

Workshop Manual OCTAVIA

**1.8-ltr./110 kW Engine,
Mechanical Components**

Supplement Overview for the Repair Manual **OCTAVIA**

Edition: 06.02

1.8 litre/110 kW engine, mechanics

Replaces the Supplement Overview - Edition: 04.01

Supplement	Edition	Subject	Article Number
	08.98	Basic Edition Workshop Manual	S00.5123.50.20
1	04.01	Supplement to Basic Edition	S00.5123.51.20
2	06.02	Changes to Rep. Gr. 10, 13, 15, 17 and 21	S02.5123.52.20
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* see the Service Manual for the 1.8 litre/92 kW engine, mechanics

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- * see the Service Manual for the 2.0 litre/85 kW engine, mechanics
- * see the Service Manual for the 1.8 litre/92 kW engine, mechanics

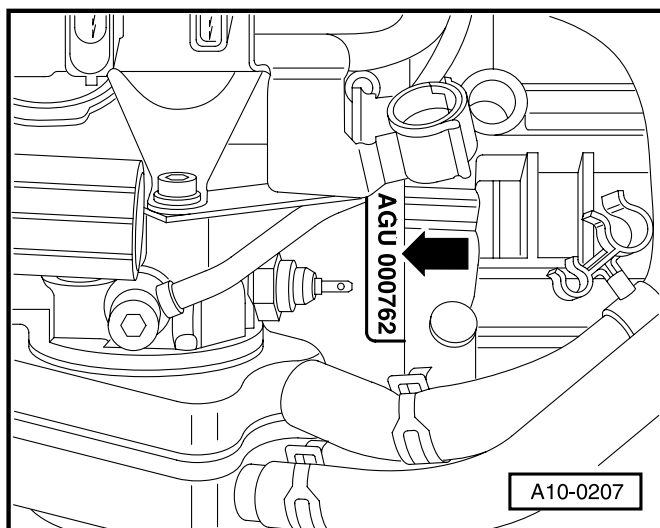
Technical data

Engine number

◀ The engine number („engine code“ and „consecutive number“) is located on the front of the engine/gearbox joint.

In addition, a sticker with „engine code“ and „consecutive number“ is affixed to the toothed belt guard.

The engine code is also listed on the vehicle data sticker.



Engine features

Engine codes		AGU	ARZ	AUM	ARX
Manufactured	from	02.98	05.99	08.00	09.00
	to		08.00		
Displacement	l	1.781	1.781	1.781	1.781
Power output	kW at rpm	110/5700	110/5700	110/5700	110/5700
Torque	Nm at rpm	210/1750... 4600	210/1750... 4600	210/1750... 4600	210/1750... 4600
Bore	Ø mm	81.0	81.0	81.0	81.0
Stroke	mm	86.4	86.4	86.4	86.4
Compression ratio		9.5 : 1	9.5 : 1	9.5 : 1	9.5 : 1
Fuel - RON	minimum	95 unleaded ¹⁾	95 unleaded ¹⁾	95 unleaded ¹⁾	95 unleaded ¹⁾
Fuel injection /ignition system		Motronic	Motronic	Motronic	Motronic
Knock control		yes	yes	yes	yes
Self-diagnosis		yes	yes	yes	yes
Lambda control		1 lambda probe	2 lambda probes	2 lambda probes	2 lambda probes
Catalytic converter		yes	yes	yes	yes
Turbocharging		yes	yes	yes	yes
Secondary air injection system		no	yes	yes	yes
Camshaft adjustment		no	no	yes	yes
Complies with emission limits		EU-2/D3 ²⁾	EU-2/D3 ²⁾	EU-4	EU-3

¹⁾ In exceptional cases at least 91 RON, although engine power output reduced.

²⁾ Applies to vehicles with automatic gearbox.

Code letters	AGU
Valve timing at 1 mm valve stroke and 0 mm valve clearance	
Inlet opens after TDC	18°
Inlet closes after BDC	28°
Exhaust opens before BDC	28°
Exhaust closes before TDC	8°

Removing and installing engine

Special tools, testers and aids required

- ◆ Workshop crane, (e.g. V.A.G 1202 A)
- ◆ Drip tray, (e.g. V.A.G 1306)
- ◆ Torque wrench
- ◆ Engine/gearbox jack, (e.g. V.A.G 1383 A)
- ◆ Pliers for spring strap clips
- ◆ Engine holder T10012
- ◆ Engine holder MP 1-202
- ◆ Holder MP 1-224
- ◆ Repair stand MP 9-101
- ◆ Suspension device MP 9-201
- ◆ Grease G 000 100
(models with manual gearbox)
- ◆ Hot bolt paste G 052 112 A3
- ◆ Bolt M10 x 25/8.8
- ◆ Cable straps
- ◆ Wire
- ◆ Adhesive tape

Removing engine

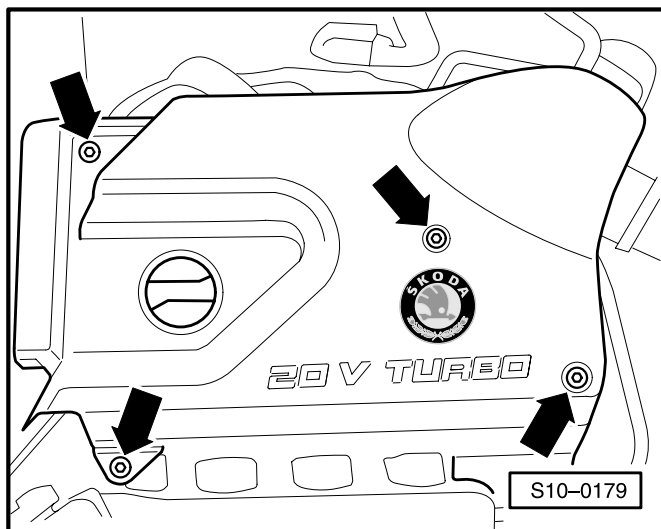
Notes:

- ◆ *The engine is lifted up and out together with the gearbox.*
- ◆ *All the cable straps which are detached or cut open when removing the engine, should be fitted on again at the same point when installing the engine.*
- ◆ *Hose connections are secured with screw-type, spring strap or collar clamps. Always replace collar clamps by spring strap clips or screw-type clips.*

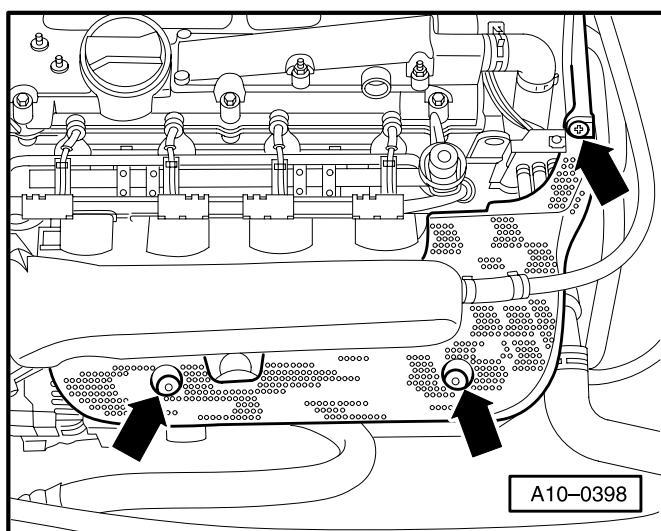
- ◆ Fuel hoses at the engine must be secured only with spring strap clips. It is not permitted to use collar clamps or screw-type clips.
- ◆ Ensure the connectors are plugged in at the correct point, pay attention to marking.

Procedure

- On models fitted with coded radio set, pay attention to coding; determine if necessary.
 - Switch ignition off and disconnect earth strap of battery.
 - Remove engine
⇒ Body Fitting Work; Repair Group 55.
- ◀ - Remove top engine trim panel -arrows-.

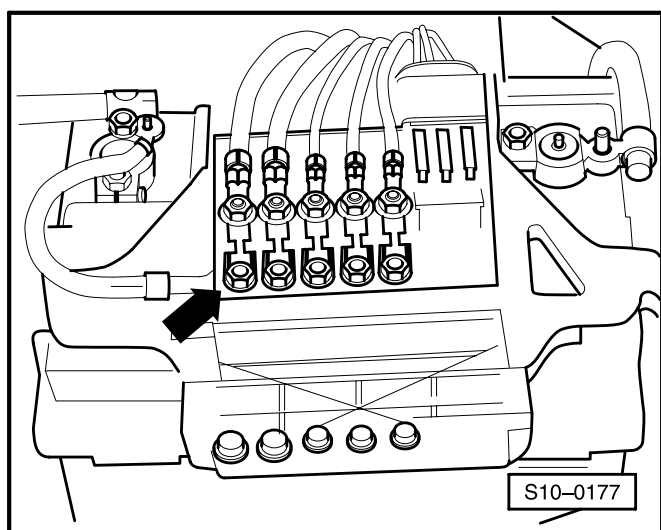


- ◀ - Remove intake manifold trim panel -arrows-

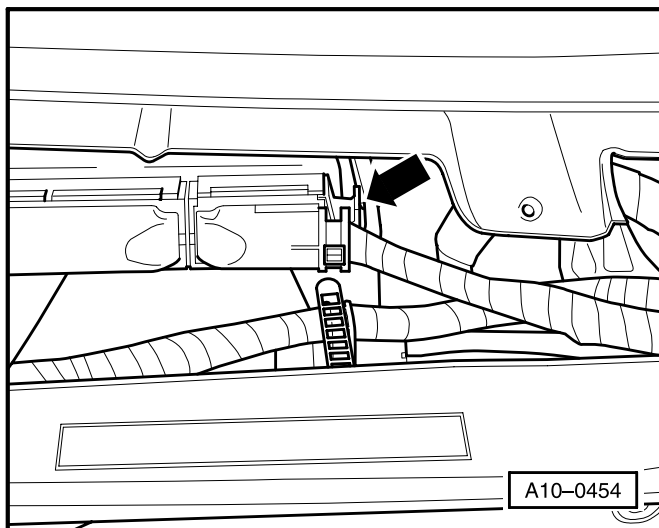


- Drain coolant
⇒ 1.8 l/92 kW Engine - Mechanical Components; Repair Group 19.

- ◀ - Open cover of fuse holder on battery and disconnect cable -arrow-.



- Remove battery and battery rack
⇒ Electrical System; Repair Group 27.
- Remove air filter together with intake hose
⇒ 1.8 l/110 kW Engine - Motronic Fuel Injection and Ignition System; Repair Group 23.
- Remove intake hose from air filter up to turbocharger (detach hoses and connectors as necessary) ⇒ page 21-1.

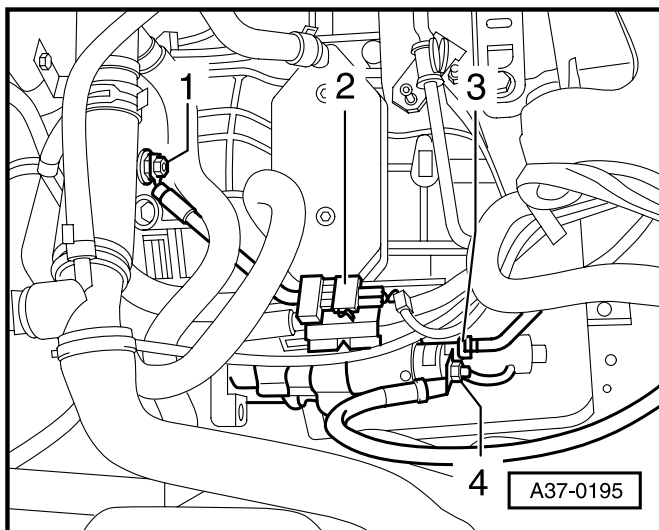


- Remove cover of plenum chamber
⇒ Body Fitting Work; Repair Group 66.

◀ - Unplug connector of engine control unit -arrow- and release electric cable from the clips in the water channel.

- Open cover of engine harness in right of engine compartment.

- Separate plug connections and cables from alternator
⇒ Electrical System; Repair Group 27.



◀ - Detach earth strap -1- from gearbox.

- Unplug connector -3- and detach cable -4- from starter.

- Separate plug connection -2- and pull it out of fixture.

- Unplug the following connectors:

- ♦ Plug connection for reversing light switch
- ♦ Plug connection to AC compressor (only on models fitted with AC)

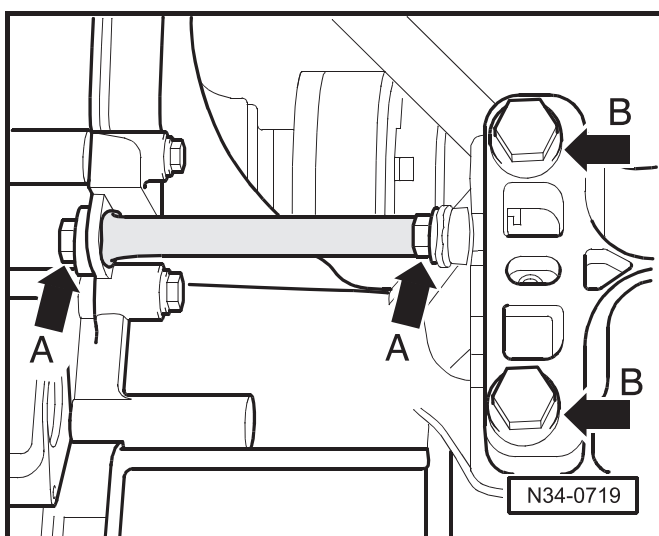
- Detach connector for main engine harness together with secondary engine harness from the fixture and unplug.

- Unclip engine harness from support, separate plug connections (if fitted) and suspend freely at engine.

- Remove cables of shift mechanism together with cable support and place down to the side
⇒ 5-Speed Manual Gearbox 02J; Repair Group 34.

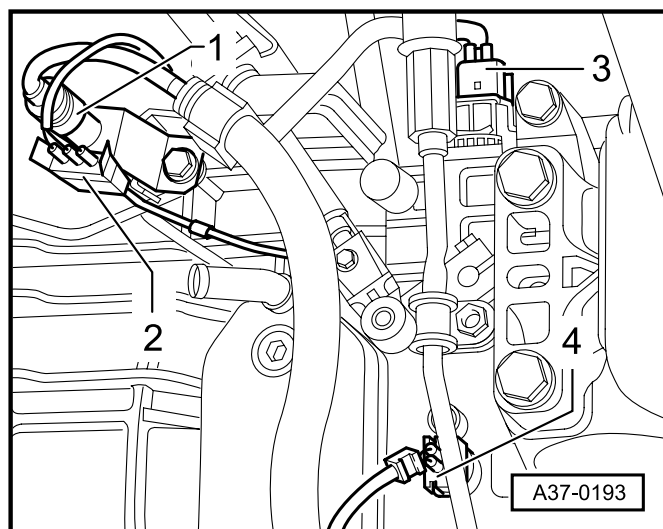
◀ - Unbolt gearbox support from gearbox mount -arrows A-.

- Remove slave cylinder, but do not separate hoses
⇒ 5-Speed Manual Gearbox 02J; Repair Group 30.



Note:

Do not depress clutch pedal!

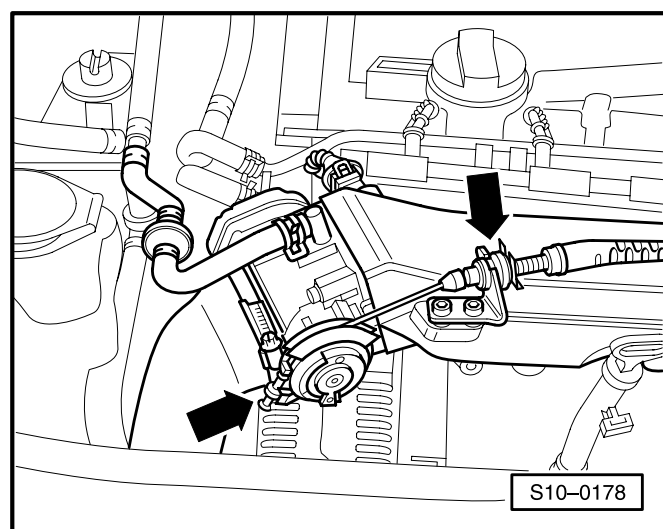


Models fitted with automatic gearbox

- ◀ - Unplug connectors:
 - 1 - to the solenoid valves
 - 2 - to vehicle speed sender -G68-
 - 3 - at multifunction switch -F125-
 - 4 - at wheel speed sender -G38-
- Take wiring loom out of the fixtures and place to the side.

Continued for all models

- Detach brake vacuum hose from brake servo unit and place down to the side.
- Detach coolant hose at bottom between engine and radiator ⇒ page 19-1.

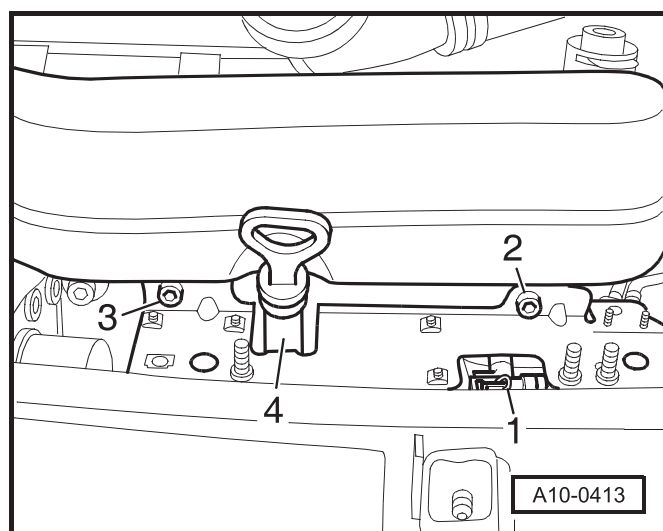


Models fitted with mechanical throttle control

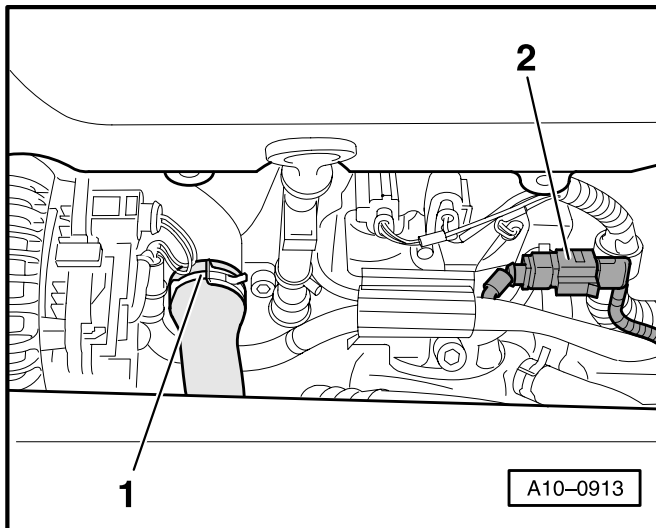
- ◀ - Detach throttle cable at throttle valve control unit and support at intake manifold -arrows- (do not remove push-in detent) and place to the side.

Models fitted with electronic throttle control and secondary air injection system

- Remove secondary air pipe from intake manifold bracket.



- ◀ - Unscrew bolts -2- and -3- and detach guide tube of dipstick -4- from fixture.
- Separate plug connection -1- for turbo-charger solenoid valve -N249 and secondary air inlet valve -N112 from bottom of fixture.
- Detach connected hoses from fixture.



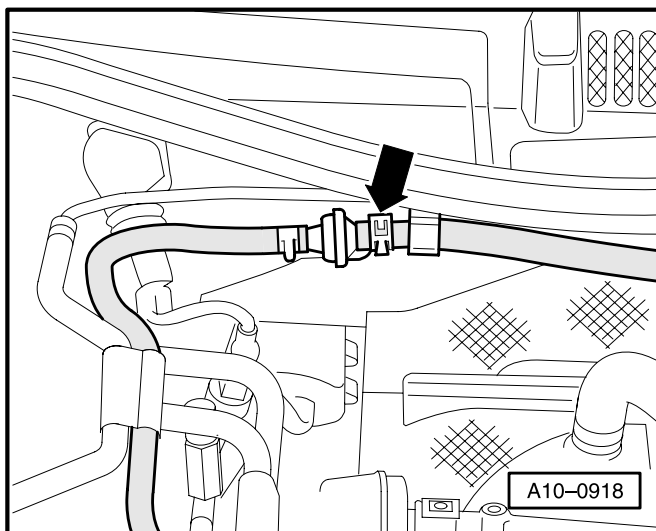
- ◀ - Separate plug connection -2-.
- Release electric cable from the clips and place down to the side.

Continued for all models

- Remove coolant hose from radiator to engine -1-.
- Detach intake air hose from throttle valve.

Models with engine code AGU, ARZ

- Detach vacuum line at throttle valve to activated charcoal filter.
- Take off non-return valve protection for vacuum line.



- ◀ - Separate clip -arrow- and detach vacuum hose to non-return valve.

Other engine codes

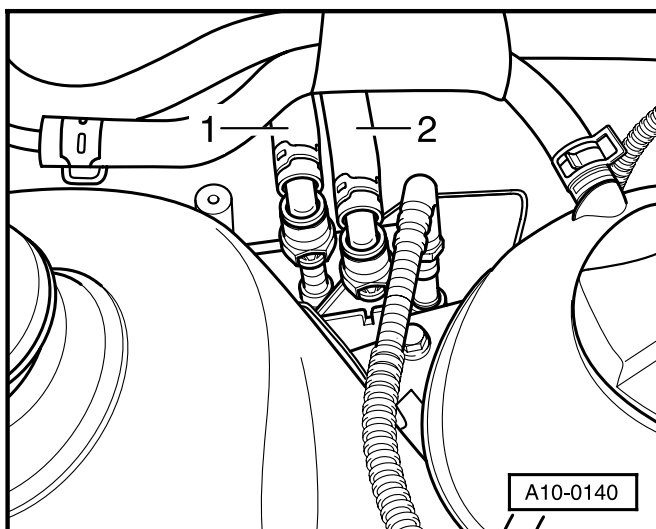
- Detach vacuum hose from throttle valve at activated charcoal filter.

Continued for all models

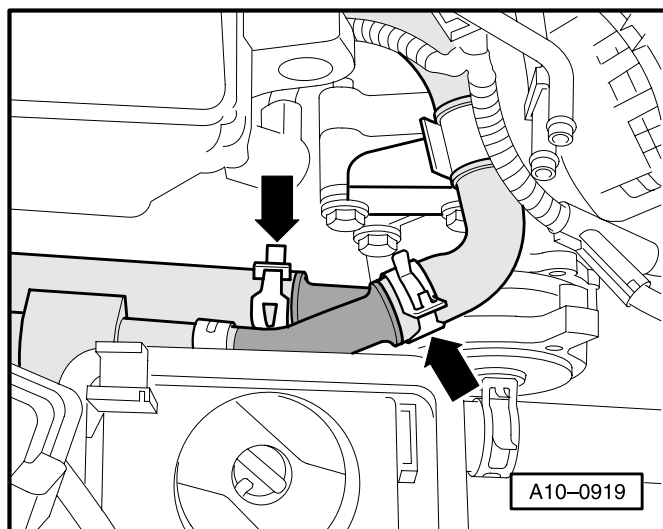
- Detach overflow hose from coolant reservoir.

Warning!

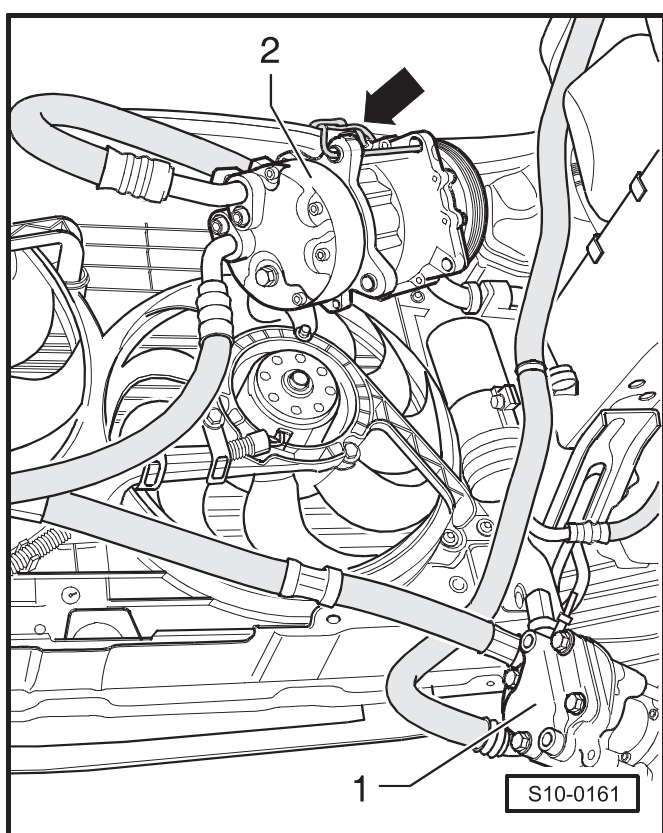
Fuel system is pressurized! Place cleaning cloths around the connection point before opening the system. Then, release pressure by carefully detaching the connection point.



- ◀ - Detach fuel feed line -1- and fuel return-flow line -2- by pressing on the unlocking buttons.



- ◀ - Detach coolant hoses -arrows-.
- Release electric cable and unplug connector from charge air cooler ⇒ page 21-14.
- Remove top charge air hose to throttle valve.
- Take off ribbed V-belt
⇒ 1.8 l/92 kW Engine - Mechanical Components; Repair Group 13.
- Unbolt power steering reservoir and place down to the side, but do not detach the hoses.



- Raise vehicle with lift platform
⇒ Inspection and Maintenance.
- Remove charge air hose between charge air cooler and turbocharger.
- ◀ - Remove power steering hydraulic pump -1- from engine bracket, but do not detach hoses. Suspend pump with wire at lock carrier.
- Remove power steering line from gearbox.

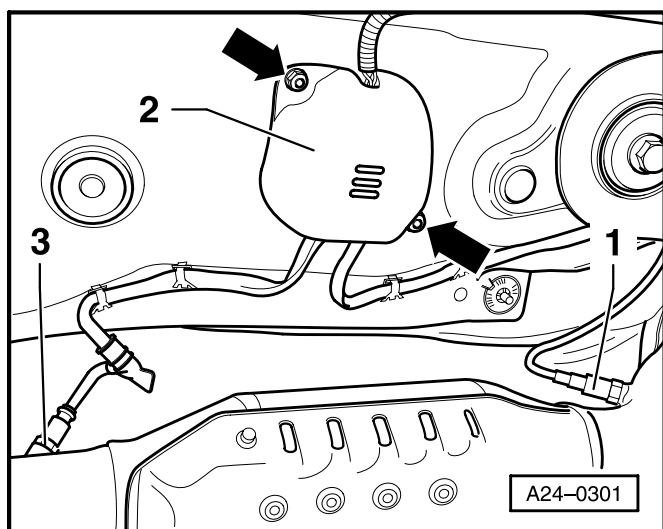
Models fitted with air conditioning

Warning!

Refrigerant circuit of air conditioning system must not be opened.

- Separate plug connection of AC compressor.
- Remove AC compressor from engine bracket, but do not detach hoses. Suspend compressor with wire at lock carrier.

Models fitted with secondary air injection system



- Remove secondary air injection pump
⇒ page 26-8.
- Slacken hoses for secondary air injection system to air filter and to combination valve of secondary air injection system and detach
⇒ page 26-8.
- ◀ - Remove bolts -arrows- and take off cover -2-.

- Separate plug connections for lambda probes and detach electric cables -3- and -1- from the clips.

Note:

Models with engine code AGU have only 1 lambda probe.

- Remove front exhaust pipe from turbo-charger ⇒ page 26-4.

- Detach drive shafts from gearbox and suspend at body
⇒ Running Gear; Repair Group 40.

4x4 models

- Detach propeller shaft from transmission and place down to the side
⇒ 5-Speed Manual Gearbox 02C; Repair Group 39.

Continued for all models

- ◀ Attach suspension device MP 9-021 with holder MP 1-224 as described below and lift out of engine/gearbox jack, e.g. V.A.G 1383 A, with workshop crane, e.g. V.A.G 1202 A.

