

Removing and installing camshafts and camshaft adjuster - cylinder head (right-side)

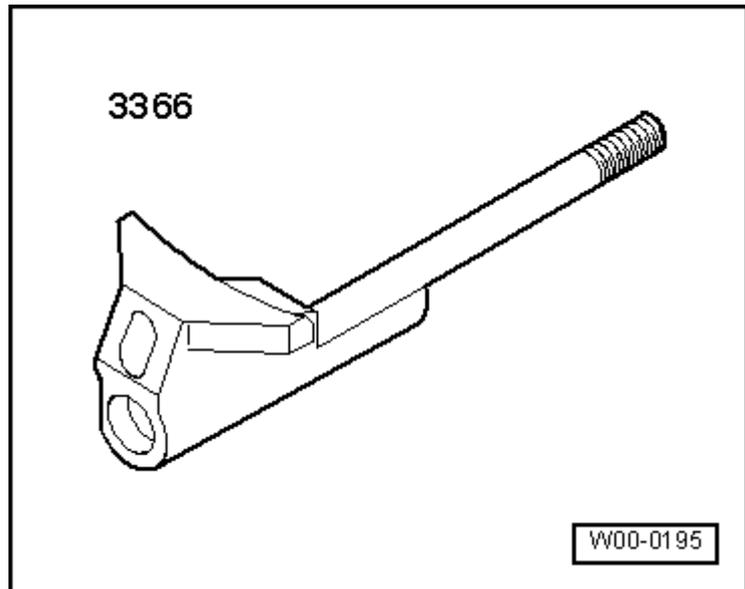


Note

There is a basic difference in the procedures for installing the camshaft drive chains on the left and right side cylinder heads. It is important to keep to the correct procedure.

Special tools and workshop equipment required

- ◆ Chain tensioner retainer -3366-

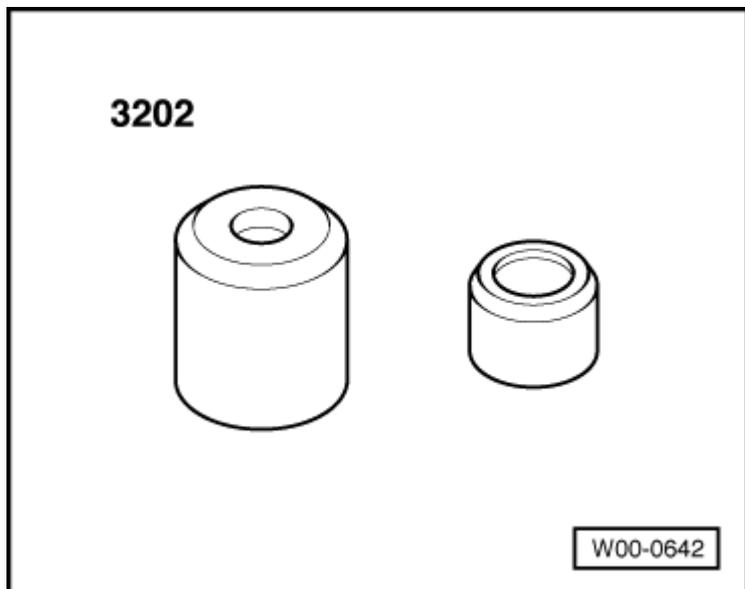


- ◆ Fitting sleeves -3202-

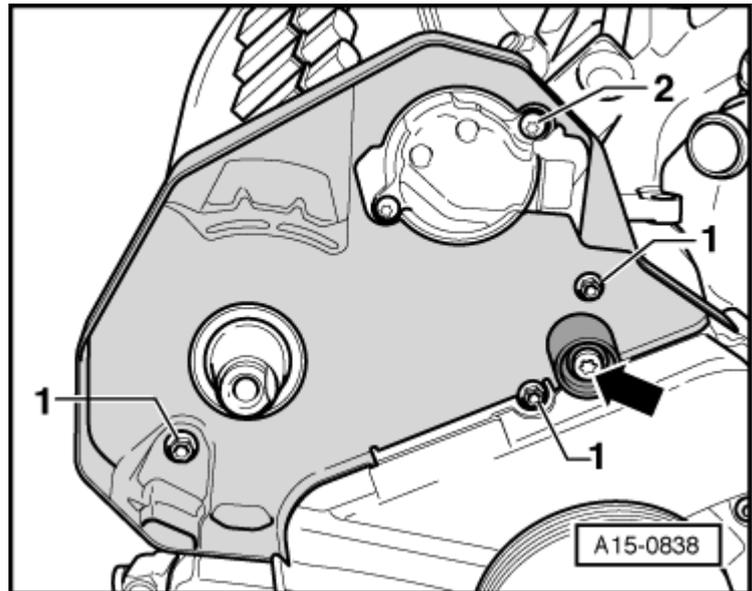
Sealant → [Parts catalogue](#)

