

## Workshop Manual FABIA 2000 ➤

**1.9/74 TDI Engine, Mechanics**

Edition 08.00

Engine code

**ATD**



## List of Supplements to Workshop Manual

### FABIA 2000 ►

#### 1.9/74 TDI Engine, Mechanics

Edition 08.00

Supplement	Edition	Subject	Article Number
	08.00	Basic Edition	S00.5313.00.20
1	08.01	Modifications in Rep. Gr. 13, 17, 20, 21	S00.5313.01.20
2	05.02	Modifications in Rep. Gr. 10, 13, 19, 20, 21	S00.5313.02.20
3	11.03	Modifications in Rep. Gr. 13, 15, 17, 19, 20, 21, 26	S00.5313.03.20



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# 00 – Technical Data

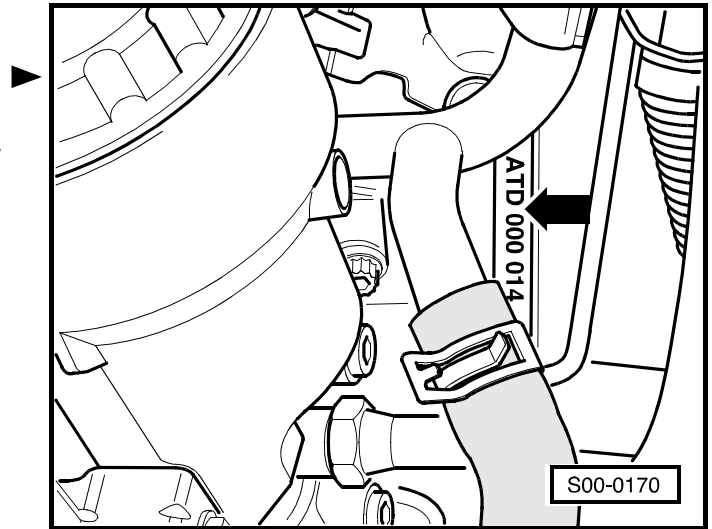
## 00-1 Technical data

### Engine number

The engine number („engine identification characters“ and „serial number“) is located in the front at the engine/ gearbox joint -arrow-.

In addition, a sticker with the „engine identification characters“ and „serial number“ is affixed to the toothed belt guard.

The engine identification characters are also indicated on the vehicle data sticker.



### Engine characteristics

Identification characters	ATD
Manufactured	02.00 ▶
Exhaust limits conforming to	EU -3
Displacement	l
Power output	kW at rpm
Torque	Nm at rpm
Bore	∅ mm
Stroke	mm
Compression ratio	
Firing order	
min. CN	
Catalytic converter	
Exhaust gas recirculation	
Turbocharging	
Charge air cooler	



## 10 – Removing and Installing Engine

### 10-1 Removing and Installing Engine

#### Special tools, test and measuring equipment and auxiliary items required

- ◆ Workshop crane (e.g. -V.A.G 1202 A-)
- ◆ Catch pan (e.g. -V.A.G 1306-)
- ◆ Torque wrench
- ◆ Engine/gearbox jack (e.g. -V.A.G 1383 A-)
- ◆ Engine mount -T10012-
- ◆ Distance sleeve -T30010-
- ◆ Extension -10-222 A/7-
- ◆ Engine / gearbox mount -MP 1-202-
- ◆ Assembly stand -MP 9-101-
- ◆ Lifting device -MP 9-201-
- ◆ Pliers for spring strap clips
- ◆ Snap hook
- ◆ Grease -G 000 100-
- ◆ Hot screw paste -G 052 112 A3-
- ◆ Wire
- ◆ Adhesive tape

#### Removing engine



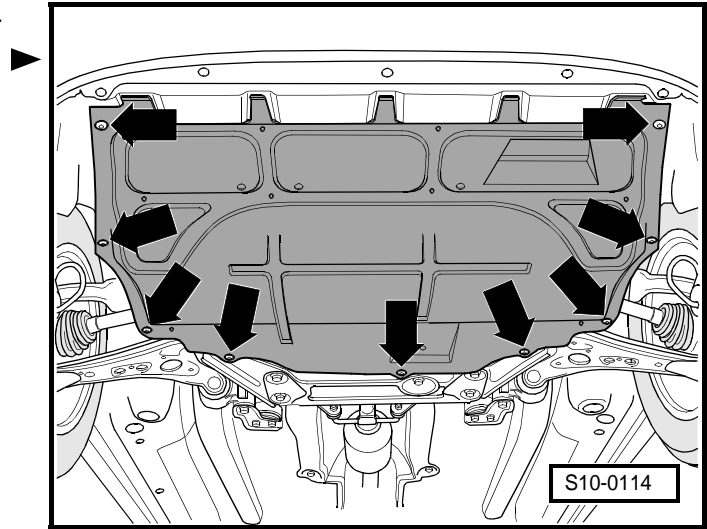
#### Note

- ◆ *The engine is removed towards the front together with the gearbox.*
- ◆ *Supporting points on the lift platform ⇒ Inspection and Maintenance.*
- ◆ *The hose connections are secured with screw-type clips, spring-type clips or clamp-type clips. Always replace warm-type clamps with spring strap clips or screw clamps.*
- ◆ *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.*
- ◆ *Use pliers for spring strap clips to fit the spring strap clips.*
- ◆ *Pay attention to the correct assignment of the connectors, if necessary mark.*
- ◆ *If the battery is disconnected and reconnected, carry out certain additional operations ⇒ Electrical System; Rep. Gr. 27.*

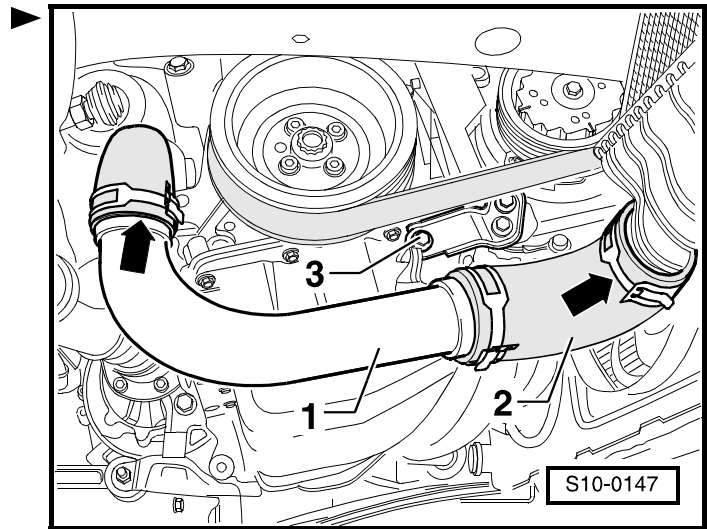
#### Procedure

- On models fitted with a coded radio set, pay attention to the coding; determine if necessary.

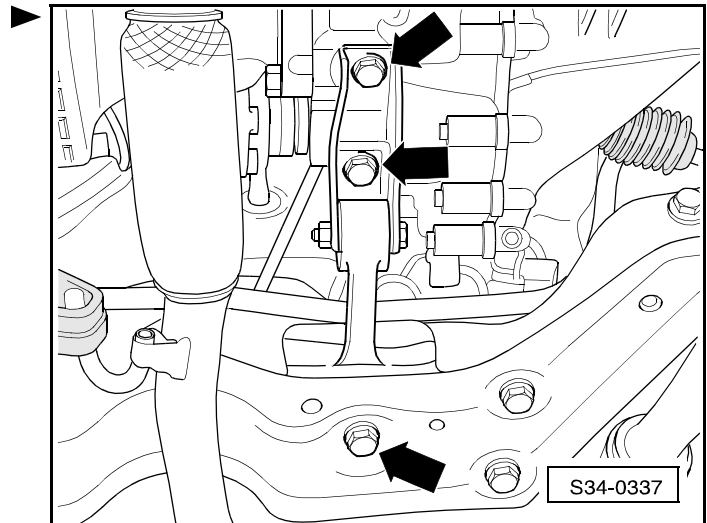
- Disconnect the battery-earth strap with the ignition off.
- Remove noise insulation -arrows-.
- Remove drive shaft to the right ⇒ Running gear; Rep. Gr. 40.
- Unscrew the drive shaft to the left of the gearbox flange.
- Raise drive shaft on the left and secure.
- Remove front exhaust pipe with catalyst ⇒ Chapter 26-1.
- Remove front bumper ⇒ Body work; Rep. Gr. 63.



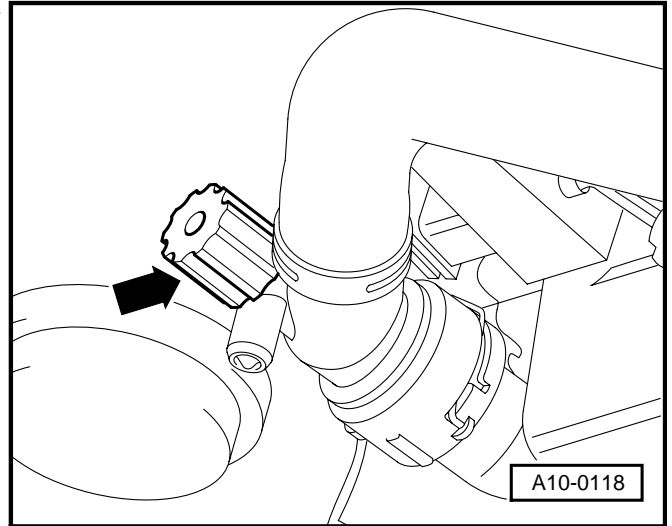
- Screw out screw -3-.
- Remove charge-air pipe at bottom -1- with connecting hose -2- -arrows-.
- Remove charge-air routing from charge-air cooler ⇒ Chapter 21-1.



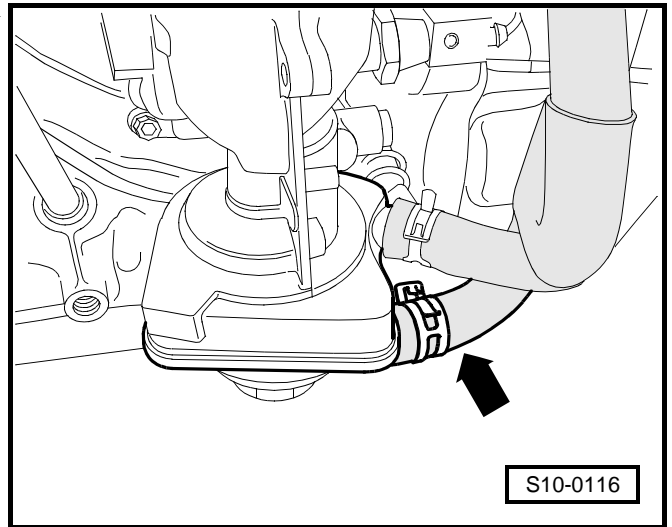
- Unbolt the pendulum support -arrows-.
- Place a catch pan under the engine.
- Open the cap on the coolant expansion bottle.



- Turn the drain plug -arrow- on the radiator to the left and draw backwards, if necessary fit auxiliary hose onto connection.



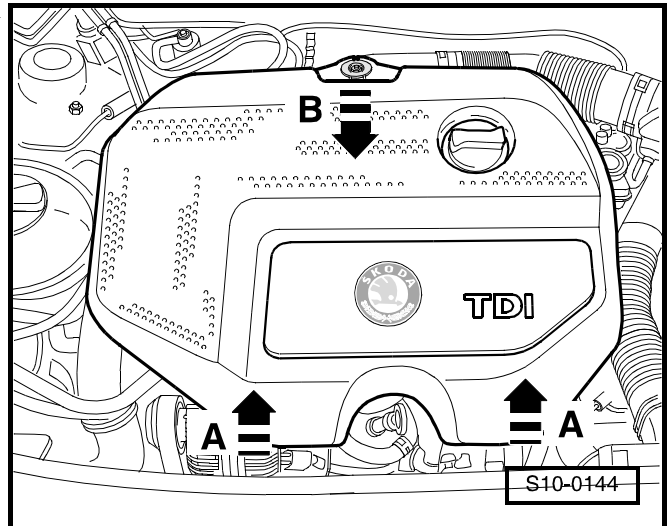
- Also detach the front coolant hose at bottom of oil cooler -arrow- and allow remaining coolant to drain off.



- Remove engine cover:

Pull the front engine cover upwards with a sudden motion -arrow A- and pull the cover out of the rear attachment -arrow B-.

- Remove air filter with intake hose ⇒ 1.9/74 TDI Engine - Fuel Injection; Rep. Gr. 23.
- Remove battery and battery tray ⇒ Electrical System; Rep. Gr. 27.
- Unscrew the generator cables from the battery cover and remove the wiring loom from the holder.
- Remove the coolant hoses from the radiator.
- Removing the lock carrier ⇒ Body work; Rep. Gr. 50.



### For vehicles with air conditioning

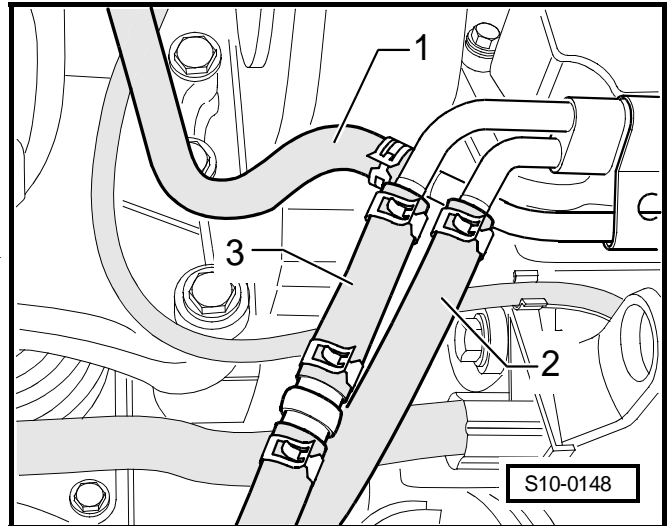
Instructions and work procedures ⇒ Heating, Air Conditioning; Rep. Gr. 87.

- Before removing the lock carrier:

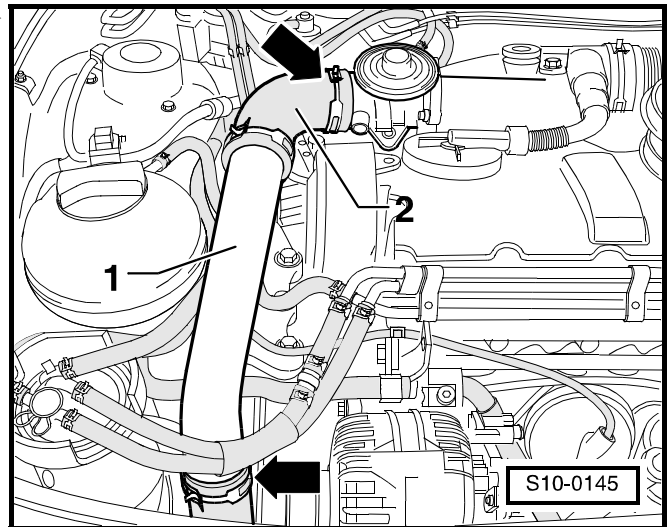
- ◆ Drain refrigerant.
- ◆ Disconnect the high and low pressure lines on the couplings.
- ◆ Remove high-pressure line from the compressor.

### For all vehicles

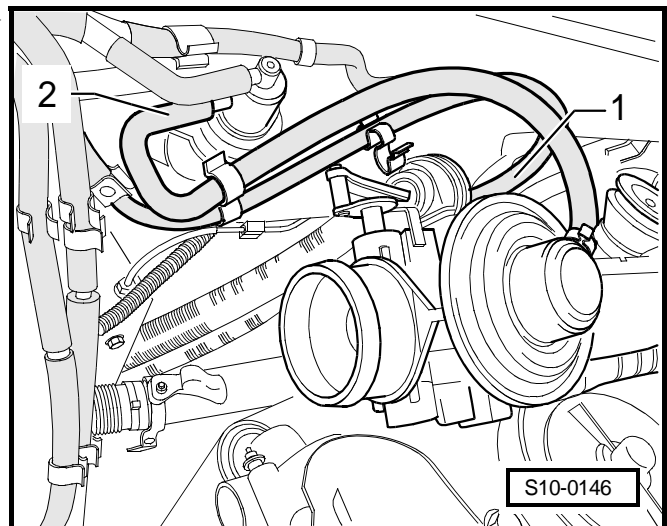
- Disconnect the coolant hose -1- from the pipe. ►
- Disconnect the fuel-intake hose -3- and the fuel-return hose -2- from the pipes.



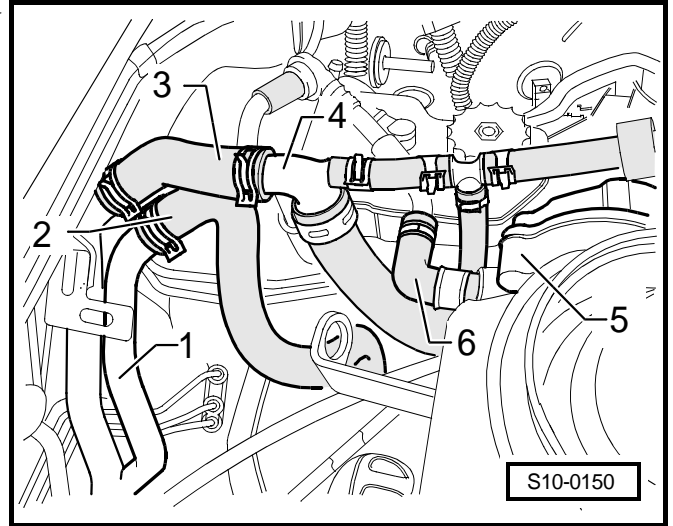
- Remove charge-air pipe at the top -1- with connecting hose -2- -arrows-. ►
- Pull off the coolant hose from the expansion bottle at the bottom.
- Disconnect the vacuum hose to the vacuum reservoir at the connecting piece.



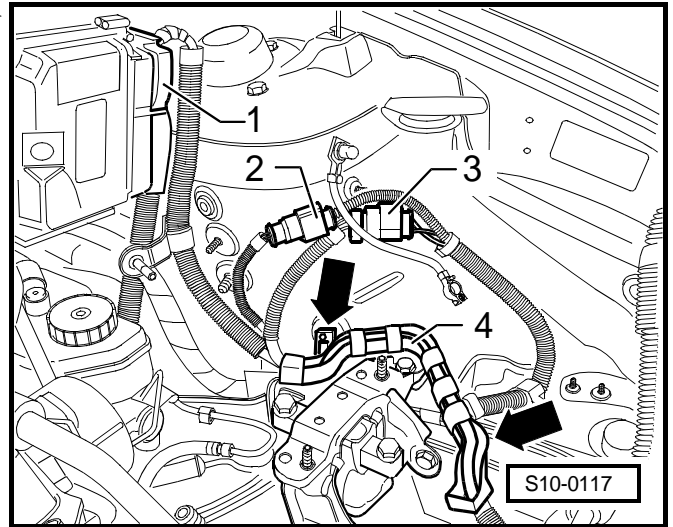
- Remove the vacuum hose -1- from the intake manifold flap vacuum unit. ►
- Pull off the vacuum hose -2- from the exhaust gas solenoid valve -N18-.



