Workshop Manual

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

6-cylinder direct petrol injection engine (3.2 ltr. 4-valve), mechanics									
Engine ID	CALA								

Edition 12.2008

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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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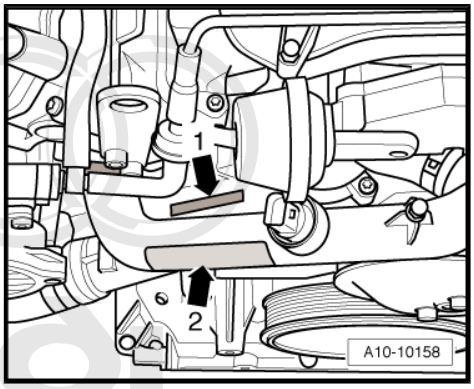
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00 – Technical data

1 Engine number



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.

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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 .*

2 Engine data

Code letters		CALA
Capacity	ltr.	3.197
Power output	kW at rpm	195/5000
Torque	Nm at rpm	330/3000
Bore	∅ in mm	85.5
Stroke	mm	92.8
Compression ratio		12.5
RON	not less than	95 [1)]
Injection/ignition system		Simos
Firing order		1-4-3-6-2-5
Turbocharging/supercharging		no
Knock control		2 sensors
Lambda control		4 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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3 Safety precautions

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 4 .

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

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- 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 diagnosis, testing and information system VAS 5051.

Caution

To prevent 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 ⇒ Rep. Gr. 27 .

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 expansion tank with cloth and open carefully.*

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 box 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.*

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

WARNING

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

Injuries can also be caused if the passenger's airbag is triggered in a collision.

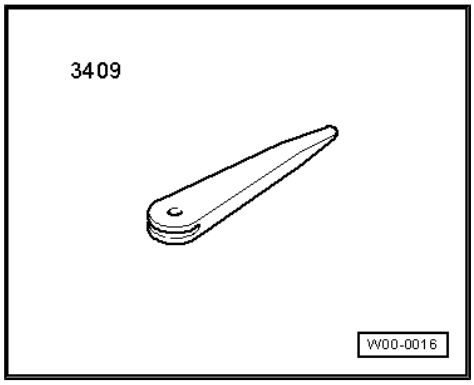
- *The use of test equipment while driving causes distraction.*
- *There is an increased risk of injury if test equipment is not secured.*
- *Test equipment must always be secured on the rear seat with a strap and operated from the rear seat by a second person.*

3.1 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-

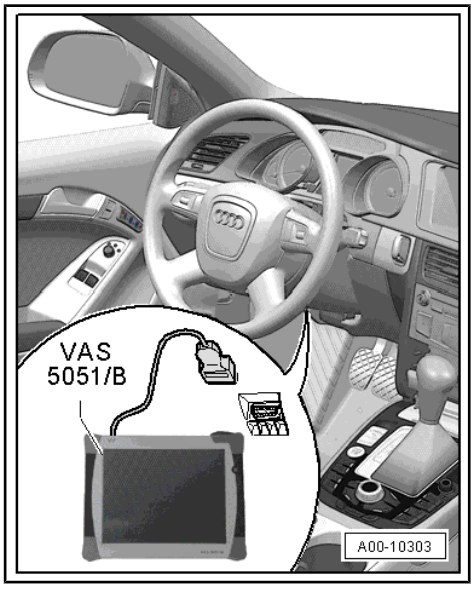


- Vehicle diagnostic, testing and information system -VAS 5051B-

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- :

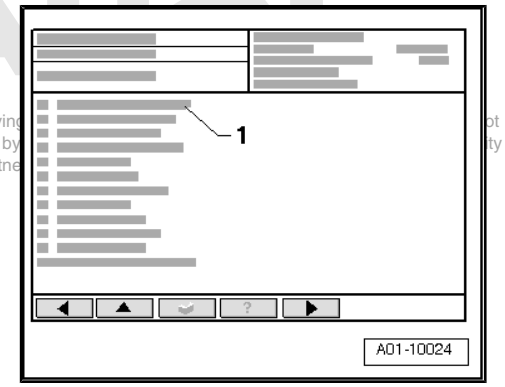
– Select `Vehicle self-diagnosis` from the list -item 1-.



Display on -VAS 5051B- :

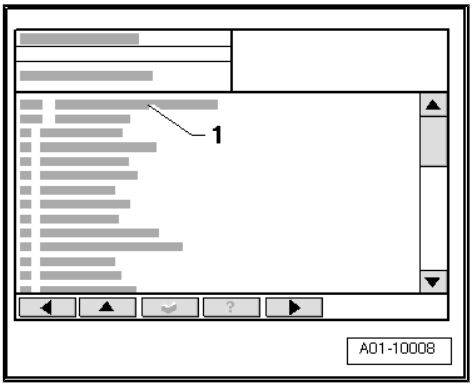
– From menu -1-, select “Self-diagnosis” system and press → key to continue.

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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- :

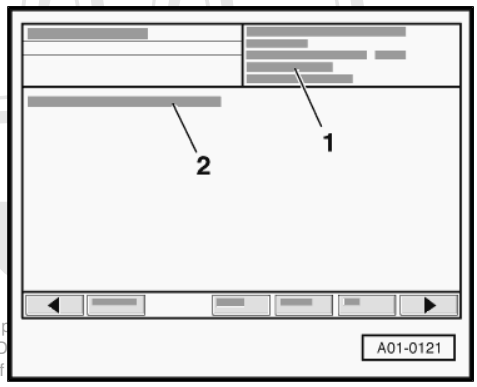
– From menu -1-, select measured value “fuel pressure” and press → key to continue.



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.



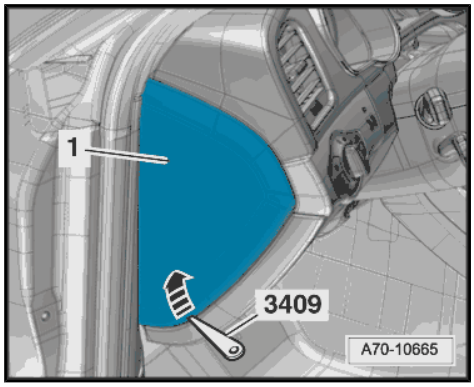
Note

“kPa” is also used as a unit for measuring pressure in addition to “bar”: 1 bar = 1 kPa.

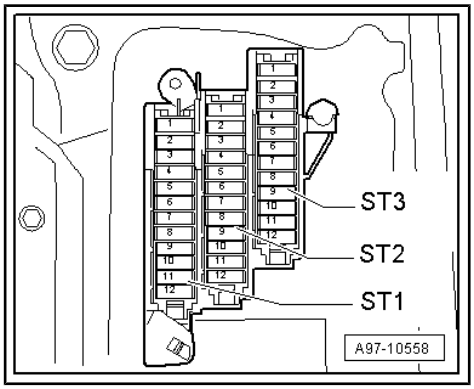
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1 - Control unit identification

– 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).

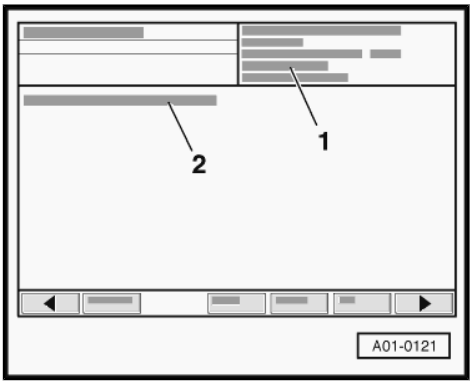


Display on -VAS 5051B- :

– 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).

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

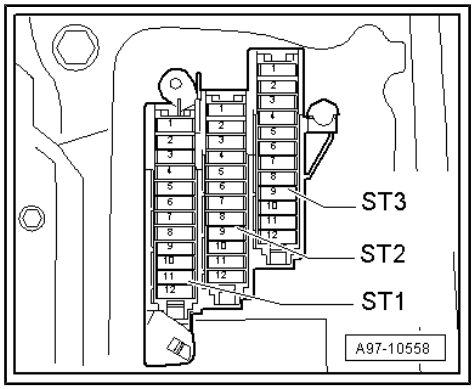
The pressure will increase again due to the effect of residual heat if the high-pressure system is not opened immediately.

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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 diagnosis, testing and information system VAS 5051.



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4 General repair instructions

4.1 Rules for cleanliness when working on the fuel supply system and injection system

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. Use only lint-free 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.

4.2 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.

4.3 Foreign particles in engine

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

4.4 Contact corrosion!

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

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

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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.

4.5 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.

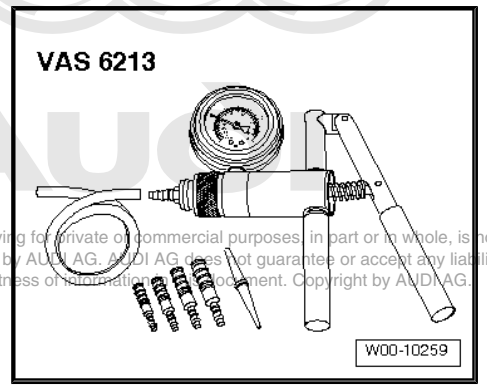
4.6 Installing radiators and condensers

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.

4.7 Checking vacuum system

Special tools and workshop equipment required

- Hand vacuum pump -VAS 6213-



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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 fault memory, check the vacuum lines leading to the corresponding component and also check the remaining vacuum lines in the system.

– If it is not possible to build up pressure with hand vacuum pump -VAS 6213- or if the pressure drops again immediately, check hand vacuum pump and connecting hoses for leaks.

10 – Removing and installing engine

1 Removing and installing engine - vehicles with manual gearbox

Note

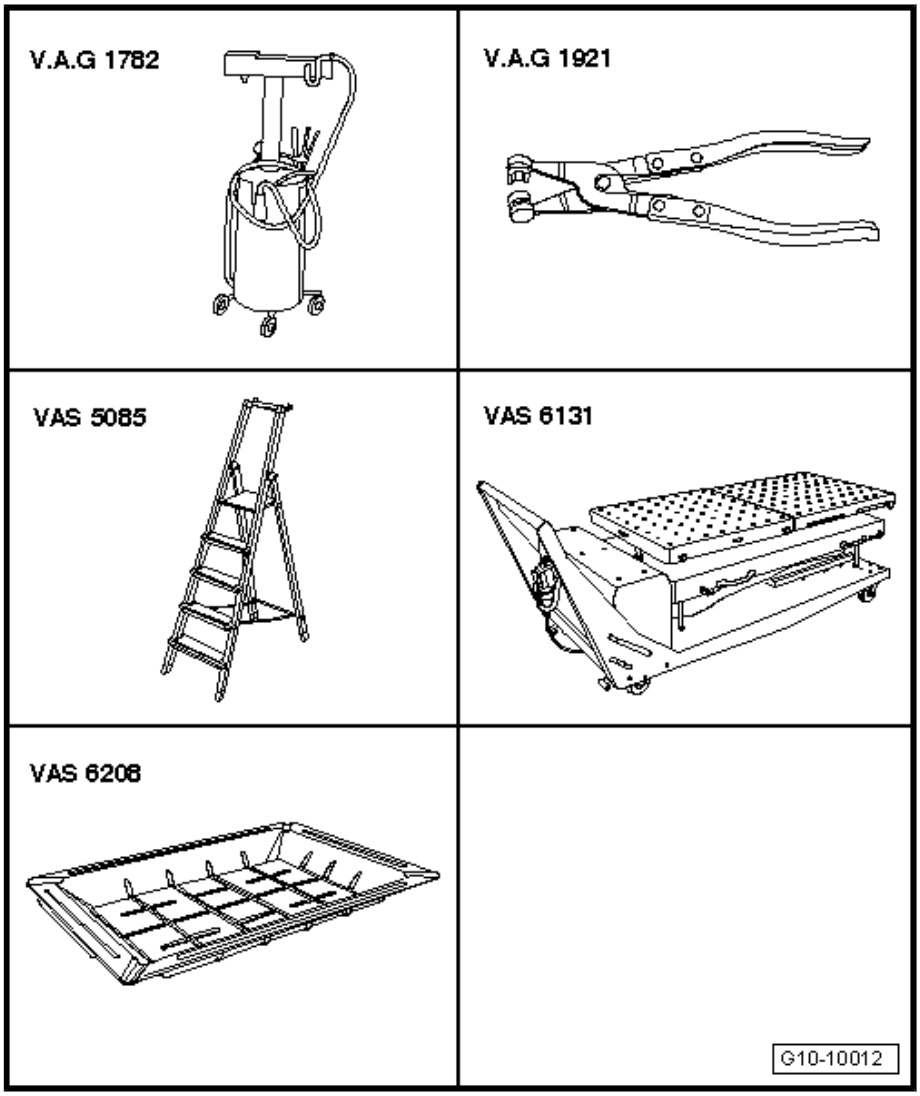
- *The engine is removed from underneath together with the gearbox and subframe (with lock carrier installed).*
- *Collect drained coolant in a clean container for re-use or disposal.*
- *Fit cable ties in the original positions when installing.*

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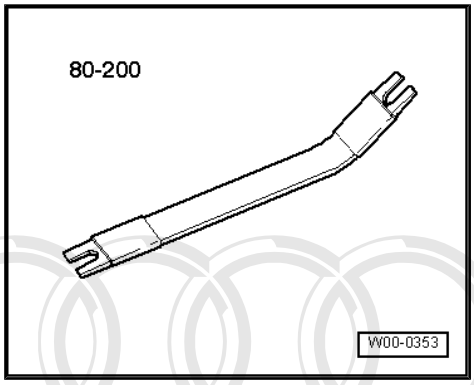
1.1 Removing engine

Special tools and workshop equipment required

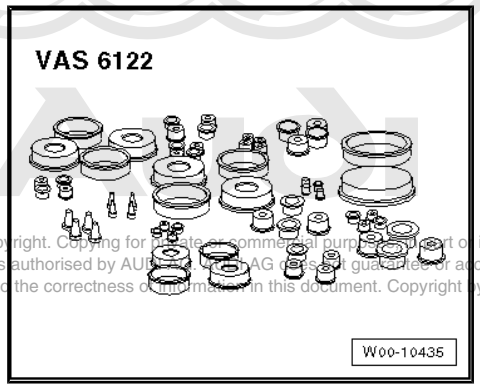
- Used oil collection and extraction unit -V.A.G 1782-
- Hose clip pliers -V.A.G 1921-
- Stepladder -VAS 5085-
- Scissor-type assembly platform -VAS 6131 A- with support set for Audi - VAS 6131/10- and supplementary set -VAS 6131/13-
- Drip tray for workshop hoist -VAS 6208-



- Removal lever -80 - 200-

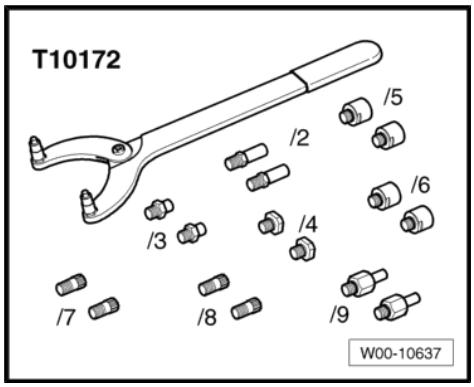


- Engine bung set -VAS 6122-

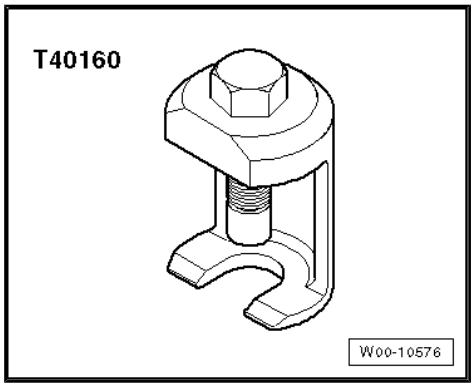


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- Counterhold tool -T10172- with -T10172/5- for vehicles with four-wheel drive



- Puller -T40160-



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 4 .

– Set front wheels to straight-ahead position.

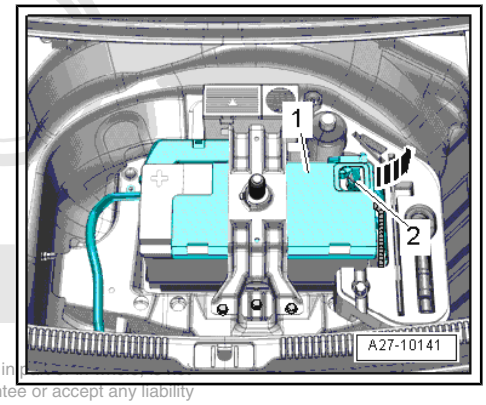
Note

The electronic 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.

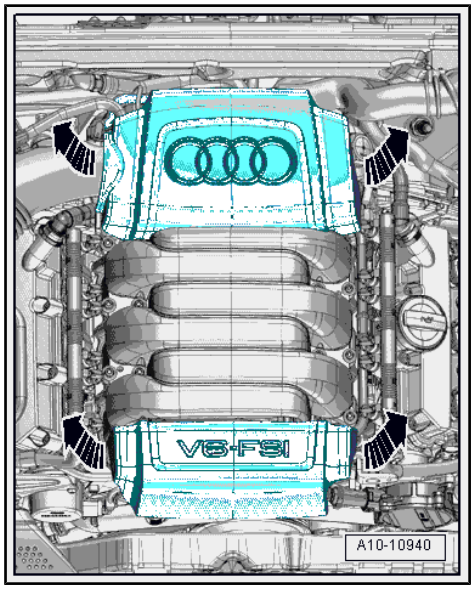
– Disconnect earth wire -2- from battery terminal ⇒ Rep. Gr. 27 .

– Discharge refrigerant system ⇒ Air conditioner with refrigerant R134a .

– 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.

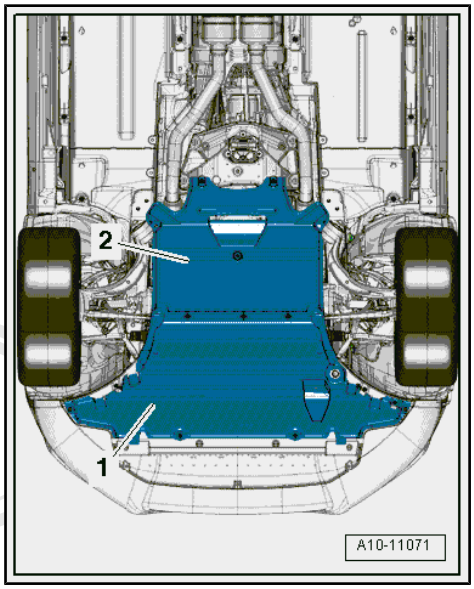
- *The cooling system is under pressure when the engine is hot.*
- *To allow pressure to dissipate, cover filler cap on expansion tank with cloth and open carefully.*

– Open filler cap on coolant expansion tank.

– Remove both front wheels.

– Remove front left and front right wheel housing liners ⇒ Rep. Gr. 66 .

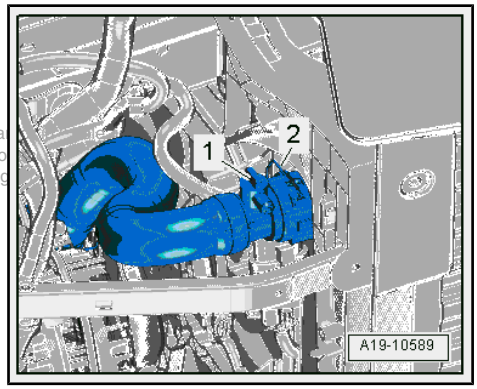
– Remove noise insulation panels -1- and -2- ⇒ Rep. Gr. 66 .



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

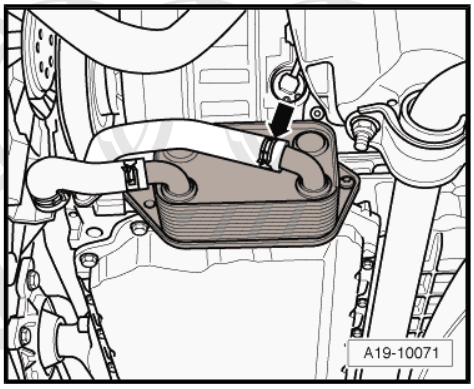
– Remove drain plug -1- and drain off coolant.

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



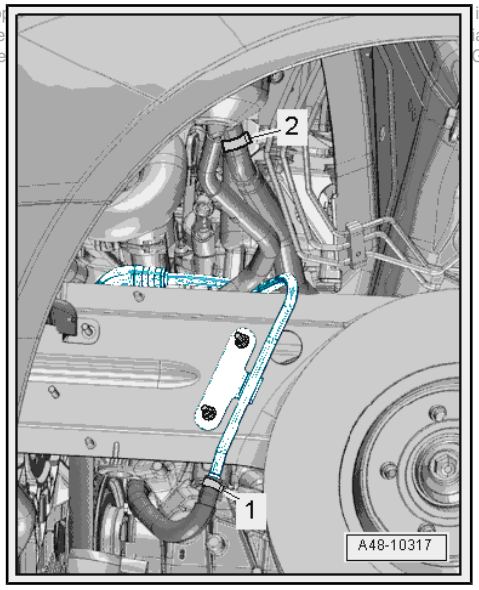
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– Disconnect coolant hose -arrow- from oil cooler and drain off remaining coolant.



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– 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- .

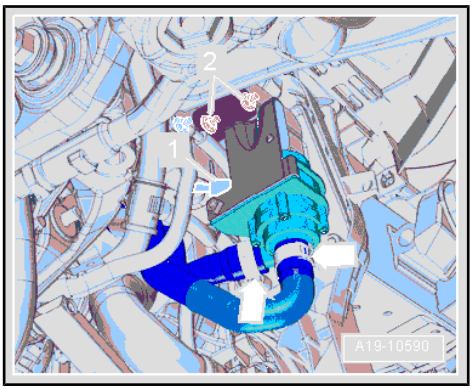


Vehicles with coolant circulation pump -V50- :

– 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-.

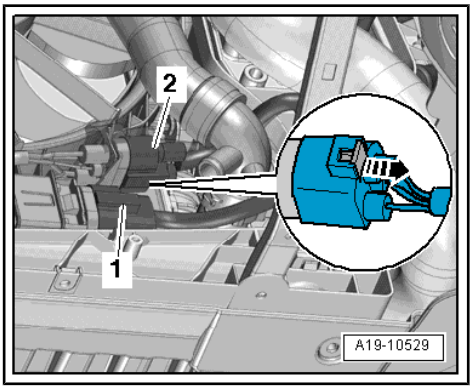
Note

Disregard -item 2- and -left arrow-.

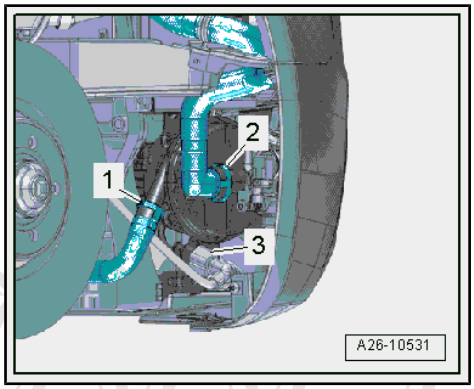


All vehicles (continued):

– 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.



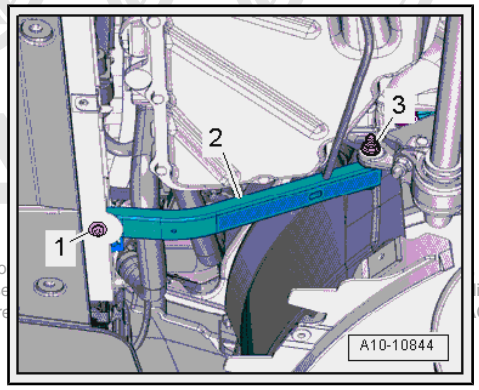
– If fitted, detach electrical connector -3- at secondary air pump motor -V101- and move electrical wire clear.



Note

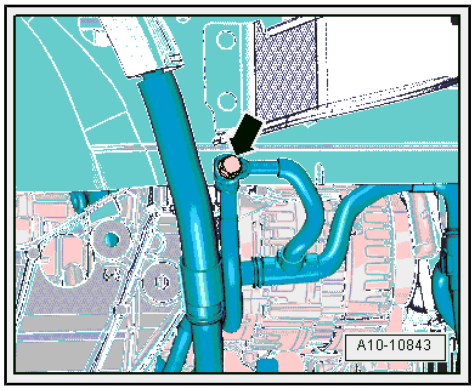
Disregard -items 1, 2-.

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

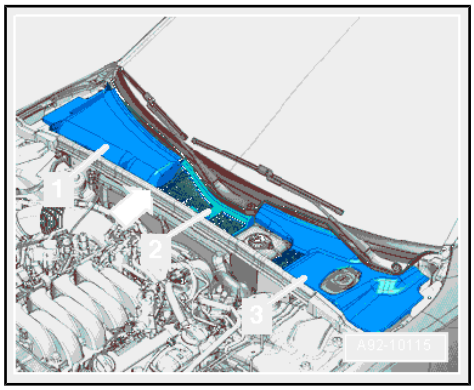


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– Unscrew nut -arrow- on longitudinal member (right-side) and move earth cables clear.

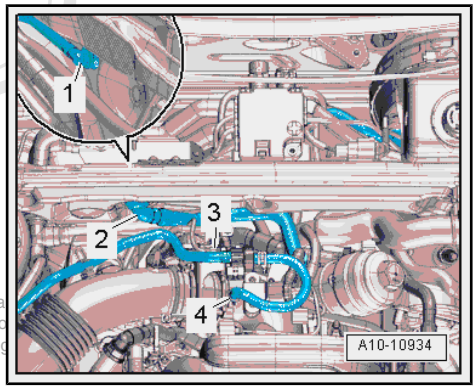


– Remove seal -arrow-.
– Remove plenum chamber cover ⇒ Rep. Gr. 50 .

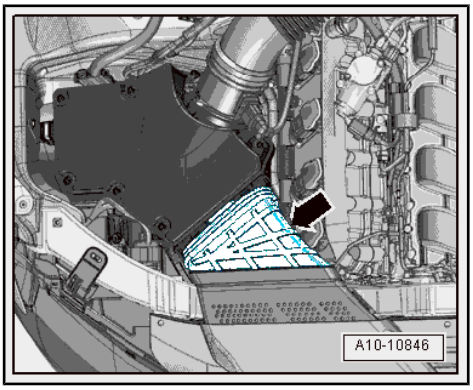


– Disconnect vacuum hose -1- on rear side of bulkhead and detach vacuum connection -2- from bulkhead.
– Move fuel line and line leading to activated charcoal filter clear at air pipe.
– Unplug electrical connector -3- at activated charcoal filter solenoid valve 1 -N80- and detach vacuum hose -4-.
– Disengage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

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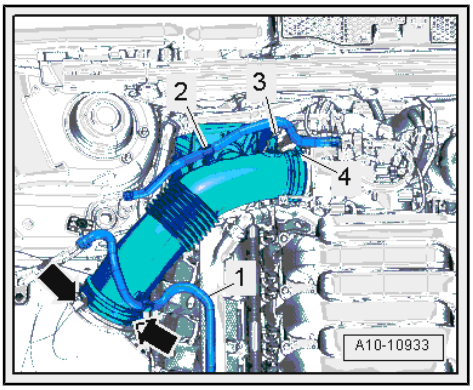
– Remove air duct -arrow-.



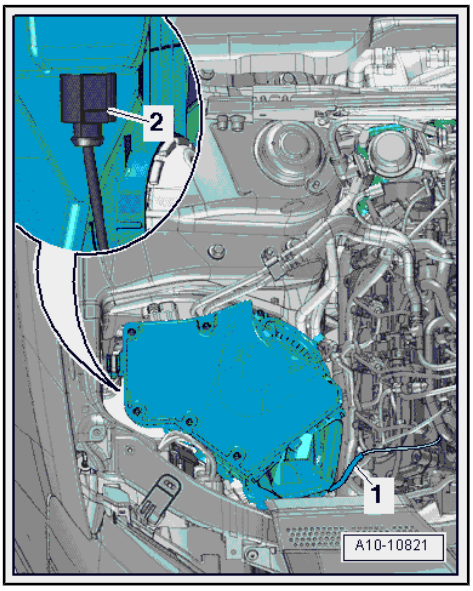
– Move fuel hose -1- clear at air pipe.
– Disconnect vacuum hose -3- from connection on air pipe.
– Remove air pipe. To do so, release hose clip -4- and clamps -arrows-.

Note

Disregard -item 2-.



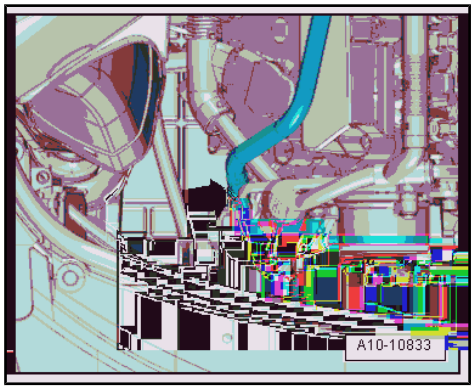
– Disconnect vacuum line -1-.
– Detach air cleaner housing and, if fitted, unplug electrical connector -2- at variable intake manifold change-over valve -N335- on reverse side of air cleaner.



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.

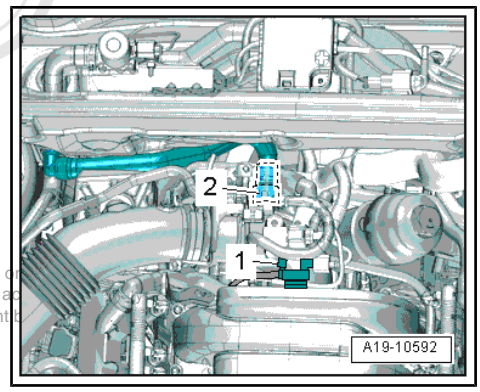
- *Observe rules for cleanliness when working on the fuel supply system* *⇒ page 9* *.*

– 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- .

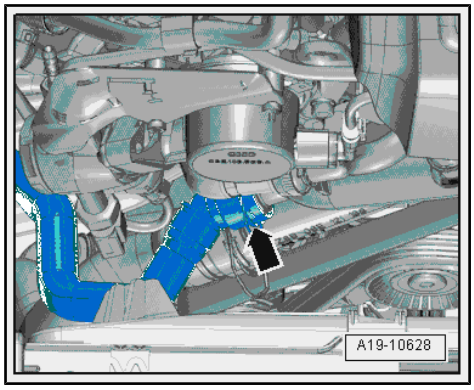
– If fitted, disconnect vacuum hose -1- and move clear.

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

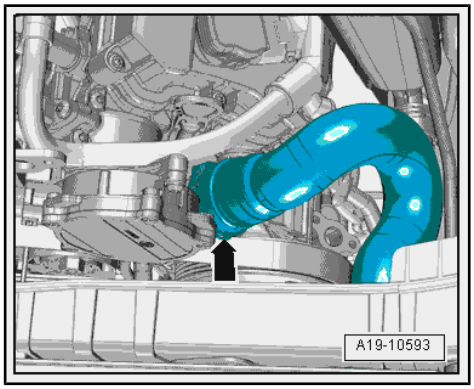


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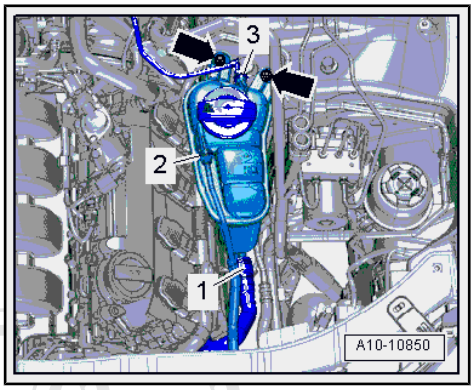
– On vehicles without coolant circulation pump -V50- , lift retaining clip -arrow- and detach coolant hose at front right of coolant pipe (front).



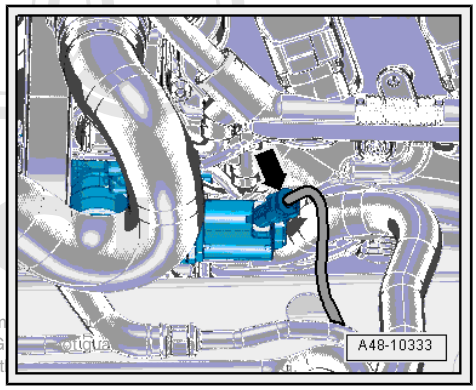
– Lift retaining clip -arrow- and detach coolant hose from coolant pipe (front).



– 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.



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



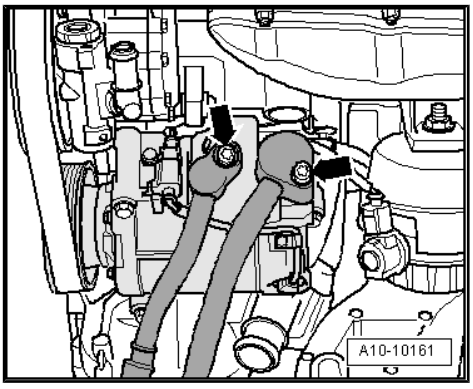
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Caution

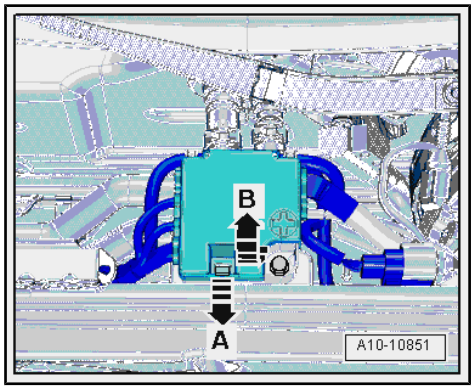
Danger of damage to refrigerant lines and hoses.

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

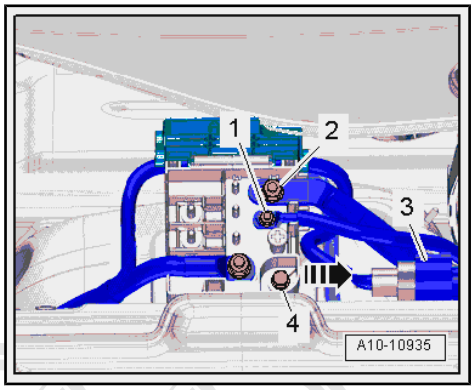
– Remove bolts -arrows- and disconnect refrigerant lines from A/C compressor.
– Seal off open pipes/lines and connections with clean plugs from engine bung set -VAS 6122- .



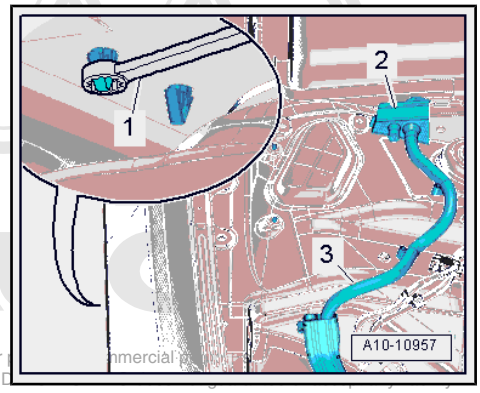
– Release retainer -arrow A- and open cover -arrow B-.



– 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-.

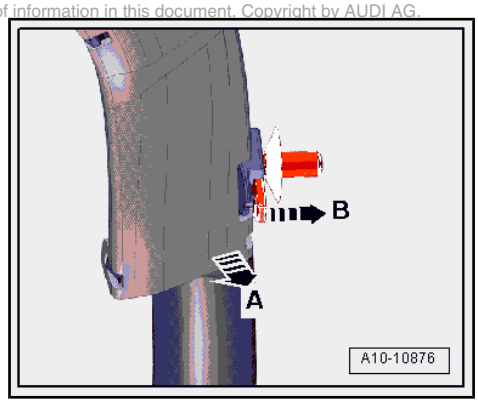


– Working from wheel housing, release catches using a 5.5 mm ring spanner -item 1- -arrow- and remove wiring protector -2- from above.
– Release wiring harness -3- leading to alternator and starter using removal lever -80 - 200- and move clear.

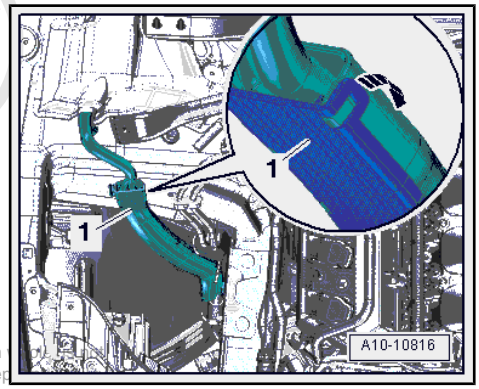


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– Wiring duct (version 1): release catch -arrow B- and move wiring duct clear by pulling it towards front -arrow A-.

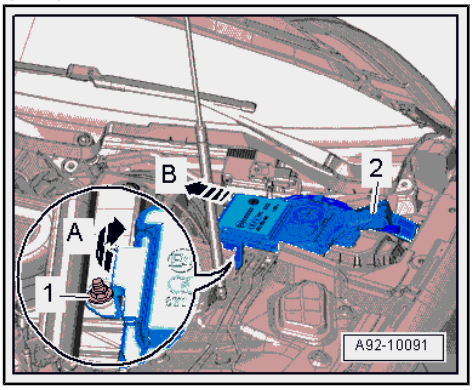


– Wiring duct (version 2): release catch -arrow- to open wiring duct -1- and move wiring harness clear.

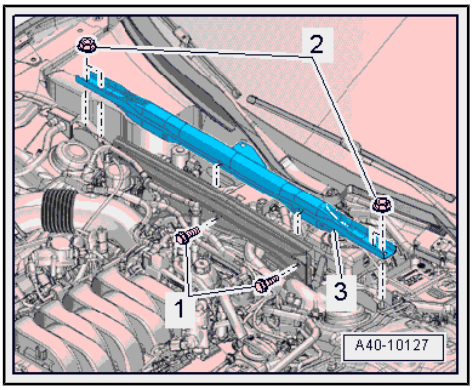


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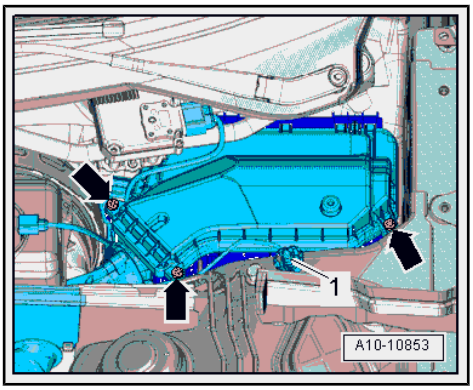
– Remove nut -1- and swivel filler neck -2- for washer fluid reservoir slightly upwards -arrow A-.
– Pull filler neck with filler pipe out of washer fluid reservoir and through opening in body -arrow B-.



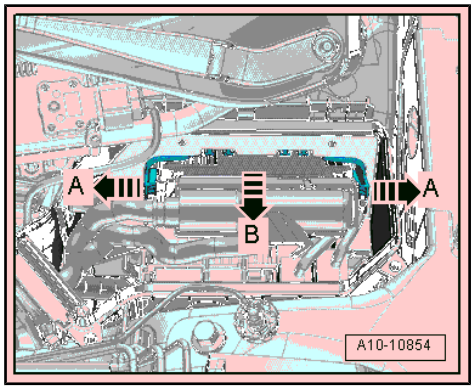
– Remove bolts -1- and nuts -2- and detach body brace -3-.



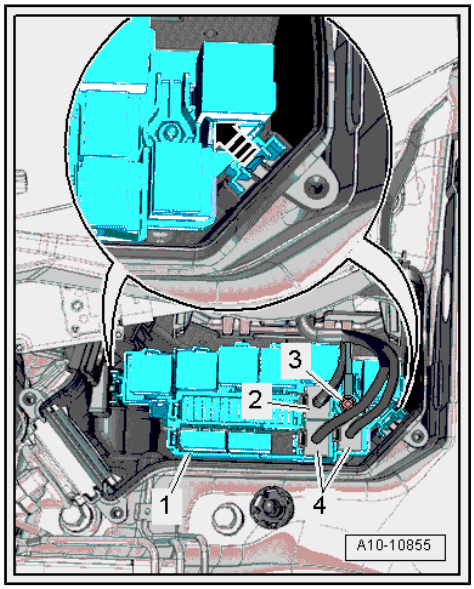
– Remove bolts -arrows- and detach cover for electronics box in engine compartment.
– Remove nut -1- and move electrical wiring clear.



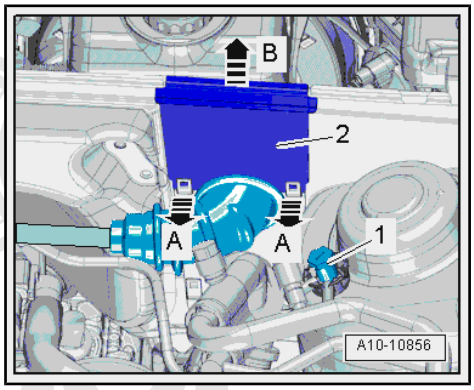
– Release catches -arrows A- and take out engine control unit -arrow B-.



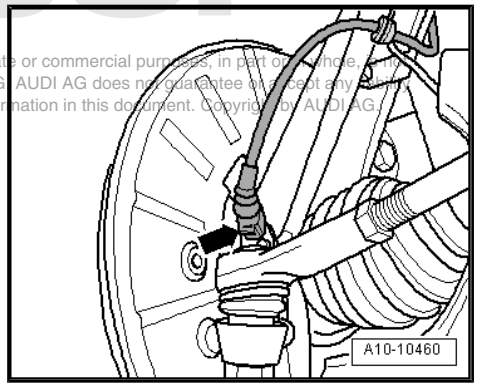
– If fitted, unplug electrical connector -2-.
– Unplug electrical connectors -4- and unscrew nut -3- for wiring.
– Release catches -arrow- and detach relay carrier with fuse holder -1-.
– Disengage engine wiring harness at electronics box in engine compartment and move clear.



– 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.

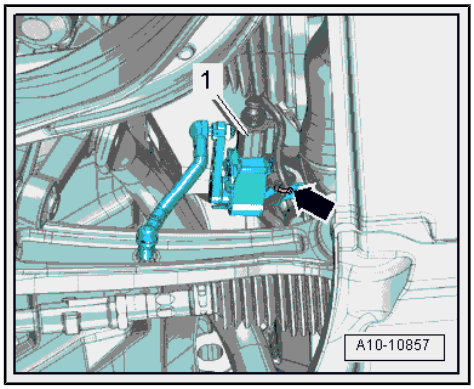


– Unplug electrical connectors -arrow- at front wheel speed sensors on both sides.

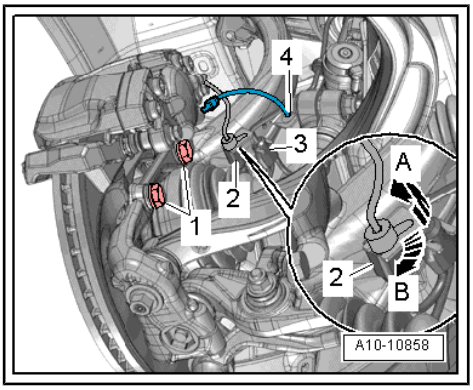


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– Unplug electrical connector -1- from front left vehicle level sender -G78- and front right vehicle level sender -G289- and move wiring clear -arrow-.



– 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.

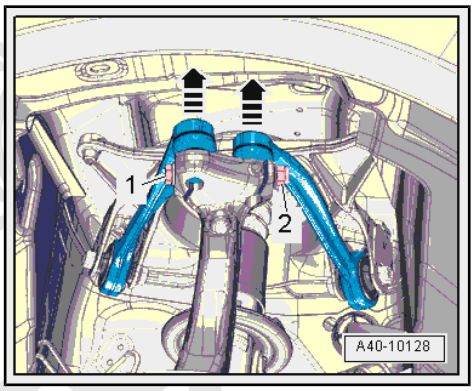


Caution

Avoid damage to brake pistons.

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

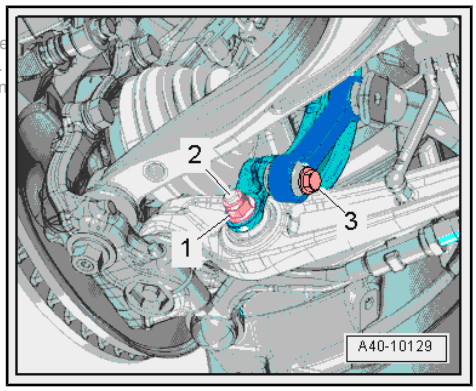
– Remove nut -2- and pull out bolt -1-.
– Pull upper suspension links upwards out of wheel bearing housing -arrows-.
– Perform the same work steps on the other side of the vehicle.



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

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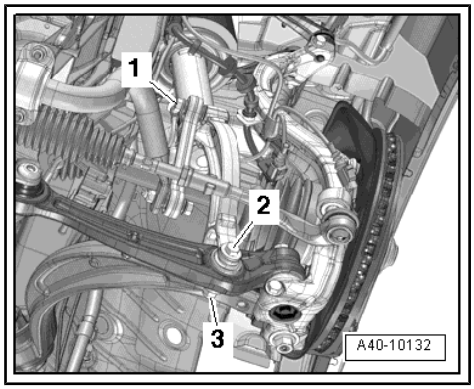
– Remove bolt -3- for anti-roll bar on both sides.
– Remove nut -1- on both sides.



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):

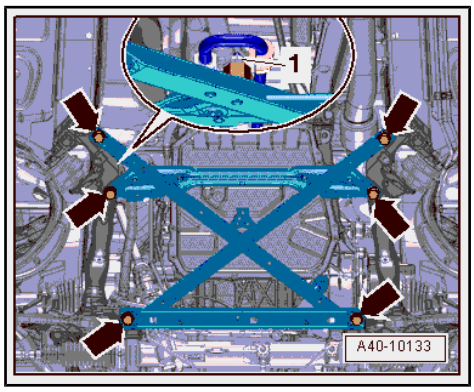
Caution

Risk of damage to running gear components.

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

Audi
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A4 (all), A5 Coupé:

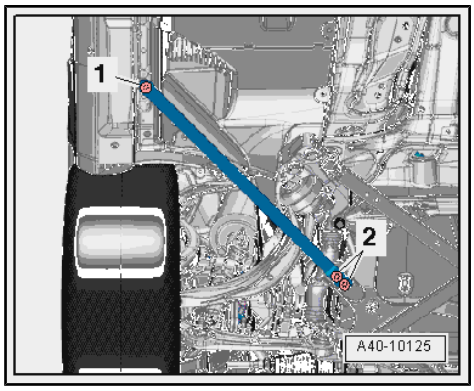


– Remove nut -1- for power steering hydraulic line.
– Remove bolts -arrows- and detach subframe cross brace.

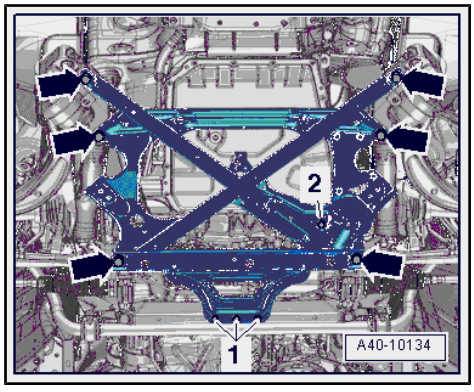
Note

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

A5 Cabriolet:



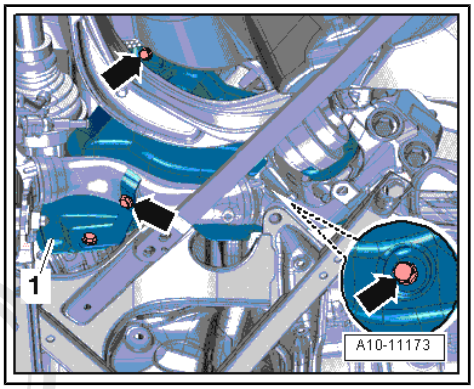
– Remove bolts -1- and -2- on both sides and detach strut.



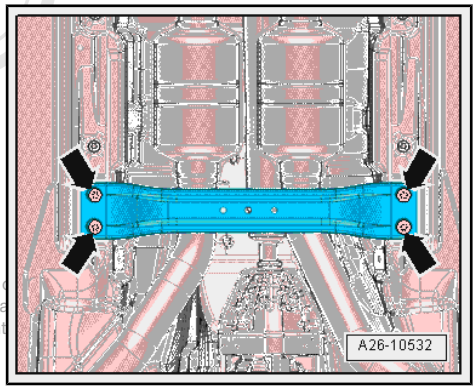
– Remove bolt -2- for power steering hydraulic line.
– Remove bolts -1- and -arrows- and detach subframe cross brace.

All vehicles (continued):

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

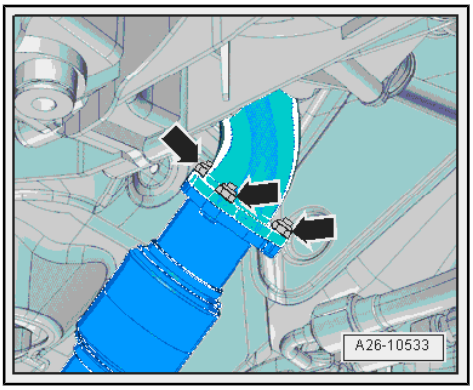


– If fitted, remove bolts -arrows- and detach front cross member.

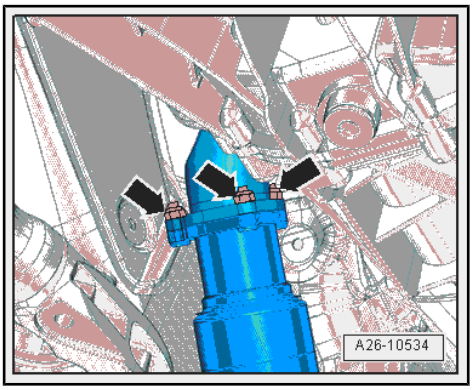


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– Unscrew nuts -arrows- for front silencer (left-side).



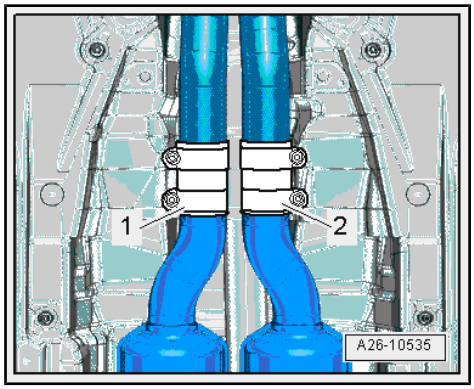
– Unscrew nuts -arrows- for front silencer (right-side).



Caution

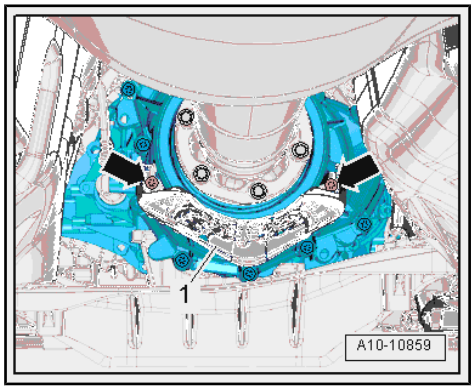
Risk of damage to flexible joints in front silencer.

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



– 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.

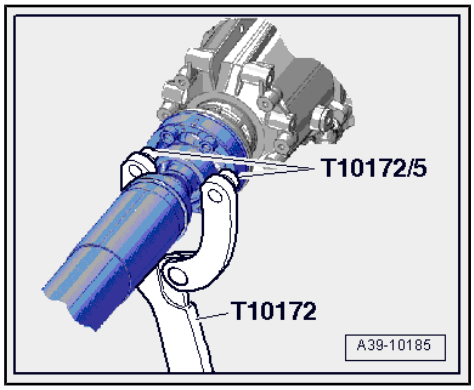


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– Remove bolts connecting propshaft to gearbox (use counter-hold tool -T10172- with -T10172/5-).

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

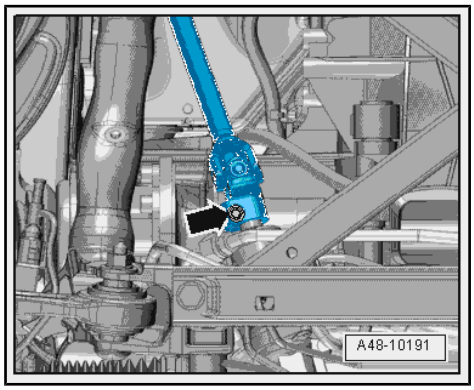
– Tie up propshaft on one side.



Caution

Risk of damage to coil connector for airbag.

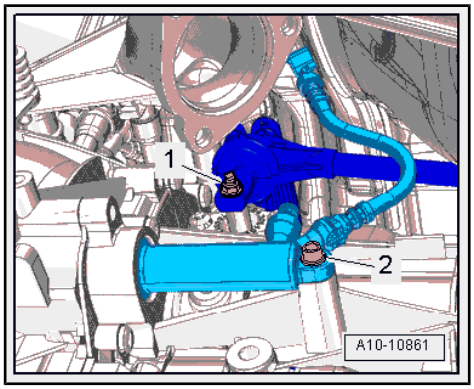
- *Make sure that front wheels are in straight-ahead position before removing universal joint from steering box.*
- *Do not alter position of steering wheel and steering box (locate steering wheel with adhesive tape if necessary).*



– Remove bolt -arrow- for universal joint ⇒ Rep. Gr. 48 .

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

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



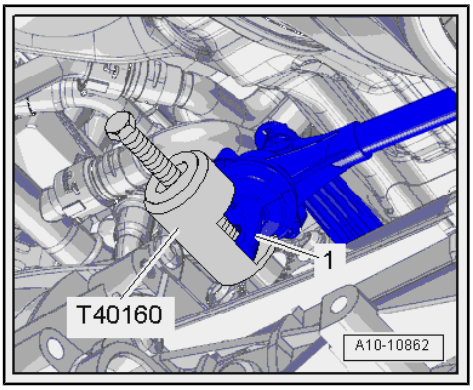
Caution

Avoid damage to clutch slave cylinder.

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

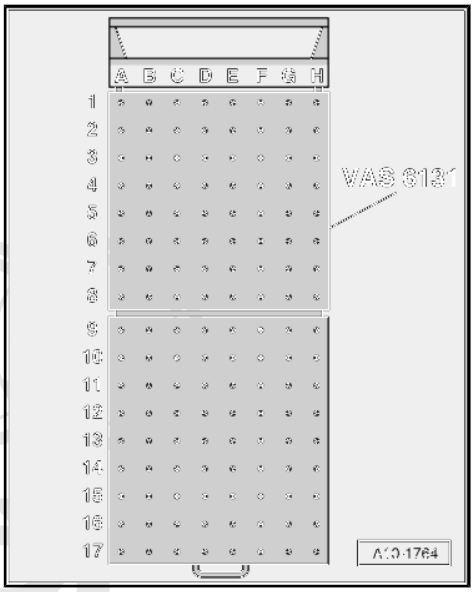
– Remove nut -1- for selector rod.

– 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.

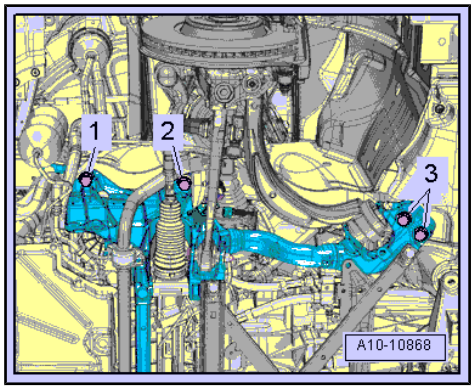
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WARNING

Accident risk if subframe mountings are detached.

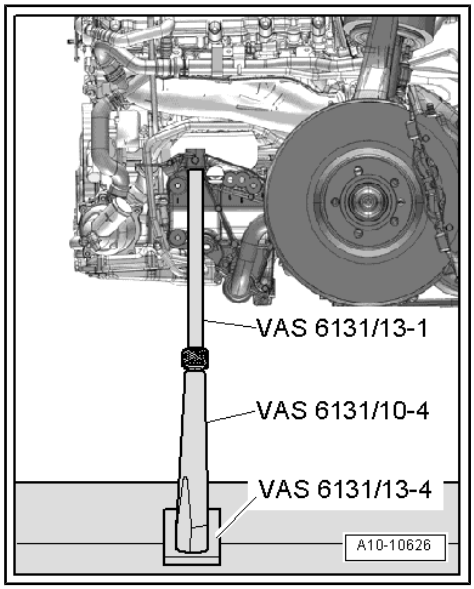
- *Subframe bolts -2- and -3- must not be loosened.*

– Remove subframe bolts -1- on both sides.

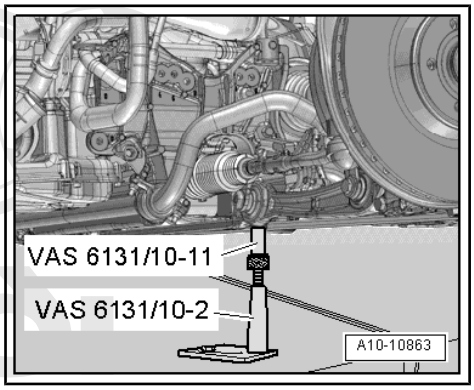


– Position support elements from -VAS 6131/10- and -VAS 6131/13- at front left and right of subframe as shown.

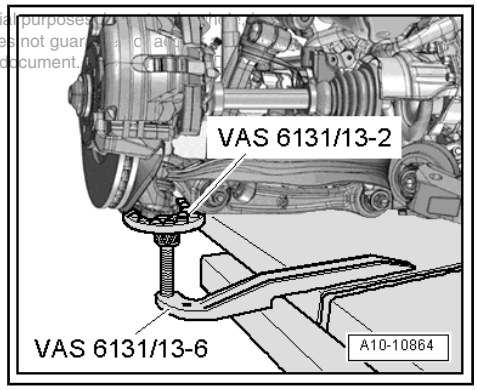
– Make sure that threaded spindles are screwed in completely.



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

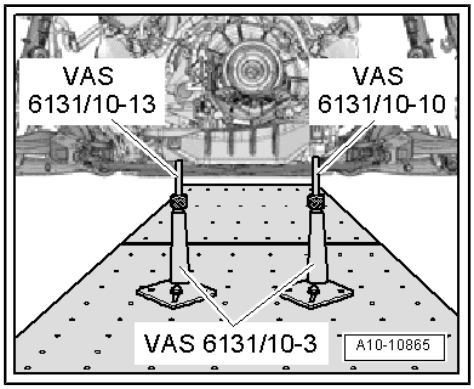


– Position support elements from -VAS 6131/13- under left and right wheel bearing housings as shown.



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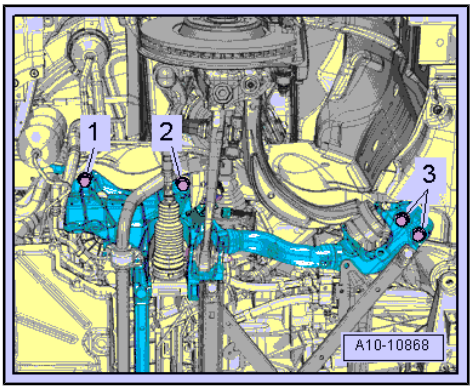
– Detach retaining clips for noise insulation from cross member.
– Position support elements from -VAS 6131/10- at rear of cross member on both sides, as shown in illustration.
– Turn all spindles for support elements upwards until all locating lugs make contact with mounting points.
– Tighten base plates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



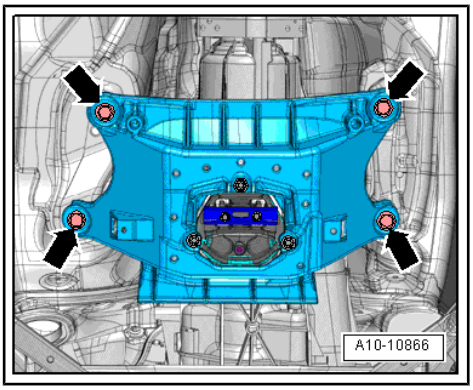
– Mark installation position of subframe and tunnel cross member on longitudinal members with felt-tip pen.
– Unscrew subframe bolts -2- and -3- on both sides in several stages and in diagonal sequence.

Note

Disregard -item 1-.

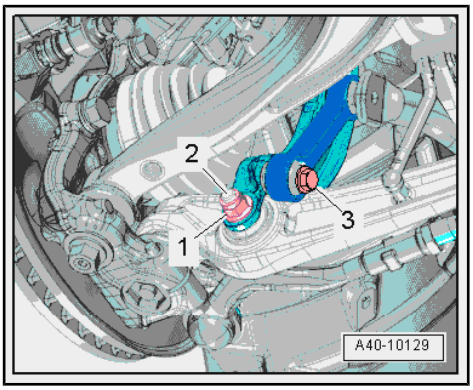


– Remove bolts -arrows- on tunnel cross member.



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

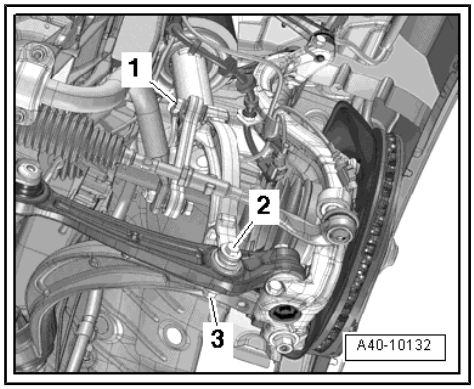
– Remove bolt -2- on both sides.



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

– Remove bolt -2- on both sides.

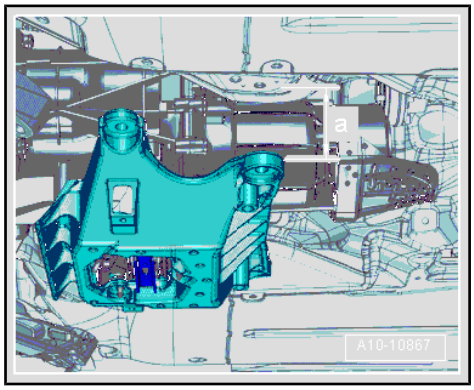


All vehicles (continued):

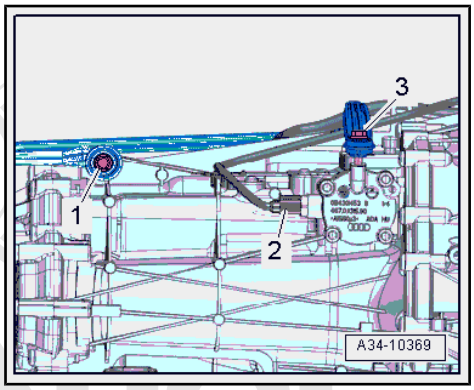
> **Caution**
>
> *Danger of damage to hoses, pipes and wiring connections and to engine compartment.*
>
> - *Check that all hoses and wiring connections between engine, gearbox, subframe and body have been detached.*
> - *Carefully guide engine/gearbox assembly with subframe out of engine compartment 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).



– 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 beneath vehicle.

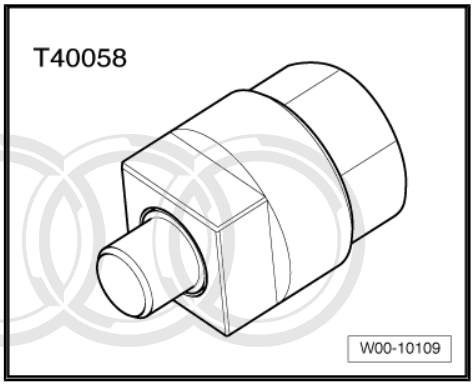
1.2 Separating engine from manual gearbox

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Special tools and workshop equipment required

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

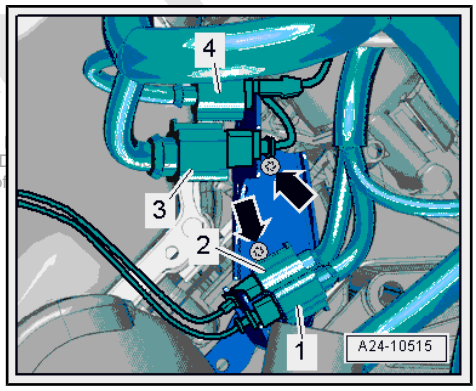
♦ Adapter -T40058-



Procedure

- Engine/gearbox assembly removed and in position on scissor-type assembly platform -VAS 6131 A- .

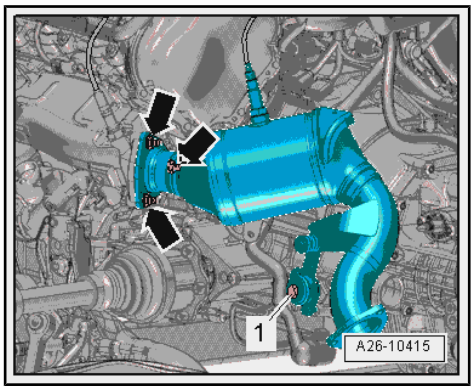
– Remove electrical connector -1- for Lambda probe 2 after catalytic converter -G131- from bracket and unplug connector.



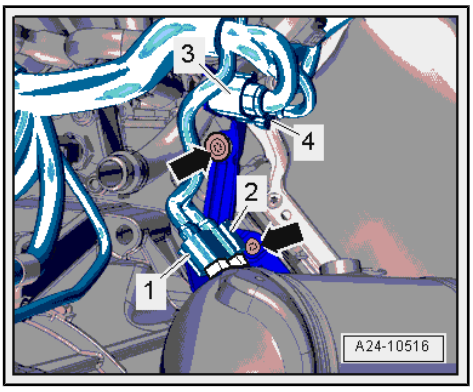
Note

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

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



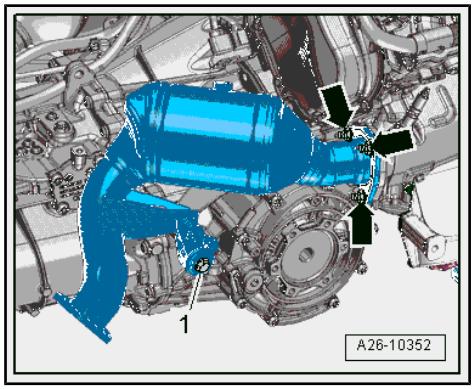
– Remove electrical connector -1- for Lambda probe after catalytic converter -G130- from bracket and unplug connector.



Note

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

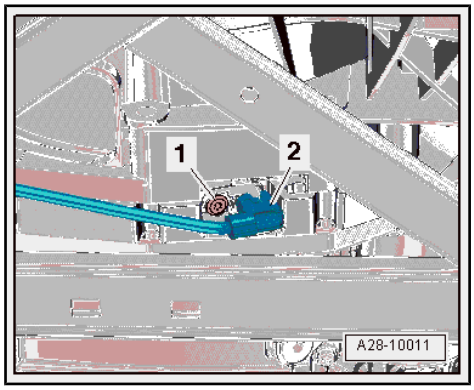
– Remove nuts -arrows- and bolt -1- and detach catalytic converter (right-side).



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

Note

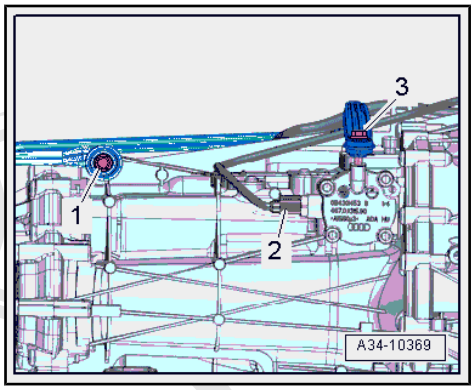
Disregard -item 1-.



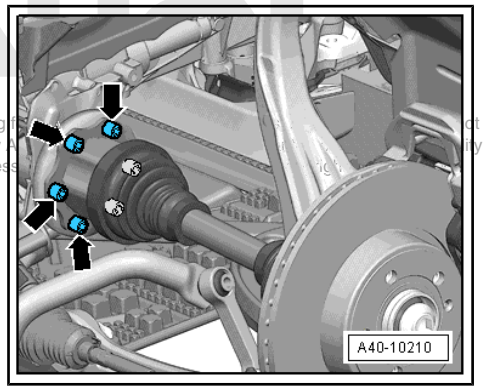
– Unplug electrical connector -2- at reversing light switch -F4- .

Note

Disregard -items 1, 3-.

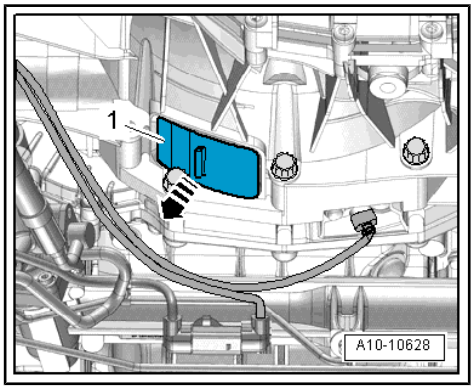


– Unbolt drive shafts (left and right) from gearbox flange shafts.



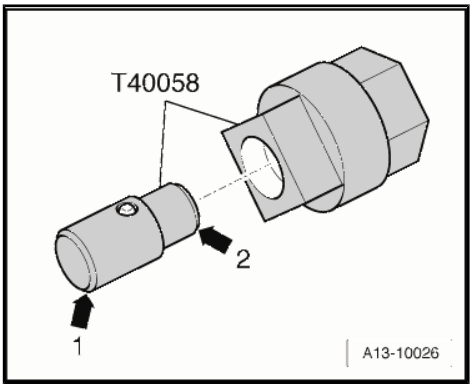
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– Detach bottom cover -1- from gearbox -arrow-.



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

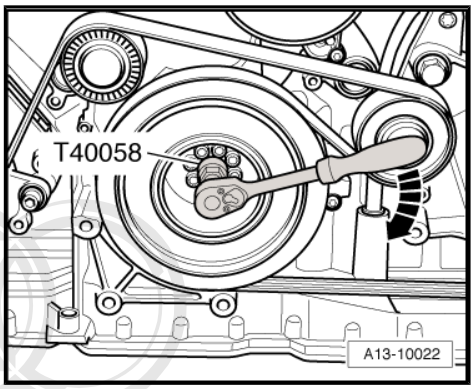
- The larger-diameter section -arrow 1- faces towards the engine.
- The smaller-diameter section -arrow 2- faces the adapter.



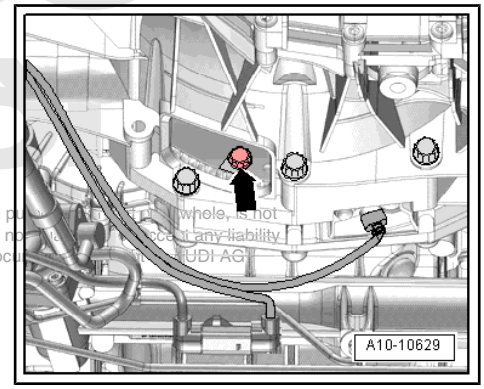
– Counterhold crankshaft using adapter -T40058- when slackening bolts for drive plate.

Note

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

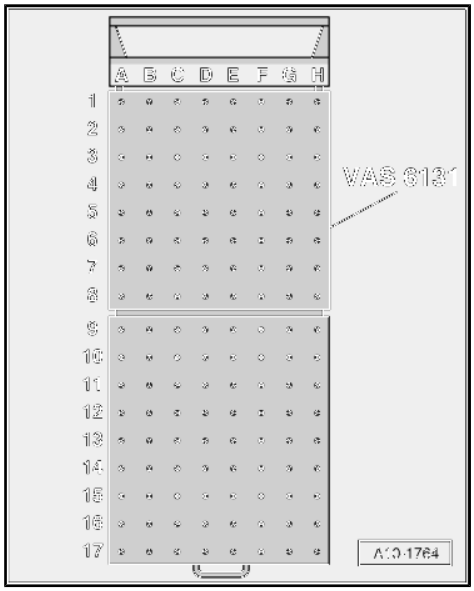


– Remove 6 bolts -arrow- for clutch module, turning crankshaft 60° in normal direction of rotation each time.



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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:

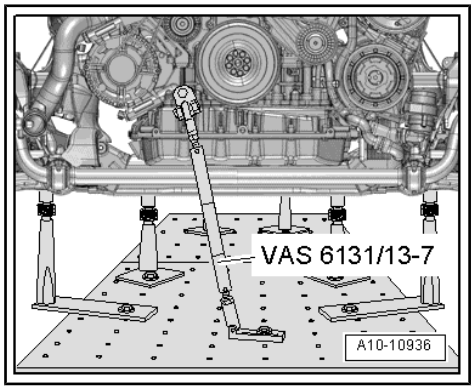


Note

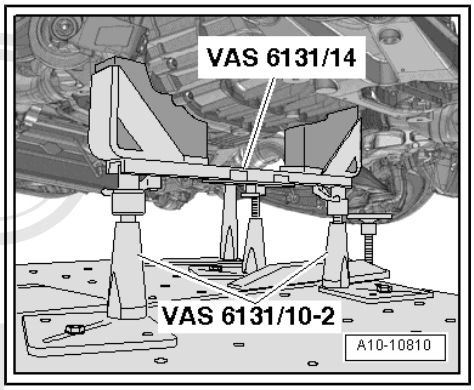
The other support elements remain unchanged.

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.

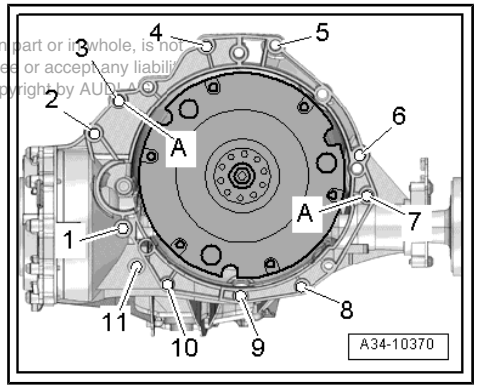


– Position support elements from -VAS 6131/10- and gearbox support -VAS 6131/14- at front of gearbox, as illustrated.
– Screw spindles on both sides upwards until gearbox support -VAS 6131/14- makes full contact with gearbox.
– Tighten base plates for support elements to 20 Nm on scissor-type assembly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



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

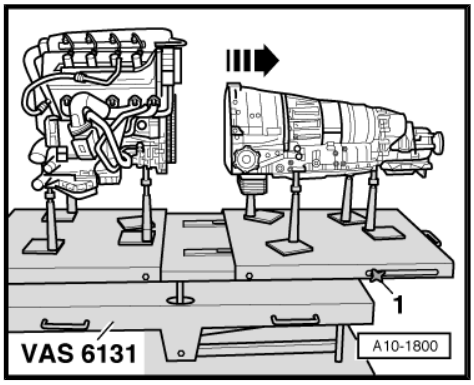
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Note

Disregard -item A-.

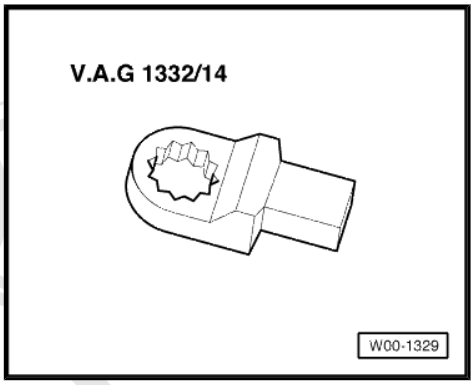
– Loosen clamping bolts -1- on sides of scissor-type assembly platform -VAS 6131 A- and pull rear section of platform together with gearbox towards rear -arrow-.



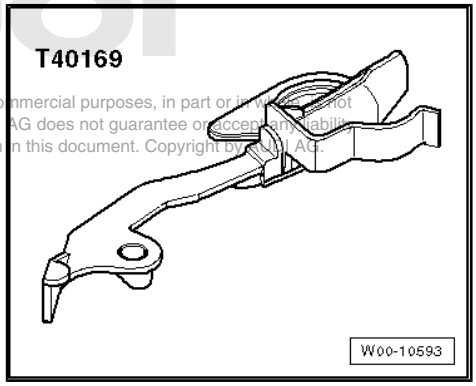
1.3 Installing engine

Special tools and workshop equipment required

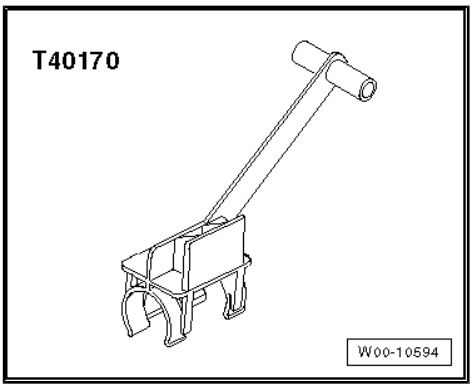
♦ Ring spanner insert AF 16 -V.A.G 1332/14-



♦ Assembly aid -T40169-



♦ Transport lock -T40170-



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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 %.*

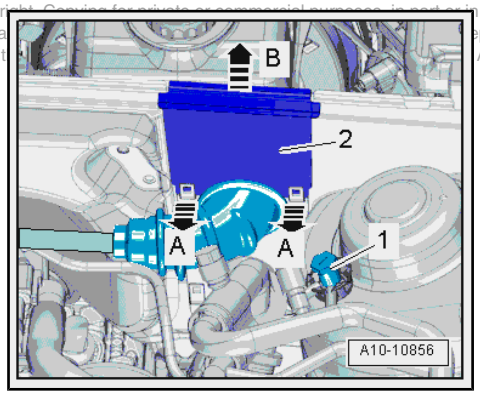
Component		Nm
Bolts/nuts	M6	9
	M7	15
	M8	20
	M10	40
	M12	65

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Assembly mountings ⇒ page 110 .

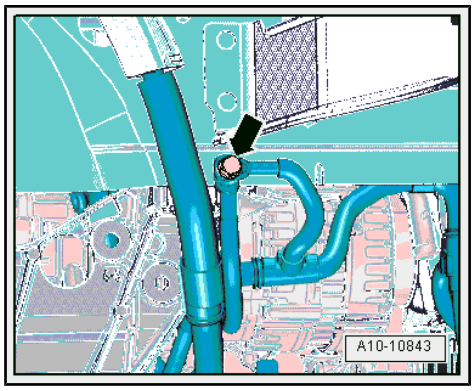
Earth stud at suspension turret - tightening torque

– Tighten earth stud -1- to 9 Nm.

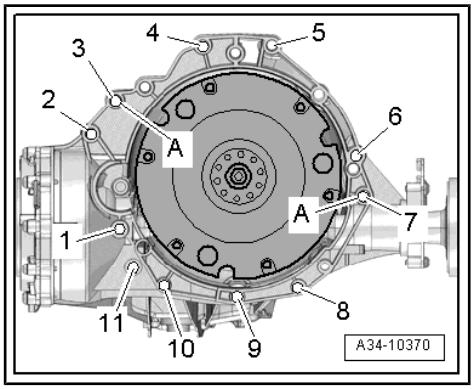


Earth wiring at longitudinal member - tightening torque

– Tighten nut -arrow- to 9 Nm.

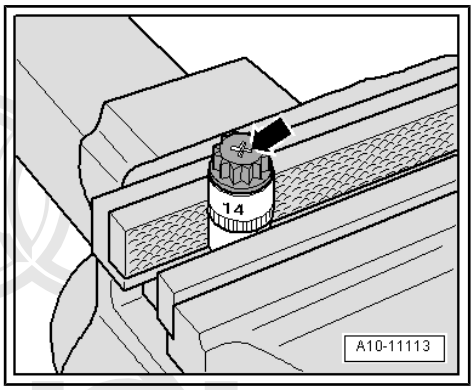


Engine to manual gearbox



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 no. 8K-9-066499, Audi A5 up to vehicle identification no. 8T-9-007999: renew aluminium bolts.
- 3) Audi A4 from vehicle identification no. 8K-9-066500 onwards, Audi A5 from vehicle identification no. 8T-9-008000 onwards: aluminium bolts must not be used more often than twice ⇒ page 37 .



- Audi A4 from vehicle identification no. 8K-9-066500 onwards, Audi A5 from vehicle identification no. 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

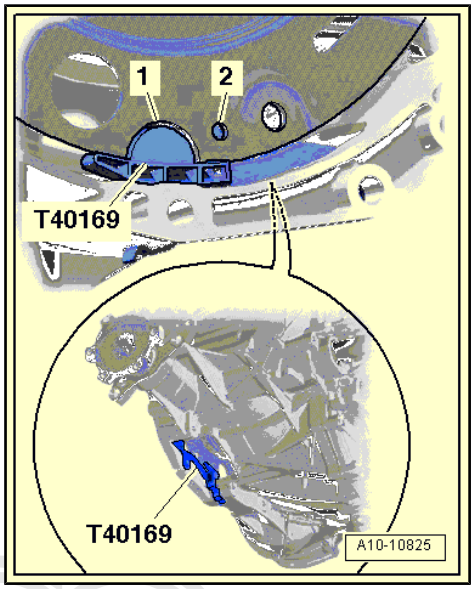
- *Renew the bolts tightened with specified tightening angle.*
- *Renew self-locking nuts and bolts as well as seals, gaskets and O-rings.*
- *On vehicles with manual gearbox, a needle bearing is fitted in the drive plate. Before installing, check that the needle bearing is fitted. Removing and installing needle bearing in drive plate (pressing in and out) ⇒ page 125 .*
- *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.

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– The following preparations are required before joining engine and gearbox.
– Insert assembly aid -T40169- into gearbox housing and clutch module from below, as illustrated.
• The assembly aid must engage in the semi-circular recess -1- and in the inspection hole -2-.

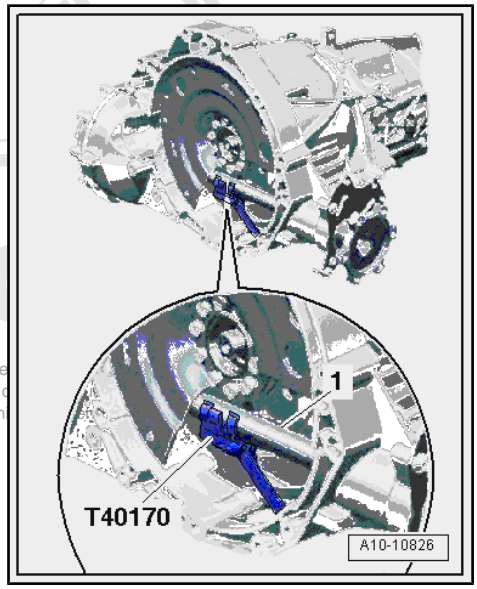


Note

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

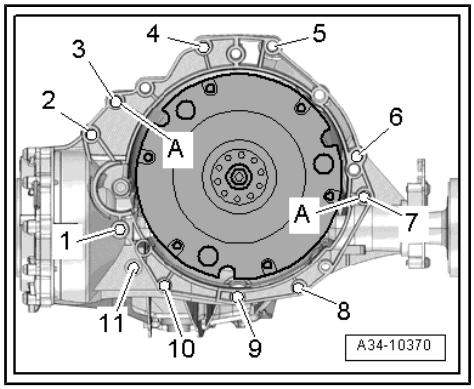
– Insert pin of assembly aid into hole on gearbox housing.

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



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– 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 37 .
– Bring gearbox into position on engine and tighten bolts -1 … 11-.
– Remove transport lock -T40170- and assembly aid -T40169- .

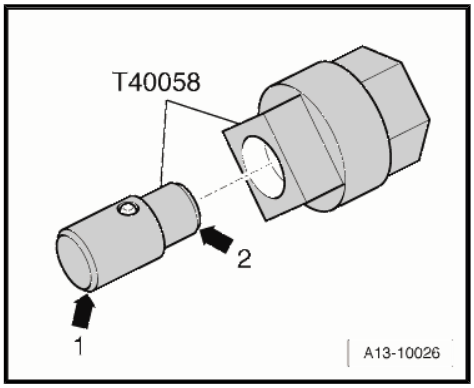


Note

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

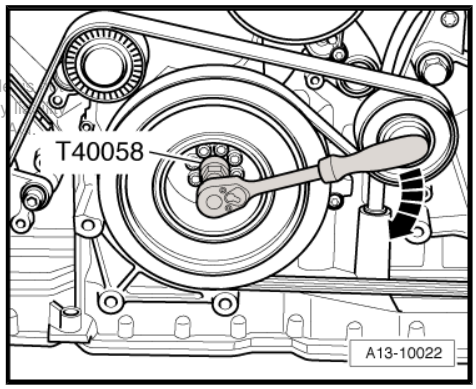
– Insert guide pin of adapter -T40058- as follows:

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

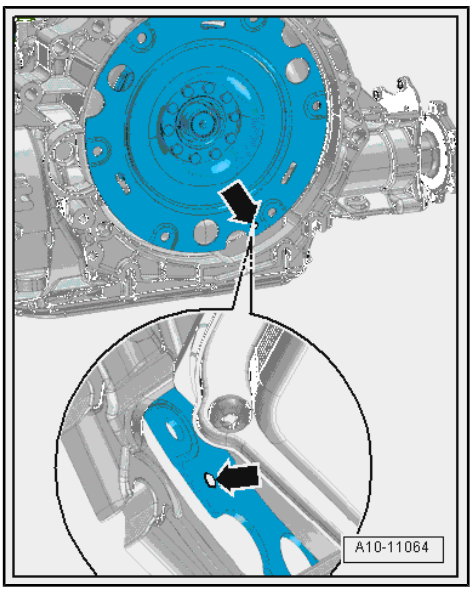


– Use adapter -T40058- to turn crankshaft one full turn (360°) in direction of engine rotation -arrow-.

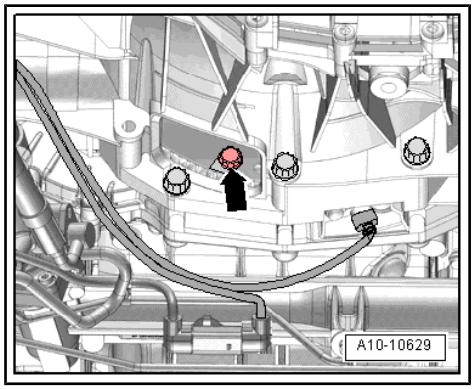
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- The inspection hole -arrow- should be visible again in the recess on the gearbox housing.



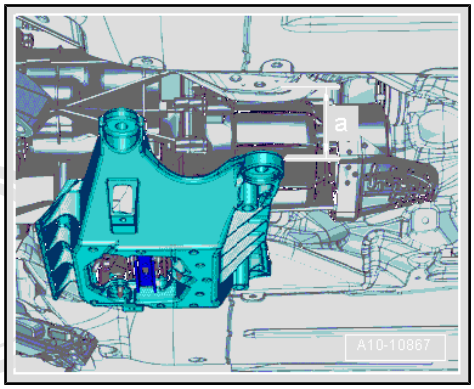
– Bolt clutch module onto drive plate as follows:



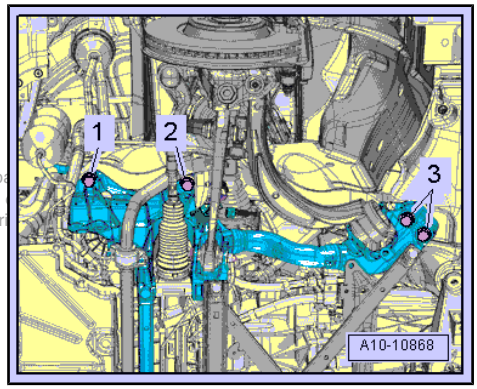
Note

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 .
– Turn crankshaft by 60° each time and tighten remaining 5 bolts to specified torque ⇒ Rep. Gr. 30 .
– Install hydraulic fluid lines for power steering ⇒ Rep. Gr. 48 .
– Install catalytic converters: left-side ⇒ page 298 , right-side ⇒ page 300 .
– Bolt drive shafts (left and right) onto gearbox flange shafts ⇒ Rep. Gr. 40 .



– 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 .
– 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.



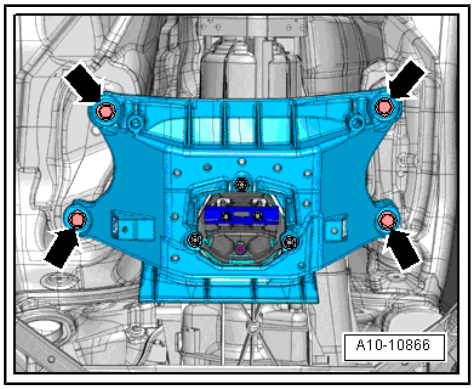
– Tighten subframe bolts only to specified torque (do not turn further); the bolts are only to be fully tightened after performing the wheel alignment check ⇒ Rep. Gr. 40 .

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 member ⇒ Rep. Gr. 34 .

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

– Install clutch slave cylinder ⇒ Rep. Gr. 30 .
– Secure universal joint on steering box ⇒ Rep. Gr. 48 .
– Install propshaft ⇒ Rear final drive 0BC; Rep. Gr. 39 or ⇒ Rear final drive 0BD; Rep. Gr. 39 .
– Install front silencer ⇒ page 303 .
– Align the exhaust system so it is free of stress ⇒ page 305 .
– Install front cross member ⇒ Rep. Gr. 66 .
– Install subframe cross brace, upper suspension links and anti-roll bar; secure suspension strut to track control link ⇒ Rep. Gr. 40 .
– Install brake calipers ⇒ Rep. Gr. 46 .
– Install engine control unit ⇒ Rep. Gr. 24 .
– 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 36 , ⇒ page 36 and ⇒ Rep. Gr. 97 .
– Install body brace ⇒ Rep. Gr. 40 .
– Install filler neck for washer fluid reservoir ⇒ Rep. Gr. 92 .
– Install refrigerant lines ⇒ Rep. Gr. 87 .
– Observe notes on procedure for connecting the battery ⇒ Rep. Gr. 27 .

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Risk of damage to control units because of excessive voltage.

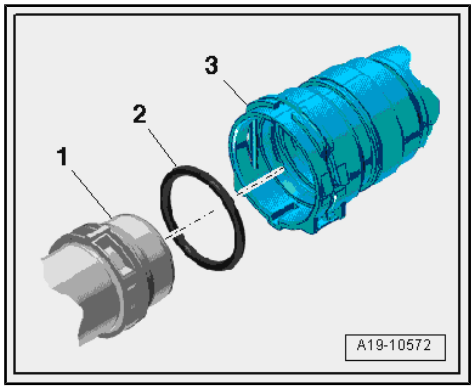
- ***Never use battery charging equipment for boost starting.***

– Install air cleaner housing ⇒ Rep. Gr. 24 .
– Install struts for lock carrier ⇒ Rep. Gr. 50 .
– Fill up with engine oil and check engine oil level ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .
– Before starting engine, top up hydraulic fluid in power steering reservoir ⇒ Rep. Gr. 48 .

Note

The power steering pump must not be run when dry.

– Connect coolant hose with plug-in connector ⇒ page 273 .
– Fill up with coolant ⇒ page 253 .



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 .
– Install wheel housing liners ⇒ Rep. Gr. 66 .
– Fit front wheels and perform wheel alignment ⇒ Rep. Gr. 44 .

WARNING

Risk of accident because of loose bolt connections.

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

– Install noise insulation panels ⇒ Rep. Gr. 66 .

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2 Removing engine - vehicles with multitronic gearbox 0AW

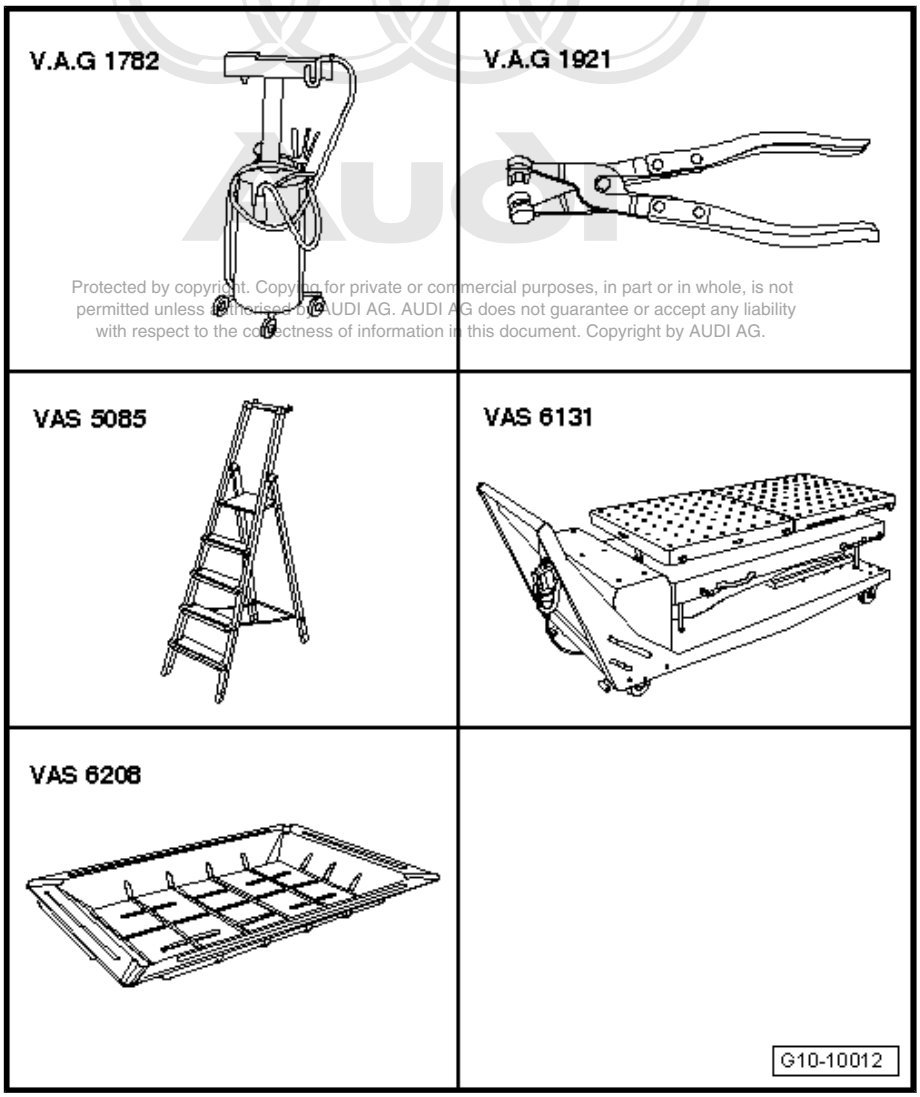
Note

- *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.*

2.1 Removing engine

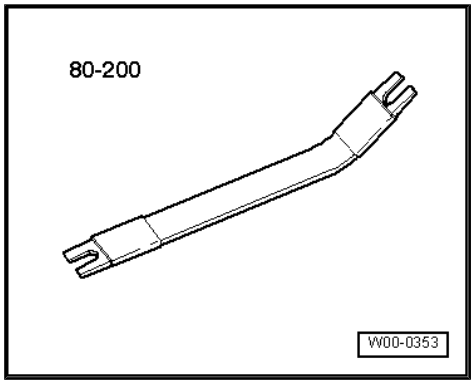
Special tools and workshop equipment required

- 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-

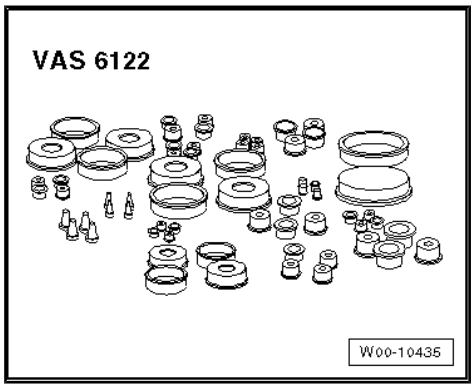


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- Removal lever -80 - 200-



- Engine bung set -VAS 6122-



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 4 .

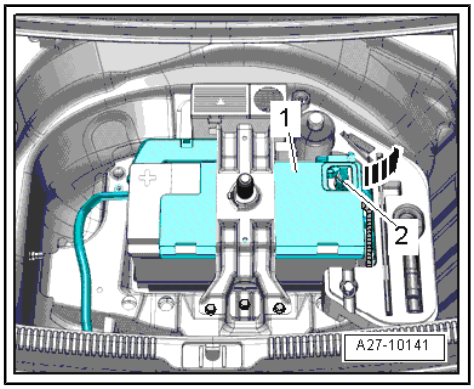
– Set front wheels to straight-ahead position.

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Caution

Electronic components are susceptible to damage.

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



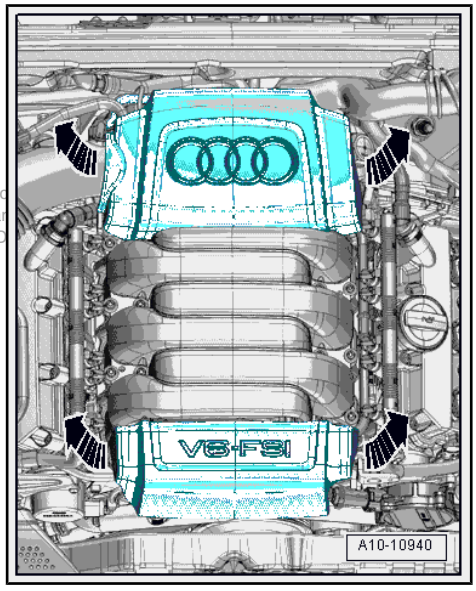
– Switch off ignition and take out ignition key.

– Disconnect earth wire -2- from battery terminal ⇒ Rep. Gr. 27 .

– Discharge refrigerant system ⇒ Air conditioner with refrigerant R134a .

– 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 expansion tank with cloth and open carefully.*

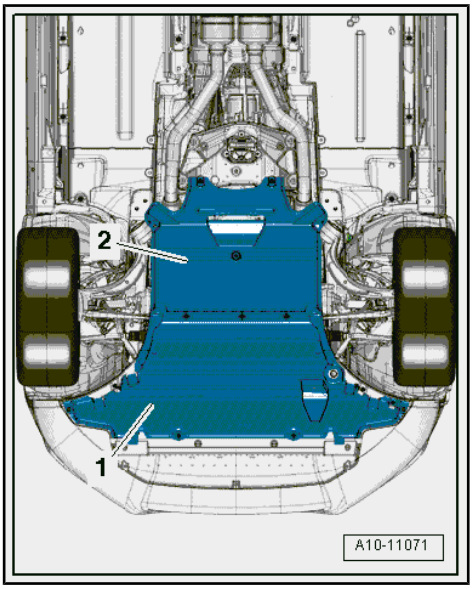
Audi
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– Open filler cap on coolant expansion tank.

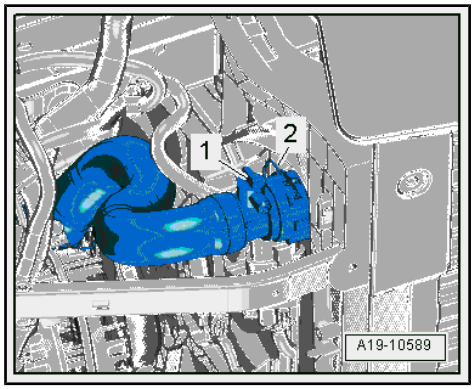
– Remove both front wheels.

– Remove front left and front right wheel housing liners ⇒ Rep. Gr. 66 .

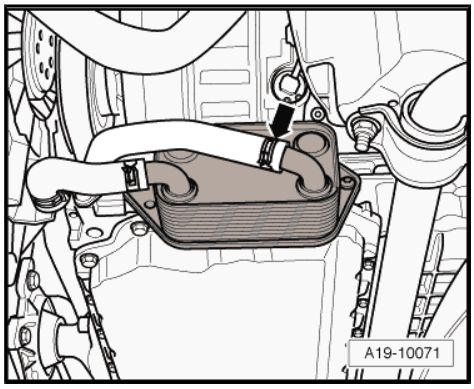
– Remove noise insulation panels -1- and -2- ⇒ Rep. Gr. 66 .



