until it engages noticeably

11 - Air cleaner (bottom section)

- ❑ Clean any salt residue, leaves and dirt out of air cleaner (bottom section)
- ❑ Check for dirt in water drain and clean as required (important)

12 - Retainer for air cleaner (bottom section)

13 - Intake hose for secondary air pump

- ❑ Not installed in all vehicles

14 - Variable intake manifold change-over valve - N335-

- ❑ Not installed in all vehicles
- ❑ Valve installed: without function

15 - Bolt

- ❑ For variable intake manifold change-over valve - N335-

16 - Bolt

17 - Air cleaner (top section)

- ❑ Clean any salt residue, leaves and dirt out of air cleaner (top section)

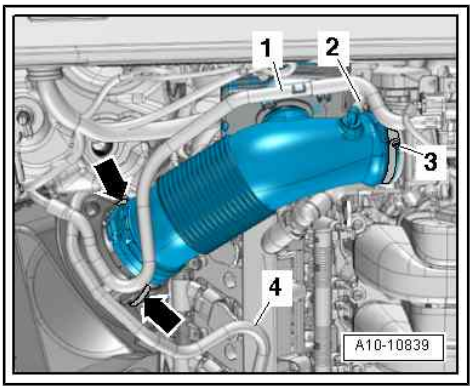
18 - Bolt

- ❑ For securing air filter element

3.2 Removing and installing air filter element

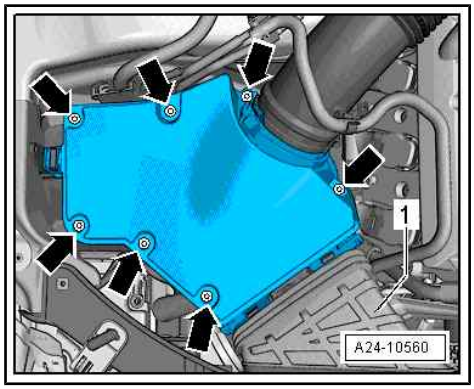
Removing

– Release clamps -arrows- and pull air hose out of air cleaner housing.



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– Remove bolts -arrows- from air cleaner (top section) and lift out air cleaner (top section).



Note

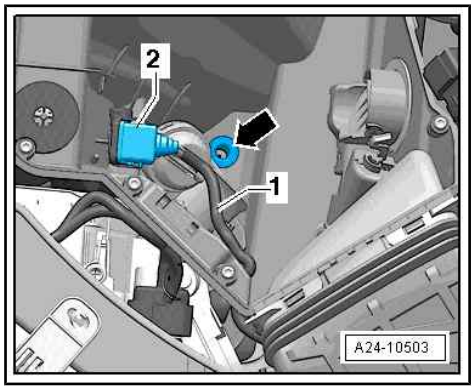
- *Always use genuine part for air filter element.*
- *Use a silicone-free lubricant when installing the air hose.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Parts catalogue*

– Check water drain hose -arrow- in air cleaner housing (bottom section) for dirt and other obstructions (clean if necessary).

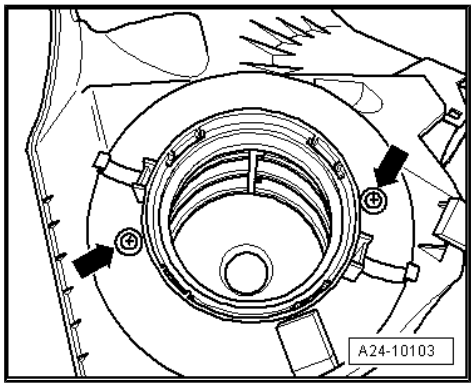
– Clean salt residue, dirt and leaves out of air cleaner housing (top and bottom sections); use a vacuum cleaner if necessary.

– Check for dirt in air duct leading to air filter element.

– When installing air filter element, check that it is properly centred in retainer in air cleaner (top section).



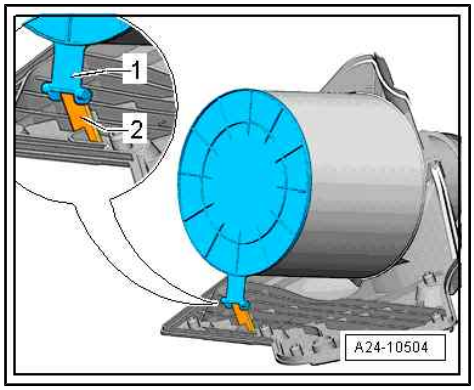
– Screw air cleaner (top section) onto new air filter element.



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– Lug on air filter element -1- must make contact with lug on air cleaner housing -2-.

– Fit the top section of the air cleaner carefully on the bottom section, without using force.



Note

Before tightening bolts, make sure that top section of air cleaner is inserted into groove on bottom section of air cleaner (to prevent air leaks).

– Then screw top section of air cleaner back onto bottom section.

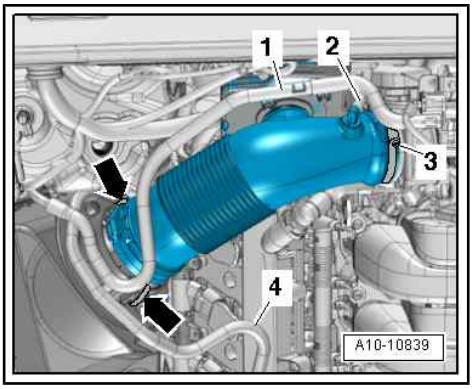
– Make sure that air hose is securely fitted.

– The remaining installation steps are carried out in the reverse sequence.

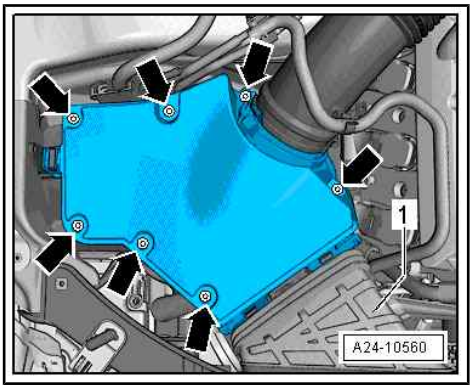
3.3 Removing air cleaner (bottom section)

Removing

– Release clamps -arrows- and pull air hose out of air cleaner housing.



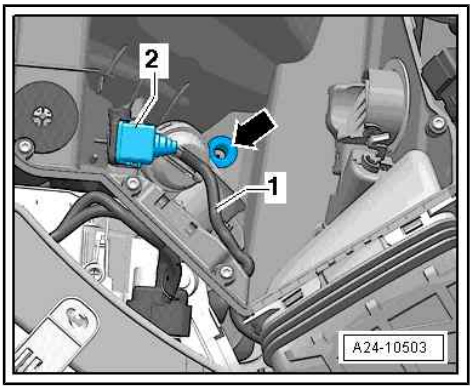
– Remove bolts -arrows- from air cleaner (top section) and lift out air cleaner (top section).



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– Disconnect vacuum hose -1- at variable intake manifold change-over valve - N335- -2-.

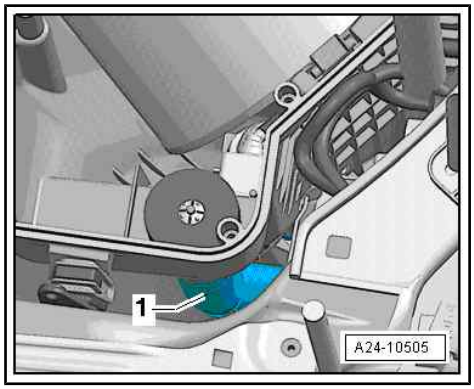
– Release retainer for bottom section of air cleaner (press in rubber on left and right side and pull upwards).



Note

Do not use lubricant when installing retainer.

– Disconnect air hose -1- leading to secondary air pump.



Note

- *Item 1 is not installed in all vehicles (only EU 5).*
- *Electrical connector at variable intake manifold change-over valve - N335- is not fitted in all vehicles.*

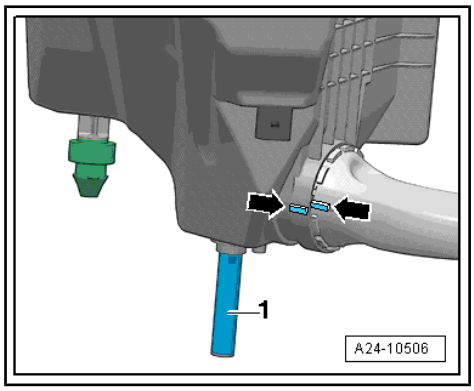
– Carefully take out air cleaner (bottom section).

Installing

Note

- *Always use genuine part for air filter element.*
- *Use a silicone-free lubricant when installing the intake hose.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Parts catalogue*

– If hot air intake is fitted (for countries with cold climates only), make sure that air intake connection has engaged properly -arrows- (pay attention to markings).

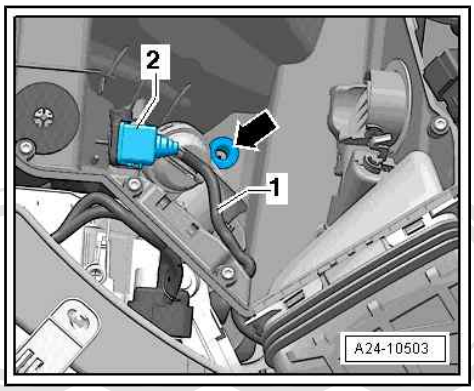


– Check water drain hose -arrow- in air cleaner housing (bottom section) for dirt and other obstructions (clean if necessary).

– Clean salt residue, dirt and leaves out of air cleaner housing (top and bottom sections); use a vacuum cleaner if necessary.

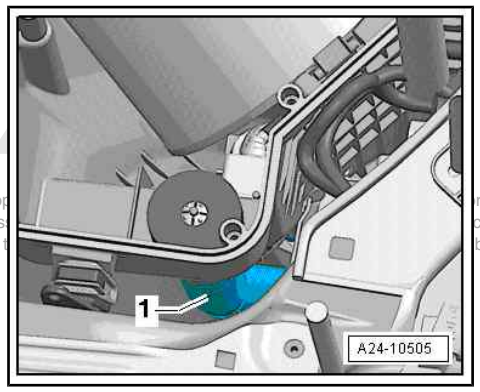
– Check for dirt in air duct leading to air filter element.

– Re-attach electrical connector at variable intake manifold change-over valve - N335- (if fitted).



– Re-attach air hose -1- (if fitted).

– Re-install air cleaner (bottom section).

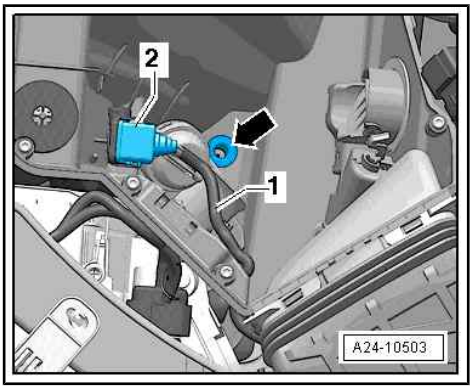


Note

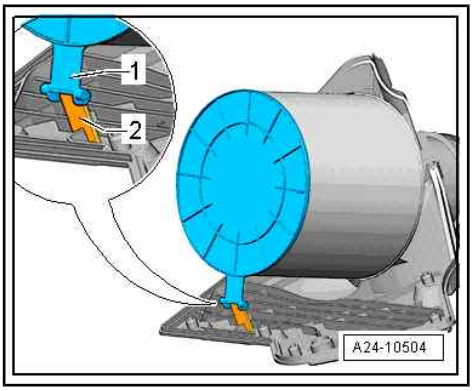
The water drain hose must be routed straight downwards and must not be kinked.

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– Slide vacuum hose -1- back onto connection of variable intake manifold change-over valve - N335- .



– Lug on air filter element -1- must make contact with lug on air cleaner housing -2-.
– Fit the top section of the air cleaner carefully on the bottom section, without using force.



Note

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Before tightening bolts, make sure that top section of air cleaner is inserted into groove on bottom section of air cleaner (risk of air leaks).

– Then screw top section of air cleaner back onto bottom section.
– Make sure that air hose is securely fitted.
– The remaining installation steps are carried out in the reverse sequence.

4 Intake manifold

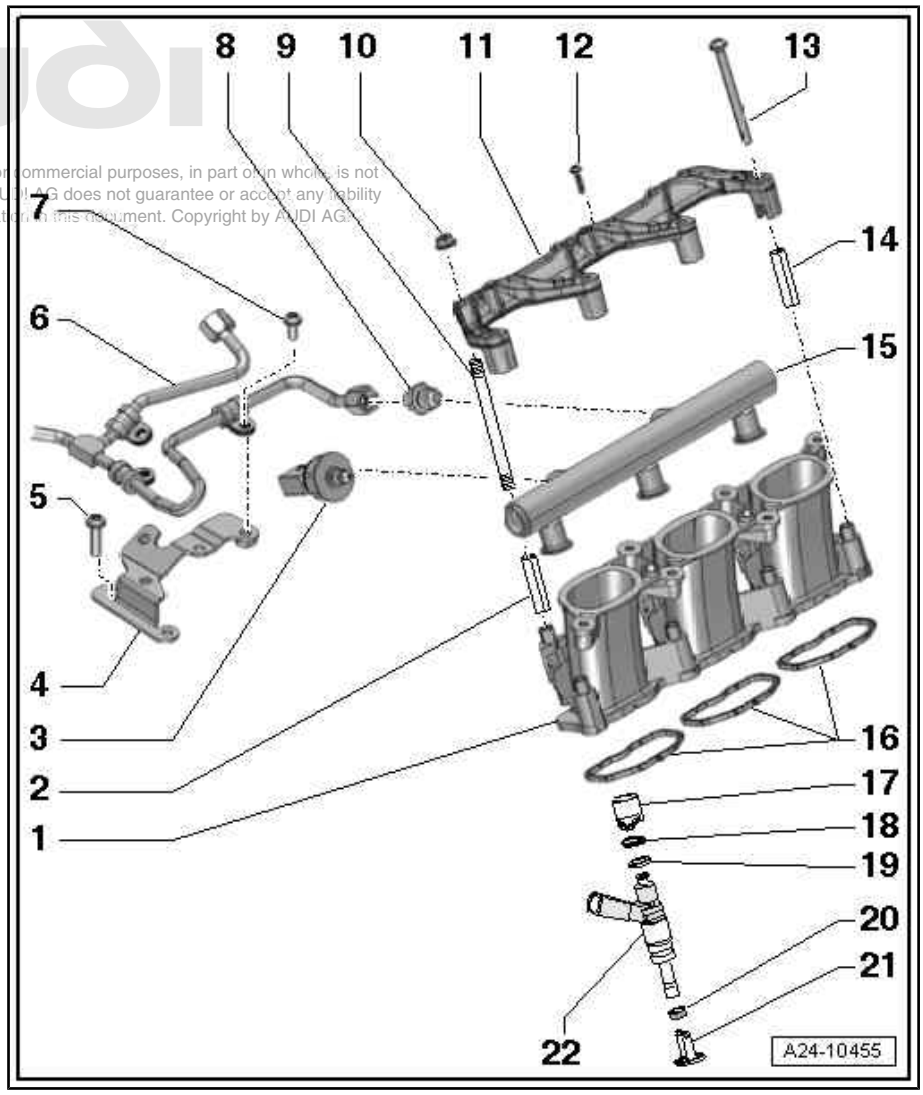
⇒ “4.1 Exploded view - intake manifold (bottom section) with fuel rail”, page 330

⇒ “4.2 Exploded view - intake manifold (top section)”, page 332

⇒ “4.3 Removing and installing intake manifold (bottom section) with fuel rail”, page 333

⇒ “4.4 Removing and installing intake manifold (top section)”, page 335

4.1 Exploded view - intake manifold (bottom section) with fuel rail



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1 - Intake manifold (bottom section)

- ❑ Removing and installing (left and right) ⇒ page 333

2 - Sleeve

3 - Fuel pressure sender - G247-

- ❑ 20 Nm

4 - Bracket

5 - Bolt

- ❑ 9 Nm

6 - High-pressure pipe

> **WARNING**
> *The fuel system operates at extremely high pressure. This can cause injury.*
> *The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system.*

- ❑ Reducing fuel pressure in high-pressure section of injection system ⇒ page 313
- ❑ Do not alter shape
- ❑ Do NOT bend open retainer for fuel pipe
- ❑ If retainer has been bent open or fuel pipe has to be renewed, retainer must also be renewed
- ❑ Tightening ⇒ page 331

7 - Bolt

- ❑ 9 Nm

8 - Threaded connection

- ❑ 40 Nm

9 - Stud

10 - Nut

- ❑ 9 Nm

11 - Retainer for fuel rail

12 - Bolt

- ❑ 2.5 Nm

13 - Bolt

- ❑ 9 Nm

14 - Sleeve

15 - Fuel rail

16 - Gaskets

- ❑ Renew

17 - 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.

18 - O-ring

- ❑ Renew
- ❑ Lubricate lightly with clean engine oil

19 - Spacer ring

- ❑ Renew if damaged

20 - Combustion chamber ring seal

- ❑ Renewing ⇒ “2.1 Removing and installing injectors”, page 320

21 - Radial compensation element

- ❑ Renew if damaged
- ❑ Clip onto support ring -item 17-

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22 - Injector

Removing and installing ⇒ page 320

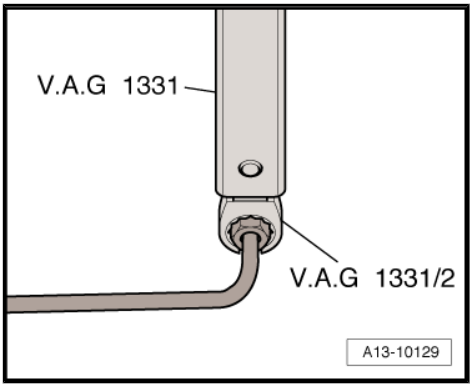
Installing high-pressure pipe

– Tighten union nut on high-pressure pipe hand-tight initially.

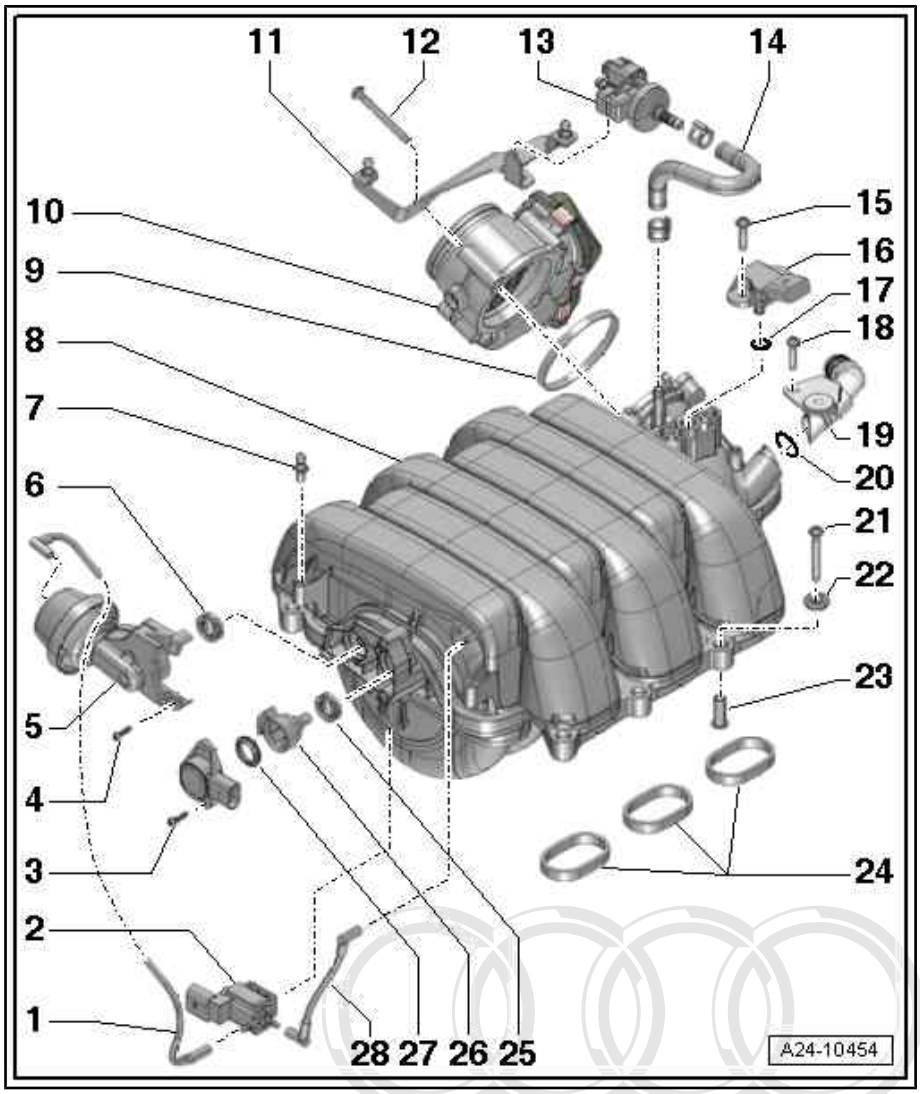
– Ensure that high-pressure pipe is not under tension.

– To tighten high-pressure pipe on fuel rail, use torque wrench - V.A.G 1331- with tool insert (open-end ring spanner, 17 mm) -V.A.G 1331/2- .

♦ Tightening torque for union nut on high-pressure pipe: 27 Nm



4.2 Exploded view - intake manifold (top section)



1 - Vacuum hose

2 - Variable intake manifold change-over valve - N156-

3 - Bolt

- ❑ 2.5 Nm

4 - Bolt

- ❑ 2.5 Nm

5 - Actuator for intake manifold change-over

- ❑ Installation position of toothed segments for intake manifold change-over ⇒ page 333
- ❑ Replacement part is supplied together with -item 26-

6 - Seal

- ❑ Renew if damaged
- ❑ When renewing lever out with screwdriver
- ❑ Press in by hand

7 - Ball stud

- ❑ 2.5 Nm

8 - Intake manifold (top section)

- ❑ Removing and installing ⇒ page 335

9 - Seal

- ❑ Renew

10 - Throttle valve module - J338-

11 - Bracket

12 - Bolt

- ❑ 6 Nm

13 - Activated charcoal filter solenoid valve 1 - N80-

14 - Hose

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15 - Bolt

- ❑ 3 Nm

16 - Intake air temperature sender - G42- / intake manifold pressure sender - G71-

17 - O-ring

- ❑ Renew

18 - Bolt

- ❑ 2.5 Nm

19 - Crankcase breather hose

20 - O-ring

- ❑ Renew

21 - Bolt

- ❑ 8 Nm

22 - Washer

23 - Sleeve

24 - Gaskets

- ❑ Renew

25 - Seal

- ❑ Renew if damaged
- ❑ When renewing lever out with screwdriver
- ❑ Press in by hand

26 - Lever with toothed segment

- ❑ For intake manifold change-over
- ❑ Installation position of toothed segments ⇒ page 333
- ❑ Replacement part is supplied together with -item 5-

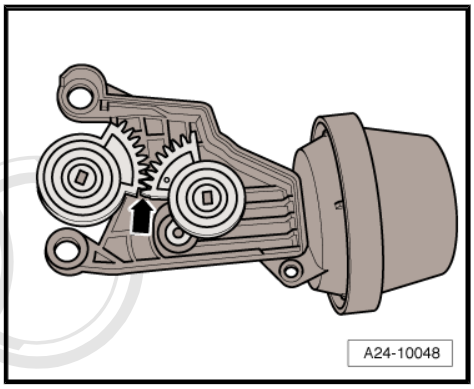
27 - Seal

- ❑ Renew if damaged
- ❑ When renewing lever out with screwdriver
- ❑ Press in by hand

28 - Vacuum hose

Installation position of toothed segments for intake manifold change-over

- The lower edges of the toothed segments must be flush -arrow-.

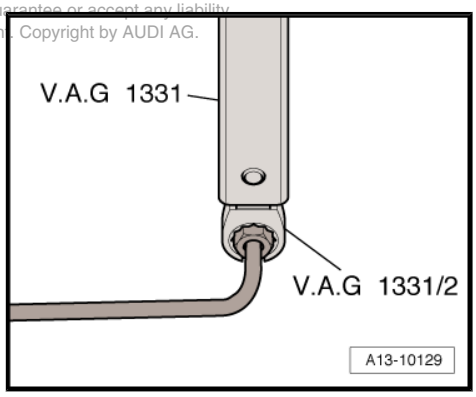


4.3 Removing and installing intake manifold (bottom section) with fuel rail

Special tools and workshop equipment required

- ♦ Torque wrench - V.A.G 1331-
- ♦ Tool insert (open-end ring spanner, 17 mm) -V.A.G 1331/2-

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Removing

Note

The following description shows the removal and installation of the bottom section of the intake manifold (left-side). The procedure for the other side is more or less identical.

WARNING

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

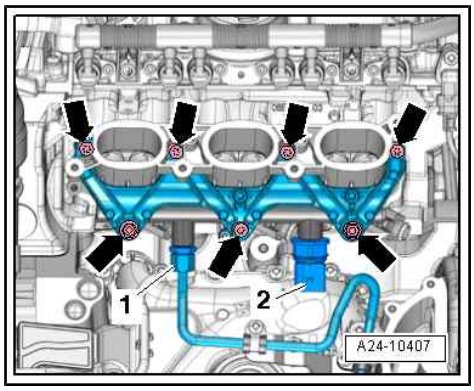
- ***The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 313 .***
- ***Wrap a clean cloth around the connection and carefully loosen the connection to allow the residual pressure to dissipate.***

– Remove intake manifold (top section) ⇒ page 335 .

– Unplug electrical connector at fuel pressure sender - G247- -item 2-.

– Remove union nut -1-.

– Unscrew bolts and nuts -arrows- and detach intake manifold (bottom section) with fuel rail.



Note

Seal intake ports on cylinder heads with clean cloths.

Installing

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

Note

- *If an injector has been pulled out of the cylinder head, the teflon ring seal must be renewed.*
- *Renew gaskets and O-rings.*
- *Lubricate O-rings of injectors lightly with clean engine oil.*

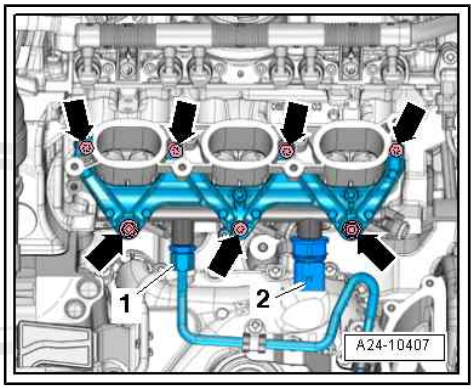
– Press intake manifold (bottom section) with fuel rail evenly onto injectors.