Belt pulley side:

3rd hole of vertical rail in position 1

Flywheel side:

2nd hole in vertical rail in position 8

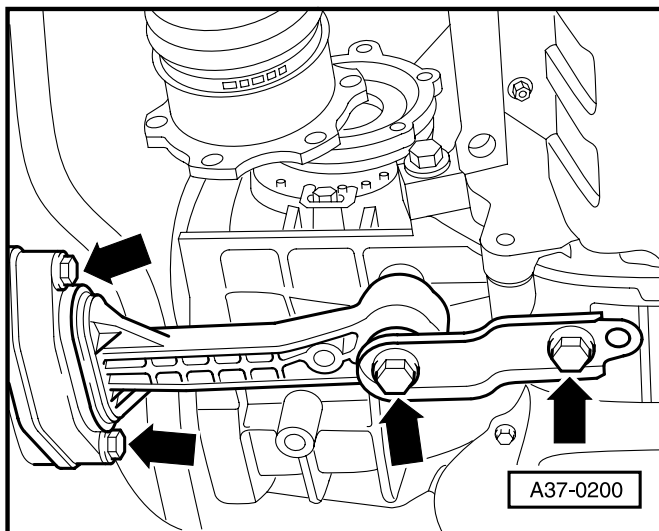
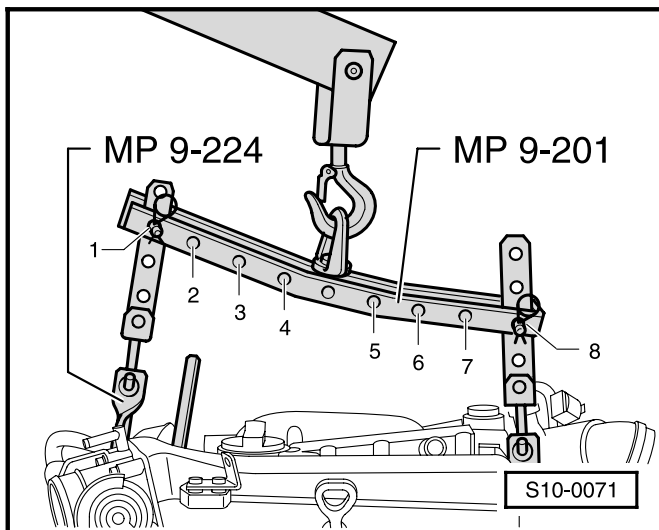
Warning!

Use locking pins at the hooks and insert pins.

- ◀ - Remove pendulum support -arrows-.
- Remove engine and gearbox mount.
- Raise engine/gearbox and run it out to the front.

Note:

Engine and gearbox must be guided with care in order to avoid damage.



Attaching engine to repair stand

The engine must be attached to the repair stand MP 9-101 with engine holder MP 1-202 for carrying out removal and installation operations.

Procedure

- Detach gearbox from engine.

Models fitted with automatic gearbox

- Unscrew nuts of torque converter and secure to prevent it dropping out.
- Detach hoses from ATF cooler.

Continued for all models

- Attach engine to repair stand MP 9-101 with engine holder MP 1-202.

Installing

Notes:

- ♦ *Always replace sealing rings and gaskets when carrying out removal and installation operations.*
- ♦ *Always replace self-locking nuts.*
- ♦ *Coat stud bolts at turbocharger with hot bolt paste G 052 112 A3.*

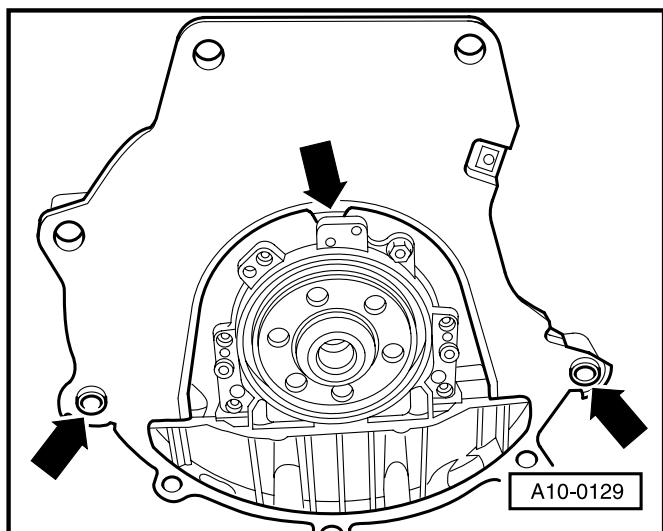
Procedure

Installation is carried out in the reverse order; pay attention to the following points:

- Check whether dowel sleeves for centering engine/gearbox are present in the cylinder block; insert if necessary.
- ◀ Attach intermediate plate to sealing flange and push onto the dowel sleeves -arrows-.

Models fitted with manual gearbox

- Inspect centering of clutch driven plate, if necessary.
- Inspect clutch release bearing for wear, replace if necessary.
- Apply a thin film of grease G 000 100 to the spline of the input shaft.

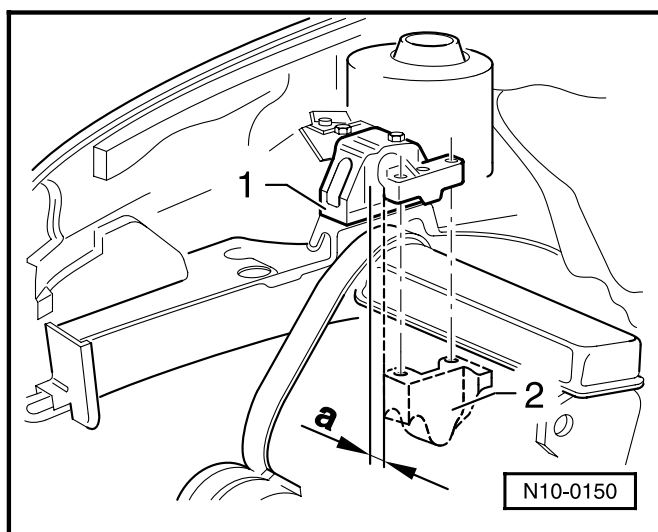


- Adjust shift cables:
⇒ 5-Speed Manual Gearbox 02J; Repair Group 34.

Models fitted with automatic gearbox

- Replace lock washer at support of selector lever cable.
- Install selector lever cable at gearbox, adjust if necessary:
⇒ Automatic Gearbox; Repair Group 37.

Continued for all models



- Run past pressure line of power steering at gearbox.
- ◀ - Align engine in transverse direction so that a clearance -a- of about 10 mm exists between engine mount -1- and engine support bracket.
- When bolting together engine mount and engine support bracket, these components must not be twisted relative to each other (align parallel).

Tightening torques ⇒ page 10-11.

Models fitted with AC

- Install AC compressor
⇒ Heating, Air Conditioning; Repair Group 87.

Continued for all models

- Install power steering hydraulic pump
⇒ Running Gear; Repair Group 48.
- Install hoses for charge air system ⇒ page 21-1.
- Install coolant hoses ⇒ page 19-1.
- Inspect oil level before starting engine.
- Electrical connections and routing of wiring
⇒ Current Flow Diagrams, Electrical Fault Finding, Fitting Locations.
- Engine code AGU - Adjust throttle cable
⇒ 1.8 l/92 kW Engine - Mechanical Components; Repair Group 20.

Note:

*Additional work has to be undertaken when disconnecting and reconnecting the battery
⇒ Electrical System, Rep. Gr. 27.*

Tightening torques**Notes:**

- ♦ *Tightening torques are valid for lightly greased, oiled, phosphated or blackened nuts and screws.*
- ♦ *Additional lubricants such as engine oil and gearbox oil are allowed but Molykote should never be used.*
- ♦ *Do not use any degreased parts*
- ♦ *The tolerance for the tightening torques is $\pm 15\%$*

Component		Nm
Screws / nuts	M6	9
	M7	13
	M8	20
	M10	40
	M12	70
of which are deviating:		
Engine mount, transmission mount, rocking support		⇒ Assembly mount
Propeller shaft on the jointed flange/ transmission		⇒ Chassis Rep. Gr. 40
Bolts connecting the engine to the transmission ⇒ 5-speed manual gearbox 02J, Rep. Gr. 34 ⇒ 5-speed manual gearbox 02C, Rep. Gr. 34 ⇒ automatic gearbox, Rep. Gr. 37		

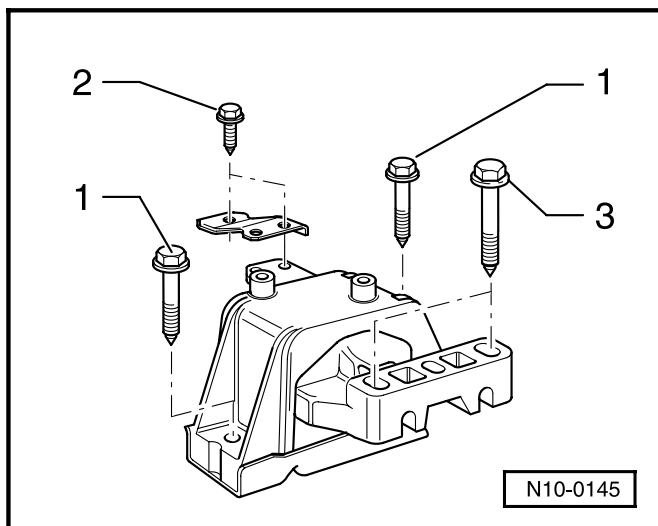
Engine/gearbox mounting

Tightening torques

◀ Engine mounting

- 1 - 40 Nm + 90° (1/4 turn)¹⁾
- 2 - 25 Nm
- 3 - 100 Nm¹⁾

¹⁾ Replace bolts

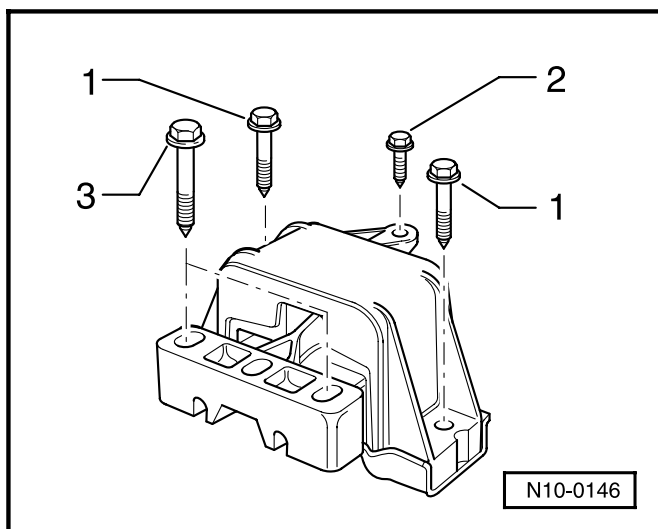


N10-0145

◀ Gearbox mounting

- 1 - 40 Nm + 90° (1/4 turn)¹⁾
- 2 - 25 Nm
- 3 - 100 Nm¹⁾

¹⁾ Replace bolts

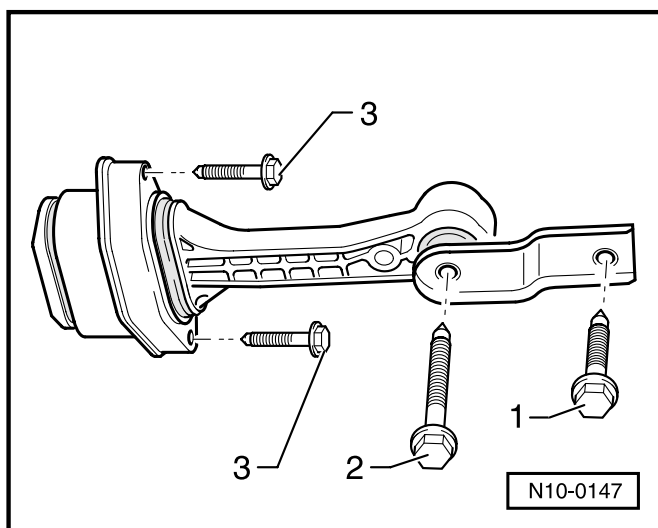


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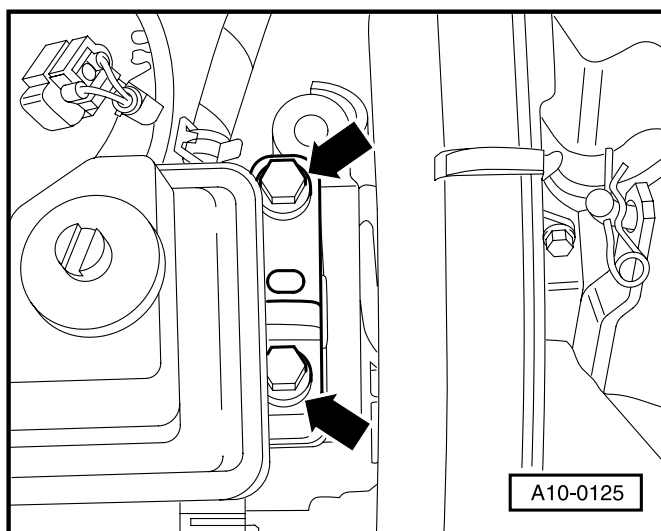
◀ Pendulum support

- 1 - 40 Nm + 45° (1/8 turn)¹⁾
- 2 - 40 Nm + 45° (1/8 turn)¹⁾
- 3 - 20 Nm + 90° (1/4 turn)¹⁾

¹⁾ Replace bolts



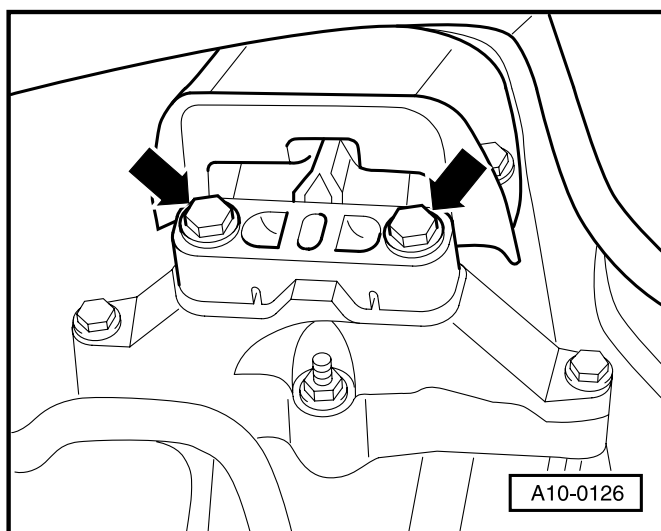
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- ◀ - Slacken engine mounts from the engine support from above -arrows-.

Note:

Use ladder, e.g. VAS 5085, for removing the securing bolts.

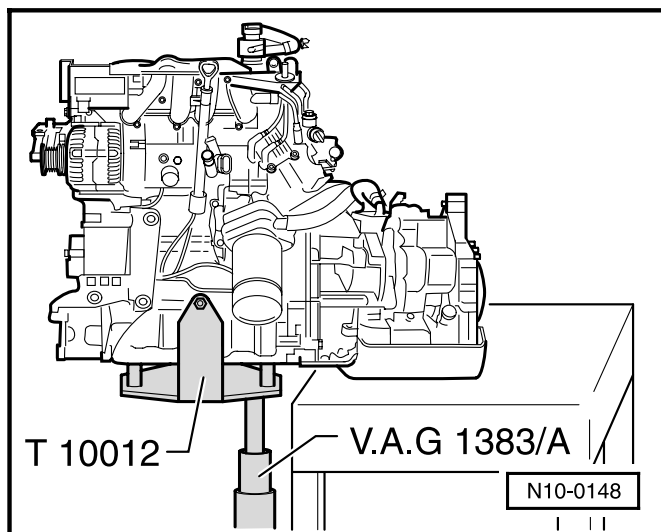


- ◀ - Slacken gearbox mounts from the gearbox support from above -arrows-.

- Carefully lower engine and gearbox.
- When doing this, guide pressure line of power steering past the gearbox.

Note:

Engine and gearbox must be guided carefully when lowering in order to avoid damage to the bodywork.



Attaching engine to repair stand

The engine should be attached with the engine and gearbox holder MP 1-202 to the repair stand MP 9-101 for carrying out removal and installation work.

Procedure

- ◀ - Use lifter, e.g. V.A.G 1383 A, to move engine/gearbox unit onto a workbench.
- Lower the engine/gearbox unit so that the gearbox is resting on the workbench.
- Remove connection hoses of engine/gearbox.
- Press gearbox off the engine.

Models with automatic gearbox

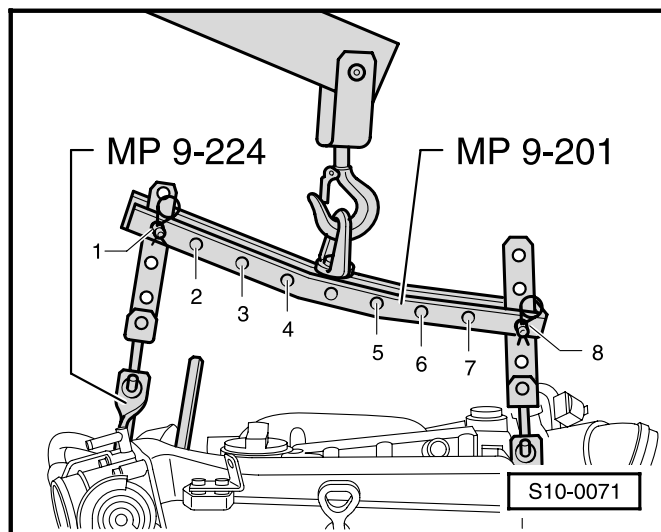
- Unscrew nuts of the torque converter.
- Detach hoses of the ATF cooler.
- Secure torque converter to prevent it dropping out.

Continued for all models

- ◀ - Attach suspension device MP 9-021 with holder MP 1-224 as described below and lift out of engine/gearbox lifter, e.g. V.A.G 1383 A, with workshop crane (e.g. V.A.G 1202 A).

Belt pulley side:
3rd hole of rail in position 1

Flywheel side:
2nd hole of rail in position 8



Warning!

Use locking pins at the hooks and inserted pins.

Notes:

- ♦ The insertion positions of the supporting frame marked with 1...4, point toward belt pulley.
- ♦ The holes in the rails are determined by counting from the hook.
- Attach engine with engine and gearbox holder MP 1-202 to the repair stand MP 9-101.

Installing engine

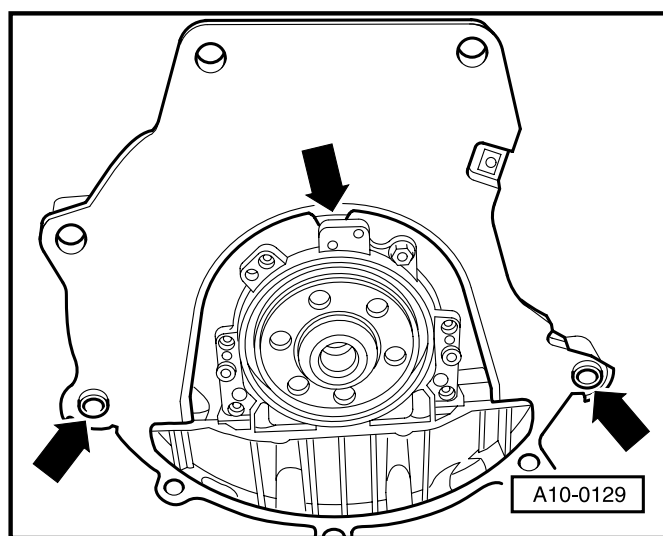
Notes:

- ◆ Always replace seals and gaskets when carrying out removal and installation work.
- ◆ Always replace self-locking nuts.
- ◆ Coat stud bolts at the turbocharger with hot bolt paste G 052 112 A3.

Procedure

Installation is carried out in the reverse order; pay attention to the following points:

- Check whether the dowel sleeves for centering engine/gearbox are present in the cylinder block; insert if necessary.
- ◀ - Attach intermediate plate to the sealing flange and push onto the dowel sleeves -arrows-.

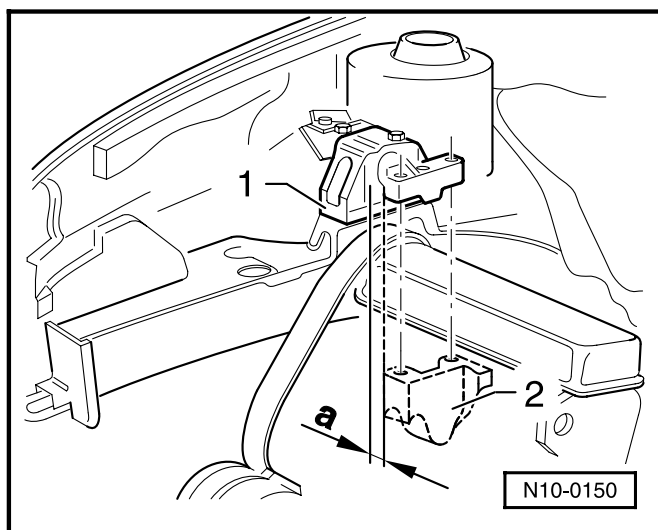


Models with manual gearbox

- Inspect centering of the clutch driven plate, if necessary.
- Inspect clutch release bearing for wear; replace if necessary.
- Apply a thin film of G 000 100 to the clutch release bearing, guide sleeve for release bearing and splines of the input shaft.
- Install slave cylinder of hydraulic clutch:
⇒ 5-Speed Manual Gearbox 02J; Repair Group 30; Servicing clutch mechanism
- Attach shift mechanism:
⇒ 5-Speed Manual Gearbox 02J; Repair Group 34; Servicing shift mechanism
- Adjust cable shift mechanism if necessary:
⇒ 5-Speed Manual Gearbox 02J; Repair Group 34; Servicing shift mechanism

Models with automatic gearbox

- Replace locking washer at the support bearing of the selector lever cable.
- Install selector lever cable at the gearbox, adjust if necessary:
⇒ Automatic Gearbox; Repair Group 37; Servicing shift mechanism; Disassembling and assembling shift mechanism



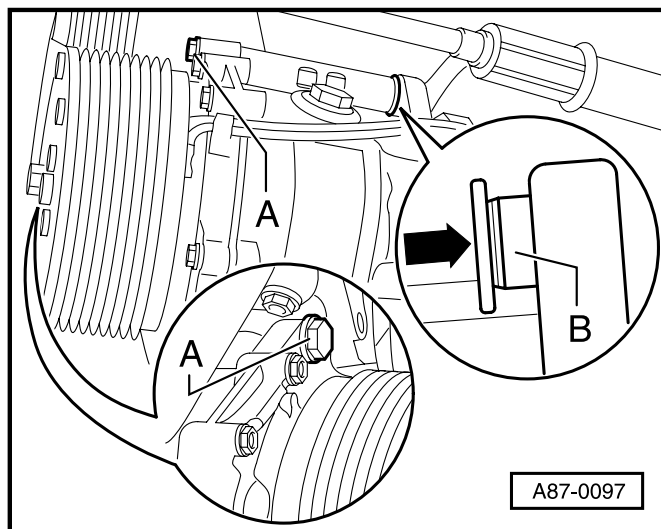
Continued for all models

- When installing the engine/gearbox unit, ensure adequate clearance to the subframe and also to the radiator.
- Guide the pressure line of the power steering past the gearbox when installing.
- ◀ - Align engine/gearbox unit in the transverse direction so that a clearance -a- of approx. 10 mm exists between engine mount -1- and engine support -2- in the installed position.
- Engine and gearbox mounts must not be twisted (align parallel to each other) when bolting the supporting arms of the mounts to the engine support and the gearbox support.

Tightening torques ⇒ page 10-18, Engine and gearbox mounting

Models with air conditioning

- Install the AC compressor:
⇒ Heating, Air Conditioning; Repair Group 87; Servicing heating and air conditioning - engine compartment



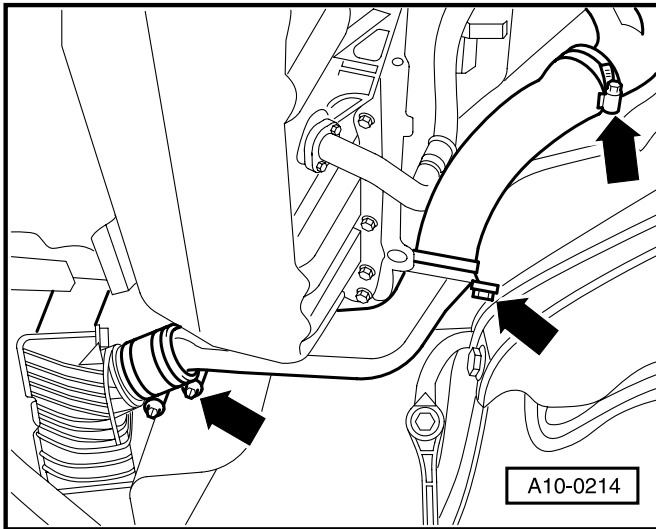
- ◀ - Push back threaded bushes -B- for the retaining bolts -A- slightly in direction of arrow to make it easier to position the AC compressor.

Continued for all models

- Install hydraulic pump for power steering.
⇒ Running Gear; Repair Group 48; Removing and installing hydraulic pump
- Install ribbed V-belt.
⇒ 1.8-ltr./92 kW Engine, Mechanical Components; Repair Group 13
- Install drive shafts.
⇒ Running Gear; Repair Group 40; Removing and installing drive shaft
- Install front exhaust pipe and align exhaust system free of stress ⇒ page 26-3.

Note:

Avoid a large deflection of the decoupling element at the front exhaust pipe (max. 10°).



◀ - Install the air hose and the air guide pipe at the bottom of the turbocharger to the charge air cooler -arrows-.

- Attach coolant hoses ⇒ page 19-1.

Note:

Only re-use drained coolant if cylinder block, cylinder head, radiator or heat exchanger are not replaced.

- Pour in coolant.
⇒ 1.8-ltr./92 kW Engine, Mechanical Components; Repair Group 19

- Inspect oil level before starting the engine.

- Electrical connections and routing.
⇒ „Current Flow Diagrams, Electrical Fault Finding and Fitting Locations“ binder

- Adjust throttle cable.
⇒ 1.8-ltr./92 kW Engine, Mechanical Components; Repair Group 20

- After connecting the battery, enter the anti-theft code of the radiator.
⇒ Operating Instructions of radio

- Set the time of the clock.

- Interrogate fault memory.
⇒ 1.8-ltr./110 kW Engine, Motronic Fuel Injection and Ignition System; Repair Group 01; Self-Diagnosis

Note:

Faults are stored as a result of separating the plug connections.

