

## Workshop Manual OCTAVIA

**1.4-ltr./44 kW Engine,  
Mechanical Components**



## List of Supplements to Workshop Manual **OCTAVIA**

Edition: 09.03

### 1.4 I/44 kW Engine, Mechanical Components

Replaces List of Supplements - Edition: 06.01

| Supplement | Edition | Subject                                             | Article Number |
|------------|---------|-----------------------------------------------------|----------------|
|            | 01.99   | Basic Edition of Workshop Manual                    | S00.5125.50.20 |
| 1          | 06.01   | Supplement to Basic Edition                         | S00.5125.51.20 |
| 2          | 09.03   | Modifications in Repair Group 10, 13, 15, 17 and 19 | S00.5125.52.20 |
| 3          |         |                                                     |                |
| 4          |         |                                                     |                |
| 5          |         |                                                     |                |
| 6          |         |                                                     |                |
| 7          |         |                                                     |                |
| 8          |         |                                                     |                |
| 9          |         |                                                     |                |
| 10         |         |                                                     |                |
| 11         |         |                                                     |                |
| 12         |         |                                                     |                |
| 13         |         |                                                     |                |
| 14         |         |                                                     |                |
| 15         |         |                                                     |                |
| 16         |         |                                                     |                |
| 17         |         |                                                     |                |
| 18         |         |                                                     |                |
| 19         |         |                                                     |                |
| 20         |         |                                                     |                |

**Contents ⇒ next page.**



## Contents

|           |                                                                                   |              |
|-----------|-----------------------------------------------------------------------------------|--------------|
| <b>00</b> | <b>Technical Data</b>                                                             | <b>Page</b>  |
|           | <b>Technical data</b> .....                                                       | <b>00-1</b>  |
|           | - Engine number .....                                                             | 00-1         |
|           | - Engine features .....                                                           | 00-1         |
| <b>10</b> | <b>Removing and Installing Engine</b>                                             | <b>Page</b>  |
|           | <b>Removing and installing engine</b> .....                                       | <b>10-1</b>  |
|           | - Removing engine .....                                                           | 10-2         |
|           | - Installing engine .....                                                         | 10-11        |
|           | - Aligning engine/gearbox assembly .....                                          | 10-13        |
|           | - Tightening torques .....                                                        | 10-14        |
|           | - Engine/gearbox mounting .....                                                   | 10-14        |
| <b>13</b> | <b>Crank Assembly</b>                                                             | <b>Page</b>  |
|           | <b>Disassembling and assembling engine</b> .....                                  | <b>13-1</b>  |
|           | - Removing and installing ribbed V-belt .....                                     | 13-1         |
|           | <b>Disassembling and assembling cylinder block, crankshaft and flywheel</b> ..... | <b>13-3</b>  |
|           | - Inspecting synchronous running of chain sprockets .....                         | 13-6         |
|           | - Replacing crankshaft seal - belt pulley side .....                              | 13-7         |
|           | - Replacing ring gear .....                                                       | 13-8         |
|           | <b>Disassembling and assembling pistons, connecting rod and liners</b> .....      | <b>13-9</b>  |
| <b>15</b> | <b>Cylinder Head/Valve Gear</b>                                                   | <b>Page</b>  |
|           | <b>Removing and installing cylinder head</b> .....                                | <b>15-1</b>  |
|           | - Removing and installing cylinder head .....                                     | 15-2         |
|           | - Servicing cylinder head .....                                                   | 15-7         |
|           | - Inspecting valve guides .....                                                   | 15-8         |
|           | - Removing and installing valves .....                                            | 15-8         |
|           | - Reworking valve seats .....                                                     | 15-10        |
|           | - Replacing valve stem seals .....                                                | 15-13        |
|           | - Basic setting of hydraulic valve clearance compensation .....                   | 15-14        |
|           | - Testing compression .....                                                       | 15-15        |
|           | <b>Servicing valve gear</b> .....                                                 | <b>15-17</b> |
|           | - Removing and installing camshafts .....                                         | 15-17        |
|           | - Removing and installing rocker arms .....                                       | 15-18        |
|           | - Inspecting hydraulic tappets .....                                              | 15-19        |
| <b>17</b> | <b>Lubrication System</b>                                                         | <b>Page</b>  |
|           | <b>Removing and installing parts of the lubrication system</b> .....              | <b>17-1</b>  |
|           | - Removing and installing oil pan .....                                           | 17-3         |
|           | - Testing oil pressure and oil pressure switch .....                              | 17-6         |
| <b>19</b> | <b>Cooling System</b>                                                             | <b>Page</b>  |
|           | <b>Removing and installing parts of the cooling system</b> .....                  | <b>19-1</b>  |
|           | - Parts of cooling system .....                                                   | 19-1         |
|           | - Draining and filling system with coolant .....                                  | 19-2         |
|           | - Inspecting cooling system for leaks .....                                       | 19-5         |
|           | - Removing and installing radiator .....                                          | 19-6         |
|           | - Removing and installing coolant thermostat housing, rear coolant pipe .....     | 19-7         |
|           | - Removing and installing coolant pump, front coolant pipe .....                  | 19-8         |
| <b>20</b> | <b>Fuel Supply System</b>                                                         | <b>Page</b>  |

|                                                                               |             |
|-------------------------------------------------------------------------------|-------------|
| <b>Removing and installing parts of the fuel supply system .....</b>          | <b>20-1</b> |
| - Removing and installing fuel tank with attached parts and fuel filter ..... | 20-2        |
| - Safety precautions when working on fuel supply system .....                 | 20-4        |
| - Rules for cleanliness .....                                                 | 20-4        |
| - Removing and installing fuel delivery unit .....                            | 20-5        |
| - Removing and installing fuel gauge sender .....                             | 20-6        |
| - Removing and installing fuel tank .....                                     | 20-6        |
| - Connecting remote control .....                                             | 20-8        |
| - Testing fuel pump .....                                                     | 20-9        |
| - Testing delivery of fuel pump .....                                         | 20-10       |
| - Removing and installing parts of the activated charcoal filter system ..... | 20-12       |
| - Servicing throttle mechanism .....                                          | 20-13       |

|           |                                                                                     |             |
|-----------|-------------------------------------------------------------------------------------|-------------|
| <b>26</b> | <b>Exhaust System</b>                                                               | <b>Page</b> |
|           | <b>Removing and installing parts of the exhaust system .....</b>                    | <b>26-1</b> |
|           | - Exhaust manifold, front exhaust pipe with catalytic converter, lambda probe ..... | 26-1        |
|           | - Silencers with hangers .....                                                      | 26-2        |
|           | - Replacing front or rear silencer .....                                            | 26-3        |
|           | - Aligning exhaust system free of stress .....                                      | 26-4        |
|           | - Inspecting exhaust system for leaks .....                                         | 26-5        |

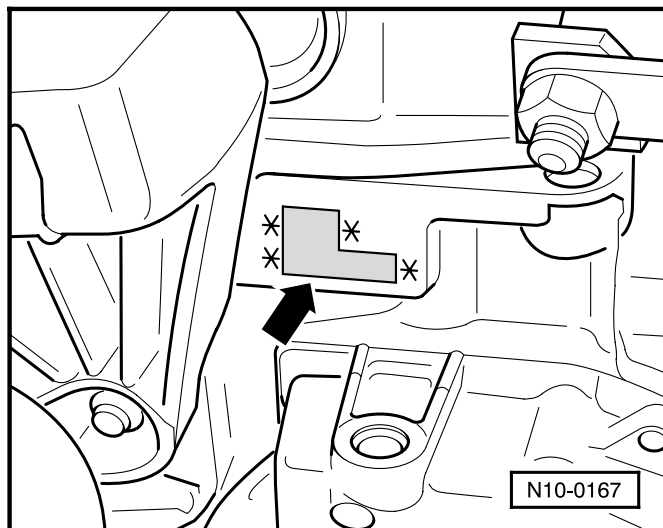
## Technical data

### Engine number

◀ The engine number („engine code“ and „serial number“) is located on the end face of the cylinder block at the belt pulley side, at the connection to the cylinder head.

In addition, a sticker with „engine code“ and „serial number“ is affixed to the cylinder head cover.

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



### Engine features

| Engine code                        |           | AMD                       |
|------------------------------------|-----------|---------------------------|
| Manufactured                       | from      | 02.99                     |
|                                    | to        | 04.01                     |
| Displacement                       | ltr.      | 1.396                     |
| Power output                       | kW at rpm | 44/4500                   |
| Torque                             | Nm at rpm | 120/2500                  |
| Bore                               | Ø mm      | 75.5                      |
| Stroke                             | mm        | 78                        |
| Compression ratio                  |           | 10 : 1                    |
| RON                                | min.      | 95 unleaded <sup>1)</sup> |
| Fuel injection and ignition system |           | Simos 3PB                 |
| Knock control                      |           | yes                       |
| Self-diagnosis                     |           | yes                       |
| Lambda control                     |           | 1 lambda probe            |
| Catalytic converter                |           | 1 catalytic converter     |
| Emission limits conforming to      |           | EU-2                      |
| Turbocharging                      |           | no                        |
| Exhaust gas recirculation          |           | no                        |
| Secondary air injection system     |           | no                        |
| Camshaft adjustment                |           | no                        |

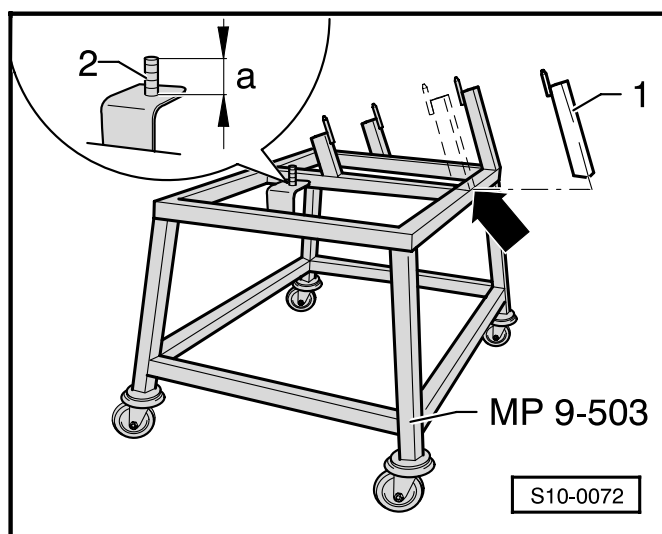
<sup>1)</sup> In exceptional cases at least 91 RON, but engine output reduced in this case.



## Removing and installing engine

### Special tools, testers and aids required

- ◆ Workshop crane (e.g. -V.A.G 1202 A-)
- ◆ Catch pan (e.g. -V.A.G 1306-)
- ◆ Torque wrench
- ◆ Pliers for spring strap clips
- ◆ Engine mount -MP 1-180-
- ◆ Repair stand -MP 9-101-
- ◆ Lifting device -MP 9-200-
- ◆ Lifting device -MP 9-201-
- ◆ Engine mount -MP 9-503-
- ◆ Grease -G 000 100-
- ◆ Hot bolt paste -G-052 112 A3-
- ◆ Wire



### Changing engine mount -MP 9-503-

- ◀ - Separate support -1- of engine mount in the area of the arrow.
- Adjust screw -2-, -a- = 52 mm

#### **Note:**

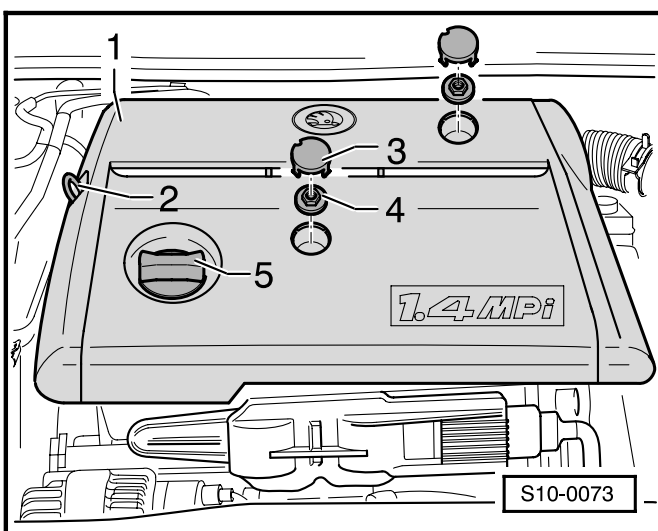
*The modified engine mount -MP 9-503- can also be used for the FELICIA 1.3 I engine.*

## Removing

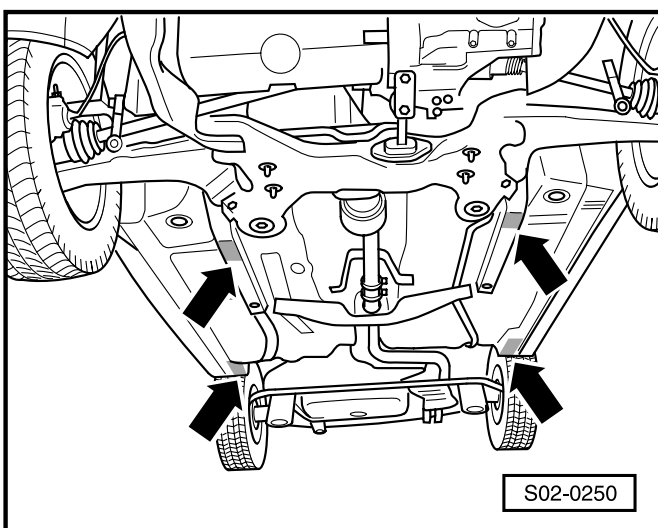
### Notes:

- ♦ The engine is removed upwards together with the gearbox.
- ♦ The hose connections are secured with screw-type clips, spring-type clips or clamp-type clips. Always replace clamp-type clips with spring-type clips or screw-type clips.
- ♦ Fuel hoses at the engine must only be secured with spring-type clips. The use of clamp-type or screw-type clips is not allowed.
- ♦ When the battery is disconnected and reconnected, carry out rework ⇒ Electrical System; Repair Group 27.
- ♦ Pay attention to correct assignment of the connectors, if necessary mark.

### Procedure



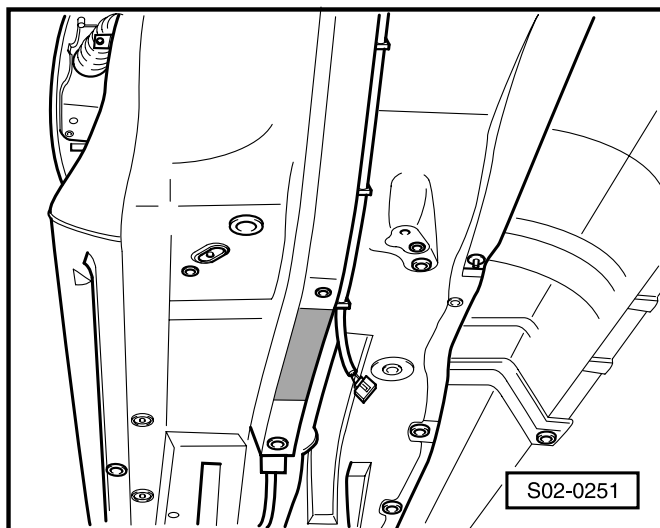
- On models fitted with a coded radio set, pay attention to the coding; determine if necessary.
- Switch off the ignition and disconnect the earth strap of the battery.
- ◀ - Release cap -3-.
- Release nuts -4- (5 Nm).
- Pull out oil dipstick -2-.
- Remove engine cover -1- towards the top (do not unscrew cap -5-)
- Close the oil filler inlet on the cylinder head cover with the cap fitted to the bottom of the engine cover (if not available use other means).



- Raise vehicle with a lift platform while paying attention to the following:
- ◀ The arms of the lift platform must be positioned only under the frame side rails.

### Caution!

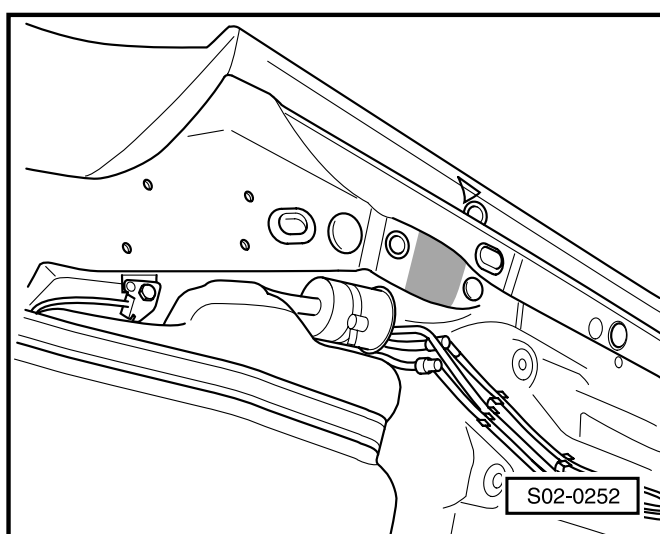
**Under no circumstances may the arms of the lift platform or jack be positioned under the engine, the gearbox, the front or rear axles.**



- ◀ 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 door sill.

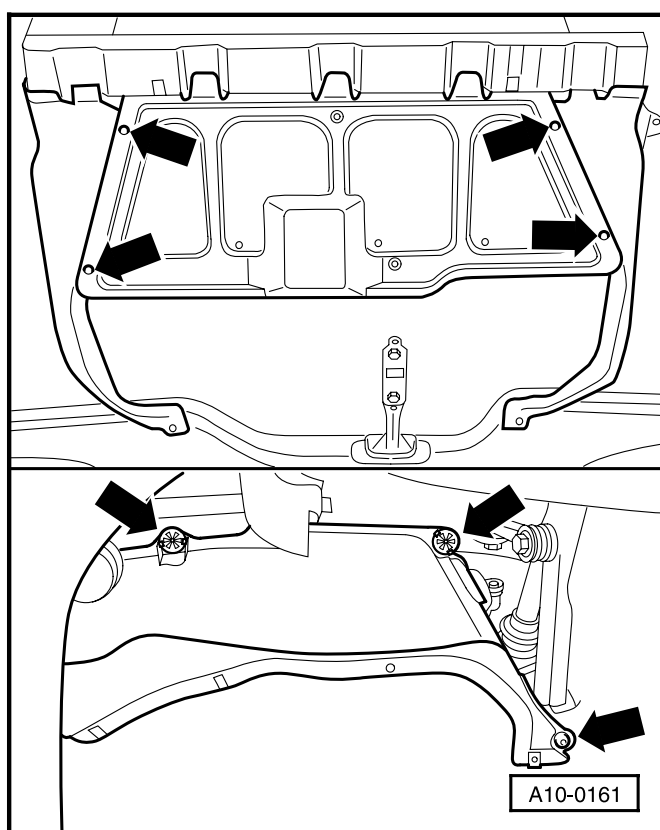
**Warning!**

*When the vehicle is raised, do not start the engine and engage a gear so long as even only one driven wheel is touching the ground.*

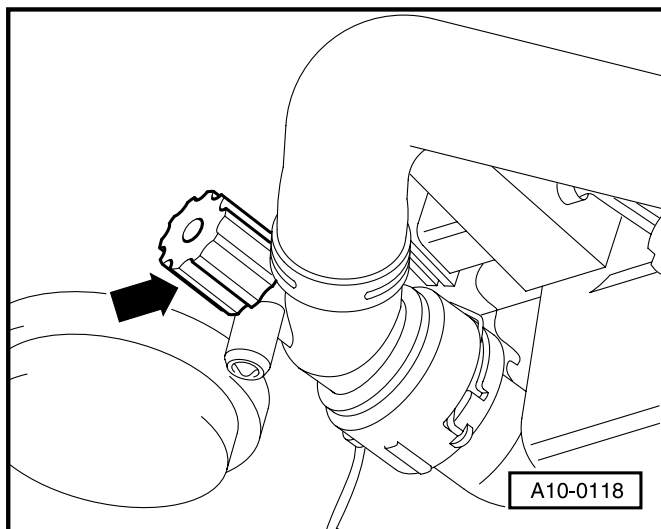


- ◀ The two jacking points at the rear are located at the rear of the two longitudinal members at the level of the marking on the door sill.

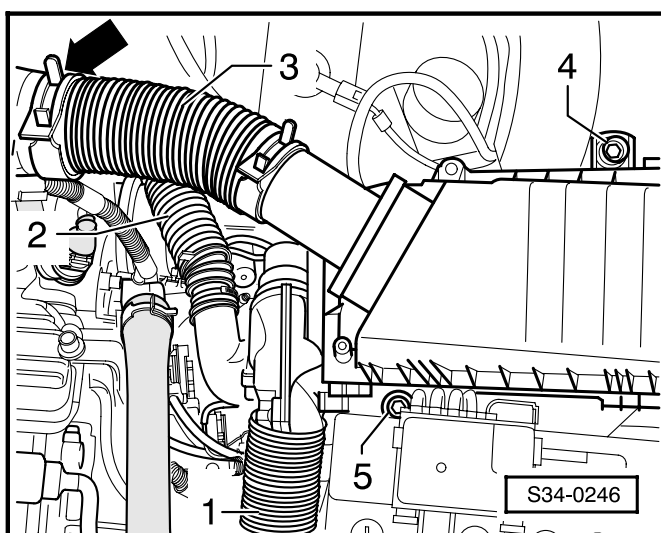
- Take off front right wheel.



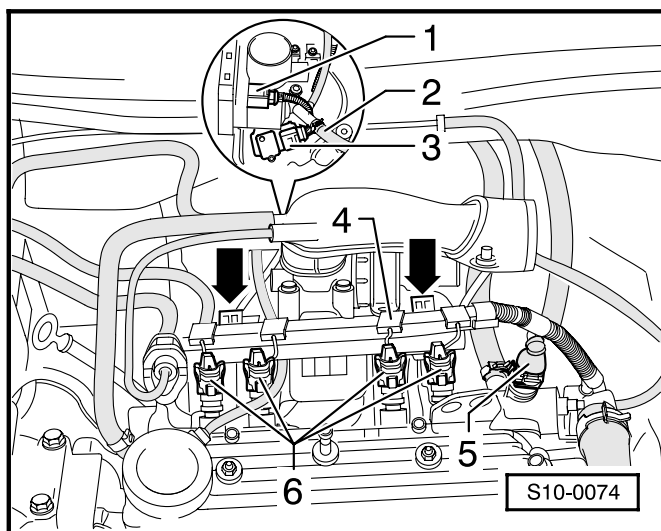
- ◀ - Remove noise insulation in the middle as well as on the left and right -arrows-.



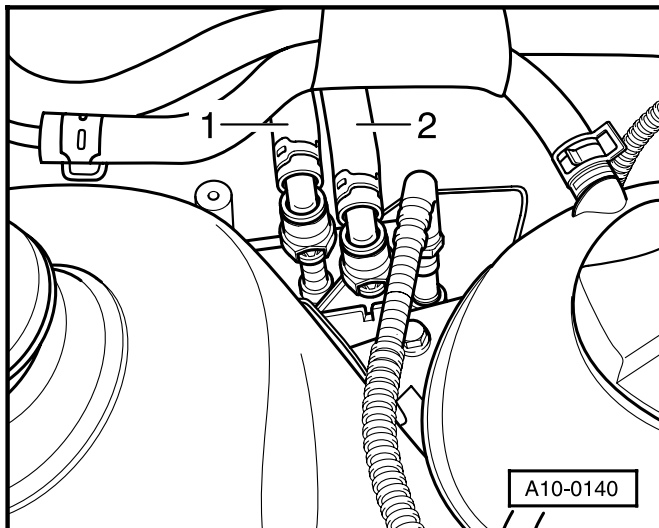
- Place drip tray (e.g. V.A.G 1306) below the engine.
- Open cap of coolant expansion reservoir.
- ◀ - Turn drain plug -arrow- at the radiator to the left and pull back; allow coolant to flow out; fit auxiliary hose onto connection, if necessary.



- ◀ - Detach intake hose -1- from intake connection/lock carrier.
- Detach air hose -2- from warm air baffle.
- Detach intake hose -3- from intake connection/throttle valve control unit -arrow-.
- Remove complete air filter housing; take out screws -4- and -5- for this step.



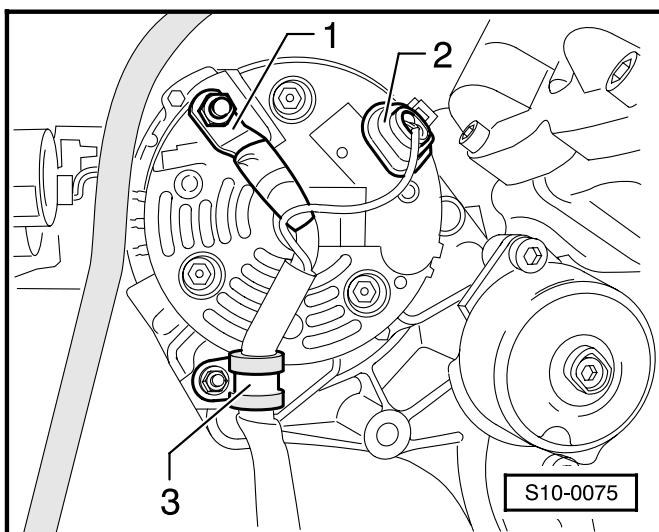
- ◀ - Unplug the following connectors:
  - 1 - from throttle valve control unit -J338-
  - 3 - from intake manifold pressure sender -G71- with intake manifold temperature sender -G72-
  - 5 - from coolant temperature sender -G62-
  - 6 - from injectors -N30... N33-
- Unclip connector strip -4- (arrows) and take wiring loom out of fixtures.
- Detach vent hose -2-.

**Warning!**

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

- ◀ - Detach fuel feed line -1- and fuel return-flow line -2- by applying pressure to the release buttons at the separation point.

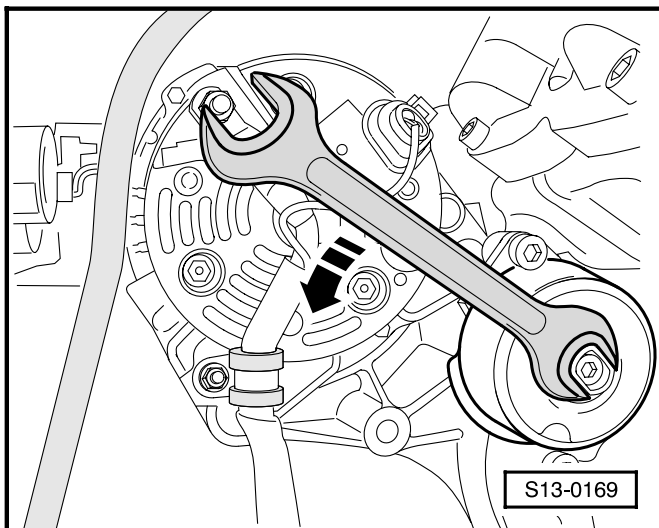
Lines and release buttons are colour-coded.



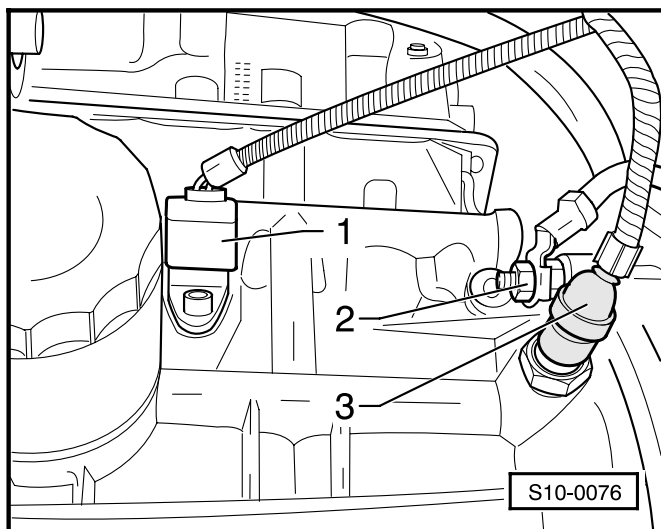
- ◀ - Detach cable at terminal 30/B+ at alternator -1- (15 Nm).
- Unplug connector -2- from terminal D+.
- Unscrew cable clip -3-.
- Unplug connector from ignition strip.

**Note:**

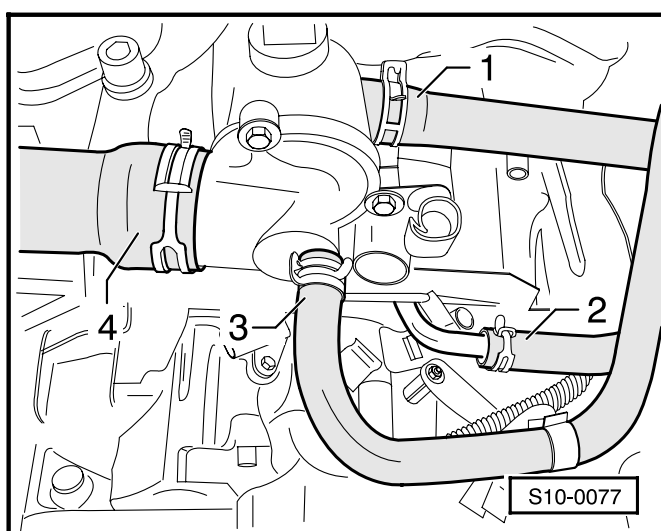
*Before removing the ribbed V-belt, mark direction of running with chalk or felt pen. If a belt which has already been used is fitted on again to run in the opposite direction, it may be destroyed. Ensure the belt is correctly positioned in the belt pulleys when it is installed.*



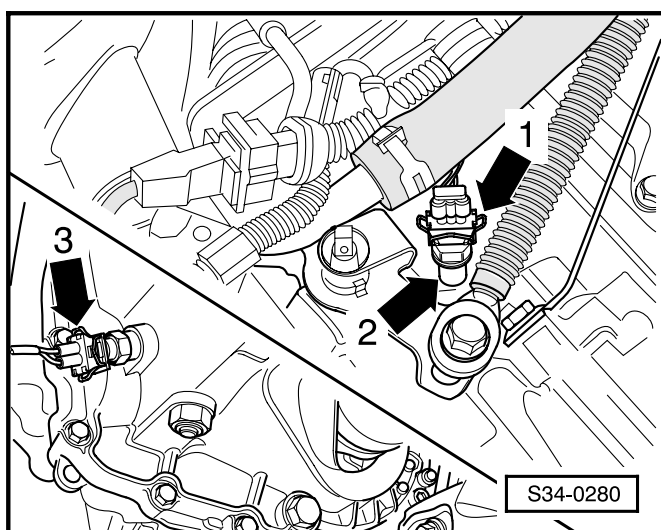
- ◀ - Use size 14 open-end wrench to swivel tensioning device in direction of arrow in order to slacken the ribbed V-belt.
- Take off ribbed V-belt.
- Unplug connector for power steering pump pressure switch.
- Unbolt 2 brackets for pressure line of power steering (at front and on left of gearbox).
- Unbolt belt pulley of power steering hydraulic pump.
- Unbolt power steering pump and tie up at the front of the vehicle. The lines remain connected.



