Workshop Manual

Audi A6 2011 ➤
Audi A7 Sportback 2011 ➤

8-cylinder direct injection engine (4.0 ltr. 4-valve TFSI)									
Engine ID	CEU C	CRD B	CEU D	CWU B	CTG E	CWU A	CWU C		

Edition 07.2019

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List of Workshop Manual Repair Groups

Repair Group

00 - Technical data
10 - Removing and installing engine
13 - Crankshaft group
15 - Cylinder head, valve gear
17 - Lubrication
19 - Cooling
21 - Turbocharging/supercharging
24 - Mixture preparation - injection
26 - Exhaust system
28 - Ignition system

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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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Contents

00 - Technical data 1
1 Identification 1
1.1 Engine number/engine data 1
2 Safety precautions 2
2.1 Safety precautions when working on the fuel supply system 2
2.2 Safety precautions when working on vehicles with start/stop system 2
2.3 Safety precautions after working in the engine compartment 3
2.4 Safety precautions when using testers and measuring instruments during a road test 3
2.5 Safety precautions when working on the cooling system 3
2.6 Safety precautions when working on the exhaust system 3
2.7 Safety precautions when working on the ignition system 4
2.8 Safety precautions when working on the subframe 4
3 Repair instructions 5
3.1 Rules for cleanliness 5
3.2 Foreign particles in engine 5
3.3 Contact corrosion 6
3.4 Routing and attachment of pipes, hoses and wiring 6
3.5 Nuts, bolts 6
3.6 Identification plates 6
3.7 Use of impact wrenches 7
3.8 Installing radiators and condensers 7

10 - Removing and installing engine 8
1 Removing and installing engine 8
1.1 Removing engine 8
1.2 Separating engine and gearbox 41
1.3 Removing engine from scissor-type assembly platform 54
1.4 Securing engine to engine and gearbox support 56
1.5 Installing engine 58
2 Assembly mountings 63
2.1 Exploded view - assembly mountings 63
2.2 Supporting engine in installation position 66
2.3 Removing and installing engine mountings 68
2.4 Removing and installing gearbox mounting 77
2.5 Removing and installing power unit mounting senders 78
2.6 Removing and installing power unit mounting control unit J931 80
2.7 Calibrating electrohydraulic engine mounting 80
3 Engine cover panel 82
3.1 Removing and installing engine cover panel 82

13 - Crankshaft group 83
1 Cylinder block (pulley end) 83
1.1 Exploded view - poly V-belt drive 83
1.2 Removing and installing poly V-belt 84
1.3 Removing and installing tensioner for poly V-belt 85
1.4 Removing and installing vibration damper 87
1.5 Renewing crankshaft oil seal (pulley end) 87
2 Cylinder block (gearbox end) 90
2.1 Exploded view - cylinder block (gearbox end) 90
2.2 Removing and installing drive plate 90
2.3 Renewing crankshaft oil seal (gearbox end) 92
3 Crankshaft 94

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3.1 Exploded view - crankshaft . . . 94
3.2 Crankshaft dimensions . . . 97
3.3 Allocation of main bearing shells . . . 98
3.4 Measuring axial clearance of crankshaft . . . 100
3.5 Measuring radial clearance of crankshaft . . . 101
3.6 Removing and installing sender wheel . . . 101
3.7 Checking sender wheel . . . 102
4 Auxiliary drive . . . 104
4.1 Exploded view - auxiliary drive . . . 104
4.2 Removing and installing spur gear drive . . . 105
4.3 Renewing oil seal for power steering pump drive . . . 107
4.4 Renewing oil seal for AC compressor drive . . . 108
5 Pistons and conrods . . . 111
5.1 Exploded view - pistons and conrods . . . 111
5.2 Removing and installing pistons . . . 113
5.3 Checking pistons and cylinder bores . . . 115
5.4 Checking radial clearance of conrod bearings . . . 116
15 - Cylinder head, valve gear . . . 117
1 Timing chain cover . . . 117
1.1 Exploded view - timing chain cover . . . 117
1.2 Removing and installing timing chain cover . . . 120
2 Chain drive . . . 133
2.1 Exploded view - camshaft timing chains . . . 133
2.2 Exploded view - drive chain for valve gear . . . 136
2.3 Exploded view - drive chain for auxiliary drive . . . 138
2.4 Removing camshaft timing chain from camshafts . . . 139
2.5 Removing and installing camshaft timing chain . . . 151
2.6 Removing and installing chain tensioner for camshaft timing chain . . . 152
2.7 Removing and installing drive chain for valve gear . . . 153
2.8 Removing and installing drive chain for auxiliary drive . . . 154
3 Cylinder head . . . 156
3.1 Exploded view - cylinder head . . . 156
3.2 Removing and installing cylinder head . . . 158
3.3 Checking compression . . . 168
4 Valve gear . . . 171
4.1 Exploded view - valve gear . . . 171
4.2 Measuring axial clearance of camshaft . . . 175
4.3 Measuring radial clearance of camshaft . . . 176
4.4 Removing and installing camshaft . . . 176
4.5 Removing and installing cam actuators . . . 192
4.6 Removing and installing camshaft control valves . . . 194
4.7 Removing and installing valve stem oil seals . . . 196
5 Inlet and exhaust valves . . . 205
5.1 Checking valve guides . . . 205
5.2 Checking valves . . . 206
5.3 Valve dimensions . . . 206
17 - Lubrication . . . 207
1 Sump/oil pump . . . 207
1.1 Exploded view - sump/oil pump . . . 207
1.2 Engine oil . . . 211
1.3 Removing and installing sump (bottom section) . . . 211
1.4 Removing and installing sump (top section) . . . 214
1.5 Removing and installing oil pump . . . 218

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1.6 Removing and installing oil level and oil temperature sender G266 . . . 220
2 Engine oil cooler . . . 221
2.1 Exploded view - engine oil cooler . . . 221
2.2 Removing and installing engine oil cooler . . . 223
3 Crankcase breather . . . 227
3.1 Exploded view - crankcase breather system . . . 227
3.2 Removing and installing oil separator . . . 228
4 Oil filter/oil pressure switches . . . 229
4.1 Exploded view - oil filter . . . 229
4.2 Exploded view - oil pressure switches/oil pressure control . . . 230
4.3 Removing and installing oil pressure switches F22 / F378 . . . 231
4.4 Removing and installing stage 3 oil pressure switch F447 . . . 233
4.5 Removing and installing oil temperature sender 2 G664 . . . 234
4.6 Checking oil pressure . . . 234
4.7 Removing and installing valve for oil pressure control N428 . . . 235
4.8 Removing and installing piston cooling jet control valve N522 . . . 236
5 Oil circuit . . . 237
5.1 Exploded view - mechanical switching valve, non-return valve, cover in inner V of engine . . . 237
5.2 Removing and installing cover in inner V of engine . . . 238
5.3 Removing and installing non-return valve . . . 240
5.4 Removing and installing mechanical switching valve . . . 240

19 - Cooling . . . 241
1 Cooling system/coolant . . . 241
1.1 Connection diagram - coolant hoses . . . 241
1.2 Checking cooling system for leaks . . . 246
1.3 Draining and filling cooling system . . . 249
2 Coolant pump/thermostat assembly . . . 257
2.1 Exploded view - coolant pump/thermostat . . . 257
2.2 Exploded view - electric coolant pump . . . 259
2.3 Exploded view - coolant temperature senders . . . 262
2.4 Removing and installing electric coolant pump . . . 262
2.5 Removing and installing coolant pump . . . 270
2.6 Checking thermostat . . . 272
2.7 Removing and installing map-controlled engine cooling system thermostat F265 . . . 272
2.8 Removing and installing coolant temperature senders G62 / G694 . . . 273
2.9 Removing and installing radiator outlet coolant temperature sender G83 . . . 275
2.10 Removing and installing coolant valves . . . 276
3 Coolant pipes . . . 278
3.1 Exploded view - coolant pipes . . . 278
3.2 Removing and installing coolant pipes . . . 281
4 Radiators/radiator fans . . . 300
4.1 Exploded view - radiators/radiator fans . . . 300
4.2 Exploded view - auxiliary radiator . . . 305
4.3 Exploded view - radiator cowl and radiator fan . . . 308
4.4 Removing and installing radiator . . . 309
4.5 Removing and installing water radiator for charge air cooling circuit . . . 318
4.6 Removing and installing radiator cowl . . . 322
4.7 Removing and installing radiator fan V7 . . . 325
4.8 Removing and installing auxiliary radiator . . . 326

21 - Turbocharging/supercharging . . . 333
1 Turbochargers . . . 333
1.1 Exploded view - turbocharger . . . 333

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1.2 Removing and installing turbocharger . . . 336
1.3 Removing and installing temperature sender for engine cover panel G765 . . . 342
2 Charge air system . . . 344
2.1 Exploded view - charge air system . . . 344
2.2 Exploded view - hose connections for charge air system . . . 346
2.3 Removing and installing charge air cooler housing . . . 346
2.4 Removing and installing charge air cooler . . . 347
2.5 Removing and installing charge pressure sender G31 . . . 349
2.6 Removing and installing charge pressure sender 2 G447 . . . 351
2.7 Removing and installing turbocharger air recirculation valve N249 . . . 352
2.8 Removing and installing turbocharger air recirculation valve, cylinder bank 2 N427 . . . 353

24 - Mixture preparation - injection . . . 355
1 Injection system . . . 355
1.1 Overview of fitting locations - injection system . . . 355
1.2 Checking fuel system for leaks . . . 364
2 Vacuum system . . . 365
2.1 Connection diagram - vacuum system . . . 365
2.2 Checking vacuum system . . . 366
2.3 Removing and installing vacuum unit for intake manifold flap . . . 367
2.4 Removing and installing charge pressure control solenoid valve N75 . . . 371
2.5 Removing and installing secondary air inlet valve N112 / N320 . . . 371
2.6 Removing and installing intake manifold flap valve N316 . . . 377
2.7 Removing and installing coolant valve for cylinder head N489 . . . 378
3 Air cleaner . . . 379
3.1 Exploded view - air cleaner housing . . . 379
3.2 Removing and installing air cleaner housing . . . 379
4 Intake manifold . . . 381
4.1 Exploded view - intake manifold . . . 381
4.2 Exploded view - throttle valve module . . . 383
4.3 Removing and installing intake manifold . . . 384
4.4 Removing and installing throttle valve module J338 . . . 391
4.5 Removing and installing intake manifold flap potentiometer G336 . . . 393
4.6 Removing and installing intake manifold flap potentiometer 2 G512 . . . 395
5 Injectors . . . 397
5.1 Removing and installing injectors . . . 397
5.2 Cleaning injectors . . . 400
6 Senders and sensors . . . 402
6.1 Removing and installing actuator for structure-borne sound R214 . . . 402
6.2 Removing and installing control unit for structure-borne sound J869 . . . 403
6.3 Removing and installing fuel pressure sender G247 . . . 403
6.4 Removing and installing fuel pressure sender 2 G624 . . . 404
6.5 Removing and installing fuel pressure sender for low pressure G410 . . . 405
6.6 Removing and installing temperature senders for charge air cooler G763 / G764 . . . 406
6.7 Removing and installing intake air temperature sender G42 . . . 406
6.8 Removing and installing intake manifold pressure sender G71 . . . 407
7 High-pressure pump . . . 409
7.1 Exploded view - high-pressure pump . . . 409
7.2 Exploded view - fuel pipes and fuel rail . . . 410
7.3 Removing and installing high-pressure pump . . . 412
7.4 Removing and installing high-pressure pipe . . . 416
8 Lambda probe . . . 422
8.1 Exploded view - Lambda probe . . . 422
8.2 Removing and installing Lambda probe . . . 422

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9 Engine control unit 427
9.1 Wiring and component check 427
9.2 Removing and installing engine/motor control unit J623 428

26 - Exhaust system 432

1 Exhaust pipes/silencers 432
1.1 Exploded view - silencers 432
1.2 Separating exhaust pipes/silencers 435
1.3 Removing and installing front silencers 436
1.4 Removing and installing silencer 437
1.5 Stress-free alignment of exhaust system 438
1.6 Checking exhaust system for leaks 439
2 Emission control system 440
2.1 Removing and installing catalytic converter 440
2.2 Removing and installing exhaust flap control unit J883 / exhaust flap control unit 2 J945 443
3 Secondary air system 444
3.1 Exploded view - secondary air system 444
3.2 Removing and installing secondary air pump motor V101 445
3.3 Checking secondary air inlet valve 447
3.4 Removing and installing combination valve 449
3.5 Removing and installing sender 1 for secondary air pressure G609 449

28 - Ignition system 450

1 Ignition system 450
1.1 Exploded view - ignition system 450
1.2 Test data - spark plugs 451
1.3 Removing and installing ignition coils with output stages 452
1.4 Removing and installing knock sensor 456
1.5 Removing and installing Hall senders 460
1.6 Removing and installing engine speed sender G28 464

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00 – Technical data

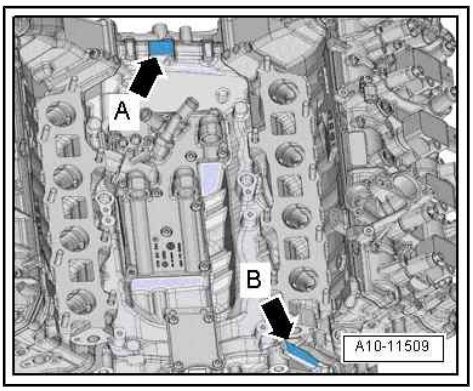
1 Identification

(ARL006510; Edition 07.2019)

⇒ “1.1 Engine number/engine data”, page 1

1.1 Engine number/engine data

Engine number



Note

- *The engine number -arrow B- is not visible until the charge air cooler housing has been removed.*
- *The engine cover panel must be pulled off to make the first three characters of the engine code -arrow A- visible.*
- The engine number (“engine code” and “serial number”) can be found on the cylinder block at the front left -arrow B-.
- 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.

Note

- *The four-letter engine code is found on the type plate (certain countries only), vehicle data sticker and engine control unit.*
- *Fitting locations of the type plate (certain countries only) and the vehicle data sticker ⇒ Maintenance ; Booklet 411 .*

Engine data

⇒ Technical data for 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 after working in the engine compartment”, 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 cooling system”, page 3

⇒ “2.6 Safety precautions when working on the exhaust system”, page 3

⇒ “2.7 Safety precautions when working on the ignition system”, page 4

⇒ “2.8 Safety precautions when working on the subframe”, page 4

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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 a 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

The engine can start unexpectedly if the vehicle's start/stop system is activated. A message in the instrument cluster indicates whether the start/stop system is activated.

– To deactivate the start/stop system, switch off the ignition.

2.3 Safety precautions after working in the engine compartment

WARNING

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

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

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

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 cooling system

Risk of scalding as hot coolant can escape

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The cooling system is under pressure when the power unit is hot.
Risk of scalding due to hot steam and hot coolant.

– Put on protective gloves.
– Put on safety goggles.
– Cover filler cap on expansion tank with a cloth and open carefully to release pressure.

2.6 Safety precautions when working on the exhaust system

Risk of damage to flexible joint

The flexible joint can be damaged or develop leaks if it is handled incorrectly.

– Do not bend flexible joint more than 10°.
– Install flexible joint so that it is not under tension.

Risk of injury caused by components of the exhaust system

Danger of injury to hands and other parts of the body due to hot or sharp parts of the exhaust system.

- Allow exhaust system to cool down.
- Put on protective gloves.

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2.7 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.

2.8 Safety precautions when working on the subframe

Risk of damage to components

Lowering the vehicle onto its wheels can damage components if the assembly mountings, steering rack or subframe cross brace are not properly fitted.

- Never lower vehicle onto its wheels with suspension components unfastened or detached.
- Never support weight of vehicle on subframe or subframe cross brace with suspension components unfastened or detached.

3 Repair instructions

⇒ “3.1 Rules for cleanliness”, page 5

⇒ “3.2 Foreign particles in engine”, page 5

⇒ “3.3 Contact corrosion”, page 6

⇒ “3.4 Routing and attachment of pipes, hoses and wiring”, page 6

⇒ “3.5 Nuts, bolts”, page 6

⇒ “3.6 Identification plates”, page 6

⇒ “3.7 Use of impact wrenches”, page 7

⇒ “3.8 Installing radiators and condensers”, page 7

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:

- Clean connections and surrounding area thoroughly with engine cleaner or brake cleaner and dry cleaned area before loosening.
- Immediately seal open lines and connections with clean plugs, for example from engine bung set - VAS 6122- .
- After removal, place parts on a clean surface and cover them. Only use lint-free cloths.
- Carefully cover or seal open components if repairs cannot be carried out immediately.
- Only install clean components; replacement parts should only be unpacked immediately prior to installation. Do not use parts that have been previously unpacked and stored away loose (e.g. in toolboxes, etc.).
- Do not work with compressed air when the system is open. If possible, do not move 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.
- In the event of mechanical damage to one of the cylinder banks, the intake and exhaust systems and combustion chambers of the opposite cylinder bank must always be examined for foreign particles to prevent further damage occurring later.

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Note

If the turbocharger has suffered mechanical damage
⇒ page 336

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 using Audi Genuine Accessories.
- Damage caused by contact corrosion is not covered by warranty.

3.4 Routing and attachment of pipes, hoses and wiring

- Mark fuel lines, hydraulic lines, vacuum lines, lines for activated charcoal filter and electrical wiring etc. before removal so they can be re-installed in the original positions and correctly connected. Make sketches or take photographs if necessary.
- Because of the limited space in the engine compartment, it is important to ensure that there is adequate clearance to any moving or hot components to avoid damage to lines and wiring.

3.5 Nuts, bolts

- Loosen bolts in reverse sequence to specified tightening sequence.
- Bolts and nuts used to secure covers and housings must be tightened in steps according to the specified tightening sequence and method.
- Bolts and nuts which secure covers and housings should be loosened and tightened in diagonal sequence and in stages if no tightening sequence is specified.
- Always renew self-locking bolts and nuts.
- Unless otherwise specified, use a wire brush to clean the threads of bolts which are secured with locking fluid. Then install bolts with locking fluid; for locking fluid refer to ⇒ Electronic parts catalogue .
- Threaded holes which take self-locking bolts or bolts coated with locking fluid must be cleaned using a thread tap or similar. Otherwise there is a danger of the bolts shearing off the next time they are removed.
- The tightening torques stated apply to non-oiled nuts and bolts.

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3.6 Identification plates

When renewing vehicle components, the identification plates on the old parts that have a replacement part number (see ⇒ Electronic parts catalogue) must be attached to the new parts due to approval regulations.

3.7 Use of impact wrenches

In general, it is permitted to use an impact wrench to unscrew bolts and nuts. An exception to this is when work is performed inside an open high-voltage battery. For this work, it is not permitted to use an impact wrench.

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An impact wrench may be used to screw in bolts and nuts when performing repair work if the following requirements are observed. In general, electric and compressed-air impact wrenches should be used.

Requirements:

- Only screw in bolts with locking fluid or self-locking nuts at low speed.
- Use a suitable impact wrench with variable speed and adjustable torque range.
- Use suitable bits when working in the vicinity of sensitive surfaces, e.g. plastic-coated bits for aluminium rims.
- When working in the vicinity of natural gas systems, observe the information in the Workshop Manual “Natural gas engines - General information”.

Use:

- Fit bolts/nuts by hand.
- Only use an impact wrench to screw in bolts/nuts until the head of the bolt/nut makes contact and then continue tightening with a torque wrench.
- Clean threaded pins before unscrewing the bolt/nut.

3.8 Installing radiators and condensers

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

10 – Removing and installing engine

1 Removing and installing engine

⇒ “1.1 Removing engine”, page 8
⇒ “1.2 Separating engine and gearbox”, page 41
⇒ “1.3 Removing engine from scissor-type assembly platform”, page 54
⇒ “1.4 Securing engine to engine and gearbox support”, page 56
⇒ “1.5 Installing engine”, page 58

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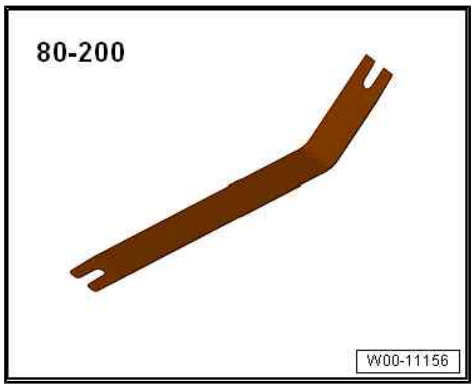
1.1 Removing engine

⇒ “1.1.1 Removing engine - Audi S6/S7”, page 8
⇒ “1.1.2 Removing engine - Audi RS 6/RS 7”, page 24

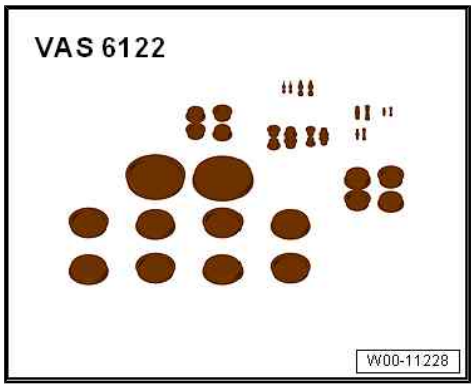
1.1.1 Removing engine - Audi S6/S7

Special tools and workshop equipment required

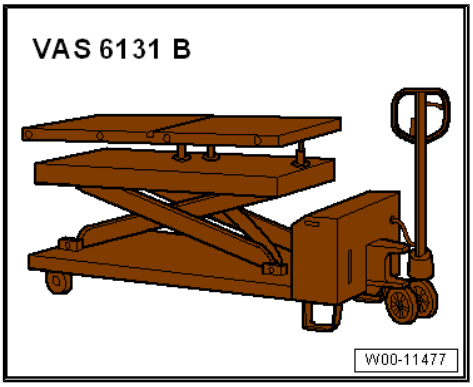
- Removal lever - 80-200-



- Engine bung set - VAS 6122-



- Scissor-type assembly platform - VAS 6131 B- with support set for Audi - VAS 6131/10- , support set -VAS 6131/11- and supplementary set -VAS 6131/13-

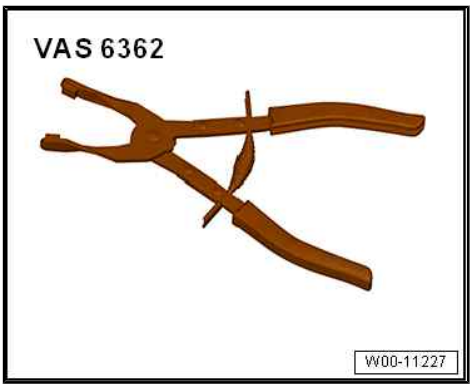


- Drip tray for workshop hoist - VAS 6208-



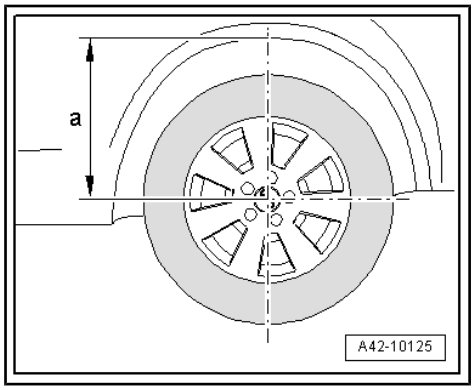
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- Hose clip pliers - VAS 6362-



- Stepladder (commercially available)
- Safety goggles
- Protective gloves

Procedure



Note

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

Note

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

– Bring front wheels into straight-ahead position.

Caution

Risk of irreparable damage to electronic components.

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

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

– Discharge refrigerant system ⇒ Air conditioner with refrigerant R134a .

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

– Remove propshaft ⇒ Rear final drive; Rep. gr. 39 ; Propshaft; Removing and installing propshaft .

– Remove engine cover panel ⇒ page 82 .

WARNING

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

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

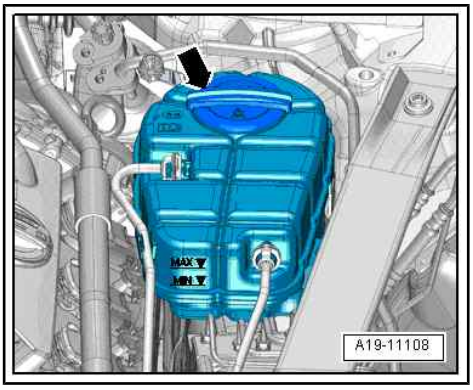
WARNING

The cooling system is under pressure when the power unit is hot. Risk of scalding due to hot steam and hot coolant.

Danger of scalding skin and other parts of the body.

- *Put on protective gloves.*
- *Put on safety goggles.*
- *Cover filler cap on expansion tank with a cloth and open carefully to release pressure.*

– Open filler cap -arrow- on coolant expansion tank.



– Remove front wheel housing liners (left and right) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Removing and installing wheel housing liner (front) .

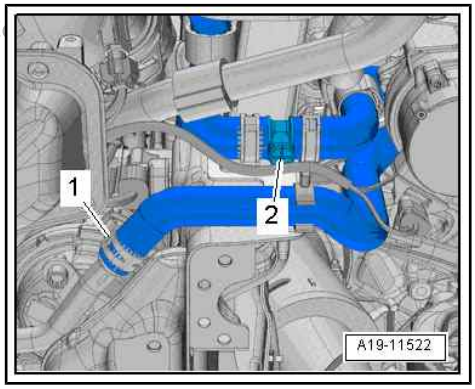
– Remove wheel spoilers (front) on both sides ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .

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

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

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

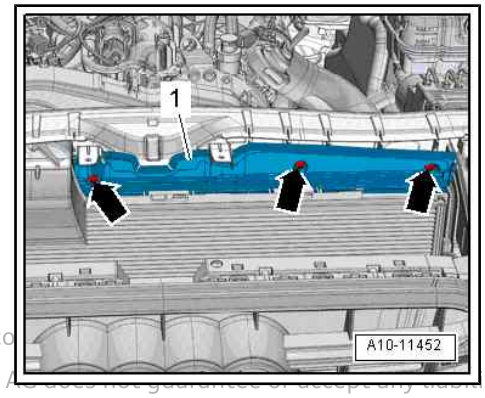


– Remove drain plug -2- and drain off coolant.

– Release hose clip -1-, disconnect coolant hose from coolant pipe (bottom left) and drain off coolant.

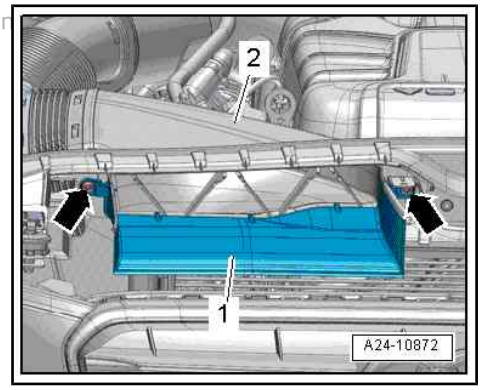
– Remove plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .

– Remove bolts -arrows- and detach air duct -1-.



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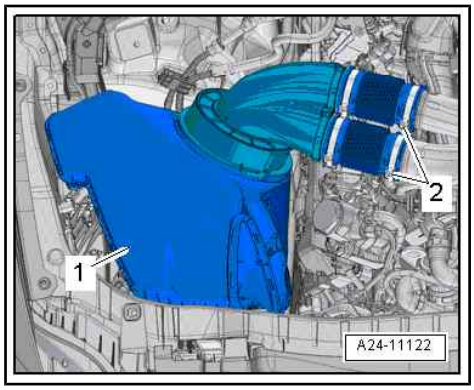
– Remove bolts -arrows- and detach air duct -2-.



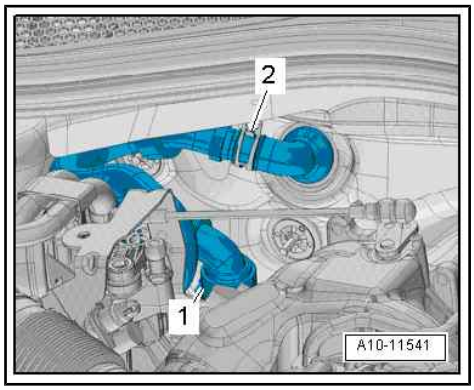
Note

Disregard -item 1-.

– Release hose clips -arrows- and detach air hoses.
– Lift off air cleaner housing -1-.



– Release hose clip -2- and disconnect vacuum hose from plenum chamber partition panel.
– Lift retaining clip -1- and disconnect coolant hose.

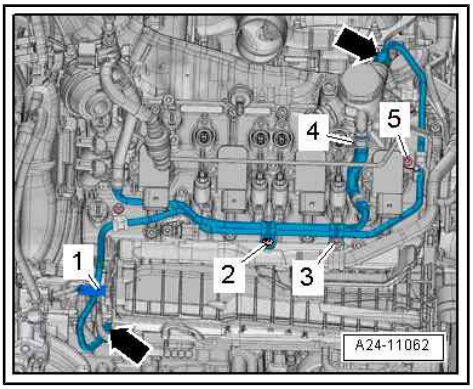


WARNING

The fuel system is pressurised.

Risk of injury as fuel may spray out.

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



– Wrap a clean cloth around connection, loosen union nuts -arrows- and release fuel pressure; to do so, counterhold hexagon flats of each connection when loosening.

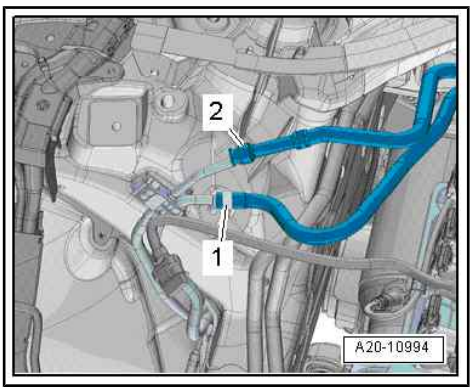
Note

Do not attempt to bend high-pressure pipes to a different shape.

– Disconnect fuel line -2- by pressing release ring.

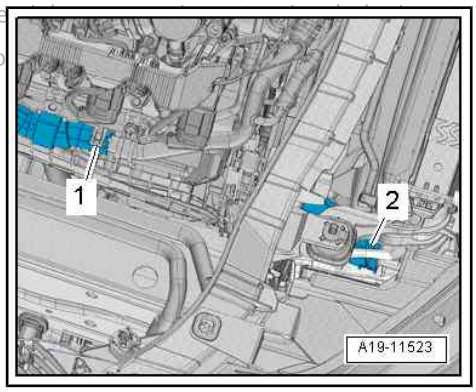
– Release hose clip -1- and disconnect hose from activated charcoal filter.

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

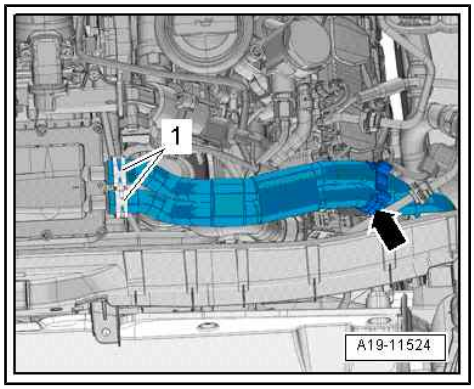


– Lift retaining clip -2-, release hose clip -1- and disconnect coolant hoses.

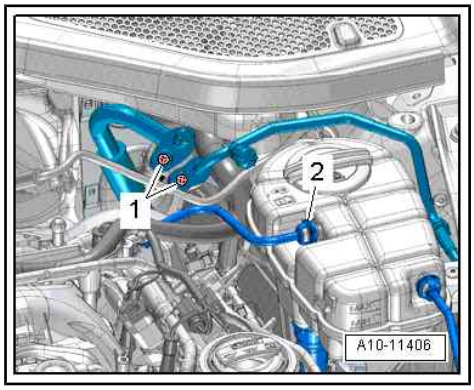
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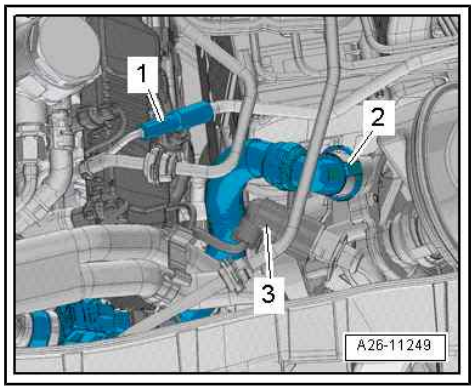
– Release hose clips -1- and detach coolant hoses from water radiator for charge air cooling circuit.
– Move coolant hoses -arrow- clear.



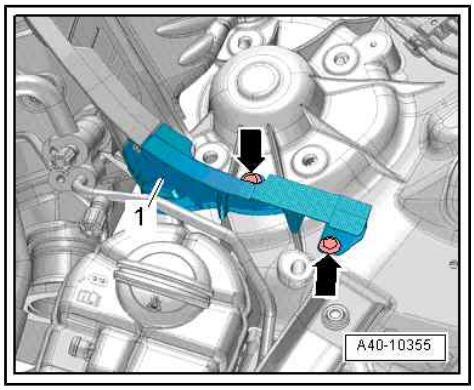
– Lift retaining clip -2- and disconnect coolant hose.
– Move coolant hose clear.
– Remove bolts -1- and move refrigerant lines clear.



– Unplug electrical connector -3-.
– Disconnect vacuum hose -1-.
– Press release tabs and disconnect secondary air hose -2-.

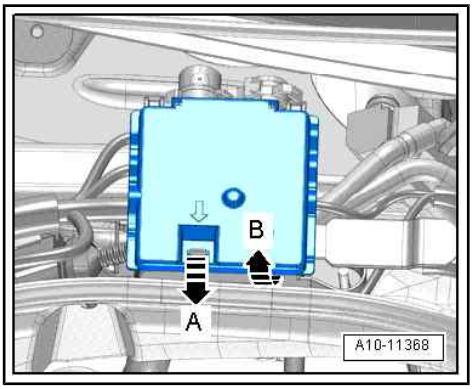


– Remove fasteners -arrows- on both sides and unclip cover -1-.
– Remove body brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Removing and installing body brace .

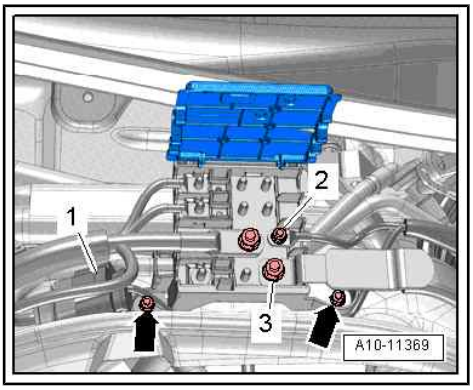


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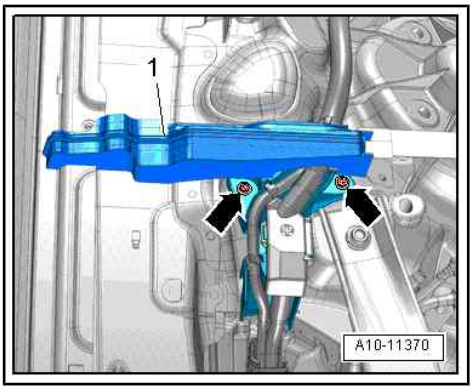
– Release catch -arrow A- and open cover -arrow B-.



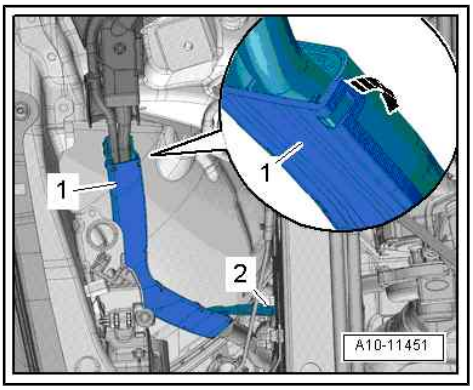
– Remove nuts -2 and 3- and move electrical wiring clear.
– Detach electrical connector -1- from bracket and unplug.
– Remove nuts -arrows- and detach terminal 30 wiring junction - TV2- from plenum chamber partition panel.



– Press foam wedge -1- to one side.
– Remove bolts -arrows-.

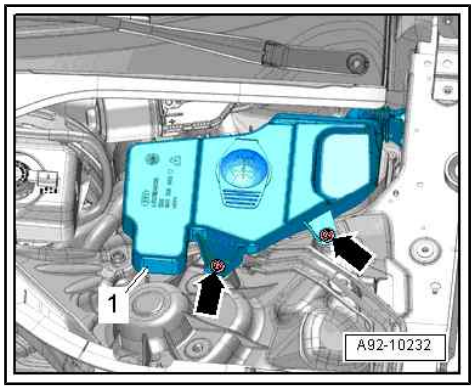


– Unscrew nut -2- on longitudinal member (right-side) and move earth cables clear.
– Release catches -arrow- to open wiring duct -1- and move electrical wiring harness clear.



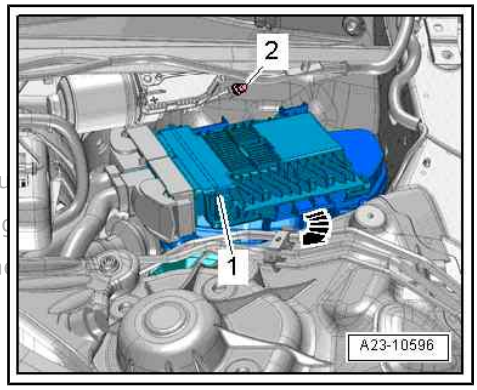
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– Unscrew bolts -arrows- and pull filler neck -1- out of washer fluid reservoir and through opening in body to right side.

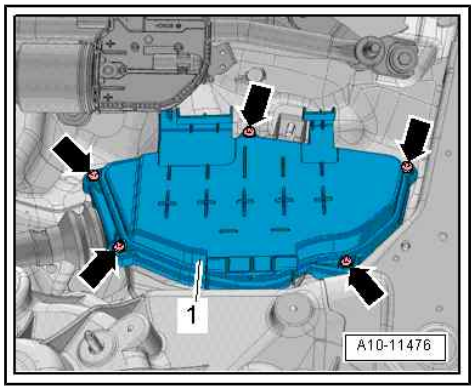


– Remove cap nut -2- and move earth wiring clear.
– Release fastener -arrow-, detach engine control unit - J623- -item 1- from bracket and swivel it to one side.

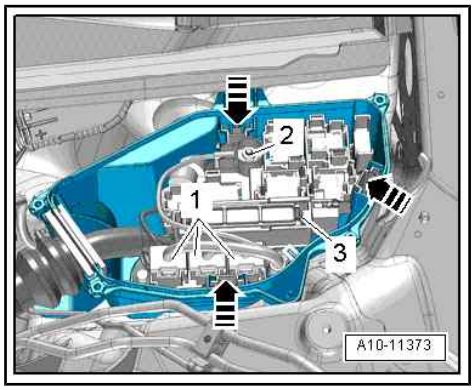
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– Remove bolts -arrows- and detach cover -1- for electronics box in engine compartment.

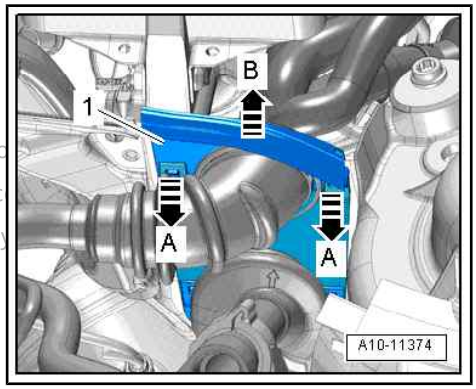


– Unplug electrical connectors -1- and unscrew nut -2- for electrical wiring.
– Release catches -arrows- and detach relay carrier with fuse holder -3-.
– Disengage engine wiring harness at electronics box in engine compartment and move clear.

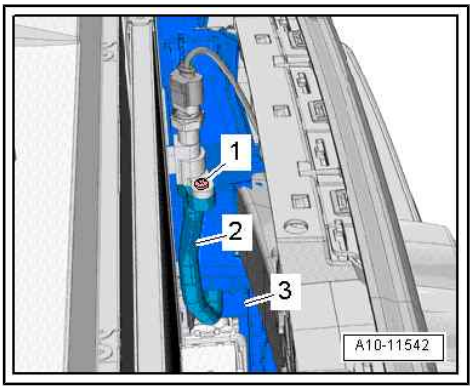


– Release catches -arrows A- and lift off wiring protector -1- -arrow B-.
– Place wiring harness on engine and secure engine/motor control unit - J623- to prevent it from dropping.

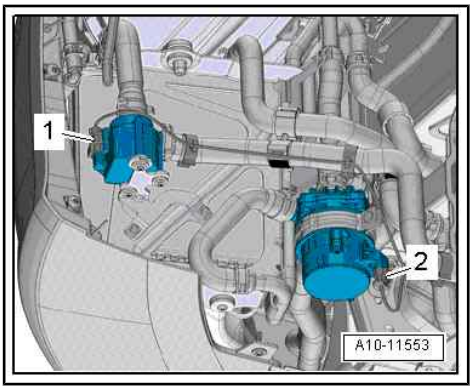
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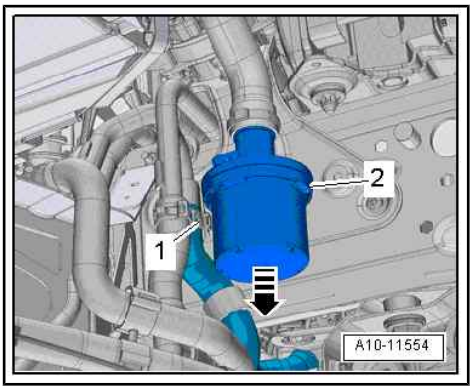
– Remove bolt -1- and guide refrigerant line -2- through air duct (left-side) -3-.



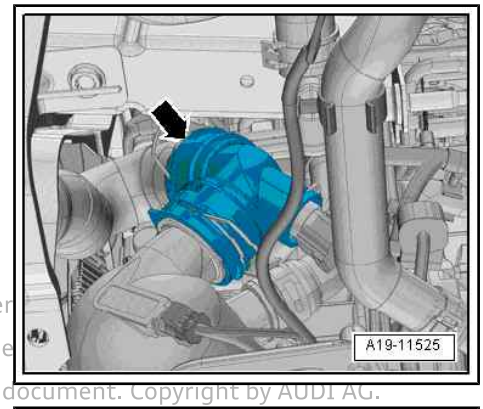
– Unplug electrical connectors -1, 2- and move clear.



– Detach air cleaner -2- from bracket -arrow-.
– Release hose clip -1- and detach coolant hose.



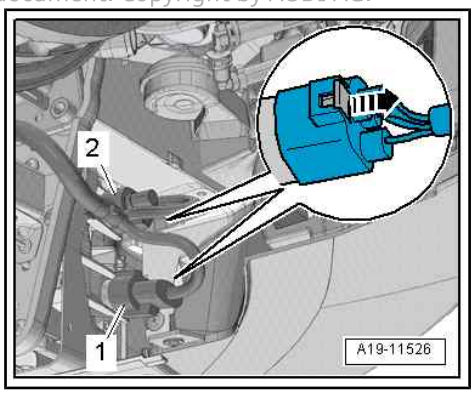
– Lift retaining clip -arrow- and disconnect coolant hose.



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– Take electrical connectors -1, 2- for radiator fan out of bracket and unplug connectors (push retainer to the rear -arrow- and press down release catch).

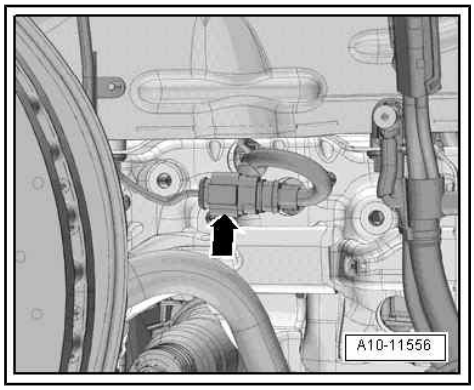
– Move electrical wiring harness clear.



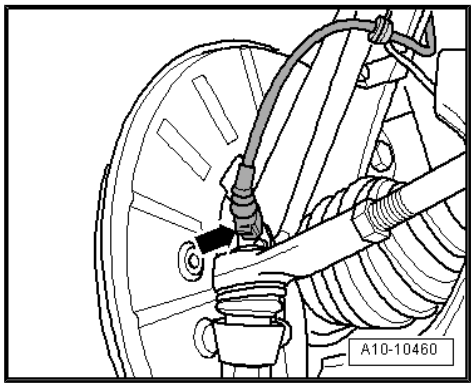
– Unplug electrical connector -arrow-.

Note

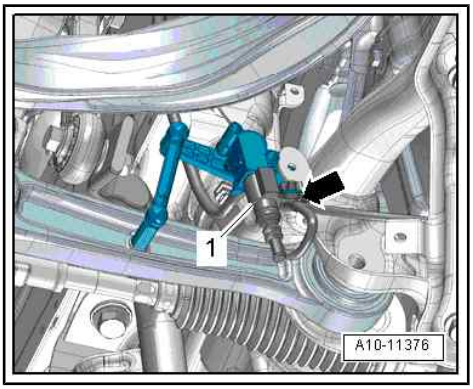
If engine is to be removed from scissor-type assembly platform in a later step, take electrical connector out of bracket and guide through subframe.



– Unplug electrical connector -arrow- at front wheel speed sensor -G45- / -G47- on both sides.



– If fitted, unplug electrical connector -1- at front vehicle level senders on both sides (-G78- and -G289-) and move electrical wiring clear -arrow-.
– Remove brake caliper and tie up in wheel housing with wire (brake hose remains attached) ⇒ Brake system; Rep. gr. 46 ; Front brakes; Removing and installing brake caliper .

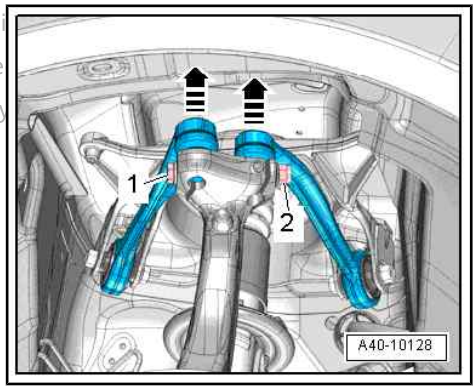


Caution

Risk of damage to brake pistons.

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

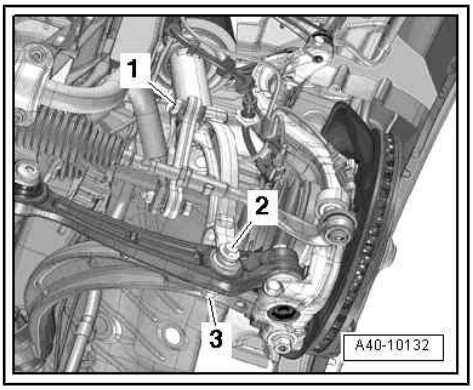
– Remove nut -2- and pull out bolt -1-.
– Pull upper suspension links upwards out of wheel bearing housing -arrows-.
– Repeat procedure on opposite side of vehicle.



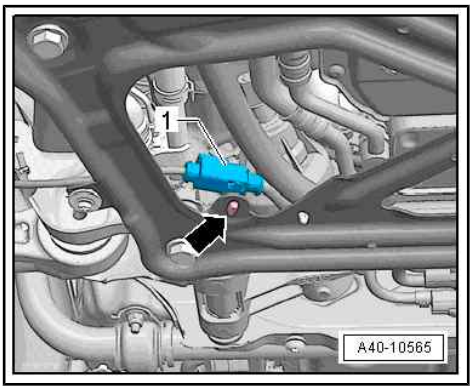
– Remove bolt -1- for anti-roll bar on both sides.
– Remove nut -3- on both sides.

Note

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



– Move clip clear -arrow-.
– Unplug electrical connector -1- and move wiring clear.
– Remove subframe cross brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Removing and installing subframe cross brace .

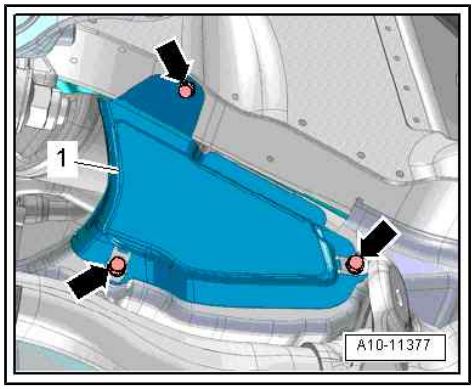


Caution

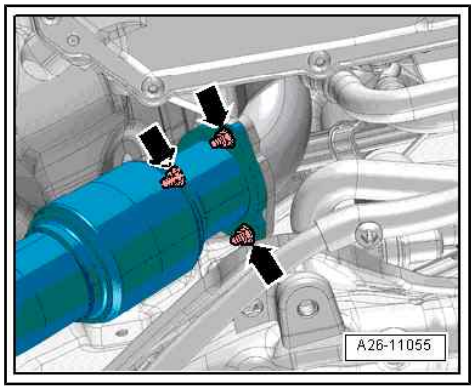
Risk of damage to running gear components.

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

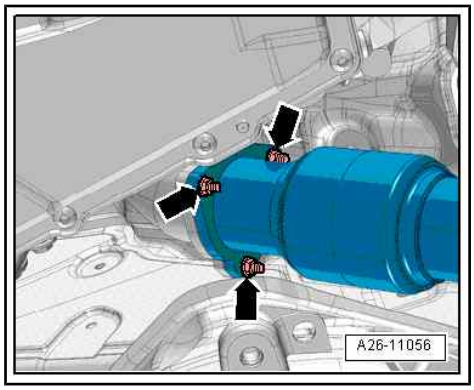
– Remove bolts -arrows- on both sides and detach heat shield -1-.



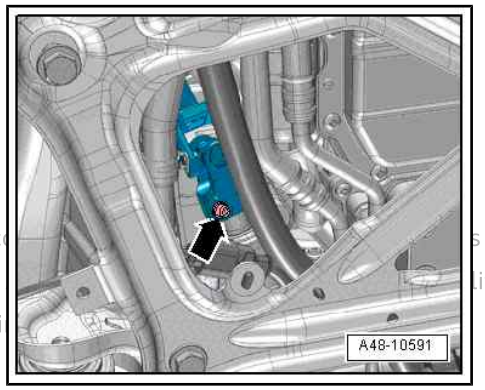
– Unscrew nuts -arrows- and detach front silencer (left-side).



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

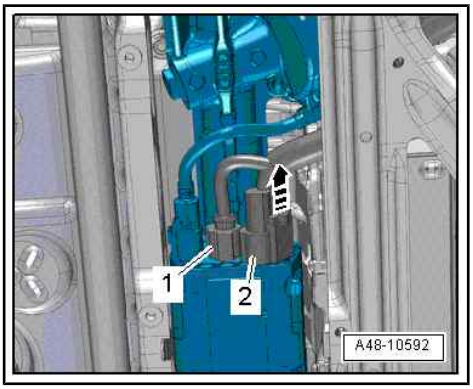


– Detach intermediate steering shaft from steering rack and move clear by telescoping splines together ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Removing and installing intermediate steering shaft .



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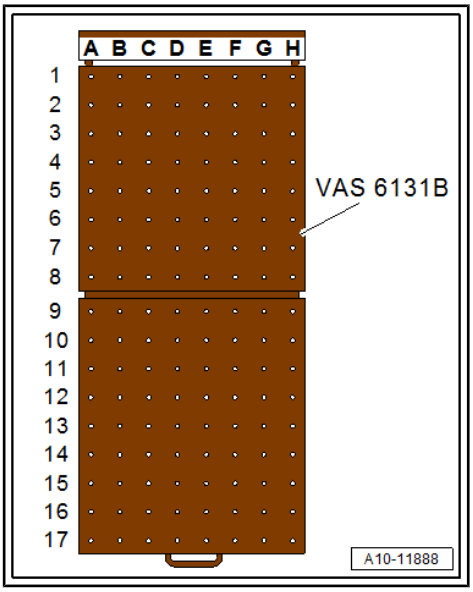
– Unplug electrical connector -2- at power steering control unit - J500- (release retainer -arrow- and press down release catch).
– Unplug electrical connector -1- at power steering control unit - J500- .
– Move electrical wiring harness clear.



Setting up scissor-type assembly platform:

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

Platform coordinates	Parts of support set for Audi - VAS 6131/10- , support set -VAS 6131/11- and supplementary set - VAS 6131/13-			
B4	/13-4	/10-4	/10-5	/13-1
G4	/13-4	/10-4	/10-5	/13-1
B6	/10-1	/10-2	/10-5	/10-11
G6	/10-1	/10-2	/10-5	/10-11
A8+C8	/13-6	–	–	/13-2
F8+H8	/13-5	–	–	/13-2
B14	/10-1	/10-3	/10-5	/11-1
G14	/10-1	/10-4	/10-5	/11-1



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

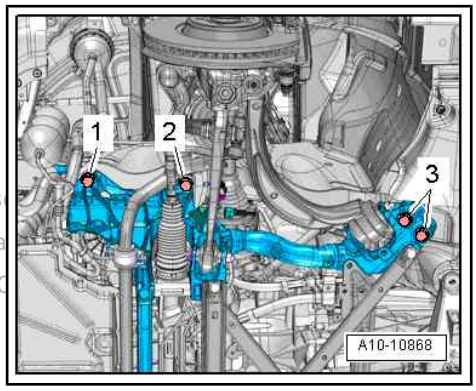
WARNING

Accident risk if subframe mountings are detached.

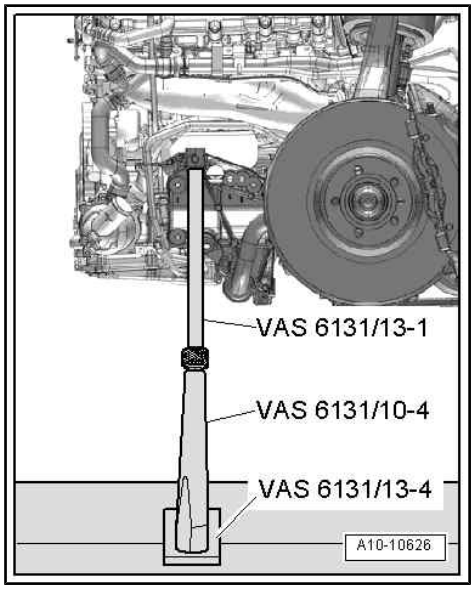
- ***Subframe bolts -2- and -3- must not be loosened.***

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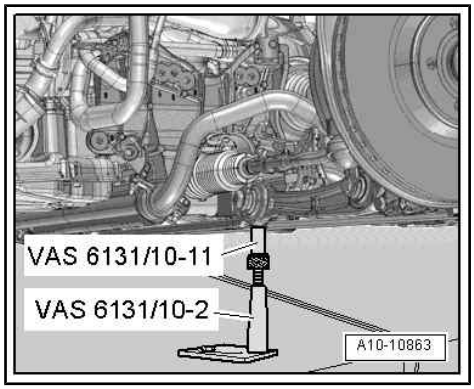
– Remove subframe bolts -1- on both sides.



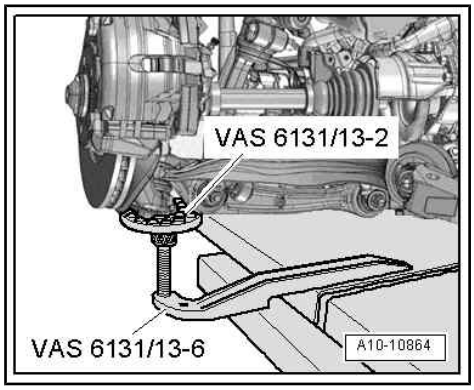
– Position support elements from -VAS 6131/10- and -VAS 6131/13- at front left and right of subframe as shown.
– Make sure that threaded spindles are screwed in completely.



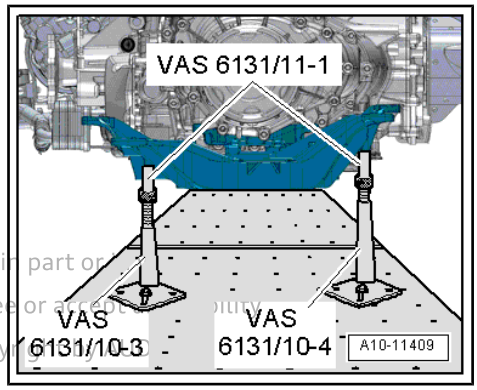
– Position support elements from -VAS 6131/10- (rear left and right) at front attachment points of subframe cross brace as shown.



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

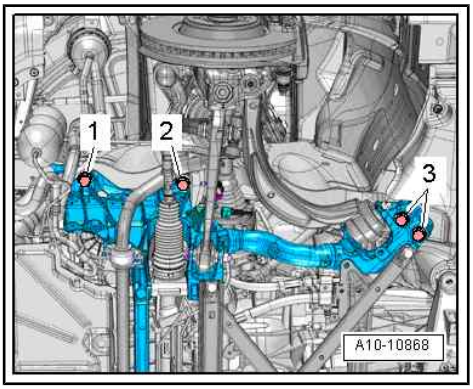


– Position support elements from -VAS 6131/10- and -VAS 6131/11- (rear left and right) at tunnel cross member as shown.
– Turn all spindles for support elements upwards until all locating lugs make contact with mounting points.
– Tighten base plates for support elements to 20 Nm on scissor-type assembly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

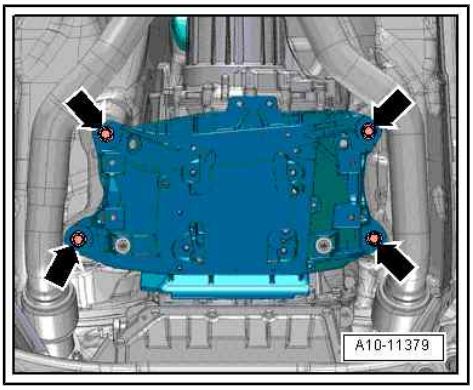


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– Mark installation position of subframe and tunnel cross member on longitudinal members with felt-tip pen.
– Unscrew subframe bolts -2- and -3- on both sides in several stages and in diagonal sequence.



– Remove bolts -arrows- on tunnel cross member.



– Remove bolt -2- on both sides.

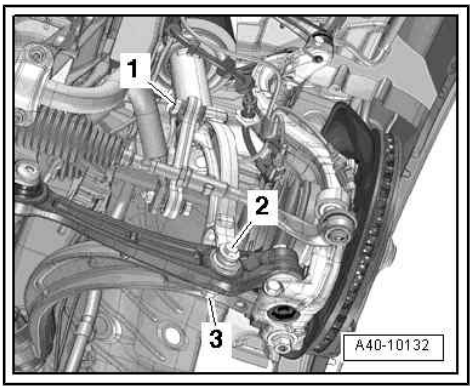
Caution

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

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

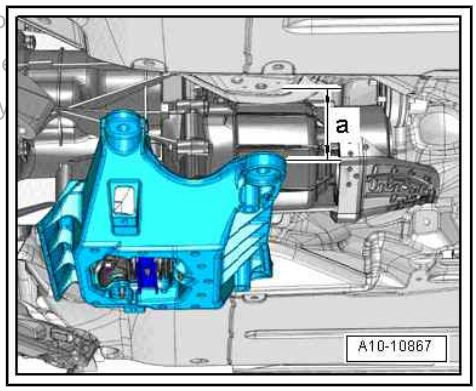
Risk of damage to oil cooler (front).

- ***When lowering, pull engine/gearbox assembly slightly to the rear.***

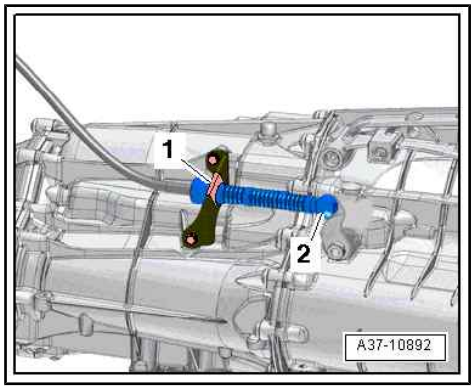


– Lower engine/gearbox assembly using scissor-type assembly platform - VAS 6131 B- initially only as far as distance -a-.
  - Dimension -a- = 100 mm (maximum).

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– Pry ball socket -2- of selector lever cable off gearbox selector lever using removal lever - 80 - 200- .
– Press off securing clip -1- and remove selector lever cable from gearbox.



Note

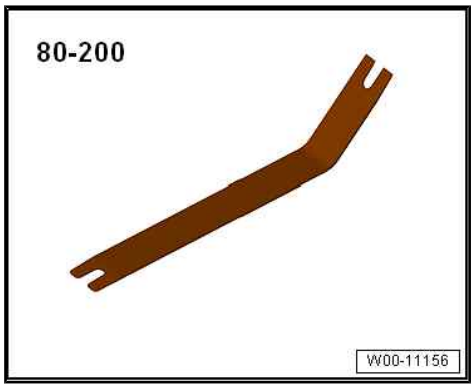
Take care not to bend or kink selector lever cable.

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

1.1.2 Removing engine - Audi RS 6/RS 7

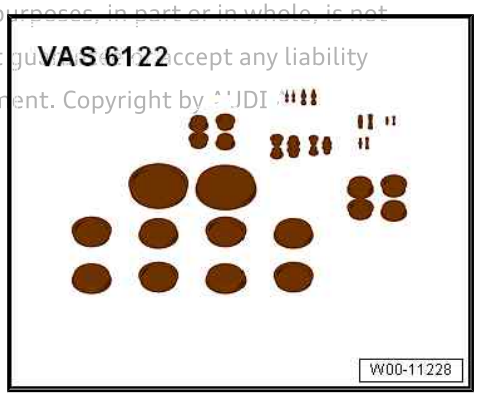
Special tools and workshop equipment required

♦ Removal lever - 80-200-

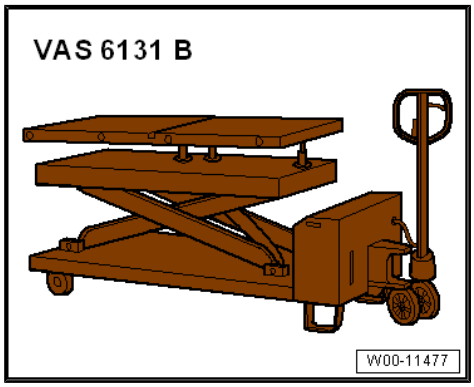


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♦ Engine bung set - VAS 6122-



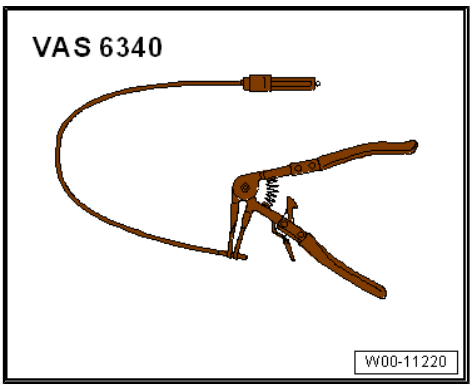
♦ Scissor-type assembly platform - VAS 6131 B- with support set for Audi - VAS 6131/10- , support set -VAS 6131/11- and supplementary set -VAS 6131/13-



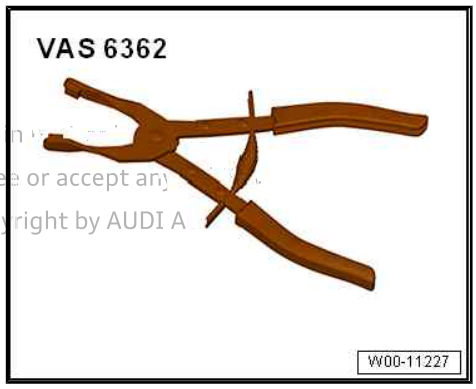
- Drip tray for workshop hoist - VAS 6208-



- Hose clip pliers - VAS 6340-

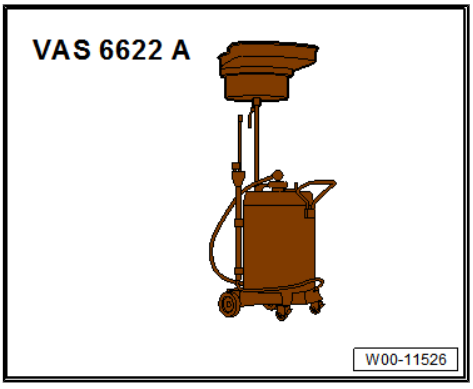


- Hose clip pliers - VAS 6362-



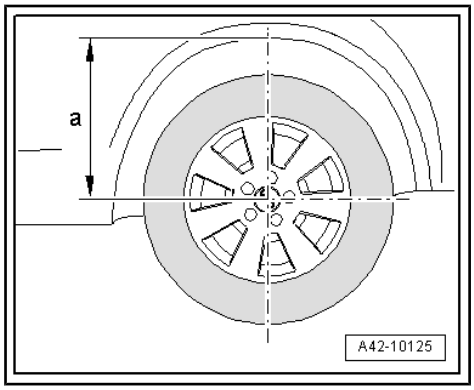
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- Used oil collection and extraction unit - VAS 6622A-



- Stepladder (commercially available)
- Safety goggles
- Protective gloves

Procedure



Note

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

WARNING

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

Note

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

– Bring front wheels into straight-ahead position.

Caution

Risk of irreparable damage to electronic components.

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

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

– Discharge refrigerant system ⇒ Air conditioner with refrigerant R134a .

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

– Remove propshaft ⇒ Rear final drive; Rep. gr. 39 ; Propshaft; Removing and installing propshaft .

– Remove engine cover panel ⇒ page 82 .

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WARNING

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

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

WARNING

The cooling system is under pressure when the power unit is hot. Risk of scalding due to hot steam and hot coolant.

Danger of scalding skin and other parts of the body.

- *Put on protective gloves.*
- *Put on safety goggles.*
- *Cover filler cap on expansion tank with a cloth and open carefully to release pressure.*

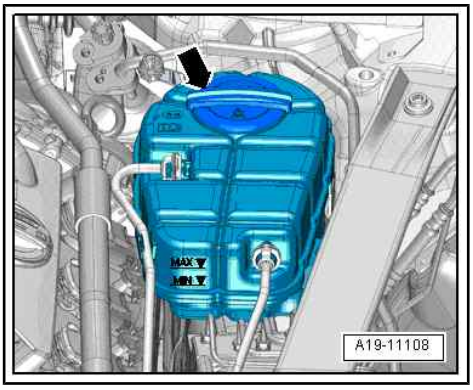
– Open filler cap -arrow- on coolant expansion tank.

– Remove wheel housing liners (front left and front right) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Removing and installing wheel housing liner (front) .

– 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 panels ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

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

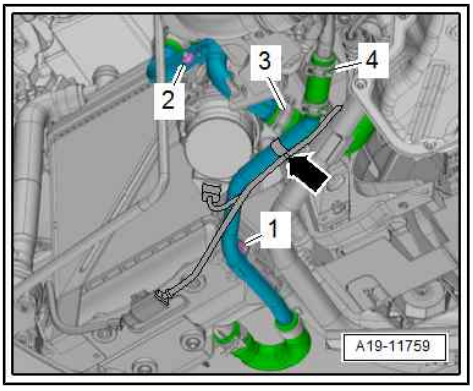


– Move clear electrical wiring harness -arrow-.

– Remove nuts -1, 2- and move coolant pipes clear.

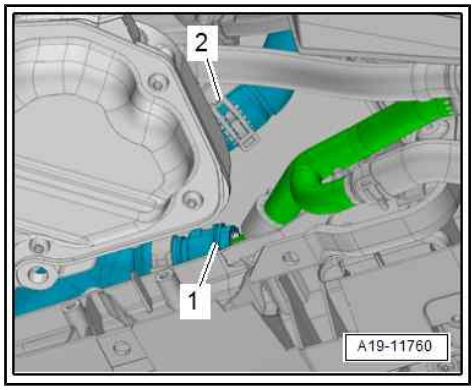
– Place drip tray for workshop hoist - VAS 6208- beneath engine.

– Release hose clips -3 and 4-, disconnect coolant hoses and drain off coolant.

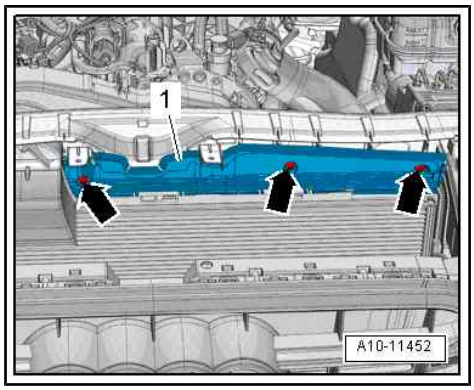


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– Lift retaining clip -1-, release hose clip -2-, disconnect coolant hoses and drain off coolant.
– Remove plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .



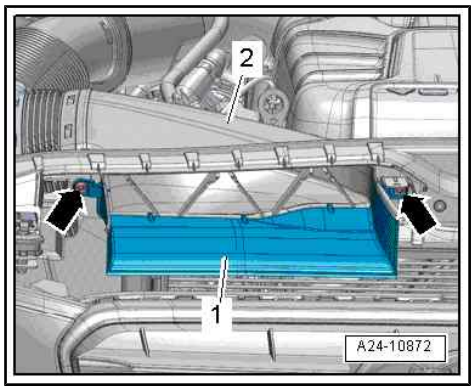
– Remove bolts -arrows- and detach air duct -1-.



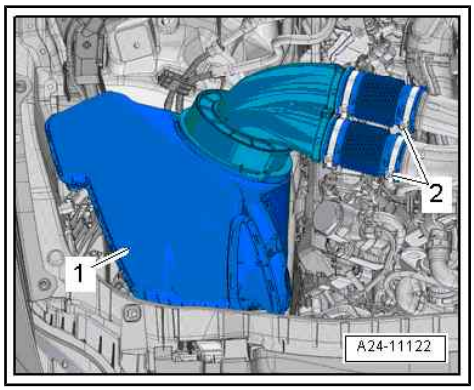
– Remove bolts -arrows- and move clear air duct -2- at lock carrier.

Note

Disregard -item 1-.



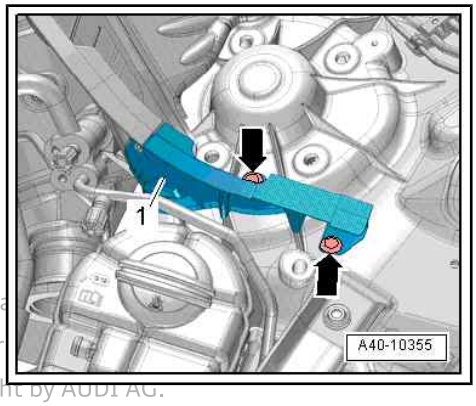
– Release hose clips -arrows- and detach air hoses.
– Lift off air cleaner housing -1-.



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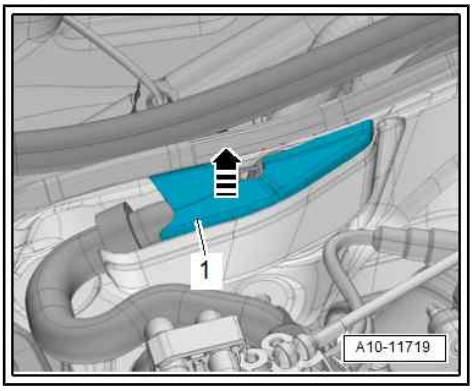
– Remove fasteners -arrows- on both sides and unclip cover -1-.

– Remove body brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Removing and installing body brace .



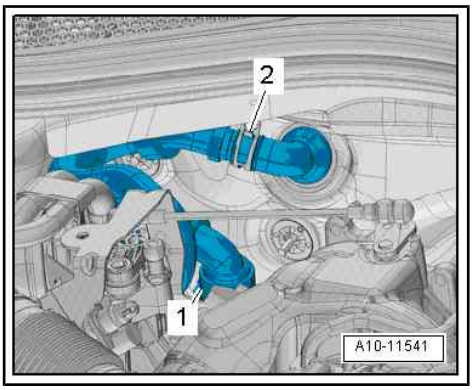
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– Lift off heat shield -1- -arrow-.



– Release hose clip -2- and disconnect vacuum hose from plenum chamber partition panel.

– Lift retaining clip -1- and disconnect coolant hose.



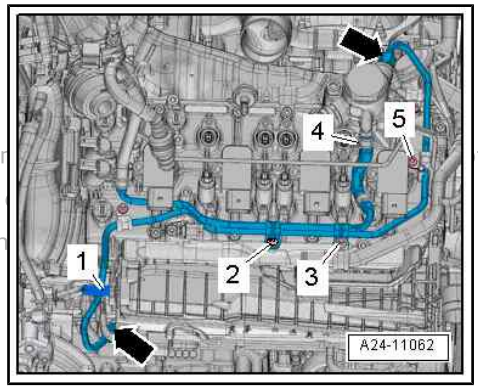
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WARNING

The fuel system is pressurised.

Risk of injury as fuel may spray out.

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



– Wrap a clean cloth around connection, loosen union nuts -arrows- and release fuel pressure; to do so, counterhold hexagon flats of each connection when loosening.

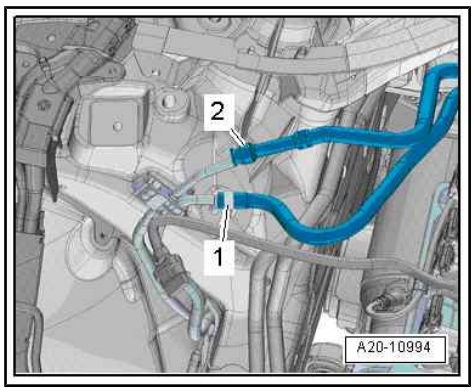
Note

Do not attempt to bend high-pressure pipes to a different shape.

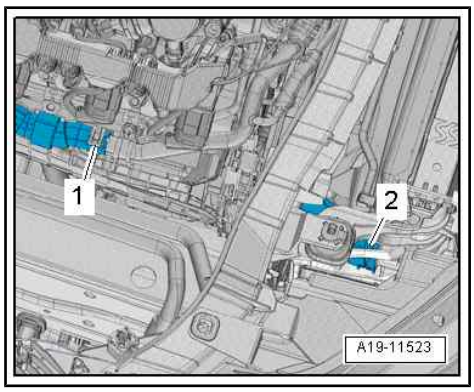
– Disconnect fuel line -2- by pressing release ring.

– Release hose clip -1- and disconnect hose from activated charcoal filter.

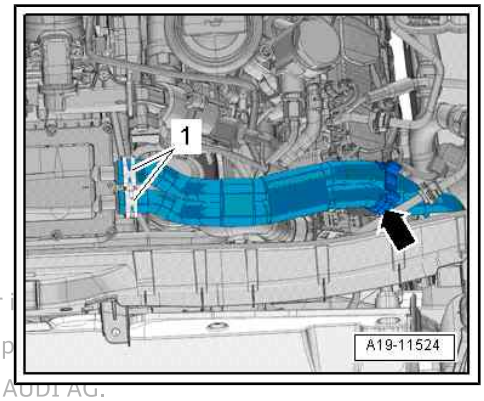
– Seal off open lines and connections with clean plugs from engine bung set - VAS 6122- .



– Lift retaining clip -2-, release hose clip -1- and disconnect coolant hoses.

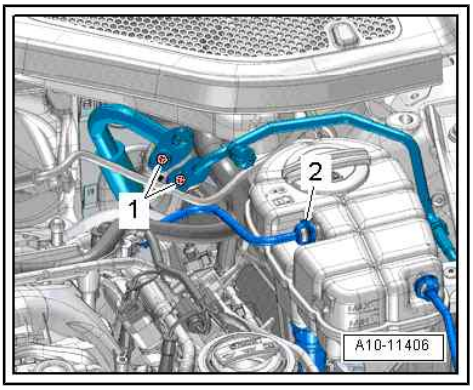


– Release hose clips -1- and detach coolant hoses from water radiator for charge air cooling circuit.
– Move coolant hoses -arrow- clear.



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– Lift retaining clip -2- and disconnect coolant hose.
– Move coolant hose clear.



WARNING

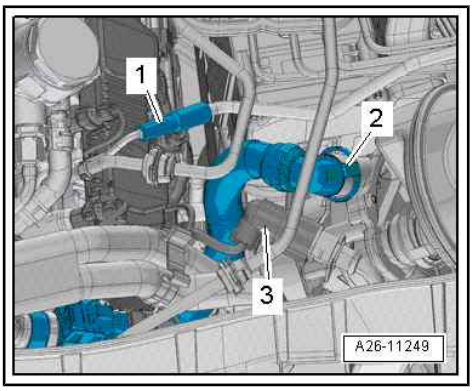
Risk of frostbite from escaping pressurised refrigerant

Risk of frostbite on skin and other parts of the body

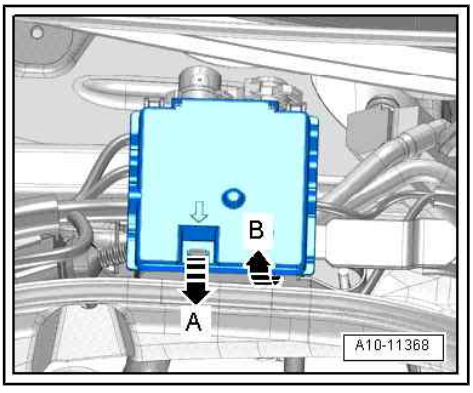
- *Put on protective gloves.*
- *Put on safety goggles.*
- *Extract/drain refrigerant and then immediately open up refrigerant circuit.*
- *Extract/drain refrigerant again if more than 10 minutes have passed since initial extraction and refrigerant circuit has not been opened up. Renewed evaporation has created pressure in the refrigerant circuit.*

– Remove bolts -1- and move refrigerant lines clear.

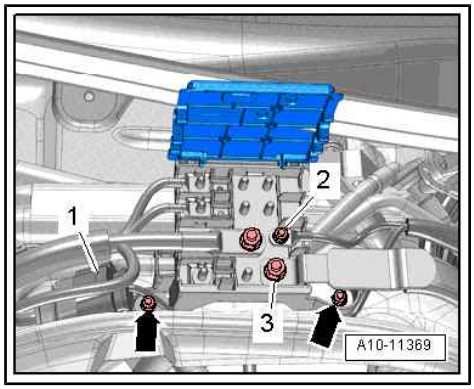
– Unplug electrical connector -3-.
– Disconnect vacuum hose -1-.
– Press release tabs and disconnect secondary air hose -2-.



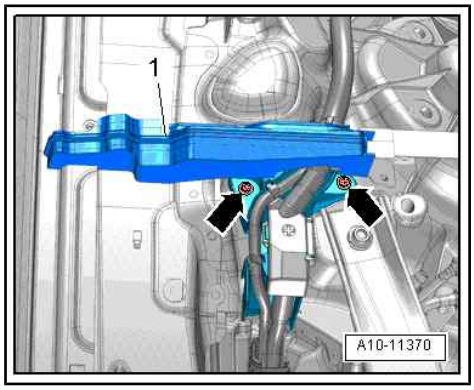
– Release catch -arrow A- and open cover -arrow B-.



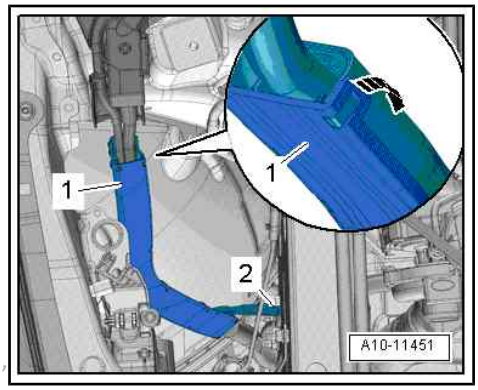
– Remove nuts -2 and 3- and move electrical wiring clear.
– Detach electrical connector -1- from bracket and unplug.
– Remove nuts -arrows- and detach terminal 30 wiring junction - TV2- from plenum chamber partition panel.



– Press foam wedge -1- to one side.
– Remove bolts -arrows-.

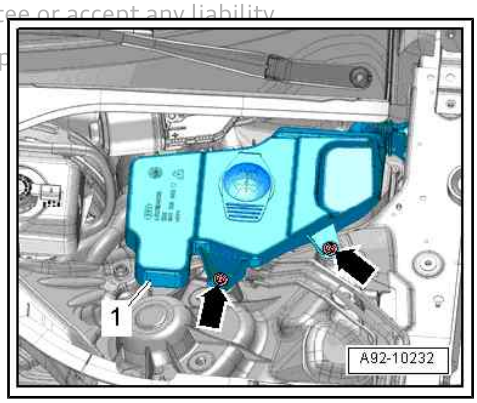


– Unscrew nut -2- on longitudinal member (right-side) and move earth cables clear.
– Release catches -arrow- to open wiring duct -1- and move electrical wiring harness clear.

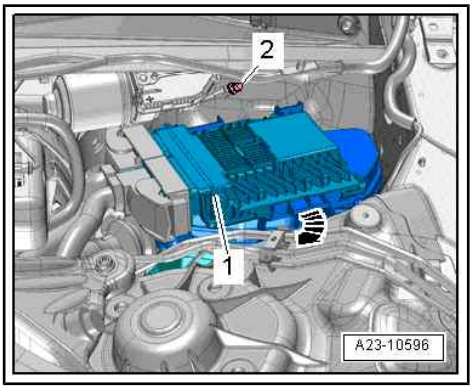


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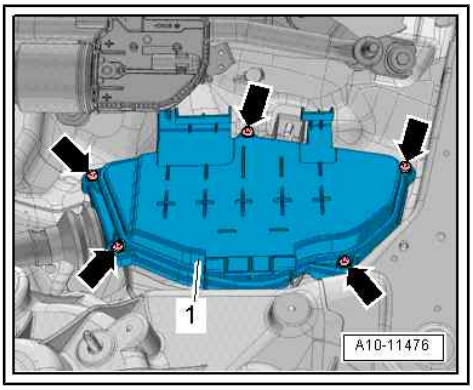
– Unscrew bolts -arrows- and pull filler neck -1- out of washer fluid reservoir and through opening in body to right side.



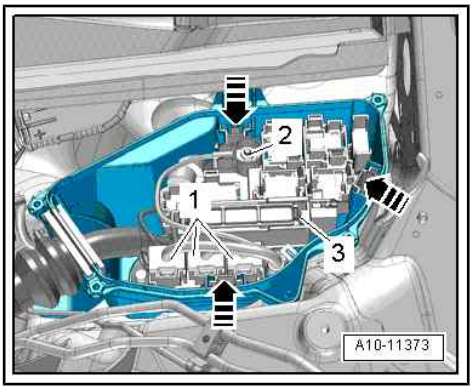
– Remove cap nut -2- and move earth wiring clear.
– Release fastener -arrow-, detach engine control unit - J623- -item 1- from bracket and swivel it to one side.



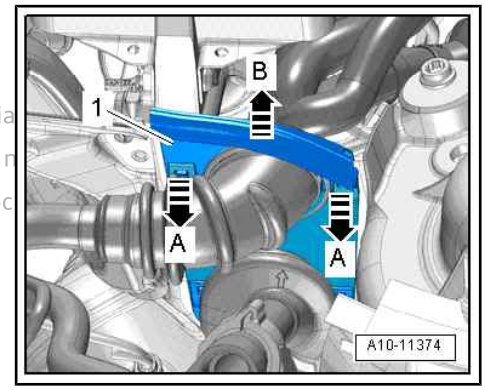
– Remove bolts -arrows- and detach cover -1- for electronics box in engine compartment.



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

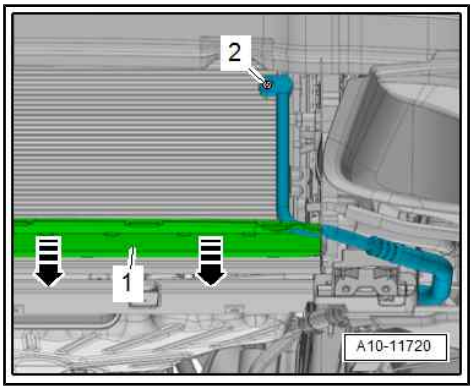


– Release catches -arrows A- and lift off wiring protector -1- -arrow B-.
– Place wiring harness on engine and secure engine/motor control unit - J623- to prevent it from dropping.



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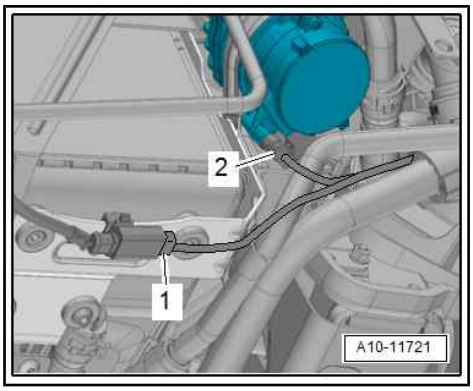
– Unclip air duct (bottom) -1- downwards -arrows-.
– Remove bolt -2- and move refrigerant line clear.



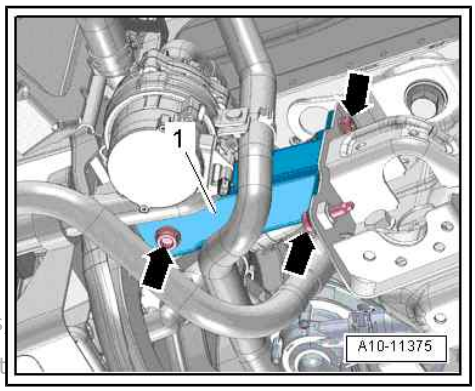
Note

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

– Move clear electrical connectors -1, 2-.

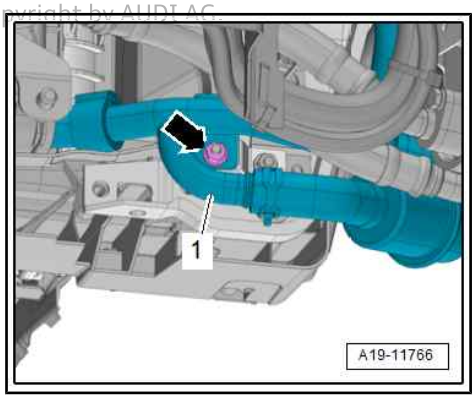


– Remove bolts -arrows- (left and right) and detach longitudinal member (bottom front) -1-.

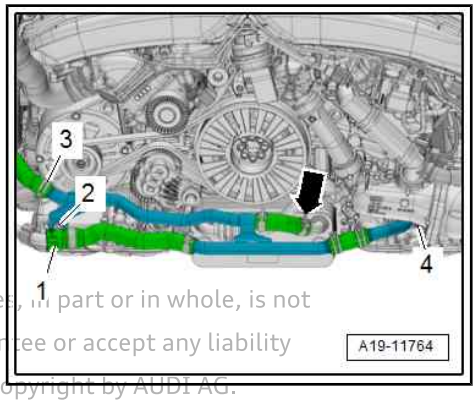


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– Remove nut -arrow- and move coolant pipe clear.



– Lift retaining clip -1-, release hose clip -3-, disconnect coolant hoses and drain off coolant.
– Remove bolt -4- and detach connection from coolant pipe.
– Release hose clip -arrow- and remove coolant pipes (front) to right side.

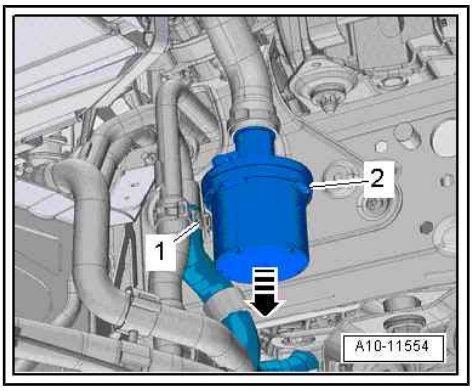


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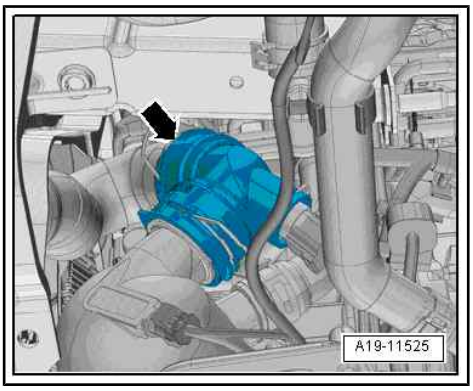
– Detach air cleaner -2- from bracket -arrow-.
– Release hose clip -1- and detach coolant hose.

Note

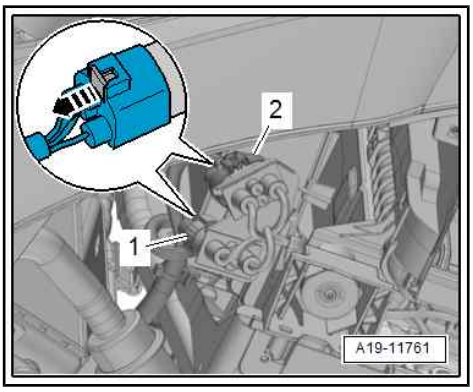
Illustration shows fitting location on an Audi S6/S7.



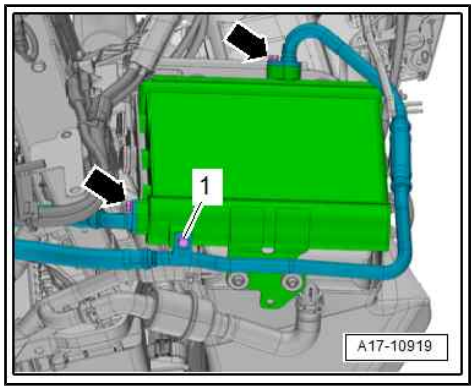
– Lift retaining clip -arrow- and disconnect coolant hose.



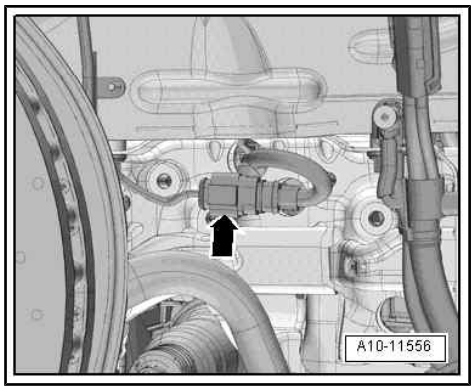
– Unplug electrical connectors -1, 2- for radiator fan (push retainer to the rear -arrow- and press down release catch).
– Move electrical wiring harness clear.



– Position used oil collection and extraction unit - VAS 6622A- below engine.
– Remove nut -1- and bolts -arrows-.
– Disconnect oil lines from engine oil cooler and move them clear.
– Seal off open lines and connections with clean plugs from engine bung set - VAS 6122- .



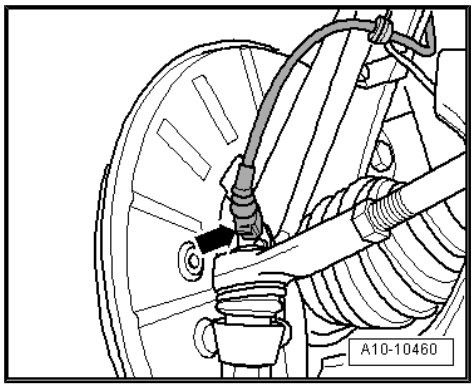
– Unplug electrical connector -arrow-.



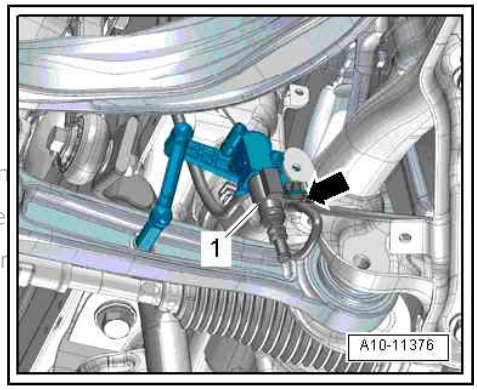
Note

If engine is to be removed from scissor-type assembly platform in a later step, take electrical connector out of bracket and guide through subframe.

– Unplug electrical connector -arrow- at front wheel speed sensor -G45- / -G47- on both sides.



– If fitted, unplug electrical connector -1- at front vehicle level senders on both sides (-G78- and -G289-) and move electrical wiring clear -arrow-.
– Remove brake caliper and tie up in wheel housing with wire (brake hose remains attached) ⇒ Brake system; Rep. gr. 46 ; Front brakes; Removing and installing brake caliper.



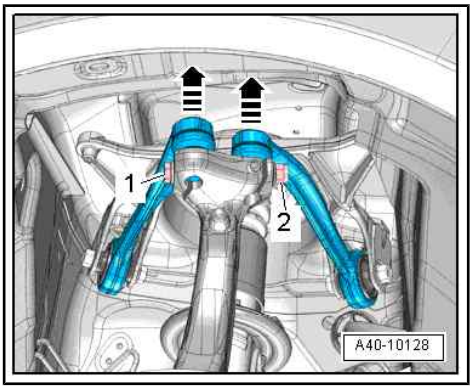
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Caution

Risk of damage to brake pistons.

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

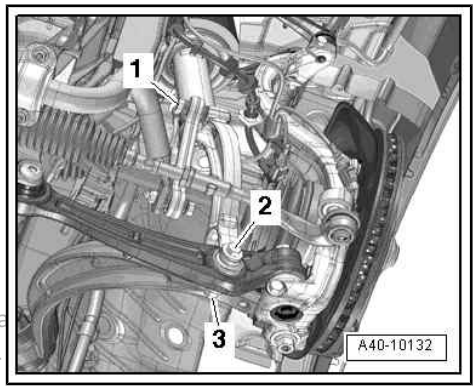
– Remove nut -2- and pull out bolt -1-.
– Pull upper suspension links upwards out of wheel bearing housing -arrows-.
– Repeat procedure on opposite side of vehicle.



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

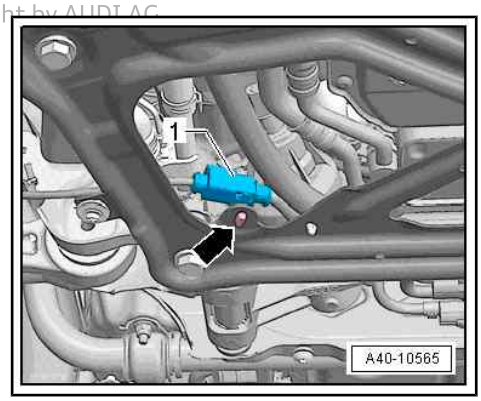
Note

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



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– Move clip clear -arrow-.
– Unplug electrical connector -1- and move wiring clear.
– Remove subframe cross brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Removing and installing subframe cross brace .

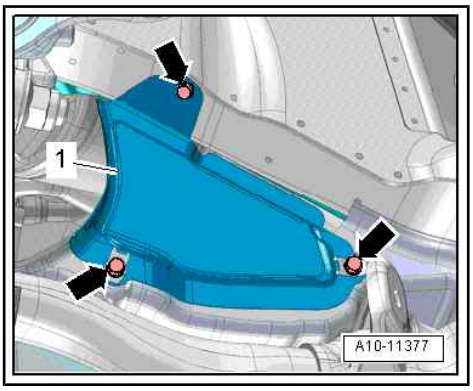


Caution

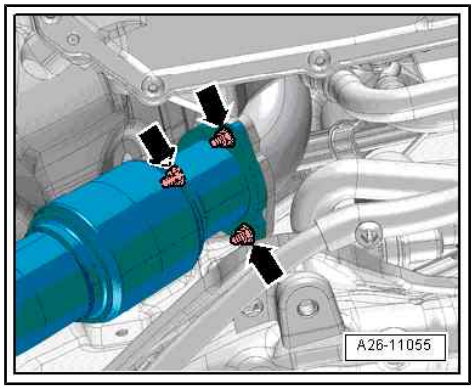
Risk of damage to running gear components.

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

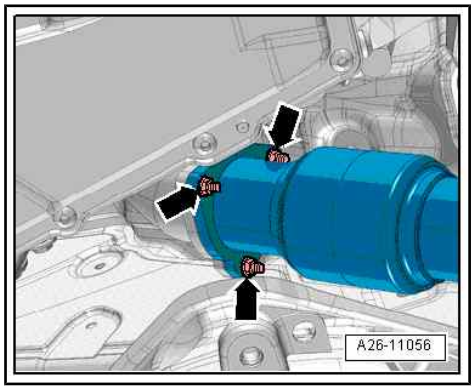
– Remove bolts -arrows- on both sides and detach heat shield -1-.



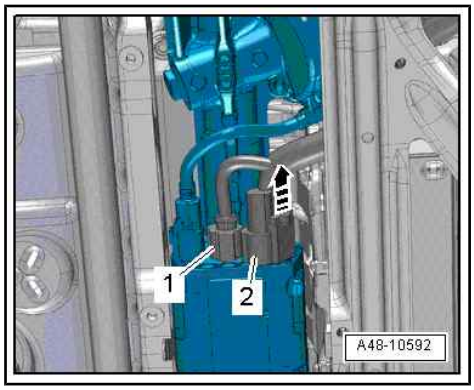
– Unscrew nuts -arrows- and detach front silencer (left-side).



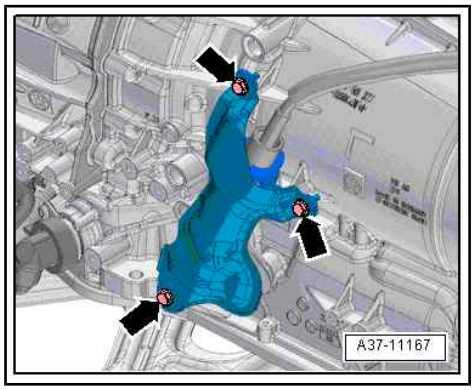
– Unscrew nuts -arrows- and detach front silencer (right-side).
– Detach intermediate steering shaft from steering rack and move clear by telescoping splines together ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Removing and installing intermediate steering shaft .



– Unplug electrical connector -2- at power steering control unit - J500- (release retainer -arrow- and press down release catch).
– Unplug electrical connector -1- at power steering control unit - J500- .
– Move electrical wiring harness clear.

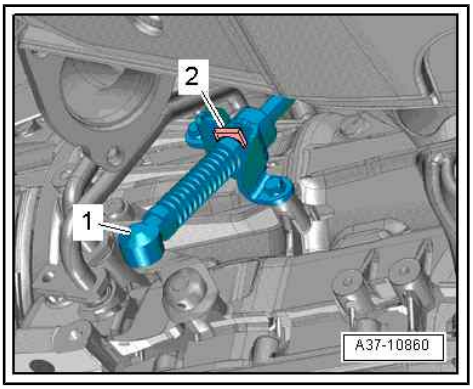


– Remove bolts -arrows- and detach heat shield.



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– Pry ball socket -1- of selector lever cable off gearbox selector lever using removal lever - 80 - 200- .



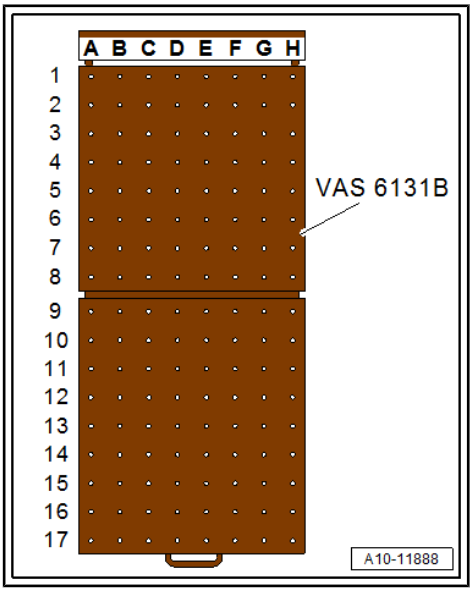
Note

Take care not to bend or kink selector lever cable.

Setting up scissor-type assembly platform:

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

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



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

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

• Take note of spirit level (bubble gauge).

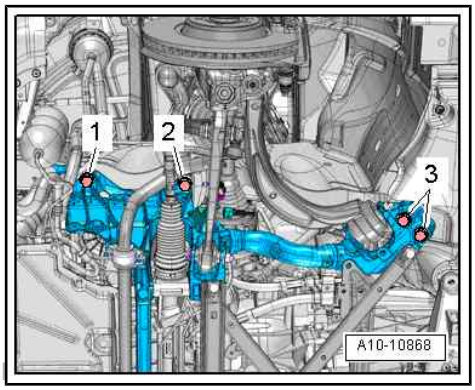
– Position scissor-type assembly platform - VAS 6131 B- below engine/gearbox assembly.

WARNING

Accident risk if subframe mountings are detached.

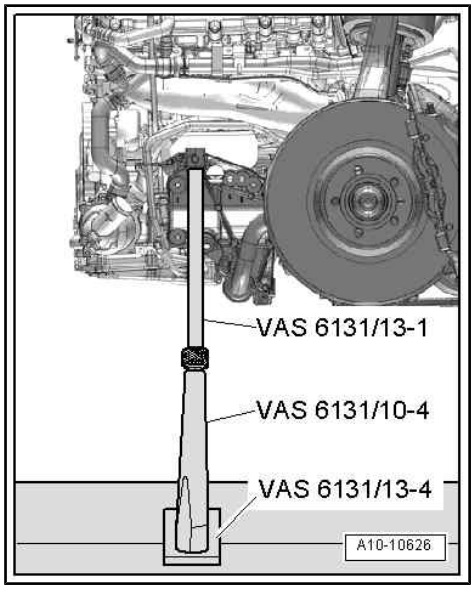
- ***Subframe bolts -2- and -3- must not be loosened.***

– Remove subframe bolts -1- on both sides.

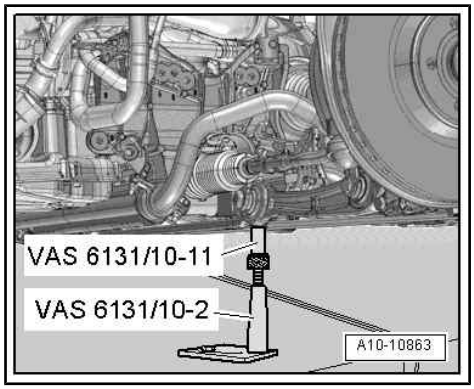


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– Position support elements from -VAS 6131/10- and -VAS 6131/13- at front left and right of subframe as shown.
– Make sure that threaded spindles are screwed in completely.

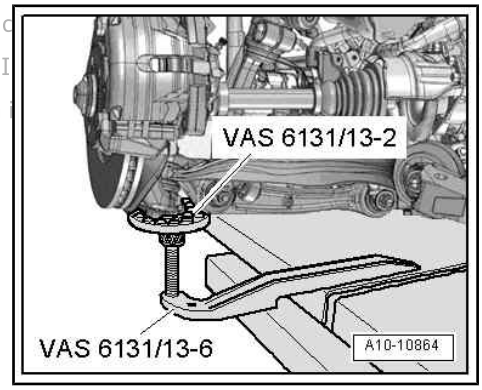


– Position support elements from -VAS 6131/10- (rear left and right) at front attachment points of subframe cross brace as shown.

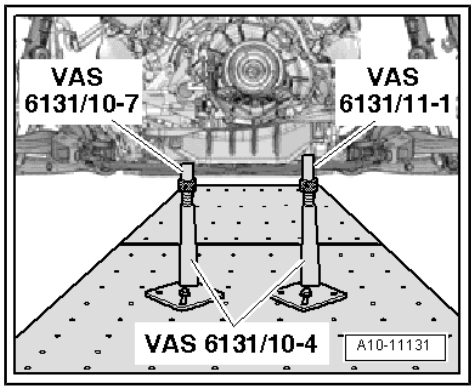


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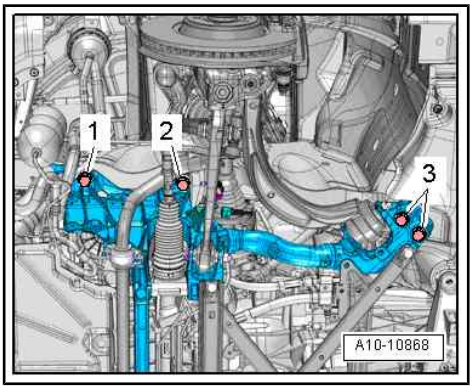
– Position support elements from -VAS 6131/13- under left and right wheel bearing housings as shown.



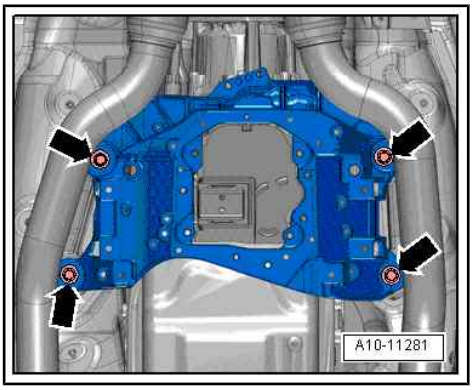
– Position support elements from -VAS 6131/10- and -VAS 6131/11- (rear left and right) at tunnel cross member as shown.
– Turn all spindles for support elements upwards until all locating lugs make contact with mounting points.
– Tighten base plates for support elements to 20 Nm on scissor-type assembly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



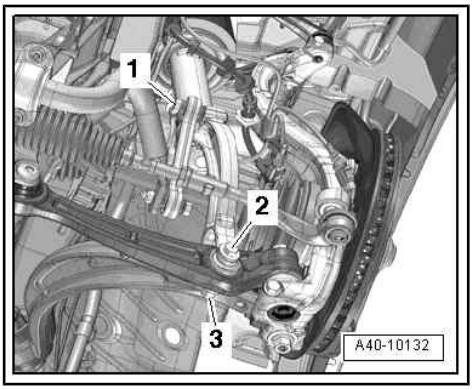
– Mark installation position of subframe and tunnel cross member on longitudinal members with felt-tip pen.
– Unscrew subframe bolts -2- and -3- on both sides in several stages and in diagonal sequence.



– Remove bolts -arrows- on tunnel cross member.



– Remove bolt -2- on both sides.



Caution

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

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

Risk of damage to oil cooler (front).

- *When lowering, pull engine/gearbox assembly slightly to the rear.*

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

1.2 Separating engine and gearbox

⇒ “1.2.1 Separating engine and gearbox - Audi S6/S7”, page 41

⇒ “1.2.2 Separating engine and gearbox, Audi RS 6/RS 7”, page 48

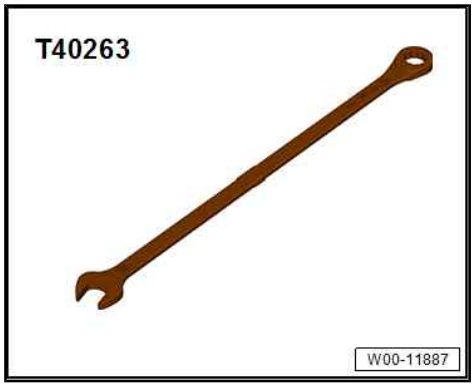
1.2.1 Separating engine and gearbox - Audi S6/S7

Special tools and workshop equipment required

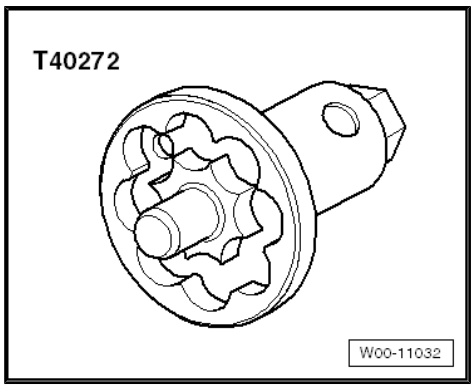
- Support set for Audi - VAS 6131/10- , supplementary set -VAS 6131/11- and support -VAS 6131/13-7-

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♦ Wrench, 21 mm - T40263-



♦ Turning-over tool - T40272-



♦ M10x65 bolt

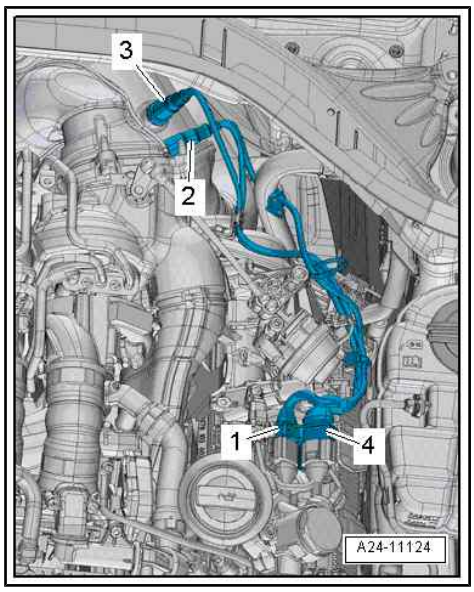
Procedure

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

– Detach electrical connectors from bracket, unplug connectors and move electrical wiring clear:

1 - For Lambda probe after catalytic converter - G130-

4 - For Lambda probe 2 - G108-



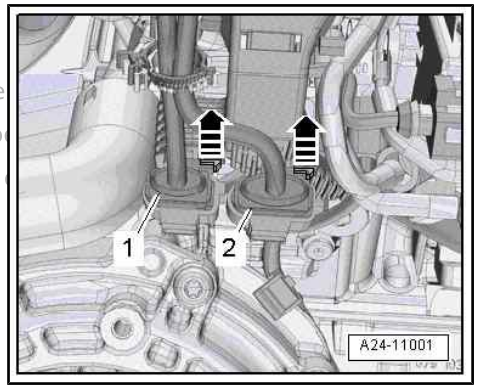
Note

Disregard items -2 and 3-.

– Detach electrical connectors from bracket one after the other; release catches -arrows- to unplug connectors and move electrical wiring clear:

2 - For Lambda probe 2 after catalytic converter - G131-

1 - For Lambda probe - G39-

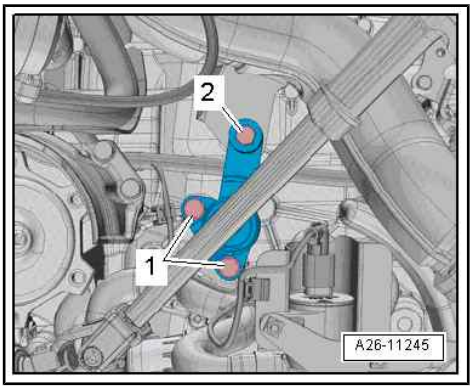


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Note

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

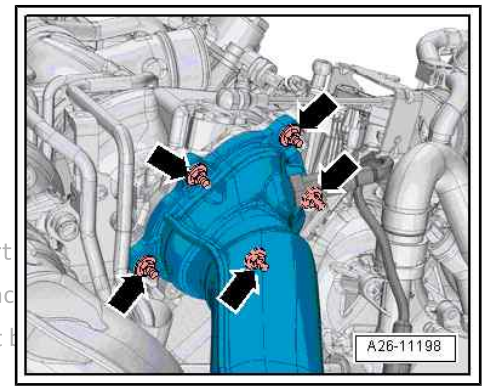
– Remove bolts -1- on mounting for catalytic converter.



Note

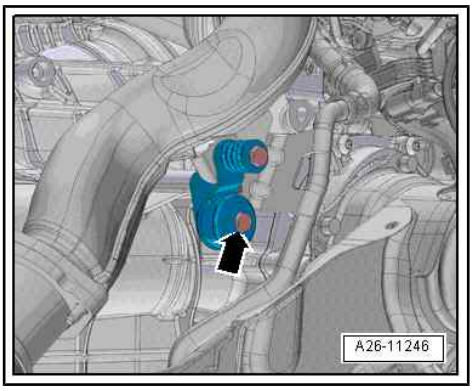
Disregard -item 2-.

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

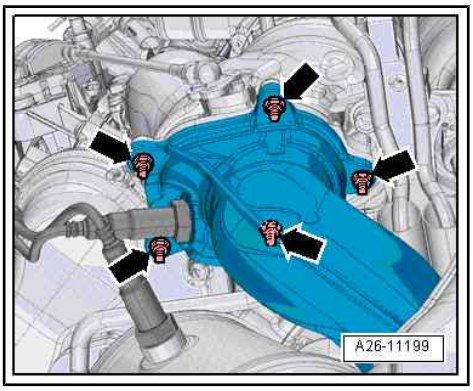


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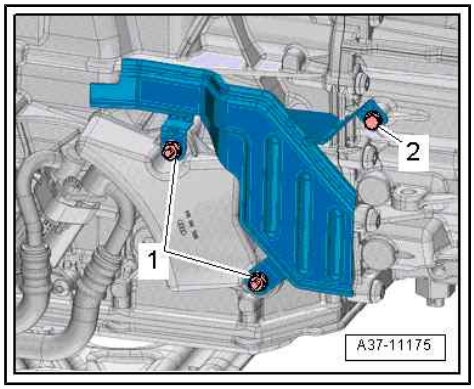
– Remove bolt -arrow- on mounting for catalytic converter.



– Unscrew nuts -arrows- on cylinder bank 2 (left-side) and detach catalytic converter on right side of vehicle.



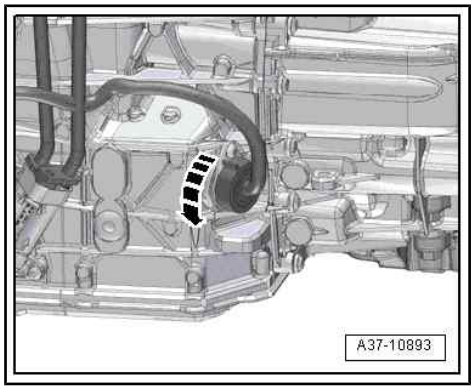
– Remove nuts -1- and bolt -2- and detach heat shield.



Caution

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

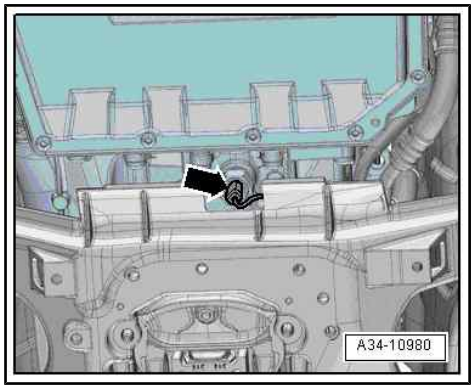
- ***Before unplugging or plugging in electrical connector, mechanic must discharge static electricity. To do so, touch vehicle earth, heater radiator, or lifting platform, with your hand.***
- ***Do NOT touch connector contacts in gearbox connector with your hands.***



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

– Move electrical wiring harness clear at gearbox.

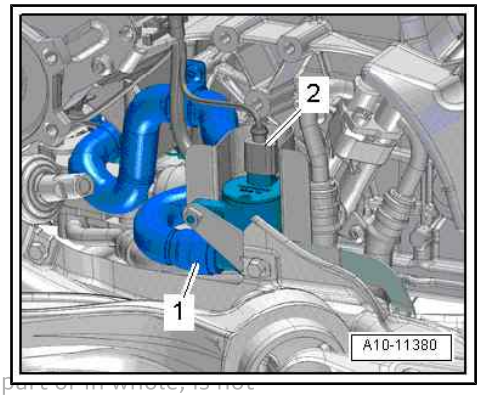
– Unplug electrical connector -arrow- and move wiring clear.



– Release hose clip -1- and detach coolant hose.

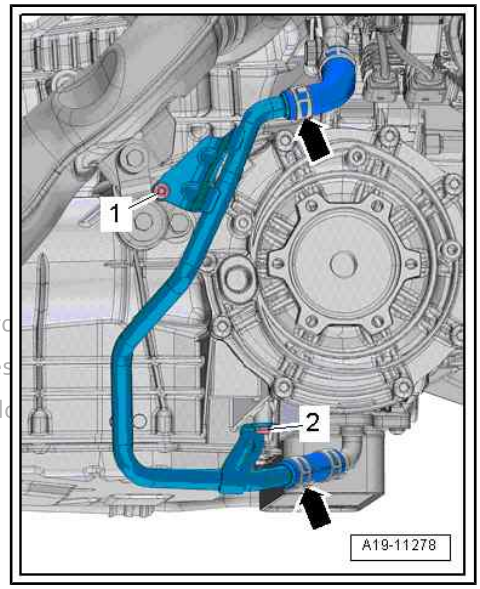
Note

Disregard -item 2-.



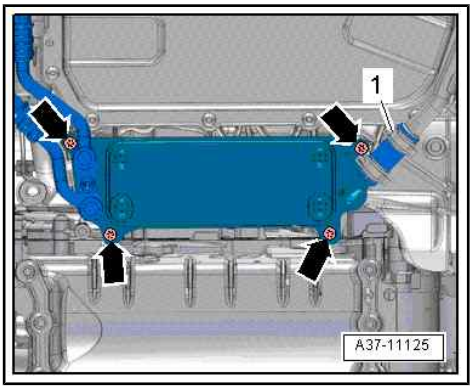
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– Fold heat insulation sleeve slightly upwards.
– Remove bolts -1, 2-, release hose clips -arrows- and detach coolant hoses from coolant pipe (right-side) at gearbox.

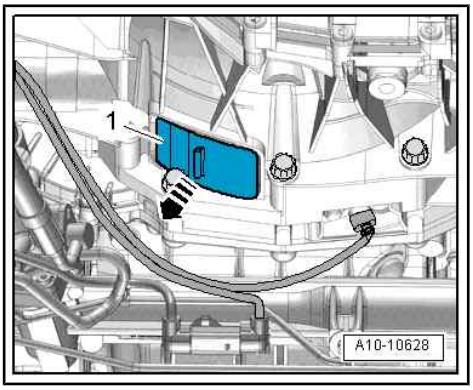


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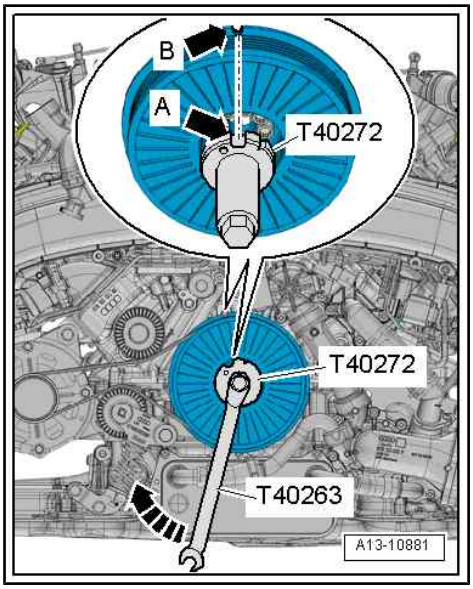
– Remove bolts -arrows-.
– Release hose clip -1- and detach ATF cooler from coolant pipe on right side of gearbox.
– Swivel ATF cooler to the side.
– Unbolt drive shaft (left and right) from gearbox flange shafts ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Removing and installing drive shaft .



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



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



Note

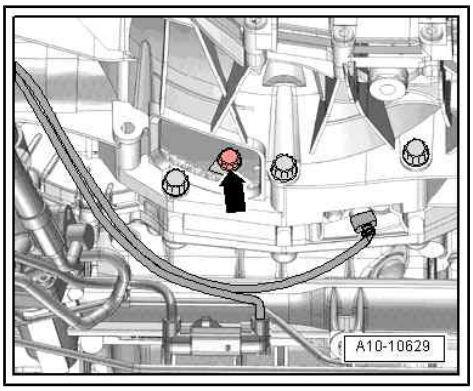
Disregard notch on turning-over tool - T40272- .

– Counterhold crankshaft using turning-over tool - T40272- and wrench (21 mm) - T40263- when loosening bolts for dual-mass flywheel.

Note

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

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

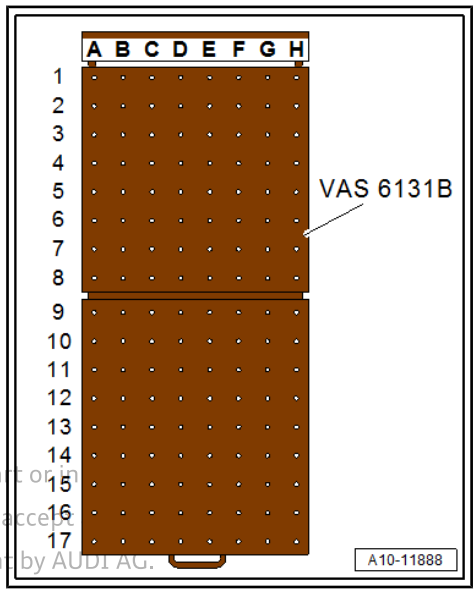


– Set up scissor-type assembly platform - VAS 6131 B- with support set for Audi - VAS 6131/10- , supplementary set -VAS 6131/12- and support -VAS 6131/13-7- as follows:

Note

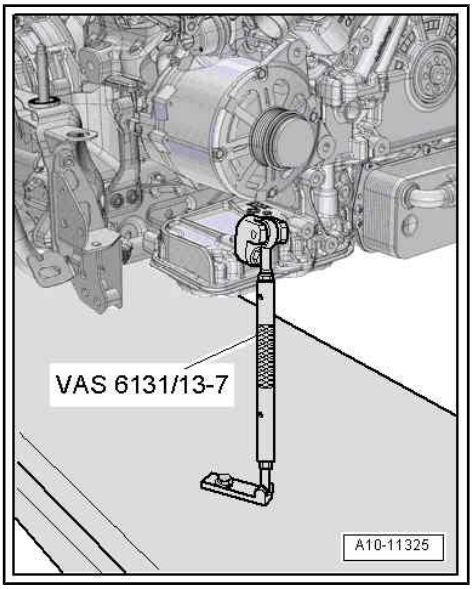
The other support elements remain unchanged.

Platform coordinates	Parts from support set for Audi - VAS 6131/10- , supplementary set -VAS 6131/11- and support - VAS 6131/13-7-			
E2	/13-7			
B10	/10-1	/10-3	/10-5	/11-4
H10	/10-1	/10-3	/10-5	/11-4

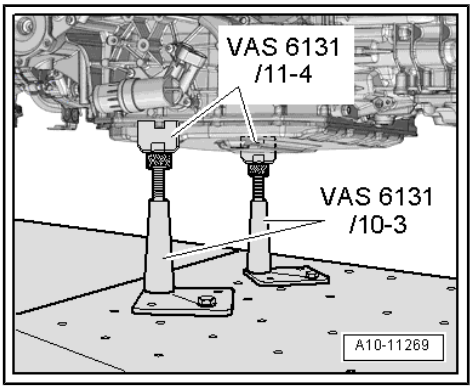


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– Secure support -VAS 6131/13-7- at tapped hole at front of engine (right-side) with bolt M10x65, as illustrated.
– Secure support -VAS 6131/13-7- to scissor-type assembly platform and tighten to 20 Nm.



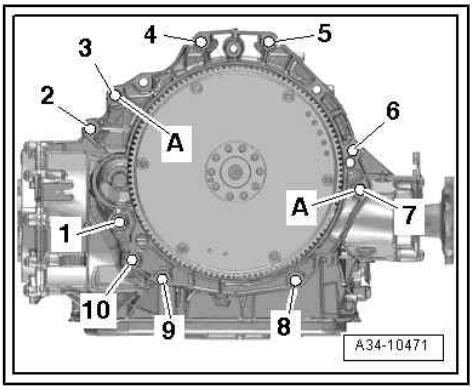
– Position support elements from -VAS 6131/10- and mountings -VAS 6131/11-4- at front of gearbox, as shown in illustration.
– Screw spindles upwards on both sides until mountings -VAS 6131/11-4- make full contact with gearbox.
– Tighten base plates for support elements to 20 Nm on scissor-type assembly platform - VAS 6131 B- .



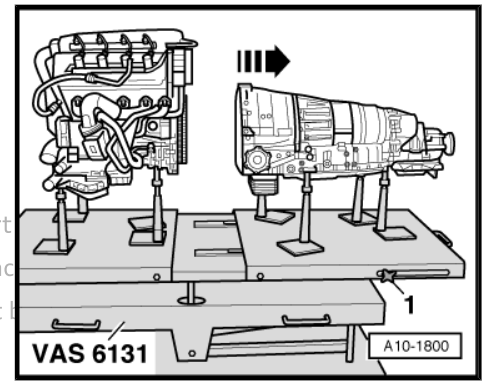
– Remove bolts -1- and -2- for starter.
– Separate starter from gearbox and leave in position.
– Unscrew remaining bolts -3 ... 10- securing engine to gearbox.

Note

- *Counterhold nut at bolt -7-.*
- *Disregard -item A-.*



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



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1.2.2 Separating engine and gearbox, Audi RS 6/RS 7

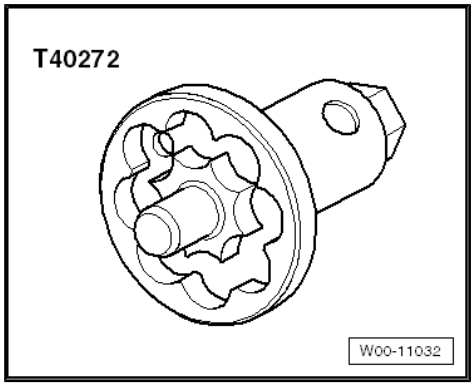
Special tools and workshop equipment required

- Support set for Audi - VAS 6131/10- , supplementary set -VAS 6131/11- and support -VAS 6131/13-7-
- Wrench, 21 mm - T40263-



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- Turning-over tool - T40272-



- M10x65 bolt

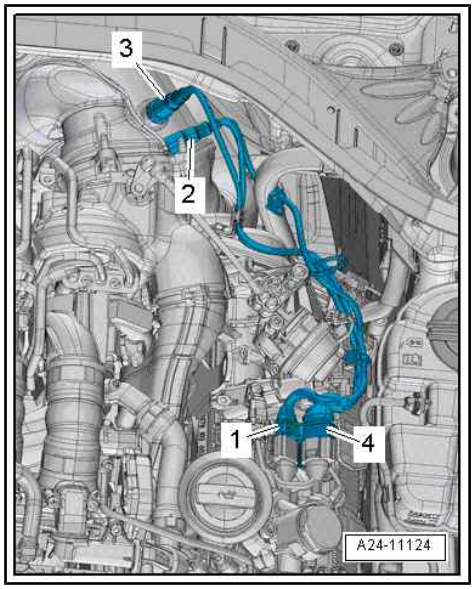
Procedure

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

– Detach electrical connectors from bracket, unplug connectors and move electrical wiring clear:

1 - For Lambda probe after catalytic converter - G130-

4 - For Lambda probe 2 - G108-



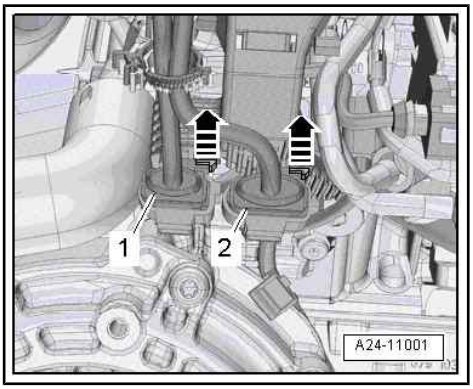
Note

Disregard items -2 and 3-.

– Detach electrical connectors from bracket one after the other; release catches -arrows- to unplug connectors and move electrical wiring clear:

2 - For Lambda probe 2 after catalytic converter - G131-

1 - For Lambda probe - G39-

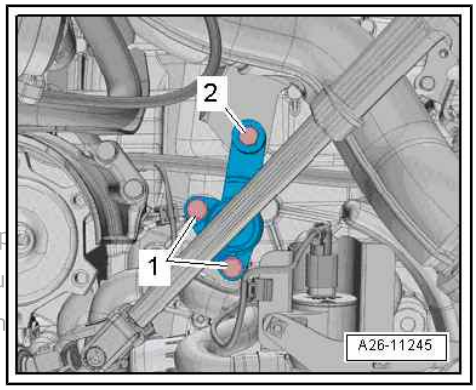


Note

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

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

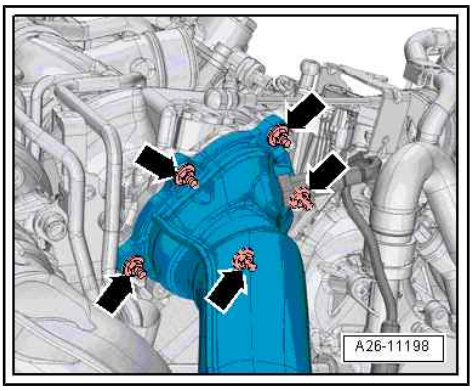
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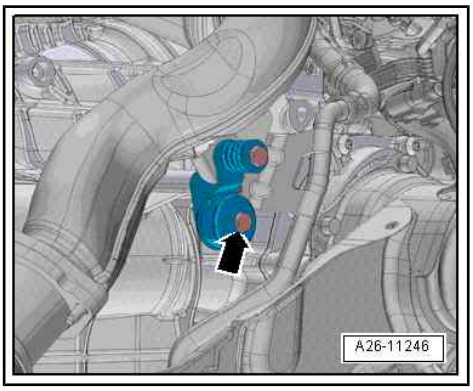
Note

Disregard -item 2-.

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

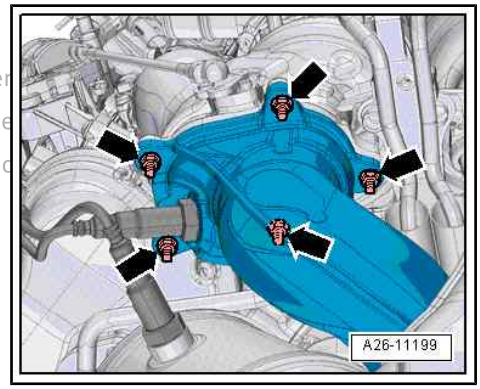


– Remove bolt -arrow- on mounting for catalytic converter.

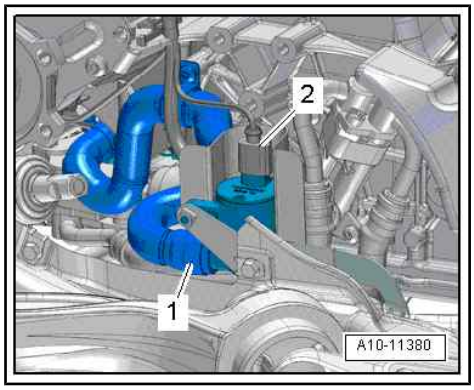


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– Unscrew nuts -arrows- on cylinder bank 2 (left-side) and detach catalytic converter on right side of vehicle.



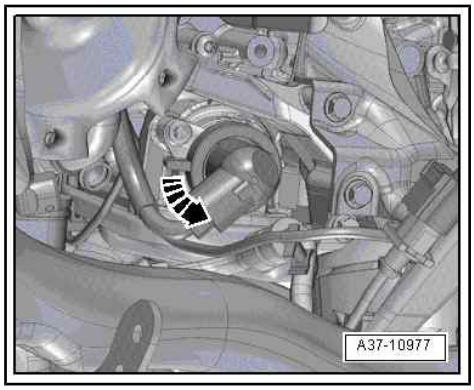
– Release hose clip -1- and detach coolant hose.
– Unplug electrical connector -2-.



Caution

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

- ***Before unplugging or plugging in electrical connector, mechanic must discharge static electricity. To do so, touch vehicle earth, heater radiator, or lifting platform, with your hand.***
- ***Do NOT touch connector contacts in gearbox connector with your hands.***

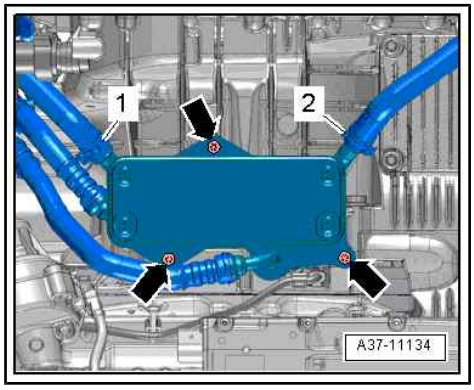


– Turn fastener anti-clockwise -arrow- and unplug electrical connector at gearbox.

Note

Place a cloth underneath to catch escaping coolant.

– Release hose clips -1, 2- and disconnect coolant hoses.
– Remove bolts -arrows- and detach ATF cooler.

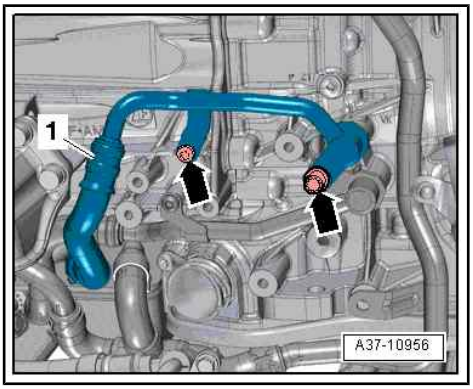


Note

Place a cloth underneath to catch escaping ATF.

– Remove bolts -arrows- and detach ATF line -1- from gearbox.

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



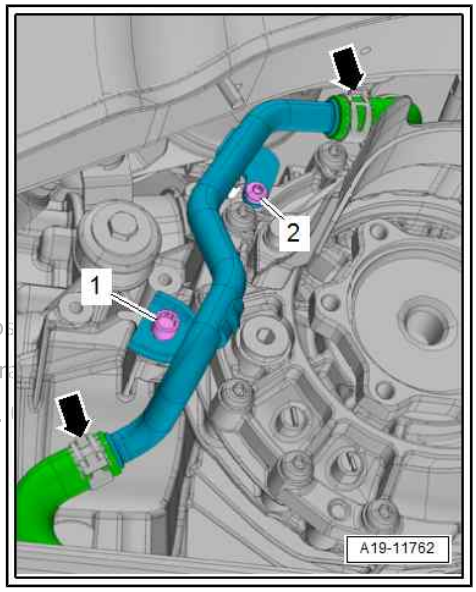
– Fold heat insulation sleeve slightly upwards.

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

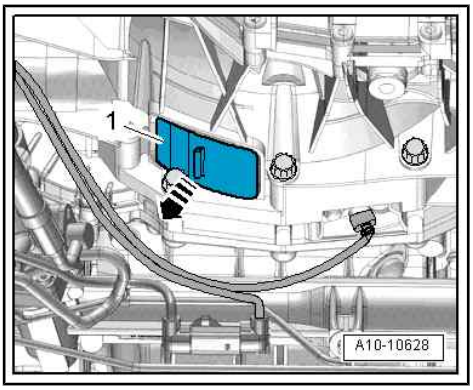
– Detach coolant pipe (right-side) with spacer sleeve from gearbox.

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

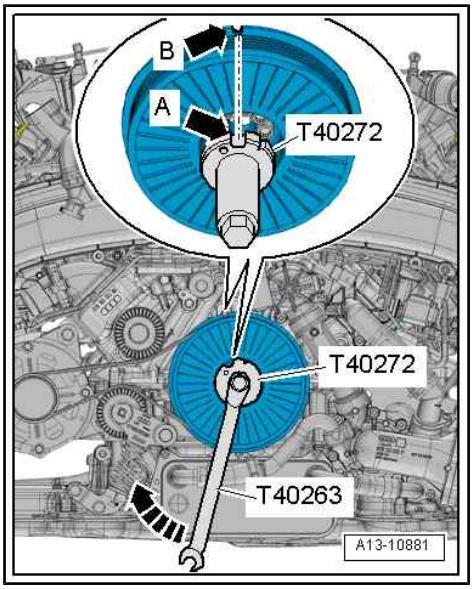
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– Detach bottom cover -1- from gearbox -arrow-.



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



Note

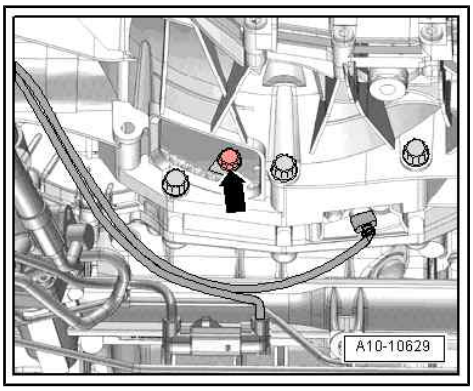
Disregard notch on turning-over tool - T40272- .

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

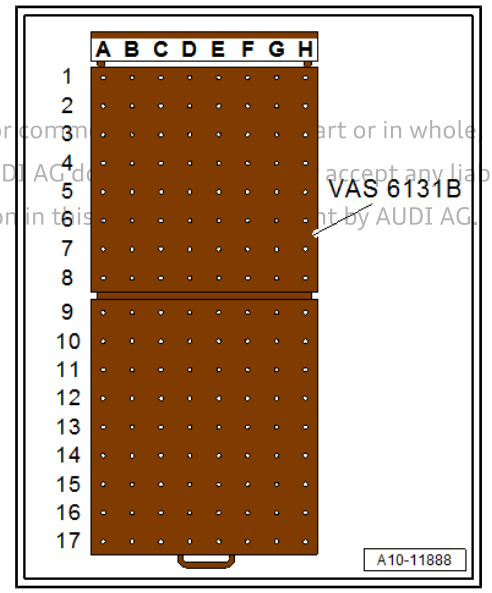
Note

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

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



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



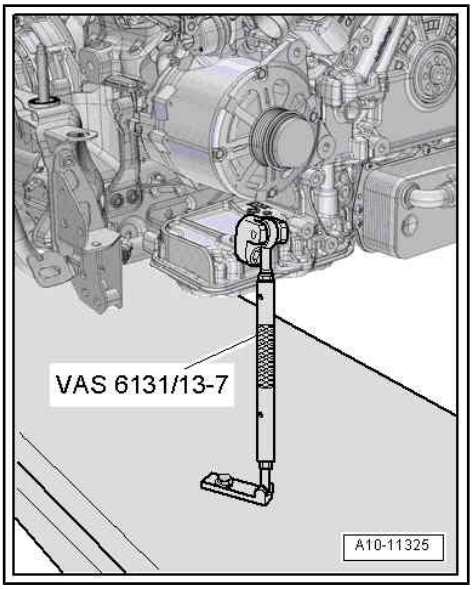
Note

The other support elements remain unchanged.

Platform coordinates	Parts from support set for Audi - VAS 6131/10- , supplementary set -VAS 6131/11- and support - VAS 6131/13-7-			
E2	/13-7			
B10	/10-1	/10-3	/10-5	/11-4
H10	/10-1	/10-3	/10-5	/11-4

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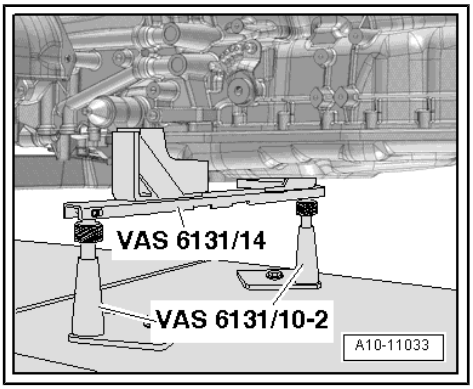
– Secure support -VAS 6131/13-7- at tapped hole at front of engine (right-side) with bolt M10x65, as illustrated.
– Secure support -VAS 6131/13-7- to scissor-type assembly platform and tighten to 20 Nm.



Caution

Risk of leaks at ATF sump.

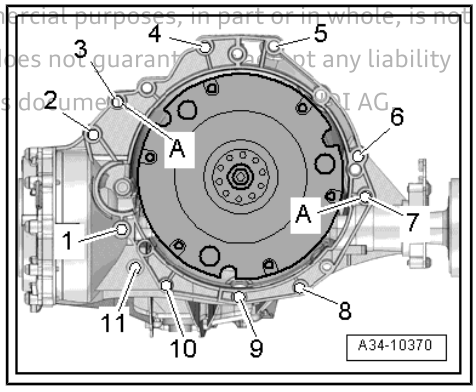
- *Do not apply gearbox support - VAS 6131/14- at ATF oil pan.*



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

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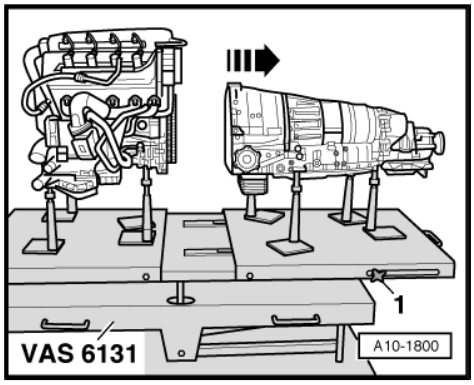
– Remove bolts -1- and -2- for starter.
– Separate starter from gearbox and leave in position.
– Unscrew remaining bolts -3 ... 11- securing engine to gearbox.



Note

Disregard -item A-.

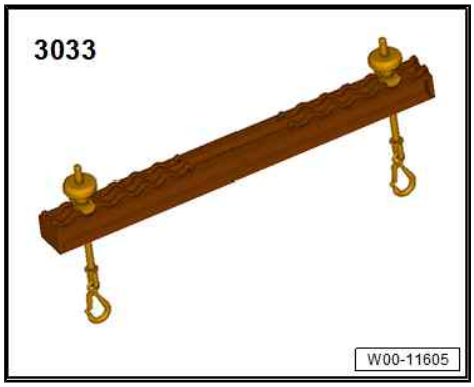
– Loosen clamping bolts -1- on sides of scissor-type assembly platform - VAS 6131 B- and pull rear section of platform together with gearbox towards rear -arrow-.



1.3 Removing engine from scissor-type assembly platform

Special tools and workshop equipment required

- Lifting tackle - 3033-

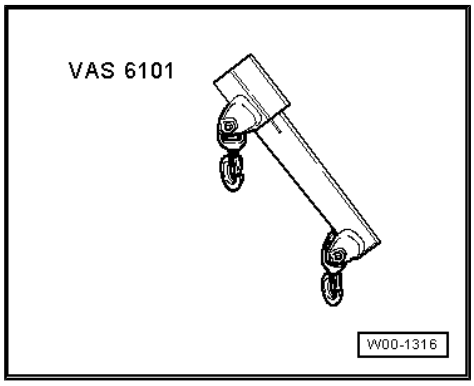


- Workshop hoist - VAS 6100-



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- Lift arm extension/workshop hoist - VAS 6101-



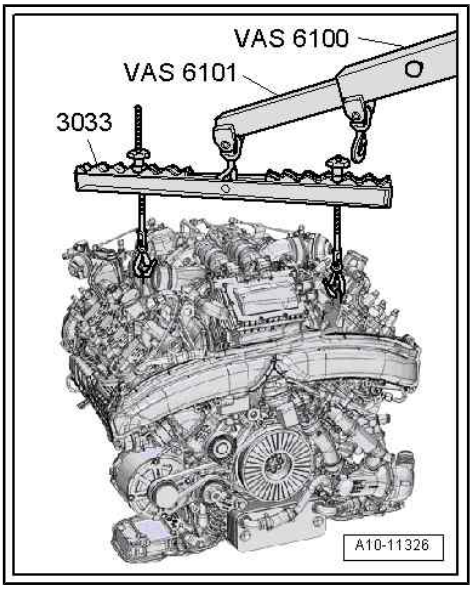
Procedure

- Engine/gearbox assembly removed; engine separated from gearbox ⇒ page 41 .
- Engine secured with support -VAS 6131/13-7- .

– Remove coolant pipe (top rear) ⇒ page 291 .

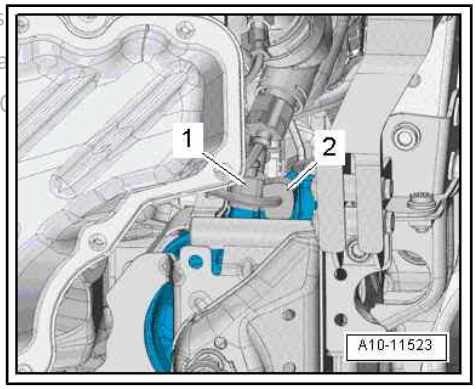
– Attach lifting tackle - 3033- to engine lifting eyes and workshop hoist as shown in illustration.

– Take up weight of engine with workshop hoist, but do not lift.



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

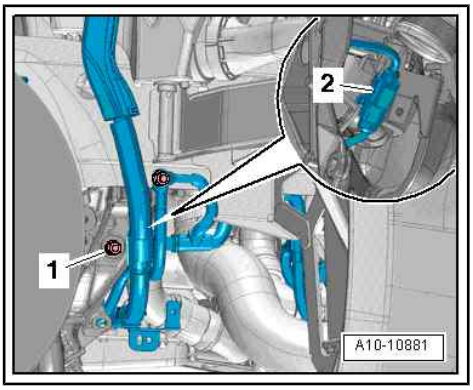


Audi S6/S7:

– Unscrew nut (right-side) -1- and detach bracket with wiring harness from subframe.

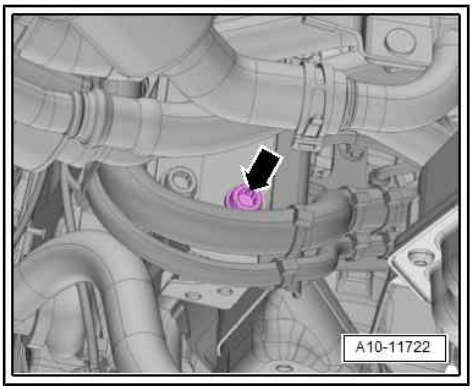
Note

Disregard -item 2-.