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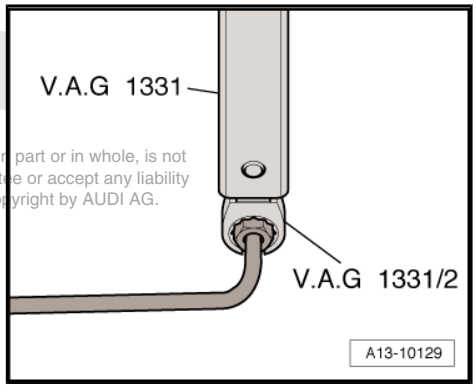
– Tighten bolts and nuts -arrows- for intake manifold (bottom section) in diagonal sequence and in stages.

♦ Tightening torques: refer to ⇒ page 330 , ⇒ page 331 .

– Plug in electrical connector -2- at fuel pressure sender -G247- .



– Fit high-pressure pipe -1- on fuel rail ⇒ page 350 .



Note

Check fuel system for leaks.

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4.4 Removing and installing intake manifold (top section)

Removing

Note

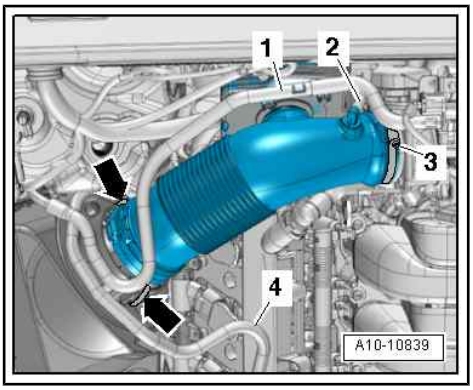
Fit all cable ties in the original positions when installing.

– Pull off engine cover panels (front and rear).

– Move line -1- leading to activated charcoal filter clear.

– Disconnect vacuum hose -2- from connection on air hose.

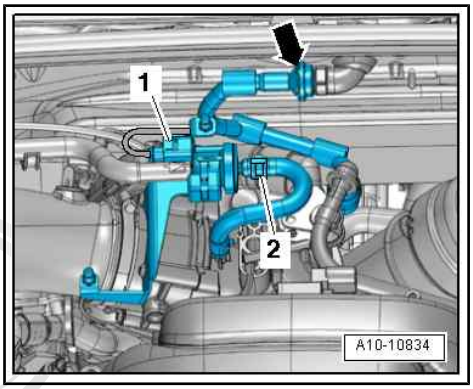
– Remove air hose. To do so, release hose clip -3- and clamps -arrows-.



Note

Disregard item -4-.

– Unplug electrical connector -1- at activated charcoal filter solenoid valve 1 - N80- and detach vacuum hose -2-.
– Detach activated charcoal filter solenoid valve 1 - N80- from bracket and move it clear to the side with hose still attached.



Note

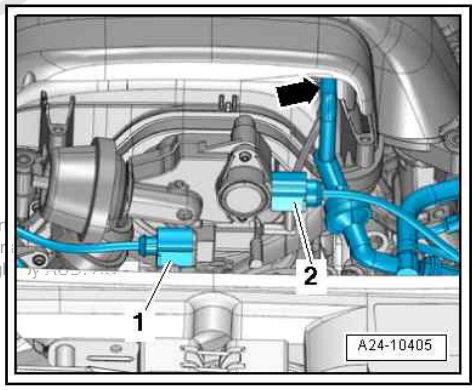
Ignore -arrow-.

– Unplug electrical connectors.

1 - Variable intake manifold change-over valve - N156-

2 - Variable intake manifold position sender - G513-

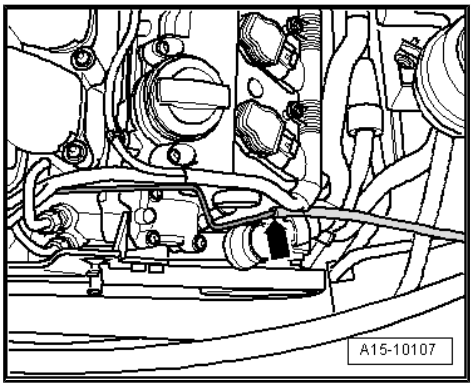
– Disconnect vacuum hose -arrow-.



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USA models:

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



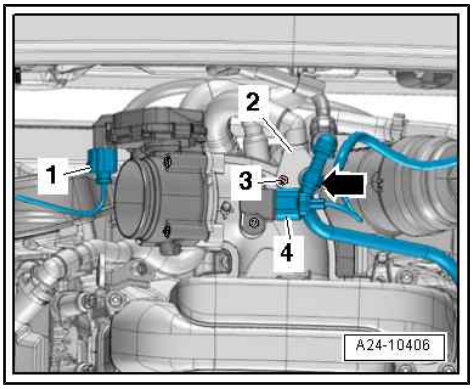
All models:

– Unplug electrical connectors.

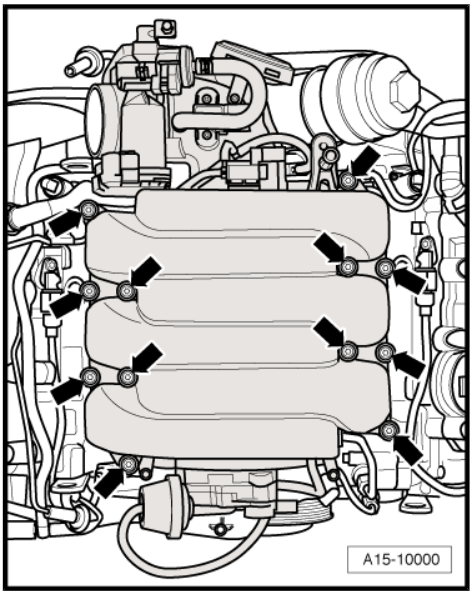
1 - Throttle valve module - J338-

4 - Intake air temperature sender - G42- / intake manifold pressure sender - G71-

– Move vacuum hose clear -arrow-.
– Move electrical wiring harness clear.
– Remove bolt -3-.
– Press retaining tab -2- up slightly and detach crankcase breather hose from intake manifold.



– Unscrew bolts -arrows- and remove intake manifold (top section).



Note

Seal intake ports on cylinder heads with clean cloths.

Installing

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

- Tightening torque ⇒ page 332

Note

- *Renew gaskets and O-rings.*
- *Fit all cable ties in the original positions when installing.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Parts catalogue.*

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5 Senders and sensors

⇒ "5.1 Removing and installing fuel pressure sender G247 ", page 338

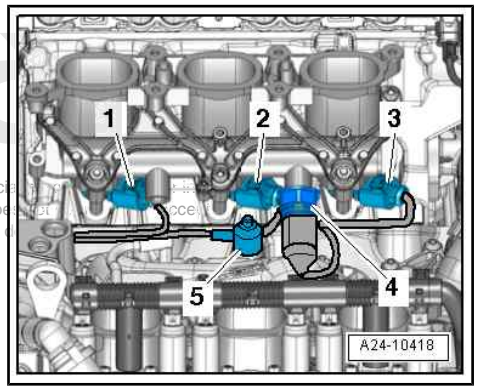
5.1 Removing and installing fuel pressure sender - G247-

Removing

– Remove intake manifold (top section) ⇒ page 335 .

– Unplug electrical connector at fuel pressure sender - G247- -4-.

– Unscrew fuel pressure sender - G247- -4-.



Installing

Install in reverse order.

♦ For tightening torque refer to exploded view of intake manifold (bottom section) with fuel rail ⇒ page 330

– Install intake manifold (top section) ⇒ page 335 .

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6 Engine control unit

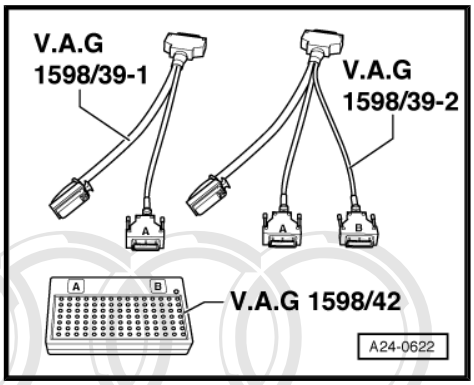
⇒ “6.1 Wiring and component check with test box V.A.G 1598/42 ”, page 339

⇒ “6.2 Removing and installing engine control unit J623 ”, page 341

6.1 Wiring and component check with test box - V.A.G 1598/42-

Special tools and workshop equipment required

- Adapter cable - V.A.G 1598/39-1-
- Adapter cable - V.A.G 1598/39-2-
- Test box - V.A.G 1598/42-



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Note

- *The test box has 105 sockets. The connecting cable can be disconnected from the test box. This means that only the cable (and not the test box) has to be purchased for future engine control units with different types of connectors.*
- *The smaller of the two connectors on the engine control unit has the contacts 1 to 60. The larger of the two connectors has the contacts 1 to 94.*
- *If you want to check a wiring connection to the engine control unit, first refer to the current flow diagram to find out which connector on the engine control unit the wiring connection leads to. If the wire goes to the 60-pin connector, connect the smaller of the two connectors -V.A.G 1598/39-1- to input "A" of test box - V.A.G 1598/42- .*
- *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).*
- *The relevant test procedure will state whether it is necessary to also connect the engine control unit to the test box.*

WARNING

To prevent damage to the electronic components, select the appropriate test range before connecting the test leads and observe the test requirements.

– Remove engine control unit - J623- ⇒ page 341 .
– Connect test box - V.A.G 1598/42- to wiring harness with adapter cable - V.A.G 1598/39-1- or adapter cable - V.A.G 1598/39-2- . Connect earth clip of test box to negative terminal of battery. 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.

– Make sure you fit metal casing back on engine control unit - J623- .
– Always use new shear bolts.

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– Clean threaded holes for new shear bolts to remove any residue from locking fluid. This can be done using a thread tap.

After installing a new engine control unit, the following operation must be performed:

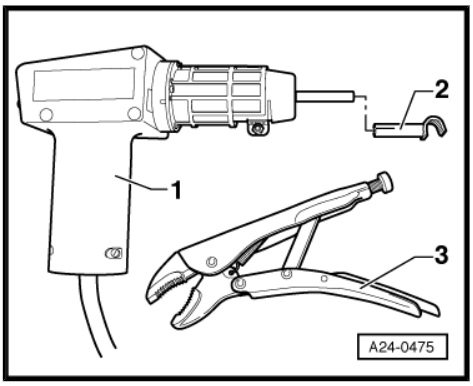
– Activate engine control unit via a vehicle diagnostic tester in “Guided Functions” mode, “Replace engine control unit”.

6.2 Removing and installing engine control unit - J623-

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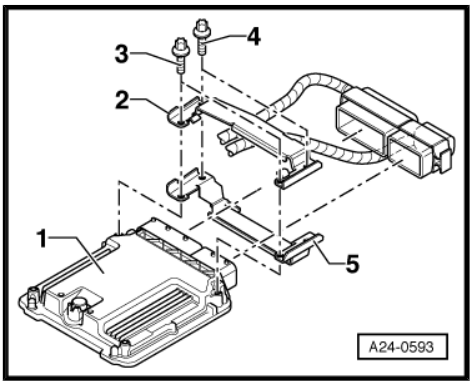
Special tools and workshop equipment required

- Hot air blower - VAS 1978/14A- -item 1- with nozzle attachment -2- from wiring harness repair set - VAS 1978 B-
- Small, commercially available mole grips -3-



Note

- *Not every engine control unit is bolted to a protective housing. Whether a protective housing is fitted depends on the engine/gearbox combination.*
- *The engine control unit -1- is bolted to the protective housing -5-. To make it more difficult to unscrew the shear bolts -4- for locking plate -2-, their threads have been coated with locking fluid.*
- *The metal casing has to be removed before the connectors can be unplugged from the engine control unit (e.g. to connect the test box or renew the engine control unit).*

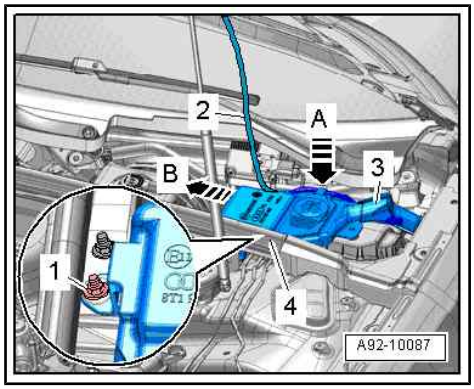


Removing

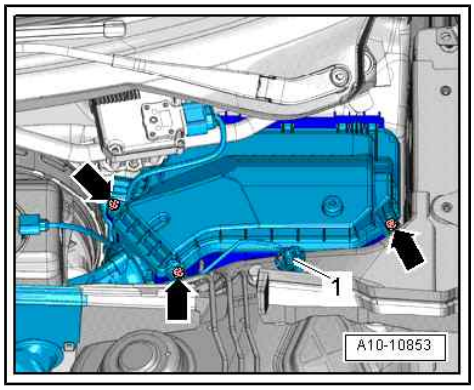
– When renewing engine control unit, select diagnosis object “Replace engine control unit” in “Guided Functions” ⇒ Vehicle diagnostic tester.

– Switch off ignition and remove ignition key.

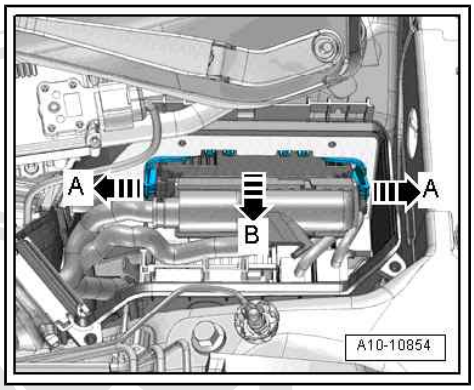
– Slightly pull off rubber seal in front of nut -1- on plenum chamber cover.
– Unhook wiring harness -2- from retainers -A-.
– Remove nut -1-.
– Pull filler neck -3- with filler pipe out of washer fluid reservoir and through opening in body.



– Unscrew bolts -arrows- and take off lid for electronics box.

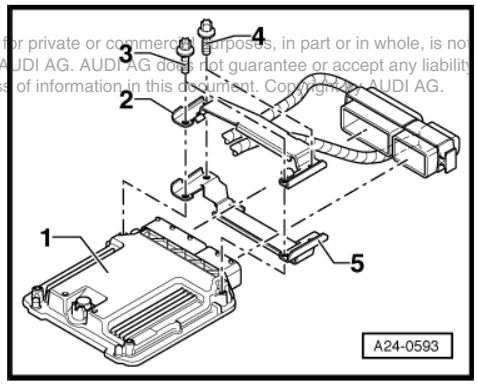


– Release retainers -arrows A- and pull out engine control unit - J623- -arrow B-.



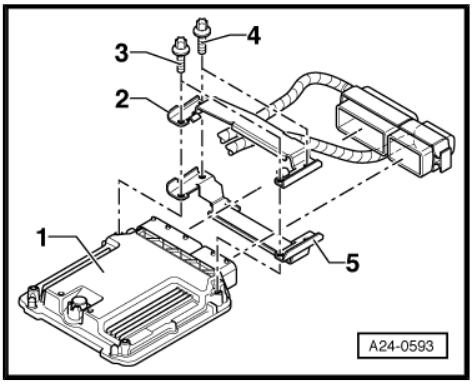
To help prevent unauthorised access to the connectors on the engine control unit, the engine control unit -1- is bolted to a metal casing -5- by means of shear bolts -3 and 4- and a locking plate -2-.

The threads of the two shear bolts -4- which are not screwed into the engine control unit are secured with locking fluid. To unscrew these two bolts, the threads must therefore be heated with the hot air blower.

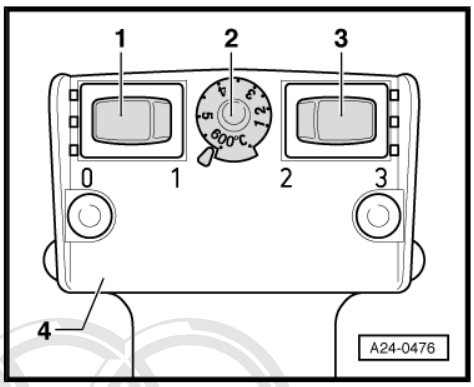


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The threads of the two shear bolts -3- which are screwed into the engine control unit are not secured with locking fluid. Do not apply heat to the threads in the control unit housing; this is not necessary and would cause overheating of the control unit.



– Select settings on hot air blower as shown in illustration, i.e. set temperature potentiometer -2- to maximum heat output and two-stage air flow switch -3- to position 3.

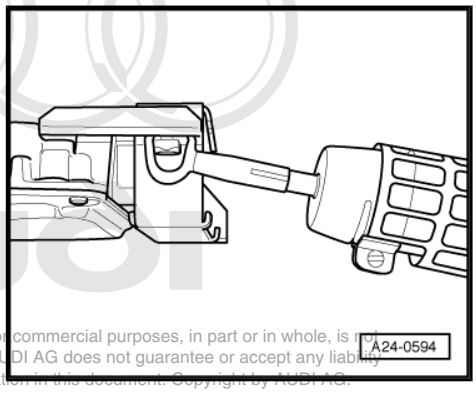


WARNING

Heating the thread of the locking plate also heats up the shear bolts and parts of the metal housing. Take care to avoid burns. It is also important to ensure that only the thread is heated and none of the surrounding components if at all possible. These should be covered if necessary.

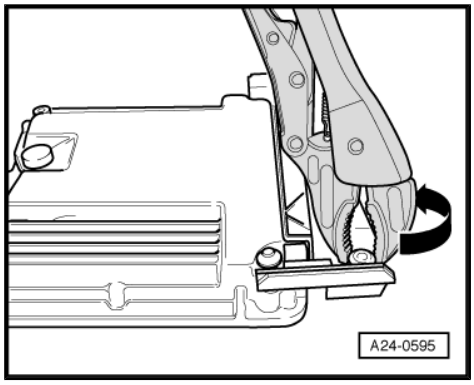
– Apply heat to the threads of the shear bolts on the connector side for approx. 25 to 30 seconds.

– Unscrew shear bolts using mole grips (see arrow in illustration).



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– The two shear bolts screwed into the engine control unit do not need to be heated. They should be removed without being heated.
– Detach metal locking plate from control unit connectors.
– Release connectors on engine control unit and unplug connectors.
– Take out old engine control unit - J623- and install new engine control unit - J623- .



Installing

Installation is performed in the reverse sequence.

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– After installation, the locking plate must be re-fitted on the engine control unit - J623- .
– Clean threaded holes for shear bolts to remove any residue from locking fluid. This can be done using a thread tap.
– Always use new shear bolts.
♦ Tightening torque for bolts securing lid of electronics box: 3.5 Nm.

After installing a new engine control unit, the following operation must be performed:

– Activate engine control unit via a vehicle diagnostic tester in “Guided Functions” mode, “Replace engine control unit”.

7 High-pressure pump

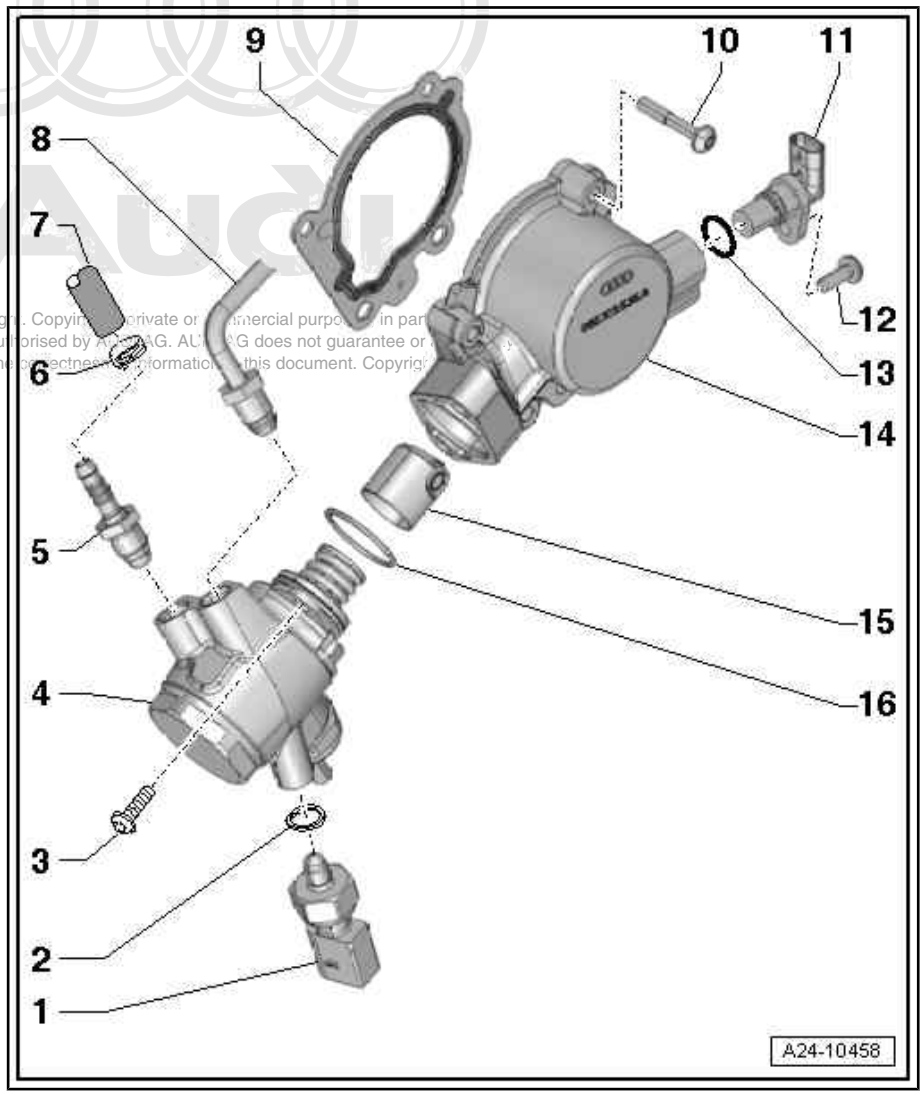
⇒ “7.1 Exploded view - high-pressure pump”, page 345

⇒ “7.2 Removing and installing high-pressure pump”, page 347

⇒ “7.3 Removing and installing high-pressure pipe”, page 350

⇒ “7.4 Checking fuel system pressurisation pump G6 ”, page 351

7.1 Exploded view - high-pressure pump



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1 - Fuel pressure sender for low pressure - G410-

- ❑ 15 Nm

2 - Seal

- ❑ Renew

3 - Bolt

- ❑ Hand-tighten in diagonal sequence, then tighten to 5 Nm
- ❑ Final torque: 20 Nm
- ❑ Do not tilt high-pressure pump

4 - High-pressure pump

- ❑ With fuel metering valve - N290-
- ❑ To loosen and tighten fuel pipes, counterhold at fuel pipe connection
- ❑ Re-tighten threaded connections for fuel pipes before installing fuel pipes
- ❑ Removing and installing ⇒ page 347
- ❑ Do not dismantle

5 - Threaded connection

- ❑ 27 Nm

6 - Hose clip

- ❑ Renew; use correct type of hose clips (as original equipment) ⇒ Parts catalogue

7 - Fuel supply hose

- ❑ Low-pressure section

8 - High-pressure fuel pipe

> **WARNING**
> *The fuel system operates at extremely high pressure. This can cause injury.*
> *The 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 313
- ❑ To loosen and tighten union nut, counterhold at connection on high-pressure pump
- ❑ Before installation, re-tighten connection on high-pressure pump
- ❑ Installing ⇒ page 347

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9 - Gasket

- ❑ Renew

10 - Bolt

- ❑ 9 Nm

11 - Hall sender - G40-

12 - Bolt

- ❑ 9 Nm

13 - O-ring

- ❑ Renew
- ❑ Lubricate lightly with clean engine oil before installing

14 - Housing

15 - Roller tappet

- ❑ Lubricate lightly with clean engine oil before installing

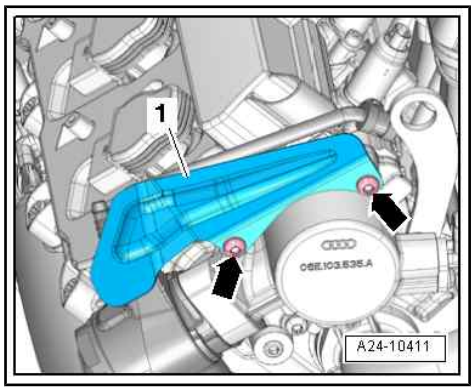
16 - O-ring

- ❑ Renew
- ❑ Lubricate lightly with clean engine oil before installing

Guard plate for high-pressure pipe - tightening torque

– Tighten bolts -arrows- securing guard plate -1-.

♦ Tightening torque: 9 Nm



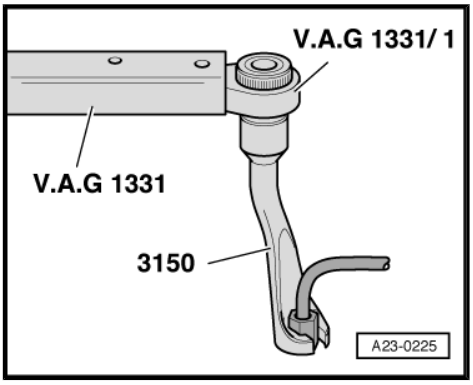
Installing high-pressure pipe

– Tighten union nut on high-pressure pipe hand-tight initially.

– Ensure that high-pressure pipe is not under tension.

– To tighten union of high-pressure pipe at high-pressure pump, use torque wrench - V.A.G 1331- with ratchet - V.A.G 1331/1- and socket, 14 mm - 3150- .