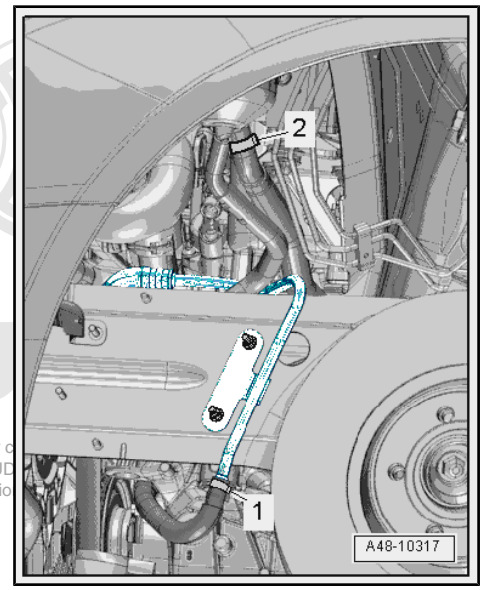
– Place drip tray for workshop hoist -VAS 6208- beneath engine.
– Remove drain plug -1- and drain off coolant.
– Lift retaining clip -2- and disconnect coolant hose from radiator.



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

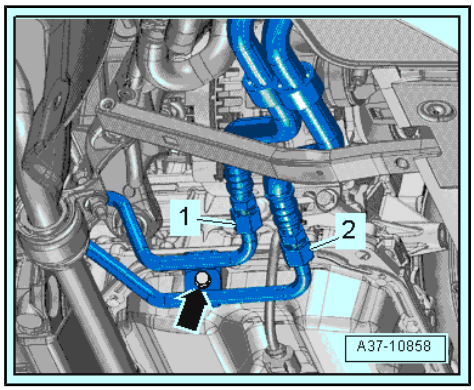


– Position used oil collection and extraction unit -V.A.G 1782- below connection point.
– Disconnect supply hose -2- and return hose -1- for power steering hydraulic fluid in front left wheel housing and move clear.
– Seal off open pipes/lines and connections with clean plugs from engine bung set -VAS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

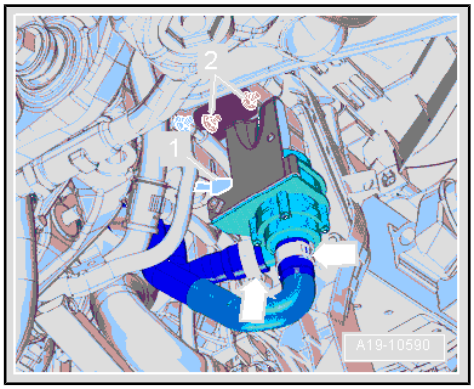
Disregard -arrow-.

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-.



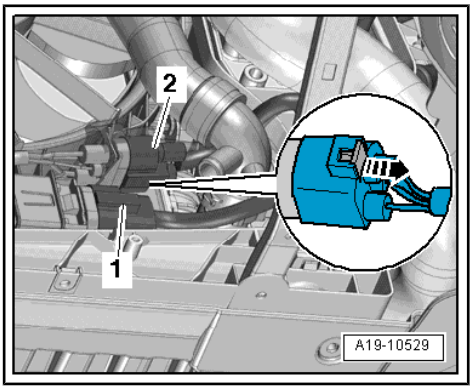
Note

Disregard -item 2- and -left arrow-.

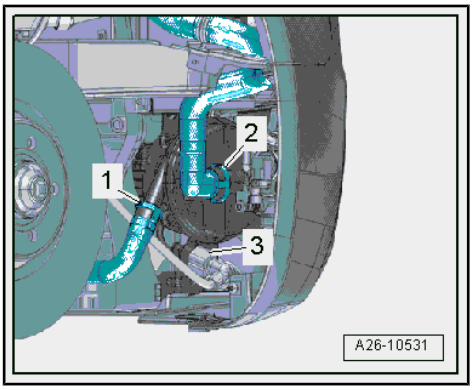
All vehicles (continued):

– 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.



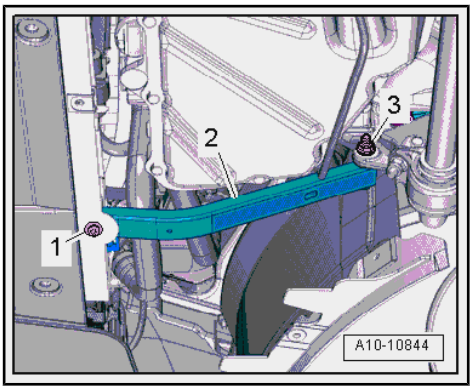
– If fitted, detach electrical connector -3- at secondary air pump motor -V101- and move electrical wire clear.



Note

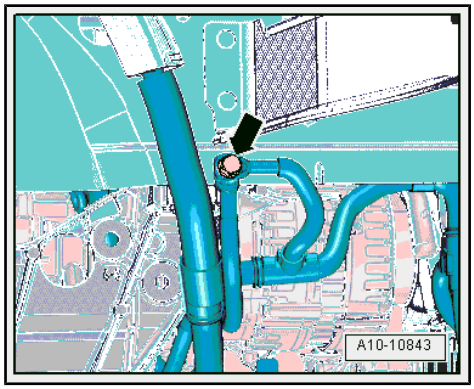
Disregard -items 1, 2-.

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

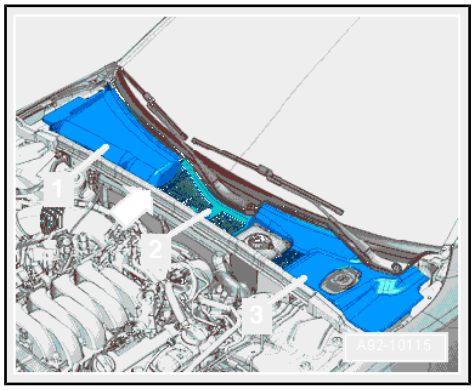


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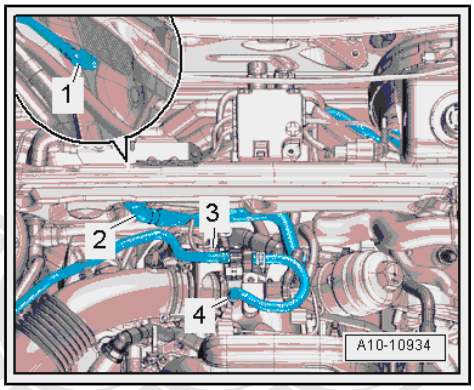
– Unscrew nut -arrow- on longitudinal member (right-side) and move earth cables clear.



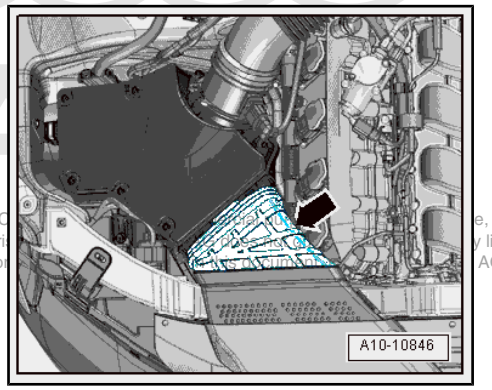
– Remove seal -arrow-.
– Remove plenum chamber cover ⇒ Rep. Gr. 50 .



– Disconnect vacuum hose -1- on rear side of bulkhead and detach vacuum connection -2- from bulkhead.
– 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.

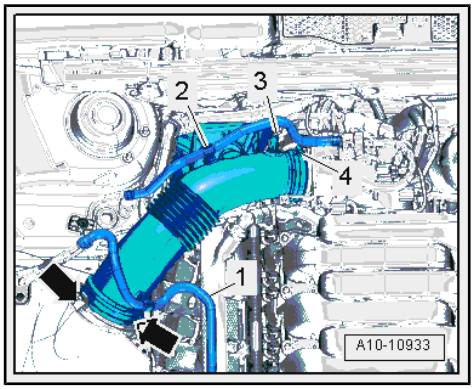


– Remove air duct -arrow-.



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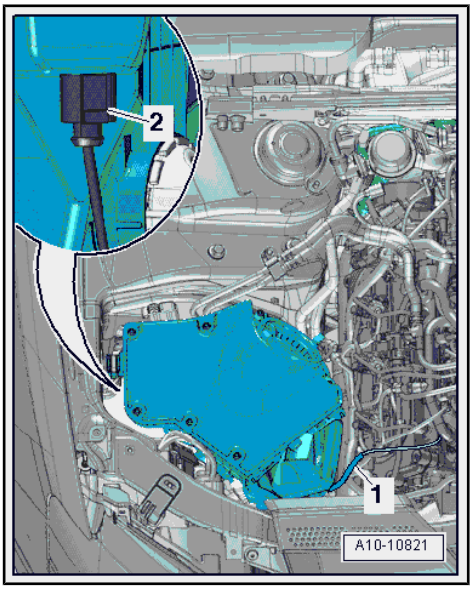
– Move fuel hose -1- clear at air pipe.
– Disconnect vacuum hose -3- from connection on air pipe.
– Remove air pipe. To do so, release hose clip -4- and clamps -arrows-.



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.

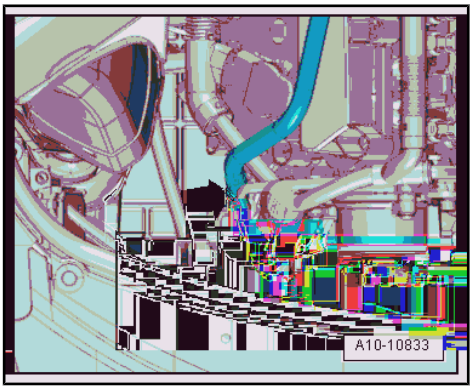


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WARNING

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

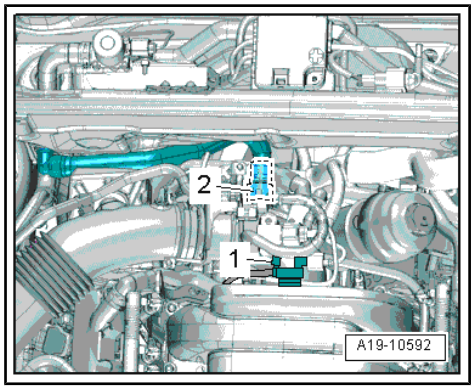
Take care to keep components clean.

- *Observe rules for cleanliness when working on the fuel supply system ⇒ page 9 .*

– 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- .

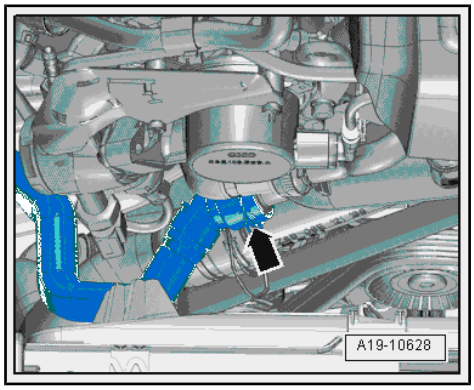
– If fitted, disconnect vacuum hose -1- and move clear.

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

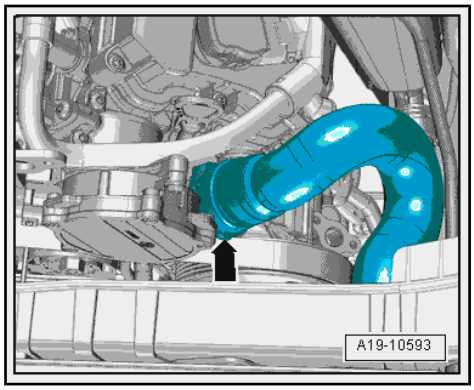


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– On vehicles without coolant circulation pump -V50- and with auxiliary heater, lift retaining clip -arrow- and detach coolant hose at front right of coolant pipe (front).

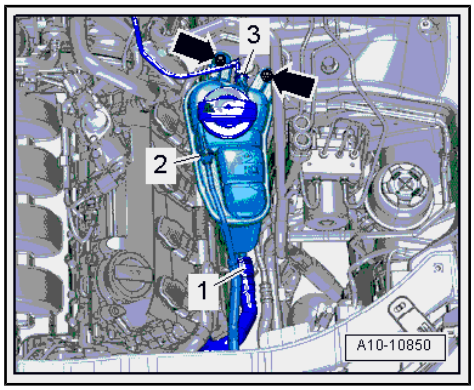


– Lift retaining clip -arrow- and detach coolant hose from coolant pipe (front).

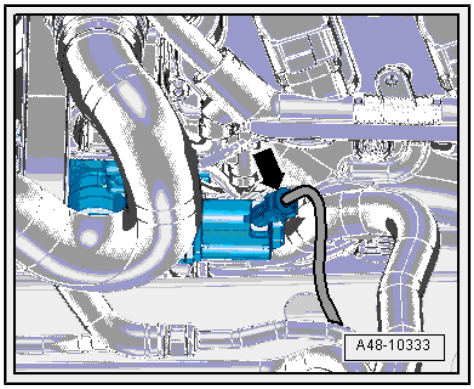


– Disconnect coolant hose -3- from coolant expansion tank and move clear.

– 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.



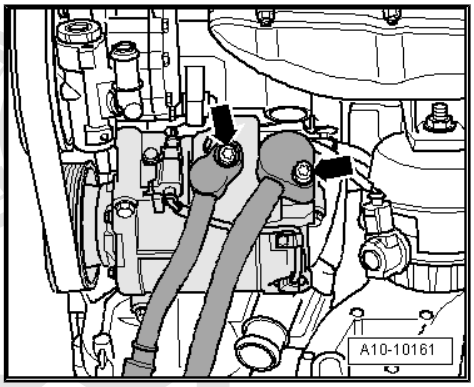
– If fitted, unplug electrical connector -arrow- at power steering pump.
– Press hydraulic fluid hose down slightly.



Caution

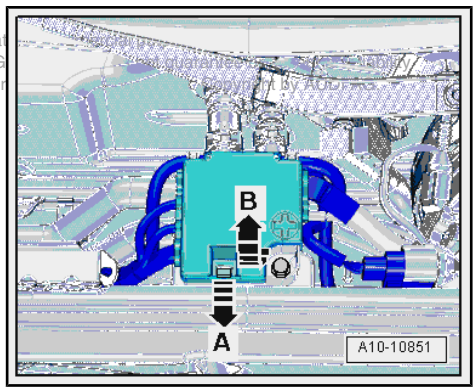
Danger of damage to refrigerant lines and hoses.

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

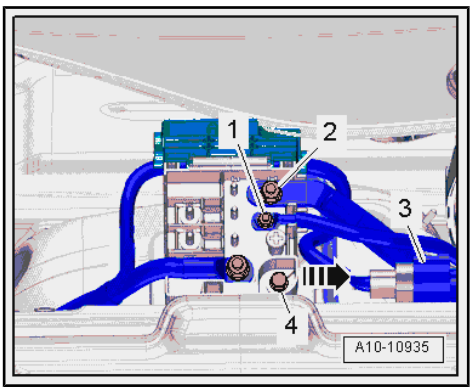


– Remove bolts -arrows- and disconnect refrigerant lines from A/C compressor.
– Seal off open pipes/lines and connections with clean plugs from engine bung set -VAS 6122- .
– Release retainer -arrow A- and open cover -arrow B-.

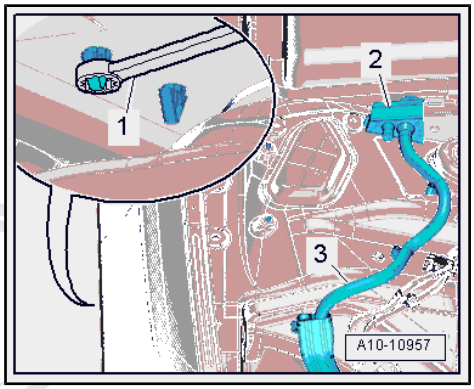
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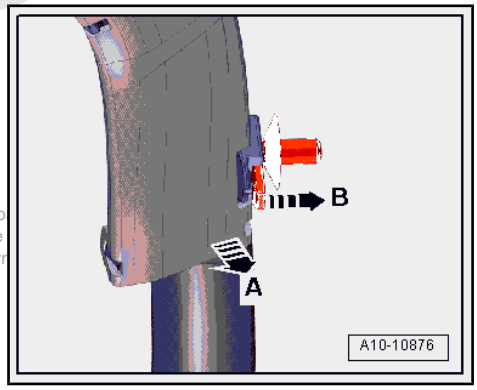
– Remove nuts -1- and -2- for electrical wiring.
– Detach electrical connector -3- from bracket and unplug.
– Remove bolt -4- and detach terminal 30 wiring junction 2 - TV22- from body brace -arrow-.



– 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.

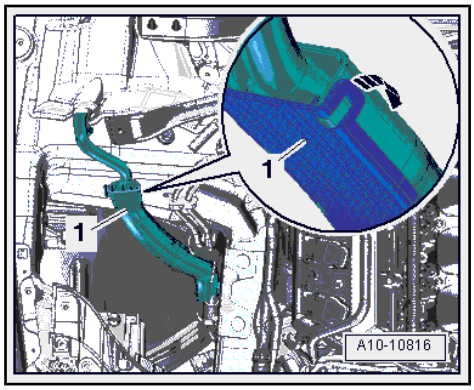


– Wiring duct (version 1): release catch -arrow B- and move wiring duct clear by pulling it towards front -arrow A-.

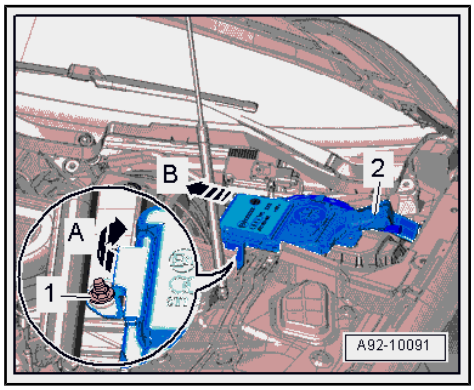


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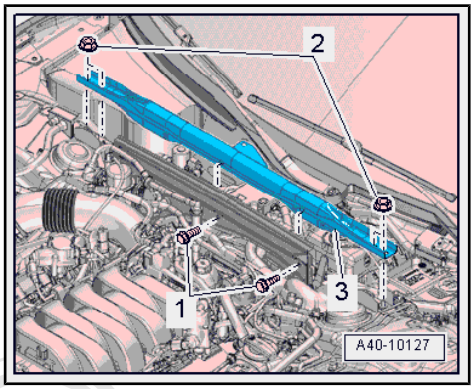
– Wiring duct (version 2): release catch -arrow- to open wiring duct -1- and move wiring harness clear.



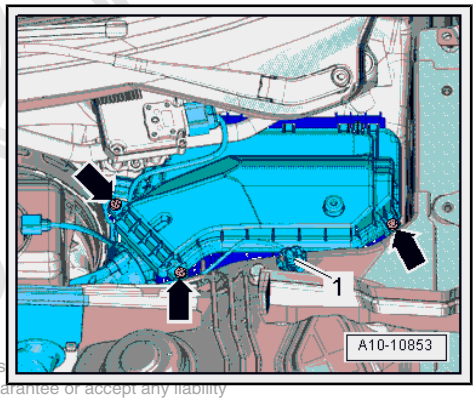
– Remove nut -1- and swivel filler neck -2- for washer fluid reservoir slightly upwards -arrow A-.
– Pull filler neck with filler pipe out of washer fluid reservoir and through opening in body -arrow B-.



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

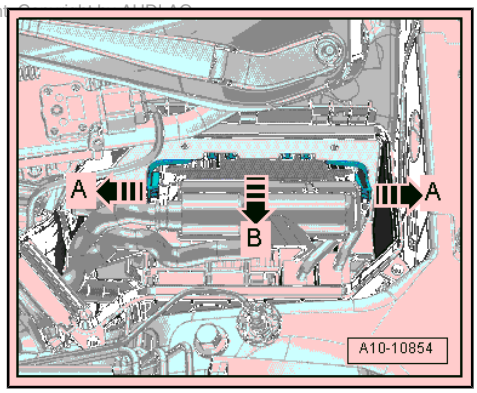


– Remove bolts -arrows- and detach cover for electronics box in engine compartment.
– Remove nut -1- and move electrical wiring clear.

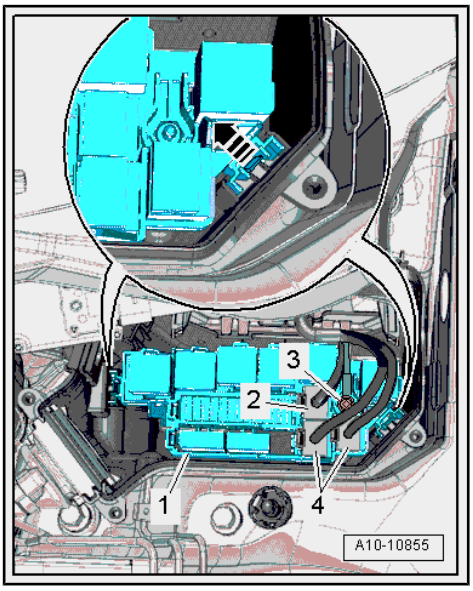


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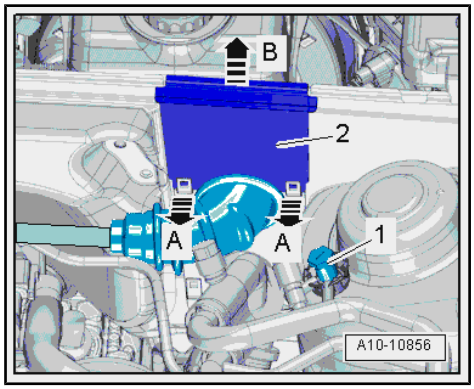
– Release catches -arrows A- and take out engine control unit -arrow B-.



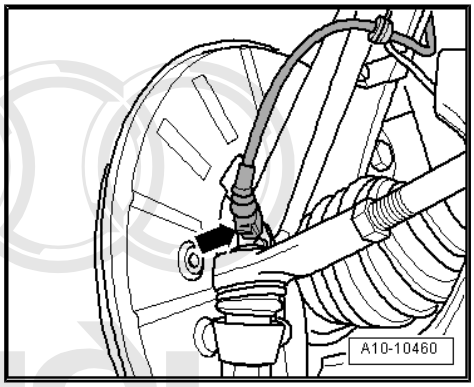
– If fitted, unplug electrical connector -2-.
– Unplug electrical connectors -4- and unscrew nut -3- for wiring.
– Release catches -arrow- and detach relay carrier with fuse holder -1-.
– Disengage engine wiring harness at electronics box in engine compartment and move clear.



– 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.

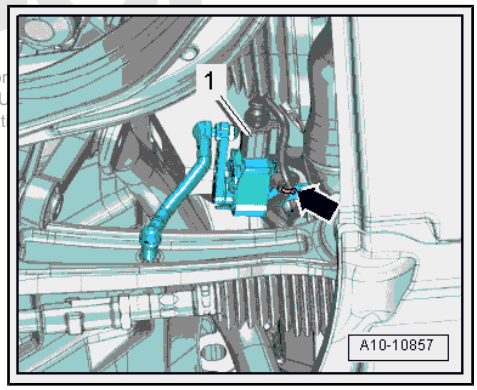


– Unplug electrical connectors -arrow- at front wheel speed sensors on both sides.

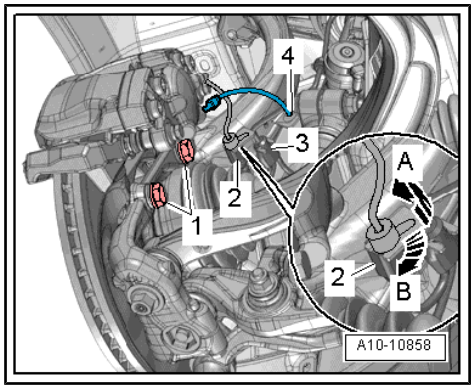


– Unplug electrical connector -1- from front left vehicle level sender -G78- and front right vehicle level sender -G289- and move wiring clear -arrow-.

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– 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.

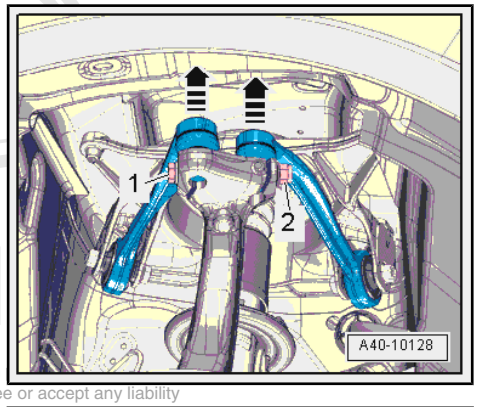


Caution

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.



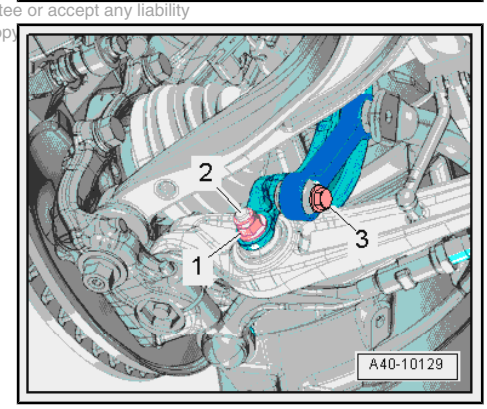
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A5 up to vehicle identification no. 8T-8-011200:

– 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.

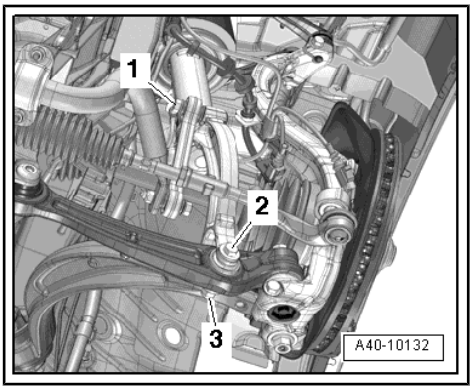


A4 (all), A5 from vehicle identification no. 8T-8-011201 onwards:

– 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.

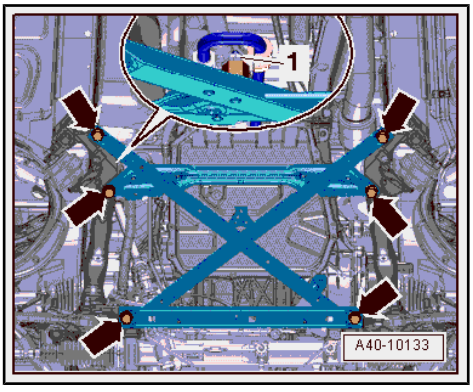
- ***The vehicle must NOT be lowered onto its wheels if the engine/gearbox mountings, steering box or subframe cross brace are not properly installed.***

A4 (all), A5 Coupé:

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

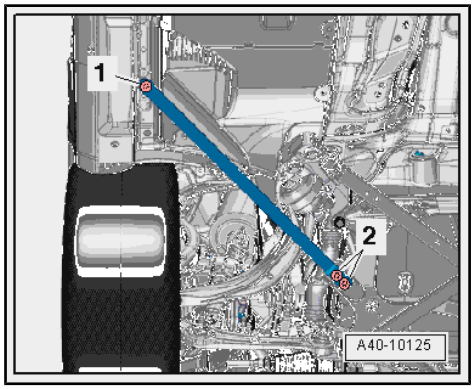
Note

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



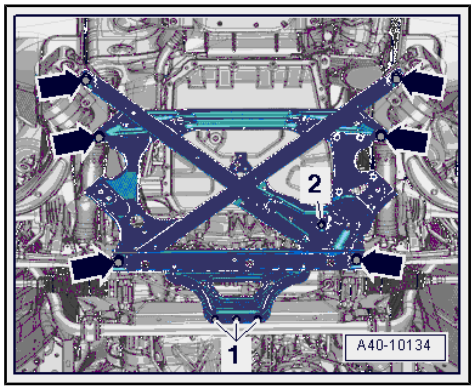
A5 Cabriolet:

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



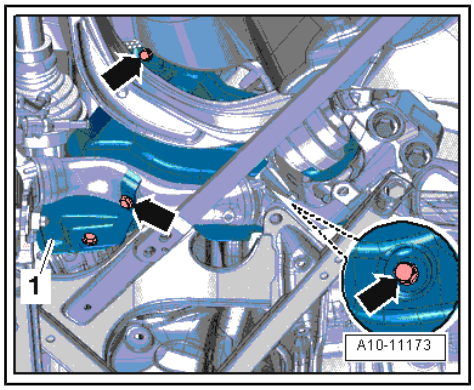
– Remove bolt -2- for power steering hydraulic line.
– Remove bolts -1- and -arrows- and detach subframe cross brace.

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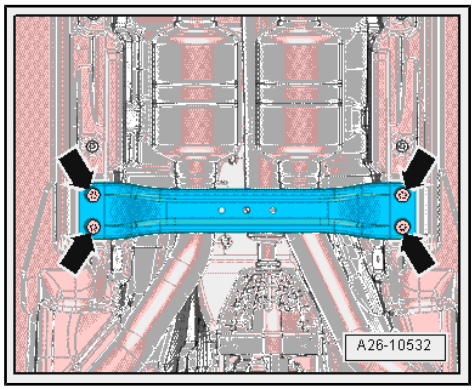


All vehicles (continued):

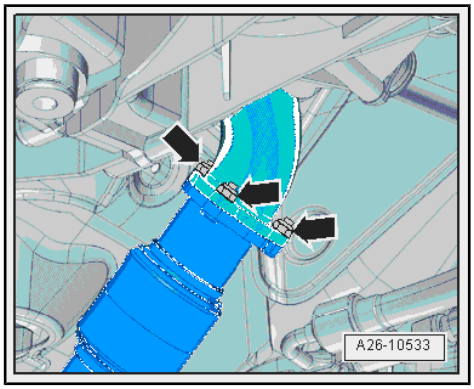
– If fitted, remove bolts -arrows- on both sides and detach heat shield -1-.



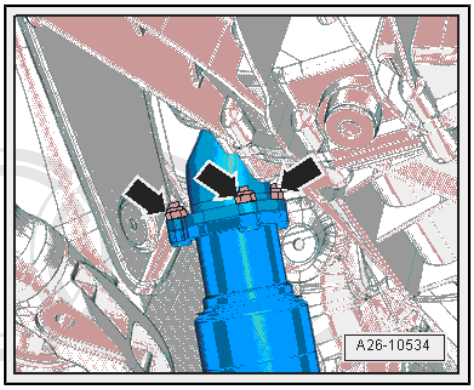
– If fitted, remove bolts -arrows- and detach front cross member.



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



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

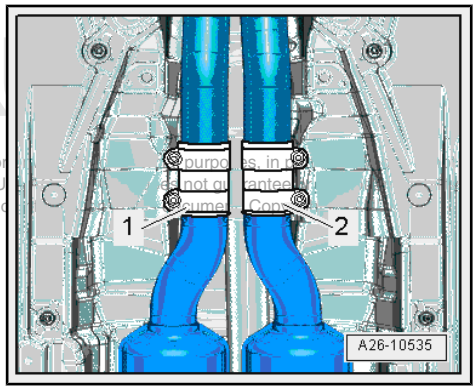


Caution

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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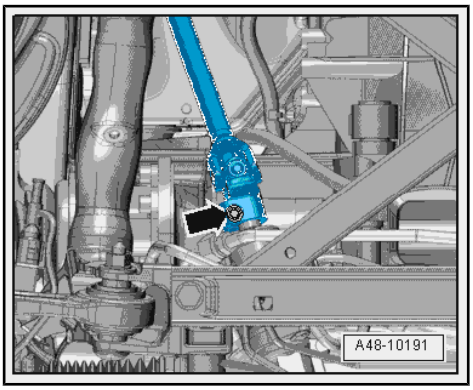


– Loosen and push back clamps -1- and -2- and detach front silencers on both sides.

Caution

Risk of damage to coil connector for airbag.

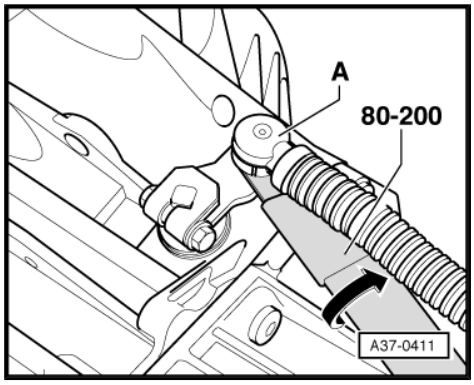
- *Make sure that front wheels are in straight-ahead position before removing universal joint from steering box.*
- *Do not alter position of steering wheel and steering box (locate steering wheel with adhesive tape if necessary).*



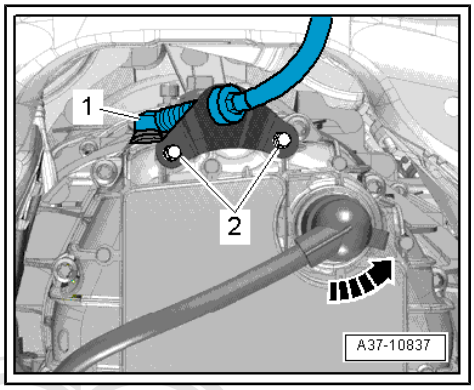
– Remove bolt -arrow- for universal joint ⇒ Rep. Gr. 48 .

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

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



– Remove bolts -2- for support bracket.

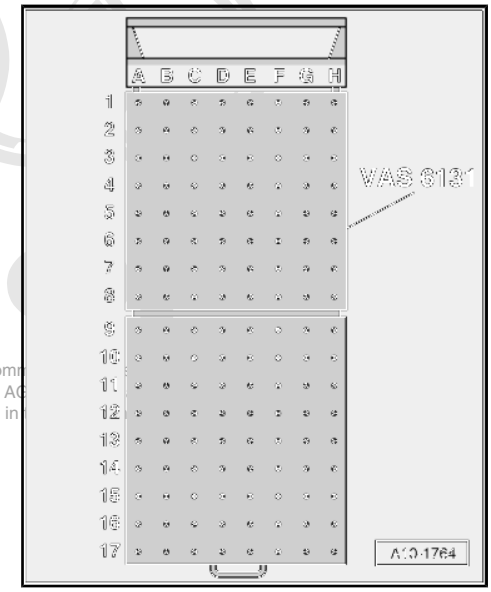


Note

- *Take care not to bend or kink selector lever cable.*
- *Disregard items marked -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

– 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.

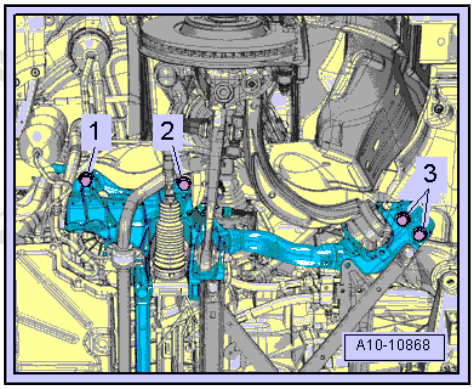
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WARNING

Accident risk if subframe mountings are detached.

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

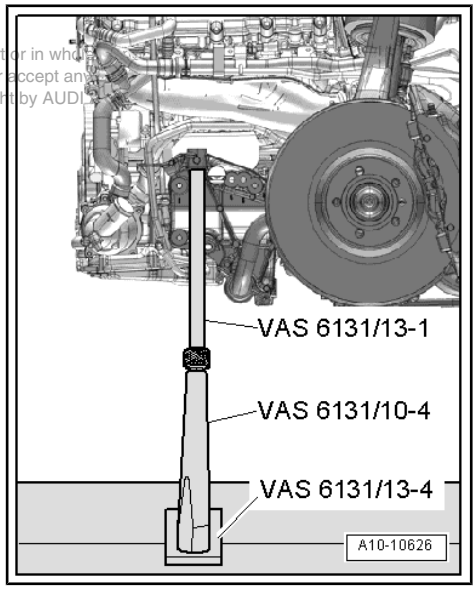
– Remove subframe bolts -1- on both sides.



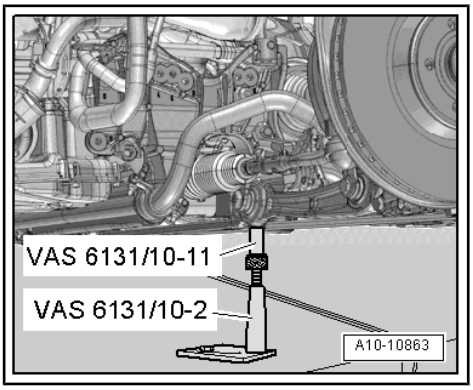
– Position support elements from -VAS 6131/10- and -VAS 6131/13- at front left and right of subframe as shown.

– Make sure that threaded spindles are screwed in completely.

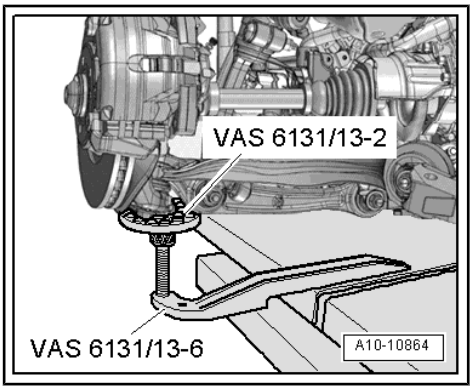
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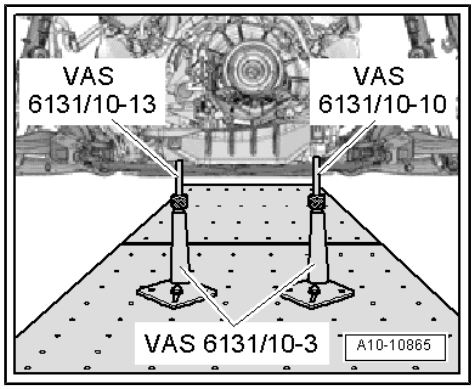
– Position support elements from -VAS 6131/10- (rear left and right) at front attachment points of subframe cross brace as shown.



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



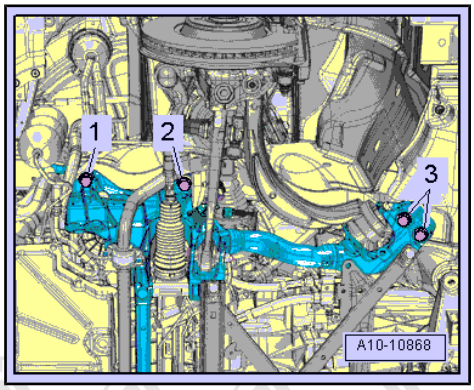
– Detach retaining clips for noise insulation from cross member.
– Position support elements from -VAS 6131/10- at rear of cross member on both sides, as shown in illustration.
– Turn all spindles for support elements upwards until all locating lugs make contact with mounting points.
– Tighten base plates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



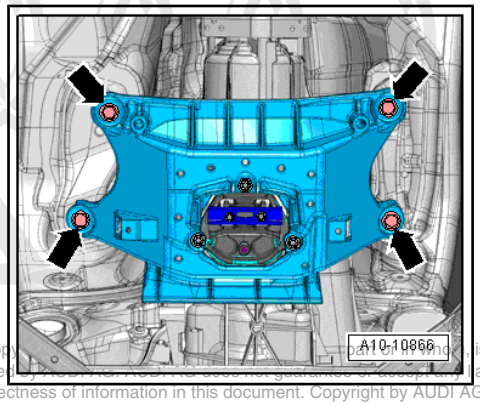
– Mark installation position of subframe and tunnel cross member on longitudinal members with felt-tip pen.
– Unscrew subframe bolts -2- and -3- on both sides in several stages and in diagonal sequence.

Note

Disregard -item 1-.



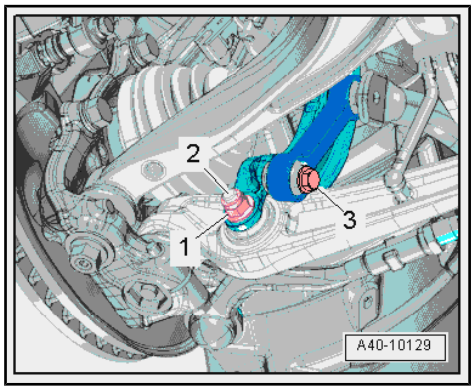
– Remove bolts -arrows- on tunnel cross member.



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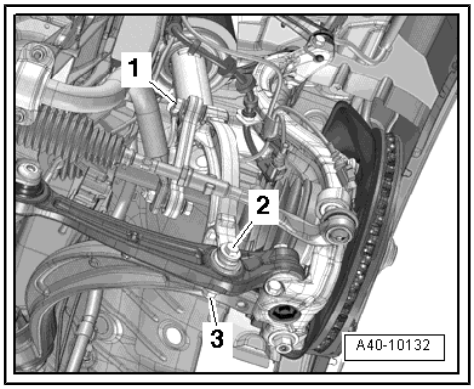
A5 up to vehicle identification no. 8T-8-011200:

– 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 engine/gearbox assembly with subframe out of engine compartment when lowering.***

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

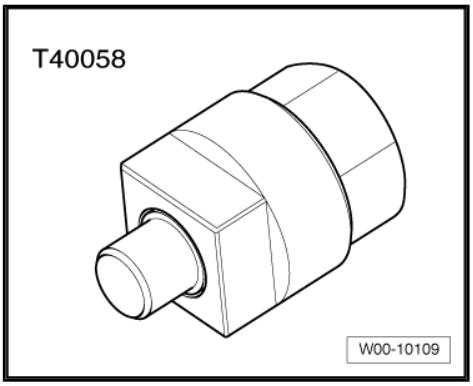
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– Pull out scissor-type assembly platform -VAS 6131 A- with engine/gearbox assembly from beneath vehicle.

2.2 Separating engine from multitronic gearbox 0AW

Special tools and workshop equipment required

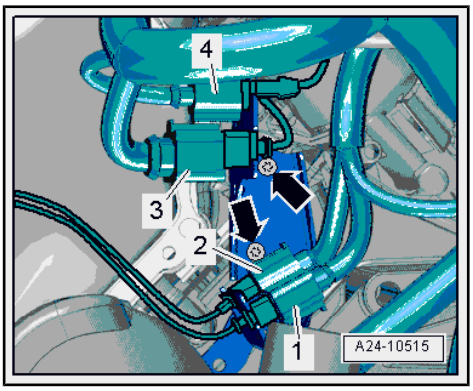
- Support set for Audi -VAS 6131/10- , supplementary set -VAS 6131/13- and gearbox support -VAS 6131/14-
- Adapter -T40058-



Procedure

• Engine/gearbox assembly removed and in position on scissor-type assembly platform -VAS 6131 A- .

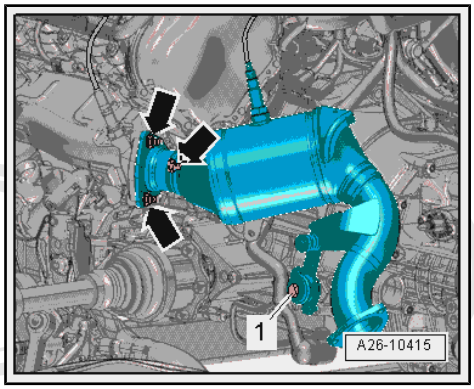
– Remove electrical connector -1- for Lambda probe 2 after catalytic converter -G131- from bracket, unplug and move wiring clear.



Note

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

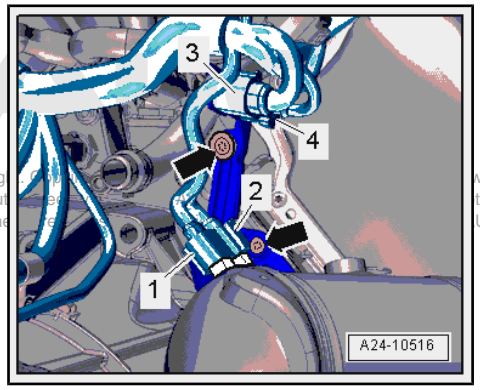
– Remove nuts -arrows- and bolt -1- and detach catalytic converter (left-side).



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

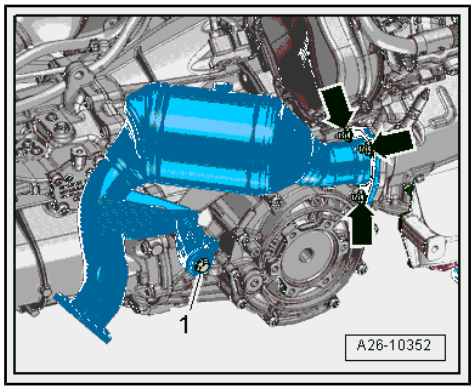
Note

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



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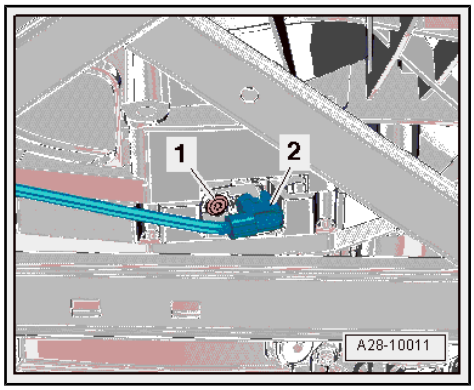
– Remove nuts -arrows- and bolt -1- and detach catalytic converter (right-side).



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

Note

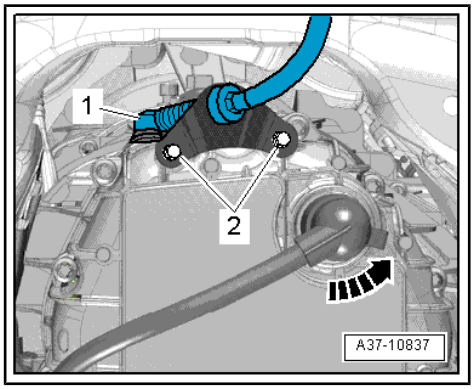
Disregard -item 1-.



Caution

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

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



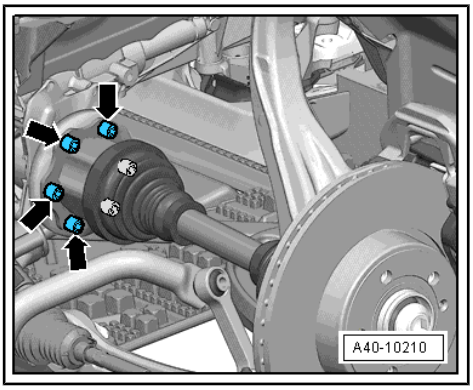
– Turn retainer catch anti-clockwise -arrow- and unplug electrical connector at gearbox.

– Move electrical wiring clear.

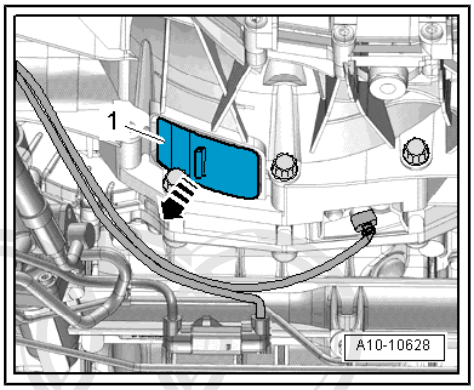
Note

Disregard -items 1, 2-.

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

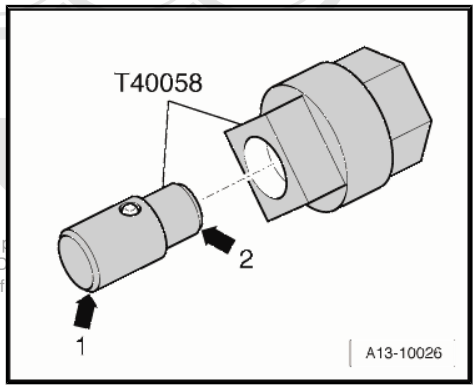


– Detach bottom cover -1- from gearbox -arrow-.



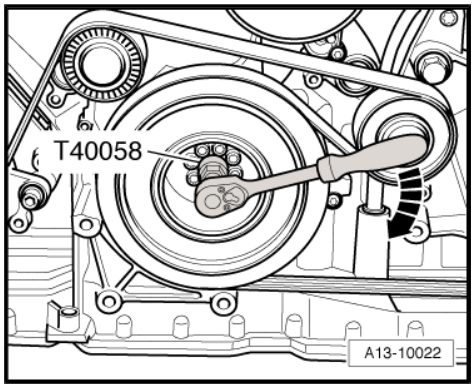
– Insert guide pin of adapter -T40058- as follows:

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



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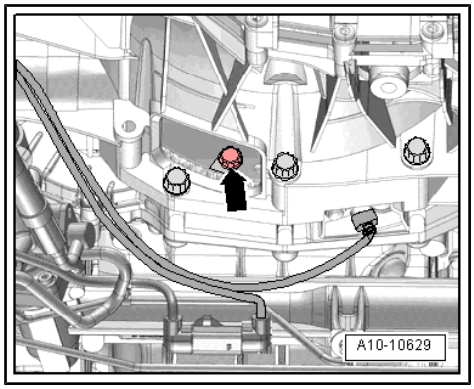
– Counterhold crankshaft using adapter -T40058- when slackening bolts for drive plate.



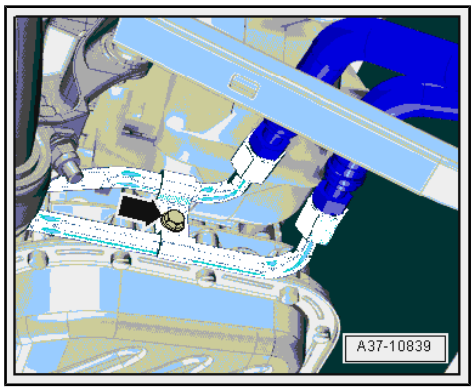
Note

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.



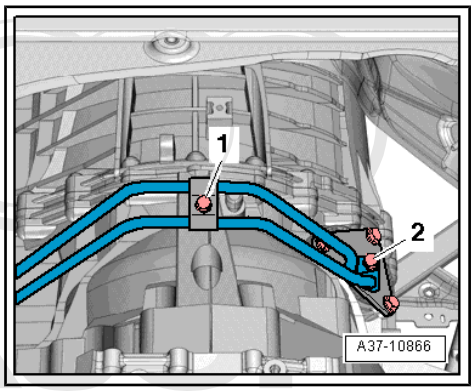
– Remove bolt -arrow- for ATF pipes.



Note

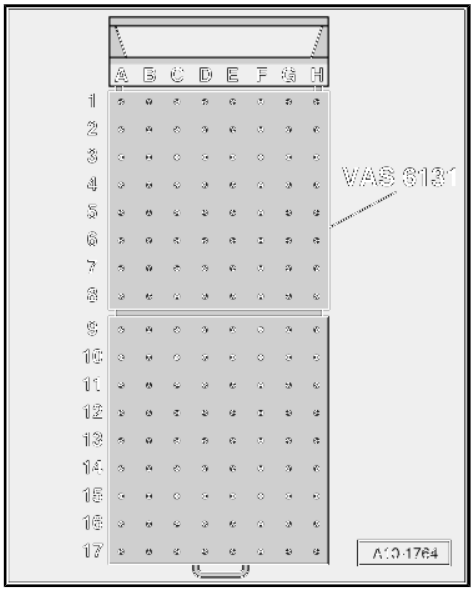
Lay a cloth under the separating point to catch escaping ATF.

– Unscrew bolts -1- and -2-, detach ATF pipes from gearbox and tie up ATF pipes.
– Seal off open pipes/lines and connections with clean plugs from engine bung set -VAS 6122- .



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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:

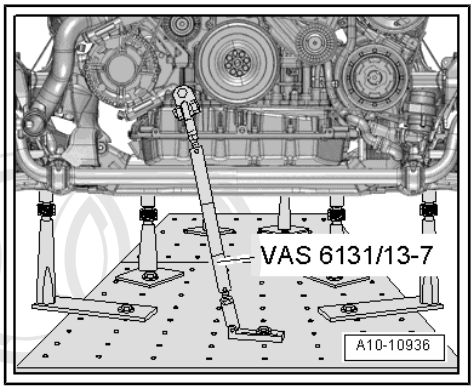


Note

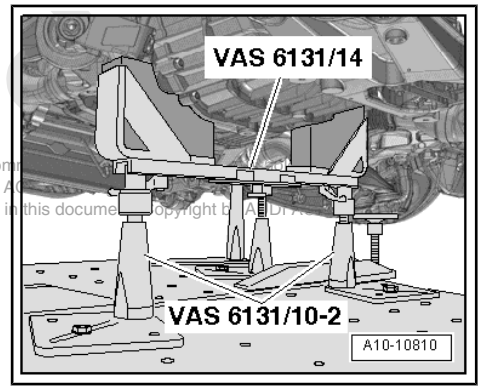
The other support elements remain unchanged.

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-.

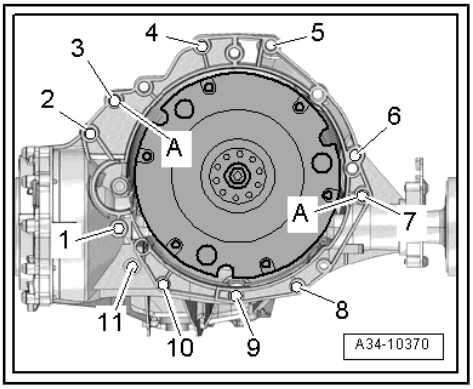


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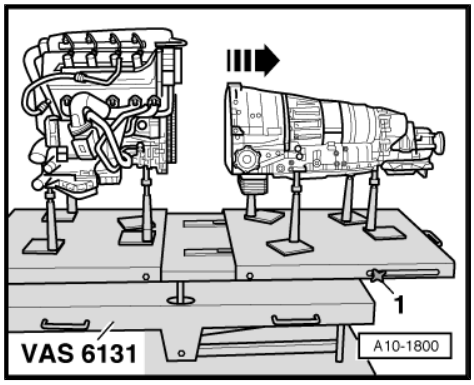
– Remove bolts -1- and -2- for starter.
– Separate starter from gearbox and leave in position.
– Unscrew remaining bolts -3 ... 11- securing engine to gearbox.

Note

Disregard -item A-.



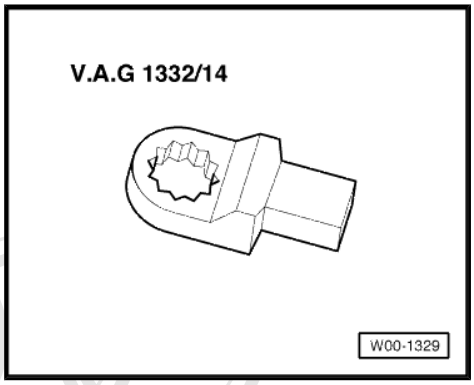
– Loosen clamping bolts -1- on sides of scissor-type assembly platform -VAS 6131 A- and pull rear section of platform together with gearbox towards rear -arrow-.



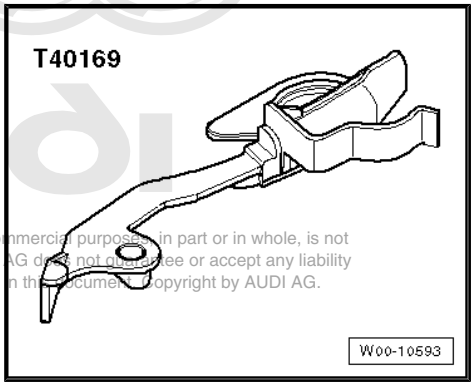
2.3 Installing engine

Special tools and workshop equipment required

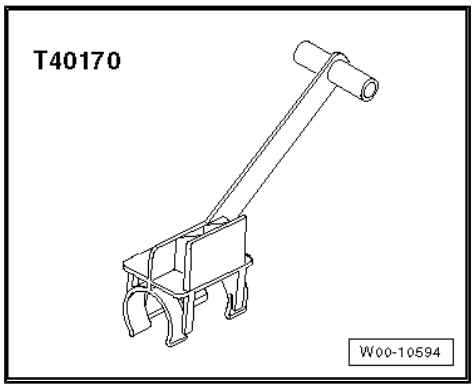
♦ Ring spanner insert AF 16 -V.A.G 1332/14-



♦ Assembly aid -T40169-



♦ Transport lock -T40170-



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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 %.*

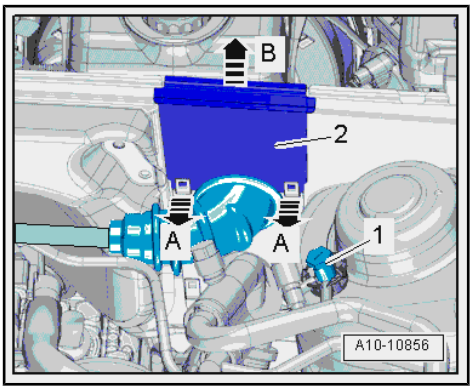
Component		Nm
Bolts/nuts	M6	9
	M7	15
	M8	20
	M10	40
	M12	65

Audi
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Assembly mountings ⇒ page 110 .

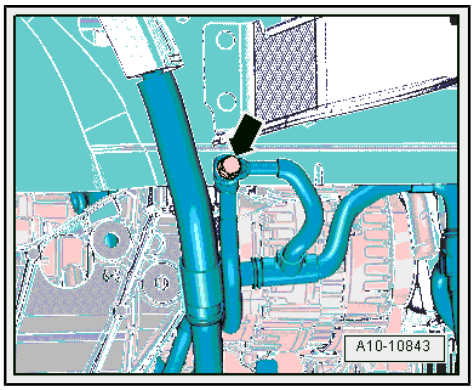
Earth stud at suspension turret - tightening torque

– Tighten earth stud -1- to 9 Nm.

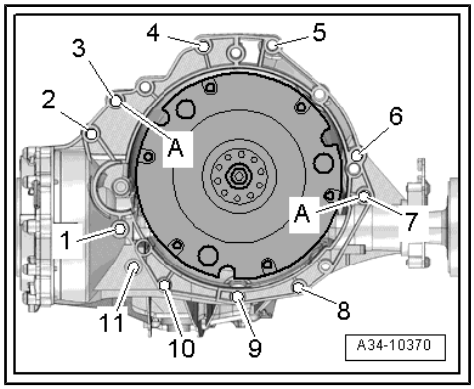


Earth wiring at longitudinal member - tightening torque

– Tighten nut -arrow- to 9 Nm.

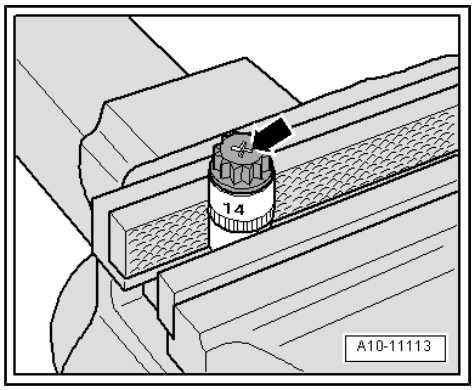


Engine to multitronic gearbox 0AW



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 no. 8K-9-066499, Audi A5 up to vehicle identification no. 8T-9-007999: renew aluminium bolts.
- 3) Audi A4 from vehicle identification no. 8K-9-066500 onwards, Audi A5 from vehicle identification no. 8T-9-008000 onwards: aluminium bolts must not be used more often than twice ⇒ page 68 .



- Audi A4 from vehicle identification no. 8K-9-066500 onwards, Audi A5 from vehicle identification no. 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.

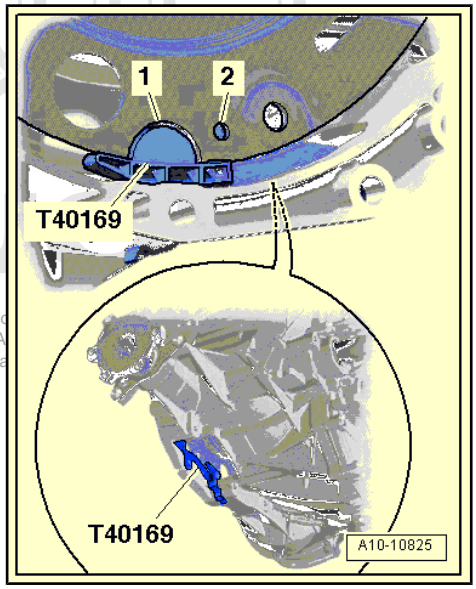
Procedure

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 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 125 .*
- *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 pipes 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 and flywheel from below, as illustrated.
• The assembly aid must engage in the semi-circular recess -1- and in the inspection hole -2-.



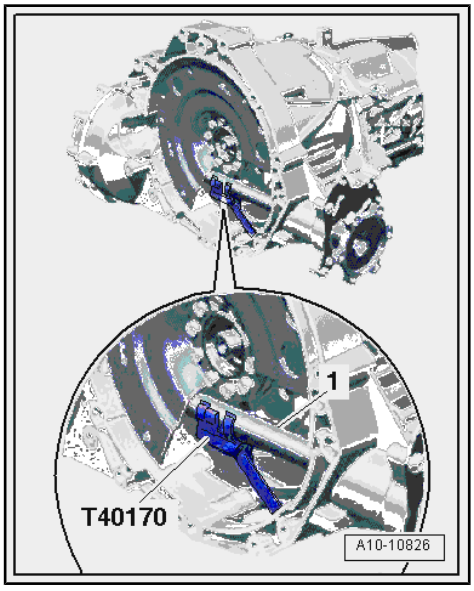
Note

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

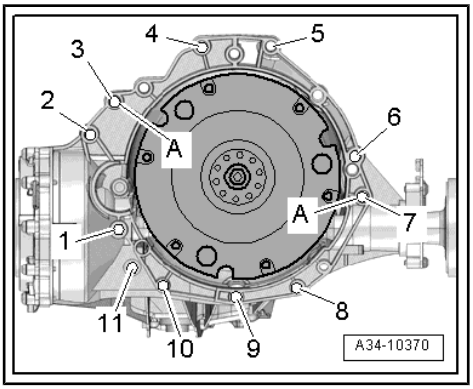
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– Insert pin of assembly aid into hole on gearbox housing.

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



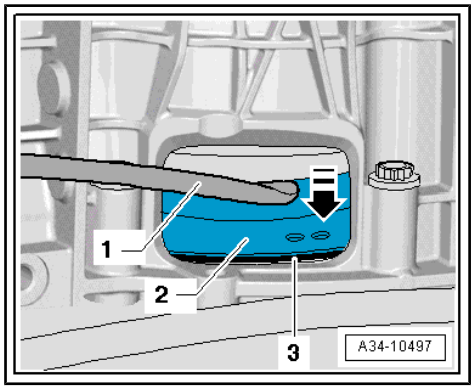
– Check whether dowel sleeves -A- for centring engine and gearbox are fitted in cylinder block; install missing dowel sleeves.
– Check whether aluminium bolts securing engine to gearbox can be reused; if so, apply marking ⇒ page 68 .
– Bring gearbox into position on engine and tighten bolts -1 … 11-.
– 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.

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

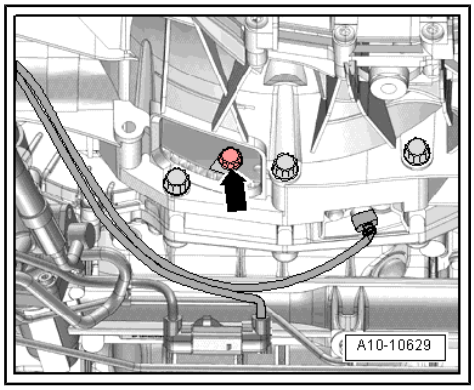


– Bolt dual-mass flywheel onto drive plate as follows:

Note

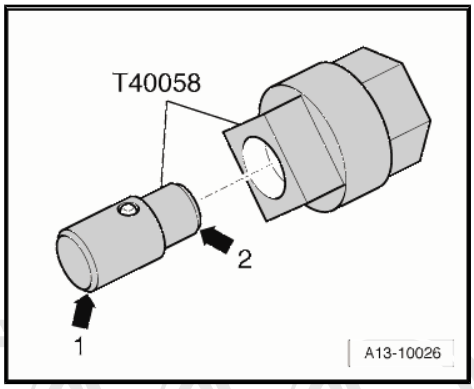
Use ring spanner insert AF 16 -V.A.G 1332/14- to tighten bolts.

– 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. 37 .

– Turn crankshaft by 60° each time and tighten remaining 5 bolts to specified torque ⇒ Rep. Gr. 37 .

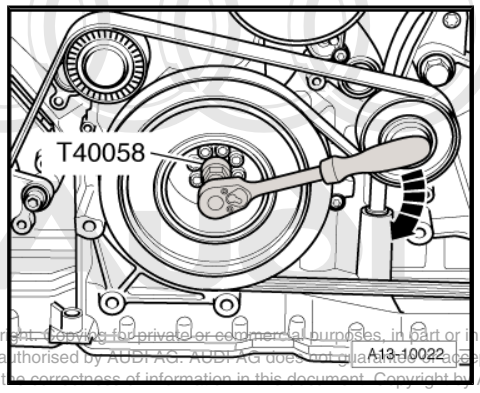
– Install hydraulic fluid lines for power steering ⇒ Rep. Gr. 48 .

– Bolt drive shafts (left and right) onto gearbox flange shafts ⇒ Rep. Gr. 40 .

– Install catalytic converters: left-side ⇒ page 299 , right-side ⇒ page 300 .

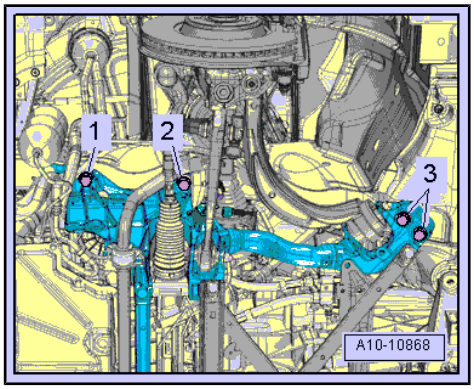
– Raise engine/gearbox assembly using scissor-type assembly platform -VAS 6131 A- .

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



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– Tighten subframe bolts only to specified torque (do not turn further); the bolts are only to be fully tightened after performing the wheel alignment check ⇒ Rep. Gr. 40 .



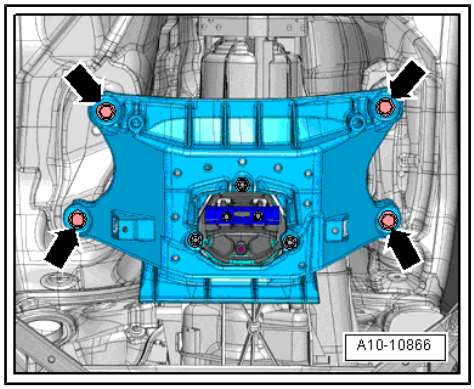
WARNING

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 member ⇒ Rep. Gr. 37 .



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

– Secure universal joint on steering box ⇒ Rep. Gr. 48 .
– Install front silencer ⇒ page 303 .
– Align the exhaust system so it is free of stress ⇒ page 305 .
– Install front cross member ⇒ Rep. Gr. 66 .
– Install subframe cross brace, upper suspension links and anti-roll bar; secure suspension strut to track control link ⇒ Rep. Gr. 40 .
– Install brake calipers ⇒ Rep. Gr. 46 .
– Install engine control unit ⇒ Rep. Gr. 24 .
– 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 67 , ⇒ page 67 and ⇒ Rep. Gr. 97 .
– Install body brace ⇒ Rep. Gr. 40 .
– Install filler neck for washer fluid reservoir ⇒ Rep. Gr. 92 .
– Install refrigerant lines ⇒ Rep. Gr. 87 .
– Observe notes on procedure for connecting the battery ⇒ Rep. Gr. 27 .

Caution

Risk of damage to control units because of excessive voltage.

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

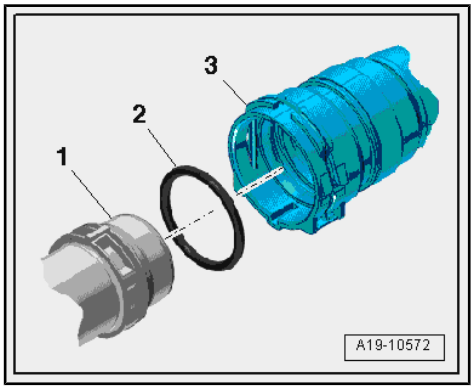
– Install air cleaner housing ⇒ Rep. Gr. 24 .
– Install struts for lock carrier ⇒ Rep. Gr. 50 .
– Fill up with engine oil and check engine oil level ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .
– Before starting engine, top up hydraulic fluid in power steering reservoir ⇒ Rep. Gr. 48 .

Note

The power steering pump must not be run when dry.

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– Connect coolant hose with plug-in connector ⇒ page 273 .
– Fill up with coolant ⇒ page 253 .



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 .
– Align subframe ⇒ Rep. Gr. 40 .
– Install wheel housing liners ⇒ Rep. Gr. 66 .
– Fit front wheels and perform wheel alignment ⇒ Rep. Gr. 44 .

WARNING

Risk of accident because of loose bolt connections.

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

– Fill up with ATF ⇒ Rep. Gr. 37 .
– Install noise insulation panels ⇒ Rep. Gr. 66 .

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3 Removing engine - vehicles with automatic gearbox 0B6

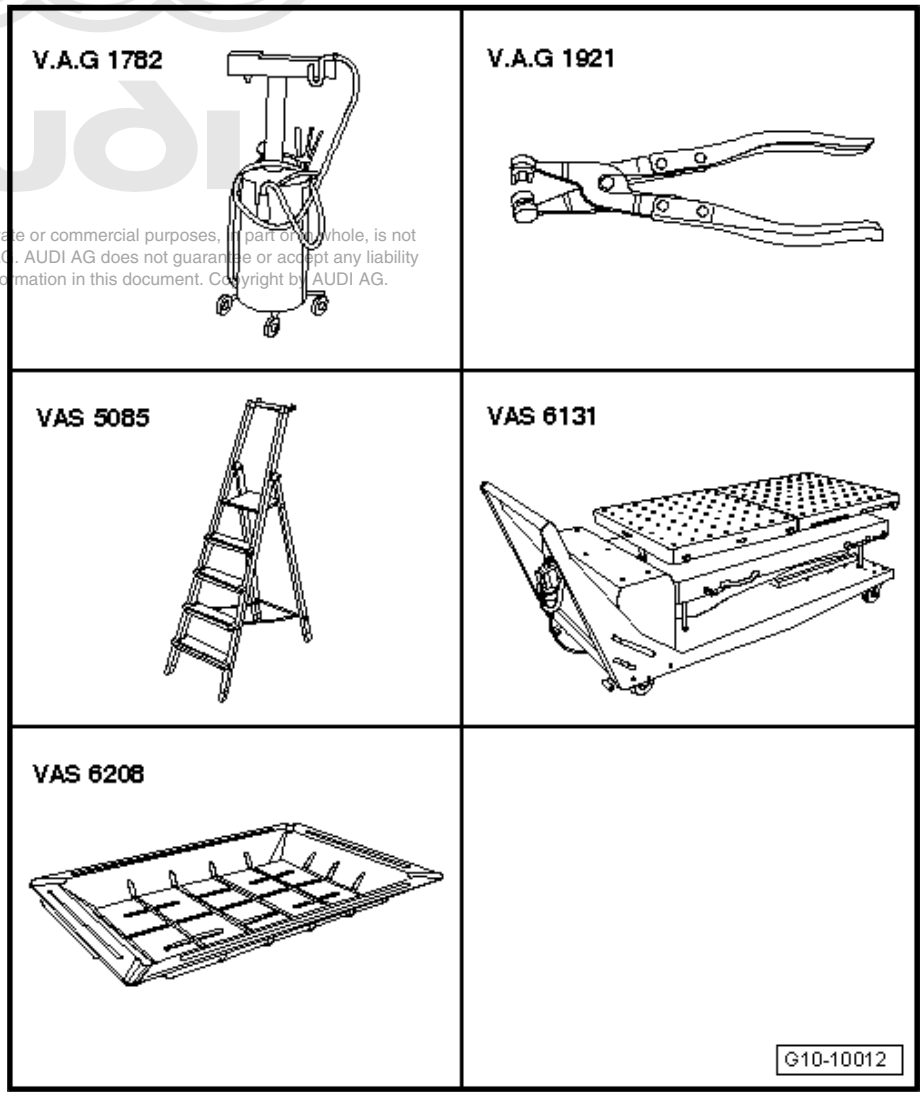
Note

- *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.*

3.1 Removing engine

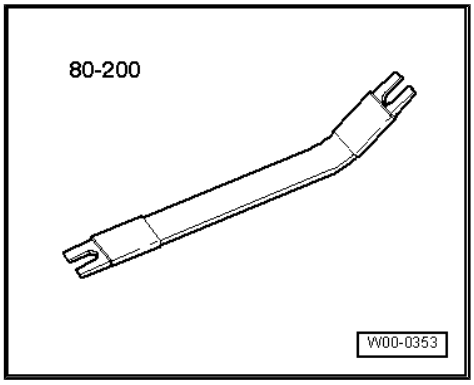
Special tools and workshop equipment required

- 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-

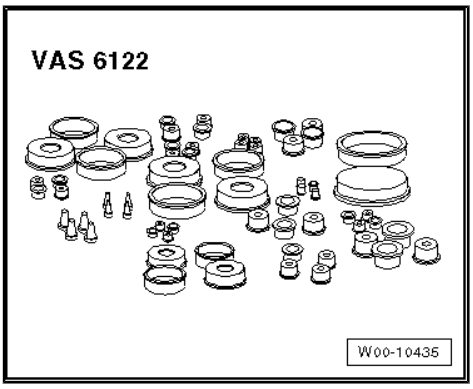


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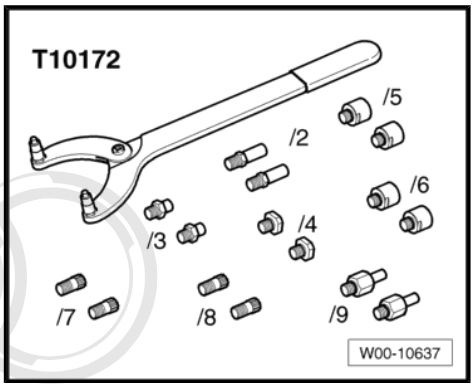
- Removal lever -80 - 200-



- Engine bung set -VAS 6122-



- Counterhold tool -T10172- with -T10172/5-



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 4 .

– Set front wheels to straight-ahead position.

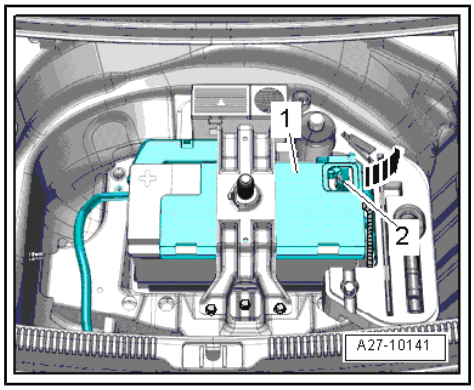
Note

The electronic 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 ⇒ Rep. Gr. 27 .

– Discharge refrigerant system ⇒ Air conditioner with refrigerant R134a .

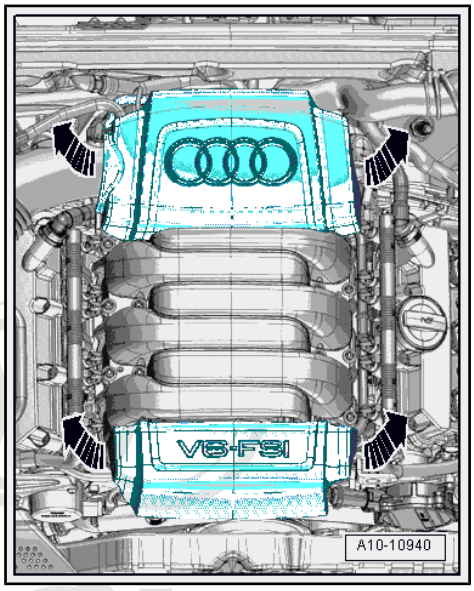
– Extract hydraulic fluid for power steering from reservoir using used oil collection and extraction unit -V.A.G 1782- .

– Pull off engine cover panels -arrows-.

WARNING

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

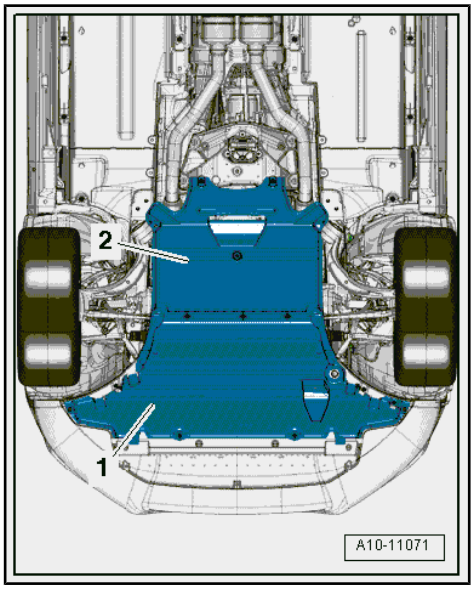
- *The cooling system is under pressure when the engine is hot.*
- *To allow pressure to dissipate, cover filler cap on expansion tank with cloth and open carefully.*



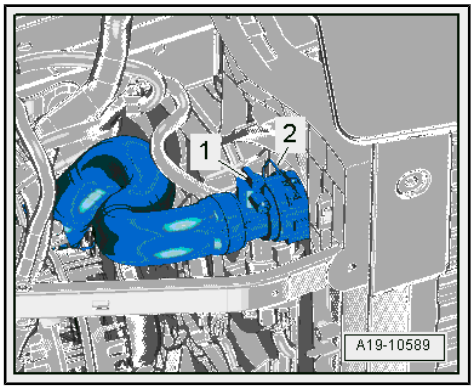
– Open filler cap on coolant expansion tank.

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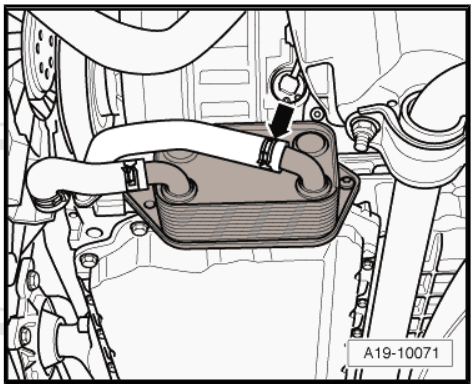
– Remove both front wheels.
– Remove front left and front right wheel housing liners ⇒ Rep. Gr. 66 .
– Remove noise insulation panels -1- and -2- ⇒ Rep. Gr. 66 .



– 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.

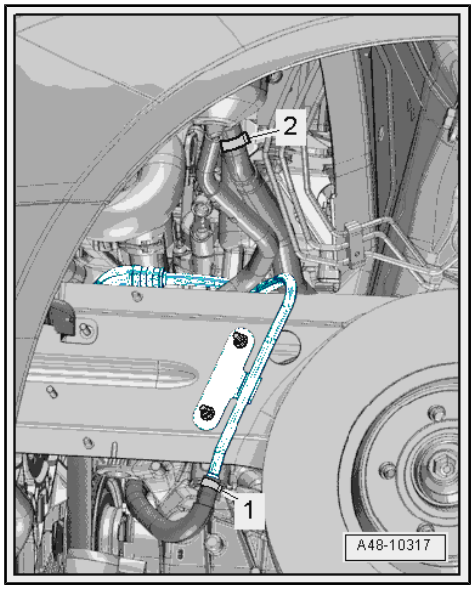


– Disconnect coolant hose -arrow- from oil cooler and drain off remaining coolant.

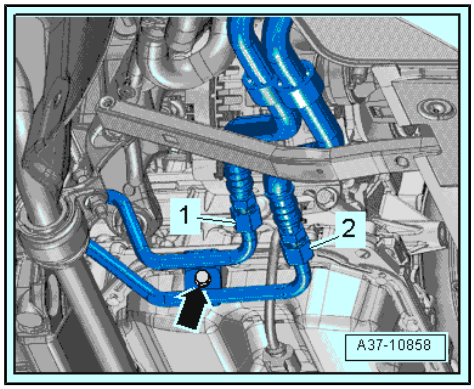


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– Position used oil collection and extraction unit -V.A.G 1782- below connection point.
– Disconnect supply hose -2- and return hose -1- for power steering hydraulic fluid in front left wheel housing and move clear.
– Seal off open pipes/lines and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

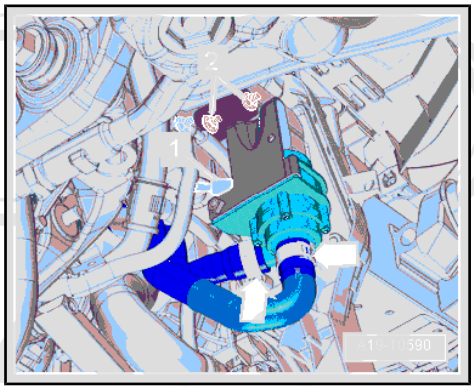


Note

Disregard -arrow-.

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-.

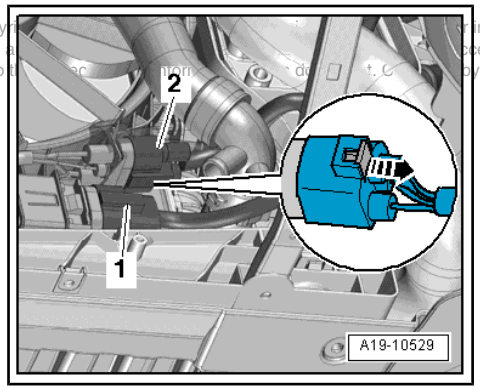


Note

Disregard -item 2- and -left arrow-.

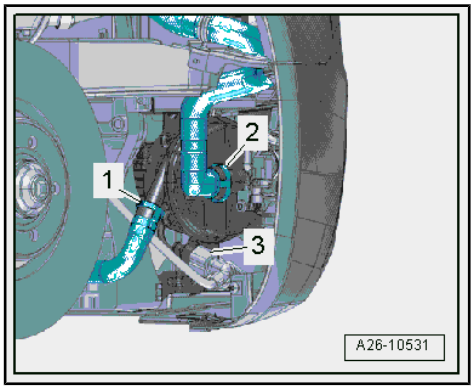
All vehicles (continued):

– 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.



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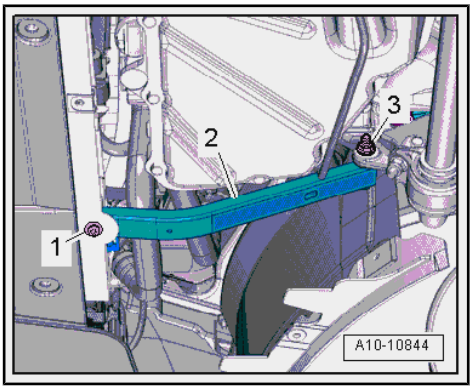
– If fitted, detach electrical connector -3- at secondary air pump motor -V101- and move electrical wire clear.



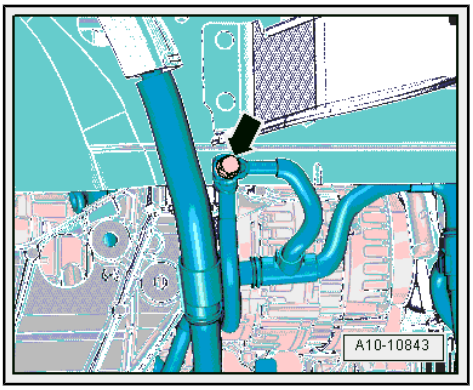
Note

Disregard -items 1, 2-.

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



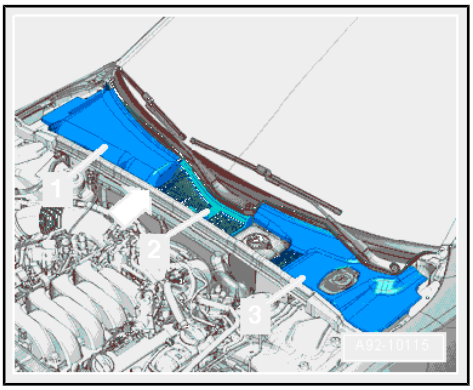
– Unscrew nut -arrow- on longitudinal member (right-side) and move earth cables clear.



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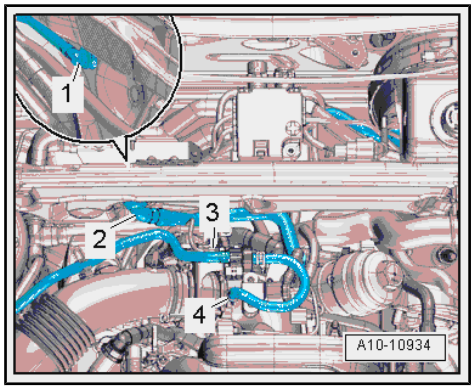
– Remove seal -arrow-.

– Remove plenum chamber cover ⇒ Rep. Gr. 50 .



– Disconnect vacuum hose -1- on rear side of bulkhead and detach vacuum connection -2- from bulkhead.

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



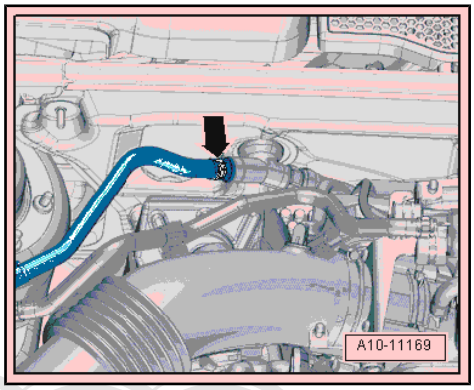
Rest-of-world vehicles:

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

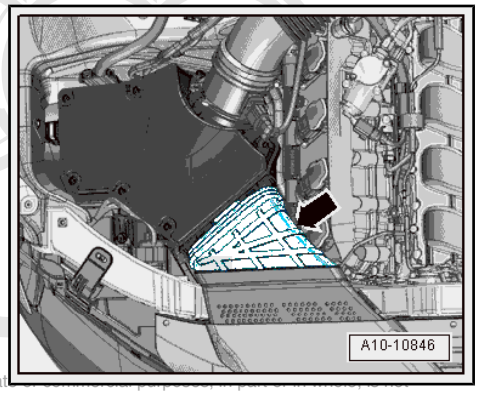
– Detach activated charcoal filter solenoid valve 1 -N80- from bracket and move it clear to the side with hoses still attached.

USA models:

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



– Remove air duct -arrow-.

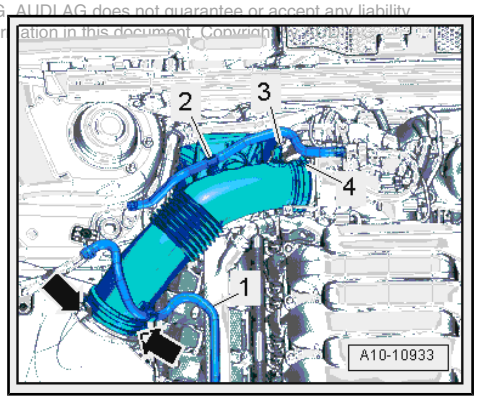


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– Move fuel hose -1- clear at air pipe.

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

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

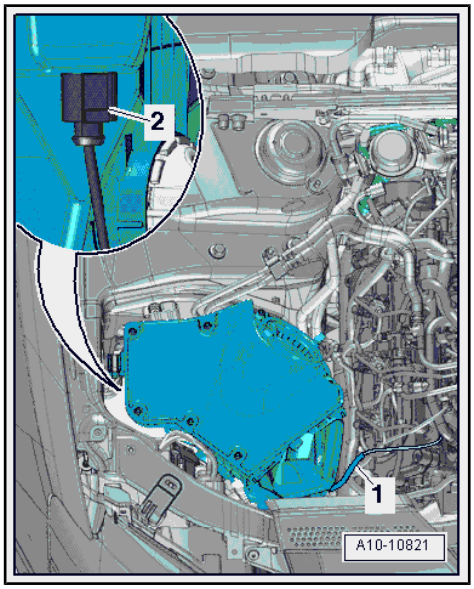


Note

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.

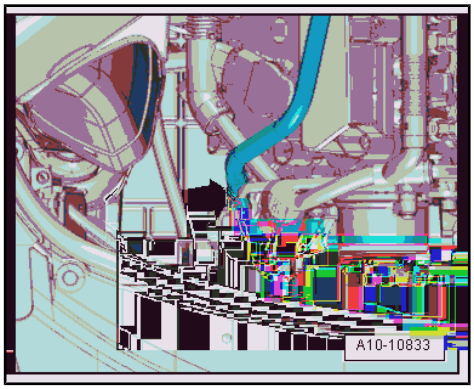


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WARNING

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.

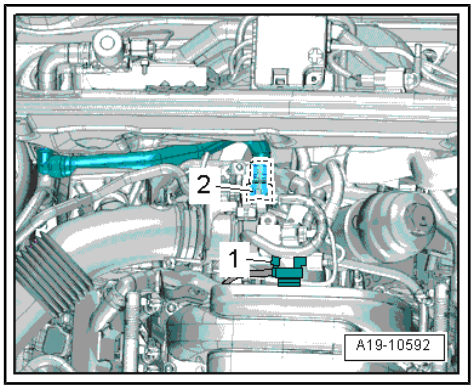
- *Observe rules for cleanliness when working on the fuel supply system ⇒ page 9 .*

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

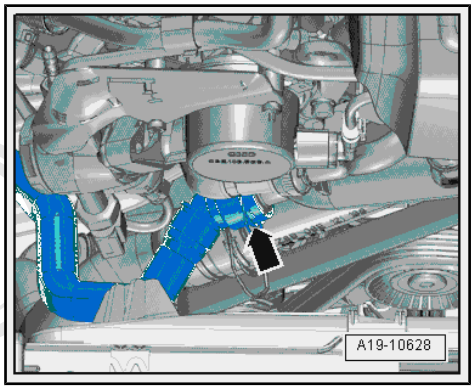
– Seal off open pipes/lines and connections with clean plugs from engine bung set -VAS 6122- .

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

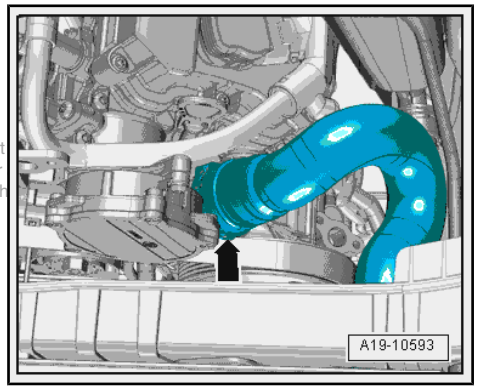
– Lift retaining clip and detach coolant hose -2- from coolant pipe (top).



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

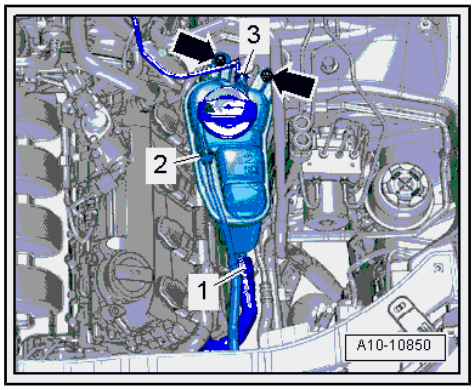


– Lift retaining clip -arrow- and detach coolant hose from coolant pipe (front).

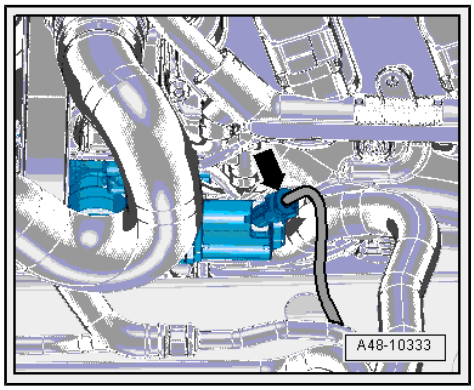


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– Disconnect coolant hose -3- from coolant expansion tank and move clear.
– Remove bolts -arrows-, unplug electrical connector at coolant shortage indicator switch -F66- and move expansion tank to one side with coolant hoses -1- and -2- attached.



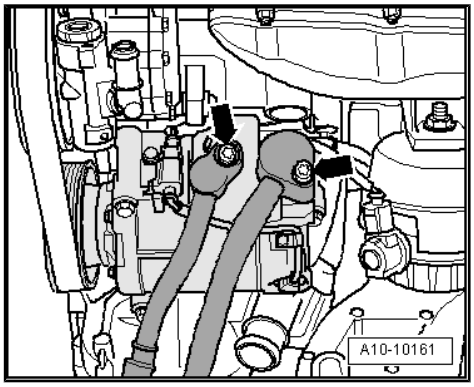
– If fitted, unplug electrical connector -arrow- at power steering pump.
– Press hydraulic fluid hose down slightly.



Caution

Danger of damage to refrigerant lines and hoses.

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

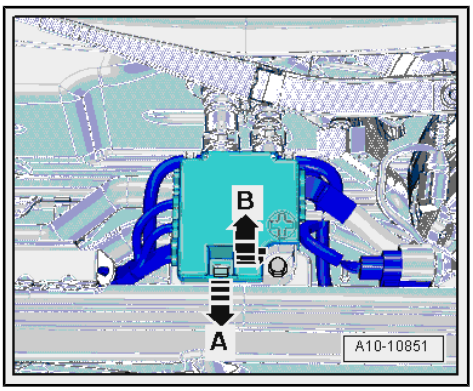


– Remove bolts -arrows- and disconnect refrigerant lines from A/C compressor.

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

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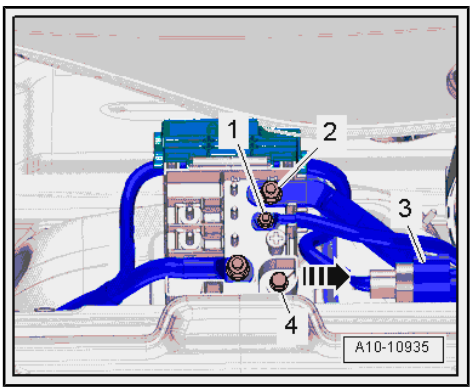
– Release retainer -arrow A- and open cover -arrow B-.



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

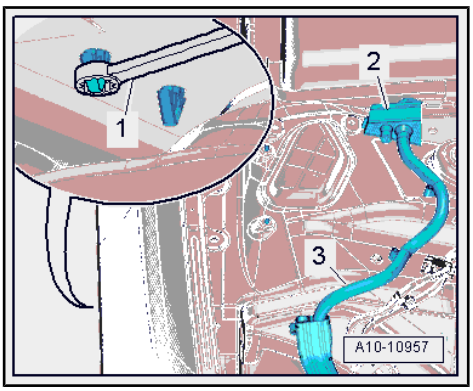
– Detach electrical connector -3- from bracket and unplug.

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

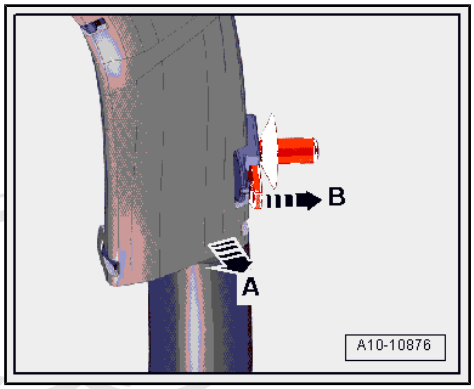


– Working from wheel housing, release catches using a 5.5 mm ring spanner -item 1- and remove wiring protector -2- from above.

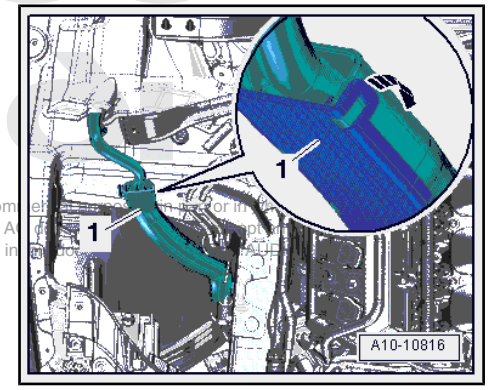
– Release wiring harness -3- leading to alternator and starter using removal lever -80 - 200- and move clear.



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

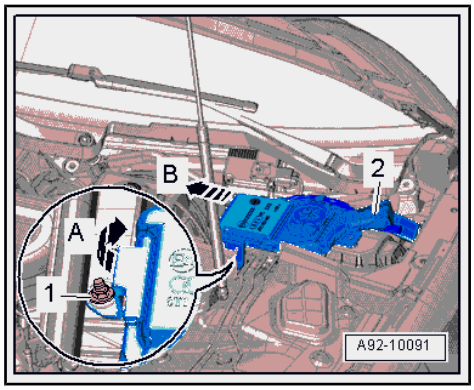


– Wiring duct (version 2): release catch -arrow- to open wiring duct -1- and move wiring harness clear.

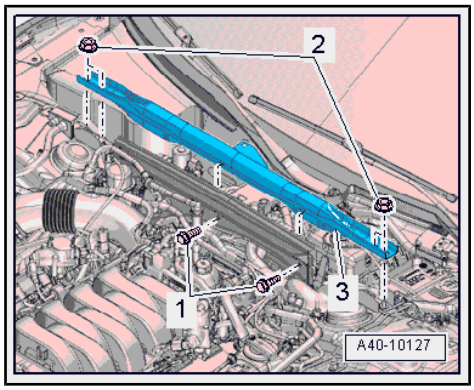


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– Remove nut -1- and swivel filler neck -2- for washer fluid reservoir slightly upwards -arrow A-.
– Pull filler neck with filler pipe out of washer fluid reservoir and through opening in body -arrow B-.

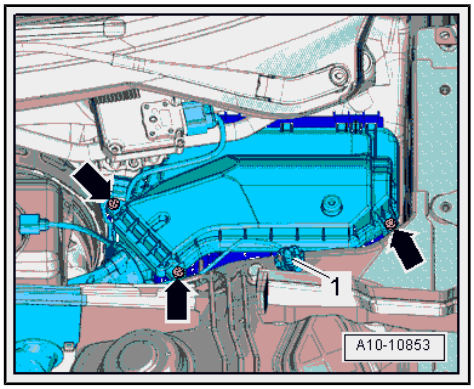


– Remove bolts -1- and nuts -2- and detach body brace -3-.

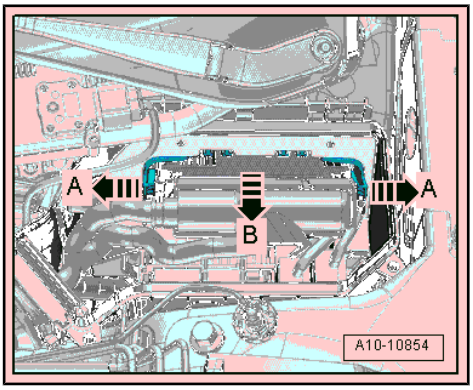


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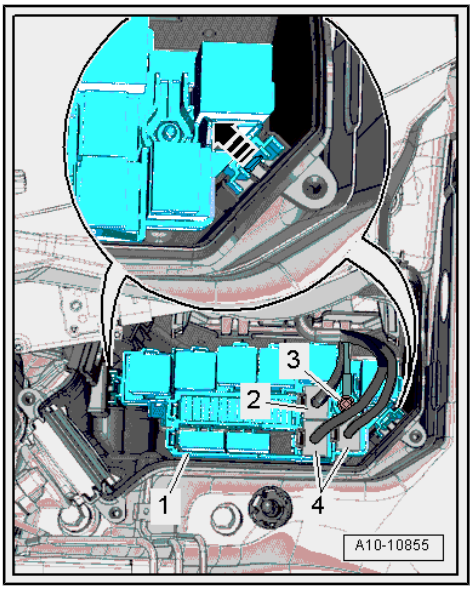
– Remove bolts -arrows- and detach cover for electronics box in engine compartment.
– Remove nut -1- and move electrical wiring clear.