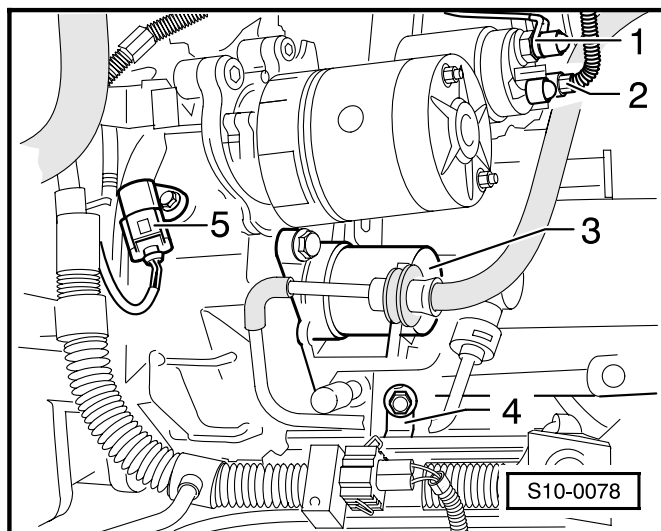
- Position pressure line at left of gearbox to the outside and attach.
- ◀ - Unplug connectors:
  - 1 - from camshaft position sensor -G163-
  - 3 - from oil pressure switch -F1-
- Disconnect earth cable at the bolt connecting engine/gearbox -2-.



- ◀ - Detach coolant hoses -1, 3 and 4- from thermostat housing.
- Detach coolant hose -2- from coolant pipe at rear.
- Detach vacuum line for brake servo unit at intake manifold.
- Separate plug connection to knock sensor -G61-.



- ◀ - Unplug connector (arrow 1) from speedometer sender -G22-.
- Unbolt speedometer sender (arrow 2) -G22- from guide bush.
- Unplug connector (arrow 3) from reversing light switch -F4-.



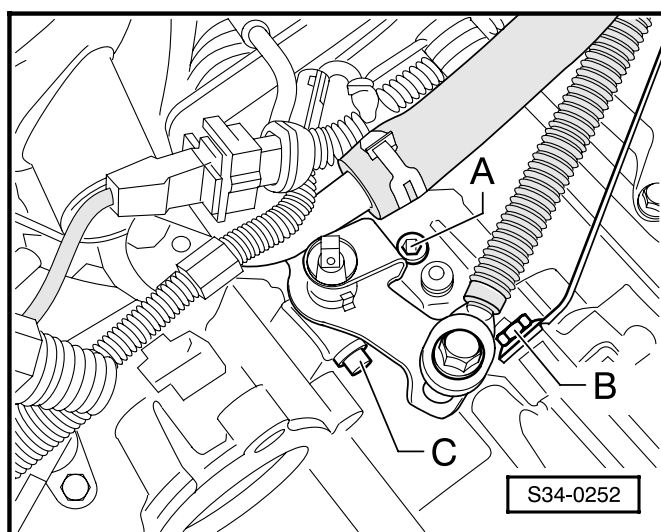
- ◀ - Unbolt cable -1- at the starter (15 Nm) and unplug connector -2-.

- Remove slave cylinder -3-, place down to the side and secure with wire. Do not open piping system.

**Note:**

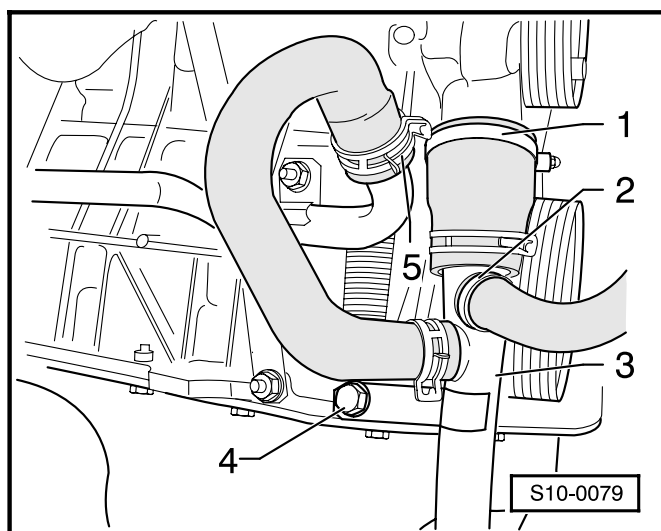
*Do not depress clutch pedal.*

- Unplug connector -5- from engine speed sender -G28-.
- Unbolt cable -4- and place cables down to the side with fixture.



- ◀ - Detach handbrake cable support and mounting bracket from top of gearbox; unscrew bolts -A-, -B- and -C- for this step.

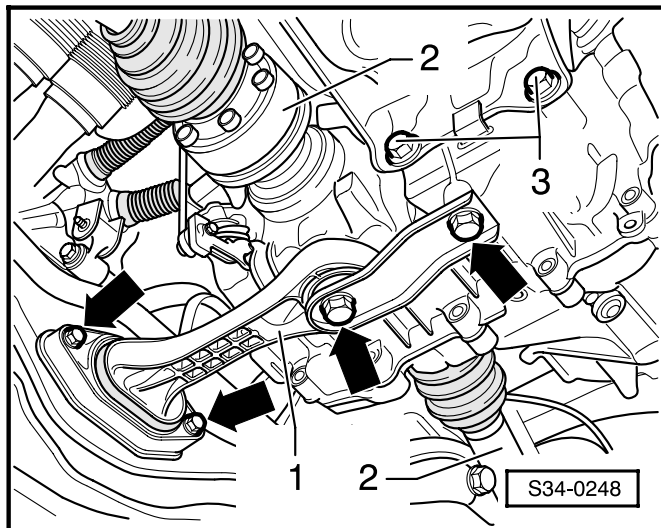
- Remove front exhaust pipe together with catalytic converter ⇒ page 26-1.



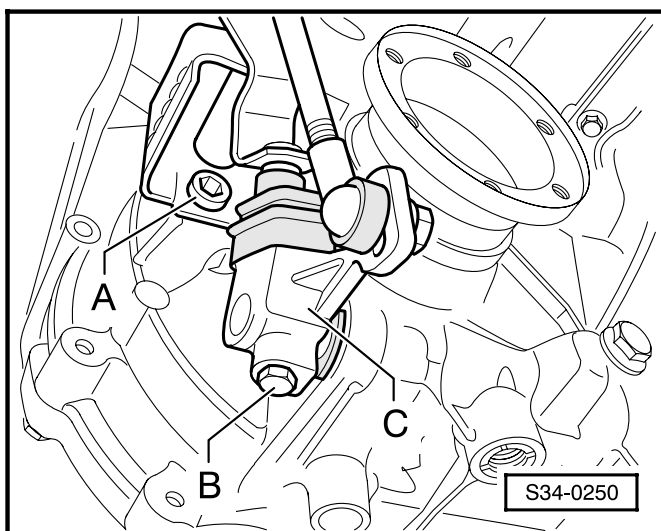
- ◀ - Slacken spring strap clips -2- and -5- and detach hoses.

- Remove front coolant pipe -3-:

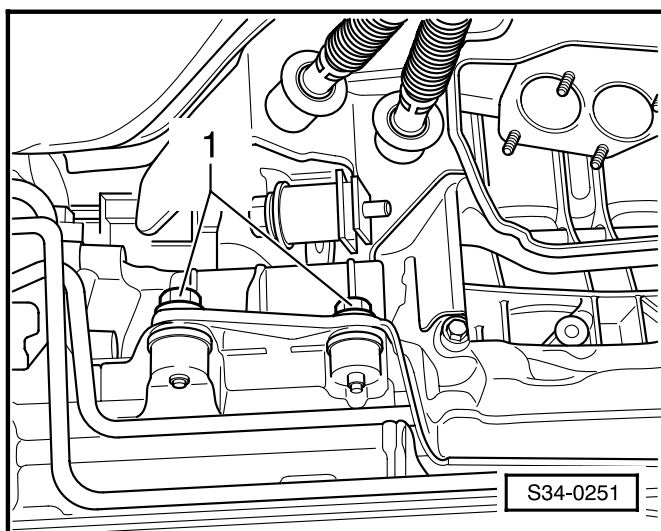
- Slacken screw-type clip -1-.
- Separate quick-coupling at bottom of radiator.
- Take off pipe attachment at front of engine and at rear of engine -4-.
- Detach front coolant pipe together with hoses.  
Collect coolant which flows out.



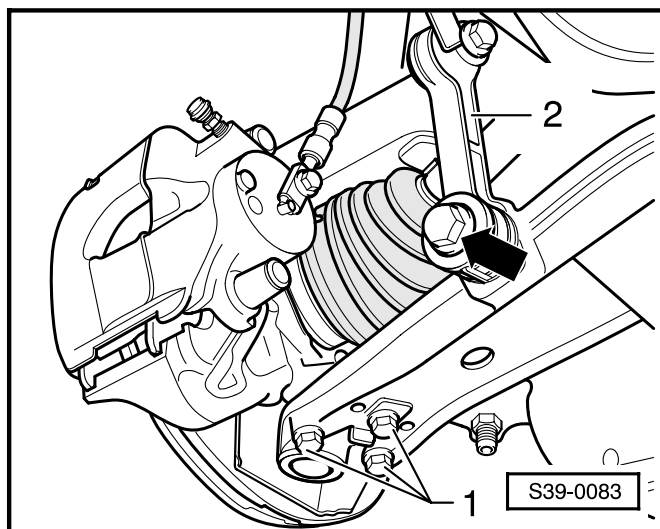
- ◀ - Unbolt pendulum support -1- (arrows).
- Detach drive shafts -2- from flange shafts, turn steering to full left lock and tie up left drive shaft as far as possible. Do not damage the surface protection during this step.



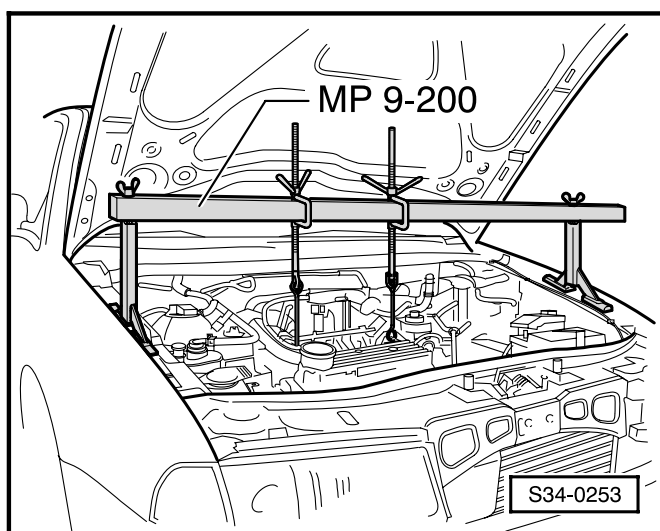
- ◀ - Detach mounting bracket from bottom of gearbox; engage 4<sup>th</sup> gear for this step.
- Remove hexagon socket screw -A-.
- Slacken bolt -B- sufficiently so that the shift finger -C- can be taken off the shift shaft.



- ◀ - Detach supporting angle bracket from steering gear; unscrew bolt -1- for this step.
- Tie up cable support together with mounting bracket and supporting angle bracket.



- ◀ - Mark installation position of bolts -1- for right steering joint, otherwise axle geometry has to be checked.
- Unscrew bolts -1-.
- Unbolt coupling rod -2- from the right steering arm -arrow-.
- Place right drive shaft to the front and tie up.

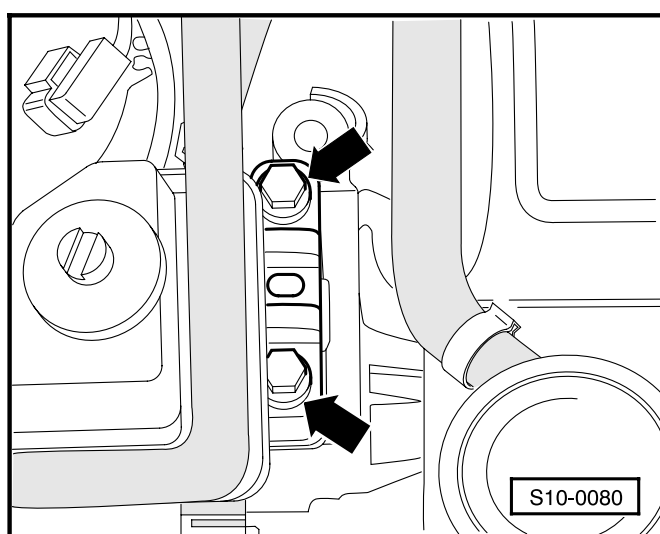


- ◀ - Install suspension device MP 9-200 and mark position of the supports on the wings.

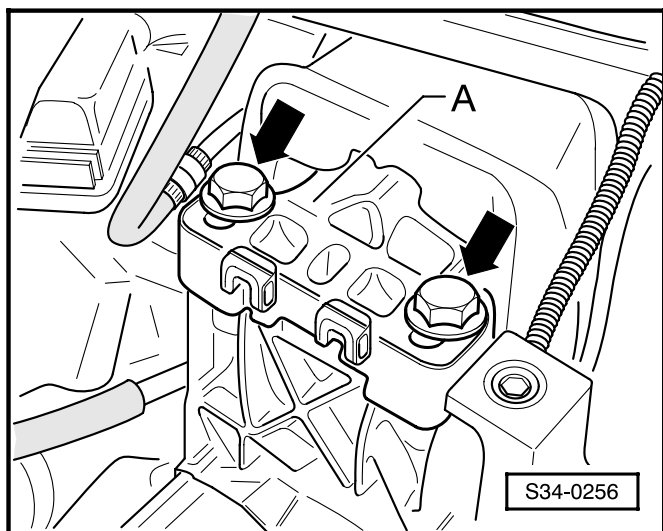
**Note:**

*The marking is important for installing the engine (inclined position of engine on engine mount MP 9-503).*

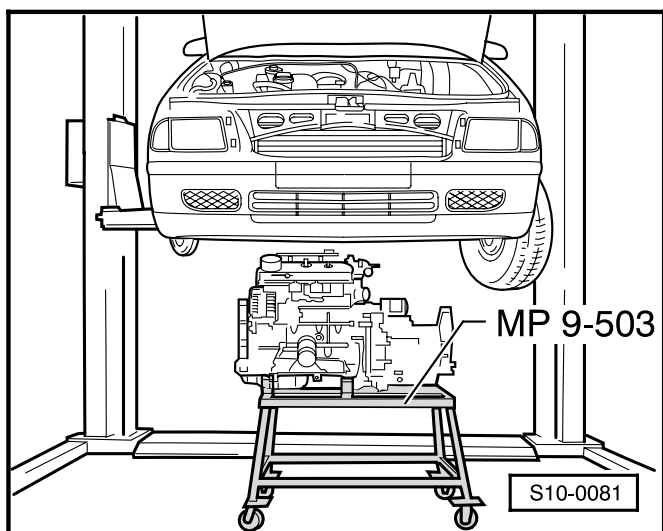
- Take up the weight of the engine/gearbox unit at the spindles.



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



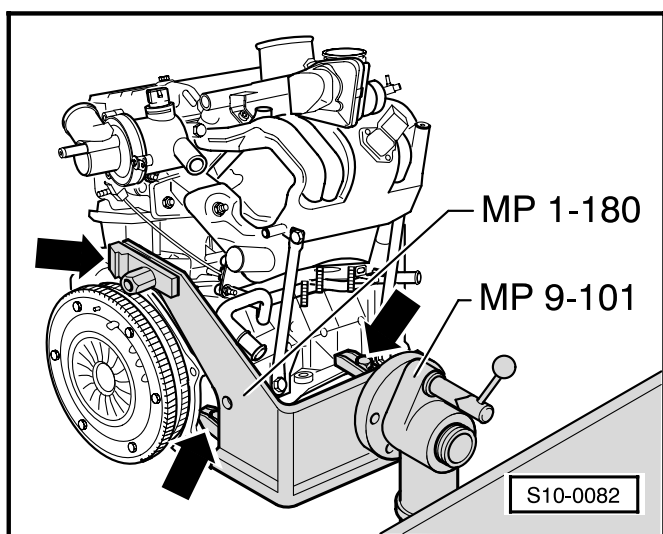
- ◀ - Unbolt gearbox mount -A- from the gearbox support -arrows-.
- Position modified engine mount MP 9-503 (⇒ page 10-1) below engine/gearbox unit.
- Lower vehicle with lift platform until it is about 6 cm from the engine mount.
- Lower engine/gearbox unit with MP 9-200 onto the modified engine mount MP 9-503. Pay attention to adequate clearance to chassis and to body.



- ◀ - Take off supporting device MP 9-200 and raise vehicle.

**Note:**

*When raising the vehicle, ensure that the engine/gearbox unit does not make contact with the body.*



- ◀ The engine should be attached with the engine holder MP 1-180 on the repair stand MP 9-101 for carrying out removal and installation work.

**Note:**

*Do not clamp engine at the mounts of the engine holder -arrows-.*

It is also possible to use engine holder MP 1-202 in place of engine holder MP 1-180.

## Installing engine

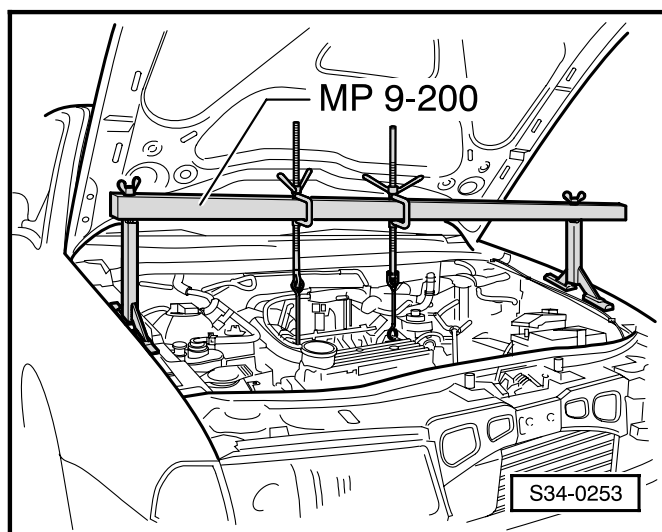
### Notes:

- ◆ Always replace seals and gaskets when carrying out removal and installation work.
- ◆ Always replace self-locking nuts.
- ◆ Coat stud bolts at exhaust manifold with hot bolt paste G 052 112 A3.
- ◆ Align mounting for engine and gearbox ⇒ page 10-13.
- ◆ Tightening torques ⇒ page 10-14.
- ◆ Engine/gearbox mounting ⇒ page 10-14.

### Procedure

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

- Clean splines of input shaft and apply a thin film of grease G 000 100.
- When attaching the gearbox, ensure the intermediate plate is correctly located.
- Check whether dowel sleeves are inserted in the cylinder block for centering engine/gearbox; insert if necessary.
- ◀ - Position supporting device MP 9-200 at the same point as for removing engine.
- When installing the engine/gearbox unit, ensure adequate clearance to surrounding components.
- Align engine/gearbox unit ⇒ page 10-13.
- Install shift mechanism:  
⇒ 5-Speed Manual Gearbox 002; Repair Group 34; Removing and installing gearbox
- Adjust shift mechanism:  
⇒ 5-Speed Manual Gearbox 002; Repair Group 34; Servicing shift mechanism; Adjusting shift mechanism
- Install drive shafts:  
⇒ Running Gear; Repair Group 40; Removing and installing drive shaft



- Install front exhaust pipe and align exhaust system free of stress ⇒ page 26-4.

**Note:**

*Avoid an excessive deflection of the decoupling element at the front exhaust pipe (max. 10°).*

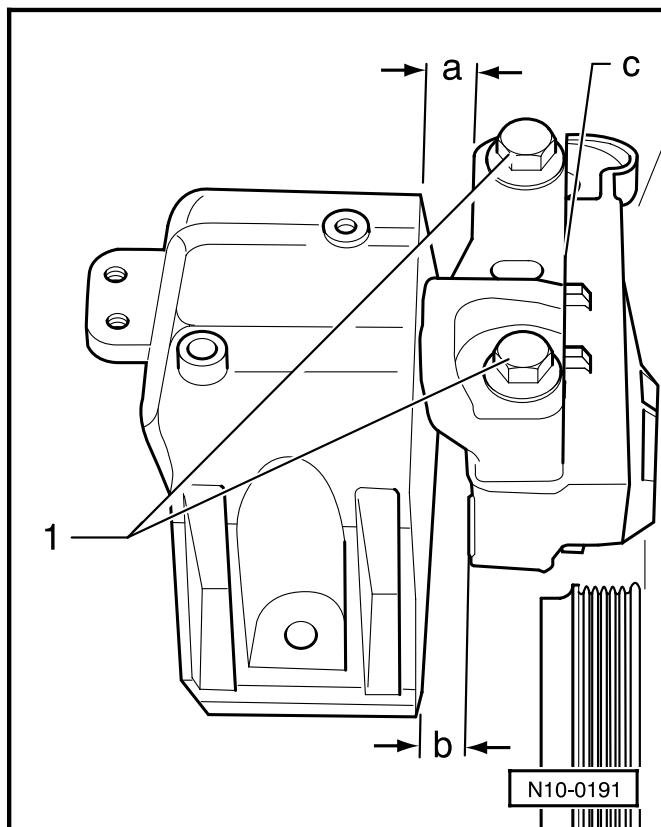
- Install the power steering hydraulic pump.  
⇒ Running Gear; Repair Group 48; Removing and installing hydraulic pump
- Install ribbed V-belt.
- Fit on coolant hoses ⇒ page 19-1.

**Note:**

*Drained coolant may only be re-used provided the cylinder block, cylinder head, radiator or heat exchanger have not been replaced.*

- Fill system with coolant ⇒ page 19-2.
- Inspect oil level before starting the engine.
- Electrical connections and routing.  
⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations binder
- After connecting the battery:
  - Encode radio.
  - Set clock.
  - Initialise power windows.
- ⇒ Inspection and Maintenance
- Carry out adaptation of throttle valve control unit.  
⇒ 1.4-ltr./44 kW Engine, Simos 3PB Fuel Injection and Ignition System; Repair Group 24; Performing adaptation of throttle valve control unit.
- Carry out a road test and interrogate and erase fault memory.  
⇒ 1.4-ltr./44 kW Engine, Simos 3PB Fuel Injection and Ignition System; Repair Group 01; Interrogating and erasing fault memory

## Aligning engine/gearbox unit

**Warning!**

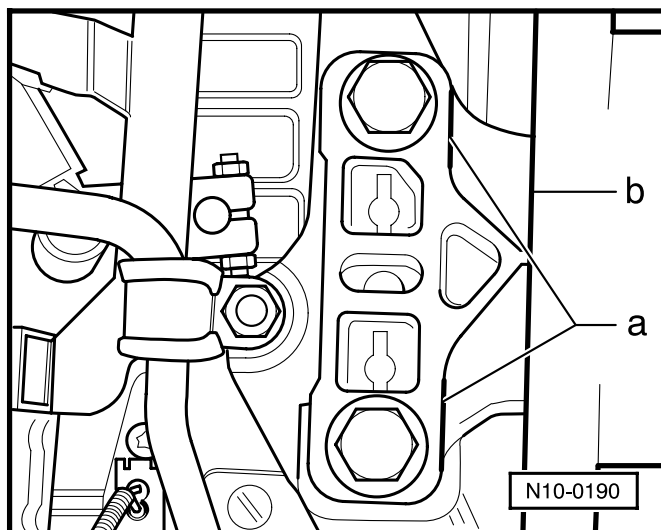
*The unit must be supported by supporting device MP 9-200 before slackening the bolts.*

## ◀ Engine mounting

a = 14.0 mm

b = at least 10.0 mm

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



## ◀ Gearbox mounting

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

Tightening torques

Notes:

- ♦ Tightening torques apply only to nuts and bolts which are slightly greased, oiled, phosphatized or blackened.
- ♦ Additional lubricants such as engine or gear oils are permissible, but not Molykote.
- ♦ Do not use any parts which have been degreased.
- ♦ The following tightening torques apply to bolted connections if no other tightening torque is indicated:

| Component                                                                           |     | Nm                       |
|-------------------------------------------------------------------------------------|-----|--------------------------|
| Nuts/bolts                                                                          | M6  | 9                        |
|                                                                                     | M7  | 13                       |
|                                                                                     | M8  | 20                       |
|                                                                                     | M10 | 40                       |
|                                                                                     | M12 | 70                       |
| in variation of this:                                                               |     |                          |
| Steering joint to track control arm <sup>1)</sup> M8                                |     | 20 + 90°                 |
| Coupling rod to track control arm M10                                               |     | 45                       |
| Cable to terminal 30/B+ of generator M8                                             |     | 15                       |
| Cable to terminal 30 of starter M8                                                  |     | 15                       |
| Engine mounts, gearbox mounts, pendulum support                                     |     | ⇒ Eng./ gearbox mounting |
| Bolts connecting engine to gearbox<br>⇒ 5-Speed Manual Gearbox 002; Repair Group 34 |     |                          |

<sup>1)</sup> Always replace these bolts.

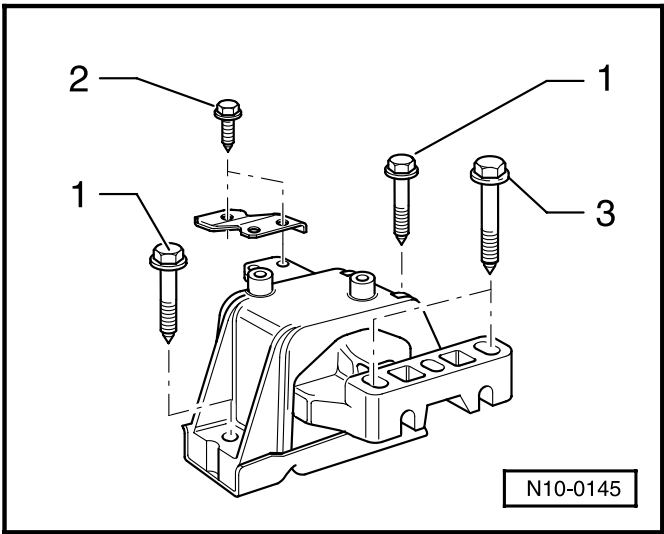
Engine/gearbox mounting

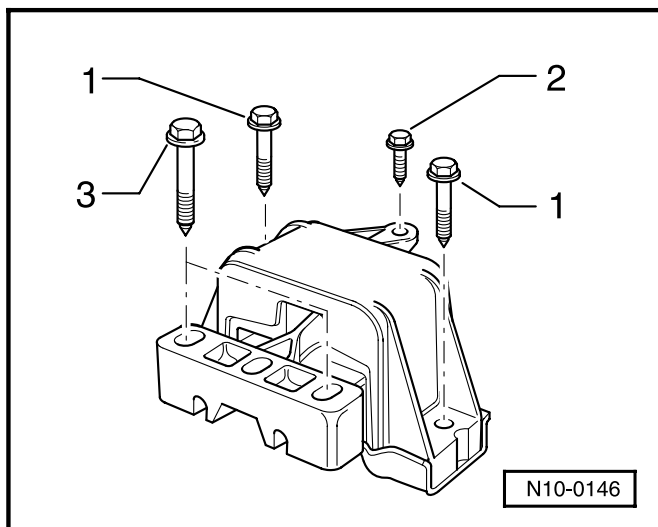
Tightening torques

◀ Engine mounting

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

<sup>1)</sup> Replace bolts



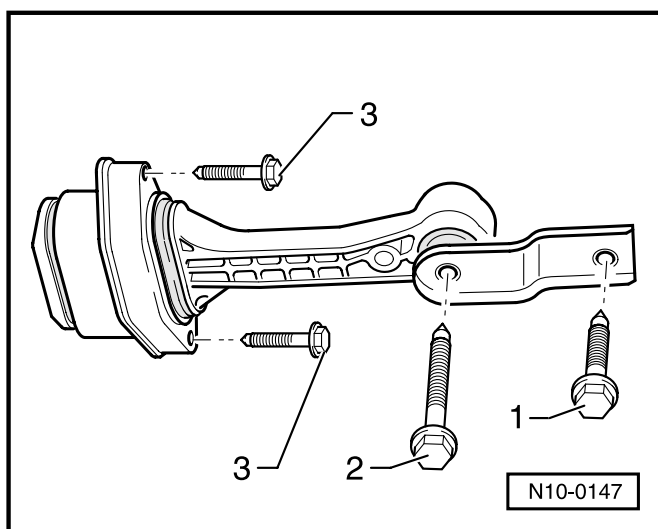
**◀ Gearbox mounting**

1 - 40 Nm + 90° (1/4 turn)<sup>1)</sup>

2 - 25 Nm

3 - 100 Nm <sup>1)</sup>

<sup>1)</sup> Replace bolts

**◀ Pendulum support**

1 - 40 Nm + 45° <sup>1)</sup>

2 - 40 Nm + 45° <sup>1)</sup>

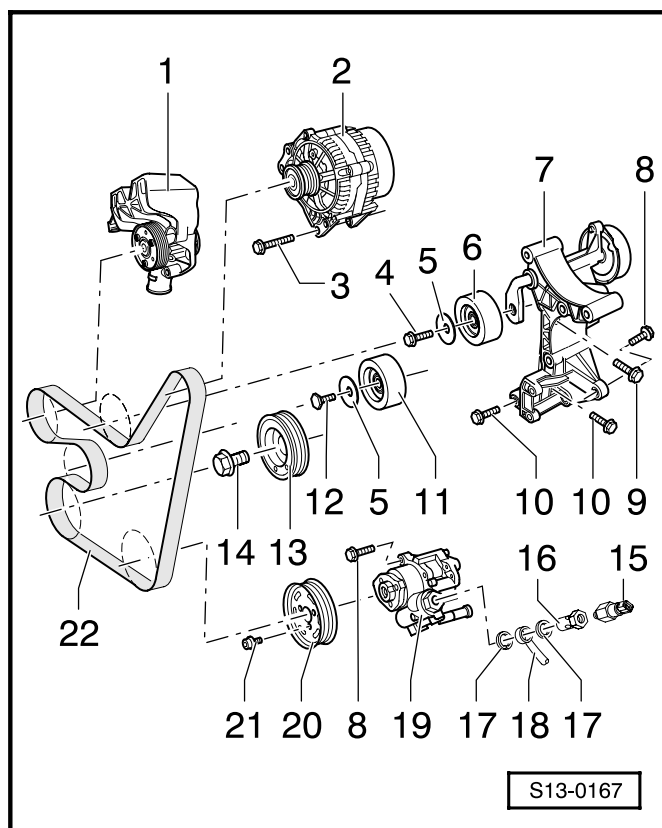
3 - 20 Nm + 90° (1/4 turn)<sup>1)</sup>

<sup>1)</sup> Replace bolts



## Disassembling and assembling engine

### Removing and installing ribbed V-belt



#### Note:

Before removing the ribbed V-belt, mark the direction of running. If a belt which has already been used is fitted on to run in the opposite direction, it may be destroyed. Ensure the belt is correctly fitted in the belt pulleys when installed.