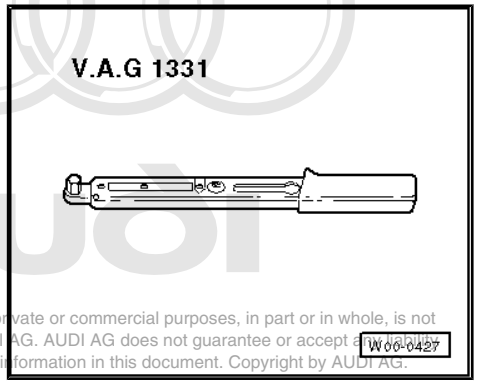
♦ Tightening torque for union nut on high-pressure pipe: 25 Nm



7.2 Removing and installing high-pressure pump

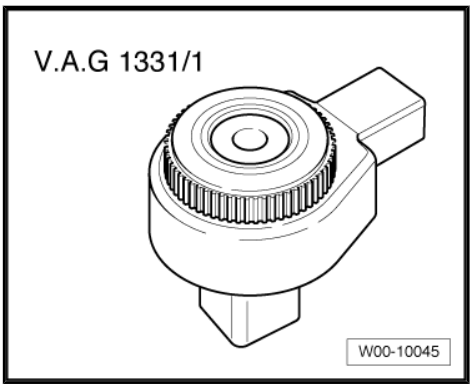
Special tools and workshop equipment required

♦ Torque wrench - V.A.G 1331-

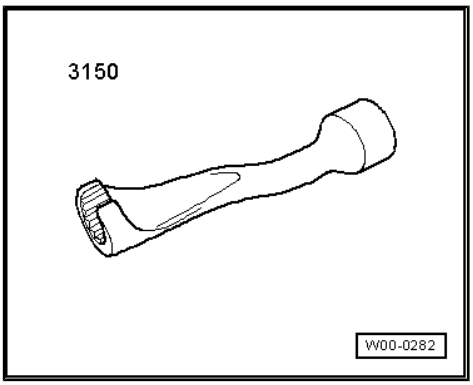


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♦ Ratchet - V.A.G 1331/1-



♦ Socket, 14 mm - 3150-



Removing

WARNING

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

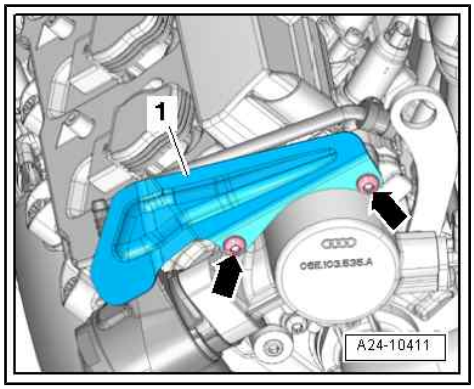
- *The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 313 .*
- *Wrap a clean cloth around the connection and carefully loosen the connection to allow the residual pressure to dissipate.*

Note

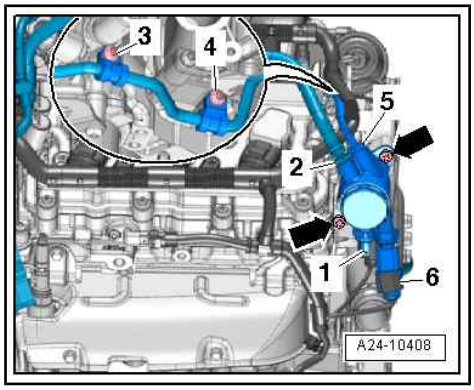
- *The high-pressure pump should only be removed and installed when the engine is cold.*
- *When installing the high-pressure fuel pump, it is essential to ensure that no dirt enters the fuel system.*
- *Use a cloth to catch escaping fuel.*
- *The O-ring must always be renewed.*
- *Always ensure that the high-pressure fuel pipes are free of tension when tightening the connections.*

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– Remove air cleaner (bottom section) ⇒ page 327 .
– Unscrew bolts -arrows- and remove guard plate -1-.



– Unplug electrical connectors -1- and -6-.
– Detach fuel supply hose -2- and unscrew connection -5-.
– Remove bolts -3- and -4- from retaining clips.
– Remove bolts -arrows- and lift high-pressure pipe carefully.

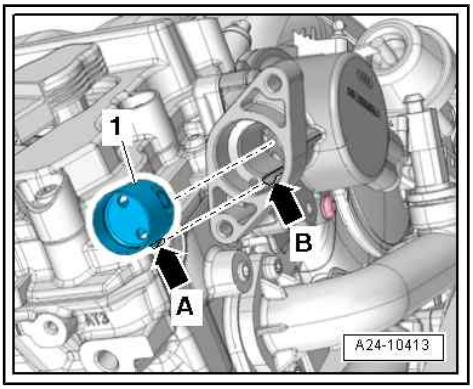


Note

- *Do not bend fuel pipes to a different shape.*
- *Do NOT bend open retaining clamps for fuel pipe.*
- *If one of the retaining clamps has been bent open or the fuel pipe has to be renewed, the retaining clamps must also be renewed.*

– Carefully pull out high-pressure pump.

– Pull roller tappet -1- out of housing.



Installing

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

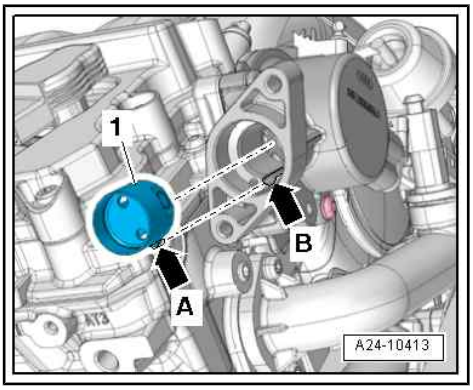
Note

- *The connections of the high-pressure pipe must not be damaged.*
- *Do not bend fuel pipes to a different shape.*
- *Do NOT bend open retaining clamps for fuel pipe.*
- *If one of the retaining clamps has been bent open or the fuel pipe has to be renewed, the retaining clamps must also be renewed.*

– Renew O-ring for high-pressure pump.

– 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-.



Note

The roller tappet must be positioned at the lowest point when installing the high-pressure pump.

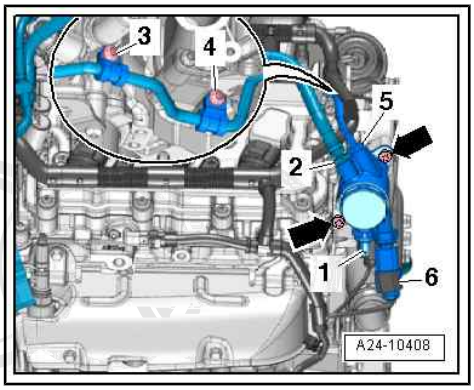
– Rotate crankshaft in direction of engine rotation by turning bolt for vibration damper, and at the same time press roller tappet into cylinder head until it reaches its lowest point.

– Only lift high-pressure pipe slightly to fit high-pressure pump.

– Insert high-pressure pump into housing.

– Hand-tighten the bolts -arrows- as far as the flange.

– Now tighten bolts in diagonal sequence to specified torque (approx 1 turn each until high-pressure pump makes contact).



Note

The pump can be damaged if it is tightened too much on one side (keep it straight).

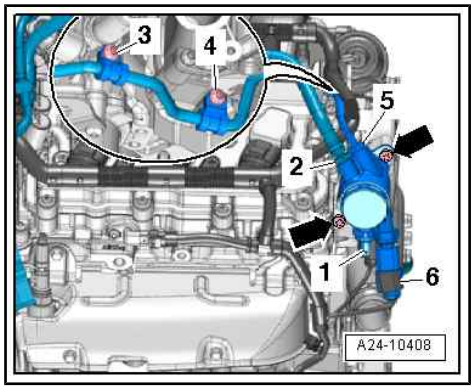
- Tightening torque: refer to exploded view of high-pressure pump ⇒ page 345 .

– Tighten union nut -5- on fuel supply line hand-tight. Align so that parts are free of tension.

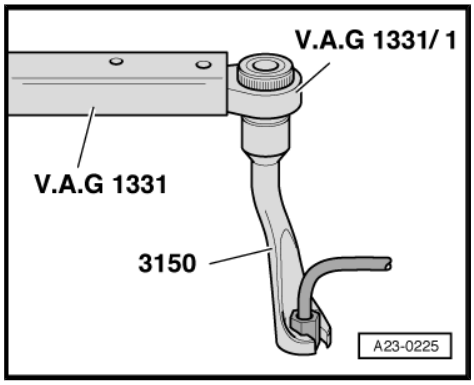
– Connect fuel supply hose -2- again.

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– Tighten bolts -3- and -4- on retaining clips.
– Plug in electrical connectors -1- and -6-.



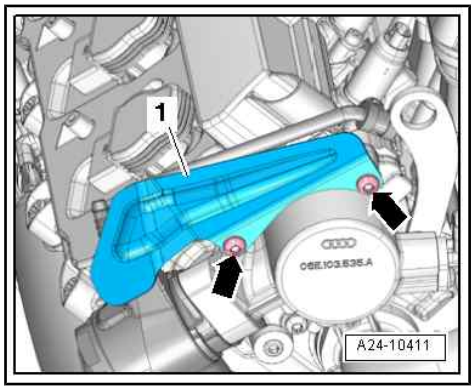
– Tighten high-pressure pipe to specified torque ⇒ page 347 .



– Install guard plate -1-.
– Install air cleaner (bottom section) ⇒ page 327 .

Note

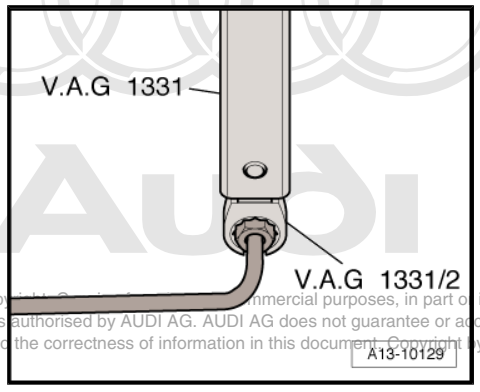
Check fuel system for leaks.



7.3 Removing and installing high-pressure pipe

Special tools and workshop equipment required

- Torque wrench - V.A.G 1331-
- Ring spanner insert set - V.A.G 1331/2-



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Note

- *Tightening union nut on high-pressure pump ⇒ page 347*
- *The connections of the high-pressure pipes must not be damaged.*
- *Do not bend the high-pressure pipes out of shape.*
- *Do NOT bend open retaining clamps for fuel pipe.*
- *If one of the retaining clamps has been bent open or the fuel pipe has to be renewed, the retaining clamps must also be renewed.*

– Lubricate threads of union nuts with fuel.

– Hand-tighten union nuts on high-pressure pipes (ensure that pipes are not under tension).

– To tighten high-pressure pipe on fuel rail, use torque wrench - V.A.G 1331- with ring spanner insert set - V.A.G 1331/2- .

- Tightening torque for union nut on high-pressure pipe: 25 Nm

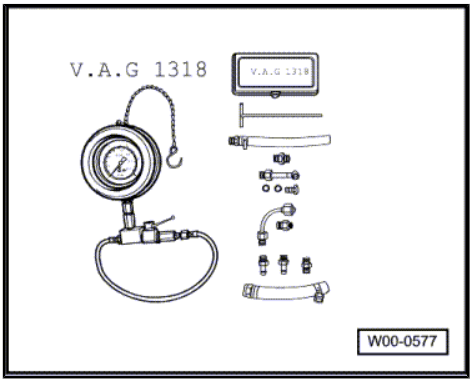
– Do not install retaining tabs until high-pressure pipes have been tightened.

– Check fuel system for leaks.

7.4 Checking fuel system pressurisation pump - G6-

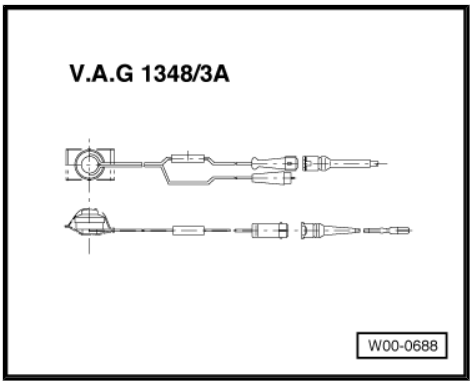
Special tools and workshop equipment required

- K-Jetronic pressure tester - V.A.G 1318-



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- Adapter set - V.A.G 1318/10-12-
- Auxiliary measuring set - V.A.G 1594C-
- Remote control - V.A.G 1348/3A- for V.A.G 1348 with adapter cable -V.A.G 1348/3-3-



- Fuel-resistant measuring container

♦ Protective gloves

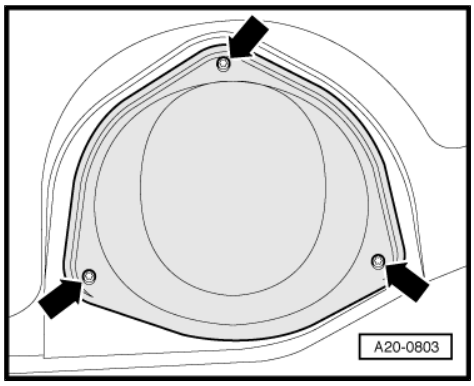
Checking fuel pressure

- Battery voltage at least 12.5 V.
- Fuel filter OK.
- Fuel tank at least $^1/_4$ full.
- Fuel pump control unit - J538- OK.
- Ignition off.

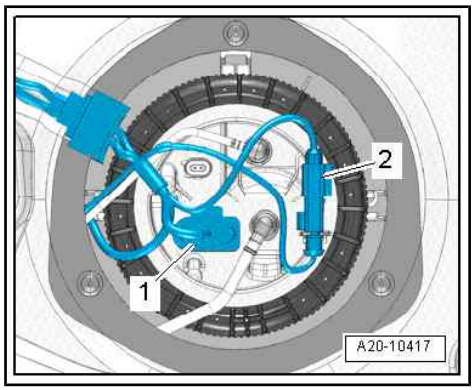
Checking fuel pressure

– Remove rear seat bench ⇒ General body repairs, interior; Rep. gr. 72 ; Rear seats; Removing and installing seat bench/ individual seats .

– Unbolt cover for flange -arrows-.



– Unplug electrical connector -1- at flange.



Note

Disregard -item 2-.

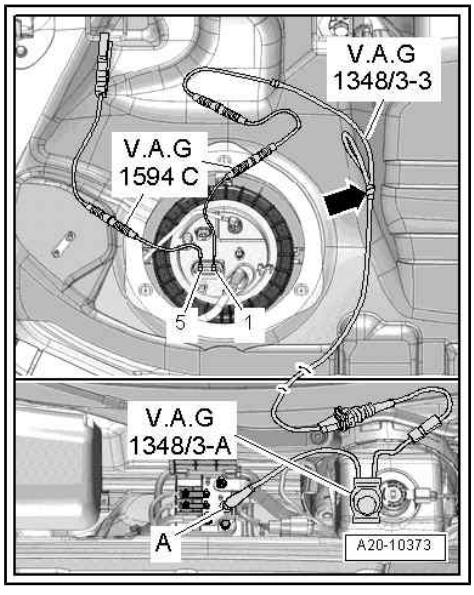
– Connect remote control - V.A.G 1348/3A- for V.A.G 1348 to contact -1- using adapter cable -V.A.G 1348/3-3- and test lead from auxiliary measuring set - V.A.G 1594C- .

– Tape off second connector contact of adapter cable -V.A.G 1348/3-3- with insulating tape -arrow- to prevent short circuits.

– Connect contact -5- to the body (earth) using a test lead from auxiliary measuring set - V.A.G 1594C- .

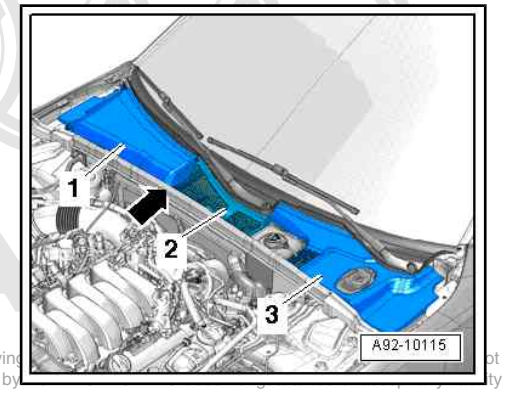
– Connect remote control - V.A.G 1348/3A- for V.A.G 1348 to item -A- of junction box in plenum chamber (battery positive). For safety reasons an in-line fuse (10 A) must be connected into the lead.

– Move switch of remote control - V.A.G 1348/3A- for V.A.G 1348 to front of engine compartment.



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– Remove seal -arrow-.
– Unclip plenum chamber cover -2- and remove.

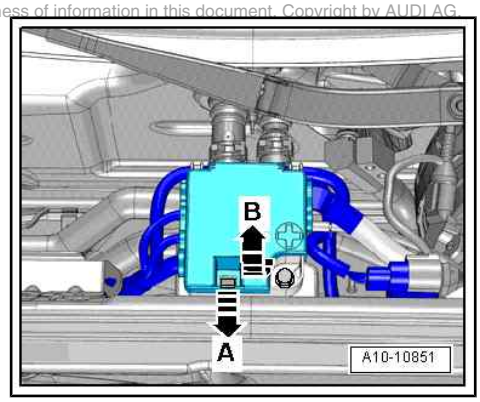


Note

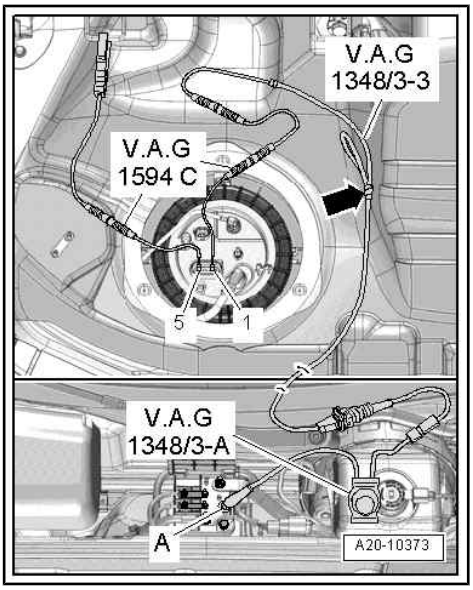
Disregard -items 1 and 3-.

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



– Connect remote control - V.A.G 1348/3A- for V.A.G 1348 to item -A- of junction box in plenum chamber (battery positive). For safety reasons an in-line fuse (10 A) must be connected into the lead.
– Remove filler cap from fuel filler neck.
– Pull off engine cover panel (front).

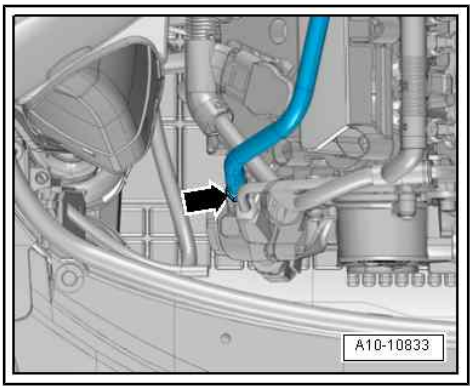


– Disconnect fuel supply line -arrow- from high-pressure pump.

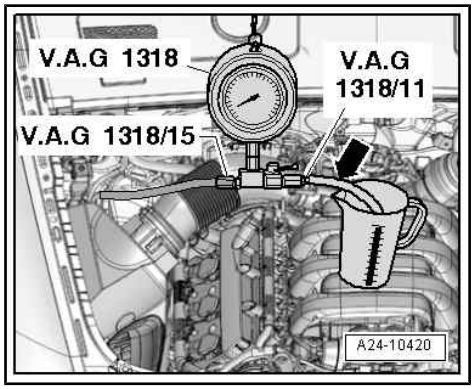
WARNING

Risk of injury - fuel system operates under high pressure.

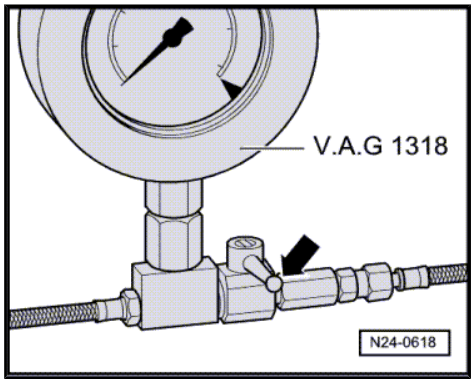
- ***To reduce the pressure in the fuel system, wrap a clean cloth around the connection and carefully loosen the connection.***



– Connect K-Jetronic pressure tester - V.A.G 1318- to fuel supply line with an adapter.
– Fit auxiliary hose -arrow- onto pressure tester and hold it in a container.
– Open cut-off valve on pressure tester.
• Lever points in direction of flow.
– Bleed fuel system by pressing remote control switch briefly.



– Close cut-off valve on pressure tester.
• Lever is at right angle to direction of flow -arrow-.
– Press button on remote control until pressure tester shows no further increase in pressure.
• Specification: approx. 5.5 bar (4.5 ... 6.5 bar)



If specification is not obtained:

– Check delivery rate of fuel pump ⇒ Fuel supply system; Rep. gr. 20 ; Fuel pump; Checking fuel system pressurisation pump - G6- .

Checking residual pressure

– Check system for leaks and check residual pressure by watching the drop in pressure on the pressure tester.
• After 10 minutes pressure should still be at least 3.75 bar.

If the residual pressure drops below 3.75 bar:

♦ Check union between pressure tester and fuel line for leaks.
♦ Check pressure tester for leaks.
♦ Check fuel lines and their connections for leaks.
♦ Check delivery rate of fuel pump ⇒ Fuel supply system; Rep. gr. 20 ; Fuel pump; Checking fuel system pressurisation pump - G6- .
♦ Renew fuel filter with integrated fuel pressure regulator ⇒ Fuel supply system; Rep. gr. 20 ; Fuel filter .
♦ Return valve of fuel pump is defective ⇒ Fuel supply system; Rep. gr. 20 ; Fuel delivery unit/fuel gauge senders; Exploded view - fuel delivery unit/fuel gauge senders .

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

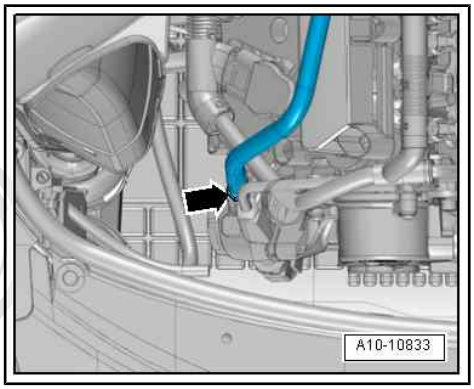
– Switch off ignition.

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Note

Before removing pressure tester, release fuel pressure by opening cut-off valve. Hold a container under the connection.

– Re-connect fuel supply line -arrow- to high-pressure pump.



Note

Check fuel system for leaks.

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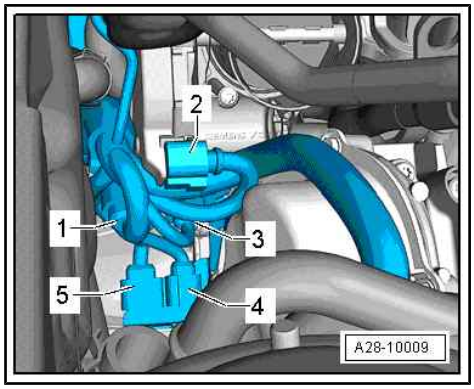
8 Lambda probe

⇒ “8.1 Exploded view - Lambda probe”, page 356

⇒ “8.2 Removing and installing Lambda probe”, page 357

8.1 Exploded view - Lambda probe

Electrical connectors for Lambda probes on cylinder bank 1 (right-side)



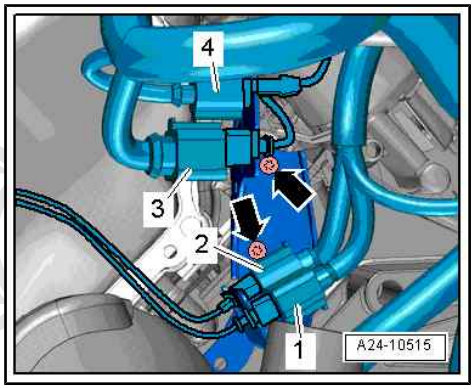
1 - Injectors, cylinder bank 1

2 - Knock sensor 1 - G61-

4 - Lambda probe - G39-

5 - Lambda probe after catalytic converter - G130-

Electrical connectors for Lambda probes on cylinder bank 2 (left-side)



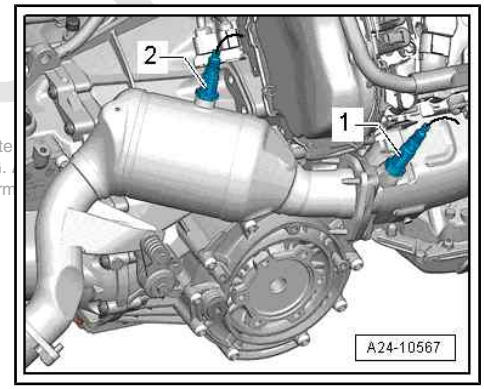
1 - Lambda probe 2 after catalytic converter - G131-

2 - Lambda probe 2 - G108-

3 - Injectors, cylinder bank 2, and for fuel pressure sender - G247-

4 - Knock sensor 2 - G66-

Fitting location of Lambda probes on cylinder bank 1 (right-side)



1 - Lambda probe - G39-

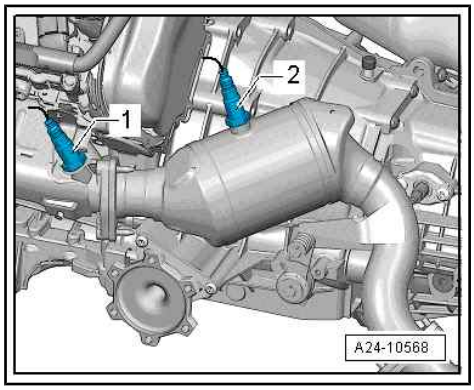
2 - Lambda probe after catalytic converter - G130-

Removing and installing Lambda probe - G39-
⇒ “8.2.1 Removing and installing Lambda probe G39 before catalytic converter - bank 1 (right-side)”, page 357

Removing and installing Lambda probe after catalytic converter - G130-
⇒ “8.2.2 Removing and installing Lambda probe after catalytic converter G130 - bank 1 (right-side)”, page 358

♦ Tightening torque: 55 Nm

Fitting location of Lambda probes on cylinder bank 2 (left-side)



1 - Lambda probe 2 - G108-

2 - Lambda probe 2 after catalytic converter - G131-

Removing and installing Lambda probe 2 - G108-
⇒ “8.2.3 Removing and installing Lambda probe 2 G108 before catalytic converter - bank 2 (left-side)”, page 360

Removing and installing Lambda probe 2 after catalytic converter - G131-
⇒ “8.2.4 Removing and installing Lambda probe 2 after catalytic converter G131 - bank 2 (left-side)”, page 362

♦ Tightening torque: 55 Nm

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8.2 Removing and installing Lambda probe

⇒ “8.2.1 Removing and installing Lambda probe G39 before catalytic converter - bank 1 (right-side)”, page 357

⇒ “8.2.2 Removing and installing Lambda probe after catalytic converter G130 - bank 1 (right-side)”, page 358

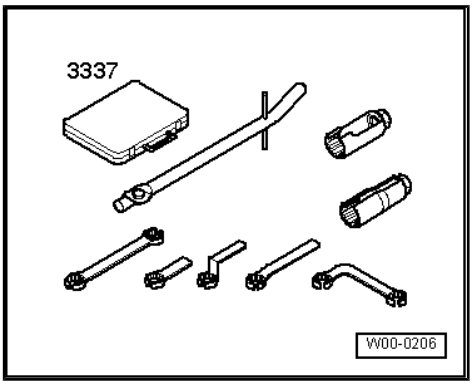
⇒ “8.2.3 Removing and installing Lambda probe 2 G108 before catalytic converter - bank 2 (left-side)”, page 360

⇒ “8.2.4 Removing and installing Lambda probe 2 after catalytic converter G131 - bank 2 (left-side)”, page 362

8.2.1 Removing and installing Lambda probe - G39- before catalytic converter - bank 1 (right-side)

Special tools and workshop equipment required

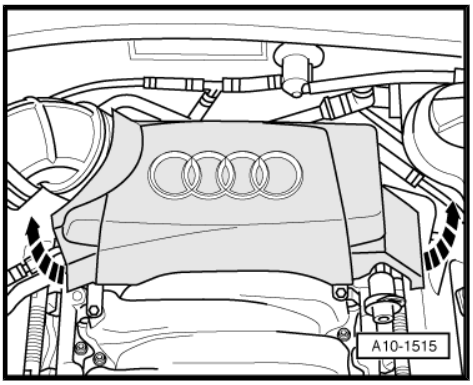
- Lambda probe open ring spanner set - 3337-



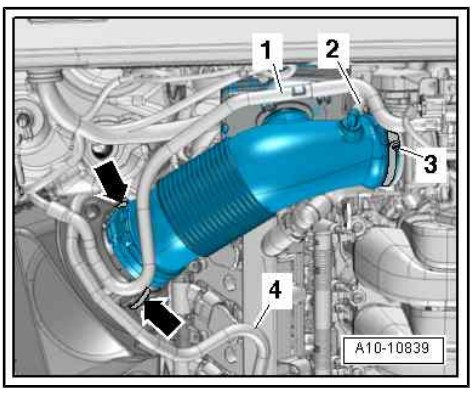
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Removing

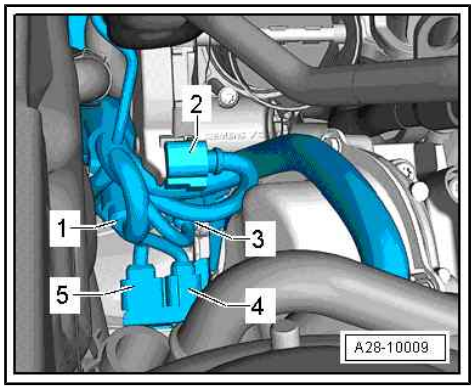
– Pull off engine cover panel (rear) -arrows-.