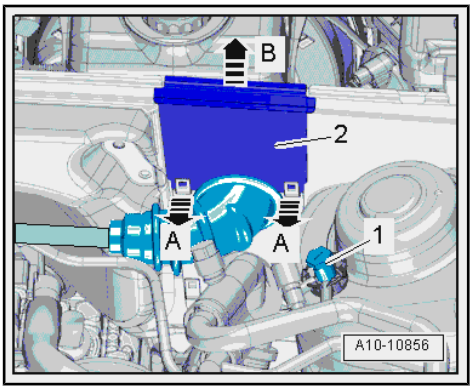
– Release catches -arrows A- and take out engine control unit -arrow B-.



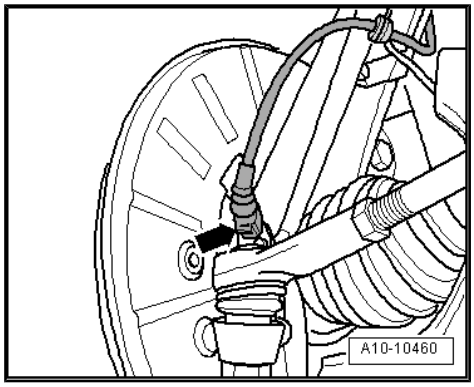
– If fitted, unplug electrical connector -2-.
– Unplug electrical connectors -4- and unscrew nut -3- for wiring.
– Release catches -arrow- and detach relay carrier with fuse holder -1-.
– Disengage engine wiring harness at electronics box in engine compartment and move clear.



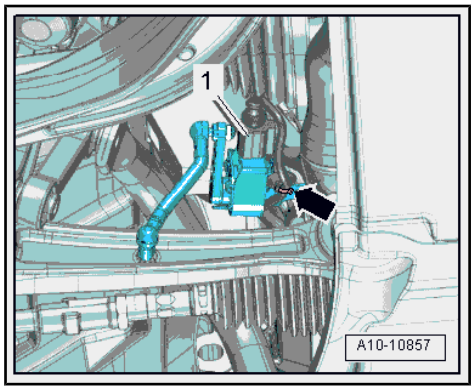
– Release catches -arrows A- and lift off wiring protector -2- -arrow B-.
– Unscrew earth stud -1- and move wiring harness clear.
– Place wiring harness on engine and secure engine control unit to prevent it from dropping.



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

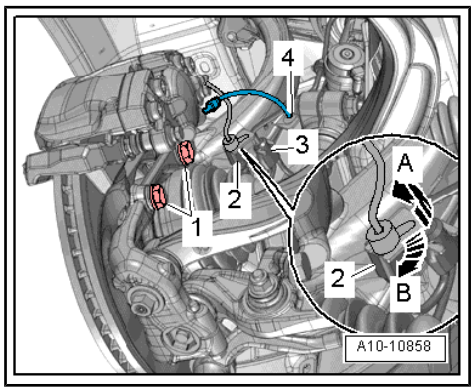


– Unplug electrical connector -1- from front left vehicle level sender -G78- and front right vehicle level sender -G289- and move wiring clear -arrow-.



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– 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.

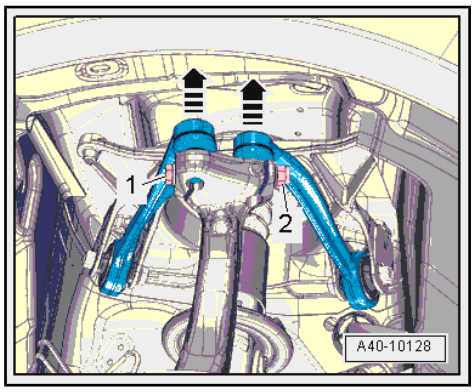


Caution

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.



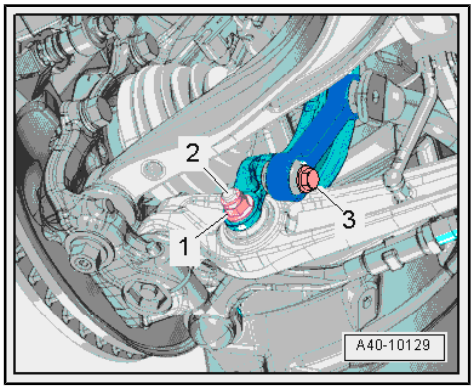
A5 up to vehicle identification no. 8T-8-011200:

– 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.



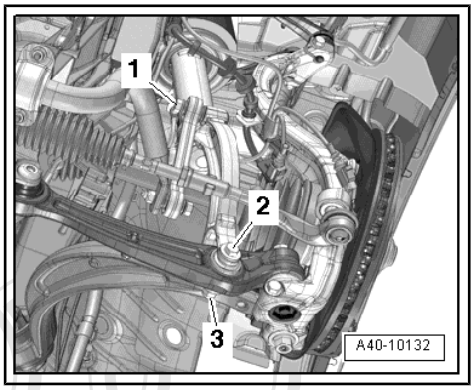
A4 (all), A5 from vehicle identification no. 8T-8-011201 onwards:

– 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.



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 box or subframe cross brace are not properly installed.***

A4 (all), A5 Coupé:

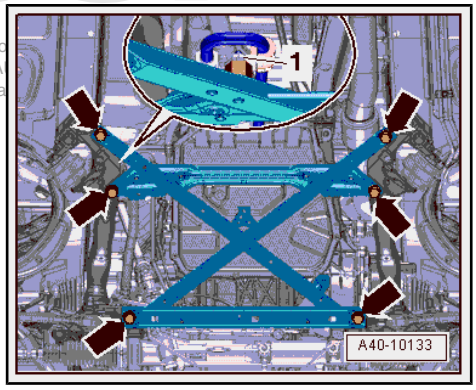
– Remove nut -1- for power steering hydraulic line.

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

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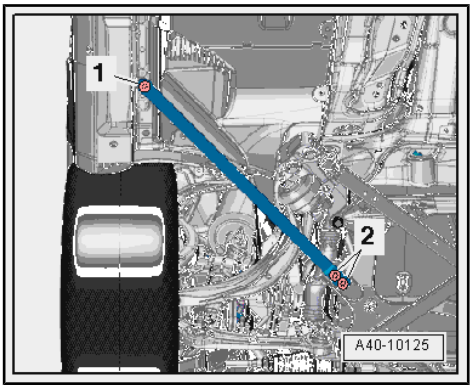
Note

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

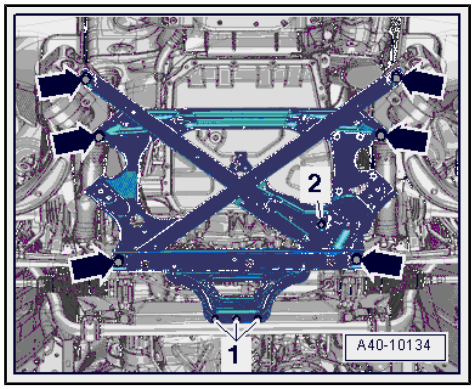


A5 Cabriolet:

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

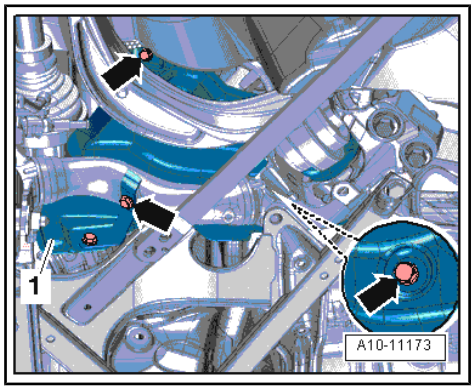


– Remove bolt -2- for power steering hydraulic line.
– Remove bolts -1- and -arrows- and detach subframe cross brace.

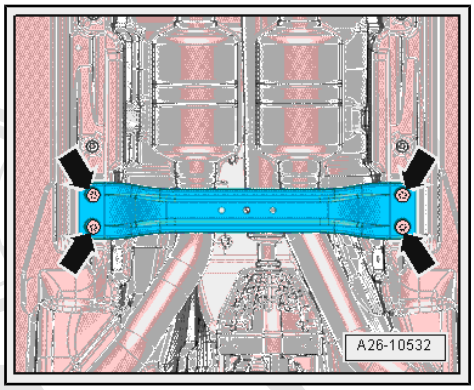


All vehicles (continued):

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



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

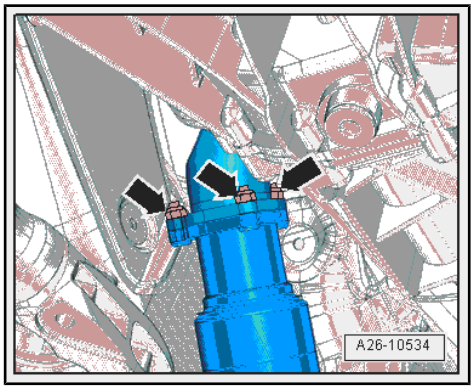


– Unscrew nuts -arrows- for front silencer (left-side).



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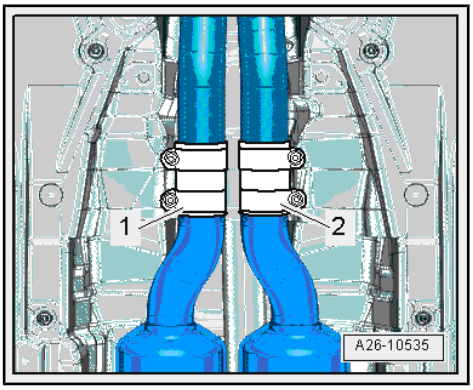
– Unscrew nuts -arrows- for front silencer (right-side).



Caution

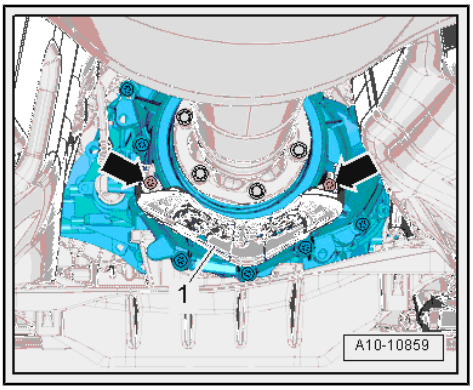
Risk of damage to flexible joints in front silencer.

- *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.

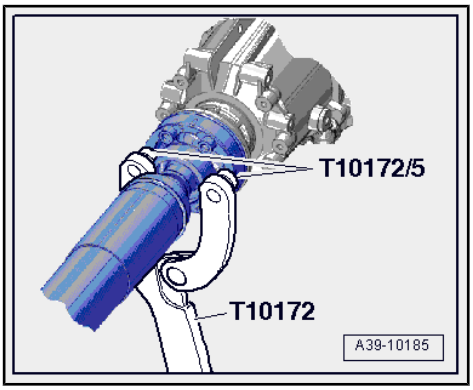
– If fitted, remove bolts -arrows- and detach heat shield -1- for propshaft.



– 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.

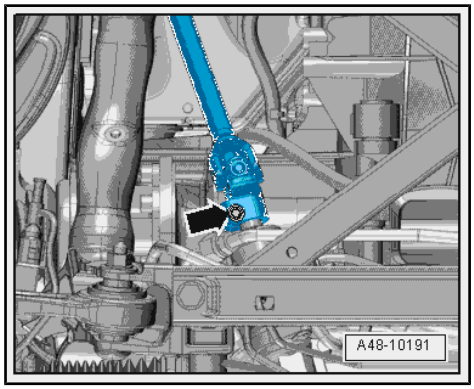


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Caution

Risk of damage to coil connector for airbag.

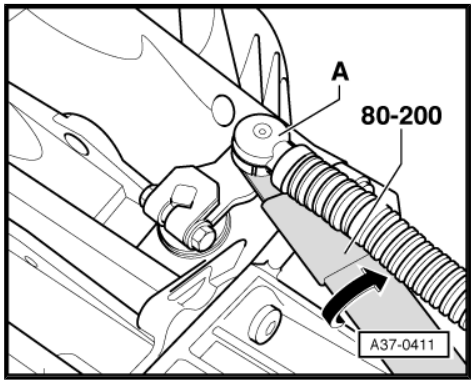
- *Make sure that front wheels are in straight-ahead position before removing universal joint from steering box.*
- *Do not alter position of steering wheel and steering box (locate steering wheel with adhesive tape if necessary).*



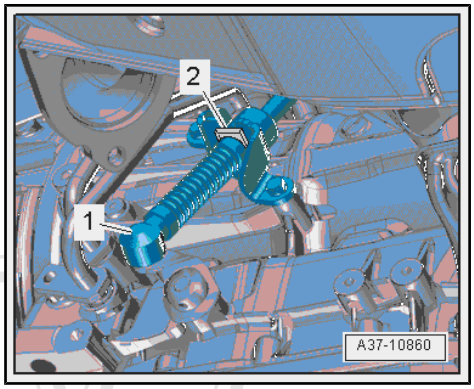
– Remove bolt -arrow- for universal joint ⇒ Rep. Gr. 48 .

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

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



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



Note

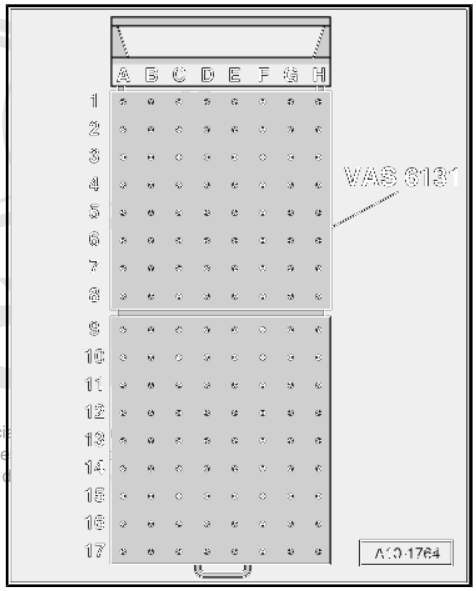
- *Take care not to bend or kink selector lever cable.*
- *Disregard -item 1-.*

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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).

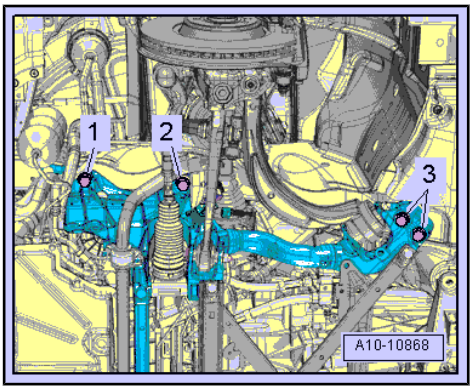
– Position scissor-type assembly platform -VAS 6131 A- below engine/gearbox assembly.

WARNING

Accident risk if subframe mountings are detached.

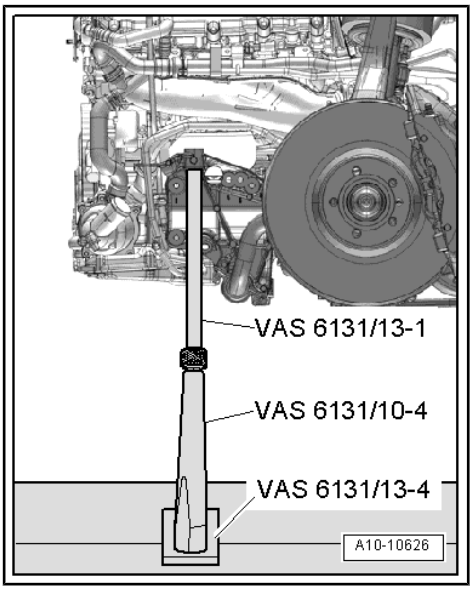
- ***Subframe bolts -2- and -3- must not be loosened.***

– Remove subframe bolts -1- on both sides.

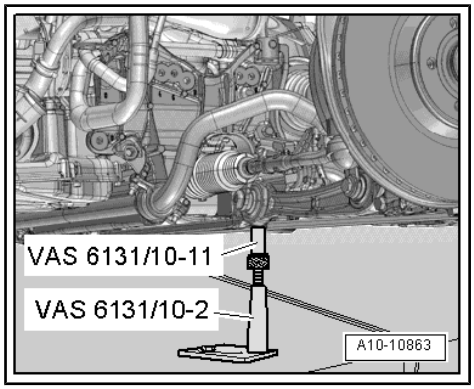


– Position support elements from -VAS 6131/10- and -VAS 6131/13- at front left and right of subframe as shown.

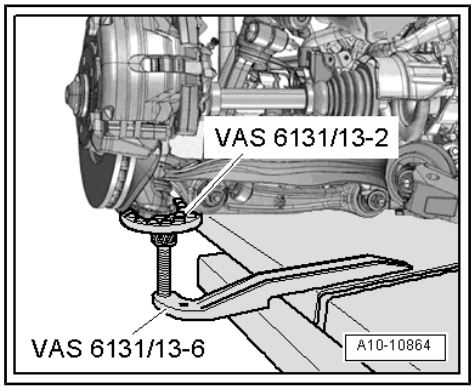
– Make sure that threaded spindles are screwed in completely.



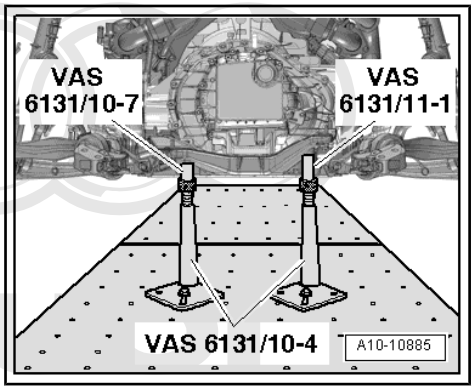
– Position support elements from -VAS 6131/10- (rear left and right) at front attachment points of subframe cross brace as shown.



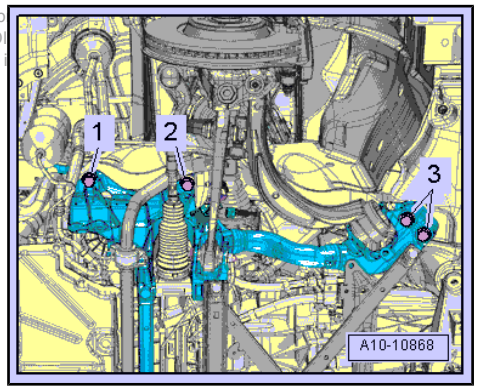
– Position support elements from -VAS 6131/13- under left and right wheel bearing housings as shown.



– 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.

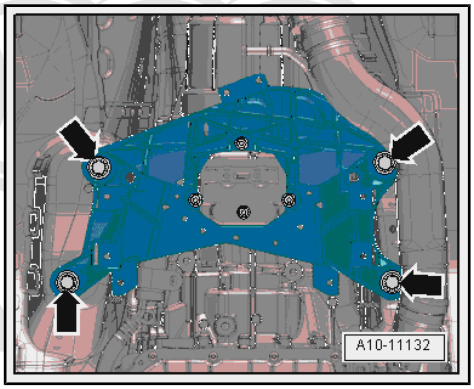


Note

Disregard -item 1-.

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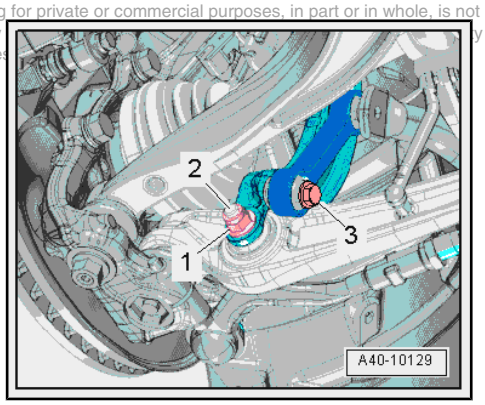
– Remove bolts -arrows- on tunnel cross member.



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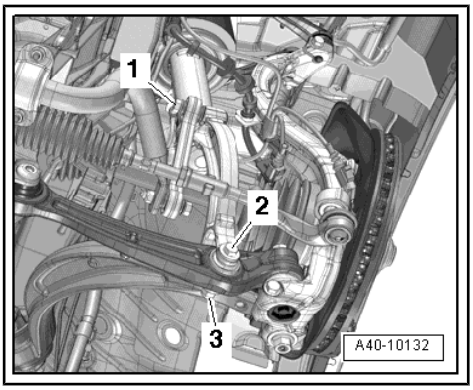
A5 up to vehicle identification no. 8T-8-011200:

– 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 engine/gearbox assembly with subframe out of engine compartment when lowering.***

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

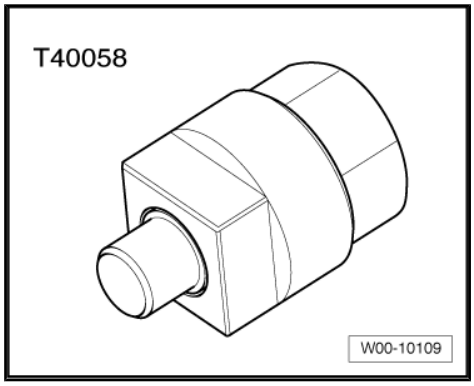
– Pull out scissor-type assembly platform -VAS 6131 A- with engine/gearbox assembly from beneath vehicle.

3.2 Separating engine from 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-

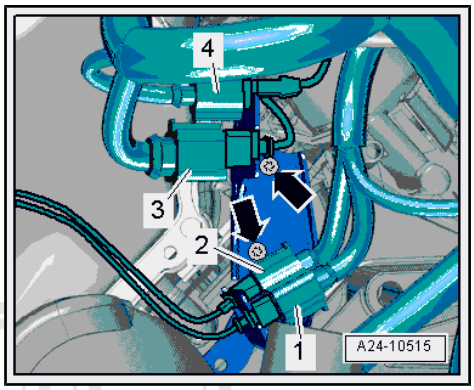
♦ Adapter -T40058-



Procedure

- Engine/gearbox assembly removed and in position on scissor-type assembly platform -VAS 6131 A- .

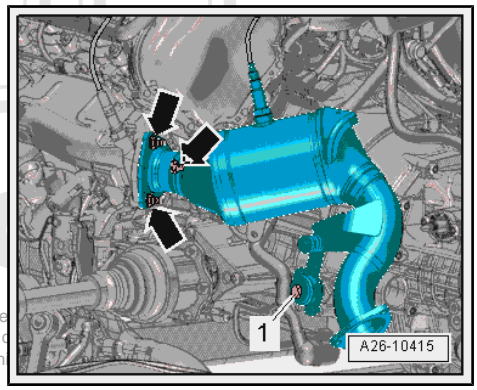
– Remove electrical connector -1- for Lambda probe 2 after catalytic converter -G131- from bracket, unplug and move wiring clear.



Note

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

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

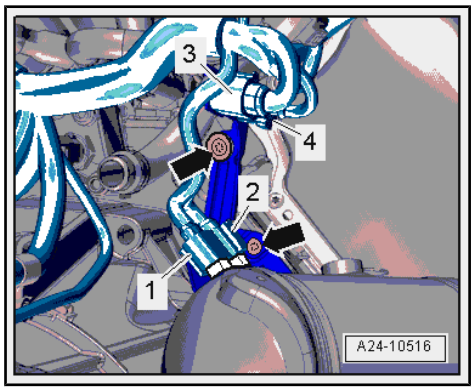


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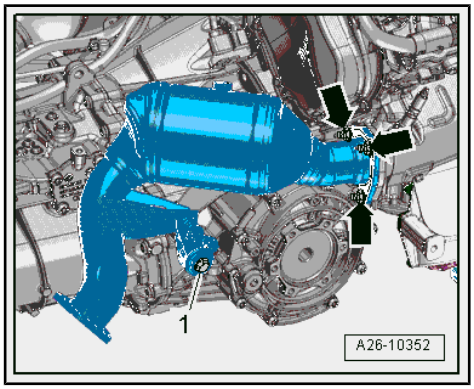
– Remove electrical connector -1- for Lambda probe after catalytic converter -G130- from bracket and unplug connector.

– Detach electrical connector -2- from bracket.

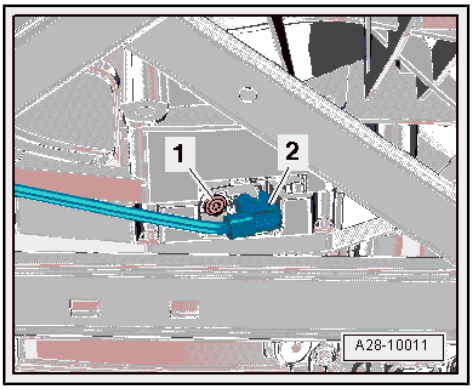
– Remove bolts -arrows- and move bracket with electrical connectors -3- and -4- to one side.



– 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.



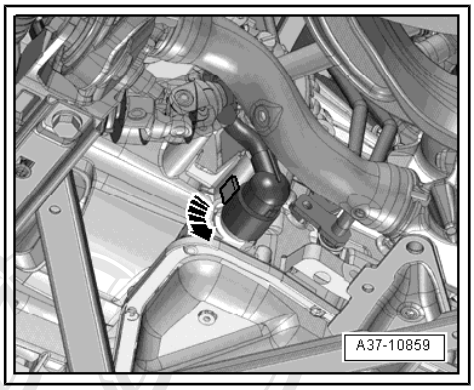
Note

Disregard -item 1-.

Caution

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

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

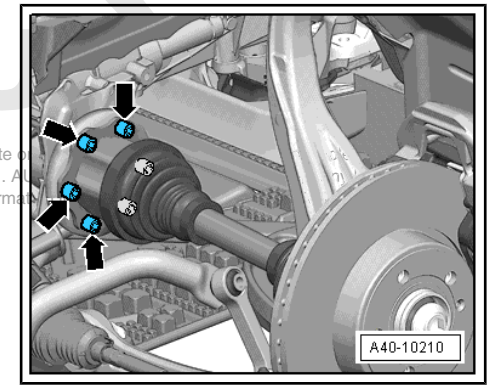


– Touch gearbox housing with your hand (without wearing gloves) to eliminate static charge.

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

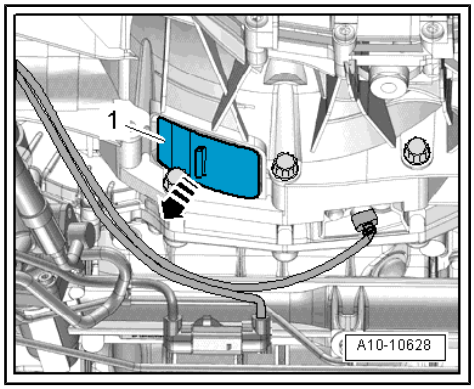
– Move electrical wiring clear at gearbox.

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



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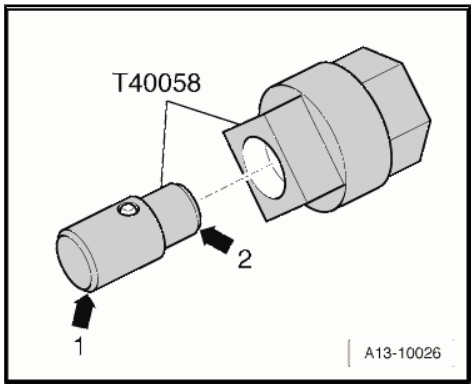
– Detach bottom cover -1- from gearbox -arrow-.



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

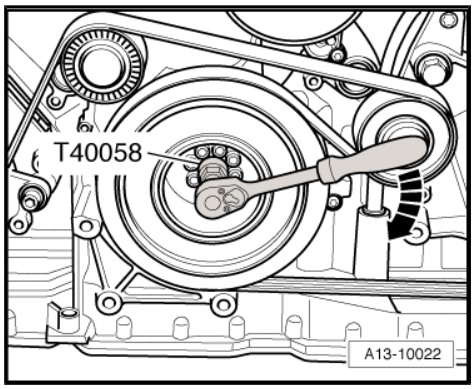
- The larger-diameter section -arrow 1- faces towards the engine.
- The smaller-diameter section -arrow 2- faces the adapter.



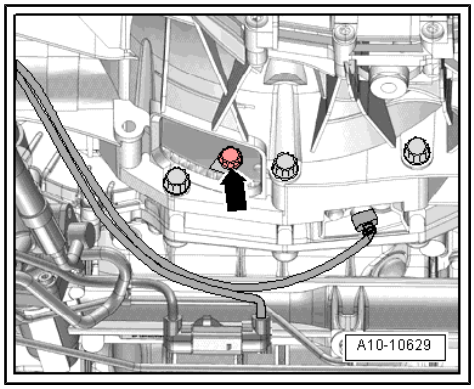
– Counterhold crankshaft using adapter -T40058- when slackening bolts for drive plate.

Note

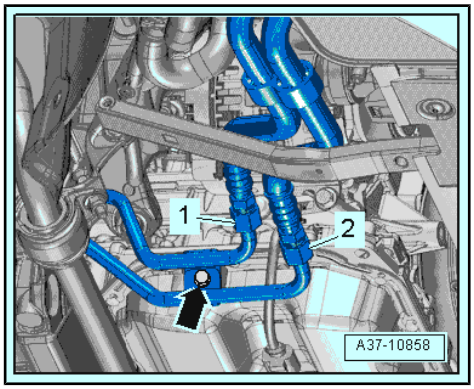
When performing the next step, turn the crankshaft only in the normal direction of rotation -arrow-.



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



– Remove bolt -arrow- for ATF pipes.



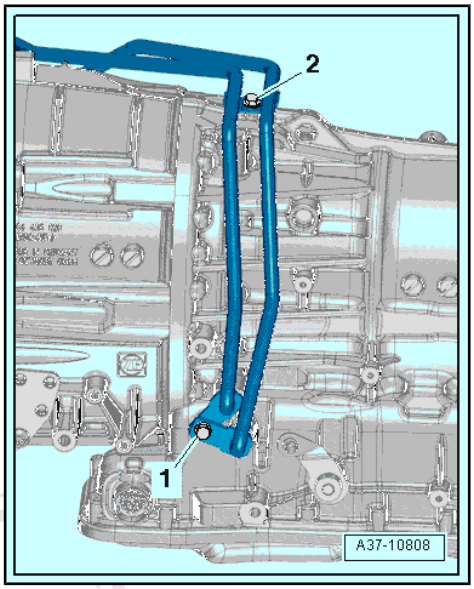
Note

Disregard -items 1, 2-.

Note

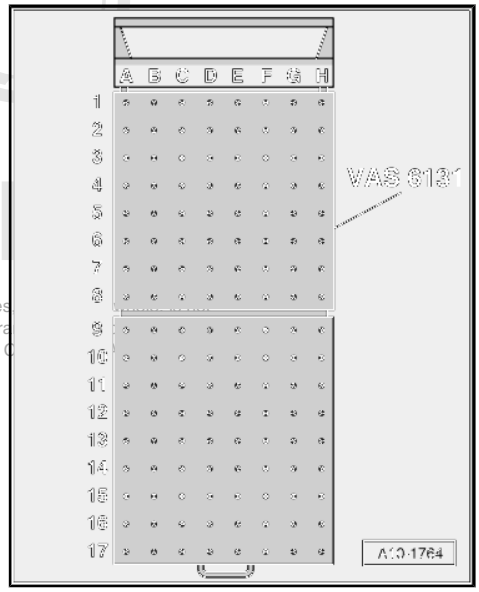
Lay a cloth under the separating point to catch escaping ATF.

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



– 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:



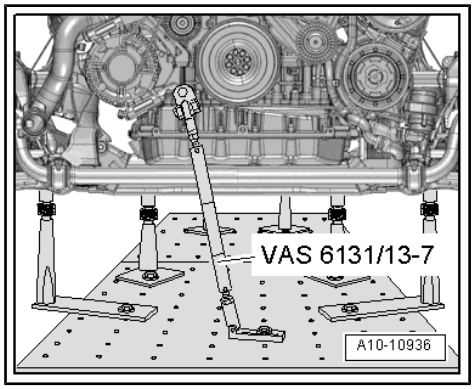
Note

The other support elements remain unchanged.

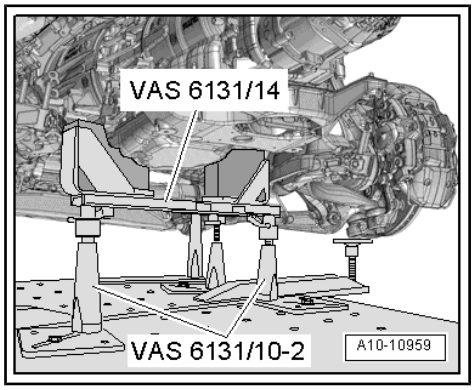
Platform coordinates	Parts of support set for Audi -VAS 6131/10- , supplementary set -VAS 6131/13- and gearbox support -VAS 6131/14-			
F2	/13-7			
B10	/10-1	/10-2	/10-5	/14
G10	/10-1	/10-2	/10-5	

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– 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.



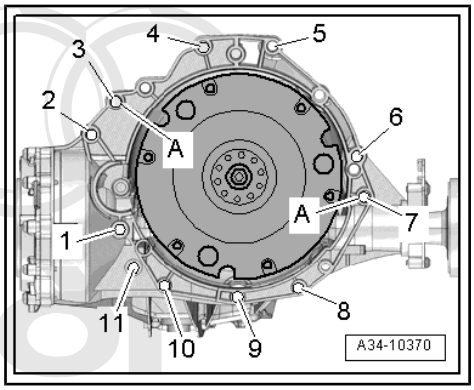
– Position support elements from -VAS 6131/10- and gearbox support -VAS 6131/14- at front of gearbox, as illustrated.
– Screw spindles on both sides upwards until gearbox support -VAS 6131/14- makes full contact with gearbox.
– Tighten base plates for support elements to 20 Nm on scissor-type assembly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



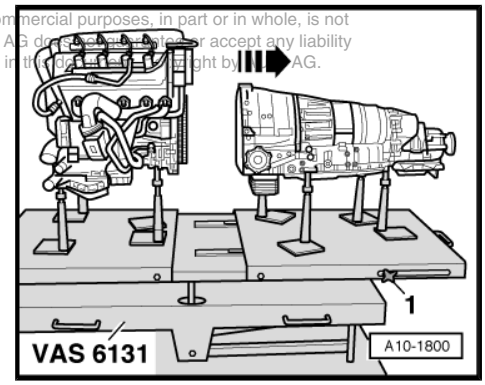
– Remove bolts -1- and -2- for starter.
– Separate starter from gearbox and leave in position.
– Unscrew remaining bolts -3 ... 11- securing engine to gearbox.

Note

Disregard -item A-.



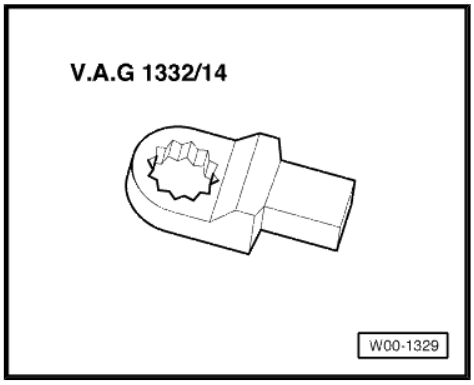
– Loosen clamping bolts -1- on sides of scissor-type assembly platform -VAS 6131 A- and pull rear section of platform together with gearbox towards rear -arrow-.



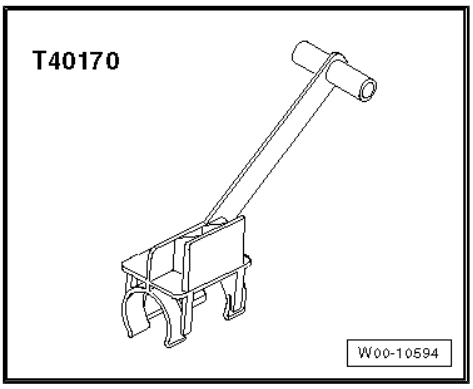
3.3 Installing engine

Special tools and workshop equipment required

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



- Transport lock -T40170-



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Tightening torques

Note

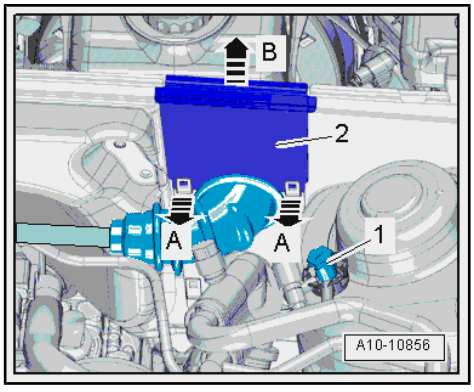
- *Tightening torques apply only to lightly greased, oiled, phosphated or black-finished nuts and bolts.*
- *Additional lubricants such as engine or gearbox oil may be used, but do not use lubricants containing graphite.*
- *Do not use de-greased parts.*
- *Tolerance for tightening torques ± 15 %.*

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

Assembly mountings ⇒ page 110 .

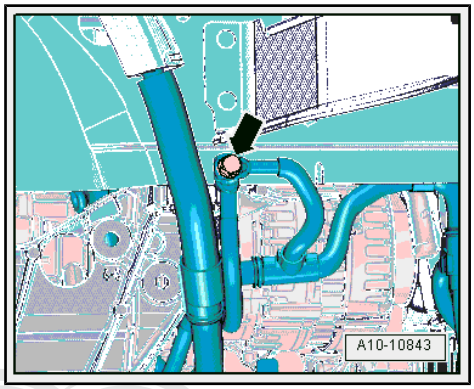
Earth stud at suspension turret - tightening torque

– Tighten earth stud -1- to 9 Nm.



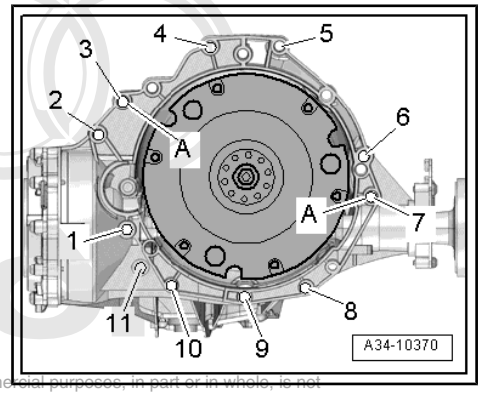
Earth wiring at longitudinal member - tightening torque

– Tighten nut -arrow- to 9 Nm.



Engine to automatic gearbox 0B6

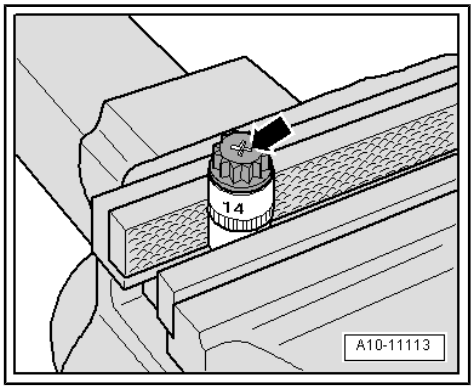
Item	Bolt	Nm
1	M10x50 1)	65
2 … 6	M12x100 2)3)	30 + 90°
7	M12x125 2)3)	30 + 90°
8, 11	M10x60 2)3)	15 + 90°
9, 10	M10x95 2)3)	15 + 90°
A	Dowel sleeves for centralising	



- 1) Property class 10.9. The steel bolt may be re-used as often as necessary.
- 2) Audi A4 up to vehicle identification no. 8K-9-066499, Audi A5 up to vehicle identification no. 8T-9-007999: renew aluminium bolts.
- 3) Audi A4 from vehicle identification no. 8K-9-066500 onwards, Audi A5 from vehicle identification no. 8T-9-008000 onwards: aluminium bolts must not be used more often than twice ⇒ page 101 .

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- Audi A4 from vehicle identification no. 8K-9-066500 onwards, Audi A5 from vehicle identification no. 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.



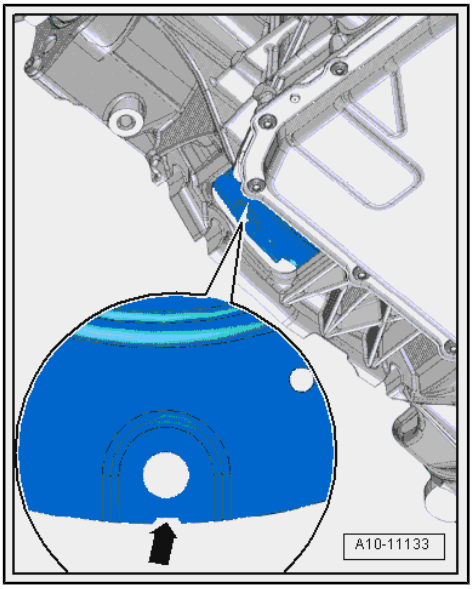
Procedure

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 125 .
- *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.*

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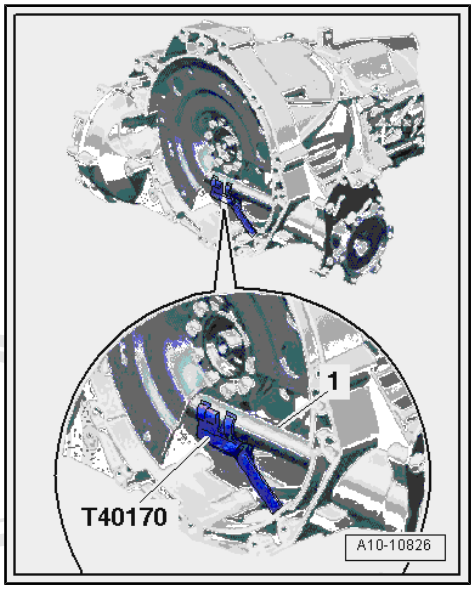
– Install engine supports and engine mountings ⇒ page 110 .
– Hold ATF pipes in installation position when joining engine and subframe.
– Before installing gearbox, remove residue from threaded holes for engine/gearbox bolts in cylinder block using a thread tap.
– The following preparations are required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



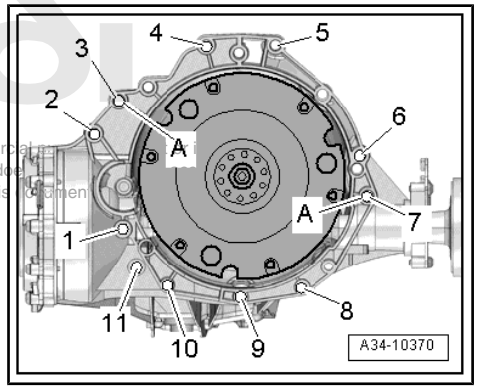
Note

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 101 .
– Bring gearbox into position on engine and tighten bolts -1, 6 … 11-.
– Remove transport lock -T40170- .

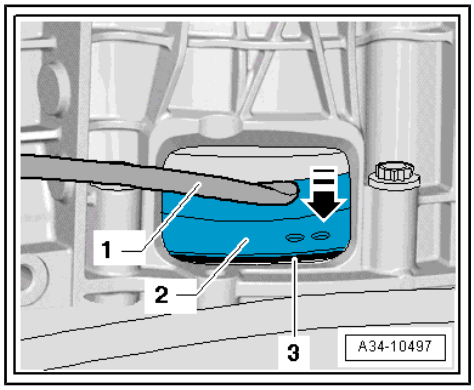


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Note

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

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

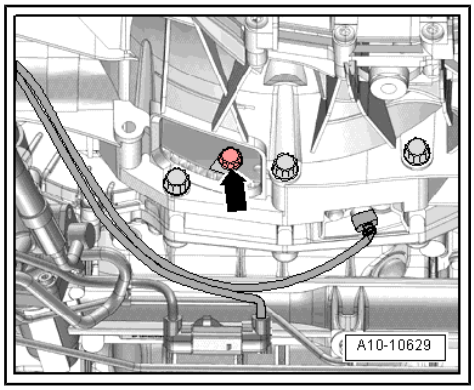


– Bolt torque converter onto drive plate as follows:

Note

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

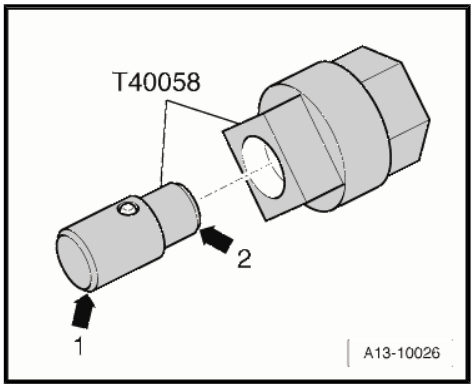
– Hand-tighten first bolt -arrow- (2 Nm).



– 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- .

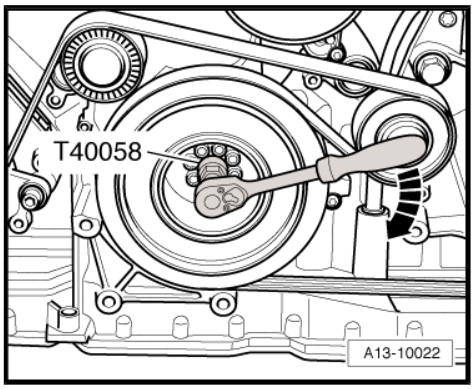
– Tighten bolt accessible in this crankshaft position to specified torque ⇒ Rep. Gr. 37 .

– Turn crankshaft by 60° each time and tighten remaining 5 bolts to specified torque ⇒ Rep. Gr. 37 .

– Install hydraulic fluid lines for power steering ⇒ Rep. Gr. 48 .

– Bolt drive shafts (left and right) onto gearbox flange shafts ⇒ Rep. Gr. 40 .

– Install catalytic converters: left-side ⇒ page 299 , right-side ⇒ page 301 .



– 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.

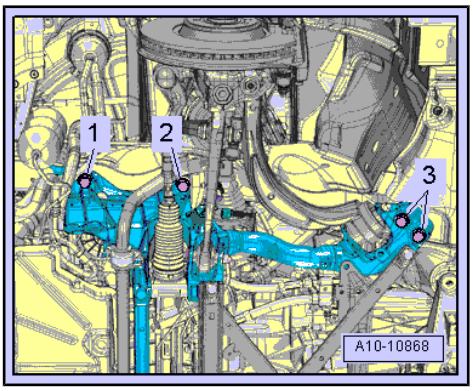
– Tighten subframe bolts only to specified torque (do not turn further); the bolts are only to be fully tightened after performing the wheel alignment check ⇒ Rep. Gr. 40 .

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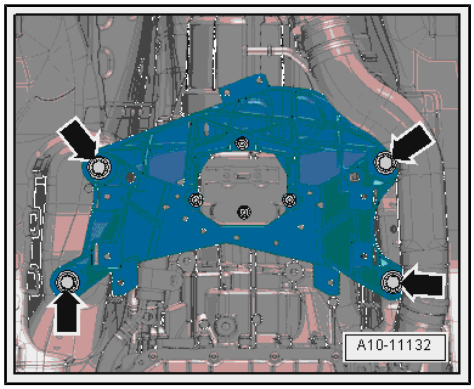
WARNING

Risk of accident because of loose bolt connections.

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



– Tighten bolts -arrows- for tunnel cross member ⇒ Rep. Gr. 34 .



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

– Secure universal joint on steering box ⇒ Rep. Gr. 48 .
– Install propshaft ⇒ Rear final drive 0BC; Rep. Gr. 39 or ⇒ Rear final drive 0BD; Rep. Gr. 39 .
– Install front silencer ⇒ page 303 .
– Align the exhaust system so it is free of stress ⇒ page 305 .
– Install front cross member ⇒ Rep. Gr. 66 .
– Install subframe cross brace, upper suspension links and anti-roll bar; secure suspension strut to track control link ⇒ Rep. Gr. 40 .
– Install brake calipers ⇒ Rep. Gr. 46 .
– Install engine control unit ⇒ Rep. Gr. 24 .
– 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 99 , ⇒ page 100 and ⇒ Rep. Gr. 97 .
– Install body brace ⇒ Rep. Gr. 40 .
– Install filler neck for washer fluid reservoir ⇒ Rep. Gr. 92 .
– Install refrigerant lines ⇒ Rep. Gr. 87 .
– Observe notes on procedure for connecting the battery ⇒ Rep. Gr. 27 .

Audi
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Caution

Risk of damage to control units because of excessive voltage.

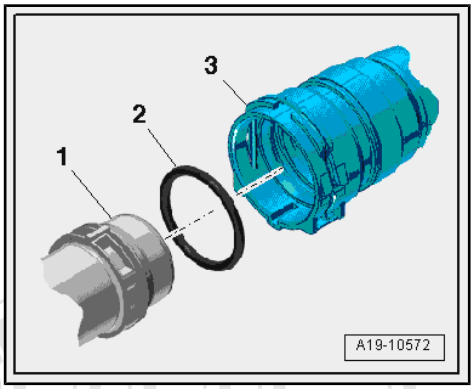
- ***Never use battery charging equipment for boost starting.***

– Install air cleaner housing ⇒ Rep. Gr. 24 .
– Install struts for lock carrier ⇒ Rep. Gr. 50 .
– Fill up with engine oil and check engine oil level ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .
– Before starting engine, top up hydraulic fluid in power steering reservoir ⇒ Rep. Gr. 48 .

Note

The power steering pump must not be run when dry.

– Connect coolant hose with plug-in connector ⇒ page 273 .
– Fill up with coolant ⇒ page 253 .



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 .
– Align subframe ⇒ Rep. Gr. 40 .
– Install wheel housing liners ⇒ Rep. Gr. 66 .
– Fit front wheels and perform wheel alignment ⇒ Rep. Gr. 44 .

WARNING

Risk of accident because of loose bolt connections.

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

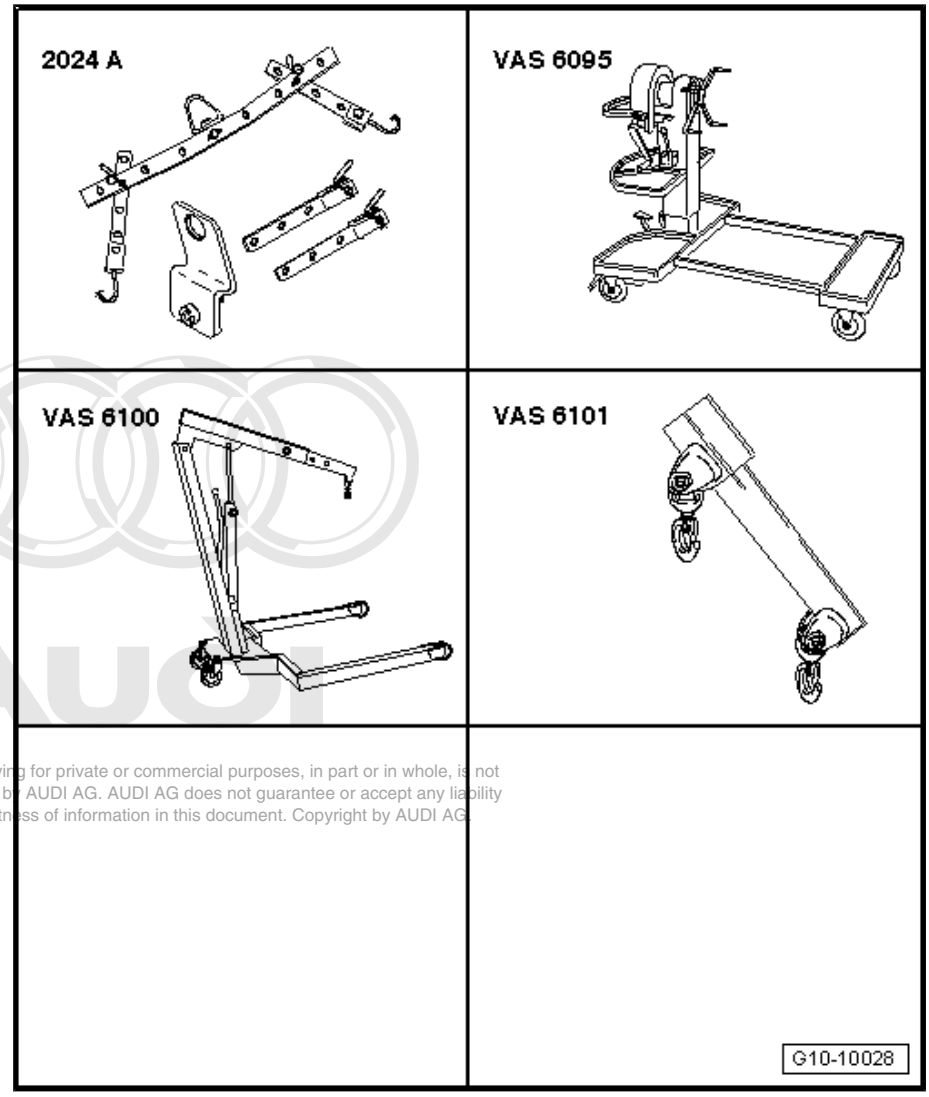
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– Fill up with ATF ⇒ Rep. Gr. 37 .
– Install noise insulation panels ⇒ Rep. Gr. 66 .

4 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-

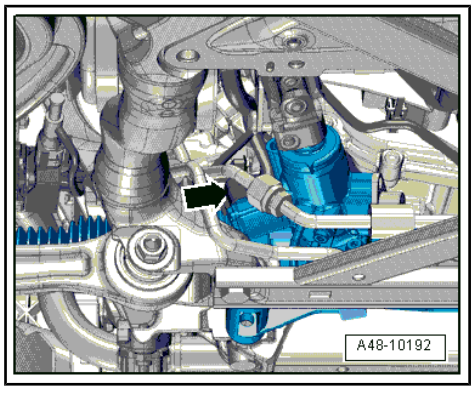


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Procedure

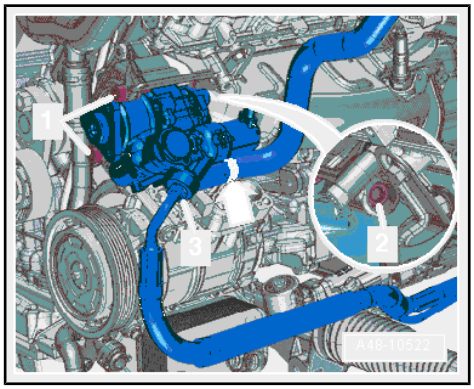
- Engine/gearbox assembly removed; engine separated from gearbox.
- Engine secured with support -VAS 6131/13-7-

– Unplug electrical connector -arrow- on steering box.



Note

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

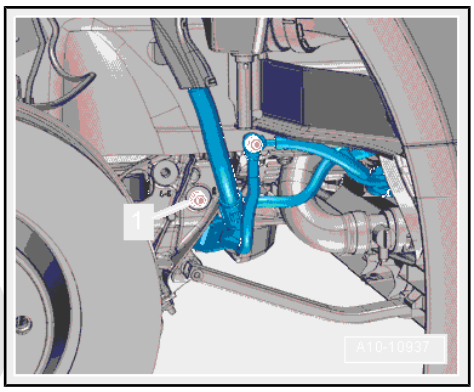


– Unscrew connection -3-.
– Seal off open pipes/lines and connections with clean plugs from engine bung set -VAS 6122- .

Note

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

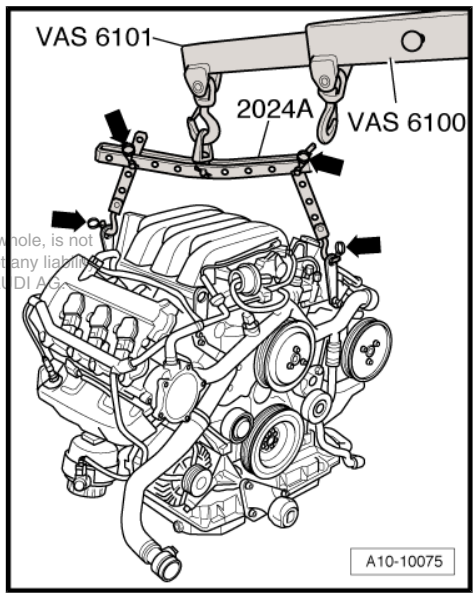
– Unscrew nut -1- and detach bracket with electrical wiring from subframe.



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.

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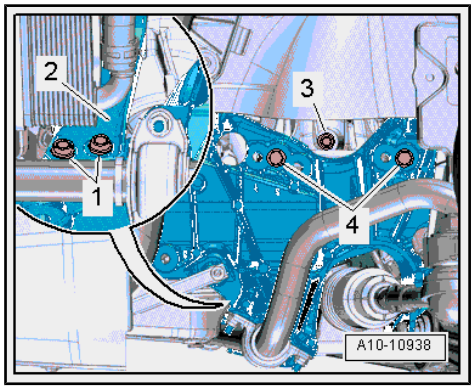
WARNING

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.

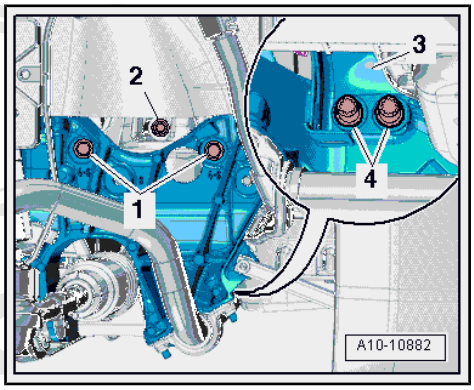
– Remove bolt -3- for engine mounting (left-side).



Note

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

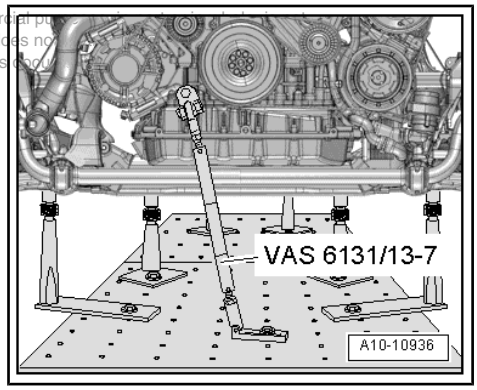
– Remove bolt -2- for engine mounting (right-side).



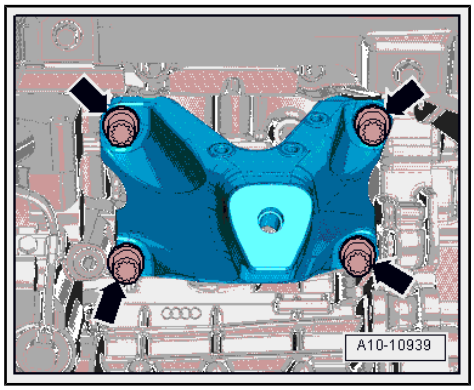
Note

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

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

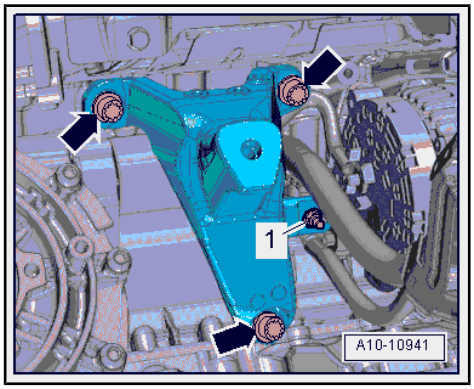


– Unscrew bolts -arrows- and remove engine support (left-side).

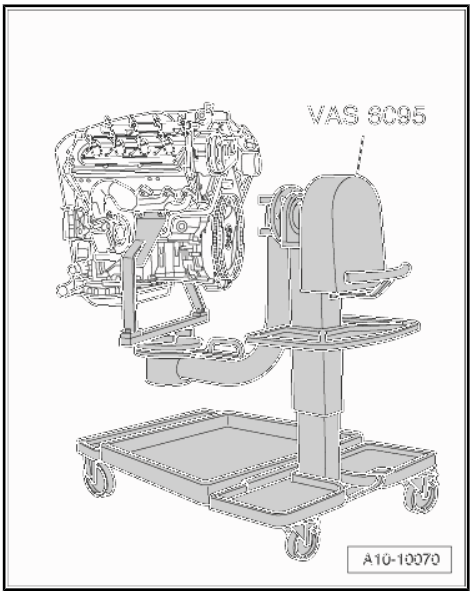


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– Remove nut -1- and move earth wire clear at engine support.
– Unscrew bolts -arrows- and remove engine support (right-side).
– Tie up starter on engine.



– 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.



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5 Assembly mountings

5.1 Assembly mountings - exploded view

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

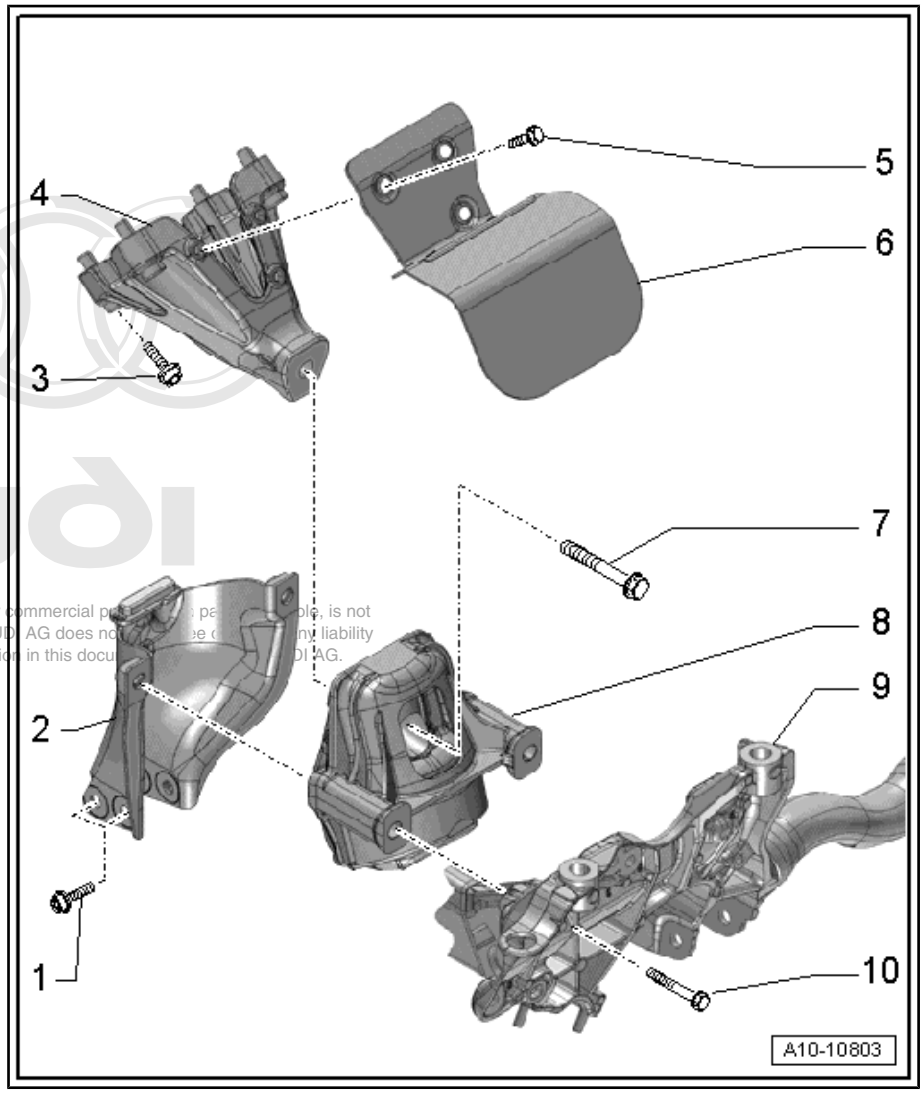
6 - Heat shield

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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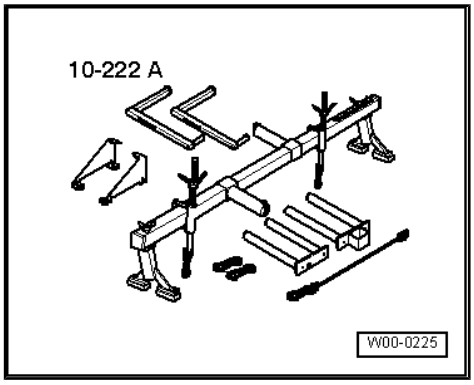
5.2 Removing and installing engine mounting (left-side)

Note

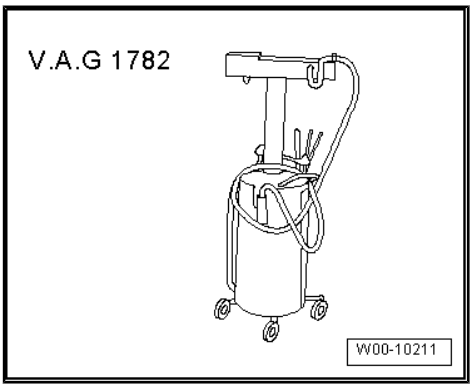
- *Renew engine mountings on both sides together.*
- *Also renew corresponding brackets.*

Special tools and workshop equipment required

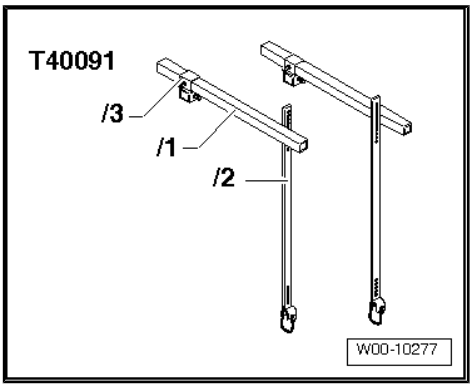
- Support bracket -10 - 222 A-



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



- Engine support bracket (basic set) -T40091-



- Engine support bracket (supplementary set) -T40093-



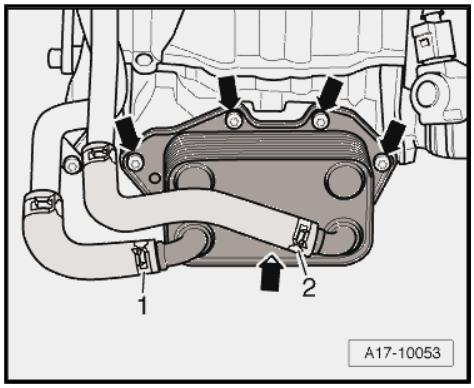
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Removing

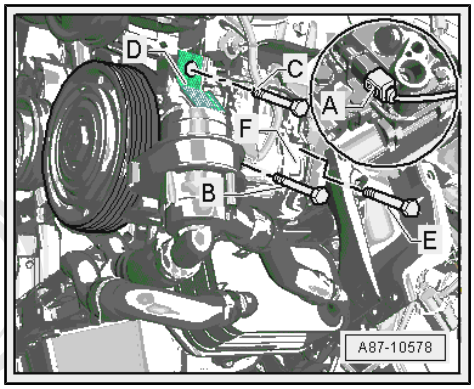
– Position used oil collection and extraction unit -V.A.G 1782- below engine.

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

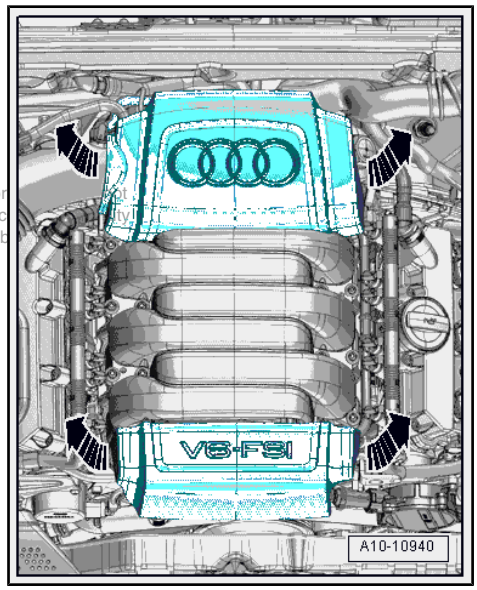
– On vehicles with continued coolant circulation pump -V51- , remove -V51- ⇒ page 270 and oil cooler ⇒ page 229 .



– Remove air conditioner compressor ⇒ Rep. Gr. 87 .

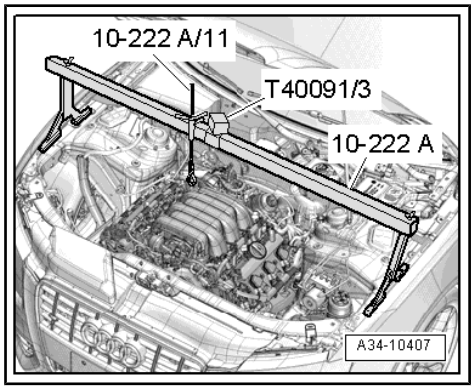


– Pull off rear engine cover panel -top arrows-.



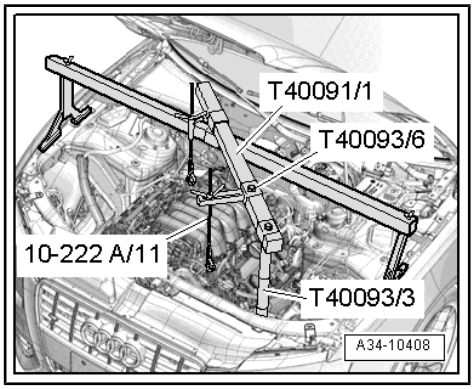
– Set up support bracket -10 - 222 A- with connecting piece -T40091/3- on suspension turrets (left and right) as illustrated.

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



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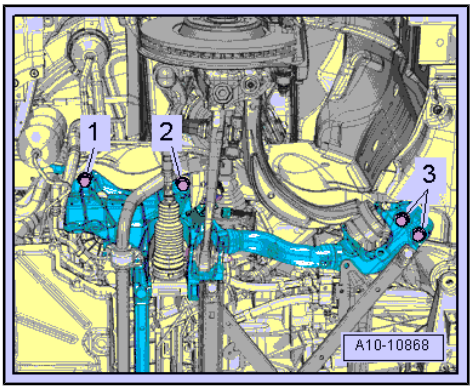
– Attach further components of support bracket -10 - 222 A- as shown in illustration. Position support -T40093/3- onto flange of longitudinal member.
– Attach spindle -10 - 222 A /11- to engine lifting eye (left-side).
– Take up weight of engine with spindles.



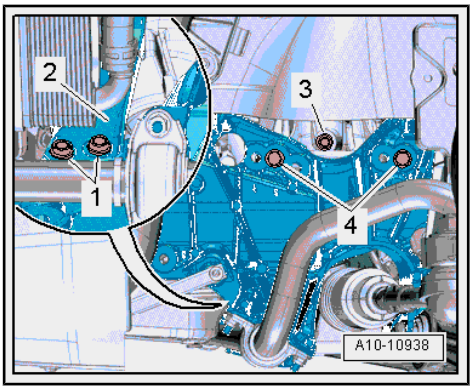
– Remove bolt -2- for subframe (left-side).

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 ⇒ Rep. Gr. 40 .
– Install oil cooler ⇒ page 229 .
– Install air conditioner compressor ⇒ Rep. Gr. 87 .
– Install continued coolant circulation pump -V51- ⇒ page 270 .

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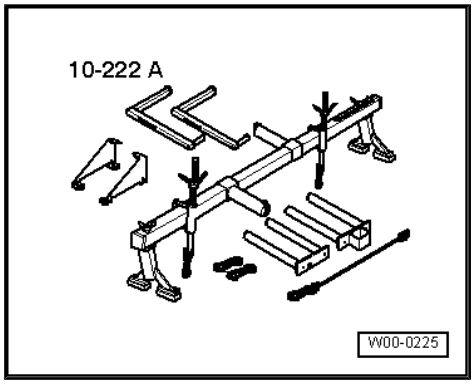
5.3 Removing and installing engine mounting (right-side)

Note

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

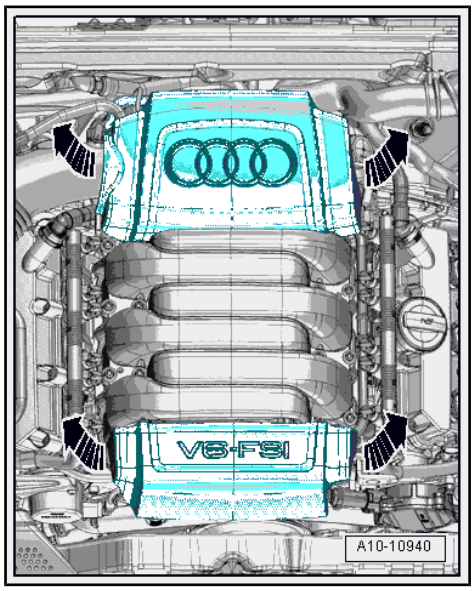
Special tools and workshop equipment required

♦ Support bracket -10 - 222 A-



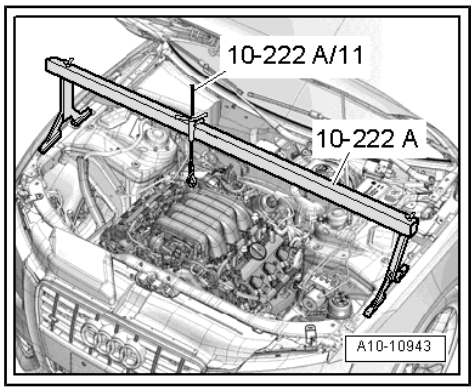
Removing

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



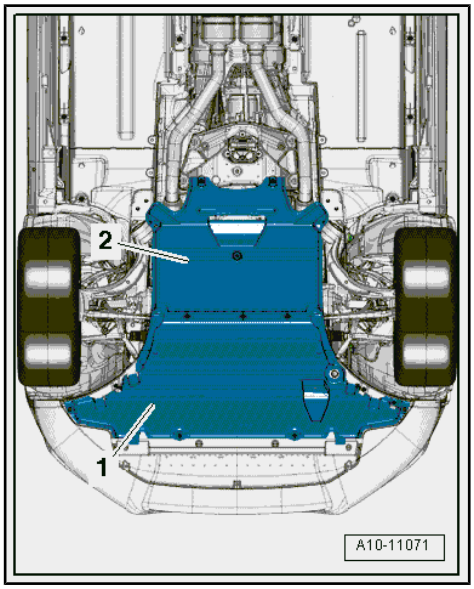
– Set up support bracket -10 - 222 A- on suspension turrets (left and right) as illustrated.

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

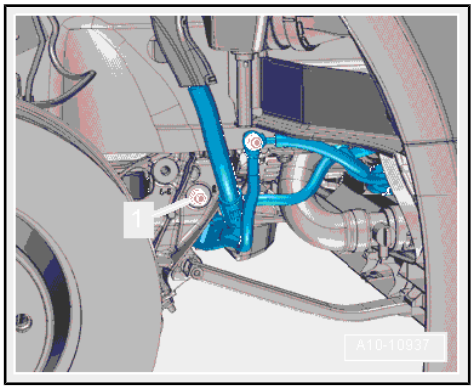


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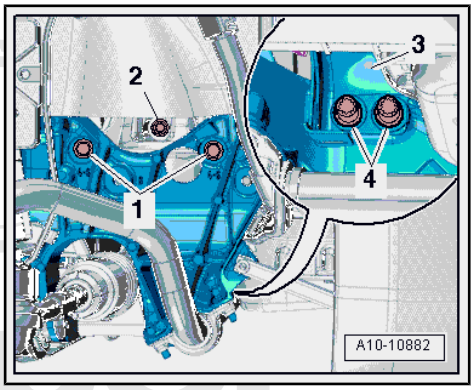
– Remove front right wheel.
– Remove front wheel housing liner (right-side) ⇒ Rep. Gr. 66 .
– Remove front noise insulation -1- ⇒ Rep. Gr. 66 .



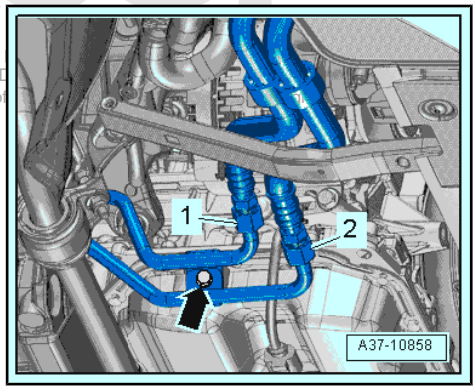
– Unscrew nut -1- and detach bracket with electrical wiring from subframe.



– 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 pipes.

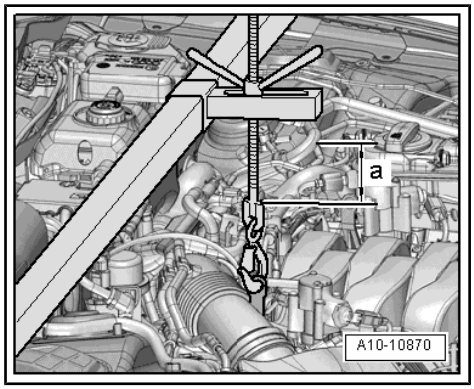


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– Using spindle -10 - 222 A /11- , raise engine through distance -a-.

• 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 wheel housing liner and noise insulation ⇒ Rep. Gr. 66 .

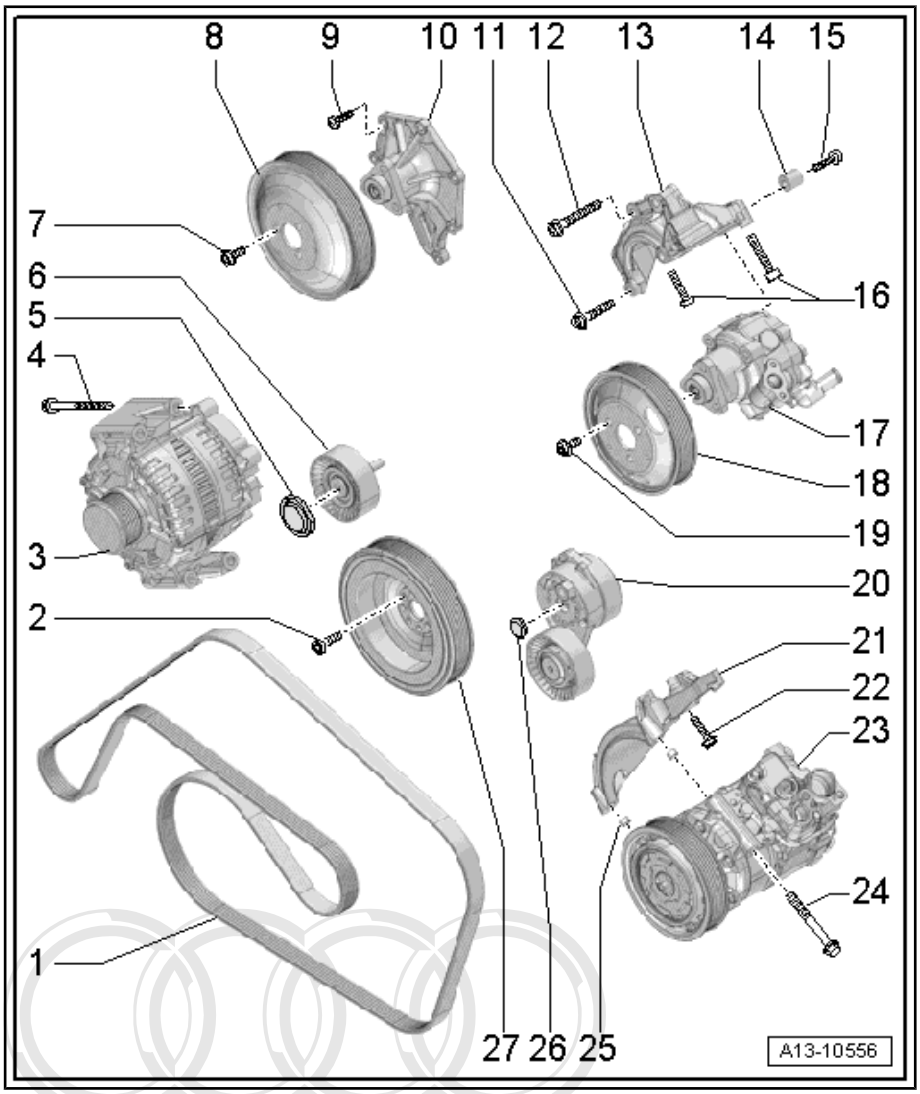
– Fit front wheel ⇒ Rep. Gr. 44 .

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13 – Crankshaft group

1 Cylinder block (pulley end)

1.1 Poly V-belt drive - exploded view



1 - Poly V-belt

- ❑ Check for wear
- ❑ Before removing, mark direction of rotation with chalk or felt-tipped 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 ⇒ Rep. Gr. 27

4 - Bolt

- ❑ Tightening torque ⇒ Rep. Gr. 27

5 - Cover for idler roller

6 - Idler roller for poly V-belt

- ❑ 40 Nm

7 - Bolt

- ❑ Tightening torque ⇒ page 257

8 - Poly V-belt pulley for coolant pump

9 - Bolt

- ❑ Tightening torque ⇒ page 257

10 - Coolant pump

- ❑ Removing and installing ⇒ page 257

11 - Bolt

- ❑ Tightening torque ⇒ Rep. Gr. 48

12 - Bolt

- ❑ Tightening torque ⇒ Rep. Gr. 48

13 - Bracket for power steering pump

14 - Sliding bush

15 - Bolt

- ❑ Tightening torque ⇒ Rep. Gr. 48

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16 - Bolt

- ❑ Tightening torque ⇒ Rep. Gr. 48

17 - Power steering pump

- ❑ Removing and installing ⇒ Rep. Gr. 48

18 - Poly V-belt pulley for power steering pump

- ❑ Removing and installing ⇒ Rep. Gr. 48

19 - Bolt

- ❑ Tightening torque ⇒ Rep. Gr. 48

20 - Poly V-belt tensioner

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- ❑ 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 ⇒ Rep. Gr. 87
- ❑ When installing check dowel sleeves -item 25-

24 - Bolt

- ❑ Tightening torque ⇒ Rep. Gr. 87

25 - Dowel sleeve

- ❑ 2x

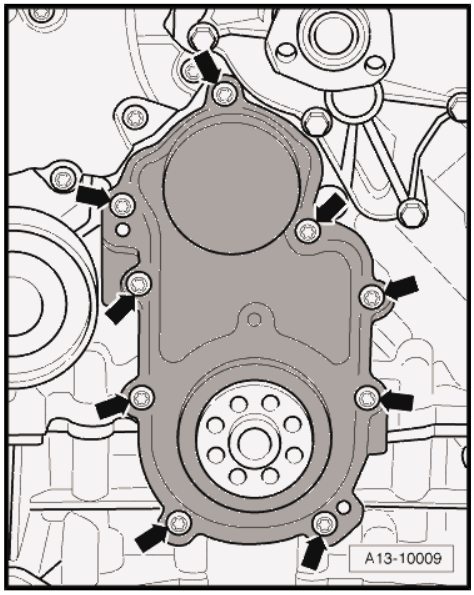
26 - Cover for tensioner

27 - Vibration damper

- ❑ With pulley for poly V-belt
- ❑ Can only be installed in one position (holes are off-set).
- ❑ Removing and installing ⇒ page 120

Sealing flange (pulley end) - tightening torque and sequence

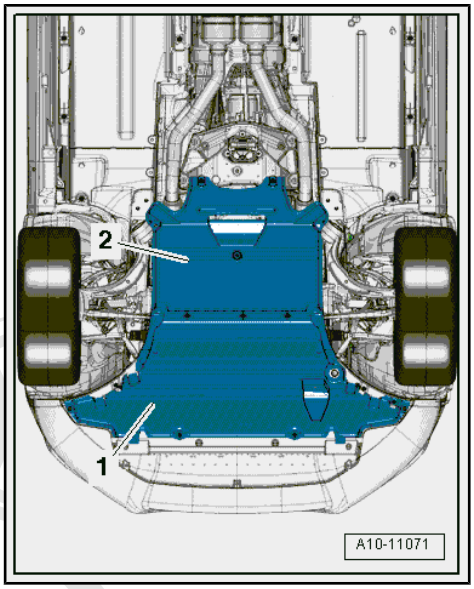
– Tighten bolts -arrows- in stages and in diagonal sequence; final torque 9 Nm.



1.2 Removing and installing poly V-belt

Removing

– Remove front noise insulation -1- ⇒ Rep. Gr. 66 .

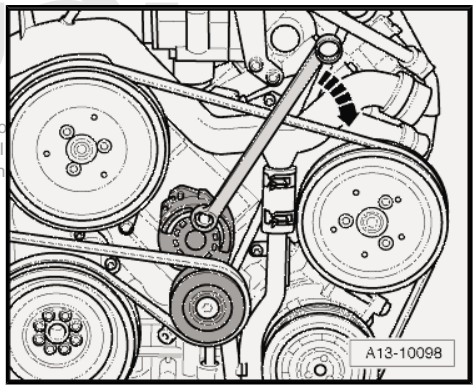


Caution

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-tipped pen for re-installation.***

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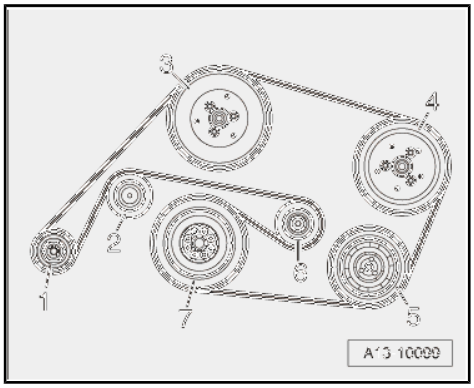


– To slacken poly V-belt turn tensioner in clockwise direction -arrow-.
– Remove poly V-belt and release tensioner.

Installing

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

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



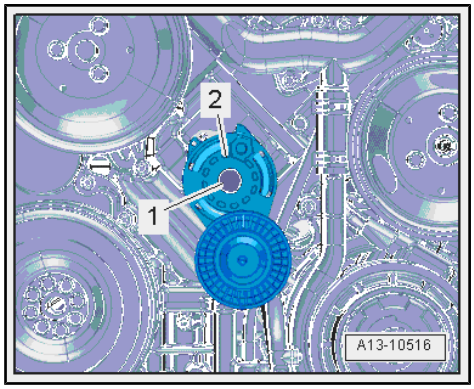
1 - Alternator
2 - Idler roller
3 - Coolant pump
4 - Power steering pump
5 - Air conditioner compressor
6 - Poly V-belt tensioner
7 - Vibration damper with poly V-belt pulley

Note

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

– Start engine and check that belt runs properly.
– Install front noise insulation ⇒ Rep. Gr. 66 .

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.

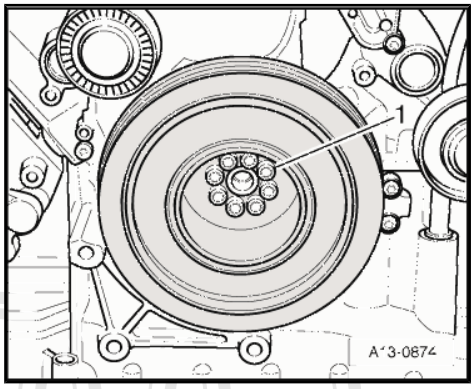
Installing

• 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 with poly V-belt pulley



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)*

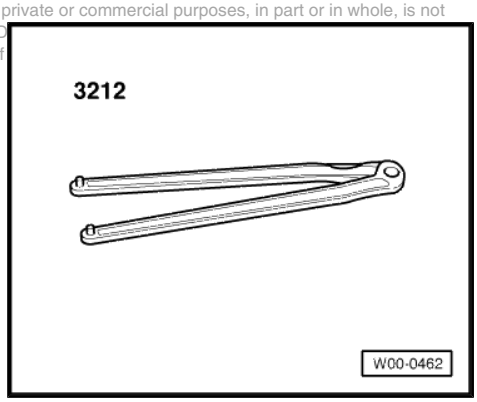
– Install poly V-belt ⇒ page 119 .

1.5 Renewing sealing flange (pulley end) with crankshaft oil seal

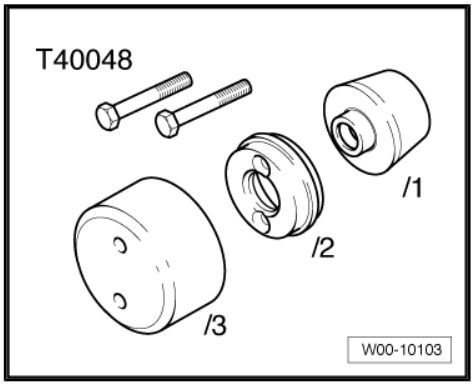
Special tools and workshop equipment required

♦ Pin wrench -3212-

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- Assembly tool -T40048-

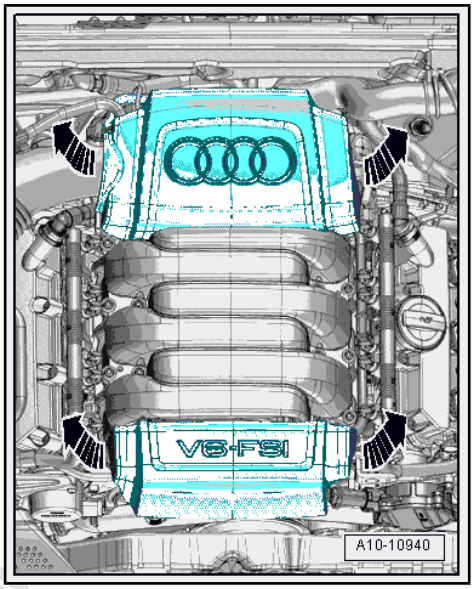


- Electric drill with plastic brush attachment
- Safety goggles
- Sealant ⇒ Electronic parts catalogue

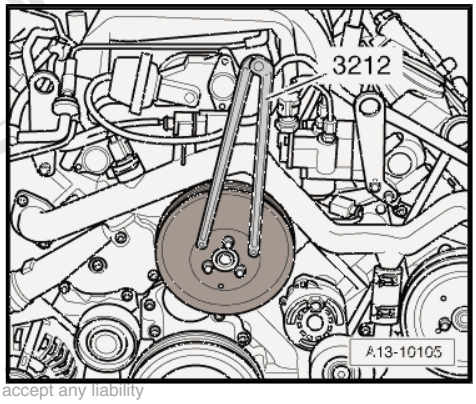
Procedure

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

– Remove vibration damper with poly V-belt pulley ⇒ page 120 .

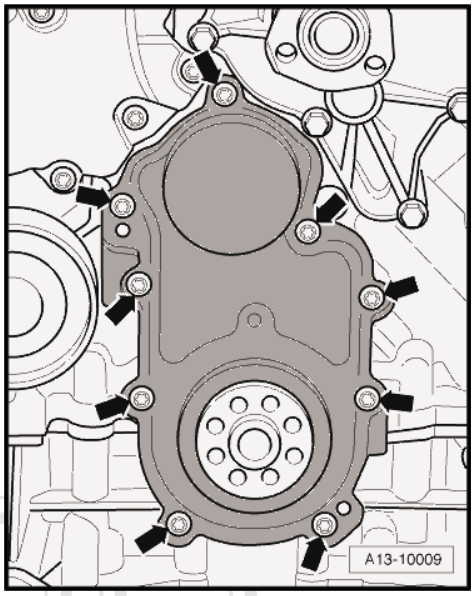


– Remove bolts for coolant pump pulley (counterhold with pin wrench -3212-).



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



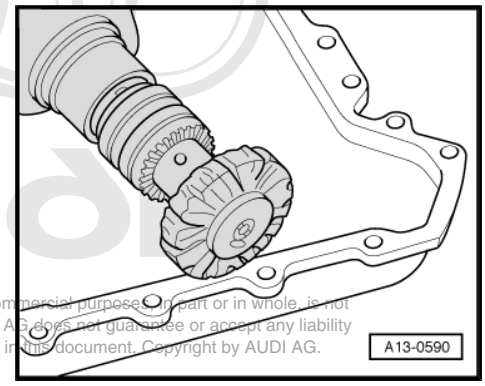
Note

Renew sealing flange (pulley end).

Caution

Protect lubrication system against contamination.

- ***Cover exposed parts of the engine.***



WARNING

Protect eyes against injuries.

- ***Wear safety goggles.***

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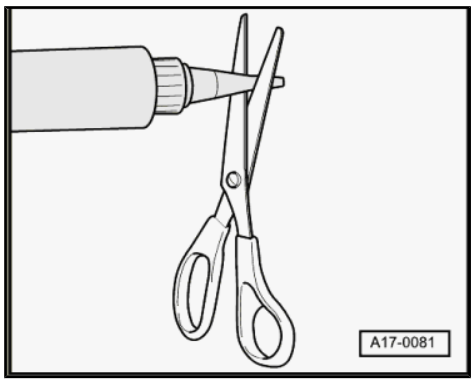
– Remove sealant residue from cylinder block and sump (top section) using rotating plastic brush or similar.

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

Note

Note the use-by date of the sealant.

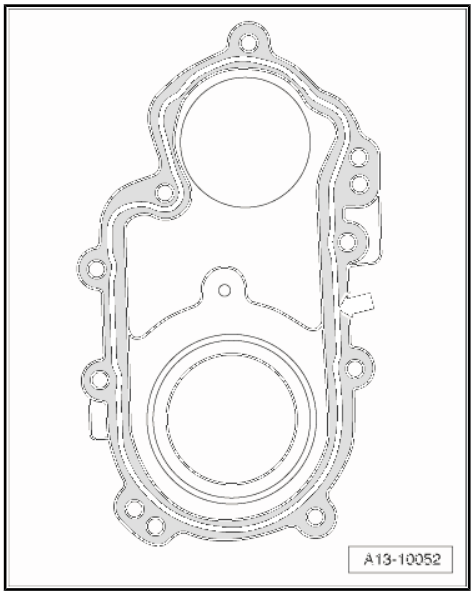
– Cut off nozzle of tube at front marking (nozzle ∅ approx. 1.5 mm).



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.

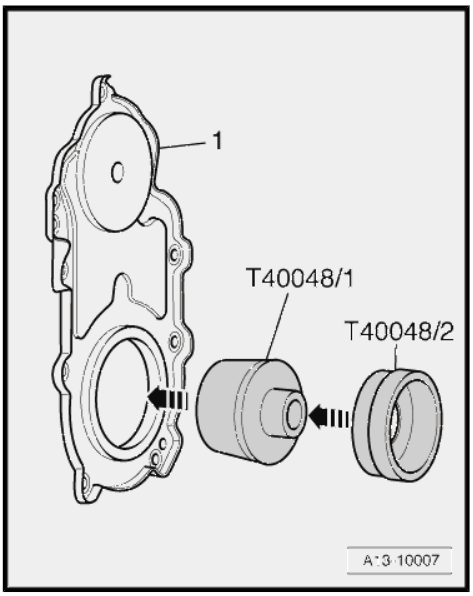
- The groove on the sealing surface must be completely filled with sealant.
- The bead of sealant must project 1.5 … 2.0 mm above the sealing surface.

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.



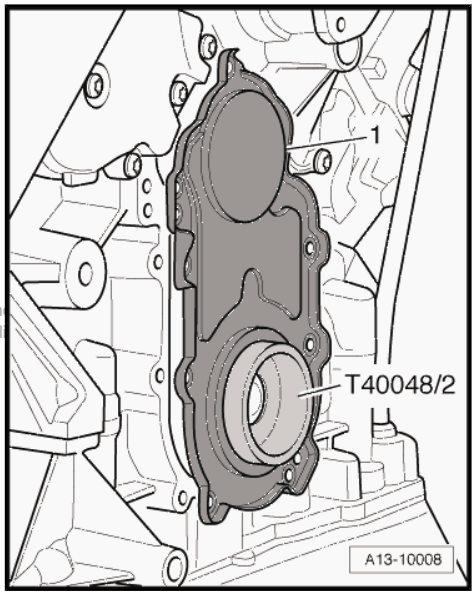
– First position sealing flange (with assembly sleeve -T40048/2- inserted) on crankshaft.

– Keep sealing flange straight while pushing it onto engine sealing surface. Then bolt on ⇒ page 118 .

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

– Install poly V-belt pulley for coolant pump ⇒ page 257 .

– Install vibration damper with poly V-belt pulley ⇒ page 120 .



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2 Cylinder block (gearbox end)

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 106 .

2.1 Drive plate - exploded view

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 124

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

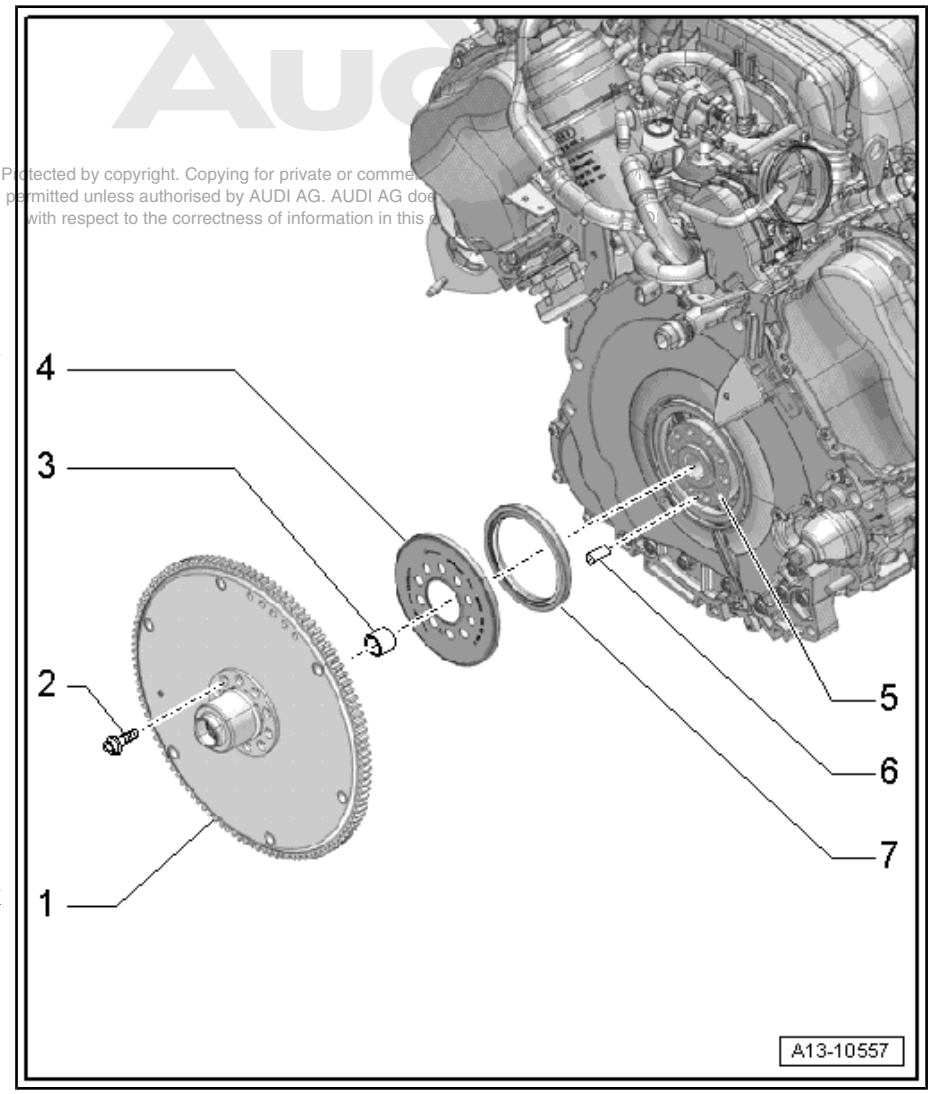
3 - Needle bearing
- ❑ Only for vehicles with manual gearbox/multi-tronic gearbox 0AW
- ❑ Installation position: closed side towards engine
- ❑ Removing and installing ⇒ page 125

4 - Sender wheel
- ❑ For engine speed sender -G28-

5 - Crankshaft

6 - Dowel pin

7 - Crankshaft oil seal (gearbox end)
- ❑ Renewing ⇒ page 127

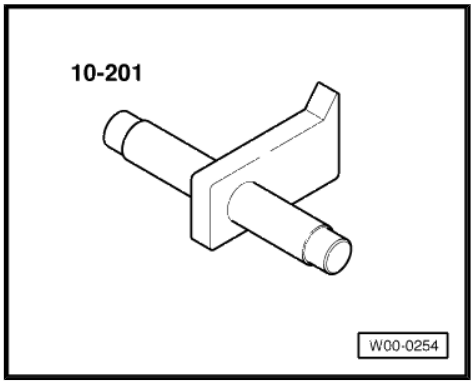


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2.2 Removing and installing drive plate

Special tools and workshop equipment required

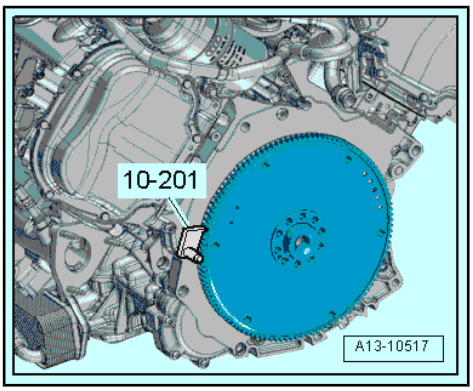
♦ Counterhold tool -10 - 201-



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.***

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– Remove bolts and take off drive plate and sender wheel.