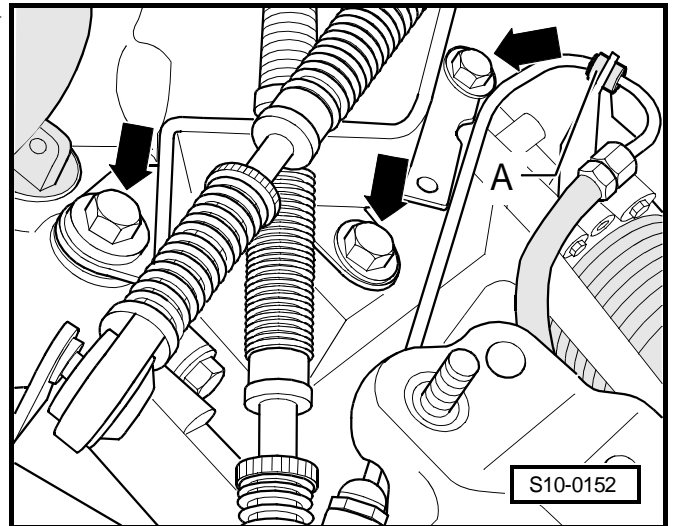
- Remove the coolant intake hose -3- from the supports -4-.
- Remove the coolant return hose -2- from the heat exchanger connection fittings -1-.
- Pull off vacuum hose -6- from tandem pump -5-.



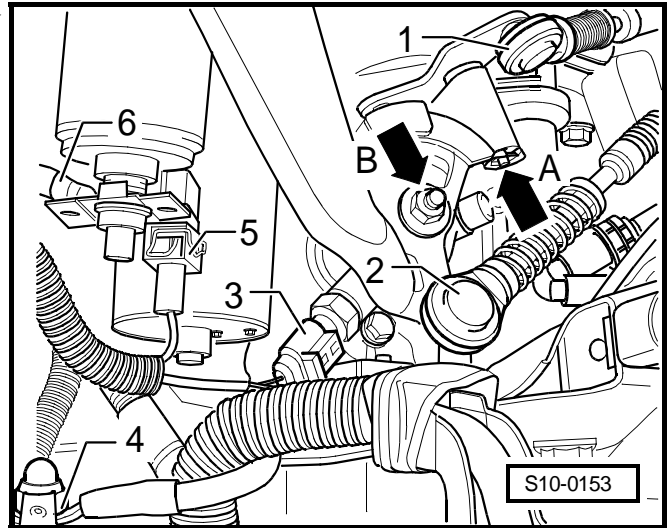
- Unplug connector -1- from the engine control unit.
- Disconnect the plug connections -2- and -3- and remove from bracket.
- Unclip cable clip -4- -arrows-.



- Remove Bowden cable support -arrows-.
- Pull out slave cylinder line -A- from the holder on the gearbox.



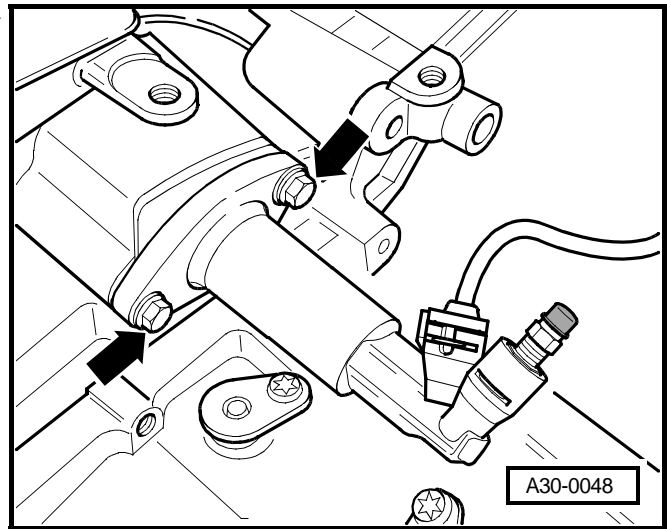
- Detach selector cable -1- with relay lever, for this step remove circlip -arrow A- from the relay lever.
- Remove the shift cable -2- with the gearbox shift lever, for this step unscrew nut -arrow B-.
- Raise control cables and secure.
- Disconnect plug -3- from the reversing light switch -F4-.
- Release earth strap -4- from the frame side rail.
- Unplug connector -5- and the cable -6- from the starter.



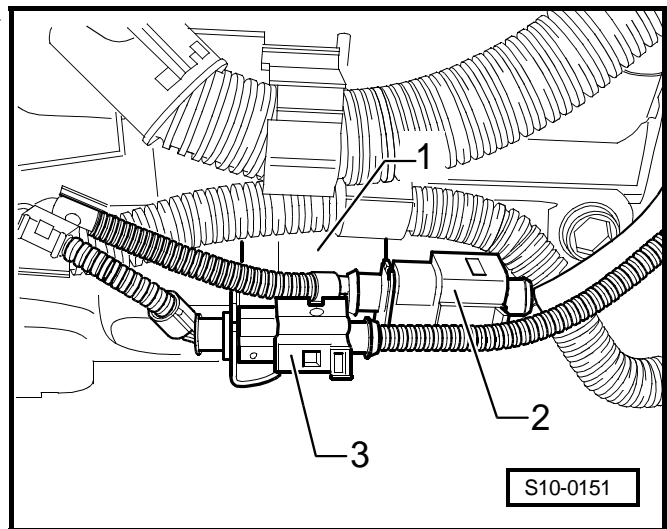
- Remove slave cylinder -B-, lay aside and secure with wire. Do not open line system.

**Note**

*Do not depress the clutch pedal.*



- Disconnect the plug connections -2- and -3- under the starter and remove from bracket.

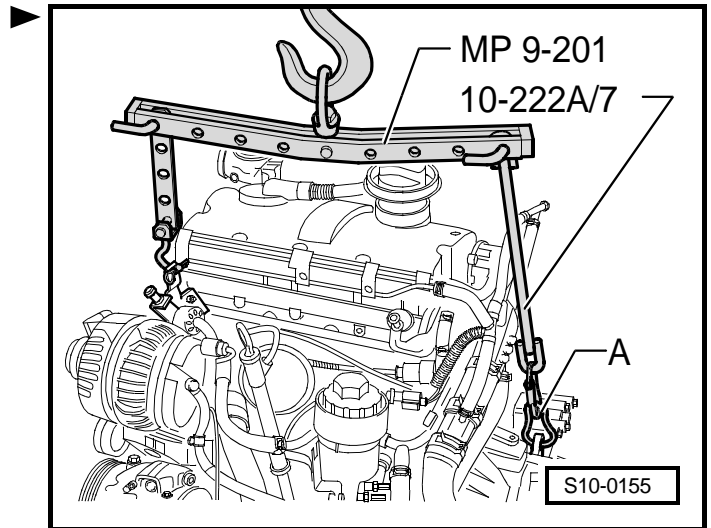




- Hook on lifting device -MP 9-201- with extension -10-222A/7- and snap hook -A-, as shown in the figure, hang up and take up the weight of the engine/gearbox assembly.

**! Caution!**

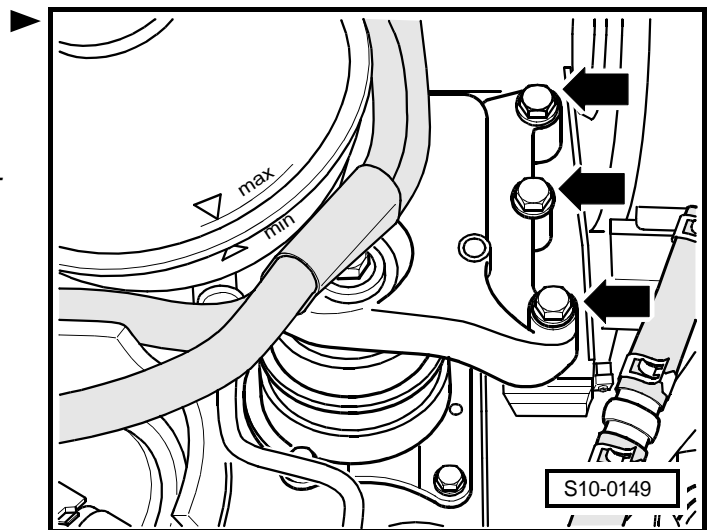
**Use securing pins on the hooks and rig pins to prevent release.**



- Unscrew the engine mounting from the engine support bracket -arrows-.

**i Note**

*If the engine/gearbox unit drops when the screws are released raise it up again.*



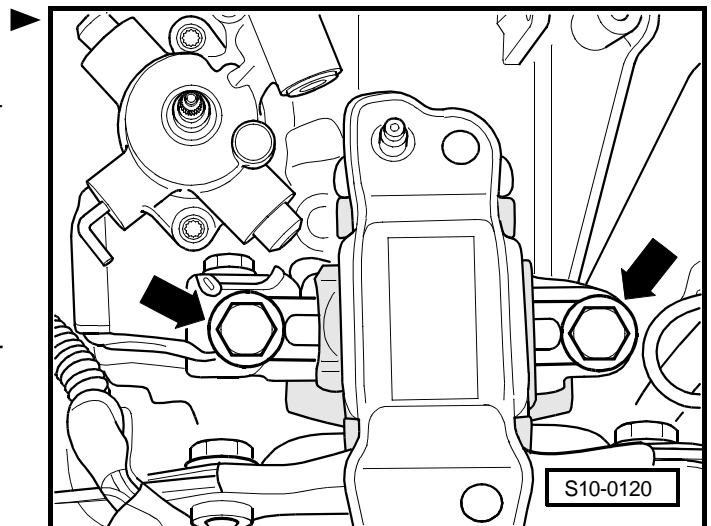
- Unscrew the gearbox mount from the gearbox support bracket -arrows-.

The note on unscrewing the engine mounting also applies for the gearbox mount.

- Carefully lower the engine with gearbox and pull out carefully towards the front.

**i Note**

*Carefully guide the engine and gearbox during withdrawal. Ensure adequate clearance to other neighbouring components.*



**Securing the engine to the assembly stand**

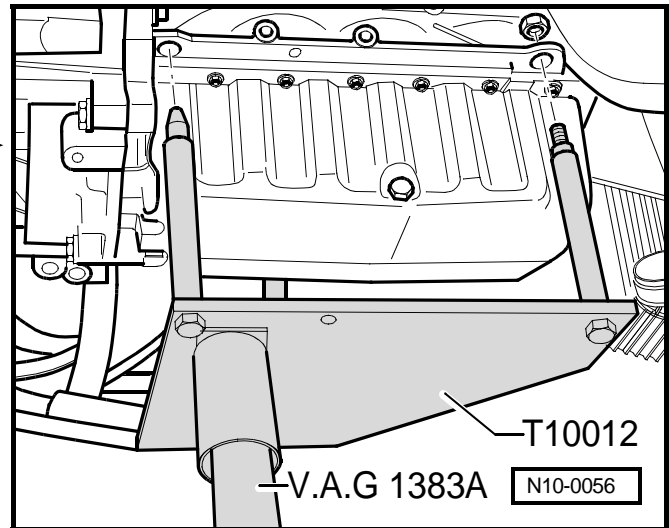
To perform the assembly work the engine must be secured to the assembly stand -MP 9-101-.

**i Note**

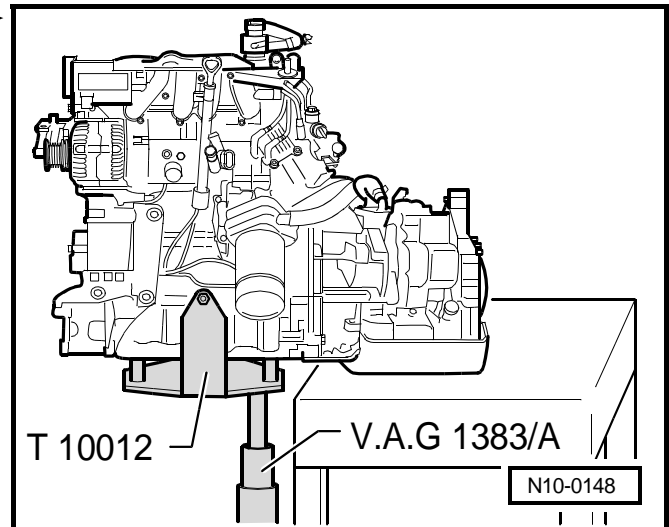
*When measuring the cylinder bore (⇒ Chapter 13-4) the engine must not be fixed to the assembly stand.*

### Procedure

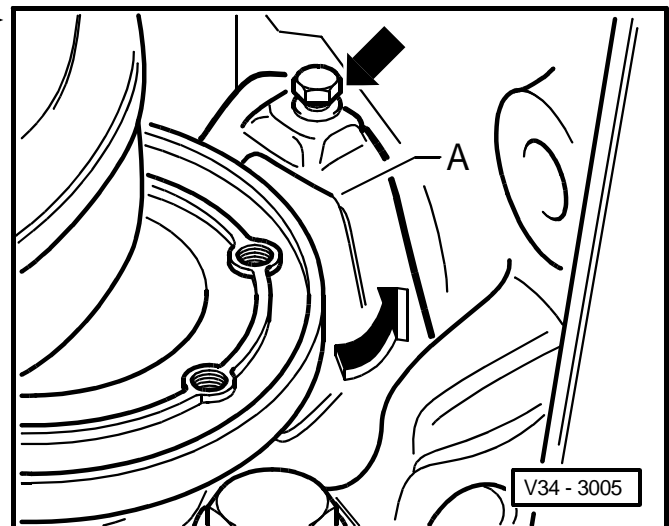
- Position the engine mount -T10012- in the engine/ gearbox jack.
- Fix engine mount -T10012- to the cylinder block using fixing nuts and bolts M10 with a tightening torque of 40 Nm.
- Raise the engine and gearbox with the engine/gearbox jack.
- Dismantle the lifting device -MP 9-201-.



- With a lifting device bring the engine/gearbox unit to the work bench.
- Lower the engine/gearbox unit in such a way that the gearbox is positioned on the support.



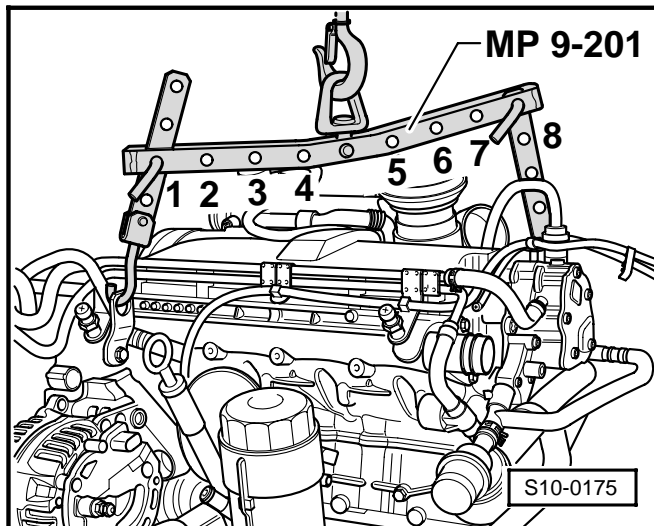
- Remove cover plate -A- for flywheel behind the right flange shaft -arrows-.
- Unplug the connector from the speedometer sender -G22-.
- Remove engine/gearbox connecting screws.
- Press gearbox from engine.



- Hook on lifting device -MP 9-201- and lift out of engine/gearbox jack using the workshop crane.

**! Caution!**

**Use securing pins on the hooks and rig pins to prevent release.**

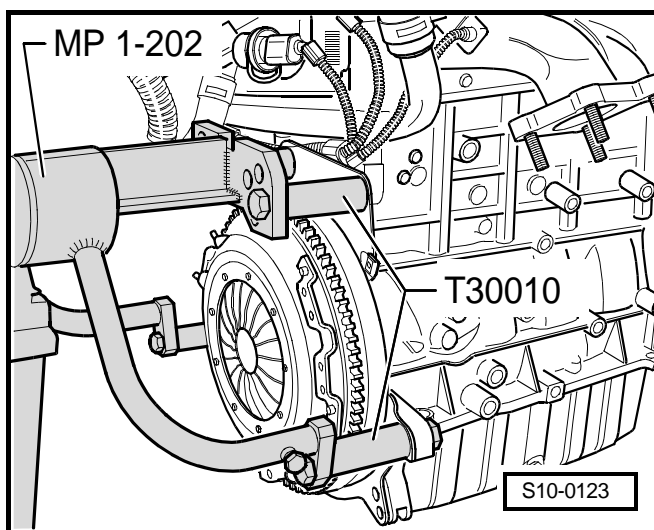


- Unscrew Engine mount -T10012-.
- Attach engine to the assembly stand -MP 9-101- with the engine / gearbox mount -MP 1-202 - and distance sleeves -T30010-. (The figure shows the 1.9 l/47 kW SDI engine; the fixing system is the same).

**Installing the engine**

**i Note**

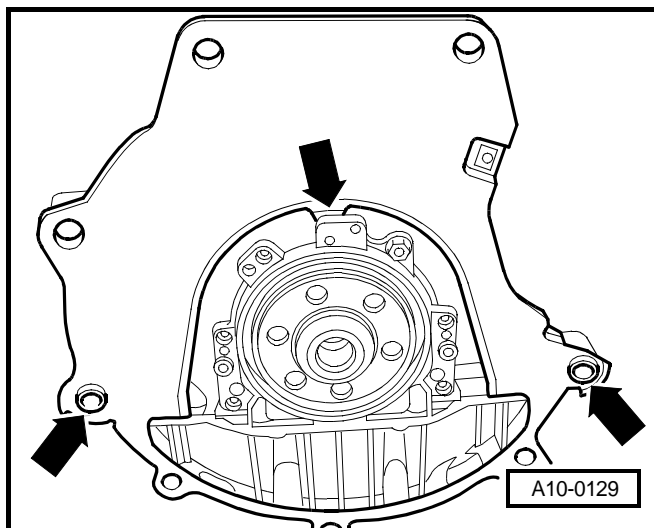
- ◆ Always replace the seals and gaskets during assembly work.
- ◆ Always replace self-locking nuts.
- ◆ Coat stud bolts of exhaust manifold with hot bolt paste -G 052 112 A3- before installing.
- ◆ Tightening torques ⇒ **10-1** page 11.
- ◆ Assembly bracket ⇒ **10-1** page 11.