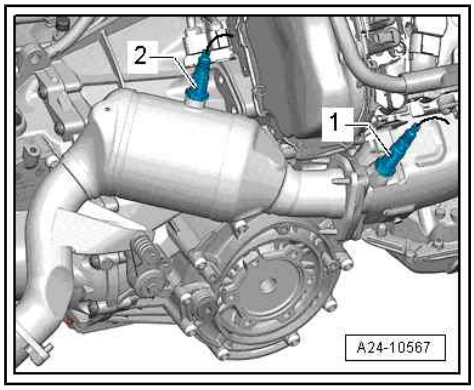
– Move fuel supply hose -4- and hose connection -1- leading to activated charcoal filter clear on air cleaner housing and air pipe.
– Detach vacuum hose -2- from air hose.
– Remove air hose. To do so, release hose clip -3- and clamps -arrows-.
– Remove air cleaner (bottom section) ⇒ page 327 .



– Unplug electrical connector -4- for Lambda probe - G39- .



– Unscrew Lambda probe - G39- -1- using tool from Lambda probe open ring spanner set - 3337- .



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:

- Tightening torque: refer to overview of Lambda probes ⇒ page 356 .

Note

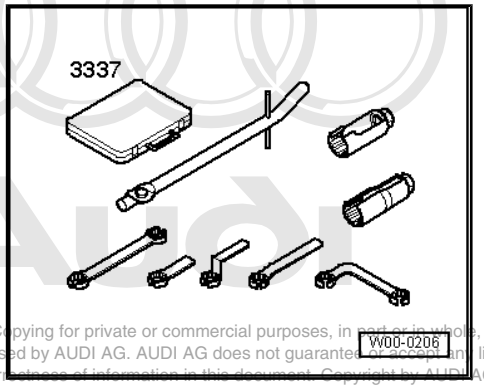
- *New Lambda probes are coated with an assembly paste.*
- *If reinstalling the old Lambda probes, coat the threads with high-temperature paste ⇒ Electronic parts catalogue .*
- *The assembly paste/high-temperature paste must not get into the slots on the Lambda probe body.*
- *When installing, the Lambda 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.*

8.2.2 Removing and installing Lambda probe after catalytic converter - G130- - bank 1 (right-side)

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Special tools and workshop equipment required

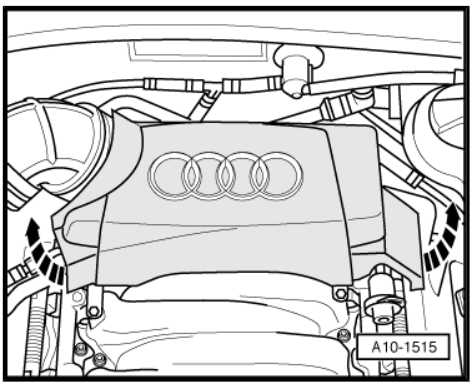
♦ Lambda probe open ring spanner set - 3337-



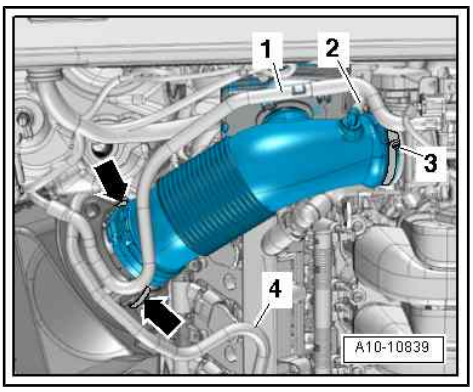
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Removing

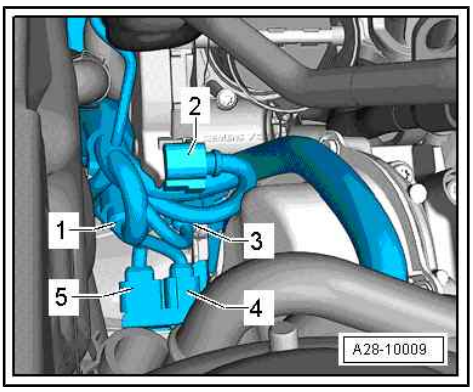
– Pull off engine cover panel (rear) -arrows-.



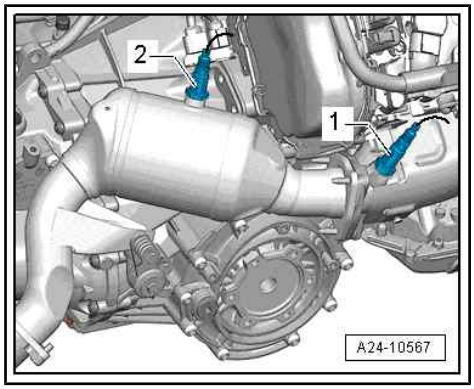
– Move fuel supply hose -4- and hose connection -1- leading to activated charcoal filter clear on air cleaner housing and air pipe.
– Detach vacuum hose -2- from air hose.
– Remove air hose. To do so, release hose clip -3- and clamps -arrows-.



– Unplug electrical connector -5- for Lambda probe after catalytic converter - G130- .



– Unscrew Lambda probe after catalytic converter - G130- -2- using tool from Lambda probe open ring spanner set - 3337- .



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:

- Tightening torque: refer to overview of Lambda probes ⇒ page 356 .

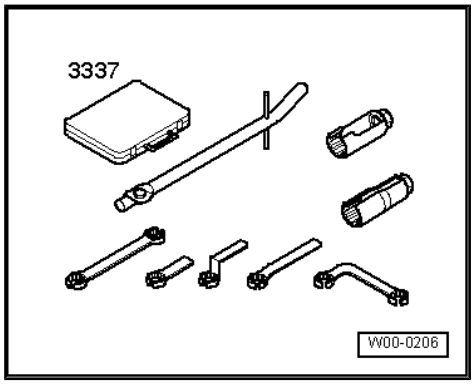
Note

- *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.*

8.2.3 Removing and installing Lambda probe 2 - G108- before catalytic converter - bank 2 (left-side)

Special tools and workshop equipment required

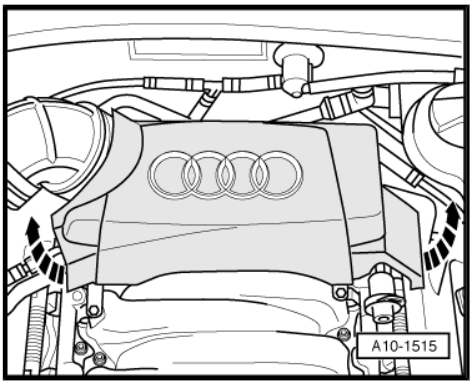
- Lambda probe open ring spanner set - 3337-



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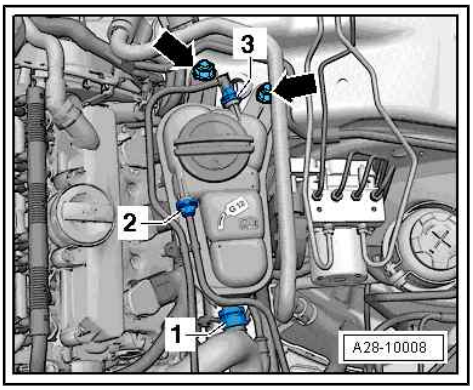
Removing

– Pull off engine cover panel (rear) -arrows-.

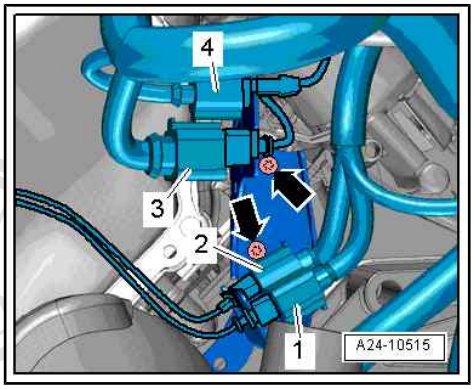


– Unbolt coolant expansion tank -arrows-.

– Unplug electrical connector for coolant shortage indicator switch - F66- at bottom of expansion tank and move expansion tank to one side with coolant hoses -1-, -2- and -3- attached.

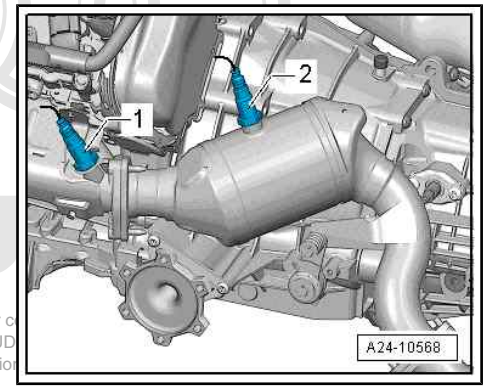


– Unplug electrical connector -2- for Lambda probe 2 - G108- .



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– Unscrew Lambda probe 2 - G108- -1- using tool from Lambda probe open ring spanner set - 3337- .



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:

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- Tightening torque: refer to overview of Lambda probes ⇒ page 356 .

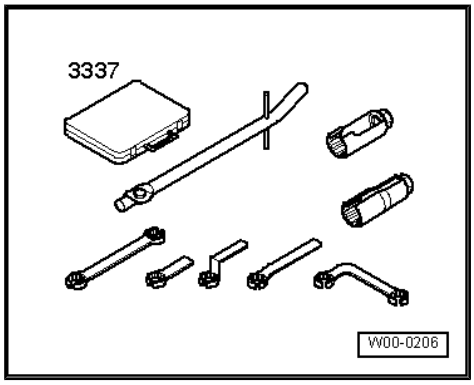
Note

- *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.*

8.2.4 Removing and installing Lambda probe 2 after catalytic converter - G131- - bank 2 (left-side)

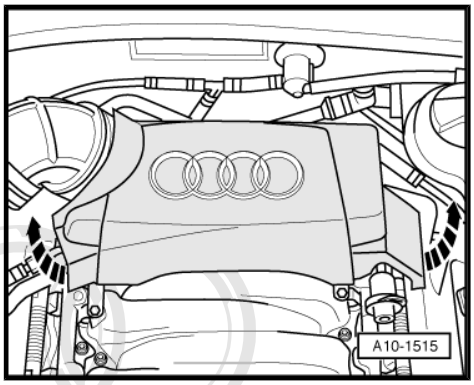
Special tools and workshop equipment required

- Lambda probe open ring spanner set - 3337-



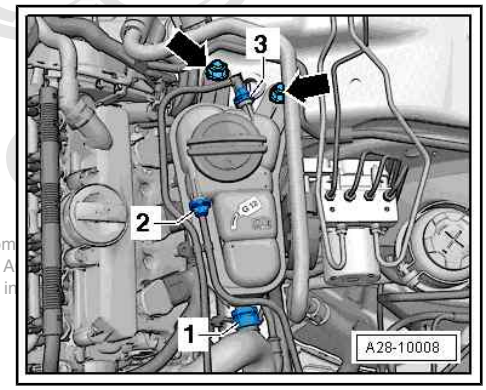
Removing

– Pull off engine cover panel (rear) -arrows-.



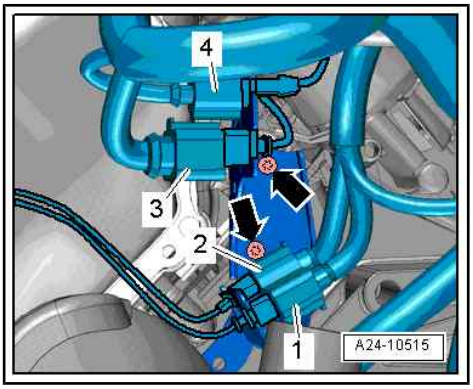
– Unbolt coolant expansion tank -arrows-.

– Unplug electrical connector for coolant shortage indicator switch - F66- at bottom of expansion tank and move expansion tank to one side with coolant hoses -1, 2 and 3- attached.

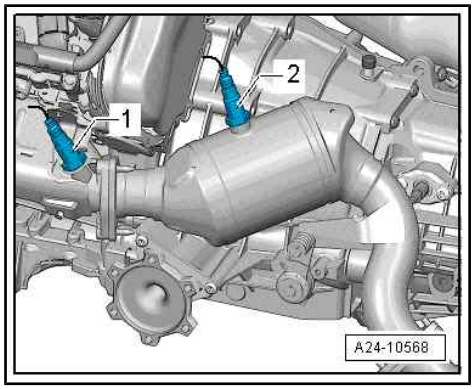


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– Unplug electrical connector -1- for Lambda probe 2 after catalytic converter - G131- .



– Unscrew Lambda probe 2 after catalytic converter - G131- -2- using tool from Lambda probe open ring spanner set - 3337- .



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:

- Tightening torque: refer to overview of Lambda probes ⇒ page 356 .

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.*

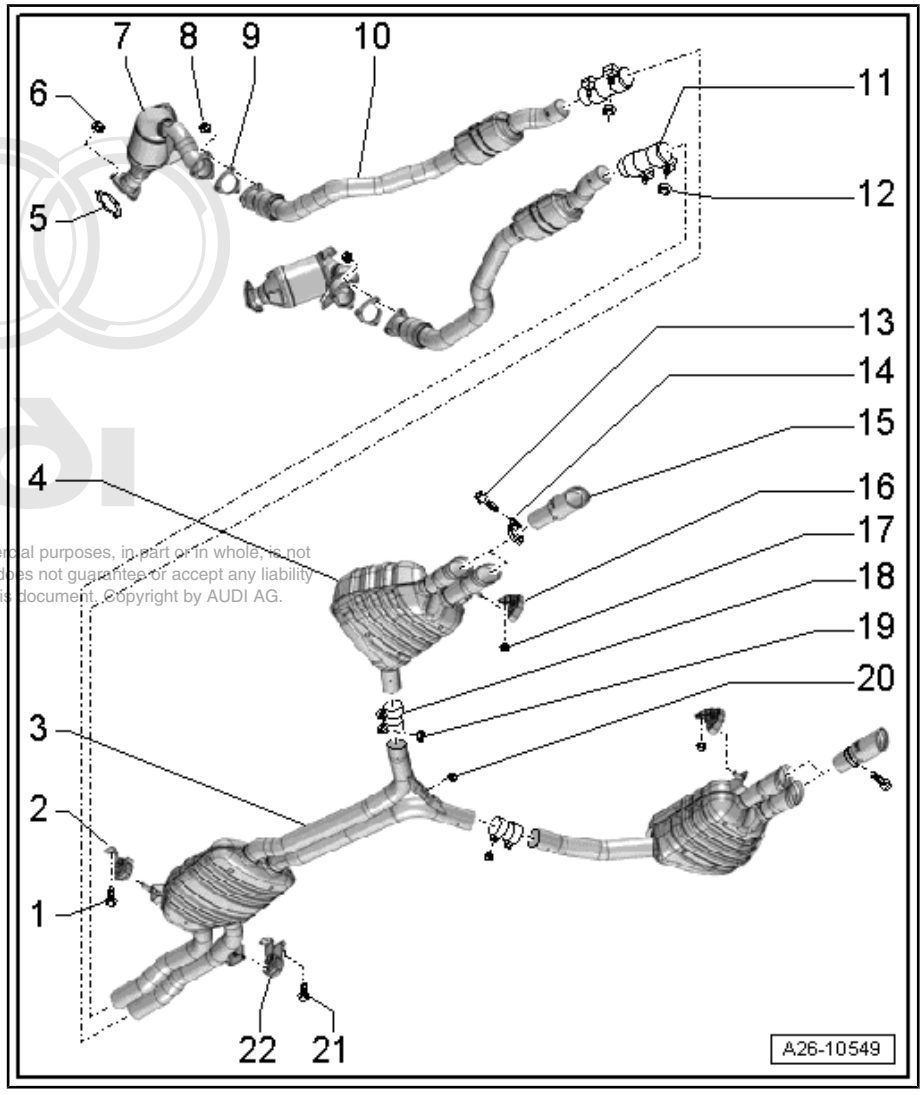
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26 – Exhaust system

1 Exhaust pipes/silencers

⇒ “1.1 Exploded view - silencers”, page 365
⇒ “1.2 Separating exhaust pipes/silencers”, page 369
⇒ “1.3 Removing and installing front silencers”, page 370
⇒ “1.4 Renewing tailpipes”, page 371
⇒ “1.5 Stress-free alignment of exhaust system”, page 372
⇒ “1.6 Aligning tailpipes”, page 373
⇒ “1.7 Checking exhaust system for leaks”, page 373

1.1 Exploded view - silencers



1 - Bolt

- ❑ 23 Nm

2 - Mounting

- ❑ Renew if damaged
- ❑ Check preload ⇒ “1.5 Stress-free alignment of exhaust system”, page 372

3 - Centre silencer

- ❑ Combined in one unit with rear silencers as original equipment. Can be renewed individually for repair purposes
- ❑ For removal on A5 Cabriolet: remove diagonal struts ⇒ page 369
- ❑ Cutting point ⇒ page 369
- ❑ Align exhaust system so it is free of stress ⇒ page 372

4 - Rear silencer

- ❑ Combined as one unit with centre silencer and tailpipe as original equipment
- ❑ For removal on A5 Cabriolet: remove diagonal struts ⇒ page 369
- ❑ Centre silencer, rear silencer and tailpipe can be renewed separately as required
- ❑ Cutting point: centre silencer / rear silencer ⇒ page 369
- ❑ Cutting point between rear silencer and tailpipe ⇒ page 371
- ❑ Align exhaust system so it is free of stress ⇒ page 372

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5 - Gasket

- ❑ Renew

6 - Nut

- ❑ 23 Nm

7 - Catalytic converter

- ❑ Protect against knocks and impact
- ❑ Removing and installing:

- ♦ left-side (vehicles with manual gearbox) ⇒ page 374
- ♦ left-side (vehicles with multitronic gearbox 0AW/automatic gearbox 0B6) ⇒ page 376
- ♦ right-side (vehicles with manual gearbox/multitronic gearbox 0AW) ⇒ page 377
- ♦ right-side (vehicles with automatic gearbox 0B6) ⇒ page 378

- ❑ Mounting components ⇒ page 368

8 - Nut

- ❑ 23 Nm

9 - Gasket

- ❑ Renew

10 - Front silencer

- ❑ With flexible joint; do not bend flexible joint more than 10° – otherwise it can be damaged
- ❑ Removing and installing ⇒ page 370
- ❑ Align exhaust system so it is free of stress ⇒ page 372

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11 - Clamp (front)

- ❑ Installation position ⇒ page 367
- ❑ Before tightening, align exhaust system so it is free of stress ⇒ page 372
- ❑ Tighten bolt connections evenly

12 - Nut

- ❑ 23 Nm

13 - Bolt

- ❑ 23 Nm

14 - Clip

15 - Tailpipe

- ❑ Combined in one unit with rear silencer as original equipment. Can be renewed individually for repair purposes
- ❑ Cutting point ⇒ page 371
- ❑ Aligning ⇒ page 373

16 - Mounting

- ❑ Renew if damaged
- ❑ Check preload ⇒ “1.5 Stress-free alignment of exhaust system”, page 372

17 - Nut

- ❑ Renew
- ❑ 20 Nm

18 - Clamp (rear)

- ❑ For separate replacement of centre and rear silencers
- ❑ Installation position ⇒ page 367
- ❑ Before tightening, align exhaust system so it is free of stress ⇒ page 372
- ❑ Tighten bolt connections evenly

19 - Nut

- ❑ 23 Nm

20 - Nut

- ❑ Renew
- ❑ 23 Nm

21 - Bolt

- ❑ 23 Nm

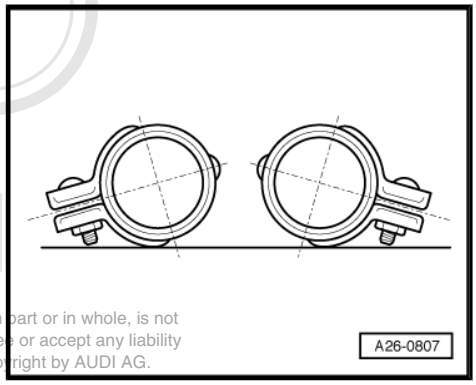
22 - Mounting

- ❑ Renew if damaged
- ❑ Check preload ⇒ “1.5 Stress-free alignment of exhaust system”, page 372

Installation position of front clamps

– Install clamps so that the bolt ends do not protrude beyond bottom of clamp.

• Installation position: bolt connections face outwards.

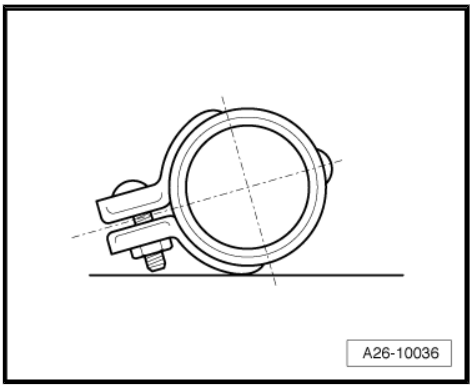


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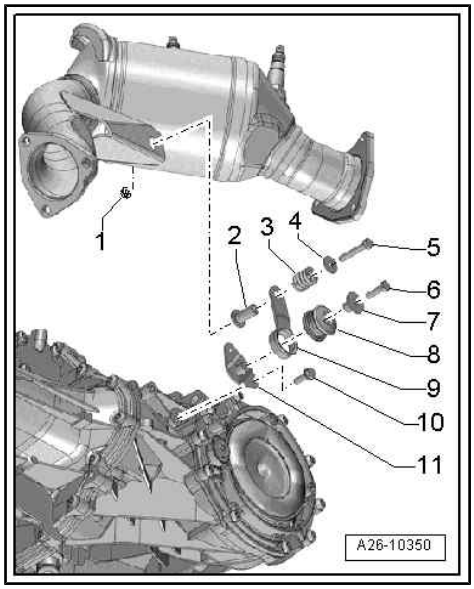
Installation position of rear clamps

– 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 - vehicles with manual gearbox/automatic gearbox 0B6

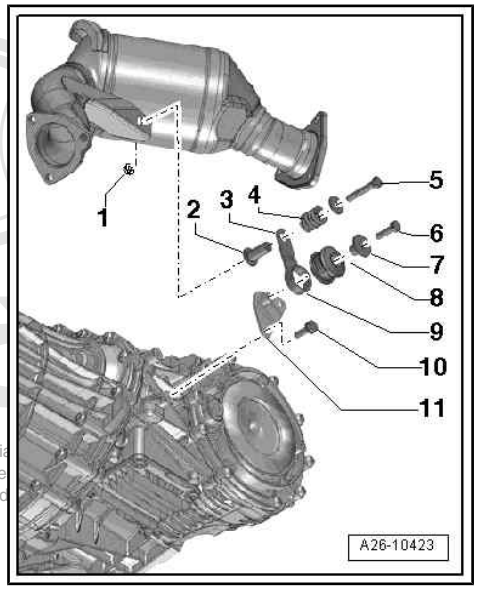


1 - Nut, 23 Nm
2 - Spacer sleeve
3 - Compression spring
4 - Washer
5 - Bolt
6 - Bolt, 23 Nm
7 - Spacer sleeve
8 - Buffer
9 - Bracket
10 - Bolt, 23 Nm
11 - Bracket

Note

The illustration shows the right-side mountings; the left-side mountings are symmetrically reversed.

Components of mountings for catalytic converter - vehicles with multitronic gearbox 0AW



1 - Nut, 23 Nm
2 - Spacer sleeve
3 - Compression spring
4 - Washer
5 - Bolt
6 - Bolt, 23 Nm
7 - Spacer sleeve
8 - Buffer
9 - Bracket
10 - Bolt, 23 Nm
11 - Bracket

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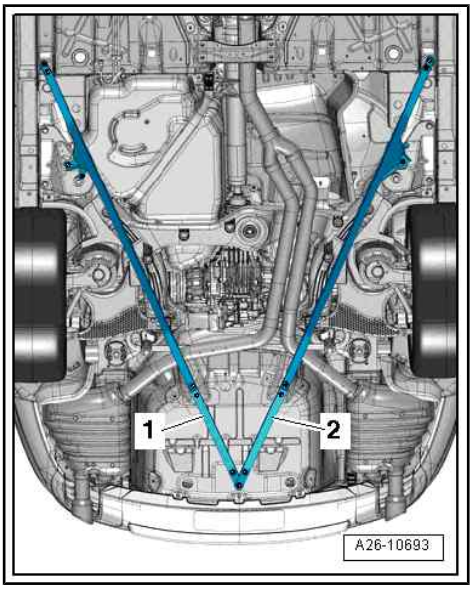
Note

The illustration shows the right-side mountings; the left-side mountings are symmetrically reversed.

