

Workshop Manual OCTAVIA

**1.6 ltr. / 74 kW Engine,
Mechanical Components**

List of Supplements to OCTAVIA Workshop Manual

Edition: 10.02

1.6 I/74 kW Engine, Mechanical Components

Replaces List of Supplements - Edition: 05.01

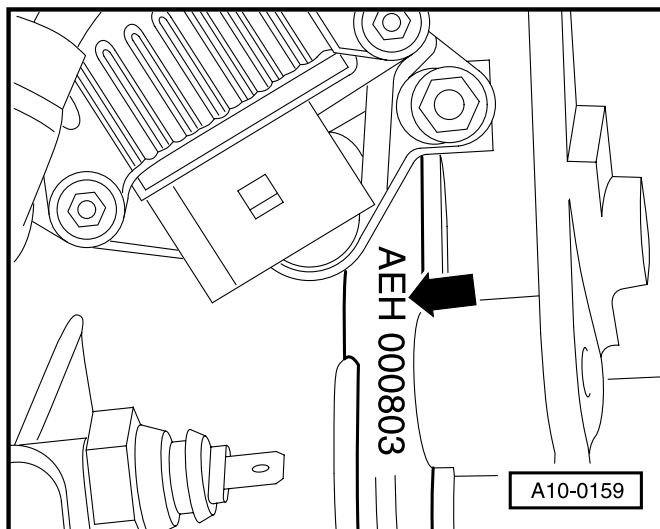
Supplement	Edition	Subject	Article Number
	08.96	Basic Edition of Workshop Manual	S00.5105.50.20
1	05.97	Supplement to Basic Edition	S00.5105.51.20
2	12.99	Modifications to Repair Groups 00, 10, 13, 15, 17, 19, 20, 26	S00.5105.52.20
3	05.01	Modifications to Repair Groups 10, 13, 15, 17, 20	S00.5105.53.20
4	10.02	Modifications to Repair Groups 13, 15, 17, 19, 26	S00.5105.54.20
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Technical data

Engine number

◀ The engine number (“engine code letters” and “serial number”) is located at the front at the joint between engine and gearbox.

In addition, a sticker with “engine code letters” and “serial number” is affixed to the toothed belt guard.

The engine code letters are also listed on the vehicle data sticker.

Engine features

Code letters		AEH	AKL
Manufactured		04.97 ➤	08.97 ➤
Displacement	ltr.	1.595	1.595
Power output	kW at rpm	74/5600	74/5600
Torque	Nm at rpm	145/3800	145/3800
Bore	Ø mm	81.0	81.0
Stroke	mm	77.4	77.4
Compression ratio		10.3:1	10.3:1
Firing order		1-3-4-2	1-3-4-2
RON		95 unleaded ¹⁾	95 unleaded ¹⁾
Injection/ignition system		Simos 2	Simos 2
Knock control system		x	x
Self-diagnosis		x	x
Lambda control		x	x
Catalytic converter		x	x
Exhaust gas recirculation		-	-
Air charging		-	-
Emission limits conforming to		EU-2/ECE	EU-3D

¹⁾ In exceptional cases at least 91 RON, but engine output reduced

Removing and installing engine

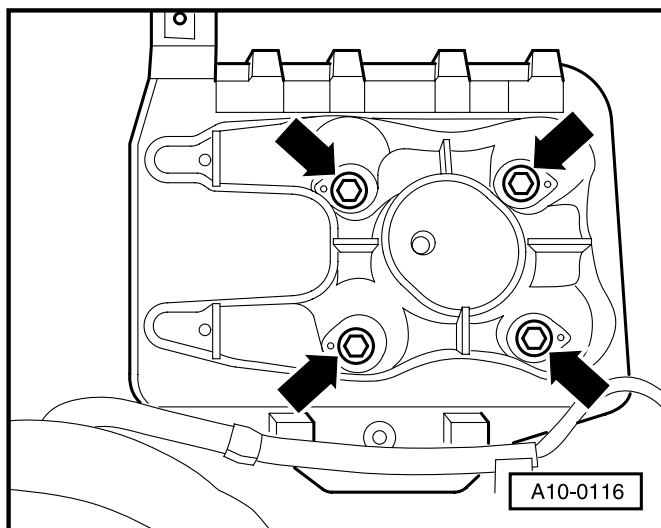
Special tools, testers and aids required

- ◆ Workshop crane (e.g. V.A.G 1202 A)
- ◆ Drip tray (e.g. V.A.G 1306)
- ◆ Torque wrench 5...50 Nm (e.g. V.A.G 1331)
- ◆ Torque wrench 40...200 Nm (e.g. V.A.G 1332)
- ◆ Engine/gearbox lift (e.g. V.A.G 1383 A)
- ◆ Pliers for spring strap clamps
- ◆ Engine holder T10012
- ◆ Engine holder MP 1-202
- ◆ Repair stand MP 9-101
- ◆ Suspension device MP 9-201
- ◆ Grease G 000 100 (models with manual gearbox)
- ◆ Cable straps

Removing engine

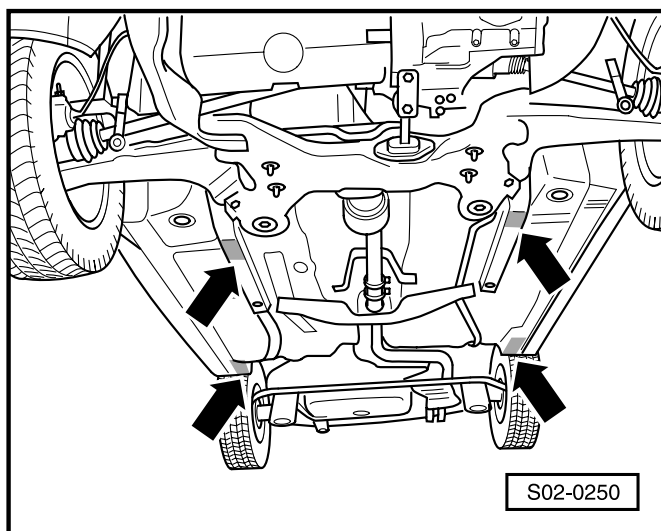
Notes:

- ◆ *The engine is removed downward 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 with spring strap or screw-type clamps.*
- ◆ *Fuel hoses at the engine must be secured only with spring strap clamps. It is not permitted to use collar or screw-type clamps.*
- ◆ *It is recommended to use the special pliers for removing and installing the spring strap clamps.*
- ◆ *Ensure the connectors are plugged in at the correct point; mark if necessary.*



Procedure

- Pay attention to coding on models fitted with coded radio set, determine if necessary.
- Remove battery:
⇒ Electrical system; Repair Group 27; Removing and installing battery
- ◀ - Remove battery carrier -arrows-.
- Open cap of coolant expansion reservoir.

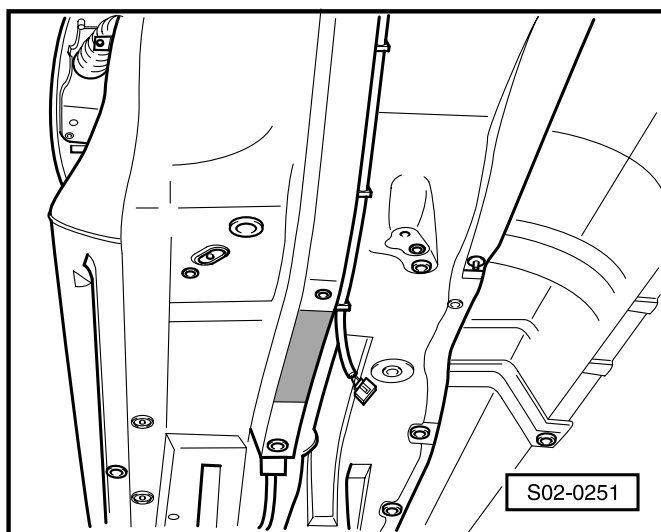


- Raise vehicle with lift platform; pay attention to the following points for this step:

◀ The arms of the lift platform must be positioned only below the longitudinal member.

Warning!

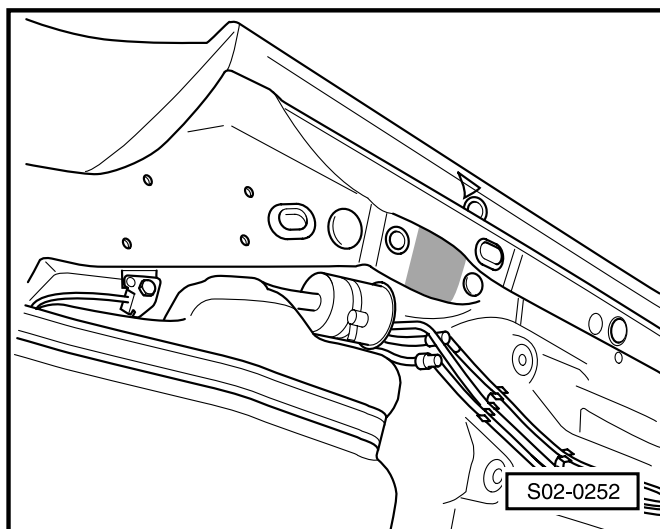
The arms of the lift platform must on no account be positioned below the sill, the front or rear suspension.



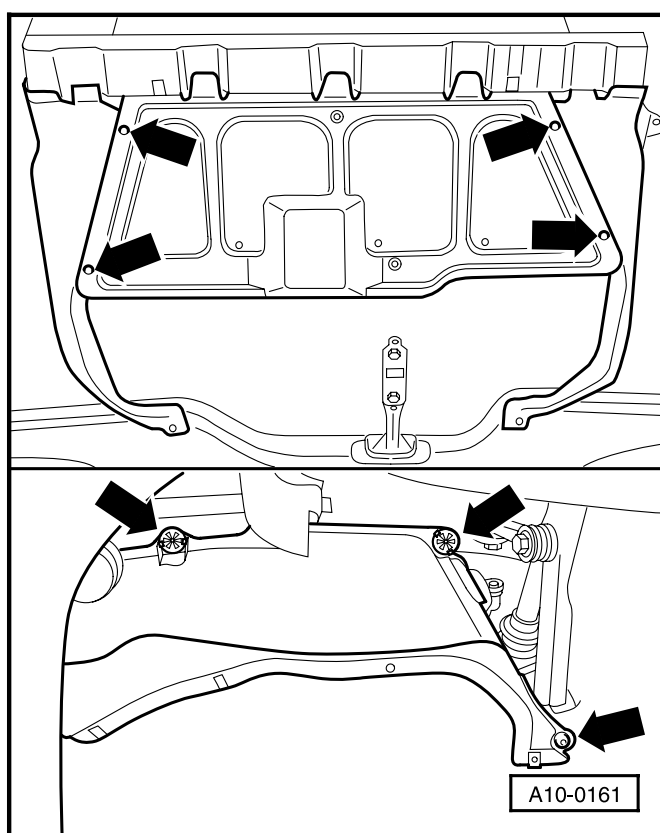
◀ The two jacking points at the front are located at the front of the two longitudinal members at the level of the marking on the sill.

Warning!

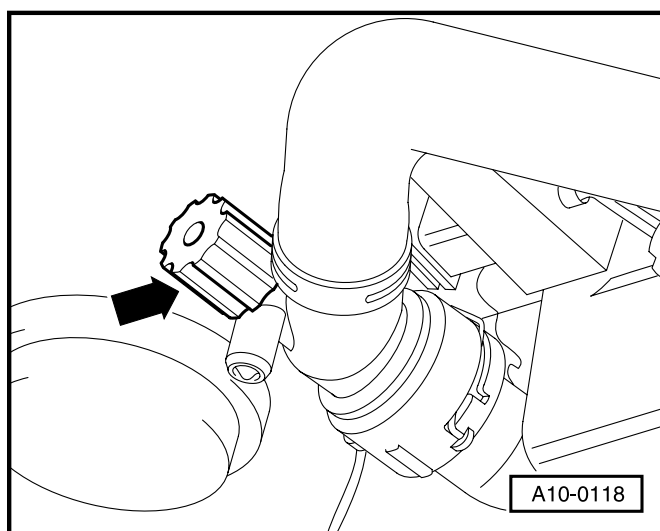
When the vehicle is raised, never start the engine and engage a gear so long as only one driven wheel is touching the ground.



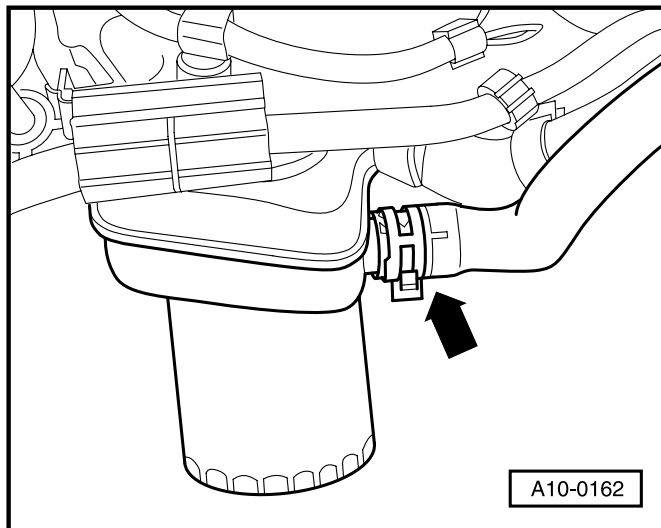
- ◀ The two rear jacking points are located at the rear of the two longitudinal members at the level of the marking at the sill.



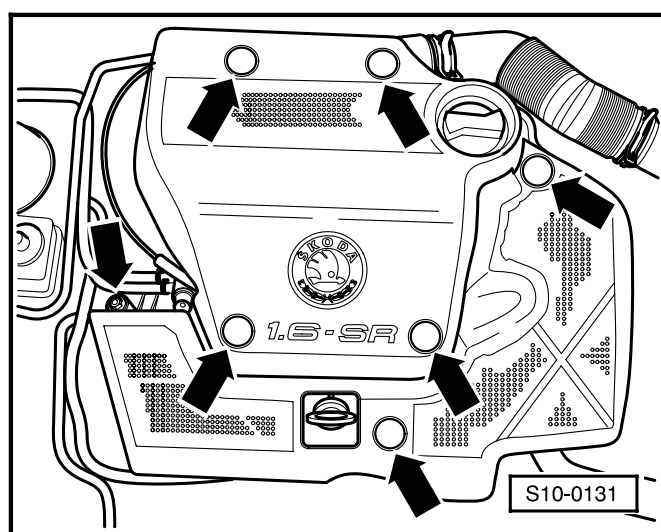
- ◀ - Remove noise insulation panel -arrows-.
- Place drip tray (e.g. V.A.G 1306) below the engine.



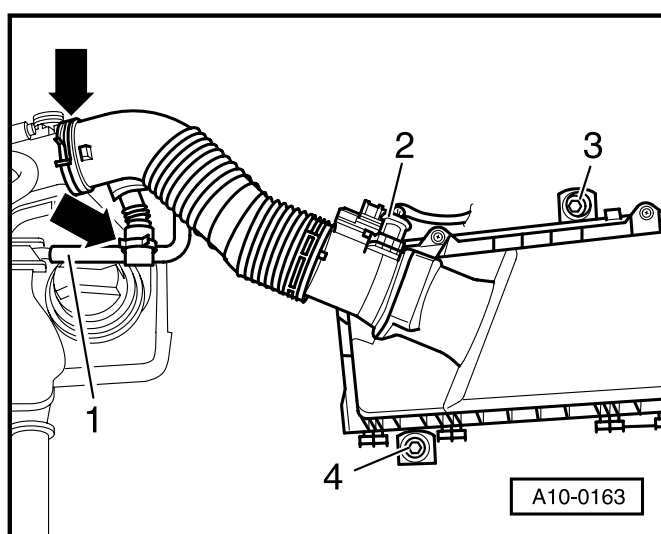
- ◀ - Turn drain plug -arrow- at the radiator to the left and pull back; fit auxiliary hose onto connection, if necessary.



- ◀ - In addition, detach coolant hose at bottom of oil cooler -arrow- and allow remaining coolant to flow out.



- ◀ - Remove engine trim panel; take off protective cover of nuts -arrows- for this step.

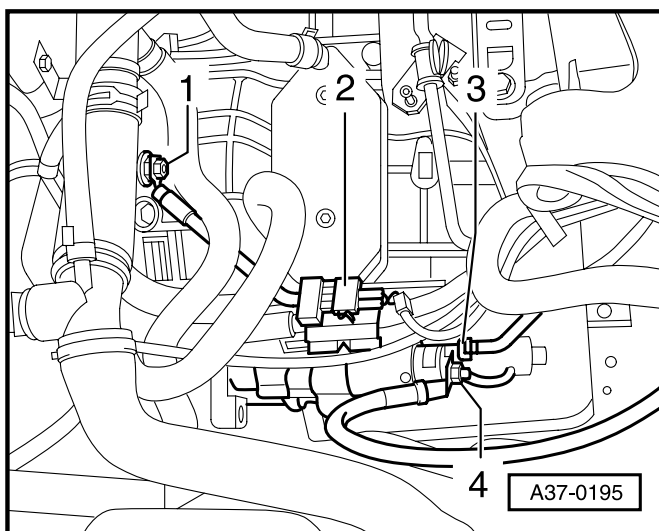


- ◀ - Detach air guide hose at throttle valve connection and at ventilation housing of crank-case ventilation -arrows-.
- Detach ventilation hose -1- and unplug connector of air mass meter -2-.
- Remove screws -3- and -4- and take off air filter housing.

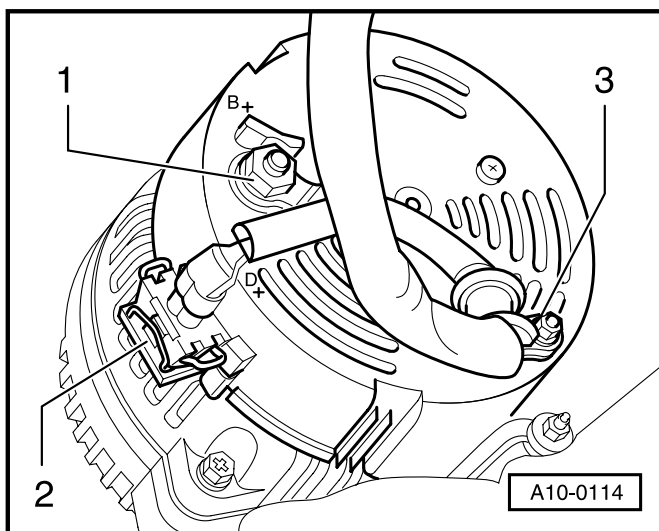
- Remove wiper arms.
⇒ Electrical System; Repair Group 92; Wind-screen Wiper System
- Remove cover of plenum chamber.
⇒ Body Fitting Work; Repair Group 66; Trim Panels
- Separate 28-pin plug connection at engine control unit -J361.

- Open cable duct below the air filter and separate 10-pin plug connection.

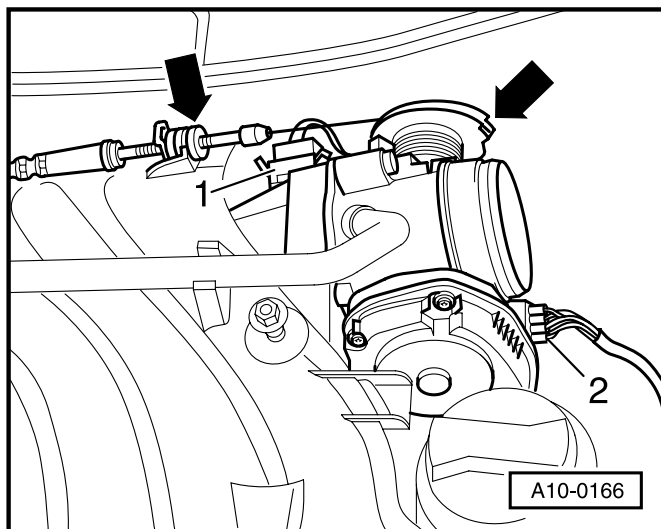
- Disconnect wiring harness from engine and attach to engine.



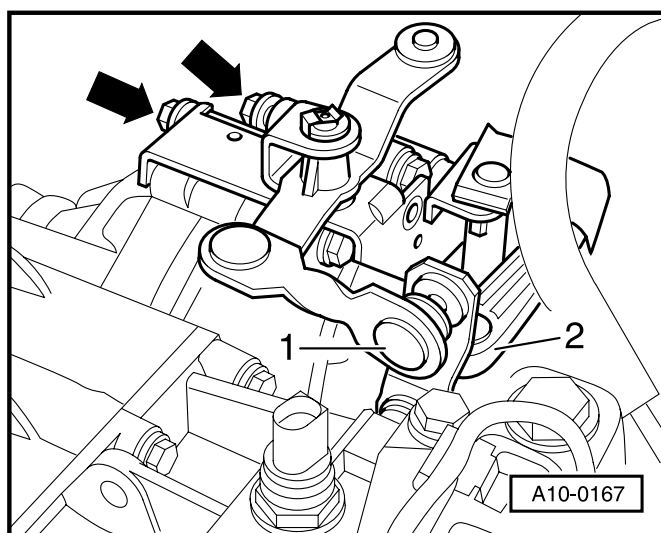
- ◀ - Unbolt earth cable -1-.
- Disconnect cables -3- and -4- at starter.
- Separate plug connection -2- and pull out of fixture.
- Detach cable from the fixture at starter and place to the side; unbolt starter.



- ◀ - Unbolt cable -1- from terminal 30/B+ at alternator.
- Separate plug connection -2- of terminal D+.
- Unscrew cable clamp -3-.
- Detach cable from fixture.
- Unplug connector for coolant temperature overheating switch (F14) (only on models with AC).

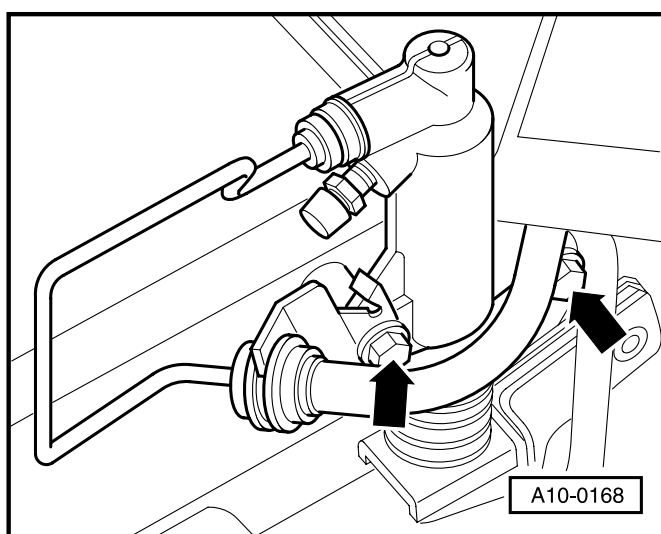


- ◀ - Detach throttle cable -arrows-.



Models with manual gearbox

- ◀ - Use a screwdriver to press off shift rods -1- and -2-.
- Unbolt shift mechanism at gearbox -arrows-.

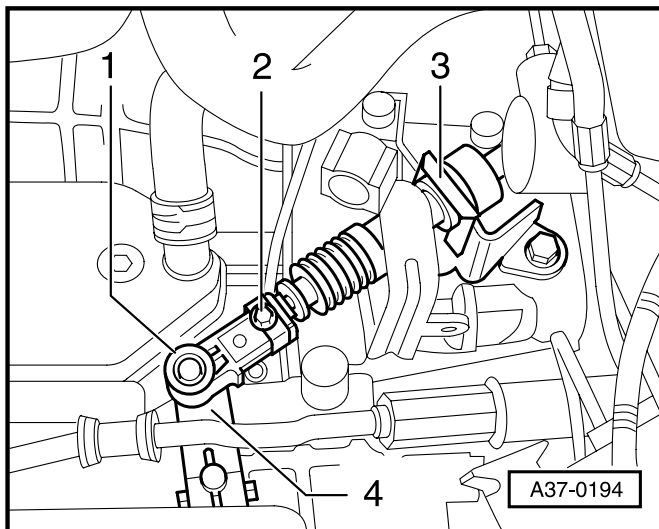


- ◀ - Remove slave cylinder -arrows- and place to the side, secure with wire; do not open line system.

Note:

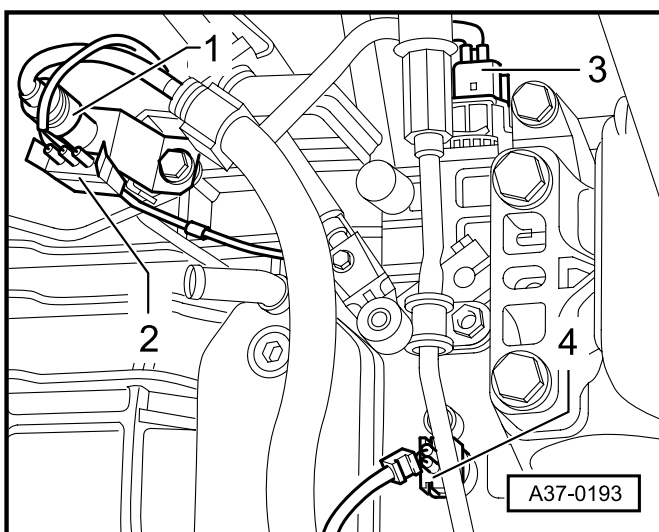
Do not depress clutch pedal.

- Unplug connector at reversing light switch -F4-.
- Detach wiring loom from the fixtures and run out (place) to the side.



Models with automatic gearbox

- ◀ - Use a screwdriver to press off selector lever cable -1- at selector lever of gearbox -4-; pull off securing clasp -3- at support bracket.
- Take off selector lever cable and place to the side.
- Unbolt bracket for pressure line of power-assisted steering at gearbox support.

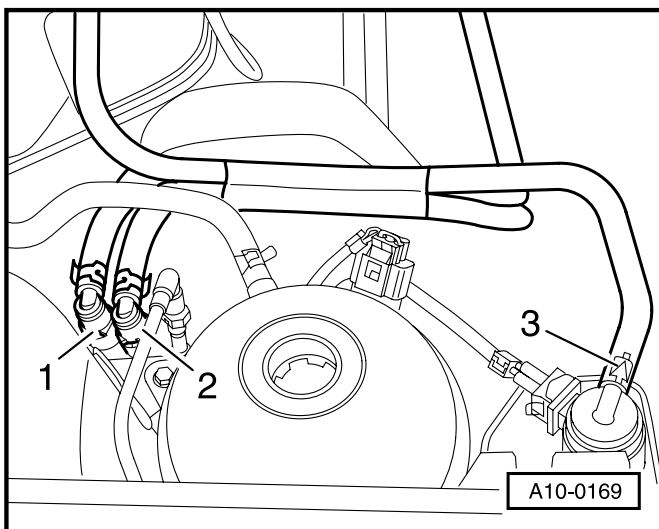


- ◀ - Unplug connectors:
 - 1 - to the solenoid valves
 - 2 - to the vehicle speed sender -G68-
 - 3 - at the multifunction switch -F125-
 - 4 - at the gearbox speed sender -G38-
- Disconnect speedometer sender -G22-.
- Detach wiring loom from the fixtures and run out to the side.

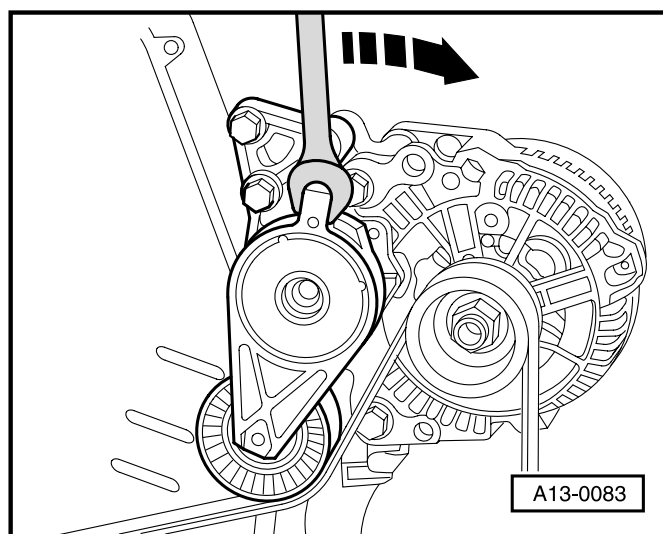
All models

Warning!

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



- ◀ - Press on the release buttons at the separation point in order to detach fuel feed line -1- and fuel return-flow line -2-. Lines and release buttons are colour-coded.
- Detach hose -3- at the ACF canister.
- Detach coolant hoses:
 - ♦ to expansion reservoir (at front of coolant pipe)
 - ♦ to thermostat housing (at bottom of radiator and at thermostat housing)



- ◆ to top of radiator (at flange on left of cylinder head)
 - ◆ to heating system heat exchanger (1 hose each at coolant pipe and on left of cylinder head)
 - ◆ on side at coolant pipe
 - ◆ at throttle valve connector (2 hoses)
 - ◆ at ATF cooler (models with automatic gearbox)
- Detach vacuum hose to the brake servo unit.

Note:

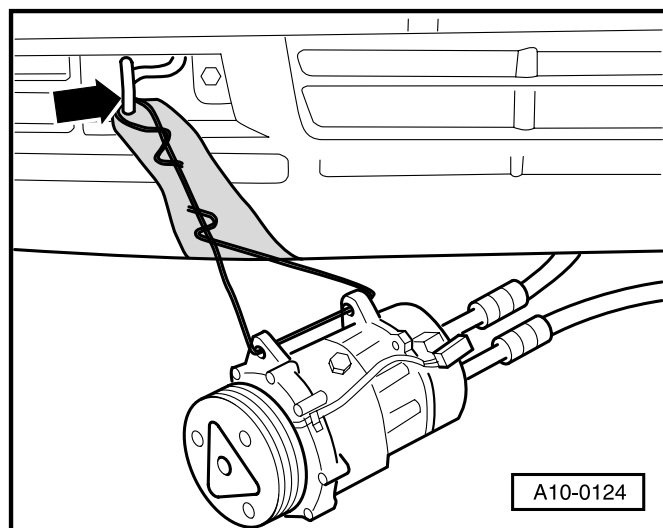
Before removing the ribbed V-belt, mark the direction of running. If a used belt is fitted on again to run in the opposite direction, it may be destroyed. When installing the belt, ensure it is correctly located in the belt pulleys.

- ◀ - Swivel tensioning device in direction of arrow in order to slacken the ribbed V-belt.
- Take off ribbed V-belt.
- Unbolt 2 brackets for pressure line of power-assisted steering (on left at gearbox and below starter).
- Unbolt belt pulley of hydraulic pump for power-assisted steering.
- Unbolt hydraulic pump of power-assisted steering and tie up to the front at the front of the vehicle. The lines remain connected.

Models with air conditioning

Warning!

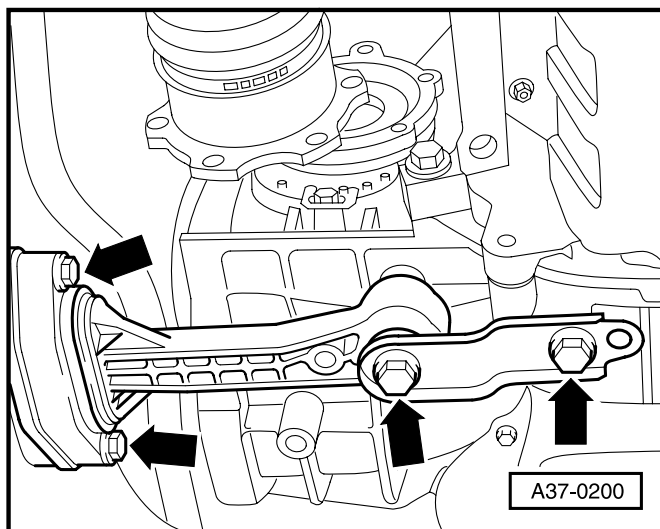
The refrigerant circuit of the air conditioning system must not be opened.



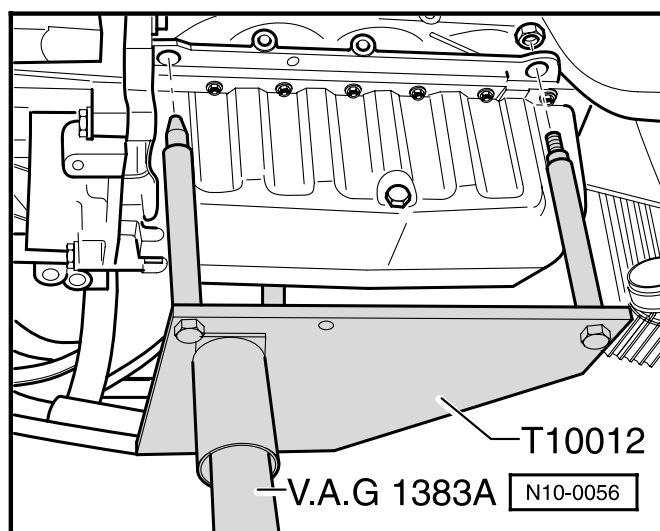
- Unbolt bracket for refrigerant hoses.
- ◀ - Unbolt compressor of air conditioning system and suspend on the inside of the bumper -arrow- together with the connected refrigerant hoses.

Note:

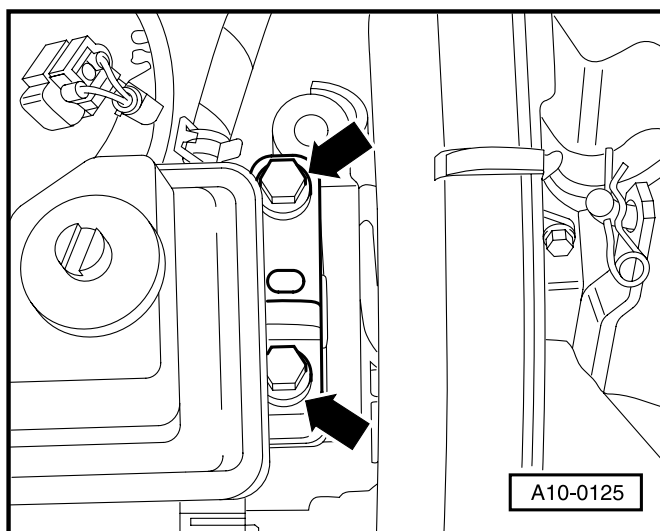
Protect the bumper from damage by using a wire with a soft cover.

**All models**

- ◀ - Unbolt pendulum support -arrows-.
- Unbolt drive shafts from the flanges of the gearbox.
- Place both drive shafts to the rear and attach to the body with a wire.
- Remove front exhaust pipe ⇒ page 26-2.



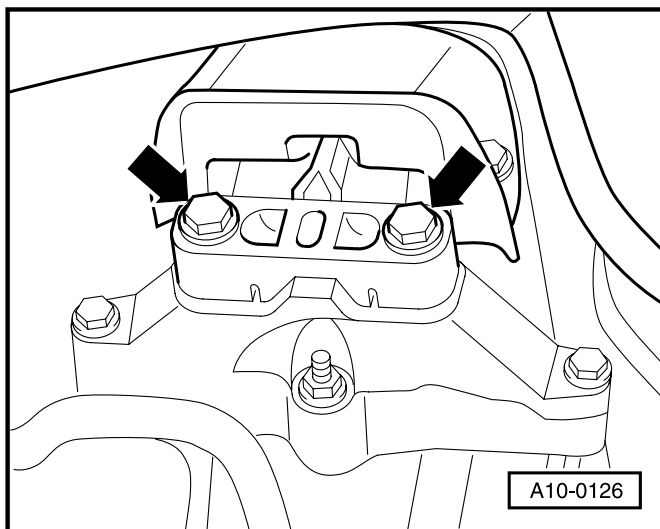
- Insert engine holder T10012 into engine/gearbox lift (e.g. V.A.G 1383 A).
- ◀ - Attach engine holder T10012 to cylinder block using securing nuts and M10 bolts and tighten to a torque of about 40 Nm.
- Raise engine and gearbox slightly with engine/gearbox lift.



- ◀ - Unbolt engine support from engine mount -arrows-.

Note:

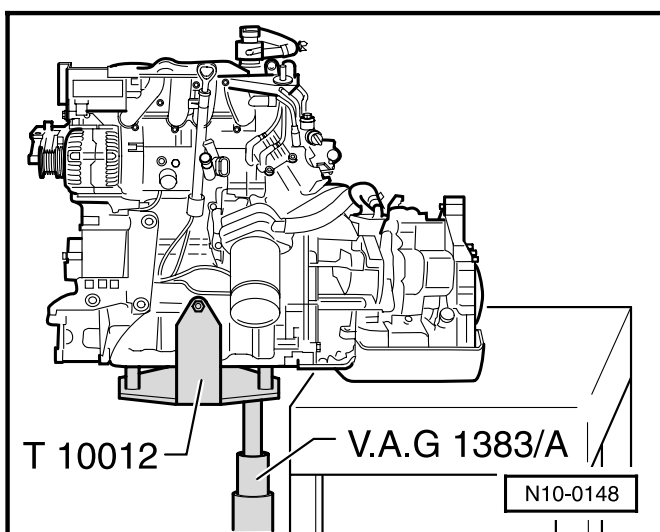
Use the assembly ladder (e.g. V.A.S 5085) for removing the securing bolts.



- ◀ - Unbolt transmission support from transmission mount -arrows-.
- Carefully lower engine/gearbox.

Note:

When lowering engine/gearbox unit, guide carefully in order to avoid any damage as a result of the slight clearance to the body.

**Attaching engine to repair stand**

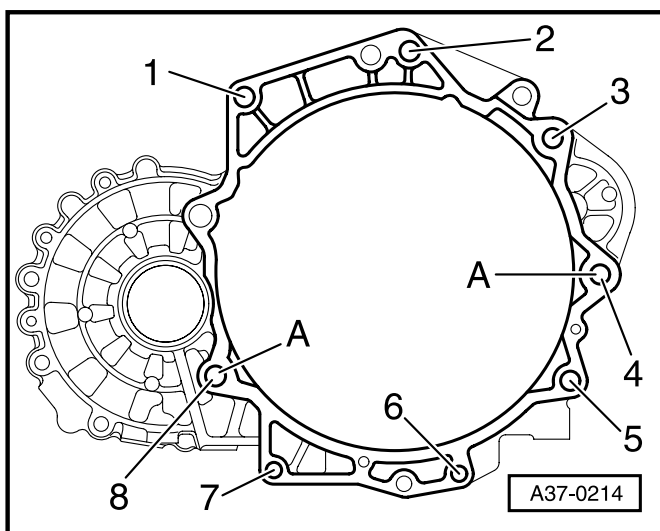
The engine should be attached to the repair stand with the engine holder MP 1-202 for carrying out removal and installation operations.