**Procedure**

Installation is performed in the reverse order. Pay attention to the following points:

- Check whether the dowel sleeves for centering the engine/gearbox are present in the cylinder block; insert if necessary.
- Check whether the intermediate plate has been inserted on the sealing flange and rests on the dowel sleeves -arrows-.
- If necessary check the centering of the clutch driver disc.
- Inspect clutch release bearing for wear, replace if necessary.
- Grease the drive shaft serration with grease -G 000 100 -.
- Assemble together the engine with gearbox ⇒ Manual gearbox 02R; Rep. Gr. 34.
- When installing engine/gearbox unit, ensure adequate clearance to neighbouring components.



- Align the engine/gearbox unit free of stress and attach firmly.

When tightening the bolts for engine and gearbox mounts, engine and gearbox support brackets must be resting fully against mount.

Tightening torques ⇒ **10-1** page 11.

- Install the slave cylinder of the hydraulic clutch ⇒ Gearbox 02R; Rep. Gr. 30.
- Adjust the gearshift mechanism and the shift cables ⇒ Gearbox 02R; Rep. Gr. 34.
- Install the right drive shaft and screw the left drive shaft onto the gearbox ⇒ Chassis; Rep. Gr. 40.
- Install the front exhaust pipe with catalytic converter and the exhaust system so that they are not under tension. ⇒ Chapter 26-1.
- Install the lock carrier with component parts ⇒ Body work; Rep. Gr. 50.

### For vehicles with air conditioning

Instructions and work procedures ⇒ Heating, Air Conditioning; Rep. Gr. 87.

- Disconnect the refrigerant lines.
- Replacing dessicator insert.
- Filling the refrigerant circuit.

### For all vehicles

- Install front bumper ⇒ Body work; Rep. Gr. 63.
- Electrical connections and proper routing ⇒ Current Flow Diagrams, Electrical Fault Finding and Fitting Locations.
- Install the coolant hoses ⇒ Chapter 19-1.



#### Note

*Only re-use drained coolant if none of the following components has been replaced: Engine block, cylinder head, radiator, heat exchanger.*

- Top up coolant ⇒ Chapter 19-1.
- Check oil level before starting the engine.
- Interrogate fault memory and erase ⇒ 1.9/74 TDI Engine - Fuel Injection; Rep. Gr. 01.
- Perform a test drive.

## Tightening torques



**Note**

- ◆ Tightening torques apply only for lightly greased, oiled, phosphatized or blackened nuts and screws.
- ◆ Other lubricants such as engine and gearbox oil are allowed. Do not use Molykote.
- ◆ Do not use degreased parts.
- ◆ Unless otherwise indicated the following tightening torques apply:

Component		Nm
Screws/nuts	M6	9
	M7	13
	M8	20
	M10	40
	M12	70

### Assembly bracket

#### Engine assembly bracket

- 1 - 20 Nm + 90° (1/4 turn) - replace
- 2 - 30 Nm + 90° (1/4 turn) - replace

#### Gearbox assembly bracket

- 1 - 50 Nm + 90° (1/4 turn) - replace
- 2 - 40 Nm + 90° (1/4 turn) - replace

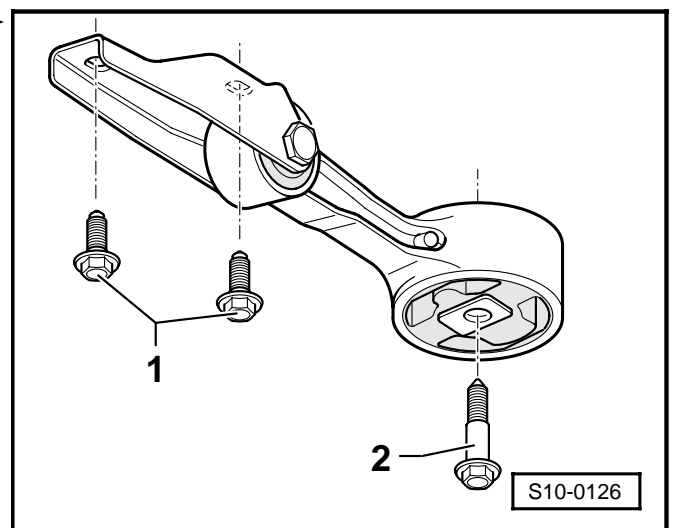
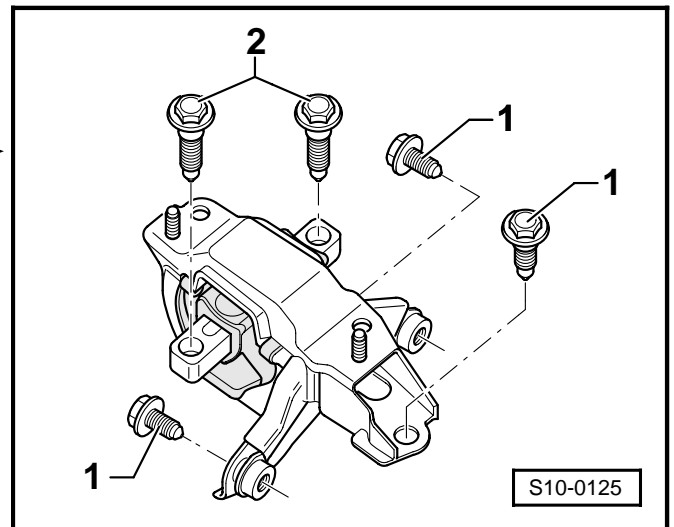
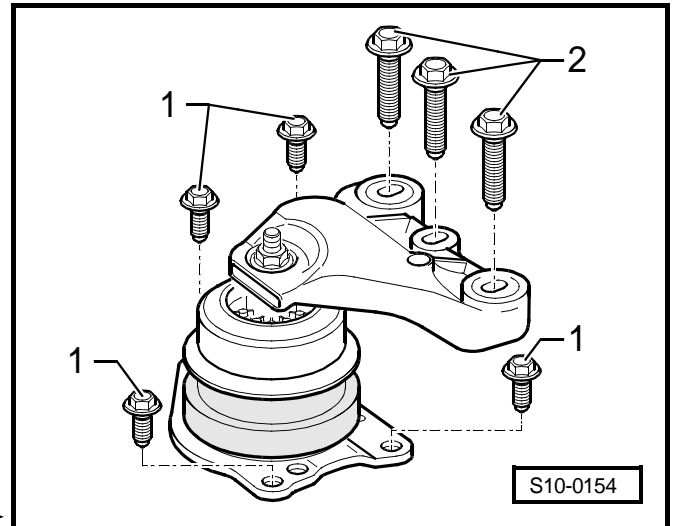
### Hinged bracket



**Note**

Position the screws -1- in the elongated holes of the pendulum support in such a way that there is maximum distance between the gearbox and the assembly carrier.

- 1 - 30 Nm + 90° (1/4 turn) - replace
- 2 - 40 Nm + 90° (1/4 turn) - replace





# 13 – Crankgear

## 13-1 Removing and installing V-ribbed belt

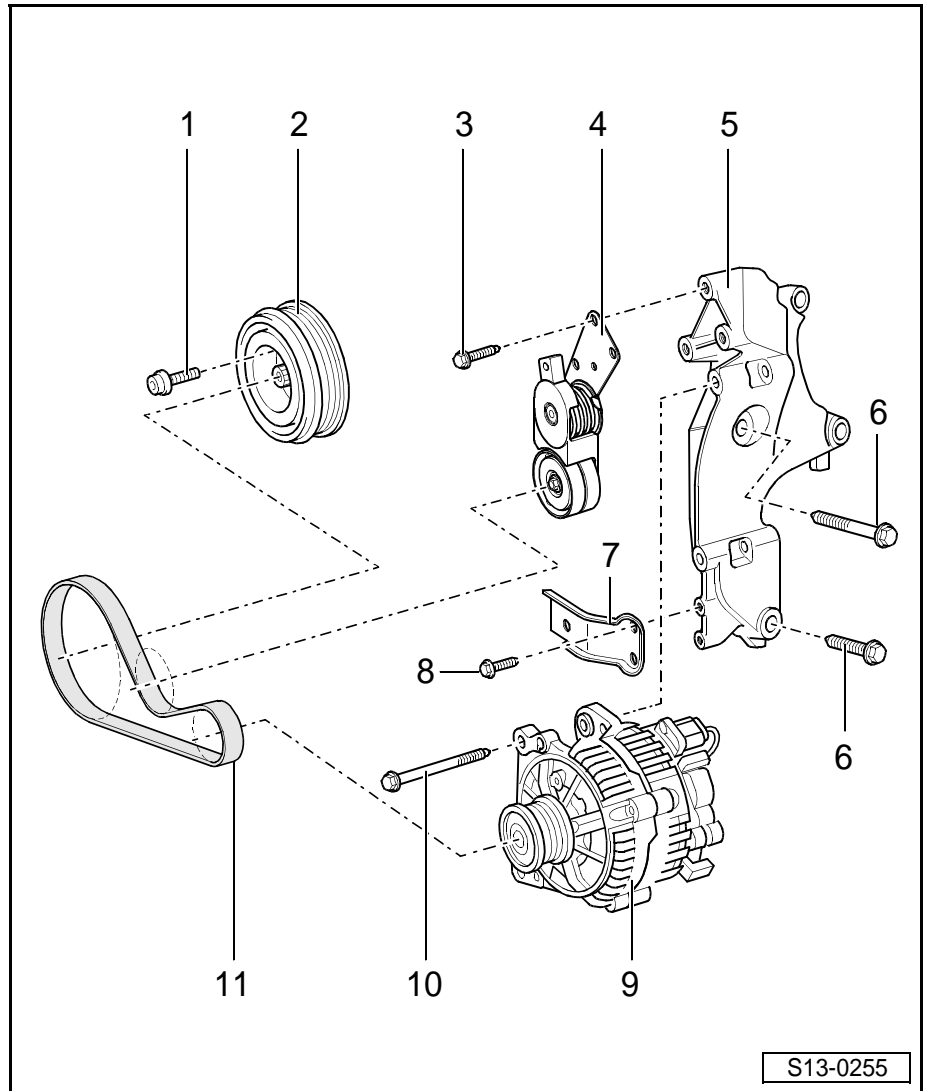
### Summary of components - Vehicles without air conditioning



**Note**

- ◆ Mark the rotation direction before removing the V-ribbed belt. Reversing the rotation direction of an already used belt may destroy it.
- ◆ Pay attention to the correct position of the V-ribbed belt in the belt pulley when installing it.

- 1 - 10 Nm + torque a further 1/4 turn (90°)**
- 2 - Vibration damper/belt pulley**
  - ❑ Assembly only possible in one position - holes offset
- 3 - 25 Nm**
- 4 - Tensioner for V-ribbed belt**
- 5 - Bracket**
  - ❑ for generator
  - ❑ Dowel sleeve for centering ⇒ Fig. 1 in **13-1** page 3
- 6 - 45 Nm**
- 7 - Bracket**
  - ❑ for bottom charge-air pipe
- 8 - 8 Nm**
- 9 - Generator**
  - ❑ to facilitate the positioning of the generator on the holder drive the threaded bushings of the retaining screws slightly backwards
- 10 - 25 Nm**
- 11 - V-ribbed belt**
  - ❑ removing ⇒ **13-1** page 3
  - ❑ installing ⇒ **13-1** page 5

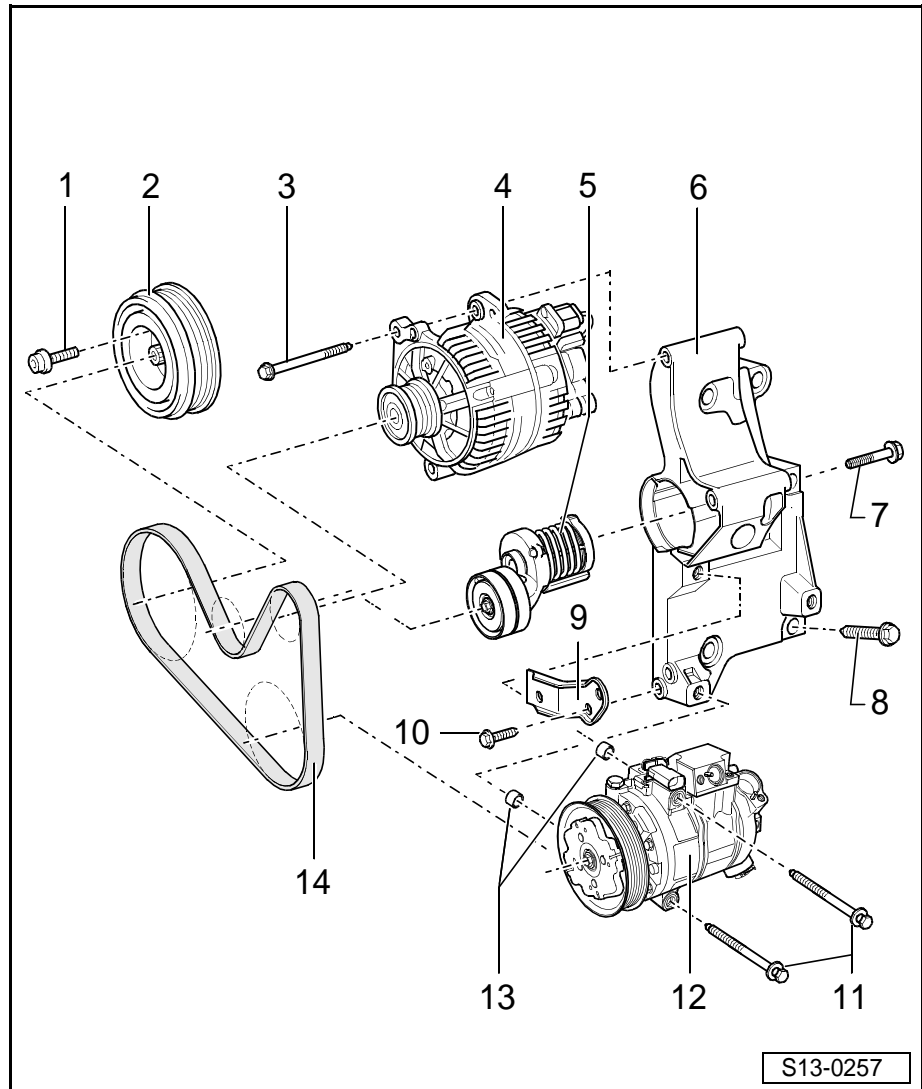


## Summary of components - Vehicles with air conditioning

### Note

- ◆ Mark the rotation direction before removing the V-ribbed belt. Reversing the rotation direction of an already used belt may destroy it.
- ◆ Pay attention to the correct position of the V-ribbed belt in the belt pulley when installing it.

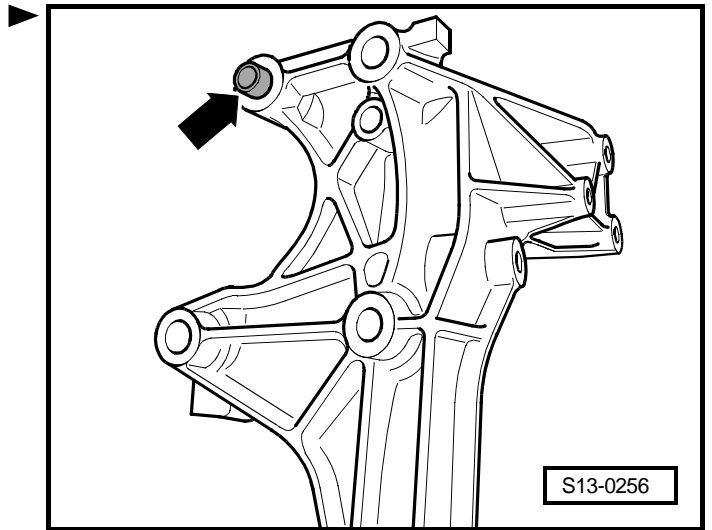
- 1 - 10 Nm + torque a further  $\frac{1}{4}$  turn (90°)
- 2 - Vibration damper/belt pulley
  - Assembly only possible in one position - holes offset
- 3 - 25 Nm
- 4 - Generator
  - to facilitate the positioning of the generator on the holder drive the threaded bushings of the retaining screws slightly backwards
- 5 - Tensioner for V-ribbed belt
- 6 - Bracket
  - for generator and AC compressor
  - Dowel sleeve for centering ⇒ Fig. 1 in **13-1** page 3
- 7 - 25 Nm
- 8 - 45 Nm
- 9 - Bracket
  - for bottom charge-air pipe
- 10 - 8 Nm
- 11 - 25 Nm
- 12 - AC compressor
- 13 - Dowel sleeves for AC compressor
  - must be present in holder ⇒ item 6
- 14 - V-ribbed belt
  - removing ⇒ **13-1** page 3
  - installing ⇒ **13-1** page 5





**Fig. 1: dowel sleeve for centering**

- Before installing the bracket check whether the dowel sleeve -arrow- has been fitted.

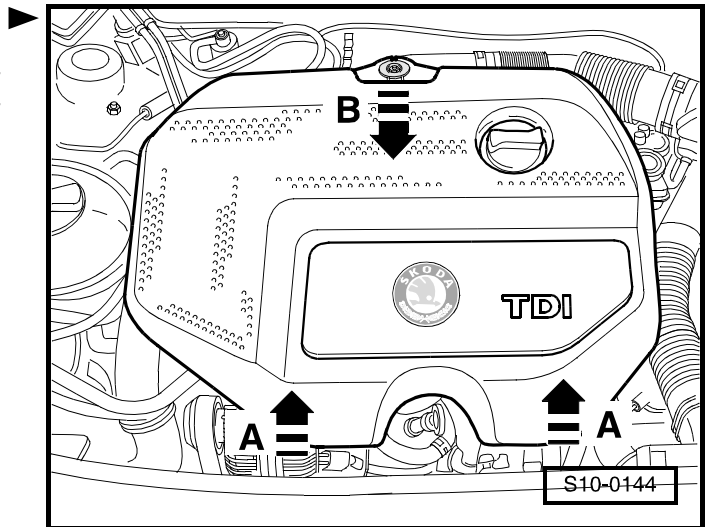


## Removing the V-ribbed belt

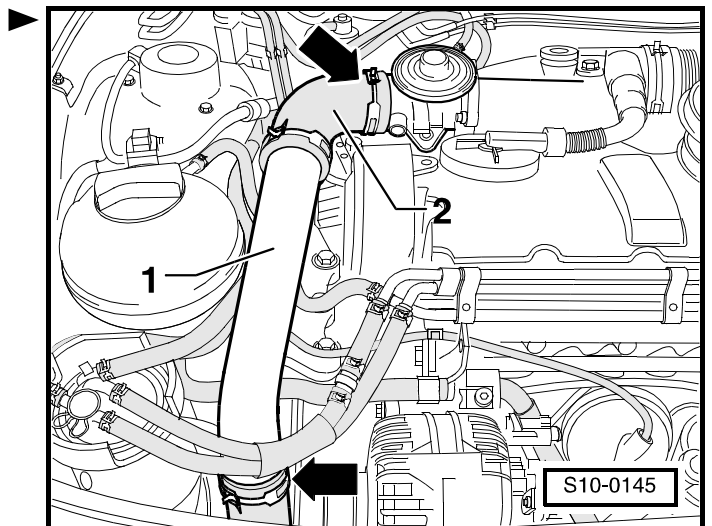
### Removing - vehicles without air conditioning

- Remove engine cover:

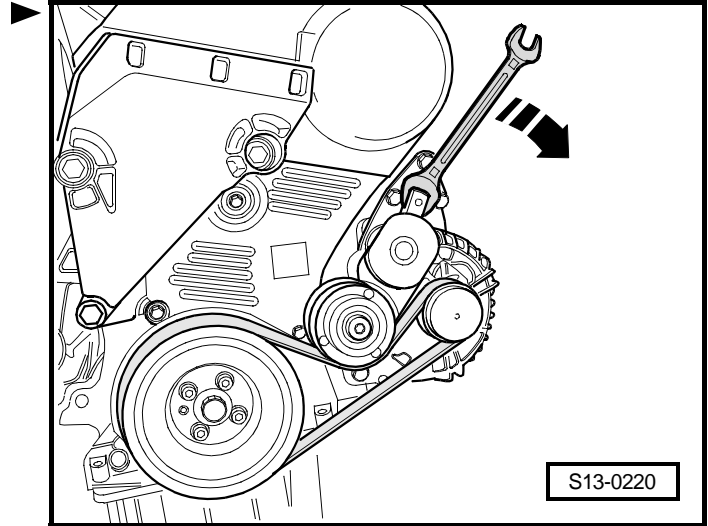
Pull the front engine cover upwards with a sudden motion -arrow A- and pull the cover out of the rear attachment -arrow B-.