#### 1 - Coolant pump

- ◆ Removing and installing  
⇒ page 19-8

#### 2 - Alternator

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

#### 3 - 25 Nm

#### 4 - 25 Nm

- ◆ Left-hand thread

#### 5 - Dished washer

- ◆ Curved side faces out

#### 6 - Tensioning pulley

- ◆ Slackening ⇒ page 13-2

#### 7 - Bracket

#### 8 - 25 Nm

#### 9 - 45 Nm

#### 10 - 25 Nm

#### 11 - Guide pulley

#### 12 - 20 Nm

- ◆ Left-hand thread

#### 13 - Belt pulley

- ◆ For crankshaft

#### 14 - 100 Nm

- ◆ Lock flywheel for slackening and tightening  
Engine removed: with MP 1-504  
Engine installed: with auxiliary tool  
⇒ page 13-7

#### 15 - Power steering pressure switch -F88-

- ◆ With sealing ring rolled on
- ◆ Tighten to 15 Nm

#### 16 - Banjo bolt, 30 Nm

- ◆ Remove and install together with power steering pressure switch

#### 17 - Sealing ring

- ◆ Replace

#### 18 - Pressure line

#### 19 - Hydraulic pump

- ◆ For power steering
- ◆ Drive back threaded bushes for retaining bolts slightly to more easily position hydraulic pump against bracket
- ◆ Removing and installing:  
⇒ Running Gear; Repair Group 48; Removing and installing hydraulic pump

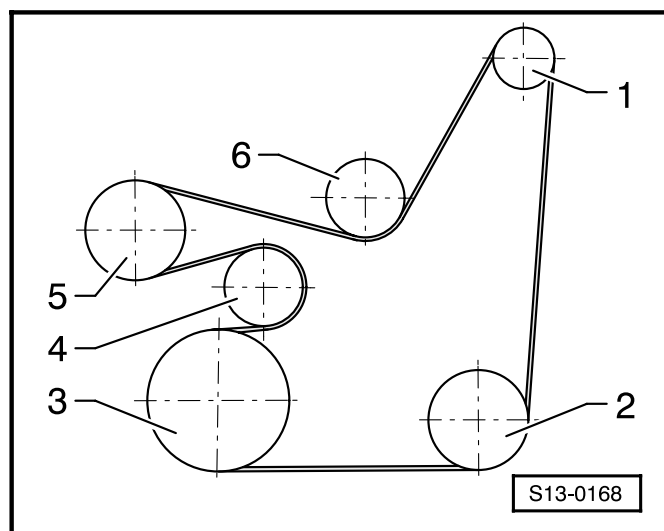
#### 20 - Belt pulley

- ◆ For hydraulic pump

#### 21 - 25 Nm

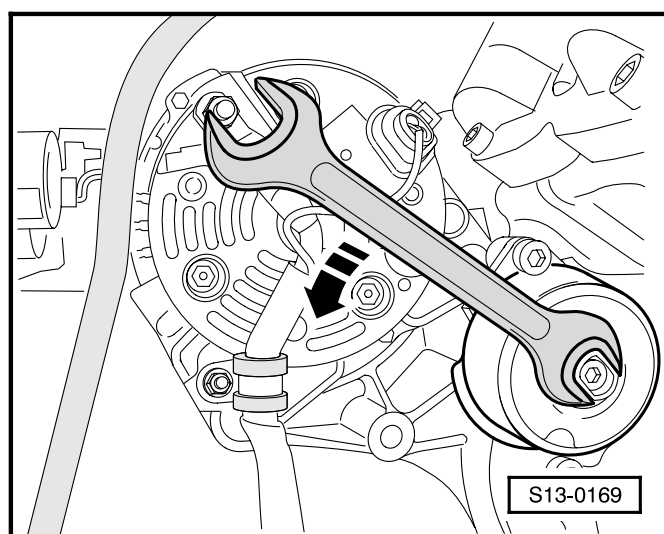
#### 22 - Ribbed V-belt

- ◆ Mark direction of running before removing
- ◆ Inspect condition  
⇒ Inspection and Maintenance; Descriptions of operations; Ribbed V-belt: Inspecting condition
- ◆ Do not kink
- ◆ Running diagram of ribbed V-belt  
⇒ Fig. 1
- ◆ Removing and installing  
⇒ page 13-2



◀ **Fig. 1 Routing of ribbed V-belt**

- 1 - Alternator
- 2 - Vane pump for the power-assisted steering
- 3 - Crankshaft
- 4 - Guide pulley
- 5 - Coolant pump
- 6 - Tensioning pulley



### Removing

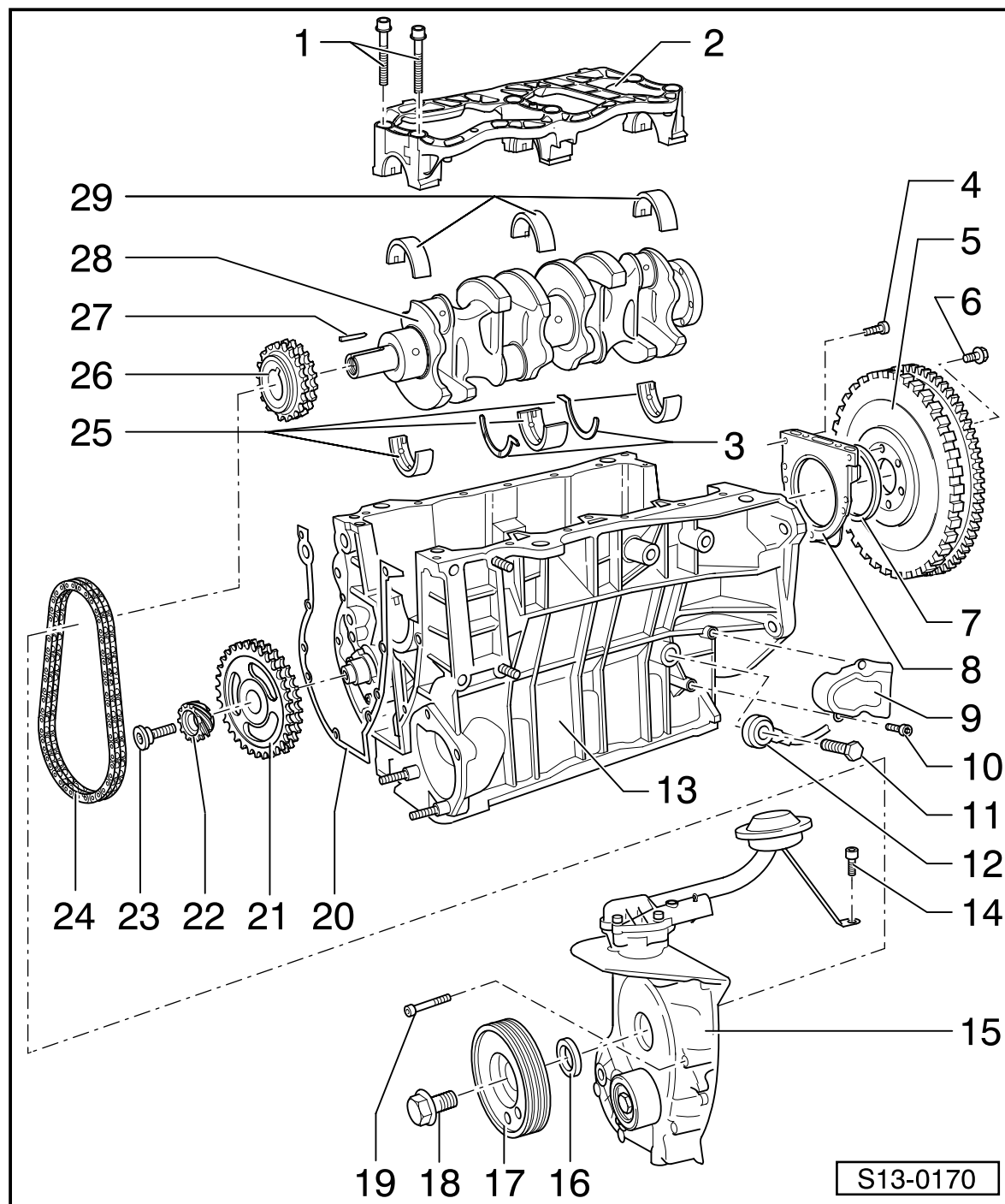
- Mark the direction of running of the ribbed V-belt.
- ◀ - Slacken tensioning pulley. Swivel out open-end wrench SW 14 in direction of arrow.
- Remove ribbed V-belt, pivot tensioning pulley back.

### Installing

#### Notes:

- ♦ *Inspect ribbed V-belt for wear.*  
⇒ Inspection and Maintenance; Work Procedures; Ribbed V-belt: Inspect condition
- ♦ *Before installing the ribbed V-belt, ensure that all the components are firmly installed (alternator, coolant pump, hydraulic pump).*
- ♦ *Check smooth operation of belt pulley, tensioning and guide pulley.*
- Fit on ribbed V-belt, except on tensioning pulley.
- Slacken tensioning pulley. Swivel out open-end wrench SW 14 in direction of arrow.
- Remove ribbed V-belt, pivot tensioning pulley back.
- Start engine and check running of belt.

## Disassembling and assembling cylinder block, crankshaft and flywheel



### Notes:

- ♦ Servicing clutch  
⇒ 5-Speed Manual Gearbox 002; Repair Group 30; Servicing clutch
- ♦ Attach engine with the engine holder MP 1-180 or MP 1-202 to the repair stand MP 9-101 for carrying out removal and installation operations.

1 - 75 Nm

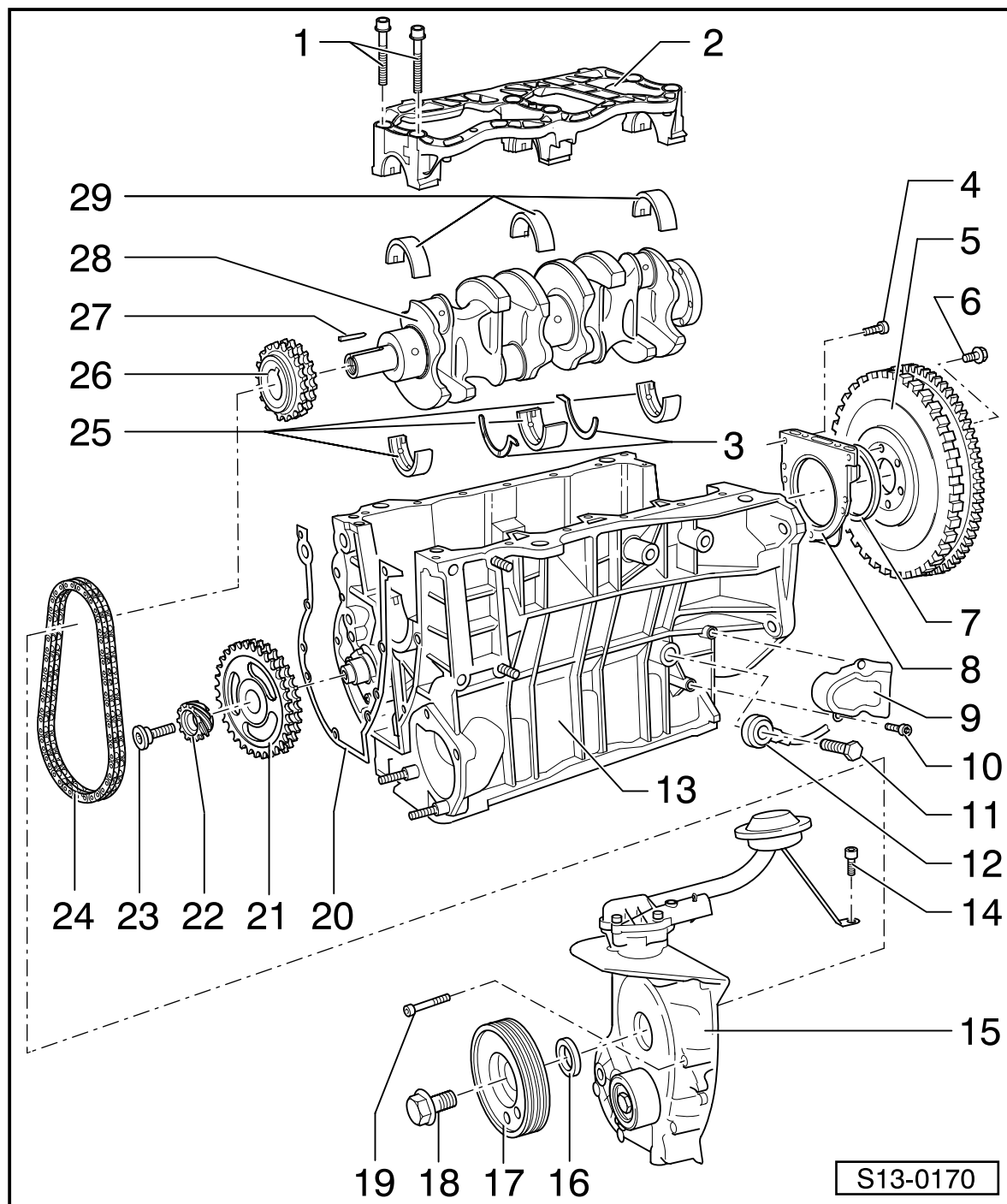
2 - Crankshaft bearing unit

3 - Thrust washer

- ♦ for middle bearing
- ♦ lubricating grooves face out

4 - 8 Nm

- ♦ insert with AMV 188 520 (Loctite 574)



S13-0170

**5 - Flywheel**

- ◆ with sensor rotor for engine speed sender -G28-
- ◆ lock with MP 1-504 for removing and installing
- ◆ replace ring gear ⇒ page 13-8
- ◆ can be installed only in one position (bolts offset)

**6 - 30 Nm + torque a further 1/4 turn (90°)**

- ◆ replace
- ◆ insert with AMV 200 000 (Loctite 270)

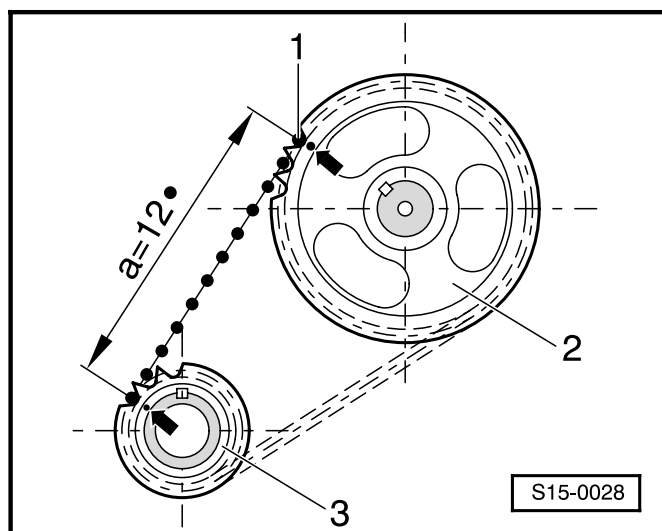
**7 - Seal**

- ◆ replace
- ◆ take off sealing flange for removing and installing
- ◆ before installing, lightly oil sealing lip and outer edge
- ◆ press seal fully into sealing flange

**8 - Sealing flange**

- ◆ not available as replacement part (only together with cylinder block)
- ◆ coat with AMV 188 520 (Loctite 574) before fitting on

- 9 - Shield**
  - ◆ for knock sensor -G61-
- 10 - 5 Nm**
- 11 - 20 Nm**
  - ◆ tightening torque affects proper operation of knock sensor
- 12 - Knock sensor -G61-**
- 13 - Cylinder block**
  - ◆ disassembling and assembling pistons, conrod and liners ⇒ page 13-9
- 14 - 8 Nm**
- 15 - Timing gear cover**
- 16 - Seal**
  - ◆ replace ⇒ page 13-7
- 17 - Belt pulley**
  - ◆ for crankshaft
- 18 - 100 Nm**
  - ◆ lock flywheel for slackening and tightening  
Engine removed: use MP 1-504  
Engine installed: use auxiliary tool ⇒ page 13-7
- 19 - 7 Nm**
  - ◆ insert with AMV 105 500 (Loctite 242)
- 20 - Gasket**
  - ◆ replace
- 21 - Camshaft sprocket**
  - ◆ check synchronous running of sprockets after replacing ⇒ page 13-6
  - ◆ setting camshaft ⇒ Fig. 1
- 22 - Helical gear**
  - ◆ for oil pump drive
- 23 - 25 Nm**
  - ◆ insert with AMV 154 100 (Loctite 648)
- 24 - Timing chain**
  - ◆ mark direction of running (installation position) before removing
  - ◆ always replace complete with crankshaft sprocket and camshaft sprocket
- 25 - Bearing shell**
  - ◆ for cylinder block with lubricating groove
  - ◆ do not mix up used bearing shells (mark)
- 26 - Crankshaft sprocket**
  - ◆ check synchronous running of sprockets after replacing ⇒ page 13-6
  - ◆ setting camshaft ⇒ Fig. 1
- 27 - Parallel key**
  - ◆ check tightly installed
- 28 - Crankshaft**
  - ◆ axial play new: 0.03...0.13 mm  
wear limit: 0.26 mm
- 29 - Bearing shell**
  - ◆ for crankshaft bearing unit without lubricating groove
  - ◆ do not mix up used bearing shells (mark)



◀ Fig. 1 Setting camshaft

- Insert chain sprockets -2- and -3- into the timing chain -1- in such a way that the distance -a- from marking to marking -arrows- is 12 chain pins.

## Inspecting synchronous running of chain sprockets

This inspection should be carried out if the sprockets have been replaced.

### Special tools, testers and aids required

- ◆ Straightedge
- ◆ Feeler gauge

The crankshaft sprocket is available in 3 different widths; graduations: 0.2 mm marked with letters „E“, „F“ or „G“. The wheel with an average thickness, marked with the letter „F“, is supplied together with the camshaft sprocket in a set, the wheels marked with the letters „E“ and „G“ are only supplied individually.

⇒ Spare Part Catalogue

- ◀ Marking of the crankshaft sprocket radially in the area of the slot for the Woodruff key -arrow- is carried out with the letters „E“, „F“ or „G“.

### Note:

*If the chain sprockets are replaced, order crankshaft sprocket with same code letter and check synchronous running of chain sprockets.*

### Test procedure

- ◀ - Press the chain sprockets until they make contact, with the markings -arrows- for the timing pointing outwards.
- Place straightedge flat onto the camshaft sprocket and measure size of gap at crankshaft sprocket.

### Positioning of chain sprockets

1 - Camshaft sprocket

2 - Crankshaft sprocket

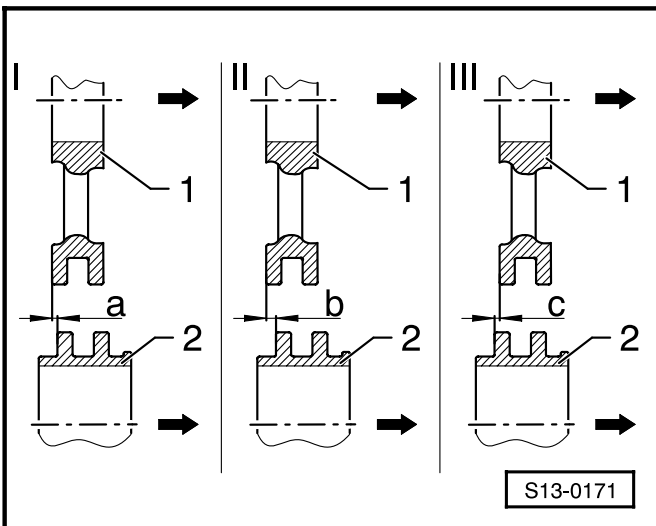
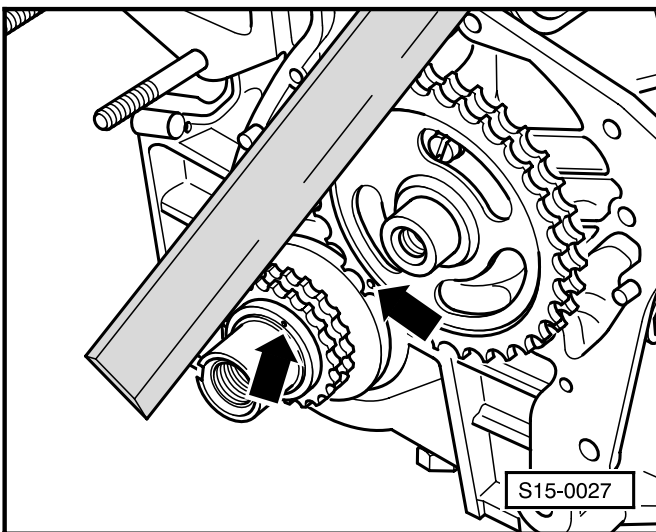
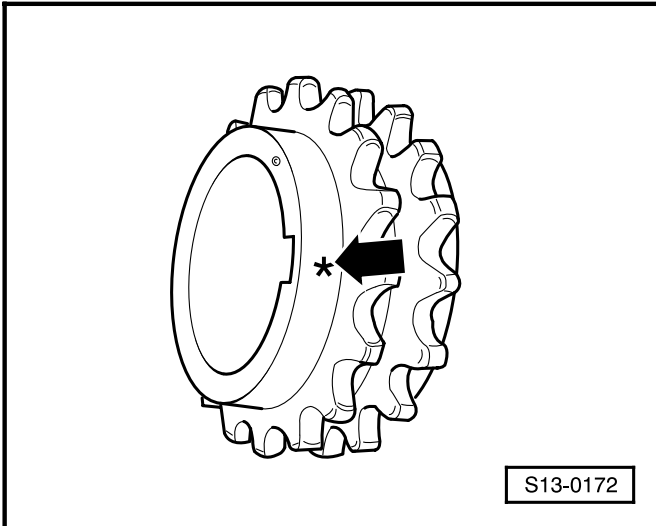
arrow - points to the flywheel side

I - Nominal dimension -a- =  $0.09 \pm 0.20$  mm

II - max. tolerance -b- = 0.29 mm

III - min. tolerance -c- = 0.11 mm  
(crankshaft sprocket is positioned further out)

- If the size of the gap is not within the tolerance range, install crankshaft sprocket of a different width and repeat the inspection.



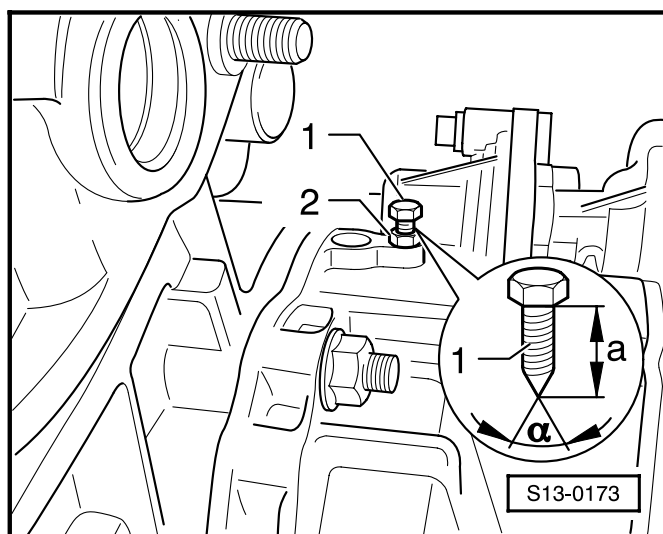
## Replacing crankshaft seal at belt pulley side

### Special tools, testers and aids required

- ◆ Thrust piece MP 6-401/1
- ◆ Two-legged puller Kukko 20-10
- ◆ Extraction hook T10040/1
- ◆ Thrust piece T10041
- ◆ Flywheel lock MP 1-504
- ◆ Torque wrench 5...50 Nm  
(e.g. V.A.G 1331)
- ◆ Torque wrench 40...200 Nm  
(e.g. V.A.G 1332)
- ◆ M 6x40 bolt (quality class: 8.8)
  - Make a 60° tip at end of bolt.
- ◆ M6 nut

### Removing

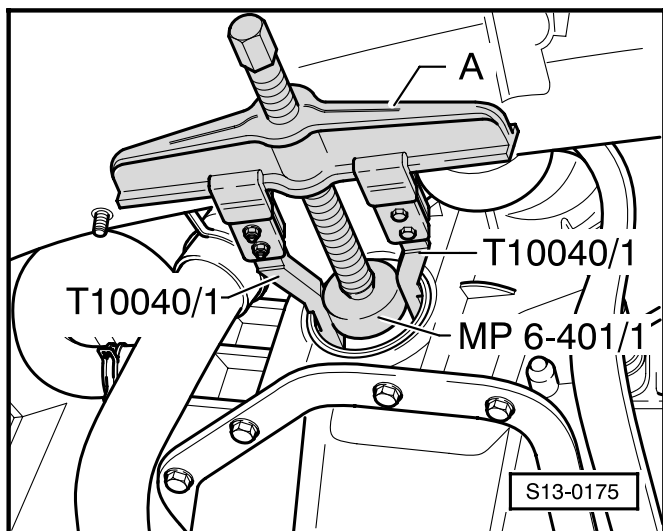
- Remove ribbed V-belt ⇒ page 13-1.
- ◀ - To lock crankshaft sender for engine speed, remove and screw in modified bolt -1- ( $a = 40 \text{ mm}$ ;  $\alpha = 60^\circ$ ).
- Remove noise insulation in the middle and on the right.
- Turn crankshaft slightly at the central bolt until the "locking bolt" can be screwed in fully (tip of bolt is positioned between 2 teeth of ring gear).
- Tighten bolt fully in this position and lock with nut -2-.



### Note:

*When engine is removed, use flywheel lock MP 1-504 for locking the crankshaft.*

- Remove central bolt and crankshaft belt pulley.



- ◀ - Use two-legged puller -A- (Kukko 20-10), extraction hook T10040/1 and thrust piece MP 6-401/1 to pull out sealing ring.

### Installing

- Crankshaft is locked with MP 1-504 or with "locking bolt".

- Lightly oil sealing lip of sealing ring.

- ◀ - Use thrust piece T10041 to press in the sealing ring until it makes contact with the sleeve.

### Note:

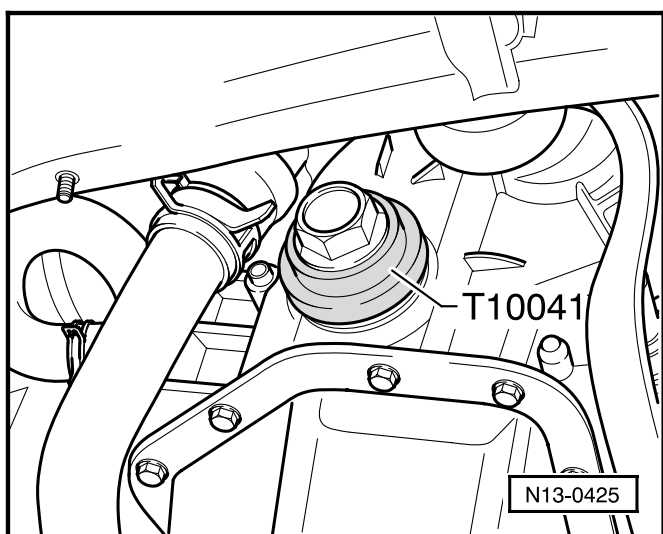
*Use central bolt of belt pulley for drawing in.*

- Install crankshaft belt pulley.
- Tighten central bolt fully to 100 Nm.
- Remove "locking bolt" and re-install engine speed sender.  
Tightening torque 10 Nm.

### Note:

*Do not start engine so long as the "locking bolt" is still in the gearbox housing.*

- Install ribbed V-belt ⇒ page 13-1.



## Replacing ring gear

- Flywheel removed

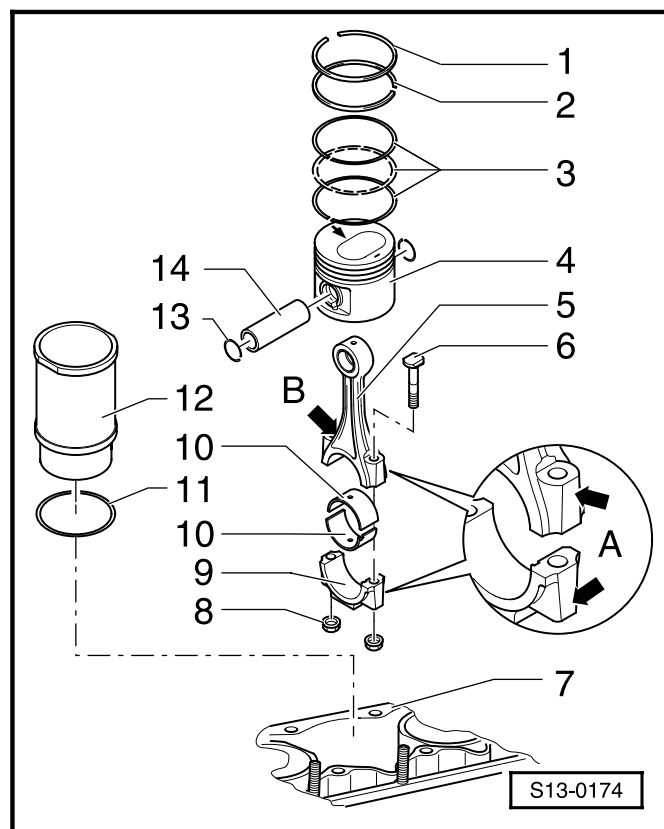
### Removing

- Place flywheel down flat and knock off ring gear in stages by applying blows over the entire circumference. Heat ring gear if it is stiff.

### Installing

- Heat ring gear to about 150 °C and fit evenly onto the flywheel. If necessary, knock in further as far as the stop by striking with a drift over the entire circumference.

## Disassembling and assembling pistons, conrod and cylinder liner



### Note:

The engine should be attached with engine holder MP 1-180 or MP 1-202 to repair stand MP 9-101 for carrying out removal and installation work.