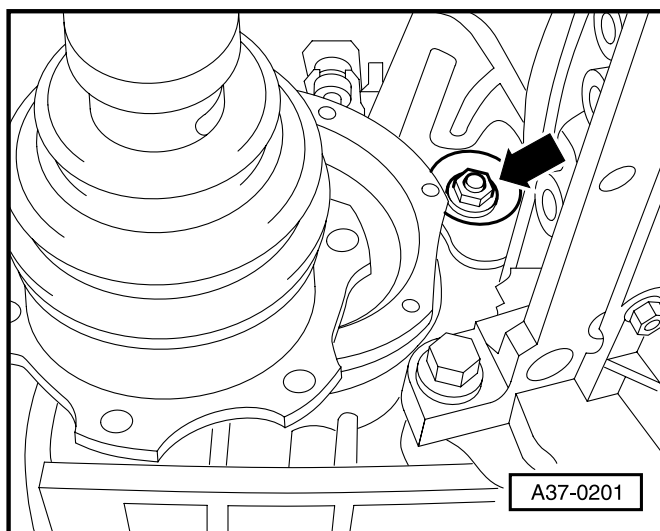
Note:

The engine must not be attached to the repair stand for measuring the cylinder bore ⇒ page 13-22.

Procedure

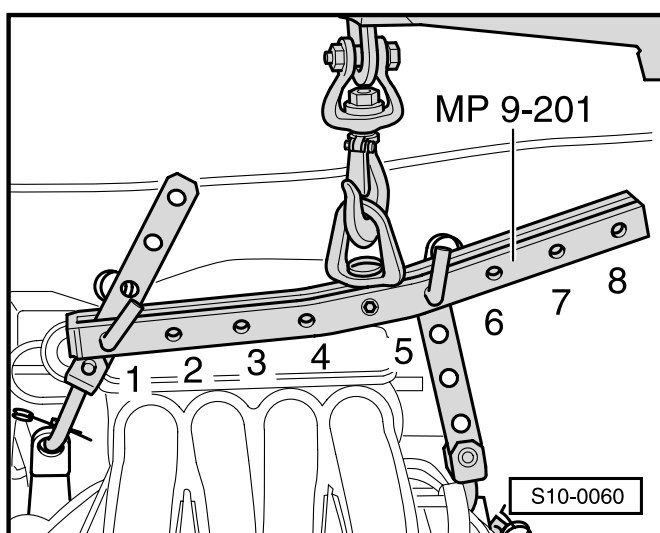
- ◀ - Place engine/gearbox unit down on a workbench with lift, e.g. V.A.G 1383 A.
- Lower the engine/gearbox unit so that it rests on the gearbox.
- ◀ - Remove bolts -1 to 8- connecting engine and gearbox.
- Press gearbox off the engine.





Models with automatic gearbox

- Pull off plug in the hole of the torque converter cover plate.
- ◀ - Unscrew 3 nuts -arrow- from torque converter; rotate crankshaft 1/3 turn each time.
- After separating engine and gearbox, secure torque converter in gearbox to prevent it dropping out.



All models

- ◀ - Attach suspension device MP 9-201 as follows and lift engine/gearbox unit out slightly with workshop crane (e.g. V.A.G 1202 A).
- ♦ Belt pulley side:
1st hole of perforated rail in position 1
- ♦ Flywheel side:
4th hole of perforated rail in position 5

Warning!

Use locking pins at the hooks and pins.

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

Installing engine

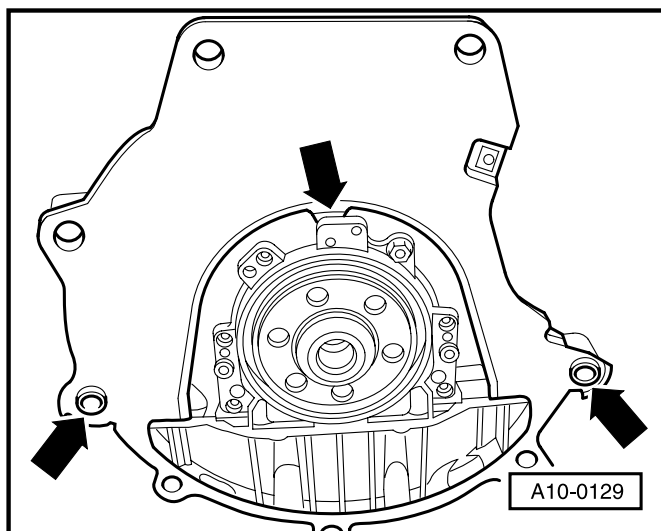
Notes:

- ♦ Always replace seals and gaskets when carrying out removal and installation operations.
- ♦ Always replace self-locking nuts.

Procedure

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

- Check whether dowel sleeves for centring engine/gearbox are present in the engine block; insert, if necessary.



- ◀ - Attach intermediate plate to sealing flange and push onto the dowel sleeves -arrows-.

Models fitted with manual gearbox

- Apply a thin film of grease G 000 100 to the splines of the gearbox input shaft.
- Inspect centering of clutch plate, if necessary.
- Install slave cylinder of hydraulic clutch:
⇒ 5-Speed Manual Gearbox 02K; Repair Group 30; Servicing clutch mechanism.
- Install shift mechanism:
⇒ 5-Speed Manual Gearbox 02K; Repair Group 34; Servicing shift mechanism.
- Adjust shift mechanism:
⇒ 5-Speed Manual Gearbox 02K; Repair Group 34; Adjusting shift mechanism.

Models fitted with automatic gearbox

- Use only nuts approved in the Parts List for attaching the torque converter to the driven plate.

Models fitted with air conditioning

- Install AC compressor:
⇒ Heating, Air Conditioning; Repair Group 87; Air Conditioning; Removing and installing compressor at bracket.

Continued for all models

- Install power steering hydraulic pump:
⇒ Running Gear; Repair Group 48; Removing and installing power steering hydraulic pump.
- Install drive shafts:
⇒ Running Gear; Repair Group 40; Servicing front suspension; Removing and installing drive shaft.
- Install front exhaust pipe and align exhaust system free of stress ⇒ page 26-2.
- Align engine/gearbox mounting ⇒ page 10-15.

- Install ribbed V-belt ⇒ page 13-4.
- Install coolant hoses ⇒ page 19-1.
- Fill system with coolant ⇒ page 19-2.
- Do not re-use drained coolant if cylinder block, cylinder head, radiator or heat exchanger has been replaced.
- Place engine connecting loom in cable duct and plug together with 10-pin plug connection.
- Plug in 28-pin plug connection at engine control unit -J361.
- Install plenum chamber cover.
⇒ Body Fitting Work; Repair Group 66; Trim Panels
- Install wiper arms.
⇒ Electrical System; Repair Group 92; Windscreen Wiper System
- Electrical connections and routing of cables:
⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder
- Adjust throttle cable ⇒ page 20-13.
- Install engine trim panel.
- Inspect engine oil level before starting engine ⇒ page 17-9.

Note:

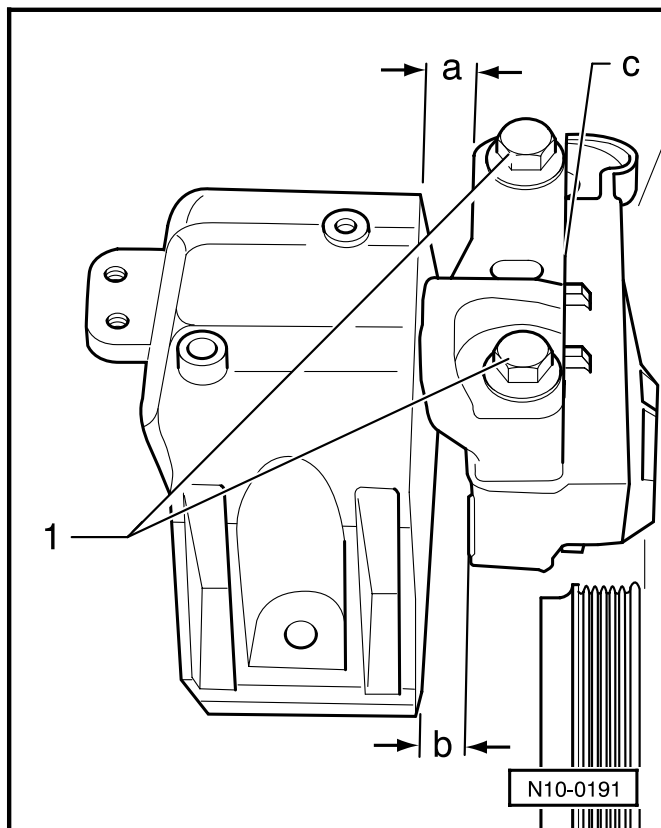
If the earth strap of the battery is disconnected and re-connected, it is necessary to carry out additional operations ⇒ Electrical System; Repair Group 27.

Tightening torques

Notes:

- ◆ *Tightening torques apply only to nuts and bolts which are lightly greased, oiled, phosphatized or blackened.*
- ◆ *Additional lubricants such as engine oil or gear oil, are permissible, but not Molykote.*
- ◆ *Do not use parts which have been degreased.*
- ◆ *Unless otherwise stated, the following tightening torques apply:*

Component		Nm
Nuts/bolts	M6	9
	M7	13
	M8	20
	M10	40
	M12	70
In variation of this:		
Driven plate to torque converter		60
Engine mounts, gearbox mounts and pendulum support		⇒ page 10-16
Bolts connecting engine to gearbox ⇒ 5-Speed Manual Gearbox 02K; Repair Group 34 ⇒ Automatic Gearbox; Repair Group 37		



Aligning engine/gearbox mounting

Warning!

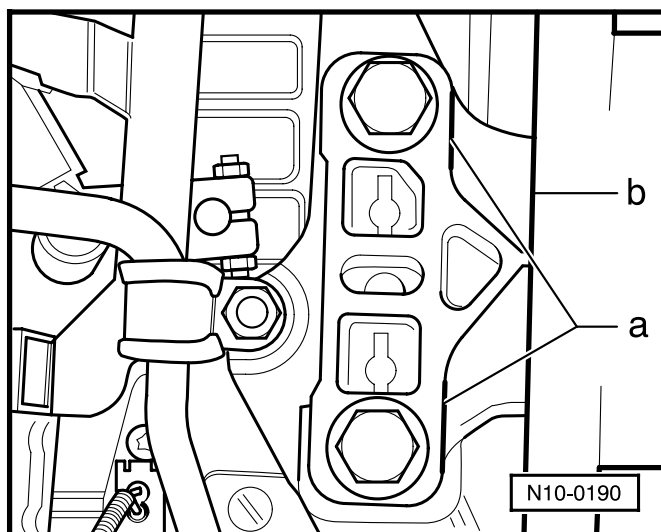
The engine/gearbox assembly must be secured with the supporting device MP 9-200 before slackening the bolts.

◀ Engine mounting

$a = 14.0 \text{ mm}$

$b = \text{at least } 10.0 \text{ mm}$

Both bolt heads -1- must end flush with the edge -c-.



◀ Gearbox mounting

The edges -a- and -b- must be parallel to each other.

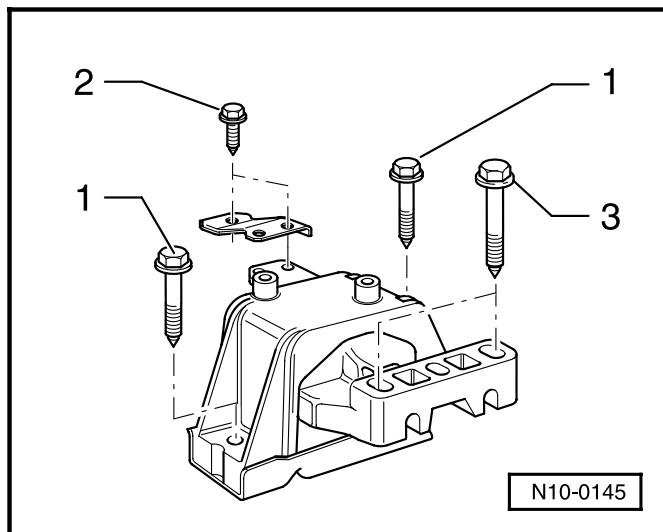
Engine/gearbox mounting

Tightening torques

◀ Engine mounting

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

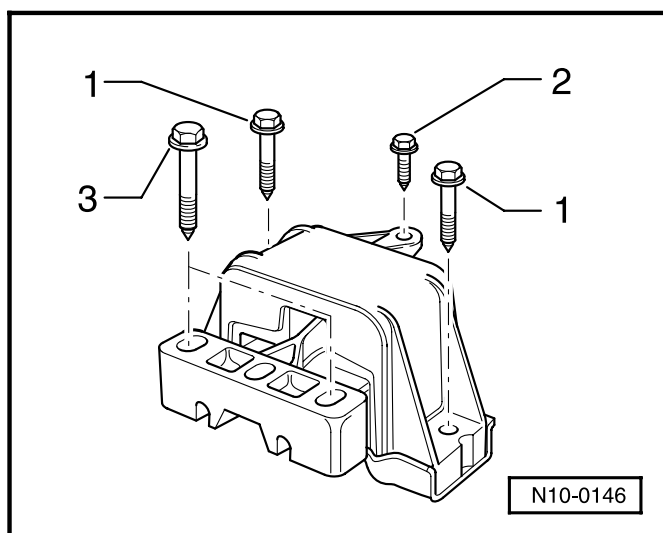
¹⁾ Replace bolts



◀ Gearbox mounting

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

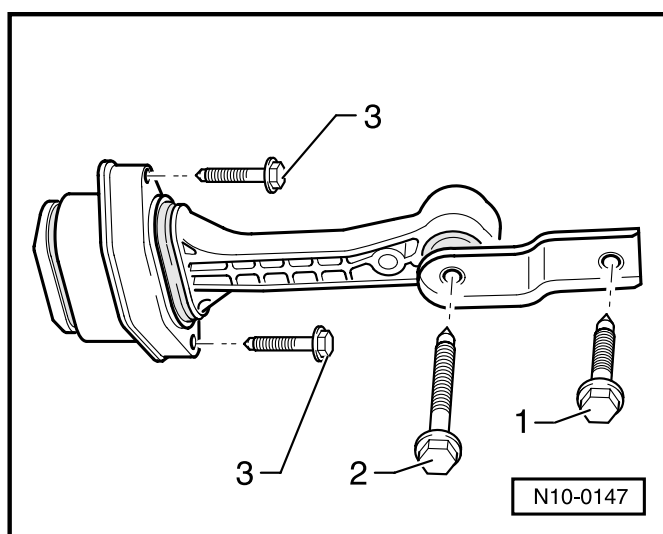
¹⁾ Replace bolts



◀ Pendulum support

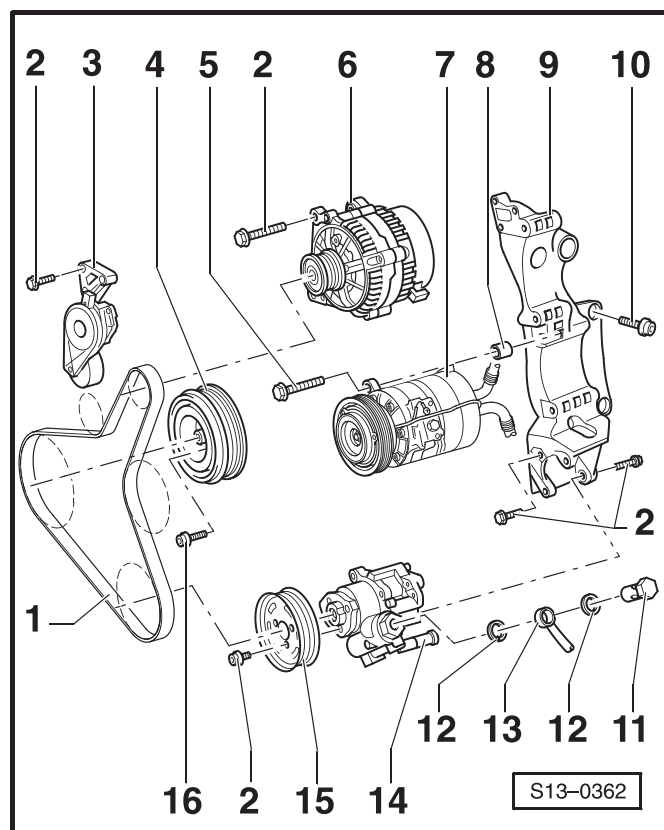
- 1 - 40 Nm + 45°¹⁾
- 2 - 40 Nm + 45°¹⁾
- 3 - 20 Nm + 90° (1/4 turn)¹⁾

¹⁾ Replace bolts



Disassembling and assembling engine

Removing and installing ribbed V-belt



Special tools, testers and aids required

- ◆ Torque wrench
- ◆ Drift T10060

Notes:

- ◆ The illustration shows the belt drive of models not fitted with air conditioning
- ◆ Mark the direction of running of the ribbed V-belt before removing it. If an already used belt is fitted on again to run in the opposite direction, it may be destroyed. When installing the belt, ensure it is correctly located in the belt pulleys.
- ◆ Removing and installing AC compressor ⇒ Heating, Air conditioning; Repair Group 87.

1 - Ribbed V-belt

- ◆ mark the direction of running before removing it.
- ◆ inspect for wear
- ◆ do not kink
- ◆ routing of ribbed V-belt on models not fitted with AC ⇒ Fig. 1
- ◆ routing of ribbed V-belt on models fitted with AC ⇒ Fig. 2
- ◆ removing and installing ribbed V-belt ⇒ page 13-3
- ◆ engines equipped with AC compressor have a double ribbed V-belt

2 - 25 Nm

3 - Tensioning device for ribbed V-belt

- ◆ swivel with open-end wrench for slackening ribbed V-belt ⇒ page 13-3

4 - Vibration damper

- ◆ can be installed in one position

5 - 45 Nm

6 - Alternator

- ◆ push back threaded bushes for retaining bolts slightly to more easily position the alternator against the bracket

7 - AC compressor

- ◆ do not open refrigerant circuit
- ◆ push back threaded bushes for retaining bolts slightly to more easily position the AC compressor against the bracket

8 - Distance sleeve

9 - Bracket

10 - 45 Nm

- ◆ tightening sequence ⇒ page 13-3

11 - Banjo bolt, 30 Nm

12 - Seal

- ◆ replace

13 - Pressure line

14 - Hydraulic pump for power steering

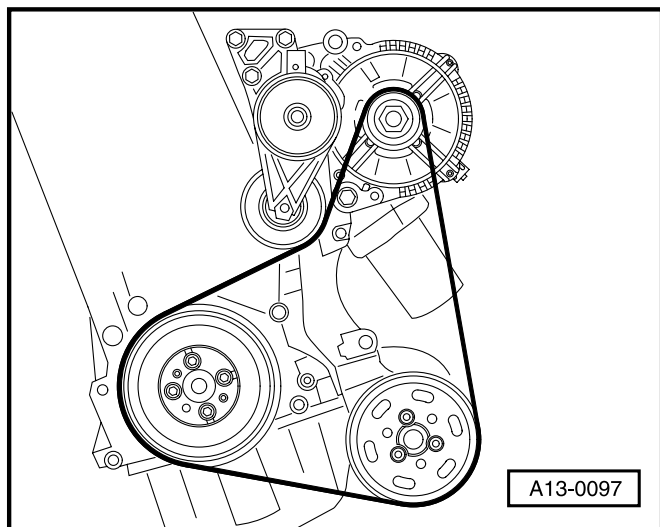
- ◆ push back threaded bushes for retaining bolts slightly to more easily position the hydraulic pump against the bracket
- ◆ removing and installing:
⇒ Running Gear; Repair Group 48

15 - Belt pulley

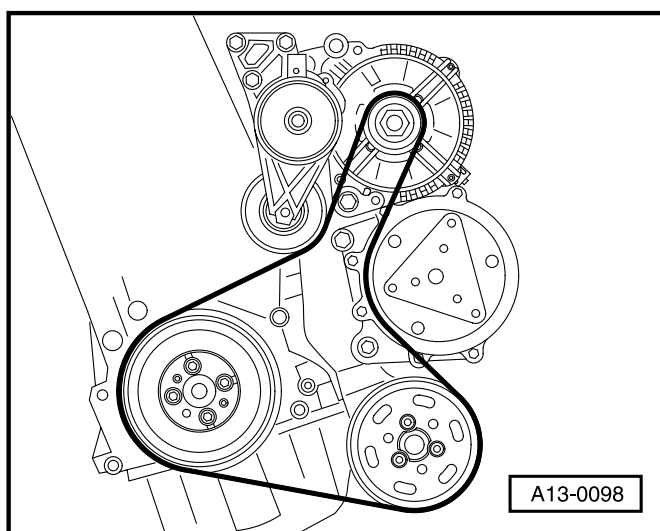
- ◆ for hydraulic pump

16 - Securing bolt

- ◆ replace bolt of strength class 8.8: 25 Nm with bolt of strength class 10.9 ⇒ Parts List
- ◆ bolt of strength class 10.9: 40 Nm
- ◆ it is not permitted to combine different strength classes



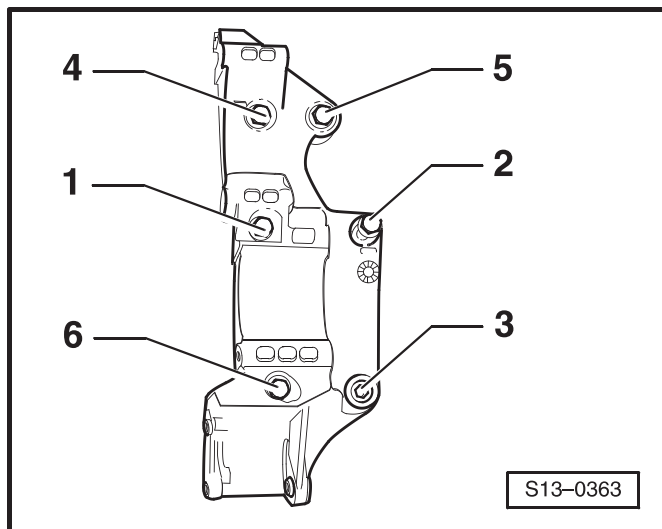
◀ Fig. 1 Routing of ribbed V-belt on models not fitted with AC



◀ Fig. 2 Routing of ribbed V-belt on models fitted with AC

Note:

Engines equipped with AC compressor have a double ribbed V-belt.



◀ Fig. 1 Tightening sequence of bolts at compact holder

Removing ribbed V-belt

Note:

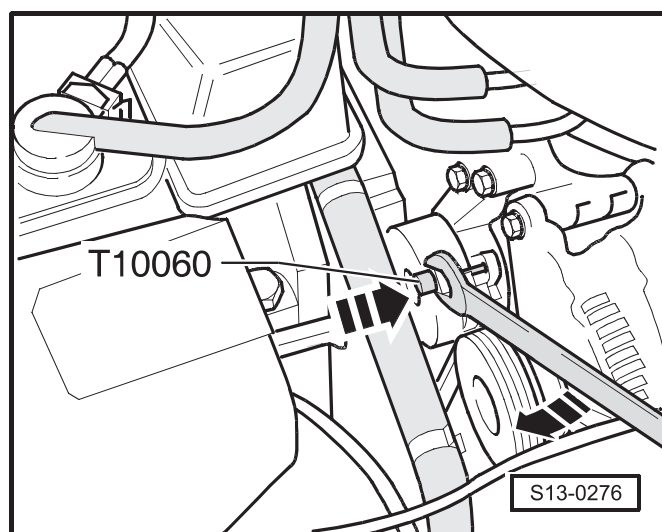
Mark the direction of running of the ribbed V-belt before removing it. If an already used belt is fitted on again to run in the opposite direction, it may be destroyed. When installing the belt, ensure it is correctly located in the belt pulleys.

- ◀ - Swivel tensioning device in direction of -arrow- and secure with drift T10060 in order to slacken the ribbed V-belt.

Note:

The tensioning device can be locked with a 3 mm external hexagon wrench.

- Take off ribbed V-belt.



Installing ribbed V-belt

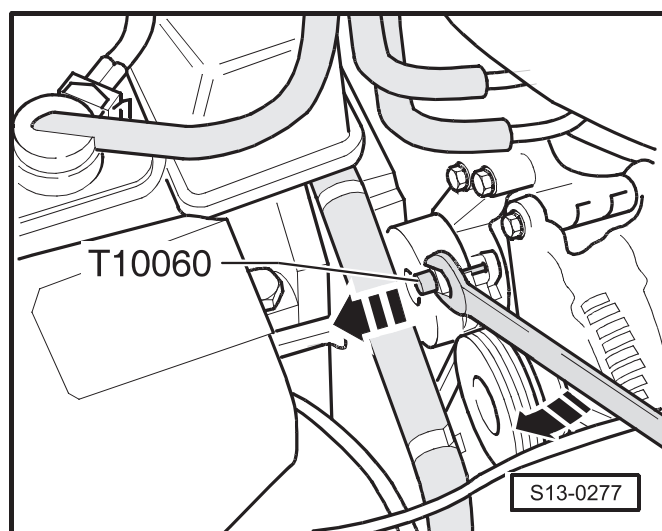
Note:

Before installing the ribbed V-belt, ensure that all the components (alternator, AC compressor, hydraulic pump) are tightly fitted.

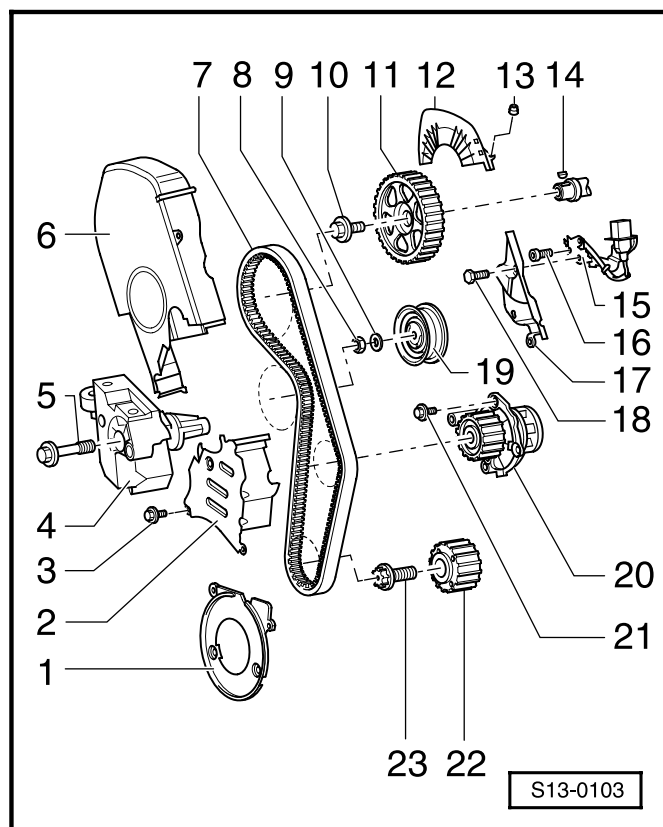
- Fit on ribbed V-belt
- ◀ - Slacken tensioning device for ribbed V-belt. Remove drift T10060 -arrows-.
- Start engine and check running of belt.

Note:

Engines fitted with AC compressor have a double ribbed V-belt.



Removing and installing, tensioning toothed belt



Note:

Mark the direction of running of the ribbed V-belt before removing it. If an already used belt is fitted on again to run in the opposite direction, it may be destroyed.

1 - Bottom toothed belt guard

- ♦ unscrew vibration damper before removing ⇒ page 13-1

2 - Center toothed belt guard

3 - 10 Nm

- ♦ replace

4 - Engine support

- ♦ removing ⇒ page 13-6

5 - 45 Nm

6 - Top toothed belt guard

7 - Toothed belt

- ♦ mark direction of running before removing
- ♦ inspect for wear
- ♦ do not kink
- ♦ removing ⇒ page 13-6
- ♦ installing ⇒ page 13-8

8 - 25 Nm

9 - Corrugated washer

10 - 100 Nm

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

11 - Camshaft sprocket

- ♦ with sensor rotor for Hall sensor -G40-
- ♦ removing and installing toothed belt ⇒ page 13-5
- ♦ fix installation position by means of parallel key -item. 14-

12 - Toothed belt guard

13 - 10 Nm

14 - Parallel key

- ♦ Check tightness

15 - Hall sensor -G40-

- ♦ when bolting on ensure base plate is centered

16 - 10 Nm

17 - Rear toothed belt guard

18 - 20 Nm

19 - Semi-automatic tensioning pulley

- ♦ inspecting semi-automatic toothed belt tensioning pulley ⇒ page 13-10
- ♦ installation position ⇒ Fig. 1

20 - Coolant pump

- ♦ removing and installing ⇒ page 19-8

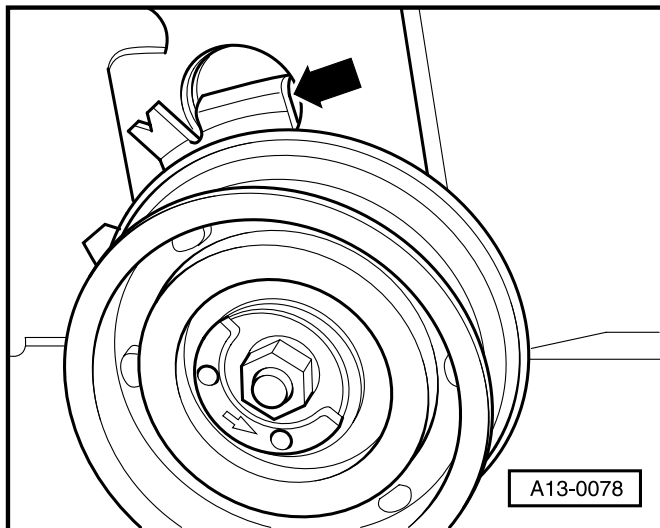
21 - 15 Nm

22 - Crankshaft toothed belt sprocket

- ♦ there must not be any oil present on contact surface between toothed belt sprocket and the crankshaft
- ♦ assembly is only possible in one position

23 - 90 Nm + torque a further $\frac{1}{4}$ turn (90°)

- ♦ replace
- ♦ use counterholder T30004 for slackening and tightening or counterholder MP 1-310 ⇒ page 13-17; removing and installing front sealing flange.



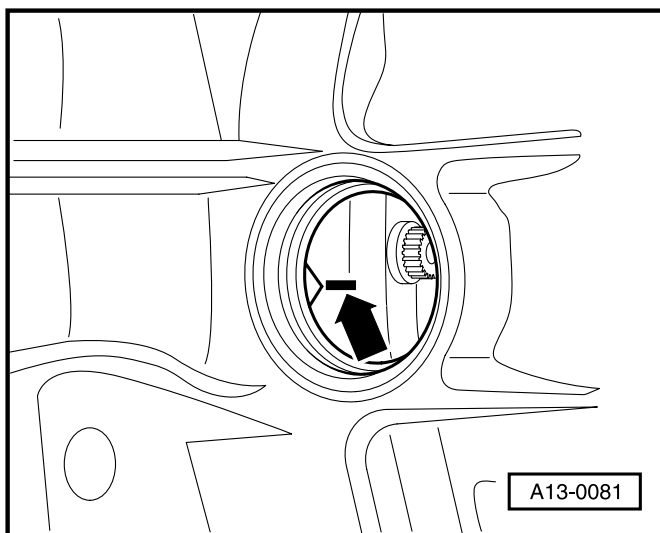
◀ Fig. 1 Installation position of the semi-automatic tensioning pulley

The angle bracket -arrow- must engage in the recess at the cylinder head.

Special tools, testers and aids required

- ◆ Torque wrench
- ◆ Counterholder MP 1-216
- ◆ Two-hole nut turner T10020
- ◆ Counterholder MP 1-310
- ◆ Supporting device MP 9-200

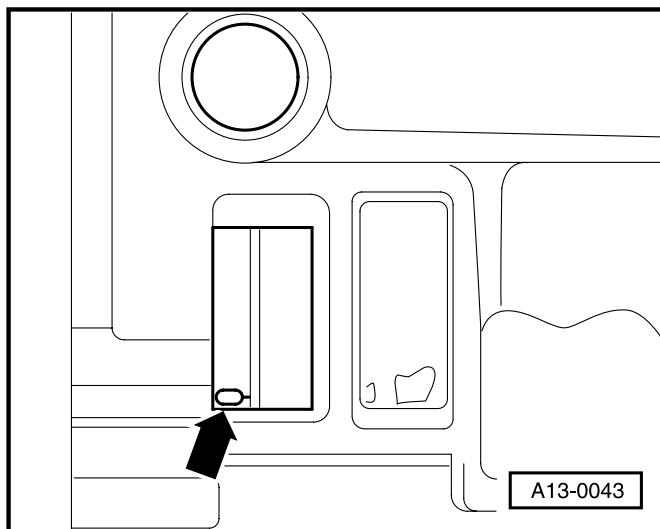
Removing toothed belt



Engine installed

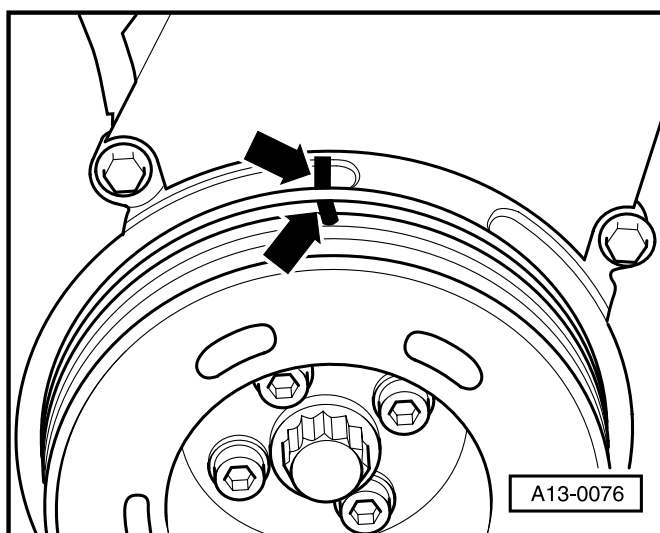
- Removing ribbed V-belt ⇒ page 13-3
- Removing tensioning device for ribbed V-belt.
- ◀ - Rotate crankshaft to TDC of cylinder 1 -arrow- (vehicles with manual gearbox)

TDC marking on flywheel and reference mark must be aligned.



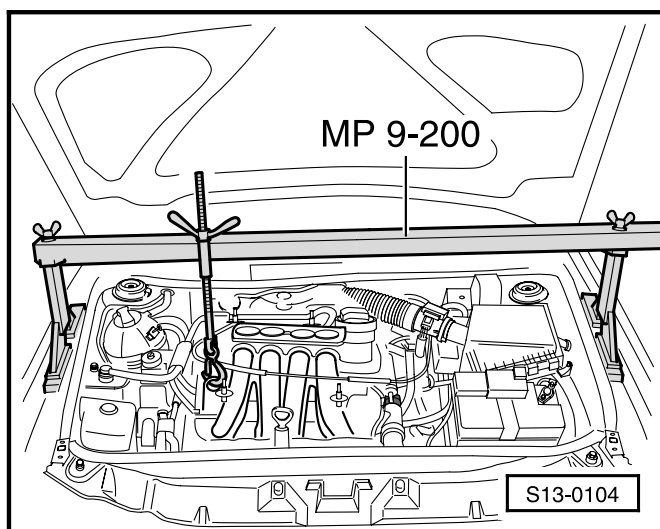
- ◀ - Rotate crankshaft to TDC of cylinder 1 -arrow- (models with automatic gearbox).

TDC marking on driven plate and reference mark should be aligned.

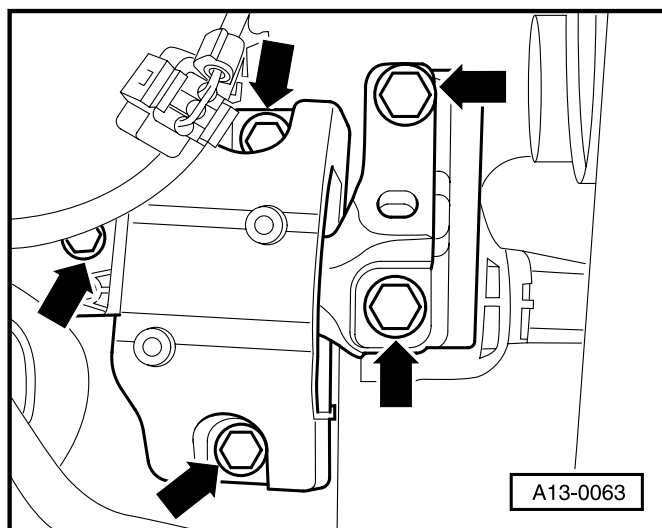


Note:

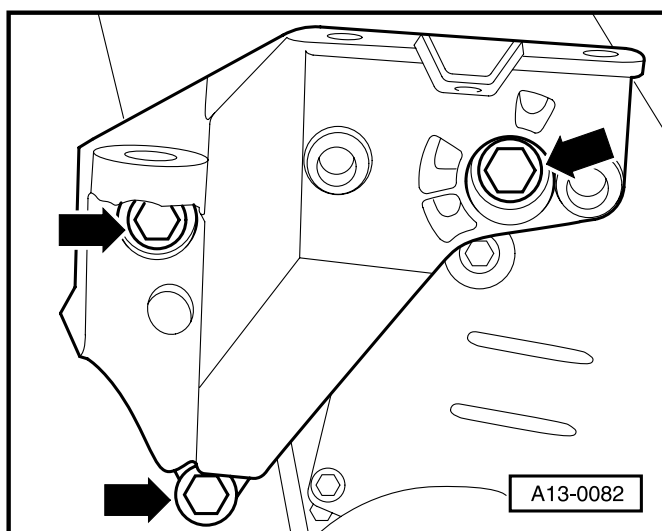
- ◀ With engine removed, position vibration damper to TDC of cylinder 1 -arrows-.



- Remove engine cover.
- ◀ - Insert supporting device MP 9-200 with supports and take up weight of engine with the shaft of the supporting device (on right only).



- Remove vibration damper.
- Remove top, bottom and centre toothed belt guards.
- Unbolt PAS reservoir.
- ◀ - Unbolt engine support from the engine mounting bracket and engine mounting bracket from the body -arrows-.
- Mark direction of running of toothed belt.
- Slacken semi-automatic tensioning pulley and take off toothed belt.
- Turn back crankshaft slightly.



- ◀ - Unbolt engine support from engine -arrows-.

Notes:

- ♦ Raise engine slightly with shaft of supporting device MP 9-200 for slackening the front bolt of the engine support.
- ♦ Raise or lower engine, appropriately, with shaft of supporting device MP 9-200 for taking off the engine support.