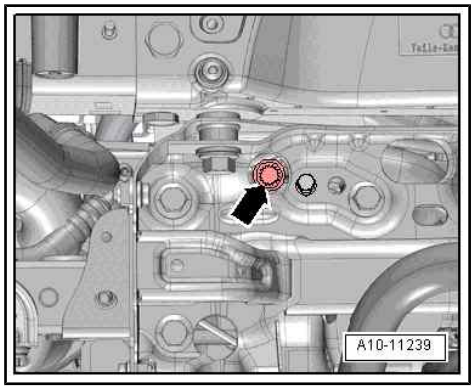
Audi RS 6/RS 7:

– Unscrew bolt (right-side) -arrow- and detach bracket with electrical wiring harness from subframe.

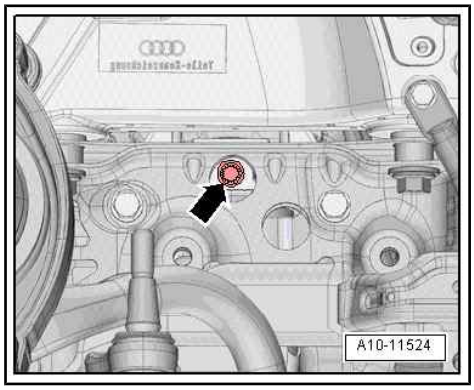


All vehicles (continued):

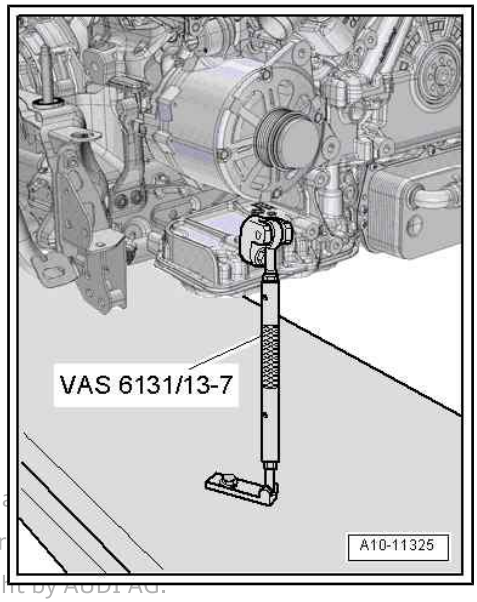
– Remove bolt -arrow- for engine mounting (left-side).



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



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

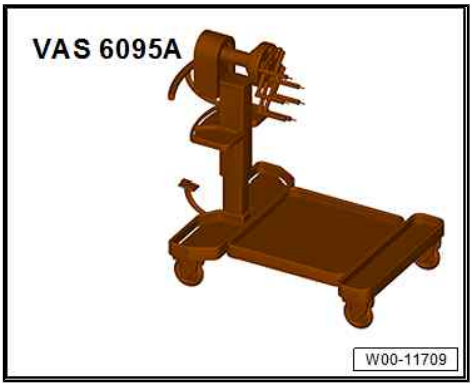


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1.4 Securing engine to engine and gearbox support

Special tools and workshop equipment required

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



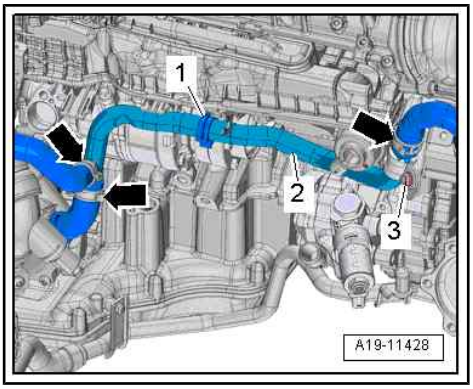
Procedure

– Move electrical wiring harness clear.

– Remove nut -3- and move retaining clip clear.

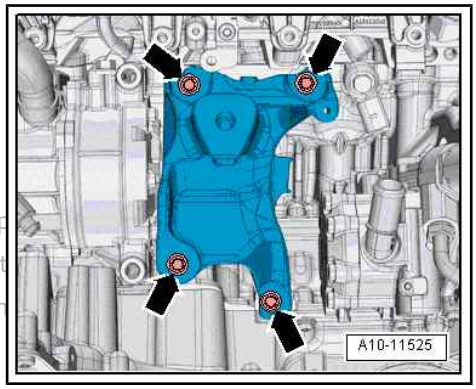
– Release hose clips -arrows- and disconnect coolant hoses from coolant pipe (top left) -2-.

– Unclip coolant pipe (top left) from bracket -1-.



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

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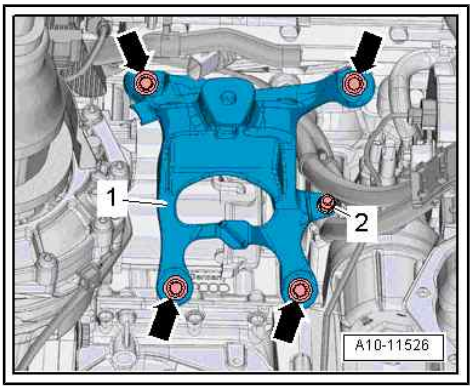


– Move electrical wiring harness clear.

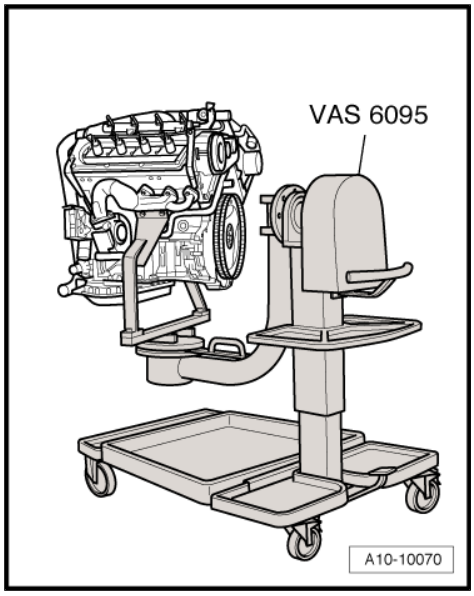
– Remove nut -2- and move earth wire clear.

– Remove bolts -arrows- and detach engine support -1- (right-side).

– Tie up starter on engine.



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



1.5 Installing engine

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 de-greased parts.*
- *Tolerance for tightening torques: ± 15 %*

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

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- ⇒ “2.1 Exploded view - assembly mountings”, page 63
- Engine to gearbox ⇒ Gearbox; Rep. gr. 34 ; Removing and installing gearbox; Tightening torques for gearbox / ⇒ Gearbox; Rep. gr. 37 ; Removing and installing gearbox; Tightening torques for gearbox

Procedure

Note

- *Renew bolts tightened with specified tightening angle.*
- *Renew self-locking nuts and bolts as well as seals, gaskets and O-rings.*
- *Fit all cable ties in the original positions when installing.*

- Before installing a new engine, check that dowel pin ⇒ Item 6 (page 90) is fitted in crankshaft; install dowel pin if

necessary. For correct version refer to ⇒ Electronic parts catalogue .

– If previously removed: Install coolant pipe (top rear) and coolant pipe (top left) ⇒ page 278 .
– Install engine supports and engine mountings ⇒ page 63 .
– Secure engine to gearbox ⇒ Gearbox; Rep. gr. 34 ; Removing and installing gearbox; Installing gearbox / ⇒ Gearbox; Rep. gr. 37 ; Removing and installing gearbox; Installing gearbox .

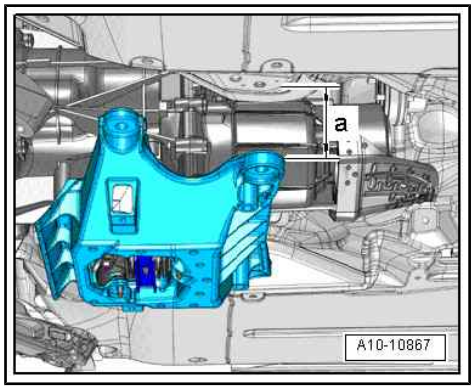
The remaining installation steps are carried out in the reverse sequence.

– Install ATF cooler ⇒ Gearbox; Rep. gr. 34 ; ATF circuit; Removing and installing ATF cooler / ⇒ Gearbox; Rep. gr. 37 ; ATF circuit; Removing and installing ATF cooler .
– Secure drive shafts to gearbox flange shafts ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft .
– Install ATF lines ⇒ Gearbox; Rep. gr. 34 ; ATF circuit; Removing and installing ATF lines / ⇒ Gearbox; Rep. gr. 37 ; ATF circuit; Removing and installing ATF lines .
– Install catalytic converters ⇒ page 432 .

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– Raise engine/gearbox assembly using scissor-type assembly platform - VAS 6131 B- only until distance between subframe and body is -a-.

• Distance -a- = min. 100 mm



– Install and, if necessary, adjust selector lever cable ⇒ 7-speed dual clutch gearbox 0B5 (S tronic); Rep. gr. 34 ; Selector mechanism; Removing and installing selector lever cable / ⇒ 8-speed automatic gearbox 0BK, four-wheel drive; Rep. gr. 37 ; Selector mechanism; Removing and installing selector lever cable .

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

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

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

WARNING

Risk of accident if bolted connections are loose.

- ***Do NOT drive the vehicle unless the subframe bolts have been tightened to their final torque.***

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– Tighten bolts for tunnel cross member ⇒ Gearbox; Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings / ⇒ Gearbox; Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings .

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

Note

- *Do not remove plugs or protective caps until you are ready to fit the relevant line.*
- *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 .*
- *Fit all cable ties in the original positions when installing.*

– Secure intermediate steering shaft to steering rack ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Removing and installing intermediate steering shaft .

– Install propshaft ⇒ Rear final drive; Rep. gr. 39 ; Propshaft; Removing and installing propshaft .

– Install front silencers ⇒ page 432 .

– Install upper suspension links and suspension strut ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Exploded view - suspension strut, upper links .

– Install subframe cross brace and anti-roll bar ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe .

- Install brake calipers ⇒ Brake system; Rep. gr. 46 ; Front brakes; Removing and installing brake caliper .
- Install engine control unit ⇒ page 428 .
- Install air cleaner housing and air duct ⇒ page 379 .
- Install filler neck for washer fluid reservoir ⇒ Electrical system; Rep. gr. 92 ; Windscreen washer system; Exploded view - windscreen washer system .
- Electrical connections and routing ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
- Install electrical wiring, terminal 30 wiring junction 2 - TV22- and cover for electronics box in engine compartment ⇒ Electrical system; Rep. gr. 97 ; Relay carriers, fuse carriers, electronic boxes; Overview of fitting locations - relay carriers, fuse carriers, electronic boxes .
- Install body brace ⇒ Running gear, axles, steering; Rep. gr. 40 ; Suspension strut, upper links; Exploded view - suspension strut, upper links .
- Install refrigerant lines ⇒ Heating, air conditioning; Rep. gr. 87 ; Refrigerant circuit; Removing and installing refrigerant lines with internal heat exchanger .
- 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 closure plate for bumper cover (front) and lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments .
- Install plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .
- Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 411 .
- Connect coolant hoses with plug-in connector ⇒ page 302 .

Note

Do not reuse coolant.

- Fill up with coolant ⇒ page 251 .
- Charge refrigerant system ⇒ Air conditioner with refrigerant R134a .
- Install wheel spoilers and wheel housing liners ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .
- Check wheel alignment ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheel alignment check; Wheel alignment procedure .

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WARNING

Risk of accident if bolted connections are loose.

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

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

– Calibrate electrohydraulic engine mounting after installing ⇒ page 80 .

– After renewing engine, “misfire adaptions” must be reset. To do so, select `01 - Reset adaptions misfires` in `Guided Functions` mode of ⇒ Vehicle diagnostic tester.

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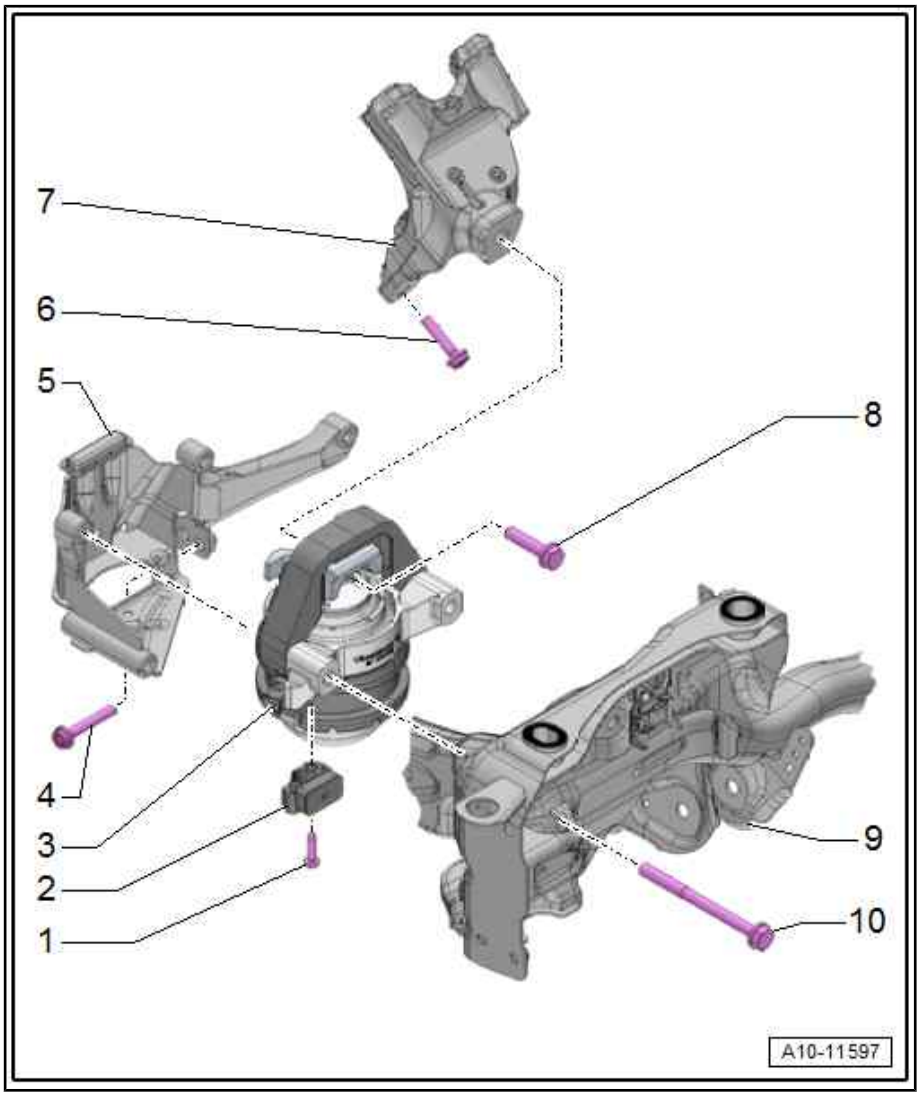
2 Assembly mountings

⇒ “2.1 Exploded view - assembly mountings”, page 63
⇒ “2.2 Supporting engine in installation position”, page 66
⇒ “2.3 Removing and installing engine mountings”, page 68
⇒ “2.4 Removing and installing gearbox mounting”, page 77
⇒ “2.5 Removing and installing power unit mounting senders”, page 78
⇒ “2.6 Removing and installing power unit mounting control unit J931 ”, page 80

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2.1 Exploded view - assembly mountings

Engine mounting



1 - Bolt

- ❑ 6 Nm

2 - Power unit mounting senders

- ❑ Right-side: power unit mounting sender 1 - G748-
- ❑ Left-side: power unit mounting sender 2 - G749-
- ❑ Removing and installing ⇒ “2.5 Removing and installing power unit mounting senders”, page 78
- – Calibrate electrohydraulic engine mounting after installing ⇒ page 80 .

3 - Engine mounting and power unit mounting actuator

- ❑ Removing and installing ⇒ “2.3 Removing and installing engine mountings”, page 68
- – Calibrate electrohydraulic engine mounting after installing ⇒ page 80 .
- ❑ Includes power unit mounting actuator 1 - N513- on right side
- ❑ Includes power unit mounting actuator 2 - N514- on left side

4 - Bolt

- ❑ 20 Nm

5 - Console for engine mounting

6 - Bolt

- ❑ 40 Nm

7 - Engine support

8 - Bolt

- ❑ Renew
- ❑ 90 Nm +90°

9 - Subframe

10 - Bolt

- ❑ 55 Nm

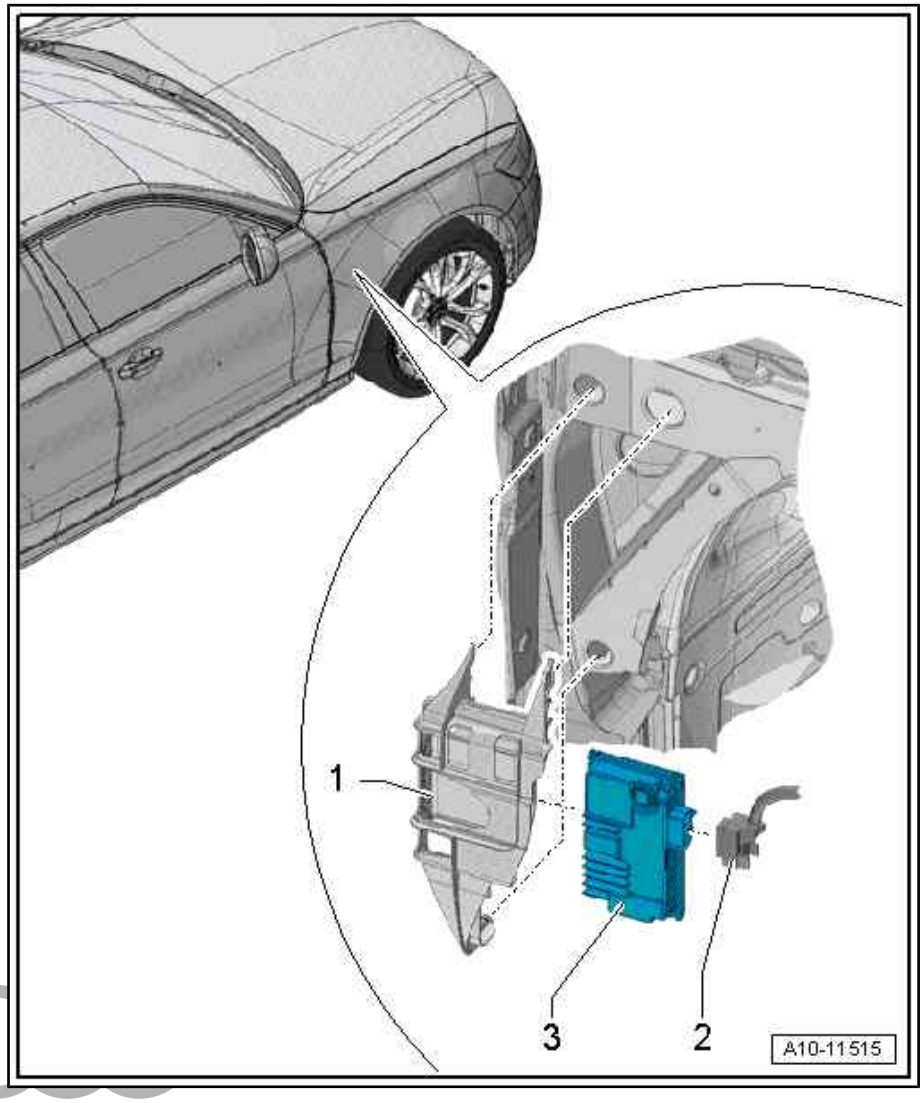
Power unit mounting control unit - J931-

1 - Bracket

2 - Electrical connector

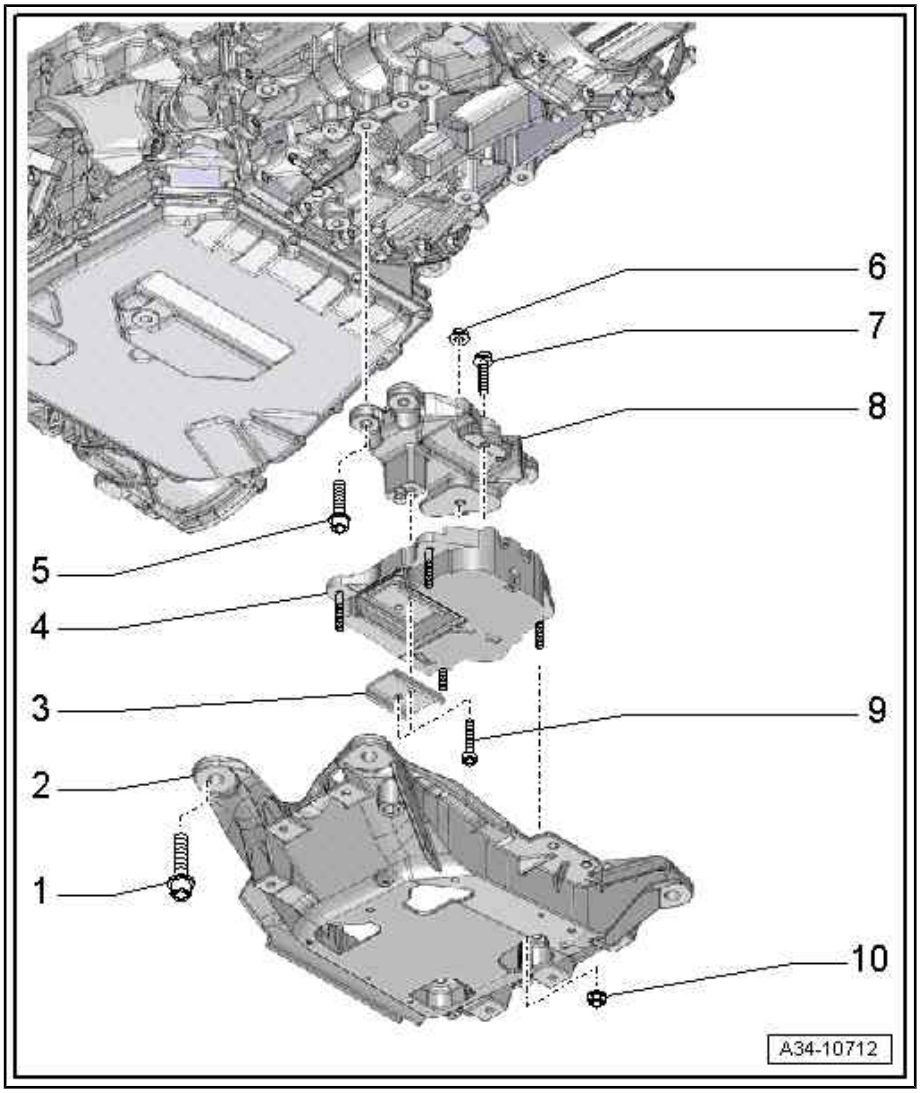
3 - Power unit mounting control unit - J931-

- ❑ Removing and installing ⇒ page 80
- – Calibrate electrohydraulic engine mounting after installing ⇒ page 80 .



Gearbox mounting for dual clutch gearbox 0B5

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1 - Bolt

- ❑ Tightening torque ⇒ Gearbox; Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings

2 - Tunnel cross member

- ❑ Removing and installing ⇒ Gearbox; Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings

3 - Stop plate

- ❑ For gearbox mounting

4 - Gearbox mounting

- ❑ Removing and installing ⇒ page 78

5 - Bolt

- ❑ Tightening torque ⇒ Gearbox; Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings

6 - Nut

- ❑ Tightening torque ⇒ Gearbox; Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings

7 - Bolt

- ❑ Tightening torque ⇒ Gearbox; Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings

8 - Gearbox support

- ❑ Removing and installing ⇒ page 77

9 - Bolt

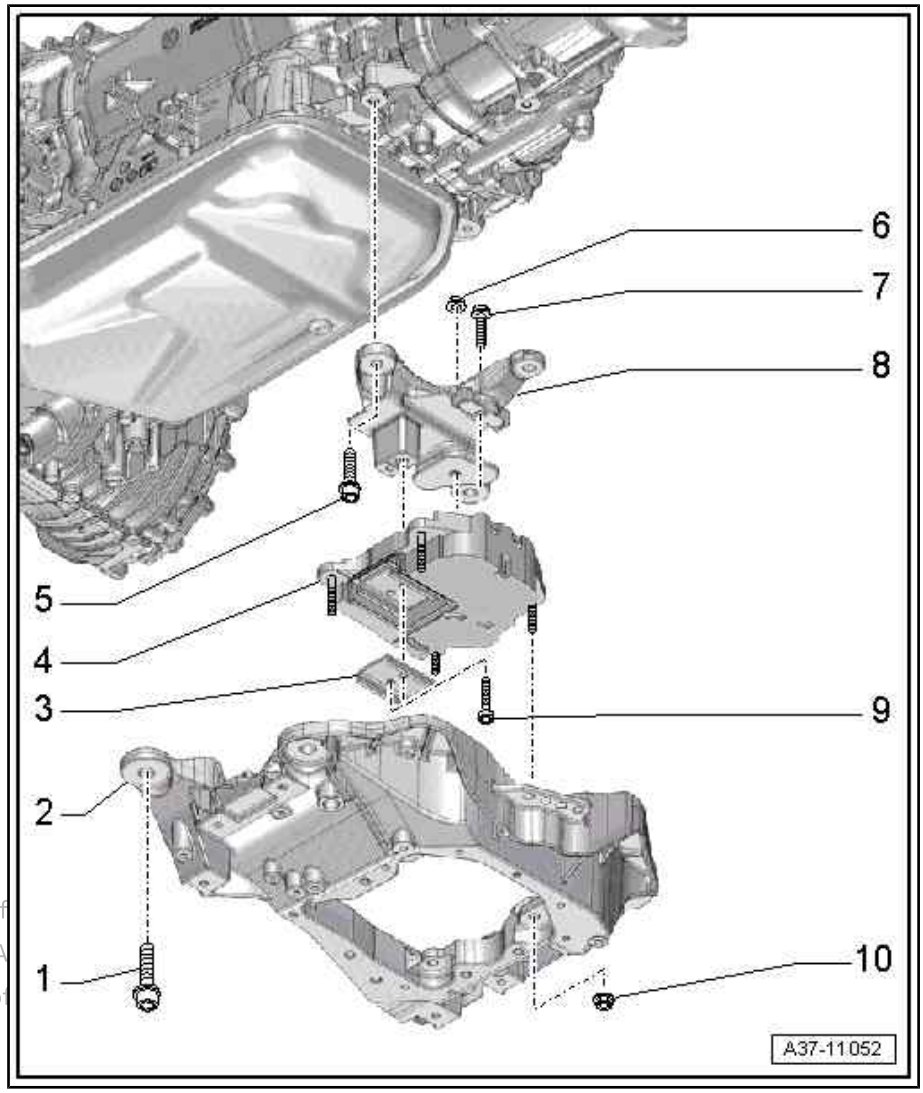
- ❑ Tightening torque ⇒ Gearbox; Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings

10 - Nut

- ❑ Tightening torque ⇒ Gearbox; Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings

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Gearbox mounting for automatic gearbox 0BK



1 - Bolt

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

2 - Tunnel cross member

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

3 - Stop plate

- ❑ For gearbox mounting

4 - Gearbox mounting

- ❑ Removing and installing ⇒ page 78

5 - Bolt

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

6 - Nut

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

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7 - Bolt

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

8 - Gearbox support

- ❑ Removing and installing ⇒ page 77

9 - Bolt

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

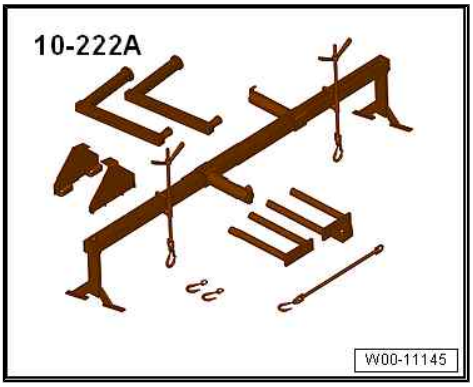
10 - Nut

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

2.2 Supporting engine in installation position

Special tools and workshop equipment required

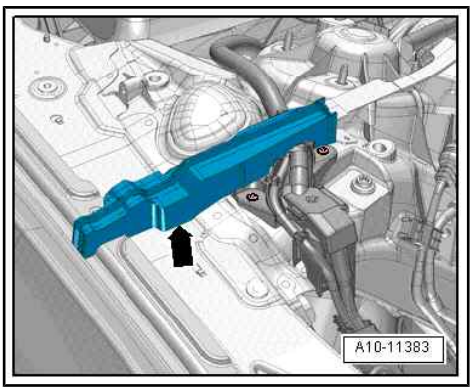
- Support bracket - 10 - 222 A-



Procedure

– Pull off foam wedge -arrow- (left and right) upwards.

– Remove engine cover panel
⇒ “3.1 Removing and installing engine cover panel”, page 82 .



WARNING

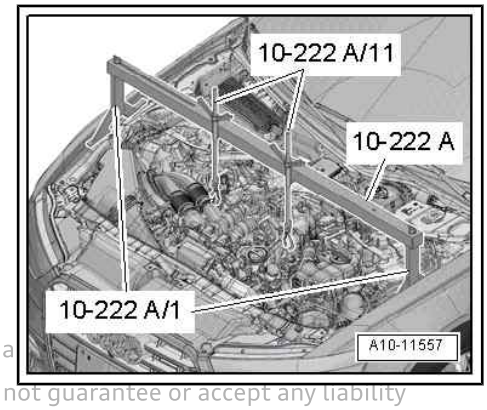
Danger of fire and damage if the engine cover panel is not fitted.

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

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

– Engage spindles -10 - 222 A /11- at engine lifting eyes (left and right).

– Partly take up weight of engine with spindles.



Assembling

Assembly is performed in reverse sequence; note the following:

– Install engine cover panel ⇒ page 82 .

WARNING

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

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

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2.3 Removing and installing engine mountings

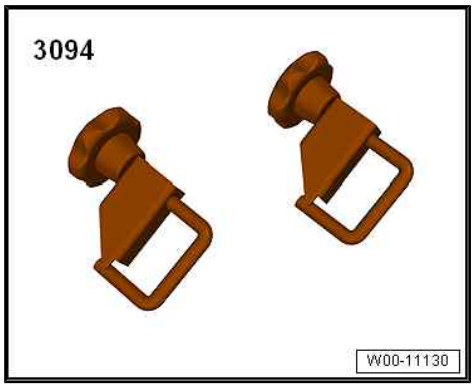
⇒ “2.3.1 Removing and installing engine mounting (left-side)”, page 68

⇒ “2.3.2 Removing and installing engine mounting (right-side)”, page 74

2.3.1 Removing and installing engine mounting (left-side)

Special tools and workshop equipment required

- Hose clamps up to 25 mm - 3094-



- Hose clip pliers - VAS 6362-



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- Engine and gearbox jack - VAS 6931-



Removing

Note

Engine mounting and power unit mounting actuator are combined as one unit.

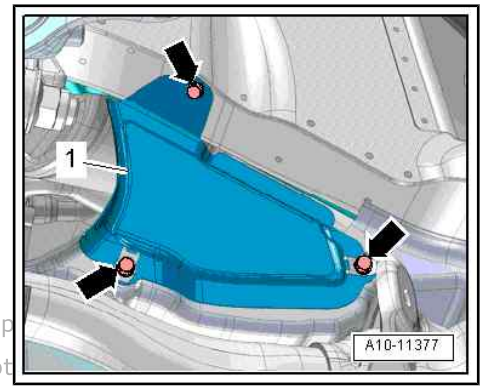
– Support engine in installation position
⇒ “2.2 Supporting engine in installation position”, page 66 .

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

– Remove wheel housing liners (front left and front right) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Removing and installing wheel housing liner (front) .

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

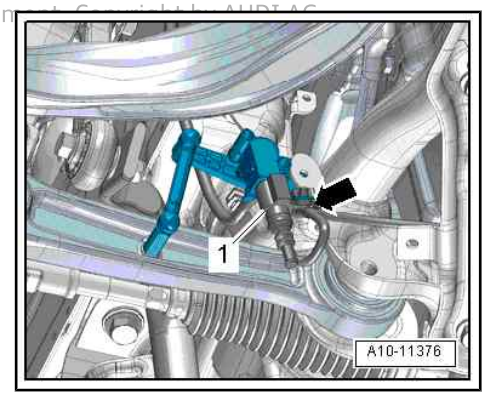
– Remove bolts -arrows- on both sides and detach heat shield -1-.



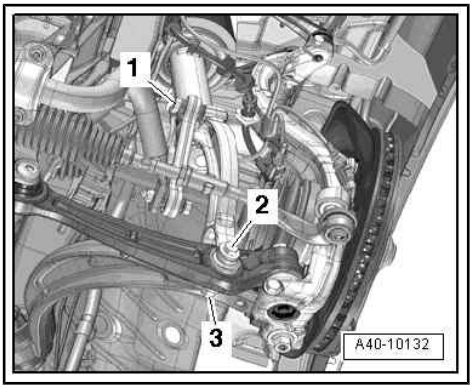
– Unbolt drive shaft (left and right) from gearbox flange shafts ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Removing and installing drive shaft .

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– If fitted, unplug electrical connector -1- from vehicle level sender on both sides (front left vehicle level sender - G78- / front right vehicle level sender - G289-) and move electrical wiring clear -arrow-.



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

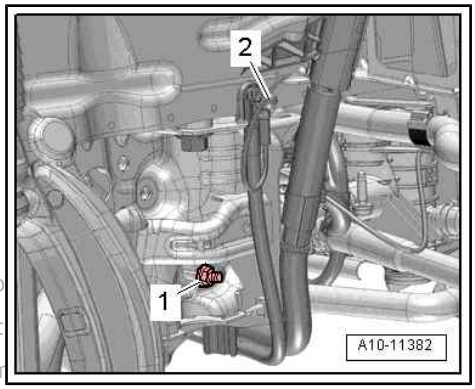


Note

Disregard items -2 and 3-.

Audi S6/S7:

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



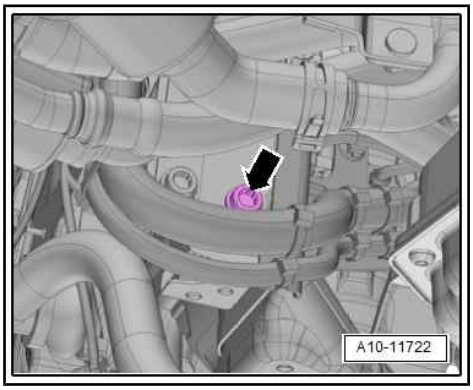
Note

Disregard -item 2-.

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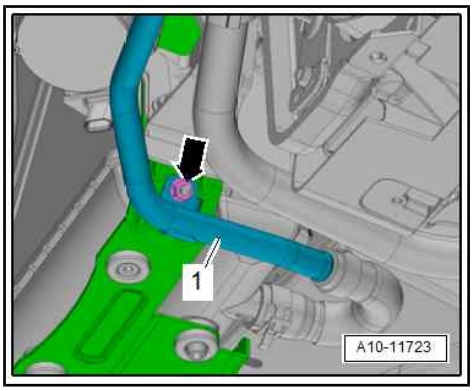
Audi RS 6/RS 7:

– Unscrew bolt (right-side) -arrow- and detach bracket with electrical wiring harness from subframe.



– Remove nut -arrow- and move coolant pipe to the side.

– Remove front longitudinal members (bottom) on both sides ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing impact bar .



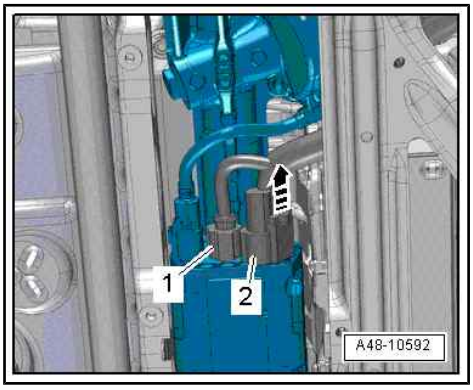
All vehicles (continued):

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

– Unplug electrical connector -2- at power steering control unit - J500- (release retainer -arrow- and press down release catch).

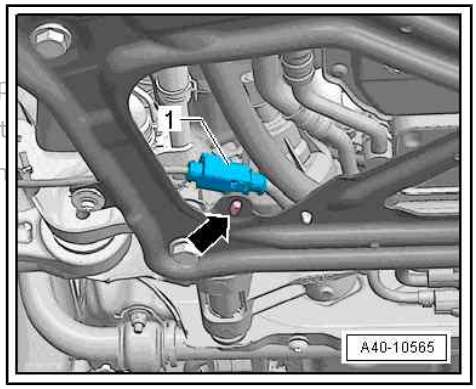
– Unplug electrical connector -1- at power steering control unit - J500- .

– Move electrical wiring harness clear.

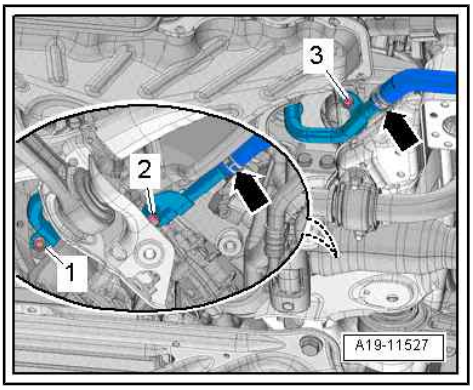


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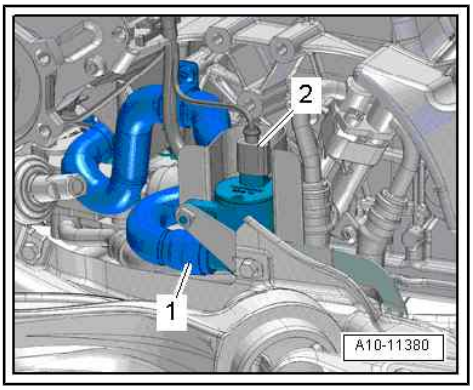
– Move clip clear -arrow-.
– Unplug electrical connector -1- and move wiring clear.



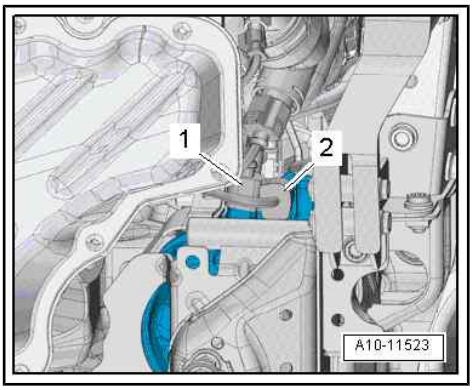
– Clamp off coolant hoses using hose clamps up to 25 mm - 3094- , release hose clips -arrows- and disconnect hoses.
– Remove bolts -1, 2, 3- for coolant pipe (bottom left).



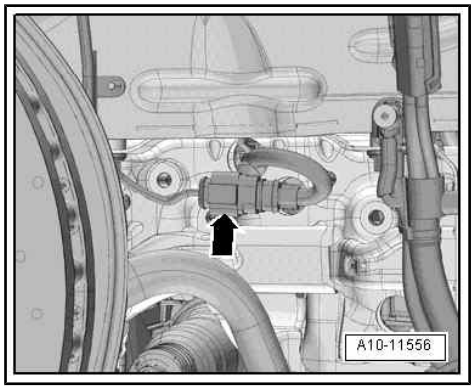
– Release hose clip -1- and detach coolant hose.
– Unplug electrical connector -2- and move wiring clear.



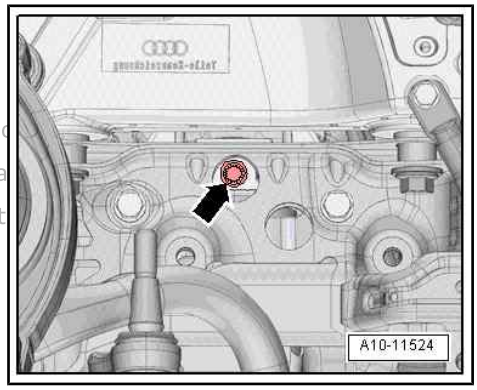
– Unplug electrical connectors (left and right) -1, 2-.



– Take electrical connector -arrow- out of bracket, unplug and guide through subframe.

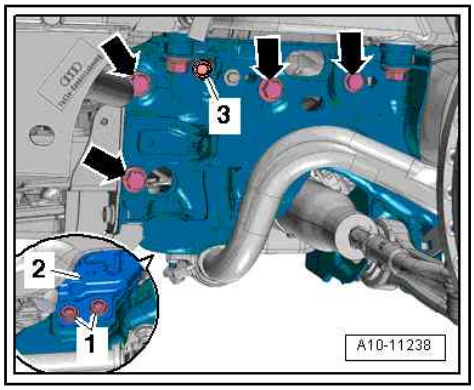


– Remove bolt -arrow- for engine mounting (right-side).

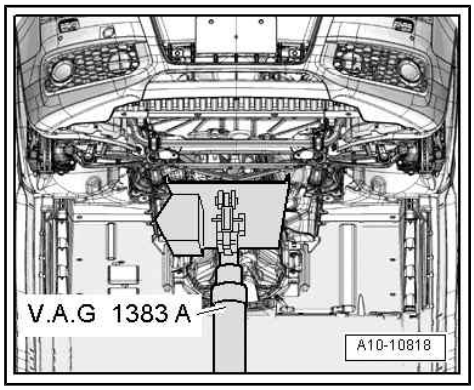


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– Remove bolts -1, 3- and -arrows-.
– Push retaining plate -2- for engine mounting (left-side) to one side.

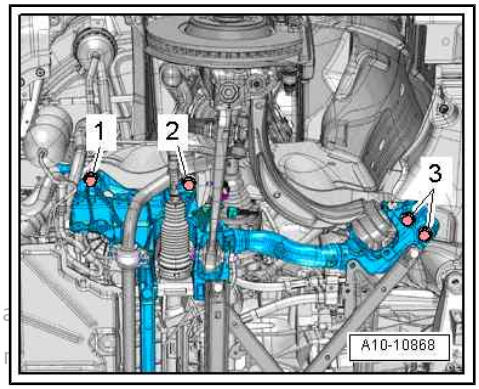


– Support subframe with engine and gearbox jack , as shown in illustration.



– Mark installation position of subframe on longitudinal members with felt-tip pen.

– Unscrew subframe bolts -1, 2, 3- on both sides in several stages and in diagonal sequence.



Caution

Risk of damage to running gear components.

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

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– Lower subframe using engine and gearbox jack just far enough for access to coolant pipe (top left), ensuring sufficient clearance for electrical wiring (right-side).

– Detach engine mounting (left-side).

Installing

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

Note

- *Renew bolts tightened with specified tightening angle.*
- *Fit new O-ring.*
- *Fit all cable ties in the original positions when installing.*

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

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

WARNING

Risk of accident if bolted connections are loose.

- ***Do NOT drive the vehicle unless the subframe bolts have been tightened to their final torque.***

– Secure intermediate steering shaft to steering rack ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Removing and installing intermediate steering shaft .

– Install electrical wiring ⇒ Electrical system; Rep. gr. 97 ; Relay carriers, fuse carriers, electronics boxes; Overview of fitting locations - relay carriers, fuse carriers, electronics boxes and ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

– Check wheel alignment ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheel alignment check; Wheel alignment procedure .

WARNING

Risk of accident if bolted connections are loose.

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

– Calibrate electrohydraulic engine mounting after installing ⇒ page 80 .

Tightening torques

- ⇒ “2.1 Exploded view - assembly mountings”, page 63
- Anti-roll bar, heat shields ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe
- ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft
- Longitudinal member (bottom front) ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Exploded view - lock carrier
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front)
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

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2.3.2 Removing and installing engine mounting (right-side)

Removing

Note

Engine mounting and power unit mounting actuator are combined as one unit.

Caution

Risk of irreparable damage to electronic components.

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

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

– Support engine in installation position ⇒ “2.2 Supporting engine in installation position”, page 66 .

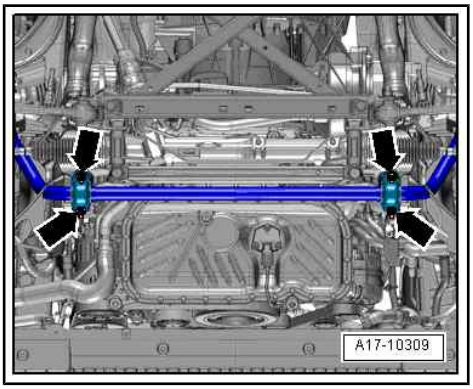
– Remove front wheel (right-side) ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres .

– Remove wheel housing liners (front left and front right) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Removing and installing wheel housing liner (front) .

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

– Remove oil filter element ⇒ Maintenance ; Booklet 411 .

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

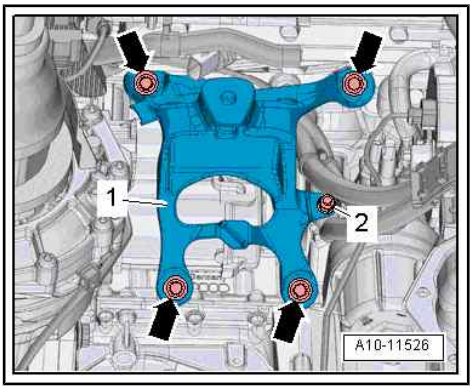


– Remove nut -2- and press earth wire to side.

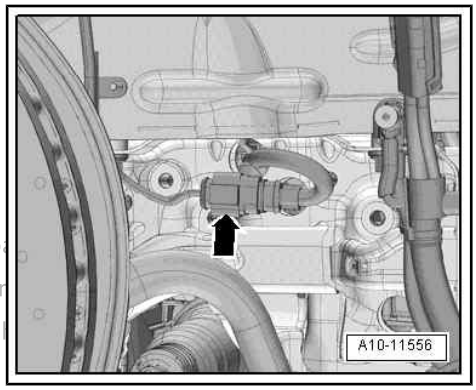
Note

-Item 1- and -arrows- can be disregarded.

– Move electrical wiring harness clear at engine support (right-side).



– Take electrical connector -arrow- out of bracket, unplug and guide through subframe.



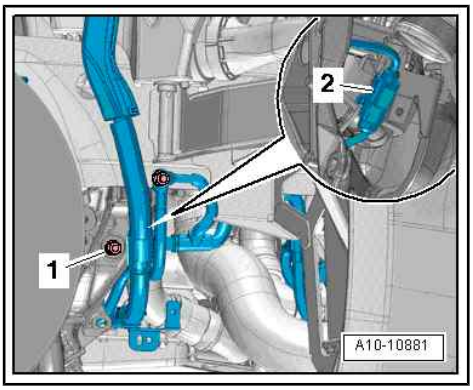
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Audi S6/S7:

– Unscrew nut (right-side) -1- and detach bracket with wiring harness from subframe.

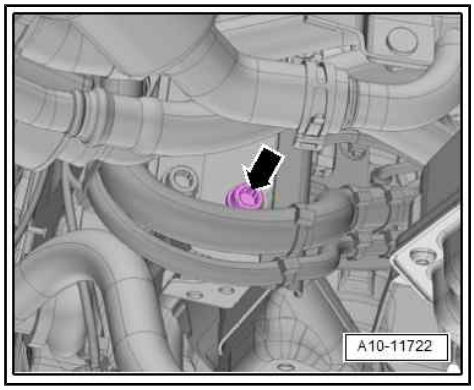
Note

Disregard -item 2-.



Audi RS 6/RS 7:

– Remove bolt (right-side) -arrow- and move clear bracket with electrical wiring harness.

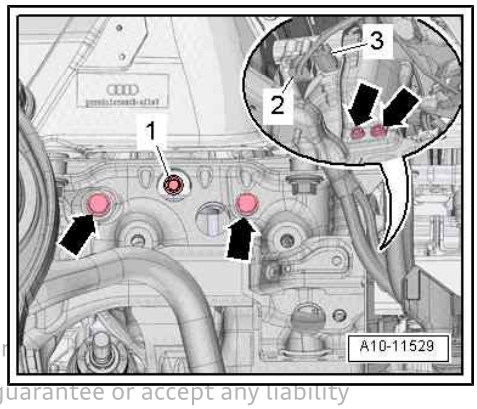


All vehicles (continued):

– Unplug electrical connectors -2 and 3- and move electrical wiring clear.

– Remove bolt -1- on both sides.

– Remove bolts -arrows-.

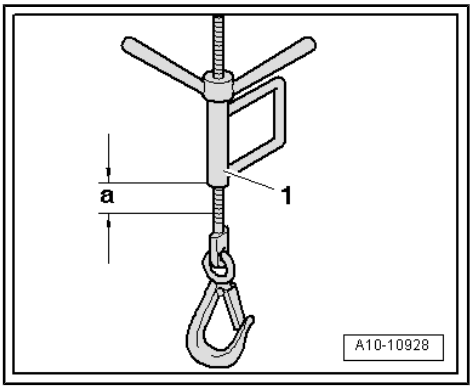


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– Using spindle - 10 - 222 A /11- -item 1-, raise engine through distance -a-.

• Distance -a- = approx. 20 mm.

– Detach retaining plate for engine mounting and engine mounting (right-side).



Installing

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

Note

Renew bolts tightened with specified tightening angle.

– Install oil filter element ⇒ Maintenance ; Booklet 411 .

– Install electrical wiring ⇒ Electrical system; Rep. gr. 97 ; Relay carriers, fuse carriers, electronics boxes; Overview of fitting locations - relay carriers, fuse carriers, electronics boxes and ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

– Observe steps required after re-connecting battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .

– Calibrate electrohydraulic engine mounting after installing ⇒ page 80 .

Tightening torques

♦ ⇒ “2.1 Exploded view - assembly mountings”, page 63

♦ Anti-roll bar ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe

♦ ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres

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

2.4 Removing and installing gearbox mounting

⇒ “2.4.1 Removing and installing gearbox support with gearbox mounting”, page 77

⇒ “2.4.2 Removing and installing gearbox mounting”, page 78

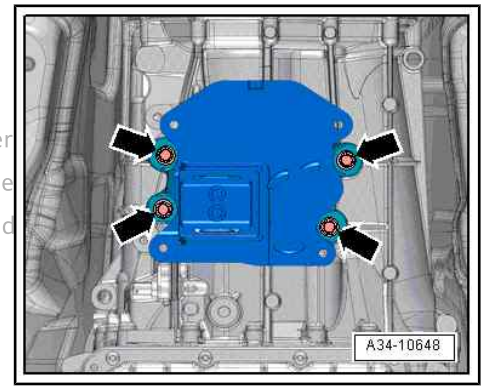
2.4.1 Removing and installing gearbox support with gearbox mounting

Removing

Dual clutch gearbox 0B5:

– Remove tunnel cross member ⇒ Gearbox; Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings .

– Remove bolts -arrows- and detach gearbox support and gearbox mounting from gearbox.

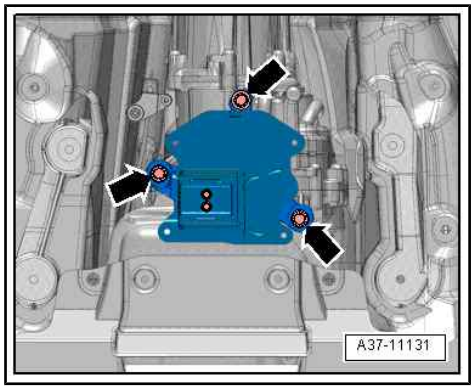


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Automatic gearbox 0BK:

– Remove tunnel cross member ⇒ Gearbox; Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings .

– Remove bolts -arrows- and detach gearbox support and gearbox mounting from gearbox.



Installing

Installation is carried out in reverse sequence.

Tightening torques

♦ ⇒ Gearbox; Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings / ⇒ Gearbox; Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings

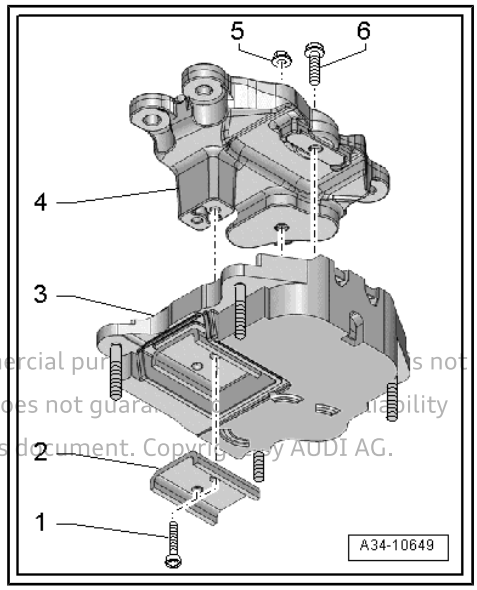
2.4.2 Removing and installing gearbox mounting

Removing

– Remove gearbox support with gearbox mounting ⇒ page 77 .

– Unscrew bolt -1- and detach stop -2- for gearbox mounting.

– Remove nut -5- and bolt -6- and detach gearbox mounting -3- from gearbox support -4-.



Installing

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

– Position gearbox support -4- on gearbox mounting -3-.

– Hand-tighten nut -5- and bolt -6-.

– Tighten bolt -1- for stop -2-.

– Tighten nut -5- and bolt -6-.

– Install gearbox support with gearbox mounting ⇒ page 77 .

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Tightening torques

♦ ⇒ Gearbox; Rep. gr. 34 ; Assembly mountings; Exploded view - assembly mountings / ⇒ Gearbox; Rep. gr. 37 ; Assembly mountings; Exploded view - assembly mountings

2.5 Removing and installing power unit mounting senders

Special tools and workshop equipment required

♦ Socket Torx T30 - T10405-



Removing

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

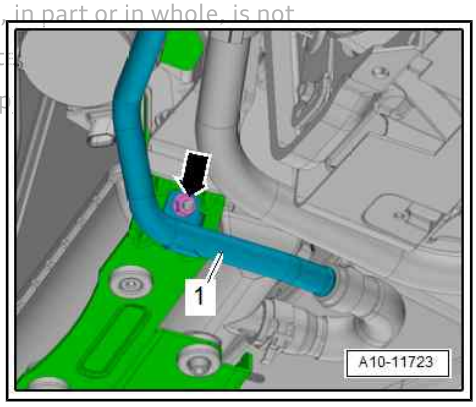
Power unit mounting sender 2 - G749- (left-side):

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

– Remove wheel spoiler (front left) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .

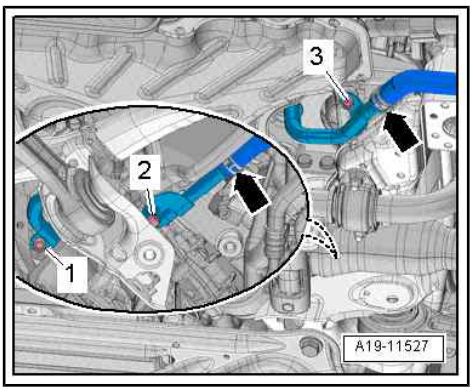
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– Audi RS 6/RS 7: Remove nut -arrow- and move coolant pipe clear.



– Loosen bolt -2- and remove bolts -1, 3-.

– Press coolant pipe (bottom left) to one side.

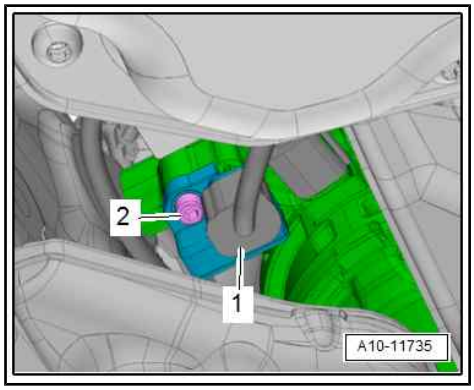


Note

Disregard -arrows-.

Both sides (continued):

– Unplug electrical connector -1-.



Note

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

– Remove bolt -2- and detach power unit mounting sender.

Installing

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

– Calibrate electrohydraulic engine mounting after installing ⇒ page 80 .

Tightening torques

- ⇒ “2.1 Exploded view - assembly mountings”, page 63
- ⇒ “3.1 Exploded view - coolant pipes”, page 278
- ⇒ “4.2.2 Exploded view - auxiliary radiator, coolers for ATF coolant circuit, Audi RS 6/RS 7”, page 306
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front)
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

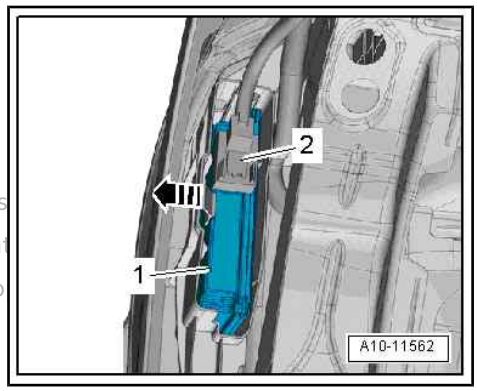
2.6 Removing and installing power unit mounting control unit - J931-

Removing

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

– Unplug electrical connector -2-.

– Release fasteners -arrow- and detach power unit mounting control unit - J931- -item 1-.



Installing

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

– Calibrate electrohydraulic engine mounting after installing ⇒ page 80 .

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Tightening torques

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

2.7 Calibrating electrohydraulic engine mounting

Calibration is only necessary on vehicles with power unit mounting sender 1 - G748- and power unit mounting sender 2 - G749- / power unit mounting actuator 1 - N513- and power unit mounting actuator 2 - N514- .

Special tools and workshop equipment required

- Vehicle diagnostic tester

Procedure

– Connect vehicle diagnostic tester .

– Select `Diagnosis` mode and begin diagnosis.

– Select `Test plan` tab.

– Choose `Select own test` and select following options one after the other:

- Drive train
- Motor - ancillaries and subsystems
- 01 - Self-diagnosis compatible systems
- BA - Engine/gearbox mounting control unit
- BA - Engine/gearbox mounting control unit, functions
- BA - Perform basic setting
- Carry out test

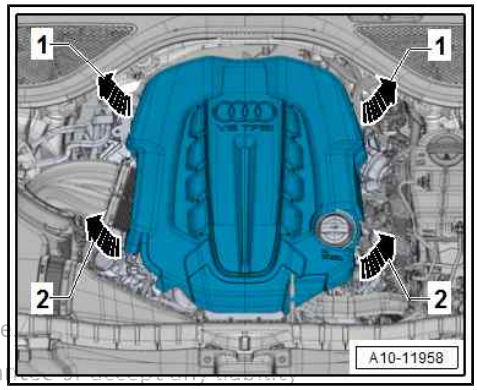
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3 Engine cover panel

⇒ “3.1 Removing and installing engine cover panel”, page 82

3.1 Removing and installing engine cover panel

Removing



– Remove engine cover panel by performing the following steps:

♦ First pull off engine cover panel at rear mounting points -arrows 1-.

♦ Then pull off engine cover panel at front mounting points -arrows 2-.

Caution

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

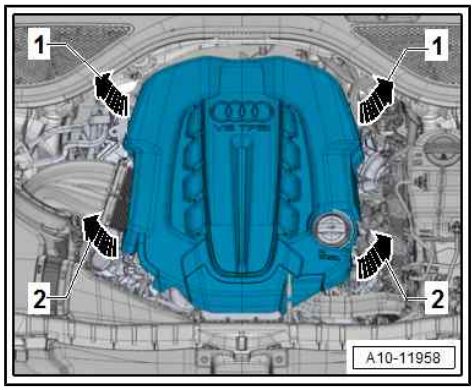
- ***The engine cover panel must always be fitted before the bonnet is closed.***
- ***If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.***

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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.



– Install engine cover panel by performing the following steps:

♦ First press engine cover panel onto rear mounting points -1- using both hands.

♦ Then press engine cover panel onto front mounting points -2- using both hands.

13 – Crankshaft group

1 Cylinder block (pulley end)

⇒ "1.1 Exploded view - poly V-belt drive", page 83

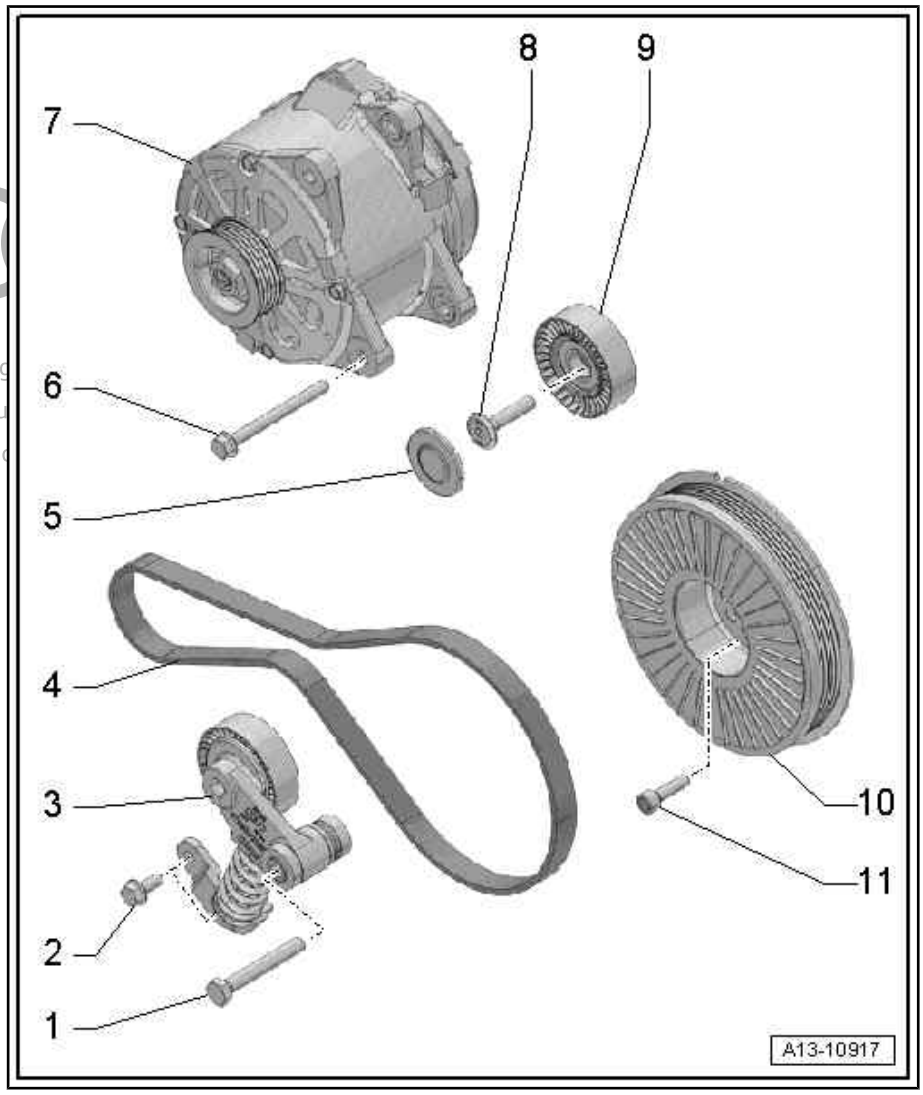
⇒ "1.2 Removing and installing poly V-belt", page 84

⇒ "1.3 Removing and installing tensioner for poly V-belt", page 85

⇒ "1.4 Removing and installing vibration damper", page 87

⇒ "1.5 Renewing crankshaft oil seal (pulley end)", page 87

1.1 Exploded view - poly V-belt drive



1 - Bolt
- ❑ 55 Nm

2 - Bolt
- ❑ 22 Nm

3 - Tensioner
- ❑ For poly V-belt
- ❑ Removing and installing ⇒ page 85

4 - Poly V-belt
- ❑ Check for wear
- ❑ Before removing, mark direction of rotation with chalk or felt-tip pen
- ❑ Removing and installing ⇒ page 84
- ❑ Do not kink
- ❑ When installing, make sure it is properly seated on pulleys

5 - Cap
- ❑ For idler roller

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

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

8 - Bolt
- ❑ 22 Nm

9 - Idler roller
- ❑ For poly V-belt
- ❑ With bolt -item 8-

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10 - Vibration damper

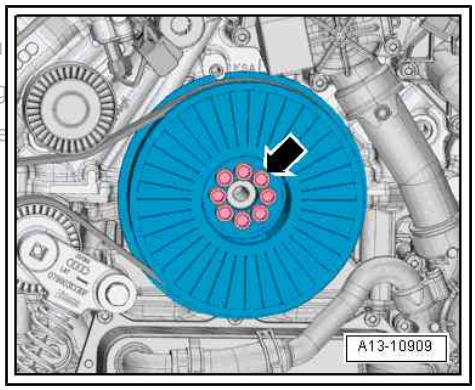
- ❑ With poly V-belt pulley
- ❑ Removing and installing ⇒ page 87

11 - Bolt

- ❑ Renew
- ❑ Tightening torque and sequence ⇒ page 84

Vibration damper - tightening torque and sequence

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Note

Renew bolts tightened with specified tightening angle.

– Tighten bolts in stages as follows:

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

1.2 Removing and installing poly V-belt

Removing

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

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

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

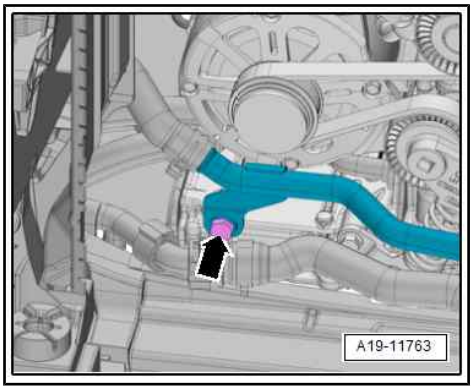
WARNING

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

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

Audi RS 6/RS 7:

– Remove bolt -arrow- and push coolant pipes (bottom front) slightly towards front.

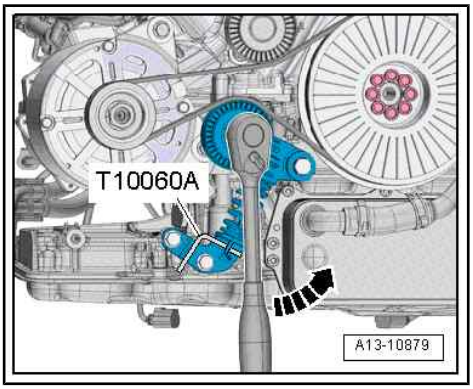


All vehicles (continued):

Caution

Running a used poly V-belt in the opposite direction could cause 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- only as far as necessary.

– Remove poly V-belt and release tensioner.

Note

Ignore -T10060 A- .

Installing

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

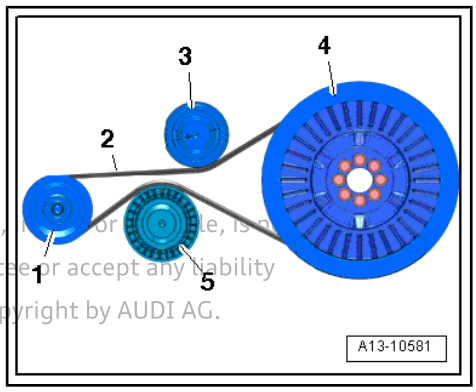
– Fit poly V-belt -2- onto pulleys in the following sequence:

1 - Alternator

3 - Idler roller

4 - Vibration damper

5 - Tensioner



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Note

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

– Start engine and check that poly V-belts run properly.

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

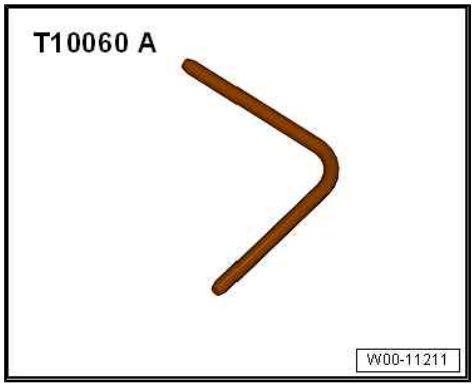
Tightening torques

- ⇒ “3.1 Exploded view - coolant pipes”, page 278
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front)
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

1.3 Removing and installing tensioner for poly V-belt

Special tools and workshop equipment required

- Locking pin - T10060 A-



Removing

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

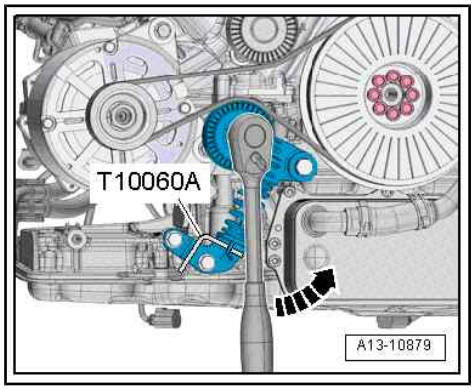
– Remove wheel spoiler (front right) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .

Audi RS 6/RS 7:

– Remove coolant pipes (bottom front) ⇒ page 283 .

All vehicles (continued):

> **Caution**
>
> ***Running a used poly V-belt in the opposite direction could cause irreparable damage.***
>
> - ***Before removing the poly V-belt, mark the direction of rotation with chalk or a felt-tip pen for re-installation.***

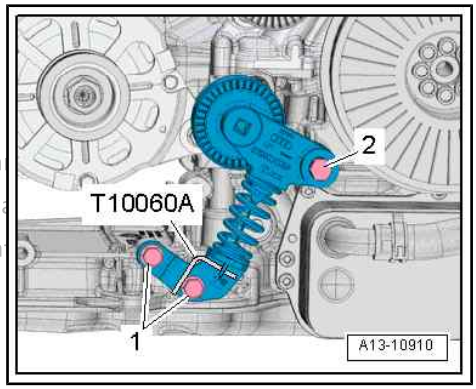


– To slacken poly V-belt turn tensioner in direction of -arrow-.

– Detach poly V-belt from alternator and lock tensioner with locking pin - T10060 A- .

– Remove bolts -1, 2-.

– Detach poly V-belt tensioner from sump (top section)



Installing

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

– Install poly V-belt ⇒ page 84 .

– Install coolant pipes (bottom front) ⇒ page 283 .

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Tightening torques

- ⇒ “1.1 Exploded view - poly V-belt drive”, page 83
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front)
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

1.4 Removing and installing vibration damper

Removing

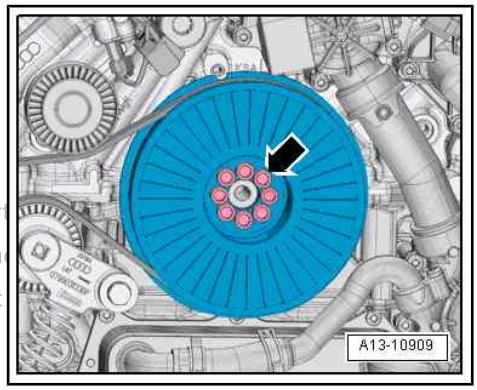
Audi S6/RS 6/RS 7:

– Remove radiator with radiator cowl ⇒ page 309 .

Audi S7:

– Remove radiator cowl ⇒ page 322 .

All vehicles (continued):



– Slacken off bolts -arrow- on vibration damper several turns (counterhold with ring spanner on nut for poly V-belt pulley for alternator).

– Remove poly V-belt ⇒ page 84 .

– Unscrew bolts -arrow- and remove vibration damper.

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Installing

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

Note

- *Renew bolts tightened with specified tightening angle.*
- *Apply locking fluid to bolts when installing; for locking fluid refer to ⇒ Electronic parts catalogue .*
- *The threaded holes for the bolts must be cleaned using a thread tap or similar.*

– Observe dowel sleeve when installing vibration damper.

– Install poly V-belt ⇒ page 84 .

Audi S6/RS 6/RS 7:

– Install radiator with radiator cowl ⇒ page 309 .

Audi S7:

– Install radiator cowl ⇒ page 322 .

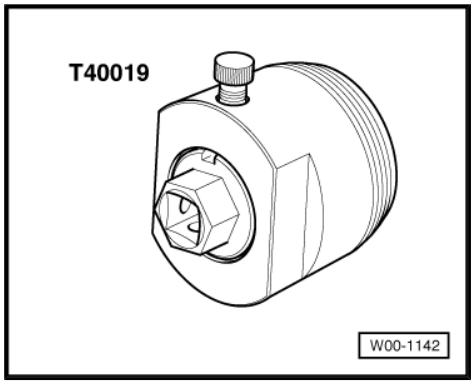
Tightening torques

- ⇒ Fig. ""Vibration damper - tightening torque and sequence"" , page 84

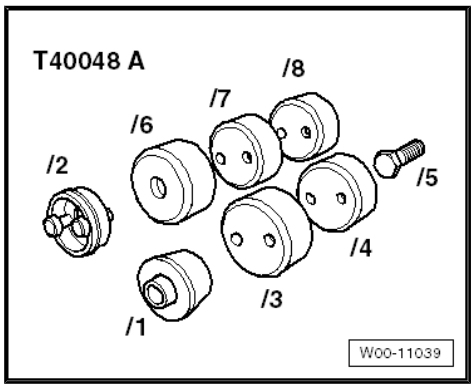
1.5 Renewing crankshaft oil seal (pulley end)

Special tools and workshop equipment required

♦ Oil seal extractor - T40019-



♦ Assembly tool - T40048A-



♦ Bolts M8x55 mm (2x)

Procedure

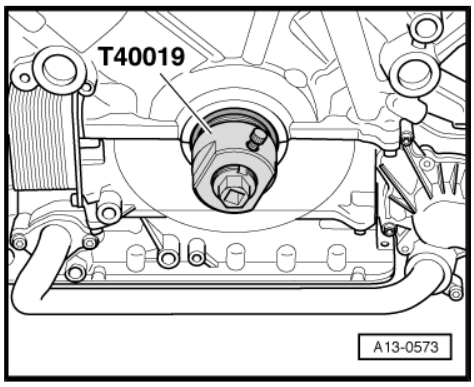
– Remove vibration damper ⇒ page 87 .

– Adjust inner part of oil seal extractor -T40019- so that it is level with the outer part and lock in position with knurled screw.

– Lubricate threaded head of oil seal extractor, place it in position and screw it into oil seal as far as possible (applying firm pressure).

– Loosen knurled screw and turn inner part against crankshaft until the oil seal is pulled out.

– Clamp flats of oil seal extractor in vice and use pliers to remove oil seal.

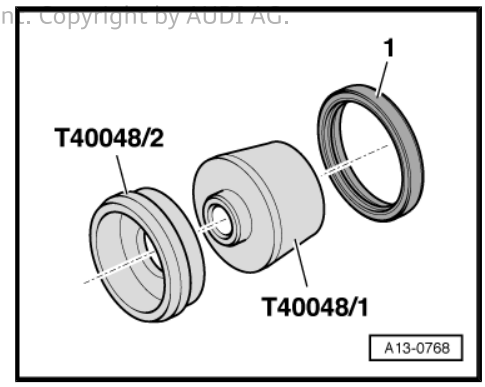


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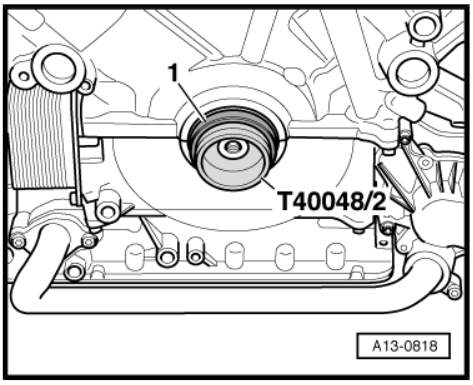
– Clean contact surface and sealing surface.

– Fit assembly aid -T40048/1- onto assembly sleeve -T40048/2- and slide oil seal -1- onto assembly sleeve.

– Detach assembly aid.



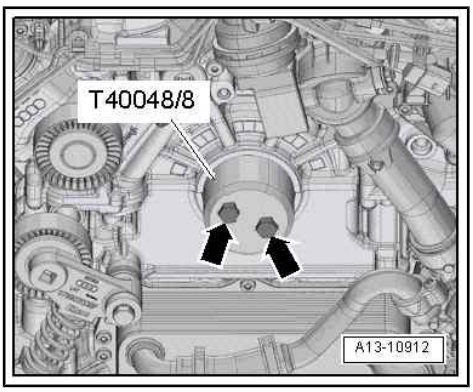
– Fit assembly sleeve -T40048/2- on crankshaft and slide oil seal -1- into sealing surface in cylinder block.



Note

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

– Apply press sleeve -T40048/8- to crankshaft using two M8×55 mm bolts -arrows-.
– Screw in bolts hand-tight at first.
– Tighten bolts alternately, $^{1}/_{2}$ turn at a time, to press in oil seal onto stop.



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

– Install vibration damper ⇒ page 87 .

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2 Cylinder block (gearbox end)

⇒ “2.1 Exploded view - cylinder block (gearbox end)”, page 90

⇒ “2.2 Removing and installing drive plate”, page 90

⇒ “2.3 Renewing crankshaft oil seal (gearbox end)”, page 92

2.1 Exploded view - cylinder block (gearbox end)

Note

When performing assembly work, secure engine to engine and gearbox support ⇒ page 56 .

1 - Bolt
- ❑ Renew
- ❑ 60 Nm +90°

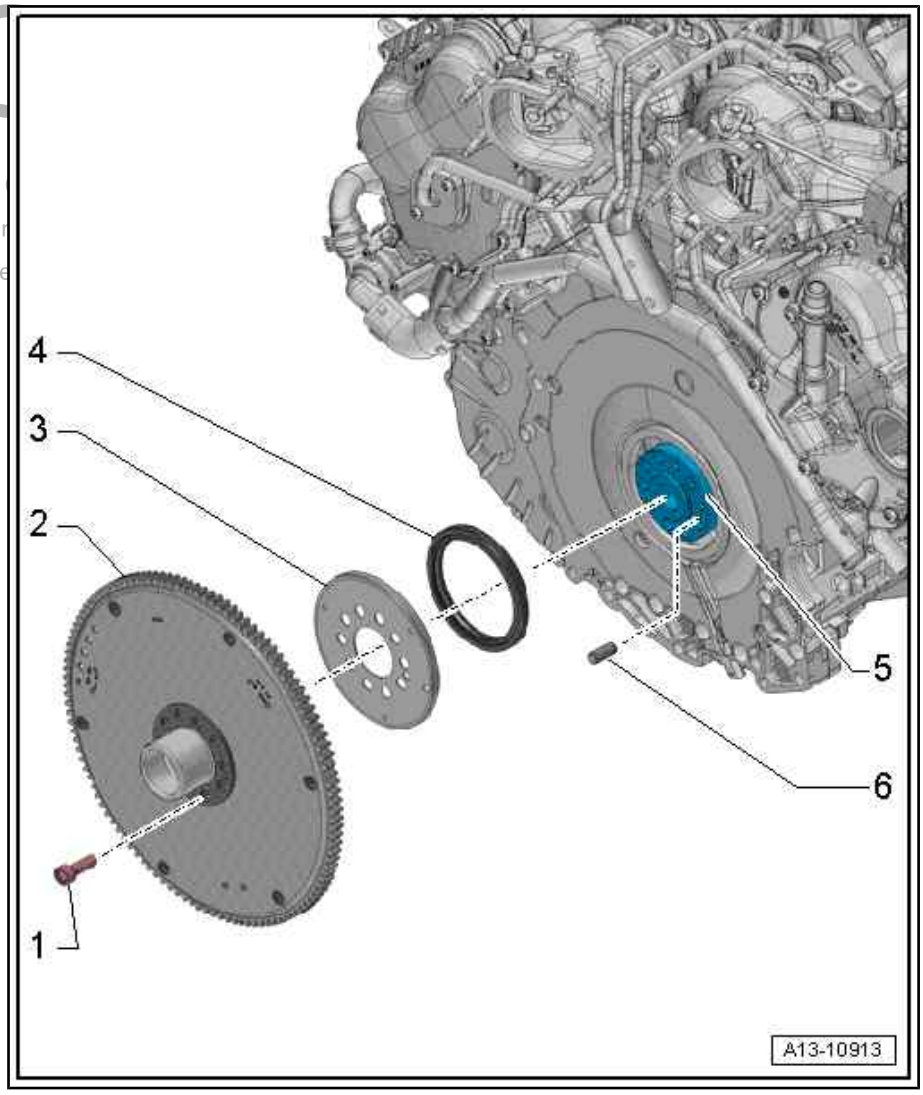
2 - Drive plate
- ❑ With bearing flange
- ❑ Check running surface on bearing flange and holes for dual-mass flywheel for cracks and scoring
- ❑ Removing and installing ⇒ page 90

3 - Sender wheel
- ❑ For engine speed sender - G28-
- ❑ Removing and installing ⇒ page 101
- ❑ Checking ⇒ page 102

4 - Oil seal
- ❑ For crankshaft (gearbox end)
- ❑ Renewing ⇒ page 92

5 - Crankshaft

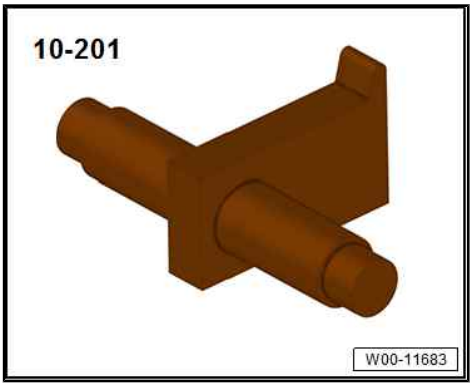
6 - Dowel pin
- ❑ When installing a new engine or crankshaft, fit new dowel pin. For correct version refer to ⇒ Electronic parts catalogue .



2.2 Removing and installing drive plate

Special tools and workshop equipment required

♦ Counterhold tool - 10 - 201-

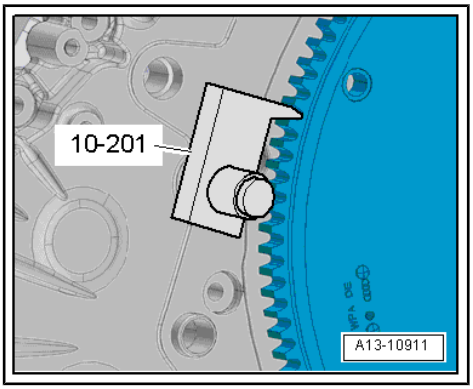


♦ Vacuum cleaner (commercially available)

Removing

- Gearbox removed ⇒ Gearbox; Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox or ⇒ Gearbox; Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .

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



Caution

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

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

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– Remove bolts and take off drive plate.
– Detach sender wheel for engine speed sender - G28- .

Installing

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

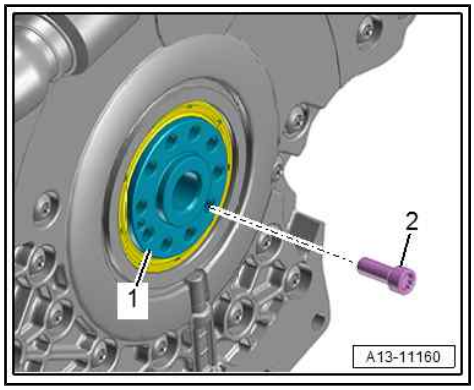
Note

Renew bolts tightened with specified tightening angle.

Before installing drive plate, crankshaft must be cleaned:

– Clean crankshaft flange until all residual adhesive has been removed completely.
- Ensure you do not damage oil seal when cleaning flange.
- Use a vacuum cleaner to hoover up residual adhesive; do NOT use compressed air.

– Remove residual adhesive from one of the old bolts -2- for drive plate using wire brush and remove oil residue using brake cleaner.
– Screw cleaned bolt into a thread on crankshaft -1- and out again; repeat this action until no further residual adhesive appears.
• Do not screw bolt in too far; otherwise, the camshaft timing chain located behind it may be damaged.
– When no further residual adhesive appears, repeat the procedure for the other crankshaft threads.
– Finally, use a vacuum cleaner to hoover up residual adhesive; do NOT use compressed air.
– Clean crankshaft flange with a cloth.
– Pay attention to dowel pin when installing drive plate.
– Fit counterhold tool - 10 - 201- the other way round to tighten bolts.



Tightening torques

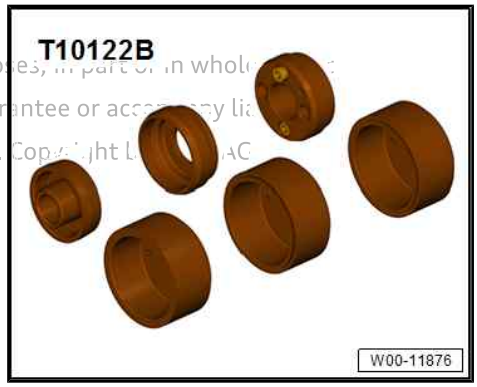
♦ ⇒ “2.1 Exploded view - cylinder block (gearbox end)”, page 90

2.3 Renewing crankshaft oil seal (gearbox end)

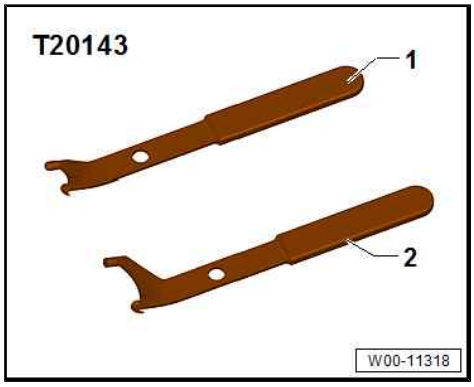
Special tools and workshop equipment required

♦ Fitting tool - T10122B-

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♦ Extractor hook - T20143/2-



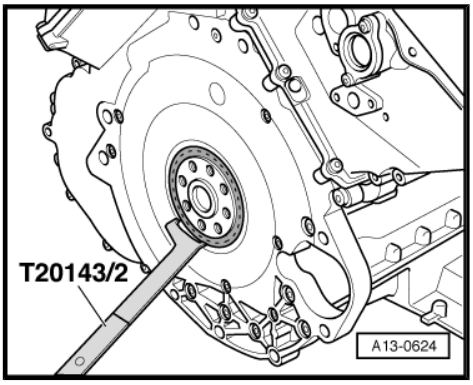
Procedure

- Gearbox removed ⇒ Gearbox; Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox or ⇒ Gearbox; Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .

– Remove drive plate ⇒ page 90 .

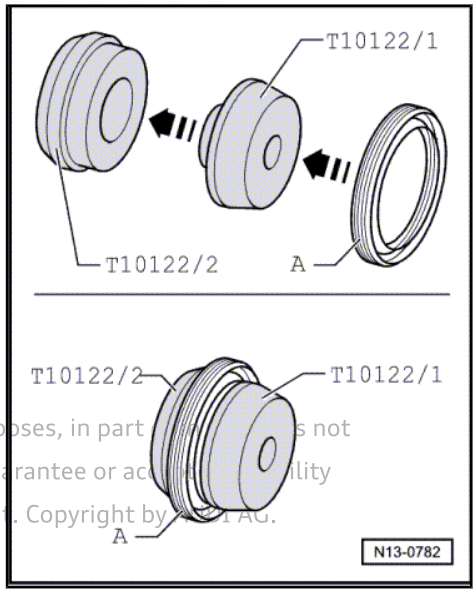
– Pry out oil seal using extractor hook -T20143/2- .

– Clean contact surface and sealing surface.



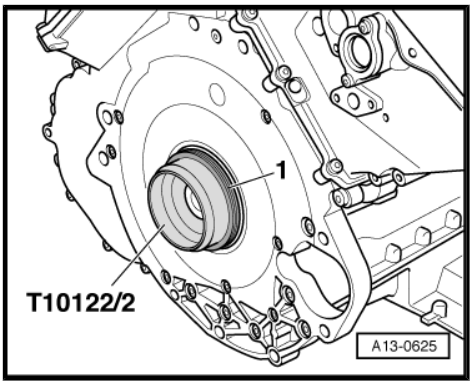
– Fit assembly aid -T10122/1- onto assembly sleeve -T10122/2- and slide oil seal -A- onto assembly sleeve.

– Detach assembly aid.



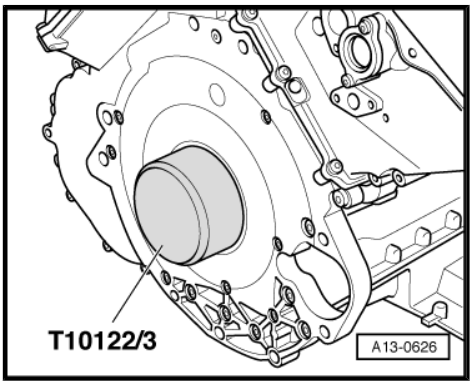
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– Fit assembly sleeve -T10122/2- with oil seal -1- onto crankshaft.



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

– Install drive plate ⇒ page 90 .



3 Crankshaft

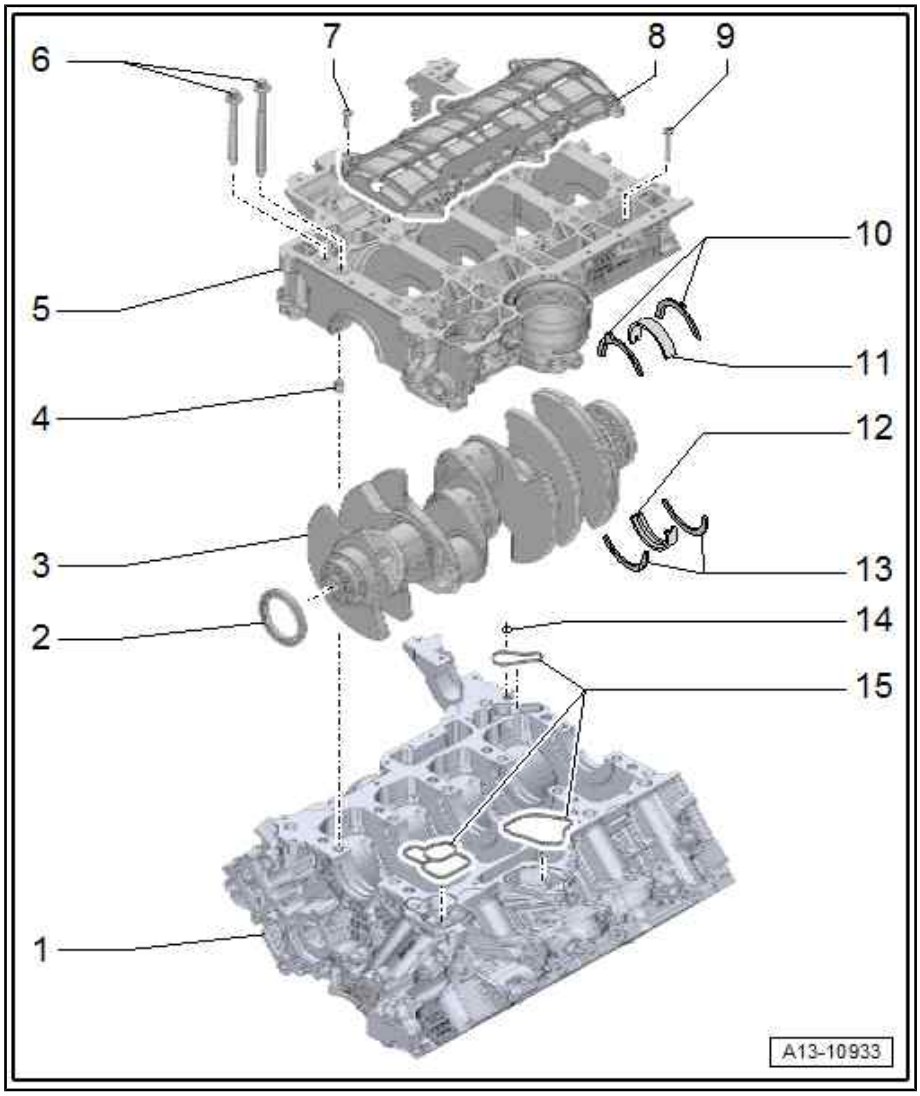
⇒ “3.1 Exploded view - crankshaft”, page 94
⇒ “3.2 Crankshaft dimensions”, page 97
⇒ “3.3 Allocation of main bearing shells”, page 98
⇒ “3.4 Measuring axial clearance of crankshaft”, page 100
⇒ “3.5 Measuring radial clearance of crankshaft”, page 101
⇒ “3.6 Removing and installing sender wheel”, page 101
⇒ “3.7 Checking sender wheel”, page 102

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3.1 Exploded view - crankshaft

Note

When performing assembly work, secure engine to engine and gearbox support ⇒ page 56 .



1 - Cylinder block

- ❑ Matched to -item 5-
- ❑ Applying sealant onto cylinder block (for retaining frame) ⇒ page 96

2 - Oil seal

- ❑ For crankshaft (pulley end)
- ❑ Renewing ⇒ page 87

3 - Crankshaft

- ❑ Different versions available; for allocation refer to ⇒ Electronic parts catalogue
- ❑ Measuring axial clearance ⇒ page 100
- ❑ Measuring radial clearance ⇒ page 101
- ❑ Crankshaft dimensions ⇒ page 97
- ❑ When installing a new crankshaft, fit new dowel pin ⇒ Item 6 (page 90) . For correct version refer to ⇒ Electronic parts catalogue .

4 - Dowel sleeve

- ❑ 2x
- ❑ Insert in cylinder block
- ❑ Installation position ⇒ page 97

5 - Retaining frame

- ❑ Matched to -item 1-
- ❑ To remove, detach guide rail ⇒ Item 1 (page 136) for drive chain for valve gear

- ❑ Before removing retaining frame, remove oil filter element ⇒ Maintenance ; Booklet 411

Caution

Do not loosen transverse bolted connections in retaining frame.

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- ❑ Apply sealant when installing (on cylinder block) ⇒ page 96 ; refer to ⇒ Electronic parts catalogue

6 - Bolts

- ❑ For retaining frame
- ❑ Renew
- ❑ Use old bolts when measuring radial clearance
- ❑ Fit long bolts on inside and short bolts on outside
- ❑ Tightening torque and sequence ⇒ page 97

7 - Bolt

- ❑ Renew
- ❑ Tightening torque and sequence ⇒ page 96

8 - Baffle plate

9 - Bolt

- ❑ For sealing surfaces: retaining frame to cylinder block
- ❑ Different bolt lengths
- ❑ Tightening sequence ⇒ page 97

10 - Thrust washers

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

11 - Bearing shell

- ❑ For retaining frame (without oil groove)
- ❑ Renew used bearing shells
- ❑ Fit new bearing shells for retaining frame with the correct colour coding: new crankshaft ⇒ page 98 , used and machined crankshaft ⇒ page 99

Note different versions:

- ❑ Version 1: Do not interchange centrally positioned crankshaft bearing shells 1 ... 4 with off-centre crankshaft bearing shell 5. Off-centre crankshaft bearing shell 5 with offset position of locating lug ⇒ Electronic parts catalogue
- ❑ Version 2: Centrally positioned crankshaft bearing shells 1 ... 5 ⇒ Electronic parts catalogue

12 - Bearing shell

- ❑ For cylinder block (with oil groove)
- ❑ Renew used bearing shells
- ❑ Fit new bearing shells for cylinder block with the correct colour coding: new crankshaft ⇒ page 98 , used and machined crankshaft ⇒ page 99

Note different versions:

- ❑ Version 1: Do not interchange centrally positioned crankshaft bearing shells 1 ... 4 with off-centre crankshaft bearing shell 5. Off-centre crankshaft bearing shell 5 with offset position of locating lug ⇒ Electronic parts catalogue
- ❑ Version 2: Centrally positioned crankshaft bearing shells 1 ... 5 ⇒ Electronic parts catalogue

13 - Thrust washers

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

14 - O-ring

- ❑ Renew

15 - Gaskets

- ❑ Renew

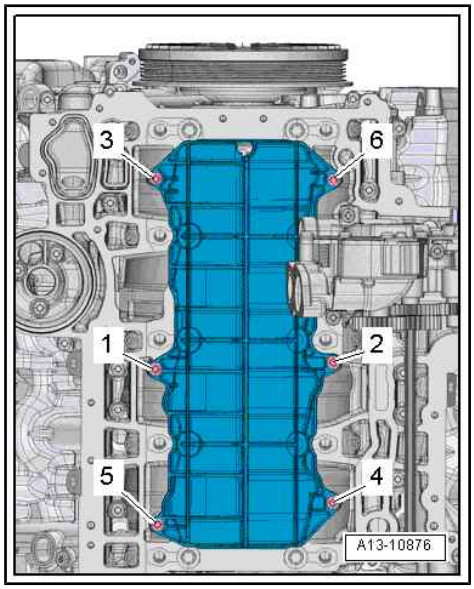
Baffle plate - tightening torque and tightening sequence

Note

Renew bolts tightened with specified tightening angle.

– Tighten bolts in stages in the sequence shown:

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



Applying sealant onto cylinder block (for retaining frame)

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

Caution

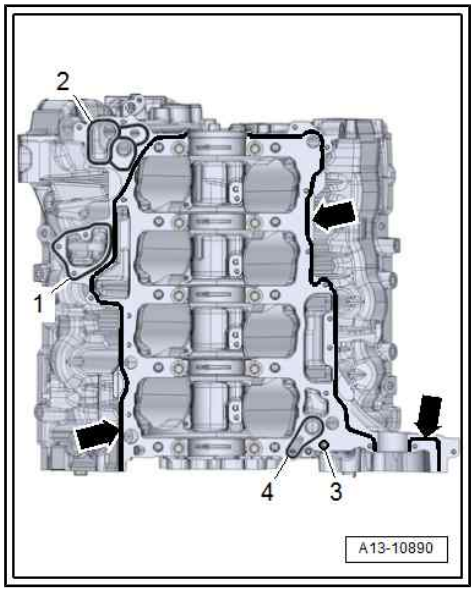
Make sure lubrication system is not clogged by excess sealant.

- ***The sealant beads must not be thicker than specified.***

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

- Width of sealant beads: 2.0 mm.

– Fit gaskets -1, 2, 4- and O-ring -3-.



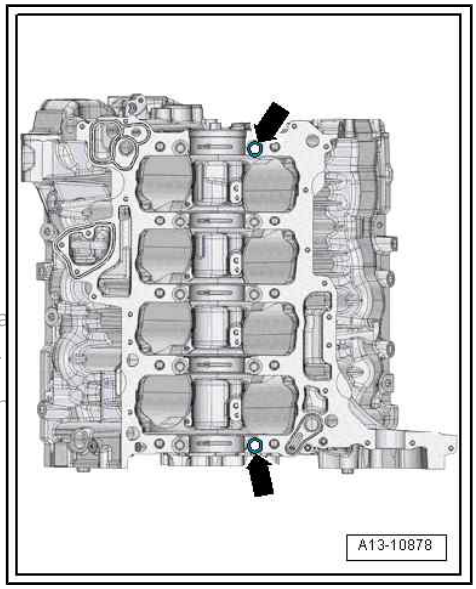
Note

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

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Fitting location of dowel sleeves

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



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Retaining frame - tightening torque and sequence

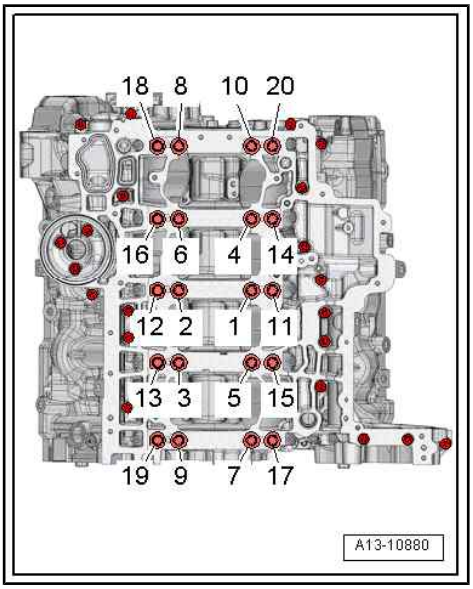
- Guide rail ⇒ Item 1 (page 136) for drive chain for valve gear detached.
- Oil filter element removed ⇒ Maintenance ; Booklet 411 .

Note

Renew bolts tightened with specified tightening angle.

– Fit long bolts on inside and short bolts on outside.

– Tighten bolts in stages in the sequence shown:



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

3.2 Crankshaft dimensions

Crankshaft with crankshaft main bearing journal ∅ 65 mm

Honing dimension	Crankshaft bearing journal ∅ mm	Crankshaft conrod journal ∅ mm
Basic dimension	65.000 - 0.022 - 0.042	54.000 - 0.022 - 0.042
Repair oversize	64.750 - 0.022 - 0.042	53.750 - 0.022 - 0.042

Crankshaft with crankshaft main bearing journal ∅ 67 mm

Honing dimension	Crankshaft bearing journal ∅ mm	Crankshaft conrod journal ∅ mm
Basic dimension	67.000 - 0.010 - 0.029	54.000 - 0.022 - 0.042
Repair oversize	66.750 - 0.010 - 0.029	53.750 - 0.022 - 0.042

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3.3 Allocation of main bearing shells

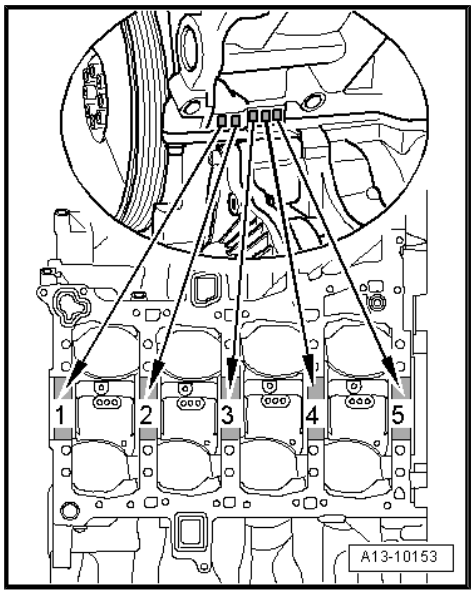
⇒ "3.3.1 Allocation of main bearing shells for new crankshaft", page 98

⇒ "3.3.2 Allocation of main bearing shells on used and machined crankshafts", page 99

3.3.1 Allocation of main bearing shells for new crankshaft

Allocation of crankshaft bearing shells for cylinder block

- Bearing shells of the correct thickness are matched to the bearings in the cylinder block at the factory. Coloured dots on the side of the bearing shells are used to identify the bearing shell thickness.
- The allocation of the bearing shells to the cylinder block is indicated by letters on the front left of the cylinder block (legible from outside), as shown in illustration.



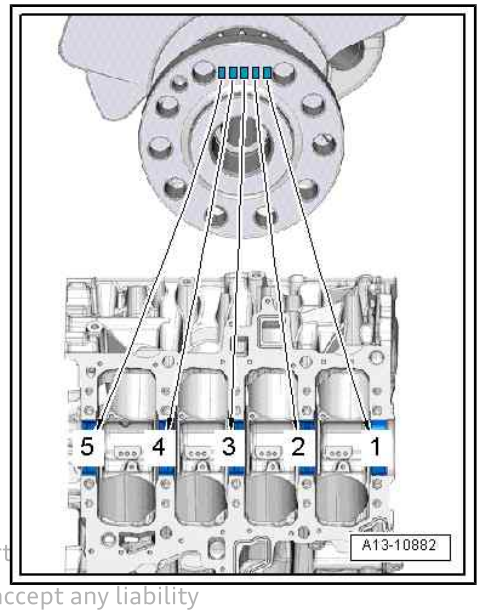
Letter on cylinder block	Colour coding of bearing
R =	Red
S =	Black
G =	Yellow
Ü =	Green
B =	Blue

Note

The code letters are also stamped on the retaining frame.

Allocation of crankshaft bearing shells for retaining frame

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



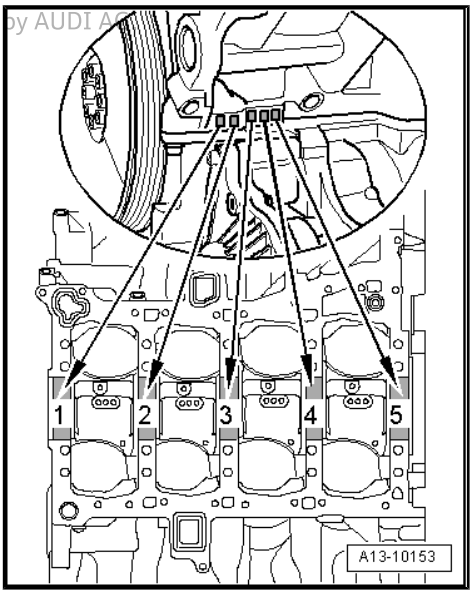
Letter on crankshaft flange	Colour coding of bearing
R =	Red
S =	Black
G =	Yellow
Ü =	Green
B =	Blue

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3.3.2 Allocation of main bearing shells on used and machined crankshafts

Allocation of crankshaft bearing shells for cylinder block

- Bearing shells are allocated to the cylinder block according to the colour codes stamped on the cylinder block.
- On a used and machined crankshaft, the crankshaft bearing journals must be measured in order to allocate the correct bearing shells.
- Crankshaft dimensions ⇒ page 97 .
- Oversized (thicker) bearing shells are available for a machined crankshaft. However, these bearing shells have the same colour coding as the original-size bearing shells.



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

Allocation of crankshaft bearing shells for retaining frame

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

Crankshaft with crankshaft main bearing journal ∅ 65 mm

Crankshaft main bearing journal ∅	Colour code of bearing shells for retaining frame				
Dimensions in mm	**Red**	**Black**	**Yellow**	**Green**	**Blue**
Basic dimension 65.000	64.978 … 64.975	64.974 … 64.971	64.970 … 64.967	64.966 … 64.963	64.962 … 64.958

Crankshaft main bearing journal ∅	Colour code of bearing shells for retaining frame				
Dimensions in mm	**Red**	**Black**	**Yellow**	**Green**	**Blue**
Repair undersize 64.750 1)	64.728 … 64.725	64.724 … 64.721	64.720 … 64.717	64.716 … 64.713	64.712 … 64.708

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

Crankshaft with crankshaft main bearing journal ∅ 67 mm

Crankshaft main bearing journal ∅	Colour code of bearing shells for retaining frame				
Dimensions in mm	**Red**	**Black**	**Yellow**	**Green**	**Blue**
Basic dimension 65.000	66.990 … 66.987	66.986 … 66.983	66.982 … 66.979	66.978 … 66.975	66.974 … 66.971
Repair undersize 64.750 1)	66.740 … 66.737	66.736 … 66.733	66.732 … 66.729	66.728 … 66.725	66.724 … 66.721

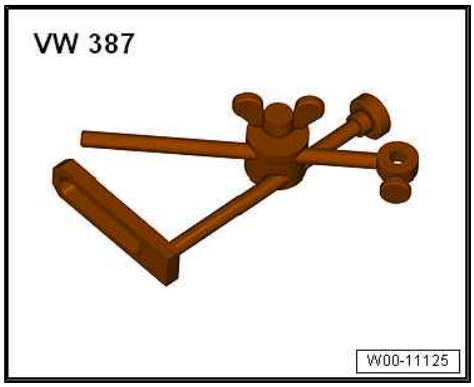
- 1) The colour codes for the oversized (thicker) bearing shells required for a machined crankshaft are the same as those on bearing shells for a new crankshaft, in spite of the greater bearing thickness.

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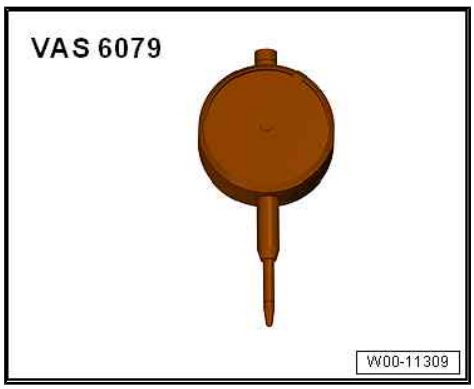
3.4 Measuring axial clearance of crankshaft

Special tools and workshop equipment required

- Universal dial gauge bracket - VW 387-



- Dial gauge - VAS 6079-



Procedure

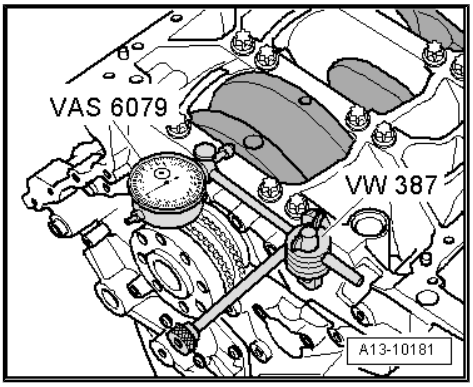
– Secure dial gauge - VAS 6079- with universal dial gauge bracket - VW 387- to cylinder block as shown in illustration.

– Apply dial gauge to crank web.

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

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

• Axial clearance: 0.090 ... 0.251 mm



3.5 Measuring radial clearance of crankshaft

Special tools and workshop equipment required

♦ Plastigauge

Procedure

Note

Use old bolts when measuring radial clearance.

– Remove retaining frame and clean bearing journals.

– Place a length of Plastigauge corresponding to the width of the bearing on the bearing journal or in the bearing shell.

• The Plastigauge must be positioned in the centre of the bearing shell.

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– Fit retaining frame and tighten through specified angle ⇒ page 97 without rotating crankshaft.

– Remove retaining frame again.

– Compare width of Plastigauge with measurement scale.

Radial clearance:

• S6/S7 (new): 0.017 … 0.044 mm

• RS 6/RS 7 (new): 0.017 … 0.033 mm

• Wear limit: 0.08 mm.

– When carrying out final assembly, renew bolts.

3.6 Removing and installing sender wheel

Removing

• Gearbox removed ⇒ Gearbox; Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox or ⇒ Gearbox; Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .

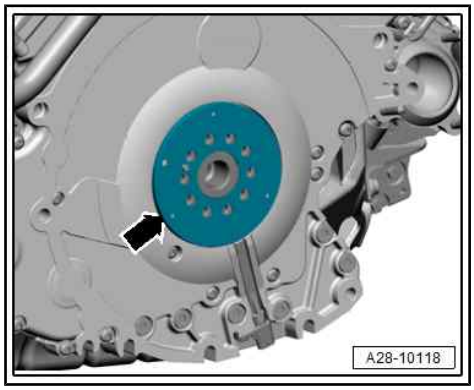
– Remove drive plate ⇒ page 90 .

Caution

Risk of magnetic fields causing irreparable damage to sender wheel.

- ***The sender wheel must be kept away from magnets (e.g. base of torch, loudspeaker).***
- ***If the drive plate/flywheel or the sender wheel itself has been removed or renewed, check that the sender wheel is operating correctly before installation.***

– Detach sender wheel -arrow-.



Installing

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

– Install drive plate ⇒ page 90 .

– After renewing sender wheel, “misfire adaptions” must be reset. To do so, select `01 - Reset adaptions misfires` in `Guided Functions` mode of ⇒ Vehicle diagnostic tester.

3.7 Checking sender wheel

Caution

Risk of magnetic fields causing irreparable damage to sender wheel.

- ***The sender wheel must be kept away from magnets (e.g. base of torch, loudspeaker).***
- ***If the drive plate/flywheel or the sender wheel itself has been removed or renewed, check that the sender wheel is operating correctly before installation.***

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Special tools and workshop equipment required

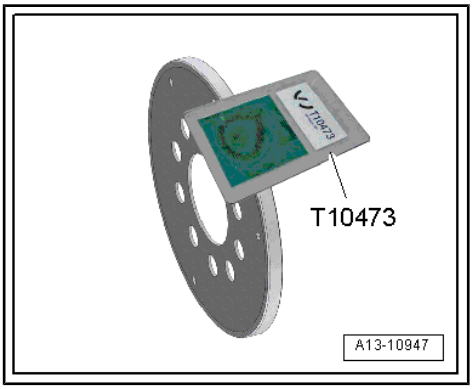
- Sensor gauge - T10473-



Procedure

- Sender wheel removed

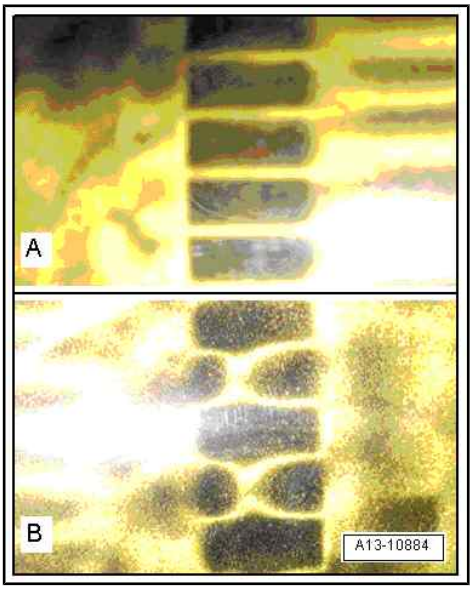
– Check entire circumference of sender wheel using sensor gauge - T10473- , as shown in illustration.



Inspection image of sender wheel

A - Sender wheel OK

B - Sender wheel defective



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4 Auxiliary drive

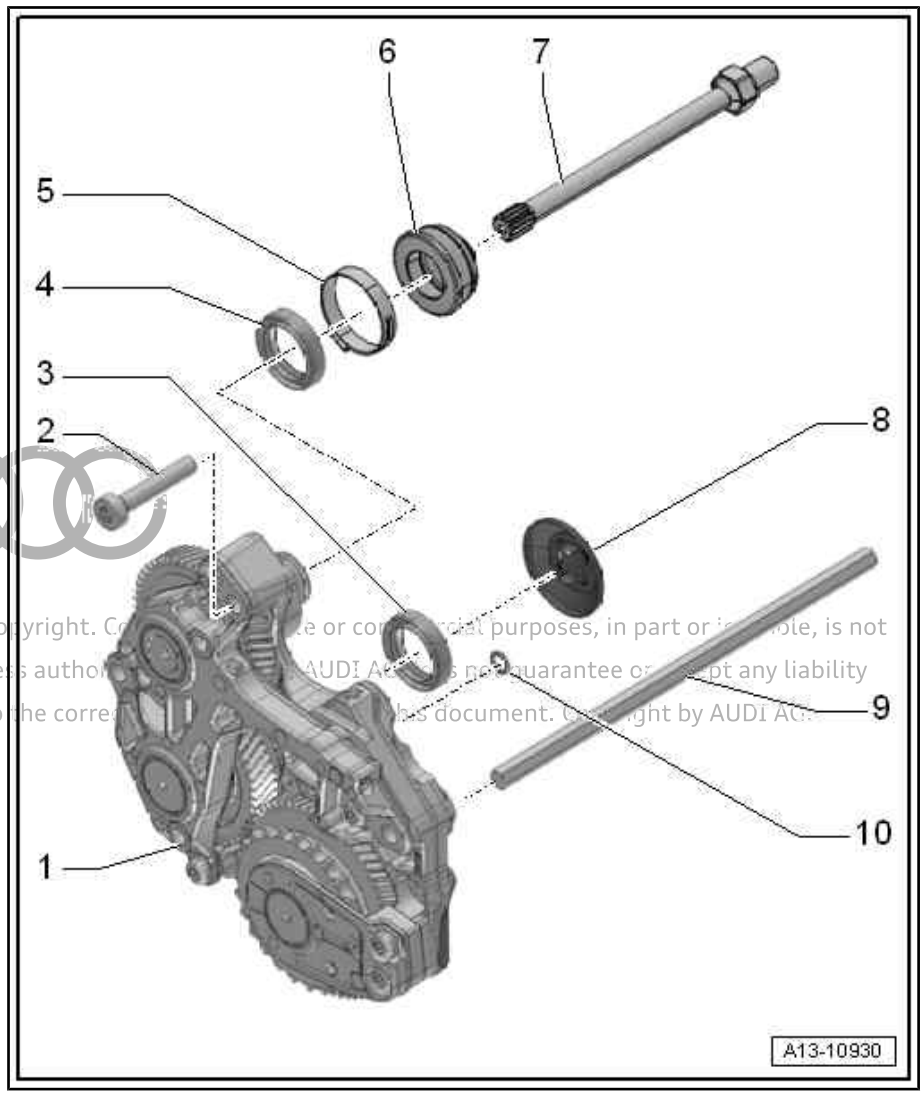
⇒ “4.1 Exploded view - auxiliary drive”, page 104

⇒ “4.2 Removing and installing spur gear drive”, page 105

⇒ “4.3 Renewing oil seal for power steering pump drive”, page 107

⇒ “4.4 Renewing oil seal for AC compressor drive”, page 108

4.1 Exploded view - auxiliary drive



1 - Spur gear drive
- ❑ Do not dismantle
- ❑ Removing and installing ⇒ page 105

2 - Bolt
- ❑ Tightening torque and sequence ⇒ page 105

3 - Oil seal
- ❑ Renewing ⇒ page 107

4 - Oil seal
- ❑ For AC compressor drive
- ❑ Renewing ⇒ page 108

5 - Clamp

6 - Dust cap
- ❑ For AC compressor drive

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

8 - Cover

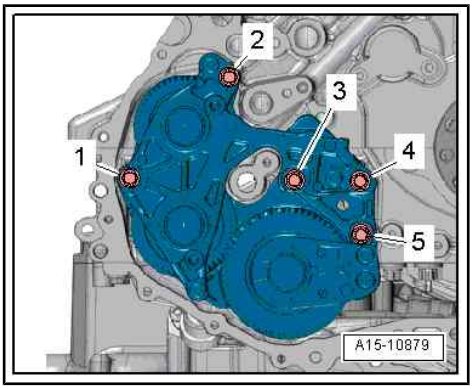
9 - Drive shaft
- ❑ For oil pump

10 - O-ring
- ❑ Renew

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Spur gear drive - tightening torque and sequence

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



4.2 Removing and installing spur gear drive

Special tools and workshop equipment required

♦ Sealant ⇒ Electronic parts catalogue

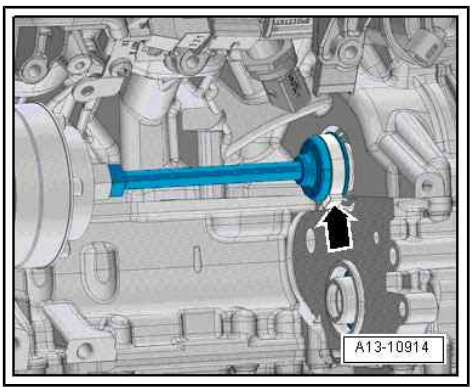
Removing

- Gearbox removed ⇒ Gearbox; Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox or ⇒ Gearbox; Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .

– Remove timing chain cover (bottom) ⇒ page 127 .

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

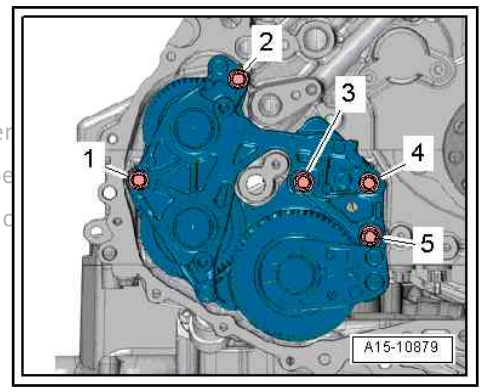
– Remove drive chain for auxiliary drives ⇒ page 154 .



– Slacken bolts -1 ... 5- in diagonal sequence and remove.

– Carefully release spur gear drive from bonded joint and detach.

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– Pull out oil pump drive shaft -arrow-.

Installing

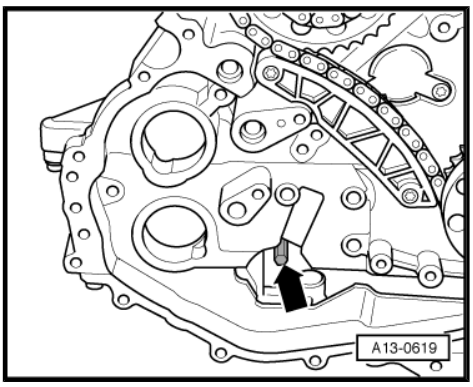
Note

Fit new O-ring.

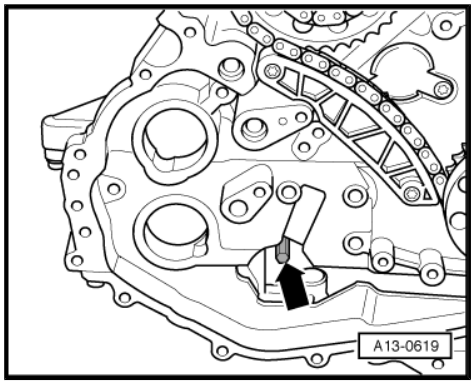
– Renew oil seals if damaged ⇒ Item 3 (page 104) and ⇒ Item 4 (page 104) .

– Remove sealant residues from spur gear drive and cylinder block.

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



– Insert drive shaft -arrow- for oil pump into guide sleeve at oil pump.



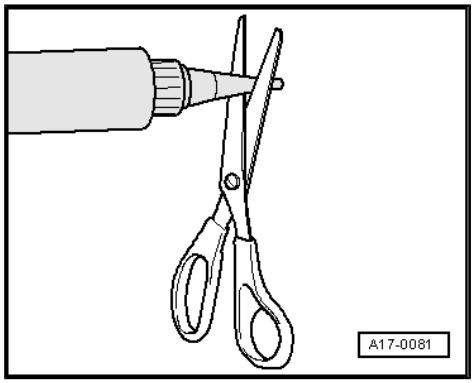
Note

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

Note

Note the use-by date of the sealant.

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



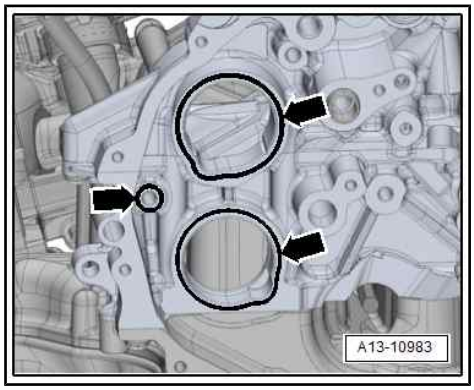
Caution

Make sure lubrication system is not clogged by excess sealant.

- ***The sealant beads must not be thicker than specified.***

– Apply beads of sealant -arrows- onto clean sealing surfaces on engine, as shown in illustration.

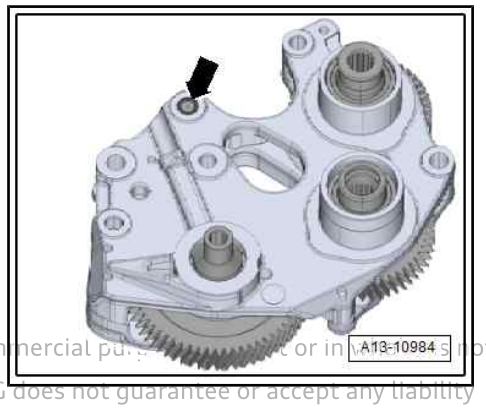
- Width of sealant beads: 2.0 mm.



– Fit new O-ring -arrow- on spur gear drive and secure in position with a small amount of grease.

Note

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



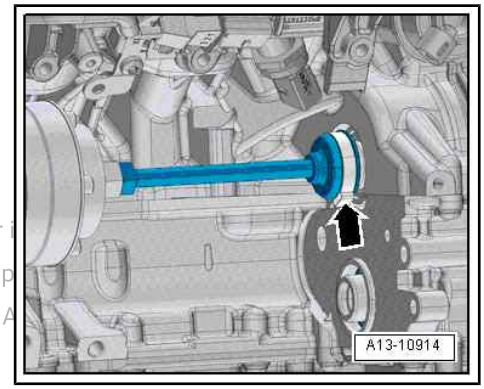
– Fit spur gear drive and tighten bolts ⇒ page 105 .

– Install drive chain for auxiliary drives ⇒ page 154 .

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Note

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



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

– Install timing chain cover (bottom) ⇒ page 127 .

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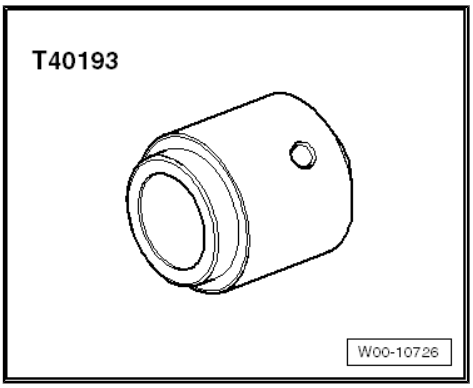
Tightening torques

- ⇒ Fig. ""Spur gear drive - tightening torque and sequence"" , page 105

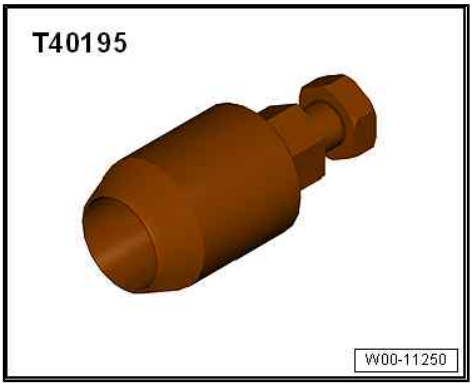
4.3 Renewing oil seal for power steering pump drive

Special tools and workshop equipment required

- Thrust piece - T40193-



- Oil seal extractor - T40195-

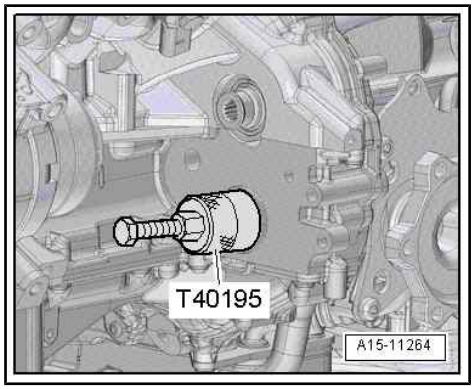


Procedure

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

– Remove cover ⇒ Item 8 (page 104) .

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

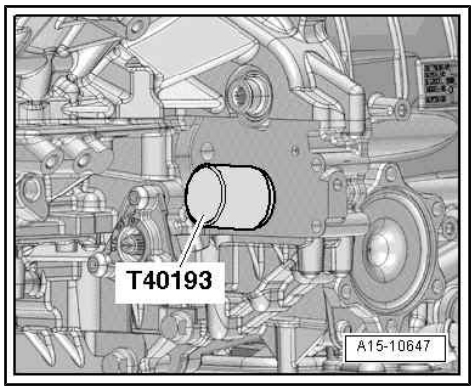


Note

If the sections of the oil seal come apart, apply oil seal extractor again and pull out remaining part of oil seal.

– Clamp hexagon flats of oil seal extractor in vice and use pliers to remove oil seal.
– Clean contact surface and sealing surface.

– Drive oil seal in as far as stop using thrust piece - T40193- .



Note

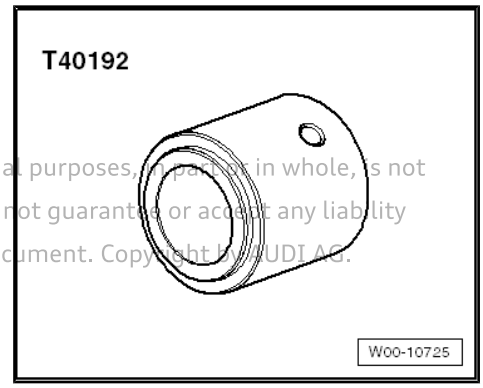
For illustration purposes, the installation position is shown with the engine removed.

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

4.4 Renewing oil seal for AC compressor drive

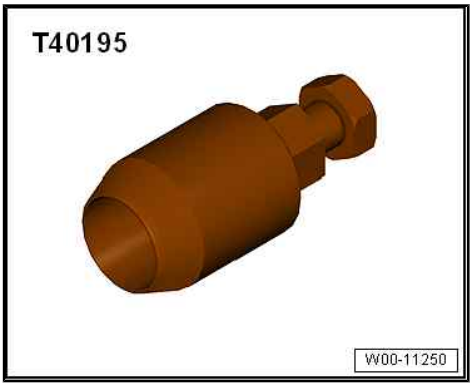
Special tools and workshop equipment required

♦ Thrust piece - T40192-



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♦ Oil seal extractor - T40195-

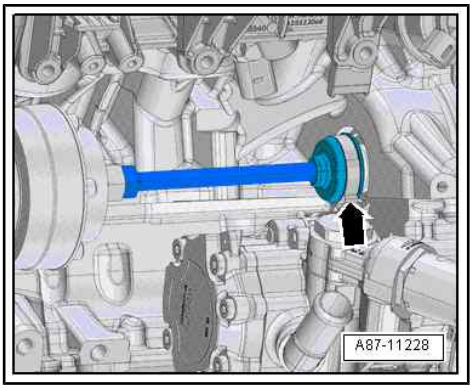


Procedure

– Remove air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket .

– Detach hose clip on dust cap -arrow-.

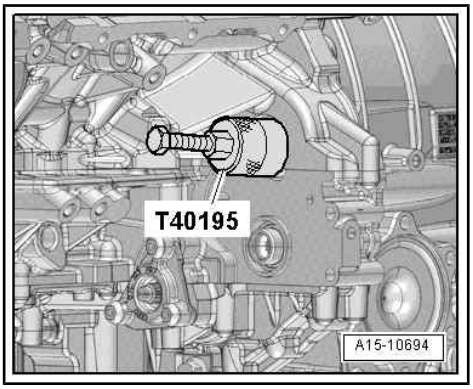
– Pull off dust cap together with drive shaft for air conditioner compressor from stub shaft of spur gear for air conditioner compressor drive.



– Screw spindle of oil seal extractor -T40195- all the way out.

– Lubricate threaded head of oil seal extractor, place it in position and screw it into oil seal as far as possible (applying firm pressure).

– Turn inner part of oil seal extractor against spur gear drive until the oil seal is pulled out.



Note

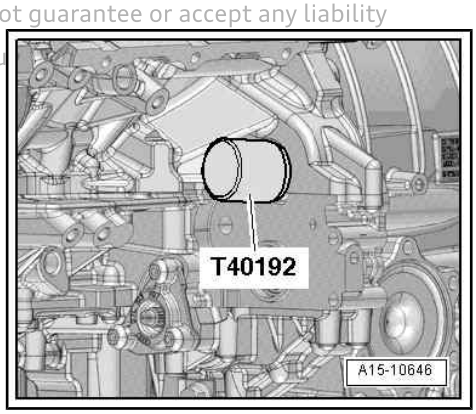
If the sections of the oil seal come apart, apply oil seal extractor again and pull out remaining part of oil seal.

– Clamp hexagon flats of oil seal extractor in vice and use pliers to remove oil seal.

– Clean contact surface and sealing surface.

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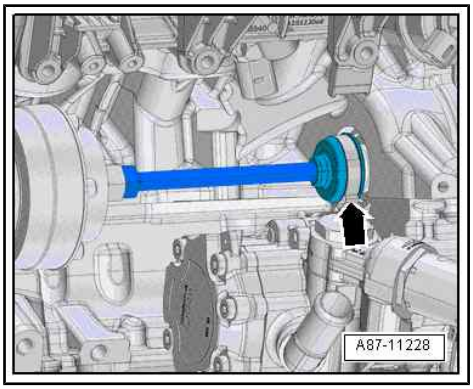
– Drive in oil seal for AC compressor drive using thrust piece -T40192- .



Note

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

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



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5 Pistons and conrods

⇒ “5.1 Exploded view - pistons and conrods”, page 111

⇒ “5.2 Removing and installing pistons”, page 113

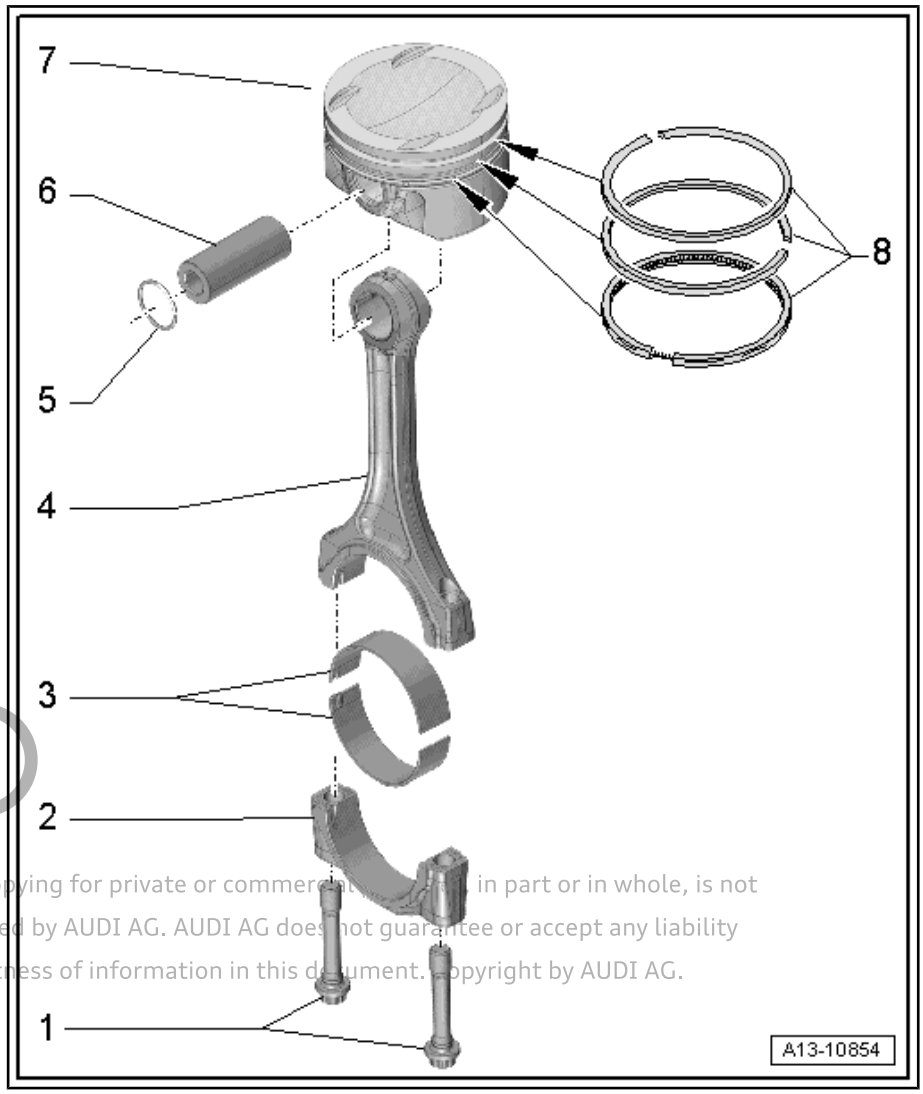
⇒ “5.3 Checking pistons and cylinder bores”, page 115

⇒ “5.4 Checking radial clearance of conrod bearings”, page 116

5.1 Exploded view - pistons and conrods

Note

Oil spray jet for piston cooling ⇒ page 113 .



1 - Bolts

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

2 - Conrod bearing cap

- ❑ Mark installation position for re-installation
- ❑ Mark cylinder and conrod allocation in colour ⇒ page 112
- ❑ Installation position of conrod pairs ⇒ page 112

3 - Bearing shells

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

4 - Conrod

- ❑ Only renew as a complete set
- ❑ Mark cylinder and conrod bearing cap allocation in colour ⇒ page 112
- ❑ Installation position of conrod pairs ⇒ page 112
- ❑ Axial clearance for each conrod pair (when new): 0.16 … 0.40 mm
- ❑ Measuring radial clearance ⇒ page 116

5 - Circlip

- ❑ 2x

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- ❑ Renew

6 - Piston pin

- ❑ Removing and installing ⇒ “5.2 Removing and installing pistons”, page 113

7 - Piston

- ❑ Mark installation position and cylinder number ⇒ page 112
- ❑ Renew piston if cracking is visible on piston crown or piston skirt
- ❑ Removing and installing ⇒ page 113
- ❑ Checking pistons and cylinder bores ⇒ page 115

8 - Piston rings

- ❑ Measuring ring gap ⇒ page 115
- ❑ Measuring ring-to-groove clearance ⇒ page 116
- ❑ Use piston ring pliers (commercially available) to remove and install
- ❑ Installation position: marking “TOP” or side with lettering faces towards piston crown
- ❑ Offset gaps by 120°

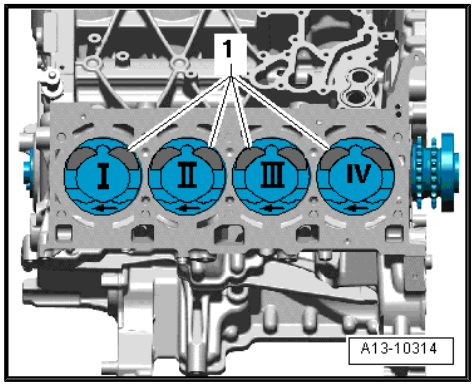
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Installation position of pistons

Caution

Do not damage the coating of the piston crown.

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



Installation position:

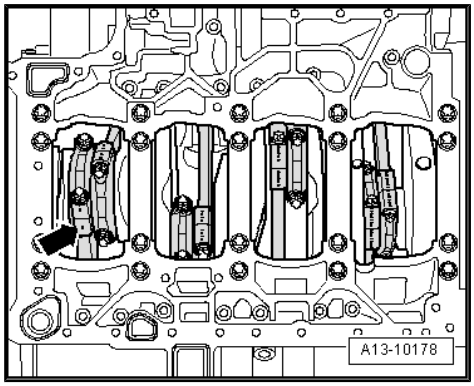
- Arrows on piston crowns point to pulley end.

Marking conrods

Note

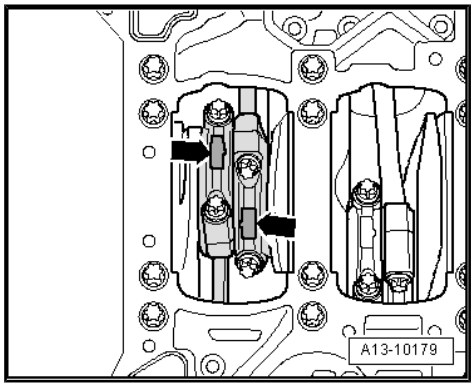
Only renew conrods as a complete set.

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

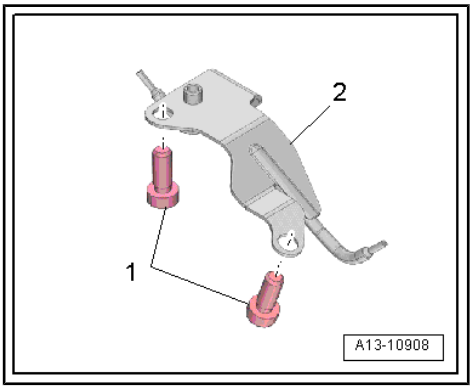


Installation position of conrods

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



Oil spray jet for piston cooling



1 - Apply locking fluid to bolts and tighten to 9 Nm; for locking fluid refer to ⇒ Electronic parts catalogue .

2 - Oil spray jet

Caution

Risk of damage to oil spray jets.

- *Do not bend oil spray jets.*
- *Check that oil spray jets have adequate clearance after re-installing pistons.*
- *Always renew bent oil spray jets.*

5.2 Removing and installing pistons

Special tools and workshop equipment required

- Pin - VW 222 A-



- Piston ring clamp, commercially available

Removing

- Engine secured to engine and gearbox support ⇒ page 56

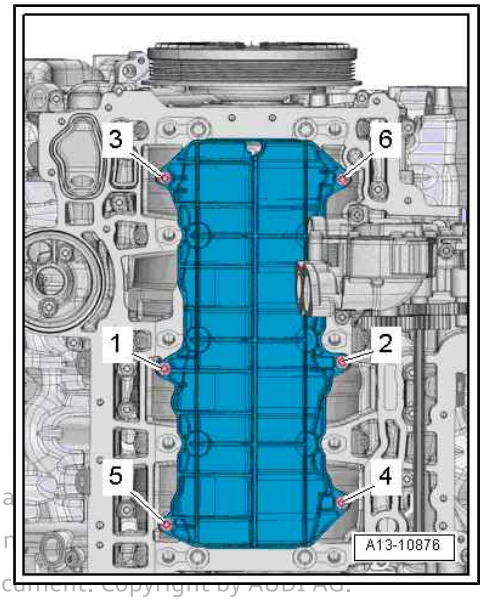
– Remove cylinder head ⇒ page 158 .

– Remove sump (top section) ⇒ page 214 .

– Remove oil pump ⇒ “1.5 Removing and installing oil pump”, page 218 .

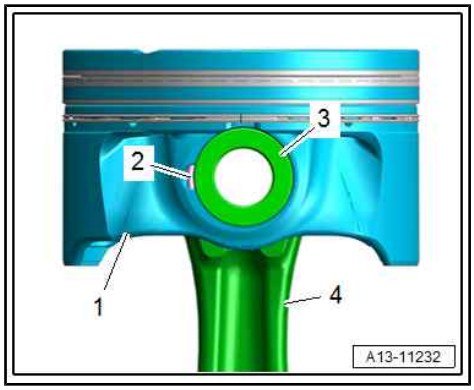
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– Remove bolts -1 … 6- and detach baffle plate.
– Mark installation position and matching of conrod bearing caps to cylinder and to conrods for re-installation ⇒ page 112 .
– Unbolt conrod bearing caps.
– Pull out pistons upwards with conrods.



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– Take circlip -2- out of piston pin boss.
– Use drift - VW 222A- to drive out piston pin -3-.



Note

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

– Detach piston -1- from conrod -4-.

Installing

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

Note

Renew bolts tightened with specified tightening angle.

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

Installation position:

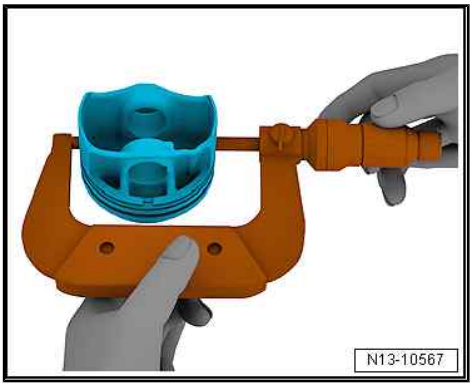
- Pistons ⇒ page 112
- Conrods ⇒ page 112

– Install conrod bearing caps according to markings.
– Install baffle plate ⇒ page 96 .
– Install oil pump ⇒ “1.5 Removing and installing oil pump”, page 218 .
– Install sump (upper section) ⇒ page 214 .
– Install cylinder head ⇒ page 166 .

Tightening torques

◆ ⇒ “5.1 Exploded view - pistons and conrods”, page 111

5.3 Checking pistons and cylinder bores



Checking piston

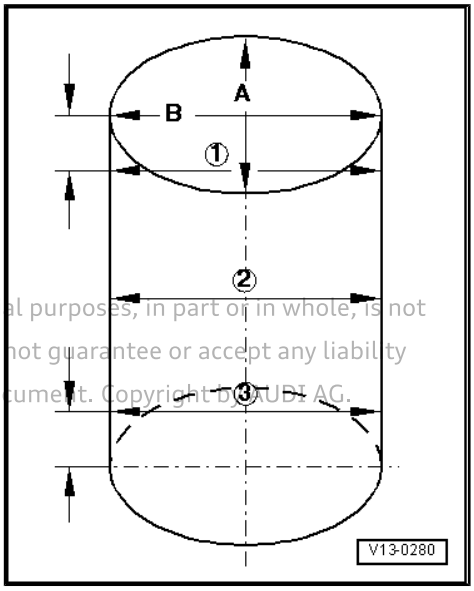
– Using a micrometer (75 ... 100 mm), measure approx. 15 mm from the lower edge, perpendicular to the piston pin axis.

• Maximum deviation from nominal dimension: 0.03 mm.

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

Piston ∅ mm		
Engine code	**CEUC/CEUD/ CTGE**	**CRDB/CUWB/ CUWC**
Nominal dimension	84.470[1)]	84.490[1)]
Repair oversize	84.580[1)]	84.590[1)]
• [1)] Dimensions including coating (thickness 0.018 mm). The coating will wear down in service.		

Measuring cylinder bore



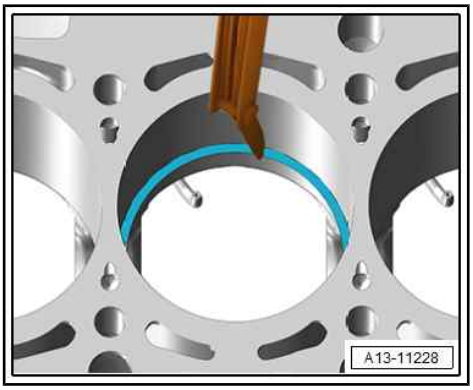
– Use a cylinder gauge - VAS 6078- to take measurements at 3 points in transverse direction -A- and in longitudinal direction -B-.

• Maximum deviation from nominal dimension: 0.08 mm.

Cylinder bore ∅ mm	
Nominal dimension	84.510 + 0.005 [1)]
Repair oversize	84.610 + 0.005 [1)]
• [1)] Measure at 50 mm into cylinder bore.	

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Measuring piston ring gap



– Insert ring at right angle to cylinder wall from above and push down into lower cylinder opening approx. 15 mm from bottom of cylinder.

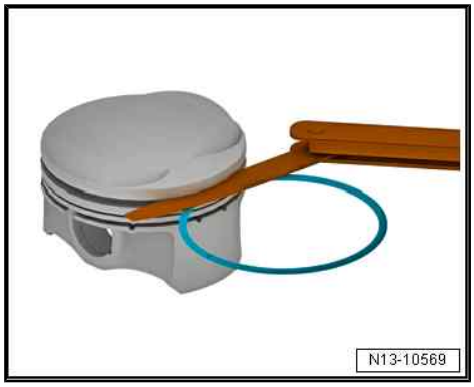
– To do so, use a piston without rings.

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

Measuring ring-to-groove clearance

– Clean groove in piston before checking clearance.