- Remove charge-air pipe at the top -1- with connecting hose -2- -arrows-.
- Mark the rotation direction of the V-ribbed belt.

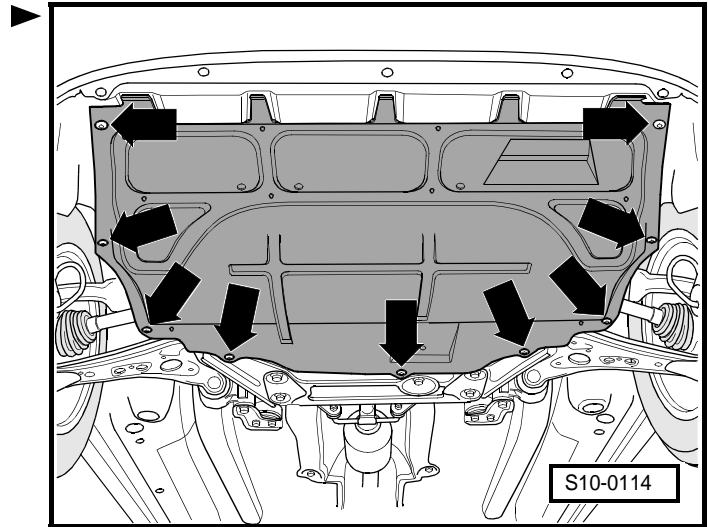


- ▶ — To slacken the V-ribbed belt turn the tensioning device in the direction of the arrow.
- Remove V-ribbed belt; first from the generator-belt pulley.

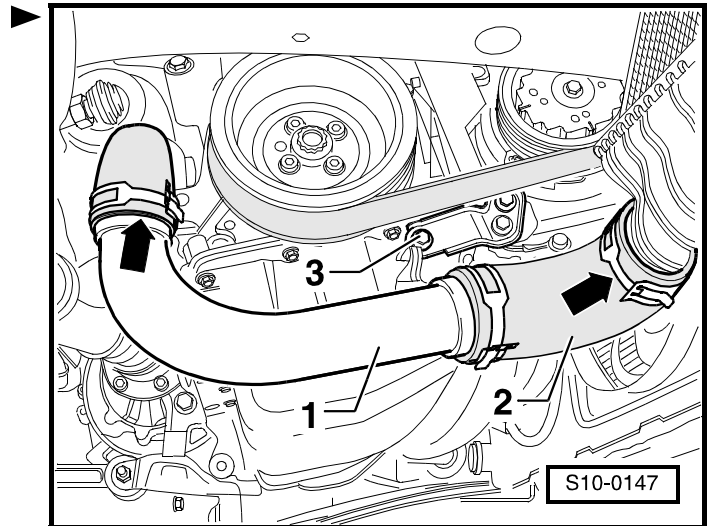


**Removing- vehicles with air conditioning**

- ▶ — Remove the noise insulation.



- ▶ — Release screw -3-.
- Remove charge-air pipe at the bottom -1- with connecting hose -2- -arrows-.
- Mark the rotation direction of the V-ribbed belt.



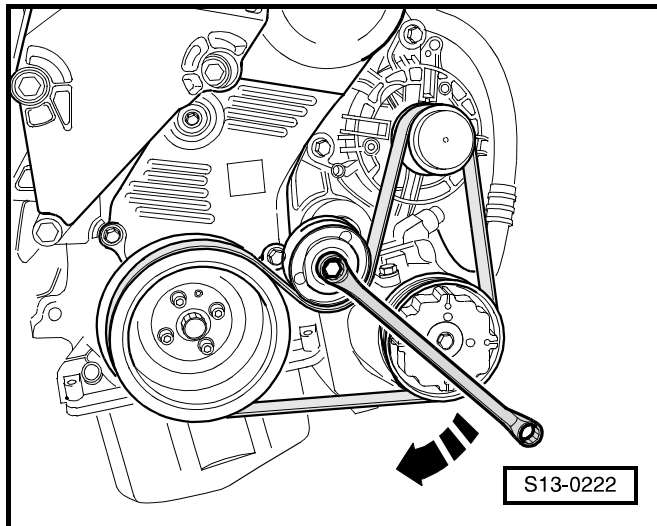
- Swivel tensioning pulley in -direction of arrow- in order to slacken the V-ribbed belt. ►
- Remove V-ribbed belt; first from the air conditioning compressor belt-pulley.

## Installing the V-ribbed belt



### Note

- ◆ *Inspect V-ribbed belt ⇒ Inspection and Maintenance.*
- ◆ *Before fitting the V-ribbed belt make sure that all assemblies (generator and AC compressor) are securely mounted.*
- ◆ *Ensure belt pulley and tensioning pulley run freely.*
- Tension the tensioning device and lay the V-ribbed belt on it; lay it over the generator belt pulley last.
- Start engine and inspect running of belt.





## 13-2 Removing and installing, tightening the timing belt

### Summary of components



**Note**

Before removing the timing belt, mark direction of running. Reversing the rotation direction of an already used belt may destroy it.

For vehicles > 04.01

1 - Timing belt guard - top part

2 - Timing belt

- before removing mark running direction
- check for wear
- do not kink
- removing and installing  
⇒ 13-2 page 3

3 - 20 Nm + torque a further 1/8 turn (45°)

4 - Tensioning pulley

5 - 100 Nm

6 - 20 Nm + torque a further 1/8 turn (45°)

7 - Camshaft sprocket

8 - Hub

- with pulse rotor
- to release and tighten use counterholder -T10051 -
- to remove use extractor -T10052-
- removing and installing  
⇒ Chapter 15-3

9 - 10 Nm

10 - Rear timing belt guard

11 - Sealing sleeve

- replace if damaged

12 - Tensioning device for timing belt

13 - Guide pulley

14 - Coolant pump

- removing and installing ⇒ Chapter 19-2

15 - Timing belt gear - crankshaft

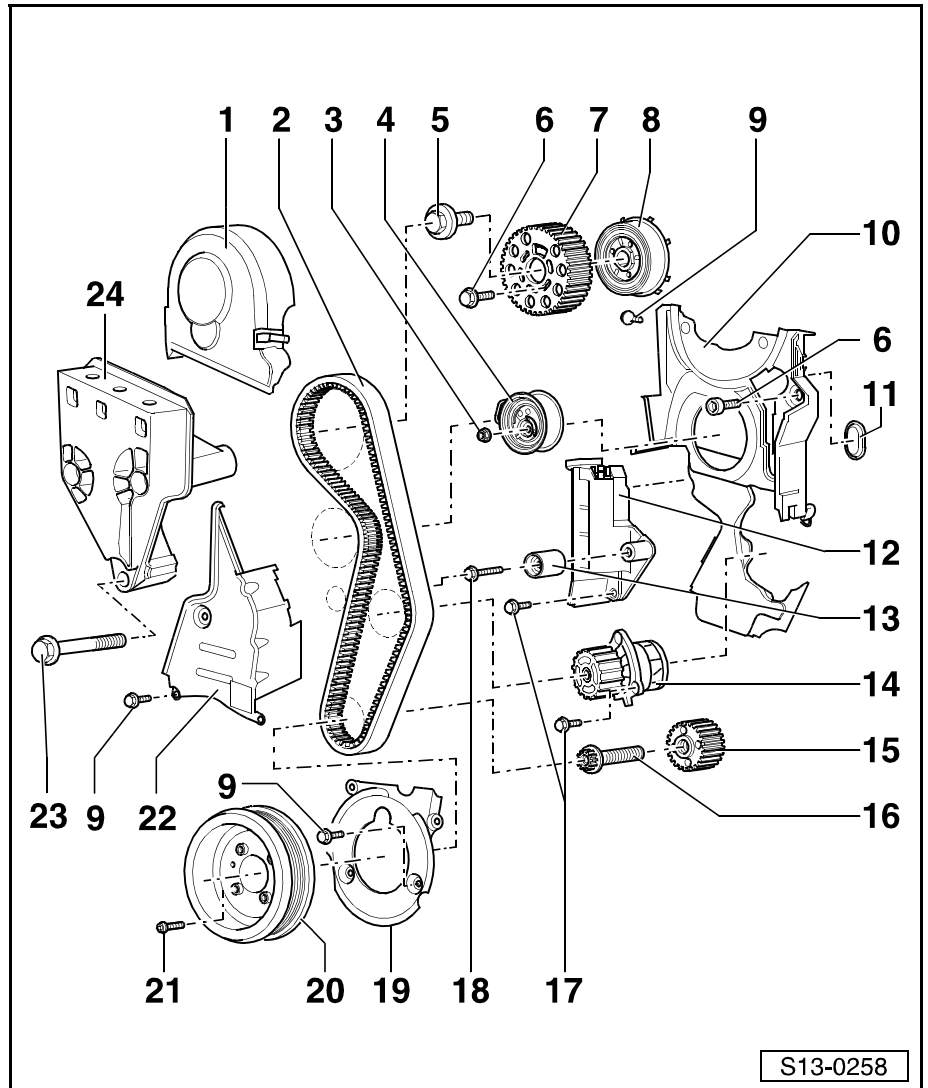
- Contact surface between crankshaft timing belt sprocket and crankshaft must be clean and free of grease
- Fitting position: flats on timing belt sprocket and crankshaft must be aligned

16 - 120 Nm + torque a further 1/4 turn (90°)

- to release and tighten use counterholder -MP 1-310 - or -T30004-
- replace
- do not wet new screws with oil and do not grease them

17 - 15 Nm

18 - 20 Nm



S13-0258

**19 - Timing belt guard - bottom part****20 - V-ribbed belt pulley**

- with vibration damper
- Assembly only possible in one position - holes offset

**21 - 10 Nm + torque a further 1/4 turn (90°)****22 - Timing belt guard - middle part****23 - 45 Nm****24 - Engine support bracket**

For vehicles 05.01 >

**1 - Timing belt guard - top part****2 - Timing belt**

- before removing mark running direction
- check for wear
- do not kink
- removing and installing  
⇒ **13-2** page 3

**3 - 20 Nm + torque a further 1/8 turn (45°)****4 - Tensioning pulley****5 - 20 Nm + torque a further 1/8 turn (45°)****6 - Camshaft sprocket****7 - 100 Nm****8 - Hub**

- with pulse rotor
- to release and tighten use counterholder -T10051 -
- to remove use extractor -T10052-
- removing and installing  
⇒ Chapter 15-3

**9 - 10 Nm****10 - Rear timing belt guard****11 - Sealing sleeve**

- replace if damaged

**12 - O-ring**

- replace

**13 - Coolant pump**

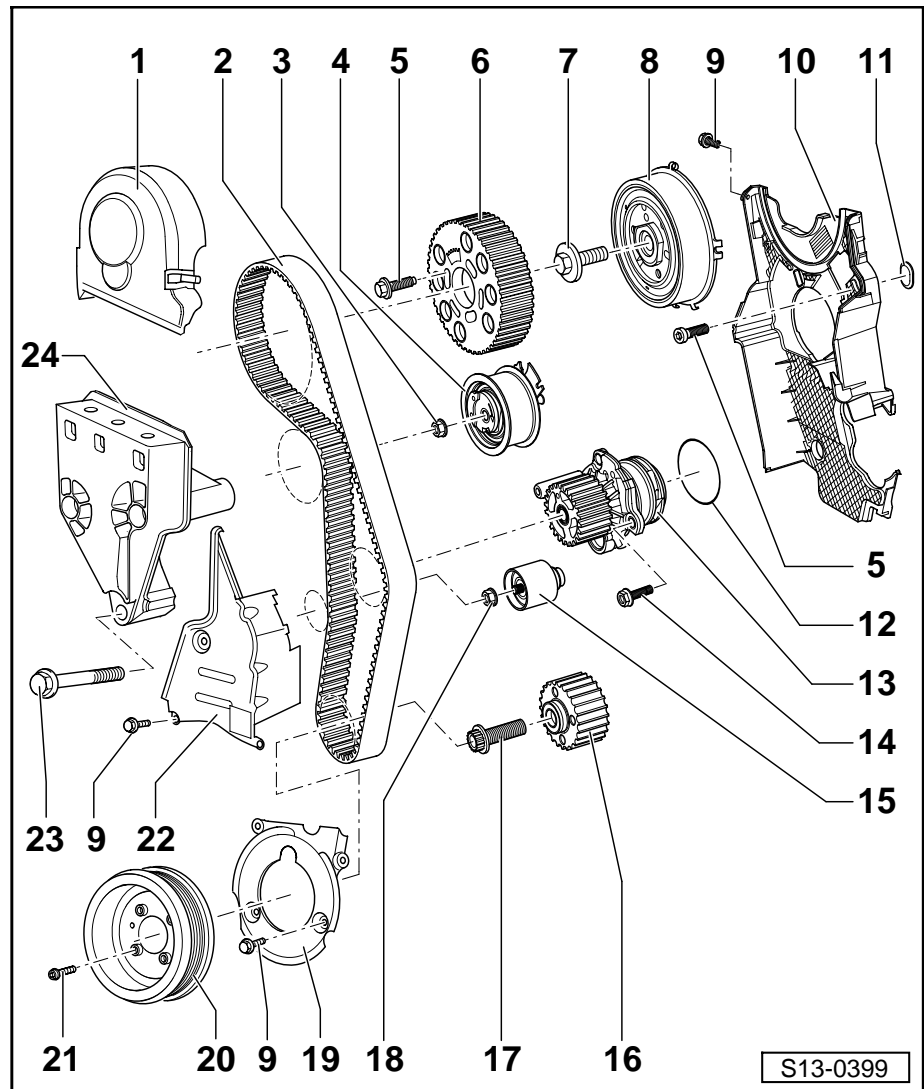
- removing and installing  
⇒ Chapter 19-2

**14 - 15 Nm****15 - Guide pulley****16 - Timing belt gear - crankshaft**

- Contact surface between crankshaft timing belt sprocket and crankshaft must be clean and free of grease
- Fitting position: flats on timing belt sprocket and crankshaft must be aligned

**17 - 120 Nm + torque a further 1/4 turn (90°)**

- to release and tighten use counterholder -MP 1-310 - or -T30004-
- replace
- do not wet new screws with oil and do not grease them



- 18 - 20 Nm + torque a further  $\frac{1}{8}$  turn (45°)
- 19 - Timing belt guard - bottom part
- 20 - V-ribbed belt pulley
  - with vibration damper
  - Assembly only possible in one position - holes offset
- 21 - 10 Nm + torque a further  $\frac{1}{4}$  turn (90°)
- 22 - Timing belt guard - middle part
- 23 - 45 Nm
- 24 - Engine support bracket

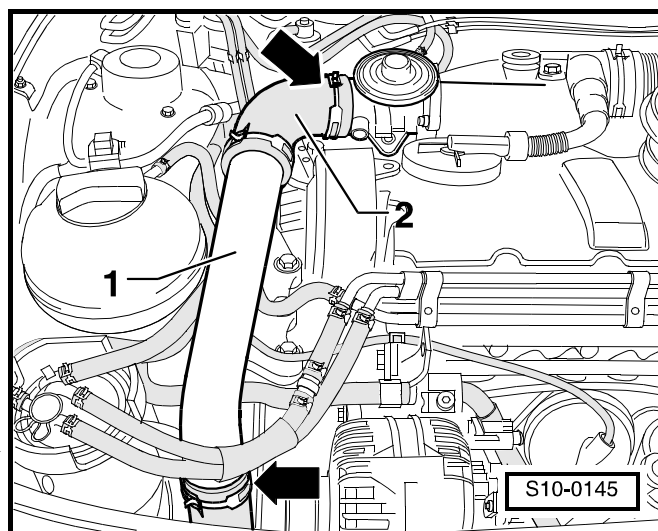
## Removing and installing, tightening the timing belt

### Special tools, test and measuring equipment and auxiliary items required

- ◆ Torque wrench
- ◆ Rig pin for injection pump -MP 1-301- or -3359-
- ◆ Supporting device -MP 9-200-
- ◆ Small locking plates -T10008-
- ◆ Locking device -T10050-
- ◆ Wrench for tensioning pulleys (e.g. -Matra V 159-, -T10020-, -Hazet 2587 - or - Stahlwille 127-17-)
- ◆ Pliers for spring strap clips
- ◆ Liquid locking material -D 000 600 A2-

### Removing

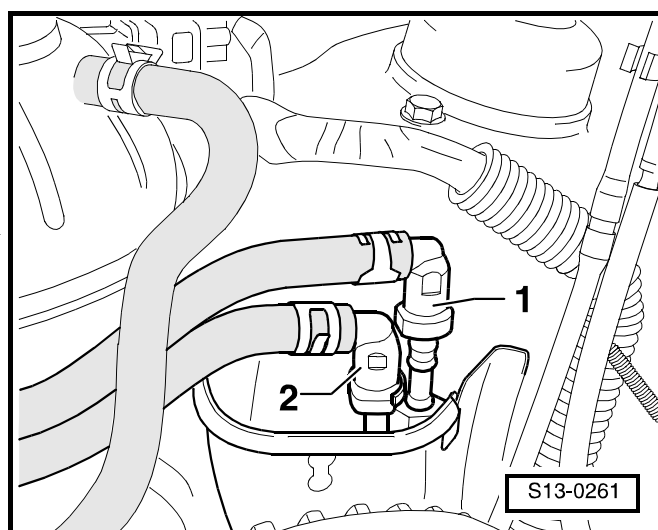
- Remove the V-ribbed belt ⇒ Chapter 13-1.
- Remove the front right wheelhouse liner ⇒ Body Work; Rep. Gr. 66.
- Removing the V-ribbed belt pulley.
- Remove middle and bottom part of toothed belt guard.
- Remove charge-air pipe at the top -1- with connecting hose -2- -arrows-.