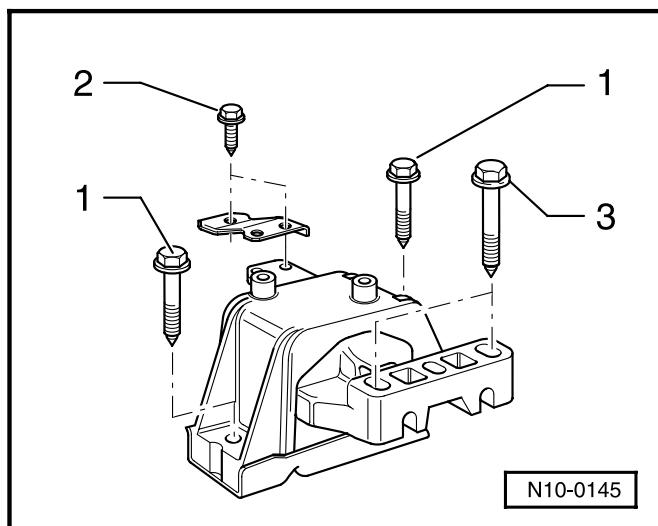
- Carry out adaptation of the throttle valve control unit.
⇒ 1.8-ltr./110 kW Engine, Motronic Fuel Injection and Ignition System; Repair Group 24; Testing throttle valve control unit

Tightening torques

Notes:

- ◆ *Tightening torques apply only to slightly greased, oiled, phosphatized or blackened nuts and bolts.*
- ◆ *Additional lubricants such as engine or gear oil are permissible, but not Molykote.*
- ◆ *Do not use ungreased parts.*
- ◆ *Tolerance for tightening torques $\pm 15\%$.*

Component		Nm
Bolts/nuts	M6	10
	M7	15
	M8	25
	M10	40
	M12	60
in variation of above:		
Engine mounts, gearbox mounts, pendulum support		⇒ Engine/gearbox mounting
Bolts for connecting engine to gearbox	M10	45
Bolts for connecting engine to gearbox	M12	80
Torque converter to driven plate		60
Drive shaft to flange/gearbox		40
AC compressor to bracket		45



Engine/gearbox mounting

Tightening torques

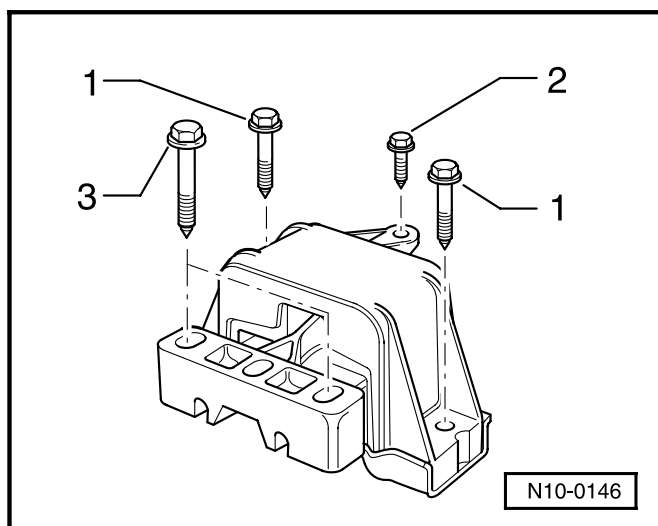
◀ Engine mounting

1 - 40 Nm + 90° (¼ turn)¹⁾

2 - 25 Nm

3 - 60 Nm + 90° (¼ turn)¹⁾

¹⁾ Replace bolts



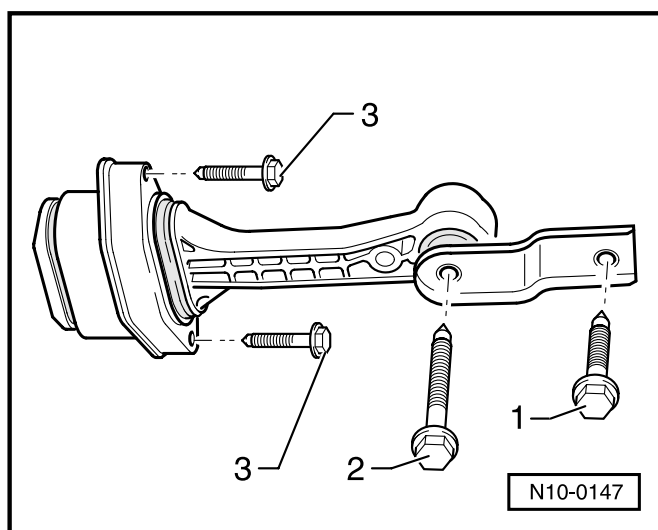
◀ Gearbox mounting

1 - 40 Nm + 90° (¼ turn)¹⁾

2 - 25 Nm

3 - 60 Nm + 90° (¼ turn)¹⁾

¹⁾ Replace bolts



◀ Pendulum support

1 - 40 Nm + 90° (¼ turn)¹⁾

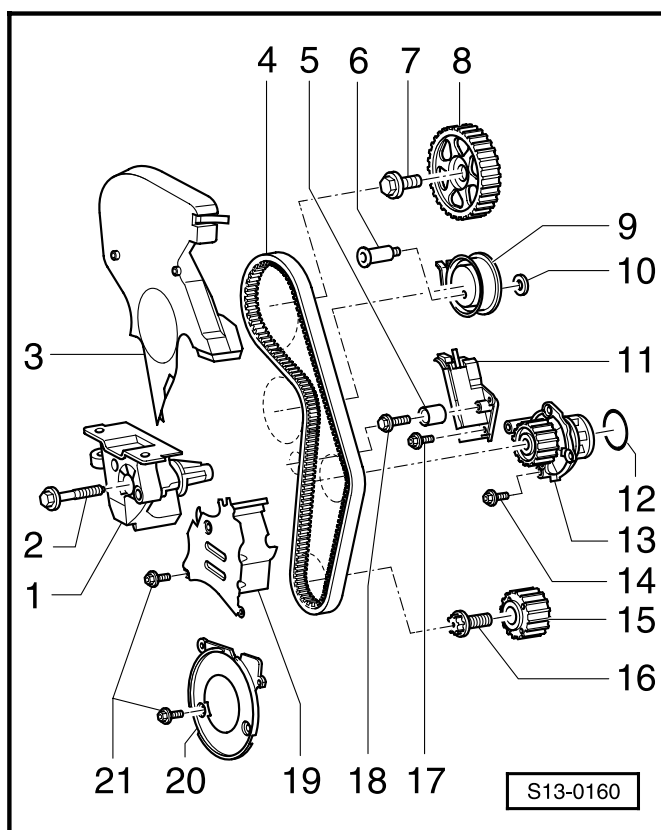
2 - 40 Nm + 90° (¼ turn)¹⁾

3 - 20 Nm + 90° (¼ turn)¹⁾

¹⁾ Replace bolts

Disassembling and assembling engine

Removing and installing, tensioning toothed belt



Note:

Before removing the toothed belt, mark direction of running. If a used toothed belt is fitted on to run in the opposite direction, this may cause damage.

1 - Engine support

2 - 45 Nm

3 - Top part of toothed belt guard

- ♦ to remove, unbolt fixture for coolant return-flow line to turbocharger, if necessary

4 - Toothed belt

- ♦ before removing, mark direction of running
- ♦ inspect for wear
- ♦ do not kink
- ♦ removing ⇒ page 13-2
- ♦ installing, tensioning ⇒ page 13-4

5 - Guide pulley

6 - 27 Nm

7 - 65 Nm

- ♦ use counterholder MP 1-216 for slackening and tightening

8 - Camshaft sprocket

- ♦ for exhaust camshaft
- ♦ take off toothed belt for removing and installing ⇒ page 13-2
- ♦ pay attention to fitting location: the narrow web of the camshaft sprocket points out and the TDC marking of cyl. 1 is visible

9 - Tensioning pulley

10 - Washer

11 - Toothed belt tensioning device

12 - O-ring

- ♦ replace, moisten with coolant when installing

13 - Coolant pump

- ♦ removing and installing
- ⇒ 1.8 l/92 kW Engine - Mechanical Components; Repair Group 19; Removing and installing coolant pump

14 - 15 Nm

15 - Crankshaft toothed belt sprocket

- ♦ there must not be any oil on contact surface between toothed belt sprocket and crankshaft
- ♦ can be installed only in one position

16 - 90 Nm + torque a further 1/4 turn (90°)

- ♦ replace
- ♦ use counterholder MP 1-310 or T30004 for slackening and tightening
- ♦ when attaching counterholder MP 1-310, place two washers between toothed belt sprocket and counterholder

17 - 15 Nm

18 - 20 Nm

19 - Centre part of toothed belt guard

20 - Bottom part of toothed belt guard

21 - 10 Nm

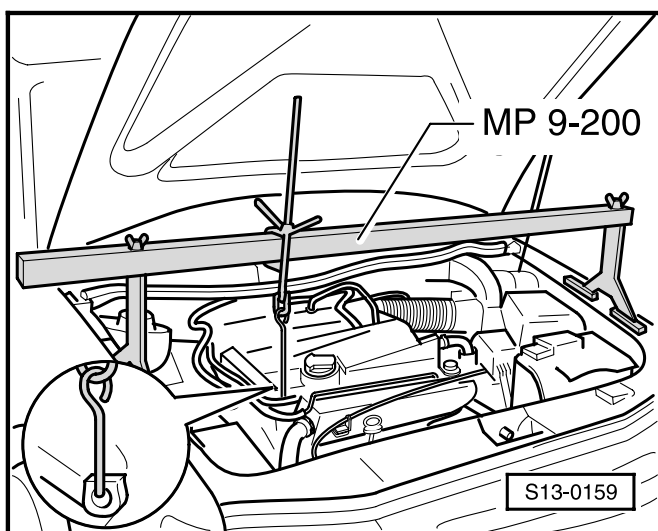
Required special tools, testing and measuring equipment as well auxiliary devices and material

- ◆ Torque wrench
- ◆ Supporting device for the engine MP 9-200
- ◆ Locking pin
- ◆ Tensioning screw

Removing the V-belt

- Engine removed

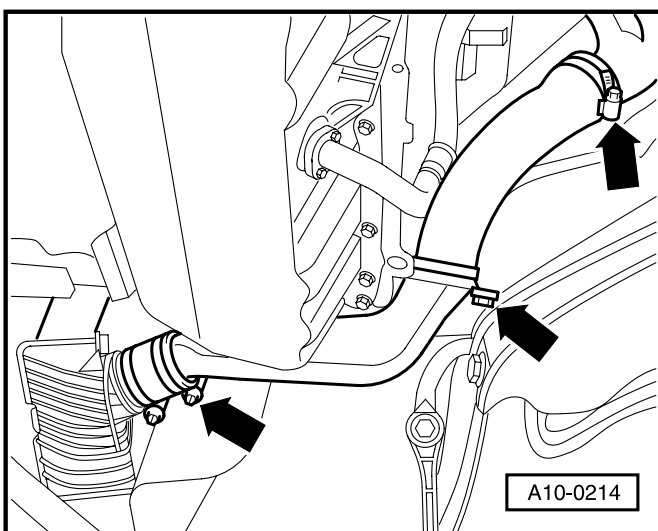
- Remove the V-ribbed belt and tensioning device
⇒ 1.8 litre/92 kW engine, mechanics, Rep. Gr. 13.



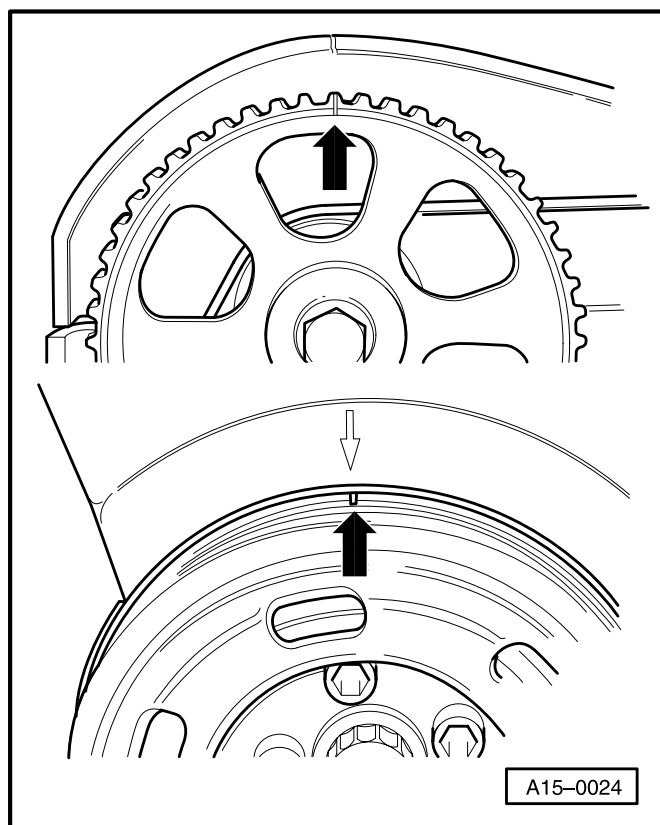
- Pull out the plug connectors for the expansion bottle for coolant and on the AKF container.
- Unscrew the expansion bottle for coolant and the topping up container for the power-assisted steering. Hoses remain attached.
- Pull off the vacuum line from the AKF container and the throttle flap valve support.
- Remove the upper part of the timing belt cover.
- ◀ Apply the supporting device for the engine MP 9-200
- Slightly raise the engine on the spindle of the supporting device MP 9-200

Note:

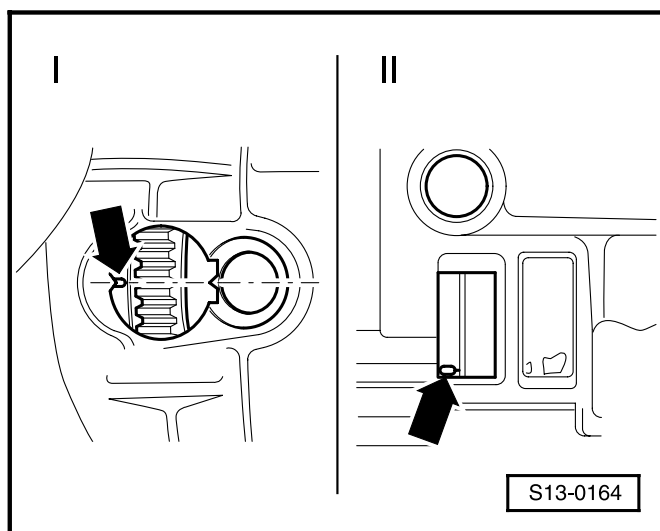
Hang the expansion bottle for coolant and the topping up container for the power-assisted steering up high on the supporting device.



- Remove the sound dampening and the engine cover on the right.
- ◀ Remove the air guide pipe below between the exhaust supercharger and the charge air cooler -arrow-.
- Unclip the line for the power-assisted steering to the hydraulic pump from the holders on the engine and car body.



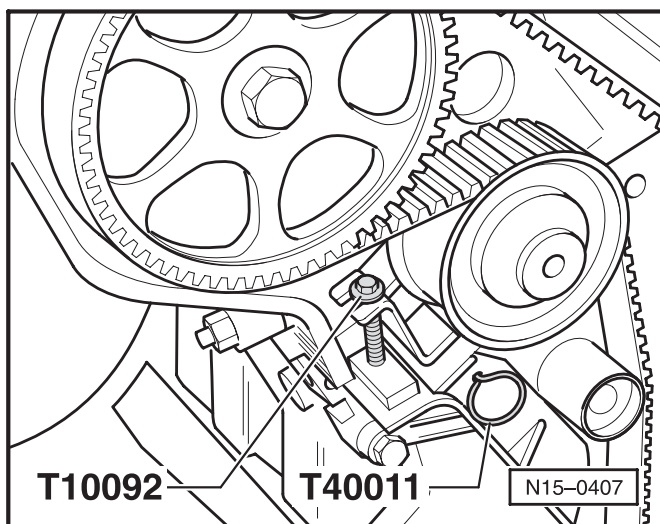
- Place the crankshaft in the engine turning direction at the TDC marking for Cylinder 1 -arrow-



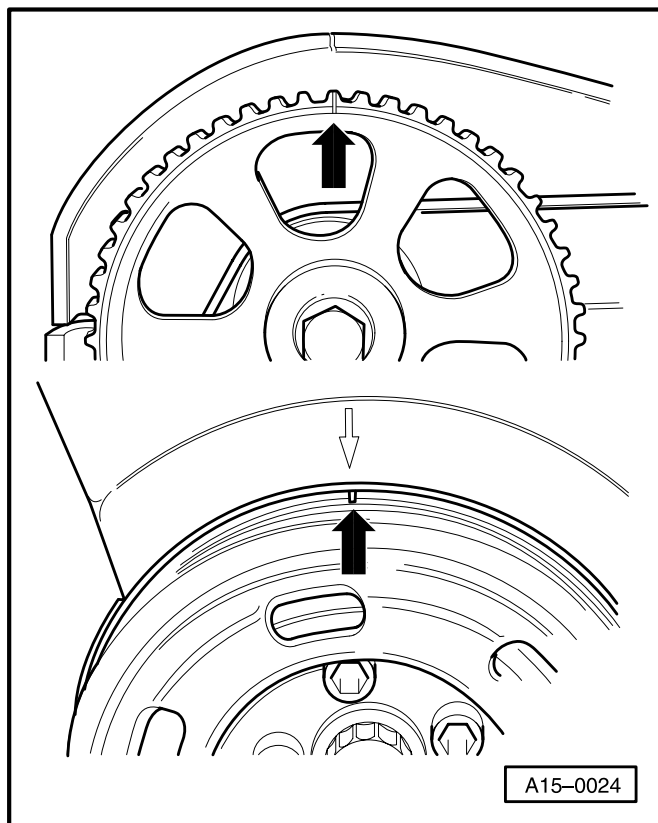
- Check whether the TDC marking on the fly-wheel and the reference mark are aligned -arrow-

- I - manual gearbox
- II - automatic gearbox

- Remove the engine mount and the engine support bracket.
- Remove the flywheel damper without changing the TDC position.
- Remove the lower and middle part of the timing belt cover.



- Mark the direction of rotation of the timing belt using chalk or a felt-tip pen.
- Screw in the tensioning screw T10092 into the tensioning device for the timing belt.
- Tension the pressure piston of the tensioning device just sufficiently to enable the pressure piston to be secured with a locking pin (e.g. T40011).
- Remove the timing belt.

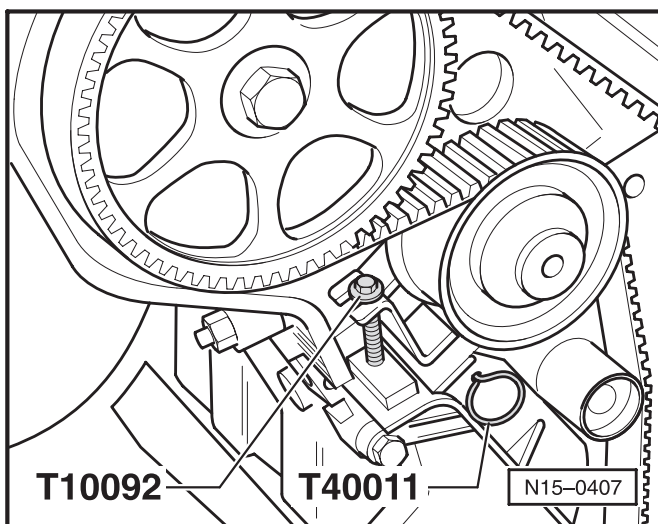
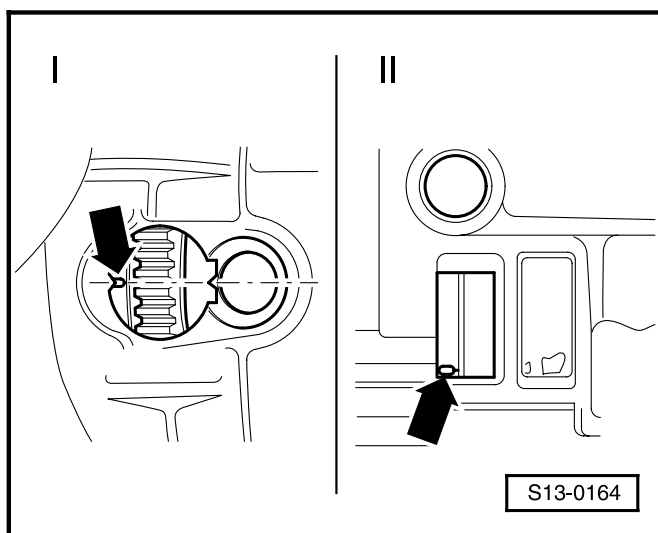


Removing and installing the timing belt

Notes:

- ♦ Adjustment of the timing belt should also take place as follows during repair work which just requires removal of the timing belt from the camshaft sprocket.
- ♦ The crankshaft should not stand at TDC during turning of the camshaft. This could lead to damage to the valves/base of the piston.

- ◀ Align the marking on the camshaft sprocket with that on the cylinder head cover (TDC for Cylinder 1).
- Lay the timing belt on the belt pulley - crankshaft (observe the direction of turning).
- Install the lower part of the timing belt cover. Tightening torque: 10 Nm.
- Install the vibration damper (observe the installed position: the bore hole on the vibration damper stands above the elevation on the camshaft sprocket). Tightening torque: 40 Nm.
- Align the marking on the vibration damper with that on the lower part of the timing belt cover (TDC for Cylinder 1).
- ◀ Check whether the TDC marking on the flywheel and the reference mark are aligned -arrow-
 - I - manual gearbox
 - II - automatic gearbox
- Lay the timing belt in place in the order coolant pump, tensioning roller, camshaft sprocket.



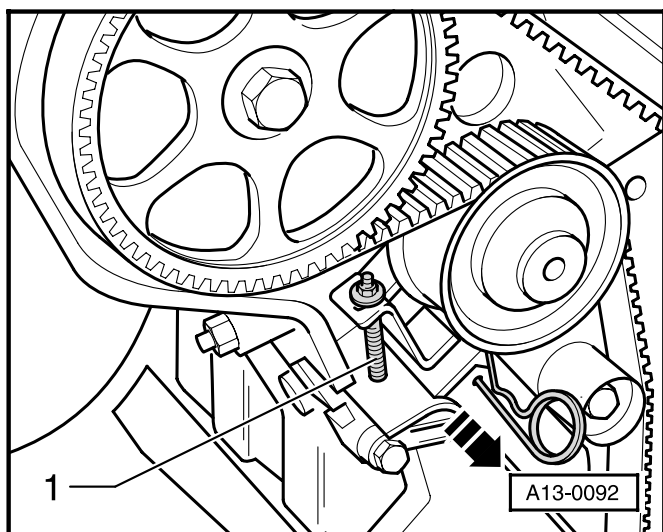
- ◀ Extract the locking pin and release the pressure piston on the tensioning device for the timing belt. Screw out clamping screw T10092.
- Turn the crankshaft twice in the direction of rotation of the engine to again reach TDC and check the setting.
- Install the middle part of the timing belt cover. Tightening torque: 10 Nm.
- Install the engine support bracket ⇒ page 13-1, Position 1

- Install engine mounts ⇒ page 10-11.
- Remove supporting device MP 9-200.
- Install top part of toothed belt guard.
- Install ribbed V-belt and tensioning device
⇒ 1.8 l/92 kW Engine - Mechanical Components; Repair Group 13.
- Attach coolant reservoir and power steering reservoir.
Tightening torque: 10 Nm

Note:

As a result of separating and re-connecting the plug connections, the faults may be stored in the engine control unit. For this reason, interrogate fault memory

- ⇒ 1.8 l/110 kW Engine - Motronic Fuel Injection and Ignition System; Repair Group 01.



- Fit on the toothed belt in the following sequence: coolant pump, tensioning pulley, camshaft sprocket.

◀ - Pull out locking drift -arrow- and relieve tension of pressure plunger of tensioning device for toothed belt. Unscrew headless set screw -1-.

- Rotate crankshaft twice fully in direction of rotation of engine, position again to TDC and check setting.

- Install middle part of toothed belt guard.
Tightening torque: 10 Nm

- Install engine support.
Tightening torque: 45 Nm

- Bolt engine mount to engine support; use new securing bolts, tighten to 60 Nm and torque a further 90° (¼ turn).

- Bolt engine mount to body; use new securing bolts for this step, tighten to 40 Nm and torque a further 90° (¼ turn).

- Remove supporting device MP 9-200.

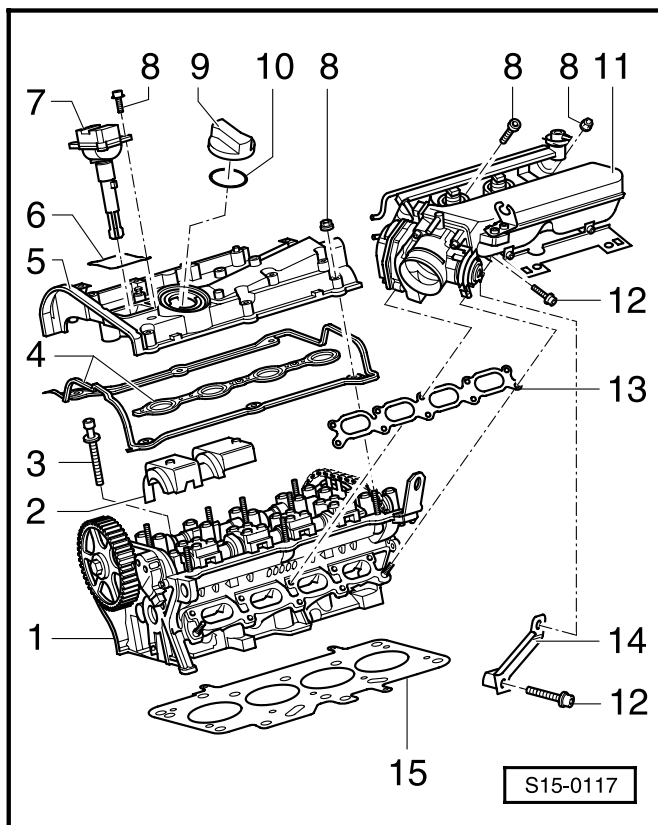
- Install top part of toothed belt guard.

- Install ribbed V-belt and tensioning device.

⇒ 1.8-ltr./92 kW Engine; Mechanical Components; Repair Group 13

- Bolt on coolant expansion reservoir and power steering reservoir.
Tightening torque: 10 Nm

Removing and installing cylinder head



Notes:

- ♦ Always replace cylinder head bolts.
- ♦ Always replace self-locking nuts.
- ♦ Always replace bolts which are tightened to a torquing angle.
- ♦ Always replace seals and gaskets when carrying out removal and installation operations.
- ♦ If a replacement cylinder head with camshaft installed is fitted, the contact surfaces between bucket tappets and cam track must be oiled after installing the head.
- ♦ The plastic bases supplied as a protection for the open valves, must not be removed until just before fitting on the cylinder head.
- ♦ If the cylinder head is replaced, the entire cooling system must be filled with fresh coolant.
- ♦ Cylinder heads with cracks between the valve seats or between a valve seat ring and the spark plug thread, can continue to be used without any reduction in life provided these are slight incipient cracks not more than 0.3 mm in width, or only the first 4 turns of the spark plug thread are cracked.

Testing compression

⇒ 1.8 l/92 kW Engine - Mechanical Components; Repair Group 15.

1 - Cylinder head

- ♦ after replacing, fill system with fresh coolant
- ♦ removing cylinder head ⇒ page 15-2
- ♦ installing cylinder head ⇒ page 15-6
- ♦ inspecting for distortion
⇒ 1.8 l/92 kW Engine - Mechanical Components; Repair Group 15
- ♦ reworking dimension ⇒ Fig. 1

2 - Oil deflector

- ♦ pay attention to installation position: above inlet camshaft between cylinders 1 and 2

3 - Cylinder head bolt

- ♦ replace
- ♦ pay attention to correct slackening order ⇒ page 15-2
- ♦ pay attention to correct tightening order ⇒ page 15-6

4 - Gaskets for cylinder head cover

- ♦ replace if damaged or leaking
- ♦ before fitting on, coat contact areas with „D 454 300 A2“:
double bearing cap/cylinder head
⇒ 1.8 l/92 kW Engine - Mechanical Components; Repair Group 15
hydraulic chain tensioner/cylinder head
⇒ 1.8 l/92 kW Engine - Mechanical Components; Repair Group 15

5 - Cylinder head cover

6 - Gasket

- ♦ for ignition coil
- ♦ replace if damaged

7 - Ignition coil

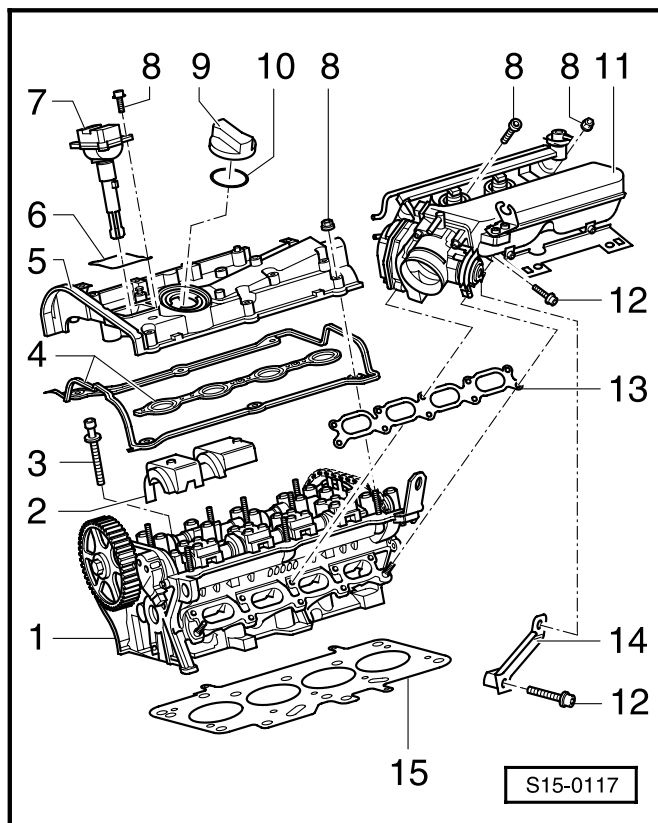
- ♦ testing
⇒ 1.8 l/110 kW Engine - Motronic Fuel Injection and Ignition System; Repair Group 28

8 - 10 Nm

9 - Cap

10 - Seal

- ♦ replace if damaged

**11 - Intake manifold**

- ◆ removing and installing ⇒ 1.8 l/110 kW Engine - Motronic Fuel Injection and Ignition System; Repair Group 24

12 - 20 Nm**13 - Gasket**

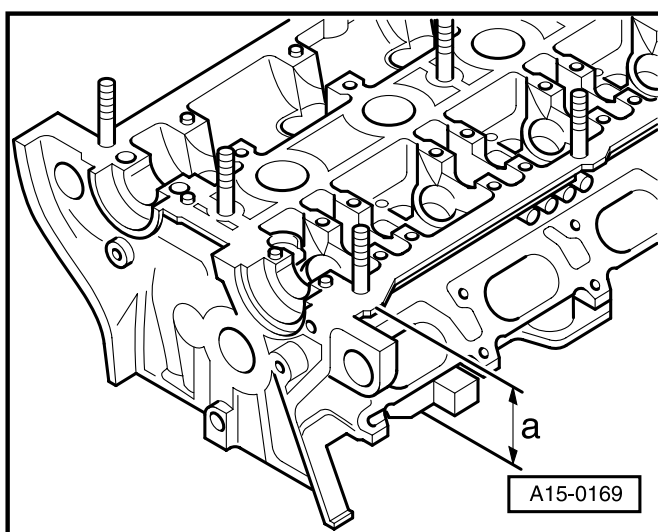
- ◆ replace

14 - Bracket

- ◆ for intake manifold

15 - Cylinder head gasket

- ◆ replace
- ◆ installation position: part No. must be visible from the inlet side



◀ **Fig. 1 Reworking dimension of cylinder head**

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

- ◆ Minimum dimension: a = 139.2 mm

Removing cylinder head

- Engine installed

Requirement

- Engine cold

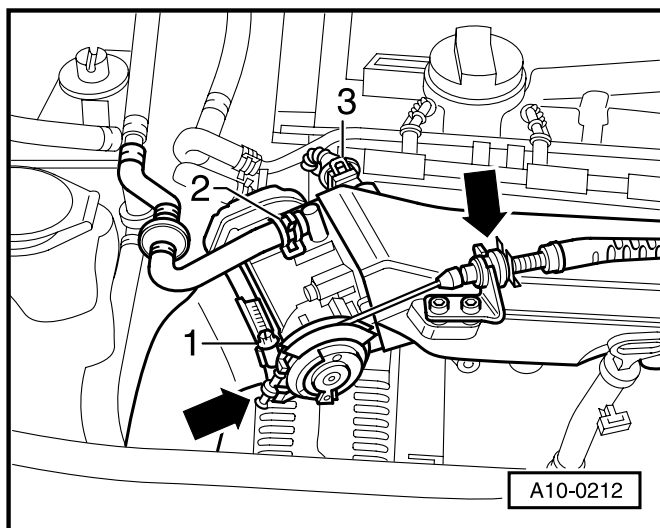
Special tools, testers and aids required

- ◆ Support for conrod MP 1-225
- ◆ Locking drift, e.g. T40011
- ◆ M5x55 threaded pin
- ◆ Wrench, e.g. 3452

Note:

All the cable straps which have been slackened or cut open when removing, must be fitted on again at the same point when installing.