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



5.4 Checking radial clearance of conrod bearings

Special tools and workshop equipment required

♦ Plastigauge

Procedure

Note

Use old bolts when measuring radial clearance.

– Remove conrod bearing cap.
– Clean bearing cap and bearing journal.
– Place a length of Plastigauge 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 111) without rotating crankshaft.
– Remove conrod bearing cap again.
– Compare width of Plastigauge with measurement scale.

Radial clearance:

- New: 0.020 ... 0.069 mm.
- Wear limit: 0.120 mm.

– When carrying out final assembly, renew bolts.

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15 – Cylinder head, valve gear

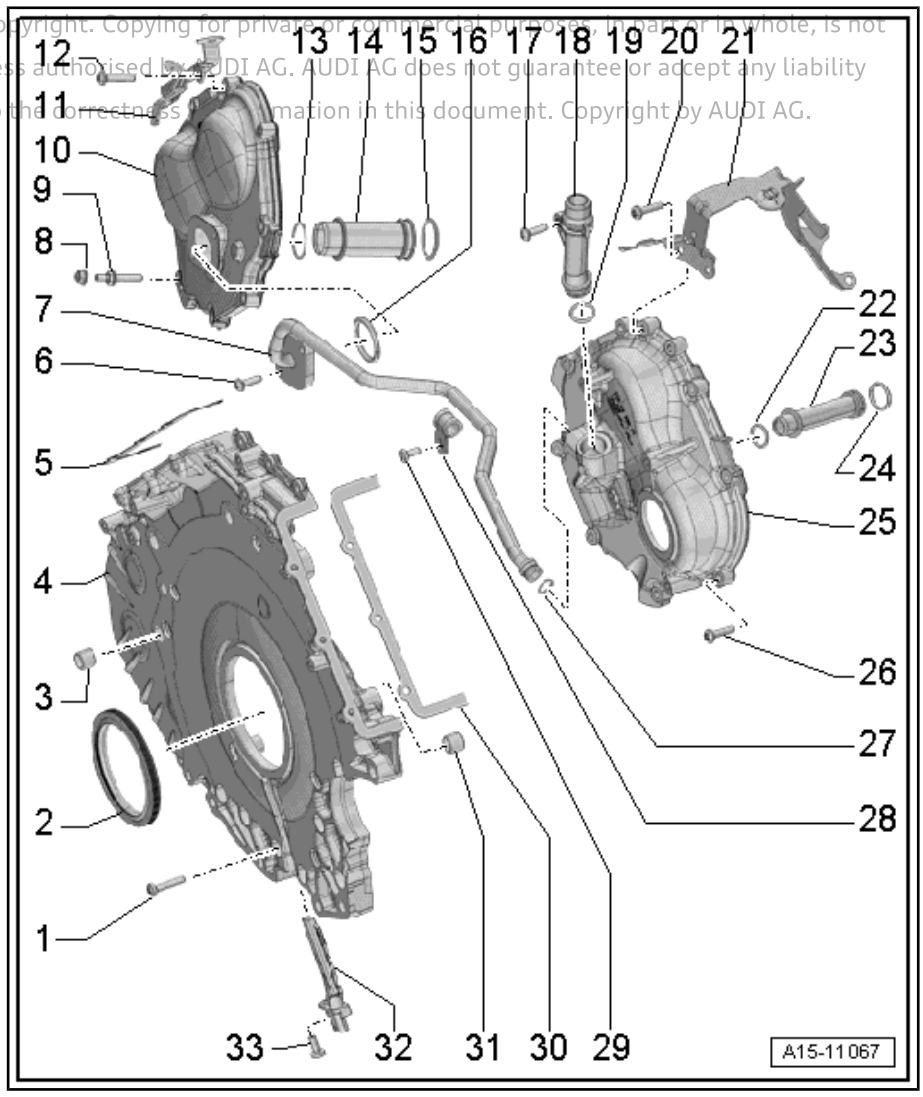
1 Timing chain cover

⇒ “1.1 Exploded view - timing chain cover”, page 117

⇒ “1.2 Removing and installing timing chain cover”, page 120

1.1 Exploded view - timing chain cover

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1 - Bolt
- ❑ Renew
- ❑ Tightening torque and sequence ⇒ page 119

2 - Oil seal
- ❑ For crankshaft (gearbox end)
- ❑ Renewing ⇒ page 92

3 - Dowel sleeve
- ❑ 2x

4 - Timing chain cover (bottom)
- ❑ Removing and installing ⇒ page 127

5 - Cylinder head gasket (left-side)

6 - Bolt
- ❑ Tightening torque ⇒ Item 12 (page 278)

7 - Coolant pipe (top rear)
- ❑ With an additional securing bolt on some versions
- ❑ Removing and installing ⇒ page 291

8 - Nut
- ❑ 9 Nm

9 - Centre hex stud
- ❑ Renew
- ❑ Tightening torque and sequence ⇒ page 119

10 - Timing chain cover (left-side)
- ❑ Removing and installing ⇒ page 120

11 - Bracket
- ❑ Version fitted in vehicle may differ from illustration

12 - Bolt
- ❑ Renew
- ❑ Tightening torque and sequence ⇒ page 119

13 - O-ring
- ❑ Renew

14 - Intermediate pipe (left-side)
- ❑ Drive out with drift

15 - O-ring
- ❑ Renew

16 - O-ring
- ❑ Renew

17 - Bolt
- ❑ 9 Nm

18 - Connection
- ❑ For coolant

19 - O-ring
- ❑ Renew

20 - Bolt
- ❑ Renew
- ❑ Tightening torque and sequence ⇒ page 119

21 - Bracket

22 - O-ring
- ❑ Renew

23 - Intermediate pipe (right-side)
- ❑ Drive out with drift

24 - O-ring
- ❑ Renew

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25 - Timing chain cover (right-side)
- ❑ Removing and installing ⇒ page 124

26 - Bolt
- ❑ Renew
- ❑ Tightening torque and sequence ⇒ page 119

27 - O-ring
- ❑ Renew

28 - Retaining clamp

29 - Bolt
- ❑ Tightening torque ⇒ Item 10 (page 278)

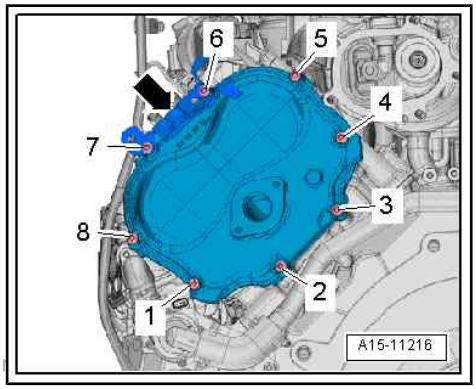
30 - Cylinder head gasket (right-side)

31 - Dowel sleeve
- ❑ 2x

32 - Engine speed sender - G28-
- ❑ Removing and installing ⇒ page 464

33 - Bolt
- ❑ Tightening torque ⇒ page 450

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



Note

Renew bolts tightened with specified tightening angle.

– Tighten bolts in stages in the sequence shown:

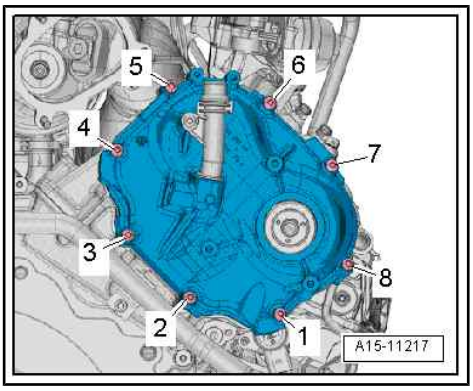
Stage	Bolts	Tightening torque/angle specification
1.	-1 … 8-	5 Nm
2.	-1 … 8-	Turn 90° further

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Note

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

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



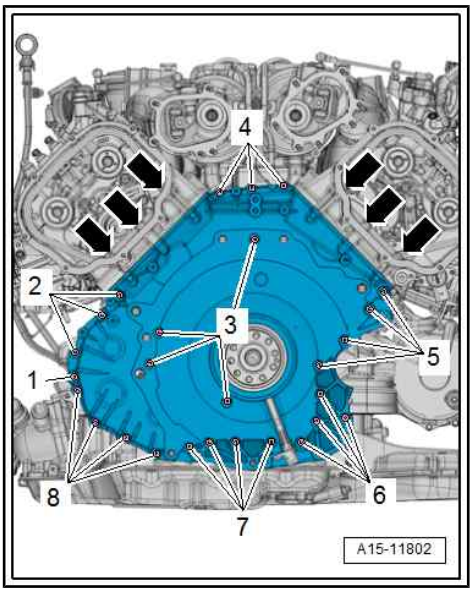
Note

Renew bolts tightened with specified tightening angle.

– Tighten bolts in stages in the sequence shown:

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

Timing chain cover (bottom) - tightening torque and sequence



Note

Renew bolts tightened with specified tightening angle.

– Tighten bolts in stages as follows:

Stage	Bolts	Tightening torque/angle specification
1.	-Arrows-	5 Nm
2.	-2 … 8-	8 Nm in diagonal sequence
3.	-Arrows-	8 Nm
4.	-2 … 8-	Turn 90° further in diagonal sequence
5.	-Arrows-	Turn 90° further

Note

Disregard -item 1-.

1.2 Removing and installing timing chain cover

⇒ “1.2.1 Removing and installing timing chain cover (left-side)”, page 120

⇒ “1.2.2 Removing and installing timing chain cover (right-side)”, page 124

⇒ “1.2.3 Removing and installing timing chain cover (bottom)”, page 127

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

Special tools and workshop equipment required

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

Removing

– Remove engine cover panel ⇒ page 82 .

WARNING

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

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

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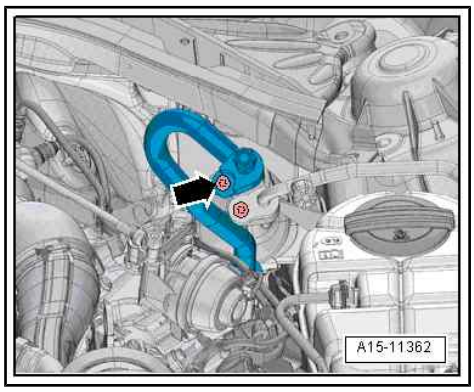
– Drain coolant ⇒ page 249 .

– Remove front silencer (left-side) ⇒ page 436 .

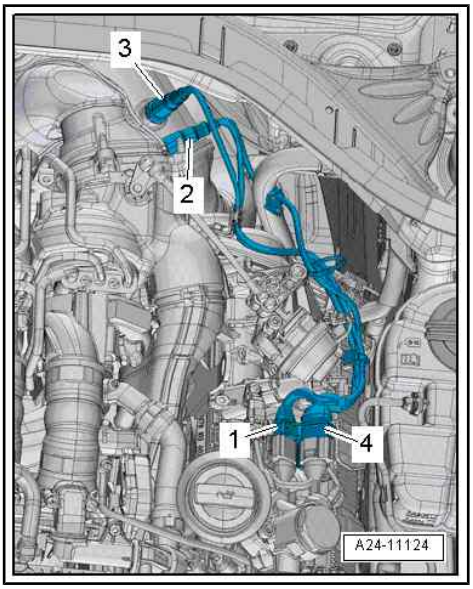
– Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .

– Discharge refrigerant system ⇒ Air conditioner with refrigerant R134a .

– Remove bolt -arrow- and push refrigerant line towards rear.



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



Note

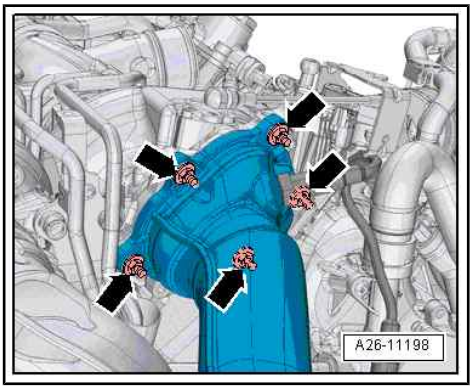
Disregard items -2 and 4-.

Note

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

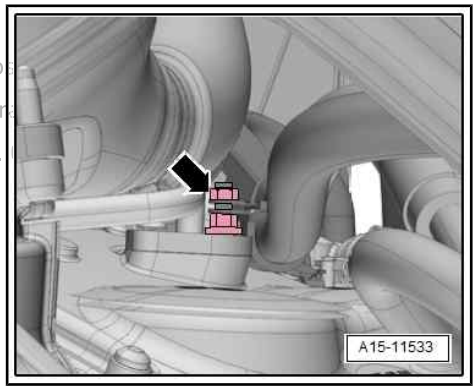
– Move clear electrical wiring for Lambda probe - G39- .

– Unscrew nuts -arrows- on cylinder bank 1 (right-side) and push catalytic converter on left side of vehicle towards rear.

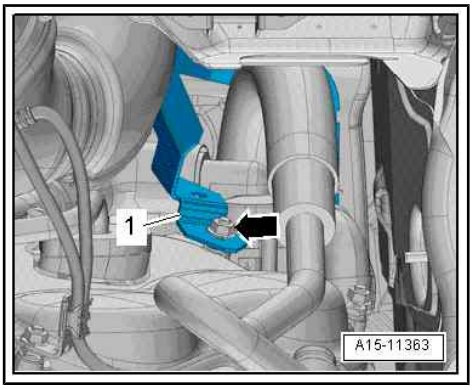


– Remove nut -arrow- and move retaining clip clear.

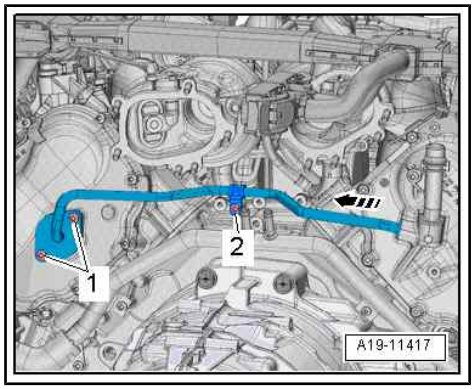
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– Remove bolt -arrow- and push bracket -1- with electrical wiring harness towards rear.



– Remove bolts -1, 2-.



Caution

Avoid damage to coolant pipe.

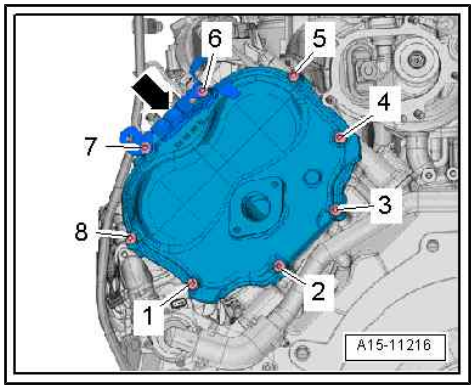
- ***Do not bend coolant pipe.***

– Pull off coolant pipe (top rear) from timing chain cover (right-side) -arrow- and move to one side.

Note

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

– Slacken and remove bolts in the sequence: -8 ... 1-.



– Press bracket -arrow- with wiring harness clear to the side.

– Carefully release timing chain cover (left-side) from bonded joint and detach.

Installing

Note

Fit new O-rings.

– Remove old sealant from sealing surfaces.

Caution

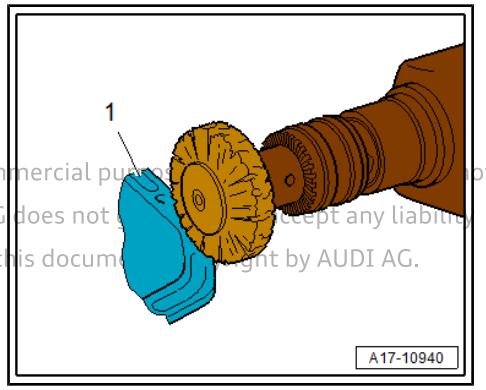
Protect lubrication system against contamination.

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

WARNING

Risk of eye injury.

- ***Put on safety goggles.***



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

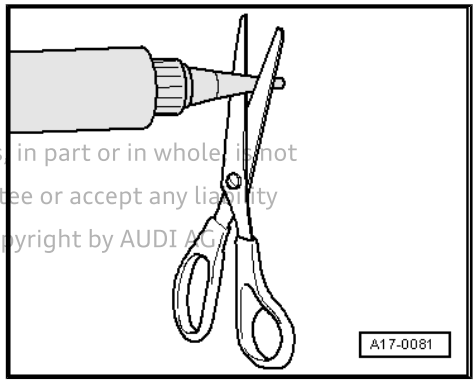
– Clean sealing surfaces; they must be free of oil and grease.

Note

Note the use-by date of the sealant.

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

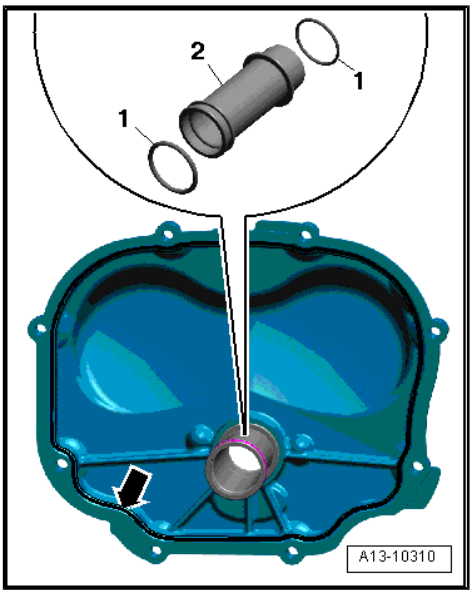


– Use drift to drive intermediate pipe -2- out of timing chain cover (left-side).
– Fit O-rings -1- on intermediate pipe.
– Fit intermediate pipe in timing chain cover (left-side).

Caution

Make sure lubrication system is not clogged by excess sealant.

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



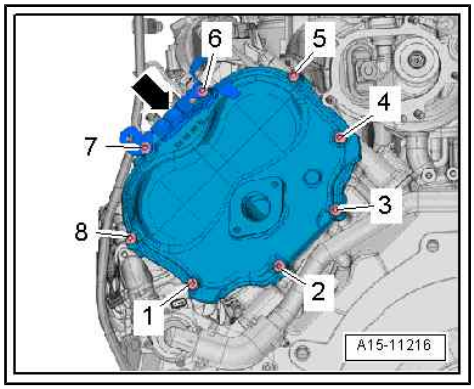
– Apply sealant bead -arrow- onto clean sealing surfaces of timing chain cover (left-side) as illustrated.

- Width of sealant bead: 2.5 mm.

Note

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

– Fit timing chain cover (left-side) together with bracket -arrow- and tighten bolts ⇒ page 119 .



Note

A centre hex stud is fitted at -item 1-.

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

– Install coolant pipe (top rear) ⇒ page 278 .

– Charge refrigerant system ⇒ Air conditioner with refrigerant R134a .

– Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .

– Install catalytic converter and front silencer ⇒ page 432 .

Note

Do not reuse coolant.

– Fill up with coolant ⇒ page 251 .

Tightening torques

♦ ⇒ Fig. ""Timing chain cover (left-side) - tightening torque and sequence"" , page 119

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

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Special tools and workshop equipment required

♦ Electric drill with plastic brush

♦ Safety goggles

♦ Sealant ⇒ Electronic parts catalogue

Removing

– Drain coolant ⇒ page 249 .

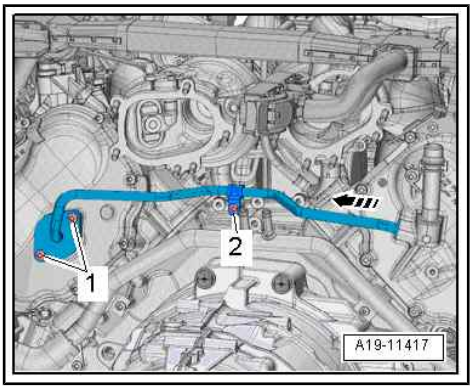
– Remove vacuum pump ⇒ Brake system; Rep. gr. 47 ; Vacuum system; Removing and installing vacuum pump .

– Remove bolts -1, 2-.

Caution

Avoid damage to coolant pipe.

- *Do not bend coolant pipe.*

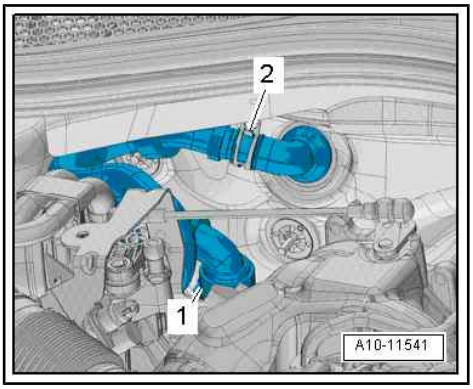


– Pull off coolant pipe (top rear) from timing chain cover (right-side) -arrow- and move to one side.

Note

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

– Lift retaining clip -1- and disconnect coolant hose.

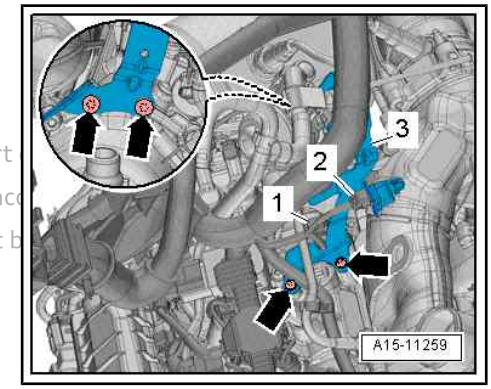


Note

Disregard -item 2-.

– Unplug electrical connectors -1, 2-.

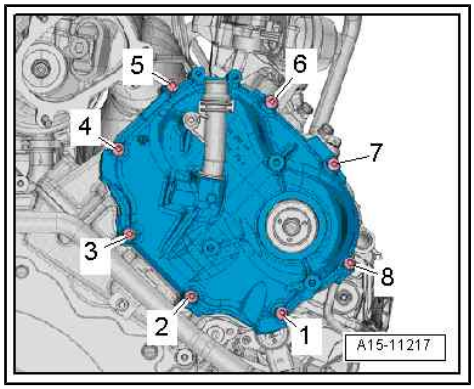
– Remove bolts -arrows- and move bracket -3- with electrical wiring harness to one side.



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– Slacken and remove bolts in the sequence: -8 ... 1-.

– Carefully release timing chain cover (right-side) from bonded joint and detach.



Installing

Note

- *Fit new O-rings.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

– Remove old sealant from sealing surfaces.

Caution

Protect lubrication system against contamination.

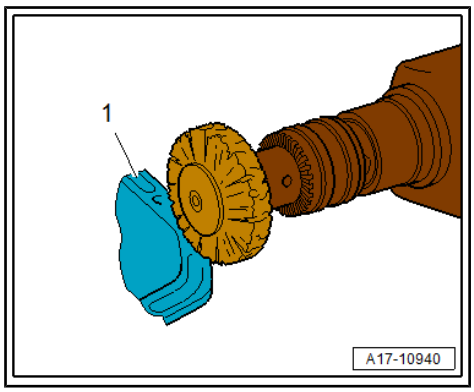
- ***Cover exposed parts of the engine.***

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WARNING

Risk of eye injury.

- ***Put on safety goggles.***



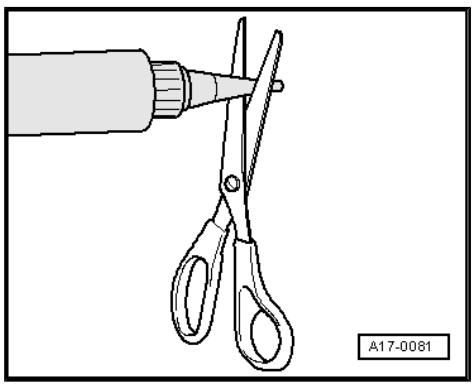
– Remove remaining sealant on timing chain cover -1- and cylinder head using rotating plastic brush or similar.

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

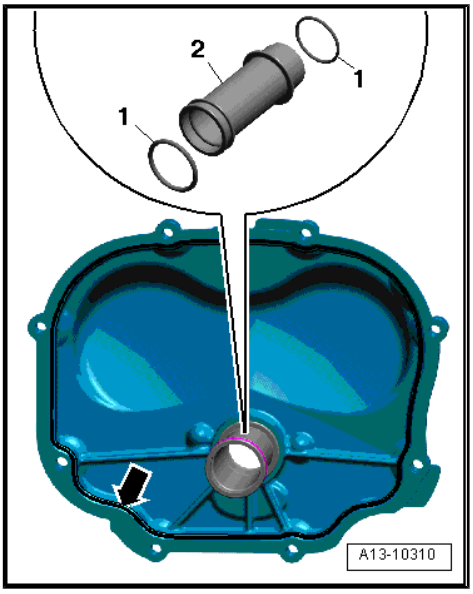
Note

Note the use-by date of the sealant.

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



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



Caution

Make sure lubrication system is not clogged by excess sealant.

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

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

- Width of sealant bead: 2.5 mm.

Note

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

– Install timing chain cover (right-side) and tighten bolts ⇒ page 119 .

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

– Install coolant pipe (top rear) ⇒ page 278 .
– Install vacuum pump ⇒ Brake system; Rep. gr. 47 ; Vacuum system; Removing and installing vacuum pump .
– Install electrical wiring ⇒ Electrical system; Rep. gr. 97 ; Relay carriers, fuse carriers, electronics boxes; Overview of fitting locations - relay carriers, fuse carriers, electronics boxes and ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
– Connect coolant hoses with plug-in connector ⇒ page 302 .

Note

Do not reuse coolant.

– Fill up with coolant ⇒ page 251 .

Tightening torques

- ⇒ Fig. ““Timing chain cover (right-side) - tightening torque and sequence”“ , page 119
- ⇒ “3.1 Exploded view - coolant pipes”, page 278

1.2.3 Removing and installing timing chain cover (bottom)

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Special tools and workshop equipment required

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

Removing

- Gearbox removed ⇒ Gearbox; Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox or ⇒ Gearbox; Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .

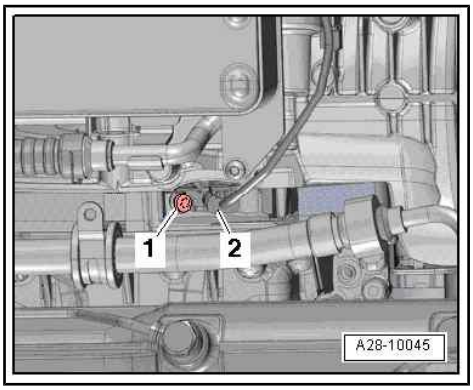
– Remove drive plate ⇒ page 90 .

– Remove coolant pipe (top rear) ⇒ page 291 .

– Remove coolant circulation pump 2 - V178- ⇒ page 264 .

– Remove timing chain covers (top) ⇒ page 120 .

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

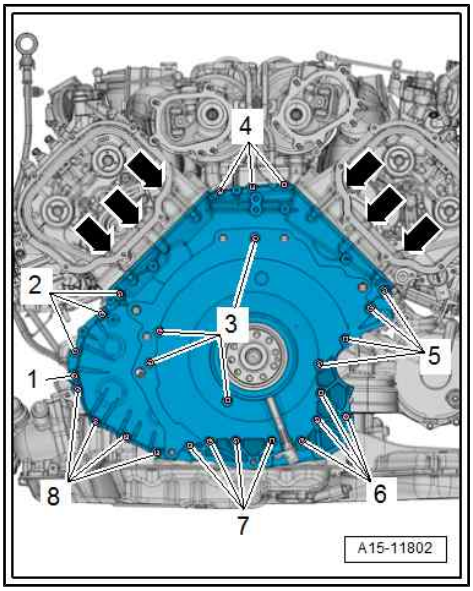


Note

Disregard -item 1-.

– Remove bolts -arrows-.

– Slacken bolts -2 ... 8- in diagonal sequence and remove.



Note

Bolt -1- is only fitted on vehicles with power steering pump.

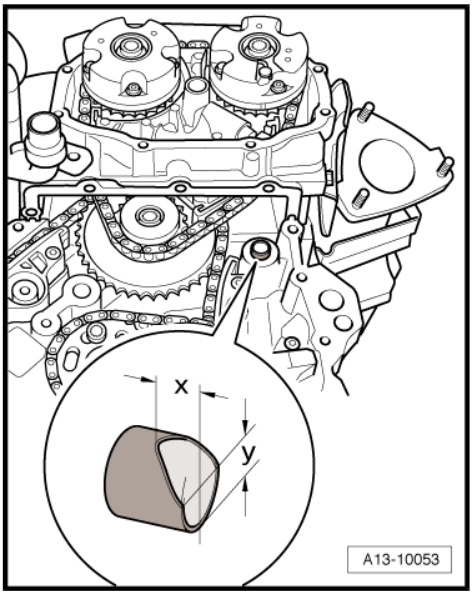
– Carefully release timing chain cover (bottom) from bonded joint and remove cover.

– Press crankshaft oil seal (gearbox end) out of timing chain cover (bottom).

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Installing

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



Note

Renew bolts tightened with specified tightening angle.

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

Note

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

Caution

Protect lubrication system against contamination.

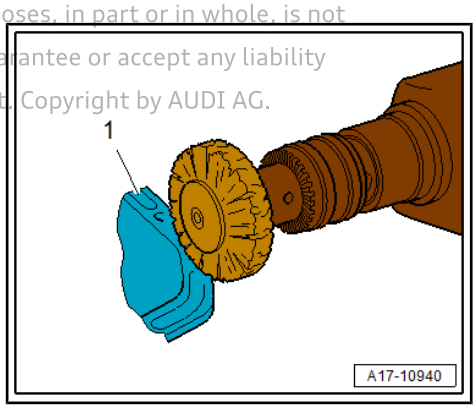
- ***Cover exposed parts of the engine.***

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WARNING

Risk of eye injury.

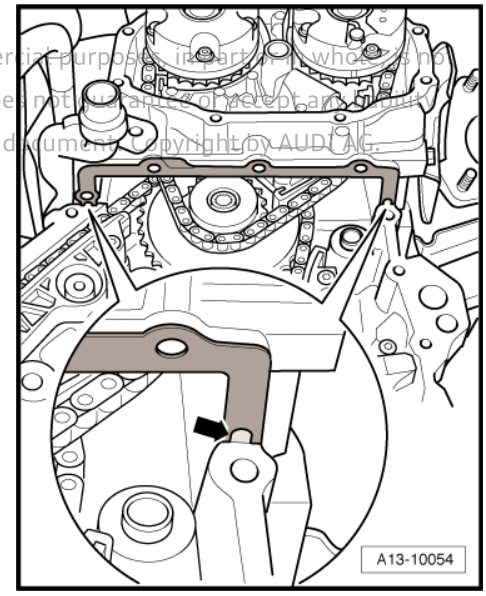
- ***Put on safety goggles.***



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

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



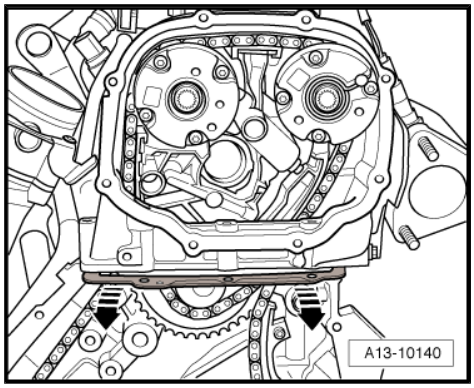
Note

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

Caution

Avoid damage to cylinder head gasket.

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



Note

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

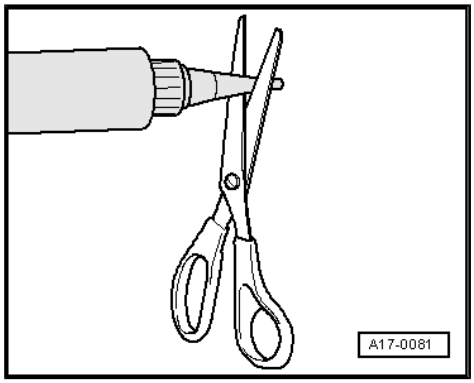
– Carefully bend the ends of the cylinder head gaskets down very slightly -arrows-, just far enough to be able to clean the upper sealing surface on the cylinder head gasket and cylinder head.

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

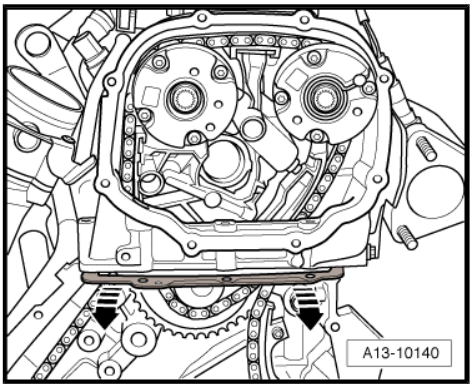
Note

Note the use-by date of the sealant.

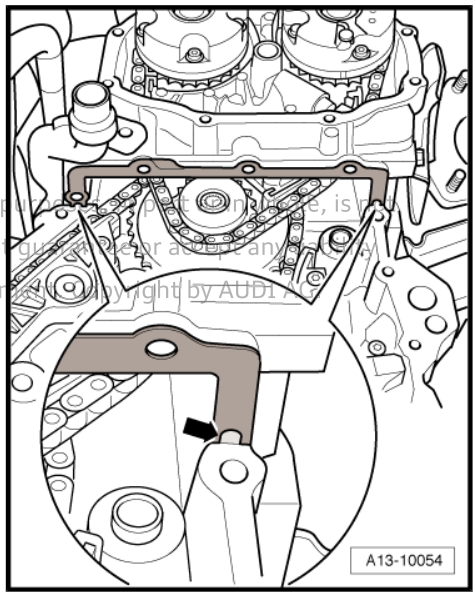
– Cut off nozzle of tube at front marking (nozzle ∅ approx. 2.5 mm).



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



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

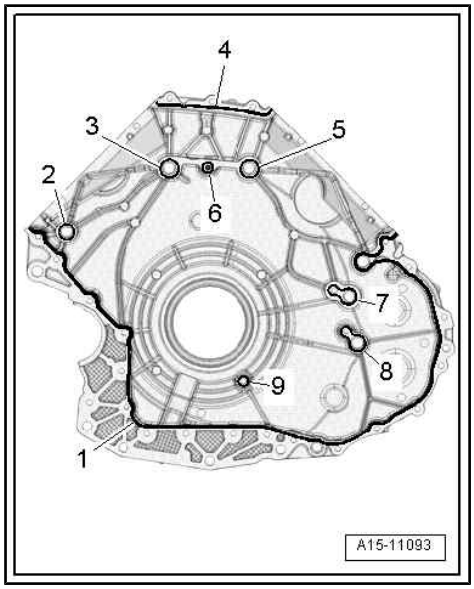


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Caution

Make sure lubrication system is not clogged by excess sealant.

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



– Apply sealant beads -1 ... 9- onto the clean sealing surfaces of the timing chain cover (bottom) as illustrated.

• Width of sealant beads: 2.0 mm.

Note

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

– Fit timing chain cover (bottom), guiding it towards the sealing surface on cylinder block and cylinder head at an angle and from below.

– Take care not to damage the cylinder head gaskets when fitting the cover.

– Tighten bolts ⇒ page 119 .

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

– Install crankshaft oil seal (gearbox end) ⇒ page 92 .

– Install timing chain covers (top) ⇒ page 120 .

– Install coolant circulation pump 2 - V178- ⇒ page 264 .

– Install coolant pipe (top rear) ⇒ page 291 .

– Install drive plate ⇒ page 90 .

Tightening torques

- ⇒ Fig. ""Timing chain cover (bottom) - tightening torque and sequence"" , page 119
- ⇒ "2.2 Exploded view - electric coolant pump", page 259
- ⇒ "3.1 Exploded view - coolant pipes", page 278

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2 Chain drive

⇒ “2.1 Exploded view - camshaft timing chains”, page 133

⇒ “2.2 Exploded view - drive chain for valve gear”, page 136

⇒ “2.3 Exploded view - drive chain for auxiliary drive”, page 138

⇒ “2.4 Removing camshaft timing chain from camshafts”, page 139

⇒ “2.5 Removing and installing camshaft timing chain”, page 151

⇒ “2.6 Removing and installing chain tensioner for camshaft timing chain”, page 152

⇒ “2.7 Removing and installing drive chain for valve gear”, page 153

⇒ “2.8 Removing and installing drive chain for auxiliary drive”, page 154

2.1 Exploded view - camshaft timing chains

Camshaft timing chain (left-side)

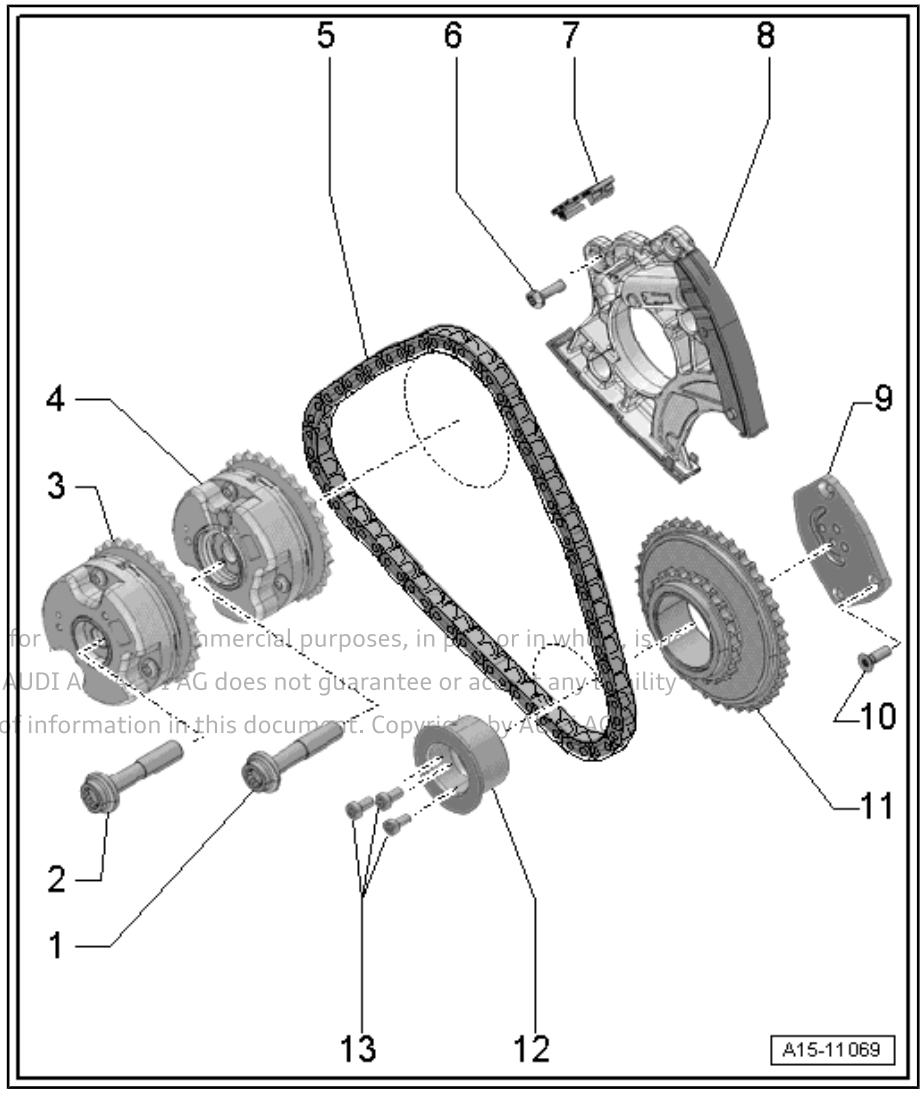
1 - Bolt
- ❑ Renew
- ❑ 80 Nm +90°

2 - Bolt
- ❑ Renew
- ❑ 80 Nm +90°

3 - Camshaft adjuster
- ❑ For inlet camshaft
- ❑ Identification: “IN”
- ❑ Removing and installing ⇒ “2.4 Removing camshaft timing chain from camshafts”, page 139

4 - Camshaft adjuster
- ❑ For exhaust camshaft
- ❑ Identification: “EX”
- ❑ Removing and installing ⇒ “2.4 Removing camshaft timing chain from camshafts”, page 139

5 - Camshaft timing chain (left-side)
- ❑ Mark direction of rotation for re-installation with a paint marker
- ❑ Removing from camshafts ⇒ “2.4 Removing camshaft timing chain from camshafts”, page 139
- ❑ Removing and installing ⇒ “2.5 Removing and installing camshaft timing chain”, page 151



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6 - Bolt

- ❑ Renew
- ❑ 5 Nm +90°

7 - Slide

8 - Chain tensioner

- ❑ For camshaft timing chain (left-side)
- ❑ Removing and installing
  ⇒ “2.6 Removing and installing chain tensioner for camshaft timing chain”, page 152

9 - Bearing plate

- ❑ For drive chain sprocket

10 - Bolt

- ❑ 9 Nm

11 - Drive chain sprocket

- ❑ For camshaft timing chain (left-side)

12 - Bearing mounting

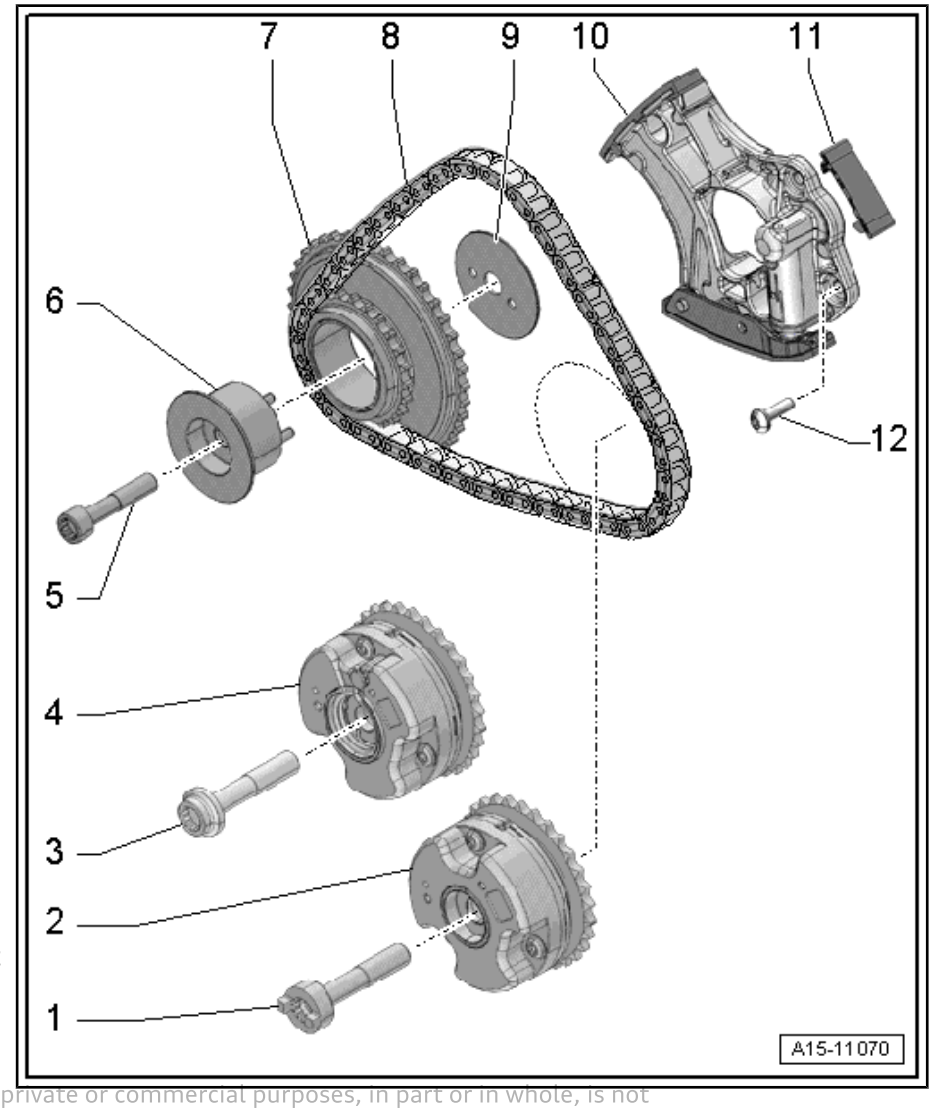
- ❑ For drive chain sprocket for camshaft timing chain (left-side)

13 - Bolts

- ❑ Renew
- ❑ 5 Nm +90°

Camshaft timing chain (right-side)

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1 - Bolt

- ❑ With follower for vacuum pump
- ❑ Renew
- ❑ 80 Nm +90°

2 - Camshaft adjuster

- ❑ For inlet camshaft
- ❑ Identification: “IN”
- ❑ Removing and installing ⇒ “2.4 Removing camshaft timing chain from camshafts”, page 139

3 - Bolt

- ❑ Renew
- ❑ 80 Nm +90°

4 - Camshaft adjuster

- ❑ For exhaust camshaft
- ❑ Identification: “EX”
- ❑ Removing and installing ⇒ “2.4 Removing camshaft timing chain from camshafts”, page 139

5 - Bolt

- ❑ Renew
- ❑ 20 Nm +45°

6 - Bearing mounting

- ❑ For drive chain sprocket for camshaft timing chain (right-side)
- ❑ Asymmetric version
- ❑ Installation position ⇒ page 136

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7 - Drive chain sprocket

- ❑ For camshaft timing chain (right-side)
- ❑ Installation position ⇒ page 136

8 - Camshaft timing chain (right-side)

- ❑ Mark direction of rotation for re-installation with a paint marker
- ❑ Removing from camshafts ⇒ “2.4 Removing camshaft timing chain from camshafts”, page 139
- ❑ Removing and installing ⇒ “2.5 Removing and installing camshaft timing chain”, page 151

9 - Thrust washer

- ❑ For drive chain sprocket for camshaft timing chain (right-side)
- ❑ Asymmetric version
- ❑ Installation position ⇒ Fig. ““Installation position: bearing mounting for drive sprocket for camshaft timing chain (right-side)”“ , page 136

10 - Chain tensioner

- ❑ For camshaft timing chain (right-side)
- ❑ Removing and installing ⇒ “2.6 Removing and installing chain tensioner for camshaft timing chain”, page 152

11 - Slide

12 - Bolt

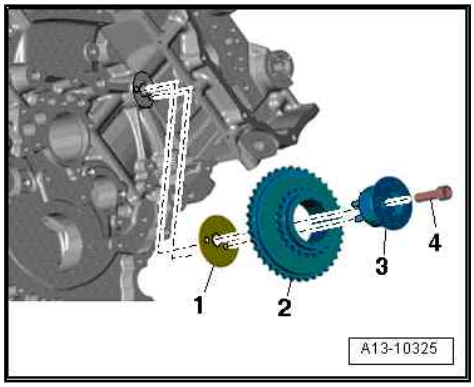
- ❑ Renew
- ❑ 5 Nm +90°

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

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

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

4 - Bolt



2.2 Exploded view - drive chain for valve gear

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1 - Guide rail

2 - Bolt

- ❑ Renew
- ❑ 17 Nm +90°

3 - Bolt

- ❑ Tightening torque ⇒ Item 5 (page 135)

4 - Bolts

- ❑ Tightening torque ⇒ Item 13 (page 134)

5 - Bearing mounting

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

6 - Drive chain sprocket

- ❑ For camshaft timing chain (left-side)

7 - Bolt

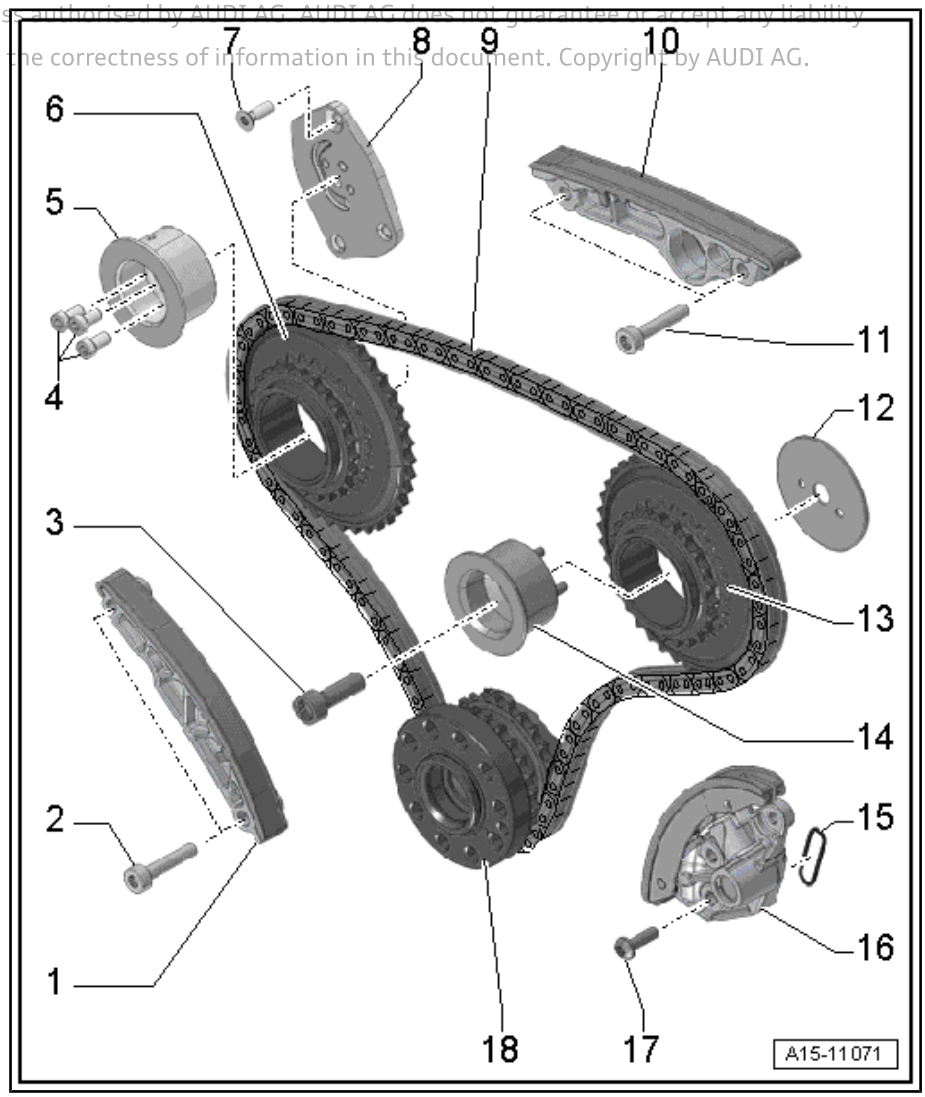
- ❑ Tightening torque ⇒ Item 10 (page 134)

8 - Bearing plate

- ❑ For drive chain sprocket for camshaft timing chain (left-side)
- ❑ Asymmetric version

9 - Drive chain

- ❑ For timing drive
- ❑ Before removing, mark running direction with paint
- ❑ Removing and installing ⇒ page 153



10 - Guide rail

11 - Bolt

- ❑ Renew
- ❑ 17 Nm +90°

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12 - Thrust washer

- ❑ Asymmetric version
- ❑ Installation position ⇒ page 136

13 - Drive chain sprocket

- ❑ For camshaft timing chain (right-side)

14 - Bearing mounting

- ❑ For drive chain sprocket for camshaft timing chain (right-side)
- ❑ Asymmetric version
- ❑ Installation position ⇒ page 136

15 - Seal

- ❑ Renew

16 - Chain tensioner

17 - Bolt

- ❑ Renew
- ❑ 5 Nm +90°

18 - Crankshaft

2.3 Exploded view - drive chain for auxiliary drive

1 - Bolt
- ❑ Renew
- ❑ 5 Nm +90°

2 - Chain tensioner
- ❑ With guide rail

3 - Gasket
- ❑ Renew

4 - Drive chain sprocket
- ❑ For auxiliary drives
- ❑ Part of spur gear drive

5 - Bolt
- ❑ 42 Nm

6 - Bearing mounting
- ❑ For idler sprocket

7 - Bolt
- ❑ Renew
- ❑ 5 Nm +90°

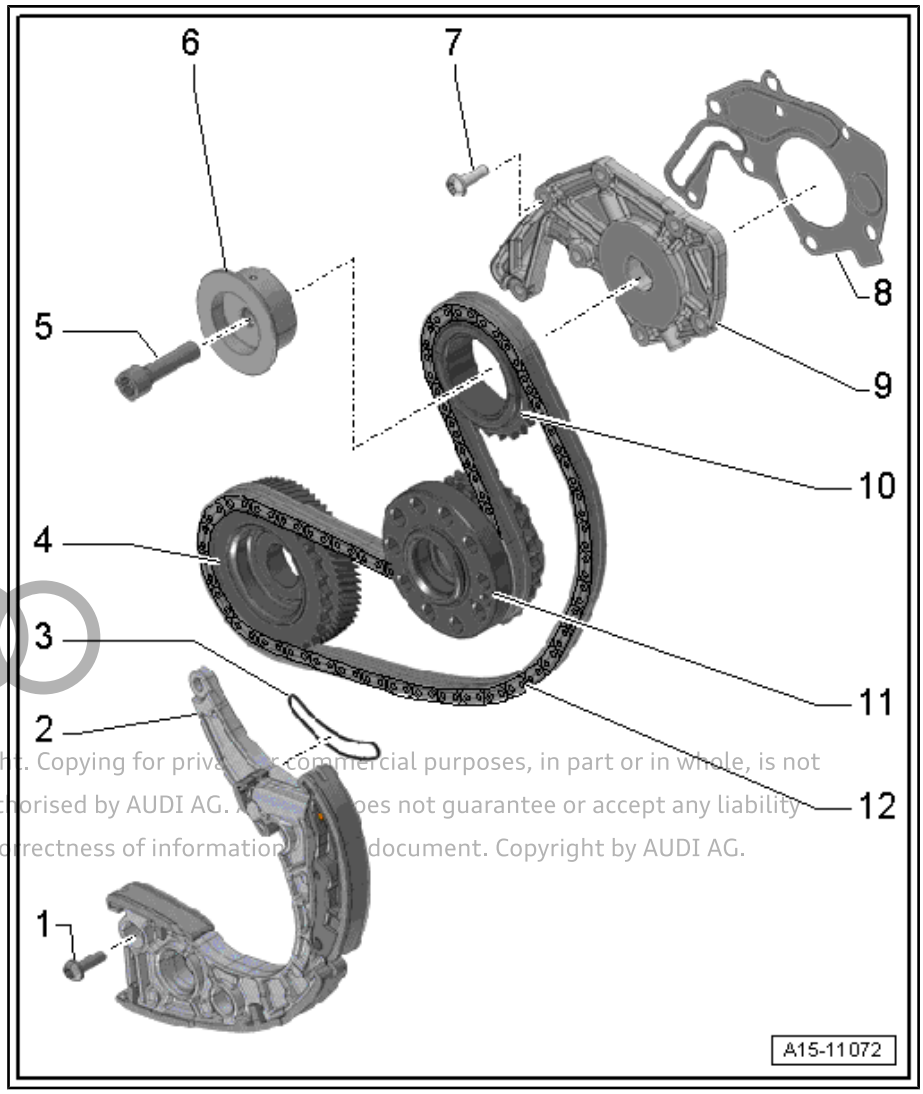
8 - Gasket
- ❑ Renew

9 - Bearing bracket
- ❑ For idler sprocket

10 - Idler sprocket
- ❑ For drive chain for auxiliary drives

11 - Crankshaft

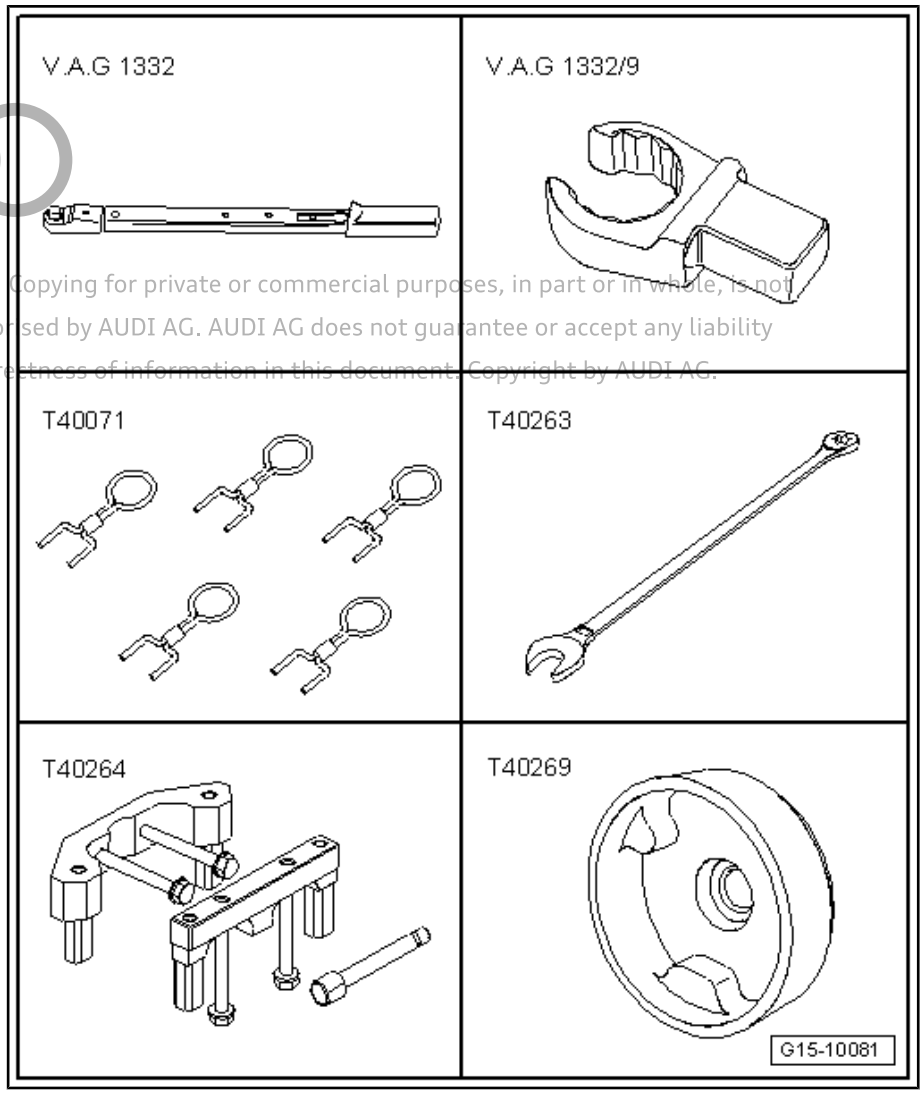
12 - Drive chain
- ❑ For auxiliary drives
- ❑ Removing and installing ⇒ page 154



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2.4 Removing camshaft timing chain from camshafts

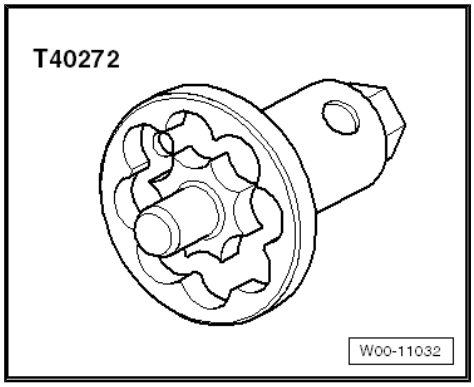
Special tools and workshop equipment required



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

♦ Turning-over tool - T40272-



Removing

Note

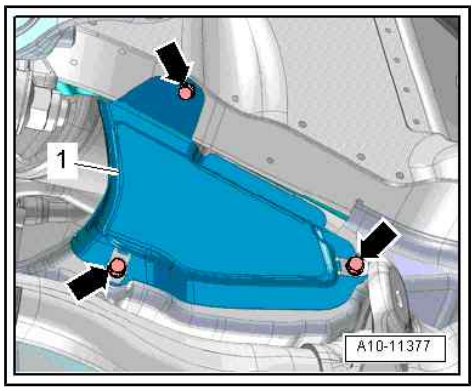
In the following procedure the camshaft timing chains remain on the engine.

– Remove relevant timing chain cover ⇒ page 120 .

Cylinder bank 1 (right-side):

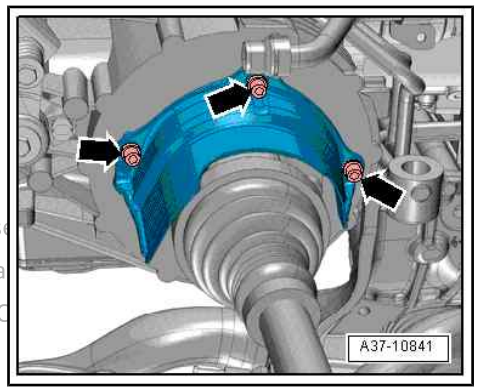
– Unbolt drive shaft (right-side) from gearbox flange shaft ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Removing and installing drive shaft .

– Remove bolts -arrows- and detach heat shield (right-side) -1-.



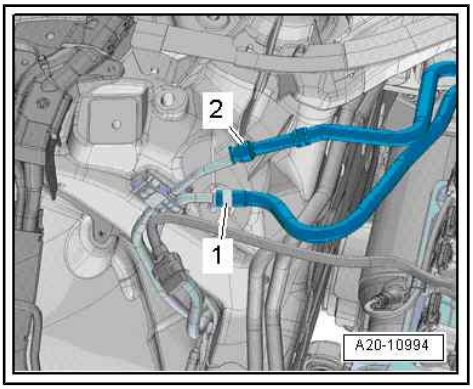
– Remove bolts -arrows- and detach heat shield for drive shaft (right-side).

– Remove air filter element ⇒ Maintenance ; Booklet 411 .



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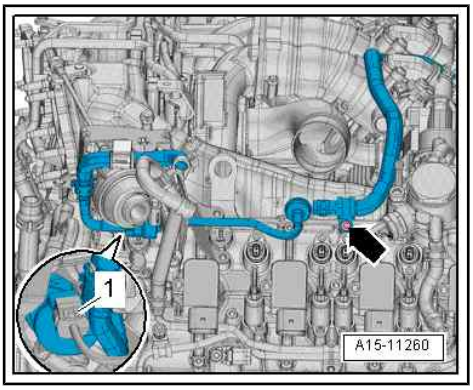
– Release hose clip -1- and disconnect hose for activated charcoal filter system.
– Move hose clear.



Note

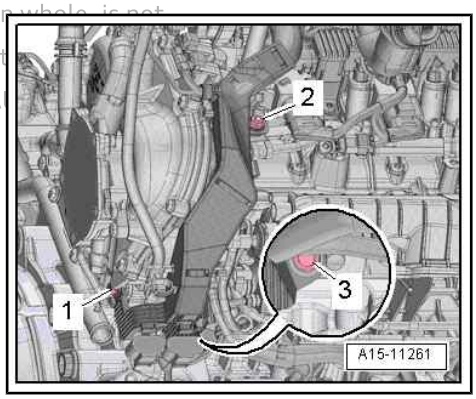
- *Illustration shows fitting location on an Audi S6/S7.*
- *Disregard -item 2-.*

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

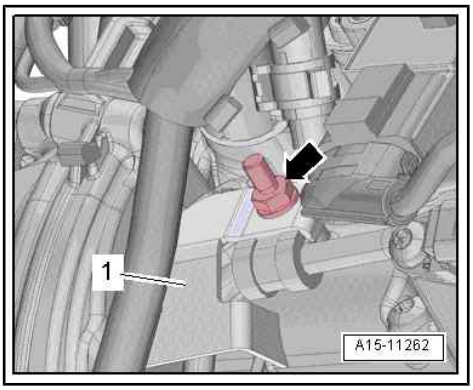


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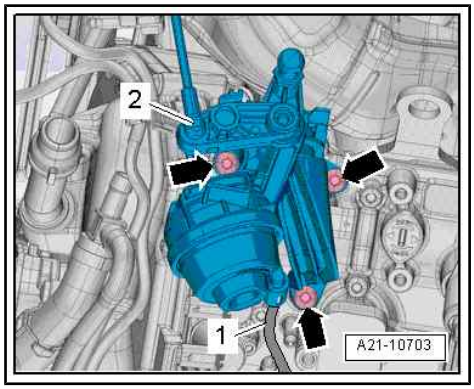
– Remove nuts -1, 2- and bolt -3-, move wiring guide clear and push to one side.



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



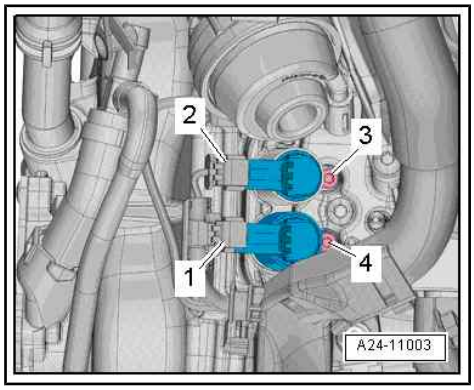
– Move hoses clear at vacuum unit for turbocharger.
– Disconnect vacuum hose -1-.



Note

- *Do not detach ball head -item 2-.*
- *Illustration shows fitting location on an Audi S6/S7.*

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

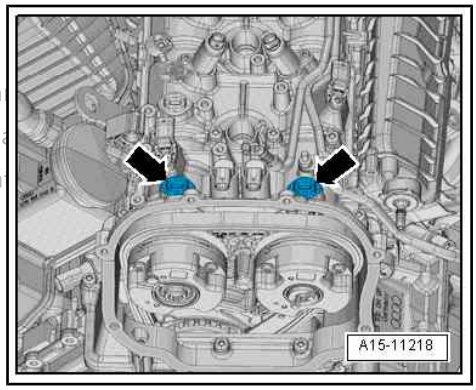


Note

Disregard items -3 and 4-.

– Remove high-pressure pipe
⇒ “7.4.1 Removing high-pressure pipe, cylinder bank 1 (right-side)”, page 416 .

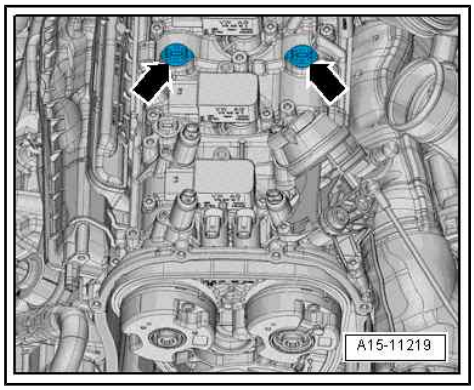
– Release plugs -arrows- on right side of camshaft housing by turning anti-clockwise and remove plugs.



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Cylinder bank 2 (left-side):

– Remove ignition coil for cylinder “7” ⇒ page 452 .
– Release plugs -arrows- on left side of camshaft housing by turning anti-clockwise and remove plugs.



Continued for both cylinder banks:

Audi S6/RS 6/RS 7:

– Remove radiator with radiator cowl ⇒ page 309 .

Audi S7:

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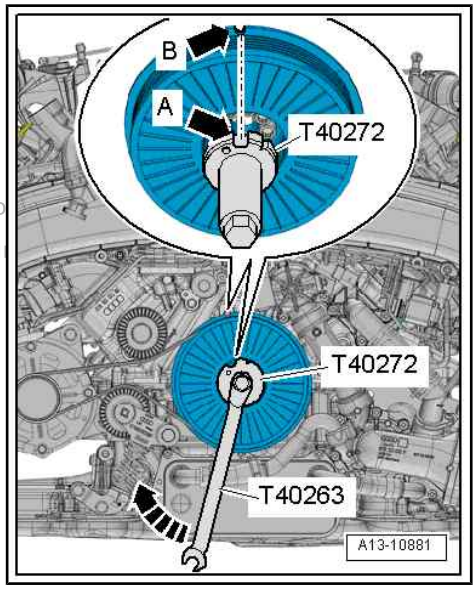
– Remove radiator cowl ⇒ page 322 .

All vehicles (continued):

– Fit turning-over tool - T40272- onto wrench (21 mm) - T40263- .

– Position adapter on bolts of vibration damper.

• Semi-circular recess -arrow A- on turning-over tool - T40272- must point to semi-circular recess -arrow B- on vibration damper.

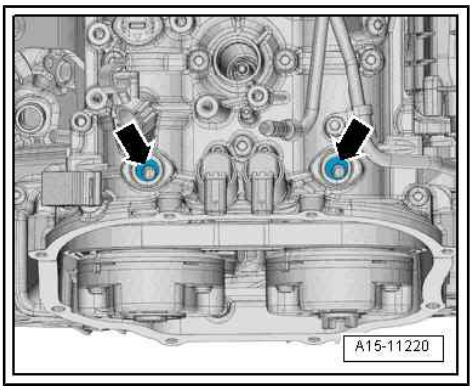


Note

Disregard notch on turning-over tool - T40272- .

– Rotate crankshaft in normal direction of rotation -arrow- to “TDC”.

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



Note

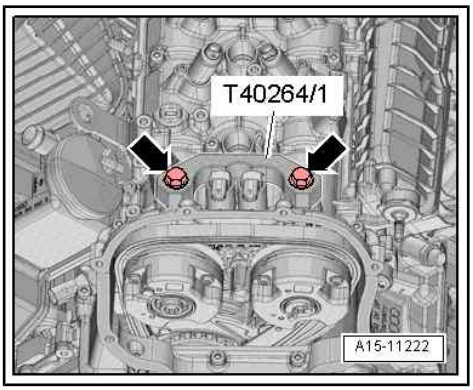
♦ *The illustration shows the camshaft housing (right-side).*

♦ *If the threaded holes are not visible, rotate the camshaft one turn further.*

Cylinder bank 1 (right-side):

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

• Tightening torque: 12 Nm

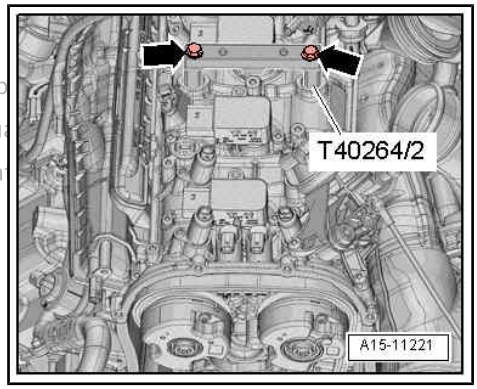


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Cylinder bank 2 (left-side):

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

- Tightening torque: 12 Nm

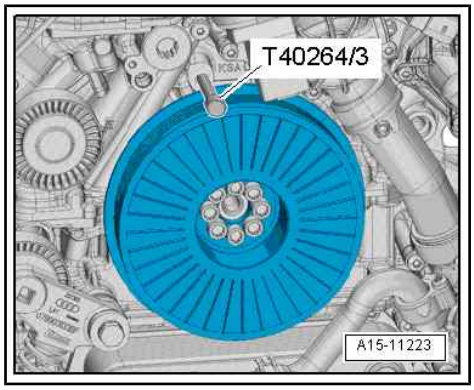


Note:

- If camshaft threads are not pointing vertically upwards, it will not be possible to screw in bolts of -T40264/2- .
- In this case, apply key - T40269- to camshaft adjuster and turn camshaft slightly backwards and forwards.

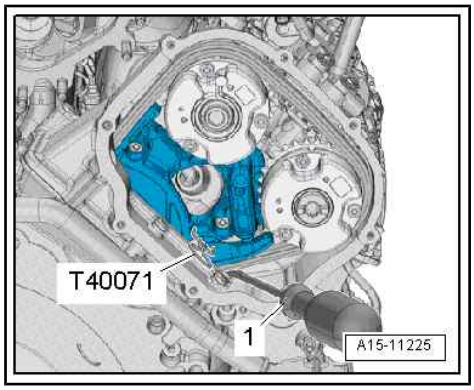
Continued for both cylinder banks:

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



Cylinder bank 1 (right-side):

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

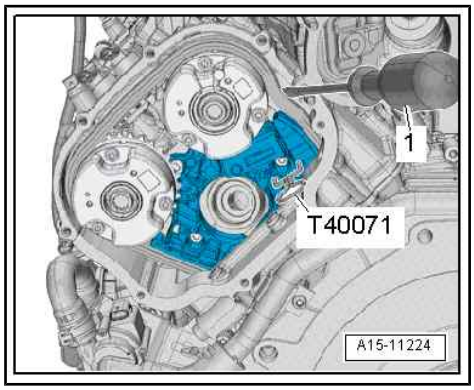


Note

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

Cylinder bank 2 (left-side):

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



Note

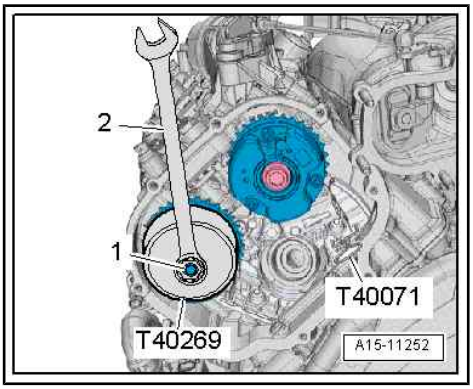
The chain tensioner is oil-damped and can therefore only be compressed slowly by applying constant pressure.

Continued for both cylinder banks:

Caution

Risk of damage to camshafts.

- *Do NOT use camshaft clamp -T40264/1- or -T40264/2- to counterhold when loosening bolt for camshaft adjuster or camshaft chain sprocket.*



– Counterhold at corresponding camshaft adjuster by applying key - T40269- and loosening bolt -1-.
– Mark position of camshaft adjusters with paint for re-installation.

Caution

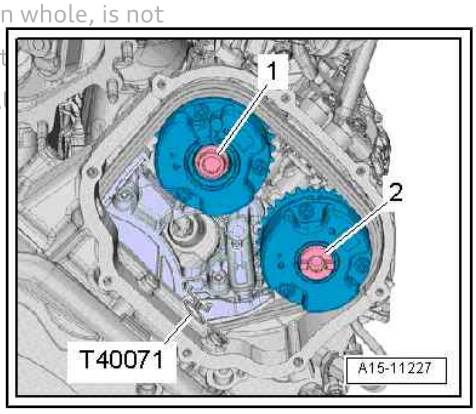
Risk of irreparable damage to engine.

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

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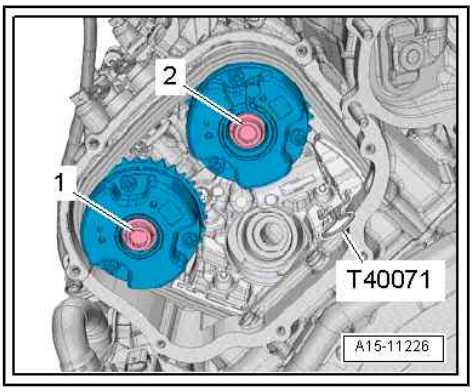
Cylinder bank 1 (right-side):

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



Cylinder bank 2 (left-side):

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

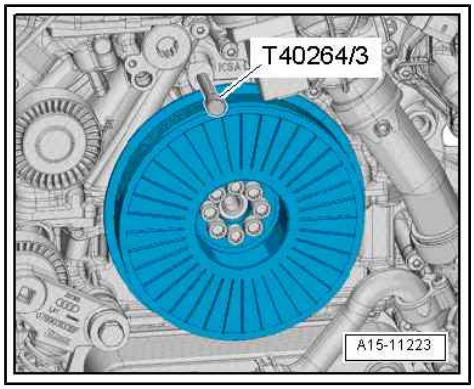


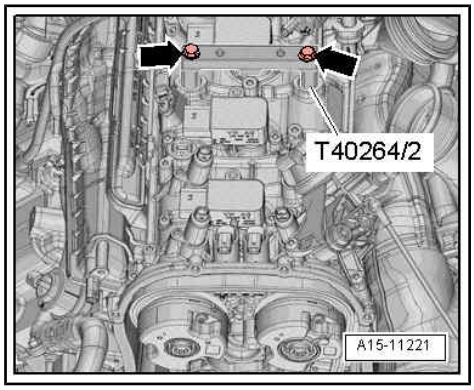
Installing

Note

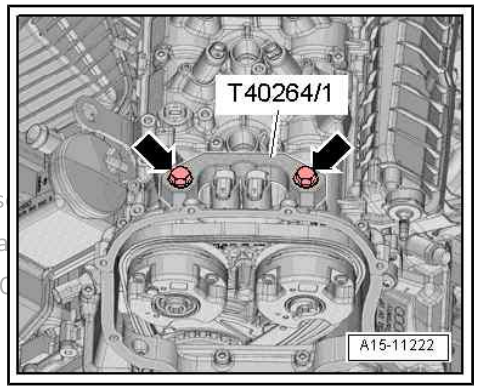
- *Renew bolts tightened with specified tightening angle.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

- Drive chain for valve gear installed ⇒ page 153
- Crankshaft locked in “TDC position” with camshaft clamp -T40264/3- .





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



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Cylinder bank 1 (right-side):

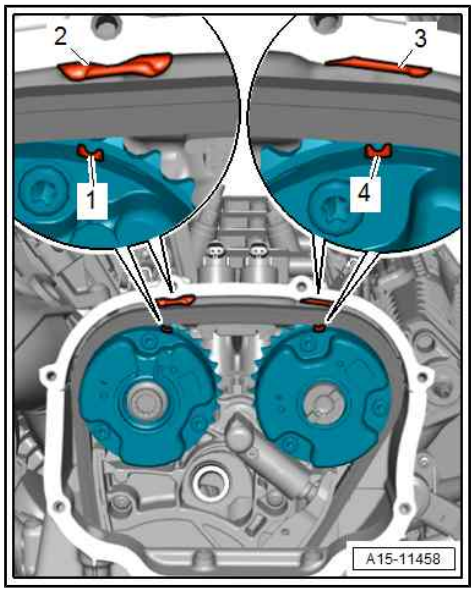
Caution

Risk of damage to engine.

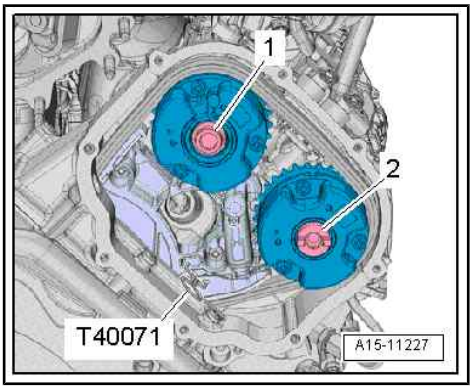
- ***The camshaft adjusters MUST be installed as described in the following work steps:***

– Fit camshaft adjusters according to marks applied during removal.

- Groove -1- or -4- on camshaft adjuster should align with corresponding adjustment window -2- or -3-.



– Fit camshaft adjusters according to marks applied during removal.
– Fit timing chain onto drive chain sprocket and camshaft adjusters and fit bolts -1 and 2- without tightening.
• It should just be possible to turn both camshaft adjusters on the camshaft without axial movement.
– Remove locking pin - T40071- .



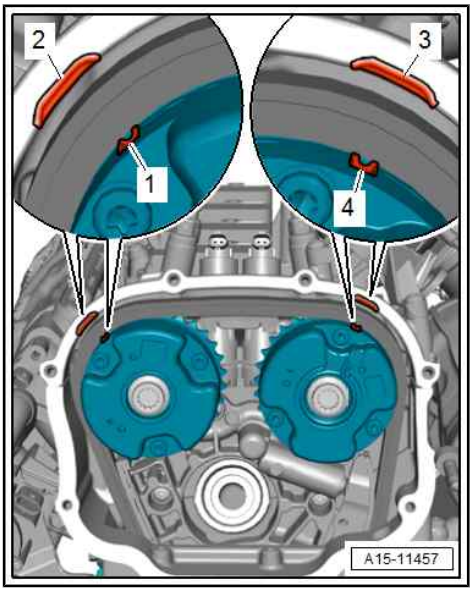
Cylinder bank 2 (left-side):

Caution

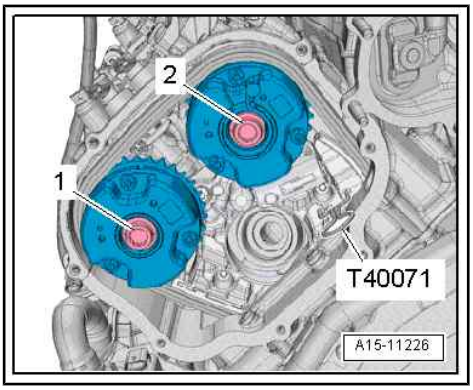
Risk of damage to engine.

- *The camshaft adjusters MUST be installed as described in the following work steps:*

– Fit camshaft adjusters according to marks applied during removal.
• Groove -1- or -4- on camshaft adjuster should align with corresponding adjustment window -2- or -3-.

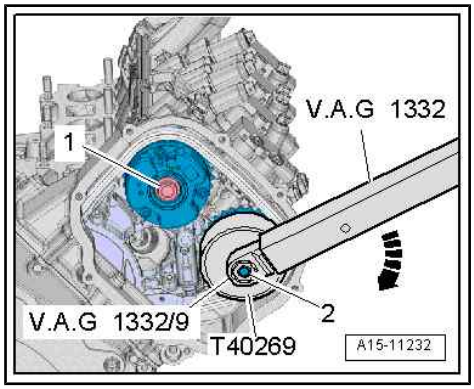


– Fit camshaft adjusters according to marks applied during removal.
– Fit timing chain onto drive chain sprocket and camshaft adjusters and fit bolts -1 and 2- without tightening.
• It should just be possible to turn both camshaft adjusters on the camshaft without axial movement.
– Remove locking pin - T40071- .



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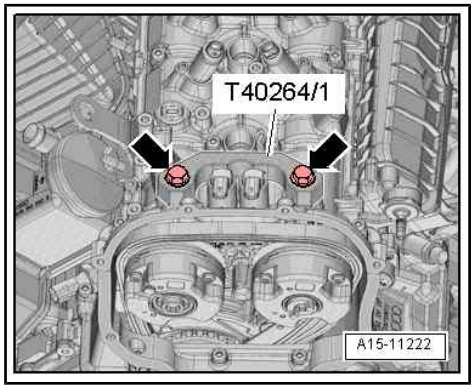
Cylinder bank 1 (right-side):



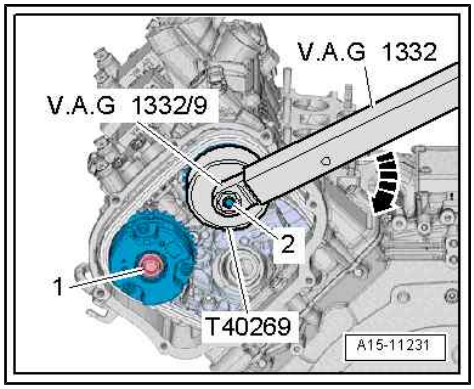
- Fit key - T40269- onto camshaft adjuster of inlet camshaft.
- Apply torque wrench - V.A.G 1332- with open ring spanner insert - V.A.G 1332/9- to key - T40269- .
- Have a second mechanic apply a torque of 40 Nm to camshaft adjuster in direction of -arrow-.
- Tighten bolts as follows while keeping camshaft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

Stage	Bolt	Tightening torque
1.	-1-	At camshaft: 60 Nm
1.	-2-	At camshaft: 60 Nm

- Remove key - T40269- .
- Remove camshaft clamp -T40264/1- -arrows-.



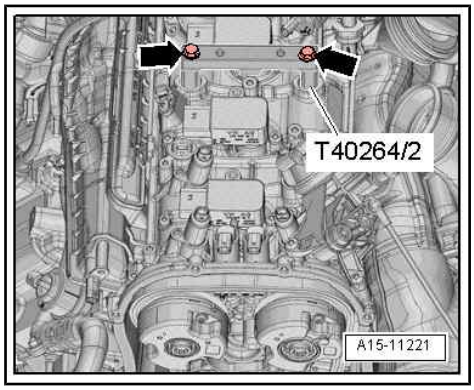
Cylinder bank 2 (left-side):



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

Stage	Bolt	Tightening torque
1.	-1-	At camshaft: 60 Nm
1.	-2-	At camshaft: 60 Nm

- Remove key - T40269- .
- Remove camshaft clamp -T40264/2- -arrows-.

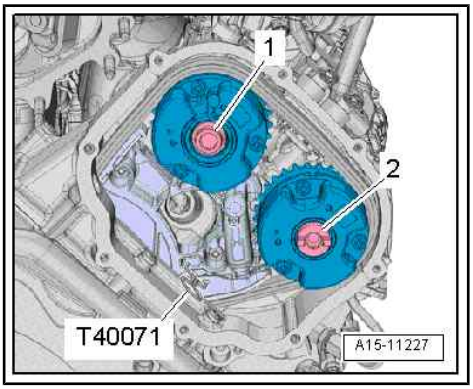


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Cylinder bank 1 (right-side):

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

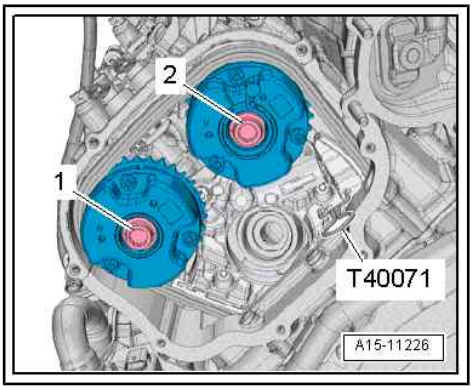
Stage	Bolt	Tightening torque
2.	-1-	Tighten on camshaft to final tightening torque ⇒ page 133
2.	-2-	Tighten on camshaft to final tightening torque ⇒ page 133



Cylinder bank 2 (left-side):

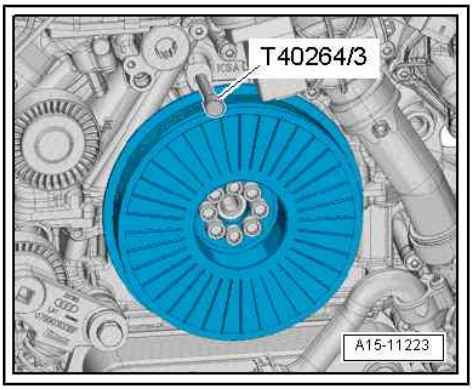
– Tighten camshaft adjuster bolts on cylinder head (left-side) as follows:

Stage	Bolt	Tightening torque
2.	-1-	Tighten on camshaft to final tightening torque ⇒ page 133
2.	-2-	Tighten on camshaft to final tightening torque ⇒ page 133

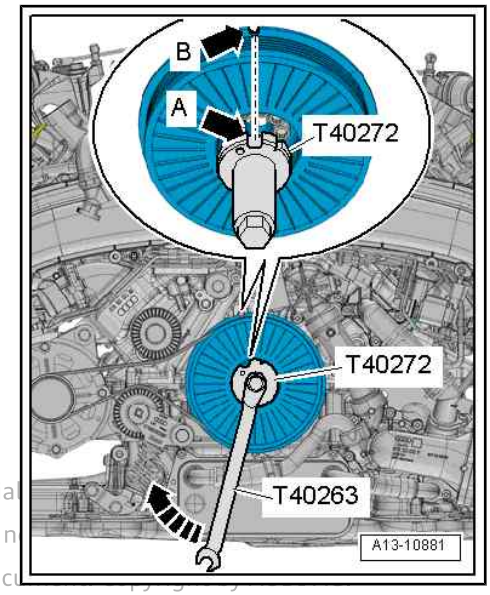


Continued for both cylinder banks:

– Remove camshaft clamp -T40264/3- .



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

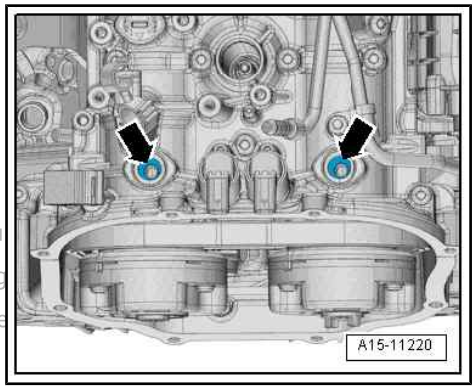


Note

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

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



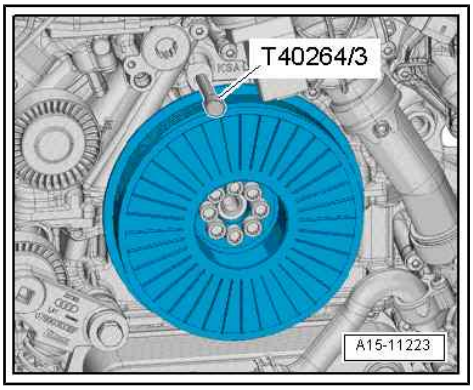
Note

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

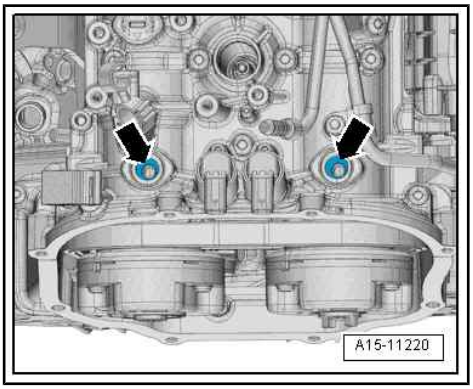
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– Screw camshaft clamp -T40264/3- through bore in vibration damper into cylinder block by hand until it makes contact.

- Camshaft clamp -T40264/3- must engage in locating hole in cylinder block. If it does not, reset valve timing.



- The threaded holes -arrows- in the camshafts must be visible from above.



Note

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

– Remove camshaft clamp -T40264/3- .

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

Audi S6/RS 6/RS 7:

– Install radiator with radiator cowl ⇒ page 309 .

Audi S7:

– Install radiator cowl ⇒ page 322 .

All vehicles (continued):

– Install ignition coil for cylinder “7” ⇒ page 452 .

– Install electrical wiring ⇒ Electrical system; Rep. gr. 97 ; Relay carriers, fuse carriers, electronics boxes; Overview of fitting locations - relay carriers, fuse carriers, electronics boxes and ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

– Install vacuum unit for turbocharger ⇒ page 333 .

– Install high-pressure pipe ⇒ page 416 .

– Install air filter element ⇒ Maintenance ; Booklet 411 .

– Install timing chain cover ⇒ page 120 .

Tightening torques

- ⇒ “2.1 Exploded view - camshaft timing chains”, page 133
- ⇒ “1.1 Exploded view - turbocharger”, page 333
- Heat shield ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe
- ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft

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2.5 Removing and installing camshaft timing chain

Procedure

– Remove timing chain cover (bottom) ⇒ page 127 .

– Remove timing chains from camshafts ⇒ page 139 .

Caution

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

- ***Mark running direction of timing chain with coloured arrows for re-installation.***

- Camshaft timing chains can be removed without removing chain tensioners.

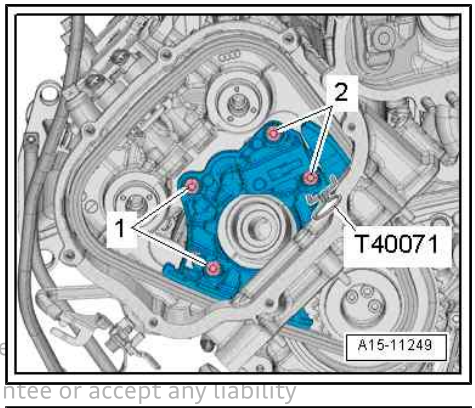
- To remove, camshaft timing chain (left-side) must be guided perfectly straight past guide rail for chain tensioner.

2.6 Removing and installing chain tensioner for camshaft timing chain

Removing

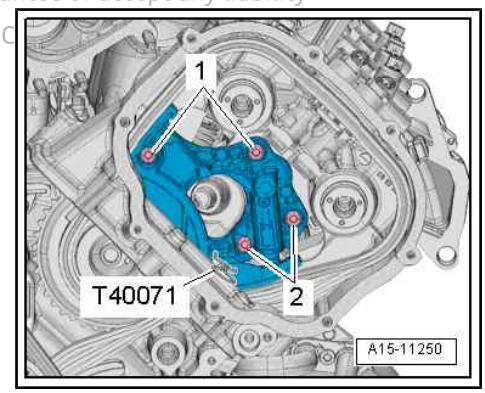
– Remove timing chains from camshafts ⇒ page 139 .

– Remove bolts -1- and -2- and take off chain tensioner (left-side) and camshaft timing chain (left-side).



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

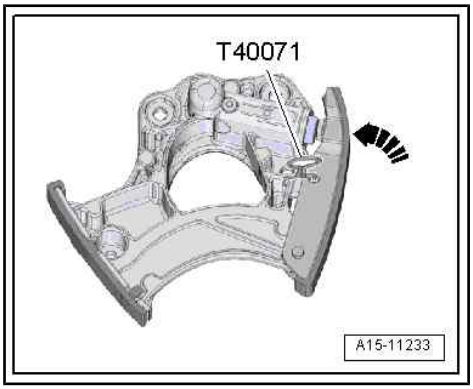


Installing

Note

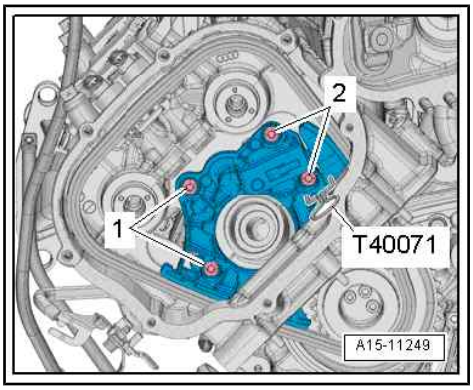
- *Note the correct installation position if the tensioning element has been removed from the chain tensioner: drilling in base of housing faces chain tensioner and piston faces tensioner rail.*
- *Renew bolts tightened with specified tightening angle.*

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



– Install chain tensioner on cylinder head (left-side) and fit timing chain as shown in illustration.

– Tighten bolts -1- and -2-.



– Install chain tensioner on cylinder head (right-side) and fit timing chain as shown in illustration.

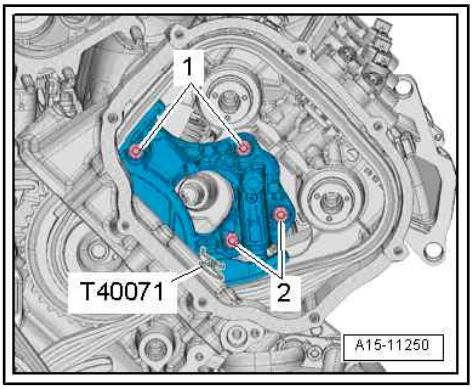
– Tighten bolts -1- and -2-.

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

– Fit timing chains on camshafts ⇒ page 139 .

Tightening torques

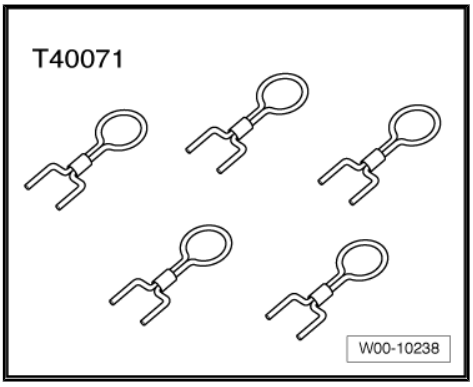
♦ ⇒ “2.1 Exploded view - camshaft timing chains”, page 133



2.7 Removing and installing drive chain for valve gear

Special tools and workshop equipment required

♦ Locking pin - T40071-



Removing

• Gearbox removed ⇒ Gearbox; Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox or ⇒ Gearbox; Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .

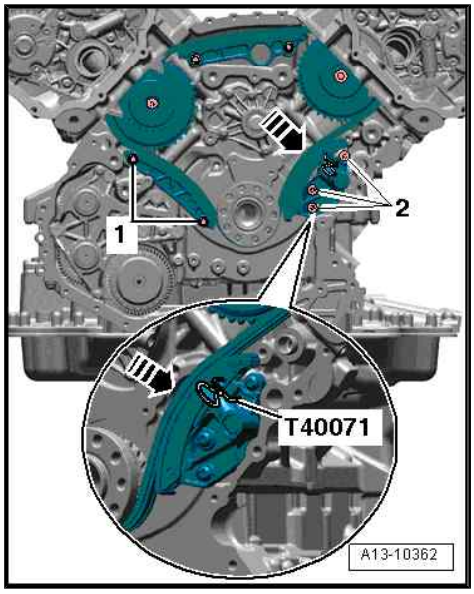
– Remove timing chains from camshafts ⇒ page 139 .

– Remove chain tensioners for camshaft timing chains ⇒ page 152 .

– Remove drive chain for auxiliary drives ⇒ page 154 .

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



Caution

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

- *Mark running direction of drive chain with coloured arrows for re-installation.*

– Unscrew bolts -1- and remove guide rail.
– Remove bolts -2- and take off chain tensioner.
– Detach drive chain for valve gear.

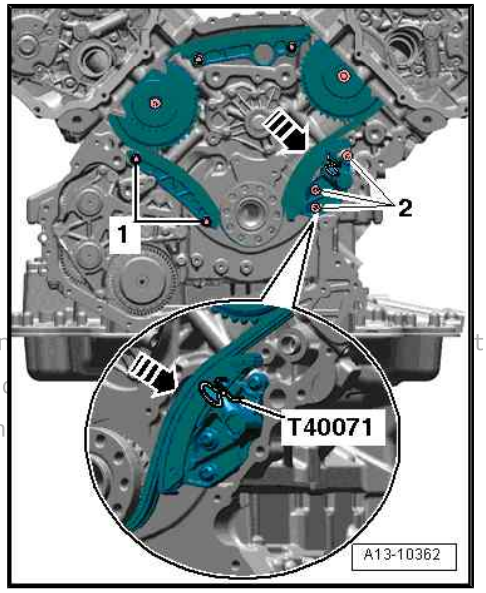
Installing

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

Note

Renew bolts tightened with specified tightening angle.

– Position drive chain for valve gear onto drive chain sprockets (according to marks applied during removal).



– Install guide rail and tighten bolts -1-.
– Install chain tensioner and tighten bolts -2-.
– Press guide rail of chain tensioner for drive chain in direction of -arrow- and pull locking pin - T40071- out of chain tensioner.
– Install drive chain for auxiliary drives ⇒ page 154 .
– Install chain tensioners for camshaft timing chains ⇒ page 152 .
– Fit timing chains on camshafts ⇒ page 139 .

Tightening torques

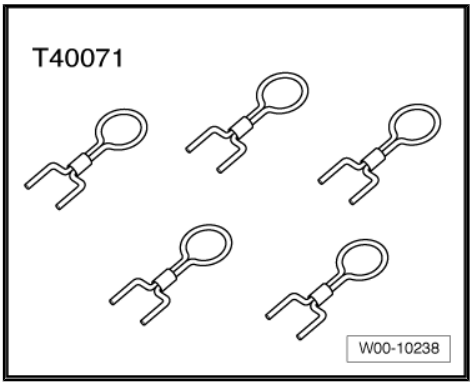
- ⇒ “2.2 Exploded view - drive chain for valve gear”, page 136

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2.8 Removing and installing drive chain for auxiliary drive

Special tools and workshop equipment required

♦ Locking pin - T40071-



Removing

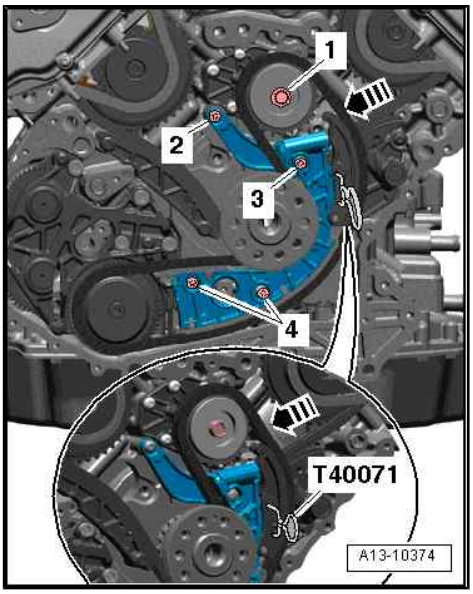
- Gearbox removed ⇒ Gearbox; Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox or ⇒ Gearbox; Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .

– Remove timing chain cover (bottom) ⇒ page 127 .

Caution

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

♦ ***Mark running direction of drive chain for auxiliary drives with coloured arrows for re-installation.***



– Press tensioning rail in direction of -arrow- and lock chain tensioner in place using locking pin - T40071- .
– Unscrew bolt -1- and remove idler sprocket.
– Remove bolts -2, 3, 4- and take off chain tensioner.
– Detach drive chain for auxiliary drives.

Installing

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

Note

♦ *Renew gasket.*
♦ *Renew bolts tightened with specified tightening angle.*

– Install timing chain cover (bottom) ⇒ page 127 .

Tightening torques

♦ ⇒ “2.3 Exploded view - drive chain for auxiliary drive”, page 138

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3 Cylinder head

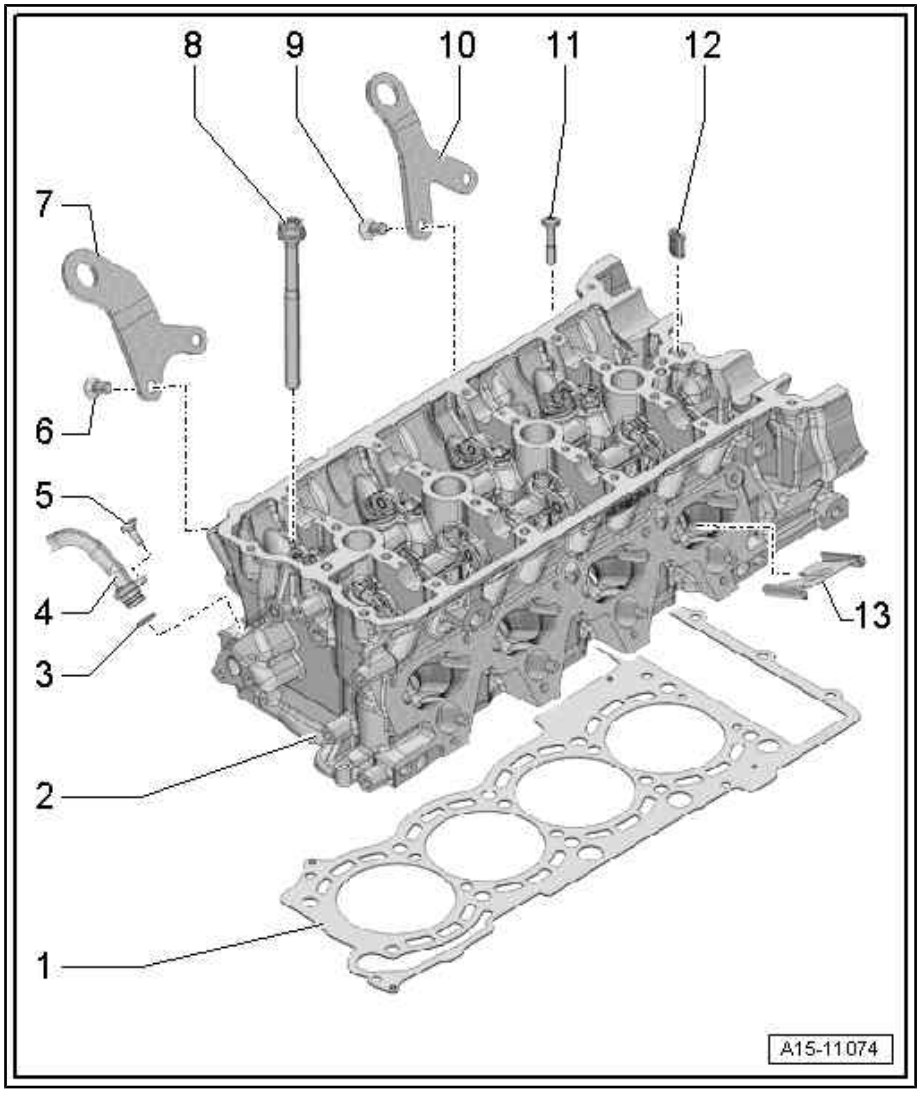
⇒ “3.1 Exploded view - cylinder head”, page 156
⇒ “3.2 Removing and installing cylinder head”, page 158
⇒ “3.3 Checking compression”, page 168

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3.1 Exploded view - cylinder head

Note

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



1 - Cylinder head gasket
- ❑ Renewing ⇒ “3.2 Removing and installing cylinder head”, page 158
- ❑ Installation position: part number must face cylinder head
- ❑ If renewed, change coolant and engine oil

2 - Cylinder head
- ❑ Removing and installing ⇒ page 158
- ❑ Checking for distortion ⇒ page 157
- ❑ Machining limit ⇒ page 158
- ❑ If renewed, change coolant and engine oil

3 - O-ring
- ❑ Renew

4 - Coolant pipe (front)
- ❑ Removing and installing ⇒ page 281

5 - Bolt
- ❑ Tightening torque ⇒ Item 17 (page 279)

6 - Bolt
- ❑ 22 Nm

7 - Engine lifting eye

8 - Bolt
- ❑ Renew
- ❑ Correct sequence when slackening ⇒ page 165
- ❑ Tightening torque and sequence ⇒ page 157

9 - Bolt
- ❑ 22 Nm

10 - Engine lifting eye

11 - Bolt

- ❑ Renew
- ❑ Correct sequence when slackening ⇒ page 165
- ❑ Tightening torque and sequence ⇒ page 157

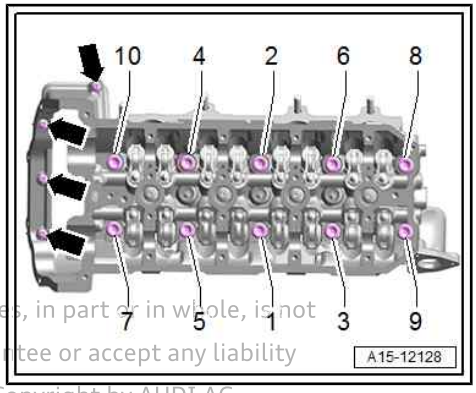
12 - Oil strainer

- ❑ Clean

13 - Separating plate

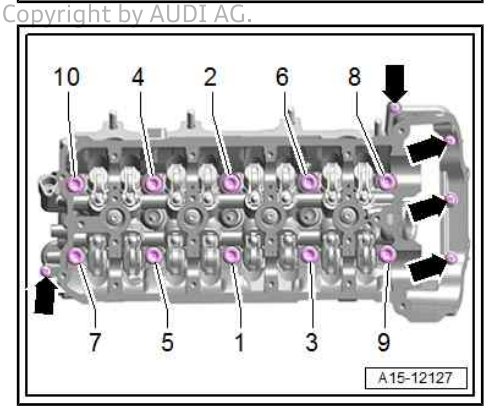
Cylinder head - tightening torque and sequence

Cylinder head, bank 1 (right-side)



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Cylinder head, bank 2 (left-side)



Note

Renew bolts tightened with specified tightening angle.

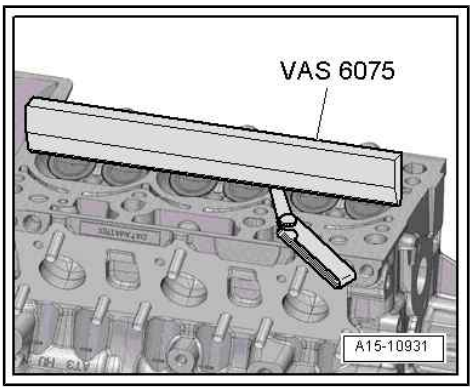
– Tighten bolts in stages in the sequence shown:

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

Checking cylinder head for distortion

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

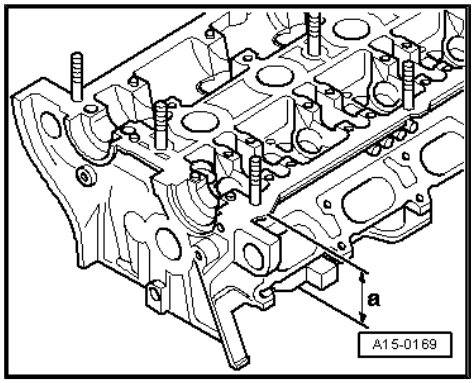
• Max. permissible distortion: 0.1 mm.



Cylinder head machining limit

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

- Minimum dimension: -a- = 139.5 mm



3.2 Removing and installing cylinder head

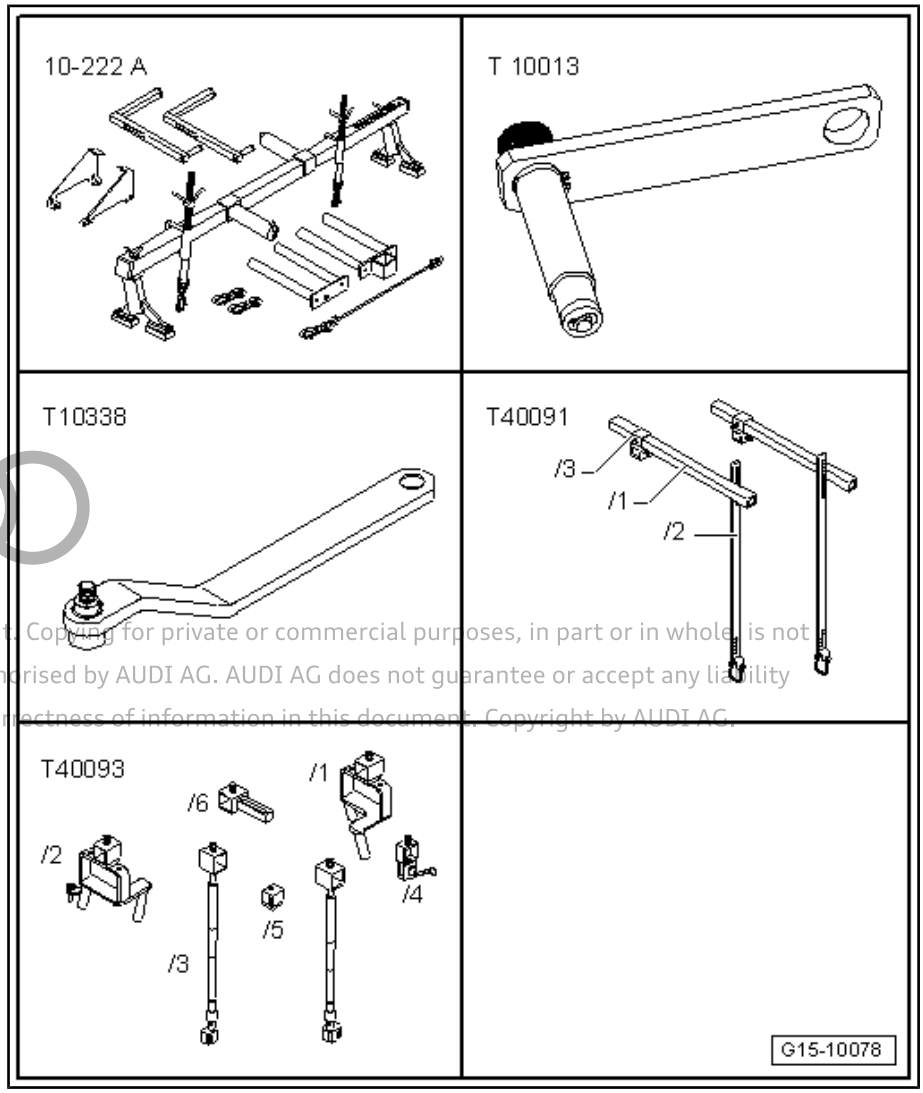
⇒ “3.2.1 Removing cylinder head - bank 1 (right-side)”, page 158

⇒ “3.2.2 Removing cylinder head - bank 2 (left-side)”, page 162

⇒ “3.2.3 Installing cylinder head”, page 166

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

Special tools and workshop equipment required



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

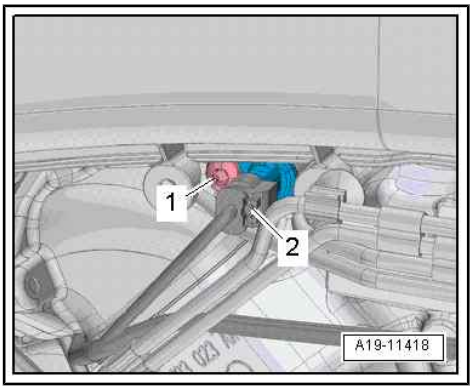
Procedure

– Remove lock carrier ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Removing and installing lock carrier .

– Remove turbocharger (right-side) ⇒ page 336 .

– Remove camshafts (right-side) ⇒ page 176 .

– Unplug electrical connector -2-.

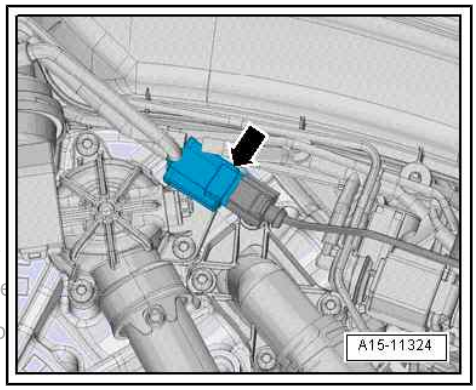


Note

Disregard -item 1-.

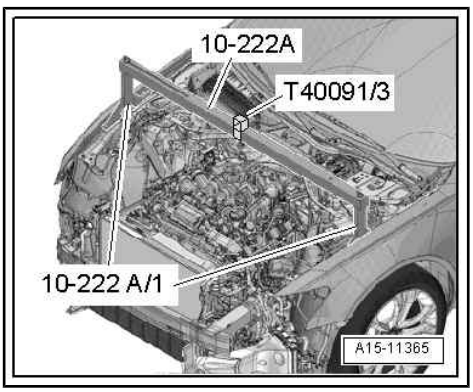
– Detach coolant valve for cylinder head - N489- -arrow- from bracket and push towards front.

– Bring impact bar into installation position and secure with bolts ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Exploded view - impact bar

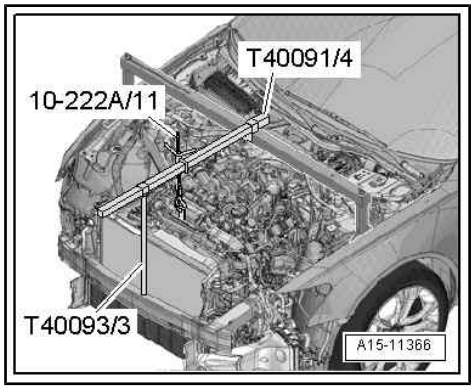


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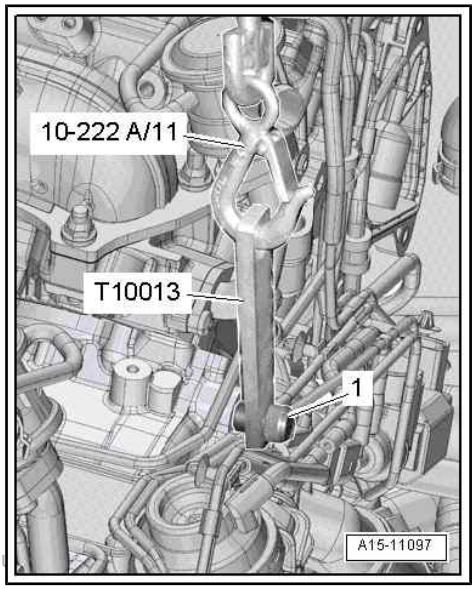
– Set up support bracket - 10 - 222 A- on suspension turrets (left and right) as illustrated.



– Set up further tools as shown in illustration.

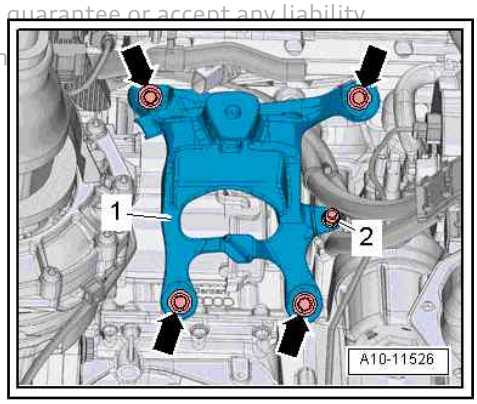


– Secure retainer - T10013- in threaded hole (front left) in cylinder block using stud -1- for bracket - T10338- as shown in illustration.
– Engage hook of spindle - 10 - 222 A /11- in retainer - T10013- and partly take up weight of engine.
– Remove alternator ⇒ Electrical system; Rep. gr. 27 ; Alternator; Removing and installing alternator .
– Remove engine mounting (right-side) ⇒ page 74 .

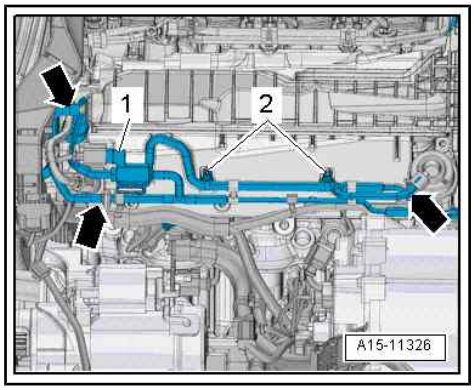


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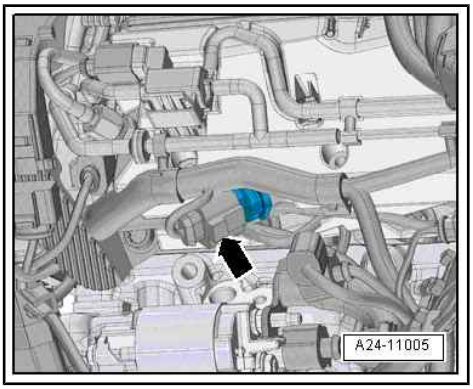
– Remove nut -2- and move earth wire clear.
– Remove bolts -arrows- and detach engine support -1- (right-side).



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



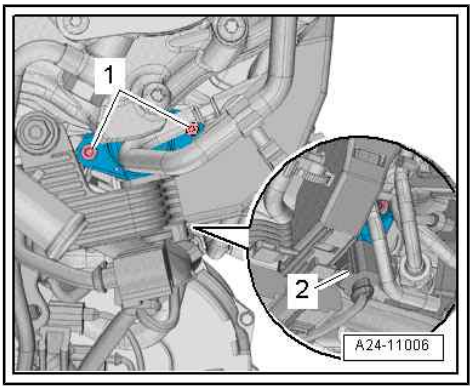
– Unplug electrical connector -arrow- for fuel pressure sender - G247- .



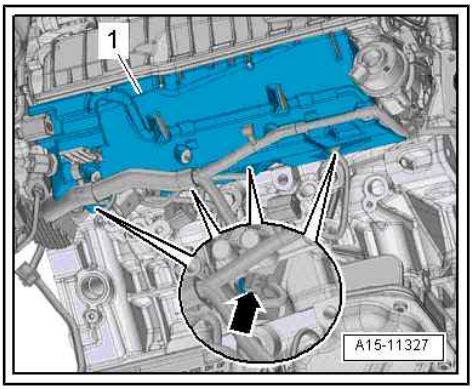
– Unplug electrical connector -2- for intake manifold flap potentiometer - G336- .

Note

Disregard -item 1-.



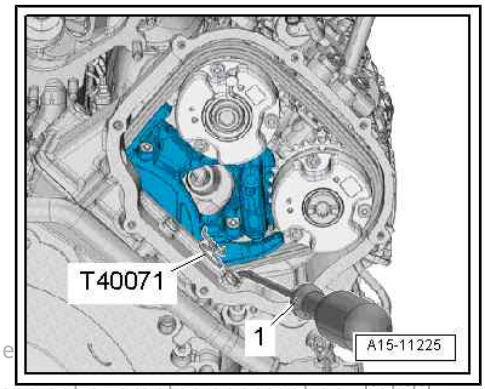
– Press noise insulation -1- to the side.
– Unplug electrical connector -arrow- at injectors.



– Remove locking pin - T40071- .

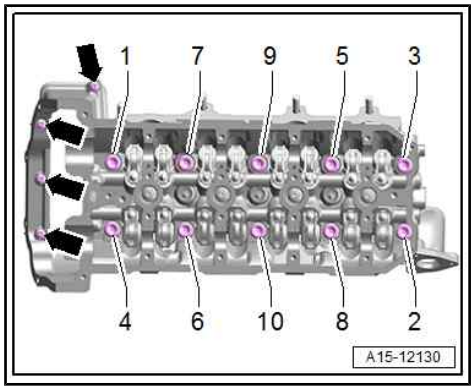
Note

The illustration shows the procedure with the camshafts installed.



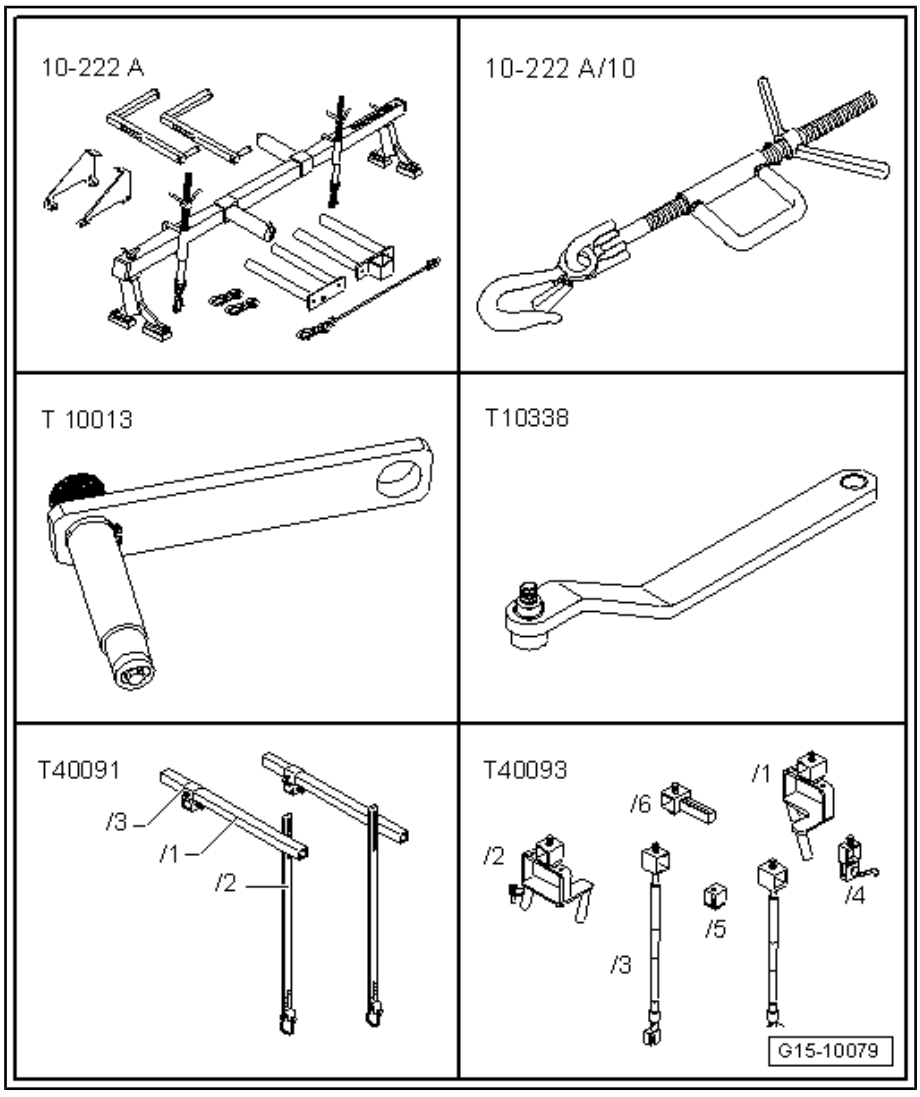
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– Remove bolts -arrows-.
– Slacken cylinder head bolts in the sequence -1 ... 10-.
– Remove bolts and carefully take off cylinder head.
– Place cylinder head onto soft surface (foam plastic).
• Note that there is a risk of damage to sealing surfaces if handled incorrectly ⇒ page 166 .



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

Special tools and workshop equipment required



◆ Support bracket - 10 - 222 A-
◆ Hook - 10 - 222 A /10-
◆ Bracket - T10013-
◆ Stud for bracket - T10338-
◆ Engine support basic set - T40091-

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- Engine support bracket (supplementary set) - T40093- with - T40093/7- and -T40093/8-
- Socket XZN M12 (at least 75 mm), commercially available
- Sealant ⇒ Electronic parts catalogue

Procedure

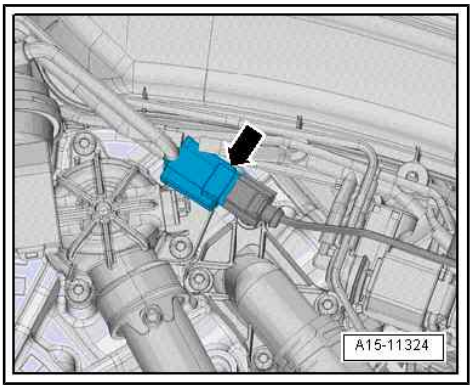
– Remove lock carrier ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Removing and installing lock carrier .

– Remove turbocharger (left-side) ⇒ page 336 .

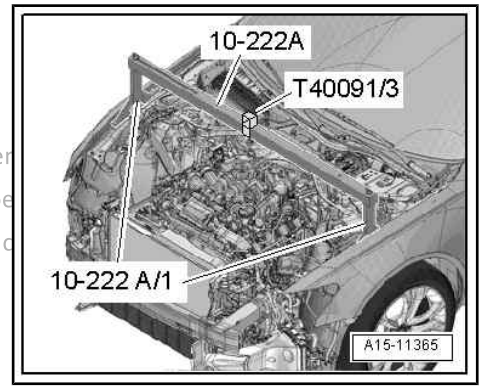
– Remove camshafts (left-side) ⇒ page 176 .

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

– Bring impact bar into installation position and secure with bolts ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Exploded view - impact bar

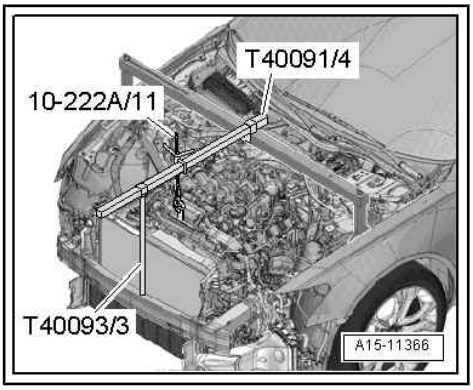


– Set up support bracket - 10 - 222 A- on suspension turrets (left and right) as illustrated.

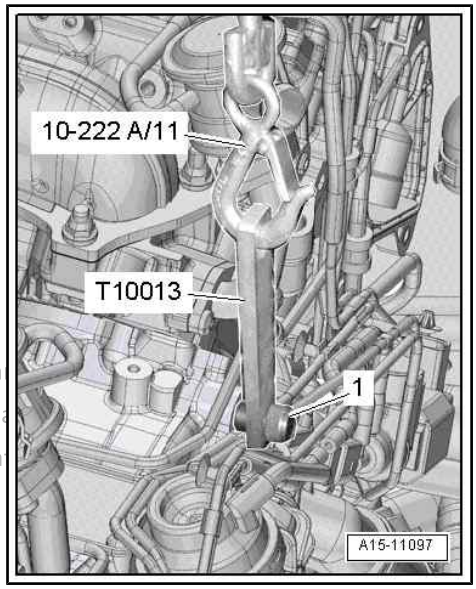


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– Set up further tools as shown in illustration.



– Secure retainer - T10013- in threaded hole (front left) in cylinder block using stud -1- for bracket - T10338- as shown in illustration.
– Engage hook of spindle - 10 - 222 A /11- in retainer - T10013- and partly take up weight of engine.
– Remove knock sensor 3 - G198- (front left) ⇒ page 459 .



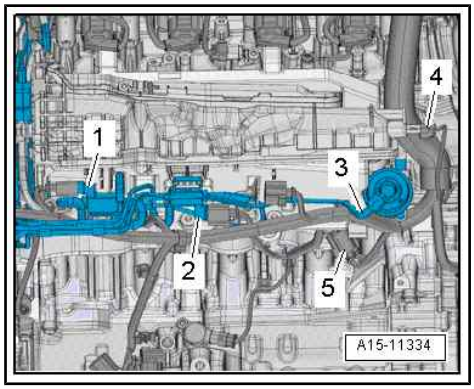
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– Disconnect vacuum hose -3- and move clear.
– Detach secondary air inlet valves from bracket and move clear to one side:

1 - Secondary air inlet valve 2 - N320-

2 - Secondary air inlet valve - N112-

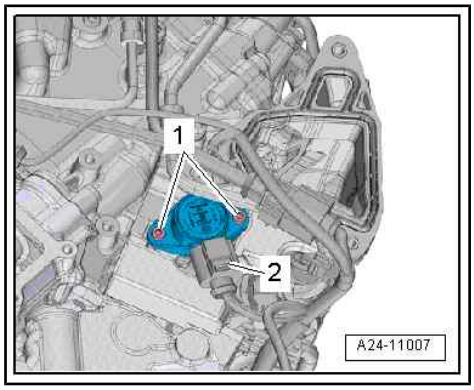
– Unplug electrical connectors -4, 5- and move clear wiring harness at intake manifold.



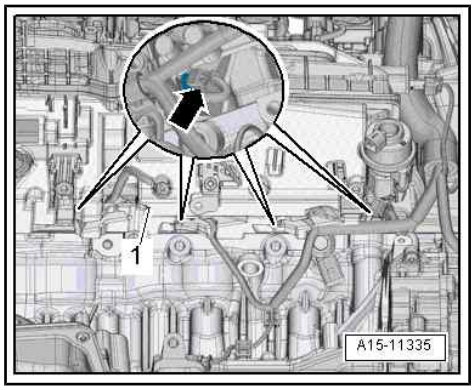
– Unplug electrical connector -2- for intake manifold flap potentiometer 2 - G512- .

Note

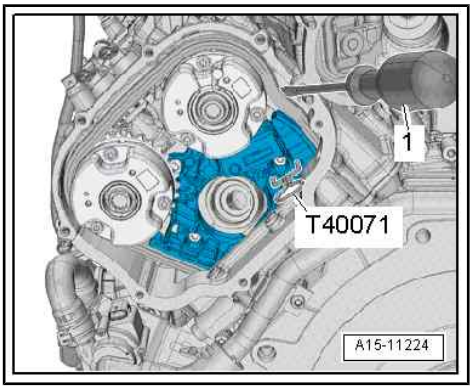
Disregard -item 1-.



– Unplug electrical connector -arrow- at injectors.
– Place subframe in installation position and tighten bolts by hand.



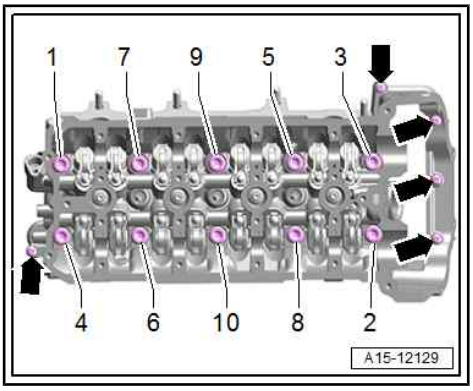
– Remove locking pin - T40071- .



Note

The illustration shows the procedure with the camshafts installed.

– Remove bolts -arrows-.
– Slacken cylinder head bolts in the sequence -1 ... 10-.
– Remove bolts and carefully take off cylinder head.
– Place cylinder head onto soft surface (foam plastic).
• Note that there is a risk of damage to sealing surfaces if handled incorrectly ⇒ page 166 .



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3.2.3 Installing cylinder head

Procedure

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Caution

Risk of damage to sealing surfaces if handled incorrectly.

- *Carefully remove sealant residue from cylinder head and cylinder block.*
- *Ensure that no long scores or scratches are made on the surfaces.*
- *Do NOT use abrasive materials (sandpaper, sanding discs, sanding pads, abrasive web, wire wool, etc.).*
- *When removing sealant residue, make sure none of the residue enters the open channels of the engine.*
- *Ensure that nearby workspaces are kept clean and that the abrasive materials listed above are not being used there.*
- *Use of non-approved abrasive materials can lead to subsequent damage to the turbocharger, conrod bearings, etc.*
- *Sealant residue may only be removed from the cylinder head and cylinder block using a commercially available scraper (blade width at least 4 cm).*
- *Remove loose residue with a lint-free cloth.*

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.*

Risk of leaks at cylinder head gasket.

- *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.*

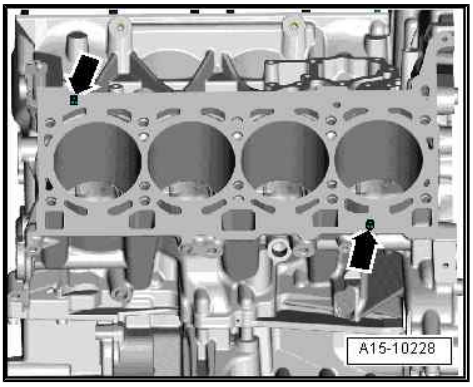
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Note

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

Note

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

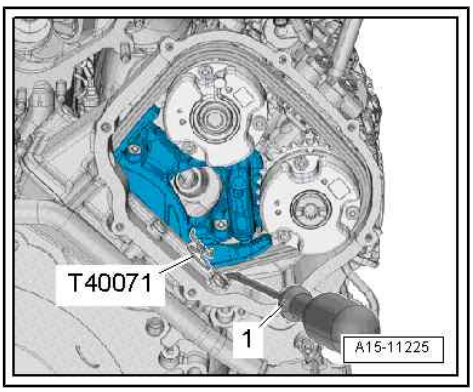


– Fit dowel sleeves -arrows-, if not fitted on the cylinder block at the points marked.
– Fit cylinder head gasket onto dowel sleeves in cylinder block.
• Installation position of cylinder head gasket: the word “oben” (top) or the part number should face towards the cylinder head.
– Fit cylinder head.
– Screw in cylinder head bolts by hand until they make contact.
– Tighten cylinder head bolts ⇒ page 157 .

Note

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

Cylinder bank 1 (right-side):



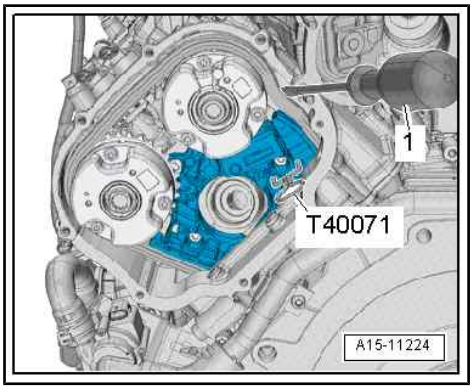
– Press guide rail of chain tensioner for camshaft timing chain (right-side) inwards as far as the stop using a screwdriver -1-. Then lock chain tensioner by inserting locking pin -T40071- .

Note

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

Cylinder bank 2 (left-side):

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



Note

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

Both sides (continued):

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

– Install engine support and engine mounting (right-side) ⇒ page 74 .

– Install electrical wiring ⇒ Electrical system; Rep. gr. 97 ; Relay carriers, fuse carriers, electronics boxes; Overview of fitting locations - relay carriers, fuse carriers, electronics boxes and ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

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

– Install knock sensor 3 - G198- (front left) ⇒ page 459 .

– Install camshafts ⇒ page 176 .

– Install turbocharger ⇒ page 336 .

– Change engine oil ⇒ Maintenance ; Booklet 411 .

– Fill cooling system with fresh coolant ⇒ page 251 .

Tightening torques

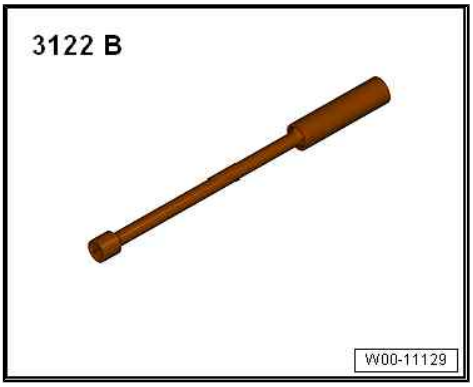
- ⇒ “3.1 Exploded view - cylinder head”, page 156
- ⇒ Fig. ““Cylinder head - tightening torque and sequence”“ , page 157
- ⇒ Electrical system; Rep. gr. 27 ; Alternator; Exploded view - alternator
- ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Exploded view - lock carrier

3.3 Checking compression

Special tools and workshop equipment required

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♦ Spark plug spanner - 3122 B-



♦ Compression tester - V.A.G 1763-



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Procedure

- Engine oil temperature at least 30 °C
- Battery voltage at least 12.5 V

– Remove fuse for fuel pump control unit - J538- ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

– Remove ignition coils ⇒ page 452 .

– Unscrew spark plugs using spark plug socket - 3122 B- .

– Check compression pressure with compression tester - V.A.G 1763- .

Note

Using the compression tester ⇒ Operating instructions .

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

– Repeat procedure on each cylinder.

Compression pressure	bar	
	Engine codes CEUC/ CEUD/CTGE	**Engine codes CRDB/ CWUB/CWUC**
When new	10.0 … 15.0	9.0 … 14.0
Wear limit	9.0	8.0
Maximum difference between cylinders	3.0	3.0

Assembly is performed in reverse sequence; note the following:

– Install spark plugs ⇒ Maintenance ; Booklet 411 .
– Install ignition coils ⇒ page 452 .
– Insert fuse for fuel pump control unit - J538- ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
– Erase any entries in event memory resulting from testing ⇒ Vehicle diagnostic tester.

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4 Valve gear

⇒ “4.1 Exploded view - valve gear”, page 171

⇒ “4.2 Measuring axial clearance of camshaft”, page 175

⇒ “4.3 Measuring radial clearance of camshaft”, page 176

⇒ “4.4 Removing and installing camshaft”, page 176

⇒ “4.5 Removing and installing cam actuators”, page 192

⇒ “4.6 Removing and installing camshaft control valves”, page 194

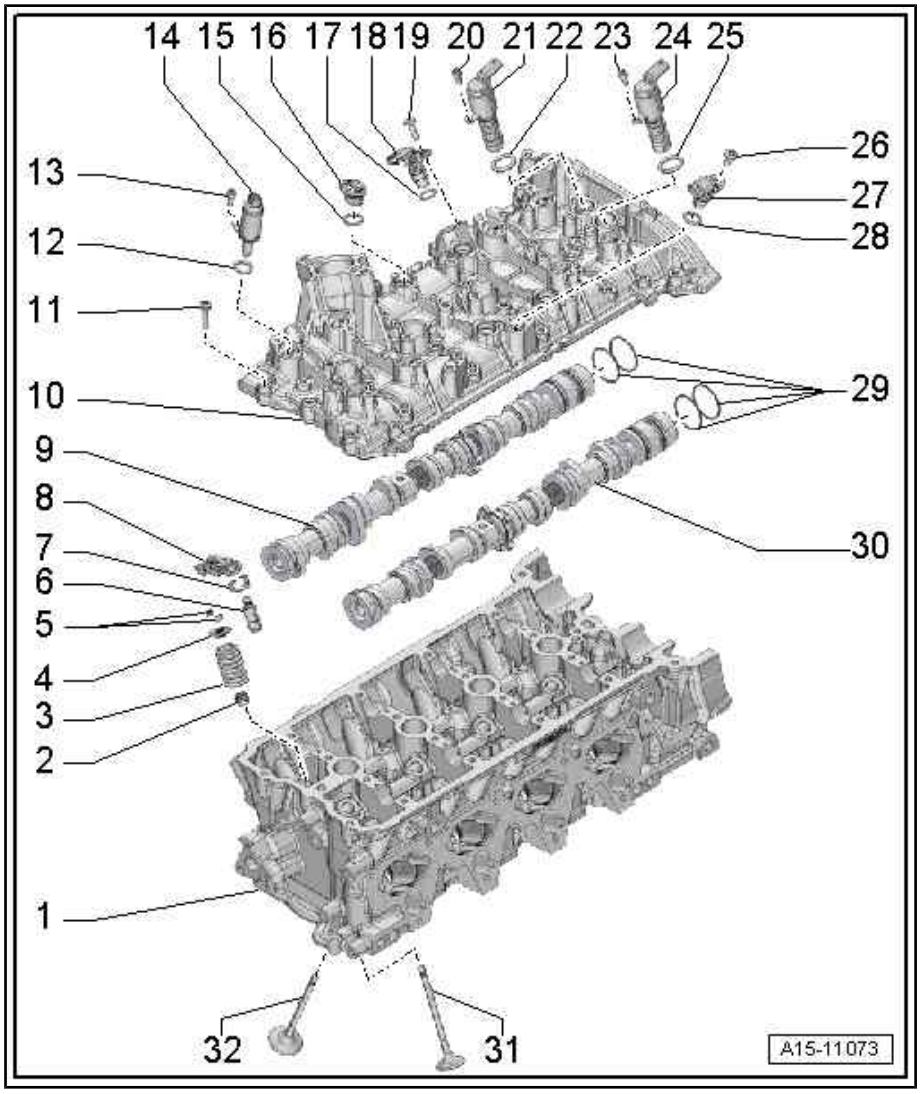
⇒ “4.7 Removing and installing valve stem oil seals”, page 196

4.1 Exploded view - valve gear

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Note

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



1 - Cylinder head

- ❑ Checking valve guides ⇒ page 205

2 - Valve stem oil seal

- ❑ Renewing with cylinder head installed ⇒ page 196
- ❑ Renewing with cylinder head removed ⇒ page 200

3 - Valve spring

- ❑ Allocation ⇒ page 174

4 - Valve spring plate

5 - Valve cotters

6 - Hydraulic compensation element

- ❑ Clipped into roller rocker finger -item 8-
- ❑ Mark installation position for re-installation with a coloured pen
- ❑ Lubricate contact surfaces before installing

7 - Securing clip

- ❑ Not available as separate part
- ❑ Check for firm attachment

8 - Roller rocker finger

- ❑ Mark installation position for re-installation with a coloured pen
- ❑ Check roller bearings for ease of movement
- ❑ Lubricate contact surfaces before installing
- ❑ Allocation to cylinders ⇒ page 174
- ❑ Attach to hydraulic compensation element -item 6- using securing clip -item 7-

9 - Exhaust camshaft

- ❑ Removing and installing ⇒ page 176
- ❑ Measuring axial clearance ⇒ page 175
- ❑ Measuring radial clearance ⇒ page 176
- ❑ Runout: max. 0.04 mm

10 - Camshaft housing

- ❑ With integrated camshaft bearings

11 - Bolt

- ❑ Renew
- ❑ Use old bolts when measuring radial clearance
- ❑ Tightening sequence ⇒ page 175

12 - O-ring

- ❑ Not available as a replacement part, supplied together with actuator for camshaft adjustment

13 - Bolt

- ❑ 5 Nm

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14 - Inlet/exhaust cam actuators -F452- ... -F479-
- ❑ Removing and installing ⇒ page 192
- ❑ Bringing into installation position ⇒ page 174

15 - O-ring
- ❑ Renew

16 - Sealing plug
- ❑ Turn anti-clockwise with screwdriver to remove

17 - O-ring
- ❑ Renew

18 - Hall sender 4 - G301-
- ❑ Cylinder bank 1 (right-side): Hall sender 2 - G163-
- ❑ Removing and installing ⇒ page 460

19 - Bolt
- ❑ Tightening torque ⇒ Item 13 (page 451)

20 - Bolt
- ❑ 5 Nm

21 - Exhaust camshaft control valve 2 - N319-
- ❑ Cylinder bank 1 (right-side): exhaust camshaft control valve 1 - N318-
- ❑ Removing and installing ⇒ page 194

22 - O-ring
- ❑ Renew

23 - Bolt
- ❑ 5 Nm

24 - Camshaft control valve 2 - N208-
- ❑ Cylinder bank 1 (right-side): camshaft control valve 1 - N205-
- ❑ Removing and installing ⇒ page 194

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25 - O-ring
- ❑ Renew

26 - Bolt
- ❑ Tightening torque ⇒ Item 5 (page 450)

27 - Hall sender 3 - G300-
- ❑ Cylinder bank 1 (right-side): Hall sender - G40-
- ❑ Removing and installing ⇒ page 461

28 - O-ring
- ❑ Renew

29 - Rectangular section seals
- ❑ For camshaft adjuster
- ❑ Renew

30 - Inlet camshaft
- ❑ Removing and installing ⇒ page 176
- ❑ Measuring axial clearance ⇒ page 175
- ❑ Measuring radial clearance ⇒ page 176
- ❑ Runout: max. 0.04 mm

31 - Exhaust valve
- ❑ Different versions available; for allocation refer to ⇒ Electronic parts catalogue
- ❑ Do not machine, only grinding-in is permitted

- ❑ Mark installation position for re-installation
- ❑ Valve dimensions ⇒ page 206
- ❑ Checking valve guides ⇒ page 205

32 - Inlet valve

- ❑ Do not machine, only grinding-in is permitted
- ❑ Mark installation position for re-installation
- ❑ Valve dimensions ⇒ page 206
- ❑ Checking valve guides ⇒ page 205

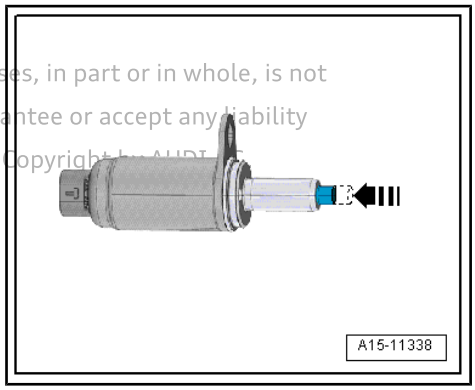
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Bringing actuators for camshaft adjustment into installation position

Caution

Risk of damage to engine.