Diagonal struts (A5 Cabriolet)

– Remove diagonal struts -1- and -2- when removing centre silencer and rear silencer unit.

– Install diagonal struts ⇒ Running gear, axles, steering; Rep. gr. 42 ; Subframe; Exploded view - subframe .

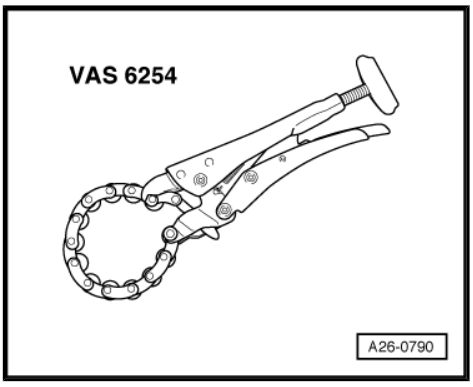


1.2 Separating exhaust pipes/silencers

- 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.

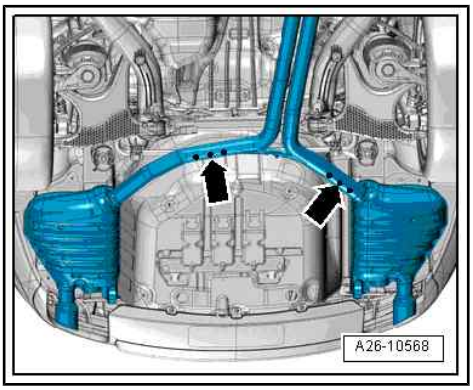
Special tools and workshop equipment required

- Chain pipe cutter - VAS 6254-



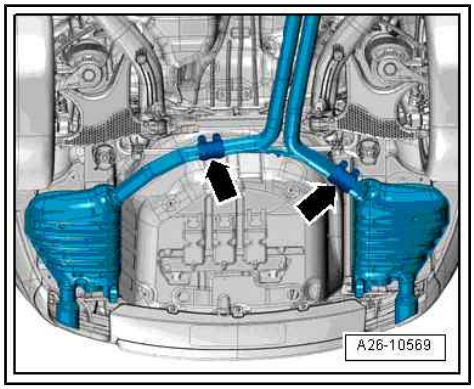
Procedure

– Cut through exhaust pipes at right angle at the position marked -arrows- using chain pipe cutter - VAS 6254- .



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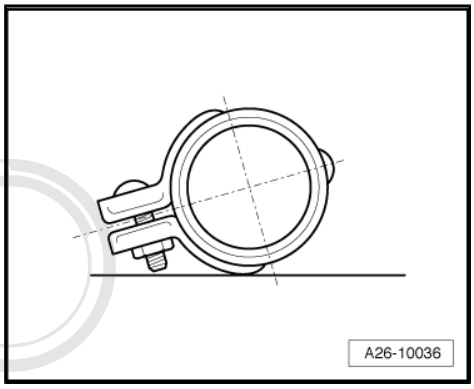
– Position centre of clamps -arrows- over cutting location.



– 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 372 .

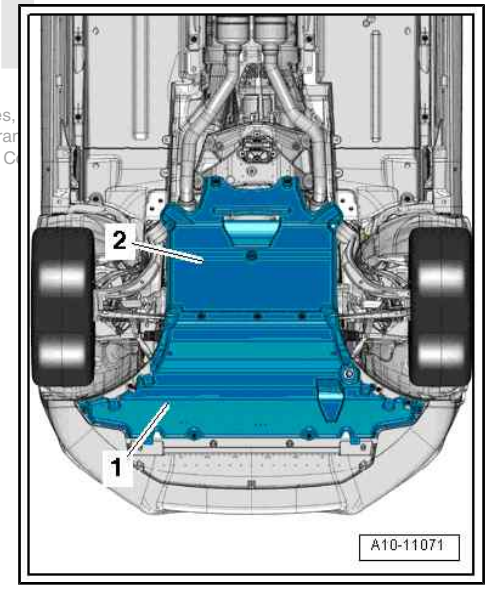


1.3 Removing and installing front silencers

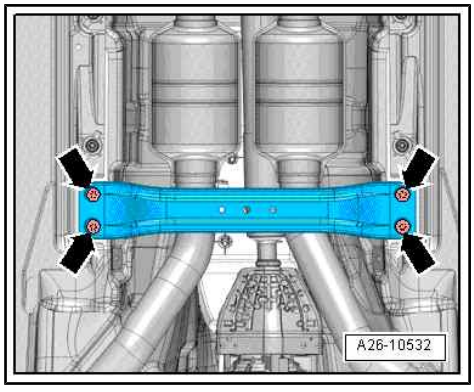
Removing

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

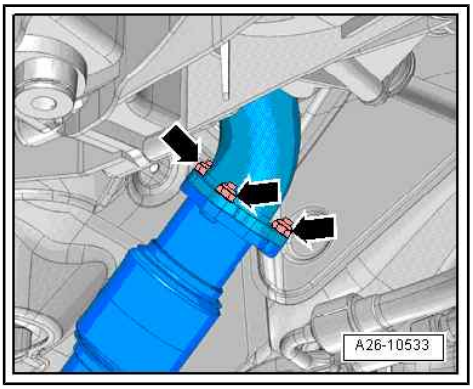
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– If fitted, remove bolts -arrows- and detach front cross member.

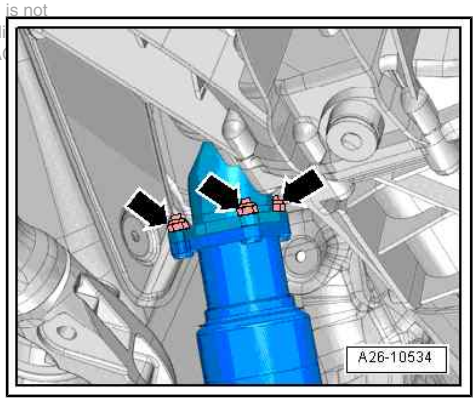


– Unscrew nuts -arrows- for front silencer (left-side).



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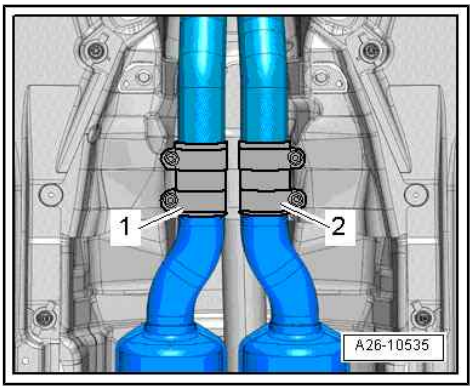
– Unscrew nuts -arrows- for front silencer (right-side).



Caution

Risk of damage to flexible joints in front silencer.

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



– Release and push back clamp -1- or -2- and detach relevant front silencer.

Installing

- Tightening torque ⇒ page 365

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 372 .

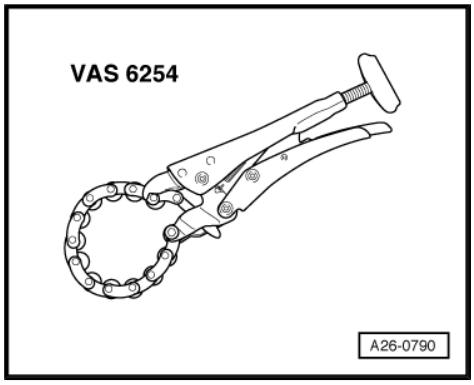
– Install front cross member ⇒ General body repairs, exterior; Rep. gr. 66 ; Underbody trim panels .

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

1.4 Renewing tailpipes

Special tools and workshop equipment required

♦ Chain pipe cutter - VAS 6254-



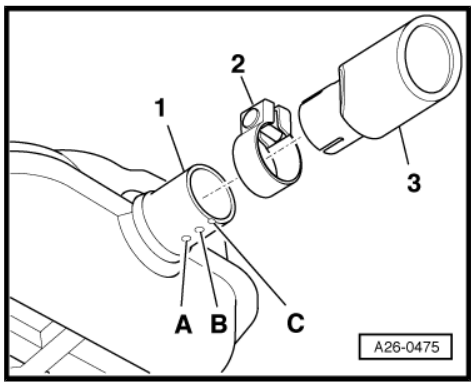
Procedure

- Tightening torque ⇒ page 365

– Cut through tailpipe -1- with chain pipe cutter - VAS 6254- at the position marked -C-.

– Push new tailpipe -3- onto tailpipe as far as marking -A-. Slot on tailpipe should align with marking -B-.

– Tighten nut for clamp -2-.



1.5 Stress-free alignment of exhaust system

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Procedure

- The exhaust system must be aligned when it is cool.
- Tightening torque ⇒ page 365

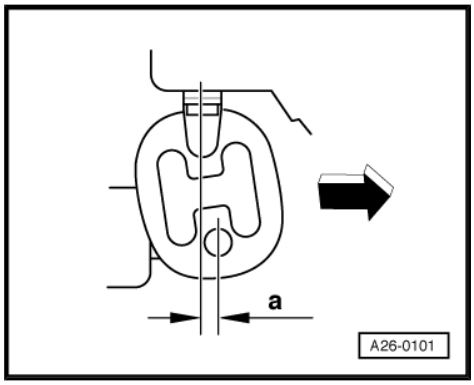
Vehicles without clamps between centre silencer and rear silencers

– 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.

– Align tailpipes ⇒ page 373 .



Vehicles with clamps between centre silencer and rear silencers

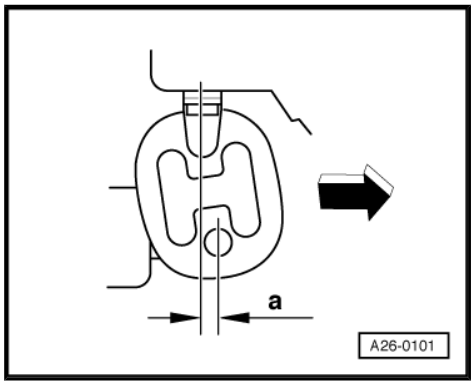
Note

On a vehicle with clamps fitted between the centre silencer and rear silencers, it is also necessary to align the centre silencer.

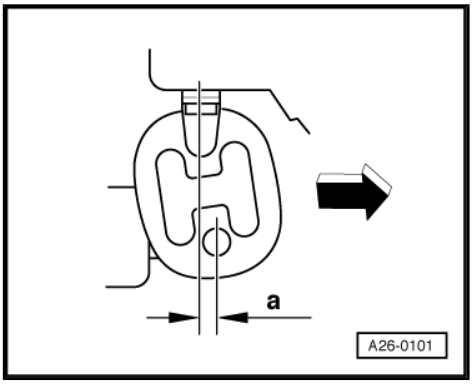
– Loosen bolt connections on front and rear clamps.

– 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.



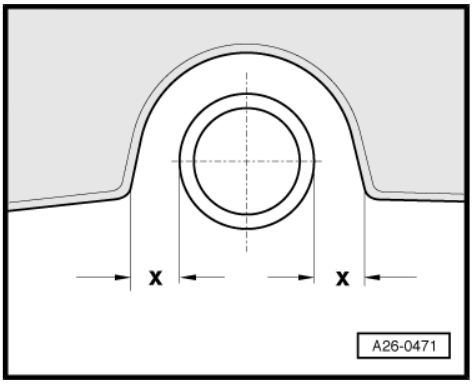
– Push rear section of exhaust system towards front of vehicle -arrow-, so that mountings (rear) for rear silencers are preloaded by -a- = 11 ... 15 mm.
– Align rear silencers so they are horizontal.
– Tighten bolt connections on rear clamps evenly.
– Align tailpipes ⇒ page 373 .



1.6 Aligning tailpipes

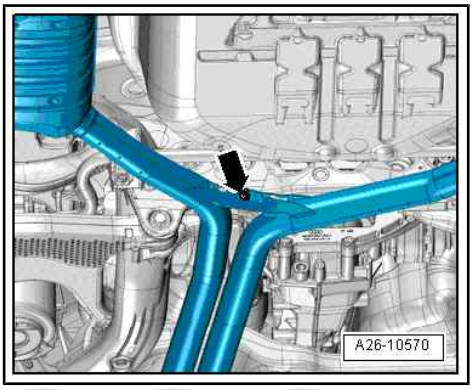
Procedure

• Tightening torque ⇒ page 365
– Check clearance between tailpipes and bumper on both sides:
• Dimension -x- (left-side) = dimension -x- (right-side)



If necessary, correct dimension -x- as follows:

– Loosen connection -arrow- on strut between exhaust pipes.
– Adjust the distance between the rear silencers.



1.7 Checking exhaust system for leaks

– Start the engine and run at idling speed.
– Plug tailpipes during leak test (e.g. with cloth or plugs).
– Listen for noise at connections between cylinder head/exhaust manifold, exhaust manifold/front exhaust pipe, etc. to locate any leaks.
– Rectify any leaks that are found.

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2 Emission control system

⇒ “2.1 Removing and installing catalytic converter (left-side)”, page 374

⇒ “2.2 Removing and installing catalytic converter (right-side)”, page 377

2.1 Removing and installing catalytic converter (left-side)

⇒ “2.1.1 Removing and installing catalytic converter (left-side) - vehicles with manual gearbox”, page 374

⇒ “2.1.2 Removing and installing catalytic converter (left-side) - vehicles with multitronic gearbox 0AW/automatic gearbox 0B6”, page 376

2.1.1 Removing and installing catalytic converter (left-side) - vehicles with manual gearbox

Removing

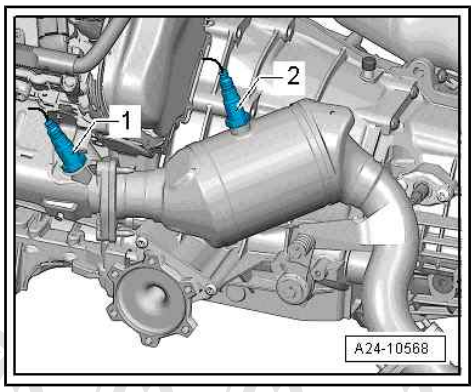
– Remove front silencer (left-side) ⇒ page 370 .

– Remove Lambda probe 2 after catalytic converter - G131- -item 2- ⇒ page 357 .

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.*



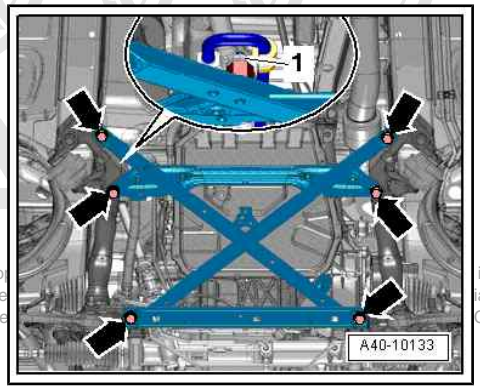
A4 (all), A5 Coupé:

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

– Remove bolts -arrows- and detach subframe cross brace.

Note

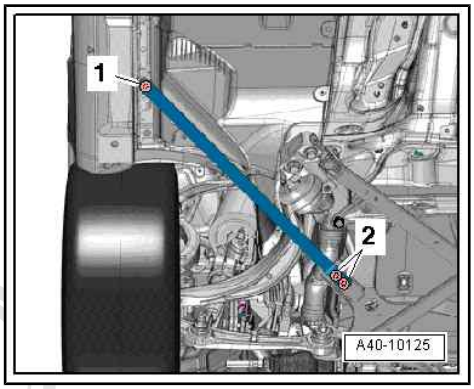
Illustration shows the installation position on a vehicle with dynamic steering.



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A5 Cabriolet:

– Remove bolt -2- on both sides.

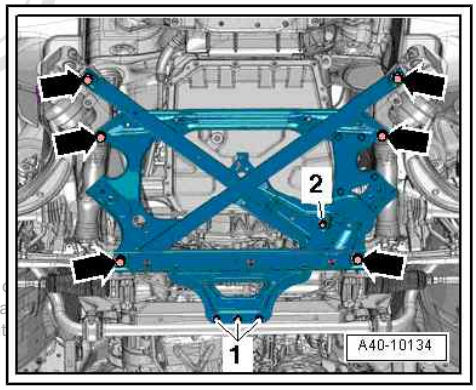


Note

Disregard -item 1-.

– Remove bolt -2- for power steering hydraulic line.

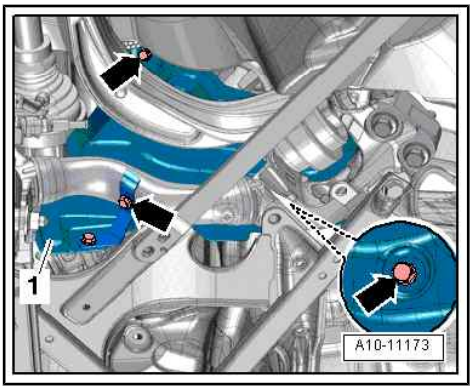
– Remove bolts -1- and -arrows- and detach subframe cross brace.



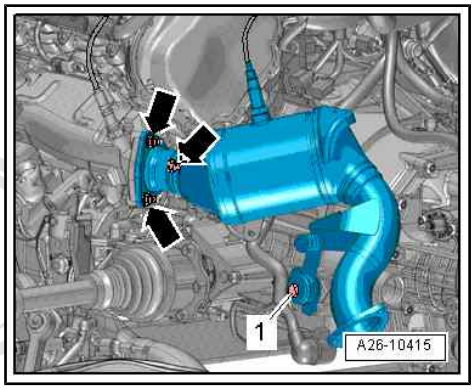
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All vehicles (continued):

– If fitted, remove bolts -arrows- and detach heat shield -1- (left-side).



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



Note

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

Installing

- Tightening torque ⇒ page 365

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

Note

Renew gaskets and self-locking nuts.

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

– Install Lambda probe 2 after catalytic converter - G131- ⇒ page 357 .

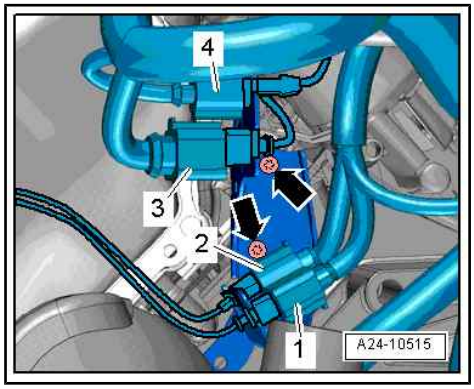
– Install front silencer (left-side) ⇒ page 370 .

2.1.2 Removing and installing catalytic converter (left-side) - vehicles with multitronic gearbox 0AW/automatic gearbox 0B6

Removing

- Gearbox removed.

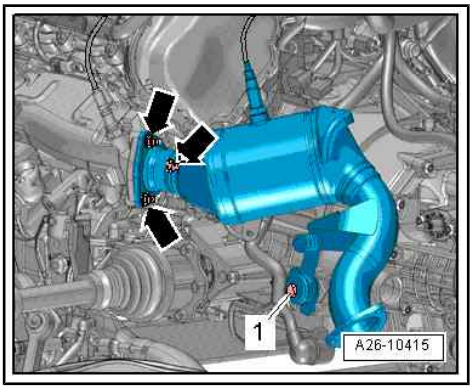
– Remove electrical connector -1- for Lambda probe 2 after catalytic converter - G131- from bracket and unplug connector.



Note

Disregard items marked -2, 3, 4- and -arrows-.

– Unscrew nuts -arrows- and detach catalytic converter (left-side).



Note

- *For illustration purposes, the installation position is shown with the engine removed.*
- *Disregard -item 1-.*

Installing

- Tightening torque ⇒ page 365

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

Note

Renew gaskets and self-locking nuts.

2.2 Removing and installing catalytic converter (right-side)

⇒ "2.2.1 Removing and installing catalytic converter (right-side) - vehicles with manual gearbox/multitronic gearbox 0AW", page 377

⇒ "2.2.2 Removing and installing catalytic converter (right-side) - vehicles with automatic gearbox 0B6", page 378

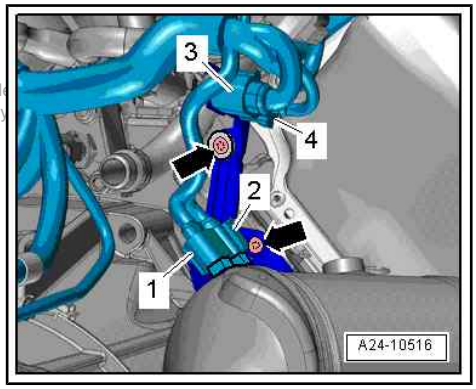
2.2.1 Removing and installing catalytic converter (right-side) - vehicles with manual gearbox/multitronic gearbox 0AW

Removing

- Gearbox removed.

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– Remove electrical connector -1- for Lambda probe after catalytic converter - G130- from bracket, unplug and move wiring clear.



Note

Disregard items marked -2, 3, 4- and -arrows-.

– Detach catalytic converter (right-side).

Installing

- Tightening torque ⇒ page 365

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

Note

Renew gaskets and self-locking nuts.

2.2.2 Removing and installing catalytic converter (right-side) - vehicles with automatic gearbox 0B6

Removing

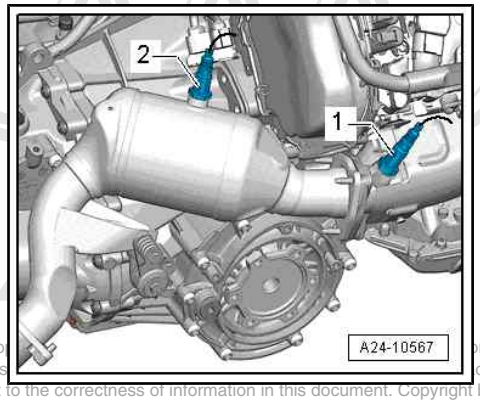
– Remove front silencer (right-side) ⇒ page 370 .

– Remove Lambda probe after catalytic converter - G130- -item 2- ⇒ page 357 .

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.*

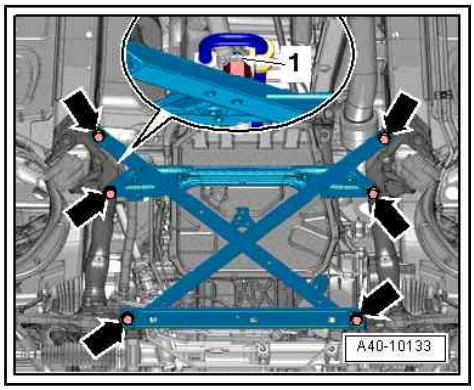


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A4 (all), A5 Coupé:

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

– Remove bolts -arrows- and detach subframe cross brace.

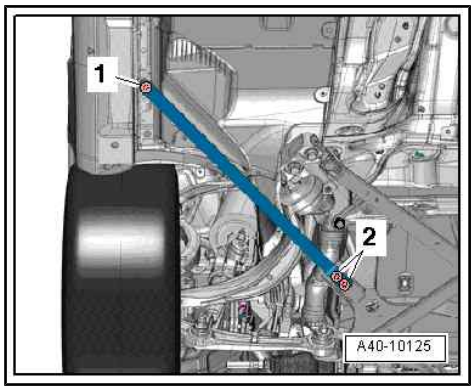


Note

Illustration shows the installation position on a vehicle with dynamic steering.

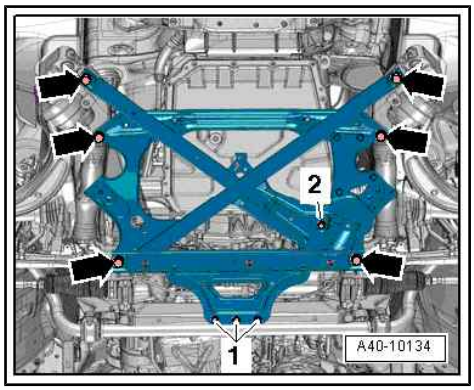
A5 Cabriolet:

– Remove bolts -1- and -2- on both sides and detach strut.



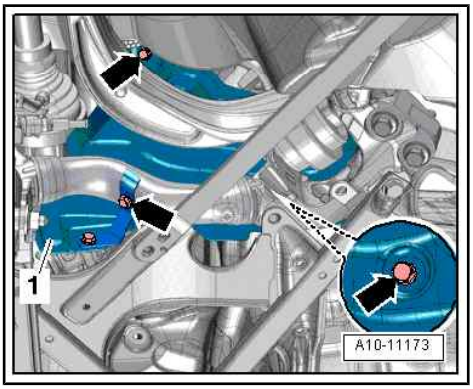
– Remove bolt -2- for power steering hydraulic line.

– Remove bolts -1- and -arrows- and detach subframe cross brace.



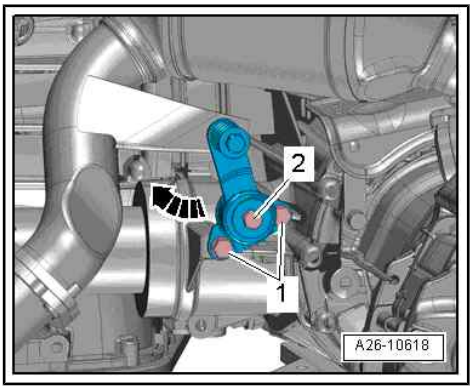
All vehicles (continued):

– If fitted, remove bolts -arrows- and detach heat shield -1- (right-side).

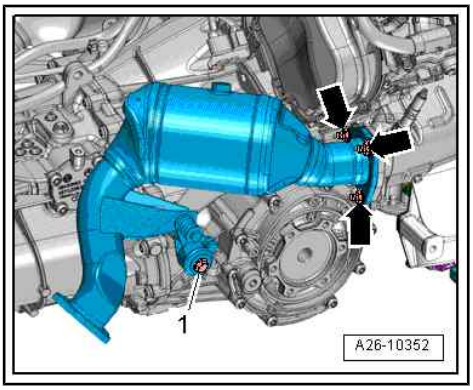


– Remove bolt -2-, press bracket off gearbox and swivel to rear -arrow-.

– Remove bolts -1- and remove bracket.



– Unscrew nuts -arrows- and detach catalytic converter (right-side).



Note

Disregard -item 1-.

Installing

- Tightening torque ⇒ page 365

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

Note

Renew gaskets and self-locking nuts.

