

Workshop Manual

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

4-cylinder direct injection engine (1.8, 2.0 ltr. 4-valve - generation II)

Engine ID	CAB B	CAB A	CAB D	CAE A	CAE B	CDH B	CDN B	CDN C	CDH A
	CDZ A	CAD A	CCU A	CFK A	CPM A	CAE D	CPM B		

Edition 09.2016


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List of Workshop Manual Repair Groups

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

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00 – Technical data

1 Identification

(ARL004882; Edition 09.2016)

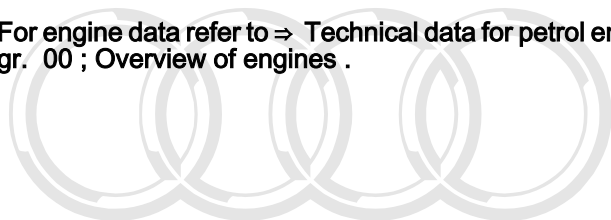
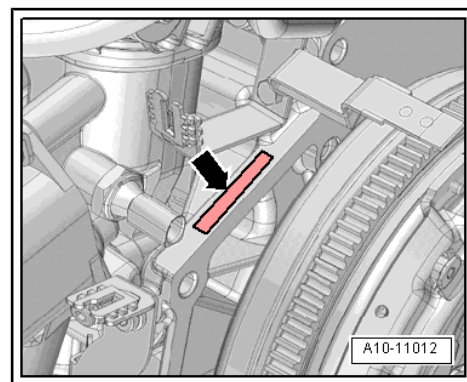
⇒ [“1.1 Engine identification number/engine data”, page 1](#)

1.1 Engine identification number/engine data

Engine number

- ◆ The engine number (“engine code” and “serial number”) can be found at the joint between engine and gearbox -arrow-.
- ◆ Additionally there is a sticker on the toothed belt cover (top) with engine code and serial number.
- ◆ Engine codes starting with the letter “C” have four letters (previously three letters).
- ◆ The first 3 characters of the engine code stand for the engine capacity and the mechanical construction and design. They are stamped onto 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.
- ◆ The 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 812 .

For engine data refer to ⇒ **Technical data for petrol engines; Rep. gr. 00 ; Overview of engines .**



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2 Safety precautions

⇒ [“2.1 Safety precautions when working on the fuel supply system”, page 2](#)

⇒ [“2.2 Safety precautions when working on vehicles with start/stop system”, page 2](#)

⇒ [“2.3 Safety precautions when working on the subframe”, page 3](#)

⇒ [“2.4 Safety precautions when using testers and measuring instruments during a road test”, page 3](#)

⇒ [“2.5 Safety precautions when working on the ignition system”, page 3](#)

⇒ [“2.6 Safety precautions when working on the cooling system”, page 4](#)

2.1 Safety precautions when working on the fuel supply system

Risk of injury - fuel system operates under high pressure

The fuel system is pressurised. There is a risk of injury as fuel may spray out.

Before opening the fuel system:

- Put on safety goggles.
- Put on protective gloves.
- Release pressure (wrap clean cloth around connection and open connection carefully).

Risk of fire due to escaping fuel

If the battery is connected, the door contact switch activates the fuel pump when the driver's door is opened. Escaping fuel may ignite, causing a fire.

- Before opening the fuel system, disconnect power supply to fuel pump.

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

Risk of injury - engine may start unexpectedly

On vehicles with the start/stop system activated, the engine may start unexpectedly. A message in the instrument cluster indicates whether the start/stop system is activated.

- Deactivate start/stop system by switching off ignition.

2.3 Safety precautions when working on the subframe



Caution

Risk of damage to running gear components.

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

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

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Risk of injury if test equipment is not secured

If an accident occurs and the front passenger's airbag is triggered, test equipment which is not secured adequately may be catapulted through the vehicle with potentially serious consequences.

- Secure test equipment on the rear seat with a strap.

Or

- Have a second mechanic operate test equipment on the rear seat.

2.5 Safety precautions when working on the ignition system

Risk of injury due to electric shock

When the engine is running, there are high voltage levels in the ignition system. There is a risk of electric shock when touching the ignition system!

- Never touch or disconnect ignition wiring when the engine is running or being turned at cranking speed.

Risk of damage to components

Washing the engine or connecting/disconnecting electrical wiring may result in components being damaged if the engine is running.

- Switch off ignition before connecting/disconnecting electrical wiring.
- Switch off ignition before cleaning engine.

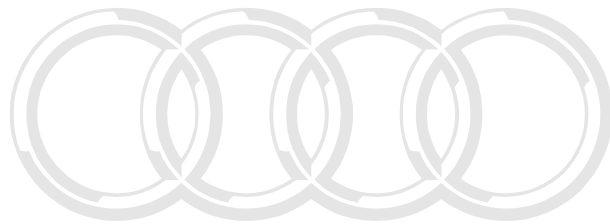


2.6 Safety precautions when working on the cooling system

Risk of scalding as hot coolant can escape

The cooling system is under pressure when the engine is hot. Hot steam/hot coolant can escape - risk of scalding.

- Put on protective gloves.
- Put on safety goggles.
- Release pressure (cover filler cap on coolant expansion tank with a cloth and open carefully).



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3 Repair instructions

⇒ [“3.1 Rules for cleanliness”, page 5](#)

⇒ [“3.2 Foreign particles in engine”, page 5](#)

⇒ [“3.3 Contact corrosion”, page 5](#)

⇒ [“3.4 Routing and attachment of pipes, hoses and wiring”, page 6](#)

⇒ [“3.5 Installing radiators and condensers”, page 6](#)

3.1 Rules for cleanliness

Even small quantities of dirt can lead to defects. For this reason, please observe the following rules when working on the fuel supply system, injection system and turbocharger:

- ◆ Carefully clean connection points and the surrounding area with engine cleaner or brake cleaner and dry thoroughly before opening.
- ◆ Immediately seal open lines and connections with clean plugs, for example from engine bung set - VAS 6122- .
- ◆ Place removed parts on a clean surface and cover them. 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 not been stored in their packing (e.g. in tool boxes etc.).
- ◆ When the system is open, do not work with compressed air and do not move the vehicle.
- ◆ Make sure that no fuel runs onto the fuel hoses. Should this occur, the fuel hoses must be cleaned again immediately.
- ◆ Protect unplugged electrical connectors against dirt and moisture and make sure connections are dry when attaching.

3.2 Foreign particles in engine

- ◆ When performing assembly work on the engine, all open passages in the intake and exhaust systems must be sealed with suitable plugs (e.g. from engine bung set - VAS 6122-) to prevent foreign particles from entering the engine.



Note

*If the turbocharger has suffered mechanical damage
⇒ [page 285](#)*

3.3 Contact corrosion

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

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

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 .



Please note:

- ◆ 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 by warranty.

3.4 Routing and attachment of pipes, hoses and wiring

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

3.5 Installing radiators and condensers

Even when the radiator, condenser and charge air cooler 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, condenser or charge air cooler.



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10 – Removing and installing engine

1 Removing and installing engine

⇒ [“1.1 Removing engine”, page 7](#)

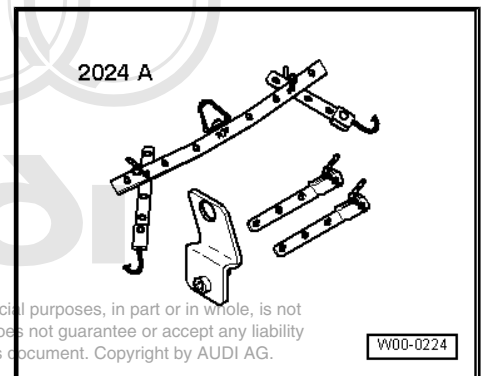
⇒ [“1.2 Securing engine to engine and gearbox support”, page 23](#)

⇒ [“1.3 Installing engine”, page 26](#)

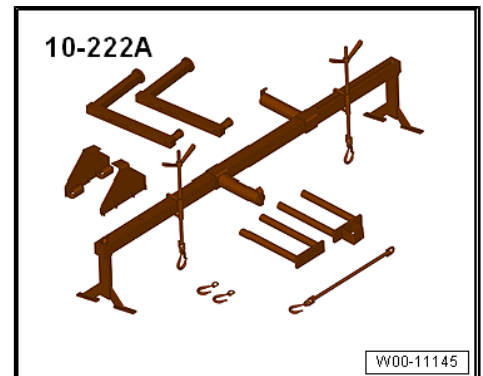
1.1 Removing engine

Special tools and workshop equipment required

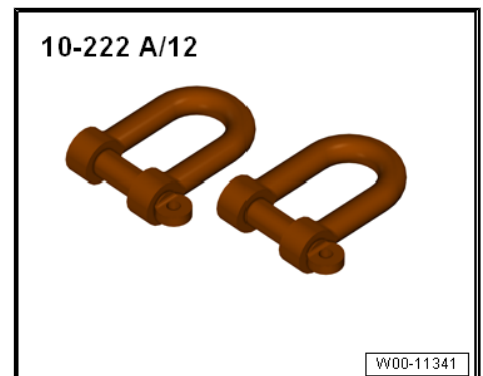
◆ Lifting tackle - 2024 A-



◆ Support bracket - 10-222A-

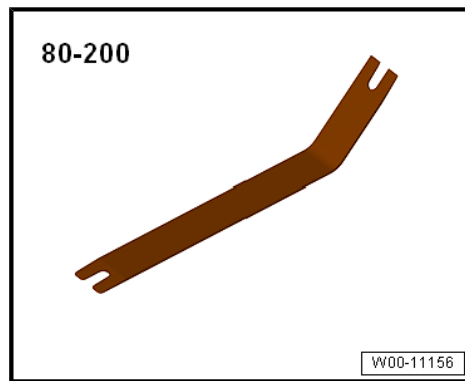


◆ Shackle - 10-222A/12-





◆ Removal lever - 80 - 200-



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

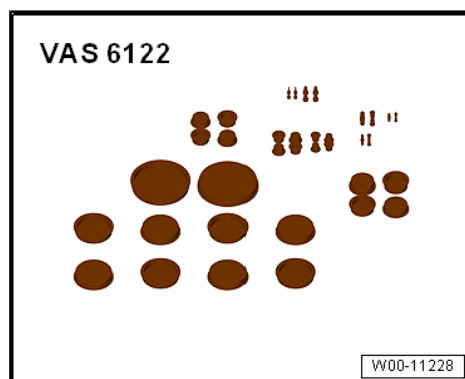


◆ Workshop hoist - VAS 6100-

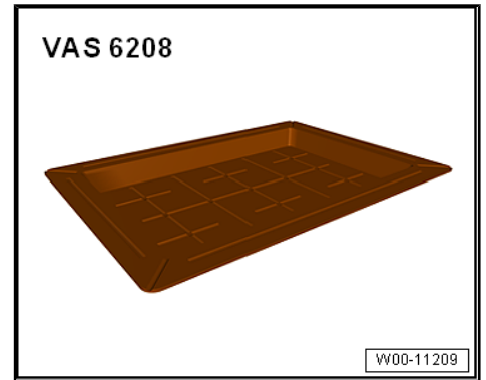
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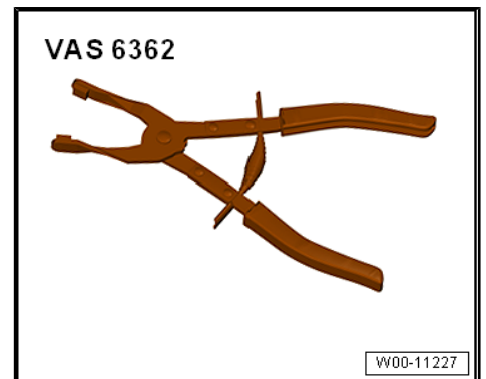
◆ Engine bung set - VAS 6122-



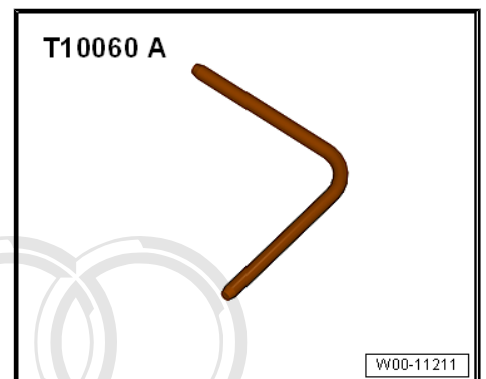
- ◆ Drip tray for workshop hoist - VAS 6208-



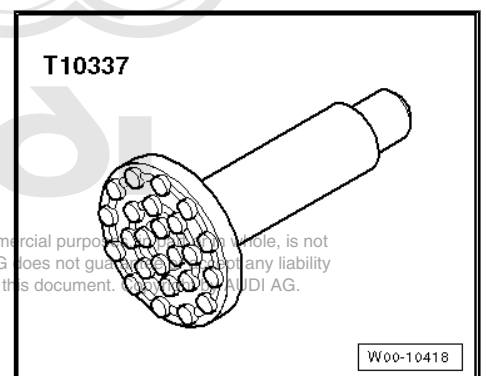
- ◆ Hose clip pliers - VAS 6362-



- ◆ Locking pin - T10060A-



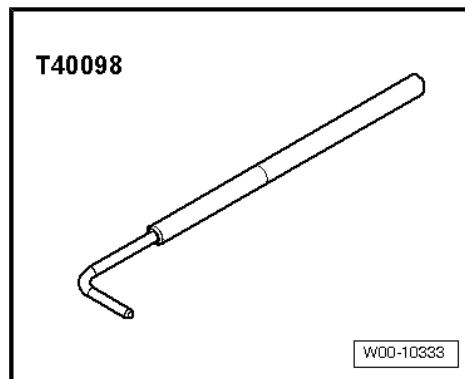
- ◆ Gearbox support - T10337-



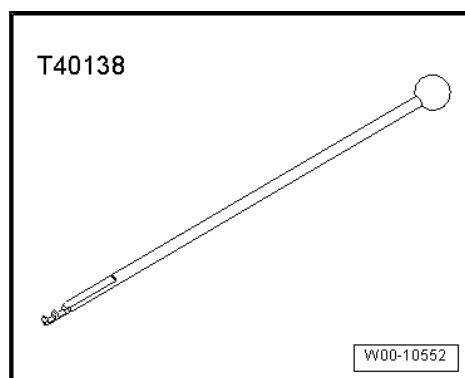
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- ◆ Locking tool - T40098-



- ◆ Release tool - T40138-



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.***



Note

- ◆ *Lift out engine without gearbox.*
- ◆ *Collect drained coolant in a clean container for re-use or disposal.*
- ◆ *Fit all cable ties in the original positions when installing.*
- ◆ *On four-wheel drive vehicles the electromechanical parking brake must be released before disconnecting the battery, so that the propshaft can be turned during removal.*
- ◆ *All open inlet and exhaust ports must be sealed with suitable plugs (e.g. from engine bung set - VAS 6122-).*



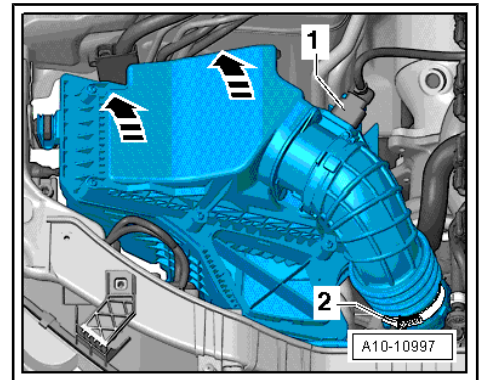
Caution

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

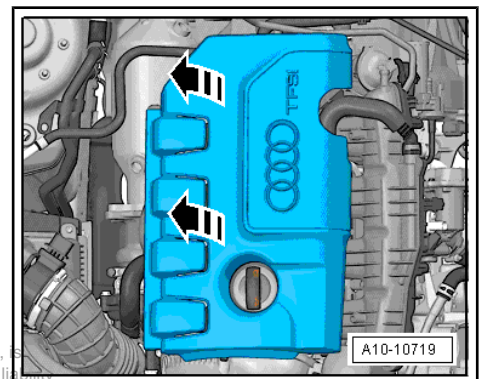
- ◆ ***Observe notes on procedure for disconnecting the battery.***

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- Disconnect battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .
- Remove both front wheels.
- Remove wheel spoilers (front) on both sides ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .
- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
- Set service position ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Setting service position and returning to normal position .
- Remove front exhaust pipe/front silencer ⇒ [page 374](#) .
- Unplug connector -1- from air mass meter - G70- .
- Disconnect air intake hose -2-.
- Pull air cleaner housing upwards -arrows-.

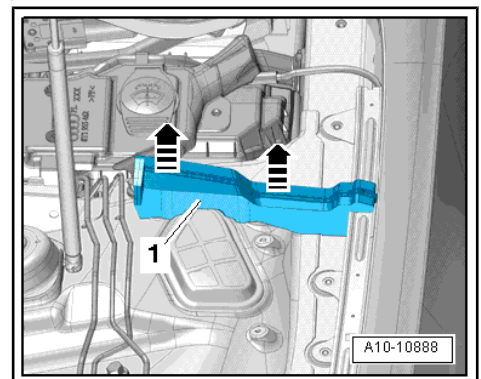


- Remove engine cover panel -arrows-.
- Remove plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .



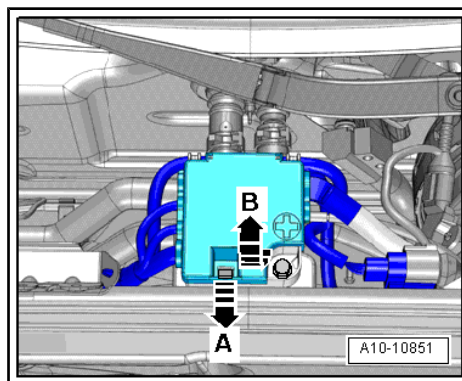
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- Lift off foam plastic block -1- on both sides of vehicle -arrows-.

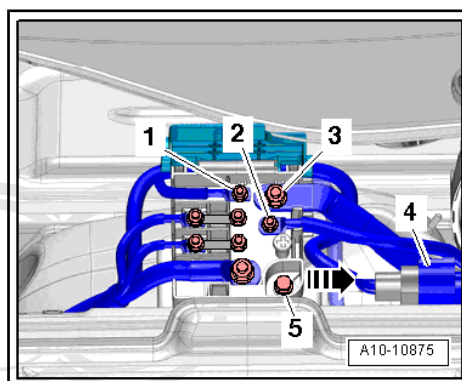




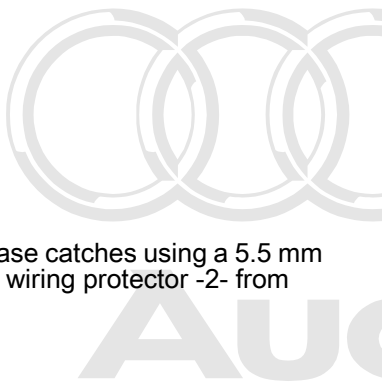
- Release retainer -arrow A- and open cover -arrow B-.



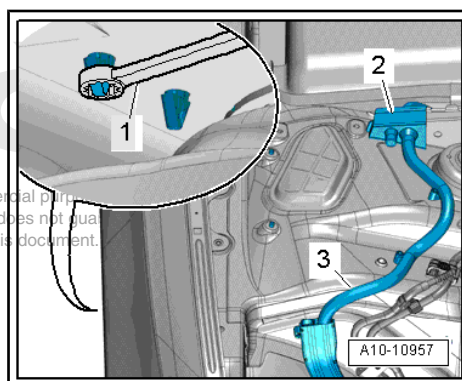
- Remove nuts -1 ... 3- for electrical wiring.
- Detach electrical connector -4- from bracket and unplug.
- Remove bolt -5- and detach wiring junction from body brace -arrow-.



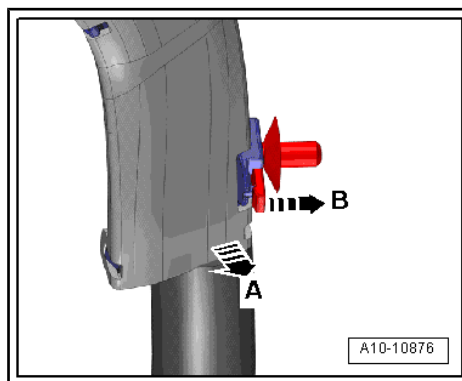
- Working from wheel housing, release catches using a 5.5 mm ring spanner -item 1- and remove wiring protector -2- from above.



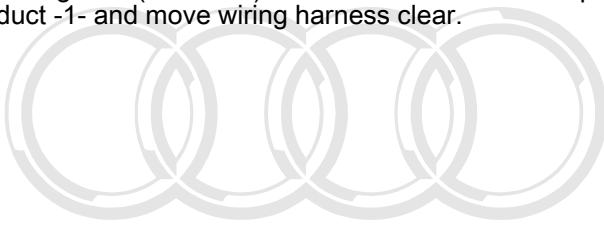
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- Wiring duct (version 1): release catch -arrow B- and move wiring harness clear by pulling it towards front -arrow A-.

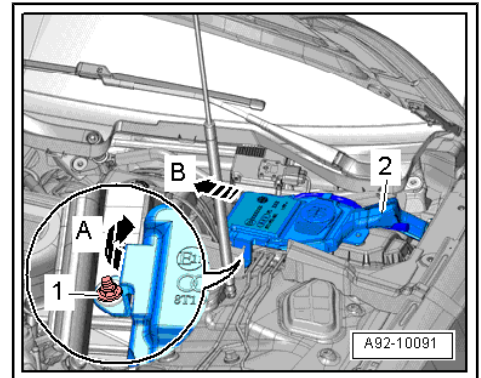
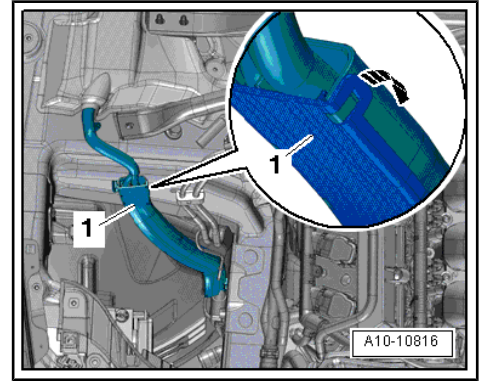


- Wiring duct (version 2): release catch -arrow- to open wiring duct -1- and move wiring harness clear.

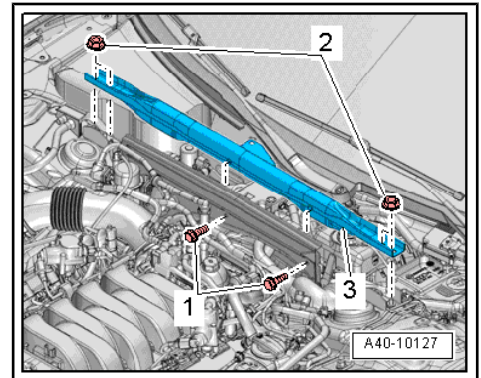


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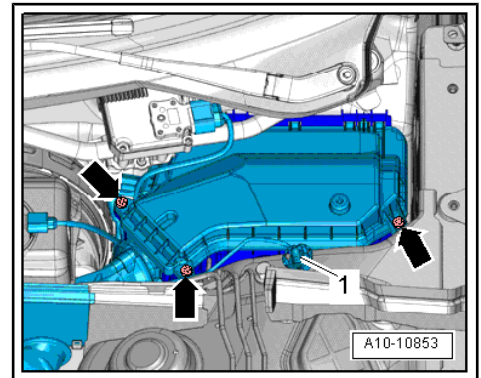
- Remove nut -1- and swivel filler neck for washer fluid reservoir slightly upwards -arrow A-
- Pull filler neck -2- with filler pipe out of washer fluid reservoir and through opening in body -arrow B-



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

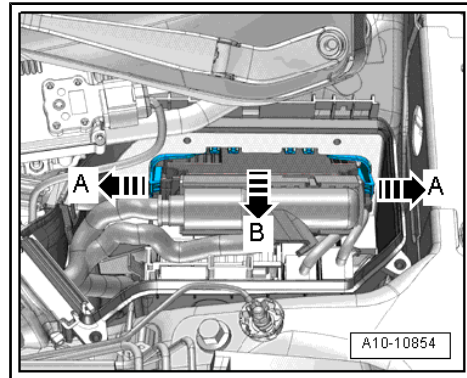


- Remove bolts -arrows- and detach cover for electronics box in engine compartment.
- Remove nut -1- and move electrical wiring clear.

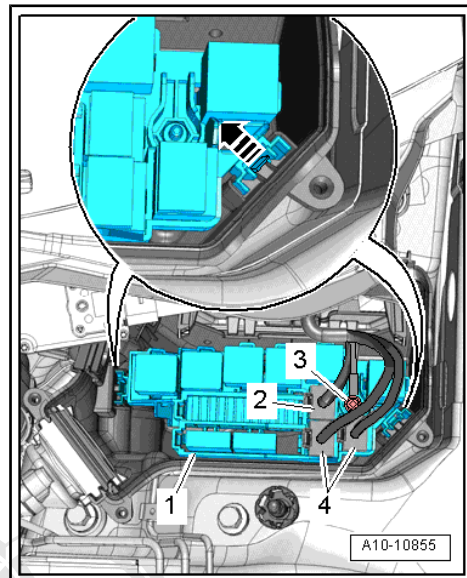




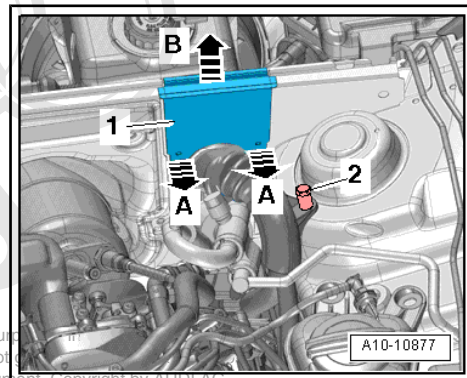
- Release catches -arrows A- and take out engine control unit -arrow B-.



- Unplug electrical connectors -4- and unscrew nut -3- for wiring.
- If fitted, unplug electrical connector -2-.
- Release catches -arrow- and detach relay carrier with fuse holder -1-.



- Release catches -arrows A- and lift off wiring protector -1- -arrow B-.
- Disengage engine wiring harness at electronics box in engine compartment and move clear.
- Place wiring harness on engine and secure engine control unit to prevent it from dropping.



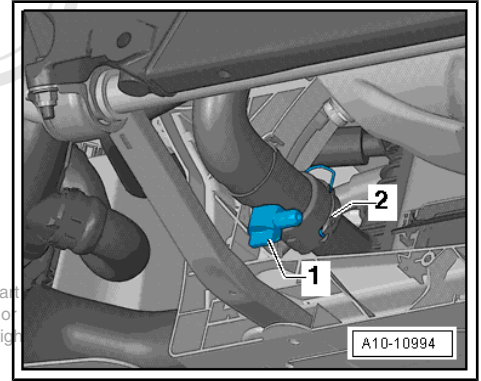
WARNING

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

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

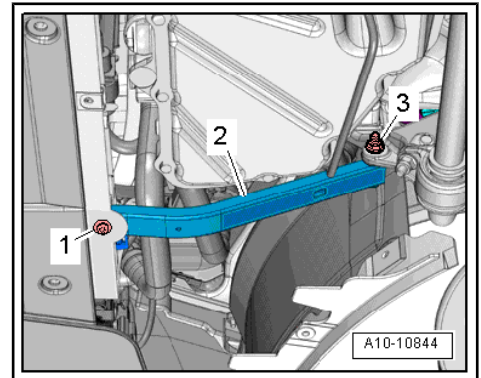
- Open filler cap on coolant expansion tank.
- Place drip tray for workshop hoist - VAS 6208- beneath engine.

- Unscrew radiator drain tap -1- at connection and drain off coolant, then detach connection -2- from radiator.

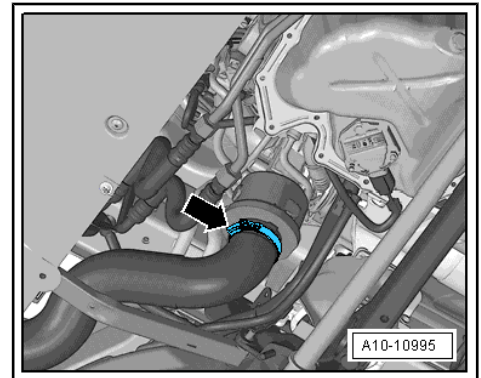


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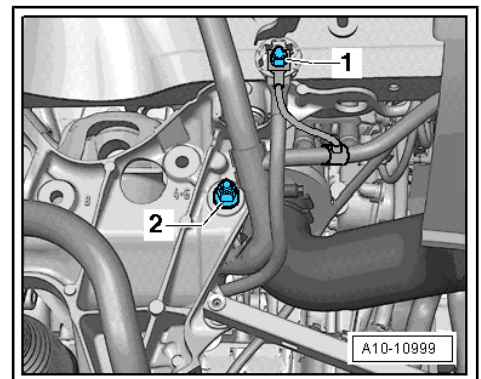
- Remove nuts -3- and longitudinal struts -2- on both sides.



- Open hose clip -arrow-, detach air hose and swivel to side.

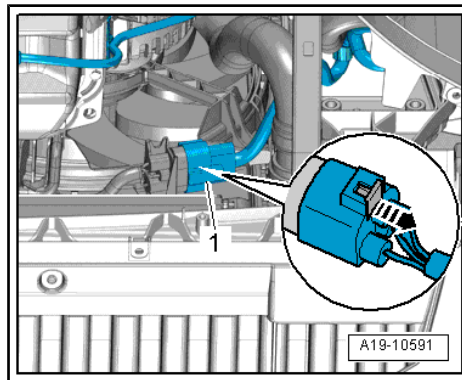


- Unscrew nut -1- on longitudinal member (right-side) and move earth cables clear.
- Remove nut -2- for bracket with wiring on right-hand side of vehicle.

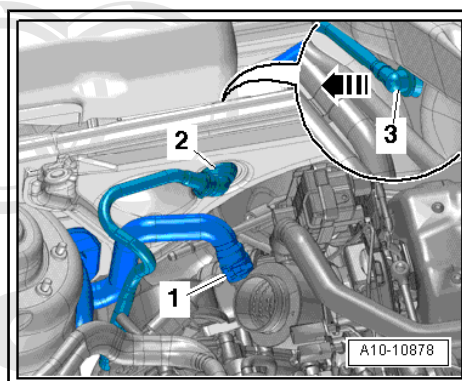




- Unplug electrical connector -1- for radiator fan (push retainer to the rear -arrow- and press down release catch).
- Place wiring harness on engine and secure to prevent it from dropping.

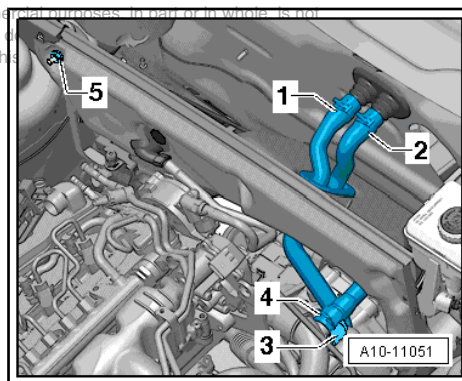


- Disconnect vacuum hose -3- on rear of plenum chamber partition panel -arrow- and detach vacuum connection -2- from plenum chamber partition panel.

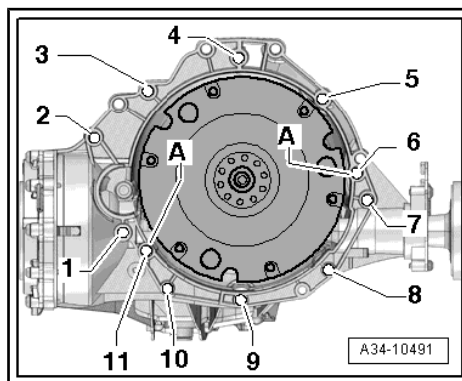


- Remove nut -5-.
- Detach coolant hoses -1- to -4- and remove plenum chamber partition panel.

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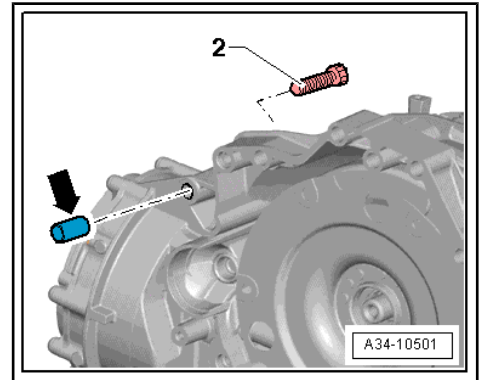


- Remove bolts -2 ... 6-.

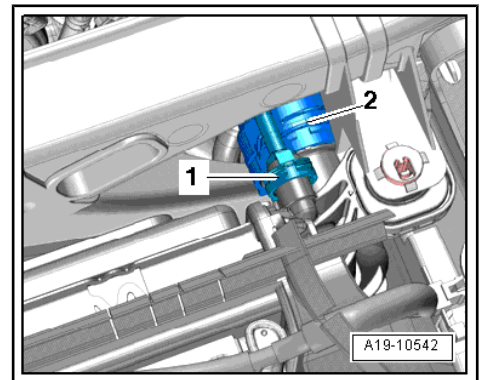


i Note

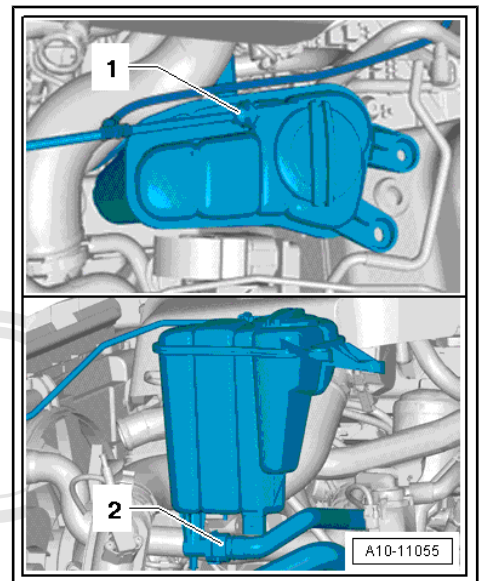
- ◆ Bolt -2- secures the starter to the gearbox and is provided with a spacer sleeve -arrow-.
- ◆ Pay attention to the spacer sleeve -arrow- when removing and installing the engine. The spacer sleeve must be fitted between starter and gearbox.



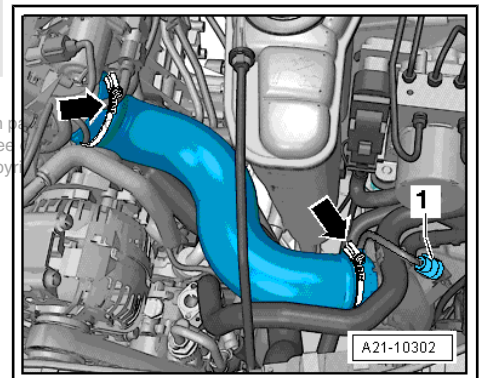
- Detach coolant hose -2- and permanent breather -1-.



- Detach permanent breather -1- and coolant hose -2- from coolant expansion tank.




- Release hose clips -arrows- and detach air hose.
- Unplug electrical connector for charge pressure sender - G31- -1- and move clear.
- Remove catalytic converter ⇒ [page 384](#)



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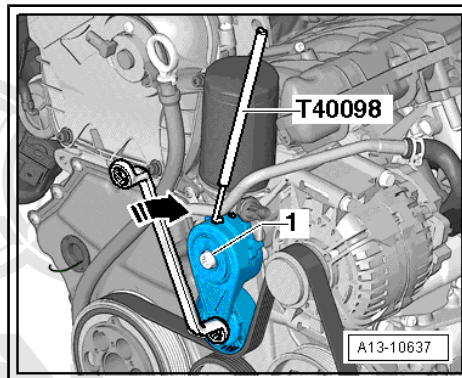


Vehicles with hydraulic power steering:

 **Caution**


Wrong direction of rotation for a used poly V-belt can lead to irreparable damage.

◆ *Before removing the poly V-belt mark the direction of rotation with chalk or a felt-tip pen for re-installation.*



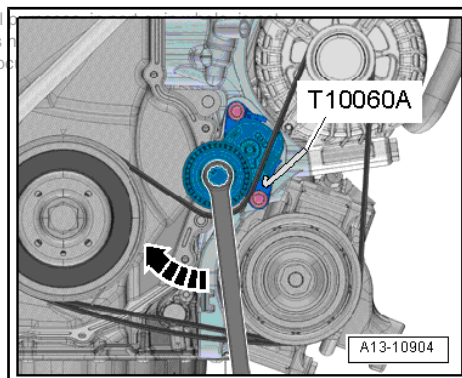
- To slacken poly V-belt turn tensioner in direction of -arrow-.
- Lock tensioner with locking tool - T40098- .
- Take off poly V-belt.

Vehicles with electromechanical power steering:

 **Caution**

Wrong direction of rotation for a used poly V-belt can lead to irreparable damage.


◆ *Before removing the poly V-belt mark the direction of rotation with chalk or a felt-tip pen for re-installation.*



- To slacken poly V-belt turn tensioner in direction of -arrow-.
- Lock tensioner with locking pin - T10060 A- .
- Take off poly V-belt.

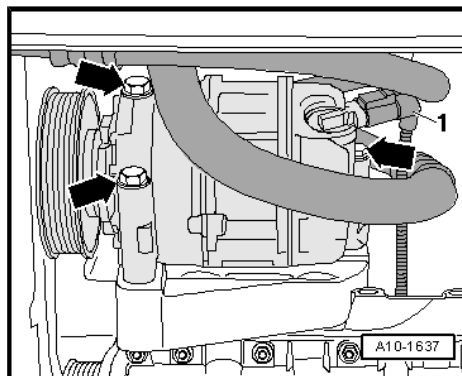
Continued for all vehicles:

- Unplug electrical connector -1- for magnetic clutch on air conditioner compressor.


 **WARNING**

Risk of injury caused by refrigerant.

◆ *The air conditioner refrigerant circuit must not be opened.*



- Remove bolts -arrows- for air conditioner compressor.

 **Caution**

Danger of damage to refrigerant lines and hoses.

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

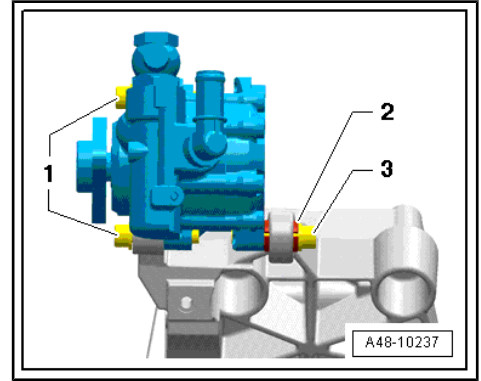
- Tie up air conditioner compressor together with refrigerant hoses to longitudinal member (refrigerant hoses remain connected).

Vehicles with hydraulic power steering:

 **Note**

Leave hydraulic lines of power steering pump connected.

- Remove bolts -1- from front (through pulley); remove bolt -2- from rear.




 **Note**

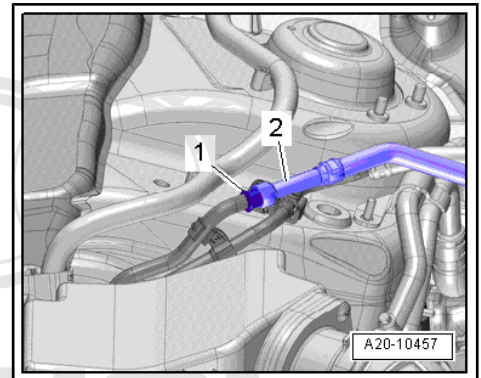
Illustration shows power steering pump without pulley and hydraulic lines.

- Place power steering pump on longitudinal member with hydraulic lines attached.

Continued for all vehicles:

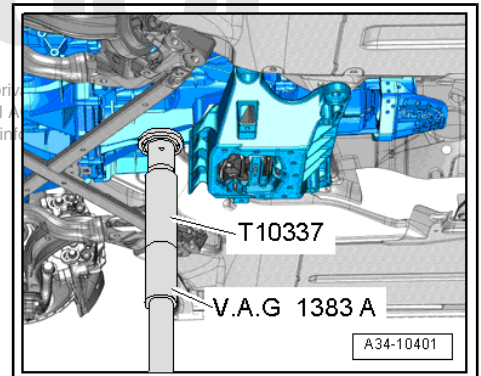
 **Caution**
Observe rules for cleanliness when working on the fuel supply system.

- Disconnect fuel supply hose -1- and fuel return hose -2-.

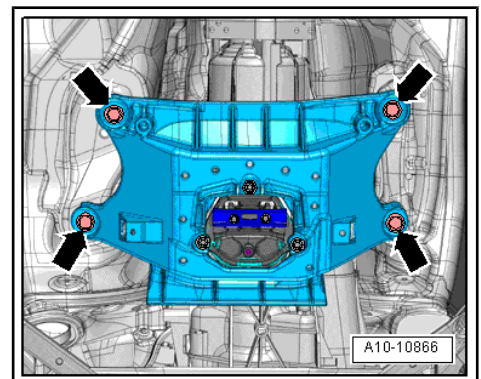


- Support gearbox using engine and gearbox jack - V.A.G 1383 A- with gearbox support - T10337- attached.

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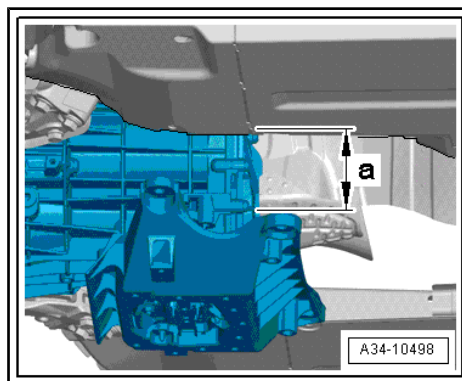
- Remove bolts -arrows- for tunnel cross member.



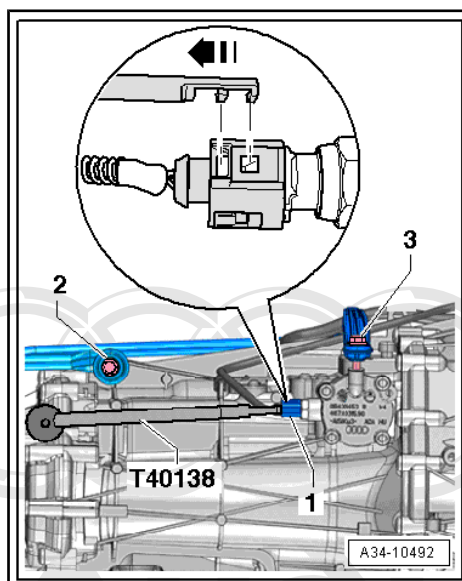


Vehicles with manual gearbox:

- Lower gearbox using engine and gearbox jack - V.A.G 1383 A- as far as distance -a-.
- Dimension -a- = 80 mm (maximum).



- Use release tool -F4- to unplug electrical connector -1- at reversing light switch - T40138- and move clear.



Vehicles with dual clutch gearbox/multitronic gearbox:

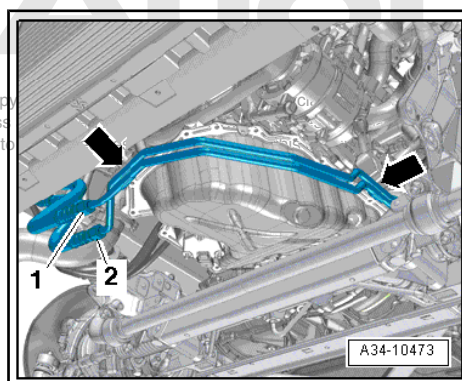
- Remove bolts -arrows- for ATF lines.



Note

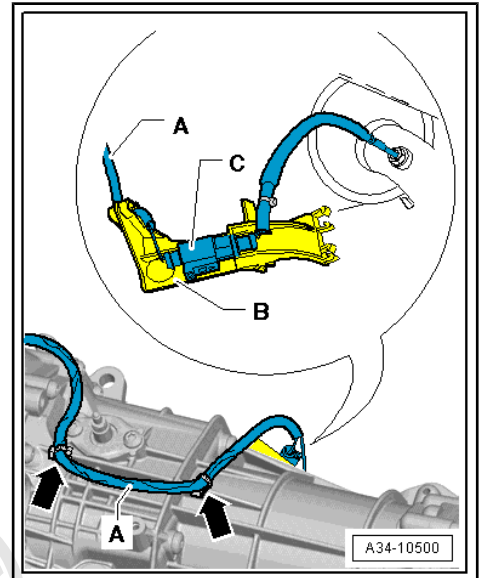
Disregard items -1 and 2-.

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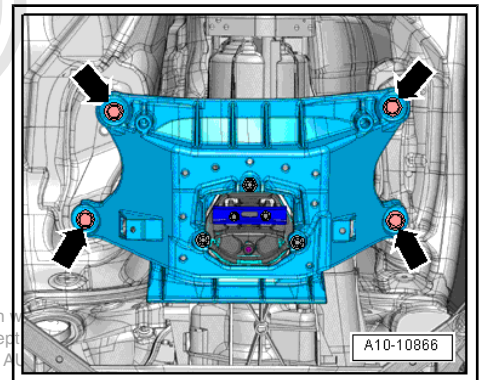


Continued for all vehicles:

- Unclip electrical wiring -A- from gearbox and unplug electrical connector -C-.

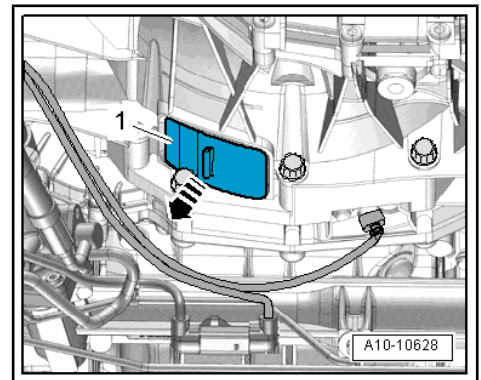


- Raise gearbox using engine and gearbox jack - V.A.G 1383 A- and fit bolts -arrows- for tunnel cross member.

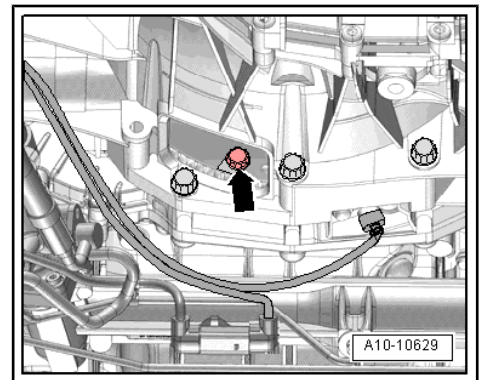


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- Detach bottom cover -1- from gearbox -arrow-.

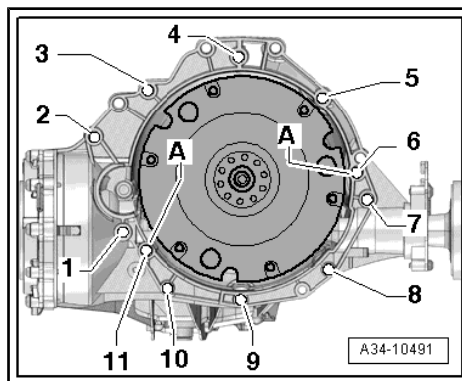


- Remove 3 bolts -arrow- for flywheel. Turn crankshaft each time by 120° in direction of engine rotation.





- Remove bolt -1- securing starter (work from side facing engine).
- Separate starter from gearbox and leave in position.
- Remove remaining bolts securing engine to gearbox.
- Support gearbox:



Version 1

- Set up support bracket - 10-222A- with adapter - 10-222A/8- on suspension turrets (left and right) as illustrated.
- Use shackle - 10-222A/12- to hook spindle onto gearbox.

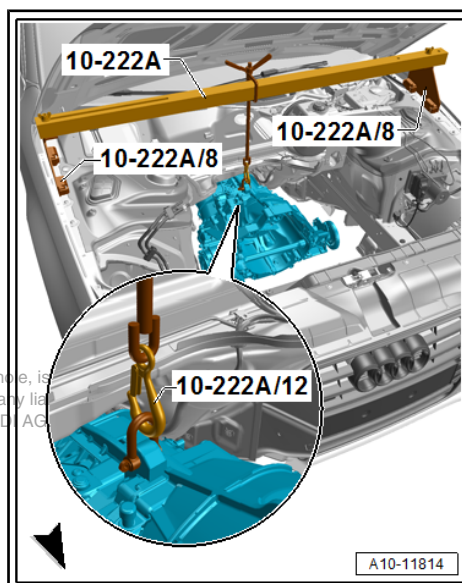


Note

Shown in illustration with engine removed.

- Pre-tension spindle of support bracket - 10-222A- slightly.

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Version 2

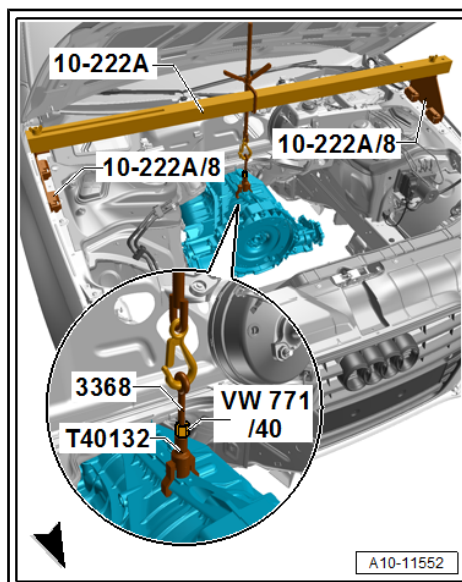
- Set up support bracket - 10-222A- with adapter - 10-222A/8- on suspension turrets (left and right) as illustrated.
- Use puller - T40132- , multi-purpose tool - VW 771/40- and eye-head bolt - 3368- to hook spindle onto gearbox, as shown in illustration.



Note

Shown in illustration with engine removed.

- Pre-tension spindle of support bracket - 10-222A- slightly.



All vehicles:

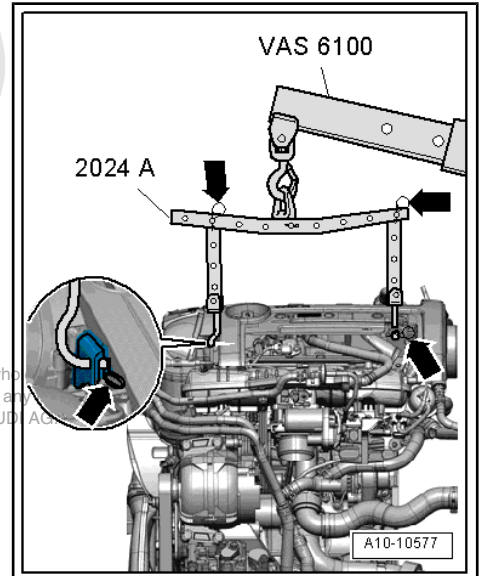
- Attach lifting tackle - 2024 A- to engine and workshop hoist - VAS 6100- as shown in illustration.



WARNING

The hook attachments and locating pins on the lifting tackle must be secured with locking pins.

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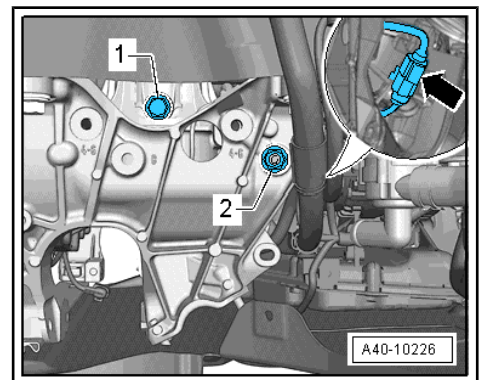
- Tighten bolts -1- for left and right engine mountings.



Note

Disregard -arrow-.

- Raise engine until engine mountings are clear.
- Tighten spindle of support bracket - 10-222A- further.



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 out of engine compartment when lifting out.*

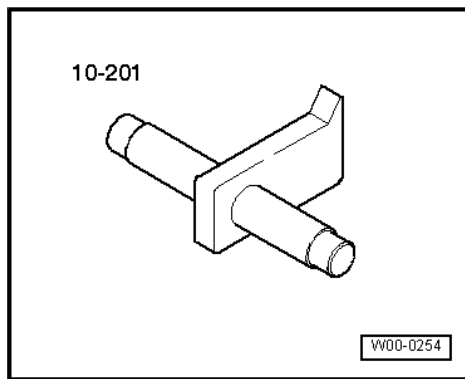
- Separate engine from gearbox and lift engine out of engine compartment.

1.2 Securing engine to engine and gearbox support

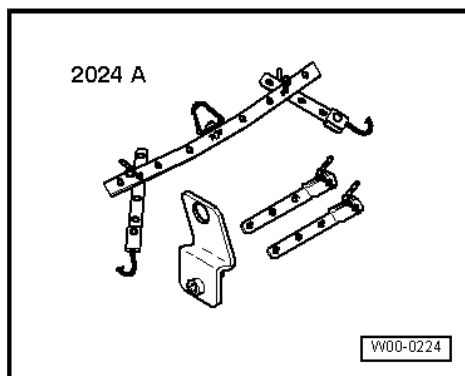
Special tools and workshop equipment required



◆ Counterhold tool - 10-201-



◆ Lifting tackle - 2024A-



◆ Engine and gearbox support - VW 540-

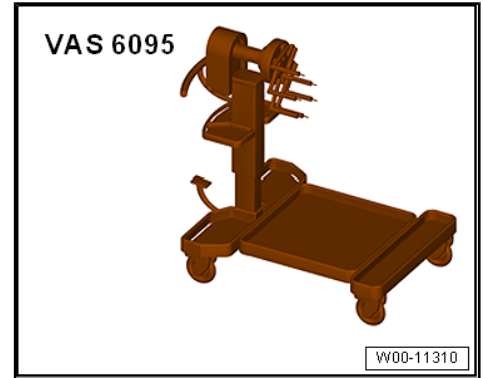
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◆ Workshop hoist - VAS 6100-




◆ Engine and gearbox support - VAS 6095-



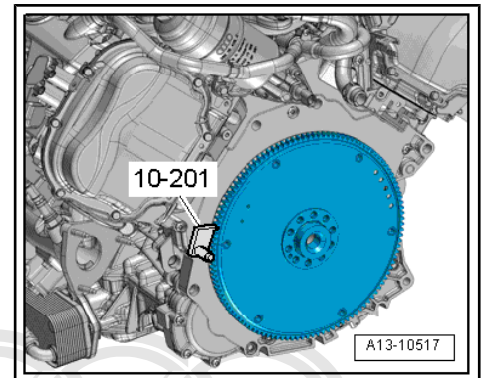
Procedure

- Insert counterhold tool - 10-201- to slacken bolts.


 **Caution**

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

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



- Remove bolts and take off drive plate.

 **WARNING**

Accident risk from loose components of lifting tackle.

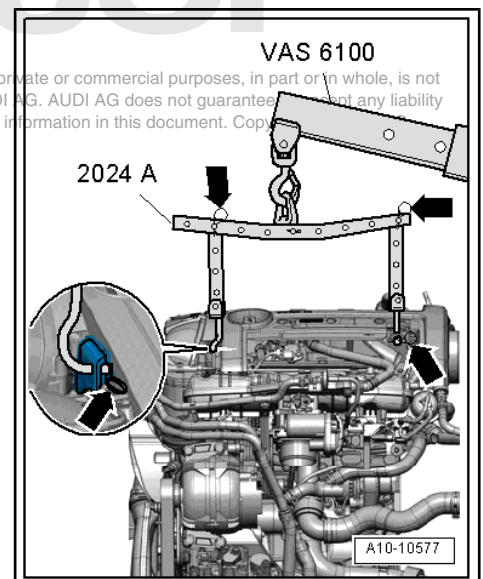
- ◆ *The support hooks and retaining pins on the lifting tackle must be secured with locking pins -arrows-.*

- Engage lifting tackle - 2024 A- on engine and workshop hoist - VAS 6100- .

 **Note**

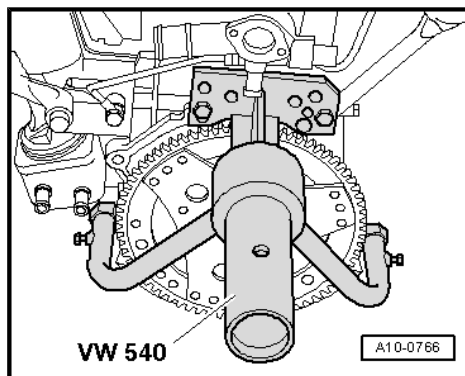
To adjust to the centre of gravity of the assembly, the perforated rails of the support hooks must be positioned as shown.

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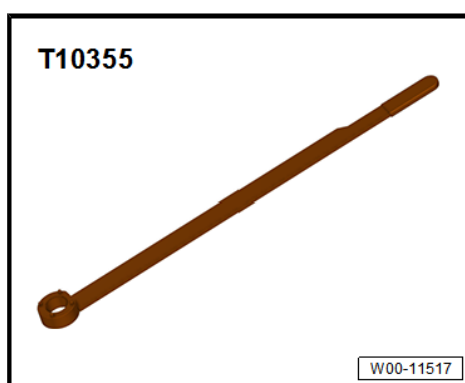
- Secure engine and gearbox support - VW 540- to engine for repair work.
- Secure engine to engine and gearbox support - VW 540- using -VAS 6095- .



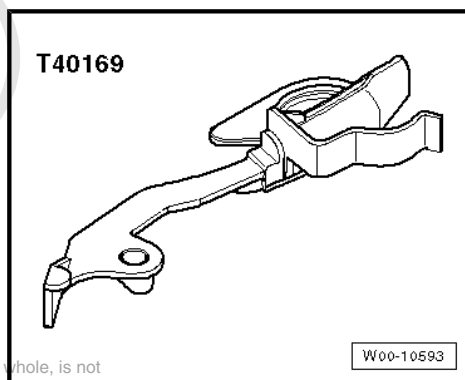
1.3 Installing engine

Special tools and workshop equipment required

- ◆ Counterhold tool - T10355- for vehicles with dual clutch gear-box

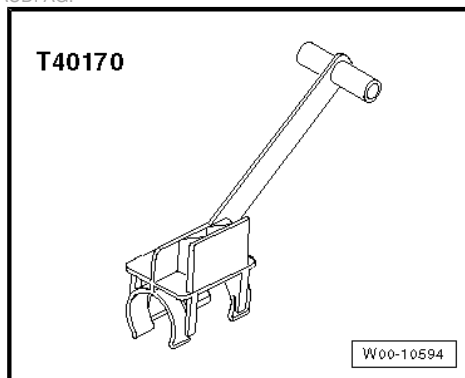


- ◆ Assembly aid - T40169-



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- ◆ Transport lock - T40170-



Tightening torques

Note

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

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

- ◆ ⇒ [“2.1 Exploded view - assembly mountings”, page 33](#)
- ◆ Engine to manual gearbox or dual clutch gearbox ⇒ Rep. gr. 34 ; Removing and installing gearbox; Tightening torques for gearbox
- ◆ Engine to multitronic ⇒ Rep. gr. 37 ; Removing and installing gearbox; Tightening torques for gearbox

Procedure

Note

- ◆ *Renew the bolts tightened with specified tightening angle.*
 - ◆ *Renew self-locking nuts and bolts as well as seals, gaskets and O-rings.*
 - ◆ *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 64](#) .*
 - ◆ *Hose connections and hoses for charge air system must be free of oil and grease prior to fitting.*
 - ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ *Electronic parts catalogue* .*
 - ◆ *To secure the charge air hoses at their connections, spray rust remover onto the worm thread of the used hose clips before installing.*
 - ◆ *Fit all cable ties in the original positions when installing.*
- Before installing gearbox, remove residue from threaded holes for engine/gearbox bolts in cylinder block using a thread tap.
 - The following preparations are required before joining engine and gearbox.

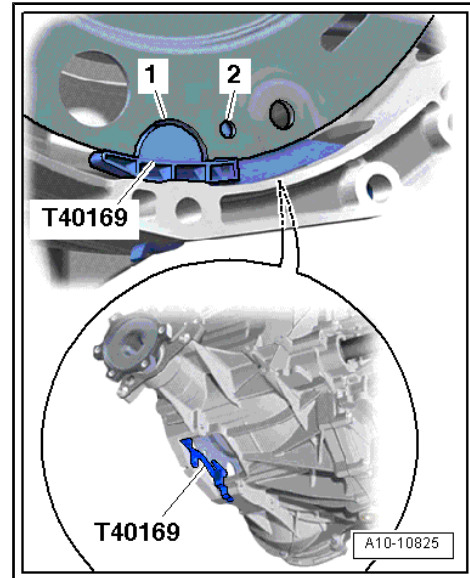


- Insert assembly aid - T40169- into gearbox housing and fly-wheel from below, as illustrated.
- The assembly aid - T40169- must engage in the semi-circular recess -1- and in the inspection hole -2-.

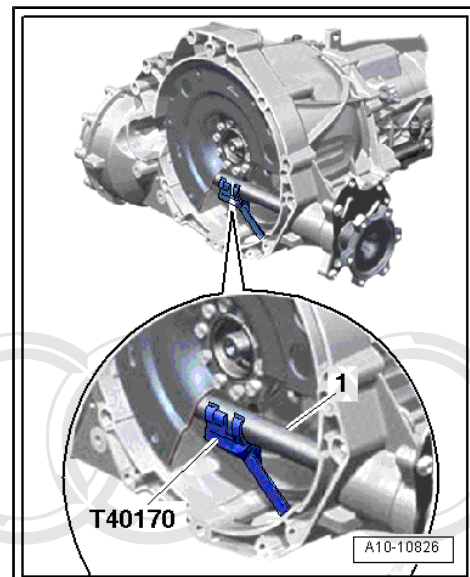


Note

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



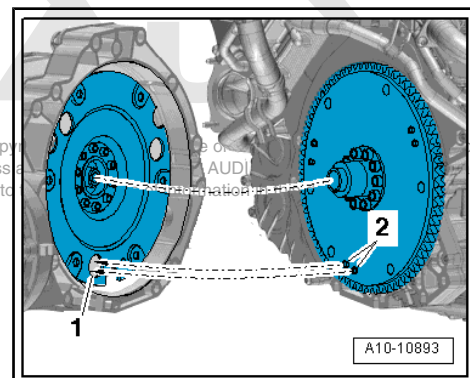
- Insert transport lock - T40170- into gearbox housing from below and clamp onto flange shaft -1-.



Note

The next work step is only required if a drive plate with locating pins -2- is fitted.

- In addition, align drive plate relative to clutch module so that locating pins -2- (if fitted) on drive plate are in position to engage in large holes -1- in clutch module.



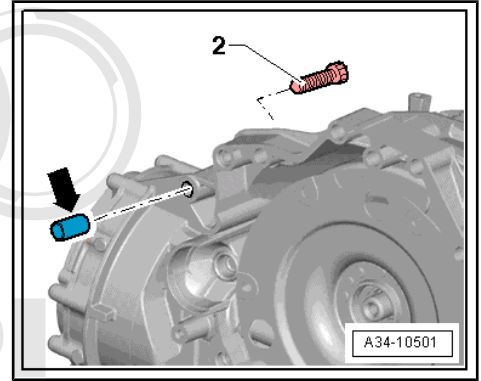
Caution

Incorrect installation will cause the clutch mechanism to malfunction.

- ◆ **If the locating pins of the drive plate -2- do not engage in the holes in the clutch module -1-, this can cause serious malfunctioning of the clutch mechanism.**

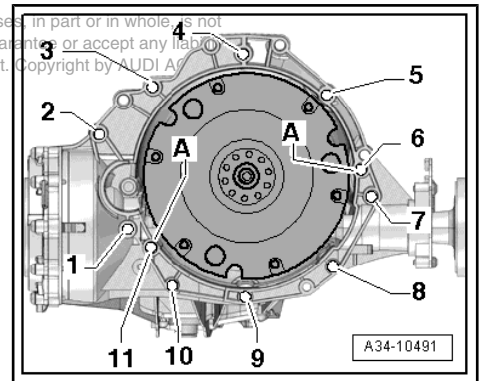
 **Note**

- ◆ Bolt -2- secures the starter to the gearbox and is provided with a spacer sleeve -arrow-.
- ◆ The spacer sleeve must be fitted between starter and gearbox.
- Check whether aluminium bolts securing engine to gearbox can be reused; if so, apply marking => Rep. gr. 34 ; Removing and installing gearbox; Tightening torques for gearbox / => Rep. gr. 37 ; Removing and installing gearbox; Tightening torques for gearbox .



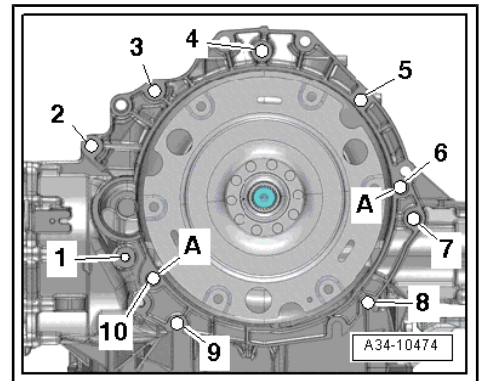
Vehicles with manual gearbox or multitronic gearbox:

- Check whether dowel sleeves -A- for centring engine and gearbox are fitted in cylinder block; install missing dowel sleeves.
- Bring gearbox into position on engine and tighten bolts -7 ... 11- securing engine to gearbox. Tightening torques => Rep. gr. 34 ; Removing and installing gearbox; Tightening torques for gearbox or => Rep. gr. 37 ; Removing and installing gearbox; Tightening torques for gearbox



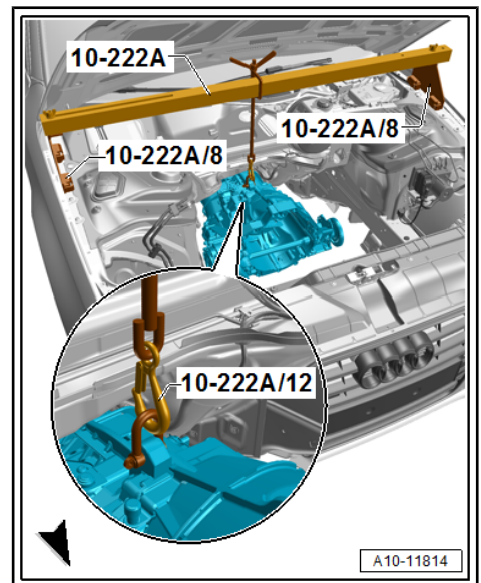
Vehicles with dual clutch gearbox:

- Check whether dowel sleeves -A- for centring engine and gearbox are fitted in cylinder block; install missing dowel sleeves.
- Bring gearbox into position on engine and tighten bolts -7 ... 10- securing engine to gearbox. Tightening torques => Rep. gr. 34 ; Removing and installing gearbox; Tightening torques for gearbox



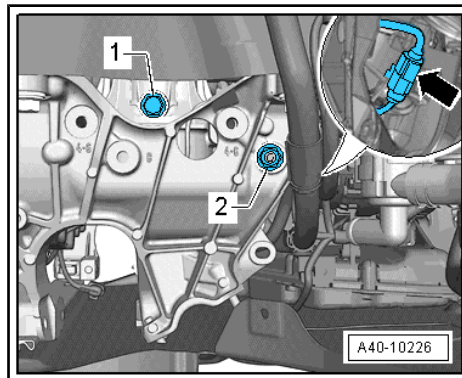
Continued for all vehicles:

- Release spindle of support bracket - 10-222A- .
- Lower workshop hoist and place engine/gearbox assembly onto engine mounting.





- Fit bolts -1- for left and right engine mountings.
- Detach workshop hoist - VAS 6100- and lifting tackle - 2024 A- .

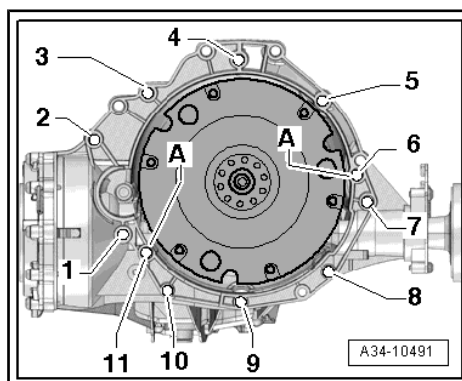


- Screw in bolts -1 ... 6- securing engine to gearbox and tighten.



Note

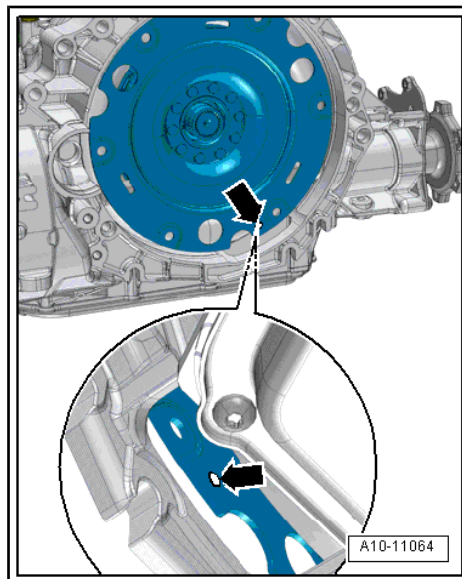
Illustration shows manual gearbox (similar on other gearbox versions).



Vehicles with manual gearbox:

- Fit front wheels ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres; Tightening torque for wheel bolts .
- Engage 4th gear and turn front wheels in direction of travel until flywheel is rotated by one complete turn (360°).
- The inspection hole -arrow- should be visible again in the recess on the gearbox housing.

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Continued for all vehicles:

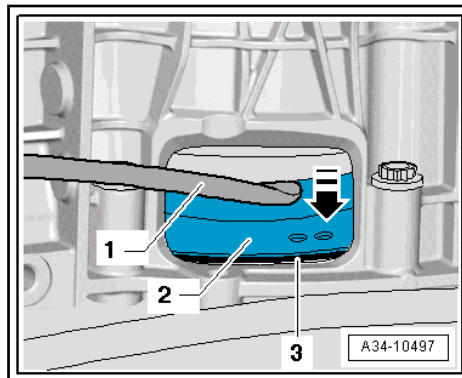
- Remove transport lock - T40170- and assembly aid - T40169- .



Note

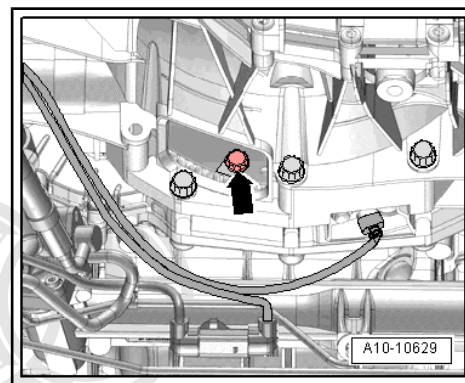
The following step is necessary to ensure that the flywheel is straight and that it makes even contact with the drive plate.

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




Tightening sequence - flywheel to drive plate

- Screw in first bolt -arrow- hand-tight.
- Turn crankshaft by 120° in direction of engine rotation and fit second bolt hand-tight.
- Turn crankshaft by 120° in direction of engine rotation once again.
- Now tighten third bolt to specified torque ⇒ Rep. gr. 30 ; Clutch; Exploded view - clutch module or ⇒ Rep. gr. 37 ; Removing and installing gearbox .
- Then tighten remaining bolts to final torque.



The remaining installation steps are carried out in the reverse sequence.

- Install starter ⇒ Electrical system; Rep. gr. 27 ; Starter; Removing and installing starter .
- Install ATF lines ⇒ Rep. gr. 34 ; ATF circuit; Removing and installing ATF lines or ⇒ Rep. gr. 37 ; ATF circuit; Removing and installing ATF lines .
- Install catalytic converter ⇒ [page 384](#) .
- Install front exhaust pipe/front silencer ⇒ [page 374](#) .
- Align the exhaust system so it is free of stress ⇒ [page 378](#) .
- Install power steering pump ⇒ Running gear, axles, steering; Rep. gr. 48 ; Hydraulic power steering; Removing and installing power steering pump .
- Install air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket .
- Install poly V-belt ⇒ [page 43](#) .
- Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Install engine control unit ⇒ [page 363](#) .
- Install electrical wiring, terminal 30 wiring junction 2 - TV22- and cover for electronics box in engine compartment ⇒ Electrical system; Rep. gr. 97 ; Relay carriers, fuse carriers, electronics boxes .
- Install body brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Removing and installing body brace .
- Install filler neck for washer fluid reservoir ⇒ Electrical system; Rep. gr. 92 ; Windscreen washer system; Removing and installing washer fluid reservoir .
- Observe steps required after re-connecting battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .

 **Caution**

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

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

- Install air cleaner housing ⇒ [page 318](#) .



- Reset service position ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Setting service position and returning to normal position .
- Check oil level: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .



Note

Do not reuse coolant.

- Fill up with coolant ⇒ [page 249](#) .
- Install noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .
- Install front wheel housing liners ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .
- After renewing engine, misfire adaptations must be reset. To do so, select 01 - Reset adaptations misfires in Guided Functions mode of ⇒ Vehicle diagnostic tester.

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2 Assembly mountings

⇒ [“2.1 Exploded view - assembly mountings”, page 33](#)

⇒ [“2.2 Removing and installing engine mountings”, page 34](#)

⇒ [“2.3 Supporting engine in installation position”, page 35](#)

2.1 Exploded view - assembly mountings

1 - Not fitted

2 - Bolt

- 20 Nm

3 - Retaining plate

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

4 - Retainer

- For hydraulic line
- Only on vehicles with hydraulic power steering

5 - Nut

- 9 Nm

6 - Bolt

- 40 Nm

7 - Engine support

8 - Bolt

- 10 Nm

9 - Heat shield

10 - Bolt

- Renew
- 90 Nm + turn 90° further

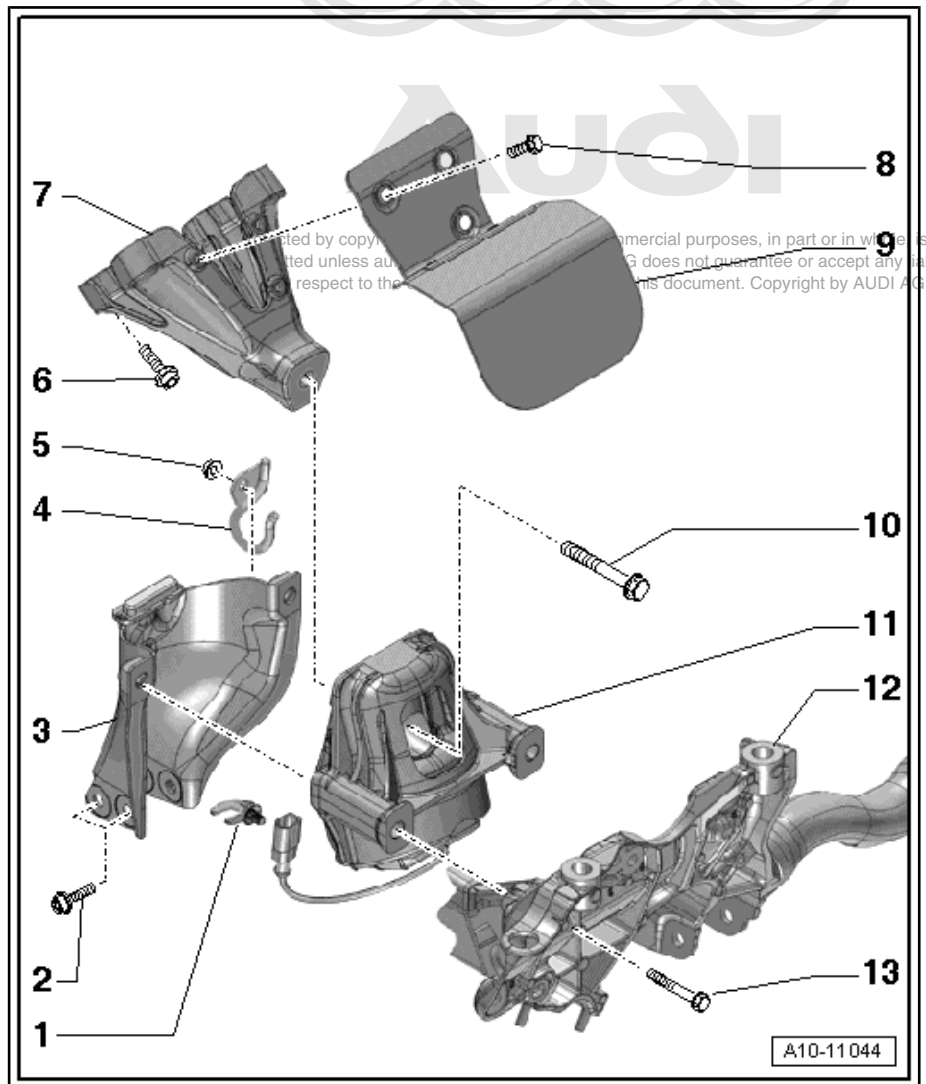
11 - Engine mounting

- Depending on equipment and version, only with left electrohydraulic engine mounting solenoid valve - N144- on left side
- Depending on equipment and version, additionally with right electrohydraulic engine mounting solenoid valve - N145- on right side
- Removing and installing ⇒ [page 34](#)
- Always renew both sides together

12 - Subframe

13 - Bolt

- 55 Nm



2.2 Removing and installing engine mountings



Note

- ◆ Renew engine mountings on both sides together.
- ◆ Also renew corresponding brackets.
- ◆ The following chapter describes the procedure for the engine mounting (left-side).

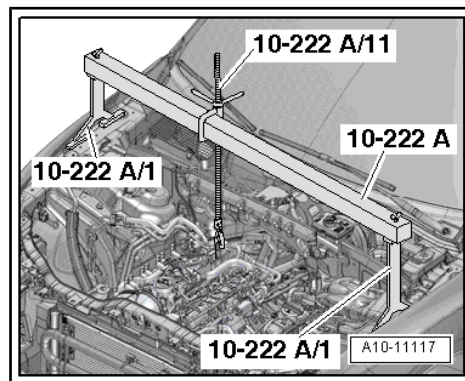
Special tools and workshop equipment required

- ◆ Support bracket - 10-222A-

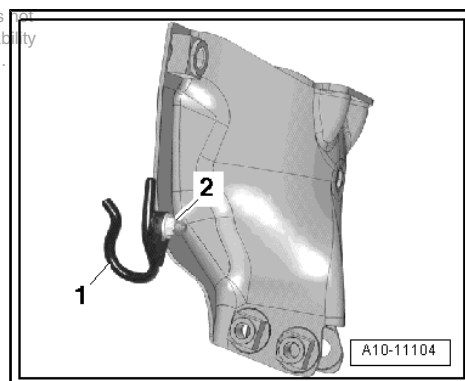


Removing

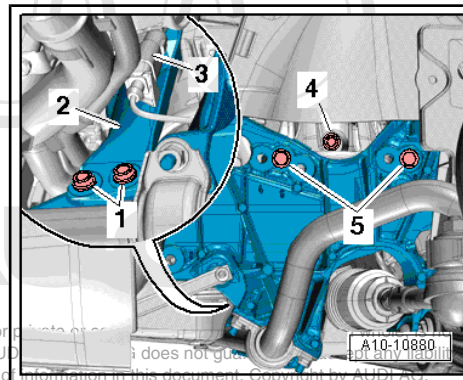
- Remove engine cover panel ⇒ [page 37](#) .
- Remove body brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Removing and installing body brace .
- Set up support bracket - 10-222A- on suspension turrets (left and right) as illustrated.
- Attach spindle - 10-222A/11- to rear engine lifting eye.
- Partly take up weight of engine with spindle.
- Remove front left wheel.
- Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
- Remove wheel housing liner (front left) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .



- Vehicles with hydraulic power steering: Remove nut -2- and move bracket -1- clear.



- If fitted: Move clear and unplug electrical connector -3- for electrohydraulic engine mounting solenoid valve.
- Remove bolts -1, 4, 5- for engine mounting.
- Move retaining plate -2- for engine mounting clear to the side.
- Detach engine mounting.



Installing

- Tightening torques
 ⇒ ["2.1 Exploded view - assembly mountings", page 33](#)

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



Note

Renew the bolts tightened with specified tightening angle.

- Install noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .
- Install front wheel housing liner (left-side) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .
- Fit front wheel ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres; Tightening torque for wheel bolts .
- Install body brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Removing and installing body brace .
- Install engine cover panel ⇒ [page 37](#) .

2.3 Supporting engine in installation position

Special tools and workshop equipment required

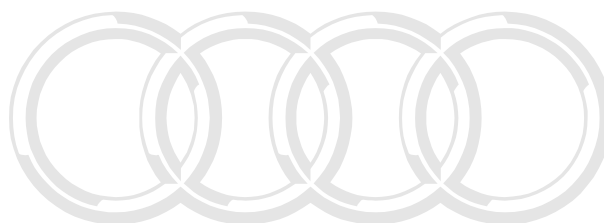
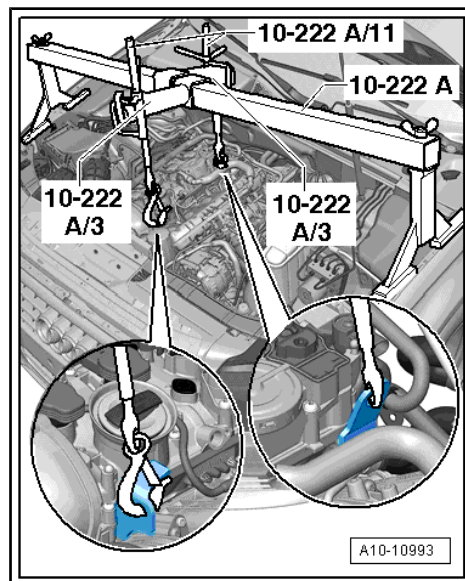
- ◆ Support bracket - 10-222A-





Supporting

- Remove engine cover panel ⇒ [page 37](#) .
- Set up support bracket - 10-222A- with adapters -10-222A/3- on suspension turrets (left and right) as illustrated.
- Attach spindles -10-222A/11- to engine lifting eyes.
- Partly take up weight of engine with spindles.



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3 Engine cover panel

⇒ [“3.1 Removing and installing engine cover panel”, page 37](#)

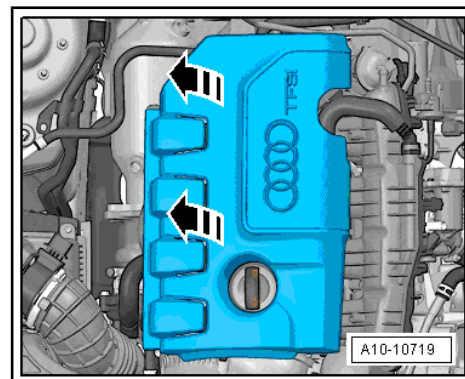
3.1 Removing and installing engine cover panel

Removing

- Carefully pull off engine cover panel -arrows-.

Installing

- To avoid damage, do not strike the engine cover panel with your fist or with any kind of tool.
- When fitting engine cover panel, take care not to damage oil filler neck.
- First press engine cover panel onto rear ball studs and then onto front ball studs with both hands.



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13 – Crankshaft group

1 Cylinder block (pulley end)

⇒ [“1.1 Exploded view - cylinder block \(pulley end\)”, page 38](#)

⇒ [“1.2 Removing and installing poly V-belt”, page 43](#)

⇒ [“1.3 Removing and installing tensioner for poly V-belt”, page 46](#)

⇒ [“1.4 Removing and installing vibration damper”, page 47](#)

⇒ [“1.5 Removing and installing bracket for ancillaries”, page 53](#)

1.1 Exploded view - cylinder block (pulley end)

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⇒ [“1.1.1 Exploded view - cylinder block \(pulley end\), vehicles with hydraulic power steering”, page 38](#)

⇒ [“1.1.2 Exploded view - cylinder block \(pulley end\), vehicles with electromechanical power steering”, page 41](#)

1.1.1 Exploded view - cylinder block (pulley end), vehicles with hydraulic power steering

1 - Poly V-belt

- Check for wear
- Do not kink
- Routing of poly V-belt
⇒ [page 40](#)



Caution

*Wrong direction of rotation for a used poly V-belt can lead to irreparable damage.
 Before removing the poly V-belt mark the direction of rotation with chalk or a felt-tip pen for re-installation.*

- Removing and installing
⇒ [page 43](#)
- When installing, make sure it is properly seated on pulleys.

2 - Idler roller

- 20 Nm

3 - Bolt

- Renew
- Lubricate O-ring with oil
- 150 Nm + turn 90° further

4 - O-ring

- Not available as replacement part; supplied together with bolt

5 - Vibration damper

- With poly V-belt pulley
- Removing and installing ⇒ [page 47](#)

6 - Bolt

- 40 Nm

7 - Tensioner for poly V-belt

- Pivot with wrench to slacken poly V-belt
- Lock using locking tool - T40098-
- Removing and installing ⇒ [page 46](#)

8 - Bracket for ancillaries

- With oil filter and engine oil cooler
- Removing and installing bracket for ancillaries ⇒ [page 53](#)
- Removing and installing engine oil cooler ⇒ [page 233](#)

9 - Alternator

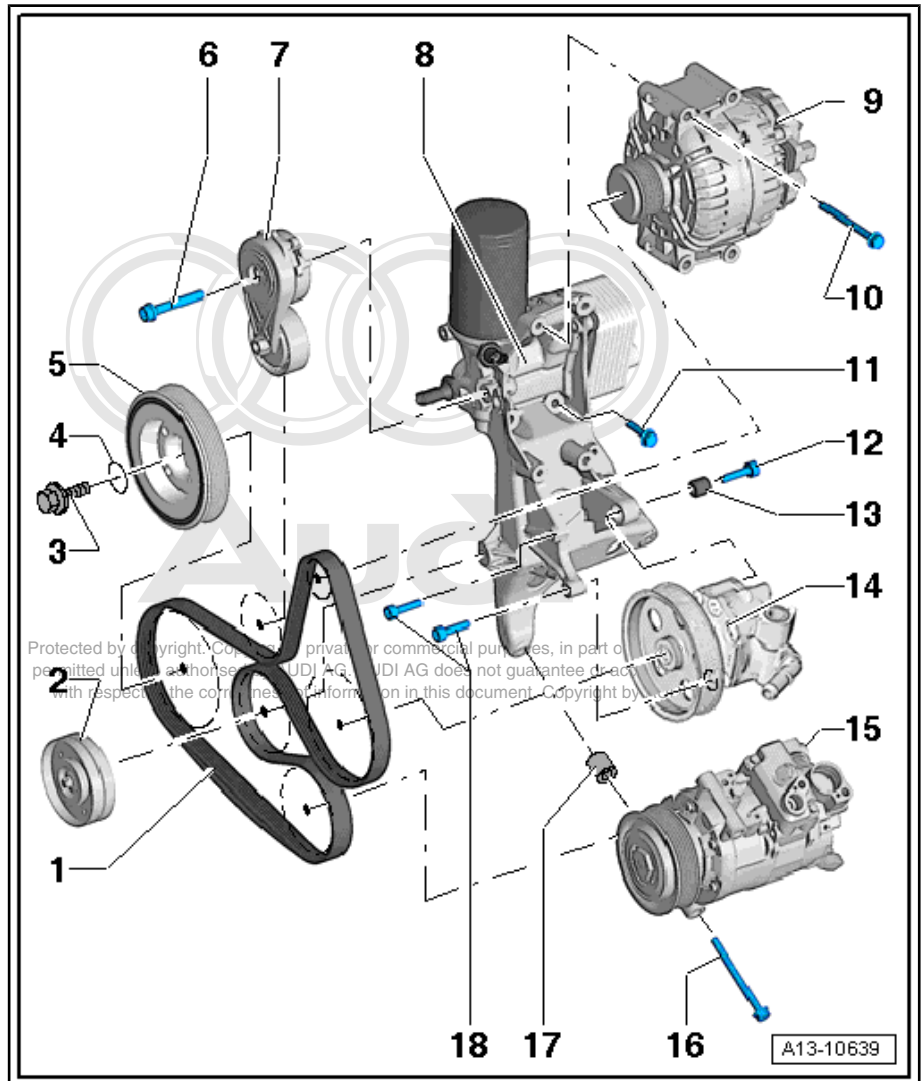
- Removing and installing ⇒ Electrical system; Rep. gr. 27 ; Alternator; Removing and installing alternator

10 - Bolt

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

11 - Bolt

- Tightening sequence ⇒ [page 40](#)





12 - Bolt

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

13 - Sleeve

14 - Power steering pump

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

15 - Air conditioner compressor

- ❑ Do not unscrew or disconnect refrigerant hoses or pipes
- ❑ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket

16 - Bolt

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

17 - Dowel sleeve

- ❑ For air conditioner compressor

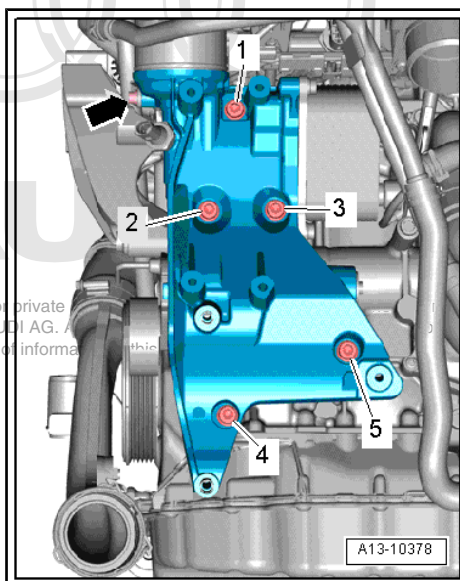
18 - Bolt

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

Tightening sequence on bracket for ancillaries

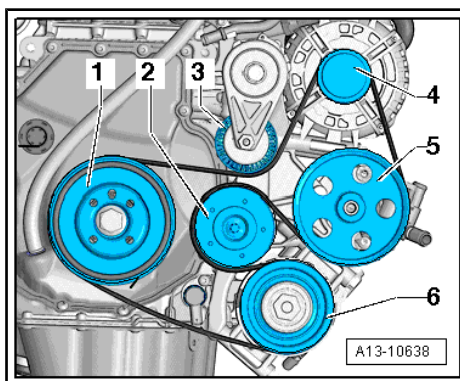
- Fit bracket for ancillaries (first tighten bolt -4-).
- Tighten bolts in the sequence -1 ... 5- in 3 stages as follows:
 1. Tighten bolts hand tight.
 2. Tighten bolts to 20 Nm.
 3. Turn bolts 90° further.

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Routing of poly V-belt

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



1.1.2 Exploded view - cylinder block (pulley end), vehicles with electromechanical power steering

1 - Poly V-belt

- Check for wear
- Do not kink
- Routing of poly V-belt
⇒ [page 42](#)



Caution

*Wrong direction of rotation for a used poly V-belt can lead to irreparable damage.
 Before removing the poly V-belt mark the direction of rotation with chalk or a felt-tip pen for re-installation.*

- Removing and installing
⇒ [page 44](#)
- When installing, make sure it is properly seated on pulleys.

2 - Tensioner for poly V-belt

- Pivot with wrench to slacken poly V-belt
- Lock in position with locking pin - T10060 A-
- Removing and installing
⇒ [page 46](#)

3 - Bolt

- Renew
- 8 Nm + turn 45° further

4 - Bolt

- Renew
- Lubricate O-ring with oil
- 150 Nm + turn 90° further

5 - O-ring

- Not available as replacement part; supplied together with bolt

6 - Vibration damper

- With poly V-belt pulley
- Removing and installing ⇒ [page 47](#)

7 - Bracket for ancillaries

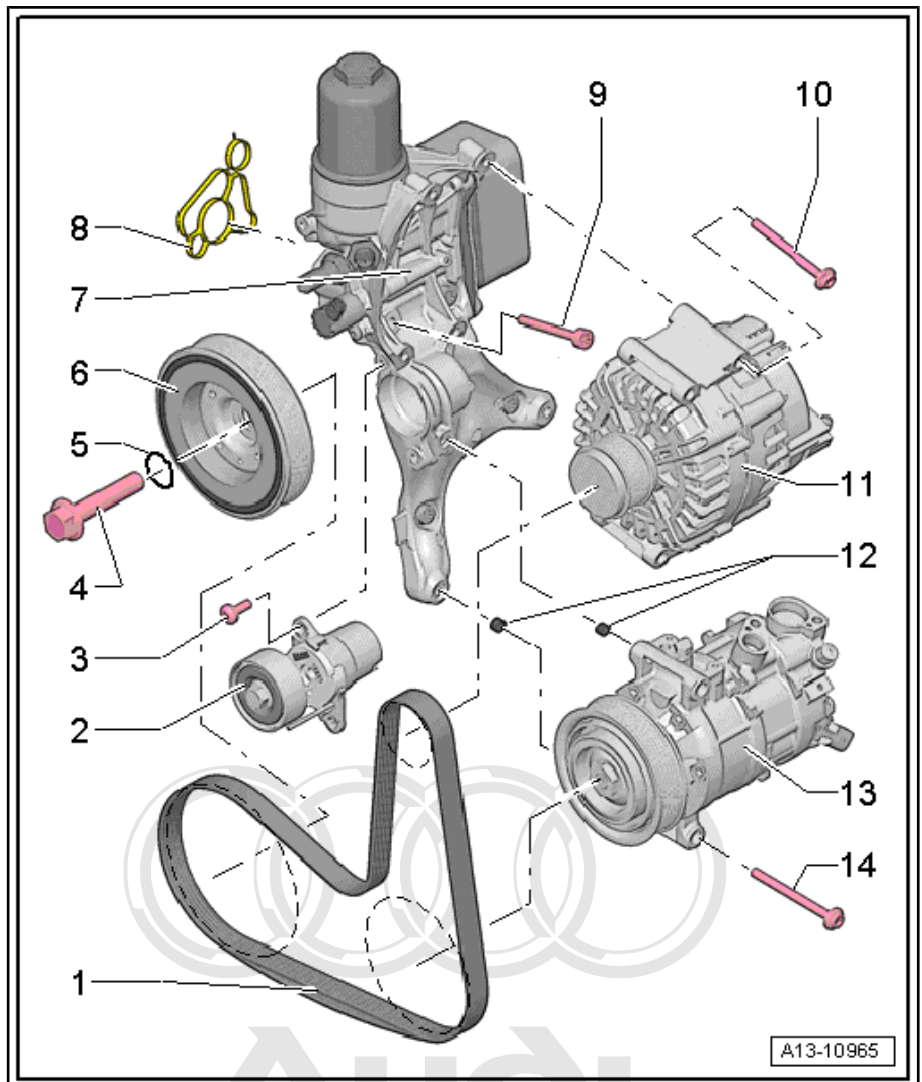
- With oil filter and engine oil cooler
- Removing and installing bracket for ancillaries ⇒ [page 56](#)
- Removing and installing engine oil cooler ⇒ [page 233](#)

8 - Gasket

- Renew

9 - Bolt

- Tightening torque and sequence ⇒ [page 42](#)



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10 - Bolt

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

11 - Alternator

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

12 - Dowel sleeve

- ❑ For air conditioner compressor

13 - Air conditioner compressor

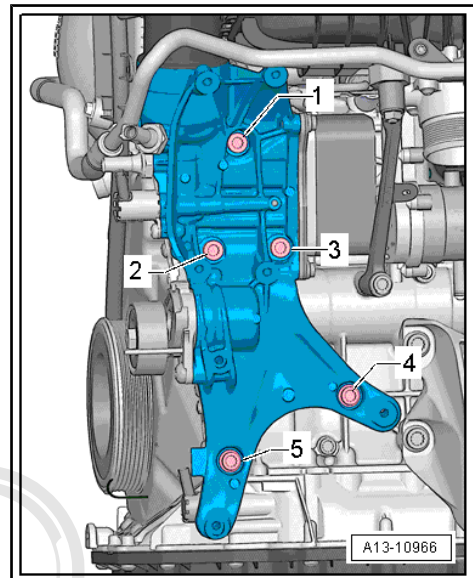
- ❑ Do not unscrew or disconnect refrigerant hoses or pipes
- ❑ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket

14 - Bolt

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

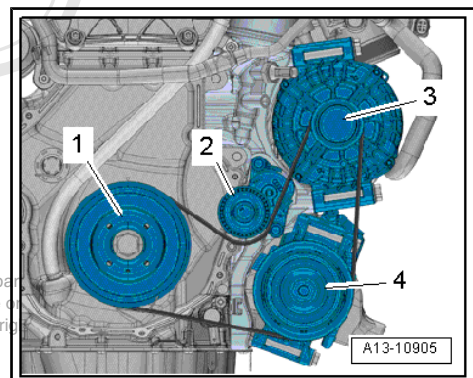
Bracket for ancillaries - tightening torque and tightening sequence

- Fit bracket for ancillaries (first tighten bolt -4-).
- Tighten bolts in the sequence -1 ... 5- in 3 stages as follows:
 1. Tighten bolts hand tight.
 2. Tighten bolts to 20 Nm.
 3. Turn bolts 90° further.



Routing of poly V-belt

- 1 - Vibration damper
- 2 - Tensioner for poly V-belt
- 3 - Alternator
- 4 - Air conditioner compressor



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1.2 Removing and installing poly V-belt

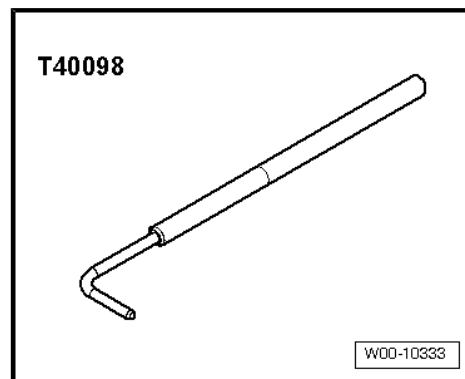
⇒ "1.2.1 Removing and installing poly V-belt - vehicles with hydraulic power steering", page 43

⇒ "1.2.2 Removing and installing poly V-belt - vehicles with electromechanical power steering", page 44

1.2.1 Removing and installing poly V-belt - vehicles with hydraulic power steering

Special tools and workshop equipment required

- ◆ Locking tool - T40098-



Removing

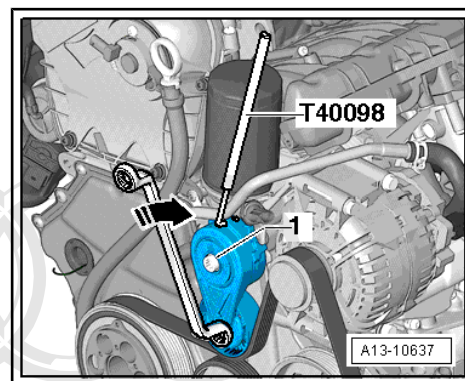


Caution

Wrong direction of rotation for a used poly V-belt can lead to irreparable damage.

- ◆ *Before removing the poly V-belt mark the direction of rotation with chalk or a felt-tip pen for re-installation.*

- To slacken poly V-belt turn tensioner in direction of -arrow-.
- Lock tensioner with locking tool - T40098- .
- Take off poly V-belt.



Installing

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



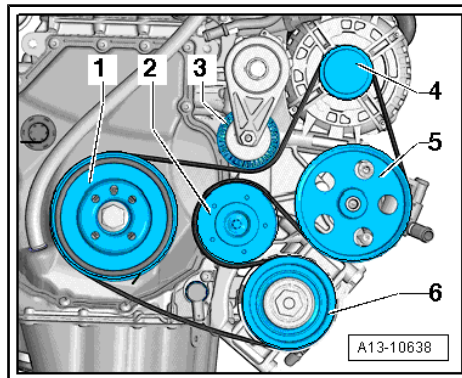
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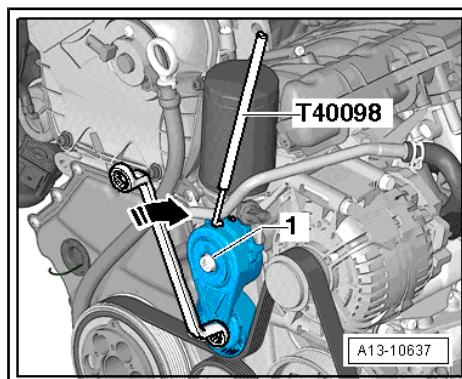
Secure alternator and air conditioner compressor before fitting poly V-belt.



- Fit poly V-belt as shown in illustration.



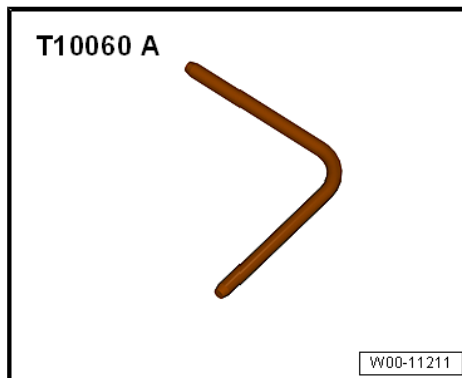
- Turn tensioner in direction of -arrow- and remove locking tool - T40098- .
- Release tensioner.
- Check that poly V-belt is properly seated.
- Start engine and check that poly V-belt runs properly.



1.2.2 Removing and installing poly V-belt - vehicles with electromechanical power steering

Special tools and workshop equipment required

- ◆ Locking pin - T10060 A-



Removing



Caution

Wrong direction of rotation for a used poly V-belt can lead to irreparable damage.

- ◆ *Before removing the poly V-belt mark the direction of rotation with chalk or a felt-tip pen for re-installation.*

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- To slacken poly V-belt turn tensioner in direction of -arrow-.
- Lock tensioner with locking pin - T10060 A- .
- Take off poly V-belt.

Installing

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

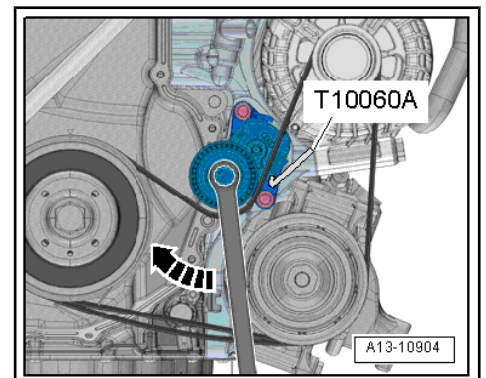
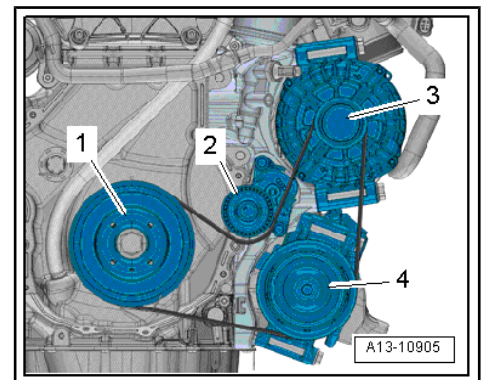
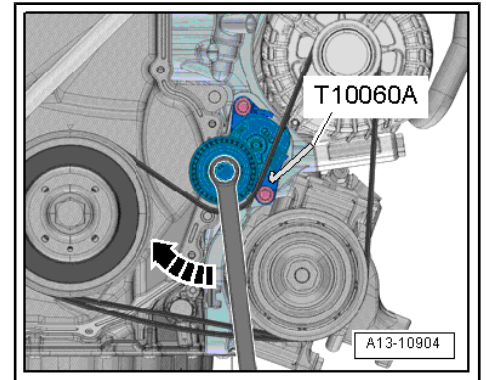


Note

Secure alternator and air conditioner compressor before fitting poly V-belt.

- Fit poly V-belt as shown in illustration.

- Turn tensioner in direction of -arrow- and remove locking pin - T10060 A- .
- Release tensioner.
- Check that poly V-belt is properly seated.
- Start engine and check that poly V-belt runs properly.



1.3 Removing and installing tensioner for poly V-belt

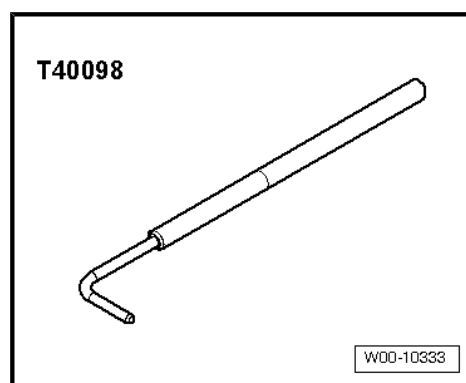
⇒ [“1.3.1 Removing and installing tensioner for poly V-belt - vehicles with hydraulic power steering”, page 46](#)

⇒ [“1.3.2 Removing and installing tensioner for poly V-belt - vehicles with electromechanical power steering”, page 46](#)

1.3.1 Removing and installing tensioner for poly V-belt - vehicles with hydraulic power steering

Special tools and workshop equipment required

- ◆ Locking tool - T40098-



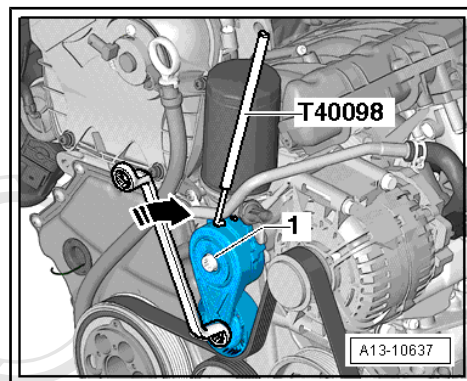
Removing



Caution

Wrong direction of rotation for a used poly V-belt can lead to irreparable damage.

- ◆ *Before removing the poly V-belt mark the direction of rotation with chalk or a felt-tip pen for re-installation.*



- To slacken poly V-belt turn tensioner in direction of -arrow-.
- Lock tensioner with locking tool - T40098- .
- Detach poly V-belt from tensioner.
- Remove bolt -1- and take off tensioner for poly V-belt from bracket for ancillaries.

Installing

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

- Install poly V-belt ⇒ [page 43](#).

Tightening torques

- ◆ ⇒ [“1.1.1 Exploded view - cylinder block \(pulley end\), vehicles with hydraulic power steering”, page 38](#)

1.3.2 Removing and installing tensioner for poly V-belt - vehicles with electromechanical power steering

Removing

- Detach poly V-belt from tensioner ⇒ [page 44](#) .

- Remove bolts -arrows- and take off tensioner -1- for poly V-belt from bracket for ancillaries.

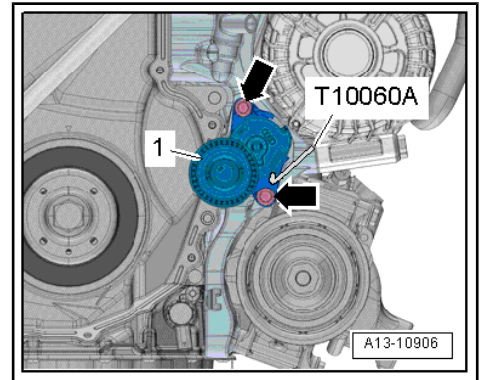
Installing

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

- Install poly V-belt ⇒ [page 44](#) .

Tightening torques

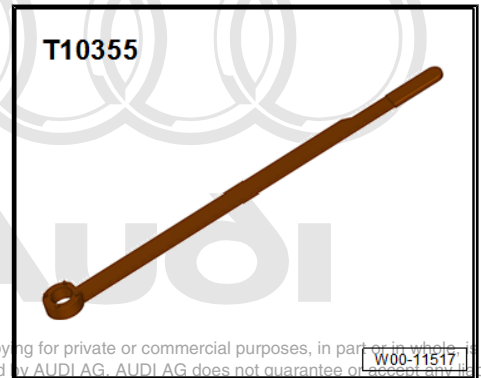
- ◆ ⇒ [“1.1.2 Exploded view - cylinder block \(pulley end\), vehicles with electromechanical power steering”, page 41](#)



1.4 Removing and installing vibration damper

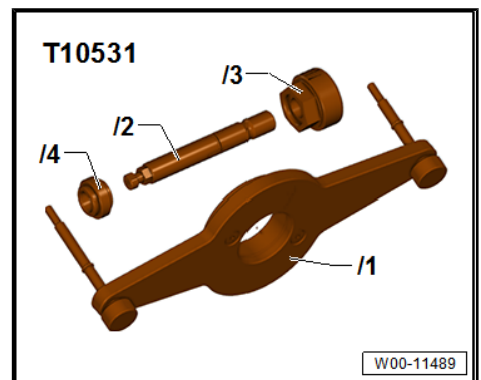
Special tools and workshop equipment required

- ◆ Counterhold tool - T10355-



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- ◆ Assembly tool - T10531-

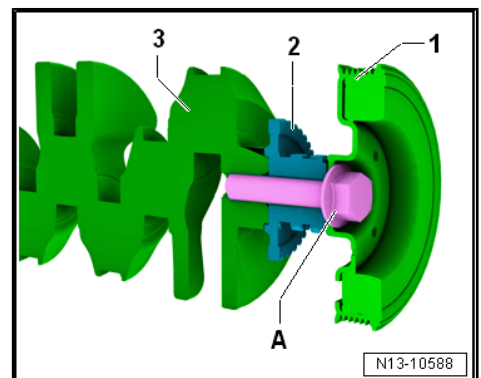


Note

The securing bolt for the vibration damper -A- secures the vibration damper -1-, timing chain sprocket -2- and crankshaft -3- to each other. Before removing the securing bolt, the timing chain sprocket must be secured to the crankshaft as described below.

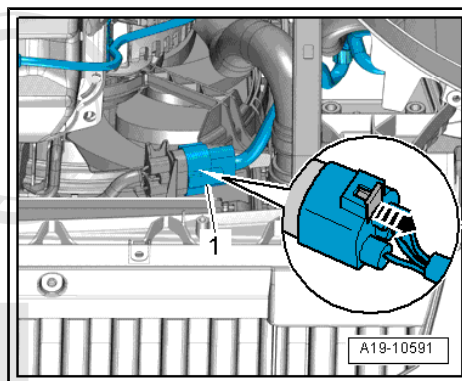
Removing

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

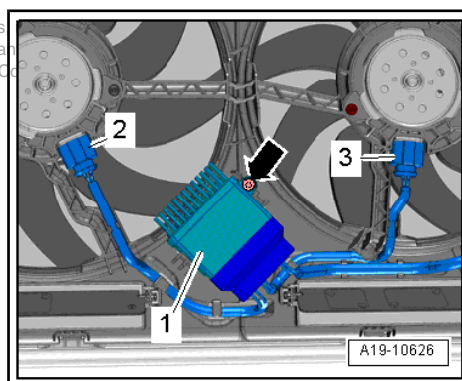




- Take electrical connector -1- for radiator fan out of bracket and unplug connector (push retainer to the rear -arrow- and press down release catch).
- Move clear electrical wiring harness going to radiator fan control unit.

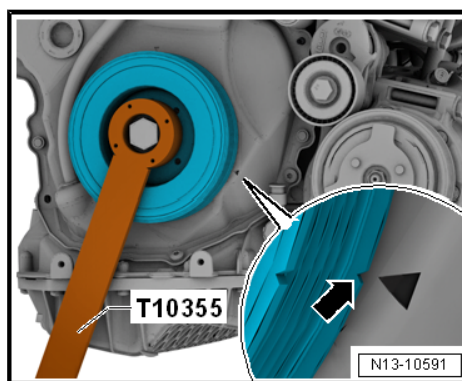


- Unplug electrical connectors -2- and -3-
- Unscrew bolt -arrow- and remove radiator fan control unit -1-
- Remove poly V-belt from pulley on vibration damper
=> [page 43](#) .

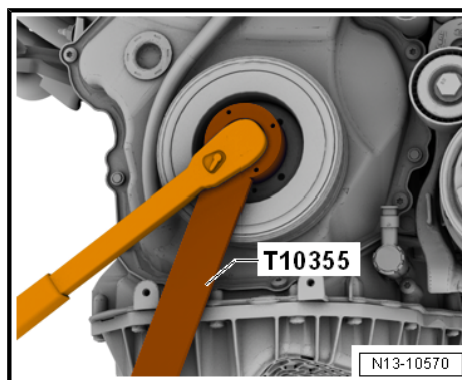


- Turn vibration damper to "TDC" position using counterhold tool - T10355- .
- Notch on vibration damper must align with arrow marking on timing chain cover (bottom) -arrow-.
- Marking on cover must be in »4 o'clock position«.

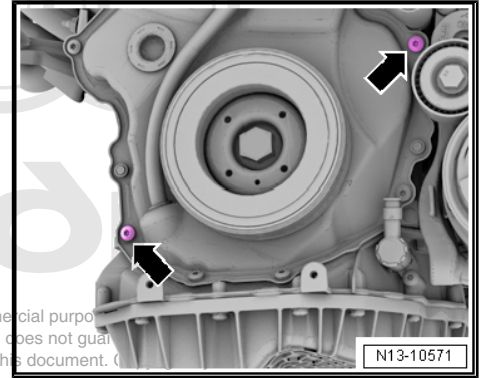
Caution
Do not loosen securing bolt for vibration damper by more than a half turn at this stage.



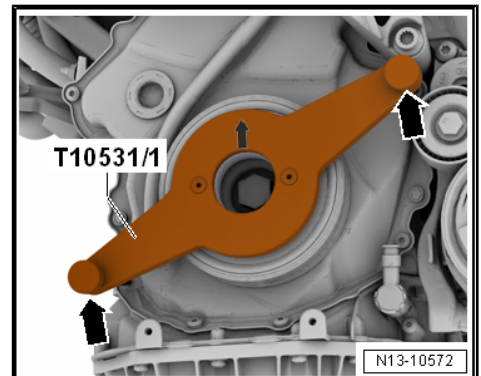
- Loosen bolt for vibration damper by approx. a half turn using counterhold tool - T10355- .
- If vibration damper has been twisted out of position, correct TDC position.



- Remove bolts -arrows- (as illustrated) from timing chain cover. These bolts must be renewed.



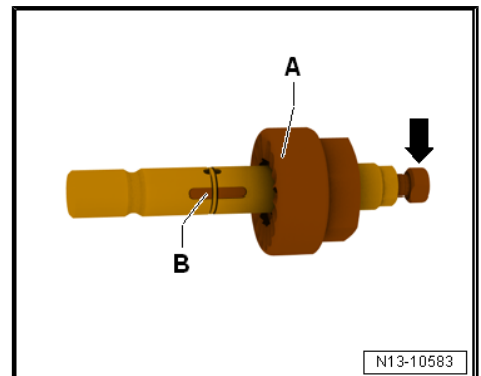
- Apply support - T10531/1- (as illustrated) to vibration damper and secure hand-tight with knurled screws -arrows-.
- Remove bolt for vibration damper completely.



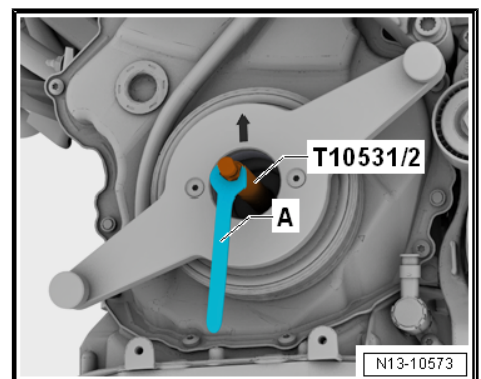
- Check whether turning-over tool -A- slides easily over clamps -B-. Turn tensioning bolt -arrow- if necessary.

 **Note**

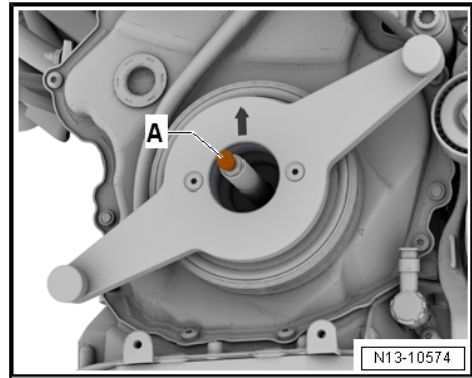
Do not turn the tensioning bolt from this stage onwards; otherwise the clamping pin - T10531/2- will get stuck when it is screwed into the crankshaft.



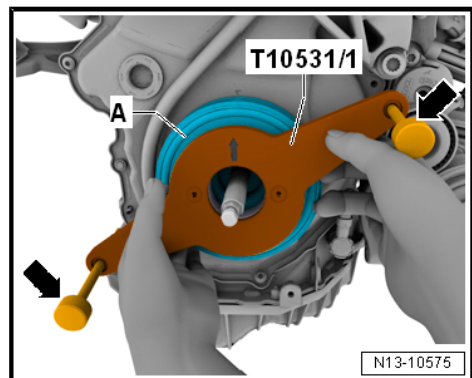
- Screw clamping pin - T10531/2- into crankshaft and hand-tighten with open-end spanner, 12 mm -A-.



- Hand-tighten tensioning bolt -A- to secure chain sprocket to crankshaft.



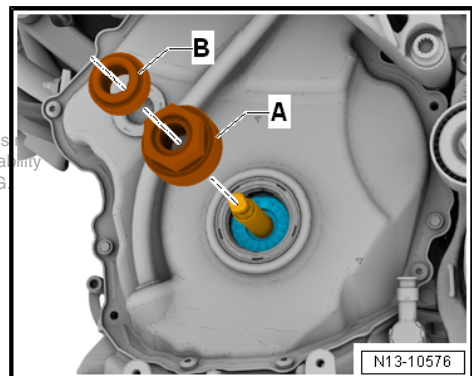
- Remove knurled screws -arrows-. Detach support - T10531/1- and vibration damper -A-.



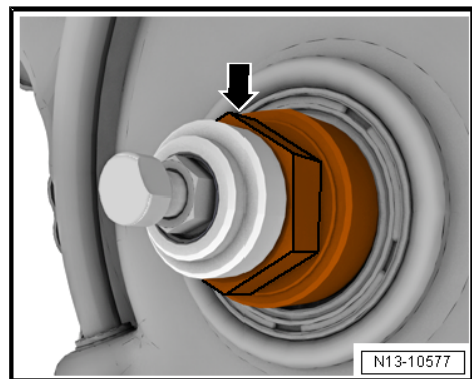
If crankshaft needs to be rotated without vibration damper:

- Fit turning-over tool -A- onto clamping pin (pay attention to tooth-shaped profile on chain sprocket). In TDC position, flat surface of tool faces upwards.
- Tighten turning-over tool with flange nut -B-.

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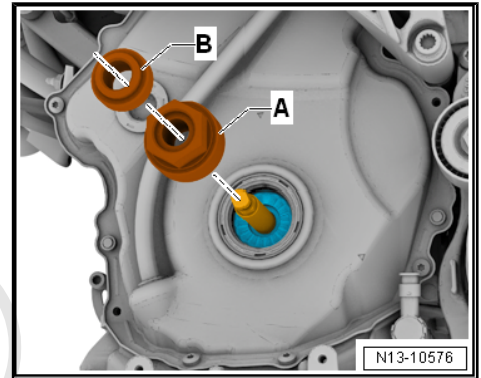


- Crankshaft can now be rotated at hexagon flats -arrow-.

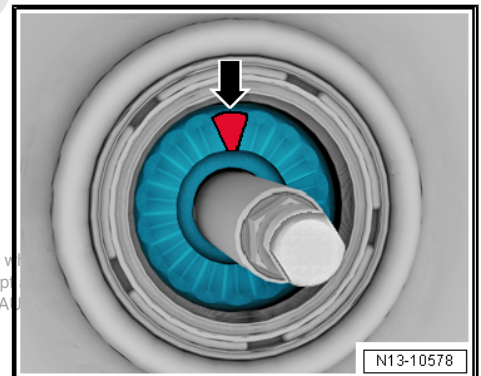


Installing

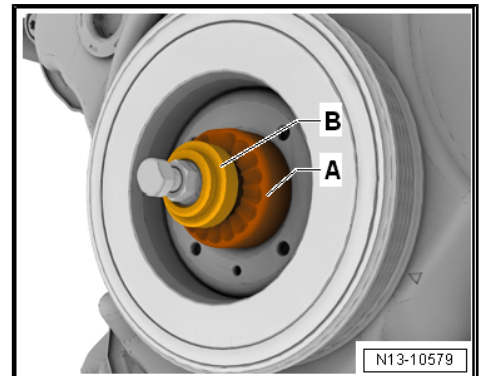
- If necessary, detach flange nut -B- and turning-over tool -A- from clamping pin.



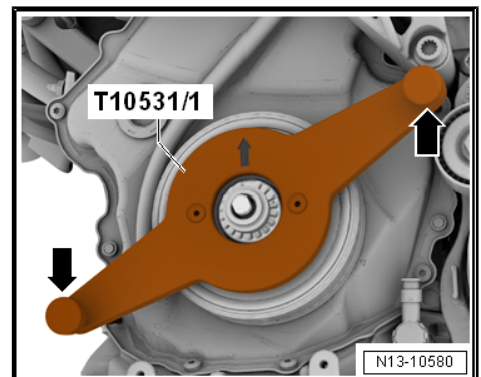
- Fit vibration damper in TDC position (pay attention to tooth-shaped profile -arrow- on chain sprocket).



- Fit turning-over tool -A- onto clamping pin. The hexagon flats should face the vibration damper.
- Screw flange nut -B- on while moving vibration damper back and forth slightly to check whether vibration damper is seated correctly in tooth-shaped profile. Tighten flange nut until vibration damper can no longer be rotated.



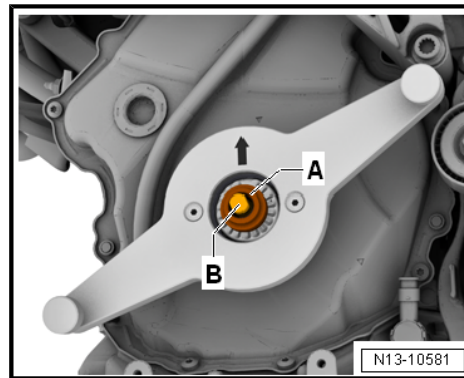
- Apply support - T10531/1- (as illustrated) to vibration damper and secure hand-tight with knurled screws -arrows-.



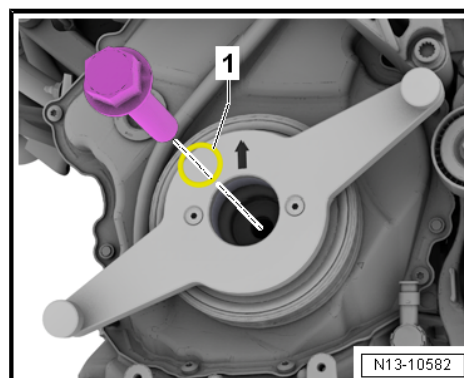
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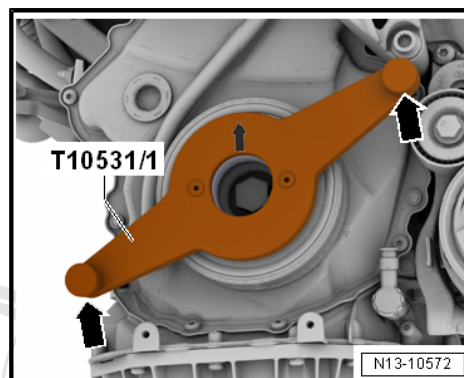
- Unscrew flange nut -A- and loosen tensioning bolt -B-.
- Unscrew clamping pin and remove with turning-over tool .



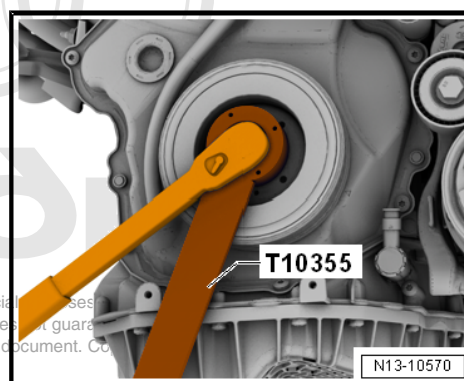
- Screw in new bolt for vibration damper with lubricated O-ring -1- hand-tight.



- Remove knurled screws -arrows- and detach support - T10531/1- .



- Tighten bolt for vibration damper using counterhold tool - T10355- .



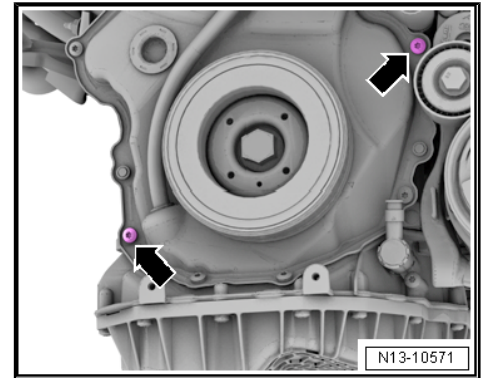
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- Screw in new securing bolts -arrows-.
- Install poly V-belt ⇒ [page 43](#) .
- Install radiator fan control unit - J293- ⇒ [page 277](#) .

Tightening torques

- ◆ ⇒ [“1.1 Exploded view - cylinder block \(pulley end\)”, page 38](#)
- ◆ ⇒ [“1.1 Exploded view - timing chain cover”, page 87](#)

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1.5 Removing and installing bracket for ancillaries

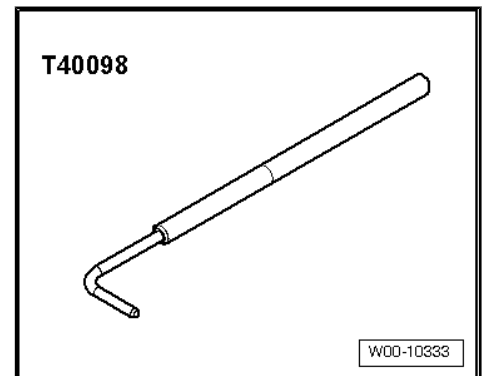
⇒ [“1.5.1 Removing and installing bracket for ancillaries - vehicles with hydraulic power steering”, page 53](#)

⇒ [“1.5.2 Removing and installing bracket for ancillaries - vehicles with electromechanical power steering”, page 56](#)

1.5.1 Removing and installing bracket for ancillaries - vehicles with hydraulic power steering

Special tools and workshop equipment required

- ◆ Locking tool - T40098-





Removing

- Drain coolant ⇒ [page 247](#) .

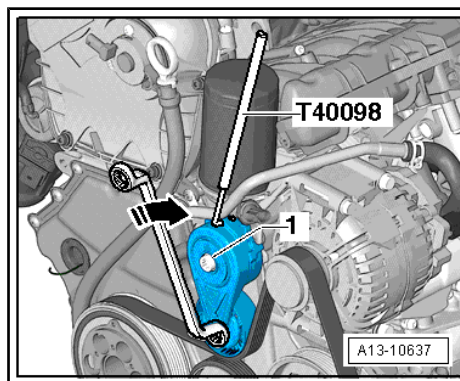


Caution

Wrong direction of rotation for a used poly V-belt can lead to irreparable damage.

- ◆ *Before removing the poly V-belt mark the direction of rotation with chalk or a felt-tip pen for re-installation.*

- To slacken poly V-belt turn tensioner in direction of -arrow-.
- Lock tensioner with locking tool - T40098- .
- Take off poly V-belt.
- Remove bolt -1- and take off tensioner for poly V-belt from bracket for ancillaries.



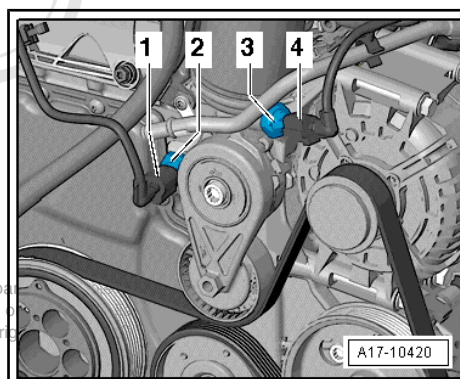
Note

Place a cloth underneath bracket for ancillaries to catch any escaping oil.

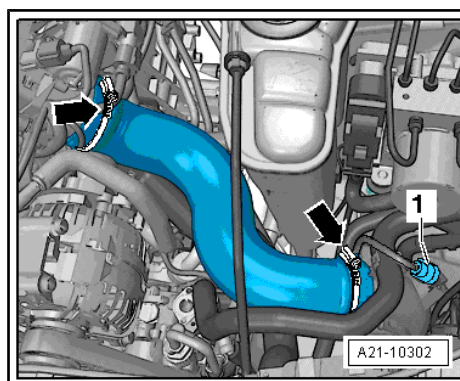
- Unplug electrical connectors -1 and 4- from oil pressure switch - F22- and oil pressure switch for reduced oil pressure - F378- .



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- Release hose clips -arrows- and detach air hose.
- Remove alternator ⇒ Electrical system; Rep. gr. 27 ; Alternator; Removing and installing alternator .



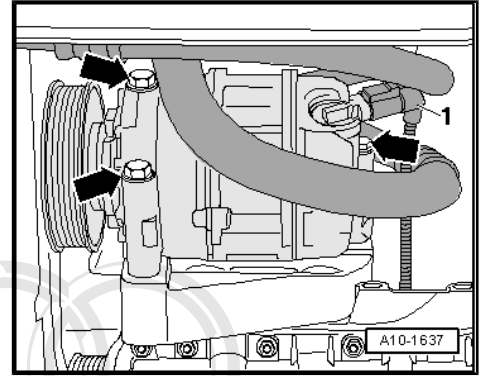
- Unplug electrical connector -1- for magnetic clutch on air conditioner compressor.



WARNING

Risk of injury caused by refrigerant.

- ◆ *The air conditioner refrigerant circuit must not be opened.*



- Remove bolts -arrows- for air conditioner compressor.



Caution

Danger of damage to refrigerant lines and hoses.

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

- Tie up air conditioner compressor together with refrigerant hoses to longitudinal member (refrigerant hoses remain connected).



Note

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Leave hydraulic lines of power steering pump connected.

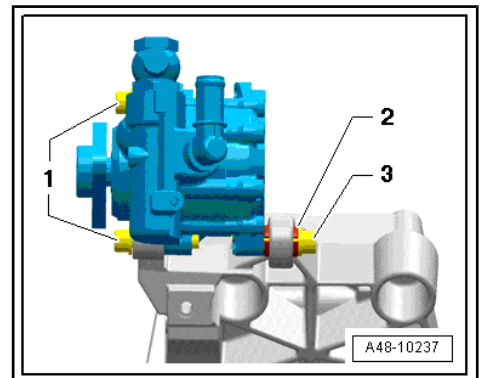
- Remove bolts -1- from front (through pulley); remove bolt -2- from rear.