- ◆ *Pins of all actuators for camshaft adjustment must be brought into installation position.*



– Press down pins of actuators for camshaft adjustment -arrow- by hand.

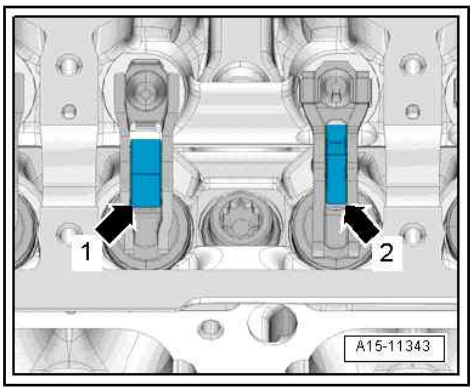
- Pins of all actuators must not be in extended position.

Allocation of roller rocker fingers to cylinders

Caution

Risk of damage to engine.

- ◆ *Note allocation of roller rocker fingers to cylinders*



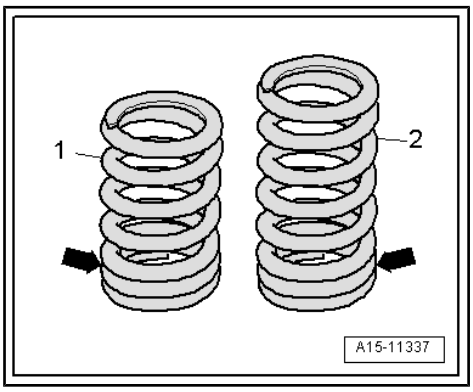
- Roller rocker fingers with wide rollers -arrow 1- correspond to cylinders without cylinder shut-off.
- Roller rocker fingers with narrow rollers -arrow 2- correspond to cylinders with cylinder shut-off.

Allocation of valve springs

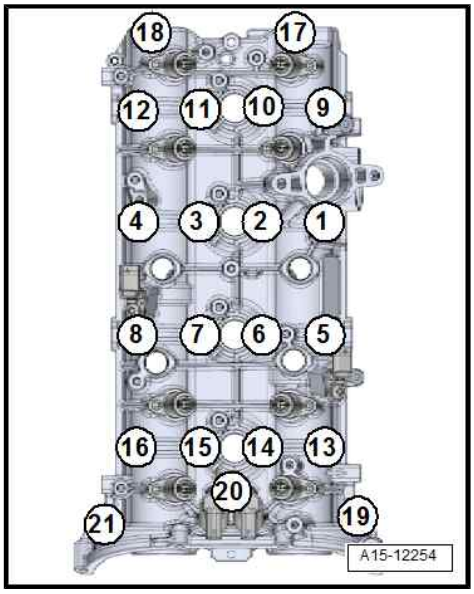
1 - Short version for inlet valve

2 - Long version for exhaust valve

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



Camshaft housing - tightening torque and sequence



Note

Renew bolts tightened with specified tightening angle.

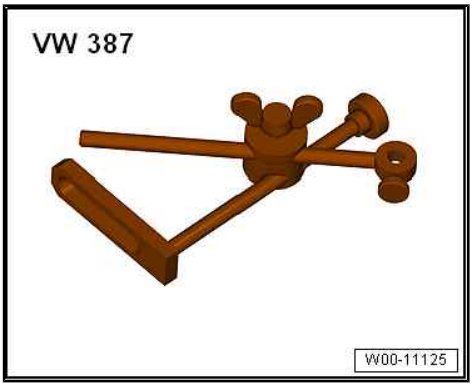
– Tighten bolts in stages in the sequence shown:

Stage	Bolts	Tightening torque/angle specification
1.	-1 … 21-	Screw in by hand until contact is made • The camshaft housing should make contact with the cylinder head over the full surface.
2.	-1 … 21-	8 Nm
3.	-1 … 21-	Turn 90° further

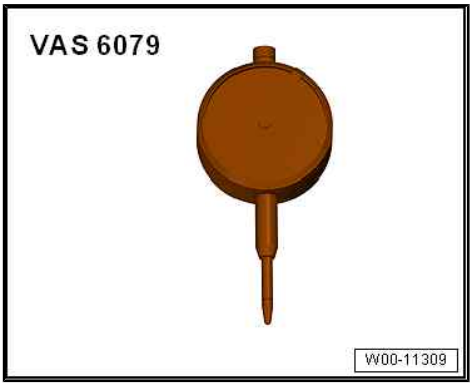
4.2 Measuring axial clearance of camshaft

Special tools and workshop equipment required

♦ Universal dial gauge bracket - VW 387-

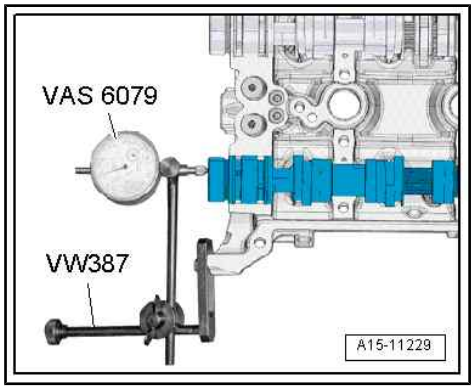


♦ Dial gauge - VAS 6079-



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Procedure



– Remove camshaft housing
⇒ “4.4 Removing and installing camshaft”, page 176 .
– Fit camshaft to be tested in camshaft housing.
– Attach dial gauge - VAS 6079- with universal dial gauge bracket - VW 387- to camshaft housing.
– Press camshaft against dial gauge by hand.
– Set dial gauge to “0”.
– Press camshaft away from dial gauge and read off value:
• Axial clearance: 0.100 ... 0.191 mm

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4.3 Measuring radial clearance of camshaft

Special tools and workshop equipment required

♦ Plastigauge

Procedure

Note

Use old bolts when measuring radial clearance.

– Remove camshafts ⇒ page 176 .
– Mark allocation of roller rocker fingers for re-installation.
– Carefully remove roller rocker fingers and place them on a clean surface.
– Clean bearings and bearing journals.
– Place a length of Plastigauge corresponding to the width of the bearing on the bearing journal or bearing shell to be measured.
• The Plastigauge must be positioned in the centre of the bearing.
– Re-insert camshafts, fit camshaft housing and tighten to specified torque without rotating camshafts ⇒ page 175 .
– Remove camshaft housing and camshafts again.
– Compare width of Plastigauge with measurement scale.

Radial clearance:

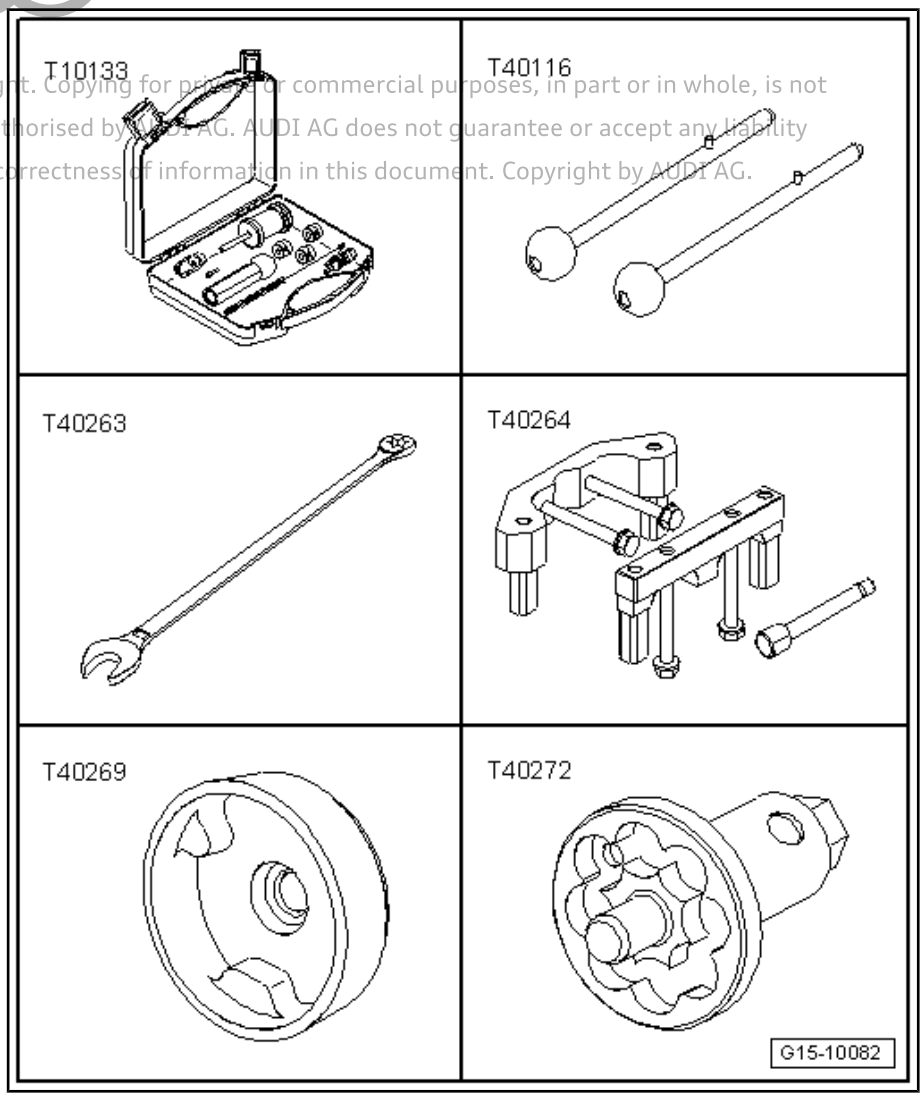
• 24 mm bearing ∅: 0.024 ... 0.066 mm
• 36 mm bearing ∅: 0.032 ... 0.078 mm

– When carrying out final assembly, renew bolts.

4.4 Removing and installing camshaft

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Special tools and workshop equipment required



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

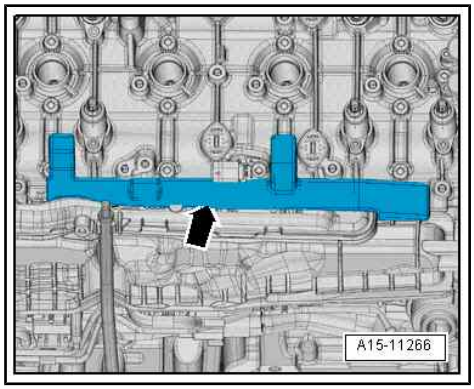
- Bolts M6x30
- Electric drill with plastic brush attachment
- Safety goggles
- Sealant ⇒ Electronic parts catalogue

Removing

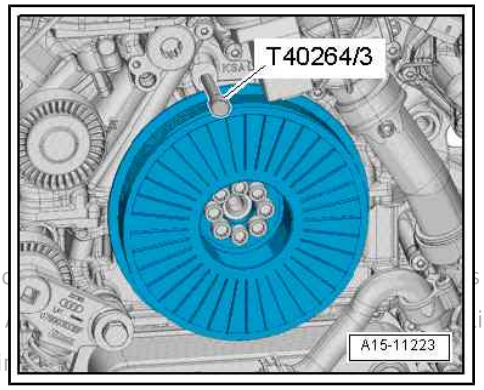
– Remove corresponding ignition coils ⇒ page 452 .
– Remove corresponding high-pressure pump ⇒ page 412 .
– Remove corresponding high-pressure pipe ⇒ page 416 .

– Remove timing chain from camshafts on relevant side ⇒ page 139 .

– Detach noise insulation -arrow- on relevant side.



– Remove camshaft clamp -T40264/3- .



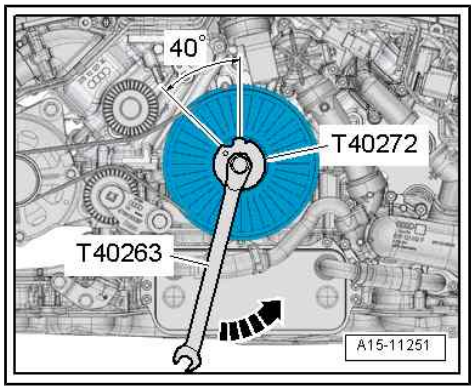
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Caution

Risk of damage to valves and piston crowns.

- ***When performing the following steps, the crankshaft must not be at "TDC" position at any cylinder.***

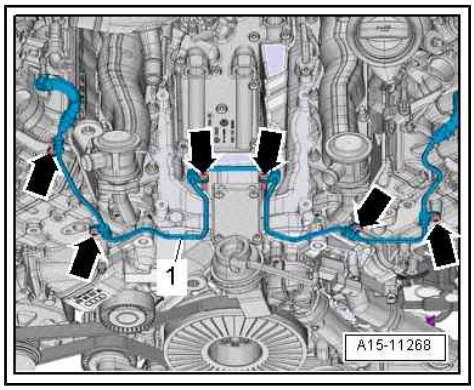
– Using wrench, 21 mm - T40263- and turning over tool - T40272- , turn crankshaft back through 40° out of "TDC" position in opposite direction to normal rotation -arrow-.



Cylinder bank 1 (right-side):

– Remove coolant pipe (right-side) ⇒ page 291 .

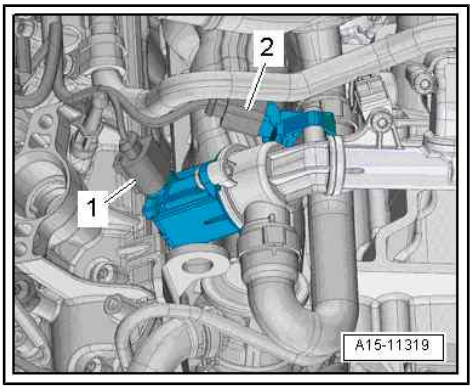
– Remove bolts -arrows- and push fuel line -1- towards front.



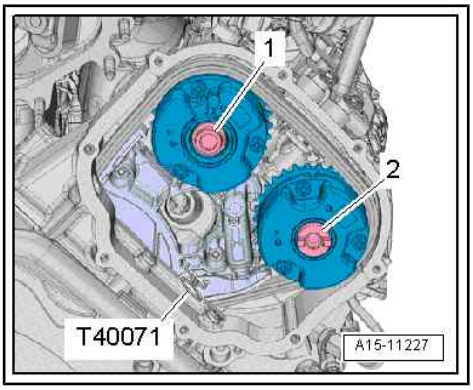
Note

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

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



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

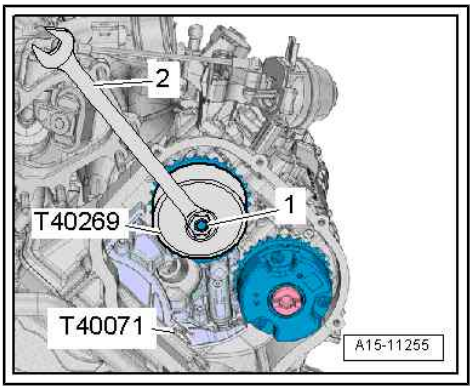


– Fit key - T40269- onto camshaft adjuster of exhaust camshaft (right-side) and counterhold with a ring spanner -2-.

– Hand-tighten bolt -1-.

Note

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

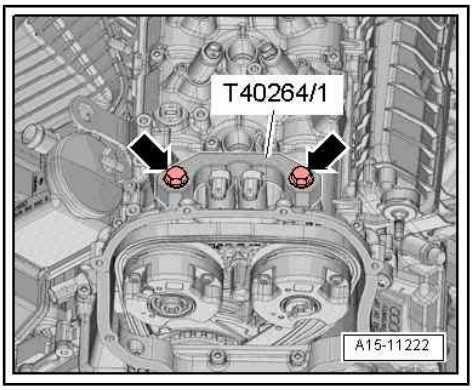


– Hold exhaust camshaft in position with ring spanner.

– Remove bolt (left-side) -left arrow- at camshaft clamp - T40264/1- .

– Release ring spanner.

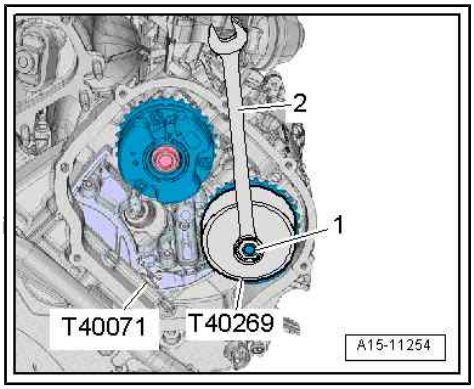
• Exhaust camshaft will then turn slightly in a clockwise direction.



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

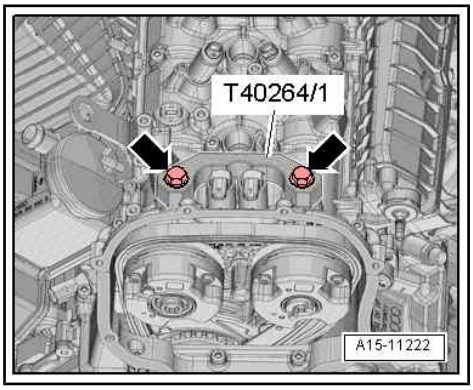


Note

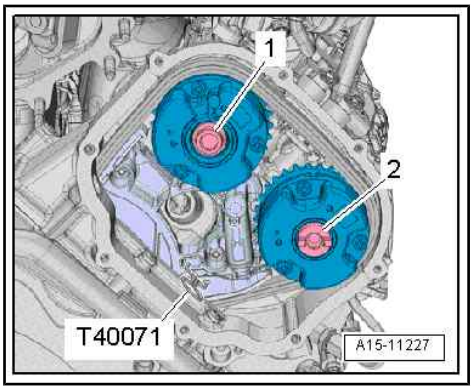
To loosen bolt for camshaft clamp -T40264/1- , secure inlet camshaft so that it cannot turn.

– Hold inlet camshaft in position with ring spanner.

– Remove bolt (right-side) -right arrow- at camshaft clamp - T40264/1- .
– Release ring spanner.
• Inlet camshaft will then turn slightly in a clockwise direction.
– Remove camshaft clamp -T40264/1- .



– Remove bolts -1, 2- (counterhold using ring spanner and key - T40269-) and detach camshaft adjuster.



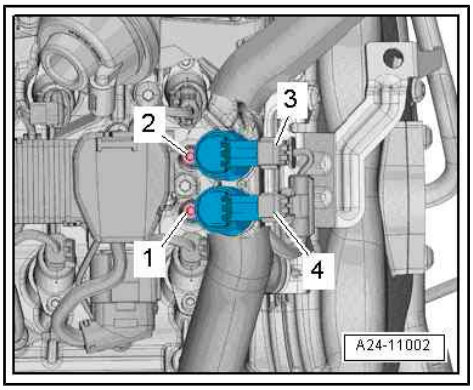
Cylinder bank 2 (left-side):

– Unplug electrical connectors:

3 - For exhaust camshaft control valve 2 - N319-

4 - For camshaft control valve 2 - N208-

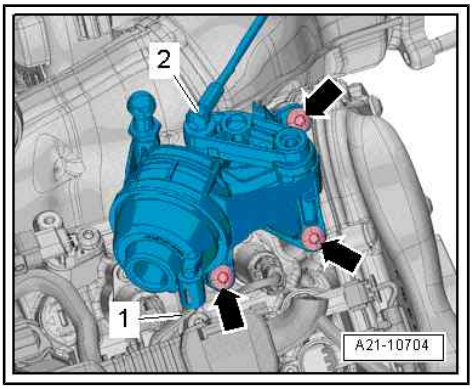
– Move electrical wiring harness to one side.



Note

Disregard items -1 and 2-.

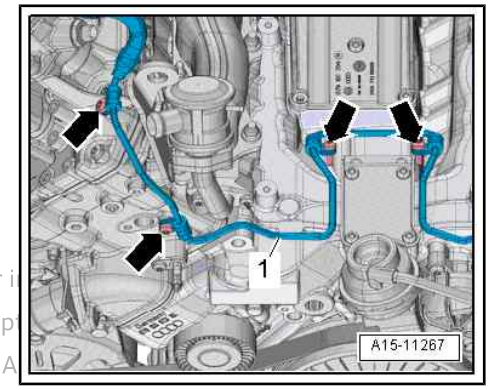
– Remove bolts -arrows- and pivot vacuum unit to one side.



Note

- *Illustration shows fitting location on an Audi S6/S7.*
- *Do not detach ball head -item 2-.*
- *Disregard -item 1-.*

– Remove bolts -arrows- and push fuel line towards front.

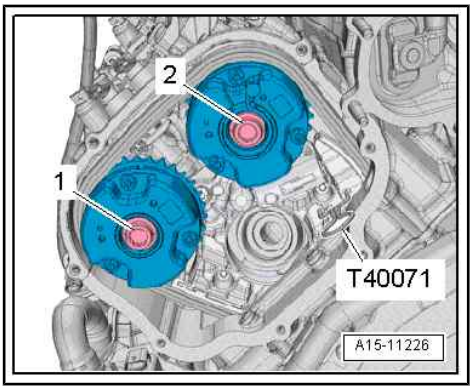


Note

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

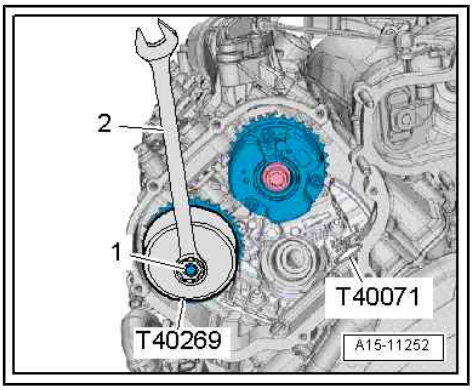
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– Attach both camshaft adjusters to cylinder head without camshaft timing chain, fit bolts -1, 2- without tightening.



– Fit key - T40269- onto camshaft adjuster of inlet camshaft (left-side) and counterhold with a ring spanner -2-.

– Hand-tighten bolt -1-.

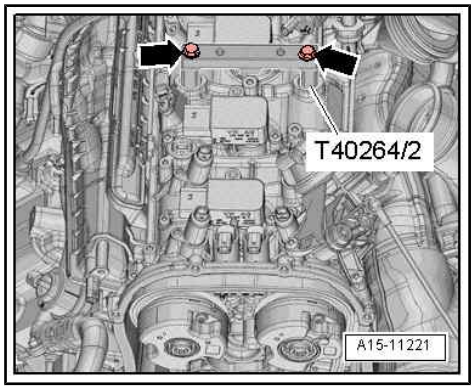


Note

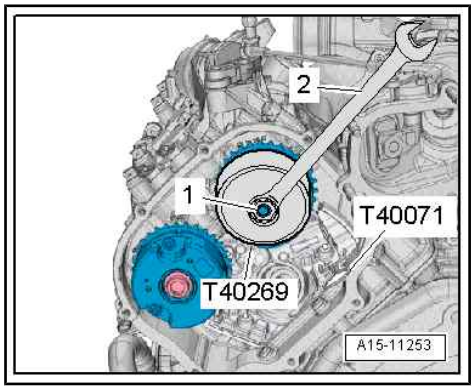
To loosen bolt for camshaft clamp -T40264/2- , secure inlet camshaft so that it cannot turn.

– Hold inlet camshaft in position with ring spanner.

– Remove bolt (left-side) -left arrow- at camshaft clamp - T40264/2- .
– Release ring spanner.
• Inlet camshaft will then turn slightly in a clockwise direction.



– Fit key - T40269- onto camshaft adjuster of exhaust camshaft (left-side) and counterhold with a ring spanner -2-.
– Hand-tighten bolt -1-.

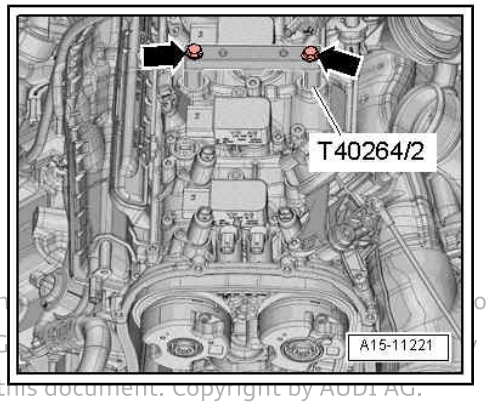


Note

To loosen bolt for camshaft clamp -T40264/2- , secure exhaust camshaft so that it cannot turn.

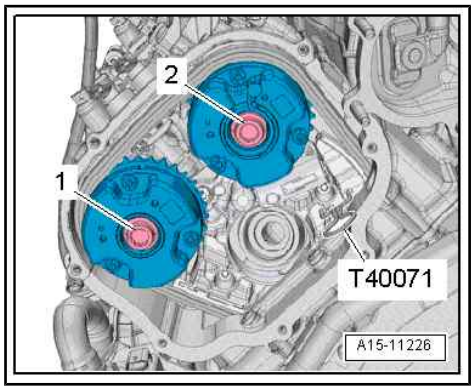
– Hold exhaust camshaft in position with ring spanner.

– Remove bolt (right-side) -right arrow- at camshaft clamp - T40264/2- .
– Release ring spanner.
• Exhaust camshaft will then turn slightly in a clockwise direction.
– Remove camshaft clamp -T40264/2- .



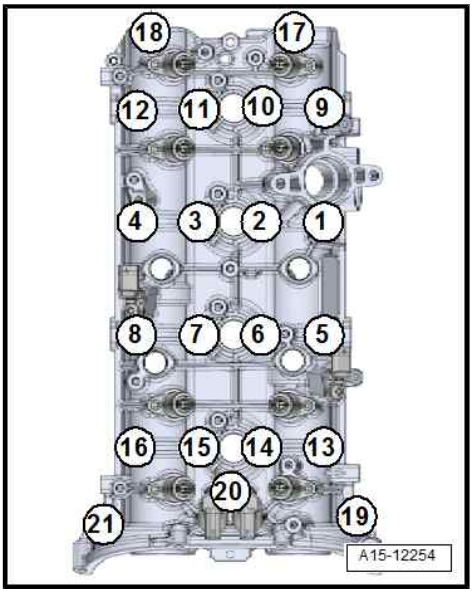
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– Remove bolts -1, 2- (counterhold using ring spanner and key - T40269-) and detach camshaft adjuster.

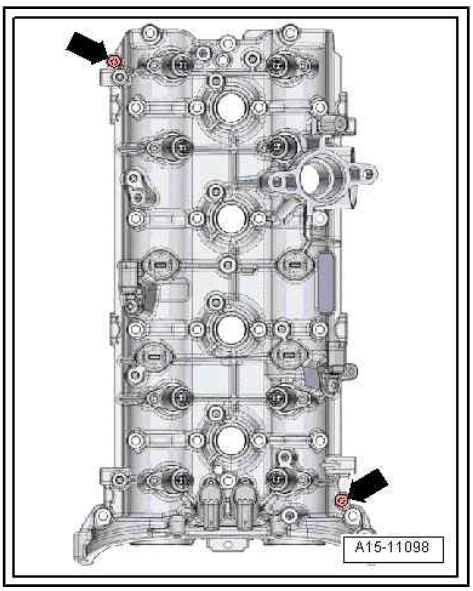


Continued for both cylinder banks:

– Slacken and remove bolts in the sequence: -21 ... 1-.



– Carefully release camshaft housing from bonded joint; to do so, screw bolts M6x30 evenly into threaded holes -arrows-.



Note

- *The illustration shows the camshaft housing (left-side).*
- *Perform the same procedure (symmetrically opposed) on camshaft housing (right-side).*

– Mark allocation of camshafts for re-installation.

– Carefully remove camshafts and place them on a clean surface.

Installing

Note

- *Renew rectangular section seals.*
- *Renew bolts tightened with specified tightening angle.*

Caution

Protect lubrication system and bearings against contamination.

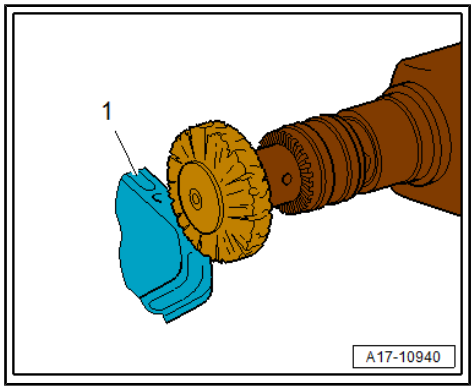
- ***Cover exposed parts of the engine.***

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WARNING

Risk of eye injury.

- *Put on safety goggles.*



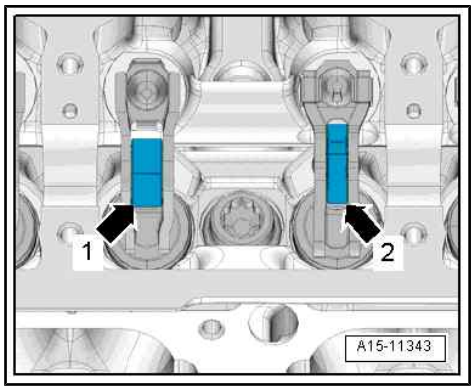
– Remove remaining sealant from cylinder head and camshaft housing -1- using rotating plastic brush or similar.

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

Caution

Risk of damage to engine.

- *Note allocation of roller rocker fingers to cylinders*



– Install hydraulic compensation elements with roller rocker fingers. Allocation:

- Roller rocker fingers with wide rollers -arrow 1- correspond to cylinders without cylinder shut-off.
- Roller rocker fingers with narrow rollers -arrow 2- correspond to cylinders with cylinder shut-off.

– Oil running surfaces of both camshafts.

– Insert camshafts in cylinder head; note position of camshafts to make sure camshaft housing is fitted free of stress.

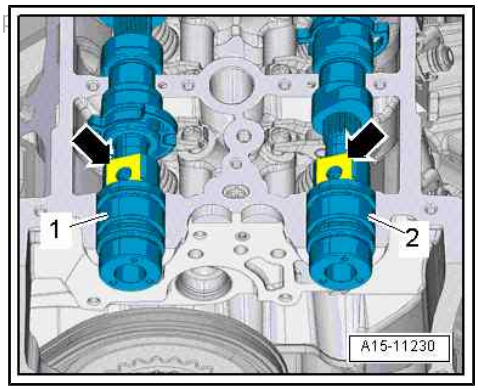
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Cylinder bank 1 (right-side):

1 - Exhaust camshaft

2 - Inlet camshaft

- Surfaces with threaded holes -arrows- must face slightly to the left (towards centre of engine).
- The camshafts will settle into the specified position.



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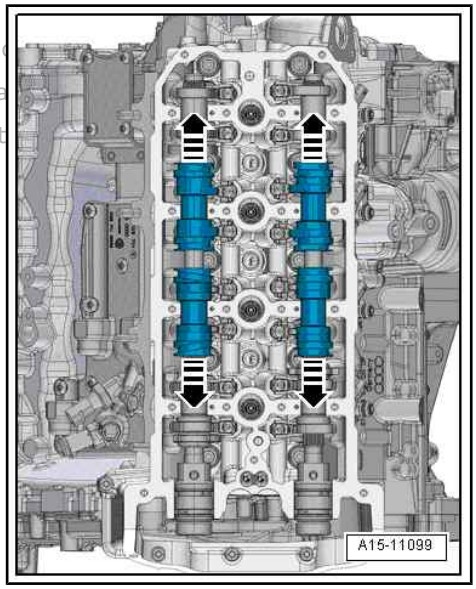
Caution

Risk of damage to engine.

- ***Camshaft sliders must be brought into installation position.***

– Bring camshaft sliders into installation position -arrows-:

• Sliders must be moved towards both ends of each camshaft.



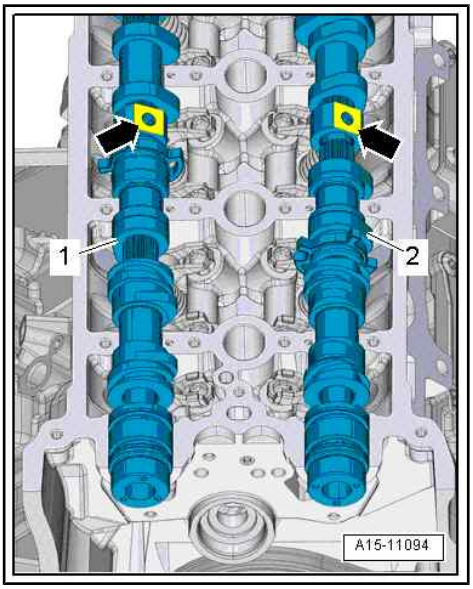
Cylinder bank 2 (left-side):

1 - Inlet camshaft

2 - Exhaust camshaft

• Surfaces with threaded holes -arrows- must face slightly to the right (towards centre of engine).

• The camshafts will settle into the specified position.



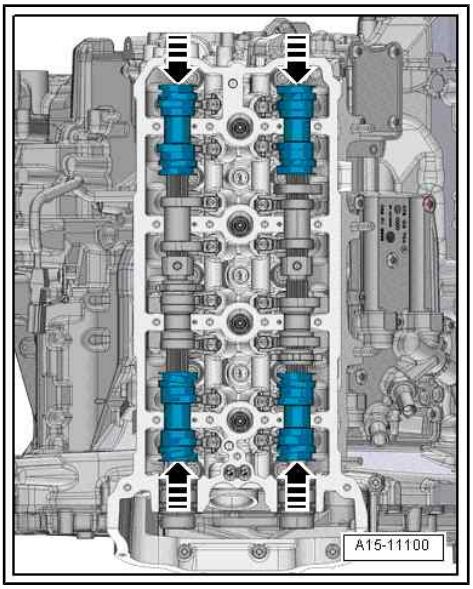
Caution

Risk of damage to engine.

- ***Camshaft sliders must be brought into installation position.***

– Bring camshaft sliders into installation position -arrows-:

• Sliders must be moved towards centre of each camshaft.

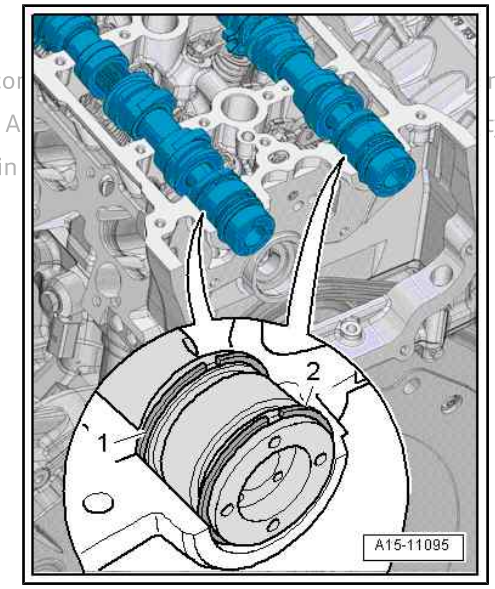


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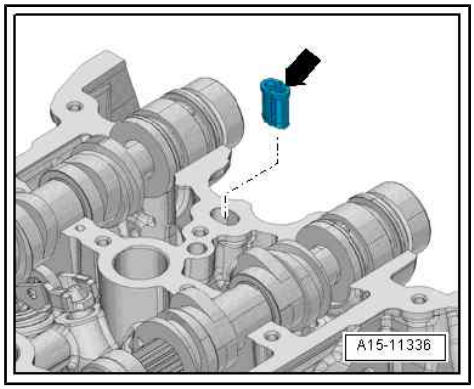
Continued for both cylinder banks:

– Check position of ends of rectangular section seals.

• The ends of the rectangular section seals -1 and 2- must point up or down, never to the side.



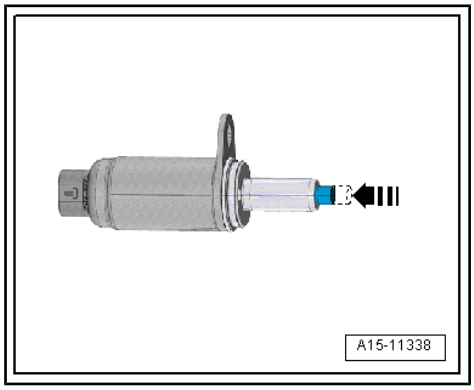
– Clean oil strainer -arrow- and install.



Caution

Risk of damage to engine.

- *Pins of all actuators for camshaft adjustment must be brought into installation position.*



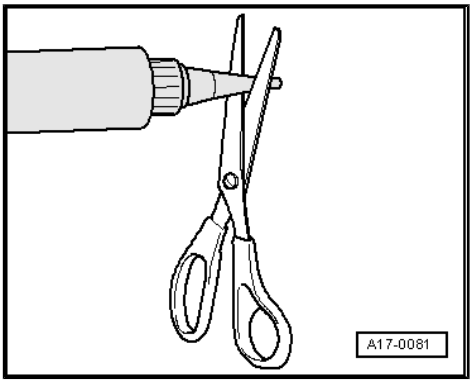
– Press down pins of actuators for camshaft adjustment -arrow- by hand.

• Pins of all actuators must not be in extended position.

Note

Note the use-by date of the sealant.

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



Caution

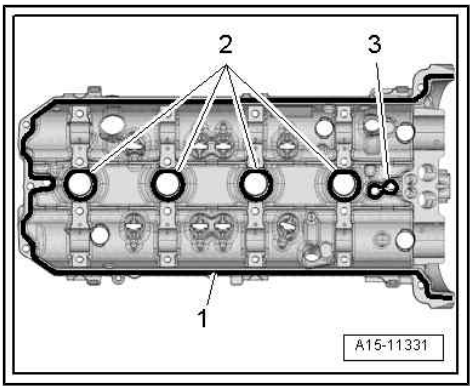
Make sure excess sealant does not contaminate camshaft bearings.

- ***The sealant beads must not be thicker than specified.***

Cylinder bank 1 (right-side):

– Apply beads of sealant -1, 2, 3- onto clean sealing surfaces of camshaft housing as shown in illustration.

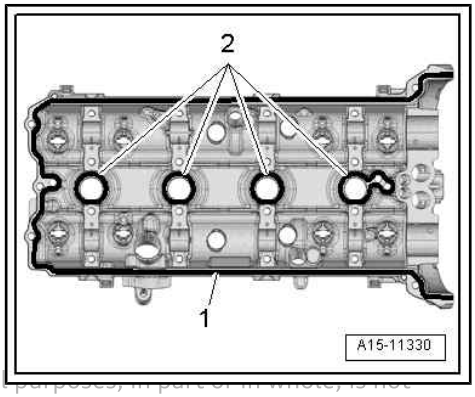
• Width of sealant beads: 2.5 mm.



Cylinder bank 2 (left-side):

– Apply beads of sealant -1, 2- onto clean sealing surfaces of camshaft housing as shown in illustration.

• Width of sealant beads: 2.5 mm.



Continued for both cylinder banks:

Note

The camshaft housing must be installed within 5 minutes after applying the sealant.

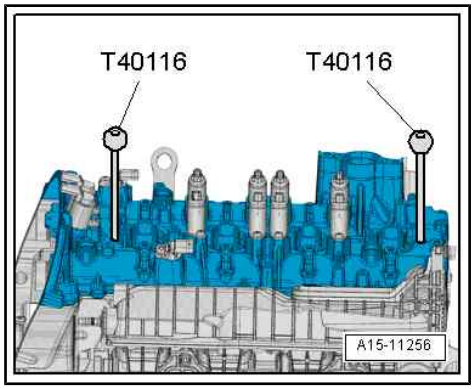
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– Fit camshaft housing on cylinder head.

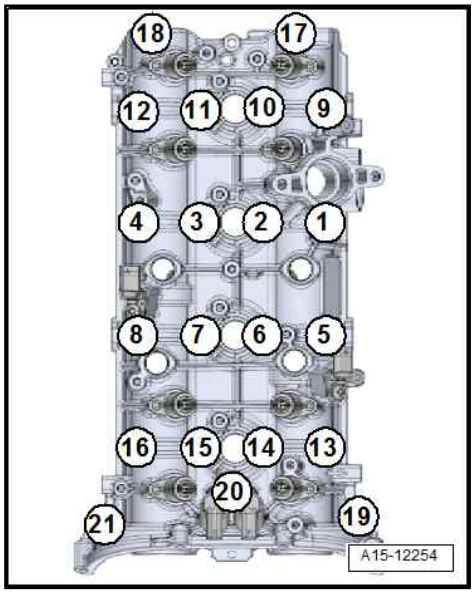
Note

Make sure that camshafts can be inserted into axial bearings of camshaft housing without applying force.

– Insert locating pins - T40116- in camshaft housing and cylinder head.



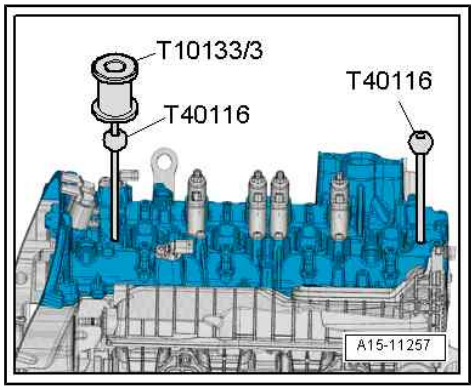
– Tighten camshaft housing bolts ⇒ page 175 .



Note

- *Illustration shows the cylinder head for cylinder bank 2 (left-side).*
- *After installing the camshaft housing, the sealant must dry for approx. 30 minutes.*

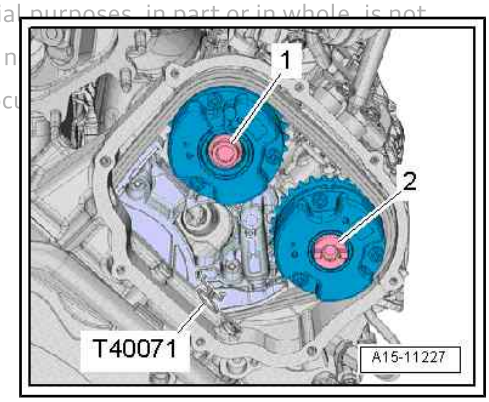
– Use impact extractor attachment -T10133/3- to pull out locating pins - T40116- .



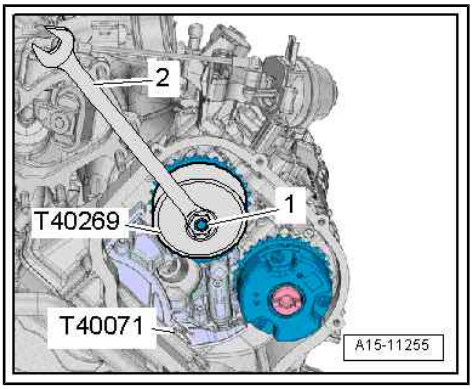
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Cylinder bank 1 (right-side):

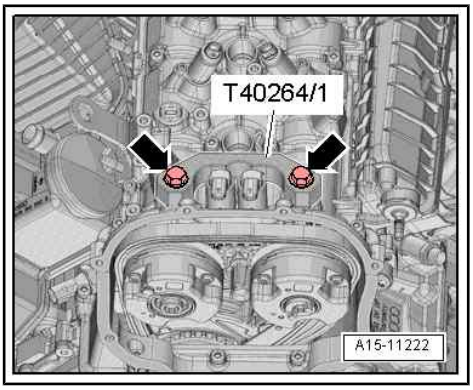
– Attach both camshaft adjusters to cylinder head without camshaft timing chain, fit bolts -1, 2- without tightening.



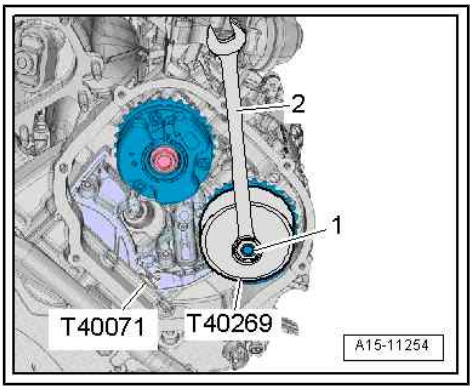
– Fit key - T40269- onto camshaft adjuster of exhaust camshaft (right-side) and counterhold with a ring spanner -2-.
– Hand-tighten bolt -1-.
– Using ring spanner, turn exhaust camshaft clockwise until thread for camshaft clamp is centred at bottom of hole in camshaft housing.



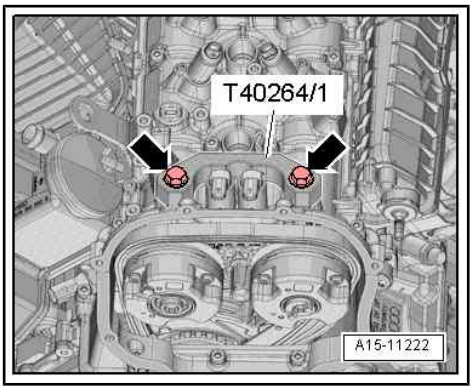
– Tighten bolt (left-side) -left arrow- at camshaft clamp - T40264/1- .



– Fit key - T40269- onto camshaft adjuster of inlet camshaft (right-side) and counterhold with a ring spanner -2-.
– Hand-tighten bolt -1-.
– Using ring spanner, turn inlet camshaft clockwise until thread for camshaft clamp is centred at bottom of hole in camshaft housing.

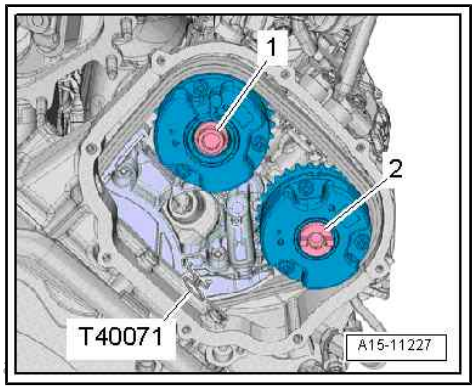


– Tighten bolt (right-side) -right arrow- at camshaft clamp - T40264/1- .



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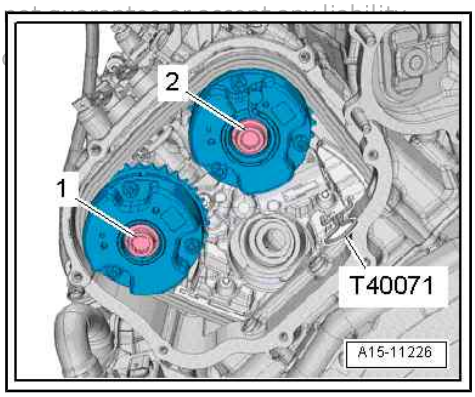
– Remove bolts -1, 2- (counterhold using ring spanner) and detach camshaft adjuster.



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Cylinder bank 2 (left-side):

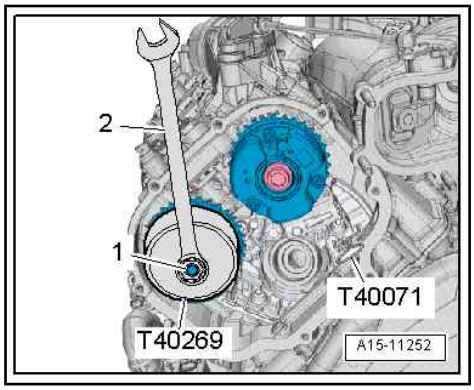
– Attach both camshaft adjusters to cylinder head without camshaft timing chain, fit bolts -1, 2- without tightening.



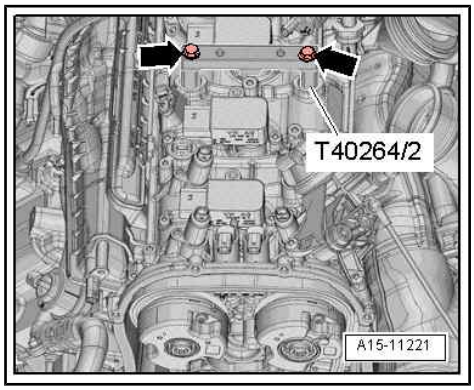
– Fit key - T40269- onto camshaft adjuster of inlet camshaft (left-side) and counterhold with a ring spanner -2-.

– Hand-tighten bolt -1-.

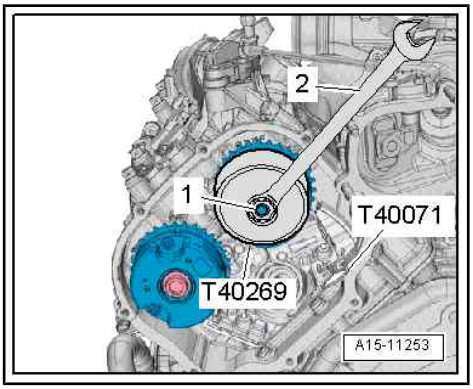
– Using ring spanner, turn inlet camshaft anti-clockwise until thread for camshaft clamp is centred at bottom of hole in camshaft housing.



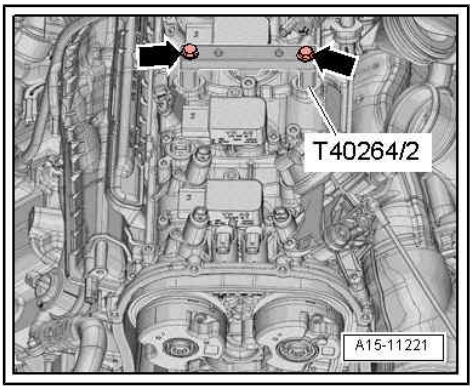
– Tighten bolt (left-side) -left arrow- at camshaft clamp - T40264/2- .



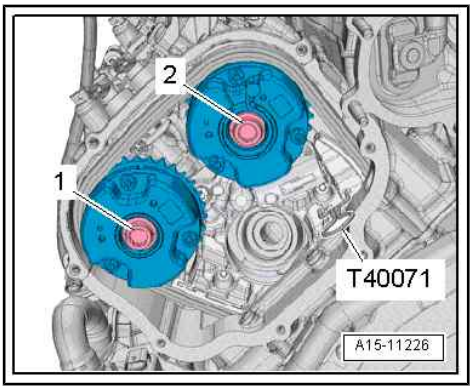
– Fit key - T40269- onto camshaft adjuster of exhaust camshaft (left-side) and counterhold with a ring spanner -2-.
– Hand-tighten bolt -1-.
– Using ring spanner, turn exhaust camshaft anti-clockwise until thread for camshaft clamp is centred at bottom of hole in camshaft housing.



– Tighten bolt (right-side) -right arrow- at camshaft clamp - T40264/2- .



– Remove bolts -1, 2- (counterhold using ring spanner and key - T40269-) and detach camshaft adjuster.

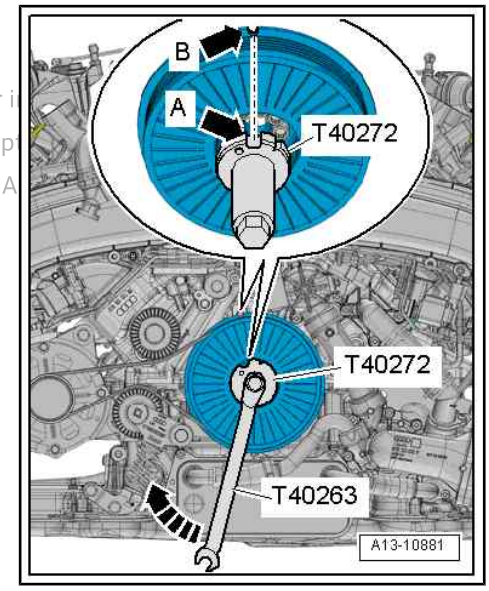


Continued for both cylinder banks:

– Fit turning-over tool - T40272- onto wrench (21 mm) - T40263- .

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– Position adapter on bolts of vibration damper.
– Semi-circular recess -arrow A- on turning-over tool - T40272- must point to semi-circular recess -arrow B- on vibration damper.

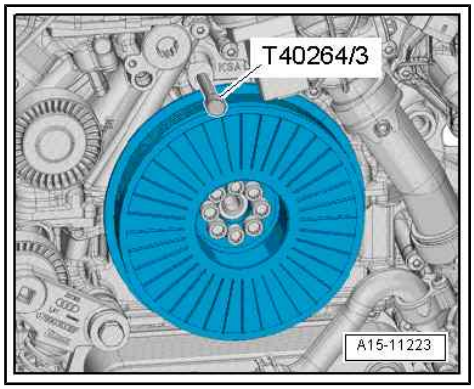


Note

Disregard notch on turning-over tool - T40272- .

– Rotate crankshaft in normal direction of rotation -arrow- to “TDC”.

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



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

– Install vacuum unit for turbocharger ⇒ page 333 .
– Install coolant pipe (right-side) ⇒ page 278 .
– Fit timing chain on camshafts ⇒ page 139 .
– Install high-pressure pipe ⇒ page 416 .
– Install high-pressure pump ⇒ page 412 .
– Install ignition coils ⇒ page 452 .

Caution

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

- ***The hydraulic tappets have to settle; wait for approx. 30 minutes after installing camshafts before starting engine.***
- ***Turn the engine carefully at least 2 rotations to ensure that none of the valves make contact when the starter is operated.***

Tightening torques

- ⇒ Fig. ""Camshaft housing - tightening torque and sequence"", page 175
- ⇒ "3.1 Exploded view - coolant pipes", page 278

4.5 Removing and installing cam actuators

Removing

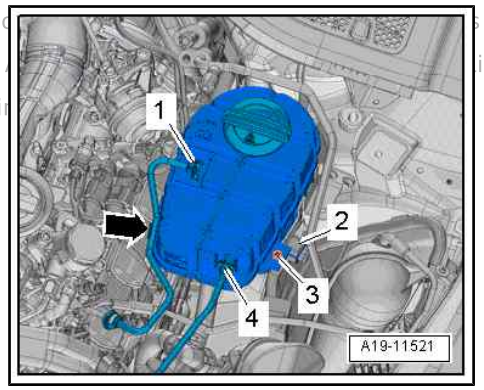
Cylinder bank 1 (right-side):

– Remove air cleaner housing ⇒ page 379 .

Cylinder bank 2 (left-side):

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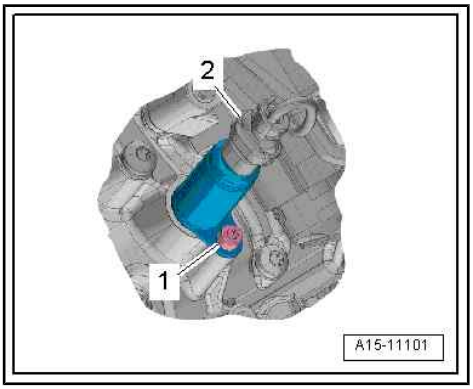
– Release retaining clips -1, 4- and disconnect coolant hoses.
– Move coolant hose -arrow- clear.
– Unplug electrical connector -2-.
– Remove bolt -3-.
– Lift coolant expansion tank out of bracket and push towards front.



Both sides (continued):

– Unplug relevant electrical connector -2-.

– Remove bolt -1- and pull off cam actuator.



Installing

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

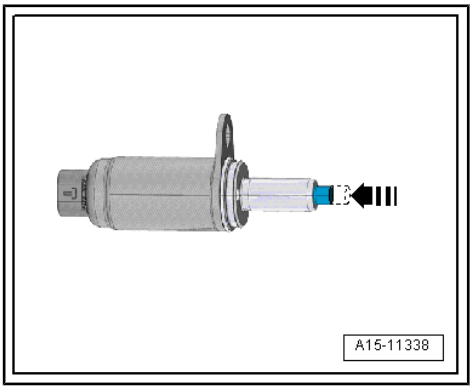
Note

Check O-rings for damage.

Caution

Risk of damage to engine.

- ***Pins of all actuators for camshaft adjustment must be brought into installation position.***



– Press down pins of actuators for camshaft adjustment -arrow- by hand.

• Pins of all actuators must not be in extended position.

– Install air cleaner housing ⇒ page 379 .

Tightening torques

- ⇒ “4.1 Exploded view - valve gear”, page 171

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4.6 Removing and installing camshaft control valves

⇒ “4.6.1 Removing and installing camshaft control valves N205 / N318 , cylinder bank 1 (right-side)”, page 194

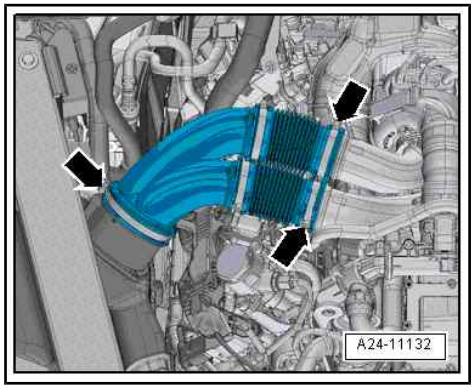
⇒ “4.6.2 Removing and installing camshaft control valves N208 / N319 , cylinder bank 2 (left-side)”, page 195

4.6.1 Removing and installing camshaft control valves -N205- / -N318- , cylinder bank 1 (right-side)

Removing

– Remove engine cover panel ⇒ page 82 .

– Loosen hose clips -arrows- and detach air pipe.



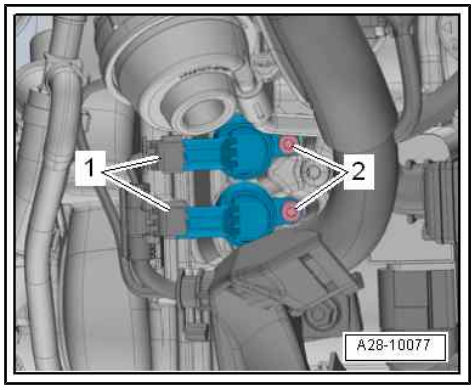
WARNING

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

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

– Unplug relevant electrical connector -1-.

– Unscrew bolt -2- and detach valve.



Installing

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

Note

Fit new O-rings.

WARNING

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

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

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Tightening torques

- ⇒ “4.1 Exploded view - valve gear”, page 171

4.6.2 Removing and installing camshaft control valves -N208- / -N319- , cylinder bank 2 (left-side)

Removing

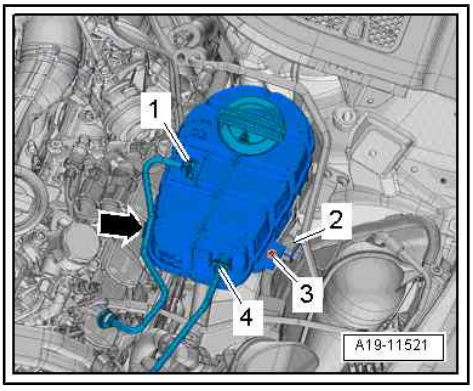
– Remove engine cover panel ⇒ page 82 .

WARNING

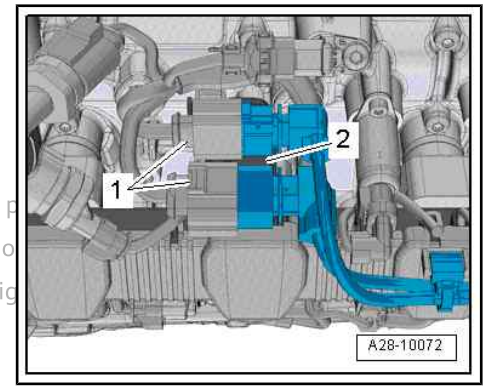
Danger of fire and damage if the engine cover panel is not fitted.

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

– Release retaining clips -1, 4- and disconnect coolant hoses.
– Move coolant hose -arrow- clear.
– Unplug electrical connector -2-.
– Remove bolt -3-.
– Lift coolant expansion tank out of bracket and push towards front.

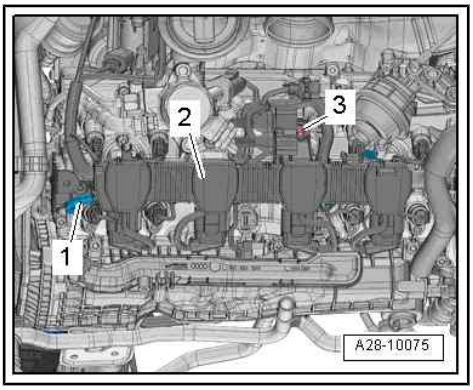


– Take electrical connectors -1- out of bracket -2-, unplug connectors and move wiring clear.
– Unclip bracket upwards.

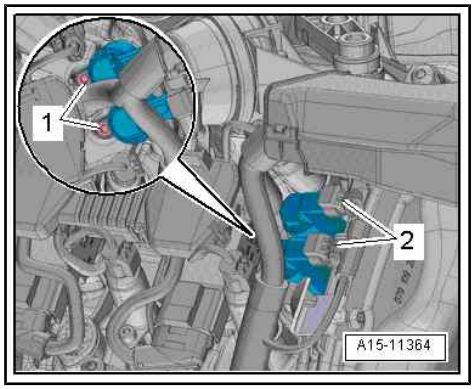


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– Remove bolt -1- and centre hex stud -3- and press cable guide -2- slightly towards front.



– Unplug electrical connectors -2-.
– Push wiring harness to one side.
– Unscrew bolt -1- and detach valve.



Installing

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

Note

Fit new O-rings.

WARNING

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

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

Tightening torques

- ⇒ “4.1 Exploded view - valve gear”, page 171

4.7 Removing and installing valve stem oil seals

⇒ “4.7.1 Removing and installing valve stem oil seals (cylinder head installed)”, page 196

⇒ “4.7.2 Removing and installing valve stem oil seals (cylinder head removed)”, page 200

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4.7.1 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 oil seal fitting tool - 3365-

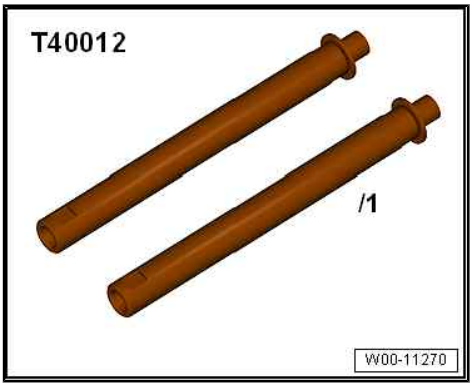


- Removal and installation device for valve cotters - VAS 5161 A- with guide plate -VAS 5161/19C- , or substitute -VAS 5161/19B-

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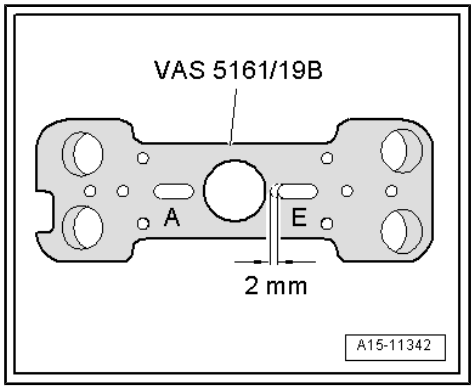


- Adapters - T40012-



- Assembly sleeve ⇒ Electronic parts catalogue

Modifying guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B- :



Note

Guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19C- may also be used instead of guide plate -VAS 5161/19B- . To do so, it must be modified as follows:

– Lengthen elongated hole by 2 mm, as shown in the illustration.

Note

In this case, the guide plate is only secured on cylinder head with one knurled screw.

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Procedure

– Remove both camshafts on both sides ⇒ page 176 .

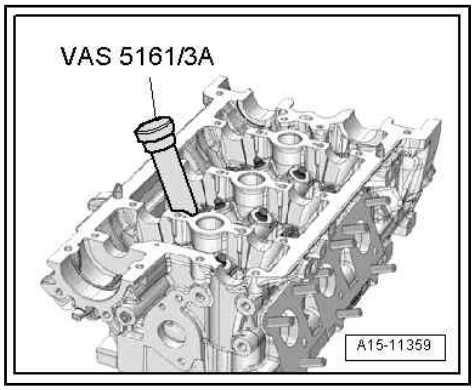
– Mark original positions of roller rocker fingers and hydraulic compensation elements for re-installation.

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

– Unscrew spark plugs using spark plug socket - 3122 B- .

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

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



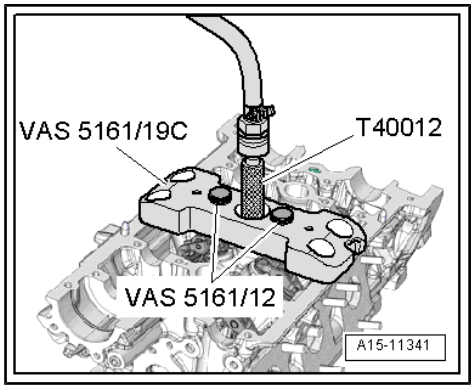
– Fit guide plate -VAS 5161/19C- onto cylinder head.

– Secure guide plate with knurled screws -VAS 5161/12- .

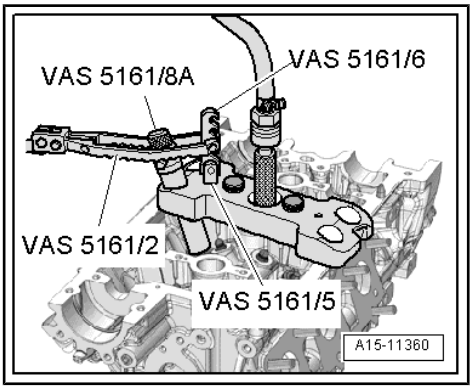
– Screw adapter - T40012- with seal hand-tight into the corresponding spark plug thread.

– Connect adapter to compressed air line using a commercially available connection piece and apply constant air pressure.

• Minimum pressure: 6 bar

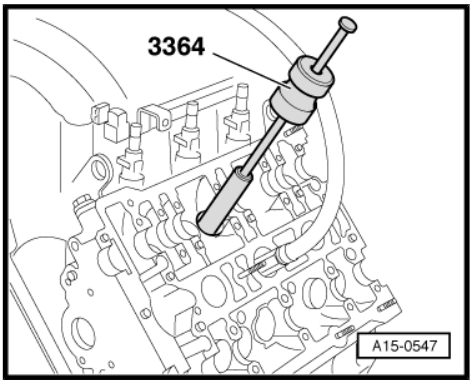


– Screw snap-in device -VAS 5161/6- with engaging fork -VAS 5161/5- into guide plate.
– Insert assembly cartridge -VAS 5161/8- in guide plate.
– Attach pressure fork -VAS 5161/2- to snap-in device and push assembly cartridge down.
– At the same time, turn knurled screw of assembly cartridge clockwise until tips engage in valve cotters.
– Move knurled screw back and forth slightly; the valve cotters are thus forced apart and taken up by the assembly cartridge.
– Release pressure fork.
– Take out assembly cartridge.
– Detach guide plate and turn to one side.



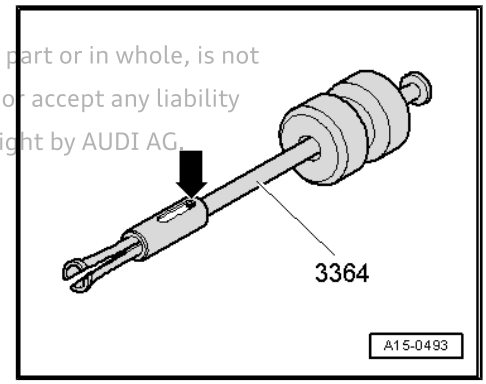
• The compressed air hose remains connected.

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



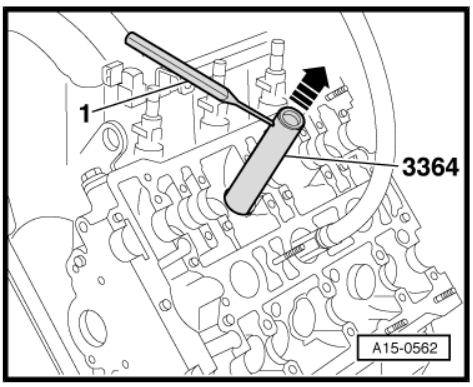
If the valve stem seal puller - 3364- cannot be used on some of the valve stem oil seals due to the confined space, proceed as follows:

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



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

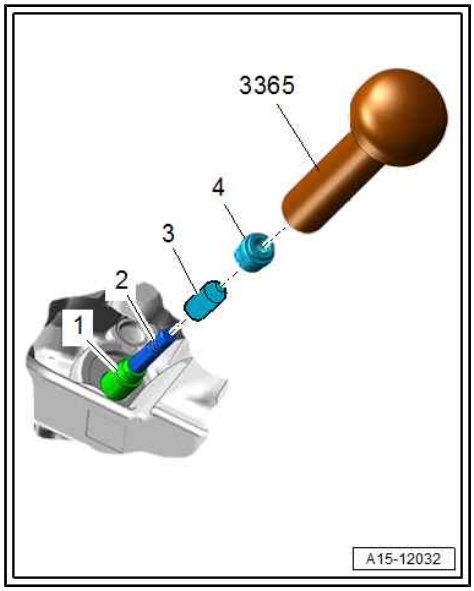


- To avoid damaging the new valve stem oil seal -4- during installation, fit the assembly sleeve -3- onto the valve stem -2-.

– Lightly oil sealing lip of valve stem oil seal.

– Insert valve stem oil seal into valve shaft seal fitting tool - 3365- and use assembly sleeve to carefully press it onto valve guide -1- as far as stop.

– Remove assembly sleeve .

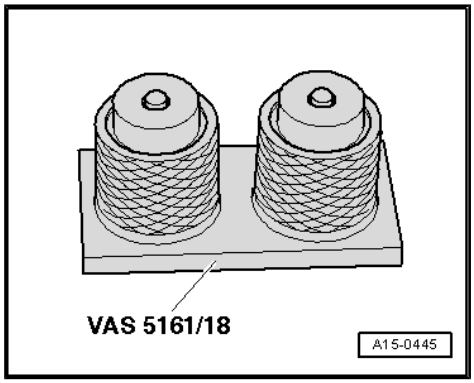


If valve cotters have been removed from assembly cartridge, they must first be inserted in insertion device -VAS 5161/18- .

- Larger diameter of valve cotters faces upwards.

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

– Insert valve spring and valve spring plate; for allocation, refer to ⇒ page 174 .



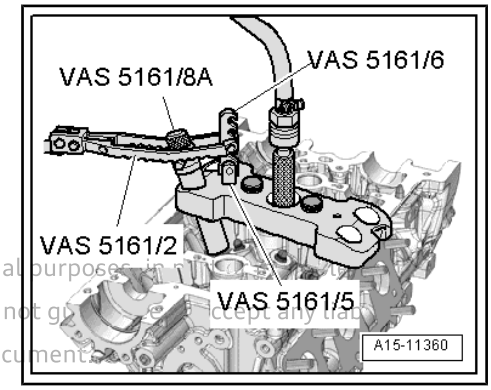
– Secure guide plate -VAS 5161/19C- back onto cylinder head.

– Insert assembly cartridge in guide plate.

– Press down pressure fork and pull knurled screw upwards while turning screw in both directions - this will insert the valve cotters.

– Release pressure fork with knurled screw still in pulled position.

– Repeat procedure for each valve.



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Assembling

– Ensure that all roller rocker fingers make contact with the ends of the valve stems correctly and are clipped onto their respective hydraulic compensation elements.

– Install spark plugs ⇒ Maintenance ; Booklet 411 .

– Install camshafts ⇒ page 176 .

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

Special tools and workshop equipment required

- Valve stem seal puller - 3364-

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- Valve stem oil seal fitting tool - 3365-



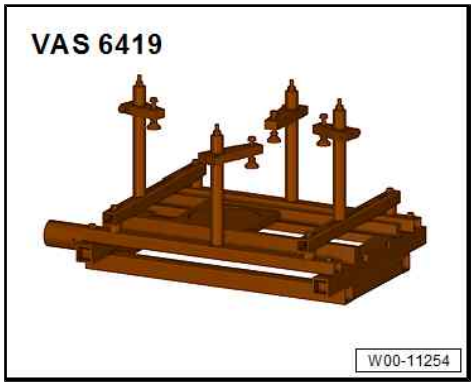
- Removal and installation device for valve cotters - VAS 5161 A- with guide plate -VAS 5161/19C- , or substitute -VAS 5161/19B-



- Engine and gearbox support - VAS 6095A-

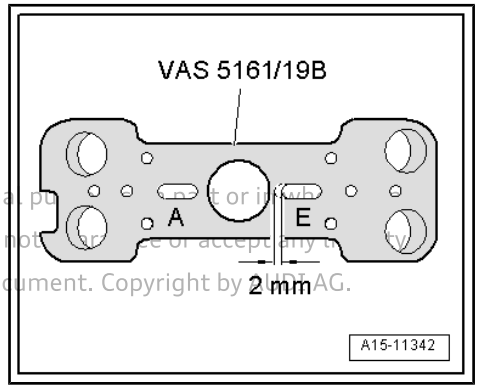


♦ Cylinder head tensioning device - VAS 6419-



♦ Assembly sleeve ⇒ Electronic parts catalogue

Modifying guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19B- :



Note

Guide plate for 2.0 ltr. and 3.0 ltr. FSI engine - VAS 5161/19C- may also be used instead of guide plate -VAS 5161/19B- . To do so, it must be modified as follows:

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– Lengthen elongated hole by 2 mm, as shown in the illustration.

Note

In this case, the guide plate is only secured on cylinder head with one knurled screw.

Procedure

– Remove intake manifold ⇒ page 384 .

– 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.

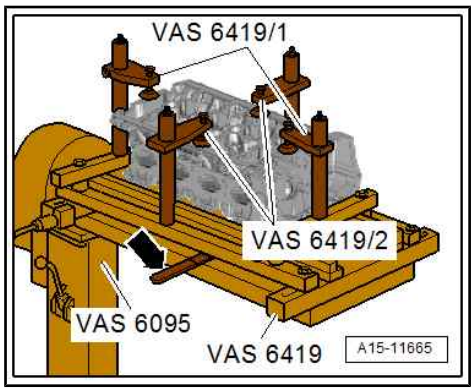
– Insert cylinder head tensioning device - VAS 6419- into engine and gearbox support - VAS 6095A- .

– Secure cylinder head in cylinder head tensioning device, as shown in illustration.

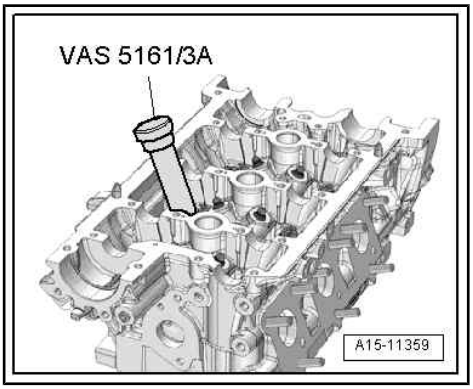
– Connect cylinder head tensioning device to compressed air supply.

– Using lever -arrow-, slide air pad under combustion chamber where valve stem oil seal is to be removed.

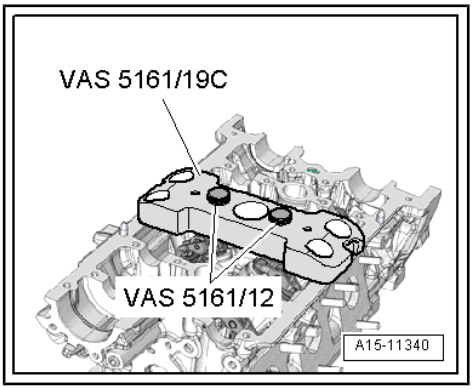
– Apply just enough compressed air to bring air pad into contact with valve heads.



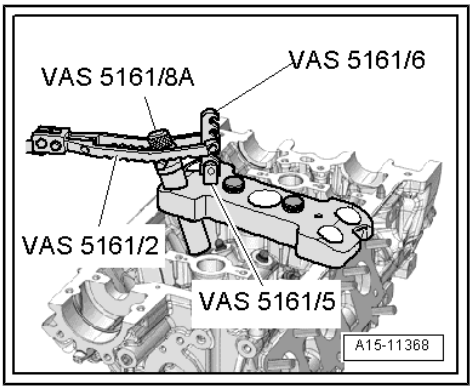
– Apply drift -VAS 5161/3- to valve spring plate and use plastic-headed hammer to release sticking valve cotters.



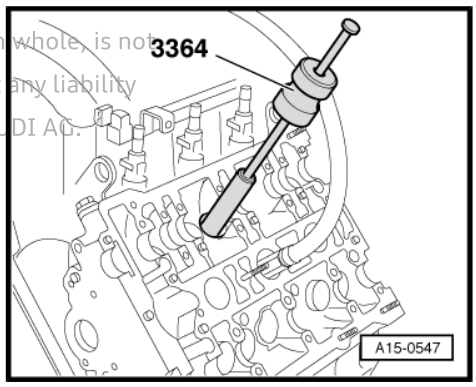
– Fit guide plate -VAS 5161/19C- onto cylinder head.
– Secure guide plate with knurled screws -VAS 5161/12- .



– Screw snap-in device -VAS 5161/6- with engaging fork -VAS 5161/5- into guide plate.
– Insert assembly cartridge -VAS 5161/8- in guide plate.
– Attach pressure fork -VAS 5161/2- to snap-in device and push assembly cartridge down.
– At the same time, turn knurled screw of assembly cartridge clockwise until tips engage in valve cotters.
– Move knurled screw back and forth slightly; the valve cotters are thus forced apart and taken up by the assembly cartridge.
– Release pressure fork.
– Take out assembly cartridge.
– Detach guide plate and turn to one side.
– Detach valve spring with valve spring plate.



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



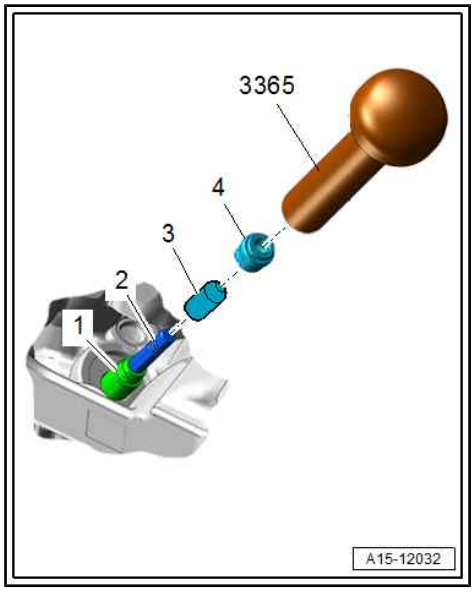
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- To avoid damaging the new valve stem oil seal -4- during installation, fit the assembly sleeve -3- onto the valve stem -2-.

– Lightly oil sealing lip of valve stem oil seal.

– Insert valve stem oil seal into valve shaft seal fitting tool - 3365- and use assembly sleeve to carefully press it onto valve guide -1- as far as stop.

– Remove assembly sleeve .

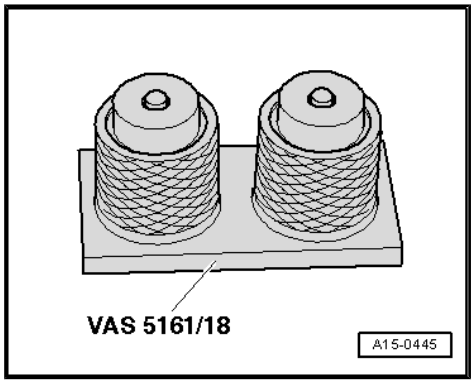


If valve cotters have been removed from assembly cartridge, they must first be inserted in insertion device -VAS 5161/18- .

- Larger diameter of valve cotters faces upwards.

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

– Insert valve spring and valve spring plate; for allocation, refer to ⇒ page 174 .



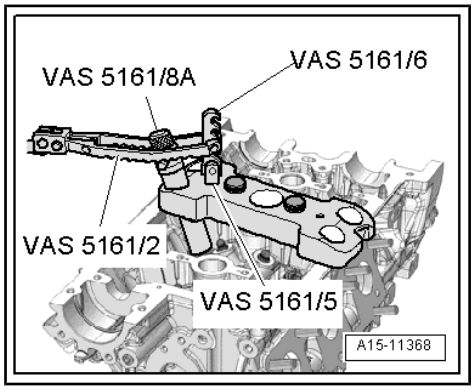
– Secure guide plate -VAS 5161/19C- back onto cylinder head.

– Insert assembly cartridge in guide plate.

– Press down pressure fork and pull knurled screw upwards while turning screw in both directions - this will insert the valve cotters.

– Release pressure fork with knurled screw still in pulled position.

– Repeat procedure for each valve.



Assembling

Assembly is performed in reverse sequence; note the following:

– Ensure that all roller rocker fingers make contact with the ends of the valve stems correctly and are clipped onto their respective hydraulic compensation elements.

– Install intake manifold ⇒ page 384 .

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5 Inlet and exhaust valves

⇒ “5.3 Valve dimensions”, page 206

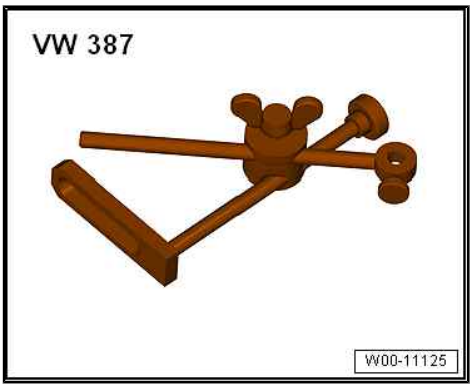
⇒ “5.1 Checking valve guides”, page 205

⇒ “5.2 Checking valves”, page 206

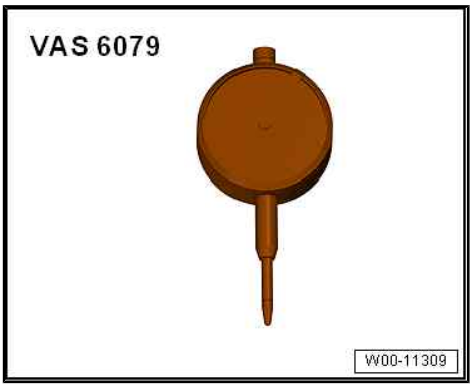
5.1 Checking valve guides

Special tools and workshop equipment required

- Universal dial gauge bracket - VW 387-



- Dial gauge - VAS 6079-



Procedure

Note

- *If the valve has to be renewed as part of a repair, use a new valve for the measurement.*
- *Only insert inlet valve into inlet valve guide and exhaust valve into exhaust valve guide, as the stem diameters are different.*

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



– Insert valve into guide.

• End of valve stem must be flush with valve guide.

– Measure the amount of sideways play.

• Wear limit: 0.8 mm.

– If the wear limit is exceeded, repeat the measurement with new valves.

– Renew cylinder head if wear limit is still exceeded.

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Note

Valve guides cannot be renewed.

5.2 Checking valves

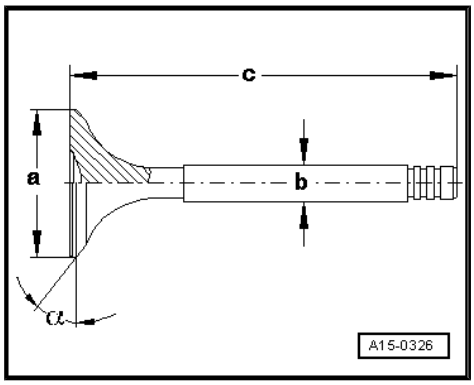
– Visually inspect for scoring on valve stems and valve seat surfaces.

– 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 ± 0.007	5.935 ± 0.007
c	mm	103.97 ± 0.20	101.87 ± 0.2
α	∠°	45	45

WARNING

Care must be taken when disposing of old sodium-cooled exhaust valves - risk of injury.

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

17 – Lubrication

1 Sump/oil pump

⇒ “1.1 Exploded view - sump/oil pump”, page 207

⇒ “1.2 Engine oil”, page 211

⇒ “1.3 Removing and installing sump (bottom section)”, page 211

⇒ “1.4 Removing and installing sump (top section)”, page 214

⇒ “1.5 Removing and installing oil pump”, page 218

⇒ “1.6 Removing and installing oil level and oil temperature sender G266 ”, page 220

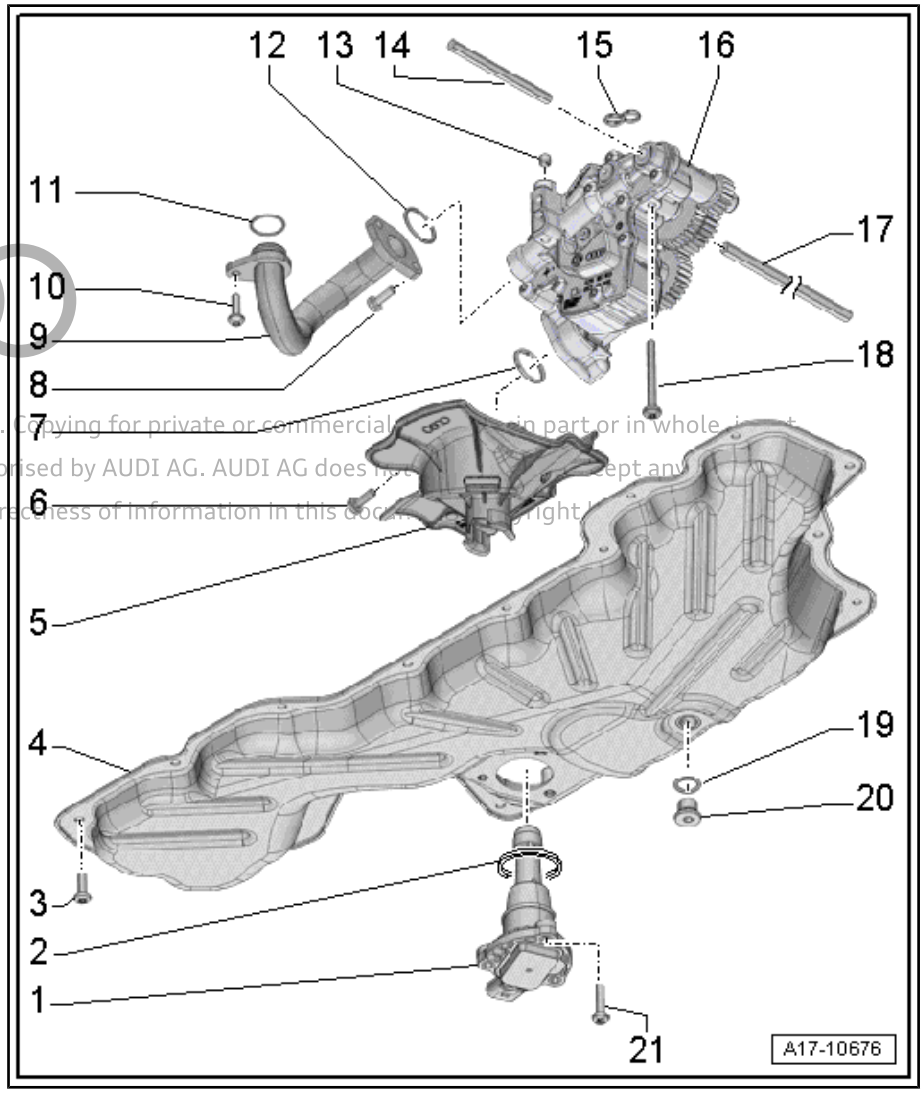
1.1 Exploded view - sump/oil pump

Note

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

Sump (bottom section)/oil pump

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1 - Oil level and oil temperature sender - G266-
- ❑ Removing and installing ⇒ page 220

2 - Seal
- ❑ Renew

3 - Bolt
- ❑ Renew
- ❑ Tightening torque and sequence ⇒ page 209

4 - Sump (bottom section)
- ❑ Removing and installing ⇒ page 211

5 - Intake connecting pipe
- ❑ For oil pump

6 - Bolt
- ❑ 9 Nm

7 - O-ring
- ❑ Renew

8 - Bolt
- ❑ Renew
- ❑ 8 Nm +90°

9 - Oil pipe
- ❑ Removing and installing ⇒ “1.5 Removing and installing oil pump”, page 218

10 - Bolt
- ❑ Renew
- ❑ 8 Nm +90°

11 - O-ring
- ❑ Renew

12 - Seal
- ❑ Renew

13 - Dowel sleeve
- ❑ 2x

14 - Drive shaft
- ❑ For coolant pump

15 - Gasket
- ❑ Renew

16 - Oil pump
- ❑ Do not dismantle
- ❑ With pressure control valve
- ❑ Removing and installing ⇒ page 218

17 - Drive shaft
- ❑ For oil pump

18 - Bolt
- ❑ Renew

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❑ 8 Nm +90°

19 - Seal

❑ Renew

20 - Oil drain plug

❑ 20 Nm

21 - Bolt

❑ 9 Nm

Sump (bottom section) - tightening torque and sequence

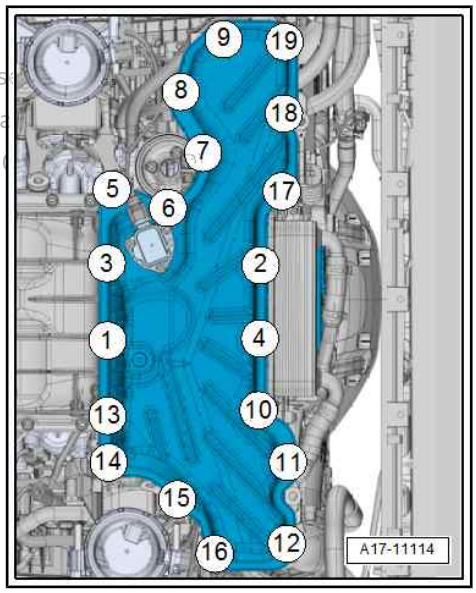
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Note

Renew bolts tightened with specified tightening angle.

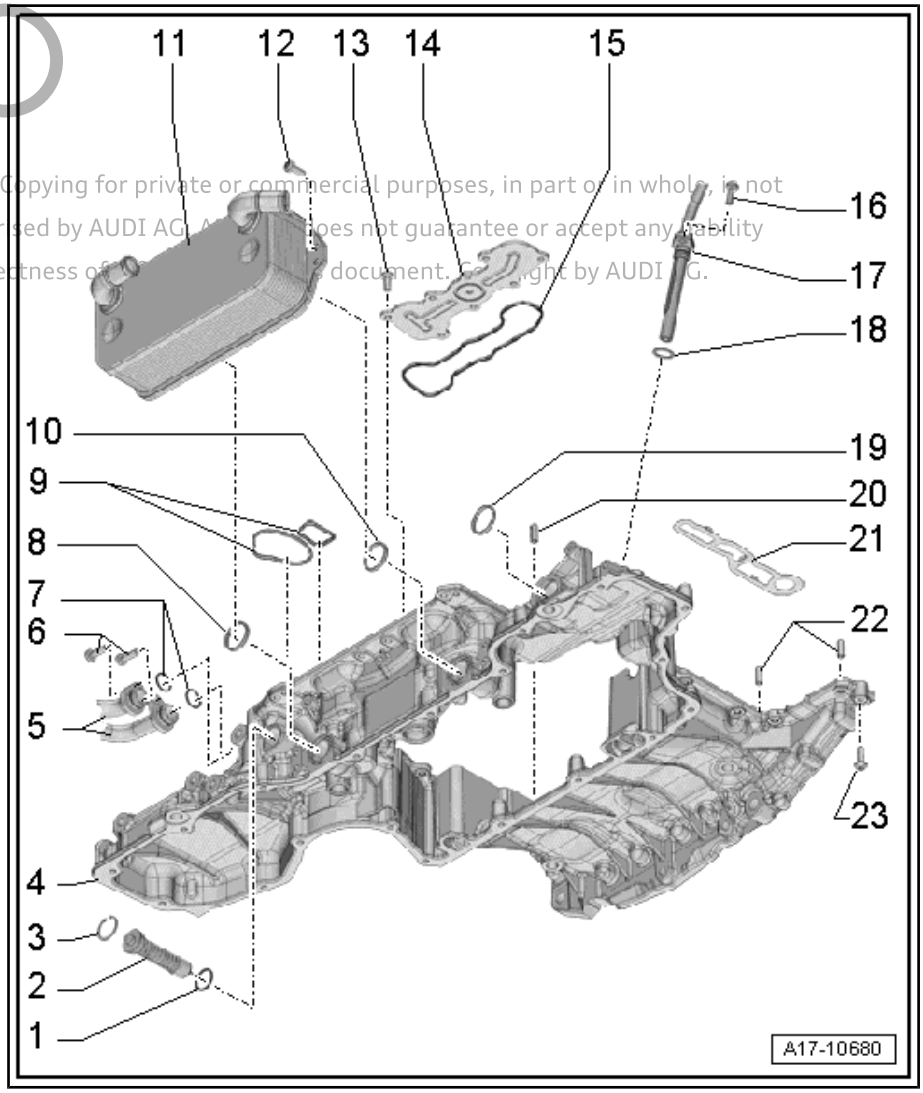
– Tighten bolts in stages as follows:

Stage	Bolts	Tightening torque/angle specification
1.	-1 ... 19-	Screw in by hand until contact is made
2.	-1 ... 19-	5 Nm
3.	-1 ... 19-	Turn 90° further



Sump (top section)

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1 - O-ring
- ❑ For Audi RS 6/RS 7
- ❑ Renew

2 - Temperature regulator
- ❑ For Audi RS 6/RS 7
- ❑ Comprised of thermal element, spring and cap

3 - Circlip
- ❑ For temperature regulator
- ❑ For Audi RS 6/RS 7

4 - Sump (top section)
- ❑ Removing and installing ⇒ page 214

5 - Oil lines
- ❑ For Audi RS 6/RS 7

6 - Bolts
- ❑ For Audi RS 6/RS 7
- ❑ 9 Nm

7 - O-rings
- ❑ For Audi RS 6/RS 7
- ❑ Renew

8 - O-ring
- ❑ Renew

9 - Gaskets
- ❑ Renew

10 - O-ring
- ❑ Renew

11 - Engine oil cooler (front)
- ❑ Removing and installing ⇒ page 223
- ❑ If renewed, refill system with fresh coolant

12 - Bolt
- ❑ Tightening torque ⇒ Item 2 (page 221)

13 - Bolt
- ❑ 8 Nm

14 - Cover

15 - Gasket
- ❑ Renew

16 - Bolt
- ❑ 9 Nm

17 - Guide tube
- ❑ For oil dipstick

18 - O-ring
- ❑ Renew

19 - O-ring
- ❑ Renew

20 - Dowel pin

21 - Gasket

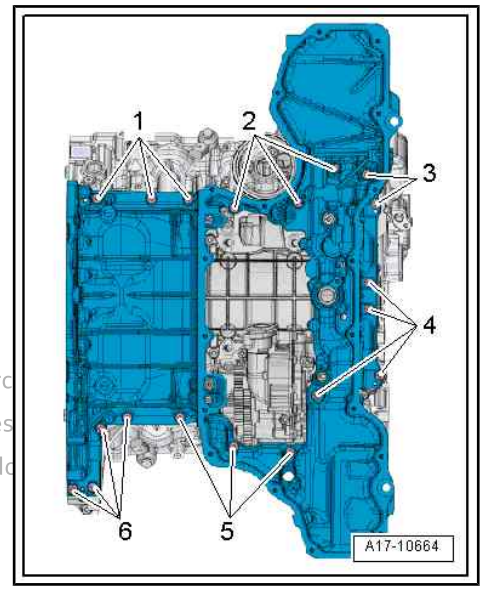
- ❑ Renew

22 - Dowel pins

23 - Bolt

- ❑ Tightening torque and sequence ⇒ page 211

Sump (top section) - tightening torque and sequence



Note

Renew bolts tightened with specified tightening angle.

– Tighten bolts in stages as follows:

Stage	Bolts	Tightening torque/angle specification
1.	-1 … 6-	Screw in by hand until contact is made
2.	-1 … 6-	5 Nm in diagonal sequence
3.	-1 … 6-	Turn 90° further in diagonal sequence

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1.2 Engine oil

Caution

Risk of damage to catalytic converter.

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

Oil capacities, oil specifications and viscosity grades ⇒ Maintenance tables .

1.3 Removing and installing sump (bottom section)

Special tools and workshop equipment required

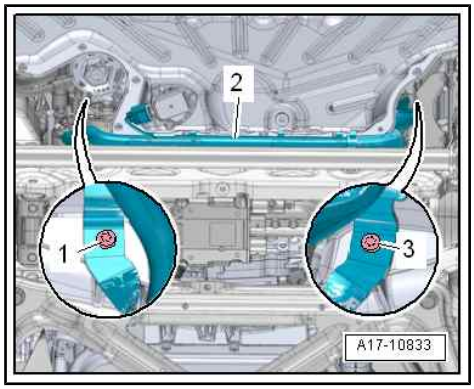
- ♦ Electric drill with plastic brush attachment
- ♦ Safety goggles
- ♦ Sealant ⇒ Electronic parts catalogue

Removing

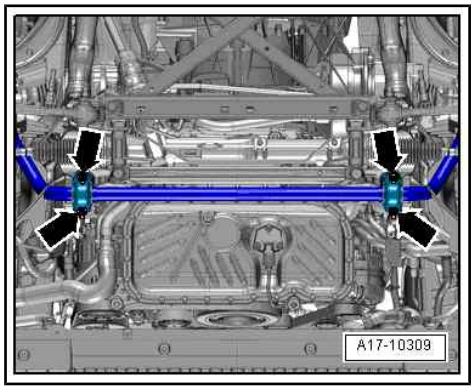
- Engine oil drained ⇒ Maintenance ; Booklet 411

– Remove bolt -1- and only loosen bolt -3- (do not remove it).

– Press bracket -2- with electrical wiring harness towards rear.



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



– Unplug electrical connector -1- at oil level and oil temperature sender - G266- .

– Move electrical wiring clear.

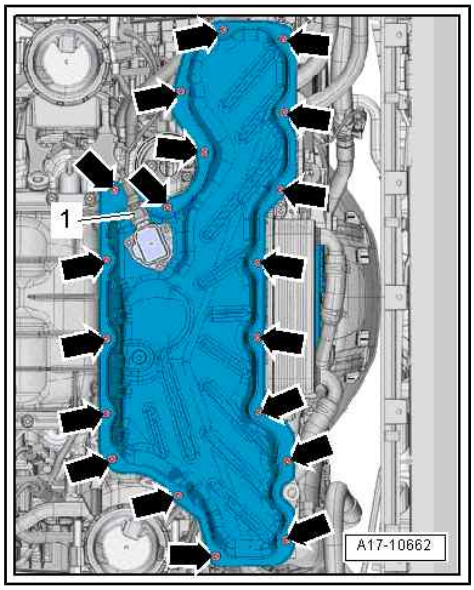
Caution

Take care to keep components clean.

- *There will still be some oil in the sump (bottom section).*

– Loosen bolts -arrows- in diagonal sequence and remove.

– Carefully release sump (bottom section) from bonded joint and detach.



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Installing

Caution

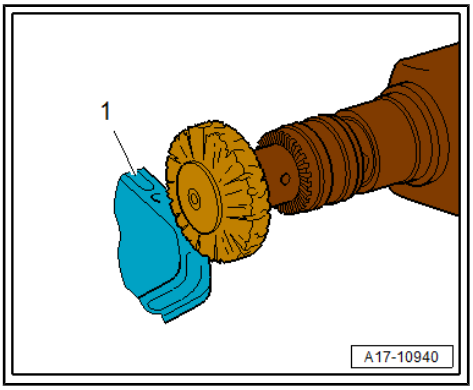
Protect lubrication system and bearings against contamination.

- *Cover exposed parts of the engine.*

WARNING

Risk of eye injury.

- *Put on safety goggles.*

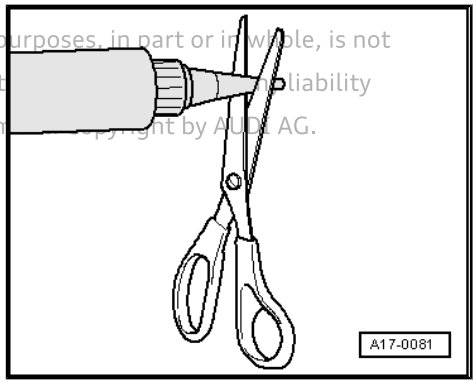


– Remove remaining sealant on sump (bottom section) -1- and sump (top section) with a rotating plastic brush or similar.

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

Note

Note the use-by date of the sealant.



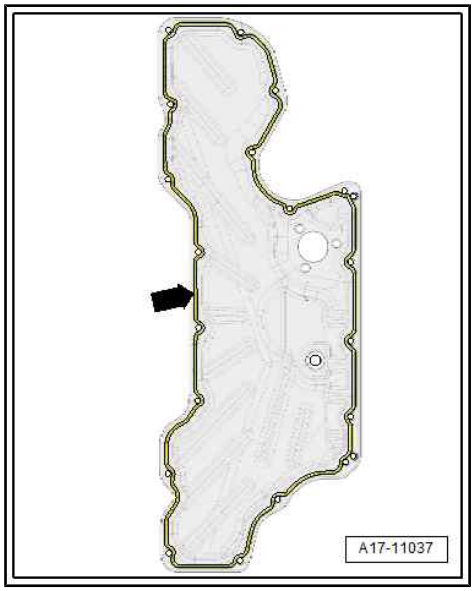
– Cut off nozzle of tube at front marking (nozzle ∅ approx. 2 mm).

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Caution

Make sure lubrication system is not clogged by excess sealant.

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



– Apply sealant bead -arrow- onto clean sealing surface of sump (bottom section) as shown in illustration.

• Width of sealant bead: 2.5 mm.

Note

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

– Fit sump (bottom section) and tighten bolts ⇒ page 209 .

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

– Install anti-roll bar ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Removing and installing anti-roll bar .

– Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 411 .

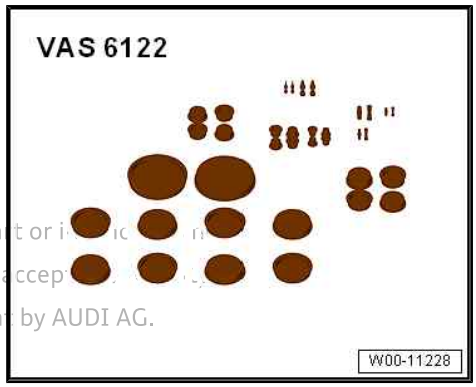
Tightening torques

- ⇒ Fig. ""Sump (bottom section) - tightening torque and sequence"" , page 209
- ⇒ "3.1 Exploded view - coolant pipes", page 278

1.4 Removing and installing sump (top section)

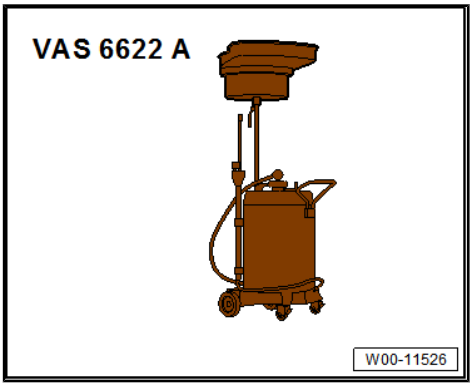
Special tools and workshop equipment required

- Engine bung set - VAS 6122-



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



♦ Safety goggles

♦ Electric drill with plastic brush attachment

♦ Sealant ⇒ Electronic parts catalogue

Removing

• Engine removed and secured to engine and gearbox support ⇒ page 56

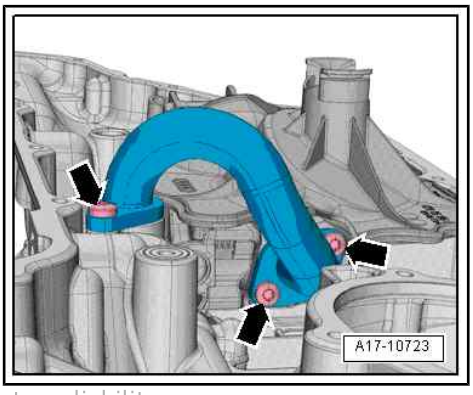
• Engine oil drained ⇒ Maintenance ; Booklet 411

– Remove timing chain cover (bottom) ⇒ page 127 .

– Remove sump (bottom section) ⇒ page 211 .

– Remove coolant pump ⇒ page 270 .

– Place used oil collection and extraction unit - VAS 6622A- under engine and leave in position for the following procedure.



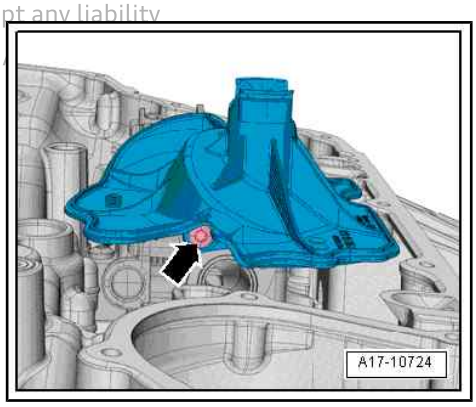
Note

Some oil will come out when oil pipe is removed.

– Remove bolts -arrows- and take out oil pipe.

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– Remove bolt -arrow- and take out intake connecting pipe.

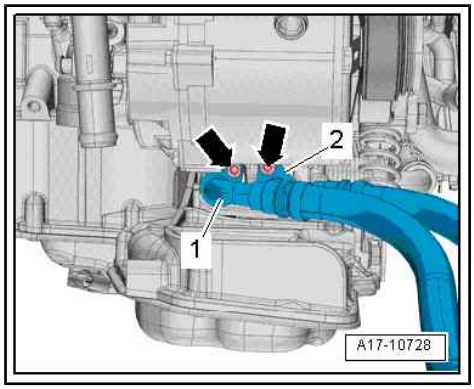


– Remove poly V-belt tensioner ⇒ page 85 .

Audi RS 6/RS 7:

– Remove bolts -arrows- and disconnect oil lines -1, 2-.

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

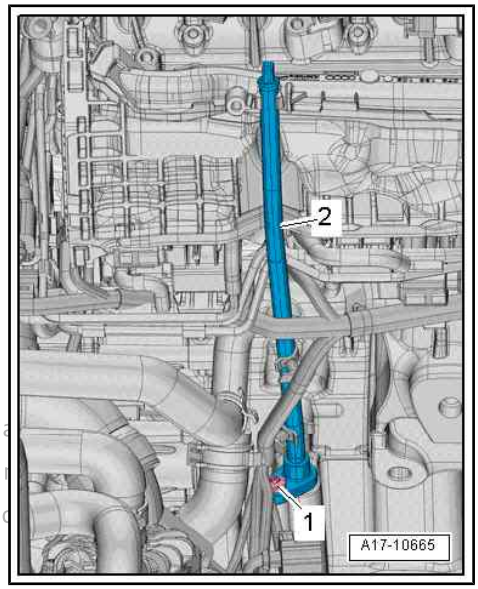


All vehicles (continued):

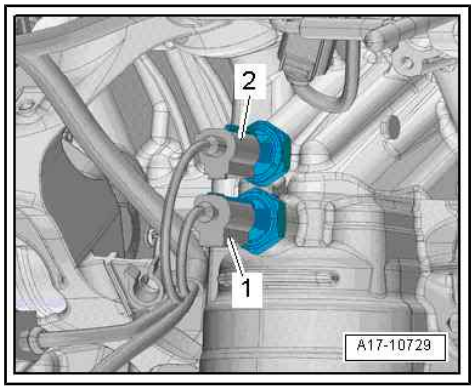
– Move clear electrical wiring at guide tube for oil dipstick.

– Remove bolt -1-, unclip guide tube -2- for oil dipstick from intake manifold and detach.

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– Unplug electrical connector -1-.

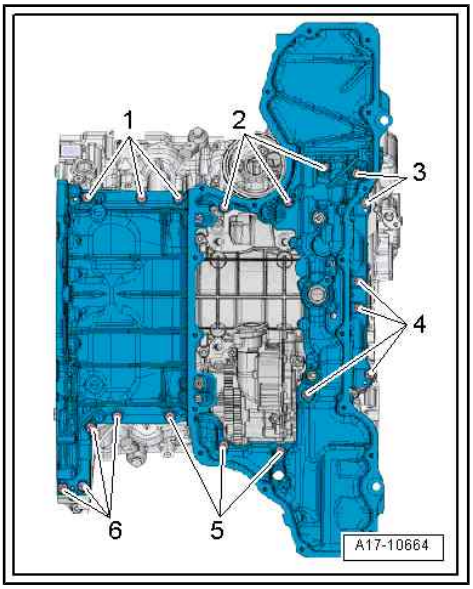


Note

Disregard -item 2-.

– Slacken bolts -1 ... 6- in diagonal sequence and remove.

– Carefully release sump (top section) from bonded joint, pry sump off dowel sleeves and detach.



Installing

Note

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

Caution

Protect lubrication system and bearings against contamination.

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

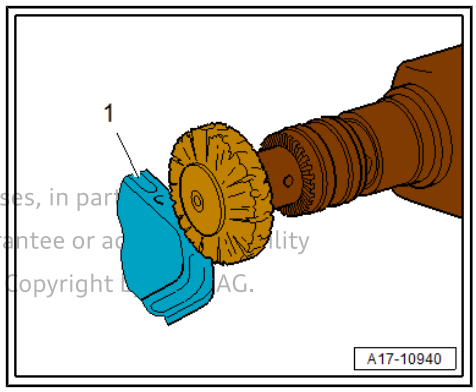
WARNING

Risk of eye injury.

- ***Put on safety goggles.***

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– Remove remaining sealant from sump (top section) and retaining frame -1- using rotating plastic brush or similar.

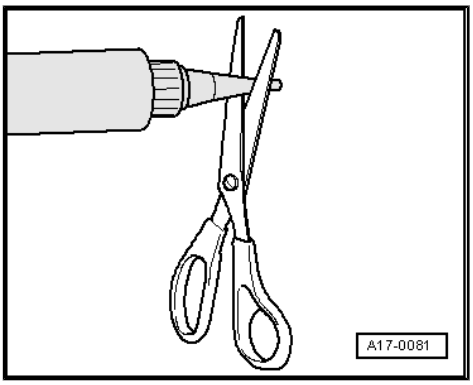


– Clean sealing surfaces; they must be free of oil and grease.

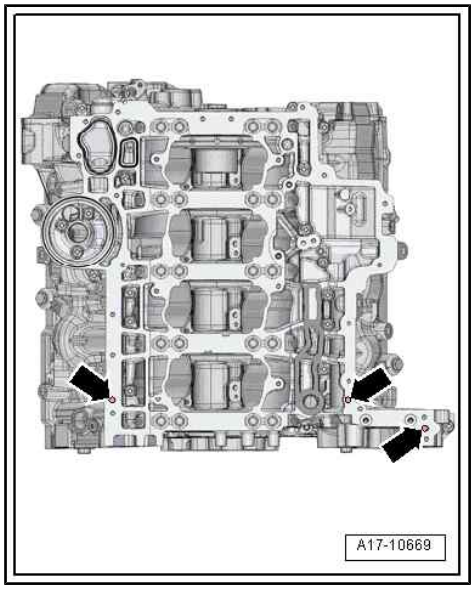
Note

Note the use-by date of the sealant.

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



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



– Fit new gaskets -3, 4- in grooves on retaining frame.

– Secure steel gasket -5- on retaining frame.

Caution

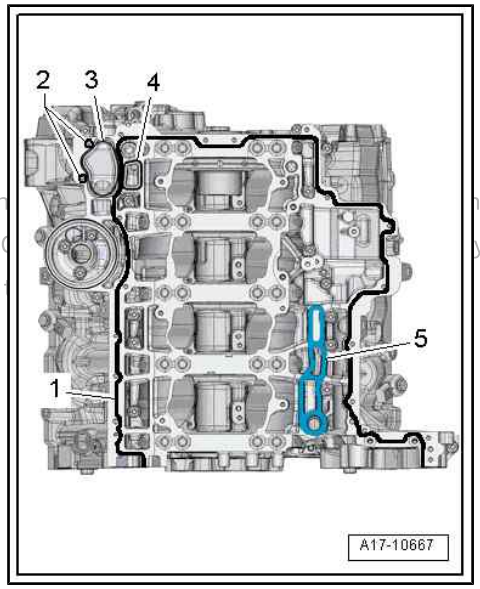
Make sure lubrication system is not clogged by excess sealant.

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

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– Apply beads of sealant -1, 2- onto clean sealing surface of sump (top section) as shown in illustration.

- Width of sealant bead: 2.0 mm.



Note

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

– Fit sump (top section) and tighten bolts ⇒ page 211 .

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

– Install timing chain cover (bottom) ⇒ page 127 .

– Install poly V-belt tensioner ⇒ page 85 .

– Install coolant pump ⇒ page 270 .

– Install sump (bottom section) ⇒ page 211 .

– Install timing chain cover (bottom) ⇒ page 127 .

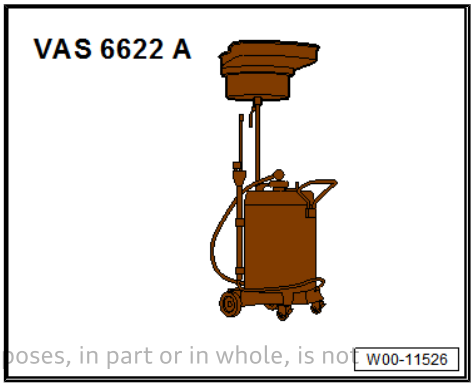
Tightening torques

- ⇒ Fig. ““Sump (top section) - tightening torque and sequence”“ , page 211
- ⇒ “1.1 Exploded view - sump/oil pump”, page 207

1.5 Removing and installing oil pump

Special tools and workshop equipment required

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



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Removing

- Gearbox removed ⇒ Gearbox; Rep. gr. 34 ; Removing and installing gearbox; Removing gearbox or ⇒ Gearbox; Rep. gr. 37 ; Removing and installing gearbox; Removing gearbox .

– Remove spur gear drive ⇒ page 105 .

– Remove coolant pump ⇒ page 270 .

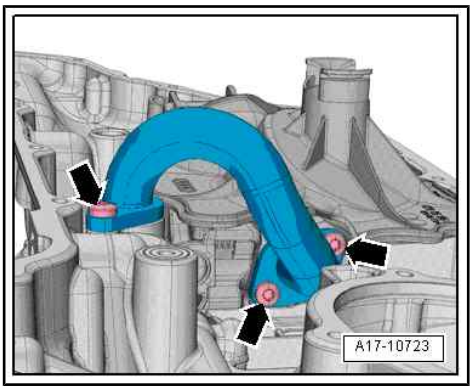
– Remove sump (bottom section) ⇒ page 211 .

– Place used oil collection and extraction unit - VAS 6622A- under engine and leave in position for the following procedure.

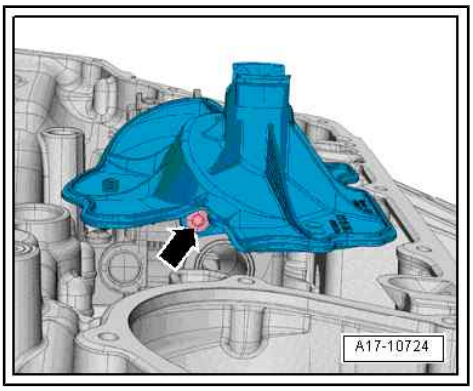
Note

Some oil will come out when oil pipe is removed.

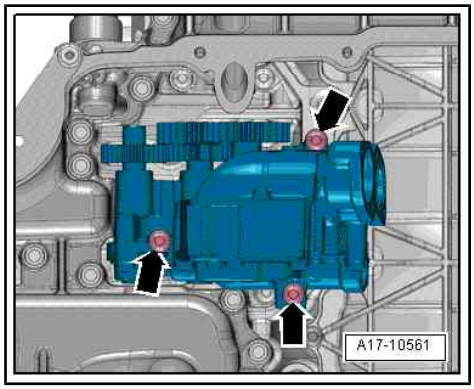
– Remove bolts -arrows- and take out oil pipe.



– Remove bolt -arrow- and take out intake connecting pipe.



– Remove bolts -arrows- and detach oil pump.



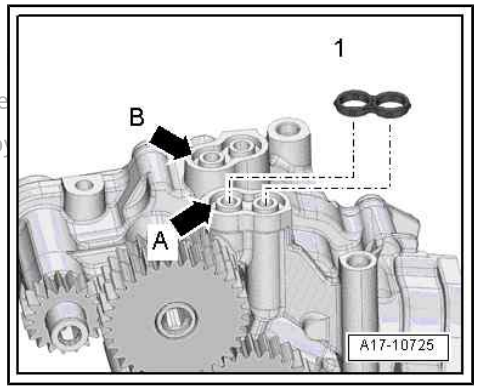
Installing

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

Note

- *Renew gaskets and O-ring.*
- *Renew bolts tightened with specified tightening angle.*

– Fit gasket -1- for oil pump.



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- Fit gasket onto connections -arrow A- next to spur gears.
- No gasket is fitted on second connection -arrow B-.

– Install sump (bottom section) ⇒ page 211 .

– Install coolant pump ⇒ page 270 .

– Install spur gear drive ⇒ page 105 .

– Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 411 .

Note

Do not reuse coolant.

– Fill up with coolant ⇒ page 251 .

Tightening torques

- ⇒ “1.1 Exploded view - sump/oil pump”, page 207

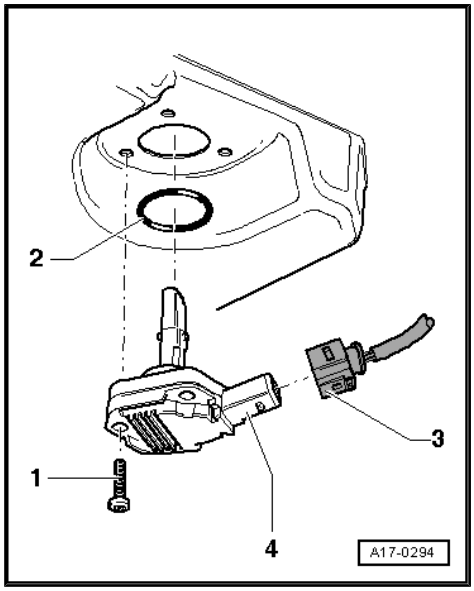
1.6 Removing and installing oil level and oil temperature sender - G266-

Removing

- Engine oil drained ⇒ Maintenance ; Booklet 411

– Unplug electrical connector -3-.

– Remove bolts -1- and detach oil level and oil temperature sender - G266- -item 4-.



Installing

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

Note

Renew seal -2-.

– Fill with engine oil and check oil level ⇒ Maintenance ; Booklet 411 .

Tightening torques

- ⇒ “1.1 Exploded view - sump/oil pump”, page 207

2 Engine oil cooler

⇒ “2.1 Exploded view - engine oil cooler”, page 221

⇒ “2.2 Removing and installing engine oil cooler”, page 223

2.1 Exploded view - engine oil cooler

⇒ “2.1.1 Exploded view - engine oil cooler (front)”, page 221

⇒ “2.1.2 Exploded view - engine oil cooler (right-side)”, page 222

2.1.1 Exploded view - engine oil cooler (front)

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1 - O-rings

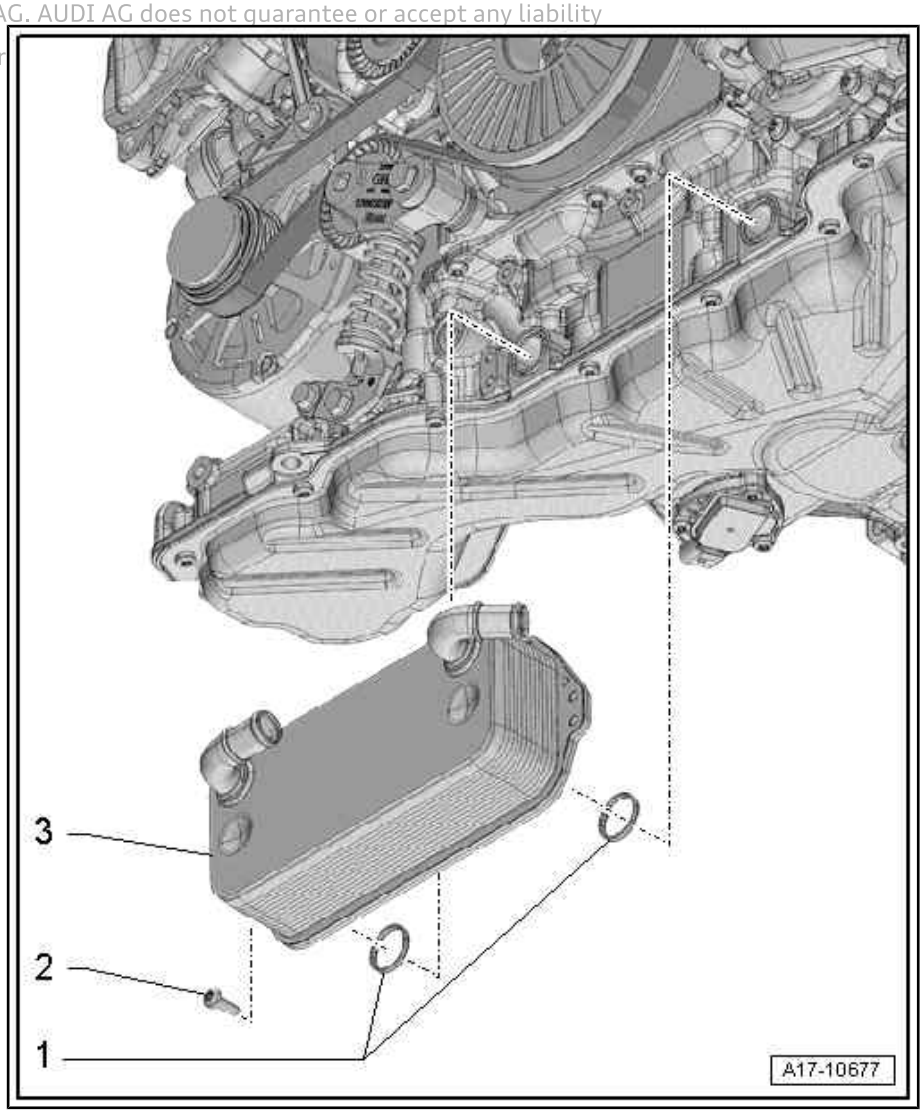
- ❑ Renew

2 - Bolt

- ❑ Tightening torque and sequence ⇒ page 222

3 - Engine oil cooler

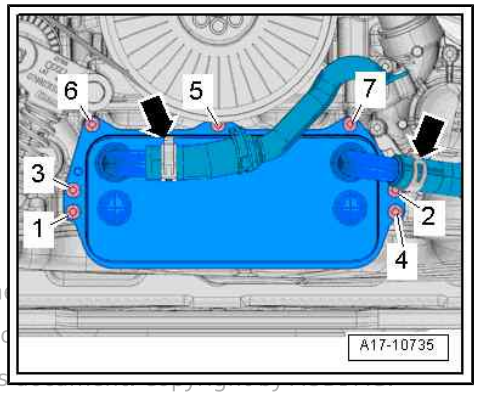
- ❑ Removing and installing ⇒ page 223
- ❑ If renewed, refill system with fresh coolant



Engine oil cooler - tightening torque and sequence

– Tighten bolts in stages as follows:

Stage	Bolts	Tightening torque
1.	-1 … 7-	3 Nm
2.	-1 … 7-	9 Nm



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2.1.2 Exploded view - engine oil cooler (right-side)

1 - Air duct

2 - Engine oil cooler (right-side)

❑ Removing and installing ⇒ page 224

3 - O-ring

❑ Renew after removing

4 - Oil pipe/hose assembly

5 - Bolt

❑ 8 Nm

6 - Bracket

❑ For engine oil cooler (right-side)

7 - Rubber bush

❑ For engine oil cooler (right-side)

8 - Bolt

❑ 8 Nm

9 - Nut

❑ 20 Nm

10 - Grommet

11 - Spacer sleeve

12 - Bolt

❑ 8 Nm

13 - O-ring

❑ Renew after removing

14 - Bolt

❑ 8 Nm

15 - Oil pipe/hose assembly

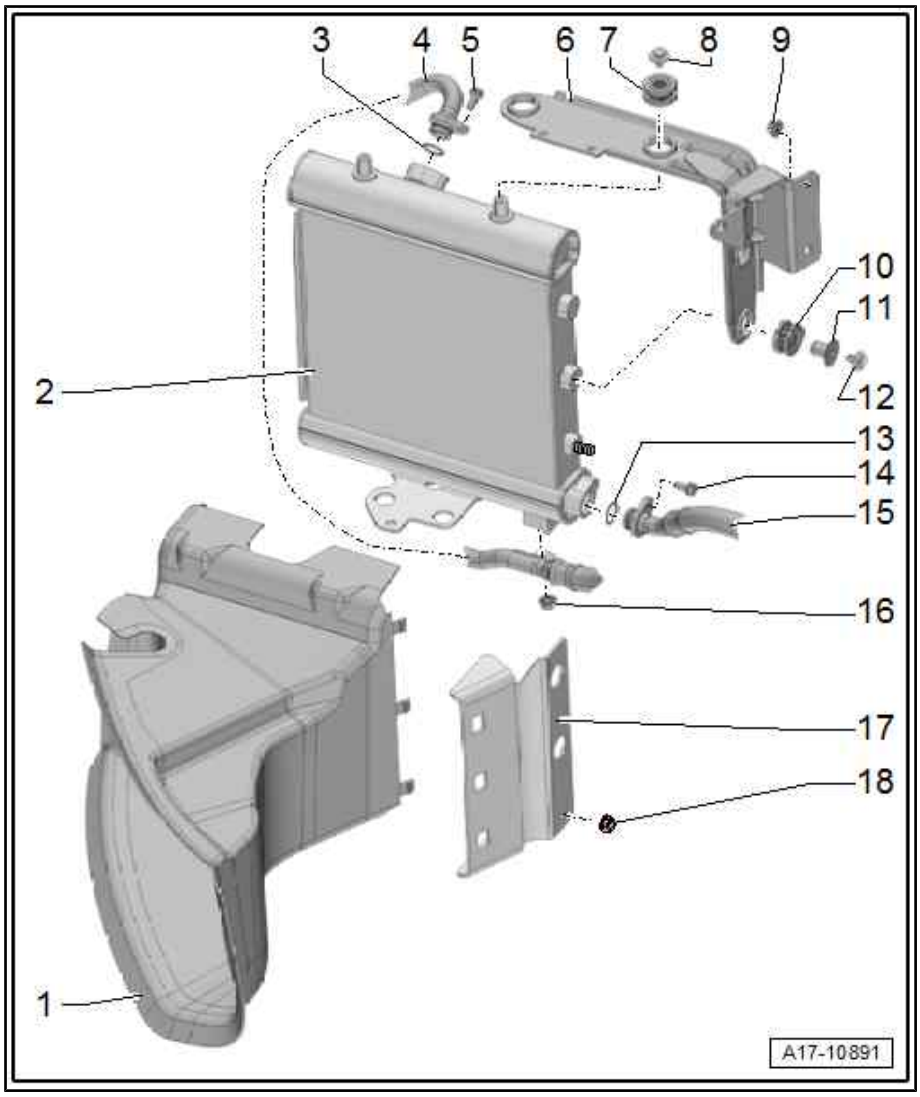
16 - Nut

❑ 8 Nm

17 - Bracket

18 - Nut

❑ 8 Nm



2.2 Removing and installing engine oil cooler

⇒ "2.2.1 Removing and installing engine oil cooler (front)", page 223

⇒ "2.2.2 Removing and installing engine oil cooler (right-side)", page 224

2.2.1 Removing and installing engine oil cooler (front)

Special tools and workshop equipment required

- Drip tray for workshop hoist - VAS 6208-



Removing

– Remove vibration damper ⇒ page 87 .

– Remove poly V-belt tensioner ⇒ page 85 .

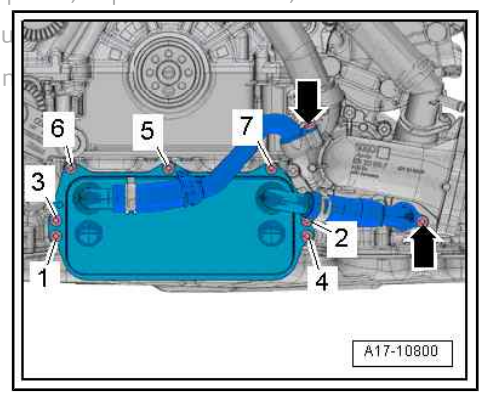
– Place drip tray for workshop hoist - VAS 6208- underneath.

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Audi S6/S7:

– Remove bolts -arrows- and detach coolant connection.

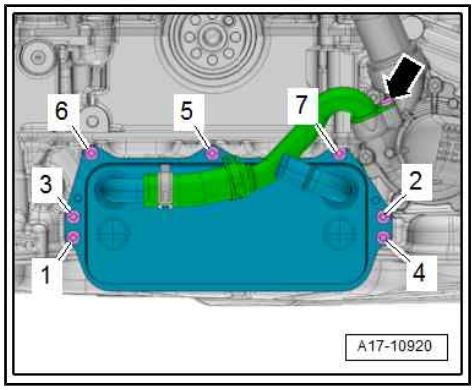
– Remove bolts in the sequence -7 ... 1-.



Audi RS 6/RS 7:

– Remove bolt -arrow- and detach coolant connection.

– Remove bolts in the sequence -7 ... 1-.



All vehicles (continued):

– Detach engine oil cooler.

Installing

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

Note

- *Fit new O-rings.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

– Install poly V-belt tensioner ⇒ page 85 .

– Install vibration damper ⇒ page 87 .

– Check oil level ⇒ Maintenance ; Booklet 411 .

Tightening torques

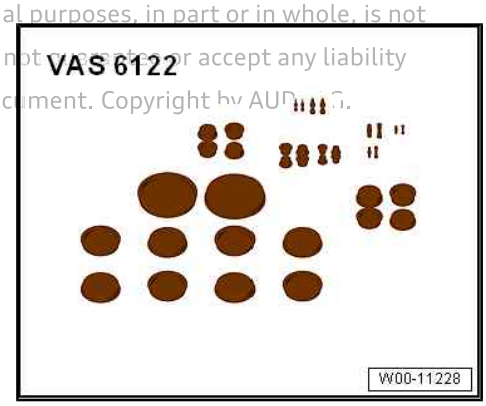
- ⇒ Fig. ""Engine oil cooler - tightening torque and sequence"" , page 222
- ⇒ "2.1 Exploded view - coolant pump/thermostat", page 257

2.2.2 Removing and installing engine oil cooler (right-side)

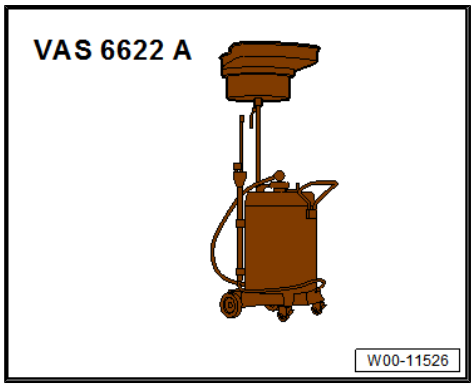
Special tools and workshop equipment required

- Engine bung set - VAS 6122-

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



Removing

Audi RS 6:

– Remove headlight (right-side) ⇒ Electrical system; Rep. gr. 94 ; Headlights; Removing and installing headlights .

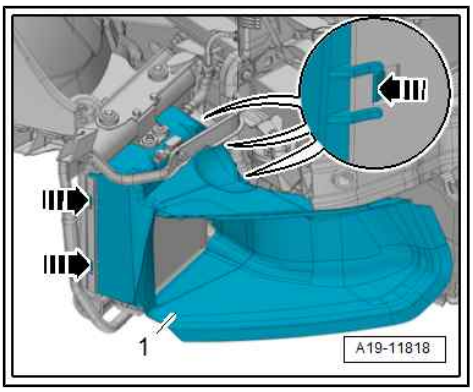
– Remove wheel spoiler (front right) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .

Audi RS 7:

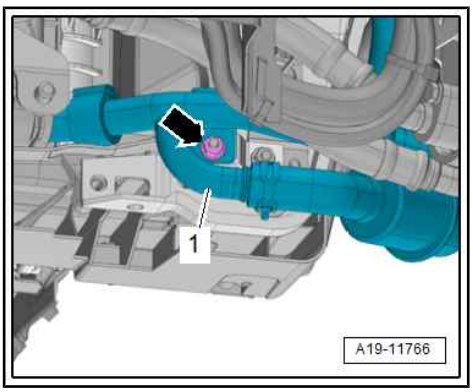
– Remove bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing bumper cover .

All vehicles (continued):

– Release fasteners -arrows- and detach air duct -1- towards front.

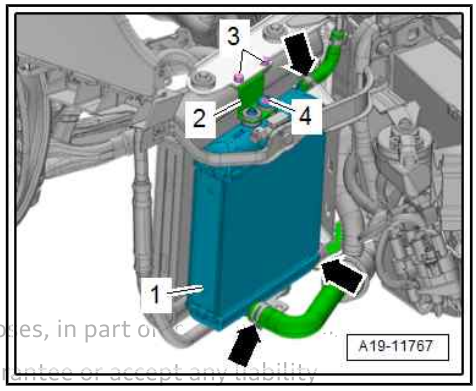


– Remove nut -arrow- and move coolant pipe clear.



– Remove bolts -3-.

– Detach auxiliary radiator (right-side) -1- with refrigerant hoses -arrows- still connected and tie up to front.

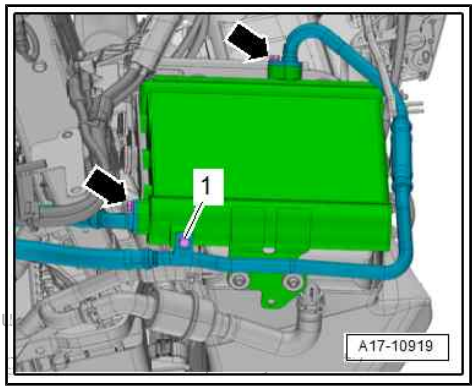


Note

Disregard items -2 and 4-.

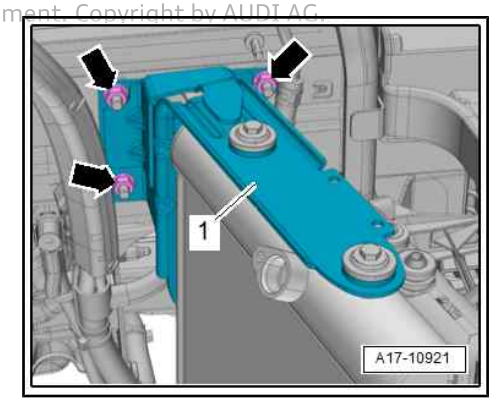
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– Place used oil collection and extraction unit - VAS 6622A- underneath.
– Remove nut -1- and bolts -arrows-.
– Disconnect oil lines from engine oil cooler and move them clear.
– Seal off open lines and connections with clean plugs from engine bung set - VAS 6122- .

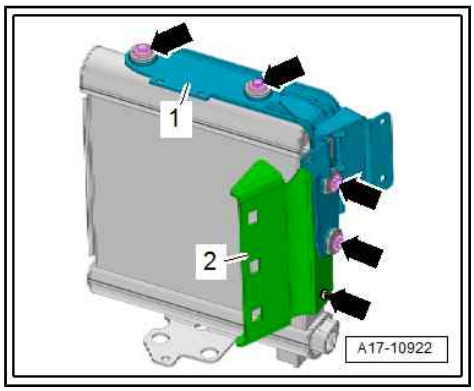


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– Remove nuts -arrows- and detach engine oil cooler with bracket -1-.



– To renew engine oil cooler, unscrew bolts -arrows- and detach bracket -1, 2-.



Installing

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

– Install bumper cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing bumper cover .
– Install headlight (right-side) ⇒ Electrical system; Rep. gr. 94 ; Headlights; Removing and installing headlights .

Tightening torques

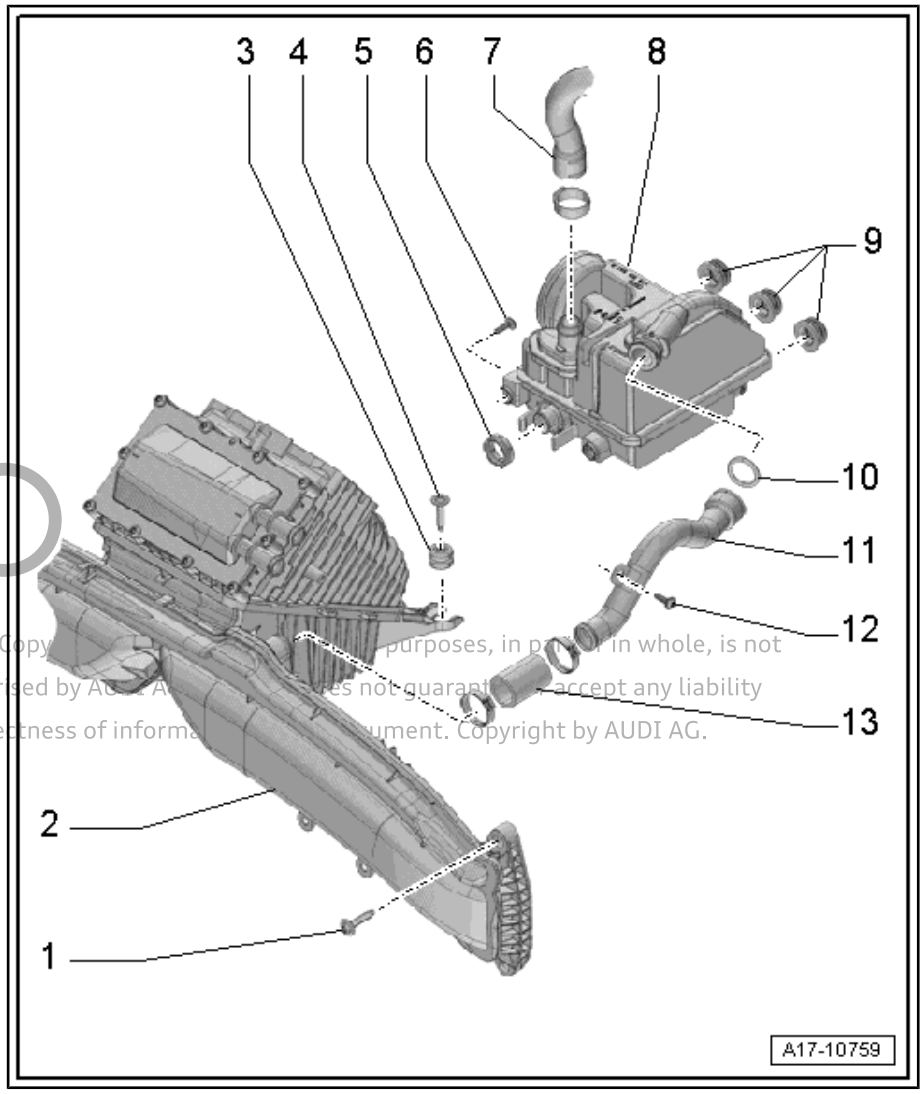
◆ ⇒ “2.1.2 Exploded view - engine oil cooler (right-side)”, page 222
◆ ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front)

3 Crankcase breather

⇒ "3.1 Exploded view - crankcase breather system", page 227

⇒ "3.2 Removing and installing oil separator", page 228

3.1 Exploded view - crankcase breather system



1 - Bolt
- ❑ Tightening torque
  ⇒ Item 2 (page 344)

2 - Charge air cooler housing
- ❑ With air ducts
- ❑ Removing and installing
  ⇒ page 346

3 - Grommet

4 - Bolt
- ❑ Tightening torque
  ⇒ Item 32 (page 345)

5 - Seal
- ❑ Renew
- ❑ Installation position
  ⇒ page 228

6 - Bolt
- ❑ 3.2 Nm

7 - Hose
- ❑ For crankcase breather

8 - Oil separator
- ❑ Removing and installing
  ⇒ page 228

9 - Gaskets
- ❑ Renew

10 - O-ring
- ❑ Renew

11 - Pipe
- ❑ For crankcase breather

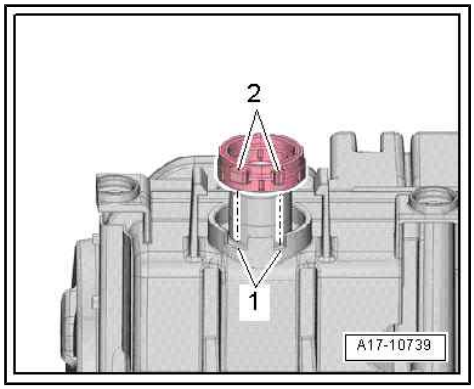
12 - Bolt
- ❑ 3.2 Nm

13 - Hose
- ❑ For crankcase breather

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Installation position of seal for oil separator

- Fit wide lugs -2- into wide notches -1- and narrow lugs into narrow notches.



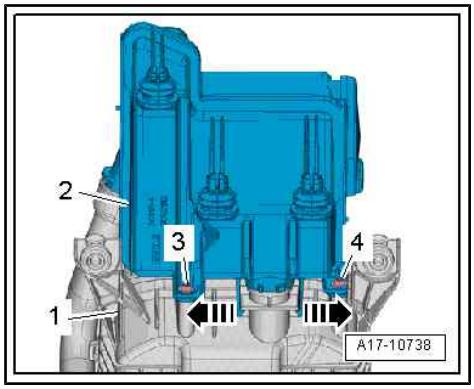
3.2 Removing and installing oil separator

Removing

– Remove charge air cooler housing ⇒ page 346 .

– Remove bolts -3, 4-.

– Release catches -arrows- and detach oil separator -2- from charge air cooler housing -1-.



Installing

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

Note

Renew gasket, seal and O-ring.

– Note installation position of seal ⇒ page 228 .

– Install charge air cooler housing ⇒ page 346 .