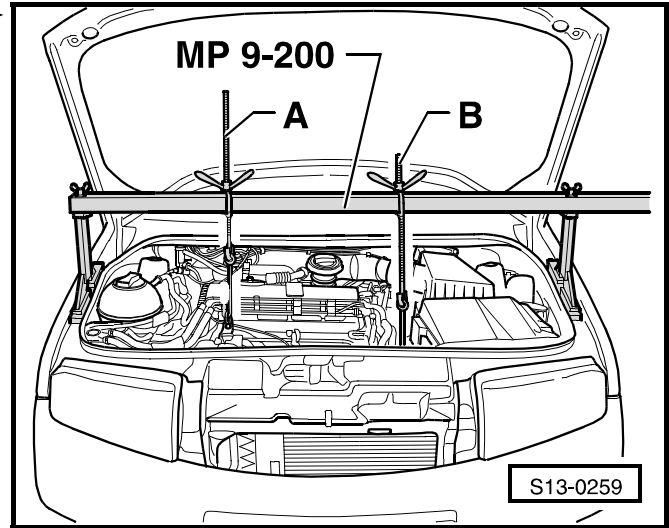
### **!** WARNING!

**Fuel line is under pressure. Place cleaning cloths around the connection point before detaching hose connections. Reduce pressure by carefully removing the hose.**

- Disconnect the fuel feed line -1- and the fuel return-flow line -2-.
- Remove expansion reservoir and place down to the front with coolant hoses connected.



- Install supporting device -MP 9-200- and support the engine with spindle -A- in fitting position. Allow spindle -B- to hang loosely.

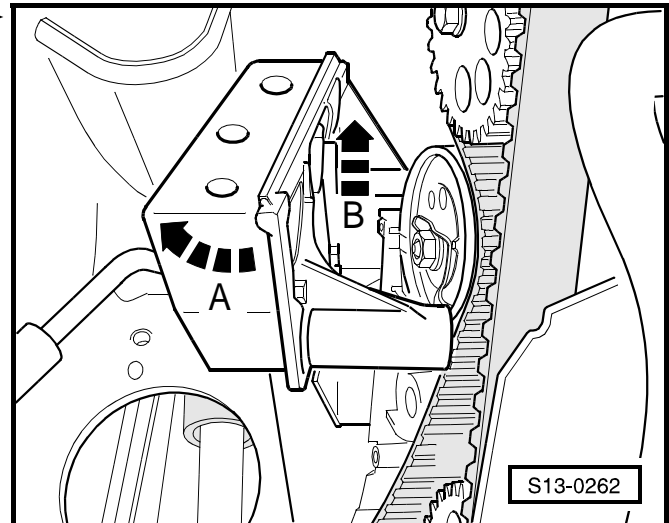
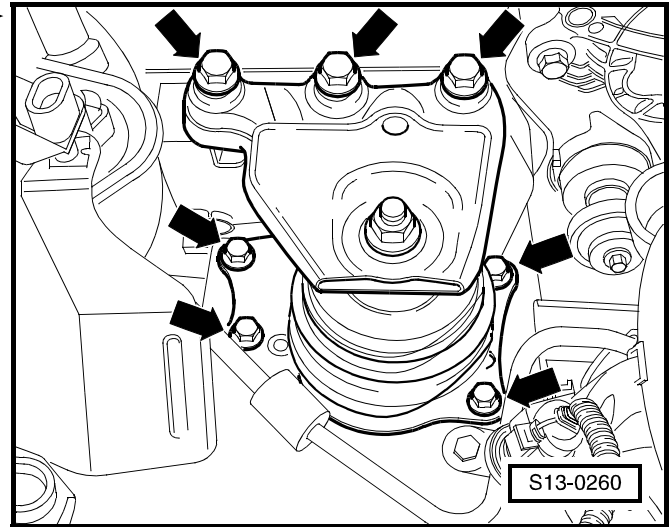


- Remove engine support -arrows-.

**i Note**

Releasing the pendulum support brings the engine forwards and the engine mounting can be removed.

- Unbolt the pendulum support from the gearbox.
- Remove timing belt guard - top part.
- Lower engine approx. 35 mm and release bottom screw of the engine mounting.
- Raise the engine approx. 45 mm relative to its normal position and release the top screws of the engine mounting.
- Swivel out the engine mounting towards the top -arrow A- and subsequently pull up at the rear -arrow B-.
- Lower engine again into normal position.
- Position crankshaft on TDC cylinder 1.





**Note**

Rotate crankshaft until the marking on the top of the toothed belt sprocket and the arrow on the rear toothed belt guard are positioned opposite the lugs on the hub of the impulse rotor -arrows A-

- Lock hub with locking pin -MP 1-301- or -3359-.
- Insert locking pin through the left slot into the hole at the cylinder head.
- Secure crankshaft toothed belt sprocket with locking device -T10050-.
- Insert locking device from the front of the timing belt sprocket into the teeth.

To facilitate this step, it is recommended to colour the TDC marking on the crankshaft timing belt sprocket and on the locking device -T10050- with white paint -arrows B-

**Note**

- ◆ The marking on the crankshaft timing belt sprocket and the marking on the locking device -T10050- must be positioned opposite -arrows B-.
- ◆ Pin of locking device must engage in the hole of the sealing flange -arrow C-
- ◆ Locking device - T10050- must not be used as a counterholder when releasing or tightening the bolts for the toothed belt gear - crankshaft!

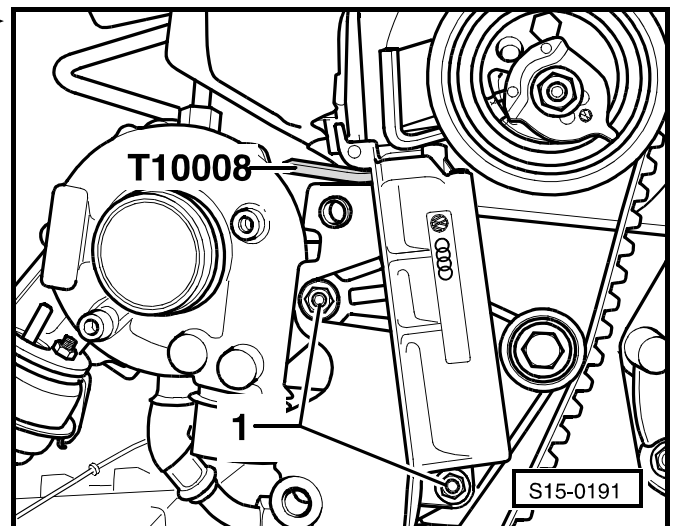
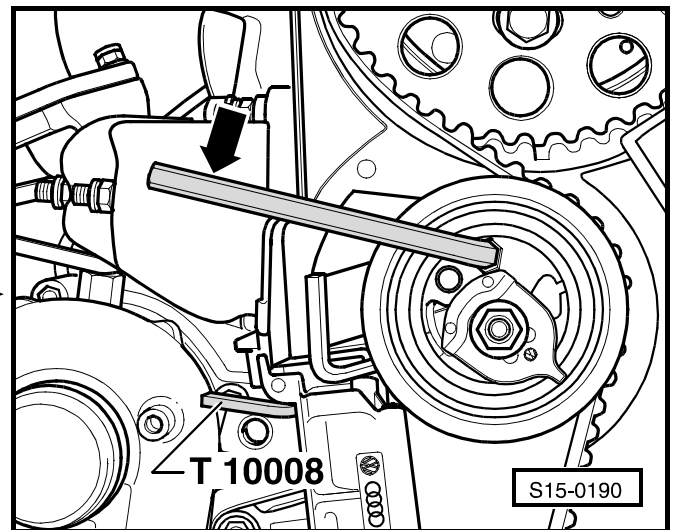
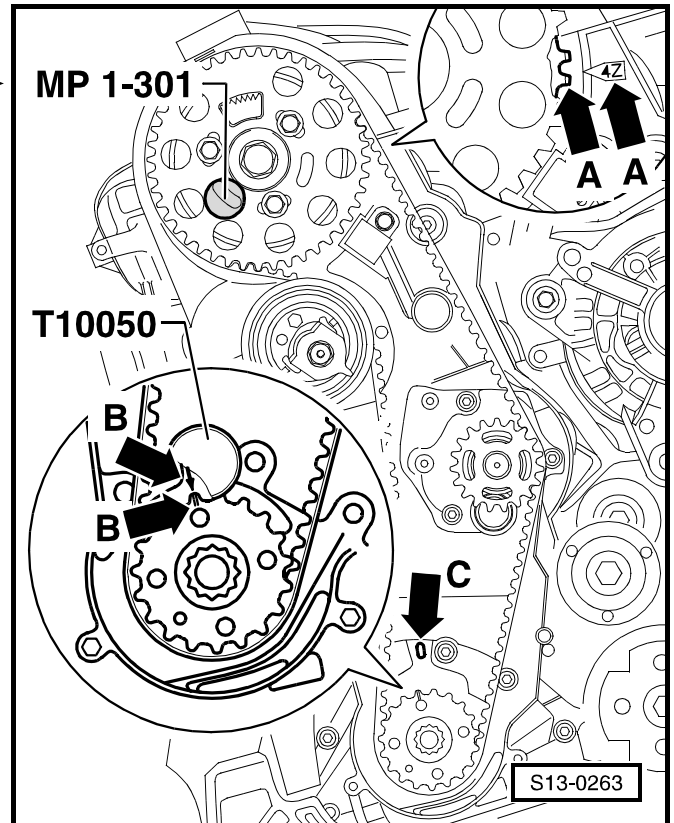
- Mark the rotation direction of the timing belt.

**For vehicles > 04.01**

- Insert wrench fully into the hexagon socket bolt and press in anti-clockwise direction onto the tensioning pulley -arrow- long enough until it is possible to secure the toothed belt tensioning device with the locking plate -T10008-.
- Slacken nut of tensioning pulley.

- Unscrew bolts -1- of toothed belt tensioning device and remove the tensioning device.
- Remove guide pulley => item 13 in **13-2** page 1

**For vehicles 05.01 >**



- Loosen the fixing nut on the tensioning roller.
- Loosen the eccentric of the tensioning pulley with a wrench (e. g. -T10020-) anti-clockwise.
- Remove guide pulley ⇒ item 15 in **13-2** page 2

#### For all vehicles >

- Remove timing belt.

#### Installing and tensioning



#### Note

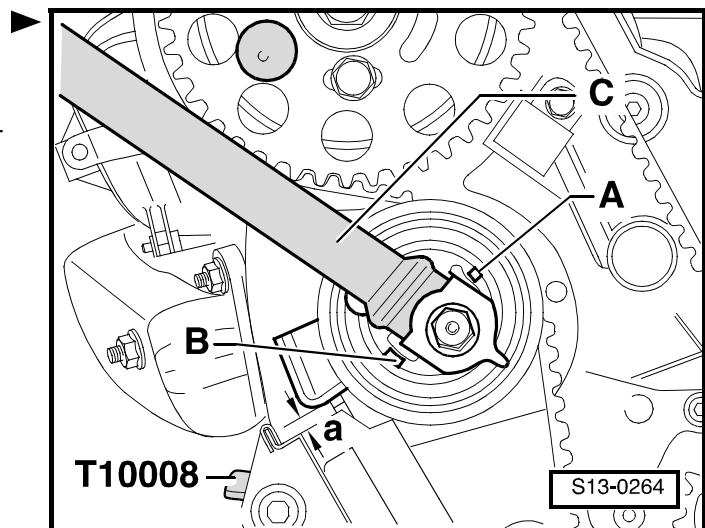
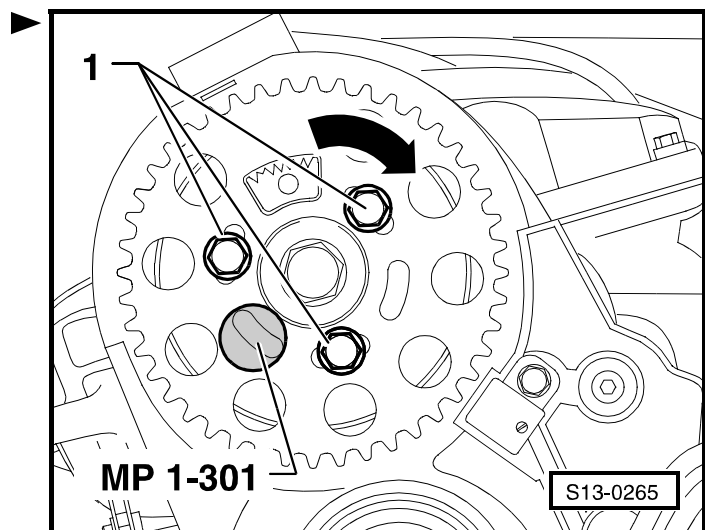
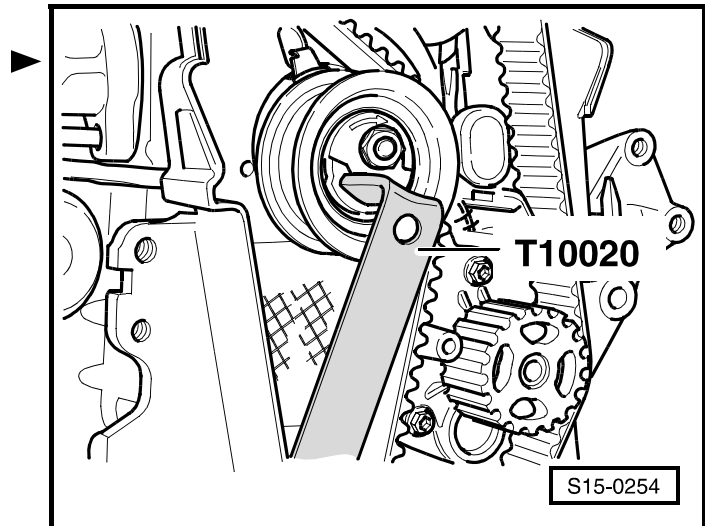
*Tensioning work at the timing belt must only be carried out when engine is cold.*

- Slacken bolts of camshaft sprocket -1- sufficiently so that the camshaft sprocket can be turned in the area of the slots.
- Turn camshaft sprocket clockwise in the slots -arrow- as far as the stop.

#### For vehicles > 04.01

- Carefully turn eccentric in clockwise direction with the wrench for tensioning pulleys -C- sufficiently until the lug on the eccentric is right in front of stop -B-.
- Fit timing belt onto camshaft sprocket, tensioning pulley, crankshaft timing belt sprocket and onto the timing belt sprocket of the coolant pump.
- Install the tensioning device for toothed belt.
- Install guide pulley ⇒ item 13 in **13-2** page 1
- Carefully turn eccentric in an anti-clockwise direction with a wrench for tensioning rollers -C- (the lug on the eccentric moves toward the stop -A-) until it is possible to move the locking plate -T10008- away slightly.
- Turn wrench in clockwise direction long enough until gap size -a- is achieved. (The lug on the eccentric moves toward the stop -B-).

Specification -a-:  $4 \pm 1$  mm.

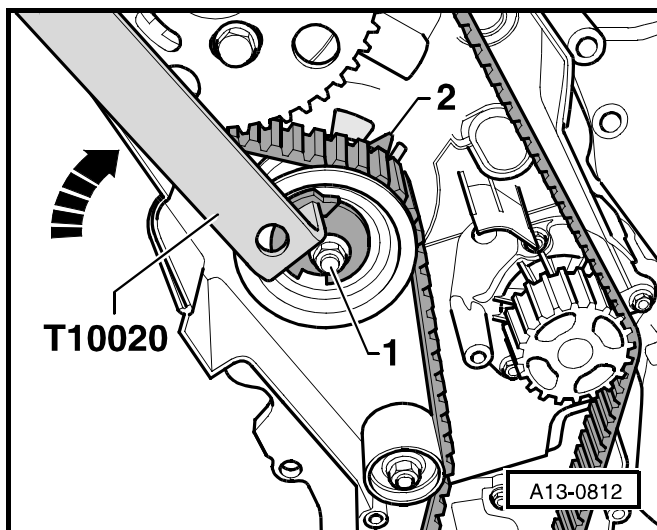
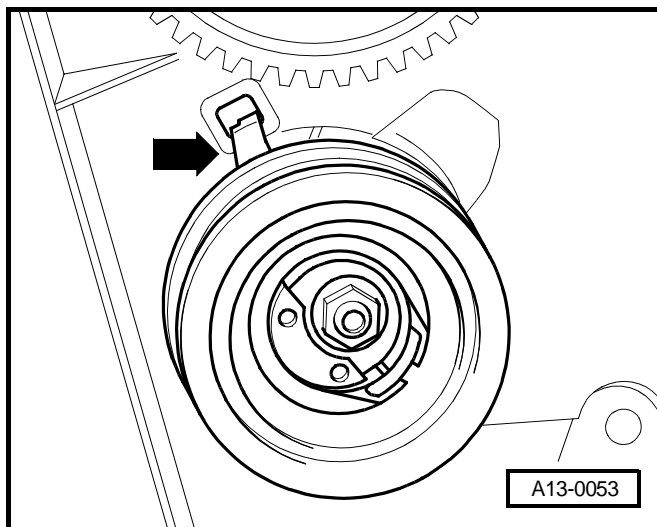


**i Note**

- ◆ Use e.g. a  $\varnothing 4$  mm drill bit to adjust gap size -a-.
  - ◆ Gap size -a- becomes smaller after the tensioning pulley is tightened. This fact should therefore be taken into account when setting with  $\varnothing 4$  mm drill bit.
  - ◆ On a warm engine dimension -a- can decrease to 1 mm.
- Hold tensioning pulley in this position and tighten nut of tensioning pulley as follows:
- 20 Nm + torque a further  $\frac{1}{8}$  turn (45°)

**For vehicles 05.01 ►**

- Fit timing belt onto crankshaft timing belt sprocket, tensioning pulley, camshaft sprocket and onto the timing belt sprocket of the coolant pump.
- Install guide pulley ⇒ item 15 in **13-2** page 2
- Check the correct catch fitting of the tensioning pulley in the hole in the rear timing belt guard -arrow-.
- Turn the eccentric of the tensioning pulley with a wrench (e. g. -T10020-) clockwise in such a way until the pointer -2- stands in the centre of the gap size of the base plate.