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

– Install Lambda probe after catalytic converter - G130- ⇒ page 357.

– Install front silencer (right-side) ⇒ page 370 .

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3 Secondary air system

⇒ “3.1 Exploded view - secondary air system”, page 380

⇒ “3.2 Removing and installing secondary air pump motor V101 ”, page 383

⇒ “3.3 Removing and installing combination valve”, page 387

⇒ “3.4 Checking combination valves”, page 393

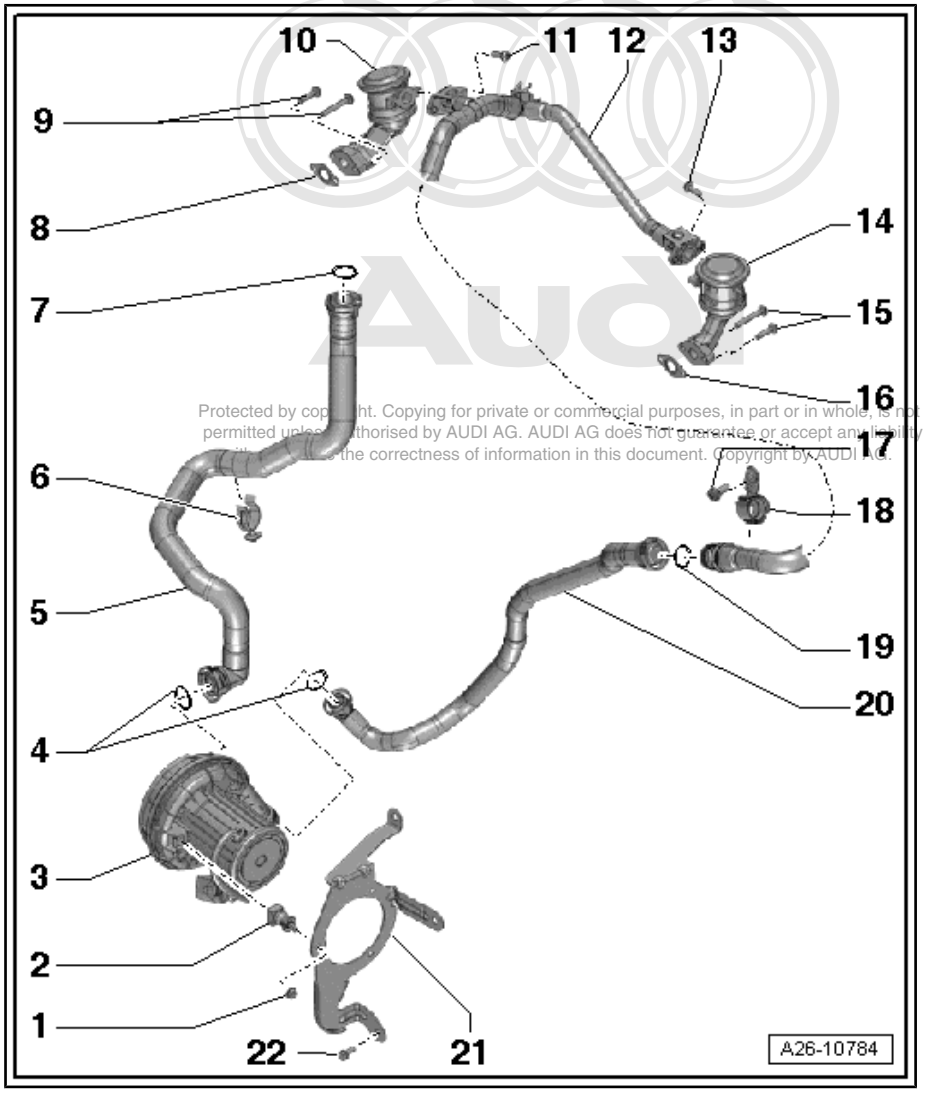
⇒ “3.5 Removing and installing sender 1 for secondary air pressure G609 ”, page 396

3.1 Exploded view - secondary air system

⇒ “3.1.1 Exploded view - secondary air system, country-specific version 1”, page 380

⇒ “3.1.2 Exploded view - secondary air system, country-specific version 2”, page 382

3.1.1 Exploded view - secondary air system, country-specific version 1



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1 - Nut
- ❑ 9 Nm

2 - Bonded rubber bush

3 - Secondary air pump motor - V101-
- ❑ Removing and installing ⇒ page 383
- ❑ Clip electrical connector into bracket
- ❑ Check in “Guided Functions” ⇒ Vehicle diagnostic tester.

4 - O-rings
- ❑ Renew

5 - Secondary air hose

6 - Clip

7 - O-ring
- ❑ Renew

8 - Gasket
- ❑ Renew

9 - Bolts
- ❑ 9 Nm

10 - Combination valve for secondary air system (right-side)
- ❑ Checking ⇒ page 393
- ❑ Removing and installing ⇒ page 388

11 - Bolt
- ❑ 9 Nm

12 - Secondary air hose

13 - Bolt
- ❑ 9 Nm

14 - Combination valve for secondary air system (left-side)

- ❑ Checking ⇒ page 393
- ❑ Removing and installing ⇒ page 387

15 - Bolts

- ❑ 9 Nm

16 - Gasket

- ❑ Renew

17 - Bolt

- ❑ 9 Nm

18 - Bracket

- ❑ For secondary air hose

19 - O-ring

- ❑ Renew

20 - Secondary air hose

21 - Bracket

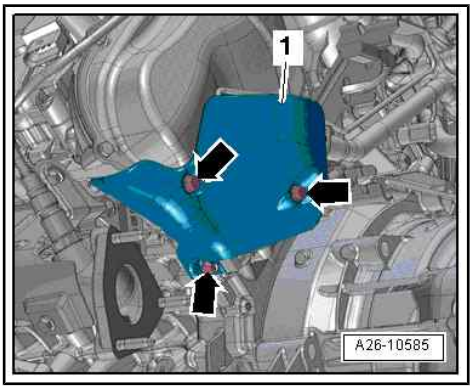
- ❑ For secondary air pump motor - V101-

22 - Bolt

- ❑ 9 Nm

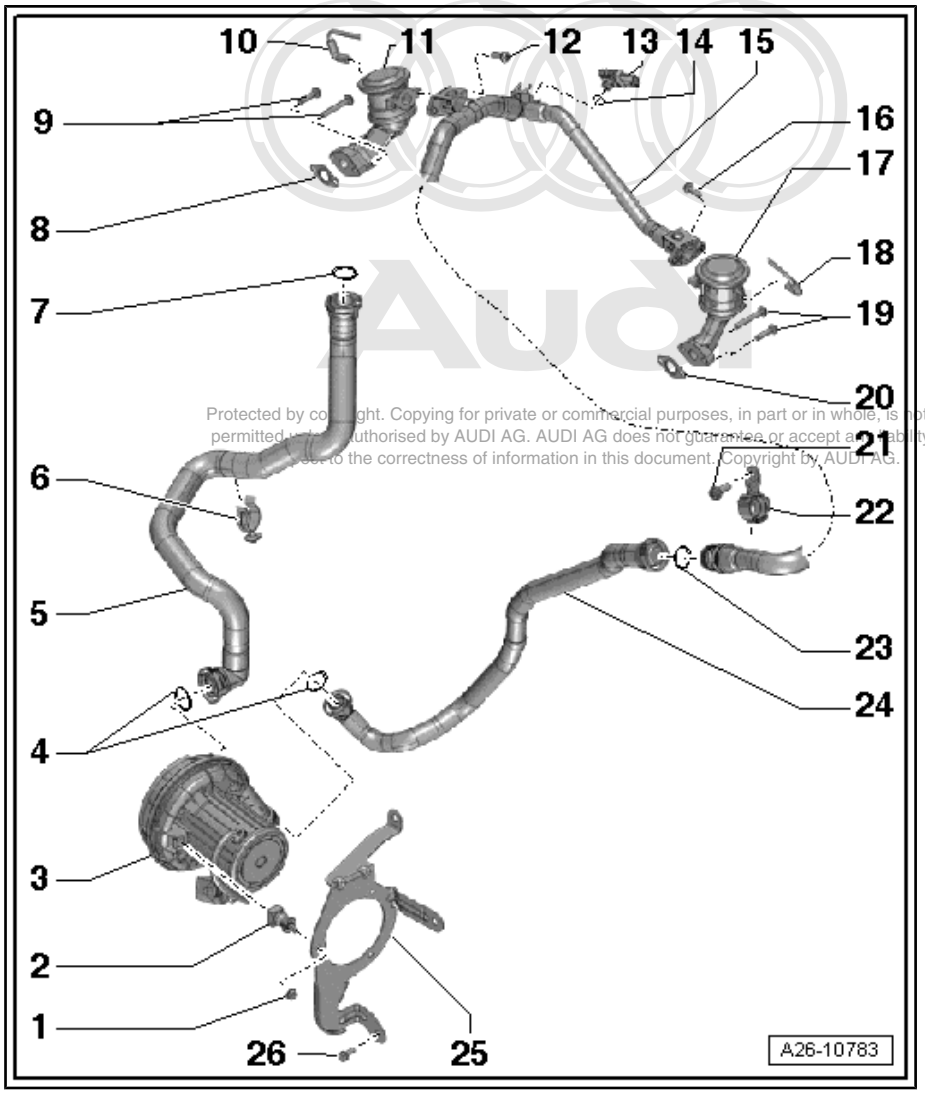
Heat shield for combination valve for secondary air system - tightening torque

– Tighten bolts -arrows- for heat shield -1- to 9 Nm.



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3.1.2 Exploded view - secondary air system, country-specific version 2



1 - Nut
- ❑ 9 Nm

2 - Bonded rubber bush

3 - Secondary air pump motor - V101-
- ❑ Removing and installing ⇒ page 385
- ❑ Clip electrical connector into bracket
- ❑ Check in “Guided Functions” ⇒ Vehicle diagnostic tester.

4 - O-rings
- ❑ Renew

5 - Secondary air hose

6 - Clip

7 - O-ring
- ❑ Renew

8 - Gasket
- ❑ Renew

9 - Bolts
- ❑ 9 Nm

10 - Vacuum hose

11 - Combination valve for secondary air system (right-side)
- ❑ Checking ⇒ page 394
- ❑ Removing and installing ⇒ page 392

12 - Bolt
- ❑ 9 Nm

13 - Sender 1 for secondary air pressure - G609-
- ❑ Removing and installing ⇒ page 396

14 - O-ring
- ❑ Renew

15 - Secondary air hose

16 - Bolt
- ❑ 9 Nm

17 - Combination valve for secondary air system (left-side)
- ❑ Checking ⇒ page 394
- ❑ Removing and installing ⇒ page 390

18 - Vacuum hose

19 - Bolts
- ❑ 9 Nm

20 - Gasket
- ❑ Renew

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21 - Bolt

- ❑ 9 Nm

22 - Bracket

- ❑ For secondary air hose

23 - O-ring

- ❑ Renew

24 - Secondary air hose

25 - Bracket

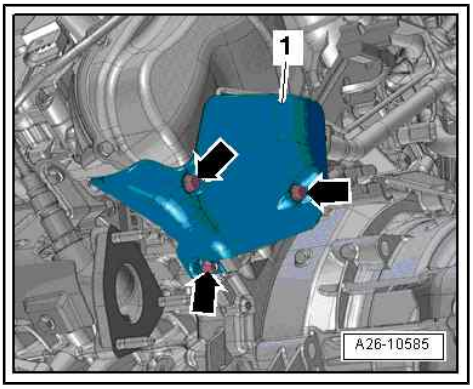
- ❑ For secondary air pump motor - V101-

26 - Bolt

- ❑ 9 Nm

Heat shield for combination valve for secondary air system - tightening torque

– Tighten bolts -arrows- for heat shield -1- to 9 Nm.



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3.2 Removing and installing secondary air pump motor - V101-

⇒ "3.2.1 Removing and installing secondary air pump - country-specific version 1", page 383

⇒ "3.2.2 Removing and installing secondary air pump - country-specific version 2", page 385

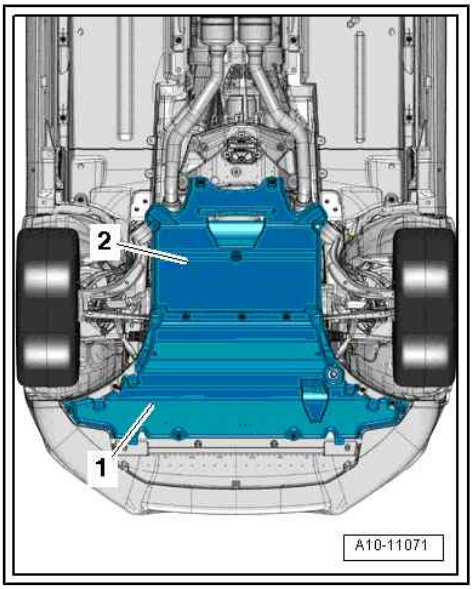
3.2.1 Removing and installing secondary air pump - country-specific version 1

Removing

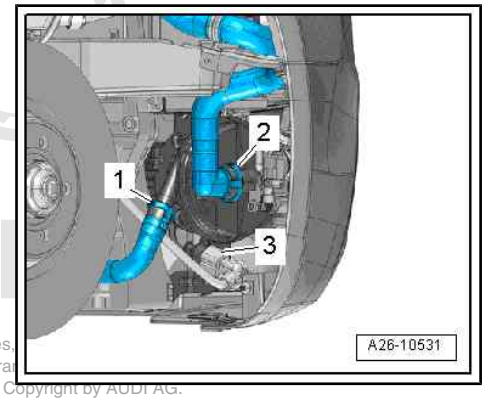
Note

Fit all cable ties in the original positions when installing.

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



– Unplug electrical connector -3- at secondary air pump motor - V101- .
– Detach secondary air hoses -1- and -2-.

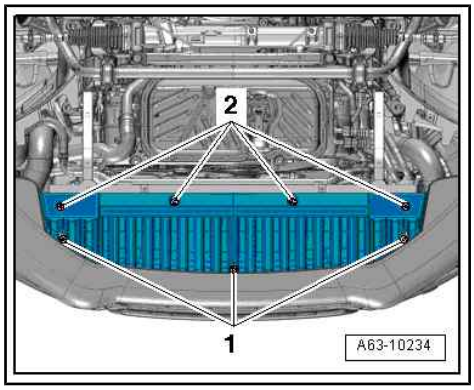


Note

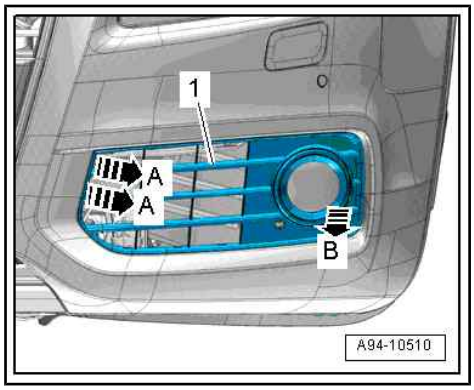
For illustration purposes, the installation position is shown with the wheel housing liner removed.

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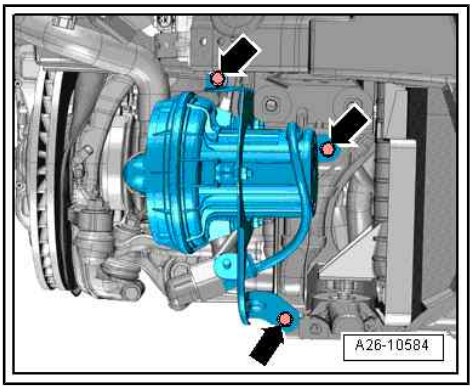
– Loosen bolts -1- and -2- and detach end plate at bumper cover towards rear.



– Release retaining clips -arrows A- and detach air intake grille -1- on left and right from bottom section of bumper cover -arrow B-.



– Remove bolts -arrows- and detach secondary air pump.



Note

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

Installing

- Tightening torque ⇒ page 380

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

Note

Fit new O-rings.

– Install closure plate at bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Exploded view - bumper cover
– Install noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

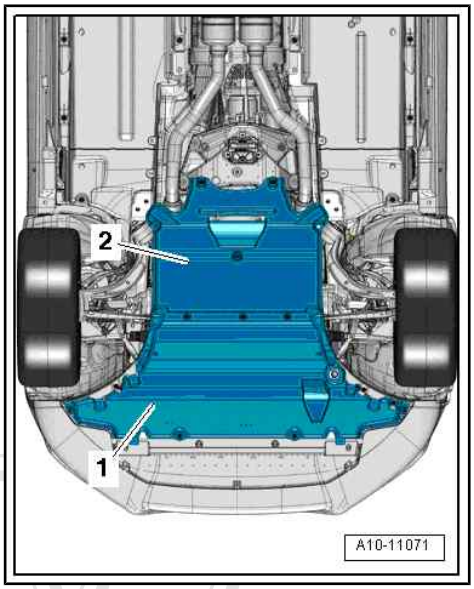
3.2.2 Removing and installing secondary air pump - country-specific version 2

Removing

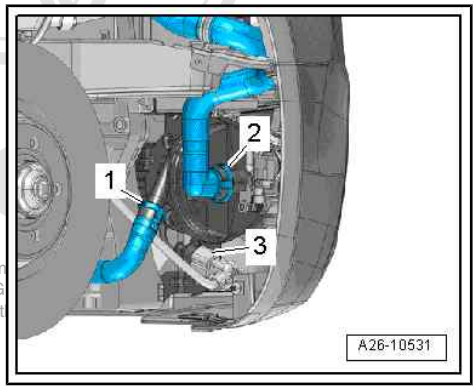
Note

Fit all cable ties in the original positions when installing.

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



– Unplug electrical connector -3- at secondary air pump motor - V101- .
– Detach secondary air hoses -1- and -2-.

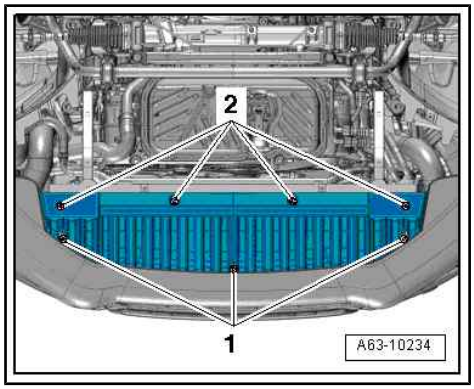


Note

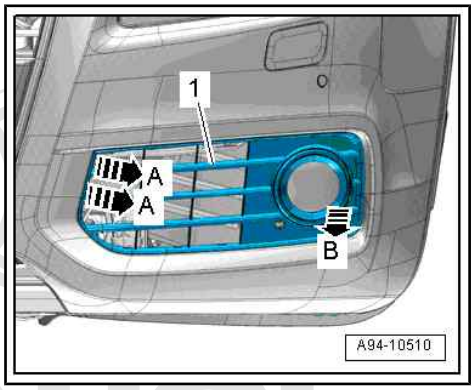
For illustration purposes, the installation position is shown with the wheel housing liner removed.

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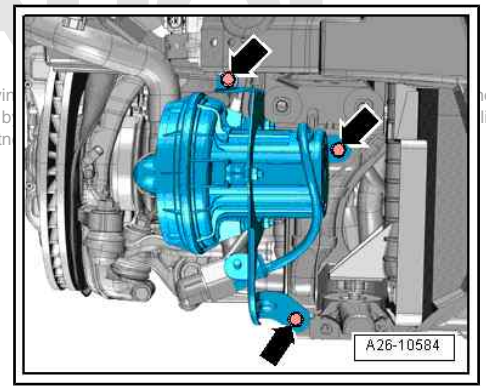
– Loosen bolts -1- and -2- and detach end plate at bumper cover towards rear.



– Release retaining clips -arrows A- and detach air intake grille -1- on left and right from bottom section of bumper cover -arrow B-.



– Remove bolts -arrows- and detach secondary air pump.



Note

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

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Installing

- Tightening torque ⇒ page 382

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

Note

Fit new O-rings.

– Install closure plate at bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Exploded view - bumper cover

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

3.3 Removing and installing combination valve

⇒ "3.3.1 Removing and installing combination valve for secondary air system (left-side) - country-specific version 1", page 387

⇒ "3.3.2 Removing and installing combination valve for secondary air system (right-side) - country-specific version 1", page 388

⇒ "3.3.3 Removing and installing combination valve for secondary air system (left-side) - country-specific version 2", page 390

⇒ "3.3.4 Removing and installing combination valve for secondary air system (right-side) - country-specific version 2", page 392

3.3.1 Removing and installing combination valve for secondary air system (left-side) - country-specific version 1

Removing

Note

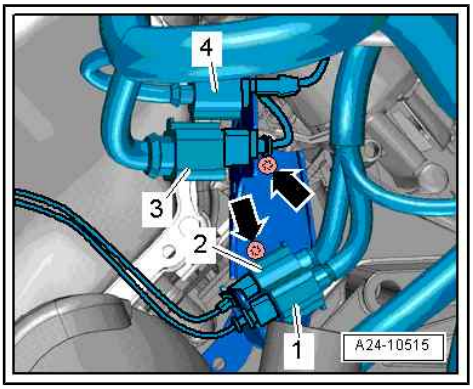
Fit all cable ties in the original positions when installing.

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– Remove front silencer (left-side) ⇒ page 370 .

– Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - bulkhead .

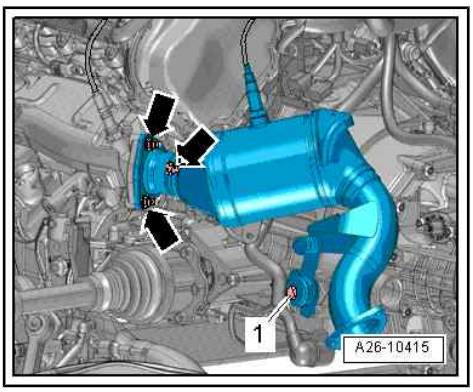
– Remove electrical connector -1- for Lambda probe 2 after catalytic converter - G131- from bracket, unplug and move wiring clear.



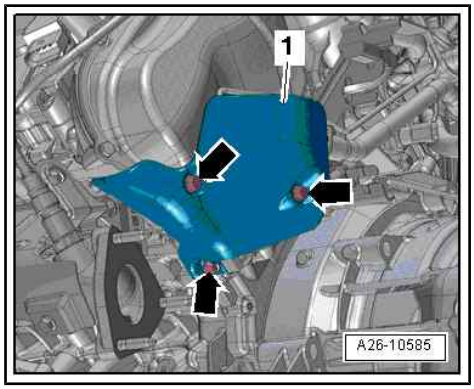
Note

Disregard items marked -2, 3, 4- and -arrows-.

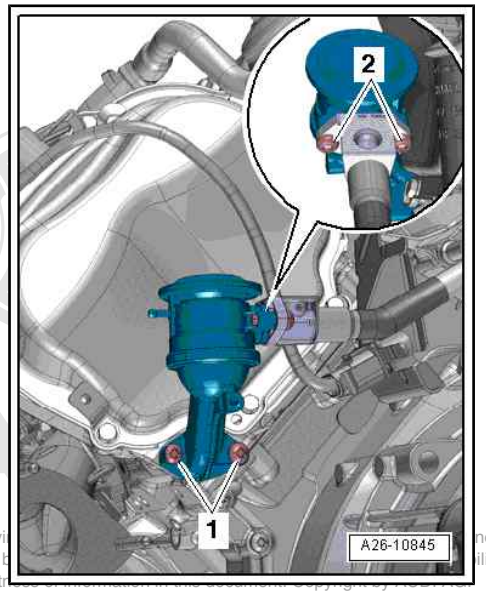
– Remove nuts -arrows- and bolt -1-, detach catalytic converter (left-side) from exhaust manifold and move to rear.



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



– Unscrew bolts -1- and -2- and remove combination valve for secondary air system (left-side).



Installing

- Tightening torque ⇒ page 380 , ⇒ page 381

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

Note

Renew seal.

– Install catalytic converter (left-side): vehicles with manual gearbox ⇒ page 374 , vehicles with multitronic gearbox 0AW/ automatic gearbox 0B6 ⇒ page 376 .

– Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - bulkhead .

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3.3.2 Removing and installing combination valve for secondary air system (right-side) - country-specific version 1

Removing

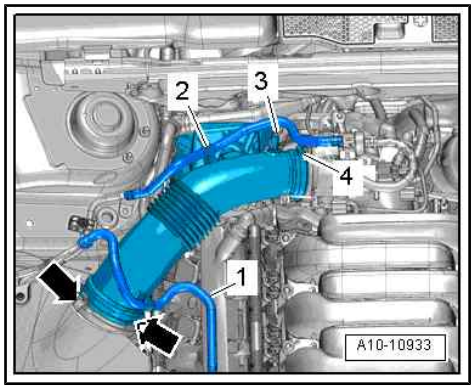
– Remove front silencer (right-side) ⇒ page 370 .

– Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - bulkhead .

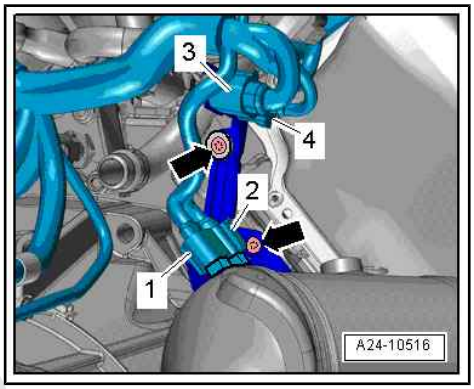
– Move fuel hose -1- and hose -2- from activated charcoal filter clear at air pipe.

– Disconnect vacuum hose -3- from connection on air pipe.

– Remove air pipe. To do so, release hose clip -4- and clamps -arrows-.



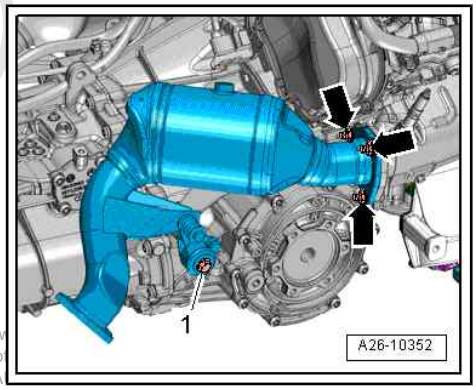
– Remove electrical connector -1- for Lambda probe after catalytic converter - G130- from bracket and unplug connector.



Note

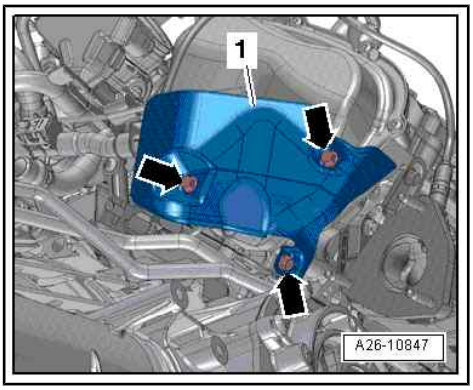
Disregard items marked -2, 3, 4- and -arrows-.