- On models fitted with coded radio set, pay attention to coding, determine if necessary.
- Switch off ignition and disconnect earth strap on battery.
- Remove engine trim panel.
- Drain coolant.
- ⇒ 1.8 l/92 kW Engine - Mechanical Components; Repair Group 19.
- Detach intake air hose from throttle valve.
- Separate plug connection at throttle valve.

**Models with mechanical throttle control**

- ◀ - Detach vacuum hose -2- at throttle valve.
- Detach throttle cable at throttle valve control unit and at support at intake manifold -arrows- (do not remove push-in detent) and place throttle cable to the side.

Models with electric throttle control

- Detach vacuum hose at throttle valve and activated charcoal filter.

Continued for all models

- Unplug the following connectors:
 - Intake air temperature sender -G42-
 - Hall sender -G40-
 - Knock sensor I -G61-
 - Engine speed sender -G28-
 - Knock sensor II -G66-
 - Oil pressure switch -F1-
 - Spark plug connectors
 - Coolant temperature sender -G62-
 - Charge pressure control solenoid valve -N75-

Fitting locations $\Rightarrow$ 1.8 l/110 kW Engine - Motronic Fuel Injection and Ignition System; Repair Group 24.

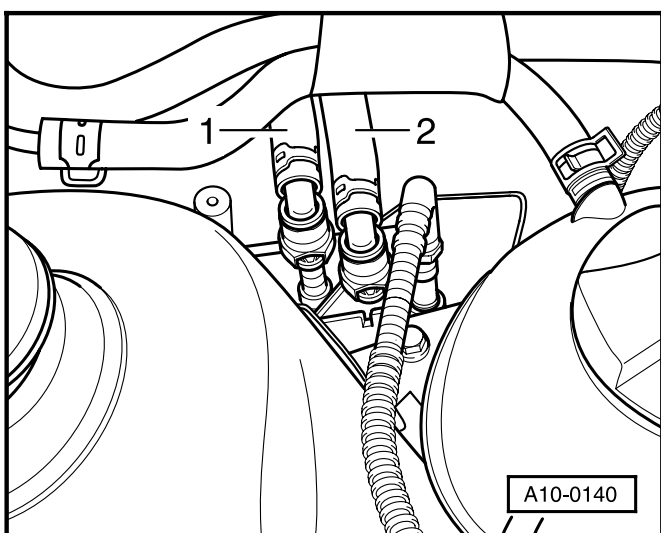
- Separate plug connections at the injectors and place wiring harness to the side.
- Detach vacuum lines.

Models fitted with secondary air injection system

- Remove secondary air injection pipe from intake manifold bracket.

Continued for all models

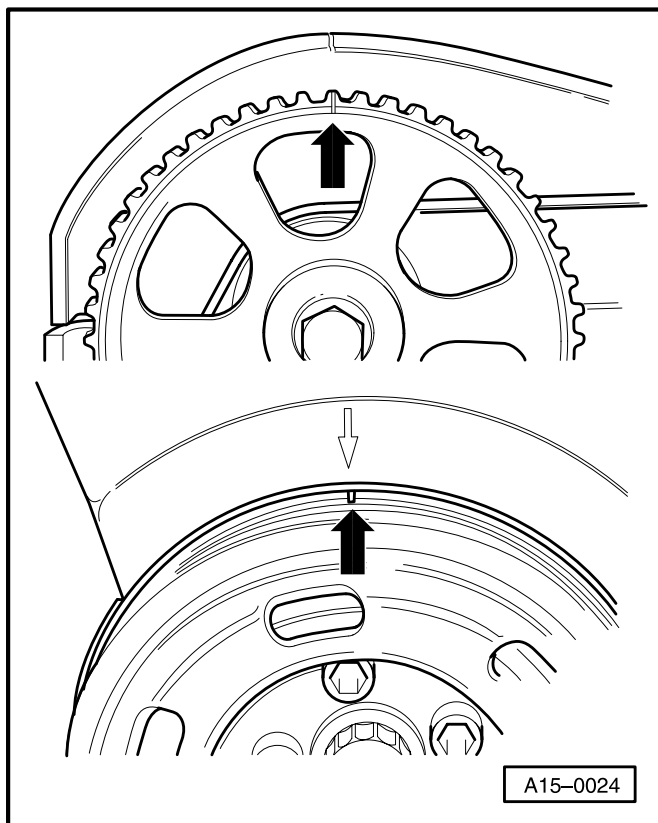
- Remove vacuum reservoir with bracket for cylinder head cover and place down to the side.



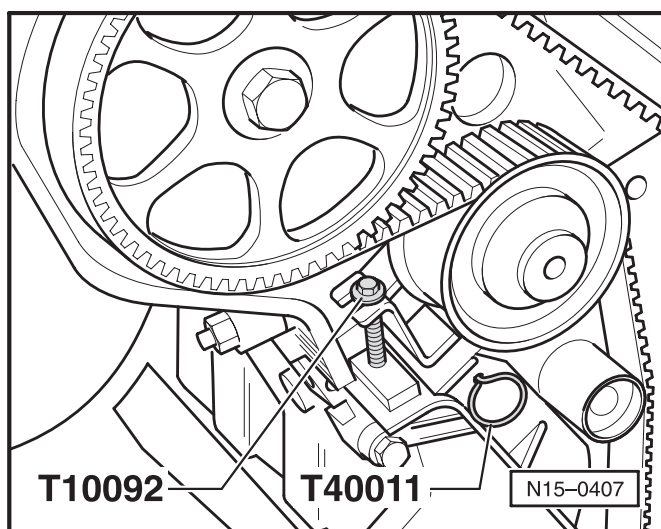
Warning!

Fuel system is pressurized! Place cleaning cloths around the connection point before opening the system. Then, release pressure by carefully detaching the connection point.

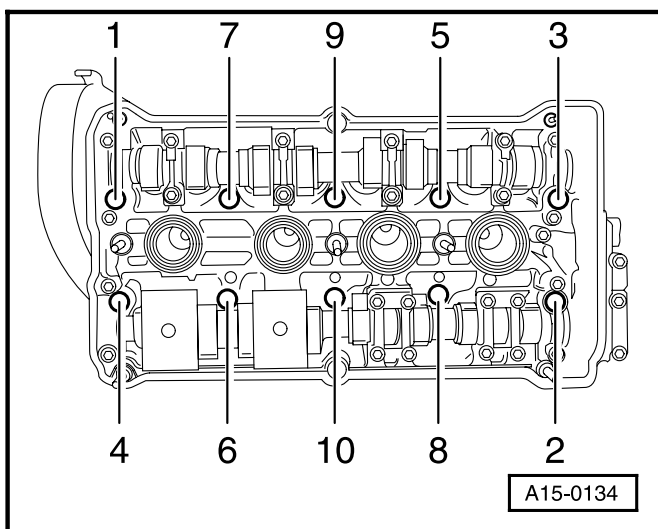
- ◀ - Detach fuel feed line -1- and fuel return-flow line -2-.
- Detach the crankcase ventilation hose at the T-connector.
- Remove ribbed V-belt and tensioning device.
 $\Rightarrow$ 1.8 l/92 kW Engine - Mechanical Components; Repair Group 13.
- Remove generator
 $\Rightarrow$ Electrical System; Repair Group 27.
- Unbolt support for intake manifold.
- Withdraw dipstick.
- Unbolt left coolant flange from cylinder head and place to the side.
- Separate connectors at ignition coils.
- Release all lines at the cylinder head and expose.
- Remove air guide pipe for charge air system from turbocharger to charge air cooler
 $\Rightarrow$ page 21-14.
- Detach turbocharger from exhaust manifold
 $\Rightarrow$ page 21-7.



- Remove the sound dampening and engine cover on the right.
- ◀ - Turn the crankshaft in the direction of rotation of the engine to the TDC marking for Cylinder 1 -arrow-



- ◀ - Screw in the clamping screw T10092 into the tensioning device for the timing belt.
- Tension the pressure piston of tensioning device just sufficiently to enable the pressure piston to be secured with a locking pin (e.g. T40011).
- Remove the timing belt from the camshaft sprocket.
- Unscrew the ignition coils.
- Remove the cylinder head cover. ⇒ page 15-1.



- ◀ - Loosen the cylinder head bolts using wrench 3452 in the order shown.
- Remove the cylinder head.

Installing the cylinder head

Requirements

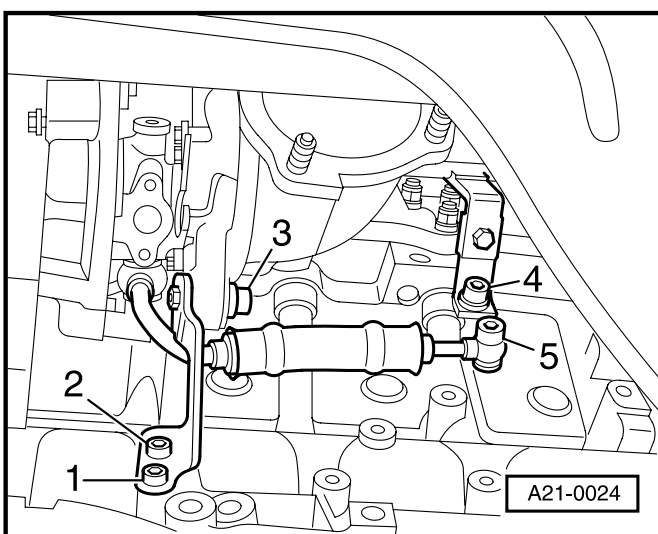
- The engine is installed
- The pistons are not standing at TDC

Required special tools, testing and measuring equipment as well auxiliary devices and material

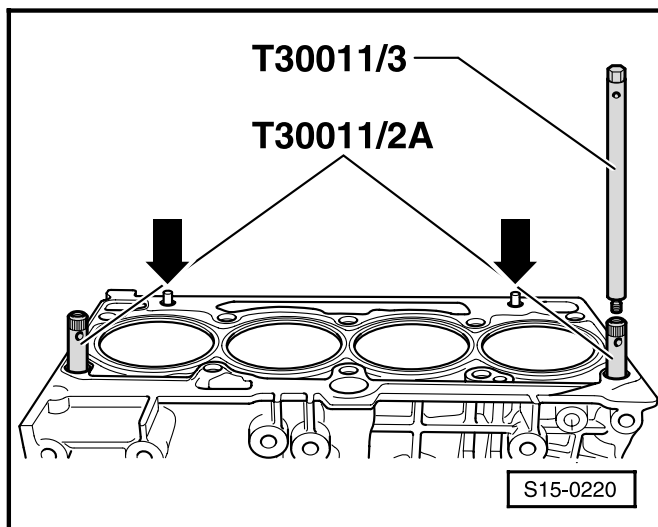
- ◆ Guide bolts T30011/2A
- ◆ Screwdriver T30011/3
- ◆ Torque wrench
- ◆ Hot screw paste G 052 112 A3
- ◆ Wrench e.g. 3542

Notes:

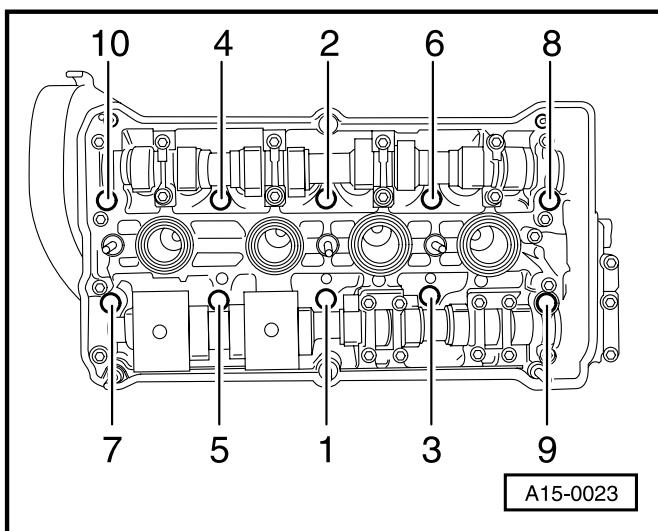
- ◆ *Cylinder head bolts should always be replaced.*
- ◆ *Carefully remove the remains of sealant when repairing the cylinder head and cylinder block. Ensure that no long grooves or scratches are made in the process. Any emery paper which is used should not have a grain size of below 100.*
- ◆ *Carefully remove lubrication and grinding residues.*
- ◆ *Only take the new cylinder head gasket out of its packaging immediately before it is going to be used.*
- ◆ *Handle the new gasket very carefully. Damage to the silicone layer can lead to leaking.*
- ◆ *No oil or coolant should be able to find its way into the blind holes for the cylinder head bolts.*



- ◀ - Loosen bolts -1- and -2- on the holder for the exhaust turbocharger by about two turns in order to avoid any stresses building up when installing the cylinder head.
- Ensure that there are no pistons standing at TDC.



- Lay the new cylinder head gasket in place.
- ◀ ♦ Note the centring pin in the cylinder block -arrow-.
- ♦ Note the installed position of the cylinder head gasket.
- Screw in guide bolts T30011/2A into the bore holes for cylinder head bolts 8 and 10 to centre the cylinder head.
- Put the cylinder head in place. Insert the remaining 8 cylinder head bolts and tighten them by hand.
- Screw out the guide bolts T30011/2A using the bolt tightener.
- Insert the remaining cylinder head bolts and tighten them by hand.



- ◀ - Tighten up the cylinder head in two stages in the tightening sequence shown:

1st stage: 40 Nm

2nd stage continue to turn using a fixed wrench:
180° (1/2 a turn)
turning 2 x 90° is allowed

- Further installation takes place in the reverse order; one should note the following

For vehicles with the engine code AGU

- Adjust the accelerator cable
- ⇒ 1.8 litre/92 kW engine - mechanics; Rep. Gr. 20.

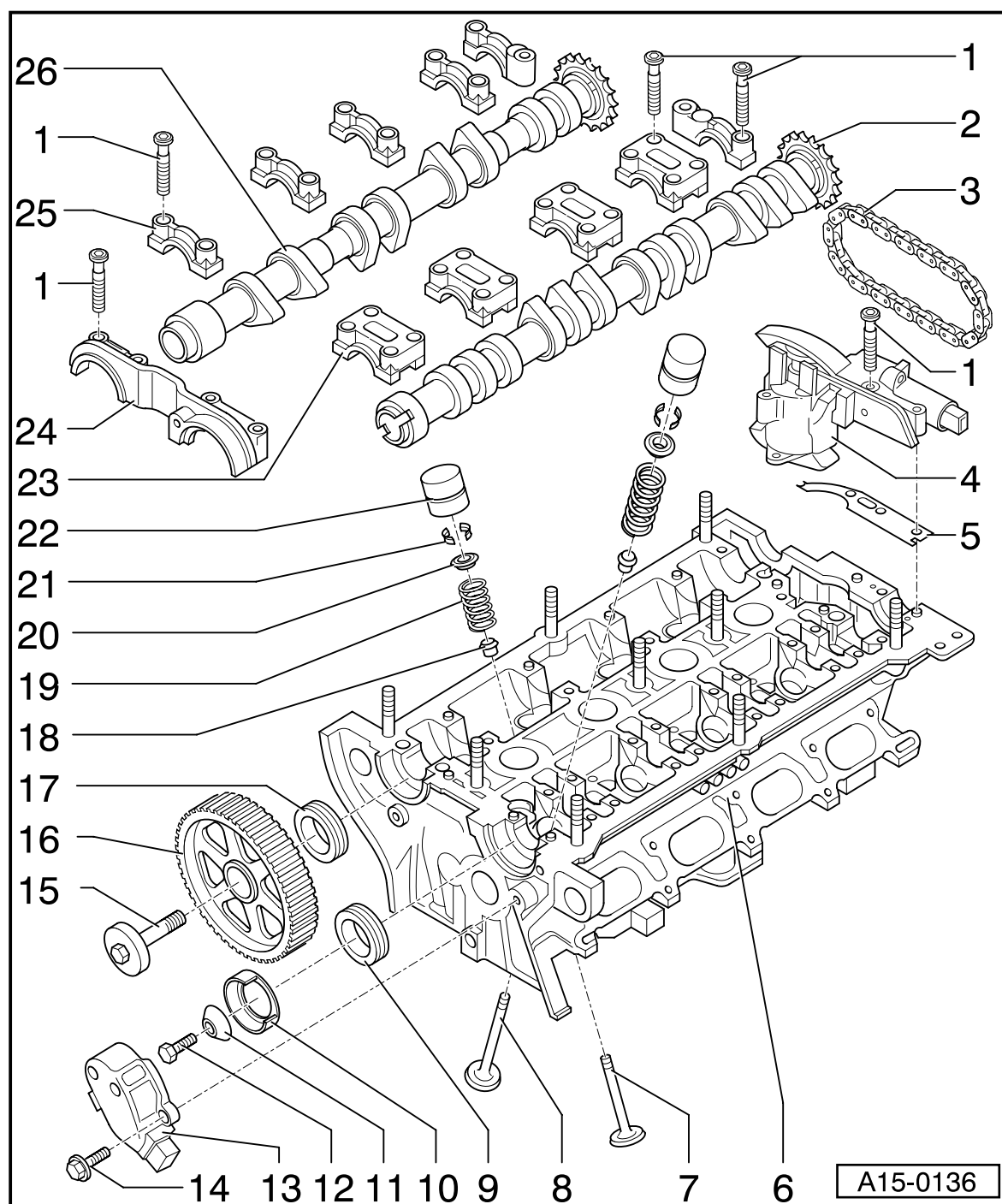
For all vehicles

- Undertake adjustment of the throttle flap valve control unit
- ⇒ 1.8 litre/110 kW engine - injection and ignition system Motronic; Rep. Gr. 24.
- Electrical connections and proper routing:
- ⇒ Current Flow Diagrams, Fault Finding Electrics, Fitting Locations

Note:

Additional work has to be undertaken when disconnecting and reconnecting the battery
⇒ *Electrical System, Rep. Gr. 27.*

Servicing valve gear

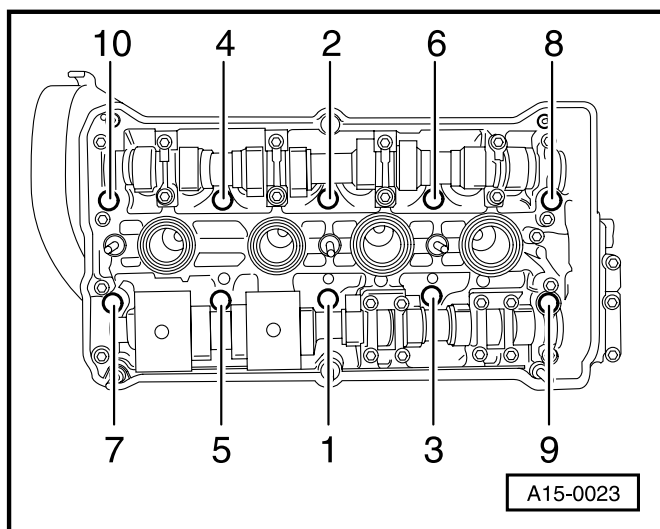


Notes:

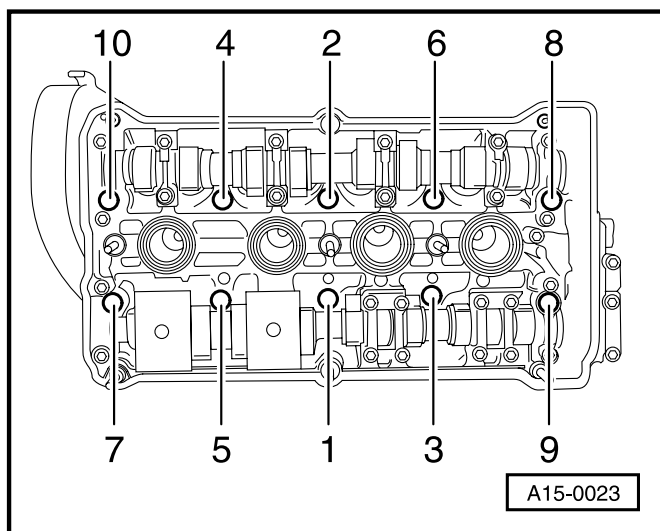
- ♦ Valve gear is identical to that of 1.8 l/92 kW engine.
- ♦ With the exception of item 4, all the notes and items are the same as those in Workshop Manual 1.8 l/92 kW Engine - Mechanical Components; Repair Group 15; Servicing valve gear.
- ♦ The removal and installation procedure is the same as the description in Workshop Manual 1.8 l/92 kW Engine - Mechanical Components; Repair Group 15; Removing and installing camshaft adjuster.

4 - Hydraulic chain tensioner/camshaft adjuster

- ♦ models with engine codes AGU and ARZ have a hydraulic chain tensioner
- ♦ other models have a camshaft adjuster
(1.8 l/92 kW engine has a camshaft adjuster)



- Check that no piston is positioned at TDC.
- ◀ - Insert the guide bolts from MP 1-208 into the holes for the cylinder head bolts 8 and 10 for centering.
- Place on the new cylinder head gasket. The inscription (part number) should always be legible from the inlet side.
- Fit on cylinder head, insert the remaining 8 cylinder head bolts and tighten by hand.
- Use bolt turner from MP 1-208 to unscrew the guide bolts through the bolt holes. Turn the bolt turner to the left for this step until the pins are free.



- Now, insert the two remaining cylinder head bolts and likewise tighten these by hand.
- ◀ - Tighten cylinder head in two stages in the tightening sequence shown, as follows:
 - 1st stage: 40 Nm
 - 2nd stage, torque further with fixed wrench: 180° (½ turn)
Torquing 2 x 90° is permissible

Note:

It is not necessary to retighten the cylinder head bolts after repairs.

- Attach the turbocharger to the exhaust manifold with a new gasket and new bolts which have been coated with G 052 112 A3, and bolt the bracket tight at the cylinder head
⇒ page 21-7.
- Install toothed belt and tension
⇒ page 13-5.
- The remaining installation is carried out in the reverse order of removal.
- Pour in coolant.
⇒ 1.8-ltr./92 kW Engine, Mechanical Components; Repair Group 19
- Adjust throttle cable.
⇒ 1.8-ltr./92 kW Engine, Mechanical Components; Repair Group 20

- After connecting the battery, enter the anti-theft code of the radio.
⇒ Operating Instructions of radio
- Set time of clock.
- Interrogate fault memory.
⇒ 1.8-ltr./110 kW Engine, Motronic Fuel Injection and Ignition System; Repair Group 01; Self-Diagnosis

Note:

Faults are stored as a result of separating the plug connections.

- Carry out adaptation of the throttle valve control unit:
⇒ 1.8-ltr./110 kW Engine, Motronic Fuel Injection and Ignition System; Repair Group 24; Testing throttle valve control unit
- Electrical connections and routing.
⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder

Testing compression pressure**Test condition**

- Engine oil temperature at least 30 °C

Special tools, testers and aids required

- ◆ Compression pressure tester
(e.g. V.A.G 1381 or 1763)
- ◆ Spark plug wrench (e.g. 3122 B)
- ◆ Torque wrench 5 ... 50 Nm
(e.g. V.A.G 1331)

Test procedure

- Remove engine trim panel.
- Switch off ignition (if not already off) and unplug the connectors at the ignition coils.
- Unplug the connectors at the injectors.

- Unbolt the ignition coils.
- Use the spark plug wrench (e.g. 3122 B) to unscrew the spark plugs.
- Open throttle valve fully.
- Use compression pressure tester (e.g. V.A.G 1381 or 1763) to test the compression pressure.

Note:

Use of tester:

⇒ *Operating Instructions*

- Operate starter and continue operating until no further pressure rise is indicated by the tester.

Compression pressures

New	Wear limit	Difference between the cylinders
1.0 ... 1.3 MPa	0.7 MPa	max. 0.3 MPa

- Install the spark plugs and ignition coils.
- Interrogate fault memory:
⇒ 1.8-ltr./110 kW Engine, Motronic Fuel Injection and Ignition System; Repair Group 01; Self-Diagnosis

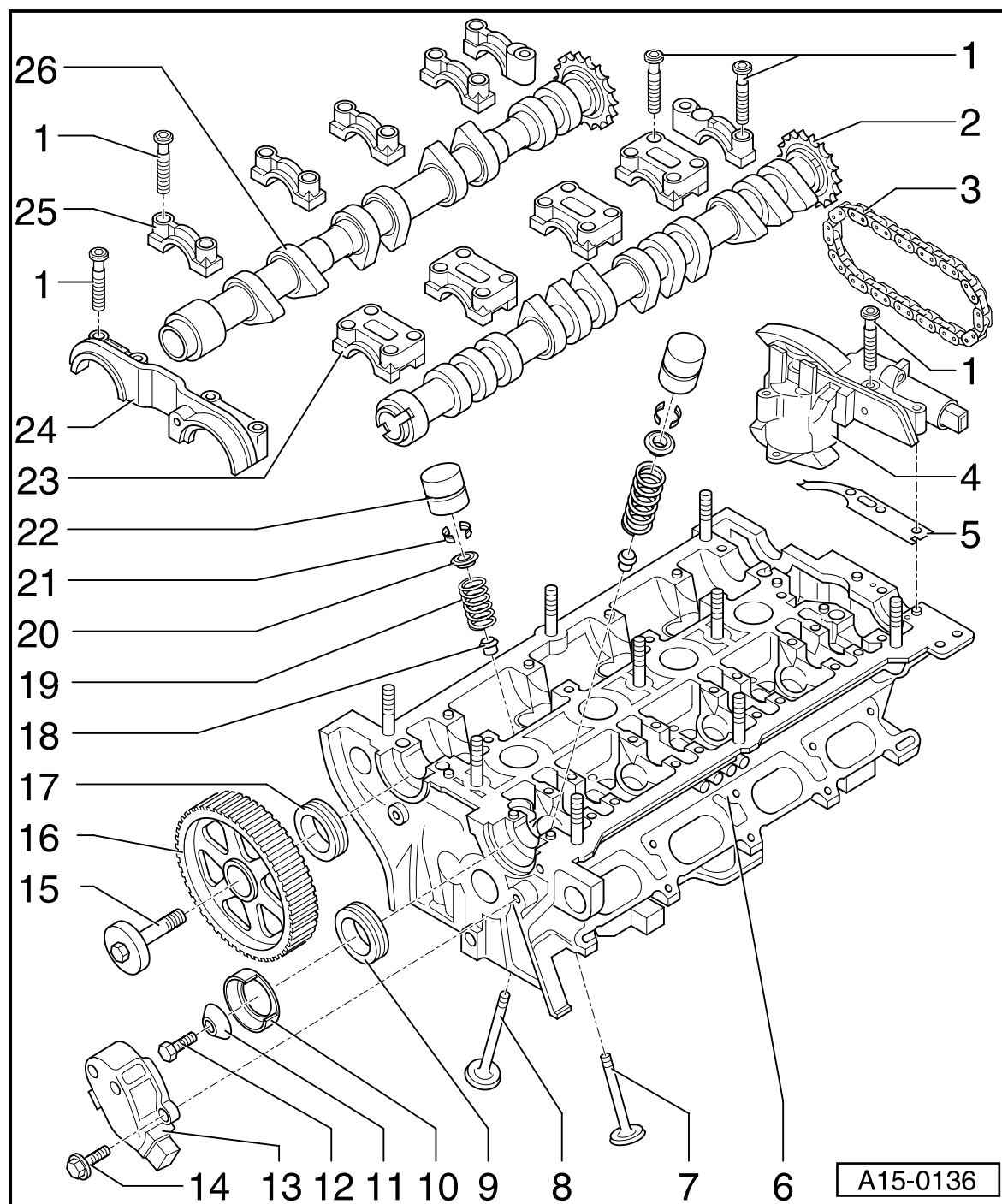
Note:

Faults are stored as a result of separating the plug connections.