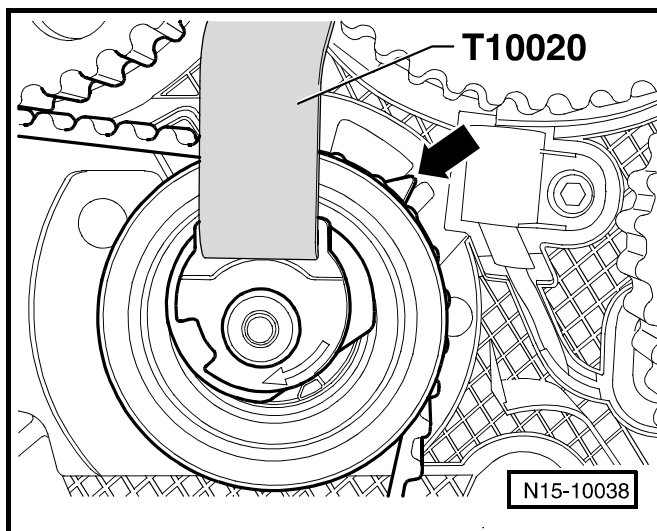
**i Note**

Ensure that the fixing nut does not turn at the same time.

- Hold the tensioning pulley in this position and tighten the nut of the tensioning pulley to 20 Nm + torque a further 45° ( $\frac{1}{8}$  turn).

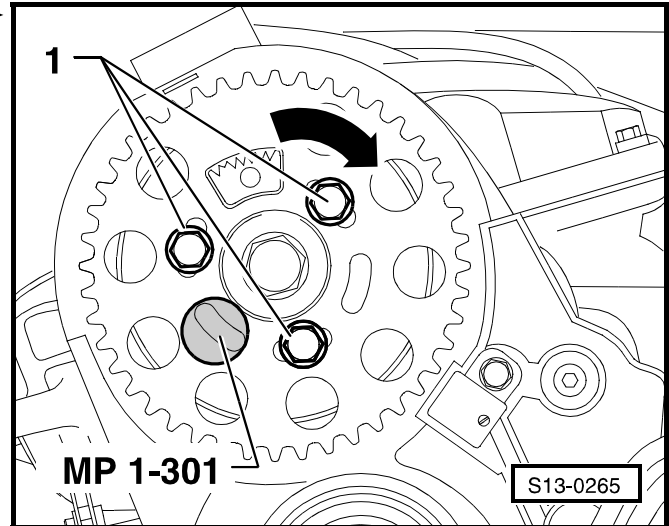
**i Note**

When tightening the fixing nut, the pointer turns -arrow- max. 5 mm to the right from the gap of the base plate. This position must not be corrected, because the toothed belt settles when running-in.



**For all vehicles ►**

- Tighten bolts of camshaft sprocket -1- to tightening torque of 25 Nm + torque a further 45° ( $\frac{1}{8}$  turn).



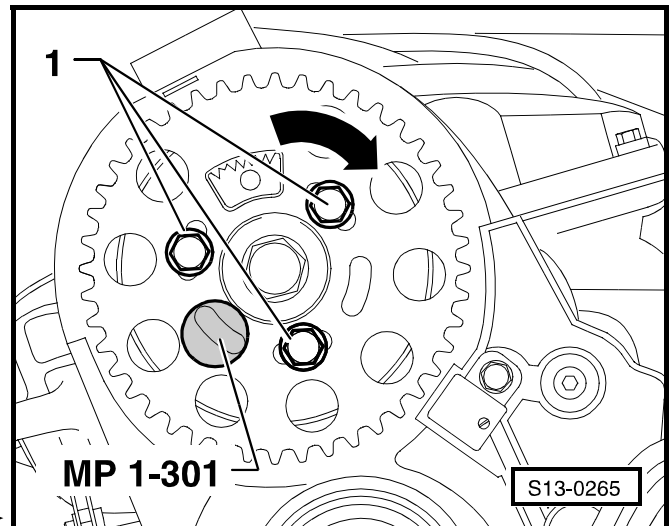
### Test timing

- Remove locking pin -MP 1-301- or -3359- and locking device -T10050-.
- Tighten crankshaft two revolutions in the direction of rotation of engine and position again to TDC of piston for cylinder 1.



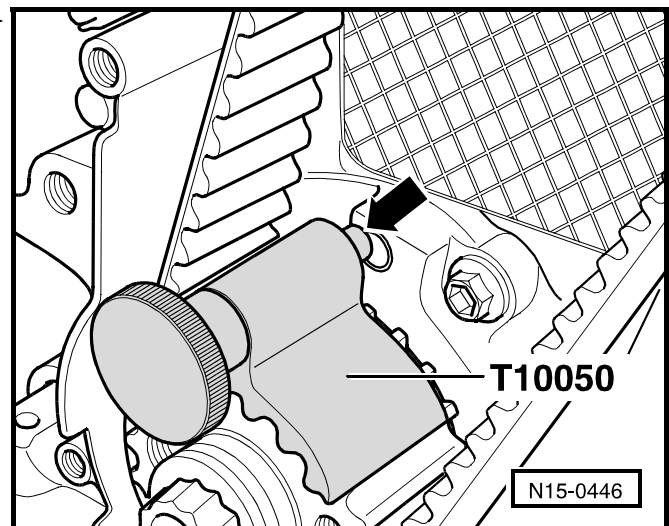
### Note

- ◆ Pin for locking device - T10050 - must engage in the sealing flange. (Locking device should be inserted just ahead of TDC on toothed belt sprocket.)
  - ◆ If the crankshaft is positioned after TDC of piston for cylinder 1 and the pin of the locking device does not engage in the sealing flange, rotate the crankshaft back no more than  $\frac{1}{4}$  revolution and again set the crankshaft to the TDC of the piston for cylinder 1 by turning in direction of rotation of engine.
  - ◆ It is not permitted to carry out the correction by turning in the opposite direction of rotation of the engine in order to insert the locking device.
- After inserting the pin for locking device -T10050- check and determine whether the hub can be secured with locking pin -MP 1-301- or -3359-.



If the hub cannot be arrested:

- Remove bolt for locking device from the hole at the sealing flange and rotate the crankshaft until the hub can be locked with locking pin.
- Slacken bolts of camshaft sprocket -1-.
- Rotate crankshaft in opposite direction of rotation of engine long enough until the pin for locking device in the sealing flange is positioned close to the hole -arrow-.
- Rotate crankshaft in direction of rotation of engine long enough until the pin for locking device engages in the sealing flange.
- Tighten bolts of camshaft sprocket to a tightening torque of 25 Nm.



20 Nm + torque a further  $\frac{1}{8}$  turn (45°)

### For vehicles ► 04.01

- After inserting the pin for locking device -T10050- check dimension -a-  $4 \pm 1$  mm and determine whether the hub can be secured with rig pin - MP 1-301- or -3359-.

If dimension -a- is not reached:

- Tighten the tensioning pulley.

Hold the tensioning pulley with the wrench, slacken the nut, and turn the wrench clockwise until dimension -a- is achieved.

Specification -a-:  $4 \pm 1$  mm.

If nominal dimension -a- is obtained and if the hub can be arrested:

– Again tighten the nut:

20 Nm + torque a further  $\frac{1}{8}$  turn ( $45^\circ$ )

**For vehicles 05.01 ►**

The pointer of the tensioning pulley stands in the centre or max. 5 mm to the right from the gap of the base plate.

**For all vehicles ►**

- Remove locking pin and locking device -T10050-.
- Rotate crankshaft on a further two revolutions in direction of rotation of the engine until the crankshaft is again positioned at TDC of piston of cylinder 1.



**Note**

- ◆ *Pin for locking device -T10050- must engage in sealing flange when this is done.*
  - ◆ *If the crankshaft is positioned after TDC of piston for cylinder 1 and the pin of the locking device does not engage in the sealing flange, rotate the crankshaft back no more than  $\frac{1}{4}$  revolution and again set the crankshaft to the TDC of the piston for cylinder 1 by turning in direction of rotation of engine.*
  - ◆ *It is not permitted to carry out the correction by turning in the opposite direction of rotation of the engine in order to insert the locking device.*
- Repeat check.

Further installation occurs in reverse order.

Tightening torque of the engine support bracket on the vehicle body: 45 Nm.

Tightening torque of the engine support and pendulum support: ⇒ Chapter 10-1.



## 13-3 Removing and installing sealing flange and flywheel



**Note**

- ◆ *Repairing the clutch* ⇒ Manual gearbox 02R; Rep. Gr. 30
- ◆ *Secure the engine with engine mount -MP 1-202- and distance sleeves -T30010- on the assembly stand before performing assembly work.*

**1 - PTFE gasket ring**

- replace ⇒ **13-3** page 3
- only install PTFE gasket ring (pay attention to different versions ⇒ Fig. 1 in **13-3** page 2)

**2 - Front sealing flange**

- must be positioned on dowel sleeves
- removing and installing ⇒ **13-3** page 4

**3 - Cylinder block**

- removing and installing crankshaft ⇒ Chapter 13-4
- disassembling and assembling pistons and conrod ⇒ Chapter 13-4

**4 - Flywheel**

- Assembly only possible in one position - holes offset
- lock using -MP 1-504- for removing and installing with the fixture ⇒ Fig. 2 in **13-3** page 2

**5 - 60 Nm + torque a further 90° (1/4 turn)**

- replace

**6 - Intermediate plate**

- must be positioned on dowel sleeves
- do not damage/bend during assembly work
- hang on the sealing flange ⇒ Fig. 3 in **13-3** page 2

**7 - 15 Nm**

**8 - Sealing flange with PTFE gasket ring**

- to remove and install, take off oil pan ⇒ Chapter 17-2
- must be replaced completely
- only install sealing flange with PTFE gasket ring (pay attention to different versions ⇒ Fig. 1 in **13-3** page 2)
- install gasket ring dry, the crankshaft stub must be free of grease
- fit new sealing flange with guide bushing (do not pull guide bushing out of gasket ring before fitting)

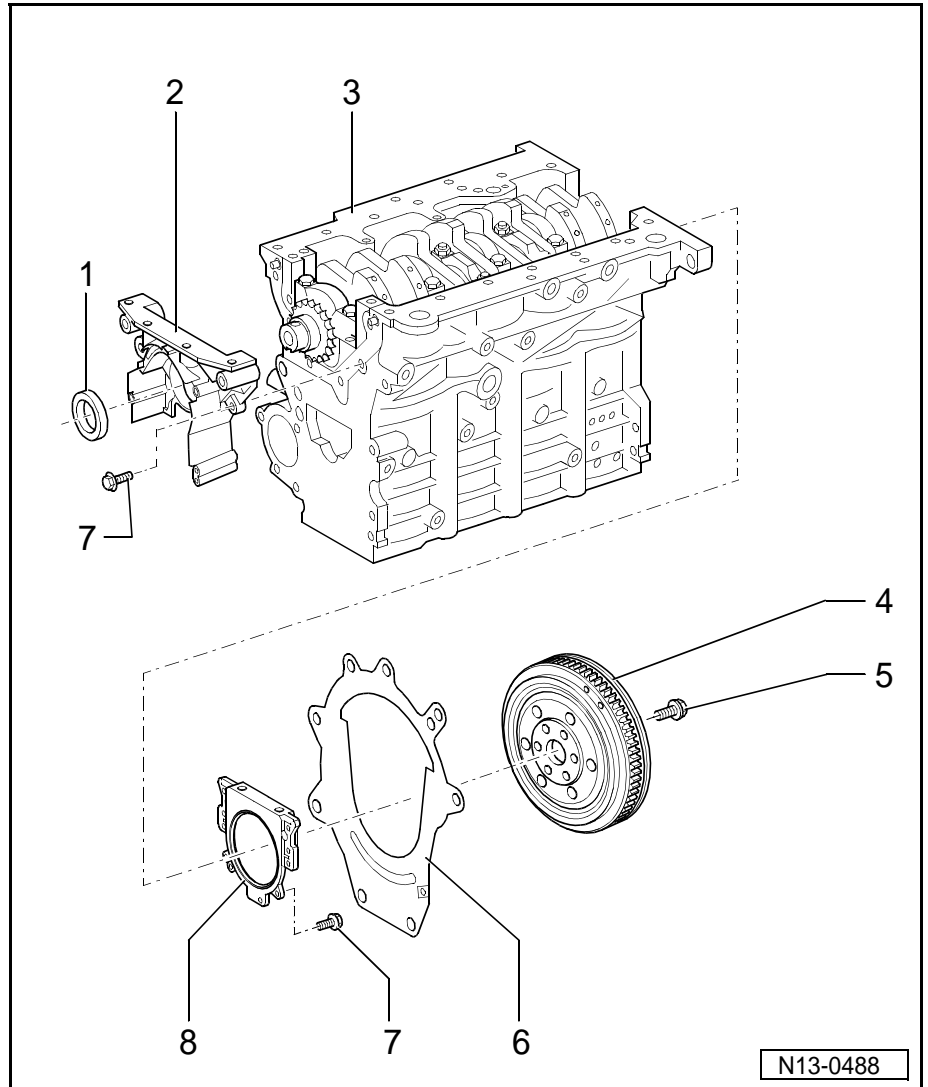


Fig. 1: Gasket ring versions

- I Elastomer gasket ring  
sealing lip -1-; with garter spring
- II PTFE gasket ring  
multiple sealing lips -2-; without garter spring

**Note**

When installing PTFE gasket ring do not moisten with oil.  
The shaft must also be free from oil and grease.

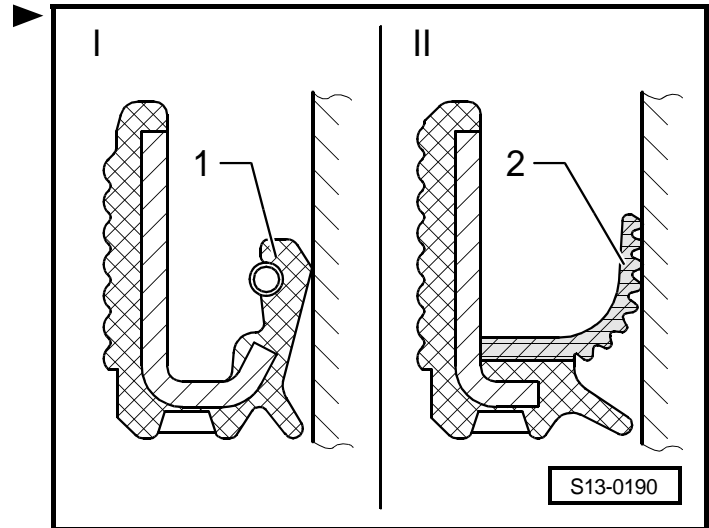


Fig. 2: Lock the flywheel

- Position the assembly fixture -MP 1-504- on the ring gear and turn until it rests against spacer bush -T30010-.

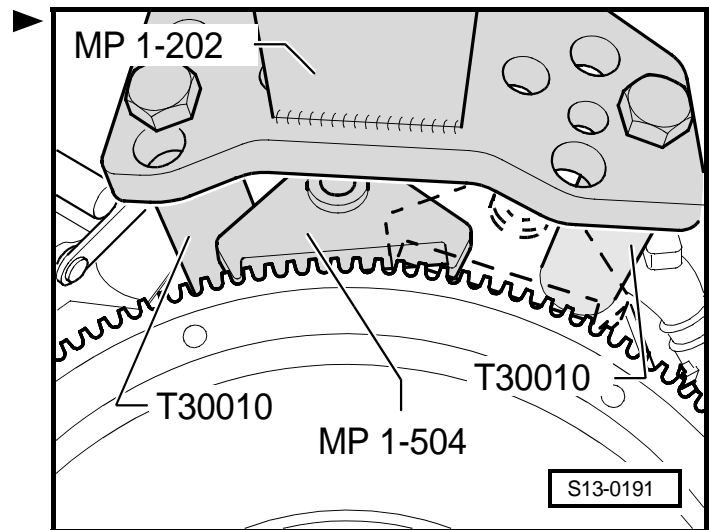


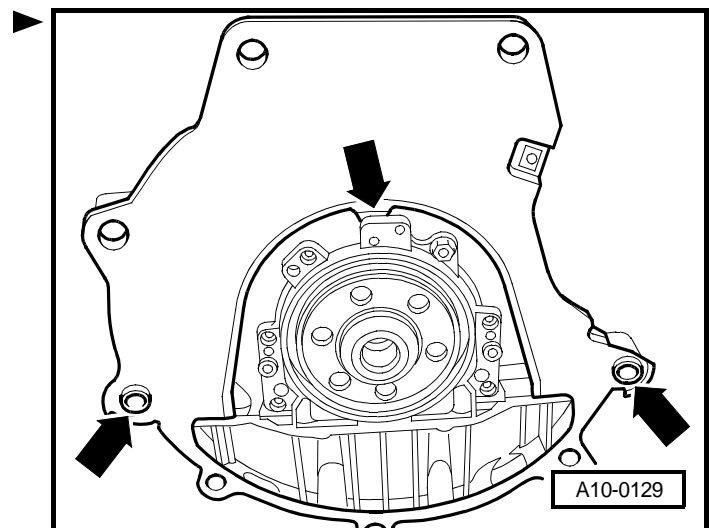
Fig. 3: Installing intermediate plate

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

### Replacing gasket ring for crankshaft - on the belt pulley side -

#### Special tools, test and measuring equipment and auxiliary items required

- ◆ Torque wrench
- ◆ Gasket ring extractor -MP 1-226-
- ◆ Pressure bushing -T10053-
- ◆ Guide bushing -T10053/1-
- ◆ Bolt (M16 x 1.5 x 60) -T10053/2-
- ◆ Counterholder -T30004- or -MP 1-310 -





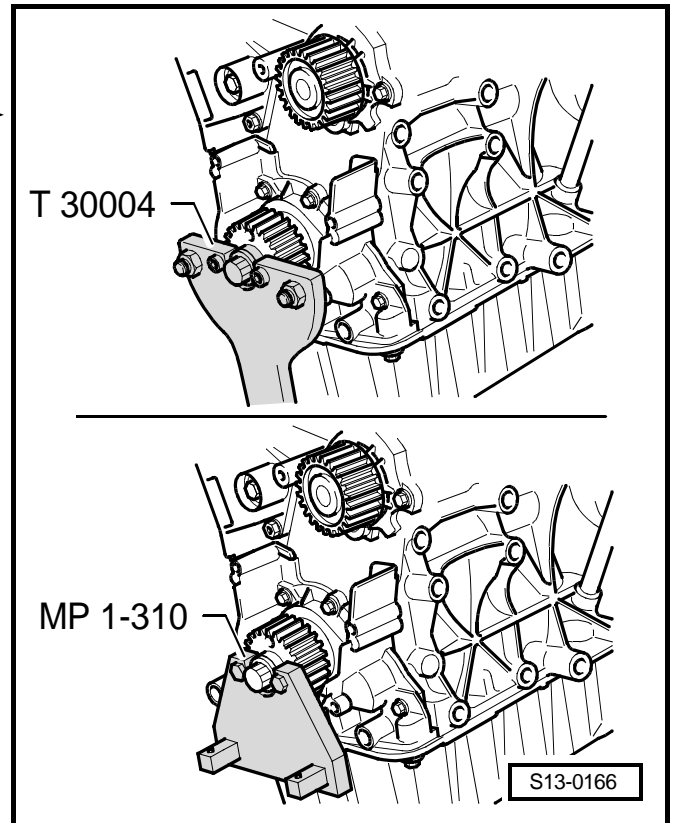
**Removing**

- Remove the timing belt ⇒ Chapter 13-2.
- Remove crankshaft timing belt sprocket. To this end lock the toothed belt gear with counterholder -T30004- or -MP 1-310-.