Note

Illustration shows power steering pump without pulley and hydraulic lines.

- Place power steering pump on longitudinal member with hydraulic lines attached.
- Remove oil filter: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .





- Remove bolt -arrow- for dipstick guide tube.
- Unscrew bolts -1 ... 5- and detach bracket for ancillaries from coolant pump housing.

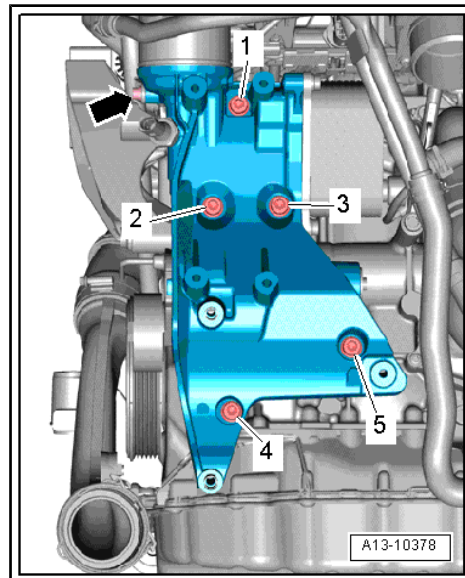
Installing

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

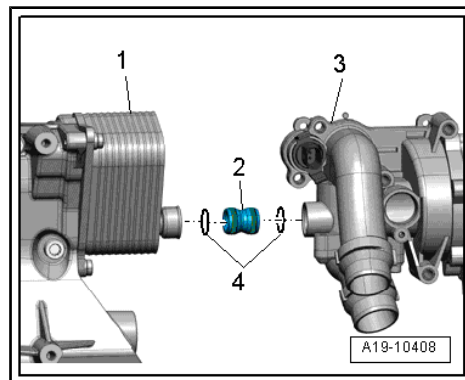


Note

- ◆ Renew the bolts tightened with specified tightening angle.
- ◆ Renew O-rings and gaskets.



- Lubricate O-rings -4- with coolant additive, for coolant additive refer to ⇒ Electronic parts catalogue .
- Insert connection -2- into coolant pump housing -3-.
- Push bracket for ancillaries -1- onto connection, fit bolts and tighten; tightening sequence ⇒ [page 40](#) .
- Install power steering pump ⇒ Running gear, axles, steering; Rep. gr. 48 ; Hydraulic power steering; Removing and installing power steering pump .
- Install air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket .
- Install alternator ⇒ Electrical system; Rep. gr. 27 ; Alternator; Removing and installing alternator .
- Install poly V-belt tensioner ⇒ [page 46](#) .



Note

Do not reuse coolant.

- Fill up with coolant ⇒ [page 249](#) .
- Check oil level: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .

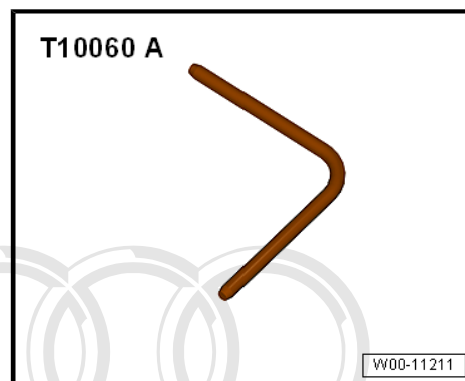
Tightening torques

- ◆ ⇒ ["1.1.1 Exploded view - cylinder block \(pulley end\), vehicles with hydraulic power steering"](#), [page 38](#)

1.5.2 Removing and installing bracket for ancillaries - vehicles with electromechanical power steering

Special tools and workshop equipment required

◆ Locking pin - T10060 A-



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.*

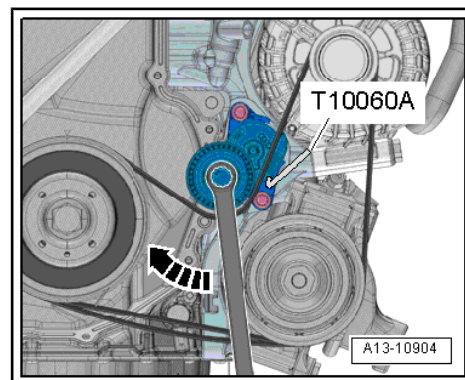
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- Drain coolant ⇒ [page 247](#) .

! Caution

Wrong direction of rotation for a used poly V-belt can lead to irreparable damage.

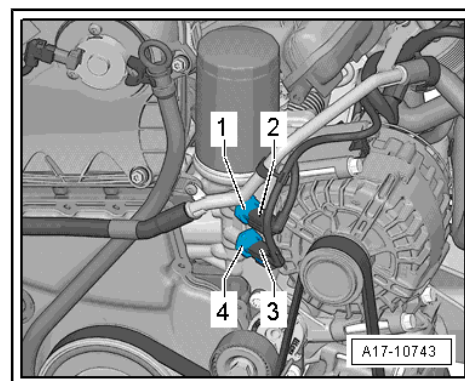
- ◆ *Before removing the poly V-belt mark the direction of rotation with chalk or a felt-tip pen for re-installation.*



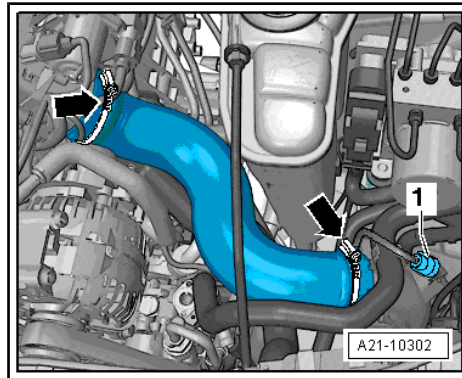
- To slacken poly V-belt turn tensioner in direction of -arrow-.
- Lock tensioner with locking pin - T10060 A- .
- Take off poly V-belt.
- Unplug electrical connectors -2 and 3- from oil pressure switch - F22- and oil pressure switch for reduced oil pressure - F378- .

i Note

Disregard items -1 and 4-.



- Open hose clips -arrows- and detach air hose.
- Unplug electrical connector for charge pressure sender - G31- item 1- and move electrical wiring clear.



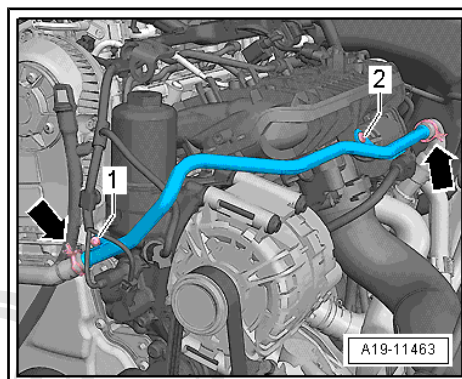
- Unscrew bolts -1- and -2- and swivel coolant pipe (left-side) upwards.



Note

Disregard -arrows-.

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



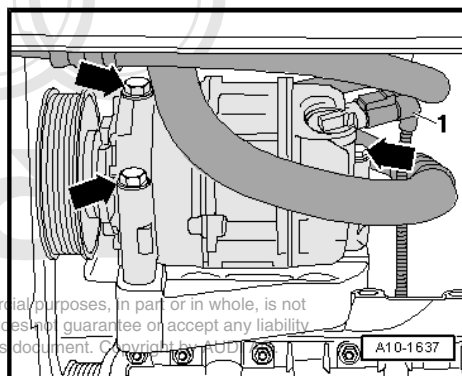
- Unplug electrical connector -1- for magnetic clutch on air conditioner compressor.



WARNING

Risk of injury caused by refrigerant.

- ◆ *The air conditioner refrigerant circuit must not be opened.*



- Remove bolts -arrows- for air conditioner compressor



Caution

Danger of damage to refrigerant lines and hoses.

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

- Tie up air conditioner compressor together with refrigerant hoses to longitudinal member (refrigerant hoses remain connected).
- Remove oil filter: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .

 **Note**

Place a cloth underneath bracket for ancillaries to catch any escaping oil.

- Unscrew bolts -1 ... 5- and detach bracket for ancillaries from coolant pump housing.

Installing

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

 **Note**

- ◆ Renew the bolts tightened with specified tightening angle.
- ◆ Renew O-rings and gaskets.

- Lubricate O-rings -4- with coolant additive, for coolant additive refer to ⇒ Electronic parts catalogue .
- Insert connection -2- into coolant pump housing -3-.
- Push bracket for ancillaries -1- onto connection, fit bolts and tighten; tightening sequence ⇒ [page 42](#) .
- Install air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket .
- Install alternator ⇒ Electrical system; Rep. gr. 27 ; Alternator; Removing and installing alternator .
- Install coolant pipe (left-side) ⇒ [page 267](#) .
- Install poly V-belt ⇒ [page 44](#) .

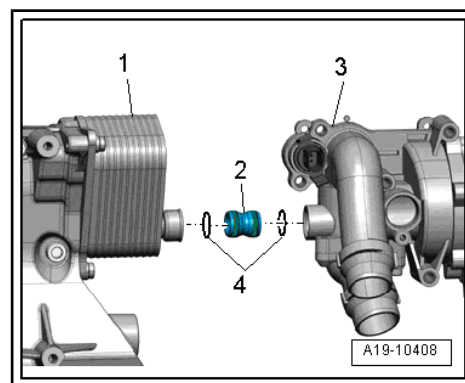
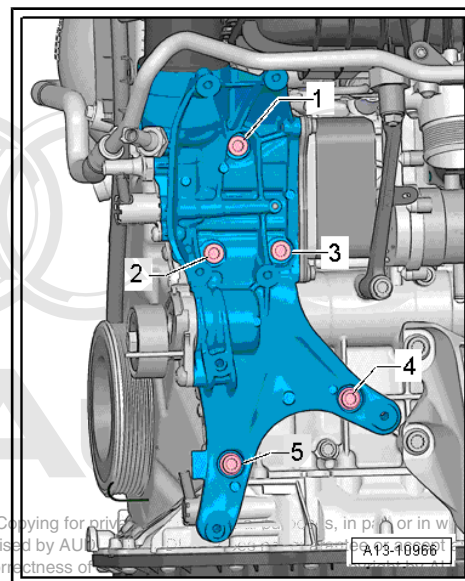
 **Note**

Do not reuse coolant.

- Fill up with coolant ⇒ [page 249](#) .
- Install oil filter and check oil level: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .

Tightening torques

- ◆ ⇒ [“1.1.2 Exploded view - cylinder block \(pulley end\), vehicles with electromechanical power steering”, page 41](#)



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2 Cylinder block (gearbox end)

⇒ "2.1 Exploded view - cylinder block (gearbox end)", page 60

⇒ "2.2 Removing and installing drive plate", page 61

⇒ "2.3 Removing and installing sealing flange (gearbox end)", page 62

⇒ "2.4 Renewing needle bearing in drive plate", page 64

2.1 Exploded view - cylinder block (gearbox end)

1 - Cylinder block

2 - Sealing flange with oil seal

- Renew
- Removing and installing
⇒ page 62
- Do not lubricate/grease sealing lip of oil seal
- Before installing, remove oil residue from crankshaft journal with a clean cloth

3 - Bolt

- Tightening sequence with 8 bolts
⇒ page 61
- Tightening sequence with 6 bolts
⇒ page 61

4 - Drive plate

- Lock with counterhold tool - 10 - 201- to slacken off securing bolts

5 - Bolt

- 60 Nm + 90°
- Renew

6 - Needle bearing

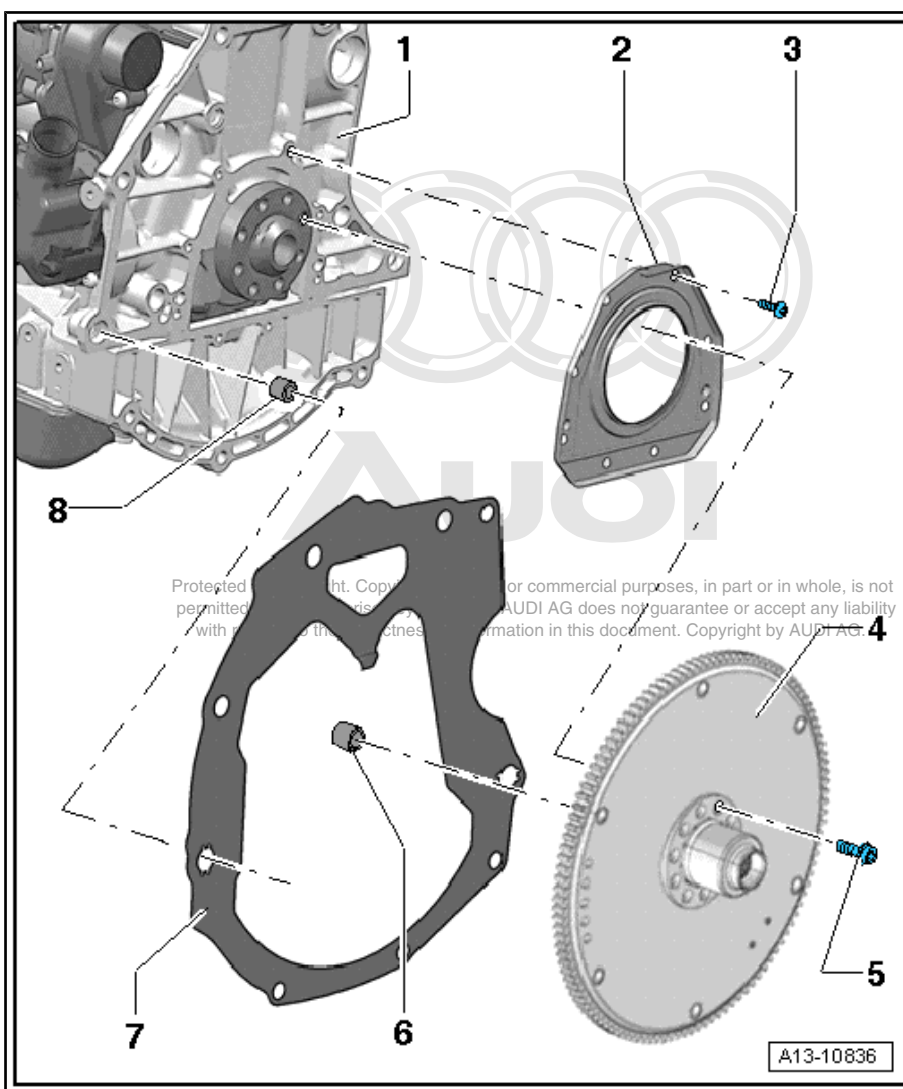
- For vehicles with manual gearbox
- Removing and installing needle bearing
⇒ page 64

7 - Intermediate plate

- Must be positioned on dowel sleeves
- Do not damage/bend when assembling
- Is fitted onto sealing flange ⇒ page 61

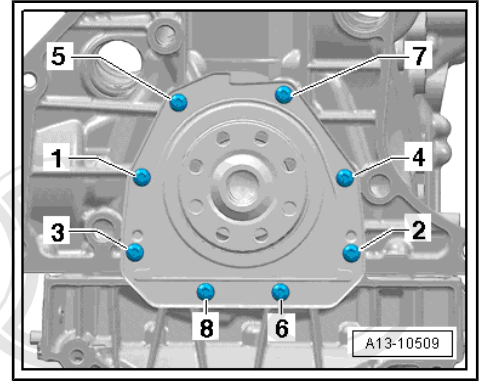
8 - Dowel sleeve

- 2x



Sealing flange (gearbox end) - tightening sequence with 8 bolts

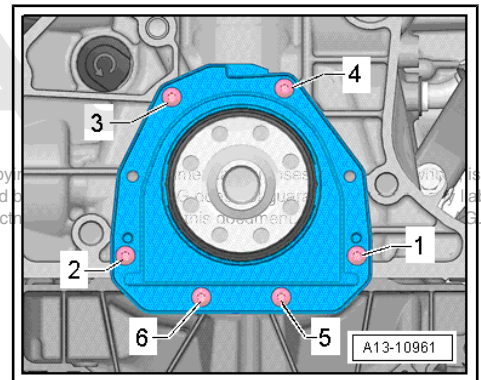
- Tighten new bolts -1 to 8- in the sequence shown:
- 1. Screw in bolts hand-tight.
- 2. Tighten bolts to 9 Nm.



Sealing flange (gearbox end) - tightening sequence with 6 bolts

- Tighten new bolts -1 to 6- in the sequence shown:
- 1. Screw in bolts hand-tight.
- 2. Tighten bolts to 4 Nm + turn 45° further.

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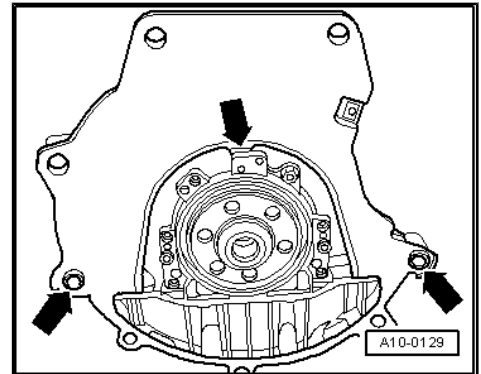


Note

Only 6 bolts are fitted; 2 bolt holes remain free.

Installing intermediate plate

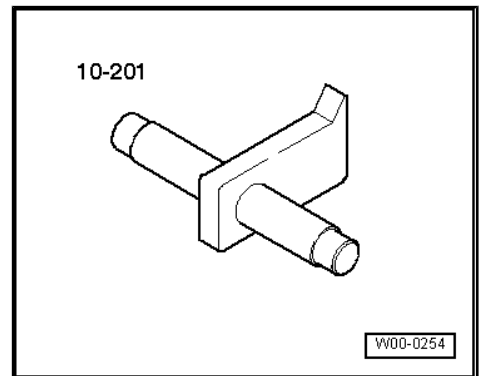
- Fit intermediate plate on sealing flange and push onto dowel sleeves -arrows-.



2.2 Removing and installing drive plate

Special tools and workshop equipment required

- ◆ Counterhold tool - 10 - 201-





Removing

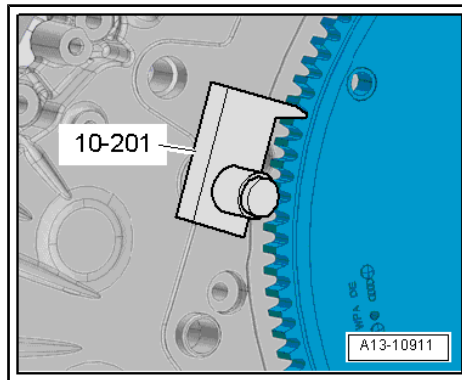
- Gearbox removed
- Insert counterhold tool - 10 - 201- to slacken bolts.



Caution

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

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



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

Installing

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



Note

- ◆ *Renew bolts for drive plate.*
- ◆ *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 64](#) .*
- Pay attention to dowel pin when installing drive plate.
- Fit counterhold tool - 10 - 201- the other way round to tighten bolts.

Tightening torques

- ◆ => ["2.1 Exploded view - cylinder block \(gearbox end\)", page 60](#)

2.3 Removing and installing sealing flange (gearbox end)

Special tools and workshop equipment required

- ◆ Assembly sleeve - T20097



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

Removing

- Gearbox removed

- Remove drive plate ⇒ [page 61](#) .
- Remove bolts -1 ... 8-. (Some versions may only have six bolts.)
- Release sealing flange from bonded joint.

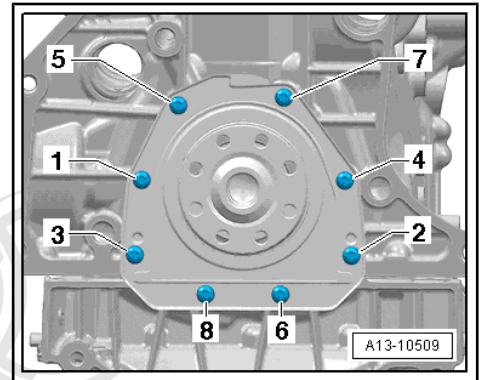
Installing

- ◆ Silicone sealant: ⇒ Electronic parts catalogue .

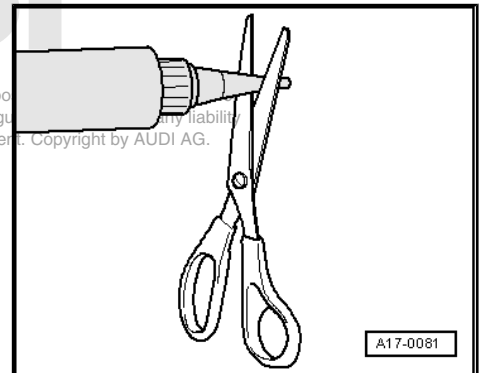
Note

- ◆ *Note the expiry date of the silicone sealant.*
- ◆ *The sealing flange must be installed within 5 minutes after applying silicone sealant.*

- Remove sealant remaining on cylinder block with flat scraper.
- Cut off nozzle of tube at front marking (∅ of nozzle approx. 2 mm).



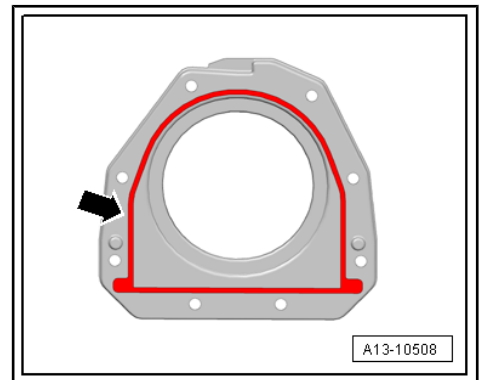
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- Apply silicone sealant onto clean sealing surface of new cover, as illustrated.
- ◆ Thickness of sealant bead: 2 ... 3 mm.

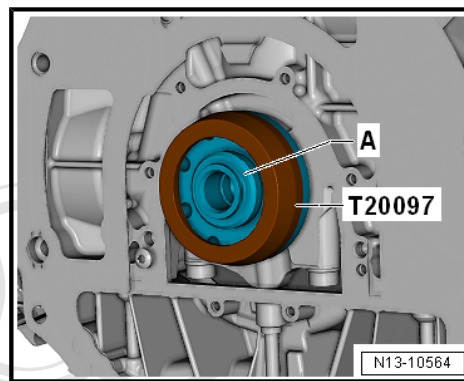
Note

- ◆ *The sealing flange must be installed within 5 minutes after applying silicone sealant.*
- ◆ *The bead of sealant must not be thicker than specified, otherwise excess sealant can enter the sump and obstruct the strainer in the oil intake pipe.*





- Fit guide sleeve - T20097- onto crankshaft journal -A-.
- Push sealing flange over guide sleeve - T20097- onto crankshaft journal and tighten bolts; tightening sequence:
- ◆ Cover with 8 bolts
⇒ Fig. [“Sealing flange \(gearbox end\) - tightening sequence with 8 bolts”](#), page 61
- ◆ Cover with 6 bolts
⇒ Fig. [“Sealing flange \(gearbox end\) - tightening sequence with 6 bolts”](#), page 61
- After installing sealing flange, wait about 30 minutes for sealant to dry. Then (and only then) fill the engine with engine oil.



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

- Install drive plate ⇒ [page 61](#) .
- Check oil level: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .

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Tightening torques

- ◆ Cover with 8 bolts
⇒ Fig. [“Sealing flange \(gearbox end\) - tightening sequence with 8 bolts”](#), page 61
- ◆ Cover with 6 bolts
⇒ Fig. [“Sealing flange \(gearbox end\) - tightening sequence with 6 bolts”](#), page 61
- ◆ Tightening torques
⇒ [“2.1 Exploded view - cylinder block \(gearbox end\)”](#), page 60

2.4 Renewing needle bearing in drive plate

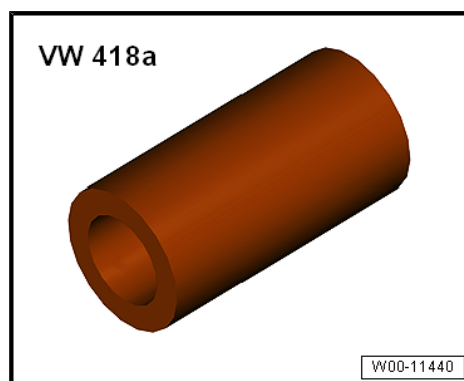


Note

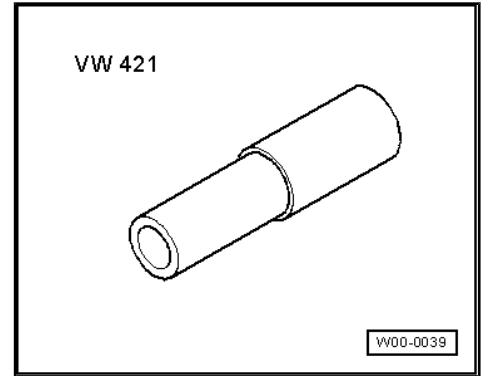
A needle bearing is fitted in the drive plate only on vehicles with manual gearbox.

Special tools and workshop equipment required

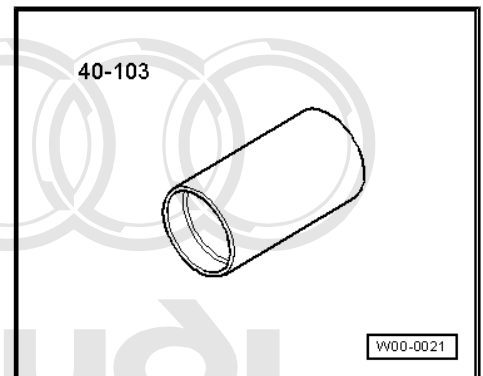
- ◆ Tube - VW 418 A-



◆ Tube - VW 421-



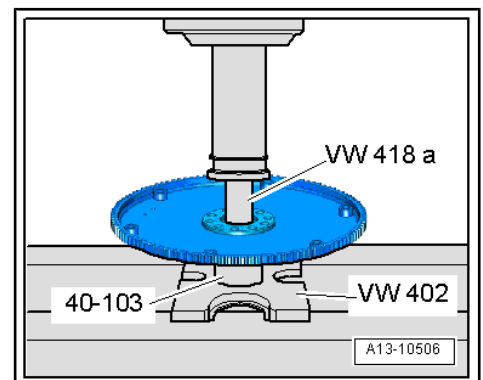
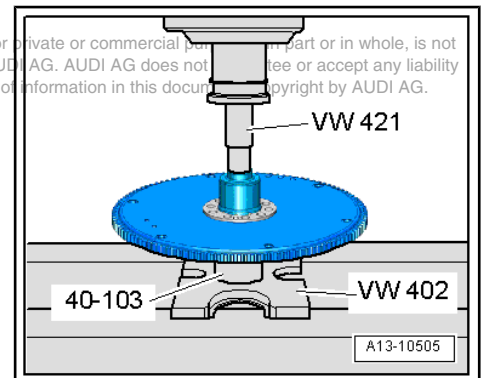
◆ Support - 40-103-



Procedure

- Gearbox removed
- Remove drive plate ⇒ [page 61](#) .
- Place support - 40-103- under drive plate when pressing out and pressing in needle bearing.
- Use tube - VW 421- and workshop press and press out needle bearing.
- Smaller diameter of tube -VW 421- faces drive plate.
- Carefully press in needle bearing as far as stop, using tube - VW 418 A- and workshop press.
- Installation position: closed side of needle bearing faces engine.
- Install drive plate ⇒ [page 61](#) .

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3 Crankshaft

- ⇒ [“3.1 Exploded view - crankshaft”, page 66](#)
- ⇒ [“3.2 Crankshaft dimensions”, page 67](#)
- ⇒ [“3.3 Allocation of main bearing shells”, page 68](#)
- ⇒ [“3.4 Measuring axial clearance of crankshaft”, page 69](#)
- ⇒ [“3.5 Measuring radial clearance of crankshaft”, page 70](#)
- ⇒ [“3.6 Removing and installing sender wheel”, page 70](#)

3.1 Exploded view - crankshaft



Note

Secure engine to engine and gearbox support - VAS 6095- when dismantling/assembling engine ⇒ [page 23](#) .

1 - Cylinder block

2 - Bearing shell for cylinder block

- With oil groove
- Lubricate
- Renew used bearing shells
- Classification of crankshaft bearing shells ⇒ [page 68](#)

3 - Crankshaft

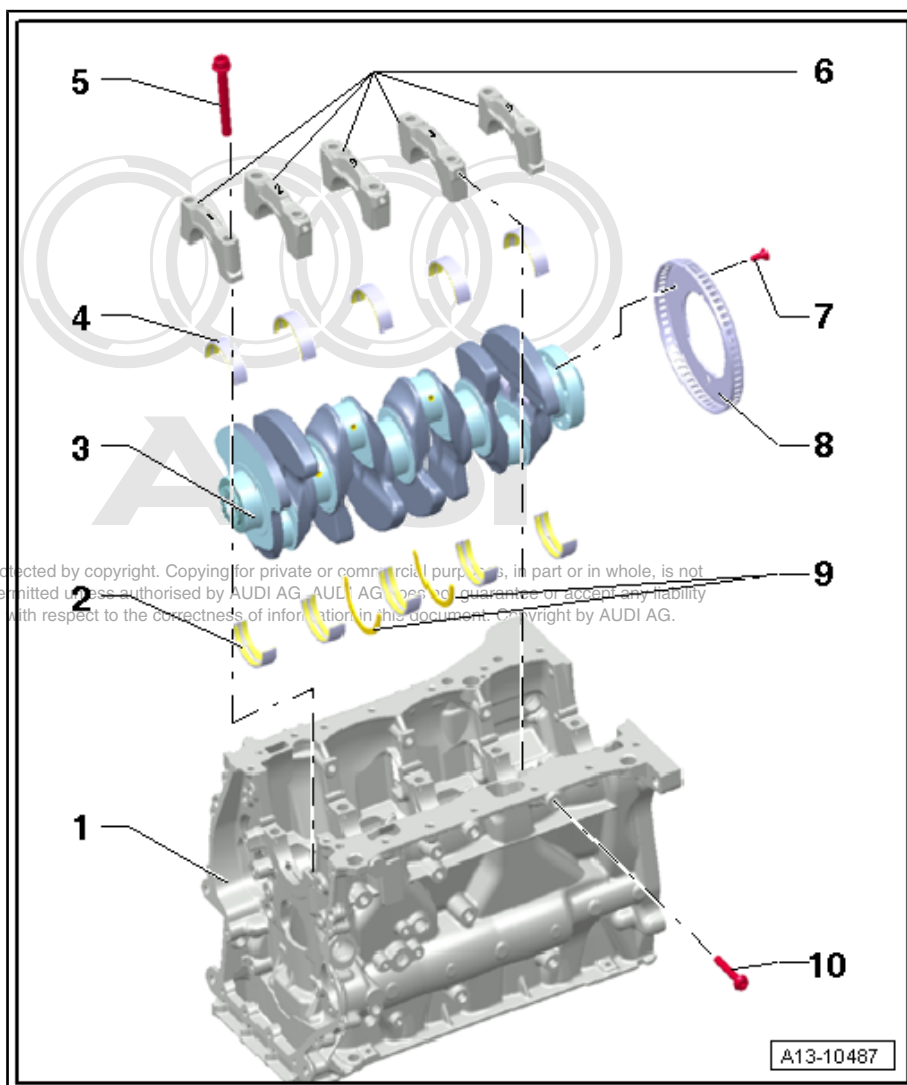
- After removing, place it down so that the sender wheel does not become damaged ⇒ [Item 8 \(page 67\)](#)
- If crankshaft is renewed new bearing shells must be assigned to bearing caps ⇒ [page 68](#)
- Measuring axial clearance ⇒ [page 69](#)
- Measuring radial clearance ⇒ [page 70](#)
- Crankshaft dimensions ⇒ [page 67](#)

4 - Bearing shell for bearing cap

- Without oil groove
- Lubricate
- Renew used bearing shells
- Classification of crankshaft bearing shells ⇒ [page 68](#)

5 - Bolt

- Renew



- Use old bolts when measuring radial clearance
- Tightening sequence ⇒ [page 67](#)

6 - Bearing caps

- Bearing cap 1: Pulley end
- Bearing shell retaining lugs (cylinder block/bearing cap) must be on the same side

7 - Bolt

- Renew
- Sender wheel must be renewed if bolts are loosened ⇒ [page 70](#)
- 10 Nm + turn 90° further

8 - Sender wheel

- For engine speed sender - G28-
- Can only be installed in one position. Holes are off-set
- Sender wheel must be renewed if bolts are loosened
- Removing and installing ⇒ [page 70](#)

9 - Thrust washers

- Lubricate
- For bearing No. 3

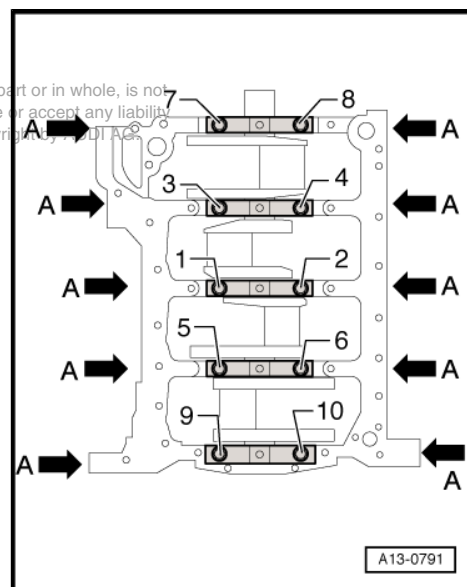
10 - Bolt

- Renew
- Tightening sequence ⇒ [page 67](#)

Crankshaft - tightening sequence

– Tighten crankshaft bolts in the sequence -1 ... 5- as follows:

1. Screw in bolts -1...10- and -arrows A- hand-tight.
2. Initially tighten bolts -1 ... 10- to 65 Nm.
3. Turn bolts -1 ... 10- 90° further using a rigid wrench.
4. Initially tighten bolts -arrows A- to 20 Nm.
5. Turn bolts -arrows A- 90° further using a rigid wrench.



3.2 Crankshaft dimensions

(in mm)

Honing dimension 1)	Crankshaft main bearing journal Ø	Conrod journal Ø
Basic dimension	58.00	47.80

1) There is currently no provision for machining used crankshafts.

3.3 Allocation of main bearing shells

Bearing shells of the correct thickness are allocated to the cylinder block at the factory. Coloured dots are used to identify the thickness of the bearing shells.

Letter codes on lower sealing surface or end of cylinder block indicate which bearing shell is to be fitted in cylinder block (top bearing shell) at each location.

Letter codes on crankshaft indicate which bearing shell is to be fitted in bearing cap (bottom bearing shell).

The first letter stands for bearing cap 1, the second letter for bearing cap 2, etc.

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Marking on bearing shell for cylinder block:

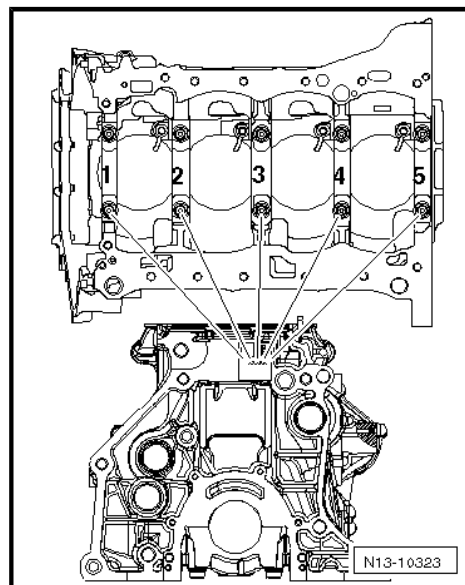
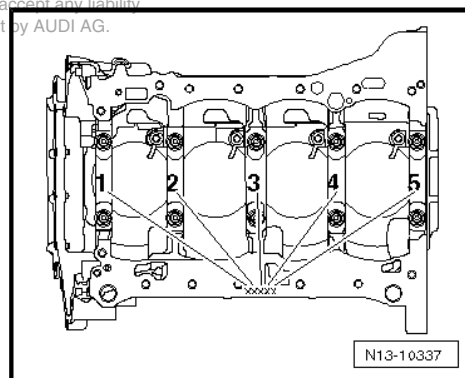


Note

Markings on cylinder block are applied either onto sealing surface for sump or gearbox end of cylinder block.

Marking on cylinder block refers to top bearing shell (bearing shell for cylinder block).

- Note down letters and refer to table for colour code to be fitted.

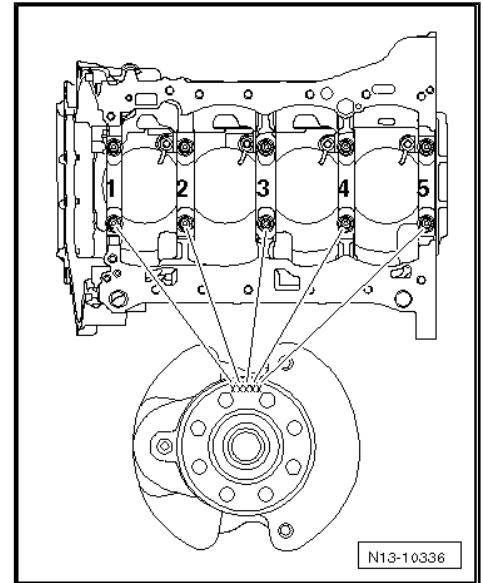


Marking on bearing shell for bearing cap:

Marking on crankshaft refers to bottom bearing shell (bearing shell for bearing cap).

- Note down letters and refer to table for colour code to be fitted.

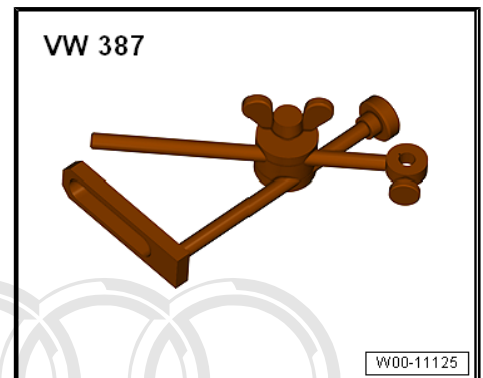
S	=	Black
R	=	Red
G	=	Yellow
B	=	Blue
W	=	White



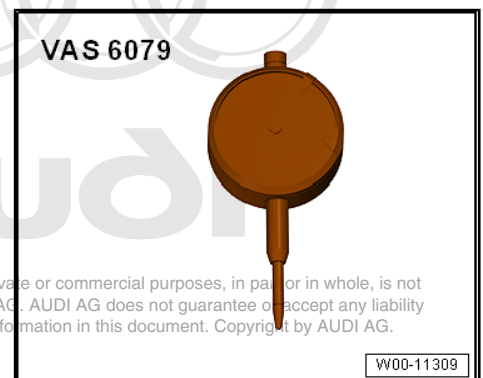
3.4 Measuring axial clearance of crankshaft

Special tools and workshop equipment required

- ◆ Universal dial gauge bracket - VW 387-



- ◆ Dial gauge - VAS 6079-



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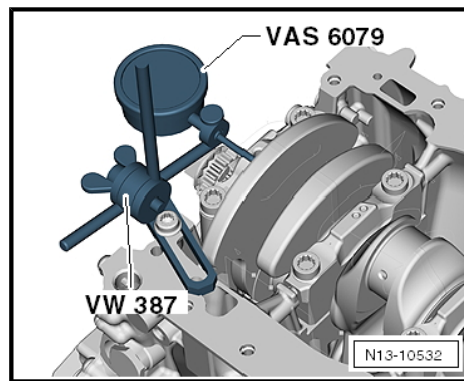


Procedure

- Bolt dial gauge - VAS 6079- with universal dial gauge bracket - VW 387- onto cylinder block and set it against crank web.
- Push crankshaft against dial gauge by hand and set gauge to "0".
- Push crankshaft away from dial gauge and read off value.

Axial clearance:

- New: 0.070 ... 0.231 mm.
- Wear limit: 0.30 mm.



3.5 Measuring radial clearance of crankshaft

Special tools and workshop equipment required

- ◆ Plastigage

Procedure

Note

- ◆ Do not interchange used bearings.
- ◆ Bearing shells worn down to nickel layer must be renewed.
- Remove crankshaft bearing caps and clean bearing caps and journals.
- Place a length of Plastigage corresponding to the width of the bearing on the bearing journal or bearing shell.
- The Plastigage must be positioned in the centre of the bearing shell.
- Fit crankshaft bearing caps and secure with old bolts -1 ... 10- => [page 67](#) without rotating crankshaft.

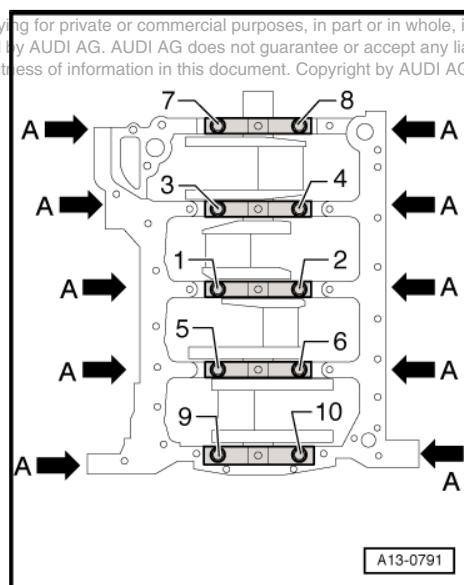
Note

Disregard bolts indicated by -arrows A-.

- Remove crankshaft bearing caps again.
- Compare width of Plastigage with measurement scale.

Radial clearance:

- New: 0.017 ... 0.037 mm.
- Wear limit: 0.15 mm.
- When carrying out final assembly, renew bolts.



3.6 Removing and installing sender wheel

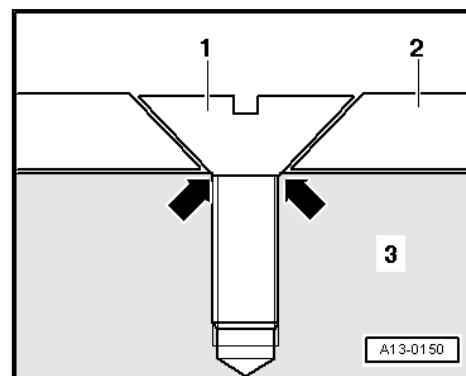
Procedure

- Remove engine.
- Remove sealing flange (gearbox end) => [page 62](#) .

- Remove sump (top section) ⇒ [page 227](#) .
- Remove drive chain for balance shaft ⇒ [page 112](#) .
- Unbolt conrod bearing caps.
- Remove crankshaft bearing caps.
- Remove crankshaft and unbolt sender wheel.
- Sender wheel -2- must always be renewed after slackening off bolts -1-.

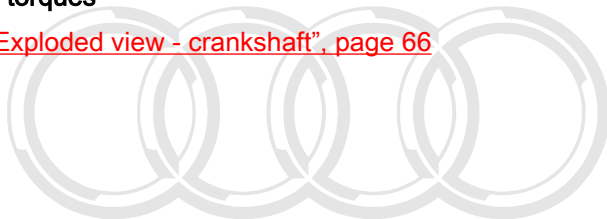
 **Note**

- ◆ *If the countersunk bolts are tightened a second time, the seats for the bolt heads in the sender wheel will be deformed to such an extent that the bolt heads make contact with the crankshaft -3- -arrows- and the sender wheel beneath the bolts will be loose.*
 - ◆ *Sender wheel can only be fitted in one position because holes are offset.*
- After renewing sender wheel, misfire adaptations must be reset. To do so, select **01 - Reset adaptations misfires** in **Guided Functions** mode of ⇒ Vehicle diagnostic tester.



Tightening torques

- ◆ ⇒ [“3.1 Exploded view - crankshaft”, page 66](#)



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4 Balance shaft

⇒ "4.1 Exploded view - balance shaft", page 72

⇒ "4.2 Removing and installing balance shaft", page 73

⇒ "4.3 Renewing oil seal for balance shaft (inlet side)", page 79

4.1 Exploded view - balance shaft

1 - Bolt

- Renew
- 9 Nm

2 - Balance shaft

- Inlet side
- Always renew after removal
- Lubricate bearing with engine oil
- Renewing ⇒ [page 73](#)

3 - Balance shaft

- Exhaust side
- Always renew after removal
- Lubricate bearing with engine oil
- Renewing ⇒ [page 76](#)

4 - Bolt

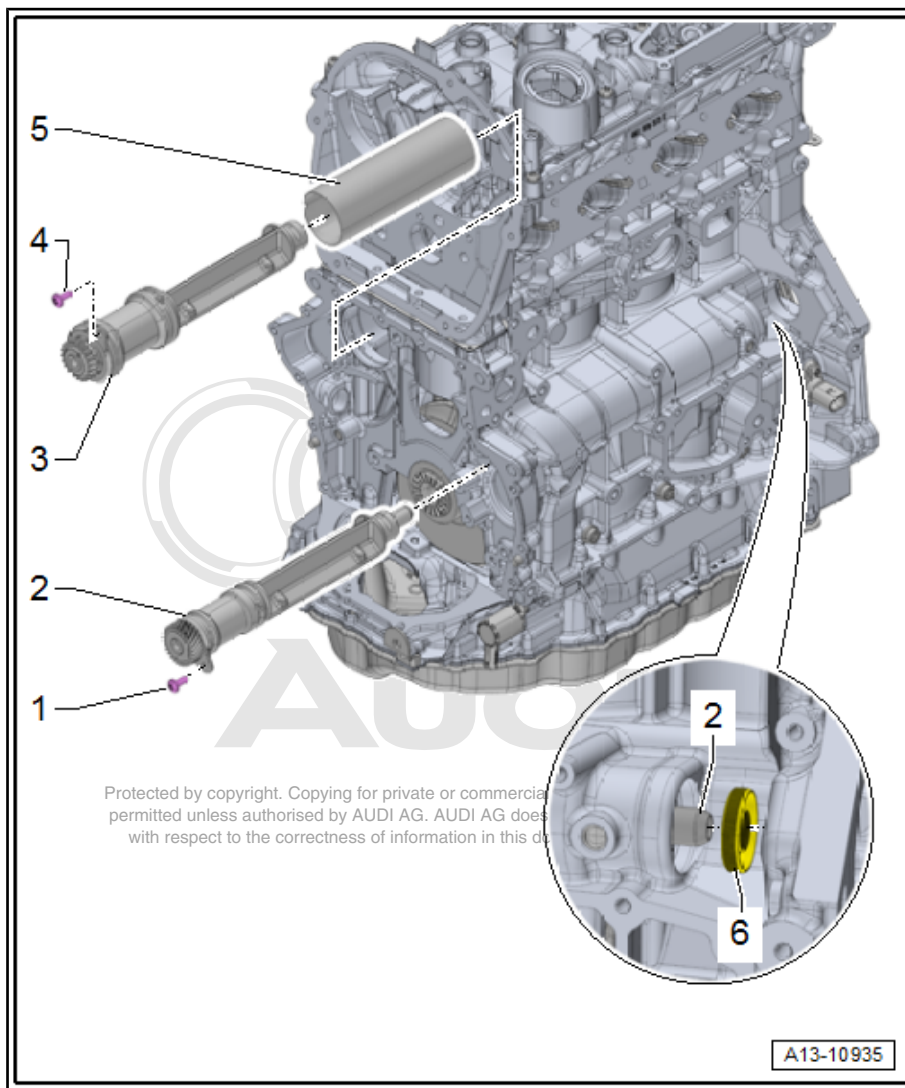
- Renew
- 9 Nm

5 - Tube for balance shaft

- Installation position ⇒ [page 72](#)

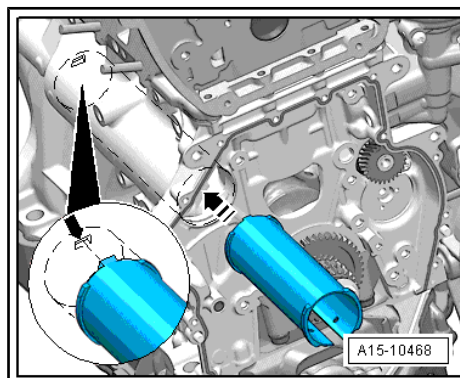
6 - Oil seal for balance shaft (inlet side)

- Renewing ⇒ [page 79](#)



Tube for balance shaft - installation position

- Lug on tube for balance shaft must engage in slot -arrow-.



4.2 Removing and installing balance shaft

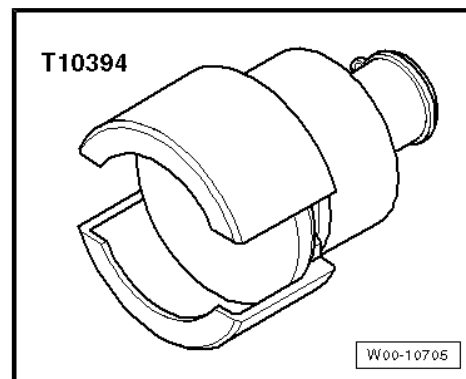
⇒ [“4.2.1 Removing and installing balance shaft \(inlet side\)”, page 73](#)

⇒ [“4.2.2 Removing and installing balance shaft \(exhaust side\)”, page 76](#)

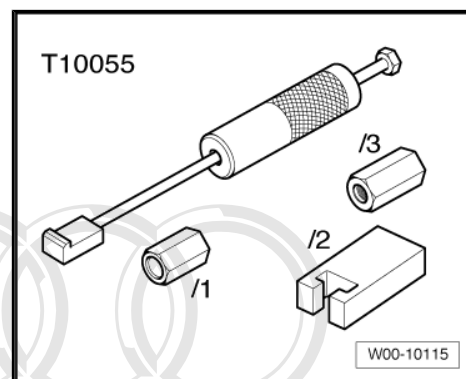
4.2.1 Removing and installing balance shaft (inlet side)

Special tools and workshop equipment required

◆ Puller - T10394-



◆ Puller - T10055-



Removing



Note

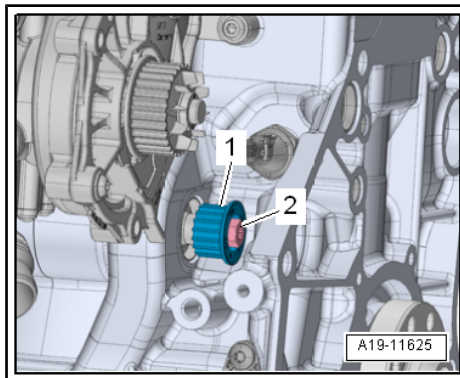
Always renew balance shaft for inlet camshaft after removal.

- Remove toothed belt for coolant pump ⇒ [page 259](#).
- Remove timing chain cover (top) ⇒ [page 89](#).
- Remove timing chain cover (bottom) ⇒ [page 89](#).
- Remove camshaft timing chain ⇒ [page 103](#).
- Remove drive chain for balance shaft ⇒ [page 112](#).

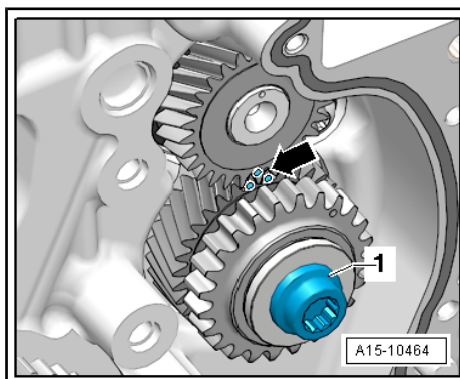
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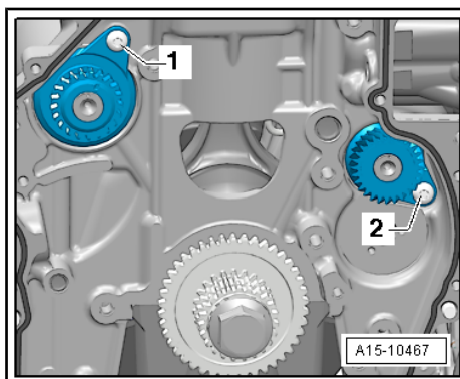
- Unscrew bolt -2- and detach drive sprocket -1- for toothed belt for coolant pump.



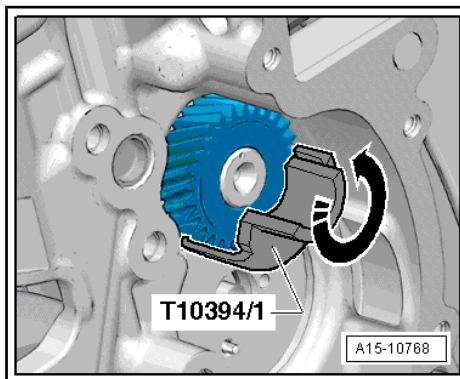
- Remove idler gear -1-.



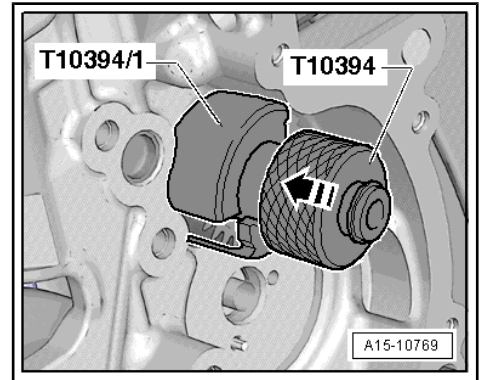
- Remove bolt -2- securing balance shaft for inlet camshaft.



- Insert half shell - T10394/1- of puller - T10394- and turn upwards in direction of arrow.



- Insert puller - T10394- and press locking collar in direction of -arrow-.

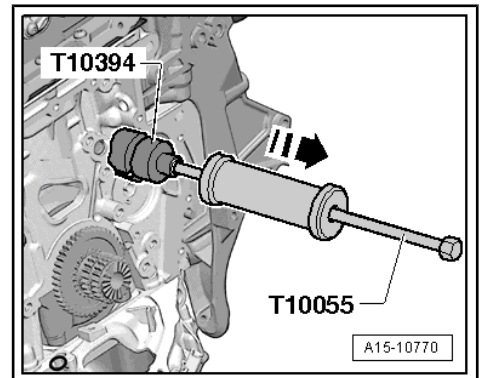


- Screw puller - T10055- into puller - T10394- and knock out balance shaft in direction of -arrow-.

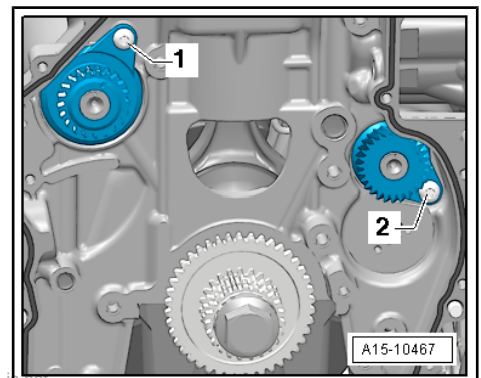
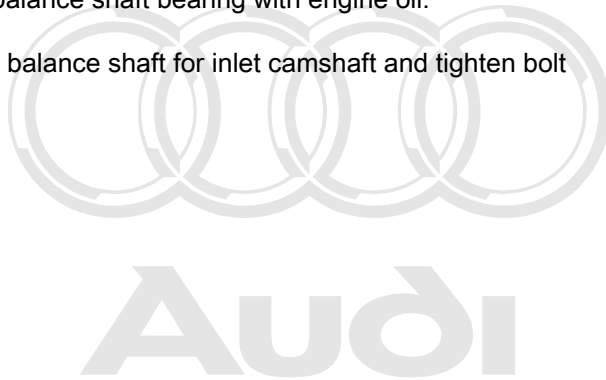
Installing



It might be necessary to cool the balance shaft before installing due to the minimal clearance between balance shaft and cylinder block. Check if it is possible to insert the balance shaft into the cylinder block without applying force. If this is not the case, the balance shaft must be cooled before installing.



- Put new balance shaft for 30 minutes into freezer compartment or spray with chilling agent (commercially available) if necessary.
- Lubricate balance shaft bearing with engine oil.
- Install new balance shaft for inlet camshaft and tighten bolt -2-.



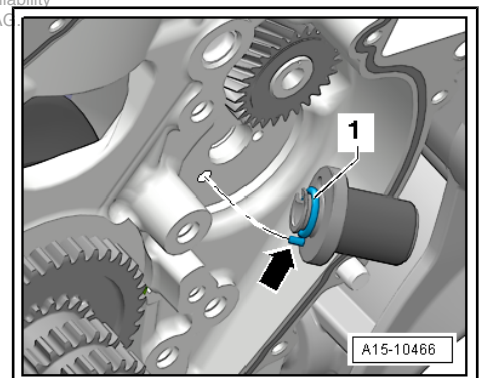
- Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability for errors or omissions in this document. Copyright by AUDI AG.
- Renew O-ring -1- and lubricate with engine oil.
 - Lubricate bearing mounting with engine oil and install; dowel pin -arrow- for bearing mounting must engage in bore in cylinder block.



Caution

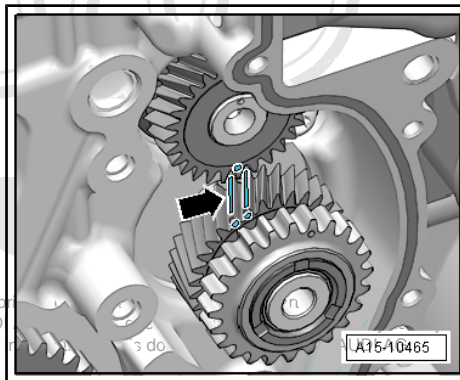
Always renew idler gear. If this is not done, there is no backlash, which causes engine damage.

The new idler gear has a special lubricant coating which wears off after a short running period and thus automatically creates the specified backlash.





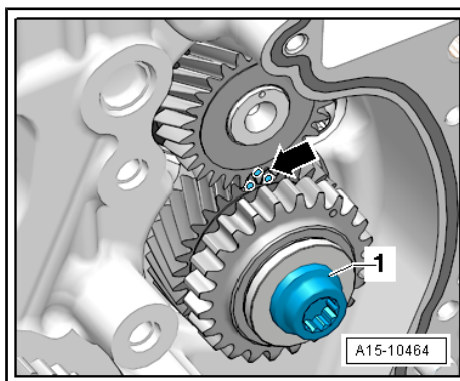
- Mark faces of gear teeth of idler gear with paint marker -arrow-.
- Insert idler gear; marking on balance shaft must be positioned between markings on faces of gear teeth.



- Tighten bolt -1- for idler gear: tightening sequence => [page 98](#) .
- Check markings on idler gear/balance shaft -arrow-.

Further assembly is basically carried out in reverse order of dismantling. Note the following:

- Install drive chain for balance shaft => [page 112](#) .
- Install camshaft timing chain => [page 103](#) .
- Install timing chain cover (bottom) => [page 89](#) .
- Install timing chain cover (top) => [page 89](#) .
- Install poly V-belt tensioner => [page 46](#) .
- Install poly V-belt => [page 43](#) .
- Renew oil seal for balance shaft (inlet side) => [page 79](#) .
- Install toothed belt for coolant pump => [page 259](#) .



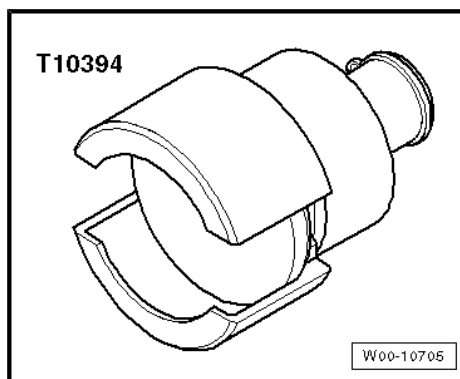
Tightening torques

- ◆ => ["4.1 Exploded view - balance shaft", page 72](#)

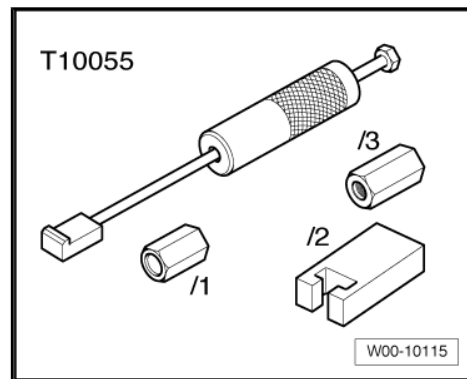
4.2.2 Removing and installing balance shaft (exhaust side)

Special tools and workshop equipment required

- ◆ Puller - T10394-



◆ Puller - T10055-

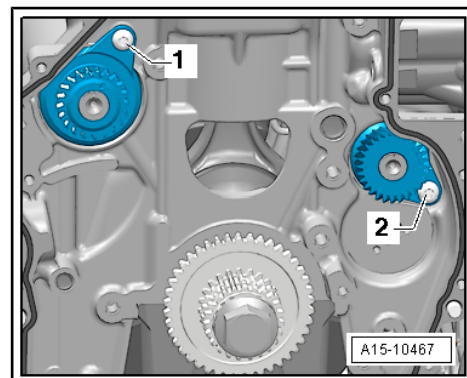


Removing

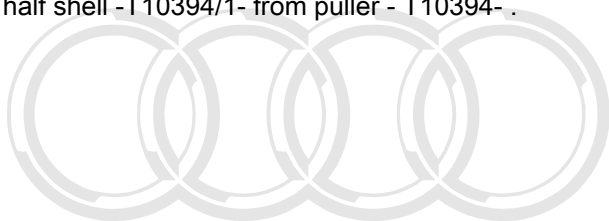
 **Note**

Always renew balance shaft for exhaust camshaft after removal.

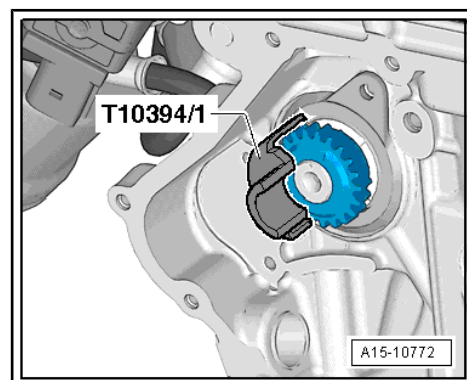
- Remove timing chain cover (top) ⇒ [page 89](#) .
- Remove timing chain cover (bottom) ⇒ [page 89](#) .
- Remove camshaft timing chain ⇒ [page 103](#) .
- Remove drive chain for balance shaft ⇒ [page 112](#) .
- Remove bolt -1- securing balance shaft for outlet camshaft.



- Insert half shell -T10394/1- from puller - T10394-



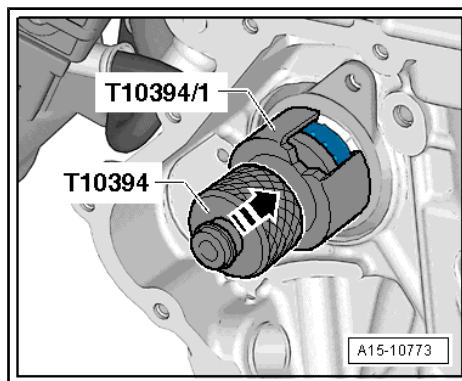
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- Insert puller - T10394- and press locking collar in direction of -arrow-.



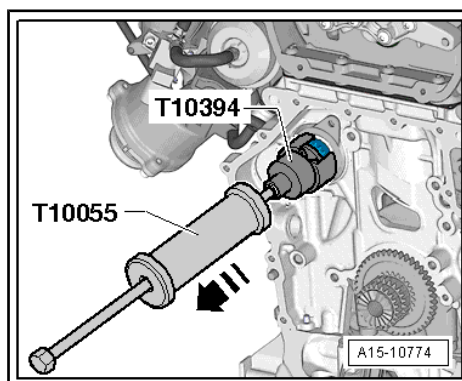
- Screw puller - T10055- into puller - T10394- and knock out balance shaft.

Installing



Note

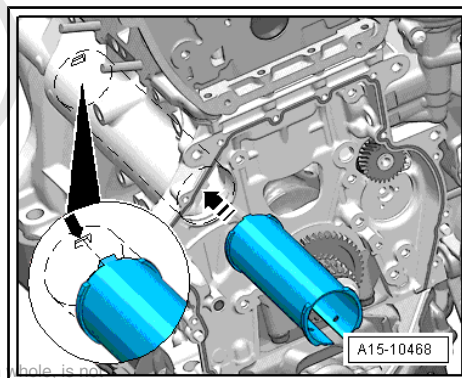
It might be necessary to cool the balance shaft before installing due to the minimal clearance between balance shaft and cylinder block. Check if it is possible to insert the balance shaft into the cylinder block without applying force. If this is not the case, the balance shaft must be cooled before installing.



- Check installation position of tube for balance shaft -arrow-.

Lug -arrow- must engage in slot.

- Put new balance shaft for 30 minutes into freezer compartment or spray with chilling agent (commercially available) if necessary.
- Lubricate balance shaft bearing with engine oil.



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- Install new balance shaft for exhaust camshaft.
- Make sure that balance shaft is in full contact with crankcase before tightening bolt -1-.

 **Note**

Repeat insertion of tube for balance shaft if the balance shaft is not in full contact.

Further assembly is basically carried out in reverse order of dismantling. Note the following:

- Install drive chain for balance shaft ⇒ [page 112](#) .
- Install camshaft timing chain ⇒ [page 103](#) .
- Install timing chain cover (bottom) ⇒ [page 89](#) .
- Install timing chain cover (top) ⇒ [page 89](#) .
- Install poly V-belt tensioner ⇒ [page 46](#) .
- Install poly V-belt ⇒ [page 43](#) .

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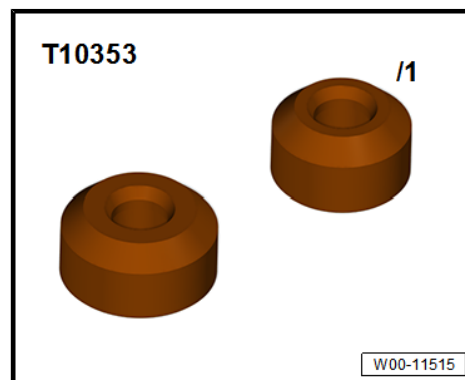
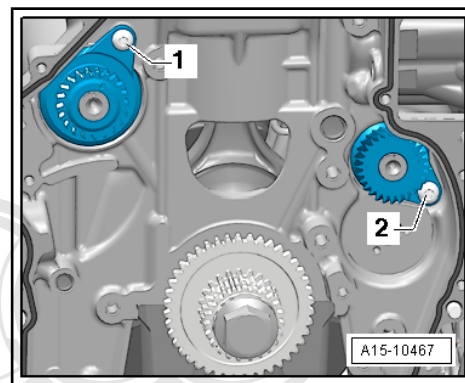
Tightening torques

- ◆ ⇒ ["4.1 Exploded view - balance shaft", page 72](#)

4.3 Renewing oil seal for balance shaft (inlet side)

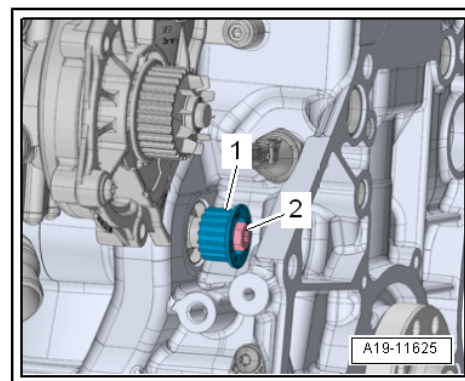
Special tools and workshop equipment required

- ◆ Thrust piece - T10353-



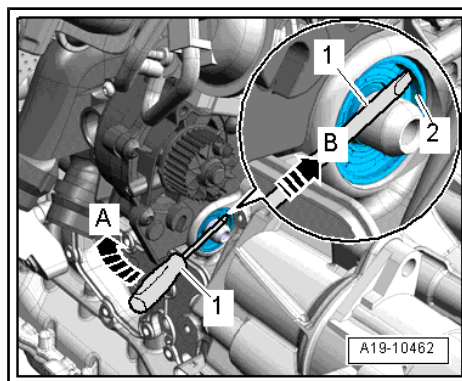
Procedure

- Remove small coolant pipe ⇒ [page 268](#) .
- Remove toothed belt for coolant pump ⇒ [page 259](#) .
- Unscrew bolt -2- and detach drive sprocket -1- for toothed belt for coolant pump.

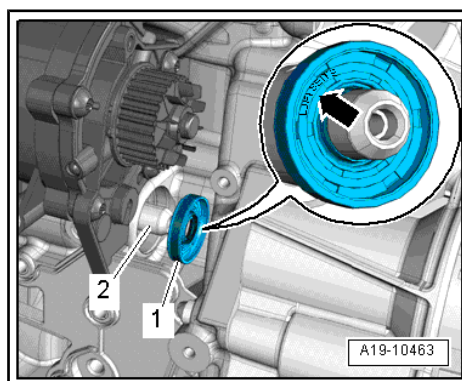




- Press screwdriver -1- firmly onto section -2- of oil seal -arrow B-.
- Lever out oil seal -arrow A-.
- Clean contact surface and sealing surface.



- Lubricate sealing surface of balance shaft -2- with gear oil.
- Fit oil seal -1- onto balance shaft.
- The marking "Luftseite" ("Outside") -arrow- should be legible from the outside.

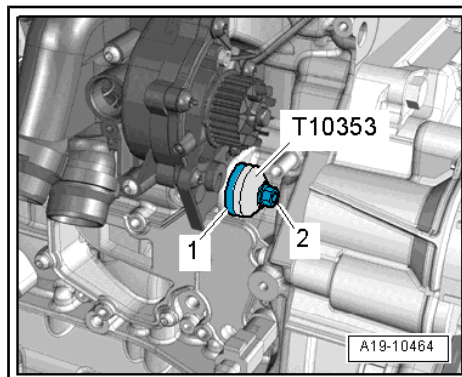


Caution

Risk of damage to thread.

◆ *The drive sprocket bolt has a left-hand thread.*

- Apply thrust piece - T10353- to oil seal -1- and press into cylinder block as far as stop using bolt -2- (take care not to tilt oil seal).
- Install toothed belt for coolant pump => [page 259](#) .
- Install small coolant pipe => [page 268](#) .



Note

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- Fill up with coolant => [page 249](#) .

5 Pistons and conrods

⇒ ["5.1 Exploded view - pistons and conrods"](#), page 81

⇒ ["5.2 Removing and installing pistons"](#), page 82

⇒ ["5.3 Checking pistons and cylinder bores"](#), page 84

⇒ ["5.4 Separating parts of new conrod"](#), page 85

⇒ ["5.5 Checking radial clearance of conrod bearings"](#), page 86

5.1 Exploded view - pistons and conrods

1 - Conrod bolts

- Renew
- Lubricate threads and contact surface
- Use old bolts when measuring radial clearance
- M8: 30 Nm + turn 90° further
- M9: 45 Nm + turn 90° further

2 - Conrod bearing cap

- Note installation position
- Due to the cracking method used to separate the bearing cap from the conrod in manufacture, the caps only fit in one position and only on the appropriate conrod
- Mark cylinder and conrod allocation in colour -A-
- Installation position: Marking -B- faces towards pulley end
- Separating parts of new conrod ⇒ [page 85](#)

3 - Bearing shells

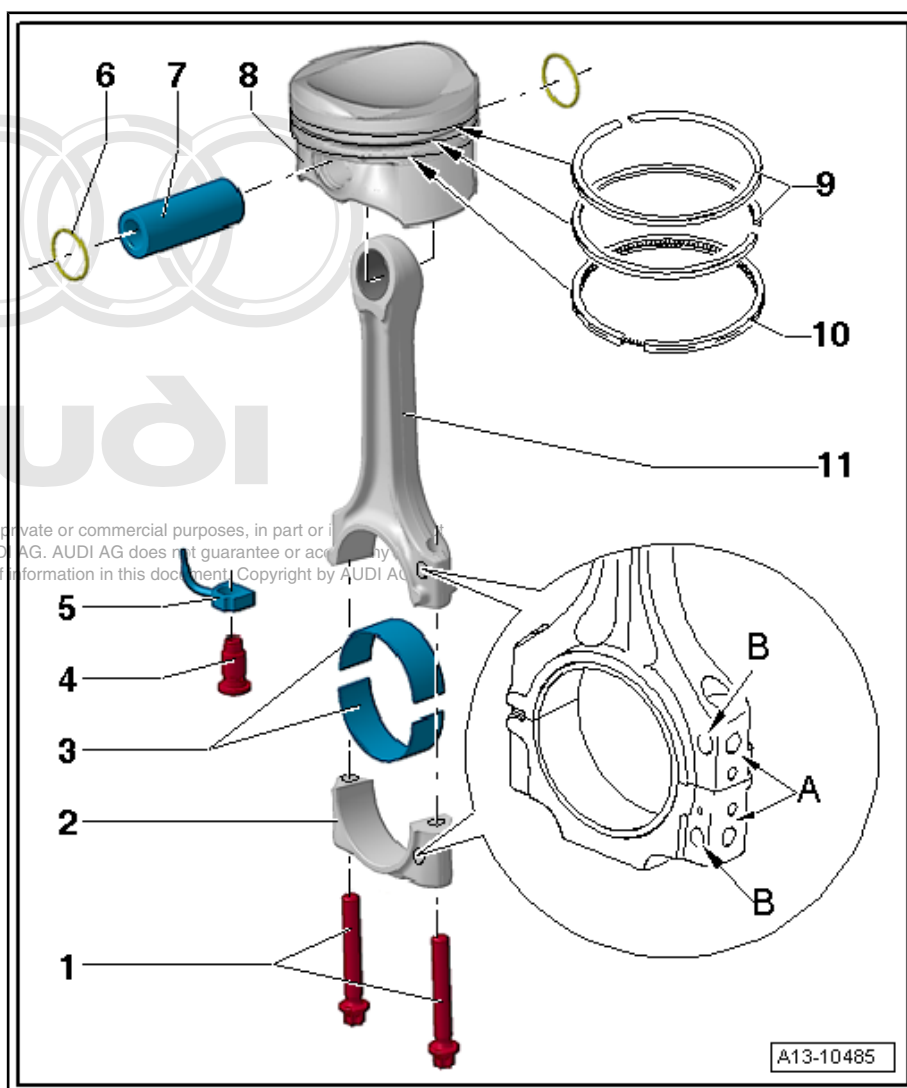
- Installation position ⇒ [page 82](#)
- Renew after removing
- Axial clearance when new: 0.10 ... 0.35 mm; wear limit: 0.40 mm
- Measuring radial clearance ⇒ [page 86](#)

4 - Pressure relief valve

- 27 Nm

5 - Oil spray jet

- For piston cooling
- Do not bend oil spray jet
- Always renew bent oil spray jets



6 - Circlip

- Renew

7 - Piston pin

8 - Piston

- Removing and installing ⇒ [page 82](#)
- Mark installation position and cylinder number
- Arrow on piston crown points to pulley end
- Checking pistons and cylinder bores ⇒ [page 84](#)

9 - Compression rings

- Use piston ring pliers (commercially available) to remove and install
- Offset gaps by 120°
- Installation position: marking "TOP" or "R" faces towards piston crown
- Checking ring gap ⇒ [page 84](#)
- Checking ring-to-groove clearance ⇒ [page 84](#)

10 - Oil scraper ring

- 2 parts
- Install with gap offset by 120° to next compression ring
- "TOP" or "R" must face towards piston crown
- Checking ring gap ⇒ [page 84](#)
- Ring-to-groove clearance cannot be checked

11 - Conrod

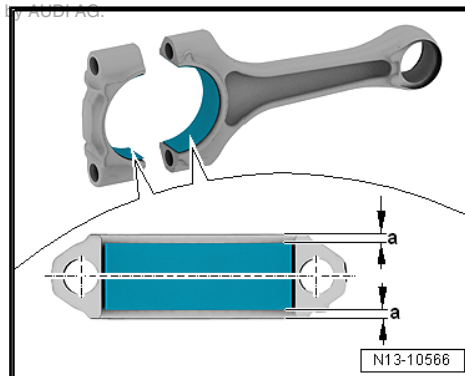
- Only renew as a complete set
- Mark cylinder and conrod bearing cap allocation in colour -A-
- Mark cylinder and conrod bearing cap allocation
- Installation position: Marking -B- faces towards pulley end
- Separating parts of new conrod ⇒ [page 85](#)
- Measuring radial clearance ⇒ [page 86](#)

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Installation position of bearing shells

- Position bearing shells in centre of conrod and conrod bearing cap when fitting.

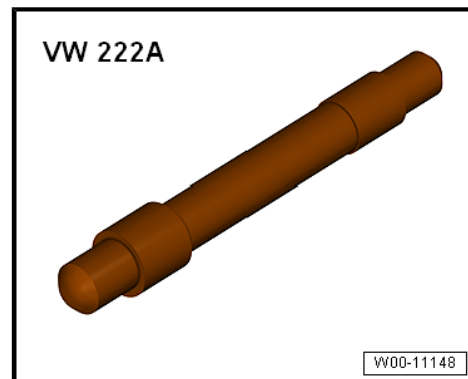
Dimension -a- must be identical on both sides.



5.2 Removing and installing pistons

Special tools and workshop equipment required

◆ Drift - VW 222A-



◆ Piston ring clamp, commercially available

Removing

- Remove engine ⇒ [page 7](#) .
- Secure engine to engine and gearbox support - VAS 6095- ⇒ [page 23](#) .
- Remove cylinder head ⇒ [page 126](#) .
- Remove sump (top section) ⇒ [page 227](#) .
- Mark installation position and cylinder number of piston.
- Mark installation position and cylinder number of conrod ⇒ [Item 11 \(page 82\)](#) .
- Remove conrod bearing cap and pull out piston and conrod upwards.



Note

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

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

Installing

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



Note

- ◆ *Renew the bolts tightened with specified tightening angle.*
- ◆ *Arrow on piston crown points to pulley end.*
- ◆ *Piston ring gaps should be spaced at 120°.*
- Oil running surfaces of bearing shells.
- Install piston using commercially available piston ring clamp; note installation position ⇒ [Item 8 \(page 82\)](#) .
- Install conrod bearing cap; note installation position ⇒ [Item 2 \(page 81\)](#) .
- Install cylinder head ⇒ [page 126](#) .
- Install sump (upper section) ⇒ [page 227](#) .

Tightening torques

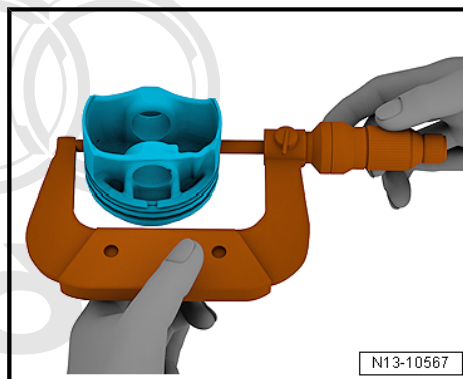
- ◆ ⇒ [“5.1 Exploded view - pistons and conrods”, page 81](#)

5.3 Checking pistons and cylinder bores

Checking piston

- Using a micrometer (75 ... 100 mm), measure approx. 15 mm from the lower edge, perpendicular to the piston pin axis.
- ◆ Difference between actual and nominal diameter: not more than 0.04 mm.

		Piston Ø
Basic dimension	mm	82.465 ¹⁾
• ¹⁾ Dimensions not including graphite coating (thickness 0.02 mm). The graphite coating will wear down in service.		

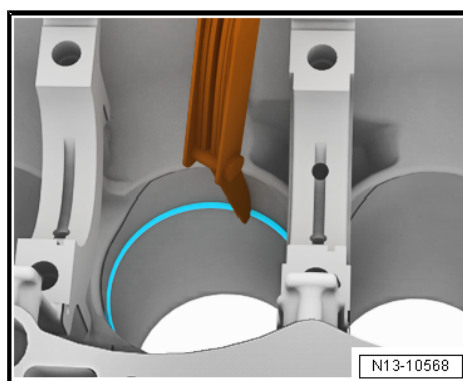


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Checking piston ring gap

- Insert piston ring at right angle to cylinder wall from above and push down into lower cylinder opening approx. 15 mm from bottom of cylinder. Use a piston without rings to push ring into bore.
- Check gap using feeler gauge.

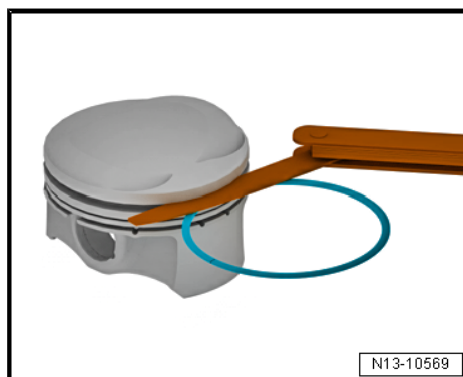
Piston ring Dimensions in mm	New	Wear limit
Compression ring	0.20 ... 0.40	0.80
Oil scraper ring	0.25 ... 0.50	0.80



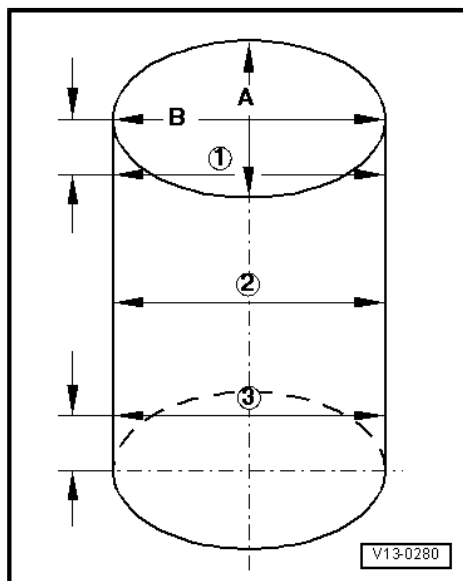
Checking ring-to-groove clearance

- Clean annular groove of piston.
- Check gap using feeler gauge.

Piston ring Dimensions in mm	New	Wear limit
1st compression ring	0.06 ... 0.09	0.20
2nd compression ring	0.03 ... 0.06	0.15
Oil scraper rings	Cannot be measured	



Checking cylinder bore



Special tools and workshop equipment required

- ◆ Cylinder gauge - VAS 6078-

Note

- ◆ *Dark or shiny patches on the cylinder wall do not indicate damage to the cylinder bore so long as the cross-hatching is visible.*
- ◆ *The cylinder bore should always be measured at three points in the transverse direction and in the longitudinal direction using cylinder gauge - VAS 6078- .*



Caution

Machining (re boring, honing, grinding) cylinder bore with workshop equipment is not permitted. The surface of the cylinder bore is damaged by machining.

- Use a cylinder gauge - VAS 6078- to take measurements at 3 points in transverse direction -A- and in longitudinal direction -B-.
- ◆ Difference between actual and nominal diameter: not more than 0.08 mm.

		Cylinder bore Ø
Basic dimension	mm	82.51

Note

Measuring the cylinder bores must not be done when the cylinder block is mounted to the engine and gearbox stand - VAS 6095- , as incorrect measurements may result.

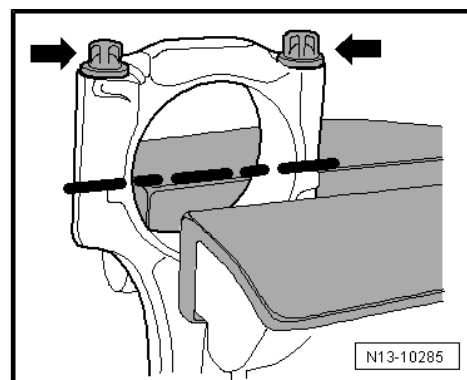
5.4 Separating parts of new conrod

It is possible that the two parts of a new conrod are not completely separated as intended. If it is not possible to take off the conrod bearing cap by hand, proceed as follows:

- To avoid any risk of damage, the conrod should only be clamped lightly in a vice using jaw covers as shown in illustration.

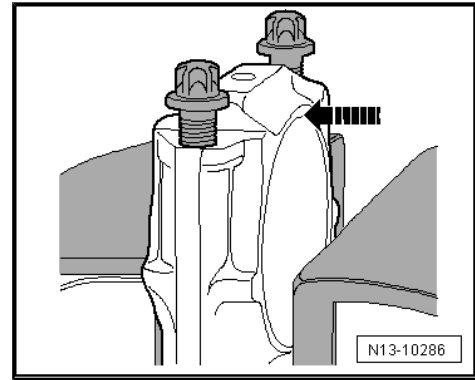
Note

- ◆ *To avoid any risk of damage, the conrod should only be clamped lightly.*
- ◆ *The conrod is clamped in a position below the dotted line.*
- Unscrew bolts -arrows- approx. 5 turns.





- Using a plastic hammer, carefully knock conrod bearing cap loose -arrow-.



5.5 Checking radial clearance of conrod bearings

Special tools and workshop equipment required

- ◆ Plastigage

Procedure



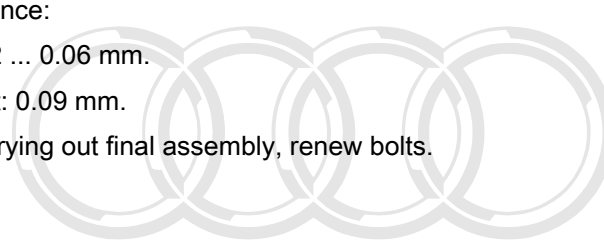
Note

Use old bolts when measuring radial clearance.

- Remove conrod bearing cap.
- 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 caps and tighten through specified angle => [Item 1 \(page 81\)](#) without rotating crankshaft.
- Remove conrod bearing cap again.
- Compare width of Plastigage with measurement scale.

Radial clearance:

- New: 0.02 ... 0.06 mm.
- Wear limit: 0.09 mm.
- When carrying out final assembly, renew bolts.



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15 – Cylinder head, valve gear

1 Timing chain cover

⇒ [“1.1 Exploded view - timing chain cover”, page 87](#)

⇒ [“1.2 Removing and installing timing chain cover”, page 89](#)

⇒ [“1.3 Renewing oil seal for vibration damper”, page 93](#)

1.1 Exploded view - timing chain cover

1 - O-ring

- Renew
- Lubricate before installing

2 - Guide tube for oil dipstick

3 - Bolt

- 9 Nm

4 - Bolt

- 9 Nm

5 - Camshaft control valve 1 - N205-

- Removing and installing ⇒ [page 210](#)

6 - Oil seal

- Lubricate before installing
- Renew if damaged

7 - Bolt

- Tightening sequence ⇒ [page 88](#)

8 - Timing chain cover (top)

- Removing and installing ⇒ [page 88](#)

9 - Gasket

- Renew if damaged

10 - O-ring

- Renew
- Lubricate before installing

11 - Dowel pins

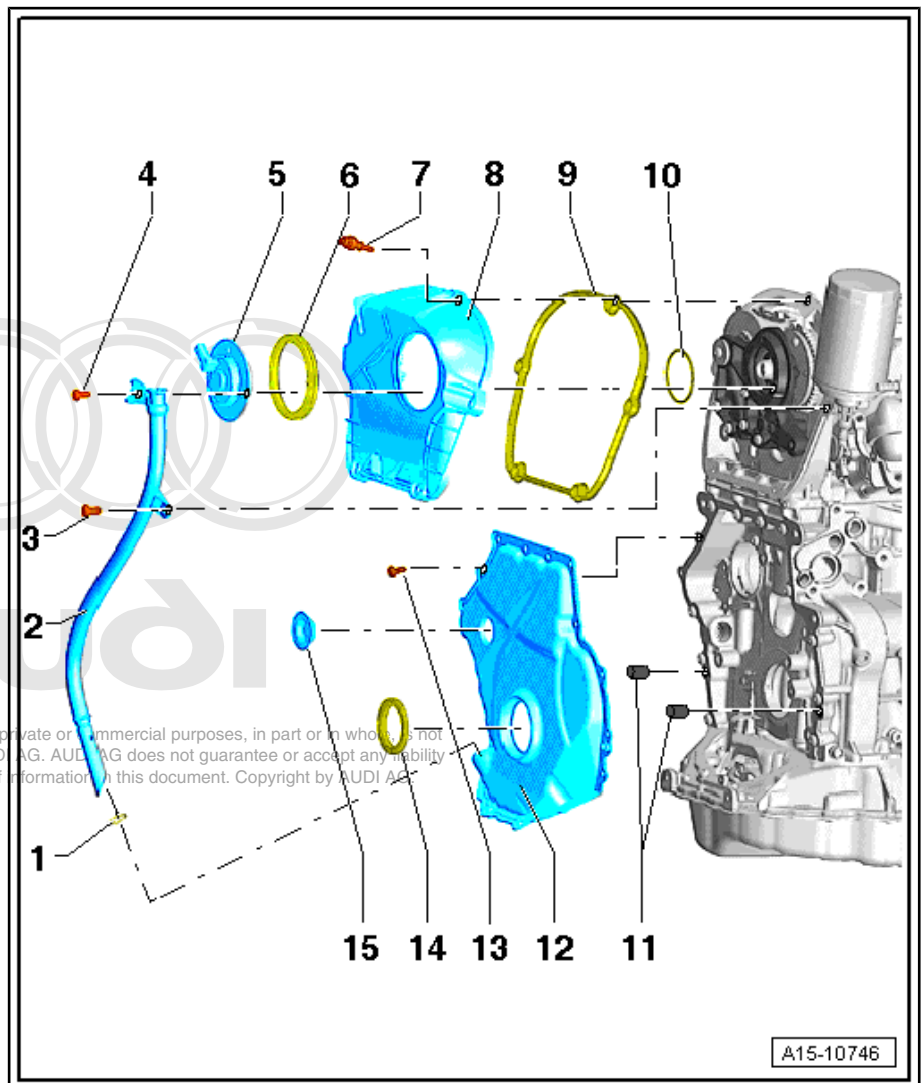
- For centring cover

12 - Timing chain cover (bottom)

- Renewing ⇒ [page 89](#)

13 - Bolt

- Renew
- Tightening sequence with 15 bolts ⇒ [page 88](#)
- Tightening sequence with 8 bolts ⇒ [page 88](#)





14 - Oil seal

- For vibration damper
- Renewing ⇒ [page 93](#)

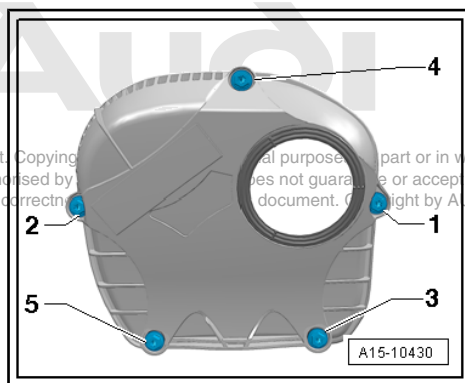
15 - Sealing plug

- Renew



Timing chain cover (top) - tightening sequence

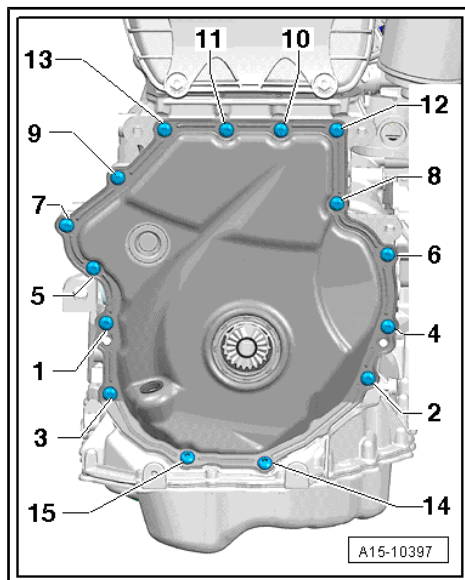
- Tighten bolts -1 to 5- in the sequence shown:
- 1. Tighten bolts to 9 Nm.



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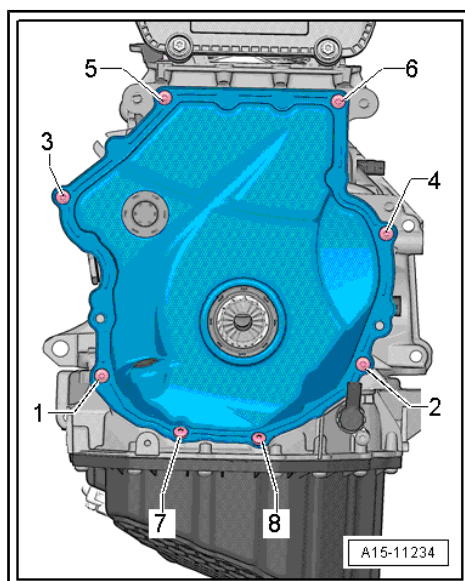
Timing chain cover (bottom), tightening sequence with 15 bolts

- Tighten bolts -1 to 15- in two stages in the sequence shown:
- 1. Tighten bolts to 8 Nm.
- 2. Turn bolts 45° further.



Timing chain cover (bottom), tightening sequence with 8 bolts

- Tighten bolts -1 to 8- in two stages in the sequence shown:
- 1. Tighten bolts to 4 Nm.
- 2. Turn bolts 45° further.



1.2 Removing and installing timing chain cover

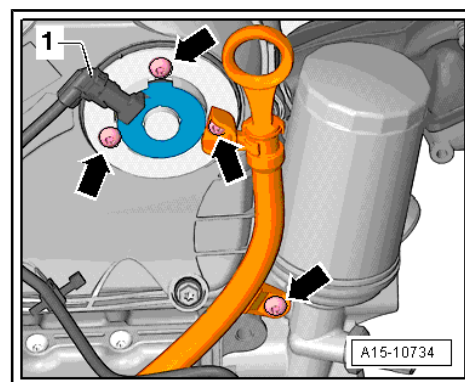
⇒ [“1.2.1 Removing and installing timing chain cover \(top\)”, page 89](#)

⇒ [“1.2.2 Renewing timing chain cover \(bottom\)”, page 89](#)

1.2.1 Removing and installing timing chain cover (top)

Removing

- Detach connector from camshaft control valve 1 - N205- -1-.
- Unscrew bolts -arrows- and remove camshaft control valve 1 - N205- .



- Unscrew bolts -1 to 5- and remove timing chain cover (top).

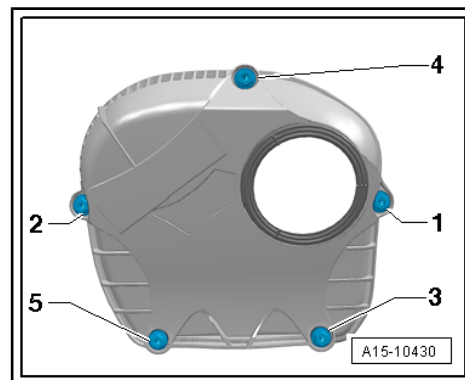
Installing

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

Note

Renew O-ring.

- Lubricate oil seal and O-ring with engine oil.
- Install timing chain cover (top); tightening sequence ⇒ [page 88](#) .
- Install camshaft control valve 1 - N205- ⇒ [page 210](#) .



Tightening torques

- ◆ ⇒ [“1.1 Exploded view - timing chain cover”, page 87](#)

1.2.2 Renewing timing chain cover (bottom)

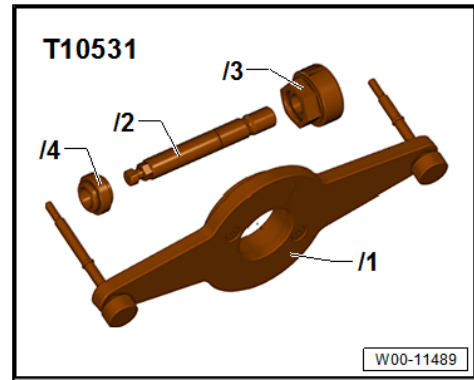
Note

The timing chain cover is bent out of shape when it is removed because of the adhesive strength of the sealant; it must therefore always be renewed.

Special tools and workshop equipment required



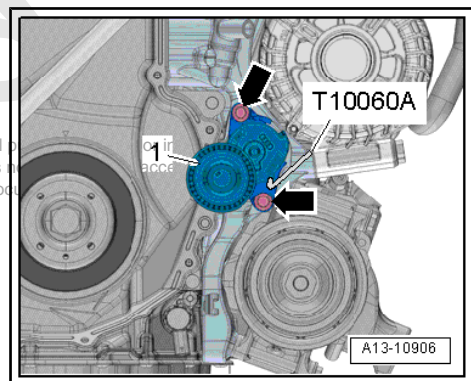
◆ Assembly tool - T10531-



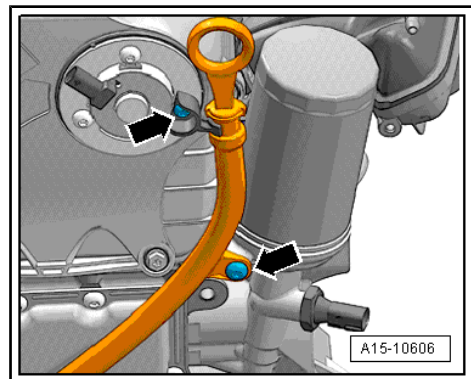
Removing

- Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
- Set service position ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Setting service position and returning to normal position .
- Remove vibration damper ⇒ [page 47](#) .
- Remove bolts -arrows- and take off tensioner -1- for poly V-belt from bracket for ancillaries.

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- Remove bolts -arrows- and detach guide tube for oil dipstick from timing chain cover.



- Remove bolts -1 ... 15-

 **Note**

Some versions have only 8 bolts.

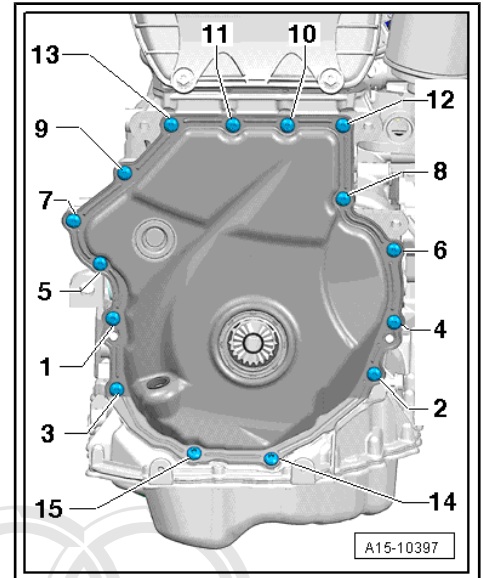
- Prise off timing chain cover (bottom).

Installing

- ◆ Silicone sealant ⇒ Electronic parts catalogue

 **Note**

- ◆ *Note the expiry date of the silicone sealant.*
- ◆ *The cover must be installed within 5 minutes after applying the silicone sealant.*
- ◆ *Renew the bolts tightened with specified tightening angle.*
- ◆ *Renew seals, gaskets and self-locking nuts.*



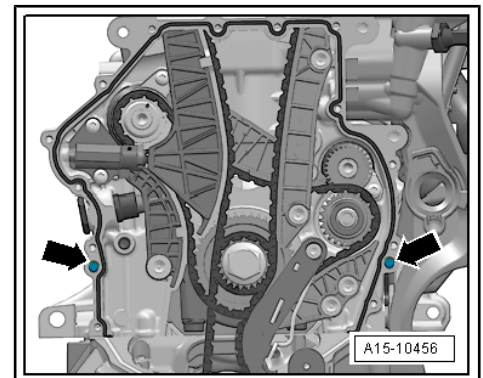
Caution

Protect lubrication system against contamination.

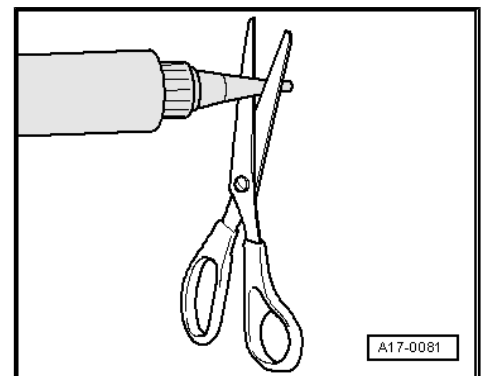
- ◆ **Cover exposed parts of the engine.**

- Remove sealant remaining on cylinder block with flat scraper.
- Clean surfaces; they must be free of oil and grease.
- Check that both dowel pins are fitted in cover -arrows-

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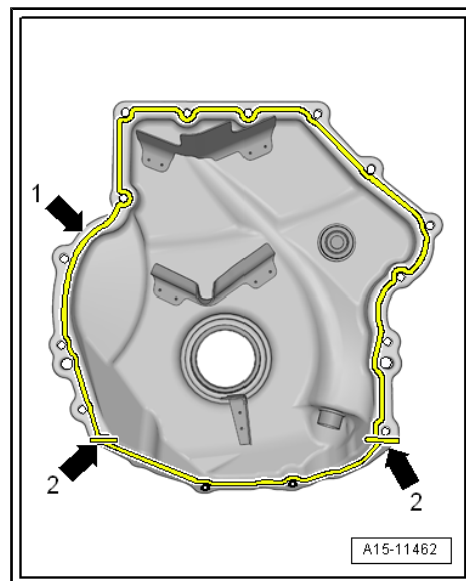
- Cut off nozzle of tube at front marking (∅ of nozzle approx. 2 mm).





Cover with 15 bolts

- Apply silicone sealant onto clean sealing surface -arrow 1- and onto edges -arrow 2- of new cover, as illustrated.
- ◆ Thickness of sealant bead: 2 ... 3 mm



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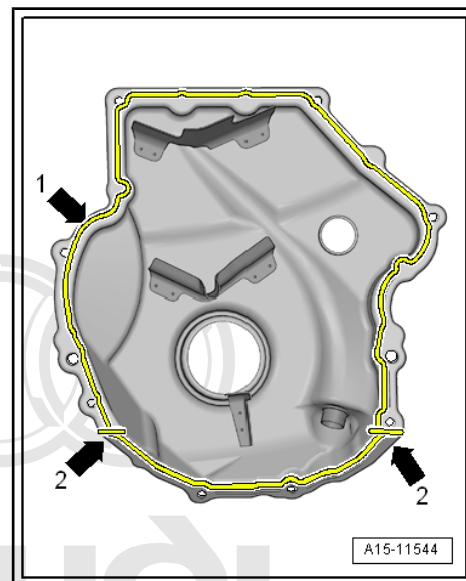
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Cover with 8 bolts

- Apply silicone sealant onto clean sealing surface -arrow 1- and onto edges -arrow 2- of new cover, as illustrated.
- ◆ Thickness of sealant bead: 2 ... 3 mm

Note

- ◆ *The cover must be installed within 5 minutes after applying the silicone sealant.*
- ◆ *The bead of sealant must not be thicker than specified, otherwise excess sealant can enter the sump and obstruct the strainer in the oil intake pipe.*
- Immediately fit timing chain cover and tighten bolts:
- ◆ Cover with 15 bolts ⇒ [page 88](#)
- ◆ Cover with 8 bolts ⇒ [page 88](#)



Note

After fitting cover, let sealant dry for approx. 30 minutes. Then (and only then) fill the engine with engine oil.

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- Install vibration damper ⇒ [page 47](#) .
- Install poly V-belt tensioner ⇒ [page 46](#) .
- Install poly V-belt ⇒ [page 43](#) .
- Reset service position ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Setting service position and returning to normal position .
- Install noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .
- Check oil level: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .

Tightening torques

- ◆ ⇒ [“1.1 Exploded view - timing chain cover”, page 87](#)

1.3 Renewing oil seal for vibration damper

Special tools and workshop equipment required

- ◆ Thrust piece - T10354-

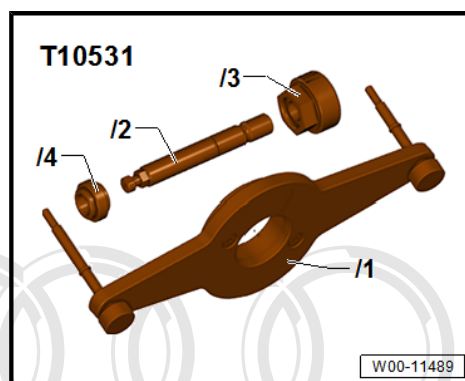




- ◆ Thrust pad - T10375-



- ◆ Flange nut - 10531/4- from assembly tool - T10531-



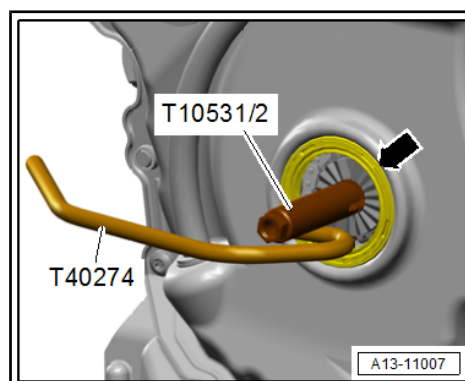
- ◆ Extractor hook - T40274-



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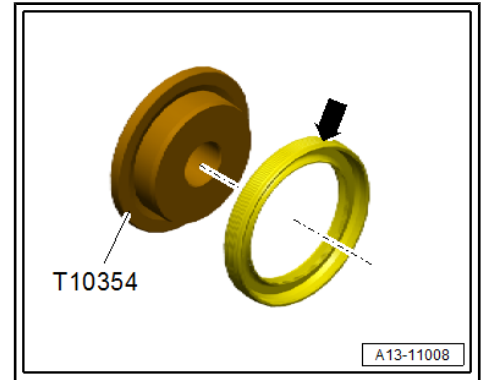
Removing

- Remove vibration damper => [page 47](#) .
- Clamping pin - T10531/2- is inserted.
- Pry out oil seal -arrow- using extractor hook - T40274- .

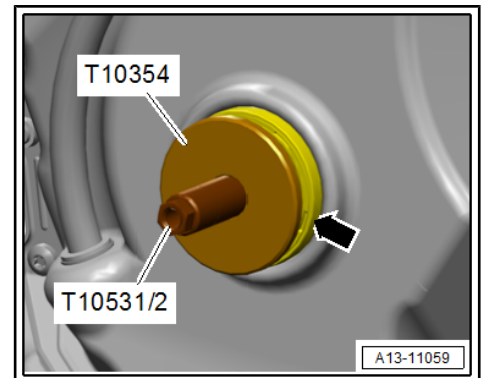


Installing

- Clean contact surface and sealing surface.
- Fit oil seal -arrow- onto thrust piece - T10354- .
- Closed side of oil seal faces thrust piece - T10354- .



- Slide oil seal -arrow- with thrust piece - T10354- onto clamping pin - T10531/2- and position on timing chain cover (bottom).



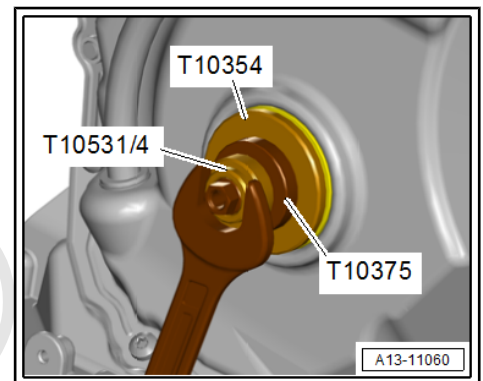
- Also fit thrust pad - T10375- and tighten flange nut - 10531/4- .
- Drive oil seal in as far as stop using thrust piece - T10354- .

Note

- ◆ *Renew bolt for vibration damper.*
- ◆ *Renew O-ring.*

Further assembly is basically carried out in reverse order of dismantling. Note the following:

- Install vibration damper ⇒ [page 47](#) .



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2 Chain drive

- ⇒ [“2.1 Exploded view - camshaft timing chains”, page 96](#)
- ⇒ [“2.2 Exploded view - drive chain for balance shaft”, page 97](#)
- ⇒ [“2.3 Removing and installing bearing saddle”, page 98](#)
- ⇒ [“2.4 Removing and installing camshaft timing chain”, page 103](#)
- ⇒ [“2.5 Removing and installing drive chain for balance shaft”, page 112](#)
- ⇒ [“2.6 Checking valve timing”, page 114](#)

2.1 Exploded view - camshaft timing chains

1 - Bolt

- 9 Nm

2 - Chain tensioner

- Exerts spring pressure
- Before removing, lock in place using locking pin - T40011-

3 - Tensioning rail for timing chain

4 - Guide pin

- 20 Nm

5 - Bolt

- 9 Nm

6 - Timing valve

- Left-hand thread
- Depending on version, use assembly tool - T10352- or assembly tool - T10352/1A- for removal
- 35 Nm

7 - Bolt

- Renew
- On vehicles with 1.8 ltr. engine: 8 Nm + turn 90° further
- On vehicles with 2.0 ltr. engine: 20 Nm + turn 90° further

8 - Washer

9 - Bearing saddle

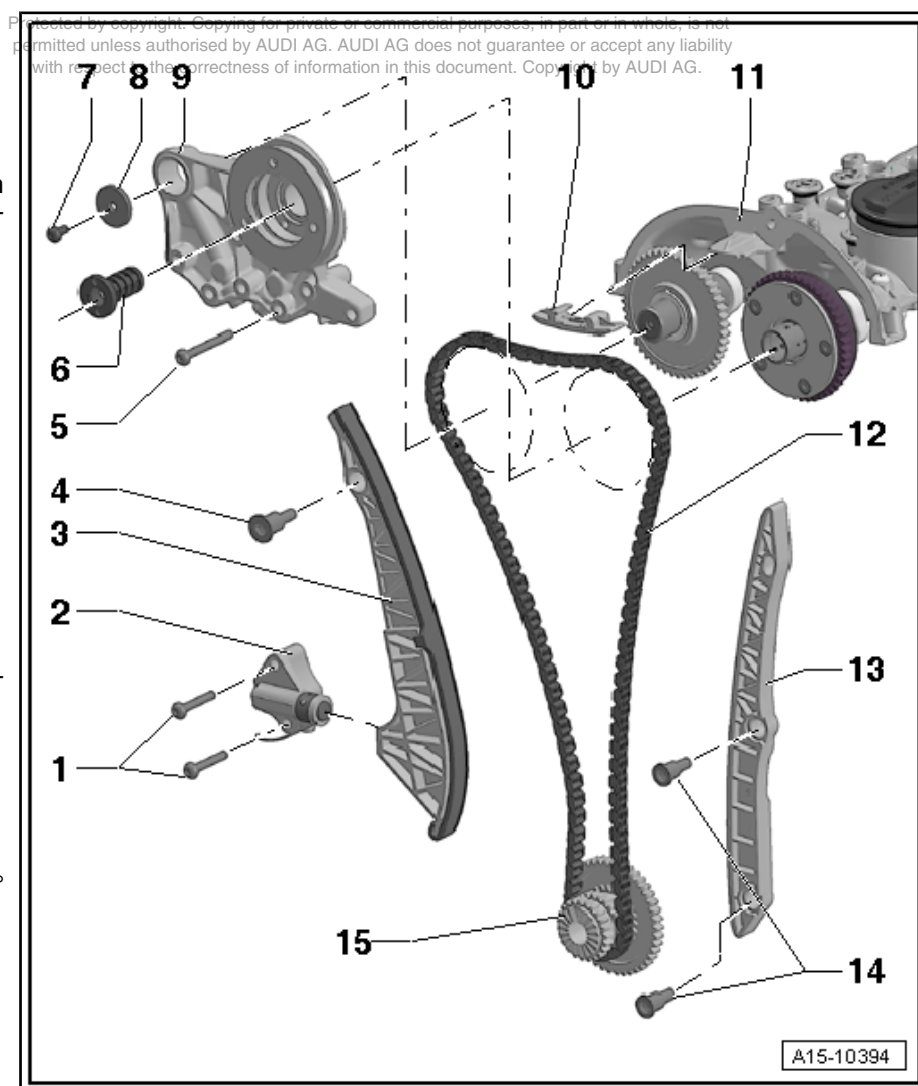
- Removing and installing ⇒ [page 98](#)

10 - Guide rail for camshaft timing chain

11 - Camshaft housing

12 - Camshaft timing chain

- Before removing, mark running direction with paint



13 - Guide rail for camshaft timing chain

14 - Guide pin

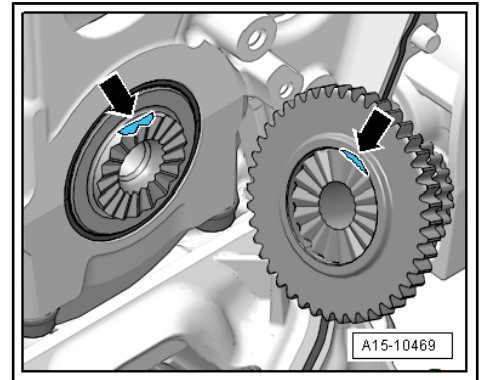
- 20 Nm

15 - Three-part chain sprocket assembly

- Crankshaft
- Installation position ⇒ [page 97](#)

Three-part chain sprocket assembly - installation position

- The two sections -arrows- must be aligned.



2.2 Exploded view - drive chain for balance shaft

1 - Guide pin

- 20 Nm

2 - Guide rail

- For timing chain

3 - Drive chain for balance shaft

- Removing ⇒ [page 112](#)

4 - Guide pin

- 20 Nm

5 - Tensioning rail

- For drive chain for balance shafts

6 - Balance shaft

- Exhaust side
- Always renew after removal
- Lubricate bearing with engine oil
- Renewing ⇒ [page 76](#)

7 - Guide pin

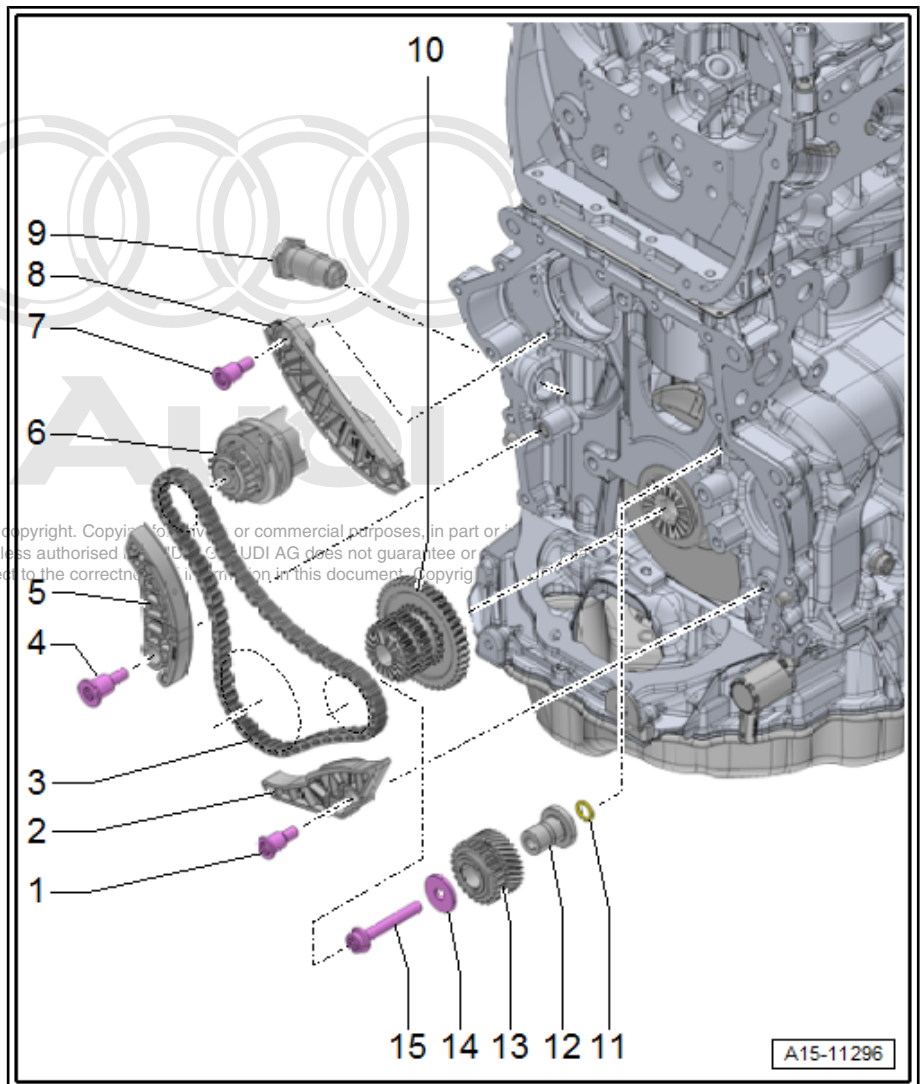
- 20 Nm

8 - Guide rail

- For timing chain

9 - Chain tensioner

- 85 Nm
- Apply sealant to seal



10 - Three-part chain sprocket assembly

- ❑ Installation position ⇒ [page 97](#)

11 - O-ring

- ❑ Lubricate with engine oil

12 - Bearing mounting

- ❑ Lubricate with engine oil
- ❑ Installation position ⇒ [page 98](#)

13 - Idler gear

- ❑ If bolt ⇒ [Item 15 \(page 98\)](#) has been loosened, idler gear must be renewed

14 - Washer

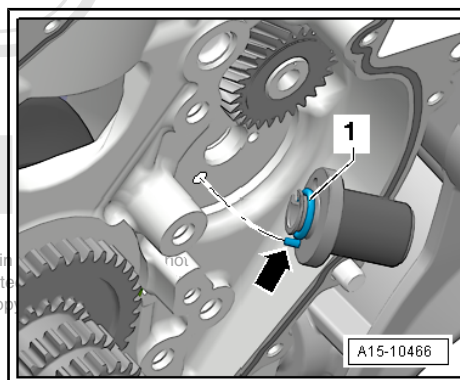
15 - Bolt

- ❑ Renew
- ❑ If bolt has been loosened, idler gear ⇒ [Item 13 \(page 98\)](#) must be renewed
- ❑ Tightening sequence ⇒ [page 98](#)

Bearing mounting - installation position

- Renew O-ring -1- and lubricate with oil.
- Dowel pin -arrow- for bearing mounting must engage in bore in cylinder block.
- Lubricate bearing mounting.

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Idler gear - tightening sequence



Caution

Always renew idler gear. If this is not done, there is no backlash, which causes engine damage.

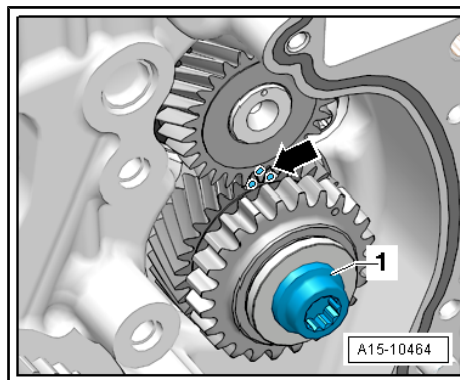
The new idler gear has a special lubricant coating which wears off after a short running period and thus automatically creates the specified backlash.

– Secure with new bolt as follows:

1. Tighten with torque wrench initially to 10 Nm.
2. Turn idler gear.

Idler gear must be without play; otherwise loosen bolt and tighten again.

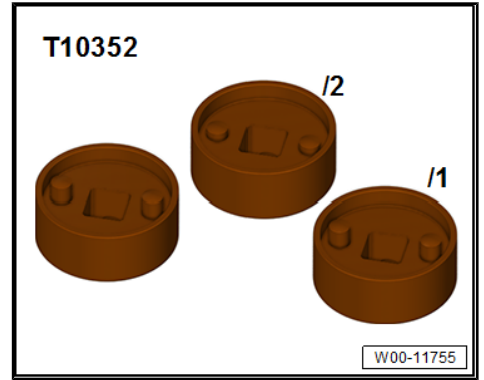
3. Tighten with torque wrench to 25 Nm.
4. Use rigid wrench to turn 90° further.



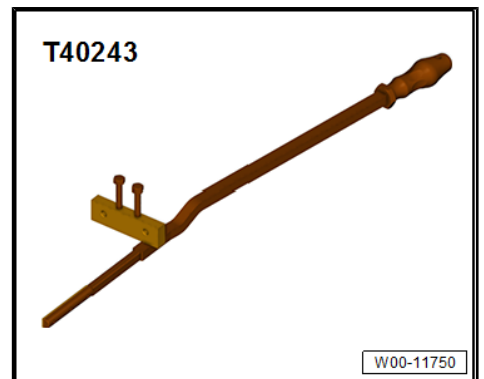
2.3 Removing and installing bearing saddle

Special tools and workshop equipment required

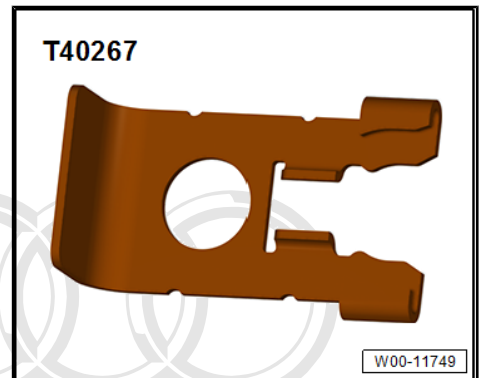
◆ Assembly tool - T10352-



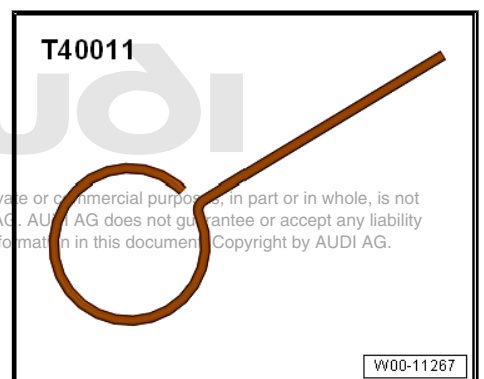
◆ Assembly lever - T40243-



◆ Locking tool - T40267-



◆ Locking pin - T40011-



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Removing

- Remove timing chain cover (top) => [page 89](#) .

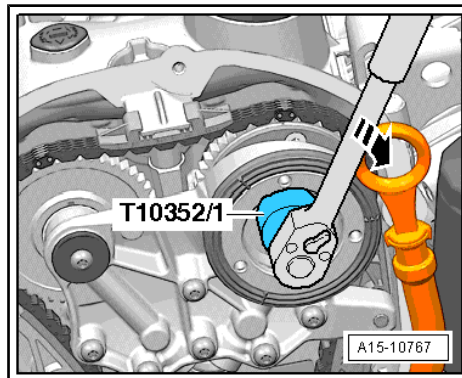


Caution

Risk of damage to thread.

- ◆ *The timing valves have a left-hand thread.*

- Depending on version, turn assembly tool - T10352- or assembly tool - T10352/1A- in direction of -arrow- to remove timing valve.



- Remove bolts -arrows-.

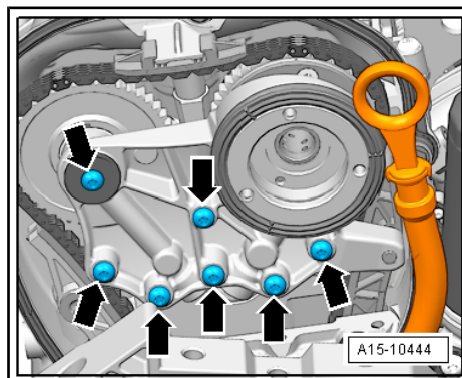


WARNING

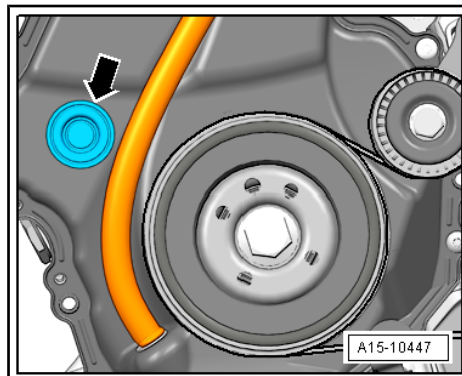
Risk of damage to bearing saddle.

- ◆ *Detach bearing saddle carefully without tilting it.*

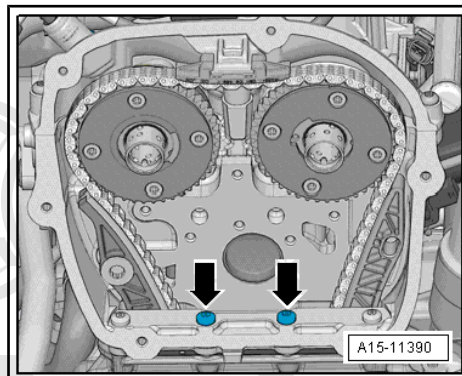
- Detach bearing saddle.



- Remove sealing plug -arrow-.

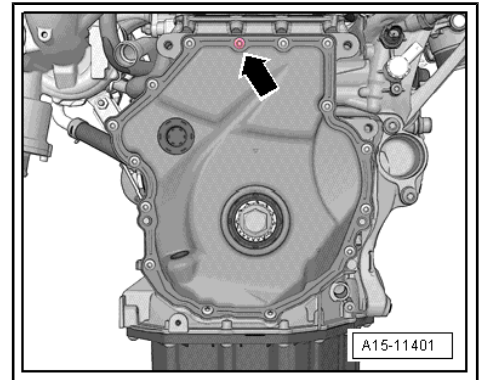
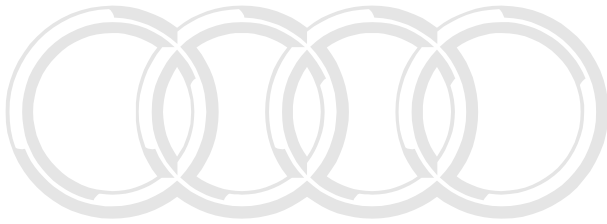


- Remove bolts -arrows-.



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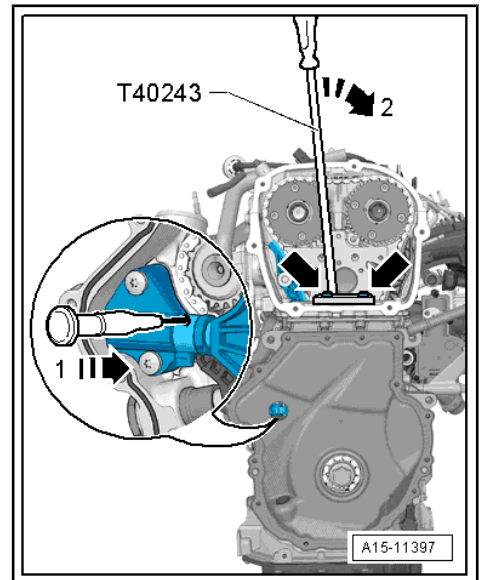
- Remove bolt -arrow-.



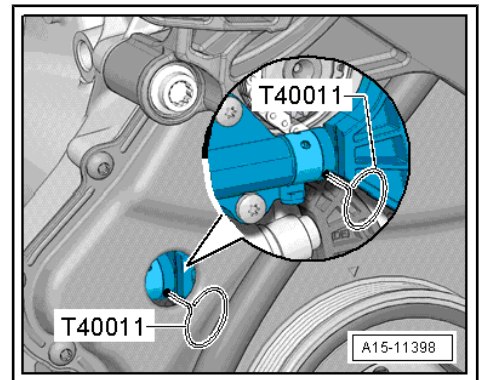
Depending on version, 2 different chain tensioners may be installed.

Version 1

- Screw in lever - T40243 - arrows -
- Lift locking element for chain tensioner; to do so, insert scribe or suitable screwdriver in hole of chain tensioner in direction of -arrow 1-, press lever - T40243- slowly in direction of -arrow 2- and hold in place.



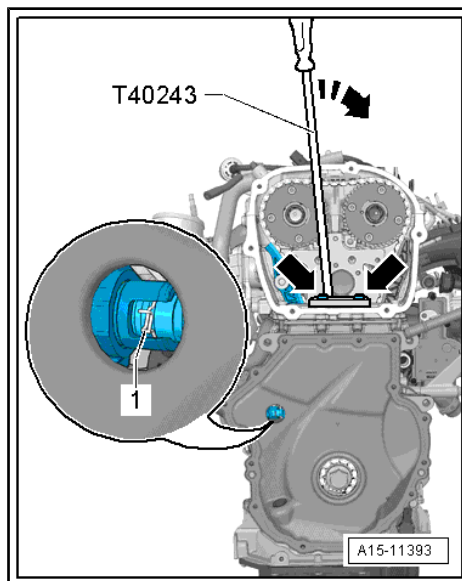
- Hold chain tensioner in position with locking pin - T40011- .





Version 2

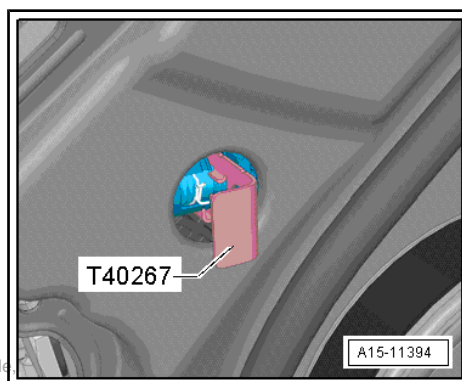
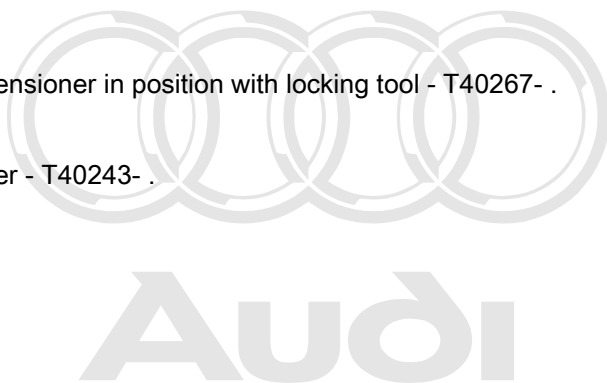
- Screw in lever - T40243- -arrows-.
- Compress circlip -1- for chain tensioner, press lever - T40243- slowly in direction of -arrow- and hold in place.



- Hold chain tensioner in position with locking tool - T40267- .

All versions

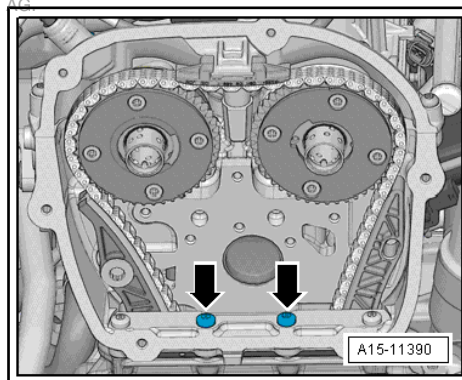
- Remove lever - T40243- .