Installing

• Tightening torque ⇒ page 124 .

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 125 .

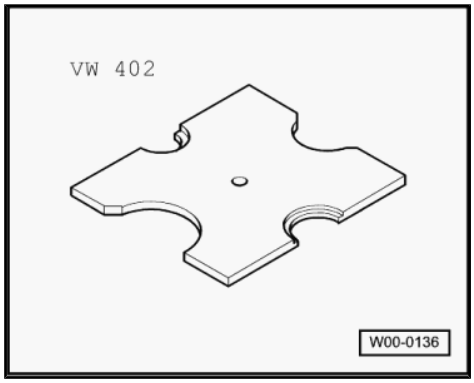
– Pay attention to dowel pin when installing drive plate.

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

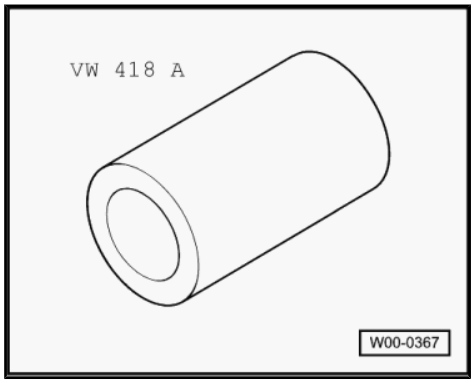
2.3 Pressing out and pressing in drive plate needle bearing

Special tools and workshop equipment required

- Thrust plate -VW 402-

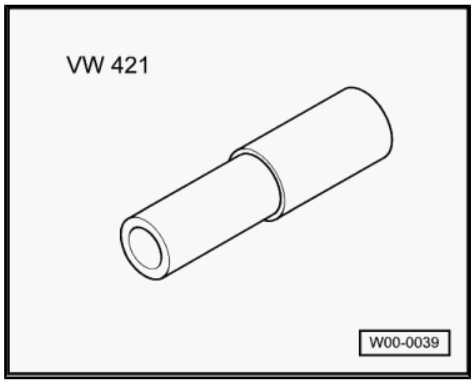


- Tube -VW 418 A-

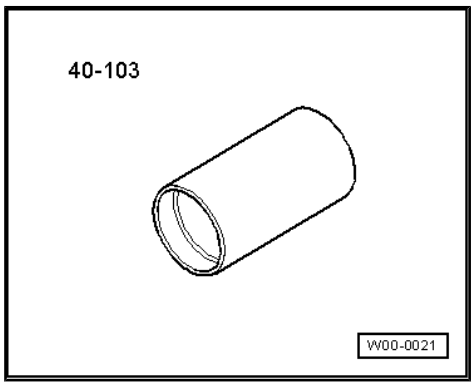


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- Tube -VW 421-

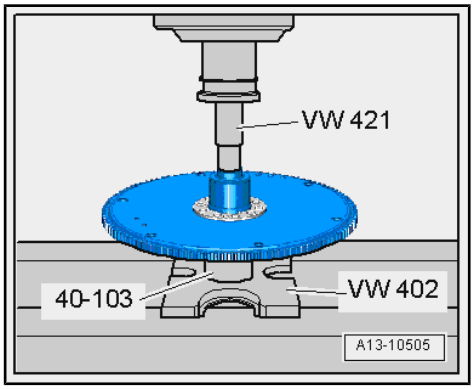


- Support -40 - 103-

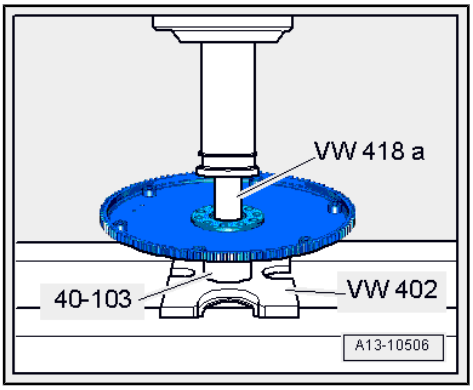


Procedure

- Gearbox removed.
- – Remove drive plate ⇒ page 124 .
- – 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 ∅ 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 124 .

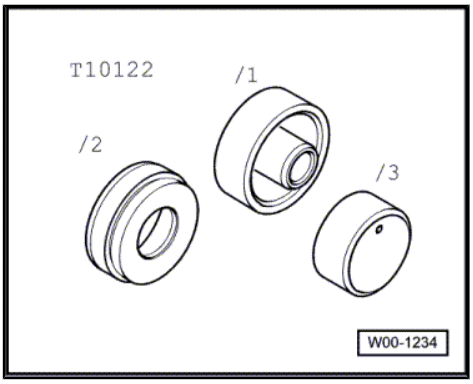


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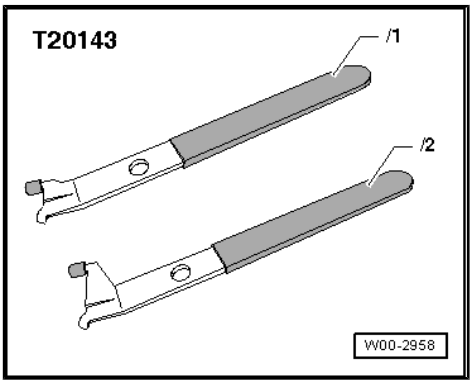
2.4 Renewing crankshaft oil seal (gearbox end)

Special tools and workshop equipment required

- ♦ Fitting tool -T10122-



- ♦ Extractor tool -T20143/2-



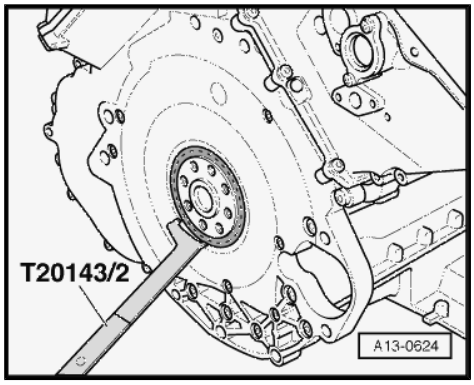
Procedure

- Gearbox removed.

– Remove drive plate ⇒ page 124 .

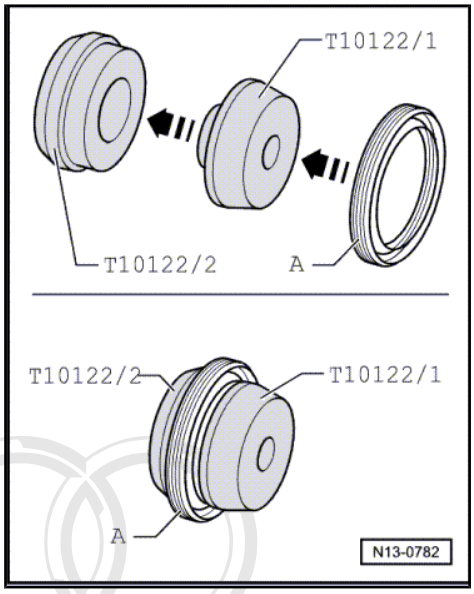
– Pry out oil seal using extractor tool -T20143/2- .

– Clean contact surface and sealing surface.

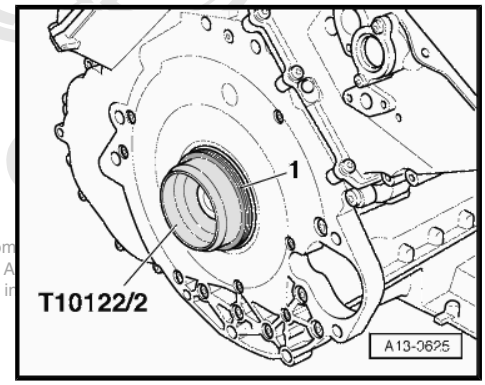


– Fit assembly aid -T10122/1- onto assembly sleeve -T10122/2- and slide oil seal -A- onto assembly sleeve.

– Detach assembly aid.

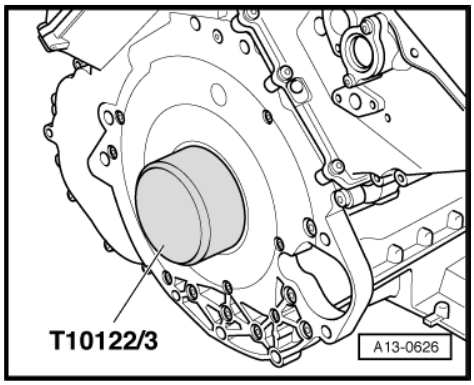


– Fit assembly sleeve -T10122/2- with oil seal -1- onto crankshaft.



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

– Install drive plate ⇒ page 124 .



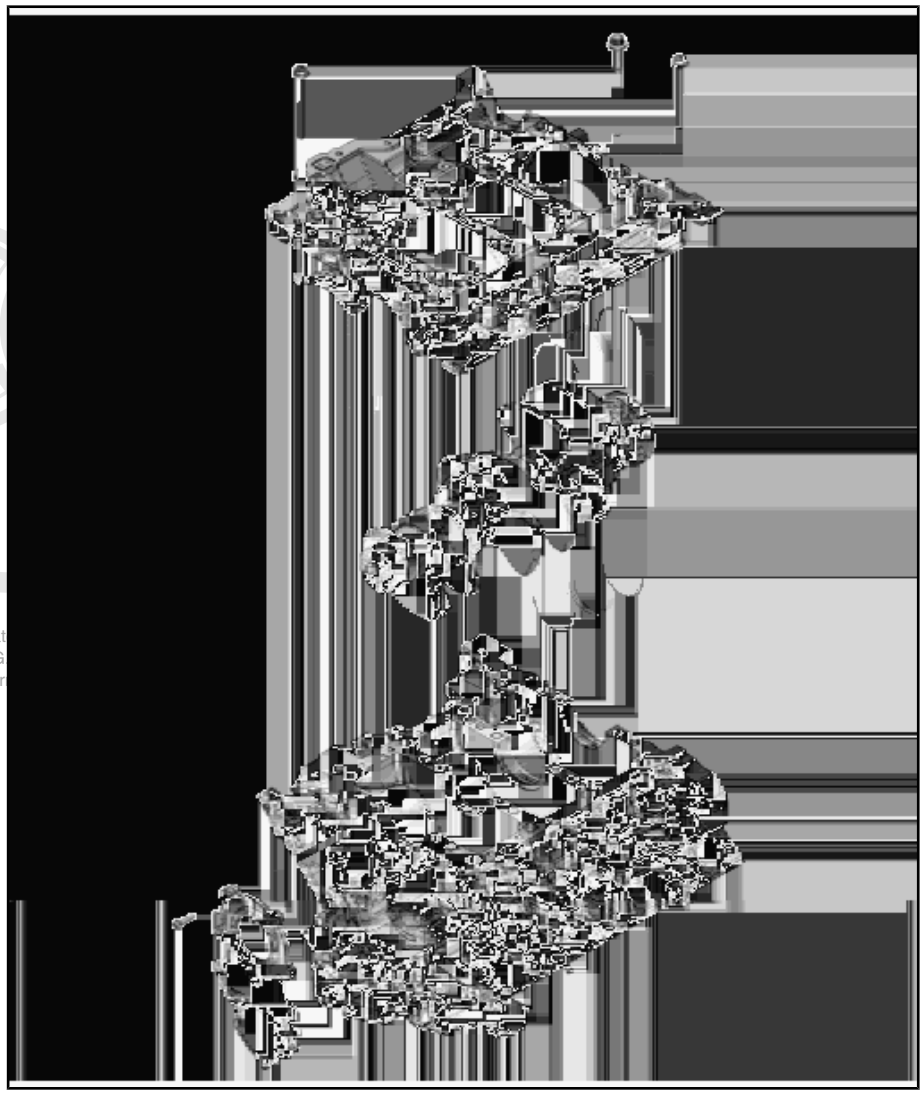
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3 Crankshaft

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 106 .

3.1 Crankshaft - exploded view



1 - Sealing flange (pulley end)
- ❑ Removing and installing ⇒ page 120

2 - Bolt
- ❑ Tightening torque ⇒ page 118

3 - Crankshaft
- ❑ Measuring axial clearance ⇒ page 132
- ❑ Measuring radial clearance ⇒ page 133
- ❑ Crankshaft dimensions ⇒ page 132

4 - Dowel sleeve
- ❑ 4 x
- ❑ Inserting in retaining frame ⇒ page 131

5 - Seal
- ❑ Renew

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6 - Bolt
- ❑ For sealing surfaces: retaining frame to cylinder block
- ❑ Differing bolt lengths and bolt heads
- ❑ Tightening sequence ⇒ page 131

7 - Bolt (long, large collar)
- ❑ For retaining frame (inner row)
- ❑ Tightening sequence ⇒ page 131

8 - Bolt (short, small collar)
- ❑ For retaining frame (outer row)
- ❑ Tightening sequence ⇒ page 131

9 - Retaining frame
- ❑ With valve for oil pressure control -N428- ⇒ page 130
- ❑ To remove, detach guide rail ⇒ Item 1 (page 162) for drive chain for valve gear
- ❑ Applying sealant ⇒ page 131
- ❑ Removing and installing valve for oil pressure control -N428- ⇒ page 242

10 - Seal

- ❑ Renew

11 - Thrust washer

- ❑ Only fitted on 3rd crankshaft bearing
- ❑ Installation position: oil grooves face 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 132

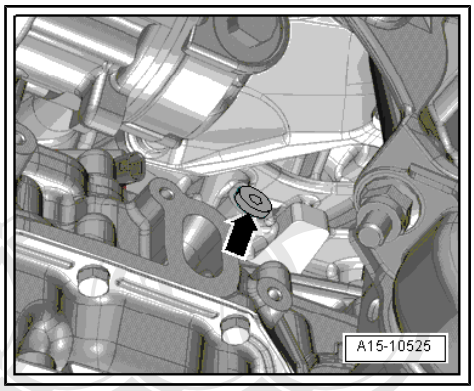
13 - Not fitted

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 131

15 - Cylinder block

Plug for “TDC” marking - tightening torque

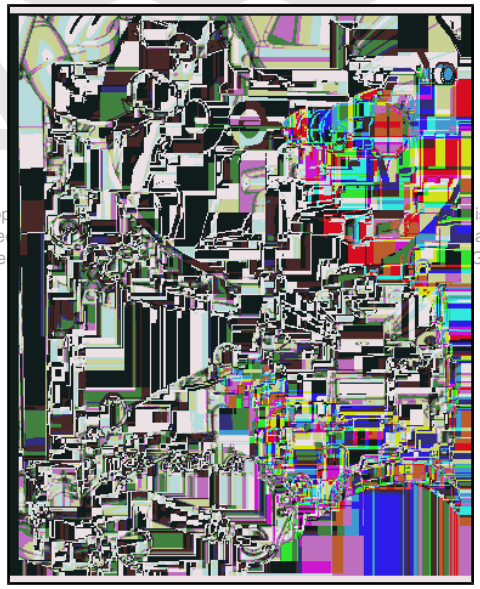


Note

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-

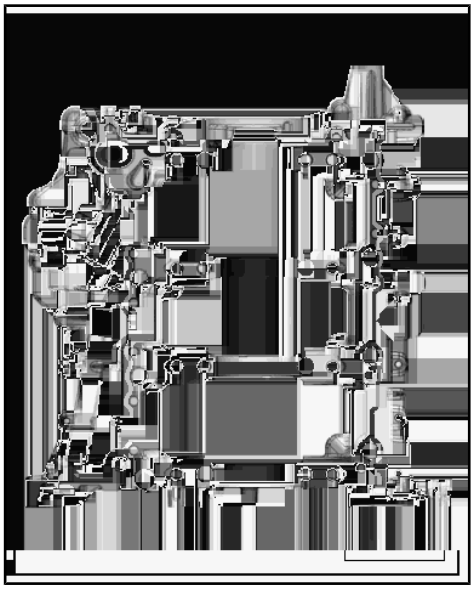
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Applying sealant to retaining frame, position of dowel sleeves

– 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.



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– Fit seals -1- and -2-.

– Check that dowel sleeves -3 .. 6- are inserted in retaining frame at positions shown in illustration.

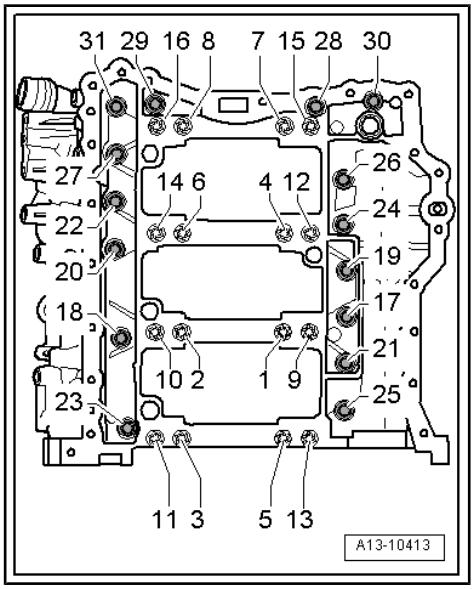
Installing retaining frame

– 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.

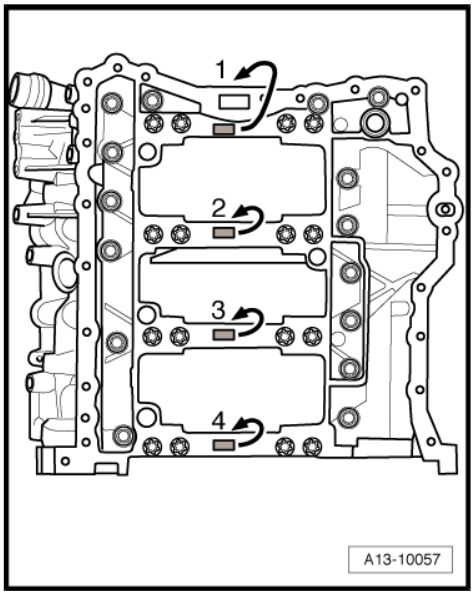


Matching crankshaft bearing shells to bearings in cylinder block

♦ 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.

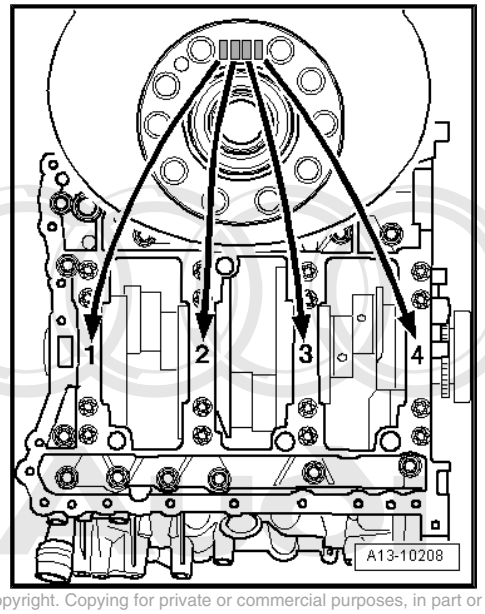
Code letter on retaining frame	Colour coding of bearing
R =	Red
G =	Yellow
B =	Blue
S =	Black



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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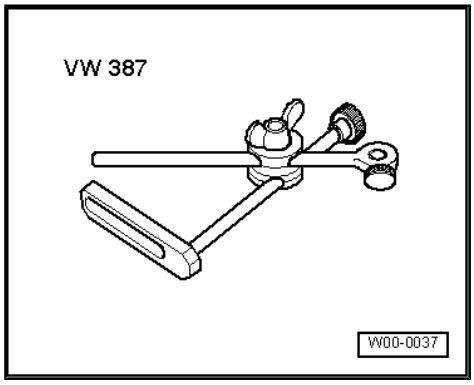
3.2 Crankshaft dimensions

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

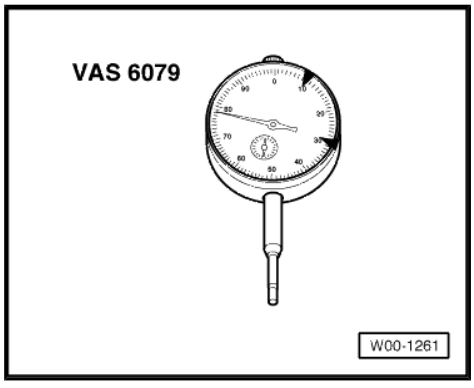
3.3 Measuring axial clearance of crankshaft

Special tools and workshop equipment required

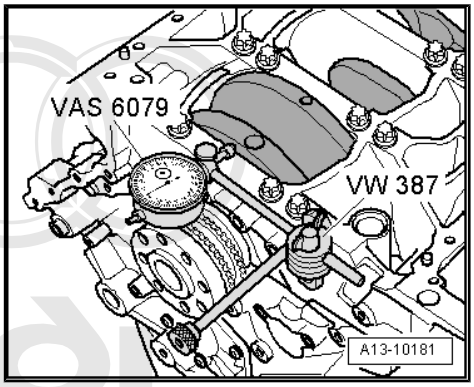
- Universal dial gauge bracket -VW 387-



- Dial gauge -VAS 6079-



Procedure



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

– Set dial gauge against crank web.

– Press crankshaft against dial gauge by hand and set gauge to “0”.

– Push crankshaft away from dial gauge and read off value.

• Axial clearance: 0.15 ... 0.25 mm

3.4 Measuring radial clearance of crankshaft

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Special tools and workshop equipment required

♦ Plastigage

Procedure

Note

♦ *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 tighten to 30 Nm. Do not rotate crankshaft.

– Remove retaining frame again.

– Compare width of Plastigage with measurement scale.

Radial clearance:

• New: 0.015 ... 0.055 mm.

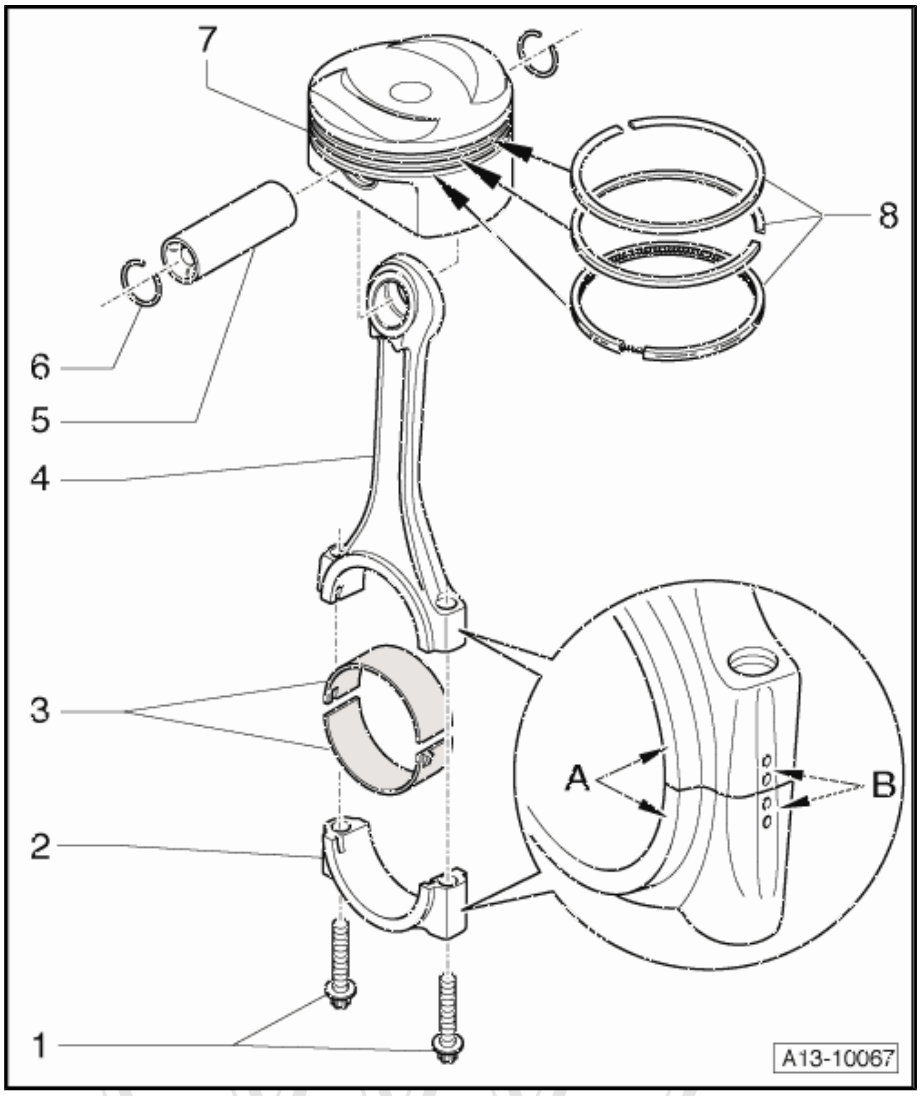
• Wear limit: 0.080 mm.

4 Pistons and conrods

Note

Oil spray jet for piston cooling ⇒ page 137 .

4.1 Pistons and conrods - exploded view



1 - Bolts

- ❑ Renew
- ❑ Lubricate threads and contact surface
- ❑ 30 Nm + turn 90° further

2 - Conrod bearing cap

- ❑ Mark installation position for re-installation
- ❑ Mark cylinder allocation in colour -B- ⇒ page 136
- ❑ 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 136

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 136
- ❑ 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 136
- ❑ Measuring radial clearance ⇒ page 137

5 - Piston pin

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

6 - Circlip

- ❑ Renew

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7 - Piston

- ❑ Mark installation position and cylinder number ⇒ page 136
- ❑ Arrow on piston crown points to pulley end
- ❑ Checking ⇒ page 135
- ❑ Renew piston if cracking is visible on piston crown or piston skirt
- ❑ Install using piston ring clamp
- ❑ Piston and cylinder dimensions ⇒ page 137
- ❑ Measuring cylinder bore ⇒ page 136

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 135
- ❑ Measuring ring-to-groove clearance ⇒ page 135

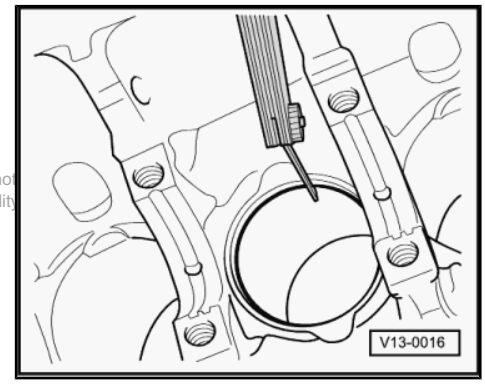
Measuring piston ring gap

– 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.

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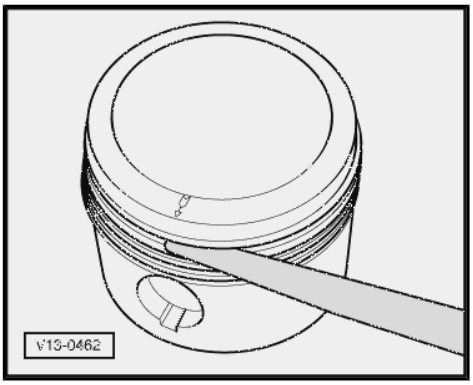
Piston ring	new mm	Wear limit mm
1st compression ring	0.35 … 0.50	0.8
2nd compression ring	0.60 … 0.80	1.0
Oil scraper ring	0.25 … 0.50	0.8



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

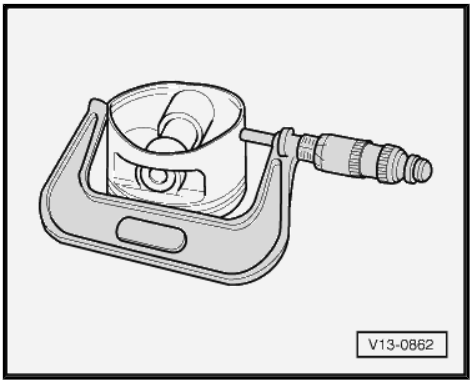


Checking piston

– 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
⇒ “4.2 Piston and cylinder dimensions”, page 137 .

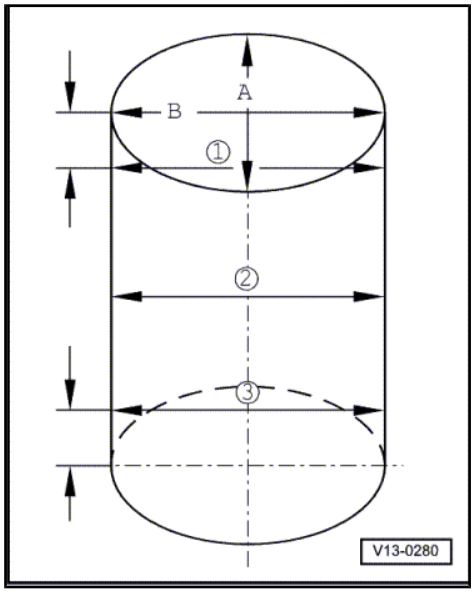


Measuring cylinder bore

– 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
⇒ “4.2 Piston and cylinder dimensions”, page 137 .

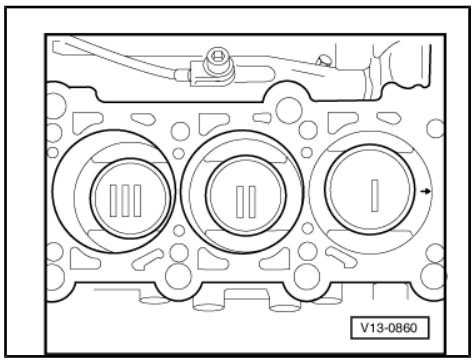


Installation position of pistons

Caution

Do not damage the coating of the piston crown.

- *Use a coloured pen to mark piston/cylinder allocation on piston crown for re-installation. Do not mark piston crown by means of centre punch, notch or the like.*



Installation position:

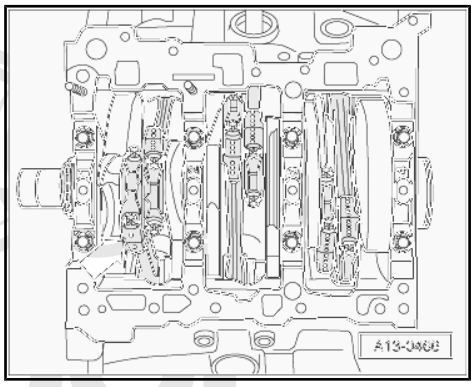
• Arrows on piston crowns point to pulley end.

Marking conrods

Note

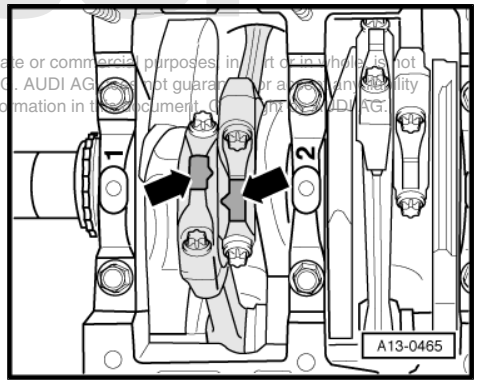
Only renew conrods as a complete set.

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



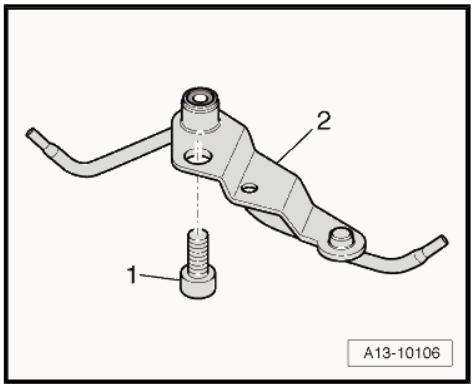
Installation position of conrods

• 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.



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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.*

4.2 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.		

4.3 Measuring radial clearance of conrods

Special tools and workshop equipment required

- Plastigage

Procedure

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– 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 to 30 Nm. Do not rotate crankshaft.

– Remove conrod bearing cap again.

– Compare width of Plastigage with measurement scale.

Radial clearance:

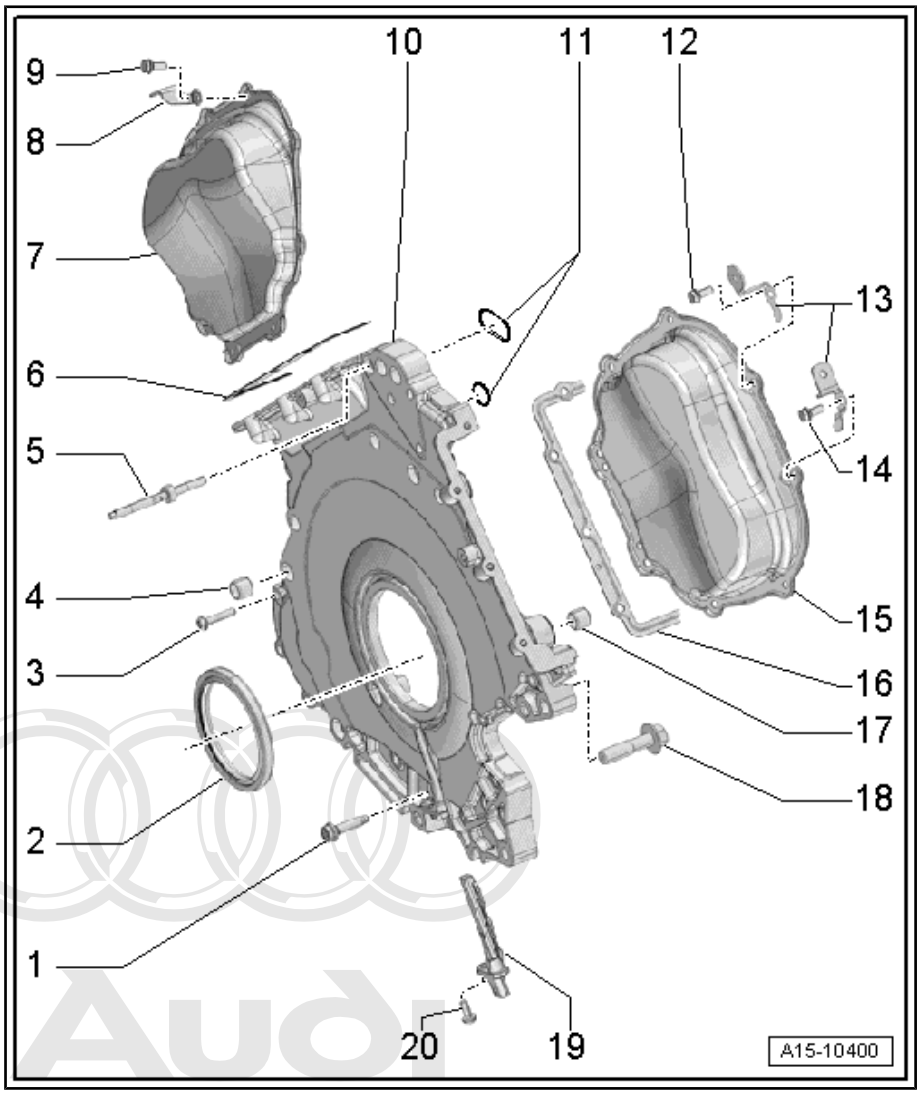
- New: 0.010 ... 0.052 mm.
- Wear limit: 0.120 mm.

– Renew conrod bolts.

15 – Cylinder head, valve gear

1 Chain drive

1.1 Timing chain covers - exploded view



1 - Bolt
- ❑ Tightening torque and sequence ⇒ page 139

2 - Crankshaft oil seal (gearbox end)
- ❑ Renewing ⇒ page 127

3 - Bolt
- ❑ Tightening torque and sequence ⇒ page 139

4 - Dowel sleeve
- ❑ 2x

5 - Bolt
- ❑ Tightening torque ⇒ Item 13 (page 237)

6 - Cylinder head gasket (left-side)

7 - Timing chain cover (left-side)
- ❑ Removing and installing ⇒ page 140

8 - Bracket
- ❑ For wiring harness

9 - Bolt
- ❑ Renew
- ❑ Tightening torque and sequence ⇒ page 139

10 - Timing chain cover (bottom)
- ❑ Removing and installing ⇒ page 143

11 - Seals
- ❑ Renew

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12 - Bolt
- ❑ Tightening torque and sequence ⇒ page 139

13 - Bracket
- ❑ For electrical connectors

14 - Bolt
- ❑ Renew
- ❑ Tightening torque and sequence ⇒ page 139

15 - Timing chain cover (right-side)
- ❑ Removing and installing ⇒ page 140

16 - Cylinder head gasket (right-side)

17 - Dowel sleeve

- ❑ 2x

18 - Bolt

- ❑ Tightening torque and sequence ⇒ page 139

19 - Engine speed sender -G28-

- ❑ Removing and installing ⇒ Rep. Gr. 28

20 - Bolt

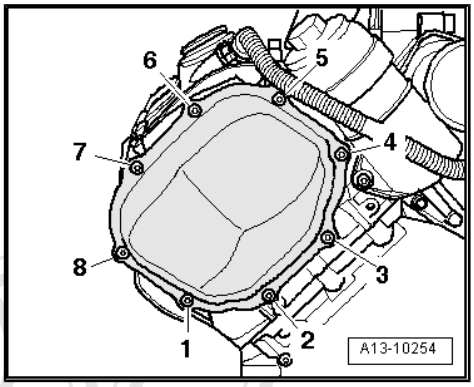
- ❑ Tightening torque ⇒ Rep. Gr. 28

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



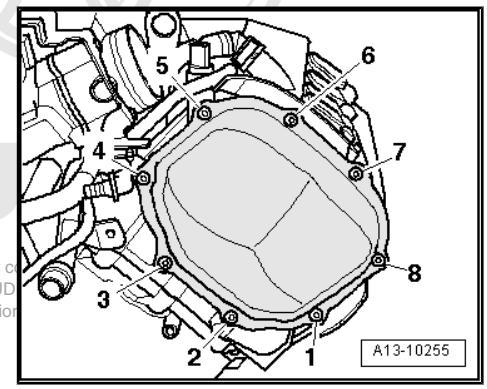
Timing chain cover (right-side) - tightening torque and tightening sequence

– 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.

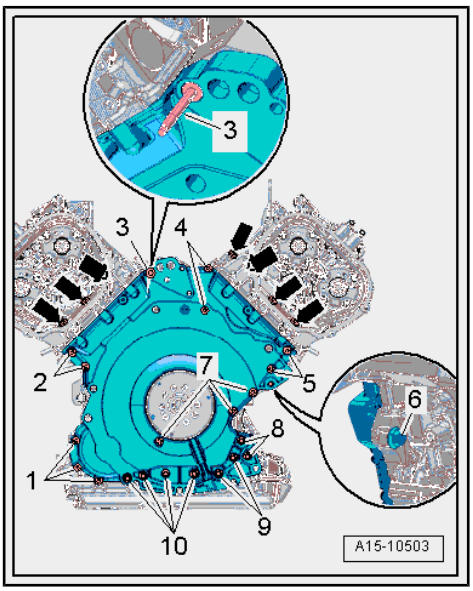
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Timing chain cover (bottom) - tightening torque and tightening sequence

– Tighten bolts in 6 stages as follows:

1. Fit bolts -arrows- and initially tighten to 5 Nm.
2. Tighten bolts -1 ... 10- in diagonal sequence to 9 Nm.
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.

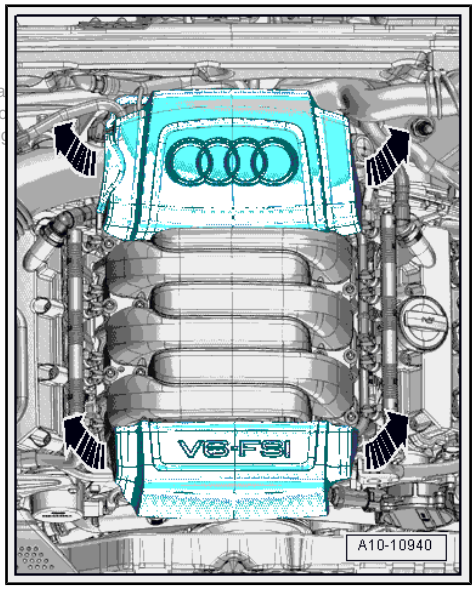


1.2 Removing and installing timing chain covers (left and right)

Special tools and workshop equipment required

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

Removing



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Fit all cable ties in the original positions when installing.

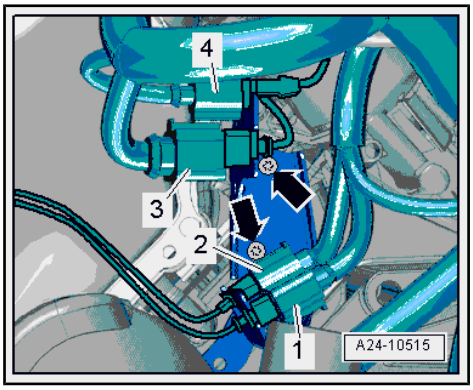
– Pull off rear engine cover panel -top arrows-.

– Vehicles without secondary air system: remove plenum chamber partition panel ⇒ Rep. Gr. 50 .

– Vehicles with secondary air system: remove corresponding combination valve for secondary air system:

- Country-specific version 1: left-side ⇒ page 316 ; right-side ⇒ page 317 .
- Country-specific version 2: left-side ⇒ page 324 ; right-side ⇒ page 325 .

Timing chain cover (left-side):

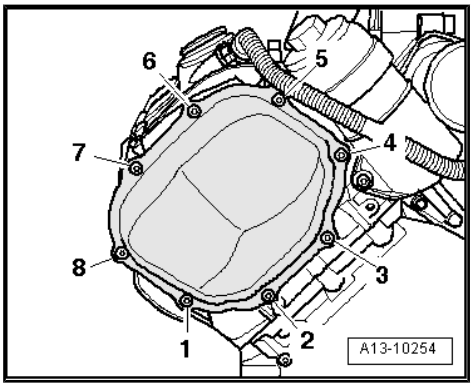


– Detach electrical connectors -1 … 4- from bracket and move clear to side.

Note

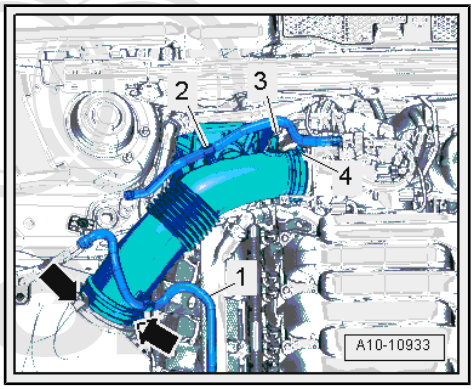
Disregard -arrows-.

– Move electrical wiring clear.



– Unscrew bolts -1 ... 8- and remove timing chain cover (left-side).

Timing chain cover (right-side):



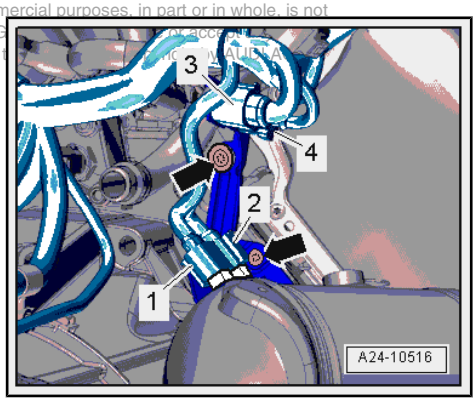
– Move fuel line -1- and line -2- (leading to activated charcoal filter) clear at air pipe.

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

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

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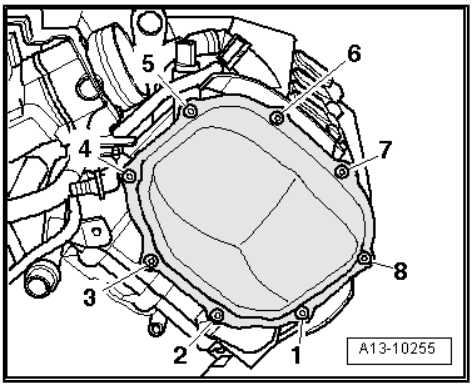
– Detach electrical connectors -1 ... 4- from bracket and move clear to side.



Note

Disregard -arrows-.

– Unscrew bolts -1 ... 8- and remove timing chain cover (right-side).



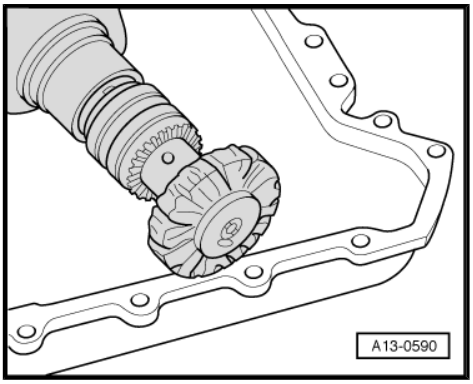
Installing

• Tightening torques ⇒ page 139 , ⇒ page 139 .

Caution

Protect lubrication system against contamination.

- ***Cover exposed parts of the engine.***



WARNING

Protect eyes against injuries.

- ***Wear safety goggles.***

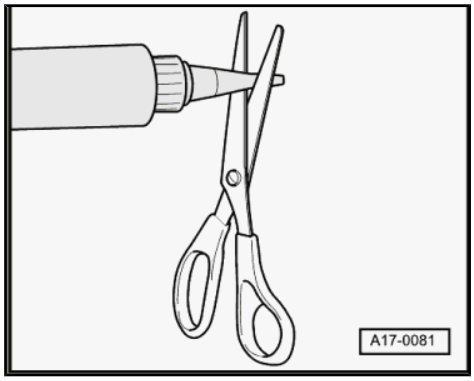
– Remove remaining sealant on timing chain covers, cylinder block and cylinder head using rotating plastic brush or similar.

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

Note

Note the use-by date of the sealant.

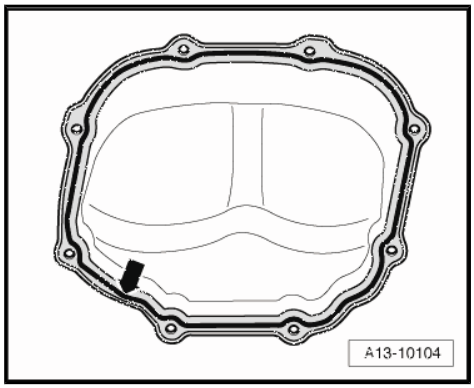
– Cut off nozzle of tube at front marking (nozzle ∅ approx. 2 mm).



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.

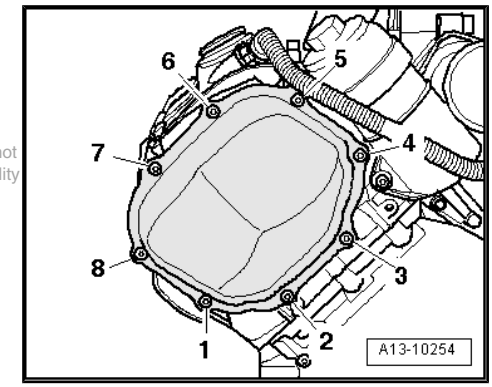
• Width of sealant bead: 2.5 mm.

Note

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

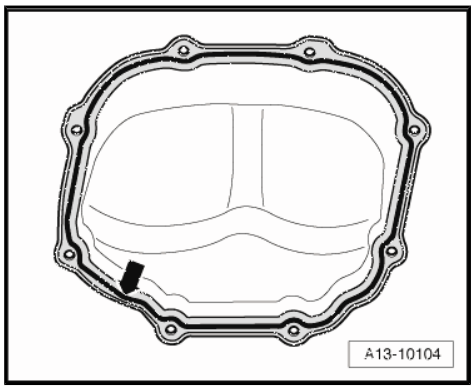
– Install timing chain cover (left-side) and tighten bolts ⇒ page 139 .

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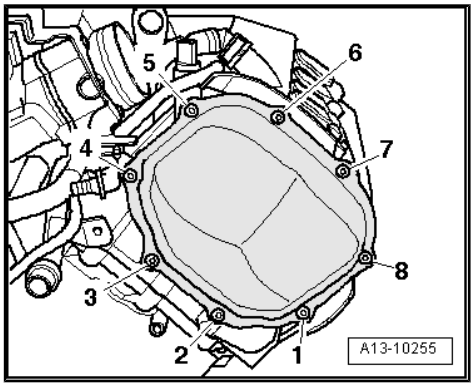
– Apply sealant bead -arrow- onto the clean sealing surface of the timing chain cover (right-side) as illustrated.

• Width of sealant bead: 2.5 mm.



– Install timing chain cover (right-side) and tighten bolts ⇒ page 139 .

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 .

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– Vehicles without secondary air system: install plenum chamber partition panel ⇒ Rep. Gr. 50 .

– Vehicles with secondary air system: install corresponding combination valve for secondary air system:

- Country-specific version 1: left-side ⇒ page 316 ; right-side ⇒ page 317 .
- Country-specific version 2: left-side ⇒ page 324 ; right-side ⇒ page 325 .

1.3 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.

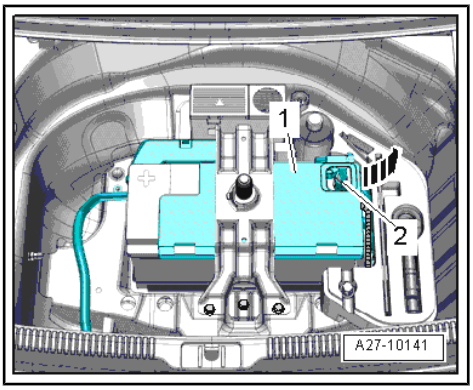
Note

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 ⇒ Rep. Gr. 27 .

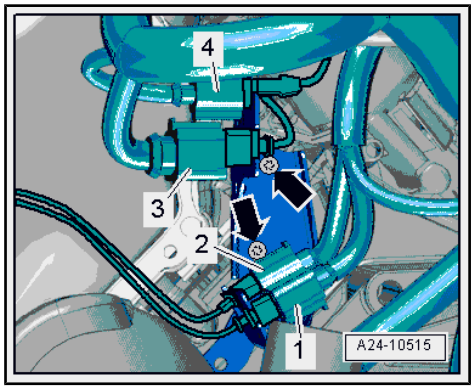
– Remove drive plate ⇒ page 124 .

– Remove timing chain covers (left and right) ⇒ page 140 .

– Remove oil filter housing ⇒ page 238 .

– Remove alternator ⇒ Rep. Gr. 27 .

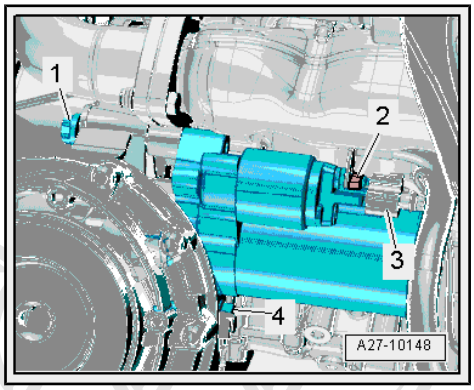
– Remove bolts -arrows- (left and right) and detach bracket for electrical connectors.



Note

Disregard items marked -1 ... 4-.

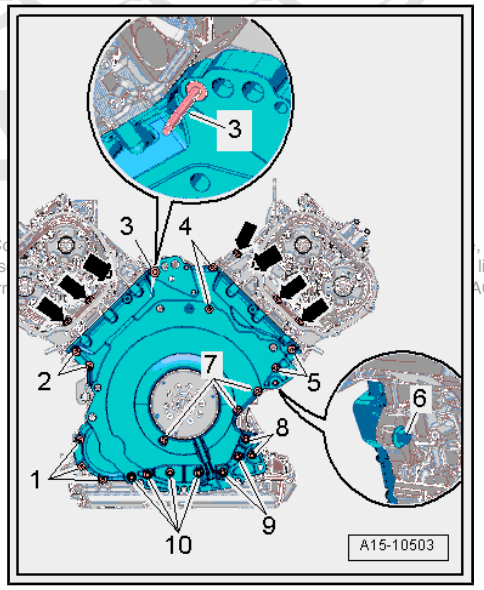
– Unplug electrical connector -3- at starter (push retainer to the rear and press down release catch).
– Remove nut -2- for electrical wiring and detach starter.



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).



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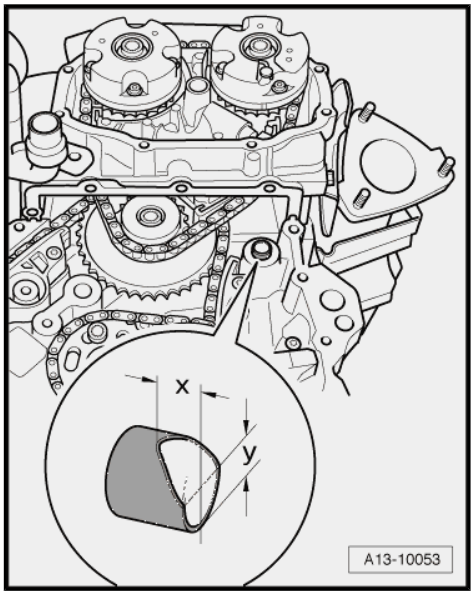
Installing

- Tightening torques ⇒ page 139

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.



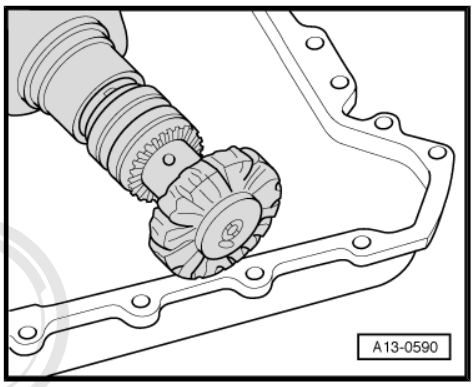
Note

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

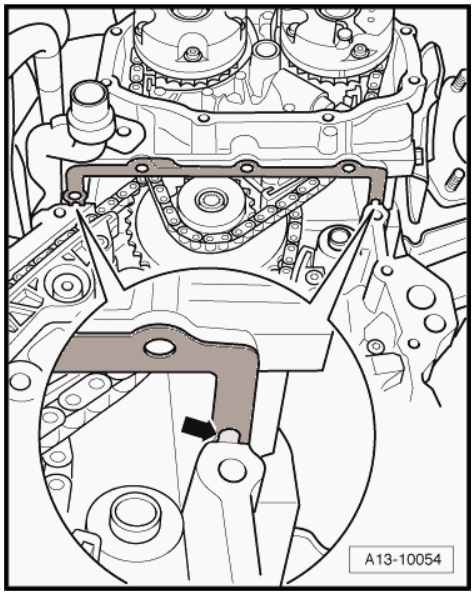
Protect eyes against injuries.

- ***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.



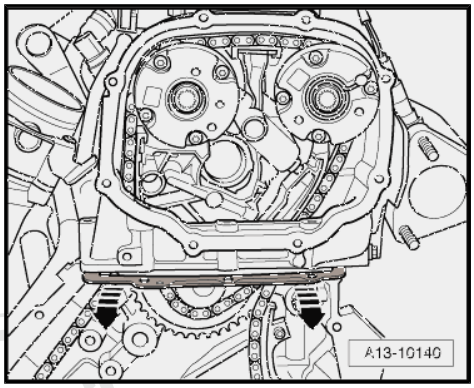
Note

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.

– 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.

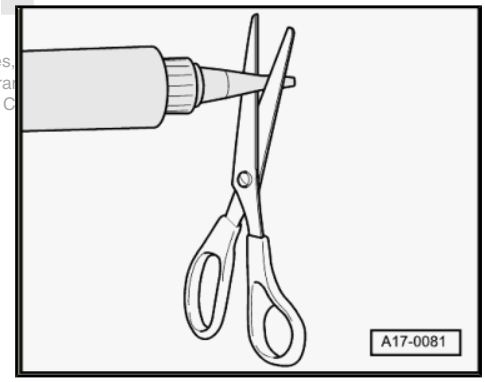
– Clean cylinder head gaskets (top and bottom); they must be free of oil and grease.

Note

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Note the use-by date of the sealant.

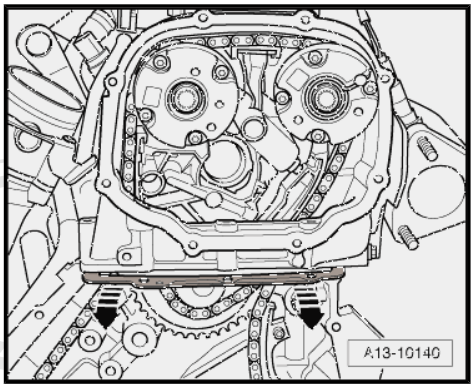
– Cut off nozzle of tube at front marking (nozzle ∅ approx. 2 mm).



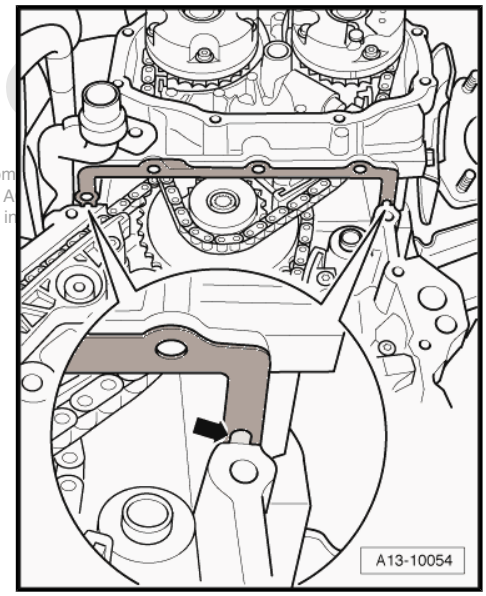
Note

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.

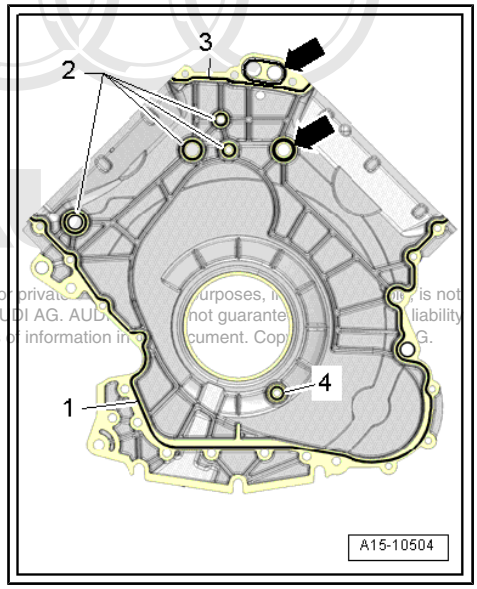


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Caution

Make sure lubrication system is not clogged by excess sealant.

- ***The bead of sealant must not be thicker than specified.***



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– 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

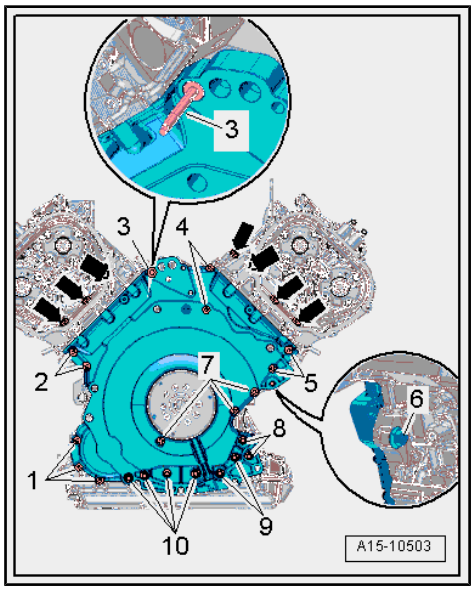
The sealant hardens within approx. 5 minutes after being applied.

– 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 139 .



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

– Install starter ⇒ Rep. Gr. 27

– Install alternator ⇒ Rep. Gr. 27 .

– Install oil filter housing ⇒ page 238 .

– Install timing chain covers (left and right) ⇒ page 141 .

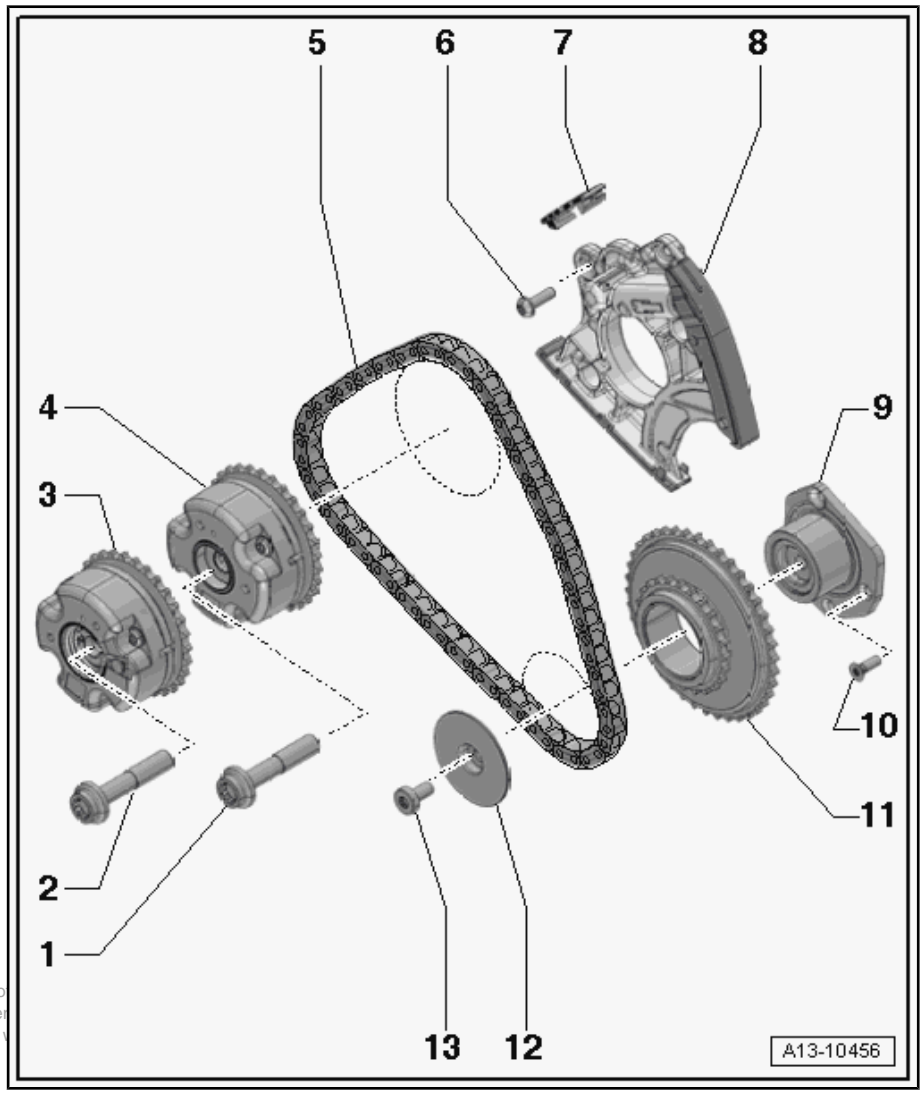
– Install crankshaft oil seal (gearbox end) ⇒ page 127 .

– Install drive plate ⇒ page 124 .

– Fill up with engine oil and check engine oil level ⇒ page 247 .

1.4 Camshaft timing chains - exploded view

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 ⇒ “1.5 Removing timing chains from camshafts”, page 151

4 - Camshaft adjuster for inlet camshaft
- ❑ Identification “Intake”
- ❑ Removing and installing ⇒ “1.5 Removing timing chains from camshafts”, page 151

5 - Camshaft timing chain (left-side)
- ❑ Before removing, mark running direction with paint
- ❑ Removing and installing ⇒ page 151

6 - Bolt
- ❑ 9 Nm

7 - Slide

8 - Chain tensioner for camshaft timing chain (left-side)
- ❑ Removing and installing ⇒ “1.5 Removing timing chains from camshafts”, page 151

9 - Bearing bracket for drive sprocket

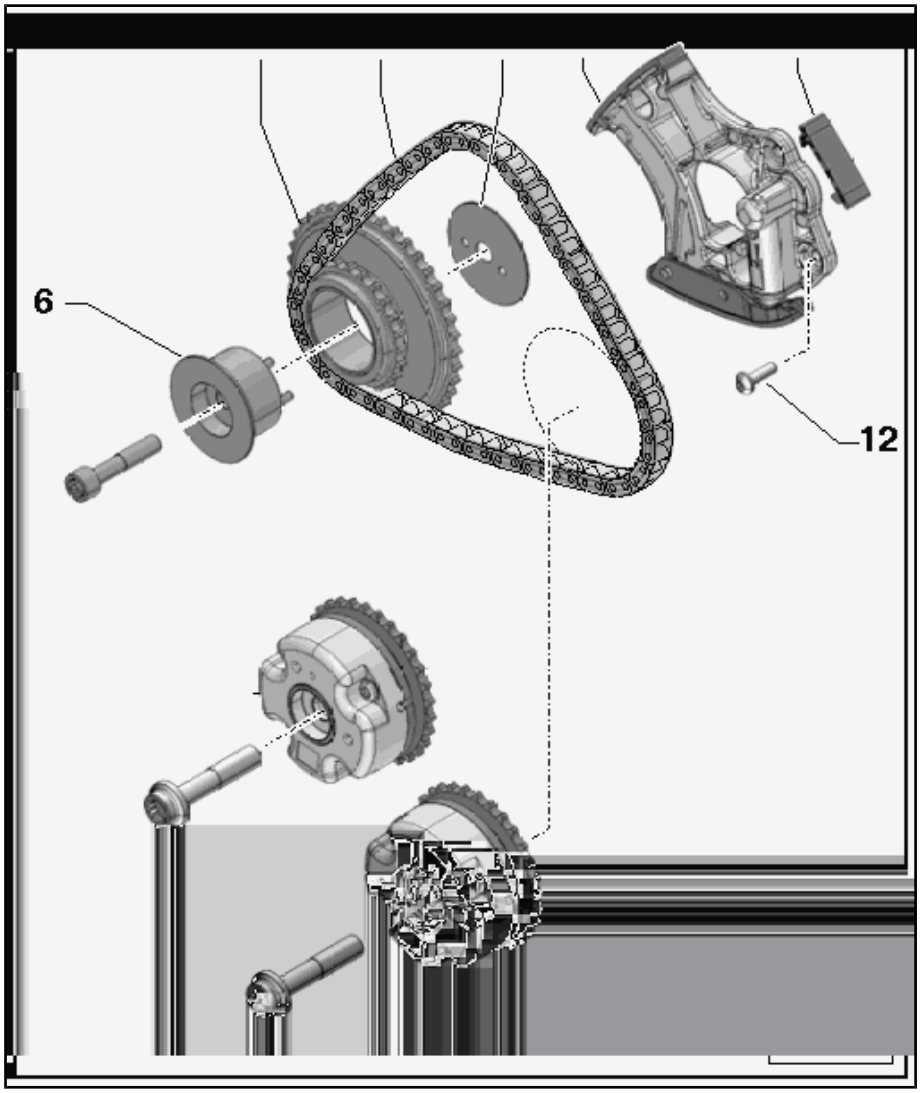
10 - Bolt
- ❑ Renew
- ❑ 8 Nm + turn 45° further

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 ⇒ “1.5 Removing timing chains from camshafts”, page 151

3 - Bolt

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

4 - Camshaft adjuster for inlet camshaft

- ❑ Identification “Intake”
- ❑ Removing and installing ⇒ “1.5 Removing timing chains from camshafts”, page 151

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 163

7 - Drive sprocket for camshaft timing chain (right-side)

- ❑ Installation position ⇒ page 163

8 - Camshaft timing chain (right-side)

- ❑ Before removing, mark running direction with paint
- ❑ Removing and installing ⇒ page 151

9 - Thrust washer for drive sprocket

- ❑ For camshaft timing chain (right-side)
- ❑ Asymmetric version
- ❑ Installation position ⇒ page 163

10 - Chain tensioner for camshaft timing chain (right-side)

- ❑ Removing and installing ⇒ “1.5 Removing timing chains from camshafts”, page 151

11 - Slide

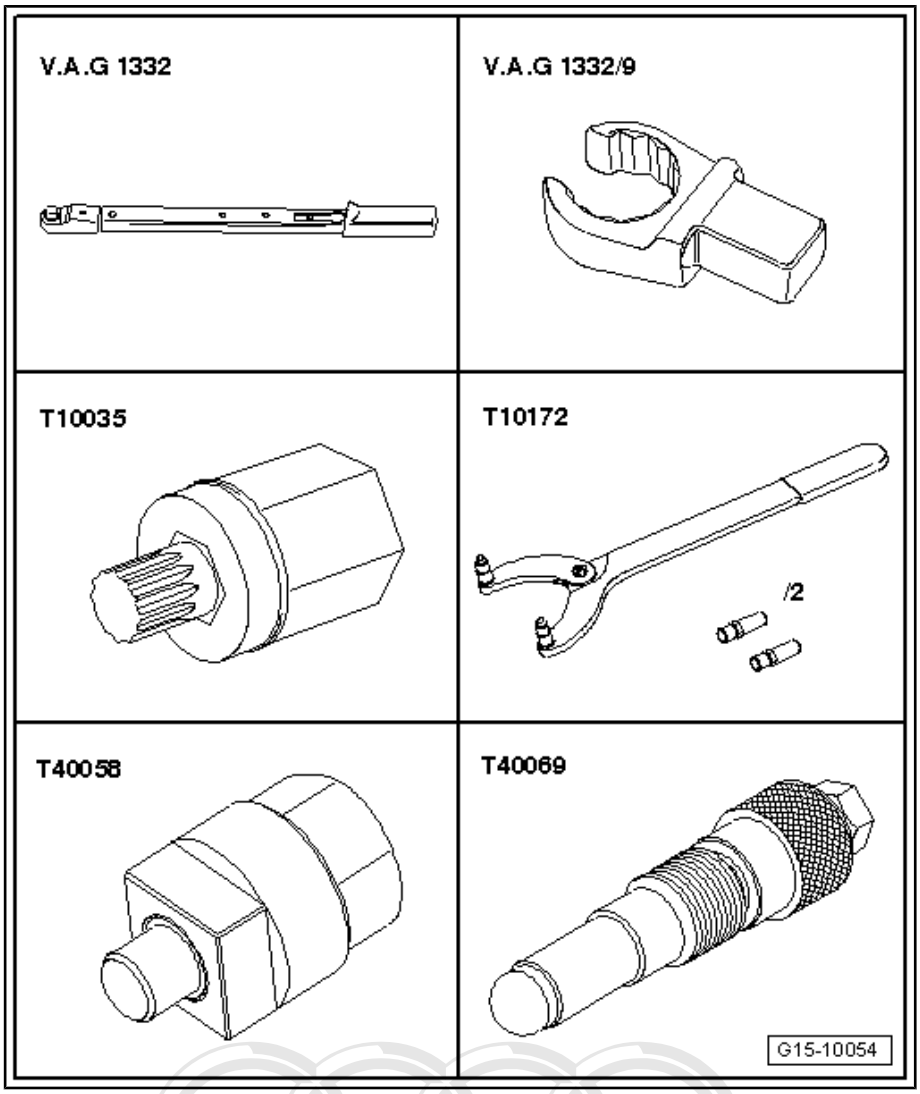
12 - Bolt

- ❑ 9 Nm

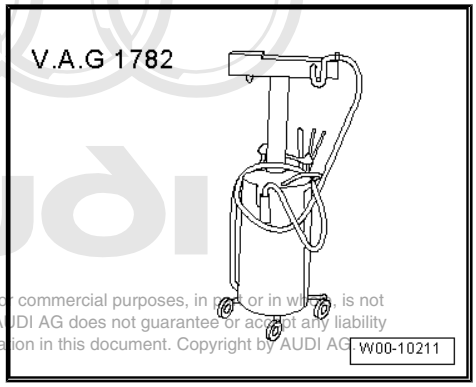
1.5 Removing timing chains from camshafts

Special tools and workshop equipment required

- Torque wrench -V.A.G 1332-
- Socket -V.A.G 1332/9-
- Special wrench -T10035-
- Counterhold tool -T10172-
- Adapter -T40058-
- Locking pin -T40069-

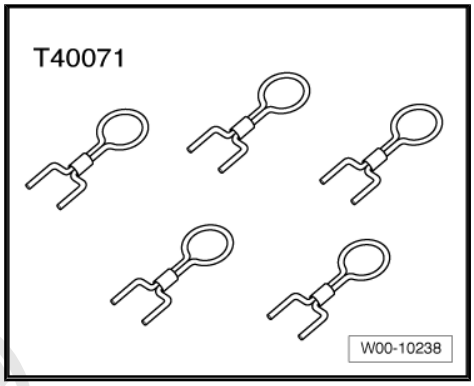


- Used oil collection and extraction unit -V.A.G 1782-

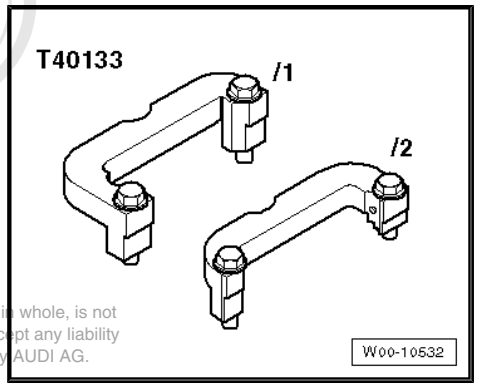


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- 2x Locking pin -T40071-



- 2x Camshaft clamp -T40133-



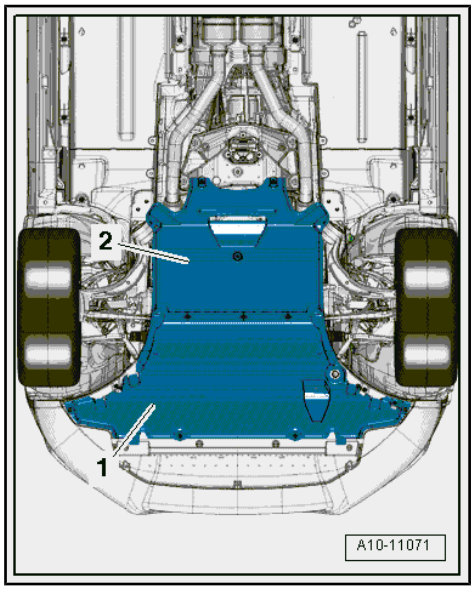
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Removing

Note

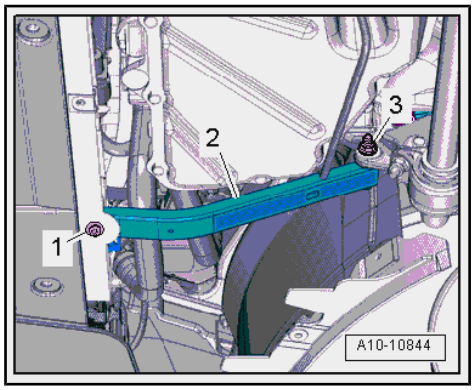
In the following procedure the camshaft timing chains remain on the engine.

– Remove relevant cylinder head cover: left-side ⇒ page 175 ; right-side ⇒ page 177 .
– Remove timing chain covers (left and right) ⇒ page 140 .
– Remove noise insulation panels -1- and -2- ⇒ Rep. Gr. 66 .



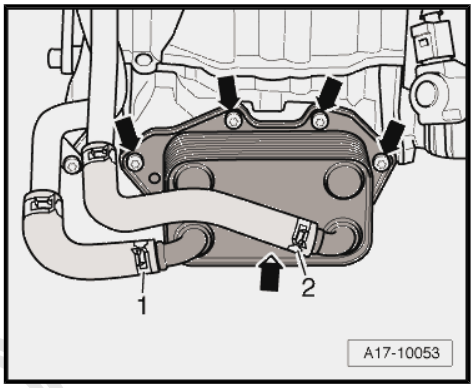
Vehicles not equipped with continued coolant circulation pump - V51- :

– 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 oil cooler to one side with coolant hoses -1- and -2- attached.



Vehicles with continued coolant circulation pump -V51- :

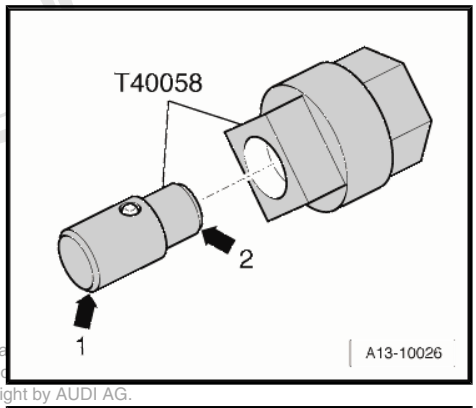
– Remove continued coolant circulation pump -V51- ⇒ page 270 and oil cooler ⇒ page 229 .

All vehicles (continued):

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

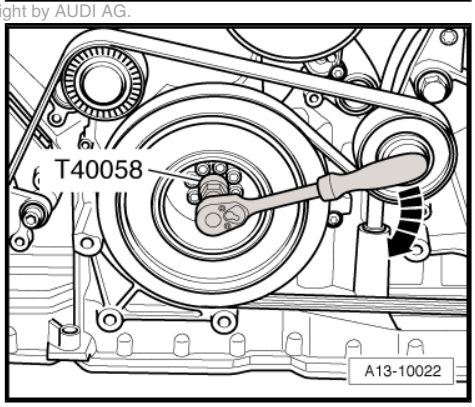
• The larger-diameter section -arrow 1- faces towards the engine.

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

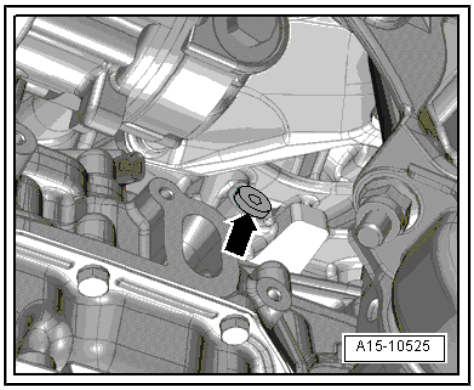


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– Turn crankshaft with adapter -T40058- in normal direction of rotation -arrow- to “TDC position”.

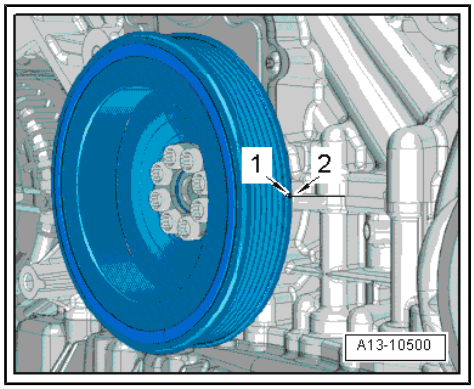


– Unscrew plug -arrow- for “TDC” marking from cylinder block.

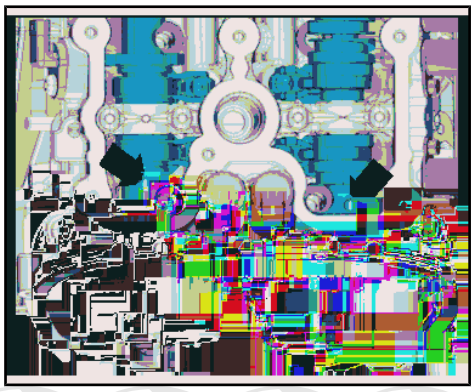


Note

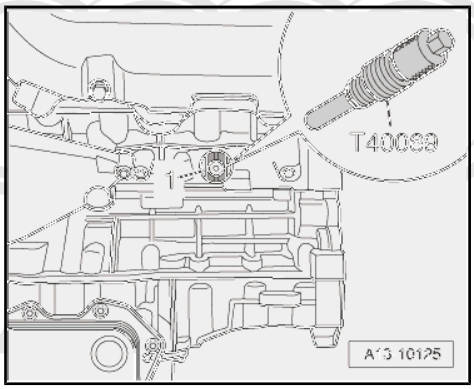
- *The bore provided for locking the crankshaft is difficult to see when the engine is installed.*
- *Therefore, turn the engine until the small notch -1- on the left-side of the vibration damper (as seen in the direction of travel) is in line with the housing joint -2- between the cylinder block and the retaining frame. 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.

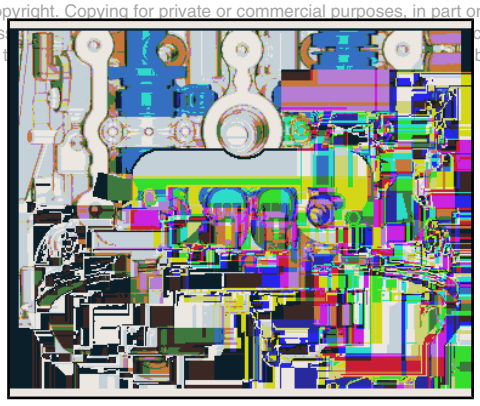


– Screw locking pin -T40069- into bore (tightening torque: 20 Nm); if necessary, turn crankshaft backwards and forwards slightly to fully centralise locking pin.



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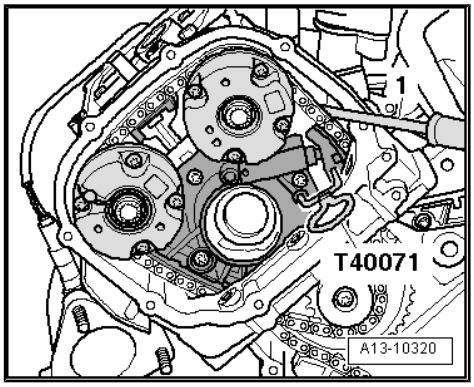
– Fit camshaft clamps -T40133- onto both cylinder heads and tighten bolts -arrows- to 25 Nm.



Note

The illustration shows the left-side cylinder head.

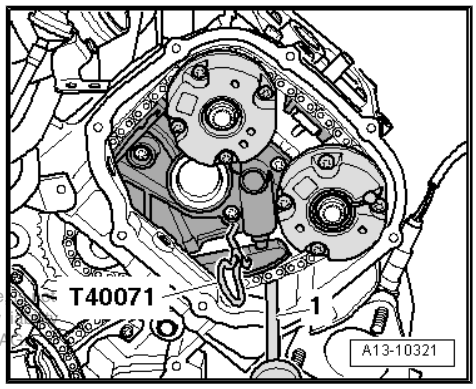
– Press guide rail of chain tensioner for camshaft timing chain (left-side) inwards as far as the stop using a screwdriver -1-. Then lock chain tensioner by inserting locking pin -T40071- .



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

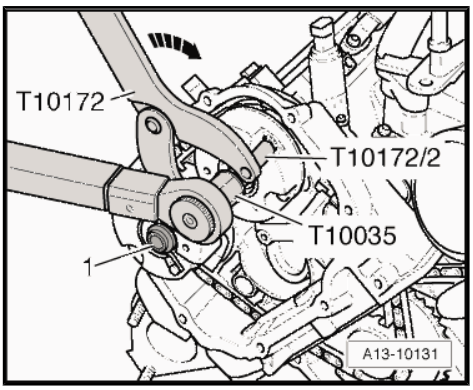
The chain tensioner is oil-damped and can therefore only be compressed slowly by applying constant pressure.

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Caution

Avoid damage to camshaft.

- *Do NOT use camshaft clamp -T40133- as a counterhold tool when loosening camshaft adjuster bolts -1-.*



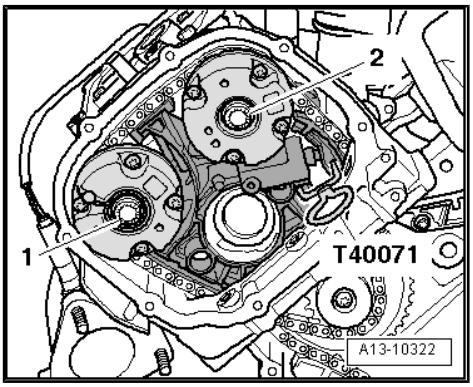
– Fit counterhold tool -T10172- with pin -T10172/2- to counterhold on corresponding camshaft adjuster and loosen with special wrench -T10035- .

– Mark position of camshaft adjusters with paint for re-installation.

Caution

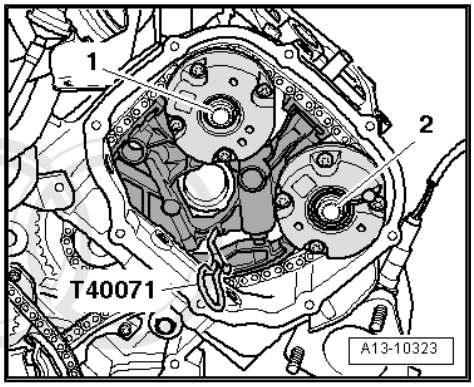
Risk of damage to engine.

- *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 149 , ⇒ page 130 .

Note

♦ *Renew the bolts tightened with specified tightening angle.*
♦ *Renew the O-ring on the screw plug for the “TDC” marking.*

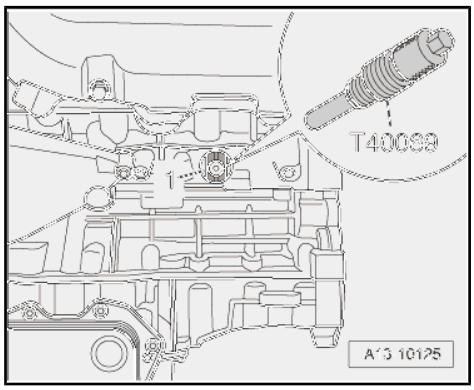
Caution

Avoid damage to valves and piston crowns.

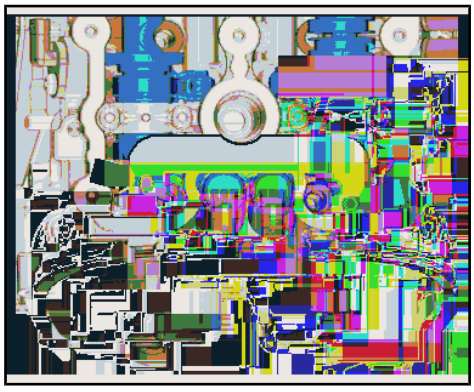
♦ ***The crankshaft must not be at “TDC” at any cylinder when the camshafts are turned.***

Audi
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- Drive chain for valve gear installed ⇒ page 163
- Crankshaft locked in “TDC” position with locking pin -T40069- .



- Camshaft clamps -T40133- installed on both cylinder heads and tightened to 25 Nm -arrows-.



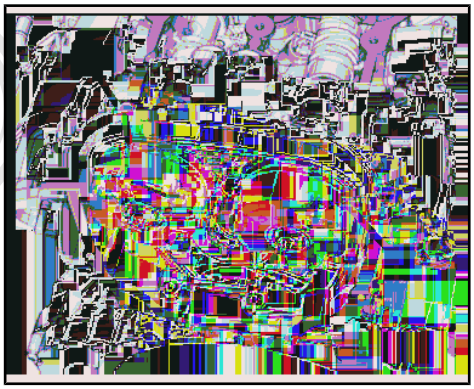
Note

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-.*



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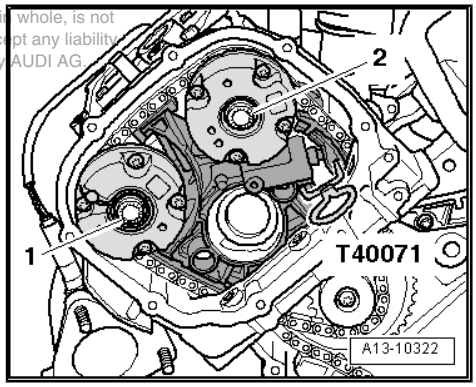
Note

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- .



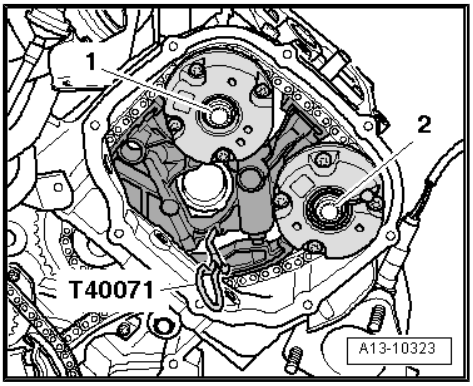
Note

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- .

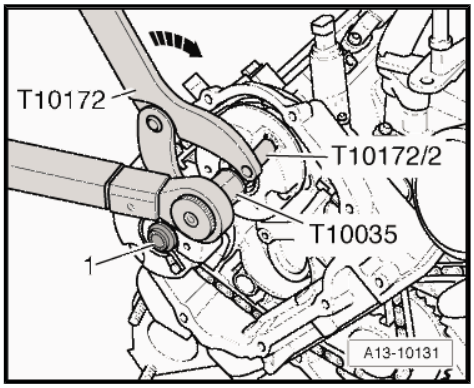


– Apply counterhold tool -T10172- with pin -T10172/2- onto camshaft adjuster of inlet camshaft (left-side).

– Have a 2nd mechanic apply tension to camshaft timing chain by pressing counterhold tool in direction of -arrow-.

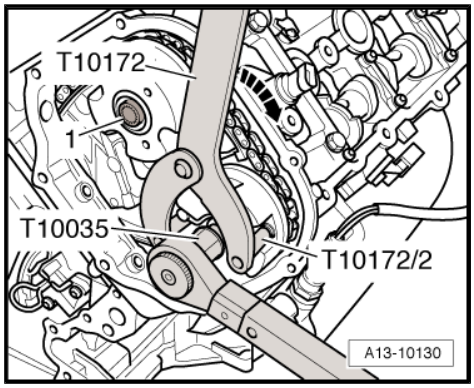
– Tighten bolts as follows while keeping camshaft adjuster under tension:

1. Pre-tighten bolt on inlet camshaft to 80 Nm.
2. Pre-tighten bolt -1- on exhaust camshaft to 80 Nm.

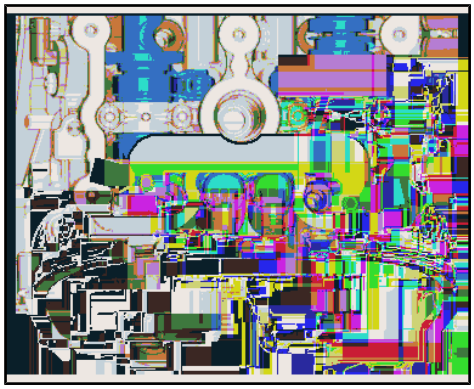


– Apply counterhold tool -T10172- with pin -T10172/2- onto camshaft adjuster of exhaust camshaft (right-side).
– Have a 2nd mechanic apply tension to camshaft timing chain by pressing counterhold tool in direction of -arrow-.
– Tighten bolts as follows while keeping camshaft adjuster under tension:

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-.

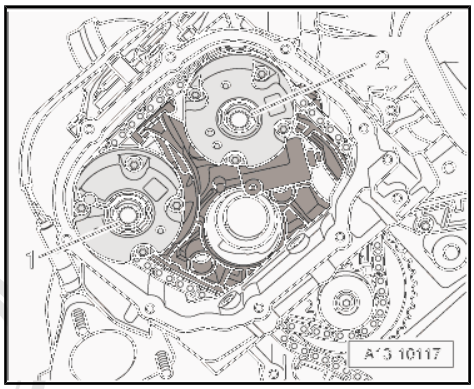


Note

The illustration shows the left-side cylinder head.

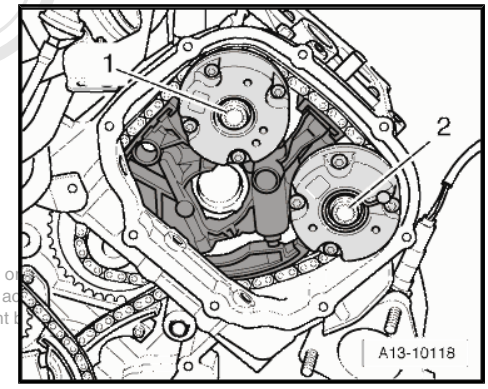
– Tighten camshaft adjuster bolts on cylinder head (left-side) as follows:

1. Tighten bolt -1- on inlet camshaft to final tightening torque.
2. Tighten bolt -2- on exhaust camshaft to final tightening torque.



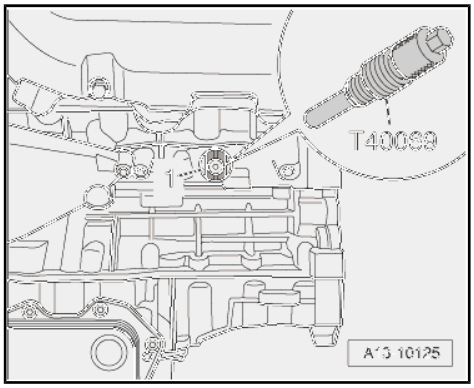
– Tighten camshaft adjuster bolts on cylinder head (right-side) as follows:

1. Tighten bolt -1- on inlet camshaft to final tightening torque.
2. Tighten bolt -2- on exhaust camshaft to final tightening torque.



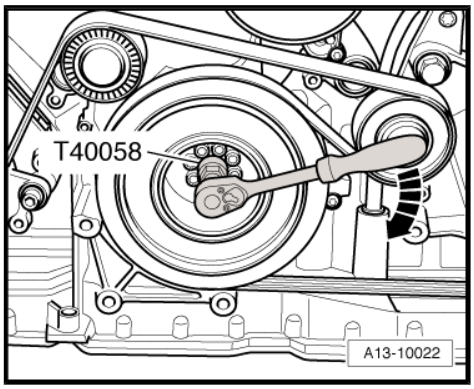
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– Remove locking pin -T40069- .



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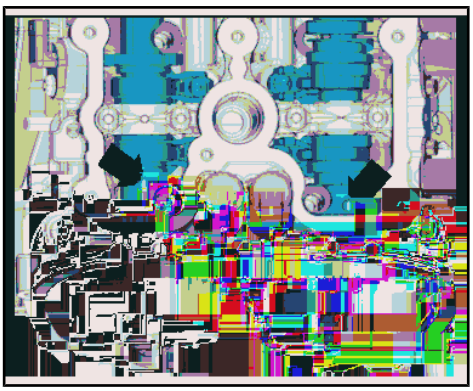
– Using adapter -T40058- , turn crankshaft 2 revolutions in normal direction of rotation -arrow- until crankshaft is at “TDC” again.



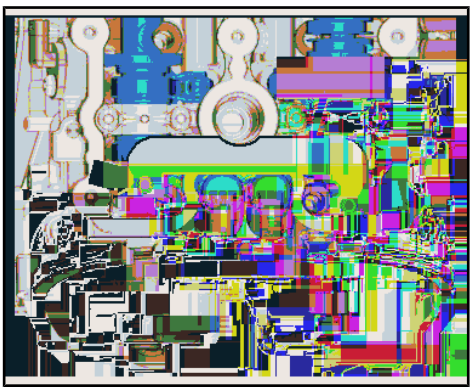
Note

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.

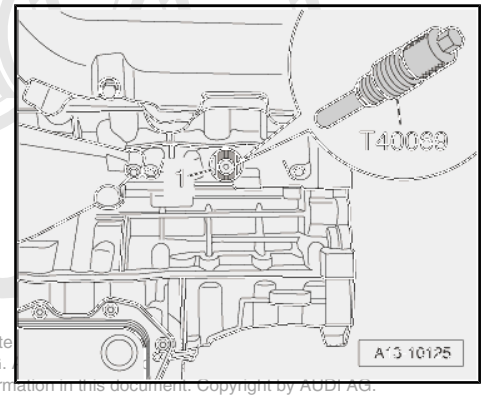


– Screw the locking pin -T40069- directly into the hole.

• 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 140 .

– Install cylinder head covers: left-side ⇒ page 175 ; right-side ⇒ page 177 .

– Install continued coolant circulation pump -V51- ⇒ page 270 .

– Install oil cooler ⇒ page 229 .

– Install strut for lock carrier ⇒ Rep. Gr. 50 .

– Install front noise insulation ⇒ Rep. Gr. 66 .

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1.6 Removing and installing camshaft timing chains

Removing

• Gearbox removed.

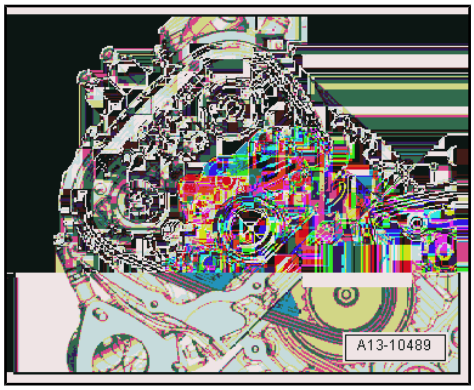
– Remove timing chain cover (bottom) ⇒ page 143 .

– Remove timing chains from camshafts ⇒ page 151 .

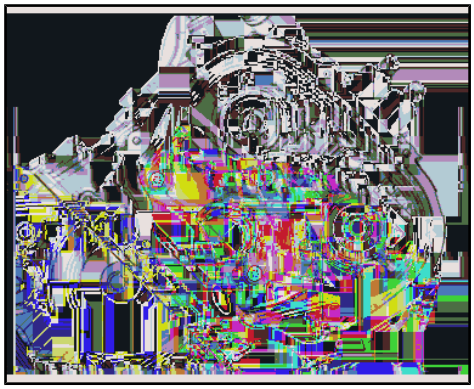
Caution

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).

– 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 149 .

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.*

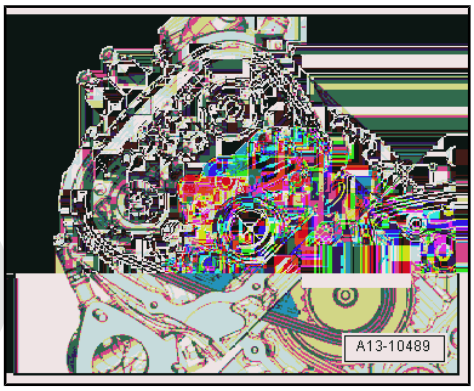
Caution

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 when removing).

– 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- .