Removing

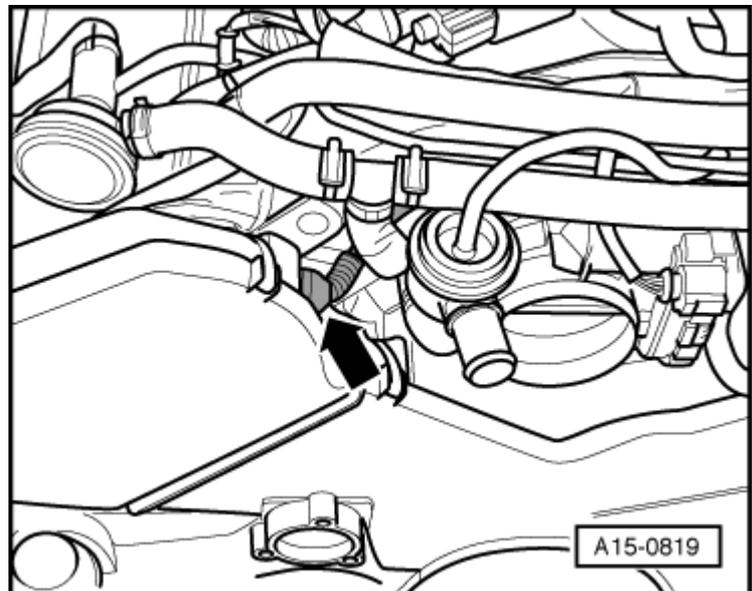
- Remove engine → [Chapter](#).
- Remove toothed belt → [Chapter](#).
- Detach camshaft sprocket.



- Unscrew idler roller -arrow-.
- Remove bolts -1- and -2- and take off toothed belt cover (rear).



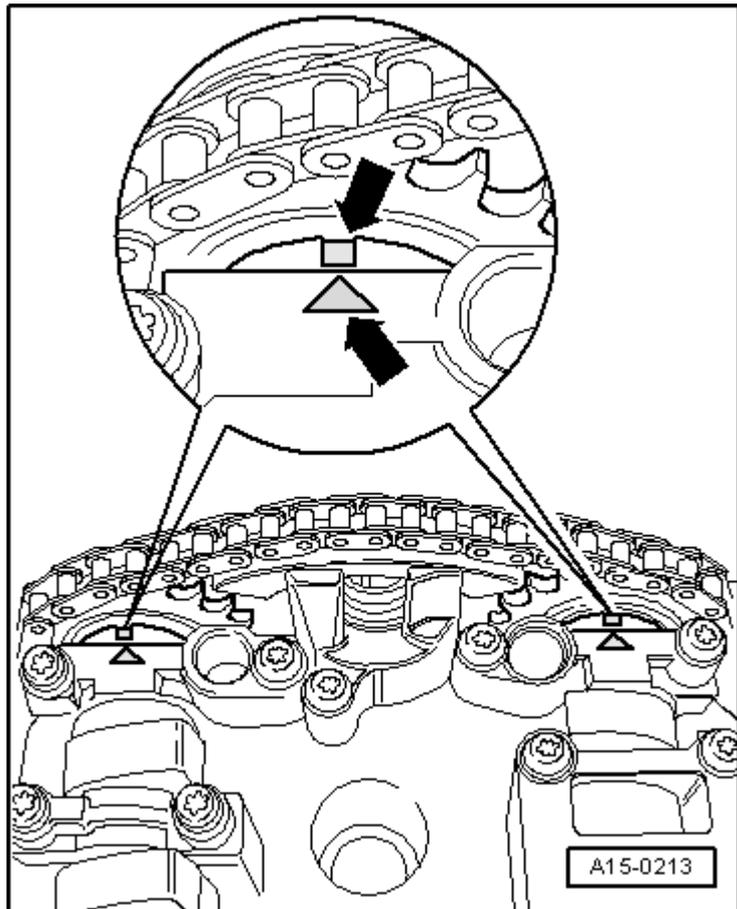
- Unplug electrical connector -arrow- at Hall sender -G40-.
- Remove housing for Hall sender.
- Remove washer and rotor for Hall sender.
- Unplug electrical connector from camshaft control valve.
- Remove cylinder head cover (right-side) → **Chapter**.
- Turn the crankshaft approx. 45° anti-clockwise at the toothed belt sprocket bolt so that all pistons are clear of TDC position.



- Check TDC position of camshafts again:
- ◆ The two marks on the camshafts must be opposite the two arrows on the bearing caps.

If old drive chain is to be reused:

- Clean drive chain and sprockets of camshafts opposite the two arrows on the bearing caps and mark installation position with a coloured dot.