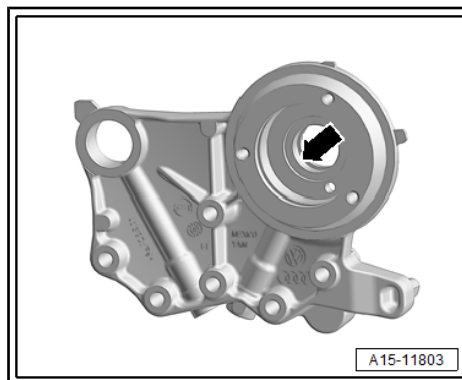
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Installing

- Fit and tighten bolts -arrows-. Tightening torque ➔ [Item 4 \(page 121\)](#)



- Lubricate hole -arrow- with engine oil.





WARNING

Risk of damage to bearing saddle.

◆ *Carefully attach bearing saddle without tilting it.*

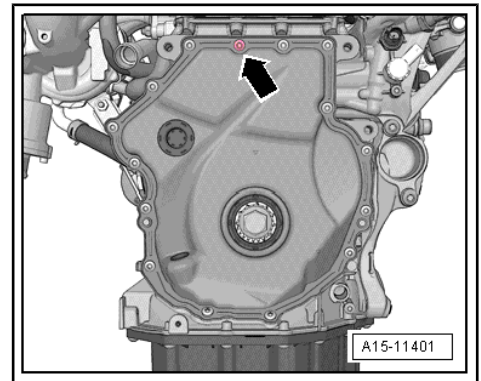
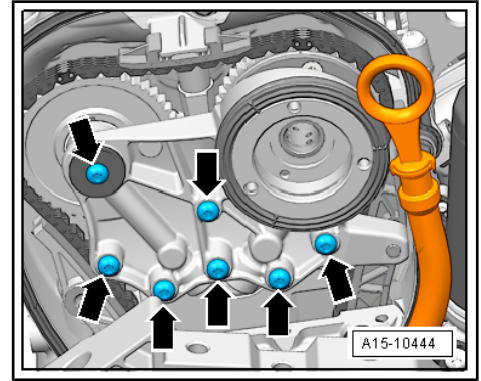
- Attach bearing saddle and screw in bolts -arrows- hand-tight.
- Depending on version, remove locking pin - T40011- or locking tool - T40267- .
- Tighten bolts -arrows- for bearing saddle ⇒ [page 96](#) .
- Screw in bolt -arrow-.
- Install timing valve ⇒ [Item 6 \(page 96\)](#) .

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

- Install timing chain cover (top) ⇒ [page 89](#) .

Tightening torques

- ◆ ⇒ [“2.1 Exploded view - camshaft timing chains”, page 96](#)
- ◆ ⇒ [“1.1 Exploded view - timing chain cover”, page 87](#)
- ◆ ⇒ [“3.1.2 Exploded view - cylinder head \(2.0 ltr. engine with assembly clearance feature\)”, page 120](#)



2.4 Removing and installing camshaft timing chain

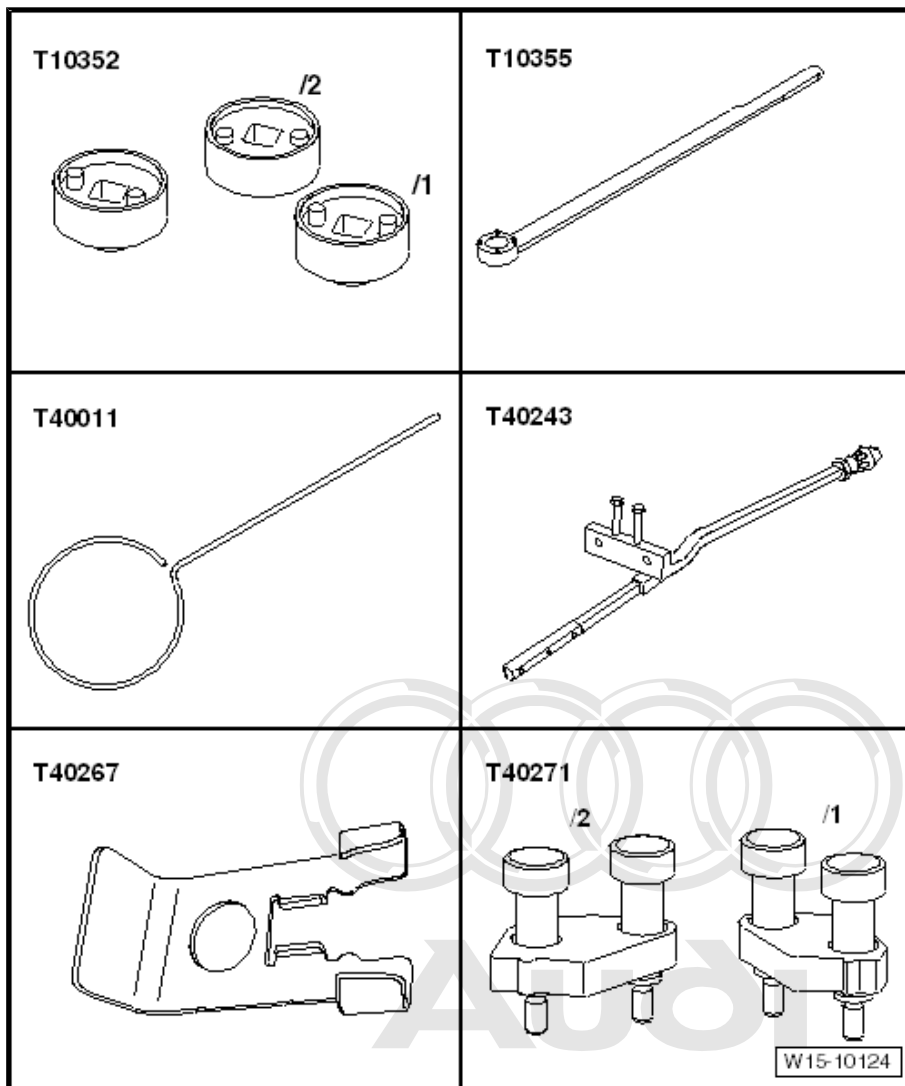


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Special tools and workshop equipment required

- ◆ Removal tool - T10352-
- ◆ Counterhold tool - T10355-
- ◆ Locking pin - T40011-
- ◆ Assembly lever - T40243-
- ◆ Locking tool - T40267-
- ◆ Camshaft clamp - T40271-



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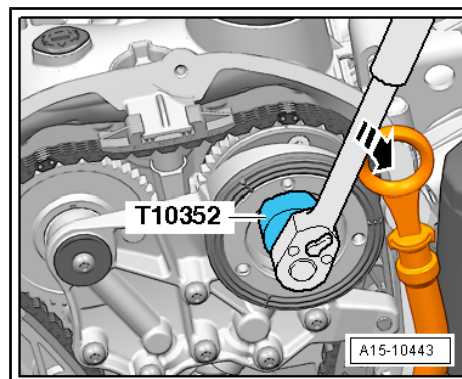
Removing

- Set service position ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Setting service position and returning to normal position .
- Remove timing chain cover (top) ⇒ [page 89](#) .


 **Caution**

The timing valve has a left-hand thread.

- Depending on version, turn assembly tool - T10352- or assembly tool - T10352/1A- in direction of -arrow- to remove timing valve.



- Remove bolts -arrows-.



WARNING

Risk of damage to bearing saddle.

◆ *Detach bearing saddle carefully without tilting it.*

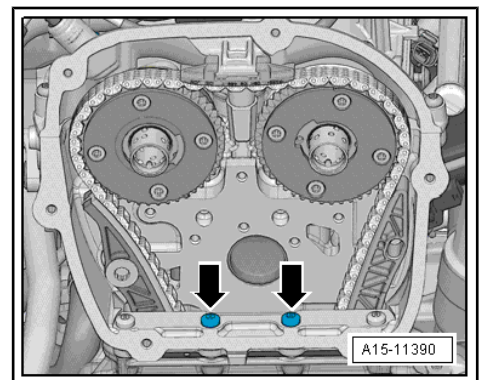
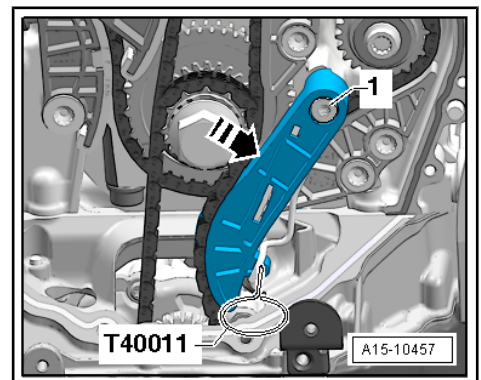
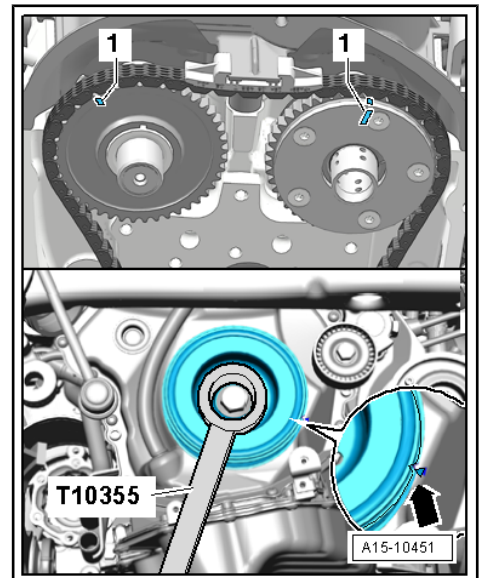
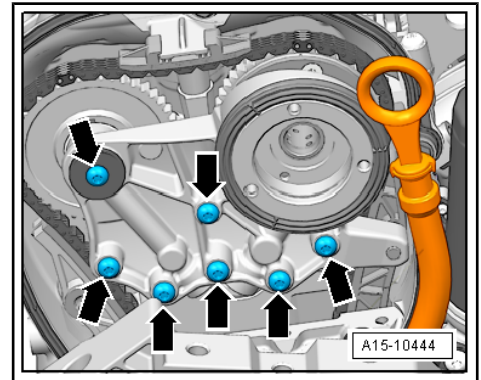
- Detach bearing saddle.

- Turn vibration damper to "TDC" position using counterhold tool - T10355- .
- Notch on vibration damper and marking on cover for timing chains (bottom) must be aligned -arrow-.
- The markings -1- on the camshafts must face upwards.
- Remove timing chain cover (bottom) ⇒ [page 89](#) .

- Press oil pump chain tensioner in direction of -arrow- and lock in place using locking pin - T40011- .
- Remove oil pump chain tensioner -1-.
- Detach drive chain for oil pump.

- Remove bolts -arrows-.

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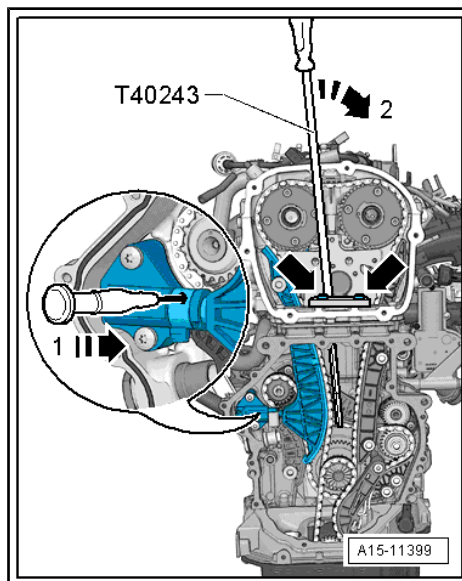




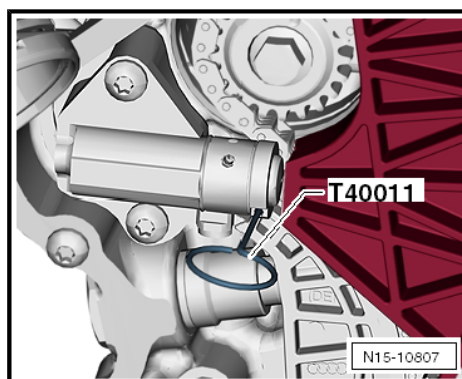
Depending on version, 2 different chain tensioners may be installed.

Version 1

- Screw in assembly lever - T40243- -arrows-.
- Lift locking element for chain tensioner; to do so, insert scribe or suitable screwdriver in hole of chain tensioner in direction of -arrow 1- and hold in place.
- Push assembly lever - T40243- slowly in direction of -arrow 2- and hold in place.

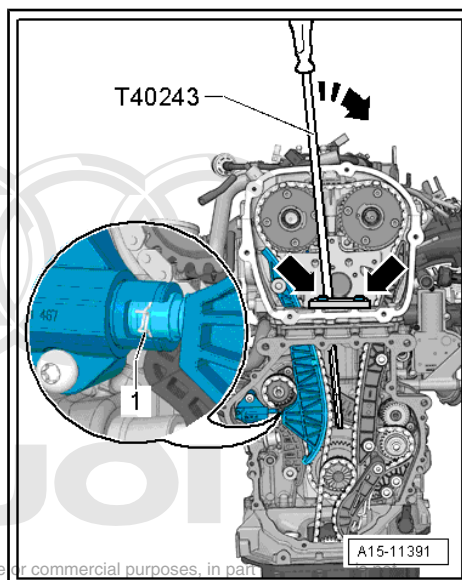


- Hold chain tensioner in position with locking pin - T40011- .



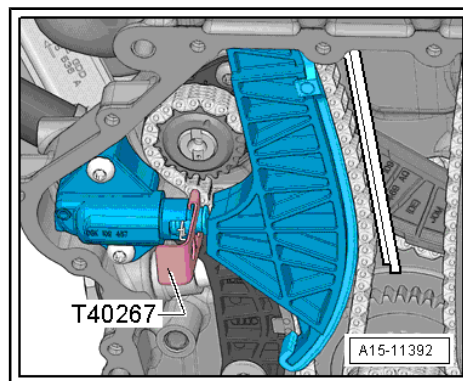
Version 2

- Screw in assembly lever - T40243- -arrows-.
- Compress and hold circlip -1- for chain tensioner.
- Push assembly lever - T40243- slowly in direction of -arrow- and hold in place.



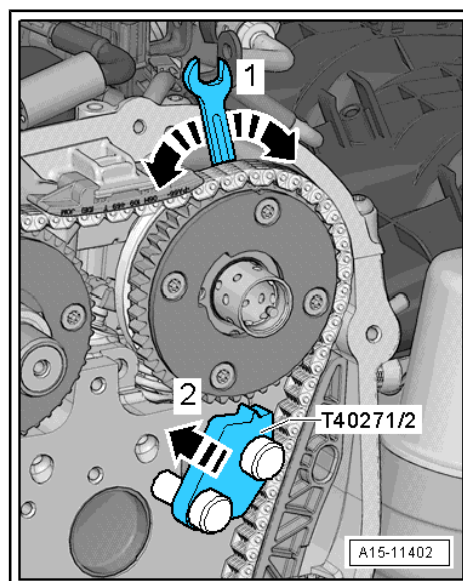
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- Hold chain tensioner in position with locking tool - T40267- .

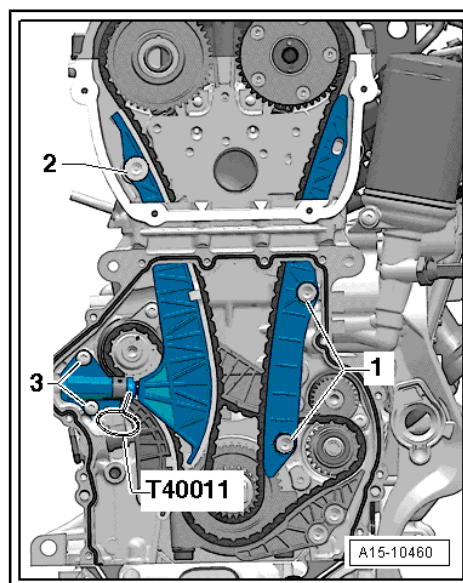
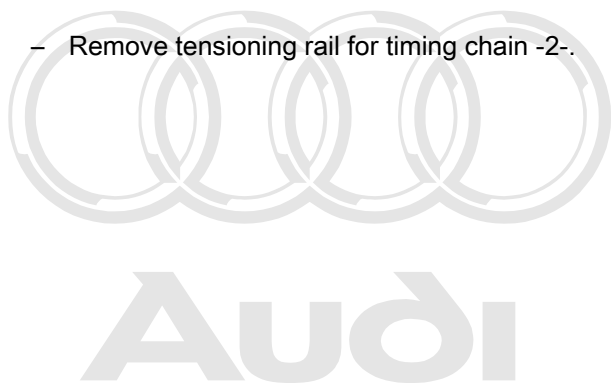


All versions

- Remove assembly lever - T40243- .
- Bolt camshaft clamp - T40271/2- onto cylinder head and slide into teeth on chain sprocket in direction of -arrow 2-; if necessary, use spanner to turn inlet camshaft in direction of -arrow 1-.



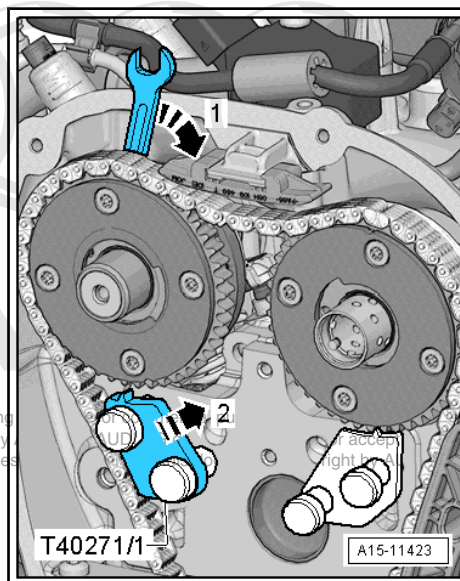
- Remove tensioning rail for timing chain -2-.



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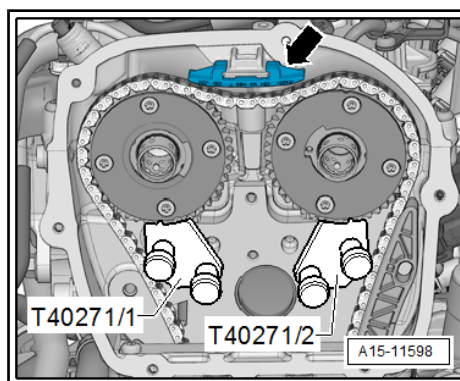


- Bolt camshaft clamp - T40271/1- onto cylinder head.
- Use spanner to turn exhaust camshaft in direction of -arrow 1- and slide camshaft clamp - T40271/1- into teeth on chain sprocket in direction of -arrow 2-.

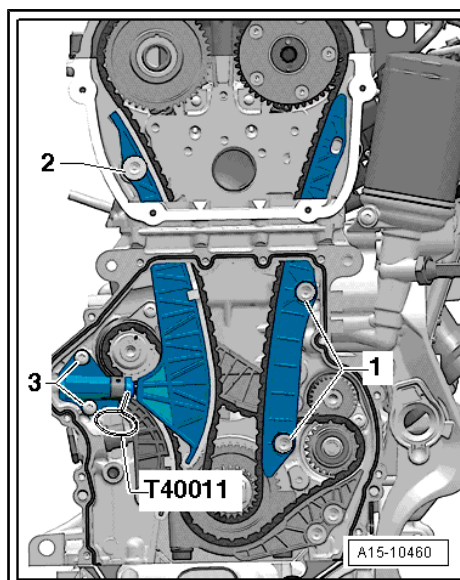


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- Use screwdriver to release catch and press off top guide rail -arrow- towards front.



- Remove guide rail for camshaft timing chain -1-.
- Remove timing chain.

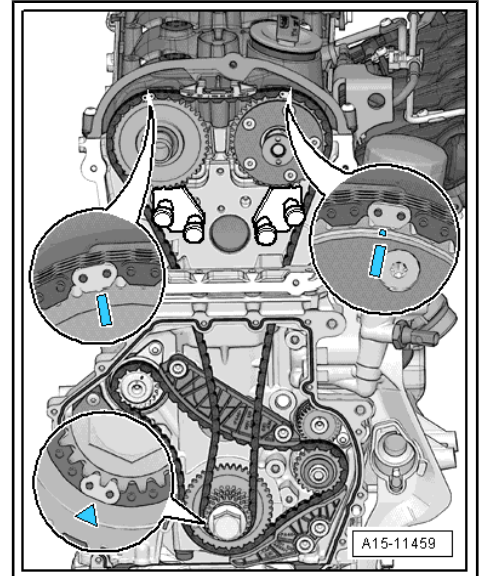


Installing

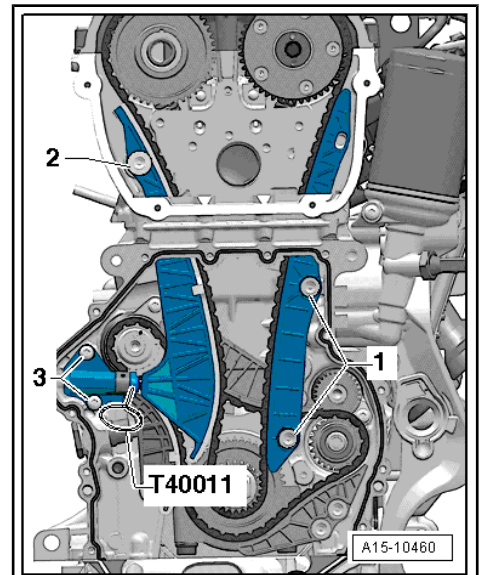
Note

The timing chain links with coloured markings must be positioned at the markings on the chain sprockets.

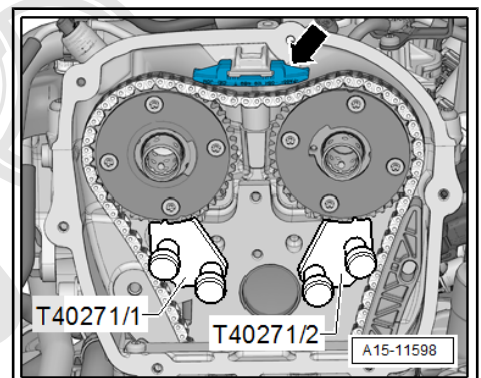
- Fit timing chain onto inlet camshaft.
- Fit timing chain onto exhaust camshaft.
- Fit timing chain onto crankshaft and hold in place.



- Fit guide rail for camshaft timing chain and tighten bolts -1-.



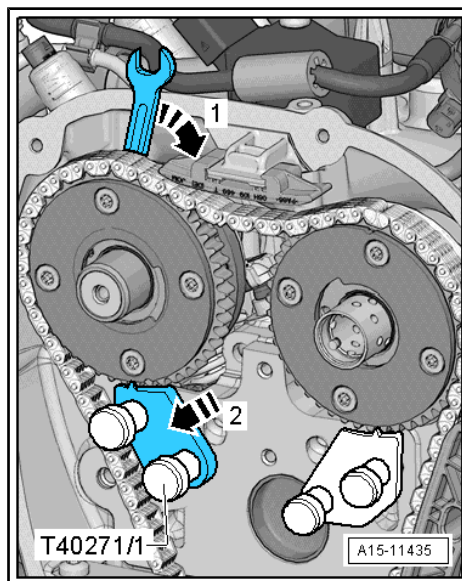
- Install top guide rail -arrow-.



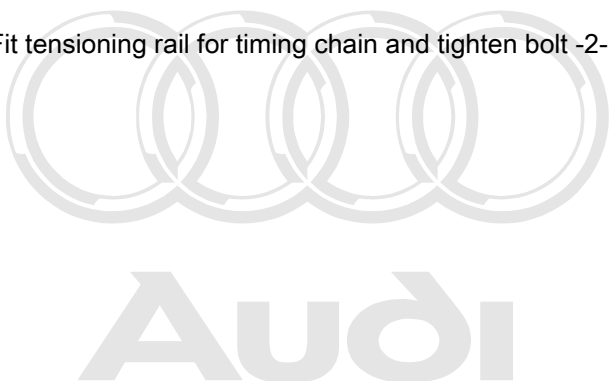
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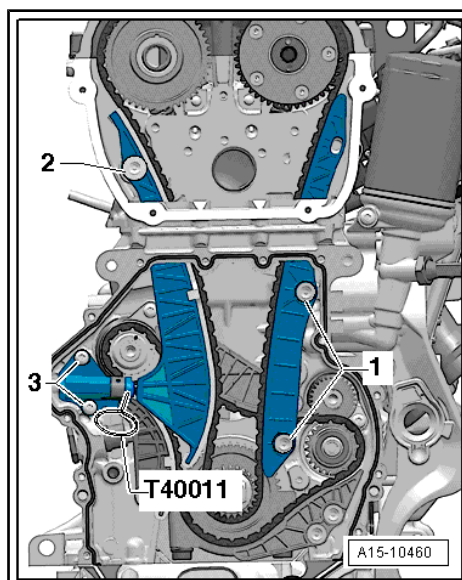
- Turn exhaust camshaft in direction of -arrow 1- and slide camshaft clamp - T40271/1- out of teeth on chain sprocket in direction of -arrow 2- and release camshaft.
- Remove camshaft clamp - T40271/1- .



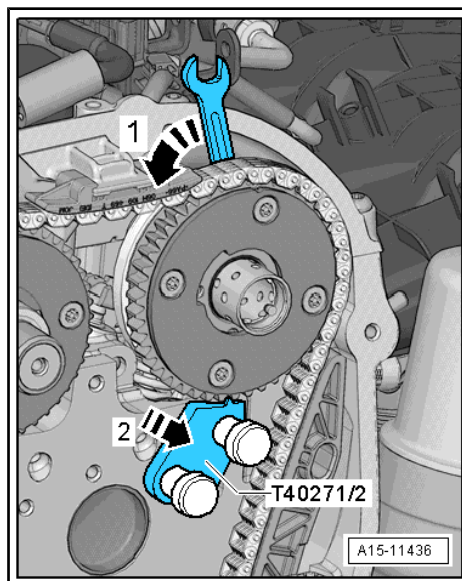
- Fit tensioning rail for timing chain and tighten bolt -2-.



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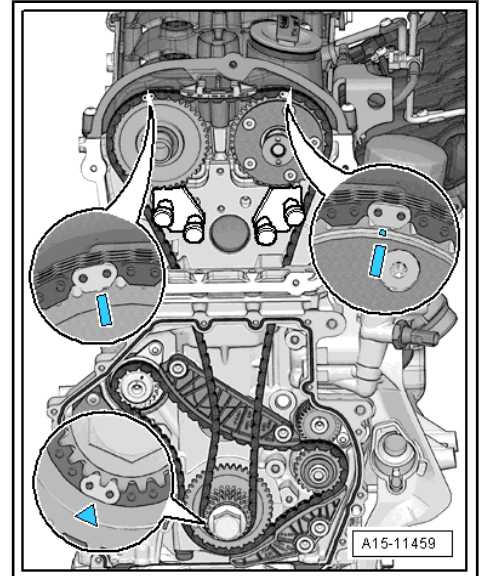
- Turn inlet camshaft in direction of -arrow 1- and slide camshaft clamp - T40271/2- out of teeth on chain sprocket in direction of -arrow 2- and release camshaft.
- Remove camshaft clamp - T40271/2- .



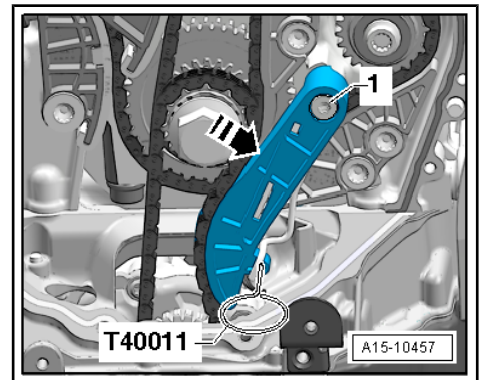
- Check that timing chain links with coloured markings are aligned with markings on chain sprockets.



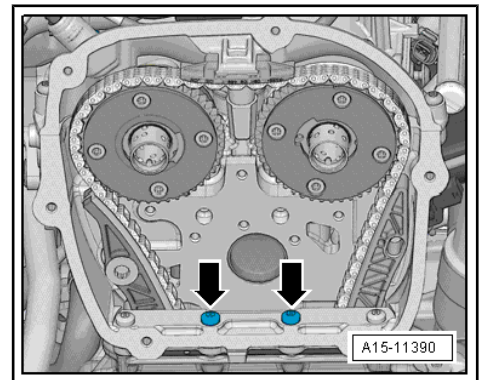
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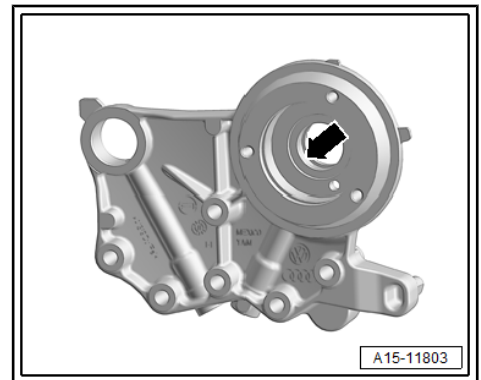
- Install drive chain for oil pump and chain tensioner. Tighten bolt -1- and remove locking pin - T40011- .



- Fit and tighten bolts -arrows-.



- Lubricate hole -arrow- with engine oil.



**WARNING**

Risk of damage to bearing saddle.

- ◆ *Detach bearing saddle carefully without tilting it.*

- Attach bearing saddle and screw in bolts -arrows- hand-tight.
- Depending on version, remove locking pin - T40011- or locking tool - T40267- .
- Tighten bolts -arrows- for bearing saddle ⇒ [page 96](#) .
- Install timing valve ⇒ [Item 6 \(page 96\)](#) .

Further assembly is basically carried out in reverse order of dismantling. Note the following:

- Install timing chain cover (bottom) ⇒ [page 89](#) .
- Install timing chain cover (top) ⇒ [page 89](#) .
- Reset service position ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Setting service position and returning to normal position .

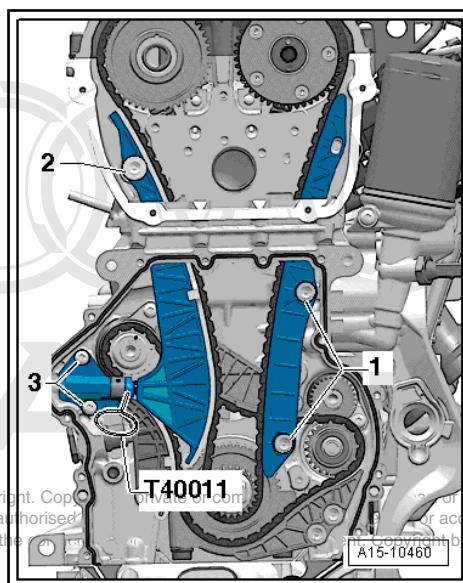
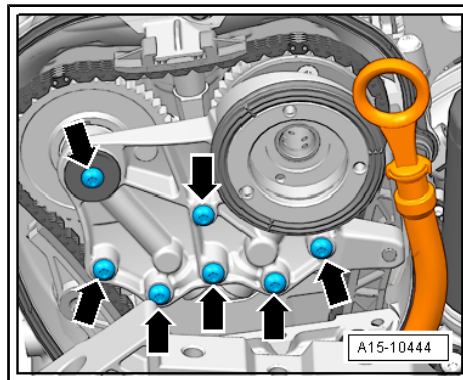
Tightening torques

- ◆ ⇒ ["2.1 Exploded view - camshaft timing chains", page 96](#)
- ◆ ⇒ ["3.1.2 Exploded view - cylinder head \(2.0 ltr. engine with assembly clearance feature\)", page 120](#)

2.5 Removing and installing drive chain for balance shaft

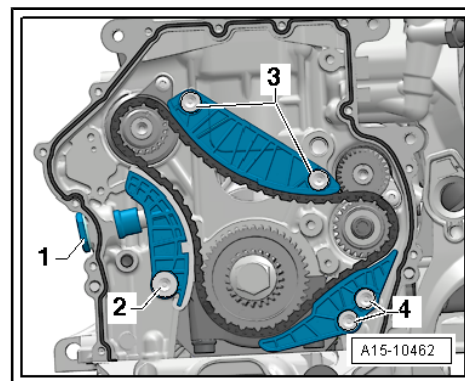
Removing

- Remove timing chain cover (top) ⇒ [page 89](#) .
- Remove timing chain cover (bottom) ⇒ [page 89](#) .
- Remove camshaft timing chain ⇒ [page 103](#) .
- Remove chain tensioner for camshaft timing chain -3-.



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- Remove chain tensioner for drive chain for balance shaft -1-.
- Remove tensioning rail -2-.
- Remove guide rail -3-.
- Remove guide rail -4-.
- Remove timing chain.



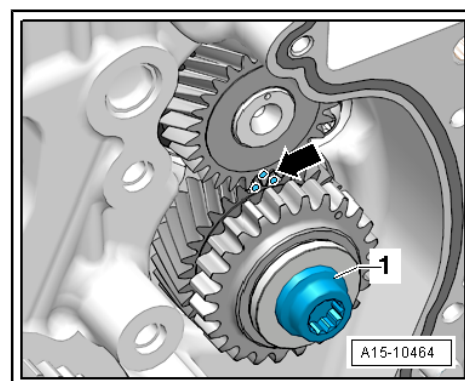
Installing

- Turn idler gear/balance shaft to markings -arrow-.

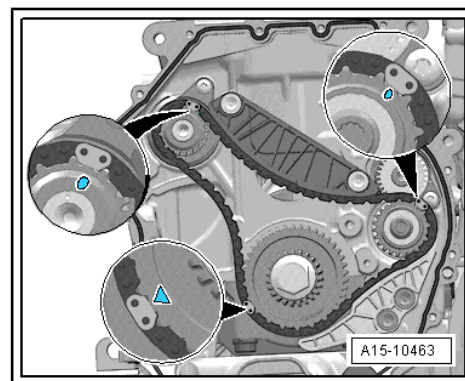


Note

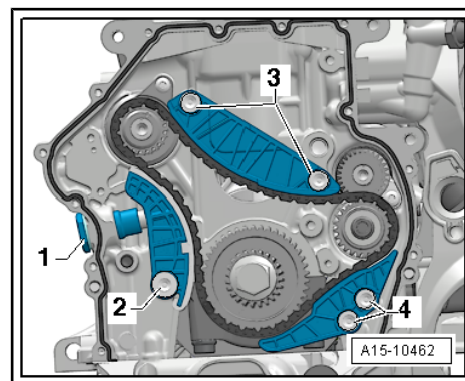
The timing chain links with coloured markings must be positioned at the markings on the chain sprockets.



- Fit timing chain; the timing chain links with coloured markings must be positioned at the markings on the chain sprockets.

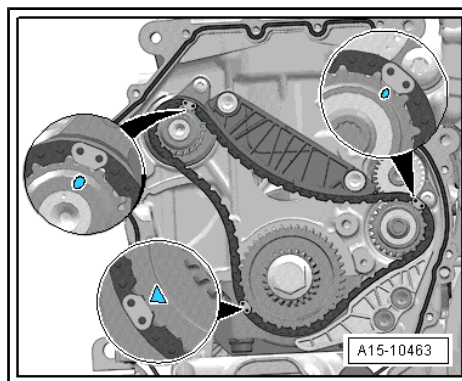


- Fit guide rail for timing chain and tighten bolts -4-.
- Fit guide rail for timing chain and tighten bolts -3-.
- Fit tensioning rail for timing chain and tighten bolt -2-.
- Apply sealant to seal of chain tensioner -1-; for sealant, refer to ⇒ Electronic parts catalogue (ETKA) .
- Screw in chain tensioner for timing chain -1-.





- Check adjustment again.



- Check markings on idler gear/balance shaft -arrow-



Note

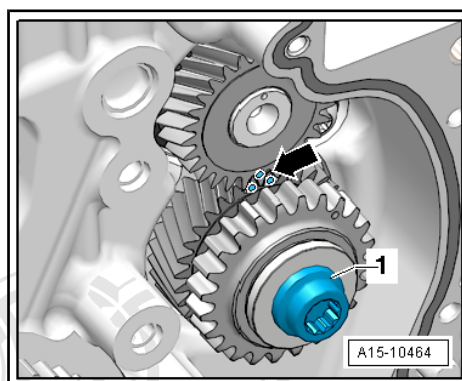
For illustration purposes, the markings on the idler gear/balance shaft are shown with the chain removed.

Further assembly is basically carried out in reverse order of dismantling. Note the following:

- Install camshaft timing chain => [page 103](#) .
- Install timing chain cover (bottom) => [page 89](#) .
- Install timing chain cover (top) => [page 89](#) .

Tightening torques

- ◆ => ["2.2 Exploded view - drive chain for balance shaft", page 97](#)

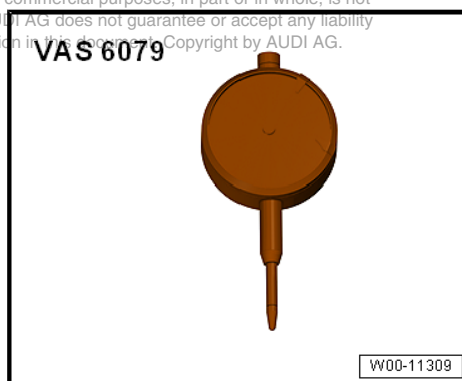


2.6 Checking valve timing

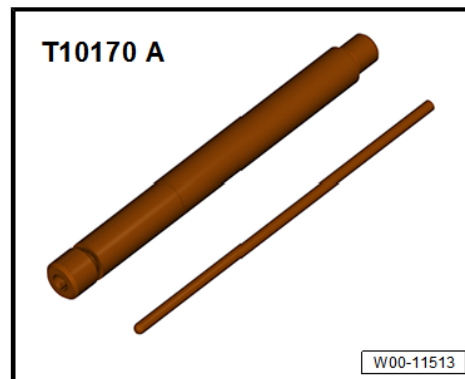
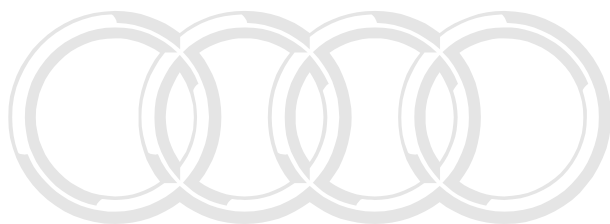
Special tools and workshop equipment required

- ◆ Dial gauge - VAS 6079-

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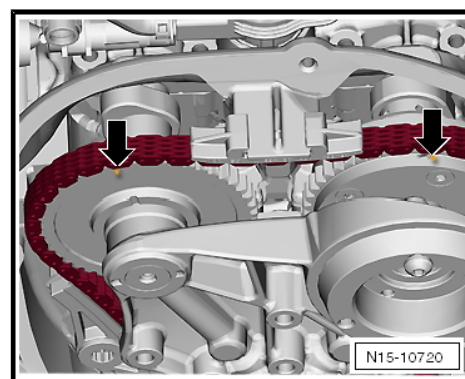


◆ Adapter for dial gauge - T10170 A-

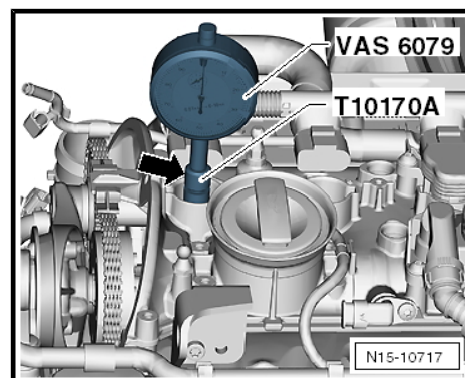


Procedure

- Remove timing chain cover (top) ⇒ [page 89](#) .
- Remove noise insulation ⇒ [General body repairs, exterior, Rep. gr. 66, Noise insulation: Removing and installing noise insulation](#) .
- Using 24 mm socket, turn crankshaft via vibration damper in normal direction of rotation until markings -arrows- are almost at top.
- Remove spark plug on cylinder 1.



- Screw dial gauge adapter - T10170/A- into spark plug thread as far as stop.
- Insert dial gauge - VAS 6079- with extension - T10170A/1- as far as stop and secure with locking nut -arrow-.
- Turn crankshaft slowly in normal direction of engine rotation until needle in dial gauge has reached maximum position. When needle has moved to maximum position (i.e. turning point in dial gauge), piston is at »TDC«.

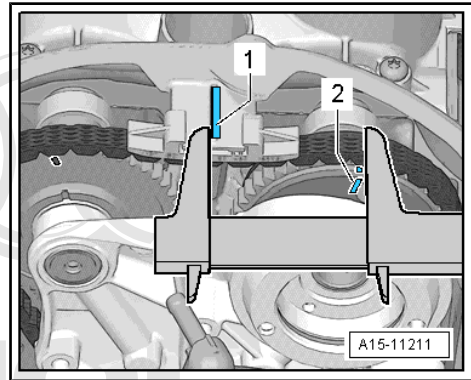


Note

- ◆ *To turn the vibration damper, use a ratchet with 24 mm socket.*
- ◆ *If the crankshaft has been turned beyond the "TDC" position, it must again be turned two rotations in normal direction of engine rotation. Do not turn engine in opposite direction to normal rotation.*

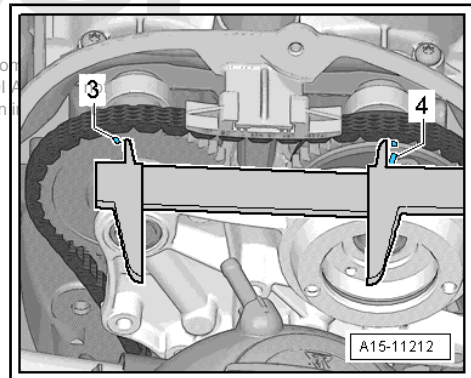


- Measure distance from left outer edge of rib -1- to marking -2- on inlet camshaft.
- Specification: 61 ... 64 mm.



- If specification is obtained, measure distance between marking on exhaust camshaft -3- and marking on inlet camshaft -4-.
- Specification: 124 ... 126 mm.

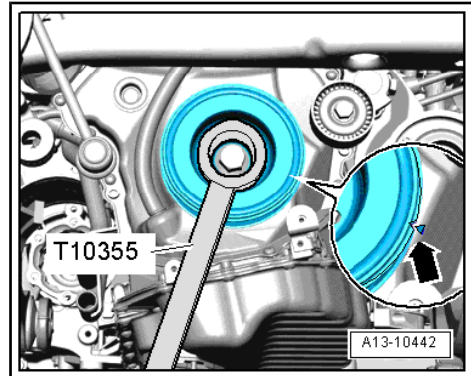
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Note

If the timing chain is one tooth out of position, this results in a deviation of approx. 6 mm from specification. The timing chain must be refitted if it is not in the correct position.

- Notch on vibration damper must align with arrow marking on timing chain cover (bottom) -arrow-.



3 Cylinder head

⇒ [“3.1 Exploded view - cylinder head”, page 117](#)

⇒ [“3.2 Removing and installing cylinder head”, page 126](#)

⇒ [“3.3 Checking compression”, page 173](#)

3.1 Exploded view - cylinder head

⇒ [“3.1.1 Exploded view - cylinder head \(1.8 ltr. engine\)”, page 117](#)

⇒ [“3.1.2 Exploded view - cylinder head \(2.0 ltr. engine with assembly clearance feature\)”, page 120](#)

⇒ [“3.1.3 Exploded view - cylinder head \(2.0 ltr. engine without assembly clearance feature\)”, page 123](#)

3.1.1 Exploded view - cylinder head (1.8 ltr. engine)



Note

- ◆ *Renew the cylinder head bolts.*
- ◆ *During assembly, renew oil seals and gaskets as well as self-locking nuts and bolts that are tightened by turning through to a specified angle.*
- ◆ *The plastic protectors fitted to protect the open valves must only be removed immediately before fitting the cylinder head.*
- ◆ *After fitting a new cylinder head or cylinder head gasket, change the engine oil and coolant.*



1 - Cylinder head gasket

- Renew
- Note installation position: part number must face cylinder head

2 - Bolt

- 25 Nm

3 - Transport plate

4 - Bolt

- Tightening sequence
⇒ [page 120](#)

5 - Cylinder head

- Removing and installing
⇒ [page 126](#)
- Checking for distortion
⇒ [page 120](#)

6 - Cylinder head bolt

- Renew
- Note correct sequence when loosening (1.8 ltr. engine) ⇒ [page 120](#)
- Note correct sequence when tightening (1.8 ltr. engine) ⇒ [page 120](#)

7 - O-ring

- Renew
- Lubricate with engine oil

8 - Sealing plug

- 5 Nm
- With ball head for engine cover panel

9 - Sealing cap

- With seal

10 - O-ring

- Renew
- Lubricate with engine oil

11 - Sealing plug

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12 - To intake manifold

13 - Heat shield

14 - Bolt

- 20 Nm

15 - Bolt

- 20 Nm

16 - To intake manifold/turbocharger

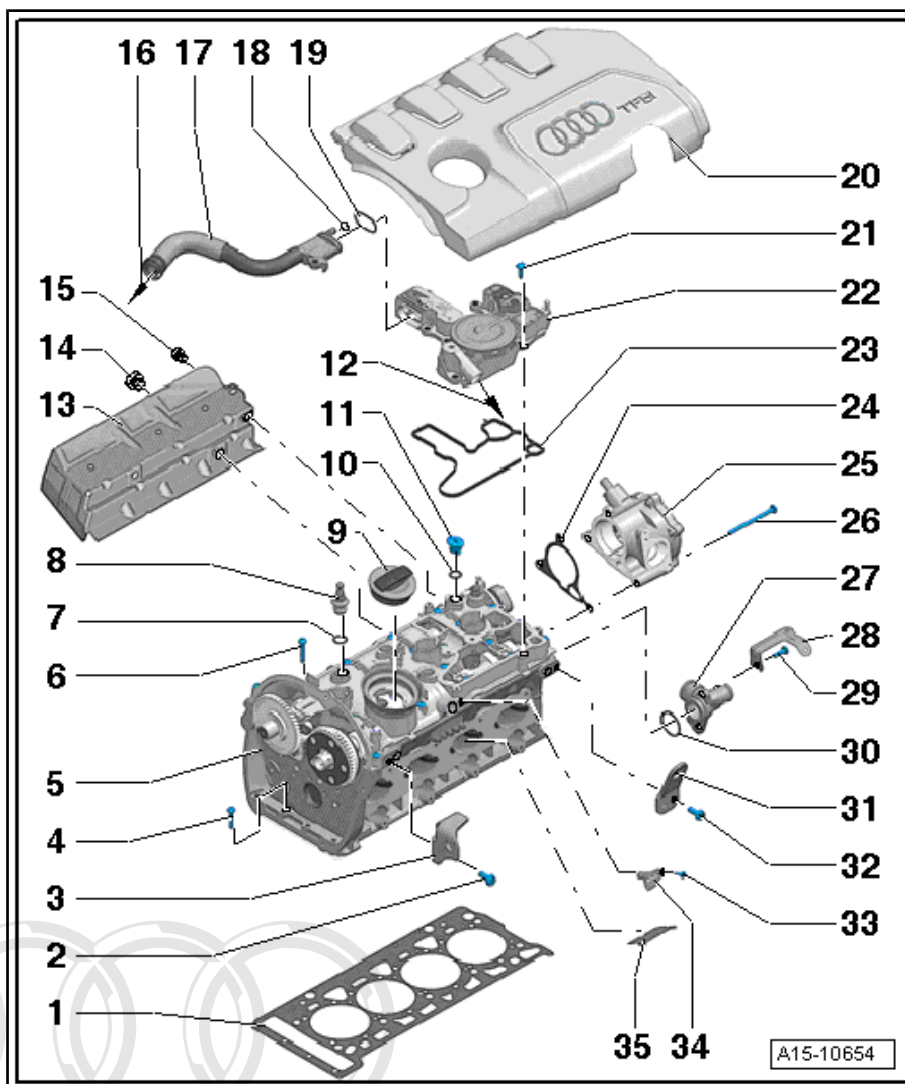
17 - Breather pipe

18 - O-ring

- Not available as replacement part

19 - Seal

- Not available as replacement part



20 - Engine cover panel

21 - Bolt

- Tightening sequence ⇒ [page 119](#)

22 - Crankcase breather

- Note correct sequence when tightening ⇒ [page 119](#)

23 - Gasket

- Not available as replacement part

24 - Gasket

- Renew if damaged

25 - Vacuum pump

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

26 - Bolt

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

27 - Connection

28 - Bracket

29 - Bolt

- 9 Nm

30 - O-ring

- Renew
- Lubricate with coolant

31 - Transport plate

32 - Bolt

- 25 Nm

33 - Bolt

- 9 Nm

34 - Hall sender - G40-

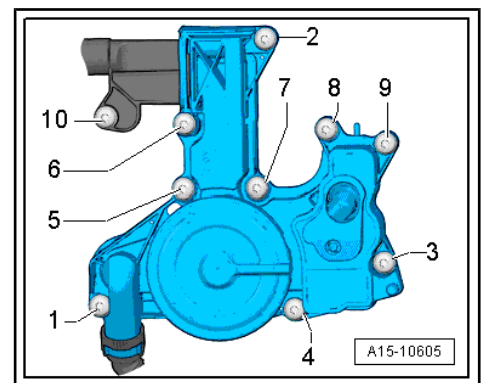
35 - Separating plate

Crankcase breather system - tightening torque



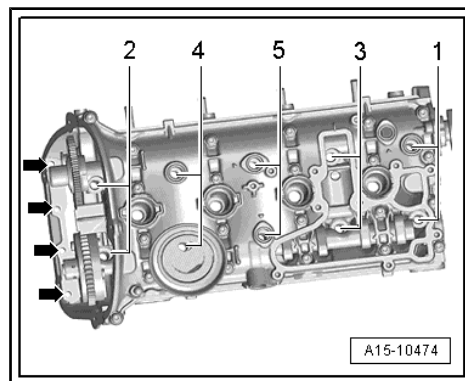
Note

- ◆ *The bolts are thread-forming bolts. When renewing the cylinder head, it is important that you use only genuine bolts since the cylinder head is supplied without threaded holes for attachment of the crankcase breather.*
- ◆ *Do NOT make threaded holes using a thread tap.*
- Tighten bolts for crankcase breather system in the sequence -1 ... 10- to 11 Nm.



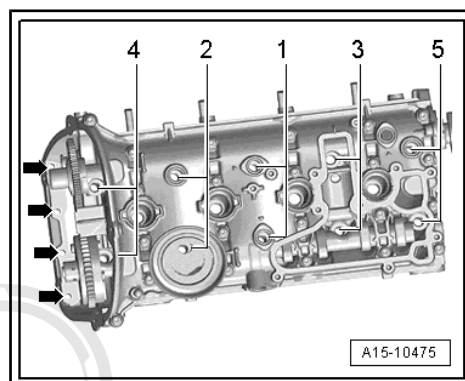
Slackening cylinder head bolts (1.8 ltr. engine)

- Remove bolts -arrows-.
- Slacken cylinder head bolts in the sequence -1 ... 5-.



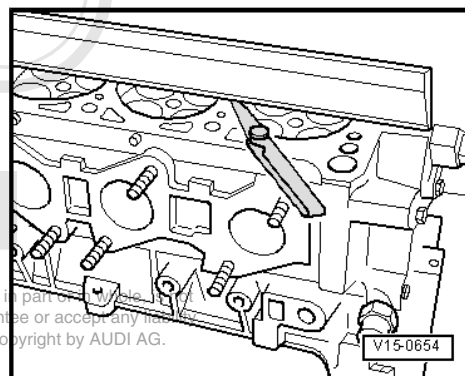
Cylinder head bolts - tightening sequence (1.8 ltr. engine)

- Tighten cylinder head bolts in the sequence -1 ... 5- as follows:
1. Tighten with torque wrench initially to 40 Nm.
 2. Use rigid wrench to turn 90° further.
 3. Use rigid wrench to turn 90° further.
 4. Pre-tighten bolts -arrows- to 8 Nm.
 5. Turn bolts -arrows- 90° further using a rigid wrench.



Checking cylinder head for distortion

- Use straight edge and feeler gauge to measure cylinder head for distortion at several points.
- ◆ Max. permissible distortion: 0.05 mm



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3.1.2 Exploded view - cylinder head (2.0 ltr. engine with assembly clearance feature)



Note

- ◆ *Renew the cylinder head bolts.*
- ◆ *During assembly, renew oil seals and gaskets as well as self-locking nuts and bolts that are tightened by turning through to a specified angle.*
- ◆ *The plastic protectors fitted to protect the open valves must only be removed immediately before fitting the cylinder head.*
- ◆ *After fitting a new cylinder head or cylinder head gasket, change the engine oil and coolant.*

1 - Cylinder head gasket

- Renew
- Note installation position: part number must face cylinder head

2 - Bolt

- 25 Nm

3 - Transport plate

4 - Bolt

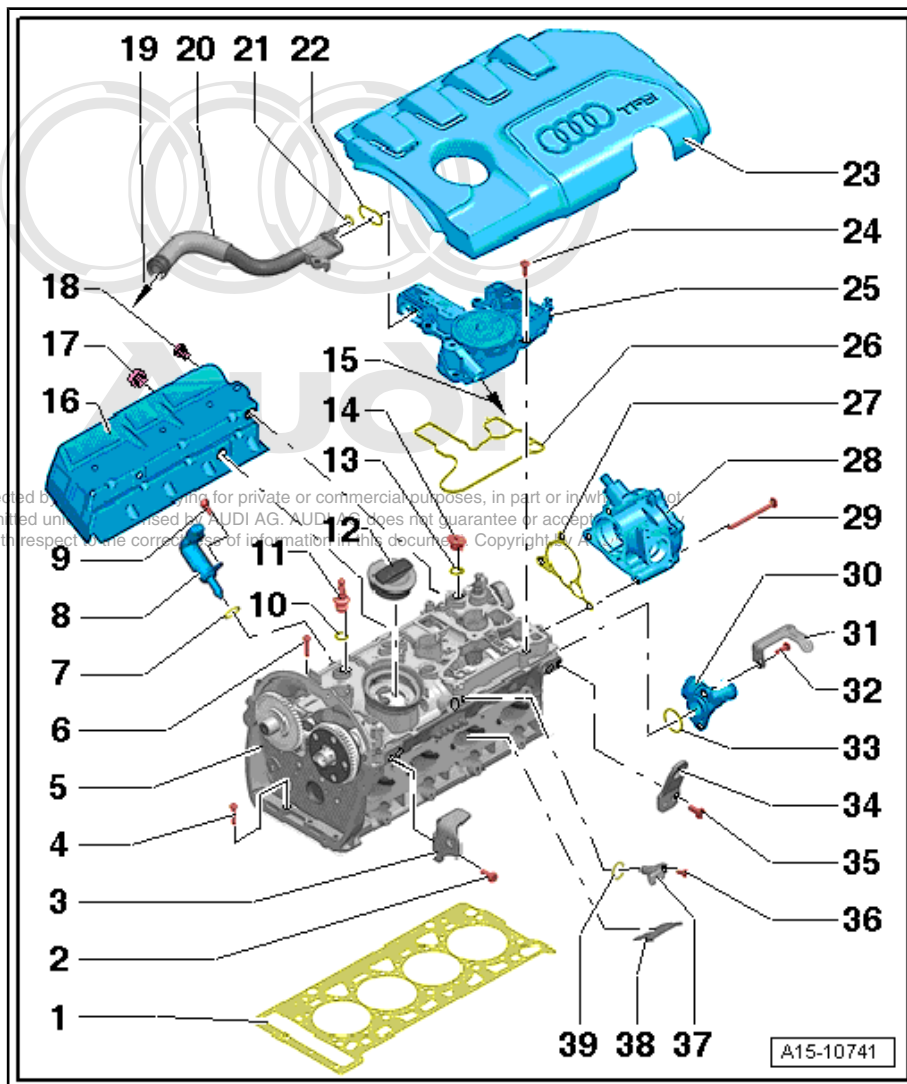
- Tighten in two stages:
 1. Tighten to 8 Nm
 2. Use rigid wrench to turn 90° further

5 - Cylinder head

- Removing and installing ⇒ [page 144](#)
- Checking for distortion ⇒ [page 120](#)

6 - Cylinder head bolt

- Renew
- Note procedure when tightening ⇒ [page 161](#)
- Tighten in three stages:
 1. Tighten to 40 Nm
 2. Use rigid wrench to turn 90° further
 3. Use rigid wrench to turn 90° further



7 - O-ring

- Renew
- Lubricate with engine oil

8 - Actuator for camshaft adjustment

9 - Bolt

- 5 Nm

10 - O-ring

- Renew
- Lubricate with engine oil

11 - Sealing plug

- 5 Nm
- With ball head for engine cover panel

12 - Sealing cap

- With seal

13 - O-ring

- Renew
- Lubricate with engine oil



14 - Sealing plug

15 - To intake manifold

16 - Heat shield

17 - Bolt

- 20 Nm

18 - Bolt

- 20 Nm

19 - To intake manifold/turbocharger

20 - Breather pipe

21 - O-ring

- Not available as replacement part

22 - Seal

- Not available as replacement part

23 - Engine cover panel

24 - Bolt

- Tightening sequence ⇒ [page 119](#)

25 - Crankcase breather

26 - Gasket

- Renew if damaged

27 - Gasket

- Renew if damaged

28 - Vacuum pump

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

29 - Bolt

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

30 - Connection

31 - Bracket

32 - Bolt

- 9 Nm

33 - O-ring

- Renew
- Lubricate with coolant

34 - Transport plate

35 - Bolt

- 25 Nm

36 - Bolt

- 9 Nm

37 - Hall sender - G40-

38 - Separating plate

39 - O-ring

- Renew
- Lubricate with engine oil

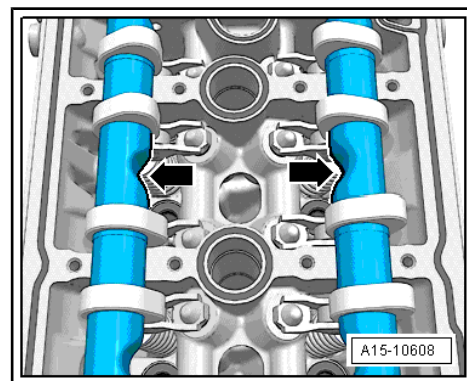


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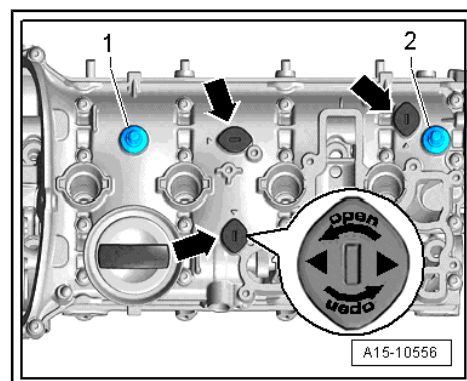
Assembly clearance feature

Camshafts with assembly clearance feature have tool recesses at the points marked with -arrows-.

Camshafts with no assembly clearance feature do not have these recesses.



To check this feature, turn sealing plugs -arrows- anti-clockwise 90° in direction indicated by -arrow- and remove.



3.1.3 Exploded view - cylinder head (2.0 ltr. engine without assembly clearance feature)



Note

- ◆ *Renew the cylinder head bolts.*
- ◆ *During assembly, renew oil seals and gaskets as well as self-locking nuts and bolts that are tightened by turning through to a specified angle.*
- ◆ *The plastic protectors fitted to protect the open valves must only be removed immediately before fitting the cylinder head.*
- ◆ *After fitting a new cylinder head or cylinder head gasket, change the engine oil and coolant.*



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1 - Cylinder head gasket

- Renew
- Note installation position: part number must face cylinder head

2 - Bolt

- 25 Nm

3 - Transport plate

4 - Bolt

- Renew
- Note procedure when loosening ⇒ [page 126](#)
- Note procedure when tightening ⇒ [page 126](#)

5 - Cylinder head

- Removing and installing ⇒ [page 164](#)
- Checking for distortion ⇒ [page 120](#)

6 - Cylinder head bolt

- Renew
- Note procedure when loosening ⇒ [page 126](#)
- Note procedure when tightening ⇒ [page 126](#)

7 - O-ring

- Renew
- Lubricate with engine oil

8 - Actuator for camshaft adjustment

9 - Bolt

- 5 Nm

10 - O-ring

- Renew
- Lubricate with engine oil

11 - Sealing plug

- 5 Nm
- With ball head for engine cover panel

12 - Sealing cap

- With seal

13 - O-ring

- Renew
- Lubricate with engine oil

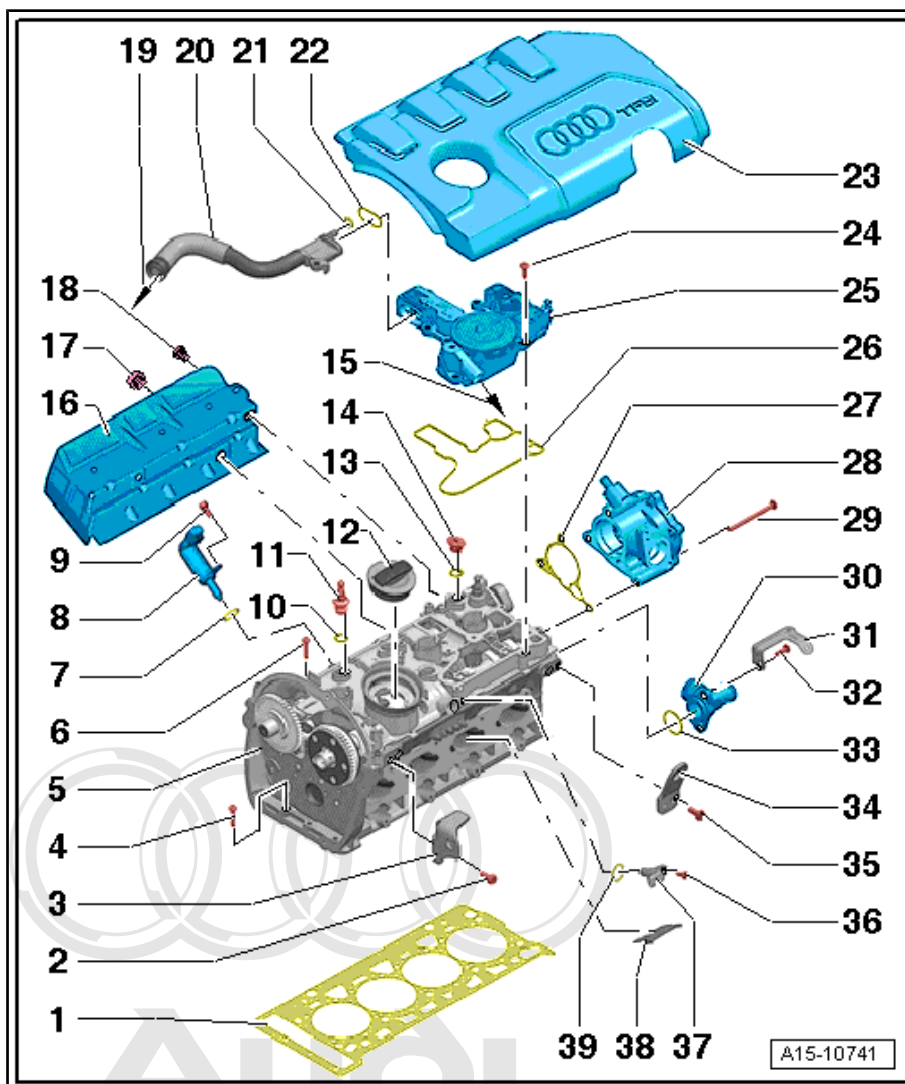
14 - Sealing plug

15 - To intake manifold

16 - Heat shield

17 - Bolt

- 20 Nm



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18 - Bolt

- 20 Nm

19 - To intake manifold/turbocharger

20 - Breather pipe

21 - O-ring

- Not available as replacement part

22 - Seal

- Not available as replacement part

23 - Engine cover panel

24 - Bolt

- Tightening sequence ⇒ [page 119](#)

25 - Crankcase breather

26 - Gasket

- Renew if damaged

27 - Gasket

- Renew if damaged

28 - Vacuum pump

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

29 - Bolt

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

30 - Connection

31 - Bracket

32 - Bolt

- 9 Nm

33 - O-ring

- Renew
- Lubricate with coolant

34 - Transport plate

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35 - Bolt

- 25 Nm

36 - Bolt

- 9 Nm

37 - Hall sender - G40-

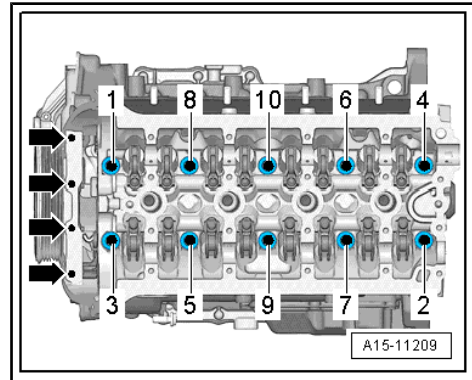
38 - Separating plate

39 - O-ring

- Renew
- Lubricate with engine oil

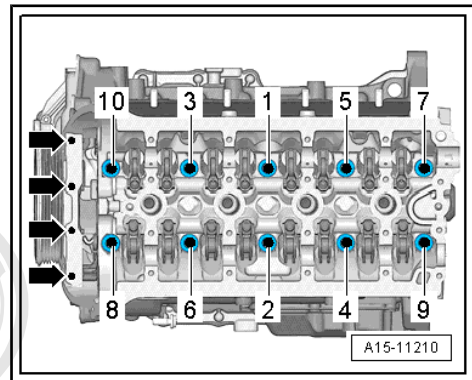
Slackening cylinder head bolts

- Remove bolts -arrows-.
- Slacken cylinder head bolts in the sequence -1 ... 10-.



Tightening sequence for cylinder head

- Tighten cylinder head bolts in the sequence -1 ... 10- as follows:
1. Tighten with torque wrench initially to 40 Nm.
 2. Use rigid wrench to turn 90° further.
 3. Use rigid wrench to turn 90° further.
 4. Pre-tighten bolts -arrows- to 8 Nm.
 5. Turn bolts -arrows- 90° further using a rigid wrench.



3.2 Removing and installing cylinder head

⇒ [“3.2.1 Removing and installing cylinder head \(1.8 ltr. engine\)”, page 126](#)

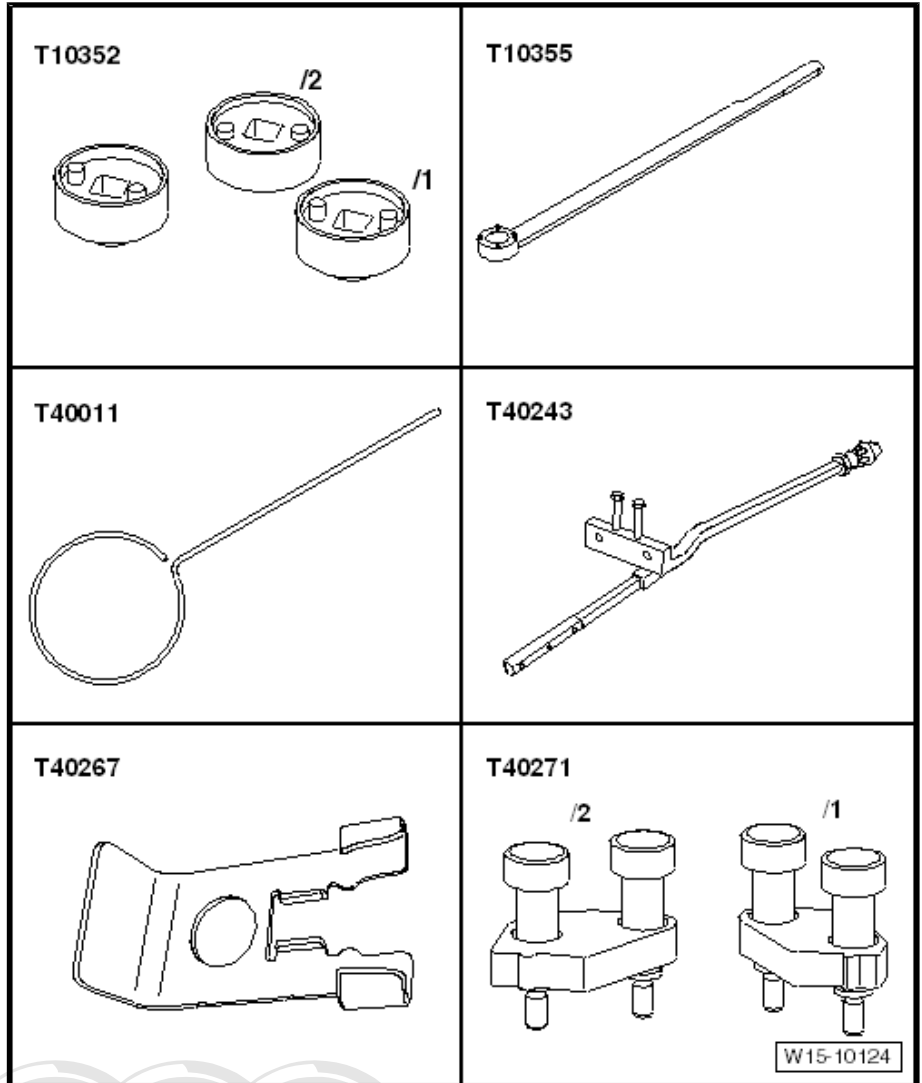
⇒ [“3.2.2 Removing and installing cylinder head \(2.0 ltr. engine with assembly clearance feature\)”, page 144](#)

⇒ [“3.2.3 Removing and installing cylinder head \(2.0 ltr. engine without assembly clearance feature\)”, page 164](#)

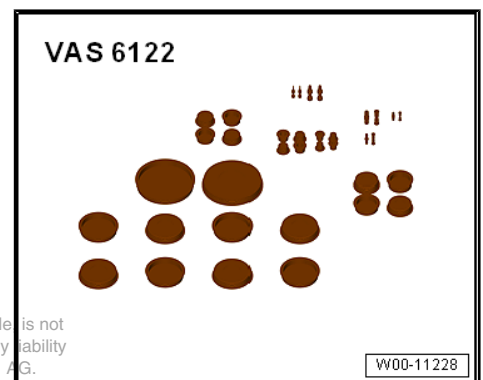
3.2.1 Removing and installing cylinder head (1.8 ltr. engine)

Special tools and workshop equipment required

- ◆ Assembly tool - T10352-
- ◆ Counterhold tool - T10355-
- ◆ Locking pin - T40011-
- ◆ Assembly lever - T40243-
- ◆ Locking tool - T40267-
- ◆ Camshaft clamp - T40271-



- ◆ Engine bung set - VAS 6122-



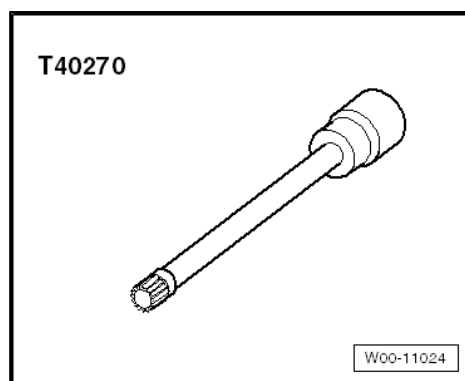
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- ◆ Special wrench (Polydrive) - T10070-



- ◆ Bit XZN 12 - T40270-



Removing



Note

- ◆ *Fit cable ties in the original positions when installing.*
- ◆ *All open inlet and exhaust ports must be sealed with suitable plugs (e.g. from engine bung set - VAS 6122-).*
- Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .



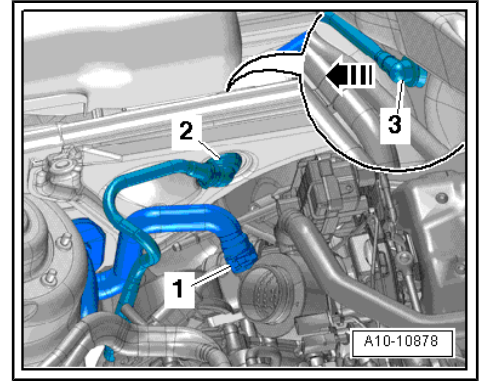
WARNING

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.***

- Drain coolant ⇒ [page 247](#) .
- Remove front exhaust pipe/front silencer ⇒ [page 374](#) .
- Remove engine cover panel ⇒ [page 37](#) .
- Remove plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .

- Disconnect vacuum hose -3- on rear of plenum chamber partition panel -arrow- and detach vacuum connection -2- from plenum chamber partition panel.
- Disconnect coolant hoses on rear of cylinder head.

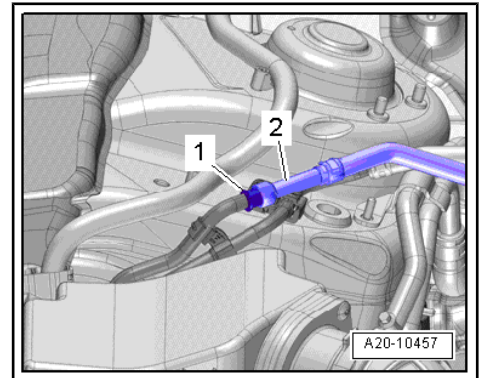


- Disconnect fuel lines -1 and 2-.

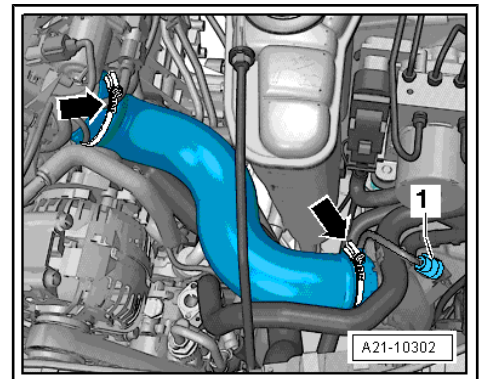


Caution

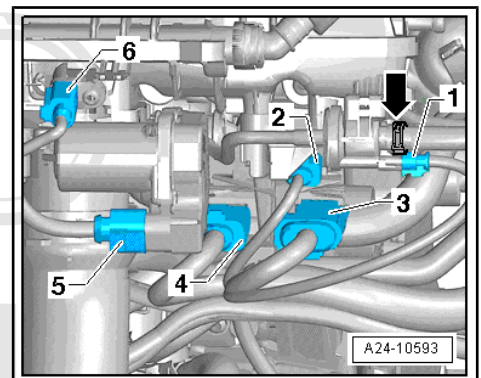
Observe rules for cleanliness when working on the fuel supply system.



- Set service position ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Setting service position and returning to normal position .
- Remove air cleaner housing ⇒ [page 318](#) .
- Release hose clips -arrows- and detach air hose.



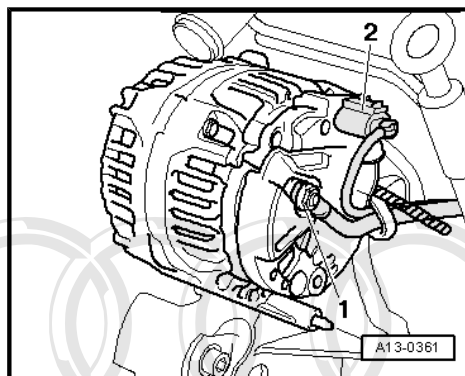
- Unplug the following electrical connectors:
 - 2 - From knock sensor 1 - G61- (unplug and move clear).
 - 3 - From intake manifold flap valve - N316- , fuel pressure sender - G247- and Hall sender - G40-
 - 4 - From injectors
 - 5 - From throttle valve module - J338-
 - 6 - From intake air temperature sender - G42-



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- Unplug electrical connector -2- and move wiring clear.



- Unbolt bracket for coolant pipe -arrow-.

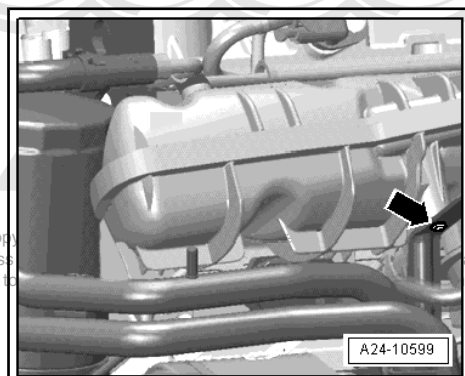


Note

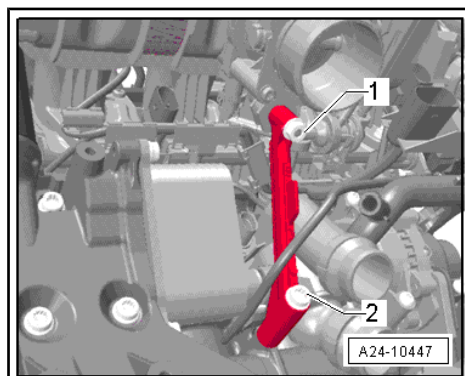
The installation position is shown in the following illustrations with the engine removed.

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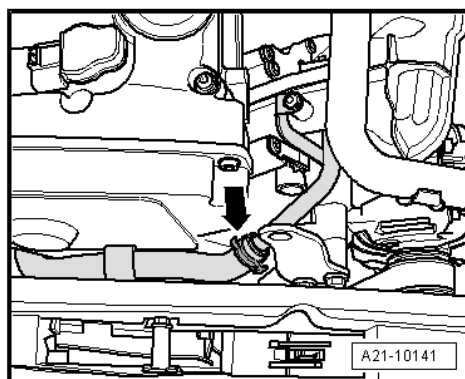
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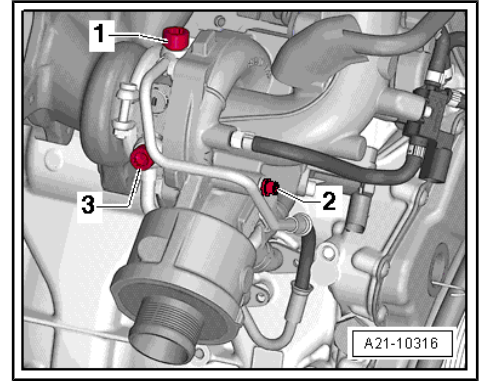
- Remove intake manifold support (remove securing nut -1- and bolt -2-).



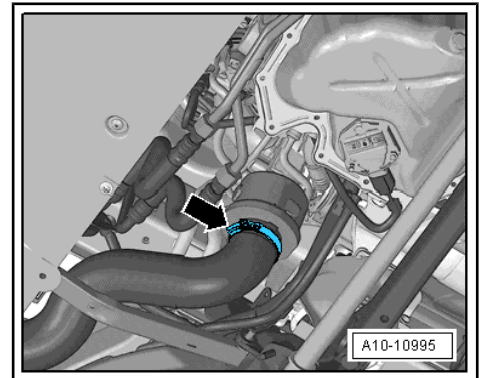
- Disconnect coolant hose -arrow-.



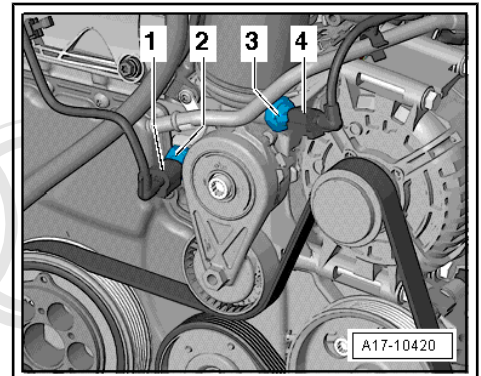
- Unscrew bolts -1 and 2- and move oil supply line clear to one side.
- Unscrew bolt -3- and move coolant pipe clear to one side.



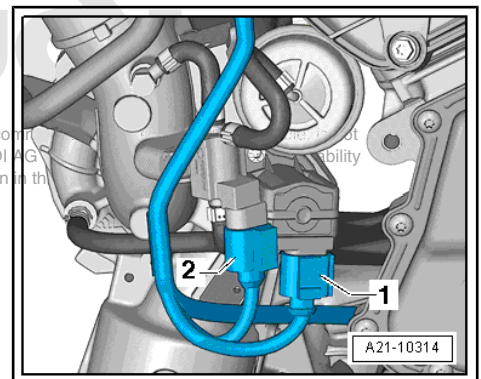
- Open hose clip -arrow-, detach air hose and swivel to side.



- Unplug electrical connectors -1 and 4- from oil pressure switch - F22- and oil pressure switch for reduced oil pressure - F378-.

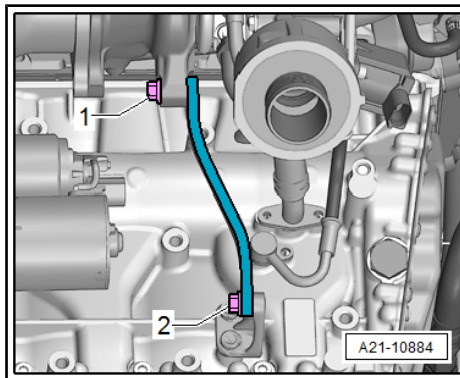


- Unplug electrical connectors -1 and 2- and move wiring clear.

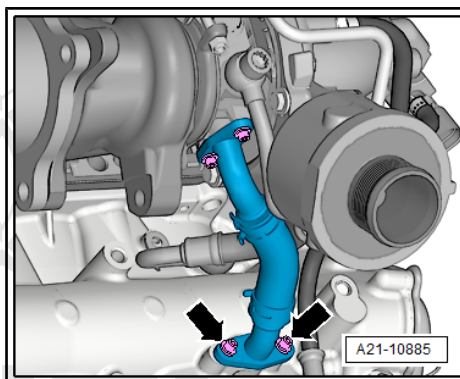


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- Slacken bolts -1- from top.
- Remove bolt -2- from underneath.

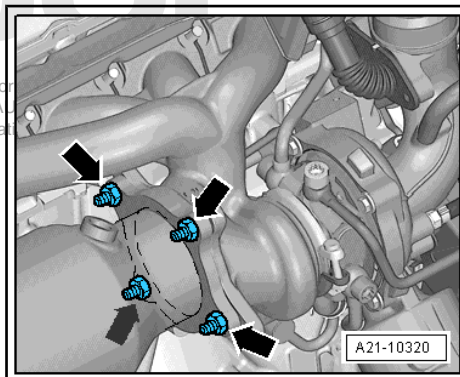


- Remove bolts -arrows- at oil return line.

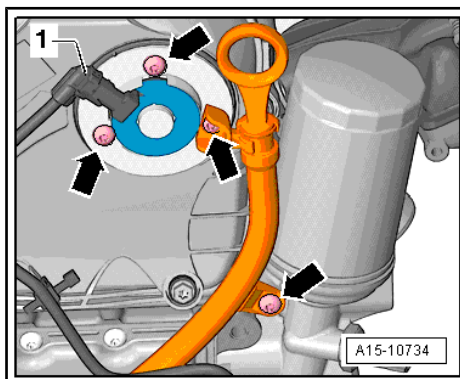


- Unscrew nuts -arrows- and push catalytic converter to rear.

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- Detach connector from camshaft control valve 1 - N205- -1-.
- Unscrew bolts -arrows- and remove camshaft control valve 1 - N205- .



- Unscrew bolts -1 to 5- and remove timing chain cover (top).

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Caution

The timing valve has a left-hand thread.

- Depending on version, turn assembly tool - T10352- or assembly tool - T10352/1A- in direction of -arrow- to remove timing valve.

- Remove bolts -arrows-.



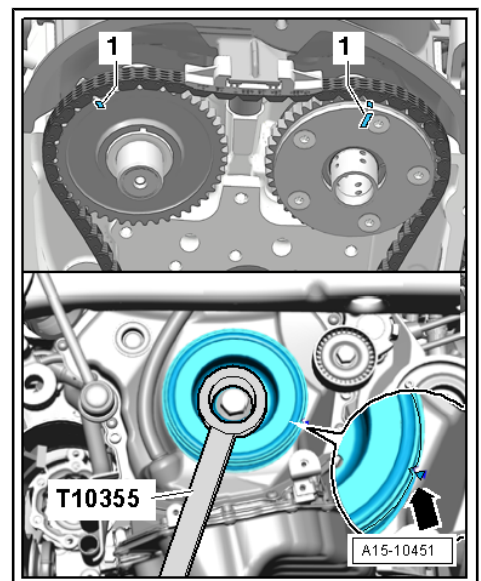
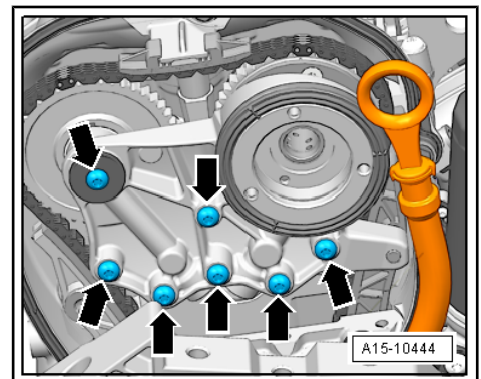
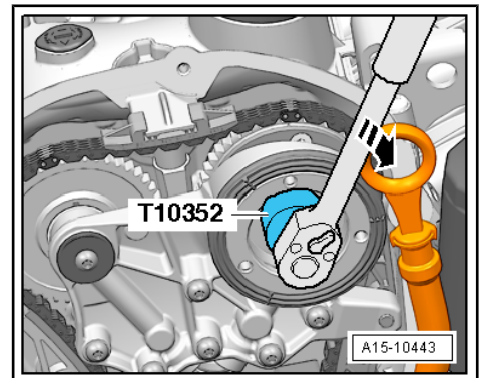
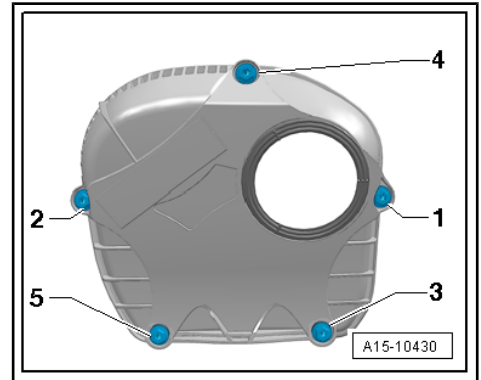
WARNING

Risk of damage to bearing saddle.

◆ *Detach bearing saddle carefully without tilting it.*

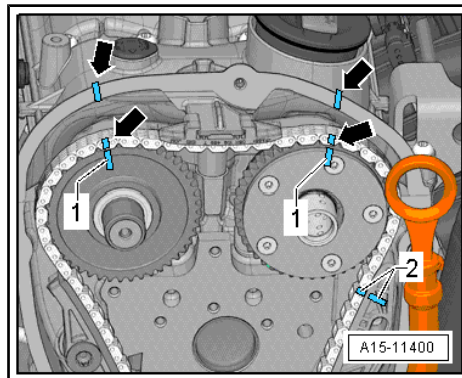
- Detach bearing saddle.

- Turn vibration damper to "TDC" position using counterhold tool - T10355- .
- Notch on vibration damper and marking on cover for timing chains (bottom) must be aligned -arrow-.
- The markings -1- on the camshafts must face upwards.

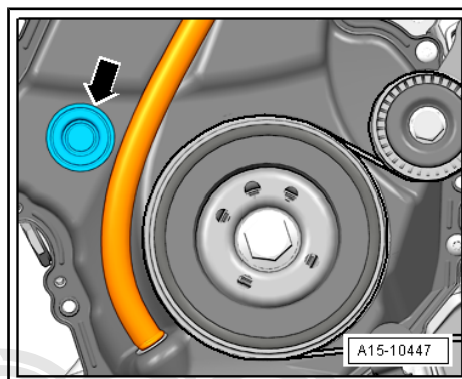




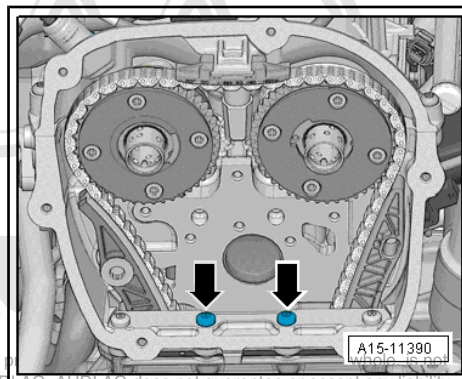
- Use a waterproof pen to mark camshaft timing chain and cylinder head -arrows- relative to markings on chain sprockets -1-.
- Use a waterproof pen to mark camshaft timing chain relative to guide rail of timing chain -2- as well.



- Remove sealing plug -arrow-.

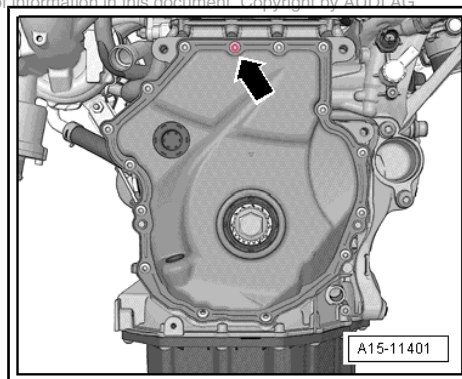


- Remove bolts -arrows-.



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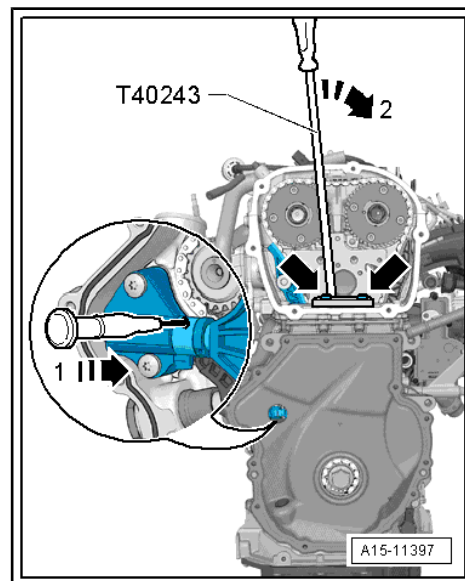
- Remove bolt -arrow-.



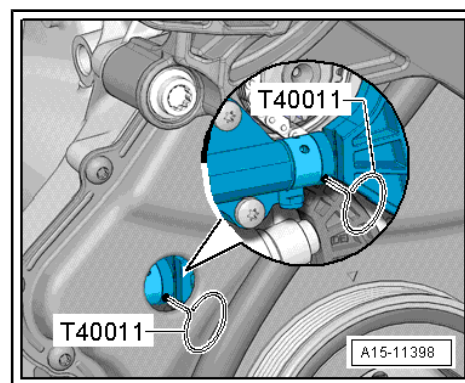
Depending on version, 2 different chain tensioners may be installed.

Version 1

- Screw in assembly lever - T40243- -arrows-.
- Lift locking element for chain tensioner; to do so, insert scribe or suitable screwdriver in hole of chain tensioner in direction of -arrow 1-, press assembly lever - T40243- slowly in direction of -arrow 2- and hold in place.

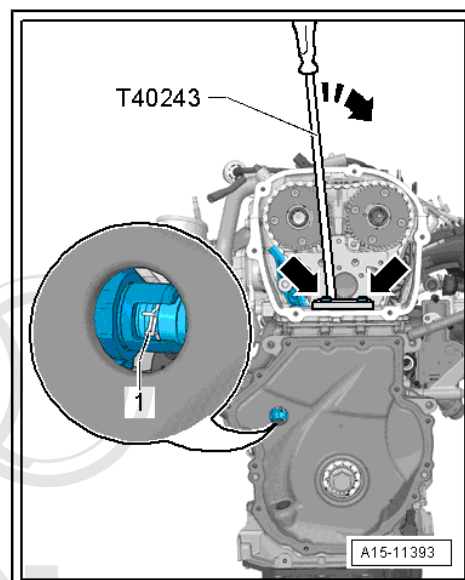


- Hold chain tensioner in position with locking pin - T40011- .



Version 2

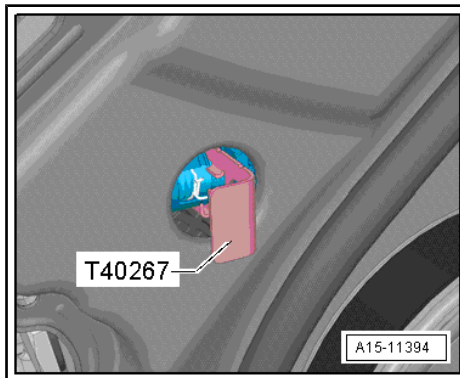
- Screw in assembly lever - T40243- -arrows-.
- Compress circlip -1- for chain tensioner, press lever - T40243- slowly in direction of -arrow- and hold in place.



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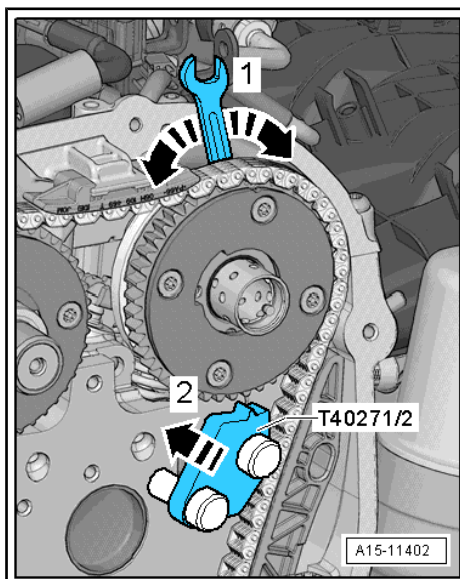


- Hold chain tensioner in position with locking tool - T40267- .

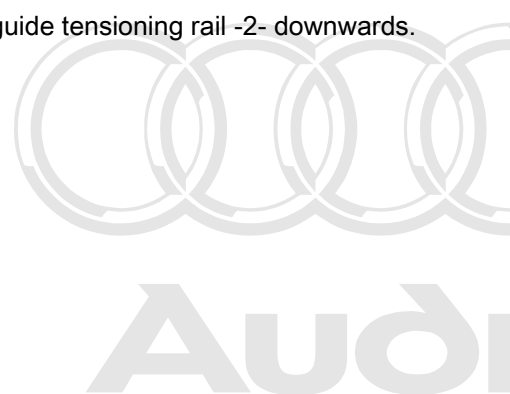
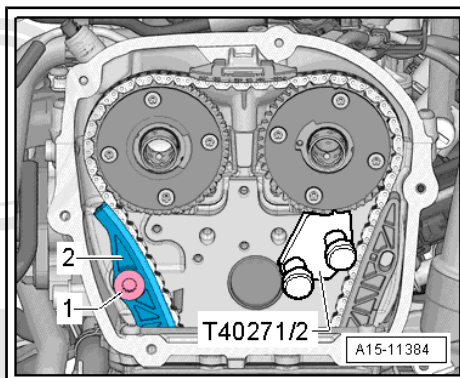


All versions

- Remove assembly lever - T40243- .
- Bolt camshaft clamp - T40271/2- onto cylinder head and slide into teeth on chain sprocket in direction of -arrow 2-; if necessary, use spanner to turn inlet camshaft in direction of -arrow 1-.

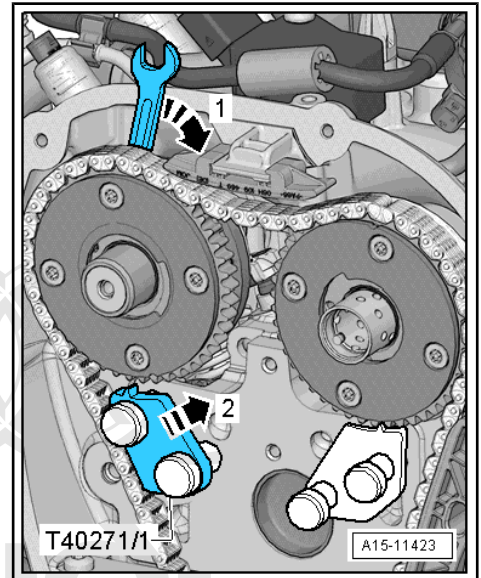


- Remove bolt -1- and guide tensioning rail -2- downwards.




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- Bolt camshaft clamp - T40271/1- onto cylinder head.
- Use spanner to turn exhaust camshaft in direction of -arrow 1- and slide camshaft clamp - T40271/1- into teeth on chain sprocket in direction of -arrow 2-.



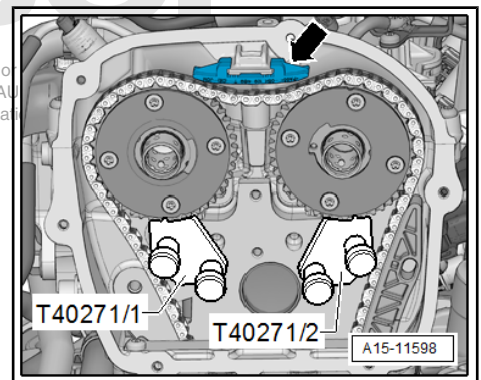
- Use screwdriver to release catch and press off top guide rail -arrow- towards front.
- Remove camshaft timing chain from camshaft sprockets.

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 **Caution**

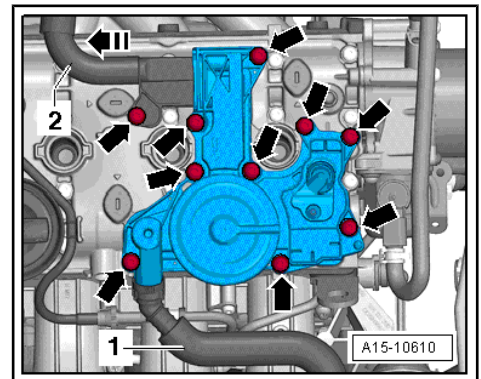
Risk of damage to valves and piston crowns.

◆ *Do not turn the crankshaft after the camshaft timing chain has been removed from the cylinder head.*

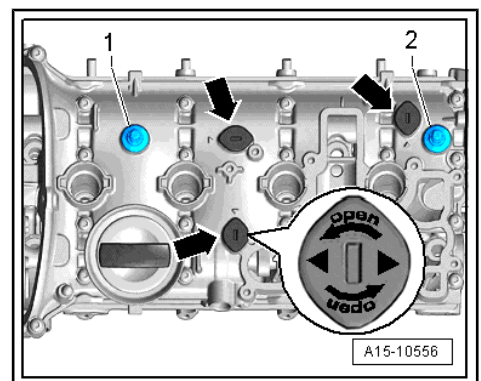


- Remove ignition coils with output stages => [page 388](#) .

- Disconnect crankcase breather hose -1-.
- Remove bolts -arrows-, detach crankcase breather system and disconnect from crankcase breather hose -2- in direction of -arrow-.



- Turn sealing plugs -arrows- 90° anti-clockwise -arrow- and remove.
- Unscrew ball heads -1 ... 2-.
- Detach filler cap.



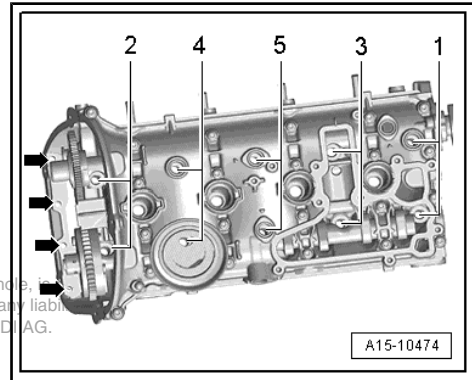


- Remove bolts -arrows-.
- Use special wrench (Polydrive) - T10070- or bit XZN 12 - T40270- to remove cylinder head bolts in the sequence -1 ... 5-.



Note

- ◆ **Make sure all hoses/pipes and wiring on component are disconnected.**
- ◆ **Make sure tensioning rail and guide rail are not damaged when lifting off cylinder head.**



- Take off cylinder head.
- Place cylinder head onto soft surface (foam plastic).

Installing



Caution

Risk of 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.**

Risk of 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.**

Risk of 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.**

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

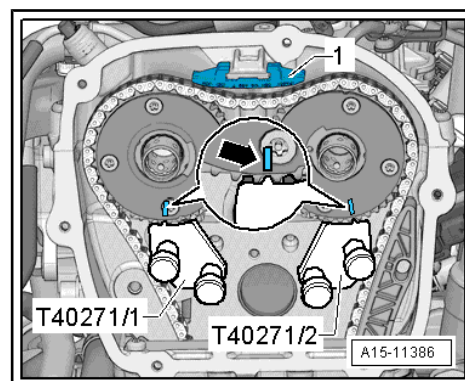
- ◆ **Turn the engine carefully at least 2 rotations to ensure that none of the valves make contact when the starter is operated.**

 **Note**

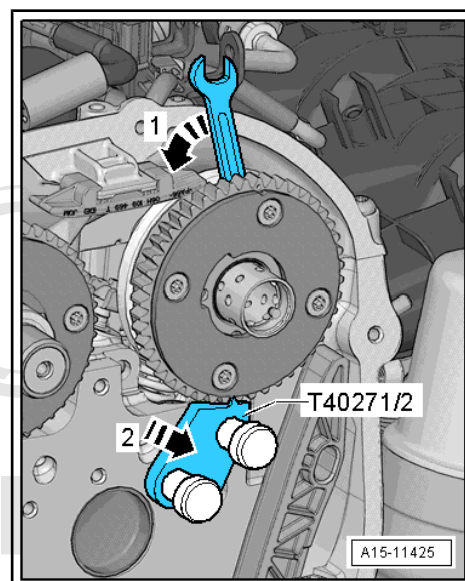
- ◆ *Renew the bolts tightened with specified tightening angle.*
- ◆ *Renew self-locking nuts as well as seals, gaskets and O-rings.*
- ◆ *When installing an exchange cylinder head, the contact surfaces between the hydraulic compensation elements, roller rocker fingers and cams must be oiled before installing the camshafts.*
- ◆ *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 charge air hoses can be properly secured at their connections, spray rust remover onto the worm thread of used hose clips before installing.*
- ◆ *After fitting a new cylinder head or cylinder head gasket, change the engine oil and the coolant in the entire cooling system.*

If using a new cylinder head

- Mark camshaft chain sprockets relative to camshaft clamp - T40271/1- and camshaft clamp - T40271/2- -arrows-.



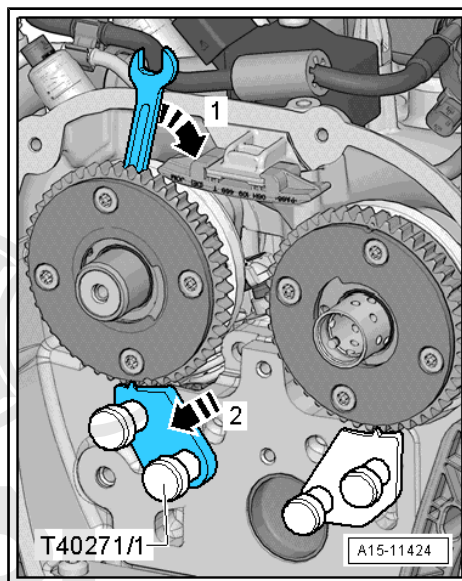
- Use spanner to turn inlet camshaft in direction of -arrow 1- and slide camshaft clamp - T40271/2- out of teeth on chain sprocket in direction of -arrow 2- and move camshaft into rest position.
- Remove camshaft clamp - T40271/2- .



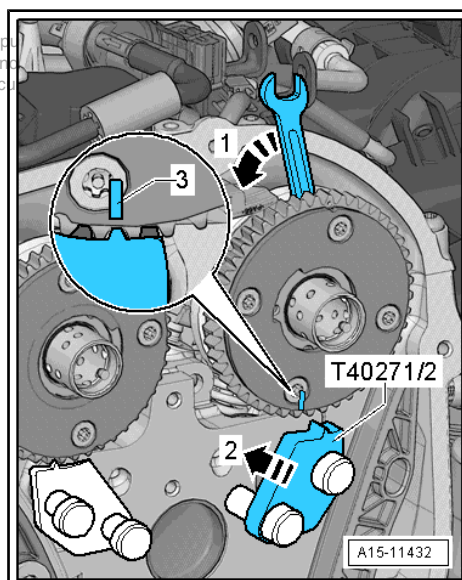
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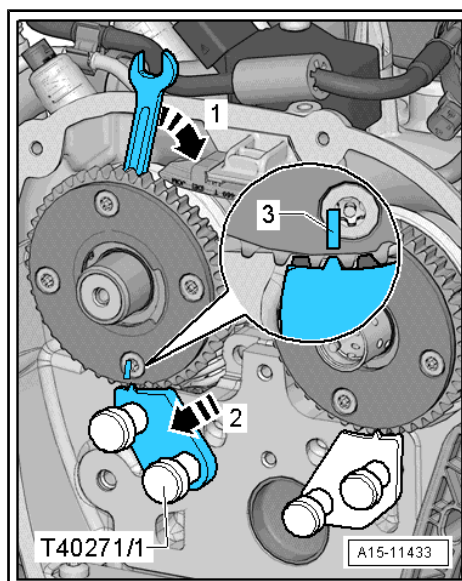
- Use spanner to turn exhaust camshaft in direction of -arrow 1- and slide camshaft clamp - T40271/1- out of teeth on chain sprocket in direction of -arrow 2- and move camshaft into rest position.
- Remove camshaft clamp - T40271/1- .
- Transfer markings made on old camshafts onto new camshafts.



- Bolt camshaft clamp - T40271/2- onto cylinder head.
- Turn inlet camshaft in direction of -arrow 1- until marking -3- aligns with camshaft clamp - T40271/2- .
- Slide camshaft clamp - T40271/2- into teeth of chain sprocket in direction of -arrow 2-.




- Bolt camshaft clamp - T40271/1- onto cylinder head.
- Turn exhaust camshaft in direction of -arrow 1- until marking -3- aligns with camshaft clamp - T40271/1- .
- Slide camshaft clamp - T40271/1- into teeth of chain sprocket in direction of -arrow 2-.



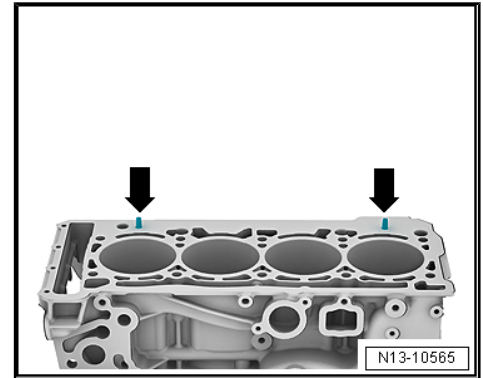
All vehicles:

- Place cylinder head gasket in position.
- ◆ Note position of centring pins in cylinder block -arrows-.
- ◆ Note installation position of cylinder head gasket. Part No. should be legible from inlet side.



WARNING

Make sure that components are not damaged by the timing chain when rotating the crankshaft.



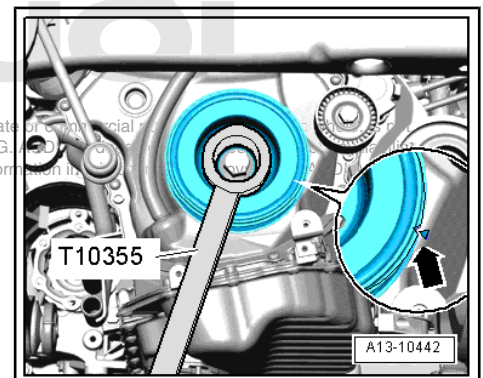
- If crankshaft has been rotated: set No. 1 cylinder piston to top dead centre and then turn crankshaft back slightly.
- Fit cylinder head.
- Insert and hand-tighten cylinder head bolts.
- Tightening sequence for cylinder head
 => Fig. [“Cylinder head bolts - tightening sequence \(1.8 ltr. engine\)”](#), page 120

 **Note**

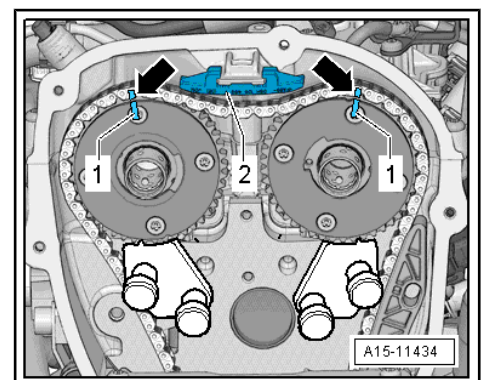
Cylinder head bolts do not have to be torqued down again later after repair work.

- Turn vibration damper to “TDC” position -arrow- using counterhold tool - T10355- .
- Notch on vibration damper must align with arrow marking on cover for timing chains (bottom).

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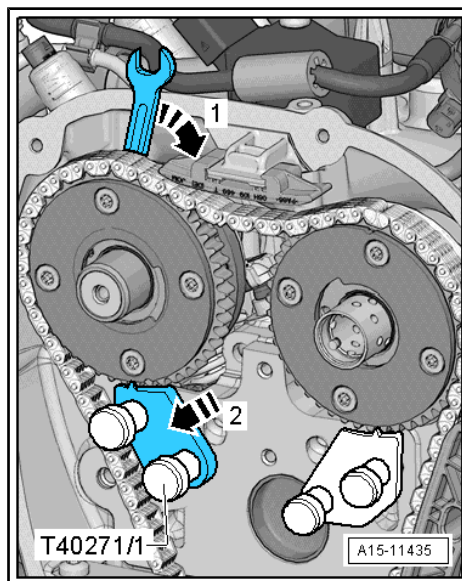


- Fit timing chain; to do so, position markings on chain links -arrows- at markings on chain sprockets -1-.
- Install top guide rail -2-.

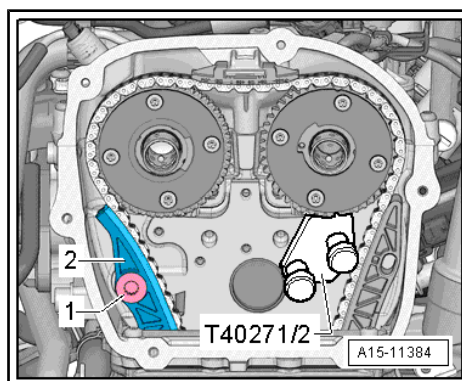




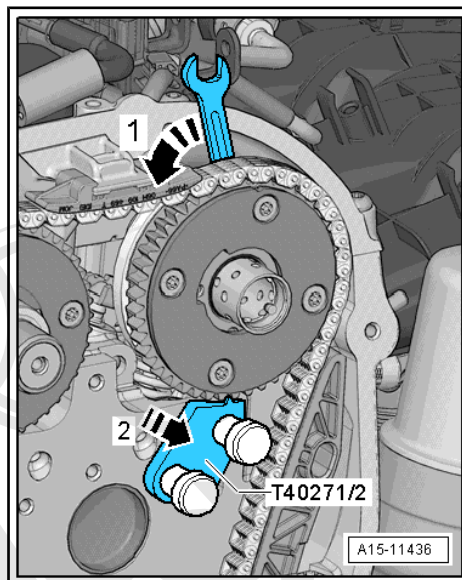
- Turn exhaust camshaft in direction of -arrow 1- and slide camshaft clamp - T40271/1- out of teeth on chain sprocket in direction of -arrow 2- and release camshaft.
- Remove camshaft clamp - T40271/1- .



- Move guide rail -2- upwards and screw in bolt -1-.



- Turn inlet camshaft in direction of -arrow 1- and slide camshaft clamp - T40271/2- out of teeth on chain sprocket in direction of -arrow 2- and release camshaft.
- Remove camshaft clamp - T40271/2- .



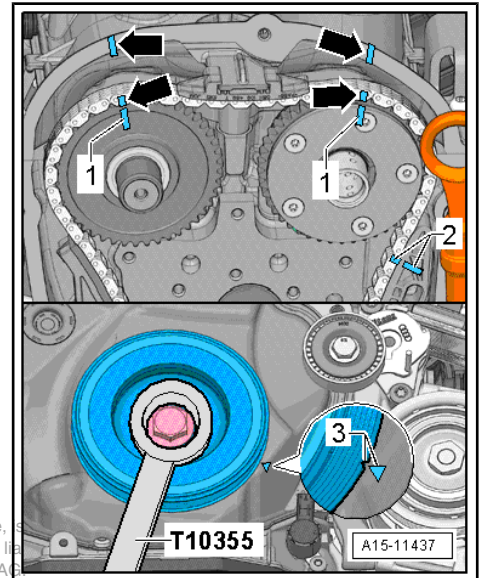
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- Check valve timing; markings on camshaft timing chain and cylinder head -arrows- must align with markings on chain sprockets -1-.
- Markings on camshaft timing chain and on guide rail for camshaft timing chain -2- must be opposite one another.
- Notch on vibration damper must align with marking on cover for timing chain (bottom) -3-.

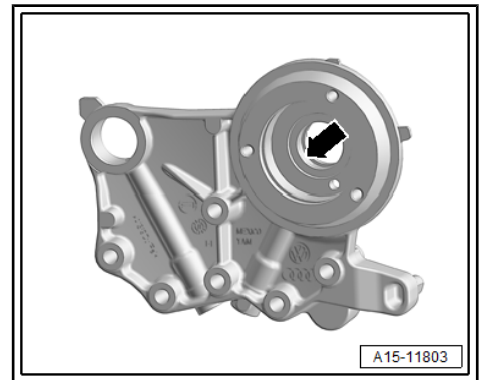
 **Note**


If the markings you have made are no longer visible, check the valve timing ⇒ [page 114](#).

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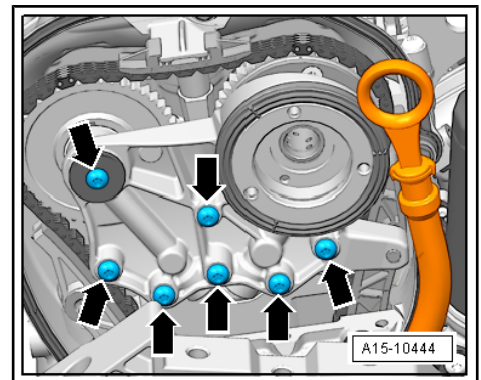


- Lubricate hole -arrow- with engine oil.



 **WARNING**
Risk of damage to bearing saddle.
 ♦ *Detach bearing saddle carefully without tilting it.*

- Attach bearing saddle and screw in bolts -arrows- hand-tight.
- Depending on version, remove locking pin - T40011- or locking tool - T40267- .
- Tighten bolts -arrows- for bearing saddle ⇒ [page 96](#) .

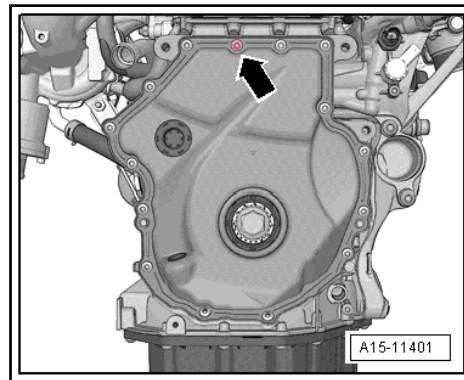




- Screw in bolt -arrow-.
- Install timing valve ⇒ [Item 6 \(page 96\)](#) .

The remaining installation steps are carried out in the reverse sequence. Note the following points:

- Change engine oil: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .
- Install timing chain cover (top) ⇒ [page 89](#) .
- Fill cooling system with fresh coolant ⇒ [page 247](#) .
- Install catalytic converter ⇒ [page 384](#) .
- Install front exhaust pipe/front silencer ⇒ [page 374](#) .
- Install ignition coils with output stages ⇒ [page 388](#) .



WARNING

Never use battery charging equipment for boost starting. There is danger of damaging the vehicle's control units.

Tightening torques

- ◆ ⇒ ["3.1.1 Exploded view - cylinder head \(1.8 ltr. engine\)" - page 117](#)

3.2.2 Removing and installing cylinder head (2.0 ltr. engine with assembly clearance feature)

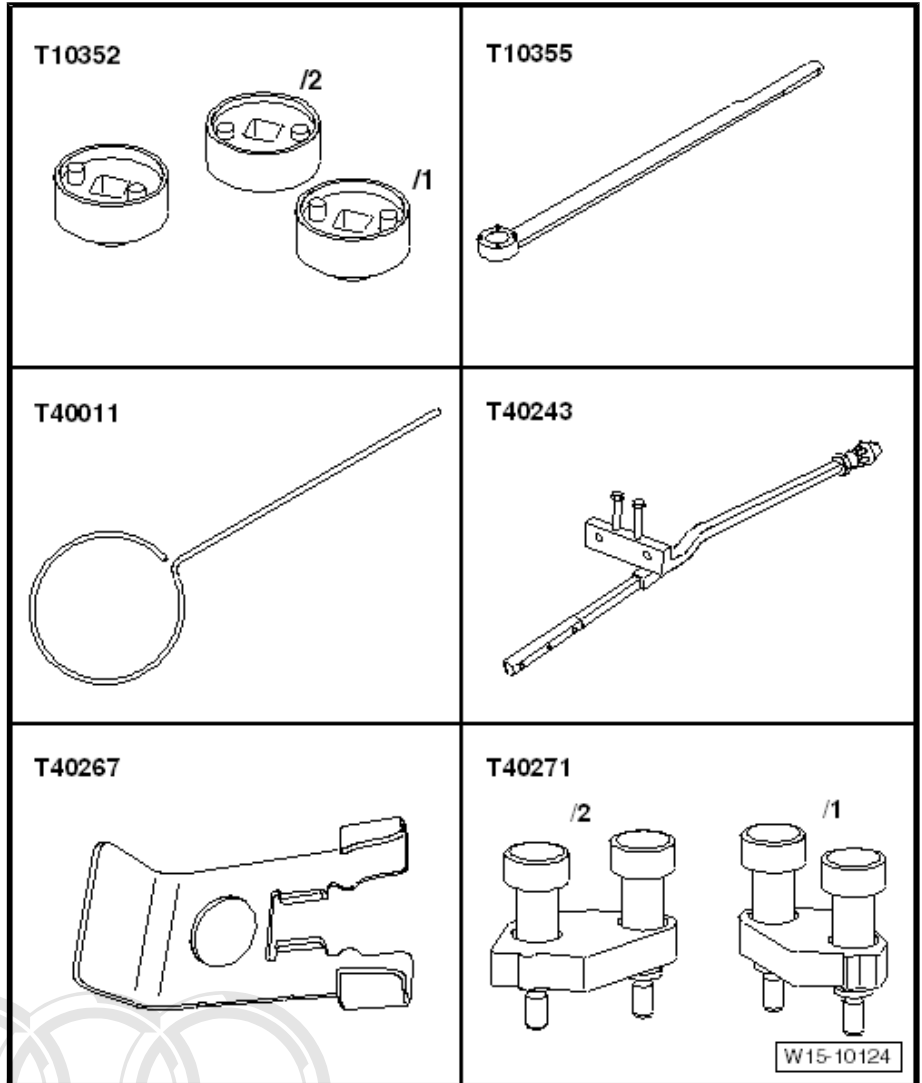


Note

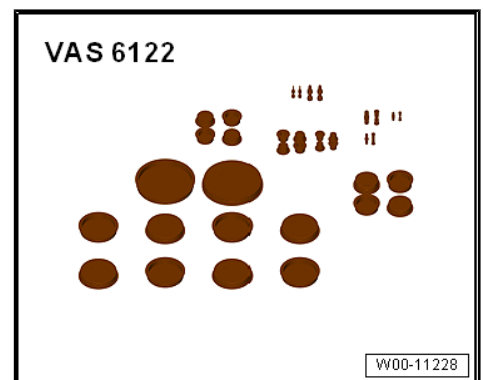
Camshafts with assembly clearance feature are provided with tool recesses ⇒ [page 123](#) .

Special tools and workshop equipment required

- ◆ Assembly tool - T10352-
- ◆ Counterhold tool - T10355-
- ◆ Locking pin - T40011-
- ◆ Assembly lever - T40243-
- ◆ Locking tool - T40267-
- ◆ Camshaft clamp - T40271-



- ◆ Engine bung set - VAS 6122-



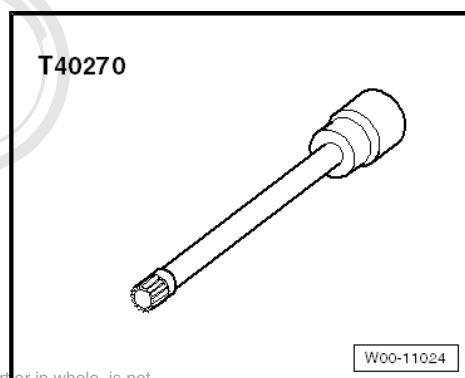
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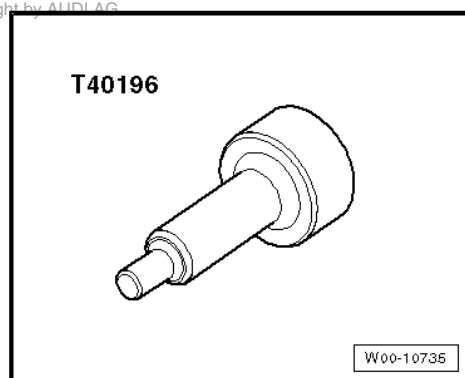
- ◆ Special wrench (Polydrive) - T10070-



- ◆ Bit XZN 12 - T40270-



- ◆ Drift - T40196-



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Removing



Note

- ◆ *Fit cable ties in the original positions when installing.*
- ◆ *All open inlet and exhaust ports must be sealed with suitable plugs (e.g. from engine bung set - VAS 6122-).*
- Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

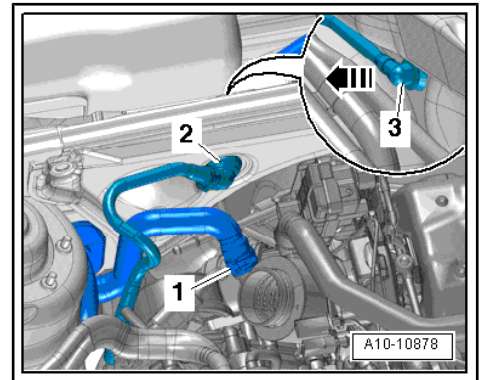


WARNING

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.*

- Drain coolant ⇒ [page 247](#) .
- Remove front exhaust pipe/front silencer ⇒ [page 374](#) .
- Remove engine cover panel ⇒ [page 37](#) .
- Remove plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .
- Disconnect vacuum hose -3- on rear of plenum chamber partition panel -arrow- and detach vacuum connection -2- from plenum chamber partition panel.
- Disconnect coolant hoses on rear of cylinder head.

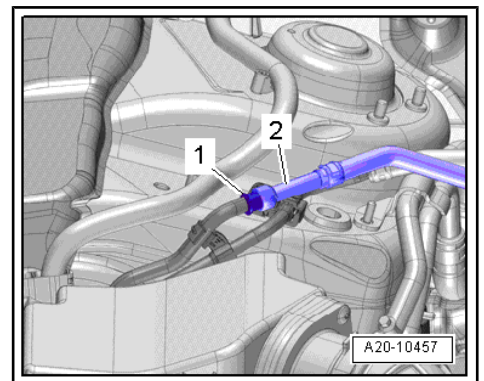


Caution

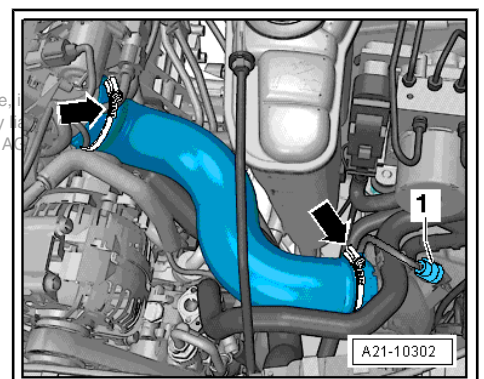
Protect fuel system against contamination.

- ◆ *Rules for cleanliness when working on the injection system ⇒ [page 5](#) .*

- Disconnect fuel lines -1 and 2-.
- Set service position ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Setting service position and returning to normal position .
- Remove air cleaner housing ⇒ [page 318](#) .
- Release hose clips -arrows- and detach air hose.

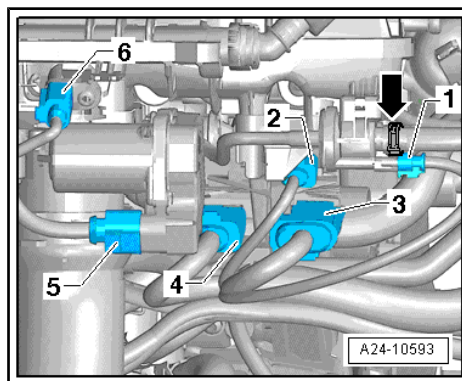


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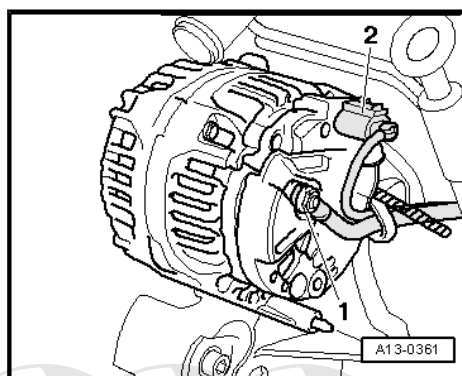




- Unplug the following electrical connectors:
- 2 - From knock sensor 1 - G61- (unplug and move clear).
- 3 - From intake manifold flap valve - N316- , fuel pressure sender - G247- and Hall sender - G40-
- 4 - From injectors
- 5 - From throttle valve module - J338-
- 6 - From intake air temperature sender - G42-



- Unplug electrical connector -2- and move wiring clear.

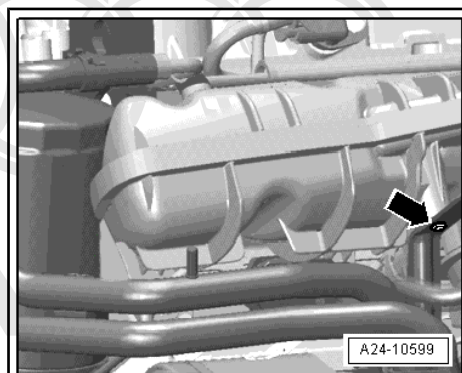


- Unbolt bracket for coolant pipe -arrow-.



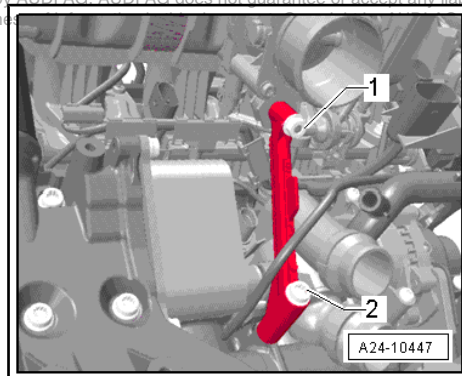
Note

The installation position is shown in the following illustrations with the engine removed.

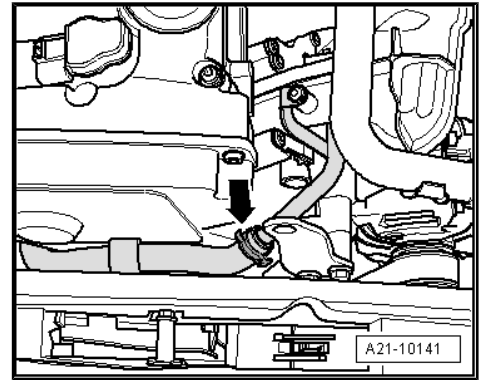


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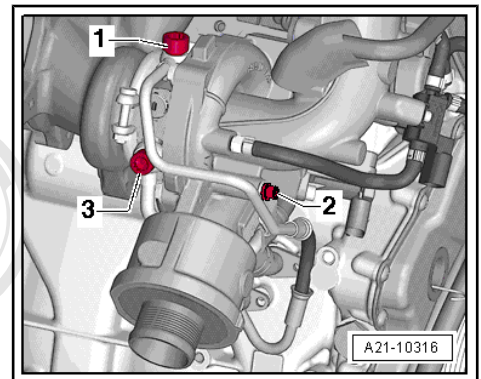
- Remove intake manifold support (remove securing nut -1- and bolt -2-).



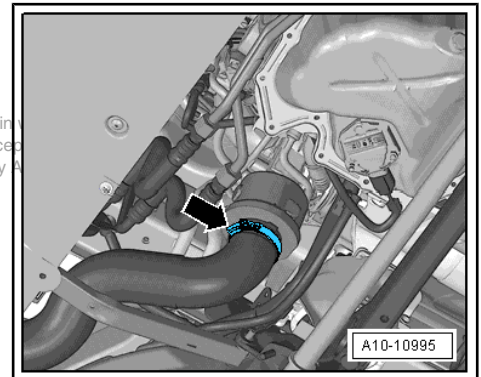
- Disconnect coolant hose -arrow-.



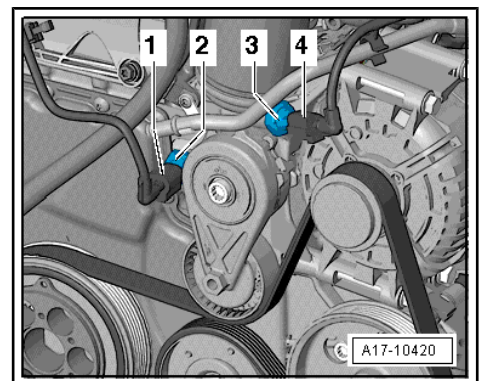
- Unscrew bolts -1 and 2- and move oil supply line clear to one side.
- Unscrew bolt -3- and move coolant pipe clear to one side.



- Open hose clip -arrow-, detach air hose and swivel to side.



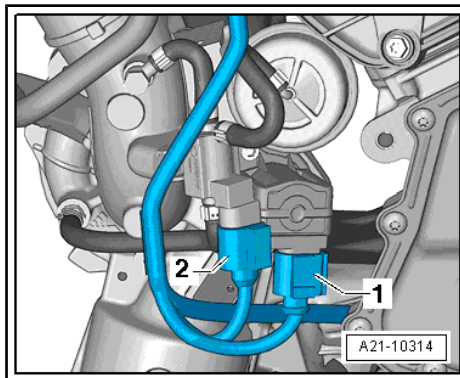
- Unplug electrical connectors -1 and 4- from oil pressure switch - F22- and oil pressure switch for reduced oil pressure - F378-.