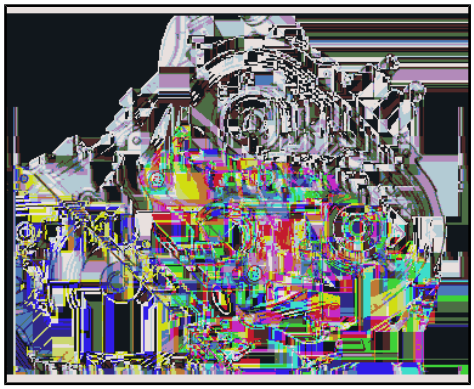


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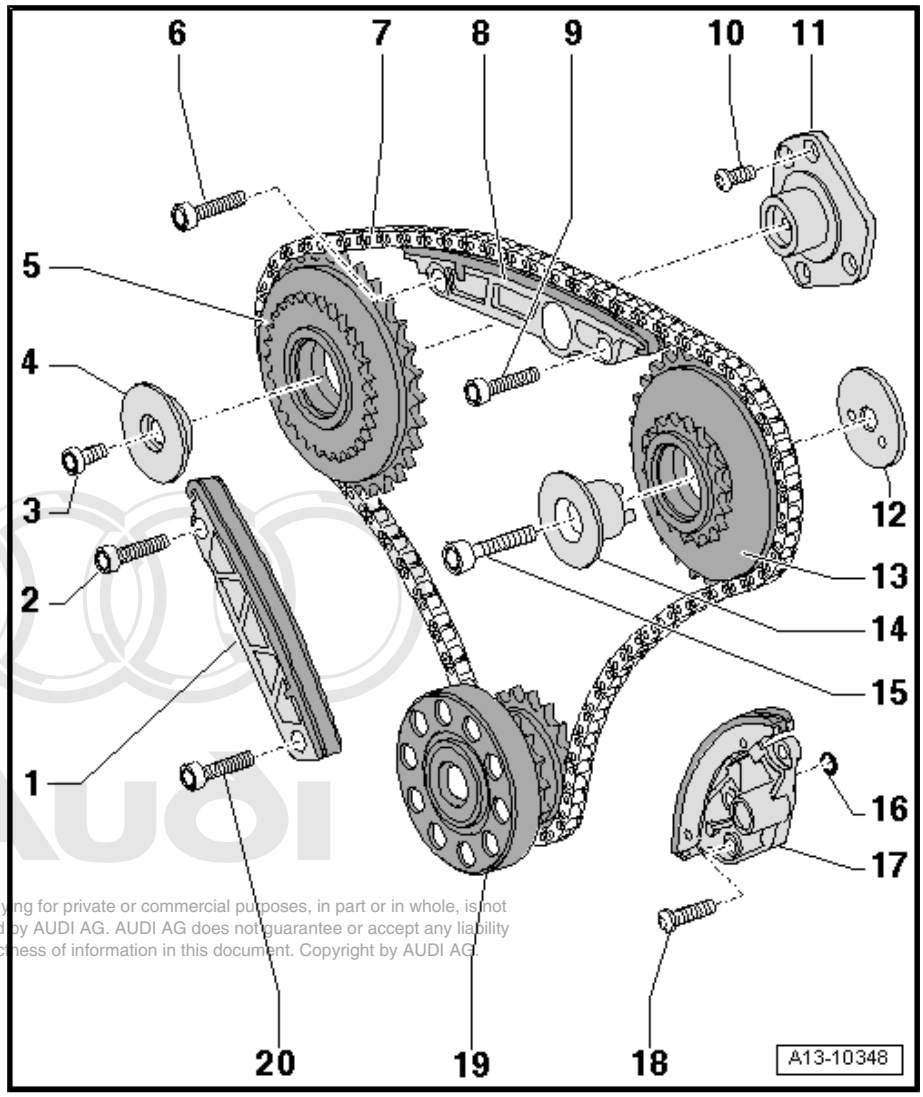
– Fit chain tensioner on cylinder head (right-side) and position timing chain.
– Tighten bolts -1- and -2-.

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

– Fit timing chains on camshafts ⇒ page 156 .
– Install timing chain cover (bottom) ⇒ page 143 .
– Fill up with engine oil and check engine oil level ⇒ page 247 .



1.7 Drive chain for valve gear - exploded view



1 - Guide rail

2 - Bolt
- ❑ Renew
- ❑ 10 Nm + turn 90° further

3 - Bolt
- ❑ Tightening torque ⇒ Item 13 (page 149)

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 163

8 - Guide rail

9 - Bolt
- ❑ Renew
- ❑ 10 Nm + turn 90° further

10 - Bolt
- ❑ Tightening torque ⇒ Item 10 (page 149)

11 - Bearing bracket for drive sprocket
- ❑ For camshaft timing chain (right-side)
- ❑ Asymmetric version
- ❑ Installation position ⇒ page 163

12 - Thrust washer
- ❑ Asymmetric version
- ❑ Installation position ⇒ page 163

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13 - Drive sprocket for timing chain (right-side)

- ❑ Installation position ⇒ page 163

14 - Bearing mounting for drive sprocket

- ❑ Asymmetric version
- ❑ Installation position ⇒ page 163

15 - Bolt

- ❑ Tightening torque ⇒ Item 5 (page 150)

16 - O-ring

- ❑ Renew

17 - Chain tensioner

18 - Bolt

- ❑ 9 Nm

19 - Crankshaft

20 - Bolt

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

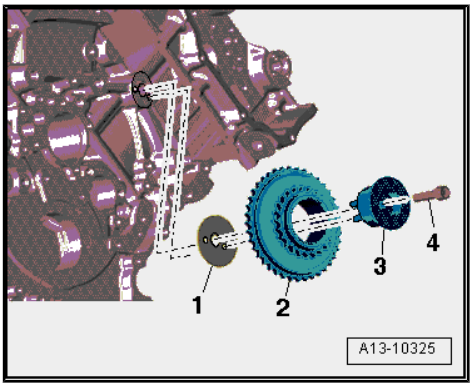
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Installation position: bearing mounting for drive sprocket for camshaft timing chain (right-side)

- 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)

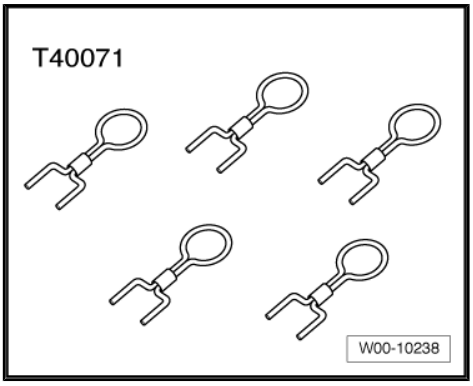
4 - Bolt



1.8 Removing and installing drive chain for valve gear

Special tools and workshop equipment required

♦ Locking pin -T40071-



Removing

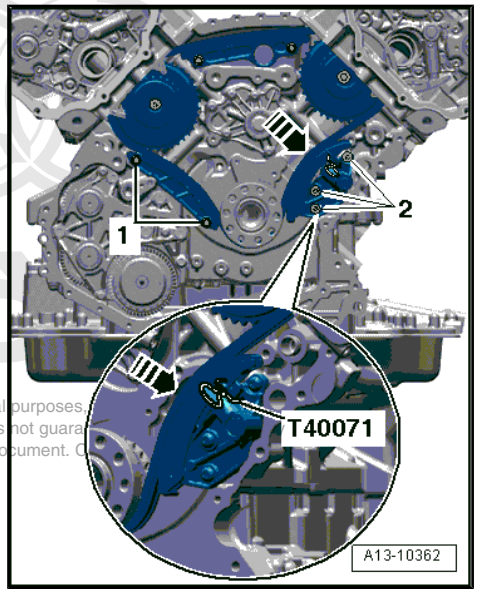
- Gearbox removed.

– Remove timing chain cover (bottom) ⇒ page 143 .

– Remove timing chains from camshafts ⇒ page 151 .

– Remove drive chain for auxiliary drives ⇒ page 165 .

– 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 162

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 when removing).

– Install guide rail and tighten bolts -1-.

– Install chain tensioner and tighten bolts -2-.

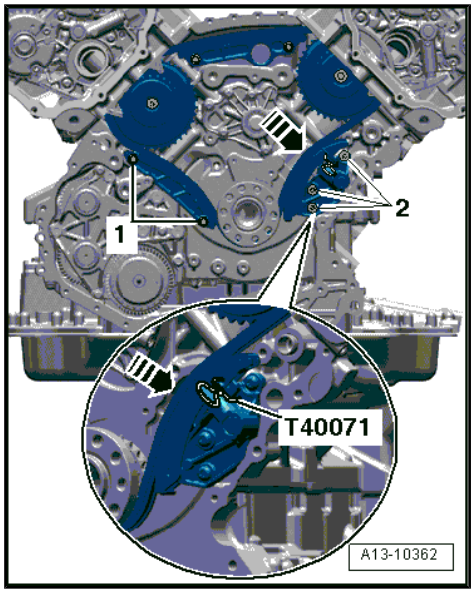
– Press guide rail of chain tensioner for drive chain in direction of -arrow- and pull locking pin -T40071- out of chain tensioner.

– Install drive chain for auxiliary drives ⇒ page 165 .

– Fit timing chains on camshafts ⇒ page 156 .

– Install timing chain cover (bottom) ⇒ page 143 .

– Fill up with engine oil and check engine oil level ⇒ page 247 .



1.9 Drive chain for auxiliary drives - exploded view

1 - Crankshaft

2 - Drive chain for auxiliary drives

- ❑ Before removing, mark running direction with paint
- ❑ Removing and installing ⇒ page 165

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

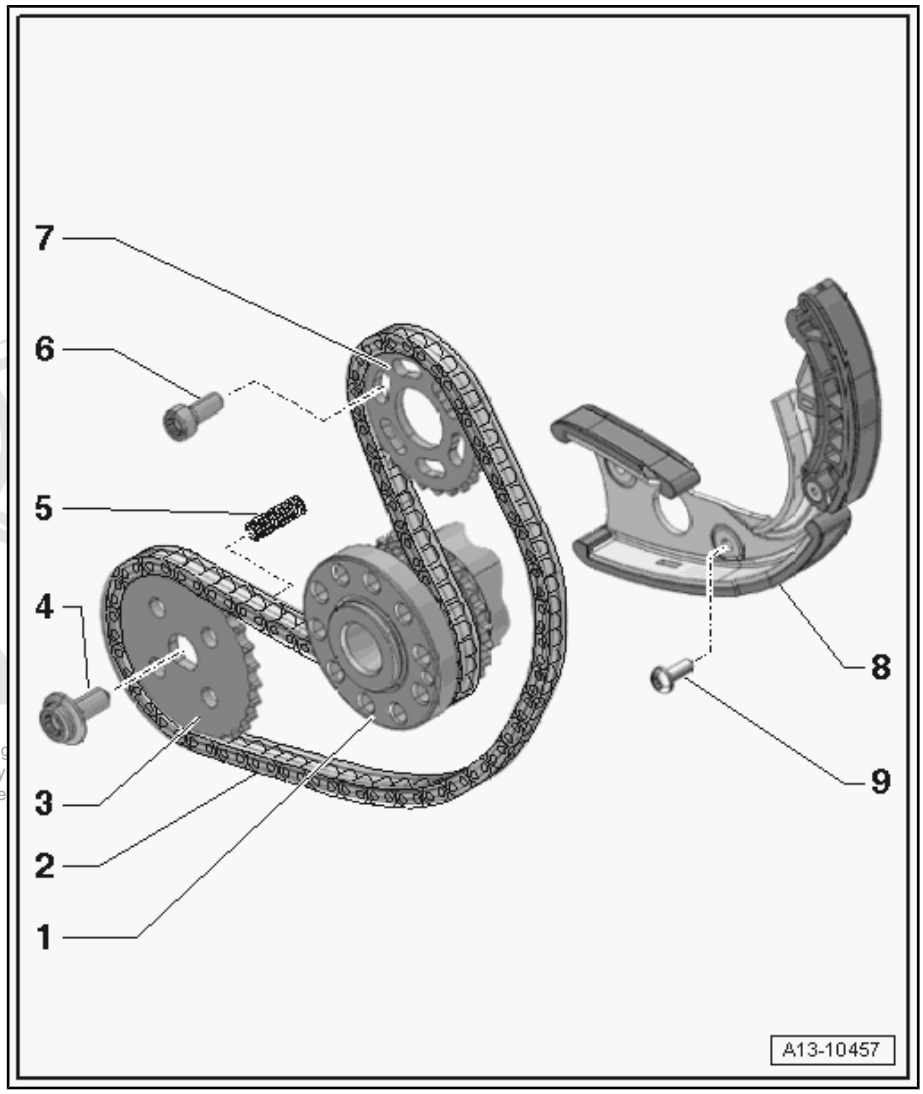
- ❑ Installation position: Side with lettering faces gearbox

8 - Chain tensioner

- ❑ With guide rail

9 - Bolt

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

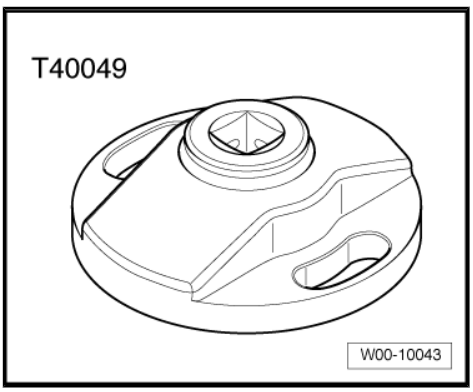


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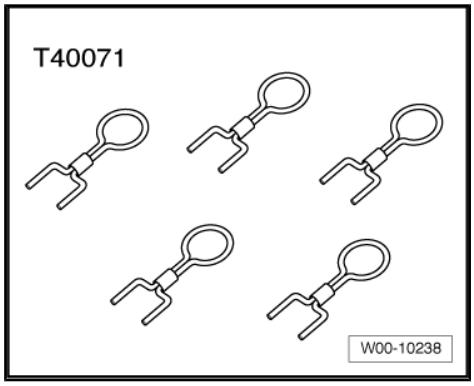
1.10 Removing and installing drive chain for auxiliary drives

Special tools and workshop equipment required

- ♦ Special wrench -T40049-



♦ Locking pin -T40071-



♦ Drill bit, ∅ 8 mm

Removing

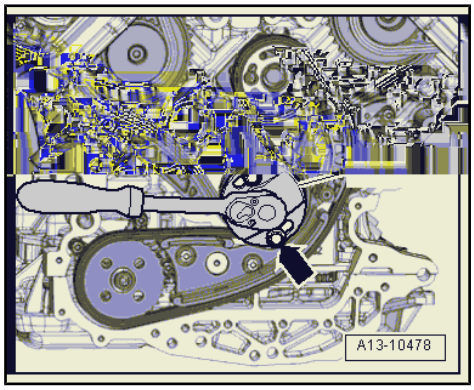
• Gearbox removed.

– Remove timing chain cover (bottom) ⇒ page 143 .

Caution

Make sure drive chain is not damaged.

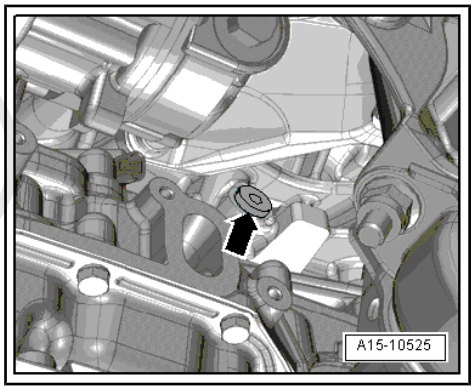
♦ *Place a washer under the bolt heads to make sure the drive chain does not get trapped by the bolts.*



– 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”.



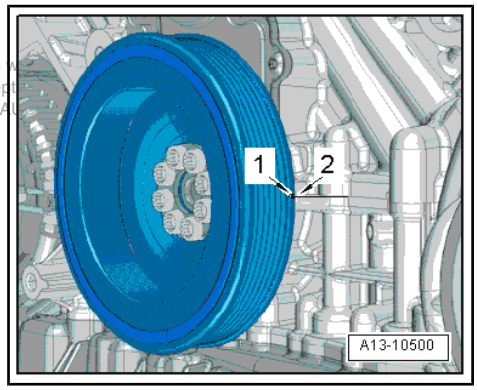
Note

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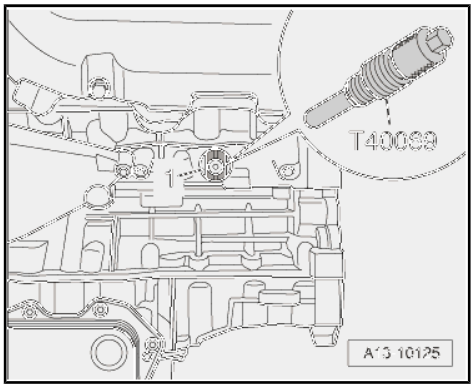
♦ *The bore provided for locking the crankshaft is difficult to see when the engine is installed.*

♦ *Therefore, turn the engine until the small notch -1- on the left-side of the vibration damper (as seen in the direction of travel) is in line with the housing joint -2- between the cylinder block and the retaining frame. 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.

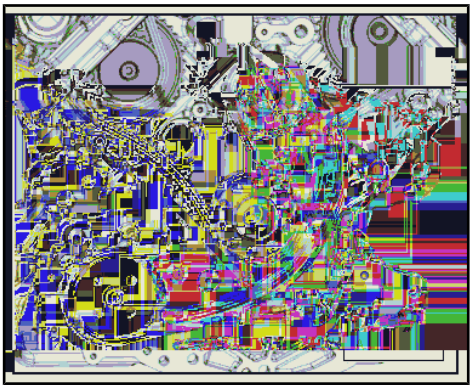


– Press guide rail of chain tensioner in direction of -arrow- and lock chain tensioner by inserting locking pin -T40071- .

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.*

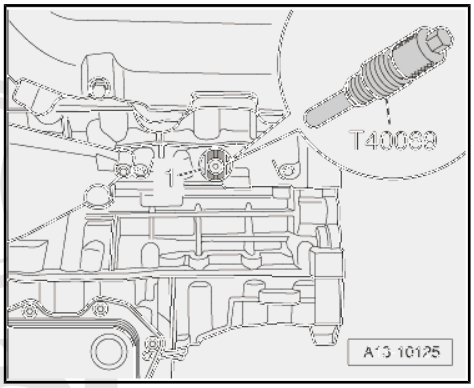


– Unscrew bolts -3- and detach chain sprocket from balance shaft.

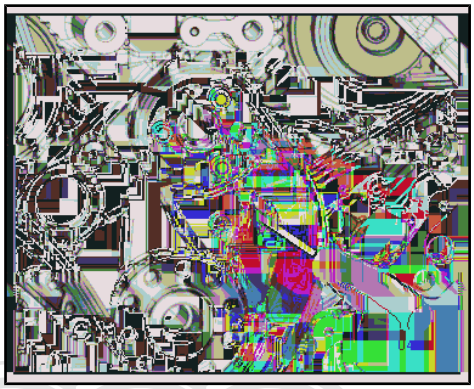
– Remove bolts -1- and -2- and take off chain tensioner with drive chain.

Installing

- Tightening torques ⇒ page 162 , ⇒ page 130 .
- Crankshaft -1- locked in “TDC” position with locking pin -T40069- .



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– 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.

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

– Install timing chain cover (bottom) ⇒ page 143 .
– Fill up with engine oil and check engine oil level ⇒ page 247 .

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1.11 Balance shaft - exploded view

1 - Balance shaft

- ❑ Removing and installing ⇒ page 169

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

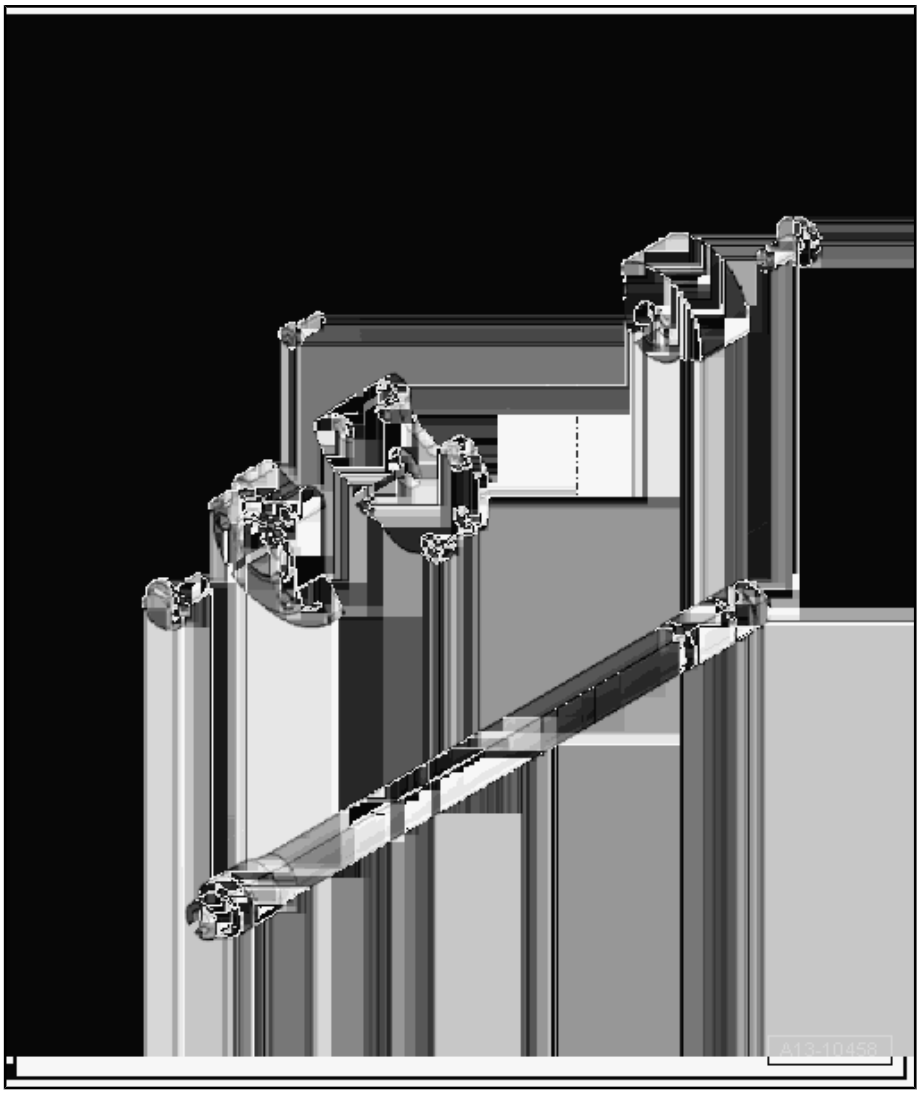
- ❑ 13 Nm

6 - Balance weight (pulley end)

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

7 - Bolt

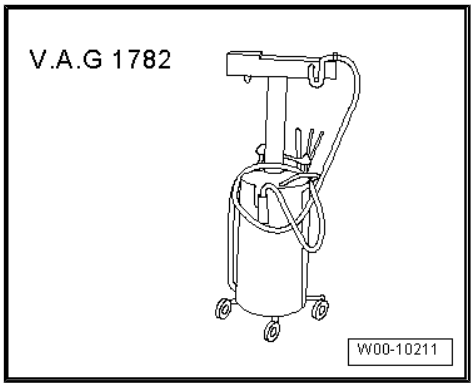
- ❑ 60 Nm
- ❑ Use ∅ 8 mm drill bit as counterhold when loosening and tightening



1.12 Removing and installing balance shaft

Special tools and workshop equipment required

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



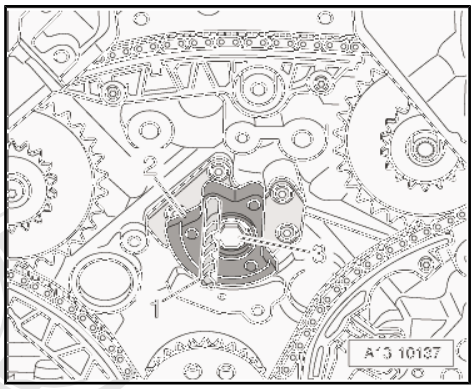
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Removing

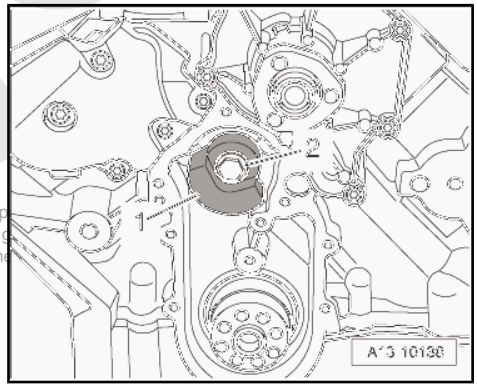
- Gearbox removed.

– Remove sealing flange (pulley end) ⇒ page 120 .

– Remove timing chain cover (bottom) ⇒ page 143 .
– Remove drive chain for auxiliary drives ⇒ page 165 .
– 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.

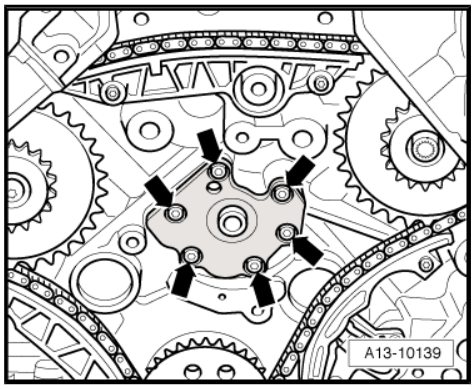


– Unscrew bolt -2- (counterhold balance weight -1- with a suitable pin) and detach balance weight at front of engine from balance shaft.

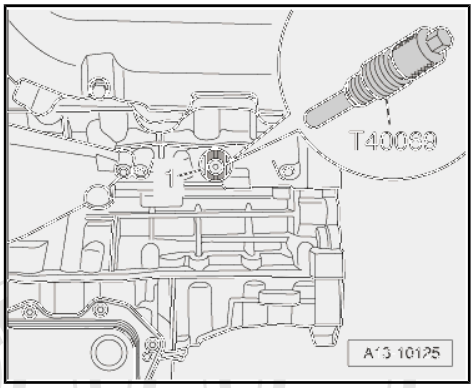


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– Unscrew bolts -arrows- and detach bearing plate for balance shaft at rear of engine.
– Pull balance shaft to rear out of cylinder block.



Installing



- Tightening torques ⇒ page 169 , ⇒ page 130 .
- 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 165 .
– Install timing chain cover (bottom) ⇒ page 143 .
– Install sealing flange (pulley end) ⇒ page 120 .
– Fill up with engine oil and check engine oil level ⇒ page 247 .

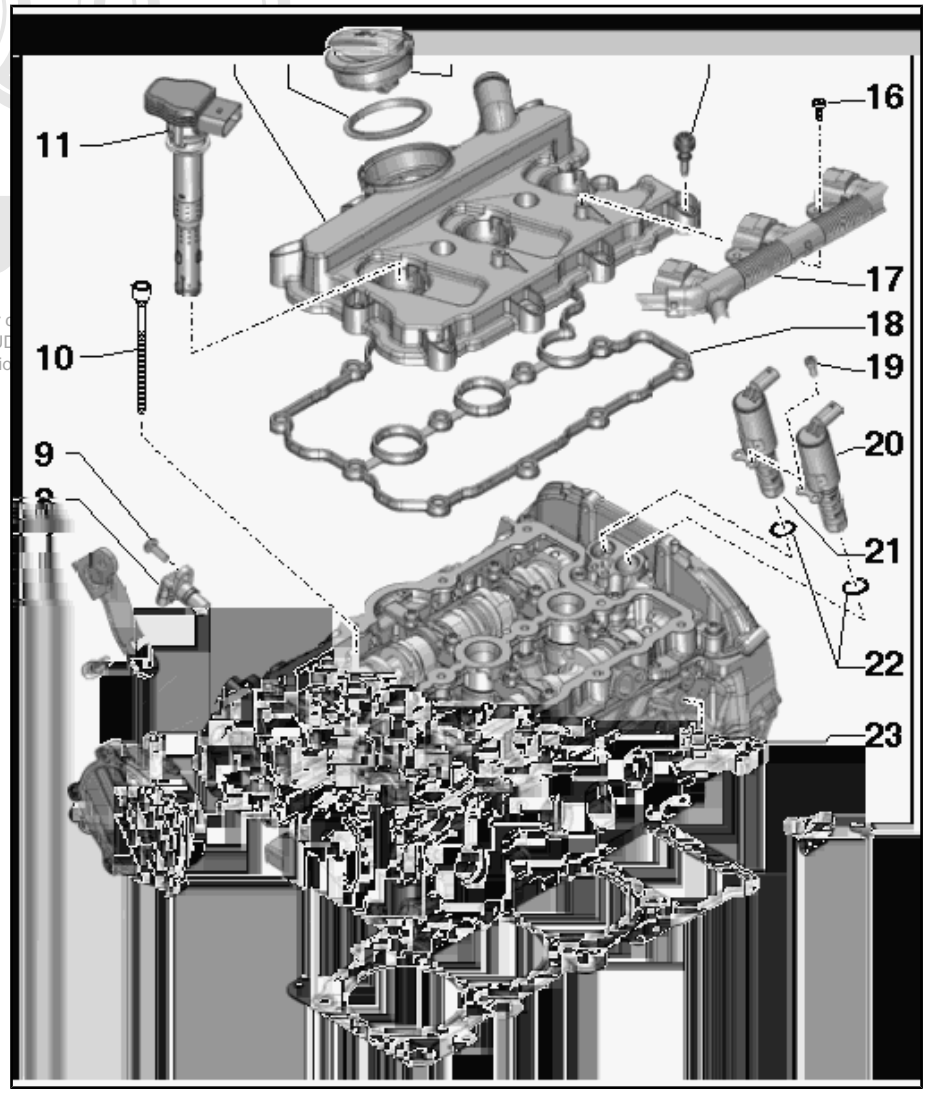
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2 Cylinder head

2.1 Cylinder head - exploded view

Note

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



1 - Cylinder head gasket

- ❑ Renewing ⇒ “2.4 Removing and installing cylinder heads”, page 180
- ❑ Installation position: Part No. towards cylinder head
- ❑ If renewed, change coolant and engine oil

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2 - Cylinder head

- ❑ Removing ⇒ page 180
- ❑ ⇒ Fig. “ Checking cylinder head for distortion “ , page 174
- ❑ ⇒ Fig. “ Cylinder head machining limit “ , page 174
- ❑ Installing ⇒ page 193
- ❑ If renewed, change coolant and engine oil

3 - Bolt

- ❑ Tightening torque ⇒ Rep. Gr. 47

4 - Exhauster pump

- ❑ Removing and installing ⇒ Rep. Gr. 47

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 186 .
- ❑ Renew
- ❑ Procedure when tightening ⇒ page 194 .

- ❑ 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 175 , right-side ⇒ page 177

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 174 and
  ⇒ Fig. “ Cylinder head cover (right-side) - tightening torque and sequence “ , page 174

16 - Bolt

- ❑ Tightening torque ⇒ Rep. Gr. 28

17 - Connector console

- ❑ For ignition coils

18 - Gasket for cylinder head cover

- ❑ Renew if damaged or leaking

19 - Bolt

- ❑ 2.5 Nm

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

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24 - Bolt

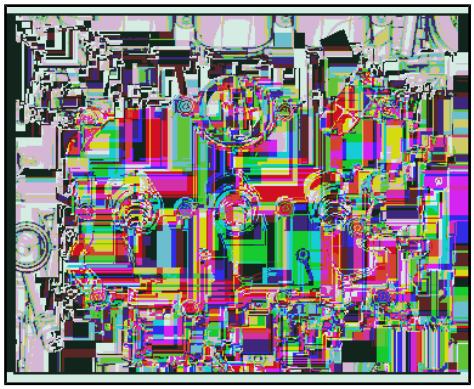
- ❑ 9 Nm

25 - Hall sender for exhaust camshaft

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

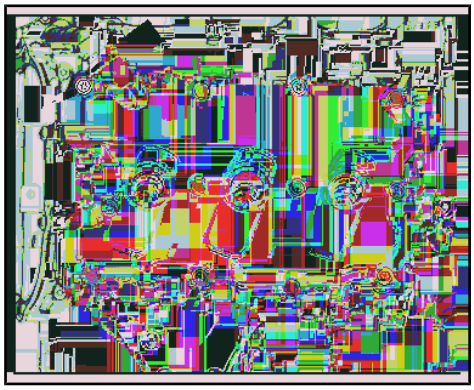
Cylinder head cover (left-side) - tightening torque and sequence

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



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

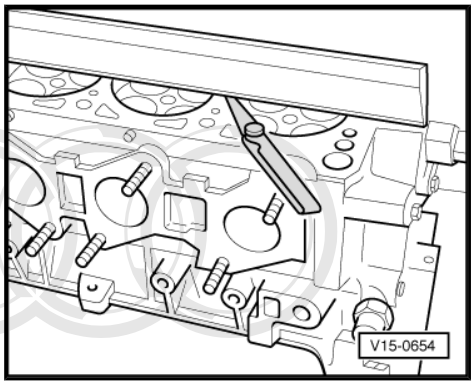
– Tighten bolts in the sequence -1 ... 12- to 9 Nm.



Checking cylinder head for distortion

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

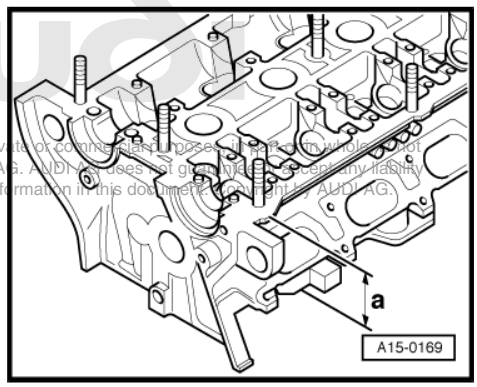
• Max. distortion: 0.05 mm.



Cylinder head machining limit

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

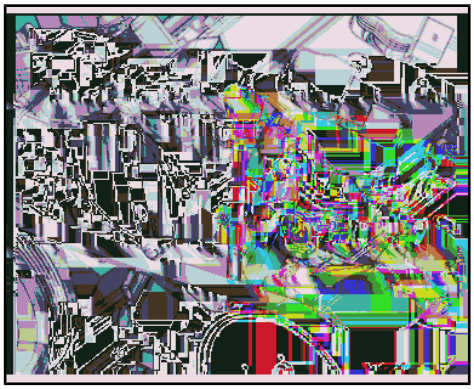
• Minimum dimension: -a- = 139.20 mm



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Guide tube for oil dipstick - tightening torque

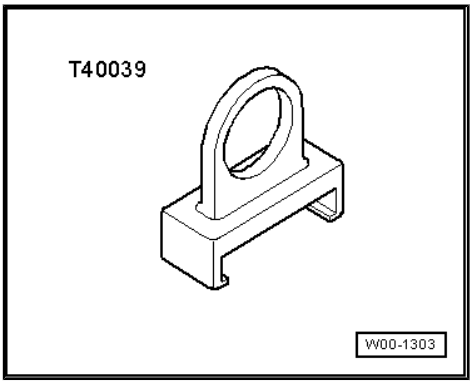
– Tighten bolt -arrow- to 9 Nm.



2.2 Removing and installing cylinder head cover (left-side)

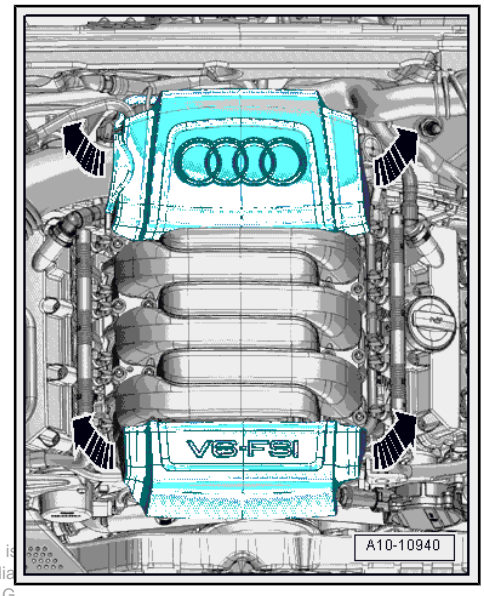
Special tools and workshop equipment required

♦ Puller -T40039-



Removing

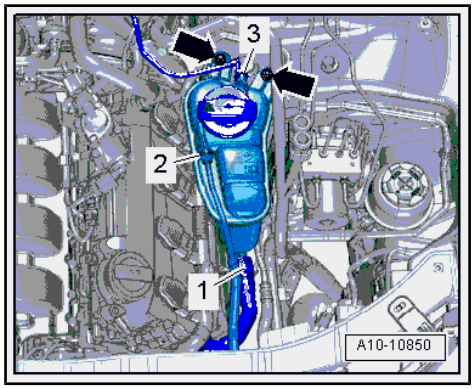
– Pull off engine cover panels -arrows-.



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– Remove bolts -arrows-.

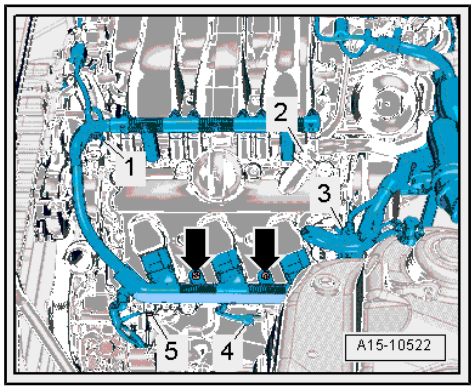
– Unplug electrical connector at coolant shortage indicator switch -F66- and move expansion tank to one side with coolant hoses -1, 2, 3- attached.



– 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

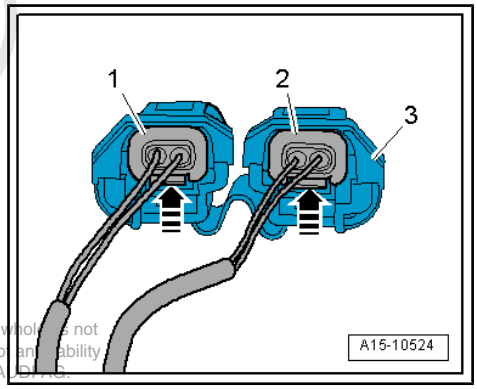
Disregard -item 2-.

– Press both catches and pull both connectors -1- off camshaft control valve 1 -N205- and exhaust camshaft control valve 1 -N318- .

Note

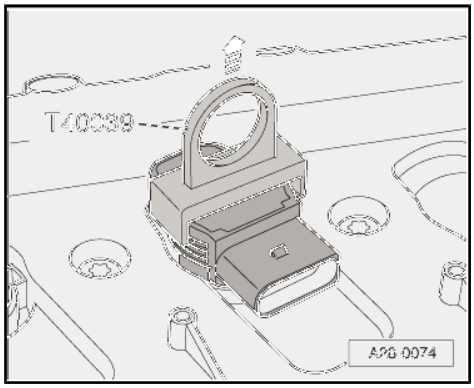
The connecting piece -3- (only on some versions) on the electrical connectors -1- and -2- for the camshaft control valves is intended to prevent the connectors from being interchanged by mistake; it should therefore not be separated from the connectors.

– Move wiring harness clear to the side.

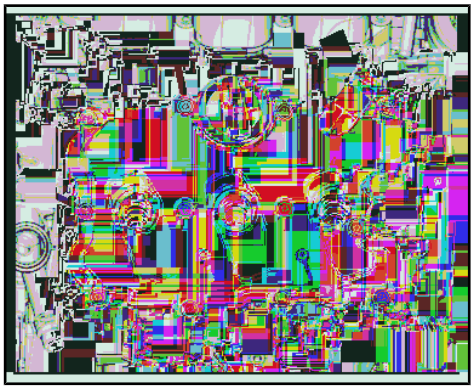


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– Remove ignition coils using puller -T40039- .



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 174 .

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.

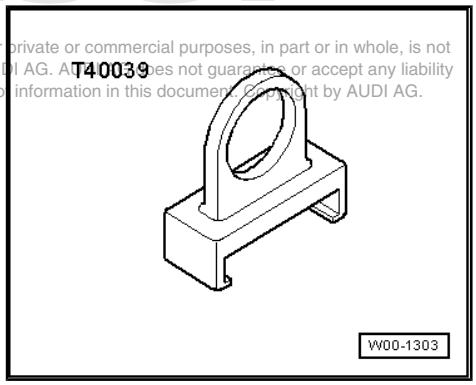
– Tighten bolts for cylinder head cover (left-side) ⇒ page 174 .

2.3 Removing and installing cylinder head cover (right-side)

Special tools and workshop equipment required

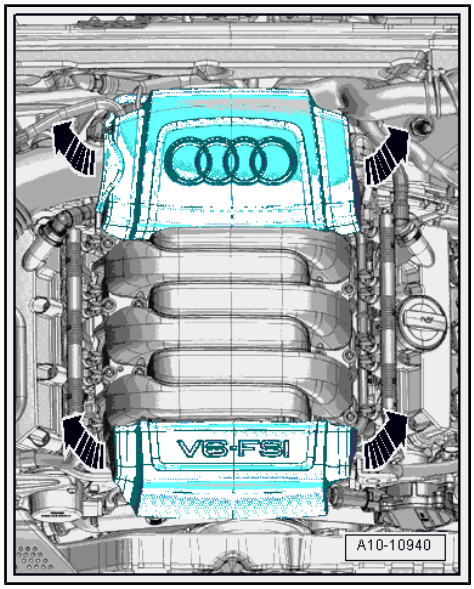
- Puller -T40039-

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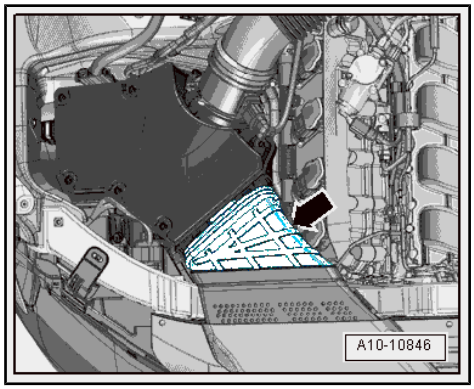


Removing

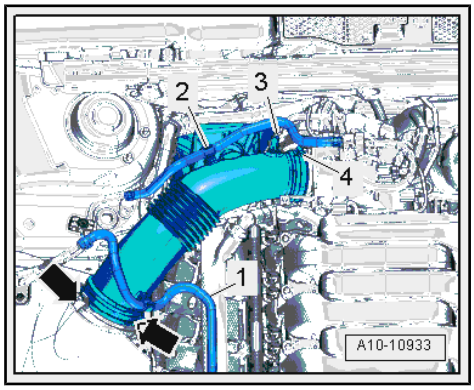
– Pull off engine cover panels -arrows-.



– Remove air duct -arrow-.



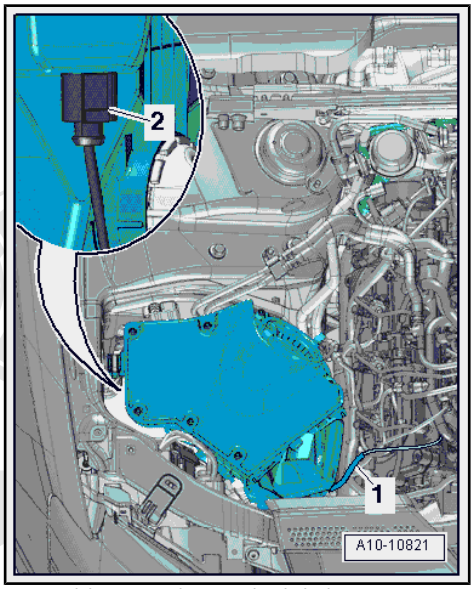
– Move fuel line -1- and line -2- (leading to activated charcoal filter) clear at air pipe.
– Disconnect vacuum hose -3- from connection on air pipe.
– Remove air pipe. To do so, release hose clip -4- and clamps -arrows-.



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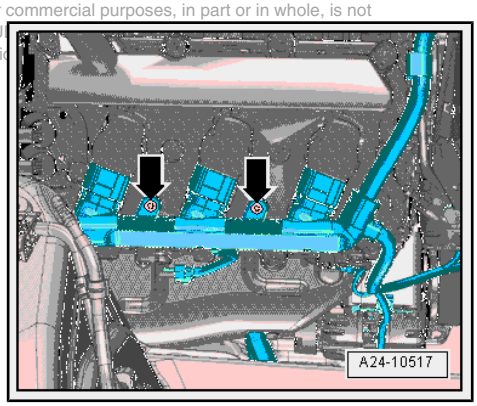
– Disconnect vacuum line -1-.

– 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.



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– Remove bolts -arrows- on cylinder head (right-side) and unplug electrical connectors at ignition coils.

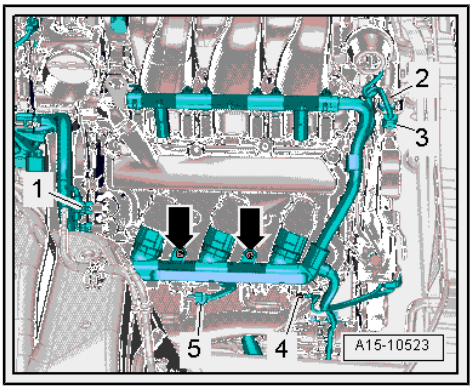


– Unplug electrical connector -5- at Hall sender 3 -G300- .

Note

Disregard items marked -2, 3 and 4-.

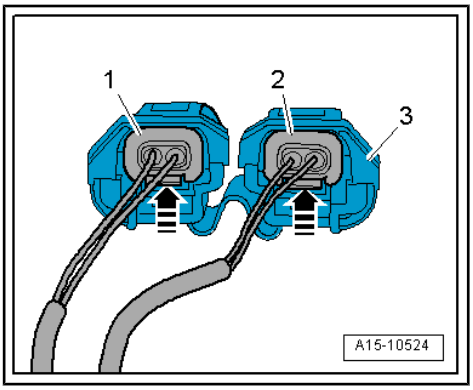
– Press both catches and pull both connectors -1- off camshaft control valve 1 -N205- and exhaust camshaft control valve 1 - N318- .



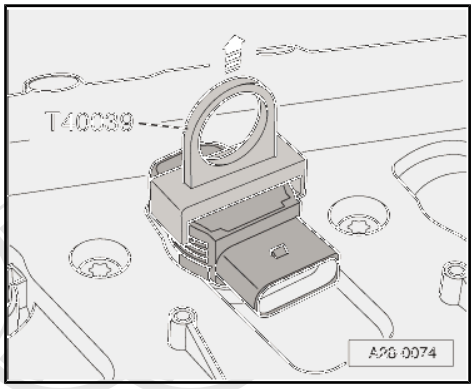
Note

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 wiring harness clear to the side.



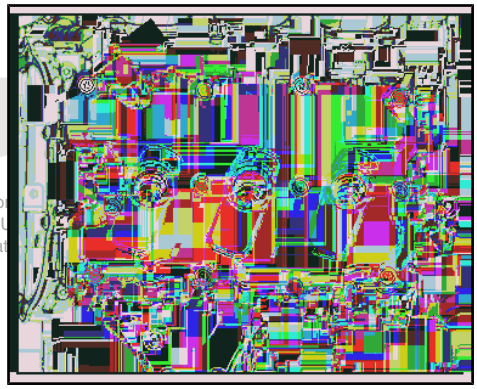
– Remove ignition coils using puller -T40039- .



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:

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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 174 .

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.*

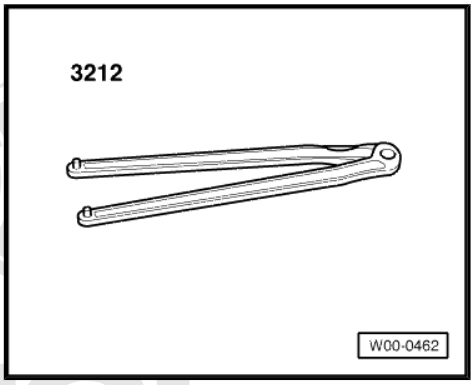
– Clean sealing surfaces; they must be free of oil and grease.

– Tighten bolts for cylinder head cover (right-side) ⇒ page 174 .

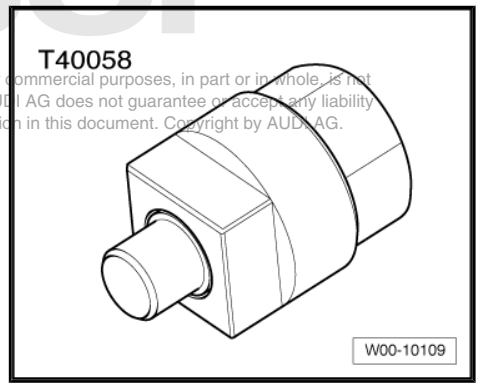
2.4 Removing and installing cylinder heads

Special tools and workshop equipment required

- Pin wrench -3212-

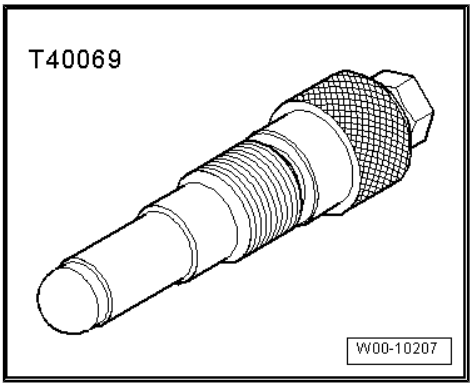


- Adapter -T40058-

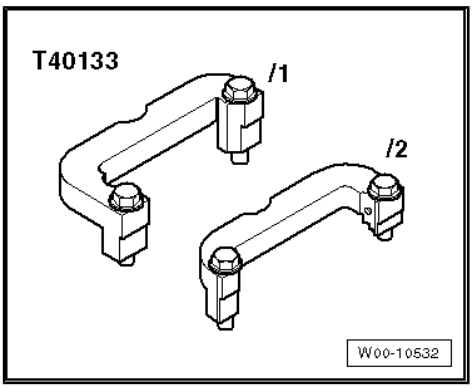


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- Locking pin -T40069-



- 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.*

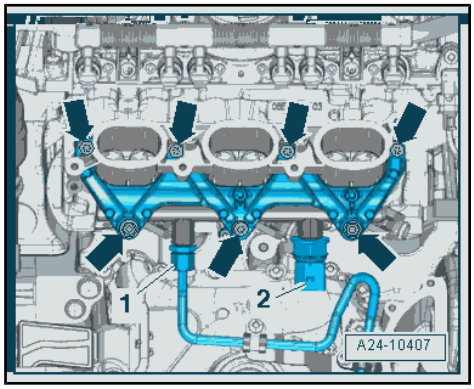
WARNING

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.***

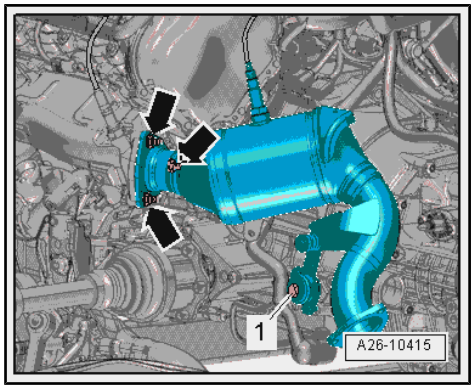
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- Reduce fuel pressure in high-pressure section of injection system ⇒ page 4 .
- Remove top coolant pipe ⇒ page 267 .
- Remove poly V-belt ⇒ page 119 .
- Remove intake manifold bottom sections ⇒ Rep. Gr. 24 .
- Unplug electrical connectors at injectors.
- Remove timing chain covers (left and right) ⇒ page 140 .



Vehicles without secondary air system:

- Remove front silencer (left-side) ⇒ page 303 .
- Remove nuts -arrows- and bolt -1-.
- Detach catalytic converter (left-side) from exhaust manifold and move clear to the side.

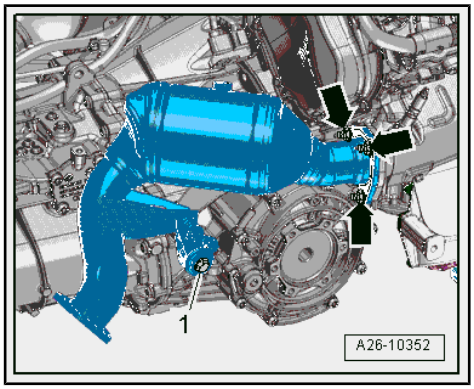


Note

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

- Remove front silencer (right-side) ⇒ page 303 .

– Remove nuts -arrows- and bolt -1- and move catalytic converter to one side.

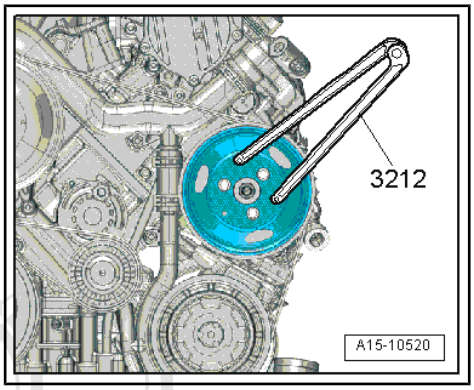


Note

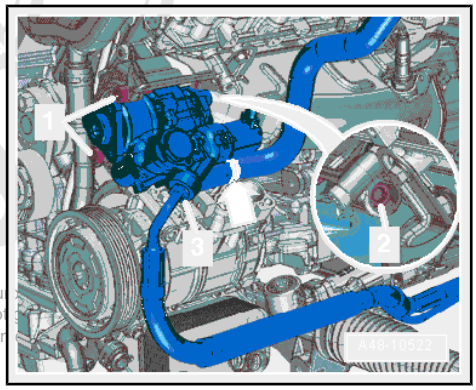
For illustration purposes, the installation position is shown with the engine removed.

All vehicles (continued):

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



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



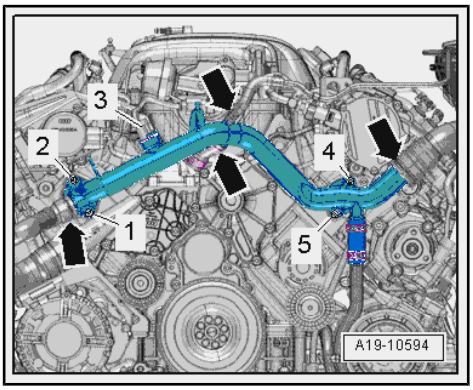
Note

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

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

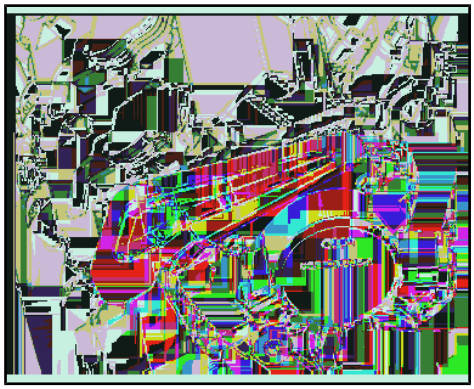
– Unscrew bolts -1, 2, 4, 5- on front coolant pipe.



Note

Disregard -arrows-.

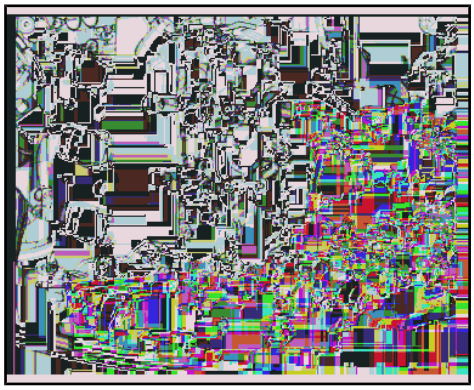
– Remove guard plate -1- for high-pressure pipe -arrows-.



WARNING

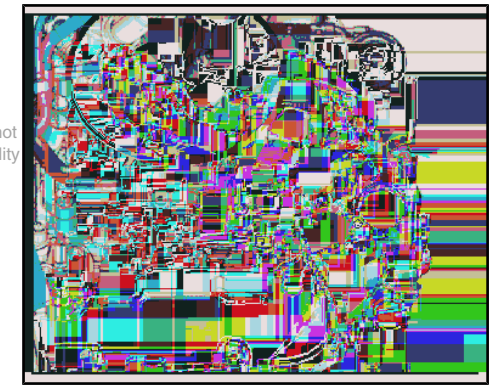
The fuel system operates at extremely high pressure. This can cause injury.

- ***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.***



– Reduce fuel pressure in high-pressure section of injection system ⇒ page 4 .
– 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-.

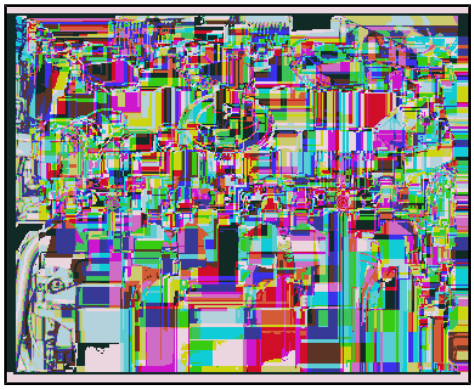


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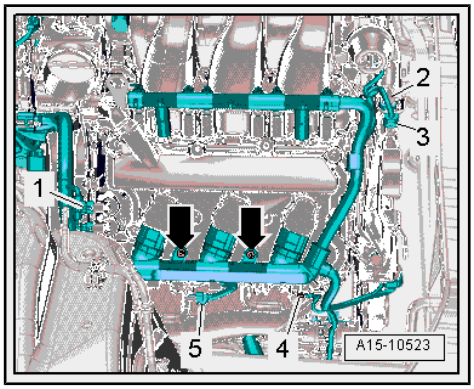
Note

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

– Unplug electrical connectors (left and right) -arrows- on actuators for variable valve timing.
– Remove bolts -1- and -2- and move wiring harness clear.
– Remove cylinder head cover: left-side ⇒ page 175 ; right-side ⇒ page 177 .



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

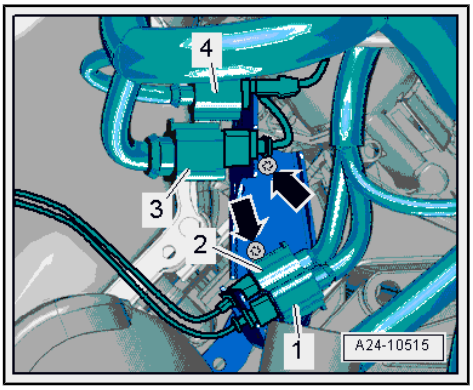


Note

Disregard items marked -1, 2 and 5-.

– Remove timing chain covers (left and right) ⇒ page 140 .

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

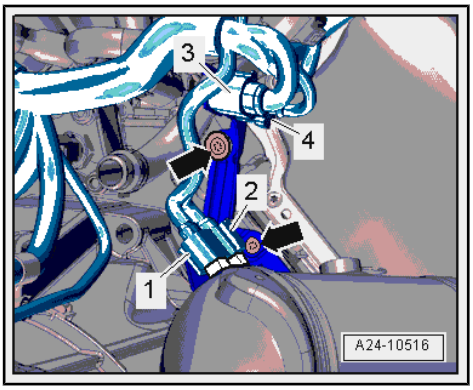


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Note

Disregard items marked -1 ... 4-.

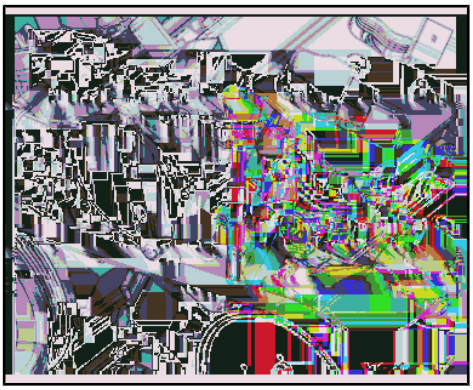
– Remove bolts -arrows- and detach bracket (right-side) for connectors.



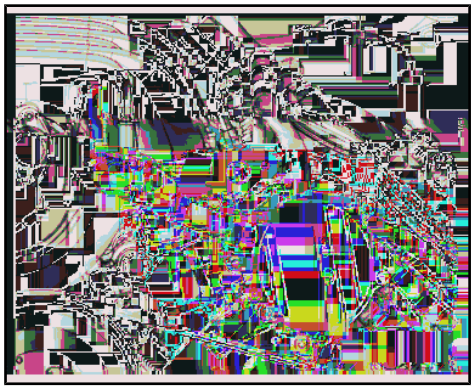
Note

Disregard items marked -1 ... 4-.

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

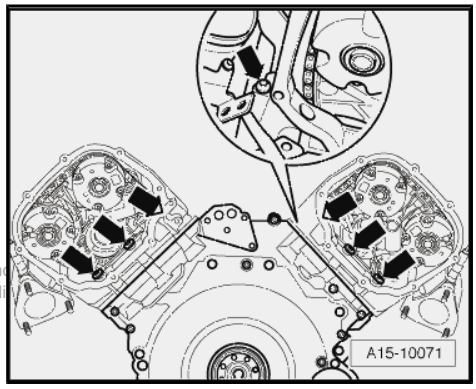


– Detach vacuum hose from exhauster pump -arrow- and move clear.



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

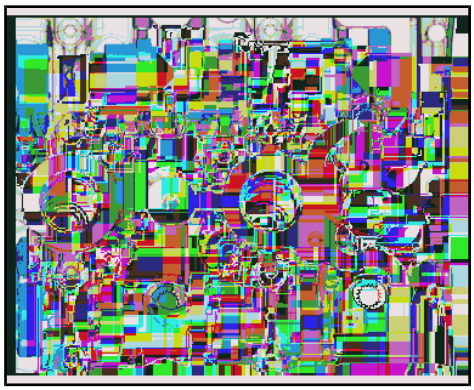
- Cylinder head (left-side): 3 bolts
- Cylinder head (right-side): 4 bolts



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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 circle of the cam). For this reason it is important to keep to sequence described in the following when loosening the cylinder head bolts.***

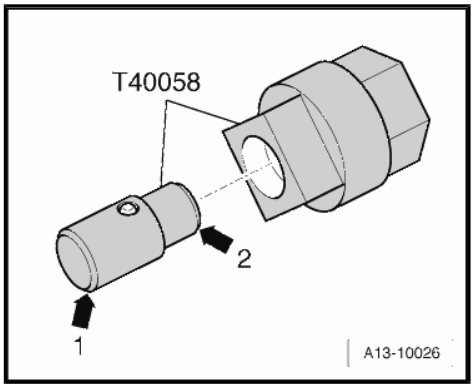
Risk of breakage

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

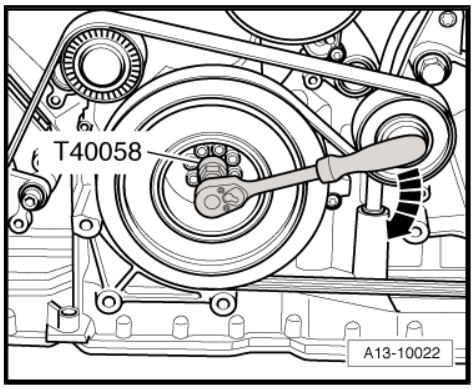
– Insert guide pin of adapter -T40058- as follows:

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

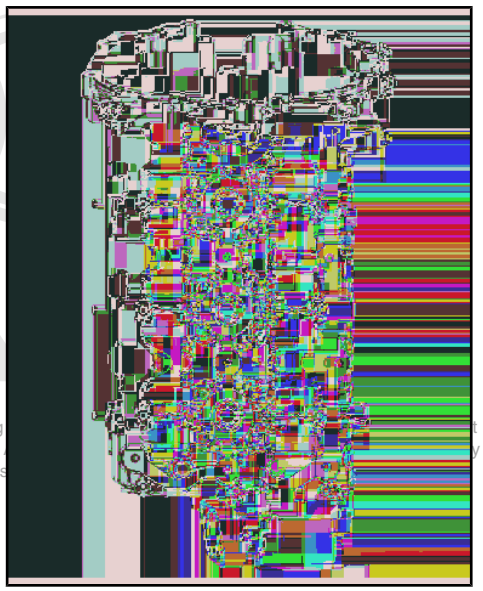
• The smaller-diameter section -arrow 2- faces the adapter.



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



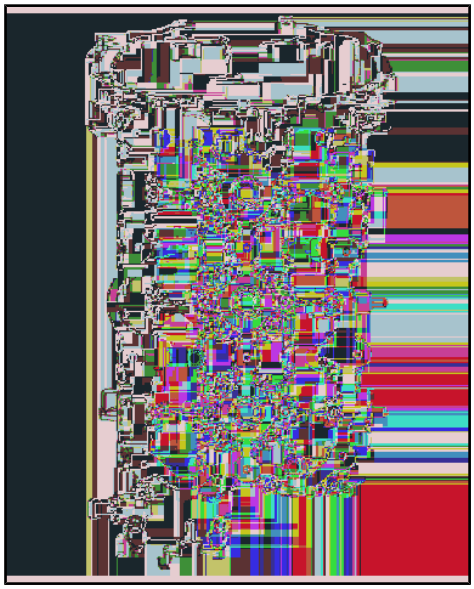
• The recesses -arrows- on the exhaust camshaft must point towards the outside of the engine as shown in the illustration.



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Cylinder head (left-side):

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



Cylinder head (right-side):

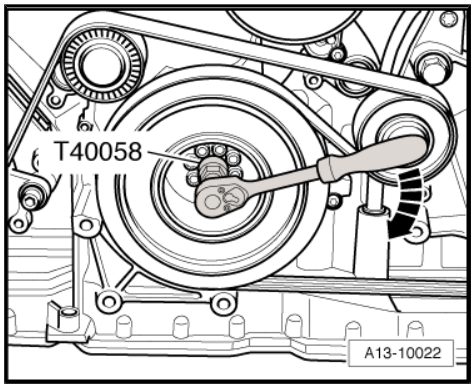
– Press slider -F- as far as stop in direction of -arrow- (slider should not be under load).



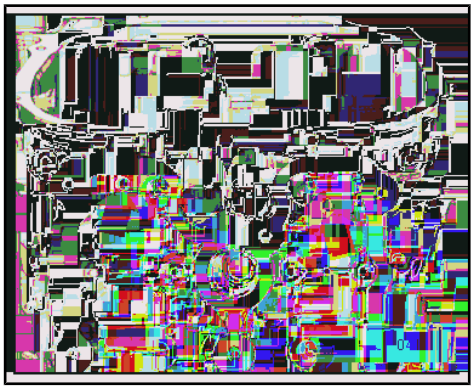
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Continued for both cylinder heads:

– 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):

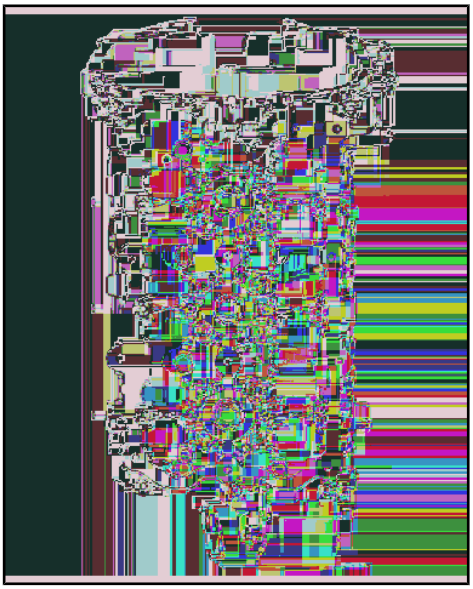
– Unscrew bolt -1- and remove.



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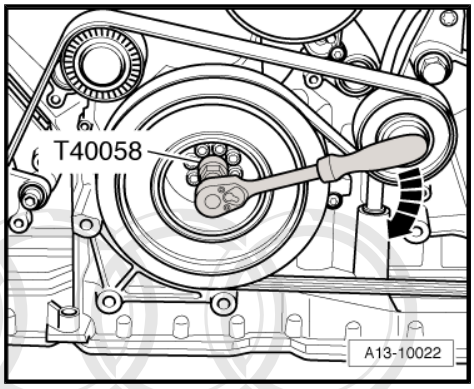
Cylinder head (right-side):

– Unscrew bolt -2- and remove.

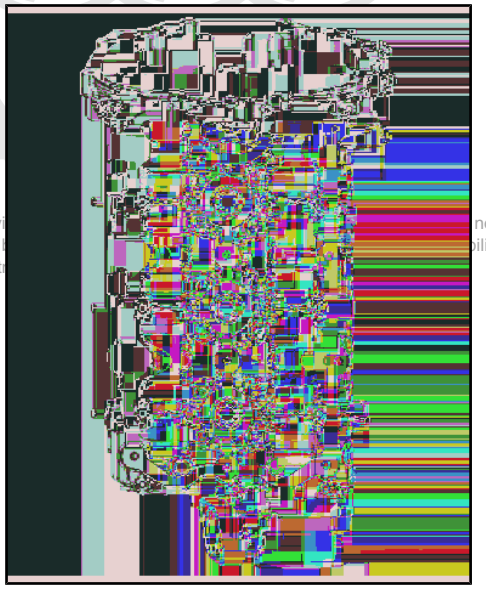


Continued for both cylinder heads:

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



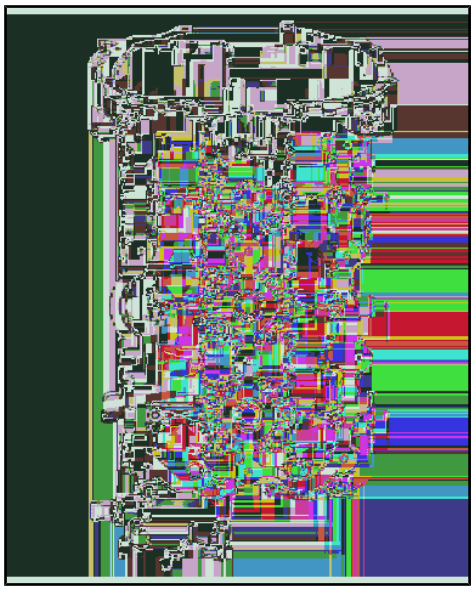
• The recesses -arrows- on the exhaust camshaft must point towards the outside of the engine.



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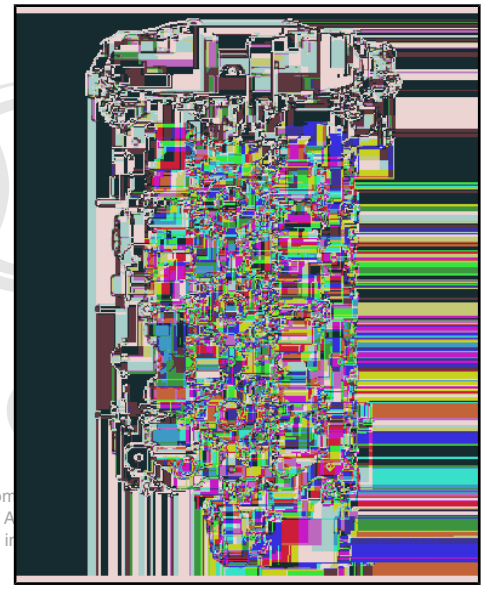
Cylinder head (left-side):

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



Cylinder head (right-side):

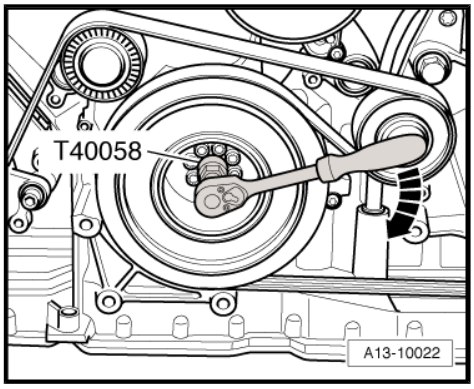
– Press slider -F- as far as stop in direction of -arrow- (slider should not be under load).



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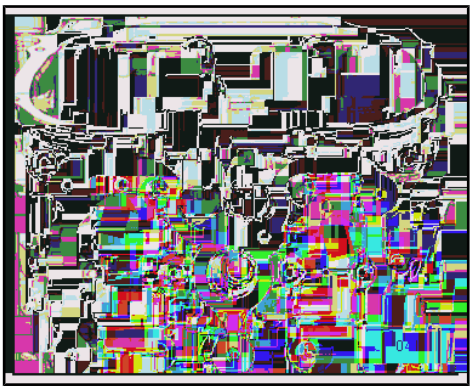
Continued for both cylinder heads:

– 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 151 .



Caution

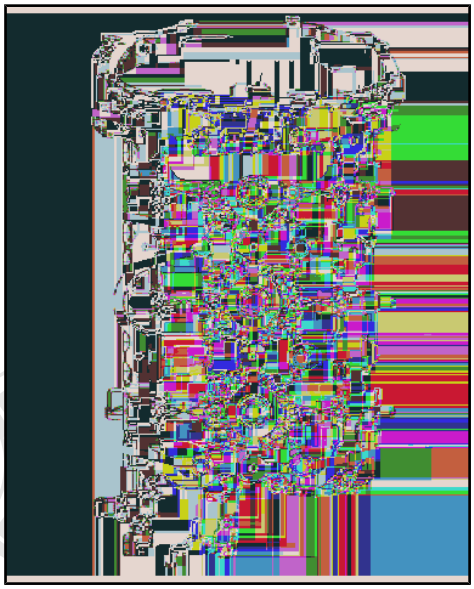
Avoid damage to valves and piston crowns.

- *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.

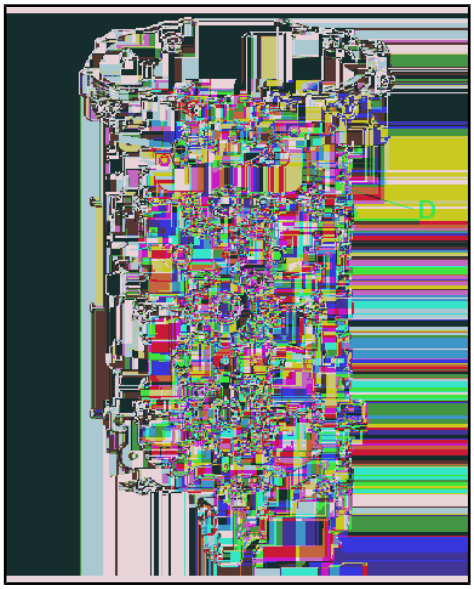


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Cylinder head (right-side):

– 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 172

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.*

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Note

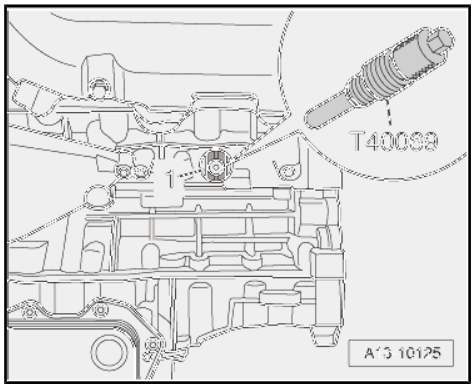
- *Renew the bolts tightened with specified tightening angle.*
- *Renew self-locking nuts as well as seals, gaskets and O-rings.*
- *Note the different sealants for sealing surfaces and cylinder head bolts.*
- *When installing an exchange cylinder head, the contact surfaces between the hydraulic compensation 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 fitting a new cylinder head or cylinder head gasket, change the coolant and the engine oil.*

– 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.

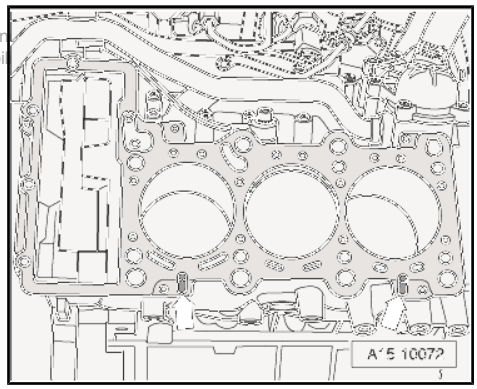


– Place cylinder head gasket in position.

• Note position of centering pins -arrows- in cylinder block.

• Check installation position of cylinder head gasket: the word “oben” (top) or the Part No. should face towards the cylinder head.

– Fit cylinder head.

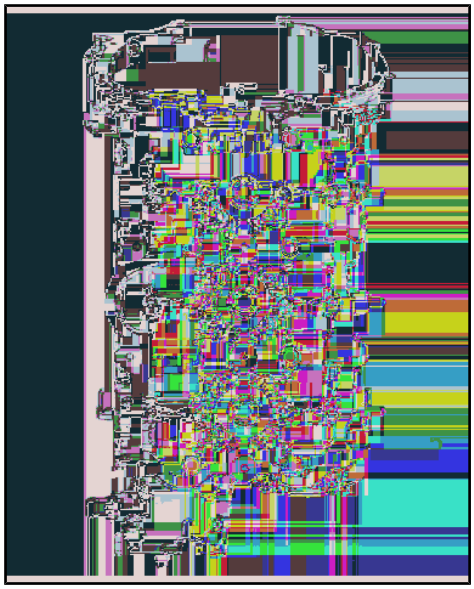


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Cylinder head (left-side):

– Move slider -A- as required (slider should not be under load) and fit bolts -1 ... 7-.

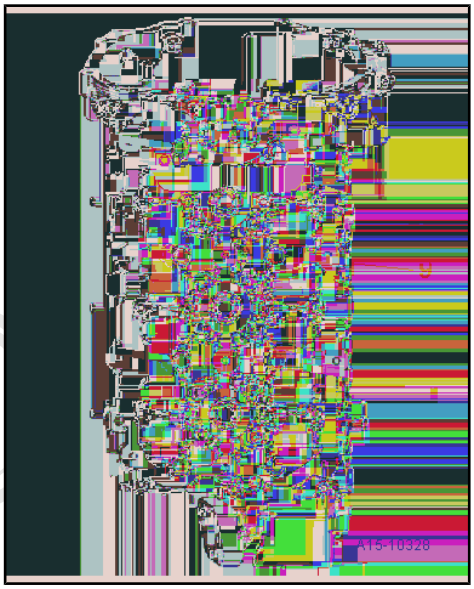
– Tighten bolts in the sequence -1 ... 7- in 3 stages as follows ⇒ page 172 .



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 as follows ⇒ page 172 .

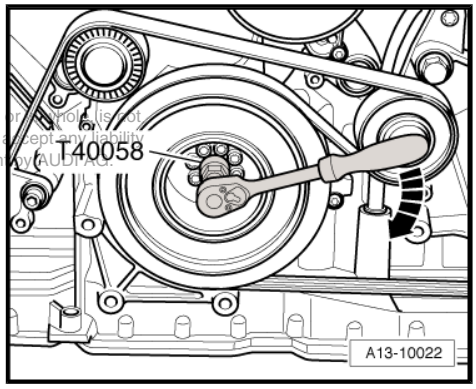


Continued for both cylinder heads:

– Fit timing chains on camshafts ⇒ page 156 .

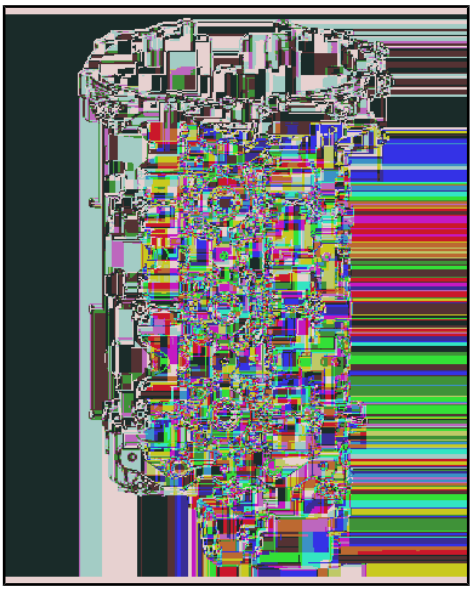
– Remove camshaft clamp -T40133- and locking pin -T40069-.

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



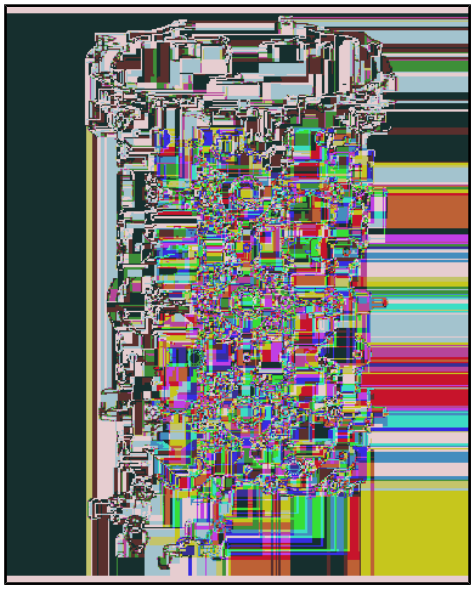
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• The recesses -arrows- on the exhaust camshaft must point towards the outside of the engine.



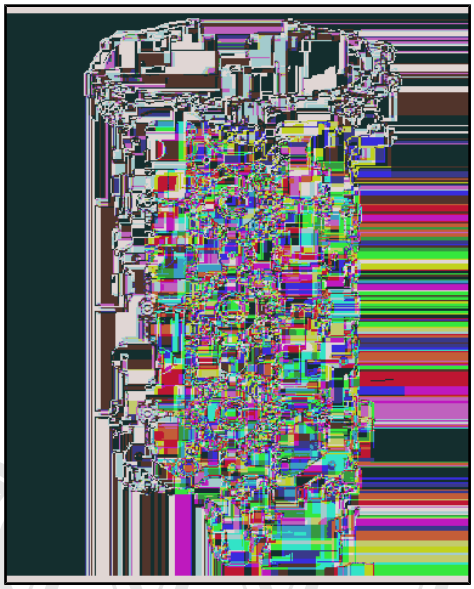
Cylinder head (left-side):

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



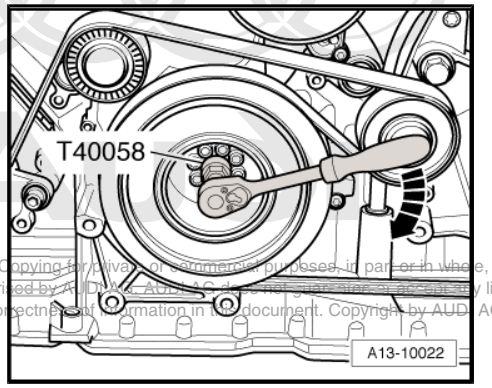
Cylinder head (right-side):

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



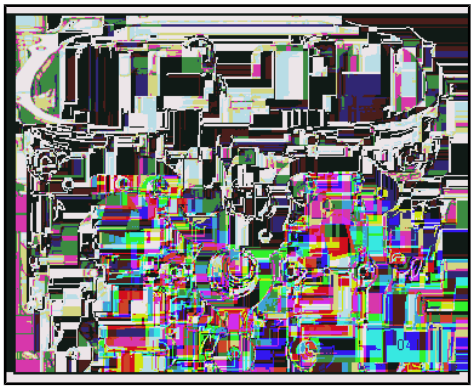
Continued for both cylinder heads:

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



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



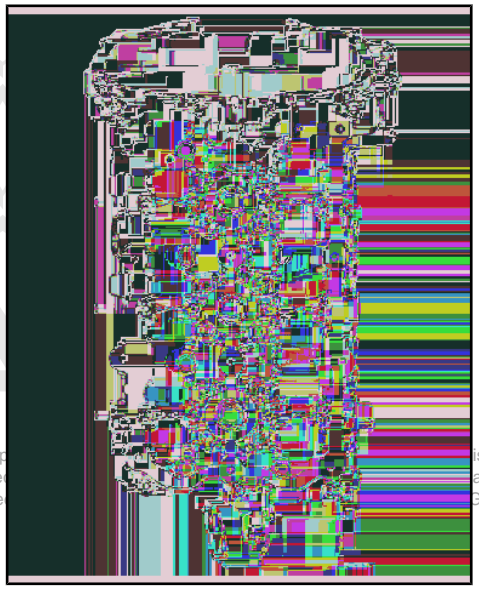
Cylinder head (left-side):

– Fit bolt -15- and tighten in three stages ⇒ page 172 .



Cylinder head (right-side):

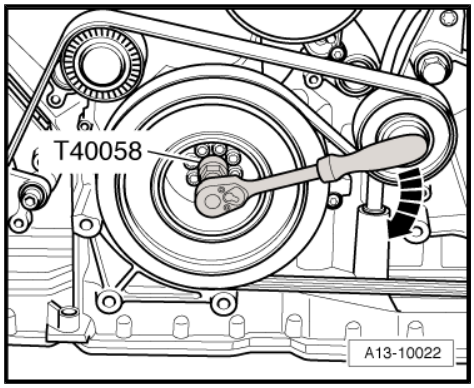
– Fit bolt -16- and tighten in three stages ⇒ page 172 .



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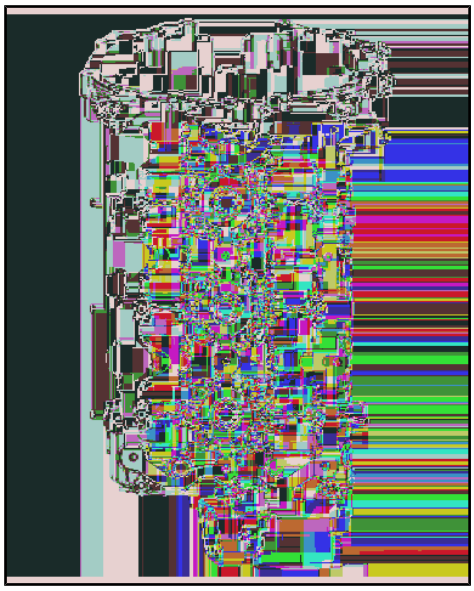
Continued for both cylinder heads:

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



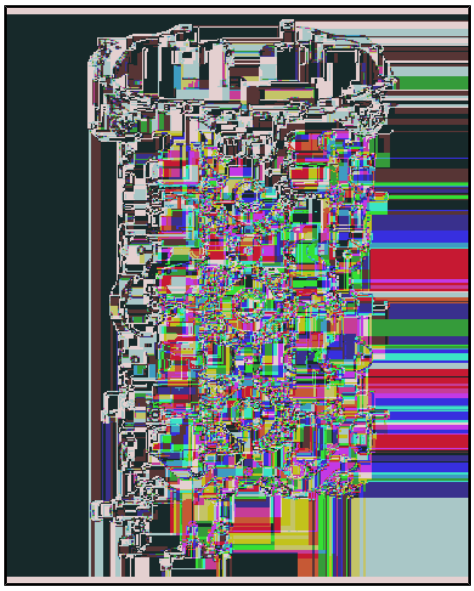
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• The recesses -arrows- on the exhaust camshaft must point towards the outside of the engine.



Cylinder head (left-side):

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



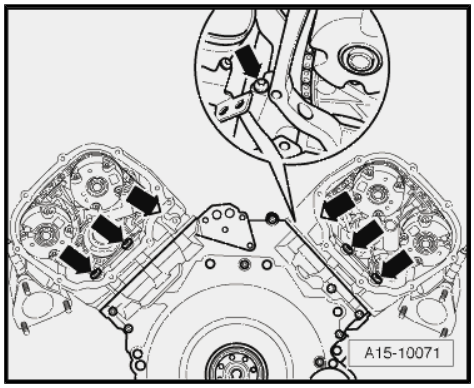
Cylinder head (right-side):

– 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.

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

– Install dipstick guide tube ⇒ page 175 .

– Fit timing chains on camshafts ⇒ page 156 .

– Install cylinder head cover: left-side ⇒ page 175 ; right-side ⇒ page 177 .

– Install coolant pipe (front) ⇒ page 262 .

– Install power steering pump ⇒ Rep. Gr. 48 .

– Install catalytic converter (left-side): vehicles with manual gearbox ⇒ page 298 , vehicles with multitronic gearbox 0AW/ automatic gearbox 0B6 ⇒ page 299 .

– Install catalytic converter (right-side): vehicles with manual gearbox/multitronic gearbox 0AW ⇒ page 300 , vehicles with automatic gearbox 0B6 ⇒ page 301

– Install front silencer ⇒ page 303 .

– Install plenum chamber partition panel ⇒ Rep. Gr. 50 .

– Install high-pressure pipe, fuel supply hose and intake manifold (bottom sections) ⇒ Rep. Gr. 24 .

– Install poly V-belt ⇒ page 119 .

– Install coolant pipe (top) ⇒ page 267 .

– Change engine oil ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .

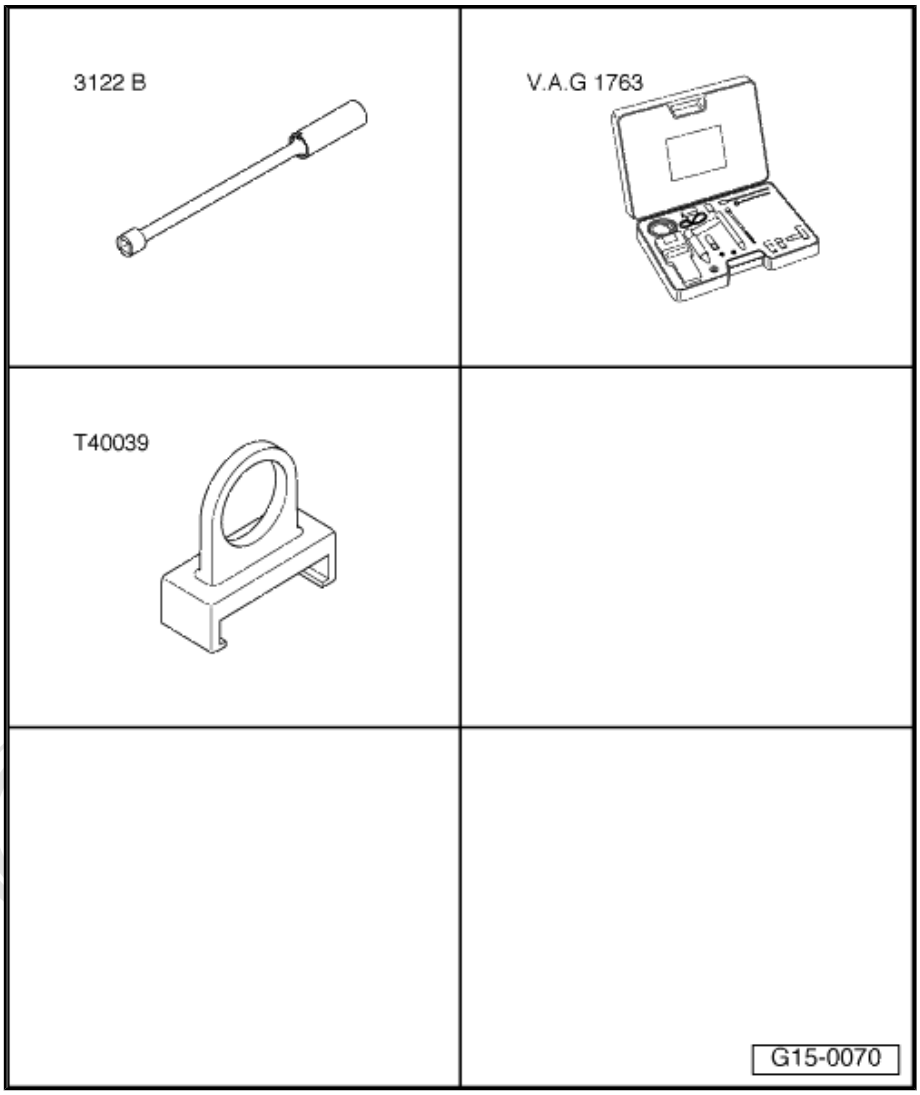
– Fill cooling system with fresh coolant ⇒ page 251 .

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2.5 Checking compression

Special tools and workshop equipment required

- Spark plug socket and extension -3122 B-
- Compression tester -V.A.G 1763-
- Puller -T40039-

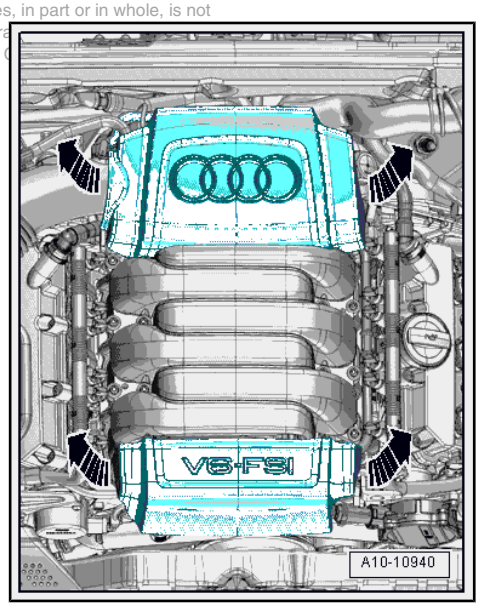


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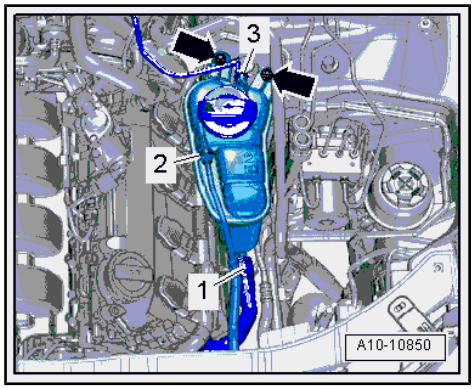
Procedure

- Engine oil temperature min. 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.



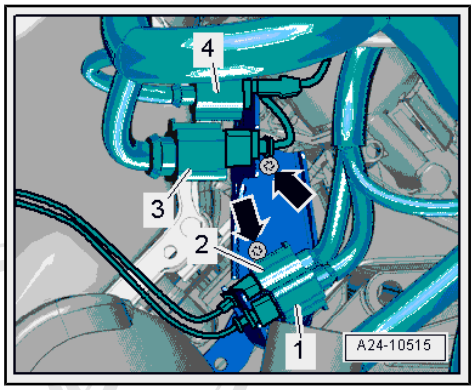
– Remove bolts -arrows- and unplug electrical connectors at ignition coils on cylinder head (left-side).
– Press electrical wiring harness down slightly.



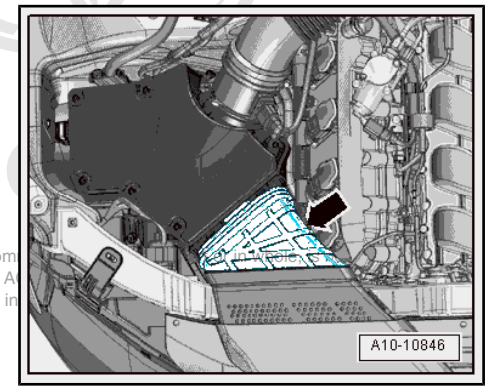
– Unplug electrical connector -3- for injectors at rear of cylinder head (left-side).

Note

Disregard items marked -1, 2, 4- and -arrows-.

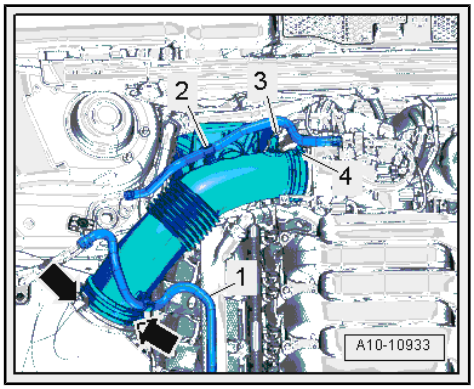


– Remove air duct -arrow-.

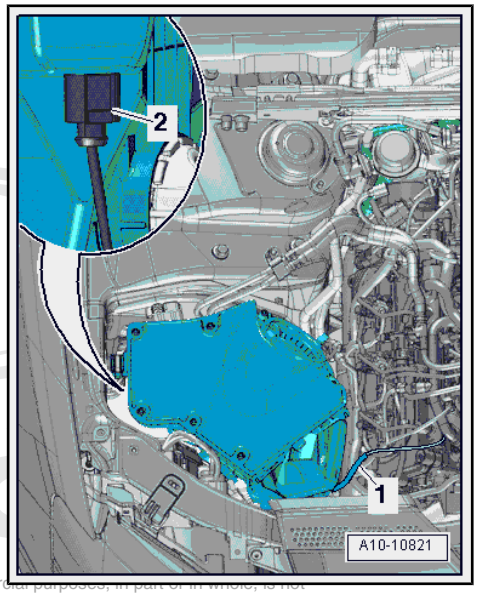


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– Move fuel line -1- and line -2- (leading to activated charcoal filter) clear at air pipe.
– Disconnect vacuum hose -3- from connection on air pipe.
– Remove air pipe. To do so, release hose clip -4- and clamps -arrows-.

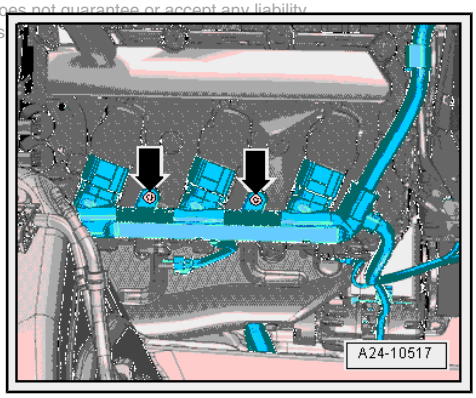


– Disconnect vacuum line -1-.
– Detach air cleaner housing and, if fitted, unplug electrical connector -2- at variable intake manifold change-over valve - N335- on reverse side of air cleaner.



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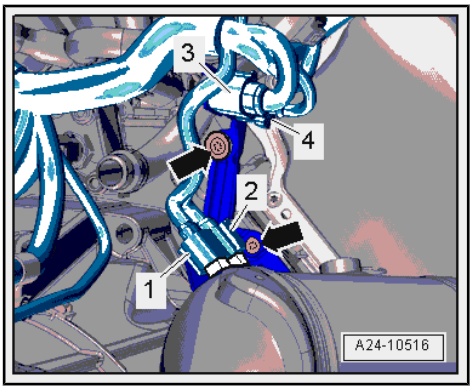
– Remove bolts -arrows- and unplug electrical connectors at ignition coils on cylinder head (right-side).
– Move wiring harness clear to the side.



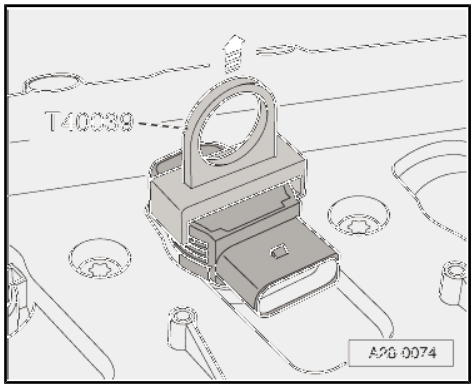
– Unplug electrical connector -3- for injectors at rear of cylinder head (right-side).

Note

Disregard items marked -1, 2, 4- and -arrows-.



– 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	10.0 … 14.0
Wear limit	9.0
Maximum difference between cylinders	3.0

Assembling

• Tightening torque ⇒ page 172 .

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 ⇒ Rep. Gr. 24 .
– Faults are stored in engine control unit because electrical connectors were unplugged and engine was started: “Generate readiness code” in “Guided Functions” ⇒ Vehicle diagnosis, testing and information system VAS 5051.