### Special tools, testers and aids required

- ◆ Cylinder liner extractor MP 1-105
- ◆ Piston pin drift T10046

#### 1 - Piston ring (chrome-plated)

- ◆ Use piston ring pliers for removing and installing
- ◆ Marking "TOP" faces piston crown
- ◆ Inspecting piston ring gap clearance ⇒ Fig. 1
- ◆ Inspecting piston ring end clearance ⇒ Fig. 2

#### 2 - Piston ring (grey)

- ◆ Use piston ring pliers for removing and installing
- ◆ Marking "TOP" faces piston crown
- ◆ Inspecting piston ring gap clearance ⇒ Fig. 1
- ◆ Inspecting piston ring end clearance ⇒ Fig. 2
- ◆ Offset gap by 120° to top piston ring

#### 3 - Oil scraper ring (3-section)

- ◆ Remove and install by hand
- ◆ Installing ⇒ Fig. 3

#### 4 - Piston

- ◆ Mark installation position and matching cylinder liner
- ◆ Arrow on piston crown points toward camshaft side
- ◆ Use piston ring tensioning strap for installing
- ◆ Install only pistons of the same weight class (+ or - on piston crown)
- ◆ Available as replacement part only as a set with liners (4 in total)

#### 5 - Conrod

- ◆ Pay attention to installation position: engraved number (1 - 4 for corresponding cylinder) -arrow A- points toward camshaft side
- ◆ Oil drilling -arrow B- for lubricating piston pin
- ◆ Available as replacement part only in a set (4 conrods with conrod cap)

#### 6 - Conrod bolt

- ◆ Pay attention to installation position
- ◆ Press out for replacing

#### 7 - Cylinder block

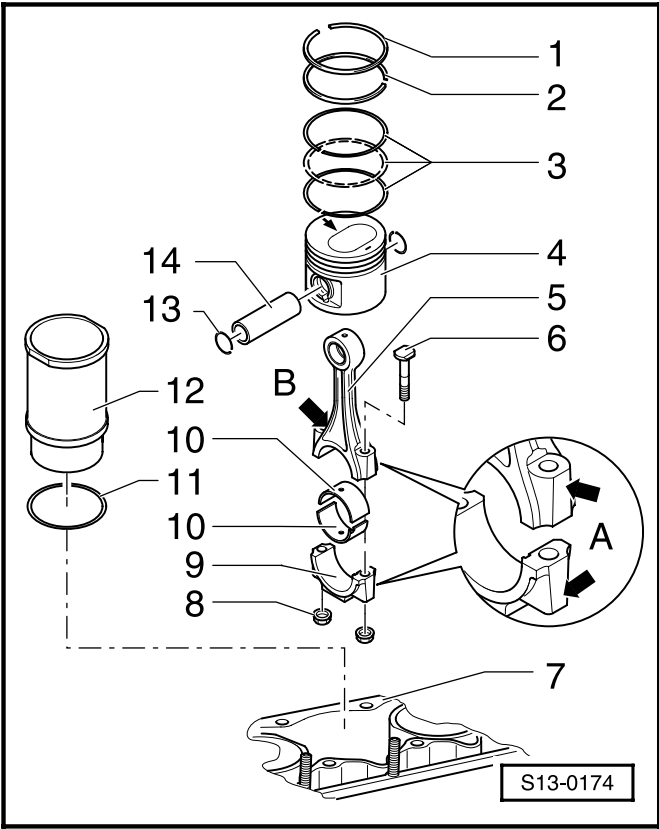
- ◆ Seat surfaces for lines must be clean and flat
- ◆ If seat surfaces of liners are soiled, rectify only by cleaning; do not use emery paper, flat scraper or similar

#### 8 - 40 Nm

- ◆ Oil thread and contact surface

#### 9 - Conrod cap

- ◆ Pay attention to installation position ⇒ Item 5



**10 - Bearing shell**

- ◆ Do not mix up used bearing shells
- ◆ Ensure they are tightly located in the retaining lugs

**11 - Sealing ring**

- ◆ Replace
- ◆ Available in different thicknesses for correcting the preload of the liner

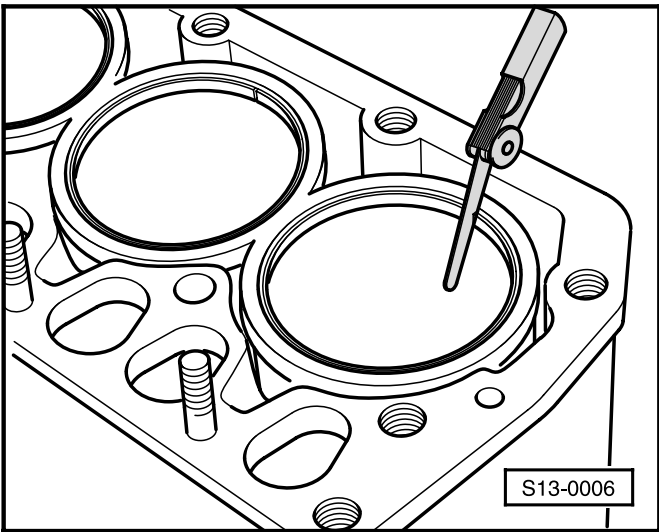
**12 - Liner**

- ◆ Use MP 1-105 for removing
- ◆ Available as replacement part only in a set with pistons (4 in total)
- ◆ Inspecting preload ⇒ Fig. 4

**13 - Circlip**

**14 - Piston pin**

- ◆ Use T10046 for removing and installing. If stiff, heat piston to 60 °C



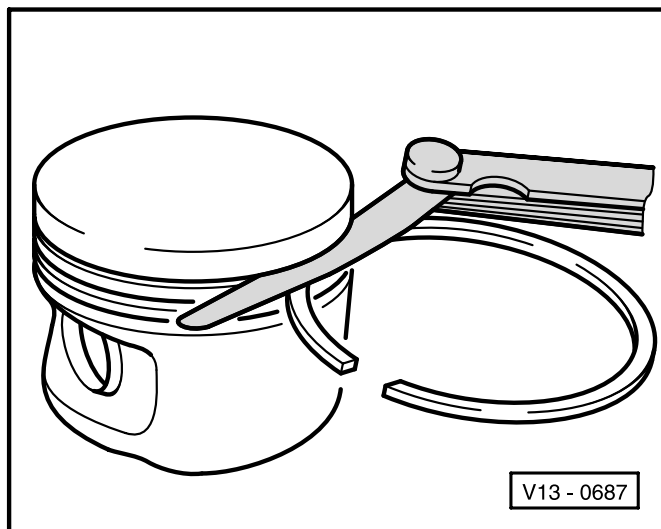
◀ **Fig. 1 Inspecting piston ring gap clearance**

**Special tools, testers and aids required**

- ◆ Feeler gauge
- Insert ring, at right angles about 15 mm away from upper edge of liner.

| Piston ring<br>Dimensions in mm   | New         | Wear limit      |
|-----------------------------------|-------------|-----------------|
| 1. Piston ring<br>(chrome-plated) | 0.40...0.72 | 1.0             |
| 2. Piston ring<br>(grey)          | 0.30...0.62 | 1.0             |
| Oil scraper ring                  | 0.40...1.40 | — <sup>1)</sup> |

<sup>1)</sup> It is not possible to state a wear limit



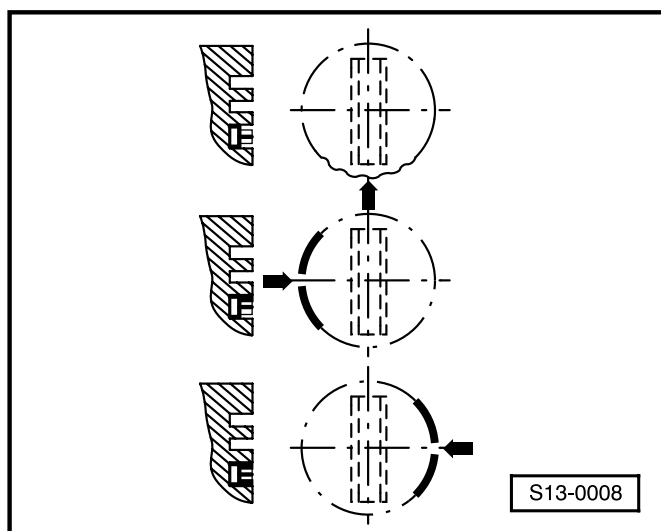
◀ Fig. 2 Inspecting piston ring end clearance

**Special tools, testers and aids required**

- ♦ Feeler gauge

Clean ring groove before inspecting.

| Piston ring<br>Dimensions in mm   | New                | Wear limit |
|-----------------------------------|--------------------|------------|
| 1. Piston ring<br>(chrome-plated) | 0.04...0.08        | 0.15       |
| 2. Piston ring<br>(grey)          | 0.04...0.08        | 0.15       |
| Oil scraper ring                  | cannot be measured |            |

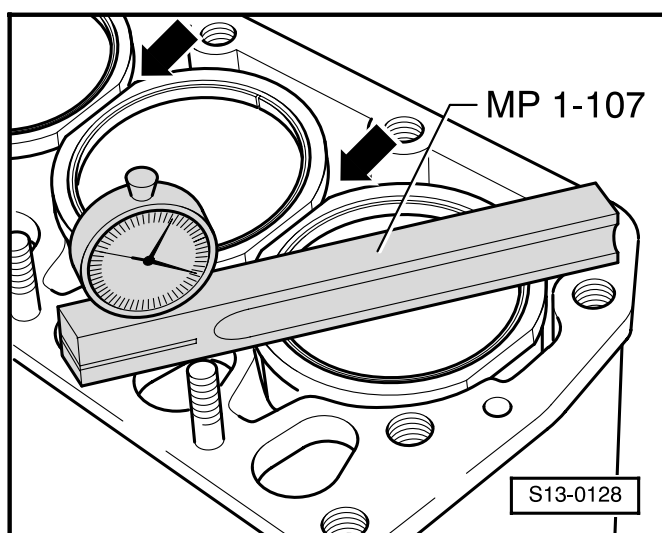


◀ Fig. 3 Installing oil scraper ring

The oil scraper ring consists of a shaped spring ring and a top and bottom metal ring.

Assembly steps:

- Insert spring ring into the groove, position joint so that there is no hole behind it.
- Press together spring ring joint and insert top metal ring.  
The joint of the top metal ring should be positioned 45°...90° to the left of the joint of the spring ring.
- Press together spring ring joint and insert bottom metal ring.  
The joint of the bottom metal ring should be positioned 45°...90° to the right of the joint of the spring ring.



◀ Fig. 4 Inspecting preload of liners

**Special tools, testers and aids required**

- ◆ Instrument for measuring liner preload MP 1-107
- ◆ Dial gauge

The seat surfaces of the liners and of the cylinder block must be clean and flat.

Remove soiling of seat surfaces only by cleaning; do not use emery paper, flat scraper or similar.

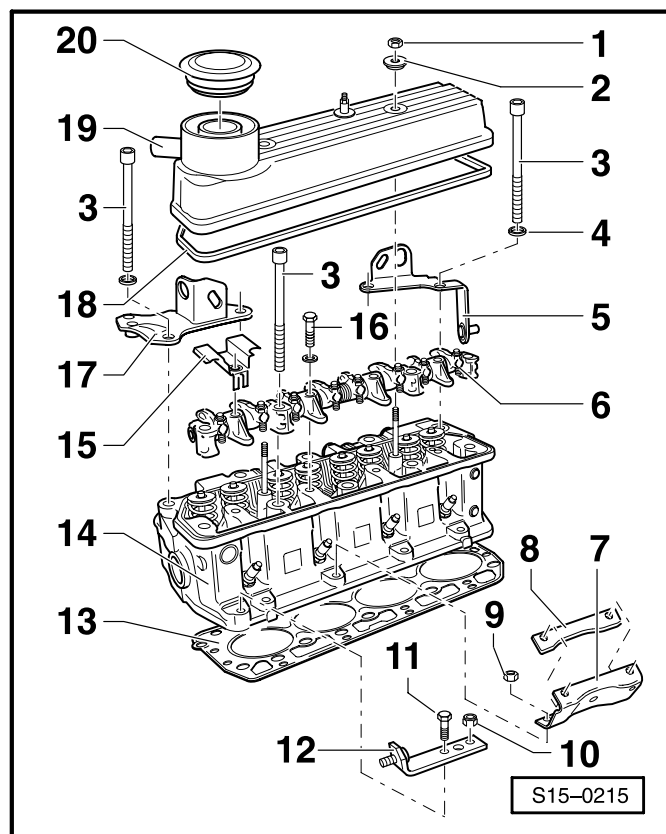
- Insert liners with sealing ring until they are resting firmly in the cylinder block.
- Measure projection (preload) of liners to top edge of cylinder block.

The projection must be 0.07...0.12 mm; correct, if necessary, by inserting different thickness of sealing rings.

**Notes:**

- ◆ *Sealing rings are available in thicknesses of 0.10, 0.12 and 0.14 mm.*
- ◆ *The difference of the projection of the cylinder liners to each other must not be more than 0.04 mm.*
- ◆ *The cylinder liners must not be touching at the flattened points -arrows-.*

## Removing and installing cylinder head



Testing compression ⇒ page 15-15

### Notes:

- ♦ *Removing and installing intake manifold:*  
⇒ 1.4 I/44 kW Engine, Simos 3PB Fuel Injection and Ignition System; Repair Group 24; Disassembling and assembling intake manifold
- ♦ *Removing and installing exhaust manifold*  
⇒ page 26-1.
- ♦ *If the cylinder head is replaced, it is then necessary to refill system with fresh coolant.*

### 1 - 3 Nm

### 2 - Sealing washer

- ♦ replace

### 3 - Cylinder head bolt

- ♦ pay attention to installation instructions and order for slackening and tightening ⇒ page 15-2
- ♦ moisten thread with oil before screwing in

### 4 - Washer

- ♦ not fitted to all cylinder head bolts  
⇒ page 15-2

### 5 - Left suspension eye

### 6 - Rocker arm shaft

- ♦ removing and installing rocker arms  
⇒ page 15-18
- ♦ conducting basic setting of hydraulic valve clearance compensation ⇒ page 15-14

### 7 - Bracket

- ♦ for ignition strip

### 8 - Washer

- ♦ from 03.01

### 9 - 23 Nm

- ♦ tighten fully only after tightening cylinder head bolts

### 10 - 20 Nm

- ♦ self-locking, replace
- ♦ tighten fully only after tightening cylinder head bolts

### 11 - 20 Nm

- ♦ insert with AMV 105 500 (Loctite 242)
- ♦ tighten fully only after tightening cylinder head bolts

### 12 - Bracket

- ♦ for alternator support

### 13 - Cylinder head gasket

- ♦ replace ⇒ page 15-2, Removing cylinder head
- ♦ pay attention to installation position: inscription must be legible

### 14 - Cylinder head

- ♦ removing and installing ⇒ page 15-2
- ♦ inspect for distortion ⇒ Fig. 1
- ♦ after replacing, fill entire system with fresh coolant

### 15 - Oil deflector

### 16 - 25 Nm

### 17 - Right lifting eye

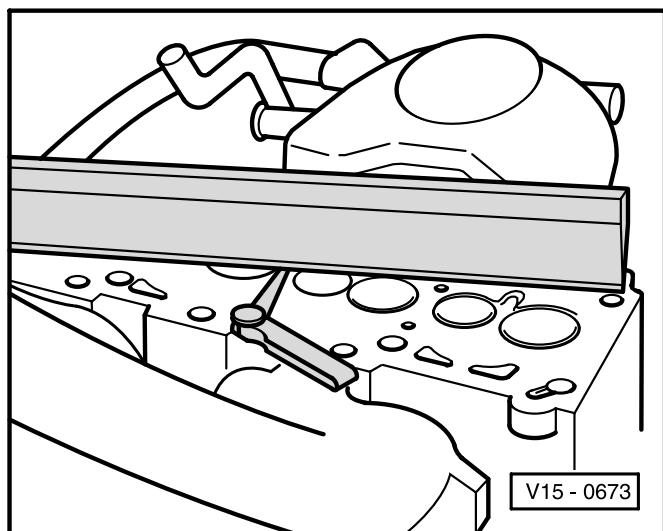
### 18 - Gasket for cylinder head cover

- ♦ replace if damaged

### 19 - Cylinder head cover

### 20 - End cover

- ♦ fit on when carrying out removal and installation work



◀ Fig. 1 Inspecting cylinder head for distortion

#### Special tools, testers and aids required

- ♦ Straightedge
- ♦ Feeler gauge

Max. permissible distortion: 0.05 mm  
(minimum clearance of base of straightedge:  
100 mm)

If the distortion is greater 0.05 mm, replace cylinder head, do not rework.

### Removing and installing cylinder head

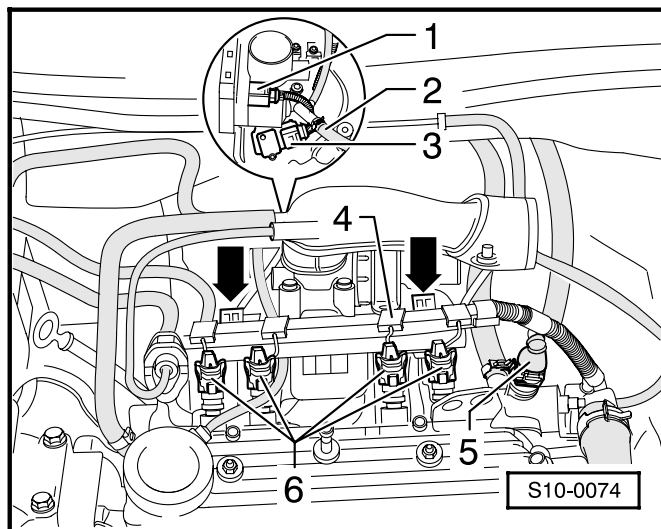
- Engine installed

#### Special tools, testers and aids required

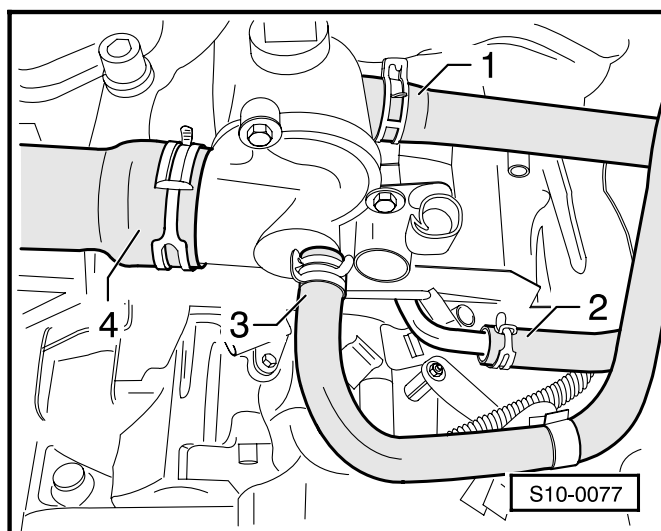
- ♦ Drip tray, (e.g. V.A.G 1306)
- ♦ Pliers for spring strap clips
- ♦ Flat scraper

#### Removing

- 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 of battery.
- Remove front exhaust pipe together with catalytic converter ⇒ page 26-1.
- Remove noise insulation in middle and on left.
- Drain coolant ⇒ page 19-2.
- Remove engine trim panel ⇒ page 10-2.



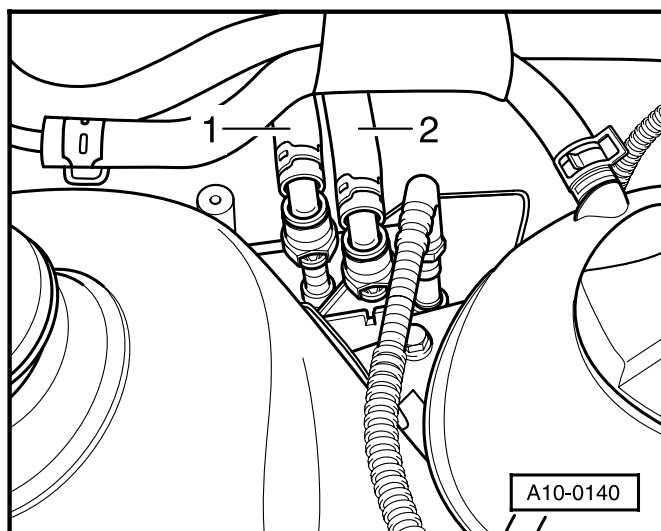
- ◀ - Unplug the following connectors:
  - 1 - from throttle valve control unit -J338-
  - 3 - from intake manifold pressure sender -G71- together with intake manifold temperature sender -G72-
  - 5 - from coolant temperature sender -G62-
  - 6 - from injectors -N30...N33-
- Unclip connector strip -4- -arrows- and take wiring harness out of fixtures.
- Detach vent hose -2-.



- Detach air hose from warm air baffle plate.
- ◀ - Detach coolant hoses -1, 3 and 4- from thermostat housing.
- Detach vacuum line for brake servo unit at intake manifold.
- Take off pipe supports for intake manifold.
- Unbolt dipstick guide tube from exhaust manifold.
- Remove ignition strip.

**Warning!**

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



- ◀ - Detach fuel feed line -1- and fuel return-flow line -2- by pressing on the unlocking buttons at the separation point.
- Lines and unlocking buttons are colour-coded.
- Take off cylinder head cover. Detach vent hose from throttle valve control unit.
- Slacken cylinder head bolts and nuts (do not remove at this stage).

- First remove the rocker arm shaft.
- Then unscrew the remaining cylinder head bolts/nuts.
- Remove alternator support bracket ⇒ page 15-1, item 12.
- Remove the push rods and place down in accordance with installation position.
- Carefully remove cylinder head.

### Installing

#### Notes:

- ◆ *Do not remove the new cylinder head gasket from its wrapping until just before installing*
- ◆ *Treat the new gasket with extreme care. Any damage will result in leaks.*
- ◆ *There must not be any oil or coolant present in the blind holes for the cylinder head bolts.*
- Insert a clean cleaning cloth in the liners and in the openings for the push rods to ensure no dirt contaminates the liners or tappets.
- Carefully clean the sealing surfaces of the cylinder head, cylinder block and liners using a flat scraper or using a suitable chemical device for this purpose. Ensure that no long scores or scratches are produced.
- Carefully remove old residual seal and the cleaning cloths.
- Turn the crankshaft in such a way that all pistons are at the same height.

While doing so the liners must not be pushed out; if necessary press down.

- Position the new cylinder head gasket in such a way that the part no. marking is at the top.

**Note:**

Before inserting the cylinder head make sure all liners are correctly fitted in the cylinder block.

- Insert the cylinder head.
- Insert the push rods with the ball socket from the top in accordance with their original location.

**Notes:**

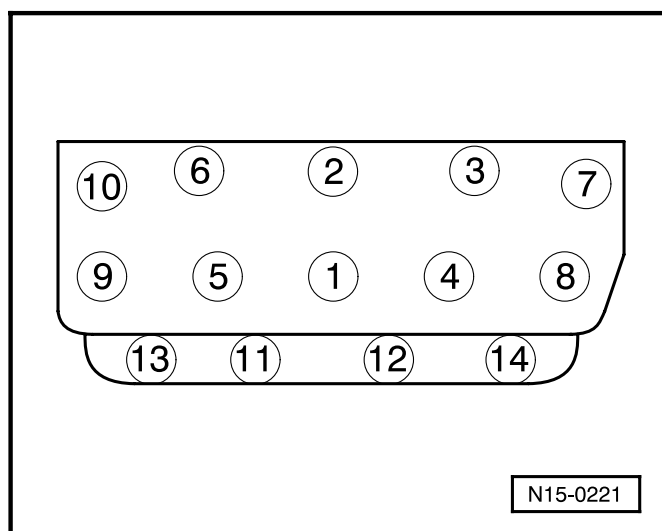
When inserting the push rods carefully introduce them in the ball socket of the tappet and in the ball knobs of the adjusting screws. Wrongly inserted push rods (with ball head on the edge of the tappet or with the edge on the ball head of the adjusting screw) result in faults in the basic setting of the valve gear or damage when the engine is started.

- Moisten the thread of the cylinder head bolts with oil.
- Fit the rocker arm shaft and tighten the fixing screws by hand.
- ◀ - Then unscrew the remaining cylinder head bolts/nuts. Observe the following bolt length and installation with/without washers:

| Position      | Bolt length | Washer |
|---------------|-------------|--------|
| 1, 2, 3, 6, 7 | 168 mm      | yes    |
| 4, 5, 8, 9    | 185 mm      | no     |
| 10            | 132 mm      | yes    |

- Tighten the cylinder head bolts/nuts in the specified sequence as follows:

| Position | Tightening method                                                                                                                                |
|----------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| 1 to 10  | Stage I 20 Nm<br>Stage II torque a further 90° (1/4 turn) with a rigid wrench.<br>Stage III torque a further 90° (1/4 turn) with a rigid wrench. |
| 11 to 14 | 20 Nm                                                                                                                                            |



- Install alternator support bracket  
⇒ page 15-1, item 12.
- Subsequently tighten the rocker arm shaft screws crosswise with 25 Nm.
- Perform basic setting of hydraulic valve clearance compensation ⇒ page 15-14.

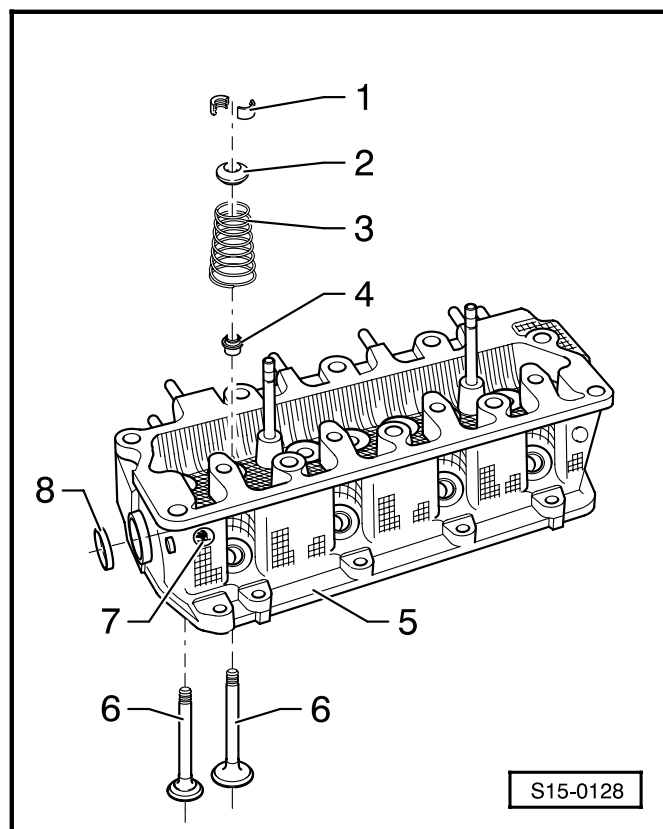
**Note:**

*The basic setting of the hydraulic valve clearance compensation must not be carried out again, if only the cylinder head gasket is replaced.*

Further installation occurs in reverse order to removal. Pay attention to the following:

- Install front exhaust pipe with catalytic converter ⇒ page 26-1.
- Filling up coolant ⇒ page 19-2.
- Adjust the throttle valve control unit.  
⇒ 1.4 l/44 kW Engine, Simos 3PB Fuel Injection and Ignition system; Repair Group 24; Adjusting the throttle valve control unit.
- Perform a test drive, interrogate fault memory and erase it.  
⇒ 1.4 l/44 kW Engine, Simos 3PB Fuel Injection and Ignition system; Repair Group 01; Interrogate fault memory and erase it.

## Servicing cylinder head



### 1 - Valve collets

### 2 - Valve spring retainer

### 3 - Valve spring

- ◆ removing and installing ⇒ page 15-8

### 4 - Valve stem seal

- ◆ replacing ⇒ page 15-13

### 5 - Cylinder head

- ◆ reworking valve seats ⇒ page 15-10
- ◆ inspecting valve guides ⇒ page 15-8

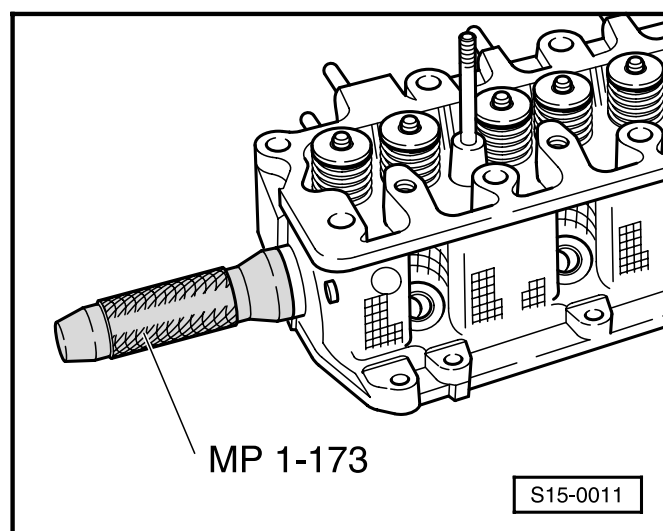
### 6 - Valves

- ◆ do not rework, only grinding in is permissible
- ◆ removing and installing ⇒ page 15-8
- ◆ valve dimensions ⇒ page 15-9

### 7 - Cylinder head marking

### 8 - Plug

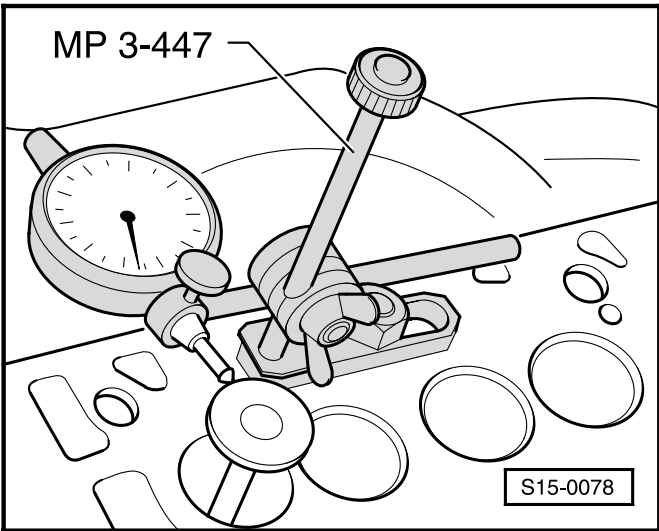
- ◆ installing ⇒ Fig. 1



◀ Fig. 1 Knocking plug into cylinder head

### Special tools, testers and aids required

- ◆ Insertion drift MP 1-173
- ◆ AMV 200 000 (Loctite 270)
- Coat outer circumference of plug with AMV 200 000 (Loctite 270).
- Use MP 1-173 to knock in plug.



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 must be flush with guide.
- Determine valve rock.

Wear limit

| Inlet valve guide | Exhaust valve guide |
|-------------------|---------------------|
| 0.5 mm            | 0.6 mm              |

Notes:

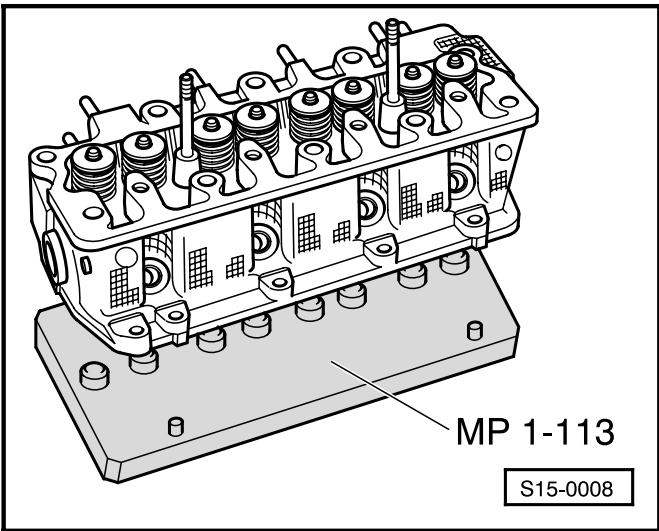
- ◆ If the wear limit is exceeded, repeat measurement with new valves. If the wear limit is again exceeded, replace cylinder head.
- ◆ If the valve is replaced when carrying out repairs, use new valve for measurement.

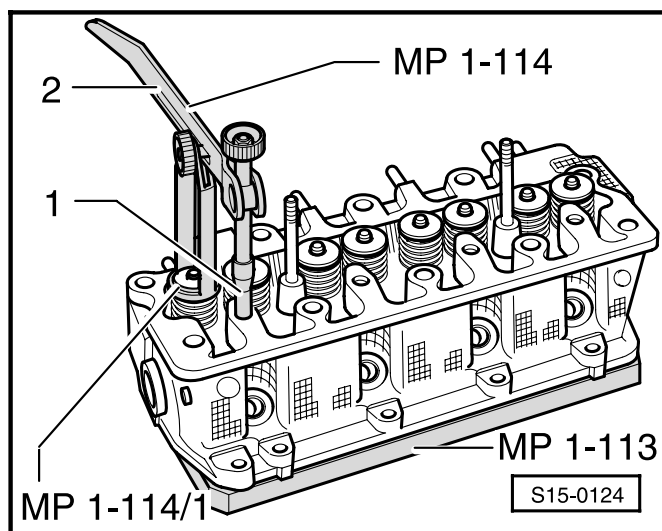
Removing and installing valves

Removing

Special tools, testers and aids required

- ◆ Valve supporting plate MP 1-113
- ◆ Valve spring assembly lever MP 1-114
- ◆ Insert for conical spring MP 1-114/1
- ◆ Threaded section M8x40
- ◀ - Place cylinder head on the valve supporting plate MP 1-113.