Tightening torques

Component	Nm
Spark plugs in cylinder head	30
Ignition coils to cylinder head	10

Servicing valve gear



Notes:

- ♦ The valve gear is identical to that of the 1.8-ltr./92 kW engine.
- ♦ With the exception of item 4, all the notes and items are identical to those in Workshop Manual 1.8-ltr./92 kW Engine, Mechanical Components; Repair Group 15; Servicing valve gear

4 - Hydraulic chain tensioner

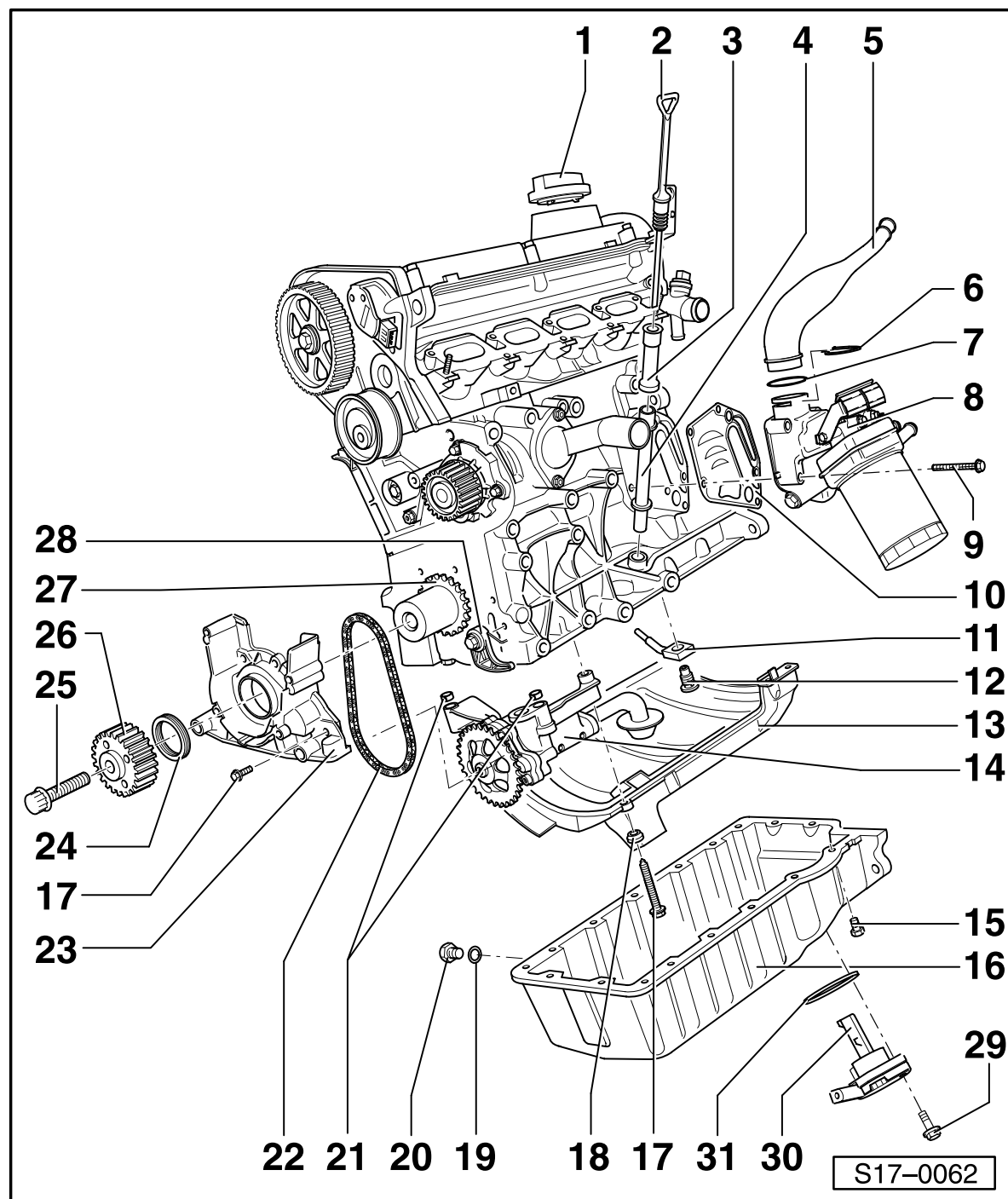
(The 1.8-ltr./92 kW engine has a camshaft adjuster)

Removing and installing camshafts and hydraulic chain tensioner

Notes:

- ◆ *Removal and installation is identical to the description in Workshop Manual 1.8-ltr./92 kW Engine, Mechanical Components; Repair Group 15; Removing and installing camshafts and camshaft adjuster.*
- ◆ *In place of the camshaft fitted to the 1.8-ltr./92 kW engine, the 1.8-ltr./110 kW engine has a hydraulic chain tensioner. The tightening torques and the tools used are identical.*

Removing and installing parts of the lubrication system



Note:

The lubrication system is essentially identical to that of the 1.8 l/92 kW engine.

Differences:

- Testing oil pressure and oil pressure switch; item 8
- Oil level and oil temperature sender -G266; items 29, 30, 31 (only for models with LongLife Service)

Testing oil pressure and oil pressure switch

⇒ page 17-3

8 - Oil filter holder

- ♦ disassembling and assembling
⇒ page 17-2

29 - 10 Nm

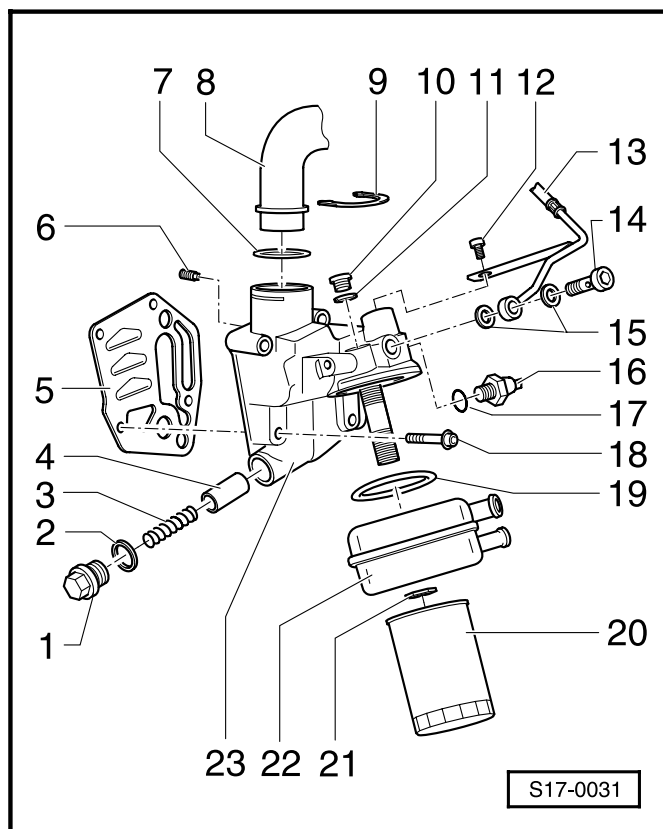
30 - Oil level/oil temperature sender -G266

- ♦ testing ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations

31 - Gasket

- ♦ replace if damaged

Dismantling and assembling the oil filter holder



1 - Screw plug - 40 Nm

2 - Gasket ring

- ♦ replace

3 - Spring

- ♦ for the overpressure valve, about 0.4 MPa (4 bar)

4 - Piston

- ♦ for the overpressure valve, about 0.4 MPa (4 bar)

5 - Gasket

- ♦ replace

6 - Oil retaining valve

- ♦ tightening torque 8 Nm
- ♦ integrated into the oil filter

7 - O-ring

- ♦ replace
- ♦ push onto the pipe -position 8- up to the collar

8 - Pipe

9 - Retaining clip

10 - Screw plug - 10 Nm

11 - Gasket ring

- ♦ cut open if leaking and replace

12 - 20 Nm

13 - Oil feed line

- ♦ to the exhaust turbocharger

14 - Hollow screw - 30 Nm

15 - Gasket ring

- ♦ replace

16 - 0.14 Mpa (1.4 bar) oil pressure switch -F1- 25 Nm

- ♦ black insulation
- ♦ check ⇒ page 17-5

17 - Gasket ring

- ♦ cut open if leaking and replace

18 - 15 Nm+ turn a further 1/4 turn (90°)

- ♦ replace

19 - Gasket ring

- ♦ replace
- ♦ fit into the grooves on the oil cooler

20 - Oil filter

- ♦ loosen with the tensioning strap
- ♦ tighten to 20 Nm
- ♦ note the method of installation on the oil filter
- ♦ observe the change intervals

21 - 25 Nm

22 - Oil cooler

- ♦ observe the guidelines

⇒ 1.8 litre/92 kW engine - mechanics; Rep. Gr. 17; Removing and installing parts of the lubrication system

- ♦ check for free access to the neighbouring components
- ♦ coat contact surfaces outside of the gasket ring with AMV 188 001 02
- ♦ connection plan for the coolant hoses ⇒ page 19-1

23 - Oil filter holder

- ♦ with an overpressure valve, about 0.4 MPa (4 bar)
- ♦ for vehicles ► 06.02

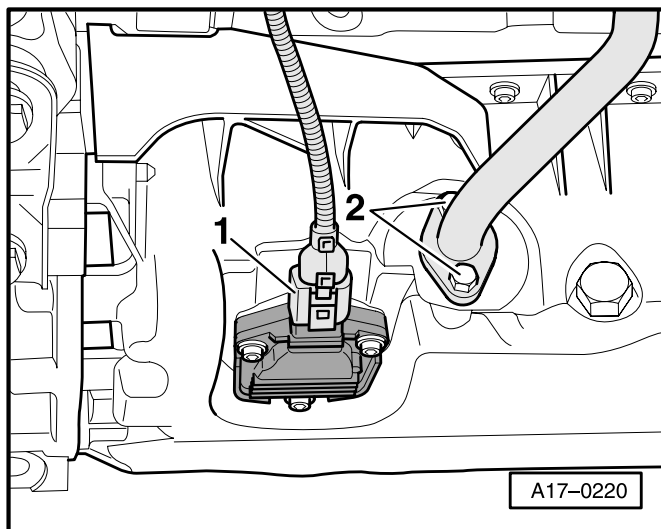
The following items should be replaced when leaks occur at the joints between the oil feed line and the oil filter holder: the complete holder, oil line, hollow screw and gasket ring

Removing and installing oil pan

Notes:

♦ The removal and installation procedure is essentially the same as the description in *Workshop Manual 1.8 l/92 kW Engine - Mechanical Components; Repair Group 17; Removing and installing oil pan.*

- ◀ ♦ In addition, unplug the connector from the oil level/oil temperature sender -G266-1- and unbolt the oil return-flow line to the turbo-charger (bolts -2-).
Tightening torque: 10 Nm
Replace gasket!



Testing oil pressure and oil pressure switch

Special tools, testers and aids required

- ♦ Oil pressure tester, e.g. V.A.G 1342
- ♦ Diode test lamp, (e.g. V.A.G 1527)
- ♦ Adapter cable set, e.g. V.A.G 1594
- ♦ Current flow diagram

Operation of dynamic oil pressure warning system

The oil pressure switch is opened when pressureless and closed when the switching pressure is reached.

The oil pressure warning is activated about 10 s after the ignition is switched on („terminal 15 on“).

Switch-on delay of oil pressure warning about 3 s.

Switch-off delay of oil pressure warning about 5 s.

Testing warning light

Note:

This test does not apply to vehicles fitted with point display.

After the ignition is switched on, engine not running, the oil pressure warning light in the dash panel insert comes on for about 3 s and then goes out again. The check is ended as soon as the engine is running.

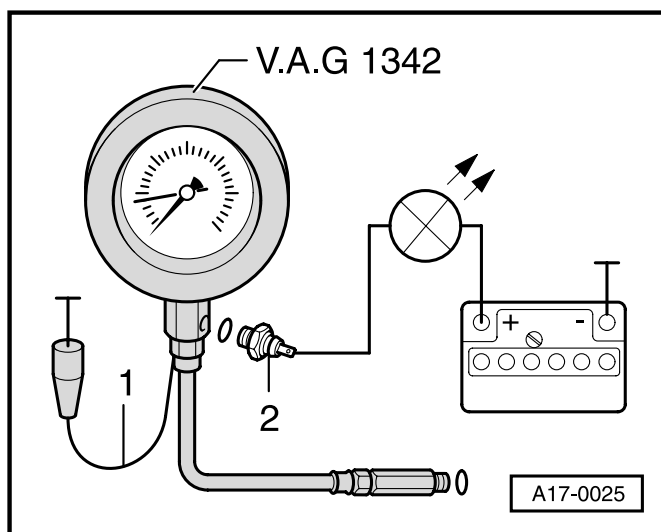
Warning criteria

The visual oil pressure warning (oil pressure warning lamp flashes) is switched on and the buzzer sounds 3 times as an audible warning if one of the following conditions exists:

- „Ignition on“, engine not running, oil pressure switch closed
- Engine speed greater than 1500 rpm, oil pressure switch open
 - At an engine speed of more than 5000 rpm, the oil pressure warning is not cancelled, also not if the oil pressure switch is closed. Oil pressure warning cancelled at engine speed below 5000 rpm.
 - If the oil pressure switch is opened for only 0.5...3 s at an engine speed greater than 1500 rpm, this is stored in the combination processor of the dash panel insert. If this situation occurs 3 times when the engine is running, the oil pressure warning is immediately activated and is also not cancelled when engine speed drops below 1500 rpm.
Oil pressure warning cancelled if the oil pressure switch is closed for more than 5 s at speed of more than 1500 rpm or when „Ignition off“.

Test conditions

- Engine oil level o.k.; testing
⇒ 1.8-ltr./92 kW Engine, Mechanical Components; Repair Group 17; Checking engine oil level
- Oil pressure warning lamp (K3) should come on for about 3 s when ignition switched on
- Engine oil temperature at least 80 °C (radiator fan must have cut in once)



Testing oil pressure switch

- Detach cable from oil pressure switch.
- ◀ - Unscrew oil pressure switch and screw in oil pressure tester (e.g. V.A.G 1342).
- Screw oil pressure switch -2- into V.A.G 1342.
- Connect brown cable -1- of the tester to earth (-).
- Connect diode test lamp (e.g. V.A.G 1527) to oil pressure switch -2- and to battery positive (+).
- Start engine and slowly increase revs.
- The LED should come on at a pressure of 0.12...0.16 MPa; if not, replace oil pressure switch.

Testing oil pressure

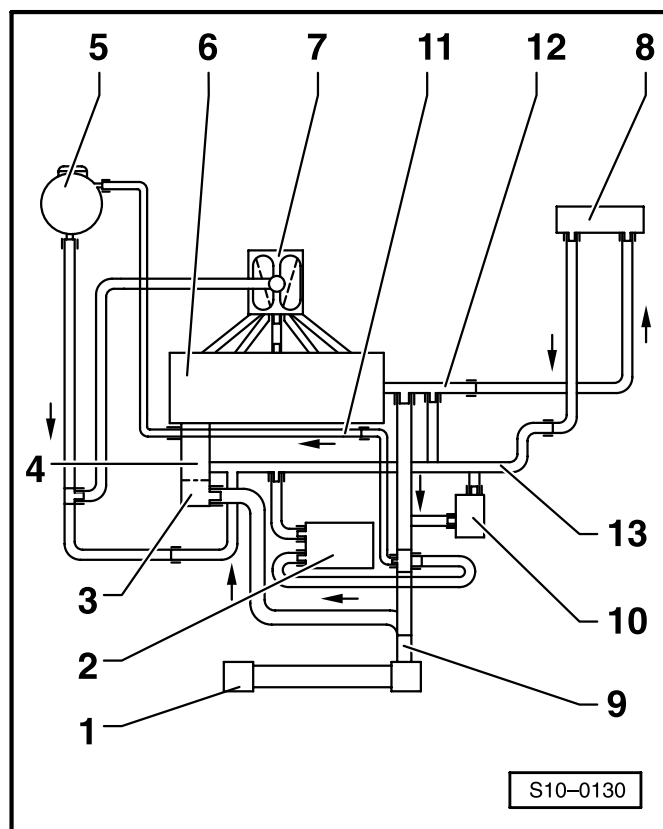
- Unscrew oil pressure switch and screw in V.A.G 1342.
- Screw oil pressure switch into V.A.G 1342.
- Start engine (engine oil temperature at least 80 °C).
 - ◆ Oil pressure at idle speed: min. 0.13 MPa
 - ◆ Oil pressure at 2000 rpm: 0.35...0.45 MPa

If the specifications are not achieved:

- Replace pressure relief valve in oil filter holder or oil pump, respectively.

Removing and installing parts of the cooling system

Parts of cooling system



Notes:

- ◆ When the engine is warm, the cooling system is pressurized. Release pressure, if necessary, before commencing repairs.
- ◆ Hose connections are secured with spring strap clips. Always use spring strap clips when carrying out repairs.
- ◆ It is recommended to use the pliers for spring strap clips in order to install such clips.
- ◆ Always replace seals and gaskets.
- ◆ When installing coolant hoses, route them free of stress, without any contact points with other components (pay attention to marking on coolant connection and on hose).
- ◆ The connection diagram of the coolant system may differ slightly depending on the individual engine codes.
- ◆ Draining and filling system with coolant, inspecting coolant mixing ratios and cooling system for leaks
⇒ 1.8 l/92 kW Engine - Mechanical Components; Repair Group 19.

1 - Radiator

- ◆ after replacing , fill entire system with fresh coolant

2 - Oil cooler

- ◆ removing and installing ⇒ page 17-2, item 22

3 - Coolant thermostat

- ◆ removing and installing ⇒ page 19-2

4 - Coolant pump

- ◆ removing and installing
⇒ 1.8 l/92 kW Engine - Mechanical Components; Repair Group 19
- ◆ check for unobstructed running

5 - Expansion reservoir

6 - Cylinder block

7 - Turbocharger

8 - Heat exchanger

9 - Quick-coupling

- ◆ always replace seal

10 - Transmission oil cooler

- ◆ for ATF
- ◆ only with automatic gearbox

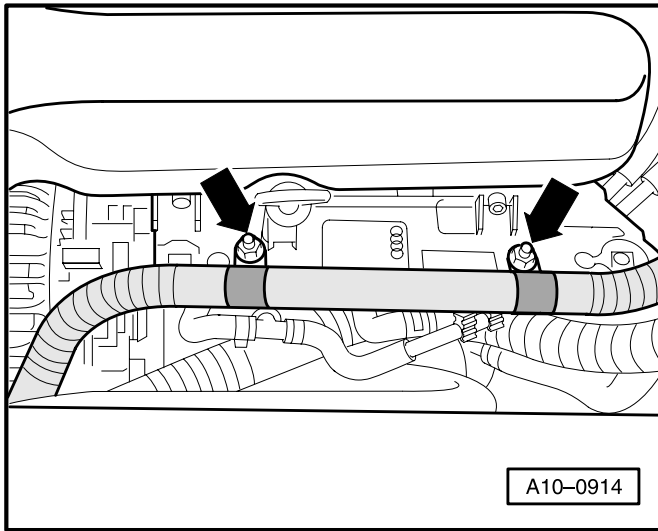
11 - Top coolant pipe

- ◆ at intake manifold

12 - Connection fitting

- ◆ at cylinder head

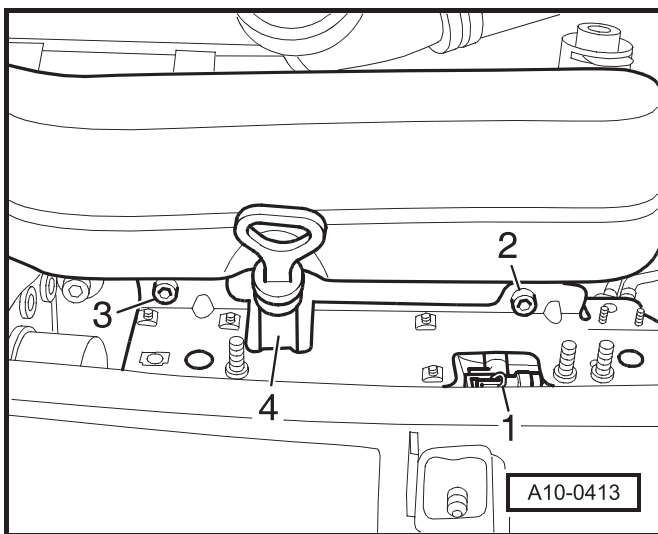
13 - Coolant pipe



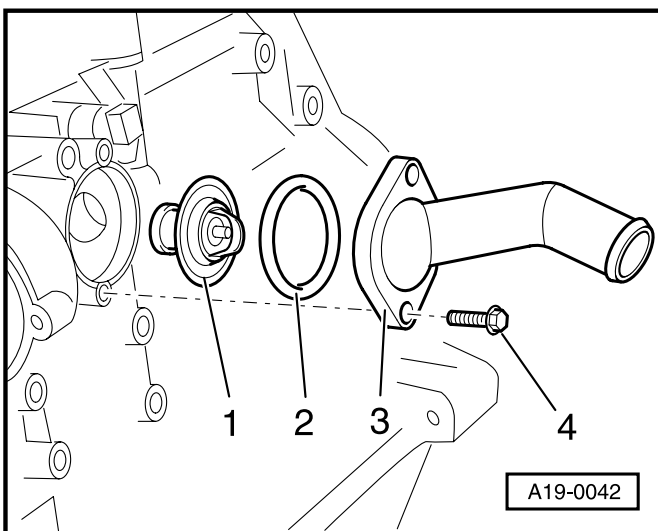
Removing and installing coolant thermostat

Removing

- Drain coolant
⇒ 1.8 l/92 kW Engine - Mechanical Components; Repair Group 19.
- Detach hoses from secondary air injection pump.
- ◀ - Remove secondary air injection pipe from bracket at engine -arrows-.



- ◀ - Unscrew bolts -2- and -3- and remove bracket of dipstick guide tube -4-.
- Separate plug connection -1- for turbo-charger solenoid valve -N249 and for secondary air inlet valve -N112 from the bottom of the bracket.
- Detach vacuum hose to switchover valve at intake manifold and place bracket down to the side.
- Take off ribbed V-belt
⇒ 1.8 l/92 kW Engine - Mechanical Components; Repair Group 13.



- Remove bolts of generator and place down to the side. The lines remain connected.
- ◀ - Detach coolant hose from connection fitting -3-.
- Unscrew bolts -4- (15 Nm), take off connection fitting -3-, O-ring -2- and coolant thermostat -1-.

Installing

Installation is carried out in the reverse order; pay attention to the following points:

Note:

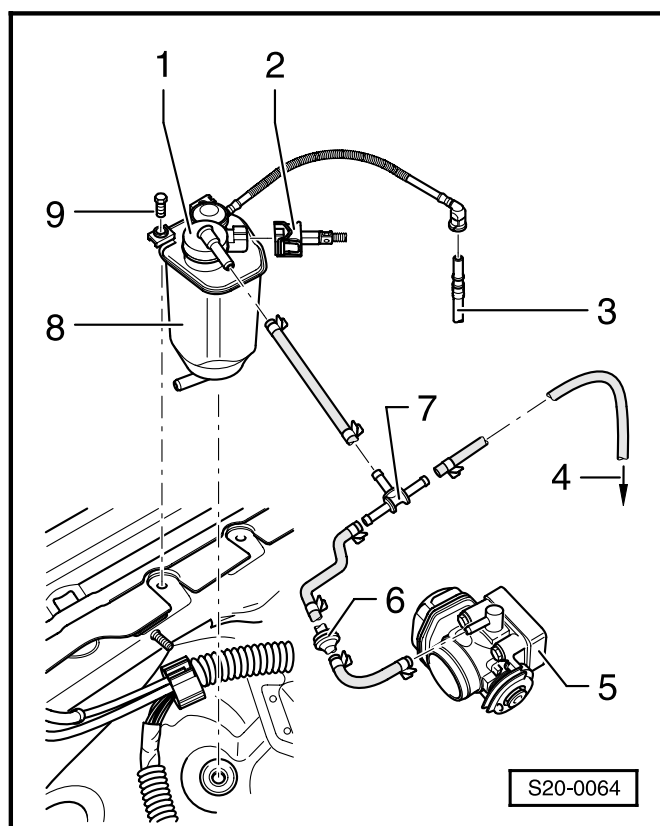
Always replace seals and gaskets.

- Clean sealing surface for O-ring.
- Moisten new O-ring with coolant.
- Fit on coolant thermostat in installation position:

Coolant thermostat arm must be positioned vertically.