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3 Valve gear

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.***

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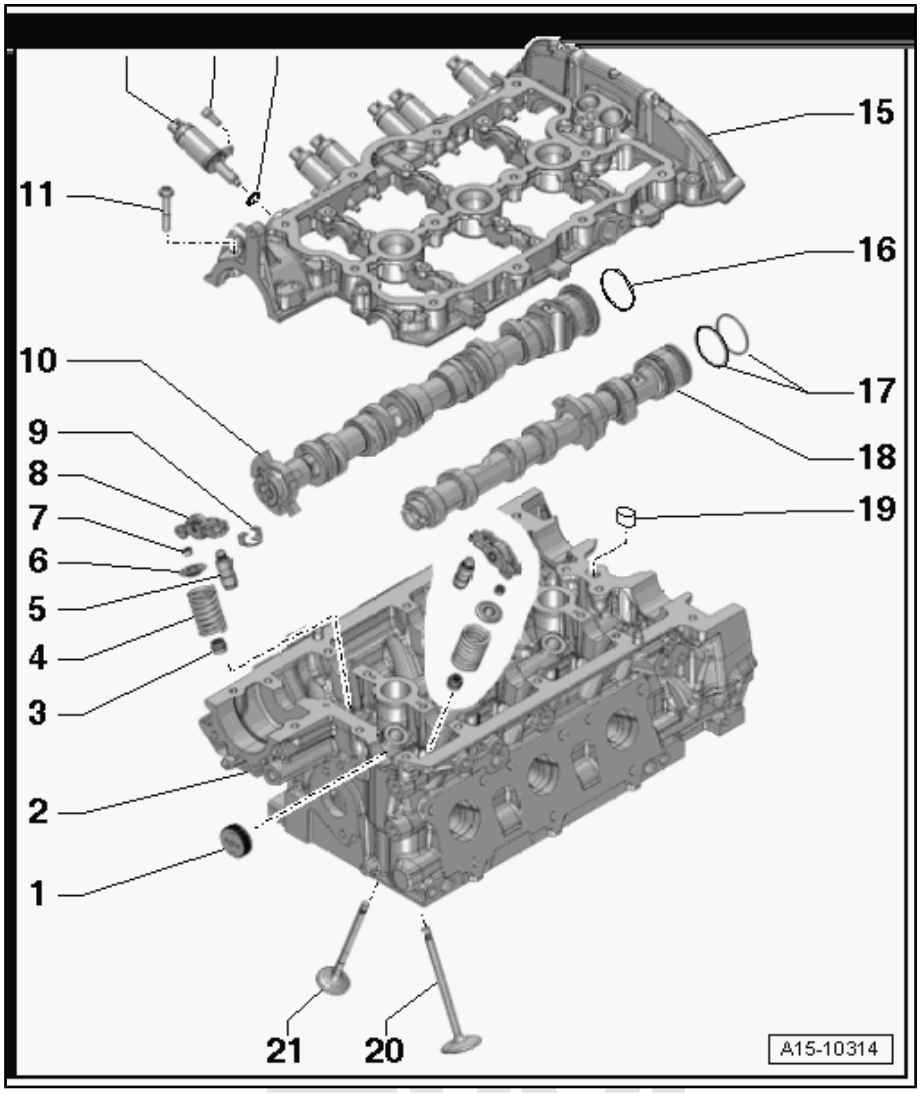
Note

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.

3.1 Valve gear - exploded view

Note

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



1 - Sealing plug

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

2 - Cylinder head

- ❑ Checking valve guides ⇒ page 224

3 - Valve stem oil seal

- ❑ Renewing with cylinder head installed ⇒ page 217
- ❑ Renewing with cylinder head removed ⇒ page 220

4 - Valve spring

- ❑ Installation position ⇒ page 208

5 - Hydraulic valve compensation element

- ❑ Checking ⇒ page 214
- ❑ Mark installation position for re-installation with a coloured pen
- ❑ Lubricate contact surfaces before installing

6 - Valve spring plate

7 - Valve cotters

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-

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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 208
- ❑ Removing and installing ⇒ page 209
- ❑ Measuring radial clearance ⇒ page 209
- ❑ Runout: max. 0.04 mm

11 - Bolt

- ❑ Renew
- ❑ Tightening sequence ⇒ page 207

12 - Actuator for variable valve timing

13 - Bolt

- ❑ 5 Nm

14 - O-ring

- ❑ Renew

15 - Retaining frame

- ❑ With integrated camshaft bearings
- ❑ Removing and installing ⇒ “3.4 Removing and installing camshafts”, page 209

16 - Compression ring

17 - Rectangular section seals

18 - Exhaust camshaft

- ❑ Measuring axial clearance ⇒ page 208
- ❑ Removing and installing ⇒ page 209
- ❑ Measuring radial clearance ⇒ page 209
- ❑ Runout: max. 0.04 mm

19 - Oil strainer

20 - Inlet valve

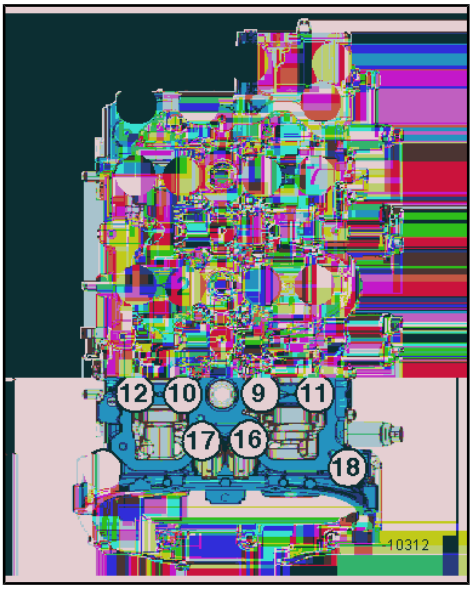
- ❑ Do not machine, only grinding-in is permitted
- ❑ Mark installation position for re-installation
- ❑ Valve dimensions ⇒ page 224
- ❑ Checking valve guides ⇒ page 224

21 - Exhaust valve

- ❑ Do not machine, only grinding-in is permitted
- ❑ Mark installation position for re-installation
- ❑ Valve dimensions ⇒ page 224
- ❑ Checking valve guides ⇒ page 224

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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.

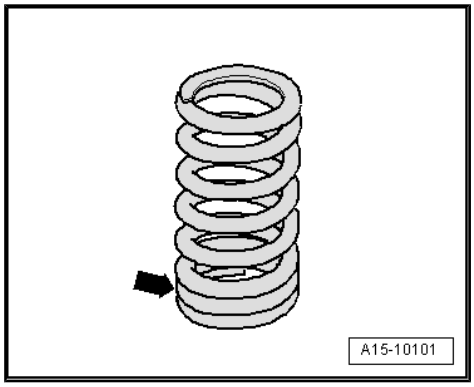
• The retaining frame should make contact with the cylinder head over the full surface.

2. Tighten to 8 Nm.

3. Turn 90° further.

Position of valve spring

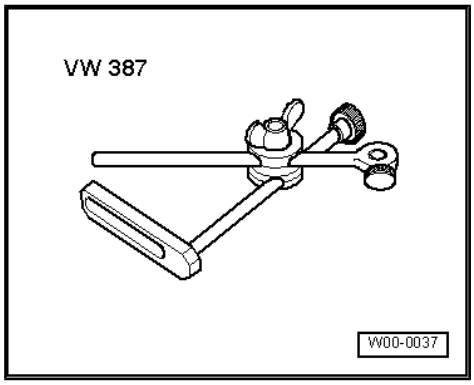
- Closely spaced spring coils -arrow- face towards cylinder head.



3.2 Measuring axial clearance of camshafts

Special tools and workshop equipment required

♦ Universal dial gauge bracket -VW 387-



♦ Dial gauge -VAS 6080-



Procedure

– Remove camshafts ⇒ page 209 .

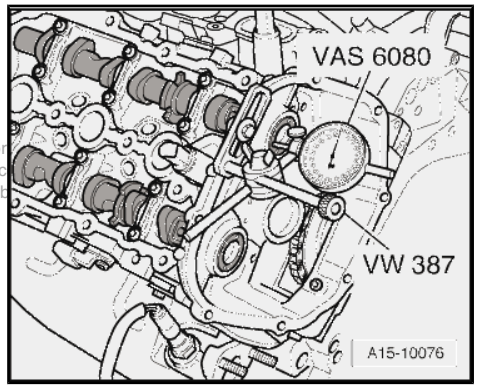
– Mark original positions of roller rocker fingers and hydraulic compensation elements for reinstallation.

– 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



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3.3 Measuring radial clearance of camshafts

Special tools and workshop equipment required

- Plastigage

Procedure

– Remove camshafts ⇒ page 209 .

– Mark allocation of roller rocker fingers for re-installation.

– Carefully remove roller rocker fingers and place them on a clean surface.

– Clean bearing and bearing journal.

– Place a length of Plastigage corresponding to the width of the bearing on the bearing journal or bearing shell to be measured.

• The Plastigage must be positioned in the centre of the bearing.

– Re-insert camshafts, fit retaining frame and tighten to 8 Nm without rotating camshafts ⇒ page 207 .

– Remove retaining frame and camshafts again.

– Compare width of Plastigage with measurement scale.

Radial clearance:

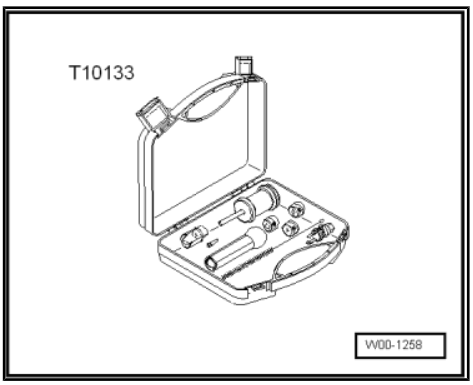
• With bearing (∅ 24 mm): 0.024 ... 0.066 mm

• With bearing (∅ 36 mm): 0.032 ... 0.078 mm

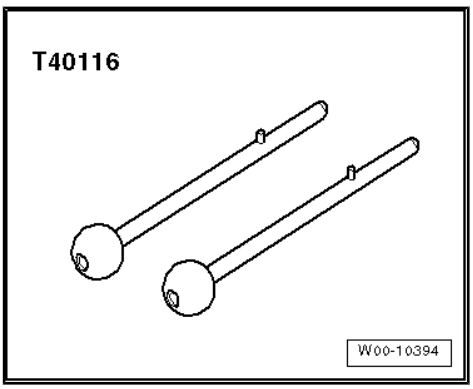
3.4 Removing and installing camshafts

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

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♦ Sealant ⇒ Electronic parts catalogue

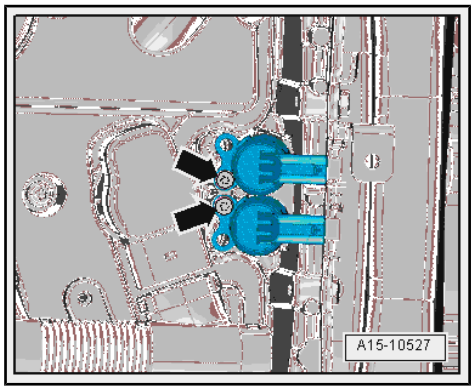
Removing

– Remove timing chains from camshafts ⇒ page 151 .

– To remove the camshafts in cylinder head (left-side) you must first remove the exhauster pump for brake servo ⇒ Rep. Gr. 47 .

– To remove camshafts in cylinder head (right-side), first remove high-pressure pump and housing for high-pressure pump drive ⇒ Rep. Gr. 24 .

– Remove bolts -arrows- and detach camshaft control valves.

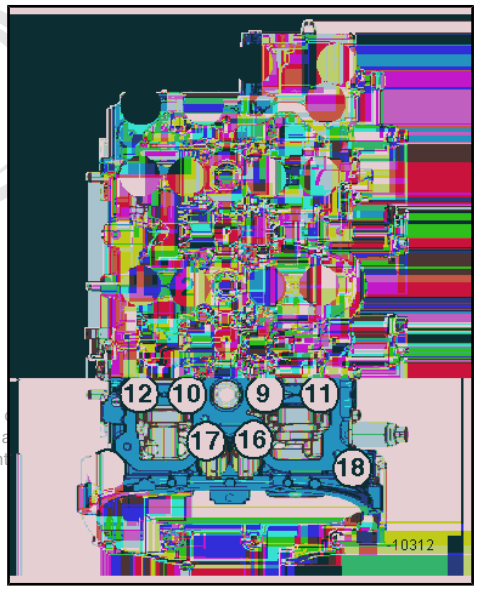


– Slacken retaining frame bolts in the sequence -21 ... 1-.

Note

The illustration shows the retaining frame for cylinder head (left-side).

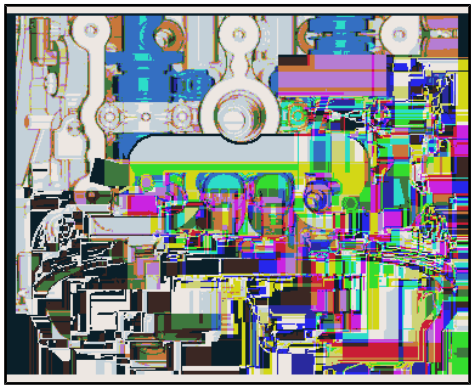
– Carefully remove retaining frame and set it down on a soft surface on workbench.



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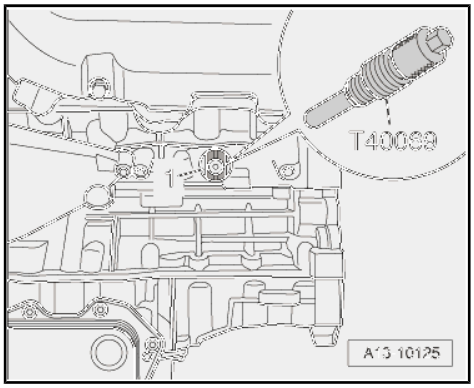
– Remove camshaft clamp -T40133- .

– 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

Protect eyes against injuries.

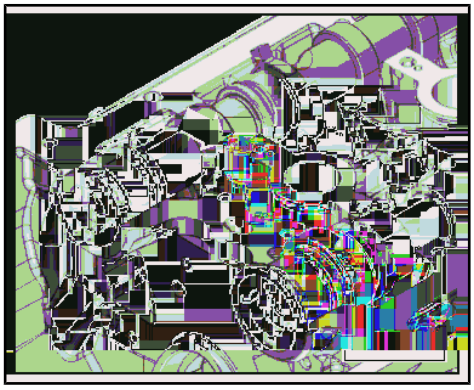
- ***Wear safety goggles.***

– 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.

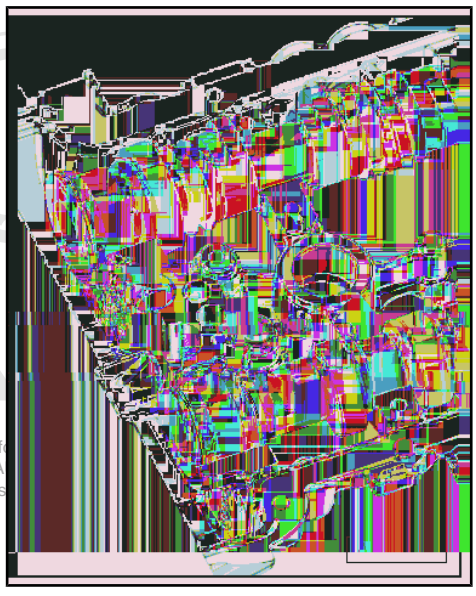
– Oil running surfaces of both camshafts.



– Fit camshafts in retaining frame.

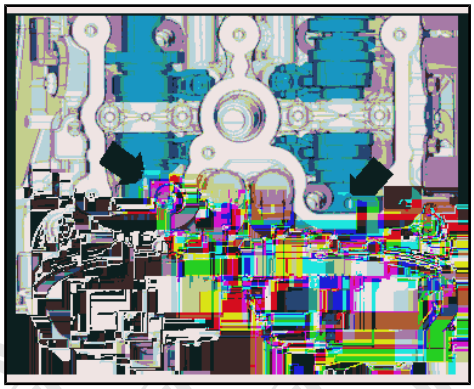
- Camshafts must be in correct position in axial bearings -arrows- in retaining frame.
- The ends of the rectangular section seals -1, 2, 3- must point up or down, never to the side.

– Turn retaining frame over with camshafts fitted, holding camshafts firmly in position.

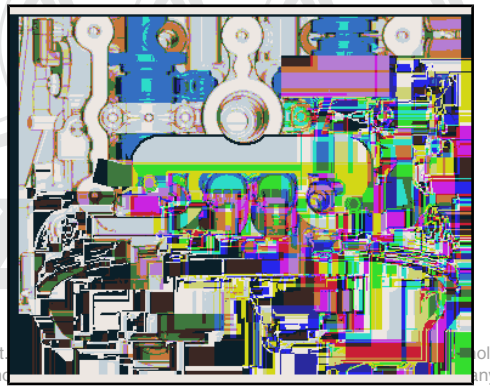


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– Turn camshafts until threaded holes -arrows- point upwards.
– Check that camshafts are still in correct position in axial bearings in retaining frame.



– Fit camshaft clamp -T40133- and tighten bolts -arrows- to 25 Nm.

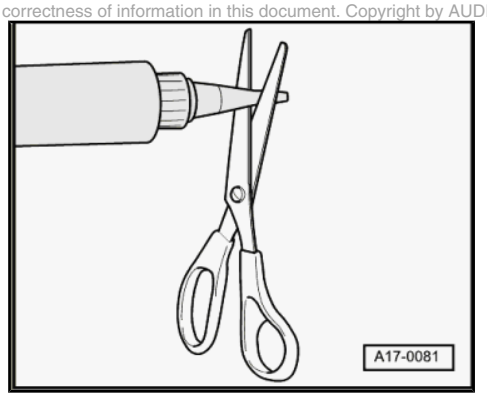


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Note

Note the use-by date of the sealant.

– Cut off nozzle of tube at front marking (nozzle ∅ approx. 2.0 mm).

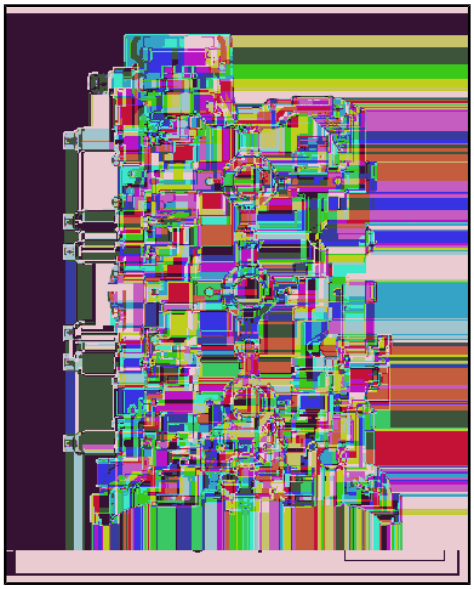


– Turn retaining frame upside down again.

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.

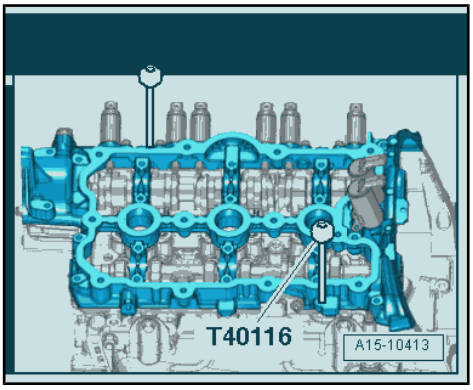
Note

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Fit and secure the retaining frame without delay, as the sealant starts hardening immediately.

– Fit retaining frame onto cylinder head.

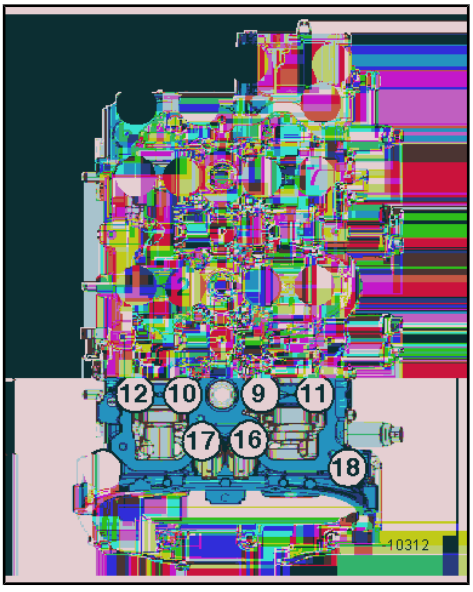
– Insert locating pins -T40116- in retaining frame and cylinder head.



Note

After installing the retaining frame, the sealant must dry for approx. 30 minutes.

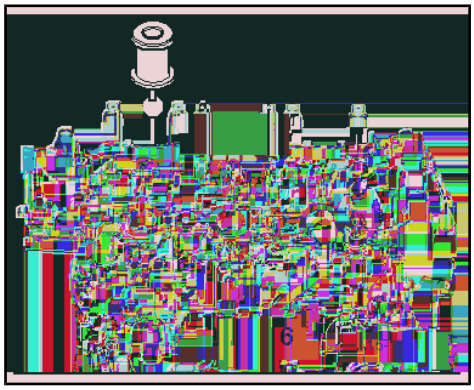
– Tighten retaining frame bolts in the sequence -1 ... 21- ⇒ page 207 .



– 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 -T10133/3- to pull out locating pins -T40116- .



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

– Install camshaft control valves ⇒ page 172 .
– Install exhauster pump for brake servo ⇒ Rep. Gr. 47 .
– Install housing for high-pressure pump drive and high-pressure pump ⇒ Rep. Gr. 24 .
– Fit timing chains on camshafts ⇒ page 156 .

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.***

3.5 Checking hydraulic valve compensation elements

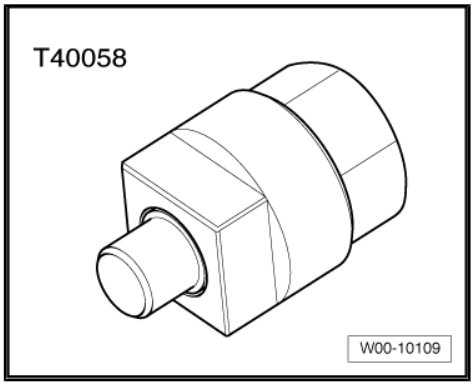
Note

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

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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 175 ; right-side ⇒ page 177 .

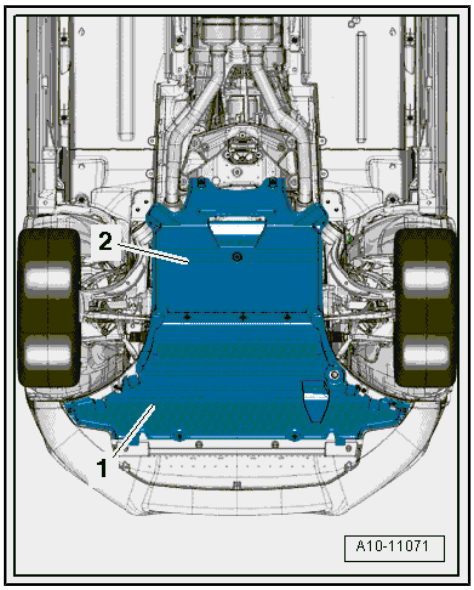
– Turn crankshaft as follows until cams of compensation element to be tested are at top:

Vehicles with manual gearbox:

– Push vehicle forwards with 4th gear engaged and ignition switched off.

Vehicles with multitronic gearbox 0AW/automatic gearbox 0B6:

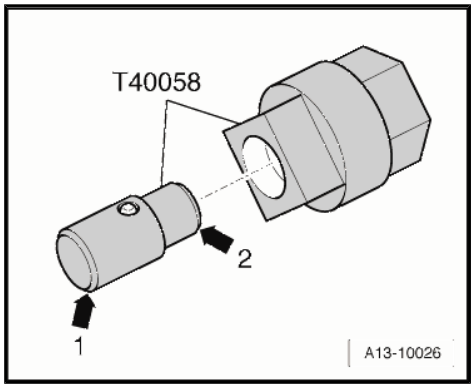
– Remove front noise insulation -1- ⇒ Rep. Gr. 66 .



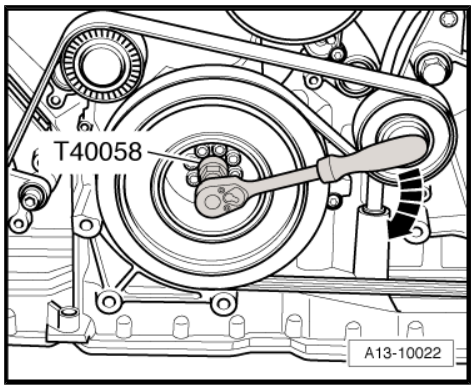
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– Insert guide pin of adapter -T40058- as follows:

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



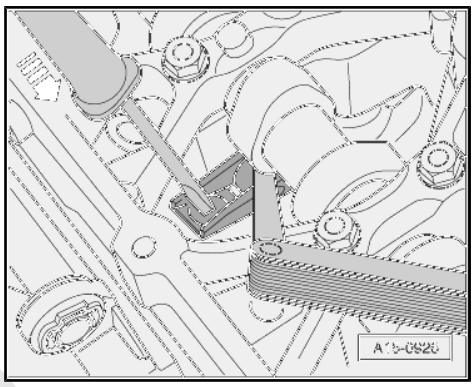
– Turn crankshaft with adapter -T40058- in normal direction of rotation -arrow-.



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
⇒ “3.4 Removing and installing camshafts”, page 209 .



Additional steps required

– Install cylinder head cover: left-side ⇒ page 175 ; right-side ⇒ page 177 .

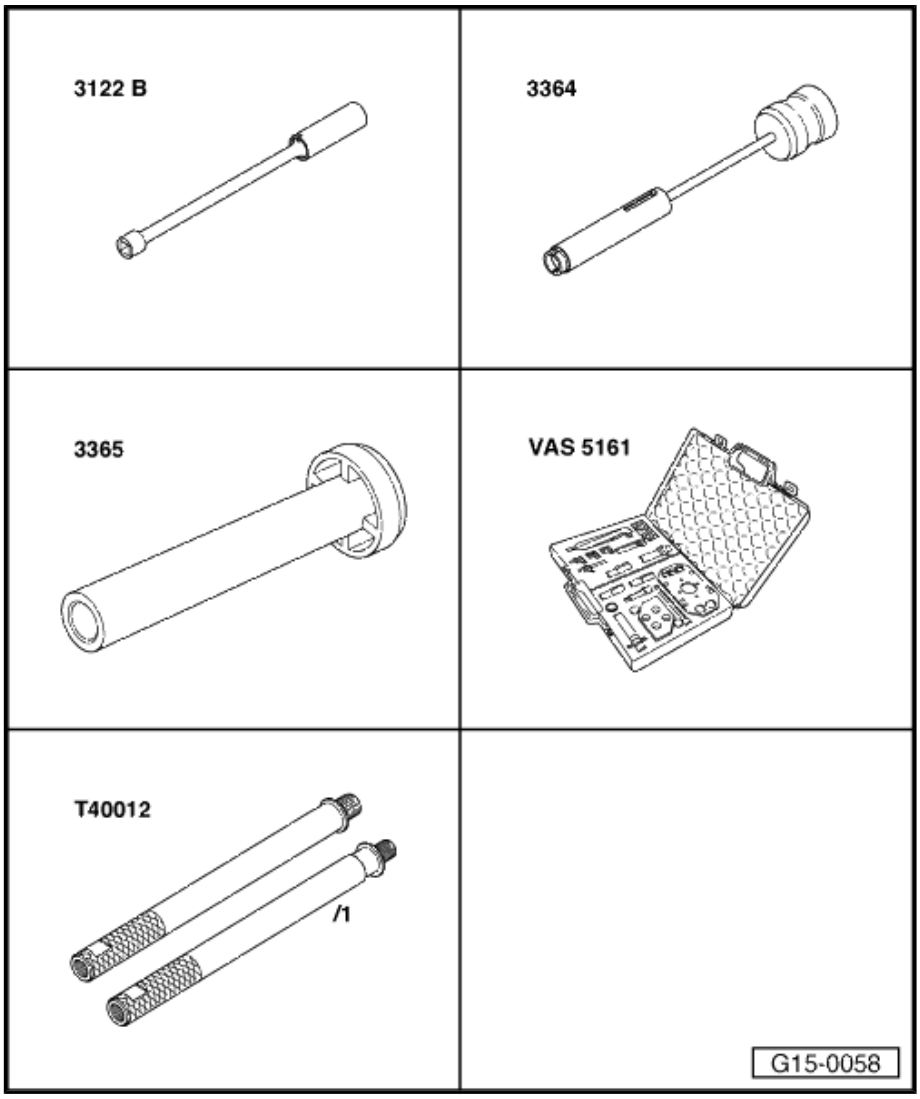
– Install front noise insulation ⇒ Rep. Gr. 66 .

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3.6 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-
- Adapter -T40012-



Procedure

– Remove camshafts ⇒ page 209 .

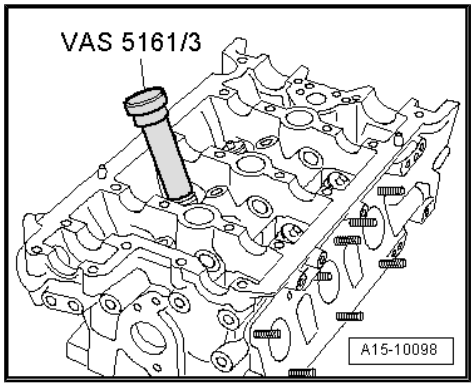
– Mark original positions of roller rocker fingers and hydraulic compensation elements for reinstallation.

– Remove roller rocker fingers together with hydraulic compensation elements and put down on a clean surface.

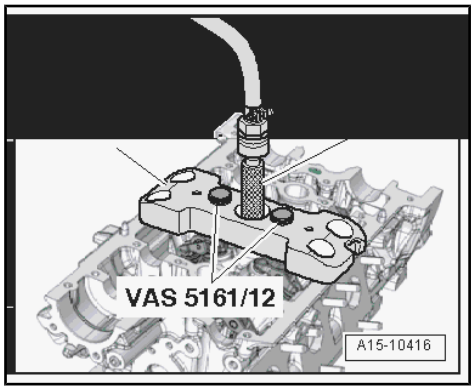
– Remove spark plugs with spark plug socket and extension -3122 B- .

– Set piston of appropriate cylinder to “bottom dead centre”.

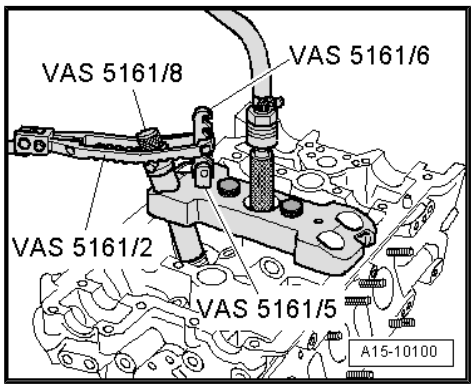
– Apply drift -VAS 5161/3- to valve spring plate and use plastic-headed hammer to release sticking valve cotters.



– Fit guide plate -VAS 5161/19B- from removal and installation device for valve cotters -VAS 5161- on cylinder head.
– Secure guide plate with knurled screws -VAS 5161/12- .
– Screw adapter -T40012- with seal hand-tight into the corresponding spark plug thread.
– Connect adapter to compressed air line using a commercially available connection piece, and apply constant air pressure.
• Air pressure: at least 6 bar



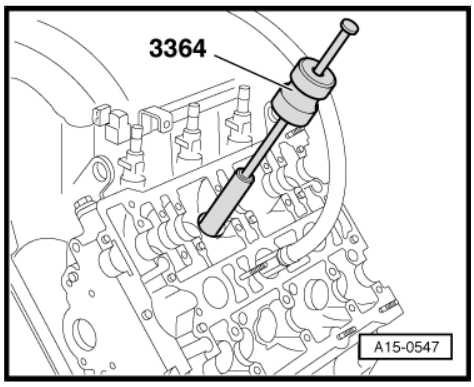
– Screw snap-in device -VAS 5161/6- with engaging fork -VAS 5161/5- into guide plate.
– Insert assembly cartridge -VAS 5161/8- in guide plate.
– Attach pressure fork -VAS 5161/2- to snap-in device and push assembly cartridge down.
– At the same time, turn knurled screw of assembly cartridge clockwise 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.



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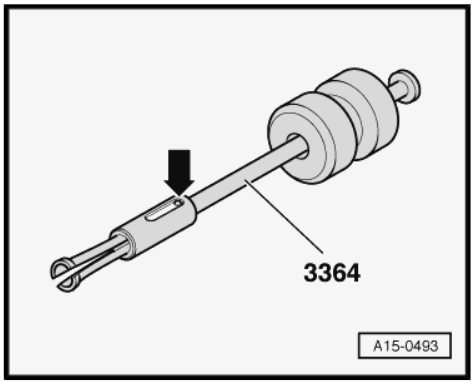
– Take out assembly cartridge.
– Detach guide plate and turn to one side.
• The compressed air hose remains connected.
– Detach valve spring with valve spring plate.

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



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

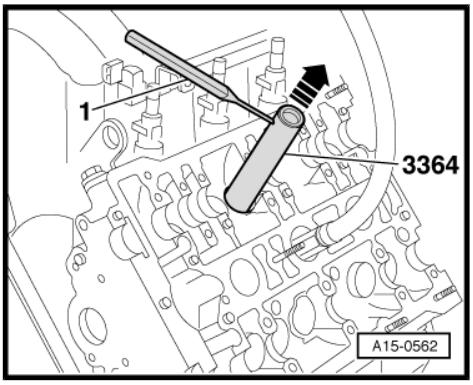
– Knock out pin -arrow- of puller using a drift and remove impact extractor attachment.



– Apply bottom section of puller -3364- to valve stem oil seal.

– Secure puller with a punch -1- or other suitable tool as shown in the illustration.

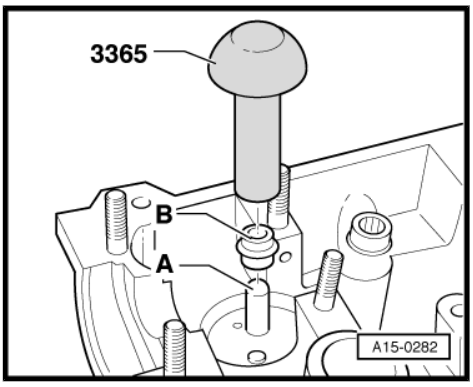
– Apply assembly lever to puller and pull out valve stem oil seal -arrow-.



Caution

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

- ***New valve stem oil seals -B- are supplied with plastic sleeve; fit plastic sleeve -A- onto valve stem.***



– Lightly oil sealing lip of valve stem oil seal.

– Slide valve stem oil seal onto plastic sleeve.

– Carefully press valve stem oil seal onto valve guide using valve stem seal fitting tool -3365- .

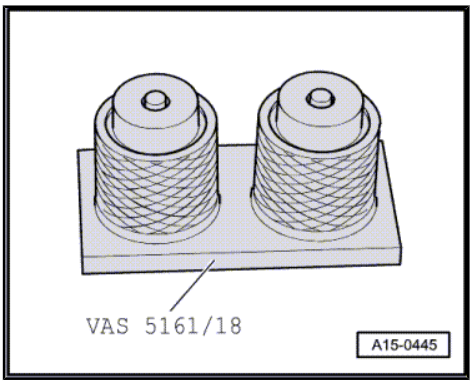
– Remove plastic sleeve.

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

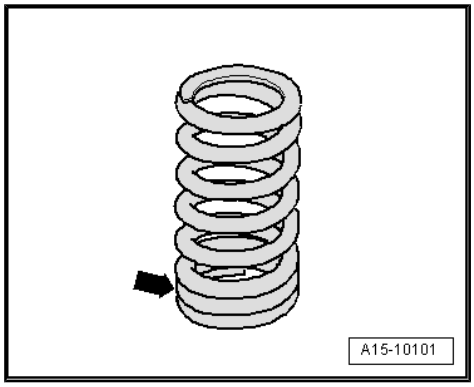
- Larger diameter of valve cotters faces upwards.

– Press assembly cartridge onto insertion device from above and take up valve cotters.



– Insert valve spring and valve spring plate.

• Installation position: Closely spaced spring coils -arrow- face towards cylinder head.



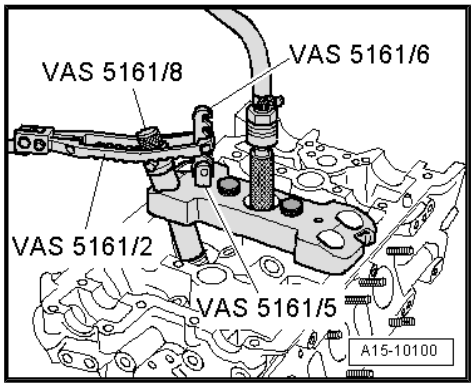
– Secure guide plate back onto cylinder head.

– 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 the 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.

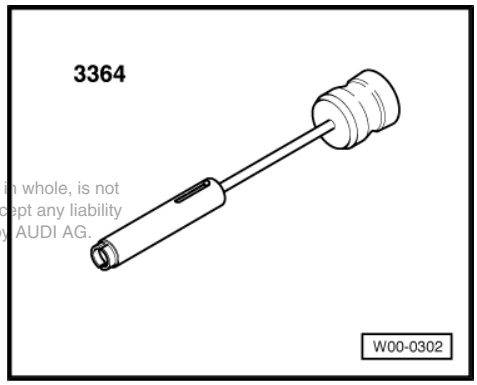
– Install camshafts ⇒ page 209 .

– Install spark plugs ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .

3.7 Renewing valve stem oil seals with cylinder head removed

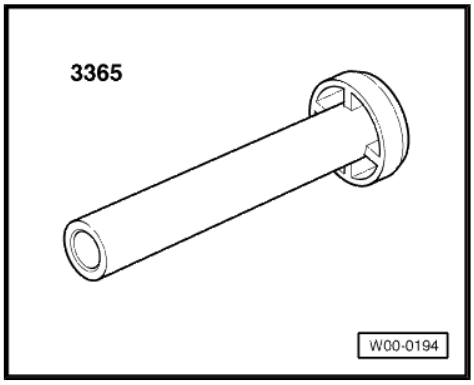
Special tools and workshop equipment required

♦ Valve stem seal puller -3364-

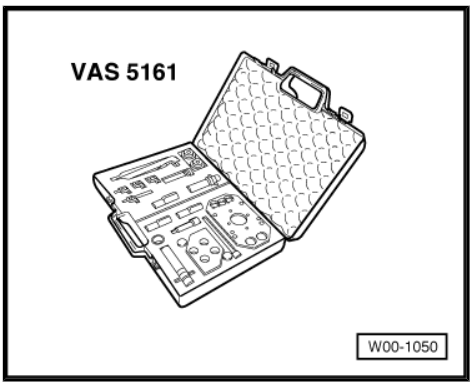


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- Valve stem seal fitting tool -3365-

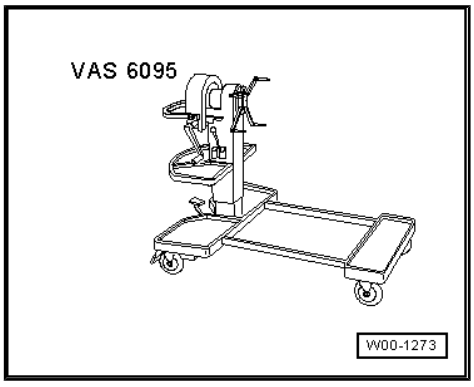


- Removal and installation device for valve cotters -VAS 5161- with guide plate -VAS 5161/19B-



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- Engine and gearbox support -VAS 6095-



- Cylinder head clamping device -VAS 6419-

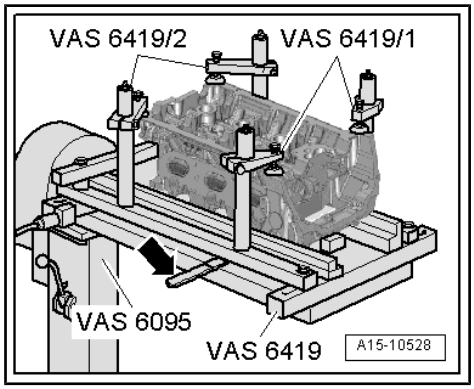
Procedure

– Remove camshafts ⇒ page 209 .

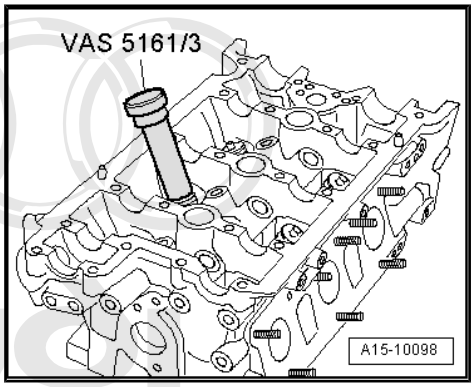
– Mark original positions of roller rocker fingers and hydraulic compensation elements for reinstallation.

– Remove roller rocker fingers together with hydraulic compensation elements and put down on a clean surface.

– Insert cylinder head clamping device -VAS 6419- into engine and gearbox support -VAS 6095- .
– Secure cylinder head in cylinder head clamping device, as shown in illustration.
– Connect cylinder head clamping 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.

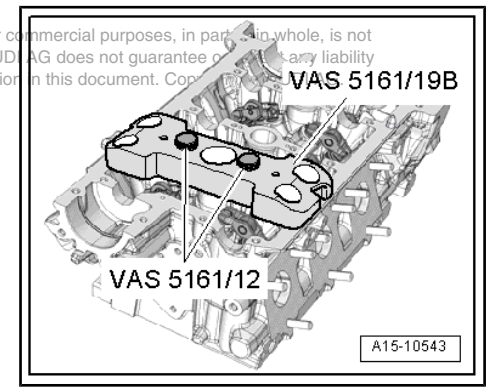


– Apply drift -VAS 5161/3- to valve spring plate and use plastic-headed hammer to release sticking valve cotters.

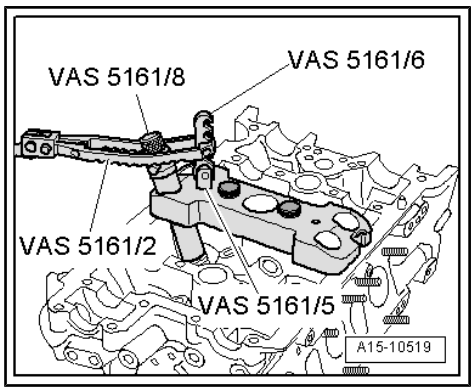


– Fit guide plate -VAS 5161/19B- from removal and installation device for valve cotters -VAS 5161- on cylinder head.
– Secure guide plate with knurled screws -VAS 5161/12- .

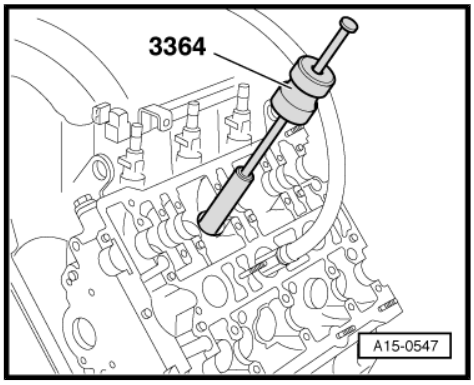
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– Screw snap-in device -VAS 5161/6- with engaging fork -VAS 5161/5- into guide plate.
– Insert assembly cartridge -VAS 5161/8- in guide plate.
– Attach pressure fork -VAS 5161/2- to snap-in device and push assembly cartridge down.
– At the same time, 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.



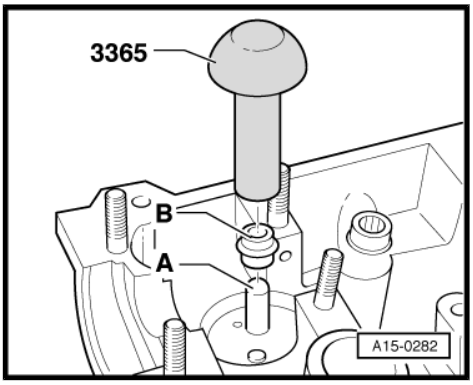
– Pull off valve stem oil seal with valve stem seal puller -3364- .
– Apply assembly lever to puller and pull out valve stem oil seal -arrow-.



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.***



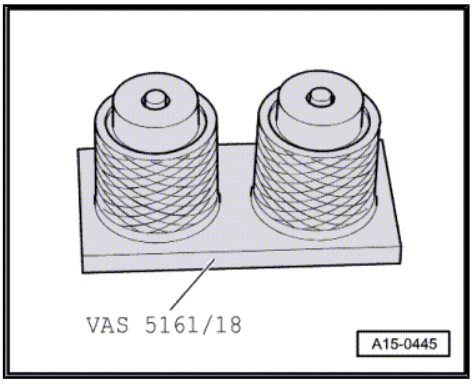
– Lightly oil sealing lip of valve stem oil seal.
– Slide valve stem oil seal onto plastic sleeve.
– Carefully press valve stem oil seal onto valve guide using valve stem seal fitting tool -3365- .
– Remove plastic sleeve.

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

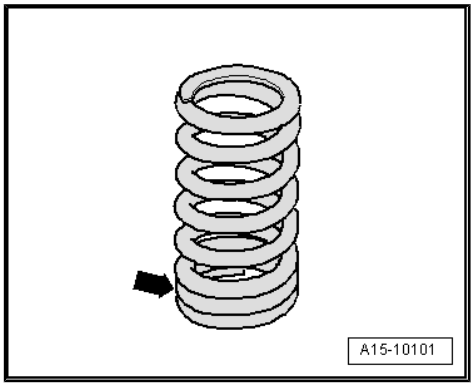
- Larger diameter of valve cotters faces upwards.

– Press assembly cartridge onto insertion device from above and take up valve cotters.

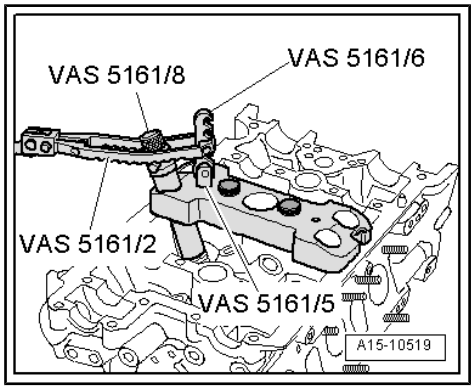


– Insert valve spring and valve spring plate.

- Installation position: Closely spaced spring coils -arrow- face towards cylinder head.



– 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 the pressure fork with knurled screw still in pulled position.
– Repeat procedure for each valve.



Assembling

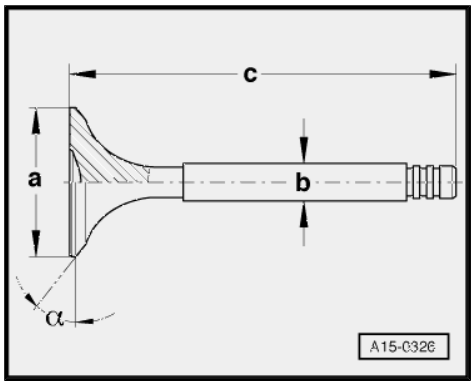
Installation is carried out in the reverse order; note the following:

– 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 209 .

3.8 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.

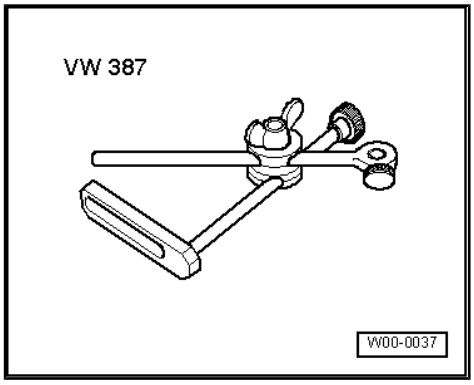
- ***The valves must be sawn in two with a metal saw between the centre of the stem and valve head. When doing so, the valves must not come into contact with water.***
- ***Then throw a maximum of ten valves into a bucket of water and step away immediately.***
- ***A sudden chemical reaction will occur upon contact with water in which the sodium filling burns.***
- ***After performing these steps the valves can be disposed of in the normal way.***

3.9 Checking valve guides

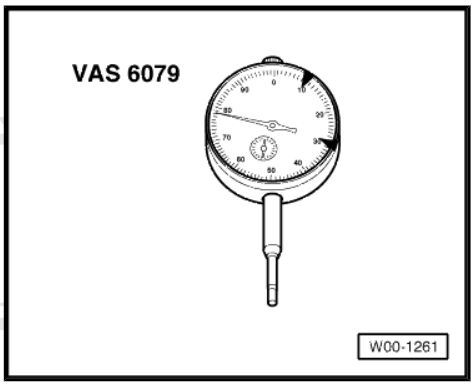
Special tools and workshop equipment required

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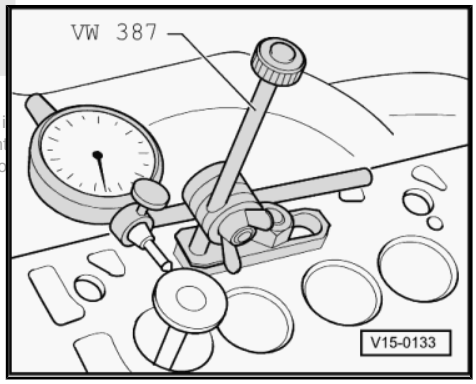
♦ Universal dial gauge bracket -VW 387-



♦ Dial gauge -VAS 6079-



Procedure



Note

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Audi

♦ *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 guide and exhaust valve into exhaust 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.

Note

Valve guides cannot be renewed.

3.10 Checking valves

– Visually inspect for scoring on valve stems and valve seat surfaces.

– Renew valve if scoring is clearly visible.

17 – Lubrication

1 Oil pump and sump (bottom section)

Caution

Risk of damage to catalytic converter.

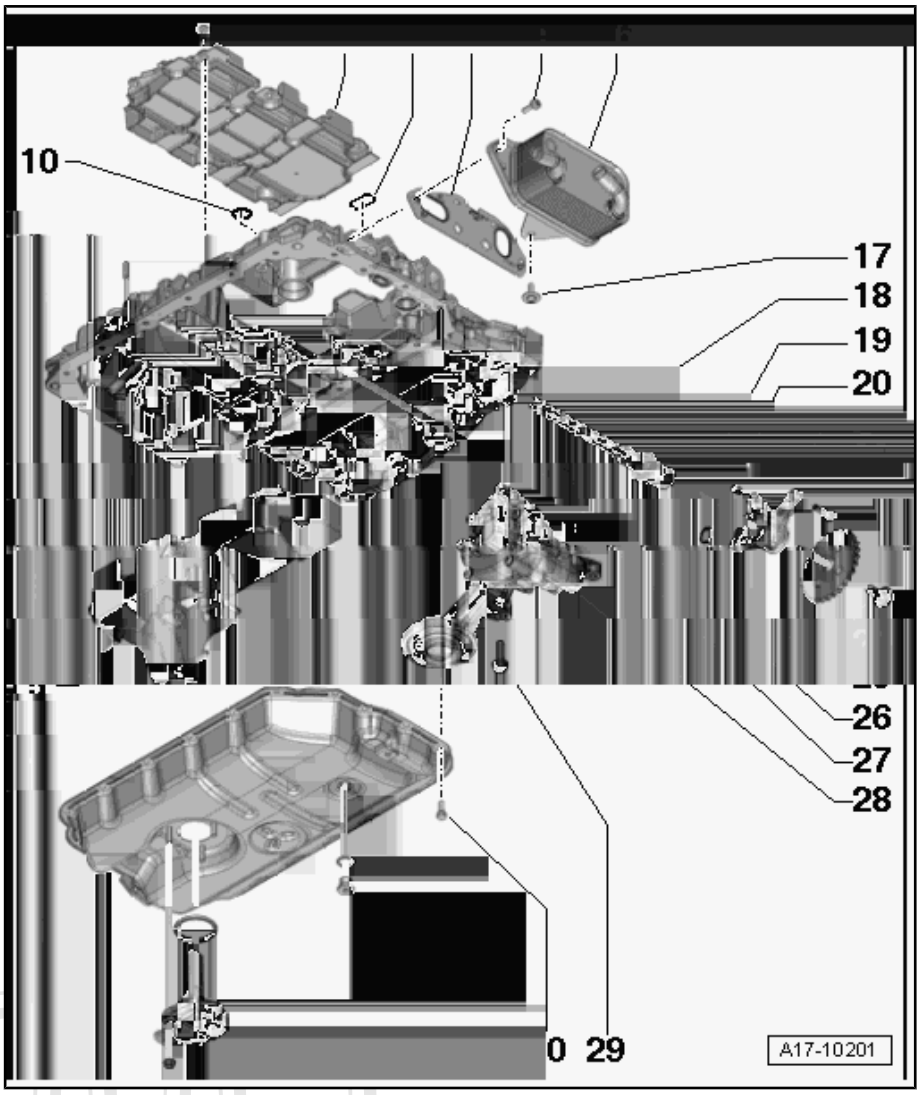
- ***The oil level must not be above the "MAX" mark on the dipstick.***

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Note

- *If large quantities of metal shavings or abrasion are found when performing engine repairs, this may be an indication of damage to the crankshaft or conrod bearings. To prevent further damage, the following steps are required after completion of repair work: clean the oil galleries carefully and renew the oil spray jets, 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 137 .*

1.1 Sump (bottom section), sump (top section), oil pump, oil cooler - exploded view



1 - Nut
- ❑ 9 Nm

2 - Oil level and oil temperature sender -G266-
- ❑ Removing and installing ⇒ page 230

3 - Seal
- ❑ Renew

4 - Sump (bottom section)
- ❑ Removing and installing ⇒ page 230

5 - Bolt
- ❑ 9 Nm

6 - Baffle plate (bottom)

7 - Bolt
- ❑ Tightening torque and sequence ⇒ page 229

8 - Sump (top section)
- ❑ Removing and installing ⇒ page 233

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

12 - Baffle plate (top)

13 - Seal
- ❑ Insert in retaining frame
- ❑ Renew

14 - Gasket
- ❑ Renew

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15 - Bolt
- ❑ 9 Nm

16 - Oil cooler
- ❑ See note ⇒ page 226
- ❑ Removing and installing ⇒ page 229
- ❑ 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 233

29 - Bolt

- ❑ 20 Nm

30 - Bolt

- ❑ Renew
- ❑ Tightening torque and sequence ⇒ page 228

31 - Seal

- ❑ Renew

32 - Oil drain plug

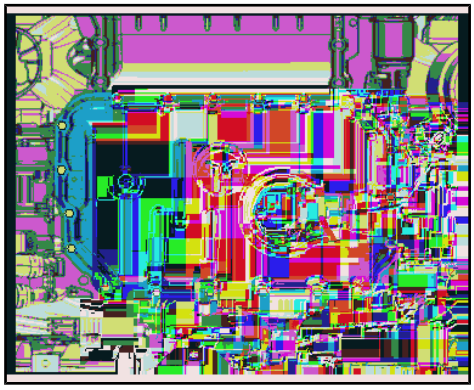
- ❑ 30 Nm

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:

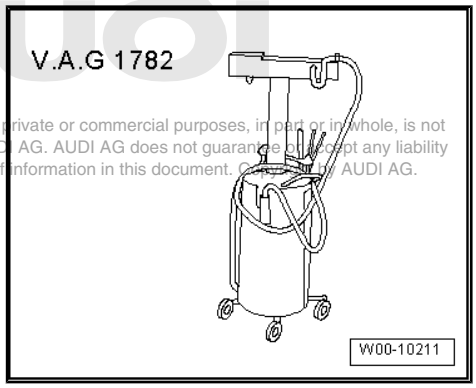
1. Initially tighten to 5 Nm.
2. Tighten to 16 Nm.



1.2 Removing and installing oil cooler

Special tools and workshop equipment required

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

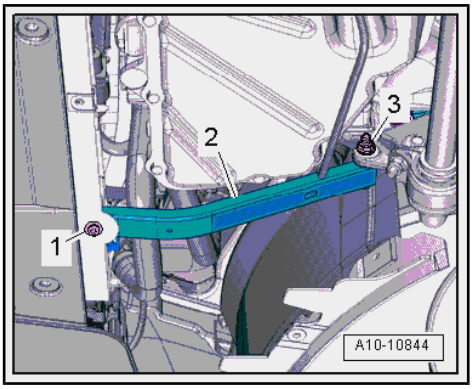


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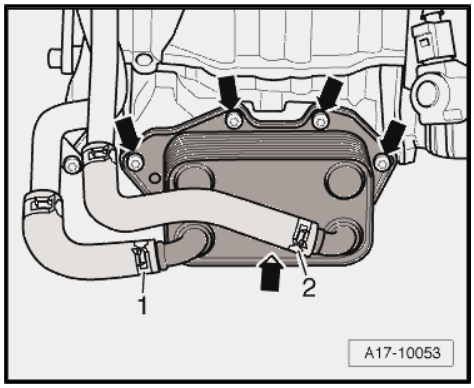
Removing

– Drain coolant ⇒ page 251 (or in vehicles equipped for a hot climate: remove continued coolant circulation pump -V51- ⇒ page 270).

– Remove bolt -1- and nut -3- and detach strut -2- (left-side) for lock carrier.



– Detach coolant hose -1- and, if necessary, -2- from 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 remove oil cooler.



Installing

• Tightening torque ⇒ page 227 .

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 .*

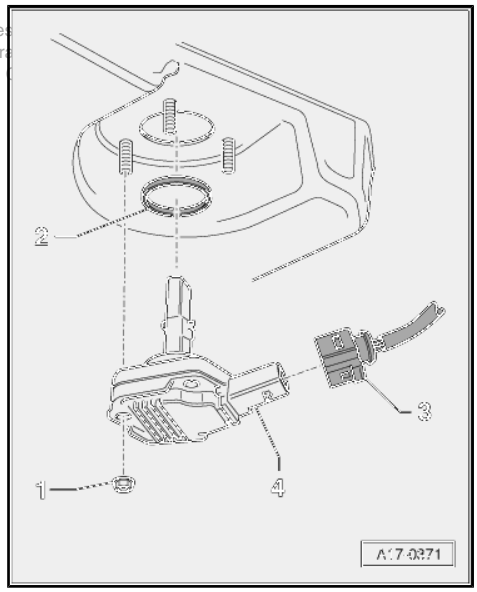
– Install continued coolant circulation pump -V51- ⇒ page 270 .
– Install strut for lock carrier ⇒ Rep. Gr. 50 .
– Check engine oil level ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .
– Fill up with coolant ⇒ page 253 .

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

Removing

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– 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 227 .

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

Note

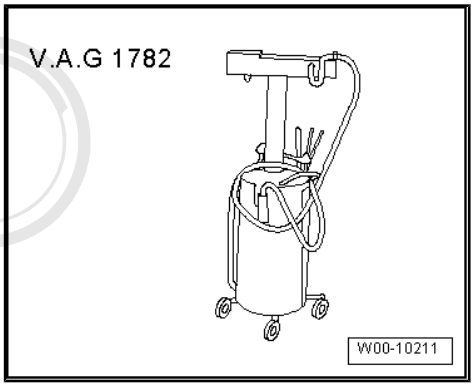
Renew seal -2-.

– Fill up with engine oil and check engine oil level ⇒ 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-



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

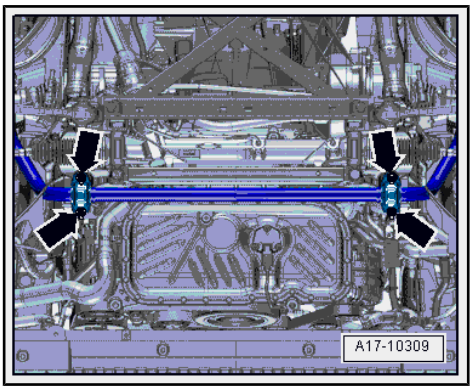
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Removing

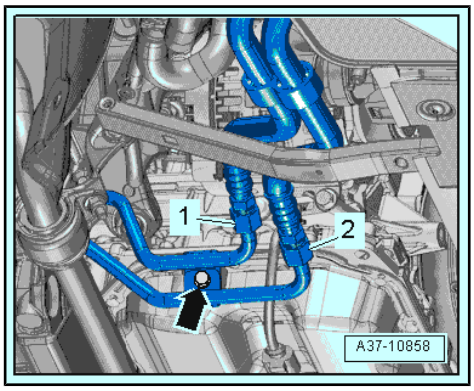
– Remove oil cooler ⇒ page 229 .

– 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 pipes.



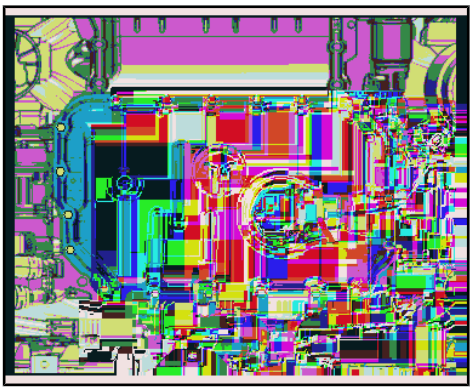
Note

Disregard -items 1, 2-.

– 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

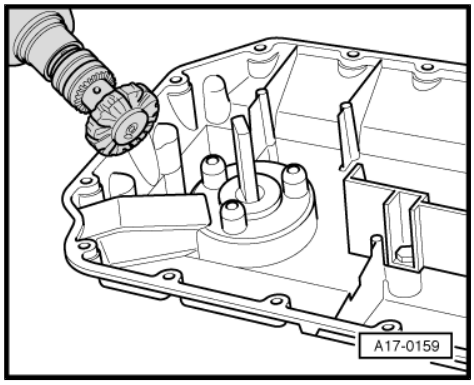
Note

- *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

Protect eyes against injuries.

- ***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).

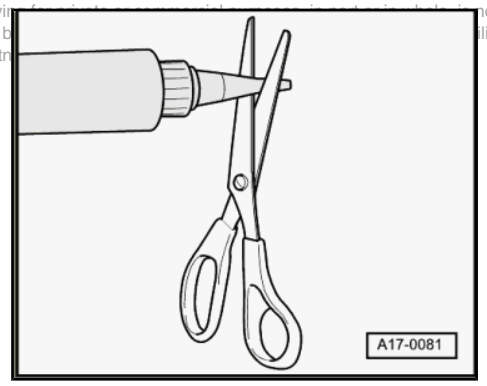
– Clean sealing surfaces; they must be free of oil and grease.

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Note

Note the use-by date of the sealant.

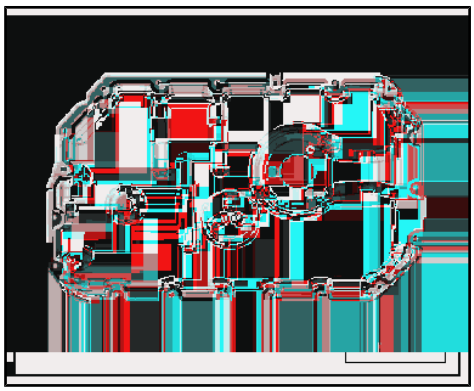
– Cut off nozzle of tube at front marking (nozzle ∅ approx. 1 mm).



Caution

Make sure lubrication system is not clogged by excess sealant.

- ***The bead of sealant must not be thicker than specified.***



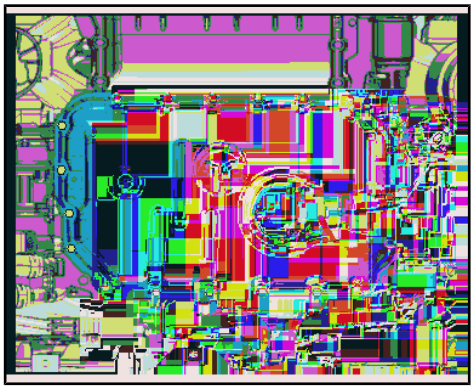
– Apply bead of sealant -arrow- onto clean sealing surface of sump (bottom section) as illustrated.

- 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 228 .



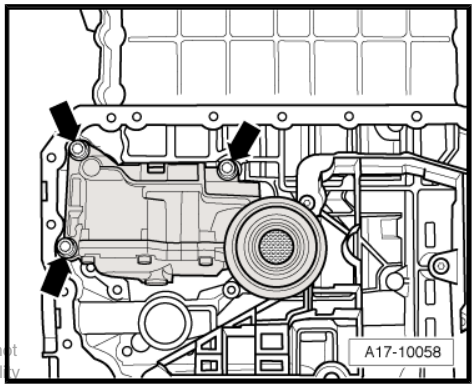
Remaining installation steps are carried out in reverse sequence; note the following:

– Vehicles with multitronic gearbox 0AW/automatic gearbox 0B6: install ATF pipes ⇒ Rep. Gr. 37 .
– Install anti-roll bar ⇒ Rep. Gr. 40 .
– Install oil cooler ⇒ page 229 .
– Fill up with engine oil and check engine oil level ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .

1.5 Removing and installing oil pump

Removing

– Remove sump (bottom section) ⇒ page 230 .
– Remove bolts -arrows-.



– Pull oil pump forwards off drive shaft.

Installing

• Tightening torque ⇒ page 227 .

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

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Note

Fit new O-rings.

– Fit oil pump onto drive shaft and tighten bolts.
– Install sump (bottom section) ⇒ page 231 .
– Fill up with engine oil and check engine oil level ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .

1.6 Removing and installing sump (top section)

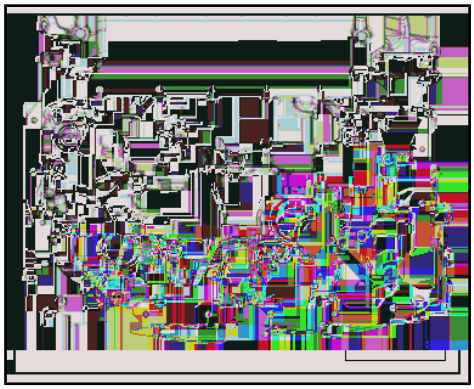
Special tools and workshop equipment required

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

Removing

• Engine secured to engine and gearbox support ⇒ page 106 .
– Remove timing chain cover (bottom) ⇒ page 143 .
– Remove oil pump ⇒ page 233 .

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



– Remove bolts -1 ... 6- for sump (top section).
– Press sump (top section) off dowel pins on cylinder block.

Installing

• Tightening torques ⇒ page 227 , ⇒ page 229 .



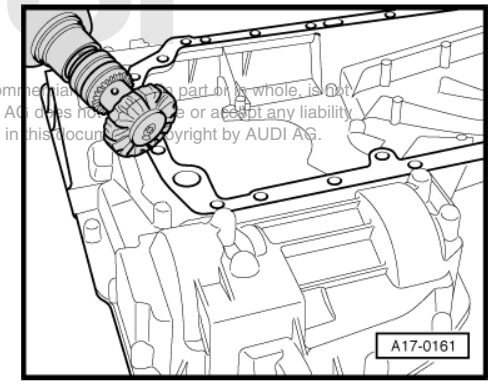
Note

Renew seals and O-rings.

Caution

Protect lubrication system and bearings against contamination.

- ***Cover exposed parts of the engine.***



WARNING

Protect eyes against injuries.

- ***Wear safety goggles.***

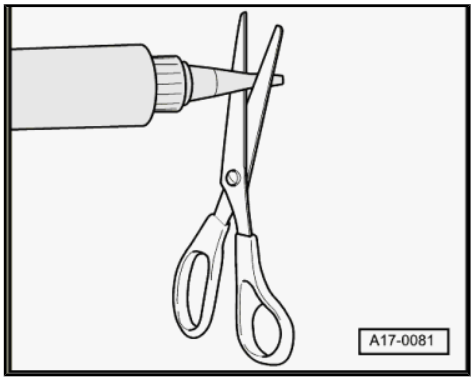
– Remove remaining sealant from sump (top section) and cylinder block using rotating plastic brush or similar.
– Clean sealing surfaces; they must be free of oil and grease.

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Note

Note the use-by date of the sealant.

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



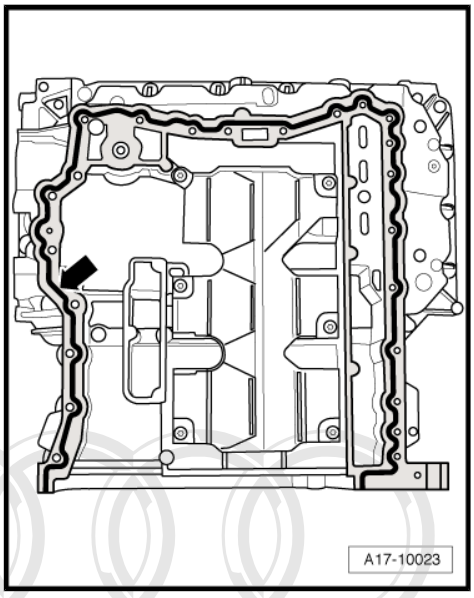
Caution

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.

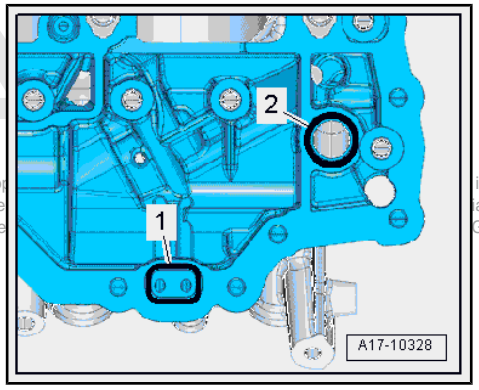
- The grooves on the sealing surfaces must be completely filled with sealant.
- The bead of sealant must project 1.5 … 2.0 mm above the sealing surface.



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.



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– Fit sump (top section) and tighten bolts ⇒ page 229 .

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

– Install oil pump ⇒ page 233 .

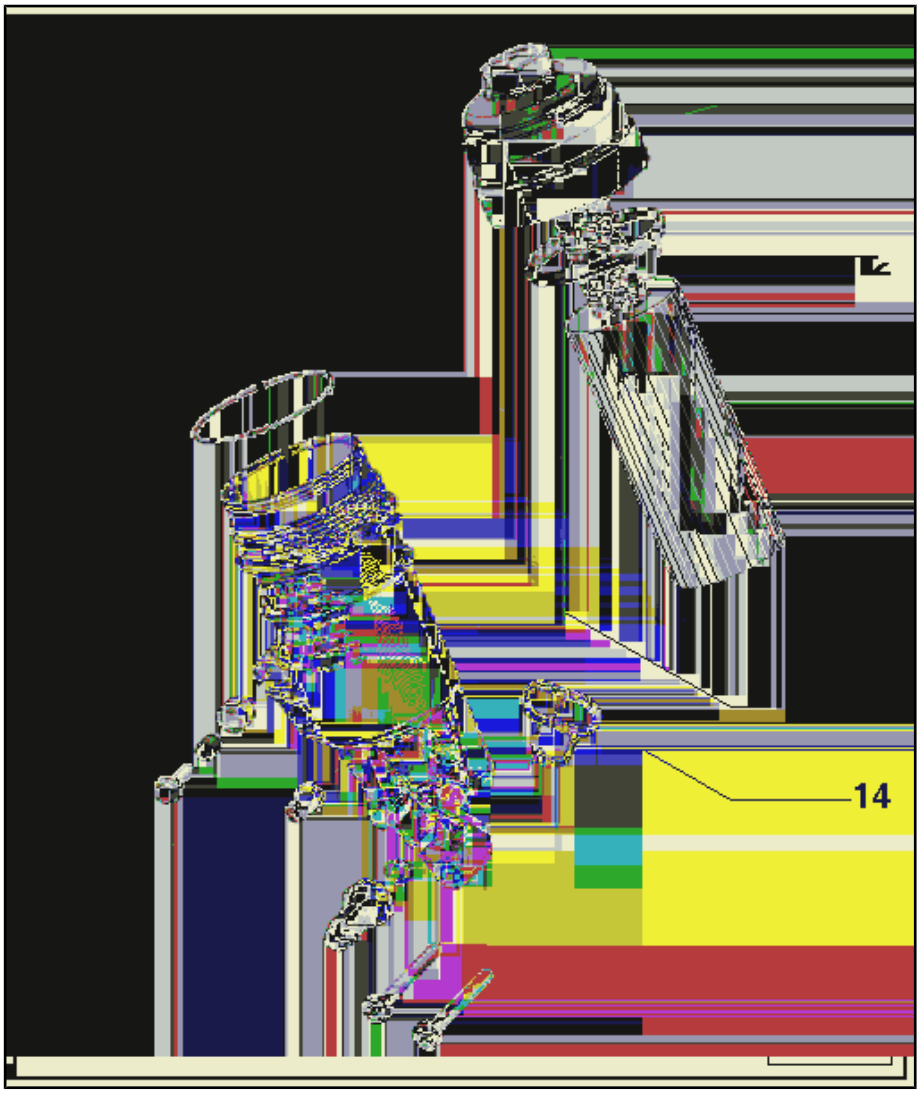
– Install timing chain cover (bottom) ⇒ page 143 .



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2 Oil filter housing, oil pressure switch

2.1 Oil filter housing, oil pressure switch - exploded view



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 diagnosis, testing and information system VAS 5051
- ❑ Removing and installing ⇒ page 241
- ❑ 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 238

10 - Sealing cap
- ❑ 25 Nm

11 - Seal
- ❑ Renew
- ❑ Removing and installing ⇒ page 238

12 - Oil filter element
- ❑ Removing and installing ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818

13 - Bolt
- ❑ 16 Nm

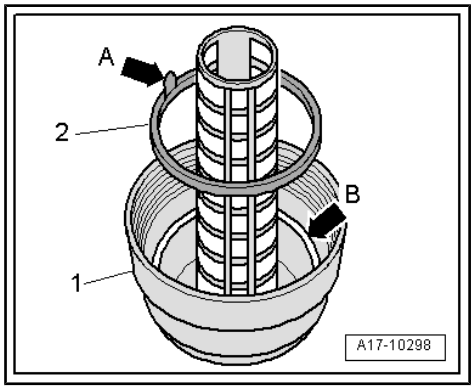
14 - Seal
- ❑ Renew

Renewing seal on sealing cap

– Take hold of tab -arrow A- and pull seal -2- out of sealing cap -1-.

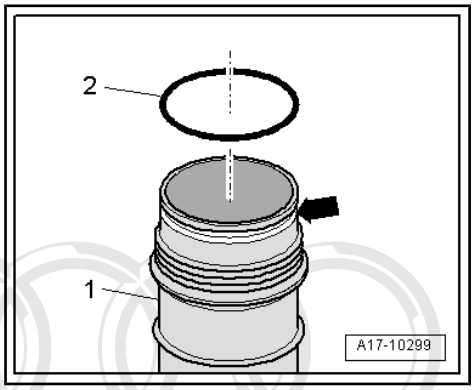
– Install new seal so that semi-circular profile fits in groove -arrow B- in sealing cap.

• 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-.



Oil pressure switch for reduced oil pressure -F378-

1 - Oil pressure switch for reduced oil pressure -F378-

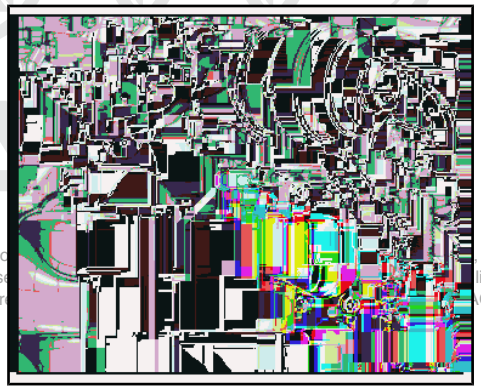
♦ Opening/closing pressure 0.75 ... 1.05 bar

♦ Grey insulation

♦ Checking in “Guided Fault Finding” ⇒ Vehicle diagnosis, testing and information system VAS 5051

♦ Removing and installing ⇒ page 242

♦ 20 Nm

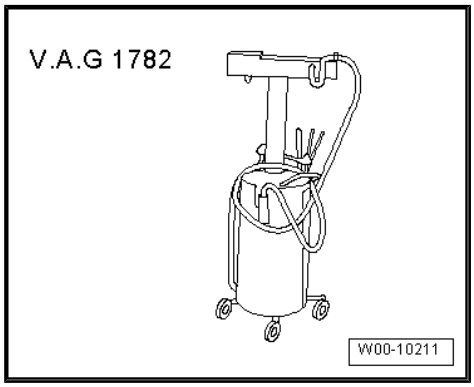


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2.2 Removing and installing oil filter housing

Special tools and workshop equipment required

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



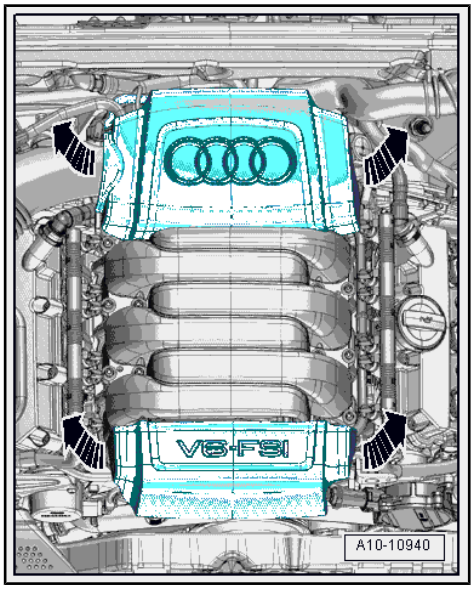
Removing

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

– Remove oil filter element ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .

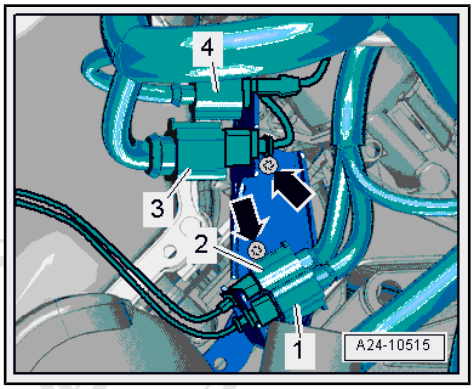
– Extract engine oil from oil filter housing using used oil collection and extraction unit -V.A.G 1782- .

– Remove plenum chamber partition panel ⇒ Rep. Gr. 50 .



– Detach electrical connectors -1 … 4- from bracket and move clear to side.

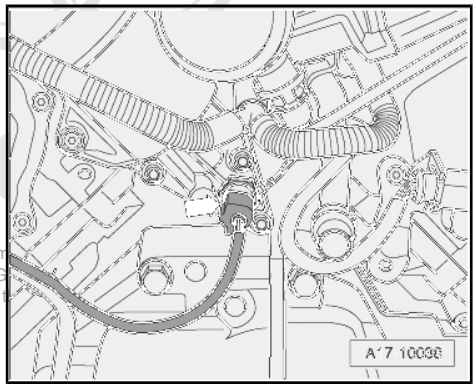
– Remove bolts -arrows-, disengage bracket and remove.



Note

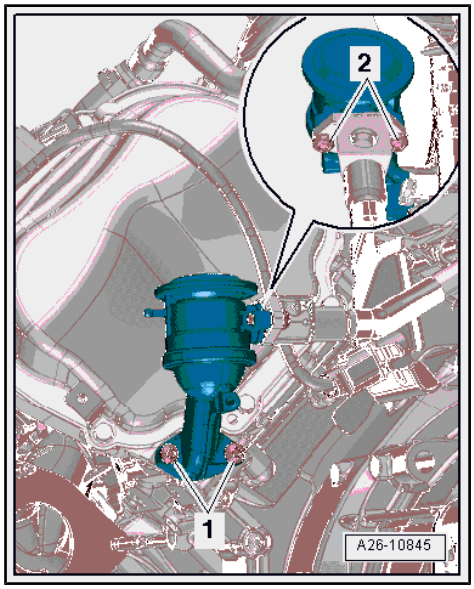
Place a cloth beneath the oil filter housing to catch escaping oil.

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



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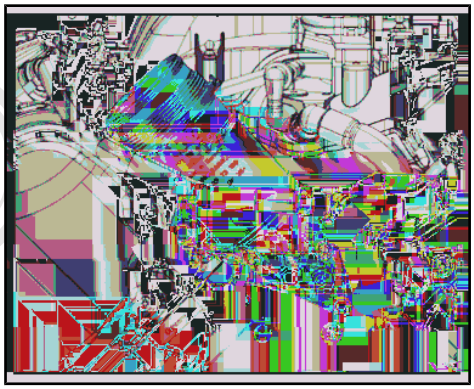
– Vehicles with secondary air system: remove bolts -2- and push secondary air pipe to rear.



Note

Disregard -item 1-.

– Remove bolts -arrows-.



– Remove nut -1- and centre hex stud, and detach oil filter housing.

Installing

- Tightening torques ⇒ page 237

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

Note

Renew gaskets, seals and O-rings.

– Install secondary air hose: country-specific version 1 ⇒ page 313 , country-specific version 2 ⇒ page 321 .
– Install plenum chamber partition panel ⇒ Rep. Gr. 50 .
– Install oil filter element ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .
– Fill up with engine oil and check engine oil level ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .

2.3 Checking oil pressure switch -F22- / oil pressure switch for reduced oil pressure -F378-

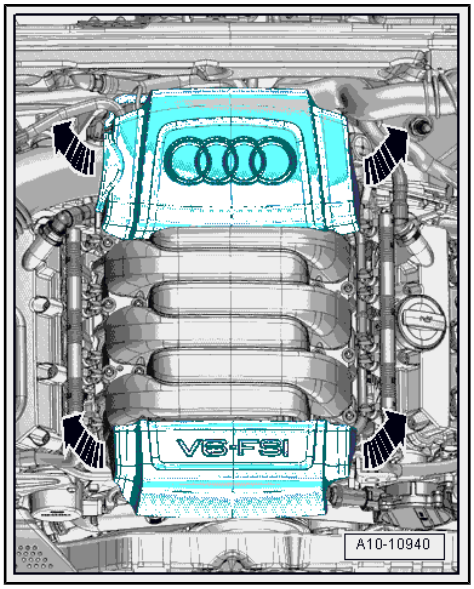
Checking oil pressure switch -F22- / oil pressure switch for reduced oil pressure -F378- in “Guided Fault Finding” ⇒ Vehicle diagnosis, testing and information system VAS 5051.

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2.4 Removing and installing oil pressure switch -F22-

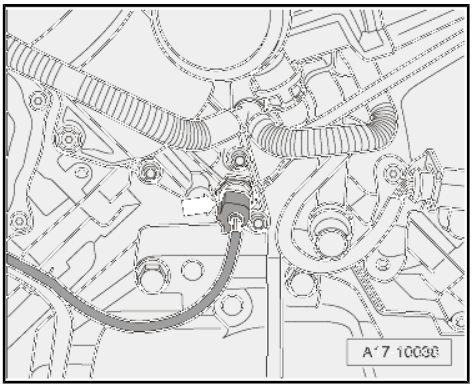
Removing

– 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 237 .

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

Note

♦ *Renew the seal.*
♦ *Fit the new oil pressure switch -F22- into the connection immediately to avoid loss of oil.*

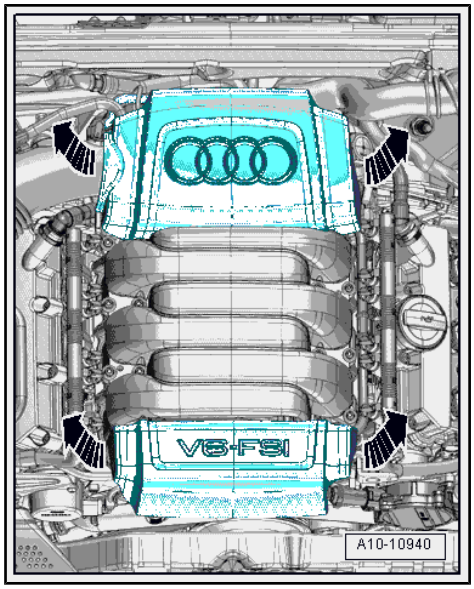
– Check engine oil level ⇒ Maintenance ; Booklet 811 , ⇒ Maintenance ; Booklet 812 or ⇒ Maintenance ; Booklet 818 .

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

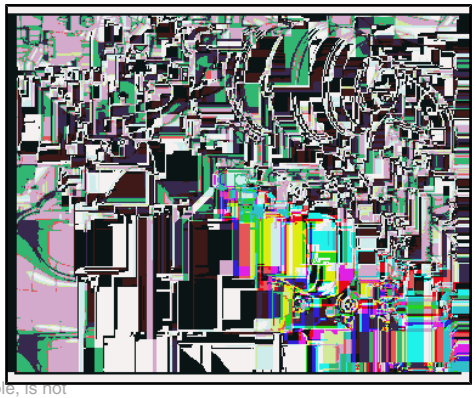
Removing

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



– Unplug electrical connector -2-.

– Unscrew oil pressure switch for reduced oil pressure -F378- -item 1-.



Installing

• Tightening torque ⇒ page 238 .

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

Note

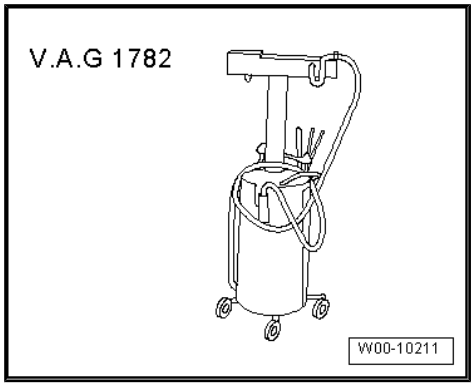
Renew the seal.

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

Special tools and workshop equipment required

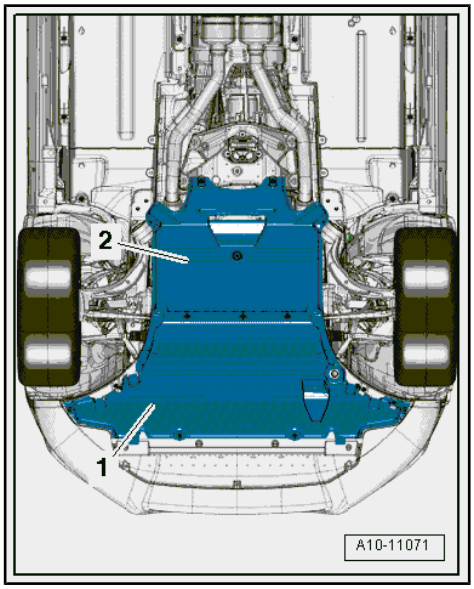
♦ Used oil collection and extraction unit -V.A.G 1782-



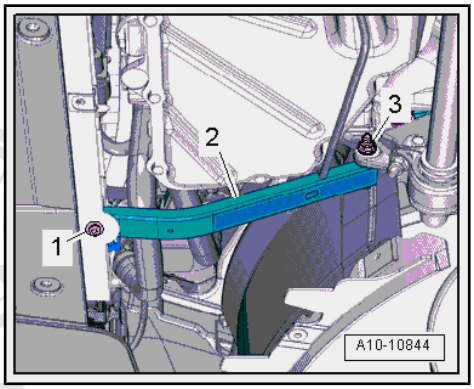
Removing

Vehicles not equipped with continued coolant circulation pump -V51- :

– Remove front noise insulation -1- ⇒ Rep. Gr. 66 .

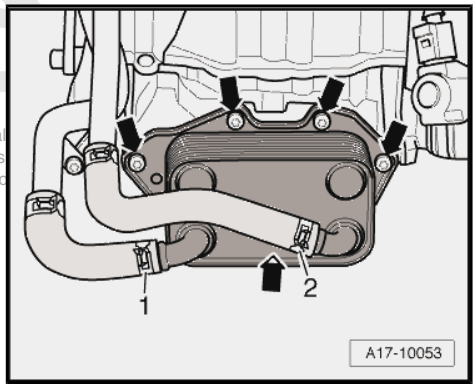


– Remove bolt -1- and nut -3- and detach strut -2- (left-side) for lock carrier.



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

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



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Vehicles with continued coolant circulation pump -V51- :

– Remove continued coolant circulation pump -V51- ⇒ page 270 and oil cooler ⇒ page 229 .

All vehicles (continued):

– Unplug electrical connector -1-.

– Remove bolt -3- and detach valve for oil pressure control - N428- -item 4-.



Installing

• Tightening torque ⇒ page 130 .

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

Note

Fit new O-ring -2-.

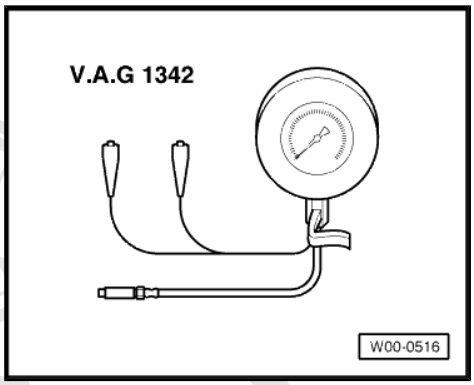
– Install continued coolant circulation pump -V51- ⇒ page 270 .

– Install oil cooler ⇒ page 229 .

2.7 Checking oil pressure

Special tools and workshop equipment required

♦ Oil pressure tester -V.A.G 1342-



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Procedure

• Oil level OK

• Engine oil temperature approx. 80 °C.

– Remove oil pressure switch -F22- ⇒ page 241 .

– 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.

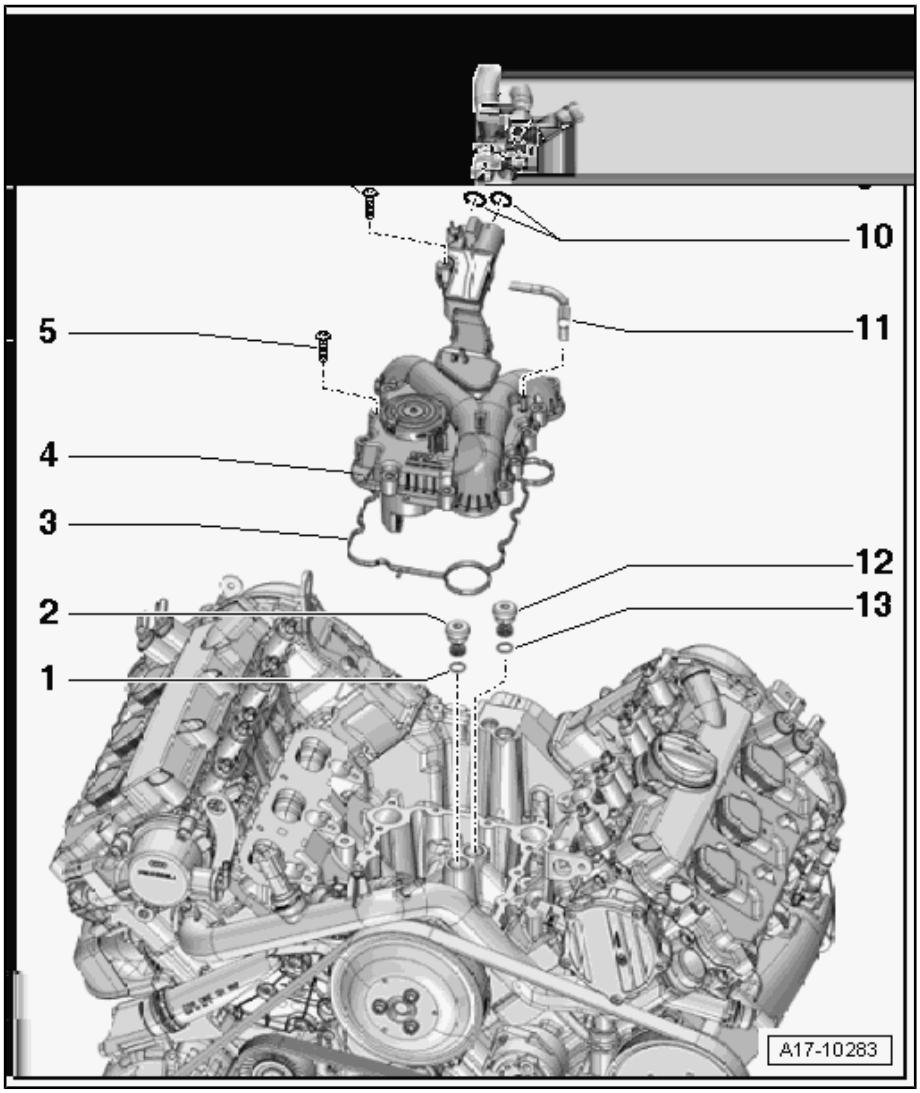
• Minimum oil pressure at 2000 rpm: 1.5 bar.

Assembling

– Install oil pressure switch -F22- ⇒ page 241 .

3 Oil retention valves, oil separator

3.1 Oil retention valves, oil separator - exploded view



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

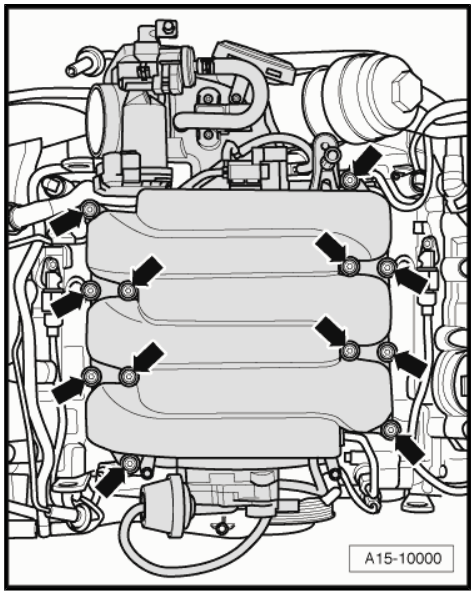
11 - Crankcase breather hose
- ❑ To air pipe

12 - Oil retention valve
- ❑ For oil supply to cylinder head (left-side)
- ❑ 20 Nm

13 - O-ring
- ❑ Renew

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) ⇒ Rep. Gr. 24 .



– 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:

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Note

Renew gaskets and O-rings.

– Install intake manifold top section ⇒ Rep. Gr. 24 .

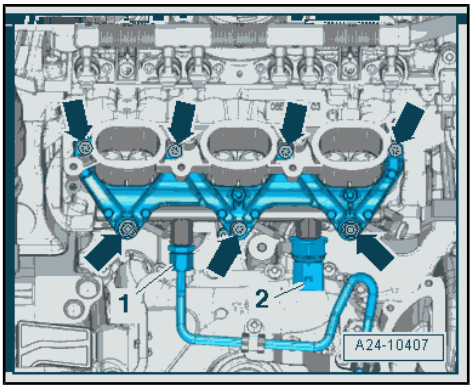
3.3 Removing and installing cover with oil separator

Removing

– Remove crankcase breather hoses ⇒ page 246 .

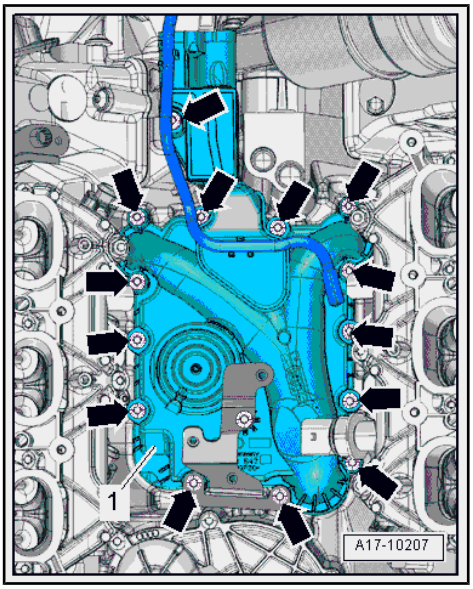
– Remove intake manifold bottom section (left-side) ⇒ Rep. Gr. 24 .

– Remove top coolant pipe ⇒ page 267 .



– Remove bolts -arrows-.

– Detach bracket for high-pressure pipes and oil separator -1-.



Installing

• Tightening torque ⇒ page 245 .

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

Note

Renew gasket.

– Install coolant pipe (top) ⇒ page 267 .

– Install intake manifold bottom section (left-side) ⇒ Rep. Gr. 24 .

– Install crankcase breather hoses ⇒ page 246 .

3.4 Engine oil

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

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3.5 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 .