◀ - Attach valve spring assembly lever -MP 1-114- and insert -MP 1-114/1- together with threaded connector -1- onto the cylinder head.

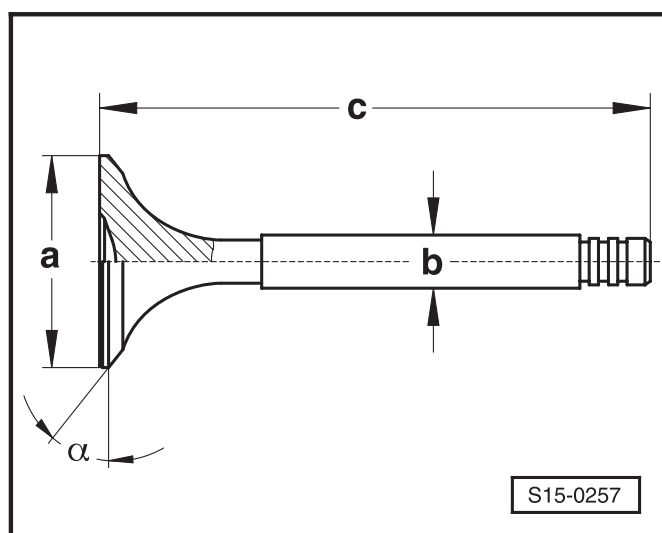
- Press down assembly lever -2-.

- Take out collets.

**Note:**

*Release collets that are tight by striking light blows with a hammer on the assembly lever.*

- Pull out valves.



◀ **Valve dimensions**

**Note:**

*Valves must not be reworked. Only grinding in is permissible.*

| Dimension |    | Inlet valve | Outlet valve |
|-----------|----|-------------|--------------|
| Ø a       | mm | 34          | 30           |
| Ø b       | mm | 7.0         | 7.0          |
| c         | mm | 101         | 101          |
| α         | ∠° | 45          | 45           |

## Reworking valve seats

### Special tools, testers and aids required

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

### Notes:

- ◆ *When servicing engines with leaking valves, it is not sufficient to machine or to replace the valve seats and valves. It is also necessary to inspect the valve guides for wear, particularly on the engines with a high mileage.*
- ◆ *Rework the valve seats only sufficiently in order to achieve a proper contact pattern. Before reworking, calculate the maximum permissible reworking dimension. If the reworking dimension is exceeded, proper operation of the valve gear 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 performing repairs, use new valve for measurement.*

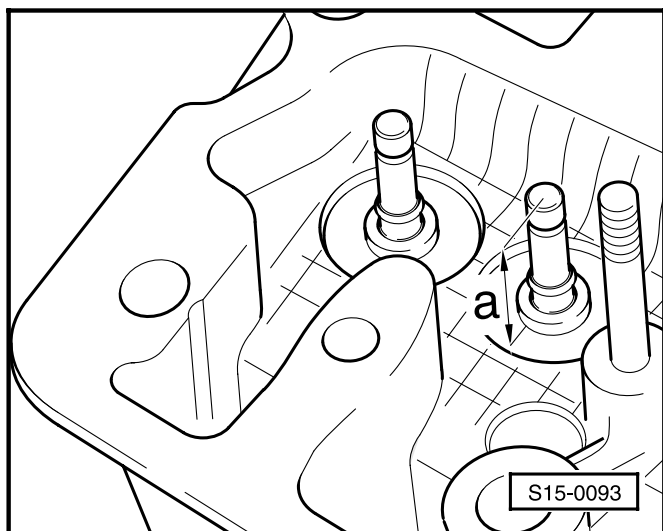
- ◀ - Measure distance -a- between end of valve stem and seat surface for valve spring.
- Calculate maximum permissible reworking dimension from the distance measured and the maximum dimension.

Maximum dimensions:

Inlet valve 42.7 mm

Exhaust valve 42.8 mm

Maximum dimension less distance measured  
= max. permissible reworking dimension.

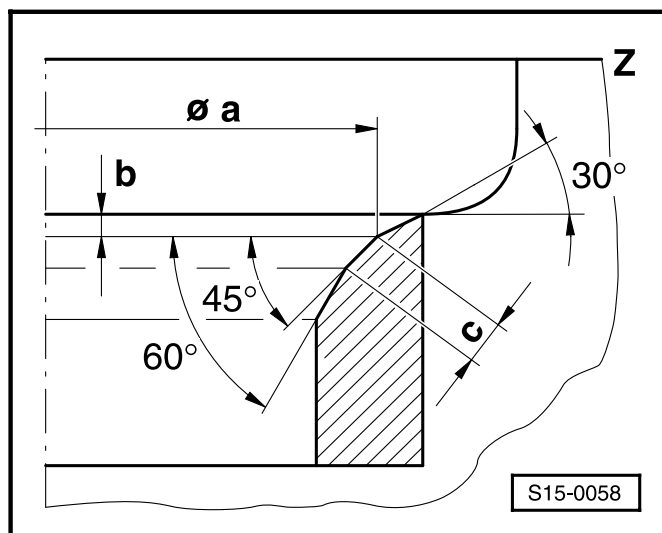


**Example:**

|                                        |         |
|----------------------------------------|---------|
| Maximum dimension                      | 42.7 mm |
| - Distance measured                    | 41.9 mm |
| = Max. permissible reworking dimension | 0.8 mm  |

**Note:**

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

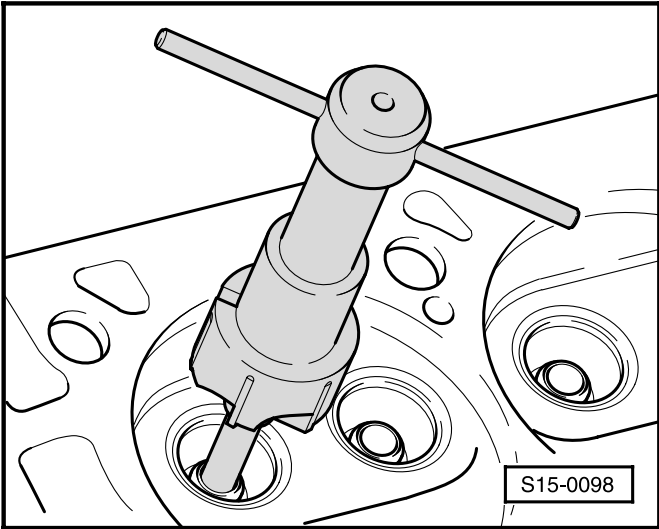
**◀ Reworking valve seats**

| Dimension | Valve seats                                                                    |
|-----------|--------------------------------------------------------------------------------|
| Ø a mm    | Valve seat diameter 32.9 -0.1 - inlet valve<br>29.6 -0.1 - exhaust valve       |
| b mm      | max. permissible reworking dimension                                           |
| c mm      | Valve seat width: 1.45...1.75 for inlet valve<br>1.65...1.95 for exhaust valve |
| Z         | Bottom edge of cylinder head                                                   |
| 45°       | Valve seat angle                                                               |
| 30°       | Top correction angle                                                           |
| 60°       | Bottom correction angle                                                        |

**Procedure**

Reworking can be carried out with a machine or by hand. The following conditions must be met:

- Wear limit of valve guides must not exceed the permissible dimension ⇒ page 15-8.
- Use NAC milling tool with carbide blades (min. 90 HRC).



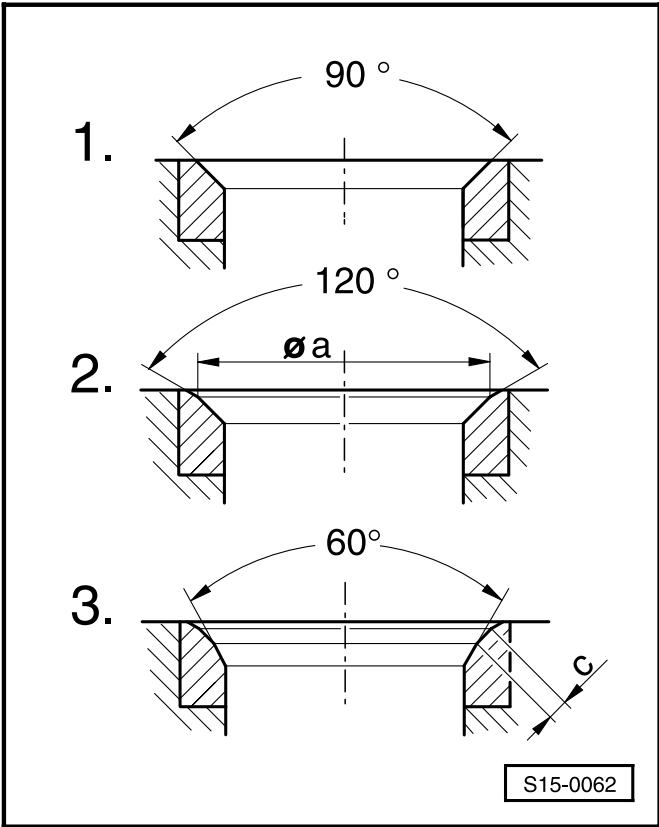
◀ Reworking valve seats with NAC milling cutter

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

| Valve guide   | Guide drift Ø mm |
|---------------|------------------|
| Exhaust valve | 7.0 -0.01        |
| Inlet valve   |                  |

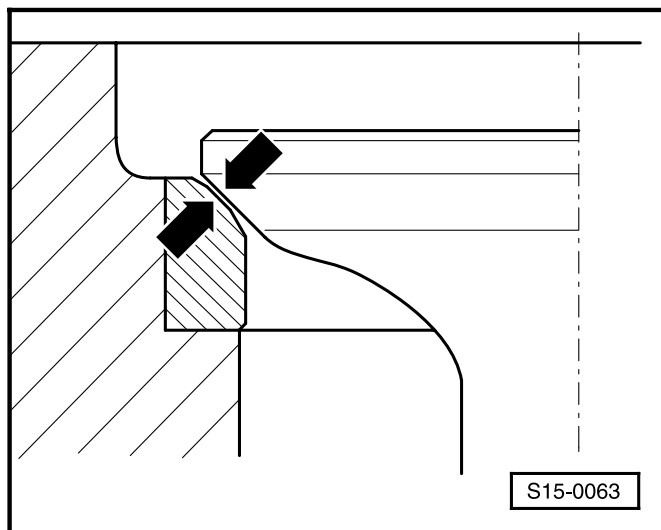
- Match diameter of milling cutter to diameter of valve seat.

| Valve seat    | Milling cutter 90°<br>Ø mm | Milling cutter 120°<br>Ø mm | Milling cutter 60°<br>Ø mm |
|---------------|----------------------------|-----------------------------|----------------------------|
| Inlet valve   | 36                         | 38                          | 21/34                      |
| Exhaust valve | 32                         | 32                          | 21/34                      |



◀ Milling sequence

1. Mill valve seat with 90° milling tool until a perfect contact pattern is achieved. (Do not exceed maximum permissible reworking dimension!)
2. Chamfer top correction angle with 120° milling cutter until valve seat diameter „a“ (⇒ page 15-11) is achieved.
3. Chamfer bottom correction angle with 60° milling cutter until valve seat diameter „c“ (⇒ page 15-11) is achieved.



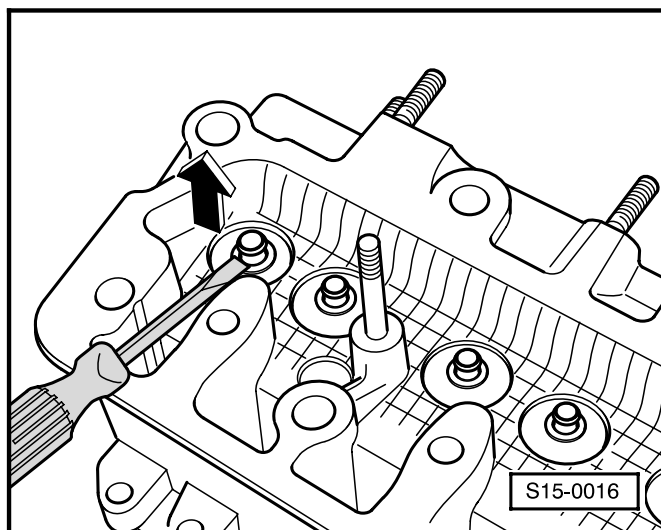
- ◀ - Use fine grinding paste to grind in valve/valve seat -arrows- so as to achieve a proper contact pattern.

- Inspect valve for leaks.

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

**Note:**

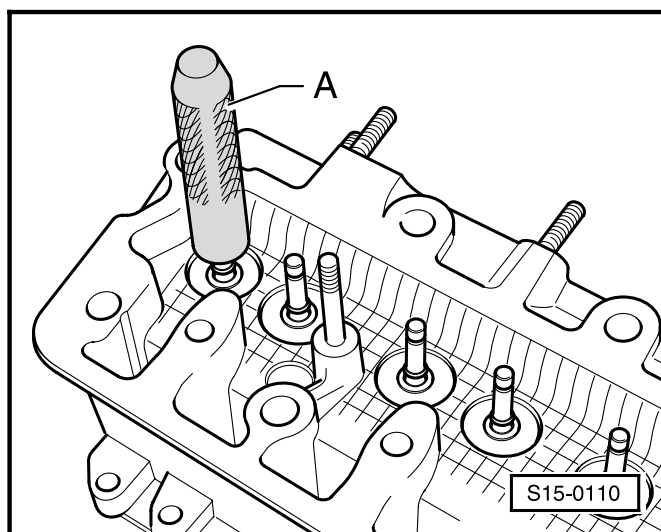
*After installing the cylinder head, perform basic setting of hydraulic valve clearance compensation.*



## Replacing valve stem seal

### Special tools, testers and aids required

- ◆ Tool for pressing on valve stem seal MP 1-212
- ◆ Valve supporting plate MP 1-113
- ◀ - Carefully lever off valve stem seal.



- Insert valve into the guide.
- ◀ - Oil valve stem seal. Place into insertion tool -A- with the coil spring first, and carefully press onto the valve guide.

**Basic setting of hydraulic valve clearance compensation**

The hydraulic valve clearance compensation is maintenance-free, the setting must not be changed.

After completing repair work on the cylinder head/valve gear, however, it is necessary to carry out the basic setting of the hydraulic valve clearance compensation as follows:

**Note:**

*The basic setting of the hydraulic valve clearance compensation must not be carried out again, if only the cylinder head gasket is replaced.*

**Procedure**

- Rotate crankshaft until the valves of cylinder 4 overlap (inlet valve opens and exhaust valve closes).
- At cylinder 1, slacken the lock nuts for the adjusting bolts of the rocker arms.
- Then, turn back the adjusting bolts in the rocker arms until play can be felt between rocker arm and valve.
- Turn adjusting bolts of both rocker arms slightly against the valves until valve gear has no play. Check the gradual reduction of the play through swinging movements of the adjusting rocker arm. The point with no play which has appeared determines the exact contact location.
- From this point, turn adjusting bolts in a further two turns. Screw in lock nut and then tighten fully to 13 Nm.
- Carry out the setting operations on the other cylinders according to the table below:

| Setting    | Valve overlap |
|------------|---------------|
| Cylinder 1 | Cylinder 4    |
| Cylinder 3 | Cylinder 2    |
| Cylinder 4 | Cylinder 1    |
| Cylinder 2 | Cylinder 3    |

**Note:**

*After installing new hydraulic tappets, the engine must not be started for about 30 minutes. Hydraulic compensation elements must settle (otherwise valves may remain constantly open and strike the piston).*

## Testing compression pressure

### Test condition

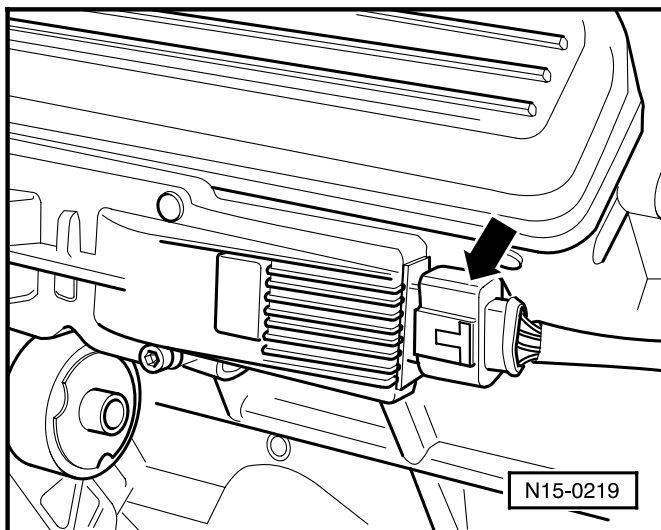
- Engine oil temperature at least 30 °C

### Special tools, testers and aids required

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

### Test procedure

- Remove engine trim panel ⇒ page 10-2.
- ◀ - Unplug 4-pin connector -arrow- from ignition strip.
- Remove screws attaching the ignition strip and detach ignition strip from the spark plugs.
- Use spark plug wrench (e.g. 3122 B) to unscrew spark plugs.
- Remove fuse 32.



### Note:

*When fuse 32 is removed, the voltage supply of the injectors is interrupted.*

- Have a second mechanic depress the accelerator pedal fully.
- Use compression pressure tester (e.g. V.A.G 1381 or V.A.G 1763) to test compression pressure.

### Note:

*Use of tester:*

⇒ *Operating Instructions*

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

**Compression pressures**

| New          | Wear limit | Difference between cylinders |
|--------------|------------|------------------------------|
| min. 1.2 Mpa | 0.75 Mpa   | max. 0.3 MPa                 |

- Install spark plugs, ignition strip, fuse 32 and engine trim panel.
  - Interrogate fault memory and erase.
- ⇒ 1.4-ltr./44 kW Engine, Simos 3PB Fuel Injection and Ignition System; Repair Group 01; Interrogating and erasing fault memory

**Note:**

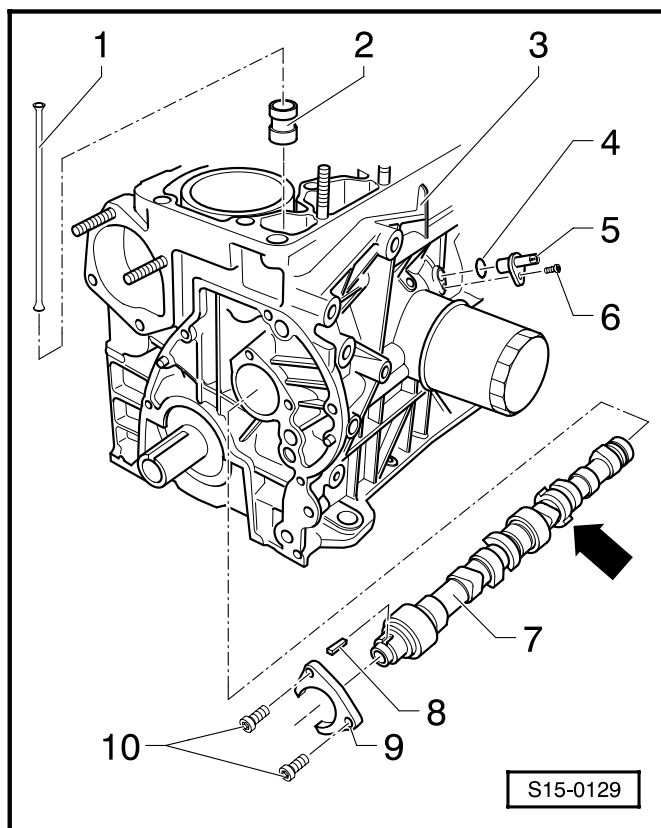
*Faults are stored as a result of separating the plug connections.*

**Tightening torques**

| Component                    | Nm |
|------------------------------|----|
| Spark plugs in cylinder head | 30 |
| Ignition strip to bracket    | 9  |

## Servicing valve gear

### Removing and installing camshaft



#### 1 - Tappet rod

- ♦ pay attention to installation position: ball socket facing up
- ♦ do not mix up

#### 2 - Hydraulic tappet

- ♦ with hydraulic valve clearance compensation
- ♦ inspecting ⇒ page 15-19
- ♦ use auxiliary tool to pull out of cylinder block ⇒ Fig. 1
- ♦ do not mix up
- ♦ place down with contact surface facing down
- ♦ oil contact surface

#### 3 - Cylinder block

- ♦ removing and installing cylinder head ⇒ page 15-2
- ♦ removing and installing timing gear cover and chain sprockets ⇒ page 13-3

#### 4 - O-ring

#### 5 - Camshaft position sensor -G163-

#### 6 - 8 Nm

#### 7 - Camshaft

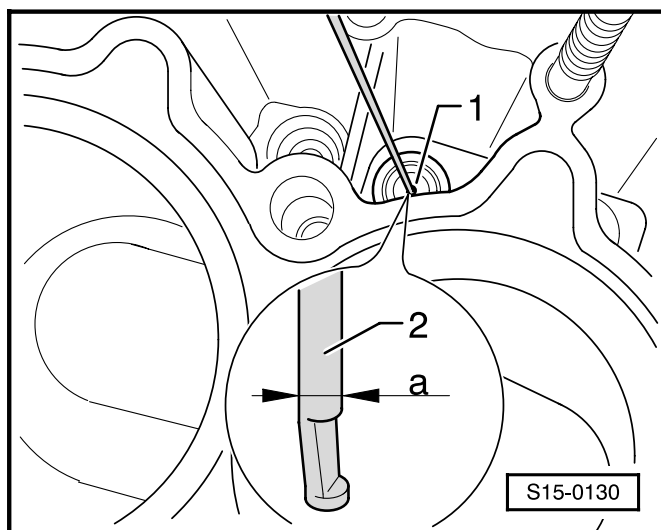
- ♦ with timing segment for camshaft position sensor -arrow-
- ♦ camshaft settings ⇒ Fig. 2

#### 8 - Parallel key

- ♦ ensure tightly installed

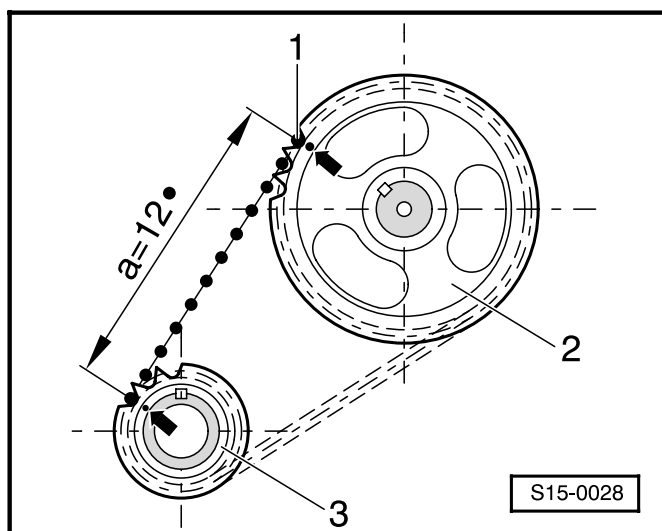
#### 9 - Retaining plate

#### 10 - 5 Nm



◀ Fig. 1 Removing hydraulic tappet

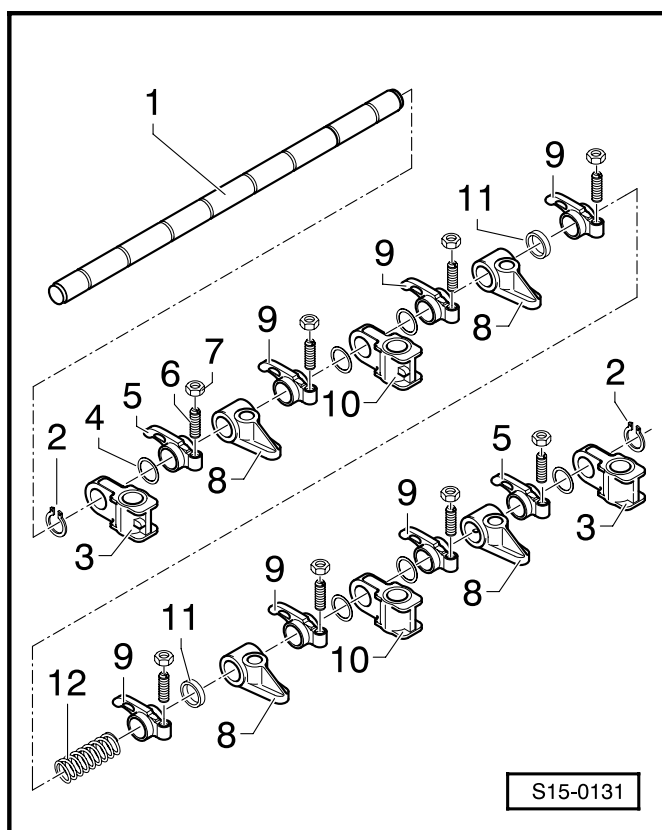
- Make auxiliary tool (wire) -2- according to illustration.
- a- 1.8...1.9 mm
- Insert auxiliary tool -2- into the hole of the tappet -1-, tilt slightly and pull tappet out of the guide in the cylinder block.



◀ Fig. 2 Camshaft setting

- Insert chain sprockets -2- and -3- into the timing chain -1- so that the distance -a- from marking to marking -arrows- is 12 chain pins.

## Removing and installing rocker arms



### 1 - Rocker arm shaft

- ♦ Removing and installing  
⇒ page 15-1

### 2 - Circlip

### 3 - Outer rocker arm bracket

- ♦ For M11 cylinder head bolt

### 4 - Spring washer

### 5 - Rocker arm

### 6 - Adjusting screw

- ♦ Perform basic setting of hydraulic valve clearance compensation  
⇒ page 15-14

### 7 - Lock nut

- ♦ 13 Nm

### 8 - Rocker arm bracket

- ♦ For M8 bolt

### 9 - Rocker arm

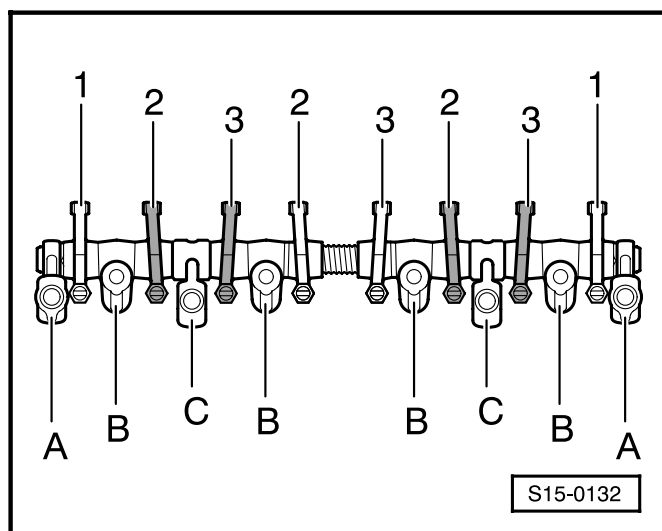
- ♦ Pay attention to different versions  
⇒ Fig. 1

### 10 - Inner rocker arm bracket

- ♦ For M11 cylinder head bolt

### 11 - Tensioning ring

### 12 - Spring



◀ Fig. 1 **Arrangement of rocker arms and rocker arm brackets**

1 - Straight rocker arm

2 - Rocker arm inclined to left

3 - Rocker arm inclined to right

A - Outer rocker arm bracket for M11 bolt

B - Rocker arm bracket for M8 bolt

C - Inner rocker arm bracket for M11 bolt

**Note:**

*The rocker arms for the inlet valves are shown as the darker ones in the illustration.*

## Inspecting hydraulic tappets

### Special tools, testers and aids required

- ◆ Feeler gauge
- ◆ Wooden or plastic wedge

**Notes:**

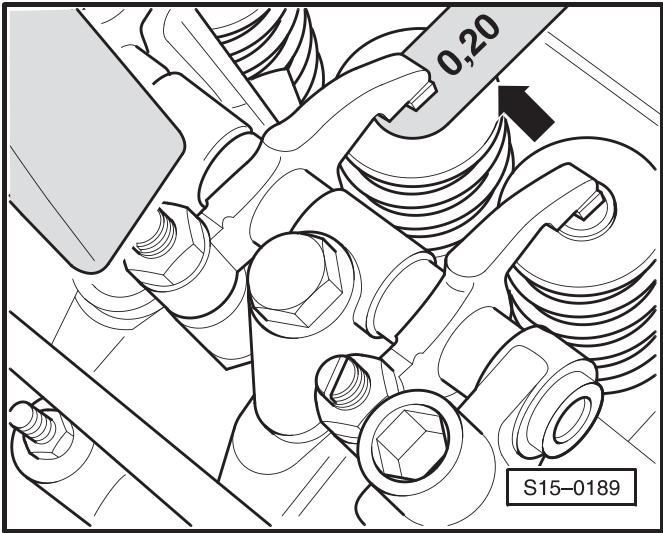
- ◆ *Always replace hydraulic tappets complete (cannot be adjusted or repaired).*
- ◆ *Irregular valve noises during starting are normal.*

### Inspection procedure

- Start engine and run until radiator fan has cut in once.
- Increase engine speed for 2 minutes to about 2500 rpm.

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

- Remove cylinder head cover.
- Rotate crankshaft until the valves of cylinder 4 overlap (inlet valve opens and exhaust valve closes).



- ◀ - Apply a load to the hydraulic tappet several times by pressing slightly with a wooden or plastic wedge onto the adjusting bolt.
- Attempt to insert a 0.2 mm feeler gauge -arrow- between rocker arm and valve.

If it is possible to insert the feeler gauge between rocker arm and valve and the tappet yields at the same time, replace tappet.

If play was measured only between rocker arm and valve (tappet does not yield), carry out basic setting of hydraulic valve clearance compensation ⇒ page 15-14; repeat the check after the setting.

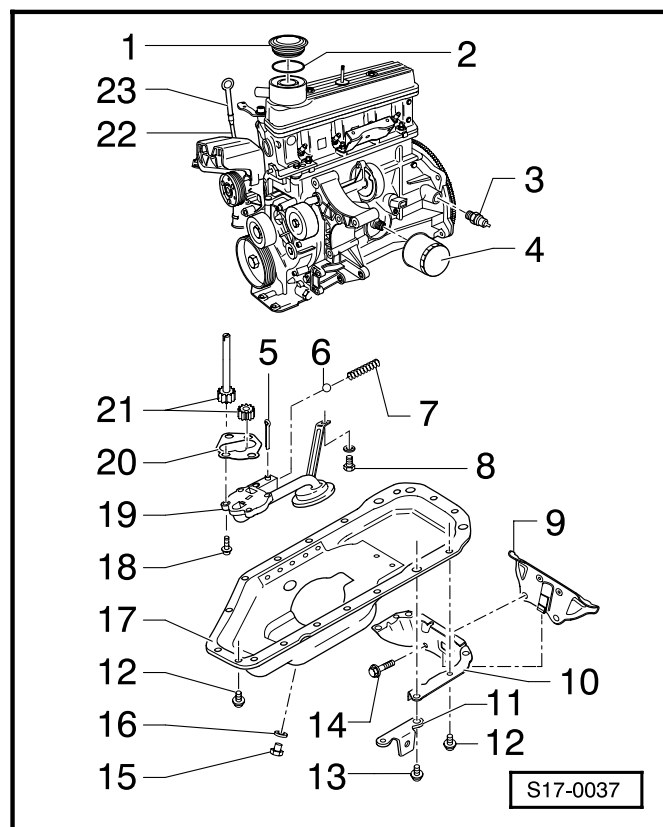
- Repeat the procedure at the tappets of the other cylinders.

| Checking   | Valve overlap |
|------------|---------------|
| Cylinder 1 | Cylinder 4    |
| Cylinder 3 | Cylinder 2    |
| Cylinder 4 | Cylinder 1    |
| Cylinder 2 | Cylinder 3    |

**Note:**

*After installing new hydraulic tappets, the engine must not be started for about 30 minutes to allow the hydraulic valve clearance compensation elements to settle (otherwise valves will strike pistons).*

## Removing and installing parts of the lubrication system



### Notes:

- ♦ If considerable quantities of metal swarf and abrasion -caused by contact damage such as damage to crankshaft and conrod bearings- are found in the engine oil when carrying out repair work in the engine, clean the oil galleries carefully in order to avoid consequential damage.
- ♦ The oil level must not extend beyond the max. marking - risk of damage to catalytic converter!