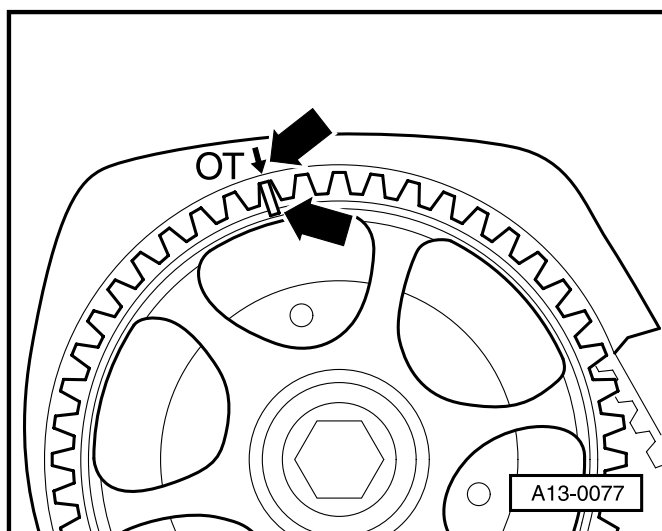
Installing, tensioning toothed belt (setting timing)

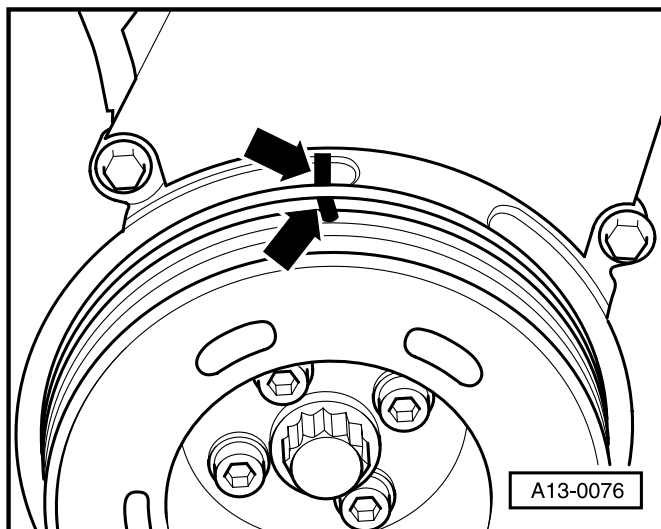
Notes:

- ♦ The toothed belt setting should be carried out as described below even in the case of repairs which only necessitate taking the toothed belt off the camshaft sprocket.
- ♦ When rotating the camshaft, the crankshaft must not be positioned at TDC otherwise there is a risk of damage from the valves striking the piston crowns.

Condition

- The pistons must not be at top dead centre.
- ◀ - Move marking on camshaft sprocket so that it is aligned with the marking on the toothed belt guard -arrow-.

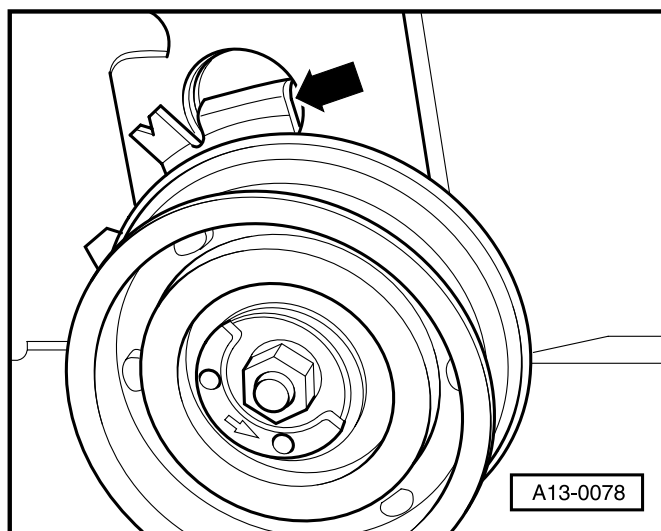




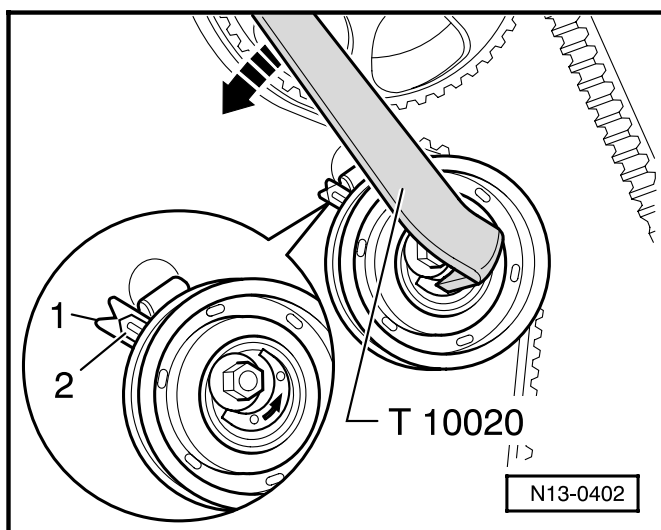
- Position crankshaft to TDC of cylinder 1
⇒ page 13-6 (except if engine removed).
- Fit toothed belt onto toothed belt sprocket of crankshaft (pay attention to direction of running) ⇒ page 13-5.

Note:

◀ If engine removed, after this fit on bottom toothed belt guard and toothed belt sprocket and position crankshaft to TDC of cylinder 1 -arrows-.



- Fit toothed belt onto tensioning pulley and camshaft sprocket.
- ◀ - Pay attention to installation position of semi-automatic tensioning pulley:
 - ♦ The retaining claw -arrow- must engage in the recess on the cylinder head.



- ◀ - Turn semi-automatic tensioning pulley with nut turner T10020 fully to the left as far as the stop (in direction of arrow).
- Slacken tensioning pulley until notch -1- and pointer -2- are positioned opposite.
- Tighten clamping nut at the semi-automatic tensioning pulley to 25 Nm.
- Rotate crankshaft fully twice and check setting.
- Install bottom toothed belt guard.
- Install vibration damper (pay attention to installation position: hole of vibration damper is positioned above the raised section on the toothed belt sprocket).

Note:

Insert bolts into engine support before installing it.

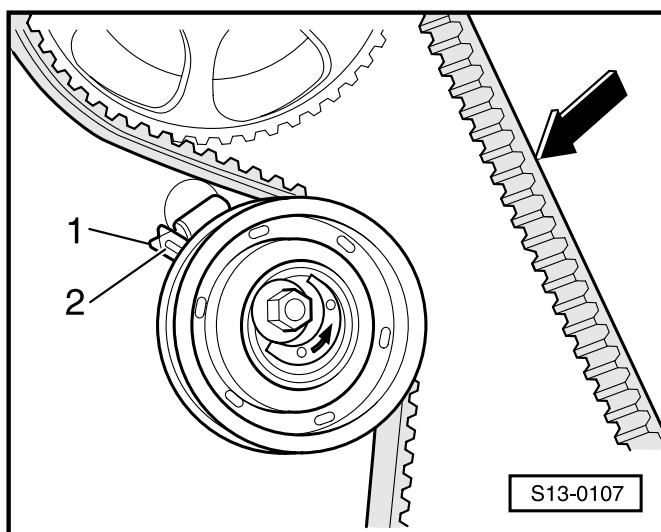
- Install engine support ⇒ page 13-5.
- Install engine mount ⇒ page 10-16.
- Remove supporting device.
- Install middle and top toothed belt guard.
- Install tensioning device for ribbed V-belt. Tightening torque: 20 Nm.
- Install ribbed V-belt ⇒ page 13-3.

Inspecting semi-automatic tensioning pulley**Inspection condition**

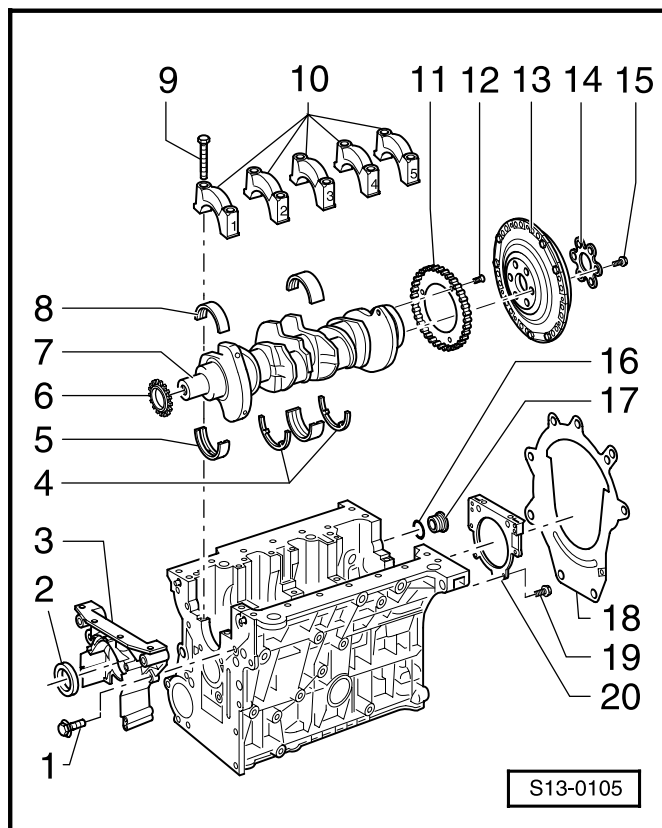
- *Toothed belt fitted on and tensioned.*
- ◀ - Apply firm pressure with your thumb -arrow-. The pointer -2- must move to the side.
- Release pressure again on toothed belt. The tensioning pulley must move back again into its original position (notch -1- and pointer -2- must be again positioned opposite).

Note:

Use a mirror.



Removing and installing crankshaft



Notes:

- ♦ *Servicing clutch:*
⇒ 5-Speed Manual Gearbox 02K; Repair Group 30; Servicing clutch.
- ♦ *Attach engine with engine holder MP 1-202 to the repair stand for carrying out removal and installation operations.*

1 - 15 Nm

2 - Seal

- ♦ replace ⇒ page 13-14
- ♦ pay attention to different versions
⇒ Fig. 2

3 - Front sealing flange

- ♦ removing and installing ⇒ page 13-17

4 - Thrust washers

- ♦ pay attention to different versions
- ♦ in bearing 3, for cylinder block or bearing cap
- ♦ lubricating grooves face to the outside

5 - Bearing shell

- ♦ marking for ordering replacement parts ⇒ Fig. 3
- ♦ for cylinder block with lubricating groove
- ♦ do not mix up used bearing shells (mark)

6 - Chain sprocket

- ♦ for oil pump drive

7 - Crankshaft

- ♦ axial play of new part:
0.07 to 0.21 mm
wear limit: 0.30 mm
- ♦ crankshaft bearing journal:
Ø 54.00mm
- ♦ conrod bearing journal: Ø 47.80 mm

8 - Bearing shell

- ♦ marking for ordering replacement parts ⇒ Fig. 3
- ♦ for bearing cap without lubricating groove
- ♦ do not mix up used bearing shells (mark)

9 - 40 Nm + torque a further 1/4 turn (90°)

- ♦ replace

10 - Bearing cap

- ♦ bearing cap 1; belt pulley side
- ♦ installation position: retaining lugs of bearing shells of cylinder block/bearing cap must be positioned one above the other

11 - Sensor rotor

- ♦ replace if damaged
- ♦ for engine speed sender -G28-
- ♦ can be installed only in one position -holes offset-
- ♦ removing and installing sensor rotor
⇒ page 13-13

12 - 10 Nm + torque a further 1/4 turn (90°)

- ♦ replace

13 - Pressure plate/driven plate

- ♦ removing and installing pressure plate
⇒ page 13-15
- ♦ removing and installing driven plate
⇒ page 13-15

14 - Washer

- ♦ pay attention to installation position

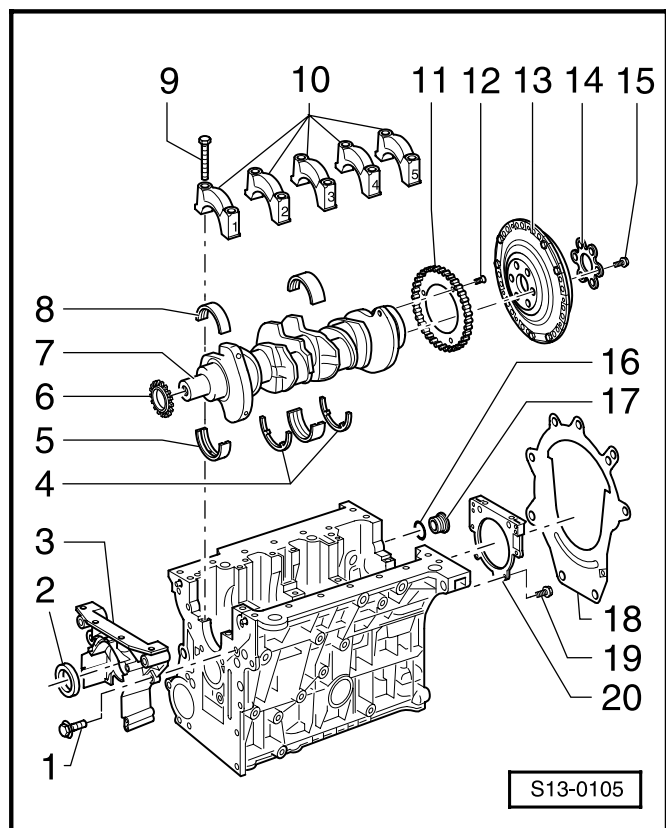
15 - 60 Nm + torque a further 1/4 turn (90°)

- ♦ replace

16 - Seal

- ♦ replace

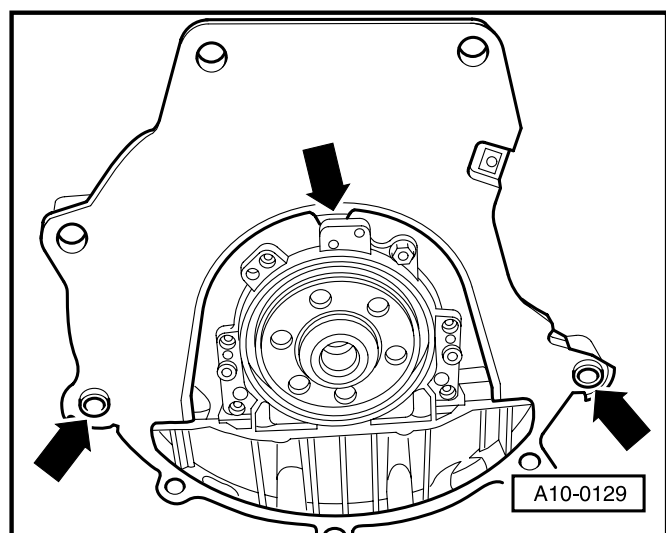
17 - Screw plug, 100 Nm

**18 - Intermediate plate**

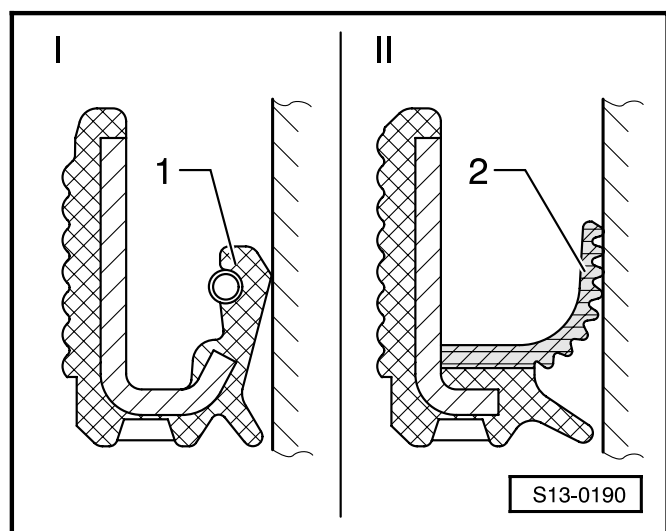
- ◆ is attached to sealing flange ⇒ Fig. 1
- ◆ must be placed on dowel sleeves
- ◆ do not damage or bend when carrying out removal and installation work

19 - 15 Nm**20 - Rear sealing flange with seal**

- ◆ always replace complete
- ◆ must be located on dowel sleeves
- ◆ to remove, take off oil pan ⇒ page 17-3
- ◆ clean sealing surface before installing
- ◆ sealing flange is supplied with PTFE seal as replacement part
- ◆ install seal dry, crankshaft journal must be free of grease
- ◆ install new sealing flange with sleeve (do not pull sleeve off sealing ring before installing)

**◀ Fig. 1 Installing intermediate plate**

- Attach intermediate plate to the sealing flange and fit onto dowel sleeves -arrows-.

**◀ Fig. 2 Seal versions****I Elastomer seal**

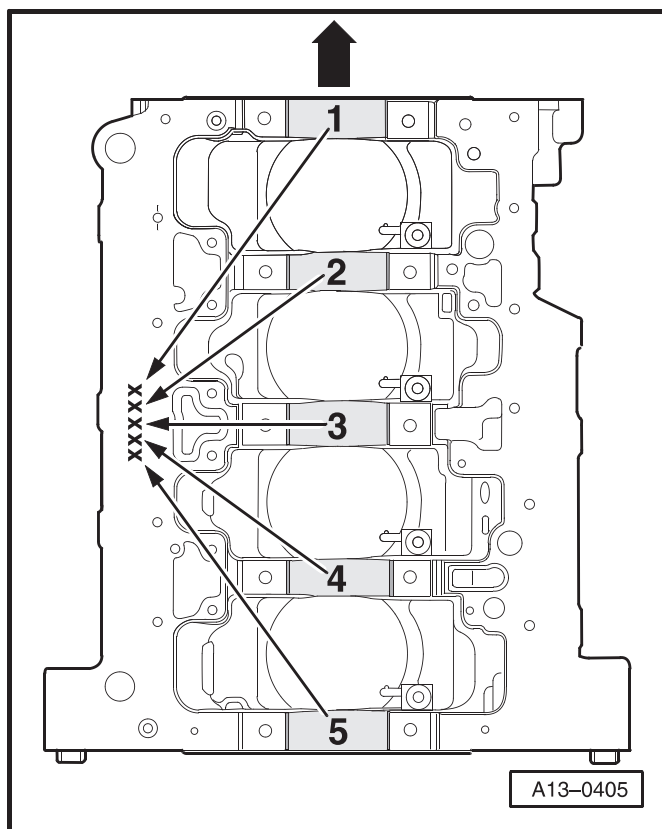
1 sealing lip -1-; with worm spring

II PTFE seal

Several sealing lips -2-; without worm spring

Notes:

- ◆ Do not moisten PTFE seal with oil before installing. The shaft must also be free of oil and grease.



- ◆ Do not replace a PTFE seal (new version) with an elastomer seal (old version).
- ◆ A PTFE seal may be installed in place of an elastomer seal.

◀ **Fig. 3 Marking crankshaft bearing for ordering replacement parts**

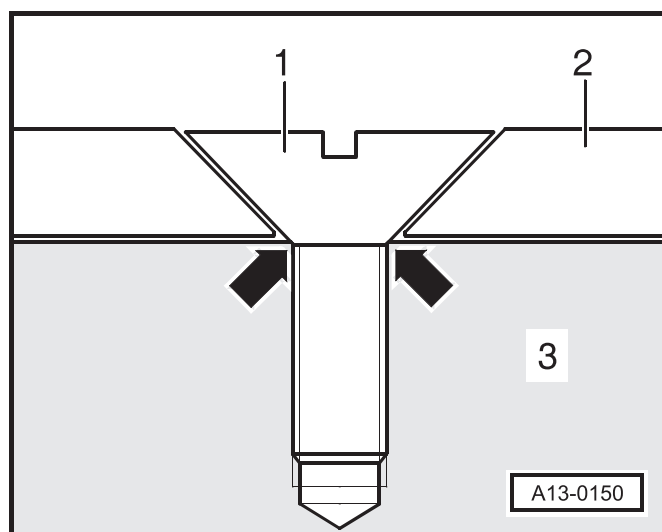
The crankshaft bearing shells are factory-marked. The top crankshaft bearing shells are based on the marking on the cylinder block (stamped letters)

Notes:

- ◆ -Arrow- points toward belt pulley
- ◆ Marking of bearing is visible, without removing oil pan.

Colour coding of bearing shells matching the letters on the cylinder block.

R	=	red
Y	=	yellow
B	=	blue
W	=	white



◀ **Fig.4 Removing and installing sensor rotor**

- Replace each time sensor rotor -2- and bolt -1- are slackened

Notes:

- ◆ After being attached a second time, the attachment point in the sensor rotor -2- is sufficiently misshapen, that the bolt head -1- rests against the crankshaft -3- -arrows- and the sensor rotor is positioned loosely below the screws.
- ◆ Assembly only possible in one position, -holes are offset-.

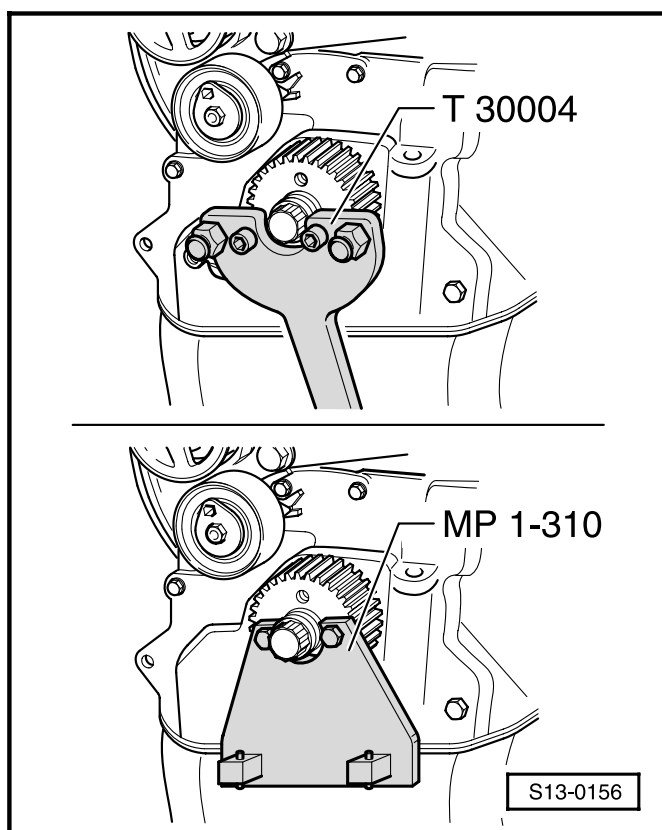
Replacing crankshaft seal -belt pulley side-

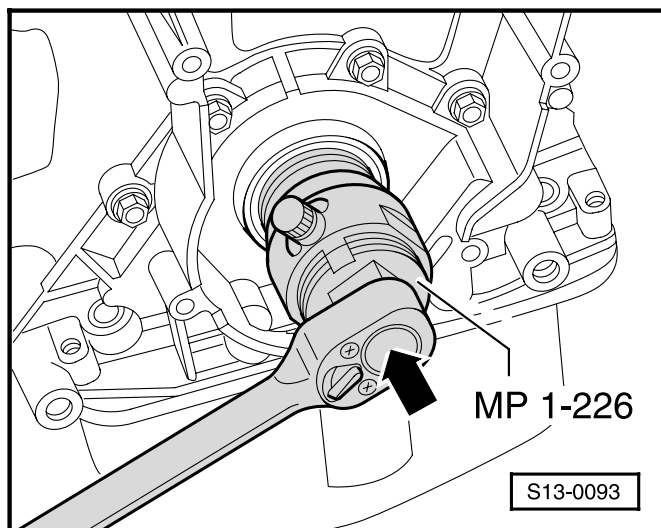
Special tools, testers and aids required

- ◆ Torque wrench
- ◆ Locking lever T30004 or counterholder MP 1-310
- ◆ Seal extractor MP 1-226
- ◆ Guide sleeve MP 1-314
- ◆ Thrust sleeve MP 1-315
- ◆ Guide sleeve T10053/1
- ◆ Thrust sleeve T10053

Removing

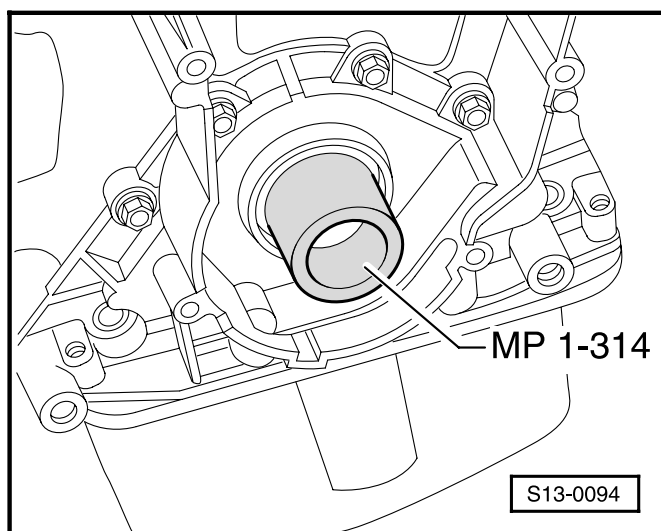
- Remove ribbed V-belt ⇒ page 13-3
- Remove toothed belt ⇒ page 13-6
- ◀ - Remove crankshaft toothed belt sprocket. Lock toothed belt sprocket with locking lever T30004 or counterholder MP 1-310.



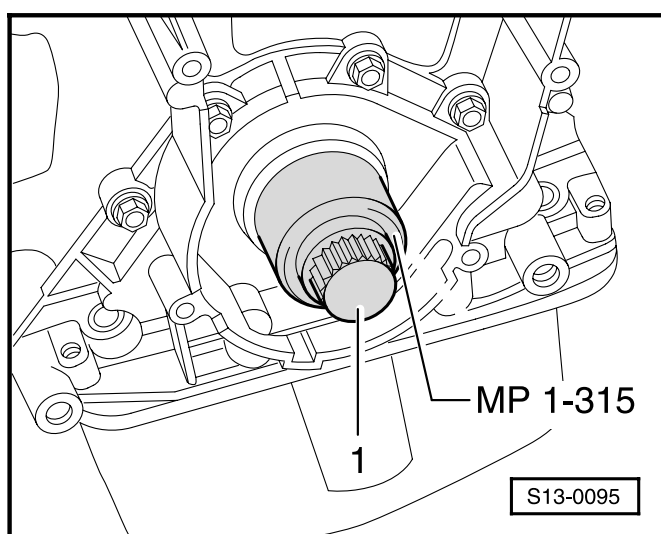


- When bolting on counterholder, place 2 washers between toothed belt sprocket and counterholder.
- Screw central bolt of toothed belt sprocket into the crankshaft again.
- Turn out inner part of seal extractor MP 1-226 two turns (about 3 mm) out of the outer part and lock with knurled screw.
- ◀ - Oil threaded head of seal extractor MP 1-226, fit on and screw as far as possible into the seal with firm pressure.
- Slacken knurled screw and turn inner part against the crankshaft until the seal is pulled out.

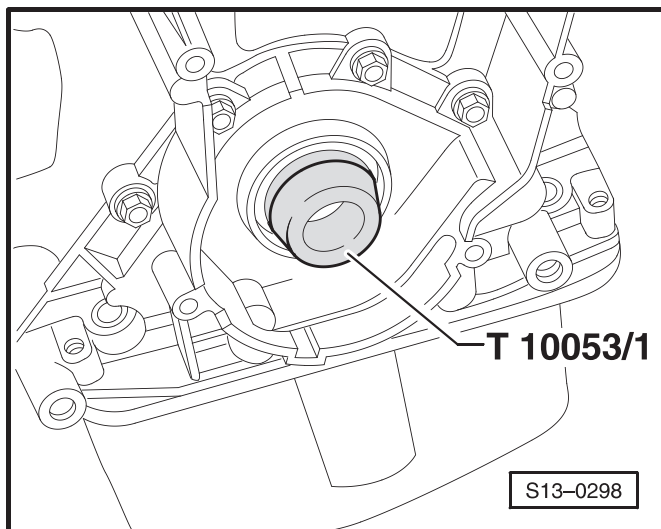
Installing elastomer seal



- Apply a thin film of oil to the sealing lip of the seal.
- ◀ - Fit guide sleeve from MP 1-314 onto the crankshaft journal.
- Push seal over guide sleeve.



- ◀ - Use central bolt -1- and thrust sleeve from MP 1-315 in seal flush.

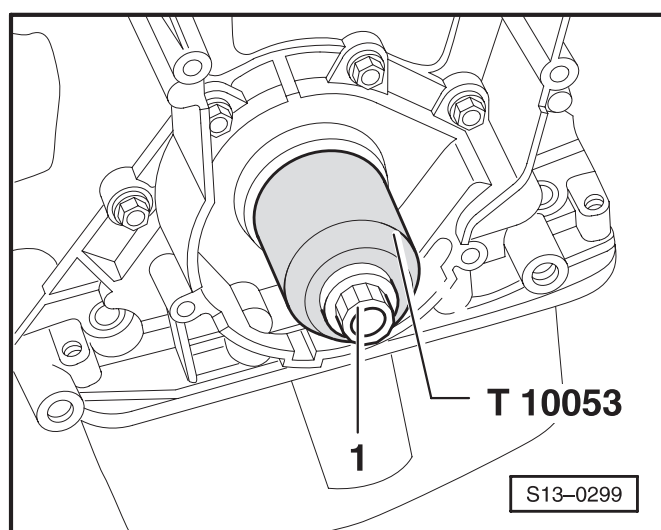


Installing PTFE seal

Note:

The sealing lips of the seal must not be oiled or greased.

- Use a clean cloth to remove oil residues on the crankshaft journal.
- ◀ - Fit guide sleeve T10053/1 onto the crankshaft journal.



- Push seal over guide sleeve onto the crankshaft journal.
- ◀ - Use thrust sleeve T10053 to press in seal as far as the stop.

Use old central bolt of crankshaft toothed belt sprocket for this step.

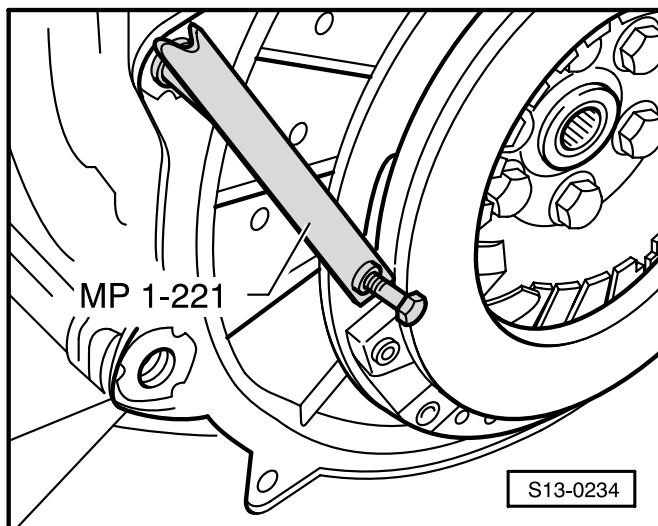
Continued for both versions

- Install crankshaft toothed belt sprocket and lock with counterholder MP 1-310.

Note:

Install new central bolt for toothed belt sprocket.

- Tighten central bolt to 90 Nm + torque a further $\frac{1}{4}$ turn (90°).
- Install toothed belt ⇒ page 13-8.
- Install ribbed V-belt ⇒ 13-3.



Removing and installing pressure plate

Special tools, testers and aids required

- ♦ Torque wrench 40...200 Nm (e.g. V.A.G 1332)
- ♦ Counterholder MP 1-221
- ◀ - Insert counterholder MP 1-221 into hole on cylinder block and bolt on at pressure plate.
- Slacken bolts for pressure plate.

Note:

Replace bolts for pressure plate.

- Tighten bolts to 60 Nm and torque a further ¼ turn (90°).

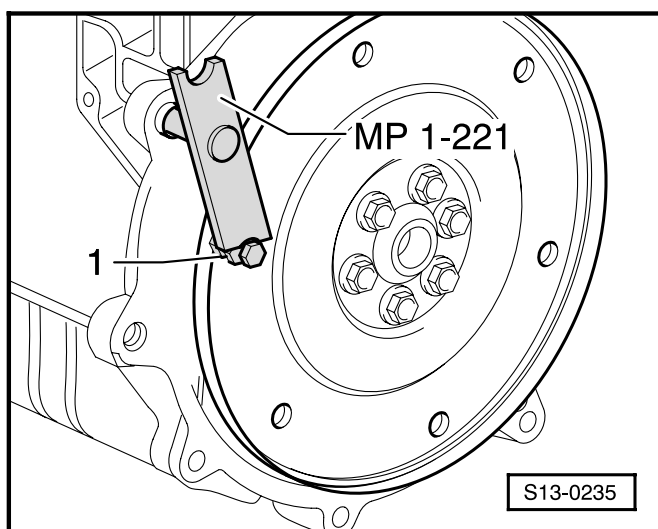
Removing and installing driven plate

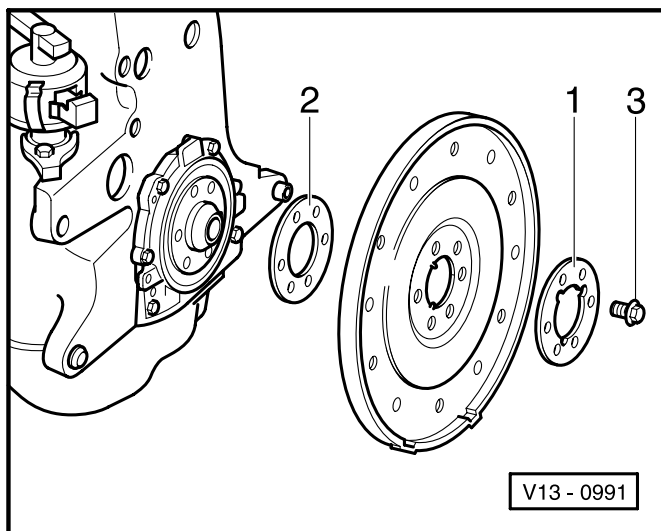
Special tools, testers and aids required

- ♦ Torque wrench 5...50 Nm (e.g. V.A.G 1331)
- ♦ Torque wrench 40...200 Nm (e.g. V.A.G 1332)
- ♦ Counterholder MP 1-221
- ♦ Depth gauge

Removing

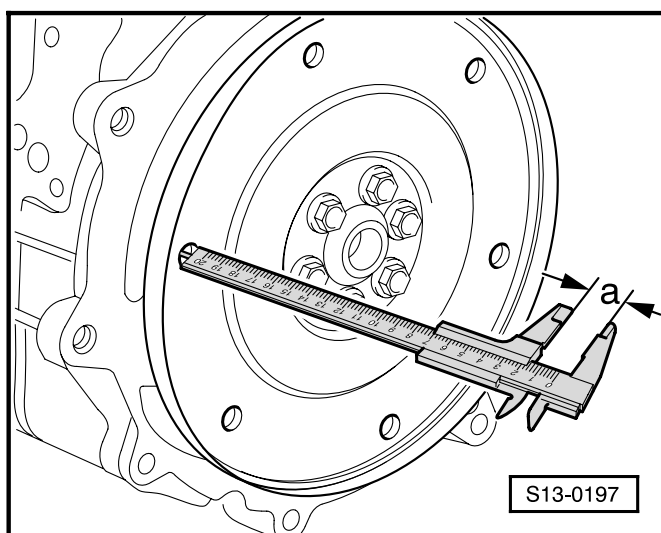
- ◀ - Attach counterholder MP 1-221 to the driven plate with hexagon bolt M8 x 45. Fit two M10 hexagon nuts -1- between counterholder and driven plate.
- Unscrew bolts for driven plate.





Installing

- Remove intermediate plate (⇒ page 13-12, item 18).
- ◀ - Fit on driven plate, using only washer with recesses -1-.
- Insert at least 3 old securing bolts -3- and tighten to 30 Nm.



- ◀ - Check installation dimension of driven plate at the 3 mounting holes for the torque converter and calculate average value.

♦ Specification: 19.5...21.1 mm

Note:

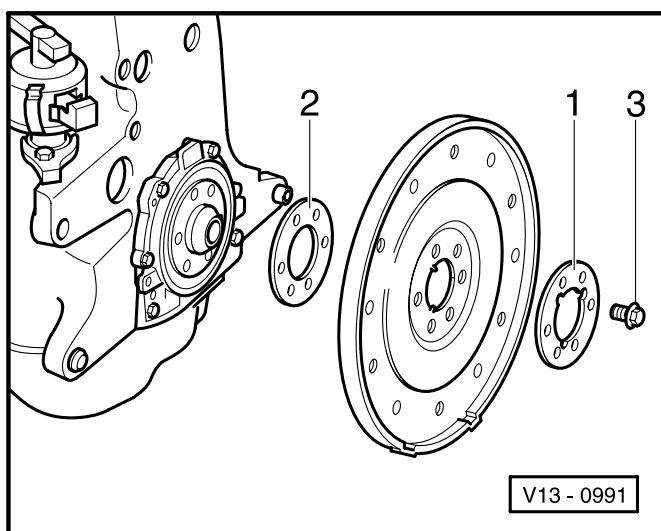
The measurement is made through the 3 outer holes of the driven plate up to the milled face of the cylinder block.

If the specification is achieved:

- Fit on driven plate.
- Install intermediate plate.
- Attach driven plate with washer and new bolts, 60 Nm + torque a further ¼ turn (90°).

If the measurement is less than the specification:

- Remove driven plate.
- Install intermediate plate.
- ◀ - Fit shim -2- between crankshaft and driven plate.
- Attach driven plate with washer -1- and new bolts -3-, 60 Nm + torque a further ¼ turn (90°).