– Remove nuts -arrows- and bolt -1-, detach catalytic converter (right-side) from exhaust manifold and move to rear.



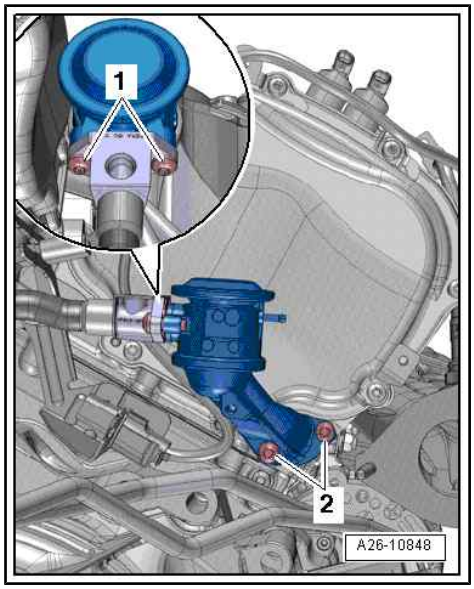
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– Remove bolts -arrows- and detach heat shield -1-.



– Remove bolts -2-.

– Detach combination valve for secondary air system (right-side) and remove bolts -1- for secondary air hose.



Installing

• Tightening torque ⇒ page 380 , ⇒ page 381

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

Note

- ♦ *Renew seal.*
- ♦ *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.*

– Install catalytic converter (right-side): vehicles with manual gearbox/multitronic gearbox 0AW ⇒ page 377 , vehicles with automatic gearbox 0B6 ⇒ page 378 .

– Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - bulkhead .

3.3.3 Removing and installing combination valve for secondary air system (left-side) - country-specific version 2

Removing

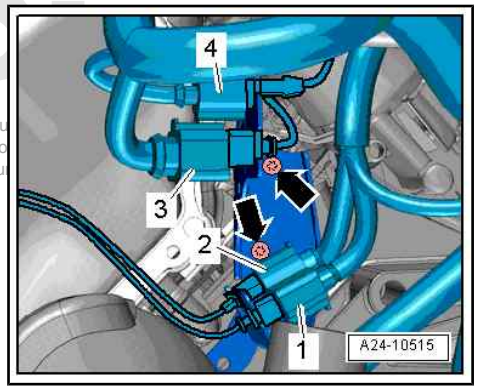
Note

Fit all cable ties in the original positions when installing.

– Remove front silencer (left-side) ⇒ page 370 .

– Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - bulkhead .

– Remove electrical connector -1- for Lambda probe 2 after catalytic converter - G131- from bracket, unplug and move wiring clear.

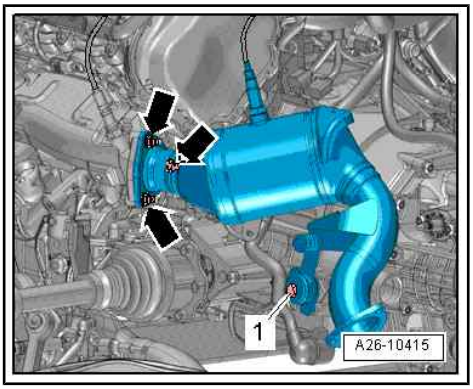


Note

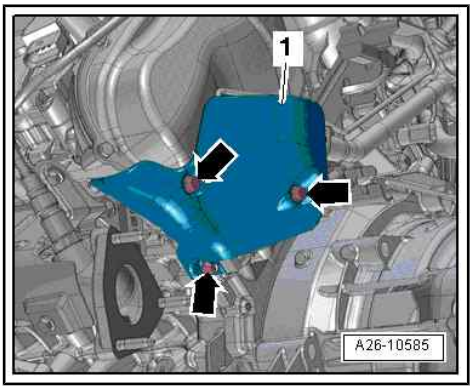
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Disregard items marked -2, 3, 4- and -arrows-.

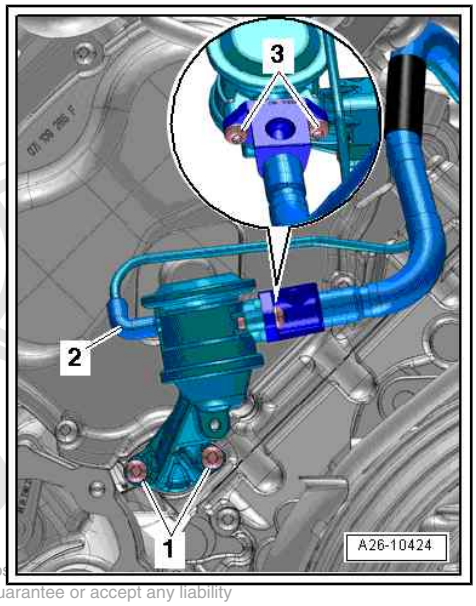
– Remove nuts -arrows- and bolt -1-, detach catalytic converter (left-side) from exhaust manifold and move to rear.



– 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

• Tightening torque ⇒ page 382 , ⇒ page 383

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

Note

Renew seal.

– Install catalytic converter (left-side) ⇒ page 376 .
– Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - bulkhead .

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3.3.4 Removing and installing combination valve for secondary air system (right-side) - country-specific version 2

Removing

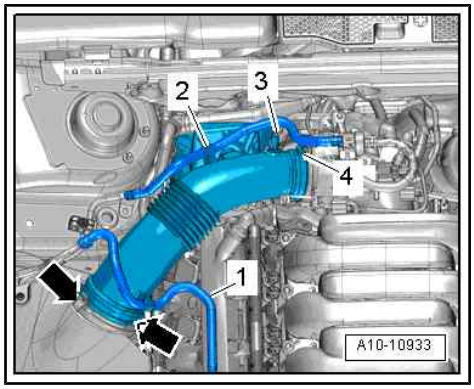
– Remove front silencer (right-side) ⇒ page 370 .

– Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - bulkhead .

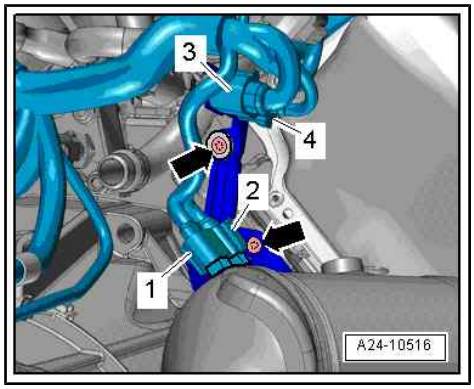
– Move fuel hose -1- and hose -2- from activated charcoal filter clear at air pipe.

– Disconnect vacuum hose -3- from connection on air pipe.

– Remove air pipe. To do so, release hose clip -4- and clamps -arrows-.



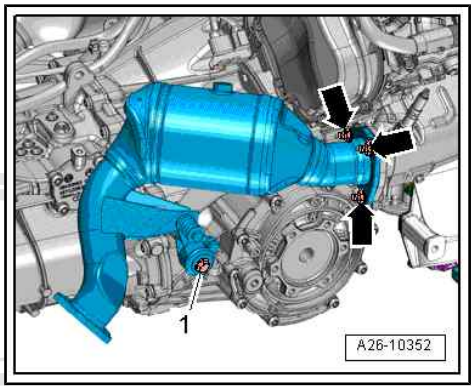
– Remove electrical connector -1- for Lambda probe after catalytic converter - G130- from bracket and unplug connector.



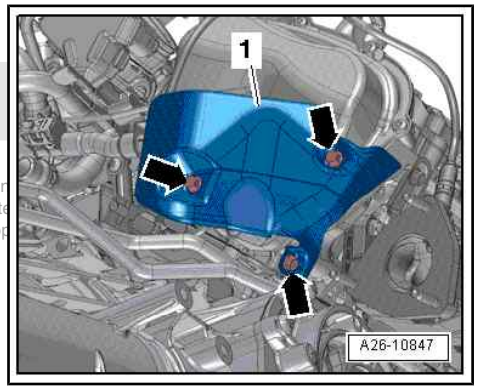
Note

Disregard items marked -2, 3, 4- and -arrows-.

– Remove nuts -arrows- and bolt -1-, detach catalytic converter (right-side) from exhaust manifold and move to rear.



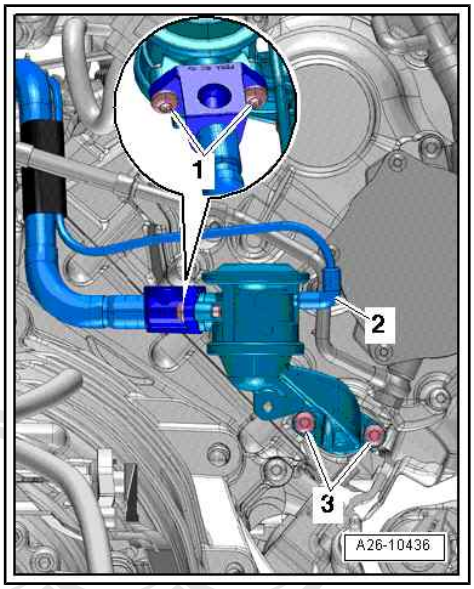
– Remove bolts -arrows- and detach heat shield -1-.



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– 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

- Tightening torque ⇒ page 382 , ⇒ page 383

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

Note

- *Renew seal.*
- *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.*

– Install catalytic converter (right-side) ⇒ page 378 .

– Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - bulkhead .

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3.4 Checking combination valves

⇒ "3.4.1 Checking combination valves for secondary air system for proper operation and leakage - country-specific version 1", page 393

⇒ "3.4.2 Checking combination valves for secondary air system for proper operation and leakage - country-specific version 2", page 394

3.4.1 Checking combination valves for secondary air system for proper operation and leakage - country-specific version 1

Procedure

- No leaks in hose connections.

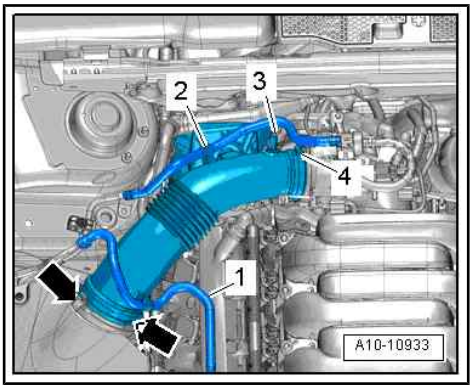
– Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - bulkhead .

Combination valve for secondary air system (right-side):

– Move fuel line -1- and line -2- (leading to activated charcoal filter) clear at air pipe.

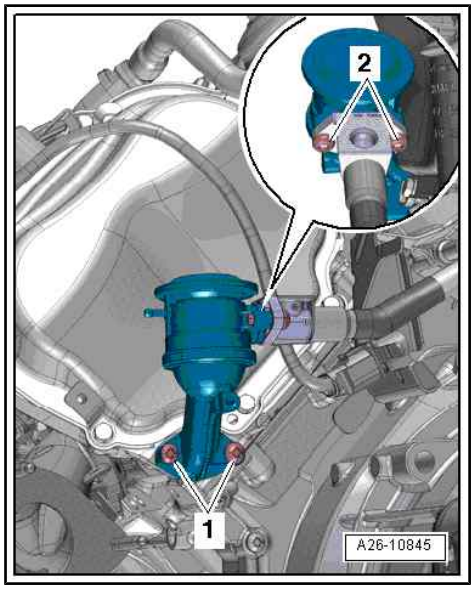
– Disconnect vacuum hose -3- from connection on air pipe.

– Remove air pipe. To do so, release hose clip -4- and clamps -arrows-.



Continuation for both sides:

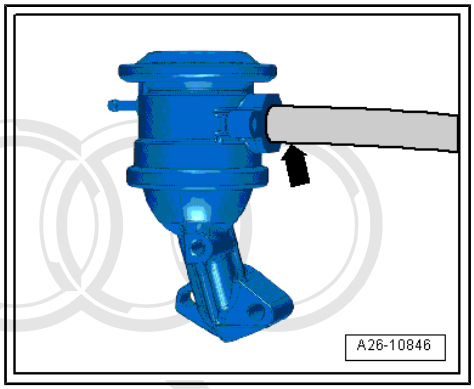
– Remove bolts -2- and press secondary air hoses to side.



Note

Disregard -item 1-.

– Connect suitable hose -arrow- to combination valve for secondary air, as shown in illustration.



– Blow lightly into test hose with your mouth (do not use compressed air).

• The combination valve for secondary air system should be closed; it should not be possible to blow through the hose.

– Blow more firmly (i.e. with greater pressure) into test hose with your mouth (do not use compressed air).

• The combination valve for secondary air system should open; it should now be possible to blow through the hose.

– Renew combination valve for secondary air system if you cannot determine the switching point: (left-side) ⇒ page 387 , (right-side) ⇒ page 388

Assembling

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

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Note

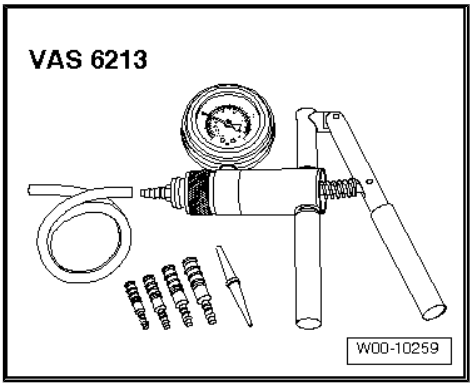
- *Hose connections and air pipes and hoses must be free of oil and grease before assembly.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *To ensure that the air hoses can be properly secured at their connections, spray rust remover onto the worm thread of used hose clips before installing.*

– Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - bulkhead .

3.4.2 Checking combination valves for secondary air system for proper operation and leakage - country-specific version 2

Special tools and workshop equipment required

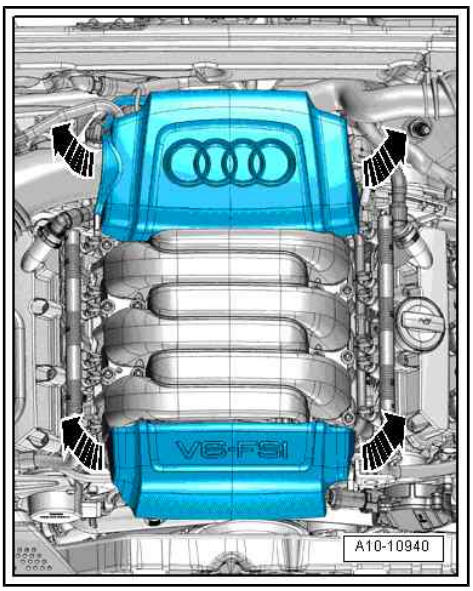
♦ Hand vacuum pump - VAS 6213-



Procedure

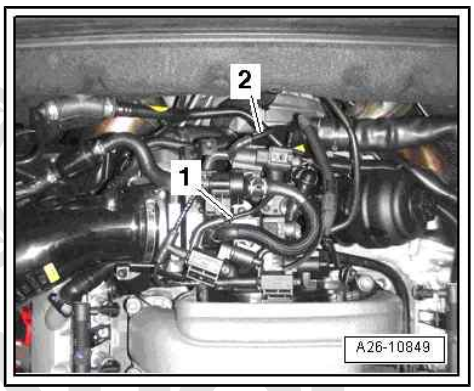
- Vacuum hoses and hose connections do not leak.
- Vacuum hoses are not clogged.

– Pull off engine cover panels -arrows-.



– Detach vacuum hose -1- (left-side) and -2- (right-side) from combination valve to be checked.

– Connect hand vacuum pump - VAS 6213- to vacuum hose of combination valve to be checked.



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– Press release tabs and detach secondary air hose -arrow- to front from bracket.

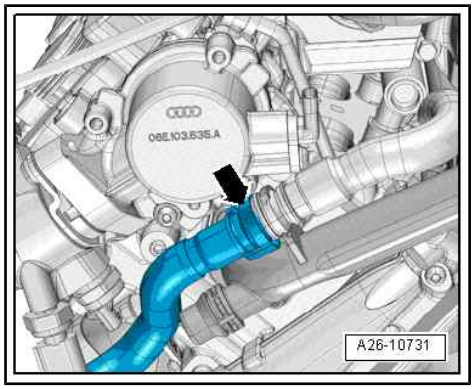
– Blow lightly into secondary air hose with your mouth (do not use compressed air).

• 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: on left-side ⇒ page 390 , on right-side ⇒ page 392 .



Assembling

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

Note

Fit new O-ring.

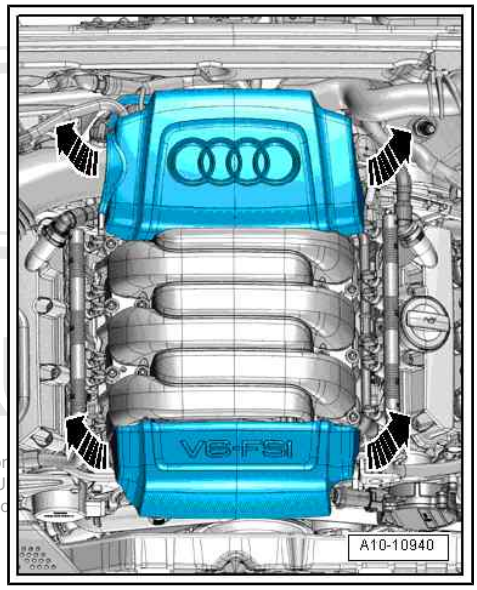
3.5 Removing and installing sender 1 for secondary air pressure - G609-

⇒ "3.5.1 Removing and installing sender 1 for secondary air pressure G609 - country-specific version 2", page 396

3.5.1 Removing and installing sender 1 for secondary air pressure - G609- - country-specific version 2

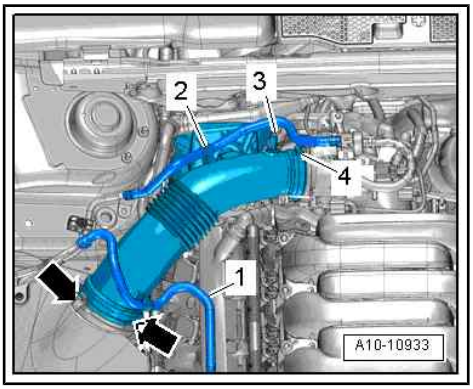
Removing

– Pull off rear engine cover panel -top arrows-.

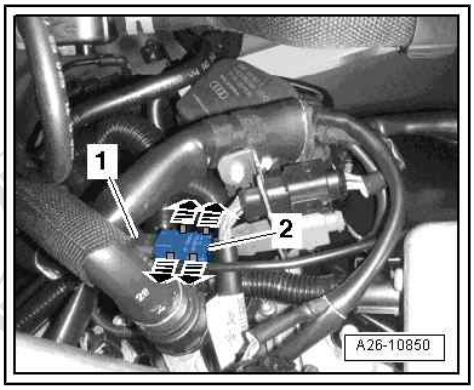


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– Move fuel hose -1- and hose -2- from activated charcoal filter clear at air pipe.
– Disconnect vacuum hose -3- from connection on air pipe.
– Remove air pipe. To do so, release hose clip -4- and clamps -arrows-.



– Unplug electrical connector -1-.
– Release catches -arrows- and detach sender 1 for secondary air pressure - G609- -item 2-.



Installing

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

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.*

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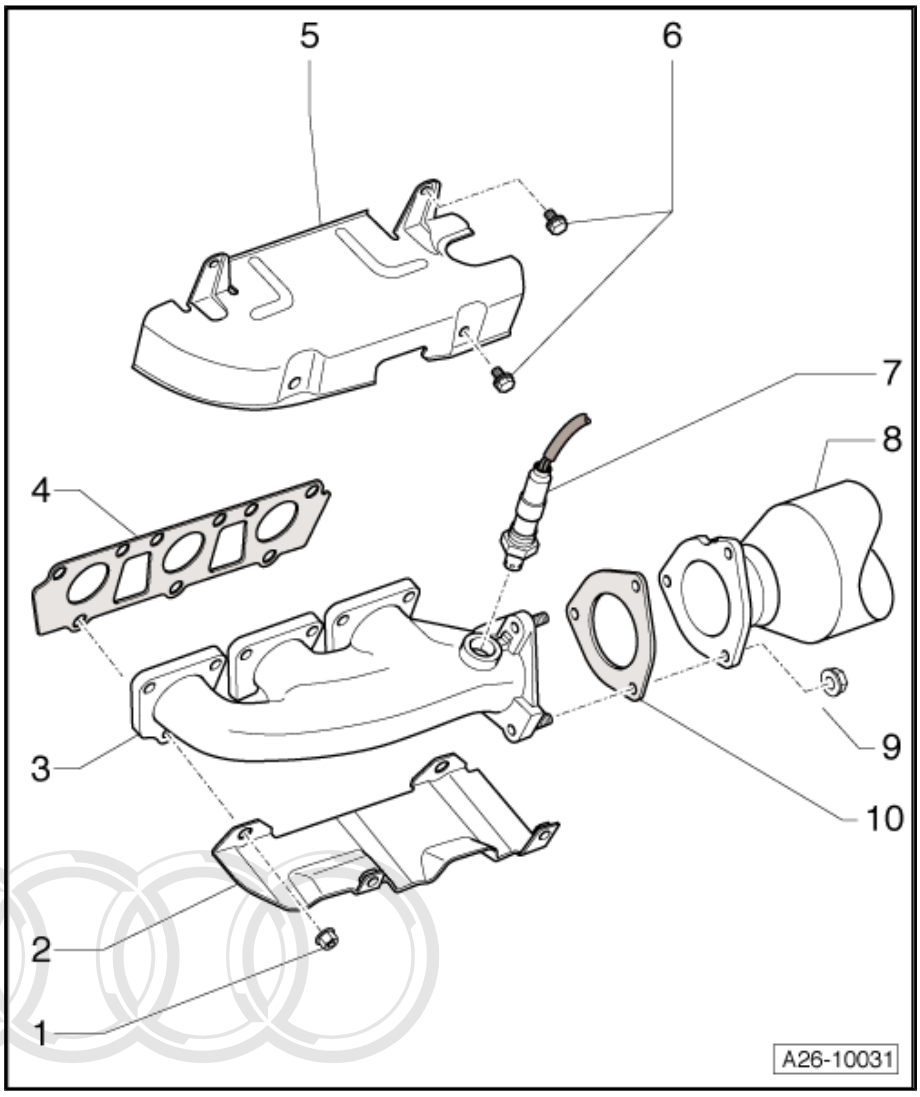
4 Exhaust manifold

⇒ “4.1 Exploded view - exhaust manifold”, page 398

⇒ “4.2 Removing and installing exhaust manifold (left-side)”, page 399

⇒ “4.3 Removing and installing exhaust manifold (right-side)”, page 401

4.1 Exploded view - exhaust manifold



1 - Nut

- ❑ Renew
- ❑ Coat with high-temperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue
- ❑ Tightening torque and tightening sequence: left-side ⇒ page 399 ; right-side ⇒ page 399

2 - Bracket for heat shield

3 - Exhaust manifold

- ❑ Removing and installing: left-side ⇒ page 399 , right-side ⇒ page 401

4 - Gasket

- ❑ Renew

5 - Heat shield

6 - Bolt

- ❑ 10 Nm

7 - Lambda probe

- ❑ Before catalytic converter
- ❑ Removing and installing ⇒ page 357

8 - Catalytic converter

- ❑ Exploded view ⇒ page 365

9 - Nut

- ❑ Renew
- ❑ Coat with high-temperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue
- ❑ 23 Nm

10 - Gasket

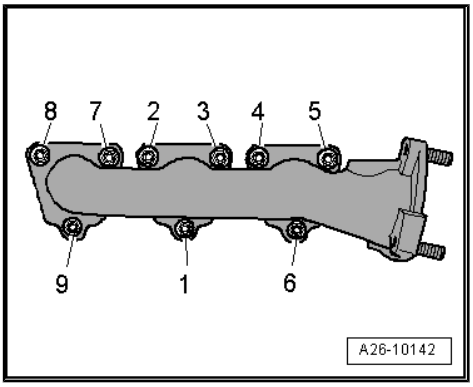
- ❑ Renew

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Exhaust manifold (left-side) - tightening torque and sequence

– Tighten nuts in the sequence -1 ... 9- in 3 stages as follows:

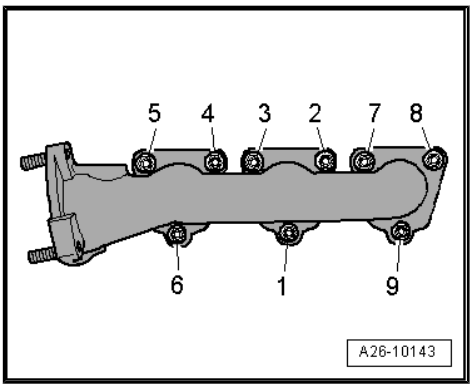
1. Screw in by hand until contact is made.
2. Initially tighten to 15 Nm.
3. Tighten to 25 Nm.



Exhaust manifold (right-side) - tightening torque and sequence

– Tighten nuts in the sequence -1 ... 9- in 3 stages as follows:

1. Screw in by hand until contact is made.
2. Initially tighten to 15 Nm.
3. Tighten to 25 Nm.



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4.2 Removing and installing exhaust manifold (left-side)

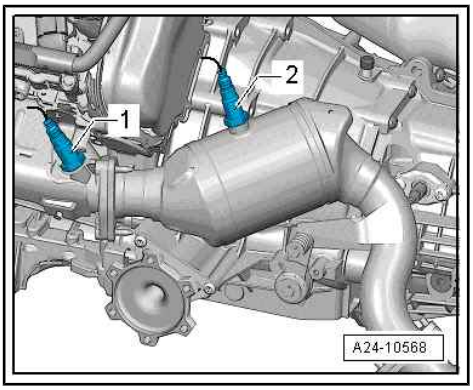
Removing

– Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - bulkhead .

– Unscrew Lambda probe 2 - G108- -item 1- ⇒ page 357 .

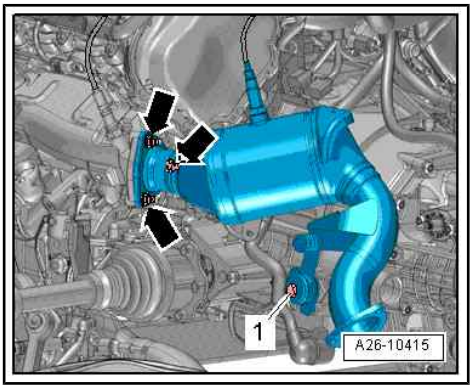
– Remove engine mounting (left-side) ⇒ page 110 .