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

⇒ Inspection and Maintenance

### 1 - End cover

- ♦ fit on for removal and installation work

### 2 - Gasket

- ♦ replace if damaged
- ♦ at engine cover

### 3 - Oil pressure switch -F1-, 45 Nm

- ♦ testing ⇒ page 17-6
- ♦ cut open seal if leaking, and replace

### 4 - Oil filter

- ♦ slacken with tensioning strap
- ♦ moisten seal with oil
- ♦ tighten by hand
- ♦ pay attention to installation instructions on oil filter
- ♦ pay attention to replacement intervals

### 5 - Split pin

### 6 - Ball

- ♦ for pressure relief valve
- ♦ knock slightly with aluminium drift when installing so that the ball seat is smoothed

### 7 - Compression spring

- ♦ for pressure relief valve

### 8 - 8 Nm

### 9 - Intermediate plate

- ♦ clamp onto oil pan support

### 10 - Oil pan support

- ♦ may also be welded to oil pan

### 11 - Bracket

- ♦ for front coolant pipe

### 12 - 10 Nm

### 13 - 20 Nm

### 14 - 45 Nm

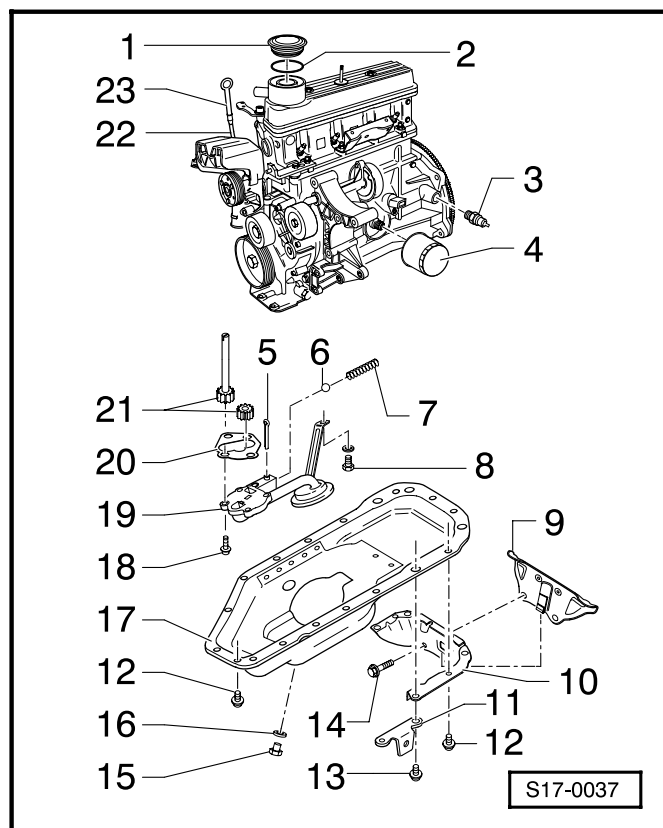
### 15 - Oil drain plug, 30 Nm

### 16 - Seal

- ♦ replace

### 17 - Oil pan

- ♦ removing and installing ⇒ page 17-3



18 - 8 Nm

**19 - Oil pump cover with pressure relief valve**

- ◆ opening pressure: approx. 0.46 MPa
- ◆ clean strainer if soiled

**20 - Gasket**

- ◆ replace
- ◆ install only if axial play of oil pump gears is not adequate ⇒ Fig. 1

**21 - Gears**

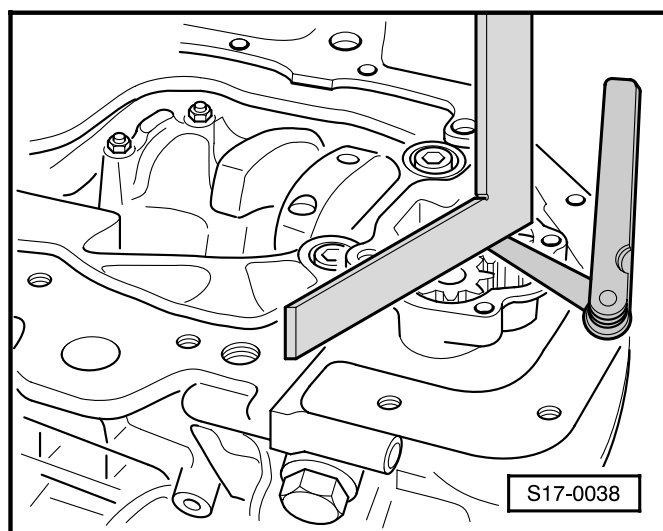
- ◆ checking axial play ⇒ Fig. 1

**22 - Guide tube**

- ◆ removing and installing ⇒ Fig. 2

**23 - Dipstick**

- ◆ oil level must not extend beyond max. marking
  - ◆ inspecting engine oil level
- ⇒ Inspection and Maintenance



◀ **Fig. 1 Inspecting axial play of oil pump**

**Special tools, testers and aids required**

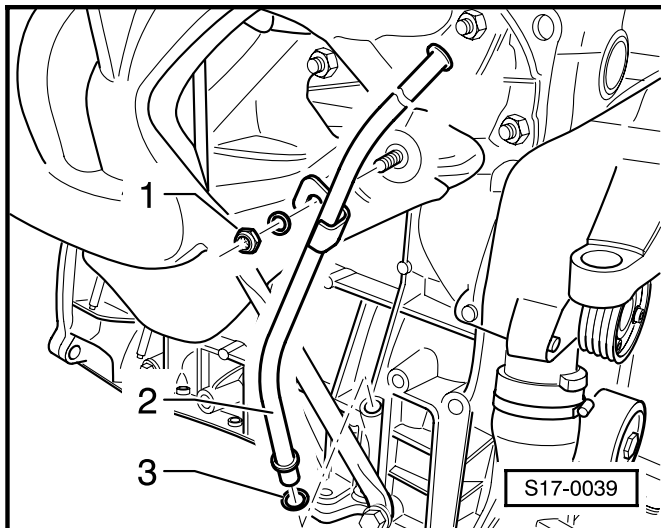
- ◆ Feeler gauge
- ◆ Straightedge

Axial play when new: 0.02...0.10 mm

Wear limit: 0.13 mm

**Notes:**

- ◆ If the wear limit is reached, replace timing gear cover ⇒ page 13-3, Disassembling and assembling cylinder block, crankshaft and flywheel.
- ◆ If no axial play is present, install gasket ⇒ page 17-2, item 20.
- ◆ Inspect unobstructed running of oil pump once assembled and with timing gear cover installed.



◀ Fig. 2 Removing and installing guide tube for oil dipstick

- Unscrew nut -1- on the exhaust manifold and lift guide tube -2- up and out.
- When installing replace seal -3-.
- Tighten new self-locking nut -1- to 20 Nm.

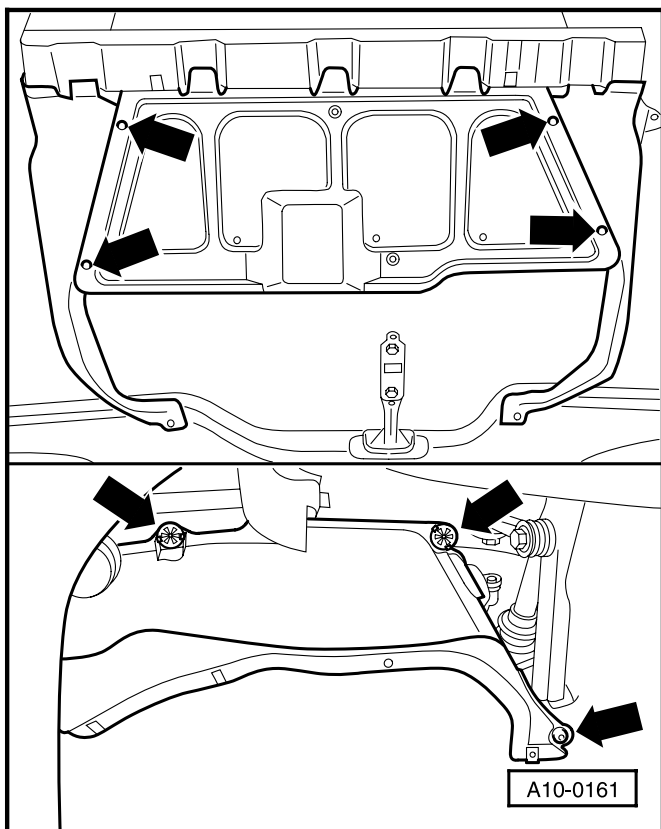
## Removing and installing oil pan

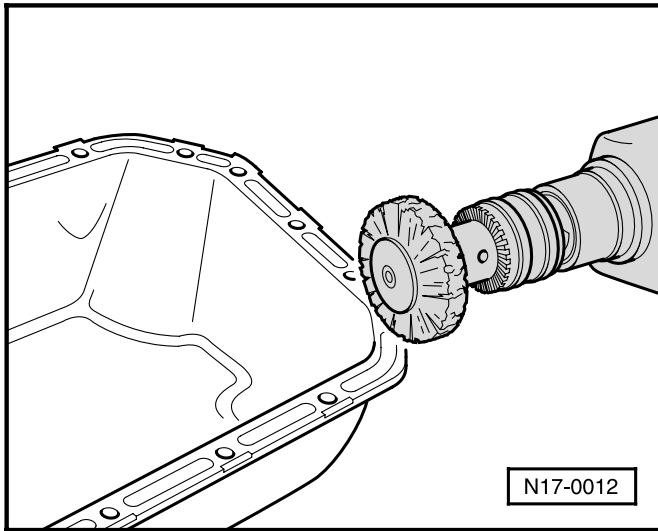
### Special tools, testers and aids required

- ◆ Hand drill with plastic brush attachment
- ◆ Flat scraper
- ◆ Silicone sealant -D 176 404 A2- or -047 198 049- (THREE BOND 1215 J)
- ◆ Counterholder -T 30008-

### Removing

- ◀ - Remove noise insulation panel in the middle and on the right -arrows-.
- Drain engine oil.
  - Unbolt front coolant pipe at the 2 fixtures at the cylinder block.
  - Unbolt oil pan together with oil pan support.
  - Remove oil pan, if necessary release by applying slight blows with a rubber-headed hammer. Press the coolant pipe slightly towards the outside for this step.
  - Use a flat scraper to remove sealant residues on the cylinder block.



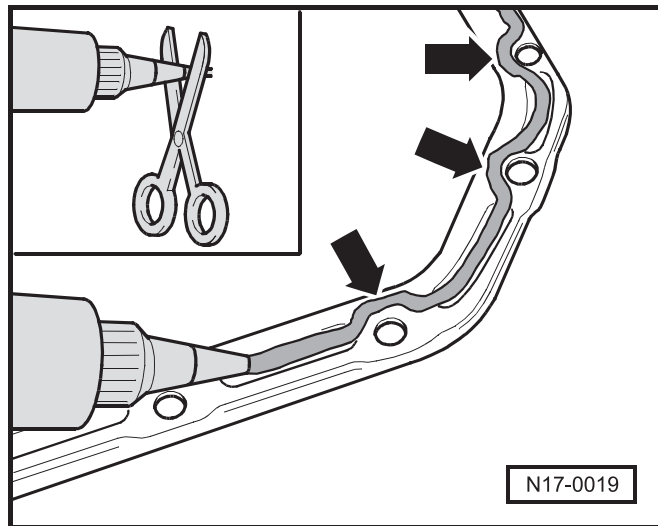


- ◀ - Use a rotating plastic brush to remove sealant residues on the oil pan (wear protective goggles).
- Clean sealing surfaces, they must be free of oil and grease.

### Installing

#### Notes:

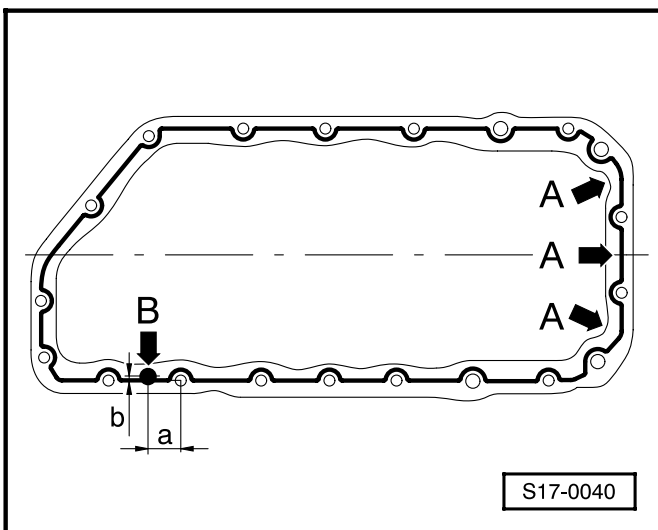
- ♦ Pay attention to the 'use by date' on sealant.
- ♦ The oil pan must be installed immediately after applying the silicone sealant -047 198 049- (THREE BOND 1215 J). If -D 176 404 A2- is used installation must be performed within 5 minutes.
- ♦ The assistance of a second mechanic is required to install the oil pan. Press the front coolant pipe slightly towards the outside.
- ♦ It is possible that the oil pan support (⇒ page 17-1, item 10) is bonded to the oil pan.



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

#### Note:

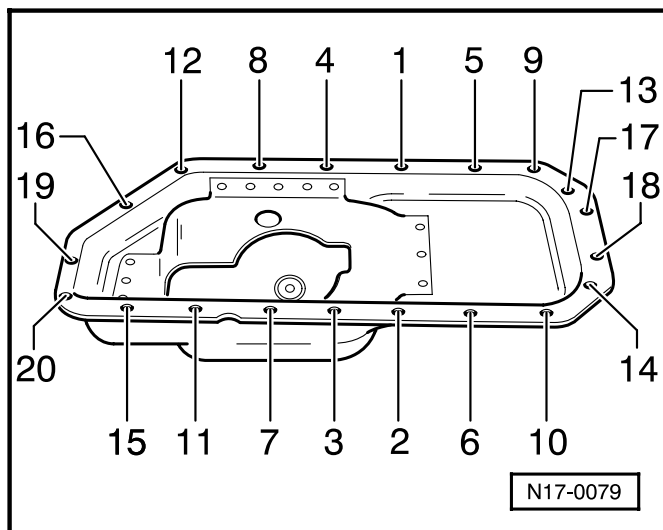
The sealant bead must not be thicker otherwise excess sealant may get into the oil pan and clog the strainer in the oil suction pipe.



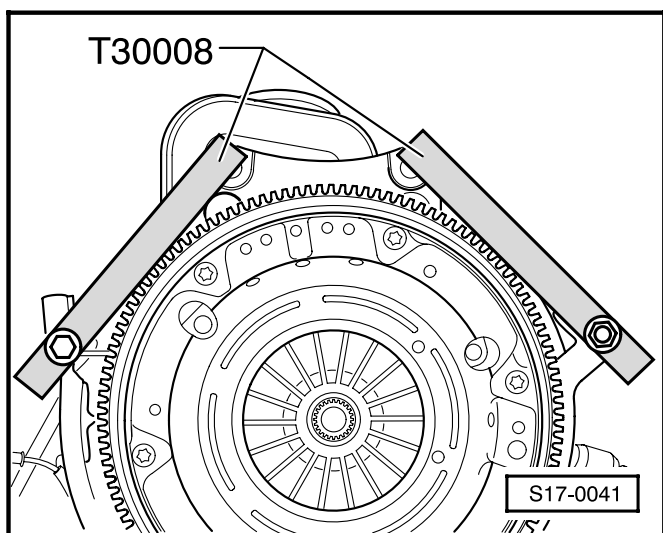
- ◀ - Apply silicone sealant to the clean sealing surface of the oil pan, as shown in the illustration.

#### Notes:

- ♦ It is particularly important to maintain the specified application pattern for the bead in the area of the sealing flange to the flywheel -arrows A-.
- ♦ There is an opening in the cylinder block -arrow B- which must be reliably sealed off by an accumulation of sealant.  
Ø 13 mm; a = 15 mm; b = 4 mm

**Engine installed**

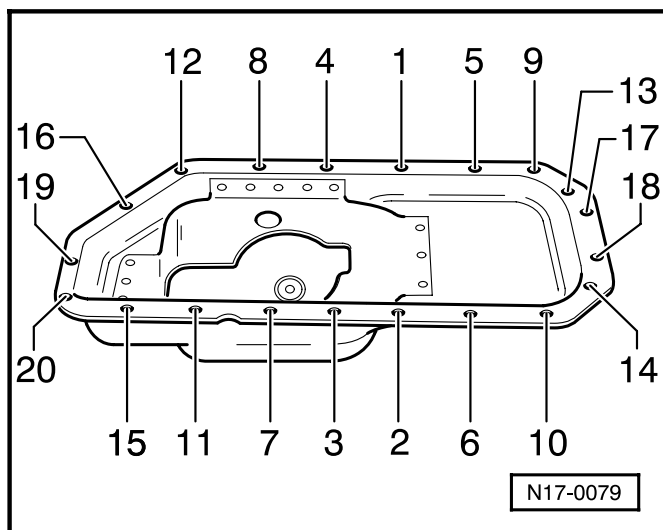
- Fit intermediate plate onto oil pan support.
- Immediately position oil pan and oil pan support against the cylinder block and tighten the bolts as follows:
  - 1 - Tighten all the oil pan/cylinder block bolts only very slightly in the order stated.
  - 2 - Slightly tighten two bolts of oil pan support/gearbox.
  - 3 - Slightly tighten all the oil pan/cylinder block bolts further in the order stated.
  - 4 - Tighten two bolts of oil pan support/gearbox fully to 45 Nm.
  - 5 - Tighten all the oil pan/cylinder block bolts fully in the order stated:  
M6 - 10 Nm  
M8 - 20 Nm.

**Engine removed**

(Gearbox removed)

- Counterholder T30008 should be bolted firmly to the cylinder block (M10), as shown in the illustration, in order to ensure clearance of the intermediate plate when installing engine and gearbox.

The flattened side of counterholder T30008 must be resting against the cylinder block for this step.



- Immediately position oil pan and oil pan support against the cylinder block and tighten bolts as follows:
  - 1 - Tighten all the oil pan/cylinder block bolts slightly in the order stated.  
Press oil pan support against counterholder T30008 for this step.
  - 2 - Tighten all the bolts fully in the order stated:  
M6 - 10 Nm  
M8 - 20 Nm.

There must not be any gap between the oil pan support and counterholder T30008. Slacken the oil pan bolts once again, if necessary, and adjust the position of the oil pan.

**Note:**

*A gearbox housing or a gearbox may also be attached in place of the counterholder T30008. Tightening order of the bolts in this case as described in "Engine installed".*

**Continuation for both installation descriptions**

The remaining assembly operations are carried out in the opposite order of disassembly.

**Note:**

*The sealant must be allowed to dry for about 30 minutes after installing the oil pan. Do not pour in engine oil during this period.*

## **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 B)
- ◆ Adapter cable set (e.g. V.A.G 1594 A)
- ◆ Current flow diagram

### **Operation of dynamic oil pressure warning system**

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

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

On delay of oil pressure warning:  
approx. 3 s

Off delay of oil pressure warning:  
approx. 5 s

### Testing warning light

After the ignition is switched on and engine not running, the oil pressure warning light in the dash panel insert must come on for about 3 s and then go out. The check is interrupted if the engine is running.

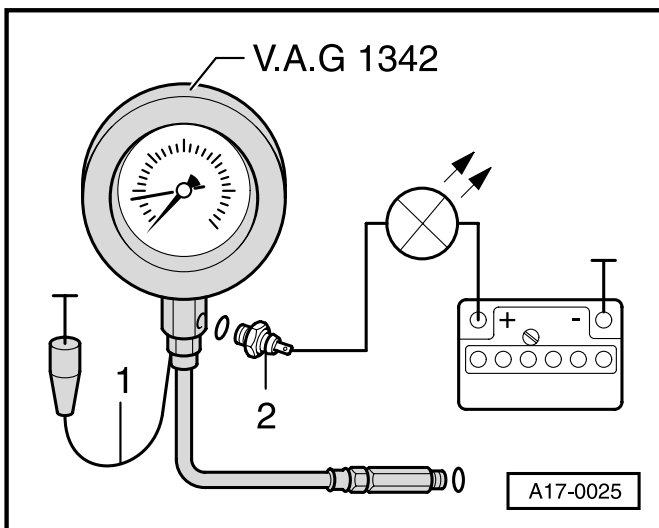
### Warning criteria

The visual oil pressure warning (oil pressure warning light flashes) and the audible warning (buzzer sounds 3 times) are activated 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
  - At an engine speed of more than 5000 rpm, the oil pressure warning is not cancelled; also not if the oil pressure switch is closed. Oil pressure warning cancelled once engine speed below 5000 rpm.
  - If the oil pressure switch is open at an engine speed of more than 1500 rpm for only 0.5...3 s, this is stored in the combination processor of the dash panel insert. If this situation occurs 3 times when the engine is running, the oil pressure warning is immediately activated and is also not cancelled if engine speed drops below 1500 rpm.  
The oil pressure warning is cancelled if the 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., inspecting  $\Rightarrow$  Inspection and Maintenance.
- Oil pressure warning light (K3) must come on for about 3 s when the ignition is switched on.
- Engine oil temperature at least 80 °C (radiator fan must have run once).

**Test procedure**

- Unplug connector from oil pressure switch.
- ◀ - Unscrew oil pressure switch and screw in oil pressure tester, (e.g. V.A.G 1342.)
- Screw oil pressure switch -2- into V.A.G 1342.
- Connect brown cable -1- of tester to earth (-).
- Connect diode test lamp, (e.g. V.A.G 1527 B), to oil pressure switch -2- and to battery positive (+).

The LED must not light up.

- If the LED lights up, replace oil pressure switch.
- Start engine and slowly increase revs.
- At a pressure of 0.075 ... 0.105 MPa, the LED must come on; if not, replace oil pressure switch.
- Further increase engine speed.  
At 2000 rpm and an oil temperature of 80 °C, the oil pressure should be at least 0.2 MPa.

If the specification is not achieved, check axial play of oil pump  $\Rightarrow$  page 17-2, Fig. 1.

At higher engine speeds, the oil pressure must not rise to more than 0.7 MPa. If necessary, replace oil pump cover together with pressure relief valve.

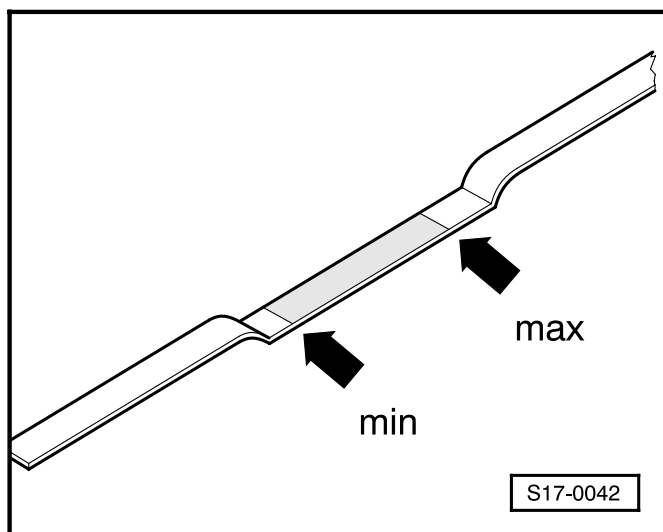
## Inspecting engine oil level

### Inspection conditions

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

### Inspection procedure

- Withdraw dipstick, wipe off with a clean cloth and re-insert the dipstick fully.
- After this, remove dipstick again and read off oil level.



◀ Markings on dipstick

The engine oil level should be maintained within the area between the „min“ and „max“ markings. The „max“ marking corresponds to an engine oil quantity of about 4 litres.

The quantity of oil between „min“ and „max“ markings is about 1 litre.

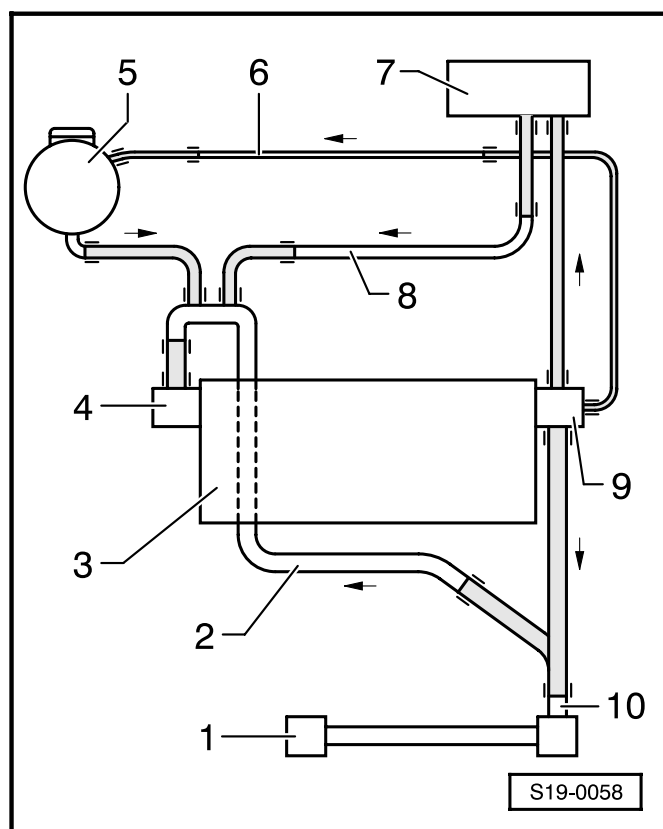
### **Note:**

*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 the cooling system



#### 1 - Radiator

- ◆ after replacing fill entire system with fresh coolant
- ◆ removing and installing ⇒ page 19-6

#### 2 - Front coolant pipe

#### 3 - Cylinder block

#### 4 - Coolant pump

- ◆ removing and installing coolant pump ⇒ page 19-9
- ◆ check smooth operation

#### 5 - Expansion reservoir

#### 6 - Coolant pipe

- ◆ for vent line

#### 7 - Heat exchanger

#### 8 - Rear coolant pipe

#### 9 - Coolant regulator housing

- ◆ with coolant regulator
- ◆ removing and installing ⇒ page 19-7

#### 10 - Quick coupling

- ◆ for radiator connections
- ◆ replacing gasket rings, moisten with coolant additives

#### Notes:

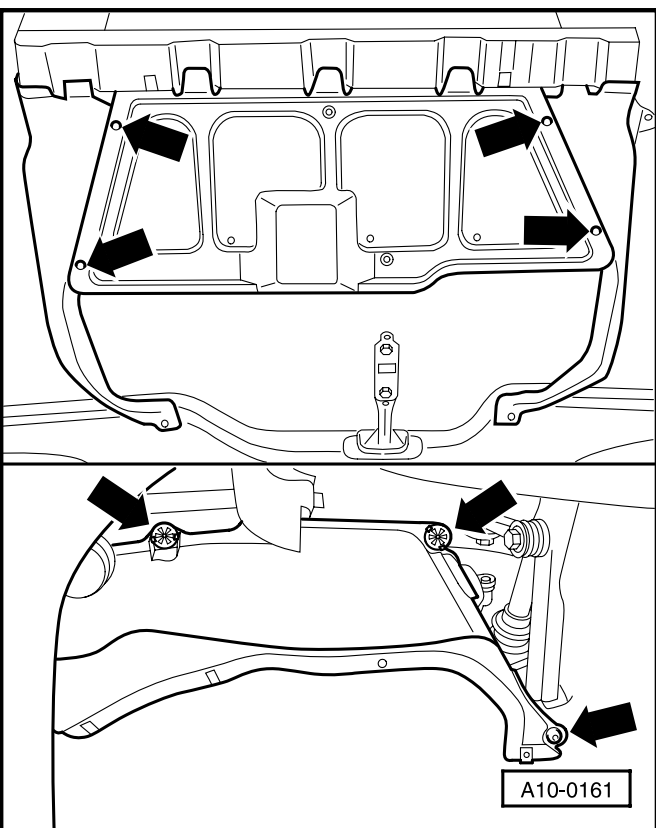
- ◆ When the engine is warm the cooling system is under pressure. If necessary reduce pressure before repairs.
- ◆ Secure all hose connections with hose clips.
- ◆ Use pliers for spring strap clips to fit the spring strap clips.
- ◆ Always replace seals and gasket rings.
- ◆ When installing fit the coolant hoses free of stress, without them touching any other components (pay attention to the marking on the coolant connection and hose).
- ◆ Draining and filling up coolant ⇒ page 19-2.
- ◆ Coolant mixing ratios ⇒ page 19-3.
- ◆ Inspecting cooling system for leaks ⇒ page 19-5.

## Draining and filling system with coolant

### Special tools, testers and aids required

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

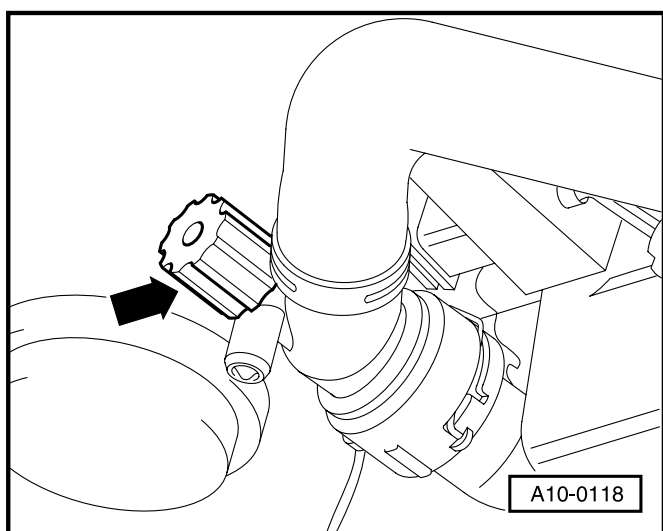
### Draining system



#### **Warning!**

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

- Open cap of the expansion reservoir.
- ◀ - Remove noise insulation in the middle and on the left.
- 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 and allow coolant to flow out; fit auxiliary hose onto connection, if necessary.