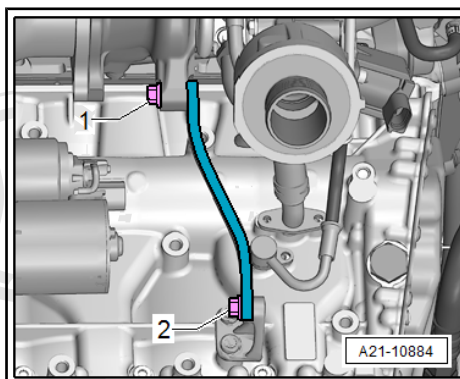
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- Unplug electrical connectors -1 and 2- and move wiring clear.

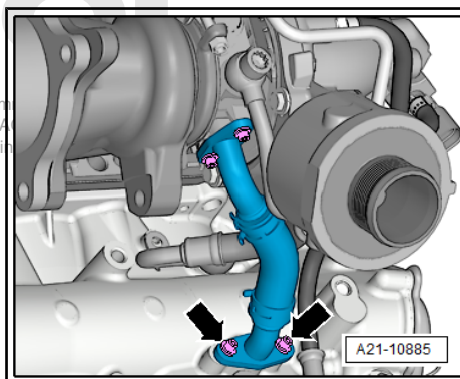


- Slacken bolts -1- from top.
- Remove bolt -2- from underneath.

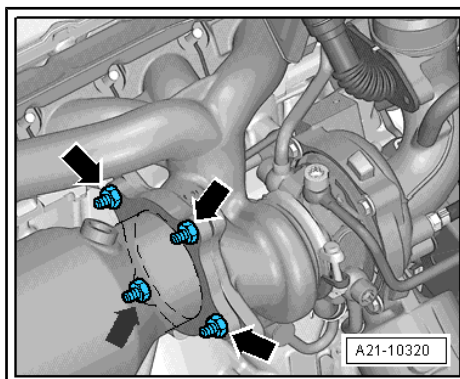


- Remove bolts -arrows- at oil return line.

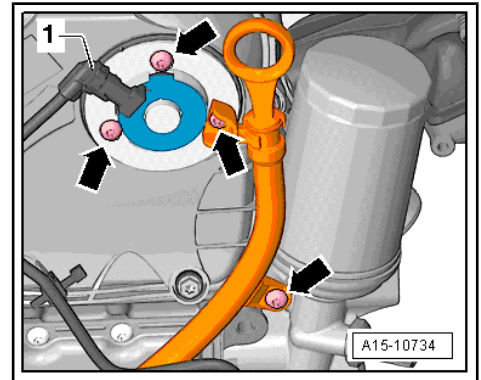
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- Unscrew nuts -arrows- and push catalytic converter to rear.

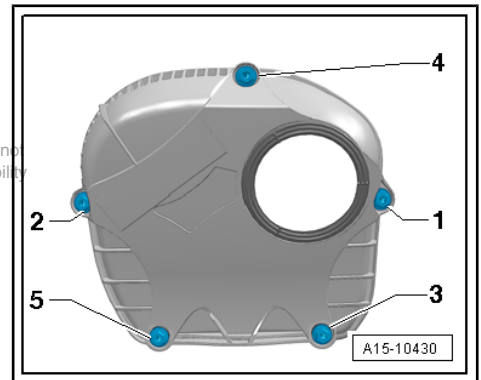


- Detach connector from camshaft control valve 1 - N205- -1-.
- Unscrew bolts -arrows- and remove camshaft control valve 1 - N205- .

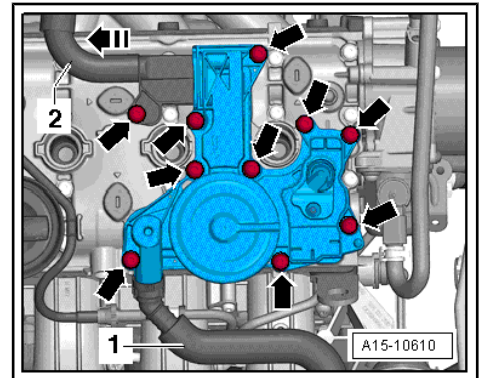


- Unscrew bolts -1 to 5- and remove timing chain cover (top).
- Remove ignition coils with output stages => [page 388](#) .
- Remove spark plugs with spark plug spanner - 3122 B- .

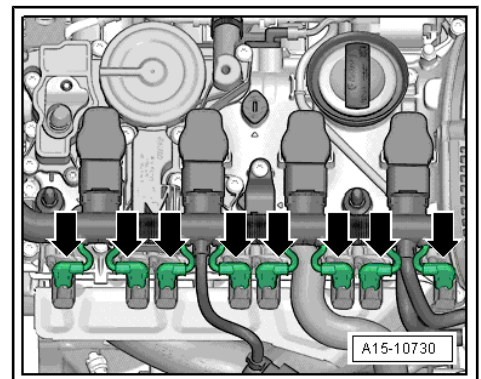
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- Disconnect crankcase breather hose -1-.
- Remove bolts -arrows-, detach crankcase breather system and disconnect from crankcase breather hose -2- in direction of -arrow-.

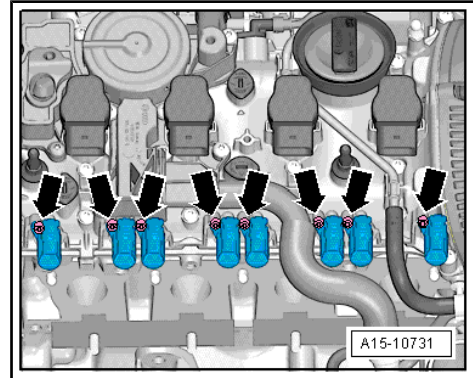


- Unplug connectors -arrows- from actuators for camshaft adjustment .

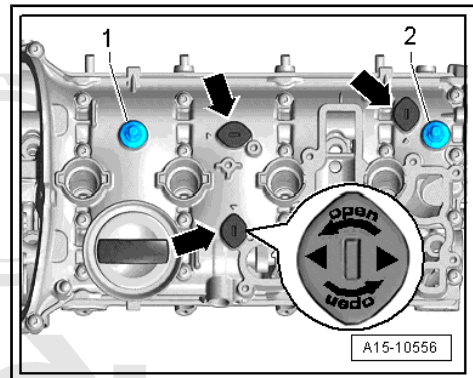




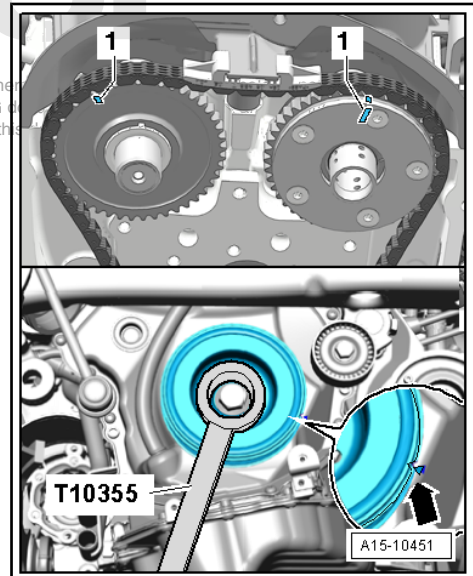
- Remove actuators for camshaft adjustment -arrows-.



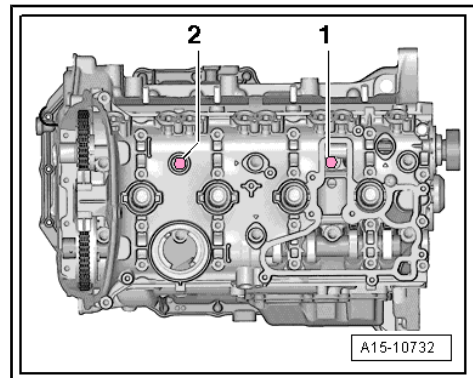
- Turn sealing plugs -arrows- 90° anti-clockwise -arrow- and remove.
- Unscrew ball heads -1 ... 2-.
- Detach filler cap.



- Turn vibration damper to "TDC" position using counterhold tool - T10355- .
- Notch on vibration damper and marking on cover for timing chains (bottom) must be aligned -arrow-.
- The markings -1- on the camshafts must face upwards.



- Remove cylinder head bolts -1 and 2- using special wrench (Polydrive) - T10070- .



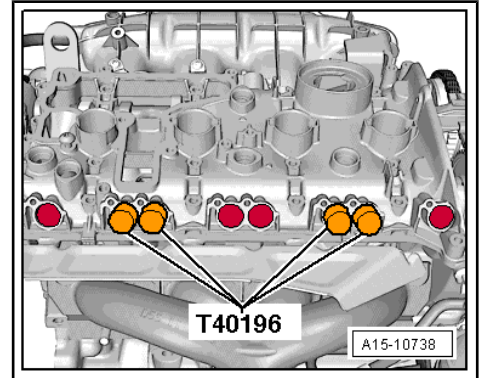


Caution

Risk of irreparable damage to engine.

◆ *Only insert drifts - T40196- in points marked in illustration.*

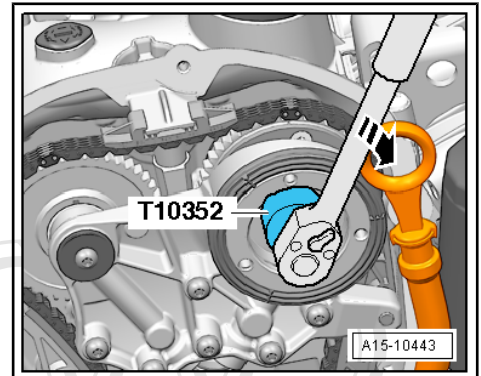
- Insert drifts - T40196- as shown in illustration.
- Turn crankshaft 4 rotations in direction of engine rotation.
- Remove drifts - T40196- .



Caution

The timing valve has a left-hand thread.

- Depending on version, turn assembly tool - T10352- or assembly tool - T10352/1A- in direction of -arrow- to remove timing valve.



- Remove bolts -arrows-.

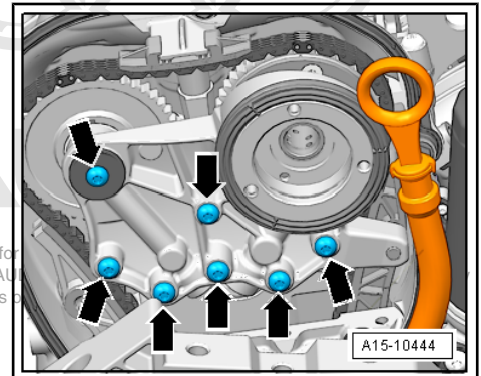


WARNING

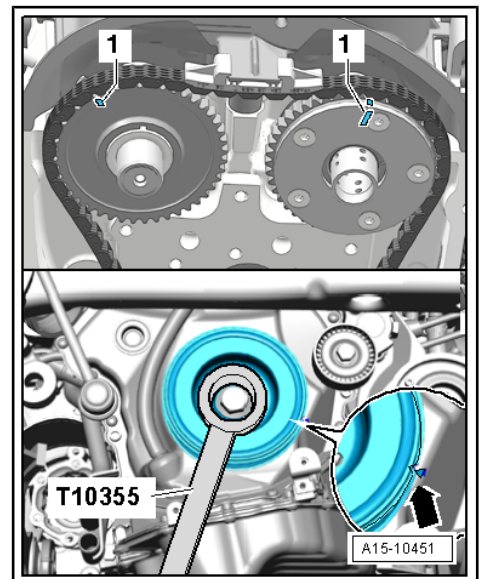
Risk of damage to bearing saddle.

◆ *Detach bearing saddle carefully without tilting it.*

- Detach bearing saddle.



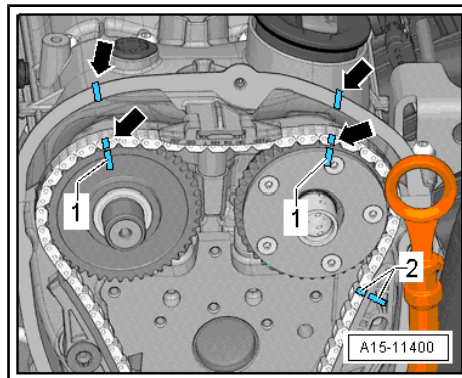
- Turn vibration damper to "TDC" position using counterhold tool - T10355- .
- Notch on vibration damper and marking on cover for timing chains (bottom) must be aligned -arrow-.
- The markings -1- on the camshafts must face upwards.



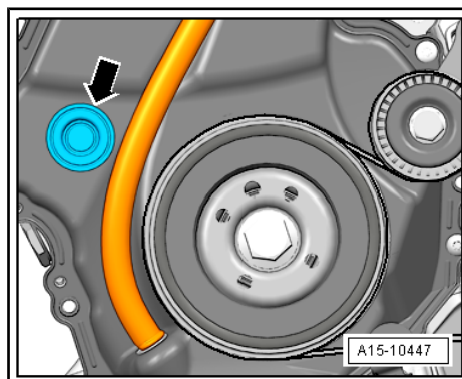
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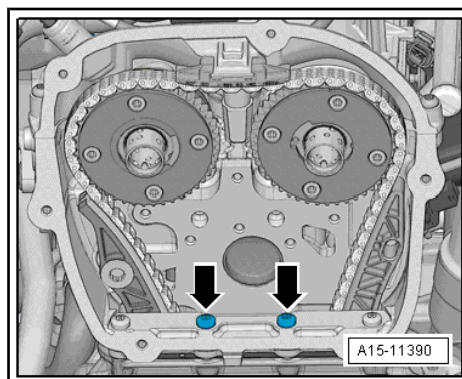
- Use a waterproof pen to mark camshaft timing chain and cylinder head -arrows- relative to markings on chain sprockets -1-.
- Use a waterproof pen to mark camshaft timing chain relative to guide rail of timing chain -2- as well.



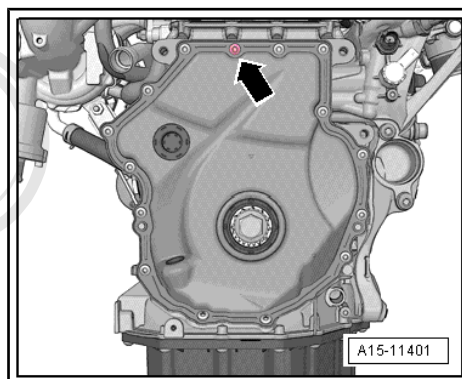
- Remove sealing plug -arrow-.



- Remove bolts -arrows-.



- Remove bolt -arrow-.

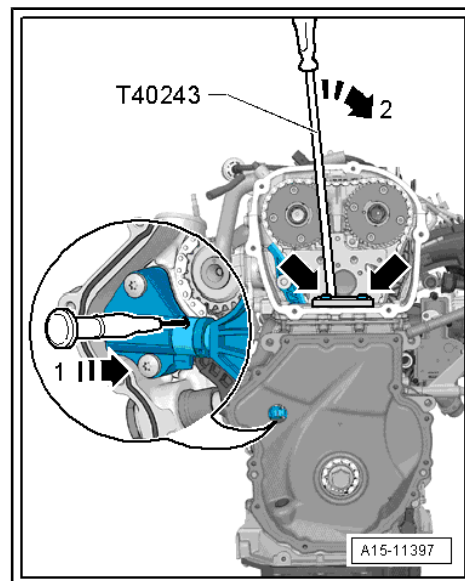


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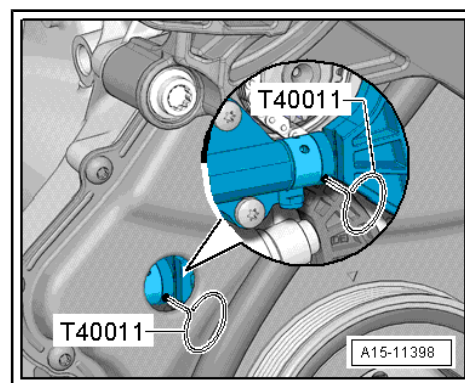
Depending on version, 2 different chain tensioners may be installed.

Version 1

- Screw in assembly lever - T40243- -arrows-.
- Lift locking element for chain tensioner; to do so, insert scribe or suitable screwdriver in hole of chain tensioner in direction of -arrow 1-, press assembly lever - T40243- slowly in direction of -arrow 2- and hold in place.

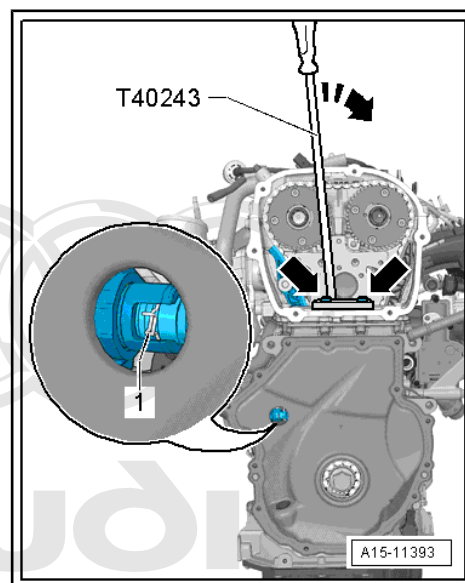


- Hold chain tensioner in position with locking pin - T40011- .



Version 2

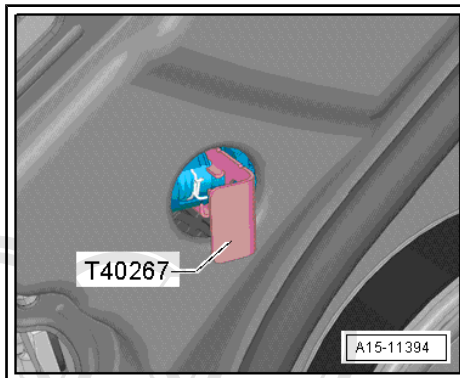
- Screw in assembly lever - T40243- -arrows-.
- Compress circlip -1- for chain tensioner, press lever - T40243- slowly in direction of -arrow- and hold in place.



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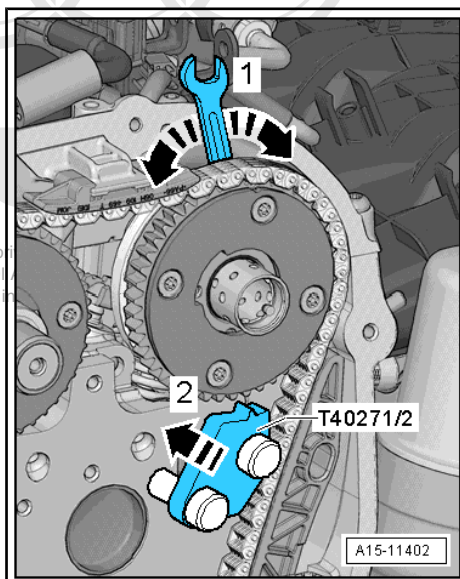
- Hold chain tensioner in position with locking tool - T40267- .



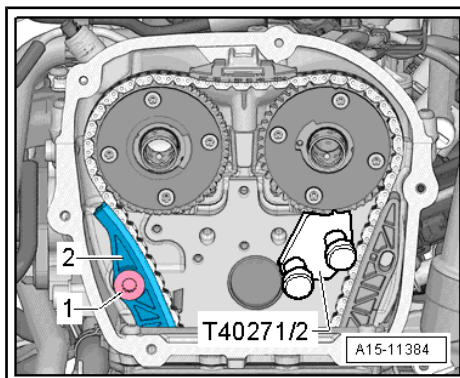
All versions

- Remove assembly lever - T40243- .
- Bolt camshaft clamp - T40271/2- onto cylinder head and slide into teeth on chain sprocket in direction of -arrow 2-; if necessary, use spanner to turn inlet camshaft in direction of -arrow 1-.

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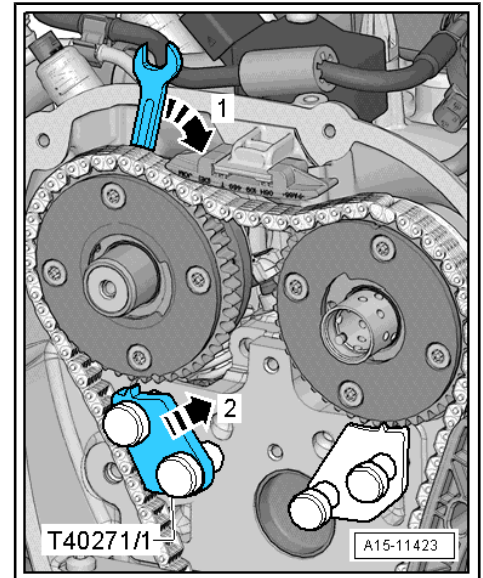
- Remove bolt -1- and guide tensioning rail -2- downwards.



- Bolt camshaft clamp - T40271/1- onto cylinder head.
- Use spanner to turn exhaust camshaft in direction of -arrow 1- and slide camshaft clamp - T40271/1- into teeth on chain sprocket in direction of -arrow 2-.

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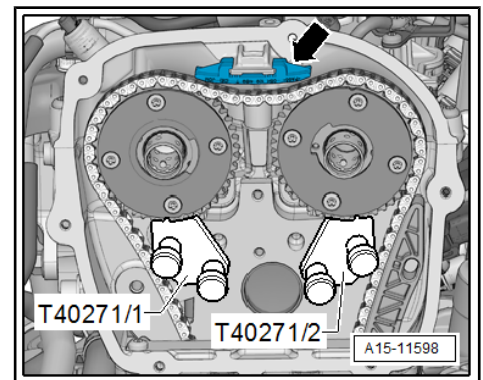
- Use screwdriver to release catch and press off top guide rail -arrow- towards front.
- Remove camshaft timing chain from camshaft sprockets.



Caution

Risk of damage to valves and piston crowns.

- ◆ ***Do not turn the crankshaft after the camshaft timing chain has been removed from the cylinder head.***

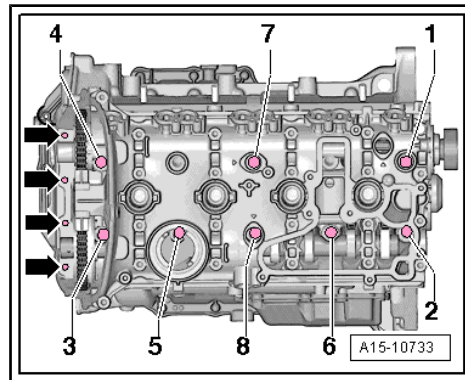


- Remove bolts -arrows-.
- Use special wrench (Polydrive) - T10070- or bit XZN 12 - T40270- to remove cylinder head bolts in the sequence -1 ... 8-.

**Note**

- ◆ *Make sure all hoses/pipes and wiring on component are disconnected.*
- ◆ *Make sure tensioning rail and guide rail are not damaged when lifting off cylinder head.*

- Take off cylinder head.
- Place cylinder head onto soft surface (foam plastic).

**Installing****Caution****Risk of 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.*

Risk of 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.*

Risk of 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.*

Risk of 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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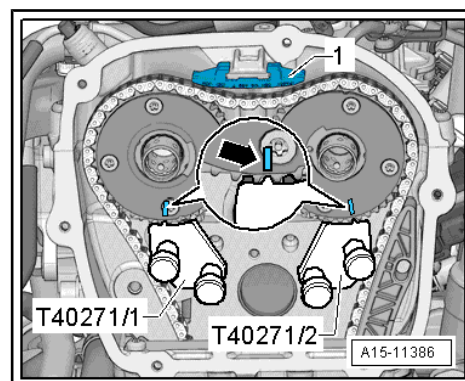
 **Note**

- ◆ *Renew the bolts tightened with specified tightening angle.*
- ◆ *Renew self-locking nuts as well as seals, gaskets and O-rings.*
- ◆ *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 camshafts.*
- ◆ *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 charge air hoses can be properly secured at their connections, spray rust remover onto the worm thread of used hose clips before installing.*
- ◆ *After fitting a new cylinder head or cylinder head gasket, change the engine oil and the coolant in the entire cooling system.*

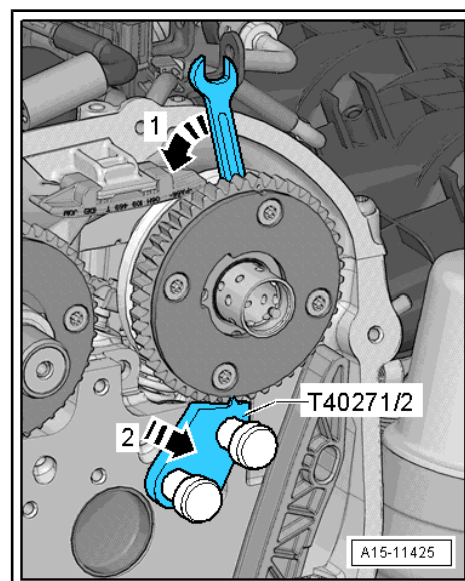
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If using a new cylinder head

- Mark camshaft chain sprockets relative to camshaft clamp - T40271/1- and camshaft clamp - T40271/2- -arrows-.

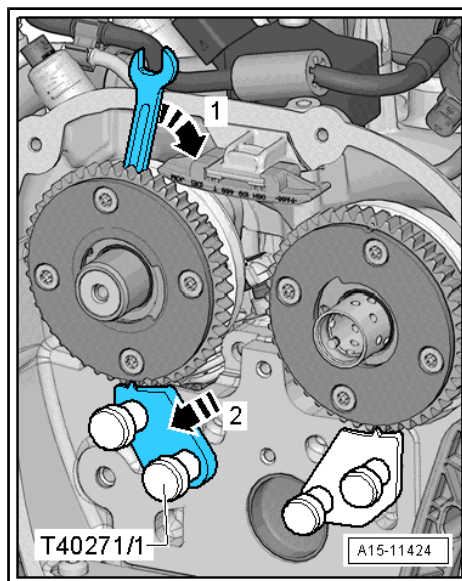


- Use spanner to turn inlet camshaft in direction of -arrow 1- and slide camshaft clamp - T40271/2- out of teeth on chain sprocket in direction of -arrow 2- and move camshaft into rest position.
- Remove camshaft clamp - T40271/2- .

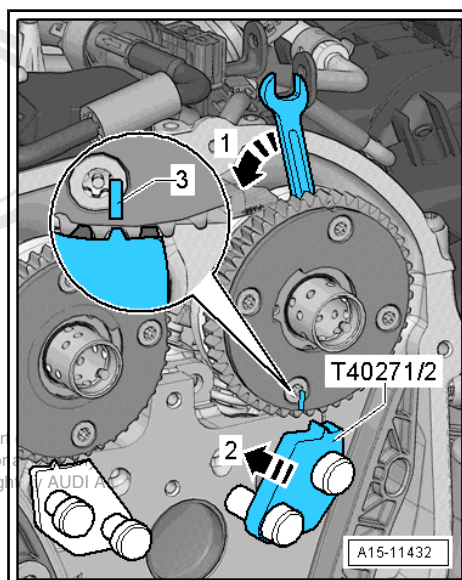




- Use spanner to turn exhaust camshaft in direction of -arrow 1- and slide camshaft clamp - T40271/1- out of teeth on chain sprocket in direction of -arrow 2- and move camshaft into rest position.
- Remove camshaft clamp - T40271/1- .
- Transfer markings made on old camshafts onto new camshafts.

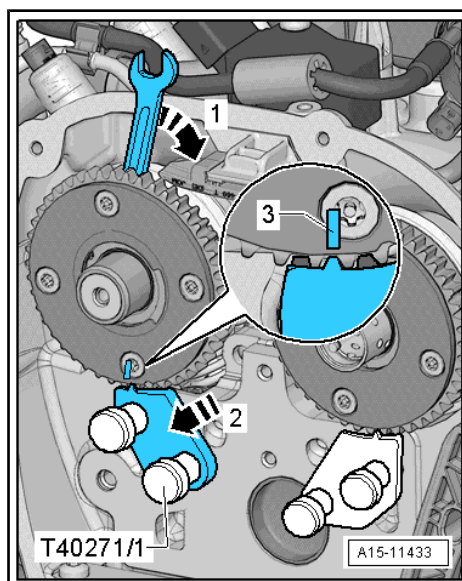


- Bolt camshaft clamp - T40271/2- onto new cylinder head.
- Turn inlet camshaft in direction of -arrow 1- until marking -3- aligns with camshaft clamp - T40271/2- .
- Slide camshaft clamp - T40271/2- into teeth of chain sprocket in direction of -arrow 2-.




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- Bolt camshaft clamp - T40271/1- onto new cylinder head.
- Turn exhaust camshaft in direction of -arrow 1- until marking -3- aligns with camshaft clamp - T40271/1- .
- Slide camshaft clamp - T40271/1- into teeth of chain sprocket in direction of -arrow 2-.



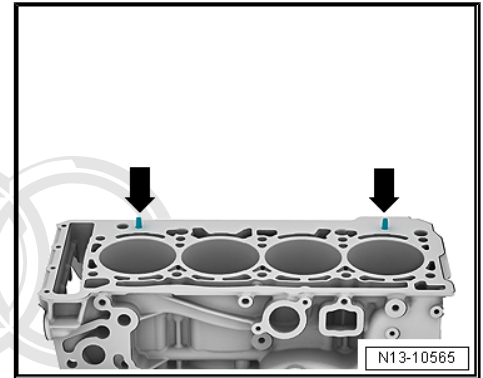
All vehicles:

- Place cylinder head gasket in position.
- ◆ Note position of centring pins in cylinder block -arrows-.
- ◆ Note installation position of cylinder head gasket. Part No. should be legible from inlet side.



WARNING

Make sure that components are not damaged by the timing chain when rotating the crankshaft.

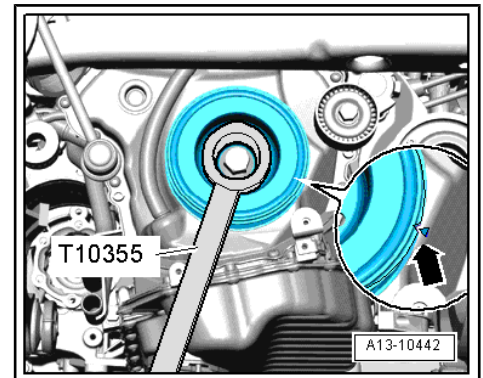
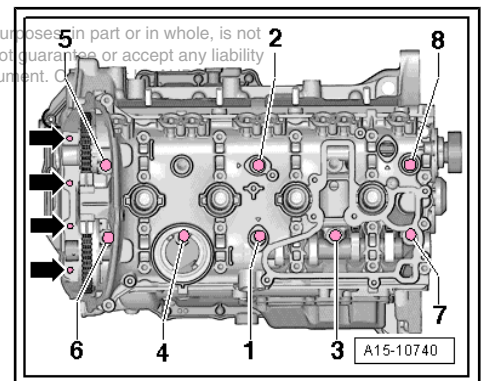


- If crankshaft has been rotated: set No. 1 cylinder piston to top dead centre and then turn crankshaft back slightly.
- Fit cylinder head.
- Fit bolts -1 ... 8-.
- Tighten cylinder head bolts ⇒ [Item 6 \(page 121\)](#) in the sequence -1 ... 8- in 3 stages using special wrench (Polydrive) - T10070- or bit XZN 12 - T40270- .
- Tighten bolts -arrows- in 2 stages ⇒ [Item 4 \(page 121\)](#) .

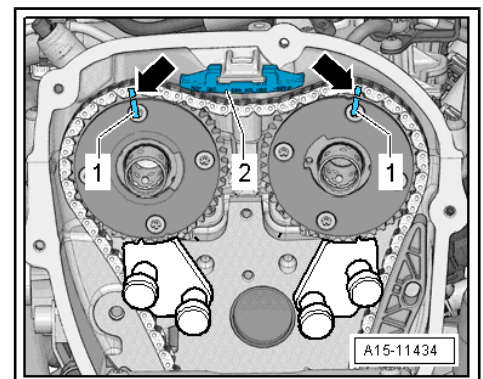
 **Note**

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

- Turn vibration damper to “TDC” position -arrow- using counterhold tool - T10355- .
- Notch on vibration damper must align with arrow marking on cover for timing chains (bottom).

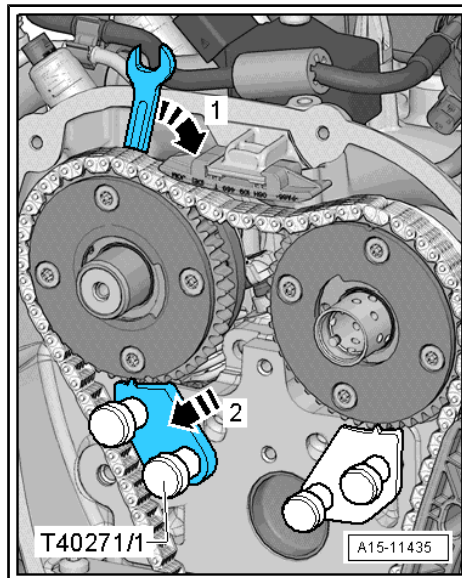


- Fit timing chain; to do so, position markings on chain links -arrows- at markings on chain sprockets -1-.
- Install top guide rail -2-.

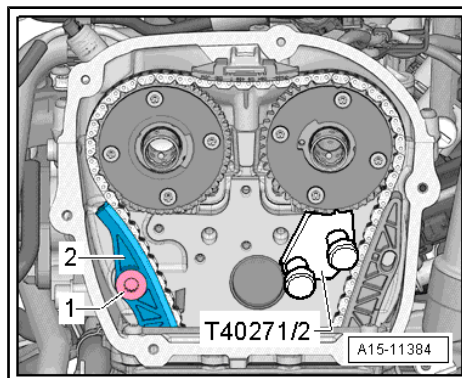




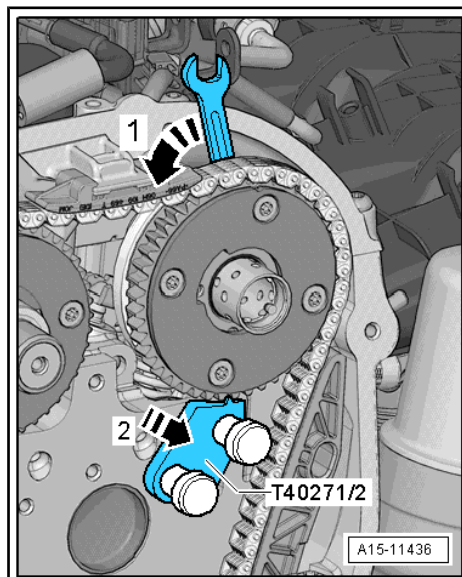
- Turn exhaust camshaft in direction of -arrow 1- and slide camshaft clamp - T40271/1- out of teeth on chain sprocket in direction of -arrow 2- and release camshaft.
- Remove camshaft clamp - T40271/1- .



- Move guide rail -2- upwards and screw in bolt -1-.



- Turn inlet camshaft in direction of -arrow 1- and slide camshaft clamp - T40271/2- out of teeth on chain sprocket in direction of -arrow 2- and release camshaft.
- Remove camshaft clamp - T40271/2- .

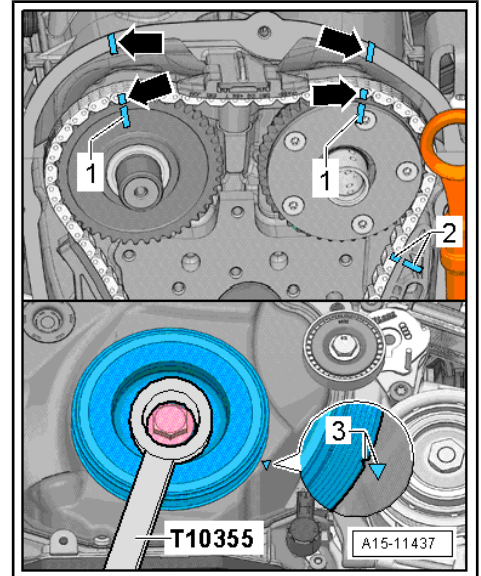


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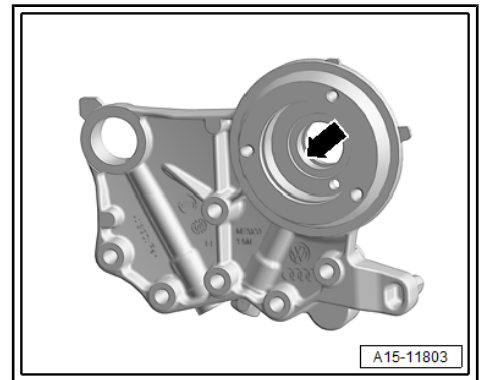
- Check valve timing; markings on camshaft timing chain and cylinder head -arrows- must align with markings on chain sprockets -1-.
- Markings on camshaft timing chain and on guide rail for camshaft timing chain -2- must be opposite one another.
- Notch on vibration damper must align with marking on cover for timing chain (bottom) -3-.


 **Note**

If the markings you have made are no longer visible, check the valve timing ⇒ [page 114](#).

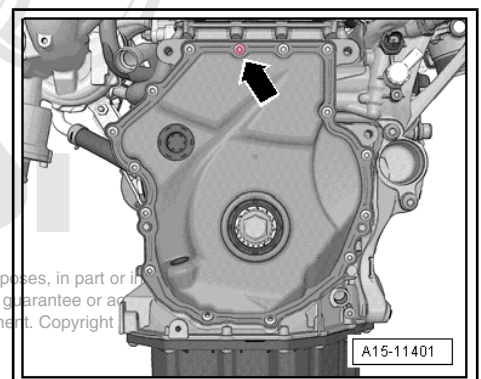
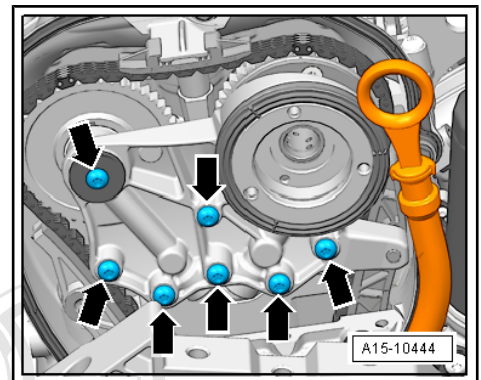


- Lubricate hole -arrow- with engine oil.



 **WARNING**
Risk of damage to bearing saddle.
 ♦ *Detach bearing saddle carefully without tilting it.*

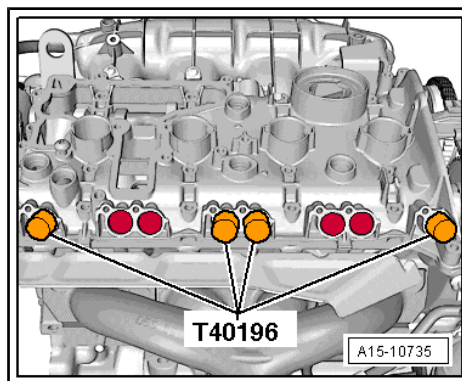
- Attach bearing saddle and screw in bolts -arrows- hand-tight.
- Depending on version, remove locking pin - T40011- or locking tool - T40267- .
- Tighten bolts -arrows- for bearing saddle ⇒ [page 96](#) .
- Screw in bolt -arrow-.
- Install timing valve ⇒ [Item 6 \(page 96\)](#) .



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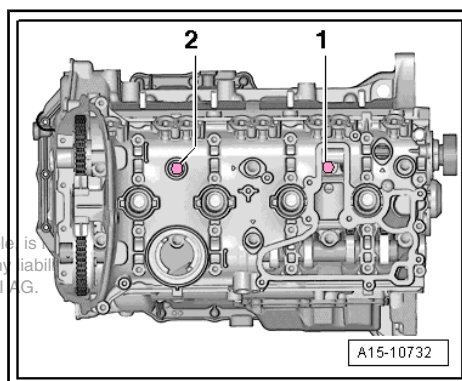
- Insert drifts - T40196- as shown in illustration.
- Turn crankshaft 4 rotations in direction of engine rotation.
- Remove drifts - T40196- .



- Fit bolts -1 and 2-
- Tighten cylinder head bolts ⇒ [Item 6 \(page 121\)](#) in the sequence -1 and 2- in 3 stages using special wrench (Polydrive) - T10070- .

The remaining installation steps are carried out in the reverse sequence. Note the following points:

- Change engine oil: A4 ➤ [Maintenance ; Booklet 812](#), A5 Coupé ➤ [Maintenance ; Booklet 811](#), A5 Cabriolet ➤ [Maintenance ; Booklet 818](#) .
- Install timing chain cover (top) ⇒ [page 89](#) .
- Fill cooling system with fresh coolant ⇒ [page 247](#) .
- Install catalytic converter ⇒ [page 384](#) .
- Install front exhaust pipe/front silencer ⇒ [page 374](#) .
- Install ignition coils with output stages ⇒ [page 388](#) .



WARNING

Never use battery charging equipment for boost starting. There is danger of damaging the vehicle's control units.

Tightening torques

- ◆ ⇒ [“3.1.2 Exploded view - cylinder head \(2.0 ltr. engine with assembly clearance feature\)”, page 120](#)

3.2.3 Removing and installing cylinder head (2.0 ltr. engine without assembly clearance feature)

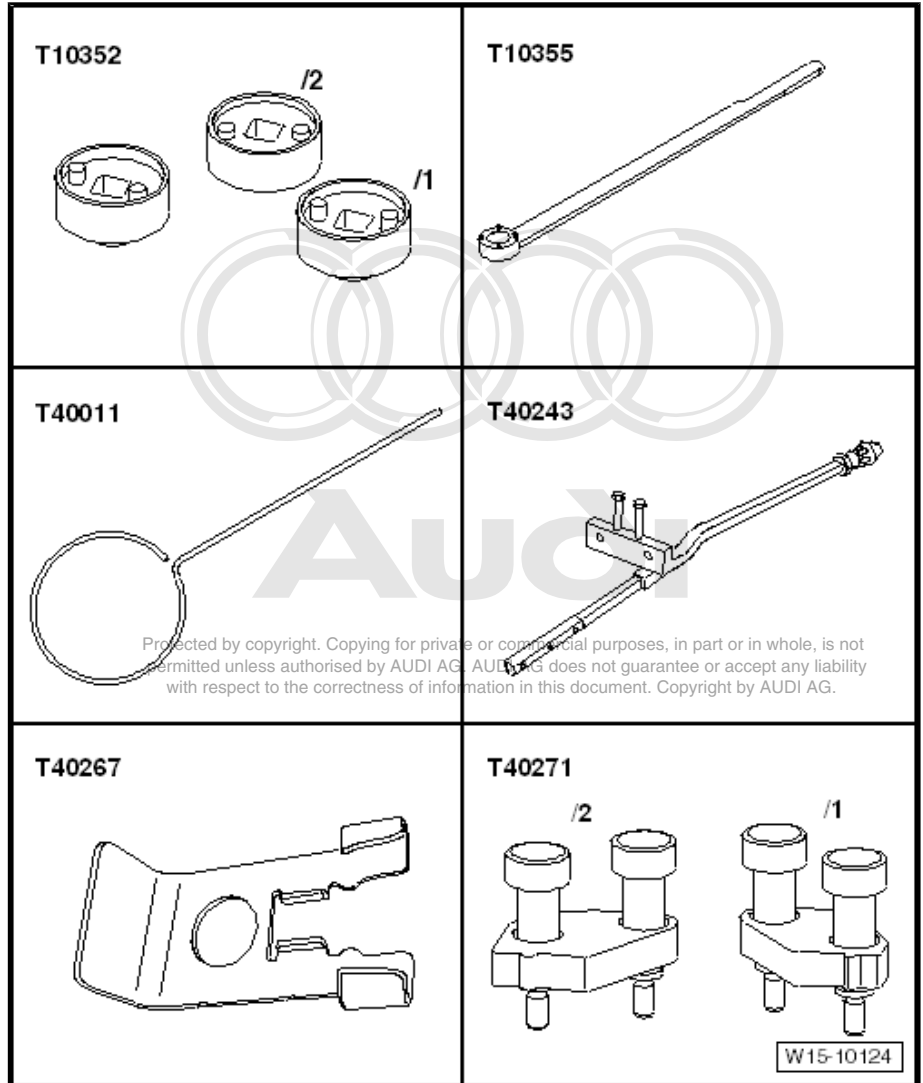


Note

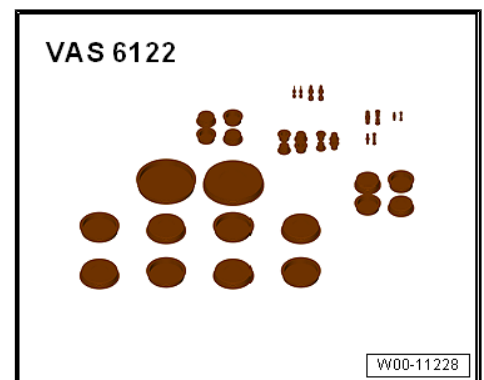
Camshafts with no assembly clearance feature do not have tool recesses ⇒ [page 123](#) .

Special tools and workshop equipment required

- ◆ Assembly tool - T10352-
- ◆ Counterhold tool - T10355-
- ◆ Locking pin - T40011-
- ◆ Assembly lever - T40243-
- ◆ Locking tool - T40267-
- ◆ Camshaft clamp - T40271-



- ◆ Engine bung set - VAS 6122-

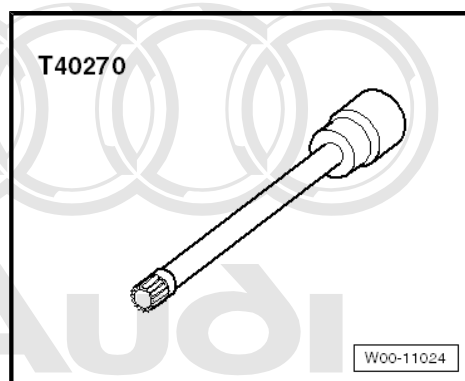




- ◆ Special wrench (Polydrive) - T10070-



- ◆ Bit XZN 12 - T40270-



Removing

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Note

- ◆ *Fit cable ties in the original positions when installing.*
 - ◆ *All open inlet and exhaust ports must be sealed with suitable plugs (e.g. from engine bung set - VAS 6122-).*
- Remove camshafts ⇒ [page 193](#) .



Caution

Risk of damage to valves and piston crowns.

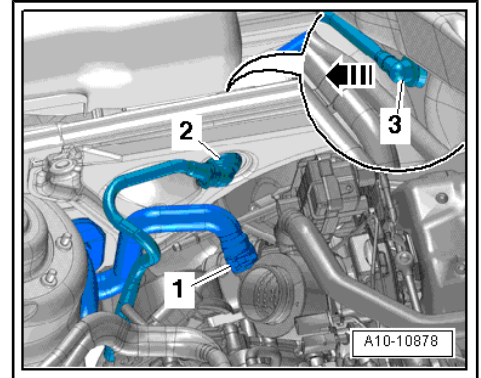
- ◆ ***Do not turn the crankshaft after the camshafts have been removed.***


Risk of scalding as hot coolant can escape

The cooling system is under pressure when the engine is hot. Hot steam/hot coolant can escape - risk of scalding.

- Put on protective gloves.
 - Put on safety goggles.
 - Release pressure (cover filler cap on coolant expansion tank with a cloth and open carefully).
- Drain coolant ⇒ [page 247](#) .
- Remove front exhaust pipe/front silencer ⇒ [page 374](#) .

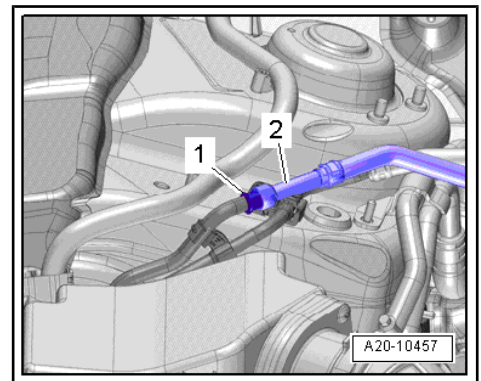
- Remove plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .
- Disconnect vacuum hose -3- on rear of plenum chamber partition panel -arrow- and detach vacuum connection -2- from plenum chamber partition panel.
- Disconnect coolant hoses on rear of cylinder head.



 **Caution**

Protect fuel system against contamination.

◆ **Rules for cleanliness when working on the injection system ⇒ page 5 .**



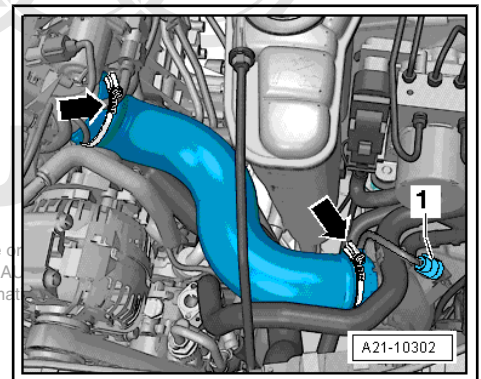
Risk of injury - fuel system operates under high pressure

The fuel system is pressurised. There is a risk of injury as fuel may spray out.

Before opening the fuel system:

- Put on safety goggles.
- Put on protective gloves.
- Release pressure (wrap clean cloth around connection and open connection carefully).

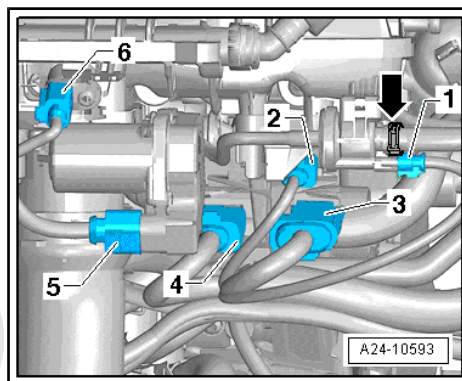
- Disconnect fuel lines -1 and 2-.
- Release hose clips -arrows- and detach air hose.



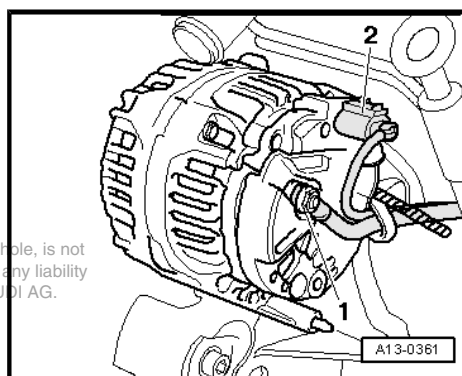
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- Unplug the following electrical connectors:
- 2 - From knock sensor 1 - G61- (unplug and move clear).
- 3 - From intake manifold flap valve - N316- , fuel pressure sender - G247- and Hall sender - G40-
- 4 - From injectors
- 5 - From throttle valve module - J338-
- 6 - From intake air temperature sender - G42-

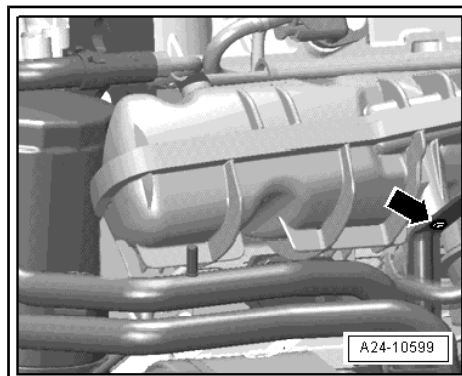


- Unplug electrical connector -2- and move wiring clear.



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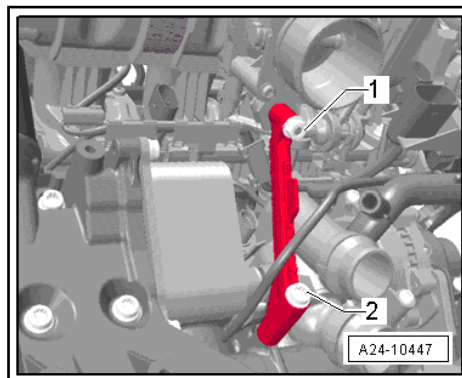
- Unbolt bracket for coolant pipe -arrow-.



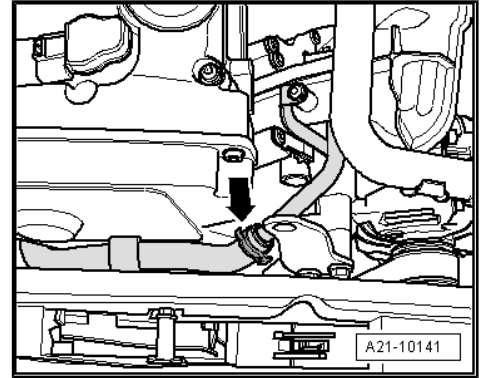
Note

The installation position is shown in the following illustrations with the engine removed.

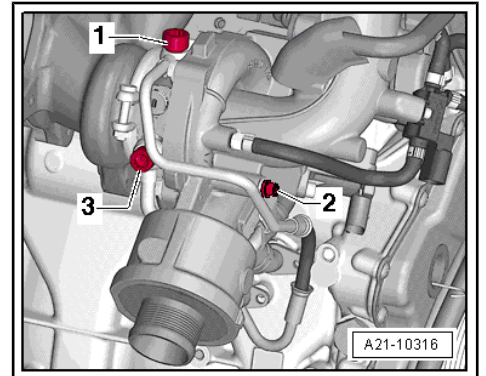
- Remove intake manifold support (remove securing nut -1- and bolt -2-).



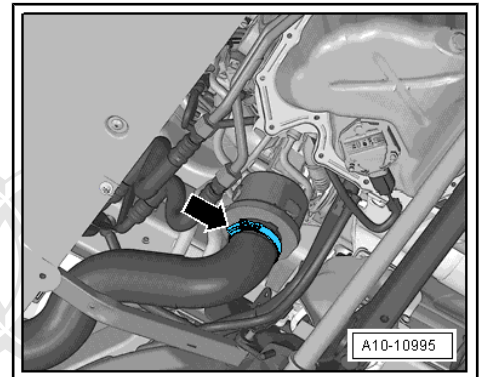
- Disconnect coolant hose -arrow-.



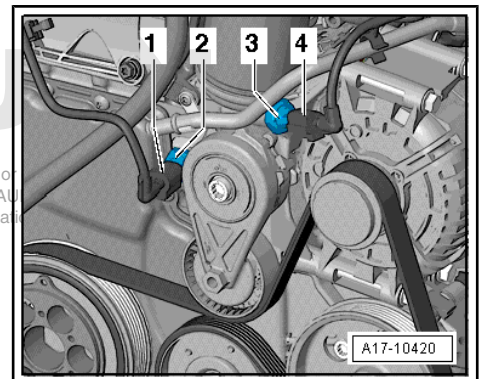
- Unscrew bolts -1 and 2- and move oil supply line clear to one side.
- Unscrew bolt -3- and move coolant pipe clear to one side.



- Open hose clip -arrow-, detach air hose and swivel to side.



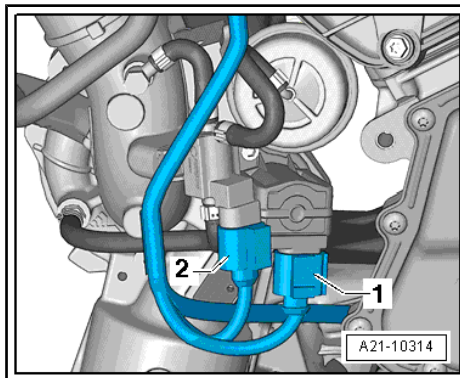
- Unplug electrical connectors -1 and 4- from oil pressure switch - F22- and oil pressure switch for reduced oil pressure - F378-.



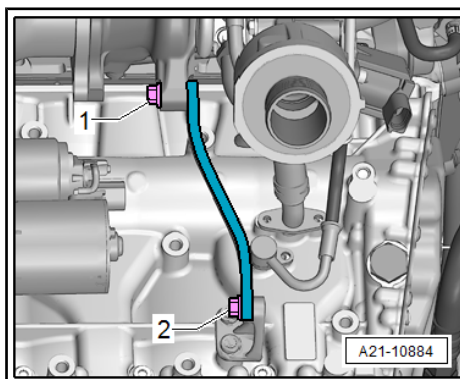
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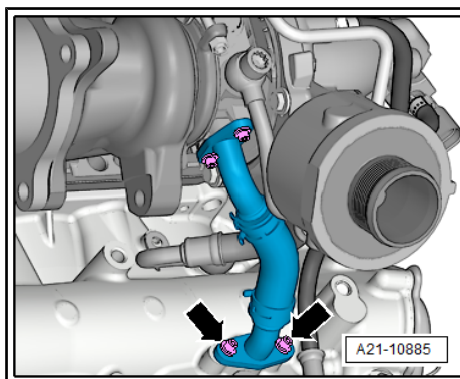
- Unplug electrical connectors -1 and 2- and move wiring clear.



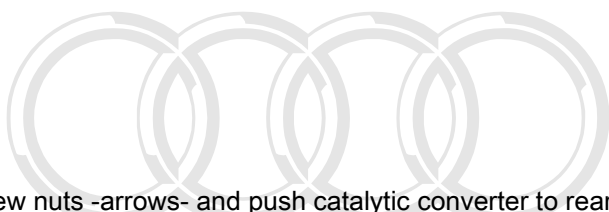
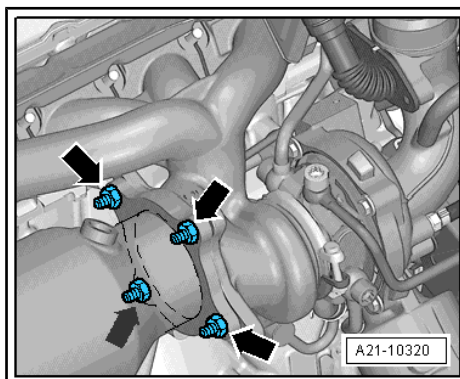
- Slacken bolts -1- from top.
- Remove bolt -2- from underneath.



- Remove bolts -arrows- at oil return line.



- Unscrew nuts -arrows- and push catalytic converter to rear.
- Remove spark plugs with spark plug spanner - 3122 B- .



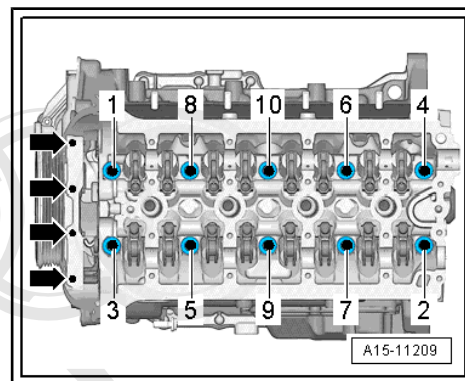
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- Remove bolts -arrows-.
- Use special wrench (Polydrive) - T10070- or bit XZN 12 - T40270- to remove cylinder head bolts in the sequence -1 ... 10-.

 **Note**


- ◆ *Make sure all hoses/pipes and wiring on component are disconnected.*
- ◆ *Make sure tensioning rail and guide rail are not damaged when lifting off cylinder head.*

- Take off cylinder head.
- Place cylinder head onto soft surface (foam plastic).



Installing

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 **Caution**

Risk of 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.*

Risk of 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.*

Risk of 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.*

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

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



Note

- ◆ *Renew the bolts tightened with specified tightening angle.*
- ◆ *Renew seals, gaskets and self-locking nuts.*
- ◆ *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 camshafts.*
- ◆ *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 charge air hoses can be properly secured at their connections, spray rust remover onto the worm thread of used hose clips before installing.*
- ◆ *After fitting a new cylinder head or cylinder head gasket, change the engine oil and coolant.*

– Place cylinder head gasket in position.

◆ Note position of centring pins in cylinder block -arrows-.

◆ Note installation position of cylinder head gasket. Part No. should be legible from inlet side.



WARNING

Make sure that components are not damaged by the timing chain when rotating the crankshaft.

– If crankshaft has been rotated: set No. 1 cylinder piston to top dead centre and then turn crankshaft back slightly.

– Fit cylinder head.

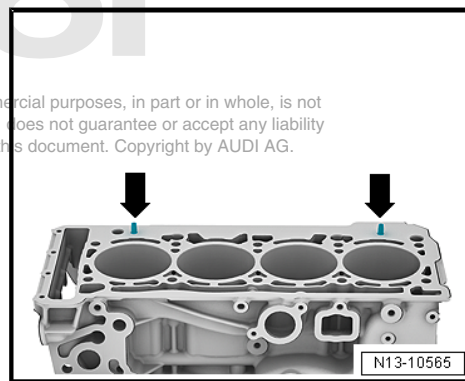
– Insert and hand-tighten cylinder head bolts.

– Tightening sequence for cylinder head ⇒ [page 126](#)



Note

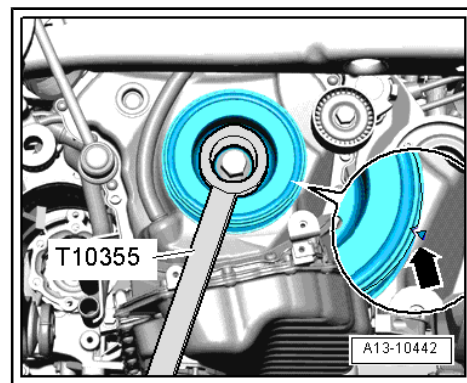
Cylinder head bolts do not have to be torqued down again later after repair work.



- Turn vibration damper to "TDC" position -arrow- using counterhold tool - T10355- .
- Notch on vibration damper must align with arrow marking on cover for timing chains (bottom).

The remaining installation steps are carried out in the reverse sequence. Note the following points:

- Install camshafts ⇒ [page 193](#) .
- Install timing chain cover (top) ⇒ [page 89](#) .
- Change engine oil: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .
- Fill cooling system with fresh coolant ⇒ [page 247](#) .
- Install catalytic converter ⇒ [page 384](#) .
- Install front exhaust pipe/front silencer ⇒ [page 374](#) .



WARNING

Never use battery charging equipment for boost starting. There is danger of damaging the vehicle's control units.

Tightening torques

- ◆ ⇒ Fig. "Tightening sequence for cylinder head" , page 126
- ◆ ⇒ "3.1.3 Exploded view - cylinder head (2.0 ltr. engine without assembly clearance feature)" , page 123

3.3 Checking compression

Special tools and workshop equipment required

- ◆ Spark plug spanner - 3122 B-



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- ◆ Compression tester - V.A.G 1763-





Test sequence



Note

- ◆ *Engine oil temperature at least 30 °C*
- ◆ *Battery voltage at least 12.7 V*
- Remove engine cover panel ⇒ [page 37](#) .
- Remove ignition coils with output stages ⇒ [page 388](#) .
- Remove spark plugs with spark plug spanner - 3122 B- .
- Check compression pressure with compression tester - V.A.G 1763- and adapter - V.A.G 1763/6- .



Note

Using the compression tester ⇒ Operating instructions .

- Operate starter until pressure reading on tester no longer rises.

Compression pressure:

New pressure in bar	Wear limit in bar	Permissible difference between cylinders in bar
11.0 ... 14.0	7.0	3.0 (maximum)

- Install spark plugs: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .
- Install ignition coils with output stages ⇒ [page 388](#) .
- Install engine cover panel ⇒ [page 37](#) .
- Erase any entries in event memory resulting from testing ⇒ Vehicle diagnostic tester, Guided Functions, Interrogate event memory, then Generate readiness code.



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4 Valve gear

⇒ [“4.1 Exploded view - valve gear”, page 175](#)

⇒ [“4.2 Removing and installing camshaft”, page 180](#)

⇒ [“4.3 Installing ball for slider”, page 209](#)

⇒ [“4.4 Removing and installing camshaft control valve 1 N205 ”, page 210](#)

⇒ [“4.5 Removing and installing valve stem oil seals”, page 210](#)

4.1 Exploded view - valve gear

⇒ [“4.1.1 Exploded view - valve gear \(1.8 ltr. engine\)”, page 175](#)

⇒ [“4.1.2 Exploded view - valve gear \(2.0 ltr. engine\)”, page 178](#)

4.1.1 Exploded view - valve gear (1.8 ltr. engine)



Note

- ◆ *Cylinder head and cylinder head cover must be renewed together.*
- ◆ *After installing camshafts, wait for approx. 30 minutes before starting engine. The hydraulic compensation elements must settle (otherwise valves will strike pistons).*
- ◆ *After working on the 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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1 - Exhaust valve

- Do not machine, only grinding-in is permitted
- Valve dimensions ⇒ [page 220](#)
- Checking valve guides ⇒ [page 219](#)

2 - Cylinder head

3 - Valve guide

- Checking ⇒ [page 219](#)

4 - Valve stem oil seal

- Renewing: with cylinder head installed ⇒ [page 210](#), with cylinder head removed ⇒ [page 214](#)

5 - Valve spring

6 - Valve spring plate

7 - Valve cotters

8 - Hydraulic compensation element

- With roller rocker finger
- Do not interchange
- Lubricate contact surface

9 - Exhaust camshaft

- Removing and installing ⇒ [page 180](#)
- Check radial clearance with Plastigage (roller rocker fingers removed)
- Radial clearance: 0.024 ... 0.066 mm
- Runout: max. 0.04 mm

10 - Cylinder head cover

- With integrated camshaft bearings
- Clean sealing surface; machining not permitted
- Remove old sealant residues

11 - Bolt

- Renew
- Slackening ⇒ [page 177](#)
- Tightening sequence ⇒ [page 177](#)

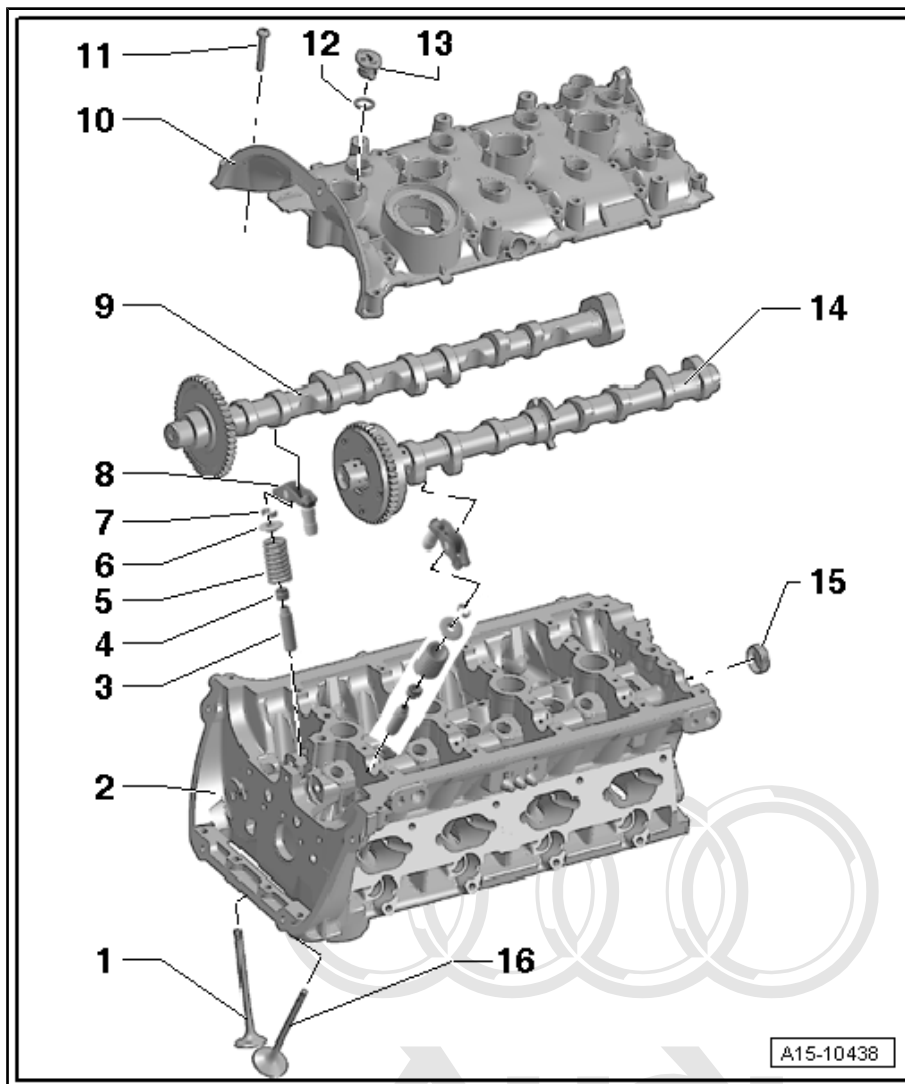
12 - O-ring

- Renew
- Lubricate with engine oil

13 - Sealing plug

14 - Inlet camshaft

- Removing and installing ⇒ [page 180](#)
- Check radial clearance with Plastigage (roller rocker fingers removed)
- Radial clearance: 0.024 ... 0.066 mm
- Runout: max. 0.04 mm



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15 - Sealing cap

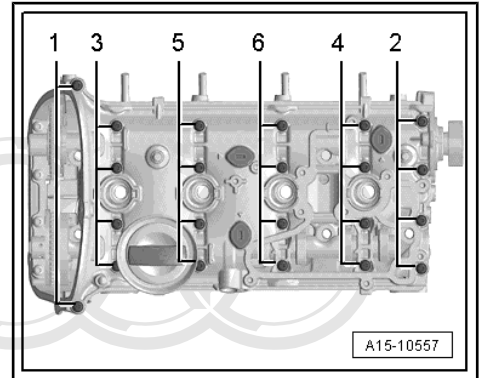
- Renew
- Removing sealing cap with cylinder head cover installed: pierce on one side with an awl and pry out
- Installing ⇒ [page 190](#)

16 - Inlet valve

- Do not machine, only grinding-in is permitted
- Valve dimensions ⇒ [page 220](#)
- Checking valve guides ⇒ [page 219](#)

Loosening cylinder head cover

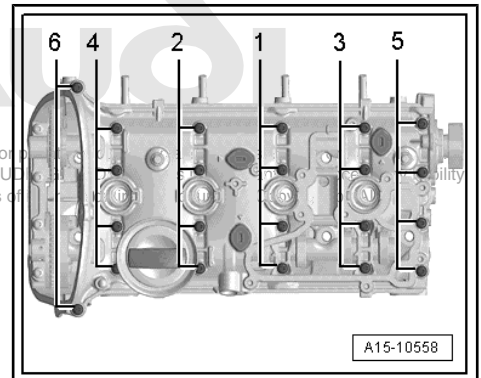
- Loosen cylinder head cover bolts in the sequence 1 ... 6.



Tightening sequence for cylinder head cover

- Renew bolts.

1. Fit bolts in the sequence -1 ... 6- and hand-tighten in several stages.
2. Tighten bolts in the sequence -1 ... 6- to 8 Nm using torque wrench.
3. Turn 90° further in the sequence -1 ... 6- using a rigid wrench.



Note

Take care to keep cylinder head cover straight.

4.1.2 Exploded view - valve gear (2.0 ltr. engine)

1 - Exhaust valve

- Do not machine, only grinding-in is permitted
- Valve dimensions
⇒ [page 220](#)
- Checking valve guides
⇒ [page 219](#)

2 - Cylinder head

3 - Valve guide

- Checking ⇒ [page 219](#)

4 - Valve stem oil seal

- Renewing: with cylinder head installed
⇒ [page 210](#) , with cylinder head removed
⇒ [page 214](#)

5 - Valve spring

6 - Valve spring plate

7 - Valve cotters

8 - Hydraulic compensation element

- With roller rocker finger
- Do not interchange
- Lubricate contact surface

9 - Exhaust camshaft

- Removing and installing
⇒ [page 193](#)
- Check radial clearance with Plastigage (roller rocker fingers removed)
- Radial clearance: 0.024 ... 0.066 mm
- Runout: max. 0.04 mm

10 - Spring

- Not available as replacement part

11 - Ball

- For slider
- Installing ⇒ [page 209](#)

12 - Cylinder head cover

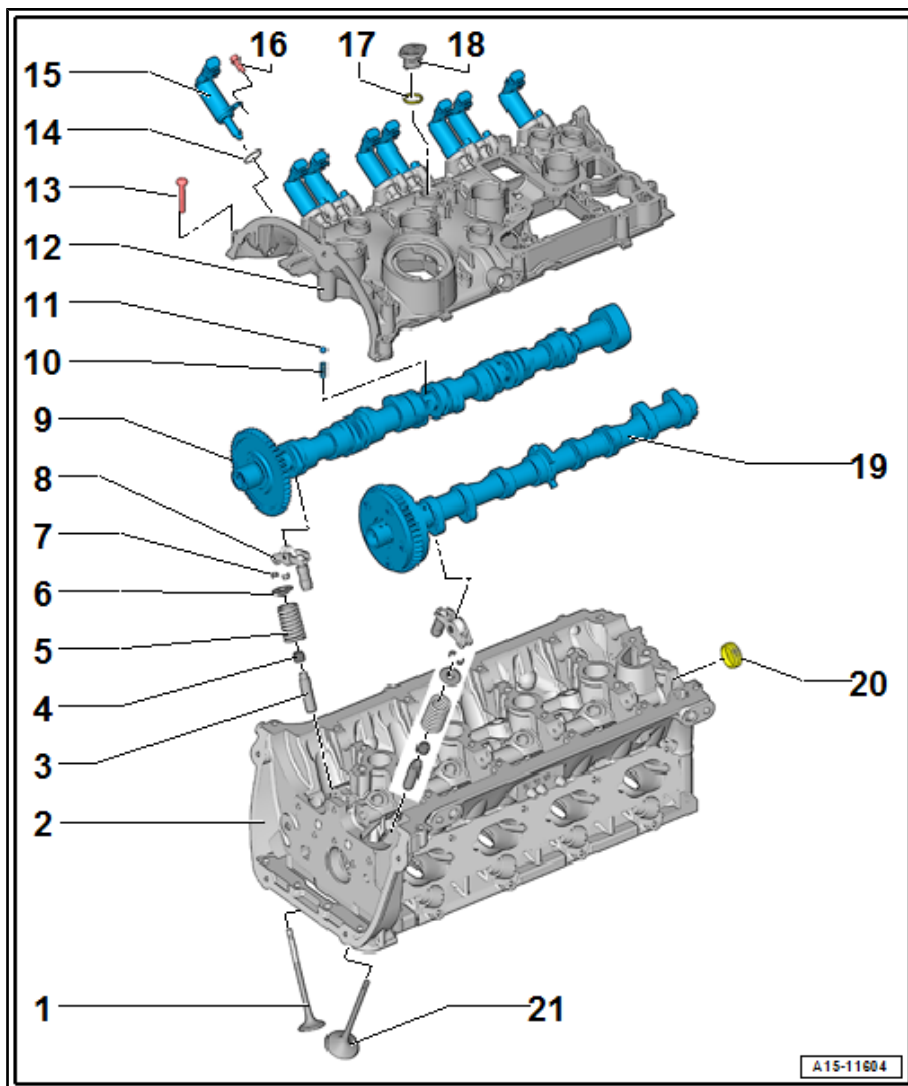
- With integrated camshaft bearings
- Clean sealing surface; machining not permitted
- Remove old sealant residues

13 - Bolt

- Renew
- Slackening ⇒ [page 179](#)
- Tightening sequence ⇒ [page 179](#)

14 - O-ring

- Not available as a replacement part, supplied together with actuator for camshaft adjustment -item 15-



- Lubricate with engine oil

15 - Actuator for camshaft adjustment

16 - Bolt

- 5 Nm

17 - O-ring

- Renew
- Lubricate with engine oil

18 - Sealing plug

19 - Inlet camshaft

- Removing and installing ⇒ [page 193](#)
- Check radial clearance with Plastigage (roller rocker fingers removed)
- Radial clearance: 0.024 ... 0.066 mm
- Runout: max. 0.04 mm

20 - Sealing cap

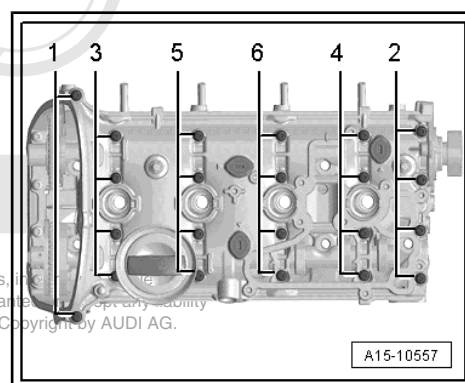
- Renew
- Removing sealing cap with cylinder head cover installed: pierce on one side with an awl and pry out
- Installing ⇒ [page 205](#)

21 - Inlet valve

- Do not machine, only grinding-in is permitted
- Valve dimensions ⇒ [page 220](#)
- Checking valve guides ⇒ [page 219](#)

Loosening cylinder head cover

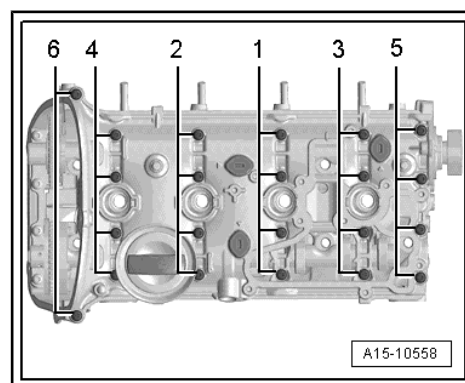
- Loosen cylinder head cover bolts in the sequence -1 ... 6-.



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Tightening sequence for cylinder head cover

- Renew bolts.
1. Fit bolts in the sequence -1 ... 6- and hand-tighten in several stages.
 2. Tighten bolts in the sequence -1 ... 6- to 8 Nm using torque wrench.
 3. Turn 90° further in the sequence -1 ... 6- using a rigid wrench.



Take care to keep cylinder head cover straight.



4.2 Removing and installing camshaft

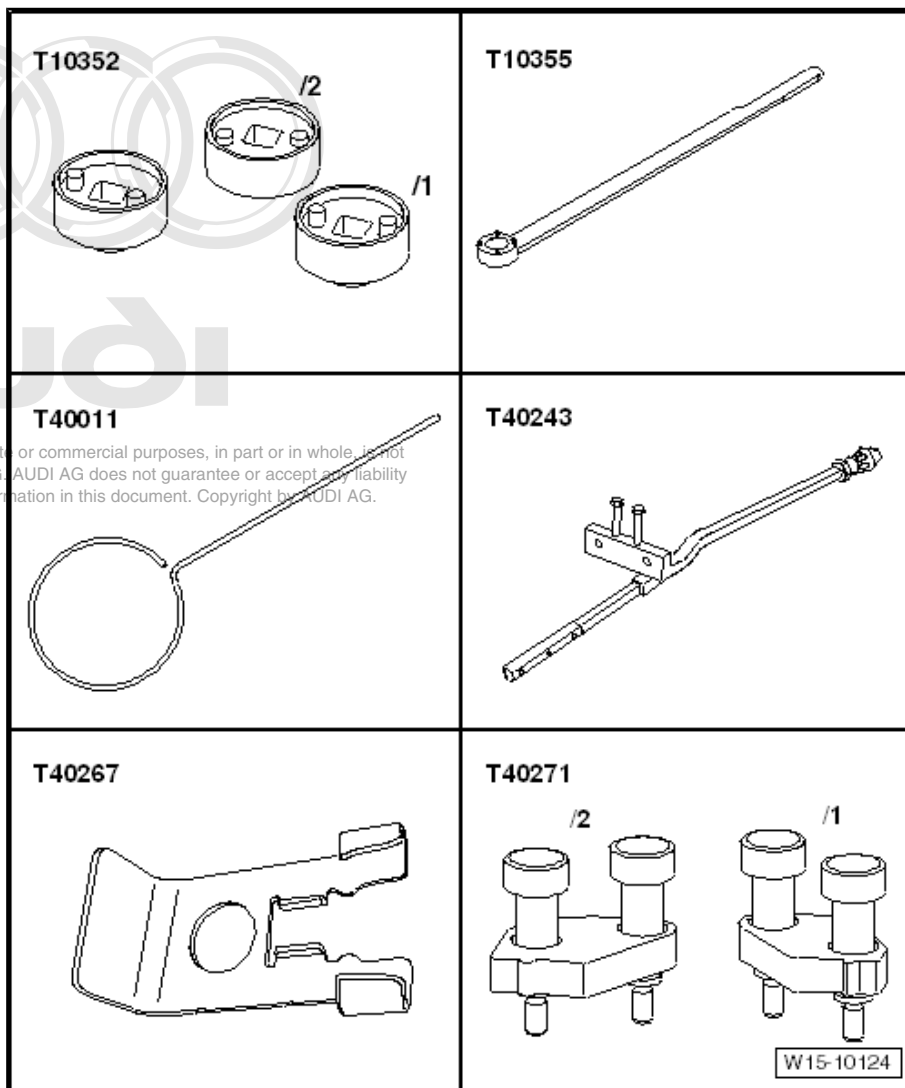
⇒ "4.2.1 Removing and installing camshaft (1.8 ltr. engine)", page 180

⇒ "4.2.2 Removing and installing camshaft (2.0 ltr. engine)", page 193

4.2.1 Removing and installing camshaft (1.8 ltr. engine)

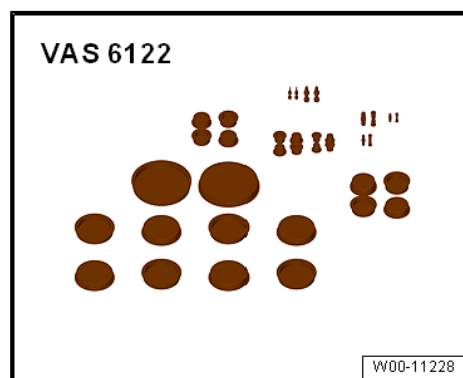
Special tools and workshop equipment required

- ◆ Assembly tool - T10352-
- ◆ Counterhold tool - T10355-
- ◆ Locking pin - T40011-
- ◆ Assembly lever - T40243-
- ◆ Locking tool - T40267-
- ◆ Camshaft clamp - T40271-

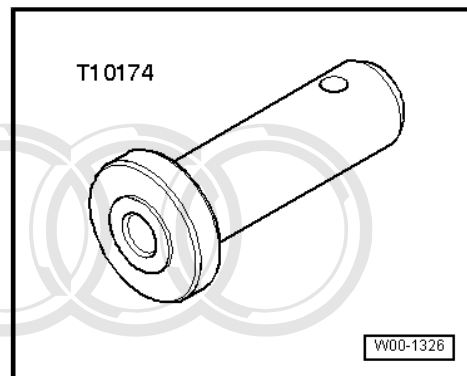


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- ◆ Engine bung set - VAS 6122-



- ◆ Thrust piece - T10174-



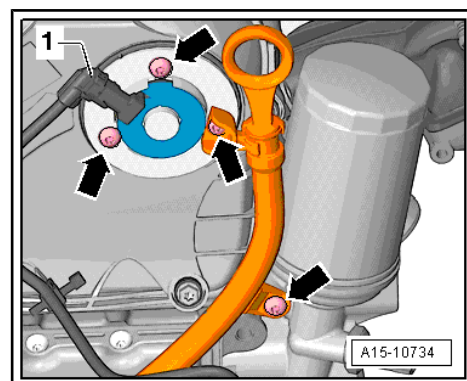
Removing



Note

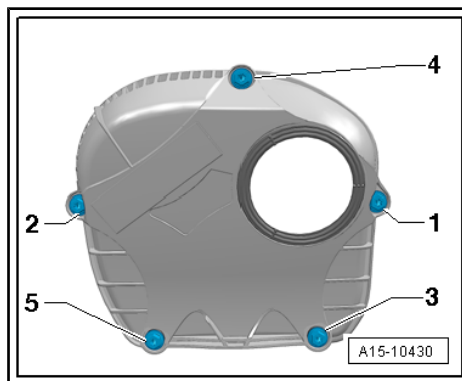
- ◆ *Sealing surfaces at bottom of cylinder head cover and top of cylinder head must not be machined.*
 - ◆ *The camshaft bearings are integrated into the cylinder head and cylinder head cover. The timing chain must be slackened before removing the cylinder head cover.*
 - ◆ *Renew sealing cap ⇒ [Item 15 \(page 177\)](#) if cylinder head cover has been detached.*
 - ◆ *Fit cable ties in the original positions when installing.*
 - ◆ *All open inlet and exhaust ports must be sealed with suitable plugs (e.g. from engine bung set - VAS 6122-).*
- Set service position ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Setting service position and returning to normal position .
 - Remove engine cover panel ⇒ [page 37](#) .
 - Remove air cleaner housing ⇒ [page 318](#) .
 - Detach connector from camshaft control valve 1 - N205- -1-.
 - Unscrew bolts -arrows- and remove camshaft control valve 1 - N205- .

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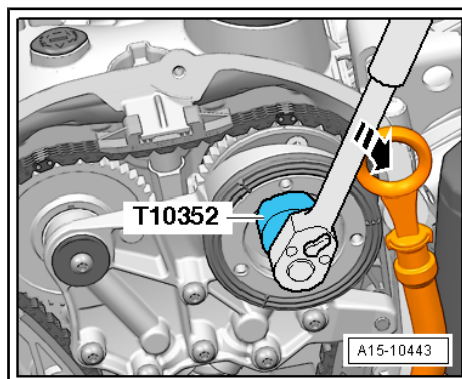
- Unscrew bolts -1 to 5- and remove timing chain cover (top).



Caution

The timing valve has a left-hand thread.

- Depending on version, turn assembly tool - T10352- or assembly tool - T10352/1A- in direction of -arrow- to remove timing valve.



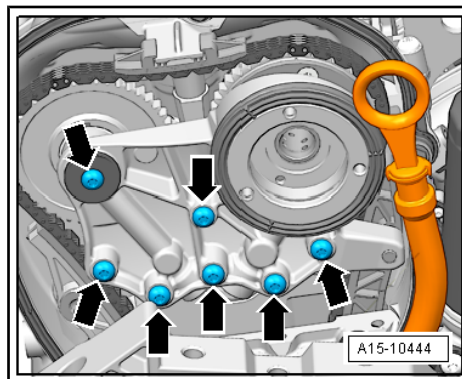
- Remove bolts -arrows-.

WARNING

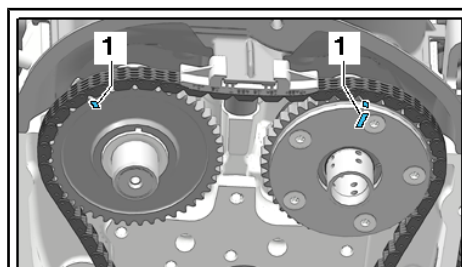
Risk of damage to bearing saddle.

◆ *Detach bearing saddle carefully without tilting it.*

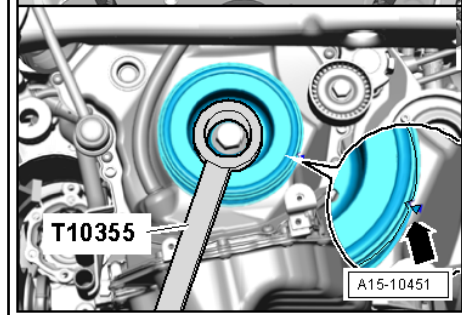
- Detach bearing saddle.



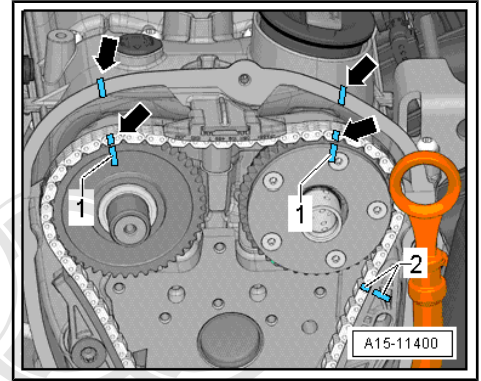
- Turn vibration damper to "TDC" position using counterhold tool - T10355- .
- Notch on vibration damper and marking on cover for timing chains (bottom) must be aligned -arrow-.
- The markings -1- on the camshafts must face upwards.



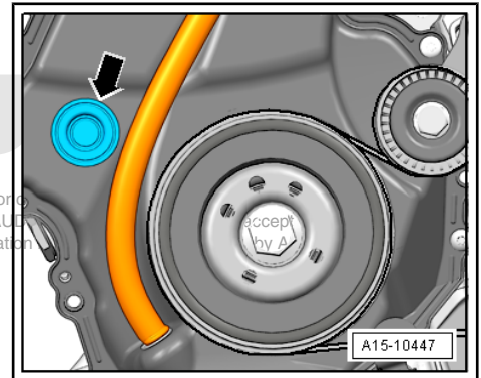
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- Use a waterproof pen to mark camshaft timing chain and cylinder head -arrows- relative to markings on chain sprockets -1-.
- Use a waterproof pen to mark camshaft timing chain relative to guide rail of timing chain -2- as well.

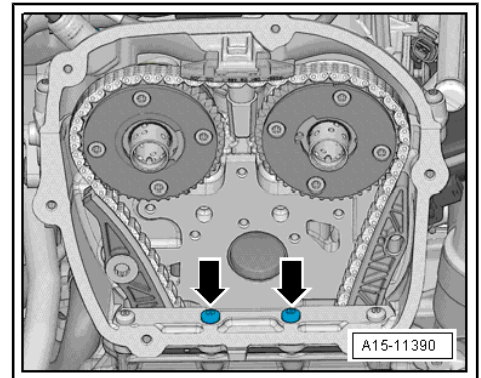


- Remove sealing plug -arrow-.

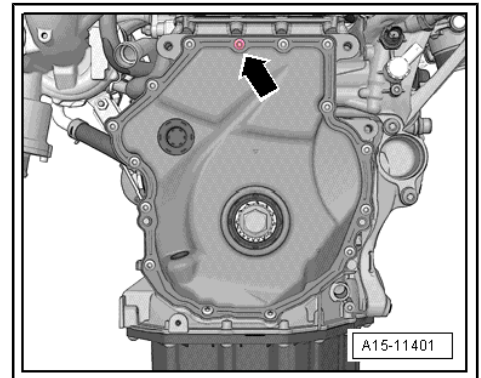


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- Remove bolts -arrows-.



- Remove bolt -arrow-.

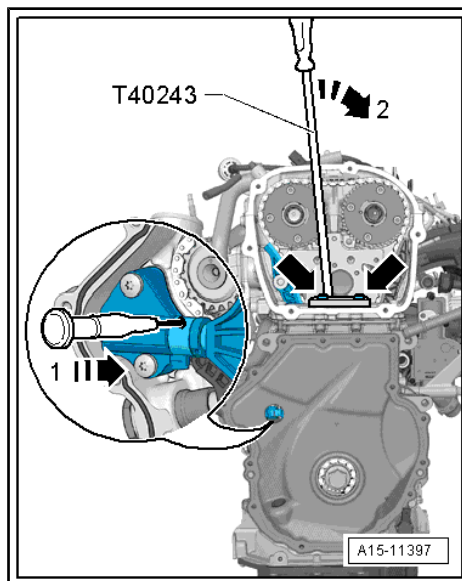




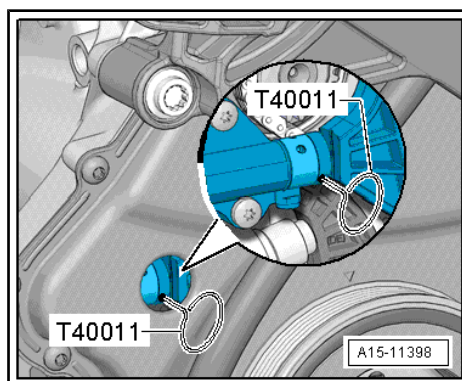
Depending on version, 2 different chain tensioners may be installed.

Version 1

- Screw in assembly lever - T40243- -arrows-.
- Lift locking element for chain tensioner; to do so, insert scribe or suitable screwdriver in hole of chain tensioner in direction of -arrow 1-, press assembly lever - T40243- slowly in direction of -arrow 2- and hold in place.



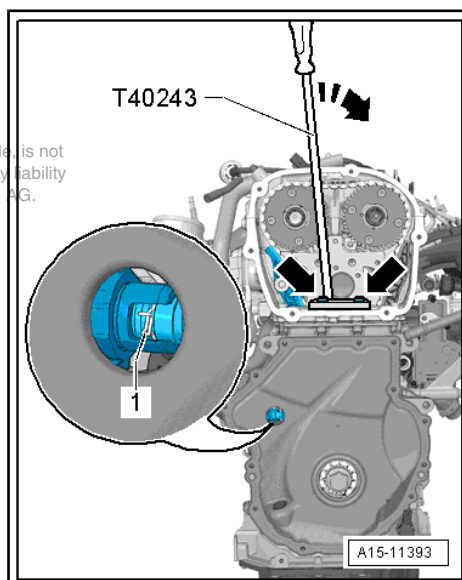
- Hold chain tensioner in position with locking pin - T40011- .



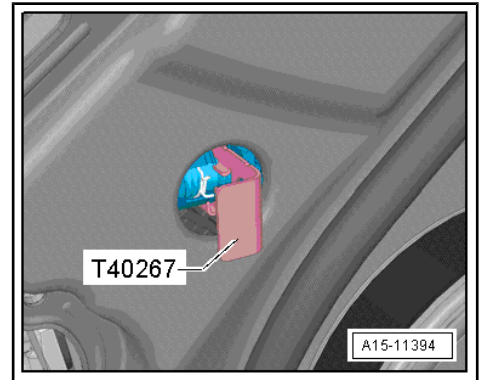
Version 2

- Screw in assembly lever - T40243- -arrows-.
- Compress circlip -1- for chain tensioner, press lever - T40243- slowly in direction of -arrow- and hold in place.

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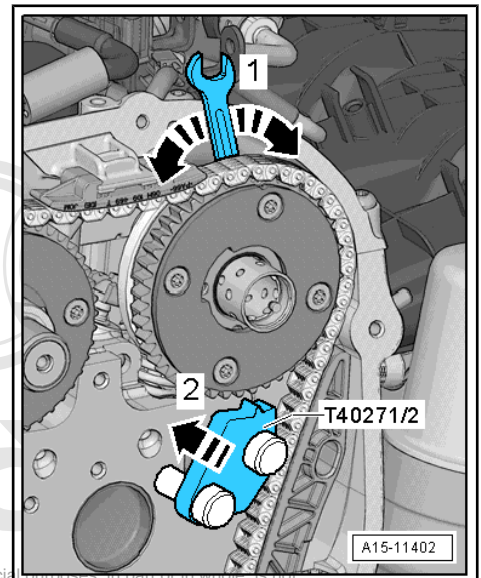


- Hold chain tensioner in position with locking tool - T40267- .



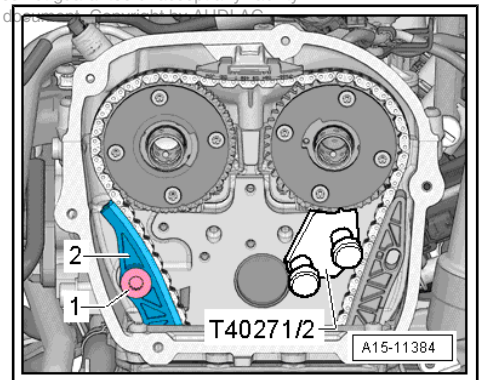
All versions

- Remove assembly lever - T40243- .
- Bolt camshaft clamp - T40271/2- onto cylinder head and slide into teeth on chain sprocket in direction of -arrow 2-; if necessary, use spanner to turn inlet camshaft in direction of -arrow 1-.



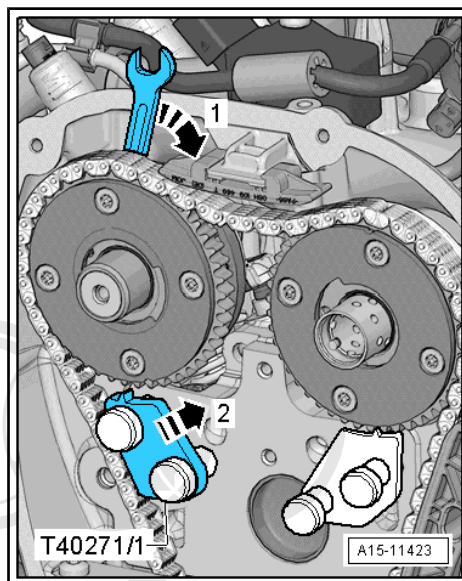
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- Remove bolt -1- and guide tensioning rail -2- downwards;



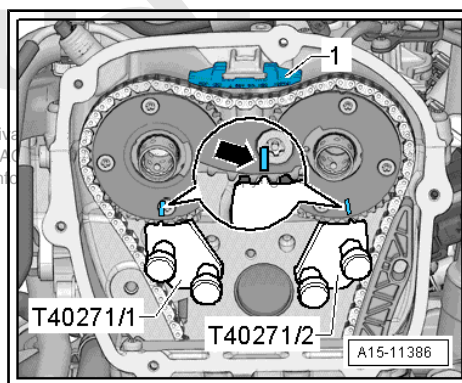


- Bolt camshaft clamp - T40271/1- onto cylinder head.
- Use spanner to turn exhaust camshaft in direction of -arrow 1- and slide camshaft clamp - T40271/1- into teeth on chain sprocket in direction of -arrow 2-.



Note

- ◆ *Mark camshafts relative to camshaft clamp - T40271/1- and camshaft clamp - T40271/2- .*
- ◆ *If using new camshafts: Transfer markings made on old camshafts onto new camshafts.*
- ◆ *It will take much more time to install the new camshafts if the markings are not applied.*
- Mark camshaft chain sprockets relative to camshaft clamp - T40271/1- and camshaft clamp - T40271/2- -arrows-.
- Use screwdriver to release catch and press off top guide rail -1- forwards.
- Remove camshaft timing chain from camshaft sprockets.



Caution

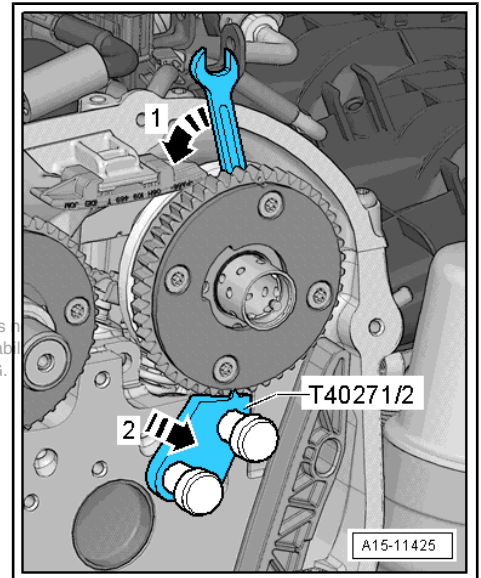
Risk of damage to valves and piston crowns.

- ◆ *Do not turn the crankshaft after the camshaft timing chain has been removed from the cylinder head.*

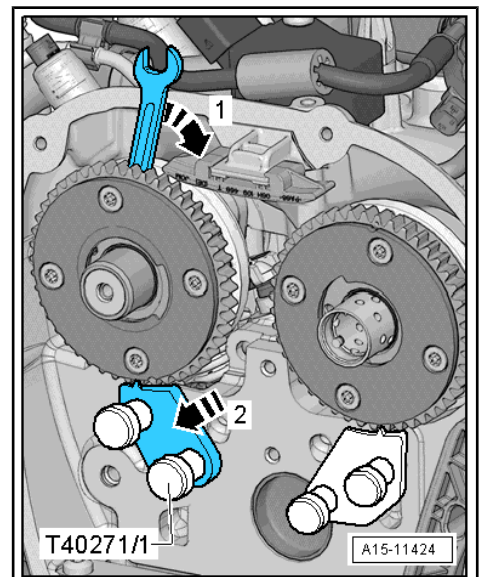
- Use spanner to turn inlet camshaft in direction of -arrow 1- and slide camshaft clamp - T40271/2- out of teeth on chain sprocket in direction of -arrow 2- and move camshaft into rest position.

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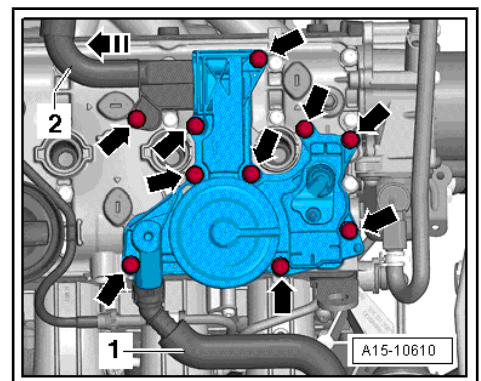
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- Use spanner to turn exhaust camshaft in direction of -arrow 1- and slide camshaft clamp - T40271/1- out of teeth on chain sprocket in direction of -arrow 2- and move camshaft into rest position.
- Remove ignition coils with output stages ➔ [page 388](#) .

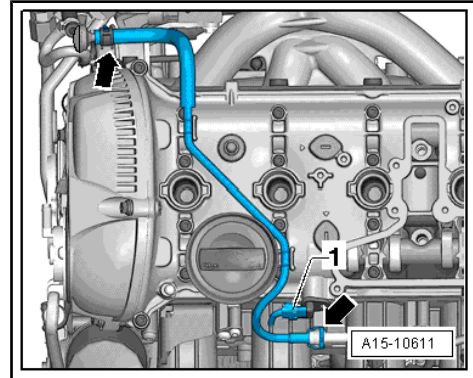


- Disconnect crankcase breather hose -1-.
- Remove bolts -arrows-, detach crankcase breather system and disconnect from crankcase breather hose -2- in direction of -arrow-.





- Disconnect pipe -arrows-.
- Unplug electrical connector -1- from Hall sender - G40- .
- Remove high-pressure pump ⇒ [page 354](#) .
- Remove vacuum pump ⇒ Brake system; Rep. gr. 47 ; Vacuum system; Removing and installing vacuum pump .



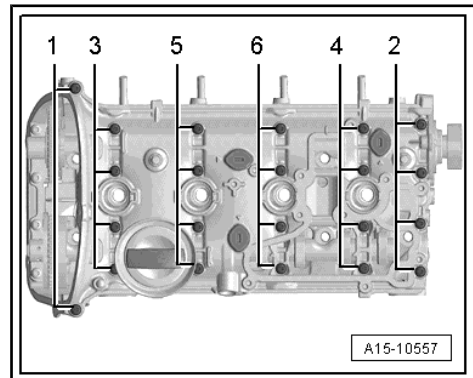
- Remove cylinder head cover bolts in the sequence -1 ... 6-.
- Detach cylinder head cover.
- Detach camshafts.



Caution

Protect lubrication system and bearings against contamination.

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



Installing



Note

- ◆ *The sealing surfaces must be free of oil and grease.*
 - ◆ *Pistons must not be at TDC.*
 - ◆ *Ensure that all roller rocker fingers contact the valve ends correctly.*
- Remove sealant remaining on cylinder head with flat scraper.



WARNING

Risk of eye injury.

- ◆ **Put on safety goggles.**

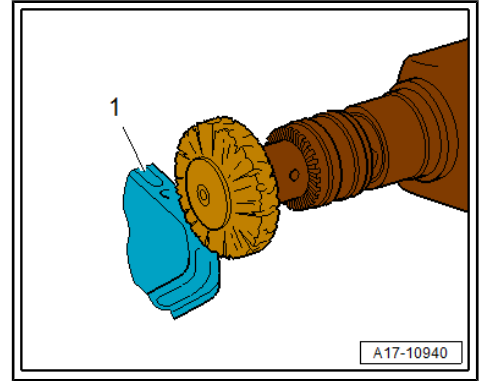


Caution

Protect lubrication system and bearings against contamination.

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

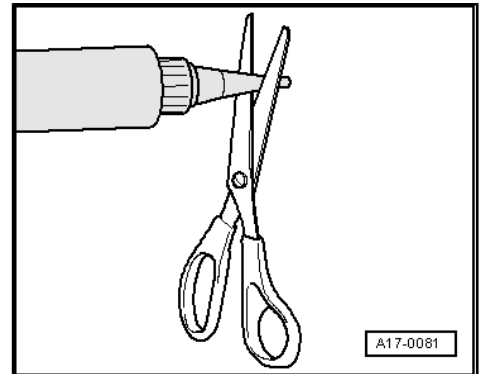
- Remove sealant residue in groove of cylinder head cover and on sealing surfaces -1- using a rotating plastic brush or similar.
- Clean sealing surfaces; they must be free of oil and grease.



- Cut off nozzle of tube at front marking (\varnothing of nozzle approx. 2 mm).
- Oil running surfaces of both camshafts.

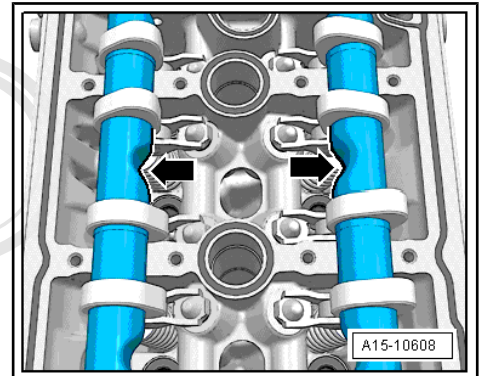
On new camshafts

- Transfer markings made on old camshafts onto new camshafts.



All vehicles:

- Fit camshafts in cylinder head, recesses -arrows- must face each other.
- Renew bolts for cylinder head cover.



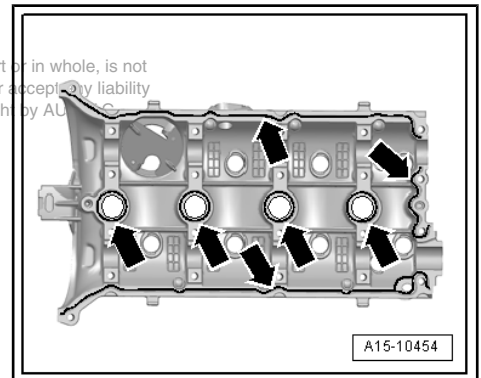
- Apply silicone sealant onto clean sealing surface of cylinder head cover, as illustrated -arrows-.

- ◆ Thickness of sealant bead: 2 ... 3 mm.

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Note

- ◆ *The cylinder head cover must be installed within 5 minutes after applying the silicone sealant.*
- ◆ *The bead of sealant must not be thicker than specified, otherwise excess sealant can enter the sump and obstruct the strainer in the oil intake pipe.*
- ◆ *Note the use-by date of the sealant.*



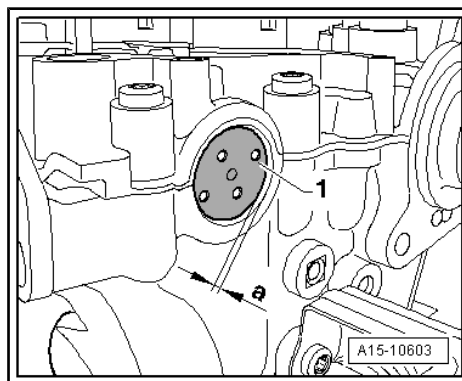
Sealant ⇒ Electronic parts catalogue

- Tighten bolts in several stages; tightening sequence ⇒ [page 177](#) .



Note

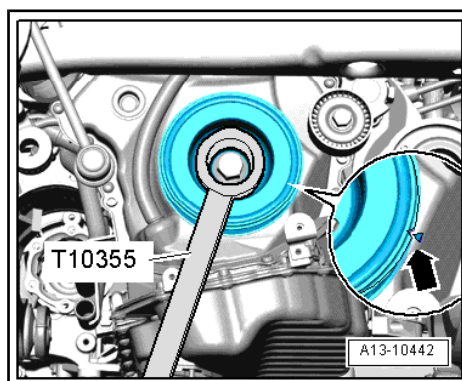
- ◆ Take care to keep cylinder head cover straight.
- ◆ Use thrust piece - T10174- to drive in sealing cap -1- (do not apply sealant).
- ◆ -a- = 1 ... 2 mm



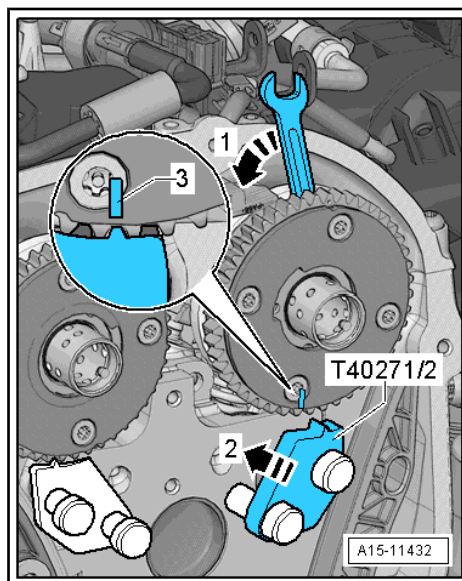
- Turn vibration damper to "TDC" position -arrow- using counterhold tool - T10355- .
- Notch on vibration damper must align with arrow marking on cover for timing chains (bottom).



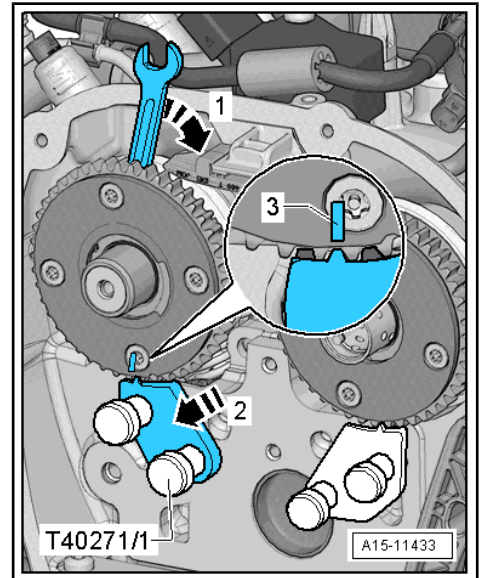
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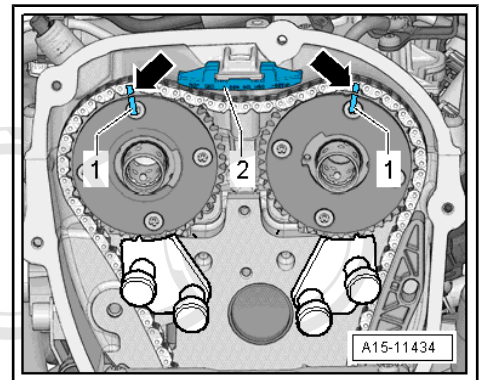
- Turn inlet camshaft in direction of -arrow 1- until marking -3- aligns with camshaft clamp - T40271/2- .
- Slide camshaft clamp - T40271/2- into teeth of chain sprocket in direction of -arrow 2-.



- Turn exhaust camshaft in direction of -arrow 1- until marking -3- aligns with camshaft clamp - T40271/1- .
- Slide camshaft clamp - T40271/1- into teeth of chain sprocket in direction of -arrow 2-.

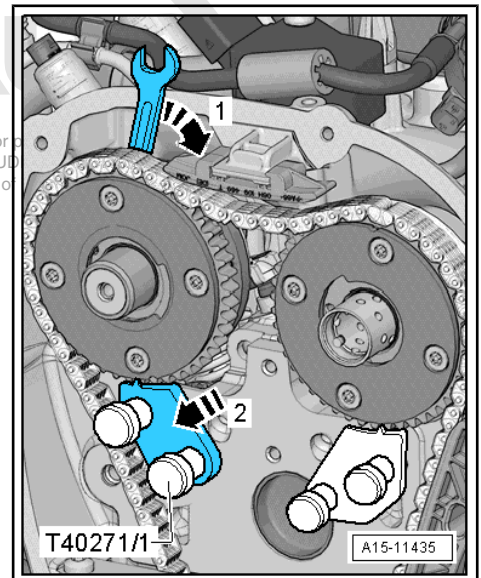


- Fit timing chain; to do so, position markings on chain links -arrows- at markings on chain sprockets -1-.
- Install top guide rail -2-.



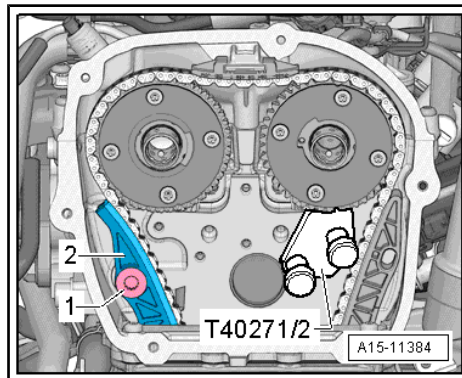
- Turn exhaust camshaft in direction of -arrow 1- and slide camshaft clamp - T40271/1- out of teeth on chain sprocket in direction of -arrow 2- and release camshaft.
- Remove camshaft clamp - T40271/1- .

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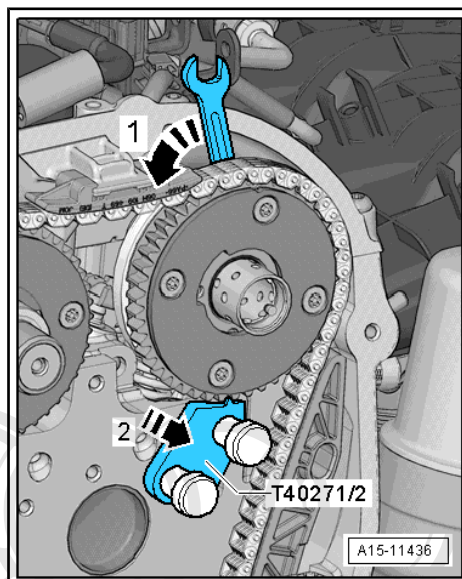




- Move guide rail -2- upwards and screw in bolt -1-.



- Turn inlet camshaft in direction of -arrow 1- and slide camshaft clamp - T40271/2- out of teeth on chain sprocket in direction of -arrow 2- and release camshaft.
- Remove camshaft clamp - T40271/2- .



- Check valve timing; markings on camshaft timing chain and cylinder head -arrows- must align with markings on chain sprockets -1-.
- Markings on camshaft timing chain and on guide rail for camshaft timing chain -2- must be opposite one another.
- Notch on vibration damper must align with marking on cover for timing chain (bottom) -3-.

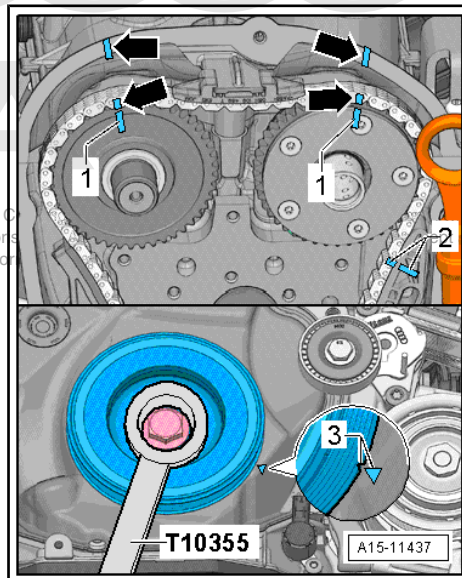
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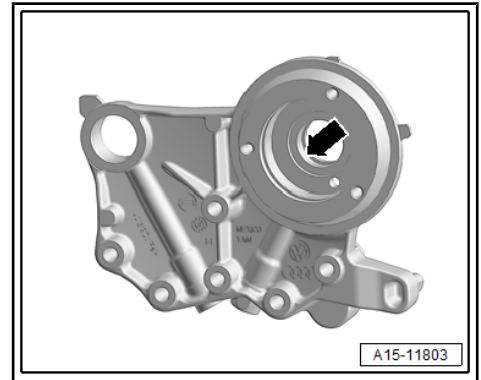



Note

If the markings you have made are no longer visible, check the valve timing => [page 114](#) .



- Lubricate hole -arrow- with engine oil.

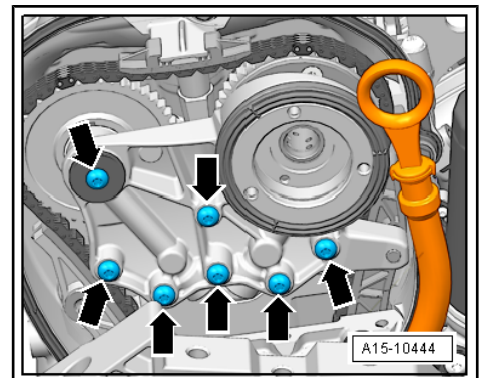


 **WARNING**

Risk of damage to bearing saddle.

◆ *Detach bearing saddle carefully without tilting it.*

- Attach bearing saddle and screw in bolts -arrows- hand-tight.
- Depending on version, remove locking pin - T40011- or locking tool - T40267- .
- Tighten bolts -arrows- for bearing saddle ⇒ [page 96](#) .
- Screw in bolt -arrow-.
- Install timing valve ⇒ [Item 6 \(page 96\)](#) .
- Install timing chain cover (top) ⇒ [page 89](#) .
- Install vacuum pump ⇒ Brake system; Rep. gr. 47 ; Vacuum system; Removing and installing vacuum pump .
- Install high-pressure pump ⇒ [page 354](#) .
- Install ignition coils with output stages ⇒ [page 388](#) .

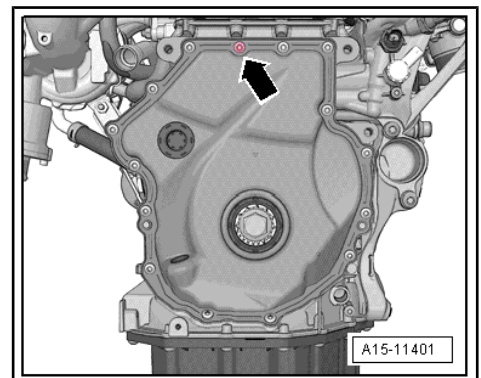


Further assembly is basically carried out in reverse order of dismantling.

- Reset service position ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Setting service position and returning to normal position .

Tightening torques

- ◆ ⇒ [“4.1.1 Exploded view - valve gear \(1.8 ltr. engine\)”](#), [page 175](#)



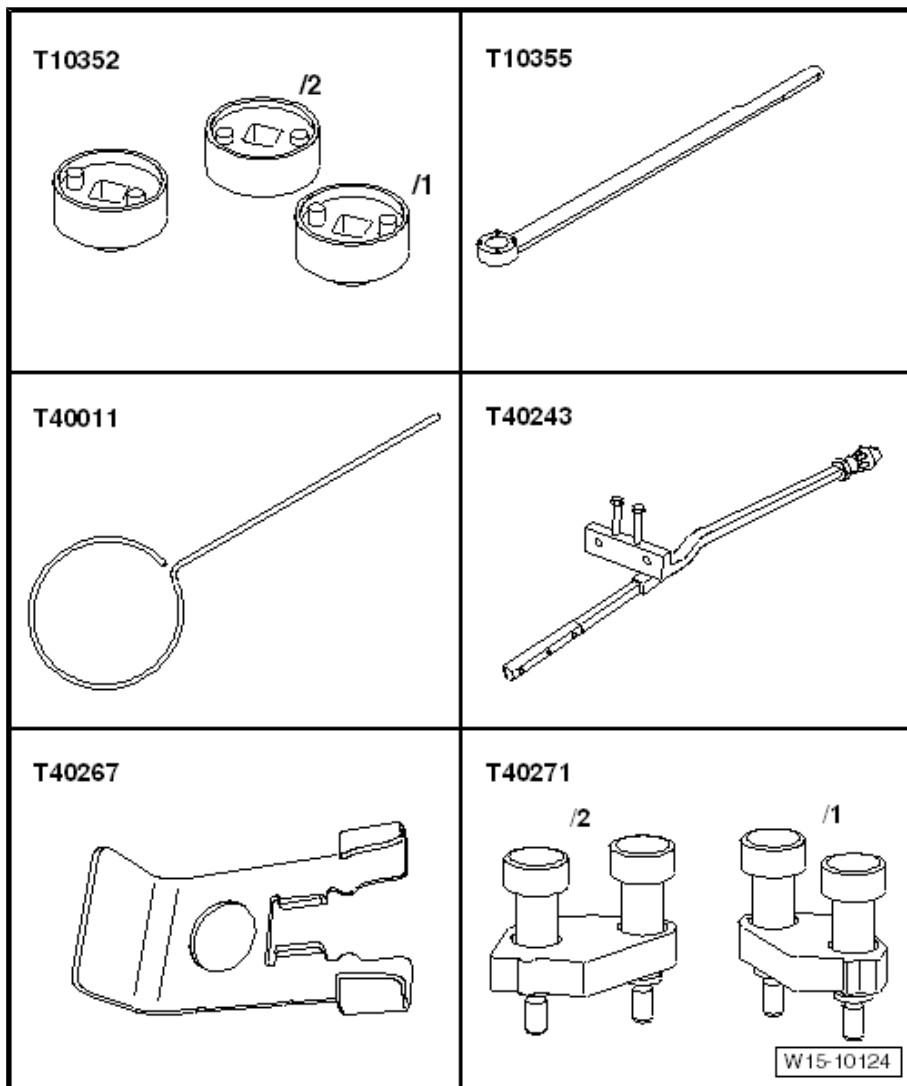
4.2.2 Removing and installing camshaft (2.0 ltr. engine)

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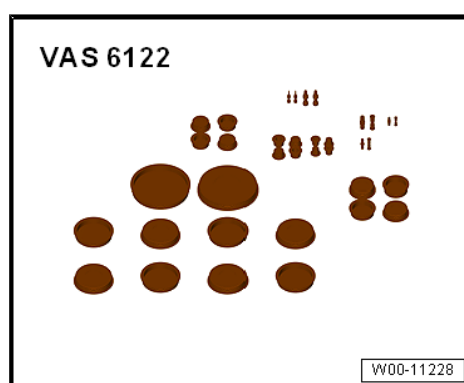


Special tools and workshop equipment required

- ◆ Assembly tool - T10352-
- ◆ Counterhold tool - T10355-
- ◆ Locking pin - T40011-
- ◆ Assembly lever - T40243-
- ◆ Locking tool - T40267-
- ◆ Camshaft clamp - T40271-

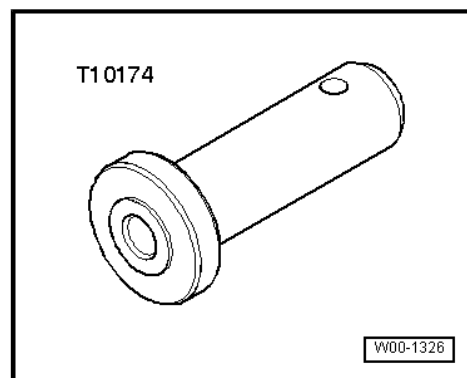


- ◆ Engine bung set - VAS 6122-



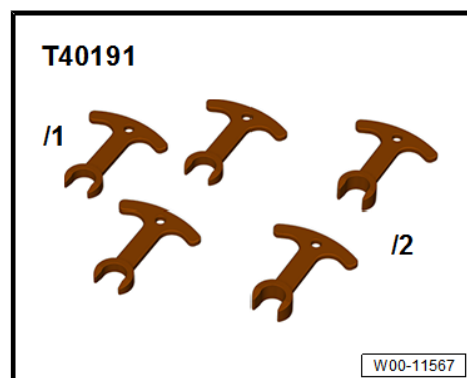
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◆ Thrust piece - T10174-

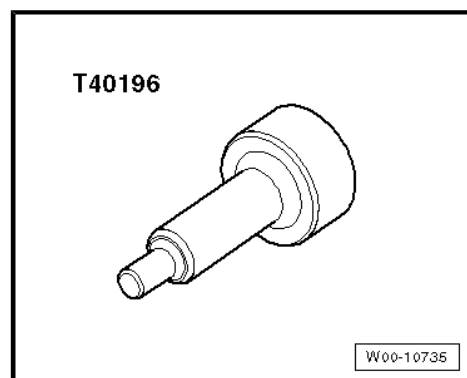


◆ Spacers - T40191-

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◆ Drifts - T40196-



Removing

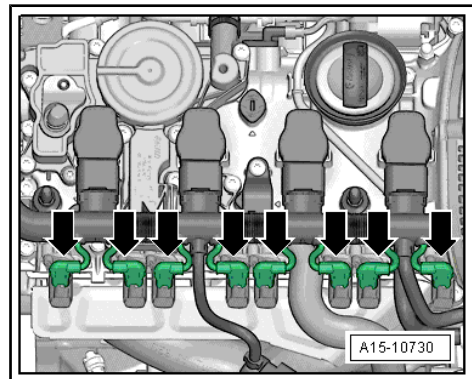


Note

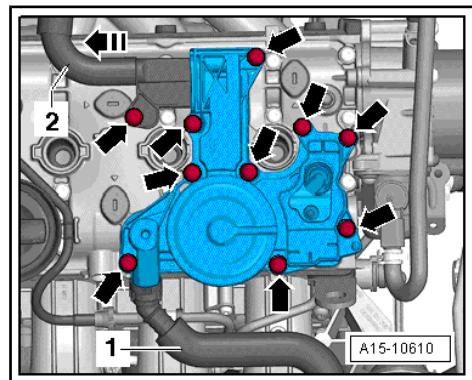
- ◆ *Sealing surfaces at bottom of cylinder head cover and top of cylinder head must not be machined.*
 - ◆ *The camshaft bearings are integrated into the cylinder head and cylinder head cover. The timing chain must be slackened before removing the cylinder head cover.*
 - ◆ *Renew sealing cap ⇒ [Item 20 \(page 179\)](#) if cylinder head cover has been detached.*
 - ◆ *Fit cable ties in the original positions when installing.*
 - ◆ *All open inlet and exhaust ports must be sealed with suitable plugs (e.g. from engine bung set - VAS 6122-).*
- Set service position ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Setting service position and returning to normal position .



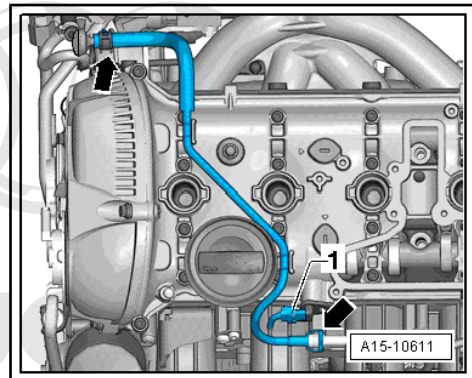
- Remove engine cover panel ⇒ [page 37](#) .
- Remove air cleaner housing ⇒ [page 318](#) .
- Remove ignition coils with output stages ⇒ [page 388](#) .
- Unplug electrical connectors -arrows- at actuators for camshaft adjustment.



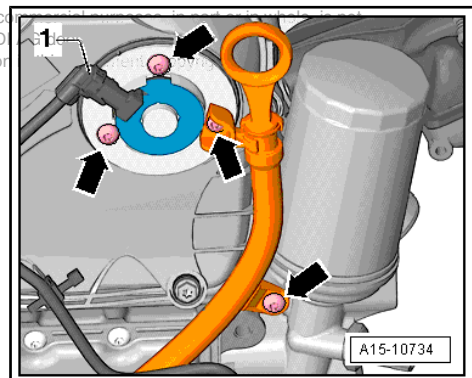
- Disconnect crankcase breather hose -1-.
- Remove bolts -arrows-, detach crankcase breather system and disconnect from crankcase breather hose -2- in direction of -arrow-.



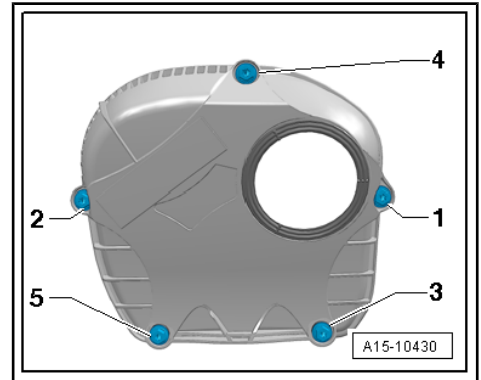
- Disconnect pipe -arrows-.
- Unplug electrical connector -1- from Hall sender - G40- .



- Detach connector from camshaft control valve 1 - N205- 1.
- Unscrew bolts -arrows- and remove camshaft control valve 1 - N205- .

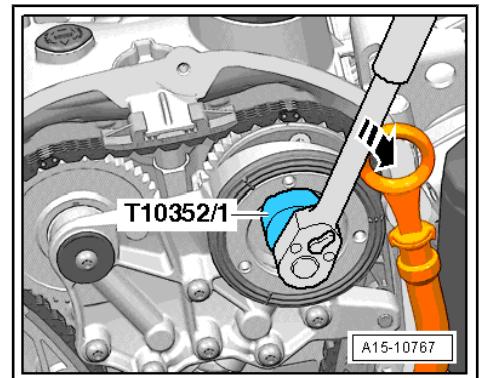


- Unscrew bolts -1 to 5- and remove timing chain cover (top).




 **Caution**
The timing valve has a left-hand thread.

- Depending on version, turn assembly tool - T10352- or assembly tool - T10352/1A- in direction of -arrow- to remove timing valve.

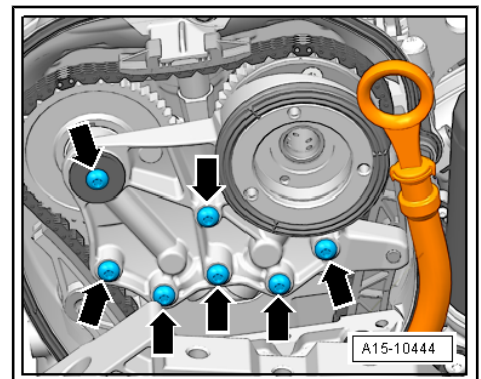


- Remove bolts -arrows-.

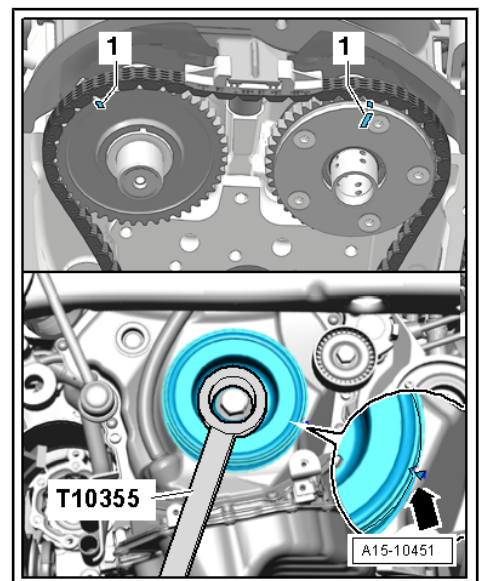
 **WARNING**
Risk of damage to bearing saddle.
 ♦ *Detach bearing saddle carefully without tilting it.*

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Detach bearing saddle.



- Turn vibration damper to "TDC" position using counterhold tool - T10355- .
- Notch on vibration damper and marking on cover for timing chains (bottom) must be aligned -arrow-.
- The markings -1- on the camshafts must face upwards.





Caution

Risk of irreparable damage to engine.