Removing and installing parts of the fuel supply system

Assembly overview of activated charcoal filter system for models with engine codes AGU and ARZ



1 - Solenoid valve 1 -N80-

- ♦ testing operation and actuation

⇒ 1.8 l/110 kW Engine - Motronic Fuel Injection and Ignition System; Repair Group 24

2 - Connector

3 - Vent line

- ♦ from gravity valve at fuel tank
- ♦ to detach, press unlocking buttons at connector

4 - To connection at turbocharger

5 - Throttle valve control unit

6 - Non-return valve

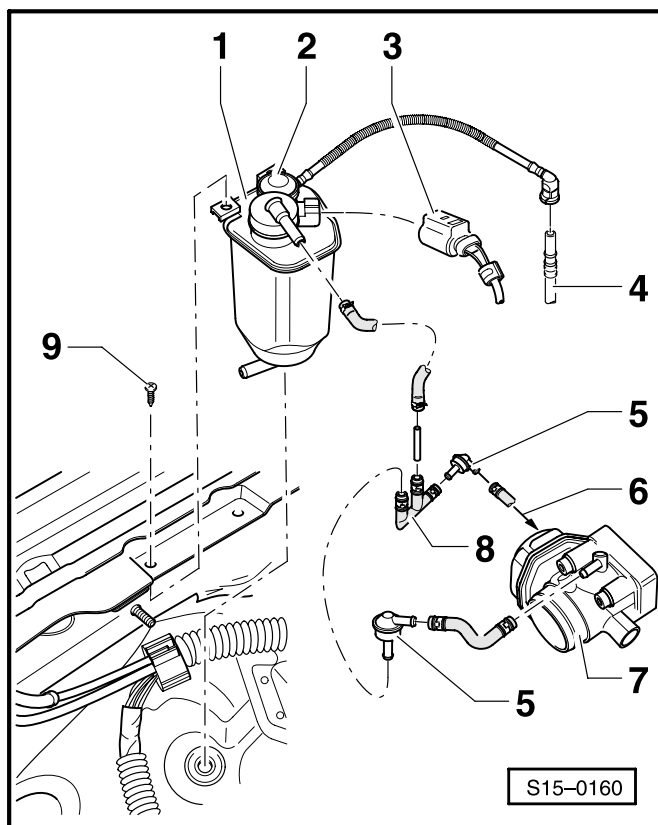
7 - T-connector

8 - Activated charcoal filter

- ♦ with activated charcoal filter solenoid valve -N80-
- ♦ installation position: in right of engine compartment
- ♦ to remove, detach power steering reservoir and push to the side

9 - 10 Nm

Assembly overview of activated charcoal system for other engine codes



1 - Activated charcoal filter

- ◆ with activated charcoal filter solenoid valve -N80-
- ◆ installation position: in right of engine compartment
- ◆ to remove, detach power steering reservoir and push to the side

2 - Solenoid valve 1 -N80-

- ◆ testing operation and actuation
- ⇒ 1.8 l/110 kW Engine - Motronic Fuel Injection and Ignition System; Repair Group 24

3 - Connector

4 - Vent line

- ◆ from gravity valve at fuel tank
- ◆ to detach, press unlocking buttons at connector

5 - Non-return valve

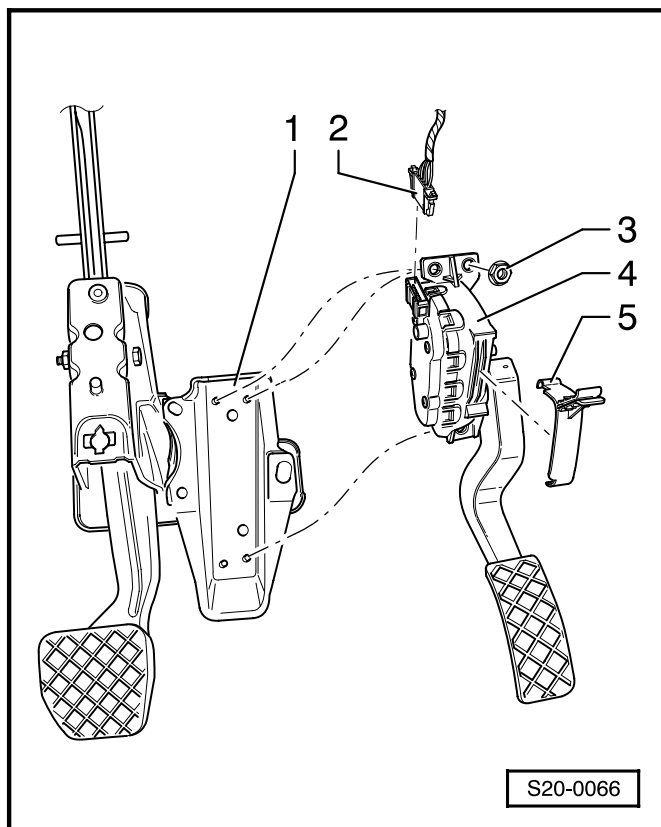
6 - To inlet connection at turbocharger

7 - Throttle valve control unit

8 - Rear passage

9 - 10 Nm

Servicing throttle mechanism

**1 - Bearing housing**

- ♦ removing and installing
⇒ Running Gear; Repair Group 46

2 - Connector**3 - 10 Nm****4 - Accelerator pedal position sender
-G79 and -G185**

- ♦ testing
⇒ 1.8 l/110 kW Engine - Motronic Fuel Injection and Ignition System; Repair Group 24
- ♦ to remove, take out footwell cover (driver side)

5 - Bracket

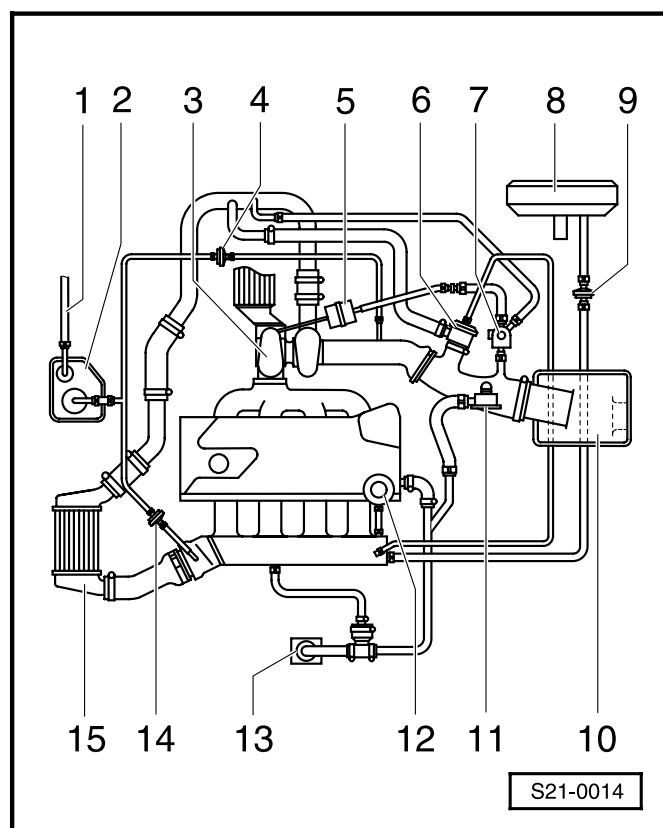
- ♦ for footwell cover
- ♦ clipped in place at accelerator pedal position sender

The charge air system with exhaust turbocharger

Notes:

- ◆ Observe the cleanliness regulations ⇒ page 21-2.
- ◆ All hose connections are secured by means of hose clamps.
- ◆ The charge air system must be leak-free.
- ◆ Self-locking nuts should always be replaced.
- ◆ Gaskets should always be replaced.

Connection plan for the charge air pressure regulation for engines with the engine code AGU



1 - Ventilation line

- ◆ from the fuel tank

2 - Activated charcoal filter system

- ◆ with solenoid valve 1 for the activated charcoal filter system -N80-

3 - Exhaust turbocharger

4 - Non-return valve for the AKF container

5 - Pressure unit for the charge pressure control valve

6 - Stroke shut-off valve

7 - Solenoid valve for charge air pressure limitation -N75-

- ◆ check ⇒ 1.8 litre/110 kW engine - Injection and ignition system Motronic; Rep. Gr. 24.

8 - Brake booster

9 - Non-return valve for the brake booster

10 - Air filter with airflow mass meter -G70-

11 - Pressure regulating valve for crankcase ventilation

12 - Fuel pressure regulator

13 - Crankcase ventilation

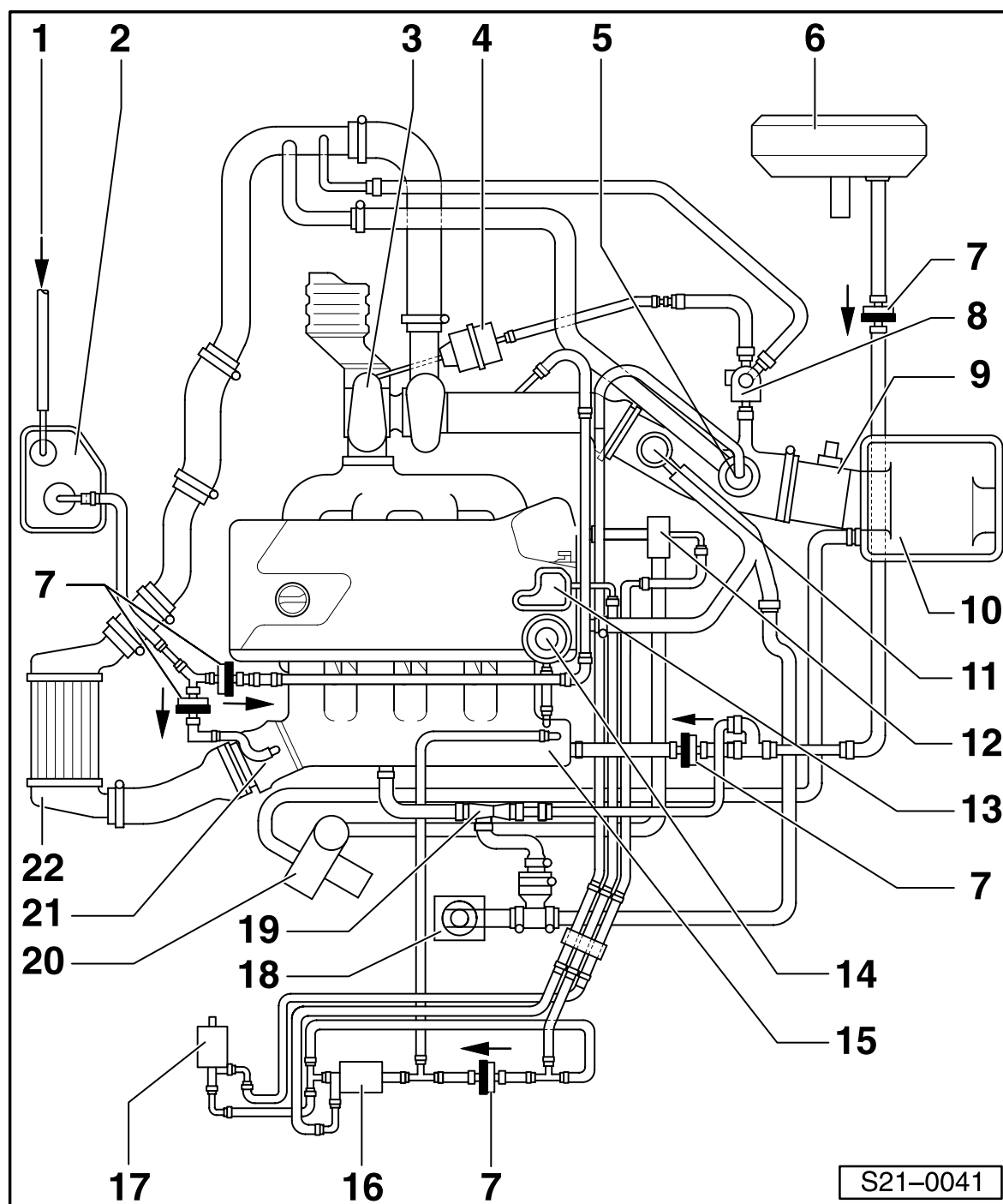
14 - Non-return valve for the AKF container

15 - Charge air cooler

Connection diagram for charge pressure control for other engine codes

Note:

The design of the non-return valves may differ. They are not colour-coded; the taper connection corresponds to the dark side.



1 - Vent line

♦ from fuel tank

2 - Activated charcoal filter

♦ with solenoid valve 1 for activated charcoal filter system -N80-

3 - Turbocharger

4 - Vacuum unit for charge pressure control valve

5 - Overrun shutoff valve

6 - Brake servo unit

7 - Non-return valve

- ◆ Installed position (light/dark side): see the figure, arrow points in the direction of the passageway

8 - Solenoid valve for charge air pressure limitation -N75-

- ◆ check ⇒ 1.8 litre/110 kW engine - injection and ignition system; Rep. Gr. 24.

9 - Airflow mass meter -N70-**10 - Air filter****11 - Pressure regulating valve for crankcase ventilation****12 - Combination valve for letting in secondary air****13 - Vacuum box**

- ◆ screwed to the cylinder head cover

14 - Fuel pressure regulator**15 - Inlet manifold**

- ◆ with sender for the inlet manifold temperature -G42-

16 - Turbocharger divert air valve

- ◆ check ⇒ 1.8 litre/110 kW engine - Injection and ignition system Motronic; Rep. Gr. 01, Actuator Diagnosis.

17 - Secondary air inlet valve -N112-

- ◆ check ⇒ 1.8 litre/110 kW engine - Injection and ignition system Motronic; Rep. Gr. 24.

18 - Crankcase ventilation**19 - Suction spray pump****20 - Secondary air pump**

- ◆ removing and installing ⇒ page 26-8

21 - Throttle valve control unit -J338-**22 - Charge air cooler**

- ◆ with sender for charge pressure -G31-

Rules for cleanliness

Pay careful attention to the following „5 rules“ for cleanliness when carrying out work on the turbocharger:

- ◆ Thoroughly clean connection points and the surrounding area before disconnecting.
- ◆ Place removed parts down on a clean surface and cover over. Do not use fluffing cloths!
- ◆ Carefully cover over or seal opened components if repairs are not carried out immediately.
- ◆ Install only clean parts:
Do not remove replacement parts from their wrapping until just before installing.
Do not use parts which have been stored unwrapped (e.g. in tool boxes etc.).
- ◆ If the system is opened:
Avoid working with compressed air, if possible.
Avoid moving the vehicle if possible.

Safety measures

If it is necessary to use test and measuring equipment during a road test, pay attention to the following points:

- ◆ The test and measuring equipment should always be attached on the rear seat and operated from that point by a second person.

If the test and measuring equipment is operated from the front passenger seat, this could result in injuries to the person occupying that seat in the event of an accident, as a result of the passenger airbag being deployed.

Testing overrun shutoff valve

Special tools, testers and aids required

- ◆ Hand vacuum pump (e.g. V.A.G 1390)

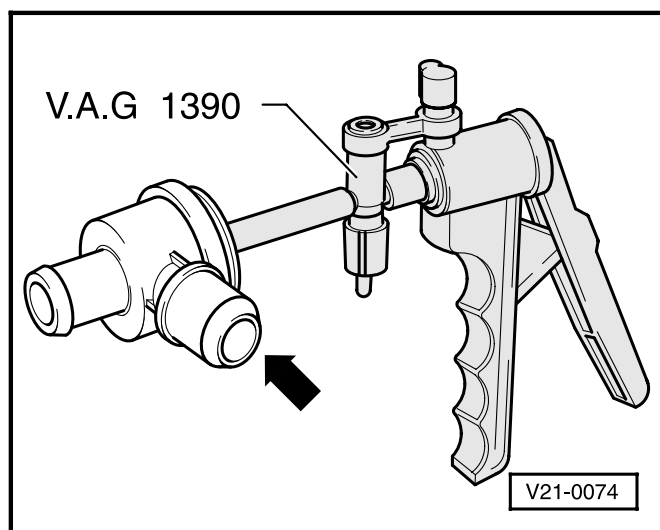
Test condition

- Poor performance or load change jolts

Test procedure

Note:

The overrun shutoff valve is located in front of the turbocharger. It is opened by vacuum in the overrun phase and when the engine is idling.



- ◀ - Connect the hand-operated vacuum pump (e.g. V.A.G 1390) at the vacuum connection of overrun shutoff valve.
- Operate vacuum pump.
Overrun shutoff valve should open -arrow-.
- Operate air admission valve at the vacuum pump.
Overrun shutoff valve should close -arrow-.

If the overrun shutoff valve does not open or close, replace valve.

Note:

The connections of the overrun shutoff valve should be attached with screw clips.

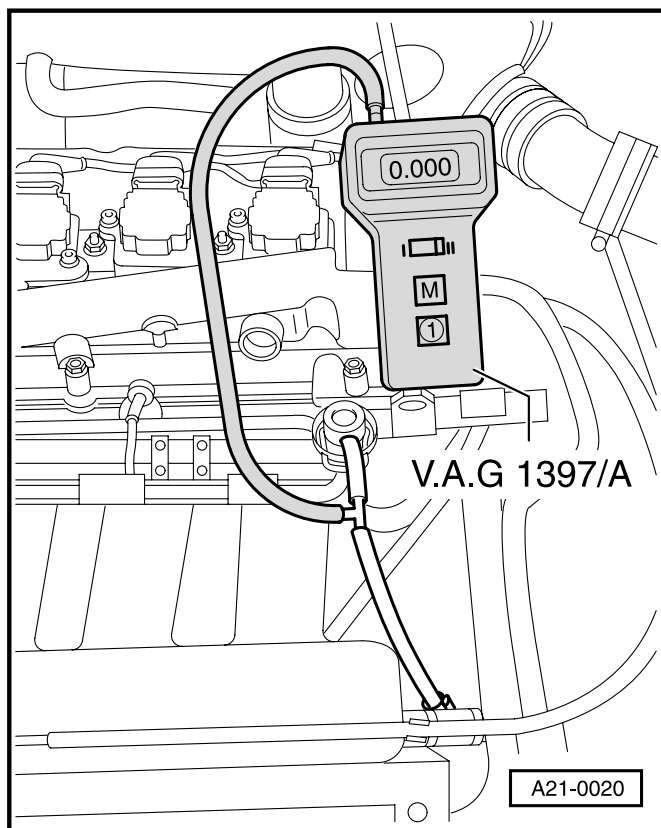
Testing charge pressure control

Special tools, testers and aids required

- ◆ Turbocharger tester (e.g. V.A.G 1397 A)

Test conditions

- No leaks at the inlet and exhaust sides.
- Engine oil temperature at least 60 °C



Test procedure

The charge pressure is measured at full throttle, when driving or on the roller dynamometer. Duration of test for each measurement not more than 10 seconds.

- ◀ - Connect T adapter with test hose of turbocharger tester V.A.G 1397 A between fuel pressure regulator and front of intake manifold.
- Draw test hose through below the bonnet and pull it through the right-hand window into the interior.
- Switch on measuring range I.

Notes:

- ◆ Use of turbocharger tester ⇒ Operating Instructions.
- ◆ The hoses must be connected completely free of leaks.
- ◆ If the charge pressure is measured when driving, a second person is required for operating the turbocharger tester for safety reasons.
- ◆ Ensure that the pressure hose is not jammed between the hood and the body.

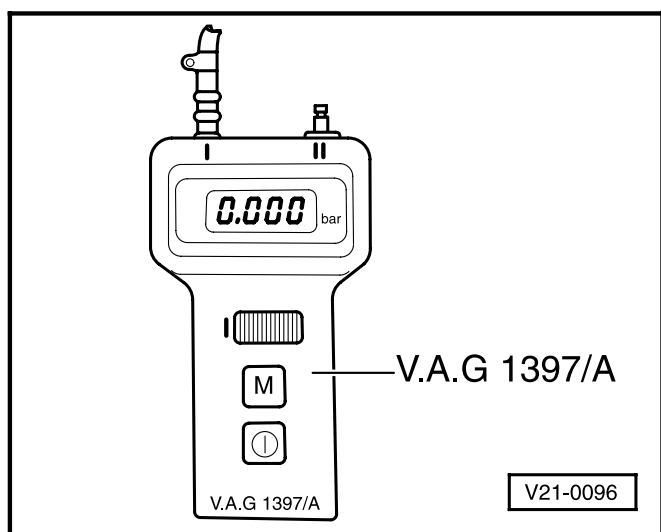
- ◀ - Measure charge pressure at full throttle:

Models with manual gearbox

- Accelerate car in 3rd gear from 2000 rpm at full throttle and press the memory button -M- on the turbocharger tester at 3000 rpm.
- ◆ Specification: 0.15 ... 0.16 MPa

Models with automatic gearbox

- Drive off with selector lever in position 2.
- Accelerate up to 2500 rpm and wait until the gearbox has engaged 2nd gear.
- Depress accelerator fully into kickdown position (the gearbox no longer shifts back at this road/engine speed) and press the memory button -M- on the turbocharger tester at 3000 rpm.
- ◆ Specification: 0.15 ... 0.16 MPa



If the charge pressure is exceeded:

- Test charge pressure control solenoid valve -N75- (passage in hose from turbocharger through valve to vacuum unit with connector unplugged).
- Inspect hoses for leaks and for correct assignment of connections:
engine codes AGU, ARZ ⇒ page 21-1
other engine codes ⇒ page 21-1.1.
- Test charge pressure control valve vacuum unit ⇒ page 21-5.

If the pressure is below the specified charge pressure:

- Test charge pressure control solenoid valve -N75-
⇒ 1.8 l/110 kW Engine - Motronic Fuel Injection and Ignition System; Repair Group 24.
- Test turbocharger solenoid valve -N249-
⇒ 1.8 l/110 kW Engine - Motronic Fuel Injection and Ignition System; Repair Group 24.
- Test charge pressure control valve vacuum unit ⇒ page 21-5.
- Test overrun shutoff valve ⇒ page 21-3.
- Inspect hoses for leaks and for correct assignment of connections:
engine codes AGU, ARZ ⇒ page 21-1
other engine codes ⇒ page 21-1.1.

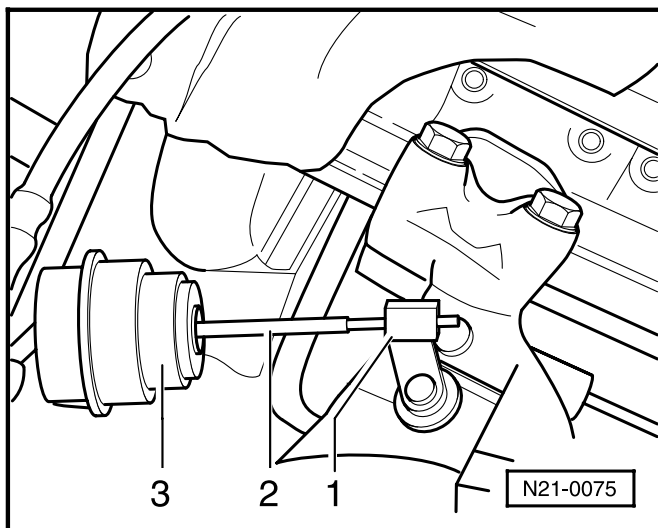
Testing charge pressure control valve vacuum unit

Special tools, testers and aids required

- ◆ Vehicle system tester V.A.G 1552

Test conditions

- Engine oil temperature at least 60 °C
- Charge pressure control solenoid valve in proper order
- Charge pressure o.k.
- Unplug connector at charge pressure control solenoid valve -N75-.



- ◀ - Start engine and increase to maximum revs by rapidly depressing accelerator. The operating rod -2- for the charge pressure control valve must move.

If the operating rod does not move:

- Inspect ease of movement of lever for charge pressure control valve -1-. If it does not move, replace turbocharger.

Note:

The restoring force of the vacuum unit is relatively stiff. Do not remove or alter position of operating rod!

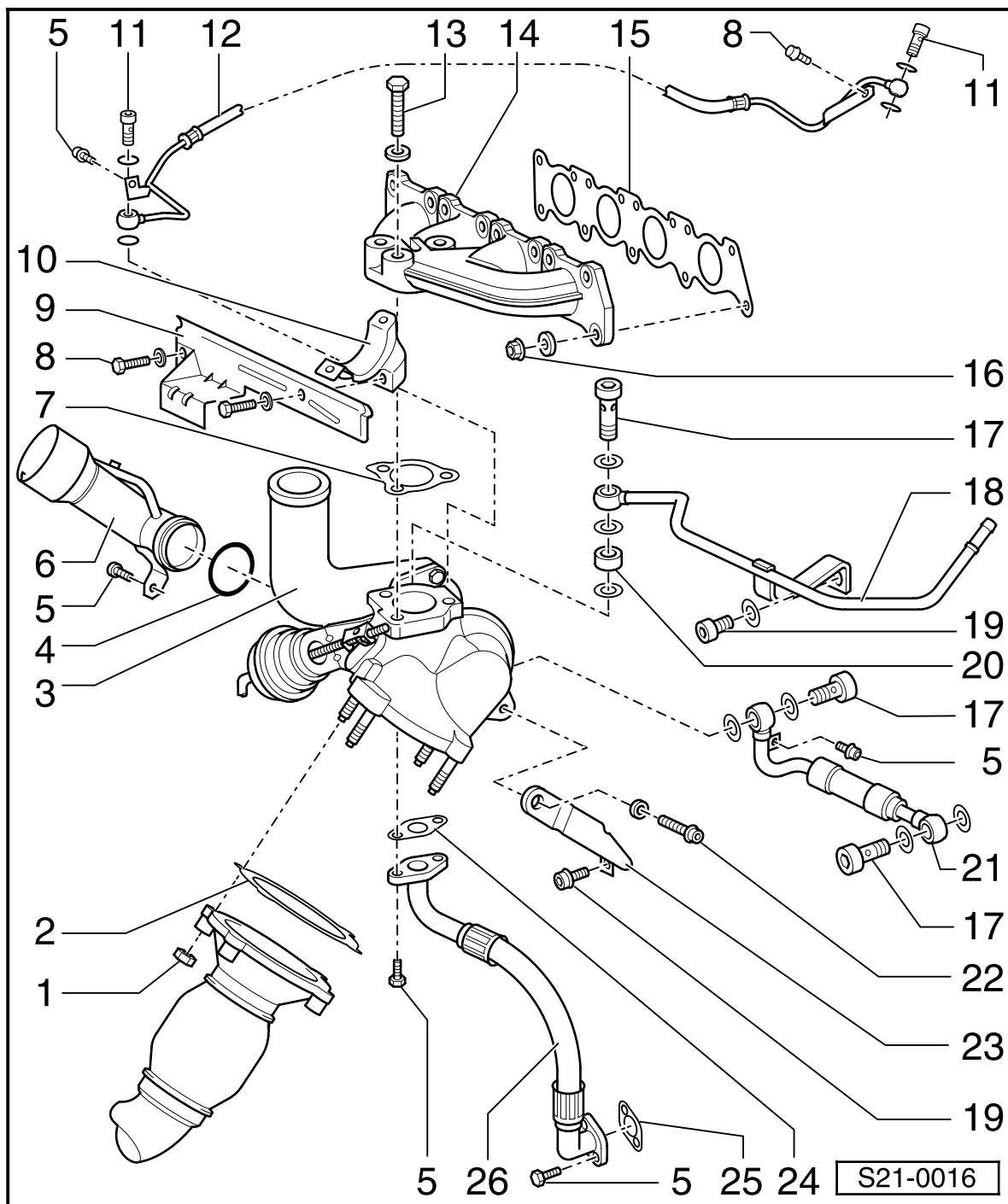
If the operating rod does not move although lever operates freely:

- Inspect connection hose for leaks.

If the operating rod does not move although the lever operates freely and there is no leak at the connection fitting:

- Replace the turbocharger.
- Interrogate fault memory and erase.
⇒ 1.8-ltr./110 kW Engine, Motronic Fuel Injection and Ignition System; Repair Group 01; Self-Diagnosis

Removing and installing turbocharger - Summary of components



Part I

Note:

Always replace seals and gaskets.