Removing and installing front sealing flange

Special tools, testers and aids required

- ♦ Torque wrench 5...50 Nm
(e.g. V.A.G 1331)
- ♦ Torque wrench 40...200 Nm
(e.g. V.A.G 1332)
- ♦ Locking lever T 30004 or counterholder MP 1-310
- ♦ Guide sleeve MP 1-314
- ♦ Hand drill with plastic brush attachment
- ♦ Silicone sealant D 176 404 A2
- ♦ Flat scraper

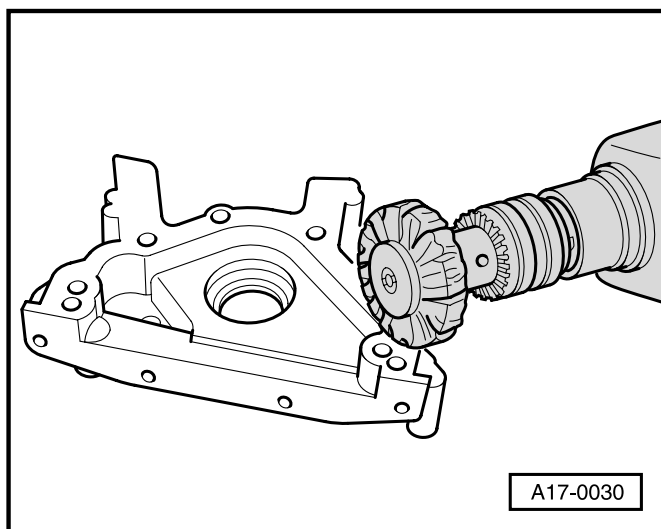
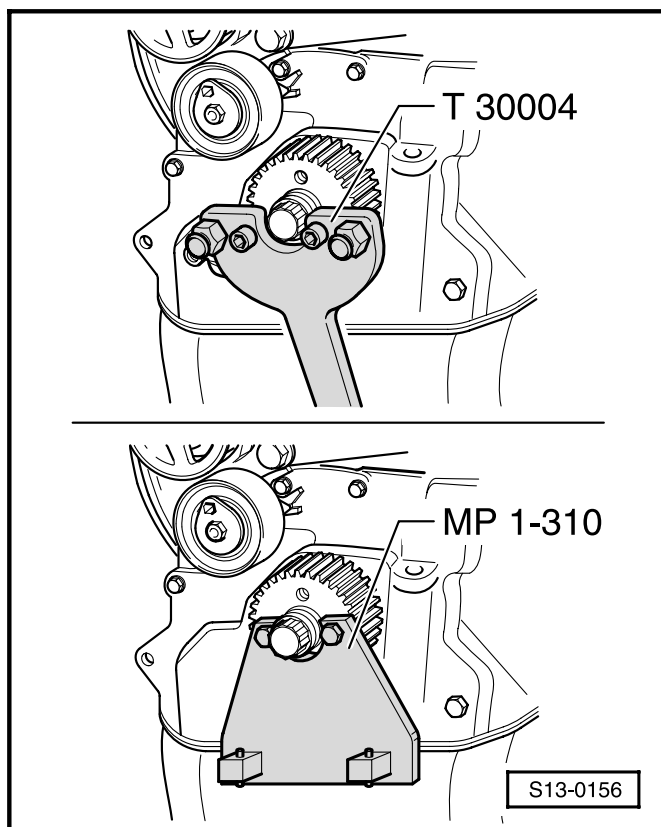
Removing

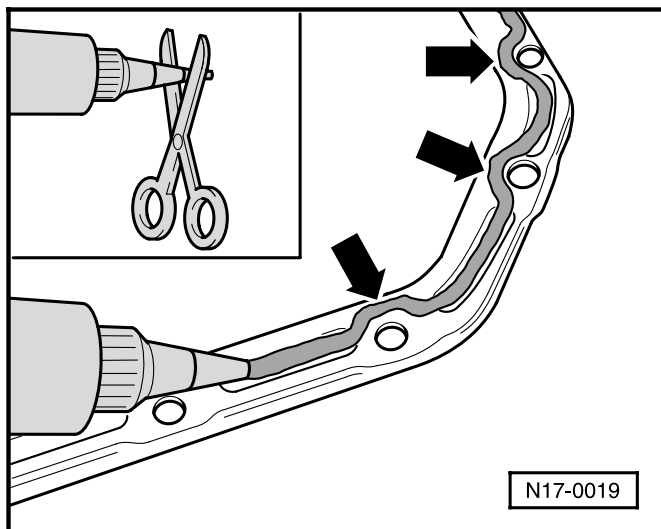
- Remove ribbed V-belt ⇒ page 13-1.
- Remove toothed belt ⇒ page 13-6.
- ◀ - Remove toothed belt sprocket of crankshaft. Lock toothed belt sprocket with locking lever T 30004 or counterholder MP 1-310 for this step.

Note:

Place 2 washers between toothed belt sprocket and counterholder when bolting on counterholder.

- Drain engine oil.
- Remove oil pan ⇒ page 17-3.
- Unbolt front sealing flange.
- Take off sealing flange; detach with light blows from a rubber-headed hammer if necessary.
- Remove sealant residues on cylinder block with flat scraper.
- ◀ - Remove sealant residues on sealing flange with rotating plastic brush (wear eye protection).
- Clean sealing surfaces; they must be free of oil and grease.



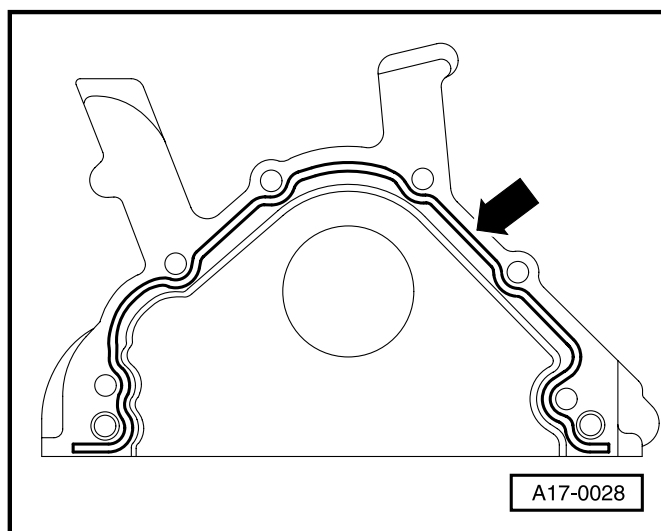
**Installing****Note:**

The sealing flange must be installed within 5 minutes after applying silicone sealant.

- ◀ - Cut off tube nozzle at the front marking (Ø of nozzle approx. 3 mm).
- ◆ Thickness of sealant bead -arrows-: 2 to 3 mm.

Note:

The sealant bead must not be thicker than 3 mm otherwise excess sealant may get into the oil pan and block the strainer in the oil intake pipe.



- ◀ - Apply silicone sealant bead to the clean sealing surface of the sealing flange, as shown in the illustration.
- Fit on sealing flange immediately and tighten all the bolts slightly.

Notes:

- ◆ If a PTFE seal is fitted ⇒ page 13-12, Fig. 2, the crankshaft journal must be free of oil and grease and the seal must not be oiled.
- ◆ Use the following devices for fitting on the sealing flange with the seal installed:
 - Elastomer seal - MP 1-314
 - PTFE seal - T10053/1
- Tighten bolts diagonally across to 15 Nm.
- Install oil pan ⇒ page 17-3.

Note:

After installing, allow the sealant to dry for about 30 minutes. Do not pour in any engine oil during this waiting period.

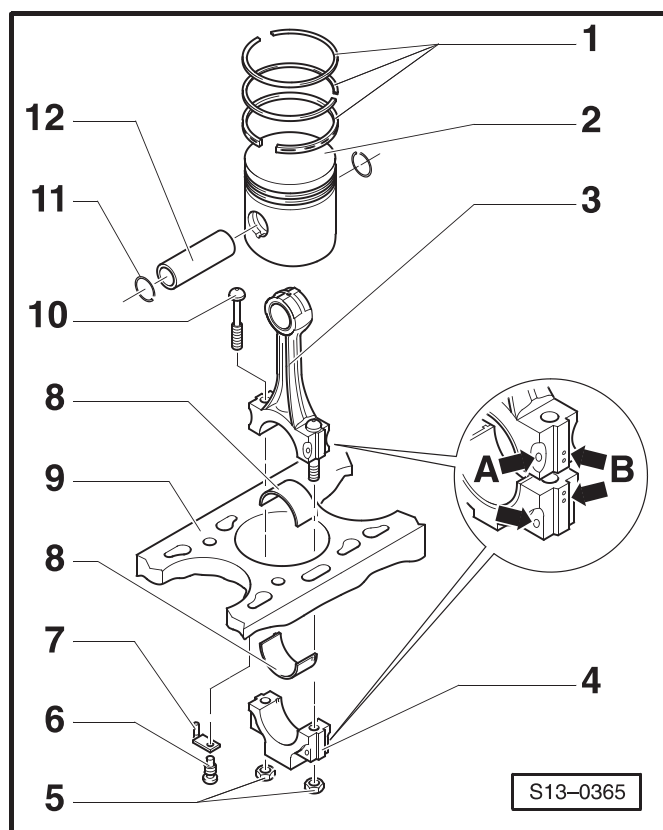
- Install crankshaft toothed belt sprocket.

Note:

Install new central bolt for toothed belt sprocket.

- Tighten central bolt to 90 Nm + torque a further 1/4 turn (90°).
- Install toothed belt ⇒ page 13-8.

Disassembling and assembling pistons and connecting rod



Note:

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

1 - Piston rings

- ◆ offset joints 120°
- ◆ use piston ring pliers for removing and installing
- ◆ marking „TOP“ must point toward piston crown
- ◆ inspecting gap clearance ⇒ Fig. 1
- ◆ inspecting end clearance ⇒ Fig. 2

2 - Piston

- ◆ inspecting ⇒ Fig. 3
- ◆ mark installation position relative to conrod and matching cylinder with waterproof felt pen
- ◆ arrow on piston crown points toward belt pulley side
- ◆ use piston ring tensioning strap for installing
- ◆ piston $\varnothing = 80.965$ mm

3 - Connecting rod

- ◆ pay attention to different versions ⇒ Fig. 5
- ◆ always replace as a set
- ◆ mark matching cylinder -B-
- ◆ installation position: markings -A- must be positioned one above the other and point toward belt pulley side
- ◆ with oil drilling for lubricating piston pin

4 - Conrod bearing cap

- ◆ mark matching cylinder -B-
- ◆ installation position: markings -A- must be positioned one above the other and point toward belt pulley side

5 - 30 Nm + torque a further 90° (1/4 turn)

- ◆ replace with conrod bolt -item 8-
- ◆ oil thread and head contact surface

6 - Pressure relief valve, 27 Nm

- ◆ opens at: 0.13...0.16 MPa (1.3...1.6 bar) over-pressure
- ◆ replace without sealant

7 - Oil spray nozzle

- ◆ for cooling piston

8 - Bearing shell

- ◆ pay attention to installation position
- ◆ do not mix up used bearing shells (mark)
- ◆ ensure tightly seated in the retaining lugs
- ◆ axial play
new part: 0.10...0.35mm
wear limit: 0.40 mm
- ◆ with oil drilling for lubricating piston pin

9 - Cylinder block

- ◆ inspecting cylinder bore ⇒ Fig. 4
- ◆ cylinder $\varnothing = 81.01$ mm

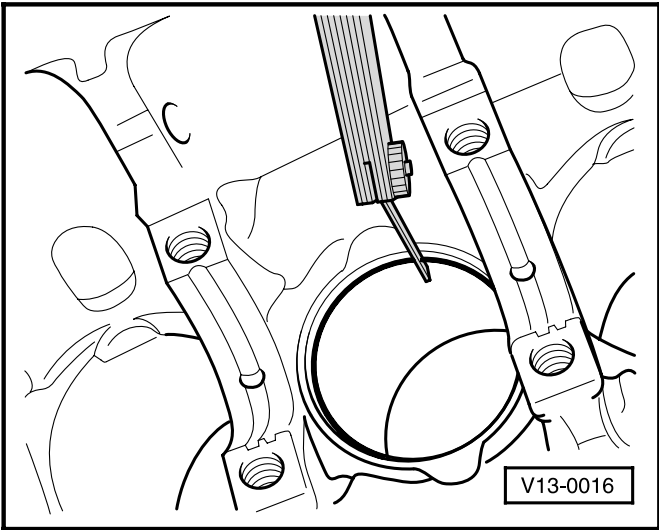
10 - Conrod

- ◆ replace together with nut ⇒ item 5

11 - Circlip

12 - Piston pin

- ◆ if tight, heat piston to approx. 60 °C
- ◆ use drift VW 222A for removing and installing



◀ Fig. 1 Inspecting piston ring gap clearance

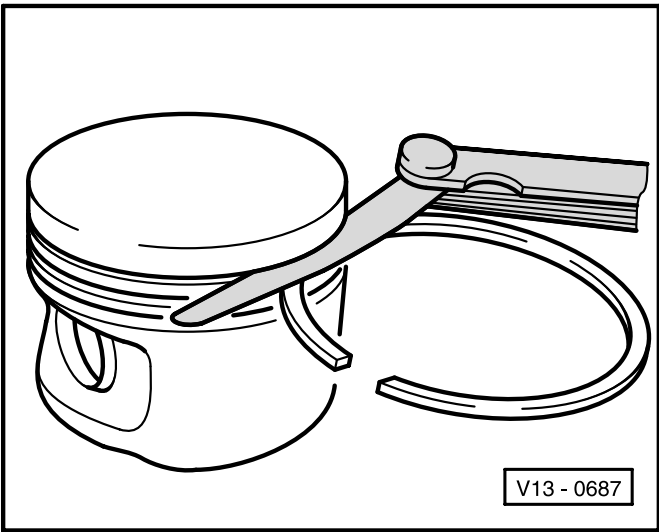
Special tools, testers and aids required

- ♦ Feeler gauge

Inspection procedure

- Insert ring at right angles to cylinder wall from the top as far as the bottom cylinder opening about 15 mm away from edge of cylinder.

Piston ring in mm	new	Wear limit
1st compression ring	0.20...0.40	0.8
2nd compression ring	0.20...0.40	0.8
Oil scraper ring	0.25...0.50	0.8

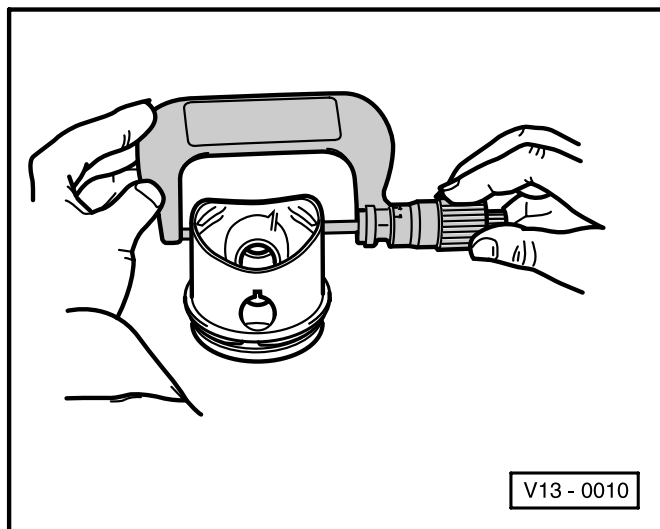


◀ Fig. 2 Inspecting piston ring end clearance

Special tools, testers and aids required

- ♦ Feeler gauge
- Clean ring groove before inspecting.

Piston ring in mm	new	Wear limit
1st compression ring	0.06...0.09	0.20
2nd compression ring	0.05...0.08	0.20
Oil scraper ring	0.03...0.06	0.15



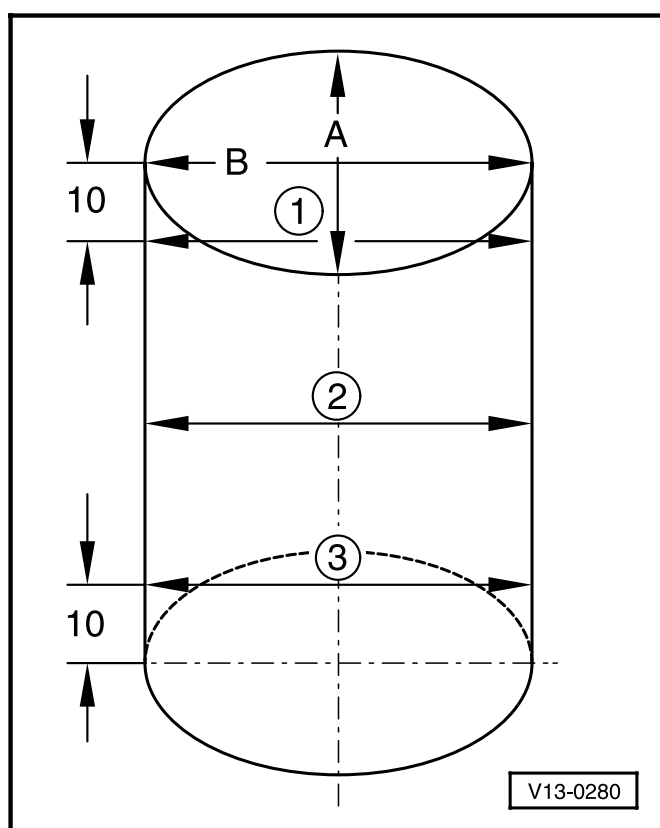
◀ Fig. 3 Inspecting pistons

Special tools, testers and aids required

- ◆ External micrometer 75 to 100 mm

Inspection procedure

- Measure about 10 mm from bottom edge, at right angles to piston pin axis.
- ◆ Variations compared to nominal size
max. 0.04 mm



◀ Fig. 4 Inspecting cylinder bore

Special tools, testers and aids required

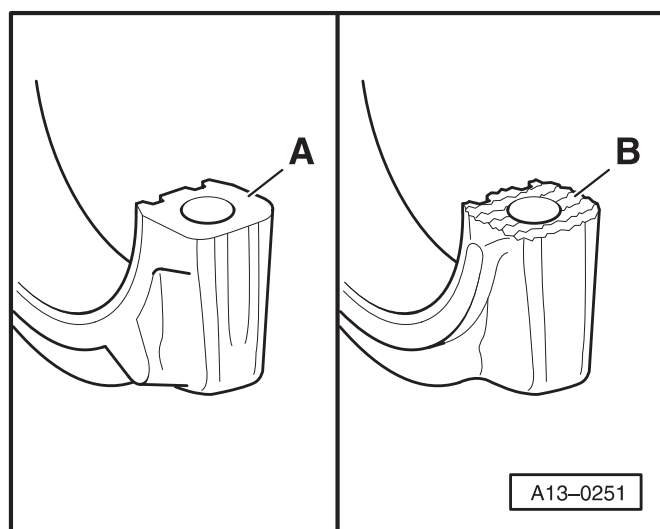
- ◆ Internal precision measuring instrument 50 to 100 mm

Inspection procedure

- Measure at 3 points diagonally across in transverse direction -A- and in longitudinal direction -B-
- ◆ Variations compared to nominal dimension
max. 0.08 mm

Note:

The measurement of the cylinder bore must not be performed when the cylinder block is attached with Engine holder MP 1-202 to the repair stand otherwise incorrect measurements may result.



◀ Fig. 5 Different versions of connecting rods

- Cut open connecting rod -A- = contact surface smooth
- Fracture connecting rod -B- = contact surface coarse

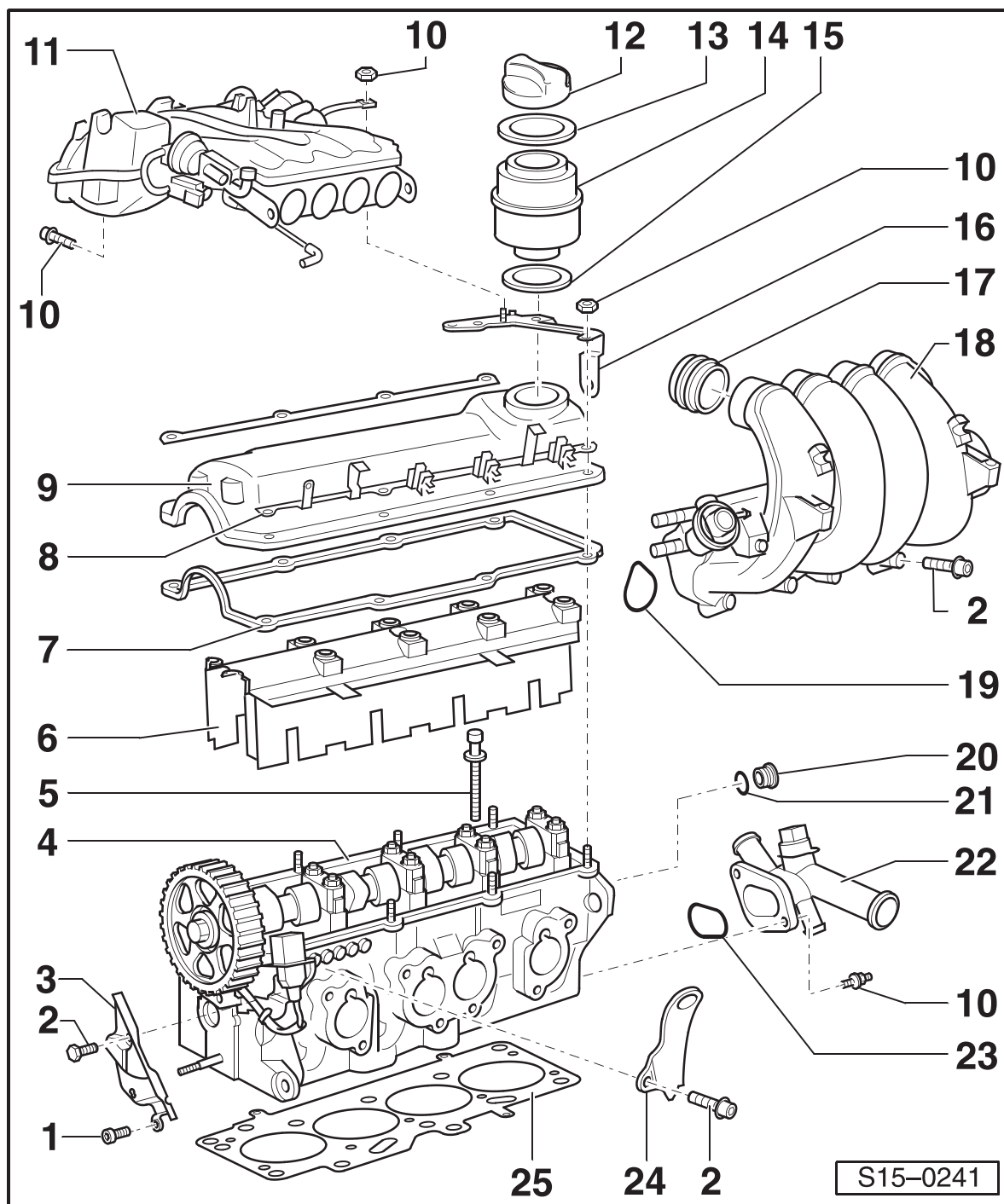
Removing and installing cylinder head

Removing and installing toothed belt ⇒ page 13-6.

Testing compression ⇒ page 15-13.

Notes:

- ◆ *Always replace cylinder head bolts.*
- ◆ *Always replace self-locking nuts.*
- ◆ *Always replace seals and gaskets when carrying out removal and installation operations.*
- ◆ *If a reconditioned cylinder head with the camshaft installed is fitted, it is necessary to oil the contact surfaces between bucket tappet and cam track after installing the cylinder 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 system must be filled with fresh coolant.*
- ◆ *Cylinder heads with cracks between the valve seats or between a valve seat ring and the thread of a spark plug, can continue to be used without any reduction in life provided these are slight incipient cracks which are not more than 0.3 mm wide, or only the first 4 turns of the spark plug thread are cracked.*



1 - 15 Nm

2 - 20 Nm

3 - Rear toothed belt guard

4 - Cylinder head

- ◆ after replacing, fill entire system with fresh coolant
- ◆ removing ⇒ page 15-7
- ◆ check for distortion ⇒ page 15-10
- ◆ reworking ⇒ page 15-11
- ◆ installing ⇒ page 15-11

5 - Cylinder head bolt

- ◆ replace
- ◆ pay attention to slackening sequence ⇒ page 15-10
- ◆ pay attention to tightening sequence ⇒ page 15-12

6 - Oil deflector

7 - Gasket for cylinder head cover

- ◆ replace if damaged
- ◆ before fitting, coat surface of cylinder head cover and cylinder head surface with „D 454 300 A2“.

-
- | | |
|--|--|
| <p>8 - Reinforcing strip</p> <p>9 - Cylinder head cover
♦ removing and installing ⇒ page 15-6</p> <p>10 - 10 Nm</p> <p>11 - Top part of intake manifold
♦ removing and installing ⇒ page 15-4
♦ with variable intake manifold changeover
♦ inspect function of variable intake manifold changeover
⇒ 1.6 l/74 kW Engine, Simos 2 Fuel injection and Ignition system; Repair Group 24</p> <p>12 - Sealing cover</p> <p>13 - Gasket</p> <p>14 - Vent housing
♦ for removing take off cylinder head cover -item 9-, unlatch springs and rotate left vent housing</p> <p>15 - Gasket
♦ replace if damaged</p> <p>16 - Bracket</p> | <p>17 - Gasket
♦ replace if damaged</p> <p>18 - Bottom part of intake manifold</p> <p>19 - Gasket
♦ replace</p> <p>20 - Screw plug, 15 Nm
♦ replace</p> <p>21 - Seal
♦ replace</p> <p>22 - Flange</p> <p>23 - Gasket
♦ replace</p> <p>24 - Lifting eye</p> <p>25 - Cylinder head gasket
♦ replace ⇒ page 15-7; remove cylinder head</p> |
|--|--|

Removing and installing top part of intake manifold

Special tools, testers and aids required

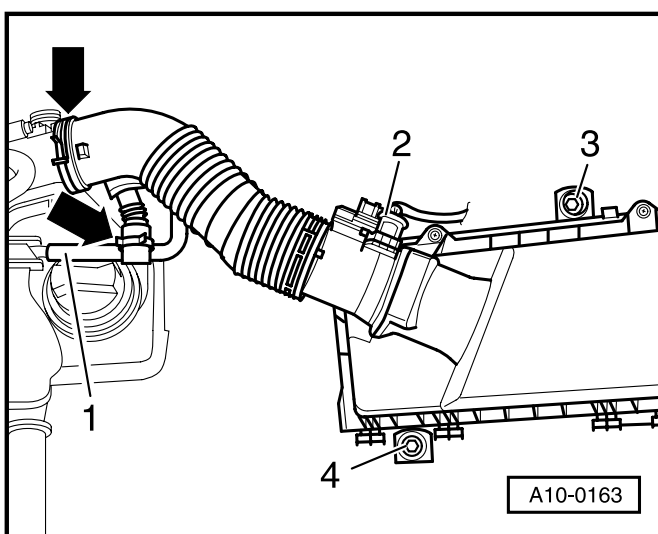
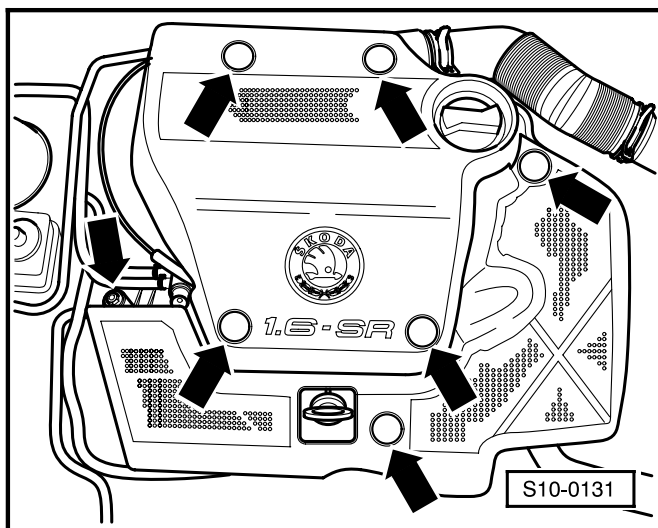
- ◆ Torque wrench 5...50 Nm
(e.g. V.A.G 1331)
- ◆ Pliers for spring strap clamps
- ◆ 2 hose clamps MP 7-602
- ◆ Cable straps

Removing

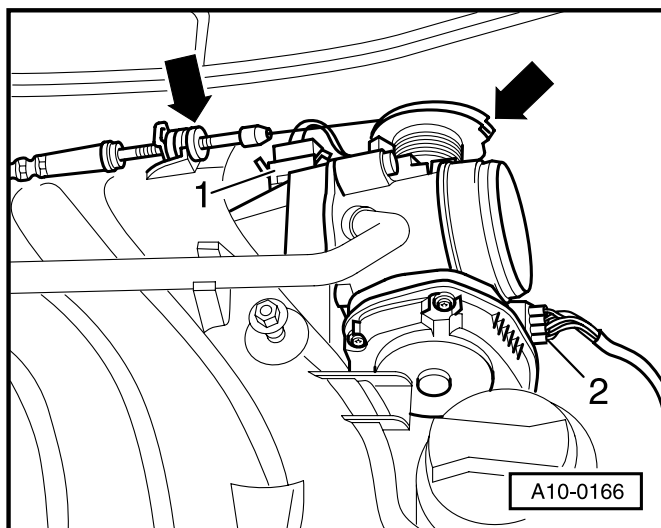
Note:

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

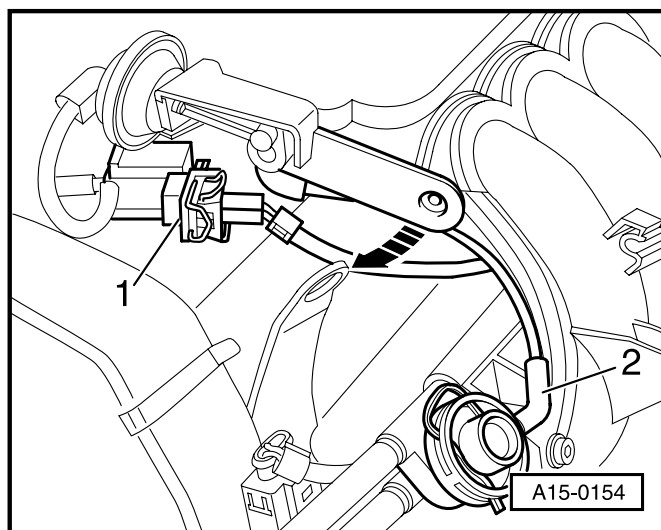
- Pay attention to coding on vehicles fitted with coded radio set, determine if necessary.
- Switch off ignition and disconnect earth strap at battery.
- ◀ - Remove engine trim panel by unscrewing the nuts -arrows-.



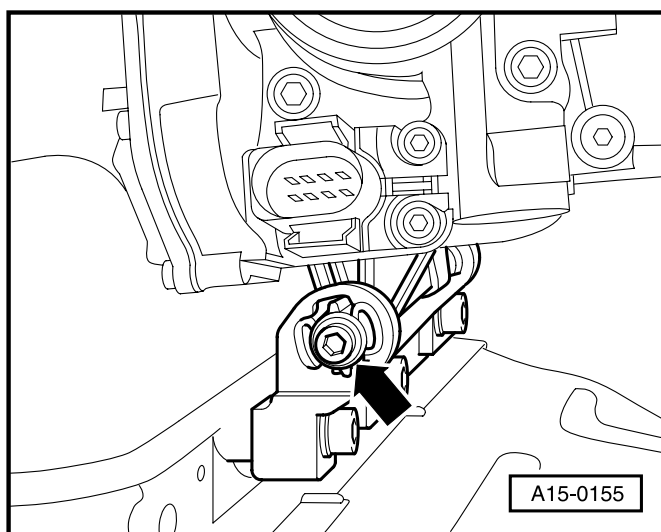
- ◀ - Detach air guide hose at throttle valve connection and at ventilation housing of crankcase ventilation -arrows-.
- Detach ventilation hose -1- and connector for air mass meter -2-.
- Remove screws -3- and -4- and take off air filter housing.



- Detach vacuum hose to brake servo unit.
- ◀ - Unplug cables/connectors:
 - 1 - Connector for intake air temperature sender -G42-
 - 2 - Connector for throttle valve control unit -J338-
- Detach hose to the ACF.
- Detach throttle cable -arrows-.
- Unbolt earth strap at the cylinder head cover.
- Use hose clamp MP 7-602 to pinch off 2 coolant hoses for the throttle valve body and detach (release pressure from cooling system first of all).



- ◀ - Unplug connector -1- at the intake manifold changeover valve -N156-.
- Detach vacuum hose -2-.
- Release retaining eyes on left and right at the intake manifold -arrow-.



- ◀ - Unscrew one bolt each on left and right -arrow- of the rear intake manifold suspension.
- Press top part of intake manifold back and off the bottom part of the intake manifold.

Note:

Seal intake galleries in the bottom part of the intake manifold with plugs (clean cloths).

Installing

Note:

Replace gaskets if damaged.

- Fit top part of intake manifold onto the bottom part.
- Press in retaining lugs on left and right until they engage.
- Coat collar of bolts of rear intake manifold suspension with commercially available lubricant and tighten to 10 Nm.
- Adjust throttle cable ⇒ page 20-13.
- Pour in coolant, if necessary ⇒ page 19-2.
- Interrogate fault memory, carry out basic setting:
⇒ 1.6-ltr./74 kW Engine, Simos 2 Fuel Injection and Ignition System; Repair Group 01; Self-Diagnosis; Interrogating and erasing fault memory, basic setting of engine

Removing and installing cylinder head cover

Special tools, testers and aids required

- ◆ Torque wrench 5...50 Nm
(e.g. V.A.G 1331)

Removing

- Remove top part of intake manifold
⇒ page 15-4.
- Remove top toothed belt guard.
- Unscrew nuts for cylinder head cover.
- Take off reinforcing strips, bracket, toothed belt guard and cylinder head cover.

Installing**Note:**

Replace gasket if damaged.

- Fit on cylinder head cover, reinforcing strips, toothed belt guard and bracket.
- Tighten nuts diagonally across to 10 Nm.

Removing cylinder head

Note:

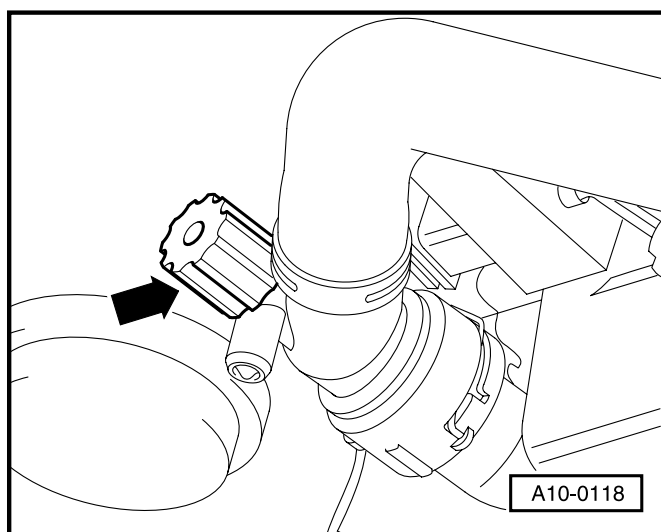
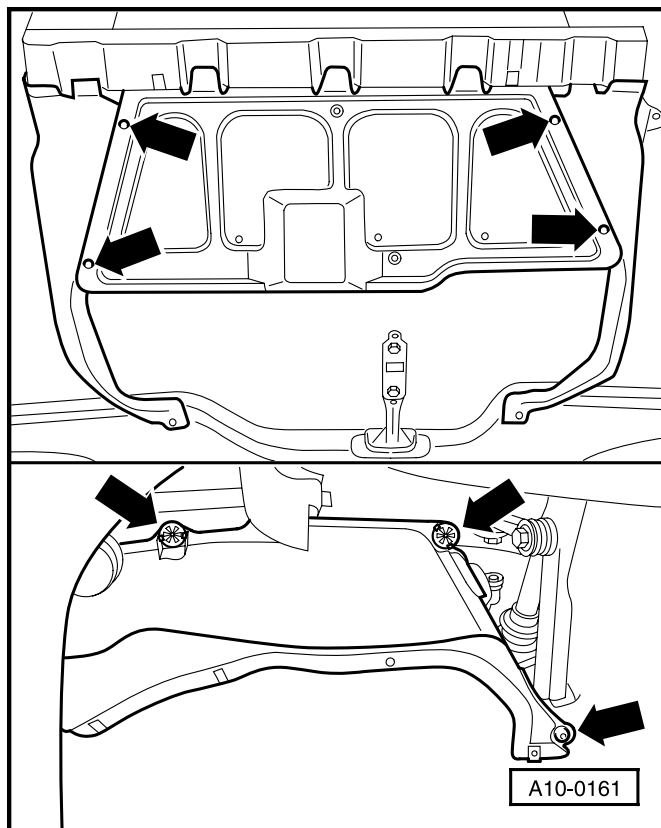
All cable straps which are detached or cut open when removing the cylinder head, should be fitted on again at the same point when installing.

Special tools, testers and aids required

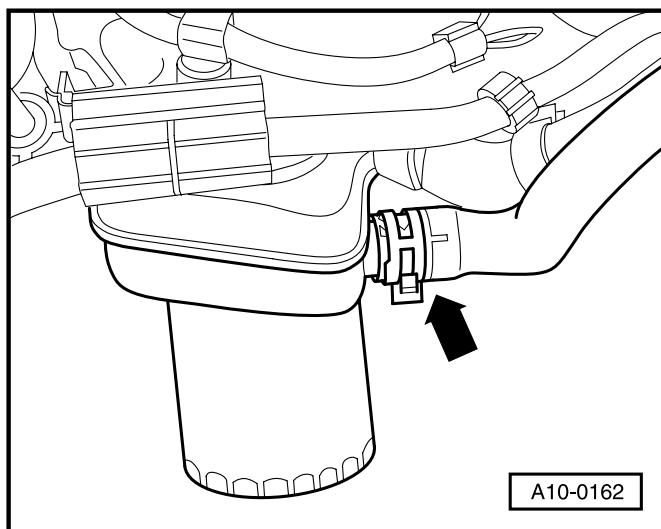
- ◆ Drip tray, e.g. V.A.G 1306
- ◆ Pliers for spring strap clips
- ◆ Wrench for cylinder head bolts, e.g. 3452

Engine installed

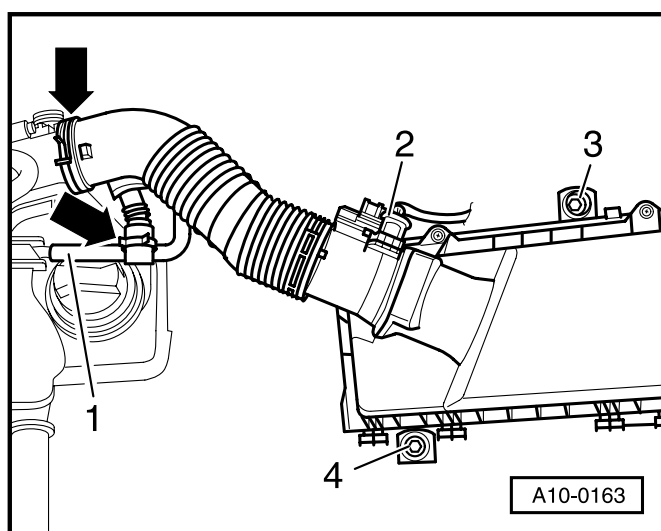
- On vehicles fitted with coded radio set, pay attention to code, determine if necessary.
- Switch off ignition (if not already off) and disconnect earth strap at battery.
- Remove top part of intake manifold ⇒ page 15-4.
- Open cap of coolant expansion reservoir.
- ◀ - Remove noise insulation panel in middle as well as on left -arrows-.
- Unbolt front exhaust pipe from the exhaust manifold ⇒ page 26-2.



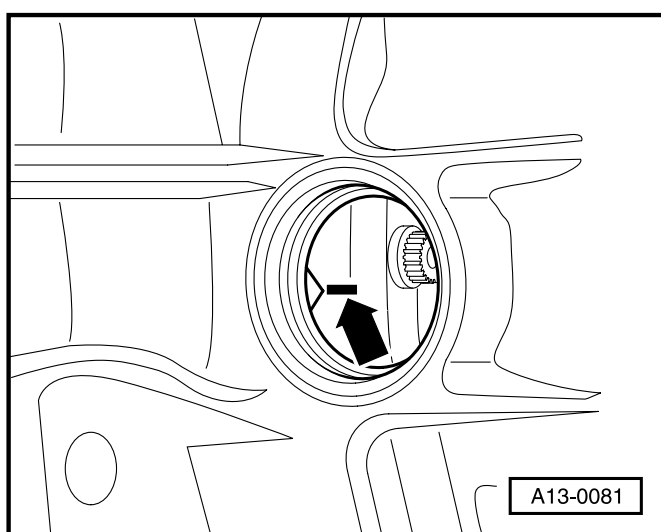
- ◀ - Turn drain valve -arrow- at radiator to the left and pull it back; fit auxiliary hose onto connection, if necessary.