◆ *Only insert drifts - T40196- in points marked in illustration.*

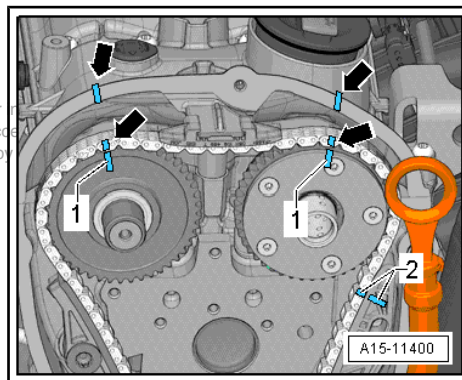
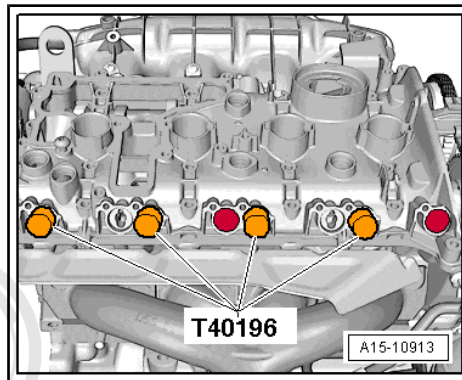
- Insert drifts - T40196- as shown in illustration.
- Turn crankshaft 2 rotations in direction of engine rotation.



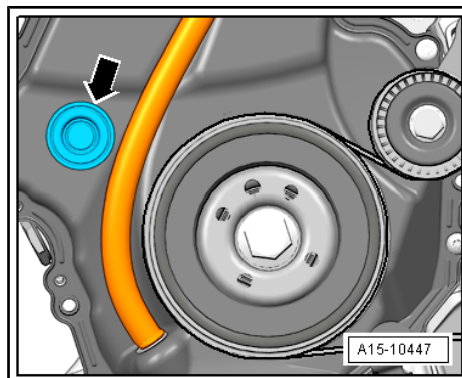
Note

Engine must be at "TDC" position again.

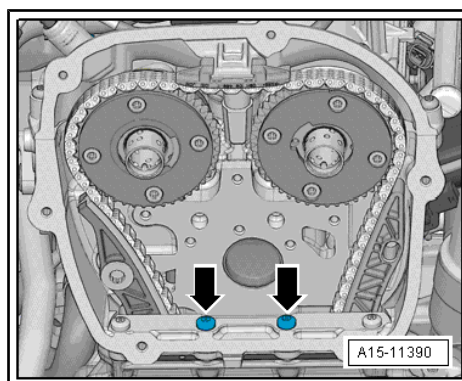
- Remove drifts - T40196- .
- Use a waterproof pen to mark camshaft timing chain and cylinder head -arrows- relative to markings on chain sprockets -1-.
- Use a waterproof pen to mark camshaft timing chain relative to guide rail of timing chain -2- as well.



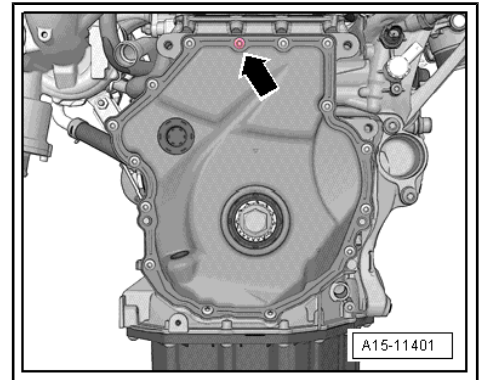
- Remove sealing plug -arrow-.



- Remove bolts -arrows-.



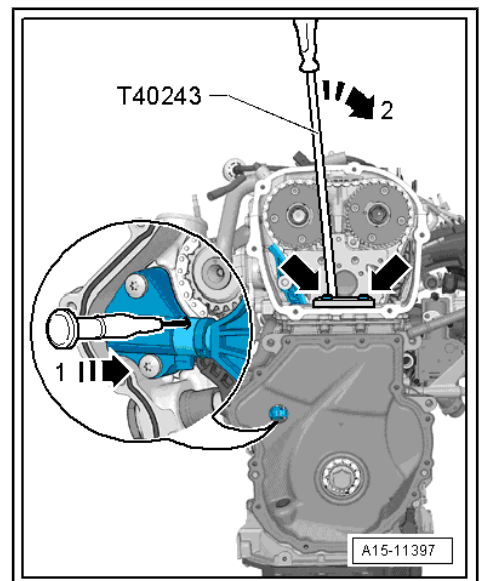
- If fitted, remove bolt -arrow-.



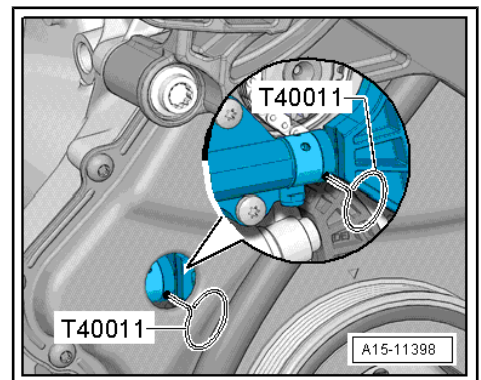
Depending on version, 2 different chain tensioners may be installed.

Version 1

- Screw in assembly lever - T40243- -arrows-.
- Lift locking element for chain tensioner; to do so, insert scribe or suitable screwdriver in hole of chain tensioner in direction of -arrow 1-, press assembly lever - T40243- slowly in direction of -arrow 2- and hold in place.



- Hold chain tensioner in position with locking pin - T40011- .

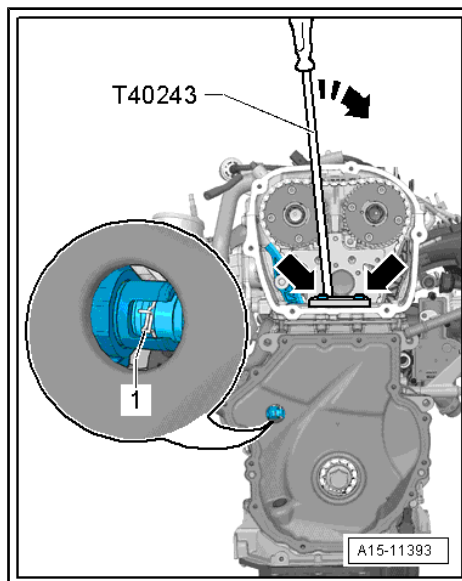


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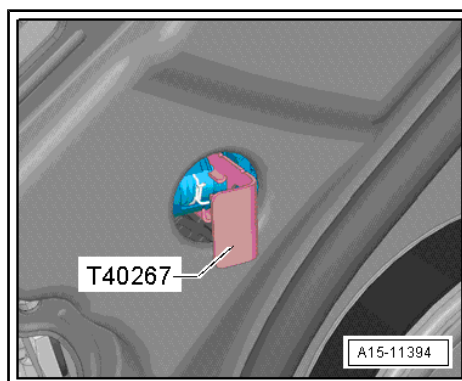


Version 2

- Screw in assembly lever - T40243- -arrows-.
- Compress circlip -1- for chain tensioner, press lever - T40243- slowly in direction of -arrow- and hold in place.

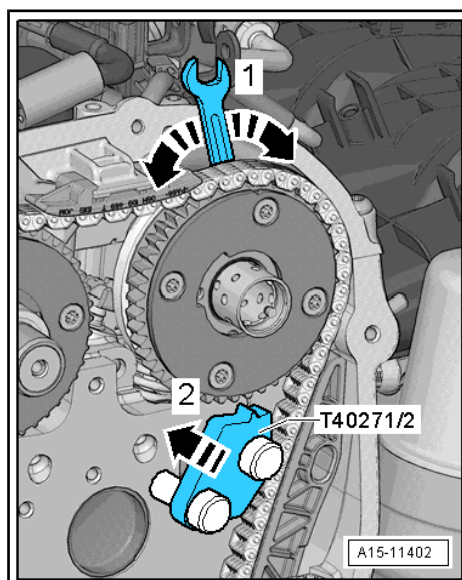


- Hold chain tensioner in position with locking tool - T40267- .



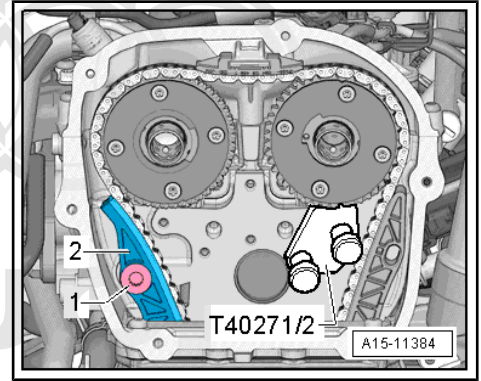
All versions

- Remove assembly lever - T40243- .
- Bolt camshaft clamp - T40271/2- onto cylinder head and slide into teeth on chain sprocket in direction of -arrow 2-; if necessary, use spanner to turn inlet camshaft in direction of -arrow 1-.



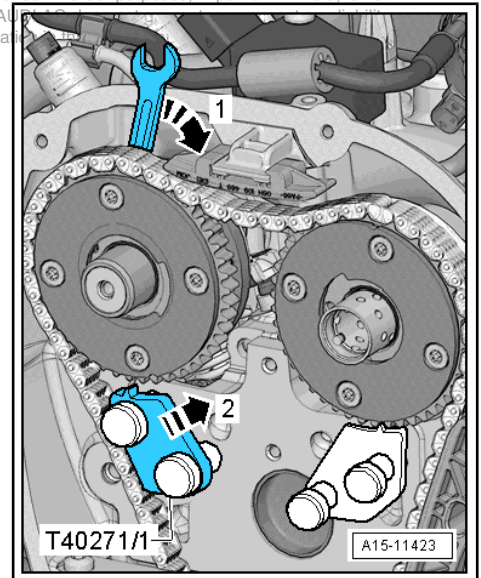
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- Remove bolt -1- and guide tensioning rail -2- downwards.



- Bolt camshaft clamp - T40271/1- onto cylinder head.
- Use spanner to turn exhaust camshaft in direction of -arrow 1- and slide camshaft clamp - T40271/1- into teeth on chain sprocket in direction of -arrow 2-.

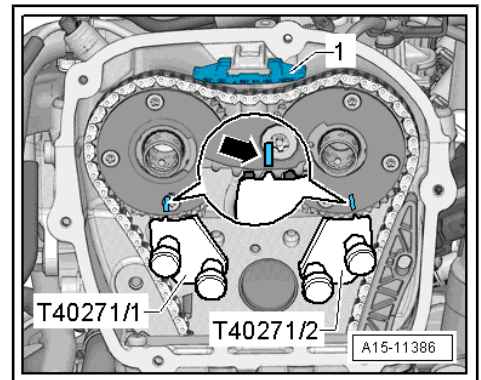
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i Note

- ◆ *Mark camshafts relative to camshaft clamp - T40271/1- and camshaft clamp - T40271/2- .*
- ◆ *If using new camshafts: Transfer markings made on old camshafts onto new camshafts.*
- ◆ *It will take much more time to install the new camshafts if the markings are not applied.*

- Mark camshaft chain sprockets relative to camshaft clamp - T40271/1- and camshaft clamp - T40271/2- -arrows-.
- Use screwdriver to release catch and press off top guide rail -1- forwards.
- Remove camshaft timing chain from camshaft sprockets.



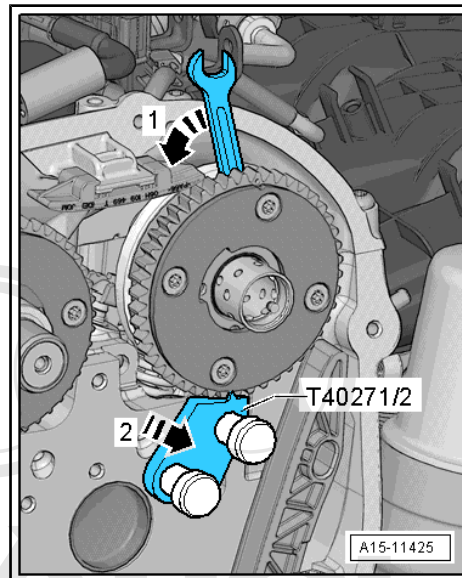
Caution

Risk of damage to valves and piston crowns.

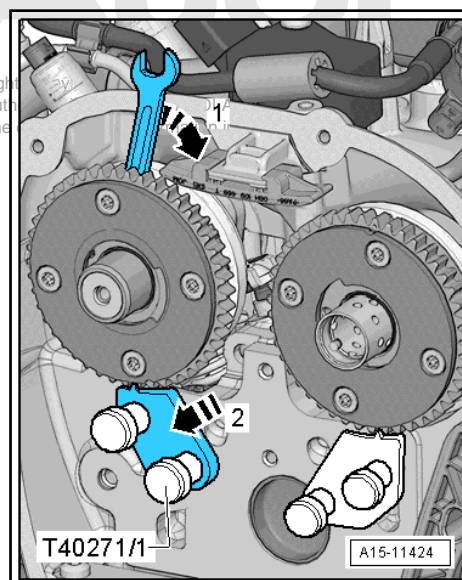
- ◆ *Do not turn the crankshaft after the camshaft timing chain has been removed from the cylinder head.*



- Use spanner to turn inlet camshaft in direction of -arrow 1- and slide camshaft clamp - T40271/2- out of teeth on chain sprocket in direction of -arrow 2- and move camshaft into rest position.




- Use spanner to turn exhaust camshaft in direction of -arrow 1- and slide camshaft clamp - T40271/1- out of teeth on chain sprocket in direction of -arrow 2- and move camshaft into rest position.
- Remove high-pressure pump ⇒ [page 354](#) .
- Remove vacuum pump ⇒ Brake system; Rep. gr. 47 ; Vacuum system; Removing and installing vacuum pump .



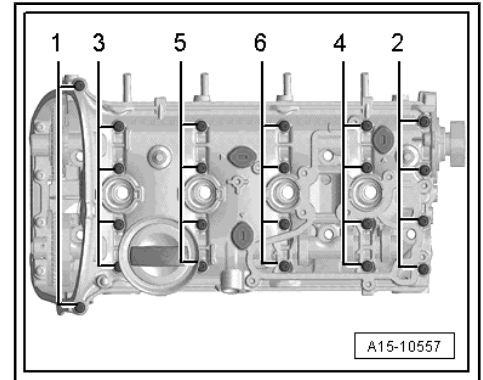
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- Remove cylinder head cover bolts in the sequence -1 ... 6-.
- Detach cylinder head cover.
- Detach camshafts.

 **Caution**

Protect lubrication system and bearings against contamination.


◆ *Cover exposed parts of the engine.*



Installing


 **Note**

- ◆ *The sealing surfaces must be free of oil and grease.*
 - ◆ *Pistons must not be at TDC.*
 - ◆ *Ensure that all roller rocker fingers contact the valve ends correctly.*
- Remove sealant remaining on cylinder head with flat scraper.

 **WARNING**

Risk of eye injury.

◆ *Put on safety goggles.*

 **Caution**

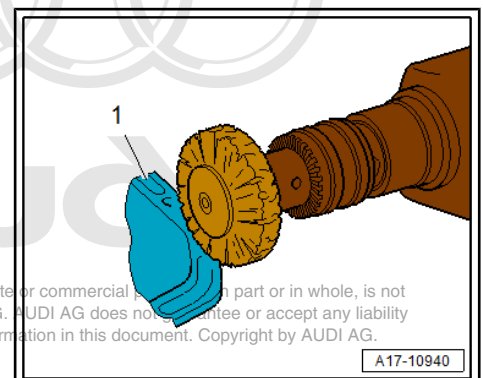
Protect lubrication system and bearings against contamination.

◆ *Cover exposed parts of the engine.*

- Remove sealant residue in groove of cylinder head cover -1- and on sealing surfaces using a rotating plastic brush or similar.
- Clean sealing surfaces; they must be free of oil and grease.
- Oil running surfaces of both camshafts.

On new camshafts


- Transfer markings made on old camshafts onto new camshafts.



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All vehicles:

 **WARNING**
Risk of eye injury.
 ♦ Put on safety goggles.

- Lock camshaft with spacers - T40191- as shown in illustration; if necessary, move sliders to correct positions.

 **Note**

If available, use second set of spacers - T40191- , or re-position -T40191/1- .

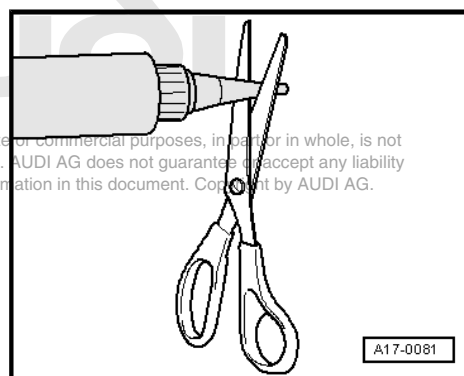
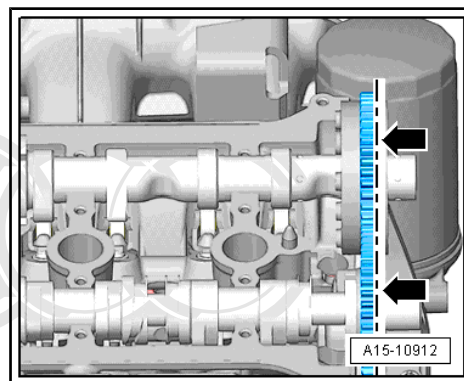
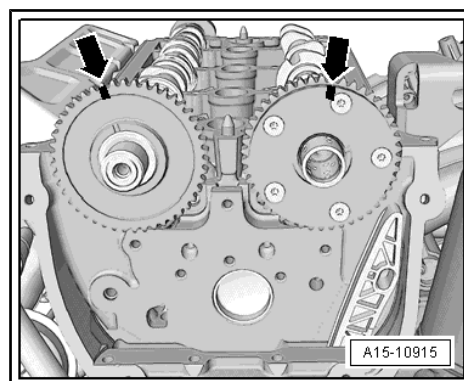
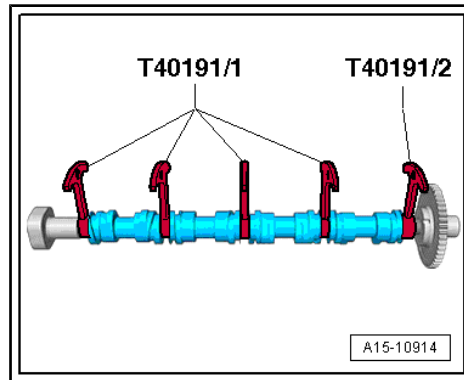
- Place camshafts in cylinder head; factory markings -arrows- must be positioned as shown in illustration.

 **Note**

Disregard the markings you have made.

- Check alignment -arrows- of camshafts.

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

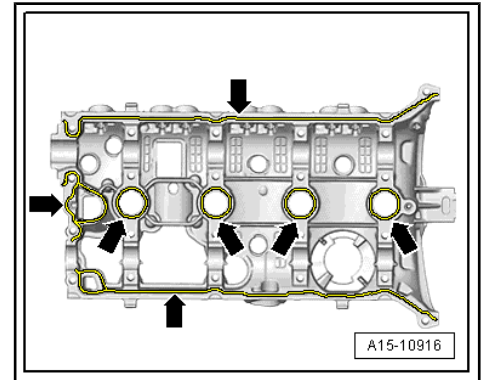


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- Apply silicone sealant onto clean sealing surface of cylinder head cover, as illustrated -arrows-.
- ◆ Thickness of sealant bead: 2 ... 3 mm.

 **Note**

- ◆ *The cylinder head cover must be installed within 5 minutes after applying the silicone sealant.*
- ◆ *The bead of sealant must not be thicker than specified, otherwise excess sealant can enter the sump and obstruct the strainer in the oil intake pipe.*
- ◆ *Note the use-by date of the sealant.*



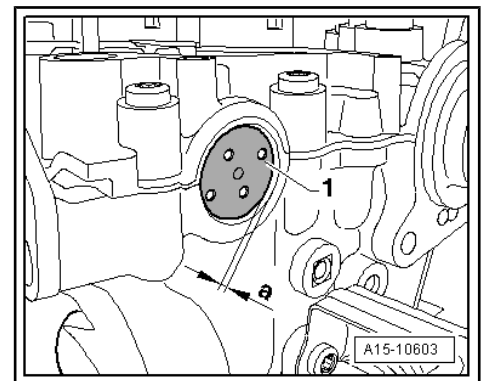
Sealant ⇒ Electronic parts catalogue

- Fit cylinder head cover on cylinder head.
- Renew bolts for cylinder head cover.
- Tighten bolts in several stages; tightening sequence ⇒ [page 179](#) .

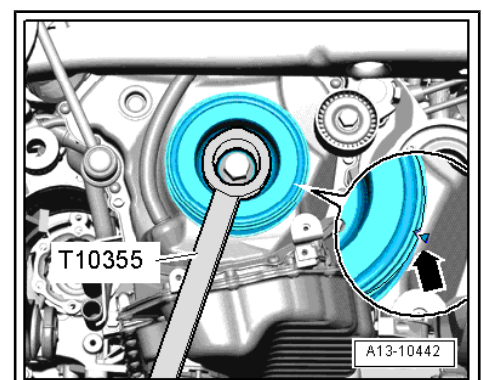
 **Note**

Take care to keep cylinder head cover straight.

- Use thrust piece - T10174- to drive in sealing cap -1- (do not apply sealant).
- a- = 1 ... 2 mm



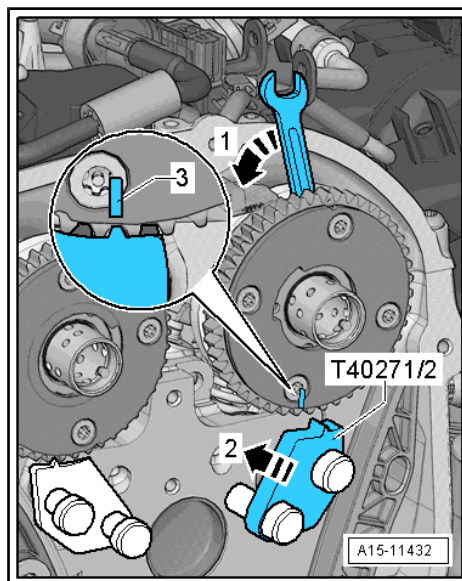
- Turn vibration damper to "TDC" position -arrow- using counterhold tool - T10355- .
- Notch on vibration damper must align with arrow marking on cover for timing chains (bottom).



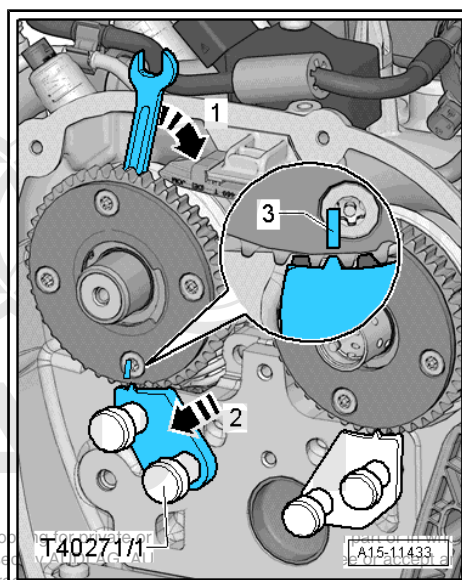
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- Turn inlet camshaft in direction of -arrow 1- until marking -3- aligns with camshaft clamp - T40271/2- .
- Slide camshaft clamp - T40271/2- into teeth of chain sprocket in direction of -arrow 2-.

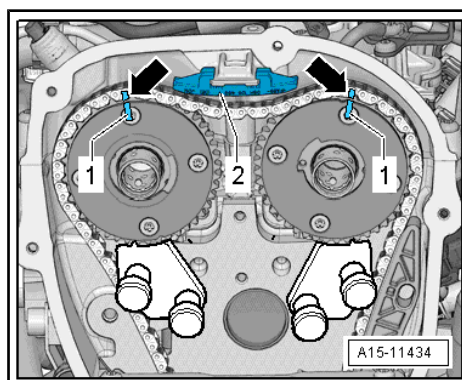


- Turn exhaust camshaft in direction of -arrow 1- until marking -3- aligns with camshaft clamp - T40271/1- .
- Slide camshaft clamp - T40271/1- into teeth of chain sprocket in direction of -arrow 2-.

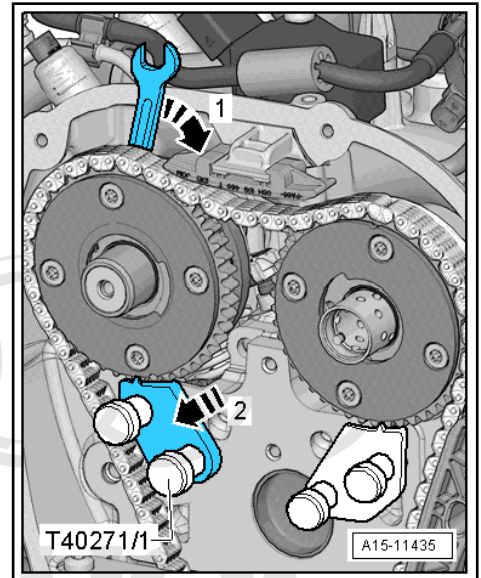


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- Fit timing chain; to do so, position markings on chain links -arrows- at markings on chain sprockets -1-.
- Install top guide rail -2-.

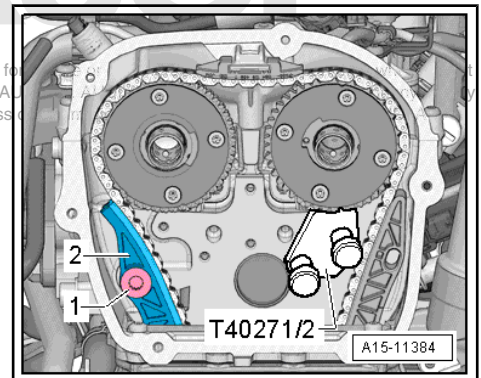


- Turn exhaust camshaft in direction of -arrow 1- and slide camshaft clamp - T40271/1- out of teeth on chain sprocket in direction of -arrow 2- and release camshaft.
- Remove camshaft clamp - T40271/1- .

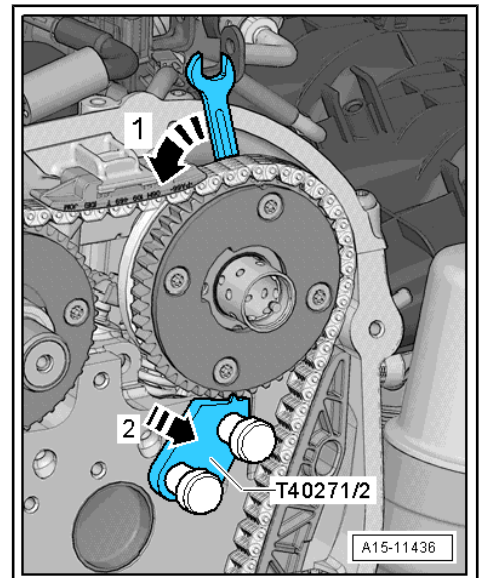


- Move guide rail -2- upwards and screw in bolt -1-.

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- Turn inlet camshaft in direction of -arrow 1- and slide camshaft clamp - T40271/2- out of teeth on chain sprocket in direction of -arrow 2- and release camshaft.
- Remove camshaft clamp - T40271/2- .



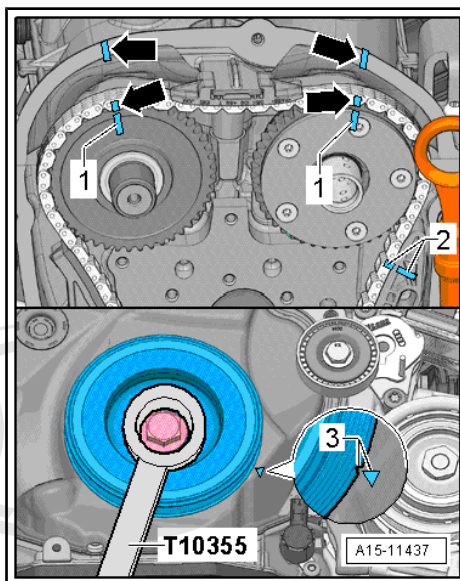


- Check valve timing; markings on camshaft timing chain and cylinder head -arrows- must align with markings on chain sprockets -1-.
- Markings on camshaft timing chain and on guide rail for camshaft timing chain -2- must be opposite one another.
- Notch on vibration damper must align with marking on cover for timing chain (bottom) -3-.



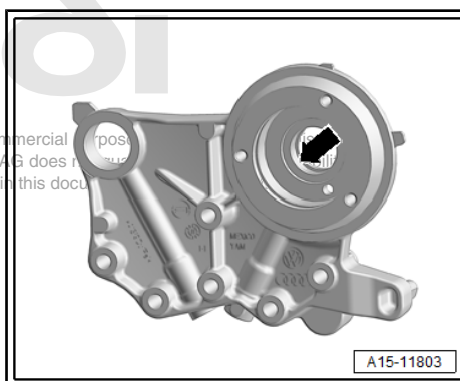
Note

If the markings you have made are no longer visible, check the valve timing => [page 114](#) .



- Lubricate hole -arrow- with engine oil.

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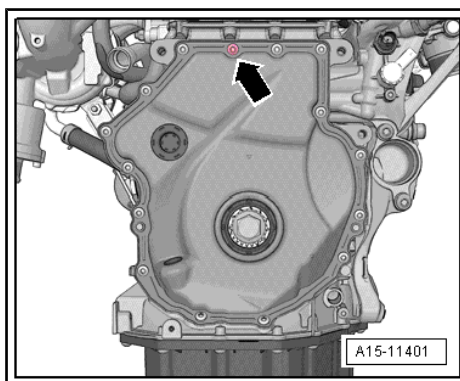
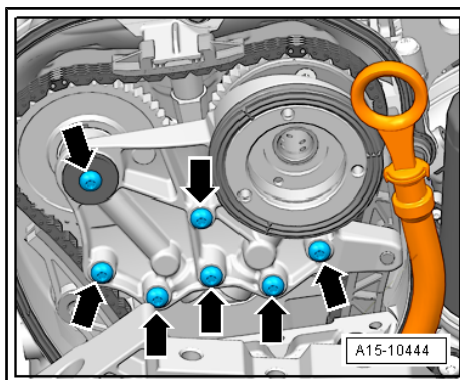


! WARNING

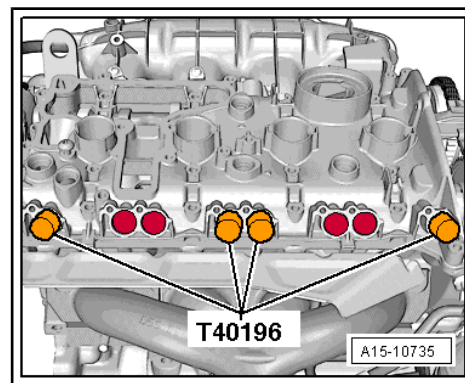
Risk of damage to bearing saddle.

◆ **Detach bearing saddle carefully without tilting it.**

- Attach bearing saddle and screw in bolts -arrows- hand-tight.
- Depending on version, remove locking pin - T40011- or locking tool - T40267- .
- Tighten bolts -arrows- for bearing saddle => [page 96](#) .
- Screw in bolt -arrow-.
- Install timing valve => [Item 6 \(page 96\)](#) .



- Insert drifts - T40196- as shown in illustration.
- Turn crankshaft 4 rotations in direction of engine rotation.
- Remove drifts - T40196- .
- Install timing chain cover (top) ⇒ [page 89](#) .
- Install vacuum pump ⇒ Brake system; Rep. gr. 47 ; Vacuum system; Removing and installing vacuum pump .
- Install high-pressure pump ⇒ [page 354](#) .
- Install ignition coils with output stages ⇒ [page 388](#) .
- Reset service position ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Setting service position and returning to normal position .
- Install air cleaner housing ⇒ [page 318](#) .



Further assembly is basically carried out in reverse order of dismantling.

Tightening torques

- ◆ ⇒ [“4.1.2 Exploded view - valve gear \(2.0 ltr. engine\)”, page 178](#)

4.3 Installing ball for slider


Special tools and workshop equipment required

- ◆ Spacers - T40191-



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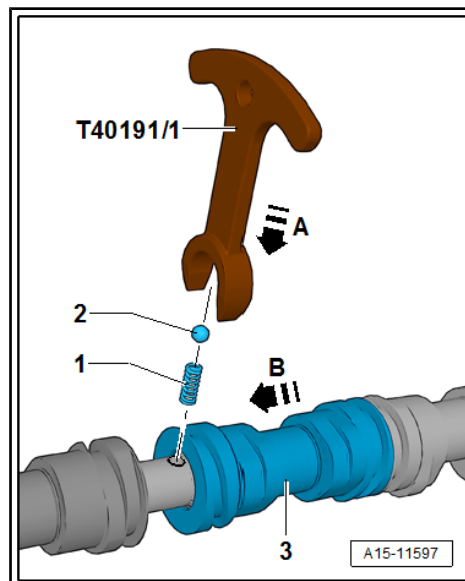
Installing

 **WARNING**

Ball may spring out - risk of eye injury.

- ◆ *Put on safety goggles.*

- Insert spring -1- in camshaft.
- Place ball -2- on spring in camshaft.
- Push ball and spring downwards in direction of -arrow A- with spacer - T40191/1- and hold in place.
- Push slider -3- in direction of -arrow B-.



4.4 Removing and installing camshaft control valve 1 - N205-

Removing

- Detach connector from camshaft control valve 1 - N205- -1-.
- Unscrew bolts -arrows- and remove camshaft control valve 1 - N205- .

Installing

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

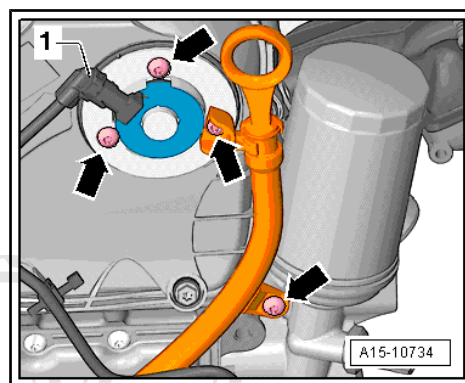


Renew O-ring.

- Lubricate oil seal and O-ring with engine oil.

Tightening torques

- ◆ => ["1.1 Exploded view - timing chain cover", page 87](#)



4.5 Removing and installing valve stem oil seals

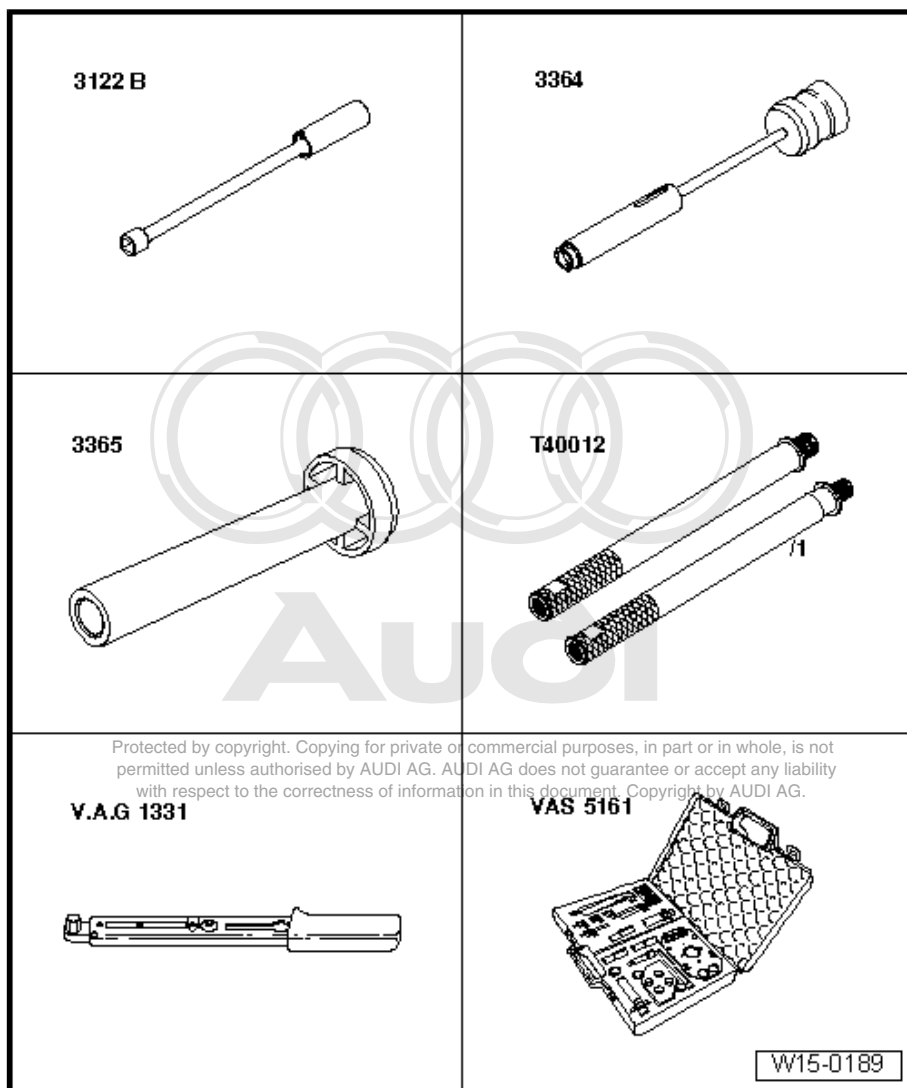
⇒ ["4.5.1 Removing and installing valve stem oil seals \(cylinder head installed\)", page 210](#)

⇒ ["4.5.2 Removing and installing valve stem oil seals \(cylinder head removed\)", page 214](#)

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

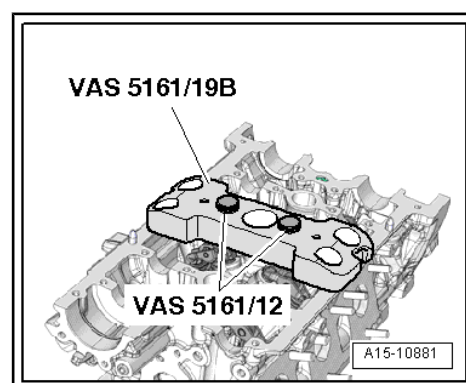
Special tools and workshop equipment required

- ◆ Spark plug spanner - 3122 B-
- ◆ Valve stem seal puller - 3364-
- ◆ Valve stem seal fitting tool - 3365-
- ◆ Adapter - T40012-
- ◆ Torque wrench - V.A.G 1331-
- ◆ Removal and installation device for valve cotters - VAS 5161 A-
- ◆ Guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B-



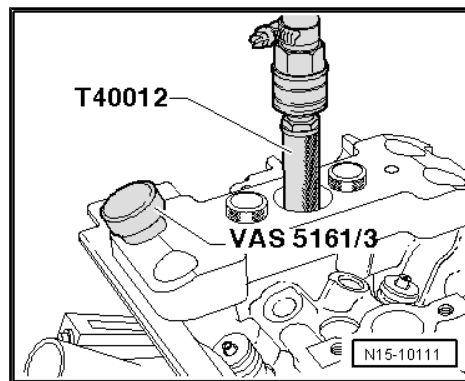
Removing valve stem oil seals

- Remove camshafts; 1.8 ltr. engine ⇒ [page 180](#) , 2.0 ltr. engine ⇒ [page 193](#) .
- Mark original positions of roller rocker fingers and hydraulic compensation elements for re-installation.
- Remove roller rocker fingers together with hydraulic compensation elements and put down on a clean surface.
- Remove spark plugs with spark plug spanner - 3122 B- .
- Secure guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B- to cylinder head with knurled screws - VAS 5161/12- as shown.
- Set piston of appropriate cylinder to “bottom dead centre”.



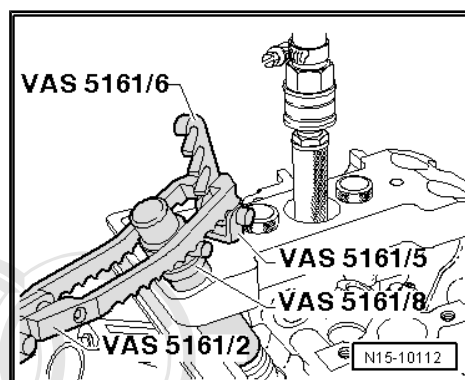


- Screw adapter - T40012- into spark plug thread.
- Connect to compressed air supply of at least 6 bar.
- Knock loose sticking valve cotters using punch - VAS 5161/3- and a plastic-headed hammer.



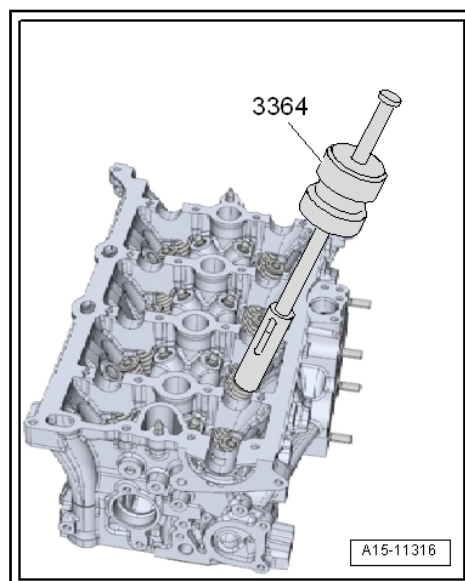
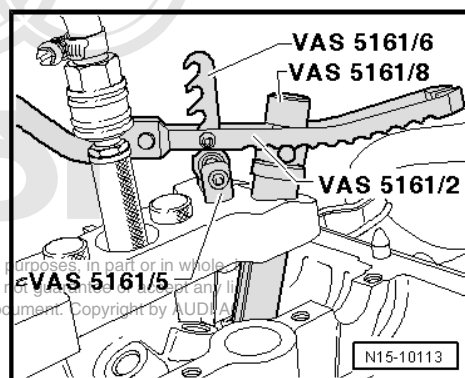
For inlet side

- Screw snap-in device - VAS 5161/6- with engaging fork - VAS 5161/5- into centre thread on guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B- .
- Insert assembly cartridge - VAS 5161/8- into guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B- .
- Engage pressure fork - VAS 5161/2- on snap-in device - VAS 5161/6- .

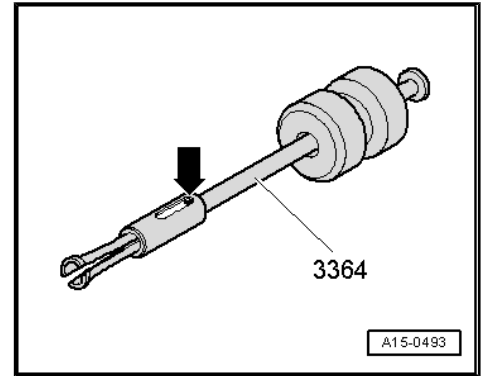


For exhaust side

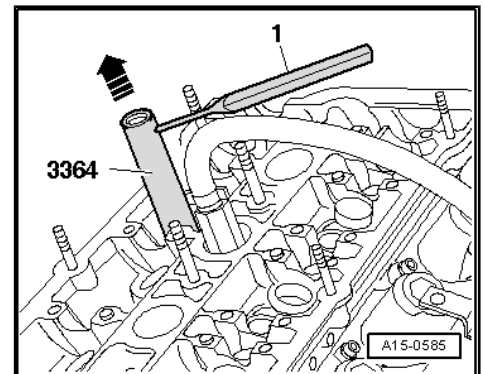
- Screw snap-in device - VAS 5161/6- with engaging fork - VAS 5161/5- into outer thread on guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B- .
- Press down assembly cartridge - VAS 5161/8- and at the same time, turn knurled screw of assembly cartridge - VAS 5161/8- clockwise until tips 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 - VAS 5161/2- .
- Take out assembly cartridge - VAS 5161/8- .
- Pull off valve stem oil seal with valve stem seal puller - 3364- .



- If valve stem seal puller - 3364- cannot be used on account of restricted space, knock out pin -arrow- with a punch and remove the impact extractor attachment.

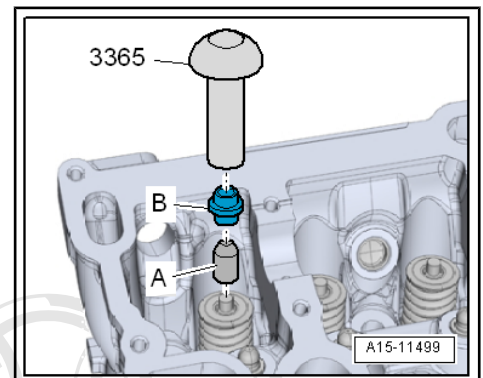


- Position lower part of valve stem seal puller - 3364- on valve stem oil seal.
- Insert a punch -1- through hole in lower section of puller.
- Apply assembly lever to puller and pull out valve stem oil seal -arrow-.

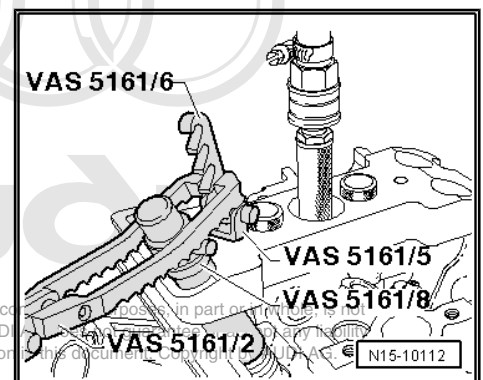


Installing valve stem oil seals

- To prevent damage to the new valve stem seals -B-, attach plastic sleeve -A- to valve stem.
- Lubricate sealing lip of valve stem oil seal -B-, place it in the valve stem seal fitting tool - 3365- and push carefully onto valve guide.
- Remove plastic sleeve -A-.
- Insert valve spring and valve spring plate.
- Set up removal and installation device for valve cotters - VAS 5161- as shown.

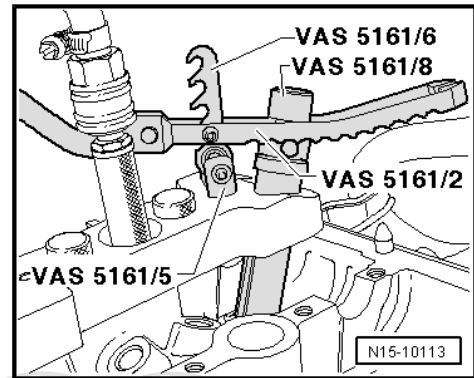


Inlet side



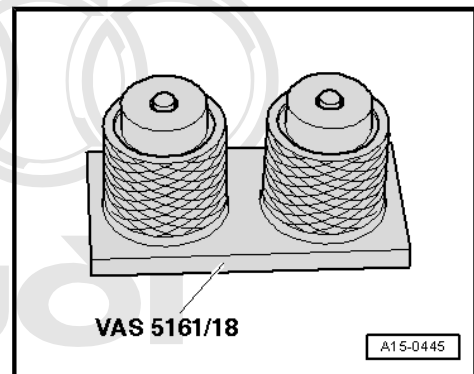
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Exhaust side



Note

- ◆ If valve cotter pins have been removed from assembly cartridge, they need to be put into insertion device - VAS 5161/18- first.
- ◆ Press assembly cartridge -VAS 5161/8- onto insertion device from above and pick up valve cotter pins.
- Use pressure fork - VAS 5161/8- to press down assembly cartridge - VAS 5161/2- , then turn knurled screw of assembly cartridge back and forth while pulling upwards.
- Release pressure fork - VAS 5161/2- with knurled screw in pulled position.
- Detach removal and installation device for valve cotter pins - VAS 5161- .



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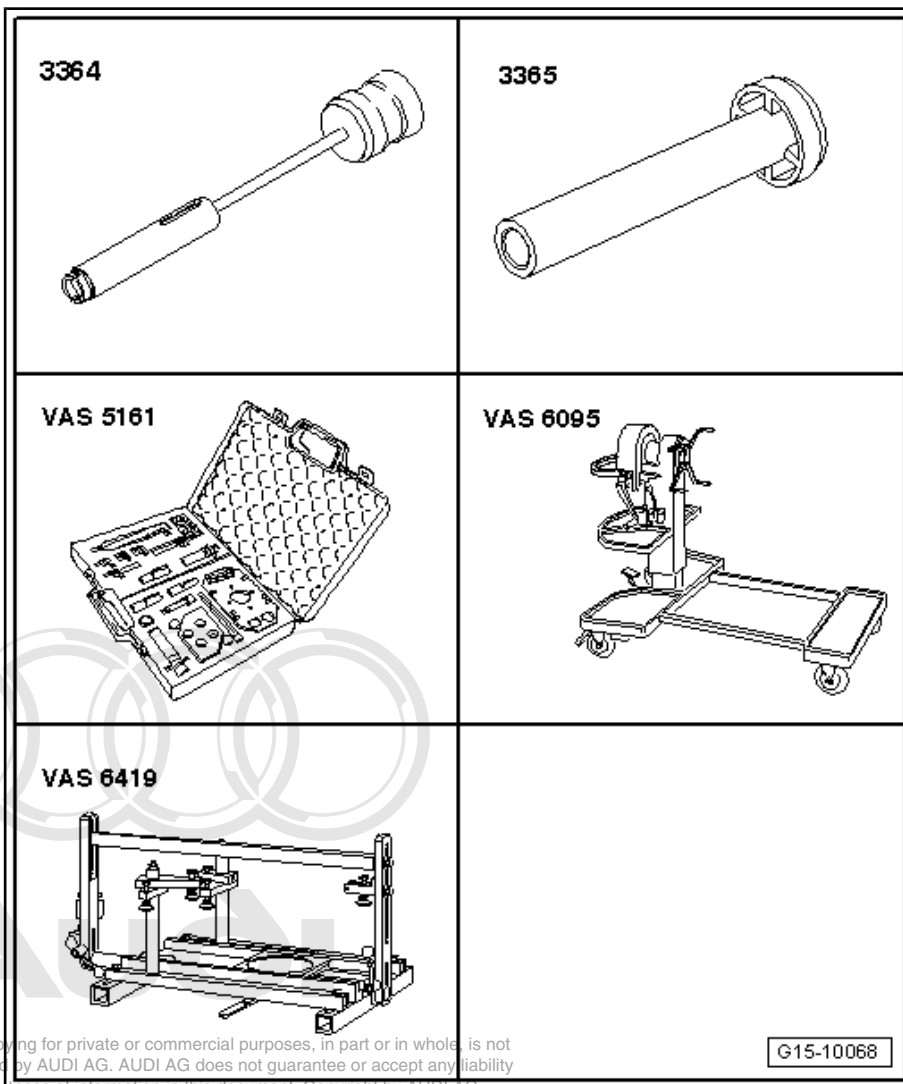
The remaining installation steps are carried out in the reverse sequence. Note the following:

- Install camshafts; 1.8 ltr. engine ⇒ [page 180](#) , 2.0 ltr. engine ⇒ [page 193](#) .

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

Special tools and workshop equipment required

- ◆ Valve stem seal puller - 3364-
- ◆ Valve stem seal fitting tool - 3365-
- ◆ Removal and installation device for valve cotters - VAS 5161 A-
- ◆ Guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B-
- ◆ Engine and gearbox support - VAS 6095-
- ◆ Cylinder head tensoning device - VAS 6419-



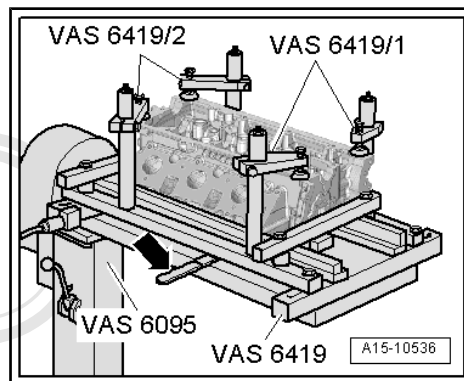
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Procedure

- Remove camshafts; 1.8 ltr. engine ⇒ [page 180](#) , 2.0 ltr. engine ⇒ [page 193](#) .
- Mark original positions of roller rocker fingers and hydraulic compensation elements for re-installation.
- Remove roller rocker fingers together with hydraulic compensation elements and put down on a clean surface.
- Insert cylinder head tensoning device - VAS 6419- into engine and gearbox support - VAS 6095- .
- Secure cylinder head in cylinder head tensoning device, as shown in illustration.
- Connect cylinder head tensoning device to compressed air supply.

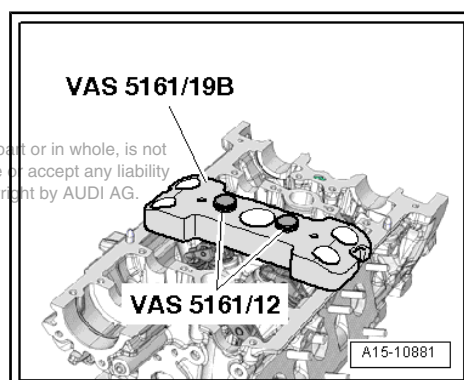


- Using lever -arrow-, slide air pad under combustion chamber where valve stem oil seal is to be removed.
- Apply just enough compressed air to bring air pad into contact with valve heads.



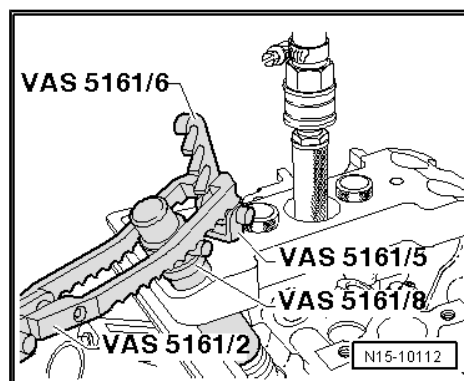
- Secure guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B- to cylinder head with knurled screws - VAS 5161/12- as shown.
- Insert drift -VAS 5161/3- into guide plate and use plastic-headed hammer to release sticking valve cotters.

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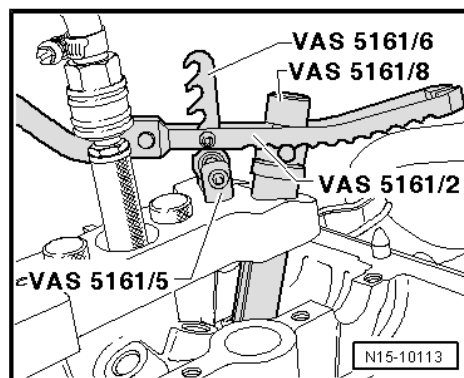
For inlet side

- Screw snap-in device - VAS 5161/6- with engaging fork - VAS 5161/5- into centre thread on guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B- .
- Insert assembly cartridge - VAS 5161/8- into guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B- .
- Engage pressure fork - VAS 5161/2- on snap-in device - VAS 5161/6- .



For exhaust side

- Screw snap-in device - VAS 5161/6- with engaging fork - VAS 5161/5- into outer thread on guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B- .
- Press down assembly cartridge - VAS 5161/8- and at the same time, turn knurled screw of assembly cartridge - VAS 5161/8- 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 - VAS 5161/2- .
- Take out assembly cartridge - VAS 5161/8- .



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

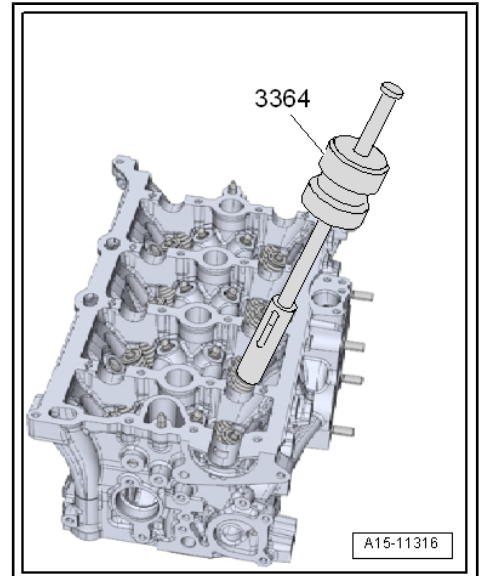
Installing valve stem oil seals



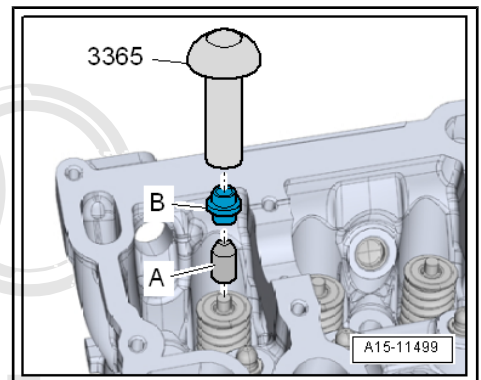
Caution

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.*

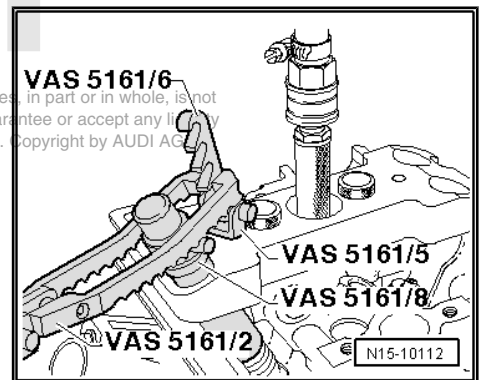


- Lightly oil sealing lip of valve stem oil seal.
- Slide valve stem oil seal onto plastic sleeve.
- Carefully press valve stem oil seal onto valve guide using valve stem seal fitting tool - 3365- .
- Take off plastic sleeve.
- Insert valve spring and valve spring plate.
- Set up removal and installation device for valve cotters - VAS 5161- as shown.

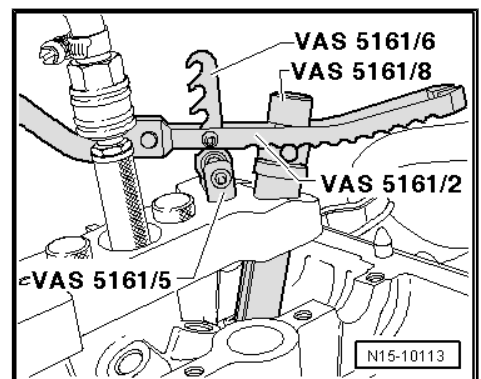


Inlet side

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Exhaust side



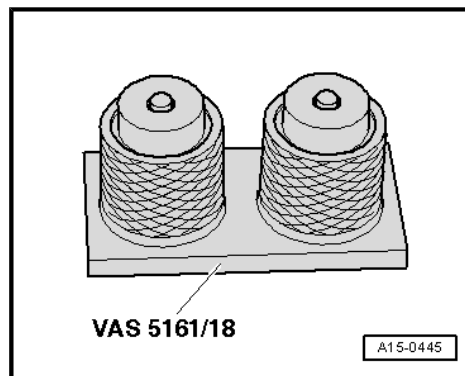


Note

- ◆ *If valve cotters have been removed from assembly cartridge, they need to be put into insertion device - VAS 5161/18- first.*
- ◆ *Press assembly cartridge -VAS 5161/8- onto insertion device from above and pick up valve cotters.*
- Use pressure fork - VAS 5161/8- to press down assembly cartridge - VAS 5161/2- , then turn knurled screw of assembly cartridge back and forth while pulling upwards.
- Release pressure fork - VAS 5161/2- with knurled screw in pulled position.
- Detach removal and installation device for valve cotters - VAS 5161- .

Further assembly is basically carried out in reverse order of dismantling. Note the following:

- Install camshafts; 1.8 ltr. engine ⇒ [page 180](#) , 2.0 ltr. engine ⇒ [page 193](#) .



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5 Inlet and exhaust valves

⇒ [“5.1 Checking valve guides”, page 219](#)

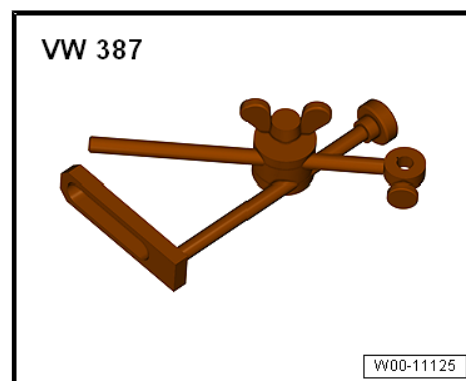
⇒ [“5.2 Checking valves”, page 220](#)

⇒ [“5.3 Valve dimensions”, page 220](#)

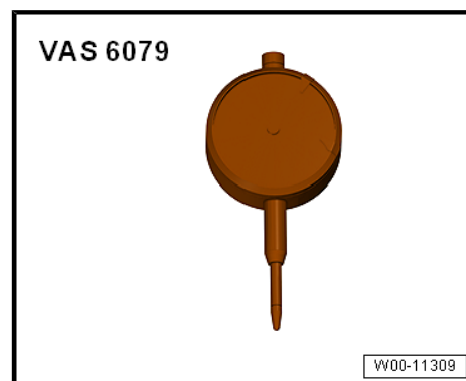
5.1 Checking valve guides

Special tools and workshop equipment required

◆ Universal dial gauge bracket - VW 387-



◆ Dial gauge - VAS 6079-



Test sequence

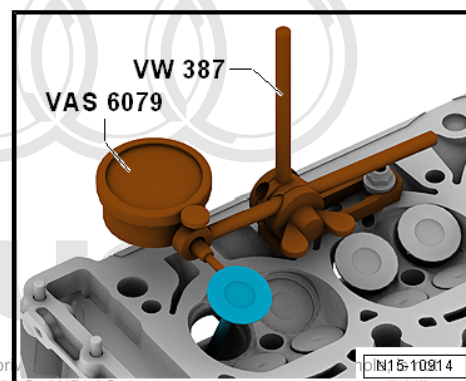
- Insert valve into guide. End of valve stem must be flush with guide. Only insert inlet valve into inlet valve guide and exhaust valve into exhaust valve guide, as the stem diameters are different.
- Measure the amount of sideways play.

Wear limit

Inlet valve guide	Exhaust valve guide
0.60 mm	0.60 mm



- ◆ *If the wear limit is exceeded, repeat the measurement with new valves. Renew cylinder head if wear limit is still exceeded.*
- ◆ *If the valve has to be renewed as part of a repair, use a new valve for the measurement.*



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5.2 Checking valves

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

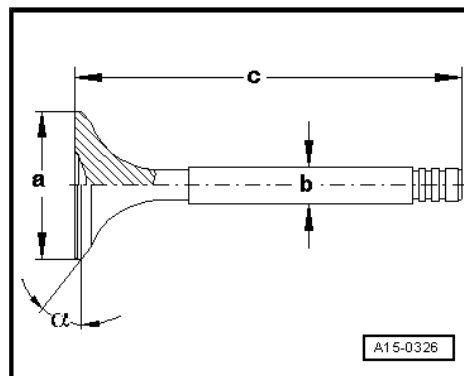
5.3 Valve dimensions



Note

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

Dimension		Inlet valve	Exhaust valve
∅ 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



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17 – Lubrication

1 Sump/oil pump

⇒ [“1.1 Exploded view - sump/oil pump”, page 221](#)

⇒ [“1.2 Engine oil”, page 224](#)

⇒ [“1.3 Removing and installing sump \(bottom section\)”, page 224](#)

⇒ [“1.4 Removing and installing sump \(top section\)”, page 227](#)

⇒ [“1.5 Removing and installing oil pump”, page 230](#)

⇒ [“1.6 Removing and installing oil level and oil temperature sender G266”, page 232](#)

1.1 Exploded view - sump/oil pump



Note

If large quantities of metal shavings or other particles are found in the engine oil when repairing the engine (possibly caused by partial seizure of crankshaft and conrod bearings), clean the oil passages thoroughly and renew the engine oil cooler to prevent further damage occurring later.



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1 - Oil level and oil temperature sender - G266-

- Removing and installing ⇒ [page 232](#)

2 - Seal

- Renew

3 - Bolt

- Renew
- Tightening sequence ⇒ [page 223](#)

4 - Sump (bottom section)

- Removing and installing ⇒ [page 224](#)

5 - Baffle plate

- Renew

6 - Suction pipe

- Clean strainer if dirty

7 - Bolt

- 9 Nm

8 - O-ring

- Renew
- Lubricate

9 - Oil pump

- Removing and installing ⇒ [page 230](#)

10 - Centring sleeve

11 - O-ring

- Renew

12 - Valve for oil pressure control - N428-

- Removing and installing ⇒ [page 239](#)

13 - Bolt

- 9 Nm

14 - Chain tensioner

15 - Drive chain for oil pump

- Mark direction of rotation before removing

16 - Bolt

- 9 Nm

17 - Gasket

- Renew

18 - Coarse oil separator

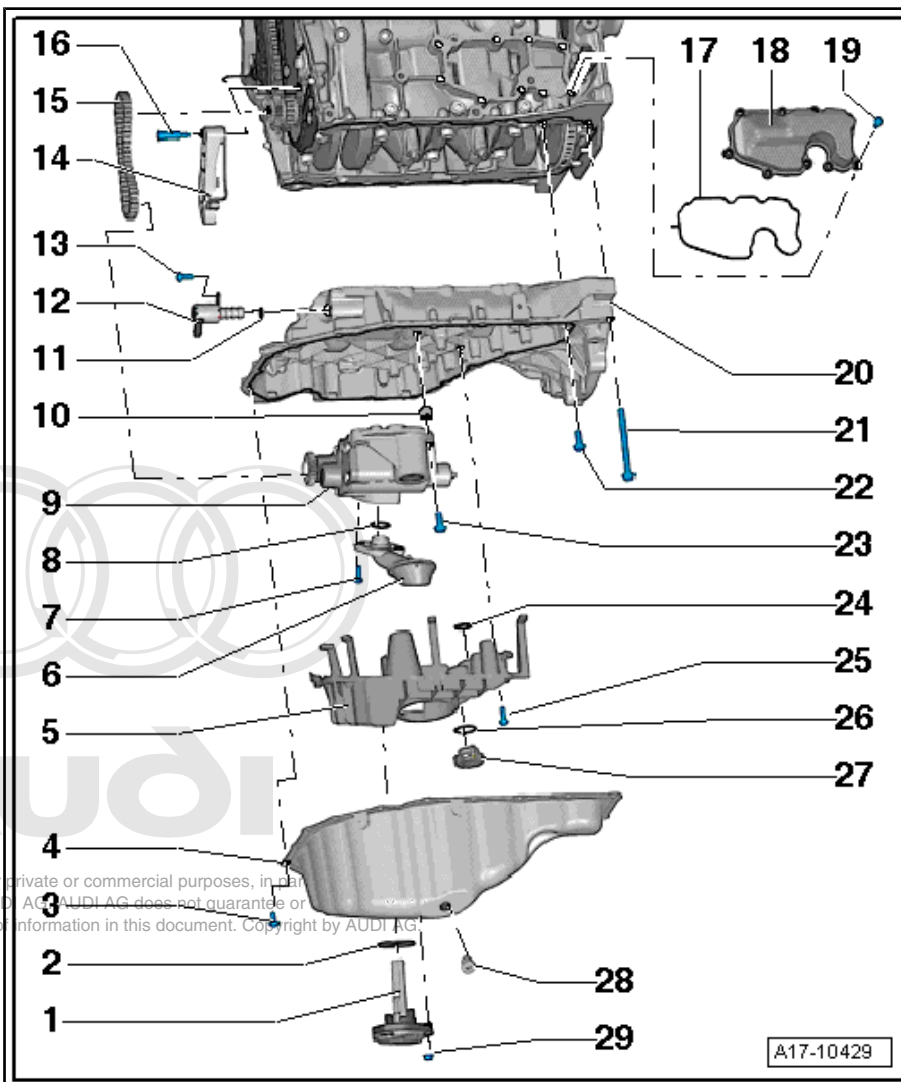
- Removing and installing ⇒ [page 234](#)

19 - Bolt

- Tightening sequence ⇒ [page 224](#)

20 - Sump (top section)

- Removing and installing ⇒ [page 227](#)



21 - Bolt

- Renew
- Tightening sequence ⇒ [page 223](#)

22 - Bolt

- Renew
- Tightening sequence ⇒ [page 223](#)

23 - Bolt

- 20 Nm

24 - Seal

25 - Bolt

- 9 Nm

26 - Seal

27 - Non-return valve

28 - Oil drain plug

- Renew
- 30 Nm

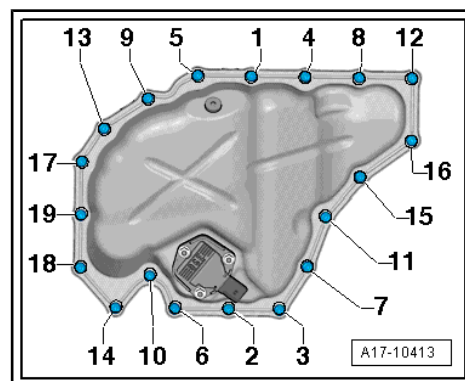
29 - Nut

- 9 Nm

Tightening sequence for sump (bottom section)

– Tighten bolts in the sequence -1 ... 19- in two stages as follows:

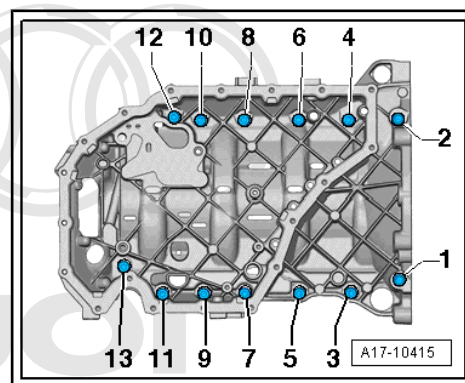
1. Tighten bolts to 8 Nm.
2. Turn bolts 45° further.



Tightening sequence for sump (top section)

– Tighten bolts in the sequence -1 ... 13- in two stages as follows:

- 1. Tighten bolts to 15 Nm.
- 2. Turn bolts 90° further.

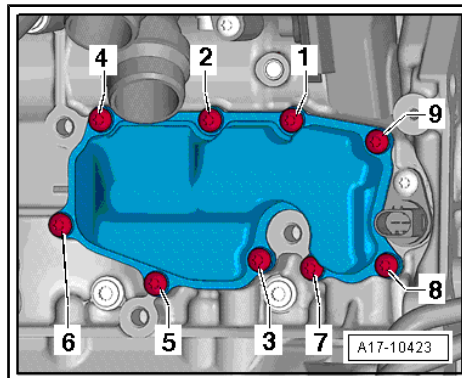


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Tightening sequence for coarse oil separator

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



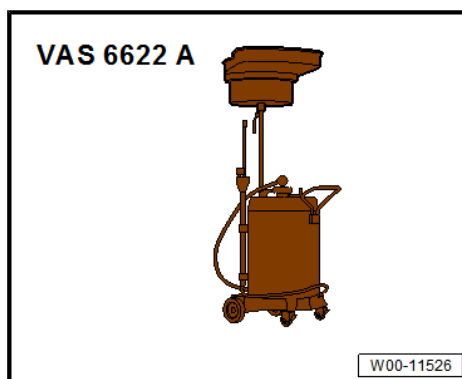
1.2 Engine oil

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

1.3 Removing and installing sump (bottom section)

Special tools and workshop equipment required

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



- ◆ Electric drill with plastic brush attachment
- ◆ Safety goggles
- ◆ Silicone sealant: => Electronic parts catalogue


Removing


- Remove noise insulation => General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

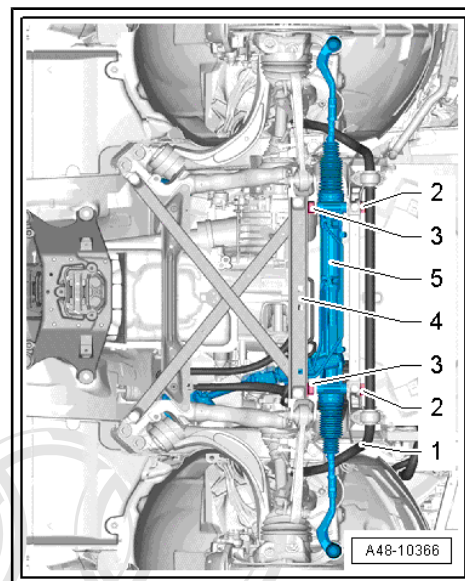


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- Remove subframe cross brace -4- ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Removing and installing subframe cross brace .
- Remove anti-roll bar -1- ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Removing and installing anti-roll bar .
- Unscrew bolts -2- and remove nuts -3-.
- Guide steering rack -5- slightly to the right, lower by approx. 10 cm and tie up.

 **Caution**
Danger of damage to oil lines and hoses.
 ♦ **Do NOT stretch, kink or bend oil lines or hoses.**

 **Caution**
Risk of damage to running gear components.
Never lower the vehicle onto its wheels if the assembly mountings, steering rack or subframe cross brace are not properly installed.
The vehicle must NOT be supported by applying a trolley jack or similar to the subframe or subframe cross brace.

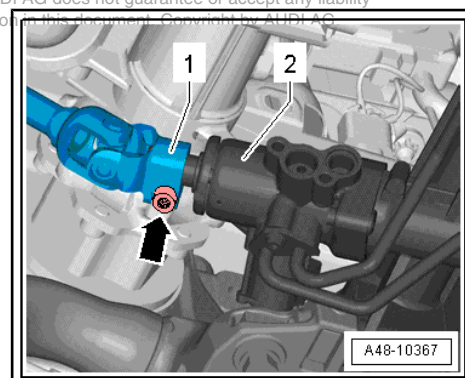


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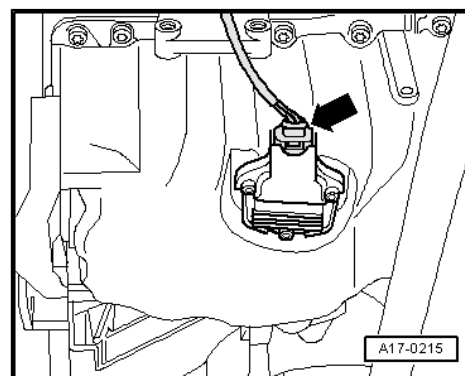
- Remove bolt -arrow-.
- Detach steering column -1- from steering rack -2-.
- Place used oil collection and extraction unit - VAS 6622A- below engine and drain off engine oil.

 **Note**

Please observe requirements for disposal.



- Unplug connector from oil level and oil temperature sender - G266- -arrow-.
- Remove oil level and oil temperature sender - G266- .





- Remove bolts -1 ... 19-.
- Take off sump: if necessary loosen it by striking lightly with a rubber hammer.

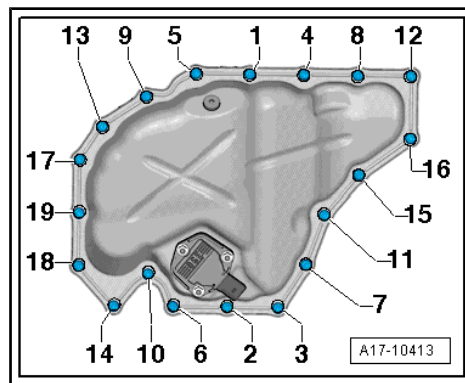
Installing

- Tightening torques
⇒ ["1.1 Exploded view - sump/oil pump", page 221](#)
- ◆ Silicone sealant: ⇒ Electronic parts catalogue



Note

- ◆ *Note expiry date of silicone sealant.*
- ◆ *The sump must be installed within 5 minutes after applying the silicone sealant.*
- ◆ *Renew the bolts tightened with specified tightening angle.*
- ◆ *Renew seals, gaskets and self-locking nuts.*
- Spray sealing surface with sealant remover and wait for it to take effect.
- Remove sealant remaining on sump (top section) with flat scraper.



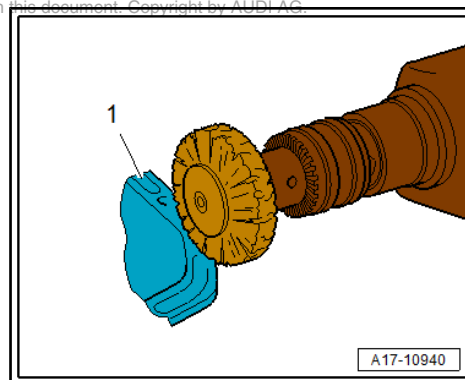
WARNING

Risk of eye injury.

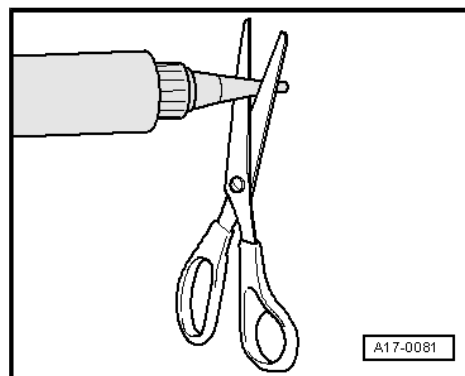
- ◆ *Put on safety goggles.*

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- Remove sealant residue on sump (bottom section) -1- using rotating plastic brush or similar.
- Clean sealing surfaces; they must be free of oil and grease.



- Cut off nozzle of tube at front marking (Ø of nozzle approx. 3 mm).



- Apply the bead of silicone sealant onto the clean sealing surface of the sump (bottom section), as illustrated.
- ◆ Thickness of sealant bead: 2 ... 3 mm

 **Note**

- ◆ *The sump must be installed within 5 minutes after applying the silicone sealant.*
- ◆ *The bead of sealant must not be thicker than specified, otherwise excess sealant can enter the sump and obstruct the strainer in the oil intake pipe.*

- Immediately fit sump (bottom section) and tighten bolts; tightening sequence ⇒ [page 223](#) .

 **Note**

After fitting sump assembly, the sealant must dry for approx. 30 minutes. Then (and only then) fill the engine with engine oil.

- Fill up engine oil and check oil level: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .
- Install steering rack ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering rack; Removing and installing steering rack .
- Install anti-roll bar ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Removing and installing anti-roll bar .
- Install subframe cross brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Removing and installing subframe cross brace .
- Install noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

Further assembly is basically carried out in reverse order of dismantling.

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Tightening torques

- ◆ ⇒ [Fig. ““Tightening sequence for sump \(bottom section\)””](#) , [page 223](#)
- ◆ ⇒ [“1.1 Exploded view - sump/oil pump”](#), [page 221](#)

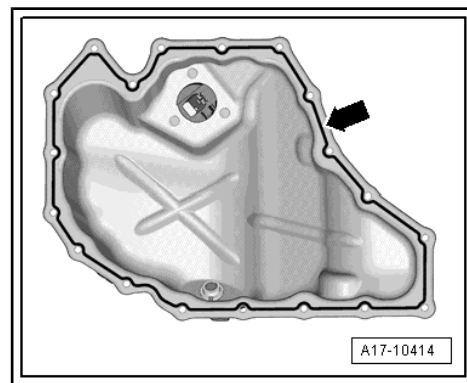
1.4 Removing and installing sump (top section)

Special tools and workshop equipment required

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

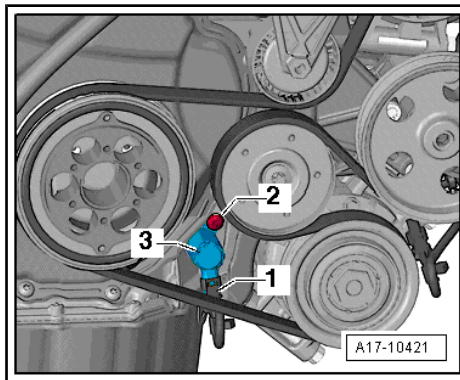
Removing

- Gearbox removed
- Remove sump (bottom section) ⇒ [page 224](#) .
- Remove rear sealing flange ⇒ [page 62](#) .
- Remove oil pump ⇒ [page 230](#) .

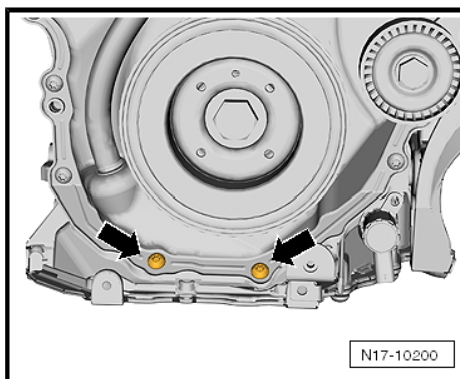




- Unplug electrical connector -1-.



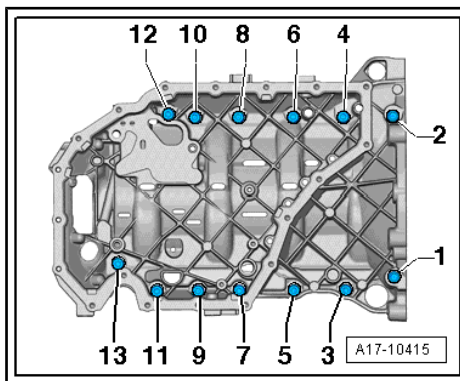
- Remove bolts -arrows-.



- Remove bolts -1 to 13- and detach sump (top section).

Caution

Lever off sump (top section) at gearbox end first. Take care timing chain cover is not bent when levering off.



Installing

- ◆ Silicone sealant ⇒ Electronic parts catalogue

Note

- ◆ Note expiry date of silicone sealant.
- ◆ The sump (top section) must be installed within 5 minutes after applying the silicone sealant.
- ◆ Renew the bolts tightened with specified tightening angle.
- ◆ Renew seals, gaskets and self-locking nuts.

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- Remove sealant remaining on cylinder block with flat scraper.

WARNING

Risk of eye injury.

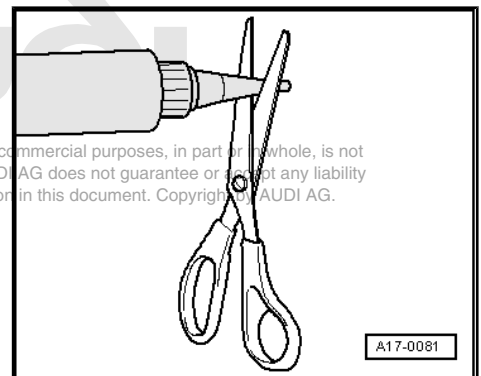
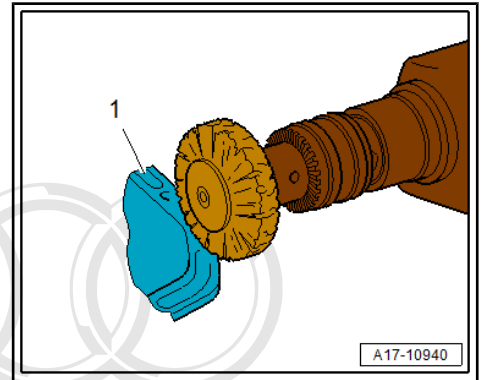
- ◆ Put on safety goggles.

- Remove sealant residue on sump (top section) -1- using rotating plastic brush or similar.

i Note

Check if timing chain cover is deformed. For this purpose, first fit sump (top section) without sealant and determine gap between cover and sump (top section). If the cover is deformed and cannot be straightened, renew cover after installing sump (top section).

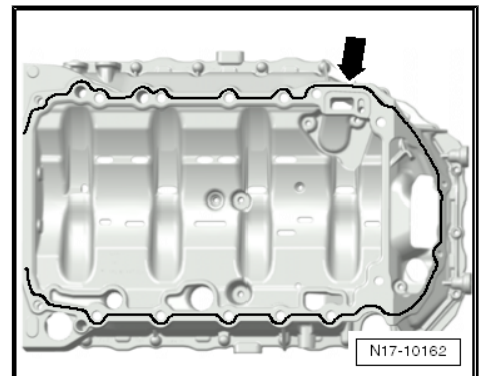
- Clean sealing surfaces; they must be free of oil and grease.
- Check oil passages in sump (top section) and crankcase for contamination.
- Cut off nozzle of tube at front marking (Ø of nozzle approx. 2 mm).



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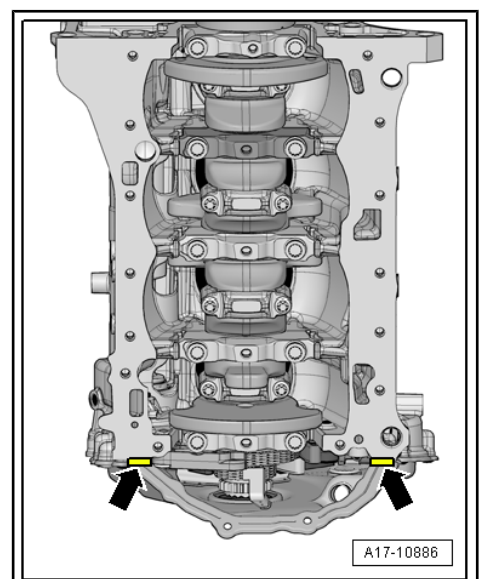
⚠ Caution
Make sure lubrication system is not clogged by excess sealant.
 ♦ ***The bead of sealant must not be thicker than specified.***

- ♦ Thickness of sealant bead: 2 ... 3 mm.
- Apply silicone sealant onto clean sealing surface of sump (top section) as illustrated -arrow-.
- Apply silicone sealant between cylinder block and timing chain cover (bottom), as illustrated -arrows-.



i Note

- ♦ *The sump (top section) must be installed within 5 minutes after applying the silicone sealant.*
- ♦ *The bead of sealant must not be thicker than specified, otherwise excess sealant can enter the sump and obstruct the strainer in the oil intake pipe.*
- Sump (top section) and crankcase must be flush at gearbox end.
- Immediately fit sump (top section) and tighten bolts, tightening torque ⇒ [page 223](#) .

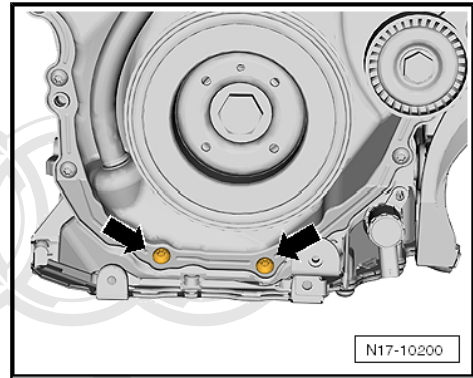




- Fit bolts -arrows-. Tightening torques ⇒ [Item 13 \(page 87\)](#)
- Install rear sealing flange ⇒ [page 62](#) .
- Install oil pump ⇒ [page 230](#) .
- Fit new baffle plate and secure in position.
- Install sump (bottom section) ⇒ [page 224](#) .

Further assembly is basically carried out in reverse order of dismantling.

- Fill up engine oil and check oil level: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .



Tightening torques

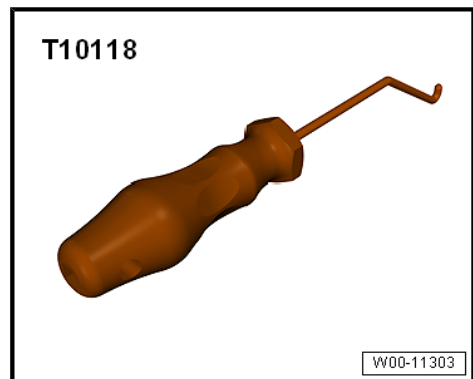
- ◆ ⇒ [Fig. ““Tightening sequence for sump \(top section\)””](#), [page 223](#)
- ◆ ⇒ [“1.1 Exploded view - sump/oil pump”](#), [page 221](#)

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1.5 Removing and installing oil pump

Special tools and workshop equipment required

- ◆ Assembly tool - T10118-



- ◆ Locking tool - T40265-



Removing

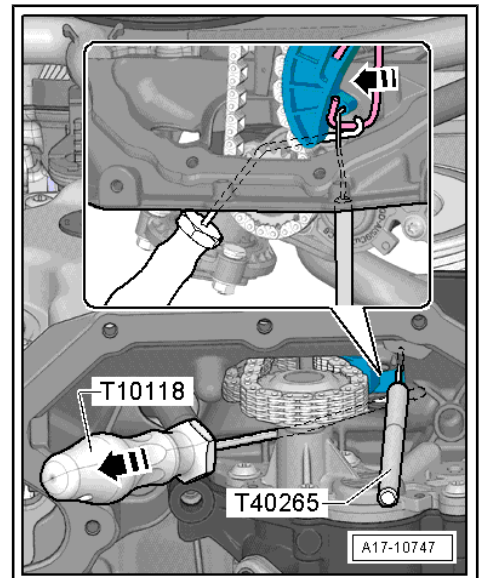
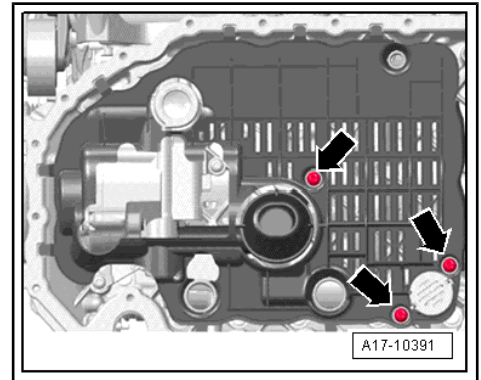
- Remove sump (bottom section) ⇒ [page 224](#) .

- Remove baffle plate -arrows-.



- Using assembly tool - T10118- , pull spring of chain tensioner in direction of -arrow- and secure with locking tool - T40265- .

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- Remove bolts -arrows- and detach oil pump.

Installing

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

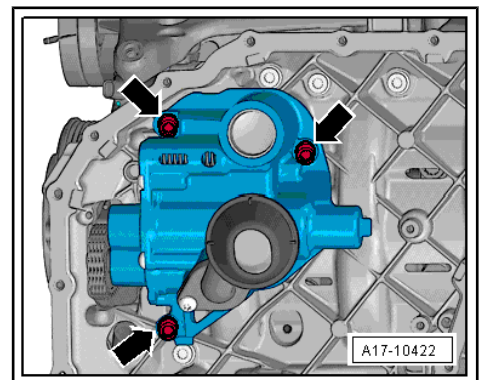
- Check that both centring sleeves are fitted in oil pump.
- Guide oil pump sprocket into drive chain and install oil pump.



Caution

Risk of irreparable damage to engine.

- ◆ ***The following step must be performed to ensure that spring of chain tensioner returns to installation position:***





- Using assembly tool - T10118- , pull spring of chain tensioner in direction of -arrow- and remove locking tool - T40265- .
- Fit new baffle plate and secure in position.



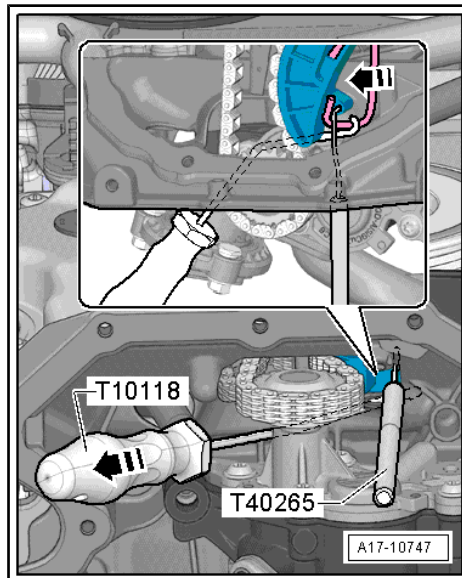
Note

The plastic fins on the baffle plate are deformed permanently when tightening. The plastic fins make sure that the baffle plate rests on the contact surface without play and does not cause rattling noises. The baffle plate must therefore always be renewed.

- Install sump (bottom section) ➔ [page 224](#)
- Fill up engine oil and check oil level: A4 ➔ Maintenance ; Booklet 812 , A5 Coupé ➔ Maintenance ; Booklet 811 , A5 Cabriolet ➔ Maintenance ; Booklet 818 .

Tightening torques

- ◆ ➔ ["1.1 Exploded view - sump/oil pump", page 221](#)



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

Removing

- Engine oil drained: A4 ➔ Maintenance ; Booklet 812 , A5 Coupé ➔ Maintenance ; Booklet 811 , A5 Cabriolet ➔ Maintenance ; Booklet 818 .
- Remove noise insulation ➔ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
- Unplug electrical connector -2-.
- Remove nuts -1- and detach oil level and oil temperature sender - G266- -item 3-.

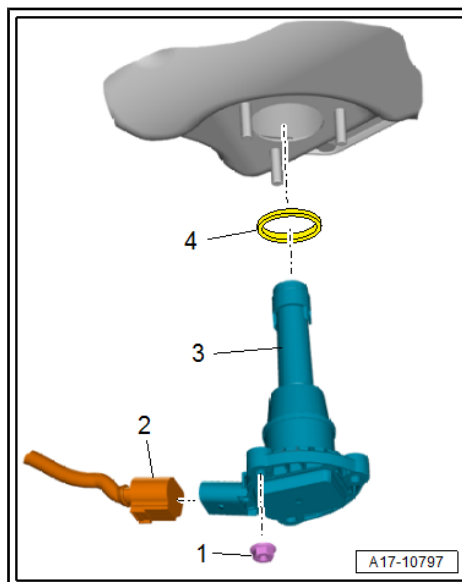
Installing

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

- Renew seal -4-.
- Fill up engine oil and check oil level: A4 ➔ Maintenance ; Booklet 812 , A5 Coupé ➔ Maintenance ; Booklet 811 , A5 Cabriolet ➔ Maintenance ; Booklet 818 .

Tightening torques

- ◆ ➔ ["1.1 Exploded view - sump/oil pump", page 221](#)



2 Engine oil cooler

⇒ [“2.1 Removing and installing engine oil cooler”, page 233](#)

2.1 Removing and installing engine oil cooler

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.**

- Drain coolant ⇒ [page 247](#) .
- Remove bracket for ancillaries ⇒ [page 53](#) .
- Unscrew bolts -4 and 5- and remove engine oil cooler -3- together with seal -2-.

Installing

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

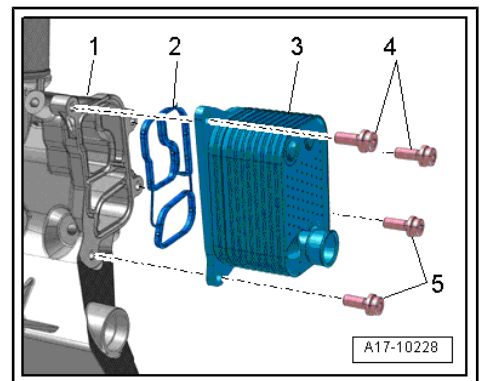
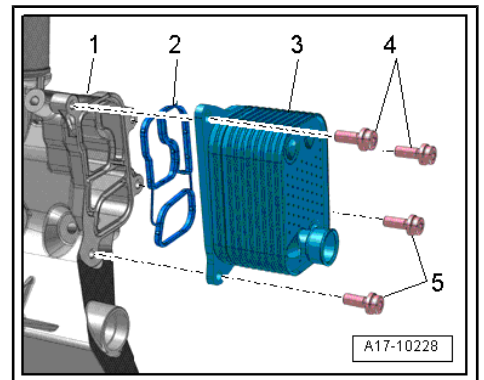


Note

- ◆ *Renew gaskets and seals.*
 - ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ [Electronic parts catalogue](#) .*
- Install engine oil cooler -3- with new seal -2-.
 - Install bracket for ancillaries ⇒ [page 53](#) .
 - Fill up with coolant ⇒ [page 249](#) .
 - Fill up engine oil and check oil level: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .

Tightening torques

- ◆ ⇒ [“4.1 Exploded view - oil filter/oil pressure switches”, page 235](#)





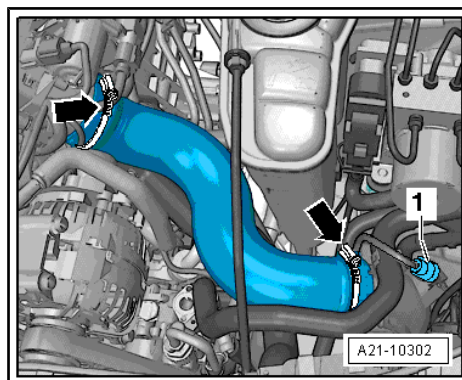
3 Crankcase breather

⇒ [“3.1 Removing and installing oil separator”, page 234](#)

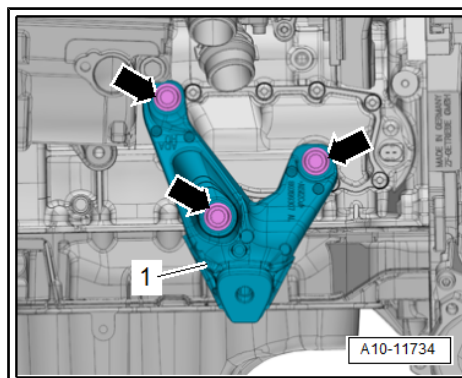
3.1 Removing and installing oil separator

Removing

- Remove engine mounting (left-side) ⇒ [page 34](#) .
- Release hose clips -arrows- and detach air hose.



- Remove bolts -arrows- and detach engine support (left-side) -1-.



- Unscrew bolts -1 ... 9- and remove coarse oil separator.

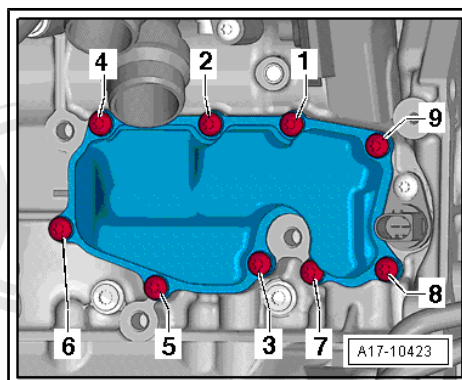
Installing

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

- Install air hose ⇒ [page 295](#) .
- Install engine mounting (left-side) ⇒ [page 34](#) .

Tightening torques

- ◆ ⇒ [Fig. ““Tightening sequence for coarse oil separator””, page 224](#)
- ◆ ⇒ [“2.1 Exploded view - assembly mountings”, page 33](#)



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4 Oil filter/oil pressure switch

⇒ [“4.1 Exploded view - oil filter/oil pressure switches”, page 235](#)

⇒ [“4.2 Removing and installing oil pressure switch F22”, page 236](#)

⇒ [“4.3 Removing and installing oil pressure switch for reduced oil pressure F378”, page 237](#)

⇒ [“4.4 Checking oil pressure”, page 238](#)

⇒ [“4.5 Removing and installing valve for oil pressure control N428”, page 239](#)

4.1 Exploded view - oil filter/oil pressure switches

1 - Bracket for ancillaries

- Removing and installing ⇒ [page 53](#)

2 - Oil pressure switch - F22-

- Blue insulation
- Removing and installing ⇒ [page 236](#)
- Checking ⇒ Vehicle diagnostic tester
- 20 Nm

3 - Seal

- Renew

4 - Gasket

- Renew

5 - O-ring

- Not available as replacement part, supplied together with valve unit

6 - O-ring

- Not available as replacement part, supplied together with valve unit

7 - Valve unit

- With O-rings

8 - Oil filter

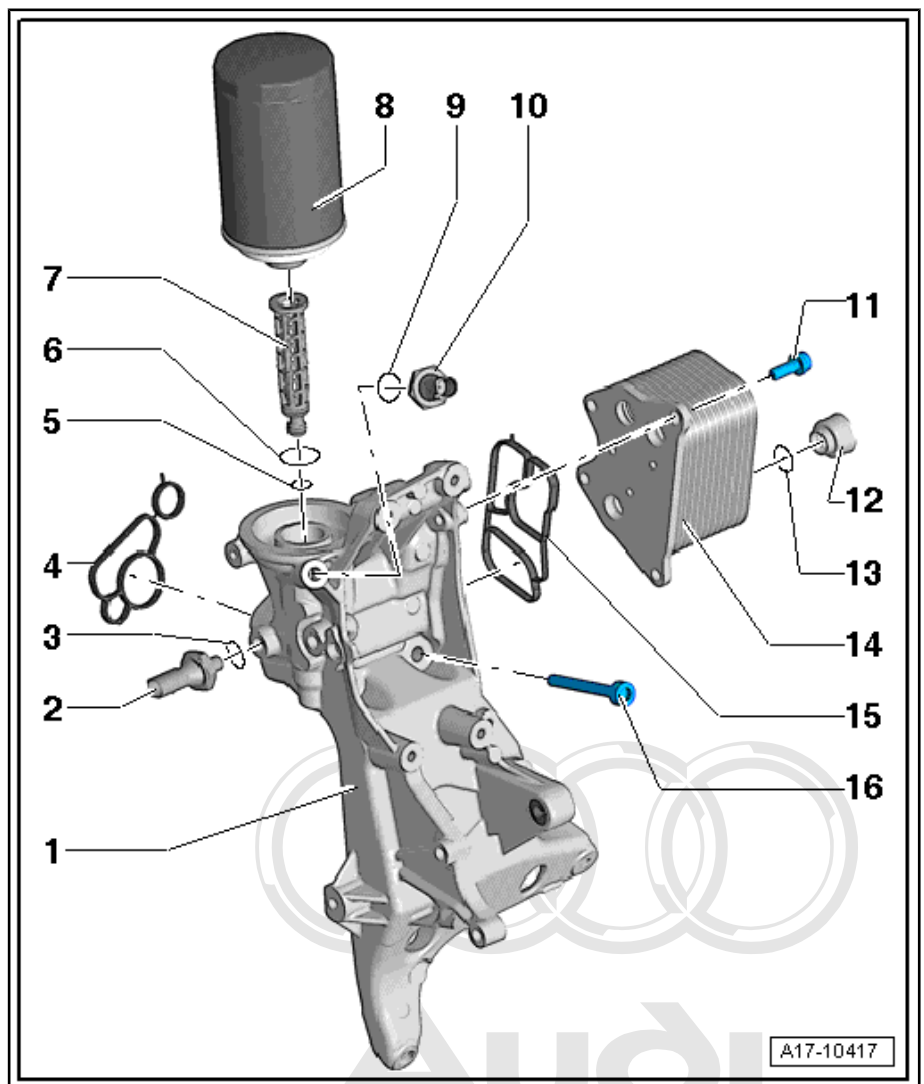
- Removing and installing: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818

9 - Seal

- Renew

10 - Oil pressure switch for reduced oil pressure - F378-

- Brown insulation
- Removing and installing ⇒ [page 237](#)



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- Checking ⇒ Vehicle diagnostic tester
- 20 Nm

11 - Bolt

- 23 Nm

12 - Connection

13 - Seal

- Renew
- Lubricate with coolant additive; coolant ⇒ Electronic parts catalogue

14 - Engine oil cooler

- See note ⇒ [page 221](#)
- Ensure clearance from surrounding components
- Removing and installing ⇒ [page 233](#)

15 - Gasket

- Renew

16 - Bolt

- Tightening sequence ⇒ [page 40](#)

4.2 Removing and installing oil pressure switch - F22-

Removing

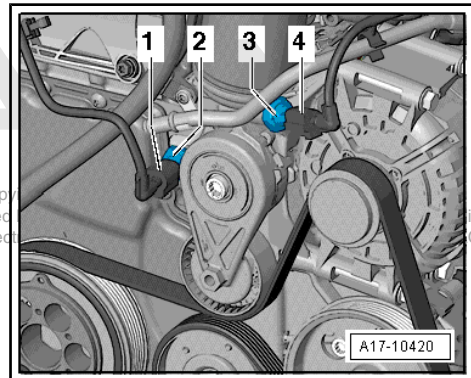


Note

Place a cloth underneath bracket for ancillaries to catch any escaping oil.

Version 1:

- Unplug electrical connector -1- on oil pressure switch - F22- .
- Remove oil pressure switch - F22- -2-.



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is not permitted unless authorised in writing with respect to the correct use of the information.

Version 2:

- Unplug electrical connector -3- on oil pressure switch - F22- .
- Remove oil pressure switch - F22- -4-.



Disregard items -1 and 2-.

Installing

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



◆ *Renew seal.*

◆ *Fit the new oil pressure switch - F22- into the connection immediately to avoid loss of oil.*

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- Check oil level: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .

Tightening torques

- ◆ ⇒ ["4.1 Exploded view - oil filter/oil pressure switches", page 235](#)

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

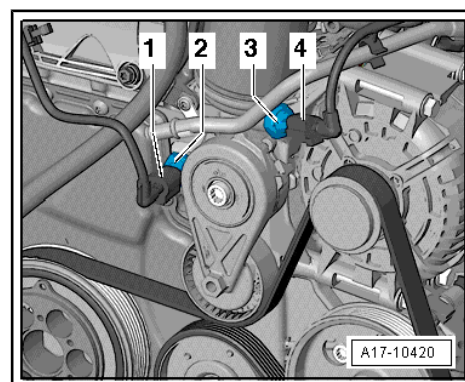
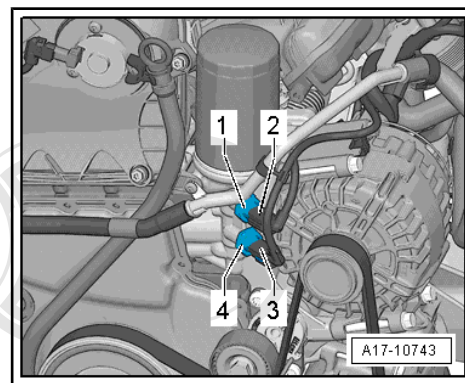
Removing



Place a cloth underneath bracket for ancillaries to catch any escaping oil.

Version 1:

- Unplug electrical connector -4- at oil pressure switch for reduced oil pressure - F378- .
- Unscrew oil pressure switch for reduced oil pressure - F378- -3-.





Version 2:

- Unplug electrical connector -2- at oil pressure switch for reduced oil pressure - F378- .
- Unscrew oil pressure switch for reduced oil pressure - F378-1-.



Note

Disregard items -3 and 4-.

Installing

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



Note

- ◆ *Renew seal.*
- ◆ *Fit the new oil pressure switch for reduced oil pressure - F378- into the connection immediately to avoid loss of oil.*
- Check oil level: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .

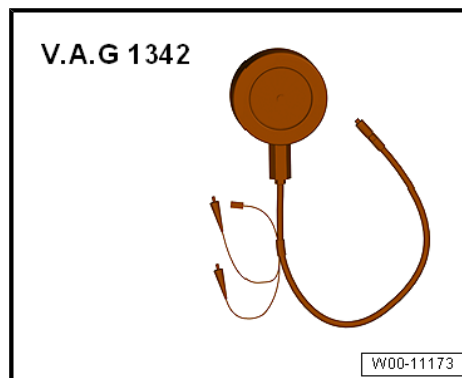
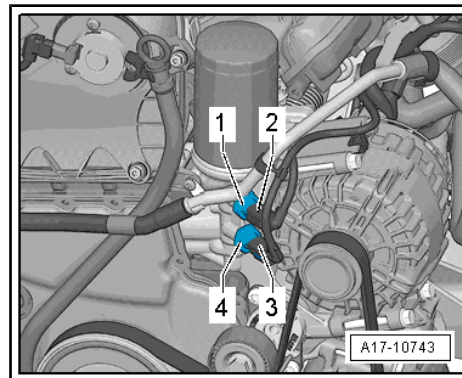
Tightening torques

- ◆ ⇒ [“4.1 Exploded view - oil filter/oil pressure switches”](#), page 235

4.4 Checking oil pressure

Special tools and workshop equipment required

- ◆ Oil pressure tester - V.A.G 1342-



Test requirements

- Oil level OK, checking: ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818
- Engine oil temperature at least 80 °C (radiator fan must have run once).

Test sequence

- Unscrew oil pressure switch for reduced oil pressure - F378- ⇒ [page 237](#)
- Screw oil pressure tester - V.A.G 1342- into oil filter bracket in place of oil pressure switch.

- Screw oil pressure switch for reduced oil pressure - F378- into oil pressure tester - V.A.G 1342- .
- Start engine.
- Oil pressure at idling speed: 1.2 ... 2.0 bar.
- Oil pressure at 2000 rpm: 1.6 ... 2.2 bar.
- Oil pressure at 3700 rpm: 3.0 ... 4.0 bar.

 **Note**

During the running-in period, the oil pressure at 2000 rpm can be between 3.0 and 4.0 bar.

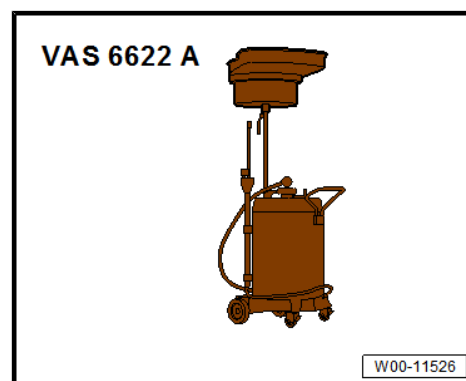
Assembling

- Install oil pressure switch for reduced oil pressure - F378-
⇒ [page 237](#) .

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

Special tools and workshop equipment required

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



Removing

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



- Place used oil collection and extraction unit - VAS 6622A- underneath.
- Unplug electrical connector -1-.
- Remove bolt -2- and detach valve for oil pressure control - N428- -item 3-.

Installing

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



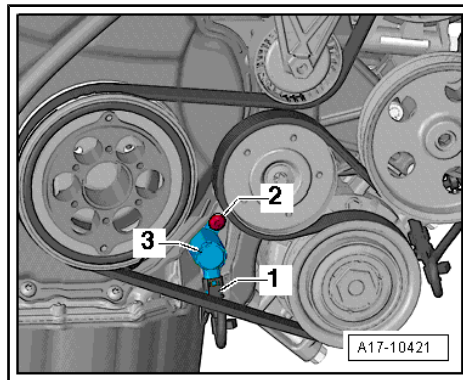
Note

Fit new O-ring.

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

Tightening torques

- ◆ ⇒ ["1.1 Exploded view - sump/oil pump", page 221](#)



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19 – Cooling

1 Cooling system/coolant

⇒ [“1.1 Connection diagram - coolant hoses”, page 241](#)

⇒ [“1.2 Checking cooling system for leaks”, page 246](#)

⇒ [“1.3 Draining and filling cooling system”, page 247](#)

1.1 Connection diagram - coolant hoses

⇒ [“1.1.1 Connection diagram - coolant hoses, vehicles without gear oil heating and without auxiliary heater”, page 241](#)

⇒ [“1.1.2 Connection diagram - coolant hoses, vehicles without gear oil heating and with auxiliary heater”, page 243](#)

⇒ [“1.1.3 Connection diagram - coolant hoses, vehicles with gear oil heating and without auxiliary heater”, page 244](#)

⇒ [“1.1.4 Connection diagram - coolant hoses, vehicles with gear oil heating and with auxiliary heater”, page 245](#)

1.1.1 Connection diagram - coolant hoses, vehicles without gear oil heating and without auxiliary heater



Note

- ◆ *Blue = Large coolant circuit.*
- ◆ *Red = Small coolant circuit.*
- ◆ *Brown = Heating circuit.*

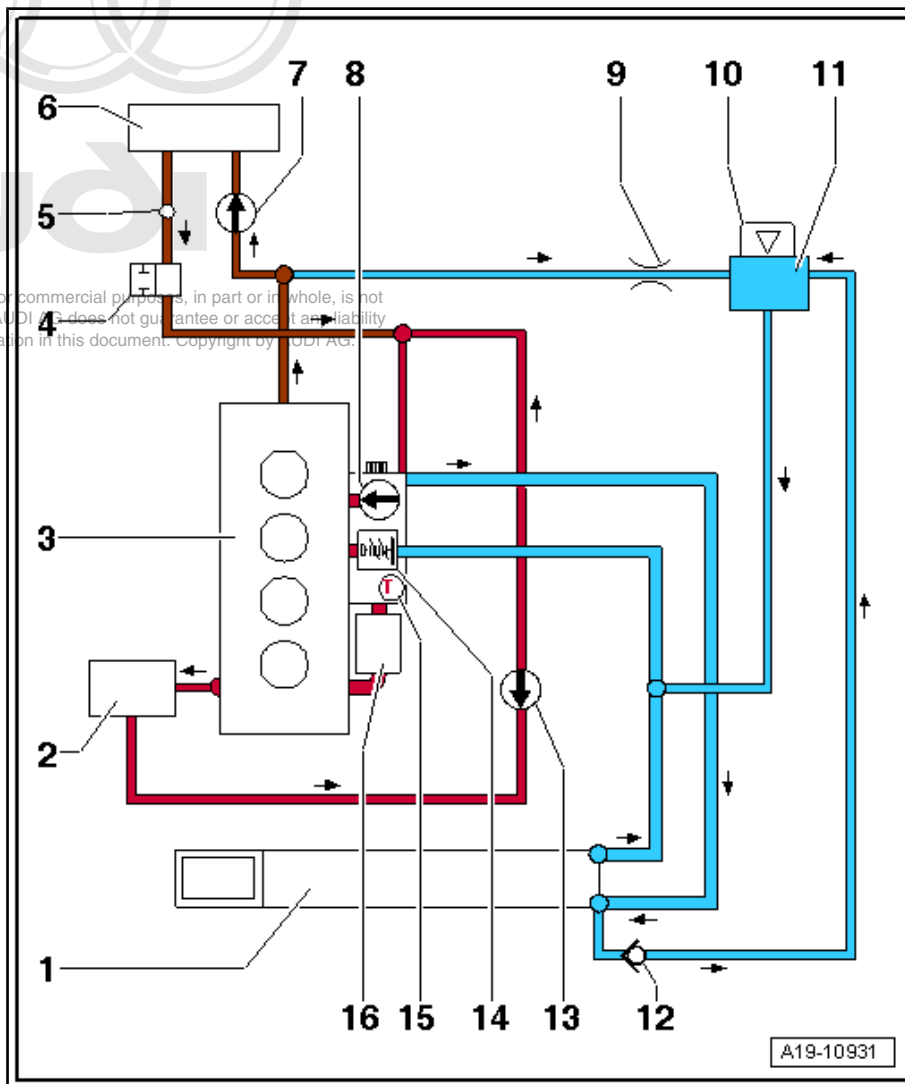


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- 1 - Radiator
- 2 - Turbocharger
- 3 - Cylinder head/cylinder block
- 4 - Coolant shut-off valve
 - Activated by Climatronic coolant shut-off valve - N422- (negative pressure)
- 5 - Bleeder hole
- 6 - Heat exchanger for heater
 - Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Front air conditioning unit; Removing and installing heat exchanger
- 7 - Coolant circulation pump - V50-
 - Only installed on vehicles with start/stop system
- 8 - Coolant pump
 - Removing and installing ⇒ [page 257](#)
- 9 - Restrictor
- 10 - Filler cap for expansion tank
 - Checking pressure relief valve ⇒ [page 247](#)
- 11 - Coolant expansion tank
- 12 - Non-return valve
- 13 - Continued coolant circulation pump - V51-
 - Only fitted on vehicles equipped for hot climates
- 14 - Thermostat
- 15 - Coolant temperature sender - G62-
- 16 - Engine oil cooler



1.1.2 Connection diagram - coolant hoses, vehicles without gear oil heating and with auxiliary heater

Note

- ◆ Blue = Large coolant circuit.
- ◆ Red = Small coolant circuit.
- ◆ Brown = Heating circuit.

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1 - Radiator

2 - Turbocharger

3 - Cylinder head/cylinder block

4 - Auxiliary heater

5 - Bleeder hole

6 - Heater coolant shut-off valve - N279-

- Removing and installing
 ⇒ Auxiliary heater, supplementary heater; Rep. gr. 82 ; Coolant circuit with auxiliary/supplementary heater; Removing and installing heater coolant shut-off valve

7 - Heat exchanger for heater

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

8 - Non-return valve

- Arrow indicates direction of flow

9 - Coolant pump

- Removing and installing
 ⇒ [page 257](#)

10 - Restrictor

11 - Filler cap for expansion tank

- Checking pressure relief valve ⇒ [page 247](#)

12 - Coolant expansion tank

13 - Non-return valve

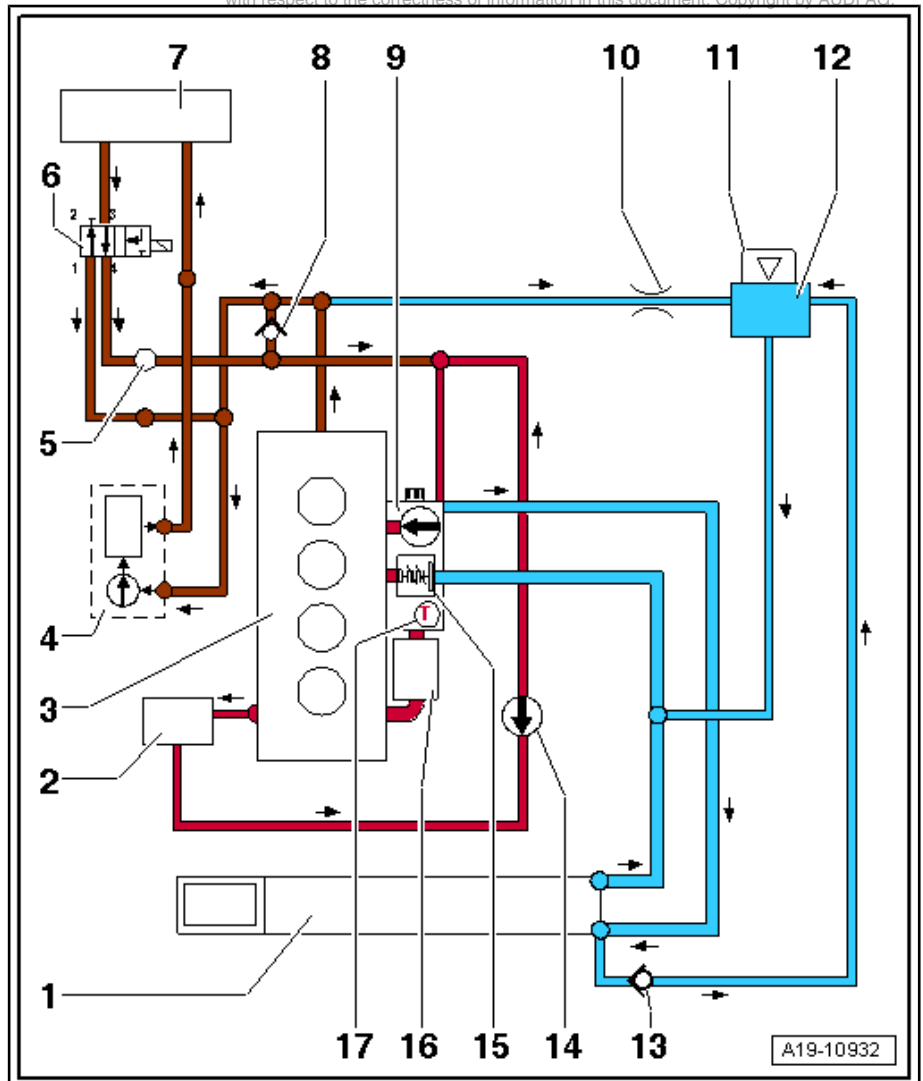
14 - Continued coolant circulation pump - V51-

- Only fitted on vehicles equipped for hot climates

15 - Thermostat

16 - Engine oil cooler

17 - Coolant temperature sender - G62-



1.1.3 Connection diagram - coolant hoses, vehicles with gear oil heating and without auxiliary heater



Note

- ◆ Blue = Large coolant circuit.
- ◆ Red = Small coolant circuit.
- ◆ Brown = Heating circuit.
- ◆ Green = Gearbox heating circuit.

1 - Radiator

2 - Turbocharger

3 - Cylinder head/cylinder block

4 - Coolant circulation pump - V50-

- Only installed on vehicles with start/stop system

5 - Coolant shut-off valve

- Activated by Climatronic coolant shut-off valve - N422 (negative pressure)

- Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Coolant circuit

6 - Bleeder hole

7 - Heat exchanger for heater

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

8 - Heat exchanger for gearbox

- In gearbox housing

9 - Coolant valve for gearbox - N488-

10 - Coolant pump

11 - Restrictor

12 - Filler cap for expansion tank

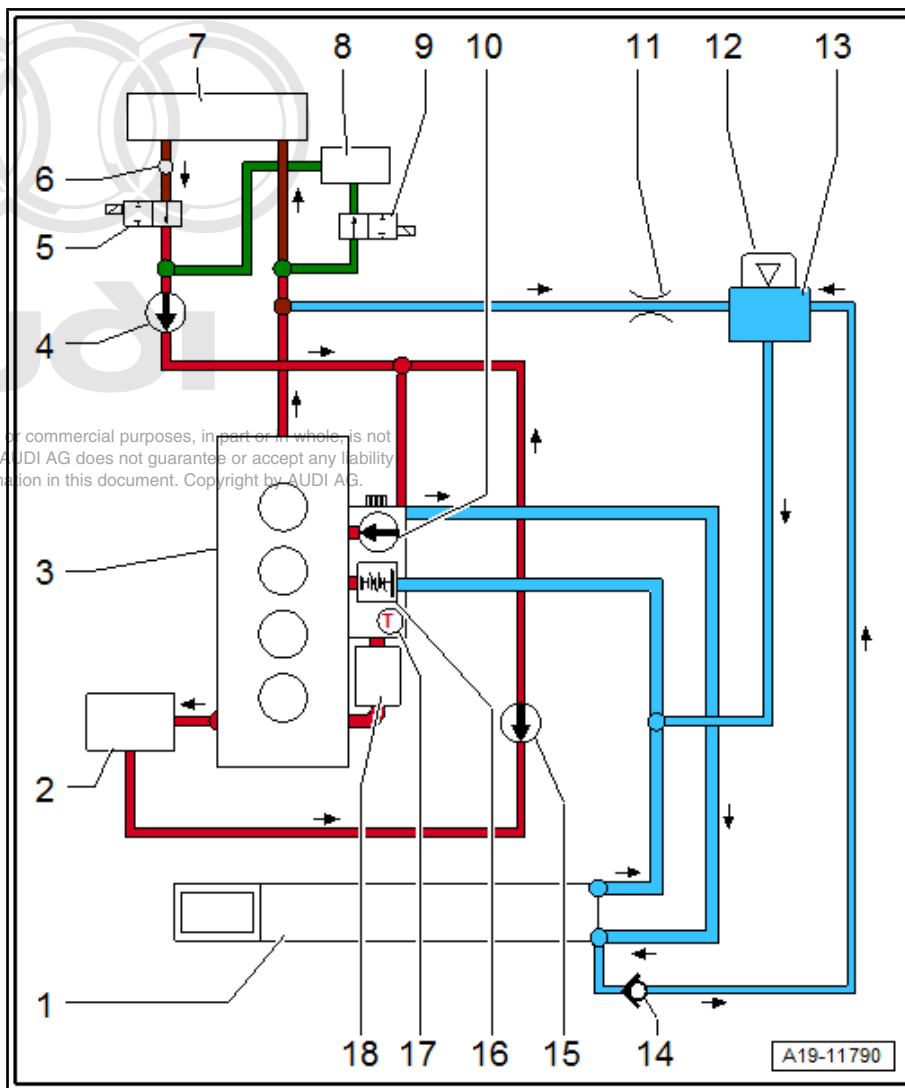
- Checking pressure relief valve ⇒ [page 247](#)

13 - Coolant expansion tank

14 - Non-return valve

15 - Continued coolant circulation pump - V51-

- Only fitted on vehicles equipped for hot climates



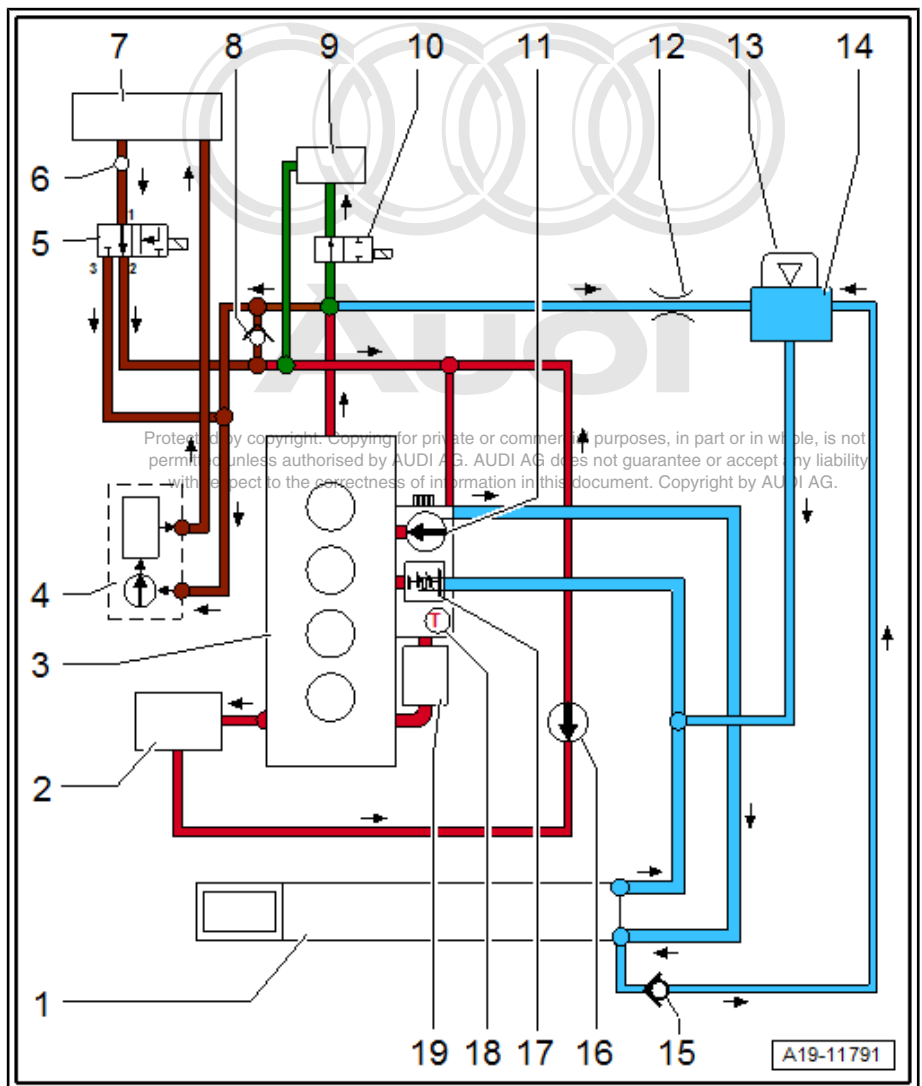
- 16 - Thermostat
- 17 - Coolant temperature sender - G62-
- 18 - Engine oil cooler

1.1.4 Connection diagram - coolant hoses, vehicles with gear oil heating and with auxiliary heater

Note

- ◆ Blue = Large coolant circuit.
- ◆ Red = Small coolant circuit.
- ◆ Brown = Heating circuit.
- ◆ Green = Gearbox heating circuit.

- 1 - Radiator
- 2 - Turbocharger
- 3 - Cylinder head/cylinder block
- 4 - Auxiliary heater
- 5 - Coolant shut-off valve - N82-
- 6 - Bleeder hole
- 7 - Heat exchanger for heater
 - Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Front air conditioning unit; Removing and installing heat exchanger
- 8 - Non-return valve
- 9 - Heat exchanger for gearbox
 - In gearbox housing
- 10 - Coolant valve for gearbox - N488-
- 11 - Coolant pump
- 12 - Restrictor
- 13 - Filler cap for expansion tank
 - Checking pressure relief valve ⇒ [page 247](#)
- 14 - Coolant expansion tank
- 15 - Non-return valve
- 16 - Continued coolant circulation pump - V51-
 - Only fitted on vehicles equipped for hot climates





17 - Thermostat

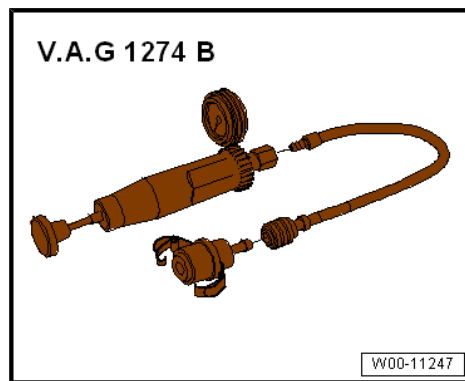
18 - Coolant temperature sender - G62-

19 - Engine oil cooler

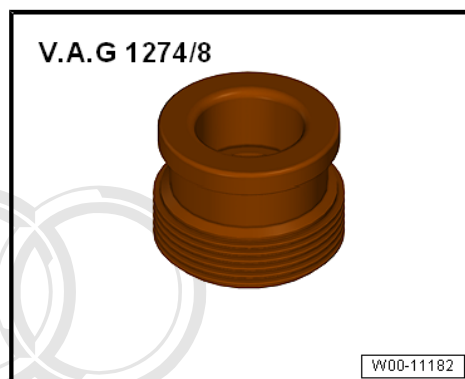
1.2 Checking cooling system for leaks

Special tools and workshop equipment required

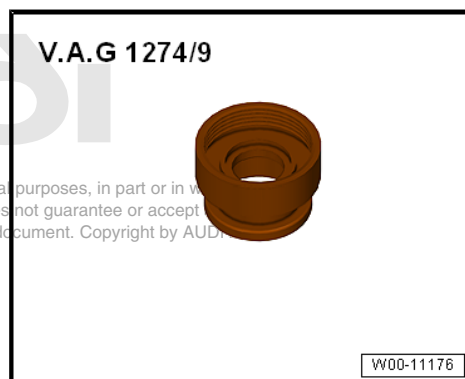
- ◆ Cooling system tester - V.A.G 1274 B-



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



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



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Procedure

- Engine must be warm.



WARNING

The cooling system is under pressure when the engine is hot. Hot steam/hot coolant can escape - risk of scalding.

Danger of scalding skin and other parts of the body.

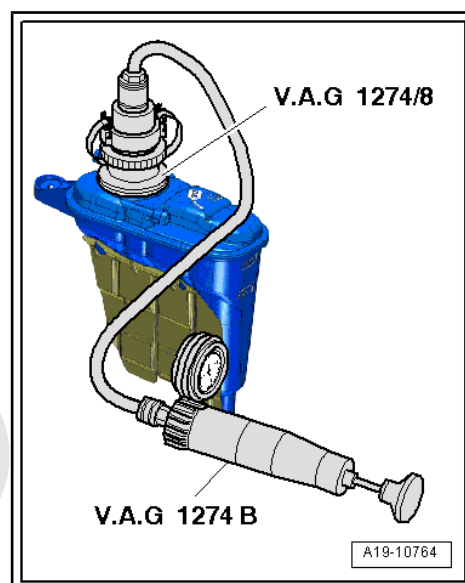
- ◆ *Put on protective gloves.*
- ◆ *Put on safety goggles.*
- ◆ *Release pressure (cover filler cap on coolant expansion tank with a cloth and open carefully).*

- 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. 1.5 bar.
- The pressure should not drop more than 0.2 bar within 10 minutes.
- If the pressure drops more than 0.2 bar, locate leak and eliminate fault.