19 – Cooling

1 Cooling system

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 expansion tank with cloth and open carefully.*

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.*

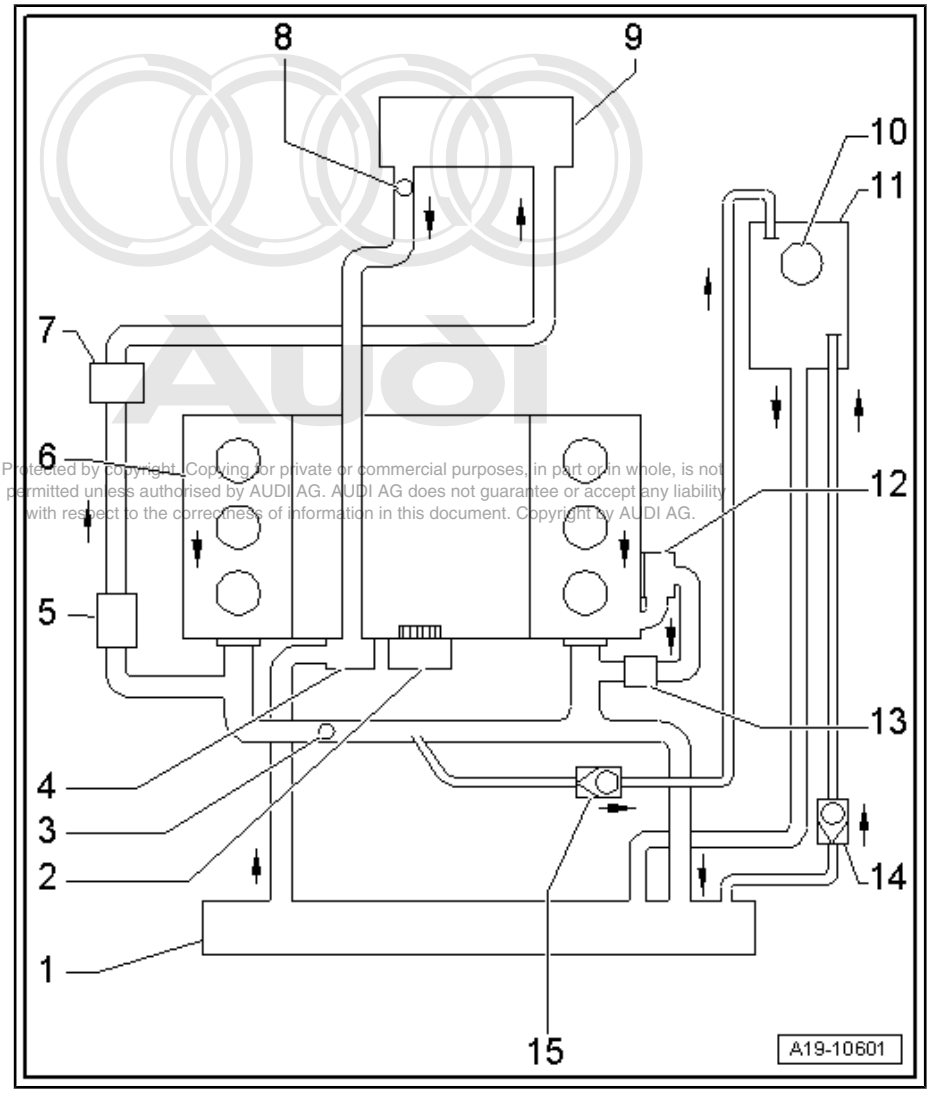
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1.1 Diagram of coolant hose connections

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 ⇒ Rep. Gr. 87

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 ⇒ Rep. Gr. 87

8 - Bleed hole

9 - Heat exchanger for heater

- ❑ Removing and installing ⇒ Rep. Gr. 87
- ❑ If renewed, refill system with fresh coolant

10 - Filler cap for expansion tank

- ❑ Checking pressure relief valve ⇒ page 293

11 - Coolant expansion tank

12 - 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

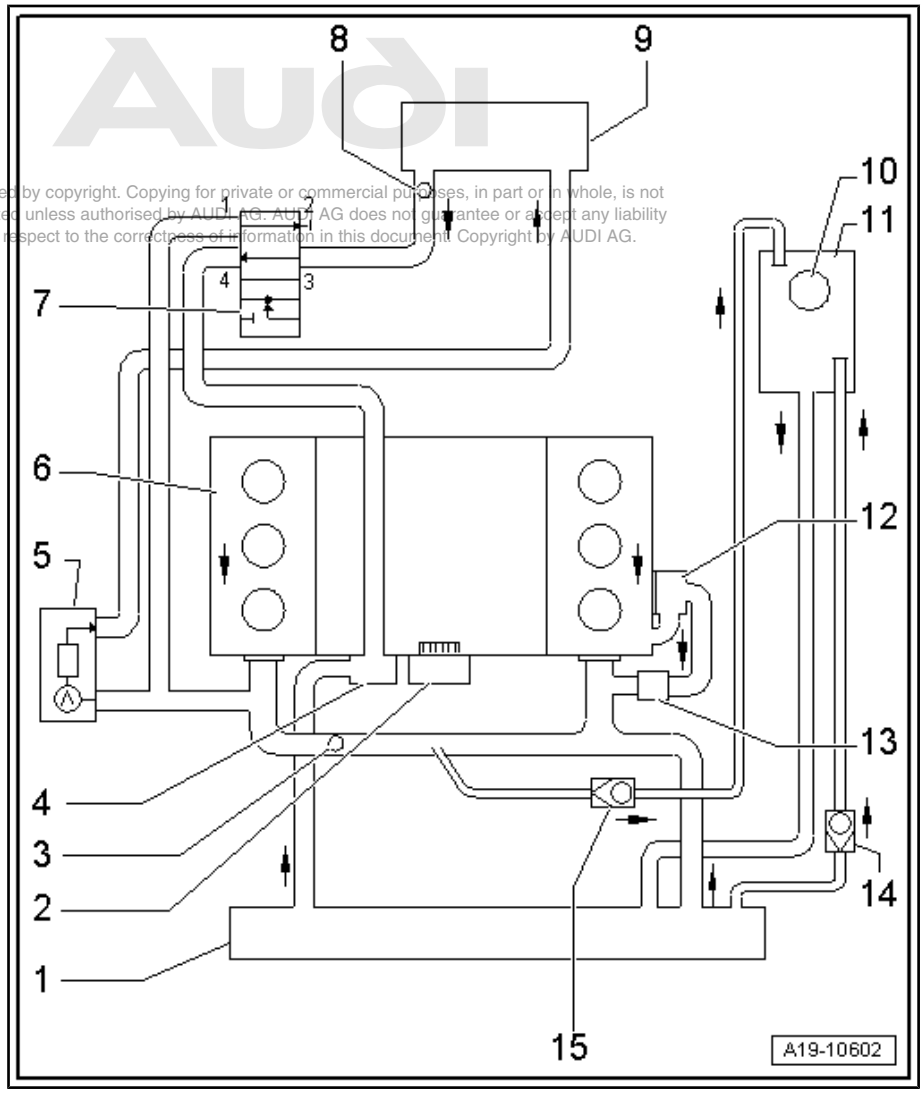
15 - Non-return valve

Vehicles with auxiliary heater

Note

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 - Auxiliary heater

- ❑ With circulation pump -V55-
- ❑ Removing and installing ⇒ Rep. Gr. 82

6 - Cylinder head and cylinder block

- ❑ If renewed, refill system with fresh coolant

7 - Climatronic coolant shut-off valve -N422-

- ❑ Removing and installing ⇒ Rep. Gr. 87
- ❑ Activated via Climatronic control unit -J255-

8 - Bleed hole

9 - Heat exchanger for heater

- ❑ Removing and installing ⇒ Rep. Gr. 87
- ❑ If renewed, refill system with fresh coolant

10 - Filler cap for expansion tank

- ❑ Checking pressure relief valve ⇒ page 293

11 - Coolant expansion tank

12 - Oil cooler

- ❑ If renewed, refill system with fresh coolant

13 - Continued coolant circulation pump -V51-

- ❑ For vehicles equipped for a hot climate

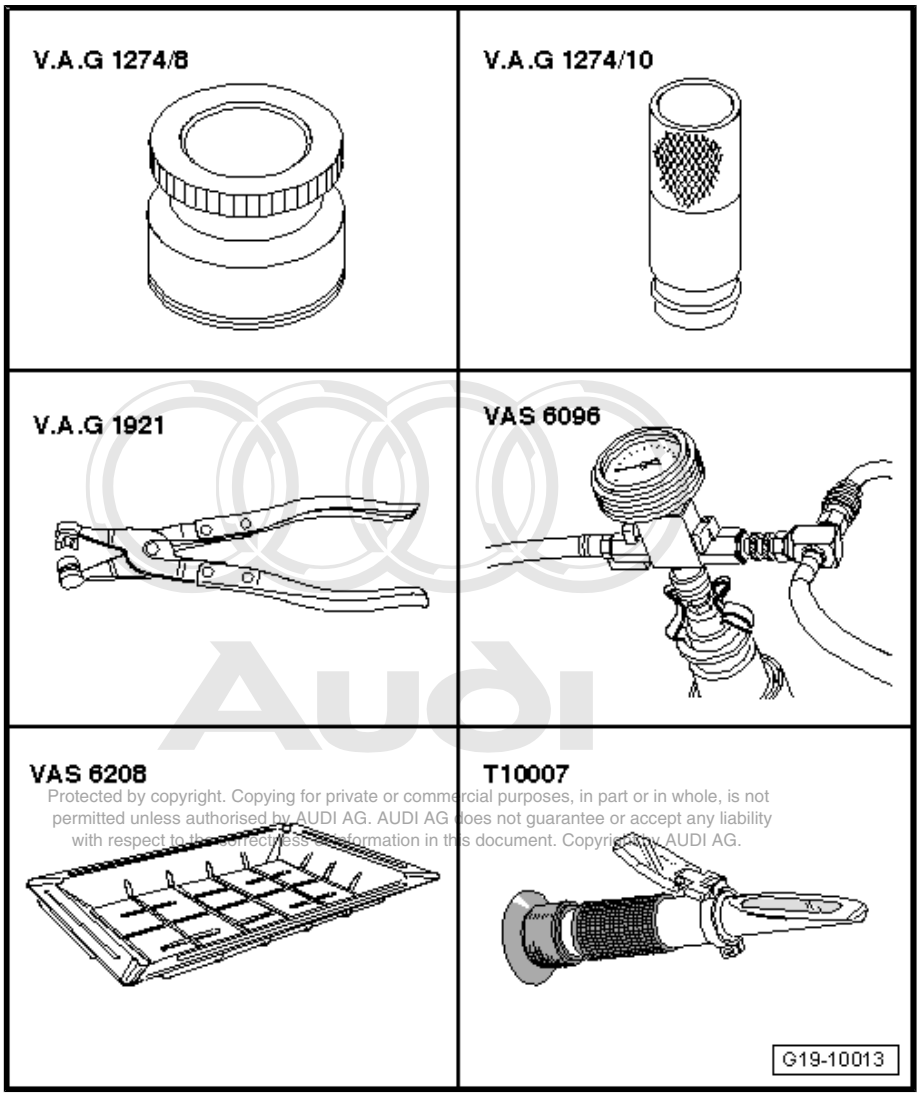
14 - Non-return valve

15 - Non-return valve

1.2 Draining and filling cooling system

Special tools and workshop equipment required

- Adapter for cooling system tester -V.A.G 1274/8-
- Pipe for cooling system tester -V.A.G 1274/10-
- Hose clip pliers - V.A.G 1921-
- Cooling system charge unit -VAS 6096-
- Drip tray for workshop hoist -VAS 6208-
- Refractometer -T10007-



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Draining

Note

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

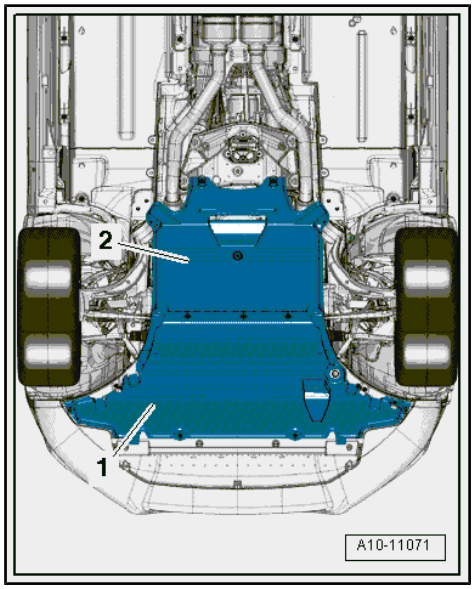
WARNING

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

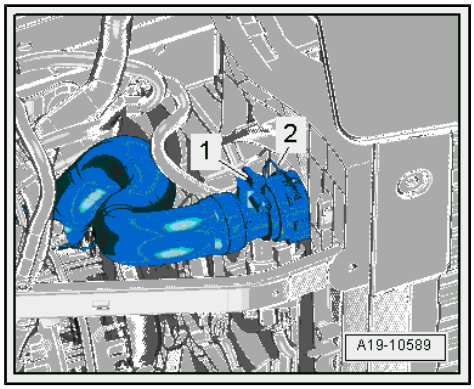
- ***The cooling system is under pressure when the engine is hot.***
- ***To allow pressure to dissipate, cover filler cap on expansion tank with cloth and open carefully.***

– Open filler cap on coolant expansion tank.

– Remove front noise insulation -1- ⇒ Rep. Gr. 66 .



– Place drip tray for workshop hoist -VAS 6208- beneath engine.
– Remove drain plug -1- and drain off coolant.

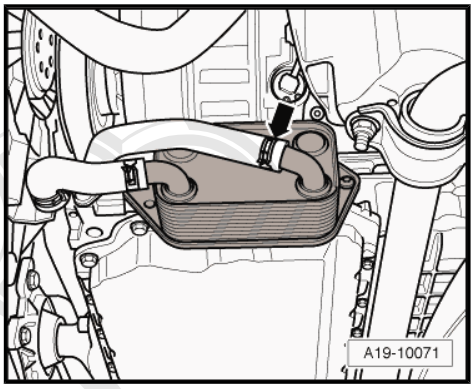


Note

Disregard -item 2-.

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



Filling

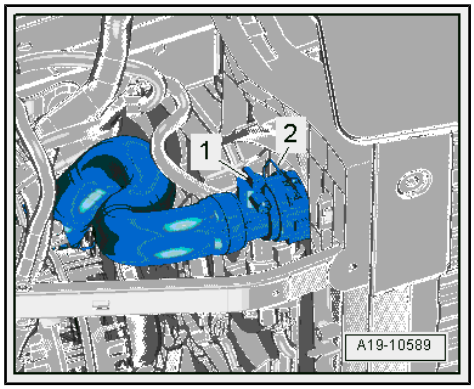
- Ignition off.

Note

- *The cooling system is filled all year round with a mixture of water and radiator antifreeze/anti-corrosion agent.*
- *Use only the radiator antifreeze/anti-corrosion agent approved for this engine ⇒ Electronic parts catalogue . Other coolant additives could seriously impair in particular the anticorrosion properties. The resulting damage could lead to loss of coolant and consequently to serious engine damage.*
- *The specified radiator antifreeze/anti-corrosion agent prevents frost and corrosion damage and stops scaling. Such additives also raise the boiling point of the coolant. For these reasons the cooling system must be filled all year round with the correct antifreeze and anticorrosion additive.*
- *Because of its high boiling point, the coolant improves engine reliability under heavy loads, particularly in countries with tropical climates.*
- *Frost protection is required down to about –25 °C (in countries with arctic climate: down to about –35 °C).*
- *The coolant concentration must not be reduced by adding water even in warmer seasons and in warmer countries. The antifreeze concentration must be at least 40 %.*
- *If greater frost protection is required in very cold climates, the concentration of radiator antifreeze/anti-corrosion agent can be increased, but only up to 60% (this gives frost protection to about –40 °C). If the concentration exceeds 60%, frost protection decreases again and cooling efficiency is also impaired.*
- *Use only clean tap water for mixing coolant.*
- *Do not use drained coolant again if:*
- *radiator, heat exchanger for heater, cylinder head and cylinder head gasket or cylinder block have been renewed.*
- *the coolant is contaminated or dirty.*
- *Contaminated or dirty coolant must not be used again.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *For checking anti-freeze protection in cooling system, use refractometer -T10007- .*

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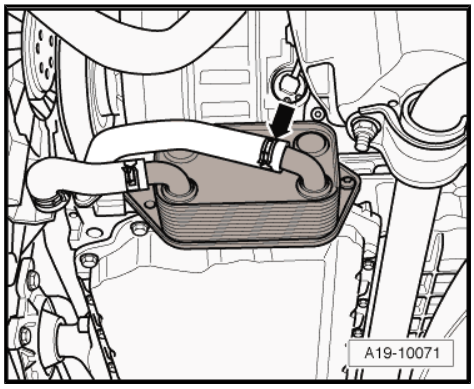
– Close drain plug -1-.



Note

Disregard -item 2-.

– Connect coolant hose to oil cooler -arrow-.



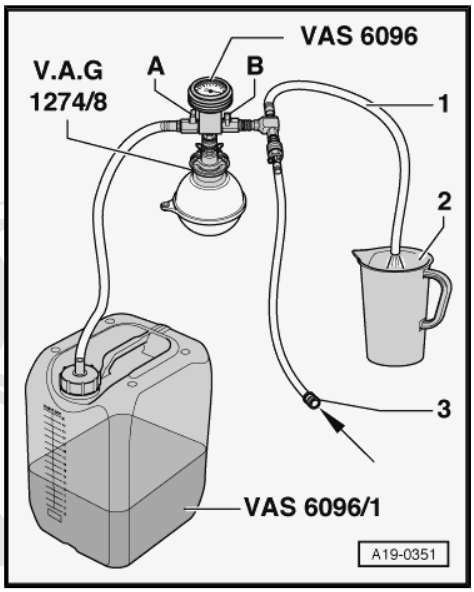
– Fill reservoir of -VAS 6096- with at least 12 litres of premixed coolant (according to recommended ratio):

- Radiator antifreeze/anti-corrosion agent (40 %) and water (60 %) for frost protection to –25 °C
- Radiator antifreeze/anti-corrosion agent (50 %) and water (50 %) for frost protection to –35 °C
- Radiator antifreeze/anti-corrosion agent (60 %) and water (40 %) for frost protection to –40 °C
- Radiator antifreeze/anti-corrosion agent ⇒ Electronic parts catalogue

– 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.

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– 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.

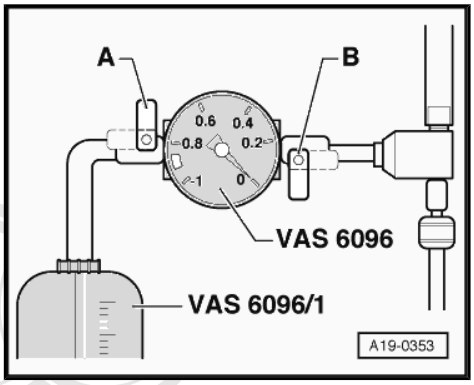
– Close valve -A- again.

– 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

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♦ *If the needle does not reach the green zone, repeat the process.*

♦ *Check cooling system for leaks if the vacuum is not maintained.*

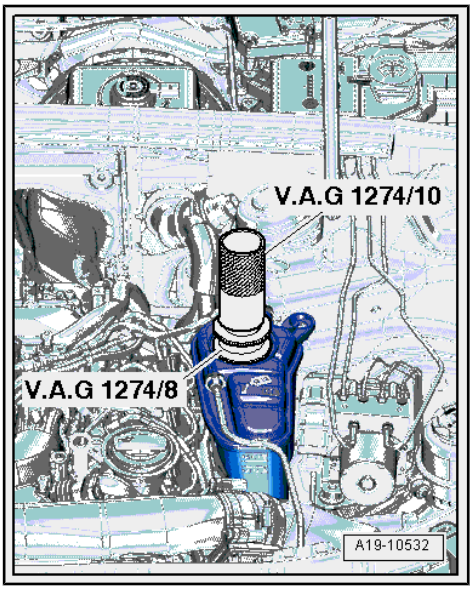
– Detach compressed air hose.

– Open valve -A-.

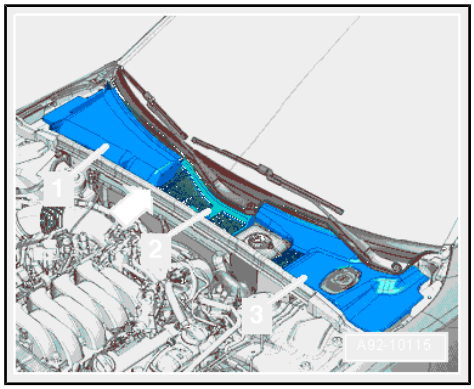
• The vacuum in the cooling system causes the coolant to be drawn out of the reservoir of -VAS 6096- ; the cooling system is then filled.

– Detach cooling system charge unit -VAS 6096- from adapter -V.A.G 1274/8- on coolant expansion tank.

– Attach pipe -V.A.G 1274/10- onto adapter -V.A.G 1274/8- .

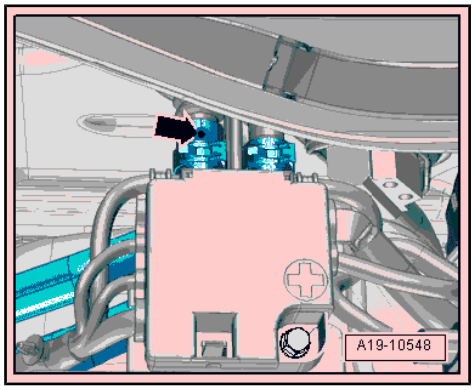


– Remove centre section -2- or complete plenum chamber cover (depending on version) ⇒ Rep. Gr. 50 .



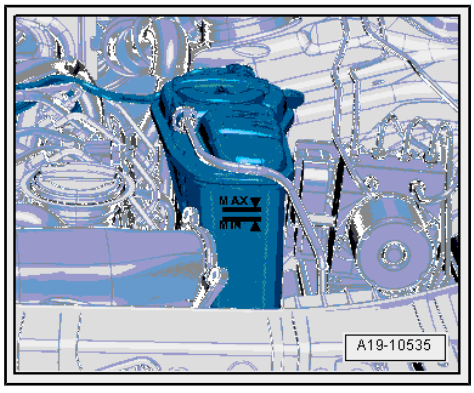
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– Release coolant hose going to heat exchanger and pull back hose until bleeder hole in hose -arrow- is no longer blocked by the connection.



– 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 two 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 front noise insulation ⇒ Rep. Gr. 66 .

– 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 and coolant thermostat

2.1 Coolant pump, thermostat and connection - exploded view

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 257

5 - Bolt
- ❑ 9 Nm

6 - Connection
- ❑ For coolant hose

7 - Gasket
- ❑ Renew

8 - Seal
- ❑ Renew

9 - Thermostat
- ❑ Removing and installing ⇒ page 259
- ❑ Checking ⇒ page 259

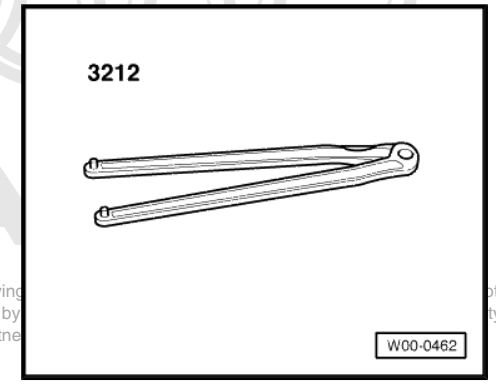
10 - Bolt
- ❑ 9 Nm



2.2 Removing and installing coolant pump

Special tools and workshop equipment required

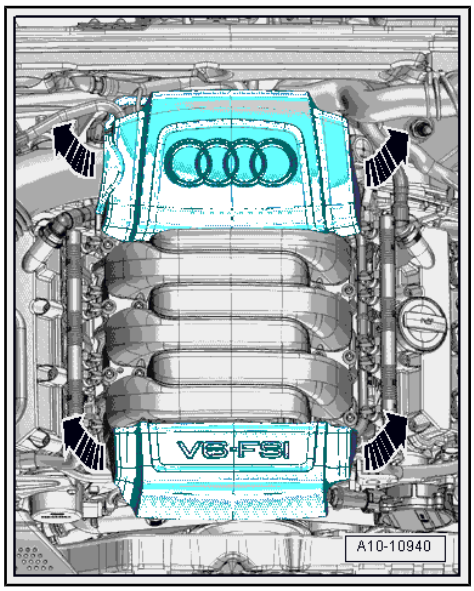
♦ Pin wrench -3212-



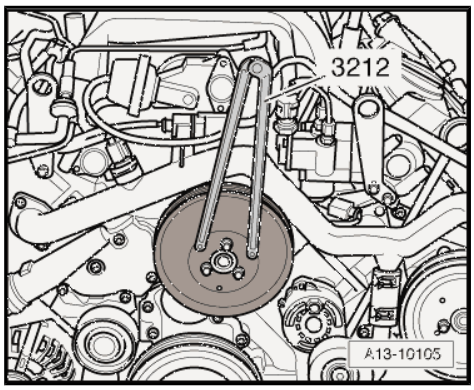
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Removing

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

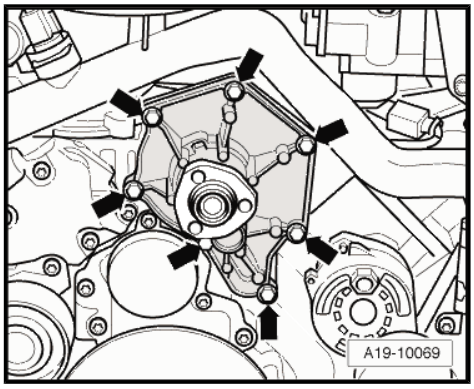


– Drain coolant ⇒ page 251 .
– Remove poly V-belt ⇒ page 119 .
– Remove bolts for coolant pump pulley (counterhold with pin wrench -3212-).



Note

Place a cloth underneath to catch escaping coolant.



– Remove securing bolts -arrows- for coolant pump and detach coolant pump.

Installing

• Tightening torques ⇒ page 257

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 253 .

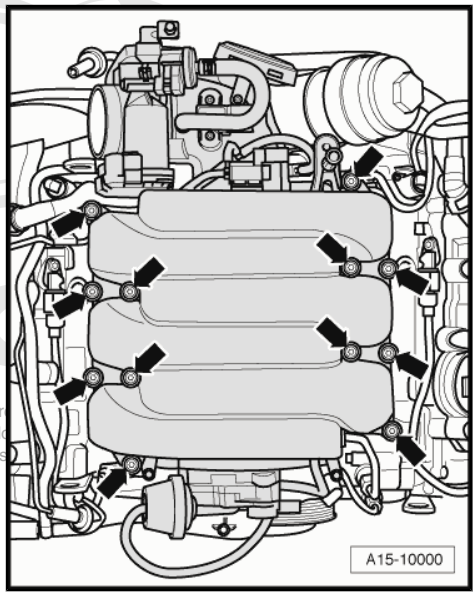
2.3 Removing and installing thermostat

Removing

– Drain coolant ⇒ page 251 .

– Remove intake manifold (top section) ⇒ Rep. Gr. 24 .

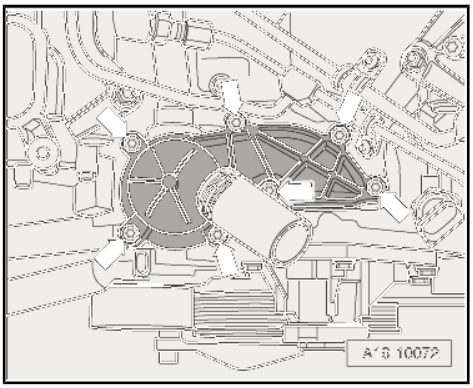
– Remove front coolant pipe ⇒ page 262 .



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– Remove bolts -arrows-.

– Detach coolant thermostat with hose connection.



Installing

• Tightening torque ⇒ page 257 .

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

Note

Renew seals and/or gaskets.

– Install coolant pipe (front) ⇒ page 262 .

– Install intake manifold top section ⇒ Rep. Gr. 24 .

– Fill up with coolant ⇒ page 253 .

2.4 Checking thermostat

– Heat removed thermostat in water bath.

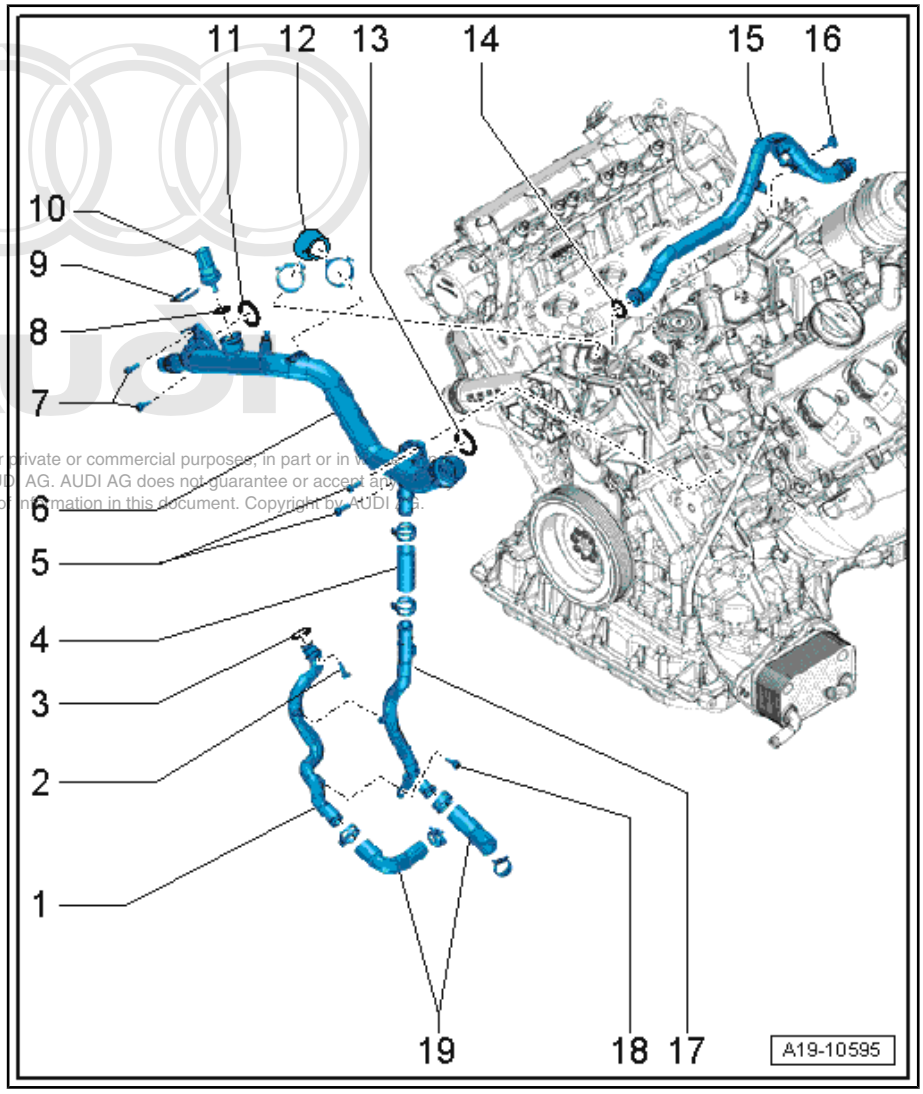
Starts to open	Fully open	Opening travel
approx. 87 °C	approx. 102 °C 1)	at least 8 mm

• 1) Cannot be tested.

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3 Coolant pipes and continued coolant circulation pump -V51-

3.1 Coolant pipes - exploded view



1 - Coolant pipe (left-side)
- ❑ Remove and install together with -item 17- ⇒ page 265

2 - Bolt
- ❑ 9 Nm

3 - O-ring
- ❑ Renew

4 - Connecting hose

5 - Bolts
- ❑ 9 Nm

6 - Coolant pipe (front)
- ❑ Removing and installing ⇒ page 262

7 - Bolts
- ❑ 9 Nm

8 - O-ring
- ❑ Renew

9 - Retaining clip

10 - Coolant temperature sender -G62-
- ❑ Removing and installing ⇒ page 262

11 - Seal
- ❑ Renew

12 - Coolant hose

13 - Seal
- ❑ Renew

14 - O-ring
- ❑ Renew

15 - Coolant pipe (top)
- ❑ Removing and installing ⇒ page 267

16 - Bolt
- ❑ 9 Nm

17 - Coolant pipe (left-side)
- ❑ Remove and install together with -item 1- ⇒ page 265

18 - Bolt
- ❑ 9 Nm

19 - Coolant hoses

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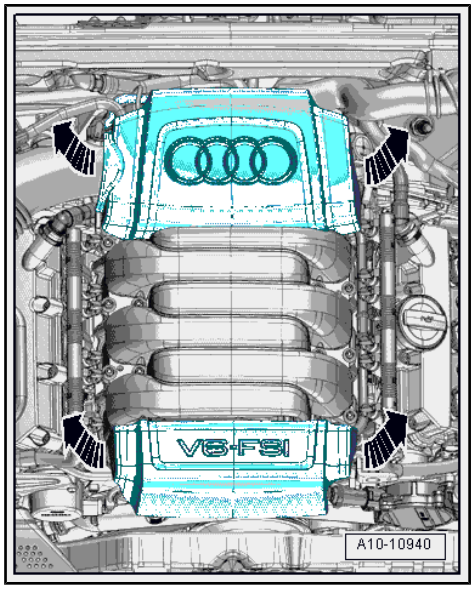
3.2 Removing and installing coolant temperature sender -G62-

Removing

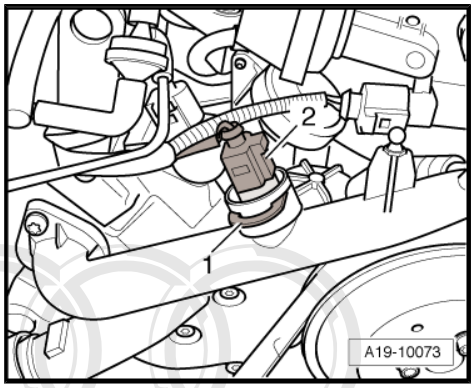
- Engine cold.

– 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:

Note

- *Fit new O-ring.*
- *Insert new coolant temperature sender -G62- immediately into connection to avoid loss of coolant.*

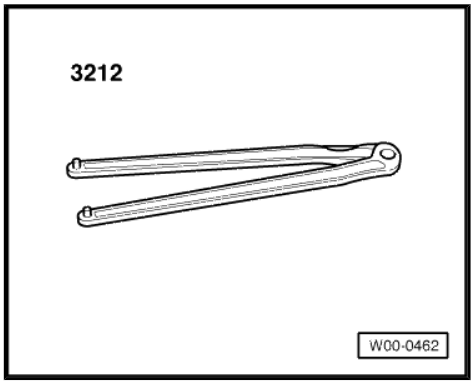
– Check coolant level ⇒ page 256 .

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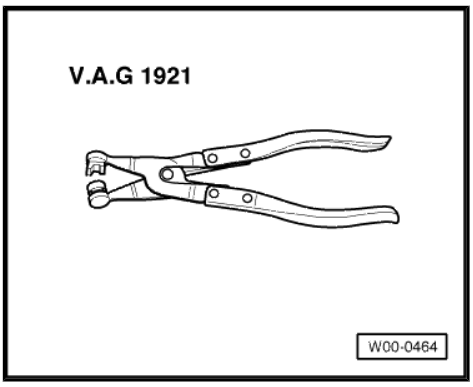
3.3 Removing and installing coolant pipe (front)

Special tools and workshop equipment required

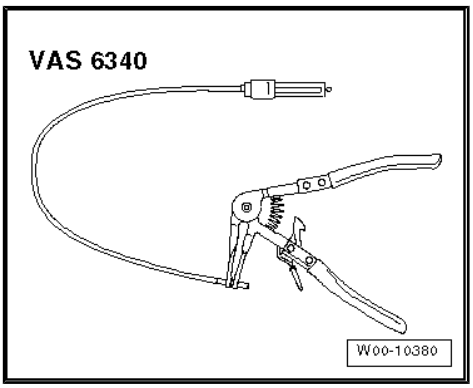
♦ Pin wrench -3212-



Hose clip pliers -V.A.G 1921-



Hose clip pliers -VAS 6340-

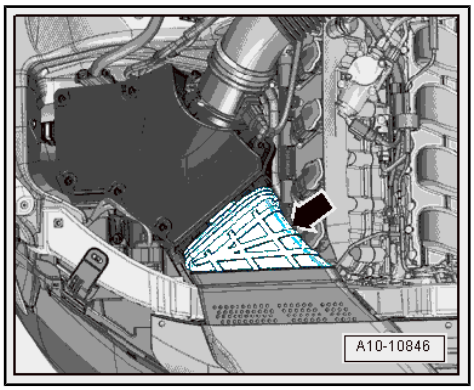


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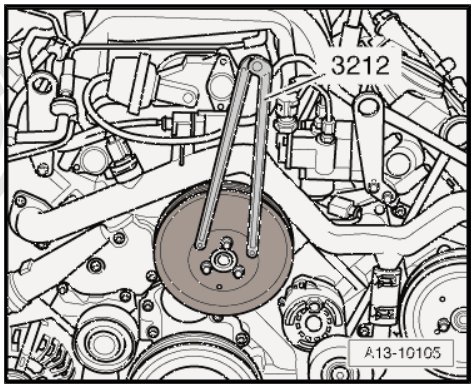
Removing

– Drain coolant ⇒ page 251 (or in vehicles equipped with continued coolant circulation pump -V51- remove continued coolant circulation pump -V51- ⇒ page 270).

– 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 front left wheel housing liner ⇒ Rep. Gr. 66 .



WARNING

Risk of injury caused by refrigerant.

- ***The air conditioner refrigerant circuit must not be opened.***

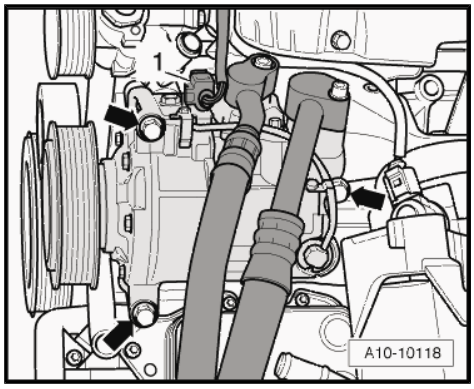
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Caution

Danger of damage to refrigerant lines and hoses.

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

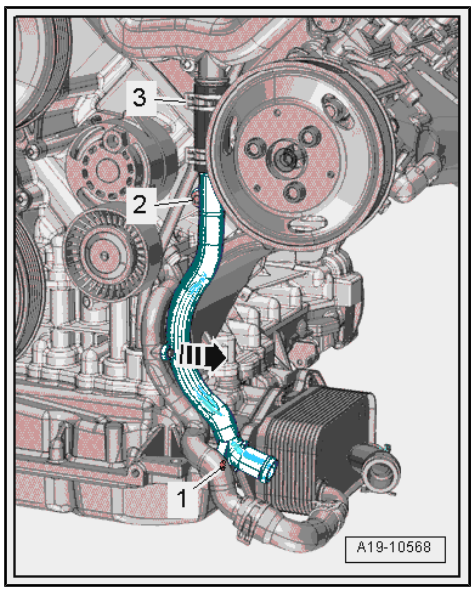
– Remove bolts -arrows-, detach air conditioner compressor from bracket and move clear to one side.



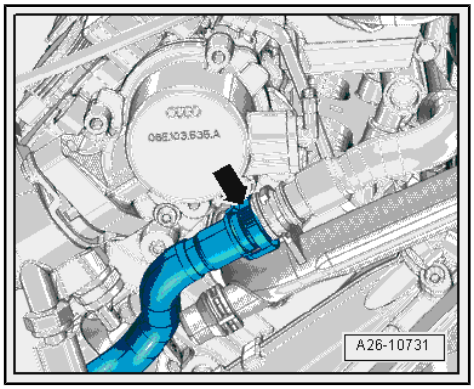
Note

Disregard -item 1-.

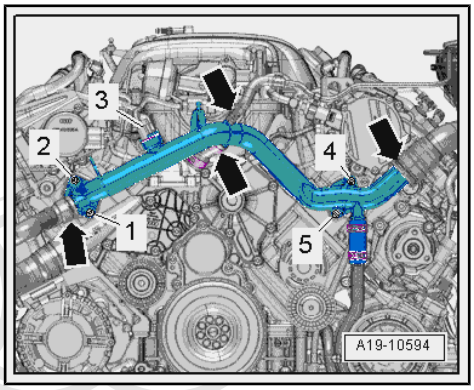
– Release hose clip -3- and remove bolts -1- and -2- for coolant pipes (left-side).
– Swivel coolant pipe slightly to the left -arrow- and pull it upwards out of coolant pipe (top).



– Vehicles with secondary air system: press release tabs and detach secondary air hose -arrow- from bracket towards front.



– 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 261 .

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 .*

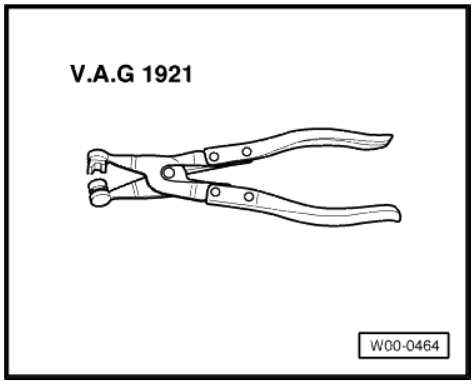
– Clean and smoothen sealing surfaces for seals.
– Lubricate seals with coolant and slide onto coolant pipe.
– Install coolant pipes (left-side) ⇒ page 265
– Install air conditioner compressor ⇒ Rep. Gr. 87 .
– Install poly V-belt pulley for power steering pump ⇒ Rep. Gr. 48 .
– Install continued coolant circulation pump -V51- ⇒ page 270 .
– Install front wheel housing liner ⇒ Rep. Gr. 66 .
– Fit front wheel ⇒ Rep. Gr. 44 .
– Install poly V-belt pulley for coolant pump ⇒ page 257 .
– Install poly V-belt ⇒ page 119 .
– Install continued coolant circulation pump -V51- ⇒ page 270 .
– Fill up with coolant ⇒ page 253 .

3.4 Removing and installing coolant pipes (left-side)

Special tools and workshop equipment required

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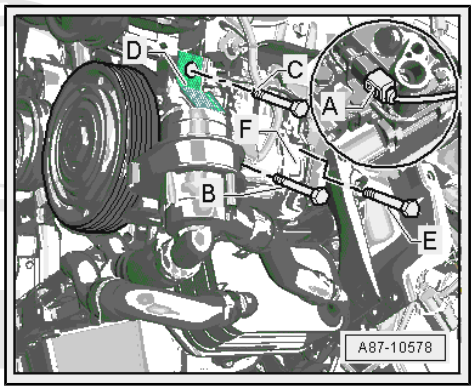
♦ Hose clip pliers -V.A.G 1921-



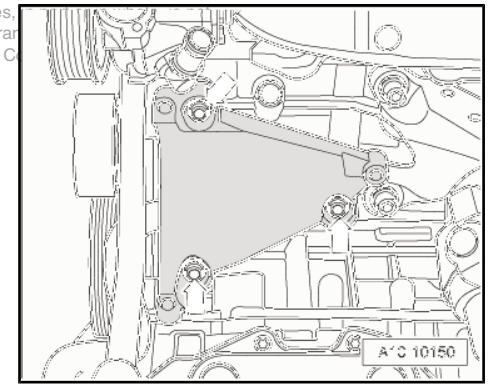
Removing

– Drain coolant ⇒ page 251 (or in vehicles equipped for a hot climate: remove continued coolant circulation pump -V51- ⇒ page 270).

– Remove air conditioner compressor ⇒ Rep. Gr. 87 .

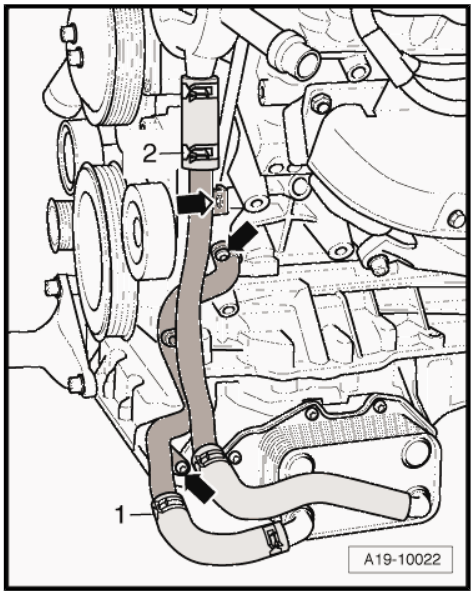


– Remove bolts -arrows- and detach bracket for air conditioner compressor.



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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 261 .

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

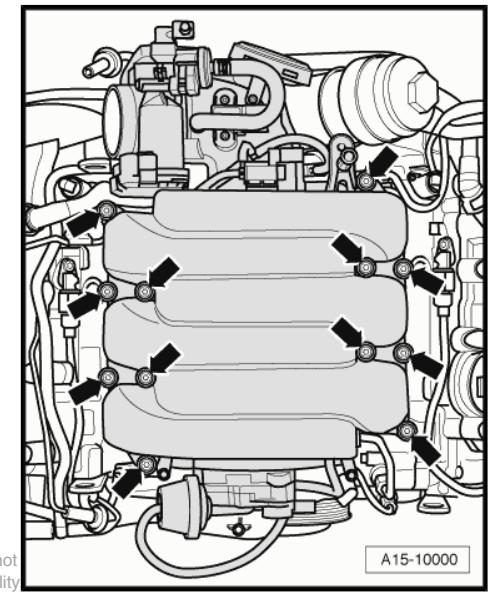
Note

♦ *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 ⇒ Rep. Gr. 87 .
– Install continued coolant circulation pump -V51- ⇒ page 270 .
– Fill up with coolant ⇒ page 253 .

3.5 Removing and installing coolant pipe (top)

Removing



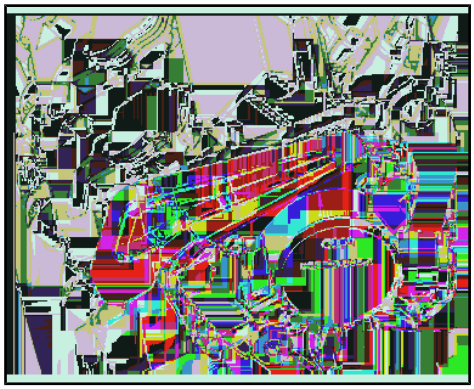
Note

Fit all cable ties in the original positions when installing.

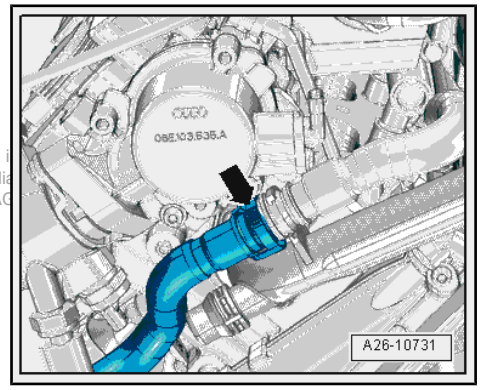
– Drain coolant ⇒ page 251 .
– Remove intake manifold (top section) ⇒ Rep. Gr. 24 .

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– 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

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

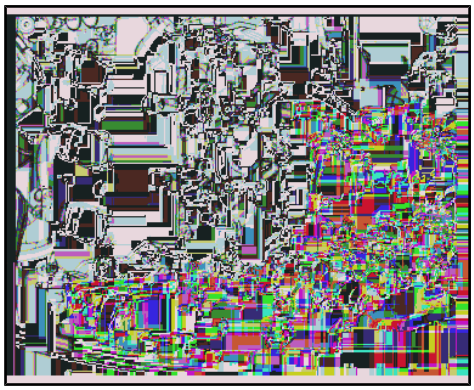
- *The fuel pressure in the high-pressure section of the injection system must be reduced to a residual pressure prior to opening the system.*
- *Wrap a clean cloth around the connection and carefully loosen the connection to allow the residual pressure to dissipate.*

– Reduce fuel pressure in high-pressure section of injection system ⇒ page 4 .

– Unscrew connection -1-.

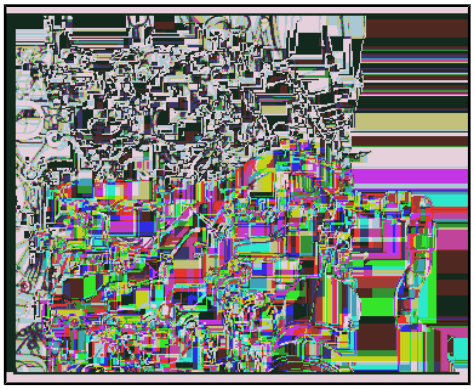
– Unscrew union nuts -2- and -3- (counterhold connection).

– 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 261 .

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

Note

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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 ⇒ Rep. Gr. 24 .
– Install intake manifold top section ⇒ Rep. Gr. 24 .
– Fill up with coolant ⇒ page 253 .

3.6 Continued coolant circulation pump -V51- - exploded view

1 - Coolant hose

2 - Bracket

3 - Bolts

- ❑ 9 Nm

4 - Coolant hose

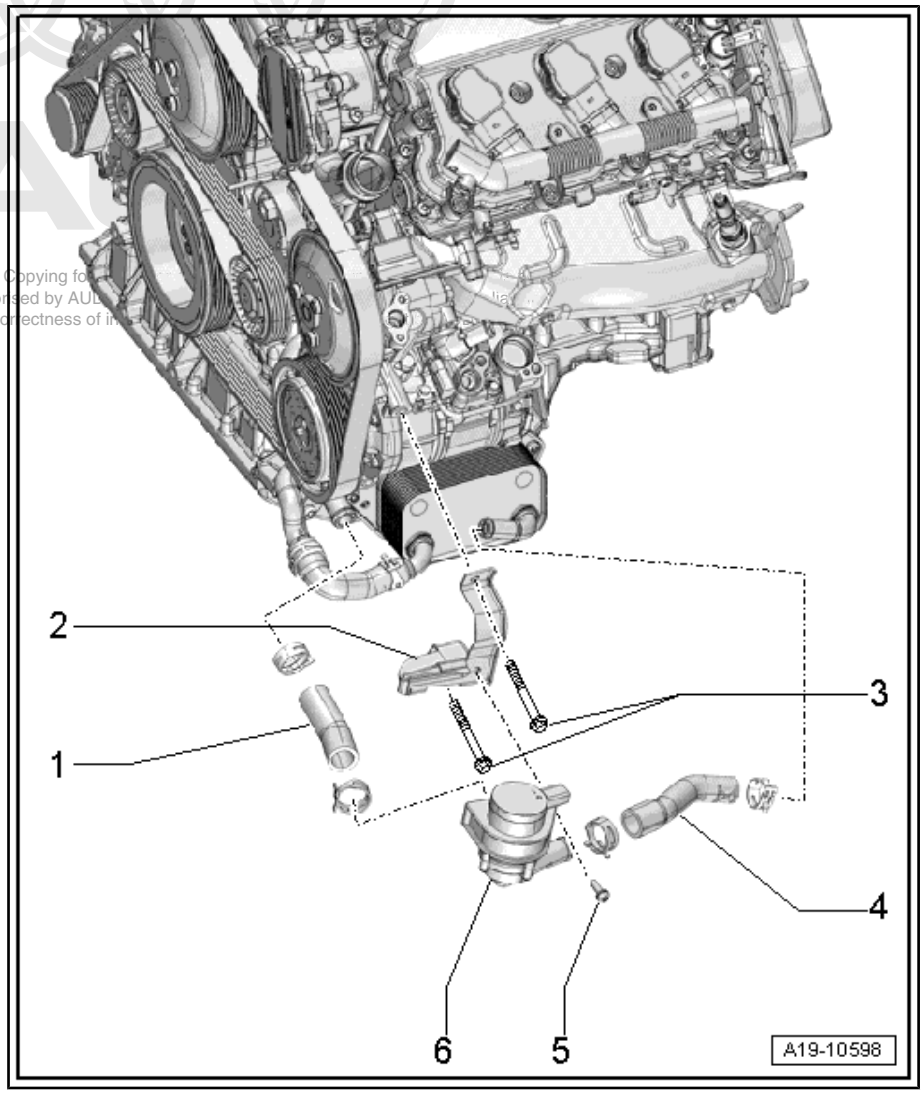
5 - Bolt

- ❑ 4 Nm

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6 - Continued coolant circulation pump -V51-

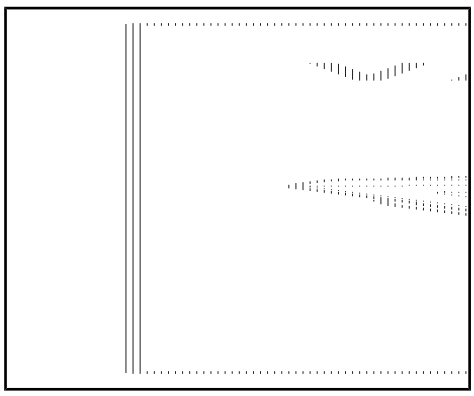
- ❑ Removing and installing ⇒ page 270



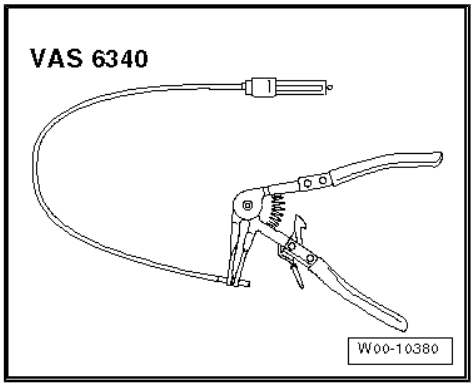
3.7 Removing and installing continued coolant circulation pump -V51-

Special tools and workshop equipment required

- ♦ Drip tray for workshop hoist -VAS 6208-



- Hose clip pliers -VAS 6340-

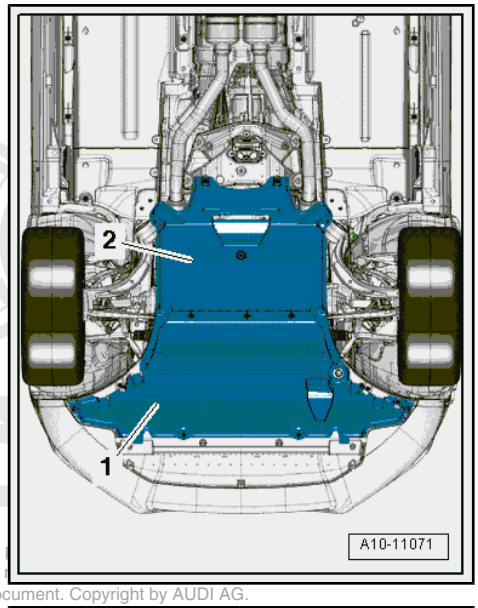


Removing

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.

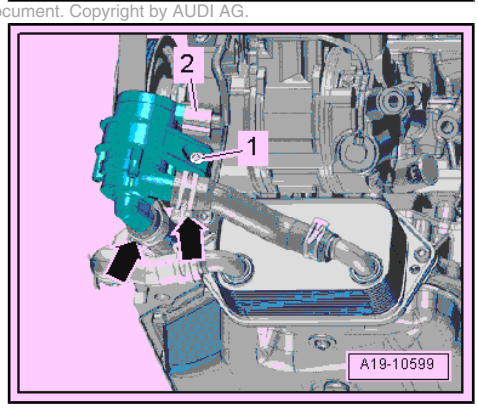
– Remove front noise insulation -1- ⇒ Rep. Gr. 66 .

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– 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 270 .

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

– Fill up with coolant ⇒ page 253 .

4 Radiator and radiator fans

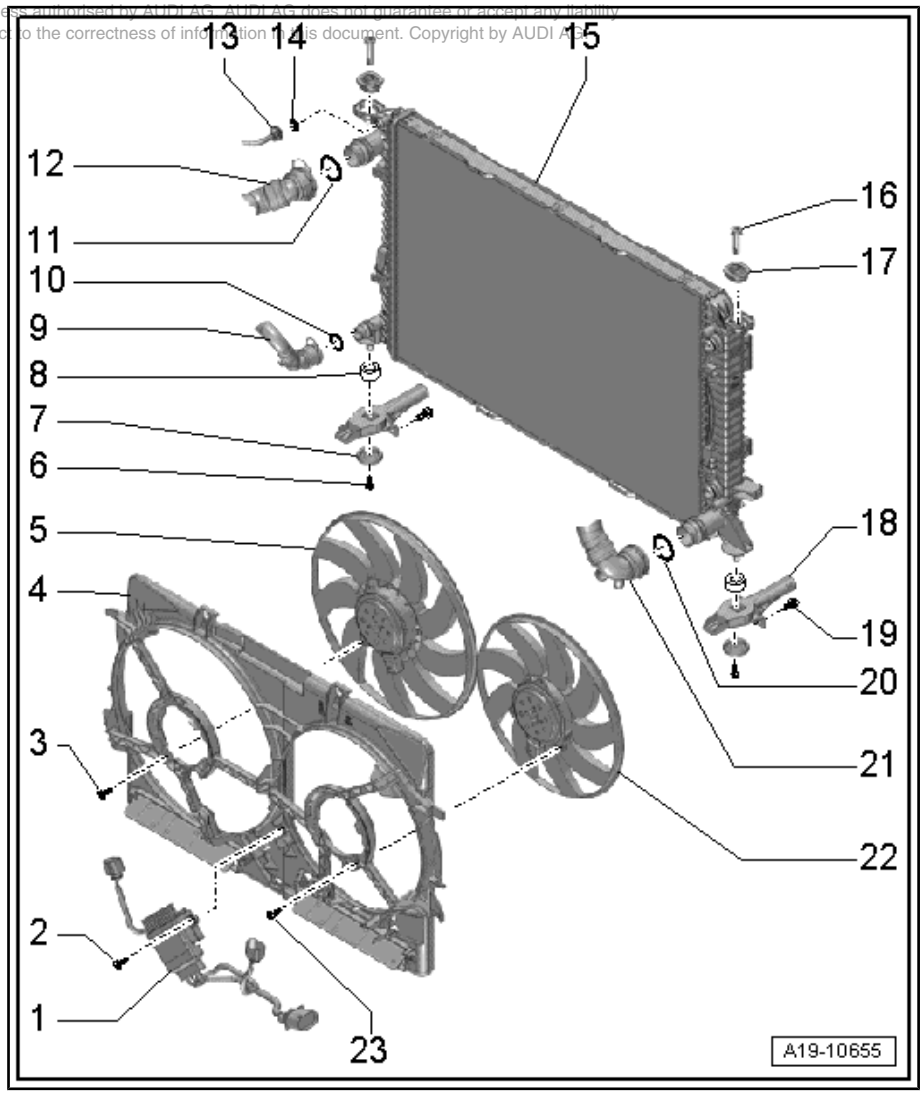
WARNING

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

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

4.1 Radiator and radiator fans - exploded view

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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 289

2 - Bolt

- 4.5 Nm

3 - Bolt

- 5 Nm

4 - Radiator cowl

- Removing and installing: on A4, together with radiator ⇒ page 273 , A5 ⇒ page 285

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 290

6 - Bolt

- 3.5 Nm

7 - Washer

8 - Rubber bush

- For radiator

9 - Coolant hose

- Lift retaining clip to detach
- Connecting to radiator ⇒ page 273

10 - O-ring

- Renew

11 - O-ring

- Renew

12 - Coolant hose

- ❑ Lift retaining clip to detach
- ❑ Connecting to radiator ⇒ page 273

13 - Coolant hose

- ❑ To coolant expansion tank

14 - O-ring

- ❑ Renew

15 - Radiator

- ❑ Removing and installing: on A4, together with radiator cowl ⇒ page 273 , A5 ⇒ page 280
- ❑ 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 273

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 290

23 - Bolt

- ❑ 5 Nm

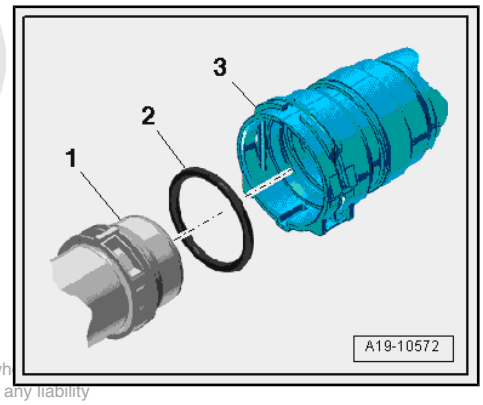
Connecting coolant hose with plug-in connector

– 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.



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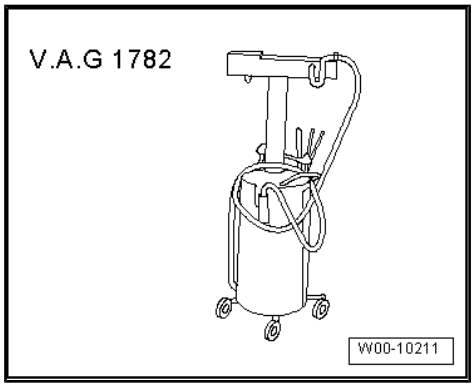
4.2 Removing and installing radiator with radiator cowl - Audi A4

Note

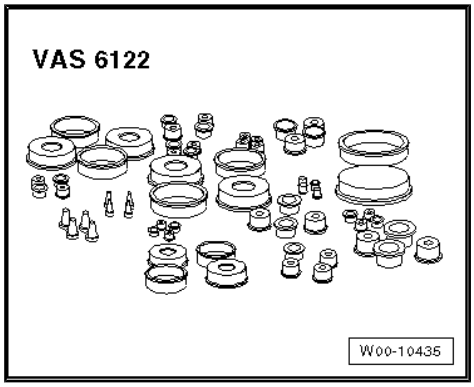
Radiator and radiator cowl can only be removed and installed together as one unit.

Special tools and workshop equipment required

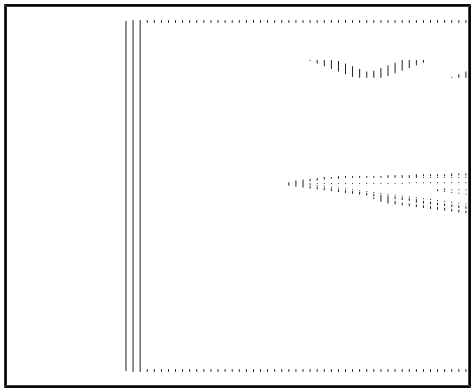
- Used oil collection and extraction unit -V.A.G 1782- for vehicles with multitronic gearbox 0AW/automatic gearbox 0B6



- Engine bung set -VAS 6122- for vehicles with multitronic gearbox 0AW/automatic gearbox 0B6



- Drip tray for workshop hoist -VAS 6208-



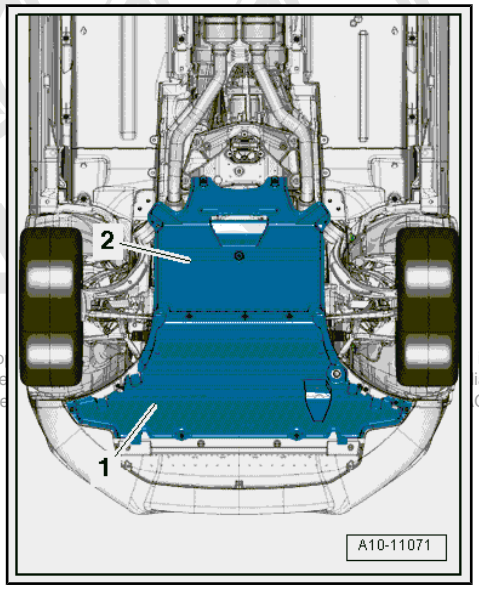
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Removing

Note

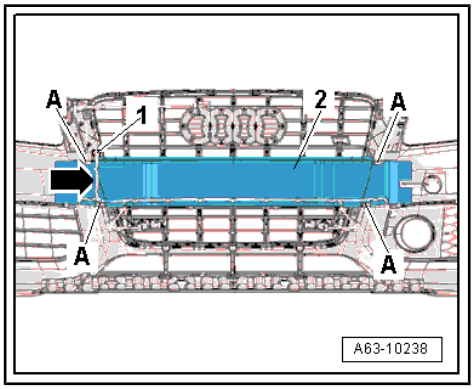
If there are slight impressions on the fins, refer to ⇒ page 10 .

– Remove front noise insulation -1- ⇒ Rep. Gr. 66 .

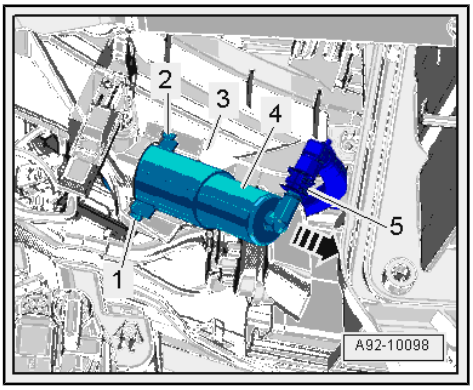


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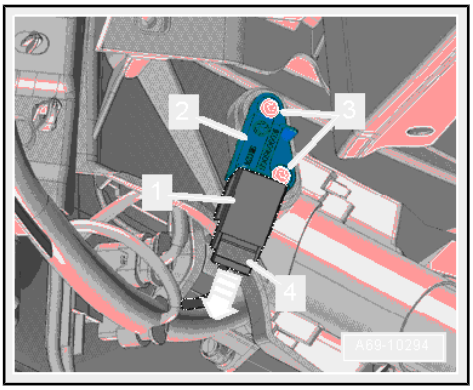
– Remove bumper cover (front) and bumper ⇒ Rep. Gr. 63 .
– Remove headlight (right-side) ⇒ Rep. Gr. 94 .



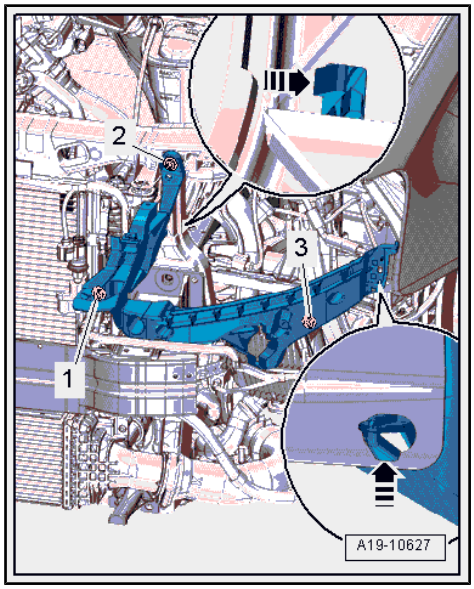
– Remove washer jet (right-side) for headlight washer system (if applicable) ⇒ Rep. Gr. 92 .



– Unplug electrical connector -1- at crash sensor ⇒ Rep. Gr. 69 .



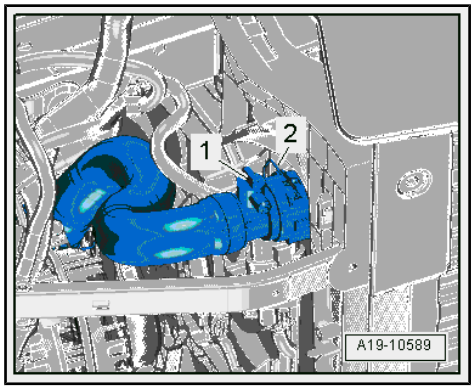
– Remove bolts -1- and -2-.
– Unclip mounting for headlight (right-side) -arrows- and remove.



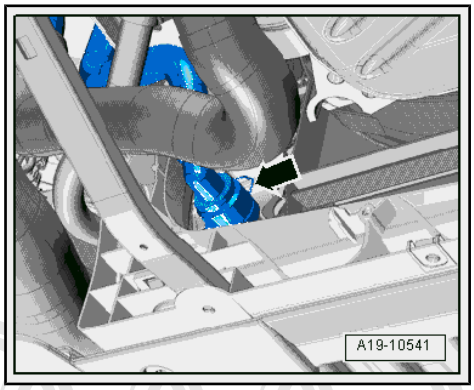
Note

Disregard -item 3-.

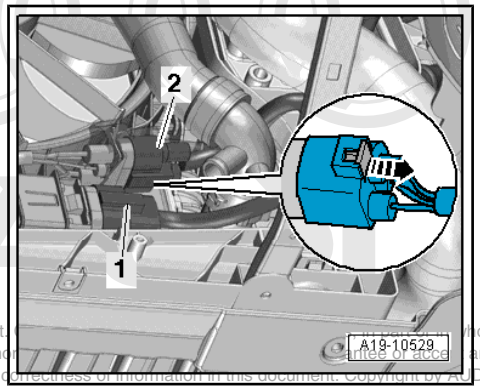
– Place drip tray for workshop hoist -VAS 6208- beneath engine.
– Remove drain plug -1- and drain off coolant.
– Then disconnect coolant hose -2- from radiator (pull out retaining clip).



– 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).



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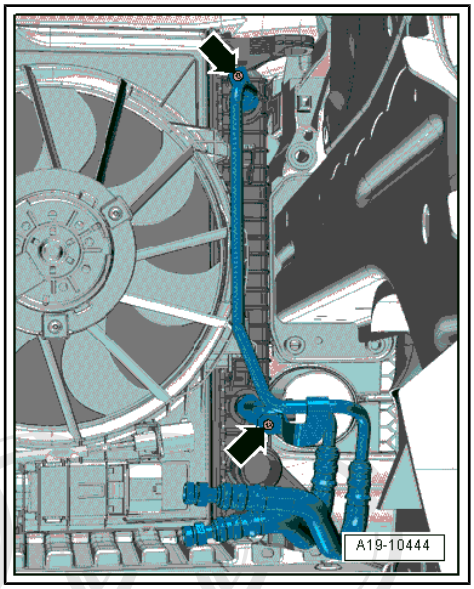
Vehicles with multitronic gearbox 0AW/automatic gearbox 0B6:

– 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 .

– Unscrew bolts -arrows- and detach ATF pipes from radiator.



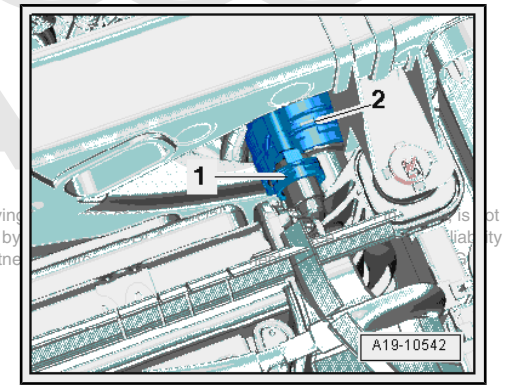
Note

Tie ATF pipes 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):

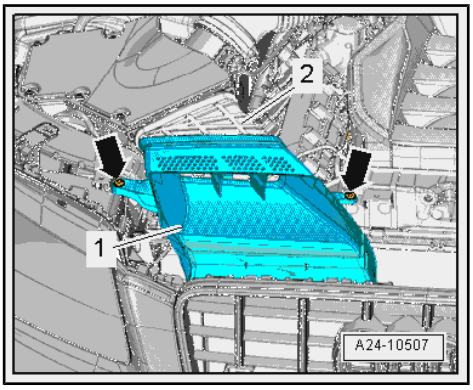
– Lift retaining clips -1- and -2- and detach connection from radiator.



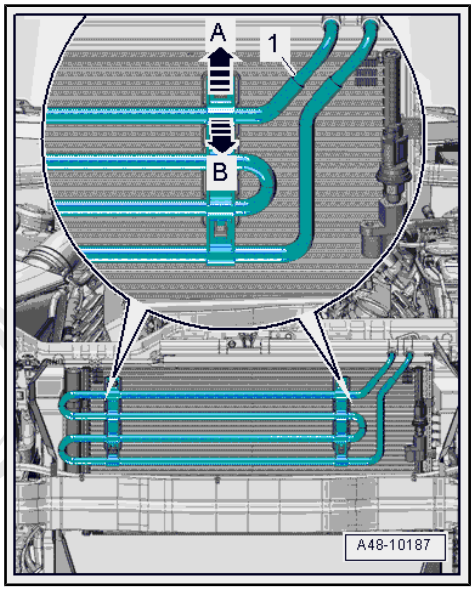
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– Remove bolts -arrows-.

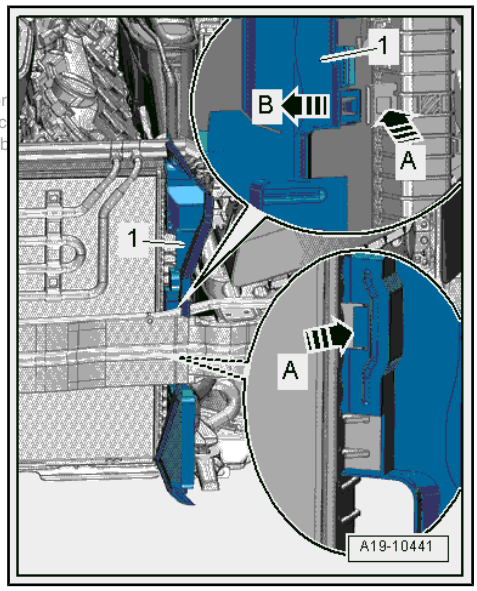
– Detach air duct -1- from intermediate flange -2- for air cleaner housing.



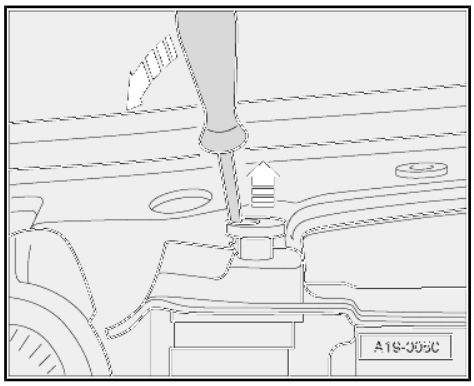
– If fitted, release retaining clips -arrow A- and swivel power steering cooling pipe -1- to front -arrow B-.
– Lift power steering cooling pipe away from condenser and place onto engine.



– Release catches -arrows A- and detach air duct -1- on left and right -arrow B-.

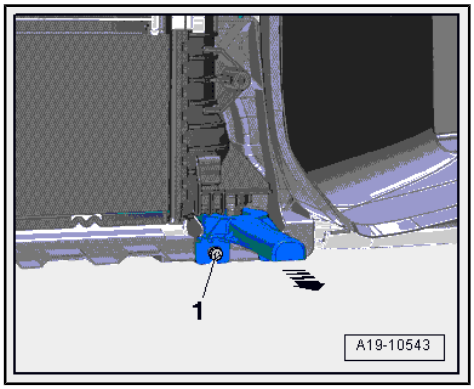


– Release retaining pins for radiator on both sides and pull out upwards -arrows-.



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– Remove bolts -1- on both sides and detach radiator bracket with radiator from lock carrier -arrow-.
– Slightly lower radiator.

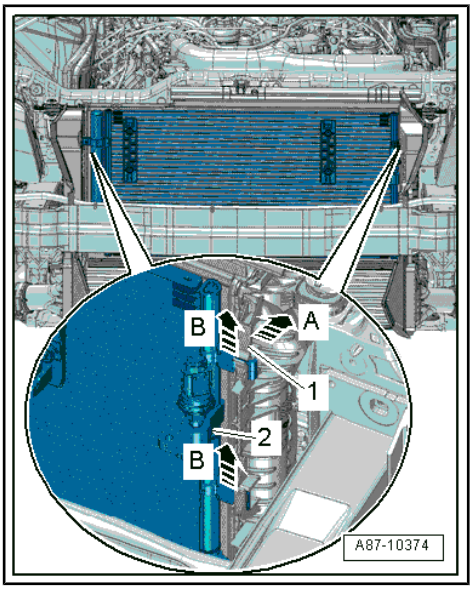


– Have a 2nd mechanic release retaining clips -1- in direction of -arrow A- and lift condenser -2- out of mounts on radiator -arrows B-.

Caution

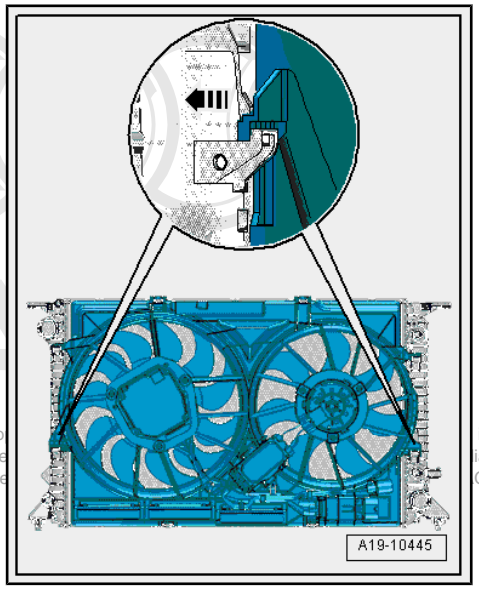
Make sure that condenser and refrigerant pipes and hoses are not damaged.

- ***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

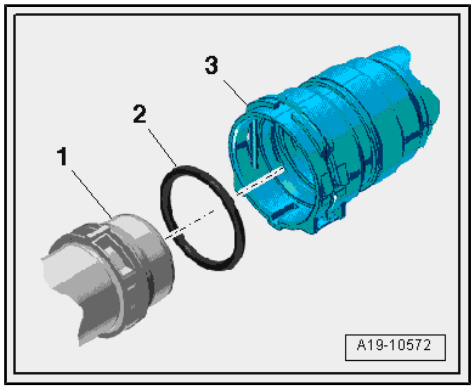
- Tightening torque ⇒ page 272 .

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

– Attach air duct to intermediate flange for air cleaner housing ⇒ Rep. Gr. 24 .
– Vehicles with multitronic gearbox 0AW/automatic gearbox 0B6: install ATF pipes ⇒ Rep. Gr. 37 .
– Install bumper and bumper cover (front) ⇒ Rep. Gr. 63 .

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– Connect coolant hose with plug-in connector ⇒ page 273 .
– Fill up with coolant ⇒ page 253 .



Note

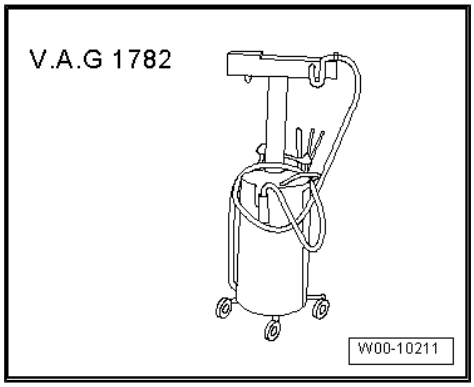
The coolant in the entire system must be changed if the radiator is renewed.

– Vehicles with multitronic gearbox 0AW/automatic gearbox 0B6: check ATF level ⇒ Rep. Gr. 37 .

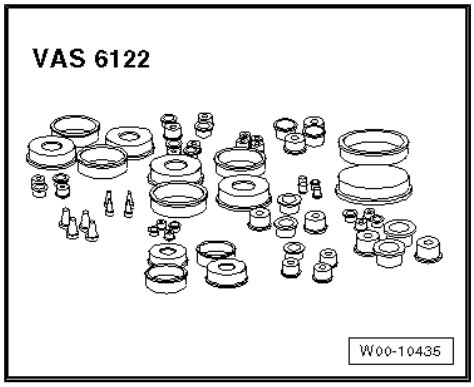
4.3 Removing and installing radiator - Audi A5

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

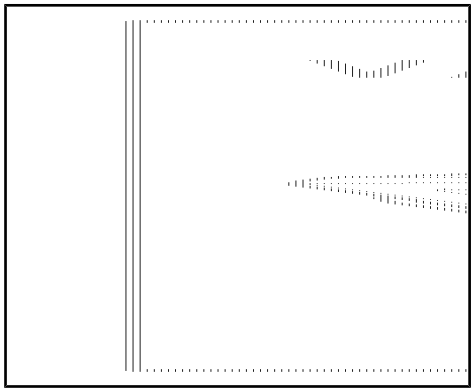


♦ Engine bung set -VAS 6122- for vehicles with multitronic gearbox 0AW/automatic gearbox 0B6



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♦ Drip tray for workshop hoist -VAS 6208-

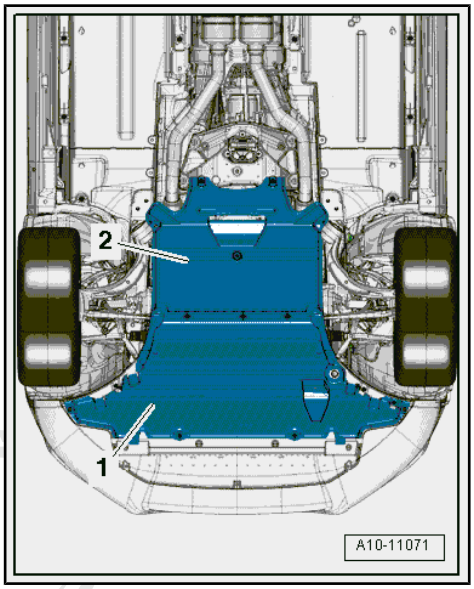


Removing

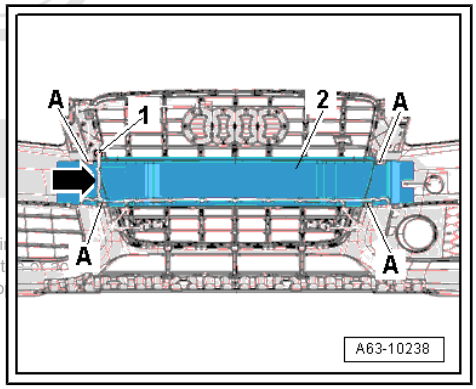
Note

If there are slight impressions on the fins, refer to ⇒ page 10 .

– Remove front noise insulation -1- ⇒ Rep. Gr. 66 .

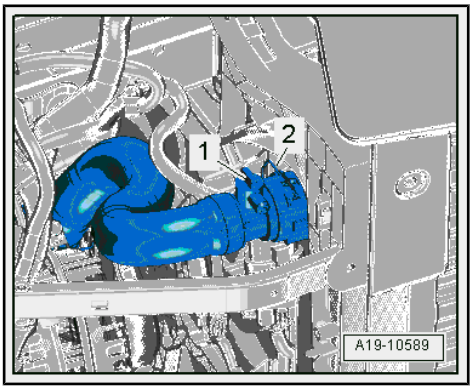


– Remove bumper cover (front) and bumper ⇒ Rep. Gr. 63 .

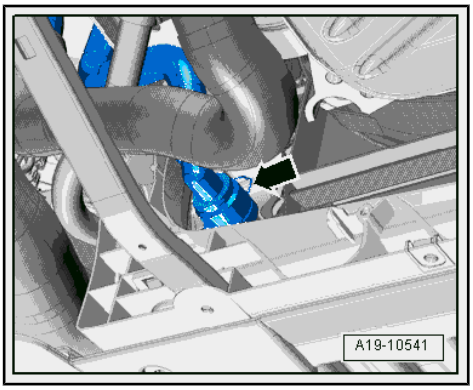


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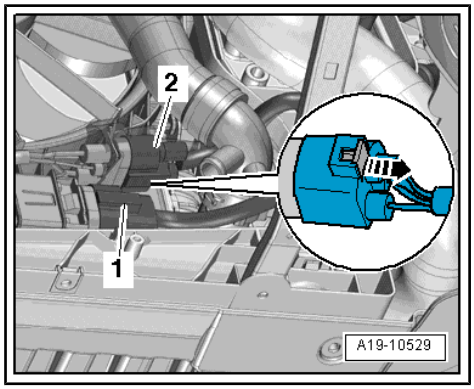
– Place drip tray for workshop hoist -VAS 6208- beneath engine.
– Remove drain plug -1- and drain off coolant.
– Then disconnect coolant hose -2- from radiator (pull out retaining clip).



– 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).



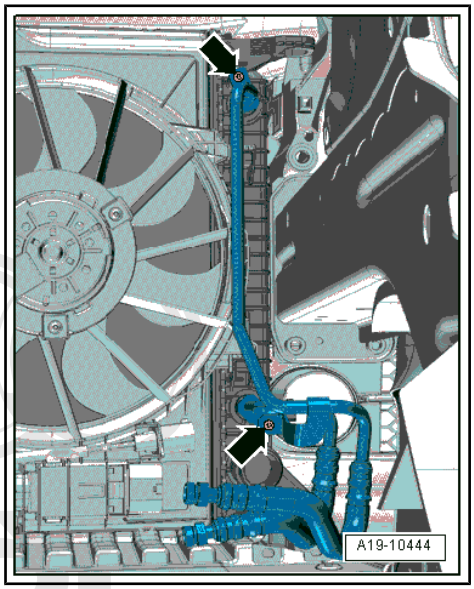
Vehicles with multitronic gearbox 0AW/automatic gearbox 0B6:

– 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 .

– Unscrew bolts -arrows- and detach ATF pipes from radiator.



Note

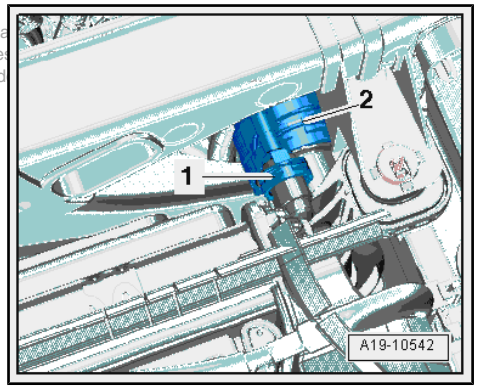
Tie ATF pipes up onto longitudinal member to prevent fluid escaping.

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

All vehicles (continued):

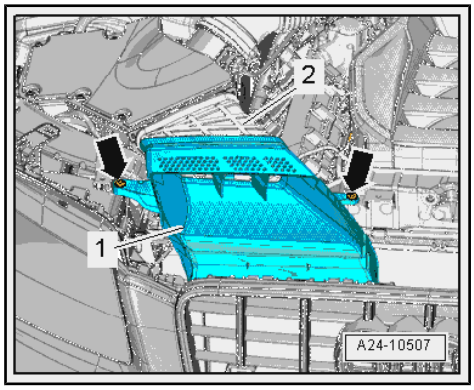
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with respect to the correctness of information in this d

– Lift retaining clips -1- and -2- and detach connection from radiator.

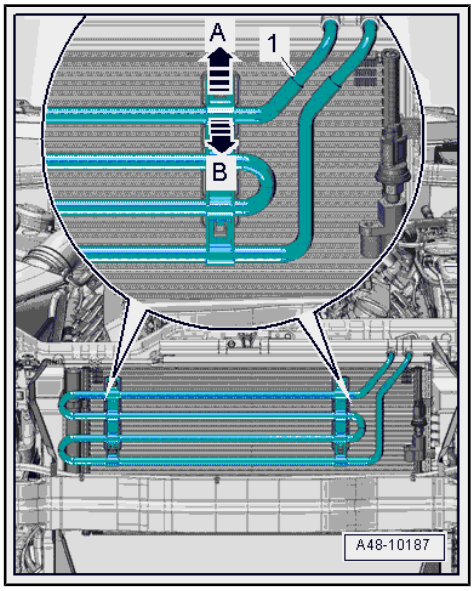


– Remove bolts -arrows-.

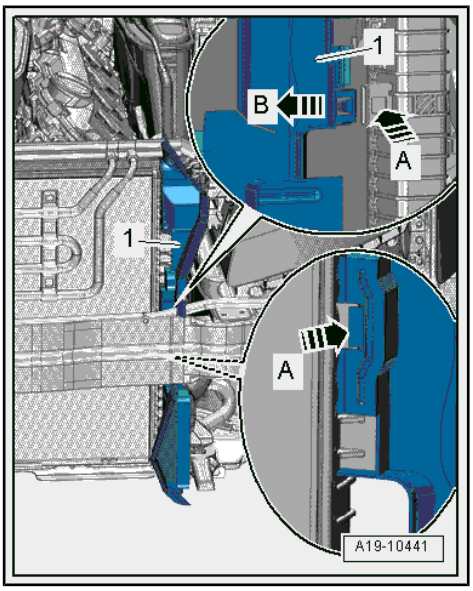
– Detach air duct -1- from intermediate flange -2- for air cleaner housing.



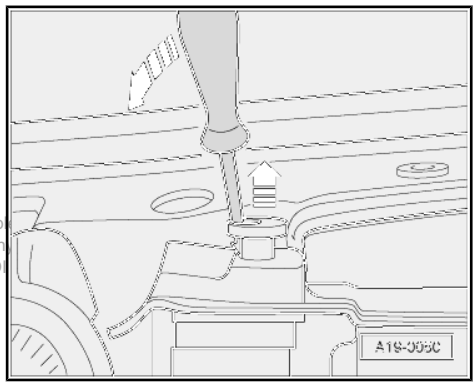
– If fitted, release retaining clips -arrow A- and swivel power steering cooling pipe -1- to front -arrow B-.
– Lift power steering cooling pipe away from condenser and place onto engine.



– Release catches -arrows A- and detach air duct -1- on left and right -arrow B-.

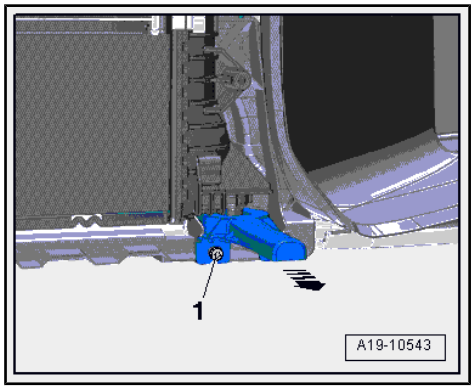


– Release retaining pins for radiator on both sides and pull out upwards -arrows-.



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– Remove bolts -1- on both sides and detach radiator bracket with radiator from lock carrier -arrow-.
– Slightly lower radiator.

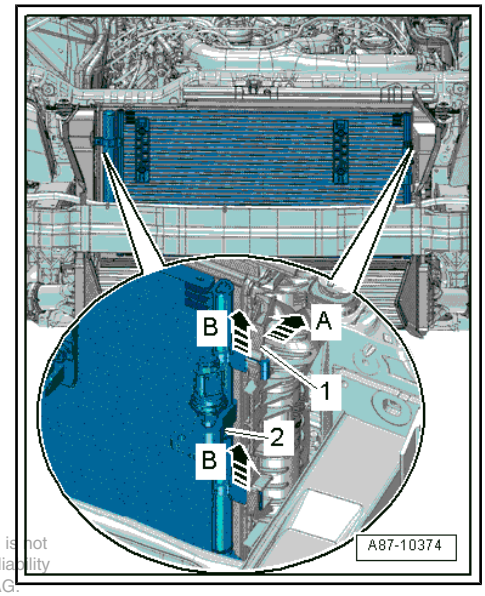


– Have a 2nd mechanic release retaining clips -1- in direction of -arrow A- and lift condenser -2- out of mounts on radiator -arrows B-.

Caution

Make sure that condenser and refrigerant pipes and hoses are not damaged.

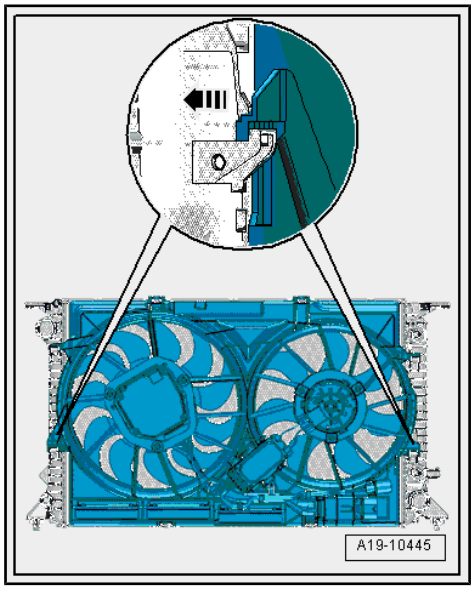
- ***Do NOT stretch, kink or bend refrigerant lines and hoses.***



– 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 272 .

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

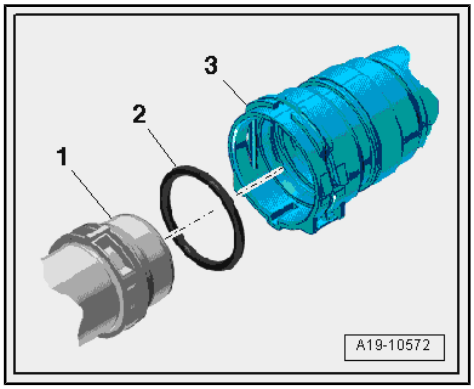
– Install ATF pipes ⇒ Rep. Gr. 37 .
– Attach air duct to intermediate flange for air cleaner housing ⇒ Rep. Gr. 24 .
– Install bumper and bumper cover (front) ⇒ Rep. Gr. 63 .

– Connect coolant hose with plug-in connector ⇒ page 273 .
– Fill up with coolant ⇒ page 253 .

Note

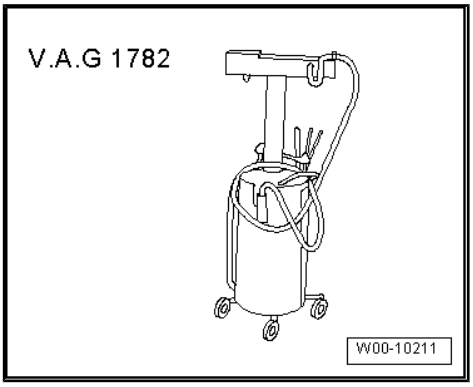
The coolant in the entire system must be changed if the radiator is renewed.

– Vehicles with multitronic gearbox 0AW/automatic gearbox 0B6: check ATF level ⇒ Rep. Gr. 37 .

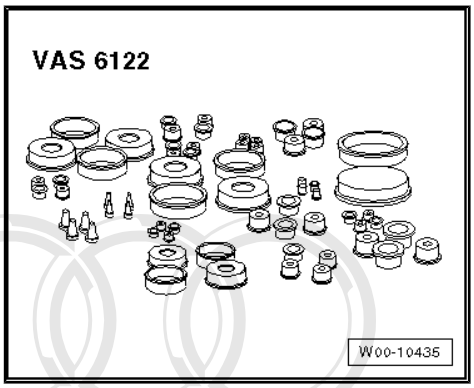


4.4 Removing and installing radiator cowl - Audi A5

Used oil collection and extraction unit -V.A.G 1782- for vehicles with multitronic gearbox 0AW/automatic gearbox 0B6



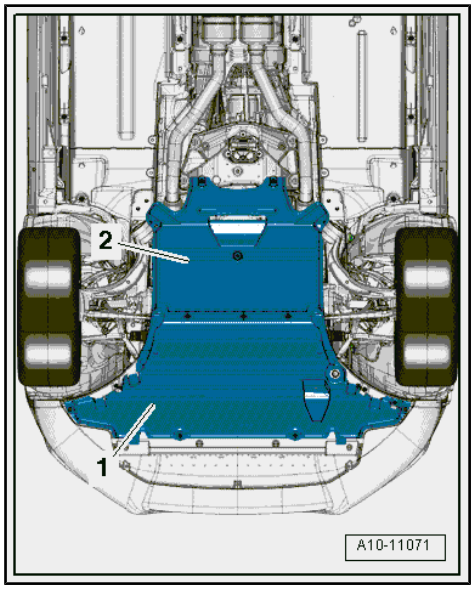
Engine bung set -VAS 6122- for vehicles with multitronic gearbox 0AW/automatic gearbox 0B6



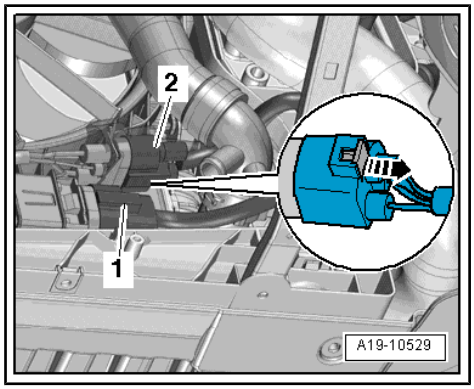
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Removing

– Remove front noise insulation -1- ⇒ Rep. Gr. 66 .



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



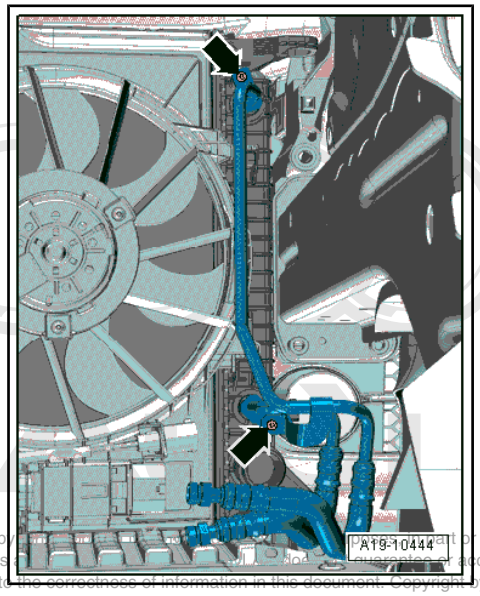
Vehicles with multitronic gearbox 0AW/automatic gearbox 0B6:

– 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 .

– Unscrew bolts -arrows- and detach ATF pipes from radiator.



Note

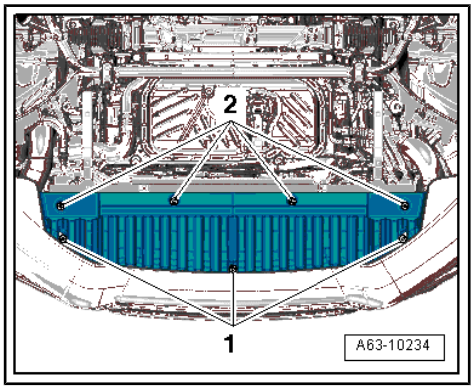
Tie ATF pipes up onto longitudinal member to prevent fluid escaping.

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

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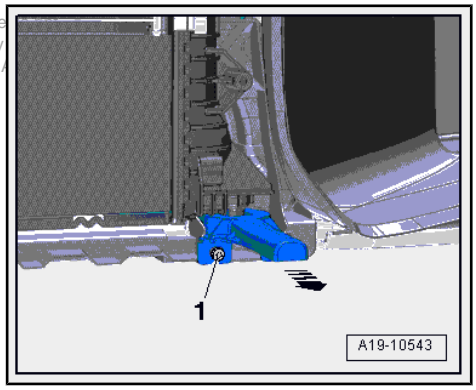
All vehicles (continued):

– Loosen bolts -1- and -2- and detach end plate at bumper cover towards rear.



– Remove bolts -1- on both sides.

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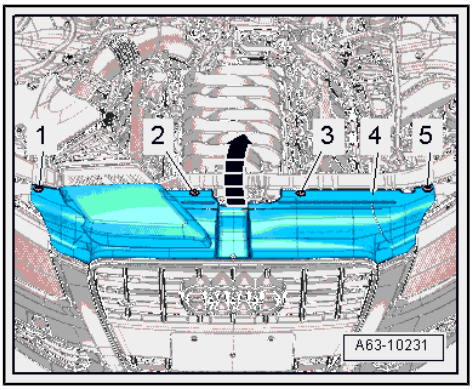


Note

Disregard -arrow-.

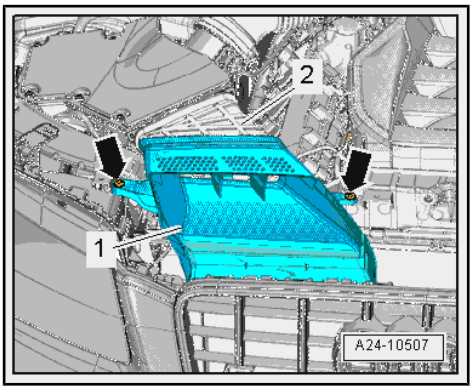
– Remove bolts -1, 2, 3, 5-.

– Lift cover -4- at lock carrier and detach from radiator grille.

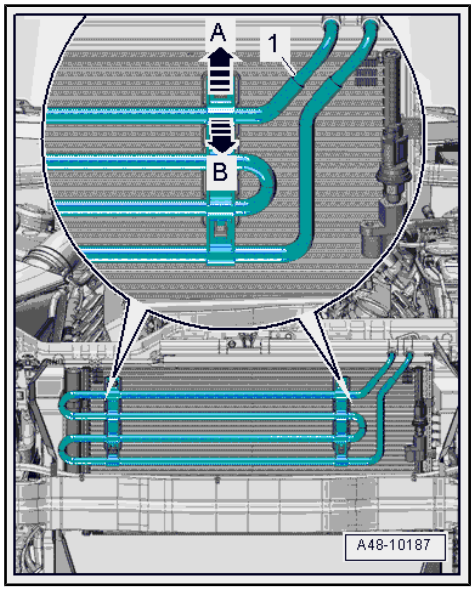


– Remove bolts -arrows-.

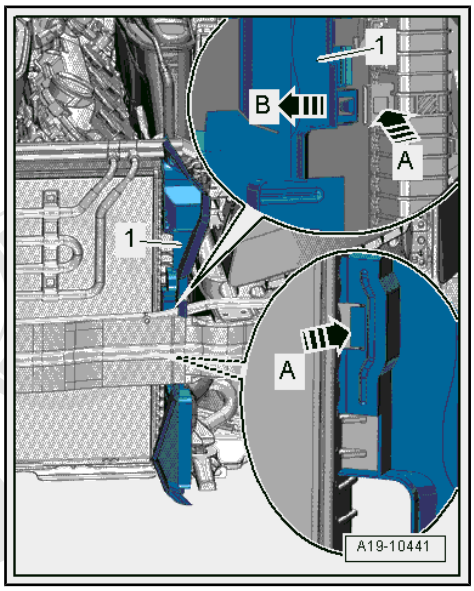
– Detach air duct -1- from intermediate flange -2- for air cleaner housing.



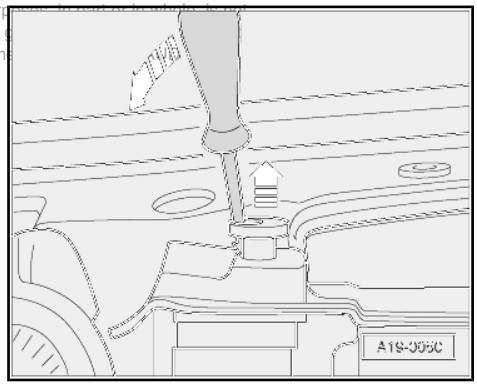
– If fitted, release retaining clips -arrow A- and swivel power steering cooling pipe -1- to front -arrow B-.



– Release catches -arrows A- and swivel air duct -1- on left and right to centre of vehicle -arrow B-.

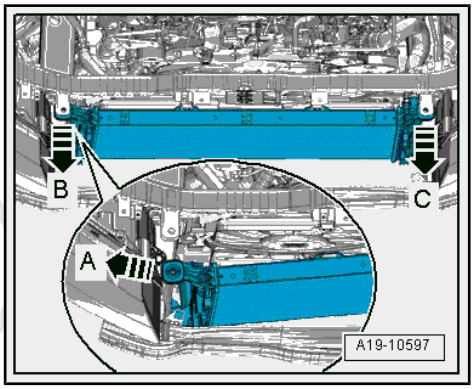


– Release retaining pins for radiator on both sides and pull out upwards -arrows-.

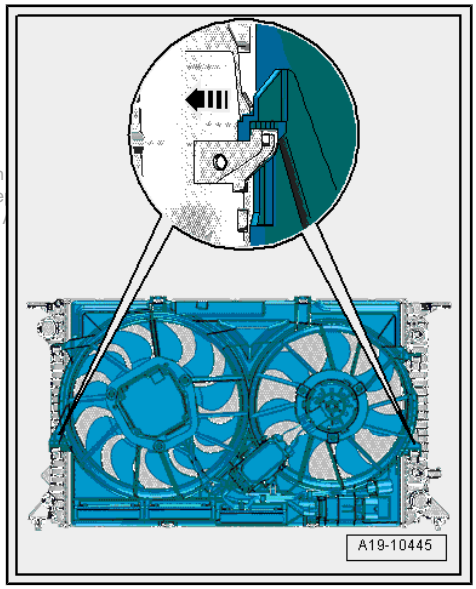


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– Pull right side of radiator towards the front -arrow B-, then press to the right -arrow A- and then pull left side towards the front -arrow C-.



– 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 272 .

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

– Attach air duct to intermediate flange for air cleaner housing ⇒ Rep. Gr. 24 .

– Install cover above lock carrier ⇒ Rep. Gr. 63 .

– Install end plate at bumper cover ⇒ Rep. Gr. 63 .

– Install front noise insulation ⇒ Rep. Gr. 66 .