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Tightening torques

◆ ⇒ “4.2 Exploded view - oil pressure switches/oil pressure control”, page 230

4 Oil filter/oil pressure switches

⇒ “4.1 Exploded view - oil filter”, page 229

⇒ “4.2 Exploded view - oil pressure switches/oil pressure control”, page 230

⇒ “4.3 Removing and installing oil pressure switches F22 / F378 ”, page 231

⇒ “4.4 Removing and installing stage 3 oil pressure switch F447 ”, page 233

⇒ “4.5 Removing and installing oil temperature sender 2 G664 ”, page 234

⇒ “4.6 Checking oil pressure”, page 234

⇒ “4.7 Removing and installing valve for oil pressure control N428 ”, page 235

⇒ “4.8 Removing and installing piston cooling jet control valve N522 ”, page 236

4.1 Exploded view - oil filter

1 - Drain plug
- ❑ 4 Nm

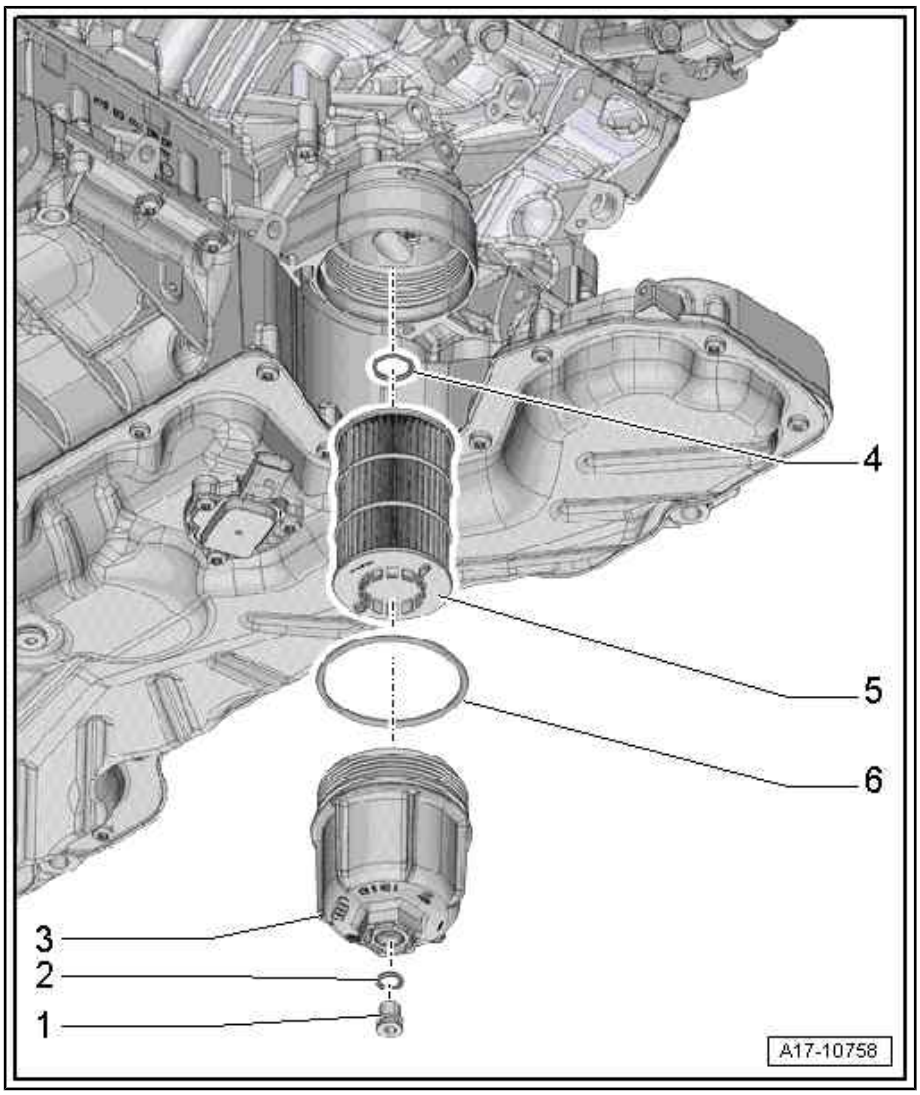
2 - O-ring
- ❑ Renew

3 - Sealing cap
- ❑ 25 Nm

4 - O-ring
- ❑ Part of oil filter element

5 - Oil filter element
- ❑ Removing and installing ⇒ Maintenance ; Booklet 411

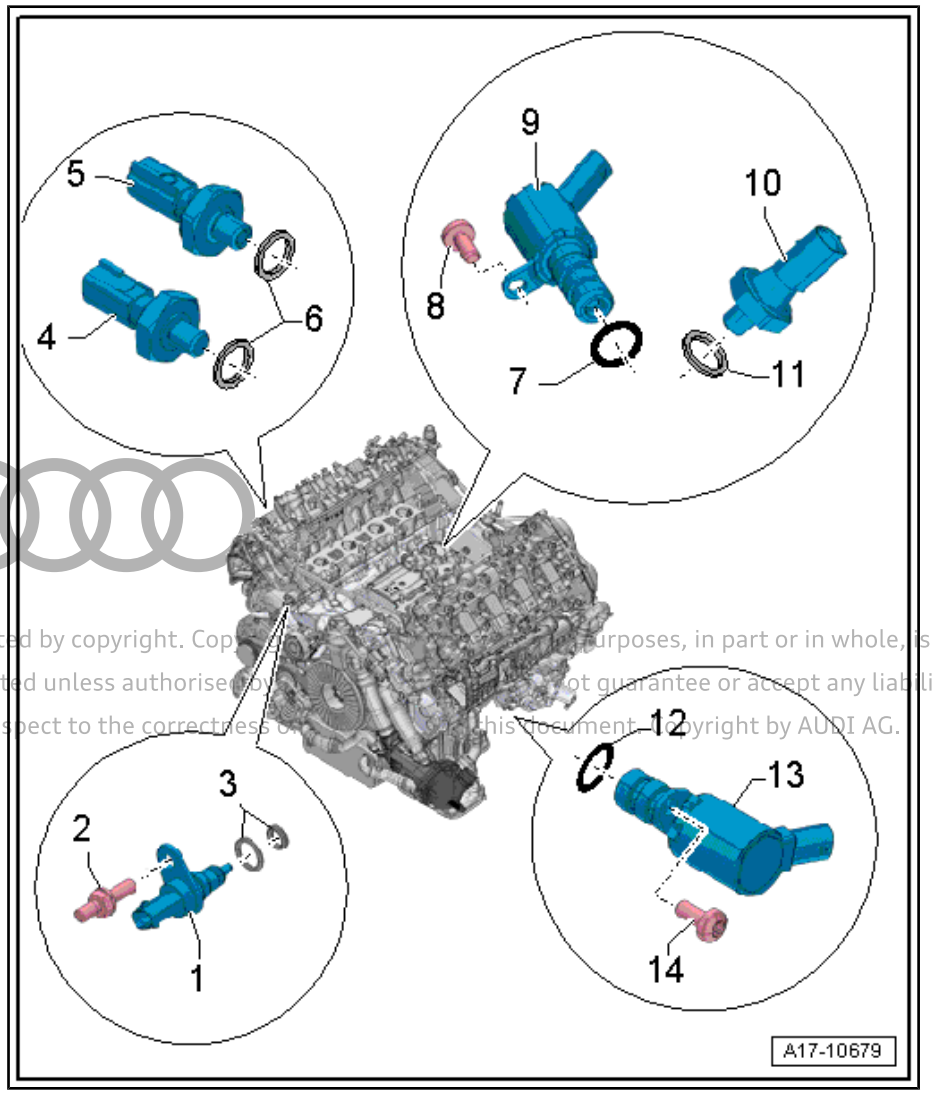
6 - O-ring
- ❑ Renew



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4.2 Exploded view - oil pressure switches/oil pressure control

Oil pressure switches, oil pressure control



1 - Oil temperature sender 2 - G664-

- ❑ Removing and installing ⇒ page 234

2 - Centre hex stud

- ❑ 9 Nm

3 - O-rings

- ❑ Renew

4 - Oil pressure switch for reduced oil pressure - F378-

- ❑ Opening/closing pressure 0.3 ... 0.6 bar (low pressure stage of oil pump)
- ❑ Green insulation
- ❑ Check in `Guided Fault Finding` ⇒ Vehicle diagnostic tester
- ❑ Removing and installing ⇒ page 231
- ❑ 20 Nm

5 - Oil pressure switch - F22-

- ❑ Opening/closing pressure 2.7 ... 3.4 bar (high pressure stage of oil pump)
- ❑ Brown insulation
- ❑ Check in `Guided Fault Finding` ⇒ Vehicle diagnostic tester
- ❑ Removing and installing ⇒ page 231
- ❑ 20 Nm

6 - Seals

- ❑ Renew

7 - O-ring

- ❑ Renew

8 - Bolt

- ❑ 9 Nm

9 - Piston cooling jet control valve - N522-

- ❑ Removing and installing ⇒ page 236

10 - Stage 3 oil pressure switch - F447-

- ❑ Check in `Guided Fault Finding` ⇒ Vehicle diagnostic tester
- ❑ Removing and installing ⇒ page 233
- ❑ 20 Nm

11 - Seal

- ❑ Renew
- ❑ Not available separately

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12 - O-ring

- ❑ Renew

13 - Valve for oil pressure control - N428-

- ❑ Check in `Guided Fault Finding` ⇒ Vehicle diagnostic tester
- ❑ Removing and installing ⇒ page 235

14 - Bolt

- ❑ 9 Nm

4.3 Removing and installing oil pressure switches -F22- / -F378-

Special tools and workshop equipment required

- ♦ Articulated wrench, 24 mm - T40175-



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Removing

> **Caution**
>
> *Risk of irreparable damage to electronic components.*
>
> ♦ *Observe notes on procedure for disconnecting the battery.*

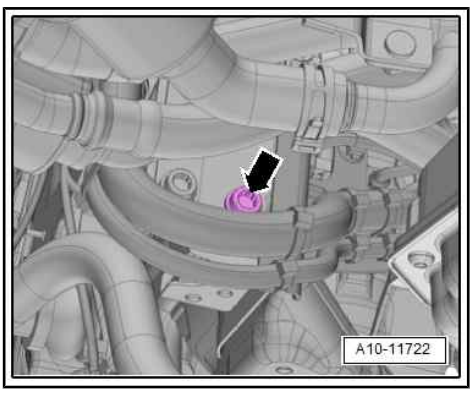
– Disconnect earth wire from battery terminal ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .

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

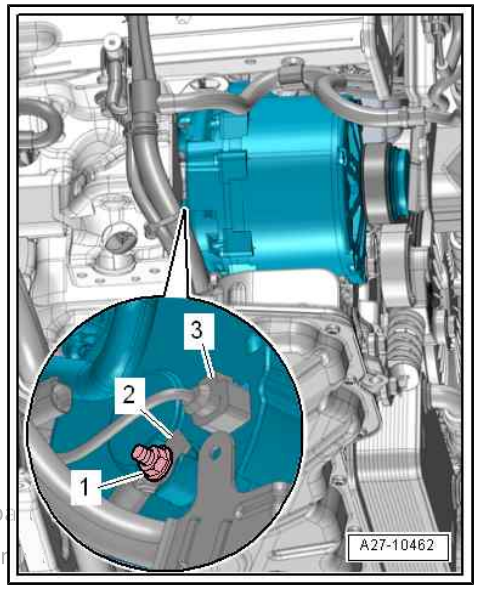
Audi RS 6/RS 7:

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

– Remove bolt -arrow- and push bracket and electrical wiring harness to one side.



– Unplug electrical connector -3- at alternator.
– Remove nut -1- and detach B+ wire -2-.



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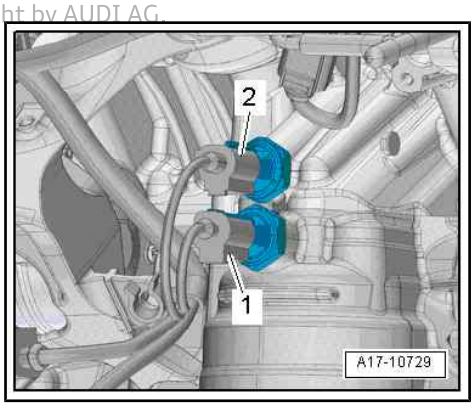
All vehicles (continued):

– Unplug electrical connector:

1 - For oil pressure switch for reduced oil pressure - F378-

2 - For oil pressure switch - F22-

– Use articulated wrench, 24 mm - T40175- to remove relevant oil pressure switch.



Installing

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

Note

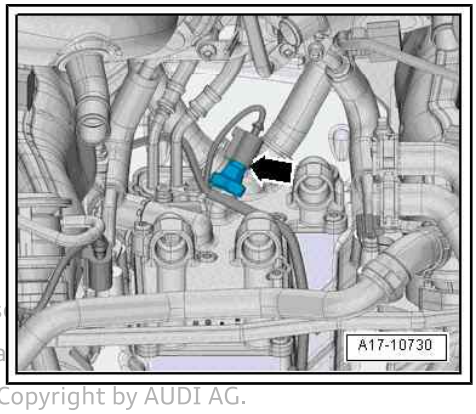
Renew seal.

– Check oil level ⇒ Maintenance ; Booklet 411 .
– Observe steps required after re-connecting battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .

Tightening torques

- ⇒ “4.2 Exploded view - oil pressure switches/oil pressure control”, page 230
- ⇒ Electrical system; Rep. gr. 27 ; Alternator; Exploded view - alternator
- Longitudinal member (bottom front) ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Exploded view - lock carrier
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

4.4 Removing and installing stage 3 oil pressure switch - F447-



Removing

– Remove charge air cooler housing ⇒ page 346 .

– Unplug electrical connector -arrow-.

– Unscrew stage 3 oil pressure switch - F447- .

Installing

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

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Note

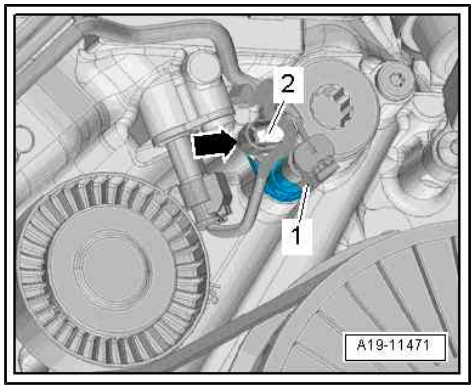
Renew seal.

– Install charge air cooler housing ⇒ page 346 .

Tightening torques

◆ ⇒ “4.2 Exploded view - oil pressure switches/oil pressure control”, page 230

4.5 Removing and installing oil temperature sender 2 - G664-



Removing

Audi S6/RS 6/RS 7:

– Remove radiator with radiator cowl ⇒ page 309 .

Audi S7:

– Remove radiator cowl ⇒ page 322 .

– Move clear retaining clip -arrow- with electrical wiring harness.

– Unplug electrical connector -1-.

– Unscrew centre hex stud -2- and remove oil temperature sender 2 - G664- .

Note

If O-ring remains lodged in cylinder block, lift out O-ring with a piece of wire.

Installing

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

Note

Fit new O-ring.

Audi S6/RS 6/RS 7:

– Install radiator with radiator cowl ⇒ page 309 .

Audi S7:

– Install radiator cowl ⇒ page 322 .

Tightening torques

◆ ⇒ “4.2 Exploded view - oil pressure switches/oil pressure control”, page 230

4.6 Checking oil pressure

Special tools and workshop equipment required

◆ Oil pressure tester - V.A.G 1342-



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Procedure

• Oil level OK

- Engine oil temperature approx. 80 °C

– Remove oil pressure switch - F22- ⇒ page 231 .

– Connect oil pressure tester - V.A.G 1342- to bore for oil pressure switch.

– Screw oil pressure switch - F22- into oil pressure tester.

– Start engine.

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- Oil pressure at idling speed: at least 1.3 ± 0.3 bar
- Oil pressure at 2000 rpm: at least 1.6 ± 0.3 bar

Assembling

– Install oil pressure switch - F22- ⇒ page 231 .

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

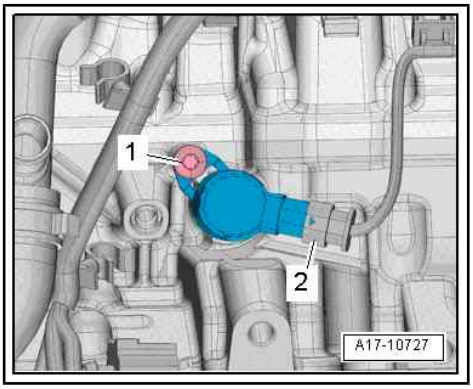
Removing

– Remove air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket .

– Unplug electrical connector -2-.

– Remove bolt -1-.

– Detach valve for oil pressure control - N428- from retaining frame.



Installing

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

Note

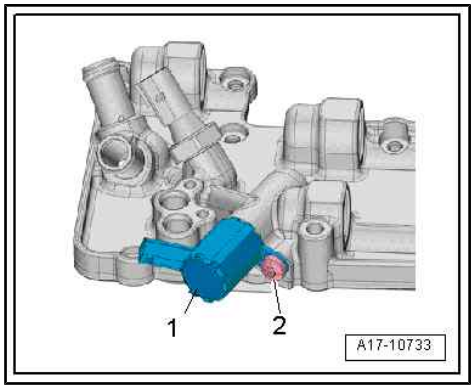
Fit new O-ring.

– Install air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket .

Tightening torques

◆ ⇒ “4.2 Exploded view - oil pressure switches/oil pressure control”, page 230

4.8 Removing and installing piston cooling jet control valve - N522-



Removing

– Remove cover in inner V of engine ⇒ page 238 .

– Remove bolt -2- and detach piston cooling jet control valve - N522- -item 1-.

Installing

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

Note

Fit new O-ring.

– Install cover in inner V of engine ⇒ page 238 .

Tightening torques

◆ ⇒ “4.2 Exploded view - oil pressure switches/oil pressure control”, page 230

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5 Oil circuit

⇒ “5.1 Exploded view - mechanical switching valve, non-return valve, cover in inner V of engine”, page 237

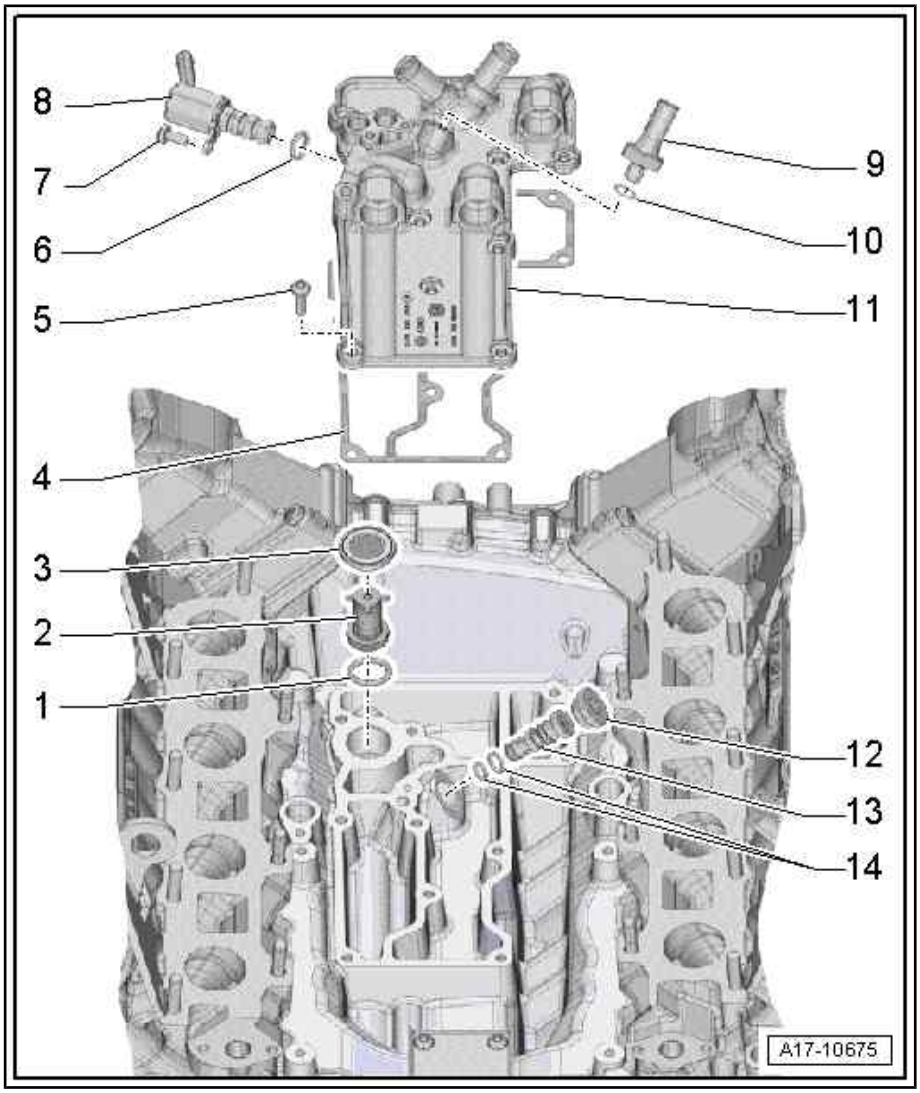
⇒ “5.2 Removing and installing cover in inner V of engine”, page 238

⇒ “5.3 Removing and installing non-return valve”, page 240

⇒ “5.4 Removing and installing mechanical switching valve”, page 240

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5.1 Exploded view - mechanical switching valve, non-return valve, cover in inner V of engine



1 - O-ring
- ❑ Renew

2 - Non-return valve
- ❑ Removing and installing ⇒ page 240

3 - Oil strainer
- ❑ Renew
- ❑ Fit in cover -item 11-
- ❑ Removing and installing ⇒ page 238

4 - Gasket
- ❑ Renew

5 - Bolt
- ❑ Renew
- ❑ Tightening torque and sequence ⇒ page 238

6 - O-ring
- ❑ Renew

7 - Bolt
- ❑ Tightening torque ⇒ Item 8 (page 230)

8 - Piston cooling jet control valve - N522-
- ❑ Removing and installing ⇒ page 236

9 - Stage 3 oil pressure switch - F447-
- ❑ Opening/closing pressure 0.3 ... 0.6 bar
- ❑ Green insulation
- ❑ Check in `Guided Fault Finding` ⇒ Vehicle diagnostic tester
- ❑ Removing and installing ⇒ page 233
- ❑ Tightening torque ⇒ Item 9 (page 237)

10 - Seal
- ❑ Renew

11 - Cover
- ❑ In inner V of engine

❑ Removing and installing ⇒ page 238

12 - Plug

❑ 30 Nm

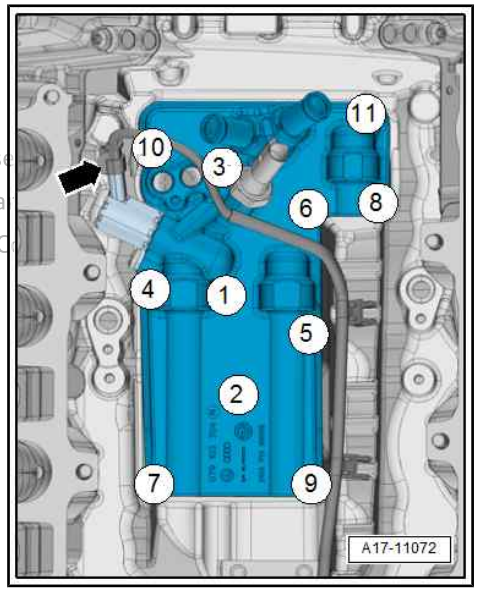
13 - Mechanical switching valve

❑ Removing and installing ⇒ page 240

14 - O-rings

❑ Renew

Cover - tightening torque and sequence



Note

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Renew bolts tightened with specified tightening angle.

– Tighten bolts in stages as follows:

Stage	Bolts	Tightening torque/angle specification
1.	-1 … 11-	Screw in by hand until contact is made
2.	-1 … 11-	5 Nm in diagonal sequence
3.	-1 … 11-	Turn 90° further in diagonal sequence

5.2 Removing and installing cover in inner V of engine

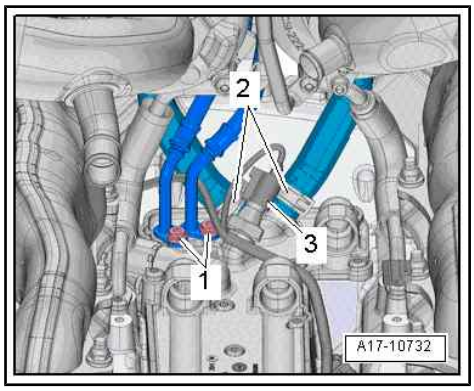
Removing

– Remove charge air cooler housing ⇒ page 346 .

– Unplug electrical connector -3-.

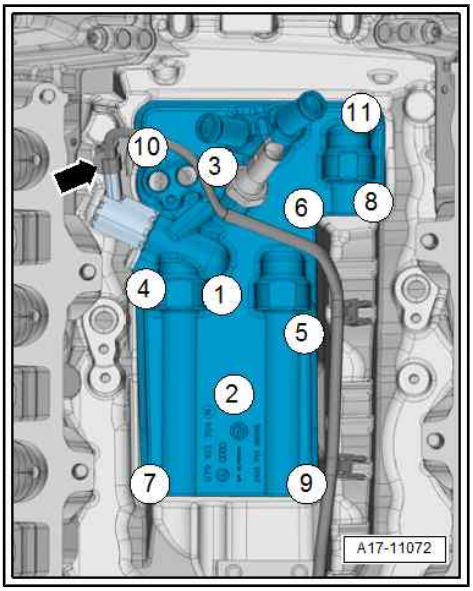
– Remove bolts -1- and disconnect hoses.

– Release hose clips -2- and detach oil return hoses.



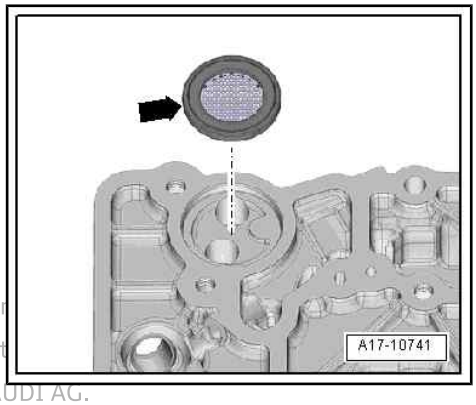
– Remove bolts in the sequence -11 ... 1- and remove cover in inner V of engine.

– Unplug electrical connector -arrow- and move wiring clear.



Installing

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



Note

- *Renew gasket and O-rings.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *Renew oil strainer in cover for inner V of engine.*

– Renew oil strainer -arrow- and install in cover.

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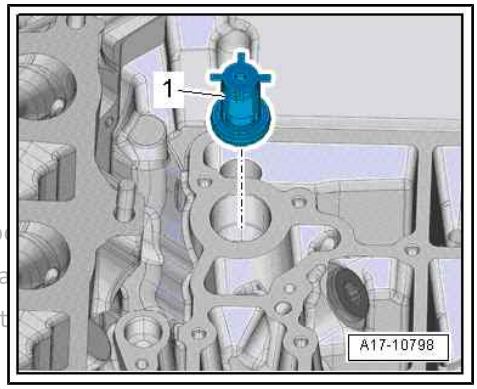
– Install charge air cooler housing ⇒ page 346 .

Tightening torques

- ⇒ “4.2 Exploded view - oil pressure switches/oil pressure control”, page 230
- ⇒ “1.1 Exploded view - turbocharger”, page 333
- ⇒ Fig. ““Cover - tightening torque and sequence”“ , page 238

5.3 Removing and installing non-return valve

Removing



– Remove cover in inner V of engine ⇒ page 238 .

– Pull non-return valve -1- out of cylinder block.

Installing

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

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Note

Fit new O-ring.

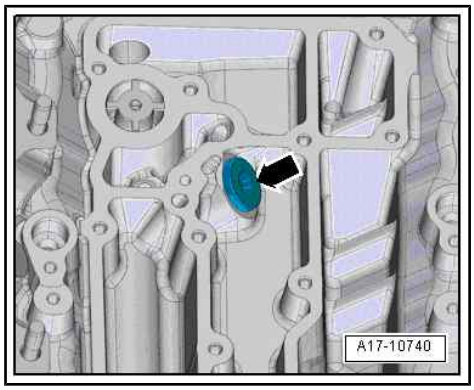
– Install cover in inner V of engine ⇒ page 238 .

Tightening torques

◆ ⇒ “4.2 Exploded view - oil pressure switches/oil pressure control”, page 230

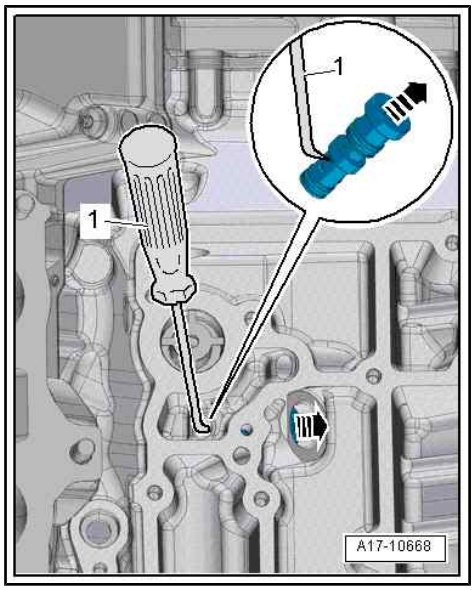
5.4 Removing and installing mechanical switching valve

Removing



– Remove cover in inner V of engine ⇒ page 238 .

– Remove screw plug -arrow-.



– Using a hook -1-, push mechanical switching valve outwards through hole, as shown in illustration; at the same time, pull valve with a magnetic rod -arrow-.

Installing

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

Note

Fit new O-rings.

– Install cover in inner V of engine ⇒ page 238 .

Tightening torques

◆ ⇒ “4.2 Exploded view - oil pressure switches/oil pressure control”, page 230

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 249

1.1 Connection diagram - coolant hoses

⇒ “1.1.1 Connection diagram - coolant hoses, Audi S6/S7 (vehicles without auxiliary heater)”, page 241

⇒ “1.1.2 Connection diagram - coolant hoses, Audi S6/S7 (vehicles with auxiliary heater)”, page 243

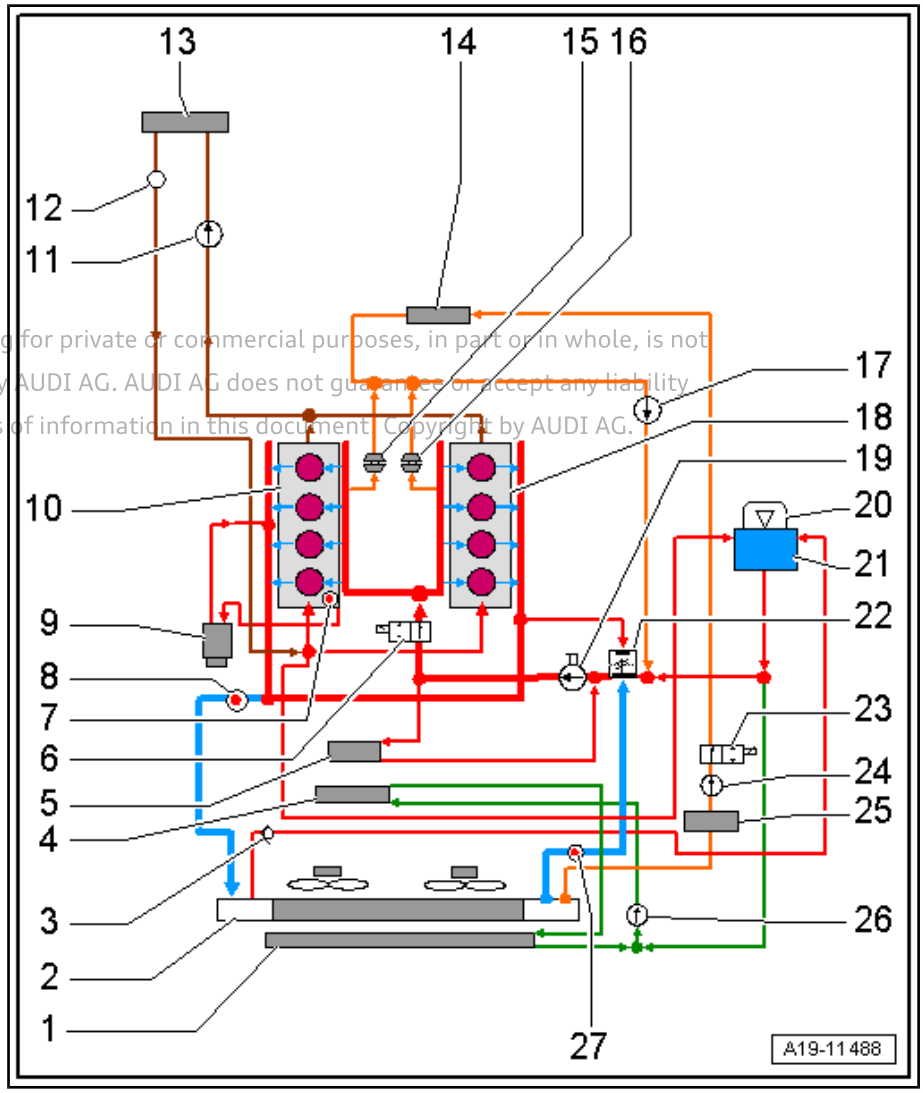
⇒ “1.1.3 Connection diagram - coolant hoses, Audi RS 6/RS 7”, page 245

Note

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- *Blue = Large coolant circuit*
- *Red = Small coolant circuit*
- *Orange = Coolant circuit for ATF.*
- *Brown = Heating circuit*
- *Green = Charge air cooling circuit.*

1.1.1 Connection diagram - coolant hoses, Audi S6/S7 (vehicles without auxiliary heater)



1 - Water radiator for charge air cooling circuit

2 - Radiator

3 - Non-return valve

4 - Charge air cooler

5 - Engine oil cooler

6 - Coolant shut-off valve

- Activated by coolant valve for cylinder head - N489-

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7 - Coolant temperature sender - G62-

8 - Temperature sender for engine temperature regulation - G694-

9 - Alternator

10 - Cylinder head

- For cylinder bank 1 (right-side)

11 - Coolant circulation pump - V50-

12 - Bleeder screw

13 - Heat exchanger for heater

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

14 - ATF cooler

- Removing and installing ⇒ Gearbox; Rep. gr. 34 ; ATF circuit; Removing and installing ATF cooler

15 - Turbocharger

- For cylinder bank 1 (right-side)

16 - Turbocharger

- For cylinder bank 2 (left-side)

17 - Coolant circulation pump 2 - V178-

18 - Cylinder head

- Cylinder bank 2 (left-side)

19 - Coolant pump

20 - Filler cap

- Checking pressure relief valve ⇒ page 248

21 - Coolant expansion tank

22 - Map-controlled engine cooling system thermostat - F265-

23 - Gearbox oil cooling valve - N509-

24 - Continued coolant circulation pump - V51-

25 - Cooler for ATF coolant circuit

26 - Charge air cooling pump - V188-

27 - Radiator outlet coolant temperature sender - G83-

1.1.2 Connection diagram - coolant hoses, Audi S6/S7 (vehicles with auxiliary heater)

1 - Water radiator for charge air cooling circuit

2 - Radiator

3 - Non-return valve

4 - Charge air cooler

5 - Engine oil cooler

6 - Coolant shut-off valve

- ❑ Activated by coolant valve for cylinder head - N489-

7 - Coolant temperature sender - G62-

8 - Temperature sender for engine temperature regulation - G694-

9 - Alternator

10 - Cylinder head

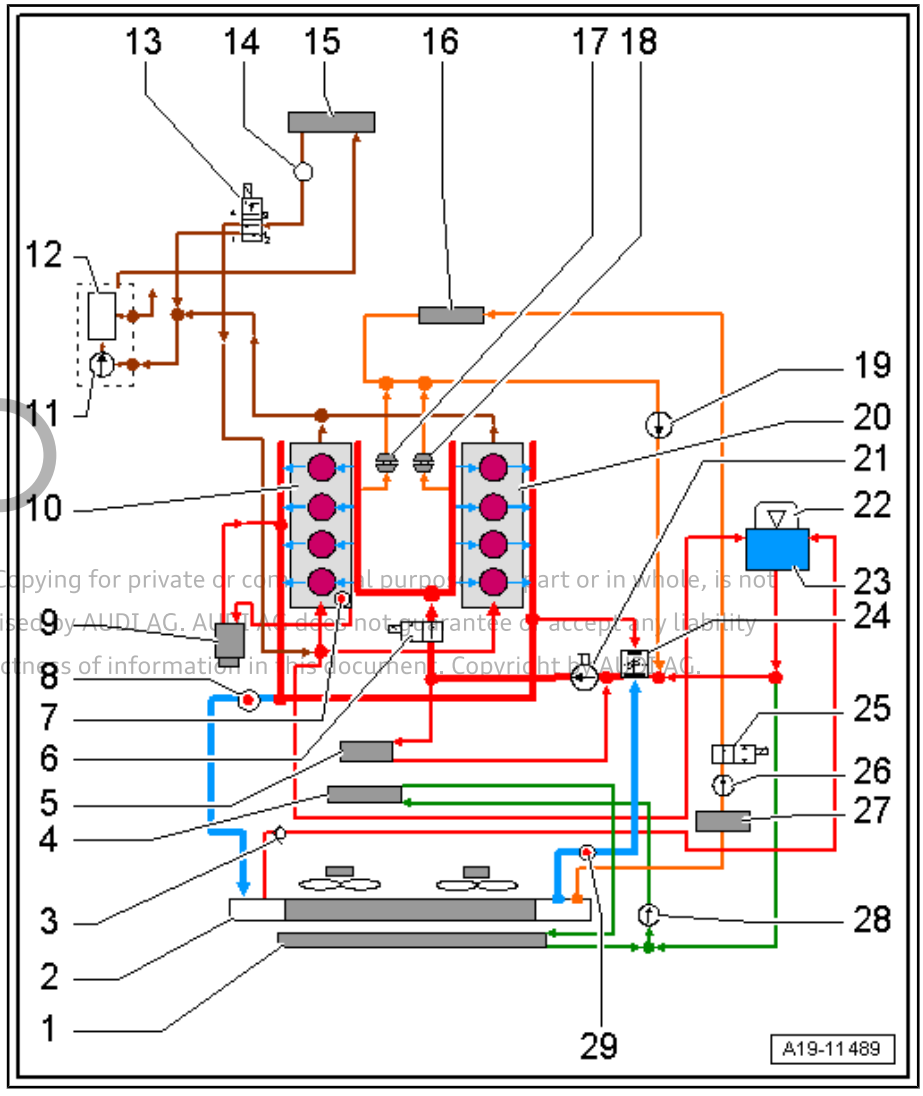
- ❑ For cylinder bank 1 (right-side)

11 - Circulation pump - V55-

- ❑ Removing and installing ⇒ Auxiliary heater, supplementary heater; Rep. gr. 82 ; Auxiliary/supplementary heater; Exploded view - internal auxiliary/supplementary heater

12 - Auxiliary heater

- ❑ Removing and installing ⇒ Auxiliary/supplementary heater; Rep. gr. 82 ; Auxiliary/supplementary heater; Removing and installing auxiliary/supplementary heater



13 - Heater coolant shut-off valve - N279-

- ❑ Removing and installing ⇒ Auxiliary/supplementary heater; Rep. gr. 82 ; Coolant circuit with auxiliary/supplementary heater; Removing and installing heater coolant shut-off valve

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14 - Bleeder screw

15 - Heat exchanger for heater

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

16 - ATF cooler

- ❑ Removing and installing ⇒ Gearbox; Rep. gr. 34 ; ATF circuit; Removing and installing ATF cooler

17 - Turbocharger

- ❑ For cylinder bank 1 (right-side)

18 - Turbocharger

- ❑ For cylinder bank 2 (left-side)

19 - Coolant circulation pump 2 - V178-

20 - Cylinder head

- ❑ Cylinder bank 2 (left-side)

21 - Coolant pump

22 - Filler cap

- ❑ Checking pressure relief valve ⇒ page 248

23 - Coolant expansion tank

24 - Map-controlled engine cooling system thermostat - F265-

25 - Gearbox oil cooling valve - N509-

26 - Continued coolant circulation pump - V51-

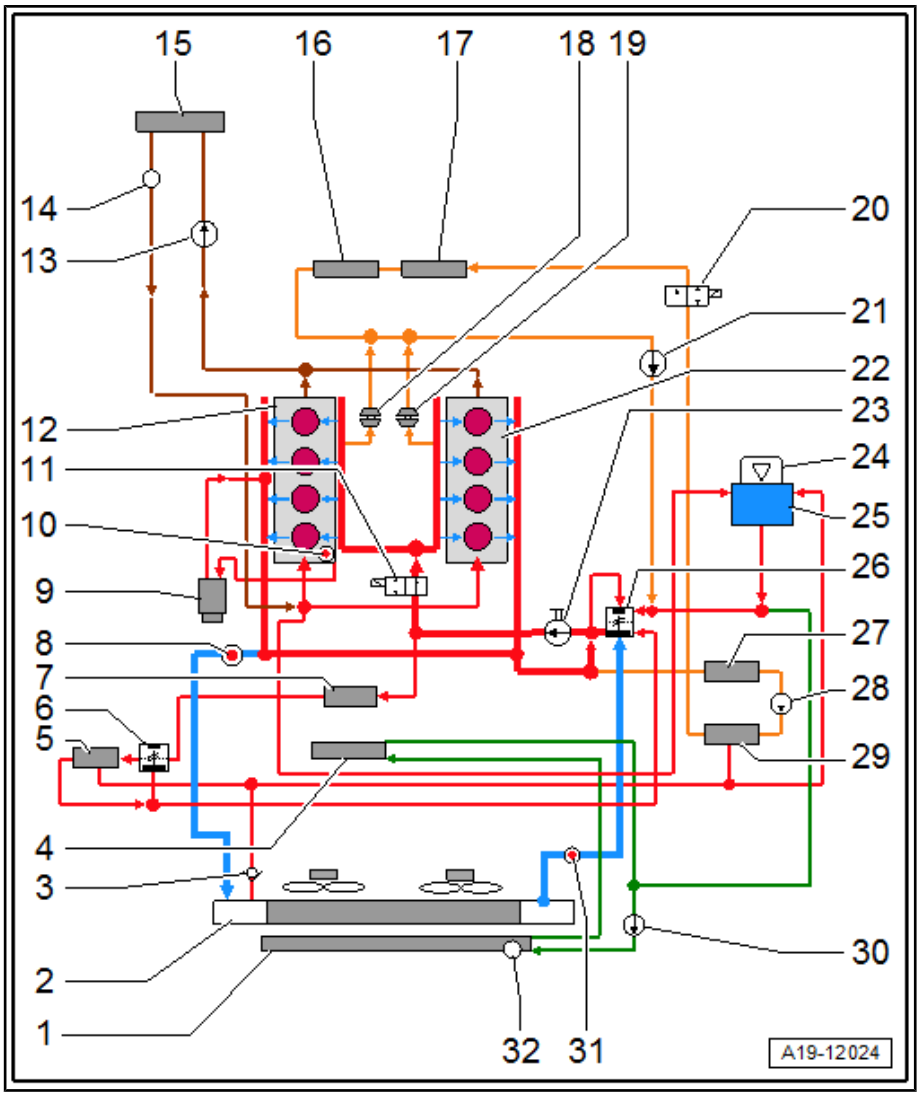
27 - Cooler for ATF coolant circuit

28 - Charge air cooling pump - V188-

29 - Radiator outlet coolant temperature sender - G83-

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1.1.3 Connection diagram - coolant hoses, Audi RS 6/RS 7



1 - Water radiator for charge air cooling circuit

2 - Radiator

3 - Non-return valve

4 - Charge air cooler

5 - Auxiliary radiator (right-side)

6 - Thermostat

- For auxiliary radiator (right-side)

7 - Engine oil cooler

8 - Temperature sender for engine temperature regulation - G694-

9 - Alternator

10 - Coolant temperature sender - G62-

11 - Coolant shut-off valve

- Activated by coolant valve for cylinder head - N489-

12 - Cylinder head

- For cylinder bank 1 (right-side)

13 - Coolant circulation pump - V50-

14 - Bleeder screw

15 - Heat exchanger for heater

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

16 - Gear oil cooler

17 - ATF cooler

- Removing and installing ⇒ Gearbox; Rep. gr. 37 ; ATF circuit; Removing and installing ATF cooler

18 - Turbocharger

- For cylinder bank 1 (right-side)

19 - Turbocharger

- For cylinder bank 2 (left-side)

20 - Gearbox oil cooling valve - N509-

21 - Coolant circulation pump 2 - V178-

22 - Cylinder head

- Cylinder bank 2 (left-side)

23 - Coolant pump

24 - Filler cap

- Checking pressure relief valve ⇒ page 248

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25 - Coolant expansion tank

26 - Map-controlled engine cooling system thermostat - F265-

27 - Rear cooler for ATF coolant circuit

28 - Continued coolant circulation pump - V51-

29 - Front cooler for ATF coolant circuit

30 - Charge air cooling pump - V188-

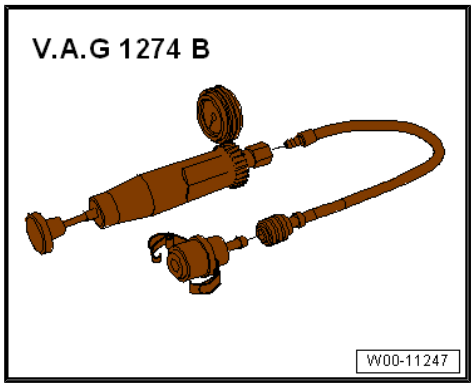
31 - Radiator outlet coolant temperature sender - G83-

32 - Bleeder screw

1.2 Checking cooling system for leaks

Special tools and workshop equipment required

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

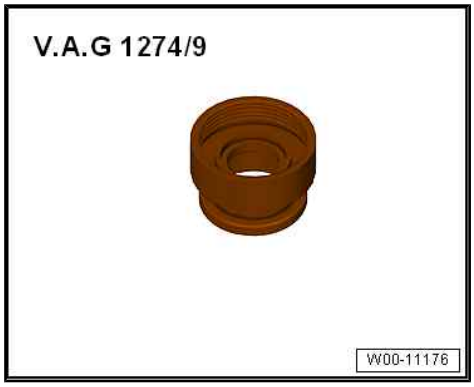


- Adapter for cooling system tester - V.A.G 1274/8-



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



- Safety goggles
- Protective gloves

Procedure

- Engine must be warm.

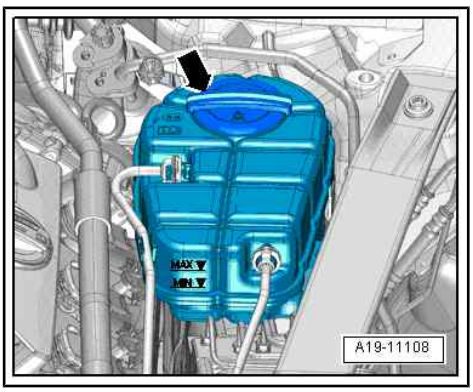
WARNING

The cooling system is under pressure when the power unit is hot. Risk of scalding due to hot steam and hot coolant.

Danger of scalding skin and other parts of the body.

- *Put on protective gloves.*
- *Put on safety goggles.*
- *Cover filler cap on expansion tank with a cloth and open carefully to release pressure.*

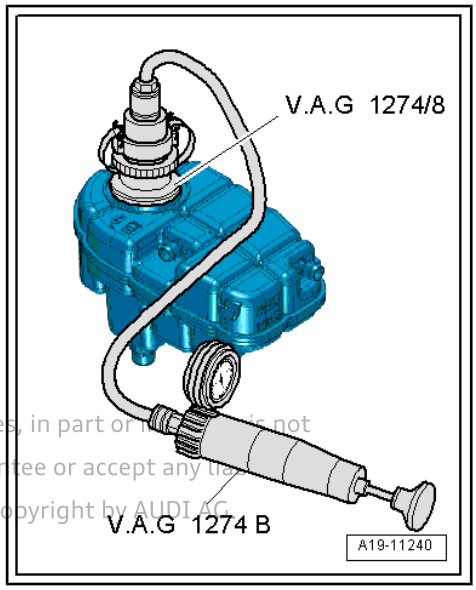
– Open filler cap -arrow- on coolant expansion tank.



– Fit cooling system tester - V.A.G 1274 B- with adapter - V.A.G 1274/8- onto coolant expansion tank.

– Using hand pump on cooling system tester, build up a pressure of approx. 1.0 bar.

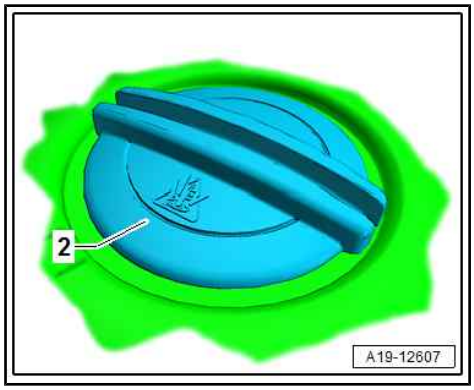
– If this pressure is not maintained, locate and rectify leaks.



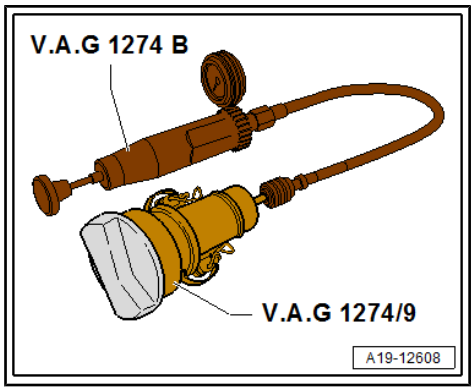
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Checking pressure relief valve in filler cap

Filler cap (version 1):



– Fit cooling system tester - V.A.G 1274 B- with adapter - V.A.G 1274/9- onto filler cap.



Blue filler cap

– Build up pressure with hand pump on cooling system tester.

• The pressure relief valve should open at a pressure of 1.4 ... 1.6 bar.

– Renew filler cap if pressure relief valve does not react as described.

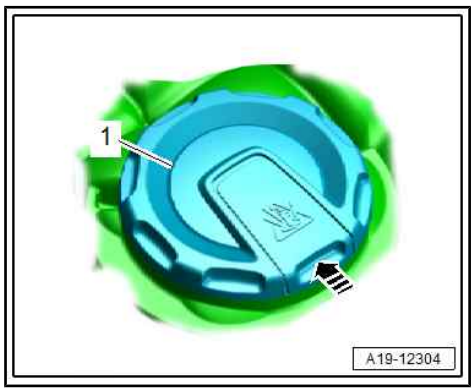
Black filler cap

• The pressure relief valve should open at a pressure of 1.6 ... 1.8 bar.

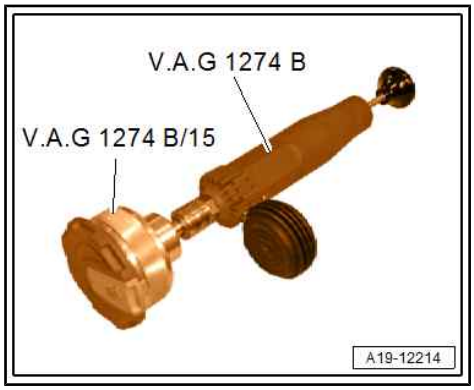
– Renew filler cap if pressure relief valve does not react as described.

Filler cap (version 2):

– Fit cooling system tester - V.A.G 1274 B- with adapter - V.A.G 1274 B/15- onto filler cap.



– Using hand pump on cooling system tester, build up a pressure of approx. 2 bar.



Blue filler cap

• The pressure must be reduced to 1.6 ... 1.4 bar and kept at this level.

– Renew filler cap if pressure relief valve does not react as described.

Black filler cap

• The pressure must be reduced to 1.8 ... 1.6 bar and kept at this level.

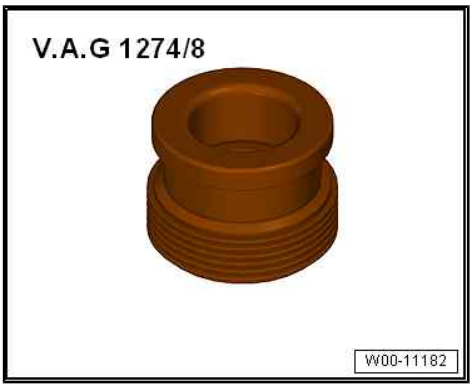
– Renew filler cap if pressure relief valve does not react as described.

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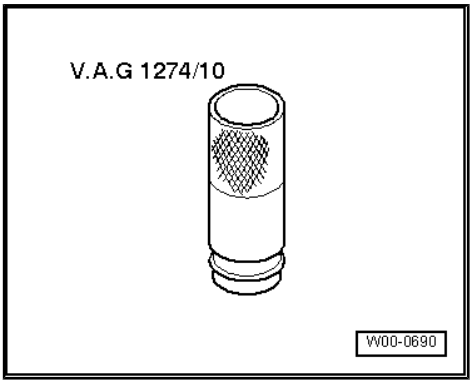
1.3 Draining and filling cooling system

Special tools and workshop equipment required

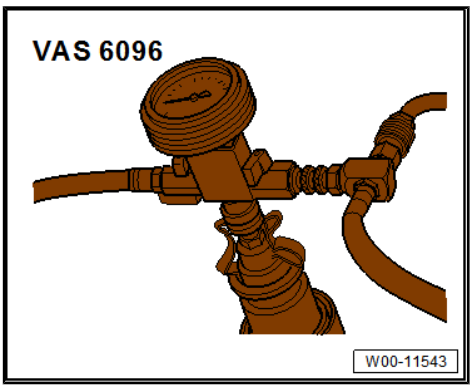
- Adapter for cooling system tester - V.A.G 1274/8-



- Pipe for cooling system tester - V.A.G 1274/10-



- Cooling system charge unit - VAS 6096-

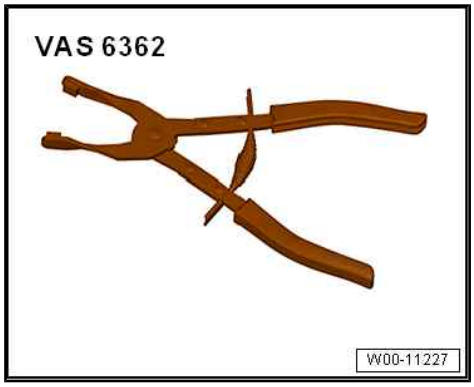


- Drip tray for workshop hoist - VAS 6208-

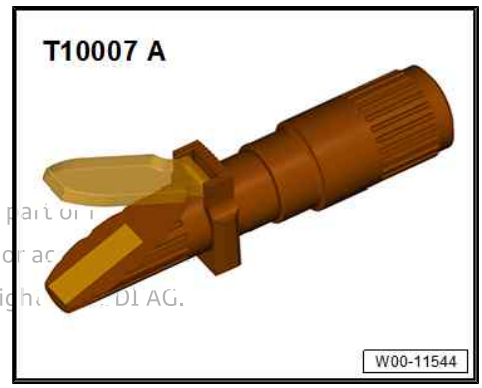


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♦ Hose clip pliers - VAS 6362-



♦ Refractometer - T10007 A-



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♦ Safety goggles

♦ Protective gloves

Draining

WARNING

The cooling system is under pressure when the power unit is hot. Risk of scalding due to hot steam and hot coolant.

Danger of scalding skin and other parts of the body.

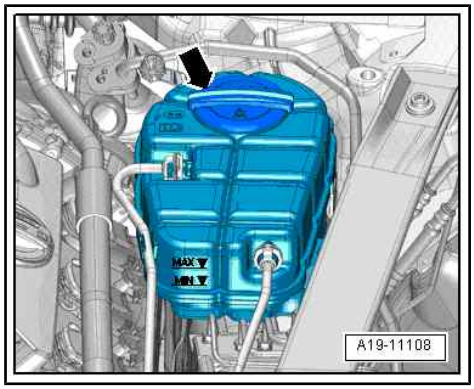
- ***Put on protective gloves.***
- ***Put on safety goggles.***
- ***Cover filler cap on expansion tank with a cloth and open carefully to release pressure.***

– Open filler cap -arrow- on coolant expansion tank.

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

– Remove wheel spoiler (front left) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .

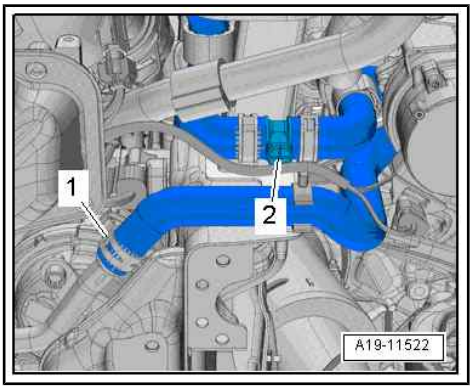
– Place drip tray for workshop hoist - VAS 6208- underneath.



Audi S6/S7:

– Remove drain plug -2- and drain off coolant.

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

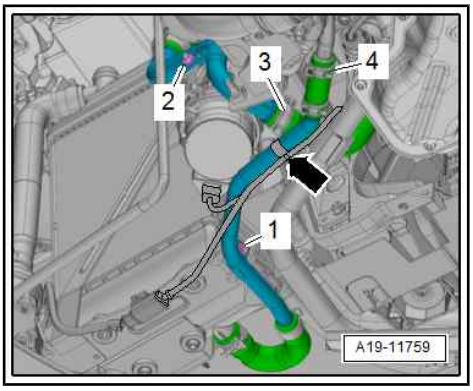


Audi RS 6/RS 7:

– Move electrical wiring harness clear -arrow-.

– Remove nut -1- and move coolant pipe.

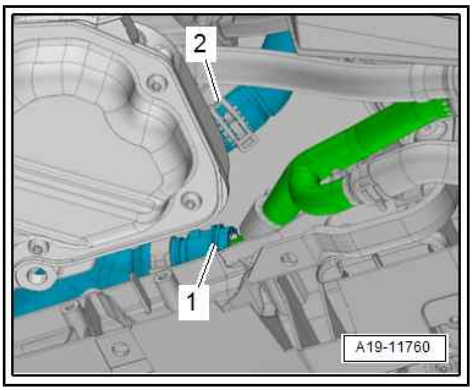
– Release hose clip -4-, disconnect coolant hose and drain off coolant.



Note

Disregard items -2 and 3-.

– Lift retaining clip -1-, disconnect coolant hose and drain off coolant.



Note

Disregard -item 2-.

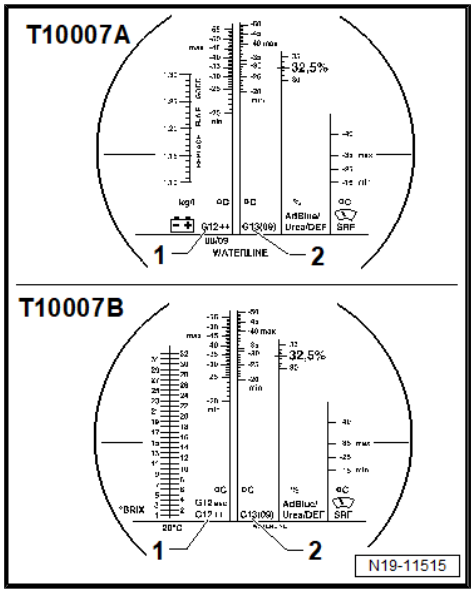
Filling

- Ignition switched off.

Caution

To ensure optimal corrosion protection, only distilled water may be mixed with coolant additives.

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Note

- *The effectiveness of the coolant is greatly influenced by the quality of the water with which it is mixed. Because water may contain different substances depending on the country or even the region, the water quality to be used for cooling systems has been specified. Distilled water meets all the requirements and is therefore recommended for use when topping up or filling up with coolant.*
- *Use only coolant additives listed in the ⇒ Electronic parts catalogue (ETKA) . 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.*
- *Refractometer - T10007A- or refractometer - T10007B- MUST be used to determine the current level of frost protection.*
- *Scale -1- on the refractometer applies to coolant additives G12 ++ and G12evo.*
- *Scale -2- on the refractometer applies to coolant additive G13.*
- *If more than one type of coolant additive has been used: Always use the scale for G13 to determine the anti-freeze 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.*
- *The temperature indicated on the refractometer corresponds to the temperature at the 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.*

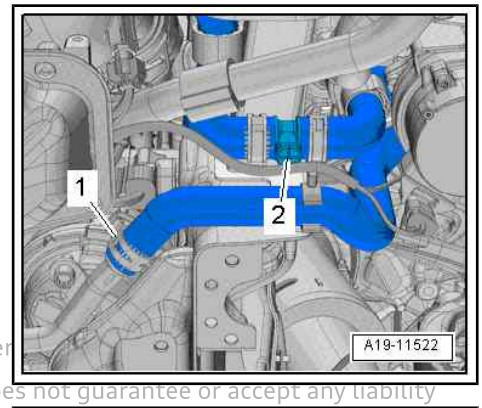
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Recommended mixture ratio for coolant

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

Procedure

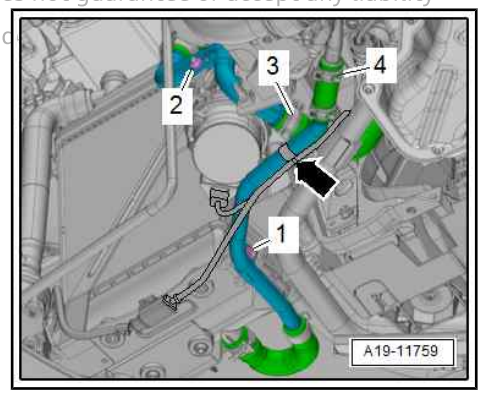
Audi S6/S7:



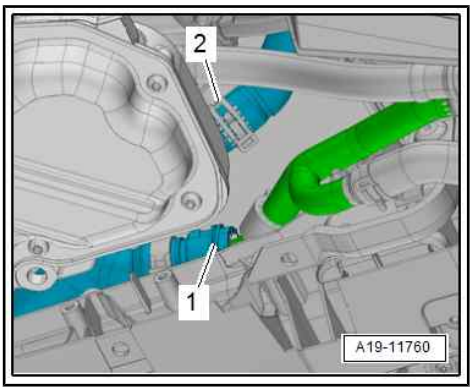
– Connect coolant hose to coolant pipe (bottom left) with hose clip -1-.
– Close drain plug -2-.

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Audi RS 6/RS 7:

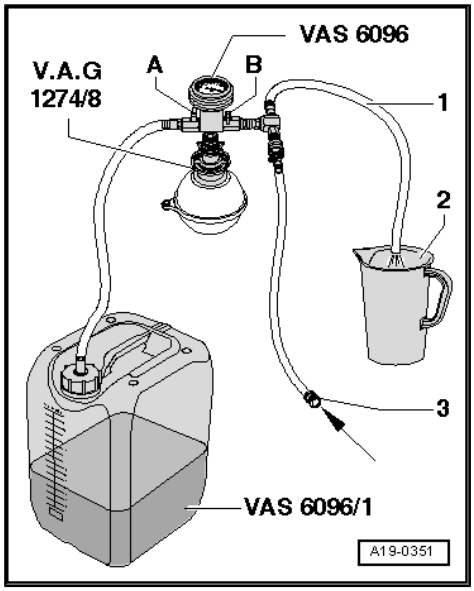


– Connect coolant hose using hose clip -4-.



– Connect coolant hose with plug-in connector -1- ⇒ page 302 .

All vehicles (continued):



– Fill reservoir of cooling system charge unit - VAS 6096- with at least 15 litres of premixed coolant (according to recommended ratio).

– Fit adapter for cooling system tester - V.A.G 1274/8- onto coolant expansion tank.

– Attach cooling system charge unit - VAS 6096- to adapter for cooling system tester - V.A.G 1274/8- .

– Run vent hose -1- into a small container -2-.

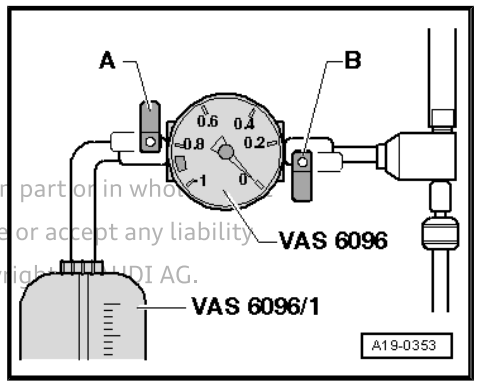
Note

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.



– 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.

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.

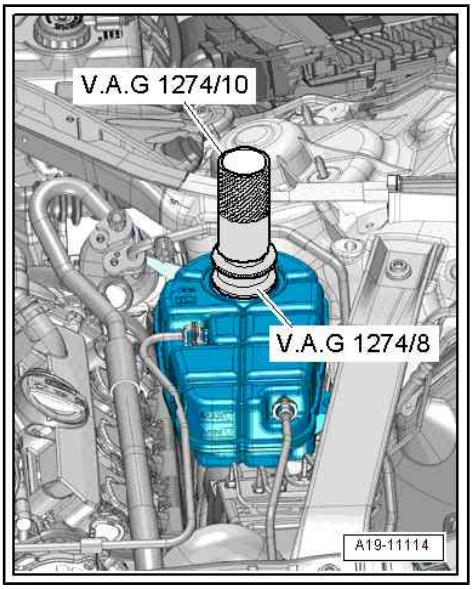
– Open valve -A-.

• 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.

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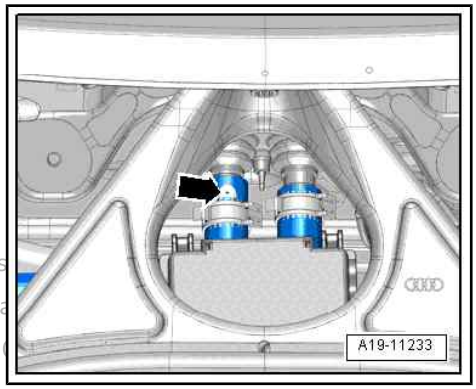
– Fit pipe for cooling system tester - V.A.G 1274/10- onto adapter for cooling system tester - V.A.G 1274/8- .
– Top up coolant to upper edge of pipe for cooling system tester - V.A.G 1274/10- .
– Remove plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .



Note

Place a cloth underneath to catch escaping coolant.

– Release coolant hose going to heat exchanger and pull back hose until coolant flows out at bleeder hole -arrow- in coolant hose.
– Push coolant hose back onto connection and secure with hose clip.



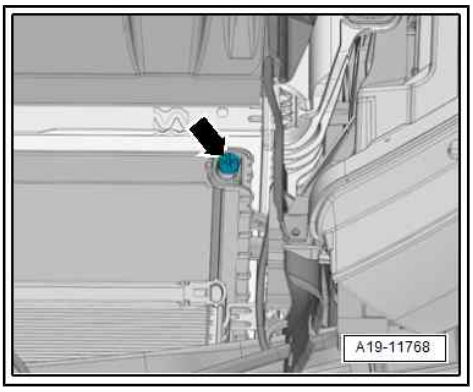
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Audi S6/S7:

– On vehicles with auxiliary heater, switch heater on (for about 30 seconds) and then off again.

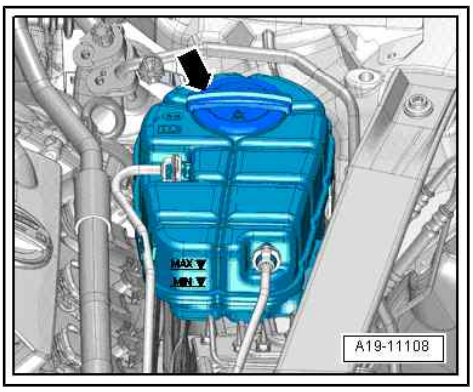
Audi RS 6/RS 7:

– Remove lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments .
– Open bleeder screw -arrow-.
– Fill up with coolant until it comes out at bleeder hole.
– Close bleeder screw.



All vehicles (continued):

– Extract coolant until coolant level is at max. mark.
– Close filler cap -arrow- on coolant expansion tank (make sure it engages).
– Start engine.



Time period	Engine speed	Air conditioner/heater setting
4 minutes	3500 rpm	• Air conditioning system “OFF”, LED in AC button not lit • Heating at “HI”, select lowest possible blower speed (= 0)
Until temperature display shows 90 °C and both hoses to heat exchanger for heater are warm	Idling	• Air conditioning system “OFF” • Heating at “HI”
2 minutes	2000 rpm	• Air conditioning system “OFF” • Heating at “HI”

– Switch off ignition and allow engine to cool down.

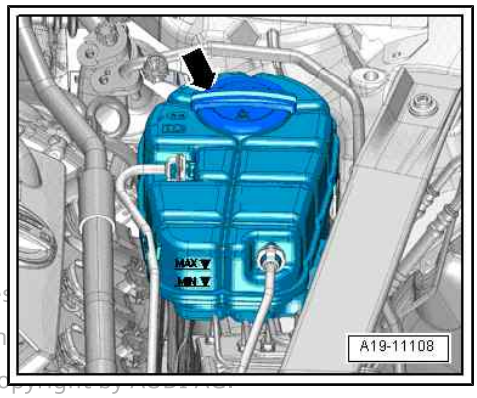
– Install lock carrier cover ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments .

– Install plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .

– Check coolant level.

• The coolant level must be at the MAX marking when the engine is cold.

• The coolant level can be above the MAX marking when the engine is warm.



Tightening torques

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

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

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2 Coolant pump/thermostat assembly

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⇒ “2.1 Exploded view - coolant pump/thermostat”, page 257

⇒ “2.2 Exploded view - electric coolant pump”, page 259

⇒ “2.3 Exploded view - coolant temperature senders”, page 262

⇒ “2.4 Removing and installing electric coolant pump”, page 262

⇒ “2.5 Removing and installing coolant pump”, page 270

⇒ “2.6 Checking thermostat”, page 272

⇒ “2.7 Removing and installing map-controlled engine cooling system thermostat F265 ”, page 272

⇒ “2.8 Removing and installing coolant temperature senders G62 / G694 ”, page 273

⇒ “2.9 Removing and installing radiator outlet coolant temperature sender G83 ”, page 275

⇒ “2.10 Removing and installing coolant valves”, page 276

2.1 Exploded view - coolant pump/thermostat

1 - Housing
- ❑ For coolant pump
- ❑ Removing and installing ⇒ “2.5 Removing and installing coolant pump”, page 270

2 - Bolt
- ❑ 9 Nm

3 - Coolant connection

4 - O-ring
- ❑ Renew

5 - Bolt
- ❑ Steel bolt: 9 Nm
- ❑ Aluminium bolt: 8 Nm +90°, renew

6 - O-ring
- ❑ Renew

7 - Bolt
- ❑ 9 Nm

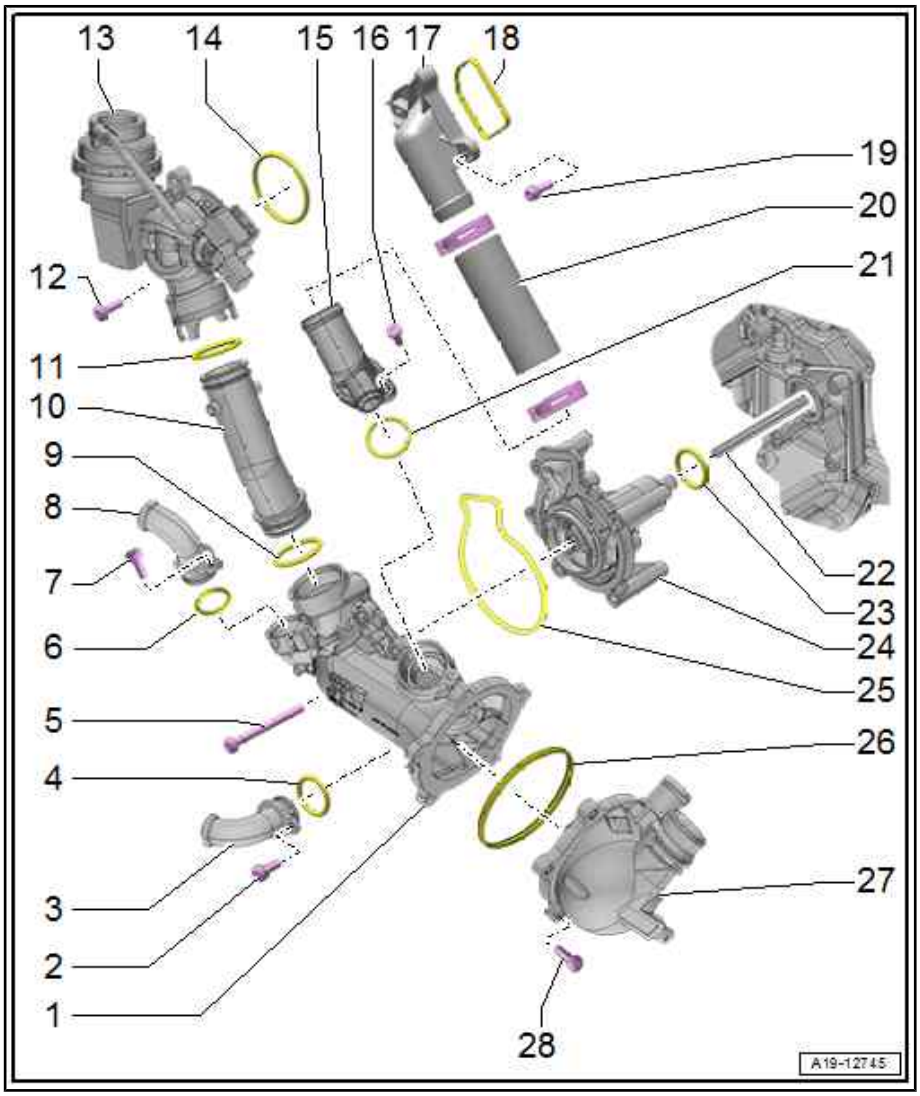
8 - Coolant connection

9 - O-ring
- ❑ Renew

10 - Intermediate pipe

11 - O-ring
- ❑ Renew

12 - Bolt
- ❑ Renew
- ❑ 5 Nm +90°



13 - Coolant shut-off valve
- ❑ Removing and installing ⇒ page 276

14 - O-ring
- ❑ Renew

15 - Coolant connection

16 - Bolt
- ❑ 9 Nm

17 - Coolant connection

18 - Gasket
- ❑ Renew

19 - Bolt
- ❑ 9 Nm

20 - Coolant hose

21 - O-ring
- ❑ Renew

22 - Drive shaft
- ❑ For coolant pump

23 - O-ring
- ❑ Renew

24 - Coolant pump
- ❑ Removing and installing ⇒ page 270

25 - Gasket
- ❑ Renew

26 - Seal
- ❑ Renew

27 - Map-controlled engine cooling system thermostat - F265-
- ❑ Removing and installing ⇒ page 272
- ❑ Thermostat opening data ⇒ page 272

28 - Bolt
- ❑ 9 Nm

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2.2 Exploded view - electric coolant pump

⇒ “2.2.1 Exploded view - electric coolant pump, coolant circulation pump”, page 259

⇒ “2.2.2 Exploded view - electric coolant pump, Audi S6/S7”, page 260

⇒ “2.2.3 Exploded view - electric coolant pump, Audi RS 6/RS 7”, page 261

2.2.1 Exploded view - electric coolant pump, coolant circulation pump

1 - Coolant circulation pump 2 - V178-

- ❑ Removing and installing ⇒ page 264

2 - Bracket

- ❑ For coolant circulation pump 2 - V178-

3 - Bolt

- ❑ 1.5 Nm

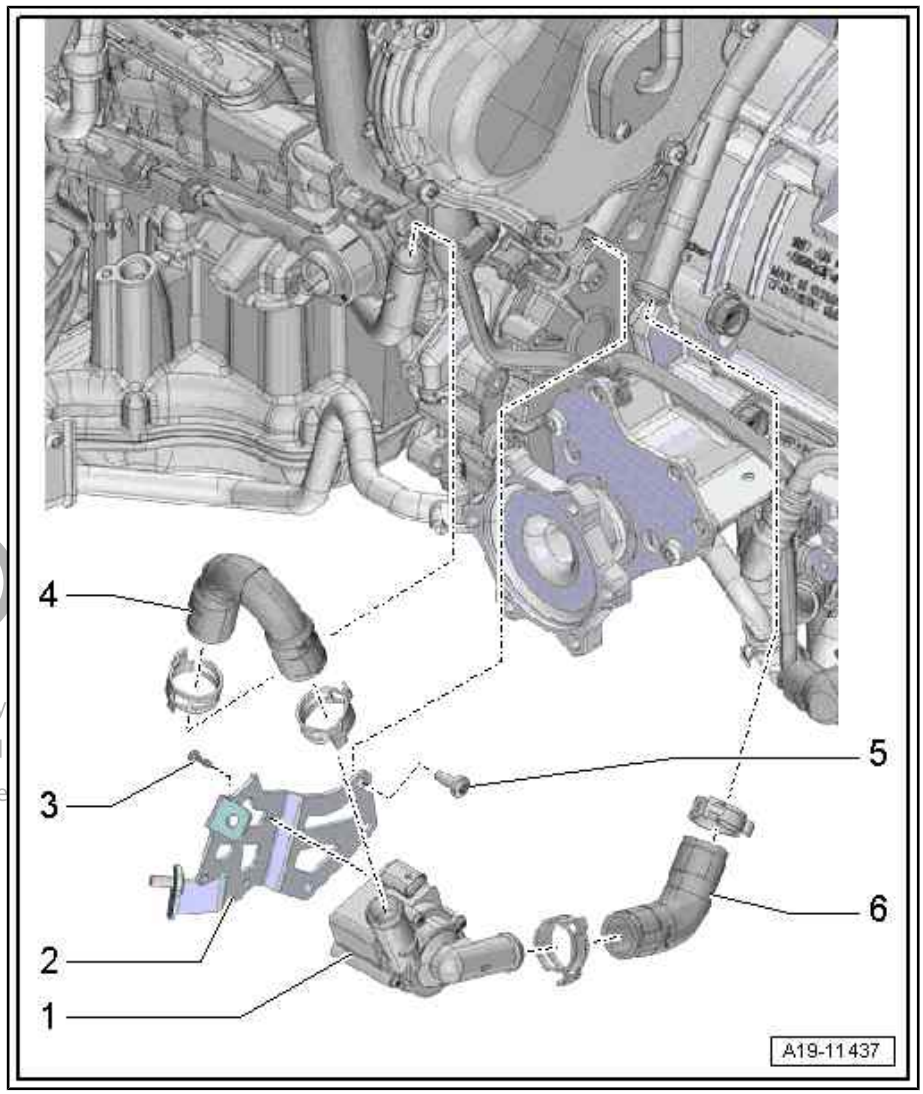
4 - Coolant hose

5 - Bolt

- ❑ 9 Nm

6 - Coolant hose

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2.2.2 Exploded view - electric coolant pump, Audi S6/S7

1 - Bolt
- ❑ 1.5 Nm

2 - Spacer sleeve

3 - Grommet

4 - Bracket
- ❑ For continued coolant circulation pump - V51-

5 - Continued coolant circulation pump - V51-
- ❑ Removing and installing ⇒ page 262

6 - Bolt
- ❑ 9 Nm

7 - Bracket

8 - Nut
- ❑ 9 Nm

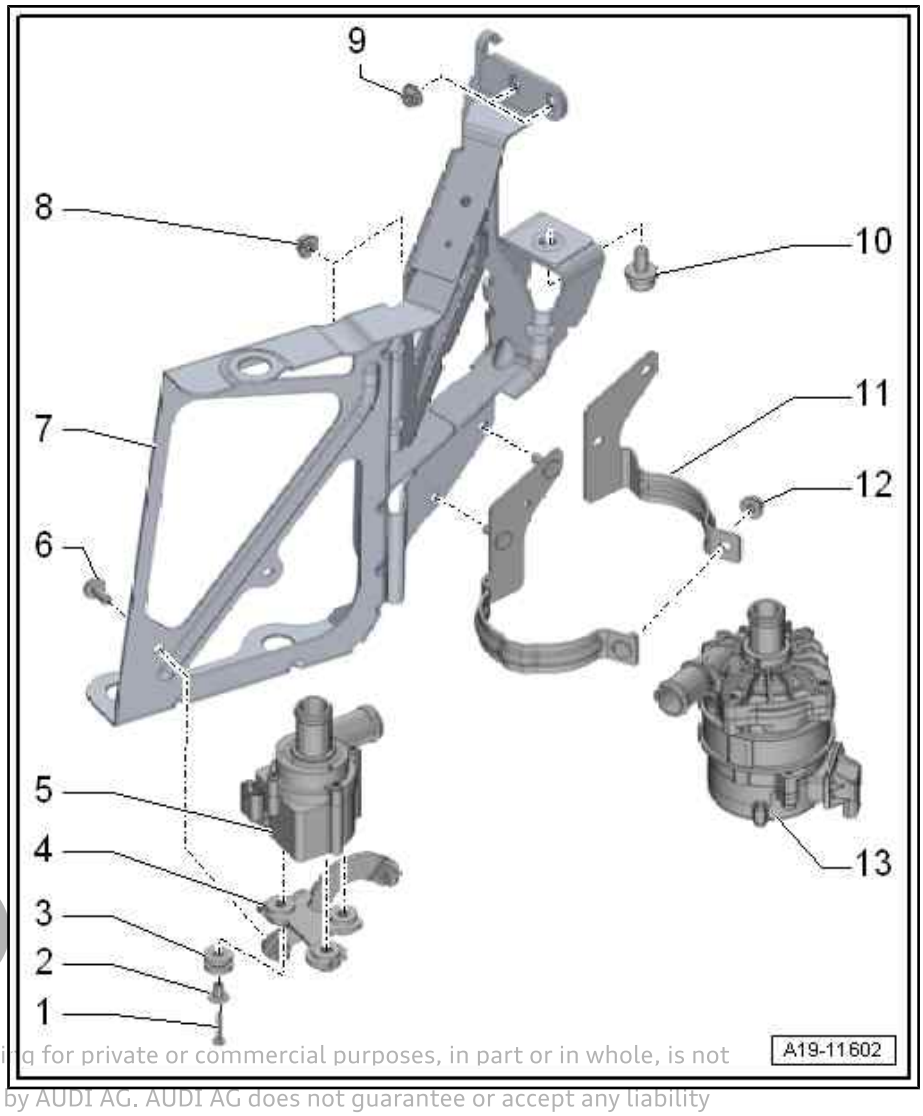
9 - Nut
- ❑ 9 Nm

10 - Bolt
- ❑ 9 Nm

11 - Retaining bracket

12 - Nut
- ❑ 9 Nm

13 - Charge air cooling pump - V188-
- ❑ Removing and installing ⇒ page 267



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2.2.3 Exploded view - electric coolant pump, Audi RS 6/RS 7

1 - Continued coolant circulation pump - V51-
- ❑ Removing and installing ⇒ page 262

2 - Bolt
- ❑ 1.5 Nm

3 - Spacer sleeve

4 - Grommet

5 - Bracket

6 - Nut
- ❑ 9 Nm

7 - Retaining bracket

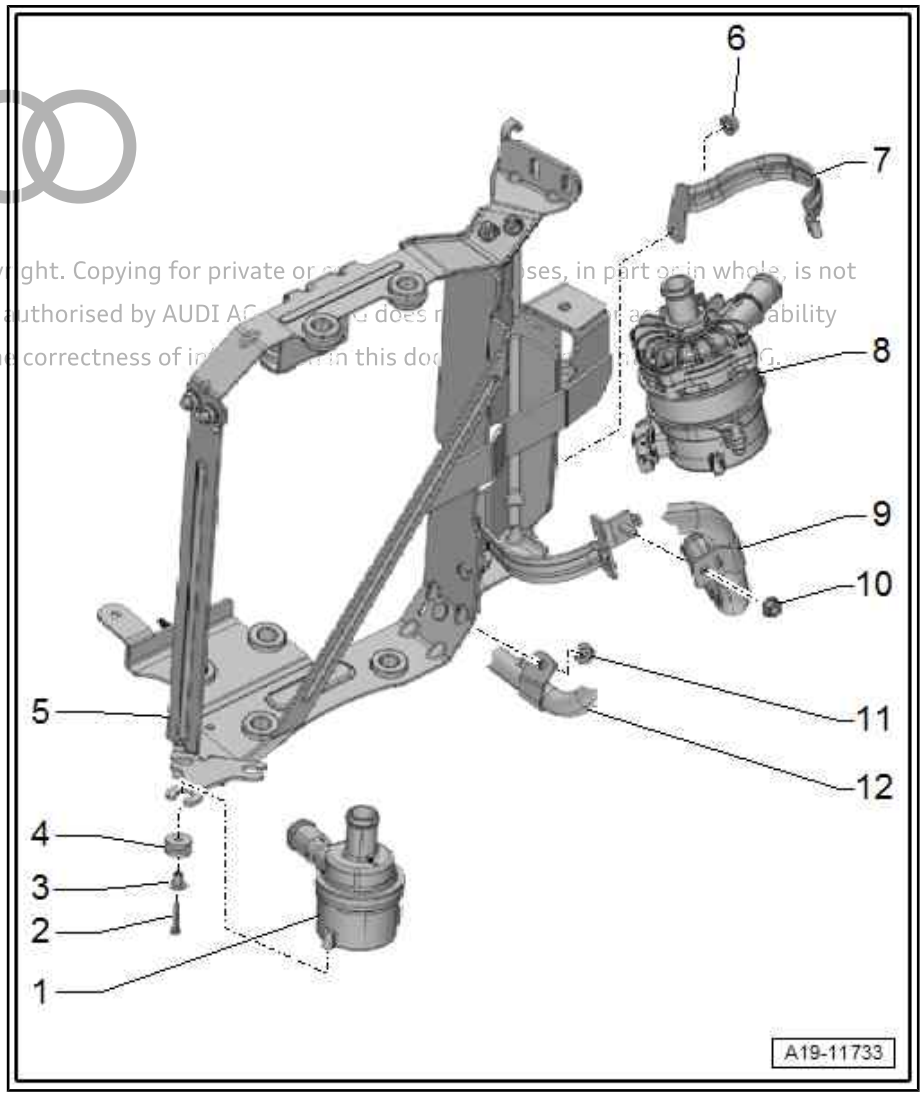
8 - Charge air cooling pump - V188-
- ❑ Removing and installing ⇒ page 267

9 - Coolant pipe

10 - Nut
- ❑ 9 Nm

11 - Nut
- ❑ 9 Nm

12 - Coolant pipe



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2.3 Exploded view - coolant temperature senders

1 - Bolt
- ❑ 9 Nm

2 - Coolant temperature sender - G62-
- ❑ Black insulation
- ❑ Removing and installing ⇒ page 273

3 - O-rings
- ❑ Renew

4 - Bolt
- ❑ 9 Nm

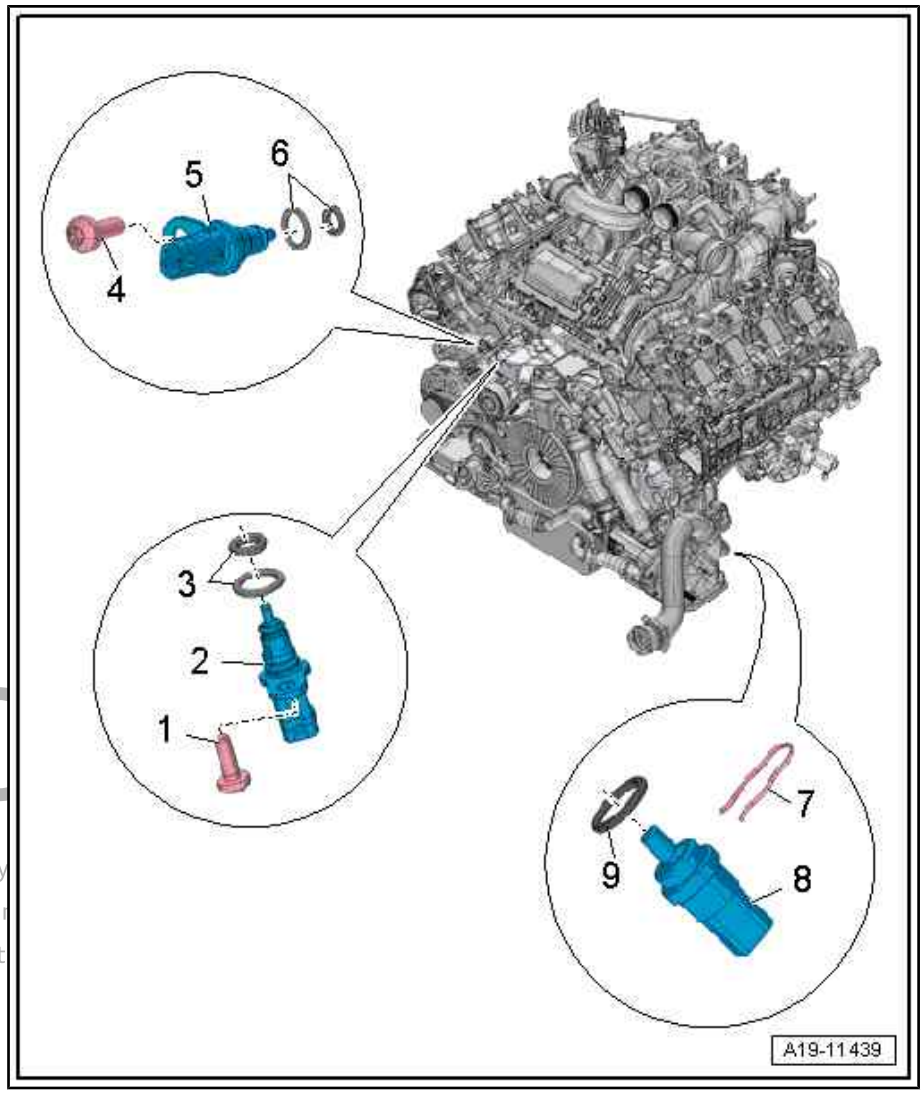
5 - Temperature sender for engine temperature regulation - G694-
- ❑ Black insulation
- ❑ Removing and installing ⇒ page 273

6 - O-rings
- ❑ Renew

7 - Retaining clip

8 - Radiator outlet coolant temperature sender - G83-
- ❑ Grey insulation
- ❑ Removing and installing ⇒ page 275

9 - O-ring
- ❑ Renew



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2.4 Removing and installing electric coolant pump

⇒ "2.4.1 Removing and installing continued coolant circulation pump V51 ", page 262

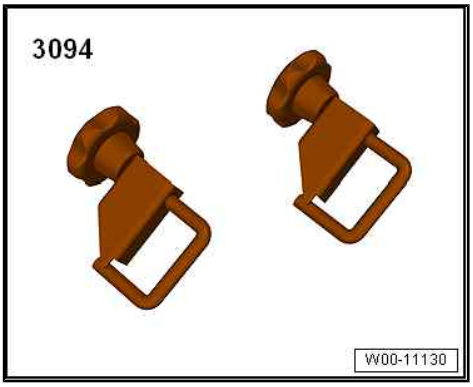
⇒ "2.4.2 Removing and installing coolant circulation pump 2 V178 ", page 264

⇒ "2.4.3 Removing and installing charge air cooling pump V188 ", page 267

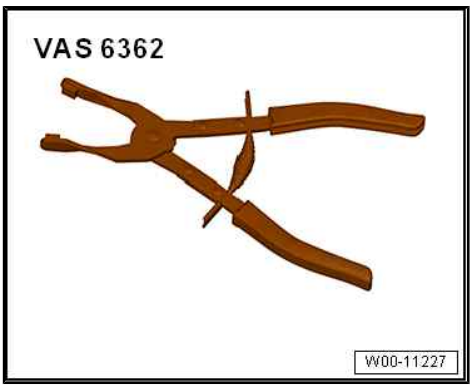
2.4.1 Removing and installing continued coolant circulation pump - V51-

Special tools and workshop equipment required

♦ Hose clamps up to 25 mm - 3094-



♦ Hose clip pliers - VAS 6362-



♦ Safety goggles

♦ Protective gloves

Removing

WARNING

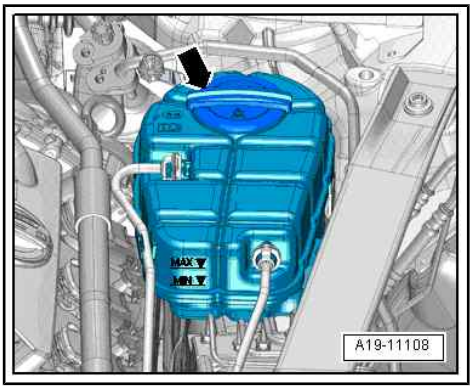
The cooling system is under pressure when the power unit is hot. Risk of scalding due to hot steam and hot coolant.

Danger of scalding skin and other parts of the body.

- ***Put on protective gloves.***
- ***Put on safety goggles.***
- ***Cover filler cap on expansion tank with a cloth and open carefully to release pressure.***

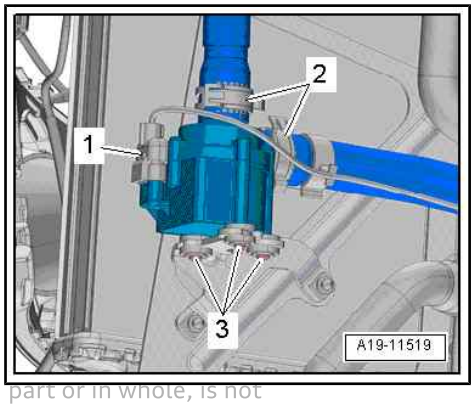
– Open filler cap -arrow- on coolant expansion tank.

– Remove wheel spoiler (front left) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .



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Audi S6/S7:



– Unfasten front section of wheel housing liner (front left) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Removing and installing wheel housing liner (front) .

– Unplug electrical connector -1-.

Note

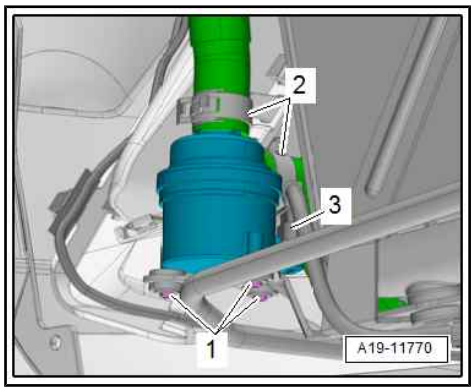
Place a cloth underneath to catch escaping coolant.

– Clamp off coolant hoses using hose clamps up to 25 mm - 3094- , release hose clips -2- and disconnect hoses.

– Remove bolts -3- and detach continued coolant circulation pump - V51- .

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Audi RS 6/RS 7:



– Drain coolant ⇒ page 249 .

– Unplug electrical connector -3-.

– Remove bolts -1-.

– Release hose clips -2- and detach coolant hoses.

– Detach continued coolant circulation pump - V51- .

Installing

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

Note

- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *Do not reuse coolant.*

– Check coolant level ⇒ page 256 , or top up coolant ⇒ page 251 .

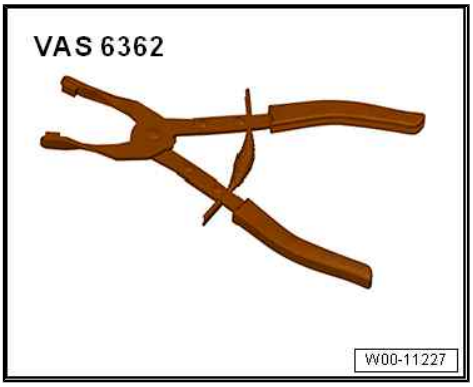
Tightening torques

- ⇒ “2.2 Exploded view - electric coolant pump”, page 259
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front)

2.4.2 Removing and installing coolant circulation pump 2 - V178-

Special tools and workshop equipment required

♦ Hose clip pliers - VAS 6362-

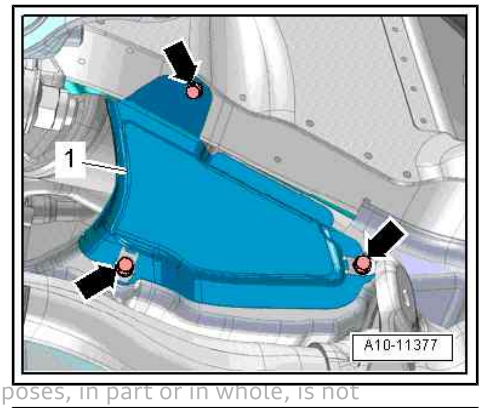


Removing

Note

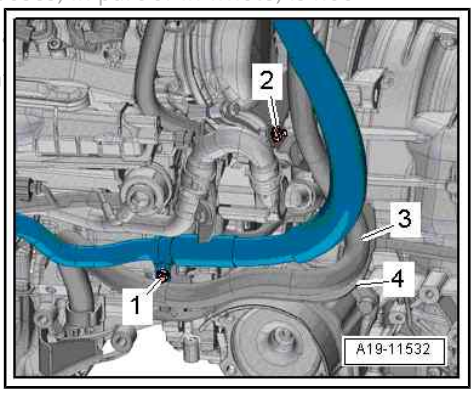
Secure the heat insulation sleeve in the original position when installing.

– Drain coolant ⇒ page 249 .
– Remove catalytic converters ⇒ page 440 .
– Remove bolts -arrows- and detach heat shield (right-side) -1-.

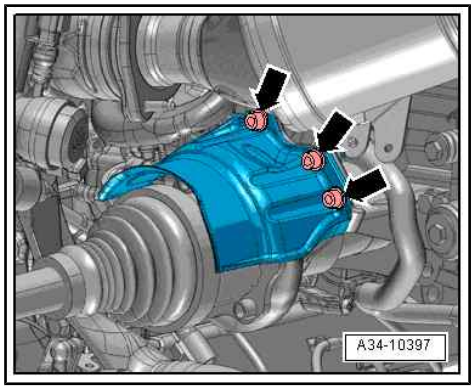


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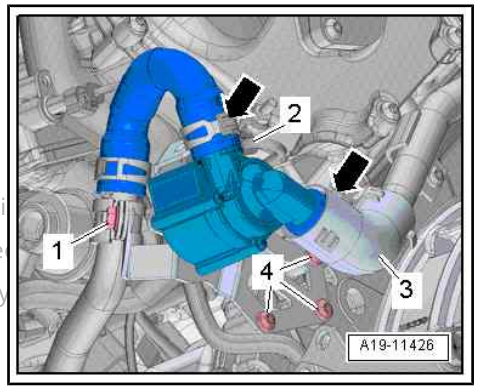
– Move clear electrical wiring harness -3- at bracket -4-.
– Remove nut -1-, move retaining clip clear and remove centre hex stud.
– Remove nut -2- and detach bracket.



– Remove bolts -arrows- and detach heat shield for drive shaft (left-side).
– Unbolt drive shaft (left-side) from gearbox flange shaft ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Removing and installing drive shaft .

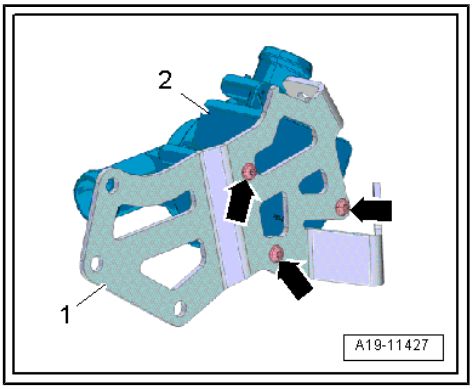


– Remove nut -1- and move retaining clip clear.
– Unplug electrical connector -2-.
– Remove bolts -4-.
– Release hose clips -arrows- and detach coolant hoses.
– Move clear electrical wiring harness and detach coolant circulation pump 2 - V178- with bracket.



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– Remove bolts -arrows- and detach coolant circulation pump 2 - V178- -item 2- from bracket -1-.



Installing

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

Note

- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *Fit all cable ties in the original positions when installing.*

– Install catalytic converters ⇒ page 440 .

– Install electrical wiring ⇒ Electrical system; Rep. gr. 97 ; Relay carriers, fuse carriers, electronics boxes; Overview of fitting locations - relay carriers, fuse carriers, electronics boxes and ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

Note

Do not reuse coolant.

– Fill up with coolant ⇒ page 251 .

Tightening torques

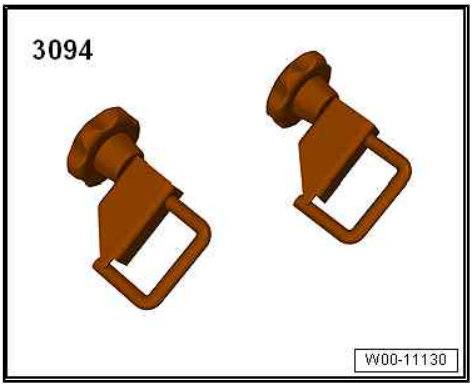
- ⇒ “2.2 Exploded view - electric coolant pump”, page 259
- ⇒ “3.1 Exploded view - coolant pipes”, page 278
- Heat shield ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe
- ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft

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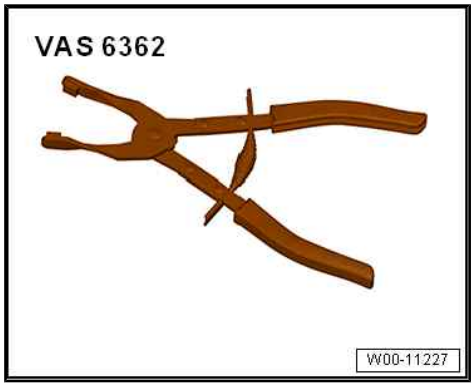
2.4.3 Removing and installing charge air cooling pump - V188-

Special tools and workshop equipment required

- Hose clamps up to 25 mm - 3094-



- Hose clip pliers - VAS 6362-



- Safety goggles
- Protective gloves

Removing

WARNING

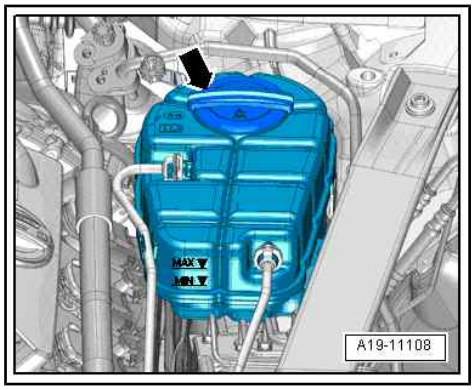
The cooling system is under pressure when the power unit is hot. Risk of scalding due to hot steam and hot coolant.

Danger of scalding skin and other parts of the body.

- *Put on protective gloves.*
- *Put on safety goggles.*
- *Cover filler cap on expansion tank with a cloth and open carefully to release pressure.*

– Open filler cap -arrow- on coolant expansion tank.

– Remove wheel spoiler (front left) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .



Audi S6/S7:

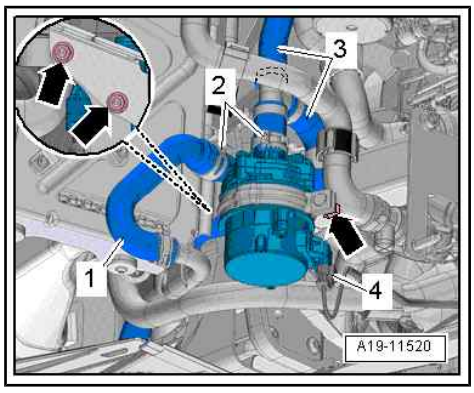
– Unfasten front section of wheel housing liner (front left) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Removing and installing wheel housing liner (front) .

– Unplug electrical connector -4-.

– Use hose clamps up to 25 mm - 3094- to clamp off coolant hoses -1, 3- at charge air cooling pump - V188- .

– Remove nuts -arrows- and detach retaining bracket.

– Release hose clips -2- and detach coolant hoses.



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Audi RS 6/RS 7:

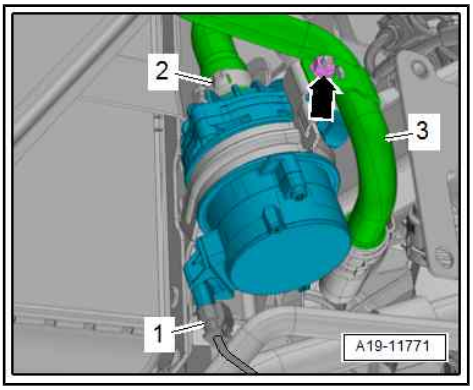
– Remove closure plate for bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments .

– Drain coolant ⇒ page 249 .

– Unplug electrical connector -1-.

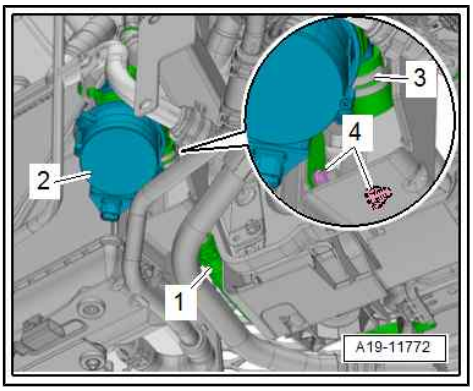
– Remove nut -arrow- and move coolant pipe -3- clear.

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



– Clamp off coolant hose -1- with hose clamp, up to 25 mm - 3094- .

– Remove nuts -4-.



Note

Place a cloth underneath to catch escaping coolant.

– Release hose clip -3-, disconnect charge air cooling pump - V188- from coolant hoses and detach.

Installing

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

Note

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

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

Note

Do not reuse coolant.

– Check coolant level ⇒ page 251 , or top up coolant ⇒ page 251 .

Tightening torques

- ⇒ “2.2 Exploded view - electric coolant pump”, page 259
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front)

2.5 Removing and installing coolant pump

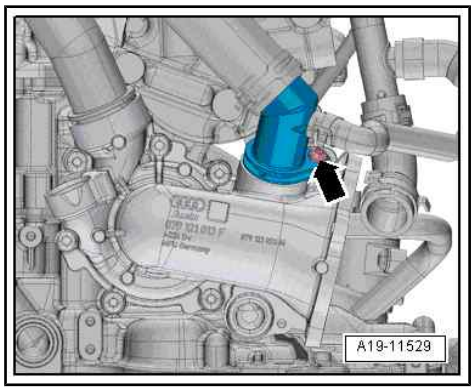
Removing

Audi S6/S7:

– Remove map-controlled engine cooling system thermostat - F265- ⇒ page 272 .

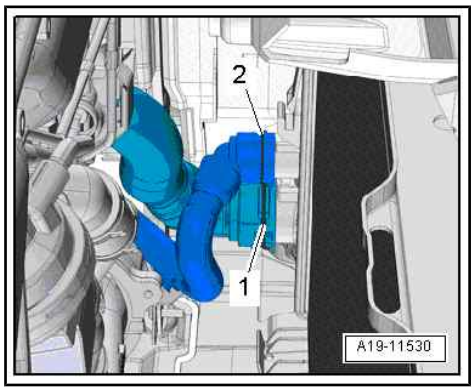
– Remove engine oil cooler ⇒ page 223 .

– Remove bolt -arrow- and detach coolant connection.



Audi S7:

– Release retaining clips -1, 2- and disconnect coolant hoses.

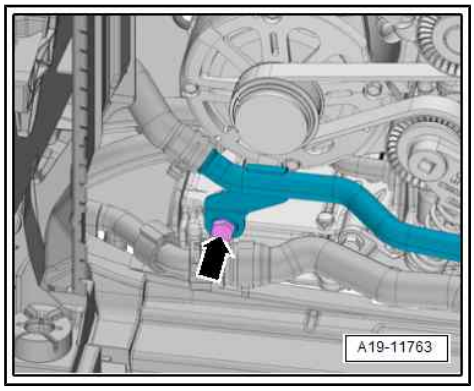


Audi RS 6/RS 7:

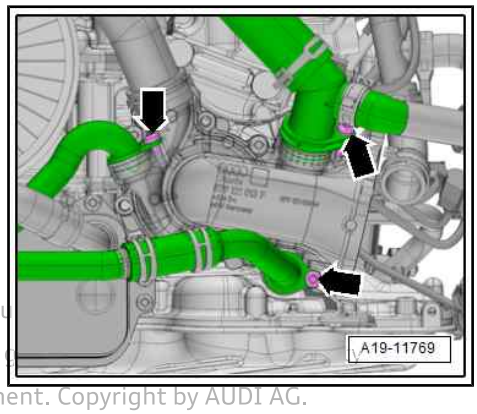
– Remove map-controlled engine cooling system thermostat - F265- ⇒ page 272 .

– Remove radiator with radiator cowl ⇒ page 313 .

– Remove bolt -arrow-.

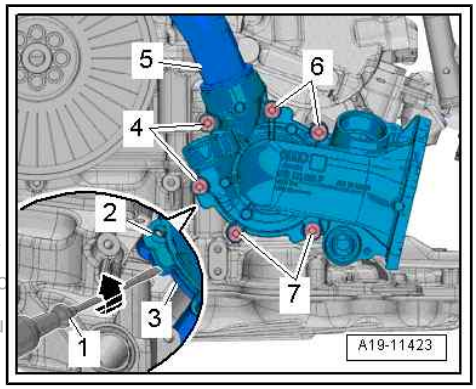


– Remove bolts -arrows- and detach coolant connection.



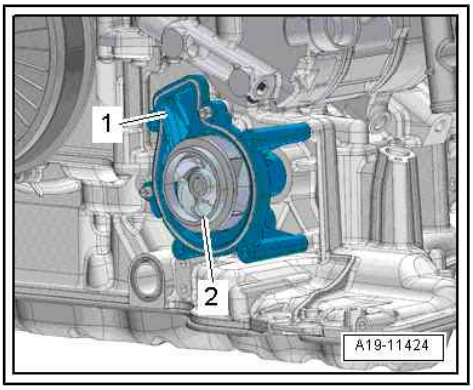
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All vehicles (continued):



– Remove bolts -4, 6, 7-.
– Use screwdriver -1- to press coolant pump housing -2- off coolant pump -3- -arrow-.
– Carefully detach housing (pay attention to intermediate pipe -5-).

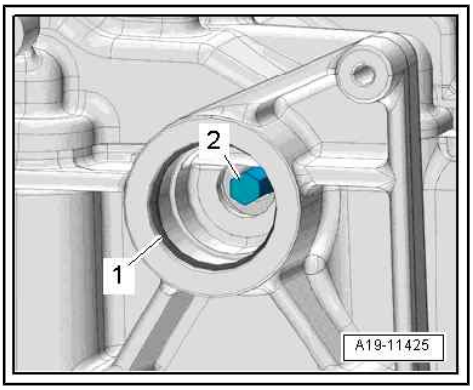
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– Pull off coolant pump -1- forwards (note the drive shaft for coolant pump).

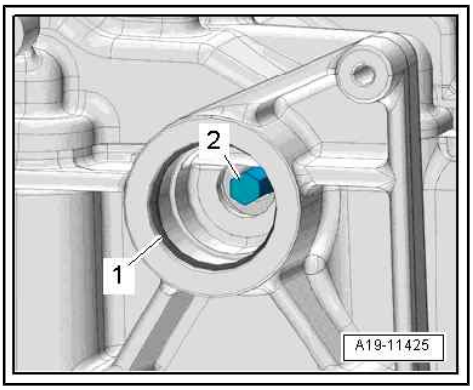
Note

Disregard -item 2-.



– Remove drive shaft -2-.

Installing

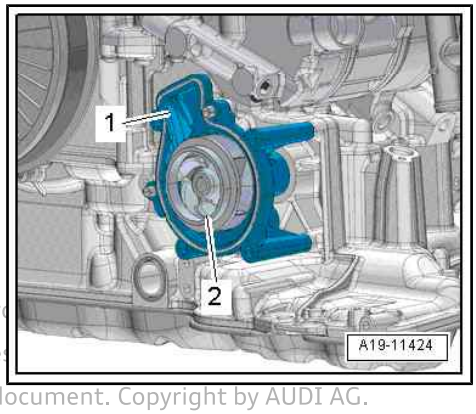


Note

Renew gasket and O-rings.

– Fit O-ring -1-.
– Insert drive shaft -2- for coolant pump in mounting for oil pump as far as stop.

– Slide coolant pump -1- into mountings on sump (top section).



Note

To fit the drive flange onto the hexagon flats of the drive shaft, turn the impeller -2- until the coolant pump can be pressed on all the way.

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

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– Install engine oil cooler ⇒ page 223 .
– Install coolant pipes (bottom front) ⇒ page 283 .
– Install radiator with radiator cowl ⇒ page 313 .
– Install map-controlled engine cooling system thermostat - F265- ⇒ page 272 .
– Connect coolant hose with plug-in connector ⇒ page 302 .

Tightening torques

♦ ⇒ “2.1 Exploded view - coolant pump/thermostat”, page 257

2.6 Checking thermostat

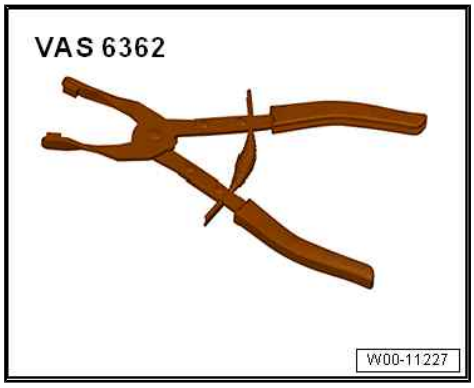
Note

The thermostat cannot be tested with workshop equipment.

2.7 Removing and installing map-controlled engine cooling system thermostat - F265-

Special tools and workshop equipment required

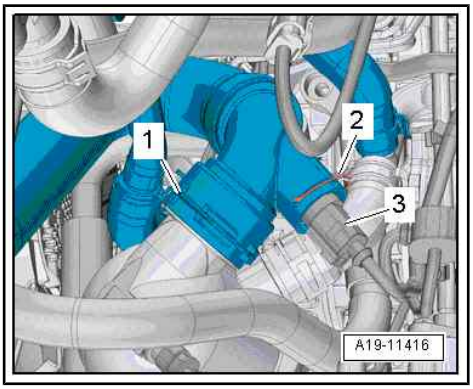
♦ Hose clip pliers - VAS 6362-



Removing

– Drain coolant ⇒ page 249 .
– If fitted, remove front longitudinal member (bottom left) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Exploded view - impact bar .

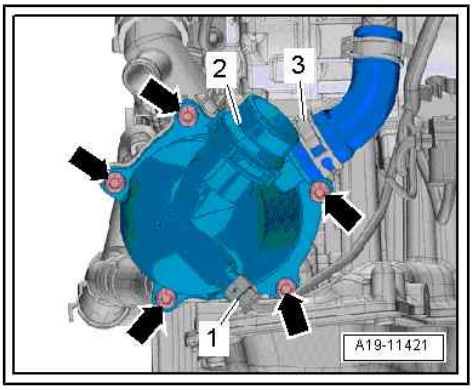
– Unplug electrical connector -3-.
– Lift retaining clip -1- and disconnect coolant hose.



Note

Disregard -item 2-.

– Unplug electrical connector -1-.
– Remove bolts -arrows-.
– Release hose clip -3- and detach coolant hose from map-controlled engine cooling system thermostat - F265- .



Installing

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

Note

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

– Connect coolant hose with plug-in connector ⇒ page 302 .

Note

Do not reuse coolant.

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– Fill up with coolant ⇒ page 251 .

Tightening torques

- ⇒ “2.1 Exploded view - coolant pump/thermostat”, page 257
- ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Exploded view - lock carrier

2.8 Removing and installing coolant temperature senders - G62- / -G694-

Removing

Audi S6/RS 6/RS 7:

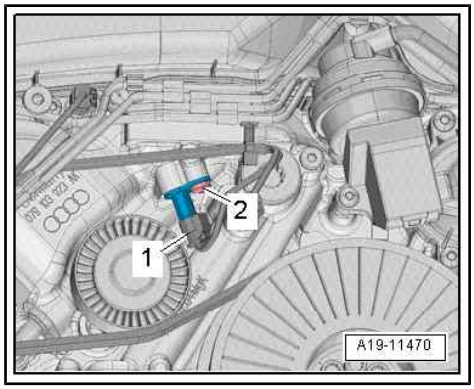
– Remove radiator with radiator cowl ⇒ page 309 .

Audi S7:

– Remove radiator cowl ⇒ page 322 .

Coolant temperature sender - G62- :

– Unplug electrical connector -1-.



Note

Place a cloth underneath to catch escaping coolant.

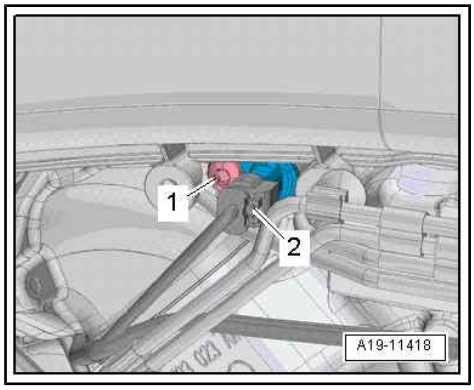
– Unscrew bolt -2- and pull off coolant temperature sender - G62- .

Note

If an O-ring remains lodged in cylinder block, lift out O-ring with a piece of wire.

Temperature sender for engine temperature regulation - G694- :

– Unplug electrical connector -2-.



Note

Place a cloth underneath to catch escaping coolant.

– Unscrew bolt -1- and detach temperature sender for engine temperature regulation - G694- .

Note

If an O-ring remains lodged in cylinder block, lift out O-ring with a piece of wire.

Installing

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

Note

Fit new O-rings.

Audi S6/RS 6/RS 7:

– Install radiator with radiator cowl ⇒ page 309 .

Audi S7:

– Install radiator cowl ⇒ page 322 .

All vehicles (continued):

– Check coolant level ⇒ page 256 .

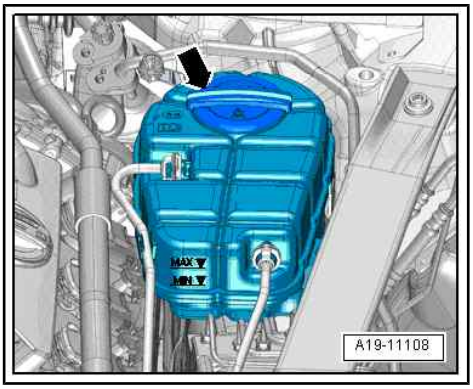
Tightening torques

◆ ⇒ “2.3 Exploded view - coolant temperature senders”, page 262

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2.9 Removing and installing radiator outlet coolant temperature sender - G83-

Removing



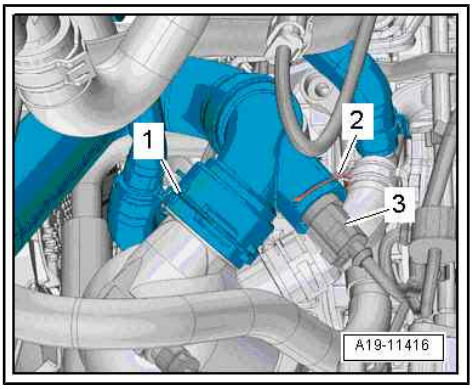
- Engine cold.

– Open filler cap -arrow- on coolant expansion tank briefly to relieve residual pressure in cooling system.

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

– Remove wheel spoiler (front left) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .

– Unplug electrical connector -3-.



Note

Place a cloth underneath to catch escaping coolant.

– Pull off retaining clip -2- and detach radiator outlet coolant temperature sender - G83- .

Note

Disregard -item 1-.

Installing

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

Note

- *Fit new O-ring.*
- *Insert new coolant temperature sender - G62- immediately into connection to avoid loss of coolant.*

– Check coolant level ⇒ page 256 .

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Tightening torques

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

2.10 Removing and installing coolant valves

⇒ “2.10.1 Removing and installing coolant shut-off valve”, page 276

⇒ “2.10.2 Removing and installing gearbox oil cooling valve N509”, page 276

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2.10.1 Removing and installing coolant shut-off valve

Removing

Audi S6/RS 6/RS 7:

– Remove radiator with radiator cowl ⇒ page 309 .

Audi S7:

– Remove radiator cowl ⇒ page 322 .

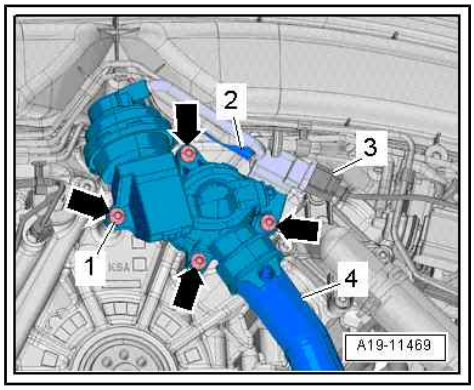
All vehicles (continued):

– Unplug electrical connector -3-.

– Disconnect vacuum hose -2-.

– Remove bolts -arrows-.

– Remove coolant shut-off valve -1- (pay attention to intermediate pipe -4-).



Installing

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

Note

Renew gasket and O-rings.

Audi S6/RS 6/RS 7:

– Install radiator with radiator cowl ⇒ page 309 .

Audi S7:

– Install radiator cowl ⇒ page 322 .

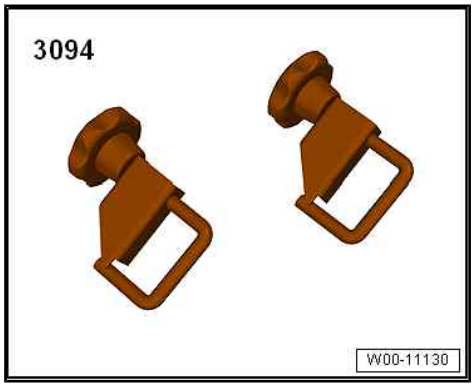
Tightening torques

♦ ⇒ “2.1 Exploded view - coolant pump/thermostat”, page 257

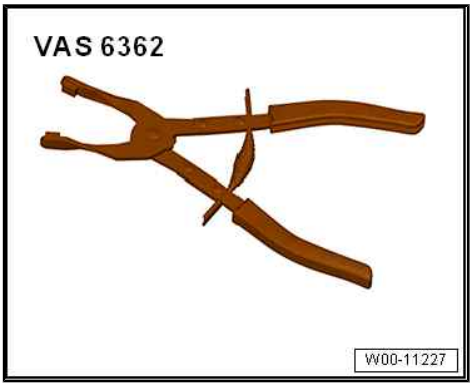
2.10.2 Removing and installing gearbox oil cooling valve - N509-

Special tools and workshop equipment required

♦ Hose clamps up to 25 mm - 3094-



- Hose clip pliers - VAS 6362-



Removing

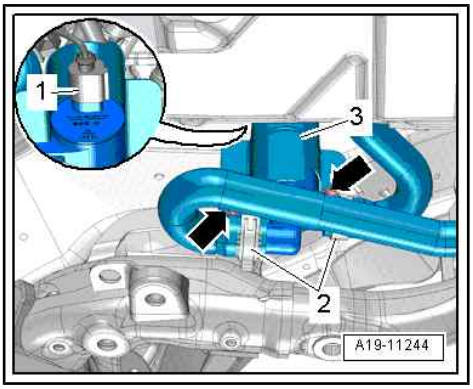
– Remove noise insulation (rear) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

– Remove bolts -arrows- and detach heat shield -3-.

– Unplug electrical connector -1-.

– Clamp off coolant hoses using hose clamps up to 25 mm - 3094- , release hose clips -2- and disconnect hoses.

– Detach gearbox oil cooling valve - N509- .



Installing

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

Note

- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *Do not reuse coolant.*

– Fill up with coolant ⇒ page 251 .

Tightening torques

- ⇒ “3.1 Exploded view - coolant pipes”, page 278
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

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3 Coolant pipes

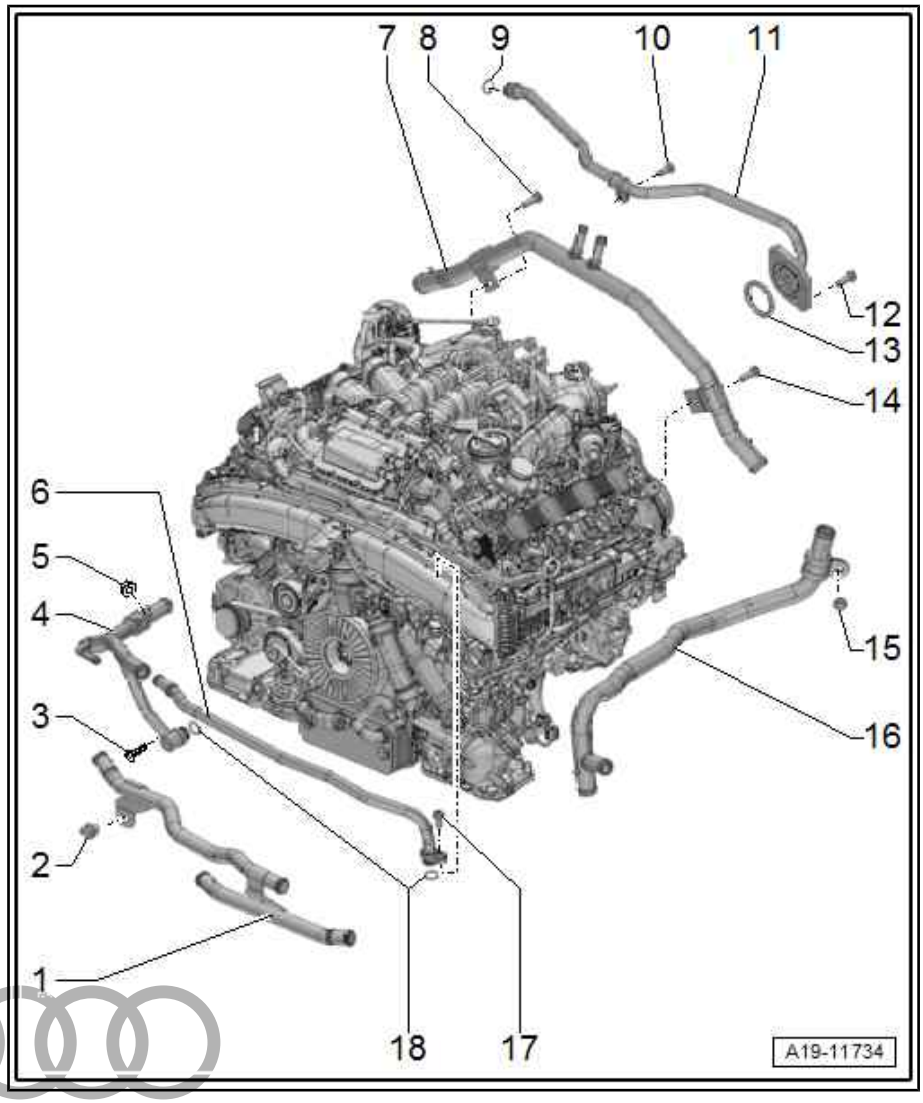
⇒ “3.1 Exploded view - coolant pipes”, page 278

3.1 Exploded view - coolant pipes

Note

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

Coolant pipes on engine



1 - Coolant pipes (bottom front)
- ❑ For Audi RS 6/RS 7
- ❑ Removing and installing ⇒ page 283

2 - Bolt
- ❑ 23 Nm

3 - Bolt
- ❑ 9 Nm

4 - Coolant pipe (right-side)
- ❑ Removing and installing ⇒ page 291

5 - Nut
- ❑ 9 Nm

6 - Coolant pipe (front)
- ❑ Removing and installing ⇒ page 281

7 - Coolant pipe (bottom rear)
- ❑ Removing and installing ⇒ page 294

8 - Bolt
- ❑ 9 Nm

9 - O-ring
- ❑ Renew

10 - Bolt
- ❑ 9 Nm

11 - Coolant pipe (top rear)
- ❑ With an additional securing bolt on some versions
- ❑ Removing and installing ⇒ page 291

12 - Bolt
- ❑ 9 Nm

13 - O-ring
- ❑ Renew

14 - Bolt
- ❑ 9 Nm

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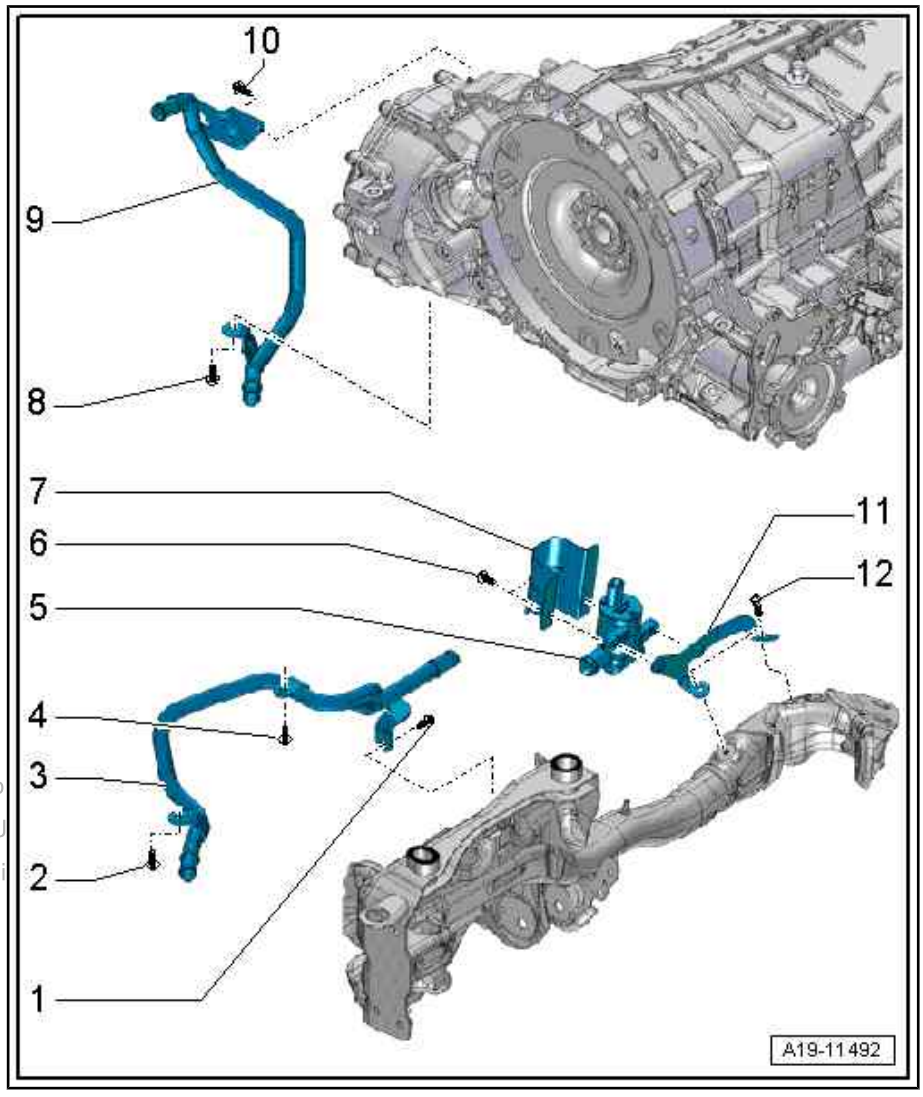
15 - Nut
- ❑ 9 Nm

16 - Coolant pipe (top left)
- ❑ Removing and installing ⇒ page 284

17 - Bolt
- ❑ 9 Nm

18 - O-rings
- ❑ Renew

Coolant pipes on dual clutch gearbox 0B5



1 - Bolt
- ❑ 9 Nm

2 - Bolt
- ❑ 9 Nm

3 - Coolant pipe (bottom left)
- ❑ Removing and installing ⇒ page 290

4 - Bolt
- ❑ 9 Nm

5 - Gearbox oil cooling valve - N509-
- ❑ Removing and installing ⇒ page 276

6 - Bolt
- ❑ 9 Nm

7 - Bracket
- ❑ For gearbox oil cooling valve - N509-

8 - Bolt
- ❑ 9 Nm

9 - Coolant pipe (right-side) on gearbox
- ❑ Removing and installing ⇒ page 296

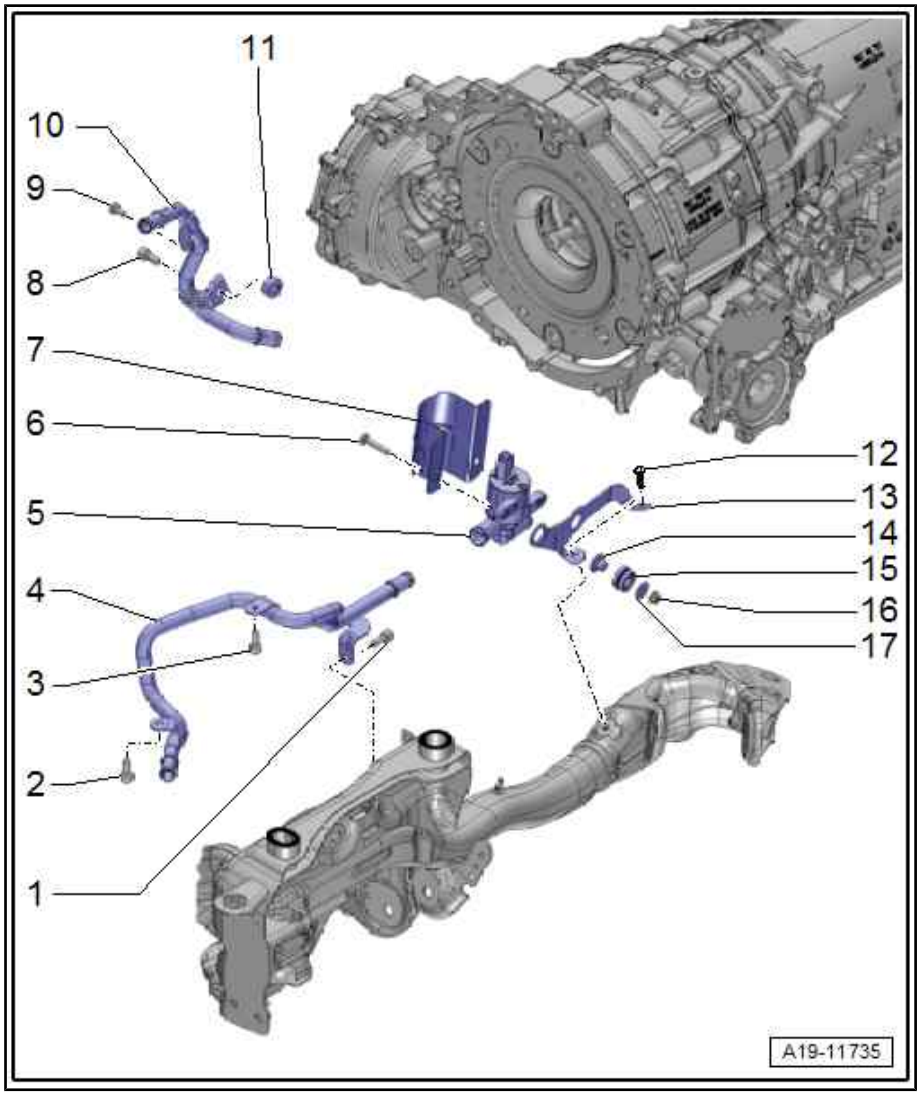
10 - Bolt
- ❑ 9 Nm

11 - Bracket

12 - Bolt
- ❑ 9 Nm

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Coolant pipes on automatic gearbox 0BK



1 - Bolt
- ❑ 9 Nm

2 - Bolt
- ❑ 9 Nm

3 - Bolt
- ❑ 9 Nm

4 - Coolant pipe (bottom left)
- ❑ Removing and installing ⇒ page 290

5 - Gearbox oil cooling valve - N509-
- ❑ Removing and installing ⇒ page 276

6 - Bolt

7 - Bracket
- ❑ For gearbox oil cooling valve - N509-

8 - Bolt
- ❑ 23 Nm

9 - Bolt
- ❑ 9 Nm

10 - Coolant pipe (right-side) on gearbox
- ❑ Removing and installing ⇒ page 296

11 - Spacer bush

12 - Bolt
- ❑ 9 Nm

13 - Bracket

14 - Spacer sleeve

15 - Rubber bush

16 - Nut
- ❑ 9 Nm

17 - Washer

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3.2 Removing and installing coolant pipes

⇒ “3.2.1 Removing and installing coolant pipe (front)”, page 281

⇒ “3.2.2 Removing and installing coolant pipes (bottom front)”, page 283

⇒ “3.2.3 Removing and installing coolant pipe (top left)”, page 284

⇒ “3.2.4 Removing and installing coolant pipe (bottom left)”, page 290

⇒ “3.2.5 Removing and installing coolant pipe (right-side)”, page 291

⇒ “3.2.6 Removing and installing coolant pipe (top rear)”, page 291

⇒ “3.2.7 Removing and installing coolant pipe (bottom rear)”, page 294

⇒ “3.2.8 Removing and installing coolant pipe (right-side) on gearbox”, page 296

3.2.1 Removing and installing coolant pipe (front)

Removing

– Drain coolant ⇒ page 249 .

– Remove engine cover panel ⇒ page 82 .

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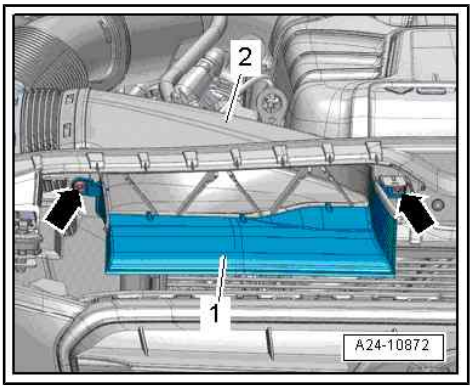
WARNING

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

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

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

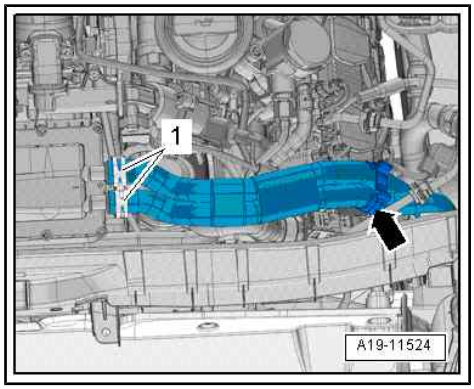
– Remove bolts -arrows- and detach air duct -2-.



Note

- *Illustration shows fitting location on an Audi S6/S7.*
- *Disregard -item 1-.*

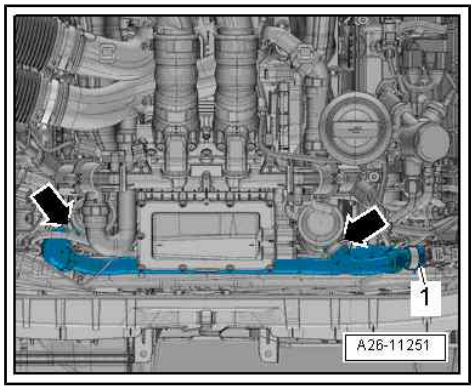
– Release hose clips -1- and detach coolant hoses.



Note

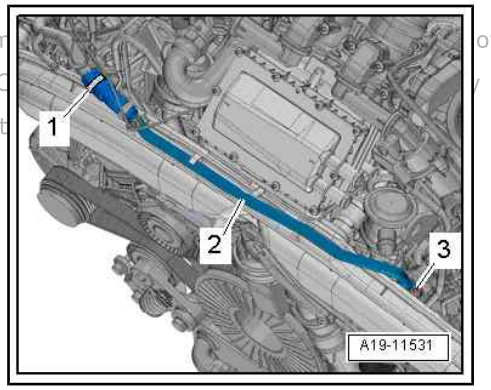
Disregard -arrow-.

– Release hose clips -arrows-, press release tabs -1- and remove secondary air pipe.



– Move electrical wiring harness clear.

– Remove bolt -3-, disconnect coolant pipe (front) -2- from cylinder head (left-side) and detach from coolant pipe (right-side) -1-.



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Installing

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

Note

- *Fit new O-ring.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

– Lubricate O-ring with coolant and fit O-ring.

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

Note

Do not reuse coolant.

– Fill up with coolant ⇒ page 251 .

Tightening torques

- ⇒ “3.1 Exploded view - coolant pipes”, page 278
- ⇒ “3.1 Exploded view - air cleaner housing”, page 379

3.2.2 Removing and installing coolant pipes (bottom front)

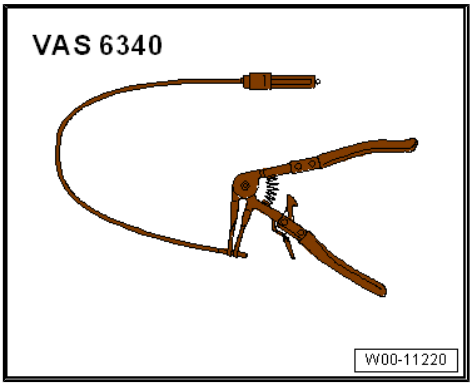
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Special tools and workshop equipment required

- Drip tray for workshop hoist - VAS 6208-



- Hose clip pliers - VAS 6340-



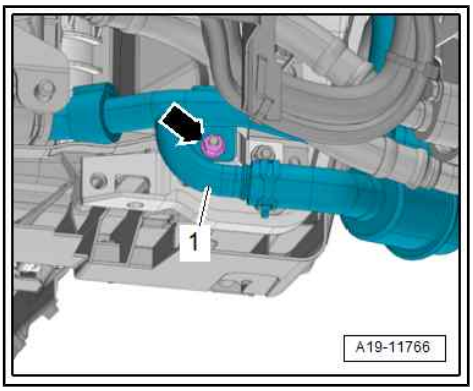
Removing

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

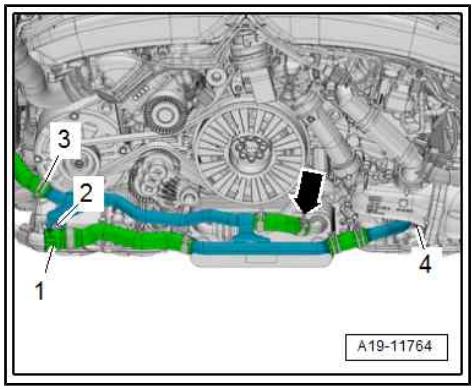
– Remove front longitudinal member (bottom right) ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Exploded view - lock carrier .

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

– Remove nut -arrow- and move coolant pipe clear.



– Place drip tray for workshop hoist - VAS 6208- under connection.
– Lift retaining clip -1-, release hose clip -3-, disconnect coolant hoses and drain off coolant.
– Remove bolt -4- and detach connection from coolant pipe.
– Release hose clip -arrow- and remove coolant pipes (front) to right side.



Installing

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

Note

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

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

Note

Do not reuse coolant.

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– Fill up with coolant ⇒ page 251 .

Tightening torques

- ⇒ “3.1 Exploded view - coolant pipes”, page 278
- ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Exploded view - lock carrier

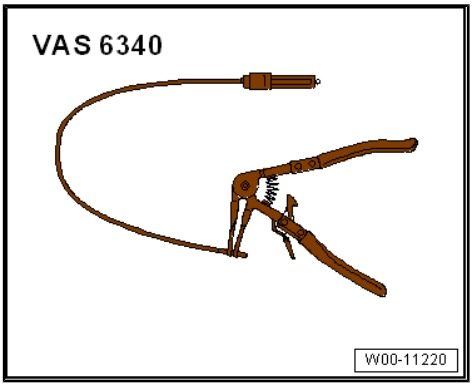
3.2.3 Removing and installing coolant pipe (top left)

Special tools and workshop equipment required

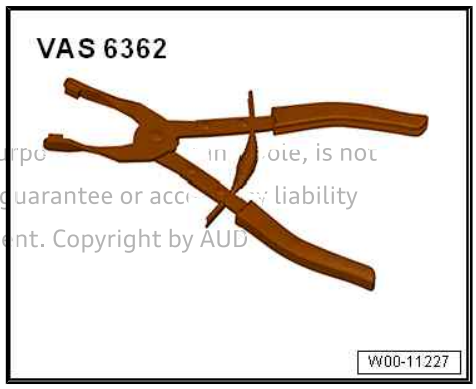
- Engine and gearbox jack - VAS 6931-



♦ Hose clip pliers - VAS 6340-



♦ Hose clip pliers - VAS 6362-



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Removing

– Discharge refrigerant system ⇒ Air conditioner with refrigerant R134a .

– Support engine in installation position ⇒ page 66 .

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

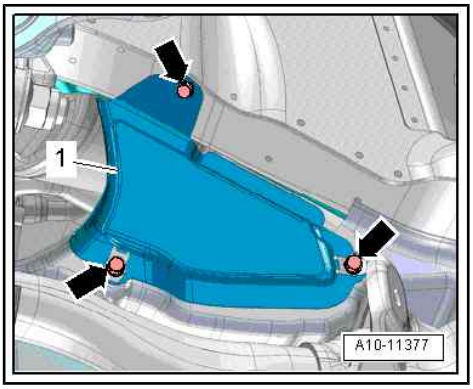
– Drain coolant ⇒ page 249 .

– Remove wheel housing liners (front left and front right) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Removing and installing wheel housing liner (front) .

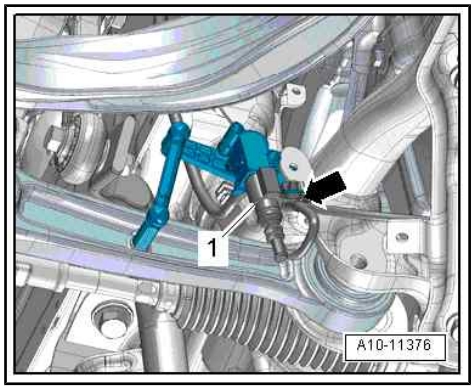
– Remove wheel spoilers (front) on both sides ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front) .

– Remove bolts -arrows- on both sides and detach heat shield -1-.

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

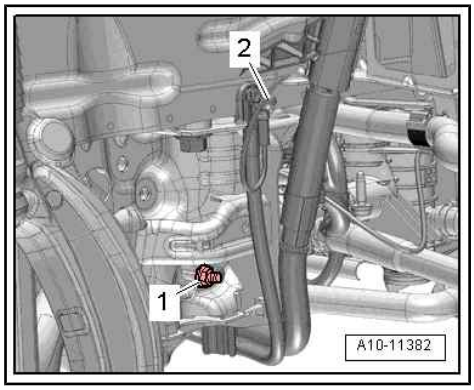


– If fitted, unplug electrical connector -1- at front vehicle level senders on both sides (-G78- and -G289-) and move electrical wiring clear -arrow-.



Audi S6/S7:

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

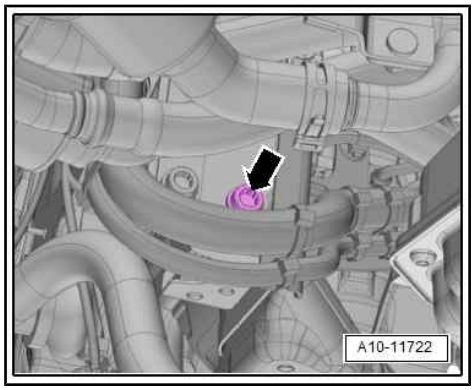


Note

Disregard -item 2-.

Audi RS 6/RS 7:

– Remove bolt -arrow- and push bracket for wiring harness to one side.



All vehicles (continued):

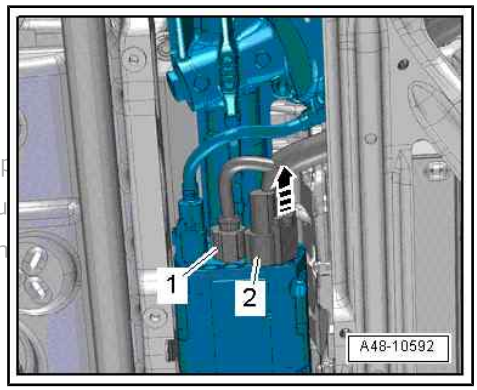
– Detach intermediate steering shaft from steering rack and move clear by telescoping upwards ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Removing and installing intermediate steering shaft .

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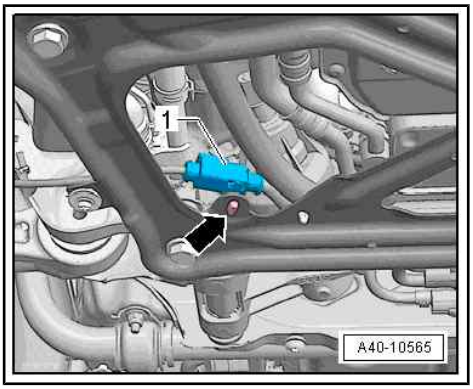
– Unplug electrical connector -2- at power steering control unit - J500- (release retainer -arrow- and press down release catch).

– Unplug electrical connector -1- at power steering control unit - J500- .

– Move electrical wiring harness clear.



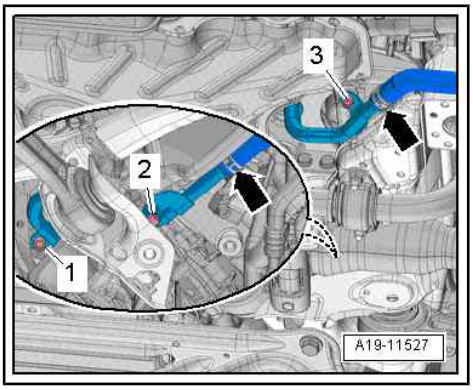
– Move clip clear -arrow-.
– Unplug electrical connector -1- and move wiring clear.



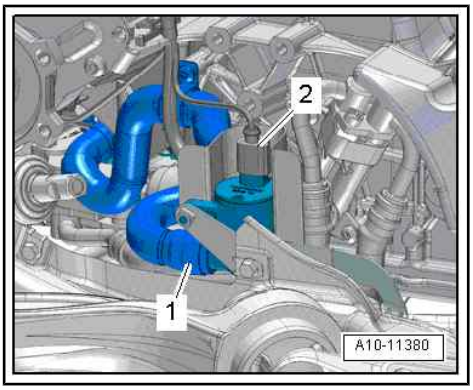
– Clamp off coolant hoses using hose clamps up to 25 mm - 3094- , release hose clips -arrows- and disconnect hoses.