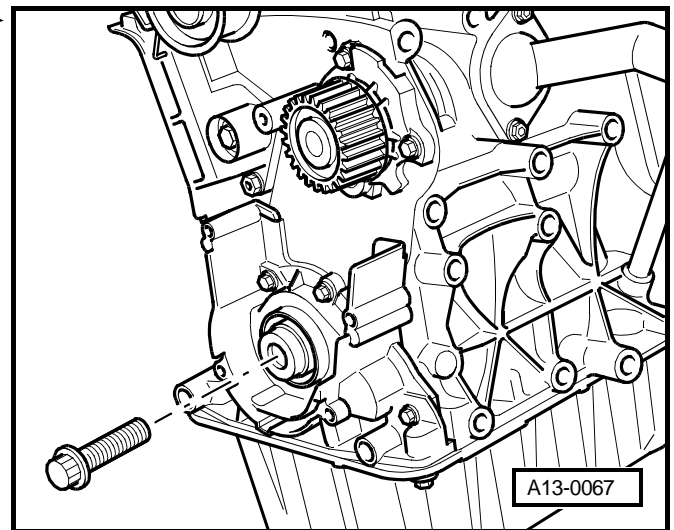


**Note**

*When screwing on the counterholder -MP 1-310- place 2 washers between the toothed belt gear and the counterholder.*



- Screw the bolt by hand into the crankshaft as far as the stop.
- Unscrew inner part of the gasket ring extractor -MP 1-226- nine turns (approx. 17 mm) out of the outer part and lock with knurled screw.



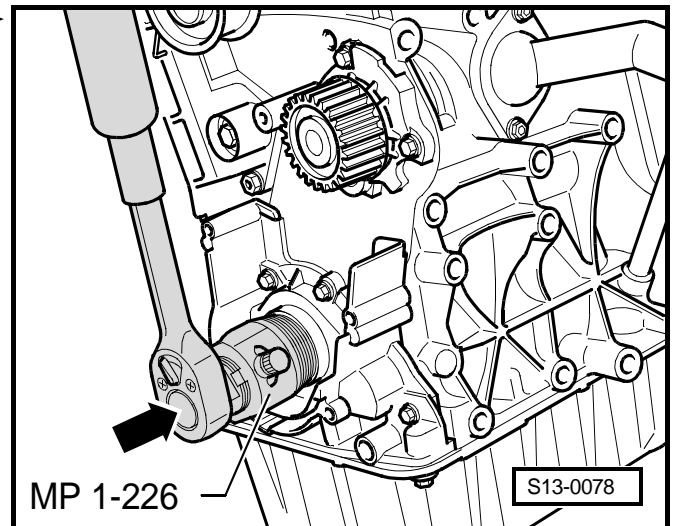
- Oil the thread head of the gasket ring extractor -MP 1-226 -, position and forcefully screw it into the gasket ring as far as possible.
- Release knurled screw and turn the inner side against the crankshaft until the gasket ring is pulled out.

**Installing**

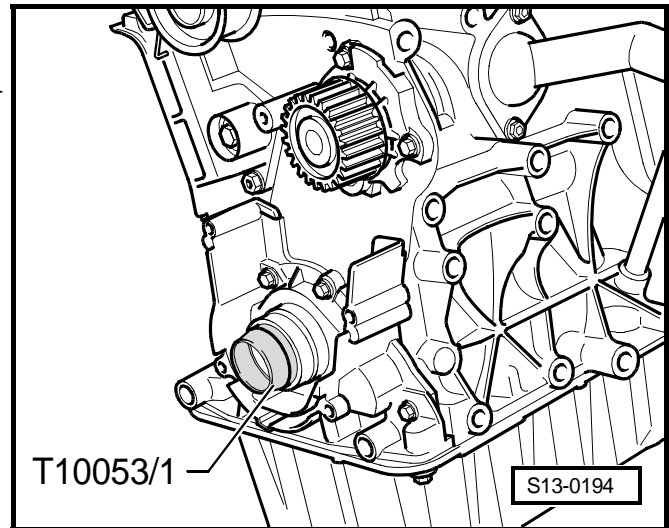


**Note**

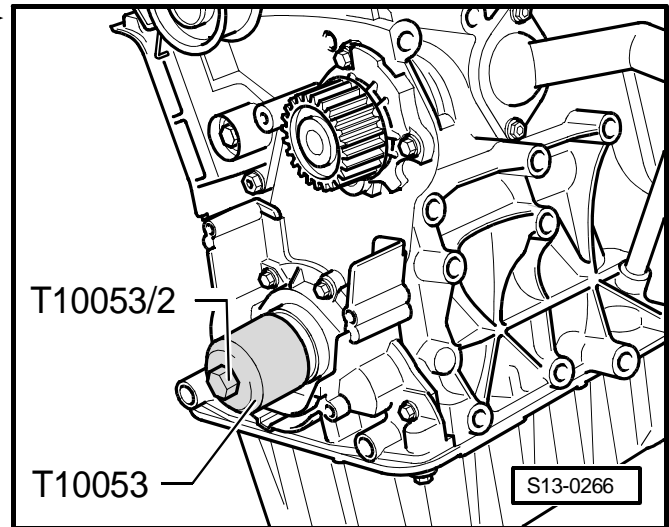
- ◆ Only fit PTFE gasket rings. Do not fit elastomer gasket rings with a garter spring.
- ◆ The sealing lips of the PTFE gasket ring must neither be oiled nor greased.



- Use a clean cloth to remove oil residues on the crankshaft journal.
- Insert guide bushing -T10053/1- on the crankshaft stub. ▶
- Slide gasket ring over the guide bushing onto the crankshaft stub.



- Press in the gasket ring with pressure bushing -T10053- and screw -T10053/2- up to the stop. ▶



- Install timing belt gear on the crankshaft and lock with counterholder -T30004- or -MP 1-310-. ▶

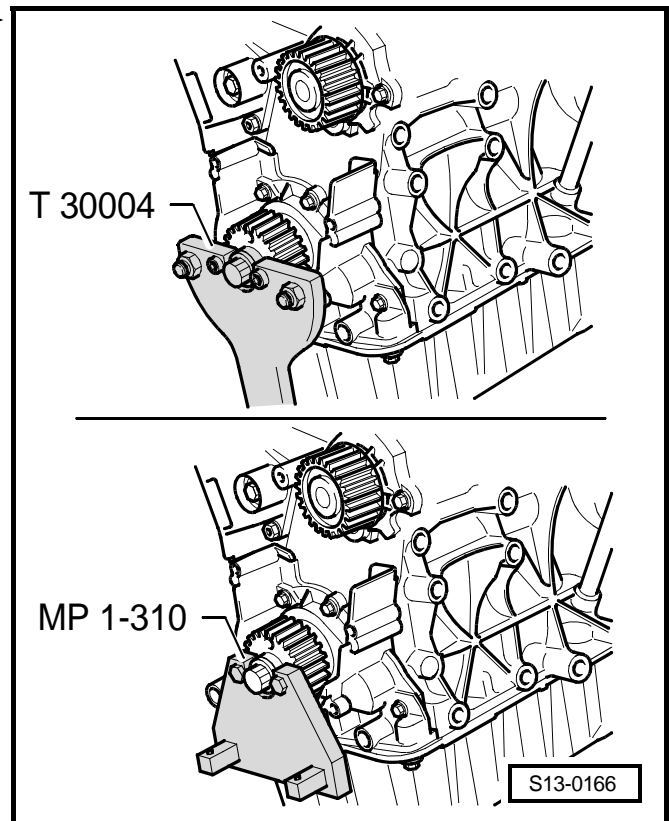
**i Note**

- ♦ When screwing on the counterholder -MP 1-310- place 2 washers between the toothed belt gear and the counterholder.
- ♦ Replace central screw for toothed belt gear - crankshaft.
- Tighten new central screw for toothed belt gear - crankshaft to 120 Nm and turn a further 90° (1/4 turn).
- Install the timing belt ⇒ Chapter 13-2.

## Removing and installing the front sealing flange

### Special tools, test and measuring equipment and auxiliary items required

- ♦ Torque wrench
- ♦ Guide bushing -T10053/1-
- ♦ Counterholder -T30004- or -MP 1-310 -
- ♦ Hand-held power drill with plastic brush insert



- ◆ Flat scraper
- ◆ Silicone sealant -D 176 404 A2-

**Removing**

- Remove the timing belt ⇒ Chapter 13-2.
- Remove crankshaft timing belt sprocket. To this end lock the toothed belt gear with counterholder -T30004- or -MP 1-310 -.



**Note**

When screwing on the counterholder -MP 1-310- place 2 washers between the toothed belt gear and the counterholder.

- Drain engine oil.
- Remove oil pan ⇒ Chapter 17-2.
- Unscrew front sealing flange.
- Remove sealing flange, if necessary release by applying slight blows with a rubber-headed hammer.
- Use a flat scraper to remove sealant residues on the cylinder block.
- Use a rotating plastic brush to remove sealant residues on the sealing flange (wear protective goggles).
- Clean sealing surfaces, they must be free of oil and grease.

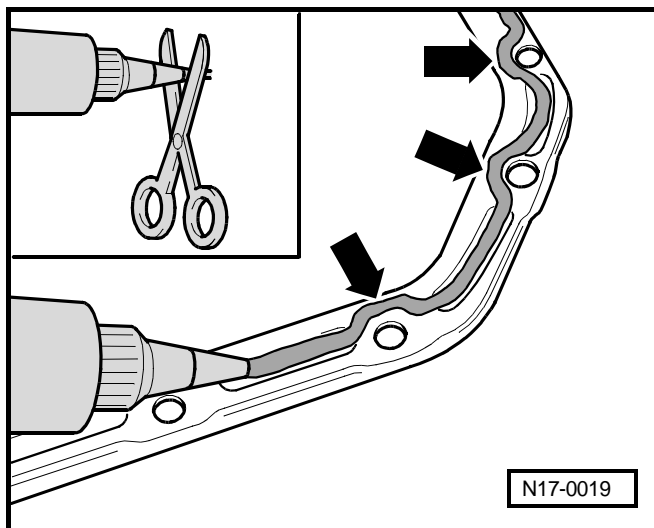
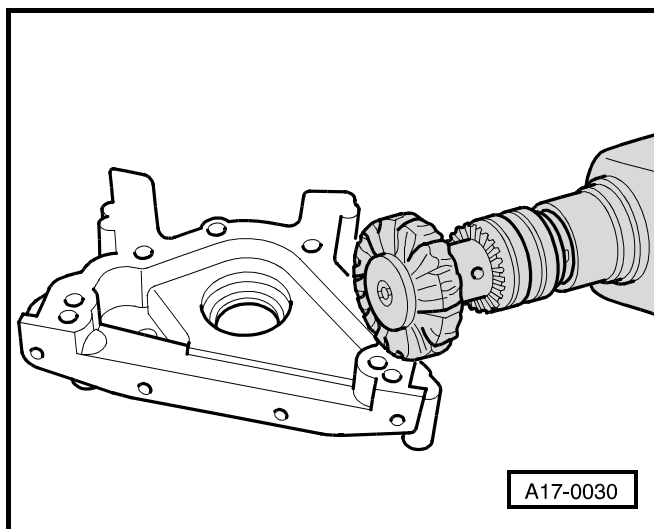
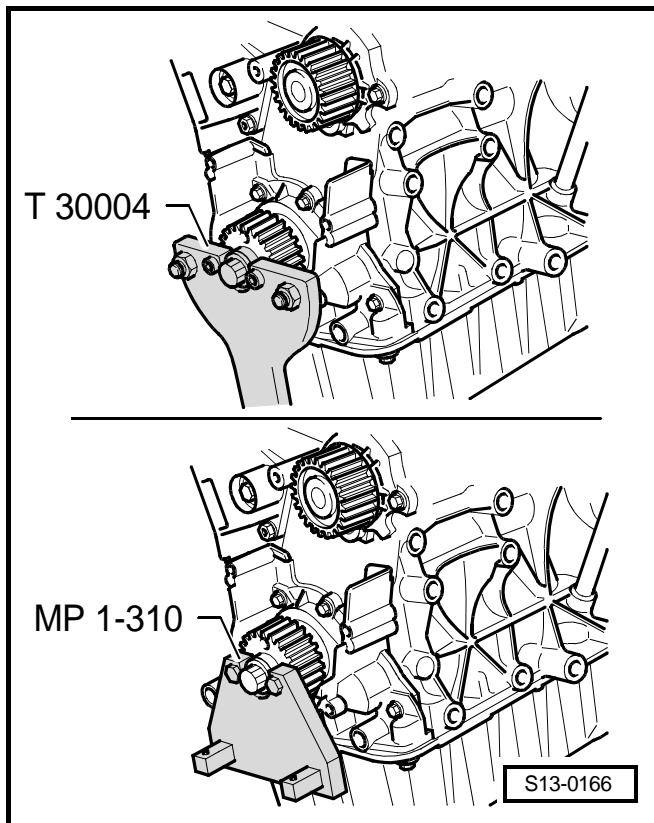
**Installing**



**Note**

- ◆ Pay attention to the 'use by date' on sealant.
- ◆ The sealing flange must be installed within 5 minutes after applying the silicone sealant.

- Cut off nozzle of tube of silicone sealant -D 176 404 A2- at the front marking (∅ of nozzle approx. 3 mm).



- Apply silicone sealant bead to the clean sealing surface of the sealing flange, as shown in the illustration. ▶

Thickness of sealant bead -arrow-: 2...3 mm

**i** Note

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

- Fit sealing flange immediately and lightly tighten all bolts.

**i** Note

*When installing the sealing flange with the gasket ring fitted use guide bushing -T10053/1-: ▶*

- Tighten the fixing screws of the sealing flange cross-wise.

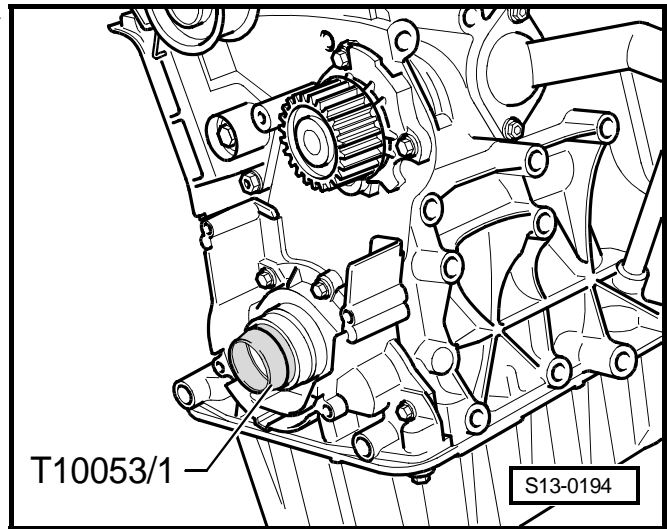
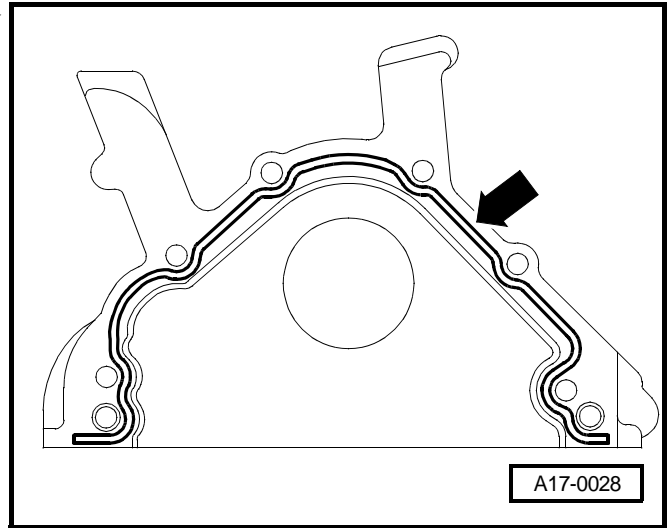
Tightening torque: 15 Nm

- Install oil pan ⇒ Chapter 17-2.

**i** Note

*After installing, allow the sealant to dry for about 30 minutes. Only then may engine oil be filled in.*

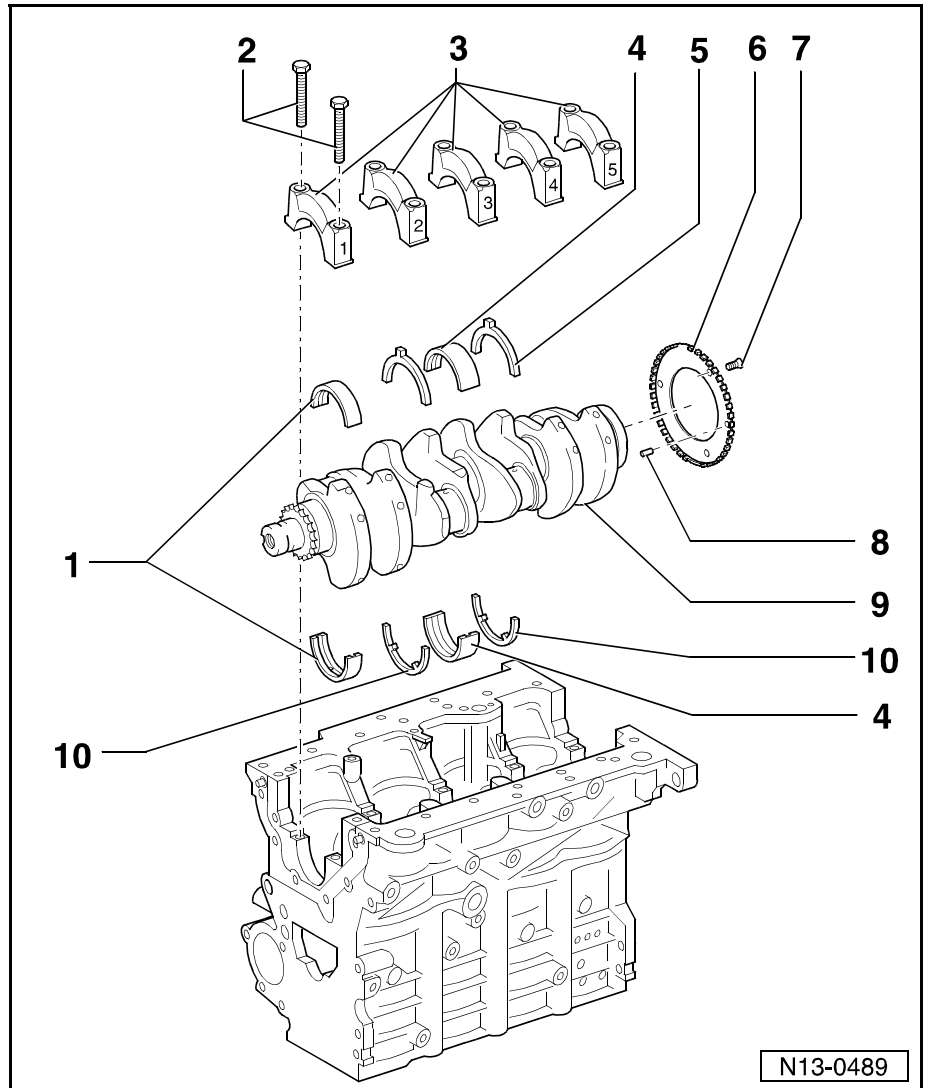
- Install the timing belt ⇒ Chapter 13-2.