– Remove front silencer (left-side) ⇒ page 370 .



– Remove nuts -arrows- and bolt -1-.

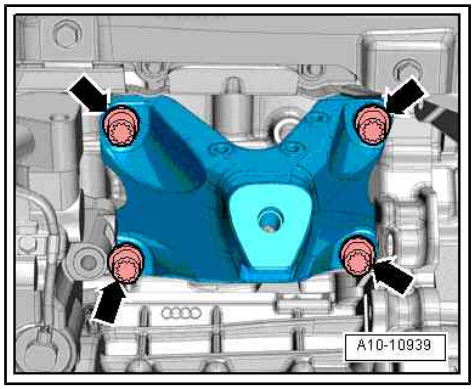
– Detach catalytic converter (left-side) from exhaust manifold and move clear to the side.



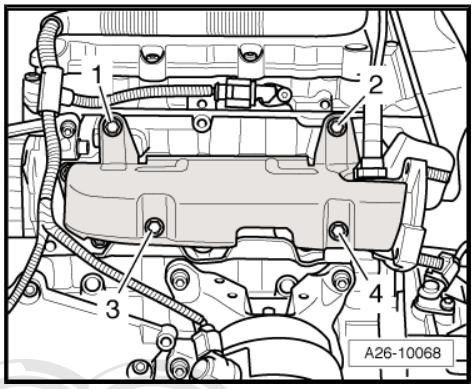
Note

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

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

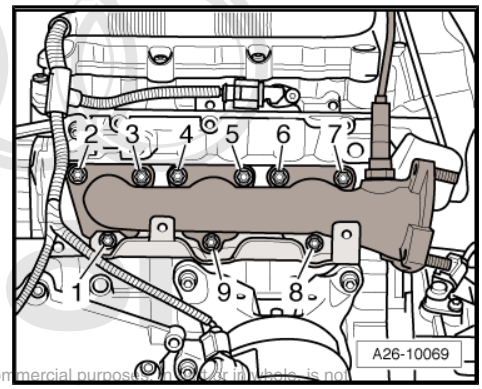


– Remove bolts -1 … 4- and detach heat shield.



– 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 gasket and self-locking nuts.

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– Fit exhaust manifold with gasket for catalytic converter and tighten nuts ⇒ page 399 .

– Install engine support with engine mounting (left-side) ⇒ page 110 .

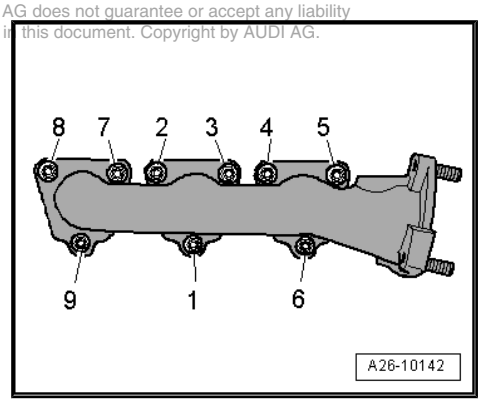
– Install Lambda probe 2 - G108- ⇒ page 357 .

– Install catalytic converter (left-side): vehicles with manual gearbox ⇒ page 374 , vehicles with multitronic gearbox 0AW/ automatic gearbox 0B6 ⇒ page 376 .

– Install front silencer (left-side) ⇒ page 370 .

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

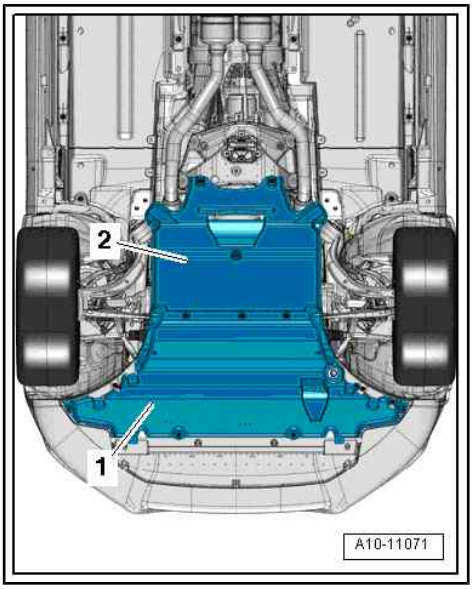
– Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - bulkhead .



4.3 Removing and installing exhaust manifold (right-side)

Removing

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

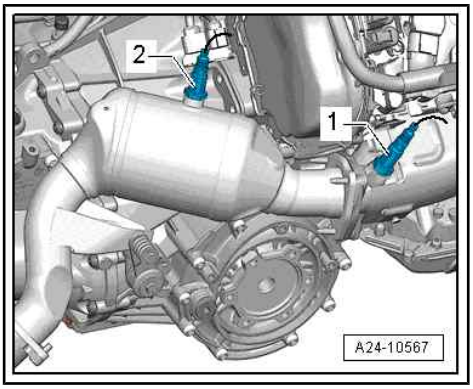


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– Remove Lambda probe - G39- -item 1- ⇒ page 357 .

– Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - bulkhead .

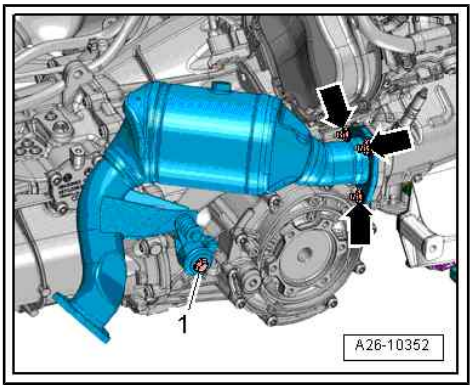
– Remove front silencer (right-side) ⇒ page 370 .



– Remove nuts -arrows- and bolt -1- and move catalytic converter to rear.

Note

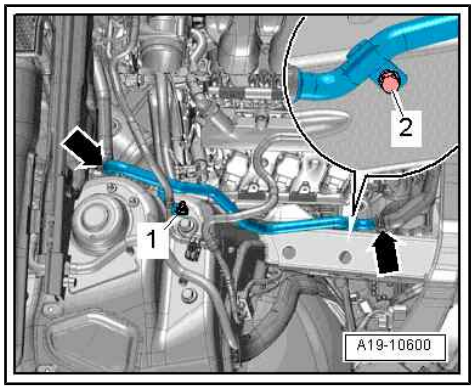
For illustration purposes, the installation position is shown with the engine removed.



– Remove front right wheel.

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

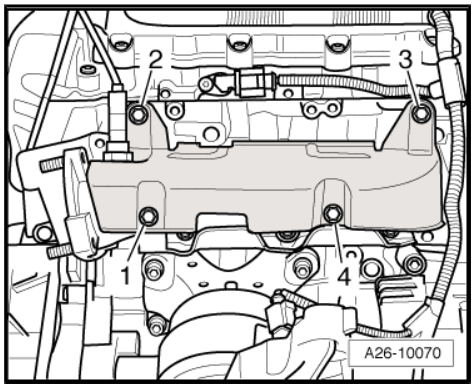
– Remove nut -1- and bolt -2- and push coolant pipe clear to one side.



Note

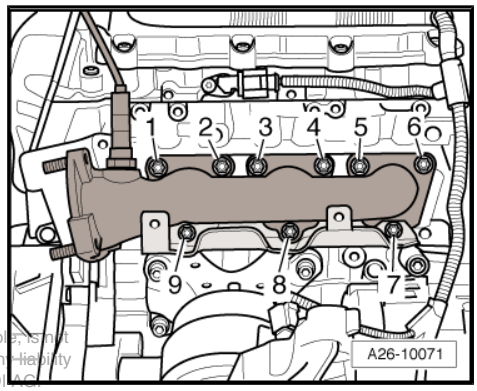
Disregard -arrows-.

– 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

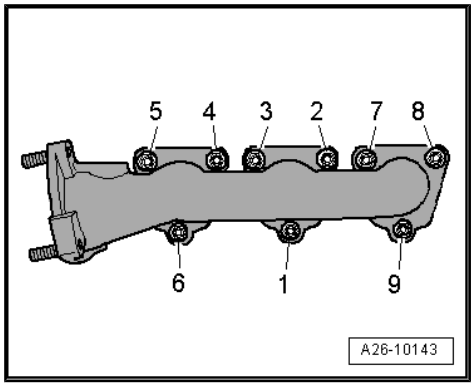
Installation is carried out in the reverse order; note the following:

Note

Renew gaskets and self-locking nuts.

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– Fit exhaust manifold with gasket for catalytic converter and tighten nuts ⇒ page 399 .



– Install catalytic converter (right-side): vehicles with manual gearbox/multitronic gearbox 0AW ⇒ page 377 , vehicles with automatic gearbox 0B6 ⇒ page 378

– Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - bulkhead .

– Install Lambda probe - G39- ⇒ page 357

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

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

28 – Ignition system

1 Ignition system

⇒ “1.2 Test data, spark plugs”, page 404

⇒ “1.1 Exploded view - ignition system”, page 403

⇒ “1.3 Removing and installing ignition coils”, page 404

⇒ “1.4 Removing and installing knock sensor”, page 406

⇒ “1.5 Removing and installing Hall senders”, page 407

⇒ “1.6 Removing and installing engine speed sender G28 ”, page 408

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1.1 Exploded view - ignition system

1 - Connector for ignition coil
- ❑ 4-pin

2 - Bolt
- ❑ 10 Nm

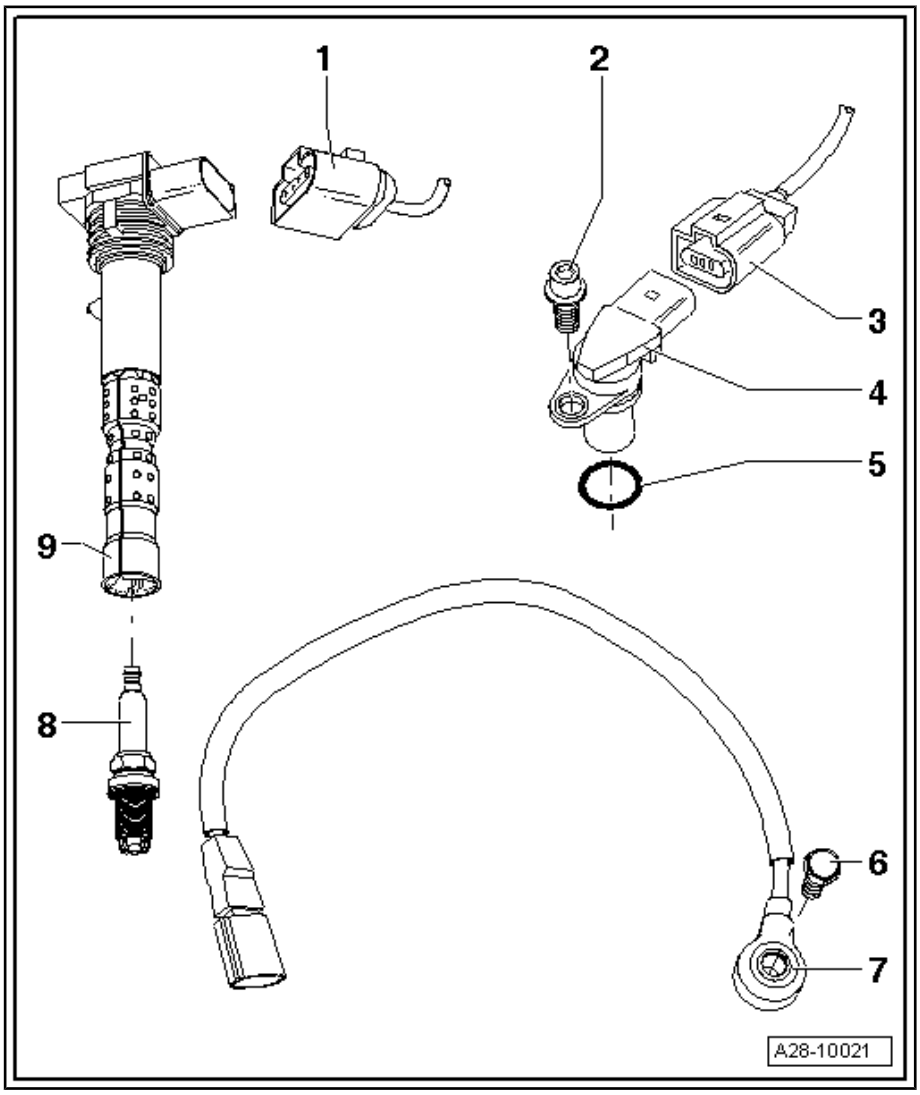
3 - 3-pin connector

4 - Hall sender
- ❑ Hall sender - G40- (cylinder bank 1)
- ❑ Hall sender 3 - G300- (cylinder bank 1)
- ❑ Hall sender 2 - G163- (cylinder bank 2)
- ❑ Hall sender 4 - G301- (cylinder bank 2)

5 - O-ring
- ❑ Renew if damaged
- ❑ Lubricate lightly with clean engine oil

6 - Bolt
- ❑ 20 Nm
- ❑ Tightening torque influences the function of the knock sensor

7 - Knock sensors
- ❑ Contact surfaces between knock sensor and cylinder block must be free of corrosion, oil and grease.
- ❑ Knock sensor 1 - G61-



(cylinder bank 1)

- ❑ Knock sensor 2 - G66- (cylinder bank 1)
- ❑ Removing and installing ⇒ page 406

8 - Spark plug

- ❑ Remove and install with spark plug socket and extension - 3122 B- ⇒ Maintenance ; Booklet 812
- ❑ 30 Nm

9 - Ignition coil

- ❑ Ignition coil 1 with output stage - N70-
- ❑ Ignition coil 2 with output stage - N127-
- ❑ Ignition coil 3 with output stage - N291-
- ❑ Ignition coil 4 with output stage - N292-
- ❑ Ignition coil 5 with output stage - N323-
- ❑ Ignition coil 6 with output stage - N324-
- ❑ Removing and installing ⇒ page 404
- ❑ Use puller - T40039- for removal

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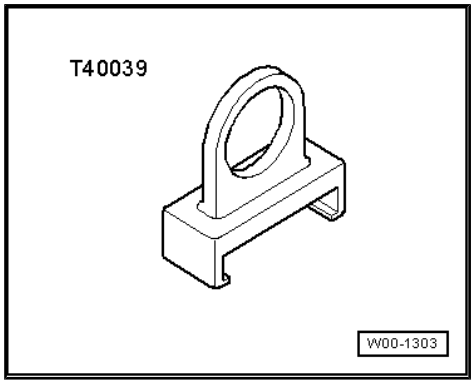
1.2 Test data, spark plugs

Engine data		3.2 ltr. / 4V / 195 kW engine
Idling speed (not adjustable)		
Ignition timing		Cannot be adjusted; 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	⇒ Data sheets for exhaust emissions test
	Removing and installing	⇒ Maintenance ; Booklet 812
Firing order		1-4-3-6-2-5

1.3 Removing and installing ignition coils

Special tools and workshop equipment required

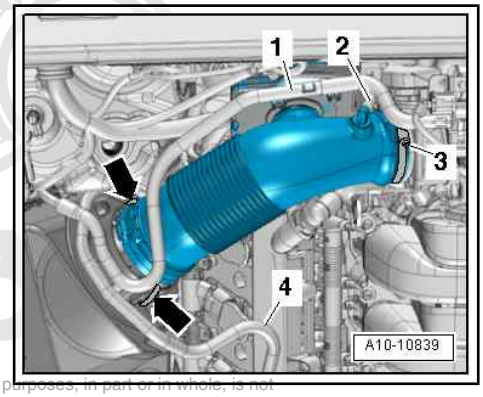
- ♦ Puller - T40039-



Removing ignition coils on cylinder bank 1:

– Only remove air cleaner (bottom section) when removing ignition coil for cylinder 1 ⇒ page 327 .

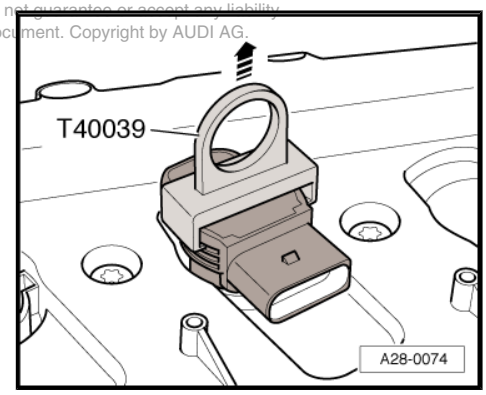
– When removing ignition coils for cylinders 2 and 3, remove air hose by opening hose clip -3- and releasing clamps -arrows-.
– Remove bolts from wiring harness of ignition coils.
– Release electrical connectors and pull all connectors off ignition coils at the same time.



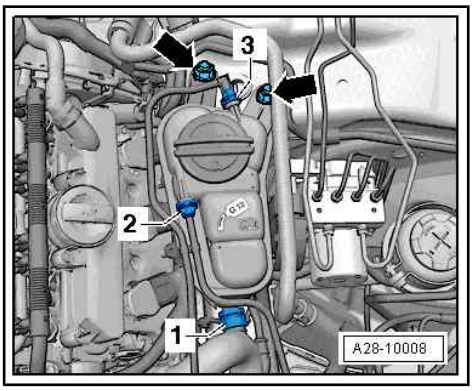
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– Pull ignition coils out of spark plug holes using puller - T40039- .

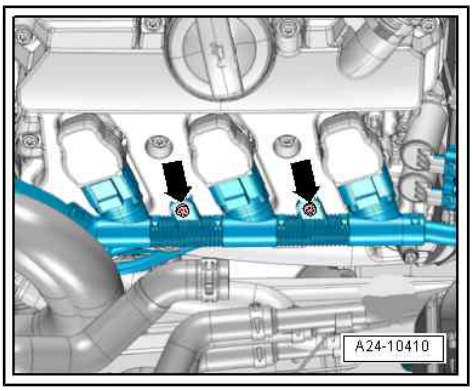
Removing ignition coils on cylinder bank 2:



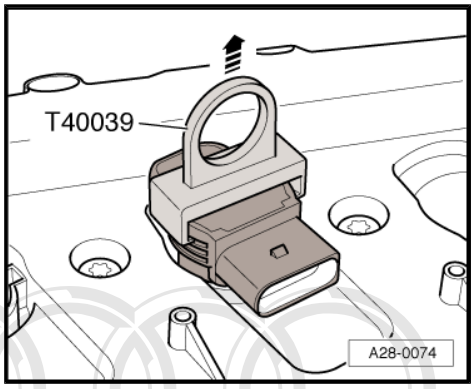
– Unbolt coolant expansion tank -arrows-.
– Unplug electrical connector for coolant shortage indicator switch - F66- at bottom of expansion tank and move expansion tank to one side with coolant hoses -1-, -2- and -3- attached.



– Remove bolts -arrows-.
– Pull ignition coil approx. 30 mm out of spark plug hole using puller - T40039- .



– Release electrical connectors and pull all connectors off ignition coils at the same time.



Installing

– Fit all ignition coils loosely into spark plug holes.

– Align the ignition coils with the connectors and attach all connectors onto ignition coils simultaneously.

– Press ignition coils onto spark plugs by hand evenly (do NOT use tool).

The remaining installation steps are carried out in the reverse sequence.

Tightening torque

Component	Nm
Electrical wiring guide for ignition coils to cylinder head cover	5

1.4 Removing and installing knock sensor

Electrical connectors

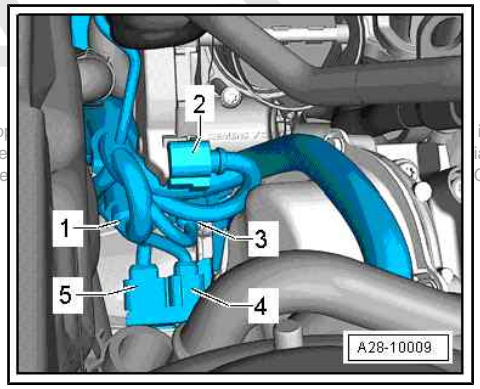
1 - To injectors on cylinder bank 1

2 - Throttle valve module - J338-

3 - Knock sensor 1 - G61-

4 - Lambda probe - G39-

5 - Lambda probe after catalytic converter - G130-



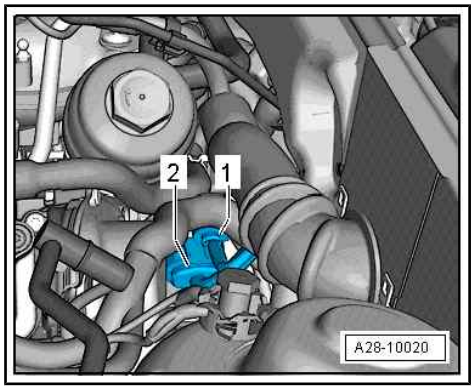
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Electrical connectors

1 - Knock sensor 2 - G66-

2 - Injectors, cylinder bank 2

2 - Fuel pressure sender - G247-



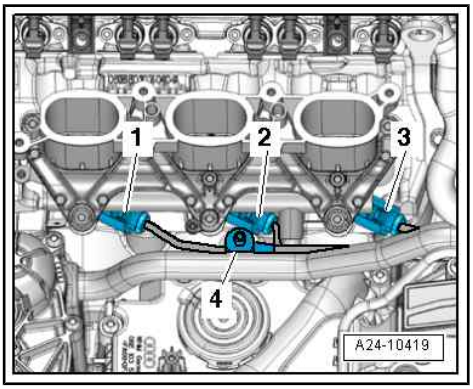
Removing

WARNING

- *The fuel system operates under high pressure. The pressure in the high-pressure part of the injection system must be reduced to a residual pressure prior to opening the system ⇒ page 313 .*
- *A clean cloth must then be wrapped around the connection and the residual pressure dissipated by carefully loosening the connection.*
- *Observe notes on procedure for disconnecting the battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .*

Remove knock sensor on cylinder bank (right-side).

4 - Knock sensor 1 - G61-



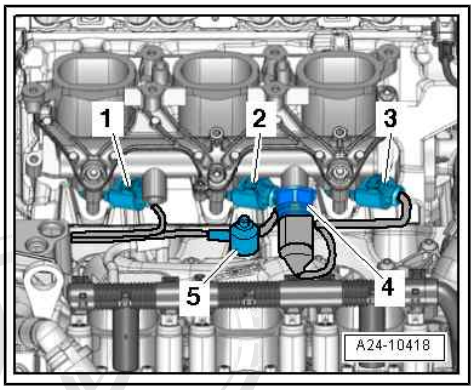
Note

To reach the bolt on knock sensor 1 - G61- -4- you must first remove injector 2.

– Remove intake manifold ⇒ page 335 .
– Remove intake manifold (right-side, bottom section) with fuel rail ⇒ page 333 .

Remove knock sensor on cylinder bank (left-side).

5 - Knock sensor 2 - G66-



Note

To reach the bolt on knock sensor 2 - G66- -5- you must first remove injector 5.

– Remove intake manifold ⇒ page 335 .
– Remove relevant intake manifold (bottom section) with fuel rail ⇒ page 333 .

Installing

– Re-install whichever knock sensor was removed.

Note

The tightening torque influences the function of the knock sensor.

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♦ Tightening torque: refer to exploded view of ignition system ⇒ page 403 .
– Install relevant intake manifold (bottom section) with fuel rail ⇒ page 333 .
– Install intake manifold ⇒ page 335 .

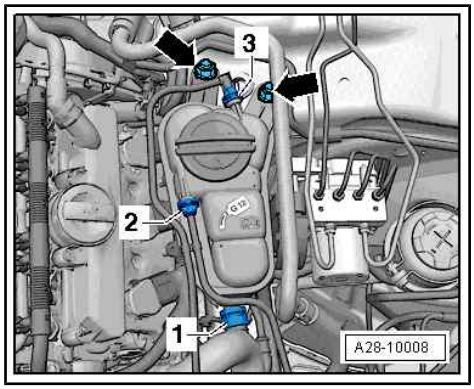
1.5 Removing and installing Hall senders

Fitting locations of the four Hall senders: refer to Fitting locations - overview ⇒ page 303 .

Removing

– Unplug electrical connector from corresponding Hall sender.
– To remove Hall sender 3 - G300- on cylinder bank 1 you must first remove air cleaner (bottom section). Removing air cleaner (bottom section) ⇒ page 327

– To remove Hall sender 4 - G301- on cylinder bank 2 you must first remove the coolant expansion tank.
– Unplug electrical connector for coolant shortage indicator switch - F66- at bottom of expansion tank and move expansion tank to one side with coolant hoses -1-, -2- and -3- attached.



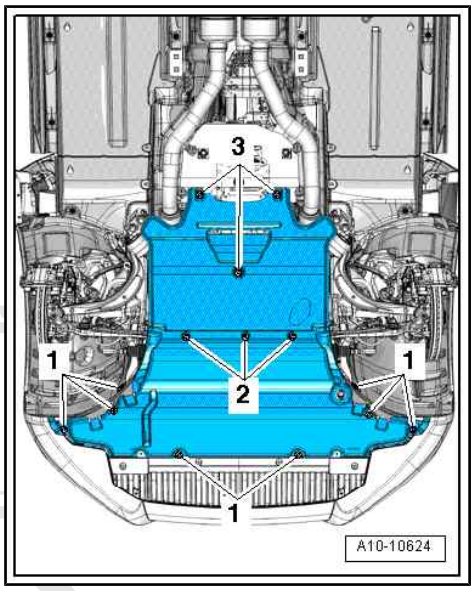
Installing

– Renew O-ring and lubricate with clean engine oil.
– Carefully press in Hall sender by hand.
– Secure Hall sender and plug back connector.
– The remaining installation steps are carried out in the reverse sequence.
♦ Tightening torque: refer to exploded view of ignition system ⇒ page 403 .

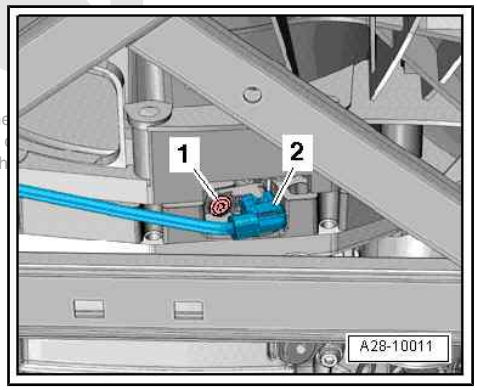
1.6 Removing and installing engine speed sender - G28-

Removing

– Release fasteners -1, 2, 3- and remove noise insulation panels.



– Unplug electrical connector -2-.
– Unscrew bolt -1- and remove engine speed sender - G28- .



Installing

Install in reverse order.

♦ Tightening torques: refer to overview of fitting locations ⇒ page 303 .

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