- ◀ - In addition, detach coolant hose at bottom of oil cooler -arrow- and allow remaining coolant to flow out.

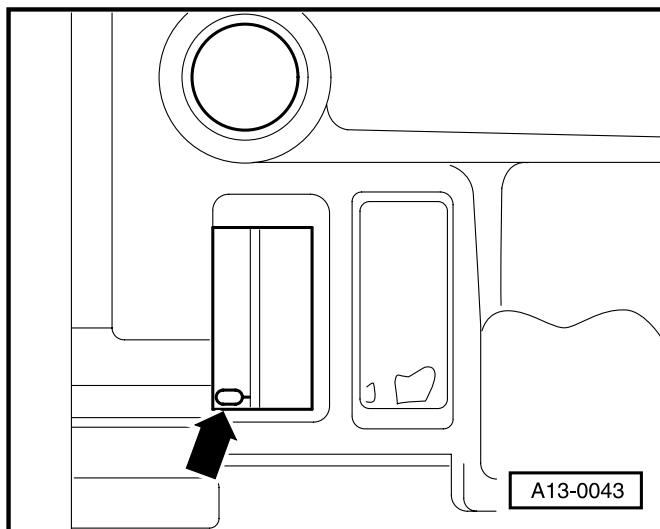


- ◀ - Detach air guide hose at throttle valve body and at ventilation housing of crankcase ventilation -arrows-.
- Detach ventilation hose -1- and unplug connector for air mass meter -2-.
- Remove screws -3- and -4- and take off air filter housing.



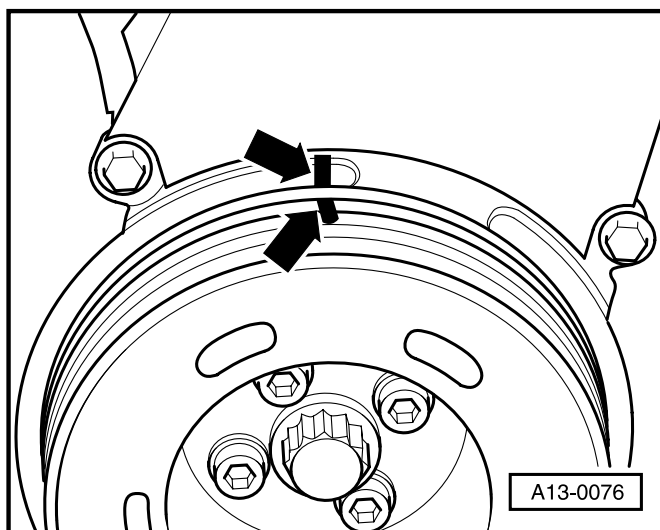
- ◀ - Rotate crankshaft to TDC of cylinder 1 -arrow- (models with manual gearbox).

TDC marking on flywheel and difference mark should be aligned.



- ◀ - Rotate crankshaft to TDC of cylinder 1 -arrow- (models with automatic gearbox).

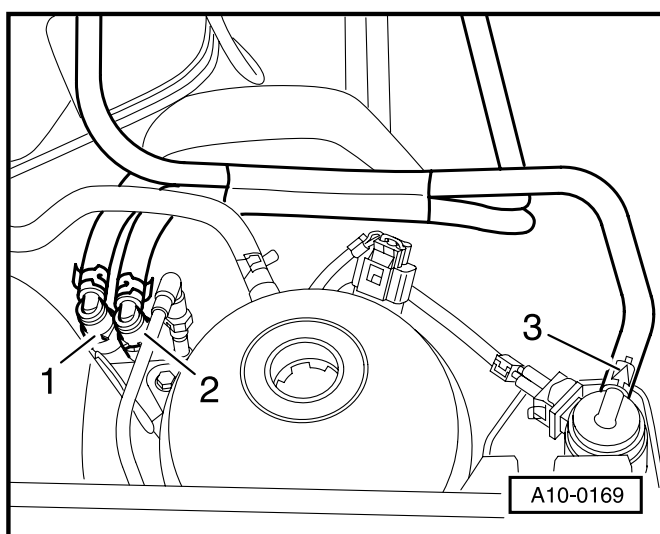
TDC marking on driven plate and reference mark should be aligned.



Note:

- ◀ If engine removed, position flywheel damper to TDC of cylinder 1 -arrows-.

- Remove top toothed belt guard.
- Slacken tensioning pulley and take toothed belt off the camshaft toothed belt sprocket.

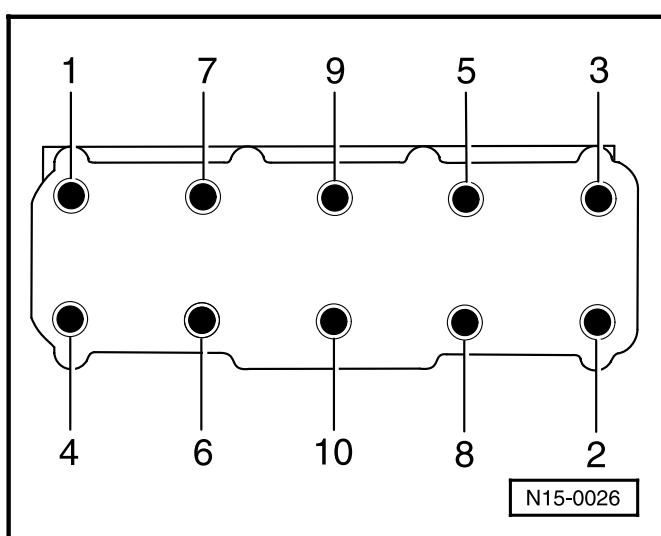


Important!

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

- ◀ - Apply pressure to the release buttons at the separation point and detach fuel feed pipe -1- and fuel return-flow pipe -2-. Pipes and release buttons are colour-coded.
- Detach hose -3- at the ACF.

- Unplug connector at the plug connection for phase sensor (Hall sender -G40-) and connectors at all four injectors.
- Release wiring loom from the fixtures and run out to the side.
- Unplug spark plug connectors and place to the side.
- Unscrew M8 bolt for rear toothed belt guard.
- Detach coolant hose on left at cylinder head.
- Unbolt coolant flange on left at cylinder head.
- Detach coolant pipe to the left.
- Remove cylinder head cover ⇒ page 15-6.



- ◀ - Unscrew cylinder head bolts in the sequence 1 ... 10.
- Remove cylinder head together with cylinder head gasket.

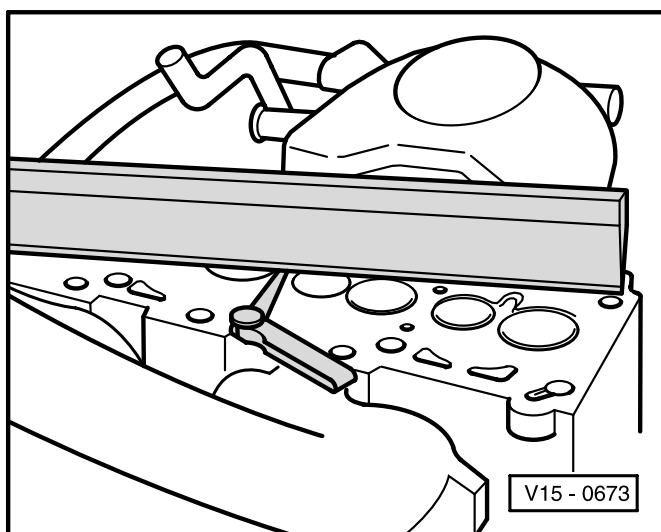
Inspecting cylinder head for distortion

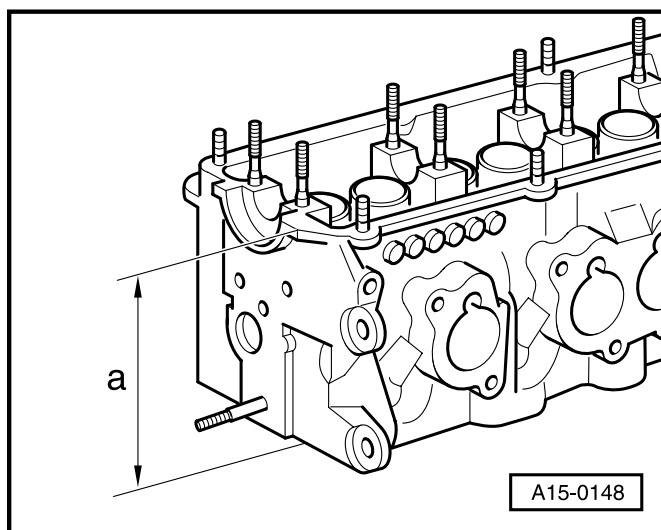
Special tools, testers and aids required

- ◆ Feeler gauge
- ◆ Knife-edge straightedge

Inspection procedure

- ◀ - Inspect cylinder head at several points for distortion with knife-edge straightedge and feeler gauge.
- ◆ Max. permissible distortion: 0.1 mm





Reworking cylinder head

Procedure

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

♦ Minimum dimension a: 132.6 mm

Note:

If the sealing surface is reworked, the valves should be positioned deeper by the same dimension (reworking valve seat rings) otherwise the valves will strike pistons. When doing this, ensure that the maximum permissible dimensions are maintained ⇒ page 15-15.

Installing cylinder head

Notes:

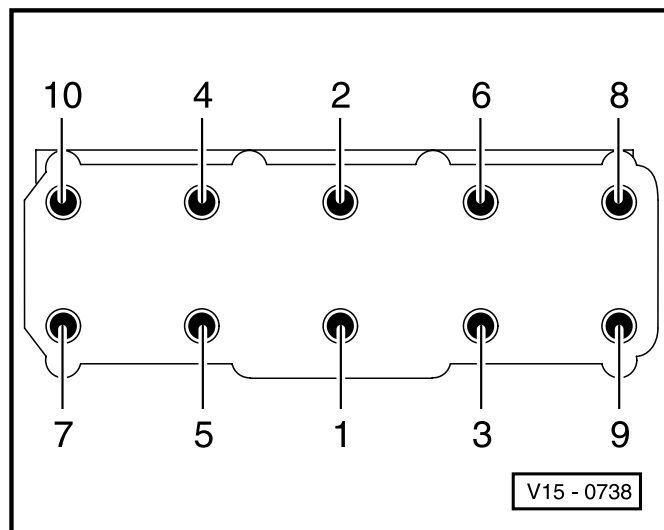
- ♦ Always replace cylinder head bolts.
- ♦ Remove gasket residues. When doing this, ensure that no scores or scratches are produced. If emery paper is used, the roughness must not be less than 100.
- ♦ Carefully remove any sanding and grinding residues.
- ♦ Do not remove cylinder head gasket from its wrapping until just before installing.
- ♦ Treat new gasket with particular care. Any damage to the silicone layer and to the bead area will result in leakages.
- ♦ There must not be any oil or coolant in the holes for the cylinder head bolts.

Special tools, testers and aids required

- ♦ Torque wrench
- ♦ Pliers for spring strap clips
- ♦ Wrench for cylinder head bolts, (e.g. 3452)

Procedure

- Position crankshaft and camshaft to TDC of cylinder 1 before fitting on the cylinder head
⇒ page 15-8.
- Fit on cylinder head gasket and lock dowel sleeves. Inscription (part number) should be legible.
- Insert new cylinder head bolts and tighten by hand.



- ◀ Tighten cylinder head in two stages in the tightening sequence shown, as follows:
 - 1st stage: 40 Nm
 - 2nd stage, torque further with a rigid wrench:
180° (½ turn)
2 x 90° is also permissible

Note:

It is not necessary to re-tighten the cylinder head bolts after performing repairs.

- Install toothed belt, tension (setting timing)
⇒ page 13-8.
- Install ribbed V-belt ⇒ page 13-4.
- Install cylinder head cover ⇒ page 15-6.
- Install top part of intake manifold
⇒ page 15-6.
- Set throttle cable ⇒ page 20-13.
- Fill system with coolant ⇒ page 19-2.
- Interrogate fault memory, carry out basic setting:
⇒ 1.6-ltr./74 kW Engine, Simos 2 Fuel Injection and Ignition System; Repair Group 01; Self-Diagnosis; Interrogating and erasing fault memory, basic setting of engine

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 V.A.G 1763)
- ◆ Spark plug wrench

Test procedure

- Switch off ignition (if not already off) and unplug connectors at all four injectors.
- Switch off ignition (if not already off) and unplug connectors at ignition coils with power output stage.
- Use spark plug wrench to remove spark plugs.
- Open throttle valve fully.
- Test compression pressure with compression pressure tester (e.g. V.A.G 1381 or V.A.G 1763).

Note:

Use of tester:

⇒ *Operating Instructions*

- Operate starter for only as long as no further pressure rise is indicated by the tester.

Compression pressures:

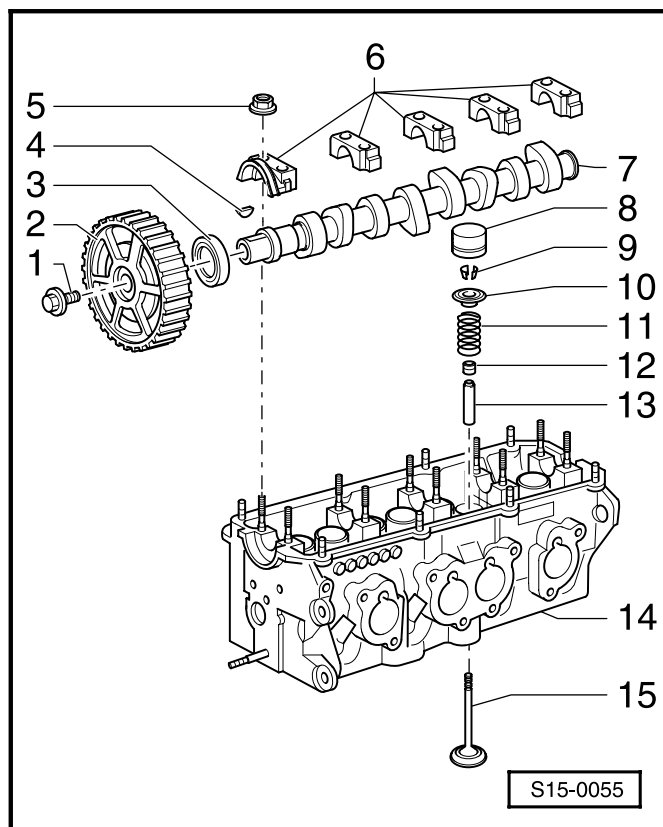
New	Wear limit	Difference between cylinders
1.0 ... 1.3 MPa	0.75 MPa	max. 0.3 MPa

- Interrogate fault memory:
⇒ 1.6-ltr./74 kW Engine, Simos 2 Fuel Injection and Ignition System; Repair Group 01; Self-Diagnosis; Interrogating and erasing fault memory

Note:

Faults are stored as a result of unplugging the connectors. After completing test, interrogate fault memory and erase, if necessary.

Servicing valve gear



Notes:

- ◆ *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 only initial slight cracks which are not more than 0.3 mm in width, or cracks exist only on the first 4 thread turns of the spark plug thread.*
- ◆ *After installing new bucket tappets, wait about 30 minutes before starting the engine (otherwise valves may strike pistons).*
- ◆ *After carrying out work on the valve gear, carefully crank engine at least 2 revolutions to ensure that no valve strikes a piston when the engine is started.*

1 - 100 Nm

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

2 - Camshaft sprocket

- ◆ with sensor rotor for Hall phase sensor -G40-
- ◆ to remove and install, take off toothed belt ⇒ page 13-6
- ◆ installation position fixed by parallel key -item 4-

3 - Seal

- ◆ replacing ⇒ page 15-16
- ◆ pay attention to different versions ⇒ page 13-12, Fig. 2

4 - Parallel key

- ◆ ensure tightly fitted

5 - 20 Nm

6 - Bearing cap

- ◆ installation position ⇒ Fig. 2
- ◆ installation sequence ⇒ page 15-17.2, Removing and installing camshaft
- ◆ apply a thin film of sealant AMV 174 004 01 to contact surface of bearing cap 1

7 - Camshaft

- ◆ inspecting axial play ⇒ Fig. 1
- ◆ removing and installing ⇒ page 15-17.2
- ◆ runout: max. 0.05 mm

8 - Bucket tappet

- ◆ do not mix up
- ◆ with hydraulic valve clearance compensation
- ◆ inspecting ⇒ page 15-19
- ◆ place down with contact surface facing down
- ◆ before installing, inspect axial play of camshaft ⇒ Fig. 1
- ◆ oil contact surface

9 - Collets

10 - Valve spring retainer

11 - Valve spring

- ◆ removing and installing
 - with cylinder head removed: use MP 1-211 and MP 1-213 together with valve supporting plate MP 1-218
 - with cylinder head installed: ⇒ page 15-20, Replacing valve stem seals

12 - Valve stem seal

- ◆ replacing ⇒ page 15-20

13 - Valve guide

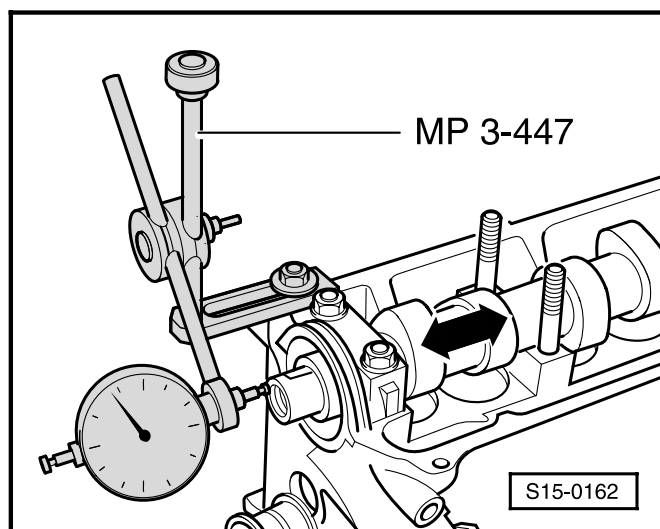
- ◆ inspecting ⇒ page 15-22
- ◆ replacing ⇒ page 15-22
- ◆ repair version with collar

14 - Cylinder head

- ◆ pay attention to Note ⇒ page 15-14
- ◆ reworking valve seats ⇒ page 15-23

15 - Valve

- ◆ do not rework, only grinding in is permissible
- ◆ valve dimensions ⇒ Fig. 3



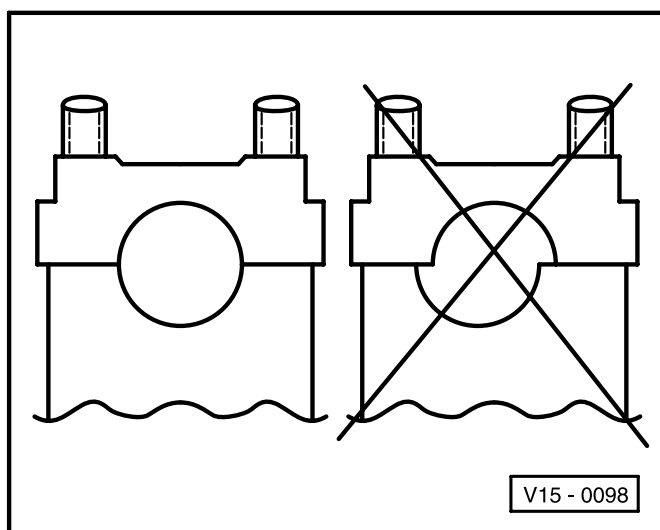
◀ Fig. 1 Inspect camshaft axial play

Special tools, testers and aids required

- ♦ Universal dial gauge holder MP 3-447
- ♦ Dial gauge

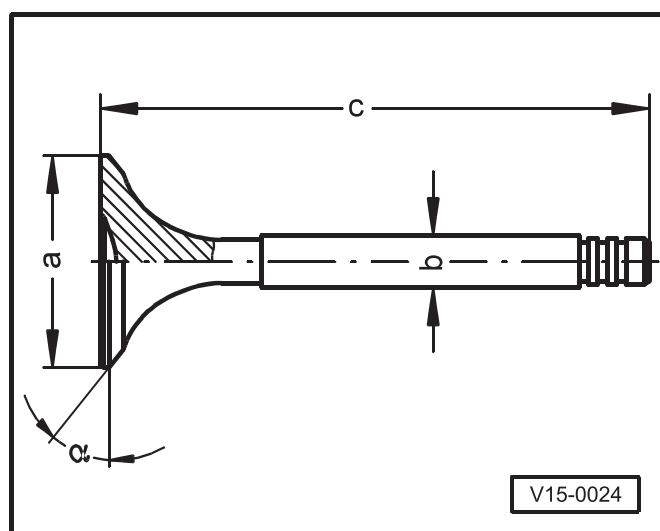
Wear limit: max. 0.15 mm

Perform measurement with the bucket tappets removed and the first and last bearing cap fitted.



◀ Fig. 2 Fitting position of the camshaft bearing cap

Pay attention to centre displacement. Before installing the camshaft fit bearing cap and determine the fitting position.



◀ Fig. 3 Valve dimensions

Note:

Do not rework valves. Only grinding in is permissible

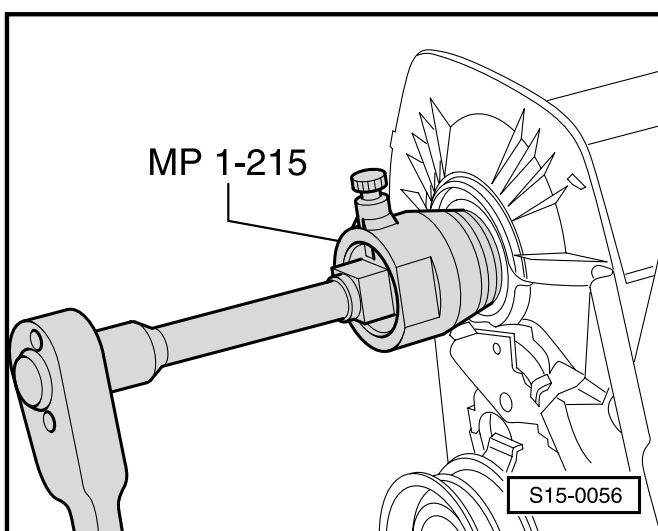
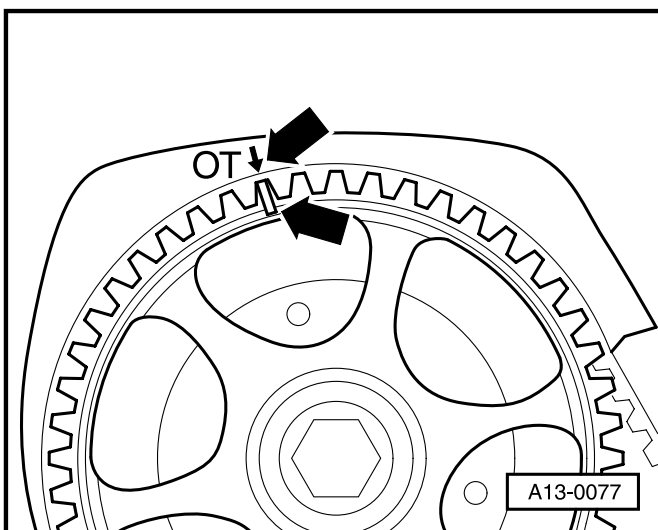
Dimension		Inlet valve	Exhaust valve
Ø a	mm	39.5 ± 0.15	32.9 ± 0.15
Ø b	mm	6.92 ± 0.02	6.92 ± 0.02
c	mm	91.85	91.15
α	°	45	45

Replacing camshaft seal

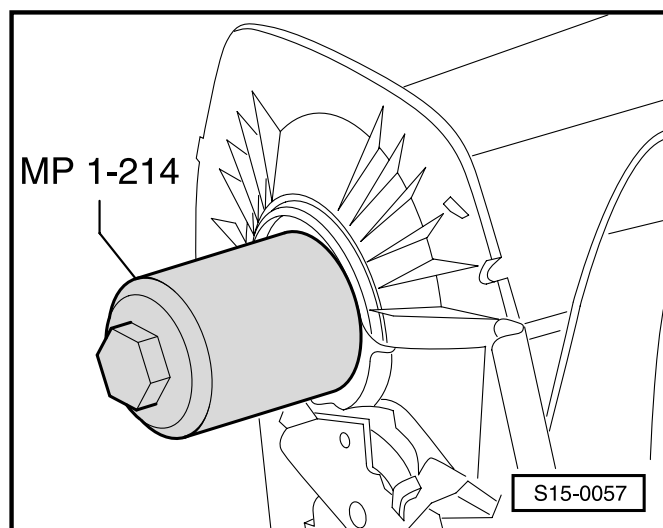
Special tools, testers and aids required

- ◆ Counterholder MP 1-216
- ◆ Seal extractor MP 1-215
- ◆ Seal insertion tool MP 1-214
- ◆ Torque wrench
- ◆ Thrust sleeve T10071
- ◆ Guide sleeve T10071/1

Removing

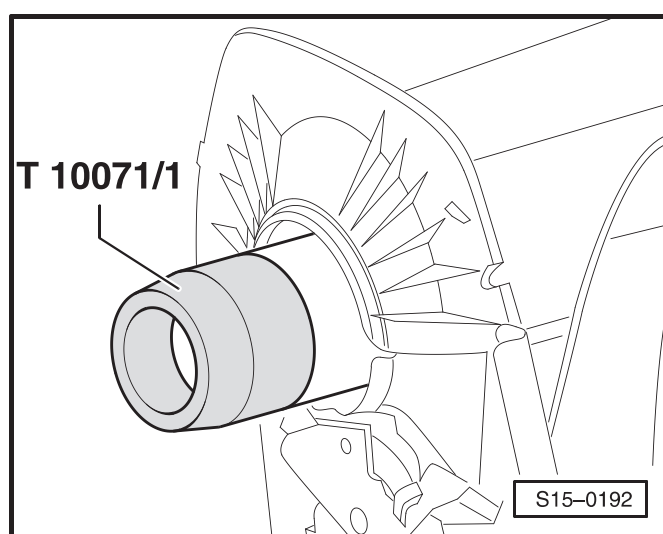


- Remove top part of toothed belt guard.
- Detach camshaft sprocket (use counterholder MP 1-216).
- ◀ - Position camshaft sprocket to TDC marking of cylinder 1 by rotating at crankshaft. Marking on camshaft sprocket must be aligned with arrow on toothed belt guard.
- Slacken tensioning pulley and take off toothed belt.
- Remove camshaft sprocket.
- Take out parallel key at camshaft.
- Screw in bolt for attaching camshaft sprocket into the camshaft as far as the stop.
- ◀ - Position inner part of seal extractor MP 1-215 flush with outer part and lock with knurled screw.
- Oil threaded head of seal extractor, position and screw into the seal as far as possible using considerable force.
- Slacken knurled screw and turn inner part against the camshaft until the seal is pulled out.



Installing elastomer seal

- Lightly oil sealing lip of seal.
- ◀ - Use guide sleeve from MP 1-214 to position seal and press in flush with thrust sleeve from MP 1-214.

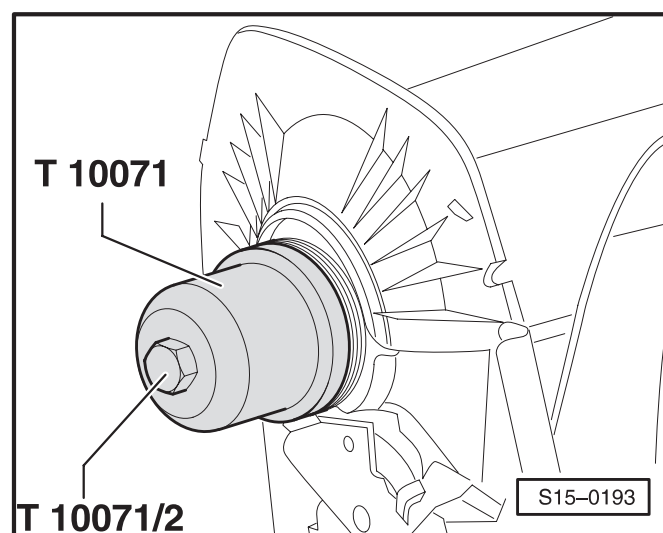


Installing PTFE seal

Note:

Do not oil sealing lips of seal.

- Use a clean cloth to remove oil residues on the camshaft journal.
- ◀ - Fit guide sleeve T10071/1 onto the camshaft journal.
- Fit seal over guide sleeve onto the camshaft journal and take off sleeve.



- ◀ - Use thrust sleeve T10071 and bolt T10071/2 to press in seal as far as the stop.

Continued for both versions

- Insert parallel key.
- Install camshaft sprocket and tighten to 100 Nm (use counterholder MP 1-216).
- Install toothed belt, tension (setting timing ⇒ page 13-8).

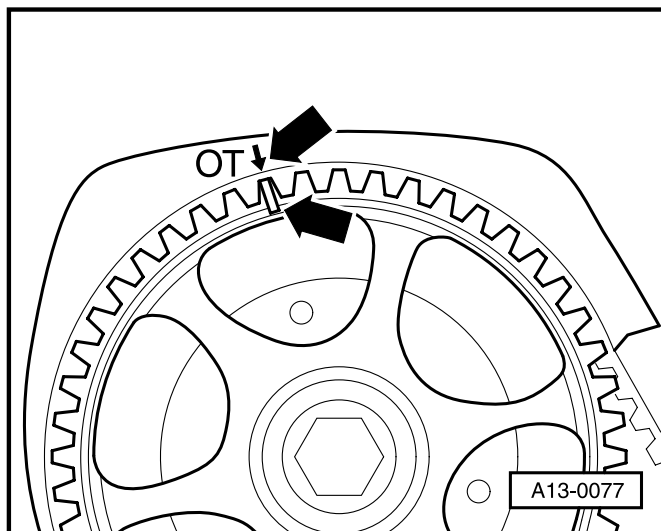
Removing and installing camshaft

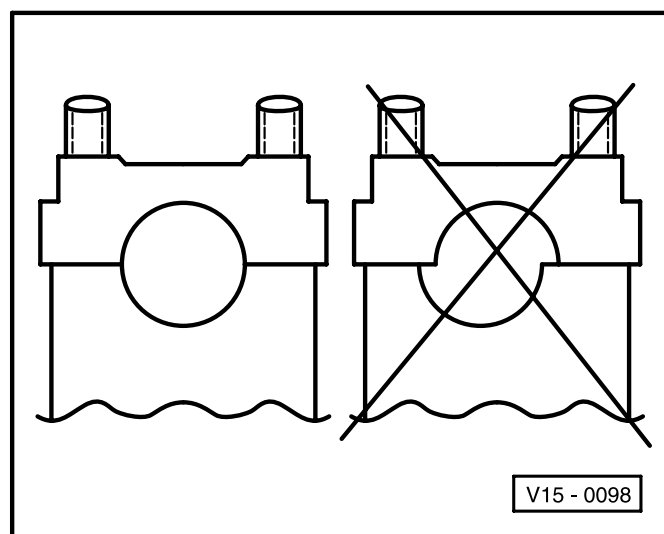
Special tools, testers and aids required

- ◆ Torque wrench
- ◆ Counterholder MP 1-216

Removing

- Remove top part of toothed belt guard.
- Slacken camshaft sprocket (use counterholder MP 1-216).
- ◀ - Position camshaft sprocket to TDC marking of cylinder 1 by turning at the crankshaft. Marking on camshaft sprocket must be aligned with arrow on toothed belt guard.
- Slacken tensioning pulley and take off toothed belt.
- Remove top part of intake manifold and cylinder head cover ⇒ page 15-4 and 15-6, respectively.
- Remove camshaft sprocket.
- Take parallel key out of camshaft.
- First of all remove bearing caps 1, 3 and 5, then slacken bearing cap 2 and 4 alternately diagonally across.





Installing

Notes:

- ◆ Replace camshaft seal.
- ◆ When installing camshaft, the cams of cylinder 1 must be facing up.
- ◆ When installing bearing caps, pay attention to off-centre position of hole; before installing, fit on bearing caps and determine installation position.
- ◆ When installing bearing cap 1, apply a thin film of sealant AMV 174 004 01 to the contact surface.
- Oil running surfaces of camshaft.
- Tighten bearing caps 2 and 4 alternately diagonally across and then to a final torque of 20 Nm.
- Install bearing caps 5, 1 and 3 and likewise tighten to a final torque of 20 Nm.
- Insert parallel key into camshaft.
- Install camshaft sprocket and tighten to 100 Nm (use counterholder MP 1-216).
- Install toothed belt, tension (setting timing) ⇒ page 13-8.

Notes:

- ◆ After installing the camshaft, wait about 30 minutes before starting the engine. The hydraulic clearance compensation elements must settle otherwise valves may strike pistons.
- ◆ After working on the valve gear, carefully crank engine at least 2 revolutions to ensure that no valve strikes a piston when the engine is started.

Inspecting hydraulic bucket tappets

Special tools, testers and aids required

- ◆ Feeler gauge
- ◆ Wooden or plastic wedge

Notes:

- ◆ *Always replace a faulty bucket tappet complete (cannot be set or repaired).*
- ◆ *Irregular valve noises when starting engine are normal.*
- ◆ *Place a removed bucket tappet down on a clean surface with the contact surface (camshaft side) facing down.*
- ◆ *After installing the camshaft, it is essential to wait about 30 minutes before starting the engine. The hydraulic valve clearance compensation elements have to settle (otherwise valves will strike the pistons).*
- ◆ *After working on the valve gear, carefully crank engine at least 2 revolutions to ensure that no valve strikes a piston when engine is started.*

Inspection sequence

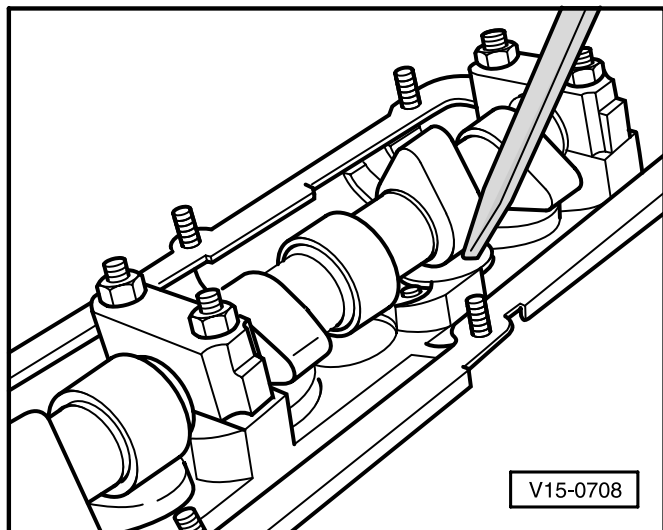
- Start engine and continue running until the radiator fan has cut in once.
- Increase engine speed about 2500 rpm for 2 minutes; carry out a road test if necessary.

Note:

If the irregular valve noises disappear, but re-occur always when driving short distances, replace the oil retention valve. Fitting location of oil retention valve: in oil filter holder ⇒ page 17-2.

If the hydraulic bucket tappets are still loud, determine the faulty tappet as follows:

- Remove top part of intake manifold and cylinder head cover ⇒ page 15-4 and 15-6, respectively.
- Rotate crankshaft in clockwise direction until the cam of the bucket tappet to be inspected is facing up.



- ◀ - Use a wooden or plastic wedge to press bucket tappet down. If it is possible to insert a 0.20 mm feeler gauge between camshaft and bucket tappet, replace tappet.

Replacing valve stem seals

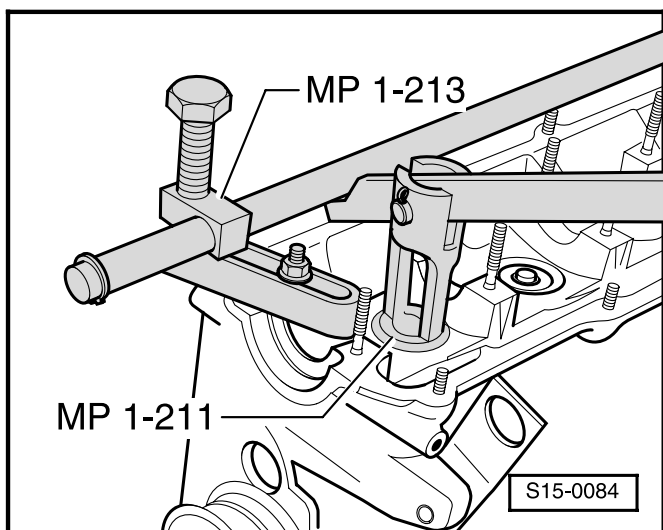
- Cylinder head installed

Special tools, testers and aids required

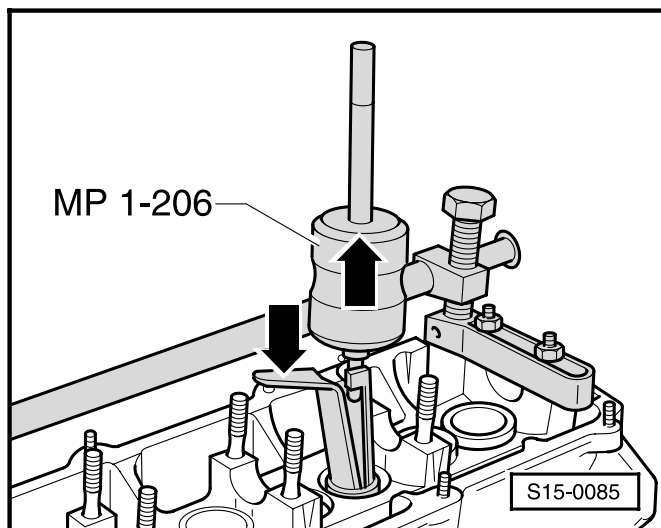
- ◆ Extraction device MP 1-206
- ◆ Pressure hose MP 1-210
- ◆ Assembly lever MP 1-211
- ◆ Fitting tool MP 1-212
- ◆ Assembly device MP 1-213

Removing

- Remove camshaft ⇒ page 15-17.
- Remove bucket tappets (do not mix up) and place down with contact surface facing down.
- Unscrew spark plugs.
- Position piston of the relevant cylinder to „bottom dead centre“.



- ◀ - Insert assembly device MP 1-213 and set mounting to height of stud bolt.
- Screw pressure hose MP 1-210 into the spark plug thread and constantly apply pressure to the cylinder.
min. 0.6 MPa pressure

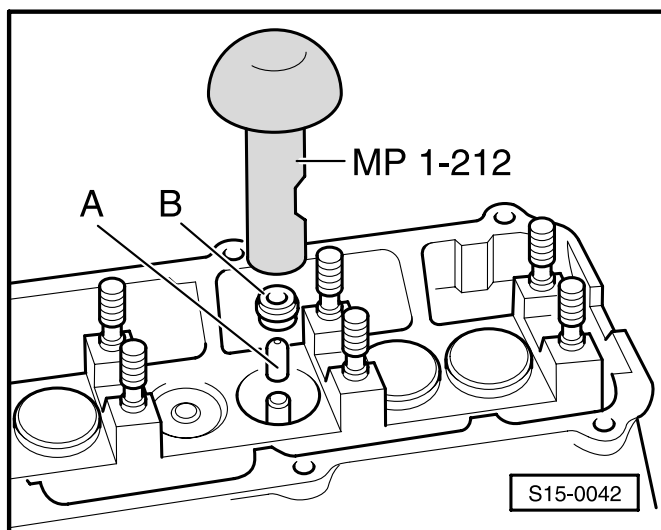


- Use assembly lever and thrust piece MP 1-211 to remove valve springs.