1 - 40 Nm

- ◆ Replace
- ◆ Insert with hot screw paste G 052 112 A3

2 - Gasket

- ◆ Replace

3 - Turbocharger

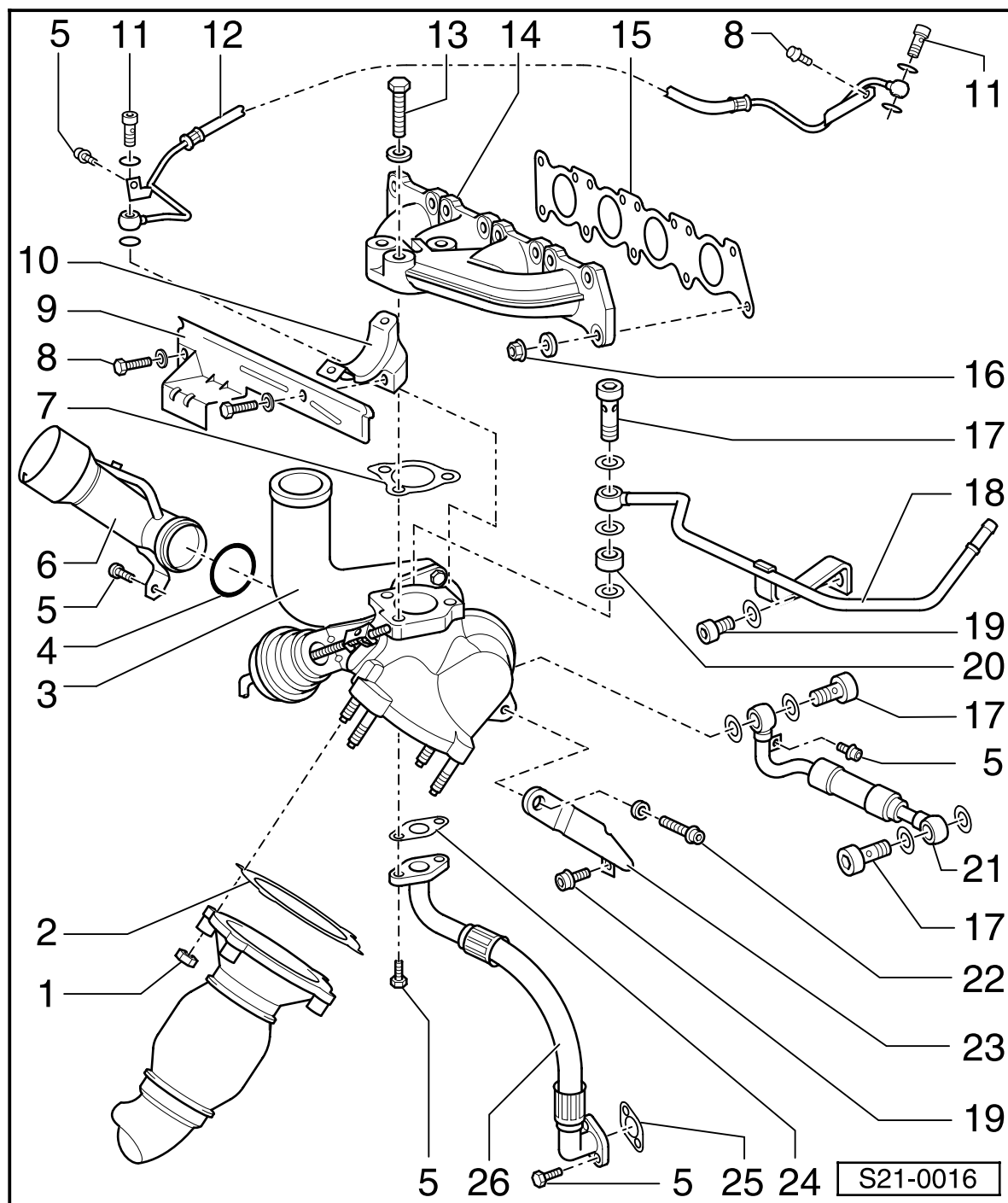
- ◆ With vacuum unit for charge pressure control valve
- ◆ Always remove and install complete

4 - O-ring

- ◆ Replace

5 - 10 Nm

6 - Inlet fitting

**7 - Gasket**

- ◆ Replace
- ◆ Pay attention to installation position

8 - 20 Nm**9 - Shield****10 - Top bracket**

- ◆ For top air guide pipe

11 - Banjo bolt, 30 Nm**12 - Oil feed line**

- ◆ From oil filter holder

13 - 30 Nm

- ◆ Replace
- ◆ Coat thread and head contact surface with hot screw paste G 052 112 A3

14 - Exhaust manifold

15 - Gasket

- ◆ Replace
- ◆ Pay attention to installation position

16 - 25 Nm

- ◆ Replace
- ◆ Insert with hot screw paste
G 052 112 A3

17 - Banjo bolt, 35 Nm**18 - Coolant return-flow line****19 - 25 Nm****20 - Spacer sleeve****21 - Coolant feed line****22 - 30 Nm**

- ◆ Always use original bolt

23 - Bracket

- ◆ For turbocharger

24 - Gasket

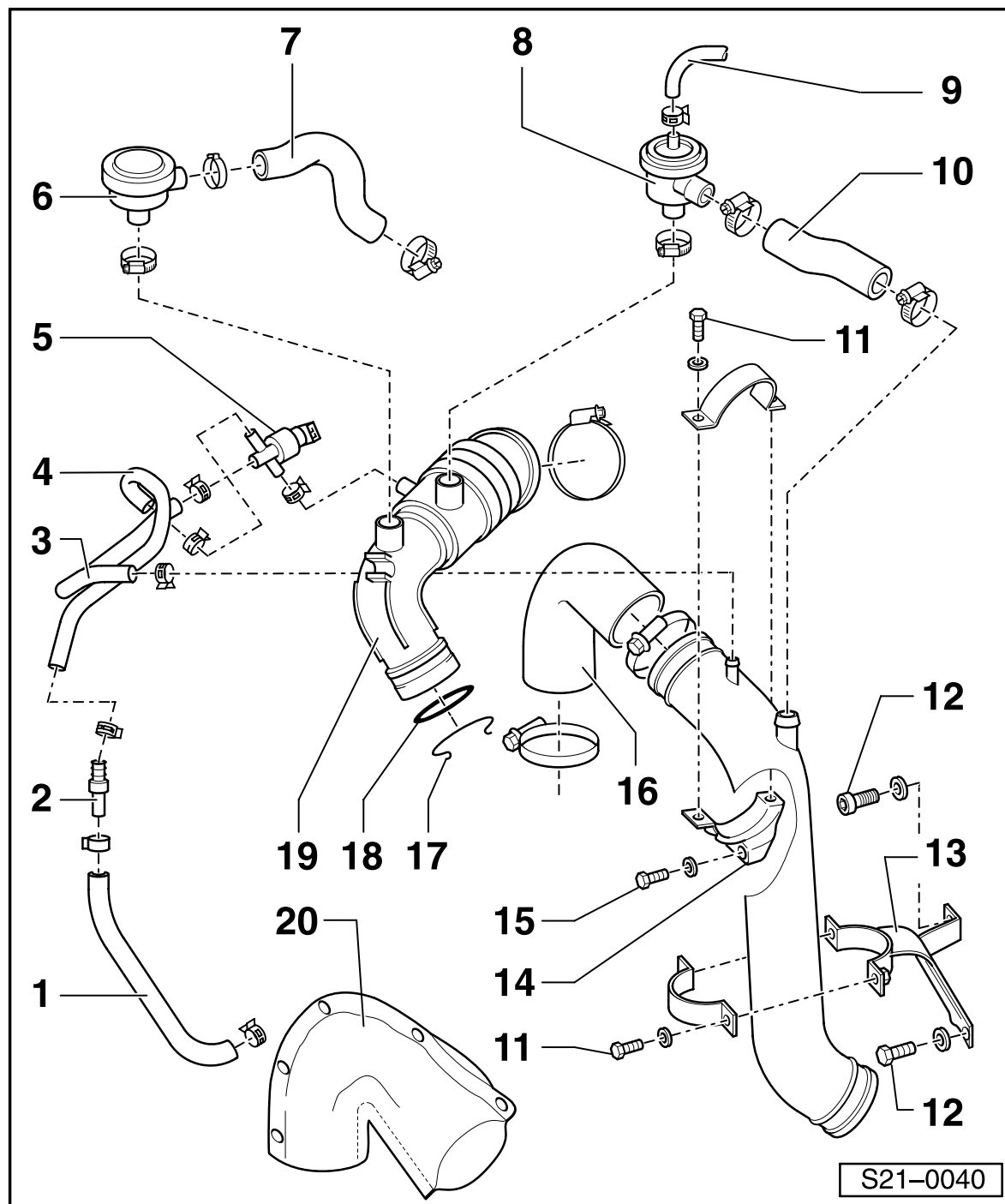
- ◆ Replace

25 - Gasket

- ◆ Replace

26 - Oil return-flow line

- ◆ To oil sump



Part II for engine codes ARX, AUM

1 - Hose

- ♦ to vacuum unit for charge pressure control valve

2 - Connector

3 - Hose

- ♦ to top air guide pipe

4 - Hose

- ♦ to vacuum unit for charge pressure control valve

5 - Charge pressure control solenoid valve -N75-

6 - Pressure regulating valve

- ♦ for crankcase ventilation

7 - Hose

- ♦ to crankcase ventilation pipe

8 - Overrun shutoff valve

9 - Vacuum hose

- ♦ to turbocharger solenoid valve -N249-

10 - Hose

- ◆ to top air guide pipe

11 - 10 Nm**12 - 25 Nm****13 - Bottom bracket**

- ◆ for top air guide pipe

14 - Top bracket

- ◆ for top air guide pipe

15 - 20 Nm**16 - Intake hose**

- ◆ from turbocharger

17 - Securing clasp**18 - O-ring**

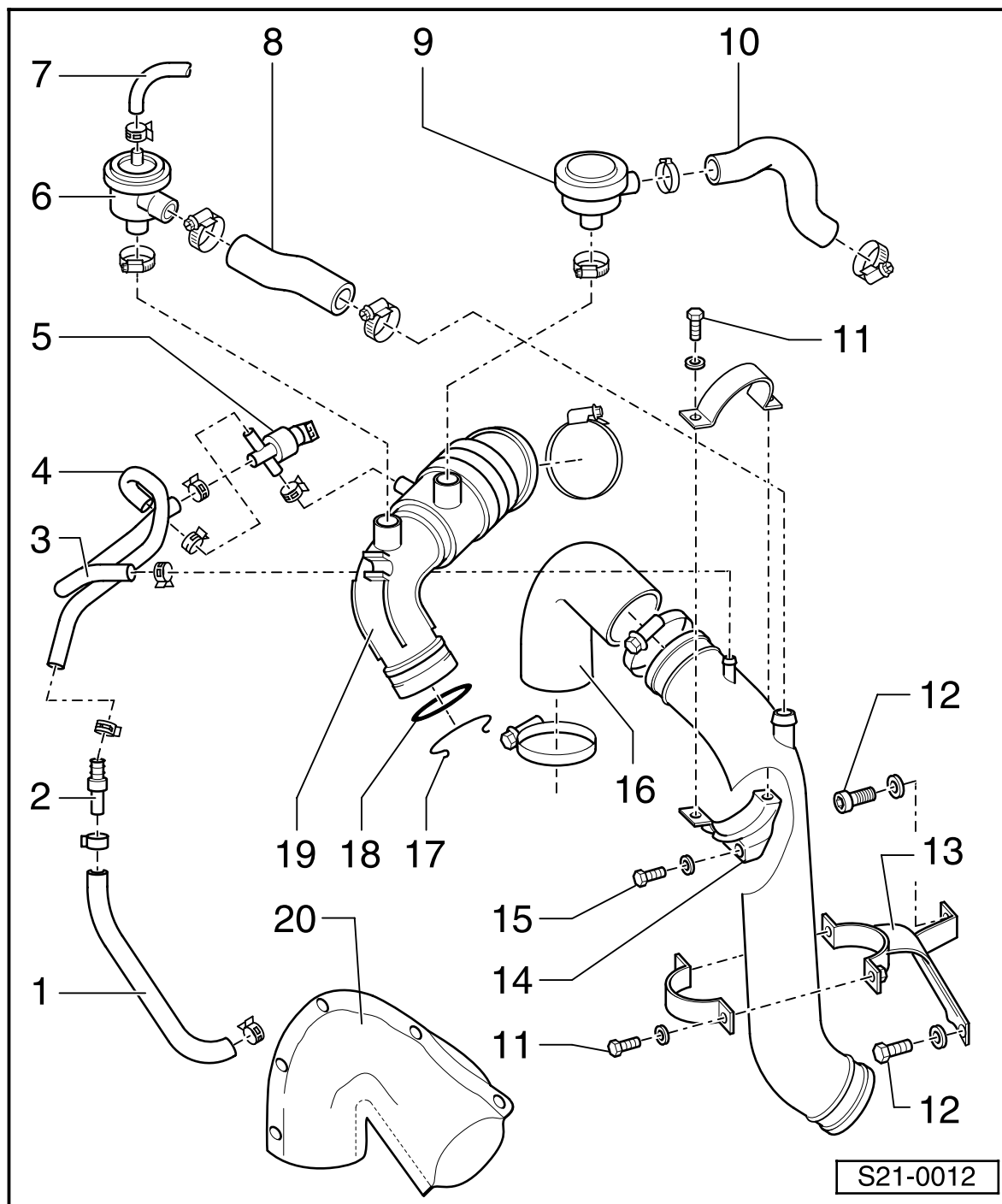
- ◆ replace

19 - Intake hose

- ◆ to connection at turbocharger

20 - Heat shield

- ◆ with studs



Part II for engine codes AGU and ARZ

1 - Hose

- ◆ to vacuum unit for charge pressure control valve

2 - Connector

3 - Hose

- ◆ to top air guide pipe

4 - Hose

- ◆ to vacuum unit for charge pressure control valve

5 - Charge pressure control solenoid valve -N75-

6 - Overrun shutoff valve

7 - Vacuum hose

- ◆ to intake manifold

8 - Hose

- ◆ to top air guide pipe

9 - Pressure regulating valve

- ◆ for crankcase ventilation

10 - Hose

- ◆ to crankcase ventilation pipe

11 - 10 Nm**12 - 25 Nm****13 - Bottom bracket**

- ◆ for top air guide pipe

14 - Top bracket

- ◆ for top air guide pipe

15 - 20 Nm**16 - Intake hose**

- ◆ from turbocharger

17 - Securing clasp**18 - O-ring**

- ◆ replace

19 - Intake hose

- ◆ to connection at turbocharger

20 - Heat shield

- ◆ with studs

Removing and installing turbocharger

Special tools, testers and aids required

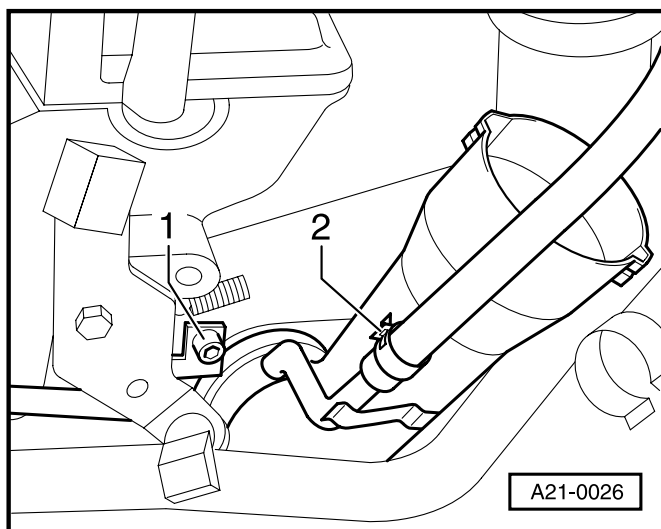
- ◆ Torque wrench
- ◆ Pliers for spring strap clips
- ◆ Hot bolt paste G 052 112 A3

Notes:

- ◆ *The turbocharger is lifted up and out after removing the exhaust manifold.*
- ◆ *Remove and install vacuum unit for charge pressure control valve only together with turbocharger (no setting facility).*
- ◆ *Always replace seals and gaskets.*

Removing

- Remove engine trim panel.
- Remove noise insulation in middle and on right.
- Unbolt heat shield for right drive shaft.
- Remove right drive shaft from gearbox
⇒ Running Gear; Repair Group 40.
- Remove exhaust manifold ⇒ page 26-5.



- Drain coolant
⇒ 1.8 l/92 kW Engine - Mechanical Components; Repair Group 19.

- Unbolt coolant feed line at cylinder block.
- Detach oil return-flow line from turbocharger (from oil pan on 4x4 models).

Note:

On 4x4 models, drain engine oil before detaching oil return-flow line.

- ◀ - Unbolt retaining plate for oil feed line at turbocharger -1-.

- Detach hose -2- to ACF canister from connection of turbocharger.

- ◀ - Unbolt oil feed line -2- and coolant return-flow line -1- at turbocharger.

- Remove spacer sleeve below connection of coolant return-flow line.

- Take off coolant return-flow line.

- Unbolt bracket for turbocharger from cylinder block and lift turbocharger up and out.

Installing

Notes:

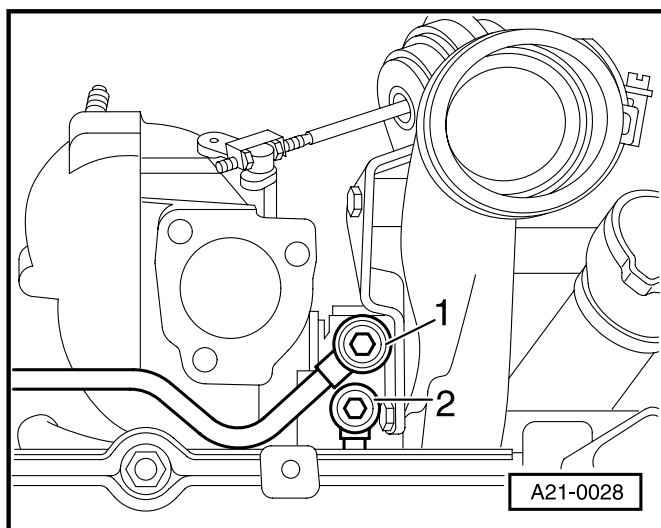
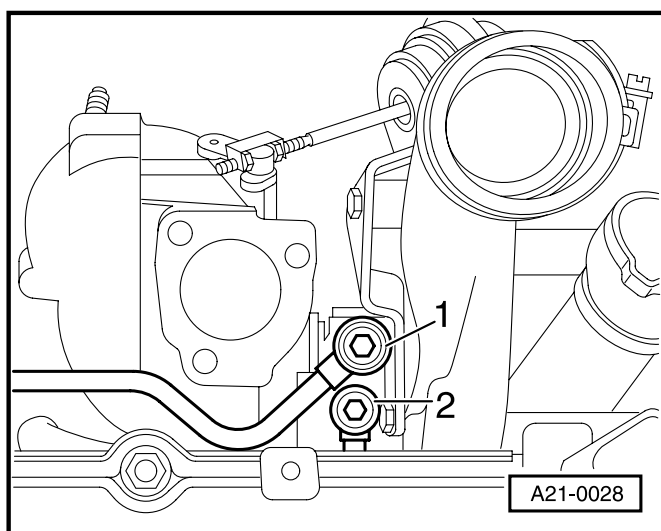
- ♦ *Fill turbocharger with engine oil at connection fitting of oil feed line.*

- ♦ *Replace all nuts and bolts for attaching exhaust manifold, turbocharger and exhaust pipe, and coat threads with hot bolt paste G 052 112 A3.*

- Bolt bracket for turbocharger loosely onto turbocharger.

- Fit turbocharger from below onto engine and screw on bracket handtight at cylinder block.

- ◀ - Bolt on oil feed line -2- (banjo bolt, 30 Nm; retaining plate, 10 Nm).



- Install coolant return-flow line -1- and screw spacer sleeve tight to turbocharger (35 Nm).
- Once again unbolt bracket for turbocharger from cylinder block.
- Install exhaust manifold (25 Nm).
- Bolt turbocharger onto exhaust manifold.

The remaining installation is carried out in the reverse order; pay attention to the following points:

Notes:

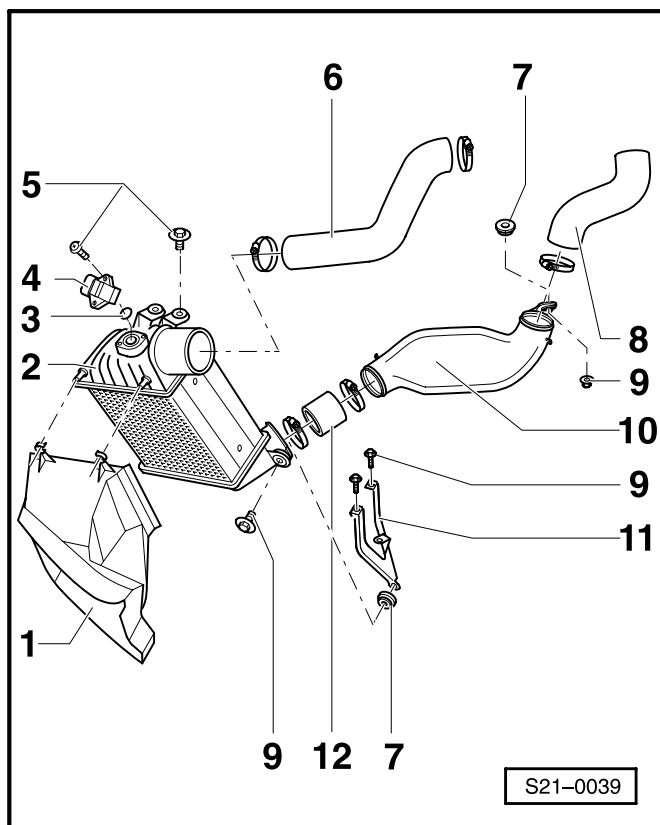
- ◆ *After installing the turbocharger, run engine at idling speed for about 1 minute but do not rev up to ensure proper supply of oil to the turbocharger.*
- ◆ *Inspect engine oil level, adjust to correct level if necessary.*

Tightening torques

Component	Nm
Oil feed line to turbocharger	30
Oil return-flow line to turbocharger	10
Bracket for oil feed line to turbocharger	10
Coolant feed line to cylinder block	35
Coolant return-flow line to turbocharger	35
Bracket for turbocharger to turbocharger	30
Bracket for turbocharger to cylinder block	25
Shield to cylinder block	20
Clip to bottom bracket for top air guide pipe	10
Turbocharger to exhaust manifold	30 ¹⁾
Exhaust manifold to cylinder head	25 ¹⁾
Front exhaust pipe to turbocharger	40 ¹⁾
Heat shield for drive shaft to cylinder block	35
Nuts for clamping sleeves of exhaust system	40

¹⁾ Always replace nuts and bolts.

Removing and installing parts of charge air cooling system



Notes:

- ♦ All hose connections are secured by clips.
- ♦ Charge air system must be free of leaks.
- ♦ Engine code AGU is not fitted with a charge pressure sender -G31-.

1 - Air duct

2 - Charge air cooler

3 - O-ring

4 - Charge pressure sender -G31-

5 - 5 Nm

6 - Hose

- ♦ between intake manifold and charge air cooler

7 - Rubber sleeve

- ♦ with clip

8 - Connection hose

9 - 10 Nm

10 - Bottom air guide pipe

11 - Bracket

12 - Connection hose

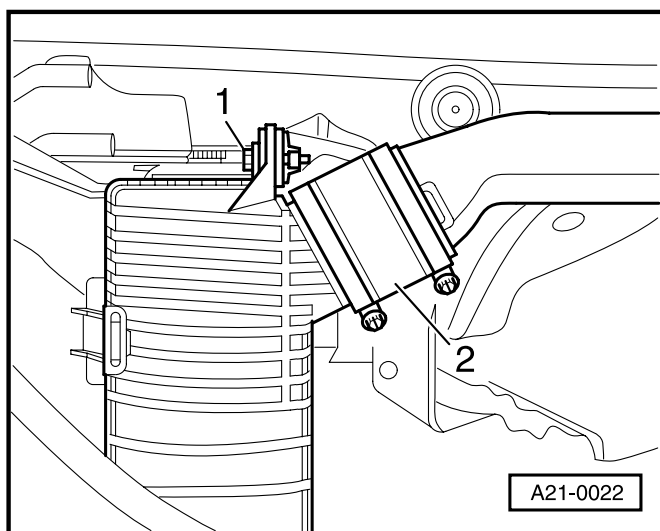
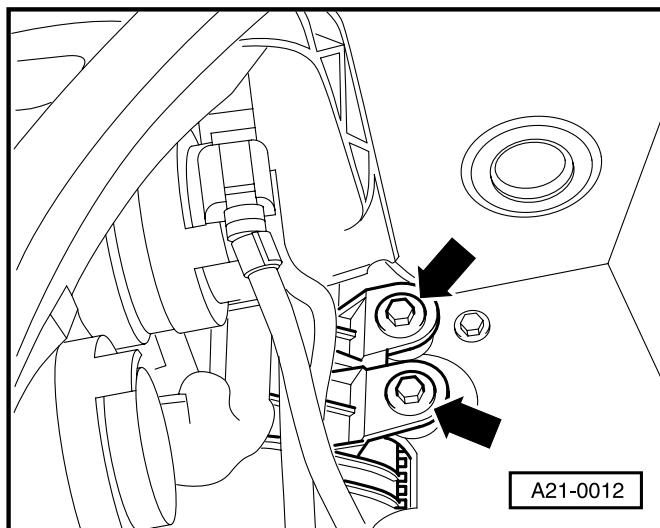
Removing and installing charge air cooler

- Remove noise insulation in middle and on right.
- Detach half of right wheelhouse liner, beginning from the front.
- ◀ - Unscrew bolts -arrows- for charge air cooler.
- Separate top air hose at charge air cooler.

Note:

*If the vehicle is equipped with xenon headlights, it is necessary to remove the right headlight
⇒ Electrical System; Repair Group 94.*

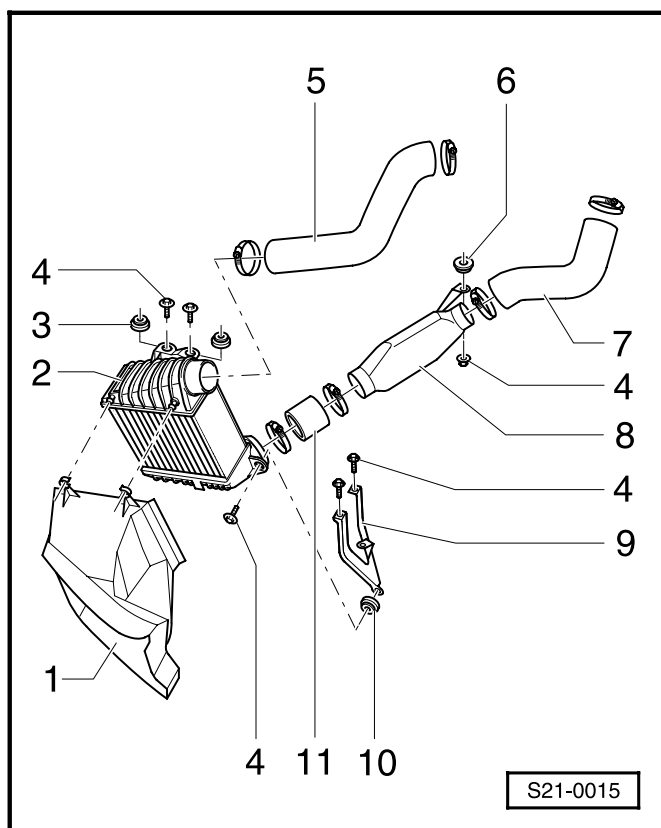
- Unplug connector at charge pressure sender -G31- ⇒ page 21-14, item 4 (not applicable to models with engine code AGU).



- ◀ - Separate intake hose -2- at charge air cooler.
- Unscrew the bottom bolt -1- attaching the charge air cooler.
- Pull plastic bowl back as far as possible until the charge air cooler can be taken out.

Installation is carried out in the reverse order.

Removing and installing parts of the charge air cooling system



Notes:

- ♦ All hose connections are secured by clips.
- ♦ The charge air system must be free of leaks.

1 - Air duct

2 - Charge air cooler

3 - Rubber grommet

- ♦ With sleeve

4 - 10 Nm

5 - Hose

- ♦ Between intake manifold and charge air cooler

6 - Rubber grommet

- ♦ With sleeve

7 - Connection hose

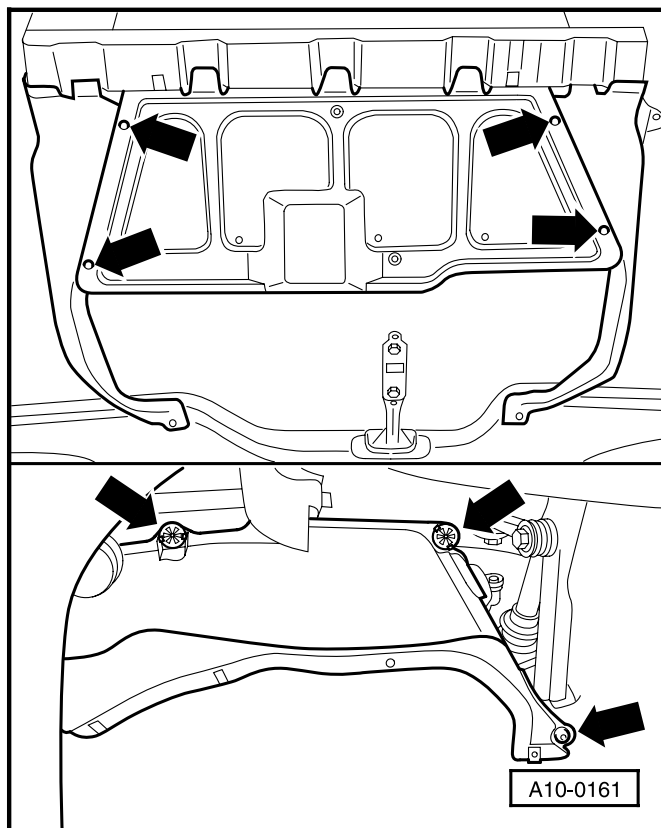
8 - Bottom air guide pipe

9 - Bracket

10 - Rubber grommet

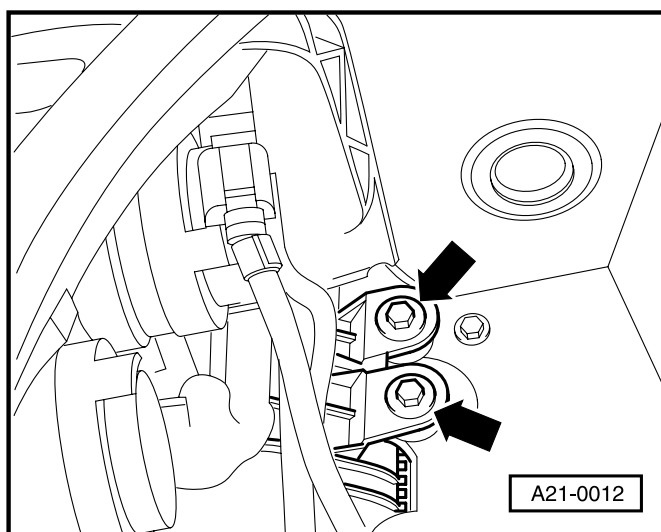
- ♦ With sleeve

11 - Connection hose

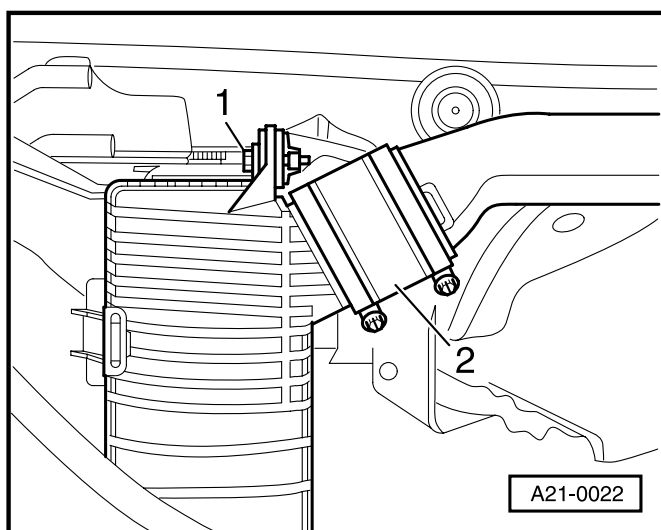


Removing and installing charge air cooler

- ◀ - Remove the noise insulation panel in the middle and on the right -arrows-.
- Slacken the right-hand wheelhouse liner halfway, beginning from the front.