Note

The drop in pressure of 0.2 bar within 10 minutes is caused by the decrease in coolant temperature. The colder the engine is, the less the pressure will fall. If necessary, check again when the engine is cold.



Checking pressure relief valve in filler cap

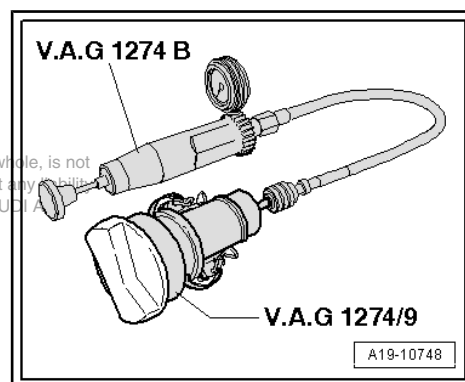
- Fit cooling system tester - V.A.G 1274 B- with adapter - V.A.G 1274/9- onto filler cap.
- Build up pressure with hand pump on cooling system tester.

Blue filler cap

- ◆ The pressure relief valve should open at a pressure of 1.4 ... 1.6 bar.

Black filler cap

- ◆ The pressure relief valve should open at a pressure of 1.6 ... 1.8 bar.

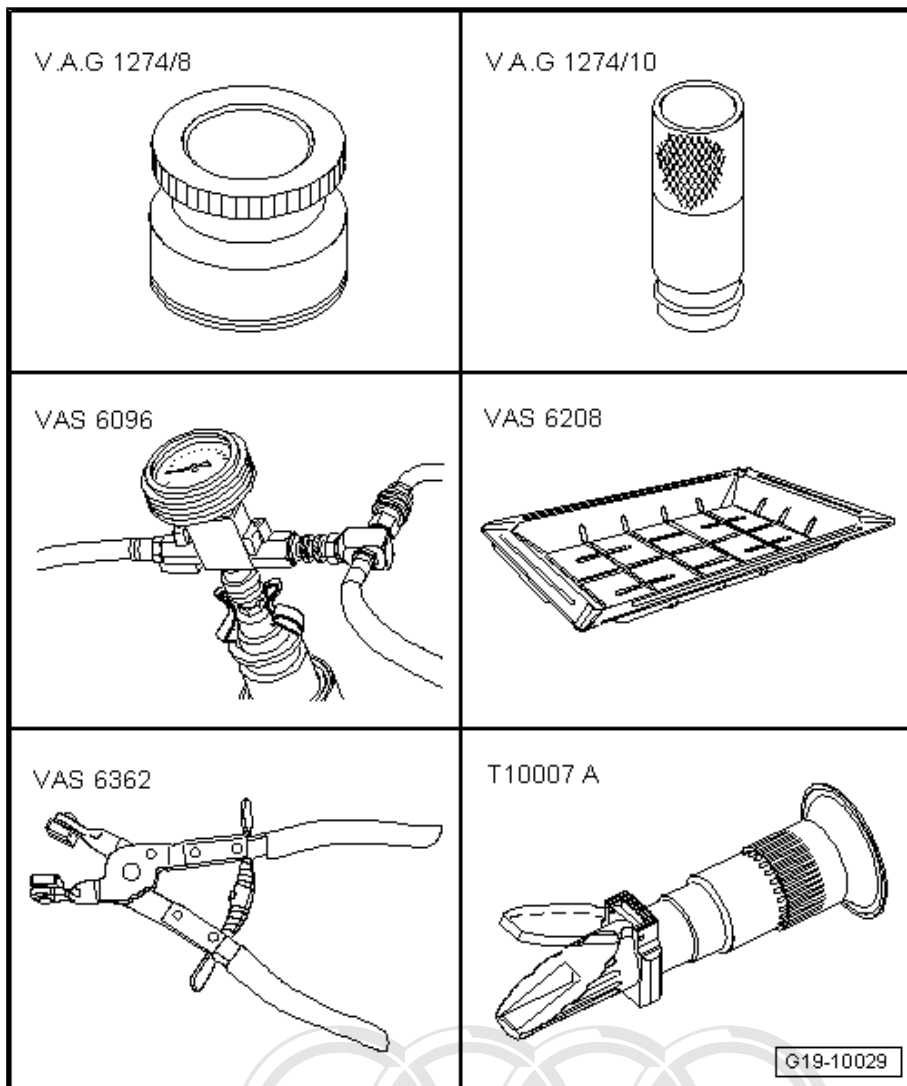


1.3 Draining and filling cooling system



Special tools and workshop equipment required

- ◆ Adapter for cooling system tester - V.A.G 1274/8-
- ◆ Pipe for cooling system tester - V.A.G 1274/10-
- ◆ Cooling system charge unit - VAS 6096-
- ◆ Drip tray for workshop hoist - VAS 6208-
- ◆ Hose clip pliers - VAS 6362-
- ◆ Refractometer - T10007 A-



Draining

Risk of scalding as hot coolant can escape

The cooling system is under pressure when the engine is hot. Hot steam/hot coolant can escape - risk of scalding.

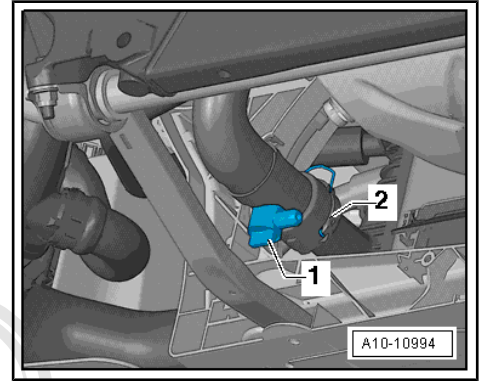
- Put on protective gloves.
- Put on safety goggles.
- Release pressure (cover filler cap on coolant expansion tank with a cloth and open carefully).
- Open filler cap on coolant expansion tank.
- Remove noise insulation (front) => General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

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- Place drip tray for workshop hoist - VAS 6208- beneath engine.
- Remove drain plug -1- and drain off coolant.

 **Note**

Disregard -item 2-.



Vehicles with gear oil heating:

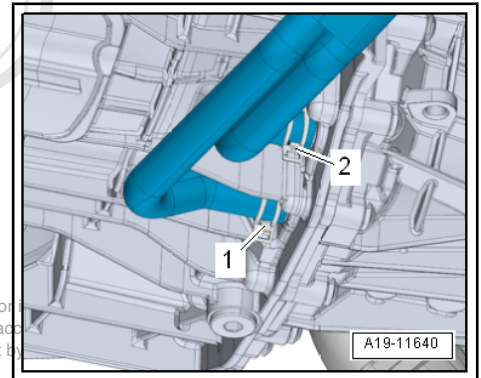
- Release hose clips -1 and 2-, disconnect coolant hoses and drain off coolant.

Filling



Caution

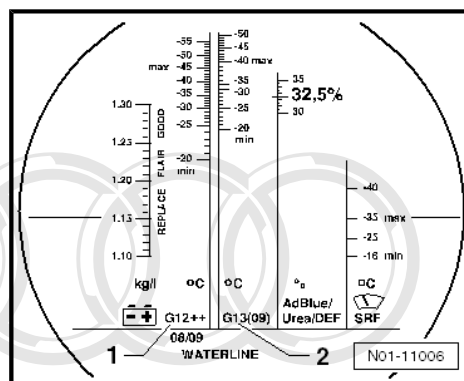
To ensure optimal corrosion protection, only distilled water may be mixed with coolant additives.





Note

- ◆ *The effectiveness of the coolant is greatly influenced by the quality of the water with which it is mixed. Because water may contain different substances depending on the country or even the region, the water quality to be used for cooling systems has been specified. Distilled water meets all the requirements and is therefore recommended for use when topping up or filling up with coolant.*
- ◆ *Use only coolant additives listed in the ⇒ Electronic parts catalogue (ETKA) . If you use other coolant additives, this can significantly impair in particular the corrosion protection effect. The resulting damage could lead to loss of coolant and consequently to serious engine damage.*
- ◆ *Coolant with the recommended mixture ratio prevents frost and corrosion damage and stops scaling. At the same time it raises the boiling point of the fluid in the system. For this reason the cooling system must be filled all year round with the correct coolant additive.*
- ◆ *Because of its high boiling point, the coolant improves engine reliability under heavy loads, particularly in countries with tropical climates.*
- ◆ *The refractometer - T10007A- MUST be used to determine the current level of frost protection.*
- ◆ *The mixture must guarantee frost protection down to at least -25 °C (in countries with arctic climate: down to -36 °C). The amount of antifreeze should only be increased if greater frost protection is required in very cold climates. This must only be down to -48 °C, however, as otherwise the cooling efficiency of the coolant is impaired.*
- ◆ *The coolant concentration must not be reduced by adding water even in warmer seasons and in warmer countries. Frost protection must be provided to at least -25 °C.*
- ◆ *Read off the level of frost protection on the scale for the relevant coolant additive.*
- ◆ *The temperature indicated on the refractometer - T10007A- corresponds to the temperature at which the first ice crystals can form in the coolant.*
- ◆ *Do not reuse coolant.*
- ◆ *Only use water/coolant additive as a lubricant for coolant hoses.*

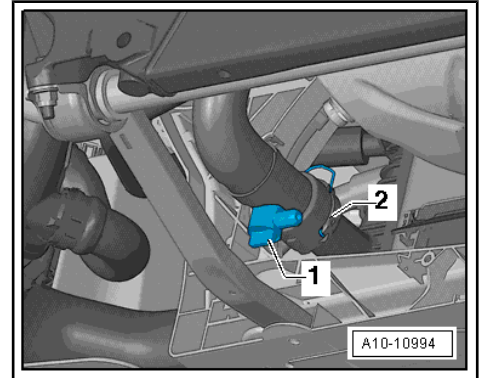


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Recommended mixture ratio for coolant

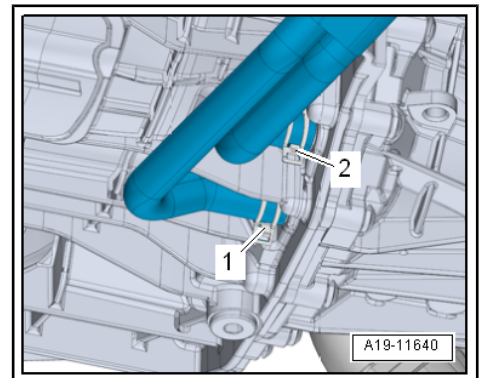
- Coolant (40 %) and distilled water (60 %) for frost protection to -25 °C
- Coolant (50 %) and distilled water (50 %) for frost protection to -36 °C
- Coolant ⇒ Electronic parts catalogue (ETKA)

- Close drain plug -1-.



Vehicles with gear oil heating:

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



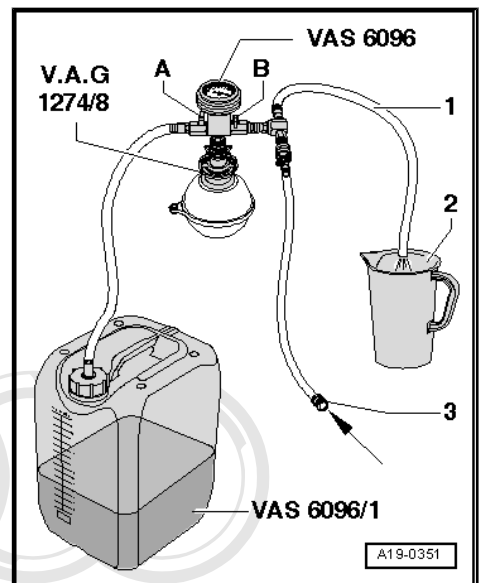
Continued for all vehicles:

- Fill reservoir of cooling system charge unit - VAS 6096- with 10 litres of premixed coolant (according to recommended ratio). For recommended ratio, refer to [⇒ page 250](#) .
- Fit adapter for cooling system tester - V.A.G 1274/8- onto coolant expansion tank.
- Attach cooling system charge unit - VAS 6096- to adapter for cooling system tester - V.A.G 1274/8- .
- Run vent hose -1- into a small container -2-.

 **Note**

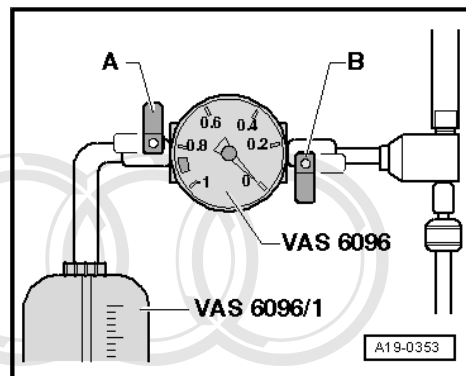
The vented air draws along a small amount of coolant, which should be collected.

- Close both valves -A- and -B- (turn lever at right angles to direction of flow).
- Connect hose -3- to compressed air supply.
- Pressure: 7 ... 10 bar.



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- 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 cooling system charge unit - 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.

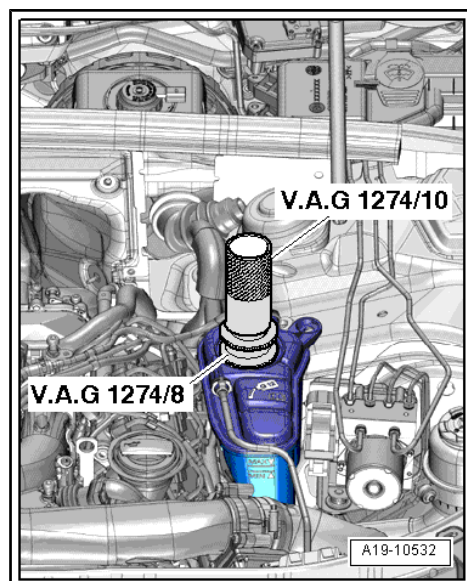


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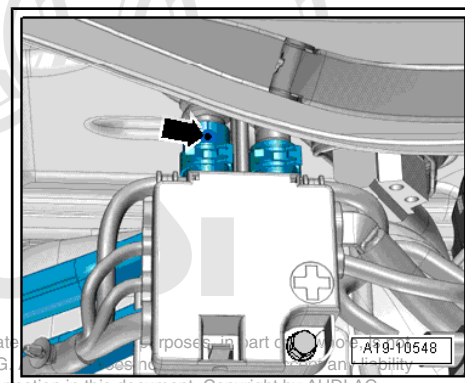


Note

- ◆ *If the needle does not reach the green zone, repeat the process.*
- ◆ *Check cooling system for leaks if the vacuum is not maintained.*
- Detach compressed air hose.
- Open valve -A-.
- The vacuum in the cooling system causes the coolant to be drawn out of the reservoir of the cooling system charge unit - VAS 6096- ; the cooling system is then filled.
- Detach cooling system charge unit - VAS 6096- from adapter for cooling system tester - V.A.G 1274/8- on coolant expansion tank.
- Fit pipe for cooling system tester - V.A.G 1274/10- onto adapter for cooling system tester - V.A.G 1274/8- .
- Fill up pipe for cooling system tester - V.A.G 1274/10- with coolant. If required, add further coolant when performing bleeding procedure.
- Remove plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .



- Release coolant hose going to heat exchanger for heater and pull back hose until bleeder hole -arrow- in hose is no longer blocked by connection.
- Fill up with coolant until it flows out at bleeder hole in coolant hose.
- Push coolant hose back onto connection and secure with spring-type hose clip.
- Close filler cap on expansion tank.
- Start engine.
- Set temperature to "HI" in all zones.
- Set fresh air blower to lowest setting.
- Switch off air conditioner compressor (press **AC** button).
- LED in button should not light up.
- Run engine for 3 minutes at 2000 rpm.
- Allow engine to run at idling speed until both large coolant hoses at radiator become warm.
- Run engine for 2 minutes at 2000 rpm.
- Switch off ignition and allow engine to cool down.
- On vehicles with auxiliary heater, switch heater on for approx. 30 seconds and allow engine to run at idling speed.
- Install noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

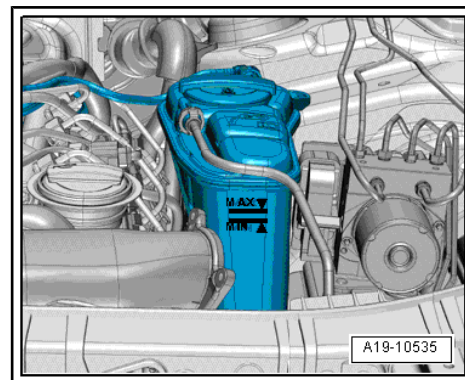


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Risk of scalding as hot coolant can escape

The cooling system is under pressure when the engine is hot. Hot steam/hot coolant can escape - risk of scalding.

- Put on protective gloves.
 - Put on safety goggles.
 - Release pressure (cover filler cap on coolant expansion tank with a cloth and open carefully).
-
- Check coolant level.
 - The coolant level must be at the "MAX" marking when the engine is cold.
 - The coolant level can be above the "MAX" marking when the engine is warm.



2 Coolant pump/thermostat assembly

⇒ ["2.1 Exploded view - coolant pump/thermostat", page 254](#)

⇒ ["2.2 Exploded view - coolant valves", page 256](#)

⇒ ["2.3 Removing and installing electric coolant pump", page 256](#)

⇒ ["2.4 Removing and installing coolant pump", page 257](#)

⇒ ["2.5 Removing and installing toothed belt for coolant pump", page 259](#)

⇒ ["2.6 Removing and installing thermostat", page 261](#)

⇒ ["2.7 Checking thermostat", page 262](#)

⇒ ["2.8 Removing and installing coolant temperature sender G62", page 262](#)

2.1 Exploded view - coolant pump/thermostat

1 - Bolt

- Tightening sequence
⇒ [page 255](#)

2 - O-rings

- Renew

3 - Connection

4 - Retaining clip

- Only on clip-on version
- Check that it is securely seated

5 - Bolt

- 4 Nm
- Only on bolted version

6 - Retaining plate

- Only on bolted version

7 - Coolant temperature sender - G62-

- Removing and installing
⇒ [page 262](#)

8 - O-ring

- Renew

9 - Coolant pump

- Removing and installing
⇒ [page 257](#)
- New coolant pump: remove protective cap

10 - Gasket

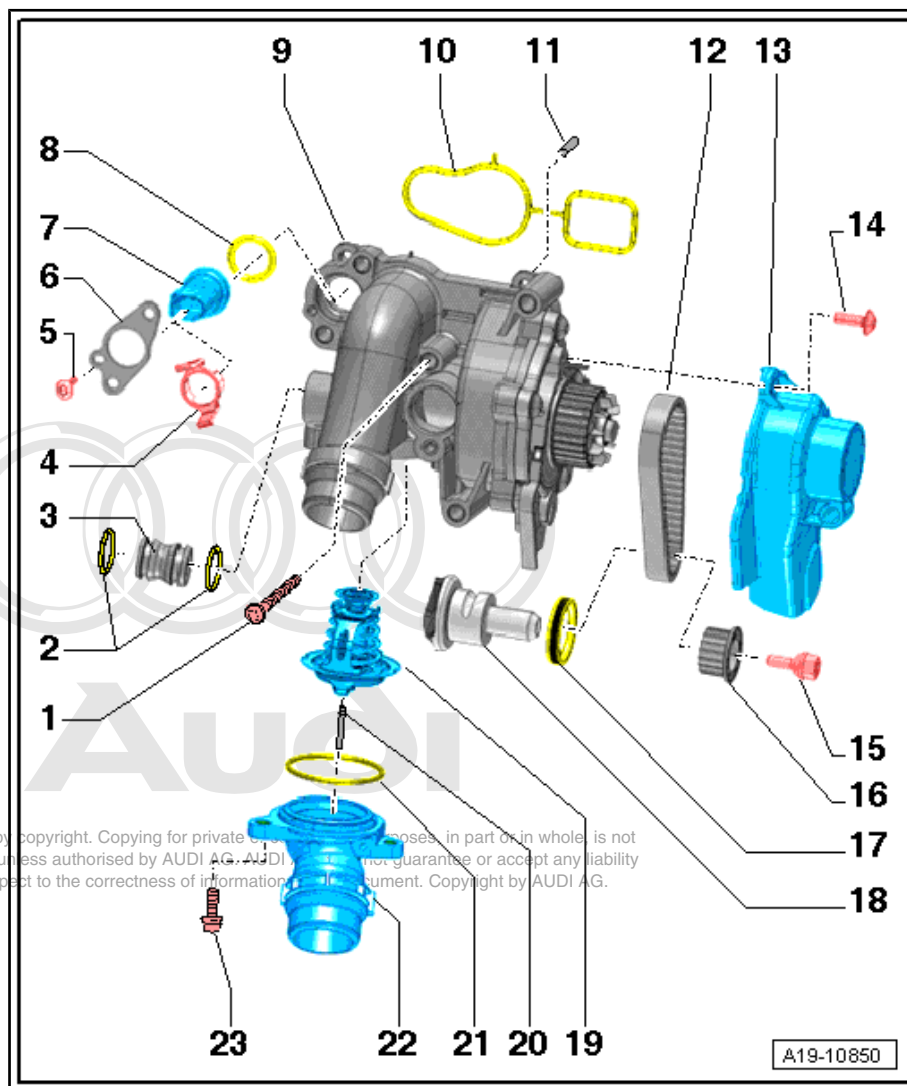
- Renew

11 - Centring pin

- 2x

12 - Toothed belt

- For coolant pump
- Removing and installing ⇒ [page 259](#)



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A19-10850

13 - Toothed belt cover

14 - Bolt

- 9 Nm

15 - Bolt

- Left-hand thread
- Renew
- 10 Nm + turn 90° further

16 - Toothed belt drive sprocket

- Note installation position

17 - Oil seal for balance shaft (inlet side)

- Renewing ⇒ [page 79](#)

18 - Balance shaft

19 - Thermostat

- Removing and installing ⇒ [page 261](#)
- Checking ⇒ [page 262](#)

20 - Centring pin

21 - O-ring

- Renew

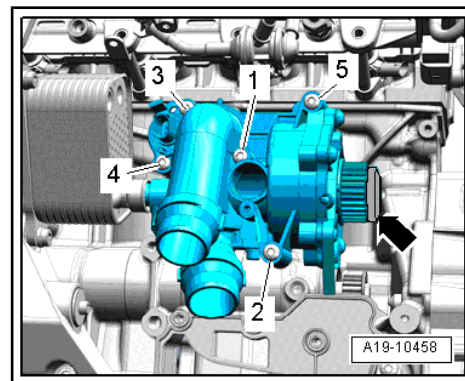
22 - Connection

23 - Bolt

- 9 Nm

Coolant pump - tightening sequence

- Tighten bolts for coolant pump in the sequence -1 ... 5- to 9 Nm.



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2.2 Exploded view - coolant valves

1 - Coolant valve for gearbox - N488-

- ❑ Removing and installing
⇒ [page 264](#)

2 - Coolant hose

3 - Bolt

- ❑ 23 Nm

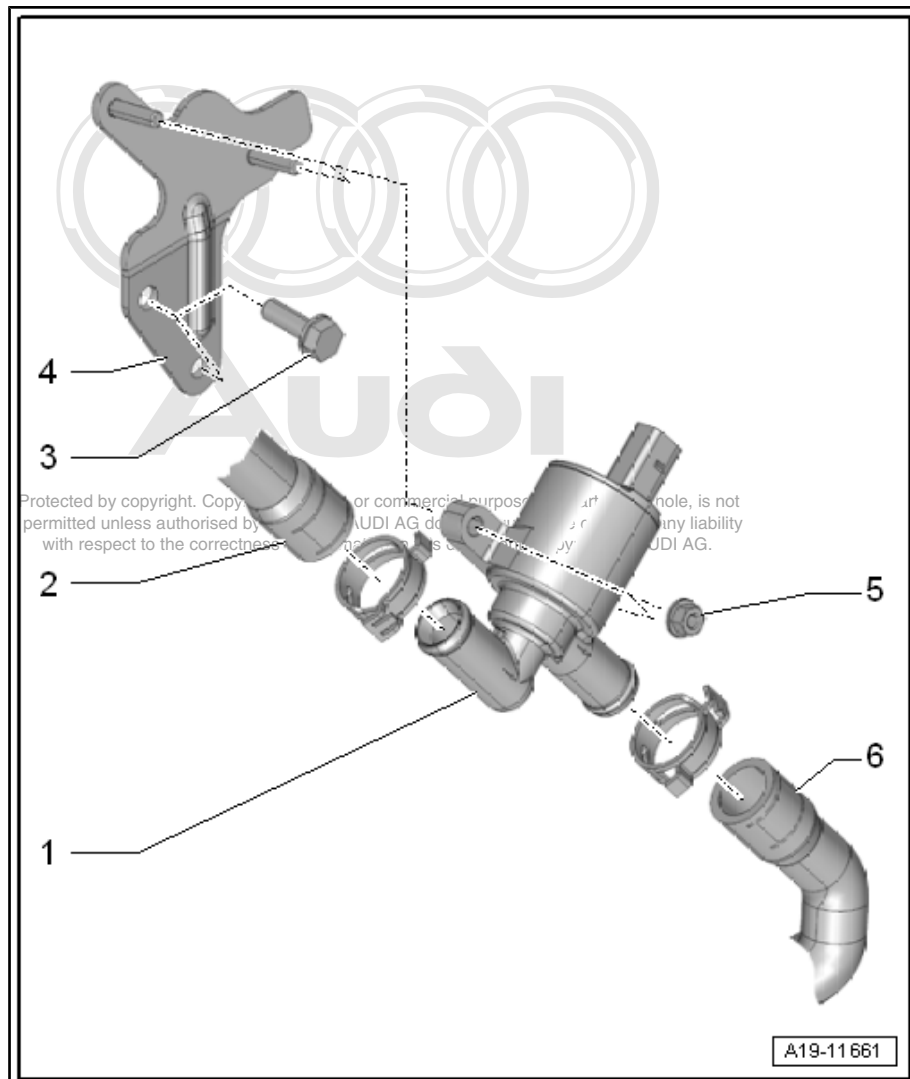
4 - Bracket

- ❑ For coolant valve for gearbox - N488-

5 - Nut

- ❑ 9 Nm

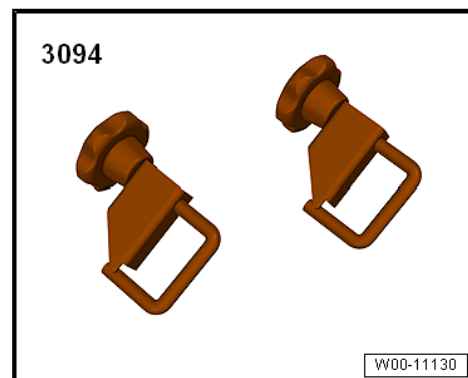
6 - Coolant hose



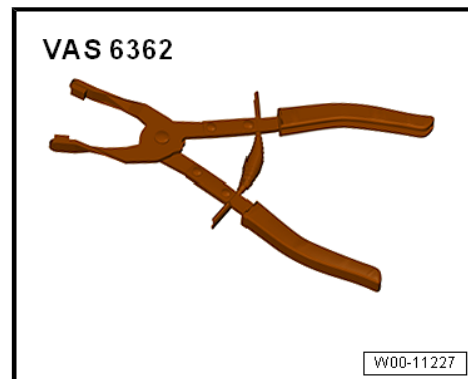
2.3 Removing and installing electric coolant pump

Special tools and workshop equipment required

- ◆ Hose clamps, up to 25 mm - 3094-



- ◆ Hose clip pliers - VAS 6362-

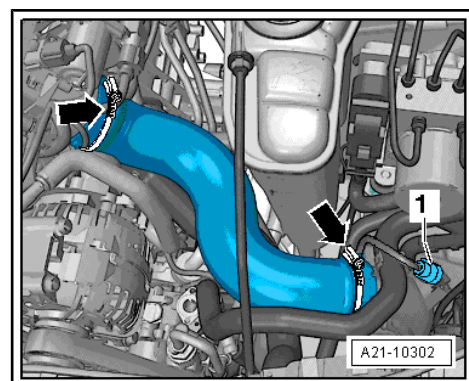


Removing

- Release hose clips -arrows- and detach air hose.

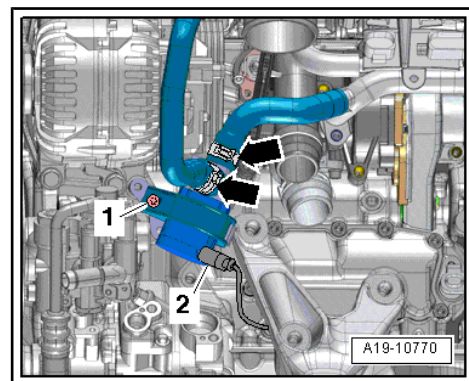


Disregard -item 1-.



Place a cloth under coolant pipe to catch escaping coolant.

- Clamp off coolant hoses -arrows- with hose clamps up to 25 mm - 3094- and detach.
- Unplug electrical connector -2-.
- Remove bolt -1- and detach continued coolant circulation pump - V51- .



Installing

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



- ◆ *Hose connections and air pipes/hoses must be free of oil and grease prior to fitting.*
- ◆ *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.*

- Check coolant level ⇒ [page 253](#) .

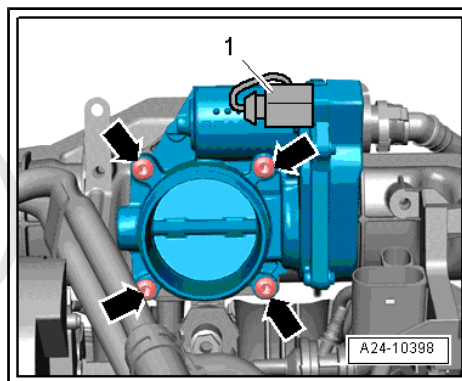
2.4 Removing and installing coolant pump

Removing

- Remove small coolant pipe ⇒ [page 268](#) .
- Remove toothed belt for coolant pump ⇒ [page 259](#) .



- Unplug electrical connector -1- at throttle valve module - J338- .
- Unscrew bolts -arrows- and detach throttle valve module - J338- .



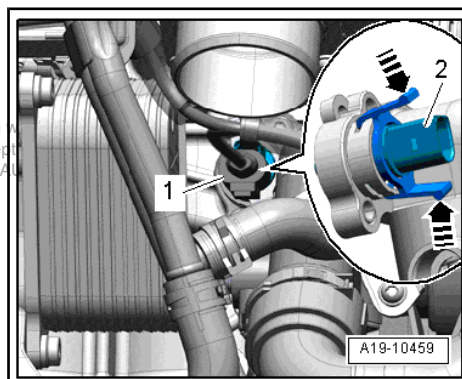
- Unplug electrical connector -1- at coolant temperature sender - G62- .



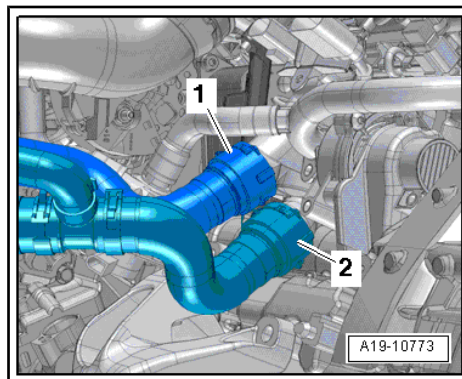
Note

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Disregard items marked -2 and arrows-.



- Lift retaining clips -1- and -2-, detach coolant hoses and move them clear to one side.



- Remove bolts -1 ... 5-.
- Detach coolant pump from centring pins and pull pump off engine oil cooler.

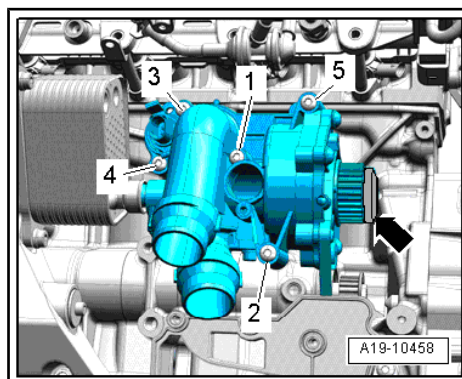


Note

Disregard -arrow-.

Installing

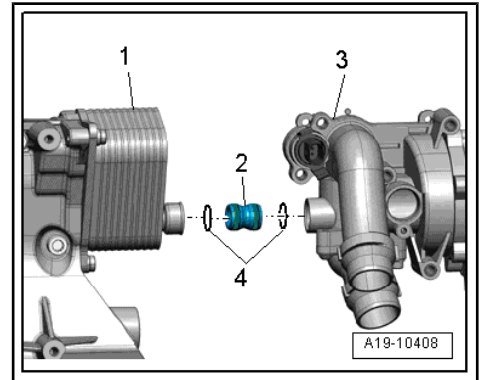
Installation is carried out in the reverse order; note the following:



Note

Renew gaskets and O-rings.

- Lubricate O-rings -4- with coolant, for coolant refer to ⇒ Electronic parts catalogue .
- Check whether the two centring pins are fitted in the cylinder block; install if necessary.
- Fit connecting piece -2- into engine oil cooler -1-.
- Push coolant pump -3- onto connecting piece and centring pins in cylinder block.

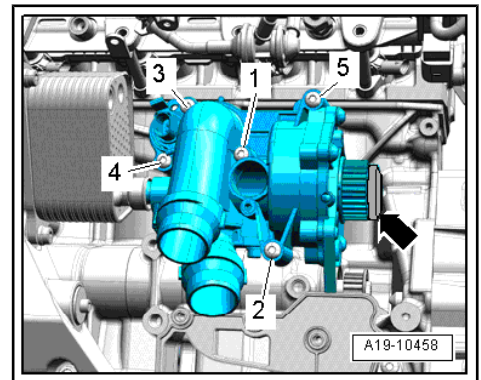


- Tighten coolant pump bolts ⇒ [page 255](#) .

 **Note**

Detach protective cap -arrow- if a new coolant pump has been fitted.

- Install toothed belt for coolant pump ⇒ [page 259](#) .
- Install throttle valve module J338 ⇒ [page 333](#) .
- Install small coolant pipe ⇒ [page 268](#) .



 **Note**

Do not reuse coolant.

- Fill up with coolant ⇒ [page 249](#) .

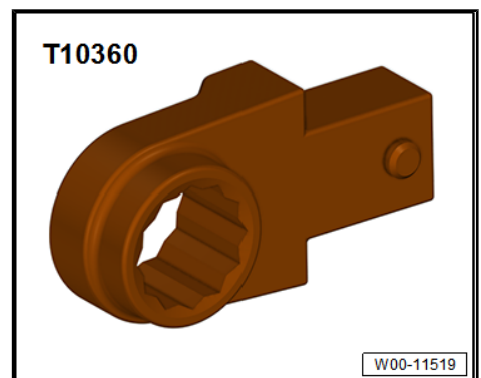
Tightening torques

- ◆ ⇒ ["2.1 Exploded view - coolant pump/thermostat", page 254](#)

2.5 Removing and installing toothed belt for coolant pump

Special tools and workshop equipment required

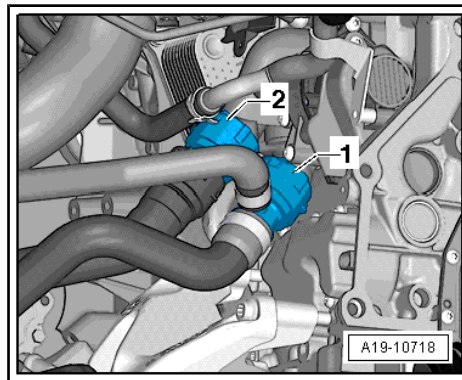
- ◆ Tool insert - T10360-



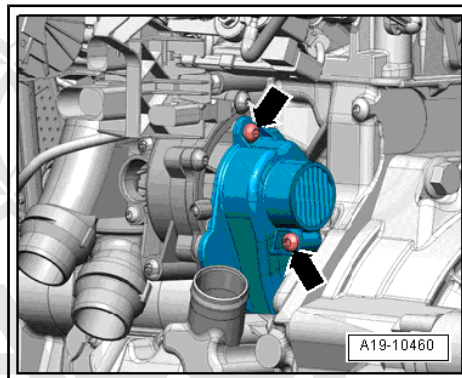


Removing


- Remove small coolant pipe ⇒ [page 268](#) .
- Disconnect coolant hoses -1 and 2- and move clear to one side.



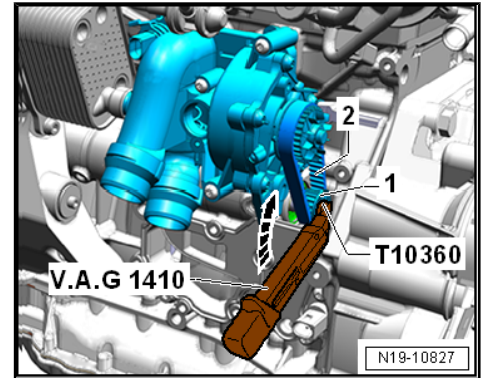
- Remove bolts -arrows- and detach toothed belt cover.



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 **Caution**
Risk of damage to thread.
 ♦ *The drive sprocket bolt has a left-hand thread.*


- Use torque wrench - V.A.G 1410- and insert tool - T10360- to loosen bolt on coolant pump drive sprocket -1- in a clockwise direction (direction of -arrow-) and unscrew three turns (counterhold at vibration damper).
- Remove toothed belt -2-.



Installing

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

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-  **Note**
- ♦ *Renew drive sprocket bolt.*
 - ♦ *Renew gaskets and O-rings.*
 - ♦ *Note installation position of toothed belt sprocket ⇒ [Item 16 \(page 255\)](#) .*
 - Install small coolant pipe ⇒ [page 268](#) .

 **Note**

Do not reuse coolant.

- Fill up with coolant ⇒ [page 249](#) .

Tightening torques

- ♦ ⇒ [“2.1 Exploded view - coolant pump/thermostat”, page 254](#)

2.6 Removing and installing thermostat

Removing

- Drain coolant ⇒ [page 247](#) .
- Remove coolant pump ⇒ [page 257](#) .
- Unscrew bolts -arrows- and remove connection.
- Detach thermostat.

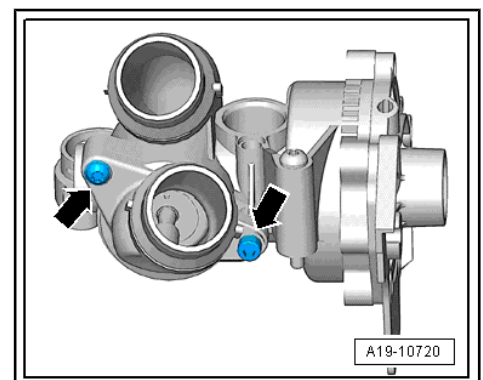
Installing

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

 **Note**

Renew gaskets and O-rings.

- Clean sealing surface for O-ring.
- Coat O-ring with coolant, coolant ⇒ [Electronic parts catalogue](#) .





- Insert thermostat -4- in coolant pump housing -5- and swivel forwards slightly -arrow-.
- Fit connection -3- carefully (insert centring pin -2- in guide -1-).
- Install support for intake manifold
⇒ [“4.1 Exploded view - intake manifold”, page 320](#) .



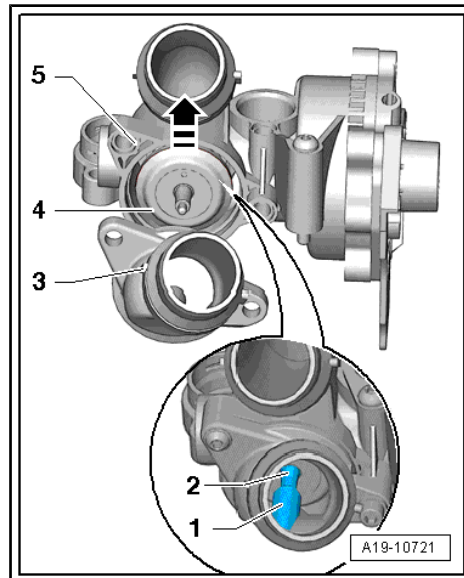
Note

Do not reuse coolant.

- Fill up with coolant ⇒ [page 249](#) .

Tightening torques

- ◆ ⇒ [“2.1 Exploded view - coolant pump/thermostat”, page 254](#)



2.7 Checking thermostat

- Thermostat removed ⇒ [page 261](#)
- Heat thermostat in water bath.

Starts to open	Fully open	Opening travel
approx. 95°	approx. 105° ¹⁾	at least 8 mm
• ¹⁾ Cannot be checked		

2.8 Removing and installing coolant temperature sender - G62-

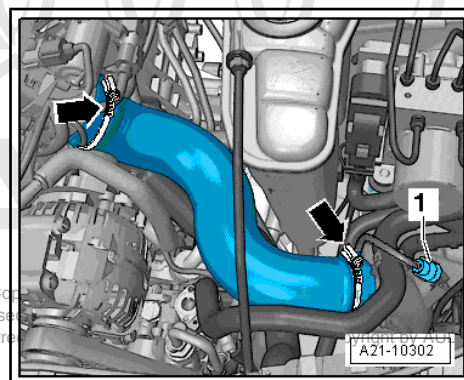
Removing

- Engine cold.
- Open filler cap on coolant expansion tank briefly and allow residual pressure in cooling system to dissipate.
- Release hose clips -arrows- and detach air hose.



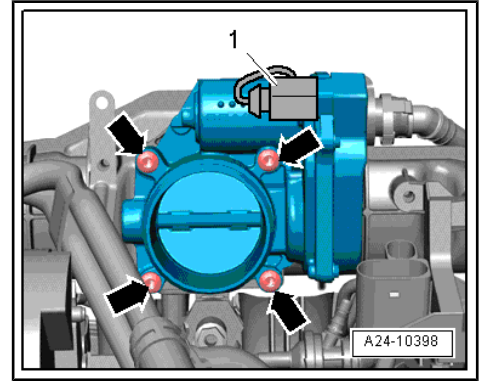
Note

Disregard -item 1-.



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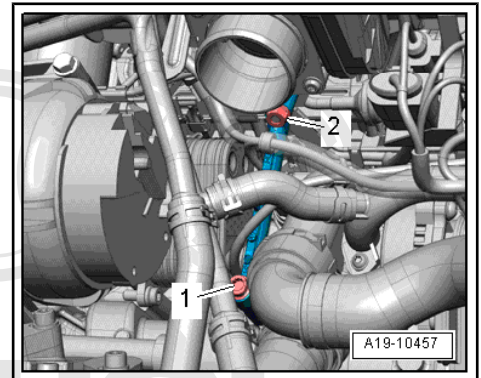
- Unplug electrical connector -1- at throttle valve module - J338- .
- Unscrew bolts -arrows- and detach throttle valve module - J338- .



- Remove support for intake manifold (remove nut -2- and bolt -1-).

 **Note**

Depending on version, different coolant temperature senders - G62- can be fitted.



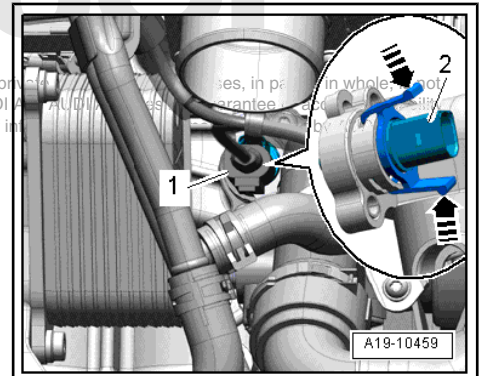
Clip-on version

- Unplug electrical connector -1- at coolant temperature sender - G62- .

 **Note**

Place a cloth underneath to catch escaping coolant.

- Detach retaining clip (press release tabs -arrows-).
- Detach coolant temperature sender - G62- -2-





Bolted version

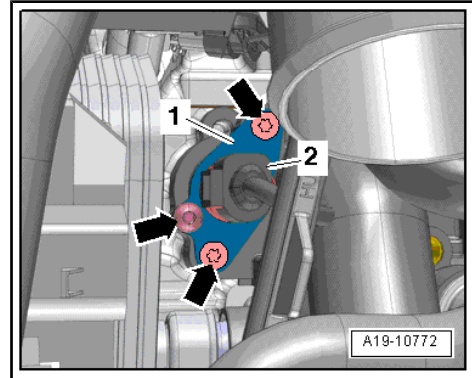
- Unplug electrical connector -2- at coolant temperature sender - G62- .



Note

Place a cloth underneath to catch escaping coolant.

- Unscrew bolts -arrows- and remove retaining plate -1-.
- Detach coolant temperature sender - G62- .



Installing

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



Note

- ◆ Fit new O-rings.
 - ◆ Insert new coolant temperature sender - G62- immediately into connection to avoid loss of coolant.
 - ◆ Hose connections and air pipes/hoses must be free of oil and grease prior to fitting.
 - ◆ Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ *Electronic parts catalogue* .
 - ◆ The screw sections of used screw-type clips must be sprayed with rust remover prior to fitting so that the air hoses can be attached securely to the hose connections.
- Install throttle valve module - J338- ⇒ [page 333](#) .
 - Check coolant level ⇒ [page 253](#) .

Tightening torques

- ◆ ⇒ ["2.1 Exploded view - coolant pump/thermostat", page 254](#)
- ◆ Support for intake manifold
⇒ ["4.1 Exploded view - intake manifold", page 320](#)

2.9 Removing and installing coolant valves

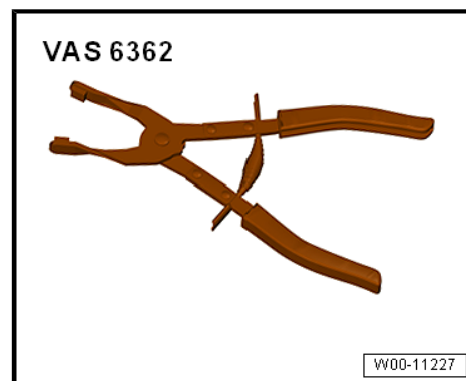
Special tools and workshop equipment required

- ◆ Hose clamps, up to 25 mm - 3094-

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- ◆ Hose clip pliers - VAS 6362-



Removing

- Remove noise insulation (rear) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
- Unplug electrical connector -2-.
- Clamp off coolant hoses using hose clamps up to 25 mm - 3094- , release hose clips -1- and disconnect hoses.
- Remove nuts -arrows- and detach coolant valve for gearbox - N488- .

Installing

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



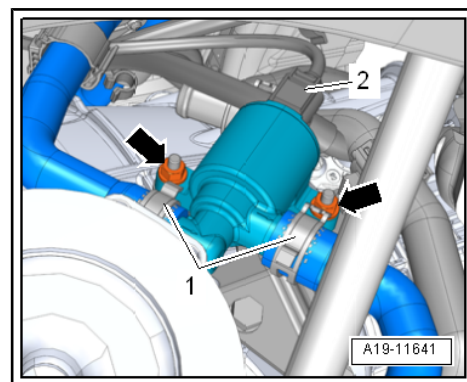
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Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .

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

Tightening torques

- ◆ ⇒ ["2.2 Exploded view - coolant valves", page 256](#)





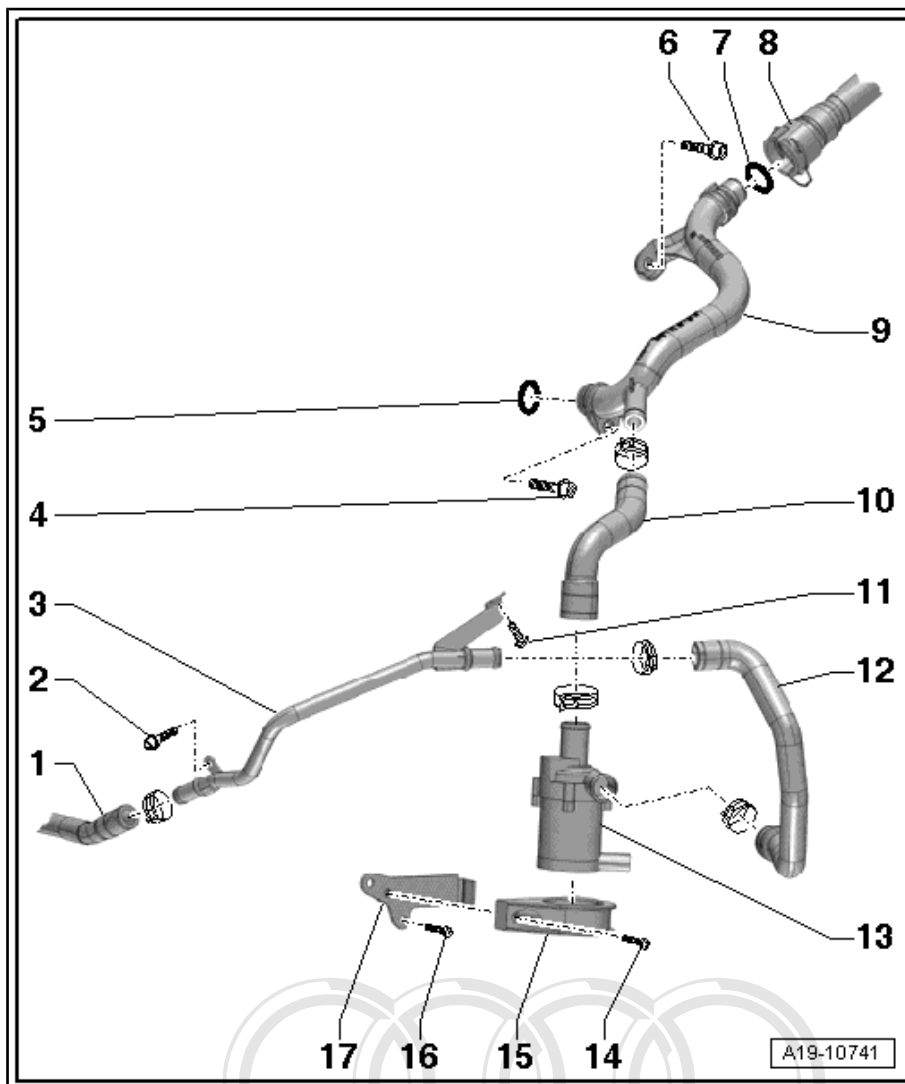
3 Coolant pipes

⇒ "3.1 Exploded view - coolant pipes", page 266

⇒ "3.2 Removing and installing coolant pipes", page 267

3.1 Exploded view - coolant pipes

- 1 - Coolant hose
- 2 - Bolt
 - 6 Nm
- 3 - Small coolant pipe
 - Removing and installing ⇒ page 268
- 4 - Bolt
 - 9 Nm
- 5 - O-ring
 - Renew
- 6 - Bolt
 - 9 Nm
- 7 - O-ring
 - Renew
- 8 - Coolant hose
 - Lift retaining clip to detach
 - Connecting to radiator ⇒ page 271
- 9 - Coolant pipe (front)
 - Removing and installing ⇒ page 267
- 10 - Coolant hose
- 11 - Bolt
 - 6 Nm
- 12 - Coolant hose
- 13 - Continued coolant circulation pump - V51-
 - Removing and installing ⇒ page 256
- 14 - Bolt
 - 4 Nm
- 15 - Bracket
- 16 - Bolt
 - 9 Nm
- 17 - Bracket



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3.2 Removing and installing coolant pipes

⇒ [“3.2.1 Removing and installing coolant pipe \(front\)”, page 267](#)

⇒ [“3.2.2 Removing and installing small coolant pipe”, page 268](#)

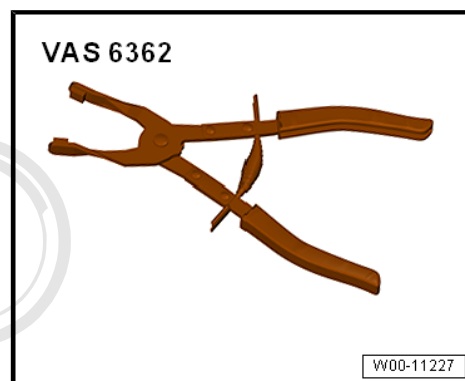
3.2.1 Removing and installing coolant pipe (front)

Special tools and workshop equipment required

◆ Hose clamps, up to 25 mm - 3094-



◆ Hose clip pliers - VAS 6362-



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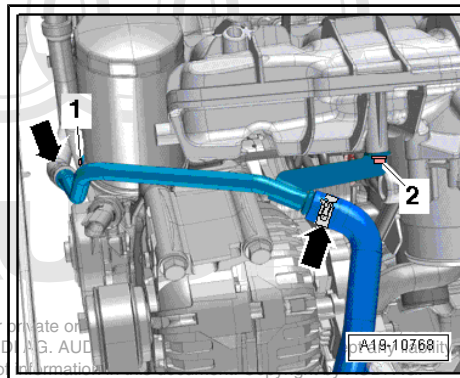
Removing



Note

Place a cloth under coolant pipe to catch escaping coolant.

- Unscrew bolts -1- and -2- and swivel coolant pipe (front) upwards.
- Clamp off coolant hoses -arrows- with hose clamps up to 25 mm - 3094- and detach.



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Installing

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



Note

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

- Check coolant level ⇒ [page 253](#) .

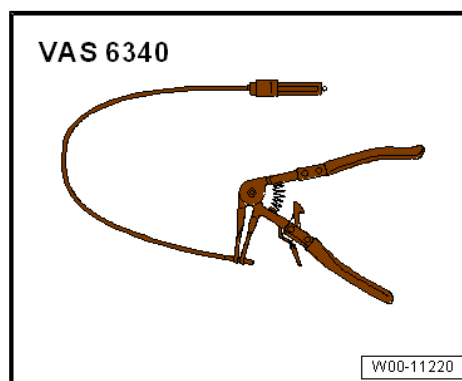
Tightening torques

- ◆ ⇒ [“3.1 Exploded view - coolant pipes”, page 266](#)

3.2.2 Removing and installing small coolant pipe

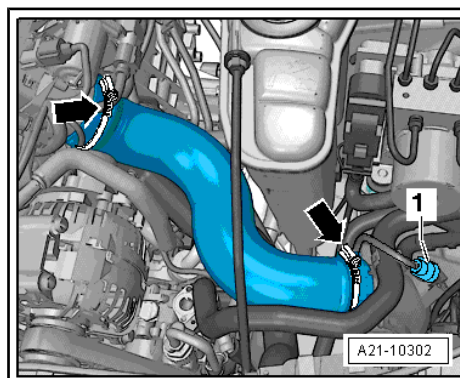
Special tools and workshop equipment required

- ◆ Hose clip pliers - VAS 6340-

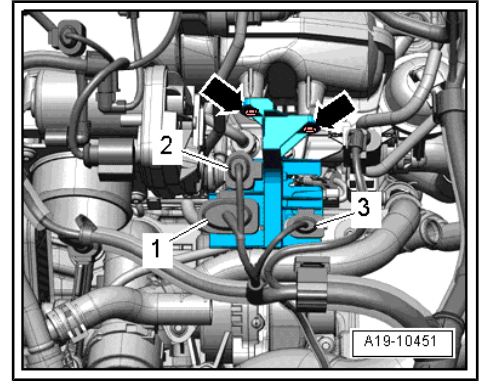
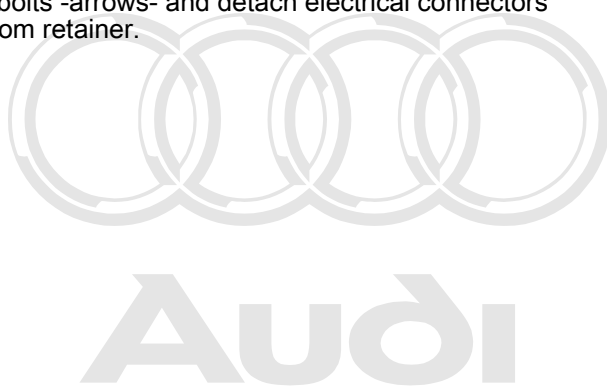


Removing

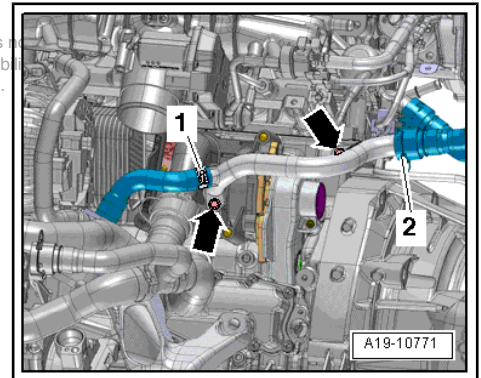
- Drain coolant ⇒ [page 247](#) .
- Release hose clips -arrows- and detach air hose.



- Remove bolts -arrows- and detach electrical connectors -1 ... 3- from retainer.



- Release hose clip -1-, lift retaining clip -2- and detach coolant hoses.
- Unscrew bolts -arrows- and detach small coolant pipe.



Installing

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

Note

- ◆ *Fit new O-rings.*
- ◆ *Hose connections and air pipes/hoses must be free of oil and grease prior to fitting.*
- ◆ *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.*

- Connect coolant hose with plug-in connector ⇒ [page 271](#) .

Note

Do not reuse coolant.

- Fill up with coolant ⇒ [page 249](#) .

Tightening torques

- ◆ ⇒ ["3.1 Exploded view - coolant pipes"](#), [page 266](#)

4 Radiator/radiator fans

⇒ "4.1 Exploded view - radiator/radiator fans", page 270

⇒ "4.2 Removing and installing radiator", page 271

⇒ "4.3 Removing and installing radiator fan V7 ", page 277

4.1 Exploded view - radiator/radiator fans

1 - Bolt

- 2.5 Nm

2 - Radiator fan control unit - J293-

- Removing and installing ⇒ page 277

3 - Bolt

- 5 Nm

4 - Radiator cowl

- Removing and installing ⇒ page 271

5 - Radiator fan - V7-

- Removing and installing ⇒ page 277

6 - Bolt

- 3.5 Nm

7 - Washer

8 - Rubber bush

- For radiator

9 - Coolant hose

- Lift retaining clip to detach

10 - O-ring

- Renew

11 - Coolant hose

- Lift retaining clip to detach

12 - O-ring

- Renew

13 - Coolant hose

- To coolant expansion tank

14 - O-ring

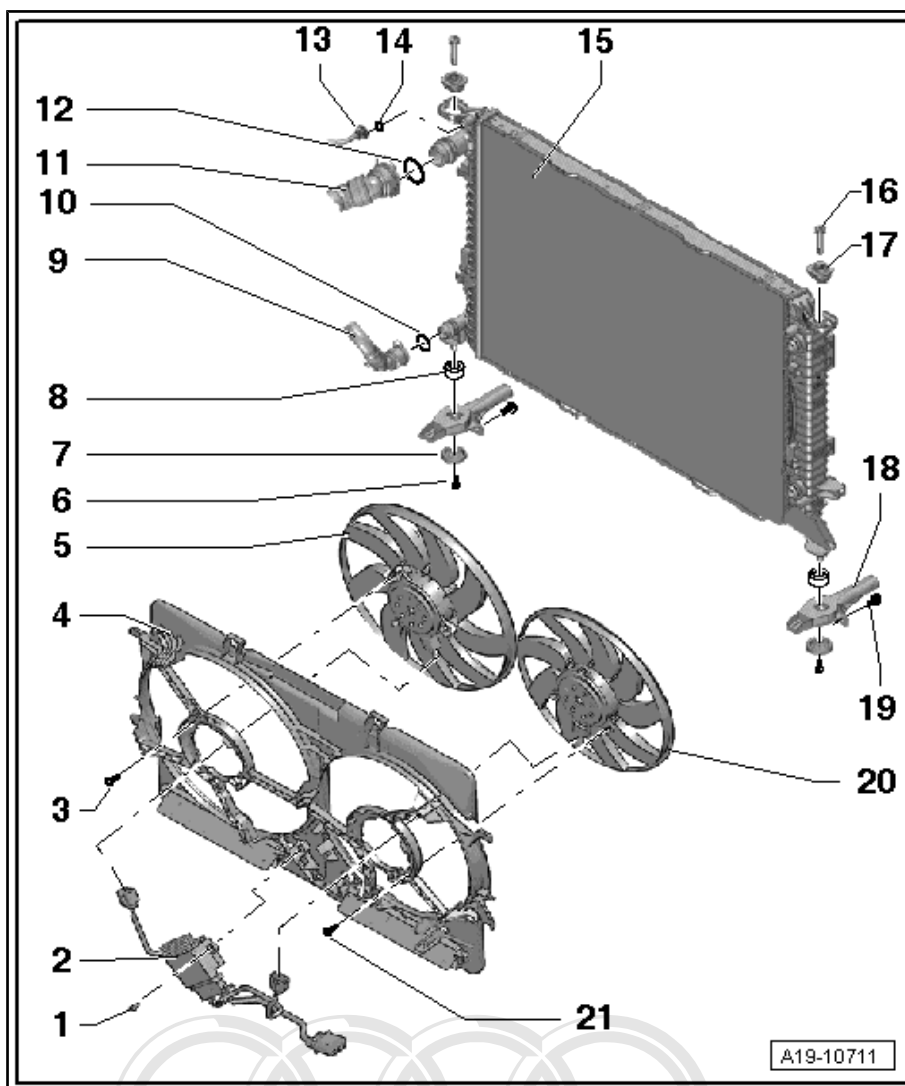
- Renew

15 - Radiator

- Remove and install together with radiator cowl ⇒ page 271
- If renewed, change coolant in entire system

16 - Retaining pin

- Use screwdriver to release and pull off



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17 - Rubber buffer

18 - Radiator bracket

19 - Bolt

- 5.5 Nm

20 - Radiator fan 2 - V177-

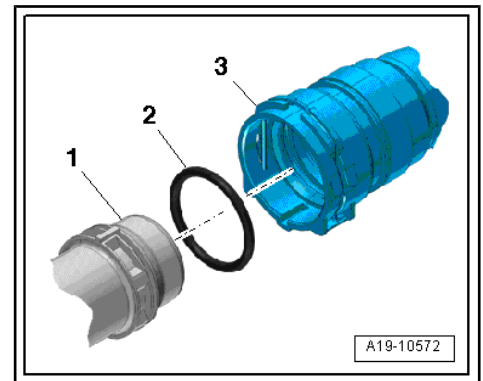
- Not fitted if fan runs with 400 W
- Removing and installing => [page 277](#)

21 - Bolt

- 5 Nm

Connecting coolant hose with plug-in connector

- Remove old O-ring -2- from coolant hose -3-.
- Lubricate new O-ring with coolant additive and fit O-ring in coolant hose.
- Press coolant hose onto coolant pipe -1- until it engages with a click.
- Press coolant hose in again and then pull to check that plug-in connector is correctly engaged.



4.2 Removing and installing radiator



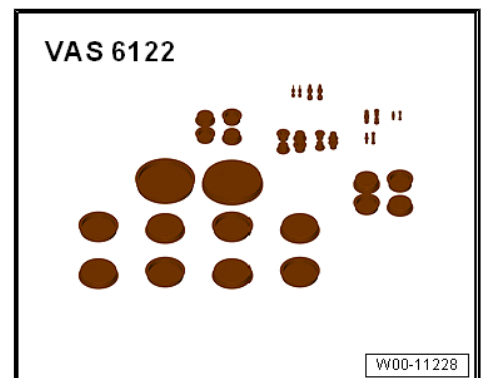
Note

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- ◆ **Radiator and radiator cowl can only be removed and installed together as one unit.**
- ◆ *On more recent versions it is no longer possible to remove the condenser from the radiator with the refrigerant lines attached. This is described below under "version 2".*

Special tools and workshop equipment required

- ◆ Engine bung set - VAS 6122- for vehicles with dual clutch gearbox

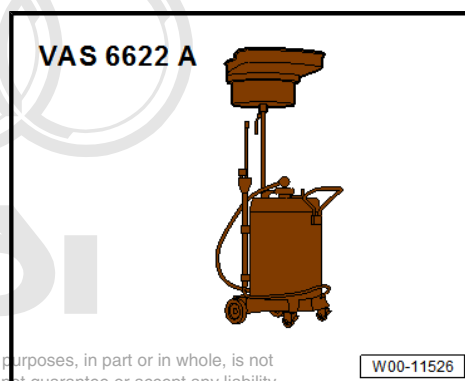




- ◆ Drip tray for workshop hoist - VAS 6208-



- ◆ Used oil collection and extraction unit - VAS 6622A- for vehicles with dual clutch gearbox



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Removing



Note

If there are slight impressions on the fins, refer to ⇒ [page 6](#) .

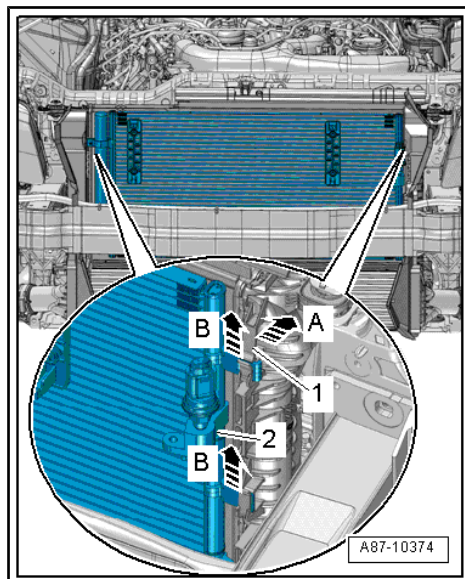
- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
- Remove impact bar ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing impact bar .
- Remove charge air cooler ⇒ [page 296](#) .

Vehicles with refrigerant lines (version 2):

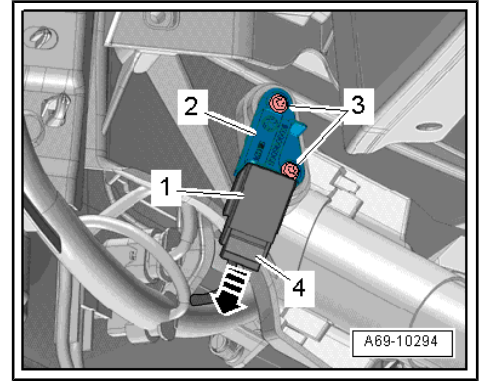
- Remove condenser ⇒ Heating, air conditioning; Rep. gr. 87 ; Refrigerant circuit; Removing and installing condenser .

A4 vehicles

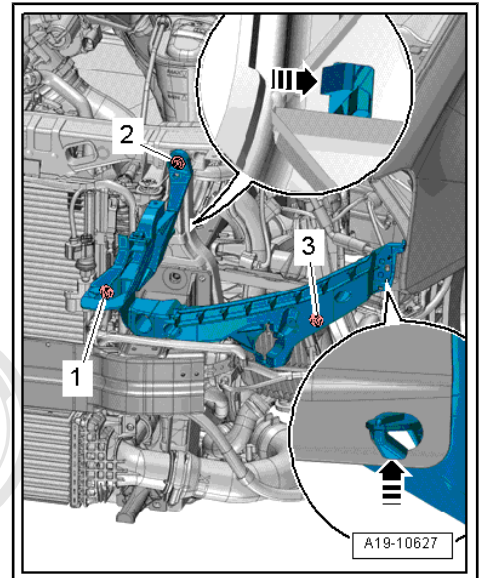
- Remove headlight (right-side) ⇒ Electrical system; Rep. gr. 94 ; Headlights; Removing and installing headlights .
- If fitted, remove headlight washer jet (right-side) ⇒ Electrical system; Rep. gr. 92 ; Headlight washer system; Removing and installing washer jets .



- Unplug electrical connector -1- at front airbag crash sensor for front passenger side - G284- → General body repairs, interior; Rep. gr. 69 ; Crash sensors for airbags; Overview of fitting locations - crash sensors for airbags .

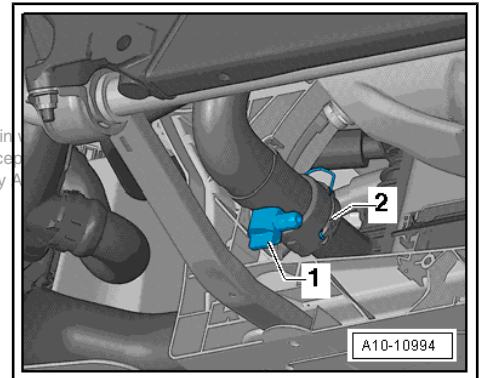



- Remove bolts -1- and -2-.
- Unclip mounting for headlight (right-side) -arrows- and remove.



All vehicles

- 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).

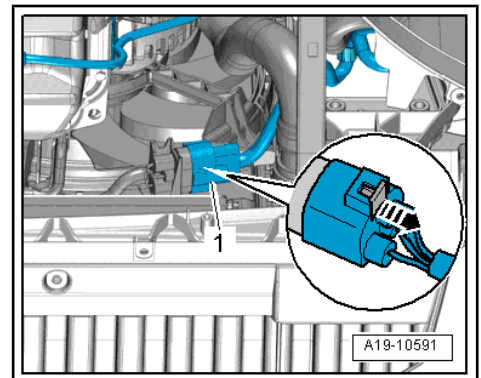


 **WARNING**

Risk of injury as the radiator fan(s) may start up automatically.

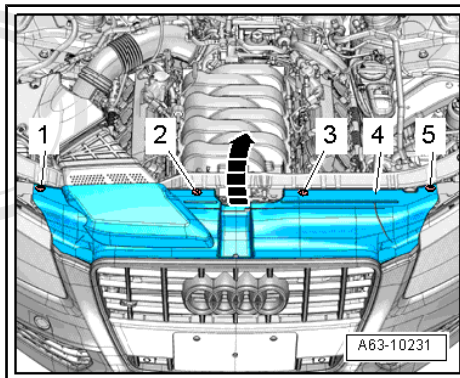
◆ *Unplug electrical connectors before starting to work in the area of radiator cowl.*

- Take electrical connector -1- for radiator fan out of bracket and unplug connector (push retainer to the rear -arrow- and press down release catch).

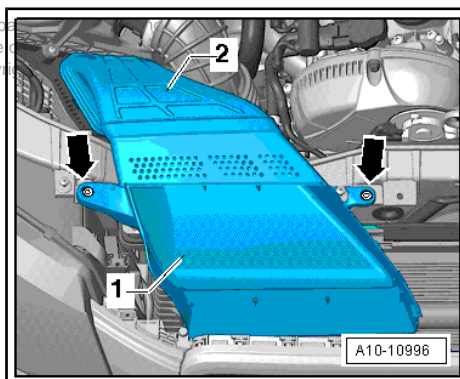




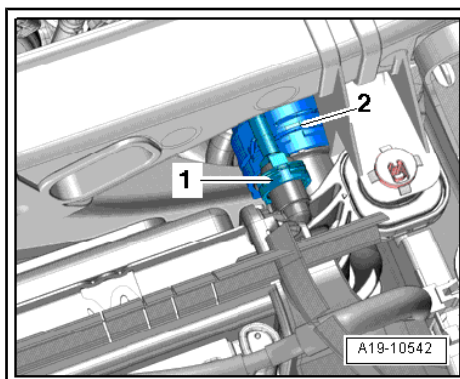
- Remove bolts -1, 2, 3, 5-
- Lift cover -4- above lock carrier and detach from radiator grille -arrow-.



- Remove bolts -arrows-



- Detach connections -1- and -2- from radiator (lift retaining clip).
- Remove air duct -1- and intermediate flange -2-.



Vehicles with dual clutch gearbox/multitronic gearbox:

- Position used oil collection and extraction unit - V.A.G 1782- below connection point.



Note

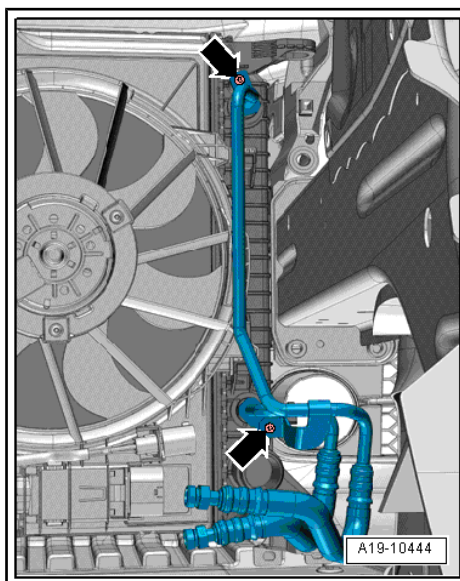
Observe rules for cleanliness when working on gearbox => Rep. gr. 00 ; Repair instructions; Rules for cleanliness .

- Unscrew bolts -arrows- and detach ATF lines from radiator.



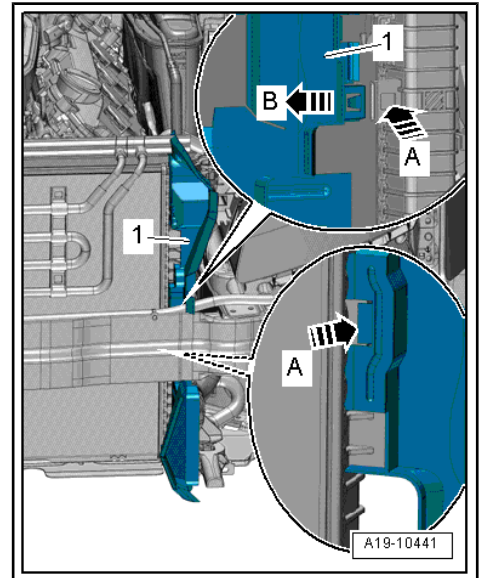
Note

- ◆ Tie ATF lines up onto longitudinal member to prevent fluid escaping.
- ◆ To prevent dirt from entering, seal off open pipes/lines and connections with a clean plug from engine bung set - VAS 6122- .

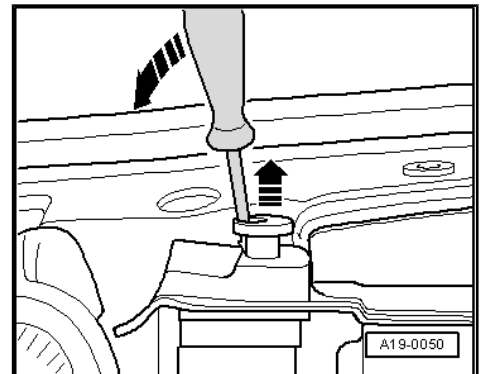


All vehicles

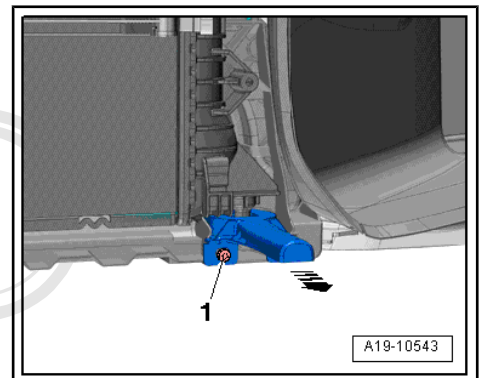
- Release catches -arrows A- and detach air duct -1- on left and right -arrow B-.



- Release retaining pins for radiator on both sides and pull out upwards -arrows-.



- Remove bolts -1- on both sides and detach radiator bracket with radiator from lock carrier -arrow-.
- Slightly lower radiator.



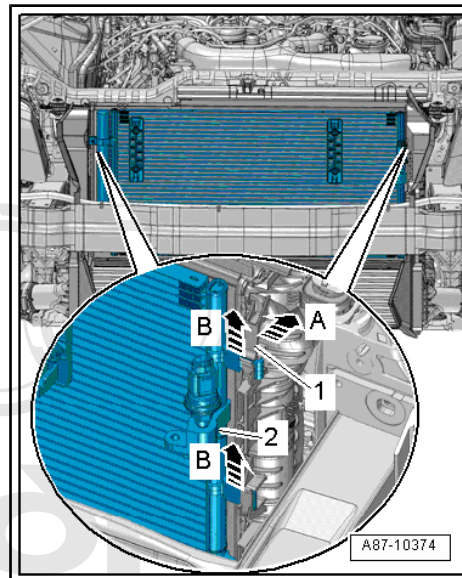
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Vehicles with refrigerant lines (version 1):**Caution**

Risk of damage to condenser, refrigerant lines and refrigerant hoses.

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

- Have a second mechanic release retaining clips -1- in direction of -arrow A- and lift condenser -2- out of mountings on radiator -arrows B-.
- Pivot condenser forwards with pipes/hoses attached.

**Continued for all vehicles:**

- 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

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

- On vehicles with multitronic gearbox: secure ATF lines => Rep. gr. 37 ; ATF circuit; Exploded view - ATF circuit .
- Install charge air cooler => [page 296](#) .
- Install impact bar => General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing impact bar .
- Connect coolant hose with plug-in connector to coolant pipe => [page 271](#) .

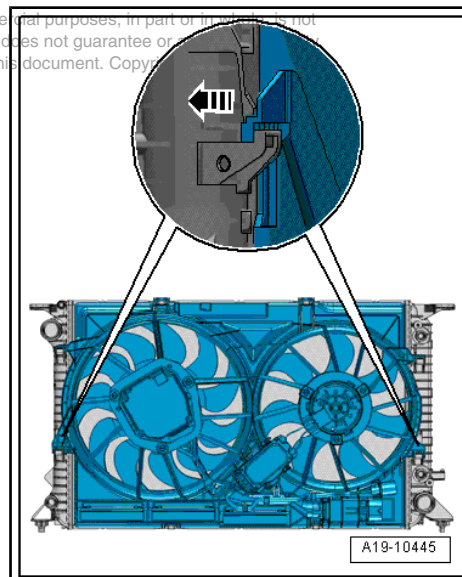
**Note**

Do not reuse coolant.

- Fill up with coolant => [page 247](#) .
- On vehicles with multitronic gearbox: check ATF level => Rep. gr. 37 ; ATF; Checking ATF level .

Tightening torques

- ◆ => ["4.1 Exploded view - radiator/radiator fans", page 270](#)
- ◆ Air duct
=> ["3.1 Exploded view - air cleaner housing", page 317](#)



4.3 Removing and installing radiator fan - V7-

⇒ [“4.3.1 Removing and installing radiator fan V7”](#), page 277

⇒ [“4.3.2 Removing and installing radiator fan control unit J293”](#), page 277

4.3.1 Removing and installing radiator fan - V7-

Removing

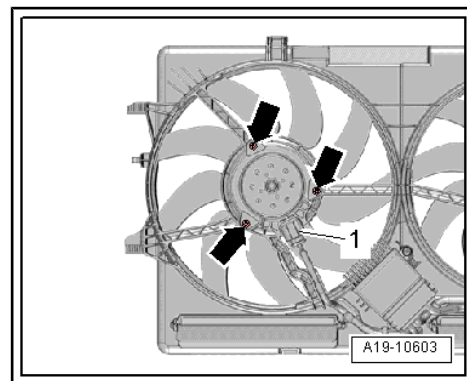


Fit all cable ties in the original positions when installing.

- Remove radiator cowl ⇒ [page 271](#) .

Radiator fan - V7-

- Unplug electrical connector -1-.
- Unscrew bolts -arrows- and remove radiator fan - V7- .



Radiator fan 2 - V177-



Radiator fan 2 - V177- not fitted if fan runs with 400 W.

- Unplug electrical connector -1-.
- Unscrew bolts -arrows- and remove radiator fan 2 - V177- .

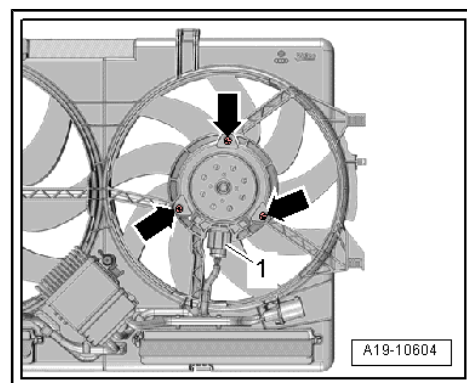
Installing

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

- Install radiator cowl ⇒ [page 271](#) .

Tightening torques

- ◆ ⇒ [“4.1 Exploded view - radiator/radiator fans”](#), page 270



4.3.2 Removing and installing radiator fan control unit - J293-

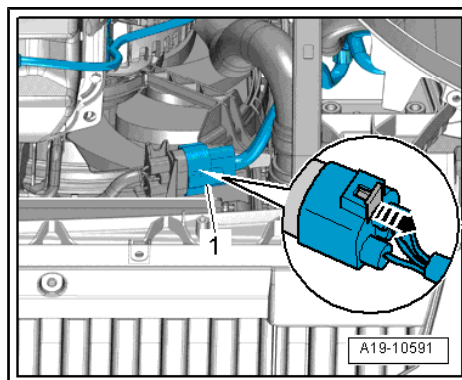
Removing



Fit all cable ties in the original positions when installing.



- Remove noise insulation => General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
- Take electrical connector -1- for radiator fan out of bracket and unplug connector (push retainer to the rear -arrow- and press down release catch).
- Move clear electrical wiring harness going to radiator fan control unit.



- Unplug electrical connectors -2- and -3-.
- Unscrew bolt -arrow- and remove radiator fan control unit -1-.

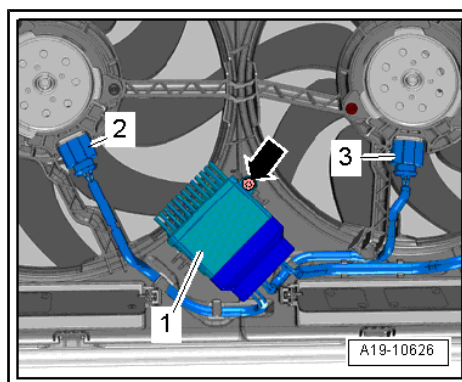
Installing

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

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

Tightening torques

- ◆ => ["4.1 Exploded view - radiator/radiator fans", page 270](#)



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21 – Turbocharging/supercharging

1 Turbocharger

- ⇒ [“1.1 Exploded view - turbocharger”, page 279](#)
- ⇒ [“1.2 Removing and installing turbocharger”, page 284](#)
- ⇒ [“1.3 Checking vacuum unit for turbocharger”, page 288](#)
- ⇒ [“1.4 Renewing vacuum unit for turbocharger”, page 290](#)
- ⇒ [“1.5 Adjusting vacuum unit for turbocharger”, page 291](#)

1.1 Exploded view - turbocharger

Part I

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Part II ⇒ [page 280](#)

Part III ⇒ [page 281](#)

Part IV - only for 1.8 ltr. engine ⇒ [page 283](#)

1 - Turbocharger

- Can only be renewed together with exhaust manifold and vacuum unit as one unit
- Removing and installing ⇒ [page 284](#)

2 - Hose

3 - Vacuum unit for turbocharger

- Can only be renewed together with turbocharger

4 - Hose clip

5 - Hose

6 - Hose

7 - Bolt

- 3 Nm

8 - Charge pressure control solenoid valve - N75-

9 - Hose

10 - Turbocharger air recirculation valve - N249-

- Note installation position ⇒ [page 280](#)

11 - Bolt

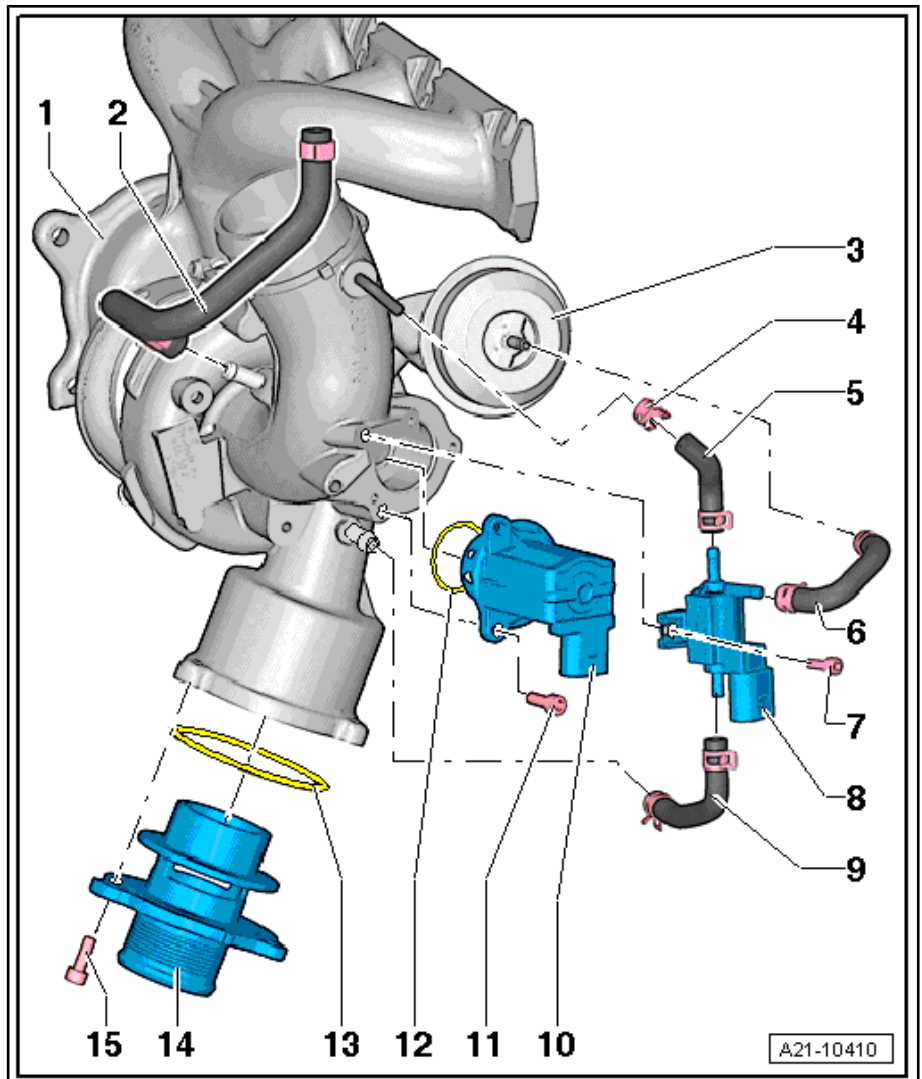
- 7 Nm

12 - O-ring

- Renew

13 - O-ring

- Renew





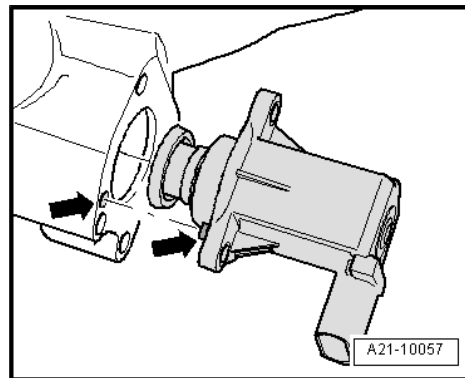
14 - Connection

15 - Bolt

- 9 Nm

Fitting location of turbocharger air recirculation valve - N249-

- Note installation position -arrows-



Part II

Part I ⇒ [page 279](#)

Part III ⇒ [page 281](#)

Part IV - only for 1.8 ltr. engine ⇒ [page 283](#)

1 - Turbocharger

- Can only be renewed together with exhaust manifold and vacuum unit as one unit
- Removing and installing ⇒ [page 284](#)

2 - Bolt

- 9 Nm

3 - Crankcase breather hose

4 - Gasket

- Renew

5 - Seal

- Renew

6 - Bolt

- 30 Nm

7 - Oil supply line

8 - Bolt

- 9 Nm

9 - Bolt

- 9 Nm

10 - O-ring

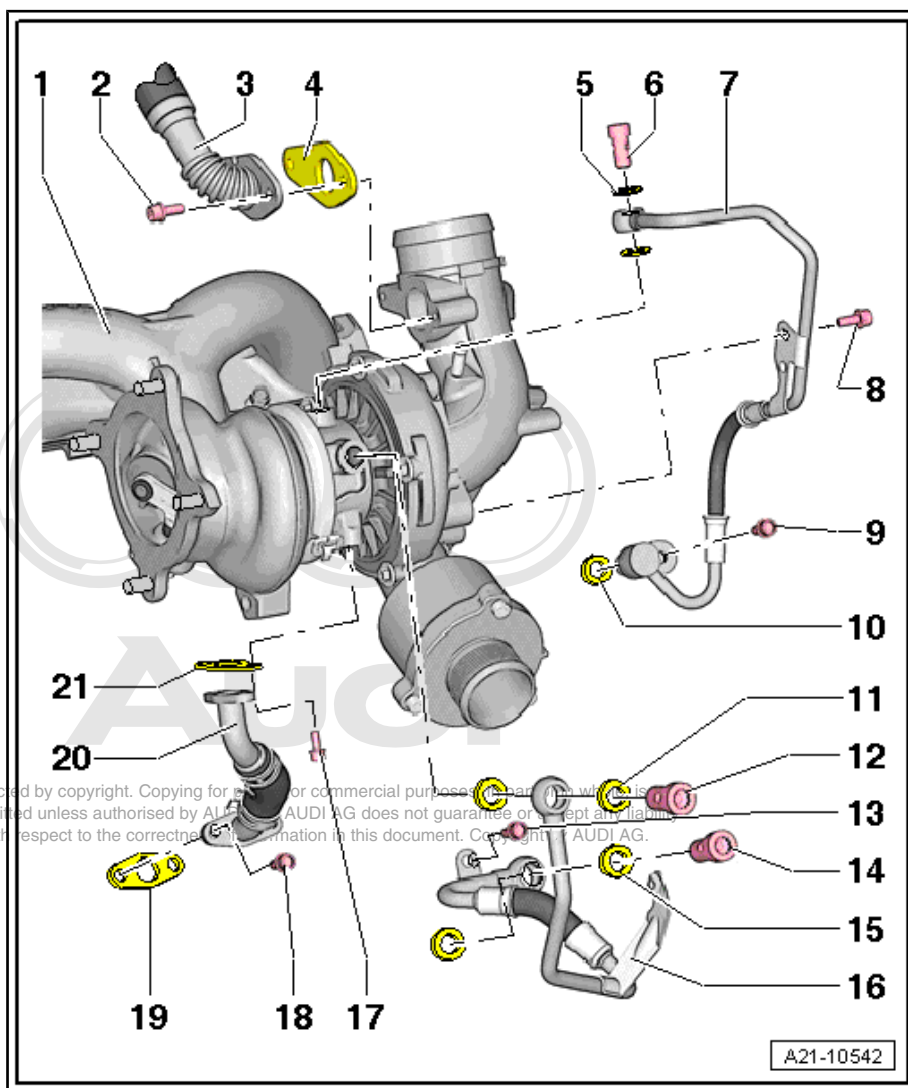
- Renew

11 - Seal

- Renew

12 - Bolt

- 35 Nm



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13 - Bolt

- 9 Nm

14 - Bolt

- 35 Nm

15 - Seal

- Renew

16 - Coolant supply line

17 - Bolt

- 9 Nm

18 - Bolt

- 9 Nm

19 - Gasket

- Renew

20 - Oil return line

21 - Gasket

- Renew

Part III

Part I ⇒ [page 279](#)

Part II ⇒ [page 280](#)

Part IV - only for 1.8 ltr. engine ⇒ [page 283](#)



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1 - Gasket

- Renew

2 - Nut

- Renew
- Tightening sequence => [page 283](#)
- Lubricate exhaust manifold studs with high-temperature paste. For high-temperature paste refer to => Electronic parts catalogue

3 - Bolt

- 35 Nm

4 - Seal

- Renew

5 - Coolant return line

6 - Bolt

- 9 Nm

7 - Turbocharger

- Can only be renewed together with exhaust manifold and manifold and vacuum unit as one unit
- Removing and installing => [page 284](#)

8 - Bolt

- 30 Nm

9 - Bracket

10 - Support

11 - Bolt

- 30 Nm

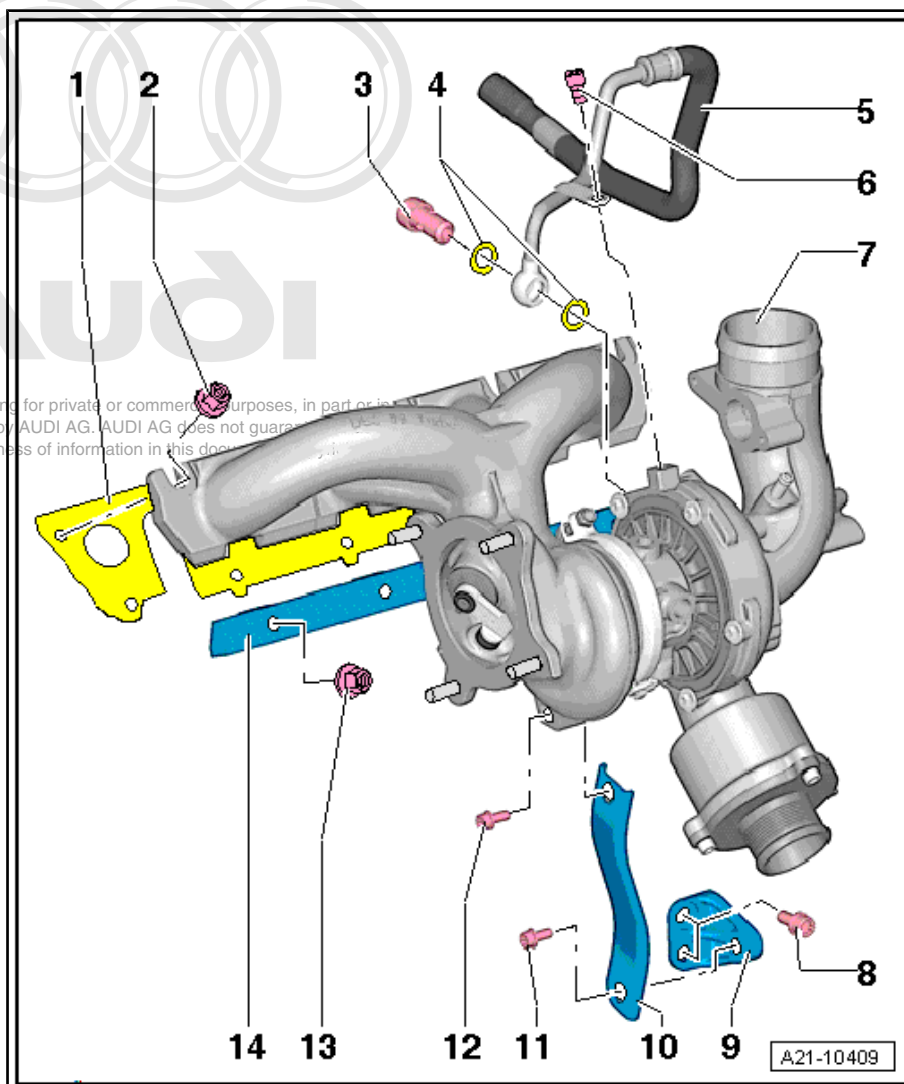
12 - Bolt

- 30 Nm
- Coat with high-temperature paste; for high-temperature paste refer to => Electronic parts catalogue

13 - Nut

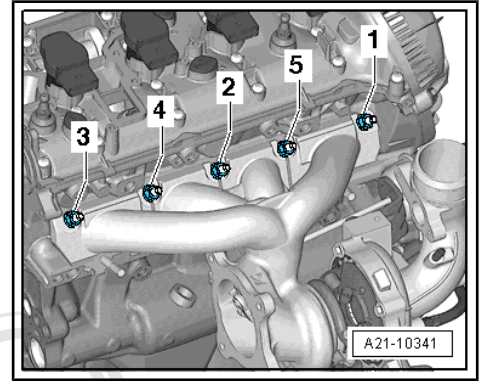
- Do not open when removing turbocharger
- Renew
- 30 Nm
- Lubricate exhaust manifold studs with high-temperature paste. For high-temperature paste refer to => Electronic parts catalogue

14 - Fastening strip



Turbocharger - tightening sequence

- Tighten nuts -1 to 5- in four stages as follows:
- 1. Tighten nuts to 5 Nm.
- 2. Tighten nuts to 12 Nm.
- 3. Tighten nuts to 16 Nm.
- 4. Tighten nuts to 25 Nm.



Part IV - only for 1.8 ltr. engine

Part I ⇒ [page 279](#)

Part II ⇒ [page 280](#)

Part III ⇒ [page 281](#)

1 - Turbocharger

- Can only be renewed together with exhaust manifold and vacuum unit as one unit
- Removing and installing ⇒ [page 284](#)

2 - Vacuum unit for turbocharger

- Checking ⇒ [page 288](#)
- Removing and installing ⇒ [page 290](#)
- Adjusting ⇒ [page 291](#)

3 - Bolt

- 10 Nm

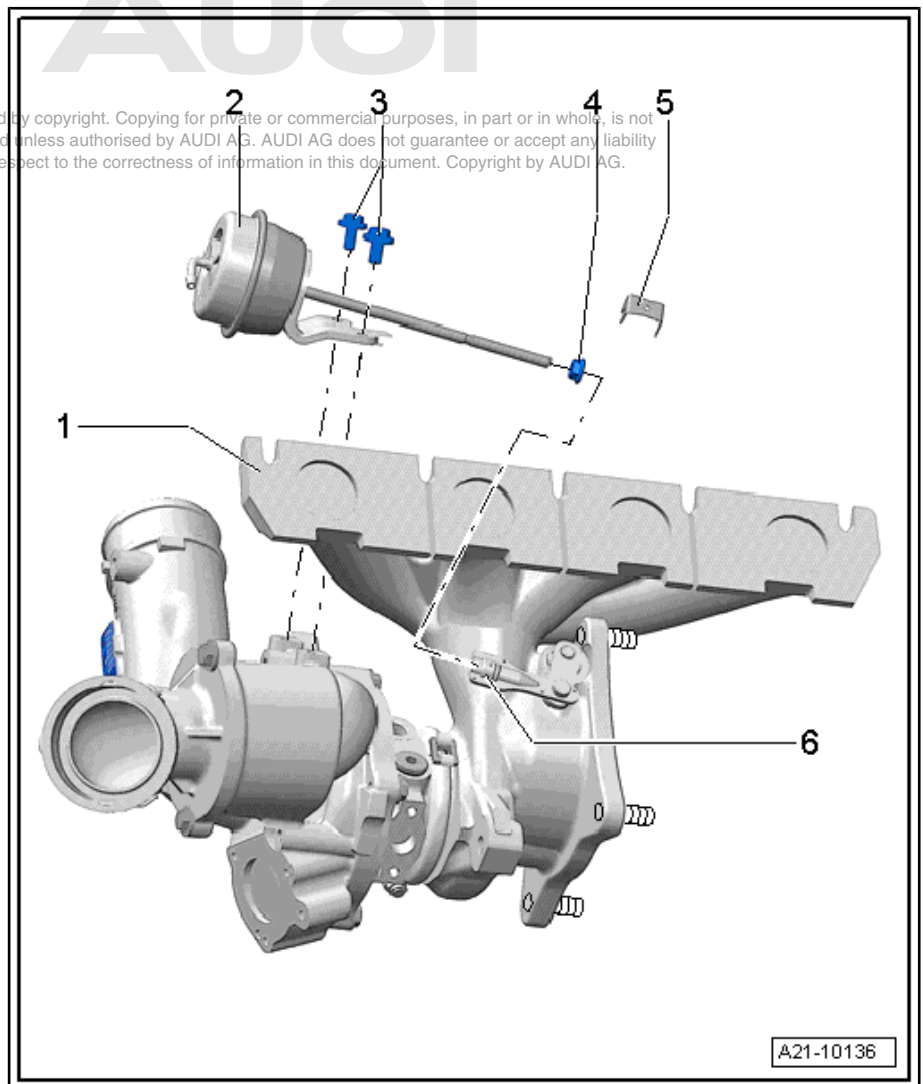
4 - Nut

- 9 Nm
- Secure with sealant paint; for sealant paint refer to ⇒ Electronic parts catalogue

5 - Retaining clip

- Renew

6 - Knurled nut



Further tightening torques

Component	Nm
Air pipe (right-side) to sump	10

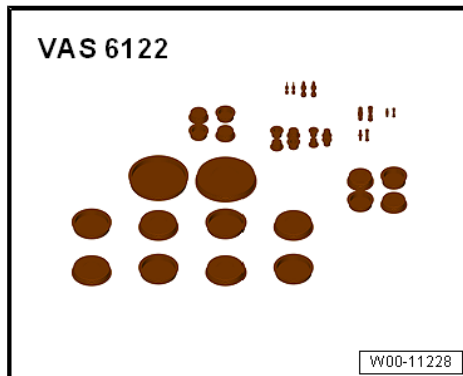


Component	Nm
Air pipe to bracket	10

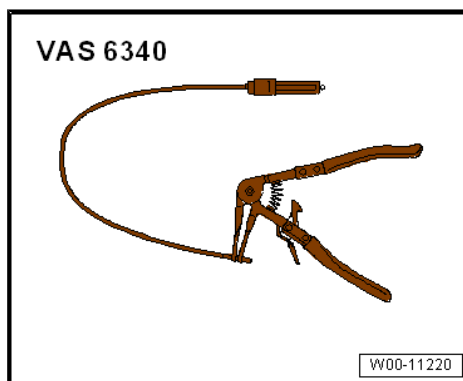
1.2 Removing and installing turbocharger

Special tools and workshop equipment required

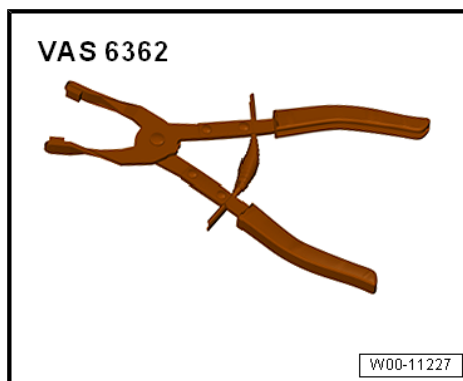
- ◆ Engine bung set - VAS 6122-



- ◆ Hose clip pliers - VAS 6340-



- ◆ Hose clip pliers - VAS 6362-



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Removing



Note

- ◆ *Observe rules for cleanliness ⇒ page 5 .*
- ◆ *All open inlet and exhaust ports must be sealed with suitable plugs (e.g. from engine bung set - VAS 6122-).*



Caution

If the turbocharger has suffered mechanical damage (e.g. damaged compressor wheel), it is not sufficient merely to fit a new turbocharger. The following work must be performed in order to avoid further damage:

- ◆ *Check air cleaner housing, air filter element and air hoses for dirt and foreign particles.*
- ◆ *Check the entire charge air system (including the charge air cooler) for foreign matter.*
- ◆ *If foreign matter is found in the charge air system, clean all relevant ducts and hoses and renew charge air cooler if necessary.*

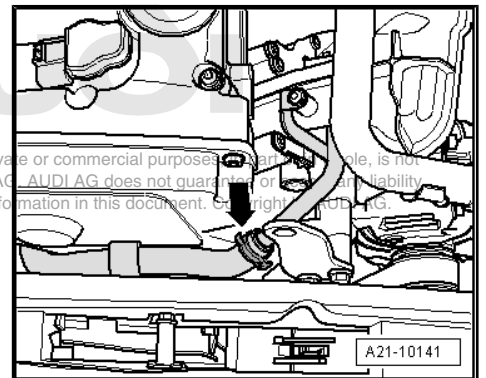
- Remove engine cover panel ➔ [page 37](#) .
- Remove air cleaner housing ➔ [page 318](#) .
- Drain coolant ➔ [page 247](#) .
- Disconnect coolant hose -arrow-.



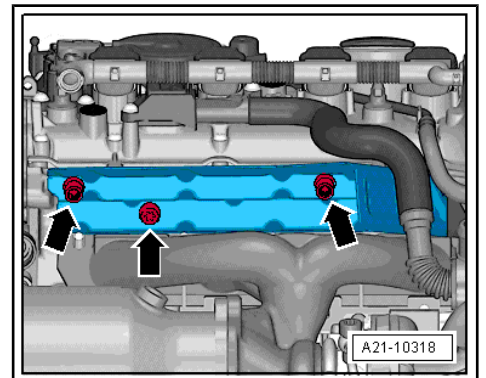
Note

The installation position is shown in the following illustrations with the engine removed.

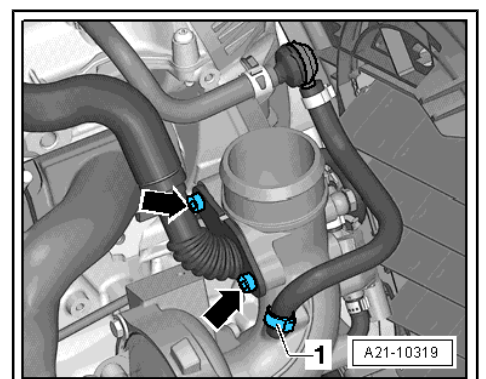
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- Remove heat shield -arrows-.

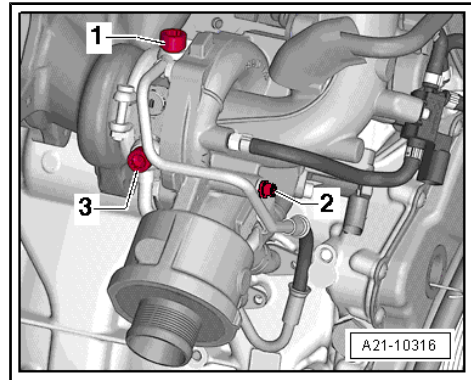


- Remove bolts -arrows- and detach crankcase breather system from turbocharger.
- Disconnect hose -1- from turbocharger.

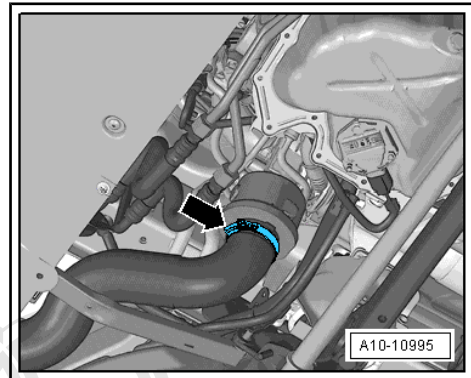




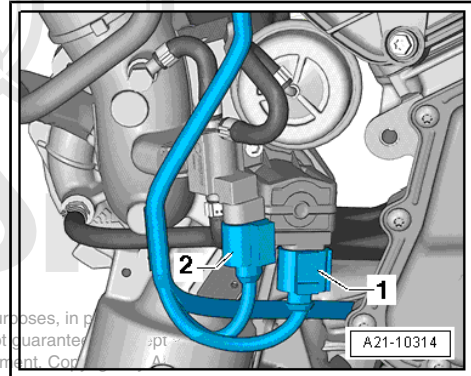
- Unscrew bolts -1 and 2- and move oil supply line clear to one side.
- Unscrew bolt -3- and move coolant pipe clear to one side.



- Open hose clip -arrow-, detach air hose and swivel to side.

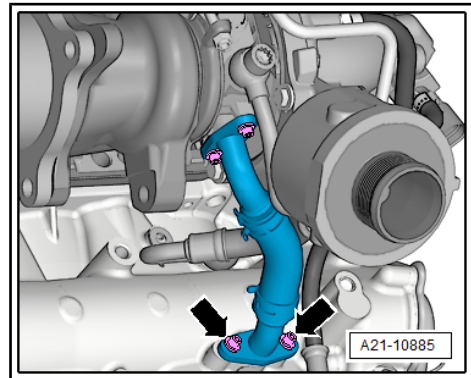


- Unplug electrical connectors -1 and 2- and move wiring clear.



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- Remove bolts -arrows- at oil return line.



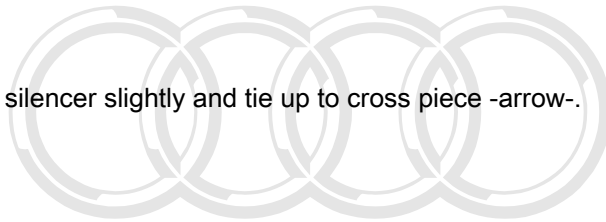


Caution

Risk of damage to flexible joints in front silencer.

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

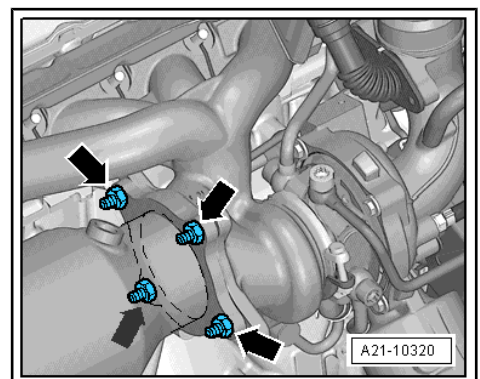
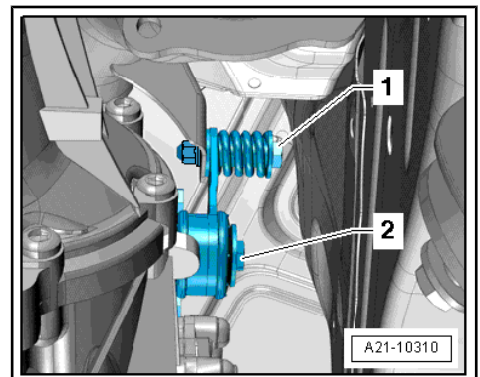
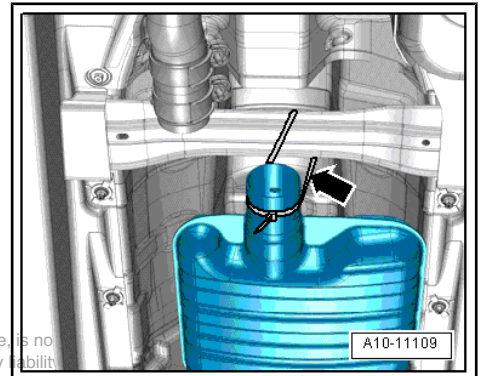
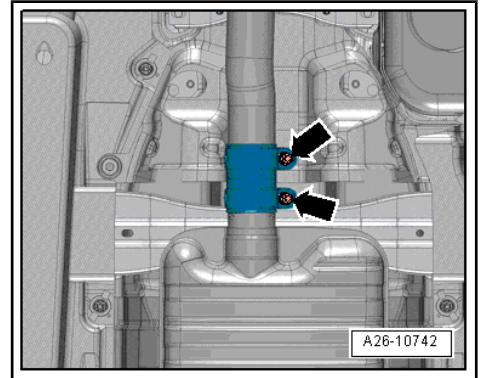
- Loosen bolted connections -arrows- and push clamp towards rear.
- Lower front silencer slightly and tie up to cross piece -arrow-.



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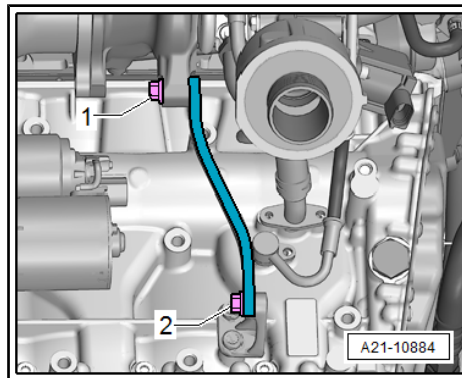
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- Unfasten connection -1-, remove bolt -2- and take out mounting for catalytic converter.
- Unscrew nuts -arrows- and press catalytic converter towards rear.





- Slacken bolts -1- from top.
- Remove bolt -2- from underneath.



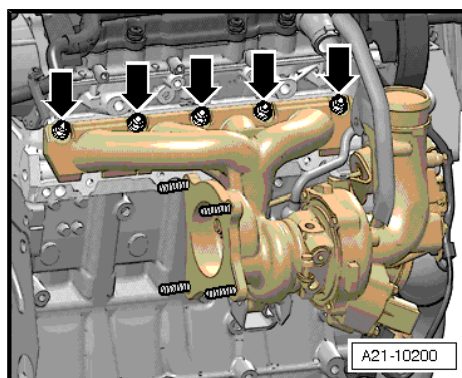
- Remove nuts -arrows-.
- Lift out turbocharger with exhaust manifold.

Installing

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

Note

- ◆ *Renew seals, gaskets, O-rings and self-locking nuts.*
- ◆ *Fill turbocharger with engine oil at connection for oil supply line.*
- ◆ *Hose connections and charge air system hoses must be free of oil and grease prior to fitting.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*



- Install catalytic converter ⇒ [page 384](#) .
- Align the exhaust system so it is free of stress ⇒ [page 378](#) .

Note

Do not reuse coolant.

- Fill up with coolant ⇒ [page 249](#) .
- Check oil level: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .

Note

After installing turbocharger, allow engine to idle for approx. 1 minute and do not rev up immediately to ensure turbocharger is supplied with oil.

Tightening torques

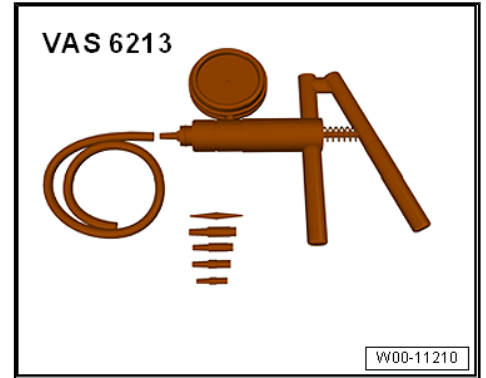
- ◆ ⇒ [“1.1 Exploded view - turbocharger” page 279](#)

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1.3 Checking vacuum unit for turbocharger

Special tools and workshop equipment required

◆ Hand vacuum pump - VAS 6213-

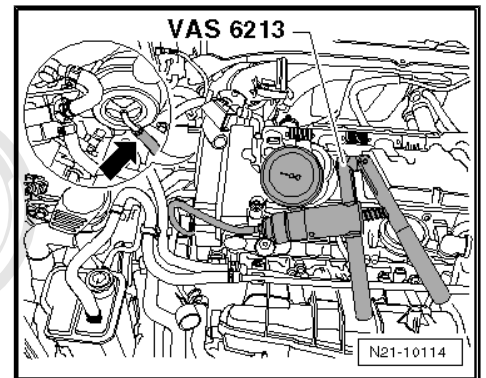


Test condition:


- ◆ Hose from turbocharger via charge pressure control solenoid valve - N75- to vacuum unit must not be blocked.
- ◆ Charge pressure control solenoid valve - N75- OK.

Procedure:

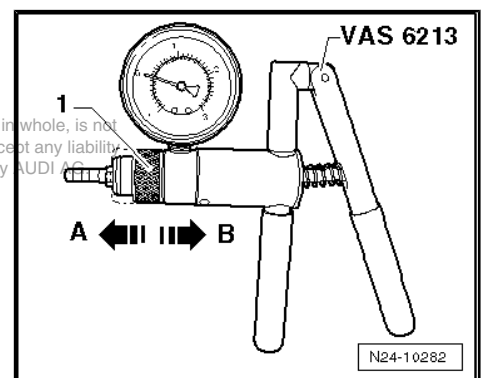
- Remove engine cover panel ⇒ [page 37](#) .
- Connect hand vacuum pump - VAS 6213- to vacuum unit -arrow-.



- Move adjuster ring -1- on hand vacuum pump - VAS 6213- to position -B- to select "pressure".

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The pressure must not exceed 750 mbar. The vacuum unit could be damaged if the pressure is exceeded.



- Operate hand vacuum pump - VAS 6213- several times and at the same time observe linkage.



The linkage -A- should start to move at a pressure of approx. 300 mbar and be at its limit stop at a pressure of approx. 700 mbar.

The linkage should travel approx. 10 mm.

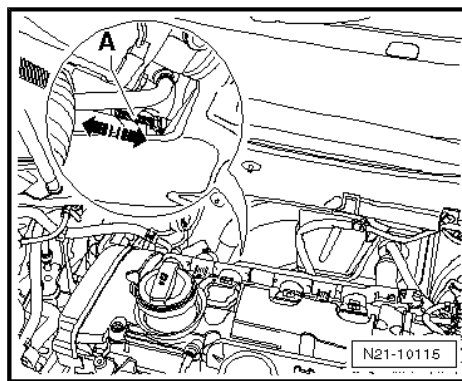


Note

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 - VAS 6213- and connecting hoses for leaks.

If no faults are detected on hand vacuum pump - VAS 6213- and connecting hoses:

- ◆ On 1.8 ltr. engines: renew vacuum unit ⇒ [page 290](#) .
- ◆ On 2.0 ltr. engines: renew turbocharger ⇒ [page 284](#) .



1.4 Renewing vacuum unit for turbocharger

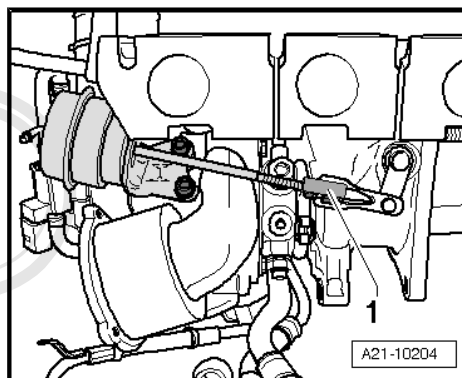


Note

This procedure only applies to the 1.8 ltr. engine.

Removing

- Remove turbocharger ⇒ [page 284](#) .
- Detach locking plate -1- on turbocharger linkage.



- Loosen lock nut -2-.
- Detach linkage from turbocharger -3-.
- Remove bolts -4- and take out vacuum unit -1-.

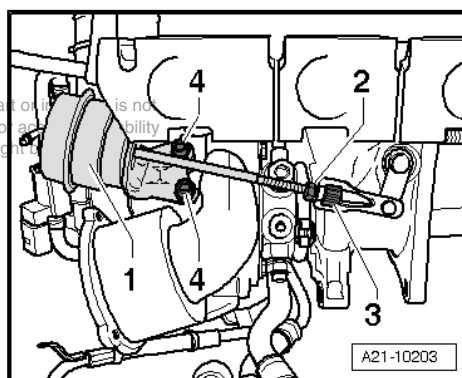
Installing

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

- Adjust vacuum unit for turbocharger ⇒ [page 291](#) .
- Install turbocharger ⇒ [page 284](#) .

Tightening torques

- ◆ ⇒ "1.1 Exploded view - turbocharger", [page 279](#)



1.5 Adjusting vacuum unit for turbocharger

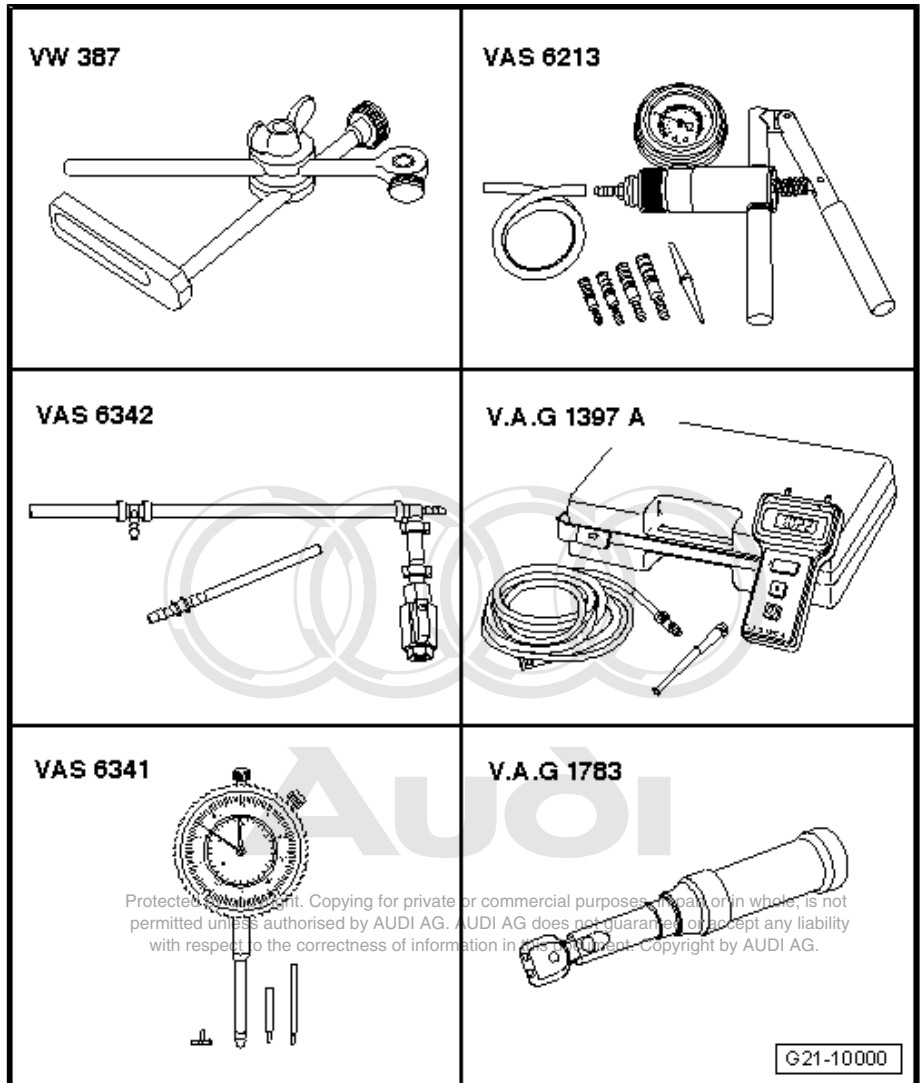


Note

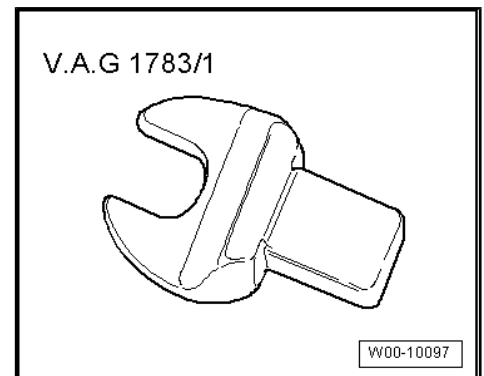
This procedure only applies to the 1.8 ltr. engine.

Special tools and workshop equipment required

- ◆ Universal dial gauge bracket - VW 387-
- ◆ Hand vacuum pump - VAS 6213-
- ◆ Pressure control valve - VAS 6342-
- ◆ Turbocharger tester - V.A.G 1397A-
- ◆ Dial gauge set, 4-part - VAS 6341-
- ◆ Torque wrench - V.A.G 1783-



- ◆ Open-end spanner insert AF 10 - V.A.G 1783/1-





Adjusting

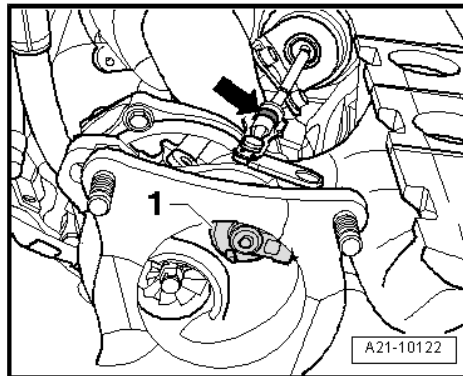
- Turbocharger removed



Note

It is only necessary to adjust the vacuum unit if the vacuum unit has been removed.

- Pre-adjust bypass flap -1- via nut -arrow- so that bypass flap can still just be turned by hand.



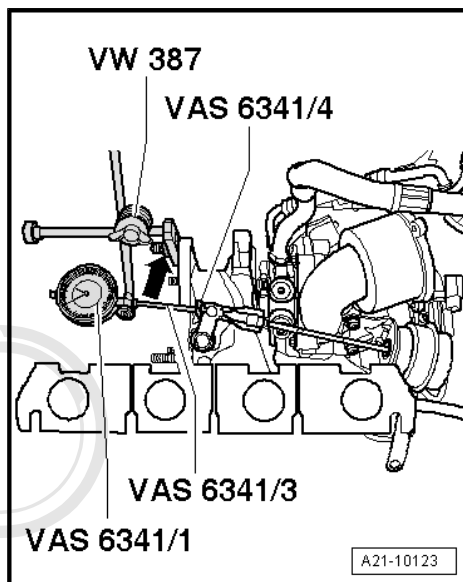
- Secure universal dial gauge bracket - VW 387- to turbocharger -arrow-.



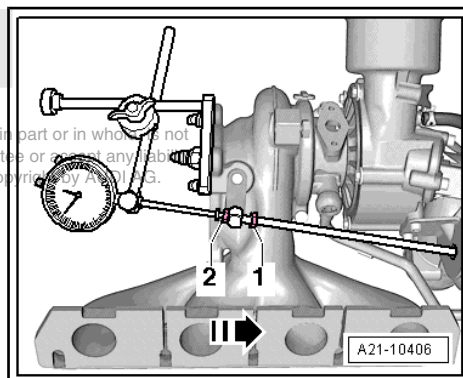
Note

- ◆ *The dial gauge values (mm) listed here include the 1 mm preload that is initially set on the gauge.*
- ◆ *Dial gauge - VAS 6341/1- with dial gauge extension, 30 mm - VAS 6341/3- must align with linkage of vacuum unit.*

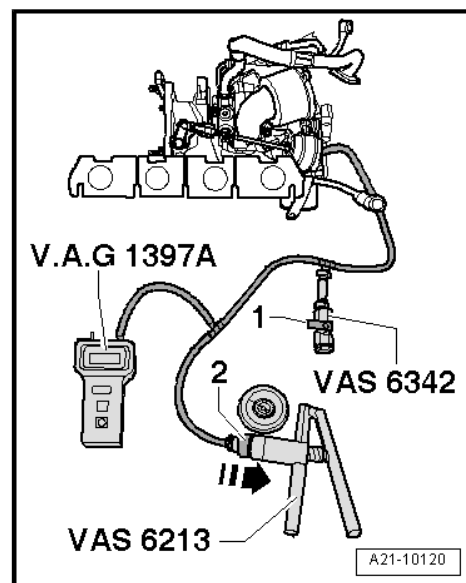
- Attach dial gauge - VAS 6341/1- with extension, 30 mm - VAS 6341/3- and flat probe - VAS 6341/4- to universal dial gauge bracket - VW 387- .
- Set dial gauge - VAS 6341/1- to 1 mm preload.
- Set scale of dial gauge - VAS 6341/1- to 0.
- Make sure that dial gauge can move freely.



- Turn nut -1- approx. 7 turns in direction of -arrow-.
- Turn nut -2- in direction of -arrow- until dial gauge displays 7 mm.
- Hand-tighten nut -1-.
- Set dial gauge - VAS 6341/1- to 1 mm preload.
- Set scale of dial gauge - VAS 6341/1- to 0.



- Connect up hand vacuum pump - VAS 6213- , turbocharger tester - V.A.G 1397A- (connection II) and pressure control valve - VAS 6342- as shown in illustration.
- Switch on turbocharger tester - V.A.G 1397A- and set sliding switch to position II.
- Close pressure control valve - VAS 6342- at lever -1-.

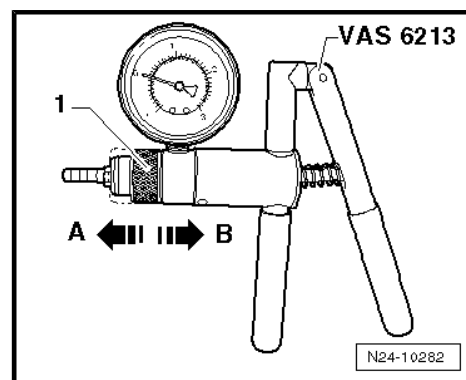


- Move adjuster ring -1- on hand vacuum pump - VAS 6213- to position -B- to select "pressure".

 **Note**

The following measurements must be performed in continuous sequence. Do not allow the pressure to drop to 0 between measurements.

- Operate hand vacuum pump - VAS 6213- until turbocharger tester - V.A.G 1397A- indicates 460 +/- 5 mbar.



 **Note**

If value exceeds 460 +/-5 mbar, repeat entire measurement.

- Read off and note value indicated on dial gauge - VAS 6341/1- .
- Operate hand vacuum pump - VAS 6213- until turbocharger tester - V.A.G 1397A- indicates 650 to 700 mbar.
- Vent system via pressure control valve - VAS 6342- so that pressure reading drops to 460 +/- 5 mbar.

 **Note**

If value does not reach 460 +/- 5 mbar, repeat entire measurement.

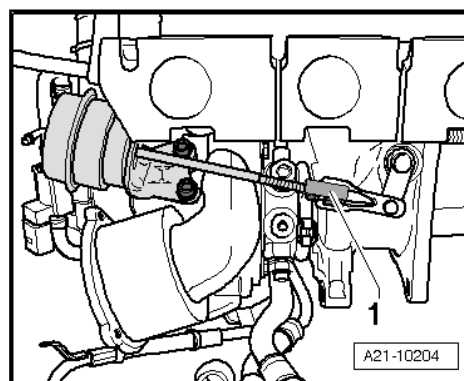
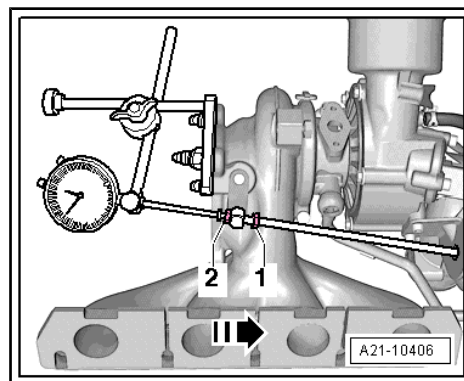
- Read off and note value indicated on dial gauge - VAS 6341/1- .
- Add values 1 and 2 together and divide by 2.
- The result (mean value) should be 5 +/- 0.5 mm.



- If value is higher, relieve pressure until it is 0 bar, loosen nut -1- and turn nut -2- half a turn in direction of arrow and hand-tighten nut -1-.
 - Set dial gauge - VAS 6341/1- to 1 mm preload.
 - Set scale of dial gauge - VAS 6341/1- to 0 and repeat measurement.
 - If result (mean value) is 5 +/- 0.5 mm, tighten lock nut and repeat measurement.
 - If result (mean value) is 5 +/- 0.5 mm, secure nuts with sealing paint. Sealing paint => Electronic parts catalogue .
- Secure new locking plate -1- on linkage of vacuum unit.

Tightening torques

- ◆ Vacuum unit for turbocharger => [page 283](#)



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2 Charge air system

⇒ [“2.1 Exploded view - charge air system”, page 295](#)

⇒ [“2.2 Removing and installing charge air cooler”, page 296](#)

⇒ [“2.3 Removing and installing charge pressure sender G31”, page 299](#)

⇒ [“2.4 Checking charge air system for leaks”, page 299](#)

2.1 Exploded view - charge air system

1 - Charge air cooler

- Removing and installing
⇒ [page 296](#)



If there are slight impressions on the fins, refer to [page 6](#).