Note:

If valve collets are tight, detach with slight blows from a hammer on the assembly lever.

- ◀ - Use MP 1-206 to pull of valve stem seals.



Installing

- ◀ - Fit plastic sleeve -A- onto the valve stem in order to avoid damage to the new valve stem seals.
- Oil valve stem seal -B-, insert into the fitting tool MP 1-212 and carefully push onto the valve guide.
- Remove plastic sleeve again.

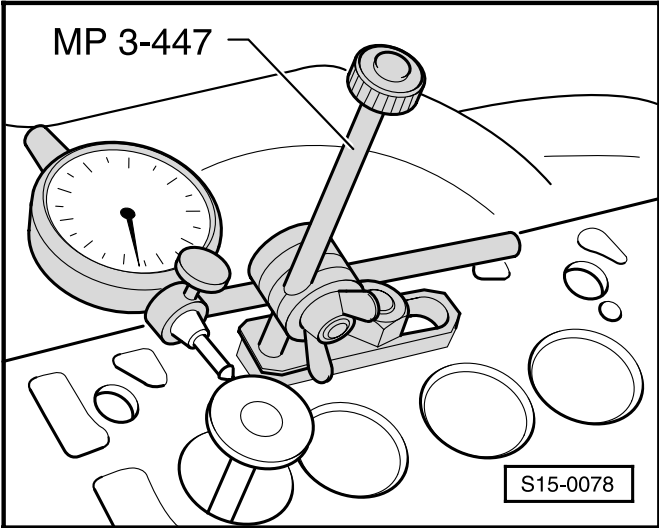
Notes:

- ◆ *After installing the camshaft, it is essential to wait about 30 minutes before starting the engine. The hydraulic valve clearance compensation elements have to settle (otherwise valves will strike the pistons).*
- ◆ *After working on the valve gear, carefully crank engine at least 2 revolutions to ensure that no valve strikes a piston when engine is started.*

Inspecting valve guides

Special tools, testers and aids required

- ◆ Universal dial gauge holder MP 3-447
- ◆ Dial gauge



Procedure

- Insert valve into guide. End of valve stem should be flush with guide.
- Determine valve rock.

Wear limit

Inlet valve guide	Exhaust valve guide
1.0 mm	1.3 mm

Notes:

- ◆ If the wear limit is exceeded, repeat measurement with new valves. If the wear limit is again exceeded, replace valve guide.
- ◆ If the valve is replaced as part of repair work, use a new valve for the measurement.

Replacing valve guides

Special tools, testers and aids required

- ◆ Driver MP 1-205
- ◆ Hand reamer MP 1-204 and diluted soluble oil

Removing

- Clean cylinder head and inspect. If it is no longer possible to rework the valve seat rings of the cylinder head, or if the cylinder head has already been machined to the minimum dimension, such cylinder heads are not suitable for replacing the valve guides.
- Use MP 1-205 to press out worn valve guides from the camshaft side (repair valve guide version with collar from the combustion chamber side).

Installing

- Moisten new guides with oil and press into the cold cylinder head from the camshaft side as far as the collar with MP 1-205.

Note:

After the guide makes contact with the collar, do not increase the insertion force to more than 10 kN otherwise the collar may shear off.

- Use hand reamer MP 1-204 to widen valve guides. It is essential to use diluted soluble oil for this step.
- Install new valves.
- Rework valve seats ⇒ page 15-23.

Reworking valve seats

Special tools, testers and aids required

- ◆ Depth gauge/sliding caliper
- ◆ NAC milling cutter for reworking valve seats
- ◆ Grinding paste

Notes:

- ◆ *When repairing engines with leaking valves, it is not sufficient to rework the valve seats and valves or to replace them. It is also necessary to inspect the valve guides for wear, particularly on engines with a high mileage.*
- ◆ *Rework valve seats only sufficiently in order to achieve a proper contact pattern. Calculate the maximum permissible reworking dimension before commencing reworking. If the reworking dimension is exceeded, proper operation of the hydraulic valve clearance compensation elements is no longer assured and the cylinder head should be replaced.*

Calculating maximum permissible reworking dimension

- Insert valve and press firmly against the valve seat.

Note:

If the valve is replaced when carrying out repairs, use a new valve for the measurement.

- Measure distance -a- between end of valve stem and top edge of cylinder head.
- Calculate maximum permissible reworking dimension from the distance -a- measured and the minimum dimension.

Minimum dimensions:
Inlet valve 33.8 mm
Exhaust valve 34.1 mm

Distance -a- measured less minimum dimension
= max. permissible reworking dimension.

Example:

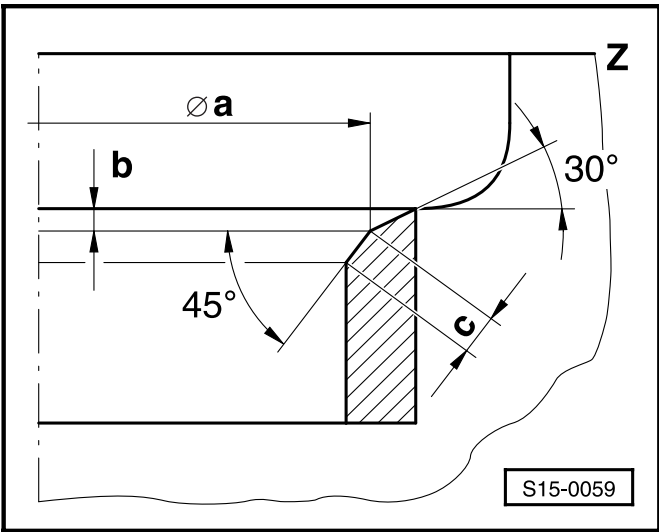
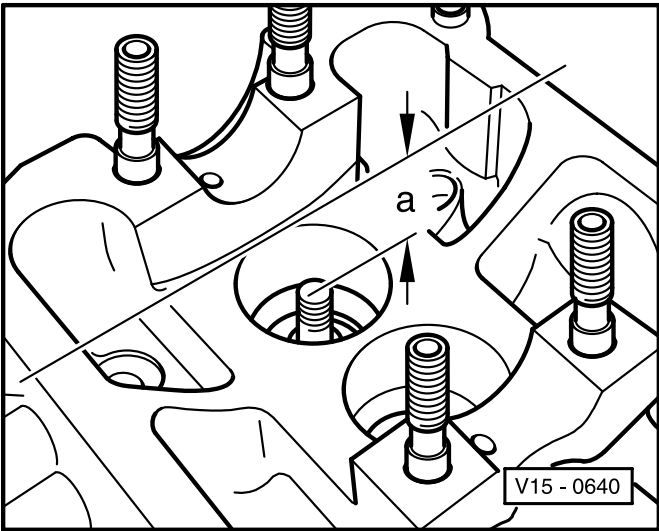
Distance measured	34.5 mm
- Minimum dimension	33.8 mm
= Max. permissible reworking dimension	0.7 mm

Note:

If the max. permissible reworking dimension obtained is 0 mm, repeat measurement with a new valve. If the max. permissible reworking dimension obtained is still 0 mm, replace cylinder head.

Reworking valve seats

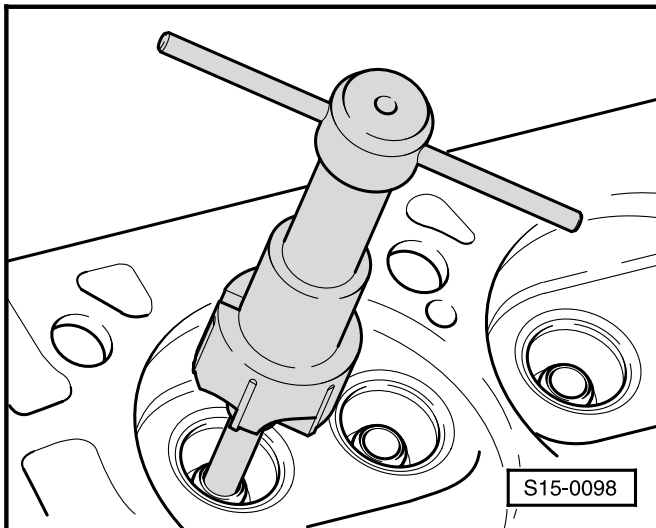
Dimension	Valve seats	
Ø a mm	Valve seat diameter	39.2 -0.1 - inlet valve 32.4 -0.1 - exhaust valve
b mm	max. permissible reworking dimension	
c mm	Valve seat width	1.9 ... 2.1 - inlet valve 2.3 ... 2.5 - exhaust valve
Z	Bottom edge of cylinder head	
45°	Valve seat angle	
30°	Top correction angle	



Procedure

Reworking can be carried out on a machine or by hand. It is essential to comply with the following conditions:

- Wear limit of valve guides must not exceed maximum permissible dimension $\Rightarrow$ page 15-22.
- Use NAC milling cutter with carbide metal blades (min. 90 HRC).



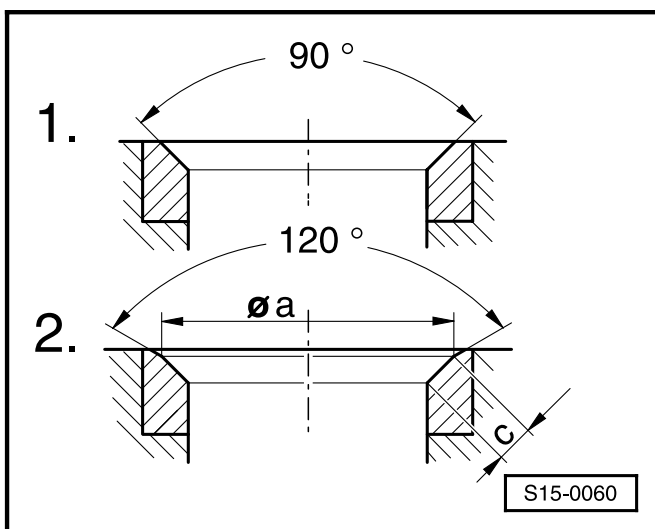
◀ Reworking valve seats with NAC hand milling cutter

- Place cylinder head on a felt base and secure against turning.
- Match diameter of guide drift to diameter of valve guide.

Valve guide	Guide drift $\varnothing$ mm
Inlet valve	7.0 -0.01
Exhaust valve	

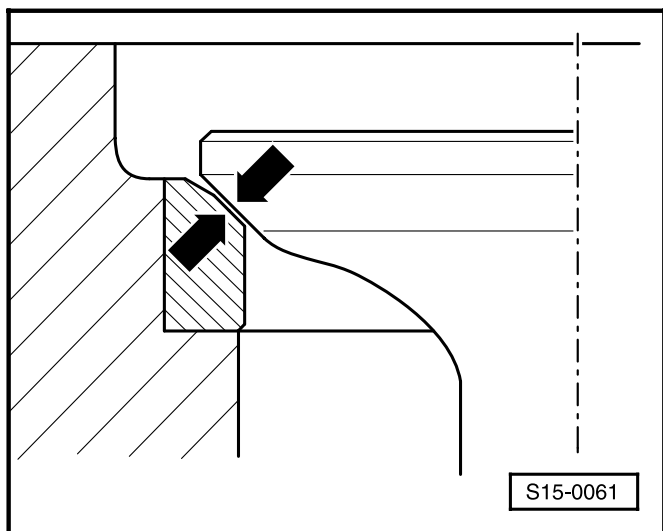
- Match diameter of milling cutter to diameter of valve seat.

Valve seat	Milling cutter $90^\circ \varnothing$ mm	Milling cutter $120^\circ \varnothing$ mm
Inlet valve	41	41
Exhaust valve	34	34



◀ Sequence of milling

1. Machine valve seat with 90° milling cutter until a proper contact pattern is achieved (do not exceed maximum permissible reworking dimension).
2. Mill top correction angle with 120° milling cutter until valve seat diameter „a“ or valve seat width „c“ ($\Rightarrow$ page 15-24) is achieved.



◀ - Use fine grinding paste to grind in valve/valve seat -arrows- so that a proper contact pattern is achieved.

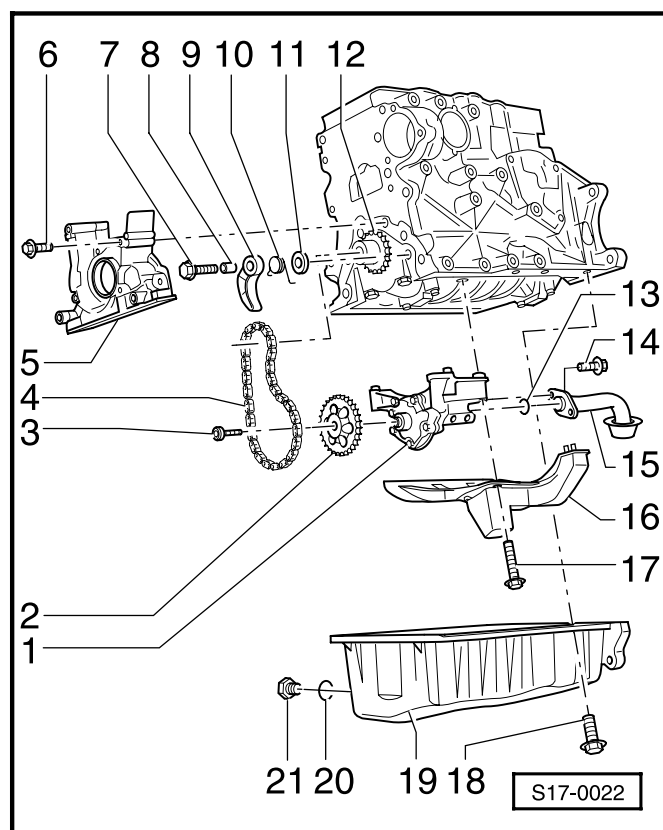
- Inspect valve for leaks.

The inspection can be carried out with water colour (proper contact pattern around the entire circumference) or by filling fuel into the combustion chamber (no fuel should flow out at the valve seat).

Note:

After installing cylinder head, inspect hydraulic bucket tappets ⇒ page 15-19.

Removing and installing parts of the lubrication system



Notes:

- ♦ If considerable quantities of metal swarf or abrasion are found in the engine oil when carrying out engine repairs, it is then necessary to carefully clean the oil galleries and, in addition, to replace the oil cooler in order to avoid consequential damage.
- ♦ The engine oil level must not extend beyond the max. marking - risk of damage to catalytic converter!

Inspecting engine oil level, quantity of oil and oil specification:

⇒ Inspection and Maintenance

1 - Oil pump

- ♦ Duocentric pump with 1.2 MPa (bar) pressure relief valve
- ♦ before installing, check whether the two dowel sleeves for centering oil pump/cylinder block are present
- ♦ if scores exist on running surfaces and gears, replace
- ♦ torque of oil pump cover to oil pump housing: 10 Nm

2 - Chain sprocket for oil pump

- ♦ pay attention to installation position
- ♦ can only be fitted onto the oil pump shaft in one position

3 - 20 Nm

4 - Chain for oil pump

5 - Sealing flange

- ♦ insert with silicone sealant D 176 404 A2 ⇒ page 13-17
- ♦ replacing crankshaft seal ⇒ page 13-14

6 - 15 Nm

7 - Collar bolt, 15 Nm

8 - Bush

9 - Chain tensioner

- ♦ in assembly with items 7, 8, 10 and 11

10 - Spring

11 - Washer

12 - Chain sprocket

13 - O-ring

- ♦ replace

14 - 15 Nm

15 - Suction line

- ♦ clean strainer if soiled

16 - Splash plate

17 - 15 Nm

18 - 15 Nm

- ♦ slacken and tighten with socket wrench

19 - Oil pan

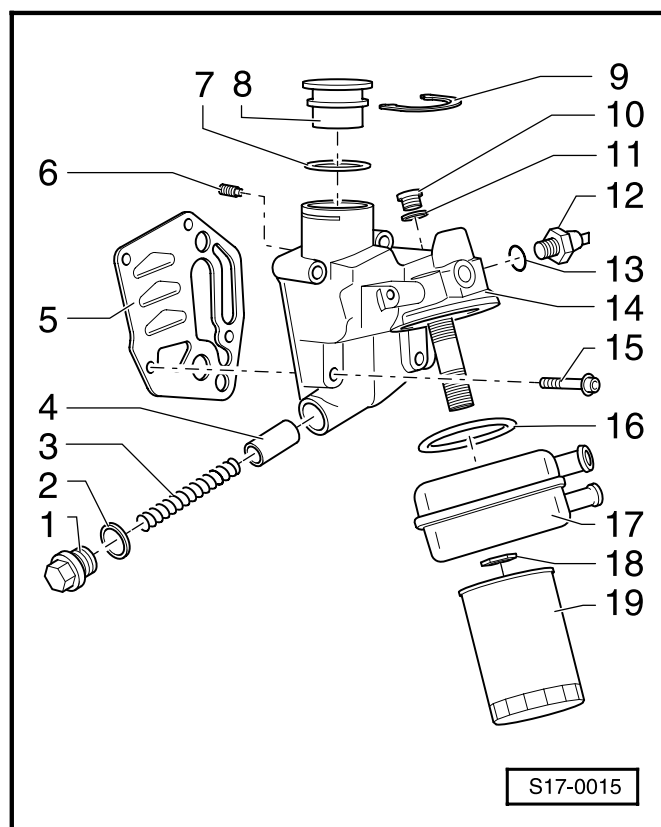
- ♦ install with silicone sealant D 176 404 A2 ⇒ page 17-4

20 - Seal

- ♦ replace

21 - Oil drain plug, 30 Nm

Disassembling and assembling oil filter holder



1 - Screw plug

2 - Seal

3 - Spring

- ◆ for 0.4 MPa pressure relief valve

4 - Piston

- ◆ for pressure relief valve

5 - Gasket

- ◆ replace

6 - Oil retention valve

- ◆ tightening torque 8 Nm
- ◆ integrated in oil filter holder

7 - Seal

- ◆ push on as far as of collar of cap
-item 8-

8 - Cap

9 - Locking clasp

10 - Screw plug, 15 Nm

11 - Seal

- ◆ cut open and replace if leaking

12 - 0.14 MPa oil pressure switch -F1-, 25 Nm

- ◆ black
- ◆ testing ⇒ page 17-5

13 - Seal

- ◆ cut open and replace if leaking

14 - Oil filter holder

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

- ◆ replace

16 - Gasket

- ◆ replace
- ◆ insert into lugs at oil cooler

17 - Oil cooler

- ◆ ensure clearance to surrounding components
- ◆ pay attention to Note ⇒ page 17-1

18 - 25 Nm

19 - Oil filter

- ◆ use tensioning strap for slackening
- ◆ tighten by hand
- ◆ pay attention to installation instructions on oil filter

Removing and installing oil pan

Special tools, testers and aids required

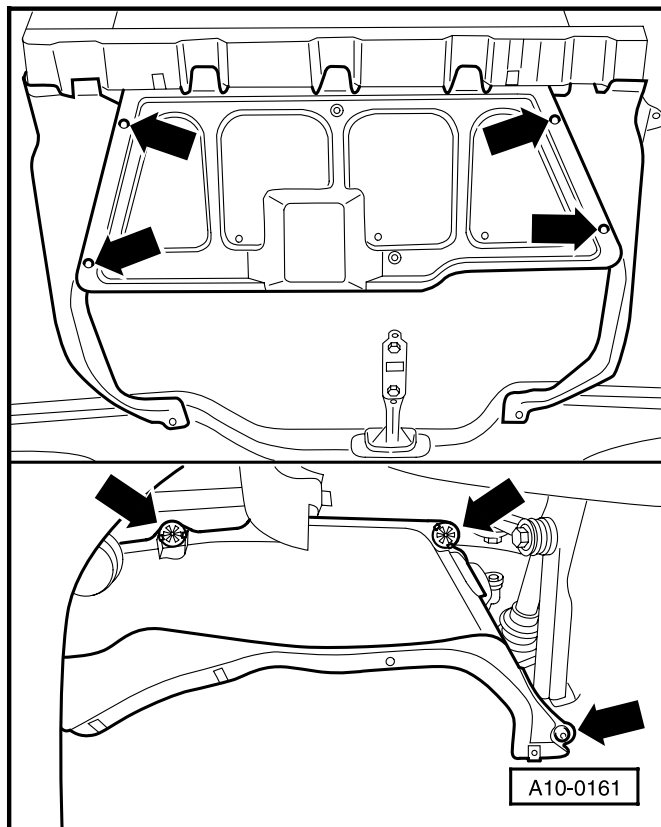
- ◆ Hinged wrench 3185
- ◆ Wrench socket insert 3249
- ◆ Hand drill with plastic brush attachment
- ◆ Flat scraper
- ◆ Torque wrench
- ◆ Silicone sealant D 176 404 A2

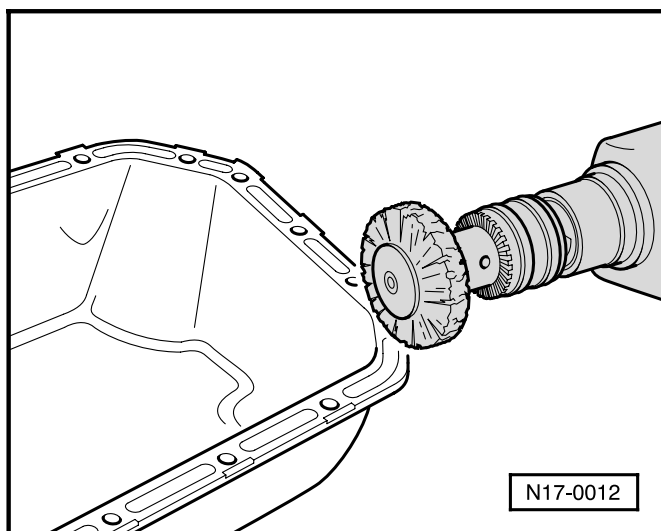
Removing

- ◀ - Remove noise insulation panel in the middle and also on left and right -arrows-.
- Drain engine oil.
- Unbolt oil pan.

Note:

Use hinged wrench 3185 to slacken oil pan bolts at flywheel side and unscrew with wrench socket 3249.





- Take off oil pan; detach with light blows with rubber-headed hammer, if necessary.
- Use a flat scraper to remove sealant residues in cylinder block.
- ◀ - Use a rotating plastic brush to remove sealant residues on oil pan (wear eye protection).
- Clean sealing surfaces; they must be free of oil and grease.

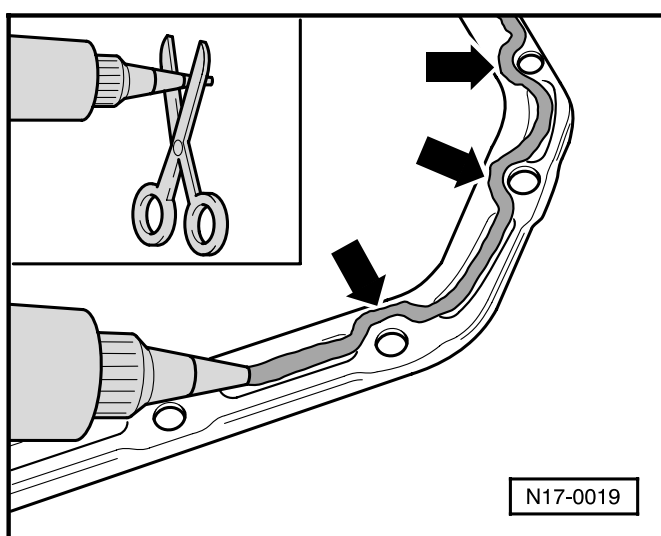
Installing

Notes:

- ◆ The oil pan must be installed within 5 minutes after applying the silicone sealant.
- ◆ Feed in oil pan bolts at flywheel side with socket 3249 and tighten with hinged wrench 3185.
- ◆ A second person is required for installing the oil pan.
- ◀ - Cut off nozzle of tube of silicone sealant D 176 404 A2 at the front marking ($\varnothing$ of nozzle about 3 mm).
 - ◆ Thickness of sealant bead: 2...3 mm
 - ◆ Run past on the inside in the area of the bolt holes -arrows-.

Note:

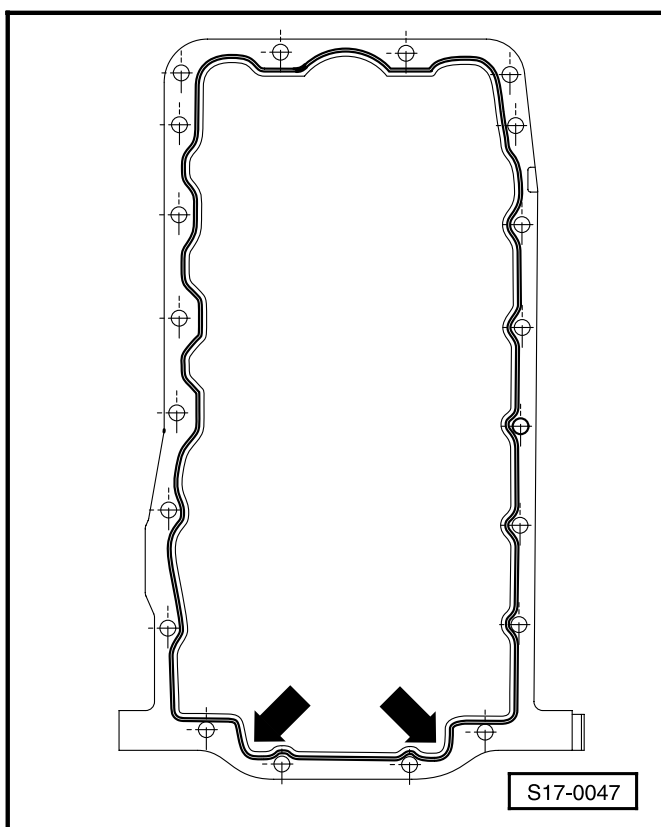
The sealant bead must not be thicker than 3 mm otherwise excess sealant may get into the oil pan and lock the strainer in oil inlet pipe.



- ◀ - Apply silicone sealant to the clean sealing surface of the oil pan, as shown in the illustration.

Note:

Take particular care when applying sealant bead in the area of the sealing flange at the rear -arrows-.



- Fit on oil sump immediately and tighten bolts as follows:
 1. Tighten all oil sump/cylinder block bolts only very slightly and diagonally across.
 2. Tighten the three oil sump/gearbox bolts slightly.
 3. Tighten all oil sump/cylinder block bolts further slightly and diagonally across.
 4. Tighten the three oil sump/gearbox bolts to a final torque of 45 Nm.
 5. Tighten all the oil sump/cylinder block bolts diagonally across to a final torque of 15 Nm.

Notes:

- ◆ *When installing the oil sump to the engine when removed, ensure that the oil sump is fitted on flush with the cylinder block at the flywheel side.*
- ◆ *After installing the oil sump, the sealant has to dry for about 30 minutes. Do not pour in engine oil until after this time.*

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 closes once the switching pressure is reached.

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

Cut-in delay of oil pressure warning:
about 3 s

Cut-off delay of oil pressure warning:
about 5 s

Testing warning light

After the ignition is switched on (engine not running), the oil pressure warning light in the dash panel insert should come on for about 3 s and then go out. The check is completed once the engine is running.

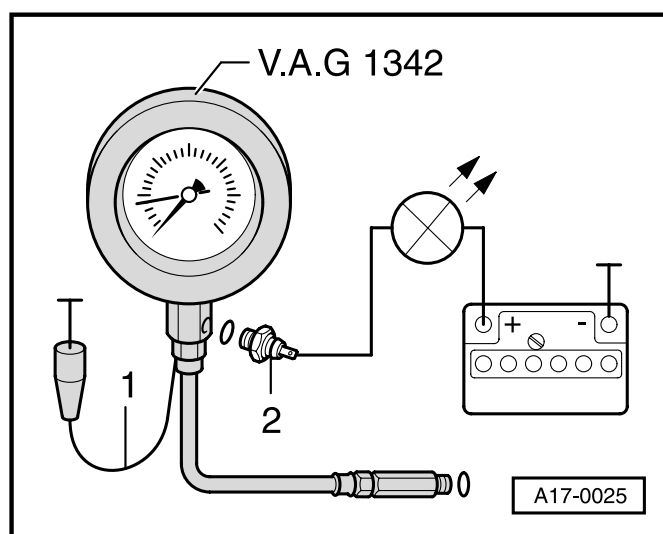
Warning criteria

The visual oil pressure warning (oil pressure warning light flashes) is activated and the buzzer for the audible warning sounds 3 times 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 opened
 - If engine speed is greater than 5000 rpm, the oil pressure warning is not cancelled; also not if the oil pressure switch is closed. Oil pressure warning cancelled once engine speed less than 5000 rpm.
 - If the oil pressure switch is open only 0.5...3 s at an engine speed of more than 1500 rpm, this is stored in the combination processor of the dash panel insert. If this state occurs 3 times when the engine is running, the oil pressure warning is immediately activated and also not cancelled at engine speed of less than 1500 rpm.
Oil pressure warning is cancelled once oil pressure switch is closed for more than 5 s at engine speed of more than 1500 rpm or in the case of „Ignition off“.

Test conditions

- Engine oil level o.k.; testing ⇒ page 17-9
- Oil pressure warning light (K3) should come on for about 3 s when ignition switched on
- Engine oil temperature at least 80 °C (radiator fan should have cut in once)



Testing oil pressure switch

- Disconnect 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.
- Route brown cable -1- of tester to earth (-).
- Connect diode test lamp (e.g. V.A.G 1527) to oil pressure switch -2- and to battery positive (+).

The LED must not come on.

- If the LED comes on, replace oil pressure switch.
- Start engine and slowly increase engine speed.
- At a pressure of 0.12...0.16 MPa (1.2...1.6 bar), the LED must come on; 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 idling: min. 0.2 MPa (2 bar)
 - ♦ Oil pressure at 2000 rpm: 0.30 ... 0.45 MPa (3 ... 4.5 bar).

If the specifications are not achieved:

- Rectify any mechanical damage, e.g. bearing damage.
- Replace pressure relief valve in oil filter holder ⇒ page 17-2.

At higher revs the oil pressure must not rise above 0.7 MPa (7 bar).

If the specification is exceeded:

- Inspect oil galleries.
- Replace pressure relief valve in oil filter holder ⇒ page 17-2, if necessary.

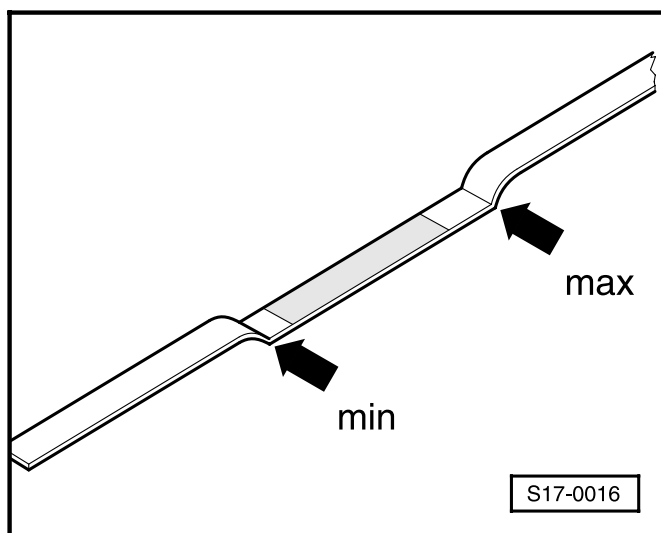
Inspecting engine oil level

Inspection conditions

- Carry out measurement of oil level only when engine warm (oil temperature greater than 60 °C).
- The vehicle should be standing on level ground when measuring oil level. Wait a few minutes after switching off the engine to allow the oil to flow back into the sump.

Inspection procedure

- Remove dipstick, wipe off with a clean cloth and re-insert dipstick fully.
- Then, remove dipstick again and read off oil level.



◀ Markings on dipstick

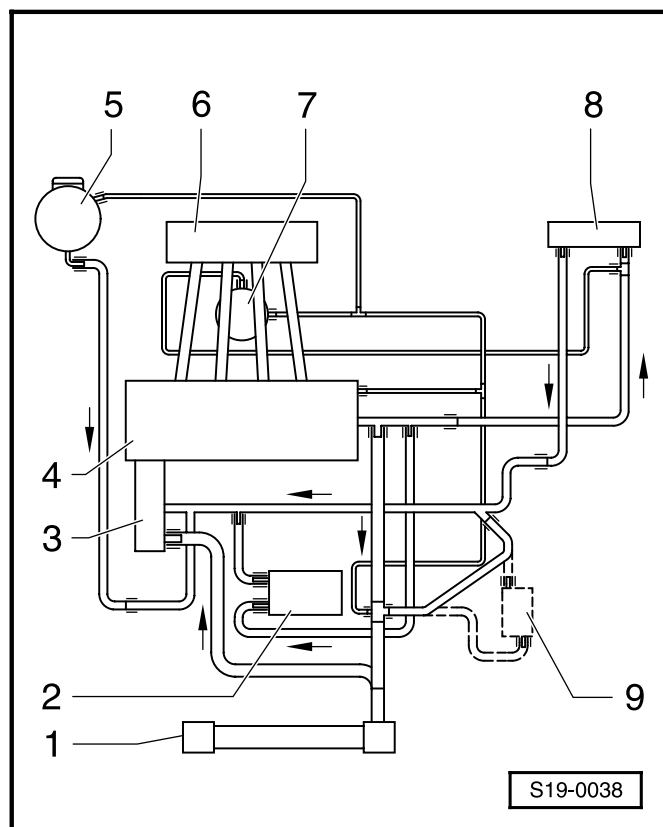
The engine oil level should be kept within the range between the „min“ and „max“ markings. the „max“ marking corresponds to an engine oil quantity of about 4.7 ltr.

Note:

The oil level must not be above the „max“ marking of the dipstick - risk of damage to catalytic converter!

Removing and installing parts of the cooling system

Parts of cooling system



1 - Radiator

- ◆ Always fill system with fresh coolant after replacing

2 - Oil cooler

- ◆ Removing and installing
⇒ page 17-1, item 17

3 - Coolant pump, thermostat

- ◆ Removing and installing coolant pump
⇒ page 19-8
- ◆ Ensure it operates freely
- ◆ Removing and installing coolant thermostat ⇒ page 19-10
- ◆ Testing, data ⇒ page 19-10

4 - Cylinder block

5 - Expansion reservoir

6 - Inlet pipe

7 - Heater for throttle valve connection

8 - Heating system heat exchanger

9 - Transmission oil cooler

- ◆ For ATF
- ◆ Only on models with automatic gear-box

Notes:

- ◆ The cooling system is pressurized when the engine is warm. Release pressure, if necessary, before carrying out repairs.
- ◆ Hose connections are secured with spring strap clamps. Always use spring strap clamps when carrying out repairs.
- ◆ It is recommended to use the special pliers for the spring strap clamps for removing and installing them.
- ◆ Always replace seals and gaskets.
- ◆ Route coolant hoses free of stress when installing and avoid contact with other components (pay attention to marking on coolant connection and on hose).
- ◆ Draining and filling system with coolant
⇒ page 19-2.
- ◆ Coolant mixing ratios ⇒ page 19-3.
- ◆ Test cooling system for leaks.

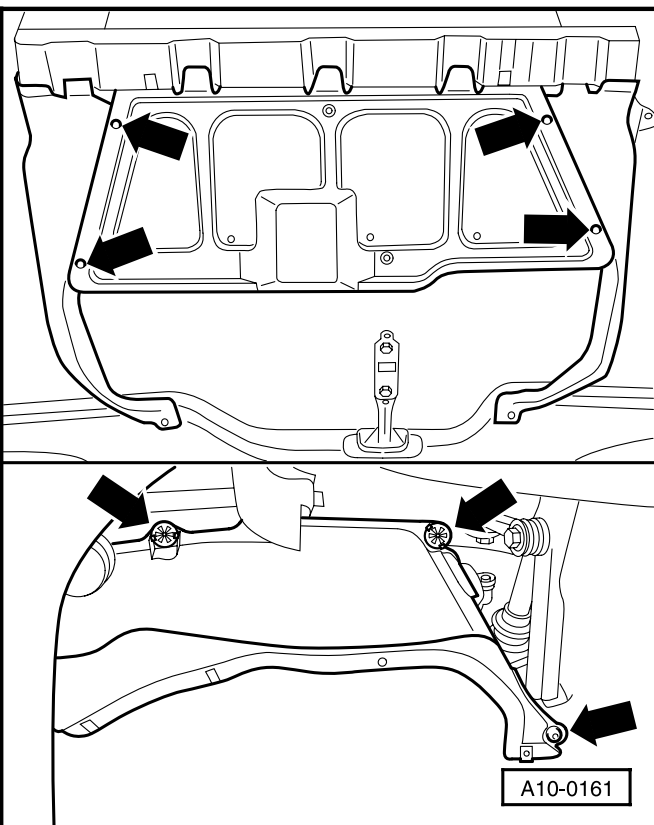
Draining and filling system with coolant

Coolant quantity approx. 5 ltr.

Special tools, testers and aids required

- ◆ Collecting tray (e.g. V.A.G 1306)
- ◆ Antifreeze tester

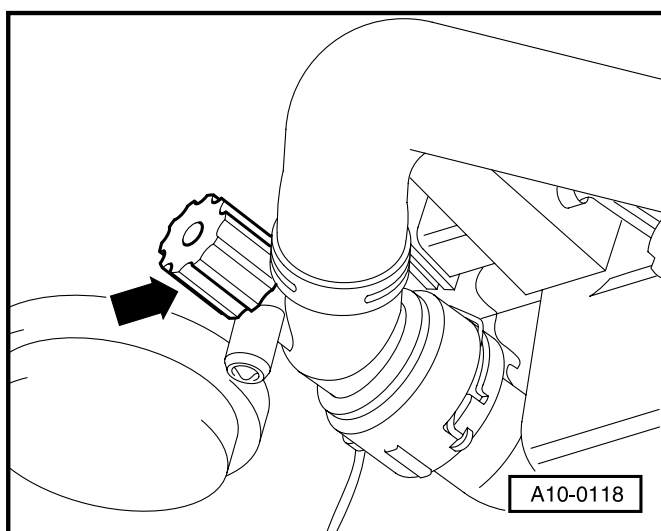
Draining



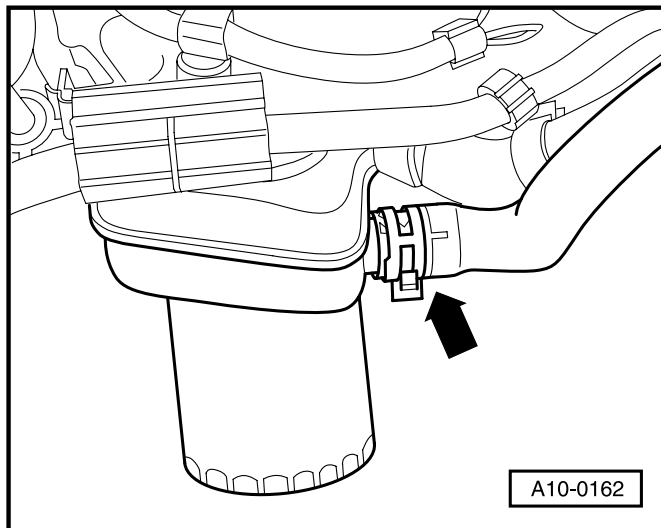
Important!