Note

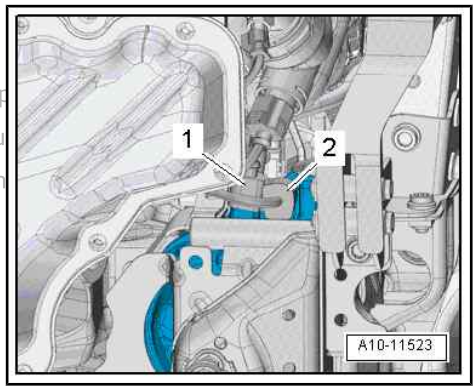
Disregard -items 1, 2, 3-.



– Release hose clip -1- and detach coolant hose.
– Unplug electrical connector -2- and move wiring clear.

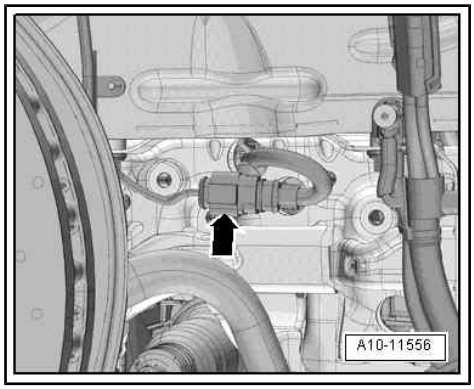


– Unplug electrical connectors (left and right) -1, 2-.



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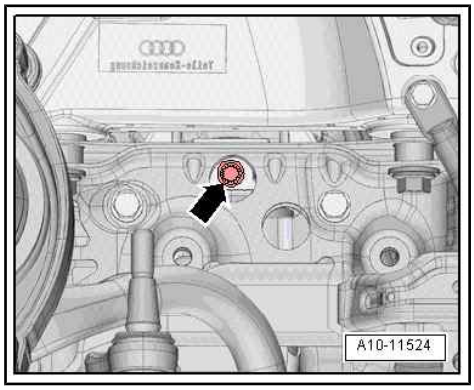
– Take electrical connector -arrow- out of bracket, unplug and guide through subframe.



– Remove bolt for engine mountings -arrow- on both sides.

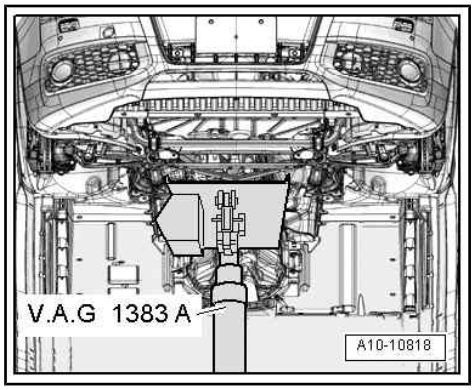
Audi RS 6/RS 7:

– Remove front longitudinal member (bottom) on both sides ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Exploded view - lock carrier .



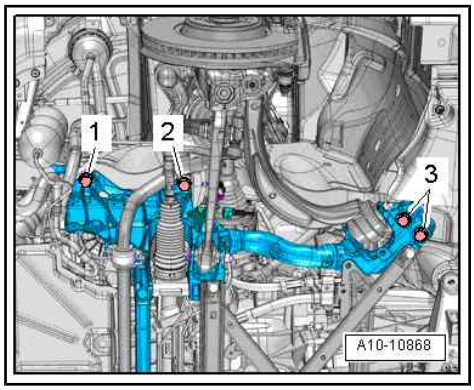
All vehicles (continued):

– Support subframe with engine and gearbox jack , as shown in illustration.



– Mark installation position of subframe on longitudinal members with felt-tip pen.

– Unscrew subframe bolts -1, 2, 3- on both sides in several stages and in diagonal sequence.



Caution

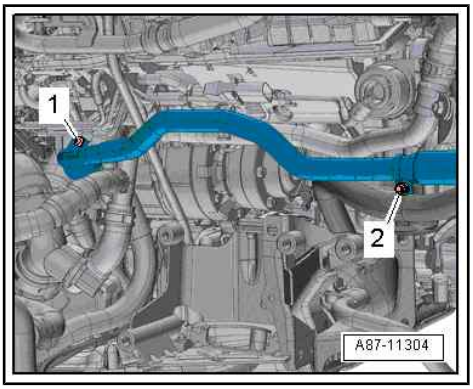
Risk of damage to running gear components.

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

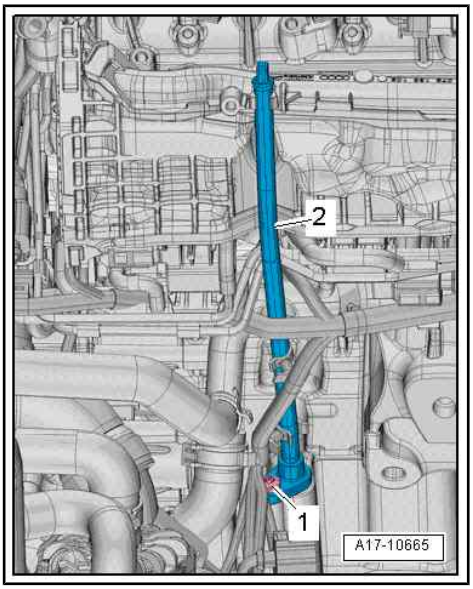
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– Lower subframe using engine and gearbox jack just far enough for access to coolant pipe (top left), ensuring sufficient clearance for electrical wiring (right-side).

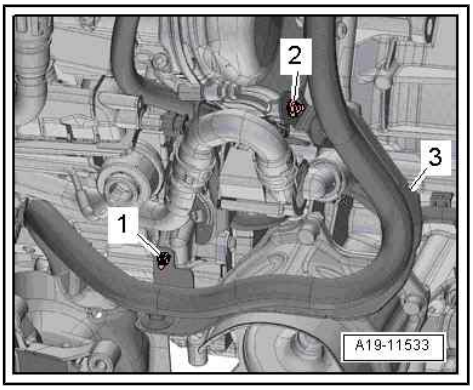
– Remove bolt -1- and nut -2- and move refrigerant line to one side.



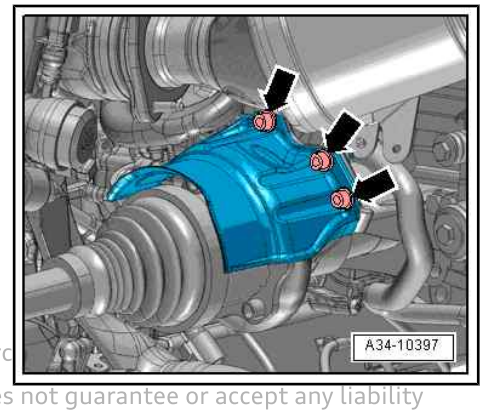
– Remove bolt -1-, unclip guide tube -2- for oil dipstick from intake manifold and detach.



– Remove centre hex stud -1- and nut -2- and press bracket -3- with electrical wiring harness slightly to one side.

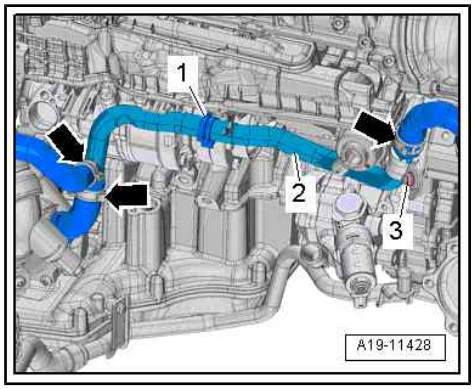


– Remove bolts -arrows- and detach heat shield for drive shaft (left-side).



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– Move electrical wiring harness clear.
– Remove nut -3- and move retaining clip clear.
– Release hose clips -arrows- and disconnect coolant hoses from coolant pipe (top left) -2-.
– Unclip coolant pipe (top left) from bracket -1-.



Installing

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

Note

- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *Fit all cable ties in the original positions when installing.*

– Install engine mountings ⇒ page 68 .

Note

Do not reuse coolant.

– Fill up with coolant ⇒ page 251 .
– Charge refrigerant system ⇒ Air conditioner with refrigerant R134a .

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Tightening torques

- ⇒ “3.1 Exploded view - coolant pipes”, page 278
- ⇒ “1.1 Exploded view - sump/oil pump”, page 207
- ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft
- Heat shield ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe
- ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Exploded view - lock carrier
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front)

3.2.4 Removing and installing coolant pipe (bottom left)

Removing

– Remove engine mounting (left-side) ⇒ page 68 .
– Detach coolant pipe (bottom left).

Installing

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

– Install engine mounting (left-side) ⇒ page 68 .

Note

Do not reuse coolant.

– Fill up with coolant ⇒ page 251 .

Tightening torques

- ⇒ “3.1 Exploded view - coolant pipes”, page 278

3.2.5 Removing and installing coolant pipe (right-side)

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Special tools and workshop equipment required

- Hose clip pliers - VAS 6362-



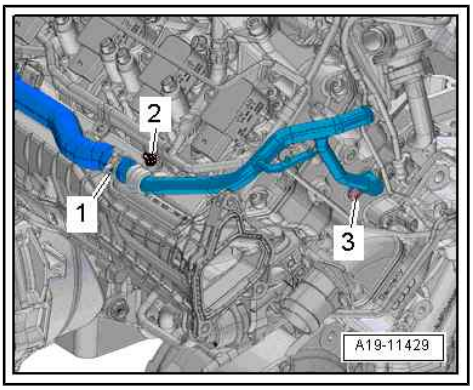
Removing

– Remove air cleaner housing ⇒ page 379 .

– Remove charge air cooler housing ⇒ page 346 .

– Release hose clip -1- and detach coolant hose.

– Remove bolt -3- and nut -2- and disconnect coolant pipe (right-side) from cylinder head.



Installing

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

Note

- *Fit new O-ring.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

– Install charge air cooler housing ⇒ page 346 .

– Install air cleaner housing ⇒ page 379 .

Tightening torques

- ⇒ “3.1 Exploded view - coolant pipes”, page 278

3.2.6 Removing and installing coolant pipe (top rear)

Removing

– Drain coolant ⇒ page 249 .

– Remove front silencers on both sides ⇒ page 436 .

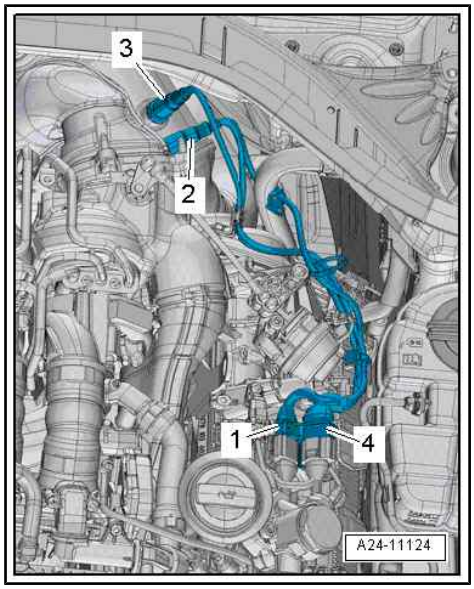
– Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .

– Detach electrical connectors from bracket, unplug connectors and move electrical wiring clear:

1 - For Lambda probe after catalytic converter - G130- -item 3-

4 - For Lambda probe - G39- -item 2-

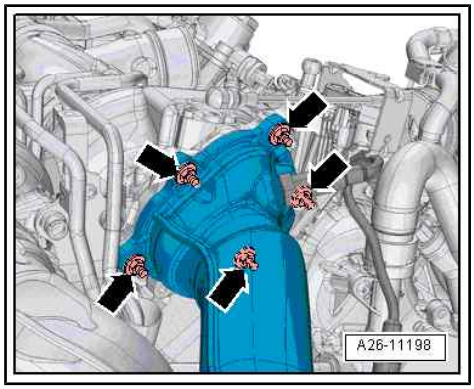
– Move clear electrical wiring harness for Lambda probe 2 - G108- and Lambda probe 2 after catalytic converter - G131- .



Note

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

– Unscrew nuts -arrows- on cylinder bank 1 (right-side) and push catalytic converter on left side of vehicle towards rear.

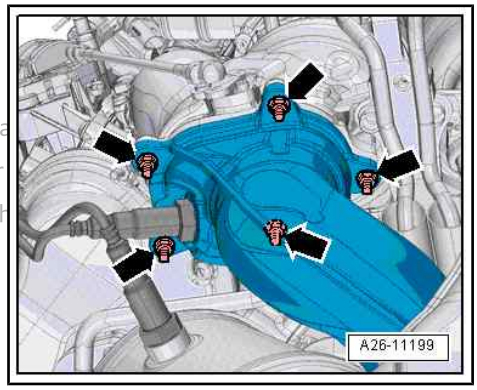


Note

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

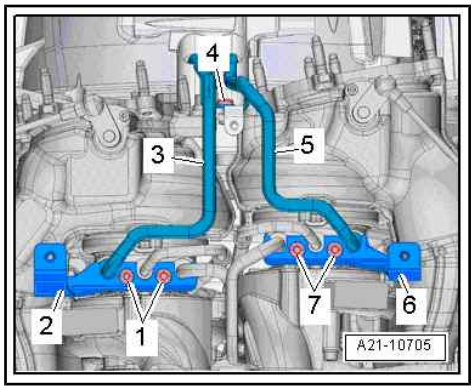
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– Unscrew nuts -arrows- on cylinder bank 2 (left-side) and push catalytic converter on right side of vehicle towards rear.

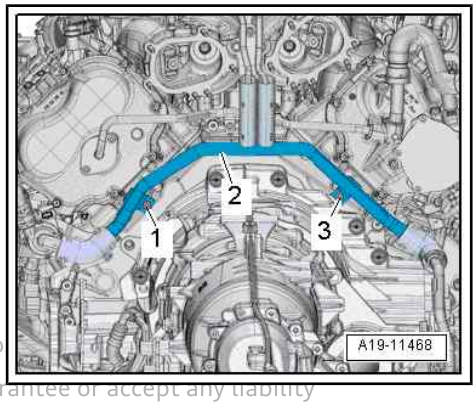


– Unscrew bolts -1, 4, 7- and remove brackets -2, 6-.

– Disconnect coolant lines -3, 5- from turbocharger on both sides.

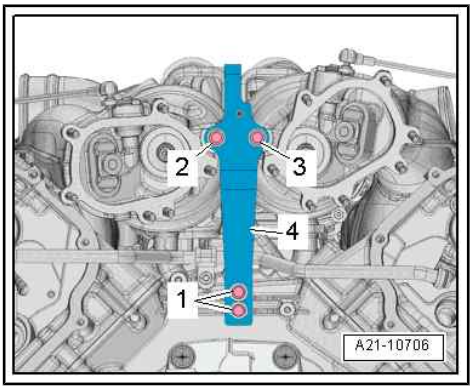


– Remove bolts -1, 3- and press coolant pipe (bottom rear) -2- towards rear.

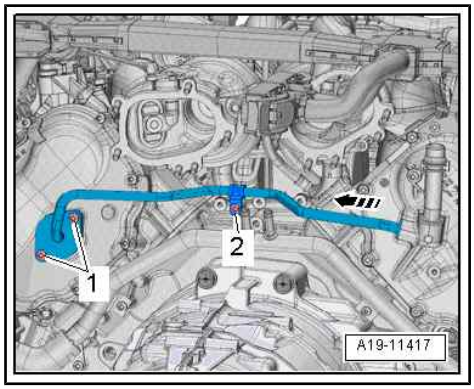


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– Unscrew bolts -1, 2, 3- and detach support -4- for turbocharger.



– Remove bolts -1, 2-.



Note

A further bolt is fitted for coolant pipe (right-side) on some versions.

Caution

Avoid damage to coolant pipe.

- ***Do not bend coolant pipe.***

– Pull off coolant pipe (top rear) from timing chain cover (right-side) -arrow- and detach.

Installing

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

Note

- *Renew gaskets and O-rings.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

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– Install air ducts with screw-type clips ⇒ page 346 .
– Install electrical wiring ⇒ Electrical system; Rep. gr. 97 ; Relay carriers, fuse carriers, electronics boxes; Overview of fitting locations - relay carriers, fuse carriers, electronics boxes and ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
– Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .

Note

Do not reuse coolant.

– Fill up with coolant ⇒ page 251 .

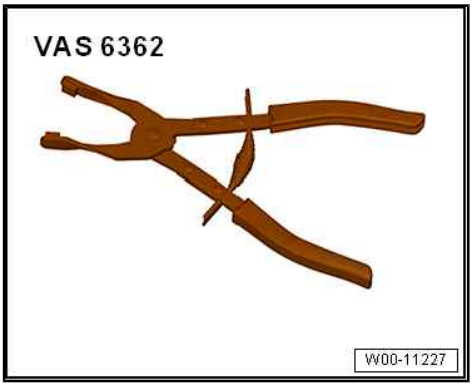
Tightening torques

- ⇒ “3.1 Exploded view - coolant pipes”, page 278
- ⇒ “1.1 Exploded view - turbocharger”, page 333
- ⇒ “1.1 Exploded view - silencers”, page 432

3.2.7 Removing and installing coolant pipe (bottom rear)

Special tools and workshop equipment required

♦ Hose clip pliers - VAS 6362-



Removing

Note

Secure the heat insulation sleeves in the original position when installing.

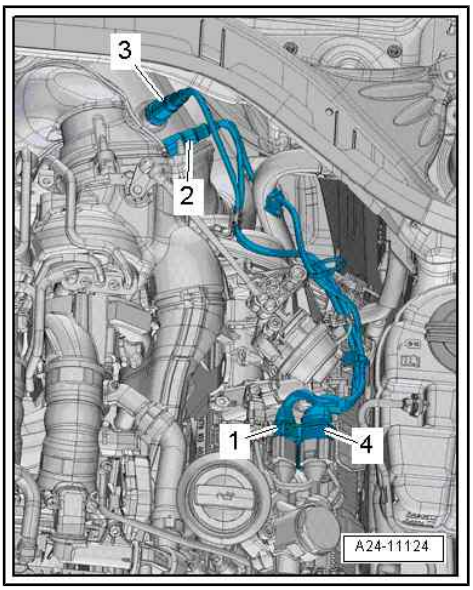
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– Drain coolant ⇒ page 249 .
– Remove front silencers on both sides ⇒ page 436 .
– Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .
– Detach electrical connectors from bracket, unplug connectors and move electrical wiring clear:

1 - For Lambda probe after catalytic converter - G130- -item 3-

4 - For Lambda probe - G39- -item 2-

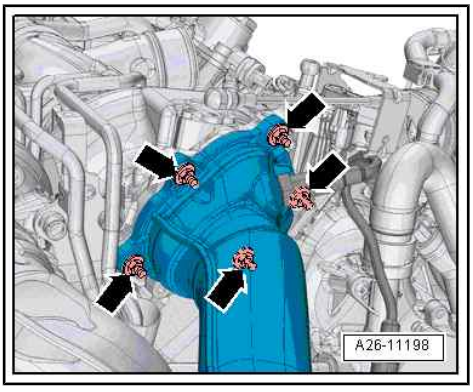
– Move clear electrical wiring harness for Lambda probe 2 - G108- and Lambda probe 2 after catalytic converter - G131- .



Note

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

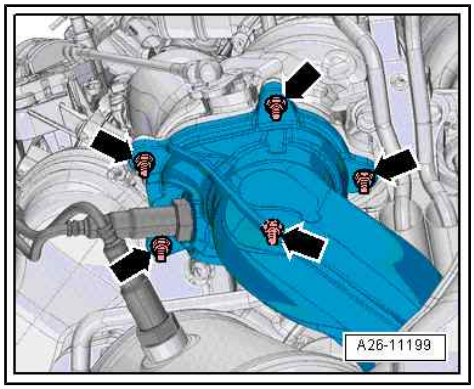
– Unscrew nuts -arrows- on cylinder bank 1 (right-side) and push catalytic converter on left side of vehicle towards rear.



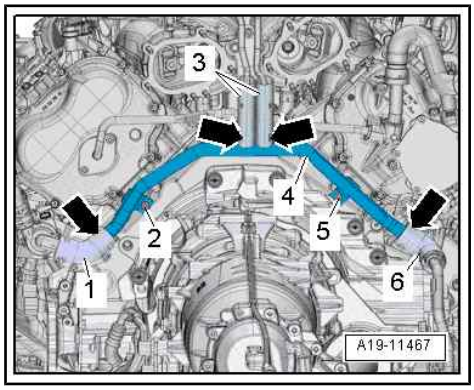
Note

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

– Unscrew nuts -arrows- on cylinder bank 2 (left-side) and push catalytic converter on right side of vehicle towards rear.



– Remove bolts -2, 5-.
– Fold heat insulation sleeves -1, 6- to one side.
– Push heat insulation sleeves -3- upwards.
– Release hose clips -arrows-, disconnect coolant hoses from coolant pipe (bottom rear) -4- and detach coolant pipe.



Installing

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

Note

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

– Lubricate O-ring with coolant.
– Install electrical wiring ⇒ Electrical system; Rep. gr. 97 ; Relay carriers, fuse carriers, electronics boxes; Overview of fitting locations - relay carriers, fuse carriers, electronics boxes and ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
– Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .

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Note

Do not reuse coolant.

– Fill up with coolant ⇒ page 251 .

Tightening torques

- ⇒ “3.1 Exploded view - coolant pipes”, page 278
- ⇒ “1.1 Exploded view - silencers”, page 432
- ⇒ “2.2 Exploded view - hose connections for charge air system”, page 346

3.2.8 Removing and installing coolant pipe (right-side) on gearbox

Special tools and workshop equipment required

- Drip tray for workshop hoist - VAS 6208-



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- Hose clip pliers - VAS 6362-



- Safety goggles
- Protective gloves

Removing

Note

Secure the heat insulation sleeve in the original position when installing.

WARNING

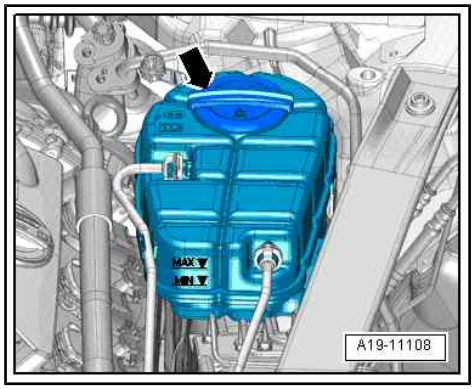
The cooling system is under pressure when the power unit is hot. Risk of scalding due to hot steam and hot coolant.

Danger of scalding skin and other parts of the body.

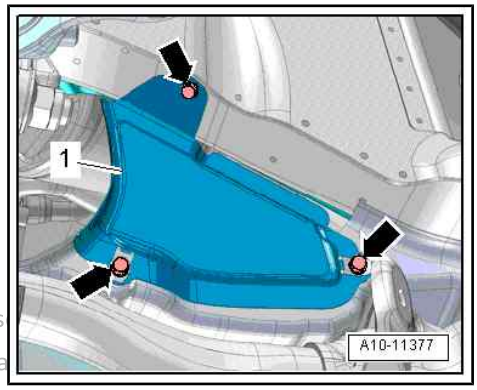
- ***Put on protective gloves.***
- ***Put on safety goggles.***
- ***Cover filler cap on expansion tank with a cloth and open carefully to release pressure.***

– Open filler cap -arrow- on coolant expansion tank.

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

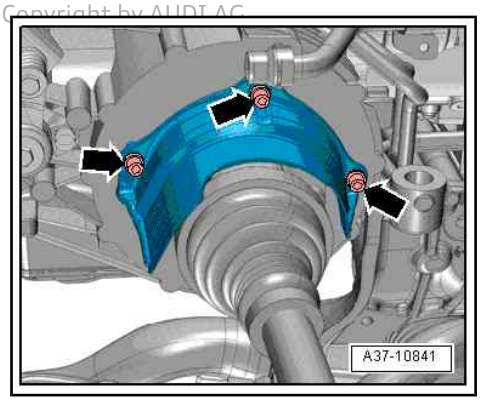


– Remove bolts -arrows- and detach heat shield (right-side) -1-.



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– Remove bolts -arrows- and detach heat shield for drive shaft (right-side).



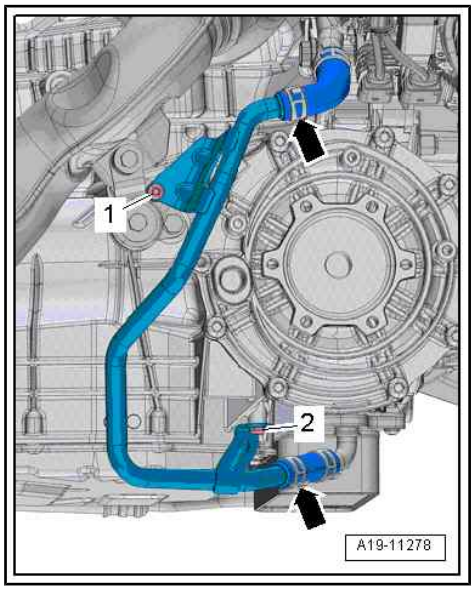
Vehicles with dual clutch gearbox 0B5:

– Fold heat insulation sleeve slightly upwards.

– Remove bolts -1, 2-.

– Place drip tray for workshop hoist - VAS 6208- under connection.

– Release hose clips -arrows-, disconnect coolant hoses from coolant pipe at gearbox (right-side) and detach coolant pipe.



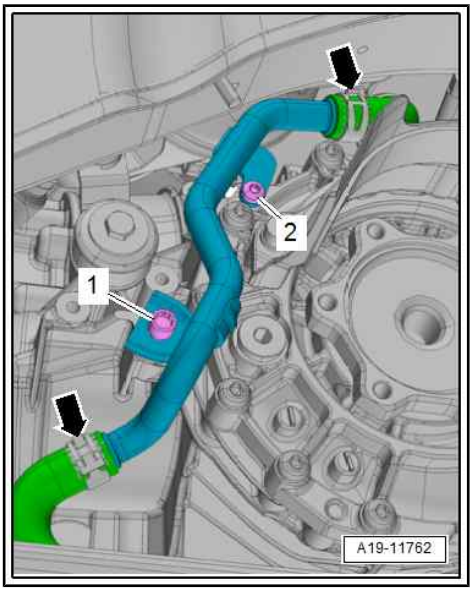
Vehicles with automatic gearbox 0BK

– Fold heat insulation sleeve slightly upwards.

– Remove bolts -1, 2-.

– Place drip tray for workshop hoist - VAS 6208- under connection.

– Release hose clips -arrows-, disconnect coolant hoses from coolant pipe at gearbox (right-side) and detach coolant pipe.



Installing

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

Note

- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *Do not reuse coolant.*

– Fill up with coolant ⇒ page 251 .

Tightening torques

- ⇒ “3.1 Exploded view - coolant pipes”, page 278
- ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft
- Heat shield ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

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4 Radiators/radiator fans

⇒ “4.1 Exploded view - radiators/radiator fans”, page 300

⇒ “4.2 Exploded view - auxiliary radiator”, page 305

⇒ “4.3 Exploded view - radiator cowl and radiator fan”, page 308

⇒ “4.4 Removing and installing radiator”, page 309

⇒ “4.5 Removing and installing water radiator for charge air cooling circuit”, page 318

⇒ “4.6 Removing and installing radiator cowl”, page 322

⇒ “4.7 Removing and installing radiator fan V7 ”, page 325

⇒ “4.8 Removing and installing auxiliary radiator”, page 326

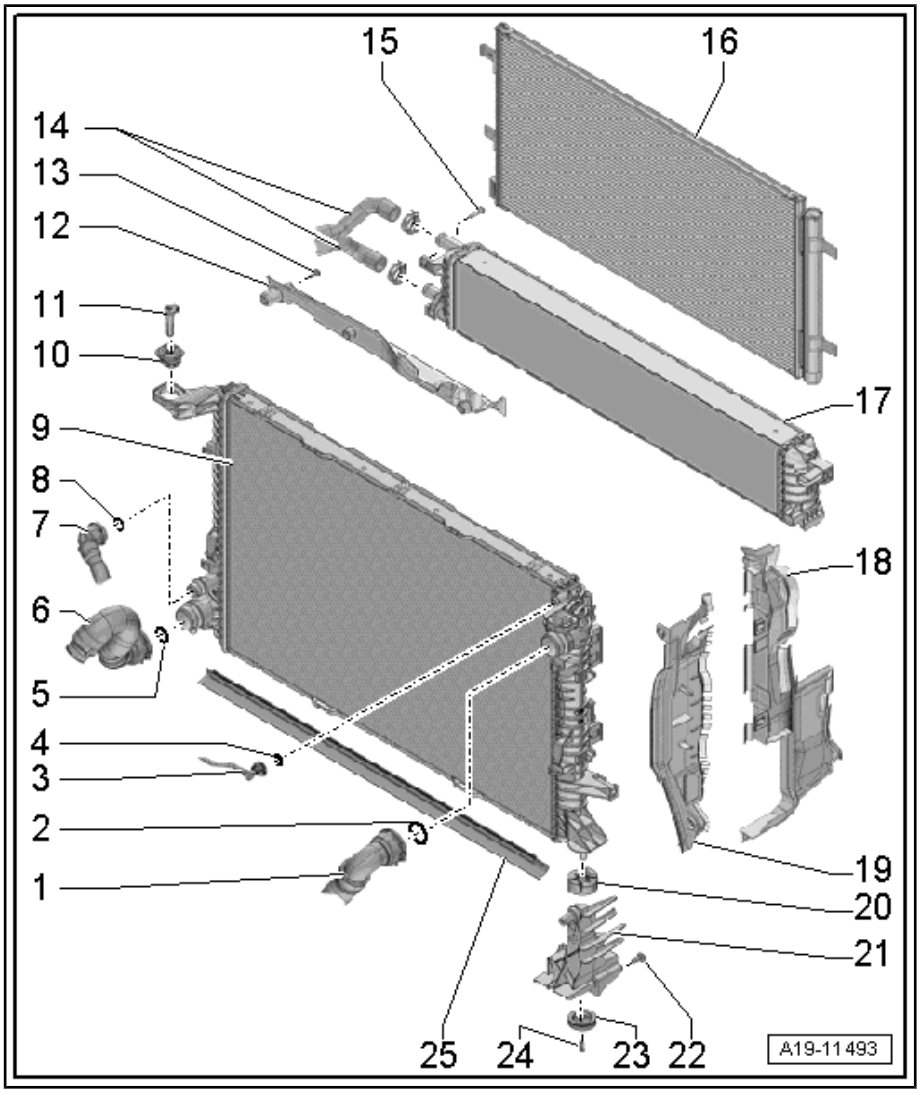
4.1 Exploded view - radiators/radiator fans

⇒ “4.1.1 Exploded view - radiators/radiator fans, Audi S6/S7”, page 300

⇒ “4.1.2 Exploded view - radiators/radiator fans, Audi RS 6/RS 7”, page 303

4.1.1 Exploded view - radiators/radiator fans, Audi S6/S7

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1 - Coolant hose

- ❑ Lift retaining clip to detach
- ❑ Connecting ⇒ page 302

2 - O-ring

- ❑ Renew

3 - Coolant hose

- ❑ To coolant expansion tank
- ❑ Lift retaining clip to detach
- ❑ Connecting ⇒ page 302

4 - O-ring

- ❑ Renew

5 - O-ring

- ❑ Renew

6 - Coolant hose

- ❑ Lift retaining clip to detach
- ❑ Connecting ⇒ page 302

7 - Coolant hose

- ❑ Lift retaining clip to detach
- ❑ Connecting ⇒ page 302

8 - O-ring

- ❑ Renew

9 - Radiator

- ❑ Remove and install together with radiator cowl ⇒ page 309
- ❑ If renewed, change coolant in entire system

10 - Rubber buffer

11 - Retaining pin

- ❑ Use screwdriver to release and pull off

12 - Bracket

13 - Bolt

- ❑ 5 Nm

14 - Coolant hoses

15 - Bolt

- ❑ 7 Nm

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16 - Condenser

- ❑ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Refrigerant circuit; Removing and installing condenser

17 - Water radiator for charge air cooling circuit

- ❑ Removing and installing ⇒ page 318

18 - Air duct

19 - Air duct

20 - Rubber bush

- ❑ For radiator

21 - Radiator bracket

22 - Bolt

- ❑ 5 Nm

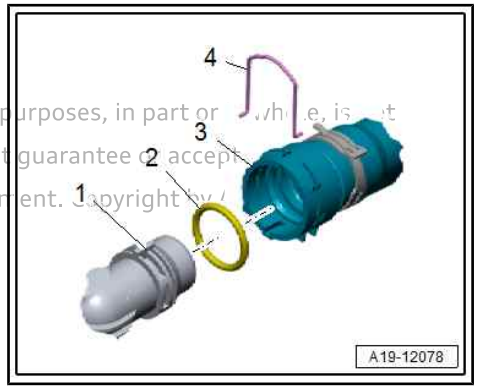
23 - Support

24 - Bolt

- ❑ 4.5 Nm

25 - Air duct

Connecting coolant hose with plug-in connector



Note

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If damaged, renew retaining clip -4-.

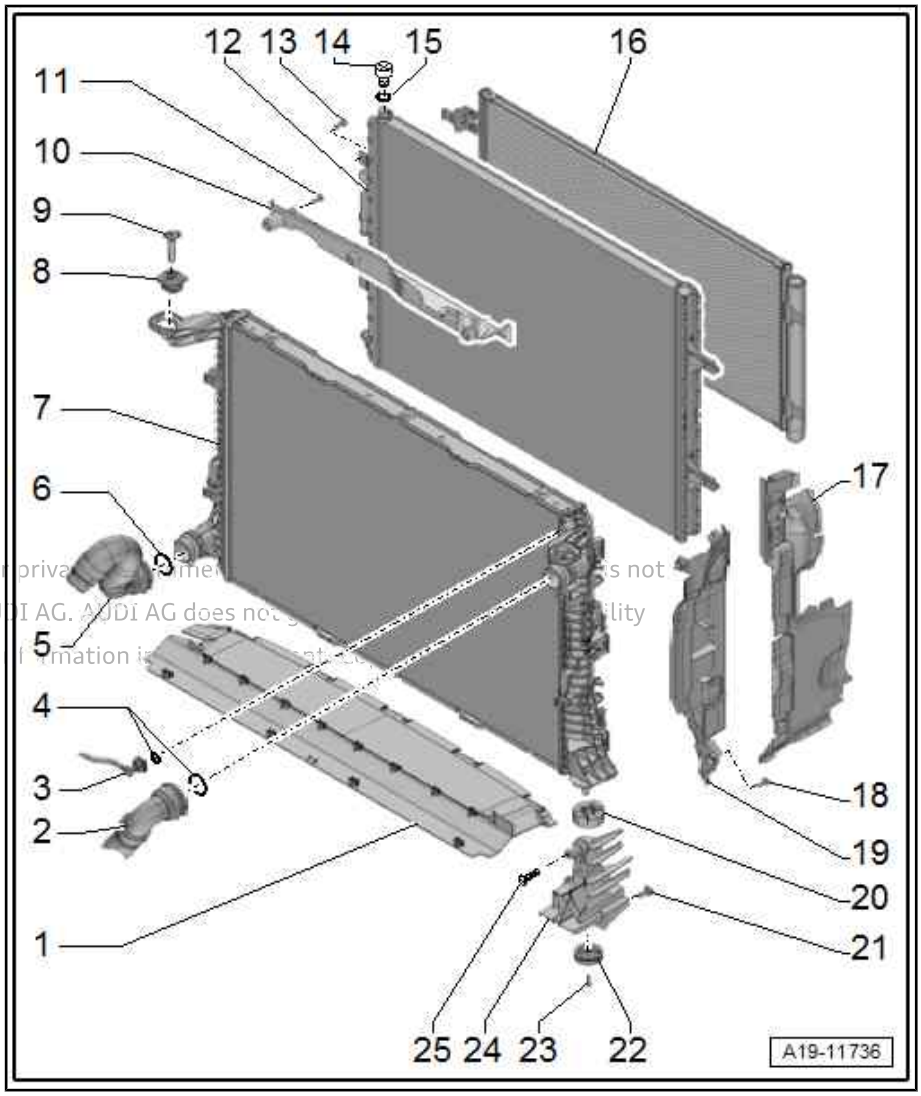
– Remove old O-ring -2- from coolant hose -3-.

– Lightly lubricate new O-ring with coolant and fit O-ring in coolant hose.

– Press coolant hose onto connection -1- until it engages audibly.

– Press coolant hose in again and then pull to check that plug-in connector is correctly engaged.

4.1.2 Exploded view - radiators/radiator fans, Audi RS 6/RS 7



1 - Air duct

2 - Coolant hose

- ❑ Lift retaining clip to detach
- ❑ Connecting ⇒ page 302

3 - Coolant hose

- ❑ To coolant expansion tank
- ❑ Lift retaining clip to detach
- ❑ Connecting ⇒ page 302

4 - O-rings

- ❑ Renew

5 - Coolant hose

- ❑ Lift retaining clip to detach
- ❑ Connecting ⇒ page 302

6 - O-ring

- ❑ Renew

7 - Radiator

- ❑ Remove and install together with radiator cowl ⇒ page 309
- ❑ If renewed, change coolant in entire system

8 - Rubber buffer

9 - Retaining pin

- ❑ Use screwdriver to release and pull off

10 - Bracket

11 - Bolt

- ❑ 5 Nm

12 - Water radiator for charge air cooling circuit

- ❑ Removing and installing ⇒ page 318
- ❑ If renewed, change coolant in entire system

13 - Bolt

- ❑ 5 Nm

14 - Bleeder screw

15 - O-ring

- ❑ Renew

16 - Condenser

- ❑ Removing and installing ⇒ Heating, air conditioning; Rep. gr. 87 ; Refrigerant circuit; Removing and installing condenser

17 - Air duct

18 - Bolt

- ❑ 5 Nm

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19 - Air duct

20 - Rubber mounting

- For radiator

21 - Bolt

- 7 Nm

22 - Support

23 - Bolt

- 8 Nm

24 - Radiator bracket

25 - Bolt

- 18 Nm

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4.2 Exploded view - auxiliary radiator

⇒ “4.2.1 Exploded view - auxiliary radiator, cooler for ATF coolant circuit, Audi S6/S7”, page 305

⇒ “4.2.2 Exploded view - auxiliary radiator, coolers for ATF coolant circuit, Audi RS 6/RS 7”, page 306

⇒ “4.2.3 Exploded view - auxiliary radiator (right-side), Audi RS 6/RS 7”, page 307

4.2.1 Exploded view - auxiliary radiator, cooler for ATF coolant circuit, Audi S6/S7

1 - Front air duct
- ❑ Clipped onto rear air duct
- ❑ Move to side to unclip and remove

2 - Bolt
- ❑ 3.5 Nm

3 - Washer

4 - Rubber mounting
- ❑ For radiator

5 - Bracket
- ❑ For water radiator (left-side) for charge air cooling circuit

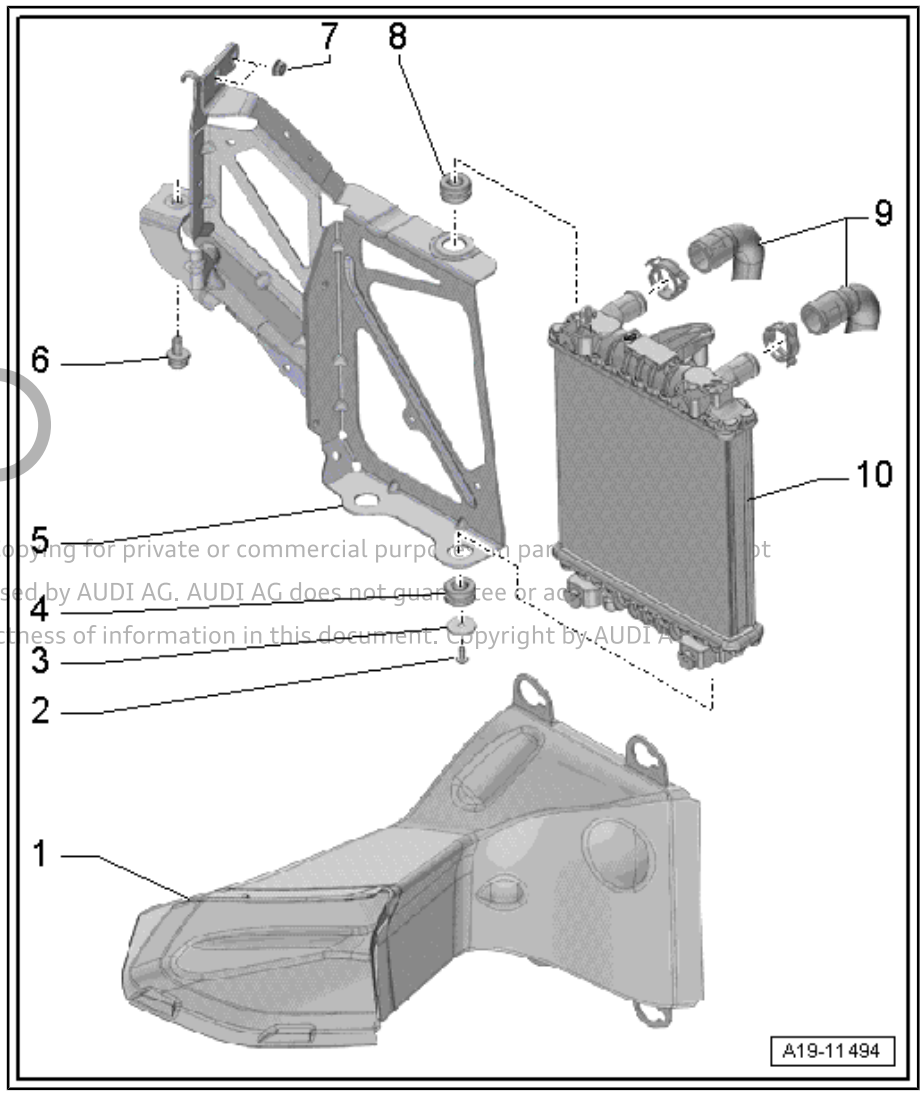
6 - Bolt
- ❑ 20 Nm

7 - Nut
- ❑ 8 Nm

8 - Rubber mounting
- ❑ For radiator

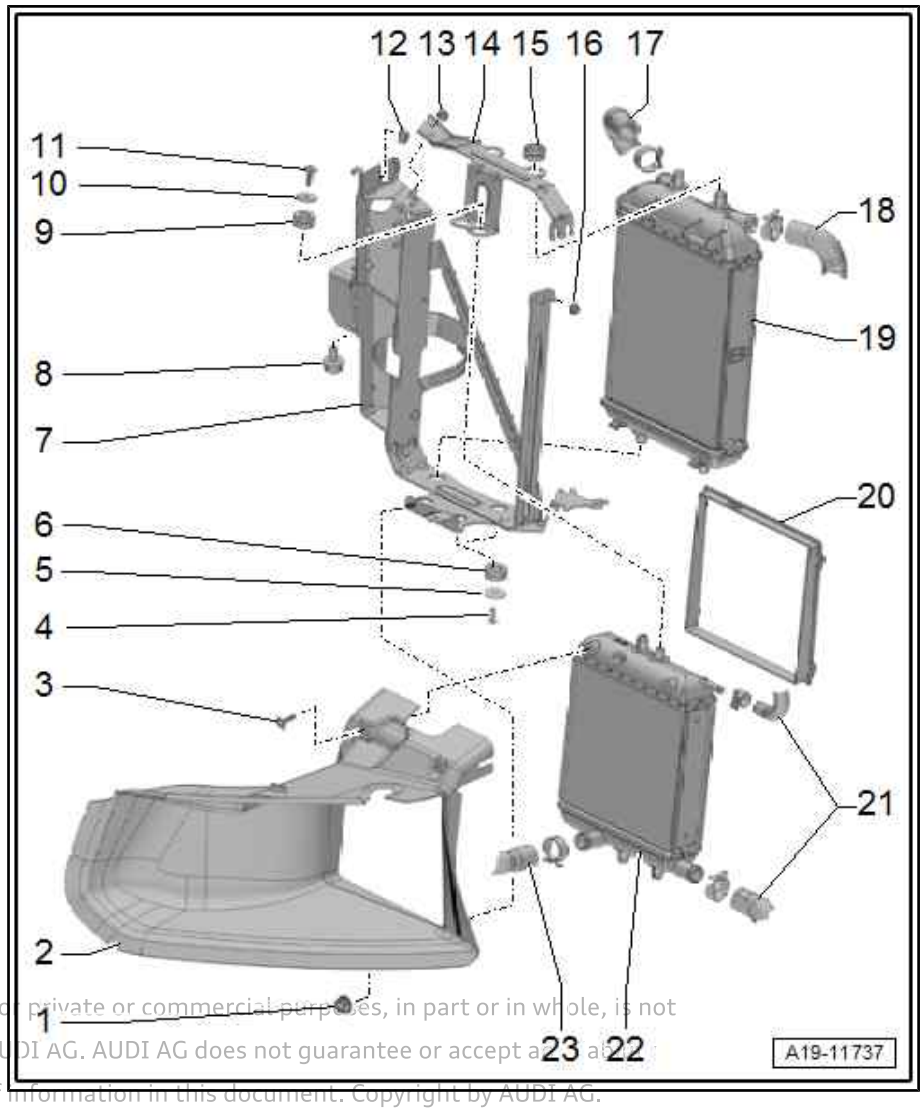
9 - Coolant hoses

10 - Cooler for ATF coolant circuit
- ❑ Removing and installing ⇒ page 326
- ❑ If renewed, change coolant in entire system



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4.2.2 Exploded view - auxiliary radiator, coolers for ATF coolant circuit, Audi RS 6/ RS 7



1 - Nut
- ❑ 5 Nm

2 - Air duct

3 - Bolt
- ❑ 5 Nm

4 - Bolt
- ❑ 3.5 Nm

5 - Washer

6 - Rubber mounting
- ❑ For radiator

7 - Bracket

8 - Bolt
- ❑ 20 Nm

9 - Rubber mounting
- ❑ For radiator

10 - Washer

11 - Bolt
- ❑ 3.5 Nm

12 - Nut
- ❑ 9 Nm

13 - Nut
- ❑ 9 Nm

14 - Bracket

15 - Rubber mounting
- ❑ For radiator

16 - Nut
- ❑ 9 Nm

17 - Coolant hose

18 - Coolant hose

19 - Rear cooler for ATF coolant circuit
- ❑ Removing and installing ⇒ page 328
- ❑ If renewed, change coolant in entire system

20 - Air duct

21 - Coolant hoses

22 - Front cooler for ATF coolant circuit
- ❑ Removing and installing ⇒ page 328
- ❑ If renewed, change coolant in entire system

23 - Coolant hose

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4.2.3 Exploded view - auxiliary radiator (right-side), Audi RS 6/RS 7

1 - Coolant hose

2 - Auxiliary radiator (right-side)

- ❑ Removing and installing ⇒ page 330

3 - Rubber mounting

- ❑ For radiator

4 - Bracket

5 - Washer

6 - Bolt

- ❑ 3.5 Nm

7 - Engine oil cooler (right-side)

- ❑ Removing and installing ⇒ page 224

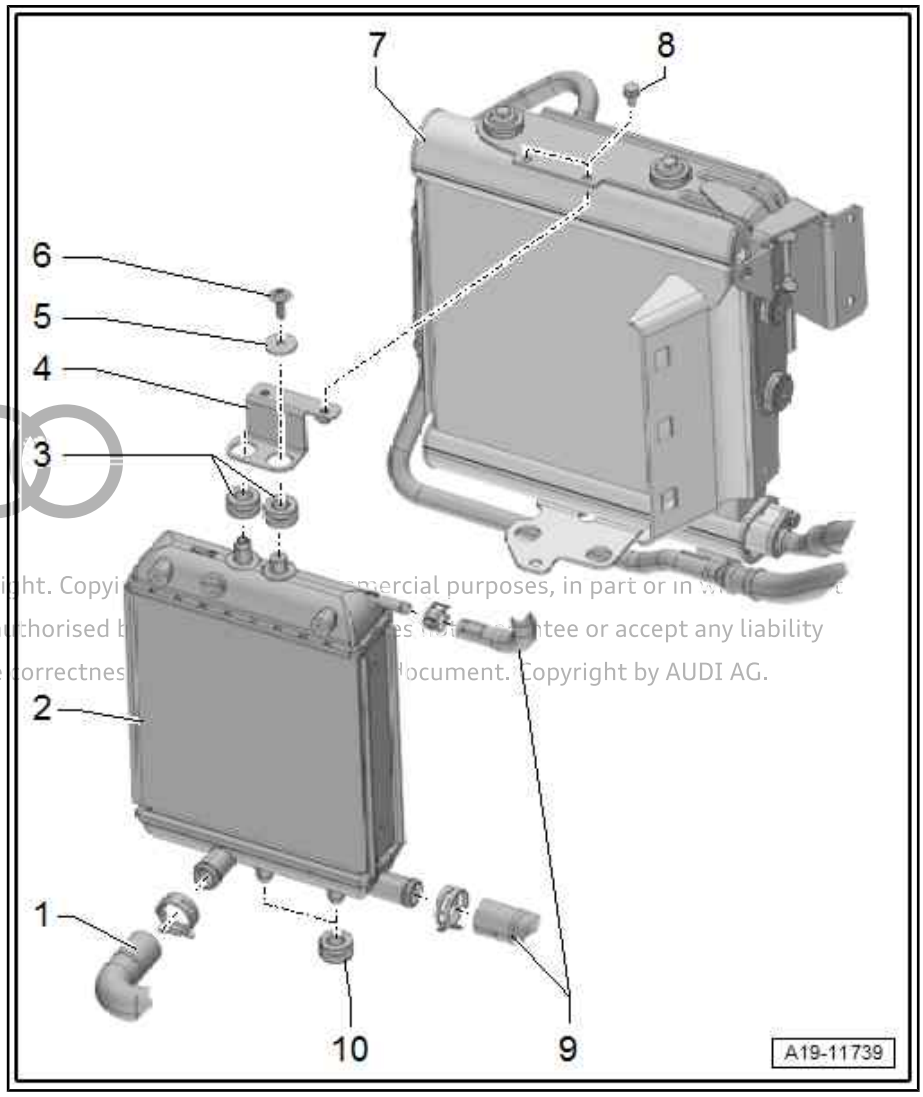
8 - Bolt

- ❑ 8 Nm

9 - Coolant hoses

10 - Rubber mounting

- ❑ For radiator



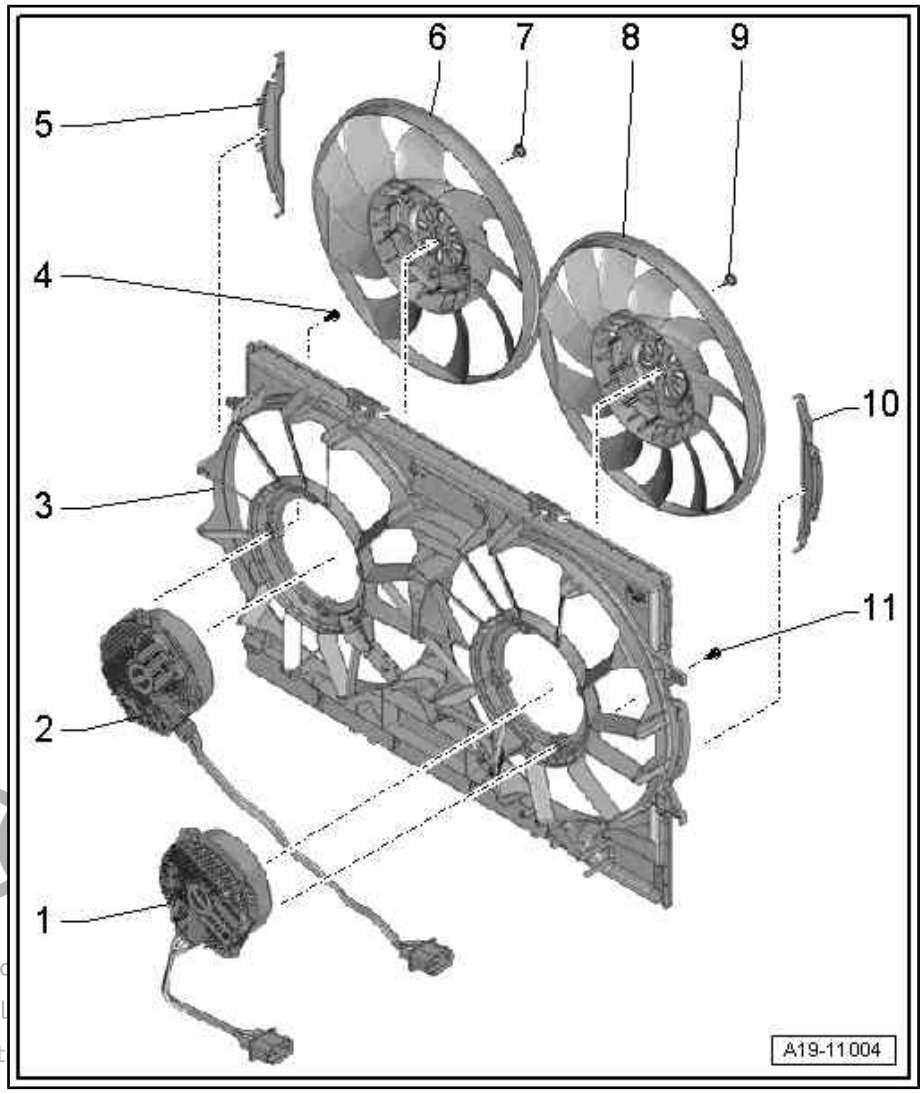
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4.3 Exploded view - radiator cowl and radiator fan

WARNING

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

- *Unplug electrical connectors before working in vicinity of radiator cowl.*



1 - Radiator fan 2 - V177-

- ❑ With radiator fan control unit 2 - J671-
- ❑ Removing and installing ⇒ page 325

2 - Radiator fan - V7-

- ❑ With radiator fan control unit - J293-
- ❑ Removing and installing ⇒ page 325

3 - Radiator cowl

- ❑ Removing and installing:

- ◆ S6/RS 6/RS 7: with radiator ⇒ page 309
- ◆ S7 ⇒ page 322

4 - Bolt

- ❑ 3.5 Nm

5 - Air duct

6 - Fan wheel

- ❑ Pin must engage in hole

7 - Bolt

- ❑ 5 Nm

8 - Fan wheel

- ❑ Pin must engage in hole

9 - Bolt

- ❑ 5 Nm

10 - Air duct

11 - Bolt

- ❑ 3.5 Nm

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4.4 Removing and installing radiator

⇒ "4.4.1 Removing and installing radiator - Audi S6/S7", page 309

⇒ "4.4.2 Removing and installing radiator - Audi RS 6/RS 7", page 313

4.4.1 Removing and installing radiator - Audi S6/S7

Note

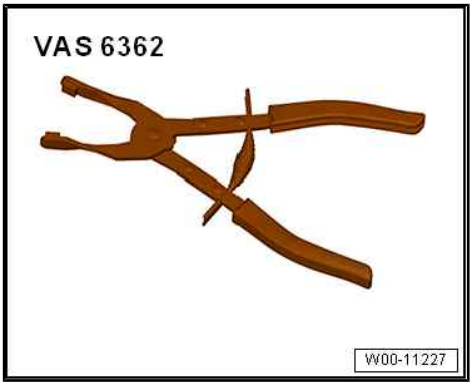
The radiator is removed together with the radiator cowl.

Special tools and workshop equipment required

- Drip tray for workshop hoist - VAS 6208-



- Hose clip pliers - VAS 6362-



Removing

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WARNING

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

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

– Drain coolant ⇒ page 249 .

Audi S6:

– Remove bumper cover mounting ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Removing and installing lock carrier .

Audi S7:

– Remove headlight (right-side) ⇒ Electrical system; Rep. gr. 94 ; Headlights; Removing and installing headlights .

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

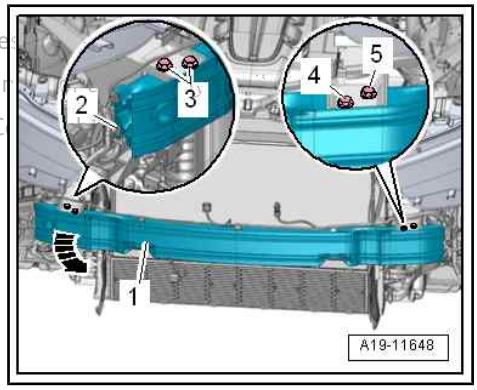
All vehicles (continued):

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– Move electrical wiring harness -2- clear.

– Remove bolts -3, 4- and loosen bolt -5- (do not remove it).

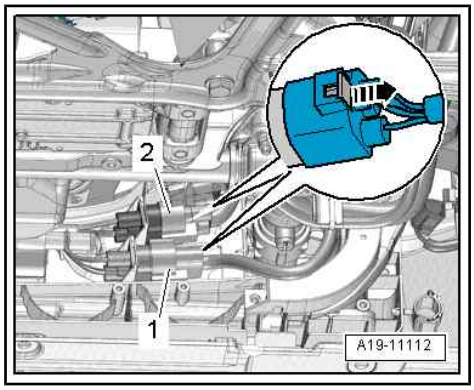
– Swivel impact bar -1- towards front -arrow-.



WARNING

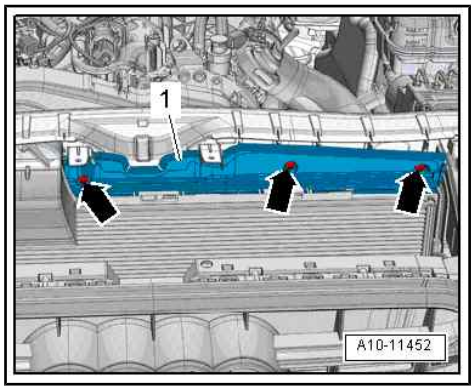
Risk of injury as the radiator fans may start up automatically.

- ***Unplug electrical connectors before working in vicinity of radiator cowl.***



– Unplug electrical connectors -1, 2- for radiator fan.

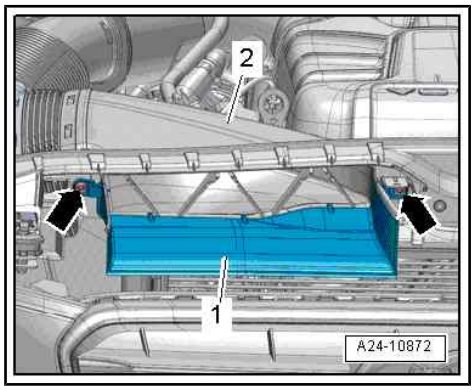
– Remove bolts -arrows- and detach air duct -1-.



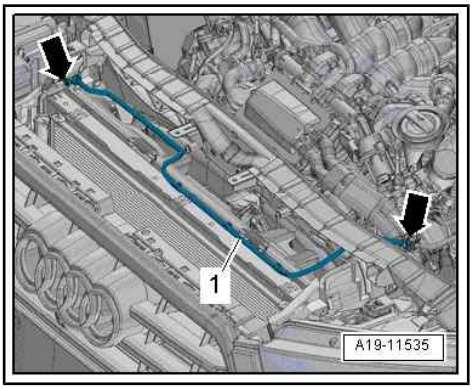
– Remove bolts -arrows- and detach air duct -1-.

Note

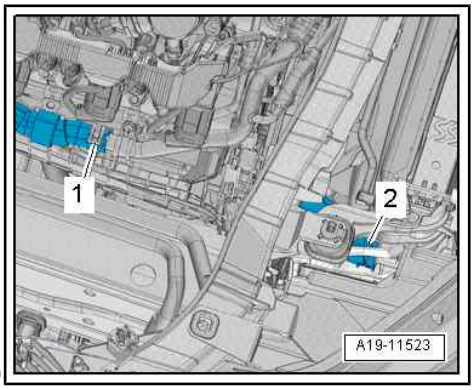
Disregard -item 2-.



– Lift retaining clips -arrows- and remove coolant line -1-.
– Move clear coolant line at radiator and at lock carrier and detach.



– Lift retaining clip -2- and disconnect coolant hose.
– Press coolant hose to rear.

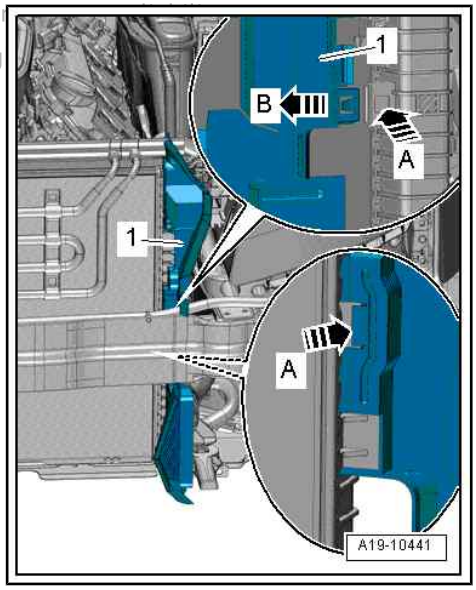


Note

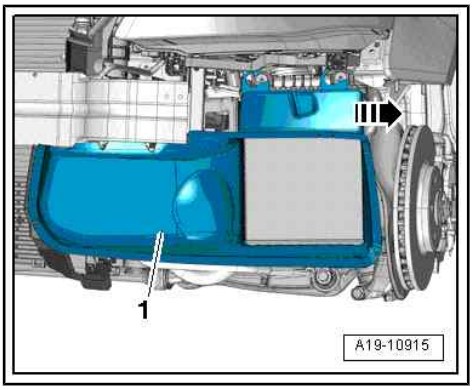
Disregard -item 1-.

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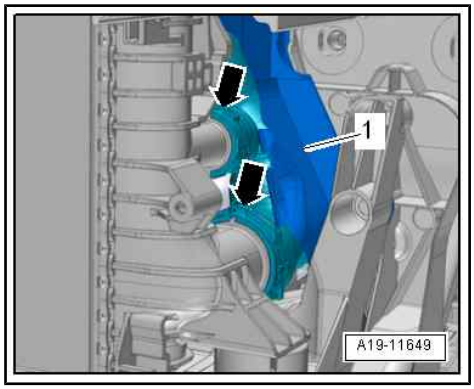
– Release catches -arrows A- and detach air duct -1- on left and right -arrow B-.
– Remove water radiator for charge air cooling circuit ⇒ page 318 .



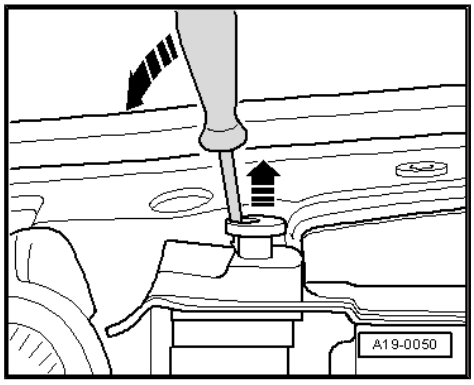
– Detach air duct -1- -arrow-.



– Press air duct -1- slightly to left.
– Place drip tray for workshop hoist - VAS 6208- underneath.
– Lift retaining clips -arrows-, disconnect coolant hoses from radiator and drain off remaining coolant.



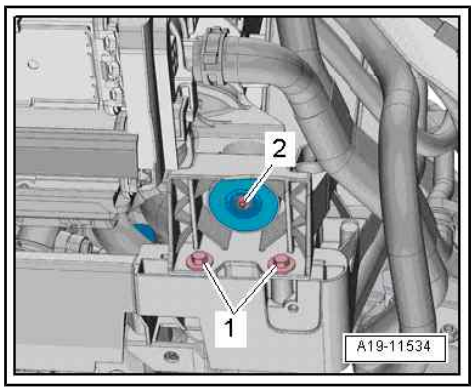
– Release retaining pins for radiator on both sides and pull out upwards -arrows-.



– Remove bolt -2- at bottom left and bottom right of radiator.

Note

Disregard -item 1-.



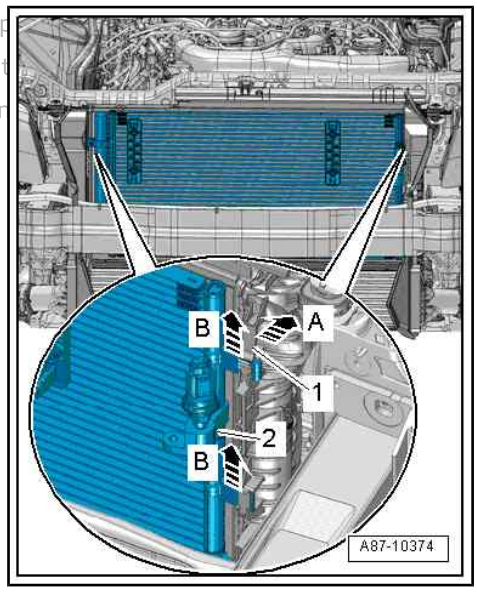
– Have a second mechanic release retaining clips -1- in direction of -arrow A- and lift condenser -2- out of mountings on radiator -arrows B-.

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Caution

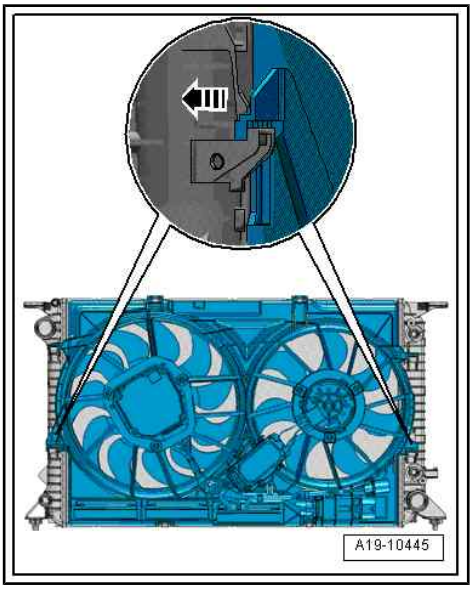
Risk of damage to condenser, refrigerant lines and refrigerant hoses.

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



– Pivot condenser forwards with pipes/hoses attached.
– Take off radiator.

– Press locking tabs on left and right sides of radiator cowl together -arrow- and lift radiator cowl off radiator.



Installing

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

Note

- *If there are slight impressions on the fins, refer to ⇒ page 7 .*
- *Fit new O-rings.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

– Install water radiator for charge air cooling circuit ⇒ page 318 .

Audi S6:

– Install bumper cover mounting ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Removing and installing lock carrier .

Audi S7:

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

– Install headlight (right-side) ⇒ Electrical system; Rep. gr. 94 ; Headlights; Removing and installing headlights .

All vehicles (continued):

– Connect coolant hoses with plug-in connector ⇒ page 302 .

Note

Do not reuse coolant.

– Fill up with coolant ⇒ page 251 .

Tightening torques

- ⇒ “4.1 Exploded view - radiators/radiator fans”, page 300

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4.4.2 Removing and installing radiator - Audi RS 6/RS 7

Note

The radiator is removed together with the radiator cowl.

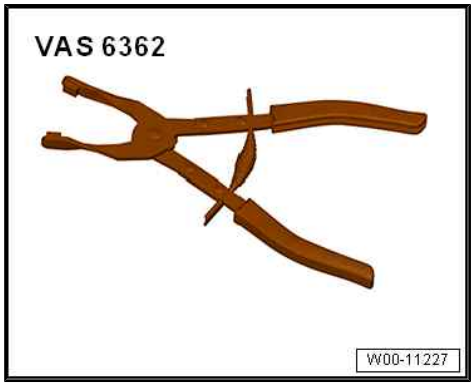
Special tools and workshop equipment required

- Drip tray for workshop hoist - VAS 6208-



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- Hose clip pliers - VAS 6362-



Removing

WARNING

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

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

– Drain coolant ⇒ page 249 .

Audi RS 6:

– Remove air cleaner housing ⇒ page 379 .

– Remove mounting (right-side) for bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments .

Audi RS 7:

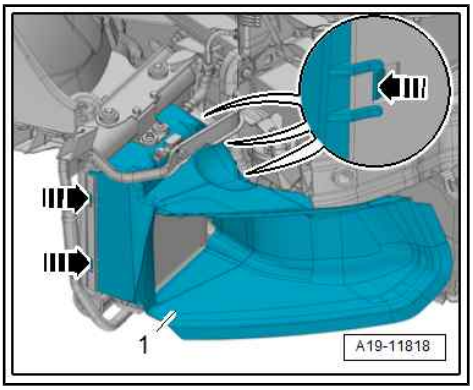
– Remove headlight (right-side) ⇒ Electrical system; Rep. gr. 94 ; Headlights; Removing and installing headlights .

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

All vehicles (continued):

– Release fasteners -arrows- and detach air duct -1- towards front.

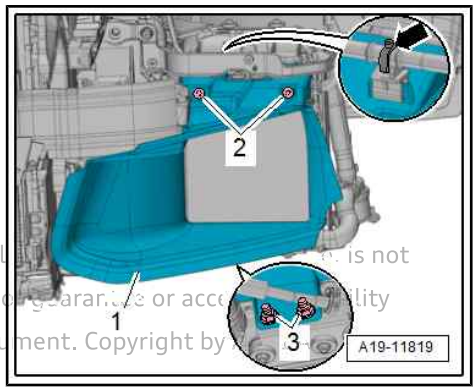
– Unclip air duct -1- towards front of vehicle.



– Move coolant line clear -arrow-.

– Remove bolts -2- and nuts -3-, detach air duct -1-.

– Remove condenser ⇒ Heating, air conditioning; Rep. gr. 87 ; Refrigerant circuit; Removing and installing condenser .

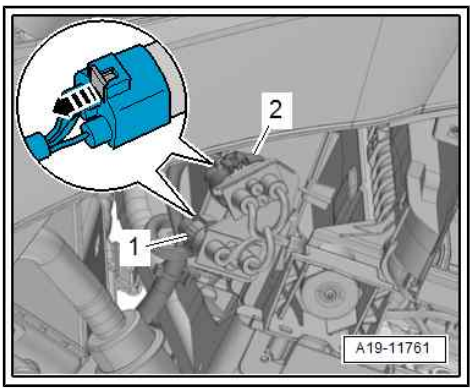


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WARNING

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

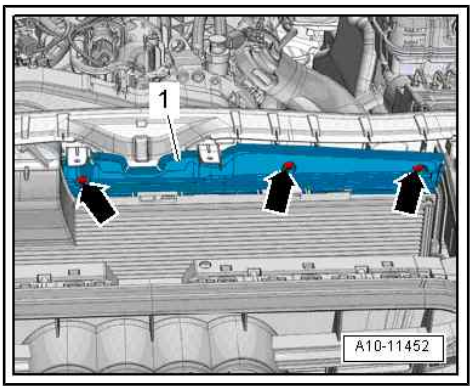
- ***Unplug electrical connectors before working in vicinity of radiator cowl.***



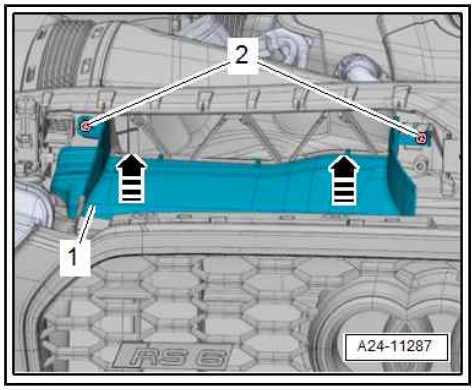
– Take electrical connectors -1, 2- for radiator fan out of bracket and unplug connectors (push retainer to the rear -arrow- and press down release catch).

– Move electrical wiring harness clear.

– Remove bolts -arrows- and detach air duct -1-.



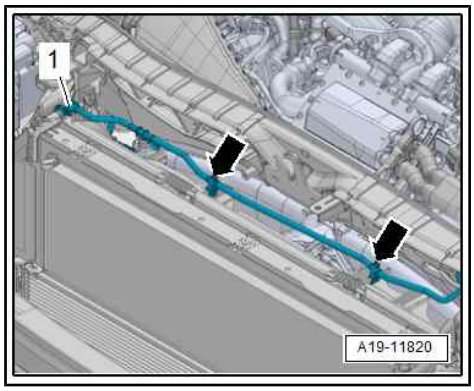
– Remove bolts -2-, unclip air duct -1- upwards from radiator -arrows- and detach towards front.



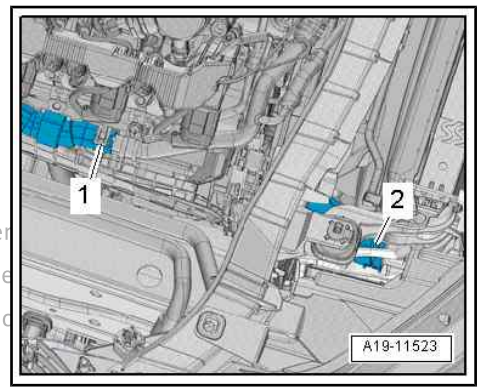
Note

Disregard -item 2-.

– Lift retaining clip -1- and disconnect coolant line.
– Move coolant line clear at radiator cowl -arrows-.



– Lift retaining clip -2- and disconnect coolant hose.
– Press coolant hose to rear.

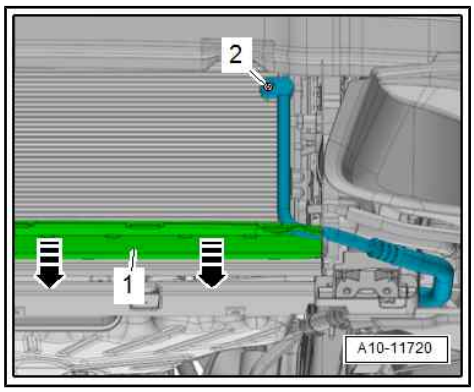


Note

Disregard -item 1-.

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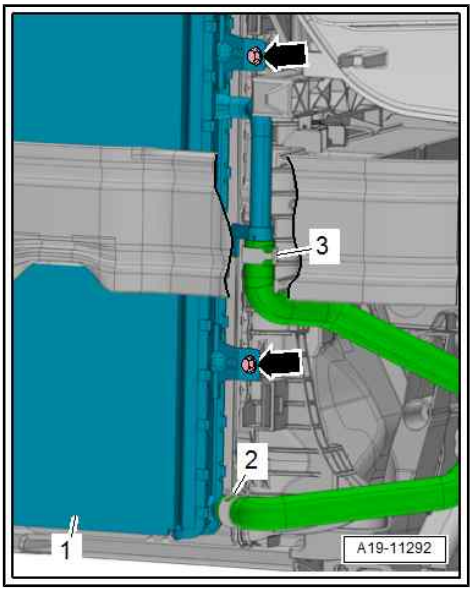
– Unclip air duct -1- downwards.



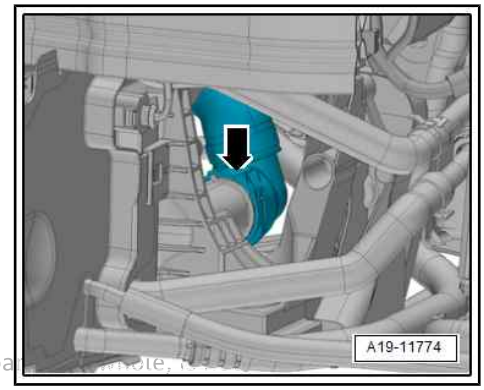
Note

Disregard -item 2-.

– Release hose clips -2, 3- and disconnect coolant hoses.
– Remove bolts -arrows- and detach water radiator for charge air cooling circuit -1-.

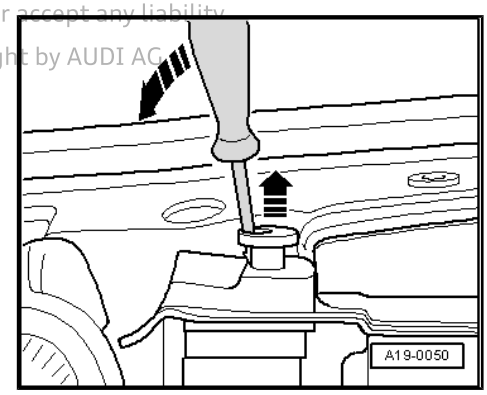


– Press air duct slightly to left.
– Place drip tray for workshop hoist - VAS 6208- underneath.
– Lift retaining clip -arrow-, disconnect coolant hose from radiator and drain off remaining coolant.



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– Release retaining pins for radiator on both sides and pull out upwards -arrows-.

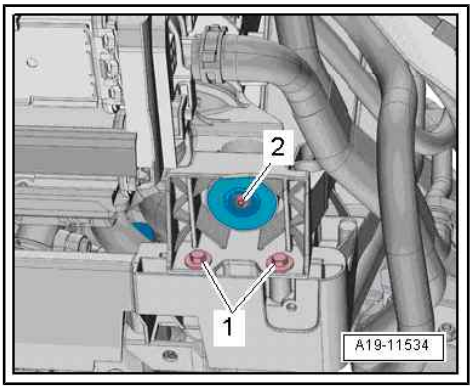


– Remove bolt -2- at bottom left and bottom right of radiator.

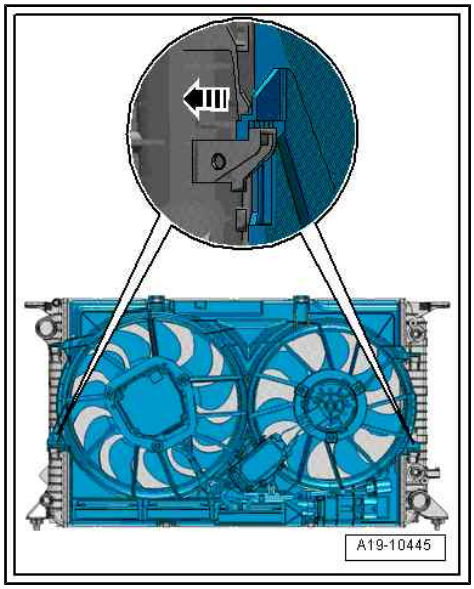
Note

Disregard -item 1-.

– Take off radiator.



– Press locking tabs on left and right sides of radiator cowl together -arrow- and lift radiator cowl off radiator.



Installing

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

Note

- *If there are slight impressions on the fins, refer to ⇒ page 7 .*
- *Fit new O-rings.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

– Install mounting for bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing attachments .

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

– Install headlight ⇒ Electrical system; Rep. gr. 94 ; Headlights; Removing and installing headlights .

– Install air cleaner housing ⇒ page 379 .

– Connect coolant hoses with plug-in connector ⇒ page 302 .

Note

Do not reuse coolant.

– Fill up with coolant ⇒ page 251 .

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Tightening torques

- ⇒ “4.1 Exploded view - radiators/radiator fans”, page 300

4.5 Removing and installing water radiator for charge air cooling circuit

⇒ “4.5.1 Removing and installing water radiator for charge air cooling circuit - Audi S6/S7”, page 318

⇒ “4.5.2 Removing and installing water radiator for charge air cooling circuit - Audi RS 6/RS 7”, page 320

4.5.1 Removing and installing water radiator for charge air cooling circuit - Audi S6/S7

Special tools and workshop equipment required

- Hose clamps up to 25 mm - 3094-

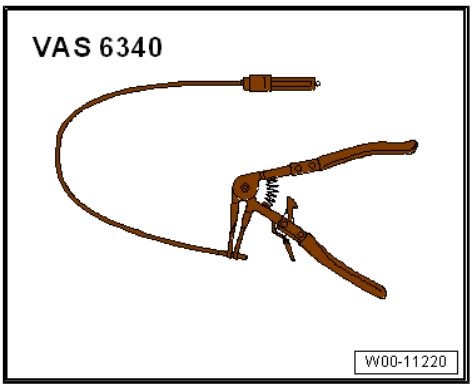
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- Drip tray for workshop hoist - VAS 6208-



- Hose clip pliers - VAS 6340-

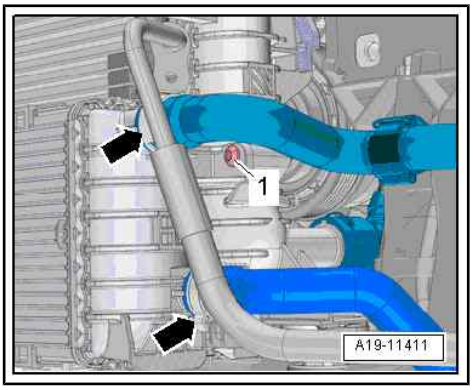


Removing

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

– Place drip tray for workshop hoist - VAS 6208- underneath.

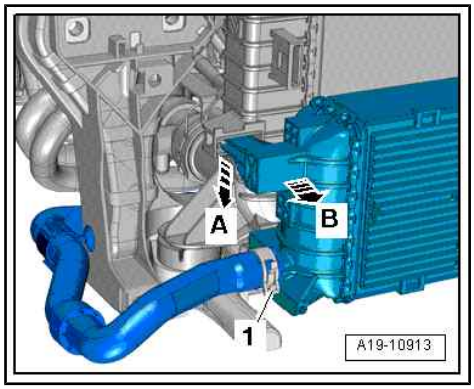
– Clamp off coolant hoses using hose clamps up to 25 mm - 3094- , release hose clips -arrows- and disconnect hoses.



Note

Disregard -item 1-.

– Push catch down -arrow A- and move water radiator for charge air cooling circuit slightly in direction of -arrow B-.

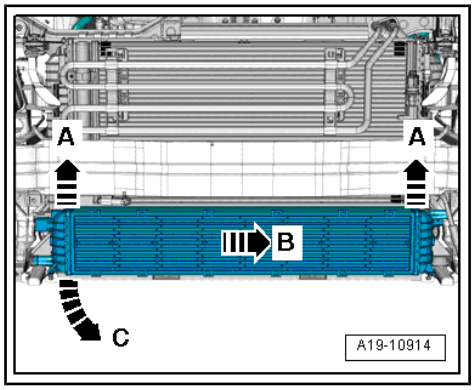


Note

Disregard -item 1-.

– Lift water radiator for charge air cooling circuit off radiator -arrows A- and swivel in direction of -arrow B-.

– Detach water radiator for charge air cooling circuit from right side downwards -arrow C-, paying attention to air ducts on both sides.



Installing

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

Note

- *If there are slight impressions on the fins, refer to ⇒ page 7 .*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *The coolant in the entire system must be changed if the radiator is renewed.*

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– Install closure plate for bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing bumper cover .

– Check coolant level ⇒ page 251 .

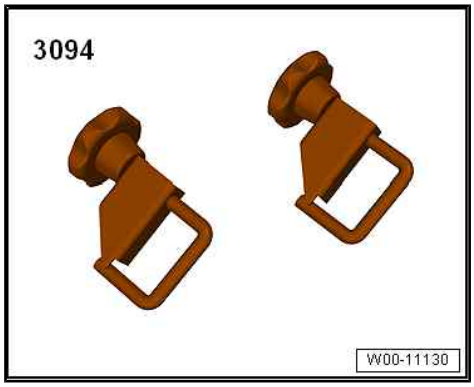
Tightening torques

- ⇒ “4.1 Exploded view - radiators/radiator fans”, page 300

4.5.2 Removing and installing water radiator for charge air cooling circuit - Audi RS 6/ RS 7

Special tools and workshop equipment required

- Hose clamps up to 25 mm - 3094-

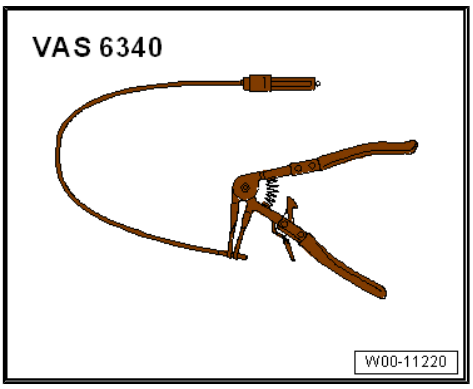


♦ Drip tray for workshop hoist - VAS 6208-



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♦ Hose clip pliers - VAS 6340-



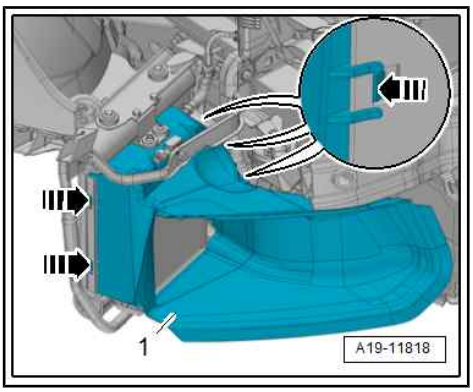
Removing

Audi RS 7:

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

All vehicles (continued):

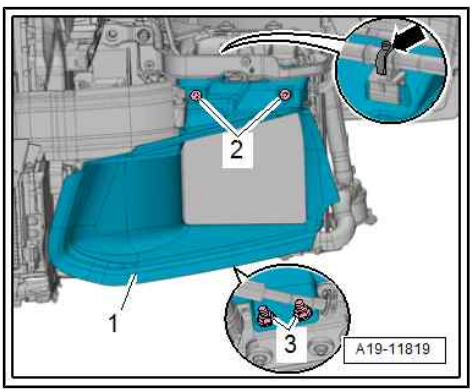
– Release fasteners -arrows- and detach air duct -1- towards front.



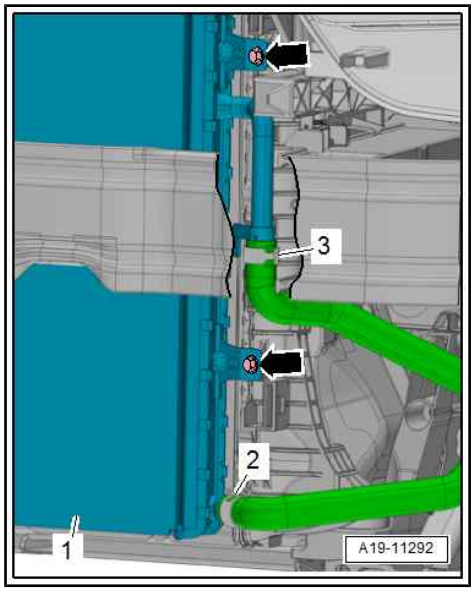
– Move coolant line clear -arrow-.

– Remove bolts -2- and nuts -3-, detach air duct -1-.

– Remove condenser ⇒ Heating, air conditioning; Rep. gr. 87 ; Refrigerant circuit; Removing and installing condenser .



– Place drip tray for workshop hoist - VAS 6208- underneath.
– Clamp off coolant hoses using hose clamps, up to 25 mm - 3094- , release hose clips -2 and 3- and disconnect hoses.
– Unscrew bolts -arrows-, detach water radiator for charge air cooling circuit -1- towards left side of vehicle and remove.



Installing

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

Note

- *If there are slight impressions on the fins, refer to ⇒ page 7 .*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *The coolant in the entire system must be changed if the radiator is renewed.*

– Install bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing bumper cover .
– Check coolant level ⇒ page 251 .

Tightening torques

- ⇒ “4.1 Exploded view - radiators/radiator fans”, page 300

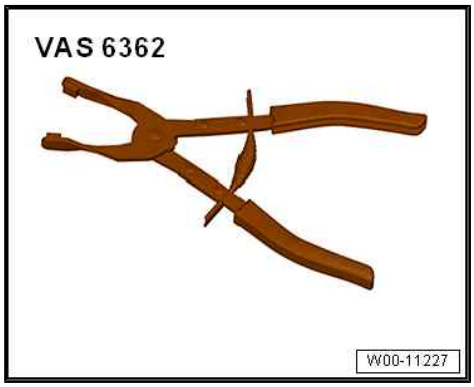
4.6 Removing and installing radiator cowl

Note

The procedure described only applies for the Audi S7.

Special tools and workshop equipment required

- Hose clip pliers - VAS 6362-



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Removing

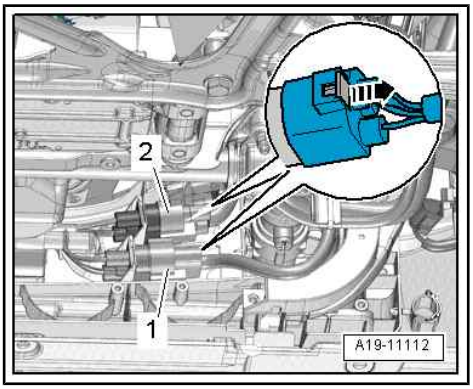
– Remove bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing bumper cover .

– Drain coolant ⇒ page 249 .

WARNING

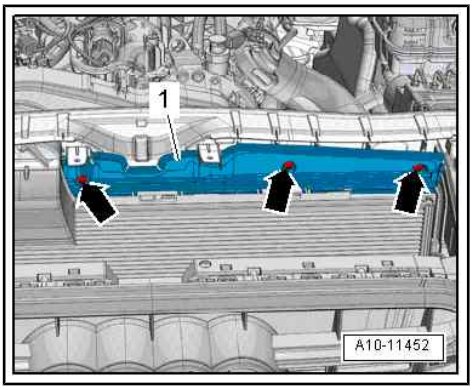
Risk of injury as the radiator fans may start up automatically.

- ***Unplug electrical connectors before working in vicinity of radiator cowl.***



– Unplug electrical connectors -1, 2- for radiator fan.

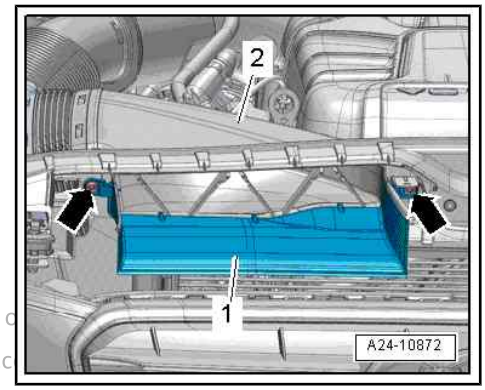
– Remove bolts -arrows- and detach air duct -1-.



– Remove bolts -arrows- and detach air duct -1-.

Note

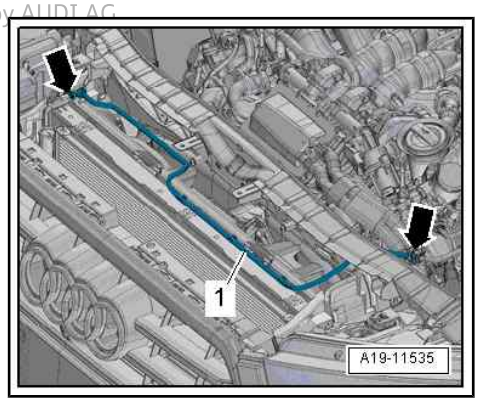
Disregard -item 2-.



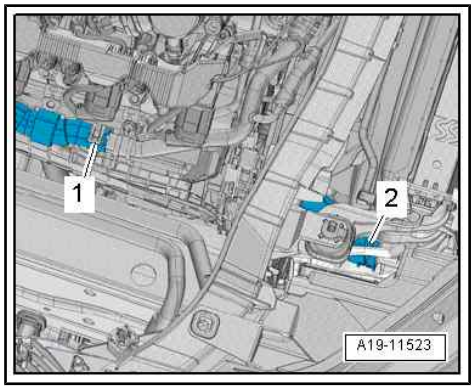
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– Lift retaining clips -arrows- and remove coolant line -1-.

– Move clear coolant line at radiator and at lock carrier and detach.



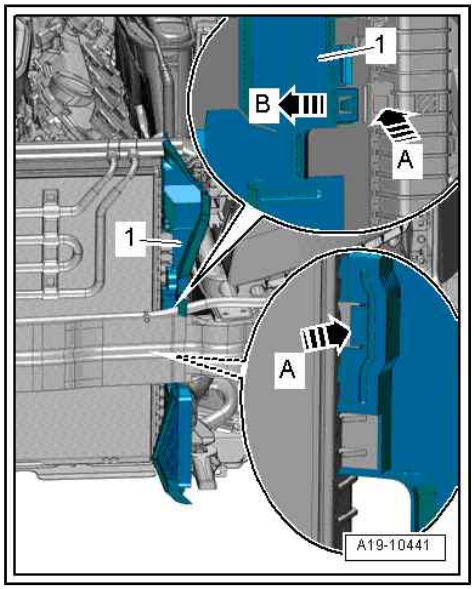
– Lift retaining clip -2- and disconnect coolant hose.
– Press coolant hose to rear.



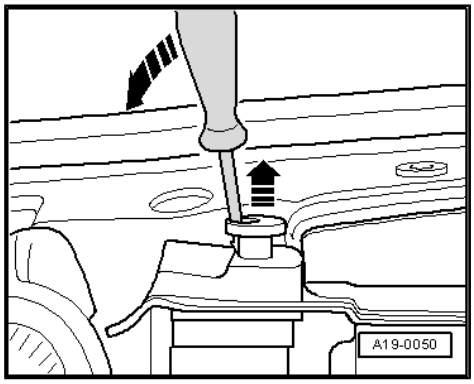
Note

Disregard -item 1-.

– Release catches -arrows A- and detach air duct -1- on left and right -arrow B-.

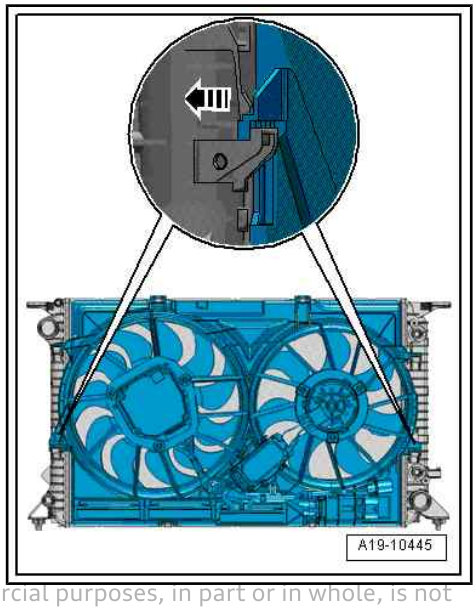


– Release retaining pins for radiator on both sides and pull out upwards -arrows-.
– Press radiator slightly towards front.



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– Press locking tabs on left and right sides of radiator cowl together -arrow- and lift radiator cowl off radiator.



Installing

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

Note

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

– Install electrical wiring ⇒ Electrical system; Rep. gr. 97 ; Relay carriers, fuse carriers, electronics boxes; Overview of fitting locations - relay carriers, fuse carriers, electronics boxes and ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
– Install air ducts ⇒ page 379 .
– Install bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing bumper cover .
– Connect coolant hose with plug-in connector ⇒ page 302 .

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Note

Do not reuse coolant.

– Fill up with coolant ⇒ page 251 .

Tightening torques

♦ ⇒ “4.1 Exploded view - radiators/radiator fans”, page 300

4.7 Removing and installing radiator fan - V7-

Removing

Note

Fit all cable ties in the original positions when installing.

Audi S6/RS 6/RS 7:

– Remove radiator with radiator cowl ⇒ page 309 .

Audi S7:

– Remove radiator cowl ⇒ page 322 .

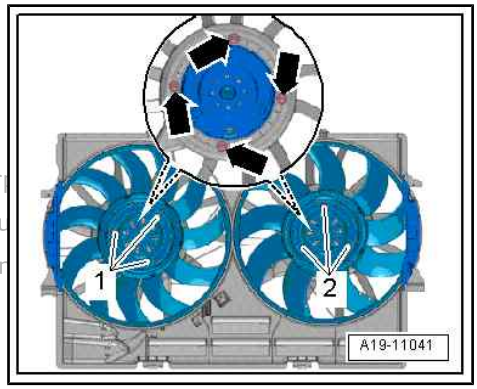
All vehicles (continued):

– Remove bolts -1- or -2- and detach corresponding fan wheel.

– Remove bolts -arrows- on radiator fan.

– Move electrical wiring harness clear and detach radiator fan.

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Installing

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

– Note installation position of fan wheel:

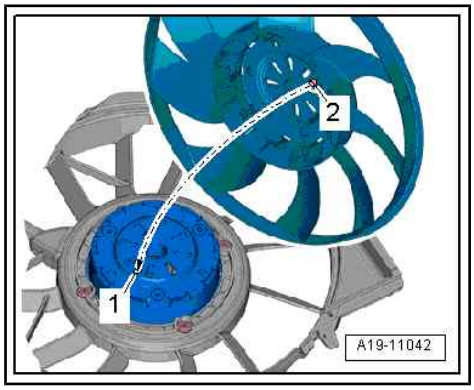
• Pin -2- must engage in hole -1-.

Audi S6/RS 6/RS 7:

– Install radiator with radiator cowl ⇒ page 309 .

Audi S7:

– Install radiator cowl ⇒ page 322 .



Tightening torques

♦ ⇒ “4.3 Exploded view - radiator cowl and radiator fan”, page 308

4.8 Removing and installing auxiliary radiator

⇒ “4.8.1 Removing and installing cooler for ATF coolant circuit, Audi S6/S7”, page 326

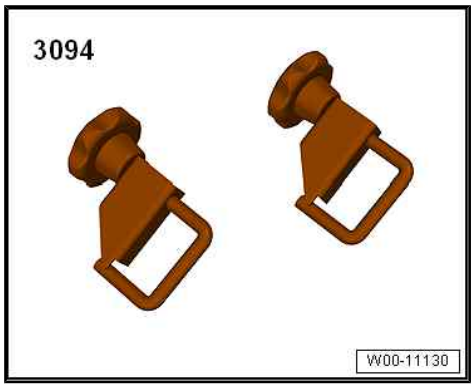
⇒ “4.8.2 Removing and installing cooler for ATF coolant circuit, Audi RS6/RS7”, page 328

⇒ “4.8.3 Removing and installing auxiliary radiator (right-side), Audi RS 6/RS 7”, page 330

4.8.1 Removing and installing cooler for ATF coolant circuit, Audi S6/S7

Special tools and workshop equipment required

♦ Hose clamps up to 25 mm - 3094-



♦ Drip tray for workshop hoist - VAS 6208-



♦ Hose clip pliers - VAS 6362-



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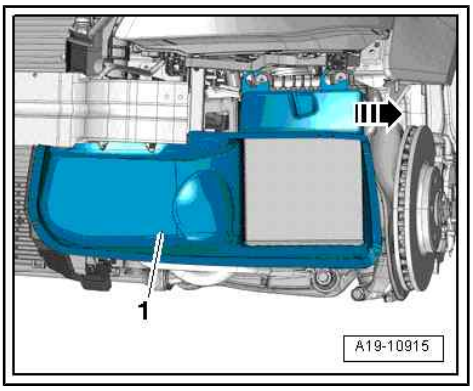
Removing

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

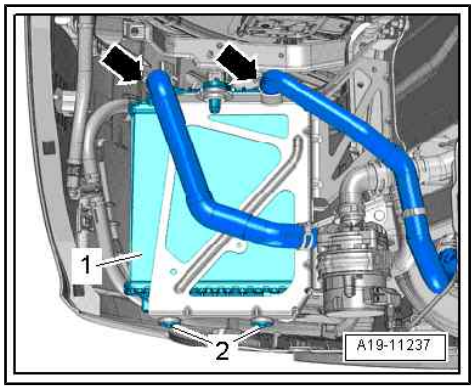
– Remove wheel housing liner (front left) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Removing and installing wheel housing liner (front) .

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

– Detach air duct -1- -arrow-.



– Place drip tray for workshop hoist - VAS 6208- underneath.
– Clamp off coolant hoses using hose clamps up to 25 mm - 3094- , release hose clips -arrows- and disconnect hoses.
– Remove bolts -2-.
– Lift radiator -1- off bracket.



Installing

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

Note

- *If there are slight impressions on the fins, refer to ⇒ page 7 .*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *The coolant in the entire system must be changed if the radiator is renewed.*

– Install bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing bumper cover .
– Check coolant level ⇒ page 251 .

Tightening torques

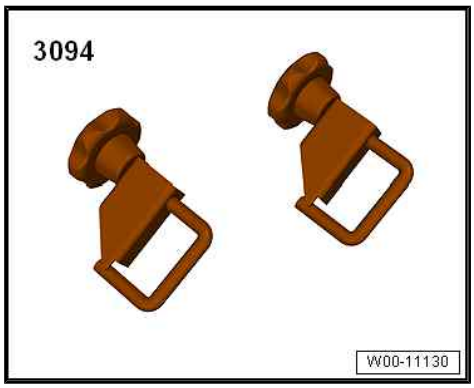
- ⇒ "4.2 Exploded view - auxiliary radiator", page 305
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front)
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

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4.8.2 Removing and installing cooler for ATF coolant circuit, Audi RS6/RS7

Special tools and workshop equipment required

- Hose clamps up to 25 mm - 3094-

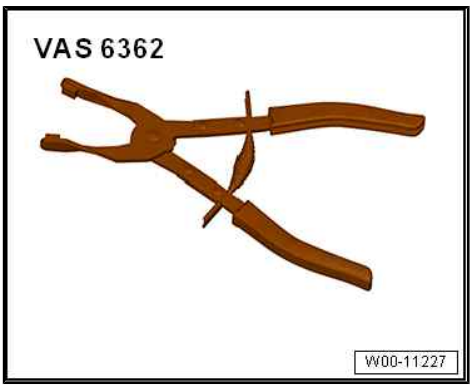


♦ Drip tray for workshop hoist - VAS 6208-



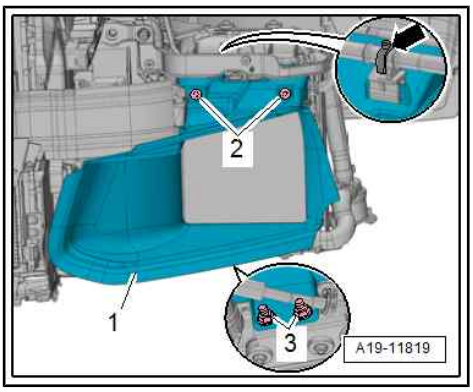
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♦ Hose clip pliers - VAS 6362-

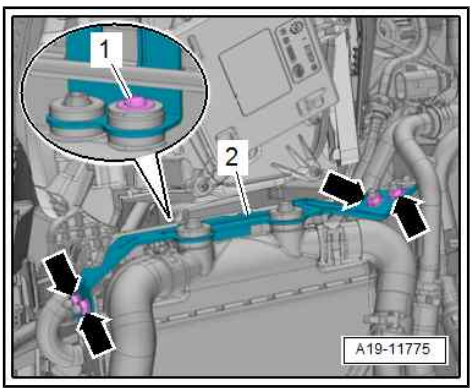


Removing

– Remove bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing bumper cover .
– Move coolant line clear -arrow-.
– Remove bolts -2- and nuts -3-, detach air duct -1-.



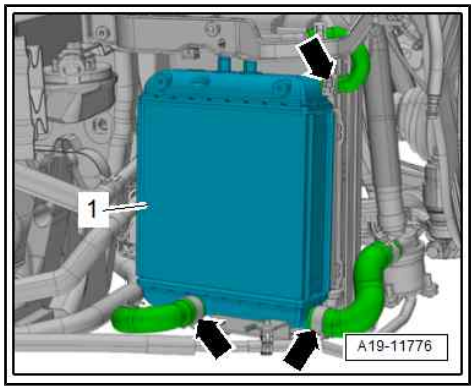
– Remove nuts -arrows- and bolt -1-.
– Lift off bracket -2- and leave in position.
– Place drip tray for workshop hoist - VAS 6208- underneath.



Front cooler for ATF coolant circuit:

– Clamp off coolant hoses using hose clamps up to 25 mm - 3094- , release hose clips -arrows- and disconnect hoses.

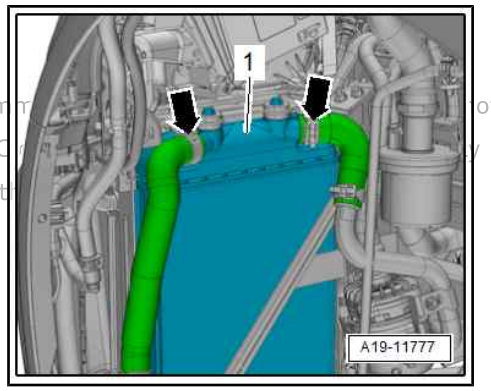
– Detach auxiliary radiator -1- (front left).



Rear cooler for ATF coolant circuit:

– Clamp off coolant hoses using hose clamps up to 25 mm - 3094- , release hose clips -arrows- and disconnect hoses.

– Detach auxiliary radiator -1- (rear left).



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Installing

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

Note

- *If there are slight impressions on the fins, refer to ⇒ page 7 .*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *The coolant in the entire system must be changed if the radiator is renewed.*

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

– Check coolant level ⇒ page 251 .

Tightening torques

- ⇒ “4.2 Exploded view - auxiliary radiator”, page 305

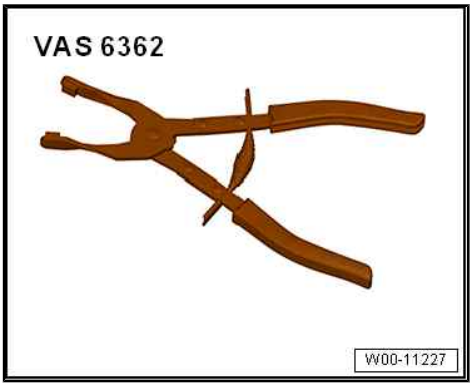
4.8.3 Removing and installing auxiliary radiator (right-side), Audi RS 6/RS 7

Special tools and workshop equipment required

- Drip tray for workshop hoist - VAS 6208-



♦ Hose clip pliers - VAS 6362-



Removing

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

– Drain coolant ⇒ page 249 .

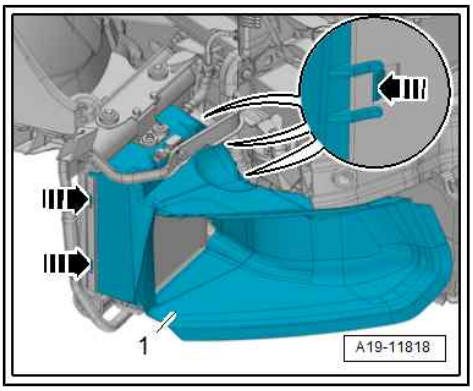
Audi RS 6:

– Remove headlight (right-side) ⇒ Electrical system; Rep. gr. 94 ; Headlights; Removing and installing headlights .

Audi RS 7:

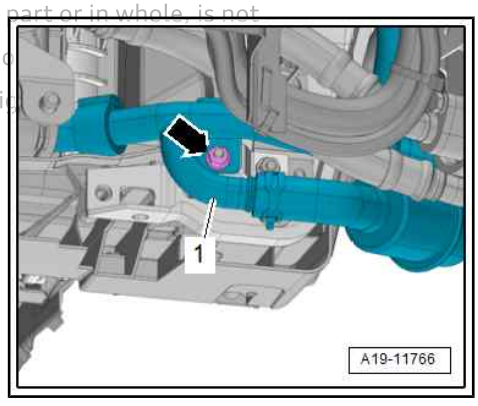
– Remove bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing bumper cover .

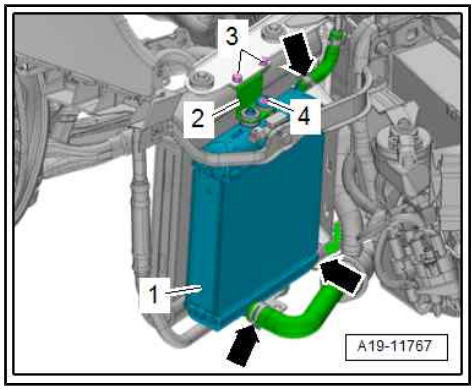
– Release fasteners -arrows- and detach air duct -1- towards front.



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– Remove nut -arrow- and move coolant pipe -1- clear.





– Remove bolts -3-.
– When renewing auxiliary radiator, remove bolt -4- and detach bracket -2-.
– Place drip tray for workshop hoist - VAS 6208- underneath.
– Release hose clips -arrows- and detach coolant hoses.
– Remove auxiliary radiator (right-side).

Installing

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

Note

- *If there are slight impressions on the fins, refer to ⇒ page 7 .*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

– Install headlight ⇒ Electrical system; Rep. gr. 94 ; Headlights; Removing and installing headlights .
– Install bumper cover (front) ⇒ General body repairs, exterior; Rep. gr. 63 ; Bumper (front); Removing and installing bumper cover .

Note

Do not reuse coolant.

– Fill up with coolant ⇒ page 251 .

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Tightening torques

- ⇒ “4.2 Exploded view - auxiliary radiator”, page 305
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front)

21 – Turbocharging/supercharging

1 Turbochargers

⇒ “1.1 Exploded view - turbocharger”, page 333

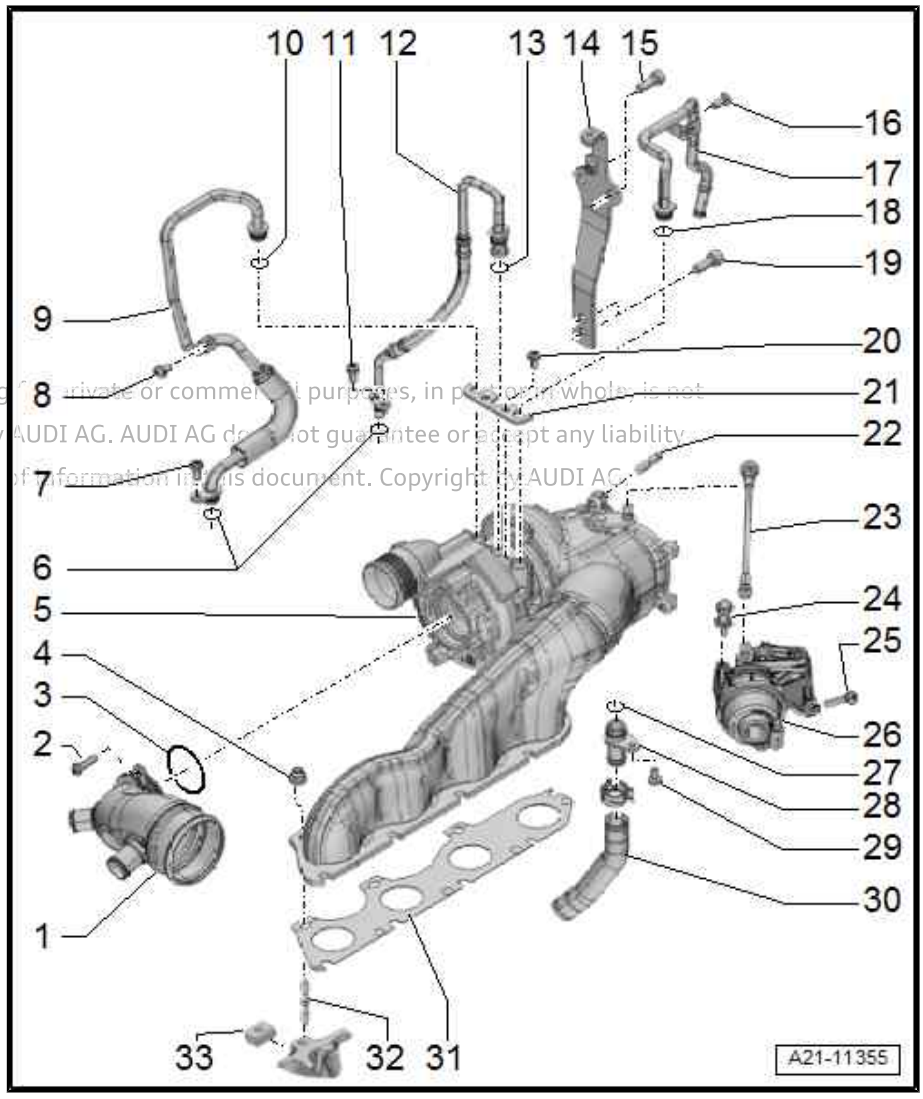
⇒ “1.2 Removing and installing turbocharger”, page 336

⇒ “1.3 Removing and installing temperature sender for engine cover panel G765 ”, page 342

1.1 Exploded view - turbocharger

Note

The illustration shows the turbocharger for cylinder bank 2 (left-side).



1 - Air pipe
- ❑ To turbocharger

2 - Bolt
- ❑ 9 Nm

3 - O-ring
- ❑ Renew

4 - Nut
- ❑ Self-locking
- ❑ Renew
- ❑ Tightening torque and sequence:

◆ ⇒ Fig. ““Turbocharger (left-side) - tightening torque and sequence”“ , page 335

◆ ⇒ Fig. ““Turbocharger (right-side) - tightening torque and sequence”“ , page 335

5 - Turbocharger
- ❑ Removing and installing ⇒ “1.2 Removing and installing turbocharger”, page 336

6 - O-rings
- ❑ Renew

7 - Bolt
- ❑ 9 Nm

8 - Bolt
- ❑ 9 Nm

9 - Coolant supply line

10 - O-ring
- ❑ Renew

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11 - Bolt
- ❑ 9 Nm

12 - Oil supply line

13 - O-ring
- ❑ Renew

14 - Support
- ❑ For turbocharger

15 - Bolt
- ❑ Tightening torque and sequence
  ⇒ Fig. ""Support for turbocharger - tightening torque and tightening sequence"" , page 335

16 - Bolt
- ❑ Tightening torque and sequence
  ⇒ Fig. ""Support for turbocharger - tightening torque and tightening sequence"" , page 335

17 - Coolant return line

18 - O-ring
- ❑ Renew

19 - Bolt
- ❑ Tightening torque and sequence
  ⇒ Fig. ""Support for turbocharger - tightening torque and tightening sequence"" , page 335

20 - Bolt
- ❑ 9 Nm

21 - Retaining plate
- ❑ For coolant lines and oil lines

22 - Stud
- ❑ 25 Nm

23 - Operating rod
- ❑ Always renew securing clip after removing
- ❑ Lightly lubricate ball socket with high-temperature paste ⇒ ETKA

24 - Ball stud
- ❑ For engine cover panel
- ❑ 2.5 Nm

25 - Bolt
- ❑ 9 Nm

26 - Vacuum unit
- ❑ For turbocharger
- ❑ Renew securing clip for operating rod ⇒ Item 23 (page 334) after removal

27 - O-ring
- ❑ Renew

28 - Connection
- ❑ For oil return hose

29 - Bolt
- ❑ 9 Nm

30 - Oil return hose
- ❑ Check for damage and/or wear

31 - Gasket
- ❑ Renew

32 - Stud

- ❑ Screw into square nut -item 33- as far as stop

33 - Square nut

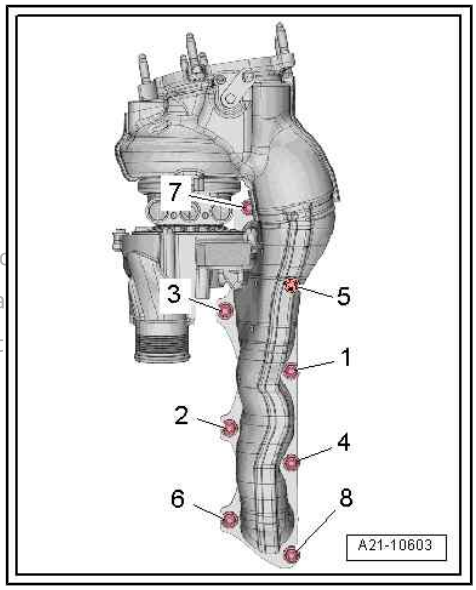
- ❑ For stud
- ❑ On inner side of engine only

Turbocharger (left-side) - tightening torque and sequence

– Tighten bolts in stages in the sequence shown:

Stage	Bolts	Tightening torque
1.	-1 … 8-	16 Nm
2.	-1 … 8-	25 Nm

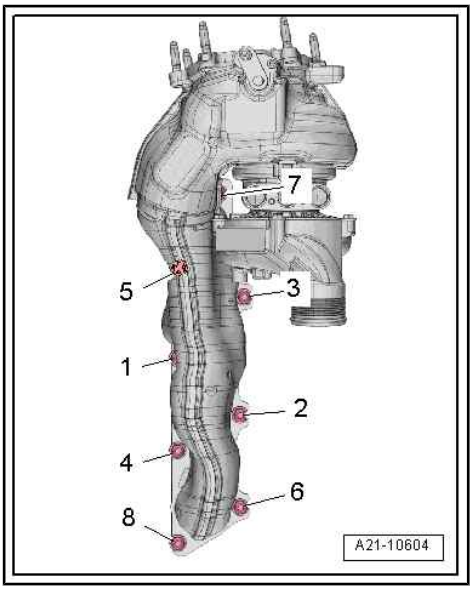
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Turbocharger (right-side) - tightening torque and sequence

– Tighten bolts in stages in the sequence shown:

Stage	Bolts	Tightening torque
1.	-1 … 8-	16 Nm
2.	-1 … 8-	25 Nm

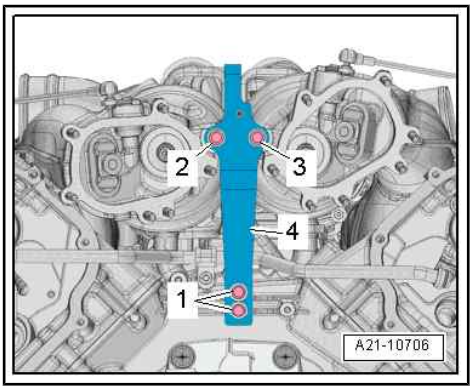


Support for turbocharger - tightening torque and tightening sequence

– Tighten bolts in stages in the sequence shown:

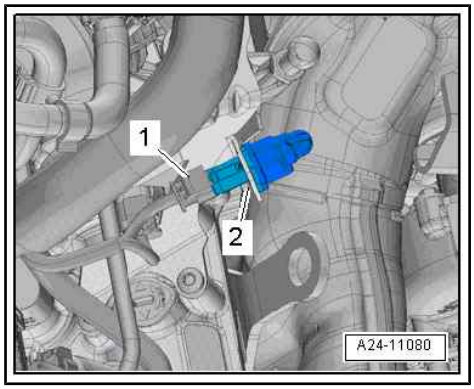
Stage	Bolts	Tightening torque
1.	-1 … 3-	5 Nm
2.	-1 … 3-	25 Nm

4 - Support for turbocharger



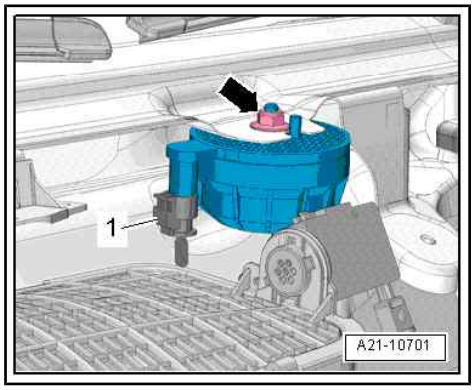
Temperature sender for engine cover panel - G765- - tightening torque

– Tighten bolt -2- to 9 Nm.



Actuator for structure-borne sound - R214- - tightening torque

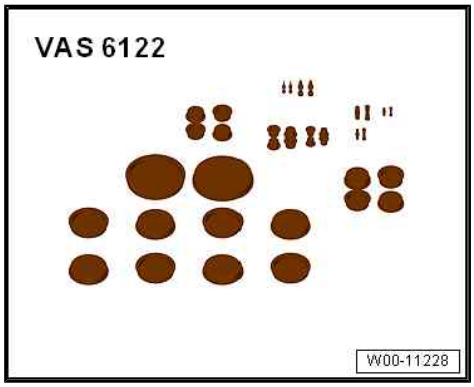
– Tighten nut -arrow- to 9 Nm.



1.2 Removing and installing turbocharger

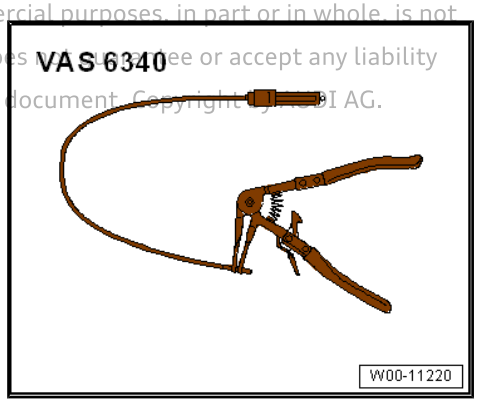
Special tools and workshop equipment required

♦ Engine bung set - VAS 6122-



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♦ Hose clip pliers - VAS 6340-



Removing

Note

Observe rules for cleanliness
⇒ "3.1 Rules for cleanliness", page 5 .

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:

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- 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.
- Renew oil strainer ⇒ Item 3 (page 237) .
- Check oil return hose for damage and/or wear ⇒ Item 30 (page 334) .
- Always renew securing clip for operating rod ⇒ Item 23 (page 334) after removal procedure.

Turbocharger (left-side):

– Remove charge air cooler housing ⇒ page 346 .

Turbocharger (right-side):

– Remove combination valve for secondary air (right-side) ⇒ page 449 .

Both sides (continued):

– Remove front silencers on both sides ⇒ page 436 .

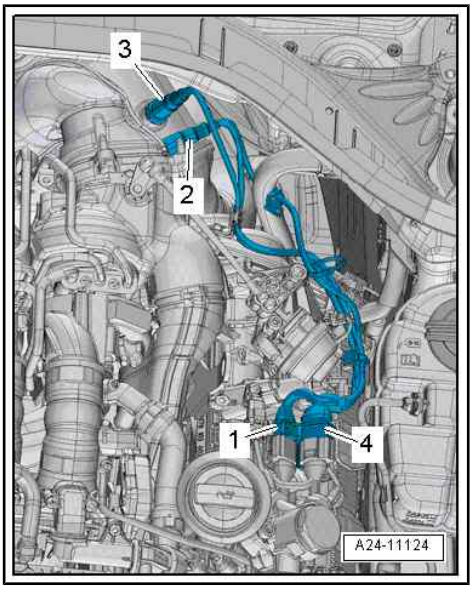
– Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .

– Detach electrical connectors from bracket, unplug connectors and move electrical wiring clear:

1 - For Lambda probe after catalytic converter - G130- -item 3-

4 - For Lambda probe - G39- -item 2-

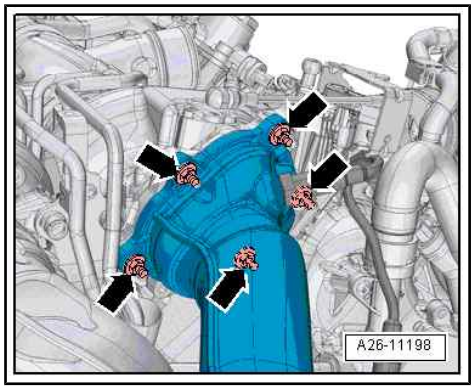
– Move clear electrical wiring harness for Lambda probe 2 - G108- and Lambda probe 2 after catalytic converter - G131- .



Note

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

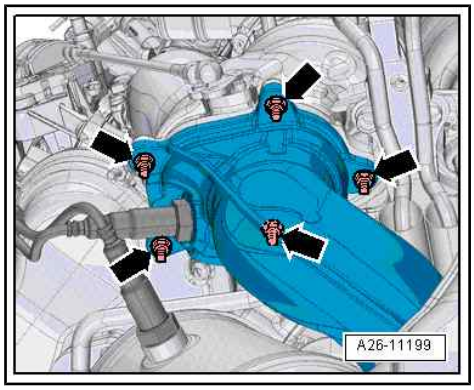
– Unscrew nuts -arrows- on cylinder bank 1 (right-side) and push catalytic converter on left side of vehicle towards rear.



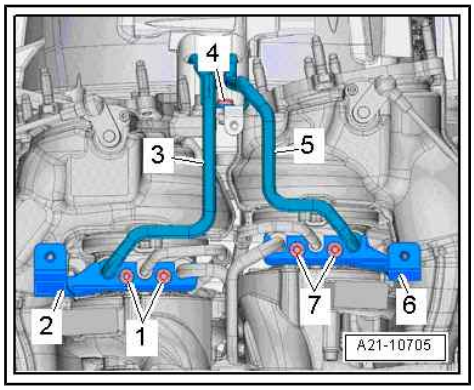
Note

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

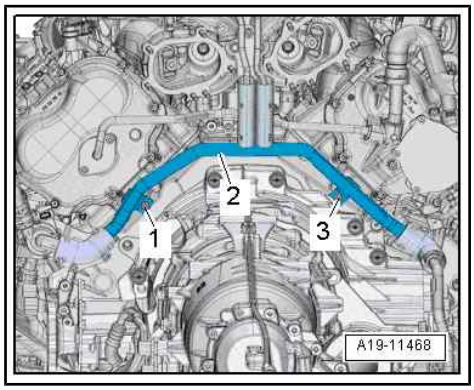
– Unscrew nuts -arrows- on cylinder bank 2 (left-side) and push catalytic converter on right side of vehicle towards rear.



– Unscrew bolts -1, 4, 7- and remove brackets -2, 6-.
– Disconnect coolant lines -3, 5- from turbocharger on both sides.

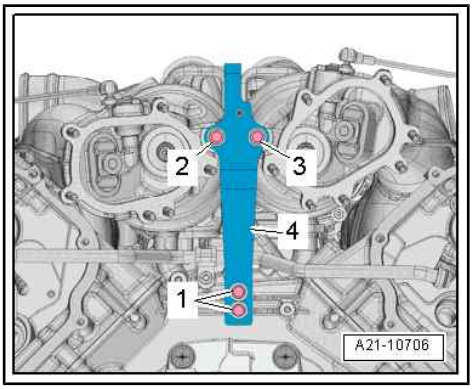


– Remove bolts -1, 3- and press coolant pipe (bottom rear) -2- towards rear.



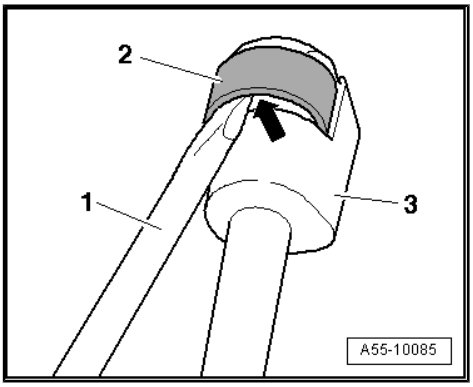
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– Unscrew bolts -1, 2, 3- and detach support -4- for turbocharger.

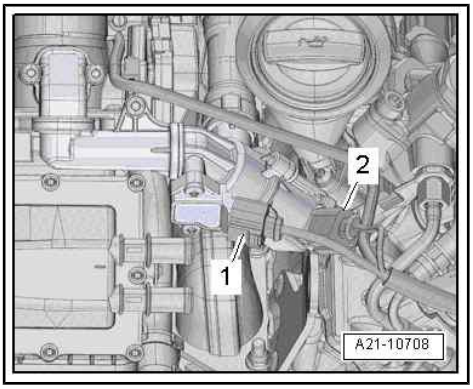


– Remove relevant operating rod for turbocharger ⇒ Item 23 (page 334) ; to do so, use small screwdriver to lift securing clip -2- and pull operating rod -3- off ball-head pin.

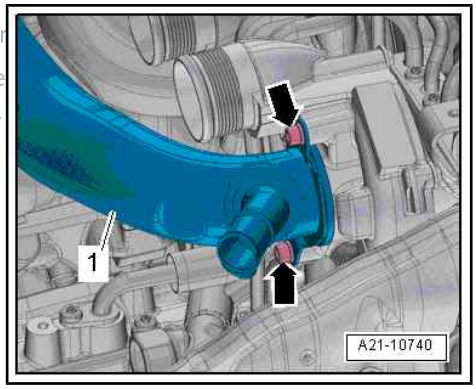
• Always renew securing clip -2- for operating rod after removal procedure.



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



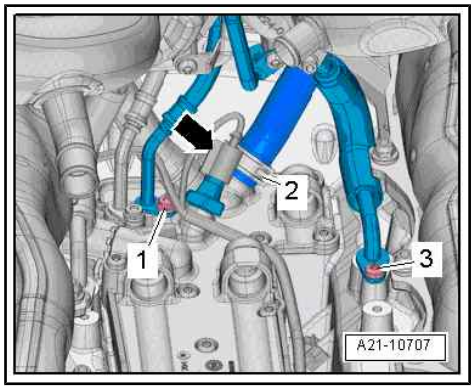
– Unscrew bolts -arrows- and detach air pipe -1-.



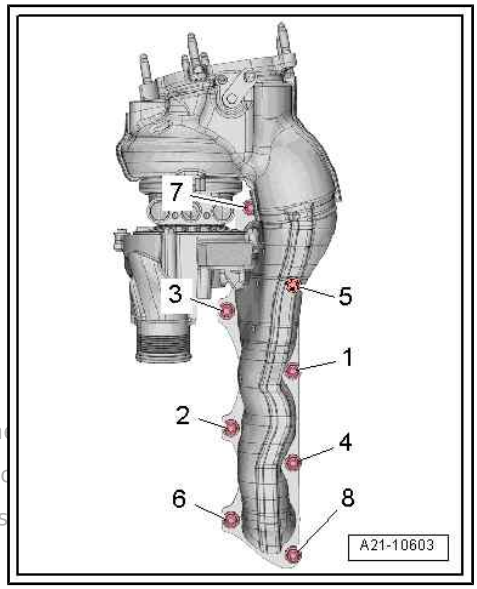
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Turbocharger (left-side):

– Unplug electrical connector -arrow-.
– Remove bolts -1, 3- and disconnect hoses.
– Release hose clip -2- and detach oil return hose.



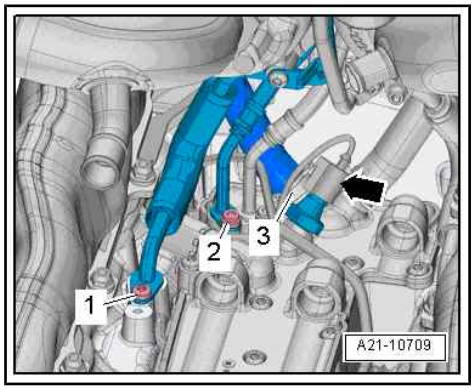
– Remove nuts in the sequence: -8 ... 1- and detach turbocharger.



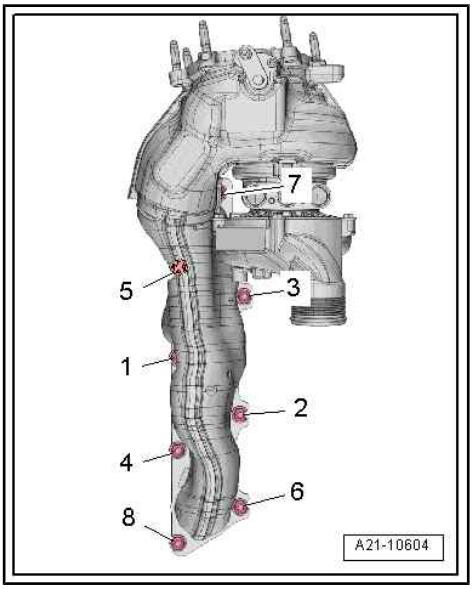
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Turbocharger (right-side):

– Unplug electrical connector -arrow-.
– Remove bolts -1, 2- and disconnect hoses.
– Release hose clip -3- and detach oil return hose.



– Remove nuts in the sequence: -8 ... 1- and detach turbocharger.



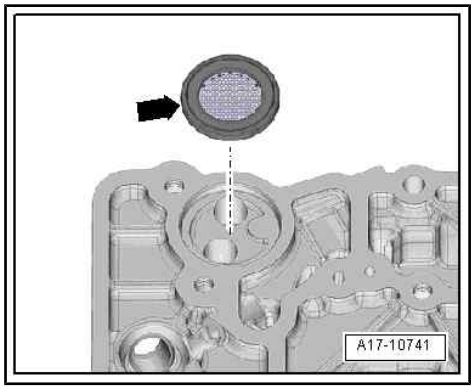
Installing

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

Note

- *Renew gaskets, seals and O-rings.*
- *Renew securing clip for operating rod for turbocharger and lightly lubricate ball socket with high-temperature paste (⇒ ETKA) ⇒ Item 23 (page 334) .*
- *Check oil return hose for damage and/or wear ⇒ Item 30 (page 334) .*
- *Fill turbochargers with engine oil at connections for oil supply line.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *After installing the turbocharger, allow the engine to idle for approx. 1 minute without pressing the accelerator to ensure that the turbocharger is supplied with oil.*

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– Renew oil strainer -arrow-
⇒ “5.2 Removing and installing cover in inner V of engine”, page 238 .
– For fitting location of oil strainer -arrow-, refer to
⇒ “5.1 Exploded view - mechanical switching valve, non-return valve, cover in inner V of engine”, page 237 .
– Coat thread of threaded pins for turbocharger with high-temperature paste.
– Fit gaskets.
– Fit turbocharger.
– Coat thread of bolts of support for turbocharger with high-temperature paste.
– Fit support for turbocharger and tighten bolts to pre-tightening torque ⇒ page 335 .
• Support for turbocharger must make full contact with both turbochargers so that there is no play.
– Tighten turbocharger nuts to pre-tightening torque and final tightening torque ⇒ page 335 .
– Tighten support for turbocharger to final tightening torque ⇒ page 335 .
– Install electrical wiring ⇒ Electrical system; Rep. gr. 97 ; Relay carriers, fuse carriers, electronics boxes; Overview of fitting locations - relay carriers, fuse carriers, electronics boxes and ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.
– Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .
– Install combination valve for secondary air (right-side) ⇒ page 449 .
– Install charge air cooler housing ⇒ page 346 .

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Tightening torques

♦ ⇒ Fig. ““Turbocharger (left-side) - tightening torque and sequence”“ , page 335
♦ ⇒ Fig. ““Turbocharger (right-side) - tightening torque and sequence”“ , page 335
♦ ⇒ “2.2 Exploded view - hose connections for charge air system”, page 346
♦ ⇒ “3.1 Exploded view - coolant pipes”, page 278
♦ ⇒ “1.1 Exploded view - silencers”, page 432

1.3 Removing and installing temperature sender for engine cover panel - G765-

Removing

Note

Observe rules for cleanliness ⇒ page 5 .

– Remove engine cover panel ⇒ page 82 .

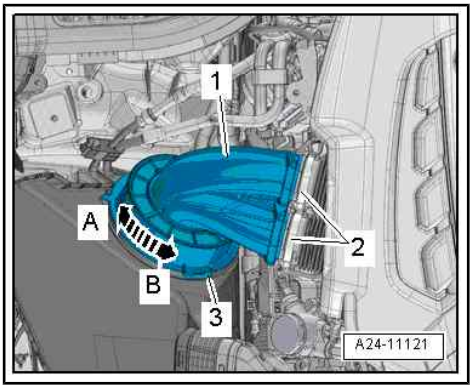
WARNING

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

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

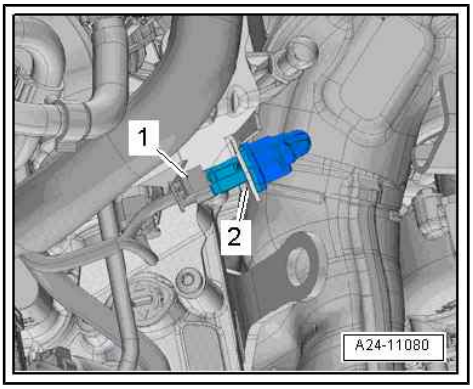
– Release hose clips -2- and detach air hoses.

– Release catch -3-, turn air cleaner (top section) -1- in anti-clockwise direction -arrow B- and detach it.



– Unplug electrical connector -1-.

– Unscrew bolt -2- and detach temperature sender for engine cover panel - G765- .



Installing

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

WARNING

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

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

Tightening torques

- ⇒ Fig. “Temperature sender for engine cover panel -G765- - tightening torque”, page 336

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2 Charge air system

⇒ “2.1 Exploded view - charge air system”, page 344

⇒ “2.2 Exploded view - hose connections for charge air system”, page 346

⇒ “2.3 Removing and installing charge air cooler housing”, page 346

⇒ “2.4 Removing and installing charge air cooler”, page 347

⇒ “2.5 Removing and installing charge pressure sender G31 ”, page 349

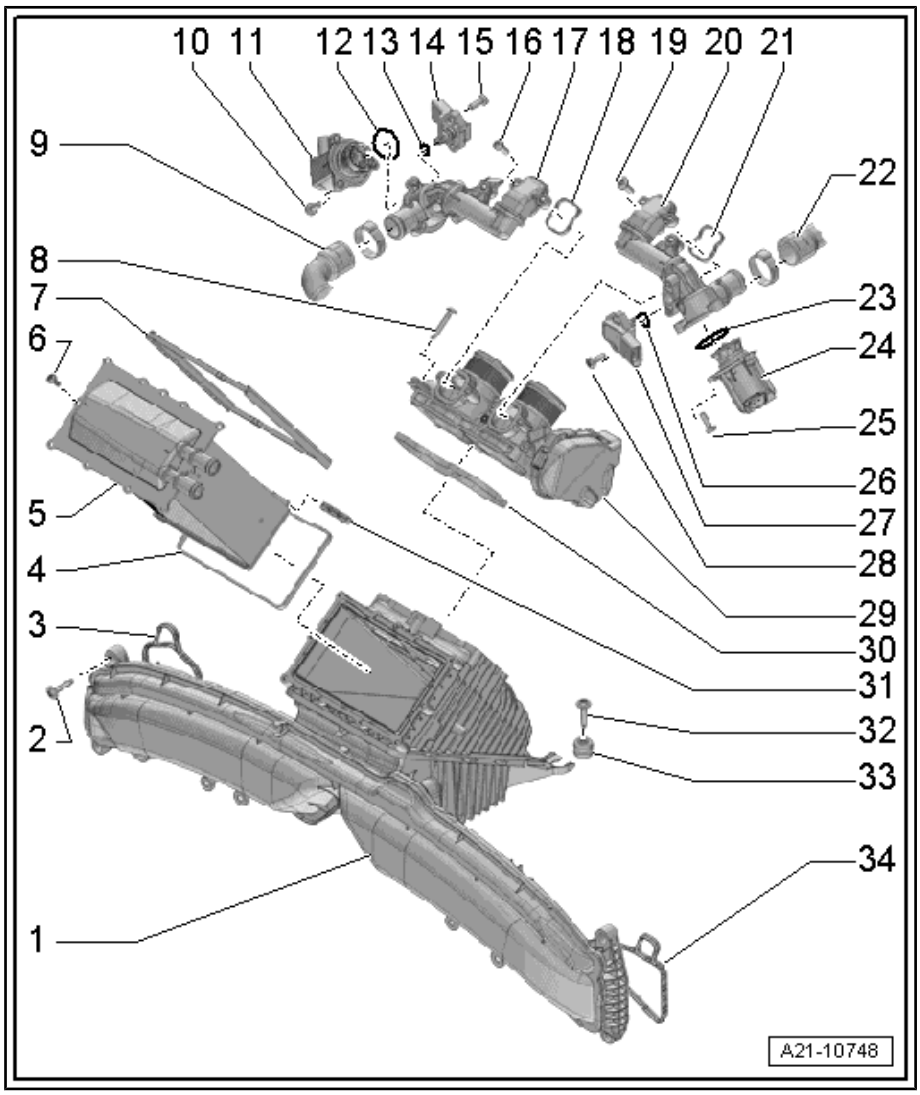
⇒ “2.6 Removing and installing charge pressure sender 2 G447 ”, page 351

⇒ “2.7 Removing and installing turbocharger air recirculation valve N249 ”, page 352

⇒ “2.8 Removing and installing turbocharger air recirculation valve, cylinder bank 2 N427 ”, page 353

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2.1 Exploded view - charge air system



1 - Charge air cooler housing
- ❑ With air ducts
- ❑ Removing and installing ⇒ page 346

2 - Bolt
- ❑ 9 Nm

3 - Gasket
- ❑ Renew

4 - Gasket
- ❑ Renew

5 - Charge air cooler
- ❑ Removing and installing ⇒ page 347
- ❑ If renewed, change coolant in entire system

6 - Bolt
- ❑ 3.2 Nm

7 - Gasket
- ❑ For charge air cooler
- ❑ Renew

8 - Bolt
- ❑ Tightening torque ⇒ Item 13 (page 383)

9 - Air hose
- ❑ To air pipe at turbo-charger

10 - Bolt
- ❑ 9 Nm

11 - Turbocharger air recircu-lation valve - N249-
- ❑ Removing and installing ⇒ page 352

12 - O-ring
- ❑ Renew

13 - O-ring
- ❑ Renew

14 - Charge pressure sender - G31-
- ❑ Removing and installing ⇒ page 349

15 - Bolt
- ❑ 9 Nm

16 - Bolt
- ❑ 9 Nm

17 - Air duct

18 - Gasket
- ❑ Renew

19 - Bolt
- ❑ 9 Nm

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20 - Air duct

21 - Gasket
- ❑ Renew

22 - Air hose
- ❑ To air pipe at turbocharger

23 - O-ring
- ❑ Renew

24 - Turbocharger air recirculation valve, cylinder bank 2 - N427-
- ❑ Removing and installing ⇒ page 353

25 - Bolt
- ❑ 9 Nm

26 - O-ring
- ❑ Renew

27 - Charge pressure sender 2 - G447-
- ❑ Removing and installing ⇒ page 351

28 - Bolt
- ❑ 9 Nm

29 - Throttle valve module - J338-
- ❑ Removing and installing ⇒ page 391

30 - Gasket
- ❑ Renew

31 - Buffer
- ❑ For charge air cooler

32 - Bolt
- ❑ 9 Nm

33 - Grommet

34 - Gasket
- ❑ Renew

2.2 Exploded view - hose connections for charge air system

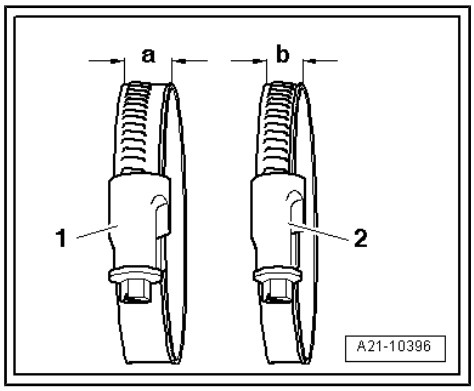
Note

- *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.*

Tightening torque for

1 - Hose clip with width -a- = 13 mm: 5.5 Nm

2 - Hose clip with width -b- = 9 mm: 3.4 Nm



2.3 Removing and installing charge air cooler housing

Special tools and workshop equipment required

- Hose clip pliers - VAS 6362-



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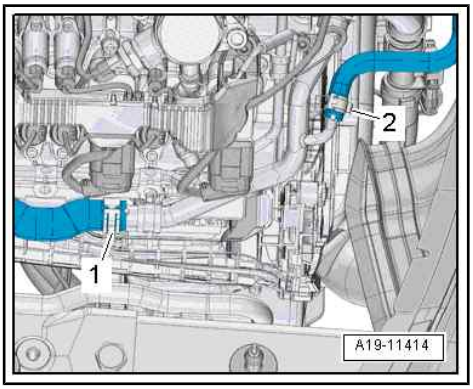
Removing

Note

Observe rules for cleanliness ⇒ page 5 .

– Remove lock carrier ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Removing and installing lock carrier .
– Remove coolant pipe (front) ⇒ page 281 .
– Remove air cleaner housing ⇒ page 379 .
– Remove throttle valve module - J338- ⇒ page 391 .

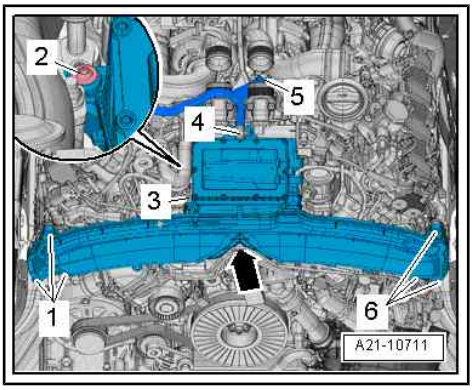
– Release hose clip -2- and detach coolant hose.
– Place coolant hoses to the side.



Note

Disregard -item 1-.

– Unplug electrical connector -3-.
– Move vacuum lines clear -arrow-.
– Release hose clips -4, 5- and detach air hoses.
– Remove bolts -1, 2, 6-, pull charge air cooler housing slightly towards front and lift to detach.



Installing

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

Note

- *Renew seals and/or gaskets.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

– Install throttle valve module - J338- ⇒ page 391 .
– Install air cleaner housing ⇒ page 379 .

Note

Do not reuse coolant.

– Fill up with coolant ⇒ page 251 .