## 13-4 Crankshaft, Piston and Conrod

### Removing and installing crankshaft

- 1 - Bearing shells 1, 2, 4 and 5**
  - for bearing cap without lubricating groove
  - for cylinder block with lubricating groove
  - do not mix up used bearing shells (mark)
- 2 - 65 Nm + torque a further 1/4 turn (90°)**
  - replace
  - tighten thread
- 3 - Bearing caps**
  - Bearing cap 1: on the belt pulley side
  - Bearing cap 3: with recesses for thrust washers
  - retaining lugs of the bearing shells of the cylinder block/ bearing cap must be on top of one another
- 4 - Bearing shell 3**
  - for bearing cap without lubricating groove
  - for cylinder block with lubricating groove
- 5 - Thrust washer**
  - for bearing cap 3
  - pay attention to locating element
- 6 - Rotor**
  - for engine speed sender -G28-
- 7 - 10 Nm + torque a further 1/4 turn (90°)**
  - replace
- 8 - Fit pin**
  - Checking projection from crankshaft ⇒ Fig. 1 in **13-4** page 2
- 9 - Crankshaft**
  - ∅ Crankshaft bearing journal: 54.00 mm
  - ∅ Conrod bearing journal: 47.80 mm
  - Axial play when new: 0,07...0.17 mm
  - Wear limit: 0.37 mm
- 10 - Thrust washer**
  - for cylinder block, bearing 3



**Fig. 1: Checking projection of fit pin from crankshaft**

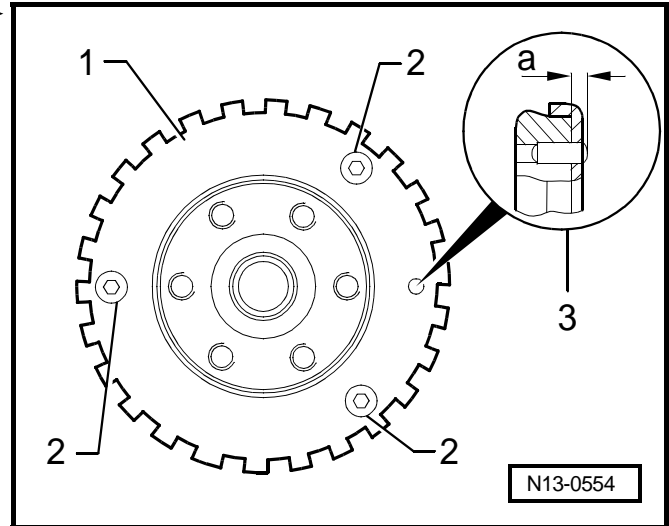
**Special tools, test and measuring equipment and auxiliary items required**

- ◆ Depth gauge

**Test sequence:**

- Use depth gauge to inspect projection -a- of dowel pin when pulse rotor -1- is removed.

- 1 - Pulse rotor
- 2 - Fixing screw
- 3 - Projection of the fit pin -3- from crankshaft -a- = 2.5...3.0 mm



**Disassembling and assembling piston and conrod**

**1 - Piston rings**

- Offset joint 120°
- use piston ring pliers for removing and installing
- Marking „TOP“ faces up
- inspect gap clearance ⇒ Fig. 2 in **13-4** page 3
- inspect end clearance ⇒ Fig. 3 in **13-4** page 4

**2 - Piston**

- with combustion chamber
  - mark installation position and matching cylinder
  - Installation position and assignment of piston/cylinder ⇒ Fig. 5 in **13-4** page 4
  - arrow on piston crown faces towards the belt pulley side
  - use piston ring tensioning strap for installing
  - if cracks present on piston stem - replace piston
  - inspect piston projection at TDC ⇒ **13-4** page 5
- Ø Pistons: 79.47 mm

**3 - Piston pin**

- if stiff, heat piston to 60°C
- use drift -VW 222A- for removing and installing

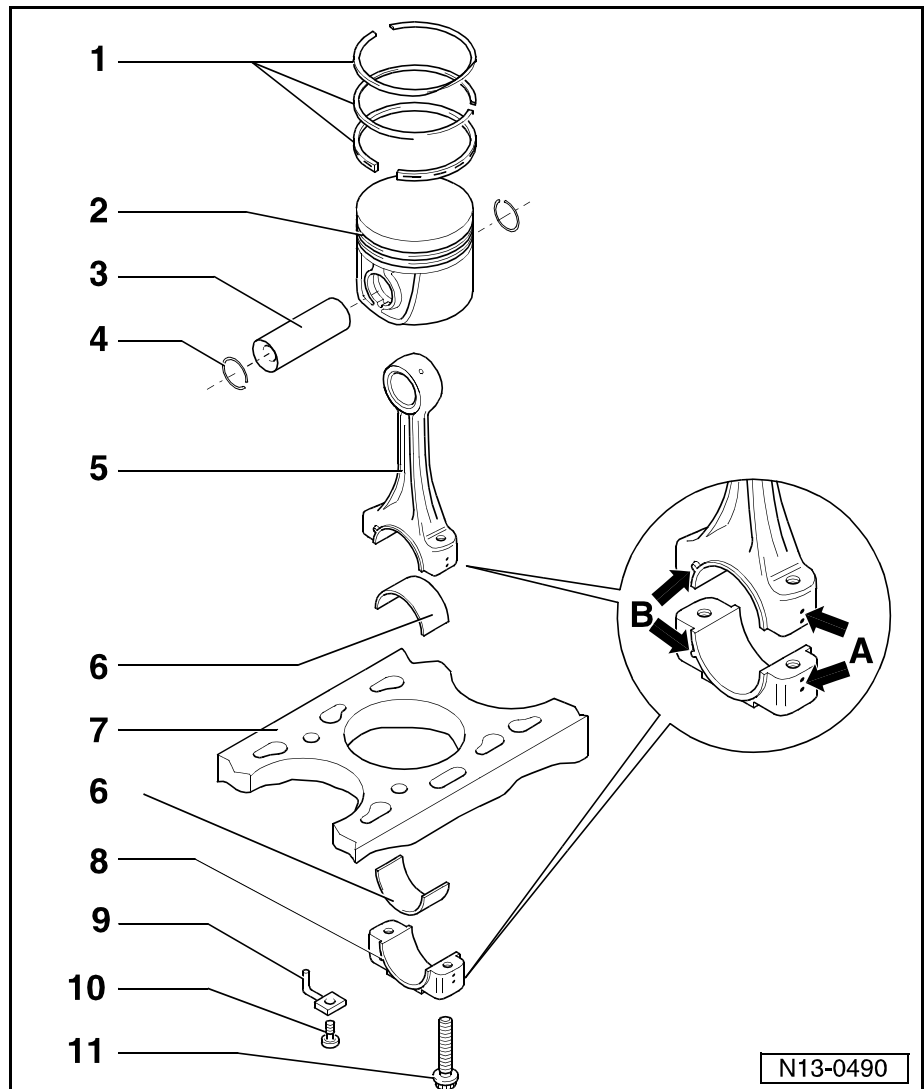
**4 - Circlip**

**5 - Conrod**

- replace as a set only
- mark assignment to cylinder, refer to -A-
- Fitting position: Markings -B- point towards the belt pulley side

**6 - Bearing shell**

- Check fitting position
- pay attention to different version:



Top bearing shell (on piston side) is subject to less stress

Distinguishing feature:

black marking on the contact surface near the separation point

- insert bearing shell in the middle of the conrod bearing cap
- do not mix up used bearing shells (mark)
- check for firm seating
- Axial clearance:  
Wear limit: 0.37 mm

**7 - Cylinder block**

- Inspect cylinder block ⇒ Fig. 4 in **13-4** page 4
- ∅ Cylinder: 79.51 mm

**8 - Conrod cap**

- as a result of the conrod separated in the cracking process, the cover fits only in one position and only to the relevant conrod

**9 - Oil injection nozzle**

- For piston cooling
- Pay attention to SP No. (right-angle bend)

**10 - Pressure relief valve, 27 Nm**

- opens at an overpressure of 2.5 to 3.2 bar (0.25 to 0.32 MPa)
- replace without sealant

**11 - Conrod bolt, 30 Nm + torque a further 1/4 turn (90°)**

- replace
- oil thread and head contact surface

**Fig. 2: Inspecting piston ring gap clearance**

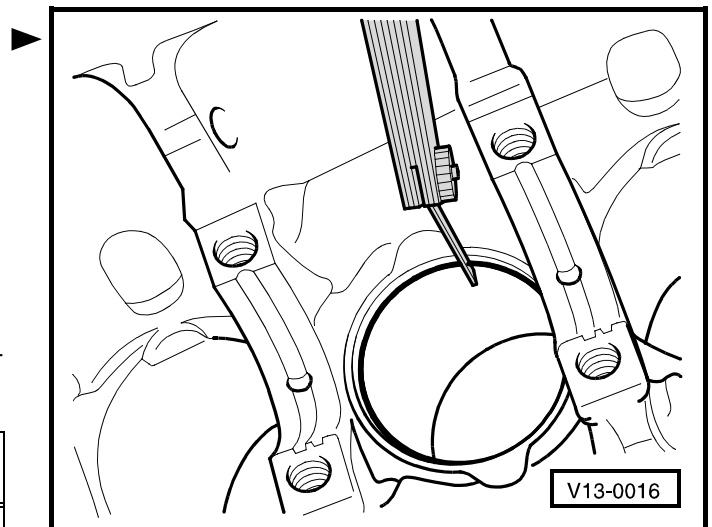
**Special tools, test and measuring equipment and auxiliary items required**

- ◆ Feeler gauge

**Test sequence**

- Push in ring at right angles to the cylinder wall from the top through to the bottom cylinder opening, about 15 mm from the cylinder edge. To insert use piston without rings.

Piston ring	new (mm)	Wear limit (mm)
1. Compression ring	0,20...0,40	1,0
2. Compression ring	0,20...0,40	1,0
Oil scraper ring	0,25...0,50	1,0

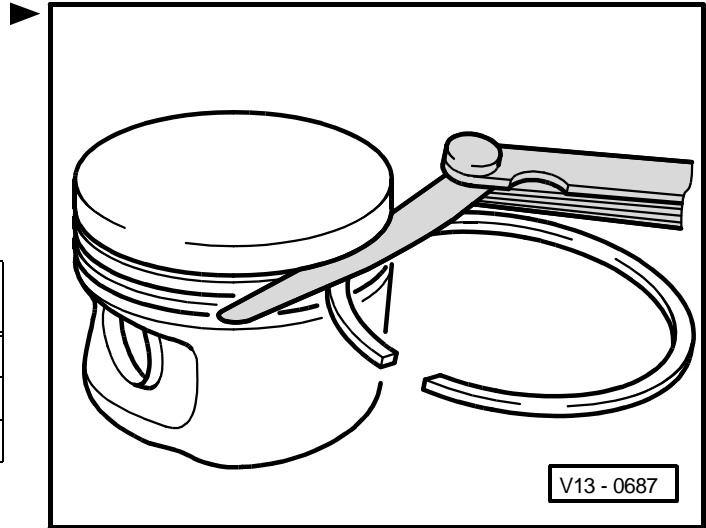


**Fig. 3: Inspect piston ring end clearance**

**Special tools, test and measuring equipment and auxiliary items required**

- ◆ Feeler gauge
- Clean ring groove before inspecting.

Piston ring	new (mm)	Wear limit (mm)
1. Compression ring	0,06...0,09	0,25
2. Compression ring	0,05...0,08	0,25
Oil scraper ring	0,03...0,06	0,15



**Fig. 4: Inspecting cylinder bore**

**Special tools, test and measuring equipment and auxiliary items required**

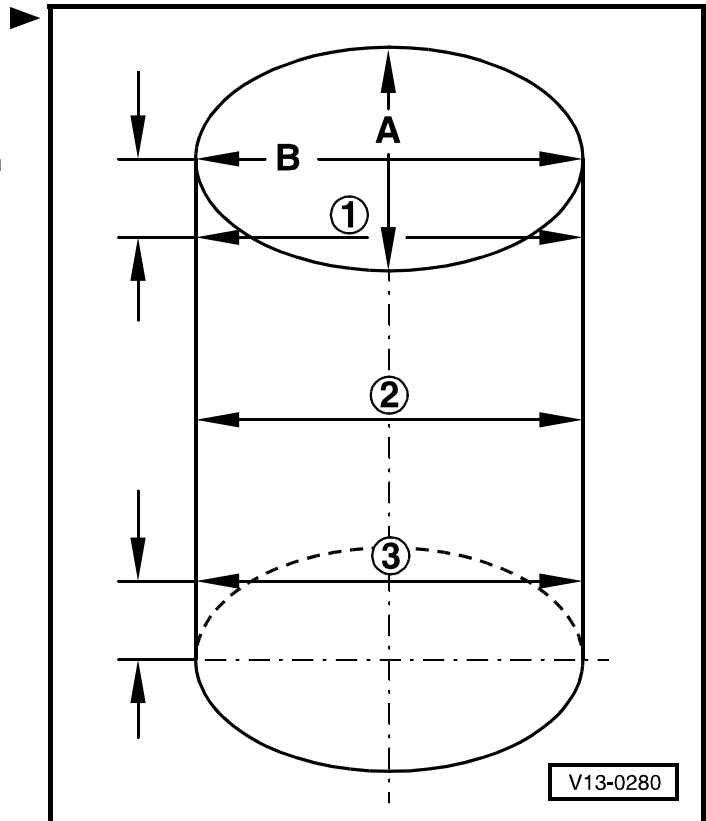
- ◆ Internal precision measuring instrument 50 to 100 mm
- Piston dimension ⇒ item 2 in **13-4** page 2.  
 Cylinder dimension ⇒ item 7 in **13-4** page 3.

**Test sequence**

- Measure at 3 points crosswise in a transverse direction -A- and lengthwise -B-.
- Deviations from specified dimension: max. 0.10 mm

**Note**

Do not measure the cylinder bore if the cylinder block is fixed to the assembly stand with the engine mount -MP 1-202-, as this may result in incorrect measurements.



**Fig. 5: Piston fitting position and assignment of the piston/cylinder**

**Special tools, test and measuring equipment and auxiliary items required**

- ◆ e. g. electric stylus

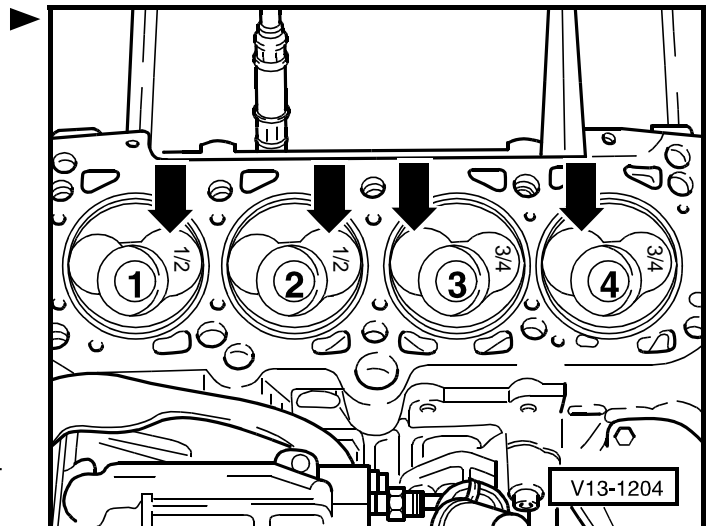
**Procedure**

- Mark installation position and assignment on inside of piston (not on piston crown), e.g. with an electric stylus.

Pistons in cylinders 1 and 2:

Large piston relief for inlet valve to flywheel side -arrows-

Pistons in cylinders 3 and 4:





Large piston relief for inlet valve to belt pulley side -arrows-



**Note**

- ◆ For new pistons the cylinder assignment is colour-coded on the piston crown.
- ◆ Pistons in cylinders 1 and 2: Identification 1/2
- ◆ Pistons in cylinders 3 and 4: Identification 3/4

**Checking piston projection in TDC**

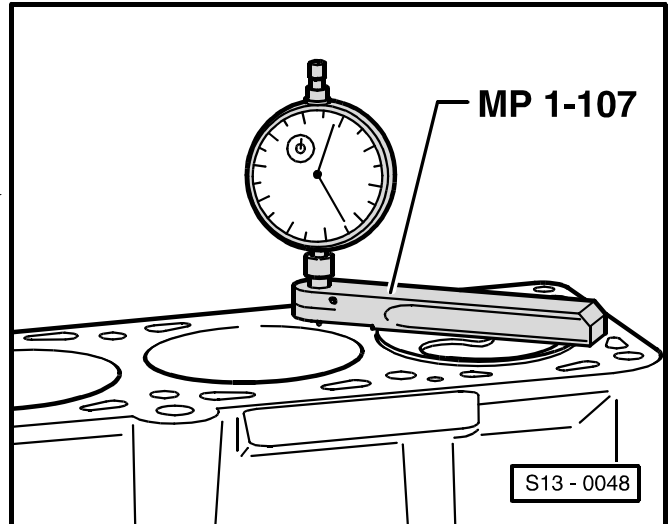
**Special tools, test and measuring equipment and auxiliary items required**

- ◆ Measuring tool for piston projection -MP 1-107-

**Procedure**

- When installing new pistons or a short engine, inspect the piston projection at TDC. Depending on the piston projection fit the relevant cylinder head seal in accordance with the table below:

Piston projection over cylinder block - top side	Marking of bore
0.91 mm...1.00 mm	1
1.01 mm...1.10 mm	2
1.11 mm...1.20 mm	3



**Identification of the cylinder head seal**

- ◆ Spare parts No. = -arrow 1-
- ◆ Control code = -arrow 2- (ignore)
- ◆ Bore = -arrow 3-



**Note**

If different values are measured during the piston projection measurement, the greatest dimension applies for the seal assignment.