Hot steam may escape when the expansion reservoir is opened. Cover over cap with a cloth and open carefully.

- Open cap of the expansion reservoir.
- ◀ - Remove centre noise insulation panel -arrow in top half of illustration-.
- Place collecting tray (e.g. V.A.G 1306) below the engine.



- ◀ - Turn drain plug -arrow- on radiator to the left and pull out to the rear; fit auxiliary hose onto connection, if necessary.



- ◀ - Detach additional coolant hose at bottom of oil cooler -arrow- and allow remaining coolant to drain.

Notes:

- ◆ Collect drained coolant for proper disposal.
- ◆ Observe the disposal instructions for coolant.

Filling up

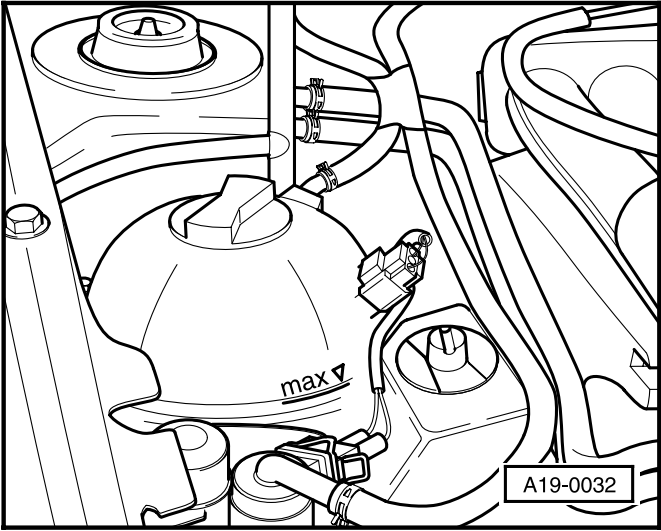
Select the appropriate coolant additive from the original spare parts catalogue Škoda or from the list of allowed coolant additives ⇒ Inspection and Maintenance; changing coolant.

Recommended mixture ratios

Antifreeze protection down to	Antifreeze concentration ¹⁾²⁾	Drinking water ²⁾
-25 °C	40 % (2.0 l)	60 % (3.0 l)
-35 °C	50 % (2.5 l)	50 % (2.5 l)

- 1) Because of sufficient corrosion protection, the antifreeze concentration must not fall below 30 % and not exceed 60%; the antifreeze protection and cooling efficiency are reduced as the concentration increases
- 2) The coolant amount may differ according to the version of the vehicle.

- Insert and tighten the coolant drain valve.
- Fit coolant hose at the bottom onto oil cooler.
- ◀ - Fill up coolant gradually up to „max“ marking on the expansion reservoir
- Start engine and run for not more than 2 minutes at 1500 1/rpm max., thereby fill up coolant up to overflow hole on the expansion reservoir.
- Close expansion reservoir
- Run engine until fan starts.



Warning!

Hot steam may escape when the expansion reservoir is open. Cover over cap with a cloth and open carefully.

- Inspect coolant level. When engine is at normal operating temperature, the coolant level must be at the "max" marking; when the engine is cold, it must be between the "min" and "max" markings.

Removing and installing radiator**Notes:**

- ◆ Always replace gaskets and seals.
- ◆ Raise vehicle with lift platform ⇒ page 10-1, Removing and installing engine.

Special tools, testers and aids required

- ◆ Torque wrench 5...50 Nm (e.g. V.A.G 1331)

Removing

- Drain coolant ⇒ page 19-2.
- ◀ - Unplug connector of thermoswitch (F18) -1- and separate plug connections -2- and -3- at the fan shroud (press catches).
- Separate coolant hoses at the connections of the radiator (pull off retaining clamp).

Models with air conditioning

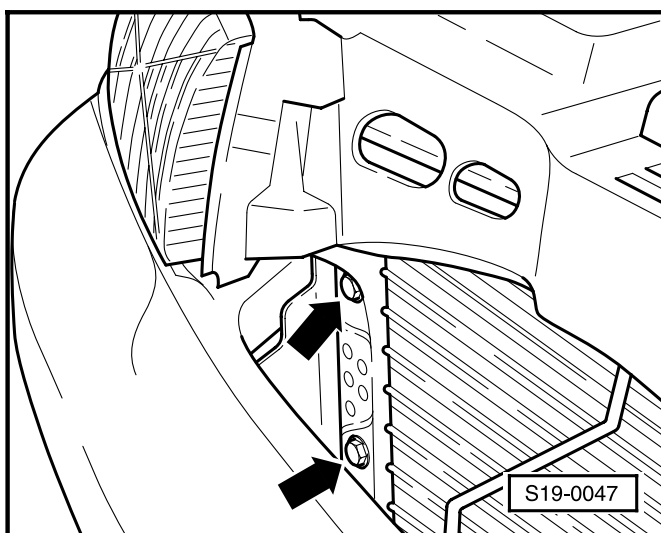
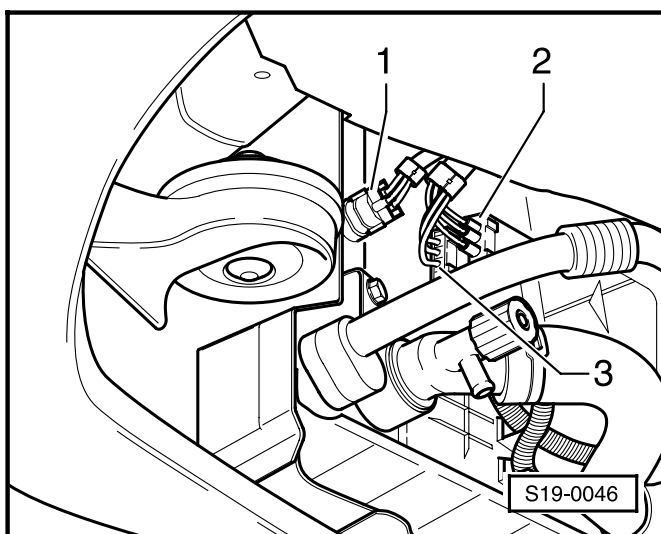
- ◀ - Unscrew the 4 bolts -arrows- attaching the condenser.

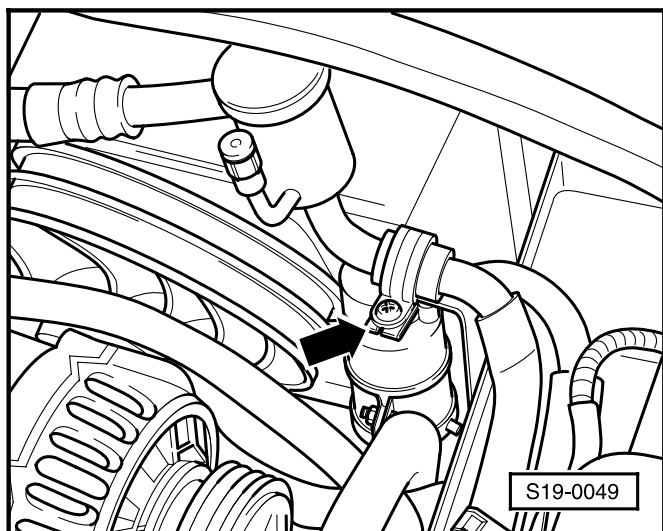
Warning!

The refrigerant circuit of the air conditioning system must not be opened.

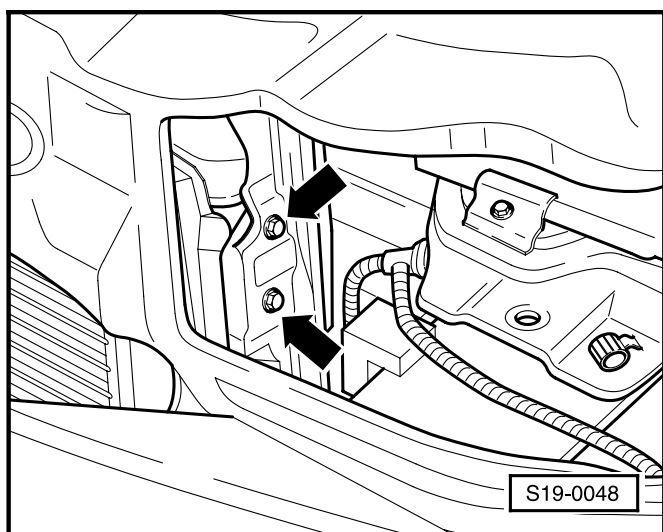
Note:

In order to avoid any damage to the condenser or to the refrigerant lines and hoses, ensure that the lines and hoses are not over-tensioned, kinked or bent.



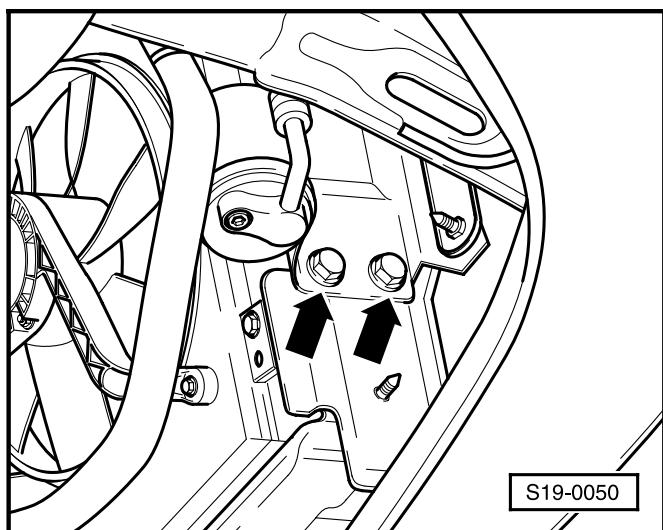


- ◀ - Detach bracket -arrow- for refrigerant pipe.

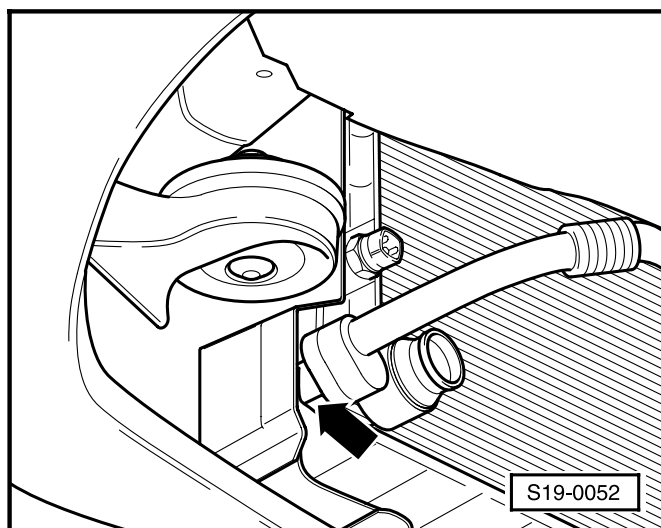


Continued for all models

- Remove both headlights:
⇒ Electrical System; Repair Group 94; Removing and installing headlights
- ◀ - Unscrew the 4 bolts for the top radiator mount -arrows-.



- ◀ - Unscrew the 4 bolts for the bottom radiator mount -arrows-.



Models with air conditioning

- Pull out radiator and condenser slightly.
- ◀ - Remove retaining clip -arrow- for refrigerant pipe.

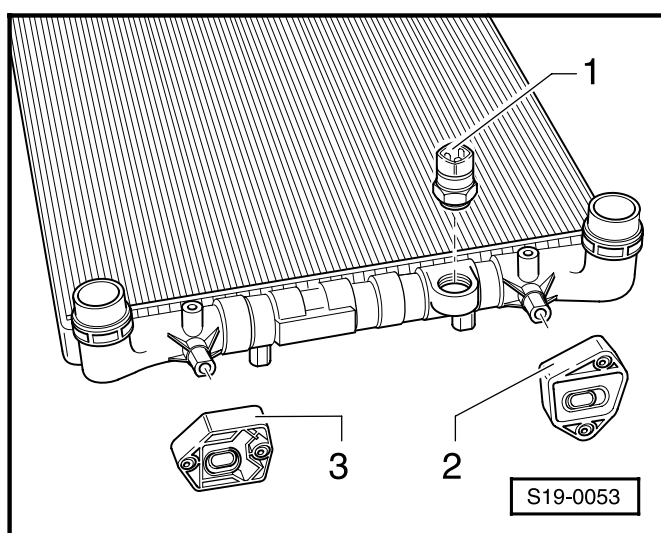
Continued for all models

- Remove fan shroud (4 bolts).

Note:

When removing and installing the fan shroud, ensure that the radiator fins are not damaged.

- Carefully lift radiator down and out.



Installing

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

- ◀ - Tighten thermoswitch -1- to 35 Nm.
- Fit on mounts -2- and -3- at the radiator as shown.
- Tighten the bolts for attaching the fan shroud and radiator mounts to 10 Nm.
- On models with air conditioning, tighten the bolts for attaching condenser and bracket for refrigerant pipes to 10 Nm.
- Replace O-rings in the connection fittings of the coolant hoses.
- Screw in coolant drain plug.
- Pour in coolant ⇒ page 19-3.
- Install headlights:
⇒ Electrical System; Repair Group 94; Removing and installing headlights
- Electrical connections and routing:
⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder

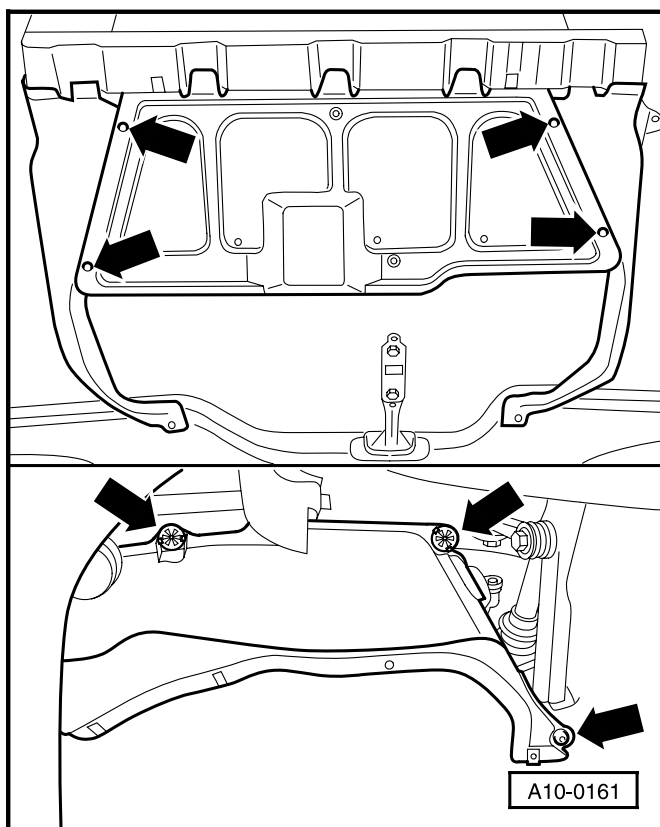
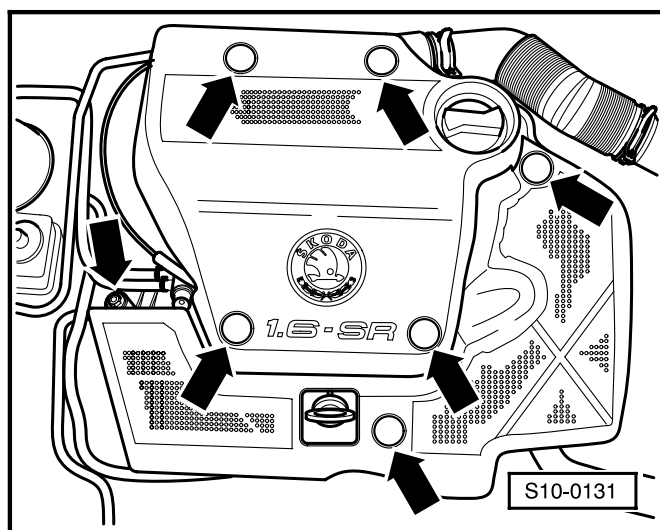
Removing and installing coolant pump

Special tools, testers and aids required

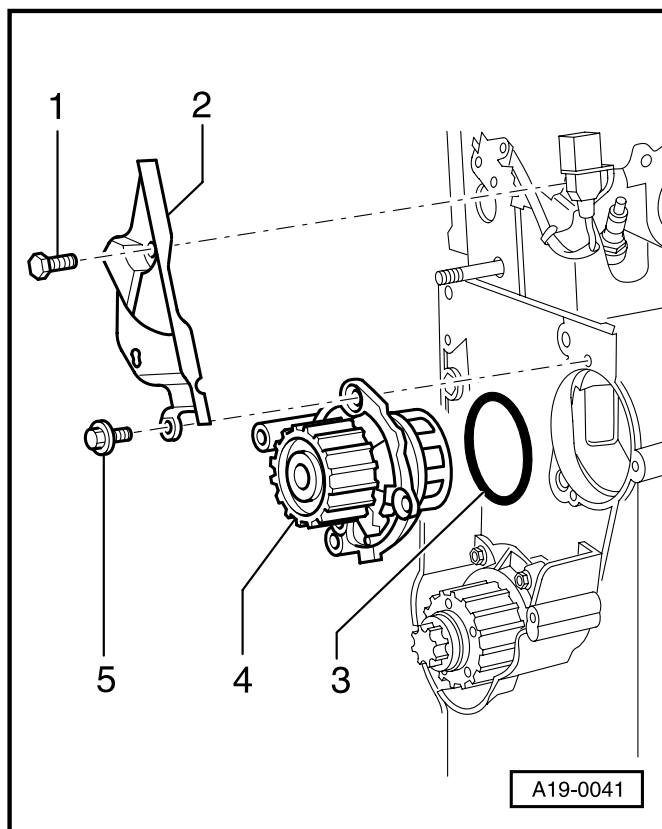
- ♦ Torque wrench 5...50 Nm
(e.g. V.A.G 1331)

Removing

- ◀ - Remove engine trim panel; take protective cover off the nuts -arrows- for this step.
- Drain coolant ⇒ page 19-2.



- ◀ - Remove noise insulation panel on right -arrows- in bottom half of illustration.
- Remove ribbed V-belt ⇒ page 13-1.
- Remove tensioning device for ribbed V-belt ⇒ page 13-1.
- Take off top and middle toothed belt guard ⇒ page 13-5.
- Position crankshaft to TDC of cylinder 1 ⇒ page 15-9.
- Take off toothed belt at camshaft sprocket ⇒ page 13-6.

**Notes:**

- ◆ The vibration damper and the toothed belt guard at the bottom can remain installed.
- ◆ The toothed belt remains fitted onto the crankshaft sprocket.
- ◆ Pay attention to all the notes for removal and installation of toothed belt ⇒ page 13-6.

◀ - Unscrew bolts -1- and -5- and take off rear toothed belt guard -2-.

- Unbolt coolant pump -4- and carefully run out along the engine support.

Installing

- Clean sealing surface for O-ring, or smooth.

◀ - Moisten new O-ring -3- with coolant additive.

- Insert coolant pump. Installation position: plug in housing points down.

- Insert rear toothed belt guard. Tighten bolt -1- to 20 Nm.

- Tighten bolts -5- of coolant pump to 15 Nm.

- Install toothed belt, tension (set timing) ⇒ page 13-8.

- Install ribbed V-belt ⇒ page 13-1.

- Pour in coolant ⇒ page 19-2.

Removing and installing, testing coolant thermostat

Special tools, testers and aids required

- ◆ Torque wrench 5...50 Nm (e.g. V.A.G 1331)
- ◆ Pliers for spring strap clamps

Note:

Always replace seals and gaskets.

Removing

- Drain coolant ⇒ page 19-2.
- ◀ - Detach coolant hose from connection -3-.
- Unscrew bolt -4- and take off connection together with O-ring -2- and coolant thermostat -1-.

Testing coolant thermostat

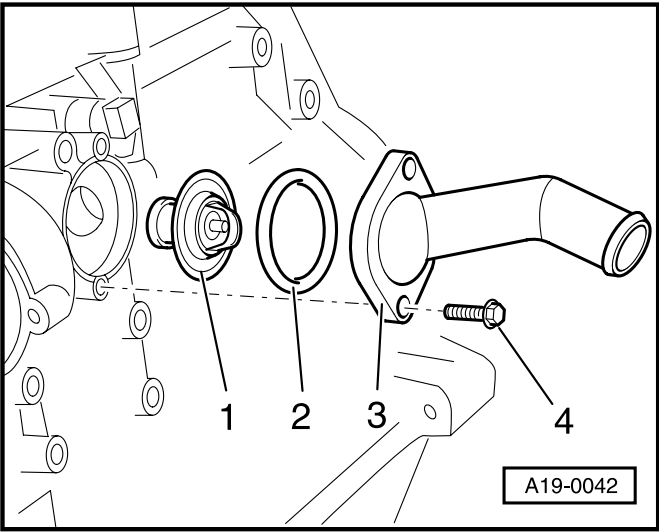
- Heat thermostat in a water bath.

Start of opening	End of opening	Opening stroke
approx. 87 °C	approx. 102 °C ¹⁾	min. 7 mm

¹⁾ cannot be tested

Installing

- Clean sealing surface for O-ring.
- Insert coolant thermostat. Installation position: bow of coolant thermostat must be vertical.
- Moisten new O-ring with coolant additive.
- Tighten bolts to 15 Nm.
- Pour in coolant ⇒ page 19-2.



Installing coolant pipe

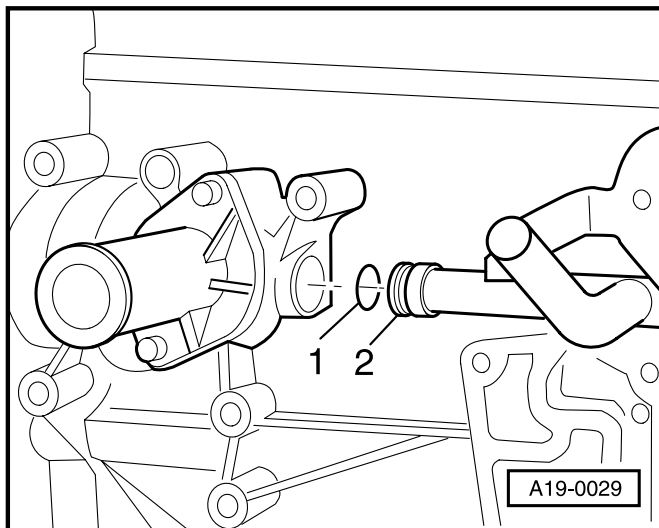
Special tools, testers and aids required

- ◆ Torque wrench 5...50 Nm
(e.g. V.A.G 1331)
- ◆ Pliers for spring strap clamps

Note:

Always replace seals and gaskets.

- ◀ - Moisten O-ring -1- with coolant additive and push onto coolant pipe -2-.
- Insert coolant pipe into the hole on the cylinder block.
- Tighten bracket for coolant pipe to 10 Nm.



Testing cooling system for leaks

Special tools, testers and aids required

- ◆ Cooling system tester (e.g. V.A.G 1274)
- ◆ Adapter (e.g. V.A.G 1274/8)
- ◆ Adapter (e.g. V.A.G 1274/9)

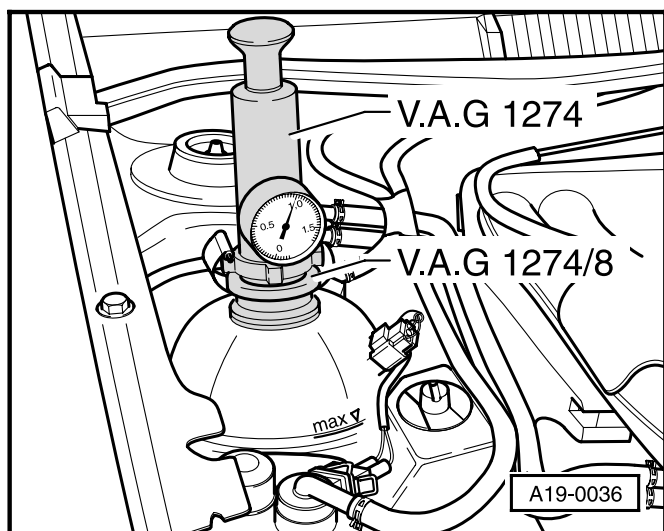
Test condition

- Engine at operating temperature

Test procedure

Important!

Hot steam may escape when the expansion reservoir is opened. Cover over cap with a cloth and open carefully.



- Open cap of coolant expansion reservoir.
- ◀ - Fit tester V.A.G 1274 with adapter V.A.G 1274/8 onto the expansion reservoir.
- Operate priming pump of tester to produce a pressure of about 0.1 MPa.
- If the pressure drops, determine the leakage point and rectify.

Testing pressure relief valve in cap

- Screw cap onto the tester with adapter V.A.G 1274/9.
- Operate priming pump of tester to produce a pressure of about 0.15 MPa.
- The pressure relief valve should open at a pressure of 0.12 ... 0.15 MPa.

Removing and installing parts of fuel supply system

Notes:

- ◆ *Hose connections are secured with screw-type, spring strap or collar clamps.*
- ◆ *Always replace collar clamps by spring strap or screw-type clamps.*
- ◆ *Fuel hoses at the engine must be secured only with spring strap clamps. It is not permitted to use collar or screw-type clamps.*
- ◆ *It is recommended to use the special pliers for spring strap clamps for removing and installing these.*
- ◆ *Always replace seals and gaskets when carrying out removal and installation operations.*

Pay attention to safety precautions
⇒ page 20-4.

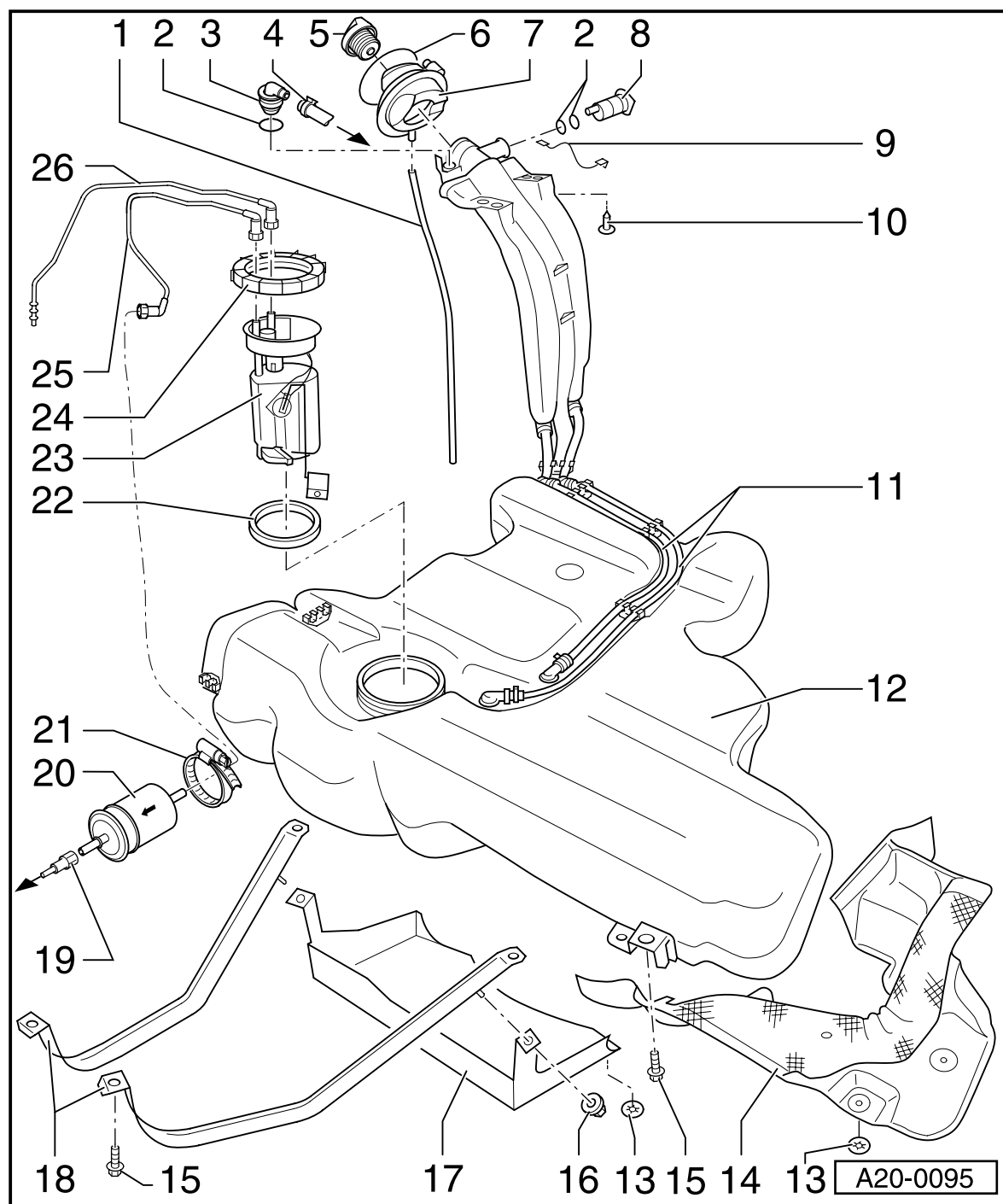
Pay attention to rules for cleanliness
⇒ page 20-4.

Removing and installing parts of activated charcoal filter system ⇒ page 20-12.

Servicing throttle mechanism ⇒ page 20-12.

Adjusting throttle cable ⇒ page 20-13.

Removing and installing fuel tank with attached parts and fuel filter



1 - Overflow hose

2 - O-ring

- ◆ Replace

3 - Gravity valve

- ◆ To remove, unclip valve and lift up and out of filler neck
- ◆ Inspect valve for blockage
Valve vertical: open,
valve tilted 45°: closed

4 - Breather pipe

- ◆ To activated charcoal filter
⇒ page 20-12, item 5

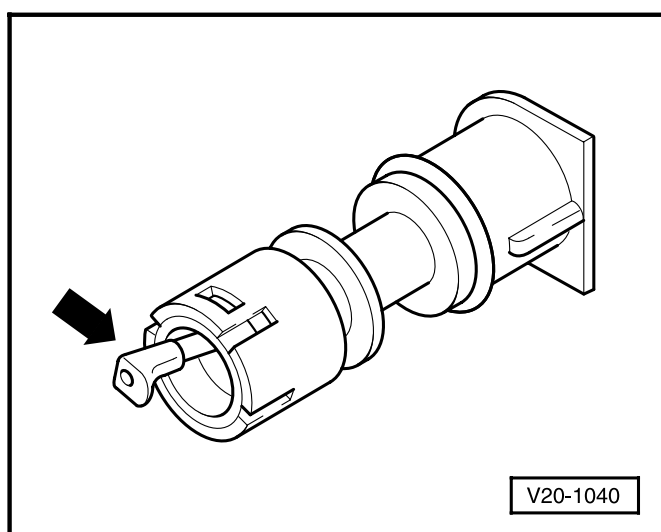
5 - Cap

- ◆ Replace seal if damaged

6 - Tensioning ring

7 - Rubber bowl

- 8 - Vent valve**
 - ♦ inspecting ⇒ Fig. 1
- 9 - Earth connection**
- 10 - 10 Nm**
- 11 - Vent lines**
- 12 - Fuel tank**
 - ♦ removing and installing ⇒ page 20-6
- 13 - Clamping washer**
 - ♦ removing: turn to left
 - ♦ installing: tighten to 2 Nm
- 14 - Heat shield**
 - ♦ for fuel tank
- 15 - 20 Nm + torque a further 1/4 turn (90°)**
- 16 - Clamping nut**
 - ♦ installing: tighten to 2 Nm
- 17 - Cover**
 - ♦ for fuel tank
- 18 - Tensioning strap**
 - ♦ pay attention to different lengths
- 19 - Feed line**
 - ♦ black
 - ♦ to fuel rail
 - ♦ to detach, press unlocking button on connector
- 20 - Fuel filter**
 - ♦ installation position: arrow points in direction of flow
- 21 - Retaining clip**
 - ♦ for fuel filter
- 22 - Seal**
 - ♦ moisten with fuel for installing
 - ♦ replace if damaged
- 23 - Fuel delivery unit**
 - ♦ removing and installing ⇒ page 20-5
 - ♦ testing fuel pump ⇒ page 20-9
 - ♦ removing and installing fuel gauge sender ⇒ page 20-6
 - ♦ testing holding pressure:
 - ⇒ 1.6 l/74 kW Engine, Simos 2 Fuel Injection and Ignition System; Repair Group 24; Testing fuel pressure regulator
- 24 - Union nut, 80 Nm**
 - ♦ use wrench MP 1-227 for removing and installing
- 25 - Feed line**
 - ♦ black
 - ♦ to fuel filter
 - ♦ is attached to connection marked „V“ at closing flange
 - ♦ to detach from closing flange, press unlocking button on connector
- 26 - Return-flow line**
 - ♦ blue
 - ♦ from fuel rail
 - ♦ is attached to connection marked „R“ at closing flange
 - ♦ to detach from closing flange, press unlocking button on connector



◀ Fig. 1 Inspecting vent valve

Lever in off position: valve closed

Lever pushed in direction of arrow: valve open

Safety precautions when carrying out work on fuel supply system

Important!

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

Pay attention to the following points when removing and installing the fuel gauge sender or the fuel pump (fuel delivery unit) from the fuel tank:

- ◆ Fuel tank should be not more than 2/3 filled.
- ◆ The extraction hose of an operating exhaust gas extraction system should be positioned close to the assembly opening of the fuel tank for extracting the fuel gases which are released even before commencing the work. If no exhaust gas extraction system is available, a radial fan (engine outside of air flow) with a delivery volume of more than 15 m³/h may be used.
- ◆ Ensure fuel does not come into contact with your skin! Wear fuel-resistant gloves!

Rules for cleanliness

Pay careful attention to the following „5 rules“ for cleanliness when carrying out work on the fuel supply/fuel injection system:

- ◆ 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 parts 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.

Removing and installing fuel delivery unit

Pay attention to safety precautions
⇒ page 20-4.

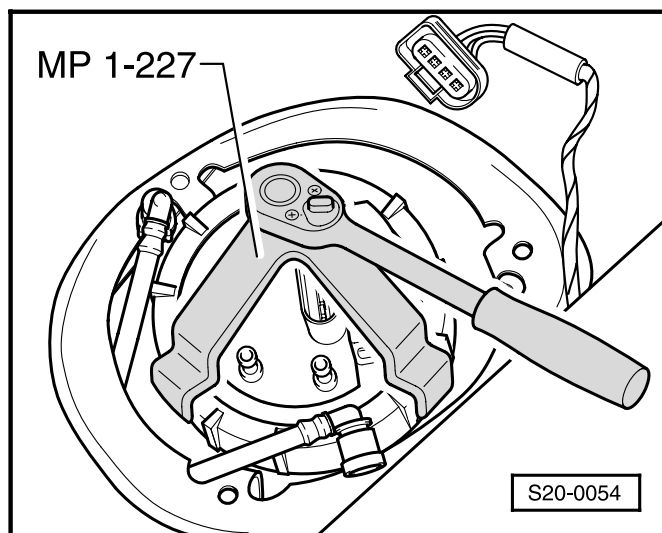
Pay attention to rules for cleanliness
⇒ page 20-4.

Special tools, testers and aids required

- ◆ Wrench for union nut MP 1-227

Removing

- If vehicle is fitted with a coded radio set, pay attention to coding; determine if necessary.
- Switch off ignition (if not already off) and disconnect earth strap at the battery.
- Unbolt cover (below rear seat).
- Detach fuel feed and fuel return pipes from the flange of the fuel delivery unit (press release buttons).
- Release and unplug 4-pin connector from the flange at the fuel tank.



- ◀ - Use wrench MP 1-227 to unscrew union nut.
- Pull fuel delivery unit and seal out of the opening of the fuel tank.

Note:

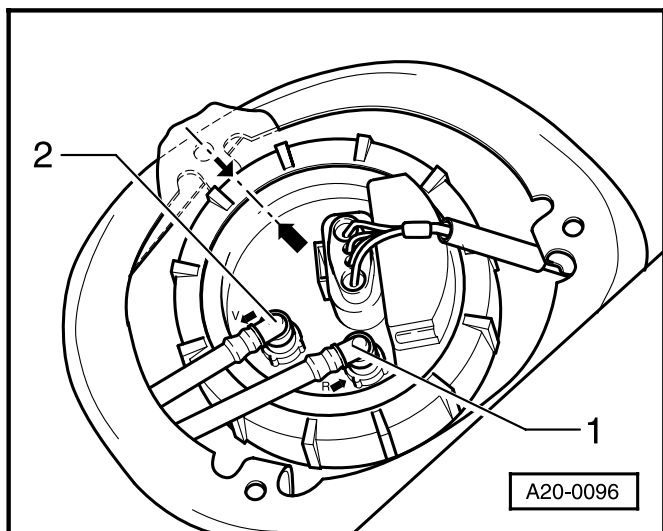
If the delivery unit is still filled with fuel, empty before replacing.

Installing

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

Notes:

- ◆ *When inserting the fuel delivery unit, ensure that the fuel gauge sender is not bent.*
- ◆ *Moisten seal of the flange with fuel for installing.*
- ◆ *Ensure the fuel hoses are tightly connected.*

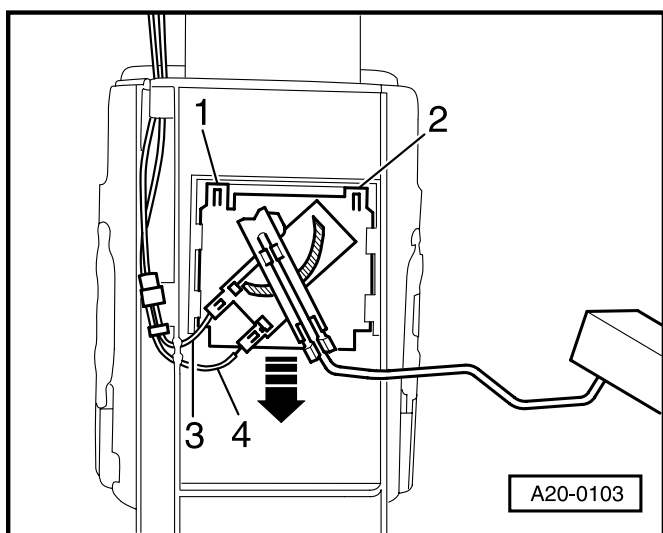


- ◀ - Pay attention to installation position:
 - ◆ Marking on flange should be aligned with the marking on the fuel tank -arrows-.
 - ◆ Blue return-flow pipe -1- to connection marked with -R-.
 - ◆ Black feed pipe -2- to connection marked with -V-.