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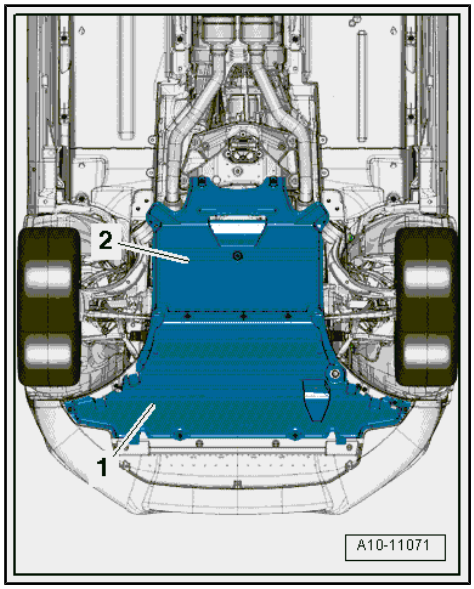
4.5 Removing and installing radiator fan control unit -J293-

Note

The following procedure refers to the radiator fan with separate radiator fan control unit -J293- .

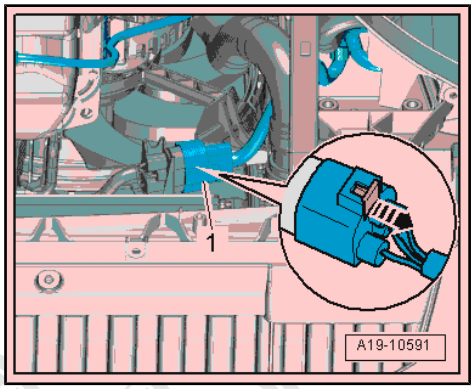
Removing

– Remove front noise insulation -1- ⇒ Rep. Gr. 66 .



– 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.



– Unplug electrical connectors -2- and -3-.

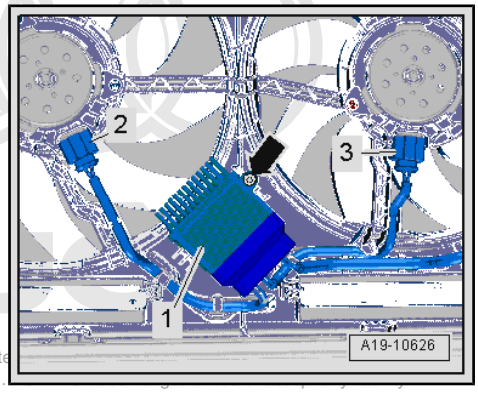
– Unscrew bolt -arrow- and remove radiator fan control unit -1-.

Installing

• Tightening torque ⇒ page 272 .

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

– Install front noise insulation ⇒ Rep. Gr. 66 .



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4.6 Removing and installing radiator fans - V7- / -V177-

Removing

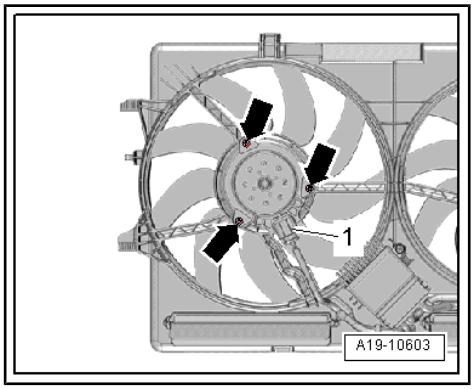
Note

Fit all cable ties in the original positions when installing.

– A4: remove radiator with radiator cowl ⇒ page 273 .

– A5: remove radiator cowl ⇒ page 285 .

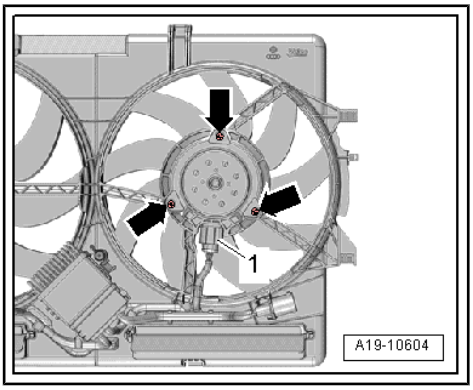
– Unplug electrical connector -1-.
– Remove bolts -arrows- and detach radiator fan -V7- (left-side).



Radiator fan 2 -V177- with separate radiator fan control unit 2:

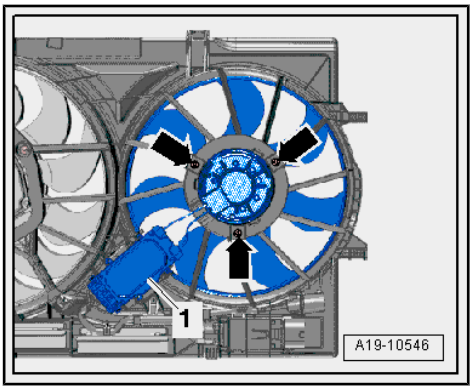
– Unplug electrical connector -1-.
– Remove bolts -arrows- and detach radiator fan 2 -V177- (right-side).

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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 272 .

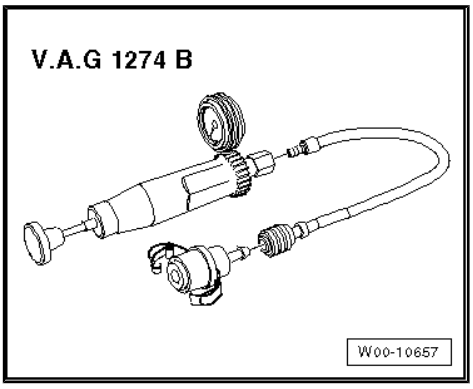
Installation is carried out in the reverse order; note the following:

– A4: install radiator with radiator cowl ⇒ page 273 .
– A5: install radiator cowl ⇒ page 285 .

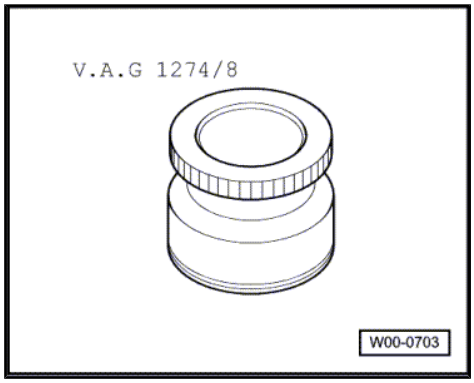
4.7 Checking cooling system for leaks

Special tools and workshop equipment required

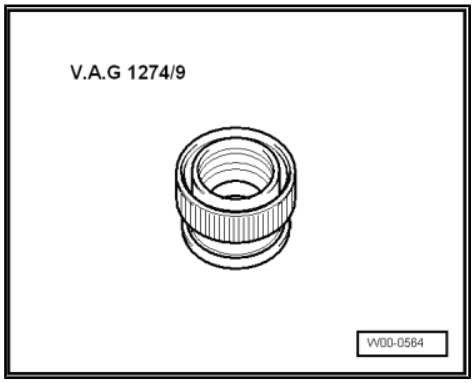
♦ Cooling system tester -V.A.G 1274 B-



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



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



Procedure

- Engine must be warm.

WARNING

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

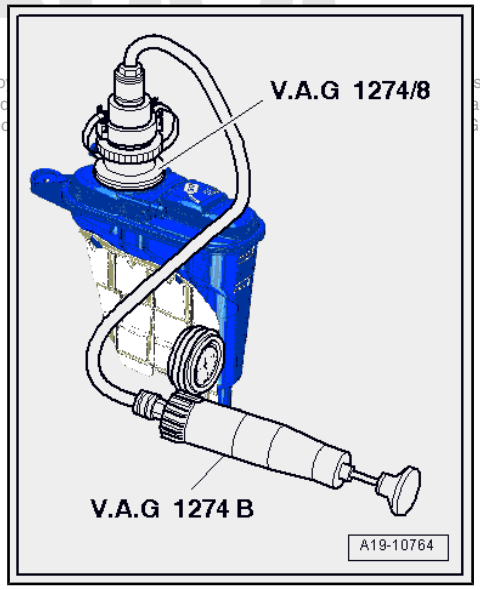
- *The cooling system is under pressure when the engine is hot.*
- *Cover filler cap on coolant expansion tank with a cloth and open carefully to dissipate pressure.*

– 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.

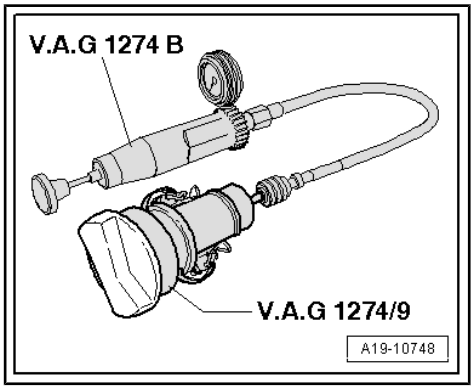
– Using hand pump on cooling system tester, build up a pressure of approx. 1.0 bar.

– If this pressure is not maintained, locate and rectify leaks.



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Checking pressure relief valve in filler cap



– Fit cooling system tester -V.A.G 1274 B- with adapter -V.A.G 1274/9- onto filler cap.

– Build up pressure with hand pump on cooling system tester.

• The pressure relief valve should open at a pressure of 1.4 ... 1.6 bar.

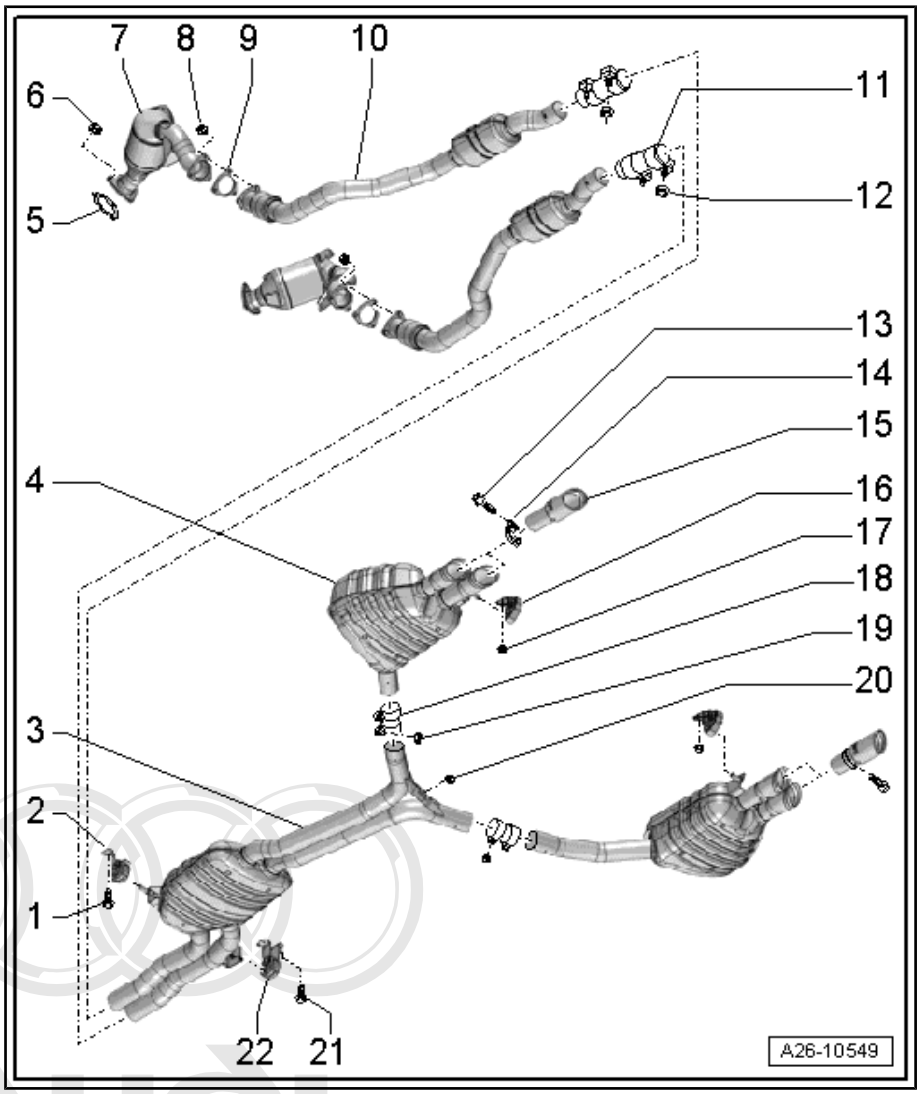
– Renew filler cap if pressure relief valve does not open as described.

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26 – Exhaust system

1 Silencers

1.1 Silencers - exploded view



1 - Bolt

- ❑ 23 Nm

2 - Mounting

- ❑ Renew if damaged
- ❑ Check preload ⇒ “1.9 Stress-free alignment of exhaust system”, page 305

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 297
- ❑ Cutting point ⇒ page 304
- ❑ Align exhaust system so it is free of stress ⇒ page 305

4 - Rear silencer

- ❑ Combined as one unit with centre silencer and tailpipe as original equipment
- ❑ For removal on A5 Cabriolet: remove diagonal struts ⇒ page 297
- ❑ Centre silencer, rear silencer and tailpipe can be renewed separately as required
- ❑ Cutting point: centre silencer / rear silencer ⇒ page 304
- ❑ Cutting point: rear silencer / tailpipe ⇒ page 305
- ❑ Align exhaust system so it is free of stress ⇒ page 305

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 298

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- left-side (vehicles with multitronic gearbox 0AW/automatic gearbox 0B6) ⇒ page 299
- right-side (vehicles with manual gearbox/multitronic gearbox 0AW) ⇒ page 300
- right-side (vehicles with automatic gearbox 0B6) ⇒ page 301

❑ Mounting components ⇒ page 296

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 303
❑ Align exhaust system so it is free of stress ⇒ page 305

11 - Clamp (front)

❑ Installation position ⇒ page 296
❑ Before tightening, align exhaust system so it is free of stress ⇒ page 305
❑ 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 305
❑ Aligning ⇒ page 306

16 - Mounting

❑ Renew if damaged
❑ Check preload ⇒ “1.9 Stress-free alignment of exhaust system”, page 305

17 - Nut

❑ Renew
❑ 20 Nm

18 - Clamp (rear)

❑ For separate replacement of centre and rear silencers
❑ Installation position ⇒ page 296
❑ Before tightening, align exhaust system so it is free of stress ⇒ page 305
❑ Tighten bolt connections evenly

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19 - Nut

❑ 23 Nm

20 - Nut

❑ Renew
❑ 23 Nm

21 - Bolt

❑ 23 Nm

22 - Mounting

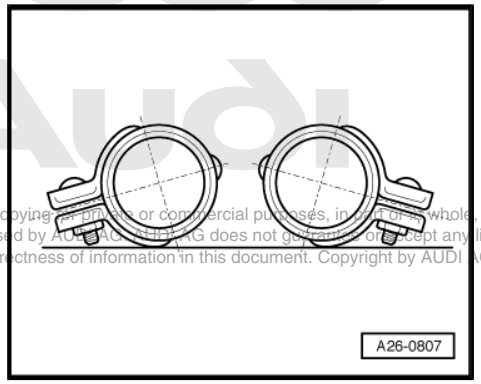
❑ Renew if damaged

❑ Check preload ⇒ “1.9 Stress-free alignment of exhaust system”, page 305

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.

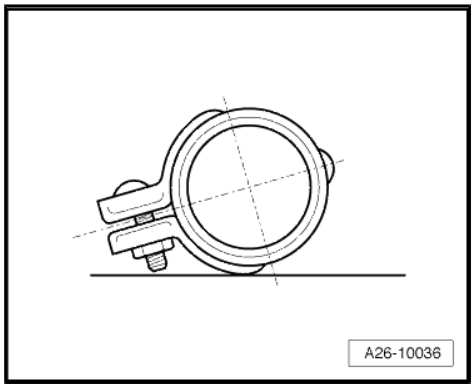


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Installation position of rear clamps

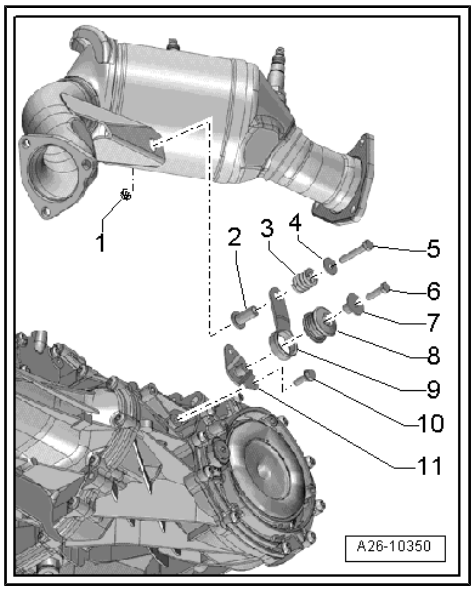
– Install clamps so that the bolt ends do not protrude beyond bottom of clamp.

• Installation position: bolt connections face forwards.



Components of mountings for catalytic converter - vehicles with manual gearbox/automatic gearbox 0B6

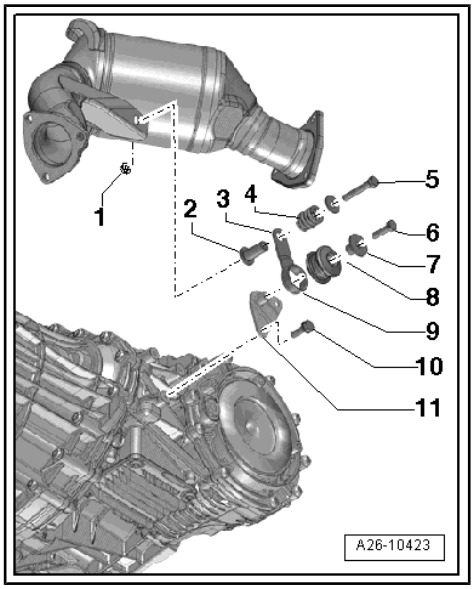
1 - Nut, 23 Nm
2 - Spacer sleeve
3 - Compression spring
4 - Washer
5 - Bolt
6 - Bolt, 23 Nm
7 - Spacer sleeve
8 - Buffer
9 - Bracket
10 - Bolt, 23 Nm
11 - Bracket



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



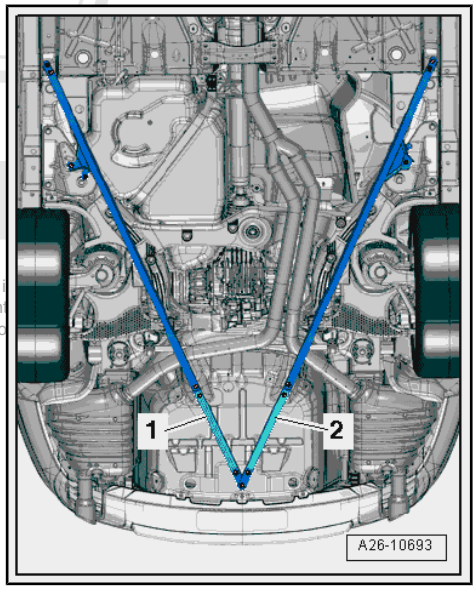
1 - Nut, 23 Nm
2 - Spacer sleeve
3 - Compression spring
4 - Washer
5 - Bolt
6 - Bolt, 23 Nm
7 - Spacer sleeve
8 - Buffer
9 - Bracket
10 - Bolt, 23 Nm
11 - Bracket

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 ⇒ Rep. Gr. 42 .



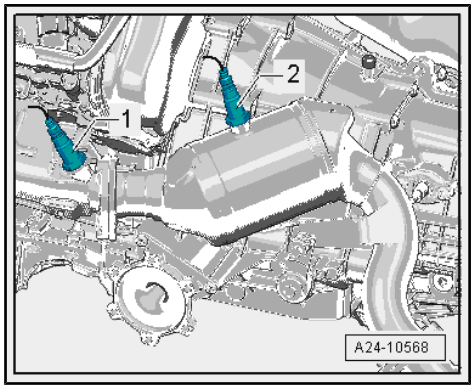
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1.2 Removing and installing catalytic converter (left-side) - vehicles with manual gearbox

Removing

– Remove front silencer (left-side) ⇒ page 303 .

– Remove Lambda probe 2 after catalytic converter -G131- -item 2- ⇒ Rep. Gr. 24 .



Caution

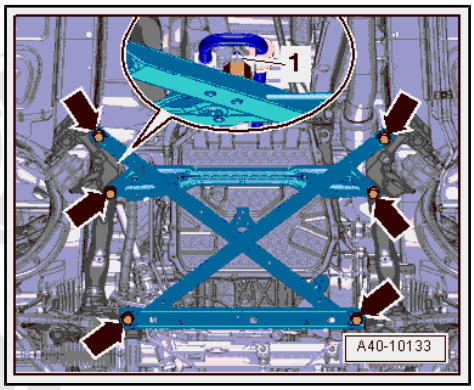
Risk of damage to running gear components.

- *The vehicle must NOT be lowered onto its wheels if the engine/gearbox mountings, steering box 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.



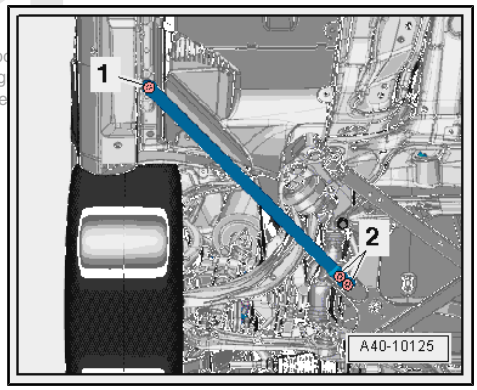
Note

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

A5 Cabriolet:

– Remove bolt -2- on both sides.

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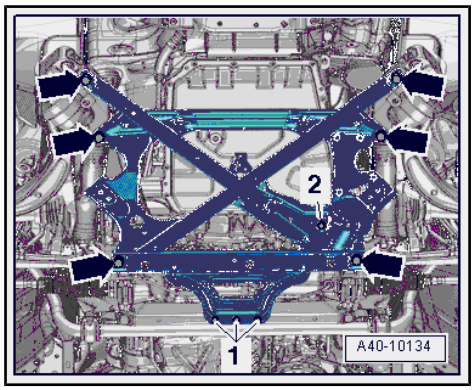


Note

Disregard -item 1-.

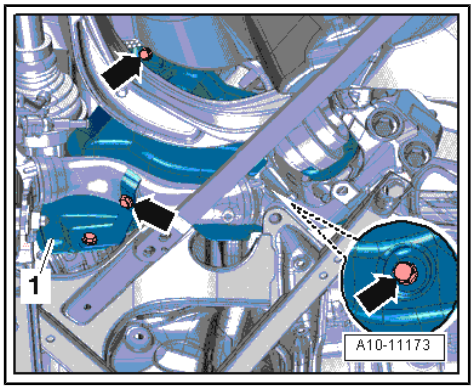
– Remove bolt -2- for power steering hydraulic line.

– Remove bolts -1- and -arrows- and detach subframe cross brace.

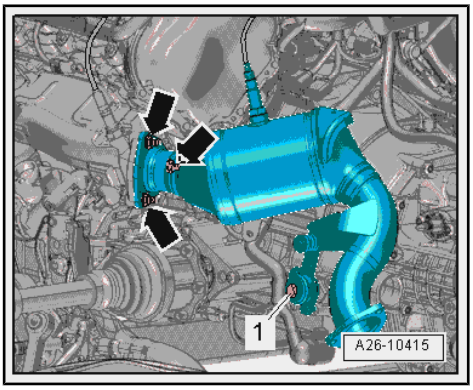


All vehicles (continued):

– If fitted, remove bolts -arrows- and detach heat shield -1- (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 294 .

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

Note

Renew gaskets and self-locking nuts.

– Install subframe cross brace ⇒ Rep. Gr. 40 .

– Install Lambda probe 2 after catalytic converter -G131- ⇒ Rep. Gr. 24 .

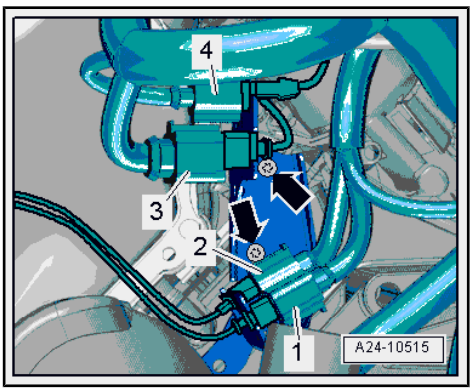
– Install front silencer (left-side) ⇒ page 303 .

1.3 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.

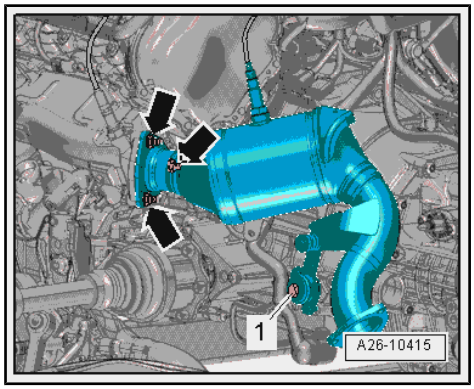


Note

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

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– 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 294 .

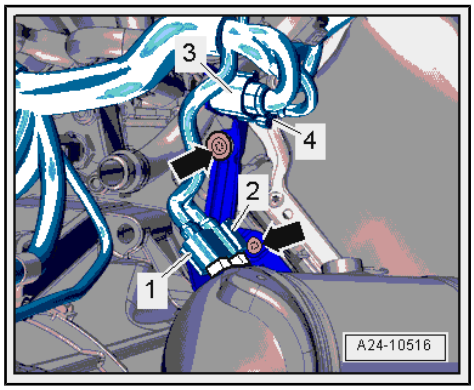
Installation is carried out in the reverse order; note the following:

Note

Renew gaskets and self-locking nuts.

1.4 Removing and installing catalytic converter (right-side) - vehicles with manual gearbox/multitronic gearbox 0AW

Removing



- Gearbox removed.

– 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 294 .

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

Note

Renew gaskets and self-locking nuts.

1.5 Removing and installing catalytic converter (right-side) - vehicles with automatic gearbox 0B6

Removing

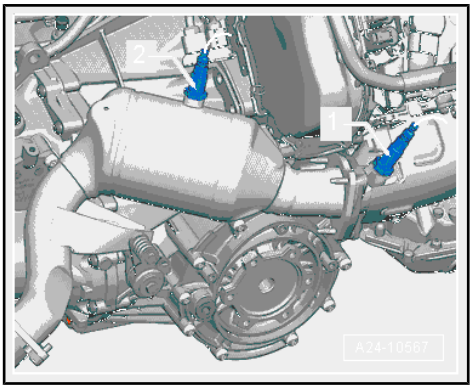
– Remove front silencer (right-side) ⇒ page 303 .

– Remove Lambda probe after catalytic converter -G130- -item 2- ⇒ Rep. Gr. 24 .

Caution

Risk of damage to running gear components.

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



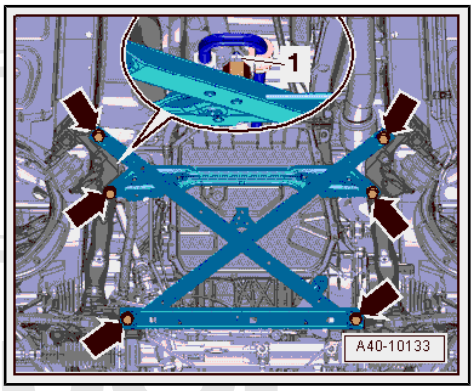
A4 (all), A5 Coupé:

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

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

Note

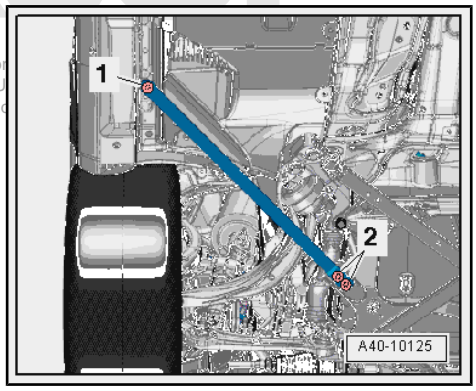
Illustration shows the installation position on a vehicle with dynamic steering.



A5 Cabriolet:

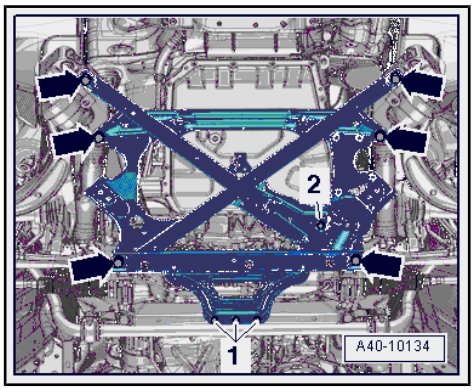
– Remove bolts -1- and -2- on both sides and detach strut.

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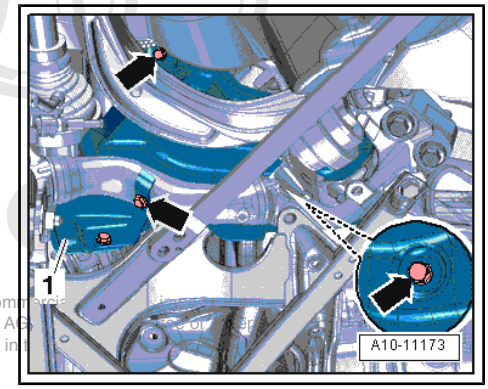
– Remove bolt -2- for power steering hydraulic line.

– Remove bolts -1- and -arrows- and detach subframe cross brace.



All vehicles (continued):

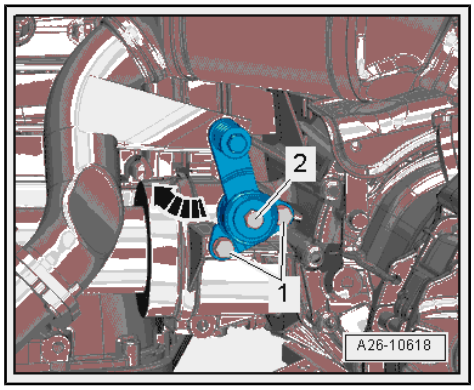
– If fitted, remove bolts -arrows- and detach heat shield -1- (right-side).



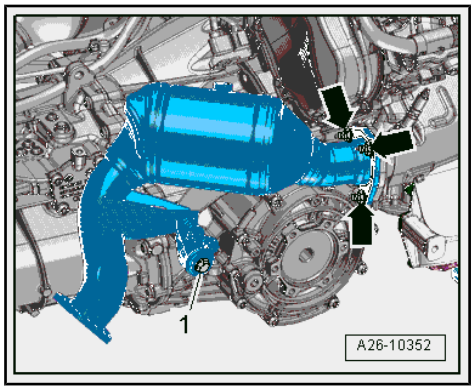
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– Remove bolt -2-, press bracket off gearbox and swivel to rear -arrow-.

– Remove bolts -1- and remove bracket.



– Unscrew nuts -arrows- and detach catalytic converter (right-side).



Note

Disregard -item 1-.

Installing

- Tightening torque ⇒ page 294 .

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

Note

Renew gaskets and self-locking nuts.

– Install subframe cross brace ⇒ Rep. Gr. 40 .

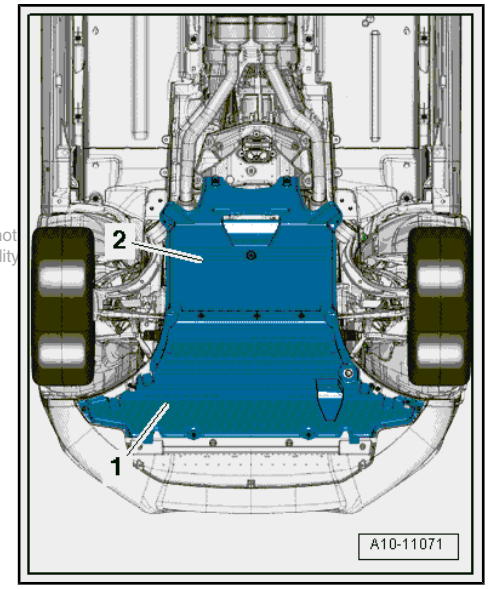
– Install Lambda probe after catalytic converter -G130- ⇒ Rep. Gr. 24 .

– Install front silencer (right-side) ⇒ page 303 .

1.6 Removing and installing front silencer

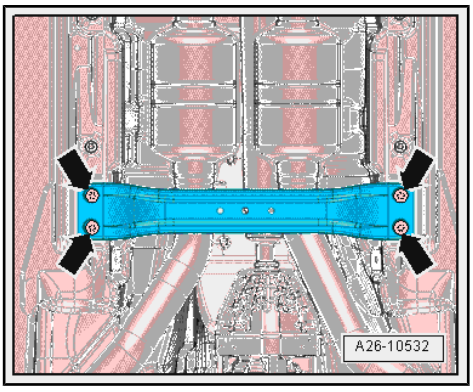
Removing

– Remove rear noise insulation panel -2- ⇒ Rep. Gr. 66 .

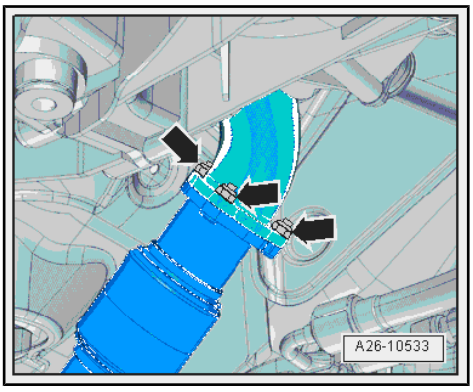


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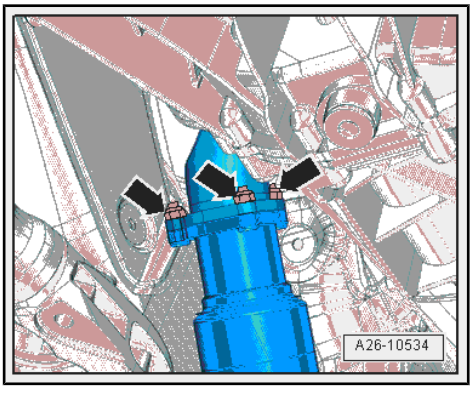
– If fitted, remove bolts -arrows- and detach front cross member.



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



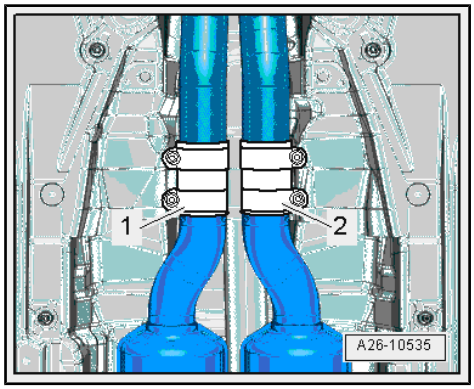
– Unscrew nuts -arrows- for front silencer (right-side).



Caution

Risk of damage to flexible joints in front silencer.

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



– Release and push back clamp -1- or -2- and detach relevant front silencer.

Installing

- Tightening torque ⇒ page 294 .

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 305 .

– Install front cross member ⇒ Rep. Gr. 66 .

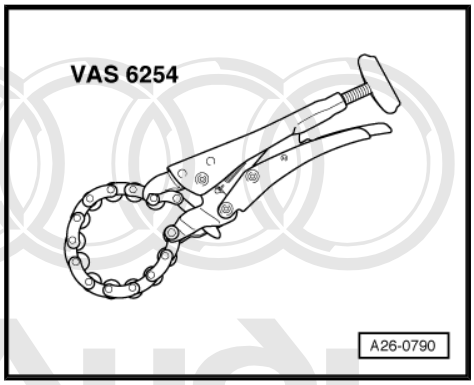
– Install rear noise insulation ⇒ Rep. Gr. 66 .

1.7 Separating centre and rear 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.

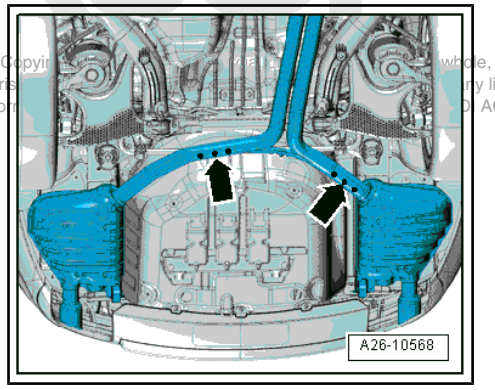
Special tools and workshop equipment required

- Chain-type pipe cutter -VAS 6254-



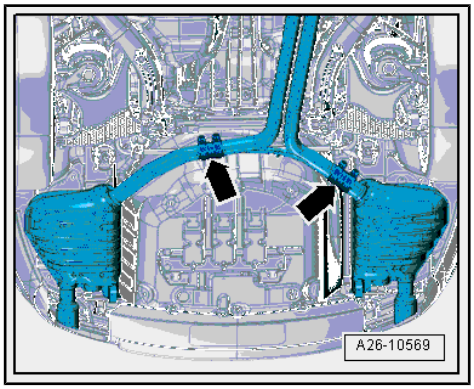
Procedure

– Cut through exhaust pipes at right angle at the position marked -arrows- using chain-type pipe cutter -VAS 6254- .



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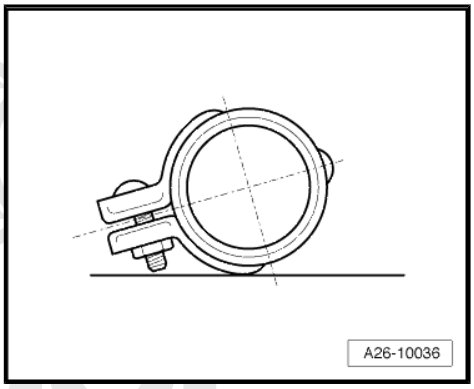
– Position centre of clamps -arrows- over cutting location.



– 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 305 .

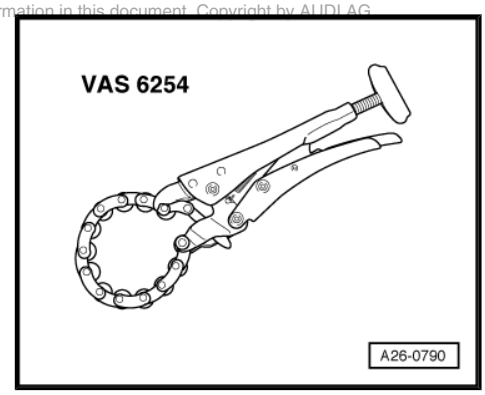


1.8 Renewing tailpipe

Special tools and workshop equipment required

♦ Chain-type pipe cutter -VAS 6254-

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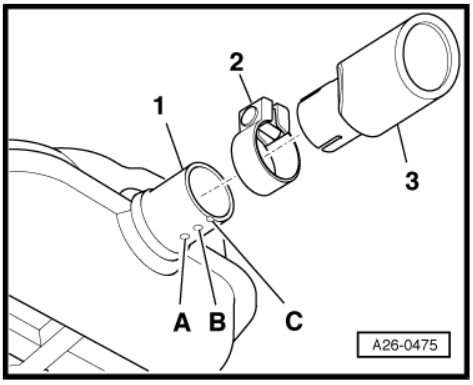
Procedure

• Tightening torque ⇒ page 294 .

– Cut through tailpipe -1- with chain-type 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-.



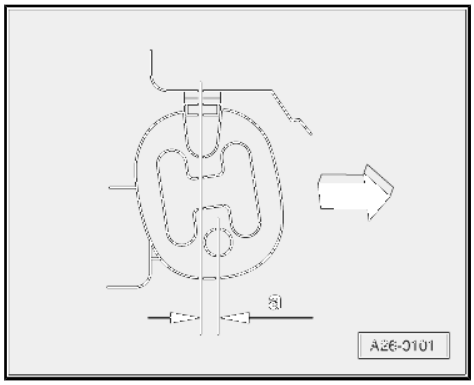
1.9 Stress-free alignment of exhaust system

Procedure

• The exhaust system must be aligned when it is cool.

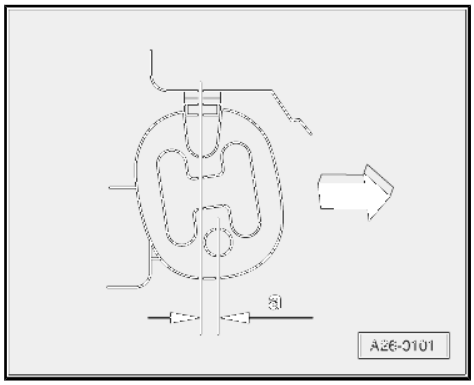
- Tightening torque ⇒ page 294 .

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 306 .

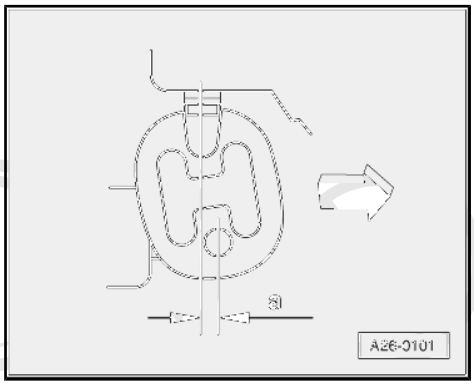
Vehicles with clamps between centre silencer and rear silencers



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 306 .

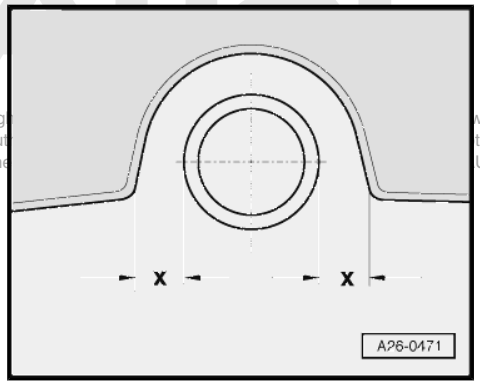
1.10 Aligning tailpipes

Procedure

- Tightening torque ⇒ page 294 .

– Check clearance between tailpipes and bumper on both sides:

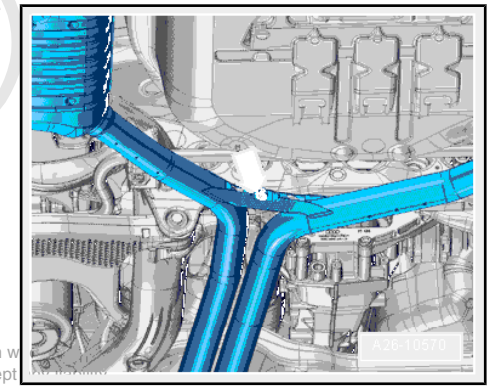
- Dimension -x- (left-side) = dimension -x- (right-side)



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If necessary, correct dimension -x- as follows:

– Loosen connection -arrow- on strut between exhaust pipes.
– Adjust the distance between the rear silencers.



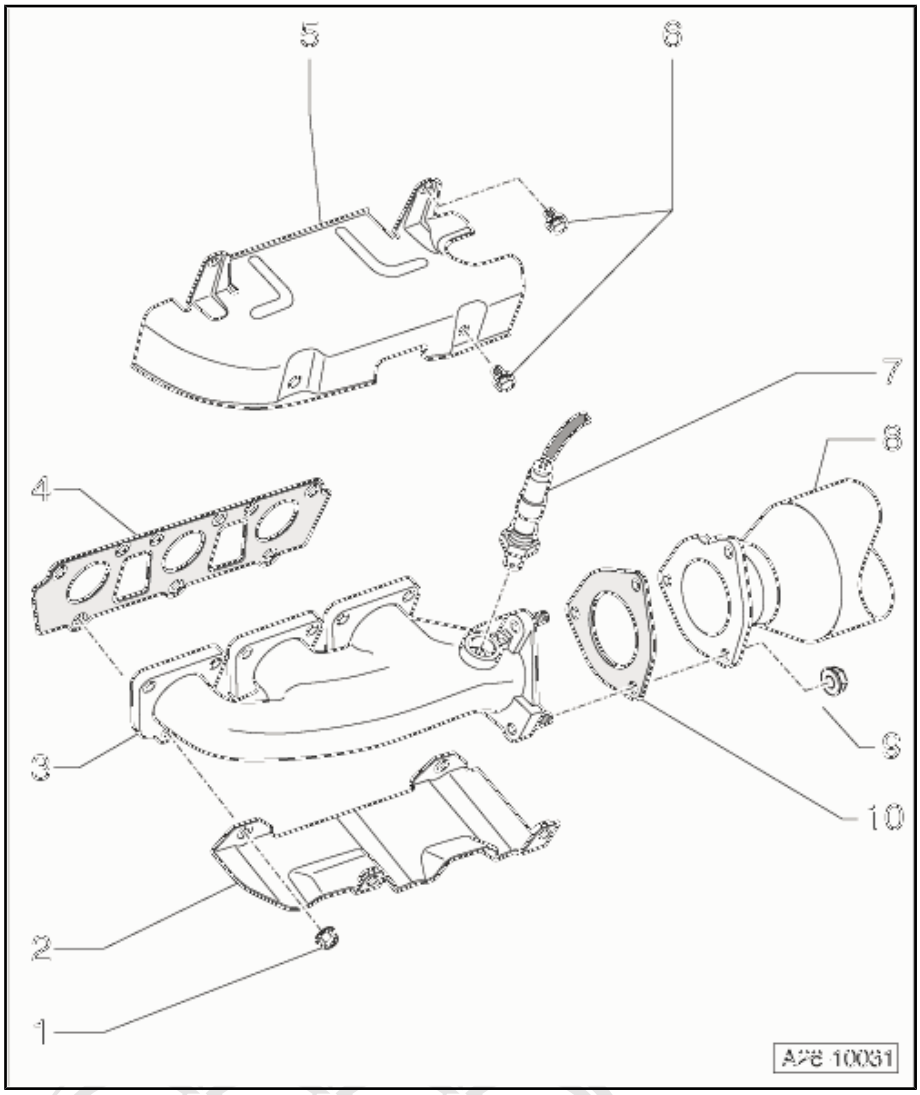
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1.11 Checking exhaust system for leaks

– 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.

2 Exhaust manifold

2.1 Exhaust manifold - exploded view



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 309 ; right-side ⇒ page 309

2 - Bracket for heat shield

3 - Exhaust manifold

- ❑ Removing and installing: left-side ⇒ page 309 , right-side ⇒ page 311

4 - Gasket

- ❑ Renew

5 - Heat shield

6 - Bolt

- ❑ 10 Nm

7 - Lambda probe

- ❑ Before catalytic converter
- ❑ Removing and installing ⇒ Rep. Gr. 24

8 - Catalytic converter

- ❑ Exploded view ⇒ page 294

9 - Nut

- ❑ Renew
- ❑ Coat with high-temperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue
- ❑ 23 Nm

10 - Gasket

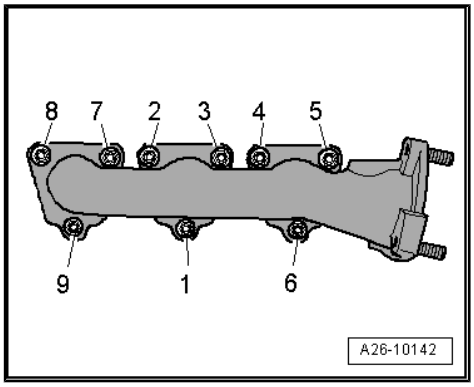
- ❑ Renew

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Exhaust manifold (left-side) - tightening torque and sequence

– Tighten nuts in the sequence -1 ... 9- in 3 stages as follows:

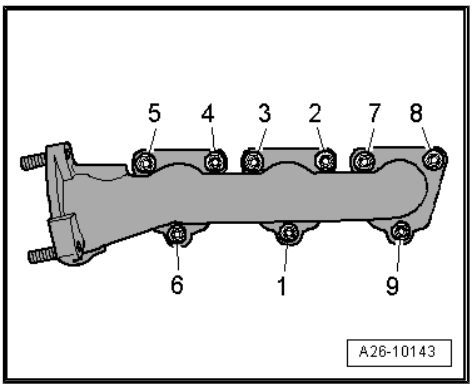
1. Screw in nuts by hand until they make contact.
2. Initially tighten to 15 Nm.
3. Tighten to 25 Nm.



Exhaust manifold (right-side) - tightening torque and sequence

– Tighten nuts in the sequence -1 ... 9- in 3 stages as follows:

1. Screw in nuts by hand until they make contact.
2. Initially tighten to 15 Nm.
3. Tighten to 25 Nm.

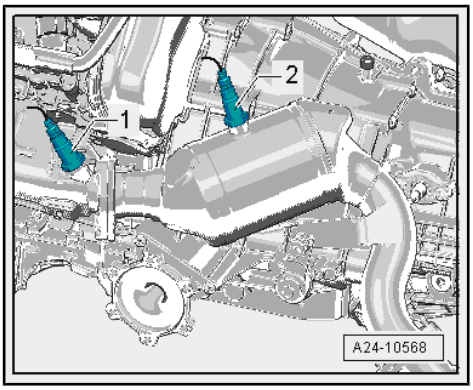


2.2 Removing and installing exhaust manifold (left-side)

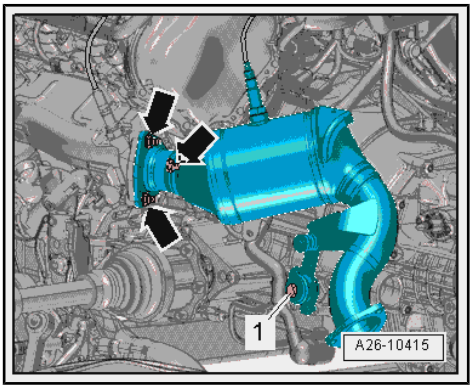
Removing

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– Remove plenum chamber partition panel ⇒ Rep. Gr. 50 .
– Unscrew Lambda probe 2 -G108- item 1- ⇒ Rep. Gr. 24 .
– Remove engine mounting (left-side) ⇒ page 110 .
– Remove front silencer (left-side) ⇒ page 303 .



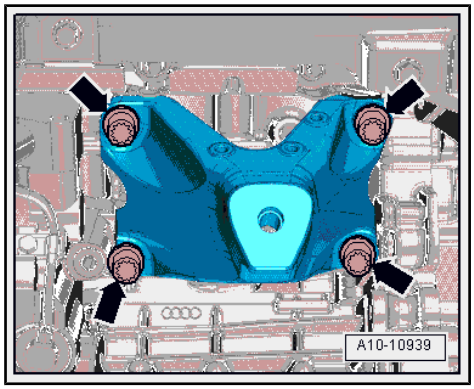
– Remove nuts -arrows- and bolt -1-.
– Detach catalytic converter (left-side) from exhaust manifold and move clear to the side.



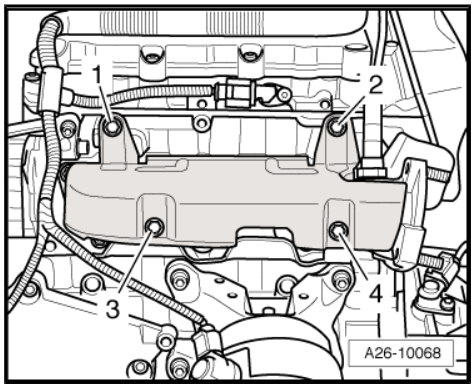
Note

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

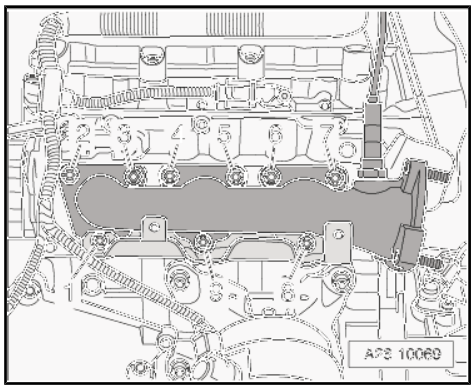
– Unscrew bolts -arrows- and remove engine support (left-side).



– 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.



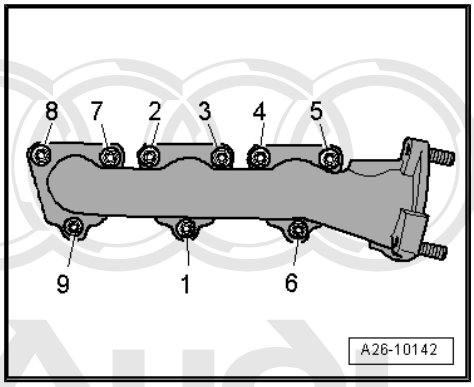
Installing

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

Note

Renew gasket and self-locking nuts.

– Fit exhaust manifold with gasket for catalytic converter and tighten nuts ⇒ page 309 .
– Install engine support with engine mounting (left-side) ⇒ page 110 .
– Install Lambda probe 2 -G108- ⇒ Rep. Gr. 24 .
– Install catalytic converter (left-side): vehicles with manual gearbox ⇒ page 298 , vehicles with multitronic gearbox 0AW/ automatic gearbox 0B6 ⇒ page 299 .
– Install front silencer (left-side) ⇒ page 303 .
– Install noise insulation ⇒ Rep. Gr. 66 .
– Install plenum chamber partition panel ⇒ Rep. Gr. 50 .

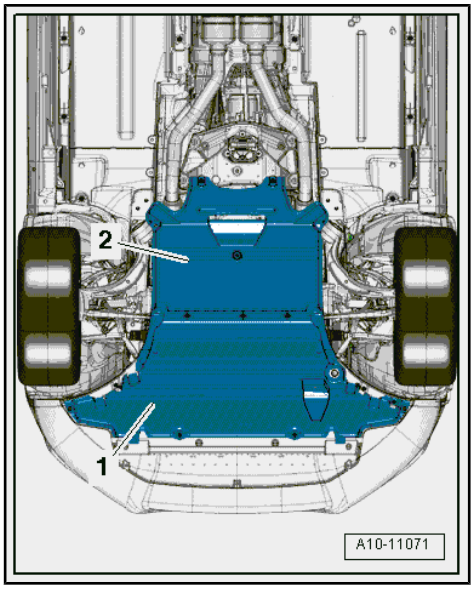


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2.3 Removing and installing exhaust manifold (right-side)

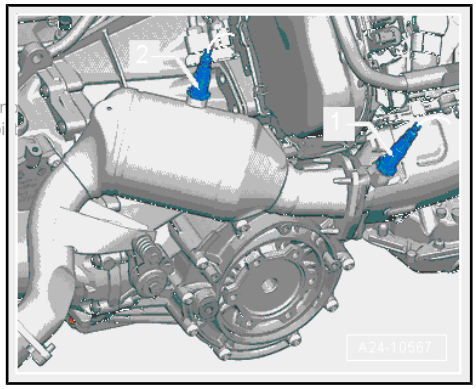
Removing

– Remove noise insulation panels -1- and -2- ⇒ Rep. Gr. 66 .

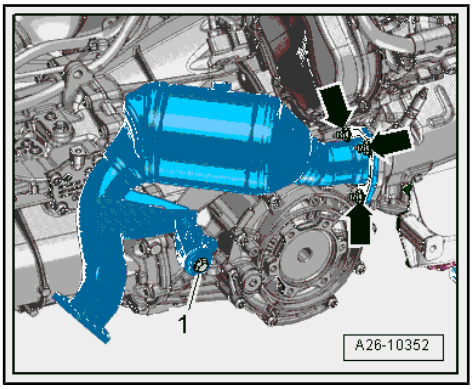


– Remove Lambda probe -G39- -item 1- ⇒ Rep. Gr. 24 .
– Remove plenum chamber partition panel ⇒ Rep. Gr. 50 .
– Remove front silencer (right-side) ⇒ page 303 .

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– Remove nuts -arrows- and bolt -1- and move catalytic converter to rear.

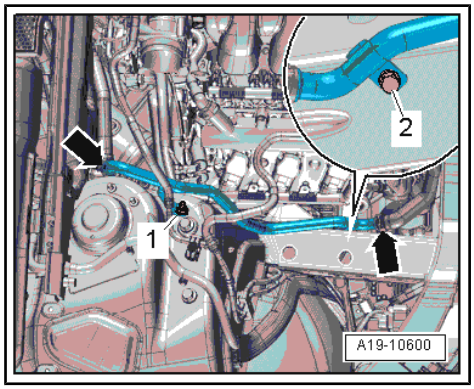


Note

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

– Remove front right wheel.
– Remove front wheel housing liner (right-side) ⇒ Rep. Gr. 66 .

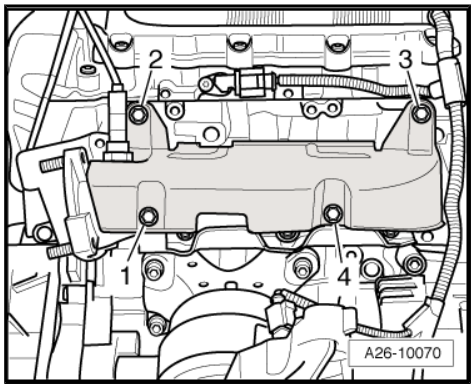
– Remove nut -1- and bolt -2- and push coolant pipe clear to one side.



Note

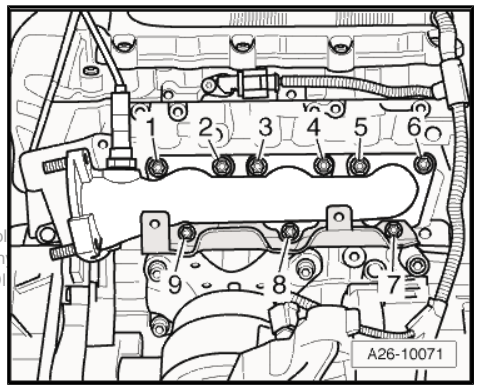
Disregard -arrows-.

– 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:

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Note

Renew gaskets and self-locking nuts.

– Fit exhaust manifold with gasket for catalytic converter and tighten nuts ⇒ page 309 .

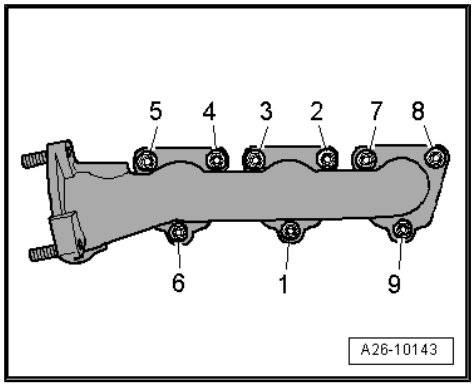
– Install catalytic converter (right-side): vehicles with manual gearbox/multitronic gearbox 0AW ⇒ page 300 , vehicles with automatic gearbox 0B6 ⇒ page 301

– Install plenum chamber partition panel ⇒ Rep. Gr. 50 .

– Install Lambda probe -G39- ⇒ Rep. Gr. 24

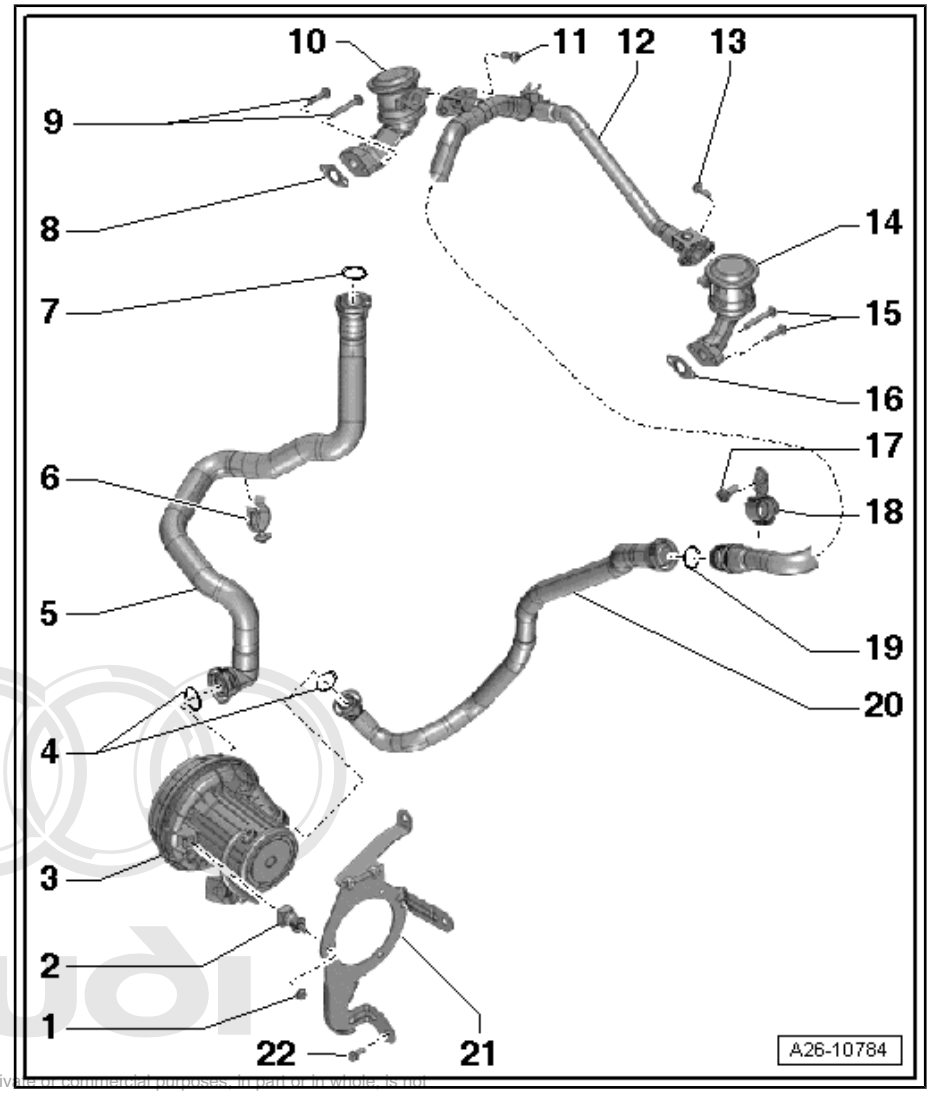
– Install noise insulation panels ⇒ Rep. Gr. 66 .

– Fit front wheel ⇒ Rep. Gr. 44 .



3 Secondary air system - country-specific version 1

3.1 Secondary air system - exploded view



1 - Nut
- ❑ 9 Nm

2 - Bonded rubber bush

3 - Secondary air pump motor -V101-
- ❑ Removing and installing ⇒ page 319
- ❑ Clip electrical connector into bracket
- ❑ Checking in “Guided Functions” ⇒ Vehicle diagnosis, testing and information system VAS 5051

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 314
- ❑ Removing and installing ⇒ page 317

11 - Bolt
- ❑ 9 Nm

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12 - Secondary air hose

13 - Bolt
- ❑ 9 Nm

14 - Combination valve for secondary air system (left-side)
- ❑ Checking ⇒ page 314
- ❑ Removing and installing ⇒ page 316

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

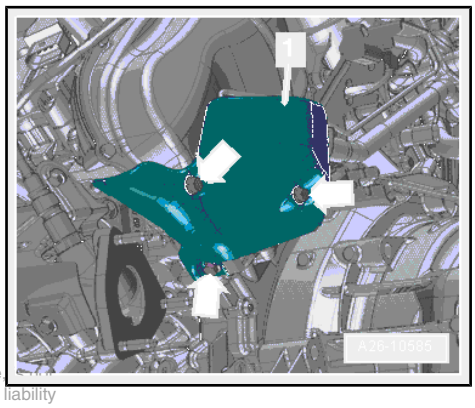
- ❑ For secondary air pump motor -V101-

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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3.2 Checking combination valves for secondary air system for correct operation and leakage

Procedure

- No leaks in hose connections.

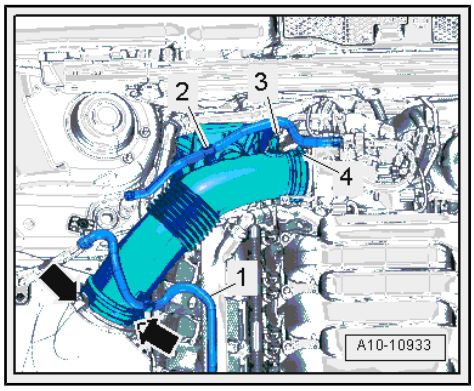
– Remove plenum chamber partition panel ⇒ Rep. Gr. 50 .

Combination valve for secondary air system (right-side):

– Move fuel line -1- and line -2- (leading to activated charcoal filter) clear at air pipe.

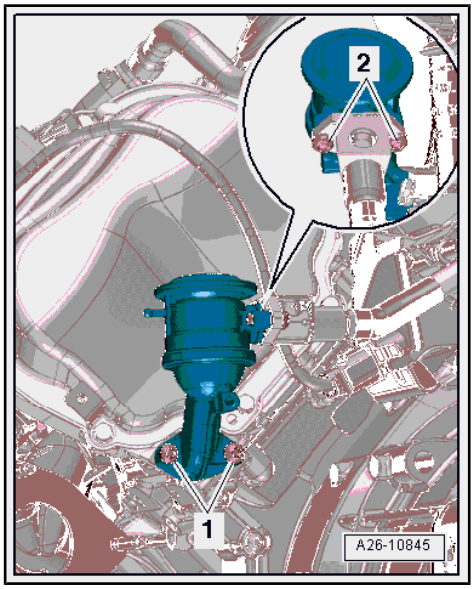
– Disconnect vacuum hose -3- from connection on air pipe.

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



Continuation for both sides:

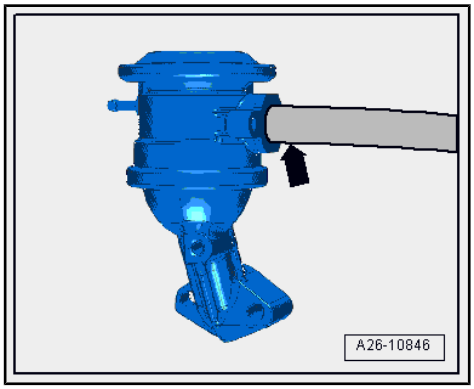
– Remove bolts -2- and press secondary air hoses to side.



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 316 , (right-side) ⇒ page 317

Assembling

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

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.*

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– Install plenum chamber partition panel ⇒ Rep. Gr. 50 .

3.3 Removing and installing combination valve for secondary air system (left-side)

Removing

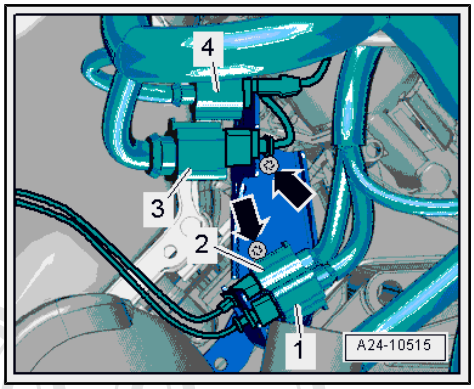
Note

Fit all cable ties in the original positions when installing.

– Remove front silencer (left-side) ⇒ page 303 .

– Remove plenum chamber partition panel ⇒ Rep. Gr. 50 .

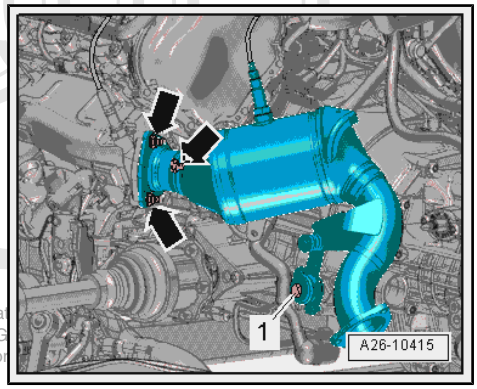
– Remove electrical connector -1- for Lambda probe 2 after catalytic converter -G131- from bracket, unplug and move wiring clear.



Note

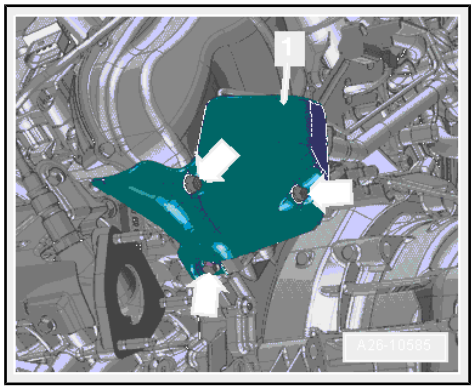
Disregard items marked -2, 3, 4- and -arrows-.

– Remove nuts -arrows- and bolt -1-, detach catalytic converter (left-side) from exhaust manifold and move to rear.

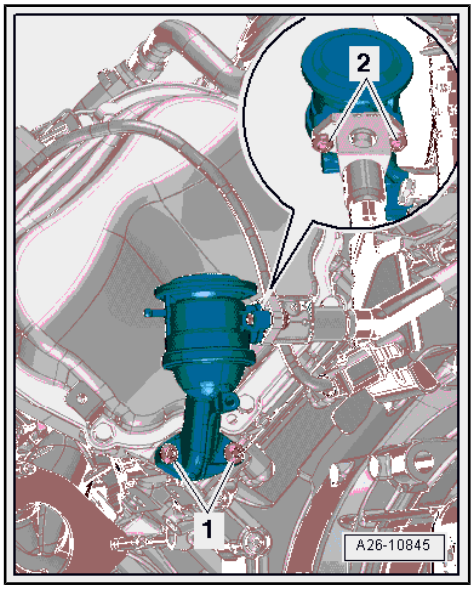


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– Remove bolts -arrows- and detach heat shield -1-.



– Unscrew bolts -1- and -2- and remove combination valve for secondary air system (left-side).



Installing

- Tightening torque ⇒ page 313 , ⇒ page 314

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

Note

Renew gasket.

– Install catalytic converter (left-side): vehicles with manual gearbox ⇒ page 298 , vehicles with multitronic gearbox 0AW/ automatic gearbox 0B6 ⇒ page 299 .

– Install plenum chamber partition panel ⇒ Rep. Gr. 50 .

3.4 Removing and installing combination valve for secondary air system (right-side)

Removing

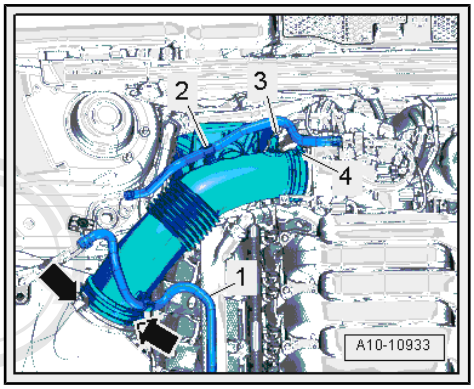
– Remove front silencer (right-side) ⇒ page 303 .

– Remove plenum chamber partition panel ⇒ Rep. Gr. 50 .

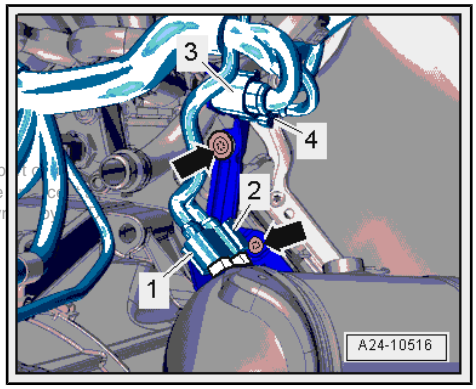
– Move fuel hose -1- and hose -2- from activated charcoal filter clear at air pipe.

– 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.

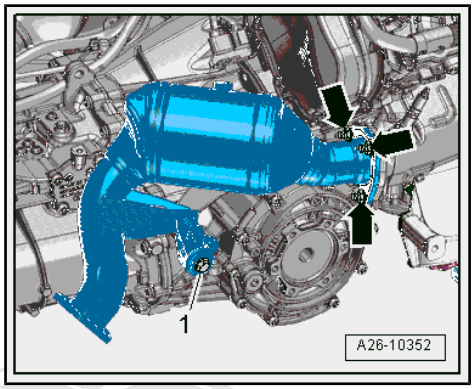


Note

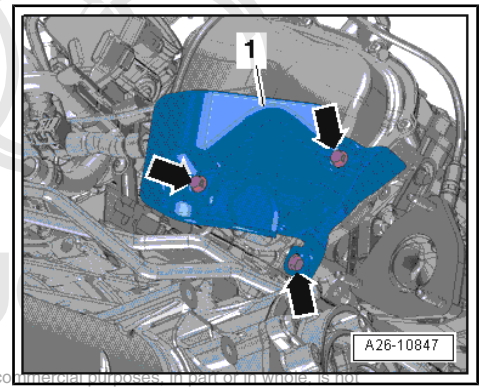
Disregard items marked -2, 3, 4- and -arrows-.

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– Remove nuts -arrows- and bolt -1-, detach catalytic converter (right-side) from exhaust manifold and move to rear.



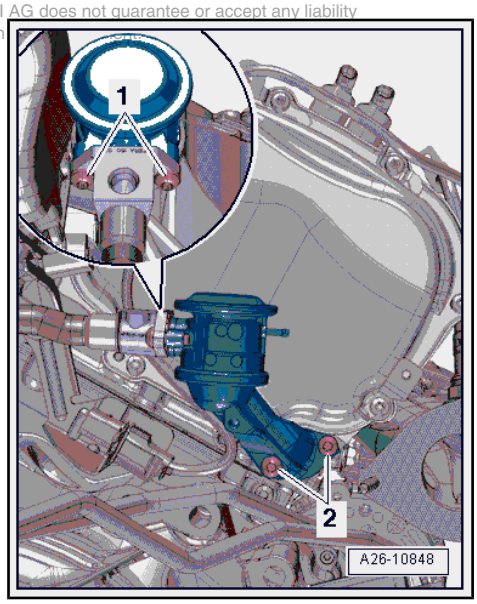
– Remove bolts -arrows- and detach heat shield -1-.



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– Remove bolts -2-.

– Detach combination valve for secondary air system (right-side) and remove bolts -1- for secondary air hose.



Installing

- Tightening torque ⇒ page 313 , ⇒ page 314

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

Note

- *Renew gasket.*
- *Hose connections and air pipes and hoses must be free of oil and grease before assembly.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *To 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 300 , vehicles with automatic gearbox 0B6 ⇒ page 301 .

– Install plenum chamber partition panel ⇒ Rep. Gr. 50 .

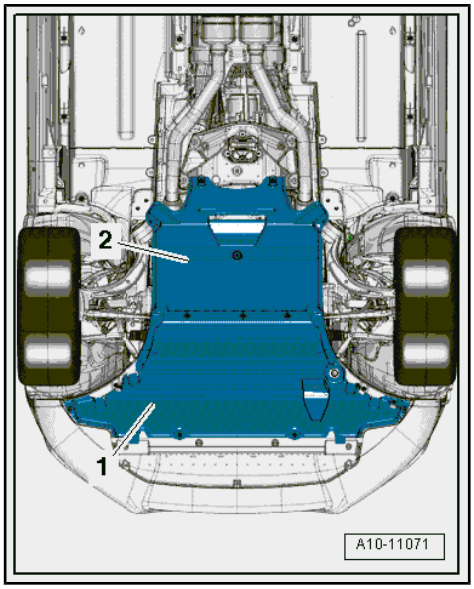
3.5 Removing and installing secondary air pump

Removing

Note

Fit all cable ties in the original positions when installing.

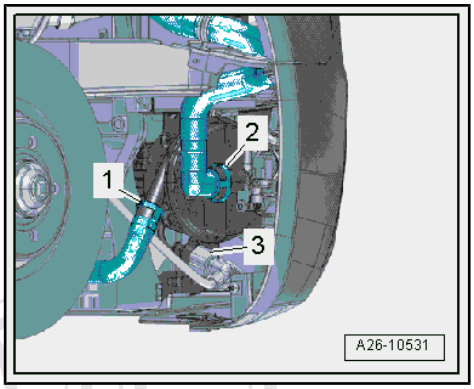
– Remove front noise insulation -1- ⇒ Rep. Gr. 66 .



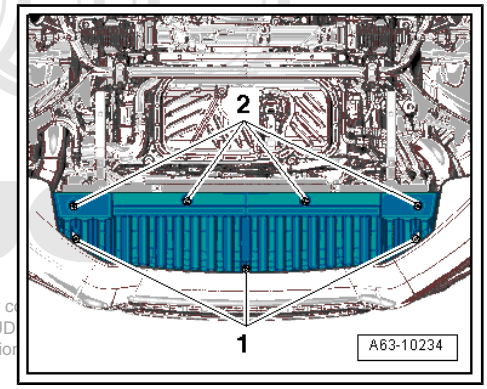
– Unplug electrical connector -3- at secondary air pump motor - V101- .
– Detach secondary air hoses -1- and -2-.

Note

For illustration purposes, the installation position is shown with the wheel housing liner removed.

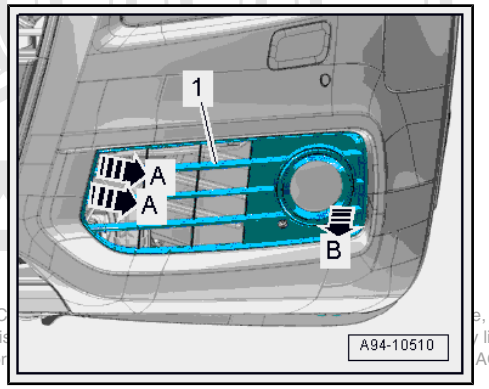


– Loosen bolts -1- and -2- and detach end plate at bumper cover towards rear.



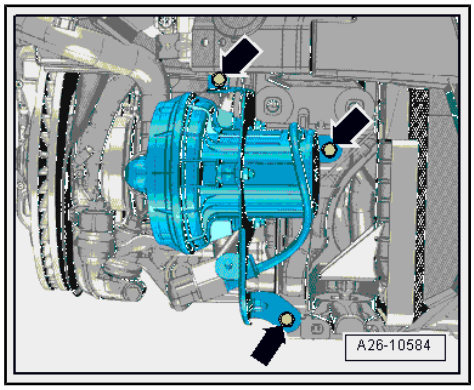
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– Release retaining clips -arrows A- and detach air intake grille -1- on left and right from bottom section of bumper cover -arrow B-.



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– 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 313 .

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

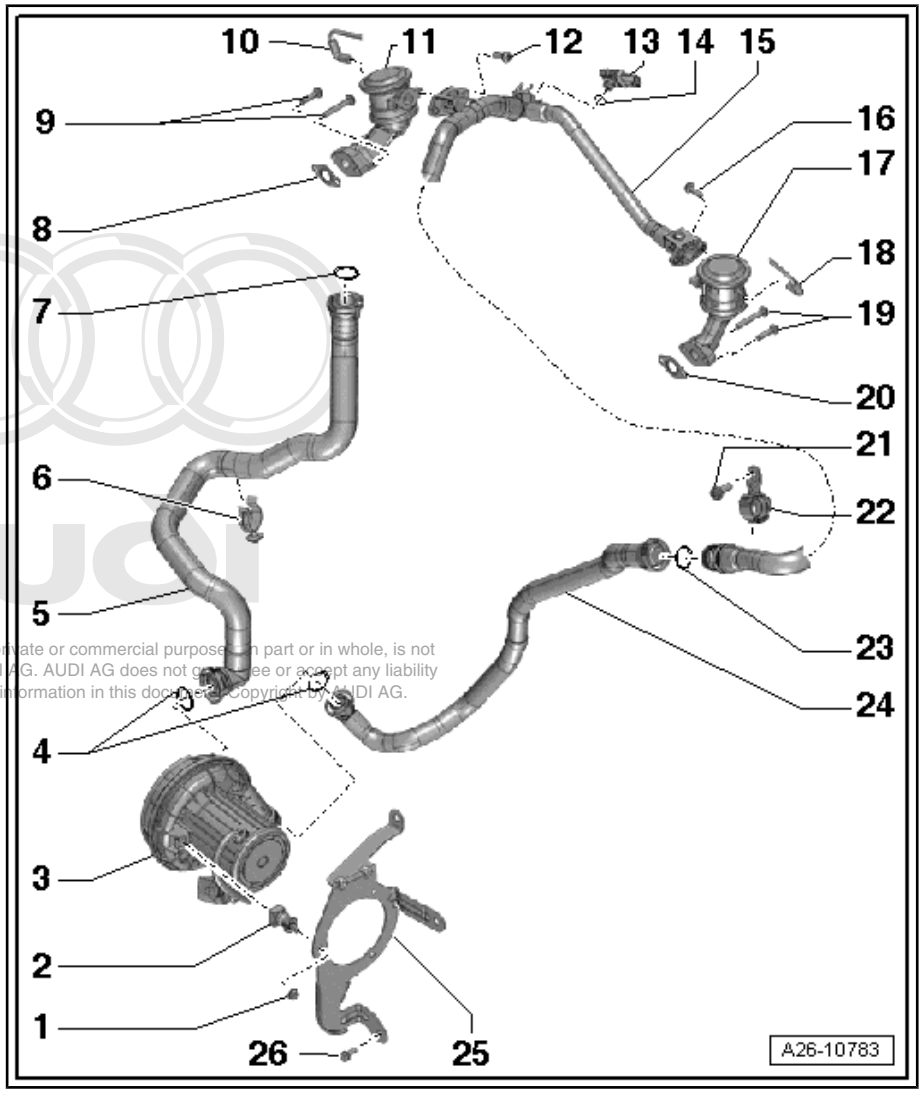
Note

Fit new O-rings.

– Install end plate at bumper cover ⇒ Rep. Gr. 63 .
– Install noise insulation ⇒ Rep. Gr. 66 .

4 Secondary air system - country-specific version 2

4.1 Secondary air system - exploded view



1 - Nut
- ❑ 9 Nm

2 - Bonded rubber bush

3 - Secondary air pump motor -V101-
- ❑ Removing and installing ⇒ page 327
- ❑ Clip electrical connector into bracket
- ❑ Checking in “Guided Functions” ⇒ Vehicle diagnosis, testing and information system VAS 5051

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 322
- ❑ Removing and installing ⇒ page 325

12 - Bolt
- ❑ 9 Nm

13 - Sender 1 for secondary air pressure -G609-
- ❑ Removing and installing ⇒ page 328

14 - O-ring
- ❑ Renew

15 - Secondary air hose

16 - Bolt
- ❑ 9 Nm

17 - Combination valve for secondary air system (left-side)
- ❑ Checking ⇒ page 322
- ❑ Removing and installing ⇒ page 324

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18 - Vacuum hose

19 - Bolts

- ❑ 9 Nm

20 - Gasket

- ❑ Renew

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-

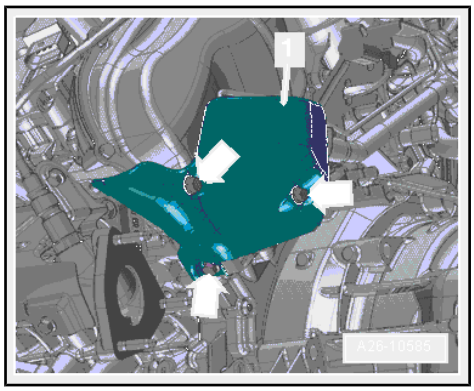
26 - Bolt

- ❑ 9 Nm

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Heat shield for combination valve for secondary air system - tightening torque

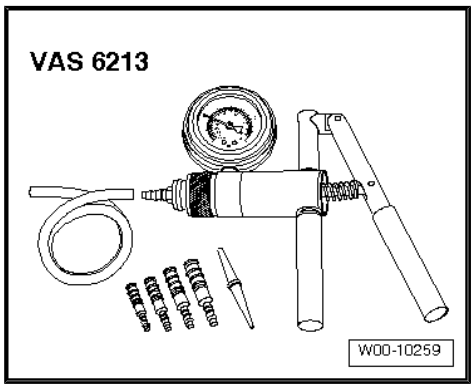
– Tighten bolts -arrows- for heat shield -1- to 9 Nm.



4.2 Checking combination valves for secondary air system for correct operation and leakage

Special tools and workshop equipment required

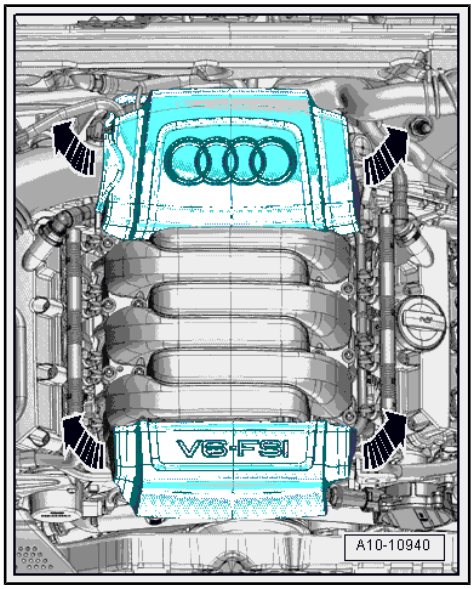
♦ Hand vacuum pump -VAS 6213-



Procedure

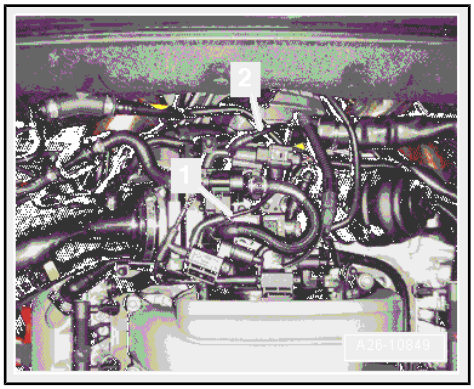
- Vacuum hoses and hose connections do not leak.
- Vacuum hoses are not clogged.

– 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.



– Press release tabs and detach secondary air hose -arrow- to front from bracket.

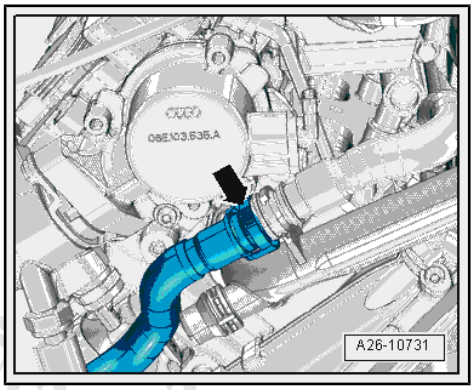
– Blow lightly into secondary air hose with your mouth (do not use compressed air).

- 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 324 , on right-side ⇒ page 325 .



Assembling

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

Note

Fit new O-ring.

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4.3 Removing and installing combination valve for secondary air system (left-side)

Removing

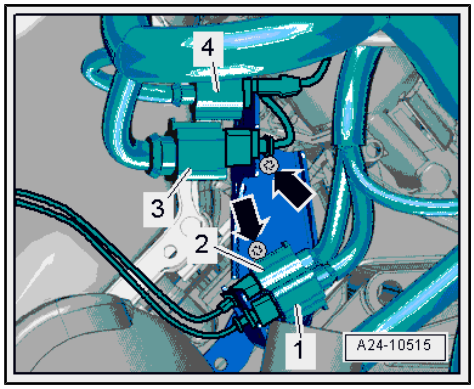
Note

Fit all cable ties in the original positions when installing.

– Remove front silencer (left-side) ⇒ page 303 .

– Remove plenum chamber partition panel ⇒ Rep. Gr. 50 .

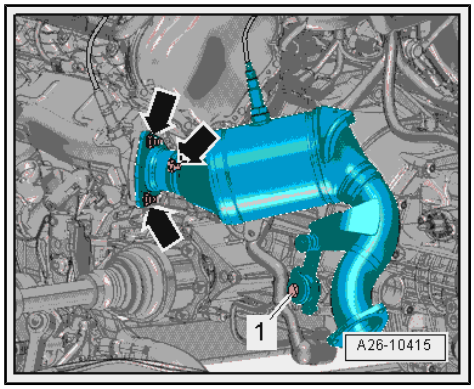
– Remove electrical connector -1- for Lambda probe 2 after catalytic converter -G131- from bracket, unplug and move wiring clear.



Note

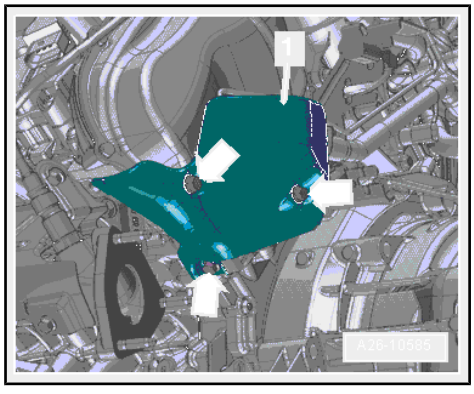
Disregard items marked -2, 3, 4- and -arrows-.

– Remove nuts -arrows- and bolt -1-, detach catalytic converter (left-side) from exhaust manifold and move to rear.

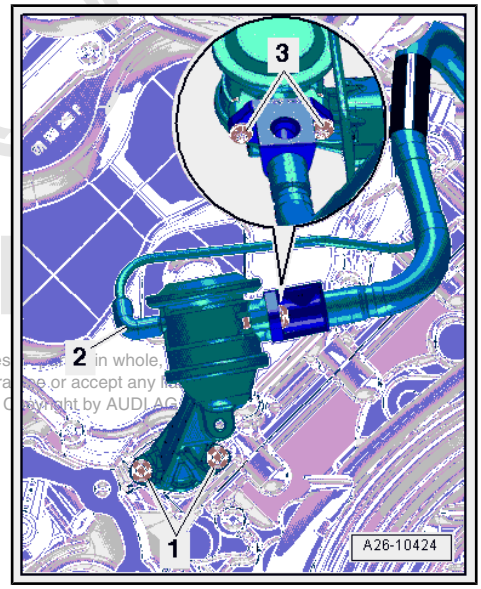


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– Remove bolts -arrows- and detach heat shield -1-.



– Remove bolts -3- for secondary air system hose.
– Detach vacuum hose -2- from combination valve for secondary air system.
– Unscrew bolts -1- and detach combination valve for secondary air system.



Installing

- Tightening torque ⇒ page 321 , ⇒ page 322

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

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Note

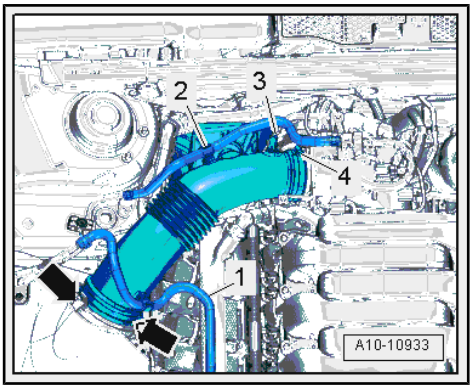
Renew gasket.

– Install catalytic converter (left-side) ⇒ page 299 .
– Install plenum chamber partition panel ⇒ Rep. Gr. 50 .

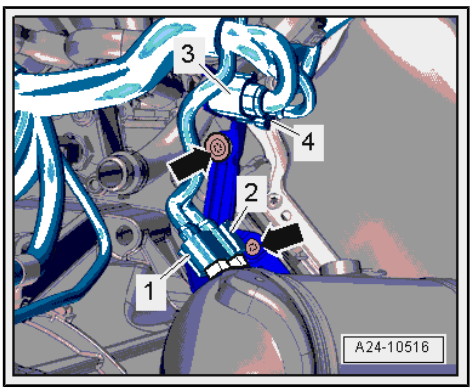
4.4 Removing and installing combination valve for secondary air system (right-side)

Removing

– Remove front silencer (right-side) ⇒ page 303 .
– Remove plenum chamber partition panel ⇒ Rep. Gr. 50 .
– 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-.



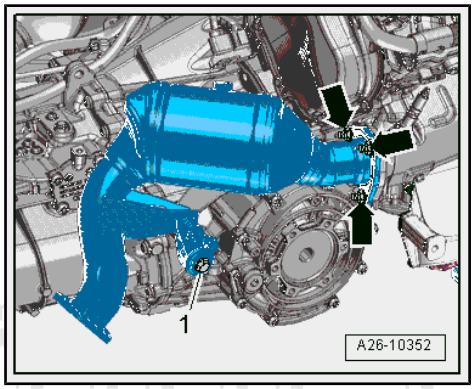
– Remove electrical connector -1- for Lambda probe after catalytic converter -G130- from bracket and unplug connector.



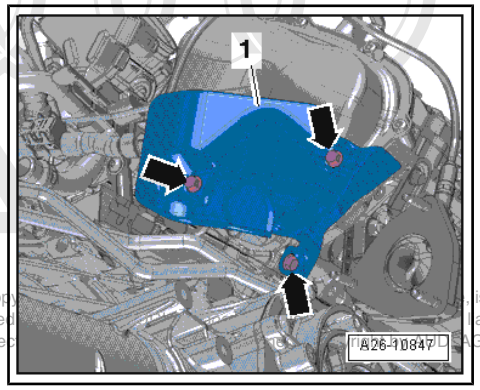
Note

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.



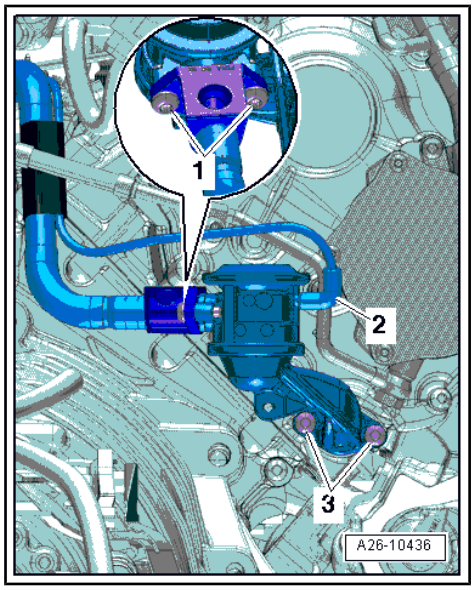
– Remove bolts -arrows- and detach heat shield -1-.



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– Detach vacuum hose -2- from combination valve for secondary air system.

– Remove bolts -3- and detach combination valve for secondary air system (right-side) and bolts -1- for secondary air hose.



Installing

• Tightening torque ⇒ page 321 , ⇒ page 322

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

Note

- *Renew gasket.*
- *Hose connections and air pipes and hoses must be free of oil and grease before assembly.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *To 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 301 .

– Install plenum chamber partition panel ⇒ Rep. Gr. 50 .

4.5 Removing and installing secondary air pump

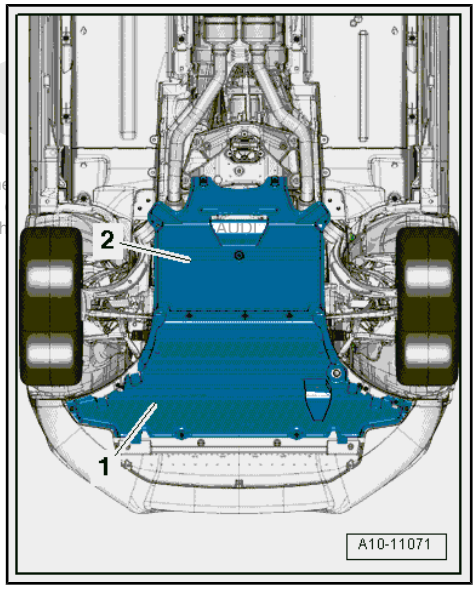
Removing

Note

Fit all cable ties in the original positions when installing.

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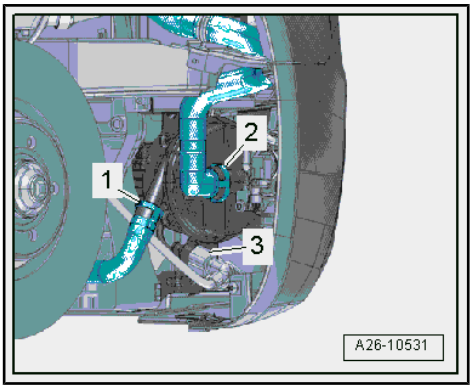
– Remove front noise insulation -1- ⇒ Rep. Gr. 66.



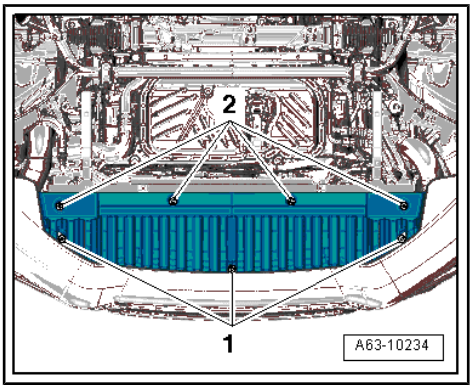
– Unplug electrical connector -3- at secondary air pump motor - V101- .
– Detach secondary air hoses -1- and -2-.

Note

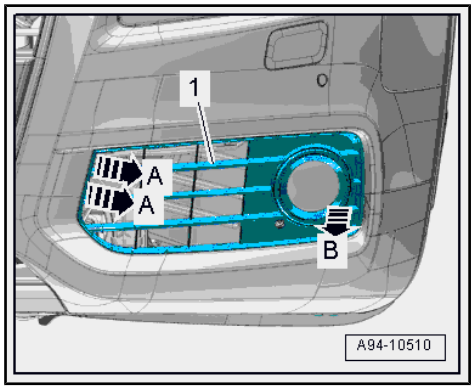
For illustration purposes, the installation position is shown with the wheel housing liner removed.



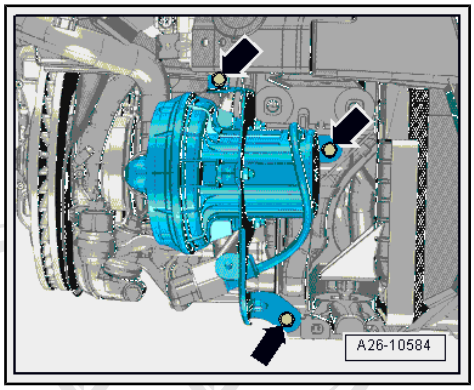
– Loosen bolts -1- and -2- and detach end plate at bumper cover towards rear.



– 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 321 .

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

Note

Fit new O-rings.

– Install end plate at bumper cover ⇒ Rep. Gr. 63 .

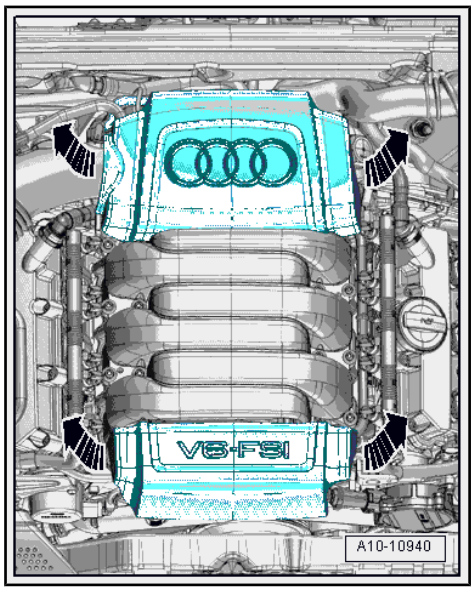
– Install noise insulation ⇒ Rep. Gr. 66 .

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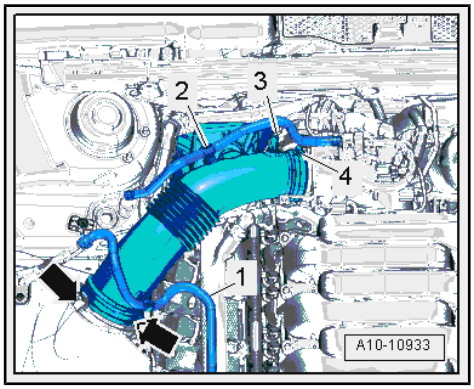
4.6 Removing and installing sender 1 for secondary air pressure -G609-

Removing

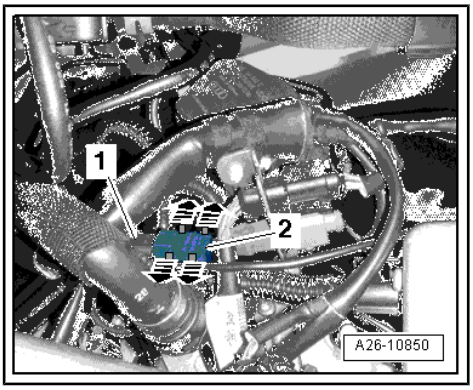
– Pull off rear engine cover panel -top arrows-.



– 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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