#### **Notes:**

- ◆ Collect drained coolant for proper disposal.
- ◆ Please pay attention to disposal regulations 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; Repair group 02.*

Recommended mixture ratios:

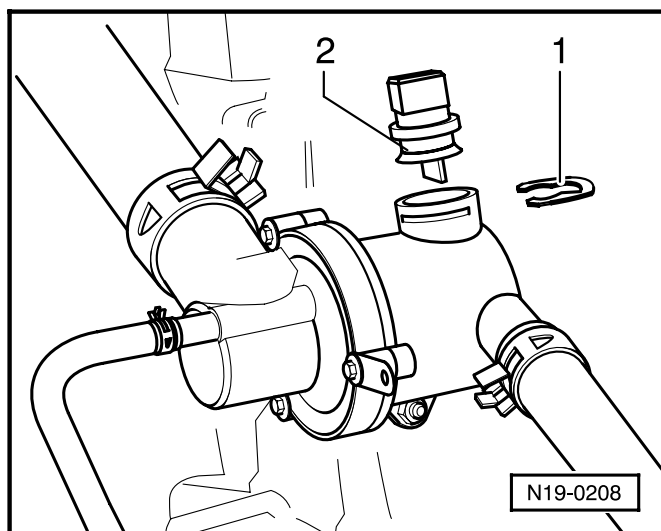
| Antifreeze protection down to | Antifreeze concentration <sup>1)</sup> | Drinking water |
|-------------------------------|----------------------------------------|----------------|
| -25 °C                        | 40 % (2.25 l)                          | 60 % (3.35 l)  |
| -35 °C                        | 50 % (2.8 l)                           | 50% (2.8 l)    |

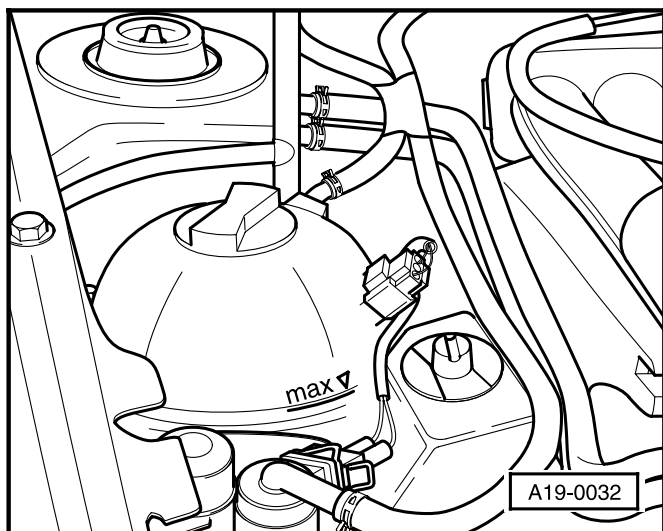
1) The antifreeze concentration must not exceed 60 %; the antifreeze protection and cooling efficiency are reduced as the concentration increases.

### Note:

*If the subsequently described method of filling is not maintained, then the cooling system is not filled completely with coolant and there is a risk of engine damage.*

- Screw in drain plug for coolant.
- ◀ - Pull out retaining clip -1- and remove sender for coolant temperature (-G62-) -2- from the coolant regulator housing.





- ◀ - Fill coolant slowly into the expansion reservoir, until the sender for the coolant temperature is visible in the filler neck.
- Install sender for coolant temperature and close expansion reservoir.
- Run engine until the fan on the radiator starts.

**Caution!**

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

- Inspect coolant level. If the engine is warm the coolant level must be on the „max“ marking, if the engine is cold the level must lie between the „min“ and „max“ marking.

## Testing coolant 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)

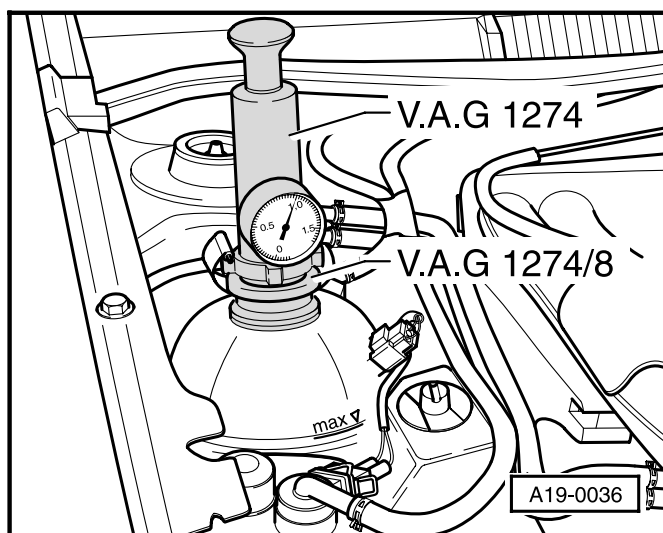
### Test condition

- Engine at normal operating temperature

### Test procedure

#### **Warning!**

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



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

### Testing pressure relief valve in cap

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

## Removing and installing radiator

### Special tools, testers and aids required

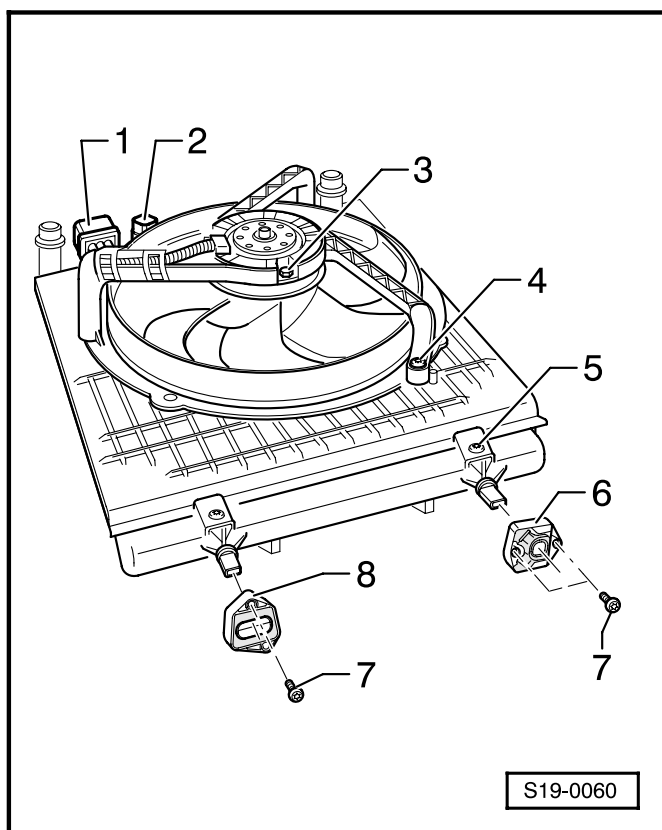
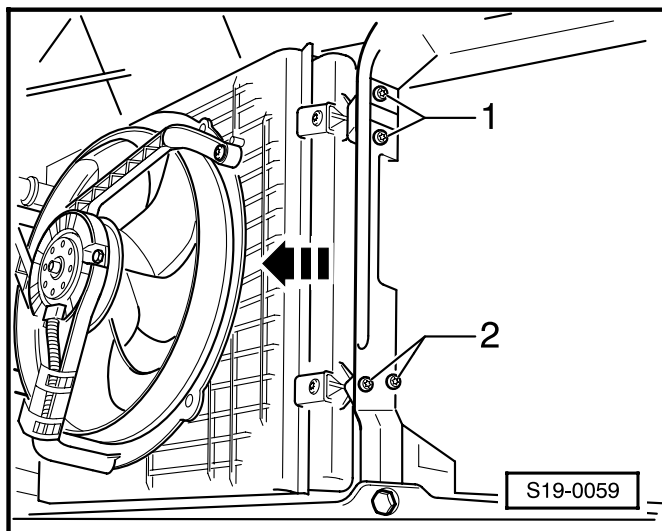
- ◆ Drip tray (e.g. V.A.G 1306)
- ◆ Torque wrench 5...50 Nm  
(e.g. V.A.G 1331)

### Removing

- Drain coolant ⇒ page 19-2.
- Separate quick-couplings (coolant connections) at radiator.
- Unplug connector of thermoswitch
- Separate plug connection for radiator fan.
- ◀ - Take screws -1- and -2- for radiator mount, swivel radiator in direction of arrow and take out of the left radiator mounts.

### Note:

*The left radiator mounts must not be detached.*



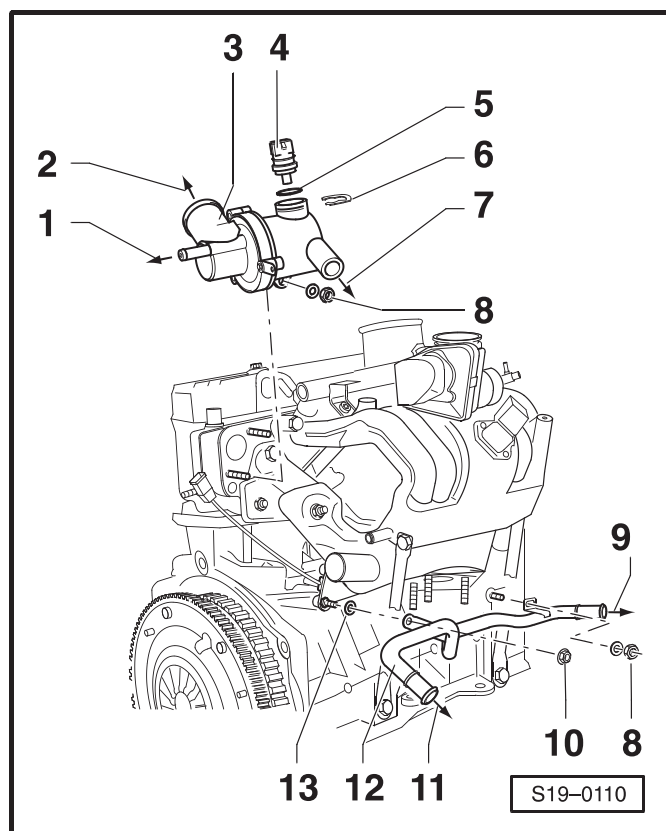
- ◀ 1 - Plug connection for radiator fan -V7-
- 2 - Thermoswitch for radiator fan -F18-, 35 Nm  
on: 95 °C  
off: 84 °C
- 3 - 8 Nm
- 4 - 6 Nm
- 5 - 6 Nm
- 6 - Top radiator mount
- 7 - 8 Nm
- 8 - Bottom radiator mount

### Installing

Installation is carried out in the reverse order.

Pay attention to installation position of the radiator mounts.

## Removing and installing coolant thermostat housing, rear coolant pipe



### Notes:

- ♦ *Draining and filling system with coolant ⇒ page 19-2.*
- ♦ *Do not separate coolant thermostat housing otherwise the leaktightness of the housing is no longer assured. If operational problems occur at the thermostat, replace coolant thermostat housing complete ⇒ Parts List.*

**1 - To expansion reservoir**

**2 - To top of radiator**

**3 - Coolant thermostat housing**

- ♦ with coolant thermostat
- ♦ start of opening: approx. 88 °C
- ♦ end of opening: approx. 103 °C

**4 - Coolant temperature sender -G62-**

- ♦ with coolant temperature gauge sender -G2-

**5 - O-ring**

- ♦ replace

**6 - Retaining clip**

**7 - To heat exchanger**

**8 - 20 Nm**

**9 - To front coolant pipe**

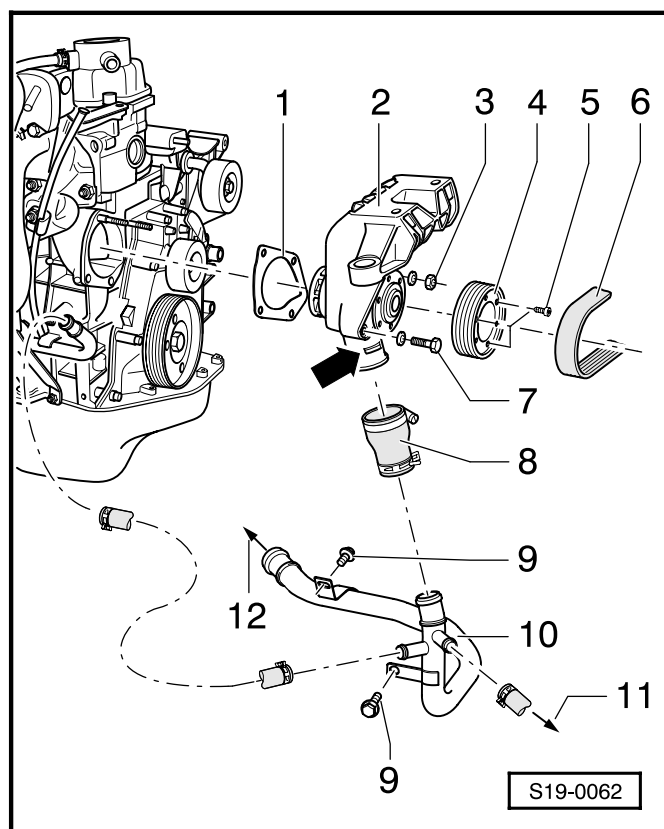
**10 - 10 Nm**

**11 - To heat exchanger**

**12 - Rear coolant pipe**

**13 - Washer**

## Removing and installing coolant pump, front coolant pipe



### 1 - Gasket

- ◆ replace

### 2 - Coolant pump

- ◆ ensure unobstructed running
- ◆ if damaged and leaking, replace complete
- ◆ removing and installing ⇒ page 19-9
- ◆ push on coolant hose (item 8) up to marking -arrow-

### 3 - 20 Nm

- ◆ self-locking, replace

### 4 - Belt pulley

- ◆ for ribbed V-belt

### 5 - 10 Nm

### 6 - Ribbed V-belt

- ◆ mark direction of running before removing
- ◆ do not kink
- ◆ inspect for wear
- ◆ removing and installing ⇒ page 13-1

### 7 - 20 Nm

### 8 - Coolant hose

- ◆ use only screw-type clamp at coolant pump side
- ◆ tighten screw-type clamp to 3 Nm
- ◆ push onto coolant pump as far as marking

### 9 - 20 Nm

### 10 - Front coolant pipe

### 11 - To expansion reservoir

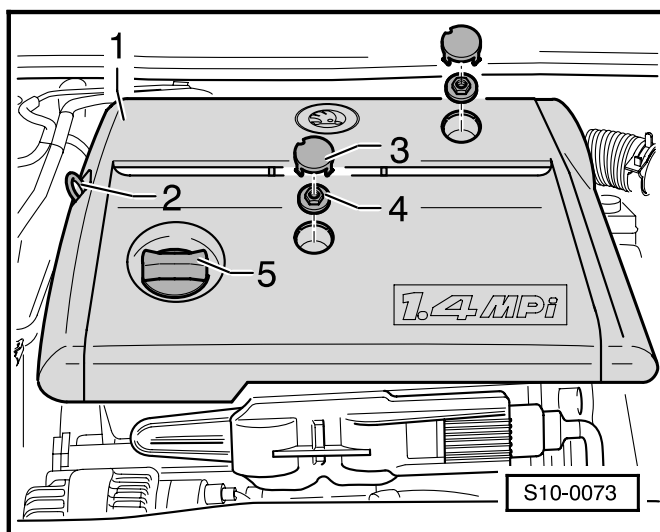
### 12 - To bottom of radiator

## Removing and installing coolant pump

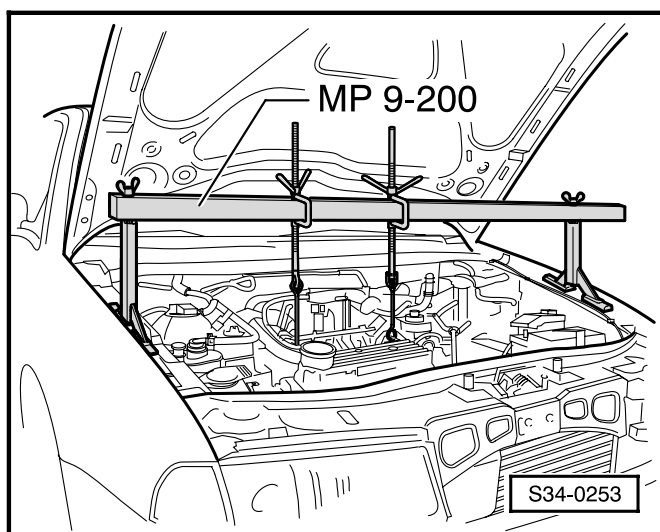
### Special tools, testers and aids required

- ◆ Suspension device MP 9-200
- ◆ 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)

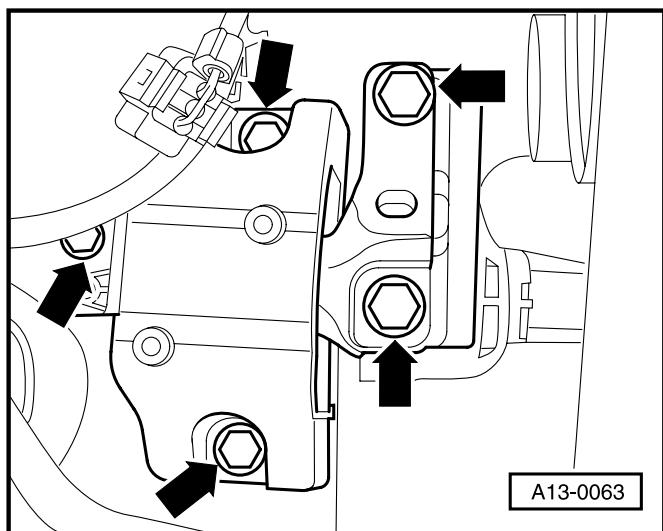
### Removing



- Drain coolant ⇒ page 19-2.
- ◀ - Remove engine trim panel ⇒ page 10-2.
- Only slacken bolts of belt pulley of coolant pump.
- Remove ribbed V-belt ⇒ page 13-1.
- Unbolt front coolant pipe from front and rear of cylinder block.
- Slacken screw-type clip at coolant pump and detach coolant hose.
- Remove belt pulley of coolant pump.



- ◀ - Install supporting device MP 9-200 and take up weight of engine/gearbox unit at the spindles.
- Remove power steering reservoir (hoses remain connected).



◀ - Unbolt engine mounts -arrows-.

- Unbolt coolant pump.

### Installing

Installation is carried out in the reverse order of removal. Pay attention to the following points:

- Replace gasket for coolant pump.
- First of all, install ribbed V-belt then fully tighten bolts of belt pulley of coolant pump.
- Tightening torques ⇒ page 10-14 (Engine/gearbox mounting) and ⇒ page 19-8.
- Fill system with coolant ⇒ page 19-3.

## Removing and installing parts of the fuel supply system

### Notes:

- ◆ *Hose connections are secured with spring strap clips or clamp-type clips.*
- ◆ *Always replace clamp-type clips by spring strap clips or screw-type clips.*
- ◆ *Fuel hoses at the engine must only be secured with spring strap clips. It is not permitted to use clamp-type or screw-type clips.*
- ◆ *Always replace seals and gaskets when carrying out removal and installation work.*

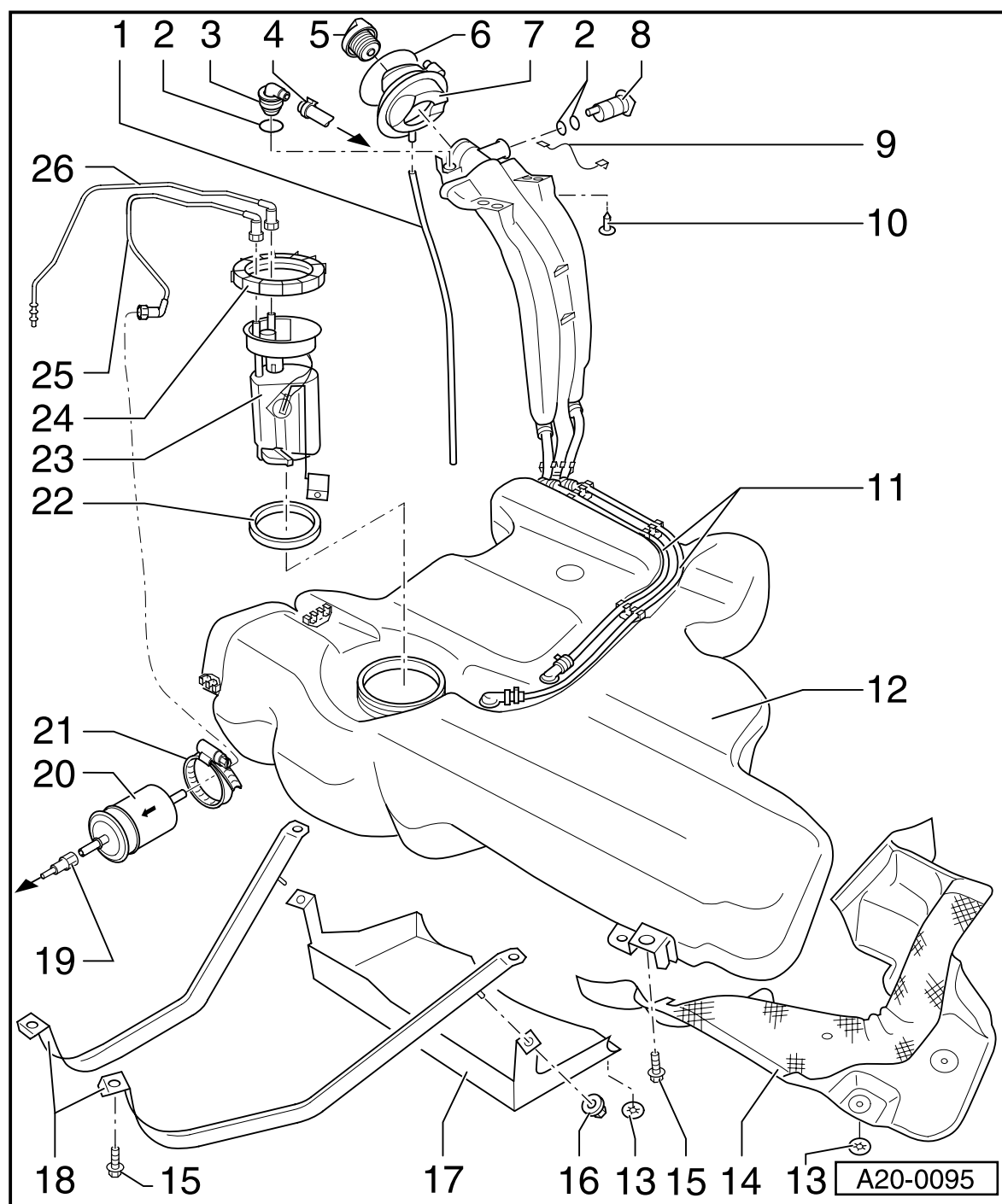
Pay attention to safety precautions  
⇒ page 20-4.

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

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

Servicing throttle mechanism ⇒ 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 out of filler neck
- ◆ Inspect valve for clear passage  
Valve vertical: open,  
valve tilted 45°: closed

### 4 - Vent line

- ◆ To activated charcoal filter

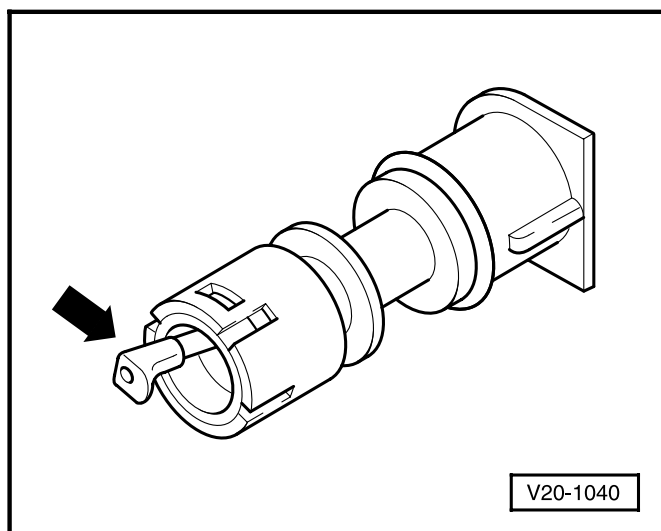
### 5 - Fuel filler cap

- ◆ Replace seal if damaged

### 6 - Tensioning ring

### 7 - Rubber bowl

- 8 - Vent valve**  
♦ inspecting ⇒ Fig. 1
- 9 - Earth connection**
- 10 - 10 Nm**
- 11 - Vent line**
- 12 - Fuel tank**  
♦ removing and installing ⇒ page 20-6
- 13 - Clamping washer**  
♦ to remove, turn to left  
♦ to install, tighten to 2 Nm
- 14 - Heat shield**  
♦ for fuel tank
- 15 - 20 Nm + torque a further 90°**  
♦ replace
- 16 - Clamping nut**  
♦ installing, tighten to 2 Nm
- 17 - Cover**  
♦ for fuel tank  
♦ not fitted to all vehicles
- 18 - Tensioning strap**  
♦ pay attention to different lengths
- 19 - Feed line**  
♦ black  
♦ to fuel rail  
♦ to detach, press unlocking buttons at connector
- 20 - Fuel filter**  
♦ installation position: arrow points in direction of flow
- 21 - Retaining clamp**  
♦ 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:  
⇒ 1.4 l/44 kW Engine, Simos 3PB Fuel Injection and Ignition System; Repair Group 24; Testing fuel pressure regulator and holding pressure
- 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 buttons at 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 buttons at connector



◀ Fig. 1 Inspecting vent valve

Lever in off position: closed

Lever pushed in direction of arrow: open

## Safety precautions when working on fuel supply system

**Warning!**

***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 must not be filled more than 2/3.
- ◆ Before commencing the work, an exhaust extraction system must be switched on and the exhaust extraction hose must be placed close to the assembly opening of the fuel tank for extracting the fuel vapours released. If no exhaust extraction system is available, a radial fan (motor not in air flow) with a delivery volume of more than 15 m<sup>3</sup>/h may be used.
- ◆ Avoid skin contact with fuel! Wear fuel-resistant gloves!

## Rules for cleanliness

Pay careful attention to the following „5 rules“ for cleanliness when working 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 components if the 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 open:  
Avoid working with compressed air.  
Avoid moving the vehicle.

## Removing and installing fuel delivery unit

Pay attention to safety precautions  
⇒ page 20-4.

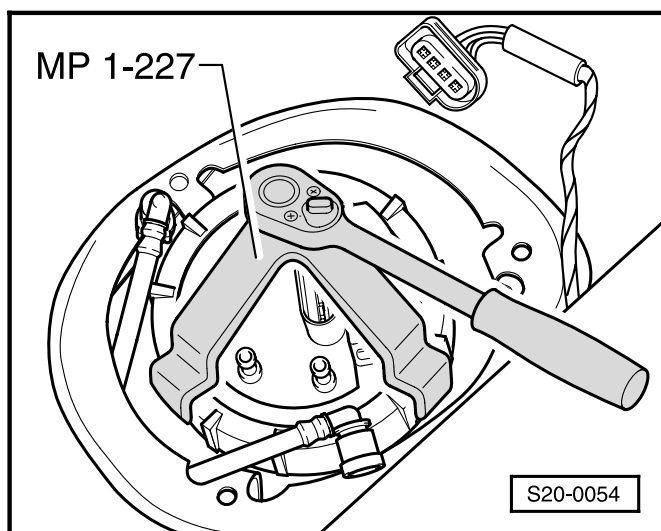
Pay attention to rules for cleanliness  
⇒ page 20-4.

### Special tools, testers and aids required

- ◆ Wrench for union nut MP 1-227

### Removing

- On models fitted with 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 feed and return-flow line 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 the union nut.
- Pull fuel delivery unit and seal out of the opening of the fuel tank.



### Note:

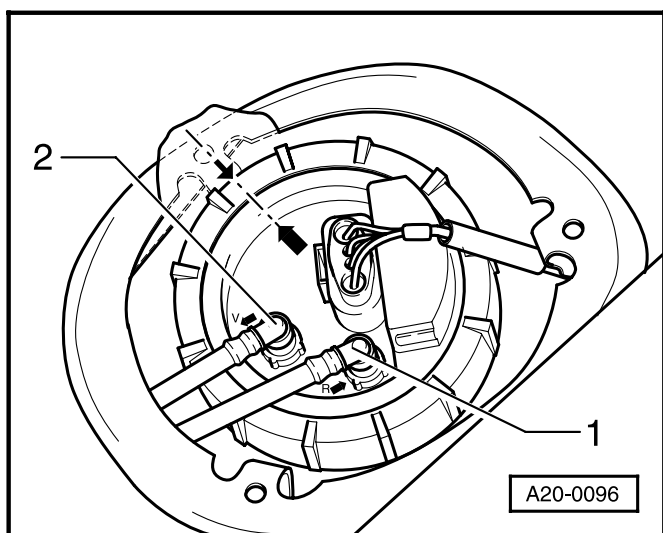
*If the fuel delivery unit is still filled with fuel, empty before replacing.*

### Installing

Installation is carried out in the reverse order to removal. Pay attention to the following points:

### Notes:

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

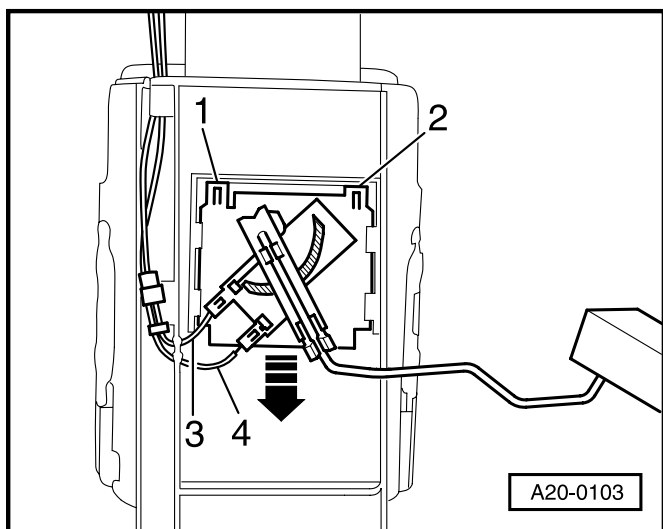


- ◀ - Pay attention to installation position:
  - ◆ Marking on closing flange must be aligned with marking on the fuel tank -arrows-.
  - ◆ Blue return-flow line -1- to connection marked with -R-.
  - ◆ Black feed line -2- to connection marked with -V-.

## Removing and installing fuel gauge sender

### Removing

- Remove fuel delivery unit ⇒ page 20-5.
- ◀ - Release connector tabs of cables -3- and -4- and detach.
- Use a screwdriver to lift 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.

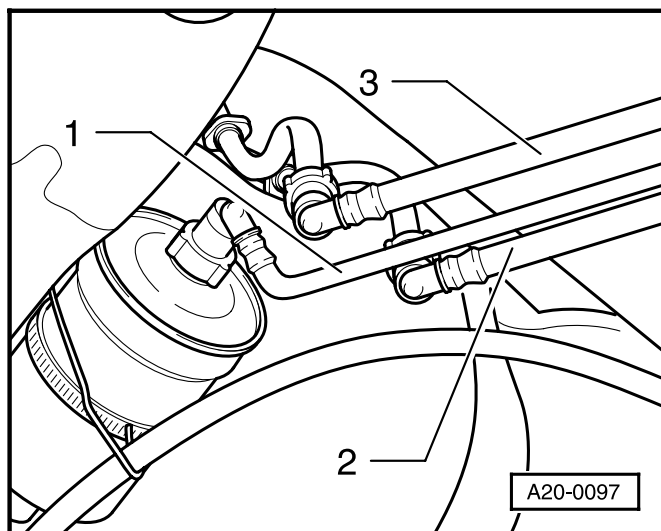
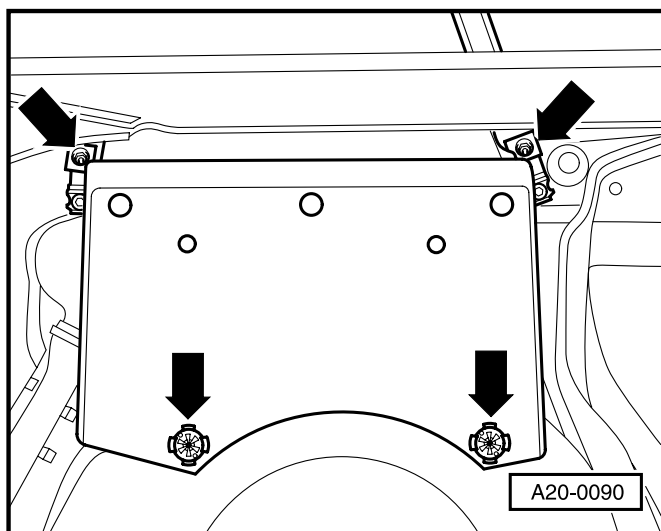
Pay attention to rules for cleanliness  
⇒ page 20-4.