Removing and installing fuel gauge sender

Removing

- Remove fuel delivery unit ⇒ page 20-5.
- ◀ - Release and detach connectors at the cables -3- and -4-.
- Use a screwdriver to raise the catches -1- and -2- and pull fuel gauge sender down and off -arrow-.



Installing

- Insert fuel gauge sender into the guides at the fuel delivery unit and press up until it locks in place.

Removing and installing fuel tank

Pay attention to safety precautions
⇒ page 20-4.

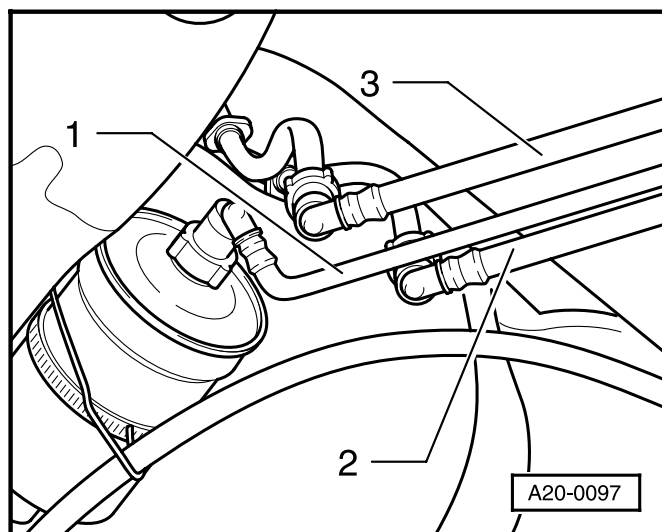
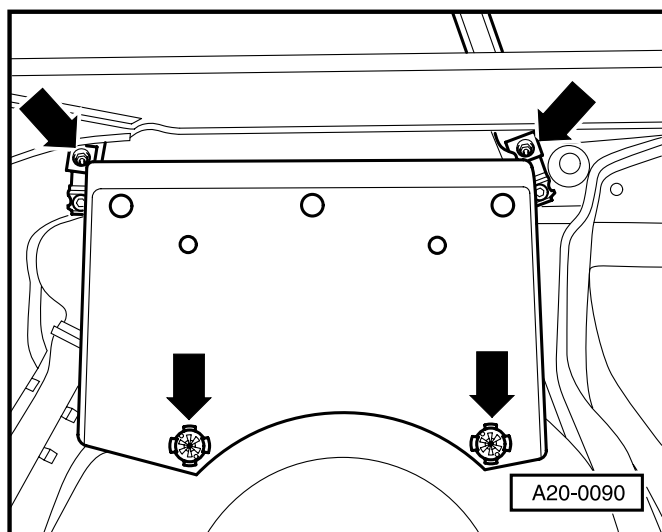
Pay attention to rules for cleanliness
⇒ page 20-4.

Special tools, testers and aids required

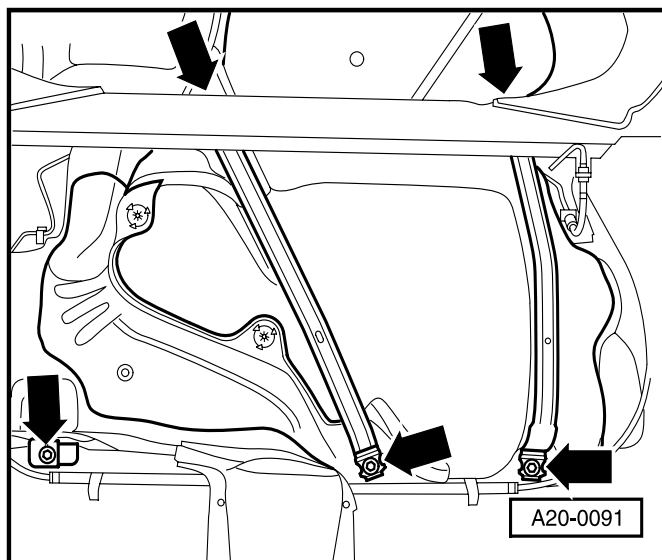
- ◆ Engine/gearbox jack (e.g. V.A.G 1383 A)
- ◆ Fuel extraction unit (e.g. V.A.G 1433 A)

Removing

- If vehicle is fitted with a coded radio set, pay attention to coding; determine if necessary.
- Switch off ignition (if not already off) and disconnect earth strap at battery.
- Empty fuel tank with fuel extraction unit (e.g. V.A.G 1433 A).
- Remove rear suspension:
⇒ Running Gear; Repair Group 42; Servicing rear suspension; Removing and installing rear suspension
- Unbolt cover (below rear seat).
- Release and unplug 4-pin connector from the flange at the fuel tank.
- Open fuel filler flap and lever out tensioning ring in rubber bowl (around filler neck).
- Press rubber bowl through to the inside.
- Remove right rear wheelhouse liner.
- Unbolt fuel filler neck below the wheelhouse liner.
- ◀ - Remove cover below the fuel tank -arrow- (if fitted).



- ◀ - Separate return-flow pipe -2- (blue), feed pipe -1- (black) and breather pipe -3- (white) at the front right of the fuel tank (press release buttons).
- Place engine/gearbox jack (e.g. V.A.G 1383 A) below the fuel tank in order to support it.



- ◀ - Slacken the bolted connections -arrows- at the front left and at the retaining straps.
- Lower fuel tank.

Installing

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

- ◀ - Connect fuel pipes at the flange of the fuel delivery unit:
 - ◆ Blue return-flow pipe -1- at connection marked with -R-.
 - ◆ Black feed pipe -2- at connection marked with -V-.

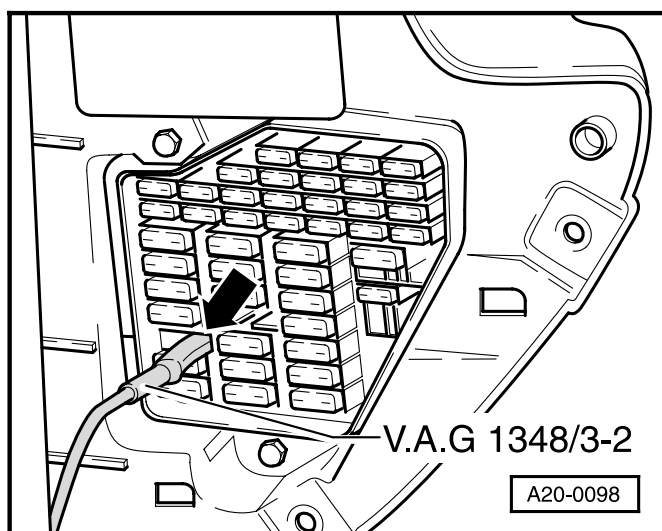
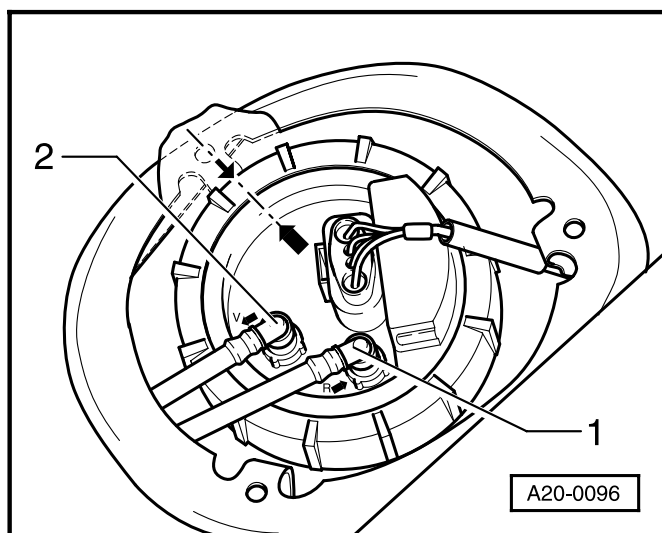
Connecting remote control

Special tools, testers and aids required

- ◆ Remote control V.A.G 1348/3A with adapter cable V.A.G 1348/3-2

Procedure

- Open cover of fuse box on the left-hand side of the dash panel.
- Remove fuse 28 at the fuse carrier (left row, 5th large fuse from top).
- ◀ - Connect remote control V.A.G 1348/3A with adapter cable V.A.G 1348/3-2 to the fuse base of fuse 28 -arrow-.
- Connect clamp to vehicle battery (+).



Testing fuel pump

Special tools, testers and aids required

- ◆ Hand-held multimeter (e.g. V.A.G 1526)
- ◆ Adapter cable set (e.g. V.A.G 1594)
- ◆ Remote control V.A.G 1348/3A with adapter cable V.A.G 1348/3-2
- ◆ Wrench for union nut MP 1-227
- ◆ Current flow diagram

Test conditions

- Battery voltage at least 12 V
- Fuse 28 o.k.
- Fuel filter o.k.

Test procedure

- Switch on ignition.

The fuel pump should be heard to run. (A second mechanic may be required for this step if surrounding noise level is high).

If the fuel pump does not run:

- Switch off ignition.
- Connect remote control V.A.G 1348/3A with adapter cable V.A.G 1348/3-2 ⇒ page 20-8.
- Operate remote control.

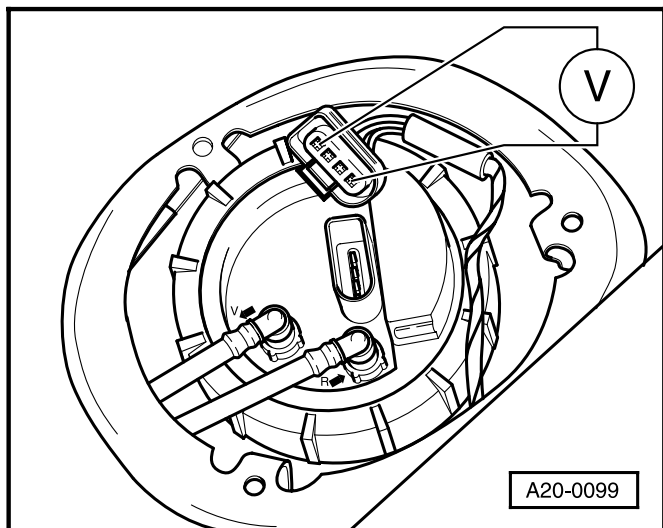
If the fuel pump runs:

Test fuel pump relay:

- ⇒ 1.6-ltr./74 kW Engine, Simos 2 Fuel Injection and Ignition System; Repair Group 24; Testing fuel pressure regulator and holding pressure

If the fuel pump does not run:

- Unbolt cover (below rear seat).
- Release and unplug 4-pin connector from the flange in the fuel tank.



- ◀ - Connect hand-held multimeter (e.g. V.A.G 1526) with adapter cables (e.g. from V.A.G 1594) to the outer contacts of the connector.

- Operate remote control.
Specification: approx. battery voltage

If the specification is not achieved:

- Determine and rectify open circuit in wiring according to current flow diagram:
⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder

If the specification is achieved:

- Use MP 1-227 to unscrew union nut.
- Check whether the electric cables are connected between flange and fuel pump; test for continuity if necessary.

If no open circuit in the wiring can be found:

Fuel pump faulty.

- Replace fuel delivery unit ⇒ page 20-5.

Testing delivery of fuel pump

Special tools, testers and aids required

- ◆ Remote control V.A.G 1348/3A with adapter cable V.A.G 1348/3-2
- ◆ Adapter V.A.G 1318/17
- ◆ Measuring vessel

Test conditions

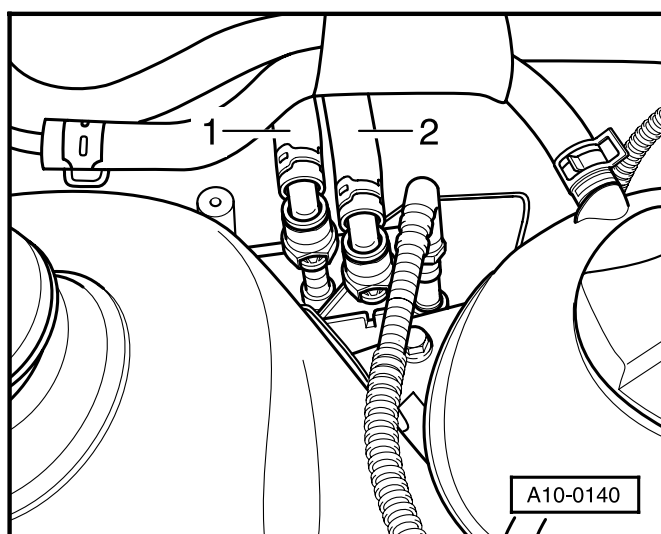
- Battery voltage at least 12 V
- Voltage supply o.k.
- Fuel filter o.k.

Test procedure

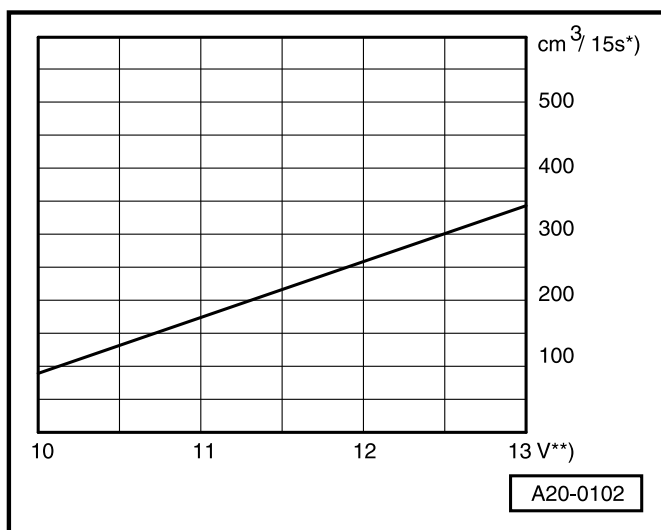
- Switch off ignition.
- Connect remote control V.A.G 1348/3A with adapter cable V.A.G 1348/3-2 ⇒ page 20-8.
- Remove cap from fuel filler neck.

Important!

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



- ◀ Detach fuel return-flow pipe -2- (press release buttons).
- Connect auxiliary hose with adapter V.A.G 1318/17 and fit on to the fuel return-flow pipe from the engine and hold in a measuring vessel.
- Operate remote control for 15 seconds (press button and hold).

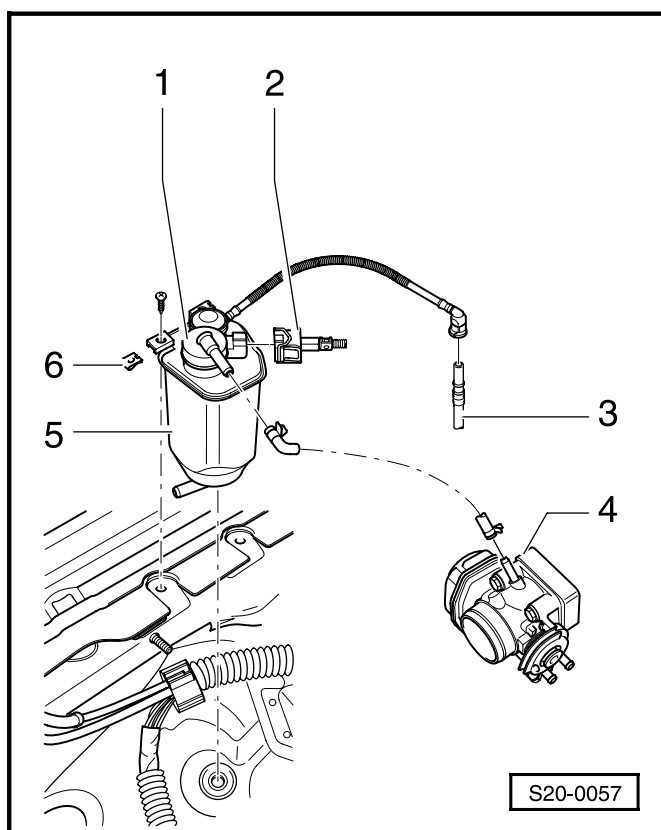


- ◀ Compare quantity of fuel pumped with specified value.

*) Minimum delivery cm³/15 s

**) Voltage at fuel pump when engine not running and pump operating (about 2 volts less than battery voltage).

Removing and installing parts of activated charcoal filter system



1 - Solenoid valve 1 (N80)

- ◆ Testing operation and actuation:
⇒ 1.6-ltr./74 kW Engine, Simos 2 Fuel Injection and Ignition System; Repair Group 24; Testing tank ventilation; Testing solenoid valve 1 for activated charcoal filter

2 - Connector

3 - Breather pipe

- ◆ From gravity valve at fuel tank ⇒ page 20-2, item 4
- ◆ For detaching, press release buttons on connector

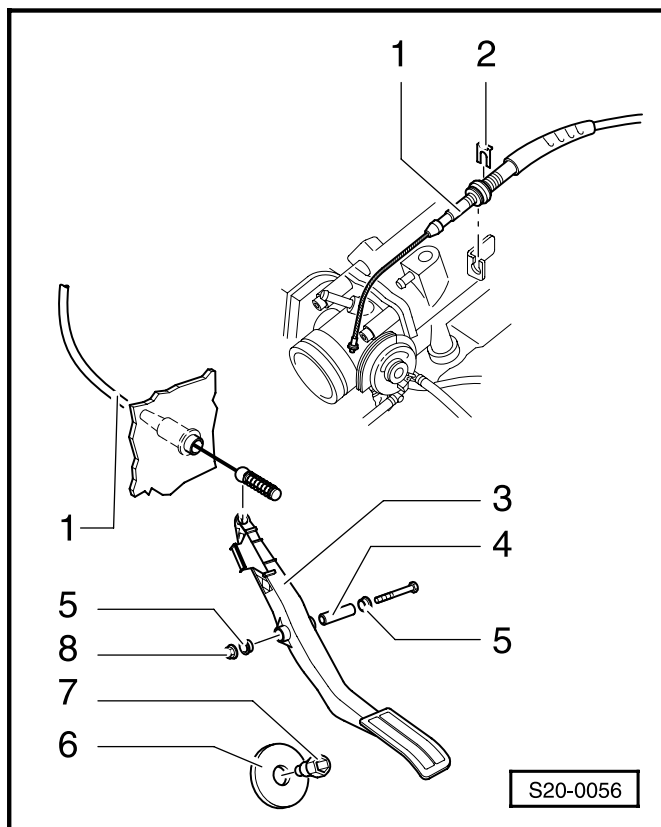
4 - Throttle valve control unit

5 - Activated charcoal filter

- ◆ With solenoid valve 1 (N80)
- ◆ Fitting location: in right of engine compartment
- ◆ For removing, detach PAS reservoir and press to the side

6 - Spring nut

Servicing throttle mechanism



1 - Throttle cable

- ◆ Set by altering position of lock element at detent ⇒ page 20-13

2 - Locking element

3 - Accelerator pedal

4 - Spacer bush

5 - Bearing bush

6 - Disc

7 - Stop screw

8 - 20 Nm

Setting throttle cable

Notes:

- ◆ *The throttle cable is very sensitive to kinking and should be treated with particular care when installing.*
- ◆ *A single slight kink can result in the cable fracturing subsequently when driving. Throttle cables which have been kinked, must therefore not be installed.*
- ◆ *When installing, ensure that the throttle cable is aligned between its mounting points and the cable attachment points.*

Special tools, testers and aids required

- ◆ Spring expander rod

Procedure

- Attach throttle cable at accelerator pedal and at the cam of the throttle valve control unit.
- Pull off locking element for throttle cable at detent.
- Depress accelerator pedal to full throttle position.

Note:

A second mechanic is required for this step or support accelerator pedal against the steering wheel with spring expander rod.

Models with manual gearbox

- Set throttle cable by altering position of detent at supporting bracket so that the full throttle position at the throttle valve lever is reached.

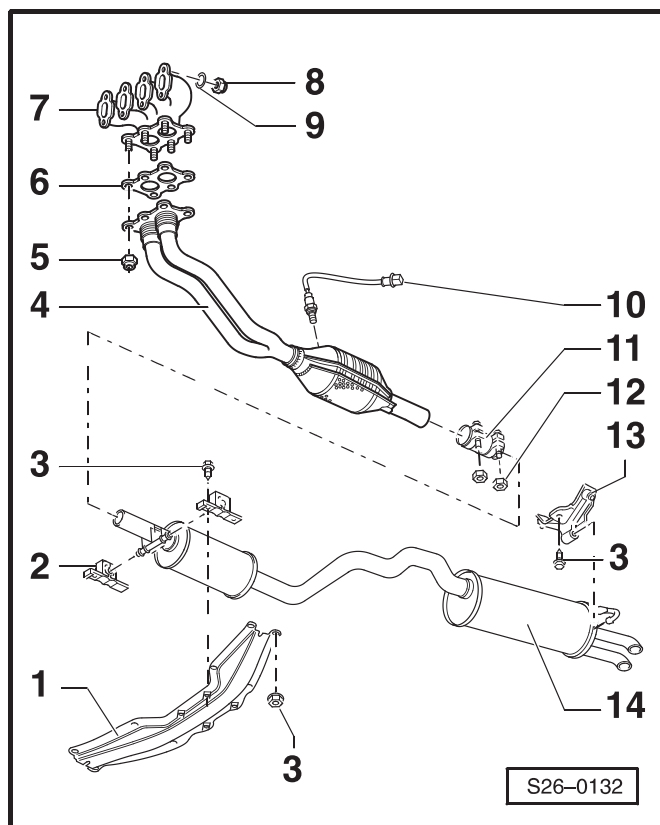
Models with automatic gearbox

- Set throttle cable by altering position of detent at supporting bracket so that the throttle valve has opened fully and the kickdown switch can be heard to click.

All models

- Release accelerator pedal or remove expander rod.
- After completing setting, check idle throttle and full throttle stop of throttle valve.

Removing and installing parts of the exhaust system



Notes:

- ◆ Always replace gaskets and self-locking nuts.
- ◆ Use a screwdriver to slacken and tighten the clamps of the heat shields
Tightening torque: 2 Nm

1 - Tunnel bridge

- ◆ with hole for aligning exhaust system
⇒ page 26-5

2 - Hanger

- ◆ installation position ⇒ Fig. 1

3 - 25 Nm

4 - Front exhaust pipe

- ◆ pay attention to different version
- ◆ with oxidation catalytic converter
- ◆ with decoupling element
- ◆ protect against shocks and blows
- ◆ avoid a large deflection, max. deflection 10°
- ◆ removing and installing ⇒ page 26-2

5 - 40 Nm

- ◆ replace
- ◆ insert with hot screw paste G 052 112 A3

6 - Gasket

- ◆ replace

7 - Exhaust manifold

- ◆ removing and installing ⇒ page 26-3

8 - 25 Nm

- ◆ replace
- ◆ insert with hot screw paste G 052 112 A3

9 - Washer

10 - Lambda probe, 50 Nm

- ◆ grease only thread with hot screw paste G 052 112 A3; the hot screw paste must not come into contact with the slot of the probe body
- ◆ check:
⇒ 1.6 l/74 kW Engine, Simos 2 Fuel injection and Ignition system; Repair Group 24
- ◆ plug connection for lambda probe below protective cover ⇒ page 26-2

11 - Double clamp

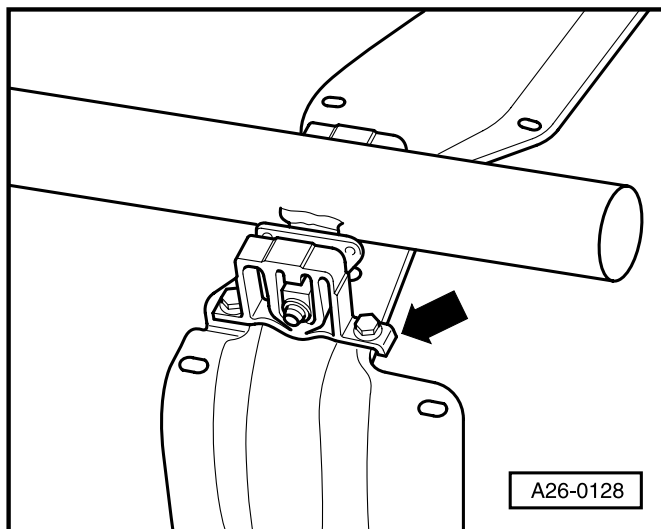
- ◆ align exhaust system free of stress before tightening ⇒ page 26-5
- ◆ installation position: synchronously for vehicle floor, bolted connection points toward left
- ◆ tighten bolted connections evenly

12 - 40 Nm

13 - Hanger

14 - Front and rear silencer

- ◆ replace individually when carrying out repairs ⇒ page 26-4
- ◆ align exhaust system free of stress
⇒ page 26-5



◀ Fig. 1 Installation position of hanger

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

Removing and installing front exhaust pipe

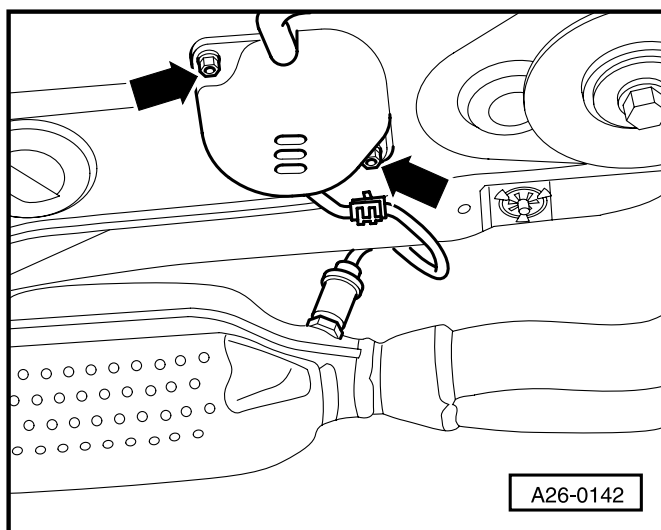
Special tools, testers and aids required

- ♦ Torque wrench 5...50 Nm
(e.g. V.A.G 1331)

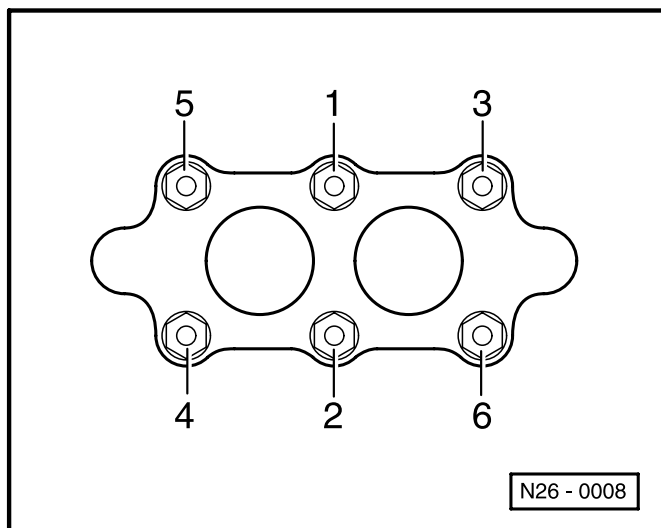
Removing

Notes:

- ♦ Avoid large deflection of decoupling element, max. 10°.
- ♦ Always replace self-locking nuts.



- ◀ - Unbolt protective cover -arrows-. Separate connector for lambda probe.
- Unbolt heat shield at front.
- Slacken clamping sleeve.
- Unbolt front exhaust pipe from exhaust manifold.
- Swivel front exhaust pipe down 180° and take off.



Installing

- ◀ Tightening order of front exhaust pipe to exhaust manifold

Components	Nm
Front exhaust pipe to exhaust manifold	40 ¹⁾
Lambda probe to front exhaust pipe	50 ¹⁾
Nuts for clamp	40
Shield for drive shaft to cylinder block	35

¹⁾ Insert with hot bolt paste G 052 112 A3.

- Align exhaust system free of stress ⇒ page 26-5.
- Interrogate fault memory:
⇒ 1.6-ltr./74 kW Engine, Simos 2 Fuel Injection and Ignition System; Repair Group 01; Interrogating and erasing fault memory

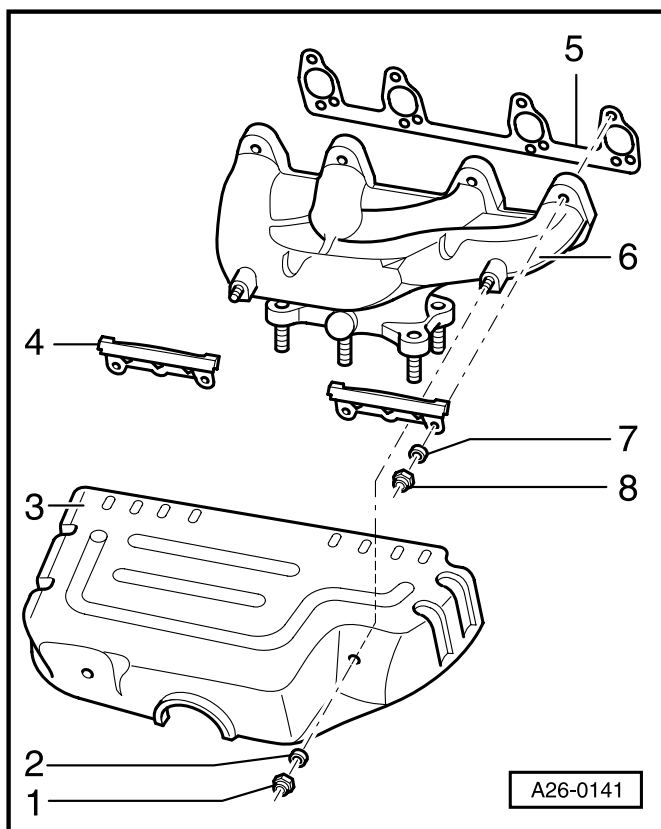
Removing and installing exhaust manifold

Special tools, testers and aids required

- ♦ Torque wrench 5...50 Nm
(e.g. V.A.G 1331)

Removing

- Remove top part of intake manifold ⇒ page 15-4.
- Remove front exhaust pipe ⇒ page 26-2.
- ◀ Unscrew nuts -1- for shield -3- and take off washers -2-.
- Unscrew nuts -8- of the two brackets -4- and take off washers -7-.
- Unscrew remaining nuts at exhaust manifold -6- and take off washers.
- Take off exhaust manifold and gasket for exhaust manifold -5-.



Installing

Notes:

- ♦ Use only 4 mm thick washers.
- ♦ Replace gasket for exhaust manifold.
- ♦ Always replace self-locking nuts.

Components	Nm
Shield to exhaust manifold	25
Exhaust manifold to cylinder head	25 ¹⁾

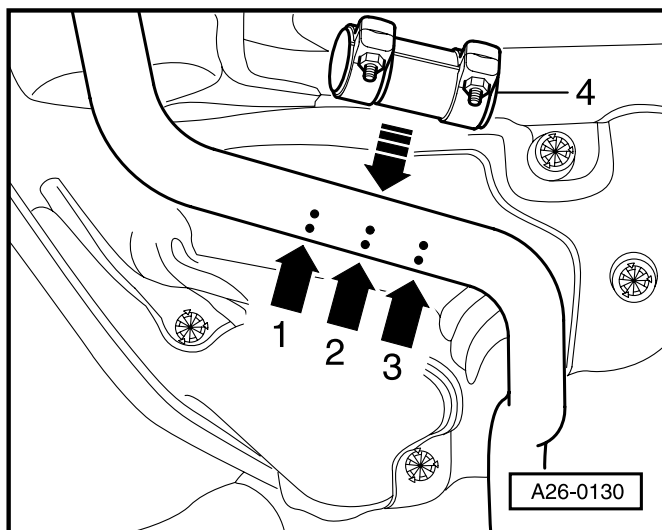
- 1) Insert with hot bolt paste G 052 112 A3.
- Align exhaust system free of stress ⇒ page 26-5.
- Install front exhaust pipe ⇒ page 26-3.

Replacing front or rear silencer

Special tools, testers and aids required

- ♦ Torque wrench 5...50 Nm (e.g. V.A.G 1331)
- ♦ Body saw (e.g. V.A.G 1523)

A separation point is provided for replacing the front or the rear silencer when carrying out repairs.



- ◀ Use a body saw (e.g. V.A.G 1523) to separate the exhaust pipe at the separation point -arrow 2- at right angles.
- Position clamping sleeve -4- at the side markings -arrows 1 and 3- when installing.
- Align exhaust system free of stress ⇒ page 26-5.
- Align rear silencer horizontally.
- Tighten bolted connections of clamping sleeve evenly to 40 Nm.
- Installation position of clamping sleeve: horizontal in vehicle, bolted connections pointing forward.

Aligning exhaust system free of stress

Special tools, testers and aids required

- ♦ Torque wrench 5...50 Nm
(e.g. V.A.G 1331)

Procedure

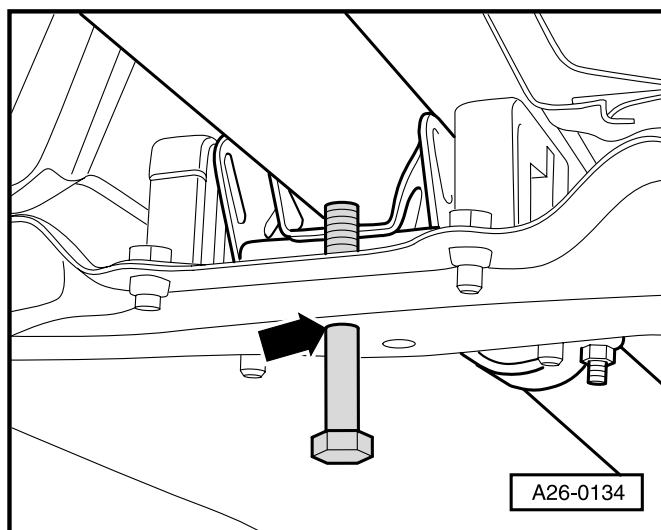
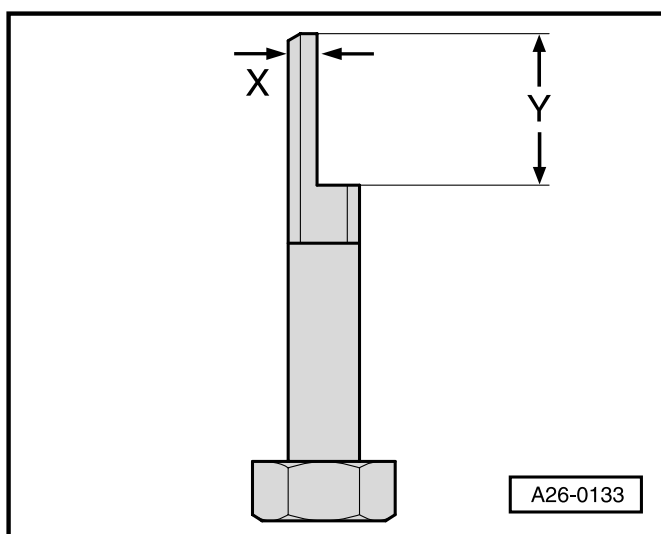
- Exhaust system is aligned when cold.
- ◀ - Shop-make auxiliary tool to the dimensions stated from an M10 bolt for aligning the exhaust system.

- ♦ Dimension -X- = 4 mm
- ♦ Dimension -Y- = 25 mm

Note:

A second mechanic is required for aligning the exhaust system.

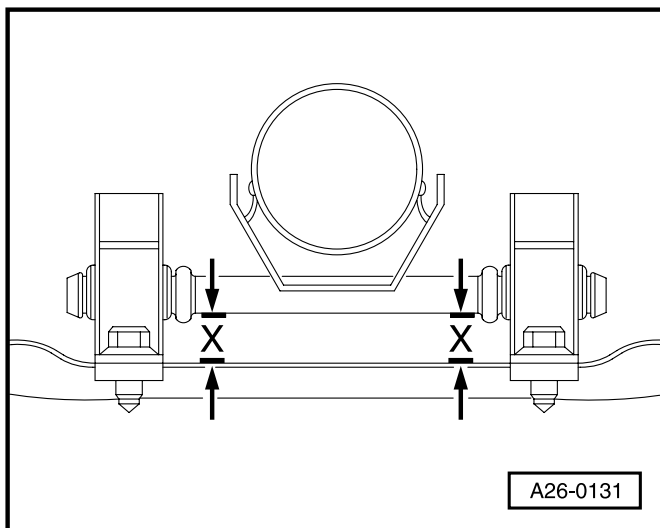
- Slacken the bolted connections of the clamping sleeve between catalytic converter and front silencer.



- ◀ - Insert shop-made tool through the rear hole -arrow- of the tunnel bridge; the flat faces toward the suspension bolt of the exhaust system.

Note:

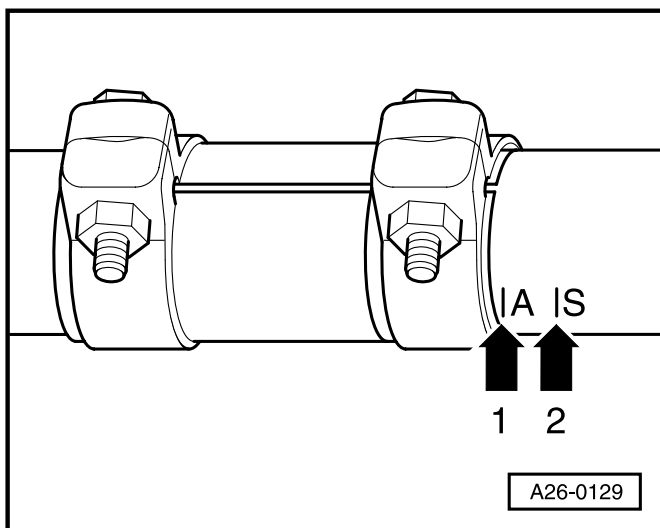
The exhaust system is prestressed in direction of travel when the shop-made tool is inserted.



- Align front and rear silencers horizontally:
- The suspension bolt at the exhaust pipe should be positioned parallel to the tunnel bridge (dimension -X- identical on left and right).

Note:

On models with separation point ⇒ page 26-4, check horizontal position of rear silencer additionally at tail pipe.



- Position clamping sleeve with a distance of about 5 mm at the relevant marking and tighten in horizontal position evenly to 40 Nm.

Different markings apply depending on gearbox version:

- ♦ Arrow 1 - models with automatic gearbox
- ♦ Arrow 2 - models with manual gearbox

The bolted connection of the clamping sleeve should be facing forward.

Inspecting exhaust system for leaks

- Start engine and run at idling speed.
- Close tail pipe for the duration of the leak test (e.g. with cloth or plug).
- Inspect connection points at cylinder head/ exhaust manifold, exhaust manifold/catalytic converter etc. for leaks by listening.
- Rectify any leaks found.