Tightening torques

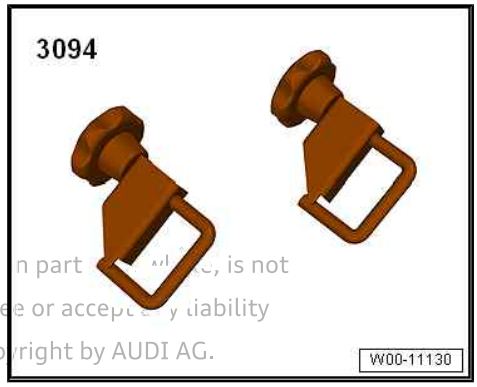
- ⇒ “2.1 Exploded view - charge air system”, page 344
- ⇒ “3.1 Exploded view - coolant pipes”, page 278
- ⇒ “2.2 Exploded view - hose connections for charge air system”, page 346
- ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Exploded view - lock carrier

2.4 Removing and installing charge air cooler

Special tools and workshop equipment required

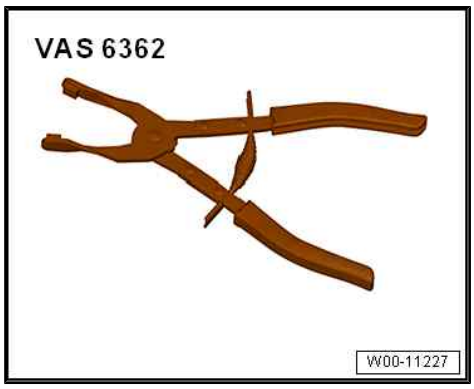
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- Hose clamps up to 25 mm - 3094-



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- Hose clip pliers - VAS 6362-

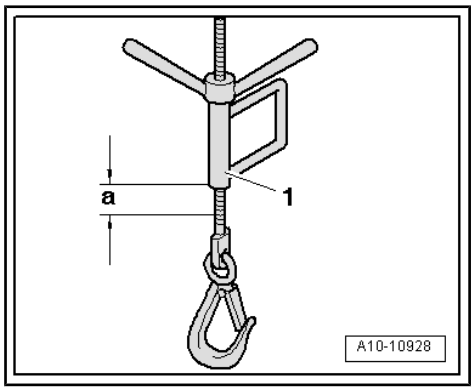


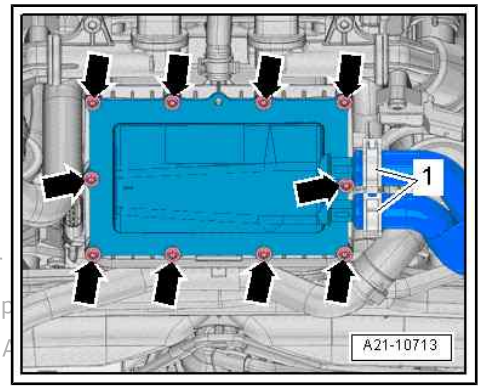
Removing

Note

Observe rules for cleanliness ⇒ page 5 .

– Support engine in installation position ⇒ page 66 .
– Using spindle - 10 - 222 A /11- -item 1-, raise engine through distance -a-.
• Distance -a- = approx. 15 mm.





Note

Place a cloth underneath to catch escaping coolant.

– Clamp off coolant hoses using hose clamps up to 25 mm - 3094- , release hose clips -1- and disconnect hoses.

– Remove bolts -arrows- and pull charge air cooler out of charge air cooler housing.

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Installing

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

Note

- *If there are slight impressions on the fins, refer to ⇒ page 7 .*
- *Renew gasket.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *The coolant in the entire system must be changed if the radiator is renewed.*

– Check coolant level ⇒ page 251 .

WARNING

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

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

Tightening torques

- ⇒ “2.1 Exploded view - charge air system”, page 344

2.5 Removing and installing charge pressure sender - G31-

Removing

Note

Observe rules for cleanliness ⇒ page 5 .

– Remove engine cover panel ⇒ page 82 .

WARNING

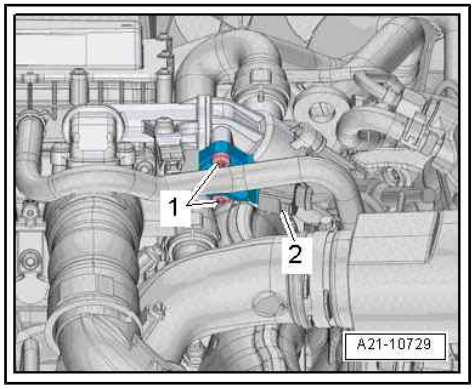
Danger of fire and damage if the engine cover panel is not fitted.

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

Audi S6/S7:

– Unplug electrical connector -2-.

– Unscrew bolts -1- and remove charge pressure sender - G31- .



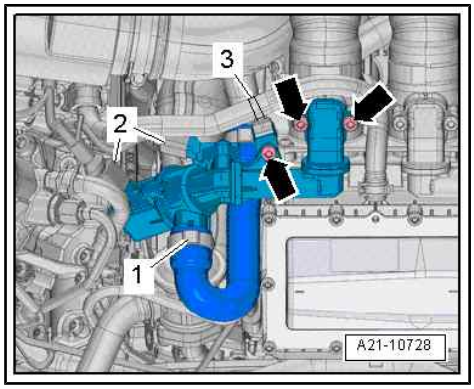
Audi RS 6/RS 7:

– Unplug electrical connectors -2-.

– Unscrew bolts -arrows- and move clear turbocharger air recirculation valve - N249- with air duct.

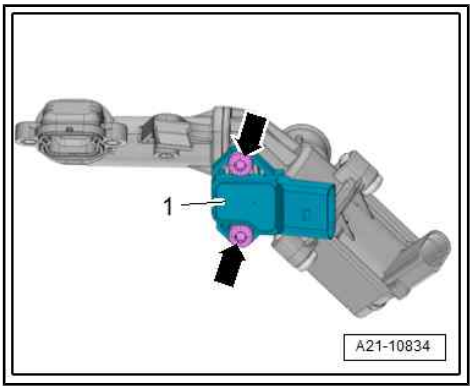
Note

Disregard -item 1-.



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– Unscrew bolts -arrows- and remove charge pressure sender - G31- .



Installing

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

Note

Fit new O-ring.

WARNING

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

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

Tightening torques

- ⇒ “2.1 Exploded view - charge air system”, page 344

2.6 Removing and installing charge pressure sender 2 - G447-

Removing

Note

Observe rules for cleanliness ⇒ page 5 .

– Remove engine cover panel ⇒ page 82 .

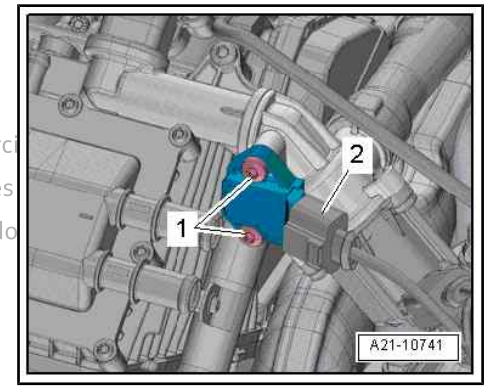
WARNING

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

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

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– Unplug electrical connector -2-.
– Unscrew bolts -1- and remove charge pressure sender 2 - G447- .



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with respect to the correctness of information in this do

Installing

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

Note

Renew gasket and O-ring.

WARNING

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

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

Tightening torques

- ⇒ “2.1 Exploded view - charge air system”, page 344

2.7 Removing and installing turbocharger air recirculation valve - N249-

Removing

Note

Observe rules for cleanliness ⇒ page 5 .

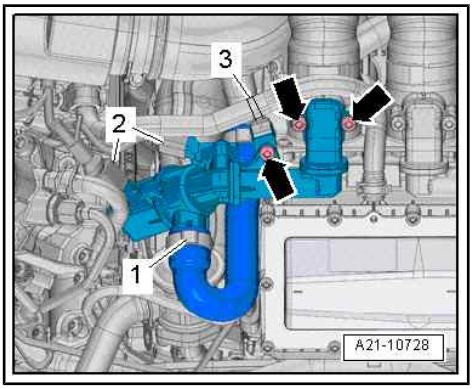
– Remove engine cover panel ⇒ page 82 .

WARNING

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

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

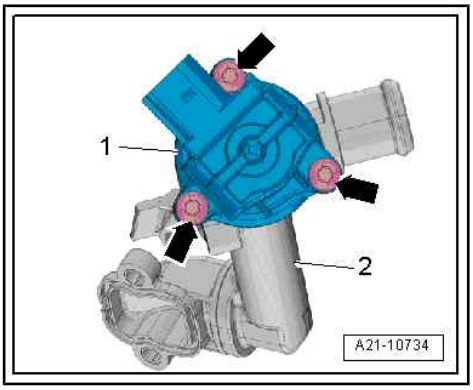
– Unplug electrical connectors -2-.
– Move air hose -3- clear.
– Unscrew bolts -arrows- and move clear turbocharger air recirculation valve - N249- with air duct.



Note

Disregard -item 1-.

– Unscrew bolts -arrows- and disconnect turbocharger air recirculation valve - N249- -item 1- from air duct -2-.



Installing

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

Note

- *Renew gasket and O-ring.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

WARNING

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

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

Tightening torques

- ⇒ “2.1 Exploded view - charge air system”, page 344

2.8 Removing and installing turbocharger air recirculation valve, cylinder bank 2 - N427-

Removing

Note

Observe rules for cleanliness ⇒ page 5 .

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– Remove engine cover panel ⇒ page 82 .

WARNING

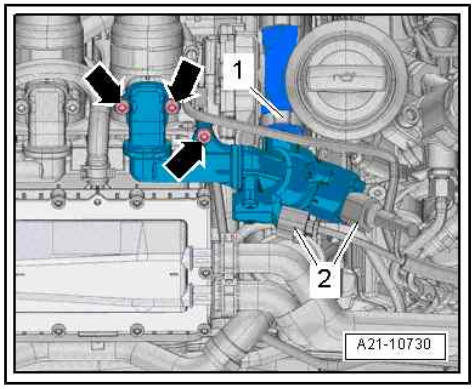
Danger of fire and damage if the engine cover panel is not fitted.

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

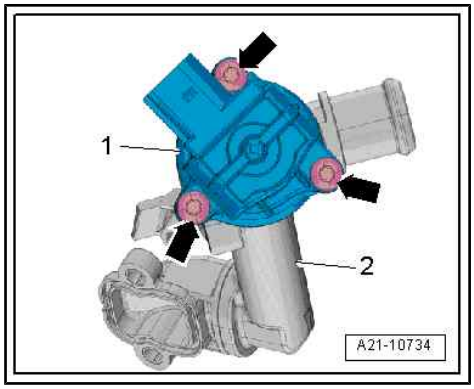
– Unplug electrical connectors -2-.

– Remove bolts -arrows-.

– Release hose clip -1- and detach air duct with turbocharger air recirculation valve - N249- from air hose.



– Unscrew bolts -arrows- and disconnect turbocharger air recirculation valve - N249- -item 1- from air duct -2-.



Installing

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

Note

- *Renew gasket and O-ring.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

WARNING

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

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

Tightening torques

- ⇒ “2.1 Exploded view - charge air system”, page 344

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24 – Mixture preparation - injection

1 Injection system

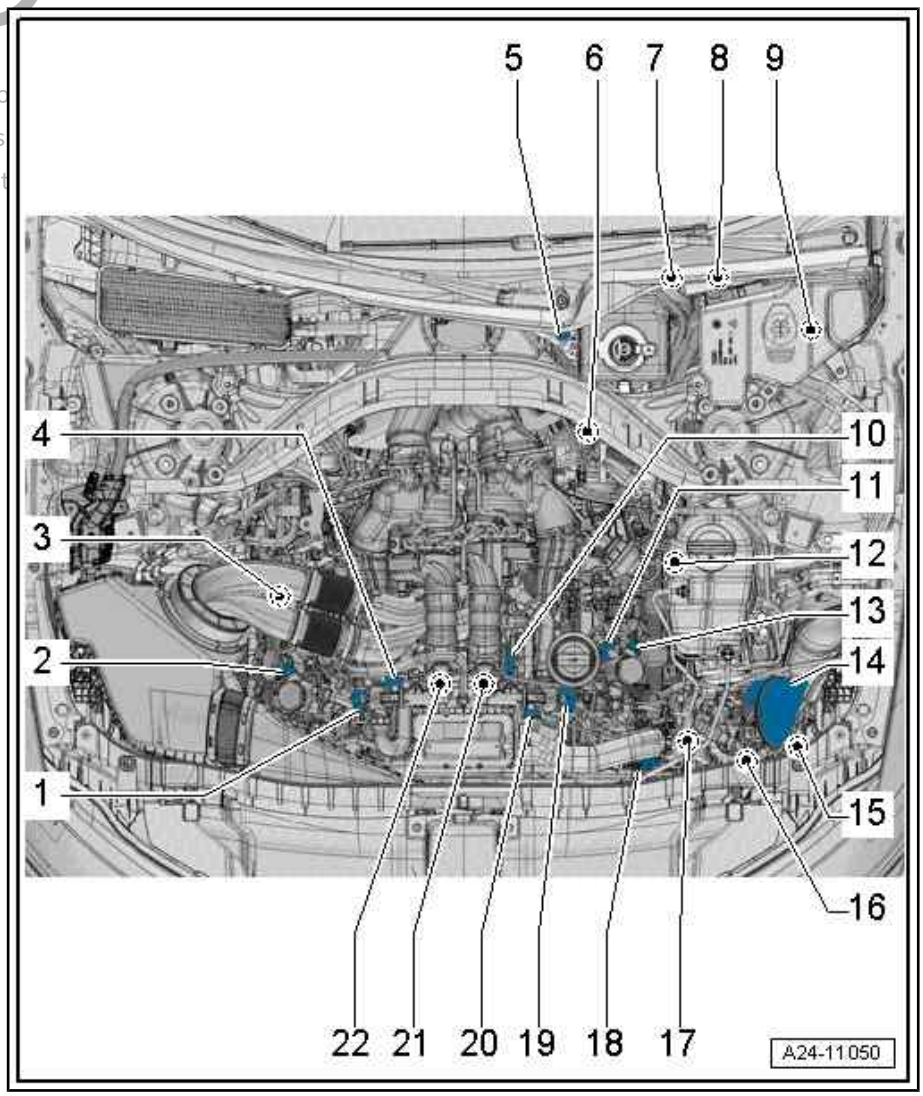
⇒ “1.1 Overview of fitting locations - injection system”, page 355

⇒ “1.2 Checking fuel system for leaks”, page 364

1.1 Overview of fitting locations - injection system

Fitting locations in engine compartment

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1 - Turbocharger air recirculation valve - N249-

- ❑ Exploded view ⇒ page 344

2 - Fuel metering valve - N290-

- ❑ Exploded view ⇒ page 409

3 - Power unit mounting sender 1 - G748- / power unit mounting actuator 1 - N513-

4 - Charge pressure sender - G31-

- ❑ Exploded view ⇒ page 344

5 - Brake servo pressure sensor - G294-

6 - Gearbox oil cooling valve - N509-

- ❑ Fitting location ⇒ page 358
- ❑ Exploded view ⇒ page 278

7 - Accelerator position sender - G79- and accelerator position sender 2 - G185-

- ❑ Fitting location ⇒ page 357

8 - Brake light switch - F-

- ❑ Fitting location ⇒ page 357

9 - Engine control unit - J623-

- ❑ Fitting location ⇒ page 356
- ❑ Removing and installing ⇒ page 428

10 - 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-
- ❑ Exploded view ⇒ page 381

11 - Fuel pressure sender for low pressure - G410-

- ❑ Exploded view ⇒ page 409

12 - Power unit mounting actuator 2 - N514- power unit mounting sender 2 - G749-

13 - Fuel metering valve 2 - N402-

- ❑ Exploded view ⇒ page 409

14 - Secondary air pump motor - V101-

- ❑ Fitting location ⇒ page 359
- ❑ Exploded view ⇒ page 444

15 - Continued coolant circulation pump - V51-

- ❑ Fitting location ⇒ page 357
- ❑ Exploded view ⇒ page 259

16 - Charge air cooling pump - V188-

- ❑ Fitting location ⇒ page 358
- ❑ Exploded view ⇒ page 259

17 - Radiator outlet coolant temperature sender - G83-

- ❑ Fitting location ⇒ page 357
- ❑ Exploded view ⇒ page 262

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18 - Sender 1 for secondary air pressure - G609-

- ❑ Fitting location ⇒ page 359
- ❑ Exploded view ⇒ page 444

19 - Turbocharger air recirculation valve, cylinder bank 2 - N427-

- ❑ Exploded view ⇒ page 344

20 - Charge pressure sender 2 - G447-

- ❑ Exploded view ⇒ page 344

21 - Temperature sender 2 for charge air cooler - G764-

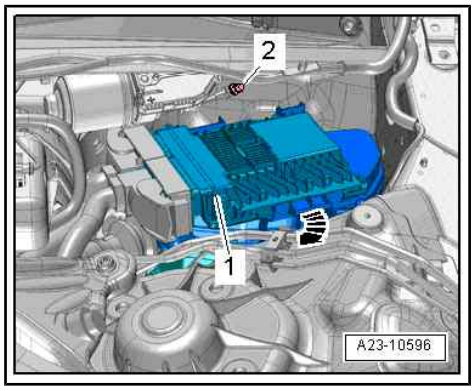
- ❑ Fitting location ⇒ page 358
- ❑ Exploded view ⇒ page 383

22 - Temperature sender 1 for charge air cooler - G763-

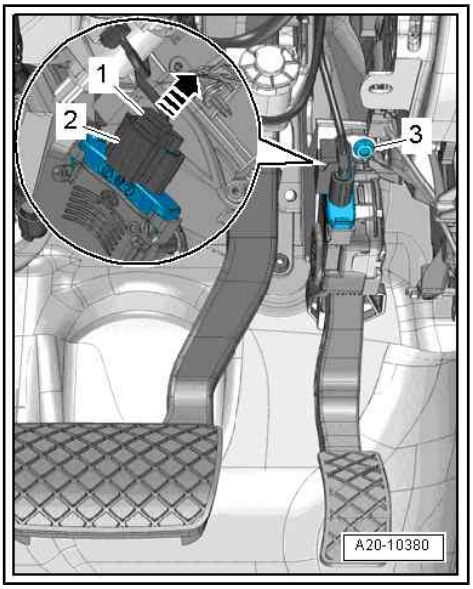
- ❑ Fitting location ⇒ page 358
- ❑ Exploded view ⇒ page 383

Fitting location of engine control unit - J623-

- ◆ -Item 1- in plenum chamber (left-side)



Fitting location of accelerator position sender - G79- / accelerator position sender 2 - G185-



♦ In accelerator pedal module

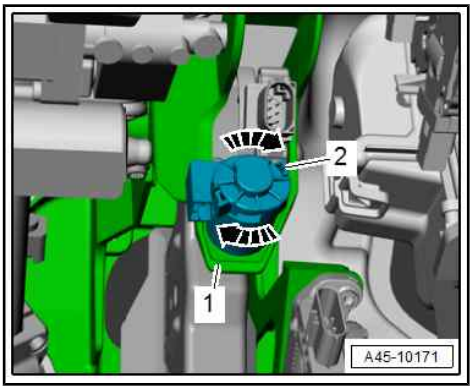
2 - Electrical connector

Note

The accelerator position sender - G79- and accelerator position sender 2 - G185- are integrated in the accelerator pedal module and cannot be renewed individually.

Removing and installing ⇒ Fuel supply system; Rep. gr. 20 ; Accelerator mechanism; Removing and installing accelerator pedal module with accelerator position sender -G79- / -G185-

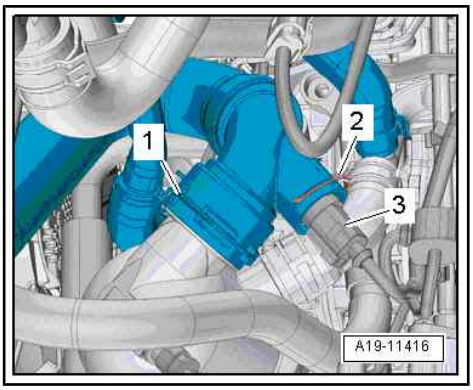
Fitting location of brake light switch - F-



♦ In footwell on brake pedal

Removing and installing ⇒ Brake system; Rep. gr. 45 ; Sensors; Removing and installing brake light switch

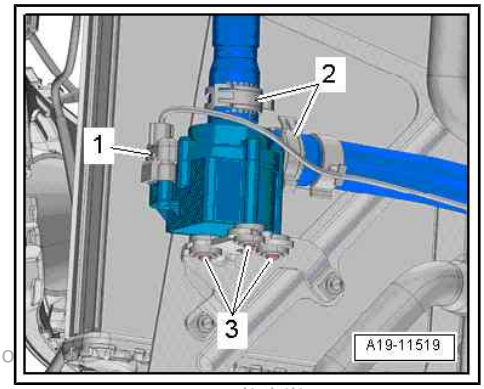
Fitting location of radiator outlet coolant temperature sender - G83-



♦ In bottom coolant hose (left-side) on radiator.

Removing and installing ⇒ page 275

Fitting location of continued coolant circulation pump - V51-



♦ At front left, beneath headlight

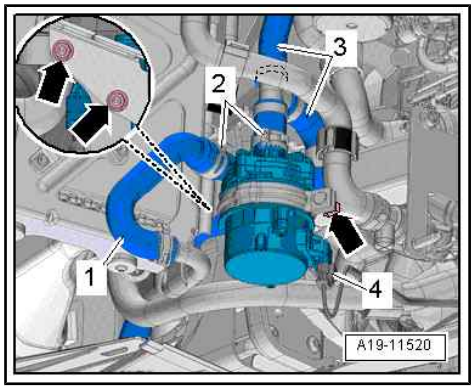
Removing and installing ⇒ page 262

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Fitting location of charge air cooling pump - V188-

- At front left, beneath headlight

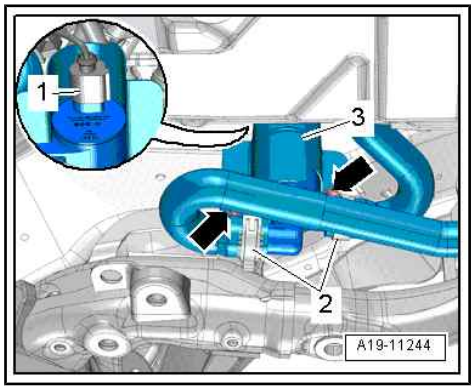
Removing and installing ⇒ page 267



Fitting location of gearbox oil cooling valve - N509-

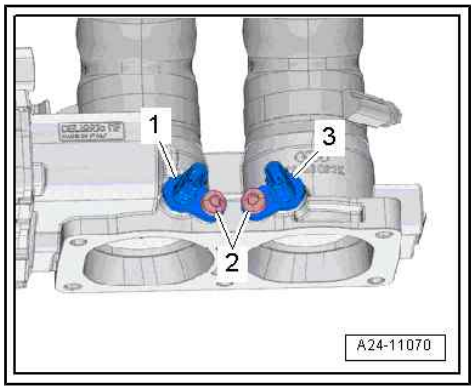
- At rear left of subframe

Removing and installing ⇒ page 276



Fitting location of temperature sender 1 for charge air cooler - G763- / temperature sender 2 for charge air cooler - G764-

- On throttle valve module - J338- (bottom)



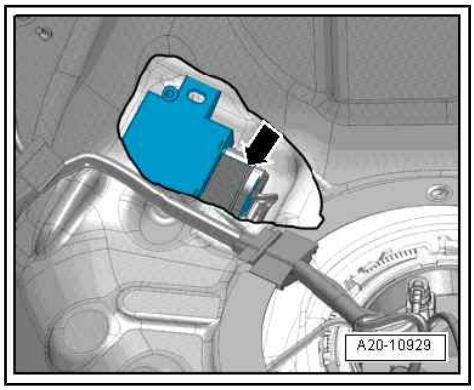
Fitting location of fuel pump control unit - J538-

- Fuel pump control unit - J538- -arrow- is located between floor panel and fuel tank level with rear seat bench (right-side).

Note

For illustration purposes, the floor panel is cut open in the illustration.

Removing and installing ⇒ Fuel supply system; Rep. gr. 20 ; Fuel pump; Removing and installing fuel pump control unit - J538-

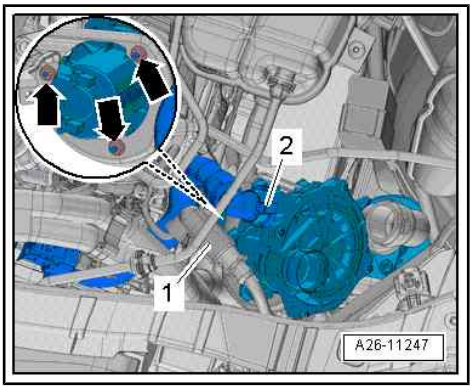


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Fitting location of secondary air pump motor - V101-

- In engine compartment (front left)

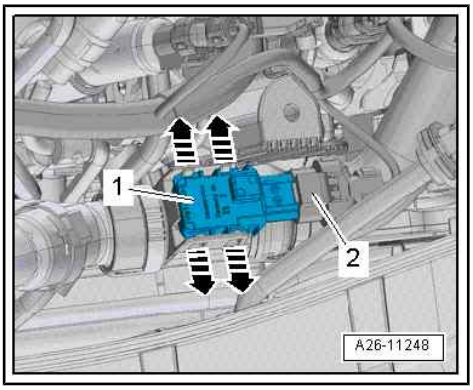
Removing and installing ⇒ page 445



Fitting location of sender 1 for secondary air pressure - G609-

- In engine compartment (front left) in secondary air pipe

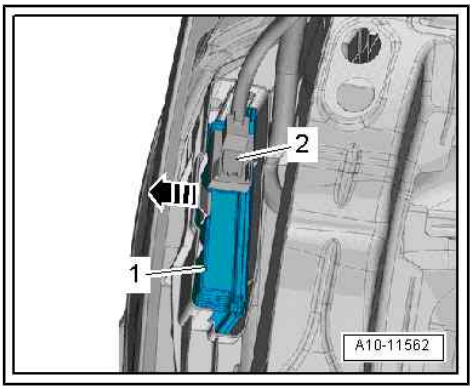
Removing and installing ⇒ page 449



Fitting location of power unit mounting control unit - J931-

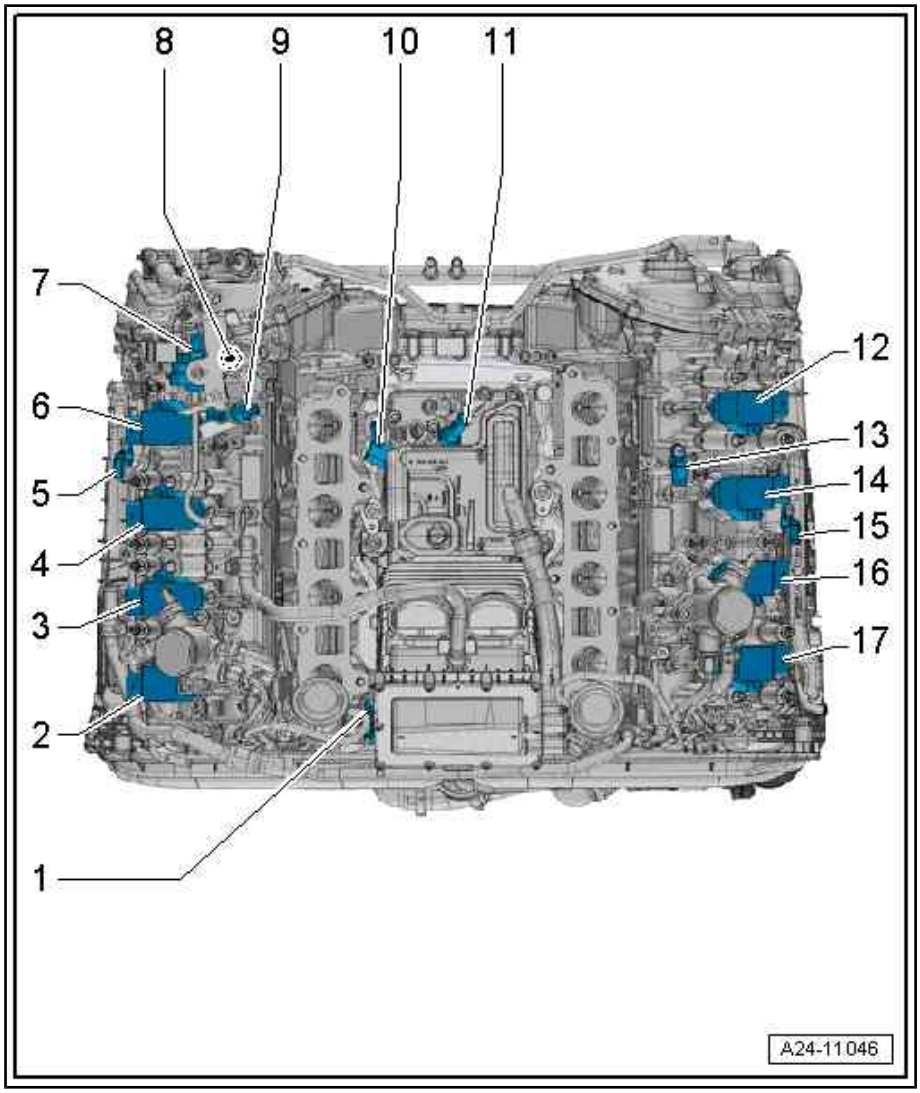
- At rear of wheel housing (front right)

Removing and installing ⇒ page 80



Fitting locations on engine (from above)

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1 - Intake manifold pressure sender - G71-

- ❑ Exploded view ⇒ page 383

2 - Ignition coil 1 with output stage - N70-

- ❑ Exploded view ⇒ page 450

3 - Ignition coil 2 with output stage - N127-

- ❑ Exploded view ⇒ page 450

4 - Ignition coil 3 with output stage - N291-

- ❑ Exploded view ⇒ page 450

5 - Hall sender - G40-

- ❑ Exploded view ⇒ page 450

6 - Ignition coil 4 with output stage - N292-

- ❑ Exploded view ⇒ page 450

7 - Activated charcoal filter solenoid valve 1 - N80-

8 - Hall sender 3 - G300-

- ❑ Exploded view ⇒ page 450

9 - Temperature sender for engine cover panel - G765-

- ❑ Removing and installing ⇒ page 342

10 - Piston cooling jet control valve - N522-

- ❑ Exploded view ⇒ page 230

11 - Stage 3 oil pressure switch - F447-

- ❑ Exploded view ⇒ page 230

12 - Ignition coil 8 with output stage - N326-

- ❑ Exploded view ⇒ page 450

13 - Hall sender 4 - G301-

- ❑ Exploded view ⇒ page 450

14 - Ignition coil 7 with output stage - N325-

- ❑ Exploded view ⇒ page 450

15 - Hall sender 2 - G163-

- ❑ Exploded view ⇒ page 450

16 - Ignition coil 6 with output stage - N324-

- ❑ Exploded view ⇒ page 450

17 - Ignition coil 5 with output stage - N323-

- ❑ Exploded view ⇒ page 450

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Fitting locations on engine (from front)

1 - Oil temperature sender 2 - G664-

- ❑ Exploded view
  ⇒ page 230

2 - Coolant temperature sender - G62-

- ❑ Exploded view
  ⇒ page 262

3 - Temperature sender for engine temperature regulation - G694-

- ❑ Exploded view
  ⇒ page 262

4 - Coolant valve for cylinder head - N489-

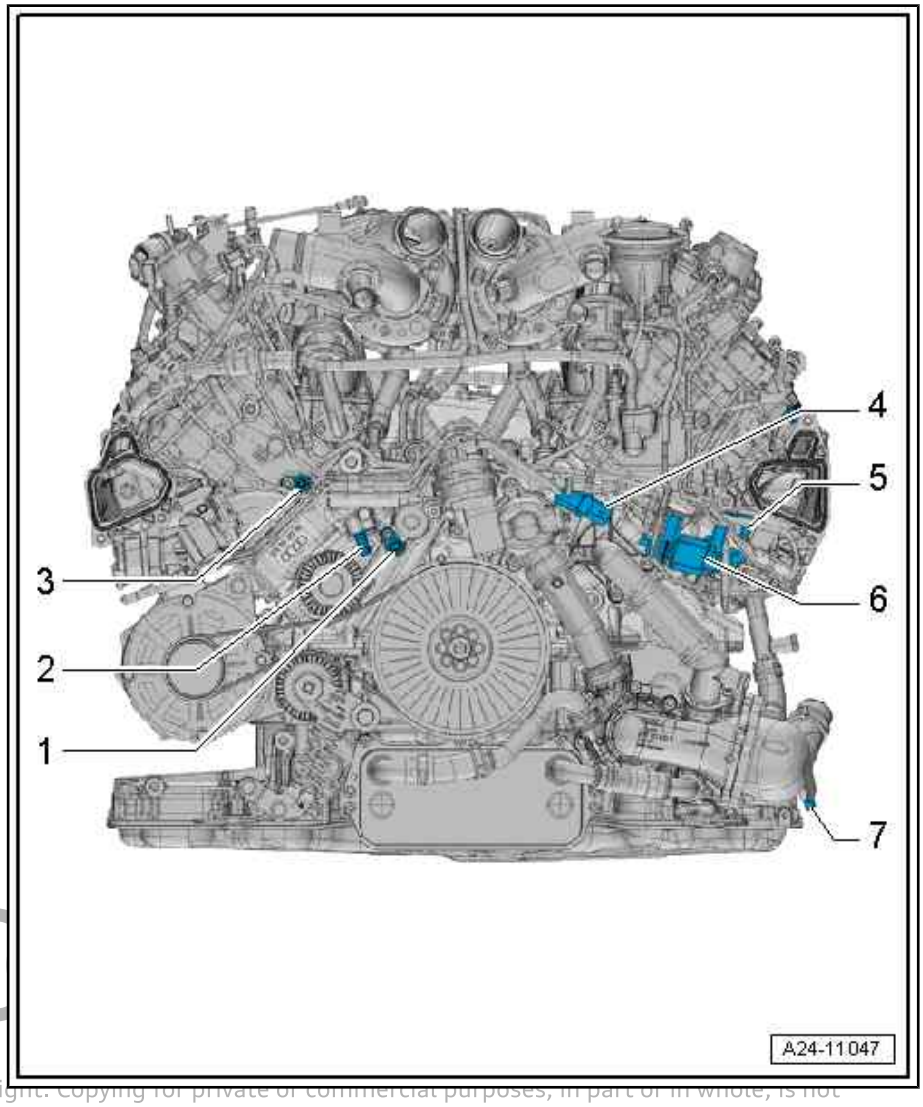
5 - Intake manifold flap potentiometer 2 - G512-

- ❑ Exploded view
  ⇒ page 381

6 - Charge pressure control solenoid valve - N75-

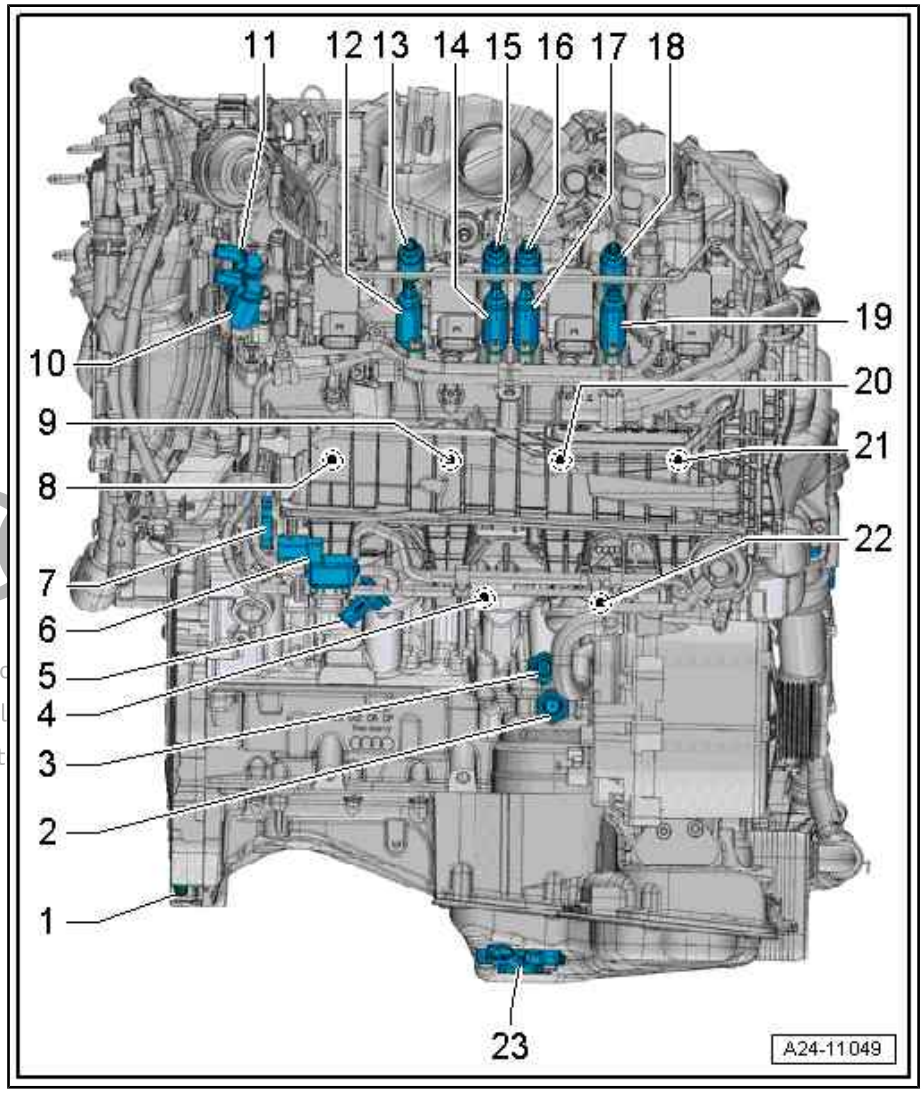
7 - Map-controlled engine cooling system thermostat - F265-

- ❑ Exploded view
  ⇒ page 257



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Fitting locations on engine (from right side)



1 - Engine speed sender - G28-

- ❑ Exploded view ⇒ page 450

2 - Oil pressure switch for reduced oil pressure - F378-

- ❑ Exploded view ⇒ page 230

3 - Oil pressure switch - F22-

- ❑ Exploded view ⇒ page 230

4 - Knock sensor 2 - G66-

- ❑ Exploded view ⇒ page 450

5 - Fuel pressure sender - G247-

- ❑ Exploded view ⇒ page 381

6 - Intake manifold flap valve - N316-

7 - Intake manifold flap potentiometer - G336-

- ❑ Exploded view ⇒ page 381

8 - Injector, cylinder 4 - N33-

- ❑ Exploded view ⇒ page 381

9 - Injector, cylinder 3 - N32-

- ❑ Exploded view ⇒ page 381

10 - Camshaft control valve 1 - N205-

- ❑ Exploded view ⇒ page 171

11 - Exhaust camshaft control valve 1 - N318-

- ❑ Exploded view ⇒ page 171

12 - Inlet cam actuator 2 for cylinder 3 - F457-

- ❑ Exploded view ⇒ page 171

13 - Exhaust cam actuator 2 for cylinder 3 - F459-

14 - Inlet cam actuator 1 for cylinder 3 - F456-

15 - Exhaust cam actuator 1 for cylinder 3 - F458-

16 - Exhaust cam actuator 1 for cylinder 2 - F454-

17 - Inlet cam actuator 1 for cylinder 2 - F452-

18 - Exhaust cam actuator 2 for cylinder 2 - F455-

19 - Inlet cam actuator 2 for cylinder 2 - F453-

20 - Injector, cylinder 2 - N31-

- ❑ Exploded view ⇒ page 381

21 - Injector, cylinder 1 - N30-

- ❑ Exploded view ⇒ page 381

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22 - Knock sensor 1 - G61-

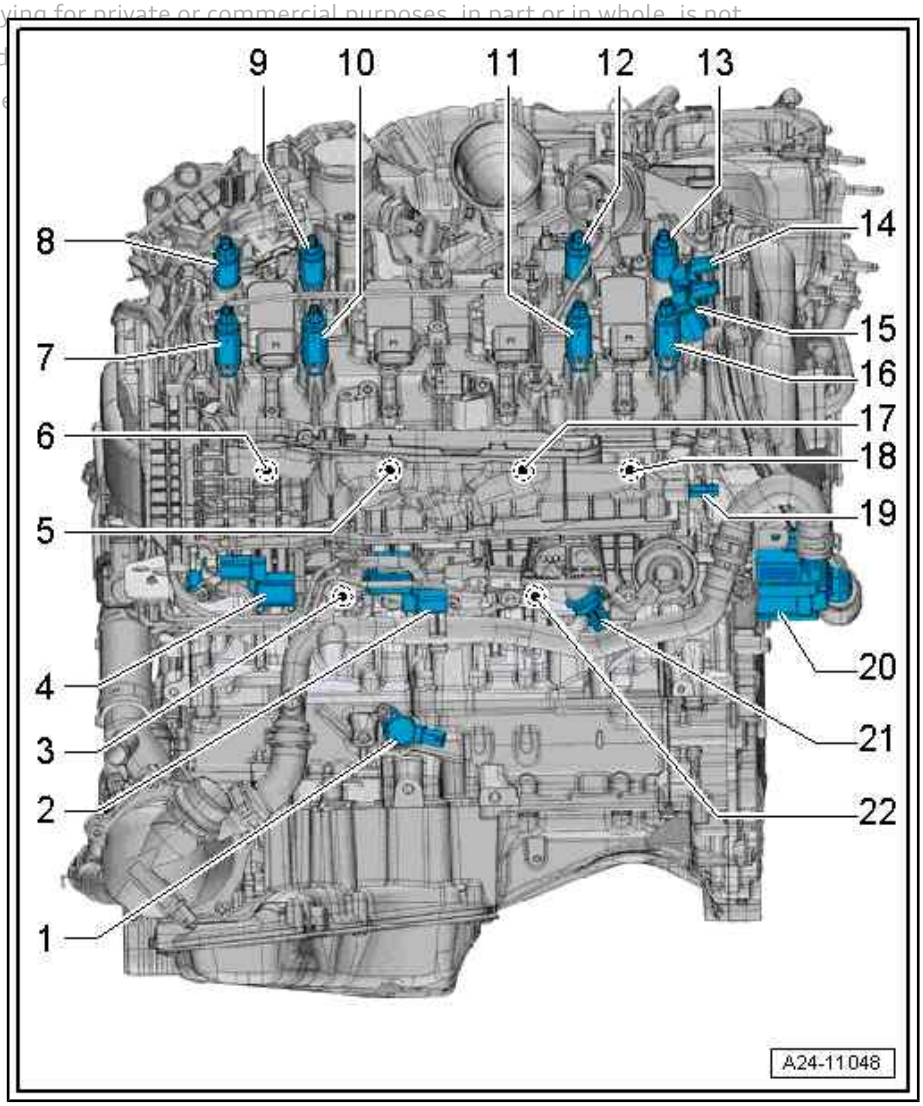
- ❑ Exploded view ⇒ page 450

23 - Oil level and oil temperature sender - G266-

- ❑ Exploded view ⇒ page 207

Fitting locations on engine (from left side)

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1 - Valve for oil pressure control - N428-

- ❑ Exploded view ⇒ page 230

2 - Secondary air inlet valve - N112-

3 - Knock sensor 3 - G198-

- ❑ Exploded view ⇒ page 450

4 - Secondary air inlet valve 2 - N320-

5 - Injector, cylinder 6 - N84-

- ❑ Exploded view ⇒ page 381

6 - Injector, cylinder 5 - N83-

- ❑ Exploded view ⇒ page 381

7 - Inlet cam actuator 1 for cylinder 5 - F464-

- ❑ Exploded view ⇒ page 171

8 - Exhaust cam actuator 1 for cylinder 5 - F466-

9 - Exhaust cam actuator 2 for cylinder 5 - F467-

10 - Inlet cam actuator 2 for cylinder 5 - F465-

11 - Inlet cam actuator 2 for cylinder 8 - F477-

12 - Exhaust cam actuator 2 for cylinder 8 - F479-

13 - Exhaust cam actuator 1 for cylinder 8 - F478-

14 - Exhaust camshaft control valve 2 - N319-

- ❑ Exploded view ⇒ page 171

15 - Camshaft control valve 2 - N208-

- ❑ Exploded view ⇒ page 171

16 - Inlet cam actuator 1 for cylinder 8 - F476-

17 - Injector, cylinder 7 - N85-

- ❑ Exploded view ⇒ page 381

18 - Injector, cylinder 8 - N86-

- ❑ Exploded view ⇒ page 381

19 - Intake air temperature sender - G42-

- ❑ Exploded view ⇒ page 381

20 - Coolant circulation pump 2 - V178-

- ❑ Exploded view ⇒ page 259

21 - Fuel pressure sender 2 - G624-

- ❑ Exploded view ⇒ page 381

22 - Knock sensor 4 - G199-

- ❑ Exploded view ⇒ page 450

1.2 Checking fuel system for leaks

– Allow engine to run for several minutes at moderate rpm.

– Switch off ignition.

– Check complete fuel system for leaks.

– If leaks are found although the connections have been tightened to the correct torque, the relevant component must be renewed.

– Road-test vehicle and accelerate with full throttle at least once.

– Then inspect high-pressure section again for leaks.

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2 Vacuum system

⇒ “2.1 Connection diagram - vacuum system”, page 365

⇒ “2.2 Checking vacuum system”, page 366

⇒ “2.3 Removing and installing vacuum unit for intake manifold flap”, page 367

⇒ “2.4 Removing and installing charge pressure control solenoid valve N75 ”, page 371

⇒ “2.5 Removing and installing secondary air inlet valve N112 / N320 ”, page 371

⇒ “2.6 Removing and installing intake manifold flap valve N316 ”, page 377

⇒ “2.7 Removing and installing coolant valve for cylinder head N489 ”, page 378

2.1 Connection diagram - vacuum system

Caution

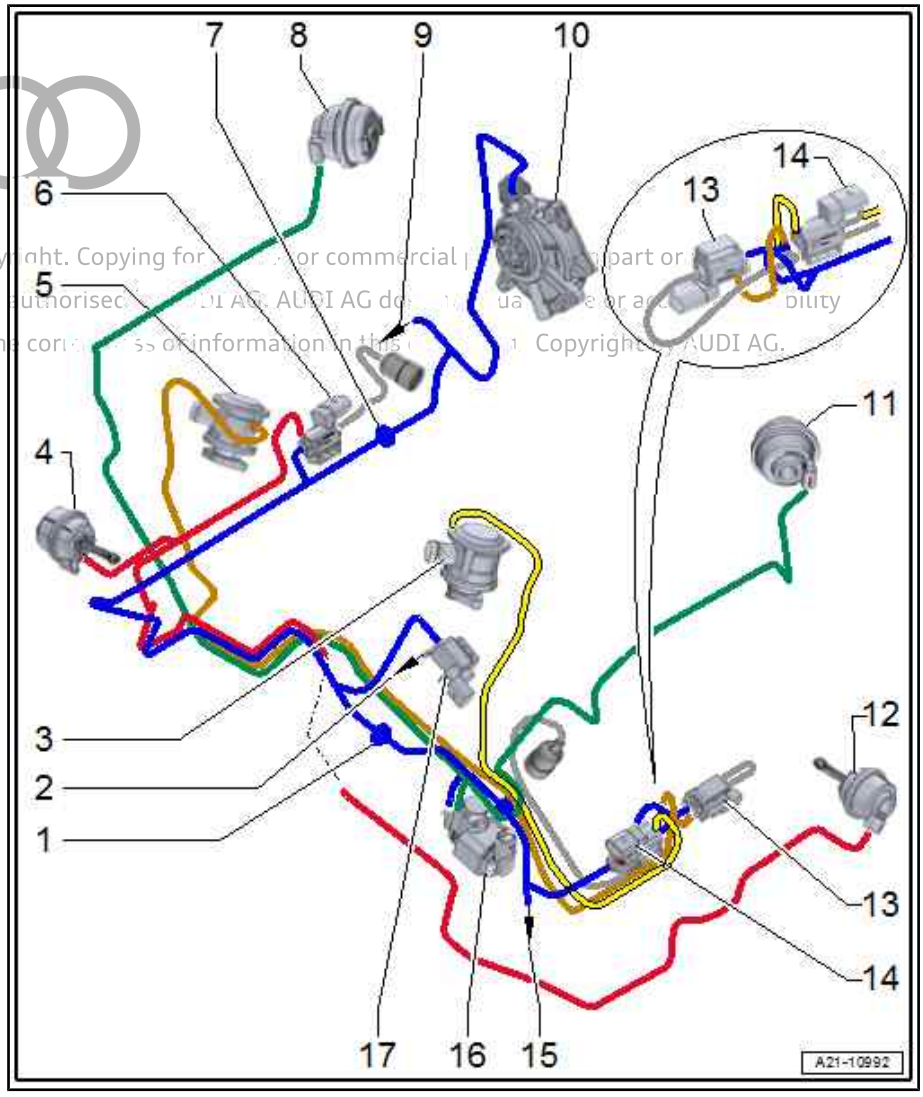
Risk of engine malfunctions

- *When routing vacuum lines, make sure they are not kinked, twisted or crushed.*

Note

- *Blue = Vacuum supply line*
- *Red = Control pipe to vacuum units for actuating intake manifold flaps*
- *Green = Control pipe to vacuum units for turbocharger*
- *Yellow = Control pipe to combination valve for secondary air system (left-side)*
- *Orange = Control pipe to combination valve for secondary air system (right-side); this component is orange in illustration for better clarity (but yellow in vehicle)*

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1 - Non-return valve

2 - To coolant shut-off valve

3 - Combination valve for secondary air system (left-side)

4 - Vacuum unit

- For intake manifold flap on cylinder bank 1 (right-side)
- Removing and installing ⇒ page 367

5 - Combination valve for secondary air system (right-side)

6 - Intake manifold flap valve - N316-

- Removing and installing ⇒ page 377

7 - Non-return valve

8 - Vacuum unit

- For turbocharger, cylinder bank 1 (right-side)

9 - To intake manifold

10 - Vacuum pump

11 - Vacuum unit

- For turbocharger, cylinder bank 2 (left-side)

12 - Vacuum unit

- For intake manifold flap on cylinder bank 2 (left-side)
- Removing and installing ⇒ page 369

13 - Secondary air inlet valve - N112-

- Removing and installing ⇒ page 371

14 - Secondary air inlet valve 2 - N320-

- Removing and installing ⇒ page 371

15 - To vacuum reservoir

16 - Charge pressure control solenoid valve - N75-

- Removing and installing ⇒ page 371

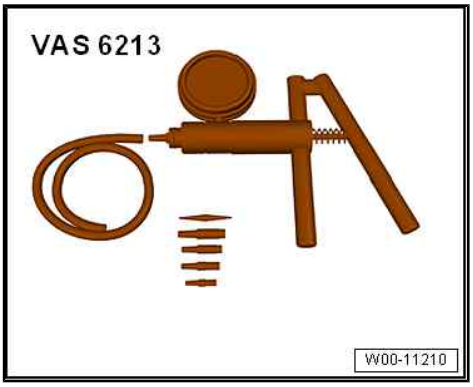
17 - Coolant valve for cylinder head - N489-

- Removing and installing ⇒ page 378

2.2 Checking vacuum system

Special tools and workshop equipment required

♦ Hand vacuum pump - VAS 6213-



Procedure

– Check all vacuum lines in the complete vacuum system for:

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♦ 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 the vacuum lines leading to the corresponding component and also check the remaining vacuum lines in the system.

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

2.3 Removing and installing vacuum unit for intake manifold flap

⇒ “2.3.1 Removing and installing vacuum unit for intake manifold flap, cylinder bank 1 (right-side)”, page 367

⇒ “2.3.2 Removing and installing vacuum unit for intake manifold flap, cylinder bank 2 (left-side)”, page 369

2.3.1 Removing and installing vacuum unit for intake manifold flap, cylinder bank 1 (right-side)

Special tools and workshop equipment required

♦ Spreader tool (commercially available)

♦ Flat-nose pliers, straight and long version (commercially available)

♦ Silicone-free lubricant (commercially available)

Removing

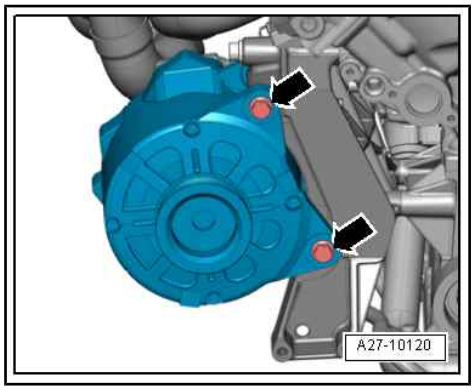
– Switch off ignition.

Caution

Risk of irreparable damage to electronic components.

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

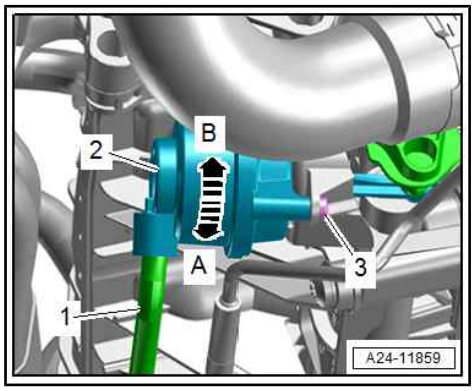
– Disconnect earth wire from battery terminal ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .
– Remove radiator with radiator cowl ⇒ page 309 .
– Remove tensioner for poly V-belt ⇒ page 85 .
– Unscrew bolts -arrows- for alternator approx. 6 turns.
– Tap carefully on bolt heads with a hammer to release sliding bushes of alternator mountings.
– Remove bolts completely and push alternator to one side.



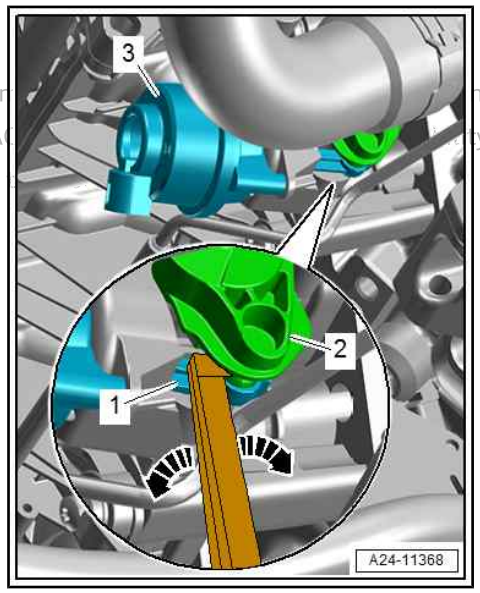
– Disconnect vacuum hose -1-.
– Remove bolt -3-.
– Turn vacuum unit slightly in anti-clockwise direction -arrow B- and move vacuum unit -2- clear at bracket.

Note:

Spray ball head of intake manifold flap with silicone-free lubricant.



– Carefully press operating rod -1- of vacuum unit off ball head of intake manifold flap -2- -arrows- using spreader tool.
– Detach vacuum unit.



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Installing

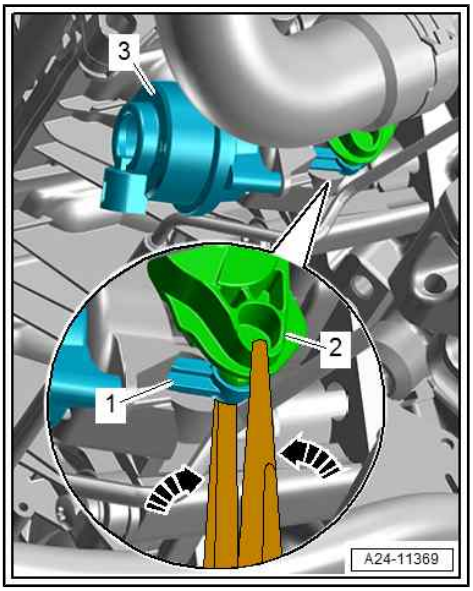
Installation is carried out in reverse order; note the following:

Note:

Spray ball head of intake manifold flap with silicone-free lubricant.

– Move vacuum unit -3- into installation position.

– Carefully press operating rod -1- of vacuum unit onto ball head of intake manifold flap -2- -arrows- using flat-nose pliers.



– Position vacuum unit -2- on bracket and lock it in position by turning it as far as stop in clockwise direction -arrow A-.

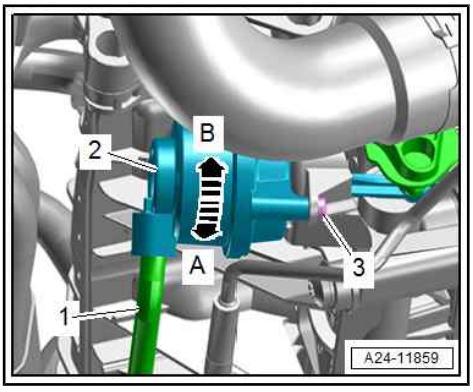
– Connect vacuum hose -1- and tighten bolt -3-.

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

– Install poly V-belt tensioner ⇒ page 85 .

– Install radiator with radiator cowl ⇒ page 309 .

– Observe steps required after re-connecting battery ⇒ Electrical system; Rep. gr. 27 ; Battery; Disconnecting and connecting battery .



Tightening torques

♦ ⇒ “4.1 Exploded view - intake manifold”, page 381

2.3.2 Removing and installing vacuum unit for intake manifold flap, cylinder bank 2 (left-side)

Special tools and workshop equipment required

♦ Spreader tool (commercially available)

♦ Flat-nose pliers, angled (45°) and long version (commercially available)

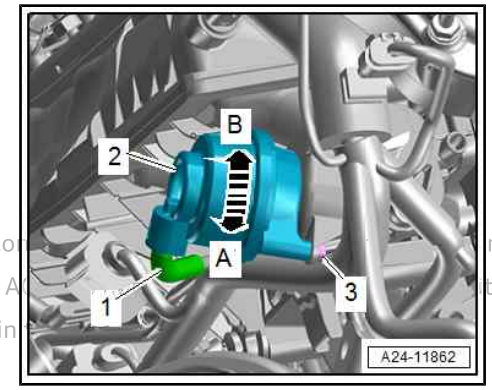
♦ Silicone-free lubricant (commercially available)

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Removing

– Remove coolant pipe (top left) ⇒ “3.2.3 Removing and installing coolant pipe (top left)”, page 284 .

– Disconnect vacuum hose -1-.
– Remove bolt -3-.
– Turn vacuum unit slightly in anti-clockwise direction -arrow B- and move vacuum unit -2- clear at bracket.

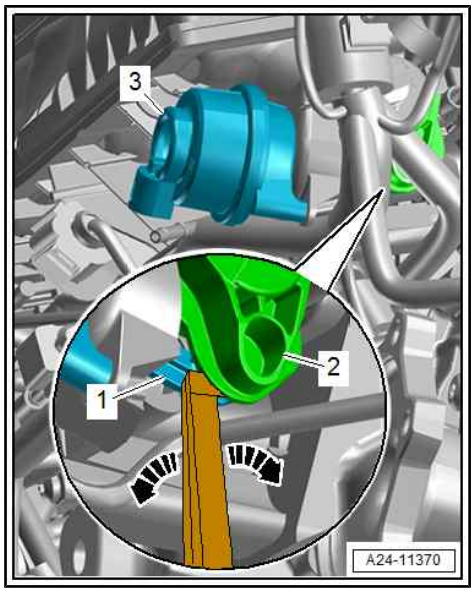


Note:

Spray ball head of intake manifold flap with silicone-free lubricant.

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– Carefully press operating rod -1- of vacuum unit off ball head of intake manifold flap -2- -arrows- using spreader tool.
– Detach vacuum unit.



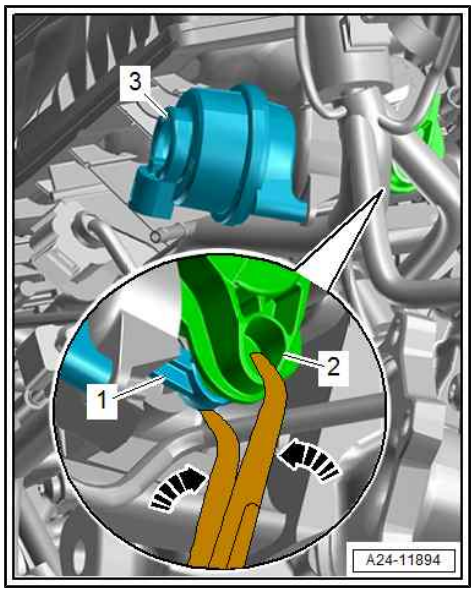
Installing

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

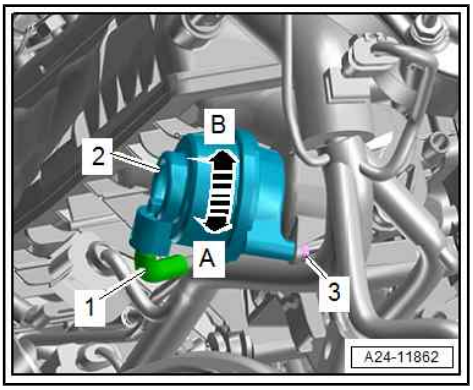
Note:

Spray ball head of intake manifold flap with silicone-free lubricant.

– Move vacuum unit -3- into installation position.
– Carefully press operating rod -1- of vacuum unit onto ball head of intake manifold flap -2- -arrows- using flat-nose pliers.



– Position vacuum unit -2- on bracket and lock it in position by turning it as far as stop in clockwise direction -arrow A-.
– Connect vacuum hose -1- and tighten bolt -3-.
– Install coolant pipe (top left) ⇒ “3.2.3 Removing and installing coolant pipe (top left)”, page 284 .



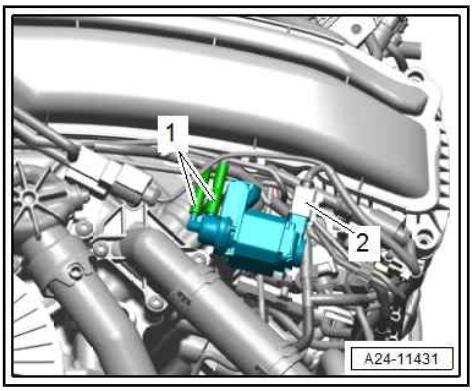
Tightening torques

◆ ⇒ “4.1 Exploded view - intake manifold”, page 381

2.4 Removing and installing charge pressure control solenoid valve - N75-

Removing

– Remove radiator ⇒ page 309 .
– Unplug electrical connector -2-.
– Mark positions of vacuum hoses -1- for re-installation.
– Pull charge pressure control solenoid valve - N75- upwards out of bracket and detach vacuum hoses.



Installing

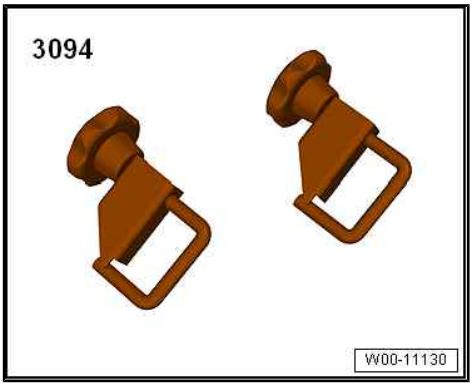
Installation is carried out in reverse order; note the following:

– Install radiator ⇒ page 309 .

2.5 Removing and installing secondary air inlet valve -N112- / -N320-

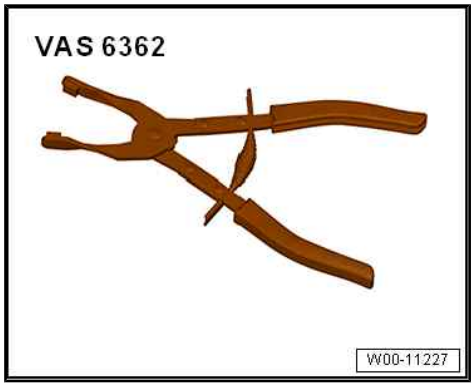
Special tools and workshop equipment required

◆ Hose clamps up to 25 mm - 3094-



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- Hose clip pliers - VAS 6362-



- Engine and gearbox jack - VAS 6931-



Removing

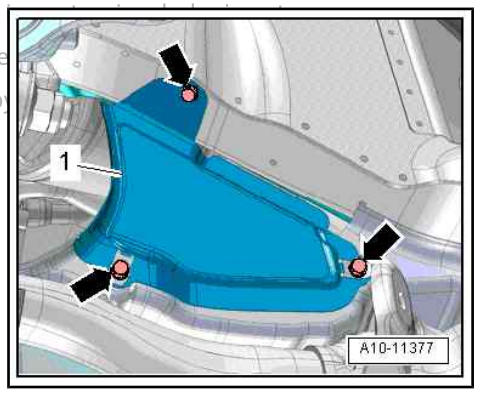
– Support engine in installation position ⇒ page 66 .

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

– Remove wheel housing liners (front left and front right) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Removing and installing wheel housing liner (front) .

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

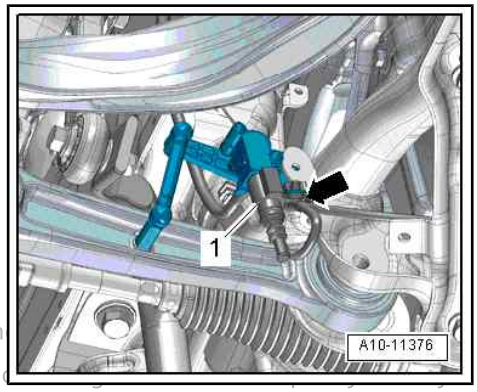
– Remove bolts -arrows- on both sides and detach heat shield -1-.



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

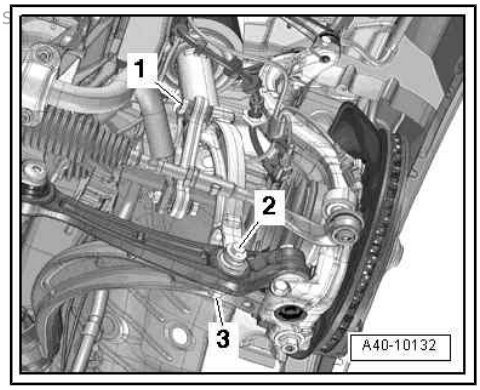
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– If fitted, unplug electrical connector -1- at front vehicle level senders on both sides (-G78- and -G289-) and move electrical wiring clear -arrow-.



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

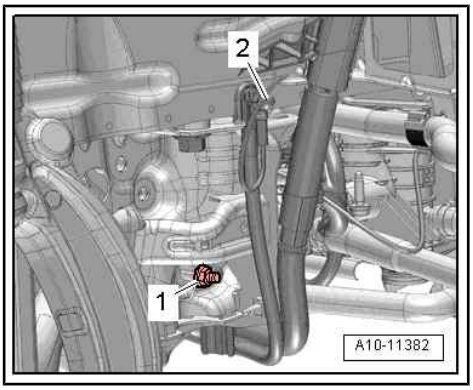


Note

Disregard items -2 and 3-.

Audi S6/S7:

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

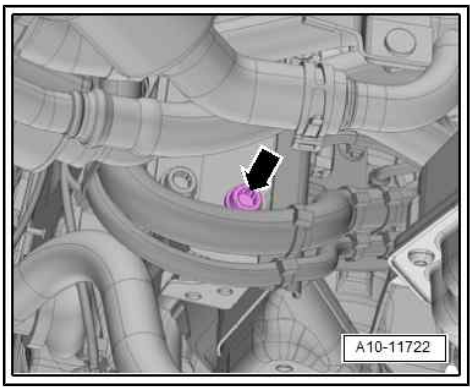


Note

Disregard -item 2-.

Audi RS 6/RS 7:

– Remove bolt -arrow- (right-side) and push bracket for wiring harness to one side.



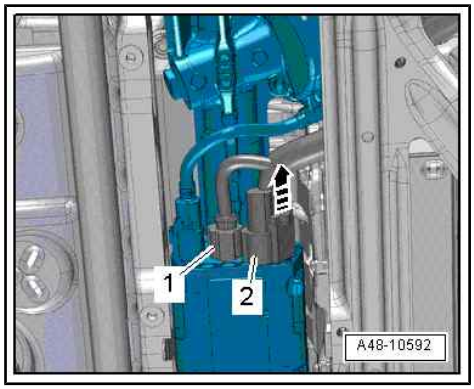
All vehicles (continued):

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

– Unplug electrical connector -2- at power steering control unit - J500- (release retainer -arrow- and press down release catch).

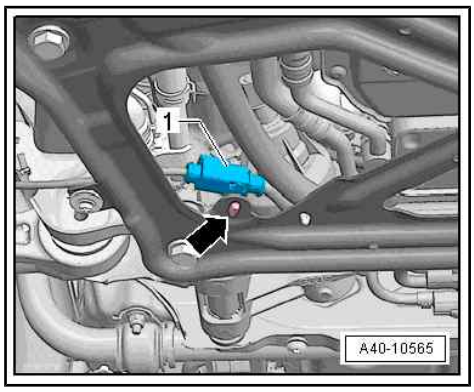
– Unplug electrical connector -1- at power steering control unit - J500- .

– Move electrical wiring harness clear.



– Move clip clear -arrow-.

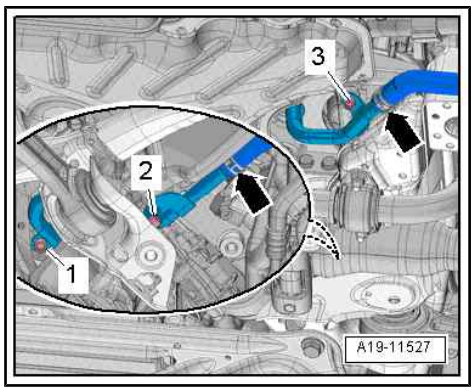
– Unplug electrical connector -1- and move wiring clear.



– Clamp off coolant hoses using hose clamps up to 25 mm - 3094- , release hose clips -arrows- and disconnect hoses.

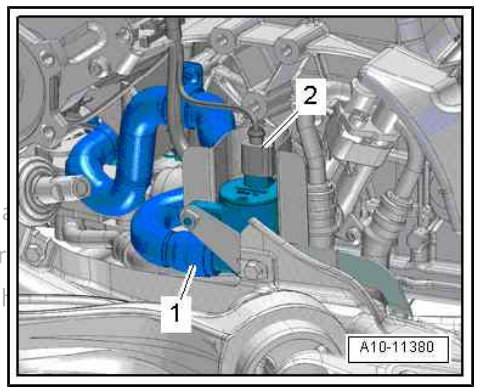
Note

Disregard -items 1, 2, 3-.



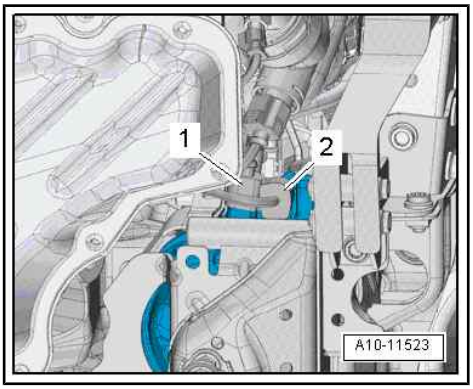
– Release hose clip -1- and detach coolant hose.

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

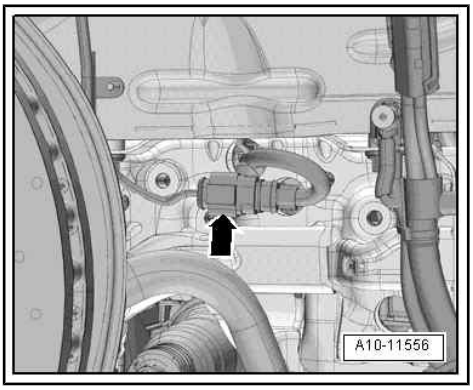


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– Unplug electrical connectors (left and right) -1, 2-.



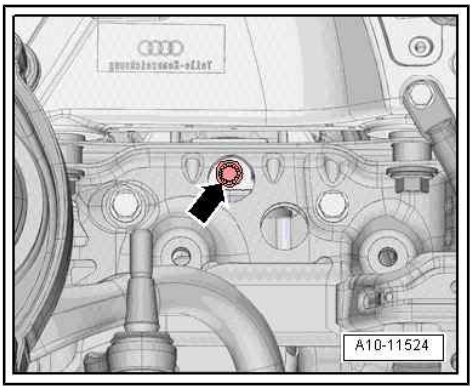
– Take electrical connector -arrow- out of bracket, unplug and guide through subframe.



– Remove bolt for engine mountings -arrow- on both sides.

Audi RS 6/RS 7:

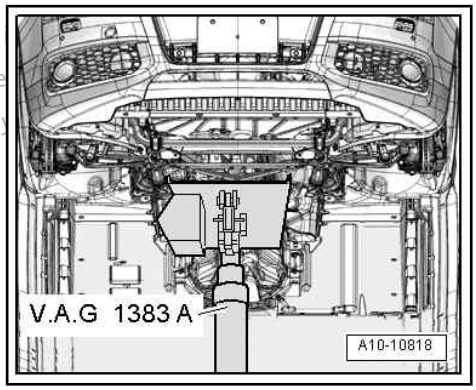
– Remove front longitudinal member (bottom) on both sides ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Exploded view - lock carrier .



All vehicles (continued):

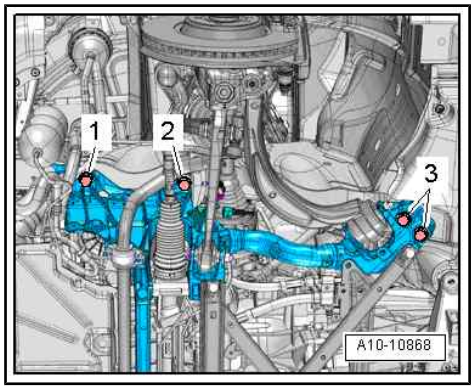
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– Support subframe with engine and gearbox jack , as shown in illustration.



– Mark installation position of subframe on longitudinal members with felt-tip pen.

– Unscrew subframe bolts -1, 2, 3- on both sides in several stages and in diagonal sequence.



Caution

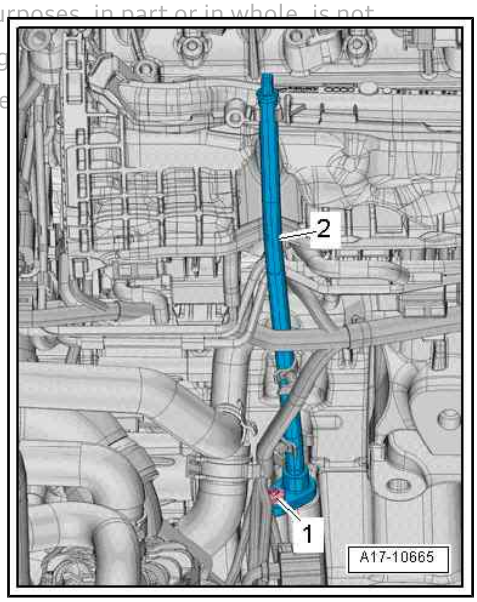
Risk of damage to running gear components.

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

– Using engine and gearbox jack , lower subframe just far enough for access to secondary air inlet valves -N112- / -N320- , ensuring sufficient clearance for electrical wiring (right-side).

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– Remove bolt -1-, unclip guide tube -2- for oil dipstick from intake manifold and detach.



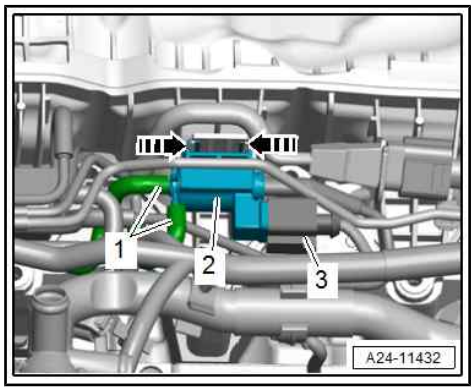
Secondary air inlet valve - N112- :

– Unplug electrical connector -3-.

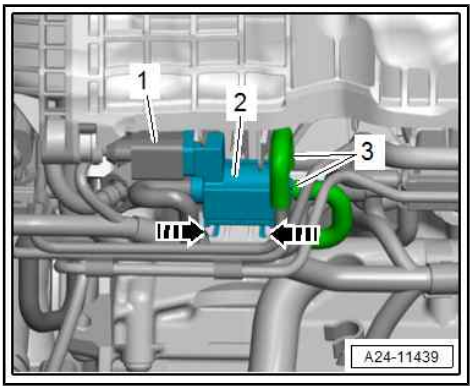
– Mark positions of vacuum hoses -1- for re-installation.

– Release catches -arrows- and detach secondary air inlet valve - N112- -item 2- from bracket and to left side.

– Disconnect vacuum hoses.



Secondary air inlet valve 2 - N320- :



– Unplug electrical connector -1-.
– Mark positions of vacuum hoses -3- for re-installation.
– Release catches -arrows- and detach secondary air inlet valve 2 - N320- -item 2- from bracket and to left side.
– Disconnect vacuum hoses.

Installing

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

Note

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

– Install intermediate steering shaft ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering column; Removing and installing intermediate steering shaft .

Note

Do not reuse coolant.

– Fill up with coolant ⇒ page 251 .

Tightening torques

- ⇒ “1.1 Exploded view - sump/oil pump”, page 207
- ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Exploded view - lock carrier
- ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front)
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

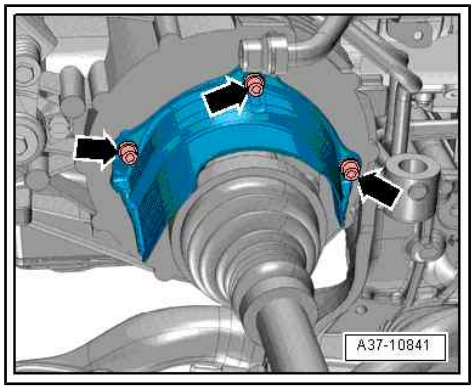
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2.6 Removing and installing intake manifold flap valve - N316-

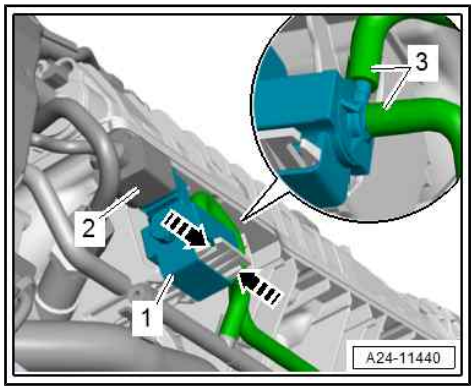
Removing

– Remove wheel housing liner (front right) ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Removing and installing wheel housing liner (front) .

– Remove bolts -arrows- and detach heat shield for drive shaft (right-side).
– Unbolt drive shaft (right-side) from gearbox flange shaft ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Removing and installing drive shaft .



– Unplug electrical connector -2-.
– Mark positions of vacuum hoses -3- for re-installation.
– Release catches -arrows- and detach intake manifold flap valve - N316- -item 1- from bracket and to left side.



Installing

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

Tightening torques

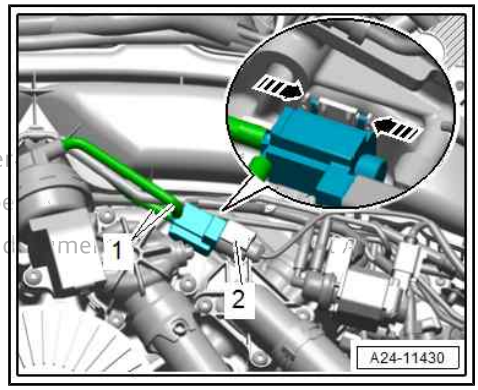
♦ ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft
♦ ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front)

2.7 Removing and installing coolant valve for cylinder head - N489-

Removing

– Remove radiator ⇒ page 309 .
– Unplug electrical connector -2-.
– Release catches -arrows- and detach coolant valve for cylinder head - N489- from bracket.
– Mark positions of vacuum hoses -1- for re-installation.
– Disconnect vacuum hoses.

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Installing

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

– Install radiator ⇒ page 309 .

3 Air cleaner

⇒ “3.1 Exploded view - air cleaner housing”, page 379
⇒ “3.2 Removing and installing air cleaner housing”, page 379

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3.1 Exploded view - air cleaner housing

1 - Mounting
- ❑ For air cleaner housing

2 - Rubber buffer

3 - Air cleaner (bottom section)
- ❑ Clean out salt deposits, dirt and leaves, etc.
- ❑ Removing and installing ⇒ “3.2 Removing and installing air cleaner housing”, page 379

4 - Air filter element
- ❑ Use genuine air filter element ⇒ Electronic parts catalogue
- ❑ Change intervals ⇒ Maintenance tables
- ❑ Removing and installing ⇒ Maintenance ; Booklet 411

5 - Air cleaner (top section)
- ❑ Clean out salt deposits, dirt and leaves, etc.

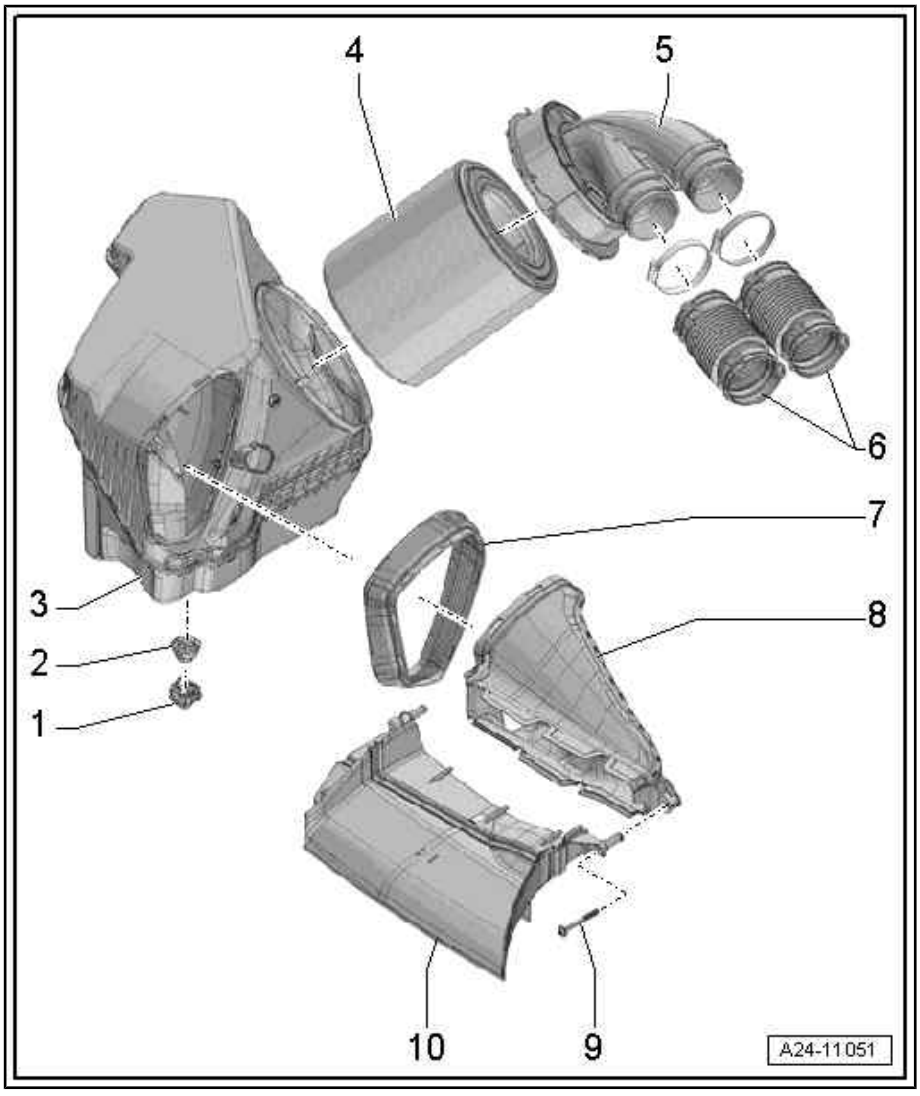
6 - Air ducts

7 - Sealing element

8 - Air duct
- ❑ Clean out salt deposits, dirt and leaves, etc.

9 - Bolt
- ❑ 2.5 Nm

10 - Air duct



3.2 Removing and installing air cleaner housing

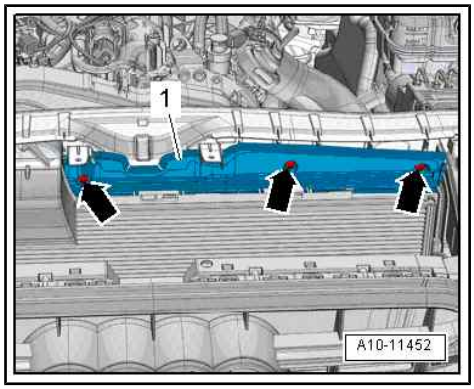
Special tools and workshop equipment required

♦ Silicone-free lubricant

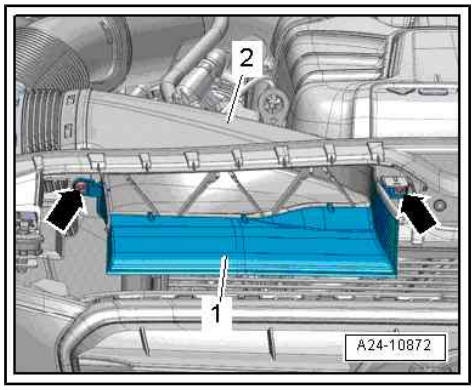
Removing

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

– Remove bolts -arrows- and detach air duct -1-.



– Remove bolts -arrows- and detach air duct -2-.

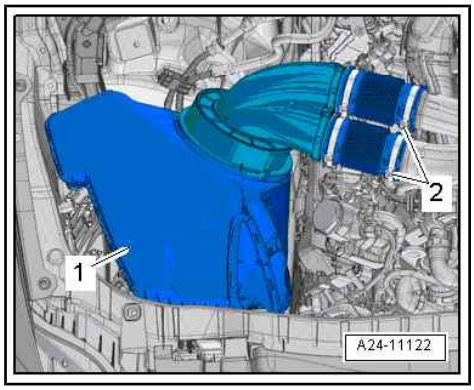


Note

Illustration shows fitting location on an Audi S6/S7.

– Release hose clips -2- and detach air hoses.

– Lift off air cleaner housing -1- with air hoses.



Installing

Note

- *The air cleaner housing must always be clean.*
- *To prevent malfunctions, cover critical parts of the engine air intake (such as air pipes, etc.) with a clean cloth when blowing out the air cleaner housing with compressed air.*
- *Hose connections and air pipes/hoses must be free of oil and grease prior to fitting.*
- *Use a lubricant (silicone-free) when installing air hoses.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

– Check air pipe (engine intake side) for salt residue, dirt and leaves.

– Check air duct leading from lock carrier to air cleaner housing for dirt and leaves.

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

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

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Tightening torques

- ⇒ “2.2 Exploded view - hose connections for charge air system”, page 346

4 Intake manifold

⇒ “4.1 Exploded view - intake manifold”, page 381

⇒ “4.2 Exploded view - throttle valve module”, page 383

⇒ “4.3 Removing and installing intake manifold”, page 384

⇒ “4.4 Removing and installing throttle valve module J338 ”, page 391

⇒ “4.5 Removing and installing intake manifold flap potentiometer G336 ”, page 393

⇒ “4.6 Removing and installing intake manifold flap potentiometer 2 G512 ”, page 395

4.1 Exploded view - intake manifold

Note

The illustration shows the intake manifold on the left side of the vehicle.

1 - Bolt

- ❑ Thread-forming
- ❑ Supplied with -item 3-
- ❑ If old bolt is to be re-used, it must be cleaned and coated with sealant
- ❑ Screw bolt in until bolt head makes contact

2 - Bolt

- ❑ Thread-forming
- ❑ Screw bolt in by hand so that it screws itself into old thread. Then tighten bolt to torque
- ❑ 2.5 Nm

3 - Intake manifold flap potentiometer 2 - G512-

- ❑ Cylinder bank 1 (right-side): intake manifold flap potentiometer - G336-
- ❑ Removing and installing ⇒ page 395

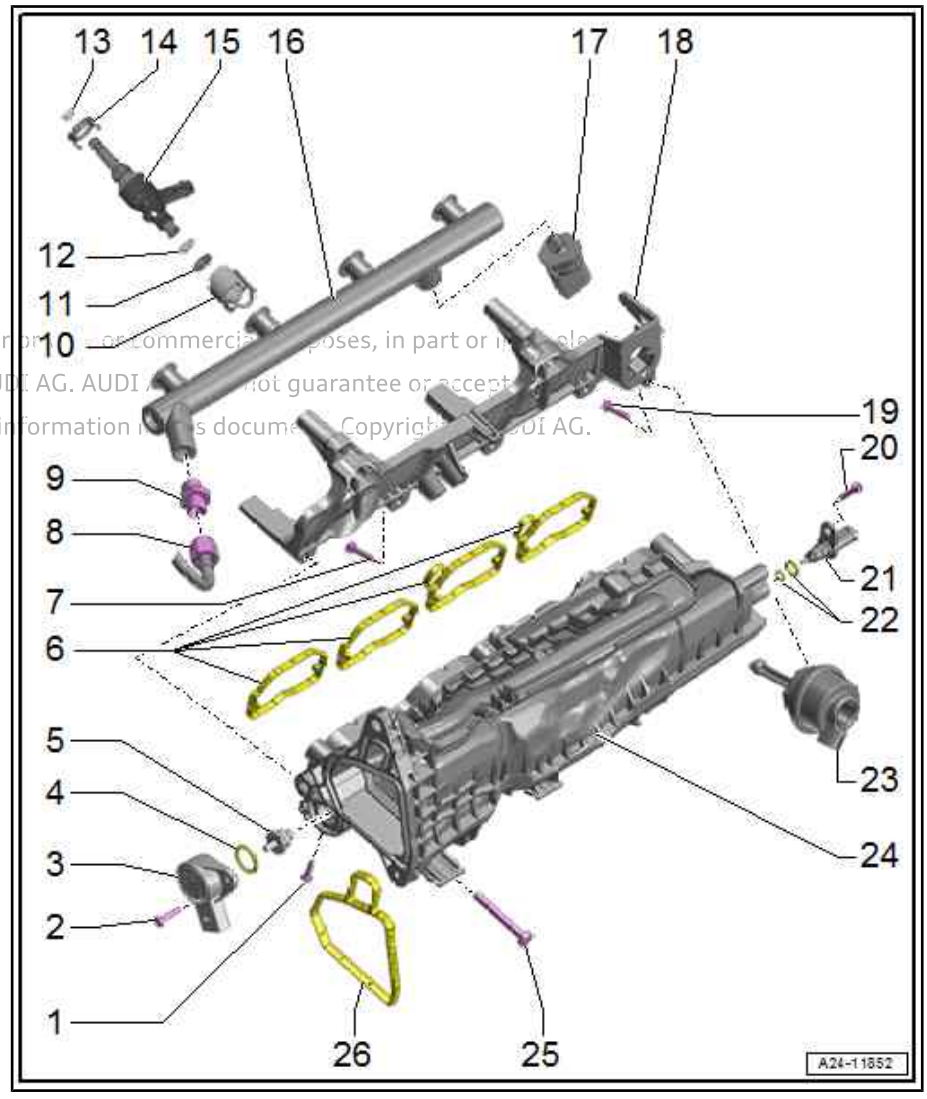
4 - Seal

- ❑ Renew if damaged
- ❑ When renewing lever out with screwdriver
- ❑ Press in by hand

5 - Carrier

6 - Gaskets

- ❑ For intake manifold
- ❑ Renew



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7 - Bolt

- ❑ 3 Nm

8 - Union nut

- ❑ For high-pressure pipe
- ❑ To loosen connection -item 9-, counterhold at fuel rail
- ❑ Observe all instructions for installing high-pressure pipes ⇒ page 420
- ❑ 25 Nm

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9 - Connection

- ❑ Renew
- ❑ 40 Nm

10 - Support ring

- ❑ Must be properly seated
- ❑ Via this support ring, the fuel rail exerts the force which holds the injector in the cylinder head

11 - O-ring

- ❑ Renew
- ❑ Lubricate lightly with clean engine oil

12 - Spacer ring

- ❑ Renew if damaged

13 - Combustion chamber ring seal

- ❑ Renewing ⇒ “5.1 Removing and installing injectors”, page 397

14 - Sealing washer

15 - Injector

- ❑ Removing and installing ⇒ page 397

16 - Fuel rail

17 - Fuel pressure sender 2 - G624-

- ❑ Cylinder bank 1 (right-side): fuel pressure sender - G247-
- ❑ Removing and installing ⇒ page 404
- ❑ Lubricate threads lightly with clean engine oil
- ❑ 25 Nm

18 - Retaining bracket

- ❑ For fuel rail

19 - Bolt

- ❑ Thread-forming
- ❑ Screw bolt in by hand so that it screws itself into old thread. Then tighten bolt to torque
- ❑ 3 Nm

20 - Bolt

- ❑ 2.5 Nm

21 - Intake air temperature sender - G42-

- ❑ Removing and installing ⇒ page 406

22 - O-rings

- ❑ Renew

23 - Vacuum unit

- ❑ For intake manifold flap
- ❑ Removing and installing
  ⇒ “2.3 Removing and installing vacuum unit for intake manifold flap”, page 367

24 - Intake manifold

- ❑ Removing and installing ⇒ page 384

25 - Bolt

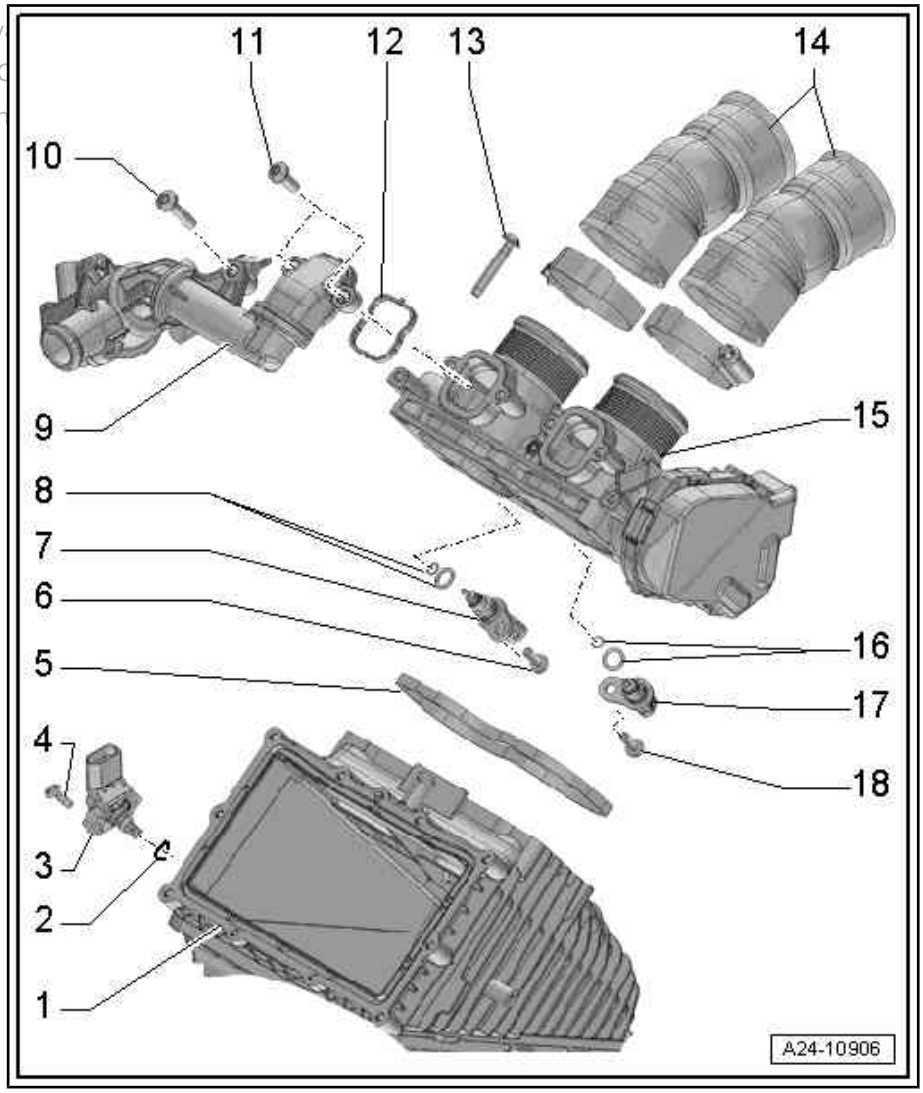
- ❑ Tighten in stages and in diagonal sequence
- ❑ 9 Nm

26 - Seal

- ❑ Renew

4.2 Exploded view - throttle valve module

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1 - Charge air cooler housing

- ❑ With air ducts
- ❑ Removing and installing ⇒ page 346

2 - O-ring

- ❑ Renew

3 - Intake manifold pressure sender - G71-

- ❑ Removing and installing ⇒ page 407

4 - Bolt

- ❑ 3 Nm

5 - Seal

- ❑ For throttle valve module - J338-
- ❑ Renew

6 - Bolt

- ❑ 9 Nm

7 - Temperature sender 1 for charge air cooler - G763-

- ❑ Removing and installing ⇒ page 406

8 - O-rings

- ❑ Renew

9 - Air duct

- ❑ With turbocharger air recirculation valve - N249-

10 - Bolt

- ❑ 9 Nm

11 - Bolt

- ❑ 9 Nm

12 - Seal

- ❑ Renew

13 - Bolt

- ❑ 5 Nm

14 - Air hoses

- ❑ To turbochargers

❑ Can only be removed together with throttle valve module - J338- ⇒ page 391

15 - Throttle valve module - J338-

❑ Removing and installing ⇒ page 391

16 - O-rings

❑ Renew

17 - Temperature sender 2 for charge air cooler - G764-

❑ Removing and installing ⇒ page 406

18 - Bolt

❑ 9 Nm

4.3 Removing and installing intake manifold

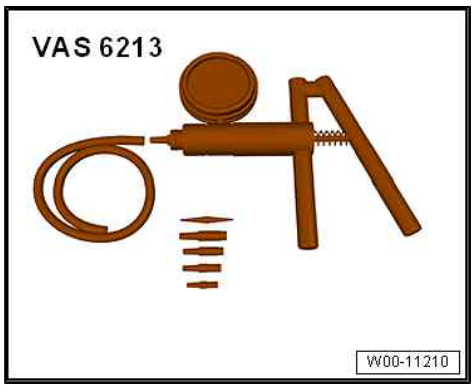
⇒ "4.3.1 Removing and installing intake manifold (right-side) with fuel rail, cylinder bank 1", page 384

⇒ "4.3.2 Removing and installing intake manifold (left-side) with fuel rail, cylinder bank 2", page 387

4.3.1 Removing and installing intake manifold (right-side) with fuel rail, cylinder bank 1

Special tools and workshop equipment required

♦ Hand vacuum pump - VAS 6213-



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♦ Safety goggles

♦ Protective gloves

Removing

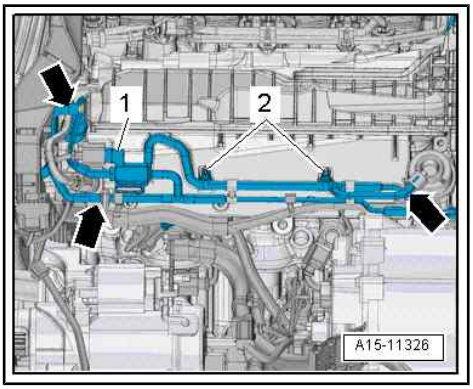
• Engine/gearbox assembly removed ⇒ page 8 .

Note

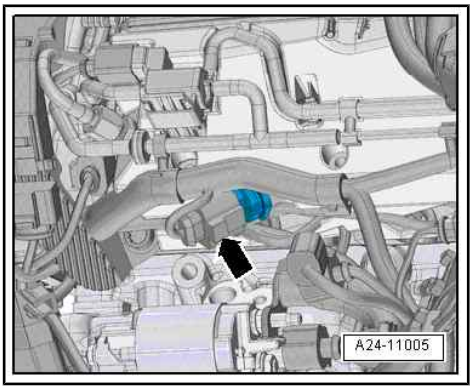
Observe rules for cleanliness ⇒ page 5 .

– Remove charge air cooler housing ⇒ page 346 .

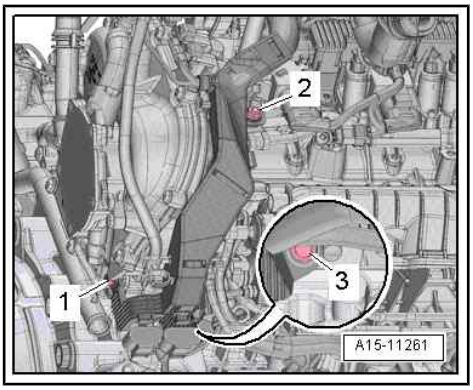
– Disconnect vacuum hoses -arrows-.
– Unplug electrical connector at intake manifold flap valve - N316- -item 1-.
– Take intake manifold flap valve out of bracket and move electrical wiring clear at intake manifold (right-side) -2-.



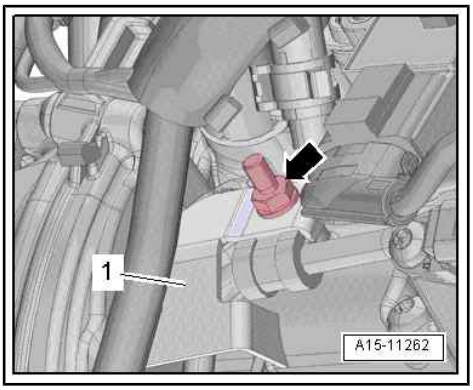
– Unplug electrical connector -arrow- for fuel pressure sender - G247- .



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



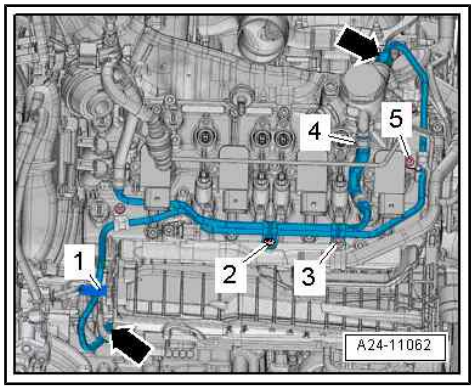
– Unscrew centre hex stud -arrow- and remove guard plate -1-.



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– Remove nut -3-, move retaining clip clear and remove centre hex stud.

– Remove bolts -2, 5-.



WARNING

The fuel system is pressurised.

Risk of injury as fuel may spray out.

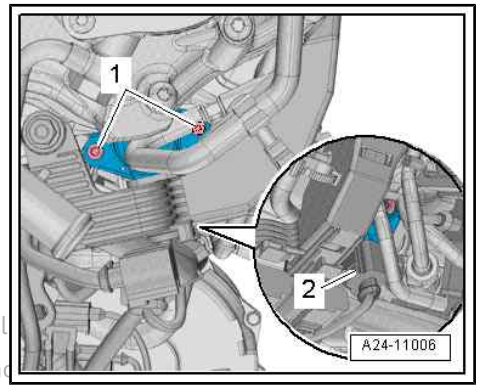
- *Put on safety goggles.*
- *Put on protective gloves.*
- *Release pressure (wrap a clean cloth around connection and open connection carefully).*

– Wrap a clean cloth around connection and remove union nuts -arrows-; to do so, counterhold hexagon flats of each connection. Push high-pressure pipe to one side.

Note

Do not attempt to bend high-pressure pipes to a different shape.

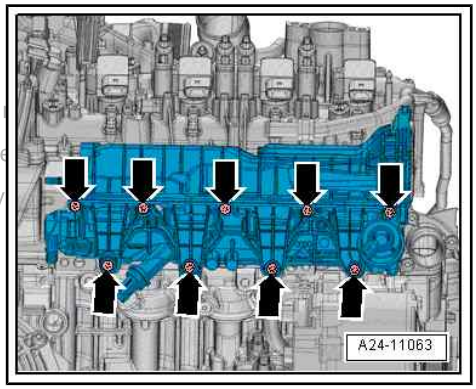
– Unplug electrical connector -2- for intake manifold flap potentiometer - G336- .



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– Detach noise insulation panels.
– Remove bolts -arrows- and detach intake manifold with fuel rail.



Caution

Risk of irreparable damage to engine.

- ***Block off the intake ports with clean cloths to prevent small objects from dropping into the engine through the intake ports in the cylinder heads.***

Installing

Note

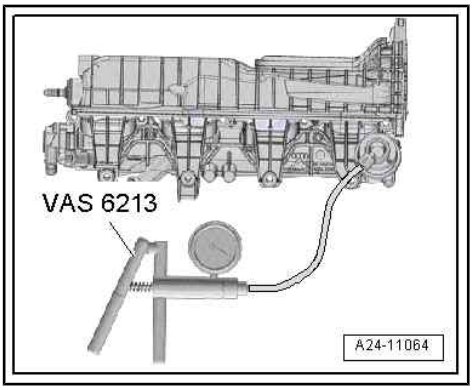
- *Renew seals and/or gaskets.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Parts catalogue .*

Caution

Risk of damage to intake manifold flaps.

- ***To prevent the intake manifold flaps from catching on the guide plates in the cylinder head, the flaps must be in the open position when the intake manifold is installed.***

– Connect hand vacuum pump - VAS 6213- to vacuum unit for actuating intake manifold flaps, as shown in illustration.
– Use vacuum pump to generate a vacuum.
• This will cause the intake manifold flaps to open.
– Press intake manifold with fuel rail evenly onto injectors.
– Tighten bolts for intake manifold in diagonal sequence and in stages.
– Disconnect hand vacuum pump from vacuum unit for actuating intake manifold flaps.



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

– Install high-pressure pipe ⇒ page 420 .
– Install charge air cooler housing ⇒ page 346 .

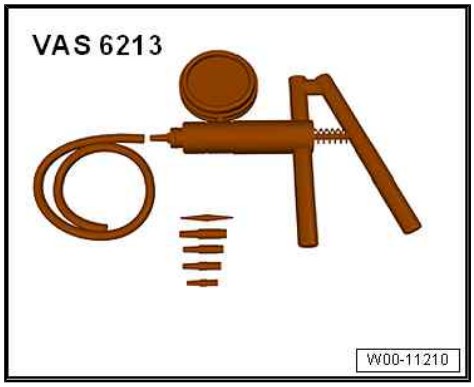
Tightening torques

- ⇒ “4.1 Exploded view - intake manifold”, page 381

4.3.2 Removing and installing intake manifold (left-side) with fuel rail, cylinder bank 2

Special tools and workshop equipment required

- Hand vacuum pump - VAS 6213-



- Safety goggles
- Protective gloves

Removing

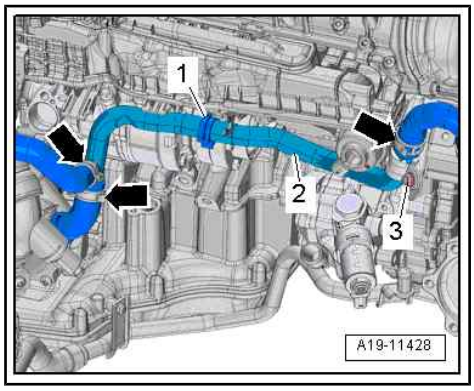
- Engine/gearbox assembly removed ⇒ page 8 .

Note

Observe rules for cleanliness ⇒ page 5 .

– Remove charge air cooler housing ⇒ page 346 .

– Remove coolant pipe (top left) ⇒ page 284 .



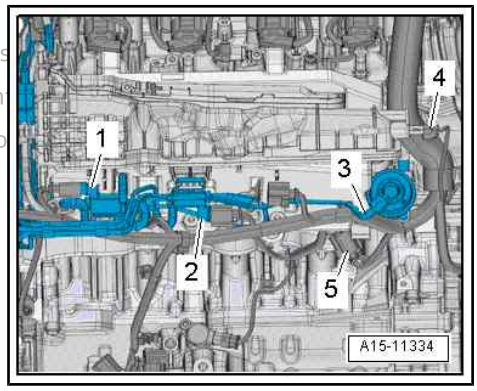
– Disconnect vacuum hose -3- and move clear.

– Detach secondary air inlet valves from bracket and move clear to one side:

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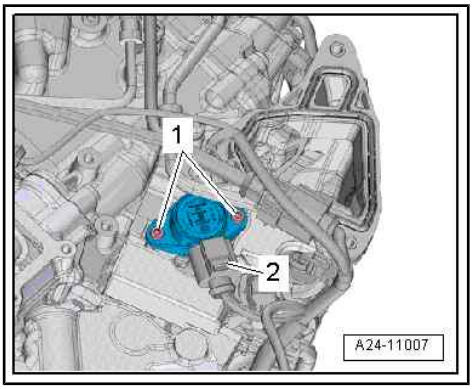
1 - Secondary air inlet valve 2 - N320-

2 - Secondary air inlet valve - N112-

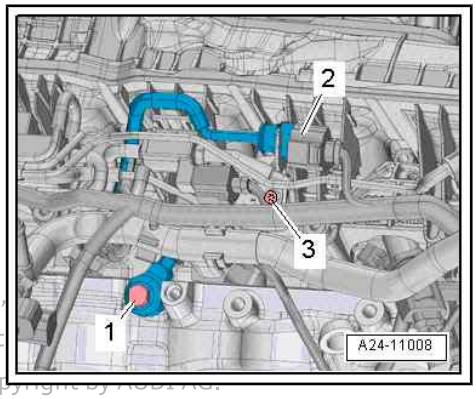


– Unplug electrical connectors -4, 5- and move clear wiring harness at intake manifold.

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

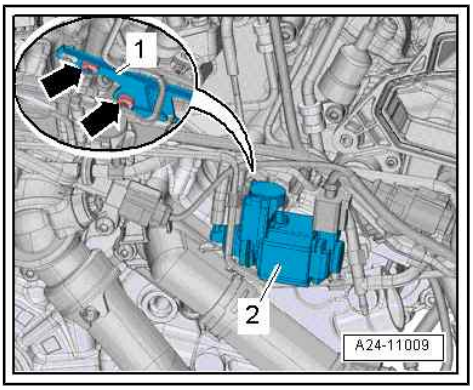


– Remove bolt -3- and move bracket with electrical connector -2- to one side.

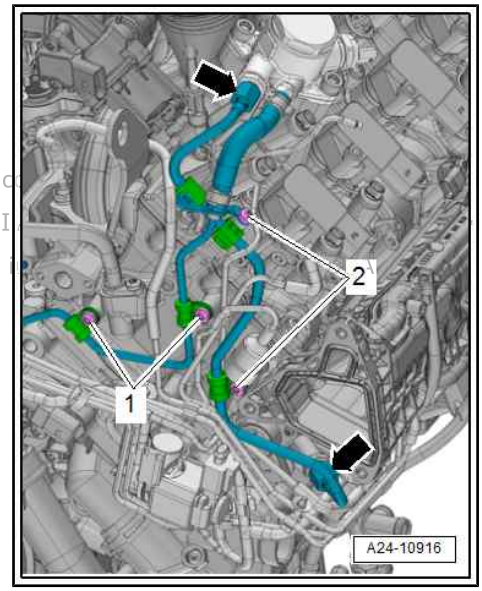


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– Detach charge pressure control solenoid valve - N75- -item 2- from bracket -1- and push it clear to one side.
– Remove bolts -arrows- and push bracket towards front of vehicle.



– Remove bolts -2-.



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 a clean cloth around connection and open connection carefully).***

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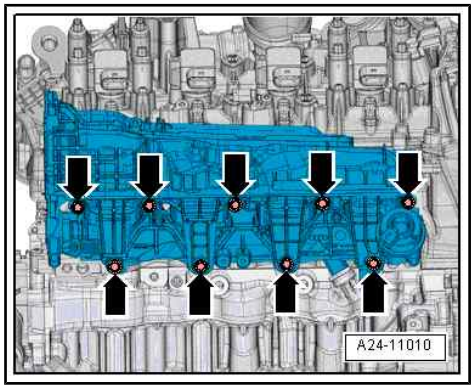
– Wrap a clean cloth around connection and remove union nuts -arrows-; to do so, counterhold hexagon flats of connection. Push high-pressure pipe to one side.

Note

- *Do not attempt to bend high-pressure pipes to a different shape.*
- *Disregard -item 1-.*

– Detach noise insulation panels.

– Remove bolts -arrows- and detach intake manifold with fuel rail.



Caution

Risk of irreparable damage to engine.

- ***Block off the intake ports with clean cloths to prevent small objects from dropping into the engine through the intake ports in the cylinder heads.***

Installing

Note

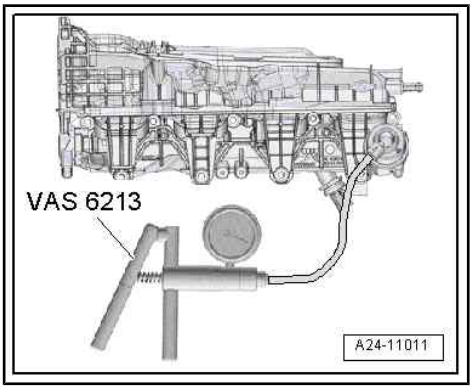
- *Renew seals and/or gaskets.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

Caution

Risk of damage to intake manifold flaps.

- ***To prevent the intake manifold flaps from catching on the guide plates in the cylinder head, the flaps must be in the open position when the intake manifold is installed.***

– Connect hand vacuum pump - VAS 6213- to vacuum unit for actuating intake manifold flaps, as shown in illustration.



– Use vacuum pump to generate a vacuum.

• This will cause the intake manifold flaps to open.

– Press intake manifold with fuel rail evenly onto injectors.

– Tighten bolts for intake manifold in diagonal sequence and in stages.

– Disconnect hand vacuum pump from vacuum unit for actuating intake manifold flaps.

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

– Install high-pressure pipe ⇒ page 420 .

– Install coolant pipe (top left) ⇒ page 284 .

– Install charge air cooler housing ⇒ page 346 .

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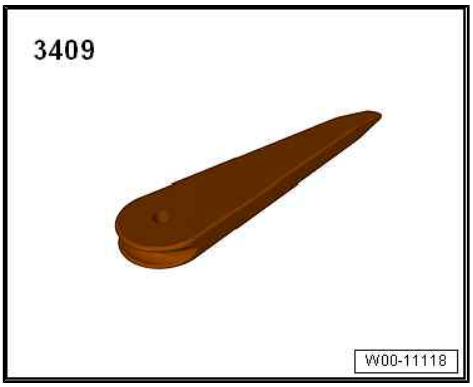
Tightening torques

♦ ⇒ “4.1 Exploded view - intake manifold”, page 381

4.4 Removing and installing throttle valve module - J338-

Special tools and workshop equipment required

♦ Removal wedge - 3409-



♦ Universal oil - G 000 115 A2-

♦ Cleaning solution - D 009 401 04-

Removing

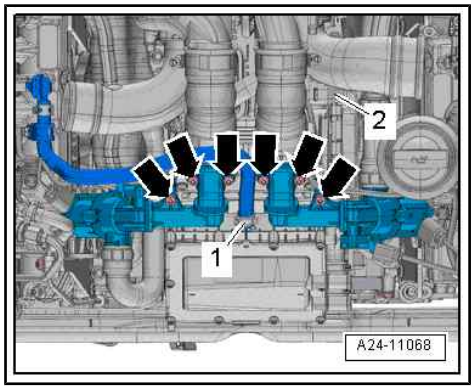
– Remove engine cover panel ⇒ page 82 .

WARNING

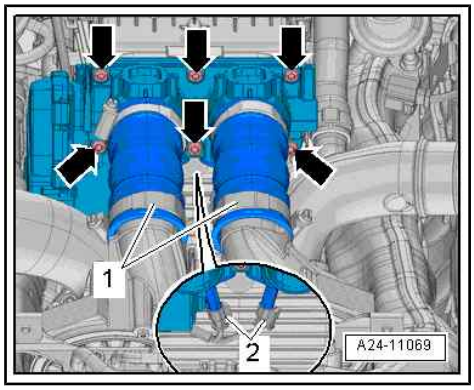
Danger of fire and damage if the engine cover panel is not fitted.

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

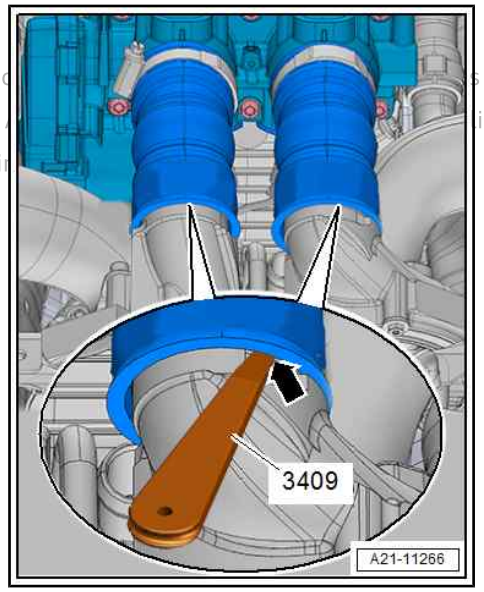
– Release hose clip -1- and detach air hose.
– Unplug electrical connector -2- and move wiring clear.
– Remove bolts -arrows- and move turbocharger air recirculation valve - N249- and turbocharger air recirculation valve, cylinder bank 2 - N427- clear to one side.



– Unscrew bolts -arrows- and release hose clips -1-.

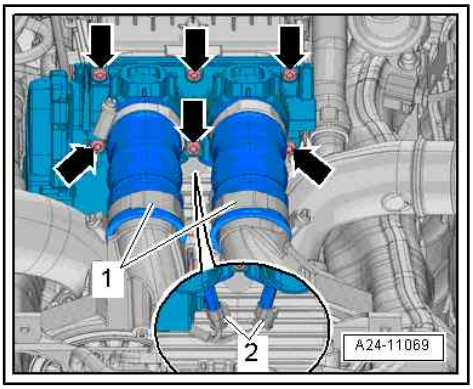


– To prevent damage to air hoses, lift corresponding air hose using removal wedge - 3409- and spray some universal oil - G 000 115 A2- between hose and hose connection -arrow-.



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– Detach throttle valve module - J338- and unplug electrical connectors -2-.



Installing

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

Note

- *Renew seal/gasket.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *Cleaning solution - D 009 401 04- is also used to facilitate assembly. Install air hoses immediately after cleaning before the cleaning solution evaporates.*

– Clean air hoses with cleaning solution - D 009 401 04- and install immediately.

– Install air ducts with screw-type clips ⇒ page 346 .

– After renewing throttle valve module, perform “Adaption” in “Guided Functions” mode using a vehicle diagnostic tester .

WARNING

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

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

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– Install engine cover panel ⇒ page 82 .

Tightening torques

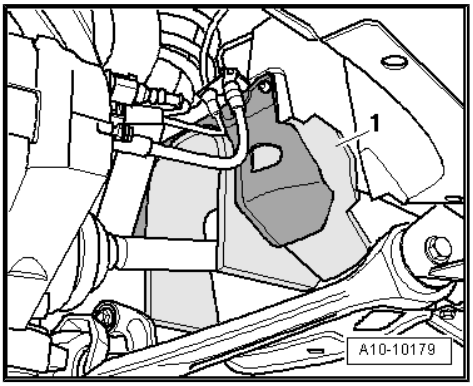
- ⇒ “4.2 Exploded view - throttle valve module”, page 383

4.5 Removing and installing intake manifold flap potentiometer - G336-

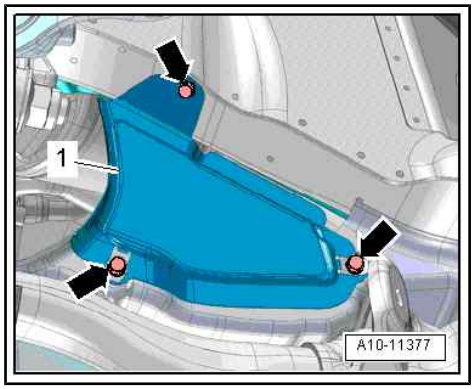
Removing

– Remove catalytic converters ⇒ page 440 .

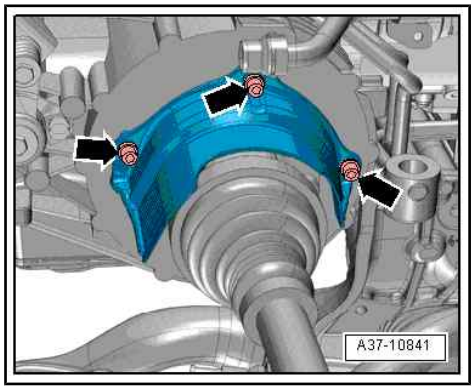
– Remove cover -1- for drive shaft in wheel housing (right-side).



– Remove bolts -arrows- and detach heat shield (right-side) -1-.

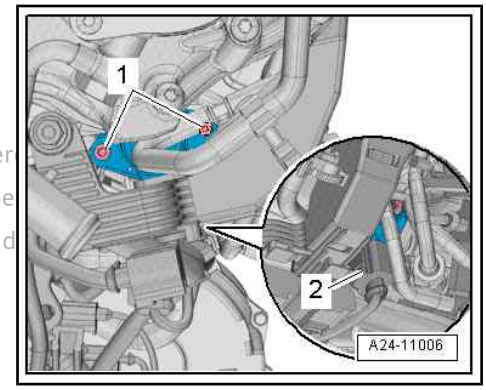


– Remove bolts -arrows- and detach heat shield for drive shaft (right-side).
– Unbolt drive shaft (right-side) from gearbox flange shaft ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Removing and installing drive shaft .



– Unplug electrical connector -2-.
– Remove bolts -1- and detach intake manifold flap potentiometer - G336- .

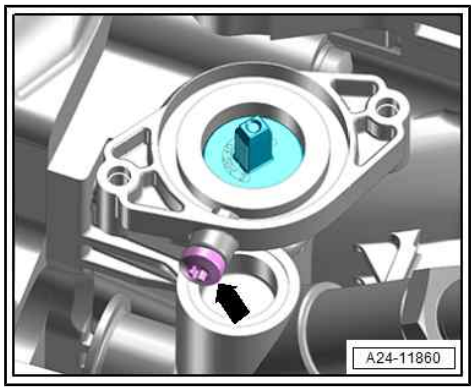
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Installing

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

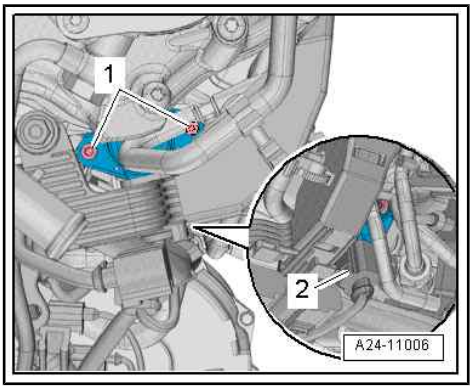
– Remove bolt -arrow-; if necessary, clean it and coat it with sealant.
– Fit and tighten bolt by hand until bolt head makes contact so that it screws itself into old thread.



– Move intake manifold flap potentiometer - G336- into installation position.
– Fit and tighten bolts -1- by hand so that they screw themselves into old threads.
– Install catalytic converters ⇒ page 440 .

Tightening torques

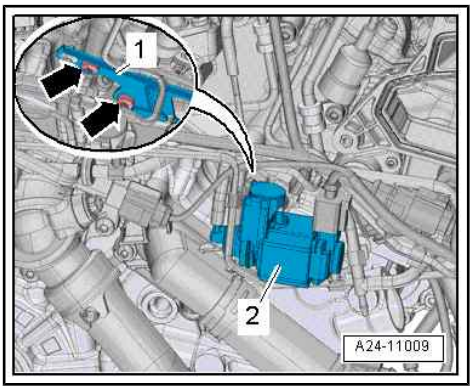
- ⇒ “4.1 Exploded view - intake manifold”, page 381
- ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft
- Heat shield ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe



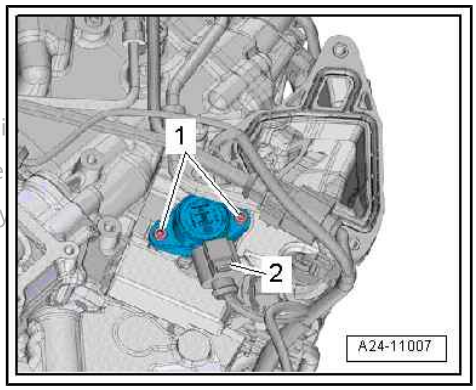
4.6 Removing and installing intake manifold flap potentiometer 2 - G512-

Removing

– Remove high-pressure pipe at cylinder bank 2 (left-side) ⇒ page 419 .
– Remove bolts -arrows- and move bracket -1- with charge pressure control solenoid valve - N75- -item 2- to one side.



– Unplug electrical connector -2-.
– Remove bolts -1- and detach intake manifold flap potentiometer 2 - G512- .

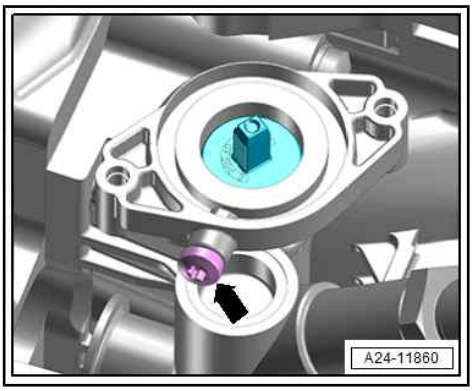


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Installing

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

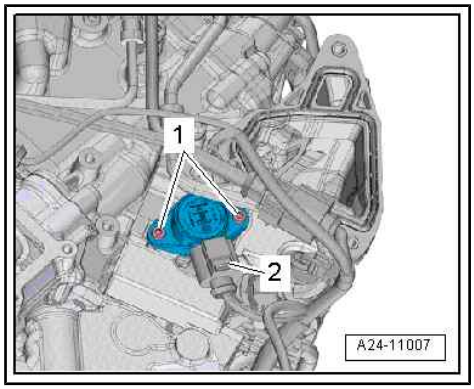
– Remove bolt -arrow-; if necessary, clean it and coat it with sealant.
– Fit and tighten bolt by hand until bolt head makes contact so that it screws itself into old thread.



– Move intake manifold flap potentiometer 2 - G512- into installation position.
– Fit and tighten bolts -1- by hand so that they screw themselves into old threads.
– Install high-pressure pipe ⇒ page 420 .

Tightening torques

◆ ⇒ “4.1 Exploded view - intake manifold”, page 381



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5 Injectors

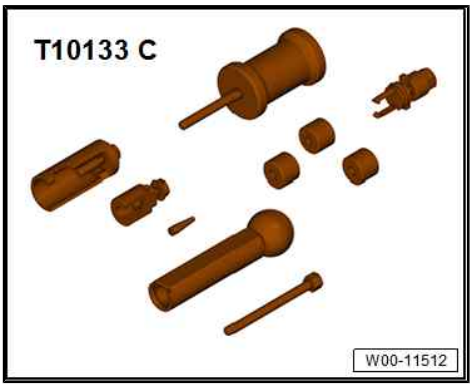
⇒ “5.1 Removing and installing injectors”, page 397

⇒ “5.2 Cleaning injectors”, page 400

5.1 Removing and installing injectors

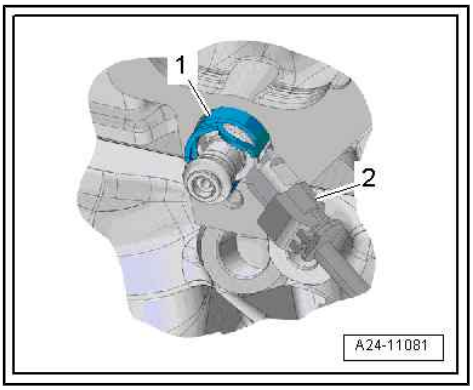
Special tools and workshop equipment required

- Tool set for FSI engines - T10133 C-

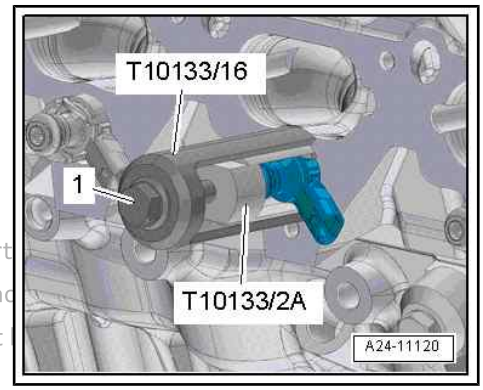


Removing

- Engine/gearbox assembly removed ⇒ page 8 .
- Remove intake manifold ⇒ page 384 .
- Unplug relevant electrical connector -2- and remove support ring -1-.



- Apply puller -T10133/2A- to groove on injector.
- Apply puller -T10133/16A- and pull out injector by turning bolt -1-.



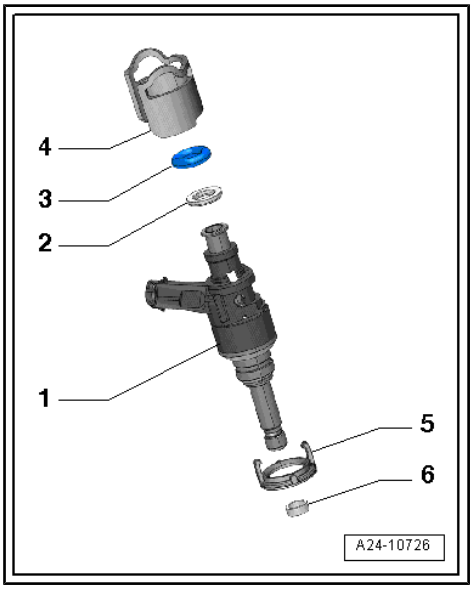
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Dismantling injector

– Pull O-ring -3- and spacer ring -2- off injector -1-.

– Unclip sealing element -5-.

– Carefully remove old combustion chamber ring seal -6-. To do so, cut open combustion chamber ring seal using knife or prise open with small screwdriver and then pull off forwards.



Note

Take care not to damage groove on injector. Injector must be renewed if groove is damaged.

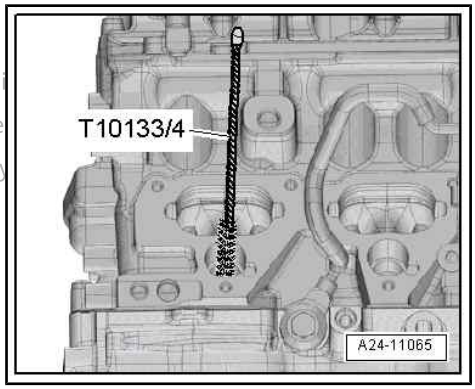
Installing

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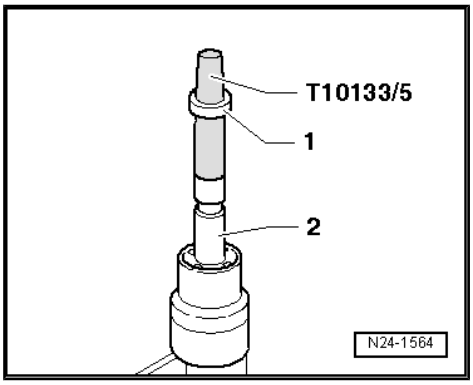
Note

- *Renew sealing element, combustion chamber ring seal and O-ring.*
- *Renew spacer ring if damaged.*
- *Lubricate O-rings of injectors lightly with clean engine oil.*

– Clean bore in cylinder head with nylon cylinder brush - T10133/4- .

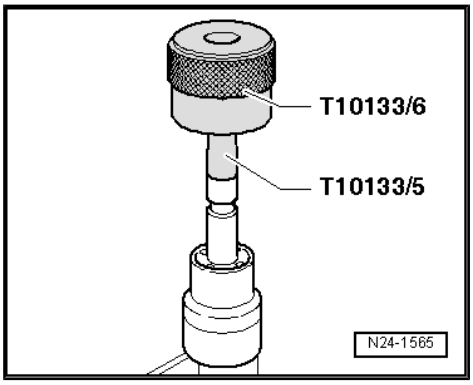


– Fit assembly cone -T10133/5- with new combustion chamber ring seal -1- from repair kit onto injector -2-.



– Using assembly sleeve -T10133/6- , push combustion chamber ring seal onto assembly cone -T10133/5- as far as it will go.

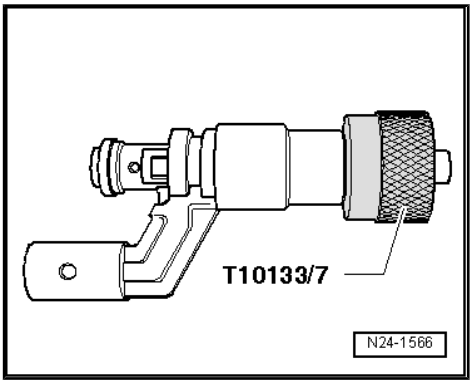
– Turn round assembly sleeve -T10133/6- and slide combustion chamber ring seal into groove.



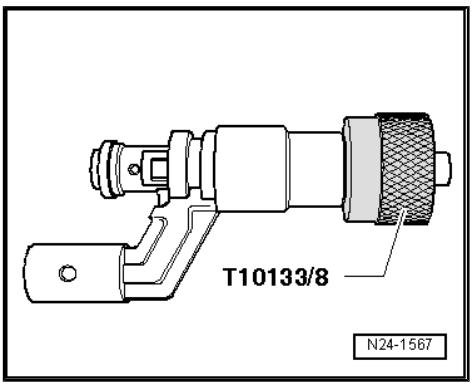
Note

The combustion chamber ring seal is widened when it is pushed onto the injector. After pushing it on, it therefore has to be compressed again. This is done in two stages, as described below.

– Push calibration sleeve -T10133/7- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).
– Pull calibration sleeve -T10133/7- off again by turning it in the opposite direction.



– Push calibration sleeve -T10133/8- onto injector as far as it will go and simultaneously turn it slightly (approx. 180°).
– Pull calibration sleeve -T10133/8- off again by turning it in the opposite direction.



– Fit parts from repair kit onto injector -1-:

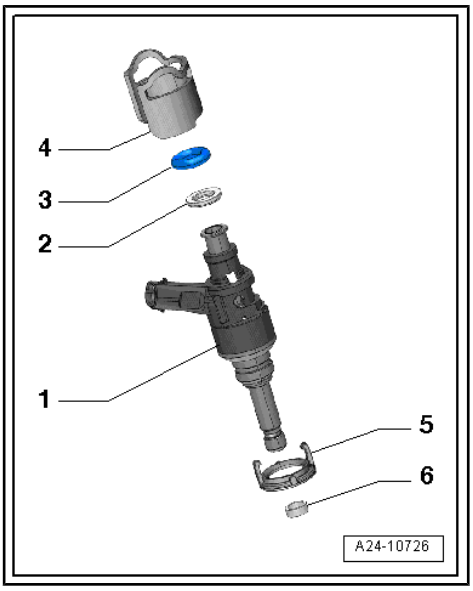
2 - Spacer ring

3 - O-ring

4 - Support ring

5 - Sealing washer

– To make it easier to install injector in fuel rail, lubricate new O-ring lightly with clean engine oil before installing it.



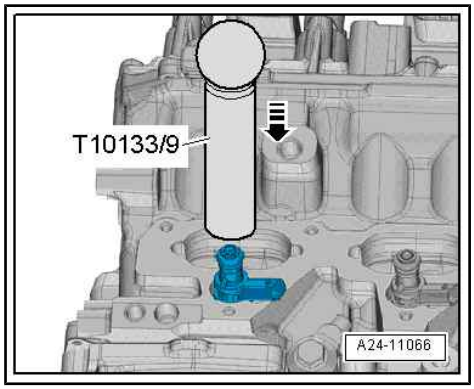
Note

The combustion chamber ring seal -6- must not be lubricated.

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– Use assembly tool -T10133/9- to insert injector as far as it will go into hole in cylinder head; note correct installation position.

• Electrical connector of injector must engage in recess in cylinder head.



Note

It should be possible to insert the injector easily. If necessary wait until the combustion chamber ring seal has contracted sufficiently.

Perform further installation in reverse order, paying attention to the following:

– Install intake manifold ⇒ page 384 .

5.2 Cleaning injectors

Special tools and workshop equipment required

♦ Ultrasonic cleaning unit - VAS 6418-

♦ Mounting plate for injection modules - VAS 6418/1-

♦ Cleaning fluid - VAS 6418/2-

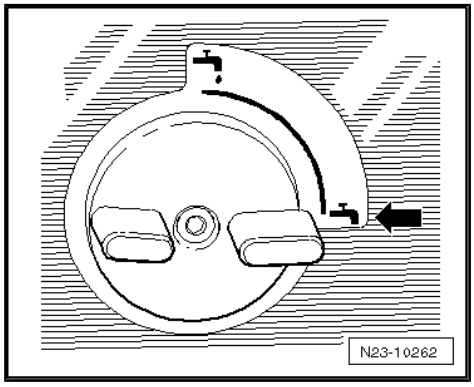
Procedure

– Close drain tap -arrow- on ultrasonic cleaning unit - VAS 6418- (located on right side of housing).

– Fill up ultrasonic unit.

• Ratio of 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-

• 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.

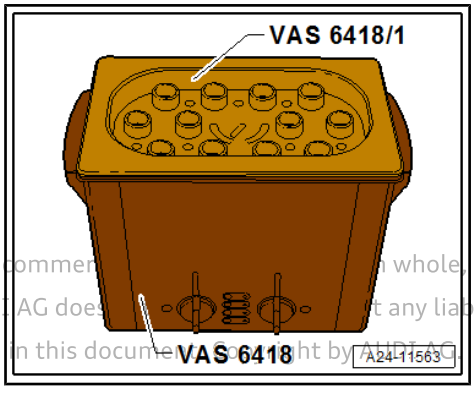


– Remove injectors ⇒ page 397 .

– Place mounting plate for injection modules - VAS 6418/1- on top of cleaning unit.

• It is important to read the safety notes in the operating instructions before switching on the ultrasonic cleaning unit - VAS 6418- .

– Insert FSI injectors all the way into guides of mounting plate for injection modules - VAS 6418/1- .

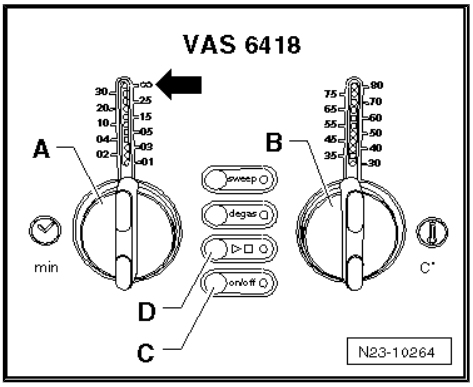


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– Switch on cleaning unit by pressing on/off button -C-.
– Select a cleaning time of 30 minutes with rotary control -A-.
– Set rotary control -B- to a temperature of 50°C.
– Press ▶ button -D- to start cleaning procedure.

• The actual cleaning process commences when the temperature reaches at least 50 °C and must last for at least 30 minutes.

– Install injectors with new combustion chamber seal ⇒ page 397 .



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6 Senders and sensors

⇒ “6.1 Removing and installing actuator for structure-borne sound R214 ”, page 402

⇒ “6.2 Removing and installing control unit for structure-borne sound J869 ”, page 403

⇒ “6.3 Removing and installing fuel pressure sender G247 ”, page 403

⇒ “6.4 Removing and installing fuel pressure sender 2 G624 ”, page 404

⇒ “6.5 Removing and installing fuel pressure sender for low pressure G410 ”, page 405

⇒ “6.6 Removing and installing temperature senders for charge air cooler G763 / G764 ”, page 406

⇒ “6.7 Removing and installing intake air temperature sender G42 ”, page 406

⇒ “6.8 Removing and installing intake manifold pressure sender G71 ”, page 407

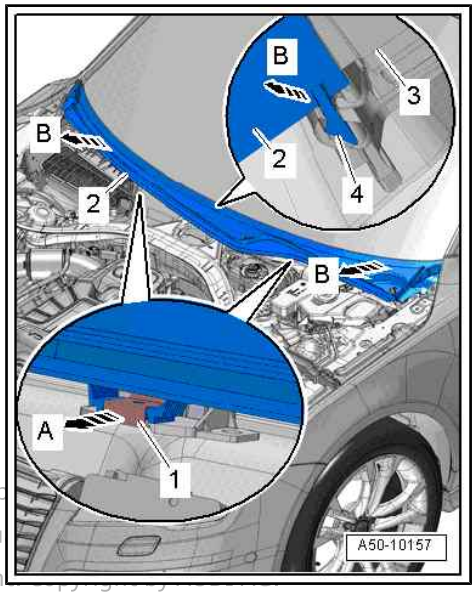
6.1 Removing and installing actuator for structure-borne sound - R214-

Removing

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

– Pull off securing clip -1- -arrow A-.

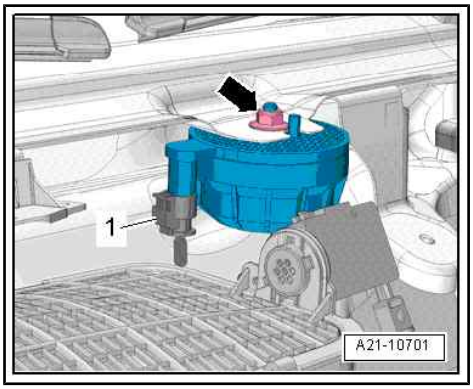
– Carefully lift cowl panel trim -2-.



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– Remove nut -arrow-.

– Detach actuator for structure-borne sound - R214- and disconnect electrical connector -1-.



Installing

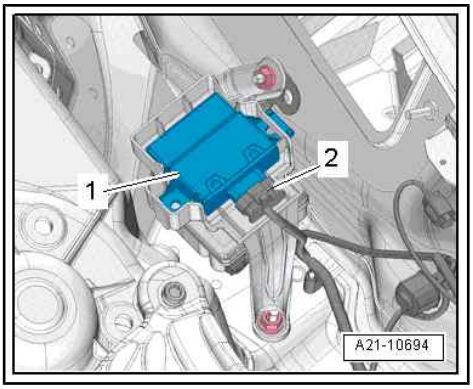
Installation is carried out in reverse order; note the following:

– Install plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .

Tightening torques

◆ ⇒ Fig. “” Actuator for structure-borne sound -R214- - tightening torque”” , page 336

6.2 Removing and installing control unit for structure-borne sound - J869-



Removing

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

– Unplug electrical connector -2- and unclip control unit for structure-borne sound - J869- -item 1-.

Installing

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

– Install plenum chamber cover ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Removing and installing plenum chamber cover .

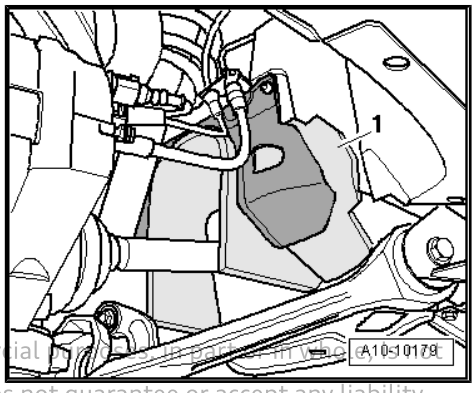
6.3 Removing and installing fuel pressure sender - G247-

Special tools and workshop equipment required

♦ Safety goggles

♦ Protective gloves

Removing



Note

Observe rules for cleanliness ⇒ page 5 .

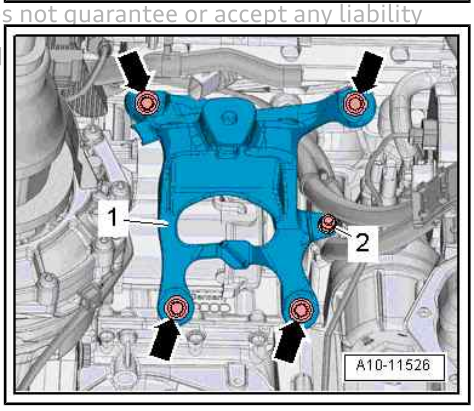
– Remove engine mounting (right-side) ⇒ page 74 .

– Remove cover -1- for drive shaft in wheel housing (right-side).

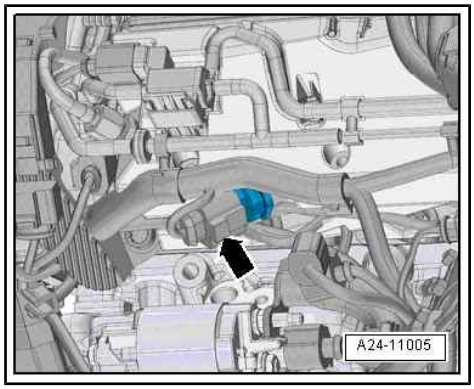
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– Remove nut -2- and move earth wire clear.

– Remove bolts -arrows- and detach engine support -1- (right-side).



– Unplug electrical connector -arrow-.



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 a clean cloth around connection and open connection carefully).*

– Wrap clean cloth around connection and unscrew fuel pressure sender - G247- .

Installing

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

– Install engine support and engine mounting (right-side) ⇒ page 74 .

Tightening torques

♦ ⇒ “4.1 Exploded view - intake manifold”, page 381

6.4 Removing and installing fuel pressure sender 2 - G624-

Special tools and workshop equipment required

♦ Safety goggles

♦ Protective gloves

Removing

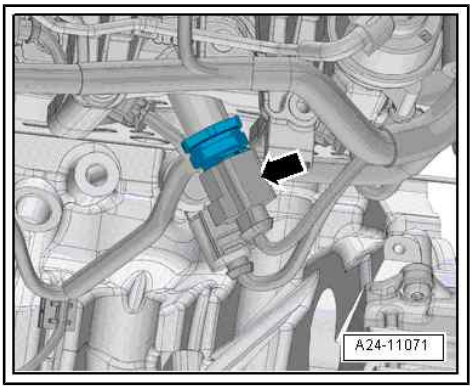
Note

Observe rules for cleanliness ⇒ page 5 .

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

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– Unplug electrical connector -arrow-.



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 a clean cloth around connection and open connection carefully).*

– Wrap clean cloth around connection and unscrew fuel pressure sender 2 - G624- .