2 - Hose clip

- Reinforced
- 5.5 Nm

3 - Air hose

- To turbocharger
- Must be free of oil or grease when installing

4 - Hose clip

- Reinforced
- 5.5 Nm

5 - Hose clip

- Reinforced
- 5.5 Nm

6 - Air hose

- To intake manifold
- Must be free of oil or grease when installing

7 - Hose clip

- Reinforced
- 5.5 Nm

8 - O-ring

- Renew

9 - Charge pressure sender - G31-

- Removing and installing ⇒ [page 299](#)

10 - Bolt

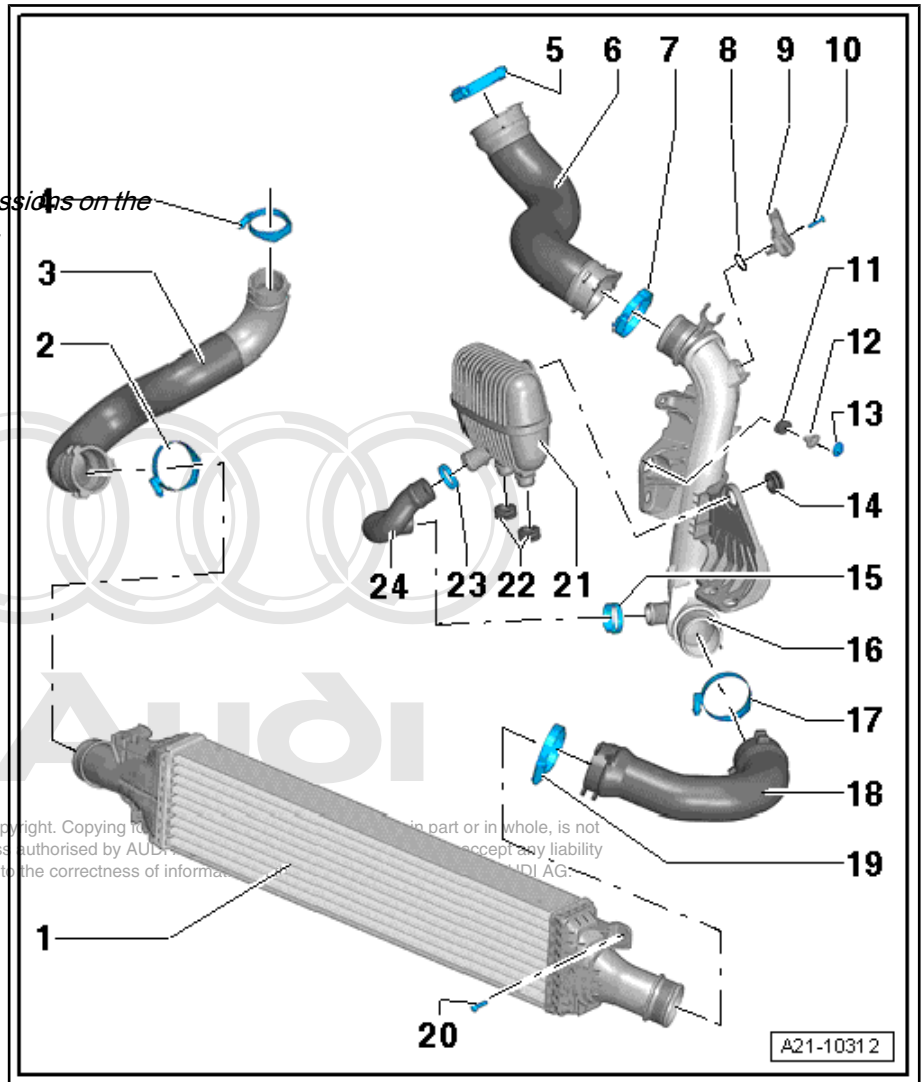
- 5 Nm

11 - Rubber grommet

12 - Bush

13 - Nut

- 9 Nm





14 - Rubber grommet

15 - Hose clip

- Reinforced
- 5.5 Nm

16 - Air pipe

17 - Hose clip

- Reinforced
- 5.5 Nm

18 - Air hose

- From charge air cooler
- Must be free of oil or grease when installing

19 - Hose clip

- Reinforced
- 5.5 Nm

20 - Bolt

- 7 Nm

21 - Resonator

22 - Rubber grommet

23 - Hose clip

- Reinforced
- 5.5 Nm

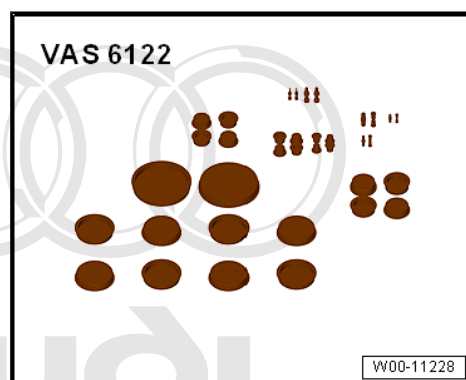
24 - Air hose

- To resonator
- Must be free of oil or grease when installing

2.2 Removing and installing charge air cooler

Special tools and workshop equipment required

- ◆ Engine bung set - VAS 6122-



Removing



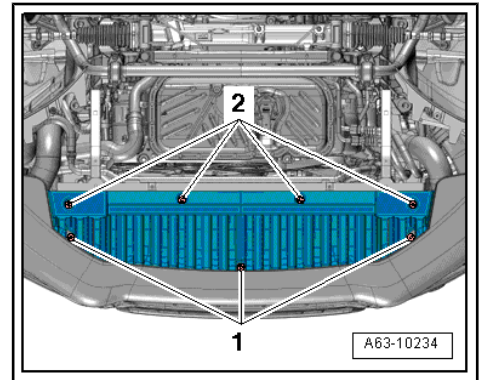
Note

Observe rules for cleanliness ⇒ [page 5](#).

- Remove lock carrier cover ⇒ General body repairs, exterior;
Rep. gr. 50 ; Lock carrier .

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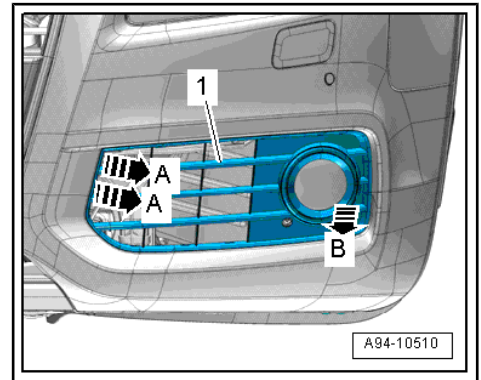
- Remove air cleaner housing ⇒ [page 318](#) .
- Loosen bolts -1- and -2- and detach noise insulation at front bumper cover towards rear.



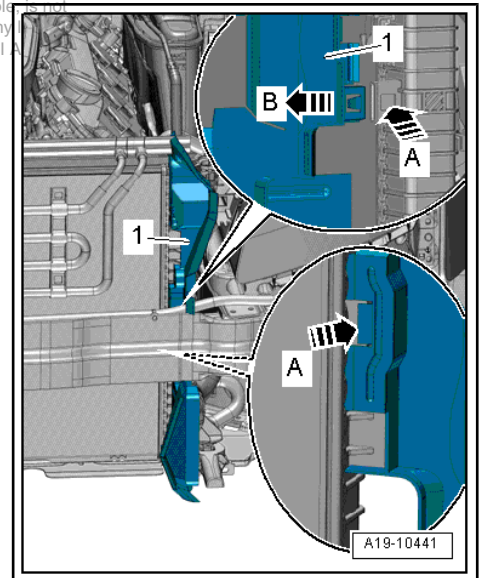
- Release retaining clips -arrows A- and detach air intake grille -1- on left and right from bottom section of bumper cover -arrow B-.

 **Note**

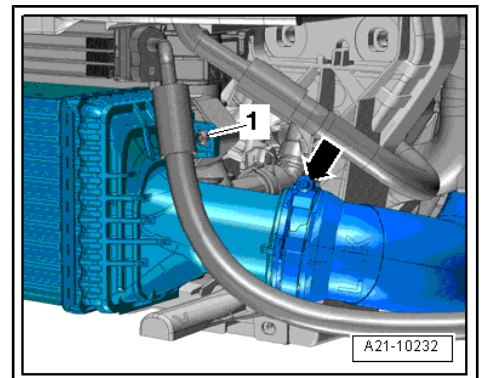
For illustration purposes, the installation position is shown in the following illustrations with the bumper removed.



- Release catches -arrows A- and swivel air duct -1- on left and right to centre of vehicle -arrow B-

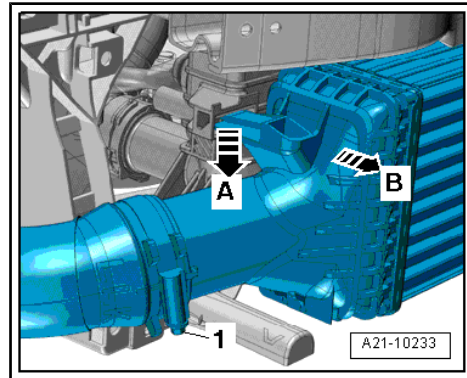


- Release hose clip -arrow- and detach air hose from charge air cooler.
- Remove bolt -1-.





- Release hose clip -1- and detach air hose from charge air cooler.
- Push catch down -arrow A- and move top of charge air cooler slightly in direction of -arrow B-.



- Lift charge air cooler off radiator -arrows A- and press in direction of -arrow B-.
- Pull left side of charge air cooler downwards -arrow C- and detach charge air cooler.

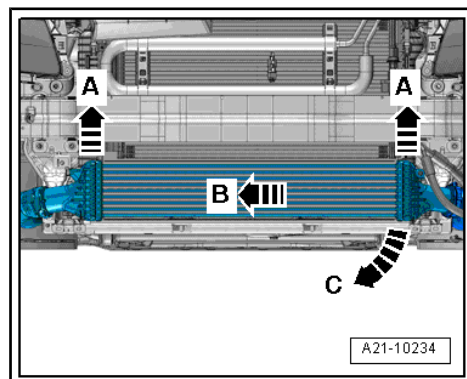
Installing

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



Note

If there are slight impressions on the fins, refer to [⇒ page 6](#) .



Note

- ◆ *Hose connections and hoses for charge air system must be free of oil and grease prior to fitting.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ [Electronic parts catalogue](#) .*
- ◆ *To ensure that the charge air hoses can be properly secured at their connections, spray rust remover onto the worm thread of used hose clips before installing.*

Tightening torques

- ◆ [⇒ “2.1 Exploded view - charge air system”, page 295](#)

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2.3 Removing and installing charge pressure sender - G31-

Removing

- Unplug electrical connector -1- from charge pressure sender - G31- .
- Remove bolts -arrows- and pull charge pressure sender - G31- out of air pipe.

Installing

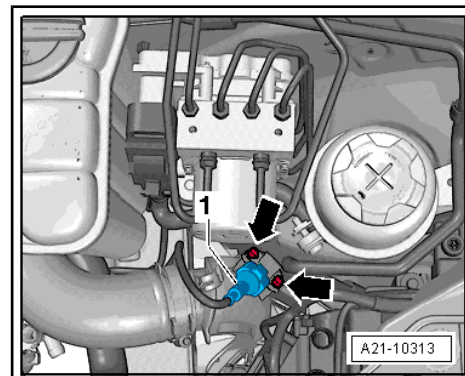
Installation is carried out in the reverse order; note the following:



Fit new O-ring.

Tightening torques

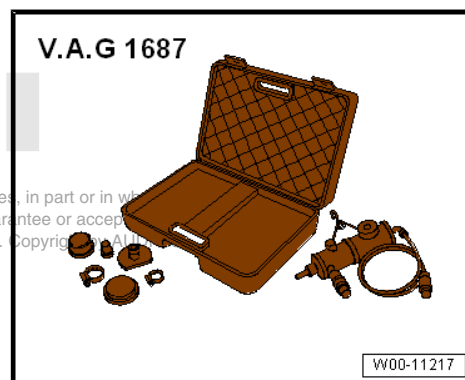
- ◆ ⇒ [“2.1 Exploded view - charge air system”, page 295](#)



2.4 Checking charge air system for leaks

Special tools and workshop equipment required

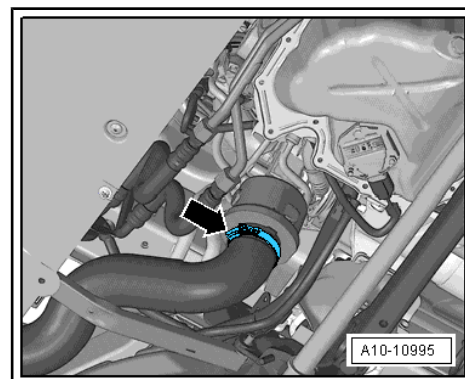
- ◆ Charge air system tester - V.A.G 1687-



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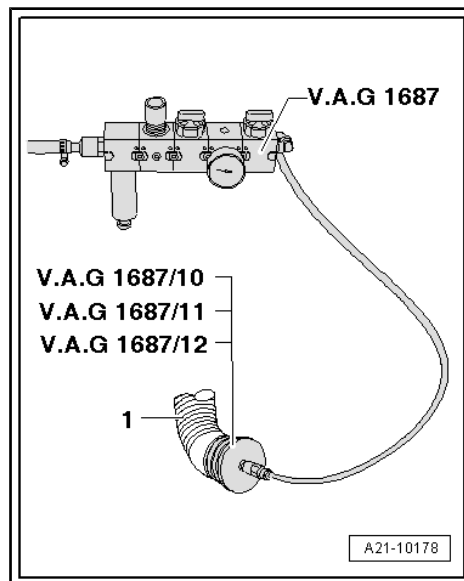
Procedure

- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
- Open hose clip -arrow-, detach air hose and swivel to side.





- Depending on hose diameter, insert adapter - 1687/10- , -1687/11- or -1687/12- into air hose -1- and secure with hose clip.
- Connect charge air system tester - V.A.G 1687- as shown on illustration.



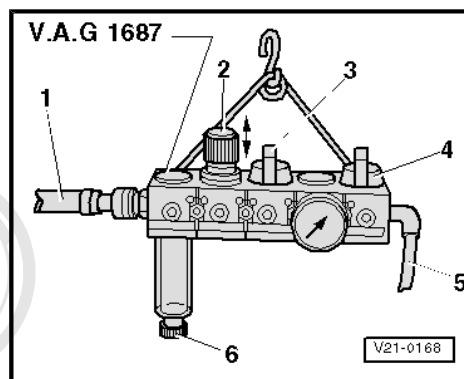
Prepare charge air system tester - V.A.G 1687- as follows:

- Unscrew pressure control valve -2- completely and close valves -3- and -4-.



Note

Make sure knob is pulled out before turning pressure control valve -2-.



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- Using a commercially available connection piece, connect charge air system tester - V.A.G 1687- to compressed air -1-.

 **Note**

If there is water in sight glass, remove drain plug -6- and drain water.

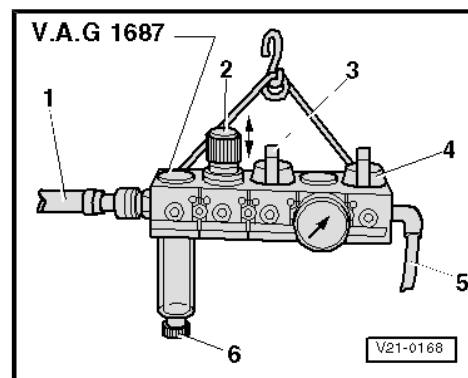
- Open valve -3-.



Caution

Risk of damage if pressure is set too high.

◆ *The pressure must not exceed 0.5 bar.*



- Adjust pressure to 0.5 bar via pressure control valve -2-.
- Open valve -4- and wait until test system is pressurised. If necessary, adjust pressure to 0.5 bar again.
- Check charge air system for audible leaks or leaks that can be felt with the hand; apply commercially available leak detecting spray or use ultrasonic tester - V.A.G 1842- .

 **Note**

- ◆ *A small amount of air escapes through the valves and enters the engine. Therefore it is not possible to perform a pressure retention test.*
- ◆ *Operation of ultrasonic tester - V.A.G 1842- ⇒ Operating instructions .*
- ◆ *Release pressure in test circuit by detaching coupling from adapter before removing adapter.*
- ◆ *Hose connections and air pipes/hoses must be free of oil and grease prior to fitting.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- ◆ *To secure the air hoses properly at their connections, spray rust remover onto the worm thread of the used hose clips before installing.*

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24 – Mixture preparation - injection

1 Injection system

⇒ [“1.1 Overview of fitting locations - injection system”, page 302](#)

1.1 Overview of fitting locations - injection system

Overview of fitting locations - engine compartment, vehicles with all engine codes except CFKA, CPMA, CPMB

1 - Air mass meter - G70-

- Exploded view
⇒ [page 317](#)

2 - Right electrohydraulic engine mounting solenoid valve - N145-

- Not fitted on all versions
- Fitting location
⇒ [page 305](#)

3 - Ignition coil 1 with output stage - N70-

- Exploded view
⇒ [page 387](#)

4 - Ignition coil 2 with output stage - N127-

5 - Ignition coil 3 with output stage - N291-

6 - Ignition coil 4 with output stage - N292-

7 - Gearbox neutral position sender - G701-

- For vehicles with manual gearbox (depending on equipment and version)
- Fitting location
⇒ [page 306](#)

8 - Coolant valve for gearbox - N488-

- For vehicles with manual gearbox with gearbox heating
- Fitting location
⇒ [page 306](#)

9 - Gear detector switch - F208- or gear detection sensor - G604-

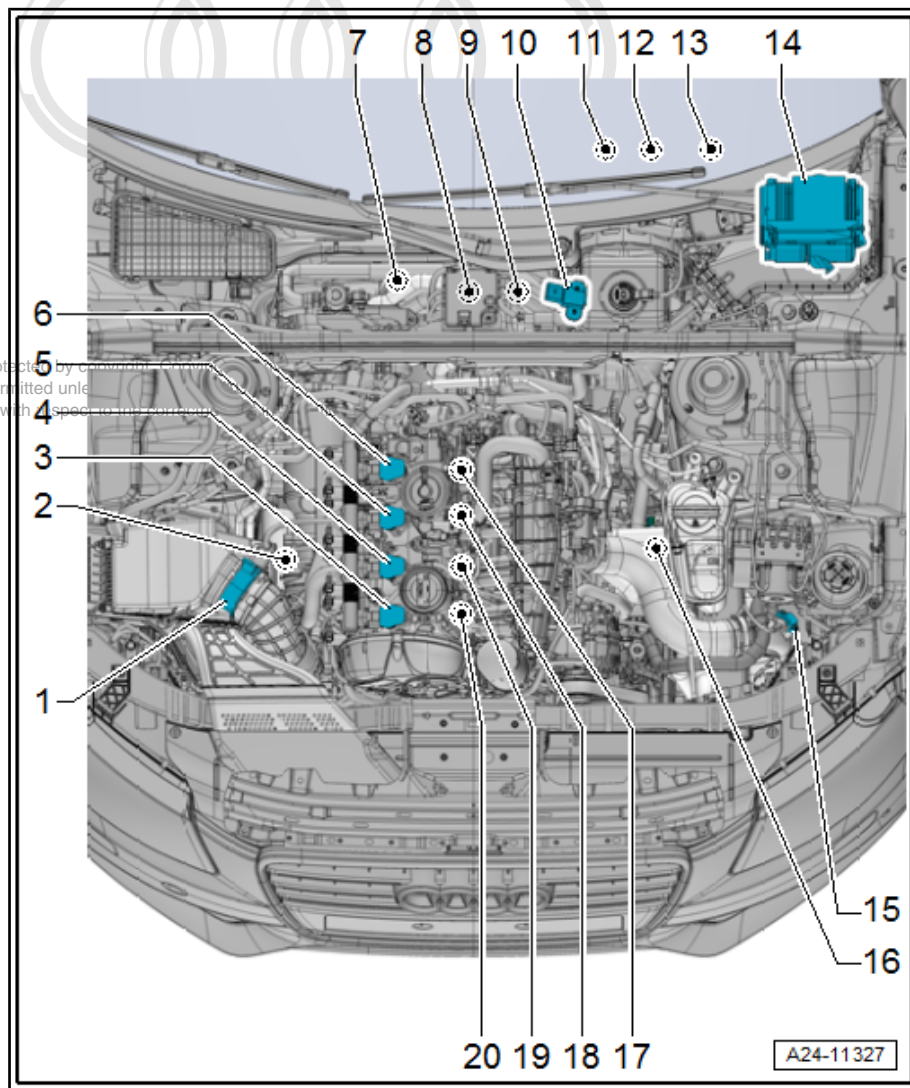
- For vehicles with manual gearbox (depending on equipment and version)
- Fitting location ⇒ [page 306](#)

10 - Brake servo pressure sensor - G294-

- Depending on equipment

11 - Accelerator position sender - G79- and accelerator position sender 2 - G185-

- Fitting location ⇒ [page 305](#)



- Exploded view ⇒ Fuel supply system; Rep. gr. 20 ; Accelerator mechanism; Exploded view - accelerator pedal module

12 - Brake light switch - F-

- Fitting location ⇒ [page 305](#)
- Removing and installing ⇒ Brake system; Rep. gr. 45 ; Sensors; Removing and installing brake light sensor

13 - Clutch position sender - G476-

- With clutch pedal switch - F36- / clutch pedal switch for engine start - F194-
- For vehicles with manual gearbox
- Fitting location ⇒ [page 305](#)

14 - Engine control unit - J623-

- Removing and installing ⇒ [page 363](#)
- Procedura de instalare este prezentată în scopuri informative, în parte sau în întregime, și nu este permisă decât cu autorizarea AUDI AG. AUDI AG nu garantează și nu acceptă nicio răspundere în acest document. Copyright by AUDI AG.

15 - Charge pressure sender - G31-

- Exploded view ⇒ [page 295](#)

16 - Left electrohydraulic engine mounting solenoid valve - N144-

- Not fitted on all versions
- Fitting location ⇒ [page 305](#)

17 - Injector, cylinder 4 - N33-

- Exploded view ⇒ [page 337](#)

18 - Injector, cylinder 3 - N32-

19 - Injector, cylinder 2 - N31-

20 - Injector, cylinder 1 - N30-

Overview of fitting locations - engine compartment, vehicles with engine codes CFKA, CPMA, CPMB



1 - Ignition coil 1 with output stage - N70-

- Exploded view
⇒ [page 387](#)

2 - Air mass meter - G70-

- Exploded view
⇒ [page 317](#)

3 - Right electrohydraulic engine mounting solenoid valve - N145-

- Fitting location
⇒ [page 305](#)

4 - Ignition coil 2 with output stage - N127-

5 - Ignition coil 3 with output stage - N291-

6 - Ignition coil 4 with output stage - N292-

7 - Fuel quality sender - G446-

- Fitting location
⇒ [page 307](#)

8 - Gear detection sensor - G604-

- For vehicles with manual gearbox
- Fitting location
⇒ [page 306](#)

9 - Coolant valve for gearbox - N488-

- For vehicles with manual gearbox with gearbox heating
- Fitting location
⇒ [page 306](#)
- Exploded view ⇒ [page 256](#)

10 - Brake servo pressure sensor - G294-

11 - Accelerator position sender - G79- and accelerator position sender 2 - G185-

- Fitting location ⇒ [page 305](#)
- Exploded view ⇒ Fuel supply system; Rep. gr. 20 ; Accelerator mechanism; Exploded view - accelerator pedal module

12 - Brake light switch - F-

- Fitting location ⇒ [page 305](#)
- Removing and installing ⇒ Brake system; Rep. gr. 45 ; Sensors; Removing and installing brake light switch

13 - Clutch position sender - G476-

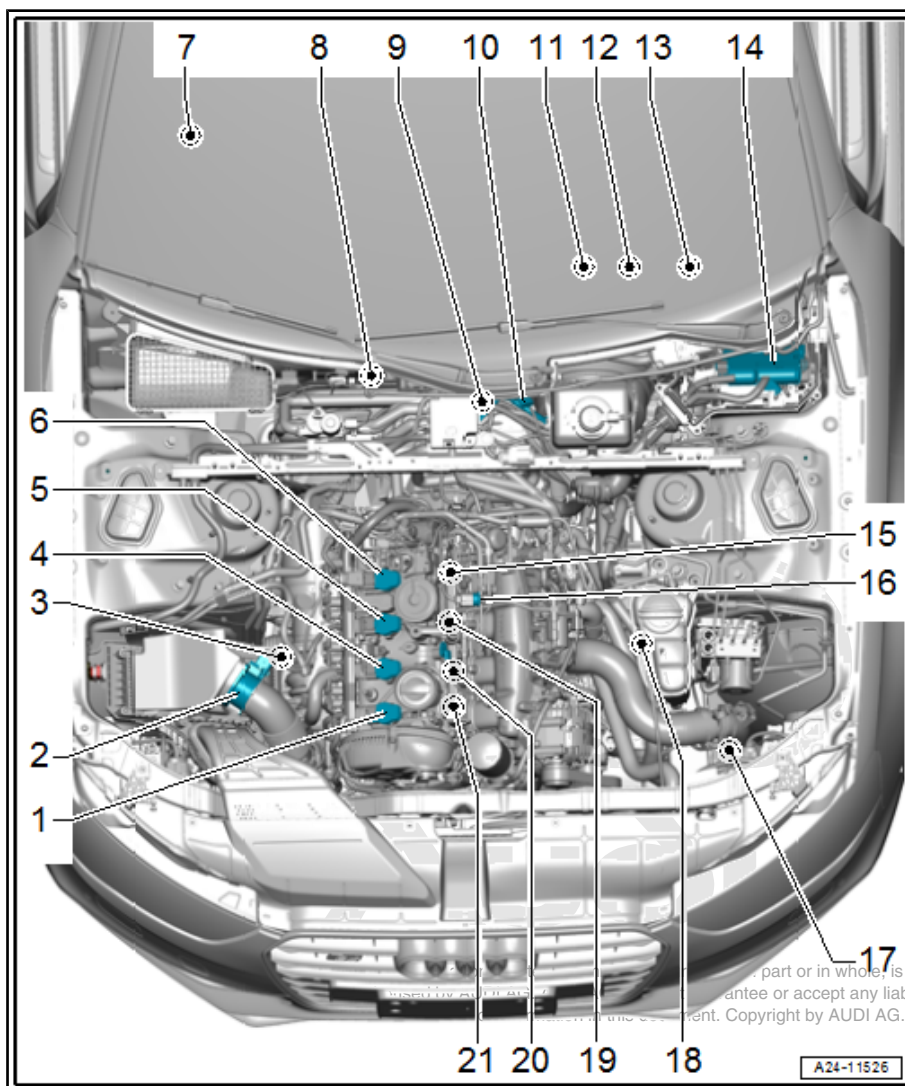
- With clutch pedal switch - F36- / clutch pedal switch for engine start - F194-
- For vehicles with manual gearbox
- Fitting location ⇒ [page 305](#)

14 - Engine control unit - J623-

- Removing and installing ⇒ [page 363](#)

15 - Injector, cylinder 4 - N33-

- Exploded view ⇒ [page 337](#)



16 - Fuel pressure sender for low pressure - G410-

- ❑ Exploded view ⇒ [page 323](#)

17 - Charge pressure sender - G31-

- ❑ Fitting location ⇒ [page 306](#)
- ❑ Exploded view ⇒ [page 295](#)

18 - Left electrohydraulic engine mounting solenoid valve - N144-

- ❑ Fitting location ⇒ [page 305](#)

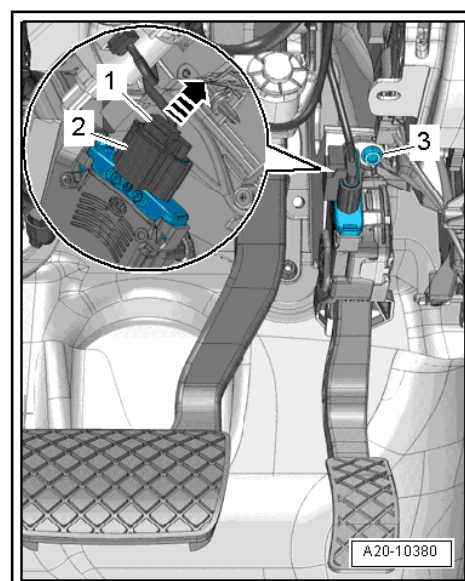
19 - Injector, cylinder 3 - N32-

20 - Injector, cylinder 2 - N31-

21 - Injector, cylinder 1 - N30-

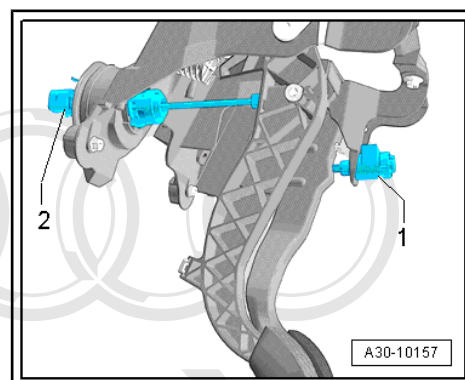
Fitting location of accelerator position sender - G79- / accelerator position sender 2 - G185-

- ◆ Integrated in accelerator pedal module
- 2 - Electrical connector



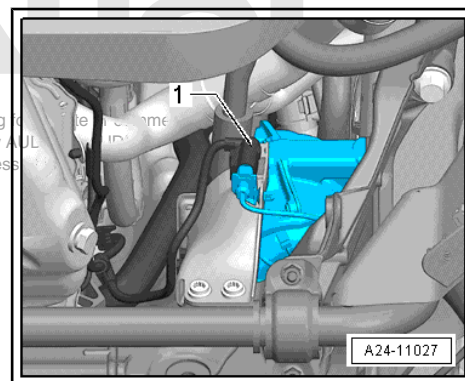
Fitting location of brake light switch - F- / clutch position sender - G476-

- ◆ On mounting bracket for pedal cluster
- 1 - Brake light switch - F-
- 2 - Clutch position sender - G476- with clutch pedal switch - F36- / clutch pedal switch for engine start - F194- for vehicles with manual gearbox



Fitting location of electrohydraulic engine mounting solenoid valve -N144- / -N145-

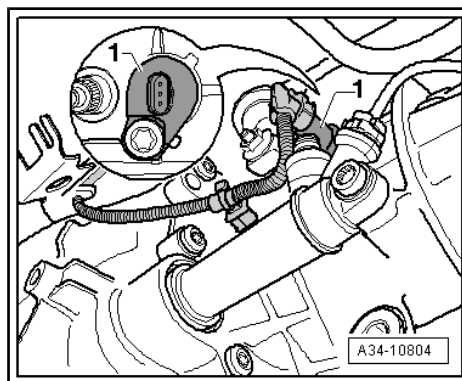
- ◆ On engine mounting (both sides)
- 1 - Electrical connector for left electrohydraulic engine mounting solenoid valve - N144-



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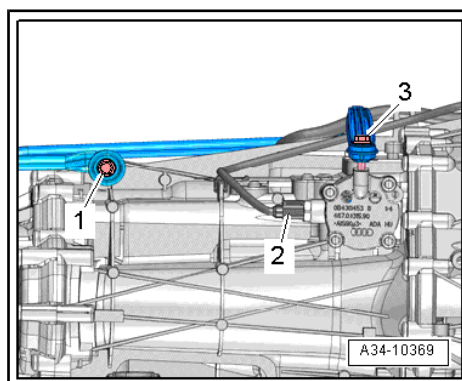


Fitting location of gearbox neutral position sender - G701-



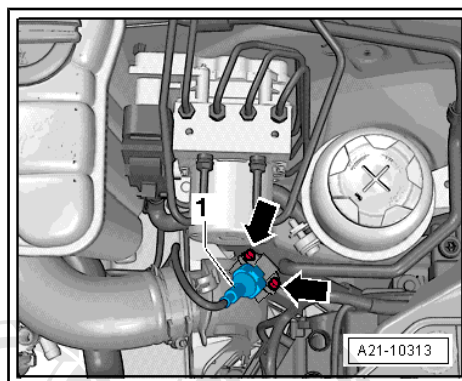
Fitting location of gear detector switch - F208- or gear detector switch - G604-

- ◆ On top of manual gearbox
- 2 - Electrical connector



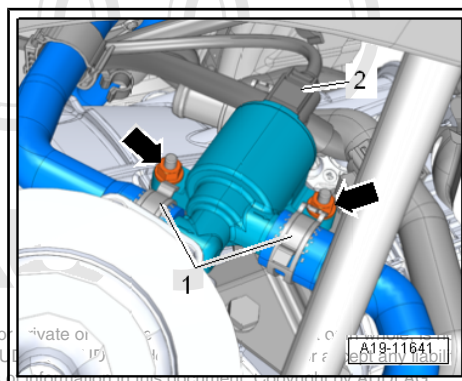
Fitting location of charge pressure sender - G31-

- ◆ In air pipe (left-side)
- 1 - Connect electrical connector for charge pressure sender - G31-



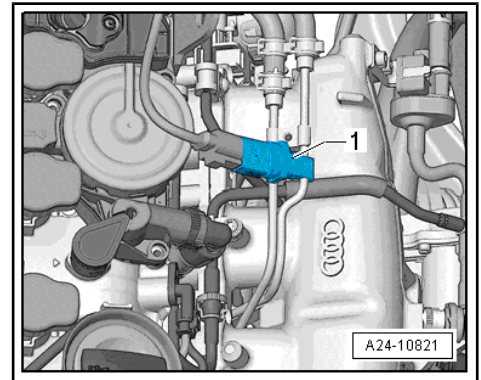
Fitting location of coolant valve for gearbox - N488-

- ◆ On manual gearbox (left-side)
- 2 - Electrical connector for coolant valve for gearbox - N488-

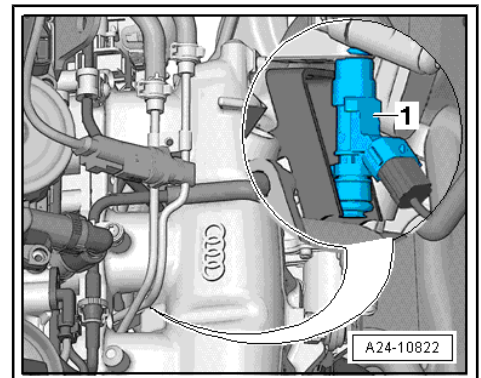


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Fitting location of fuel pressure sender for low-pressure - G410-1-



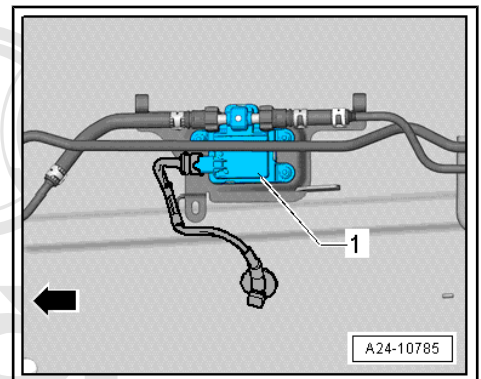
Fitting location of cold-start valve - N17- -item 1-



Fitting location of fuel quality sender - G446-

- ◆ On right side of underbody (-arrow- points in direction of travel).

1 - Fuel quality sender - G446-



Overview of fitting locations - engine from left, vehicles with all engine codes except CFKA, CPMA, CPMB

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1 - Valve for oil pressure control - N428-

- Exploded view
⇒ [page 221](#)

2 - Continued coolant circulation pump - V51-

- Not fitted on all versions
- Exploded view
⇒ [page 266](#)

3 - Coolant temperature sender - G62-

- Exploded view
⇒ [page 254](#)

4 - Oil pressure switch - F22-

- Installation position varies depending on engine version
- Exploded view
⇒ [page 235](#)

5 - Oil pressure switch for reduced oil pressure - F378-

- Installation position varies depending on engine version
- Exploded view
⇒ [page 235](#)

6 - Intake manifold flap potentiometer - G336-

- Exploded view
⇒ [page 320](#)

7 - Fuel pressure sender - G247-

- Exploded view
⇒ [page 337](#)

8 - Intake air temperature sender - G42-

- Exploded view ⇒ [page 320](#)

9 - Hall sender - G40-

- Exploded view ⇒ [page 387](#)

10 - Throttle valve module - J338-

- Including throttle valve drive (electric throttle operation) - G186- , angle sender for throttle valve drive - G187- and angle sender 2 for throttle valve drive - G188-
- Exploded view ⇒ [page 320](#)

11 - Activated charcoal filter solenoid valve 1 - N80-

12 - Fuel metering valve - N290- or fuel pressure regulating valve - N276-

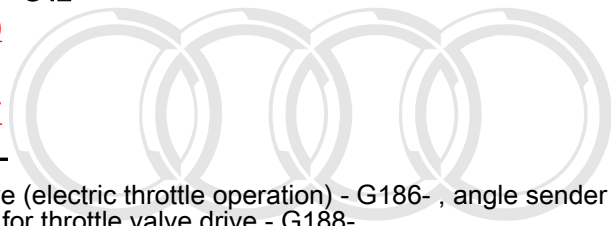
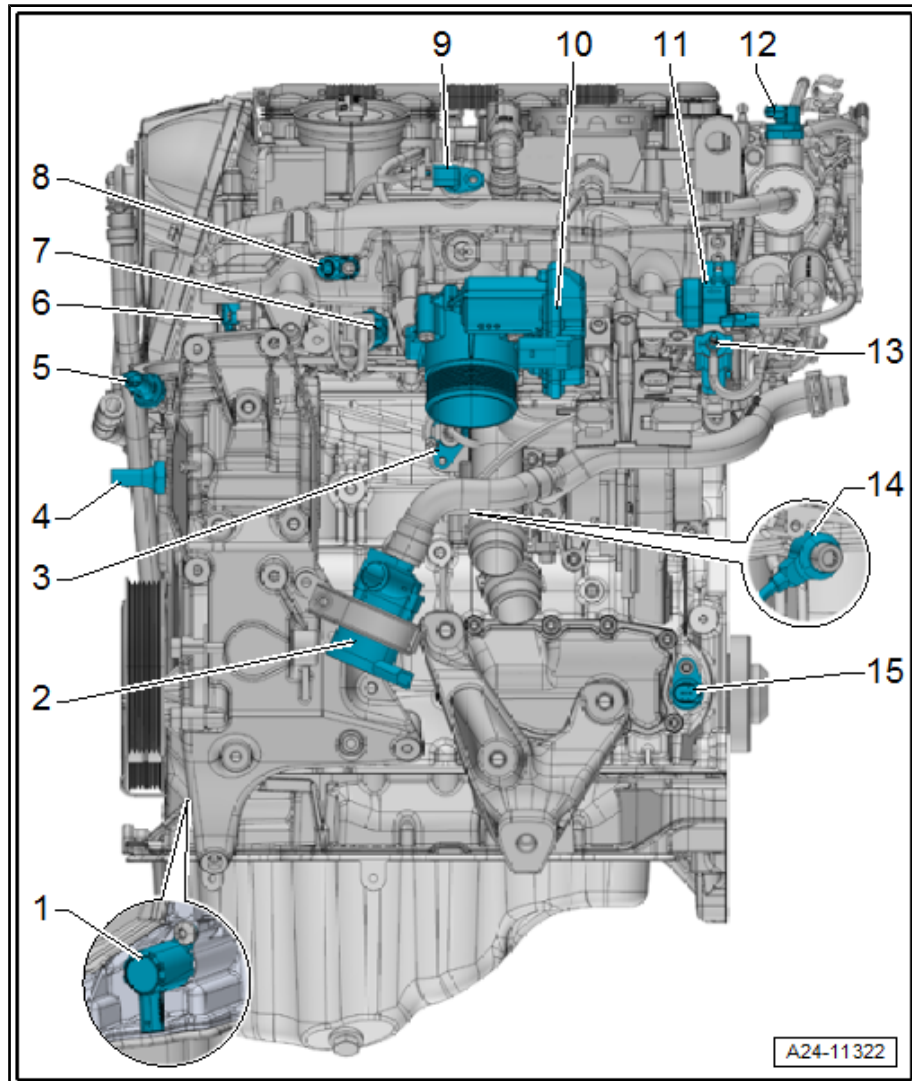
- Fuel metering valve - N290- or fuel pressure regulating valve - N276- may be fitted, depending on version
- Integrated in high-pressure pump
- Exploded view ⇒ [page 353](#)

13 - Intake manifold flap valve - N316-

- Exploded view ⇒ [page 320](#)

14 - Knock sensor 1 - G61-

- Exploded view ⇒ [page 387](#)



15 - Engine speed sender - G28-

- Exploded view ⇒ [page 387](#)

Overview of fitting locations - engine from left, vehicles with engine codes CFKA, CPMA, CPMB

1 - Valve for oil pressure control - N428-

- Exploded view
⇒ [page 221](#)

2 - Continued coolant circulation pump - V51-

- Not fitted on all versions
- Exploded view
⇒ [page 266](#)

3 - Fuel pressure sender - G247-

- Exploded view
⇒ [page 337](#)

4 - Oil pressure switch - F22-

- Installation position varies depending on engine version
- Exploded view
⇒ [page 235](#)

5 - Oil pressure switch for reduced oil pressure - F378-

- Installation position varies depending on engine version
- Exploded view
⇒ [page 235](#)

6 - Intake manifold flap potentiometer - G336-

- Exploded view
⇒ [page 320](#)

7 - Intake air temperature sender - G42-

- Exploded view
⇒ [page 320](#)

8 - Cold-start valve - N17-

- Removing and installing ⇒ [page 346](#)

9 - Hall sender - G40-

- Exploded view ⇒ [page 387](#)

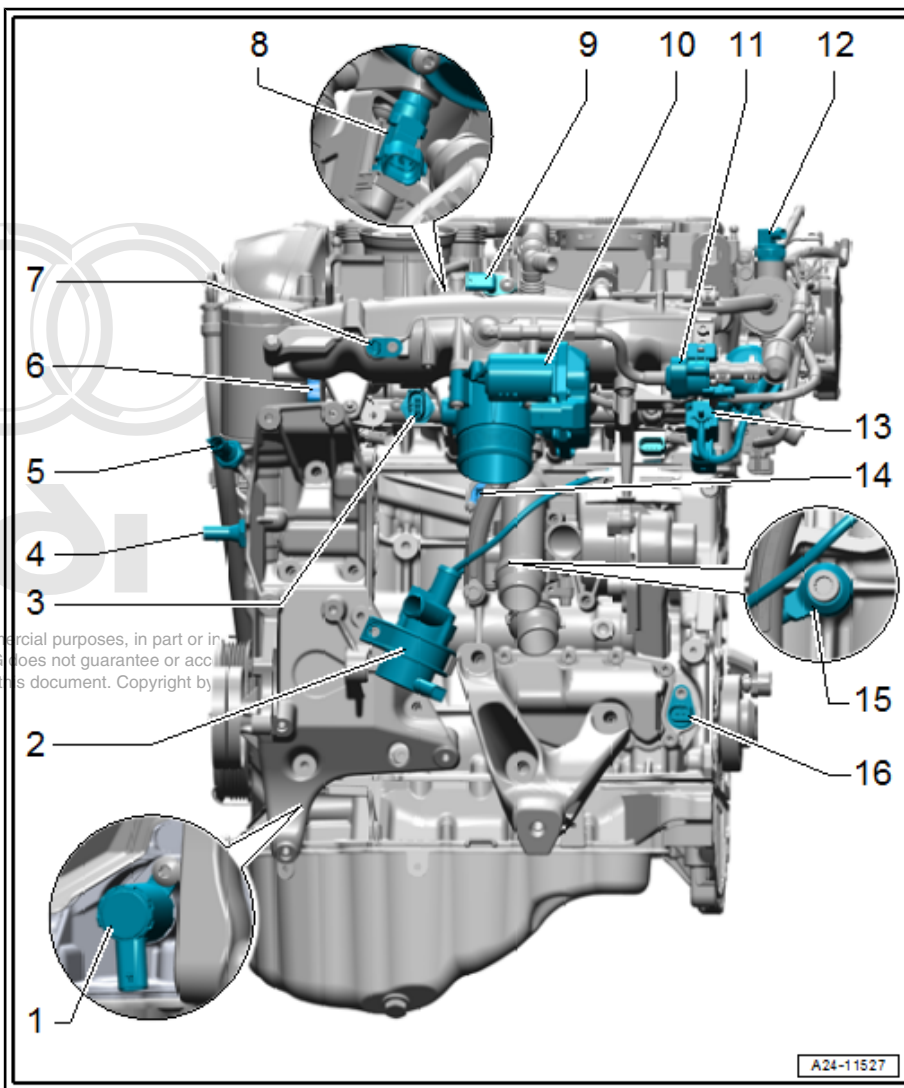
10 - Throttle valve module - J338-

- Including throttle valve drive (electric throttle operation) - G186- , angle sender for throttle valve drive - G187- and angle sender 2 for throttle valve drive - G188-
- Exploded view ⇒ [page 320](#)

11 - Activated charcoal filter solenoid valve 1 - N80-

12 - Fuel metering valve - N290- or fuel pressure regulating valve - N276-

- Fuel metering valve - N290- or fuel pressure regulating valve - N276- may be fitted, depending on version
- Integrated in high-pressure pump



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- Exploded view ⇒ [page 353](#)

13 - Intake manifold flap valve - N316-

- Exploded view ⇒ [page 320](#)

14 - Coolant temperature sender - G62-

- Exploded view ⇒ [page 254](#)

15 - Knock sensor 1 - G61-

- Exploded view ⇒ [page 387](#)

16 - Engine speed sender - G28-

- Exploded view ⇒ [page 387](#)

Overview of fitting locations - engine (view from right side)

1 - Lambda probe after catalytic converter - G130- and Lambda probe heater 1 after catalytic converter - Z29-

- Exploded view ⇒ [page 357](#)

2 - Lambda probe - G39- and Lambda probe heater - Z19-

- Exploded view ⇒ [page 357](#)

3 - Actuator 8 for camshaft adjustment - F373- (for cylinder No. 4)

- 2.0 ltr. engine only
- Exploded view ⇒ [page 178](#)

4 - Actuator 7 for camshaft adjustment - F372- (for cylinder No. 4)

- 2.0 ltr. engine only
- Exploded view ⇒ [page 178](#)

5 - Actuator 6 for camshaft adjustment - F371- (for cylinder No. 3)

- 2.0 ltr. engine only
- Exploded view ⇒ [page 178](#)

6 - Actuator 5 for camshaft adjustment - F370- (for cylinder No. 3)

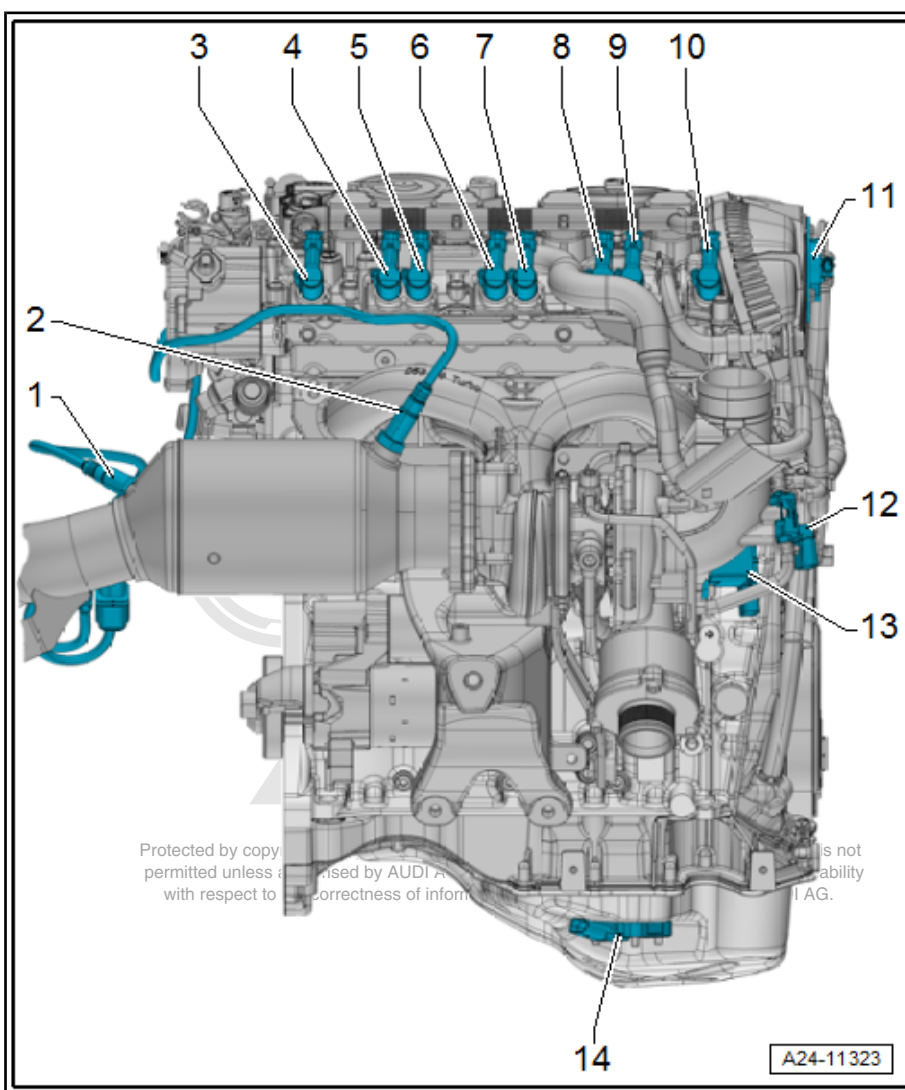
- 2.0 ltr. engine only
- Exploded view ⇒ [page 178](#)

7 - Actuator 4 for camshaft adjustment - F369- (for cylinder No. 2)

- 2.0 ltr. engine only
- Exploded view ⇒ [page 178](#)

8 - Actuator 3 for camshaft adjustment - F368- (for cylinder No. 2)

- 2.0 ltr. engine only
- Exploded view ⇒ [page 178](#)



9 - Actuator 2 for camshaft adjustment - F367- (for cylinder No. 1)

- 2.0 ltr. engine only
- Exploded view ⇒ [page 178](#)

10 - Actuator 1 for camshaft adjustment - F366- (for cylinder No. 1)

- 2.0 ltr. engine only
- Exploded view ⇒ [page 178](#)

11 - Camshaft control valve 1 - N205-

- Exploded view ⇒ [page 87](#)

12 - Charge pressure control solenoid valve - N75-

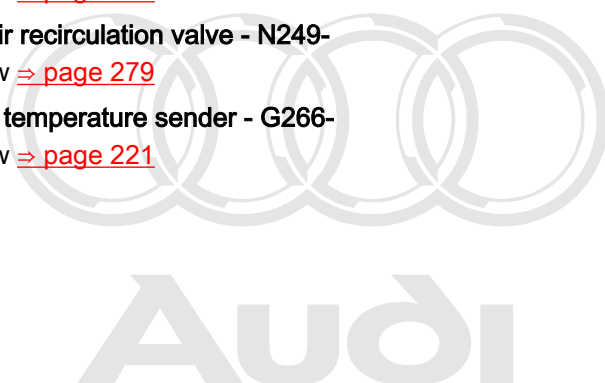
- Exploded view ⇒ [page 279](#)

13 - Turbocharger air recirculation valve - N249-

- Exploded view ⇒ [page 279](#)

14 - Oil level and oil temperature sender - G266-

- Exploded view ⇒ [page 221](#)



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2 Vacuum system

⇒ [“2.1 Removing and installing activated charcoal filter solenoid valve 1 N80”, page 312](#)

⇒ [“2.2 Checking dual non-return valve”, page 313](#)

⇒ [“2.3 Checking vacuum system”, page 315](#)

2.1 Removing and installing activated charcoal filter solenoid valve 1 - N80-

⇒ [“2.1.1 Removing and installing activated charcoal filter solenoid valve 1 N80, vehicles with all engine codes except CFKA, CPMA, CPMB”, page 312](#)

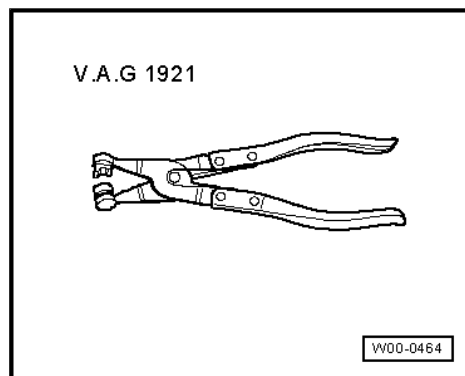
⇒ [“2.1.2 Removing and installing activated charcoal filter solenoid valve 1 N80, vehicles with engine codes CFKA, CPMA, CPMB”, page 313](#)

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2.1.1 Removing and installing activated charcoal filter solenoid valve 1 - N80- , vehicles with all engine codes except CFKA, CPMA, CPMB

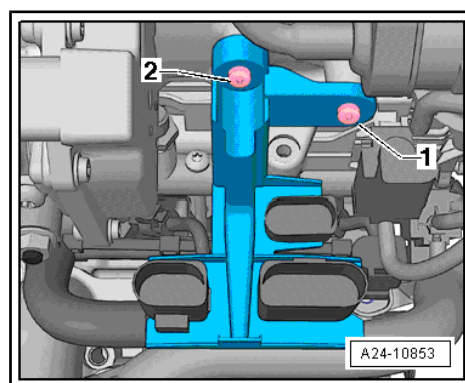
Special tools and workshop equipment required

- ◆ Hose clip pliers - V.A.G 1921-

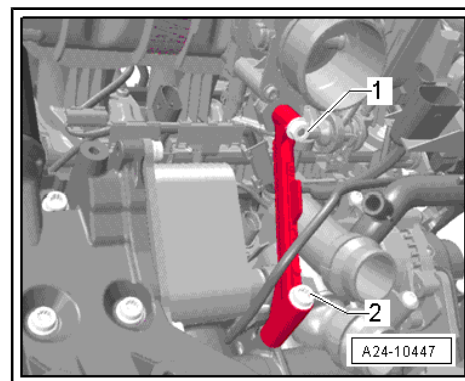


Removing

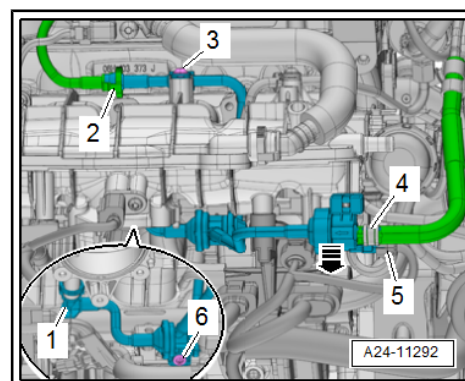
- Remove engine cover panel ⇒ [page 37](#) .
- Remove throttle valve module - J338- ⇒ [page 333](#) .
- Remove bolts -1, 2- and push bracket with electrical connectors to one side.



- Unscrew bolt -2- and nut -1- for support for intake manifold.
- Move electrical wiring harness clear and detach support for intake manifold.
- Unplug following electrical connectors:



- Unplug electrical connector -4-.
- Release hose clip -5- and detach vacuum line.
- Unscrew bolt -3- and detach retaining clip.
- Press release tabs on both sides and disconnect vacuum line -1- at intake manifold and at connection point -2-.
- Detach activated charcoal filter solenoid valve 1 - N80- from bracket and guide out vacuum line.



Installing

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

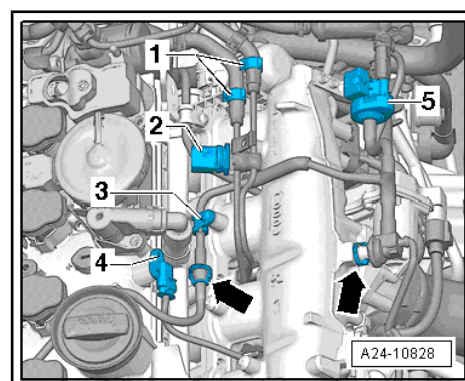
- Install throttle valve module - J338- ⇒ [page 333](#) .
- Install engine cover panel ⇒ [page 37](#) .

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2.1.2 Removing and installing activated charcoal filter solenoid valve 1 - N80- , vehicles with engine codes CFKA, CPMA, CPMB

Removing

- Remove engine cover panel ⇒ [page 37](#) .
- Unplug electrical connector from activated charcoal filter solenoid valve 1 - N80- -5-.
- Detach activated charcoal filter solenoid valve 1 - N80- -5- from bracket.
- Release hose clip -3-.
- Detach line for active charcoal filter at intake manifold (top section) and at connection -arrows-.
- Guide line coming from activated charcoal filter out underneath fuel lines.



Installing

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

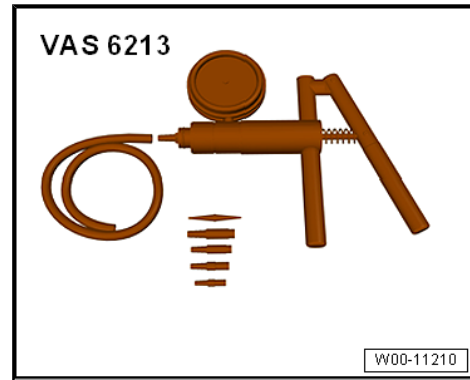
- Install engine cover panel ⇒ [page 37](#) .

2.2 Checking dual non-return valve

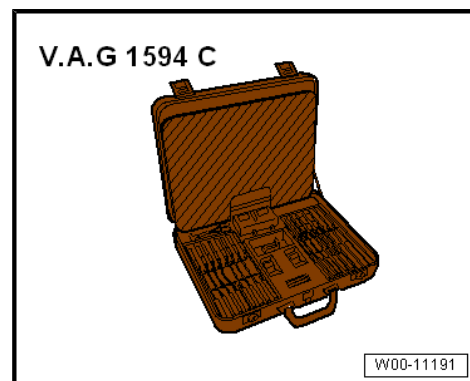
Special tools and workshop equipment required



- ◆ Hand vacuum pump - VAS 6213-

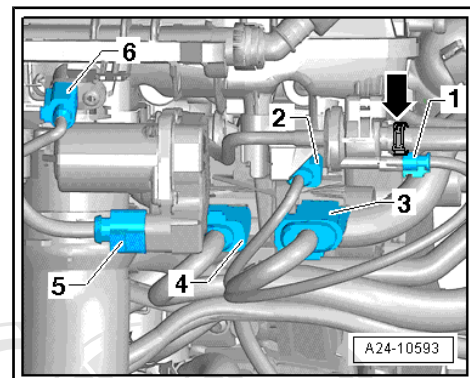


- ◆ Auxiliary measuring set - V.A.G 1594C-

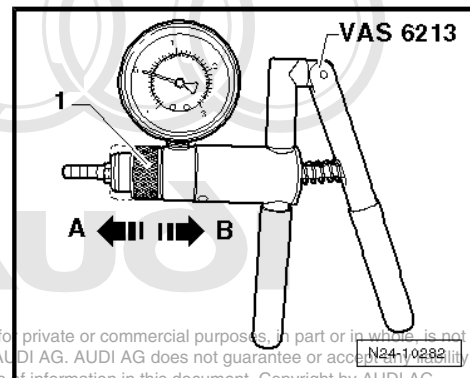


Test condition:

- Activated charcoal filter solenoid valve 1 - N80- has been checked with ⇒ Vehicle diagnostic tester and is OK.
- Remove engine cover panel ⇒ [page 37](#) .
- Unplug connector -1- and detach breather hose -arrow- from activated charcoal filter solenoid valve 1 - N80- .



- Move adjuster ring -1- on hand vacuum pump - VAS 6213- to position -A- to select "vacuum".



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- Connect hand vacuum pump - VAS 6213- to activated charcoal filter solenoid valve 1 - N80- .
- Connect contacts of activated charcoal filter solenoid valve 1 - N80- -1- to battery using test leads. This will open activated charcoal filter solenoid valve 1 - N80- .

Then immediately operate hand vacuum pump - VAS 6213- several times.

- Vacuum should build up.
- Disconnect test leads from battery again to cut off current supply.

If vacuum does not build up:

- Renew activated charcoal filter system solenoid valve 1 - N80- .

 **Note**

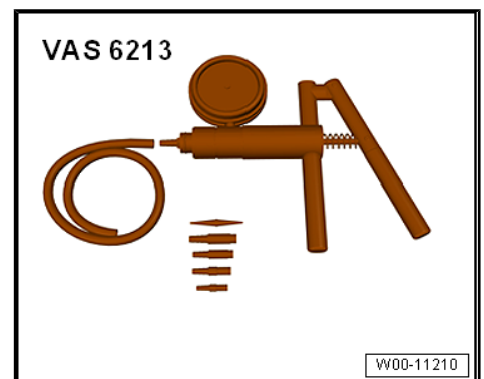
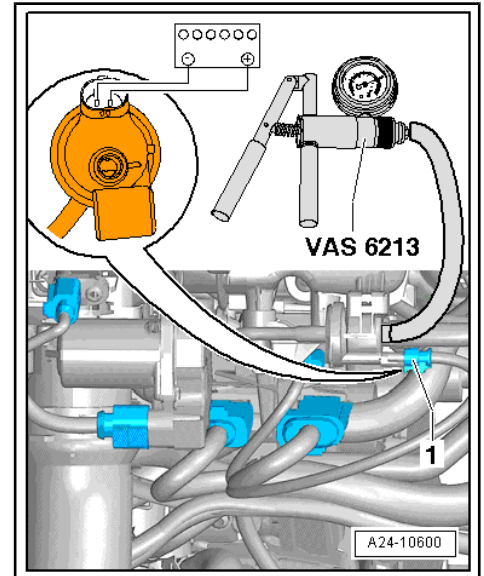
Dual non-return valve, activated charcoal filter solenoid valve 1 - N80- and plastic hoses are combined as one unit and can only be renewed together.

- Install engine cover panel ⇒ [page 37](#) .

2.3 Checking vacuum system

Special tools and workshop equipment required

- ◆ Hand vacuum pump - VAS 6213-



Procedure

- Check all vacuum lines in the complete vacuum system for:
 - ◆ Cracks
 - ◆ Traces of animal bites
 - ◆ Kinked or crushed lines
 - ◆ Porous or leaking lines
- Check vacuum line to solenoid valve and from solenoid valve to corresponding component.
- If a fault is stored in the event memory, check all vacuum lines leading to the corresponding component, and also check the remaining vacuum lines leading to other components.
- If it is not possible to build up pressure with the hand vacuum pump - VAS 6213- or if the pressure drops again immediately, check the hand vacuum pump and connecting hoses for leaks.



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



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3 Air cleaner

⇒ [“3.1 Exploded view - air cleaner housing”, page 317](#)

⇒ [“3.2 Removing and installing air cleaner housing”, page 318](#)

3.1 Exploded view - air cleaner housing

1 - Hose clip

2 - Air hose

3 - Hose clip

4 - Air duct

- Clipped into air cleaner housing
- Clean out dirt and leaves, etc.

5 - Air duct

- Clean out dirt and leaves, etc.

6 - Air duct

- Clean out dirt and leaves, etc.
- Secure to lock carrier (2 Nm)

7 - Rubber grommet

8 - Water drain hose

- Clean out dirt and leaves, etc.

9 - Guide for water drain hose

10 - Hot air intake

- For cold climates
- Insert as far as stop and turn clockwise until you feel it engage

11 - Air cleaner housing

- Clean out salt deposits, dirt and leaves, etc.
- Important: Check for dirt in water drain and clean as required
- Removing and installing ⇒ [page 318](#)

12 - Bracket

- For air cleaner housing
- Must engage positively
- Do not use any lubricants

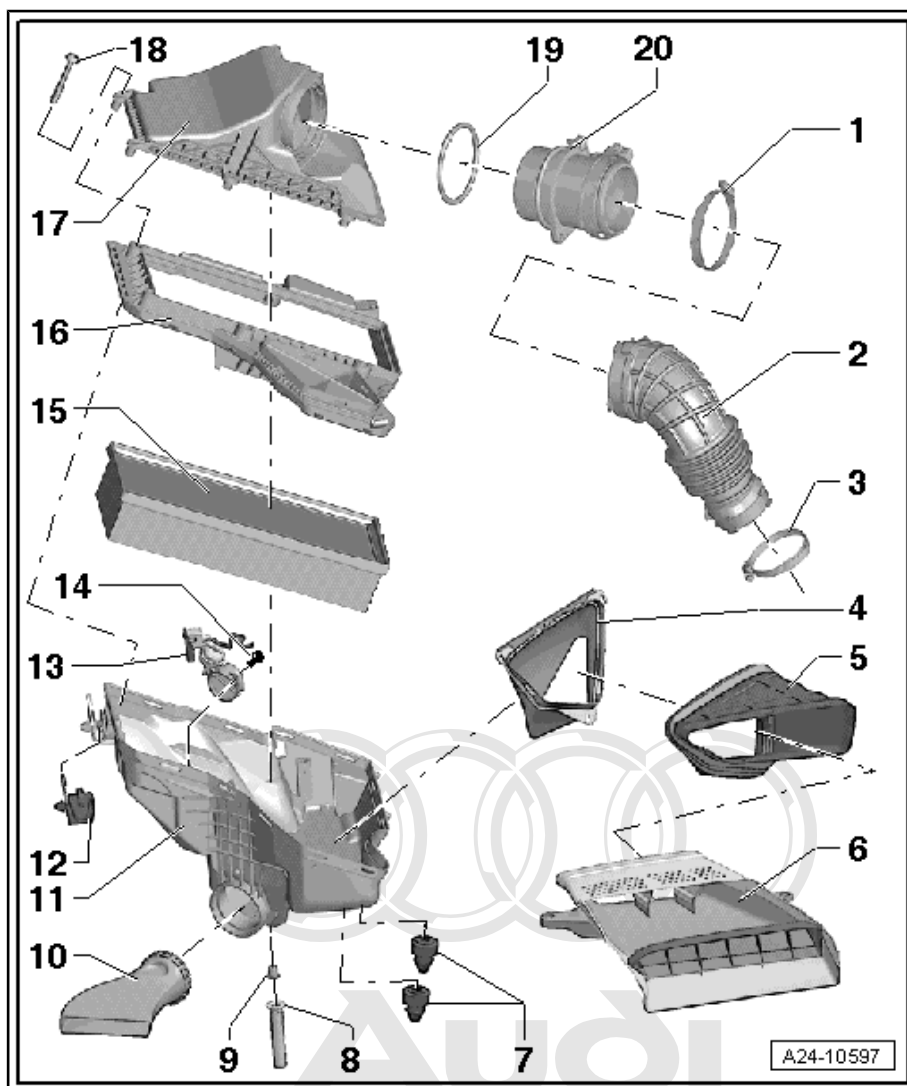
13 - Variable intake manifold change-over valve - N335-

- Country-specific version

14 - Bolt

15 - Air filter element

- Change intervals ⇒ Maintenance tables
- Removing and installing: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818



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- Always use genuine part for air filter element
- Also clean snow screen (if fitted)

16 - Frame insert

- For air cleaner housing

17 - Air cleaner (top section)

- Clean out salt deposits, dirt and leaves, etc.

18 - Bolt

19 - O-ring

- Renew if damaged

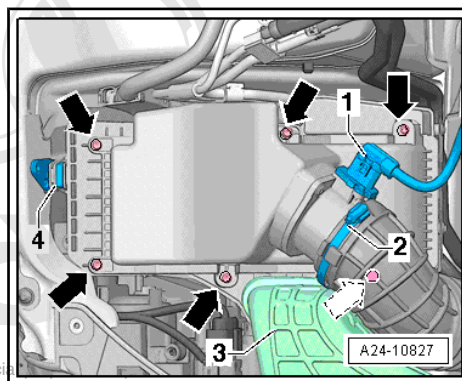
20 - Air mass meter - G70-

- Removing and installing => [page 351](#)

3.2 Removing and installing air cleaner housing

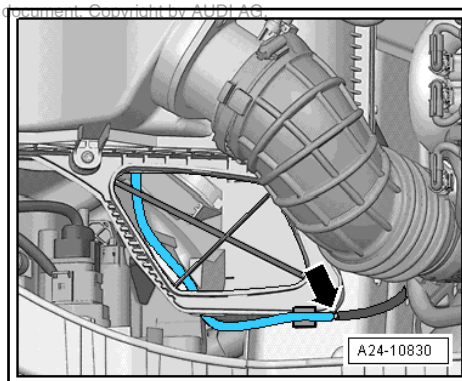
Removing

- Unplug electrical connector -1- at air mass meter - G70- .
- Open hose clip -2- on air hose leading to turbocharger and disconnect hose at air mass meter - G70- .
- Remove air duct -3-.



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- Detach vacuum hose -arrow- (if fitted).

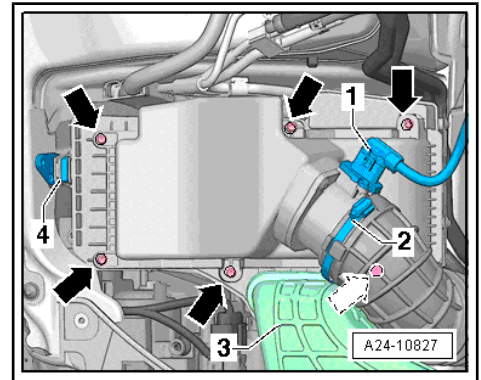


- Release retainer -4- for bottom section of air cleaner (press in rubber on left and right side and pull upwards).

 **Note**

- ◆ *These components (bypass flap with variable intake manifold change-over valve - N335- -1-) are not installed on certain equipment versions or on vehicles for certain export markets.*
- ◆ *Do not use lubricants when installing retainer.*

- Lift off air cleaner housing.
- Disconnect electrical connector at variable intake manifold change-over valve - N335- (if fitted).



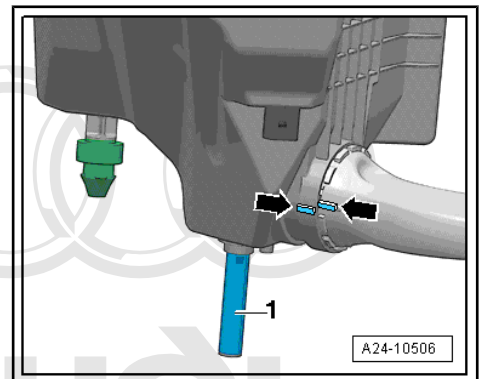
Installing

To ensure the proper function of the air mass meter - G70- it is important to observe the following instructions.

 **Note**

- ◆ *Use a silicone-free lubricant when installing the intake hose.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) → Electronic parts catalogue .*

- If hot air intake is fitted (for countries with cold climates only), make sure that air intake connection has engaged properly -arrows- (pay attention to marking).
- Check intake duct as far as air filter element for dirt.
- Check air mass meter and air hose (engine intake side) for salt residue, dirt and leaves.
- Re-attach electrical connector at variable intake manifold change-over valve - N335- (if fitted).
- Check water drain hose -1- in air cleaner (bottom section) for dirt and other obstructions (clean if necessary).

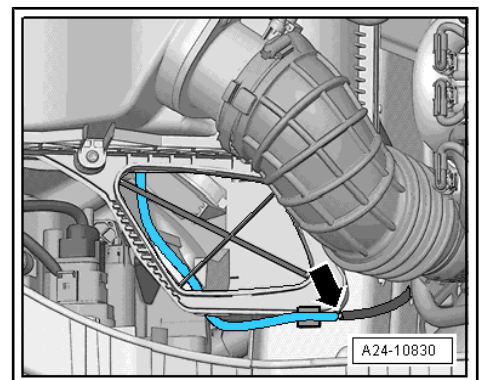


 **Note**

The water drain hose must be routed straight downwards; make sure it is not kinked or twisted.

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- Re-attach vacuum hose -arrow- (if fitted previously).
- Ensure secure fit of air hose at air mass meter - G70- .
- The remaining installation steps are carried out in the reverse sequence.





4 Intake manifold

⇒ [“4.1 Exploded view - intake manifold”, page 320](#)

⇒ [“4.2 Removing and installing intake manifold”, page 325](#)

⇒ [“4.3 Removing and installing intake manifold \(top section\)”, page 328](#)

⇒ [“4.4 Removing and installing intake manifold \(bottom section\)”, page 332](#)

⇒ [“4.5 Removing and installing throttle valve module J338”, page 333](#)

⇒ [“4.6 Cleaning throttle valve module”, page 334](#)

⇒ [“4.7 Checking intake manifold change-over function”, page 334](#)

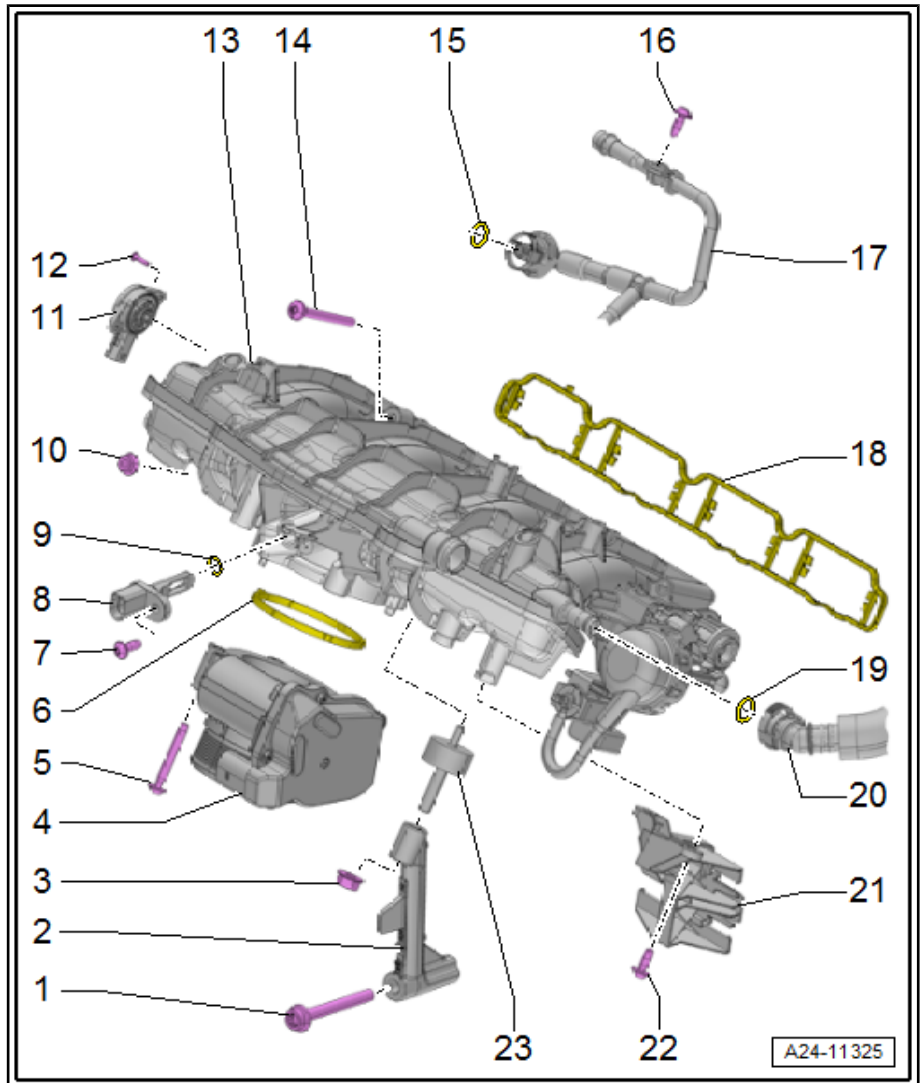
4.1 Exploded view - intake manifold

⇒ [“4.1.1 Exploded view - intake manifold, vehicles with all engine codes except CFKA, CPMA, CPMB”, page 320](#)

⇒ [“4.1.2 Exploded view - intake manifold, vehicles with engine codes CFKA, CPMA, CPMB”, page 323](#)

4.1.1 Exploded view - intake manifold, vehicles with all engine codes except CFKA, CPMA, CPMB

- 1 - Bolt**
 - 20 Nm
- 2 - Support for intake manifold**
- 3 - Nut**
 - 10 Nm
- 4 - Throttle valve module - J338-**
 - Including throttle valve drive for electric throttle - G186- , throttle valve drive angle sender 1 for electric throttle - G187- and throttle valve drive angle sender 2 for electric throttle - G188-
 - Removing and installing ⇒ [page 333](#)
 - Cleaning ⇒ [page 334](#)
 - After renewing, perform "Adaption" for engine control unit - J623- / throttle valve module - J338- in ⇒ Vehicle diagnostic tester, [Guided Functions](#)



- 5 - Bolt**
 - 7 Nm
- 6 - Seal**
 - Renew
- 7 - Bolt**
 - 5 Nm
- 8 - Intake air temperature sender - G42-**
 - Removing and installing ⇒ [page 37](#)
- 9 - O-ring**
 - Renew
- 10 - Nut**
 - Pre-tightening torque: 3 Nm
 - Final tightening torque: 10 Nm
- 11 - Intake manifold flap potentiometer - G336-**
 - After renewing, perform "Adaption" for engine control unit - J623- / intake manifold flap potentiometer - G336- using ⇒ Vehicle diagnostic tester, [Guided Functions](#)
- 12 - Bolt**
 - Thread-forming
 - Fit and screw in bolt by hand so that it is screwed into old thread. Then tighten bolt to torque.
 - 0.8 Nm
- 13 - Intake manifold**
 - Version for 2.0 ltr. engine is shown as an example
 - Removing and installing ⇒ [page 325](#)
 - After installing, perform "Adaption" for engine control unit - J623- / intake manifold flap potentiometer - G336- in ⇒ Vehicle diagnostic tester, [Guided Functions](#)

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14 - Bolt

- Pre-tightening torque: 3 Nm
- Final tightening torque: 10 Nm

15 - O-ring

- Renew

16 - Bolt

- Thread-forming
- Fit and screw in bolt by hand so that it is screwed into old thread. Then tighten bolt to torque.
- 4 Nm

17 - Vacuum hose

18 - Gasket

- Renew

19 - O-ring

- Renew

20 - Hose

- For crankcase breather

21 - Retainer

- For electrical connectors

22 - Bolt

- Thread-forming
- Fit and screw in bolt by hand so that it is screwed into old thread. Then tighten bolt to torque.
- 4 Nm

23 - Bonded rubber bush

- 10 Nm



Audi

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4.1.2 Exploded view - intake manifold, vehicles with engine codes CFKA, CPMA, CPMB

1 - Bolt

- 20 Nm

2 - Support for intake manifold

3 - Bonded rubber mounting

- 10 Nm

4 - Bolt

- 9 Nm

5 - Throttle valve module - J338-

- Including throttle valve drive for electric throttle - G186- , throttle valve drive angle sender 1 for electric throttle - G187- and throttle valve drive angle sender 2 for electric throttle - G188-
- Removing and installing ⇒ [page 333](#)
- Cleaning ⇒ [page 334](#)
- After renewing, perform "Adaption" for engine control unit - J623- / throttle valve module - J338- in ⇒ Vehicle diagnostic tester, [Guided Functions](#)

6 - Gasket

- Renew

7 - Hose

- For crankcase breather

8 - O-rings

- Renew

9 - Bolt

- 5 Nm

10 - Intake air temperature sender - G42-

- Removing and installing ⇒ [page 352](#)

11 - O-ring

- Renew

12 - Nut

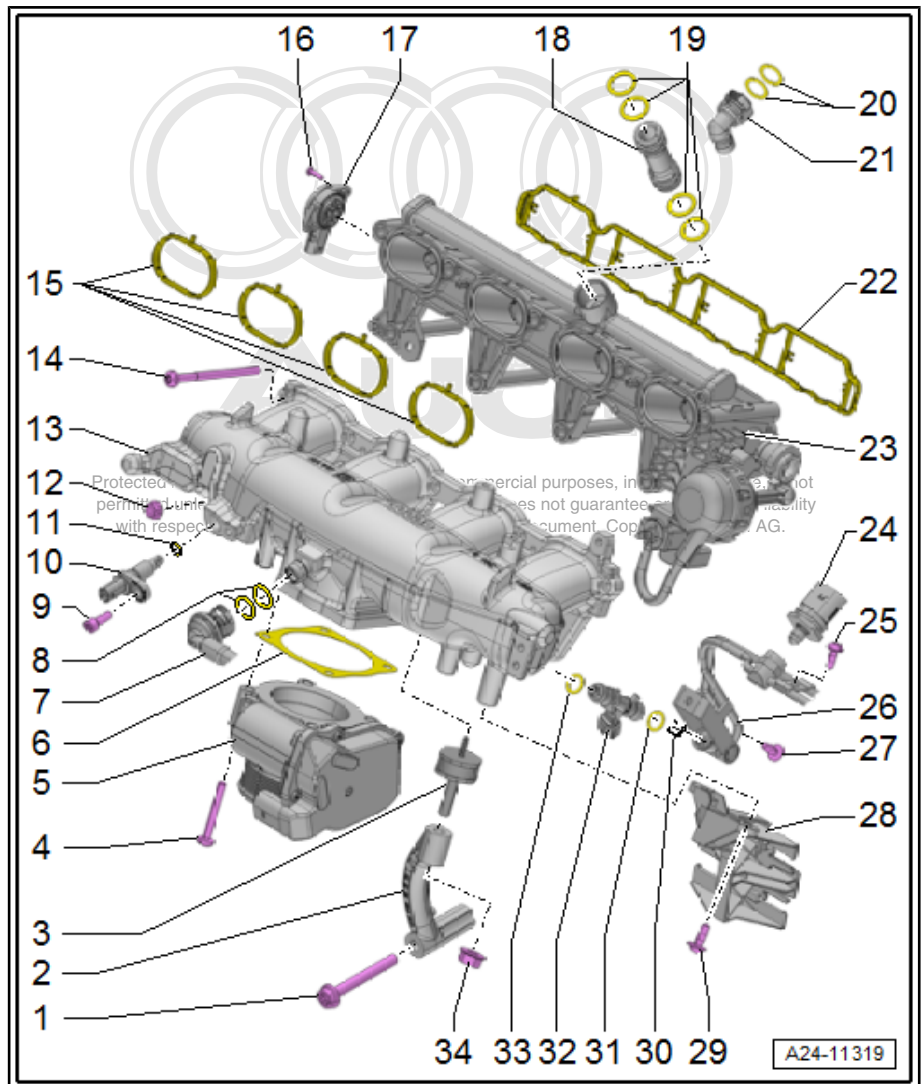
- Pre-tightening torque: 3 Nm
- Final tightening torque: 10 Nm

13 - Intake manifold (top section)

- Removing and installing ⇒ [page 328](#)
- After installing, perform "Adaption" for engine control unit - J623- / intake manifold flap potentiometer - G336- in ⇒ Vehicle diagnostic tester, [Guided Functions](#)

14 - Bolt

- Pre-tightening torque: 3 Nm





- Final tightening torque: 10 Nm

15 - Gaskets

- Renew

16 - Bolt

- Thread-forming
- Fit and screw in bolt by hand so that it is screwed into old thread. Then tighten bolt to torque.
- 0.8 Nm

17 - Intake manifold flap potentiometer - G336-

- After renewing, perform "Adaption" for engine control unit - J623- / intake manifold flap potentiometer - G336- using ⇒ Vehicle diagnostic tester, Guided Functions

18 - Connection

- For crankcase breather

19 - O-rings

- Renew

20 - O-rings

- Renew

21 - Connection

- For crankcase breather

22 - Gasket

- Renew

23 - Intake manifold (bottom section)

- Removing and installing ⇒ [page 332](#)

24 - Fuel pressure sender for low pressure - G410-

- 27 Nm

25 - Bolt

- 9 Nm

26 - Fuel line

- With bracket for cold-start valve - N17-

27 - Bolt

- 9 Nm

28 - Bracket

- For electrical connectors

29 - Bolt

- Thread-forming
- Fit and screw in bolt by hand so that it is screwed into old thread. Then tighten bolt to torque.
- 4 Nm

30 - Clip

31 - O-ring

- Renew

32 - Cold-start valve - N17-

- Removing and installing ⇒ [page 346](#)

33 - O-ring

- Renew
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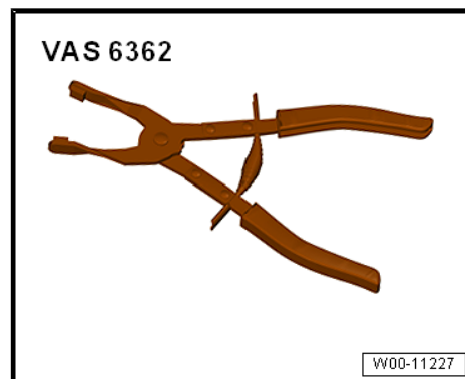
34 - Nut

- 10 Nm

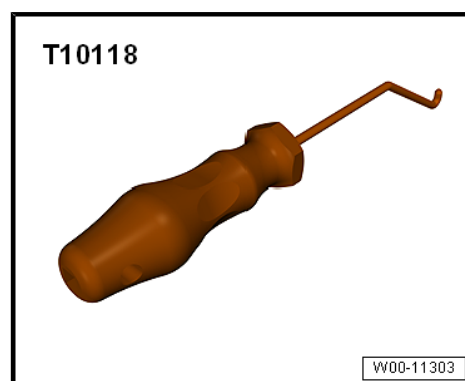
4.2 Removing and installing intake manifold

Special tools and workshop equipment required

- ◆ Hose clip pliers - VAS 6362-



- ◆ Assembly tool - T10118-



- ◆ Socket - T10347-



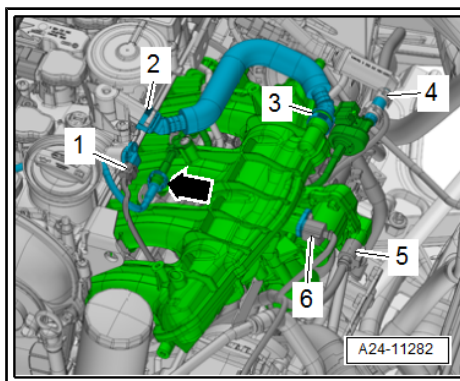
Removing

- Remove engine cover panel ⇒ [page 37](#) .
- Remove oil filter: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .

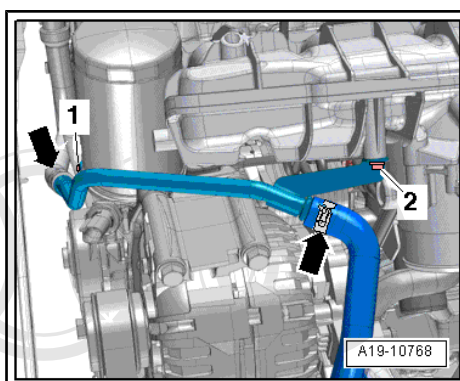
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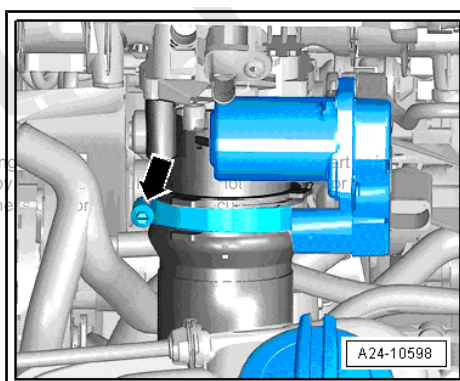
- Press release tabs -2, 3- on both sides and remove crankcase breather hose.
- Release hose clip -4-.
- Press release tabs -arrow- on both sides and disconnect line from activated charcoal filter.
- Unplug electrical connectors:
 - 1 - For Hall sender - G40-
 - 5 - For throttle valve module - J338-
 - 6 - For intake air temperature sender - G42-



- Remove bolts -1, 2- and push coolant pipe to side with coolant hoses -arrows- connected.

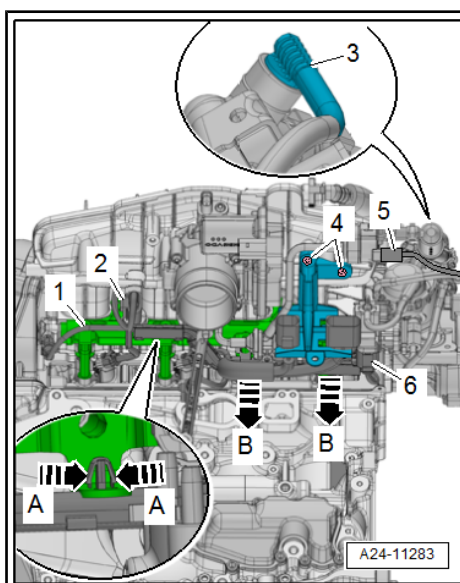


- Open hose clip -arrow- securing air hose and disconnect hose downwards from throttle valve module - J338- .



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- Disconnect vacuum hose -3- and move clear.
- Unplug electrical connectors:
 - 2 - For fuel pressure sender - G247-
 - 5 - For activated charcoal filter solenoid valve 1 - N80-
 - 6 - For intake manifold flap valve - N316-
- Remove bolts -4-.
- Release fasteners -arrows A- and move clear electrical wiring harness.
- Unplug electrical wiring harness from fuel rail -arrows- and unclip at -item 1-.



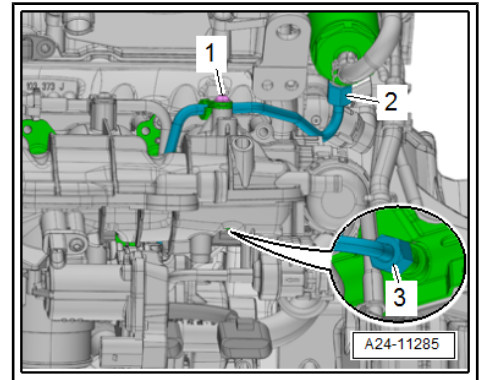


WARNING

The fuel system is pressurised.

Risk of injury as fuel may spray out.

- *Put on safety goggles.*
- *Put on protective gloves.*
- *Release pressure (wrap clean cloth around connection and open connection carefully).*



- Remove union nuts -2, 3- and bolt -1- and detach high-pressure pipe.



Note

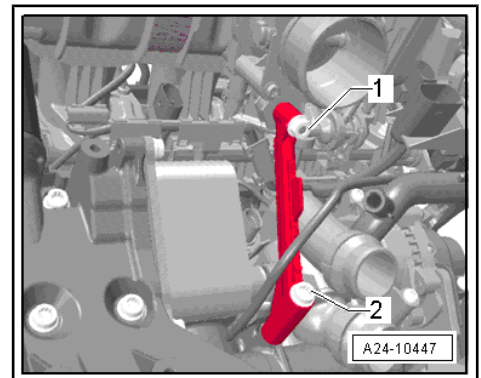
- ◆ *Use a clean cloth to catch escaping fuel.*
 - ◆ *Seal off open connections with clean caps. It is essential to ensure that no dirt enters the fuel system.*
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- Move electrical wiring clear.
- Remove bolt -2-.



Note

Disregard -item 1-.





- Remove bolts -arrows- and nuts -2, 3-.
- Detach intake manifold and unplug electrical connector -1- from intake manifold flap potentiometer - G336- .



Note

- ◆ *The injectors can remain in the fuel rail. Unplug electrical connector from corresponding injector.*
- ◆ *Block off intake ports with clean cloths.*

Installing

- Fit intake manifold onto studs (left and right) on cylinder head.
- Tighten intake manifold bolts to torque, working from inside to outside.
- The remaining installation steps are carried out in the reverse sequence.
- Install oil filter: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .
- Electrical wiring and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- After installing intake manifold, perform "Adaption" for engine control unit - J623- / intake manifold flap potentiometer - G336- in ⇒ Vehicle diagnostic tester, [Guided Functions](#)

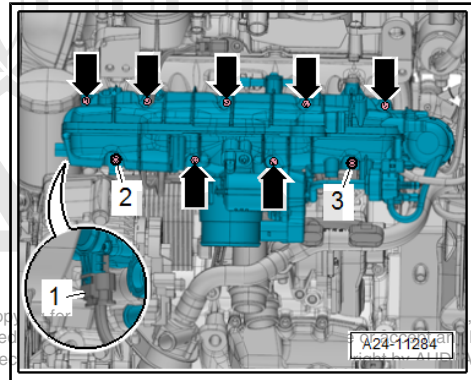
Tightening torques

- ◆ ⇒ ["4.1 Exploded view - intake manifold", page 320](#)
- ◆ ⇒ ["5.1 Exploded view - fuel rail with injectors", page 337](#)

4.3 Removing and installing intake manifold (top section)

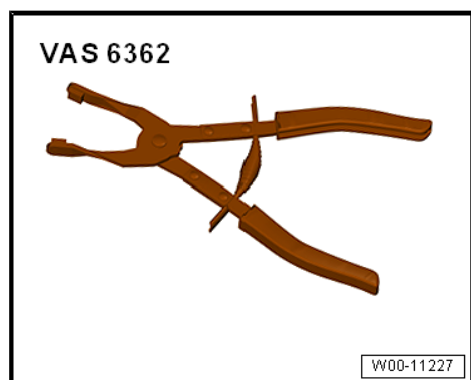
Special tools and workshop equipment required

- ◆ Hose clip pliers - VAS 6362-

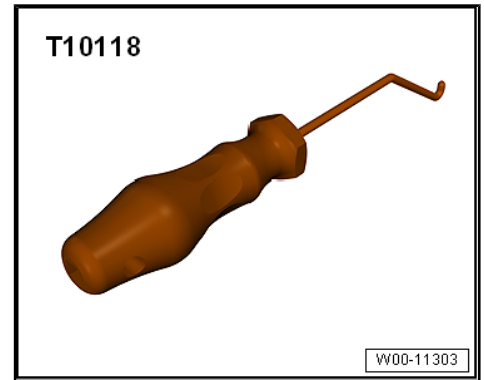


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◆ Assembly tool - T10118-



◆ Socket - T10347-



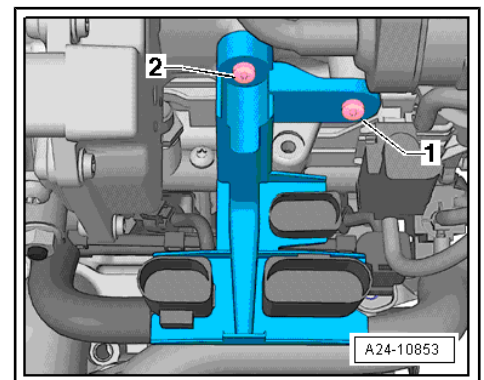
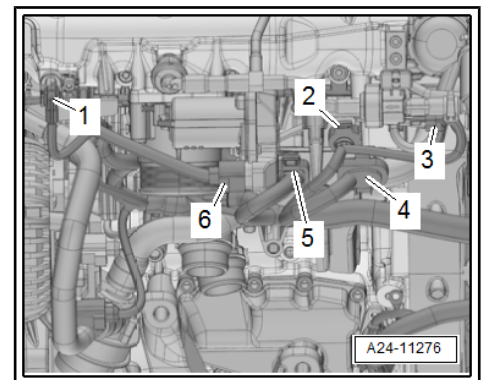
Removing

- Remove engine cover panel ⇒ [page 37](#) .
- Remove oil filter: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .
- Unplug electrical connectors:
 - 1 - For intake air temperature sender - G42-
 - 3 - For activated charcoal filter solenoid valve 1 - N80-
 - 6 - For throttle valve module - J338-

i Note

Disregard -items 2, 4, 5-.

- Unscrew bolts -1 and 2- and detach bracket for electrical connectors.



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Caution

Protect fuel system against contamination.

◆ **Rules for cleanliness when working on the injection system => page 5.**

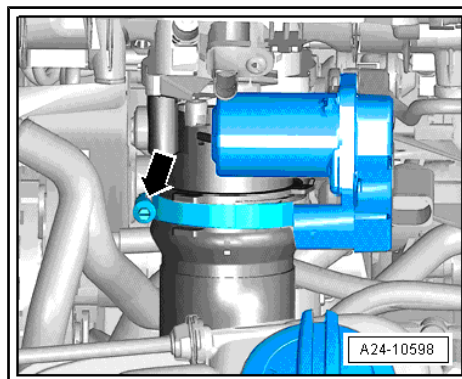
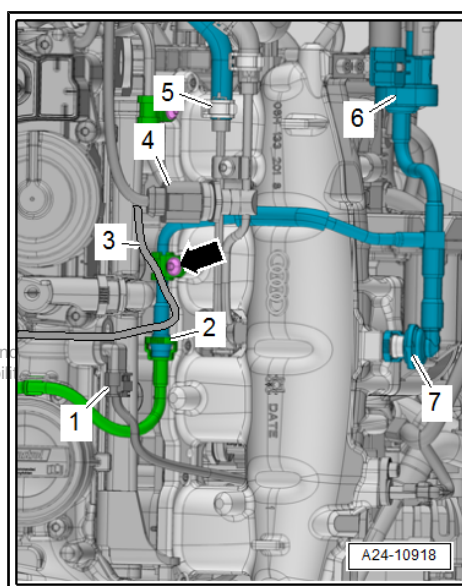
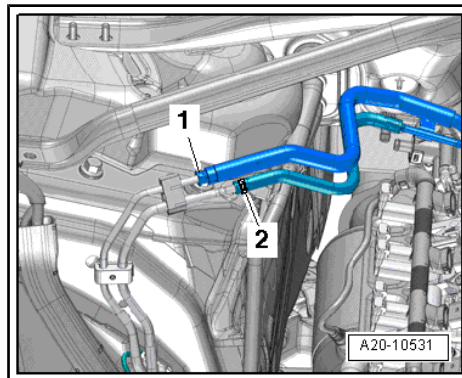
- Disconnect fuel supply hose -1- by pressing release ring.
- Move fuel hose clear.



Note

Disregard -item 2-.

- Release hose clip -5- and detach fuel hose.
 - Unplug electrical connector -4- at fuel pressure sender for low pressure - G410- .
 - Unplug electrical connector -1- at Hall sender - G40- .
 - Move wiring -3- for actuating intake manifold flaps clear.
 - Press release tabs and disconnect line -7- coming from activated charcoal filter at intake manifold (top section) and at connection point -2-.
 - Unscrew bolt -arrow- and remove retaining clip.
 - Detach activated charcoal filter solenoid valve 1 - N80- -item 6- from bracket.
 - Guide line coming from activated charcoal filter out underneath fuel lines and put to one side.
-
- Open hose clip -arrow- securing air hose and disconnect hose downwards from throttle valve module - J338- .



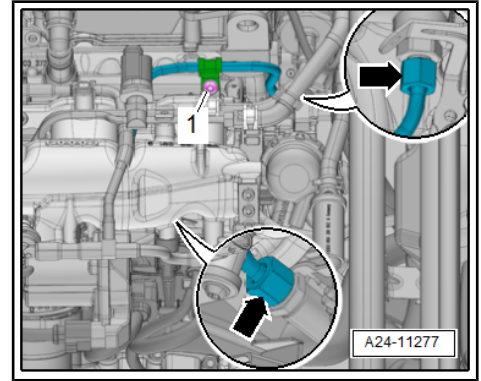


WARNING

The fuel system is pressurised.

Risk of injury as fuel may spray out.

- *Put on safety goggles.*
- *Put on protective gloves.*
- *Release pressure (wrap clean cloth around connection and open connection carefully).*



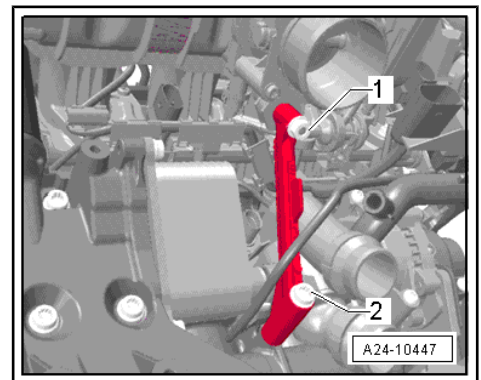
- Remove bolt -1- and union nuts -arrows- and detach high-pressure pipe.
- Remove bolt -2- for support for intake manifold.



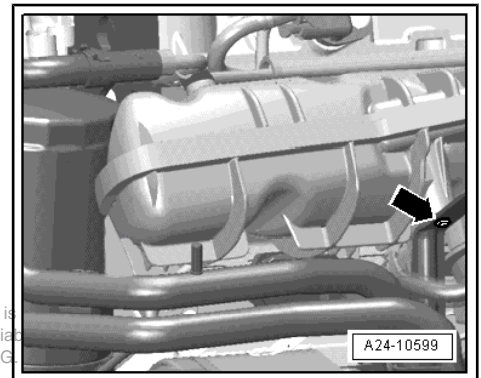
Note

Disregard -item 1-.

- Move electrical wiring harness clear.



- Remove bolt -arrow- for coolant line from intake manifold (top section).



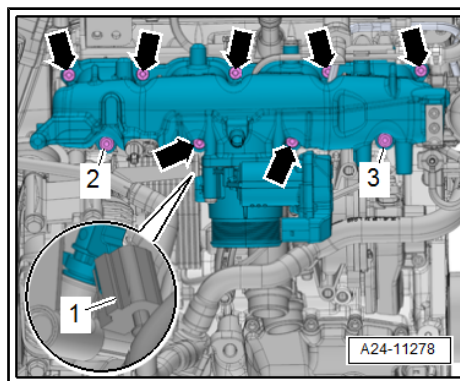
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- Remove bolts -arrows- and nuts -2, 3-.
- Detach intake manifold (top section) and unplug electrical connector -1- from cold-start valve - N17- .

Installing

- Renew connecting pieces for high-pressure fuel line at high-pressure fuel pump and at fuel rail.
- Fit intake manifold onto studs (left and right) on cylinder head.
- Tighten union nuts on high-pressure fuel line hand-tight.
- Install oil filter: A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ; Booklet 818 .
- Tighten intake manifold bolts to torque, working from inside to outside.
- Secure high-pressure fuel line (specified torque).
- The remaining installation steps are carried out in the reverse sequence.
- After installing intake manifold (top section), perform “Adap-tion” for engine control unit - J623- / intake manifold flap potentiometer - G336- in ⇒ Vehicle diagnostic tester, Guided Functions



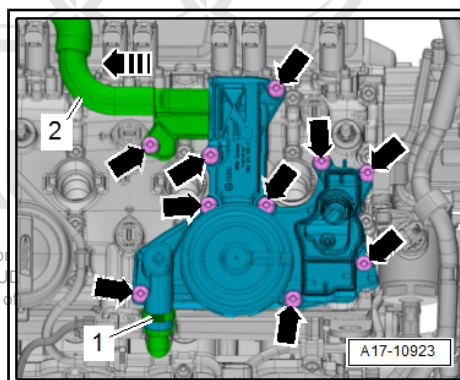
Tightening torques

- ◆ ⇒ [“4.1.2 Exploded view - intake manifold, vehicles with engine codes CFKA, CPMA, CPMB”, page 323](#)
- ◆ ⇒ [“5.1.2 Exploded view - fuel rail with injectors, vehicles with engine codes CFKA, CPMA, CPMB”, page 339](#)

4.4 Removing and installing intake manifold (bottom section)

Removing

- Remove intake manifold (top section) ⇒ [page 328](#) .
- Remove ignition coils with output stage for cylinders “2” and “3” ⇒ [page 388](#) .
- Remove bolts -arrows-.
- Detach oil separator and move to one side; to do so, press release tabs on crankcase breather pipe -1-.
- Cover open valve gear with a clean cloth.



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- Detach vacuum hose -3- and move clear.
- Move electrical wiring harness -5- clear and unplug electrical connector -4-.
- Unscrew connection -6-.
- Detach intake manifold (bottom section) -2- and unplug electrical connector -1- from intake manifold flap potentiometer - G336- .
- Install ignition coils with output stages ⇒ [page 388](#) .

Installing

- Install in reverse sequence.



Note

- ◆ *Renew seals and gaskets.*
- ◆ *Renew both connecting pieces for fuel supply line.*

- Install intake manifold (top section) ⇒ [page 328](#) .
- Install oil separator ⇒ [page 234](#)

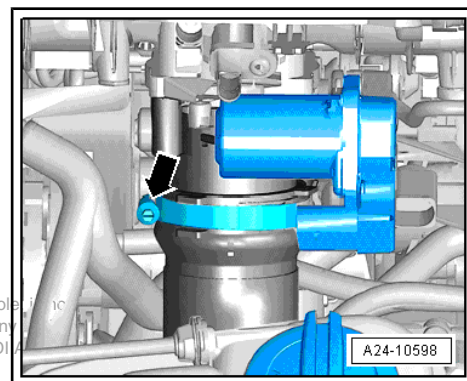
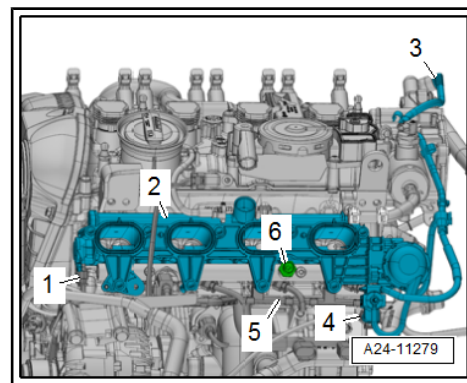
Tightening torques

- ◆ ⇒ [“4.1.2 Exploded view - intake manifold, vehicles with engine codes CFKA, CPMA, CPMB”](#), [page 323](#)
- ◆ ⇒ [“5.1.2 Exploded view - fuel rail with injectors, vehicles with engine codes CFKA, CPMA, CPMB”](#), [page 339](#)

4.5 Removing and installing throttle valve module - J338-

Removing

- Remove engine cover panel ⇒ [page 37](#) .
- Open hose clip -arrow- securing air hose and disconnect hose downwards from throttle valve module - J338- .
- Unplug electrical connector -1- from throttle valve module - J338- .



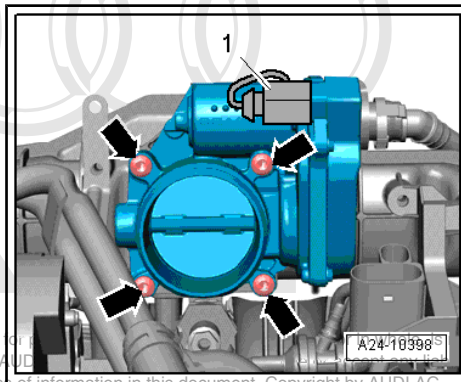
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- Remove the four bolts -arrows- from throttle valve module - J338- and detach throttle valve module - J338- .

Installing

- Install in reverse sequence.
- Clean sealing surface for seal.
- Renew seal.
- Install engine cover panel ⇒ [page 37](#) .
- After renewing throttle valve module, perform “Adaption” for engine control unit - J623- / throttle valve module - J338- in ⇒ Vehicle diagnostic tester, [Guided Functions](#)



Tightening torques

- ◆ ⇒ [“4.1 Exploded view - intake manifold”, page 320](#)

4.6 Cleaning throttle valve module



Note

Take care not to scratch the throttle valve housing when cleaning it.

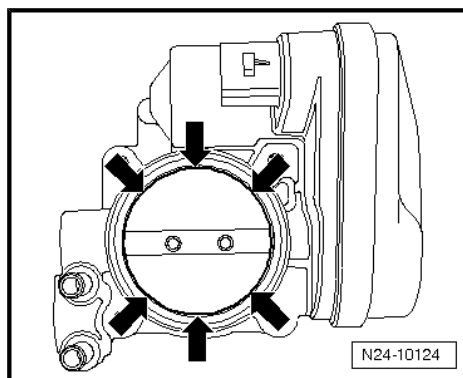
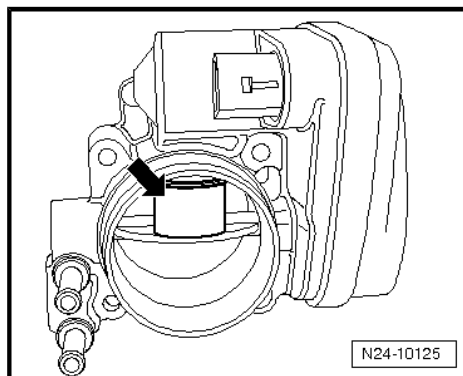
- Remove throttle valve module - J338- ⇒ [page 333](#) .
- Open throttle valve by hand and block it in the open position with a suitable object (e.g. plastic or wooden wedge) -arrow-.



WARNING

Acetone is highly flammable. Please observe all accident prevention regulations and safety precautions when handling flammable liquids. Do not use compressed air when cleaning the throttle valve. Wear safety goggles and protective clothing to avoid possible injury and skin contact.

- Clean throttle valve housing thoroughly, especially around the points -arrows- where the throttle valve closes, using commercially available acetone and a small brush.
- Wipe out throttle valve housing with a lint-free cloth.
- Allow acetone to evaporate completely and re-install throttle valve module after cleaning ⇒ [page 333](#) .
- After installing throttle valve module, perform “Adaption” for engine control unit - J623- / throttle valve module - J338- in ⇒ Vehicle diagnostic tester, [Guided Functions](#).

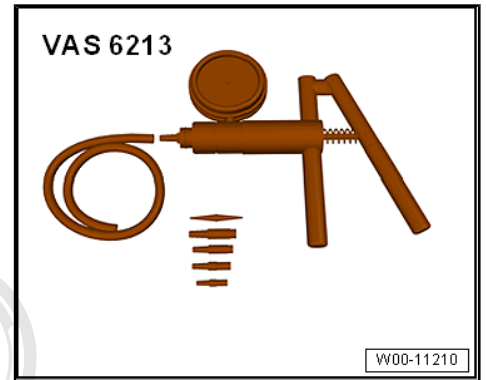


4.7 Checking intake manifold change-over function

Only perform this test if there is a loss of engine torque (poor flexibility or lack of pulling power).

Special tools and workshop equipment required

◆ Hand vacuum pump - VAS 6213-



Test condition:

- ◆ Intake manifold flap valve - N316- has been checked with a vehicle diagnostic tester.

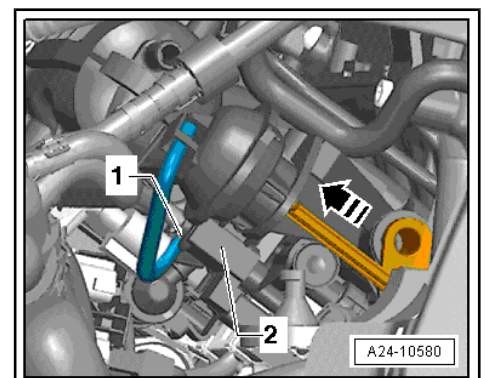
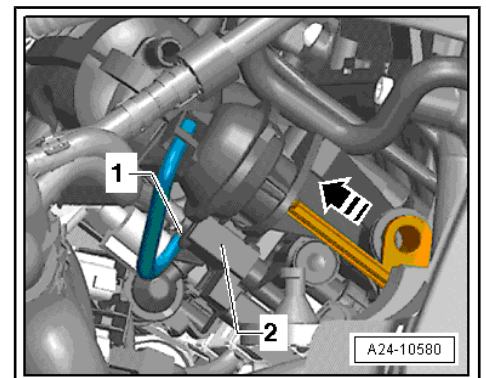
Procedure

Perform the following steps if the intake manifold flap valve - N316- is OK.

- Remove engine cover panel → [page 37](#)
- Start engine and run at idling speed.
- Have a second mechanic rev up engine quickly (short burst of throttle) and observe vacuum unit for intake manifold change-over.
- The vacuum unit should pick up -arrow-.

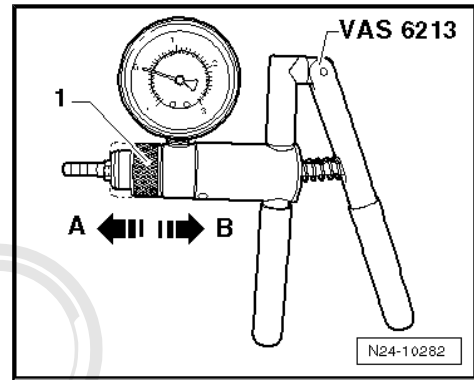
If the change-over does not operate as described:

- Check vacuum system for leaks.
- Check that change-over mechanism moves freely by operating linkage manually.
- Check proper connection of vacuum lines.
- Check vacuum hoses for porosity.
- Disconnect vacuum hose -1- leading to vacuum unit for intake manifold flap valve - N316- at intake manifold flap valve - N316- -2-.



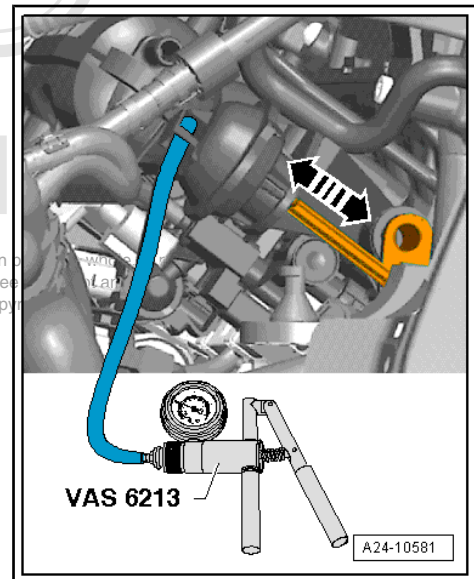


- Move adjuster ring -1- on hand vacuum pump - VAS 6213- to position -A- to select "vacuum".



- Connect hand vacuum pump - VAS 6213- to vacuum unit for intake manifold flap valve - N316- .
 - Operate the hand vacuum pump - VAS 6213- several times.
- The vacuum unit should move -arrows-.
- If vacuum unit does not move, renew vacuum unit.
 - Install engine cover panel ⇒ [page 37](#) .

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5 Injectors

⇒ ["5.1 Exploded view - fuel rail with injectors", page 337](#)

⇒ ["5.2 Removing and installing fuel rail", page 340](#)

⇒ ["5.3 Removing and installing injectors", page 341](#)

⇒ ["5.4 Cleaning injectors", page 345](#)

⇒ ["5.5 Removing and installing cold-start valve N17 ", page 346](#)

5.1 Exploded view - fuel rail with injectors

⇒ ["5.1.1 Exploded view - fuel rail with injectors, vehicles with all engine codes except CFKA, CPMA, CPMB", page 337](#)

⇒ ["5.1.2 Exploded view - fuel rail with injectors, vehicles with engine codes CFKA, CPMA, CPMB", page 339](#)

5.1.1 Exploded view - fuel rail with injectors, vehicles with all engine codes except CFKA, CPMA, CPMB

1 - High-pressure pipe

- Connections must not be damaged
- Do not alter shape
- Lubricate thread of union nut with clean engine oil
- Tighten union nut to 27 Nm

2 - Fuel rail

- Connections must not be damaged
- Removing and installing
⇒ [page 340](#)

3 - Fuel pressure sender - G247-

- Removing and installing
⇒ [page 348](#)
- Lubricate threads lightly with clean engine oil
- 27 Nm

4 - Bolt

- 5 Nm

5 - Support ring

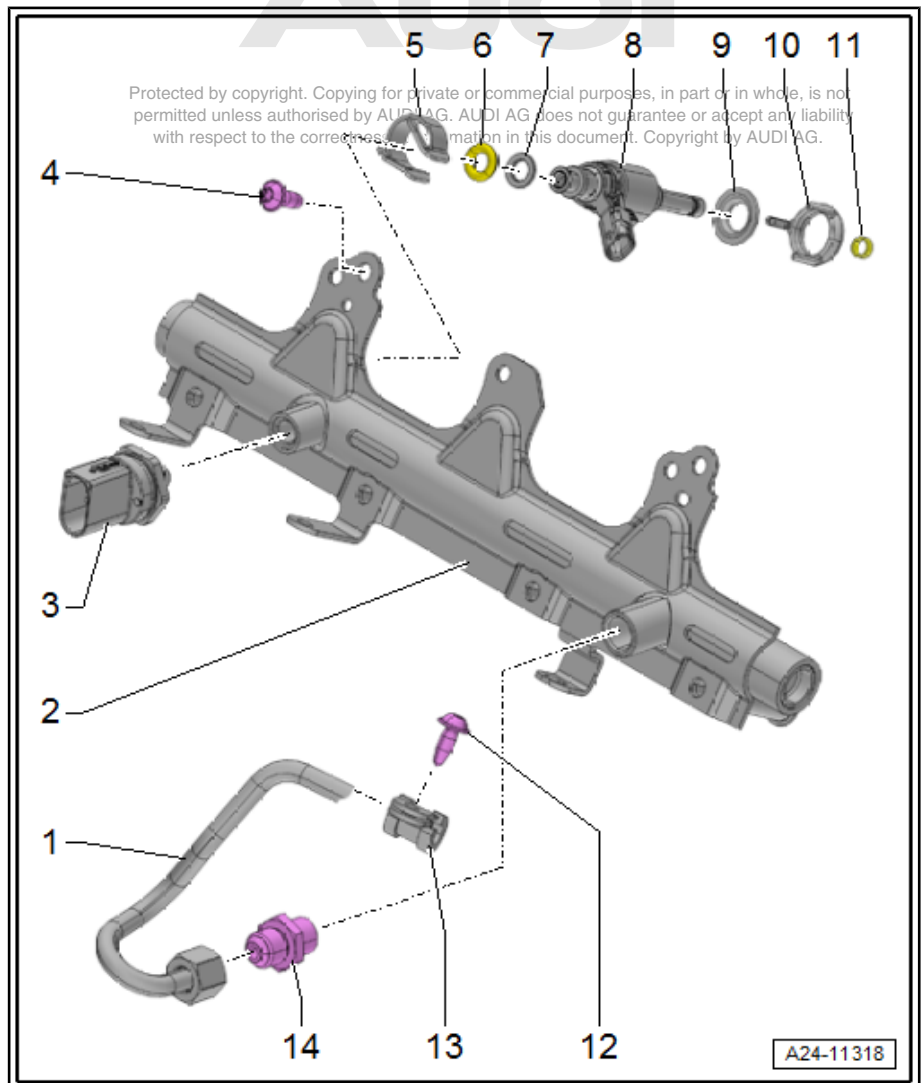
- Make sure it is correctly seated
- Via this support ring, the fuel rail exerts the force which holds the injector in the cylinder head

6 - O-ring

- Renew
- Lubricate lightly with clean engine oil

7 - Spacer ring

- Renew if damaged





8 - Injector

- Different versions; for allocation refer to ⇒ Electronic parts catalogue
- Ensure correct installation position.
- Removing and installing ⇒ [page 341](#)

9 - Sealing element

10 - Retainer

- For sealing element

11 - Combustion chamber ring seal

- Renewing ⇒ [“5.3 Removing and installing injectors”, page 341](#)

12 - Bolt

- Thread-forming
- Fit and screw in bolt by hand so that it is screwed into old thread. Then tighten bolt to torque.
- 5 Nm

13 - Retaining clamp

- For high-pressure pipe

14 - Connecting piece

- For high-pressure pipe
- Counterhold when loosening union nut
- Renew after removing
- 40 Nm



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5.1.2 Exploded view - fuel rail with injectors, vehicles with engine codes CFKA, CPMA, CPMB

1 - High-pressure pipe

- Connections must not be damaged
- Do not alter shape
- Lubricate thread of union nut with clean engine oil
- Tighten union nut to 27 Nm

2 - Fuel rail

- Connections must not be damaged
- Removing and installing ⇒ [page 340](#)

3 - Fuel pressure sender - G247-

- Removing and installing ⇒ [page 348](#)
- Lubricate threads lightly with clean engine oil
- 27 Nm

4 - Bolt

- 9 Nm

5 - Support ring

- Make sure it is correctly seated
- Via this support ring, the fuel rail exerts the force which holds the injector in the cylinder head

6 - O-ring

- Renew
- Lubricate lightly with clean engine oil

7 - Spacer ring

- Renew if damaged

8 - Injector

- Different versions; for allocation refer to ⇒ Electronic parts catalogue
- Ensure correct installation position.
- Removing and installing ⇒ [page 341](#)

9 - Sealing element

10 - Retainer

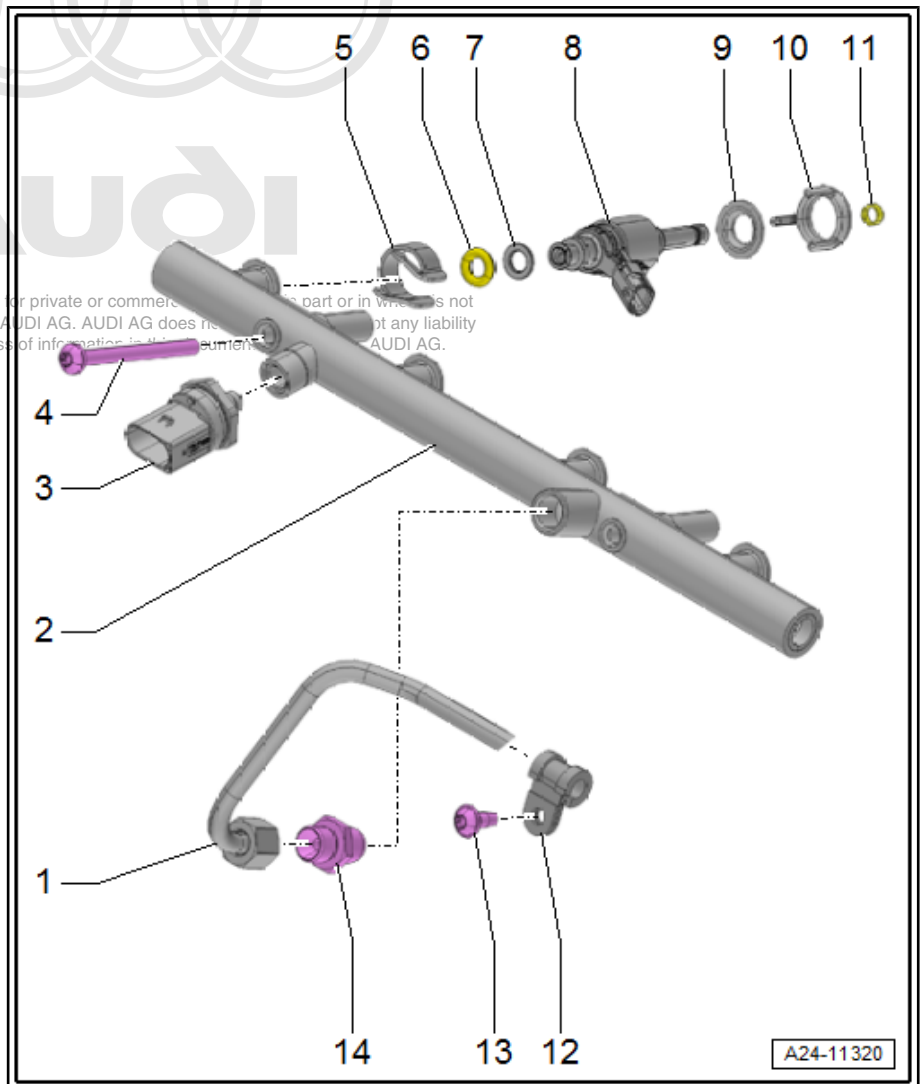
- For sealing element

11 - Combustion chamber ring seal

- Renewing ⇒ ["5.3 Removing and installing injectors", page 341](#)

12 - Retaining clamp

- For high-pressure pipe



13 - Bolt

- 5 Nm

14 - Connection

- For high-pressure pipe
- Counterhold when loosening union nut
- Renew after removing
- 40 Nm

5.2 Removing and installing fuel rail

⇒ [“5.2.1 Removing and installing fuel rail - vehicles with all engine codes except CFKA, CPMA, CPMB”, page 340](#)

⇒ [“5.2.2 Removing and installing fuel rail - vehicles with engine codes CFKA, CPMA, CPMB”, page 340](#)

5.2.1 Removing and installing fuel rail - vehicles with all engine codes except CFKA, CPMA, CPMB

Removing

- Remove intake manifold
⇒ [“4.2 Removing and installing intake manifold”, page 325](#) .
- Remove bolts -arrows-.
- Detach fuel rail from intake manifold.



Note

Disregard -item 1-.

Installing

- Installation is carried out in the reverse order; note the following:
- Always renew both connecting pieces for fuel supply line.
- Connect and tighten fuel line.
- Plug electrical connector back in.
- Install intake manifold
⇒ [“4.2 Removing and installing intake manifold”, page 325](#) .

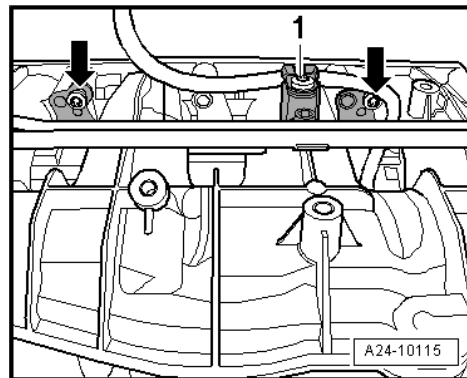
Tightening torques

- ◆ ⇒ [“5.1.1 Exploded view - fuel rail with injectors, vehicles with all engine codes except CFKA, CPMA, CPMB”, page 337](#)

5.2.2 Removing and installing fuel rail - vehicles with engine codes CFKA, CPMA, CPMB

Removing

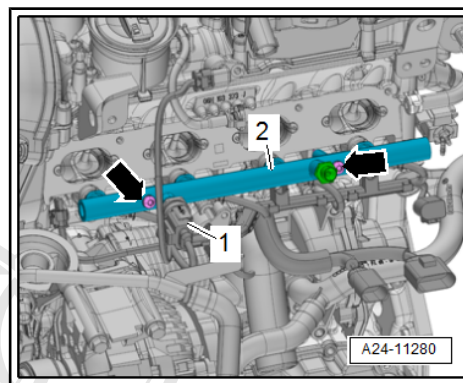
- Remove intake manifold (bottom section) ⇒ [page 332](#) .



- Unplug electrical connector -1- at fuel pressure sender - G247- .
- Remove bolts -arrows- and pull fuel rail off injectors.

 **Note**

The injectors can remain in the fuel rail. Unplug electrical connector from corresponding injector.



Installing

- Install in reverse sequence.

 **Note**

Make sure that injectors are installed correctly.

- Install intake manifold (bottom section) => [page 332](#) .

Tightening torques

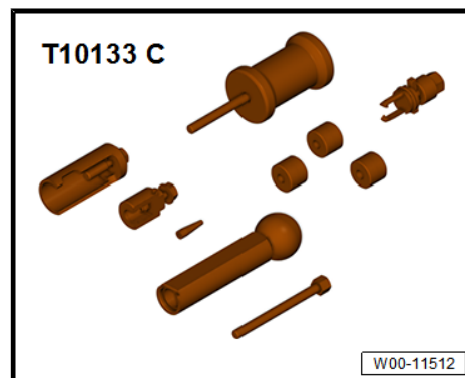
- ◆ => ["5.1.2 Exploded view - fuel rail with injectors, vehicles with engine codes CFKA, CPMA, CPMB", page 339](#) .

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5.3 Removing and installing injectors

Special tools and workshop equipment required

- ◆ Tool set for FSI engines - T10133 C-



 **Note**

Special tool T10133/2 (puller) has been modified and now has the designation puller T10133/2 A . If you have not yet received the new tool you can make the modification yourself.

Modifying puller T10133/2 to make it equivalent to puller T10133/2 A

Special tools and workshop equipment required

- ◆ Round file, approx. 6 mm
- File out a semi-circular recess as shown in the illustration. The recess allows the tool to be pushed further onto the injector so the contact surface is increased.



- For identification purposes, mark the modified tool with the letter "A" after the tool number.

Removing

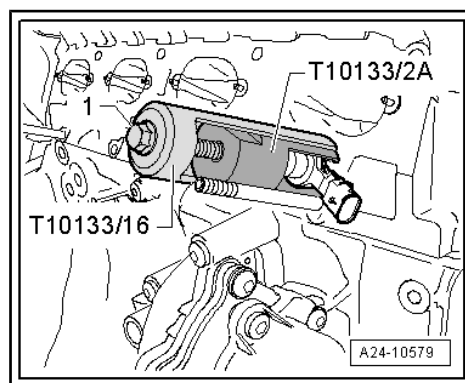
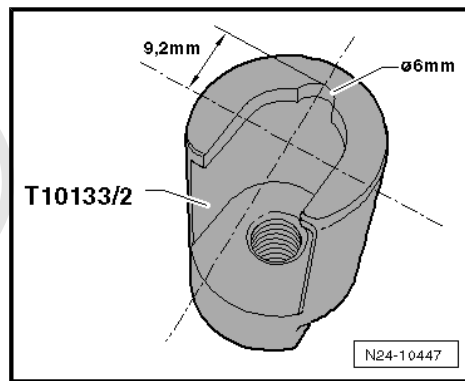
- Vehicles with all engine codes except CFKA, CPMA, CPMB: Remove intake manifold ⇒ [page 325](#) .
- Vehicles with engine codes CFKA, CPMA, CPMB: Remove fuel rail ⇒ [page 340](#) .



Note

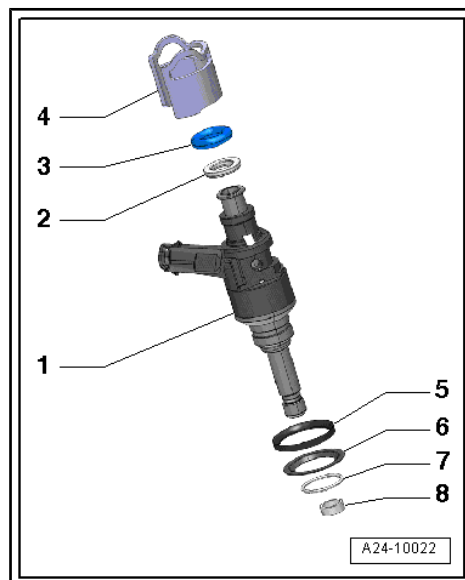
Carefully pull out any injectors that remain lodged in the fuel rail.

- Cover open inlet ports with a clean cloth.
- **Unplug electrical connector on injector that is to be removed and pull off support ring.**
- Guide puller -T10133/2A- into groove on injector.
- Then attach removal tool -T10133/16- and pull out injector by turning bolt -1-.