### Special tools, testers and aids required

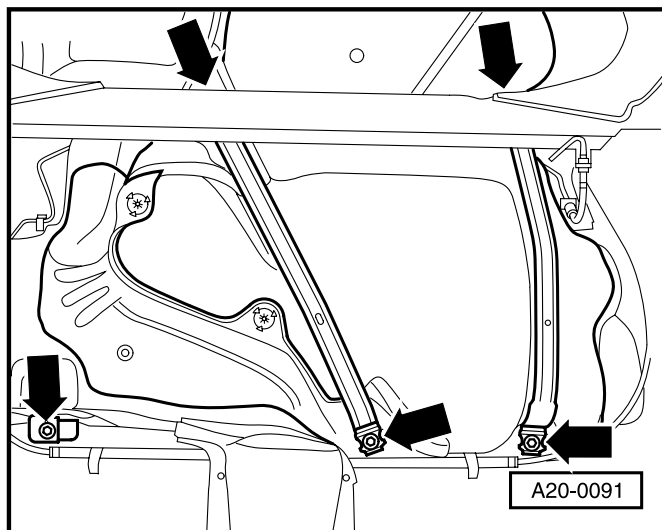
- ◆ Engine/gearbox lifter (e.g. V.A.G 1383 A)
- ◆ Fuel extractor (e.g. V.A.G 1433 A)

### Removing

- On models fitted with coded radio set, pay attention to coding, determine if necessary.
- Switch off ignition (if not already off) and disconnect earth strap at the battery.
- Empty fuel tank with fuel extractor (e.g. V.A.G 1433 A).
- Remove rear axle:  
⇒ Running Gear; Repair Group 42; Servicing rear axle; Removing and installing rear axle
- 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 the rubber bowl (around filler neck).
- Push through rubber bowl to the inside.
- Remove rear right wheelhouse liner.
- Unscrew fuel filler neck below wheelhouse liner.
- ◀ - Remove cover below fuel tank -arrows- (if fitted).



- ◀ - Detach return-flow line -2- (blue), feed line -1- (black) and vent line -3- (white) at the front right of the fuel tank (press release buttons).
- Place engine/gearbox lifter (e.g. V.A.G 1383 A) below the fuel tank for supporting it.

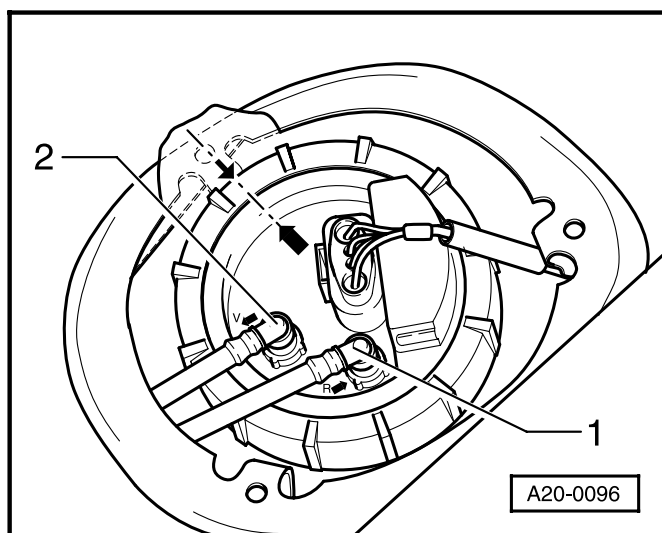


- ◀ - Slacken bolted connections -arrows- at the front left and at the retaining straps.
- Lower fuel tank.

### Installing

Installation is carried out in the reverse order to removal. Pay attention to the following points:

- ◀ - Connect fuel lines at the flange of the fuel delivery unit:
  - ♦ Blue return-flow line -1- to connection marked with -R-.
  - ♦ Black feed line -2- to connection marked with -V-.



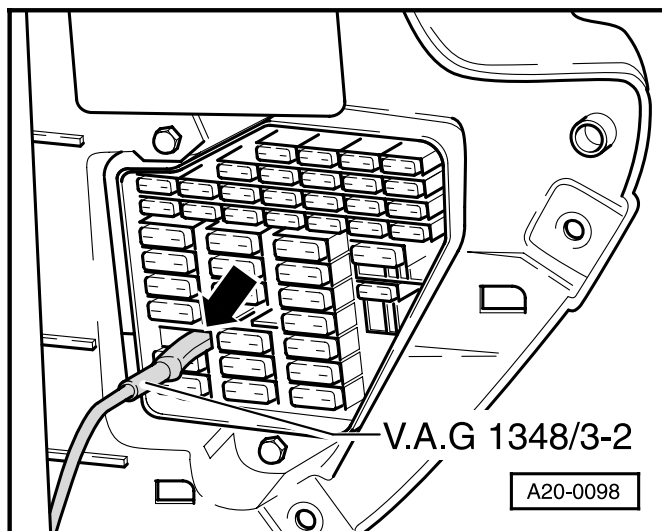
### Connecting remote control

#### 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 at the left side of the dash panel.
- Take out fuse 28 at the fuse carrier (left row, 5th large fuse from the top).
- ◀ - Connect remote control V.A.G 1348/3A with adapter cable V.A.G 1348/3-2 to the 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 A)
- ◆ Wrench for union nut MP 1-227
- ◆ Current flow diagram

### Test conditions

- Holding pressure o.k.; testing:  
⇒ 1.4-ltr./44 kW Engine, Simos 3PB Fuel Injection and Ignition System; Repair Group 24; Testing fuel pressure regulator and holding pressure
- Battery voltage at least 12 V
- Fuse 28 o.k.
- Fuel filter o.k.

### Test procedure

- Switch on ignition.

The fuel pump must be heard to run. (A second fitter may be required here if the surrounding noise level is high).

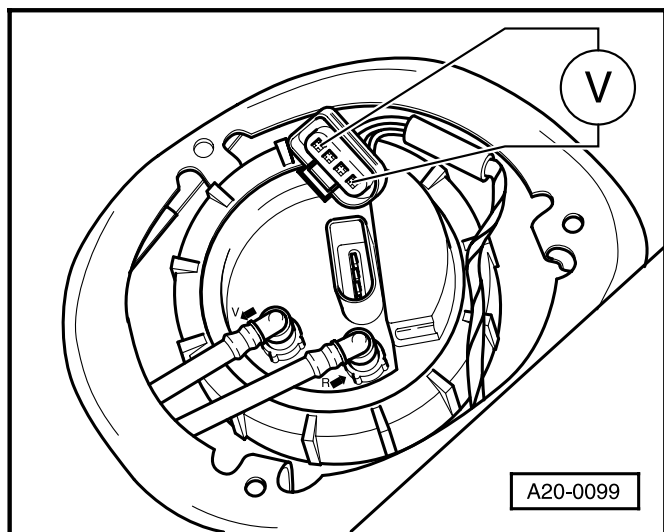
If the fuel pump does not run:

- 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:

- ⇒ 1.4-ltr./44 kW Engine, Simos 3PB Fuel Injection and Ignition System; Repair Group 24; Testing fuel pump relay -J17 and actuation



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 A) 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, and test for continuity, if necessary.

If no open circuit can be found in the wiring:

Fuel pump is faulty.

- Replace fuel delivery unit ⇒ page 20-5.

## Testing delivery of fuel pump

### Special tools, testers and aids required

- ◆ Adapter (e.g. V.A.G 1318/17)
- ◆ Measuring vessel

### Test conditions

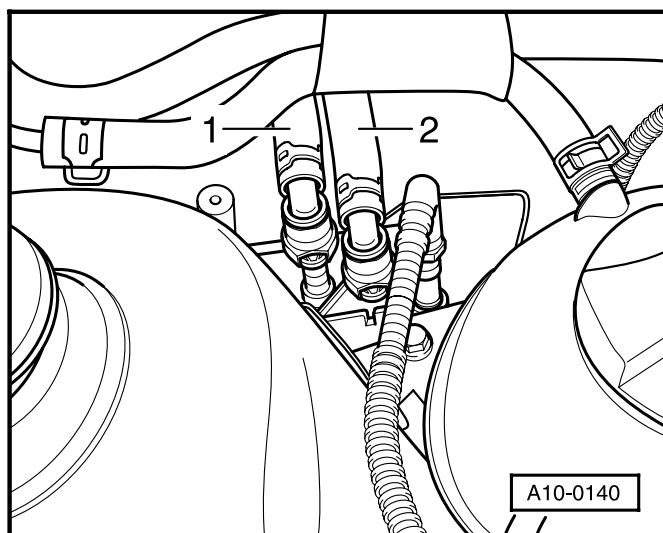
- Battery voltage at least 12 V
- Voltage supply o.k.
- Fuel filter o.k.

**Test procedure**

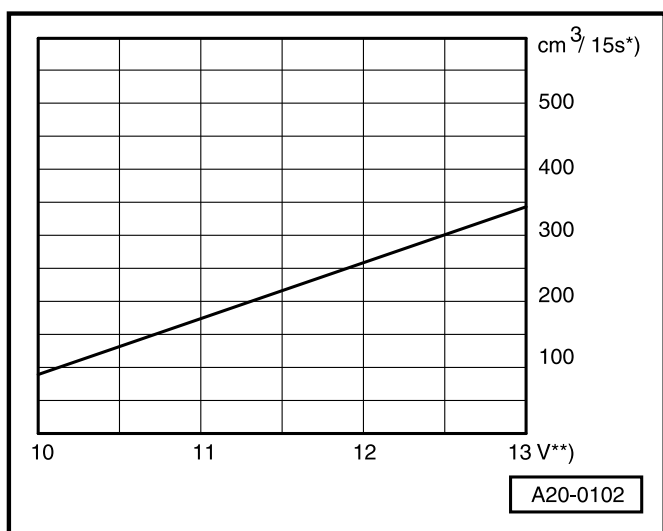
- Switch off ignition.
- Connect remote control V.A.G 1348/3A with adapter cable V.A.G 1348/3-2 ⇒ page 20-8.
- Remove cap at fuel filler neck.

**Warning!**

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

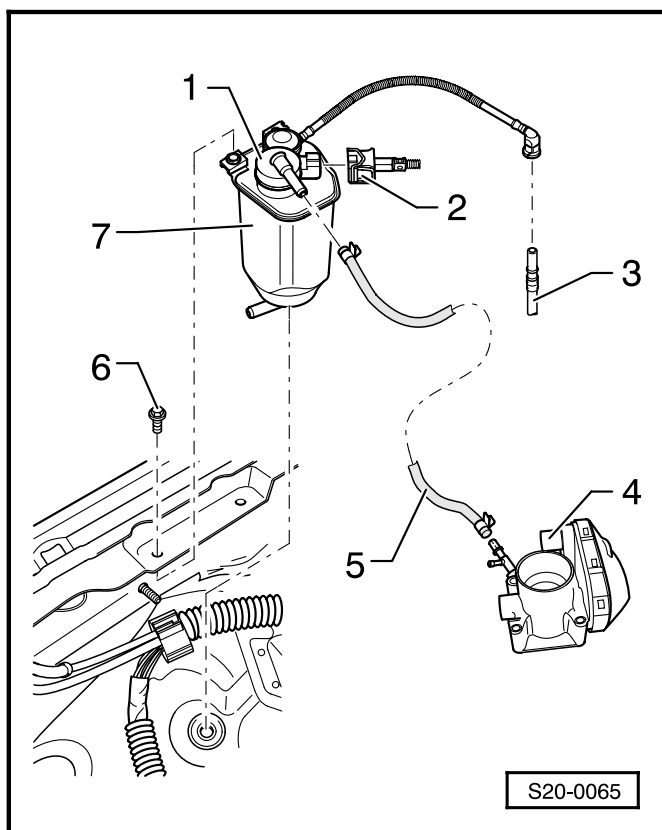


- Compare quantity of fuel pumped with specification.

\*) Minimum delivery cm³/15 s

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

## Removing and installing parts of the activated charcoal filter system



### 1 - Solenoid valve 1 -N80-

- ◆ Testing operation and actuation:

⇒ 1.4-ltr./44 kW Engine, Simos 3PB Fuel Injection and Ignition System; Repair Group 24; Testing solenoid valve 1 for activated charcoal filter

### 2 - Connector

### 3 - Vent line

- ◆ From gravity valve at fuel tank
- ◆ For detaching, press release buttons at connection

### 4 - Throttle valve control unit

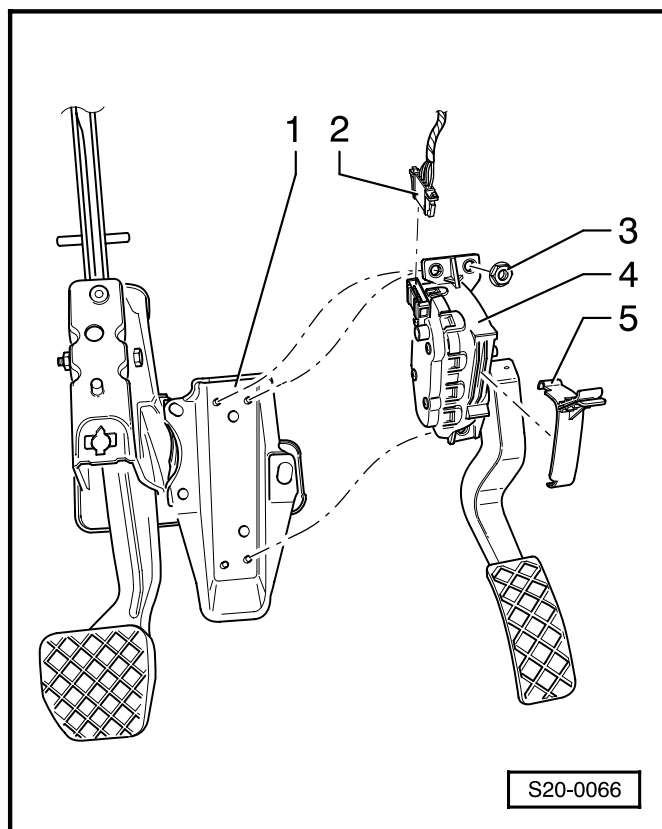
### 5 - Vent hose

### 6 - 10 Nm

### 7 - Activated charcoal filter

- ◆ With solenoid valve 1 -N80-
- ◆ Installation point: in right of engine compartment
- ◆ For removing, detach power steering reservoir and push to the side

## Servicing throttle mechanism



### 1 - Bearing bracket

- ◆ Removing and installing:

⇒ Running Gear; Repair Group 46; Summary of components: Pedal Assembly, Brake Pedal; Removing and installing brake pedal

### 2 - Connector

- ◆ black, 6-pin

### 3 - 10 Nm

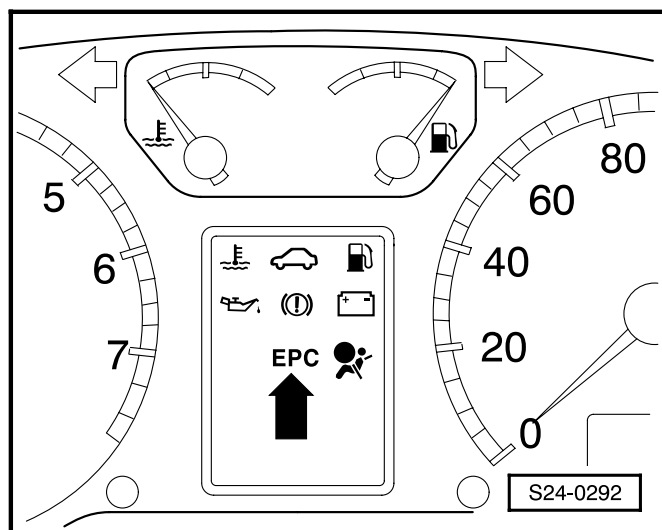
### 4 - Accelerator pedal position sender -G79-

- ◆ Cannot be adjusted
- ◆ The accelerator pedal position sender passes on the driver input to the engine control unit
- ◆ For removing sender, take out footwell trim panel on driver side
- ◆ Testing:

⇒ 1.4-ltr./44 kW Engine, Simos 3PB Fuel Injection and Ignition System; Repair Group 24; Testing accelerator pedal position sender

### 5 - Bracket

- ◆ For footwell trim on driver side
- ◆ Clipped in at accelerator pedal position sender



### Note:

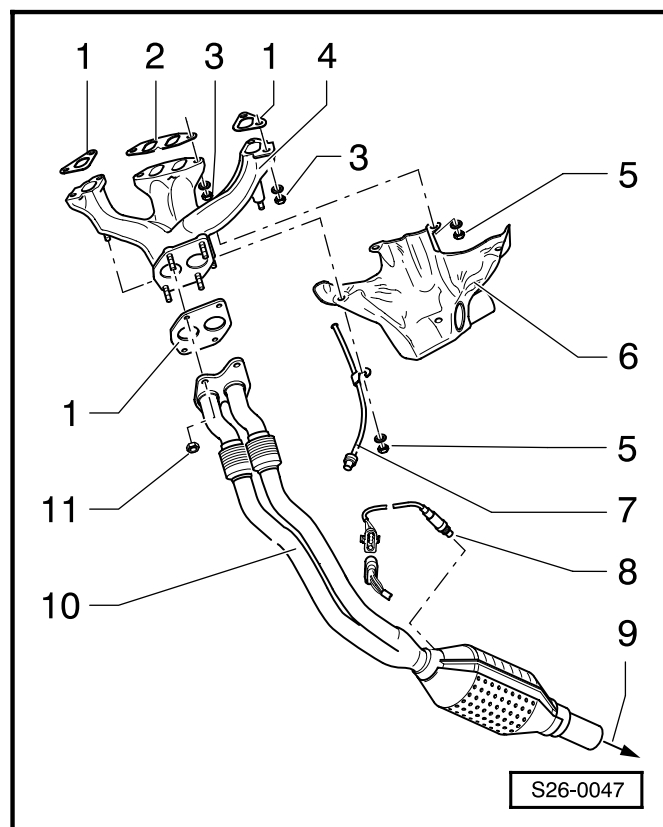
*If the accelerator pedal position sender is faulty or, for example, if the connector is not plugged in, the EPC warning light comes on and remains on in the dash panel insert after the ignition is switched on.*

⇒ 1.4-ltr./44 kW Engine, Simos 3PB Fuel Injection and Ignition System; Repair Group 24; Testing electronic power control (electronic throttle).



## Removing and installing parts of the exhaust system

### Exhaust manifold, front exhaust pipe with catalytic converter, lambda probe



#### Notes:

- ♦ Always replace gaskets and self-locking nuts.
- ♦ After carrying out removal and installation work on the exhaust system, ensure that the exhaust system is not twisted and has adequate clearance to the body. If necessary, slacken double clamp and align silencer and exhaust pipe so that adequate clearance to the body exists at all points and the weight of the exhaust system is evenly distributed over the hangers.
- ♦ Use a screwdriver to slacken and tighten clamping washers for heat shields.  
Tightening torque: 2 Nm

#### 1 - Gasket

- ♦ replace

#### 2 - Gasket

- ♦ replace
- ♦ installation position: notch faces down

#### 3 - 25 Nm

- ♦ insert with heat-resistant bolt paste  
G 052 112 A3

#### 4 - Exhaust manifold

- ♦ take off intake manifold for removing:
- ⇒ 1.4 l/44 kW Engine, Simos 3PB Fuel Injection and Ignition System; Repair Group 24; Disassembling and assembling intake manifold

#### 5 - 20 Nm

- ♦ replace

#### 6 - Warm air baffle

#### 7 - Guide tube

- ♦ for dipstick

#### 8 - Lambda probe, 50 Nm

- ♦ grease only thread with G 052 112 A3; G 052 112 A3 must not get onto the slots of the probe body
- ♦ use lambda probe ring wrench for removing and installing
- ♦ testing:
- ⇒ 1.4 l/44 kW Engine, Simos 3PB Fuel Injection and Ignition System; Repair Group 01; Interrogating and erasing fault memory
  - ♦ testing lambda control and lambda probe heater:
- ⇒ 1.4 l/44 kW Engine, Simos 3PB Fuel Injection and Ignition System; Repair Group 24; Testing lambda control

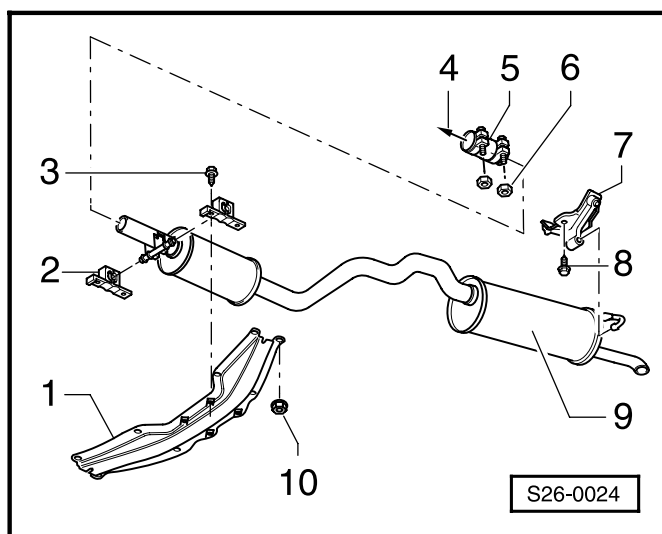
#### 9 - To front silencer

#### 10 - Front exhaust pipe with catalytic converter

#### 11 - 25 Nm

- ♦ replace
- ♦ insert stud bolts with heat-resistant bolt paste G 052 112 A3

## Silencer with hangers



### 1 - Tunnel bridge

- ◆ With hole for aligning exhaust system  
⇒ page 26-4

### 2 - Hanger

- ◆ Installation position ⇒ Fig. 1

3 - 25 Nm

4 - To catalytic converter

### 5 - Double clip

- ◆ Align exhaust system free of stress before tightening ⇒ page 26-4
- ◆ Installation position: horizontal in vehicle, bolted connection pointing to the left
- ◆ Tighten bolted connections evenly

6 - 40 Nm

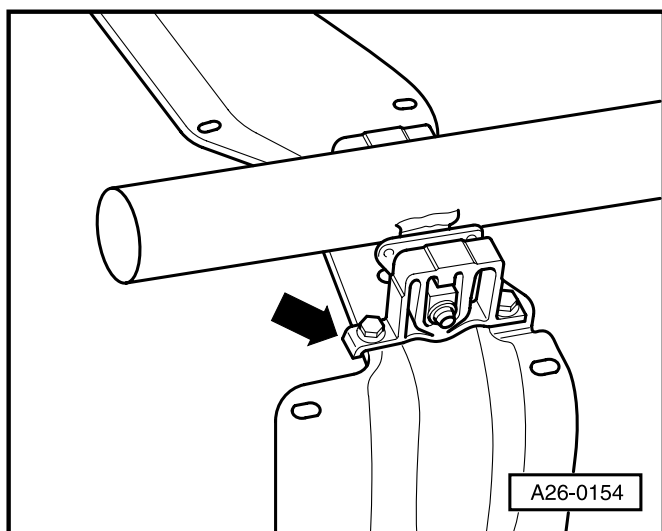
7 - Hanger

8 - 25 Nm

### 9 - Front and rear silencers

- ◆ Can be replaced individually when performing repairs ⇒ page 26-3
- ◆ Align exhaust system free of stress  
⇒ page 26-4

10 - 25 Nm



◀ Fig. 1 Installation position for hanger

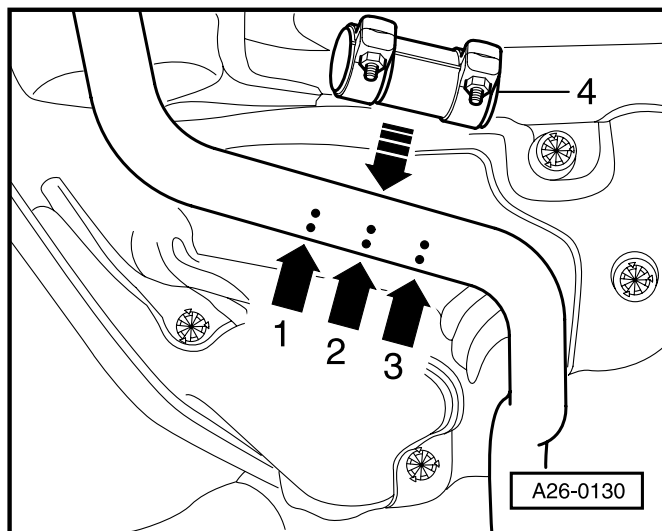
The angled side -arrow- at the base of the hanger points in direction of travel.

## 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 repair purposes for replacing the front or the rear silencer.



- ◀ - Separate exhaust pipe at right angles at the separation point -arrow 2- with a body saw (e.g. V.A.G 1523).
- When installing, position double clip -4- at the side markings -arrows 1 and 3-.
- Align exhaust system free of stress ⇒ page 26-4.
- Align rear silencer horizontally.
- Tighten bolted connections of double clip evenly to 40 Nm.
- Installation position of double clip: 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)

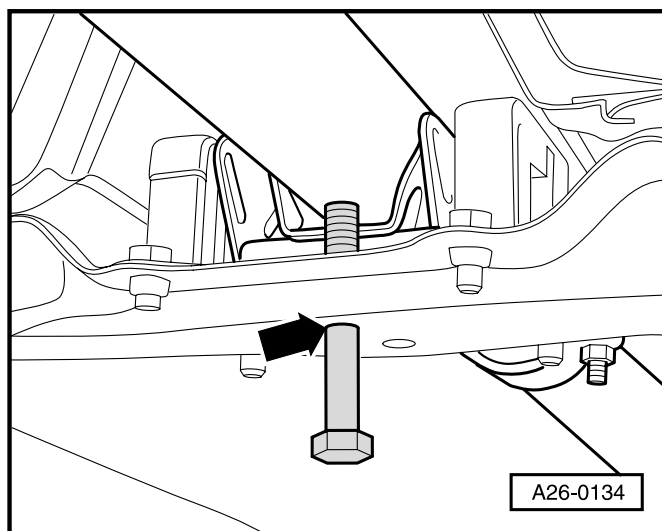
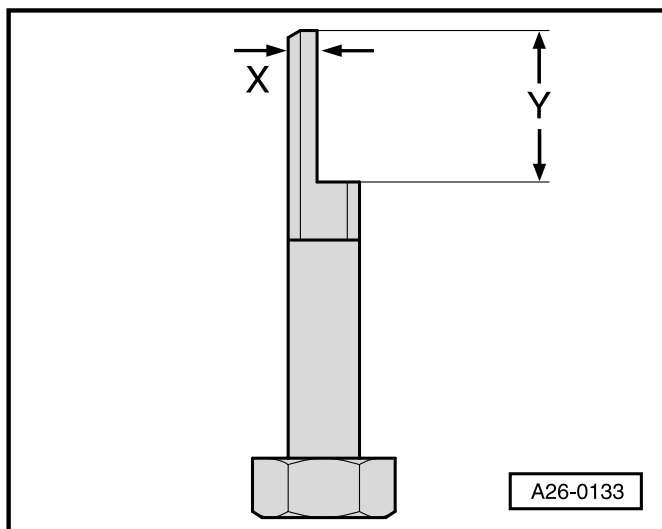
### Procedure

- The exhaust system is aligned when cold.
- ◀ - Shop-make tool from M10 bolt according to the dimensions stated opposite for aligning the exhaust system.
  - ◆ Dimension -X- = 4 mm
  - ◆ Dimension -Y- = 25 mm

### Note:

*A second fitter is required for aligning the exhaust system.*

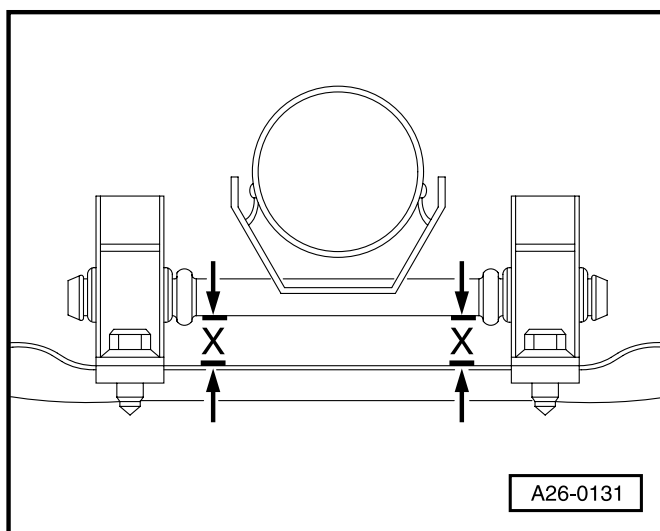
- Slacken bolted connections of the clamping sleeve between catalytic converter and front silencer.



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

### Note:

*The exhaust system is pretensioned in direction of travel when the shop-made bolt is inserted.*

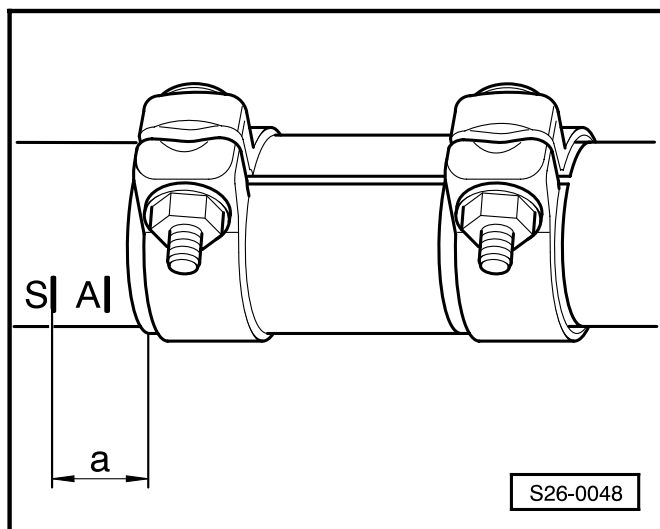


- Align front and rear silencer horizontally:

- The hanger bolt at the exhaust pipe must be positioned parallel to the tunnel bridge (dimension -X- identical on left and right).

**Note:**

On models provided with separation point  
⇒ page 26-3, additionally inspect horizontal position of rear silencer at the tail pipe.



- Position double clip at a distance of  $a = 5$  mm from the marking "S" on the catalytic converter and tighten evenly to 40 Nm in horizontal position.

### Inspecting exhaust system for leaks

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