- ◀ - Remove the 2 bolts -arrows- for the charge air cooler.
- Separate the air hose at the top of the charge air cooler.



- ◀ - Separate the air hose -2- at the bottom of the charge air cooler.
- Unscrew the bottom bolt -1- attaching the charge air cooler.
- Pull back the wheelhouse liner sufficiently until it is possible to take out the charge air cooler.

Installation is carried out in the reverse order.

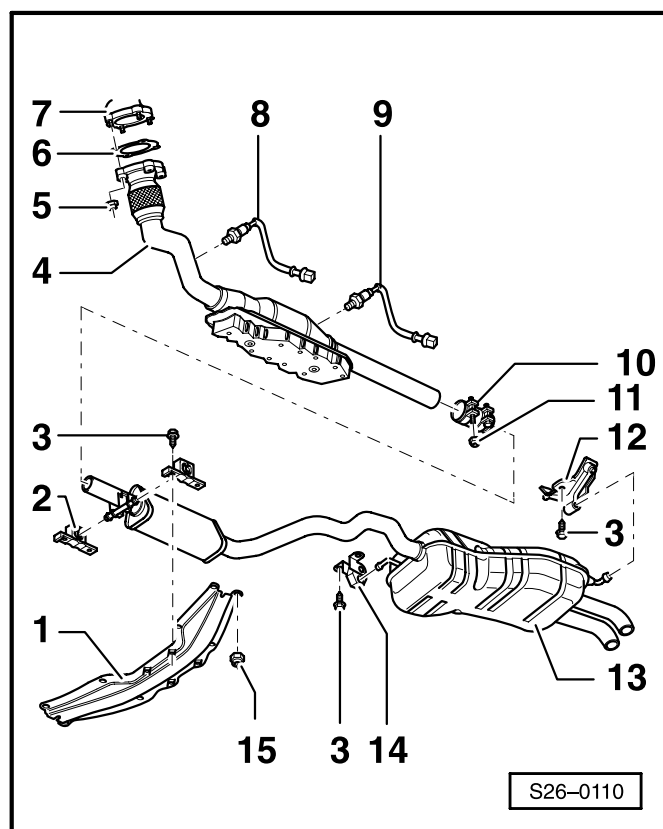
Removing and installing parts of the exhaust system

Notes:

- ♦ Always replace gaskets and self-locking nuts.
- ♦ After carrying out removal and installation work on the exhaust system, ensure that the exhaust system is not installed with any pre-stress and has adequate clearance to the body. If necessary, slacken clamping sleeve and align silencer and exhaust pipe so that adequate clearance to the body exists at all points, and the weight of the exhaust system is evenly distributed over the hangers.

- ♦ Use a screwdriver to slacken and tighten clamping plates for heat shields. Tightening torque: 2 Nm.
- ♦ Avoid an excessive deflection of the decoupling element at the front exhaust pipe (max. 10°).
- ♦ Vehicles fitted with engine code AGU have only 1 lambda probe upstream of the catalytic converter ⇒ item 8.

Assembly overview - Exhaust system for FWD models



1 - Tunnel bridge

- ♦ with hole for aligning exhaust system
⇒ 1.8 l/92 kW Engine - Mechanical Components; Repair Group 26; Aligning exhaust system free of stress

2 - Hanger

- ♦ installation position ⇒ page 26-3, Fig. 2

3 - 25 Nm

4 - Front exhaust pipe

- ♦ with catalytic converter
- ♦ protect from shocks and knocks
- ♦ avoid excessive deflection, max. 10°
- ♦ removing and installing ⇒ page 26-4

5 - 40 Nm

- ♦ replace
- ♦ coat with hot bolt paste G 052 112 A3

6 - Gasket

- ♦ replace

7 - Turbocharger

- ♦ removing and installing ⇒ page 21-11

8 - Lambda probe -G39, 50 Nm

- ♦ coat with hot bolt paste G 052 112 A3; hot bolt paste G 052 112 A3 must not get onto the slots of the probe body
- ♦ testing:
⇒ 1.8 l/110 kW Engine, Motronic Fuel Injection and Ignition System, Repair Group 24
- ♦ plug connection for lambda probe is located below protective cover ⇒ page 26-4

9 - Lambda probe -G130, 50 Nm

- ♦ ⇒ item 8

10 - Double clamp

- ♦ installation position: horizontally in vehicle, bolted connection points to left
- ♦ tighten bolted connections evenly

11 - 40 Nm

12 - Hanger

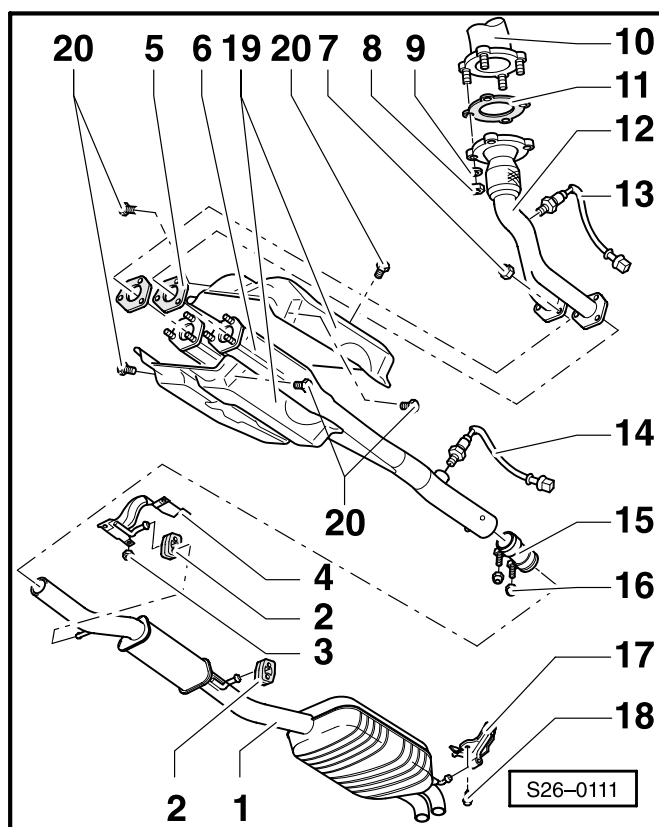
13 - Front and rear silencer

- ♦ replace individually for repairs
- ♦ exhaust pipe with separation point
⇒ page 26-3, Fig. 1

14 - Hanger

15 - 25 Nm

Assembly overview - Exhaust system for 4x4 models



1 - Front and rear silencer

- ♦ replace individually for repairs
- ♦ separation point ⇒ page 26-3, Fig. 1

2 - Hanger

3 - 23 Nm

4 - Bracket

5 - Gasket

- ♦ replace

6 - Middle exhaust pipe with catalytic converter

- ♦ protect catalytic converter from shocks and knocks

7 - 23 Nm

- ♦ coat with hot bolt paste G 052 112 A3
- ♦ pay attention to tightening sequence ⇒ page 26-3, Fig. 3

8 - 40 Nm

- ♦ coat with hot bolt paste G 052 112 A3

9 - Spacer sleeve

10 - Turbocharger

- ♦ removing and installing ⇒ page 21-11

11 - Gasket

- ♦ replace

12 - Front exhaust pipe

- ♦ protect from shocks and knocks
- ♦ avoid excessive deflection, max. 10°
- ♦ removing and installing ⇒ page 26-4

13 - Lambda probe -G39, 50 Nm

- ♦ coat with hot bolt paste G 052 112 A3; hot bolt paste G 052 112 A3 must not get onto the slots of the probe body
- ♦ testing:
⇒ 1.8 l/110 kW Engine, Motronic Fuel Injection and Ignition System, Repair Group 24
- ♦ plug connection for lambda probe is located below protective cover ⇒ page 26-4

14 - Lambda probe -G130, 50 Nm

- ♦ coat with hot bolt paste G 052 112 A3; hot bolt paste G 052 112 A3 must not get onto the slots of the probe body
- ♦ testing:
⇒ 1.8 l/110 kW Engine, Motronic Fuel Injection and Ignition System, Repair Group 24
- ♦ plug connection for lambda probe is located below protective cover ⇒ page 26-4

15 - Double clamp

- ♦ installation position: horizontally in vehicle, bolted connection points to left
- ♦ tighten bolted connections evenly

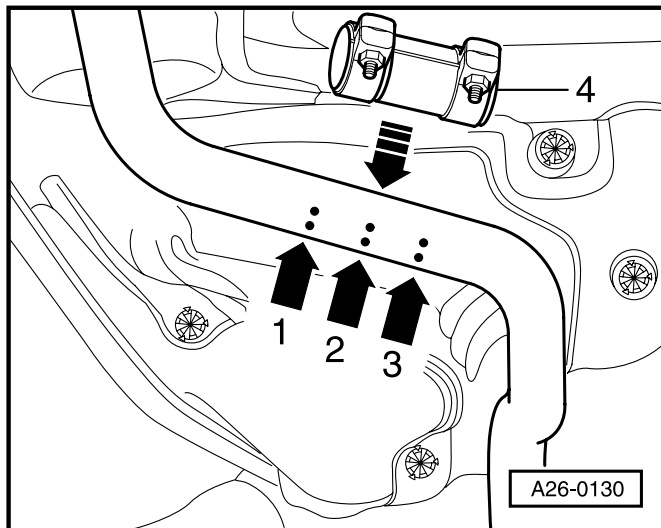
16 - 40 Nm

17 - Hanger

18 - 25 Nm

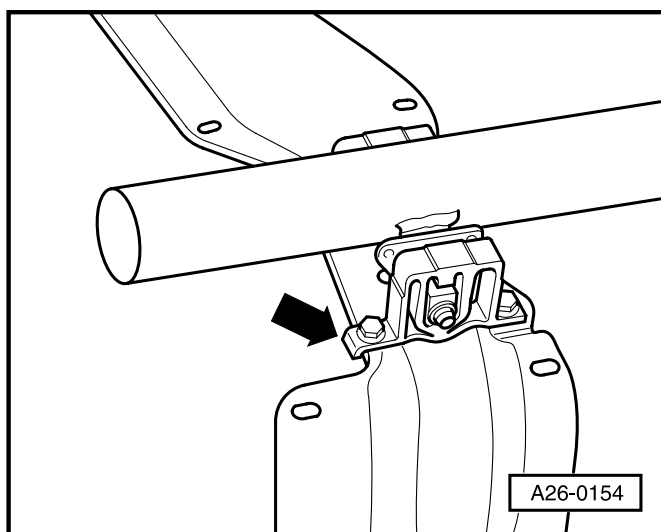
19 - Heat shield for catalytic converter

20 - 10 Nm



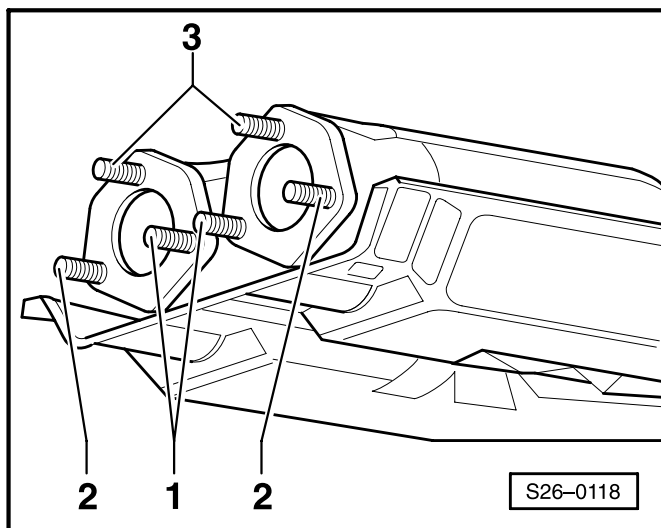
◀ Fig. 1 Separation point

- ◆ For replacing front silencer or rear silencer separately
- ◆ Marked by three indentations around circumference of exhaust pipe.
- Use a body saw, (e.g. V.A.G 1523), to cut exhaust pipe at the separation point -arrow 2- at right angles.
- When installing, position double clamp -4- at the side markings -arrows 1 and 3-.
- Align exhaust system free of stress
⇒ 1.8 l/92 kW Engine - Mechanical Components; Repair Group 26.
- Align rear silencer horizontally.
- Tighten bolted connections of double clamp evenly to 40 Nm.
- Installation position of double clamp: horizontally in vehicle, bolted connections pointing forward.



◀ Fig. 2 Installation position of hanger

The angled side -arrow- at the base of the hanger points in direction of travel.



◀ Fig. 3 Tightening sequence

Removing and installing front exhaust pipe

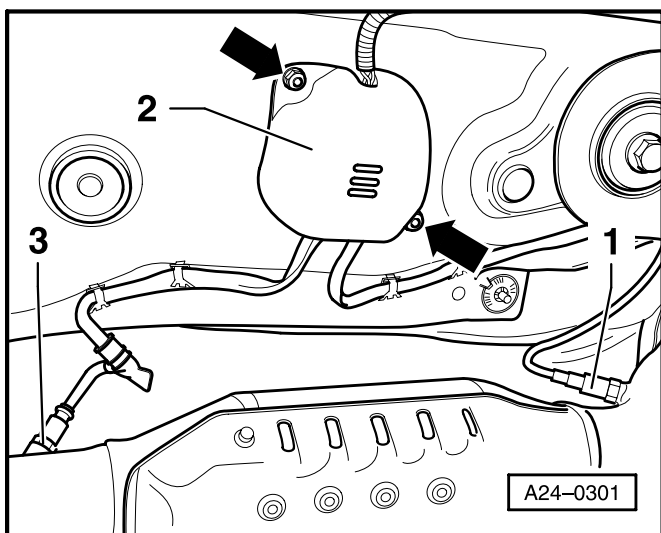
Special tools, testers and aids required

- ◆ Torque wrench
- ◆ Hot bolt paste G 052 112 A3

Removing

Notes:

- ◆ Avoid excessive deflection of decoupling element, max. 10°.
- ◆ Replace self-locking nuts.
- ◆ Vehicles with engine code AGU have only 1 lambda probe upstream of catalytic converter.



- ◀ - Remove cover of plug connection of lambda probes -2- and unplug electric cable together with retaining clip from heat shield.
- Pull plug connections out of cover and separate.

4x4 models

- Remove centre exhaust pipe ⇒ page 26-2, item 6.
- Detach propeller shaft from gearbox and place down to the side
⇒ 5-Speed Manual Gearbox 02C; Repair Group 39.

Continued for all models

- Unbolt front exhaust pipe from turbocharger.
- Slacken bolted connections of double clamp between catalytic converter and front silencer and push back.
- Take off front exhaust pipe.

Installing

Installation is carried out in the reverse order; pay attention to the following points:

- Coat stud bolts at turbocharger with hot bolt paste G 052 112 A3.

- Align exhaust system free of stress
⇒ 1.8 l/92 kW Engine - Motronic Fuel Injection and Ignition System; Repair Group 26.

Note:

Separating and re-connecting the plug connections may cause faults to be stored in the engine control unit. For this reason, interrogate fault memory

- ⇒ 1.8 l/110 kW Engine - Motronic Fuel Injection and Ignition System; Repair Group 01.

Removing and installing exhaust manifold

Removing

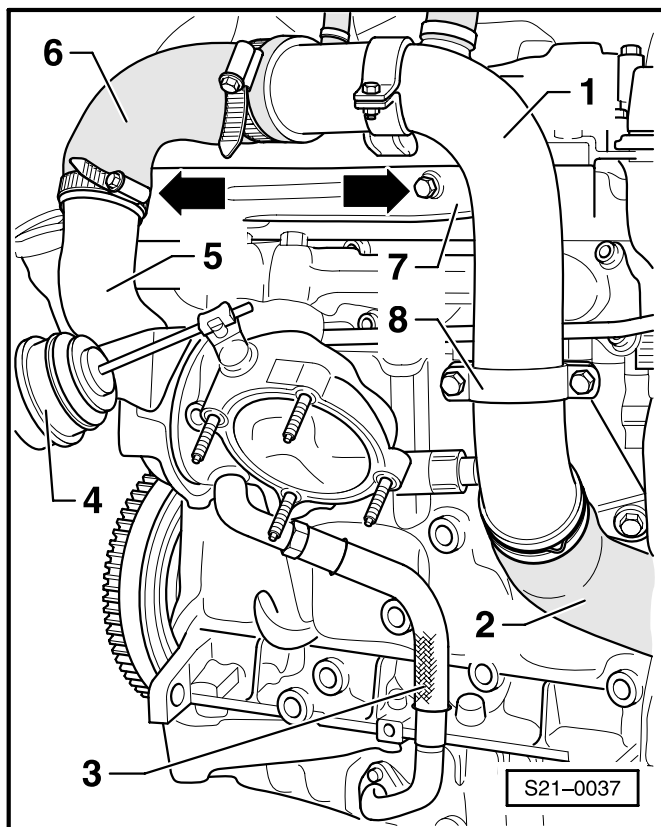
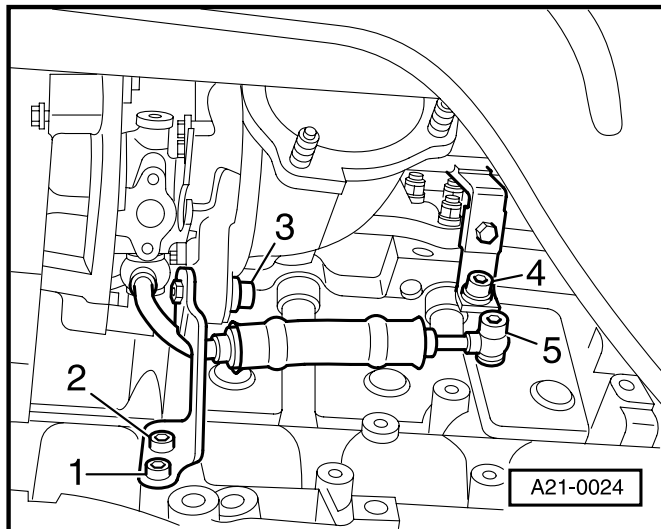
- Remove heat shield for drive shaft.
- Remove front exhaust pipe from turbocharger ⇒ page 26-4.
- ◀ - Unscrew bolt -3- at bracket for turbocharger.
- Unbolt bracket for coolant return-flow line -4-.
- ◀ - Separate inlet hose -2- from top air guide pipe -1- (spring clip).

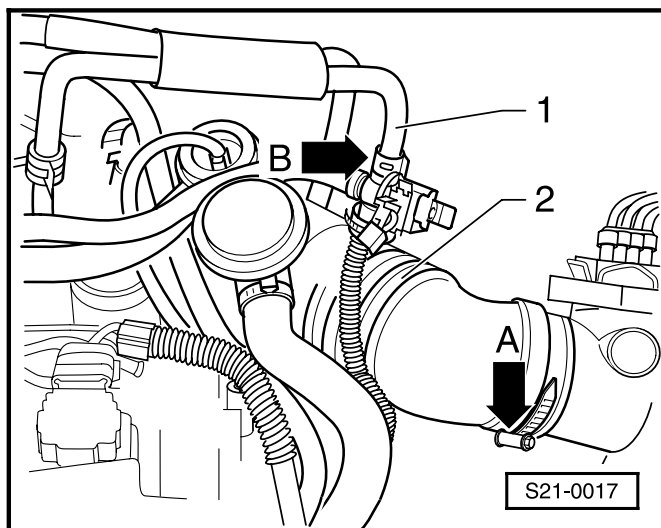
Open up heat shield at intake hose first of all.

- Unbolt clamp -8- at bottom bracket for top air guide pipe.
- Detach hose at vacuum unit for charge pressure control valve -4-.
- Detach hose -6- from outlet connection -5- of turbocharger (screw-type clip).

Open up heat shield at intake hose first of all.

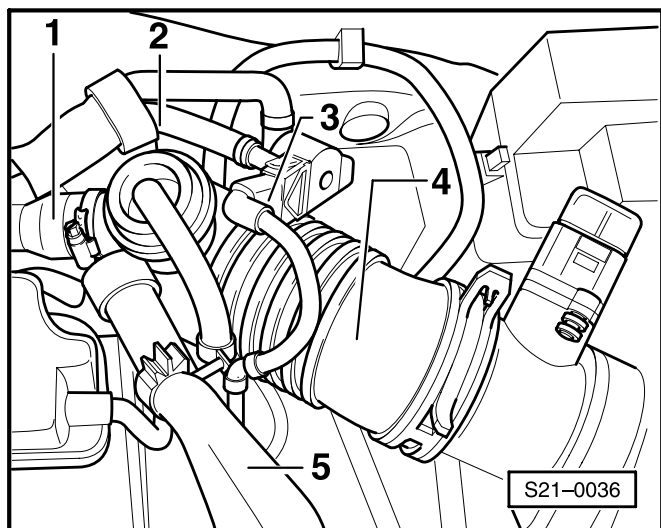
- Unbolt shield -7- (arrows).





Models with engine codes AGU, ARZ:

- ◀ - Detach hose -1- from vacuum unit for charge pressure control valve.
- Separate intake air hose -2- at air mass meter.



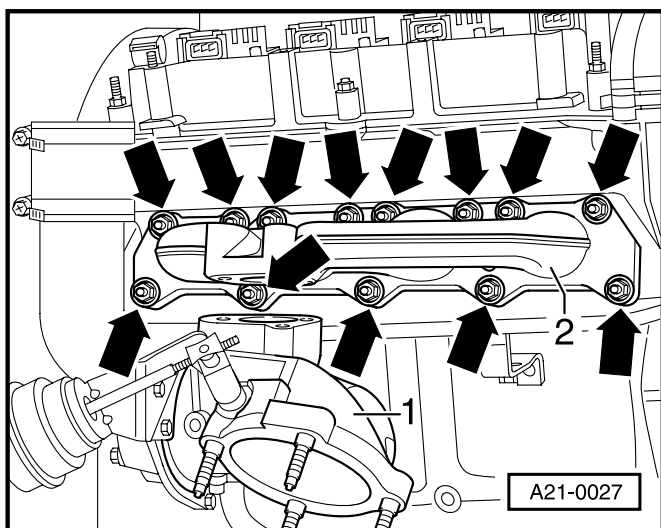
Models with other engine code:

- ◀ - Separate intake air hose -4- from air mass meter.
- Unplug connector -3- at charge pressure control solenoid valve -N75-.
- Detach hose -2- from valve -N75-.
- Detach hose -1- from overrun shutoff valve.
- Detach hose -5- from charge pressure control valve for crankcase ventilation.

Continued for all models:

- Take off intake air hose and top air guide pipe.

The top fixture can remain attached to top air guide pipe.



- ◀ - Unbolt turbocharger -1- from exhaust manifold -2-.
- Take off gasket; the turbocharger drops down slightly.
- Unscrew all the nuts of the exhaust manifold -arrows-.
- Take off washers and exhaust manifold.

Installing

Installation is carried out in the reverse order; pay attention to the following point:

- Coat stud bolts at turbocharger and nuts at exhaust manifold with hot bolt paste G 052 112 A3.

Note:

Separating and re-connecting the plug connections may cause faults to be stored in the engine control unit. For this reason, interrogate fault memory

⇒ 1.8 l/110 kW Engine - Motronic Fuel Injection and Ignition System; Repair Group 01.

Tightening torques

Component	Nm
Bracket for turbocharger to turbocharger	30
Bracket for turbocharger to cylinder block	25
Turbocharger to exhaust manifold	30 ¹⁾
Exhaust manifold to cylinder head	25 ¹⁾
Front exhaust pipe to turbocharger	40 ¹⁾
Heat shield for drive shaft to cylinder block	35
Nut for double clamp	40

¹⁾ Replace nuts and bolts.

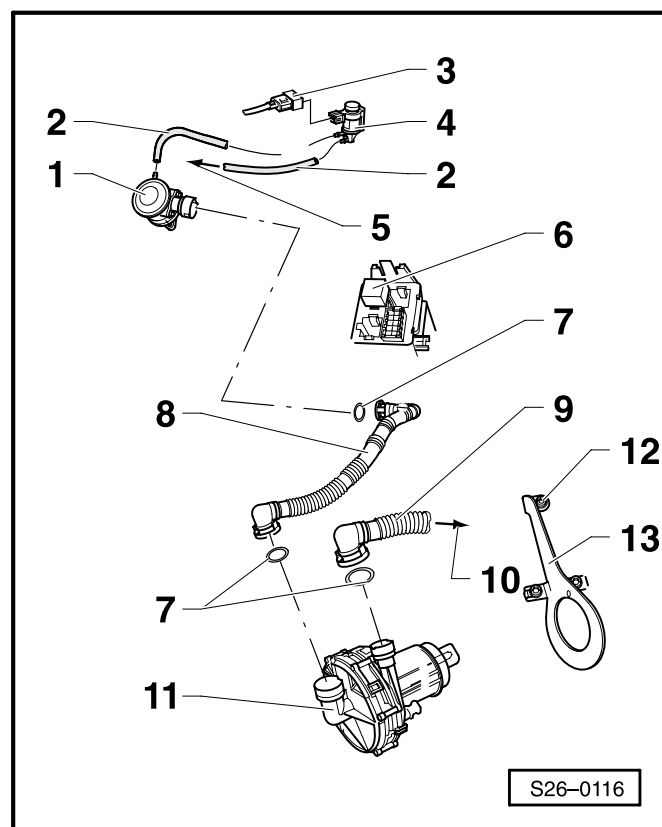
Secondary air injection system

Function

After a cold start (coolant temperature +5 °C up to +33 °C) the secondary air injection system injects air downstream of exhaust valves for up to 100 seconds. This enriches the exhaust gas with oxygen, activates post-combustion and thus shortens the heating-up phase of the catalytic converter. The system is actuated by the Motronic control unit (J220) through the secondary air pump relay (J299) to the secondary air

injection valve (N112, switchover valve) and to the combination valve. In addition, after each subsequent engine start (up to an engine temperature of max. 96 °C), the secondary air injection system is switched on for 10 seconds and checked by the self-diagnosis. The lambda closed-loop control must be active in this case.

Removing and installing parts of the secondary air injection system



Notes:

- ◆ Components marked with * are tested by self-diagnosis:
⇒ 1.8 l/110 kW Engine - Motronic Fuel Injection and Ignition System; Repair Group 01; Interrogating and erasing fault memory.
- ◆ Components marked with ** are tested with the final control diagnosis:
⇒ 1.8 l/110 kW Engine - Motronic Fuel Injection and Ignition System; Repair Group 01; Final control diagnosis.

1 - Combination valve

2 - Vacuum hose

3 - Connector

- ◆ 2-pin

4 - Secondary air injection valve

-N112-*/**

- ◆ in bracket above brake servo unit
- ◆ testing ⇒ Current Flow Diagrams, Electrical Fault Finding, Fitting Locations
- Specified resistance: 25...35 Ω

5 - To connection at pipe to brake servo unit

6 - Secondary air pump relay -J299-*/**

- ◆ in protective housing for relays in engine compartment next to brake servo unit

7 - O-ring

- ◆ replace

8 - Pressure hose

- ◆ ensure tightly connected
- ◆ press together at front for releasing

9 - Intake hose

- ◆ for secondary air injection pump

10 - To air filter

11 - Secondary air injection pump motor -V101-**

- ◆ testing ⇒ Current Flow Diagrams, Electrical Fault Finding, Fitting Locations

12 - 25 Nm

13 - Bracket