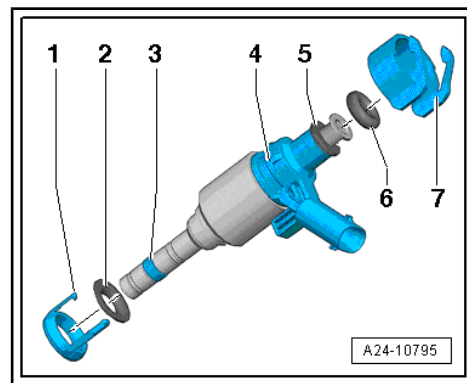
Injector (old version)

- 1 - Injector
- 2 - Spacer ring - renew
- 3 - O-ring - renew (apply thin coating of clean engine oil prior to installation)
- 4 - Support ring - renew (via this support ring, fuel rail exerts force which secures injector in cylinder head)
- 5 - Intermediate ring/retaining ring (top) - note installation position; renew if visibly damaged or worn (no longer available; replaced with an intermediate ring - see next illustration ⇒ [page 343](#))
- 6 - Intermediate ring/retaining ring (bottom) - note installation position; renew if visibly damaged or worn (no longer available; replaced with an intermediate ring - see next illustration ⇒ [page 343](#))
- 7 - Circlip - do not stretch (no longer available; replaced with a retaining ring - see next illustration ⇒ [page 343](#))
- 8 - Combustion chamber ring seal (teflon ring seal) - renew; when fitting, do not grease ring or use any other lubricant. Carefully remove old combustion chamber ring seal. To do so, cut open combustion chamber ring seal using knife or prise open with small screwdriver and then pull off forwards. Take care not to damage groove on injector. Injector must be renewed if groove is damaged.



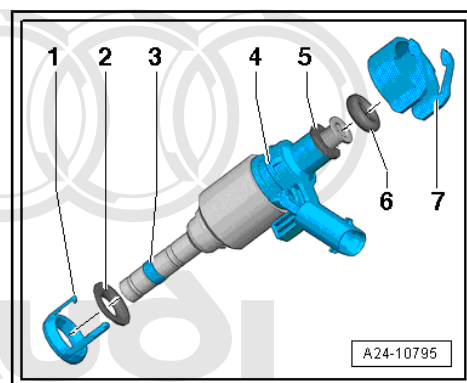
Injector (new version)

- 1 - Retaining ring - renew (combined as a unit with intermediate ring -2-)
- 2 - Intermediate ring - renew (combined as a unit with retaining ring -1-)
- 3 - Combustion chamber ring seal (teflon ring seal) - renew; when fitting, do not grease ring or use any other lubricant
- 4 - Injector
- 5 - Spacer ring - renew
- 6 - O-ring - renew (apply thin coating of clean engine oil prior to installation)
- 7 - Support ring - renew (via this support ring, fuel rail exerts force which secures injector in cylinder head)



Dismantling injector

- Pull O-ring -6- and spacer ring -5- off injector -4-.
- Unclip sealing element -1-.
- Carefully remove old combustion chamber ring seal -3-. To do so, cut open combustion chamber ring seal using knife or prise open with small screwdriver and then pull off forwards.



Note

Take care not to damage groove on injector. Injector must be renewed if groove is damaged.

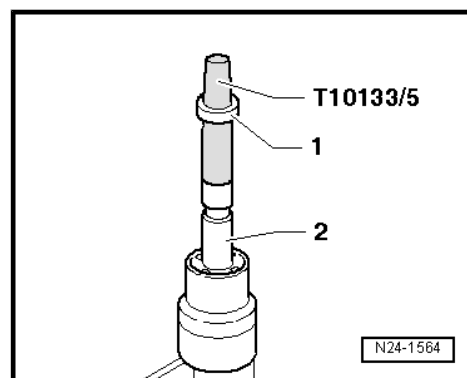
Installing



Note

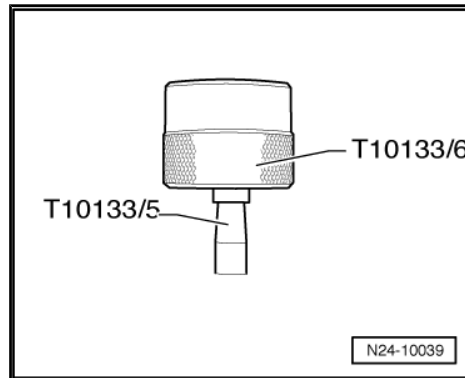
- ◆ *Renew sealing element, combustion chamber ring seal and O-ring.*
- ◆ *Renew spacer ring if damaged.*
- ◆ *Lubricate O-rings of injectors lightly with clean engine oil.*
- Before new combustion chamber ring seal is fitted, any combustion residue must be removed from ring groove and injector stem using a clean cloth.
- Fit assembly cone -T10133/5- with new combustion chamber ring seal -1- onto injector -2-.

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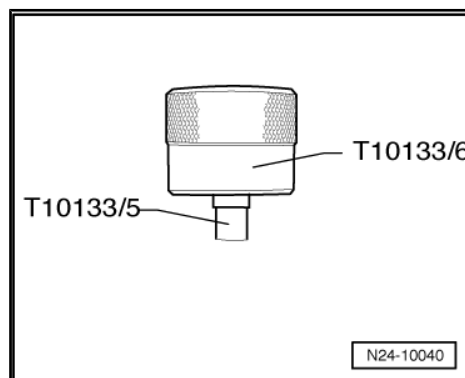




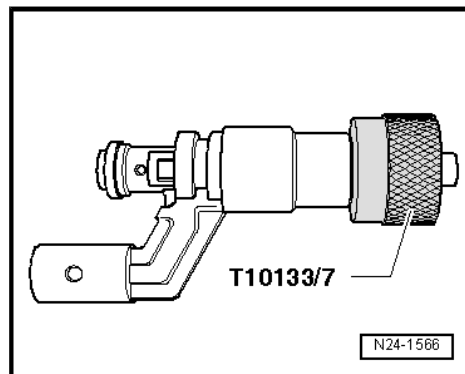
- Using assembly sleeve -T10133/6- , push combustion chamber ring seal onto assembly cone -T10133/5- as far as it will go.



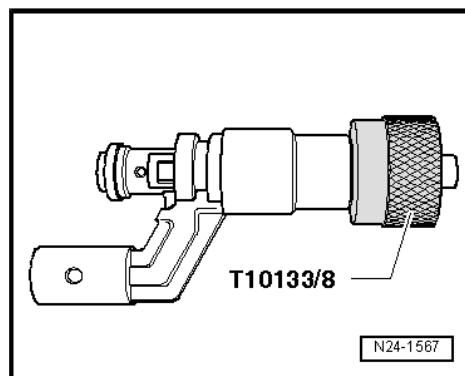
- Turn assembly sleeve - T10133/6- upside down and push combustion chamber ring seal to end of assembly cone - T10133/5- .
- Remove assembly cone - T10133/5- and push combustion chamber ring seal into sealing ring groove using assembly sleeve - T10133/6- .



- Push calibration sleeve -T10133/7- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).
- Pull calibration sleeve -T10133/7- off again by turning it in the opposite direction.



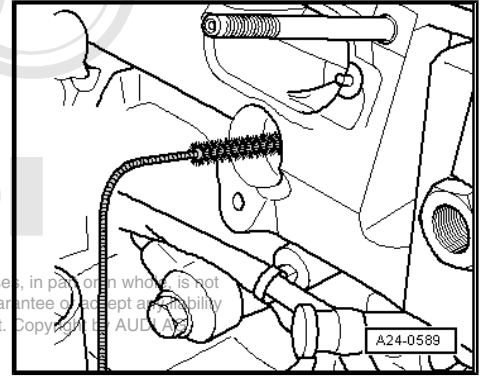
- Push calibration sleeve -T10133/8- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).
- Pull calibration sleeve -T10133/8- off again by turning it in the opposite direction.
- Fully assemble injector using parts from repair kit.



Note

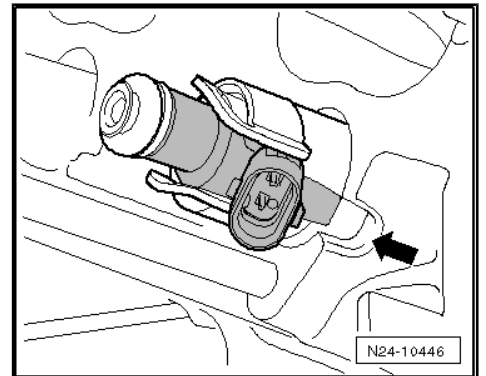
- ◆ *The combustion chamber ring seal on the injector must not be oiled or greased.*
- ◆ *Make sure that there is no cleaning fluid or oil in the holes in the cylinder head when installing the injectors.*

- Before installing injectors, thoroughly clean apertures for injectors in cylinder head using supplied nylon brush - T10133/4- .



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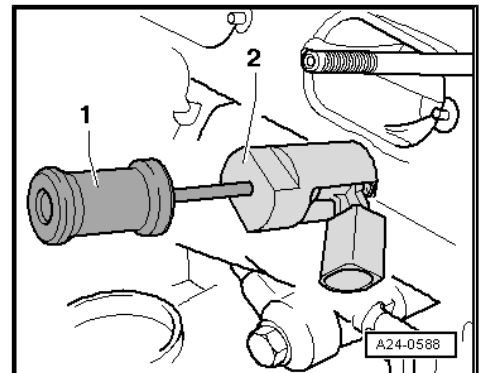
- Press injector by hand as far as it will go into aperture in cylinder head (aperture must be free of oil and grease). Ensure that the injector is properly seated -arrow- in the cylinder head.



Note

If the injector cannot be pushed in by hand, use puller - T10133/2A- -2- with striker - T10133/3- to insert the injector.

- Fit support ring onto injector.
- Lightly lubricate O-rings for injectors with clean engine oil.
- Position fuel rail on injectors and press into place evenly.
- Vehicles with all engine codes except CFKA, CPMA, CPMB: Install intake manifold ⇒ [page 325](#) .
- Vehicles with engine codes CFKA, CPMA, CPMB: Install fuel rail ⇒ [page 340](#) .



5.4 Cleaning injectors

Special tools and workshop equipment required

- ◆ Ultrasonic cleaning unit - VAS 6418-
- ◆ Mounting plate for injection modules - VAS 6418/1-
- ◆ Cleaning fluid - VAS 6418/2-

Cleaning

- Close drain tap -arrow- on ultrasonic cleaning unit - VAS 6418- (located on right side of housing).
- Fill ultrasonic unit with 2,120 ml of water which has been allowed to settle for a few minutes and cleaning fluid - VAS 6418/2- .

Mixture ratio for cleaning fluid

- 2,100 ml of tap water which has been allowed to settle for a few minutes and 20 ml of cleaning fluid - VAS 6418/2-
- Remove injectors ⇒ [page 341](#) .

- Place mounting plate for injection modules - VAS 6418/1- on top of cleaning unit.



WARNING

It is important to read the safety notes in the operating instructions before switching on the ultrasonic cleaning unit - VAS 6418- .

The ideal fluid level is approx. 1-4 mm above the base of the mounting plate. The ultrasonic cleaning unit - VAS 6418- can be damaged if the fluid level is too low.

- Insert FSI injectors all the way into guides of mounting plate for injection modules - VAS 6418/1- .
- Switch on cleaning unit by pressing on/off button -C-.
- Select a cleaning time of 30 minutes with rotary control -A-.
- Set rotary control -B- to a temperature of 50°C.
- Press button -D- to start cleaning procedure.



Note

- ◆ *The temperature-controlled cleaning process is now started. While the fluid is being heated, the ultrasound is activated at intervals in order to circulate the cleaning solution. The ultrasound is activated continuously when the preselected temperature is reached.*
- ◆ *The actual cleaning process commences when the temperature reaches at least 50 °C and must last for at least 30 minutes.*

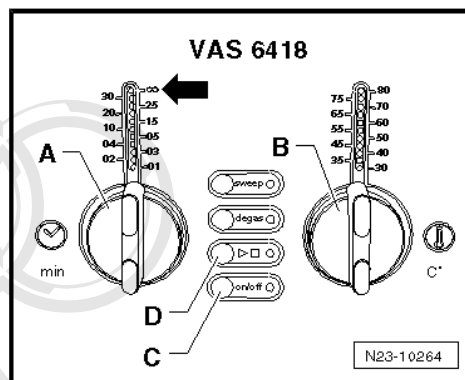
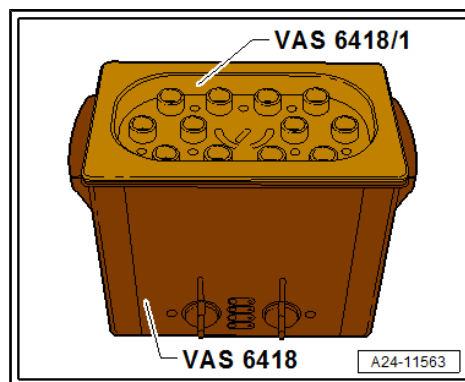
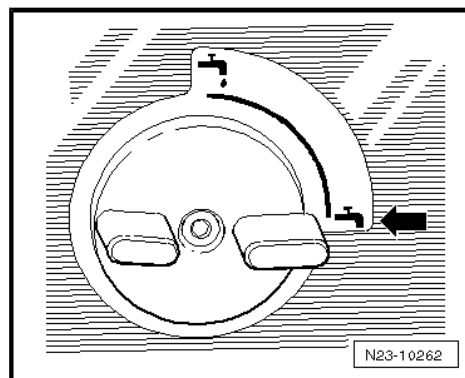
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- Install injectors with new combustion chamber seal ⇒ [page 341](#) .

5.5 Removing and installing cold-start valve - N17-

Removing

- Remove intake manifold (top section) ⇒ [page 328](#) .



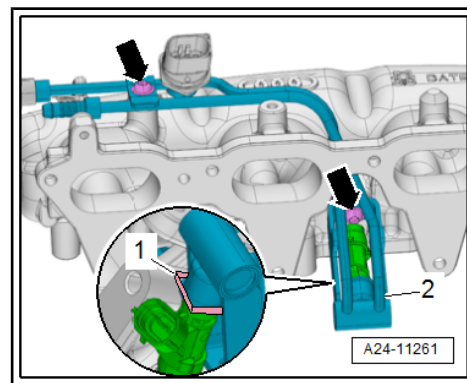
- Pull off retaining clip -1-.
- Remove bolts -arrows- and disconnect fuel lines with bracket -2- from cold-start valve - N17- .
- Disconnect cold-start valve - N17- from intake manifold (top section)/from bracket with fuel lines.

Installing

- Install in reverse sequence.
- Install intake manifold (top section) ⇒ [page 328](#) .

Tightening torques

- ◆ ⇒ ["5.1.2 Exploded view - fuel rail with injectors, vehicles with engine codes CFKA, CPMA, CPMB"](#), [page 339](#)



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6 Senders and sensors

⇒ [“6.1 Removing and installing fuel pressure sender G247”, page 348](#)

⇒ [“6.2 Checking fuel pressure sender G247”, page 349](#)

⇒ [“6.3 Removing and installing air mass meter”, page 351](#)

⇒ [“6.4 Removing and installing intake air temperature sender G42”, page 352](#)

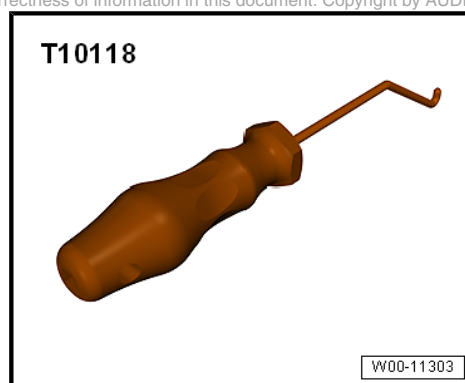
6.1 Removing and installing fuel pressure sender - G247-

If the fuel pressure sender - G247- fails, the fuel metering valve - N290- or fuel pressure regulating valve - N276- is switched off, the electric fuel pump is activated fully and the engine is operated with the fuel pressure which remains. This will reduce engine torque considerably.

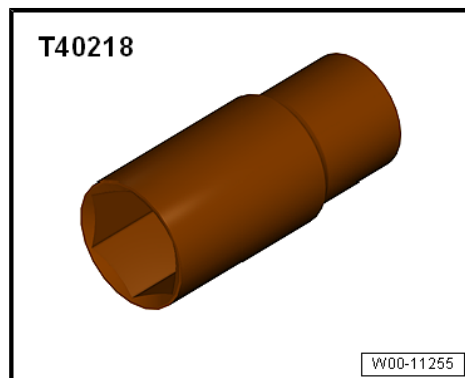
Special tools and workshop equipment required

- ◆ Assembly tool - T10118-

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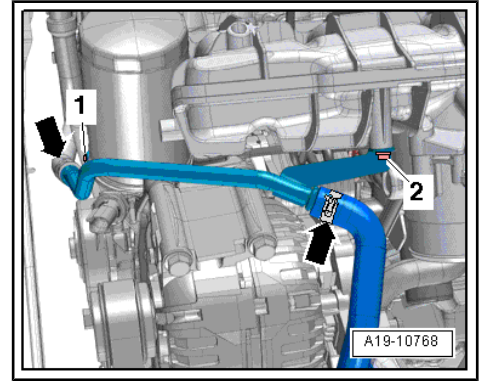
- ◆ Bit (27 mm) - T40218- or commercially available socket (27 mm)




Removing

- Remove engine cover panel ⇒ [page 37](#) .

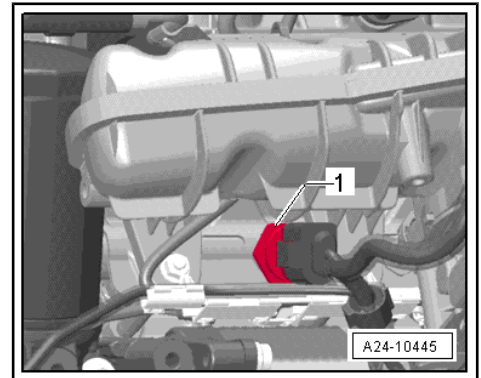
- Remove bolts -1, 2- and push coolant pipe to side with coolant hoses -arrows- connected.



 **WARNING**

The fuel system is pressurised.
Risk of injury as fuel may spray out.

- *Put on safety goggles.*
- *Put on protective gloves.*
- *Release pressure (wrap clean cloth around connection and open connection carefully).*



- Release electrical connector at fuel pressure sender - G247- -item 1- using assembly tool - T10118- .
- Unscrew fuel pressure sender using bit, 27 mm - T40218- .

 **Note**

Installation position varies depending on engine version

Installing

- Install in reverse sequence.

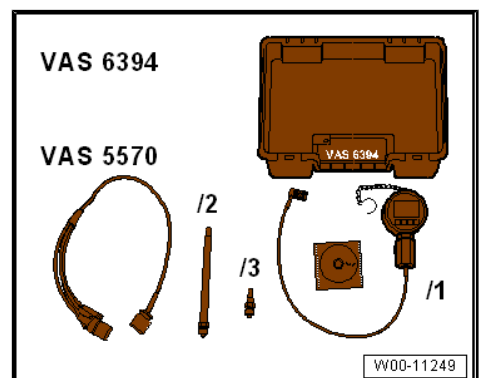
Tightening torques

- ◆ ⇒ ["5.1 Exploded view - fuel rail with injectors", page 337](#)

6.2 Checking fuel pressure sender - G247-

Special tools and workshop equipment required

- ◆ Vehicle diagnostic tester
- ◆ **Test instrument adapter - VAS 5570-**
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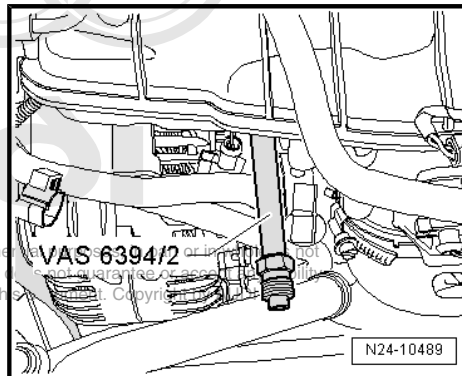




- ◆ Pressure sensor tester - VAS 6394-
- ◆ Adapter - VAS 6394/2-

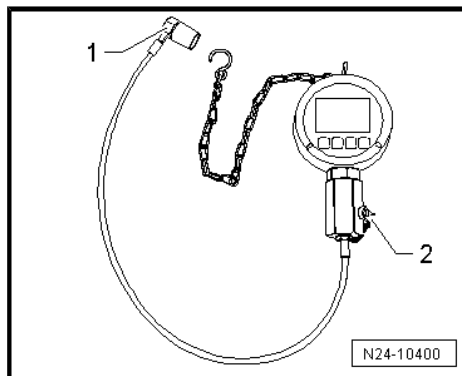
Procedure

- Remove engine cover panel ⇒ [page 37](#) .
- Remove fuel pressure sender - G247- ⇒ [page 348](#) .
- Screw in adapter - VAS 6294/2- in place of fuel pressure sender - G247- and tighten adapter with the same torque as that specified for fuel pressure sender - G247- .

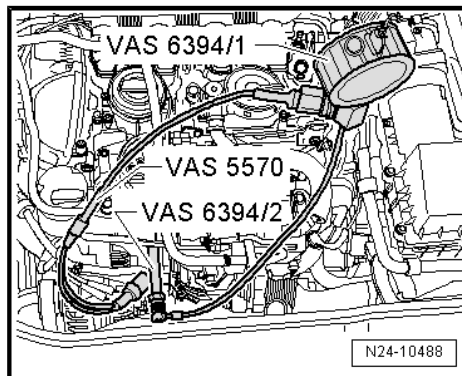


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- Unscrew plug -2- on pressure sensor tester - VAS 6394/1- and screw in the removed fuel pressure sender - G247- . Tighten to torque normally specified for fuel pressure sender.



- Use test instrument adapter - VAS 5570- to make electrical connection between vehicle and fuel pressure sender - G247- .
- Connect a ⇒ Vehicle diagnostic tester.
- Switch on ignition.
- Select "Engine electronics" in vehicle self-diagnosis.
- Then select "Measured values".
- Select "Fuel pressure" from the list.



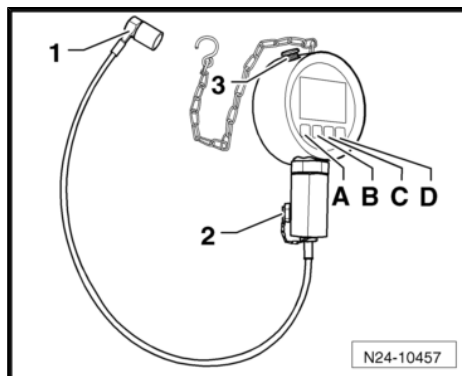
The actual pressure value being transmitted to the engine control unit by the fuel pressure sender - G247- is displayed.

- Switch on pressure sensor tester - VAS 6394/1- by pressing button -A- once briefly.

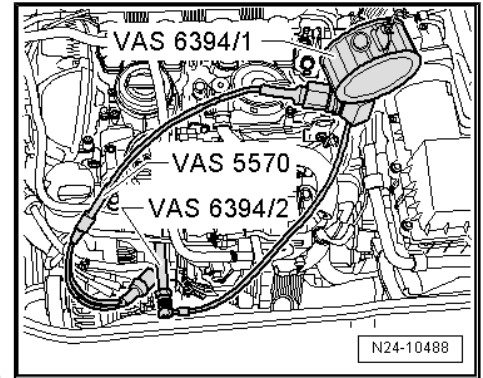
 **Note**

You can press and hold button -A- for 2 seconds to switch on the illumination for 20 seconds.

Pressure sensor tester - VAS 6394/1- should indicate 0 bar. If this is not the case, press button -C- once briefly to zero the tester.



- Connect pressure line of pressure sensor tester - VAS 6394/1- to adapter - VAS 6394/2- .
- Start the engine.
- Compare the pressure indicated by the pressure sensor tester - VAS 6394/1- with the actual pressure value on the ⇒ Vehicle diagnostic tester.
- The pressure readings must not deviate by more than 5 bar.
- If the deviation is more than 5 bar, test a new fuel pressure sender - G247- .
- Screw a new fuel pressure sender - G247- into the pressure gauge - VAS 6394/1- .
- Repeat the test with the new fuel pressure sender - G247- and compare the two pressure values.



If the two values still do not agree:

- Check the electrical connection between the fuel pressure sender - G247- and the engine control unit; refer to ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

If the values agree:

- Install the new fuel pressure sender - G247- ⇒ [page 348](#) .

Tightening torques

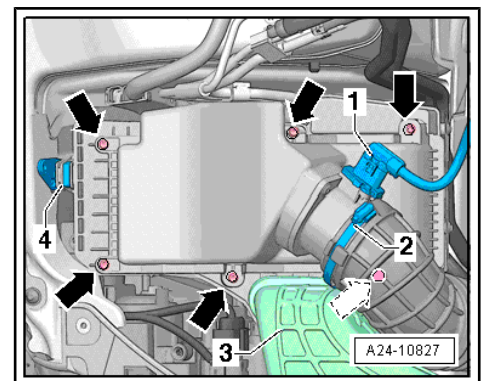
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- ◆ ⇒ ["5.1 Exploded view - fuel rail with injectors" page 337](#)

6.3 Removing and installing air mass meter

Removing

- Detach electrical connector -1- from air mass meter - G70- .
- Open hose clip -2- on air hose leading to turbocharger and disconnect hose at air mass meter - G70- .





- Unscrew bolts -arrows- for air mass meter - G70- .
- Then carefully pull air mass meter - G70- out of guide on air cleaner housing.

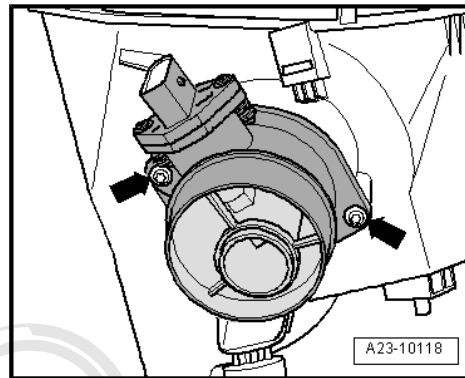
Installing

To ensure the correct function of the air mass meter - G70- , it is important to observe the following notes and instructions.



Note

- ◆ *If the air filter element is very dirty or wet, dirt particles or water can reach the air mass meter - G70- and falsify the detected air mass values. This will cause a loss of power, as the calculated injection quantities will be too low.*
- ◆ *Always use genuine air filter elements (same as original equipment).*
- ◆ *Use a silicone-free lubricant when installing the air hose.*
- ◆ *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- Check for salt residue, dirt and leaves in air mass meter and air intake hose (engine intake side).
- Check intake duct as far as air filter element for dirt. If necessary, clean salt residue, dirt and leaves out of air cleaner housing (top and bottom sections); wash out or use a vacuum cleaner as required.



The remaining installation steps are carried out in the reverse sequence.

6.4 Removing and installing intake air temperature sender - G42-

Removing

- Remove engine cover panel ⇒ [page 37](#) .
- Unplug electrical connector -1-.
- Unscrew bolt and detach intake air temperature sender - G42- .



Note

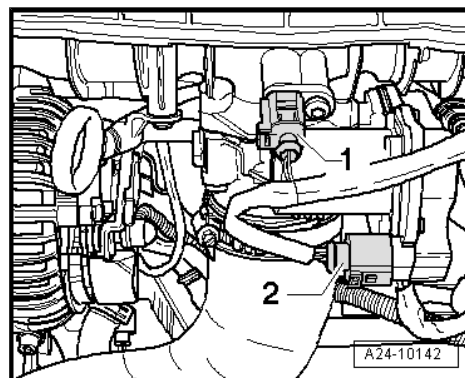
- ◆ *Installation position varies depending on engine version*
- ◆ *Disregard -item 2-.*

Installing

- Installation is carried out in the reverse order; note the following:
- Install engine cover panel ⇒ [page 37](#) .

Tightening torques

- ◆ ⇒ [“4.1 Exploded view - intake manifold”, page 320](#)



7 High-pressure pump

⇒ "7.1 Exploded view - high-pressure pump", page 353

⇒ "7.2 Removing and installing high-pressure pump", page 354

7.1 Exploded view - high-pressure pump

1 - Quick release coupling

- With cut-off valve

2 - Electrical connector

3 - Fuel metering valve - N290- or fuel pressure regulating valve - N276-

- Fuel metering valve - N290- or fuel pressure regulating valve - N276- may be fitted, depending on version
- Integrated in high-pressure pump; cannot be renewed separately

4 - High-pressure pump

- With fuel metering valve - N290- or fuel pressure regulating valve - N276- (do not loosen)
- Observe rules for cleanliness when installing ⇒ page 5
- Removing and installing ⇒ page 354
- Take care not to tilt when installing

5 - O-ring

- Renew after removing
- Lubricate lightly with engine oil

6 - Roller tappet

- May remain lodged in vacuum pump when high-pressure pump is removed

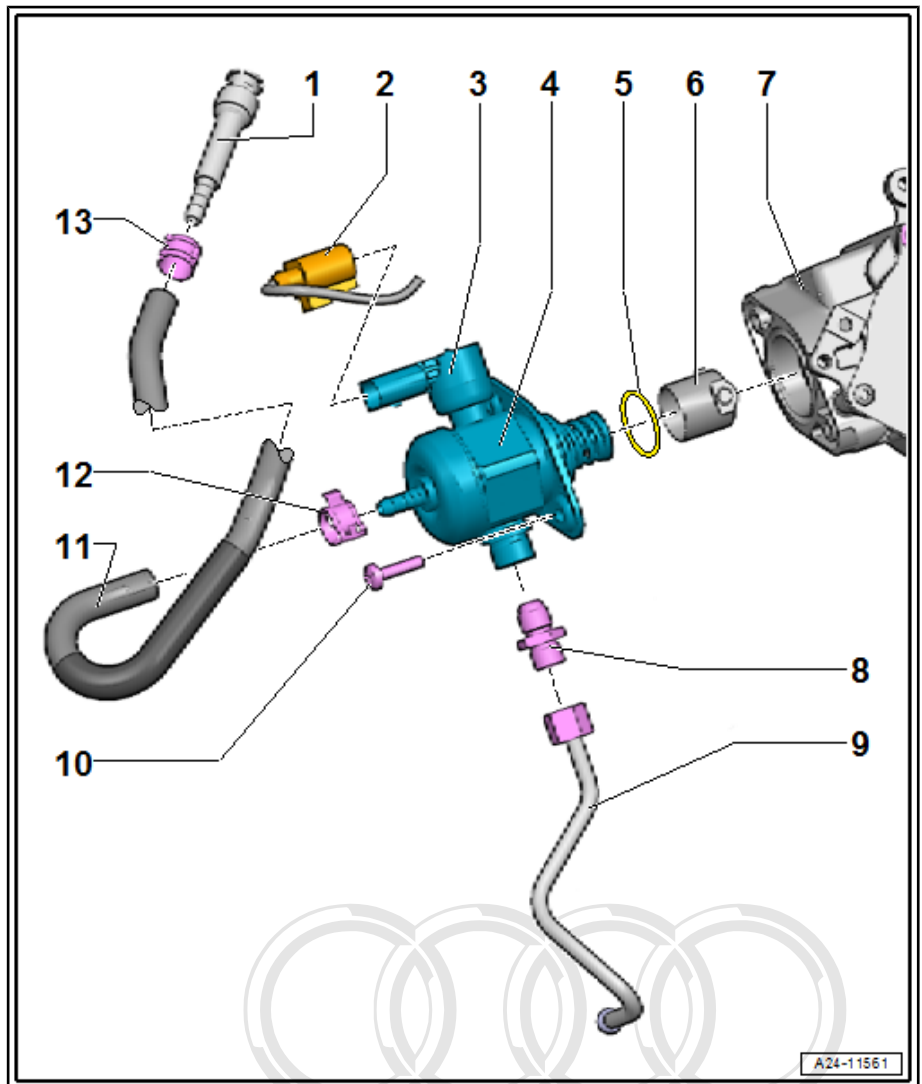
7 - Vacuum pump

8 - Connection

- For high-pressure pipe
- Counterhold when loosening union nut
- Must always be renewed once loosened
- 40 Nm

9 - High-pressure pipe

- Do not alter shape
- Install so that parts are free of tension
- Lubricate thread of union nut with clean engine oil
- Tighten union nut to 27 Nm



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10 - Bolt

- M6; renew
- Tightening torque and sequence ⇒ [page 354](#)

11 - Fuel supply hose

- From fuel tank

12 - Spring-type clip

- Renew

13 - Spring-type clip

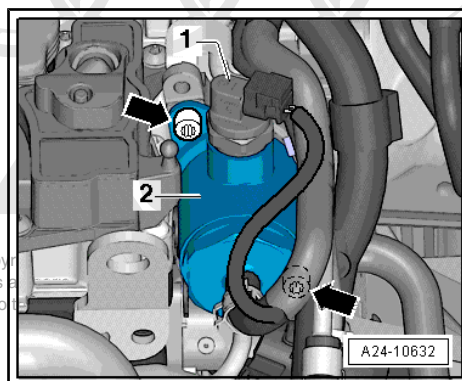
- Renew

High-pressure pump - tightening torque and sequence

To prevent flange of high-pressure pump from being deformed during installation, fit high-pressure pump as follows:

– Tighten bolts in stages as follows:

Stage	Bolts	Tightening torque
1.	-arrows-	Screw in by hand until contact is made
2.	-arrows-	Tighten one turn alternately until flange of high-pressure pump makes contact with vacuum pump
3.	-arrows-	M6 bolt: 8 Nm + 90°; renew bolts after removal M8 bolt: 20 Nm



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7.2 Removing and installing high-pressure pump



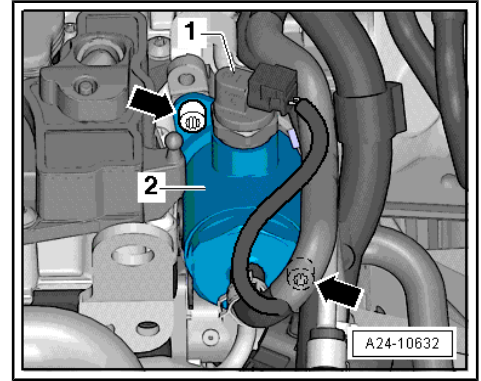
Note

- ◆ *The high-pressure fuel pump may only be removed and installed when the engine is cold.*
- ◆ *When installing the high-pressure fuel pump, it is essential to ensure that no dirt enters the fuel system.*
- ◆ *Use a cloth to catch escaping fuel.*
- ◆ *The O-ring must always be renewed.*
- ◆ *Always ensure that the high-pressure fuel pipes are free of tension when tightening the connections.*

Removing

- Remove engine cover panel ⇒ [page 37](#) .

- Unplug electrical connector -1-.

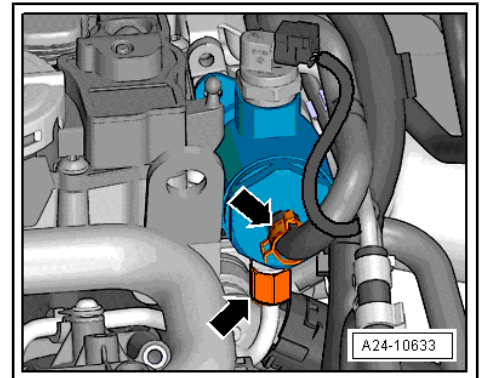


WARNING

The fuel system is pressurised.

Risk of injury as fuel may spray out.

- *Put on safety goggles.*
- *Put on protective gloves.*
- *Release pressure (wrap clean cloth around connection and open connection carefully).*



- Disconnect both fuel lines -arrows-.



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- Remove 2 bolts -arrows-.
- Carefully pull out high-pressure pump. It is possible that the roller tappet may remain lodged in the vacuum pump.

Installing

- Renew O-ring for high-pressure pump.
- Fit roller tappet in vacuum pump (check roller tappet for damage first).



Note

- ◆ *The roller tappet must be positioned at the lowest point when installing the high-pressure pump.*
- ◆ *When installing a used high-pressure pump, the connecting piece for the fuel supply line (high-pressure section of the system) must be renewed.*

- Turn crankshaft until roller tappet is positioned at lowest point.
- Fit high-pressure pump in vacuum pump.
- Tighten bolts in stages ⇒ [page 354](#) .



Note

The high-pressure pump can be damaged if it is tightened too much on one side (keep it straight).

- Tighten union nut on high-pressure pipe hand-tight initially. Position high-pressure pipe so it is free of stress and tighten union nut.

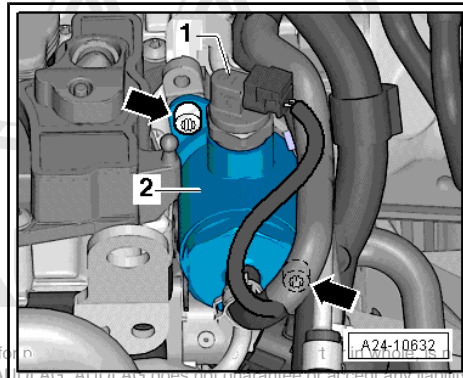


Note

Check fuel system for leaks.

Tightening torques

- ◆ ⇒ [“7.1 Exploded view - high-pressure pump”, page 353](#)
- ◆ ⇒ [Fig. “High-pressure pump - tightening torque and sequence”, page 354](#)



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8 Lambda probe

⇒ ["8.1 Exploded view - Lambda probe", page 357](#)

⇒ ["8.2 Removing and installing Lambda probe", page 358](#)

8.1 Exploded view - Lambda probe

1 - Nut

- Tightening torque
⇒ [Item 1 \(page 383\)](#)

2 - Gasket

- Renew

3 - Turbocharger

4 - Lambda probe - G39- and Lambda probe heater - Z19-

- Allocation ⇒ Electronic parts catalogue
- The threads on the new Lambda probes are coated with a special assembly paste.
- If re-installing old Lambda probe, coat thread with high-temperature paste: Refer to ⇒ Electronic parts catalogue for high-temperature paste
- The assembly paste/ high-temperature paste must not get into the slots on the Lambda probe body
- Removing and installing
⇒ [page 358](#)
- 55 Nm

5 - Lambda probe after catalytic converter - G130- and Lambda probe heater 1 after catalytic converter - Z29-

- Allocation ⇒ Electronic parts catalogue
- The threads on the new Lambda probes are coated with a special assembly paste.
- If re-installing old Lambda probe, coat thread with high-temperature paste: Refer to ⇒ Electronic parts catalogue for high-temperature paste
- The assembly paste/high-temperature paste must not get into the slots on the Lambda probe body
- Removing and installing ⇒ [page 359](#)
- 55 Nm

6 - Catalytic converter

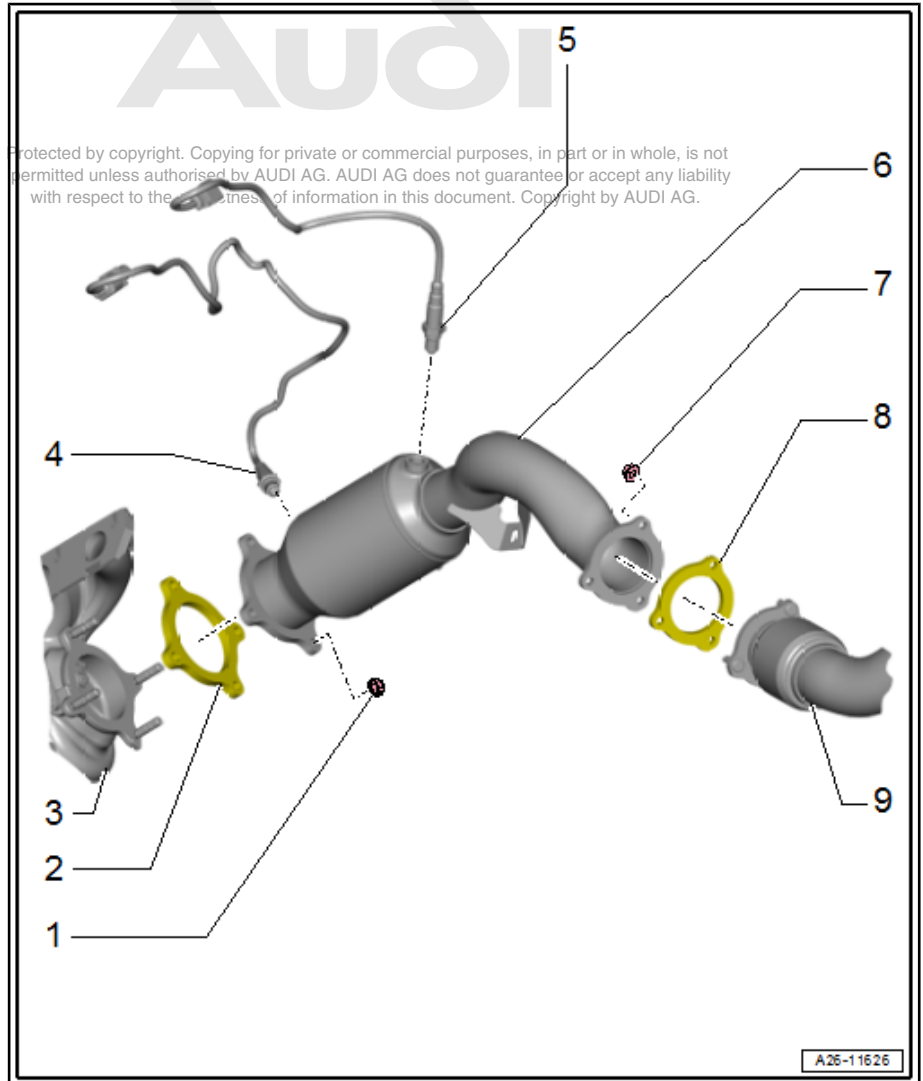
- Removing and installing ⇒ [page 384](#)

7 - Nut

- Tightening torque ⇒ [Item 7 \(page 383\)](#)

8 - Gasket

- Renew





9 - Front silencer

8.2 Removing and installing Lambda probe

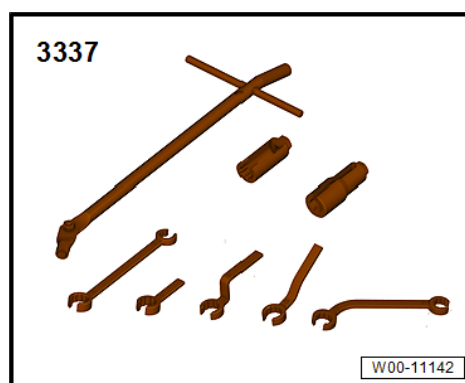
⇒ ["8.2.1 Removing and installing Lambda probe G39", page 358](#)

⇒ ["8.2.2 Removing and installing Lambda probe after catalytic converter G130", page 359](#)

8.2.1 Removing and installing Lambda probe - G39-

Special tools and workshop equipment required

- ◆ Lambda probe open ring spanner set - 3337-



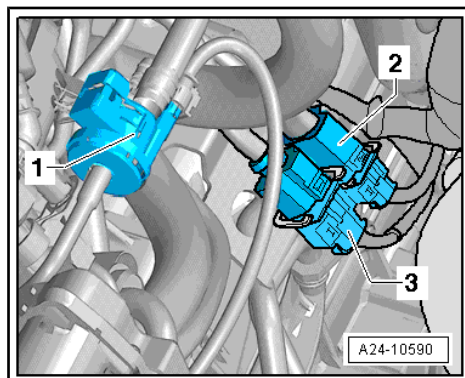
Removing

Bracket for electrical connectors, version 1:

- Unplug electrical connector -3- for Lambda probe - G39- and Lambda probe heater - Z19- .

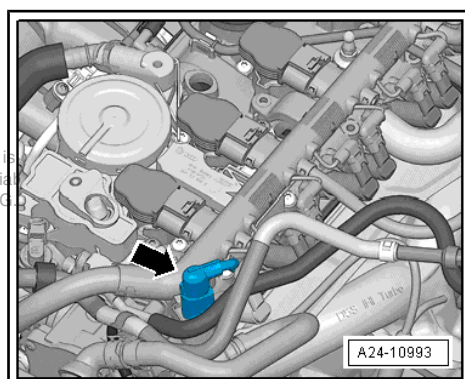
Note

Disregard items -1 and 2-.



Bracket for electrical connectors, version 2:

- Unplug electrical connector -arrow- for Lambda probe - G39- and Lambda probe heater - Z19- .



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Continued for all vehicles:

- Unscrew Lambda probe - G39- -2- using tool from Lambda probe open ring spanner set - 3337- .

Installing

When installing, note the following:

 **Note**

- ◆ *Threads of new Lambda probes are already coated with assembly paste; the paste must not get into the slots on the probe body.*
- ◆ *In the case of a used Lambda probe grease only the thread with high-temperature paste. The paste must not get into the slots on the Lambda probe body. For high-temperature paste refer to => Parts catalogue .*
- ◆ *When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.*

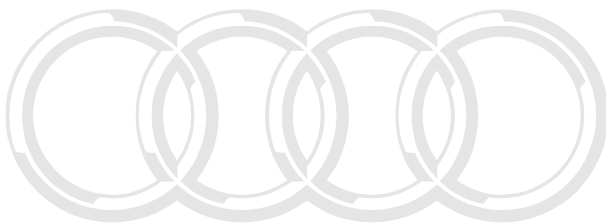
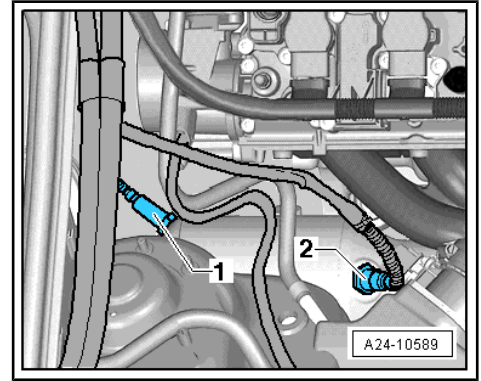
Tightening torques

- ◆ => ["8.1 Exploded view - Lambda probe", page 357](#)

8.2.2 Removing and installing Lambda probe after catalytic converter - G130-

Special tools and workshop equipment required

- ◆ Lambda probe open ring spanner set - 3337-



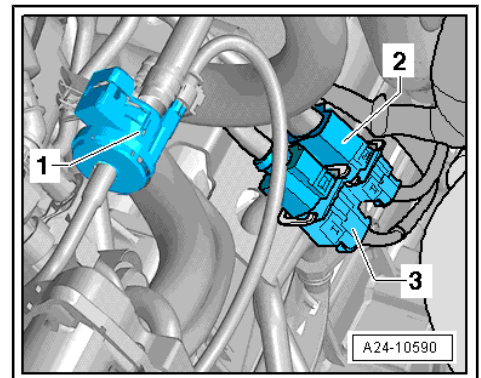
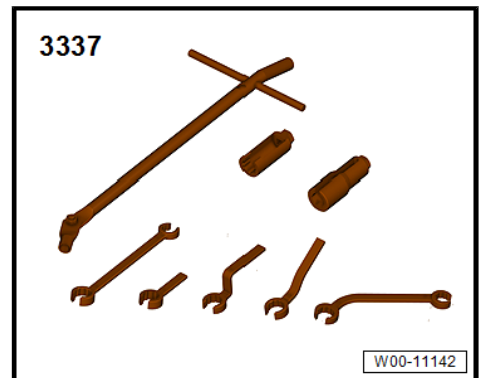
Removing

Bracket for electrical connectors, version 1:

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 **Note**

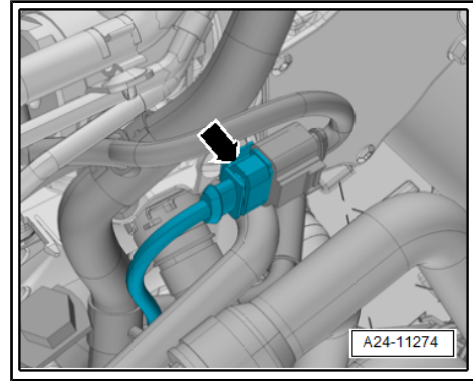
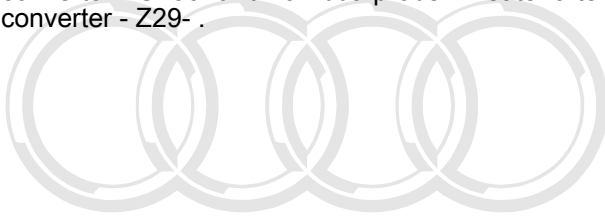
Disregard items -1 and 3-





Bracket for electrical connectors, version 2:

- Unplug electrical connector -arrow- for Lambda probe after catalytic converter - G130- and Lambda probe 1 heater after catalytic converter - Z29- .



Continued for all vehicles:

- Unscrew Lambda probe after catalytic converter - G130- -1- using tool from Lambda probe open ring spanner set - 3337- .

Installing

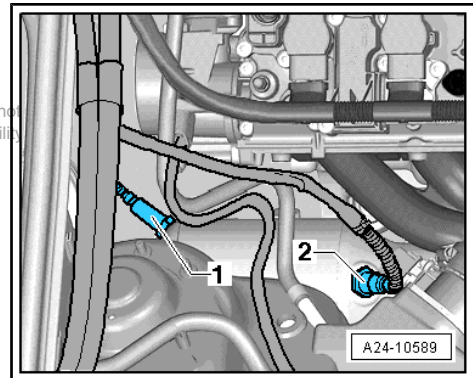
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When installing, note the following:



Note

- ◆ *Threads of new Lambda probes are already coated with assembly paste; the paste must not get into the slots on the probe body.*
- ◆ *In the case of a used Lambda probe grease only the thread with high-temperature paste. The paste must not get into the slots on the Lambda probe body. For high-temperature paste refer to → Parts catalogue .*
- ◆ *When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.*



Tightening torques

- ◆ ⇒ ["8.1 Exploded view - Lambda probe", page 357](#)

9 Engine control unit

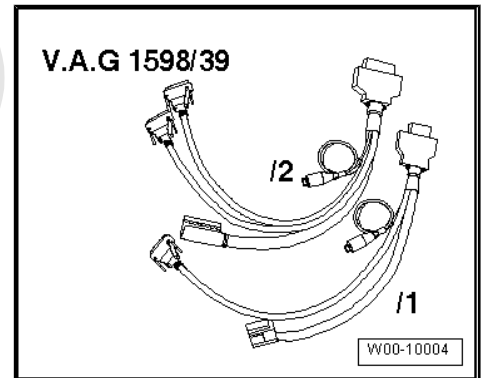
⇒ ["9.1 Wiring and component check", page 361](#)

⇒ ["9.2 Removing and installing engine control unit J623 ", page 363](#)

9.1 Wiring and component check

Special tools and workshop equipment required

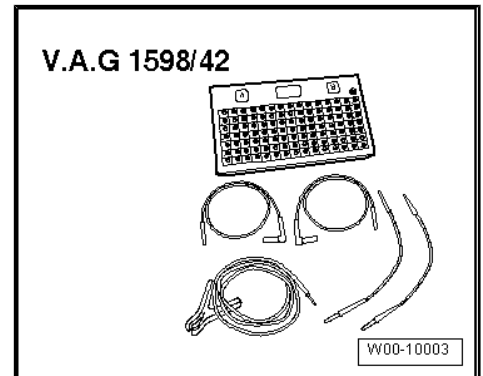
- ◆ Adapter cable - V.A.G 1598/39-1-



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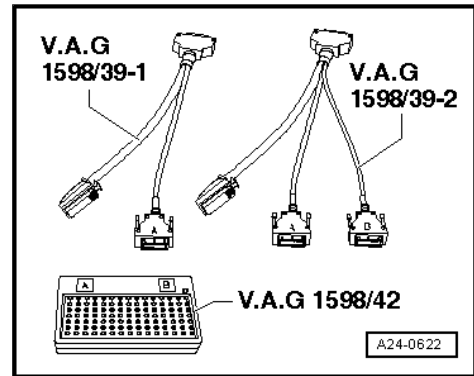
- ◆ Adapter cable V.A.G 1598/39-2-

- ◆ Test box - V.A.G 1598/42-



**Note**

- ◆ *The test box has 105 sockets. The connecting cable can be disconnected from the test box. This means that only the cable (and not the test box) has to be purchased for future engine control units with different types of connectors.*
- ◆ *The smaller of the two connectors on the engine control unit has the contacts 1 to 60. The larger of the two connectors has the contacts 1 to 94.*
- ◆ *To carry out tests on the 60-pin wiring harness connector, the adapter cable - V.A.G 1598/39-1- is connected to connector "A" on the test box. For components connected to 60-pin wiring harness connector ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.*
- ◆ *To carry out tests on the 94-pin wiring harness connector, the adapter cable - V.A.G 1598/39-2- must be connected to connectors -A- and -B- on the test box. For components connected to 94-pin wiring harness connector ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.*
- ◆ *The test box - V.A.G 1598/42- is designed so it can be connected both to the wiring harness for the engine control unit and to the engine control unit itself at the same time.*
- ◆ *The advantage of this is that the electronic engine control system remains fully functional when the test box is connected (for example, for measuring signals when the engine is running).*
- ◆ *The relevant test procedure will state whether it is necessary to also connect the engine control unit to the test box.*

**WARNING**

To prevent irreparable damage to the electronic components, select appropriate measuring range before connecting the measuring cables and observe the test requirements.

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- Remove engine control unit ⇒ [page 363](#) .
- Connect the test box - V.A.G 1598/42- to wiring harness with adapter cable - V.A.G 1598/39-1- or adapter cable - V.A.G 1598/39-2- . Connect earth clip of test box to negative terminal of battery. The instructions for performing the individual tests indicate whether or not the engine control unit itself also needs to be connected to the test box.
- Carry out test as described in appropriate repair procedures.

Installing engine control unit

Installation is performed in the reverse sequence; the engine control unit must be installed with the protective housing. New shear bolts must be used.

- Interrogate event memory and erase if necessary. Use ⇒ Vehicle diagnostic tester.

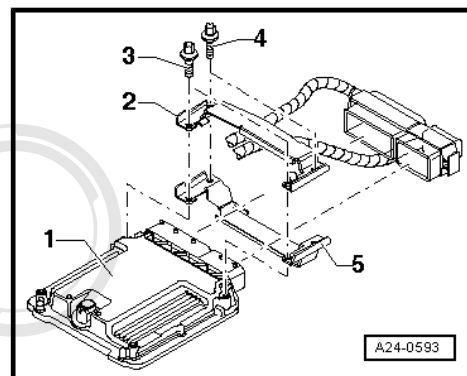
 **Note**

After completion of the Guided Fault Finding routine, the tester will attempt to erase the event memories of all control units. If this is not successful, the remaining events saved in the memories must be dealt with so that all event memory entries can be erased.

9.2 Removing and installing engine control unit - J623-

 **Note**

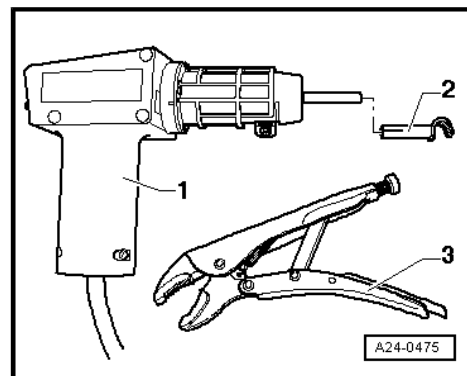
- ◆ *Not every engine control unit is bolted to a protective housing. Whether a protective housing is fitted depends on the engine/gearbox combination.*
- ◆ *The engine control unit -1- is bolted to a protective casing -2 and 5-. To make it more difficult to unscrew the shear bolts -4- for locking plate -2-, their threads have been coated with locking fluid.*
- ◆ *The protective housing has to be removed before the connectors can be unplugged from the engine control unit (e.g. to connect the test box or renew the engine control unit).*



The following special tools are required if a protective housing is fitted:

Special tools and workshop equipment required

- ◆ Hot air blower - VAS 1978/14A- -item 1- with nozzle attachment -2- from wiring harness repair set - VAS 1978 B-
- ◆ Small, commercially available mole grips -3-

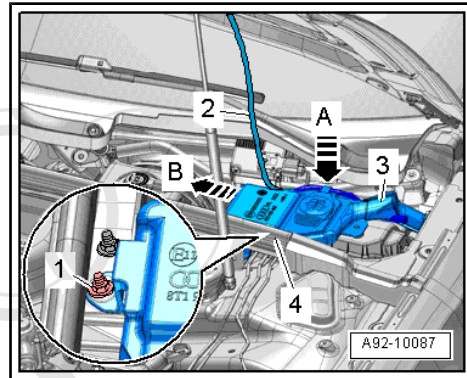


Removing

- When renewing engine control unit, select diagnosis object "Replace engine control unit" in "Guided Functions" mode of ⇒ Vehicle diagnostic tester.
- Switch off ignition and remove ignition key.

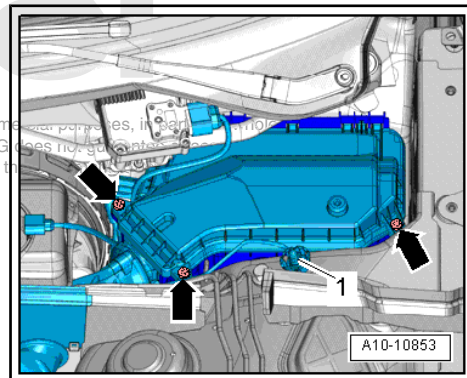


- Slightly pull off rubber seal in front of nut -1- on plenum chamber cover.
- Unhook wiring harness -2- from retainers -A-.
- Unscrew nut -1-.
- Pull filler neck -3- with filler pipe out of washer fluid reservoir and through opening in body.

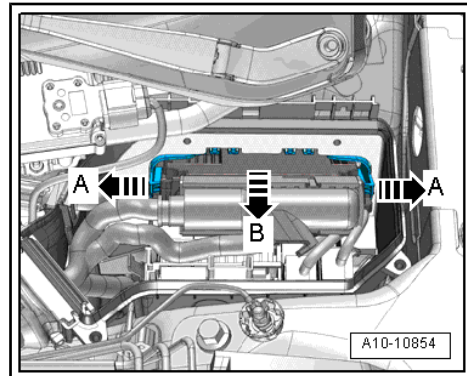


- Unscrew bolts -arrows- and take off lid for electronics box.

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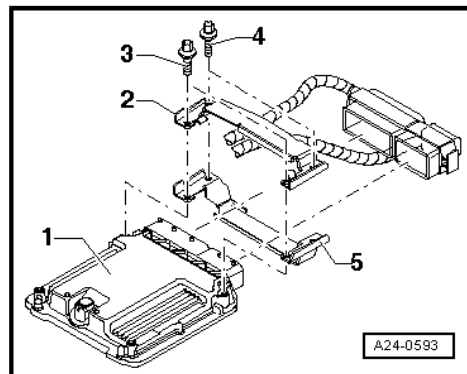
- Release retainers -arrows A- and pull out engine control unit -J623- -arrow B-.



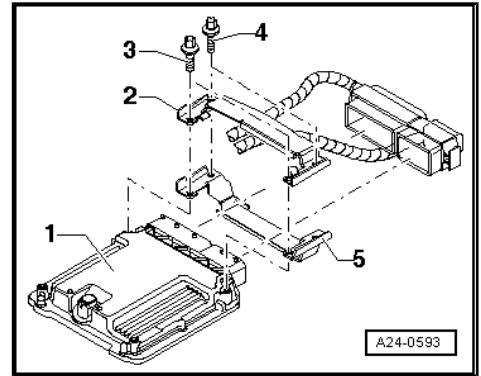
Perform the following work steps if a protective housing is fitted:

To help prevent unauthorised access to the connectors on the engine control unit, the engine control unit -1- is bolted to a protective housing -5- by means of shear bolts -3 and 4- and a locking plate -2-.


The threads of the two shear bolts -4- which are not screwed into the engine control unit are secured with locking fluid. To unscrew these two bolts, the threads must therefore be heated with the hot air blower.



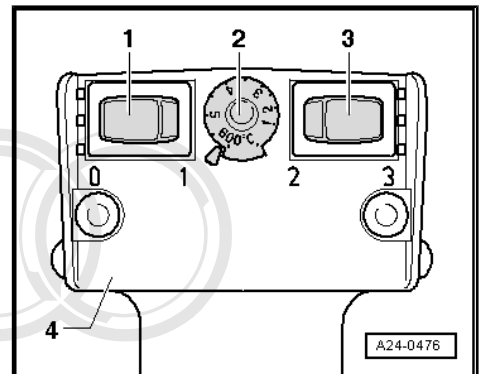
The threads of the two shear bolts -3- which are screwed into the engine control unit are not secured with locking fluid. Do not apply heat to the threads in the control unit housing; this is not necessary and would cause overheating of the control unit.



- Select settings on hot air blower as shown in illustration, i.e. set temperature potentiometer -2- to maximum heat output and two-stage air flow switch -3- to position 3.

 **WARNING**

The shear bolts and protective housing also become very hot when heating the threads of the locking mechanism. Take care to avoid burns. It is also important to ensure that only the thread is heated and none of the surrounding components if at all possible. These should be covered if necessary.

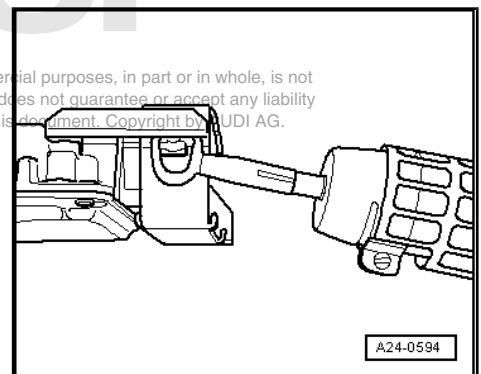


Apply heat to the threads of the shear bolts on the connector side as shown in the illustration.

Switch on the hot air blower and heat the bolt for approximately 20 ... 30 seconds.

- Unscrew shear bolts using mole grips (see arrow in illustration).

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- The two shear bolts screwed into the engine control unit do not need to be heated. They should be removed without being heated.
- Detach protective housing from control unit connectors.
- Release connectors on engine control unit and unplug connectors.
- Detach engine control unit - J623- .

Installing

Installation is performed in the reverse sequence.

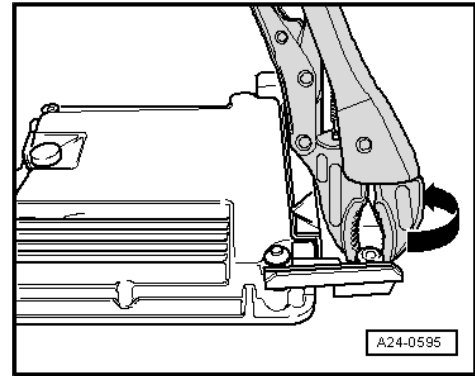
- It is important that the protective housing is re-fitted on the engine control unit - J623- (if fitted previously).
- Clean threaded holes for shear bolts to remove any residue from locking fluid. This can be done using a thread tap.
- Always use new shear bolts.

After installing a new engine control unit, the following operation must be performed:

- Activate engine control unit using ⇒ Vehicle diagnostic tester in "Guided Functions" mode, "Replace engine control unit".

Tightening torques

- ◆ ⇒ Electrical system; Rep. gr. 97 ; Relay carriers, fuse carriers, electronics boxes; Overview of fitting locations - relay carriers, fuse carriers, electronics boxes



Audi

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26 – Exhaust system

1 Exhaust pipes/silencers

⇒ [“1.1 Exploded view - silencers”, page 367](#)

⇒ [“1.2 Removing and installing front exhaust pipe”, page 374](#)

⇒ [“1.3 Separating exhaust pipes/silencers”, page 375](#)

⇒ [“1.4 Stress-free alignment of exhaust system”, page 378](#)

⇒ [“1.5 Renewing tailpipes”, page 381](#)

⇒ [“1.6 Checking exhaust system for leaks”, page 382](#)

1.1 Exploded view - silencers

⇒ [“1.1.1 Exploded view - silencers, vehicles with one rear silencer”, page 367](#)

⇒ [“1.1.2 Exploded view - silencers, vehicles with two rear silencers”, page 371](#)

1.1.1 Exploded view - silencers, vehicles with one rear silencer



Note

The exhaust manifold and the turbocharger are combined as one unit; removing and installing ⇒ [page 279](#).



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1 - Rear silencer

- Combined in one unit with centre silencer as original equipment. Can be renewed individually for repair purposes
- Cutting point [=> page 375](#)
- Align exhaust system so it is free of stress [=> page 378](#)

2 - Nut

- 25 Nm

3 - Clamp (rear)

- Before tightening, align exhaust system so it is free of stress [=> page 378](#)
- Installation position [=> page 370](#)
- Tighten bolt connections evenly.

4 - Bolt

- 23 Nm

5 - Bracket

6 - Rubber mounting

- Renew if damaged

7 - Nut

- 25 Nm

8 - Clamp (front)

- Before tightening, align exhaust system so it is free of stress [=> page 378](#)
- Installation position [=> page 370](#)
- Tighten bolt connections evenly.

9 - Gasket

- Renew

10 - Nut

- 25 Nm

11 - Catalytic converter

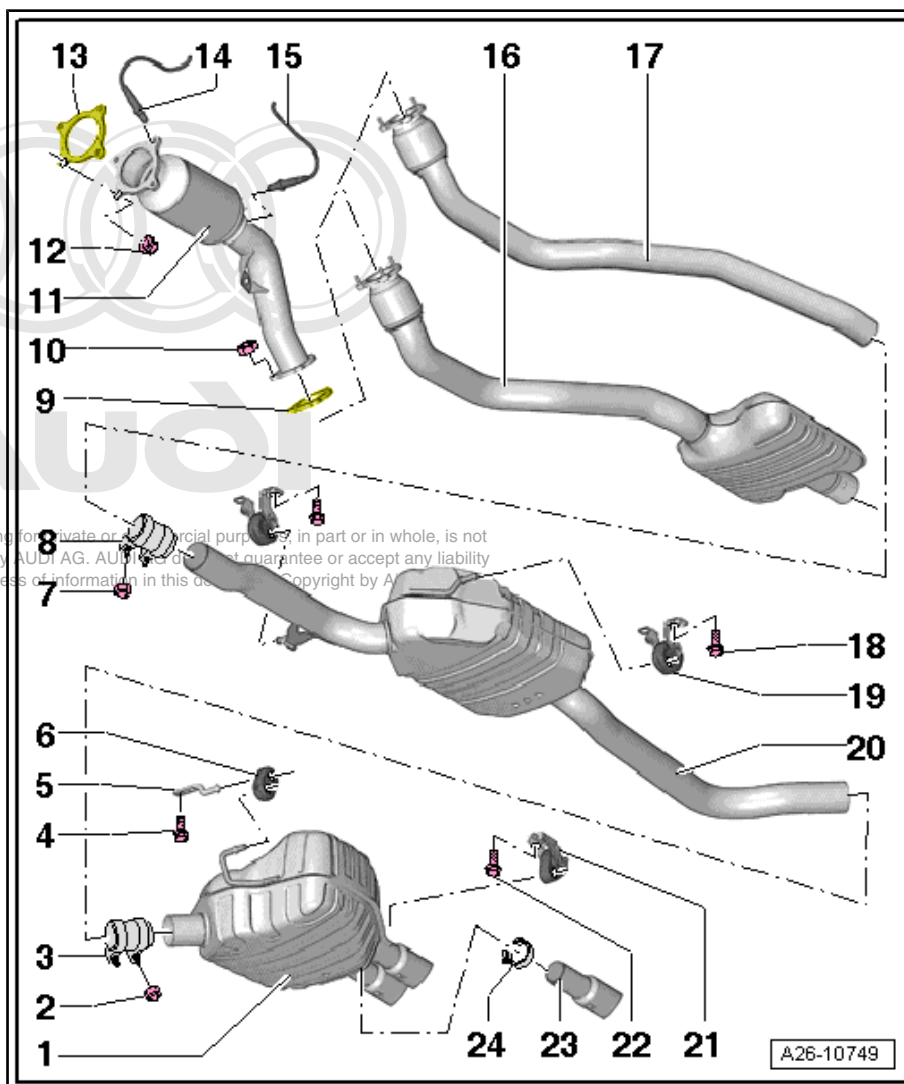
- Protect catalytic converter from damage by knocks and impact
- Removing and installing [=> page 384](#)
- Align exhaust system so it is free of stress [=> page 378](#)

12 - Nut

- 40 Nm
- Renew
- Coat studs of turbocharger with high-temperature paste
- High-temperature paste => Electronic parts catalogue

13 - Gasket

- Renew



14 - Lambda probe - G39- and Lambda probe heater - Z19-

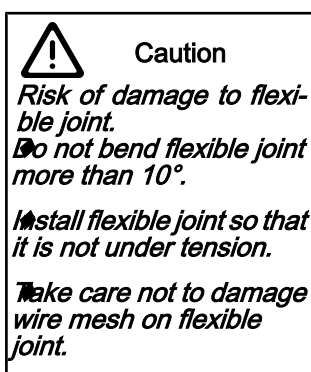
- The threads on the new Lambda probes are coated with a special assembly paste.
- If re-installing old Lambda probe, coat thread with high-temperature paste: Refer to ⇒ Electronic parts catalogue for high-temperature paste
- The assembly paste/high-temperature paste must not get into the slots on the Lambda probe body
- Removing and installing ⇒ [page 358](#)

15 - Lambda probe after catalytic converter - G130- and Lambda probe heater 1 after catalytic converter - Z29-

- The threads on the new Lambda probes are coated with a special assembly paste.
- If re-installing old Lambda probe, coat thread with high-temperature paste: Refer to ⇒ Electronic parts catalogue for high-temperature paste
- The assembly paste/high-temperature paste must not get into the slots on the Lambda probe body
- Removing and installing ⇒ [page 359](#)

16 - Front silencer

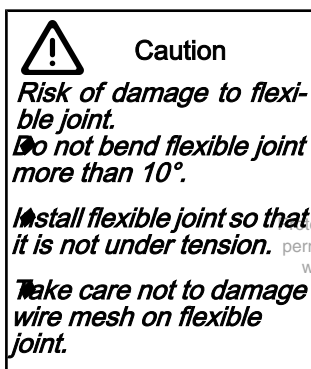
- With flexible joint



- Depending on version, front exhaust pipe ⇒ [Item 17 \(page 369\)](#) might be installed instead of front silencer
- Removing and installing ⇒ [page 374](#)
- Align exhaust system so it is free of stress ⇒ [page 378](#)

17 - Front exhaust pipe

- With flexible joint



- Depending on version, front silencer ⇒ [Item 16 \(page 369\)](#) might be installed instead of front exhaust pipe
- Removing and installing ⇒ [page 374](#)
- Align exhaust system so it is free of stress ⇒ [page 378](#)

18 - Bolt

- 23 Nm

19 - Mounting

- Renew if damaged
- Check preload ⇒ [page 378](#)



20 - Centre silencer

- Combined in one unit with rear silencer as original equipment. Can be renewed individually for repair purposes
- Cutting point ⇒ [page 375](#)
- Align exhaust system so it is free of stress ⇒ [page 378](#)

21 - Mounting

- Renew if damaged
- Check preload ⇒ [page 378](#)

22 - Bolt

- 23 Nm

23 - Tailpipe

- Can be renewed separately for repair purposes ⇒ [page 381](#)
- Cutting point between rear silencer and tailpipe ⇒ [page 381](#)

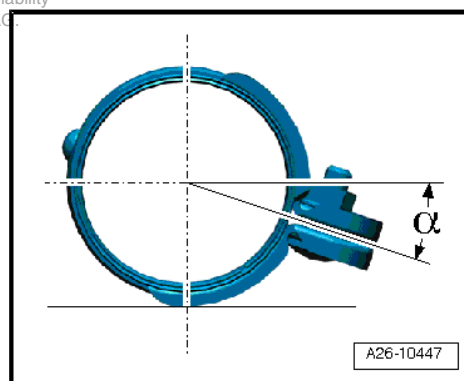
24 - Clamp

- 60 Nm

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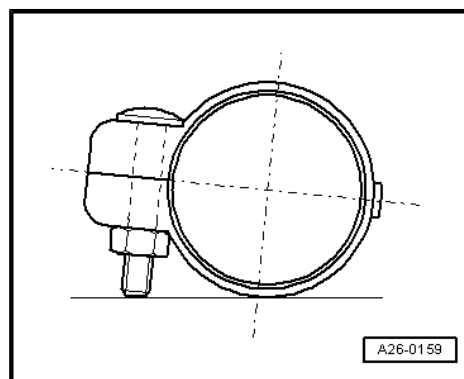
Installation position of front clamp

- Fit the clamp at the angle shown.
- Bolted connections face to right.
- Nuts face upwards.
- $\alpha = \text{approx. } 20^\circ$



Installation position of rear clamp

- Install clamp so that ends of bolts do not protrude beyond bottom of clamp.
- Bolted connections face downwards.



1.1.2 Exploded view - silencers, vehicles with two rear silencers



Note

The exhaust manifold and the turbocharger are combined as one unit; removing and installing ⇒ [page 279](#).

1 - Gasket

- Renew

2 - Lambda probe - G39- and Lambda probe heater - Z19-

- The threads on the new Lambda probes are coated with a special assembly paste.
- If re-installing old Lambda probe, coat thread with high-temperature paste: Refer to ⇒ Electronic parts catalogue for high-temperature paste
- The assembly paste/high-temperature paste must not get into the slots on the Lambda probe body
- Removing and installing ⇒ [page 358](#)

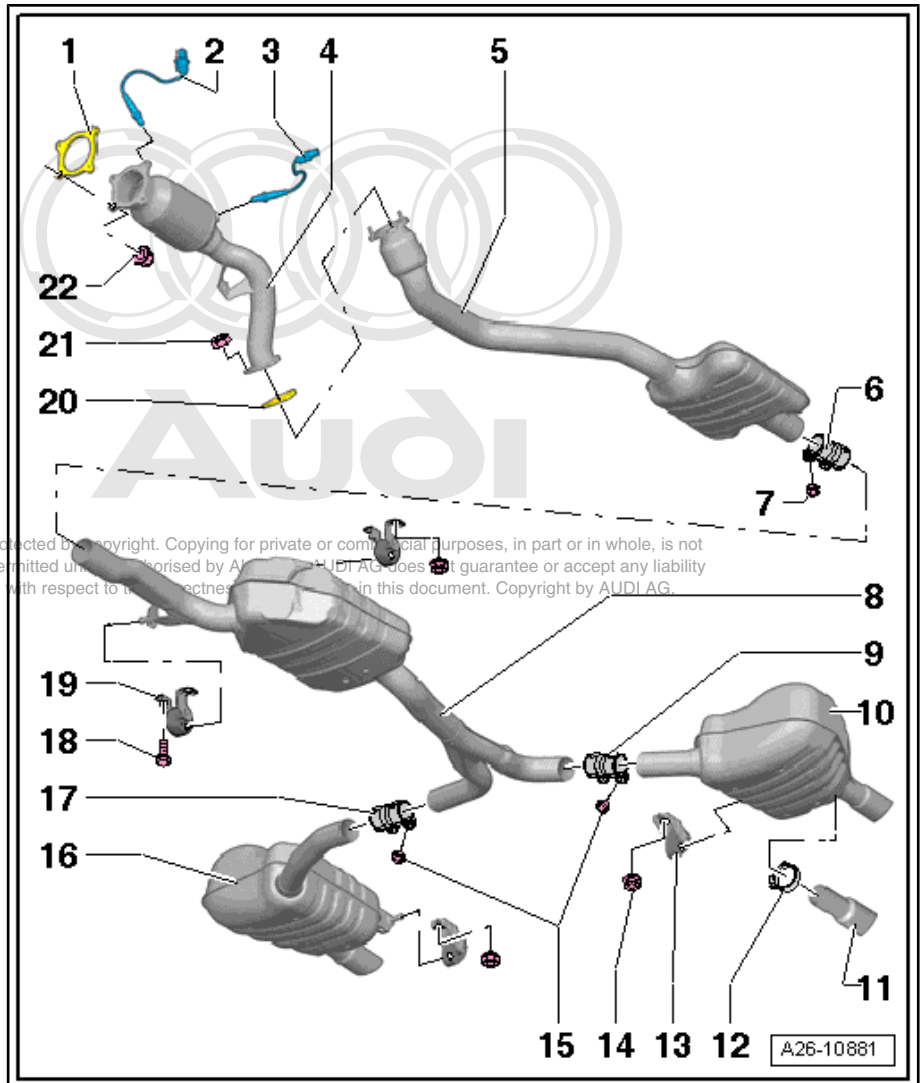
3 - Lambda probe after catalytic converter - G130- and Lambda probe heater 1 after catalytic converter - Z29-

- The threads on the new Lambda probes are coated with a special assembly paste.
- If re-installing old Lambda probe, coat thread with high-temperature paste: Refer to ⇒ Electronic parts catalogue for high-temperature paste

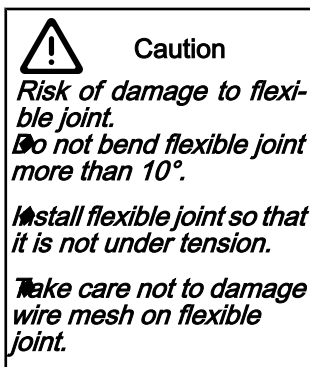
- The assembly paste/high-temperature paste must not get into the slots on the Lambda probe body
- Removing and installing ⇒ [page 359](#)

4 - Catalytic converter

- Protect catalytic converter from damage by knocks and impact
- Removing and installing ⇒ [page 384](#)
- Align exhaust system so it is free of stress ⇒ [page 379](#)



5 - Front silencer



- Removing and installing ⇒ [page 374](#)
- Align exhaust system so it is free of stress ⇒ [page 379](#)

6 - Clamp (front)

- Before tightening, align exhaust system so it is free of stress ⇒ [page 379](#)
- Installation position ⇒ [page 373](#)
- Tighten bolt connections evenly.

7 - Nut

- 23 Nm

8 - Centre silencer

- Combined in one unit with rear silencers as original equipment. Can be renewed individually for repair purposes
- Remove diagonal struts prior to removal ⇒ [page 374](#)
- Cutting point ⇒ [page 377](#)
- Align exhaust system so it is free of stress ⇒ [page 379](#)

9 - Clamp (rear left)

- For separate replacement of centre and rear silencers
- Installation position ⇒ [page 374](#)
- Before tightening, align exhaust system so it is free of stress ⇒ [page 379](#)
- Tighten bolted connections evenly

10 - Rear silencer (left-side)

- Combined as one unit with centre silencer and tailpipe as original equipment
- Remove diagonal struts prior to removal ⇒ [page 374](#)
- Centre silencer, rear silencer and tailpipe can be renewed separately as required
- Cutting point: centre silencer / rear silencer ⇒ [page 377](#)
- Cutting point between rear silencer and tailpipe ⇒ [page 381](#)
- Align exhaust system so it is free of stress ⇒ [page 379](#)

11 - Tailpipe

- Combined in one unit with rear silencer as original equipment. Can be renewed individually for repair purposes
- Cutting point ⇒ [page 381](#)
- Aligning ⇒ [page 379](#)

12 - Clamp

- 23 Nm

13 - Mounting

- Renew if damaged
- Check preload ⇒ [page 379](#)

14 - Nut

- Renew
- 20 Nm

15 - Nut

- 23 Nm

16 - Rear silencer (right-side)

- Combined as one unit with centre silencer and tailpipe as original equipment
- Remove diagonal struts prior to removal ⇒ [page 374](#)
- Centre silencer, rear silencer and tailpipe can be renewed separately as required
- Cutting point: centre silencer / rear silencer ⇒ [page 377](#)
- Cutting point between rear silencer and tailpipe ⇒ [page 381](#)
- Align exhaust system so it is free of stress ⇒ [page 379](#)

17 - Clamp (rear right)

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- For separate replacement of centre and rear silencers
- Installation position ⇒ [page 374](#)
- Before tightening, align exhaust system so it is free of stress ⇒ [page 379](#)
- Tighten bolted connections evenly

18 - Bolt

- Renew
- 20 Nm

19 - Mounting

- Renew if damaged
- Check preload ⇒ [page 379](#)

20 - Gasket

- Renew

21 - Nut

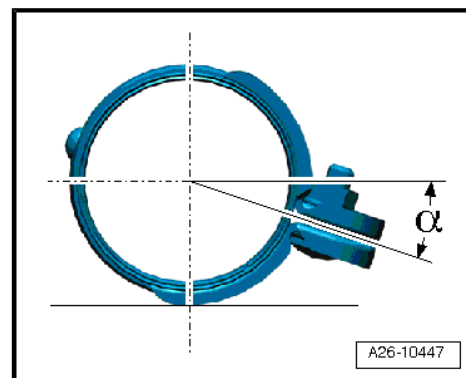
- 25 Nm

22 - Nut

- 40 Nm
- Renew
- Coat studs of turbocharger with high-temperature paste
- High-temperature paste ⇒ Electronic parts catalogue

Installation position of front clamp

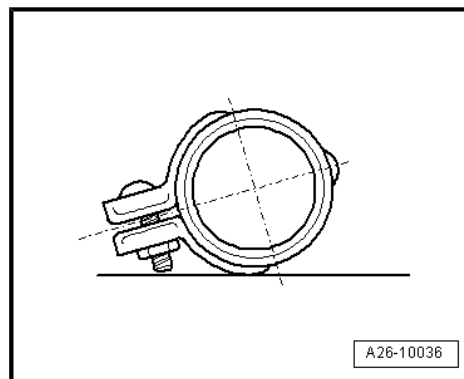
- Fit the clamp at the angle shown.
- Bolted connections face to right.
- Nuts face upwards.
- α = approx. 20°





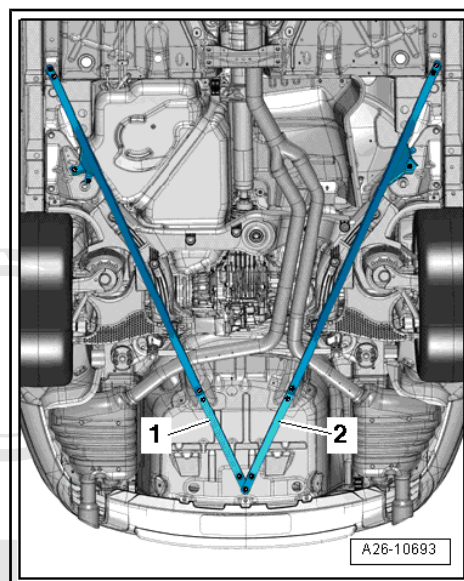
Installation position of rear clamp

- Install clamps so that the bolt ends do not protrude beyond bottom of clamp.
- Installation position: bolted connections face forwards.



Diagonal struts

- Remove diagonal struts -1- and -2- when removing centre silencer and rear silencer unit.
- Install diagonal struts => Running gear, axles, steering; Rep. gr. 42 ; Subframe; Exploded view - subframe .



1.2 Removing and installing front exhaust pipe

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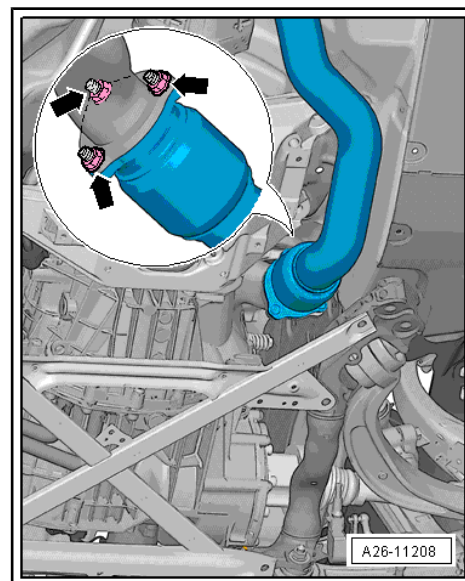


Note

Depending on version, either front exhaust pipe or front silencer may be fitted.

Removing

- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
- Remove nuts -arrows-.

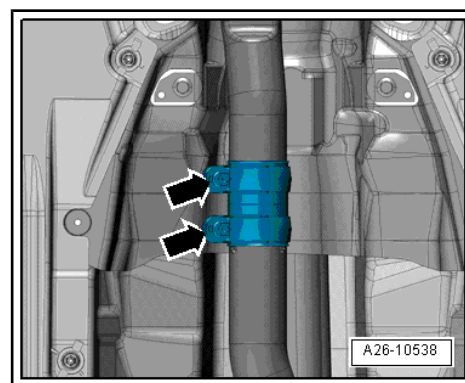


Caution

Risk of damage to flexible joint.

- ◆ *Do not bend flexible joint more than 10°.*
- ◆ *Install flexible joint so that it is not under tension.*
- ◆ *Take care not to damage wire mesh on flexible joint.*

- Loosen bolts -arrows-, push back clamp and detach front exhaust pipe/front silencer.



Installing

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



Note

Renew seals, gaskets and self-locking nuts.

- Align the exhaust system so it is free of stress ⇒ [page 378](#) .
- Install noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation .

Tightening torques

- ◆ ⇒ [“1.1 Exploded view - silencers”, page 367](#)

1.3 Separating exhaust pipes/silencers

⇒ [“1.3.1 Separating exhaust pipes/silencers - vehicles with one rear silencer”, page 375](#)

⇒ [“1.3.2 Separating exhaust pipes/silencers - vehicles with two rear silencers”, page 377](#)

1.3.1 Separating exhaust pipes/silencers - vehicles with one rear silencer

- ◆ The connecting pipe can be cut through at the cutting location in order to renew the centre and rear silencers separately.

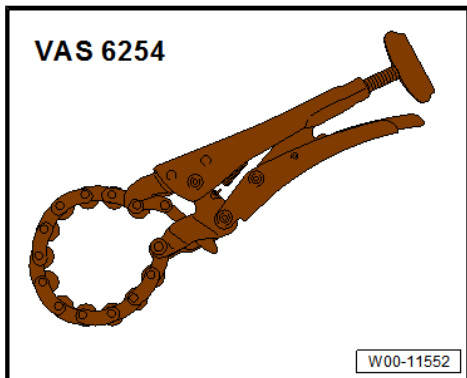
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- ◆ The cutting point is marked by an indentation on the circumference of the exhaust pipe.

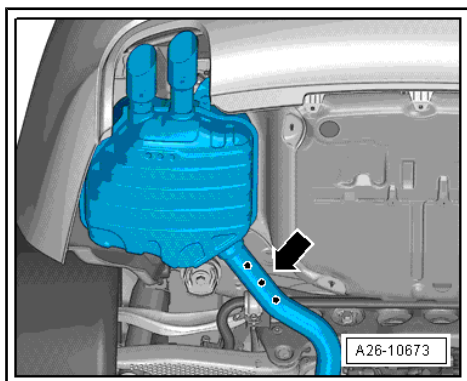
Special tools and workshop equipment required

- ◆ Chain pipe cutter - VAS 6254-

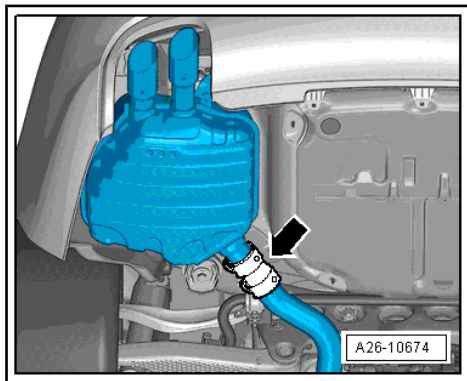


Procedure

- Cut through exhaust pipe at right angles at the position marked -arrow- using chain-type pipe cutter - VAS 6254-

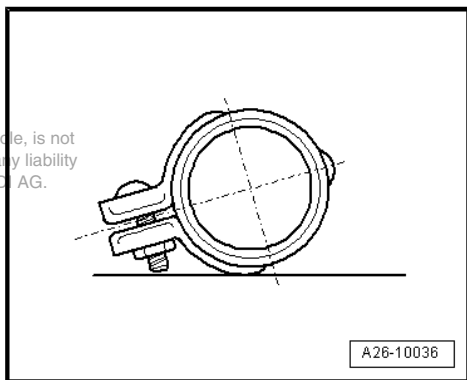


- Position centre of clamp -arrow- over cutting location.



- Install clamp so that ends of bolts do not protrude beyond bottom of clamp.
- Bolted connection faces to left.
- Align the exhaust system so it is free of stress => [page 378](#)

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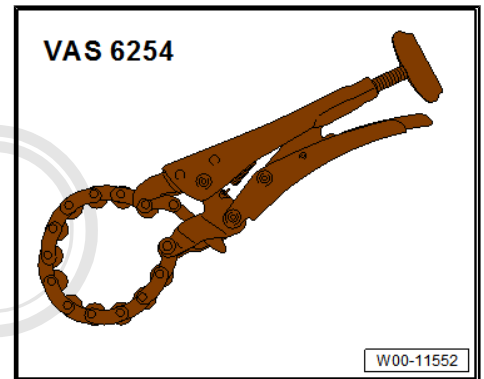


1.3.2 Separating exhaust pipes/silencers - vehicles with two rear silencers

- ◆ The connecting pipe can be cut through at the cutting point in order to renew the centre or rear silencer separately.
- ◆ The cutting point is marked by an indentation on the circumference of the exhaust pipe.

Special tools and workshop equipment required

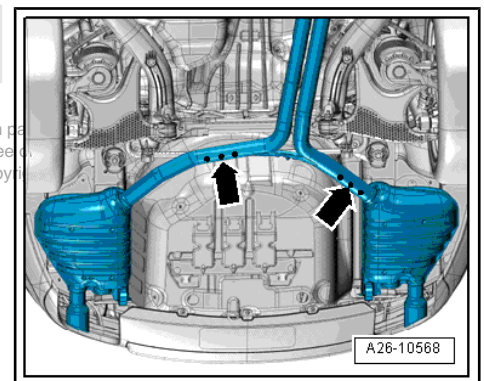
- ◆ Chain pipe cutter - VAS 6254-



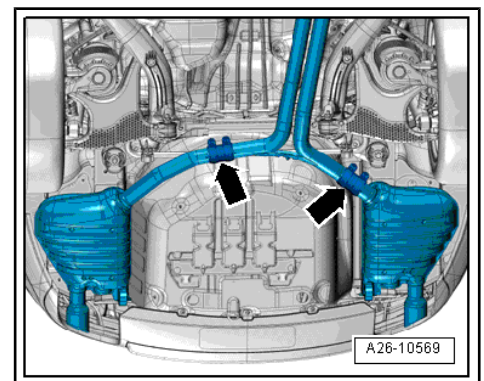
Procedure

- Cut through exhaust pipes at right angles at the positions marked -arrows- using chain pipe cutter - VAS 6254- .

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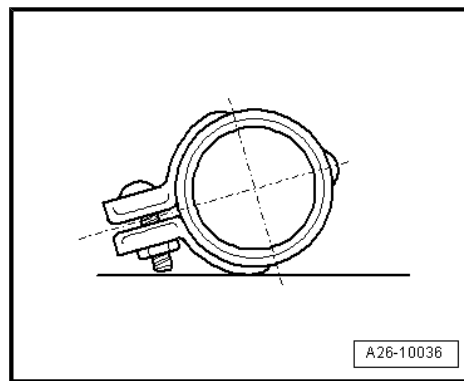


- Position centre of clamps -arrows- over cutting location.





- Install clamps so that the bolt ends do not protrude beyond bottom of clamp.
- Installation position: bolted connections face forwards.
- Align the exhaust system so it is free of stress ⇒ [page 379](#) .



1.4 Stress-free alignment of exhaust system

⇒ [“1.4.1 Stress-free alignment of exhaust system - vehicles with one rear silencer”, page 378](#)

⇒ [“1.4.2 Stress-free alignment of exhaust system - vehicles with two rear silencers”, page 379](#)

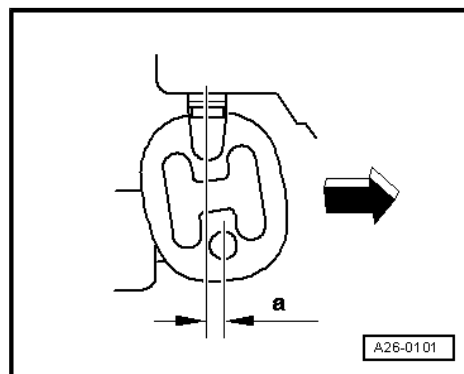
1.4.1 Stress-free alignment of exhaust system - vehicles with one rear silencer

Procedure

- The exhaust system must be aligned when it is cool.

Vehicles without clamps between centre silencer and rear silencer

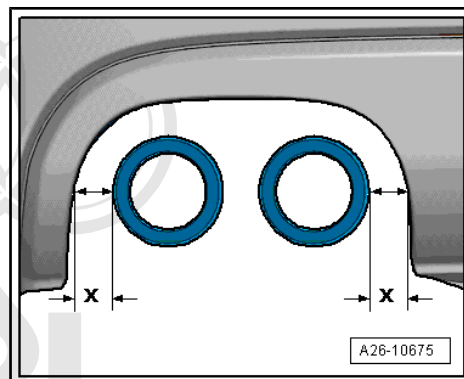
- Loosen bolted connections on front clamp.
- Push exhaust system towards front of vehicle -arrow- so that rear mountings for rear silencer are preloaded by -a- = 6 ... 10 mm.
- Align rear silencer so it is horizontal.



- Check clearance between tailpipes and bumper:
- Dimension -x- (left-side) = dimension -x- (right-side)
- Tighten bolt connections on clamp evenly.

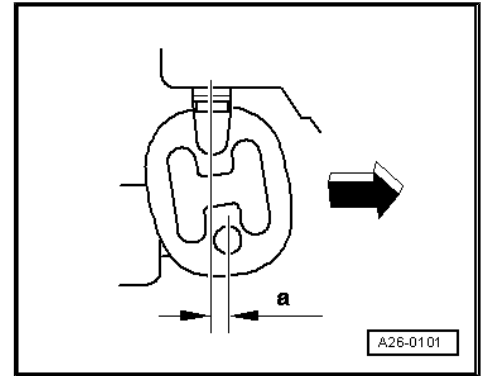
Vehicles with clamps between centre silencer and rear silencer

- Loosen bolted connections on front and rear clamps.

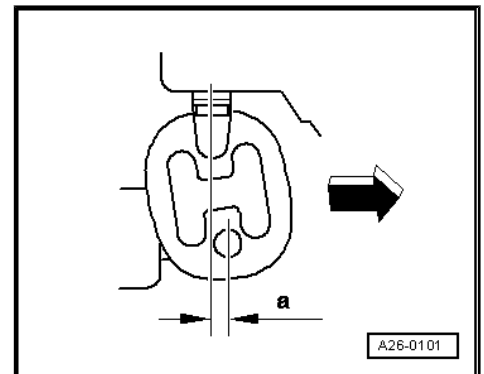


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- Push centre silencer towards front of vehicle -arrow- until mounting for centre silencer is preloaded by -a- = 6 ... 10 mm.
- Tighten bolt connections on front clamp evenly.



- Push rear silencer towards front of vehicle -arrow- so that rear mounting for rear silencer is preloaded by -a- = 11 ... 15 mm.
- Align rear silencer so it is horizontal.

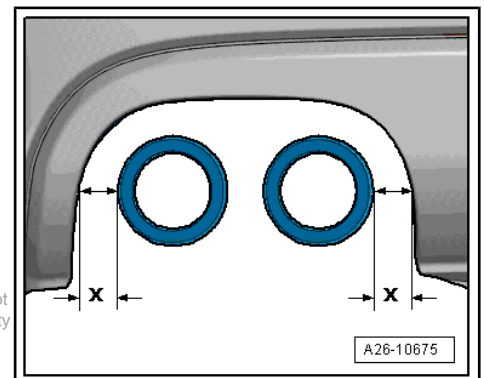


- Check clearance between tailpipes and bumper:
 - Dimension -x- (left-side) = dimension -x- (right-side)
- Tighten bolted connections on rear clamps evenly.

Tightening torques

- ◆ ⇒ ["1.1.1 Exploded view - silencers, vehicles with one rear silencer", page 367](#)

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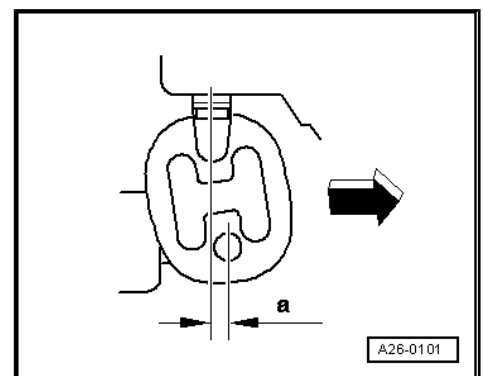
1.4.2 Stress-free alignment of exhaust system - vehicles with two rear silencers

Procedure

- The exhaust system must be aligned when it is cool.

Vehicles without clamps between centre silencer and rear silencer

- Loosen bolted connections on front clamp.
- Push exhaust system towards front of vehicle -arrow- so that rear mountings for rear silencer are preloaded by -a- = 6 ... 10 mm.
- Align rear silencer so it is horizontal.

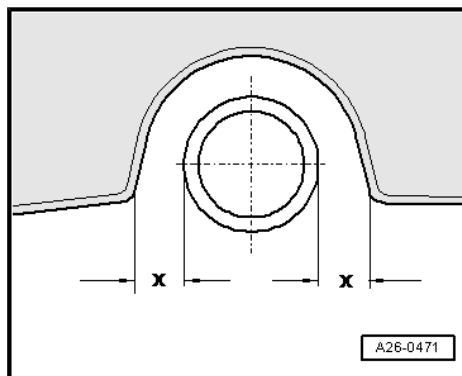




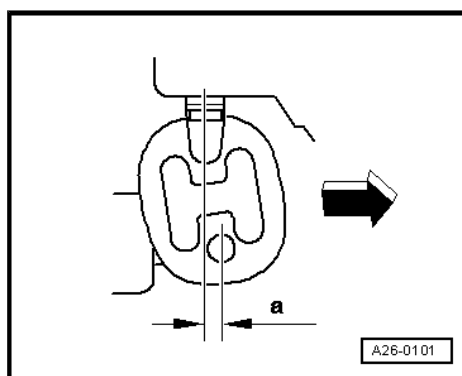
- Check clearance between tailpipes and bumper:
 - Dimension -x- (left-side) = dimension -x- (right-side)
- Tighten bolt connections on clamp evenly.

Vehicles with clamps between centre silencer and rear silencer

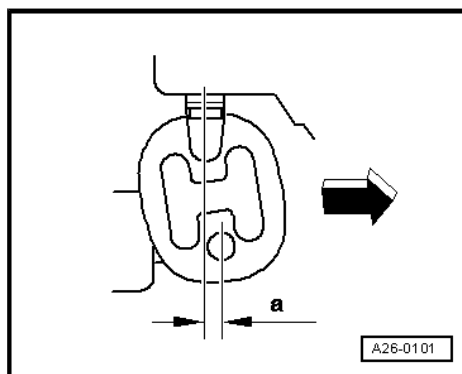
- Loosen bolted connections on front and rear clamps.



- Push centre silencer towards front of vehicle -arrow- until mounting for centre silencer is preloaded by -a- = 6 ... 10 mm.
- Tighten bolt connections on front clamp evenly.



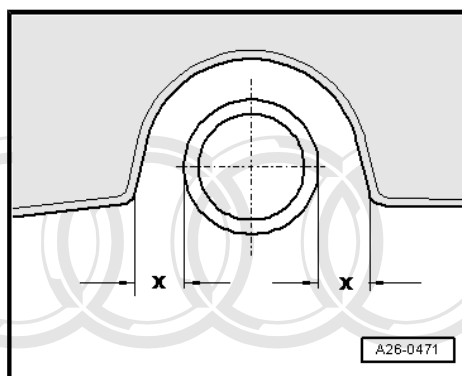
- Push rear silencer towards front of vehicle -arrow- so that rear mounting for rear silencer is preloaded by -a- = 11 ... 15 mm.
- Align rear silencer so it is horizontal.



- Check clearance between tailpipes and bumper:
 - Dimension -x- (left-side) = dimension -x- (right-side)
- Tighten bolted connections on rear clamps evenly.

Tightening torques

◆ => ["1.1.2 Exploded view - silencers, vehicles with two rear silencers", page 371](#)



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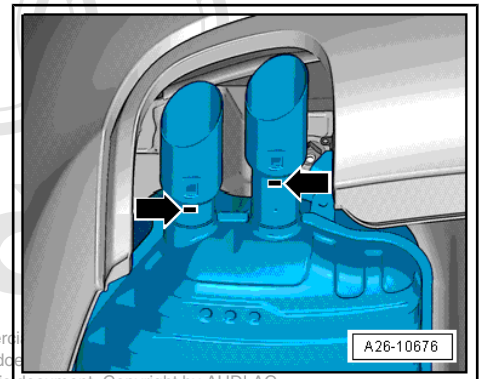
1.5 Renewing tailpipes

⇒ [“1.5.1 Renewing tailpipes - vehicles with one rear silencer”, page 381](#)

⇒ [“1.5.2 Renewing tailpipes - vehicles with two rear silencers”, page 381](#)

1.5.1 Renewing tailpipes - vehicles with one rear silencer

- ◆ The tailpipes can be cut through at the point marked so that the tailpipes can be renewed separately.
- ◆ The cutting point is marked by an indentation on the circumference of the exhaust pipe.
- Cut through exhaust pipe at right angle at the position marked by -arrows- using chain pipe cutter - VAS 6254- .
- Fit tailpipes.

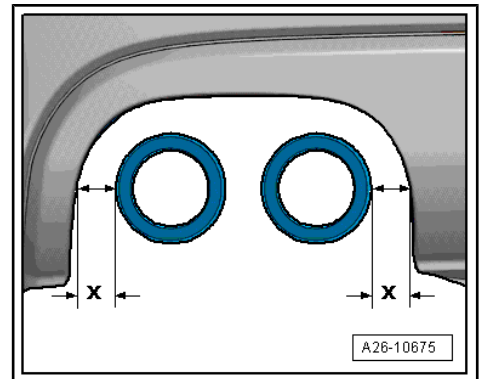


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- Check clearance between tailpipes and bumper:
 - Dimension -x- (left-side) = dimension -x- (right-side)
- Tighten bolt connections on clamps.

Tightening torques

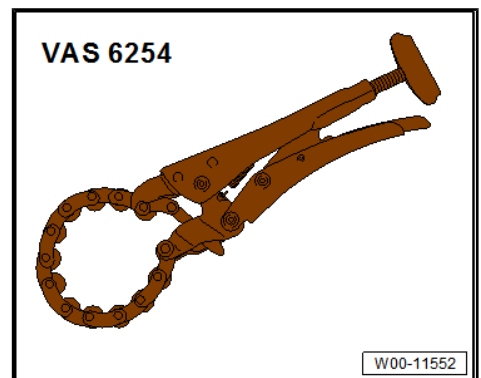
- ◆ ⇒ [“1.1.1 Exploded view - silencers, vehicles with one rear silencer”, page 367](#)



1.5.2 Renewing tailpipes - vehicles with two rear silencers

Special tools and workshop equipment required

- ◆ Chain pipe cutter - VAS 6254-



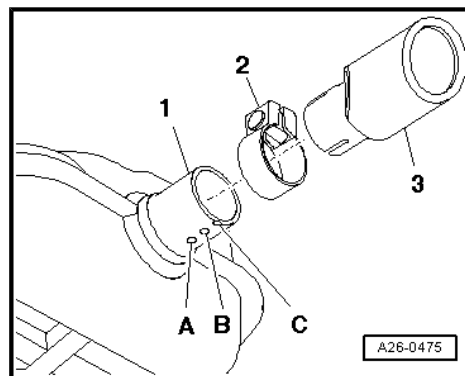


Procedure

- Cut through tailpipe -1- with chain pipe cutter - VAS 6254- at the position marked -C-.
- Push new tailpipe -3- onto tailpipe as far as marking -A-. Slot on tailpipe should align with marking -B-.
- Tighten nut for clamp -2-.

Tightening torques

- ◆ => ["1.1.2 Exploded view - silencers, vehicles with two rear silencers", page 371](#)



1.6 Checking exhaust system for leaks

- Start engine and run at idling speed.
- Plug tailpipes (e. g. with rags or stopper) and leave plugged until the check is complete.
- Listen for noise at connection points (cylinder head/exhaust manifold, exhaust manifold/front exhaust pipe, etc.) to locate any leaks.
- Rectify any leaks that are found.



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2 Emission control system

⇒ "2.1 Exploded view - emission control system", page 383

⇒ "2.2 Removing and installing catalytic converter", page 384

2.1 Exploded view - emission control system

1 - Nut

- Renew
- Coat studs of turbo-charger with high-temperature paste
- High-temperature paste
⇒ Electronic parts catalogue
- 40 Nm

2 - Gasket

- Renew

3 - Turbocharger

4 - Lambda probe - G39- and Lambda probe heater - Z19-

- Removing and installing
⇒ [page 358](#)

5 - Lambda probe after catalytic converter - G130- and Lambda probe heater 1 after catalytic converter - Z29-

- Removing and installing
⇒ [page 359](#)

6 - Catalytic converter

- Protect catalytic converter from damage by knocks and impact
- Removing and installing
⇒ [page 384](#)
- Align exhaust system so it is free of stress
⇒ [page 378](#)

7 - Nut

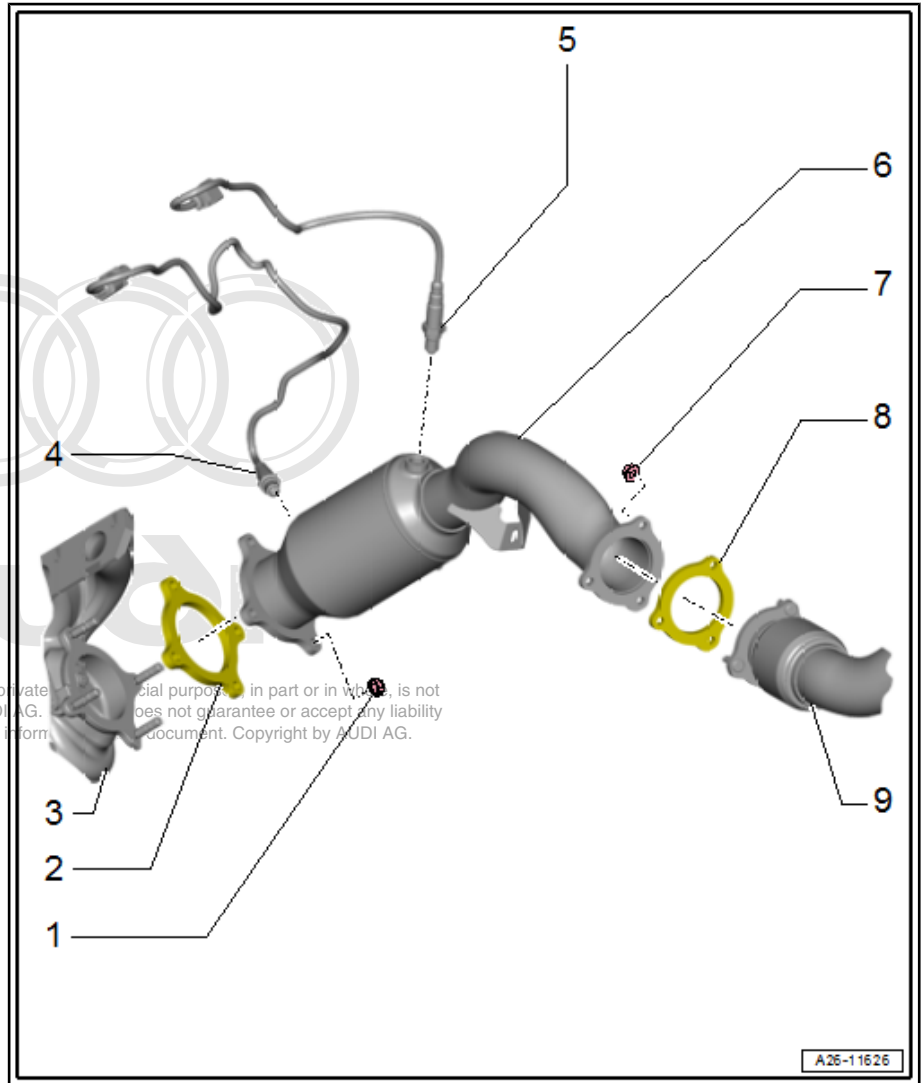
- Renew
- 25 Nm


8 - Gasket

- Renew

9 - Front silencer

- With flexible joint

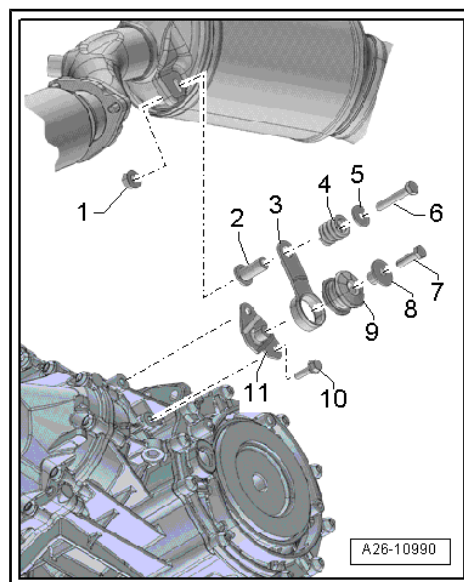


 **Caution**
Risk of damage to flexible joint.
Do not bend flexible joint more than 10°.
Install flexible joint so that it is not under tension.
Take care not to damage wire mesh on flexible joint.

- Depending on version, front exhaust pipe ⇒ [Item 17 \(page 369\)](#) might be installed instead of front silencer
- Removing and installing ⇒ [page 374](#)
- Align exhaust system so it is free of stress ⇒ [page 378](#)

Components of mountings for catalytic converter

- 1 - Nut
- 2 - Spacer sleeve
- 3 - Bracket
- 4 - Compression spring
- 5 - Washer
- 6 - Bolt, 23 Nm
- 7 - Bolt, 23 Nm
- 8 - Spacer sleeve
- 9 - Buffer
- 10 - Bolt, 23 Nm
- 11 - Bracket



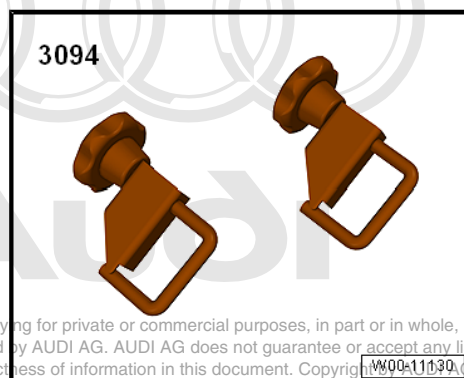
Note

Illustration shows vehicle with dual clutch gearbox.

2.2 Removing and installing catalytic converter

Special tools and workshop equipment required

- ◆ Hose clamps, up to 25 mm - 3094-



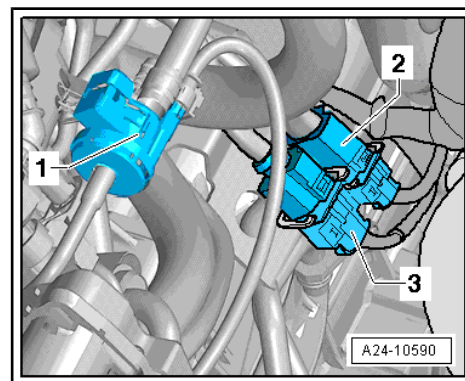
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Removing



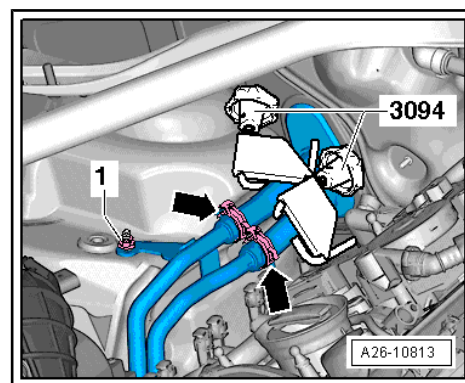
Fit all cable ties in the original positions when installing.

- Unplug electrical connector for Lambda probe after catalytic converter - G130- and Lambda probe 1 heater after catalytic converter - Z29- and move electrical wiring clear.
- Unplug electrical connector for Lambda probe - G39- and Lambda probe heater - Z19- and move electrical wiring clear.
- Remove air cleaner housing ⇒ [page 318](#) .
- Remove noise insulation ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

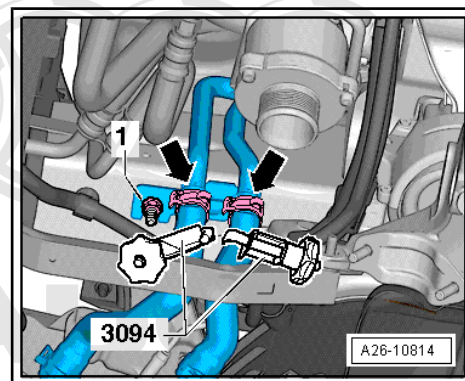


Vehicles with auxiliary heater

- Clamp off coolant lines (top) for auxiliary heater with hose clamps up to 25 mm - 3094- and detach coolant lines.
- Unfasten coolant lines -1- from body.

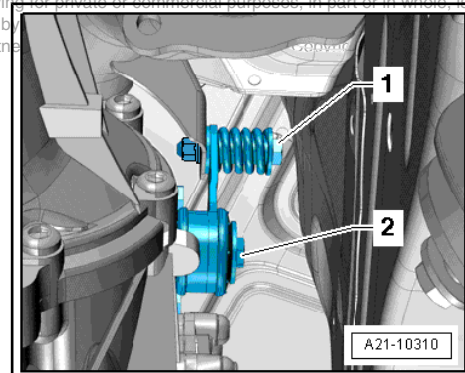


- Clamp off coolant lines (bottom) for auxiliary heater with hose clamps up to 25 mm - 3094- and detach coolant pipes.
- Unfasten coolant lines -1- from body and detach.



All vehicles:

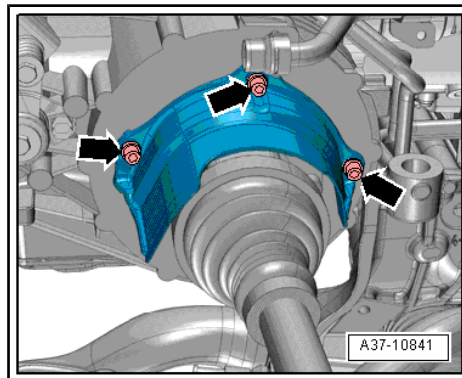
- Remove front exhaust pipe/front silencer ⇒ [page 374](#) .
- Unfasten connection -1-, remove bolt -2- and take out mounting for catalytic converter.



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- Remove bolts -arrows- and detach heat shield for drive shaft (right-side).



- Remove nuts -arrows- and lift out catalytic converter.

Installing

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



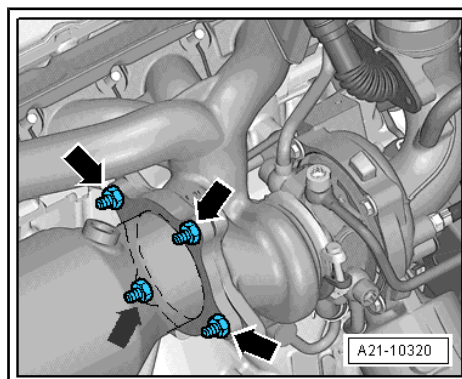
Note

Renew seals, gaskets and self-locking nuts.

- Install front exhaust pipe/front silencer ⇒ [page 374](#) .

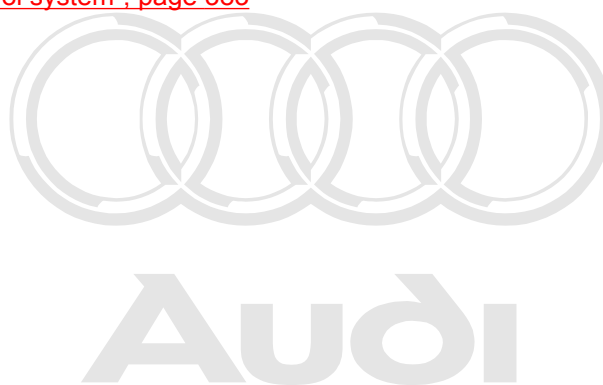
Vehicles with auxiliary heater

- Bleed auxiliary heater ⇒ Auxiliary heater, supplementary heater; Rep. gr. 82 ; Coolant circuit with auxiliary/supplementary heater .



Tightening torques

- ◆ ⇒ [“2.1 Exploded view - emission control system”, page 383](#)



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28 – Ignition system

1 Ignition system

⇒ [“1.1 Exploded view - ignition system”, page 387](#)

⇒ [“1.2 Test data, spark plugs”, page 388](#)

⇒ [“1.3 Removing and installing ignition coils with output stages”, page 388](#)

⇒ [“1.4 Removing and installing knock sensor”, page 390](#)

⇒ [“1.5 Removing and installing Hall senders”, page 391](#)

⇒ [“1.6 Removing and installing engine speed sender G28”, page 391](#)

1.1 Exploded view - ignition system

1 - Bolt

- The tightening torque influences the function of the knock sensor
- 20 Nm

2 - Knock sensor 1 - G61-

- Contacts gold-plated
- Removing and installing
⇒ [page 390](#)

3 - Bolt

- 9 Nm

4 - Hall sender - G40-

- Removing and installing
⇒ [page 391](#)

5 - O-ring

- Renew

6 - Ignition coil with output stage

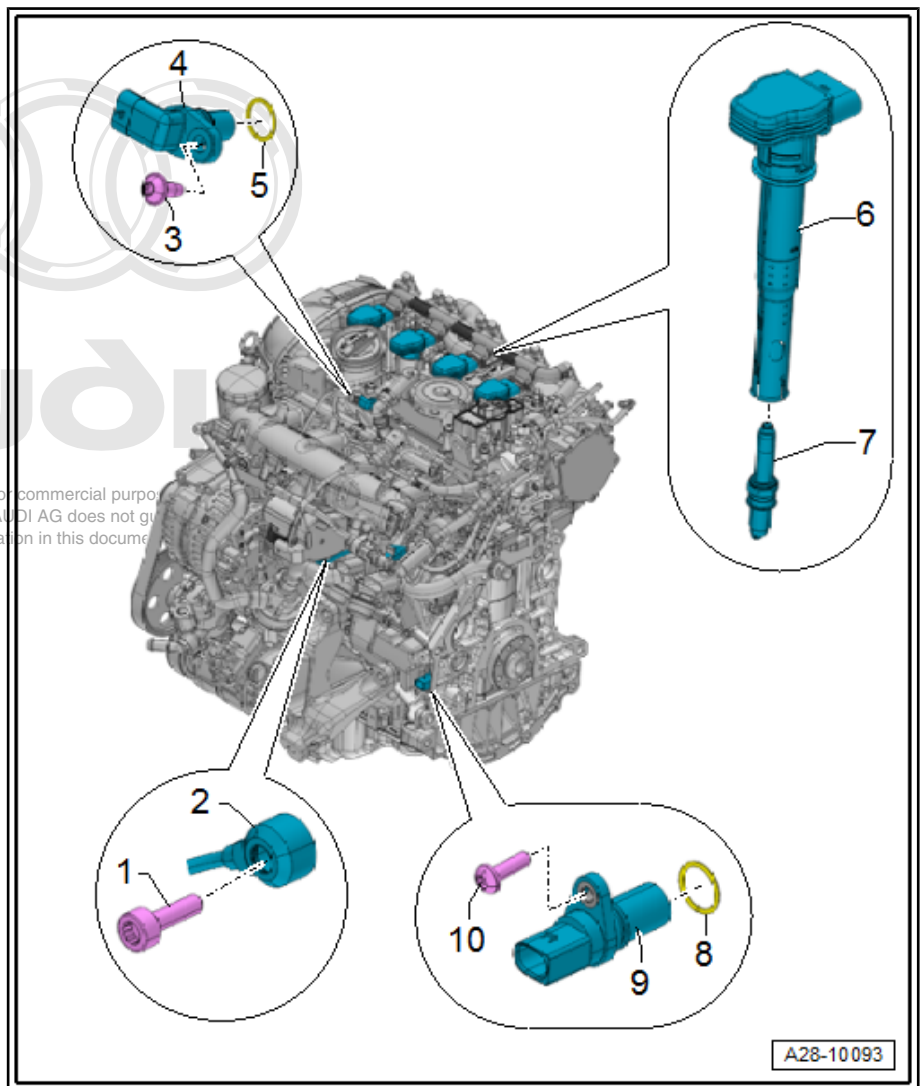
- ◆ Ignition coil 1 with output stage - N70-
- ◆ Ignition coil 2 with output stage - N127-
- ◆ Ignition coil 3 with output stage - N291-
- ◆ Ignition coil 4 with output stage - N292-
- Removing and installing
⇒ [page 388](#)

7 - Spark plug

- Removing and installing, tightening torque:
A4 ⇒ Maintenance ; Booklet 812 , A5 Coupé ⇒ Maintenance ; Booklet 811 , A5 Cabriolet ⇒ Maintenance ;
Booklet 818

8 - O-ring

- Renew



A28-10 093



9 - Engine speed sender - G28-

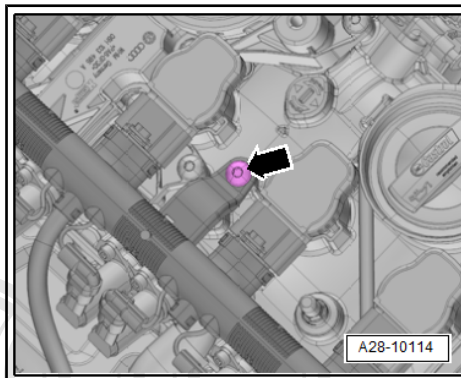
- Removing and installing => [page 391](#)

10 - Bolt

- 4.5 Nm

Electrical connectors for ignition coils - tightening torque

- Tighten bolts -arrow- to 5 Nm.



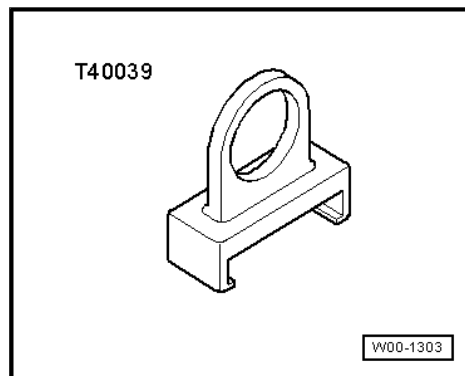
1.2 Test data, spark plugs

Engine data	1.8 ltr./2.0 ltr. turbo FSI engine
Idling speed (cannot be adjusted; is regulated by idling speed stabilisation)	640...800 rpm
Engine speed limiter (deactivates injectors/closes throttle valve)	approx. 6,500 rpm
Ignition timing is determined by the control unit. Ignition timing cannot be adjusted.	
Ignition system	Multi-coil system with 4 ignition coils (output stages integrated) connected directly to spark plugs via spark plug connectors
Firing order	1-3-4-2
Spark plugs	=> Electronic parts catalogue

1.3 Removing and installing ignition coils with output stages

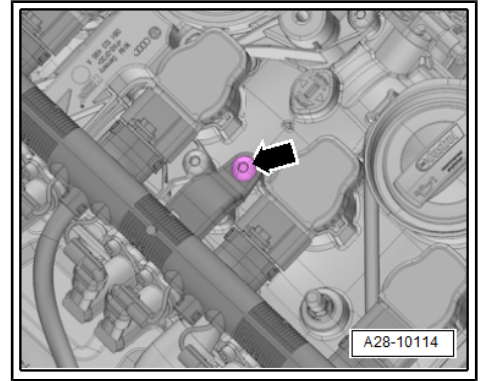
Special tools and workshop equipment required

- ◆ Puller - T40039-



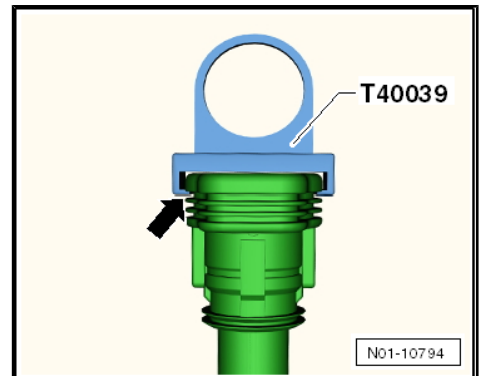
Removing

- Remove engine cover panel ⇒ [page 37](#) .
- Remove bolts -arrow- for connector rail.

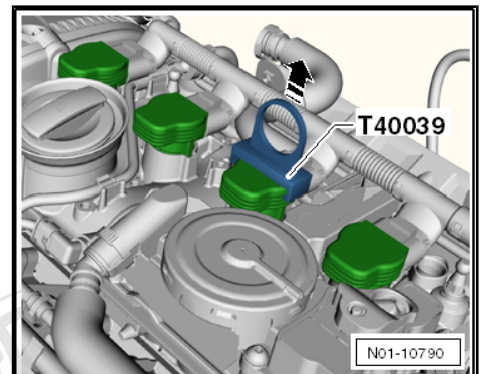


Note

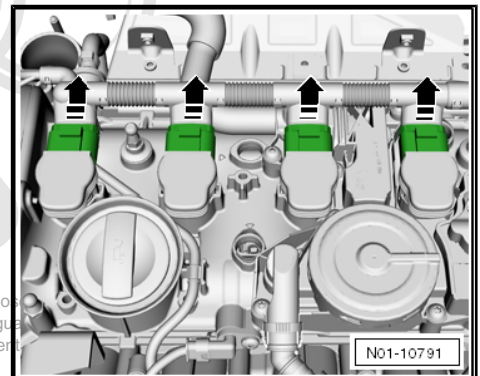
- ◆ To remove ignition coils, fit puller - T40039- onto upper (thick) rib -arrow- of ignition coil with output stage.
- ◆ The lower ribs can be damaged if they are used.



- Using puller - T40039- , pull all ignition coils approx. 30 mm out of spark plug holes.



- Release connectors and unplug all connectors from the ignition coils at the same time.



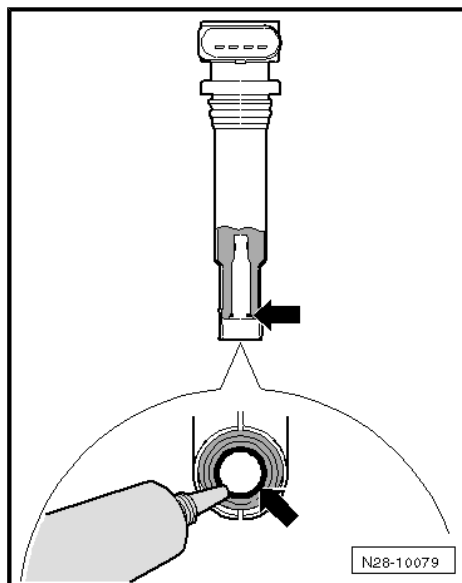
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Installing

- Apply a thin bead of silicone paste all around end of sealing hose of ignition coil with output stage -arrow-.

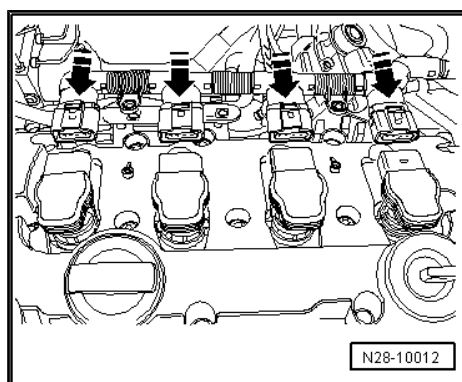
Silicone paste => Electronic parts catalogue (ETKA) .



- Fit all ignition coils loosely into spark plug holes.
- Align ignition coils with electrical connectors and plug all connectors simultaneously onto coils.
- Press ignition coils onto spark plugs by hand with uniform pressure (do not use any tools).
- Install engine cover panel => [page 37](#) .

Tightening torques

- ◆ => [Fig. "“Electrical connectors for ignition coils - tightening torque”", page 388](#)



1.4 Removing and installing knock sensor

Removing

- Unplug electrical connector -2- at knock sensor 1 - G61- .
- Remove thermostat => [page 261](#) .



Note

Knock sensor 1 - G61- is located below the intake manifold and behind the coolant pump.

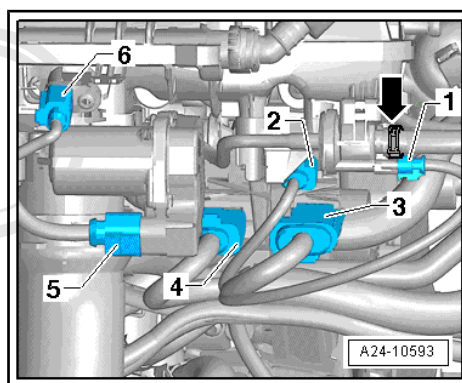
- Remove knock sensor 1 - G61- .

Installing

- Install in reverse **sequence**.
- Install thermostat => [page 261](#) .

Tightening torques

- ◆ => [“1.1 Exploded view - ignition system”, page 387](#)



1.5 Removing and installing Hall senders

Removing

- Remove engine cover panel ⇒ [page 37](#) .
- Unplug electrical connector -1-.
- Unscrew bolt -2- and detach Hall sender - G40- .

Installing

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



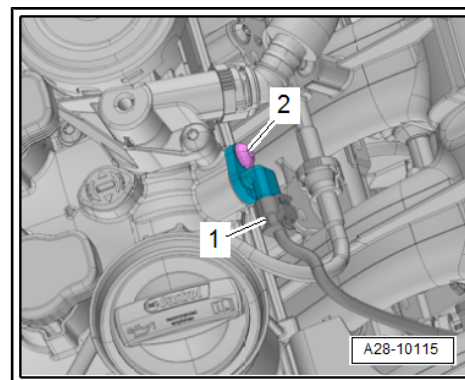
Note

Renew O-ring.

- Install engine cover panel ⇒ [page 37](#) .

Tightening torques

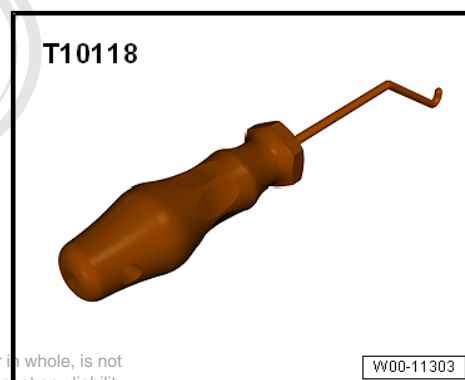
- ◆ ⇒ [“1.1 Exploded view - ignition system”, page 387](#)



1.6 Removing and installing engine speed sender - G28-

Special tools and workshop equipment required

- ◆ Assembly tool - T10118-



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Removing

- Unplug electrical connector at engine speed sender - G28-2- using assembly tool - T10118- .



Note

To release electrical connector without assembly tool - T10118-, press connector on engine speed sender in with a screwdriver and at the same time lift release tab with a thin wire hook.

- Remove securing bolt -1-.

Installing

Install in reverse sequence.

Tightening torques

- ◆ ⇒ [“1.1 Exploded view - ignition system”, page 387](#)