Installing

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

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

Tightening torques

◆ ⇒ “4.1 Exploded view - intake manifold”, page 381

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6.5 Removing and installing fuel pressure sender for low pressure - G410-

Removing

Note

Observe rules for cleanliness ⇒ page 5 .

– Remove engine cover panel ⇒ page 82 .

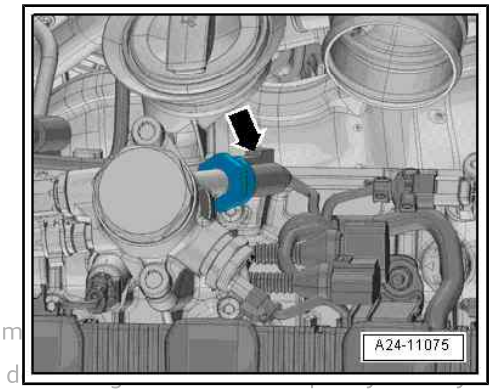
WARNING

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

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

– Unplug electrical connector -arrow-.

– Unscrew fuel pressure sender for low pressure - G410- .



Installing

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

– Install air ducts with screw-type clips ⇒ page 346 .

– Check fuel system for leaks ⇒ page 364 .

WARNING

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

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

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Tightening torques

- ⇒ “7.1 Exploded view - high-pressure pump”, page 409

6.6 Removing and installing temperature senders for charge air cooler -G763- / -G764-

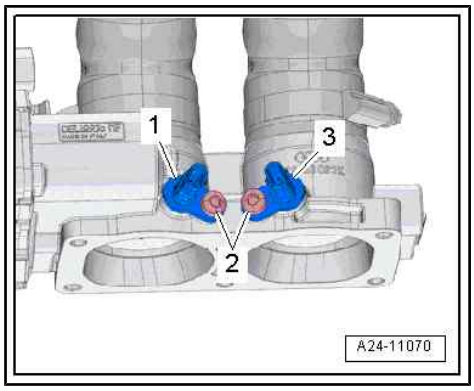
Removing

– Remove throttle valve module - J338- ⇒ page 391 .

– Unscrew relevant bolt -2- and detach temperature sender:

1 - Temperature sender 2 for charge air cooler - G764-

3 - Temperature sender 1 for charge air cooler - G763-



Installing

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

Note

Fit new O-rings.

– Install throttle valve module - J338- ⇒ page 391 .

Tightening torques

- ⇒ “4.2 Exploded view - throttle valve module”, page 383

6.7 Removing and installing intake air temperature sender - G42-

Removing

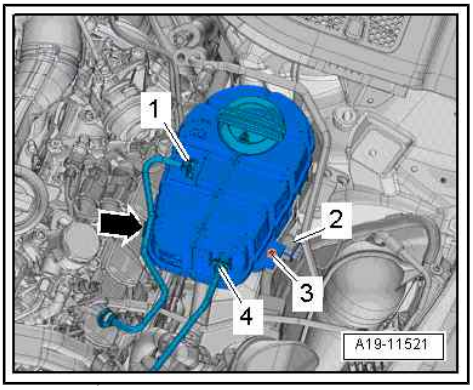
– Remove engine cover panel ⇒ page 82 .

WARNING

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

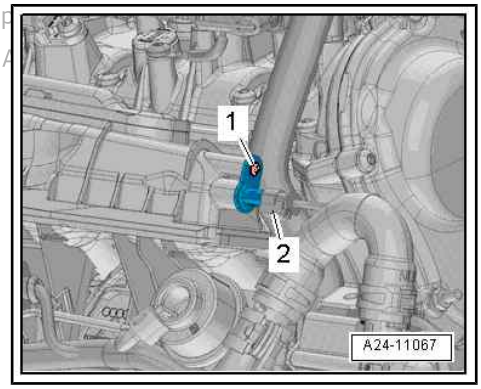
- ***The engine cover panel must always be fitted before the bonnet is closed.***
- ***If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.***

– Release retaining clips -1, 4- and disconnect coolant hoses.
– Move coolant hose -arrow- clear.
– Unplug electrical connector -2-.
– Remove bolt -3-.
– Lift coolant expansion tank out of bracket and push towards front.



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– Remove bolt -1-.
– Pull off intake air temperature sender - G42- and unplug electrical connector -2-.



Installing

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

Note

- *Fit new O-ring.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

WARNING

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

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

Tightening torques

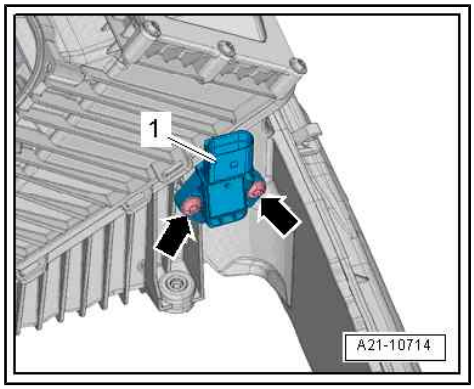
- ⇒ “4.1 Exploded view - intake manifold”, page 381

6.8 Removing and installing intake manifold pressure sender - G71-

Removing

– Remove charge air cooler housing ⇒ page 346 .

– Unscrew bolts -arrows- and pull intake manifold pressure sender - G71- -item 1- out of air pipe.



Installing

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

Note

Fit new O-ring.

– Install charge air cooler housing ⇒ page 346 .

Tightening torques

◆ ⇒ “4.2 Exploded view - throttle valve module”, page 383

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7 High-pressure pump

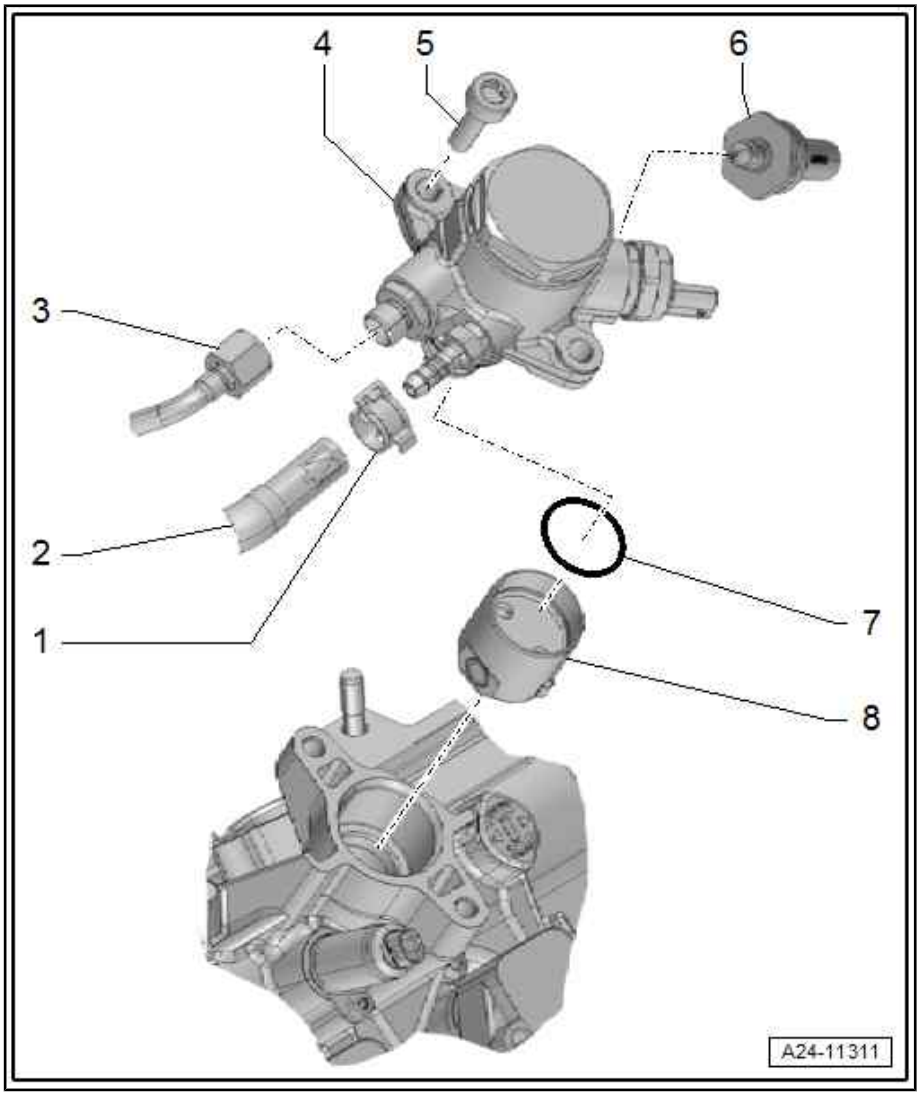
⇒ “7.1 Exploded view - high-pressure pump”, page 409

⇒ “7.2 Exploded view - fuel pipes and fuel rail”, page 410

⇒ “7.3 Removing and installing high-pressure pump”, page 412

⇒ “7.4 Removing and installing high-pressure pipe”, page 416

7.1 Exploded view - high-pressure pump



1 - Hose clip

- ❑ Renew

2 - Fuel hose (low-pressure section)

- ❑ Renew spring-type clip after removing

3 - Union nut

- ❑ For high-pressure pipe
- ❑ Counterhold connection on high-pressure pump to loosen
- ❑ Observe all instructions for installing high-pressure pipes ⇒ “7.4.3 Installing high-pressure pipe”, page 420
- ❑ 25 Nm

4 - High-pressure pump

- ❑ Do not hold onto or pull on plunger of high-pressure pump
- ❑ Cylinder bank 1 (right-side) with fuel metering valve - N290-
- ❑ Cylinder bank 2 (left-side) with fuel metering valve 2 - N402-
- ❑ ⇒ “7.3 Removing and installing high-pressure pump”, page 412

5 - Bolt

- ❑ Renew
- ❑ Tighten in stages ⇒ page 416
- ❑ 20 Nm +45°

6 - Fuel pressure sender for low pressure - G410-

- ❑ ⇒ “6.5 Removing and installing fuel pressure sender for low pressure G410 ”, page 405
- ❑ 15 Nm

7 - O-ring

- ❑ Renew
- ❑ Lubricate lightly with clean engine oil before installing

8 - Roller tappet

- ❑ Can only be installed in one position

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- ❑ Lubricate lightly with clean engine oil before installing

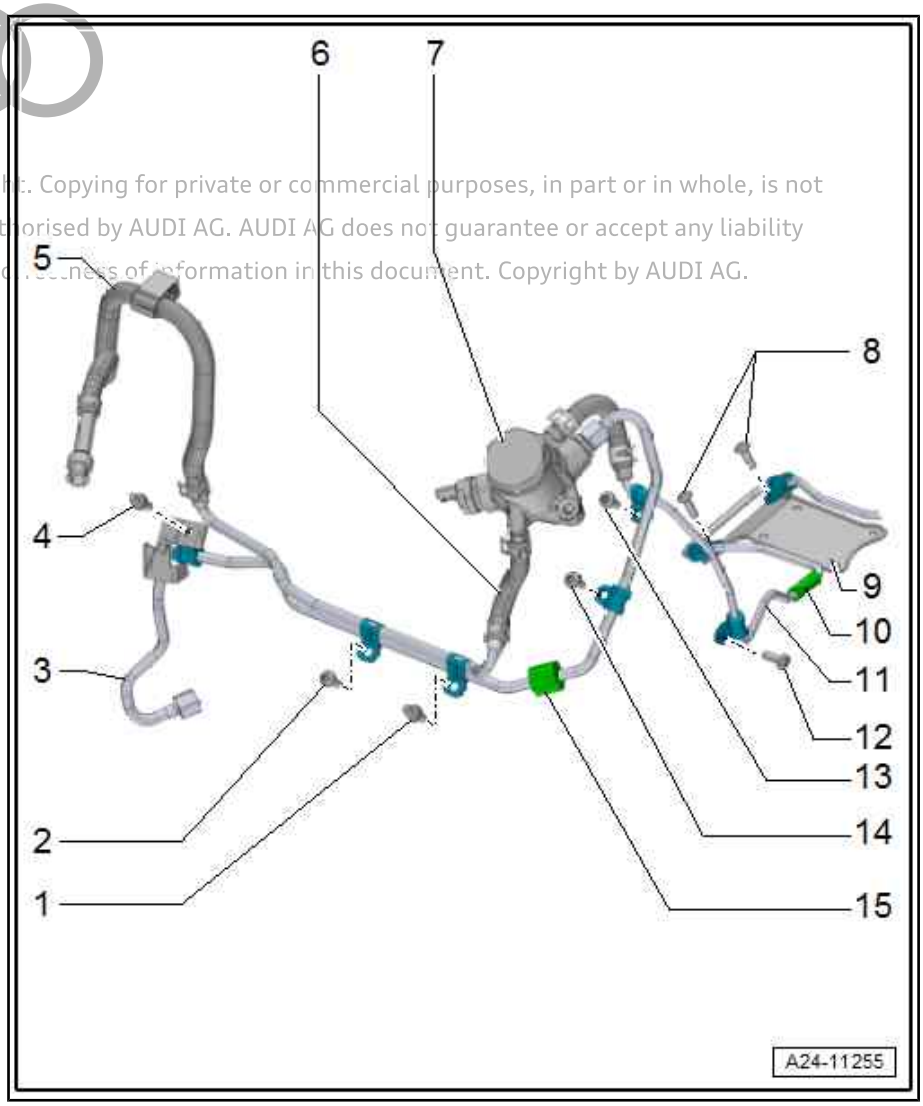
7.2 Exploded view - fuel pipes and fuel rail

⇒ “7.2.1 Exploded view - fuel pipes and fuel rail, cylinder bank 1 (right-side)”, page 410

⇒ “7.2.2 Exploded view - fuel pipes and fuel rail, cylinder bank 2 (left-side)”, page 411

7.2.1 Exploded view - fuel pipes and fuel rail, cylinder bank 1 (right-side)

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1 - Centre hex stud

- ❑ 9 Nm

2 - Bolt

- ❑ 9 Nm

3 - High-pressure pipe

- ❑ ⇒ “7.4.1 Removing high-pressure pipe, cylinder bank 1 (right-side)”, page 416
- ❑ ⇒ “7.4.2 Removing high-pressure pipe, cylinder bank 2 (left-side)”, page 419
- ❑ To loosen union nuts, counterhold hexagon flats at each connection
- ❑ Observe all instructions for installing high-pressure pipes ⇒ page 420
- ❑ Tightening torque for union nuts ⇒ Item 8 (page 382) , ⇒ Item 3 (page 409)

4 - Centre hex stud

- ❑ 9 Nm

5 - Fuel supply hose

6 - Fuel hose (low-pressure section)

7 - High-pressure pump

8 - Bolts

- ❑ For retaining clips
- ❑ 9 Nm

9 - Bracket

- ❑ For low-pressure line

10 - Rubber damper

- ❑ Must make contact with cylinder block

11 - Low-pressure line

- ❑ Note minimum clearance from bracket for low-pressure line ⇒ page 412

12 - Bolt

- ❑ For retaining clip
- ❑ 9 Nm

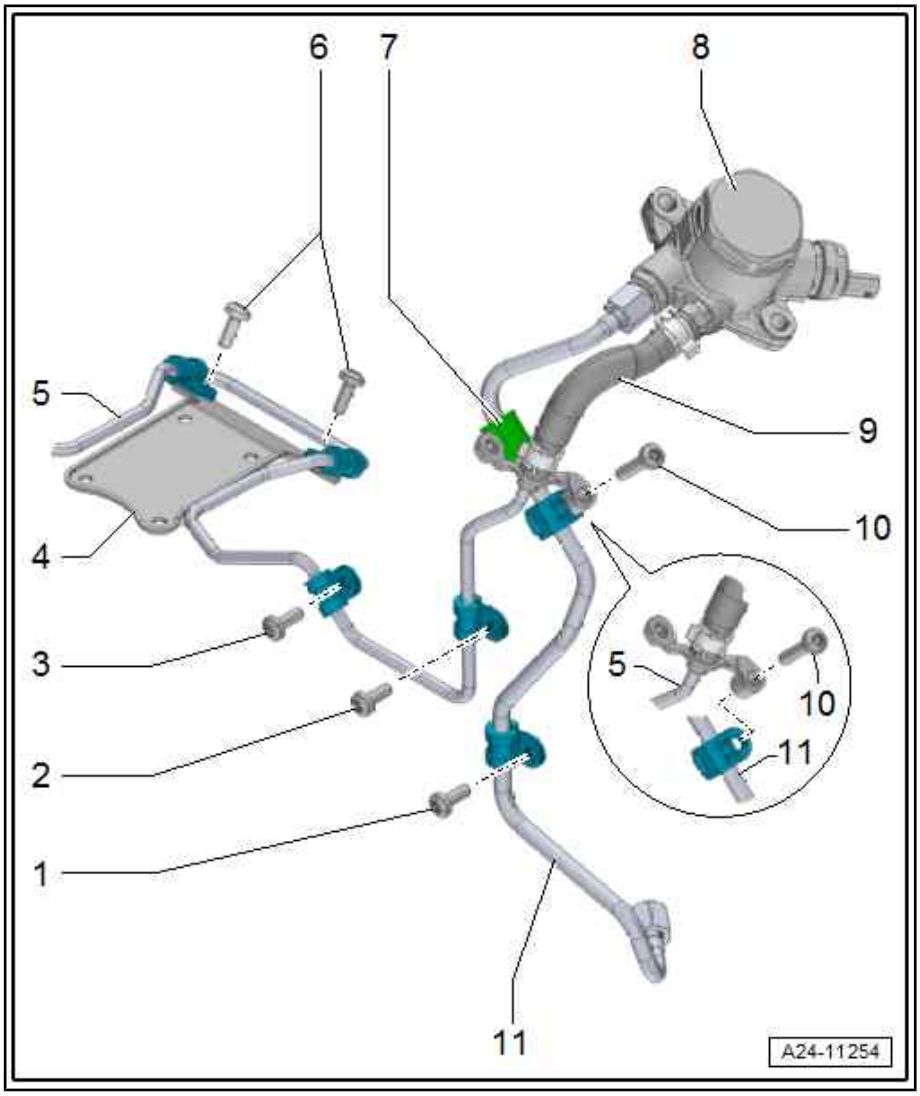
13 - Bolt
- ❑ For retaining clip
- ❑ 9 Nm

14 - Bolt
- ❑ For retaining clip
- ❑ 9 Nm

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15 - Rubber damper
- ❑ Must make contact with cylinder head cover

7.2.2 Exploded view - fuel pipes and fuel rail, cylinder bank 2 (left-side)



1 - Bolt
- ❑ For retaining clip
- ❑ 9 Nm

2 - Bolt
- ❑ For retaining clip
- ❑ 9 Nm

3 - Bolt
- ❑ For retaining clip
- ❑ 9 Nm

4 - Bracket
- ❑ For low-pressure line

5 - Low-pressure line
- ❑ Note minimum clearance from bracket for low-pressure line ⇒ page 412

6 - Bolts
- ❑ For retaining clips
- ❑ 9 Nm

7 - Rubber damper
- ❑ Must make contact with bracket for adjacent low-pressure line

8 - High-pressure pump
- ❑ Removing and installing ⇒ page 412

9 - Fuel hose (low-pressure section)
- ❑ Note installation position ⇒ page 412

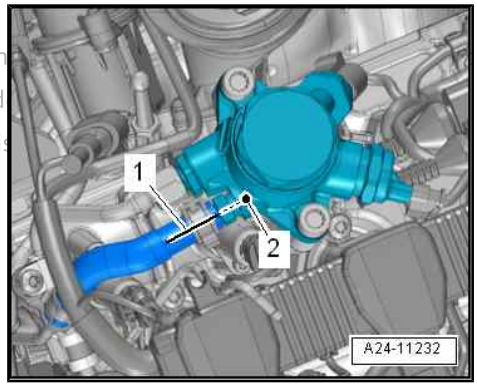
10 - Bolt
- ❑ 9 Nm

11 - High-pressure pipe
- ❑ Removing and installing ⇒ “7.4.2 Removing high-pressure pipe, cylinder bank 2 (left-side)”, page 419
- ❑ To loosen union nuts, counterhold hexagon flats at each connection
- ❑ Observe all instructions for installing high-pressure pipes ⇒ page 420
- ❑ Tightening torque for union nuts ⇒ Item 8 (page 382) , ⇒ Item 3 (page 409)

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Installation position of fuel hose (low-pressure section)

- Marking -1- on fuel hose (low-pressure section) must be aligned with marking -2- on high-pressure pump.

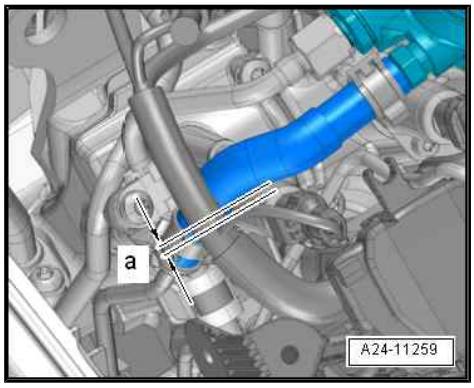


Note

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

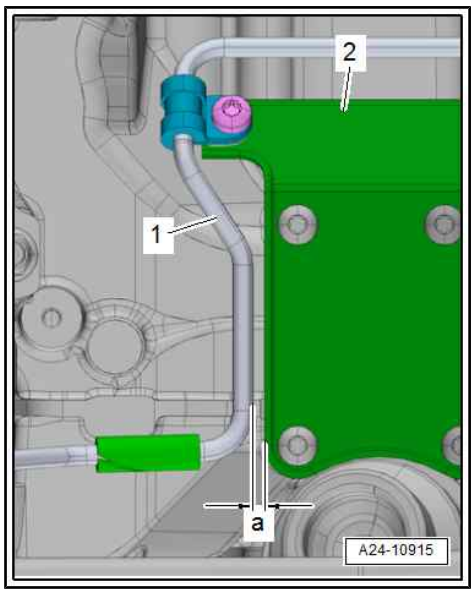
Minimum clearance between fuel hose (low-pressure section) and exhaust cam actuator 2 for cylinder 5 - F467-

- Minimum clearance -a- = 2 mm must be maintained between fuel hose (low-pressure section) and exhaust cam actuator 2 for cylinder 5 - F467- .



Minimum clearance between low-pressure line and bracket for low-pressure line

- Minimum clearance -a- = 2 mm must be maintained between low-pressure line -1- and bracket -2- for low-pressure line.



7.3 Removing and installing high-pressure pump

Special tools and workshop equipment required

- Safety goggles
- Protective gloves

Removing

Note

Observe rules for cleanliness ⇒ page 5 .

– Remove engine cover panel ⇒ page 82 .

WARNING

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

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

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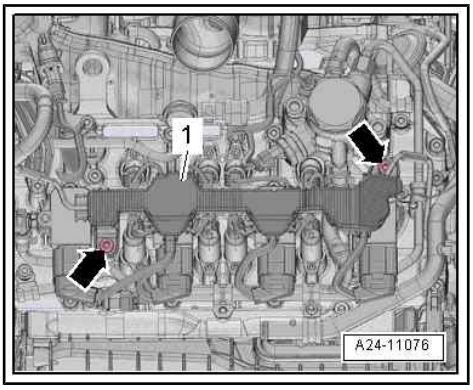
Note

- *Do not hold onto or pull on plunger of high-pressure pump.*
- *Do not attempt to bend high-pressure pipes to a different shape.*

Cylinder bank 1 (right-side):

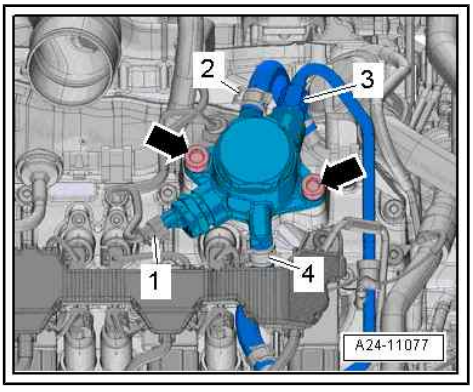
– Remove air filter element ⇒ Maintenance ; Booklet 411 .

– Remove bolts -arrows- and push wiring guide -1- slightly to right side.



– Unplug electrical connector -1-.

– Release hose clips -2 and 4- and detach fuel hoses.



WARNING

The fuel system is pressurised.

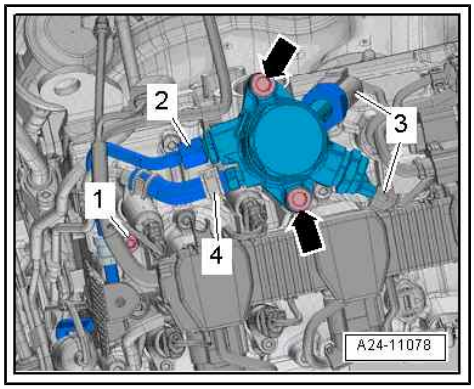
Risk of injury as fuel may spray out.

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

– Wrap a clean cloth around connection and remove union nut -3-; to do so, counterhold hexagon flats of connection. Push high-pressure pipe to one side.

– Remove bolts -arrows-.

Cylinder bank 2 (left-side):



– Unplug electrical connectors -3-.
– Release hose clip -4- and detach fuel hose.

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 a clean cloth around connection and open connection carefully).***

– Wrap a clean cloth around connection and remove union nut -2-; to do so, counterhold hexagon flats of each connection. Push high-pressure pipe to one side.
– Remove bolts -1- and -arrows-.

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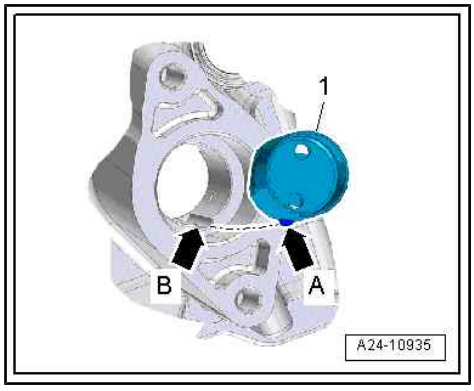
Both sides (continued):

– Carefully pull out high-pressure pump. It is possible that the roller tappet may remain lodged inside.

Installing

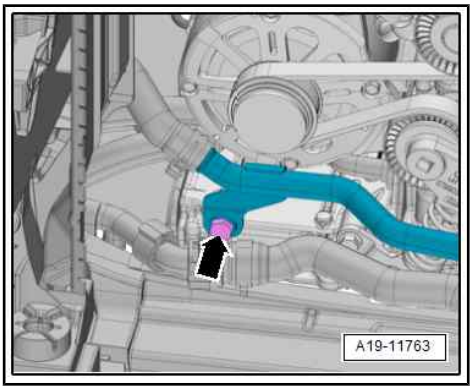
Note

- *Renew O-ring and hose clip.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *The connections of the high-pressure pipes must not be damaged.*
- *Do not attempt to bend high-pressure pipes to a different shape.*
- *Do not hold onto or pull on plunger of high-pressure pump.*

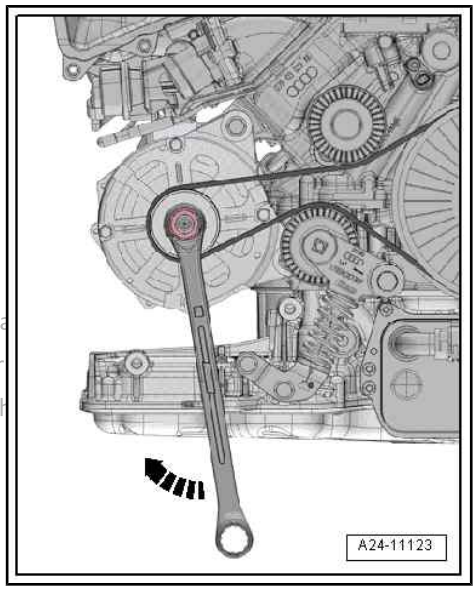


– Check roller tappet -1- for damage and renew if necessary.
– Lightly lubricate roller tappet with oil and insert it so that lug -arrow A- slides into guide notch -arrow B-.
– Remove noise insulation (front) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .
– Remove front longitudinal member (right) ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Exploded view - lock carrier .

– Remove bolt for coolant pipe (front).

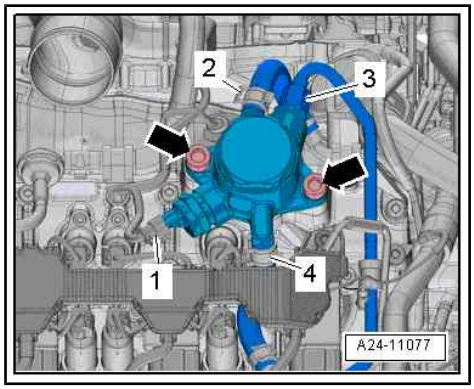


– Rotate crankshaft at alternator in direction of normal engine rotation -arrow- using ring spanner, and at the same time press roller tappet into cylinder head until it reaches its lowest point.



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– Tighten bolts -arrows- hand tight in small steps.
– Then initially tighten bolts alternately to 5 Nm (do not tilt high-pressure pump).



Note

The high-pressure pump can be damaged if it is tightened too much on one side (keep it straight).

- Final tightening torque for bolts ⇒ Item 5 (page 409)

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

– Install high-pressure pipe ⇒ page 420 .
– Install air filter element ⇒ Maintenance ; Booklet 411 .
– Install coolant pipe (bottom front) ⇒ page 278 .
– Check fuel system for leaks ⇒ page 364 .

WARNING

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

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

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Tightening torques

- ⇒ “7.1 Exploded view - high-pressure pump”, page 409
- ⇒ “2.1 Exploded view - charge air system”, page 344
- Longitudinal member ⇒ General body repairs, exterior; Rep. gr. 50 ; Lock carrier; Exploded view - lock carrier
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation

7.4 Removing and installing high-pressure pipe

⇒ “7.4.1 Removing high-pressure pipe, cylinder bank 1 (right-side)”, page 416

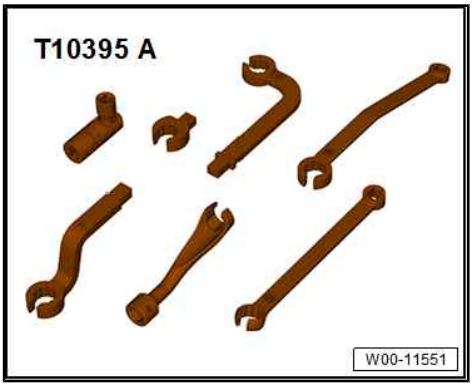
⇒ “7.4.2 Removing high-pressure pipe, cylinder bank 2 (left-side)”, page 419

⇒ “7.4.3 Installing high-pressure pipe”, page 420

7.4.1 Removing high-pressure pipe, cylinder bank 1 (right-side)

Special tools and workshop equipment required

- Tool set - T10395 A-



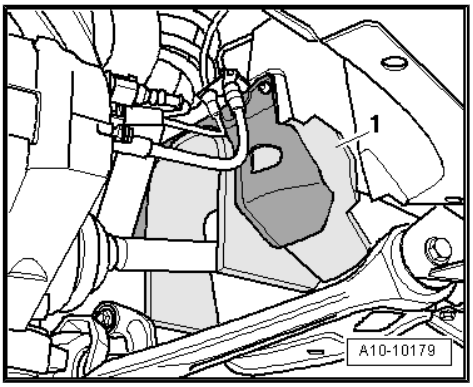
- Safety goggles
- Protective gloves

Removing

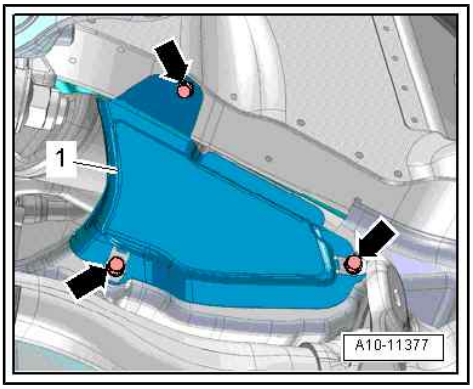
Note

Observe rules for cleanliness ⇒ page 5 .

– Remove air cleaner housing ⇒ page 379 .
– Remove cover -1- for drive shaft in wheel housing (right-side).

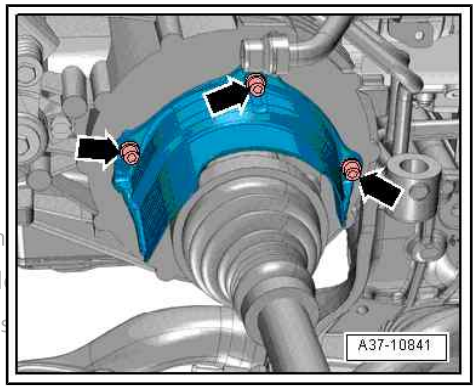


– Remove bolts -arrows- and detach heat shield (right-side) -1-.

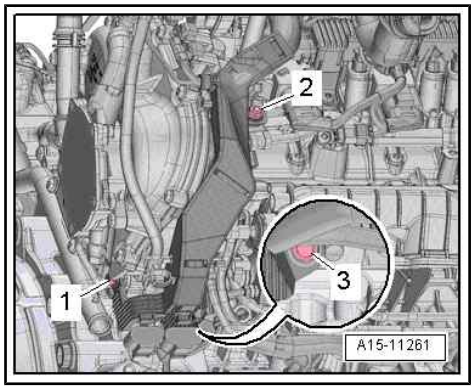


– Remove bolts -arrows- and detach heat shield for drive shaft (right-side).
– Unbolt drive shaft (right-side) from gearbox flange shaft ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Removing and installing drive shaft .
– Remove ignition coil “cylinder 4” ⇒ page 452 .

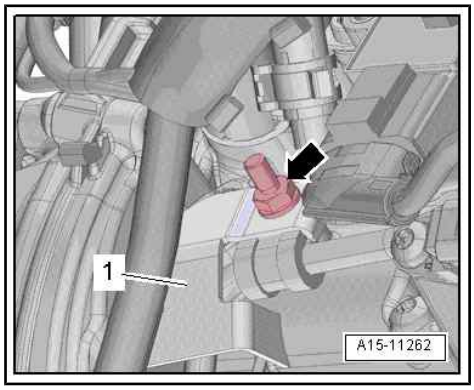
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– Remove nuts -1, 2- and bolt -3-, move wiring guide clear and push to one side.



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

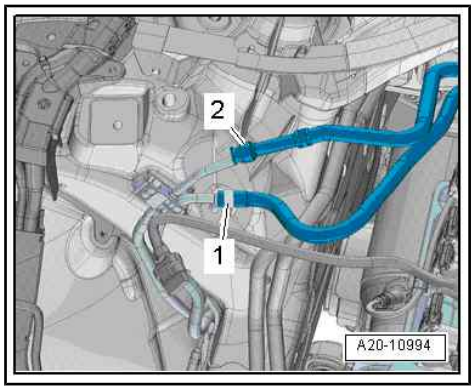


WARNING

The fuel system is pressurised.

Risk of injury as fuel may spray out.

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



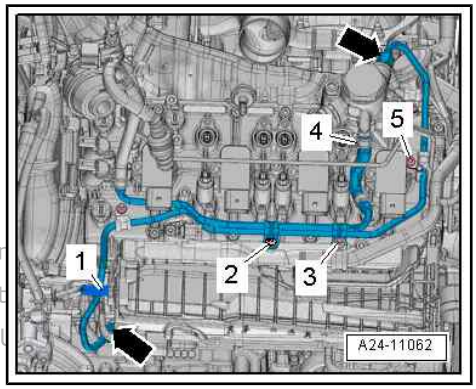
– Disconnect fuel line -2- by pressing release ring.

Note

Disregard -item 1-.

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– Disconnect vacuum hose -1-.
– Remove nut -3-, move retaining clip clear and remove centre hex stud.
– Remove bolts -2, 5-.
– Release hose clip -4- and detach fuel hose.
– Unscrew union nuts -arrows- (counterhold hexagon flats of each connection when loosening).
– Detach high-pressure pipe.



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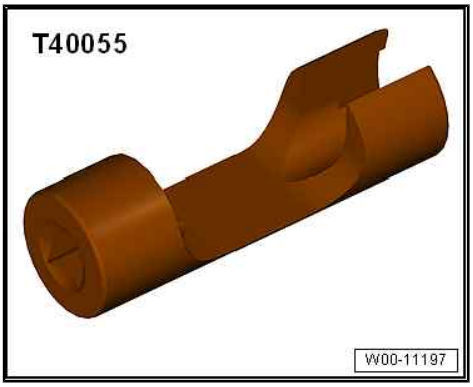
Note

Do not attempt to bend high-pressure pipes to a different shape.

7.4.2 Removing high-pressure pipe, cylinder bank 2 (left-side)

Special tools and workshop equipment required

♦ Socket - T40055-



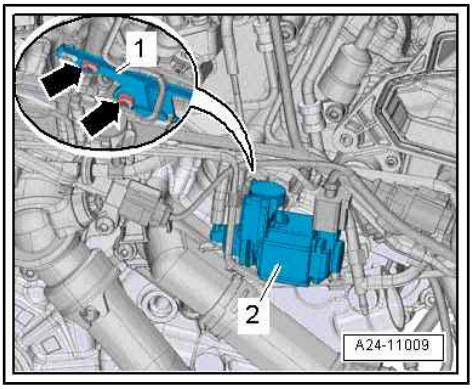
♦ Safety goggles
♦ Protective gloves

Removing

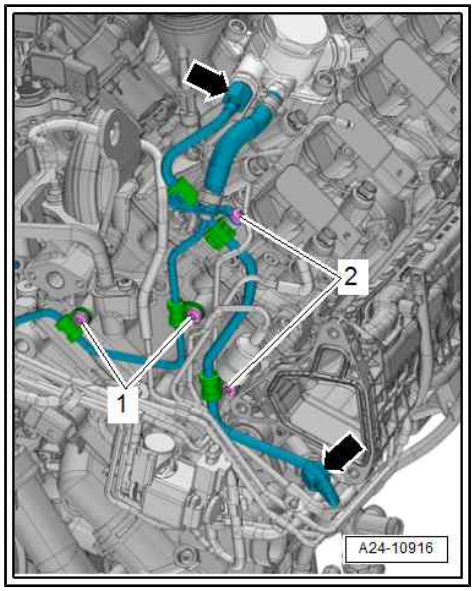
Note

Observe rules for cleanliness ⇒ page 5 .

– Remove charge air cooler housing ⇒ page 346 .
– Detach charge pressure control solenoid valve - N75- -item 2- from bracket -1- and push it clear to one side.
– Remove bolts -arrows- and push bracket towards front of vehicle.



– Remove bolts -1, 2-.



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 a clean cloth around connection and open connection carefully).*

– Wrap clean cloth around connection. Unscrew union nuts -arrows- (counterhold hexagon flats of each connection when loosening).

– Detach high-pressure pipe.

Note

Do not attempt to bend high-pressure pipes to a different shape.

7.4.3 Installing high-pressure pipe

Installing

Note

- *Do not attempt to bend high-pressure pipes to a different shape.*
- *The connections of the high-pressure pipe must not be damaged.*

– Position retaining clips and rubber dampers as shown in illustrations ⇒ page 410 .

– Lubricate threads of union nuts with clean engine oil.

– First tighten union nut by hand until it makes contact, making sure that high-pressure pipe is not under tension.

– Tighten union nut initially to 5 Nm using torque wrench.

– Tighten bolts for retaining clips.

– Tighten union nut to final tightening torque using torque wrench; to do so, counterhold hexagon flats of each connection.

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

Cylinder bank 1 (right-side):

– Install ignition coil “cylinder 4” ⇒ page 452 .

– Install air cleaner housing ⇒ page 379 .

Cylinder bank 2 (left-side):

– Install charge air cooler housing ⇒ page 346 .

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Tightening torques

- ⇒ “4.1 Exploded view - intake manifold”, page 381
- ⇒ “7.1 Exploded view - high-pressure pump”, page 409
- ⇒ “7.2 Exploded view - fuel pipes and fuel rail”, page 410
- ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft
- Heat shield ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe

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8 Lambda probe

⇒ “8.1 Exploded view - Lambda probe”, page 422

⇒ “8.2 Removing and installing Lambda probe”, page 422

8.1 Exploded view - Lambda probe

1 - Lambda probe after catalytic converter - G130-

- ❑ With Lambda probe 1 heater after catalytic converter - Z29-
- ❑ Removing and installing ⇒ page 422
- ❑ 55 Nm

2 - Lambda probe 2 - G108- (before catalytic converter)

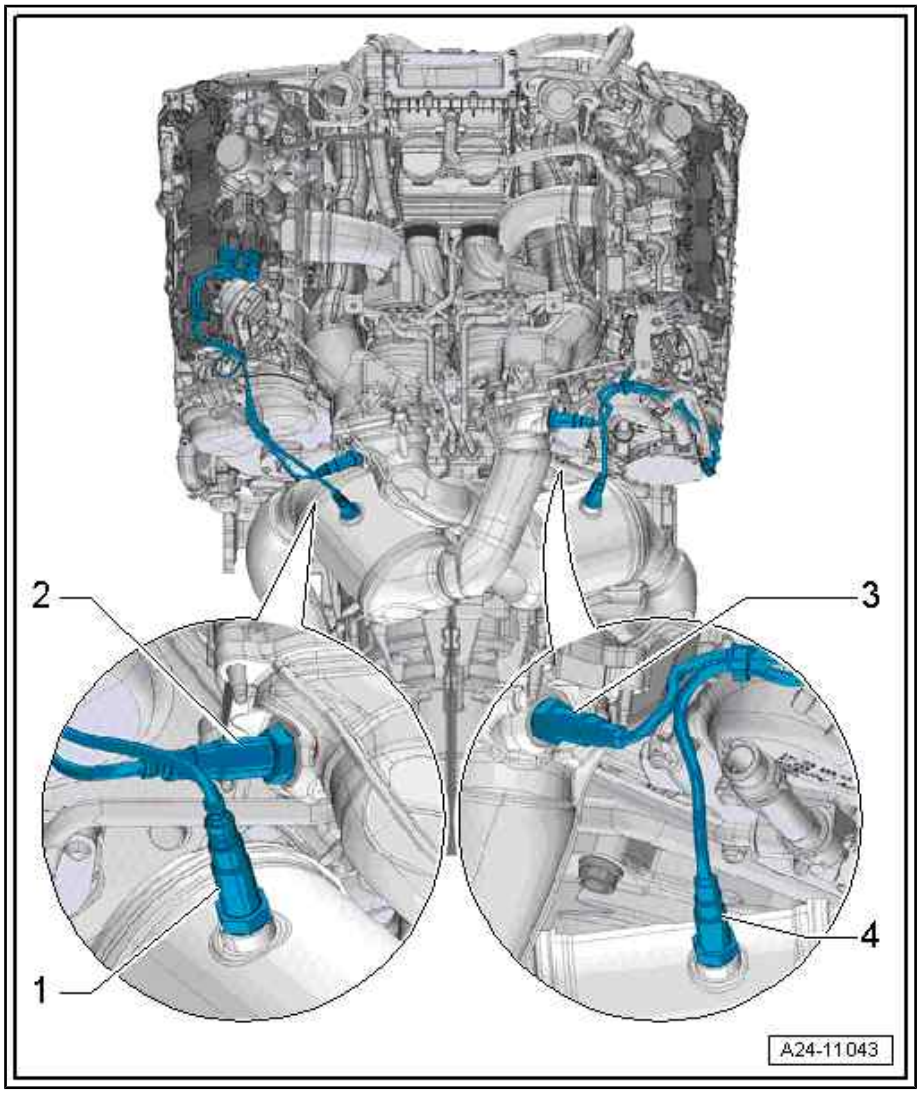
- ❑ With Lambda probe heater 2 - Z28-
- ❑ Removing and installing ⇒ page 422
- ❑ 55 Nm

3 - Lambda probe - G39- (before catalytic converter)

- ❑ With Lambda probe heater - Z19-
- ❑ Removing and installing ⇒ page 422
- ❑ 55 Nm

4 - Lambda probe 2 after catalytic converter - G131-

- ❑ With Lambda probe 2 heater after catalytic converter - Z30-
- ❑ Removing and installing ⇒ page 422
- ❑ 55 Nm



8.2 Removing and installing Lambda probe

⇒ “8.2.1 Removing and installing Lambda probe G39 / G131 ”, page 422

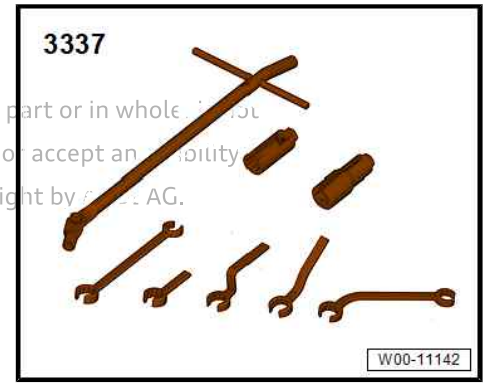
⇒ “8.2.2 Removing and installing Lambda probe G108 / G130 ”, page 424

8.2.1 Removing and installing Lambda probe -G39- / -G131-

Special tools and workshop equipment required

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♦ Lambda probe open ring spanner set - 3337-



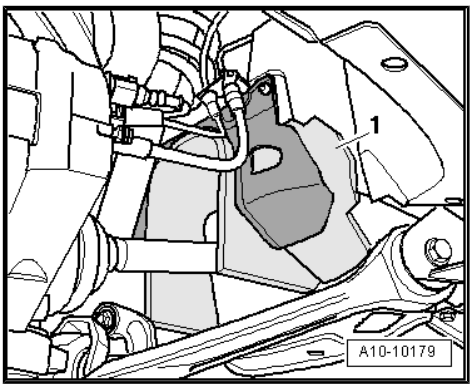
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Removing

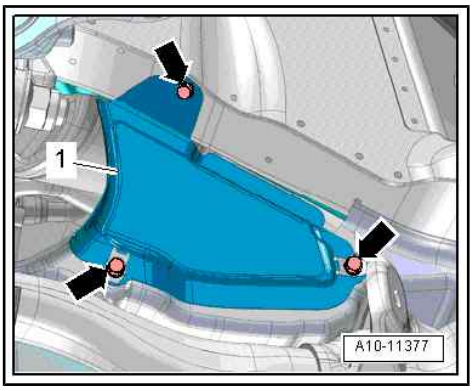
Note

All cable ties which are released or cut open when removing must be fitted in the same position when installing.

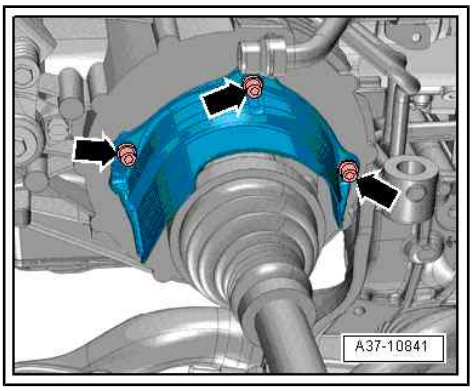
– Remove cover -1- for drive shaft in wheel housing (right-side).



– Remove bolts -arrows- and detach heat shield (right-side) -1-.



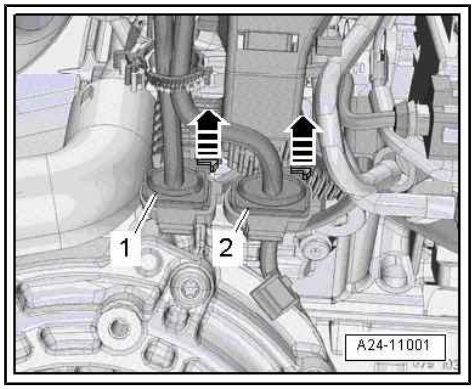
– Remove bolts -arrows- and detach heat shield for drive shaft (right-side).



– Detach electrical connectors from bracket in the sequence shown; release catches -arrows- to unplug connectors and move electrical wiring clear:

2 - For Lambda probe - G39- (5-pin connector)

1 - For Lambda probe 2 after catalytic converter - G131- (4-pin connector)



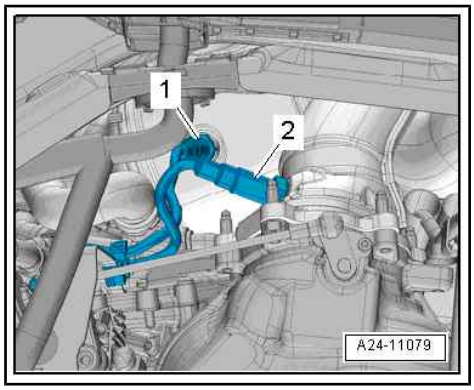
Note

The layout of the Lambda probe connectors may vary on different models.

– Unscrew Lambda probes using ring spanner -3337/7- :

1 - Lambda probe 2 after catalytic converter - G131-

2 - Lambda probe - G39-



Installing

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

Note

- *Threads of new Lambda probes are already coated with assembly paste; the paste must not get into the slots on the probe body.*
- *In the case of a used Lambda probe grease only the thread with high-temperature paste. The paste must not get into the slots on the Lambda probe body. High-temperature paste ⇒ Electronic parts catalogue*
- *When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.*
- *Fit all cable ties in the original positions when installing.*

Tightening torques

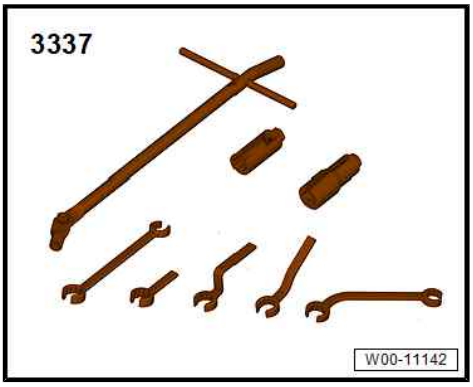
- ⇒ “8.1 Exploded view - Lambda probe”, page 422
- ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft
- Heat shield ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe

8.2.2 Removing and installing Lambda probe -G108- / -G130-

Special tools and workshop equipment required

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- Lambda probe open ring spanner set - 3337-



Removing

– Remove engine cover panel ⇒ page 82 .

WARNING

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

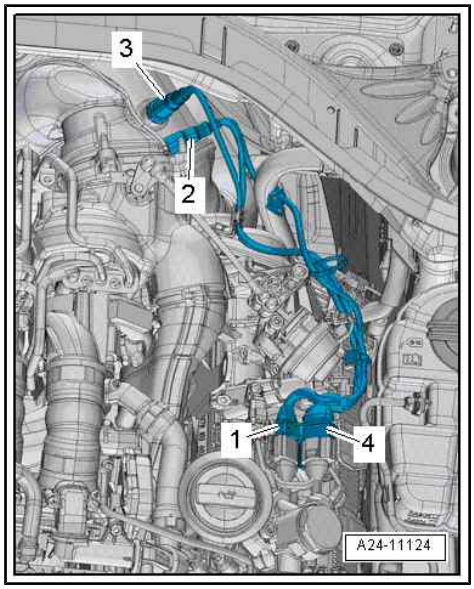
- *The engine cover panel must always be fitted before the bonnet is closed.*
- *If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.*

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– Detach electrical connectors one after the other from bracket, unplug connectors and move electrical wiring clear:

1 - For Lambda probe after catalytic converter - G130-

4 - For Lambda probe 2 - G108-



Note

All cable ties which are released or cut open when removing must be fitted in the same position when installing.

– Unscrew Lambda probes:

2 - Lambda probe 2 - G108- using ring spanner -3337/7-

3 - Lambda probe after catalytic converter - G130- using ring spanner -3337/3-

Installing

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

Note

- *Threads of new Lambda probes are already coated with assembly paste; the paste must not get into the slots on the probe body.*
- *In the case of a used Lambda probe grease only the thread with high-temperature paste. The paste must not get into the slots on the Lambda probe body. High-temperature paste ⇒ Electronic parts catalogue*
- *When installing, the Lambda probe wire must always be reattached at the same locations to prevent it from coming into contact with the exhaust pipe.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*
- *Fit all cable ties in the original positions when installing.*

WARNING

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

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

Tightening torques

- ⇒ “8.1 Exploded view - Lambda probe”, page 422
- ⇒ “2.2 Exploded view - hose connections for charge air system”, page 346

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9 Engine control unit

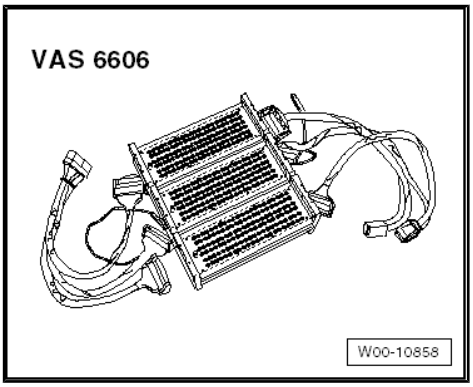
⇒ “9.1 Wiring and component check”, page 427

⇒ “9.2 Removing and installing engine/motor control unit J623 ”, page 428

9.1 Wiring and component check

Special tools and workshop equipment required

- Isolator box, 198-pin - VAS 6606/1-1-



- Isolator box, 198-pin - VAS 6606/1-2-
- Isolator box, 198-pin - VAS 6606/1-3-
- Sheets -VAS 6606/1-1-
- Sheets -VAS 6606/2-1-
- Sheets -VAS 6606/3-1-
- Set of cables -VAS 6606/7-1- and -VAS 6606/7-2-

Note

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- *Always make sure that the cables are properly connected.*
- *Do not use damaged or worn tools and accessories.*
- *Observe operating instructions.*

– Connect both cable sets -VAS 6606/7-1- and -VAS 6606/7-2- to the three isolator boxes -VAS 6606- .

– Use the following sheets:

- -VAS 6606/1-1- for isolator box, 198-pin - VAS 6606/1-1-
- -VAS 6606/2-1- for isolator box, 198-pin - VAS 6606/1-2-
- -VAS 6606/3-1- for isolator box, 198-pin - VAS 6606/1-3-

Note

Make sure that all plug-in bridges are inserted completely in all isolator boxes.

– Connect earth strap to an isolator box and to an earth point on the vehicle.

– Remove engine control unit ⇒ page 428 .

– Connect engine control unit to cable set -VAS 6606/7-1- .

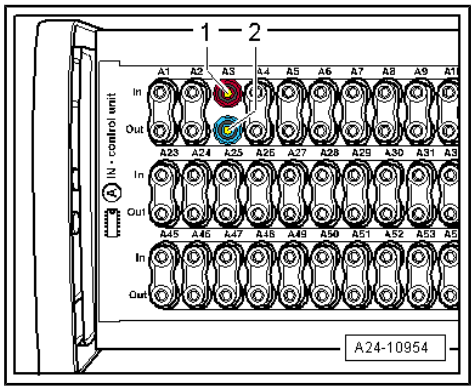
– Connect vehicle wiring harness to cable set -VAS 6606/7-2- .

The connection on the engine control unit consists of a large and a small connector.

The large connector has 105 pins and is assigned to the sheets for the isolator box marked “A 1 to A 105”.

The small connector has 91 pins and is assigned to the sheets for the isolator box marked “B 1 to B 91”.

When a push-in bridge is pulled out, the corresponding wiring connection is disconnected.



Note

- *The “In” contact -1- (red socket) leads to the engine control unit.*
- *The “Out” contact -2- (blue socket) leads to the wiring harness.*

– Carry out test as described in appropriate repair procedures.

Installing engine control unit

Installation is performed in the reverse sequence.

The procedure required after connecting the new engine control unit is described in the Guided Fault Finding or Guided Functions.

Note

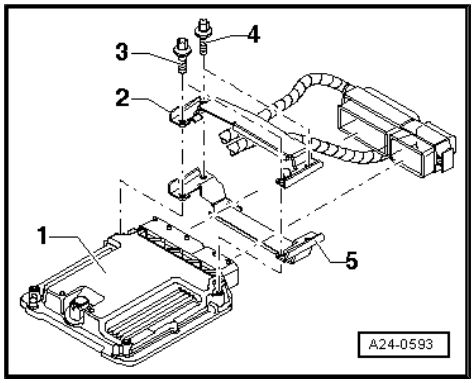
After completion of the Guided Fault Finding routine, the tester will attempt to erase the event memories of all control units. If this is not successful, the remaining events saved in the memories must be dealt with so that all event memory entries can be erased.

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9.2 Removing and installing engine/motor control unit - J623-

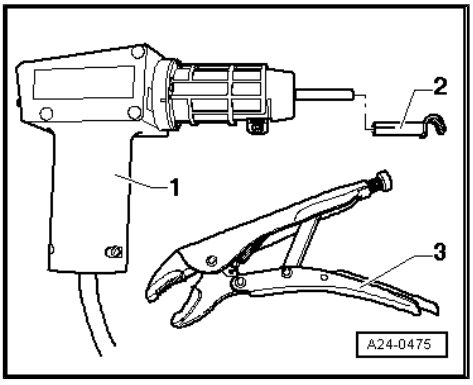
Note

- *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 metal locking plate 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).*



Special tools and workshop equipment required

- Hot air blower - VAS 1978/14A- -item 1- with shrink element for hot air blower - VAS 1978/15A- -2- from wiring harness repair set - VAS 1978B-



- Small mole grips -3-

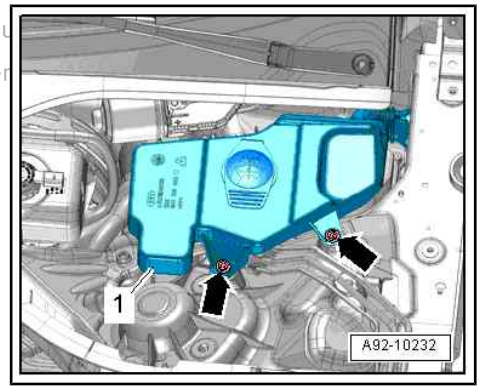
Removing

– When renewing engine control unit, select diagnosis object “Replace engine control unit” in “Guided Functions” mode of vehicle diagnostic tester .

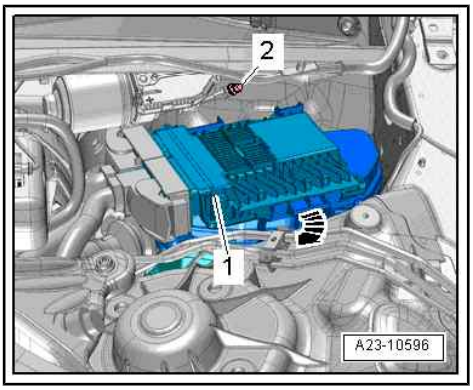
– Switch off ignition.

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– Unscrew bolts -arrows- and pull filler neck -1- out of washer fluid reservoir and through opening in body to right side.



– Release catch -arrow- and detach engine control unit - J623- -item 1-.



Note

Disregard -item 2-.

Perform the following work steps if a protective housing is fitted:

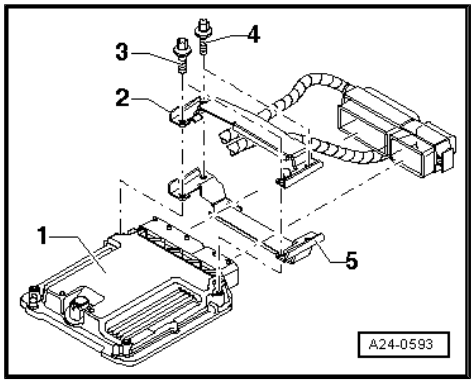
Caution

Wiring, connectors, insulation and control units can be burnt and damaged.

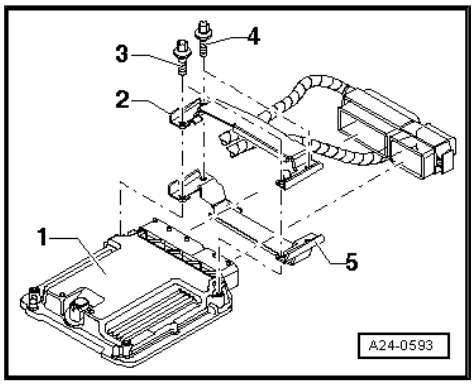
- ***Keep exactly to the following procedure. Observe the instructions for operating the hot air blower.***

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-.

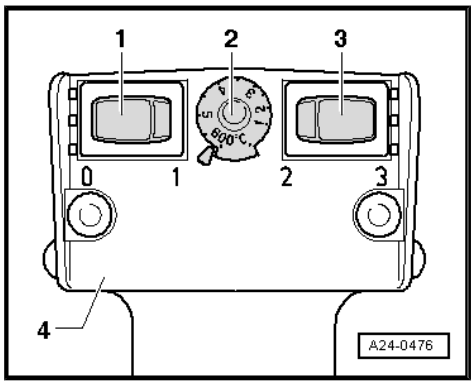
The threads of the two shear bolts -4- which are not screwed into the engine control unit are secured with locking fluid. To unscrew these two bolts, the threads must therefore be heated with the hot air blower.



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.

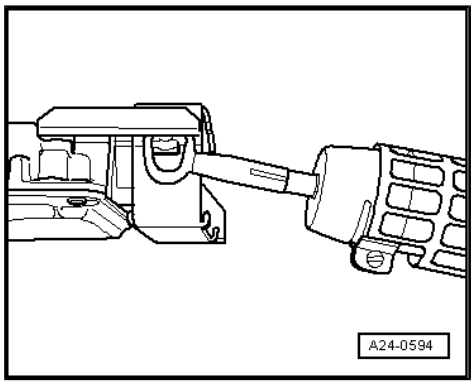


WARNING

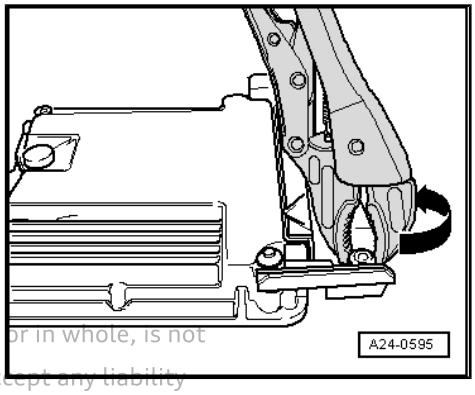
The shear bolts and protective housing also become very hot when heating the threads of the locking mechanism. Take care to avoid burns. It is also important to ensure that only the thread is heated and none of the surrounding components if at all possible. These should be covered if necessary.

– Apply heat to the threads of the shear bolts on the connector side for approx. 25 to 30 seconds.

– Unscrew shear bolts using mole grips (see arrow in illustration).



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– The two shear bolts screwed into the engine control unit do not need to be heated. They should be removed without being heated.
– Detach protective housing from control unit connectors.
– Release connectors on engine control unit and unplug connectors.

Installing

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

– After installation, the protective housing must be re-fitted on the engine control unit - J623- .
– Clean threaded holes for shear bolts to remove any residue from locking fluid. This can be done using a thread tap.

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– Always use new shear bolts.
– Install filler neck for washer fluid reservoir ⇒ Electrical system; Rep. gr. 92 ; Windscreen washer system; Exploded view - windscreen washer system .

After installing a new engine control unit, the following operation must be performed:

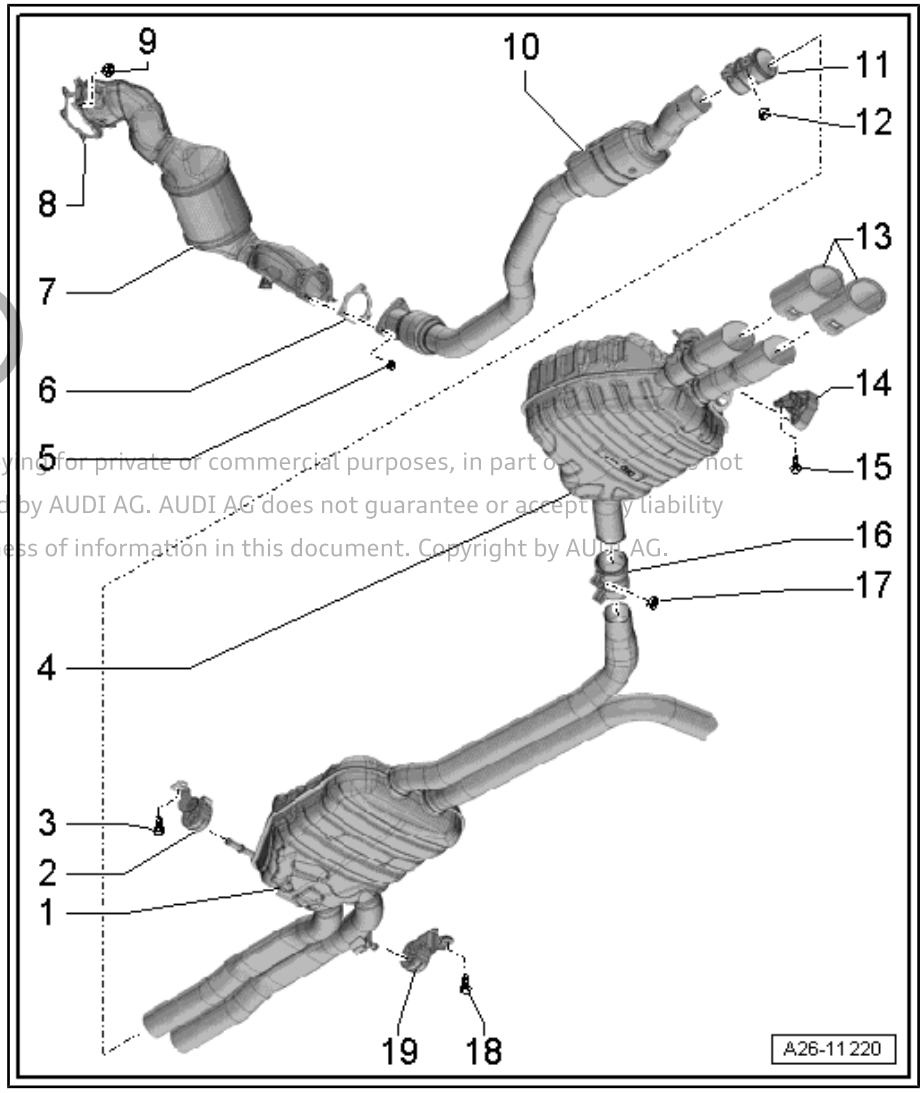
– Activate engine control unit via a vehicle diagnostic tester in “Guided Functions” mode, “Replace engine control unit”.

26 – Exhaust system

1 Exhaust pipes/silencers

⇒ “1.1 Exploded view - silencers”, page 432
⇒ “1.2 Separating exhaust pipes/silencers”, page 435
⇒ “1.3 Removing and installing front silencers”, page 436
⇒ “1.4 Removing and installing silencer”, page 437
⇒ “1.5 Stress-free alignment of exhaust system”, page 438
⇒ “1.6 Checking exhaust system for leaks”, page 439

1.1 Exploded view - silencers



1 - Centre silencer

- ❑ Combined in one unit with rear silencers as original equipment. Can be renewed separately for repair purposes
- ❑ Removing and installing ⇒ page 437
- ❑ Cutting point ⇒ page 435
- ❑ Align exhaust system so it is free of stress ⇒ page 438

2 - Mounting

- ❑ Renew if damaged
- ❑ Check preload ⇒ “1.5 Stress-free alignment of exhaust system”, page 438

3 - Bolt

- ❑ 20 Nm

4 - Rear silencer

- ❑ Combined in one unit with centre silencer as original equipment. Can be renewed separately for repair purposes
- ❑ Removing and installing ⇒ page 437
- ❑ Cutting point ⇒ page 435
- ❑ Align exhaust system so it is free of stress ⇒ page 438

5 - Nut

- ❑ Renew
- ❑ Coat threads with high-temperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue
- ❑ 23 Nm

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6 - Gasket

- ❑ Renew

7 - Catalytic converter

- ❑ Protect against knocks and impact
- ❑ Removing and installing ⇒ page 440
- ❑ Mounting components ⇒ page 434

8 - Gasket

- ❑ Renew

9 - Nut

- ❑ Renew
- ❑ Coat threads with high-temperature paste; for high-temperature paste refer to ⇒ Electronic parts catalogue
- ❑ 23 Nm

10 - Front silencer

- ❑ With flexible joint; do not bend flexible joint more than 10° – otherwise it can be damaged
- ❑ Removing and installing ⇒ page 436
- ❑ Align exhaust system so it is free of stress ⇒ page 438

11 - Clamp (front)

- ❑ Installation position ⇒ page 434
- ❑ Push onto front silencer as far as stop
- ❑ Before tightening, align exhaust system so it is free of stress ⇒ page 438
- ❑ Tighten bolted connections evenly

12 - Nut

- ❑ 23 Nm

13 - Trim

- ❑ For tailpipes
- ❑ Only on Audi S6/S7
- ❑ Slide onto tailpipes as far as stop

14 - Mounting

- ❑ Renew if damaged
- ❑ Check preload ⇒ “1.5 Stress-free alignment of exhaust system”, page 438

15 - Bolt

- ❑ 23 Nm

16 - Clamp (rear)

- ❑ For separate replacement of centre and rear silencers
- ❑ Installation position ⇒ page 434
- ❑ Before tightening, align exhaust system so it is free of stress ⇒ page 438
- ❑ Tighten bolted connections evenly

17 - Nut

- ❑ 23 Nm

18 - Bolt

- ❑ 23 Nm

19 - Mounting

- ❑ Renew if damaged
- ❑ Check preload ⇒ “1.5 Stress-free alignment of exhaust system”, page 438

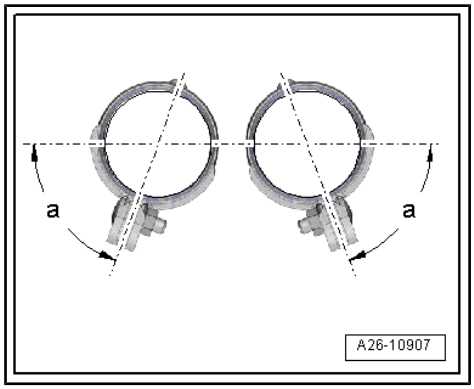
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Installation position of front clamps

– Install clamps so that the bolt ends do not protrude beyond bottom of clamp.

• Installation position: bolted connections face outwards.

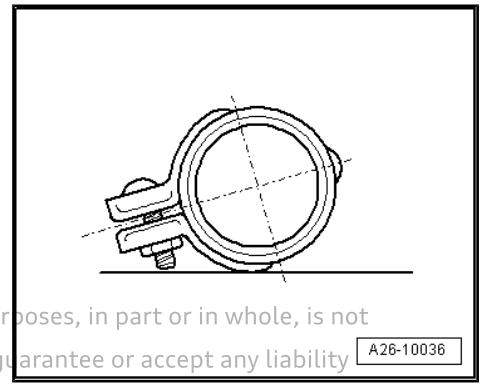
• Angle -α- = 45°



Installation position of rear clamps

– Install clamps so that the bolt ends do not protrude beyond bottom of clamp.

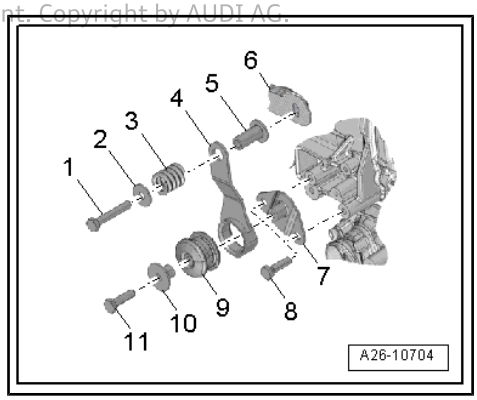
• Installation position: bolted connections face forwards.



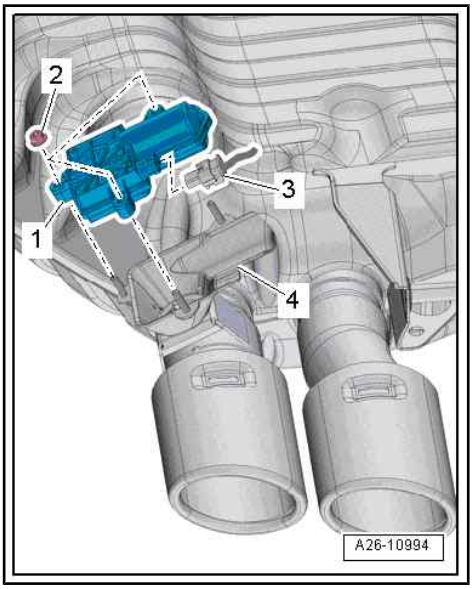
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Mounting components

1 - Bolt, 23 Nm
2 - Washer
3 - Compression spring
4 - Bracket
5 - Spacer sleeve
6 - Front silencer (left-side)
7 - Bracket
8 - Bolt, 23 Nm
9 - Buffer
10 - Spacer sleeve
11 - Bolt, 23 Nm



Exhaust flap control unit - tightening torque



Note

Renew nuts.

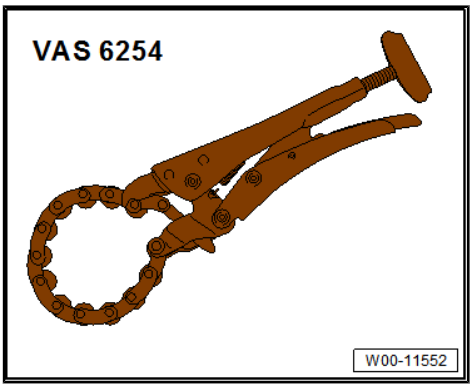
– Tighten nuts -2- to 3 Nm.

1.2 Separating exhaust pipes/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.

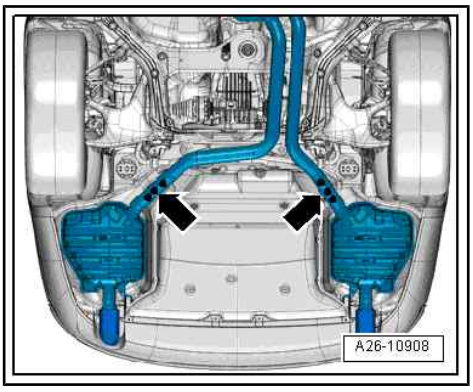
Special tools and workshop equipment required

- Chain pipe cutter - VAS 6254-



Procedure

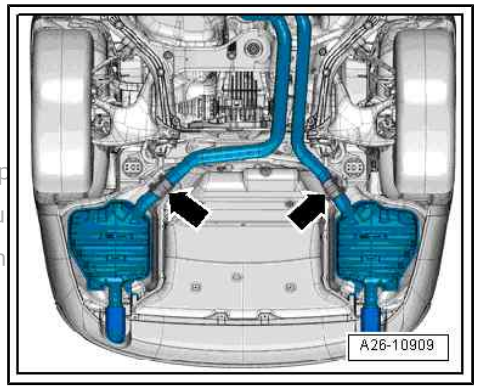
– Cut through exhaust pipes at right angles at the positions marked -arrows- using chain pipe cutter - VAS 6254- .



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– Position centre of clamps -arrows- over cutting location.

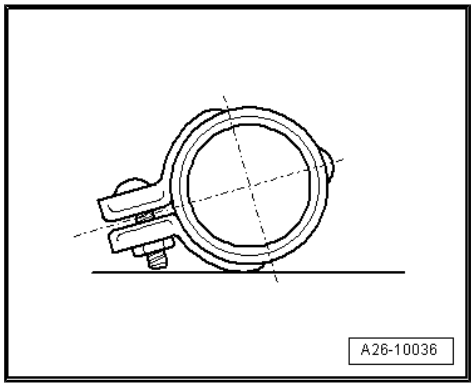
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– Install clamps so that the bolt ends do not protrude beyond bottom of clamp.

• Installation position: bolted connections face forwards.

– Align the exhaust system so it is free of stress ⇒ page 438 .



Tightening torques

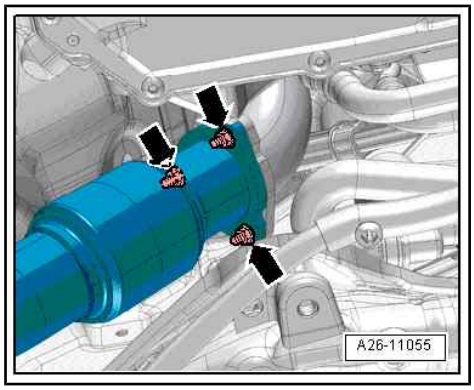
◆ ⇒ “1.1 Exploded view - silencers”, page 432

1.3 Removing and installing front silencers

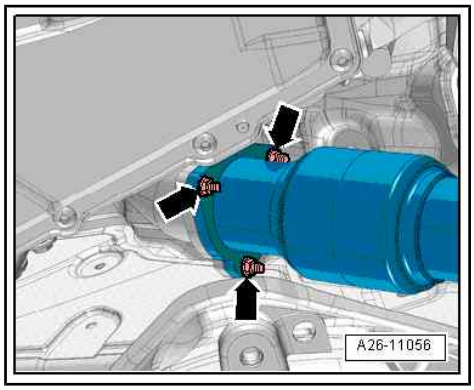
Removing

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

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



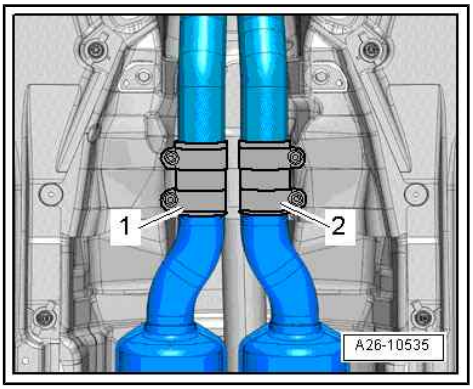
– Unscrew nuts -arrows- for front silencer (right-side).



Caution

Risk of damage to flexible joints in front silencer.

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



– Release and push back clamp -1- or -2- and detach relevant front silencer.

Installing

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

Note

Renew gaskets and self-locking nuts.

– Align the exhaust system so it is free of stress ⇒ page 438 .

Tightening torques

- ⇒ “1.1 Exploded view - silencers”, page 432
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Exploded view - noise insulation

1.4 Removing and installing silencer

Removing

– Remove cross piece ⇒ General body repairs, exterior; Rep. gr. 66 ; Strips / trim panels / extensions; Exploded view - heat shield .

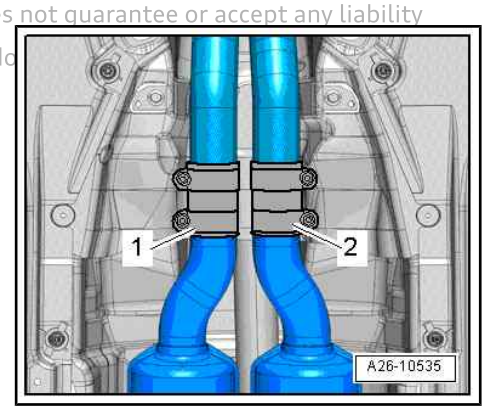
– If fitted, remove diagonal struts ⇒ Running gear, axles, steering; Rep. gr. 42 ; Subframe .

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Caution

Risk of damage to flexible joints in front silencer.

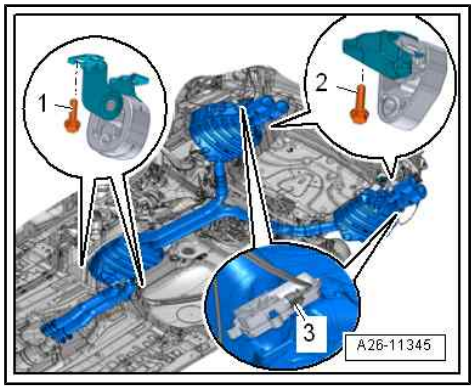
- ***Do NOT bend the flexible joints in the front silencer more than 10°.***



– Release clamps -1 and 2- and push to rear.

– Tie front silencers up to underbody.

– Unplug electrical connector (left and right) -3-.



WARNING

Risk of accident caused by weight of silencers.

- *A second mechanic is required for removal of the silencers.*

– Unscrew bolts -1, 2- and remove silencer.

Installing

Installation is carried out in reverse sequence.

Tightening torques

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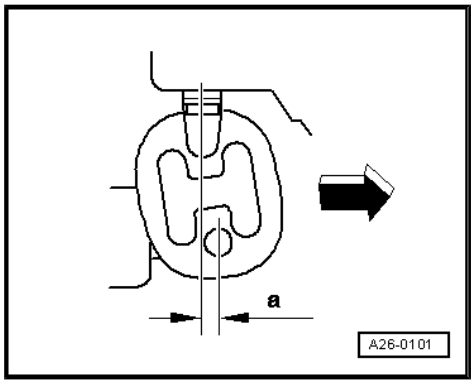
- ⇒ "1.1 Exploded view - silencers", page 432
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Strips / trim panels / extensions; Exploded view - heat shield
- ⇒ Running gear, axles, steering; Rep. gr. 42 ; Subframe

1.5 Stress-free alignment of exhaust system

Procedure

- The exhaust system must be aligned when it is cool.

Vehicles without clamps between centre silencer and rear silencers

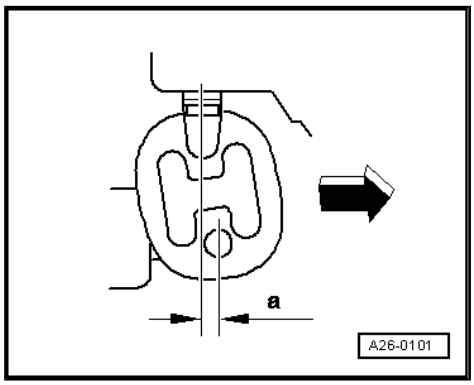


– Loosen bolted connections on front clamps.

– Push exhaust system towards front of vehicle -arrow- until mountings in front of centre silencer are preloaded by -a- = 6 ... 10 mm.

– Tighten bolted connections on clamps evenly.

Vehicles with clamps between centre silencer and rear silencers



Note

On a vehicle with clamps fitted between the centre silencer and rear silencers, it is also necessary to align the centre silencer.

– Loosen bolted connections on front and rear clamps.

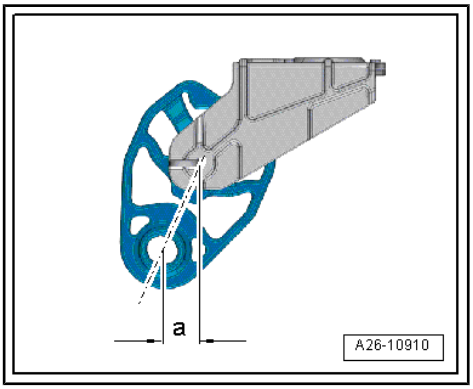
– Push exhaust system towards front of vehicle -arrow- until mountings in front of centre silencer are preloaded by -a- = 6 ... 10 mm.

– Tighten bolted connections on front clamps evenly.

– Push rear section of exhaust system towards front of vehicle so that mountings (rear) for rear silencers are preloaded by -a- = 11 ... 15 mm.
– Align rear silencer so it is horizontal.
– Tighten bolted connections on rear clamps evenly.

Tightening torques

◆ ⇒ “1.1 Exploded view - silencers”, page 432



1.6 Checking exhaust system for leaks

– Start the engine and run at idling speed.
– Plug tailpipes during leak test (e.g. with cloth or plugs).
– Listen for noise at connections between cylinder head/exhaust manifold, exhaust manifold/front exhaust pipe, etc. to locate any leaks.
– Rectify any leaks that are found.

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2 Emission control system

⇒ “2.1 Removing and installing catalytic converter”, page 440

⇒ “2.2 Removing and installing exhaust flap control unit J883 / exhaust flap control unit 2 J945 ”, page 443

2.1 Removing and installing catalytic converter

Note

- *The catalytic converter for cylinder bank 1 (right-side) is located on the left side of the vehicle.*
- *The catalytic converter for cylinder bank 2 (left-side) is located on the right side of the vehicle.*

Removing

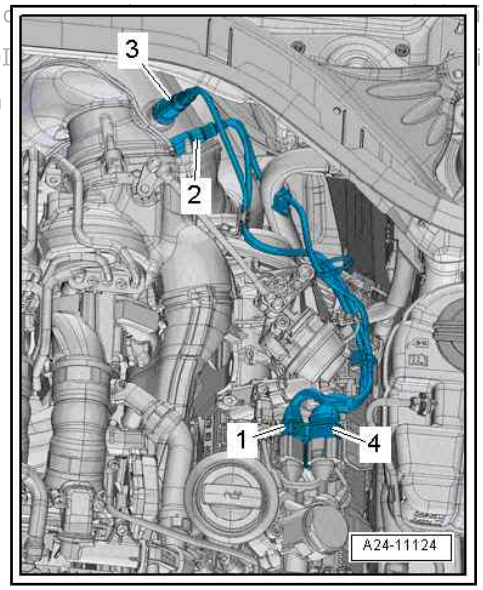
– Remove plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .

– Remove front silencer on both sides ⇒ page 436 .

– Remove Lambda probe 2 - G108- ⇒ page 424 .

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

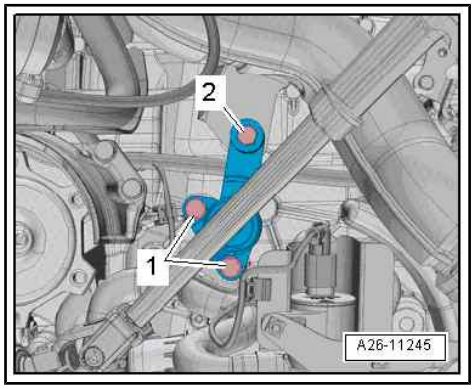
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Note

Disregard items -2 and 4-.

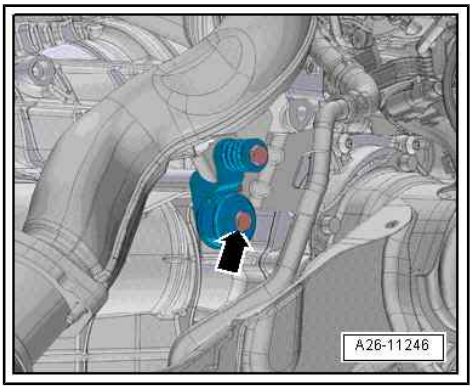
– Remove bolt -2- on mounting for catalytic converter on left side of vehicle.



Note

- *Illustration shows fitting location on a vehicle with dual clutch gearbox 0B5.*
- *Disregard -item 1-.*

– Remove bolt -arrow- on mounting for catalytic converter on right side of vehicle.

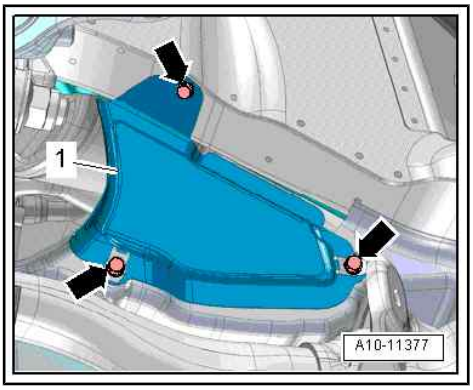


Note

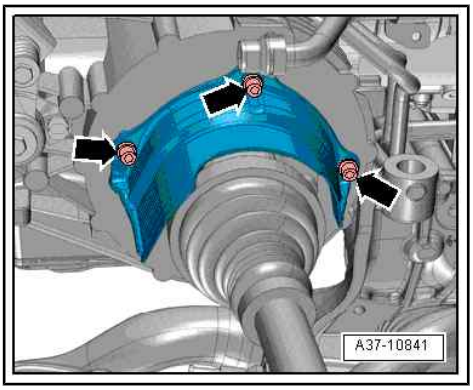
Illustration shows fitting location on a vehicle with dual clutch gearbox 0B5.

Catalytic converter, cylinder bank 2:

– Remove bolts -arrows- and detach heat shield (right-side) -1-.



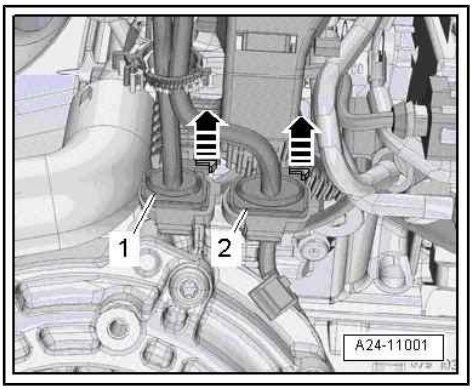
– Remove bolts -arrows- and detach heat shield for drive shaft (right-side).



– Detach electrical connectors from bracket one after the other; release catches -arrows- to unplug connectors and move electrical wiring clear:

2 - For Lambda probe 2 after catalytic converter - G131-

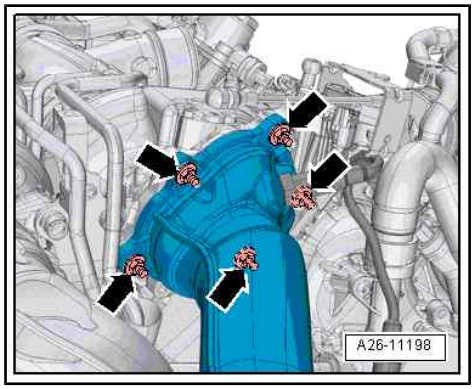
1 - For Lambda probe - G39-



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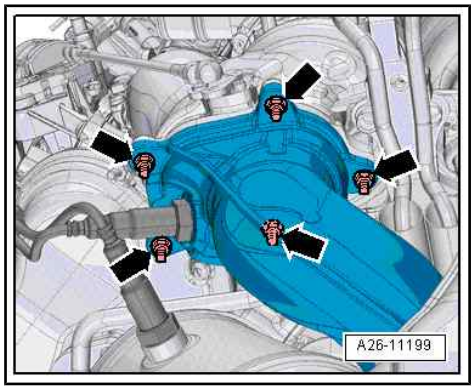
Both sides (continued):

– Unscrew nuts -arrows- on cylinder bank 1 (right-side) and push catalytic converter on left side of vehicle towards rear.



– Unscrew nuts -arrows- on cylinder bank 2 (left-side) and push catalytic converter on right side of vehicle towards rear.

– First detach catalytic converter on left side of vehicle, then on right side.



Installing

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

Note

Renew gaskets and self-locking nuts.

– Install electrical wiring ⇒ Electrical system; Rep. gr. 97 ; Relay carriers, fuse carriers, electronics boxes; Overview of fitting locations - relay carriers, fuse carriers, electronics boxes and ⇒ Current flow diagrams, Electrical fault finding and Fitting locations.

– Install Lambda probe 2 - G108- ⇒ page 424 .

– Install plenum chamber partition panel ⇒ General body repairs, exterior; Rep. gr. 50 ; Bulkhead; Exploded view - plenum chamber partition panel .

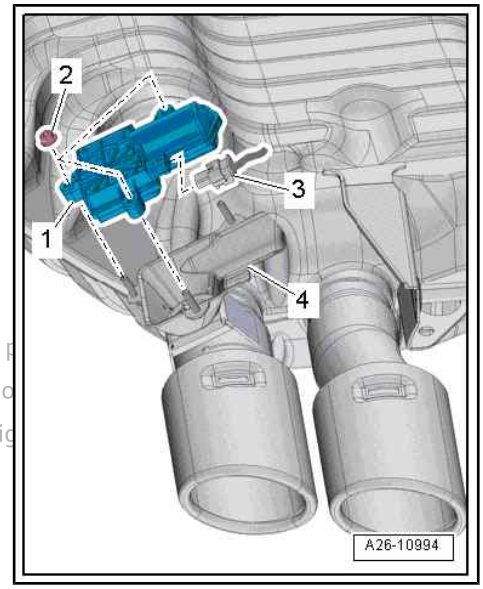
Tightening torques

- ⇒ “1.1 Exploded view - silencers”, page 432
- ⇒ Running gear, axles, steering; Rep. gr. 40 ; Drive shaft; Exploded view - drive shaft
- Heat shield ⇒ Running gear, axles, steering; Rep. gr. 40 ; Subframe; Exploded view - subframe

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2.2 Removing and installing exhaust flap control unit - J883- / exhaust flap control unit 2 - J945-

Removing



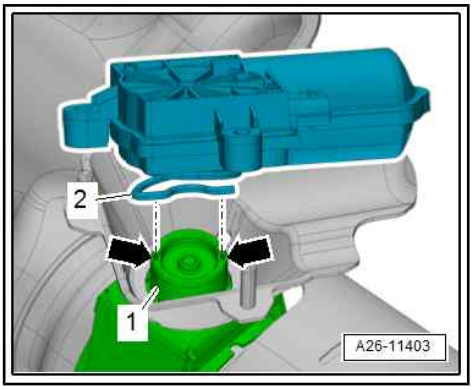
Note

- *Exhaust flap control unit 2 -J945- is installed on the left side of the vehicle (as seen in direction of travel).*
- *Exhaust flap control unit -J883- is installed on the right side of the vehicle (as seen in direction of travel).*
- *The following instructions describe the removal and installation procedures for exhaust flap control unit 2 -J945- on the left side. The procedure for the right side is similar.*

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– Unplug electrical connector -3-.
– Lower rear exhaust system -4-.
– Remove nuts -2- and detach exhaust flap control unit -1-.

Installing



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

Note

Renew nuts.

– Move exhaust flap control unit into installation position.
• Spring -2- must engage in grooves on exhaust flap -1-.

Tightening torques

- ⇒ Fig. ""Exhaust flap control unit - tightening torque"" , page 435

3 Secondary air system

⇒ “3.1 Exploded view - secondary air system”, page 444

⇒ “3.2 Removing and installing secondary air pump motor V101 ”, page 445

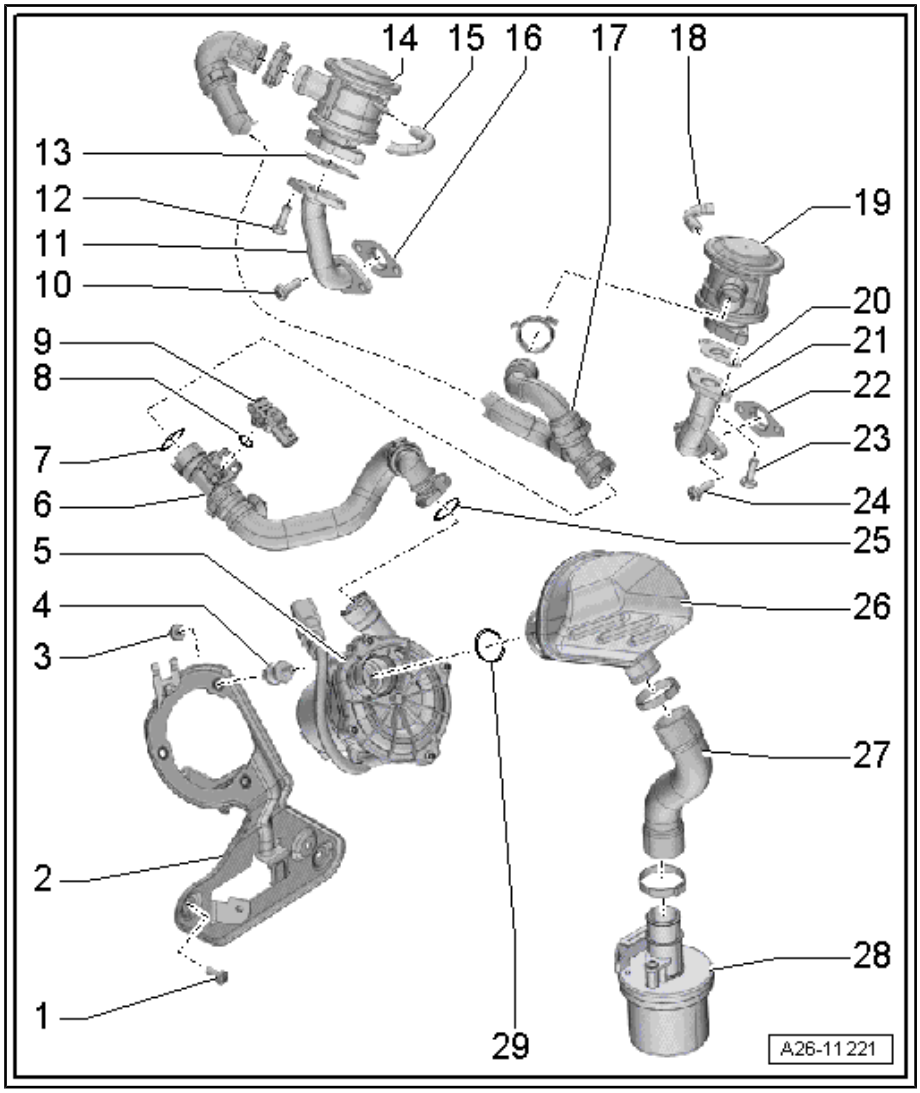
⇒ “3.3 Checking secondary air inlet valve”, page 447

⇒ “3.4 Removing and installing combination valve”, page 449

⇒ “3.5 Removing and installing sender 1 for secondary air pressure G609 ”, page 449

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3.1 Exploded view - secondary air system



1 - Bolt
- ❑ 9 Nm

2 - Bracket
- ❑ For secondary air pump motor - V101-

3 - Nut
- ❑ 9 Nm

4 - Bonded rubber bush

5 - Secondary air pump motor - V101-
- ❑ Fitting location: At front right in engine compartment below longitudinal member
- ❑ Removing and installing ⇒ page 445
- ❑ Check in `Guided Fault Finding` ⇒ Vehicle diagnostic tester

6 - Pipe
- ❑ For secondary air

7 - O-ring
- ❑ Renew

8 - O-ring
- ❑ Renew

9 - Sender 1 for secondary air pressure - G609-
- ❑ Removing and installing ⇒ page 449

10 - Bolt
- ❑ 9 Nm

11 - Connecting flange

12 - Bolt
- ❑ 9 Nm

13 - Gasket
- ❑ Renew

14 - Combination valve for secondary air system (right-side)
- ❑ Fitting location: at front of cylinder head

- ❑ Checking ⇒ page 447
- ❑ Removing and installing ⇒ page 449

15 - Vacuum hose

16 - Gasket

- ❑ Renew

17 - Hose

- ❑ For secondary air
- ❑ To combination valves for secondary air inlet

18 - Vacuum hose

19 - Combination valve for secondary air system (left-side)

- ❑ Fitting location: at front of cylinder head
- ❑ Checking ⇒ page 447
- ❑ Removing and installing ⇒ page 449

20 - Gasket

- ❑ Renew

21 - Connecting flange

22 - Gasket

- ❑ Renew

23 - Bolt

- ❑ 9 Nm

24 - Bolt

- ❑ 9 Nm

25 - O-ring

- ❑ Renew

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26 - Resonator

27 - Hose

- ❑ For secondary air

28 - Air cleaner

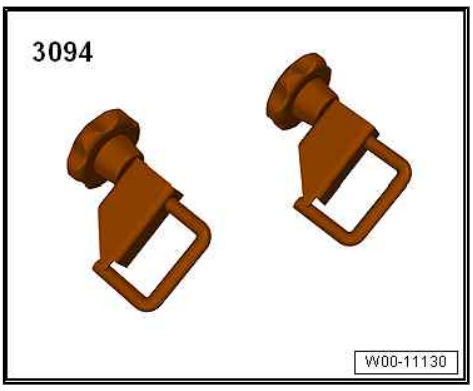
29 - O-ring

- ❑ Renew

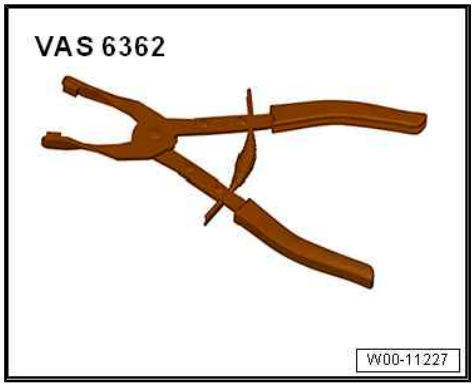
3.2 Removing and installing secondary air pump motor - V101-

Special tools and workshop equipment required

- ♦ Hose clamps, up to 25 mm - 3094- for Audi RS 6/RS 7



♦ Hose clip pliers - VAS 6362- for Audi RS 6/RS 7

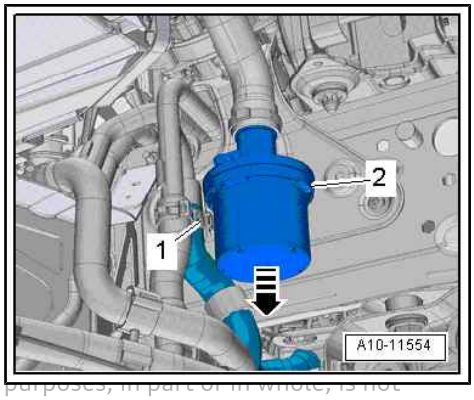


Removing

– Remove front wheel (left-side) ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres .

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

– Detach air cleaner -2- from bracket -arrow-.



Note

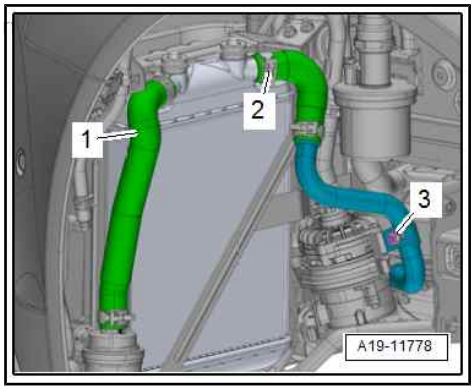
Disregard -item 1-.

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Audi RS 6/RS 7:

– Remove nut -3- and move coolant pipe.

– Clamp off coolant hose -1- with hose clamp, up to 25 mm - 3094- .



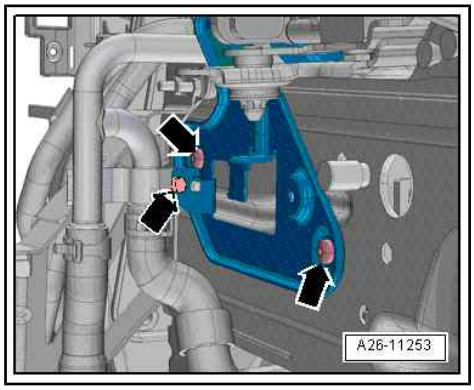
Note

Place a cloth underneath to catch escaping coolant.

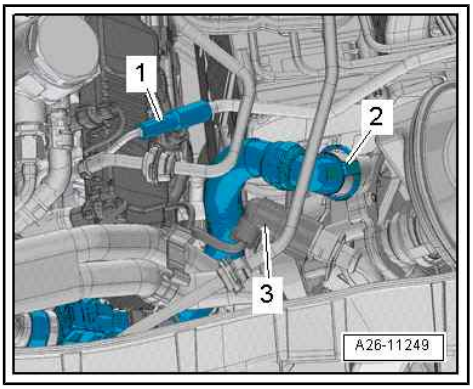
– Clamp off coolant hose using hose clamp up to 25 mm - 3094- , release hose clip -2- and disconnect hose.

All vehicles (continued):

– Remove bolts -arrows-.



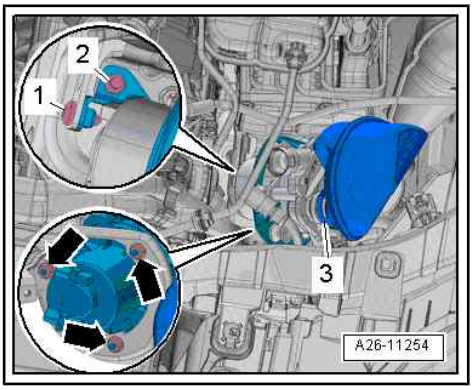
– Detach electrical connector -3- from bracket and unplug.
– Press release tabs and disconnect secondary air hoses.



Note

Disregard -item 1-.

– Press release tabs -3- and detach resonator with air cleaner.
– Remove bolt -1- and nut -2- and push secondary air pump motor - V101- with bracket slightly to left side.
– Remove nuts -arrows- and detach secondary air pump.



Installing

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

Note

- *Fit new O-rings.*
- *Secure all hose connections with the correct type of hose clips (same as original equipment) ⇒ Electronic parts catalogue .*

– Check coolant level ⇒ page 256 .

Tightening torques

- ⇒ “3.1 Exploded view - secondary air system”, page 444
- ⇒ General body repairs, exterior; Rep. gr. 66 ; Wheel housing liners; Exploded view - wheel housing liner (front)
- ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres

3.3 Checking secondary air inlet valve

Special tools and workshop equipment required

- Hand vacuum pump - VAS 6213-



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Procedure

- Vacuum hoses and hose connections do not leak.
- Vacuum hoses are not clogged.

– Remove engine cover panel ⇒ page 82 .

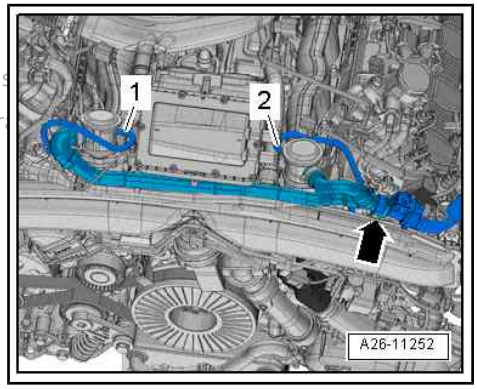
WARNING

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

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

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– Detach vacuum hose -1- or -2- leading to relevant combination valve.



Note

Illustration shows the hose to combination valve (right-side).

– Connect hand vacuum pump - VAS 6213- to vacuum hose of combination valve to be checked.

– Press release tabs and detach secondary air hose -arrow- to front from bracket.

– Blow lightly into secondary air hose with your mouth (do not use compressed air). Fit auxiliary hose if secondary air hose is not long enough.

• The combination valves for secondary air should be closed; it should not be possible to blow through the hose.

– Operate hand vacuum pump.

• The combination valve should open; it should now be possible to blow through the hose.

– Renew combination valve for secondary air system if it does not open ⇒ page 449 .

Assembling

Assembly is performed in reverse sequence; note the following:

Note

Fit new O-ring.

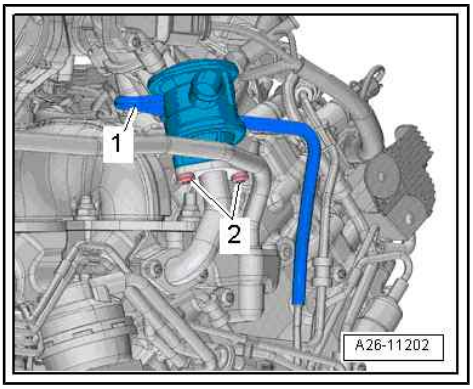
WARNING

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

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

3.4 Removing and installing combination valve

Removing



Note

The removal and installation procedures are described for cylinder bank 2 (left-side).

– Remove charge air cooler housing ⇒ page 346 .
– Disconnect vacuum hose -1-.
– Unscrew bolts -2- and detach combination valve for secondary air system.

Note

Disregard -item 1-.

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Installing

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

Note

Renew gasket.

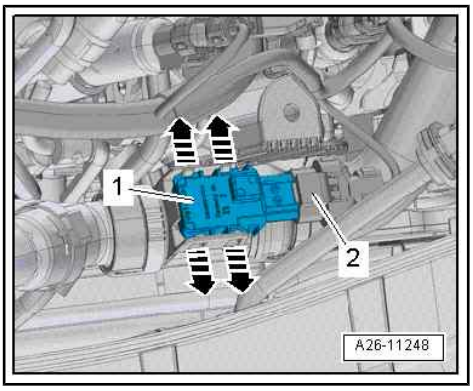
– Install charge air cooler housing ⇒ page 346 .

Tightening torques

◆ ⇒ “3.1 Exploded view - secondary air system”, page 444

3.5 Removing and installing sender 1 for secondary air pressure - G609-

Removing



– Unplug electrical connector -2-.
– Release catches -arrows- and detach sender 1 for secondary air pressure - G609- -item 1-.

Installing

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

Note

Fit new O-ring.

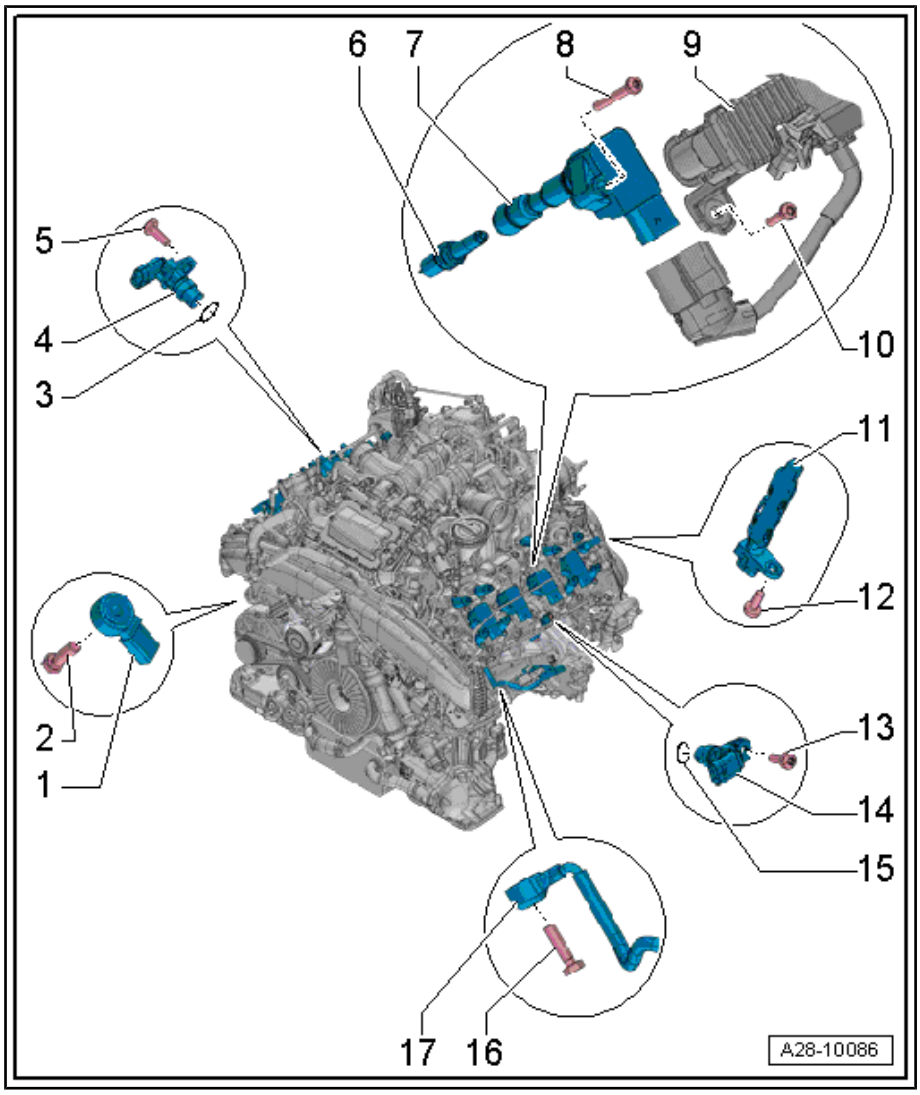
28 – Ignition system

1 Ignition system

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⇒ “1.1 Exploded view - ignition system”, page 450
⇒ “1.2 Test data - spark plugs”, page 451
⇒ “1.3 Removing and installing ignition coils with output stages”, page 452
⇒ “1.4 Removing and installing knock sensor”, page 456
⇒ “1.5 Removing and installing Hall senders”, page 460
⇒ “1.6 Removing and installing engine speed sender G28 ”, page 464

1.1 Exploded view - ignition system



1 - Knock sensor

- ❑ Cylinder bank 1 (right-side)
- ❑ Knock sensor 1 - G61- (front)
- ❑ Knock sensor 2 - G66- (rear)
- ❑ Removing and installing ⇒ page 456

2 - Bolt

- ❑ 25 Nm
- ❑ The tightening torque influences the function of the knock sensor

3 - O-ring

- ❑ Renew

4 - Hall sender

- ❑ Inlet side: Hall sender - G40-
- ❑ Removing and installing ⇒ page 460
- ❑ Exhaust side: Hall sender 3 - G300-
- ❑ Removing and installing ⇒ page 462

5 - Bolt

- ❑ 9 Nm

6 - Spark plug

- ❑ Change interval ⇒ Maintenance tables
- ❑ Tightening torque ⇒ Maintenance ; Booklet 411

7 - Ignition coil

- ❑ Removing and installing ⇒ page 452

8 - Bolt

- ❑ 9 Nm

9 - Cable guide

10 - Bolt

- ❑ 5 Nm

11 - Engine speed sender - G28-

- ❑ Removing and installing ⇒ page 464

12 - Bolt

- ❑ 9 Nm

13 - Bolt

- ❑ 9 Nm

14 - Hall sender

- ❑ Inlet side: Hall sender 2 - G163-
- ❑ Removing and installing ⇒ page 461
- ❑ Exhaust side: Hall sender 4 - G301-
- ❑ Removing and installing ⇒ page 461

15 - O-ring

- ❑ Renew

16 - Bolt

- ❑ 25 Nm
- ❑ The tightening torque influences the function of the knock sensor

17 - Knock sensor

- ❑ Cylinder bank 2 (left-side)
- ❑ Knock sensor 3 - G198- (front)
- ❑ Knock sensor 4 - G199- (rear)
- ❑ Removing and installing ⇒ page 456

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1.2 Test data - spark plugs

Test data		4.0 ltr. TFSI engine
Idling speed		Cannot be adjusted; regulated by idling speed stabilisation
Ignition timing		Not adjustable (determined by control unit)
Ignition system		Multi-coil system with 8 ignition coils (output stages integrated) connected directly to spark plugs via spark plug connectors
Spark plugs	Designations	⇒ Data sheets for exhaust emissions test
	Tightening torque	⇒ Maintenance ; Booklet 411
Firing order		1-5-4-8-6-3-7-2

1.3 Removing and installing ignition coils with output stages

⇒ "1.3.1 Removing and installing ignition coils with output stages, cylinder bank 1 (right-side)", page 452

⇒ "1.3.2 Removing and installing ignition coils with output stages, cylinder bank 2 (left-side)", page 454

1.3.1 Removing and installing ignition coils with output stages, cylinder bank 1 (right-side)

The ignition coils are easier to remove when the engine is warm. The grease used at the factory facilitates removal of the ignition coils and spark plug connectors when the engine is warm.

Special tools and workshop equipment required

- Silicone paste ⇒ Electronic parts catalogue

Removing

– Remove engine cover panel ⇒ page 82 .

WARNING

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

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

– Remove air cleaner housing ⇒ page 379 .

– Unplug electrical connectors and move wiring clear:

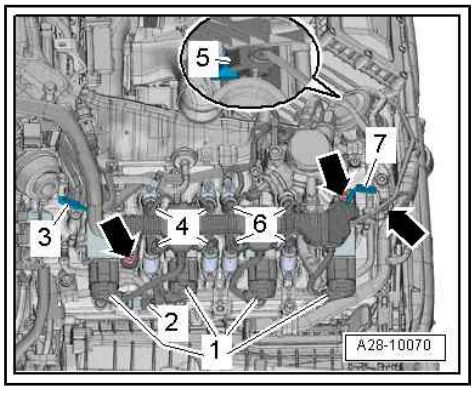
1 - For ignition coils -N70- , -N127- , -N291- and -N292-

2 - For Hall sender - G40-

4 - For inlet/exhaust cam actuators -F456- , -F457- , -F458- and -F459-

5 - For intake air temperature sender - G42-

6 - For inlet/exhaust cam actuators -F452- , -F453- , -F454- and -F455-



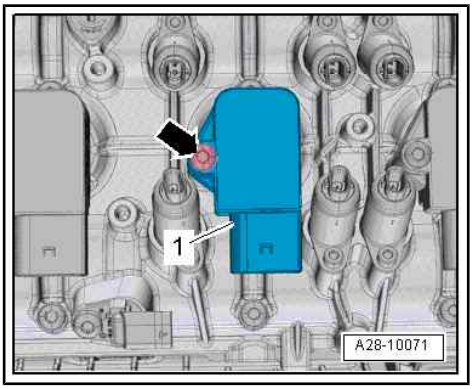
– Disconnect vacuum hoses -3 and 7-.

– Remove bolts -arrows-.

– Move earth wire clear and swivel wiring guide to rear.

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– Remove bolt -arrow- and pull off relevant ignition coil -1-.

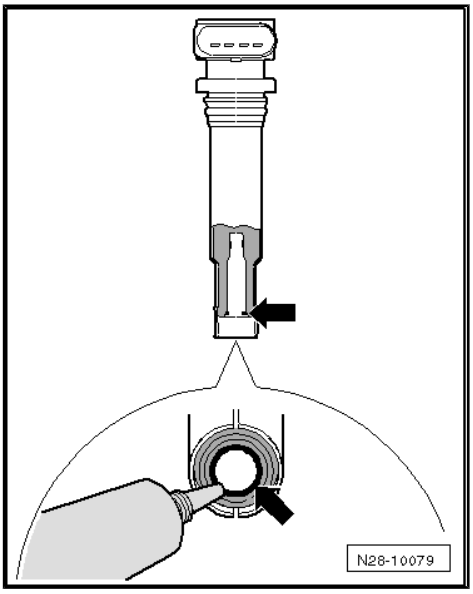


Installing

Caution

Ignition coils can be damaged irreparably if the wrong lubricant is used.

- ***Use only the approved silicone paste ⇒ Electronic parts catalogue .***



– Align ignition coils with recesses in cylinder head cover.

– Push ignition coils onto spark plugs by hand (do NOT attempt to knock in coils with any kind of tool).

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

Note

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

– Install air cleaner housing ⇒ page 379 .

– Install air ducts with screw-type clips.

WARNING

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

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

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Tightening torques

- ⇒ “1.1 Exploded view - ignition system”, page 450
- ⇒ “2.2 Exploded view - hose connections for charge air system”, page 346

1.3.2 Removing and installing ignition coils with output stages, cylinder bank 2 (left-side)

The ignition coils are easier to remove when the engine is warm. The grease used at the factory facilitates removal of the ignition coils and spark plug connectors when the engine is warm.

Special tools and workshop equipment required

- Silicone paste ⇒ Electronic parts catalogue

Removing

– Remove engine cover panel ⇒ page 82 .

WARNING

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

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

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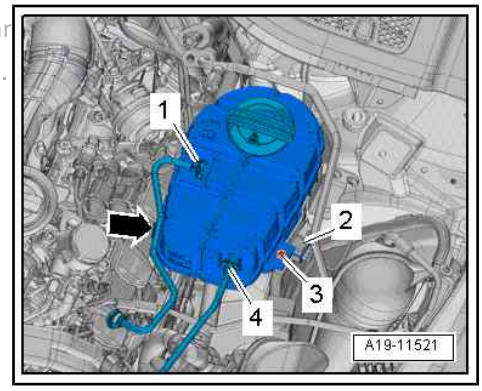
– Release retaining clips -1, 4- and disconnect coolant hoses.

– Move coolant hose -arrow- clear.

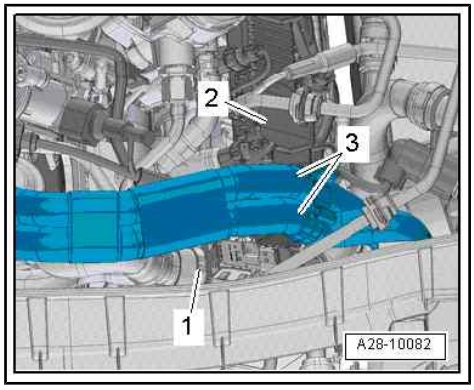
– Unplug electrical connector -2-.

– Remove bolt -3-.

– Lift coolant expansion tank out of bracket and push towards front.

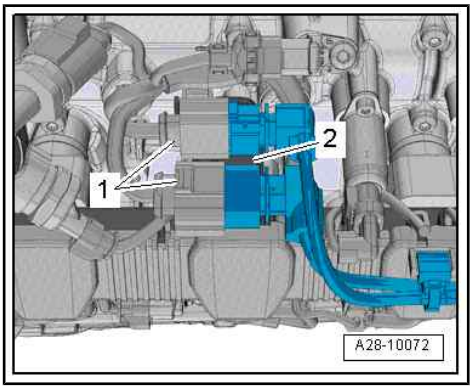


– Move coolant hoses -3- and air hose -1- clear at wiring guide -2-.

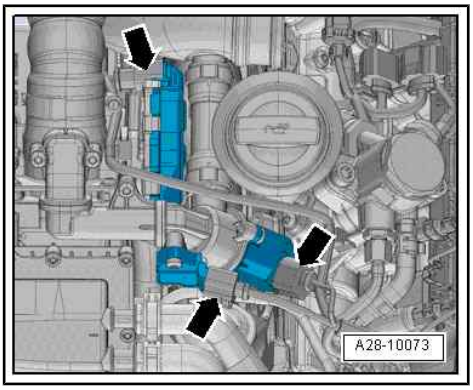


– Take electrical connectors -1- out of bracket -2-, unplug connectors and move wiring clear.

– Lift out bracket.



– Unplug electrical connectors -arrows- and move wiring clear.



– Unplug electrical connectors and move wiring clear:

3 - For inlet/exhaust cam actuators -F464- , -F465- , -F466- and -F467-

4 - For fuel metering valve 2 - N402-

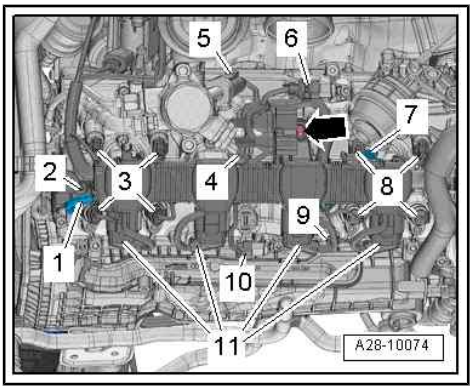
5 - For fuel pressure sender for low pressure - G410-

6 - For Hall sender 4 - G301-

8 - For inlet/exhaust cam actuators -F476- , -F477- , -F478- and -F479-

10 - For Hall sender 2 - G163-

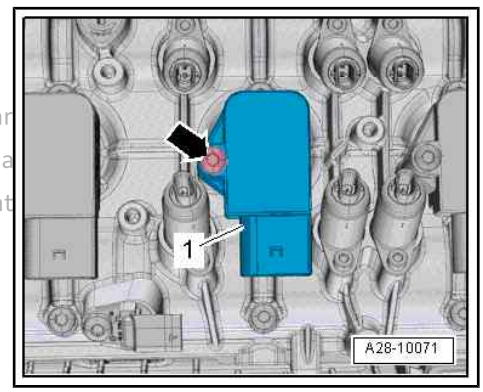
11 - For ignition coils -N323- , -N324- , -N325- and -N326-



– Disconnect vacuum hoses -1 and 7-.

– Remove bolts -2 and 9- and centre hex stud -arrow-, move earth wire clear and swivel wiring guide to rear.

– Remove bolt -arrow- and pull off relevant ignition coil -1-.



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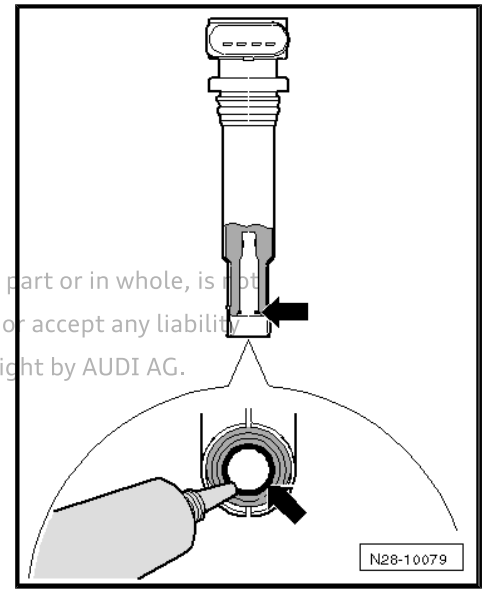
Installing

Caution

Ignition coils can be damaged irreparably if the wrong lubricant is used.

- *Use only the approved silicone paste ⇒ Electronic parts catalogue .*

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– Apply a thin bead of silicone paste all around end of sealing hose of ignition coil with output stage -arrow-.

– Align ignition coils with recesses in cylinder head cover.

– Push ignition coils onto spark plugs by hand (do NOT attempt to knock in coils with any kind of tool).

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

Note

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

– Install air ducts with screw-type clips ⇒ page 346 .

WARNING

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

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

Tightening torques

- ⇒ “1.1 Exploded view - ignition system”, page 450

1.4 Removing and installing knock sensor

⇒ “1.4.1 Removing and installing knock sensor 1 G61 ”, page 456

⇒ “1.4.2 Removing and installing knock sensor 2 G66 ”, page 457

⇒ “1.4.3 Removing and installing knock sensor 3 G198 ”, page 459

⇒ “1.4.4 Removing and installing knock sensor 4 G199 ”, page 459

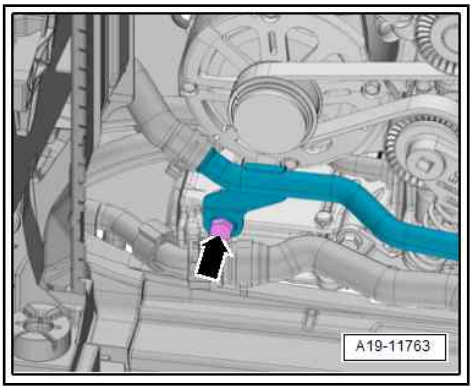
1.4.1 Removing and installing knock sensor 1 - G61-

Fitting location
⇒ “1.1 Overview of fitting locations - injection system”, page 355

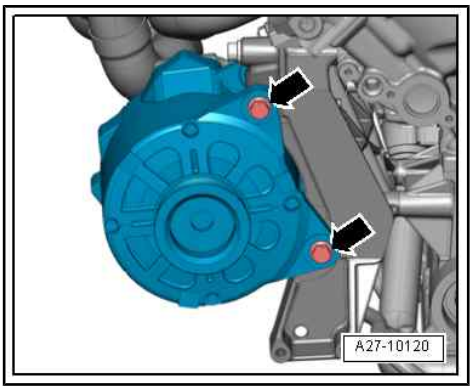
Removing

– Remove oil pressure switch -F22- / -F378- ⇒ page 231 .

– Remove bolt for coolant pipe (front).
– Remove poly V-belt tensioner ⇒ page 85 .

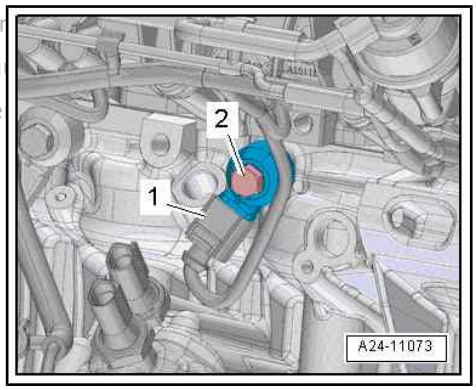


– Unscrew bolts -arrows- for alternator approx. 6 turns.
– Tap carefully on bolt heads with a hammer to release sliding bushes of alternator mountings.
– Remove bolts completely.
– If fitted, remove silencer for auxiliary heater ⇒ Auxiliary/supplementary heater; Rep. gr. 82 ; Auxiliary/supplementary heater; Removing and installing exhaust system .
– Press alternator as far as possible towards front.



– Unscrew bolt -2- and remove knock sensor 1 - G61-.
– Unplug electrical connector -1-.

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Installing

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

Note

The tightening torque influences the function of the knock sensor.

– Install oil pressure switch -F22- / -F378- ⇒ page 231 .
– Install poly V-belt tensioner ⇒ page 85 .

Tightening torques

- ⇒ “1.1 Exploded view - ignition system”, page 450
- ⇒ “3.1 Exploded view - coolant pipes”, page 278
- ⇒ Electrical system; Rep. gr. 27 ; Alternator; Exploded view - alternator
- ⇒ Auxiliary heater, supplementary heater; Rep. gr. 82 ; Auxiliary/supplementary heater; Exploded view - internal auxiliary/supplementary heater

1.4.2 Removing and installing knock sensor 2 - G66-

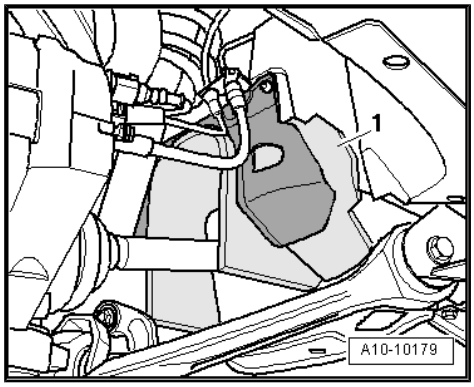
Fitting locations
⇒ “1.1 Overview of fitting locations - injection system”, page 355

Removing

– Remove front wheel (right-side) ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres .

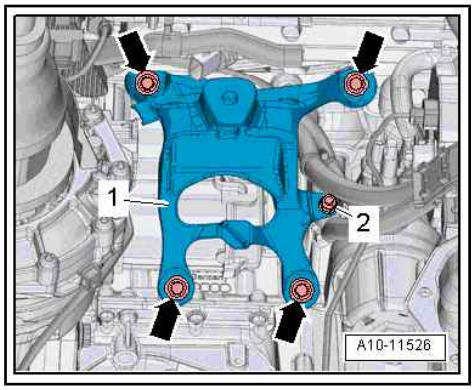
– Remove cover -1- for drive shaft in wheel housing (right-side).

– Remove engine mounting (right-side) ⇒ page 74 .



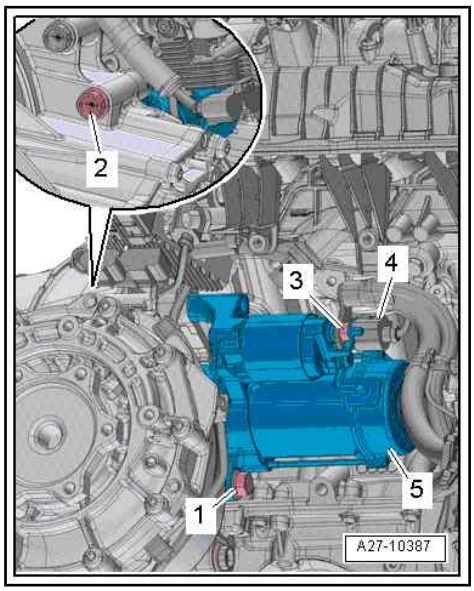
– Remove nut -2- and move earth wire clear.

– Remove bolts -arrows- and detach engine support -1- (right-side).



– Unplug electrical connector -4- from starter (push retainer to rear and press down release catch).

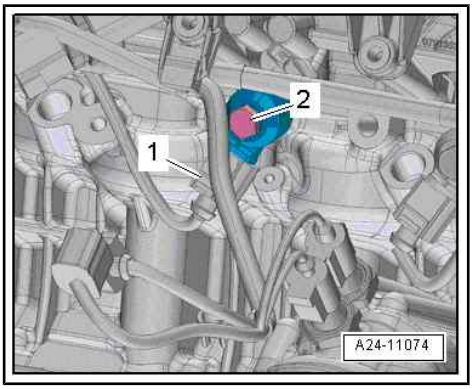
– Unfasten nut -3- and detach battery positive wire from solenoid switch.



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– Unplug electrical connector -1-.

– Unscrew bolt -2- and remove knock sensor 2 - G66- .



Installing

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

Note

The tightening torque influences the function of the knock sensor.

– Install engine support and engine mounting (right-side) ⇒ page 74 .

Tightening torques

- ⇒ “1.1 Exploded view - ignition system”, page 450
- ⇒ Running gear, axles, steering; Rep. gr. 44 ; Wheels, tyres

1.4.3 Removing and installing knock sensor 3 - G198-

Fitting locations
⇒ “1.1 Overview of fitting locations - injection system”, page 355

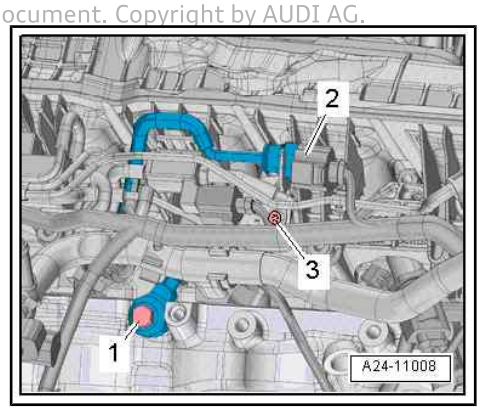
Removing

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– Remove air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket .

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

– Unscrew bolt -1- and remove knock sensor 3 - G198- .



Note

Disregard -item 3-.

Installing

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

Note

The tightening torque influences the function of the knock sensor.

– Install air conditioner compressor ⇒ Heating, air conditioning; Rep. gr. 87 ; Air conditioner compressor; Detaching and attaching air conditioner compressor at bracket .

Tightening torques

- ⇒ “1.1 Exploded view - ignition system”, page 450

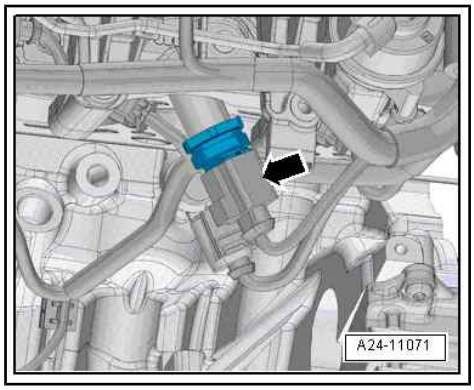
1.4.4 Removing and installing knock sensor 4 - G199-

Fitting locations
⇒ “1.1 Overview of fitting locations - injection system”, page 355

Removing

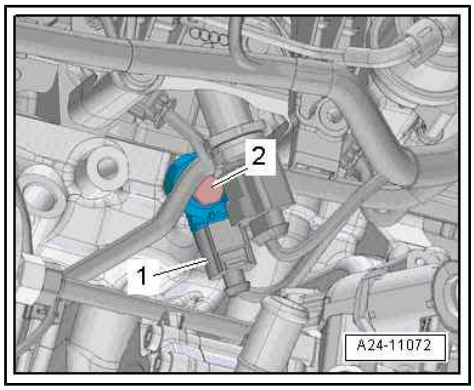
– Remove steering rack ⇒ Running gear, axles, steering; Rep. gr. 48 ; Steering rack; Removing and installing steering rack .

– Unplug electrical connector -arrow-.



– Remove bolt -2-.

– Detach knock sensor 4 - G199- and unplug electrical connector -1-.



Installing

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

Note

The tightening torque influences the function of the knock sensor.

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

Tightening torques

◆ ⇒ “1.1 Exploded view - ignition system”, page 450

1.5 Removing and installing Hall senders

⇒ “1.5.1 Removing and installing Hall sender G40 ”, page 460

⇒ “1.5.2 Removing and installing Hall senders G163 / G301 ”, page 461

⇒ “1.5.3 Removing and installing Hall sender 3 G300 ”, page 462

1.5.1 Removing and installing Hall sender - G40-

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Fitting locations
⇒ “1.1 Overview of fitting locations - injection system”, page 355

Removing

– Remove engine cover panel ⇒ page 82 .

WARNING

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

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

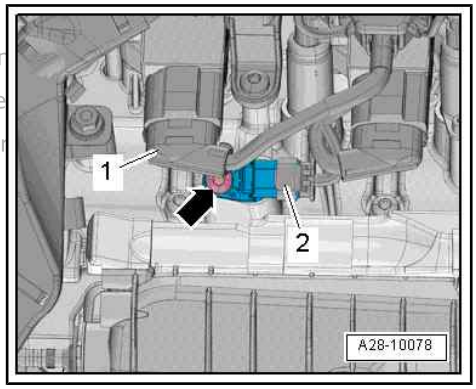
– Remove air filter element ⇒ Maintenance ; Booklet 411 .

– Unplug electrical connectors:

1 - For Ignition coil 4 with output stage - N292-

2 - For Hall sender - G40-

– Unscrew bolt -arrow- and remove Hall sender.



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Installing

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

WARNING

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

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

Tightening torques

- ⇒ “1.1 Exploded view - ignition system”, page 450

1.5.2 Removing and installing Hall senders - G163- / -G301-

Fitting locations
⇒ “1.1 Overview of fitting locations - injection system”, page 355

Removing

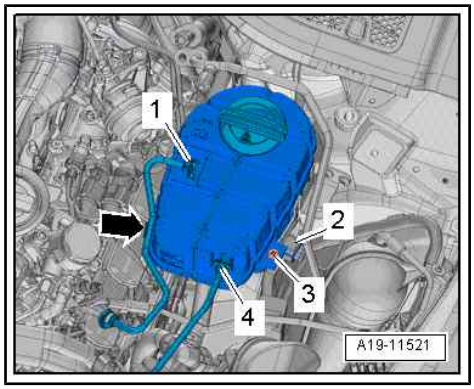
– Remove engine cover panel ⇒ page 82 .

WARNING

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

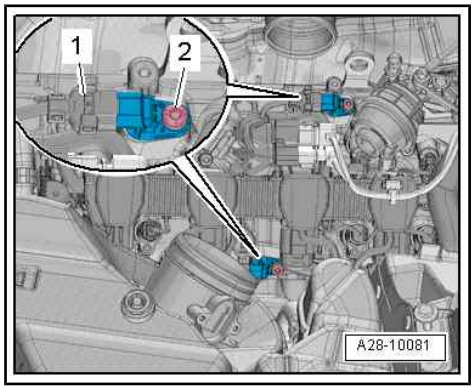
- *The engine cover panel must always be fitted before the bonnet is closed.*
- *If the engine cover panel is not fitted, it is not permissible to start or drive the vehicle with the bonnet closed.*

Hall sender 3 - G300- :



- Release retaining clips -1, 4- and disconnect coolant hoses.
- Move coolant hose -arrow- clear.
- Unplug electrical connector -2-.
- Remove bolt -3-.
- Lift coolant expansion tank out of bracket and push towards front.

Continuation for both Hall senders:



- Unplug relevant electrical connector -1-.
- Unscrew bolt -2- and detach relevant Hall sender.

Installing

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

Note

If Hall sender 3 - G300- was removed, coolant level must be checked ⇒ page 256 .

WARNING

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

- ***The engine cover panel must always be fitted before the bonnet is closed.***
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Tightening torques

- ⇒ “1.1 Exploded view - ignition system”, page 450

1.5.3 Removing and installing Hall sender 3 - G300-

Fitting locations
⇒ “1.1 Overview of fitting locations - injection system”, page 355

Removing

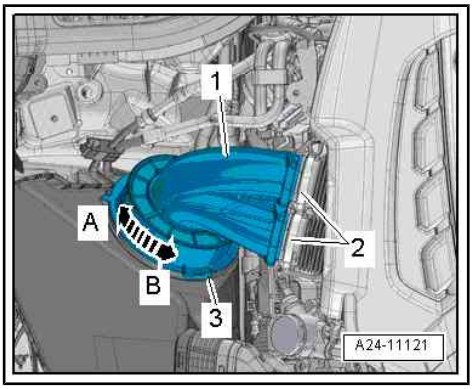
- Remove engine cover panel ⇒ page 82 .

WARNING

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

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

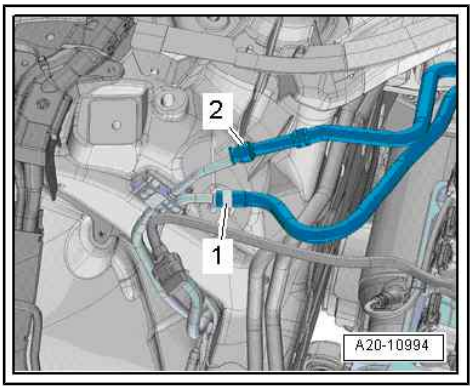
– Release hose clips -2- and detach air hoses.
– Release catch -3-, turn air cleaner (top section) -1- in anti-clockwise direction -arrow B- and detach it.



– Release hose clip -1- and disconnect hose from activated charcoal filter.

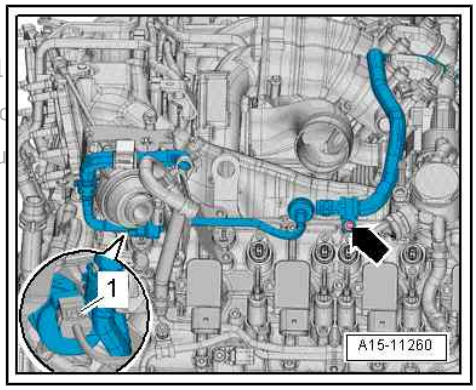
Note

Disregard -item 2-.

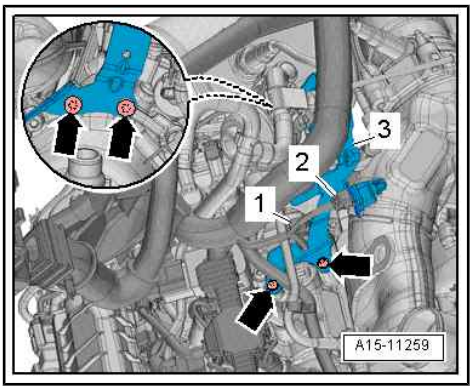


– Unplug electrical connector -1- at activated charcoal filter solenoid valve 1 - N80- .
– Remove bolt -arrow-.

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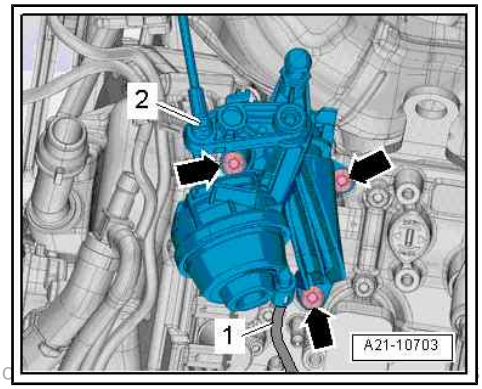


– Unplug electrical connectors -1, 2-.
– Remove bolts -arrows- and move bracket -3- with electrical wiring harness to one side.



– Disconnect vacuum hose -1-.

– Remove bolts -arrows- and place vacuum unit for turbocharger to one side.

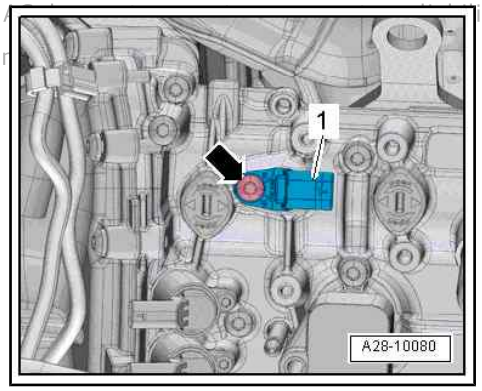


Note

Disregard -item 2-.

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– Unscrew bolt -arrow- and remove Hall sender -1-.



Installing

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

WARNING

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

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

Tightening torques

- ⇒ “1.1 Exploded view - ignition system”, page 450

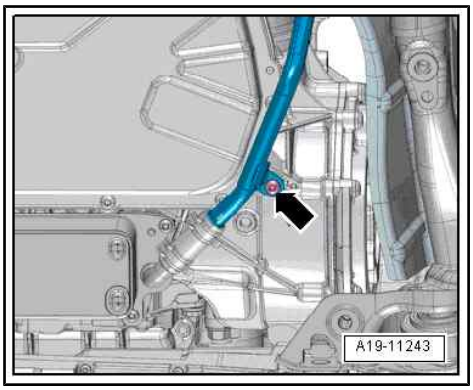
1.6 Removing and installing engine speed sender - G28-

Removing

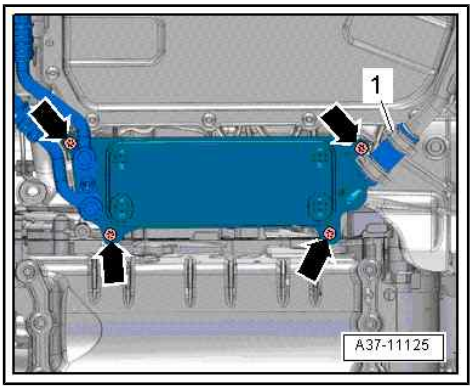
– Remove noise insulation (rear) ⇒ General body repairs, exterior; Rep. gr. 66 ; Noise insulation; Removing and installing noise insulation .

Vehicles with dual clutch gearbox 0B5:

– Remove bolt -arrow- for coolant pipe on gearbox (right-side).



– Remove bolts -arrows- and push ATF cooler slightly to one side.



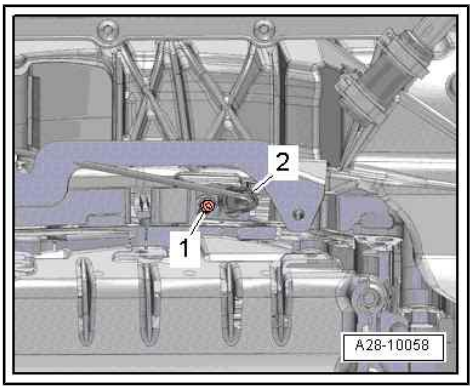
Note

Disregard -item 1-.

All vehicles (continued):

– Unplug electrical connector -2-.

– Unscrew bolt -1- and pull out engine speed sender - G28- .



Installing

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

– Install ATF cooler ⇒ Gearbox; Rep. gr. 34 ; ATF circuit; Removing and installing ATF cooler / ⇒ Gearbox; Rep. gr. 37 ; ATF circuit; Removing and installing ATF cooler .

– Install coolant pipe (right-side) on gearbox ⇒ page 296 .

Tightening torques

♦ ⇒ “1.1 Exploded view - ignition system”, page 450

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

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