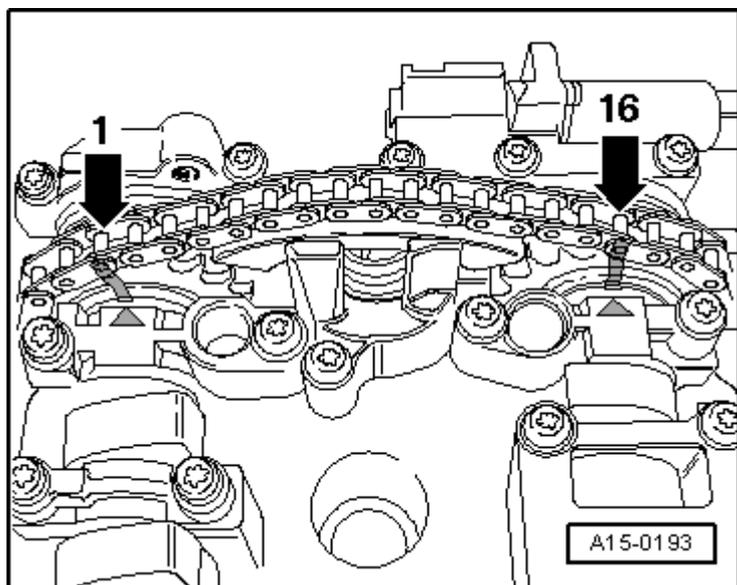
- ◆ The distance between the two arrows (and thus between the coloured markings) is 16 rollers on the chain.
- ◆ Notch on inlet camshaft has a slight inward offset with respect to chain roller -16-.



Note

Do not mark chain with a centre punch or by making a notch or similar.

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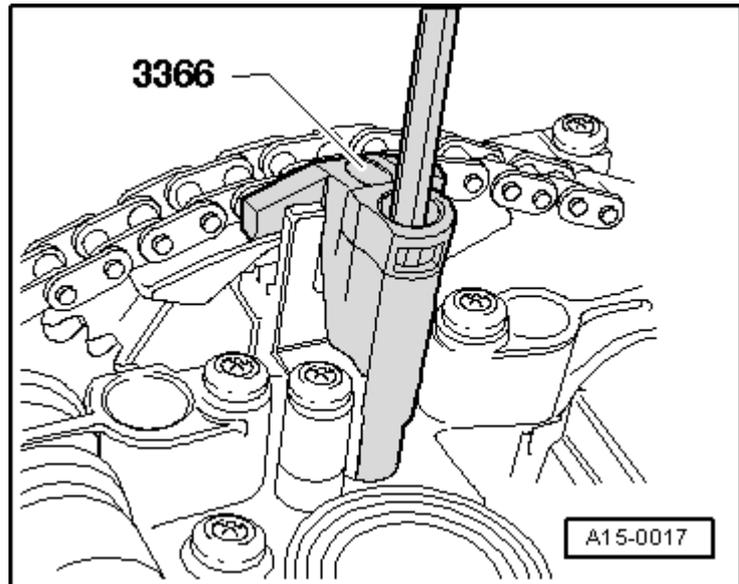


- Hold camshaft adjuster in position with chain tensioner retainer -3366-

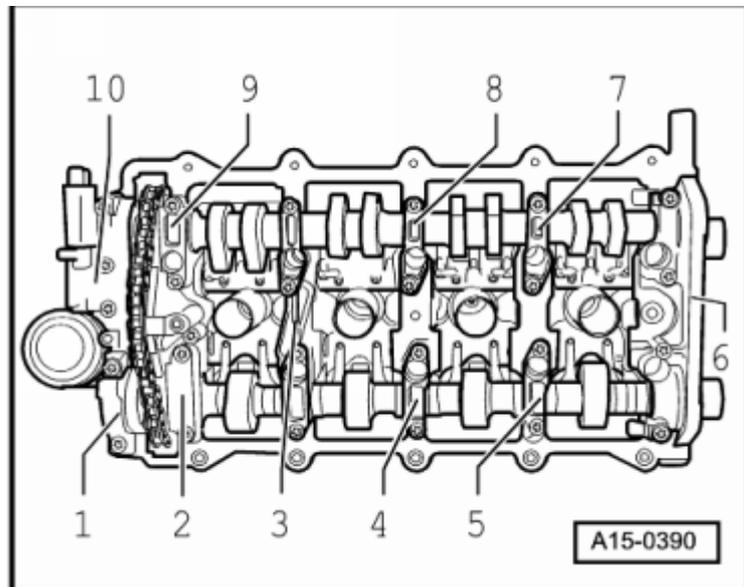


Note

Over-tightening retainer for chain tensioner can damage the camshaft adjuster.



- Mark the sequence and installation positions of all bearing caps, as shown, regardless of any existing markings on the bearing caps.
- Clean the bearing caps and then use a waterproof felt-tip pen to apply markings.
- Unscrew bolts securing camshaft adjuster -10-.
- Unbolt bearing cap 1.
- Unbolt bearing caps 2, 4, 6, 8, and 9 and place in sequence on a clean surface.
- Slacken off bearing caps 3, 5 and 7 of inlet and exhaust camshafts alternately in diagonal sequence, and remove.
- Lift out both camshafts together with camshaft adjuster.

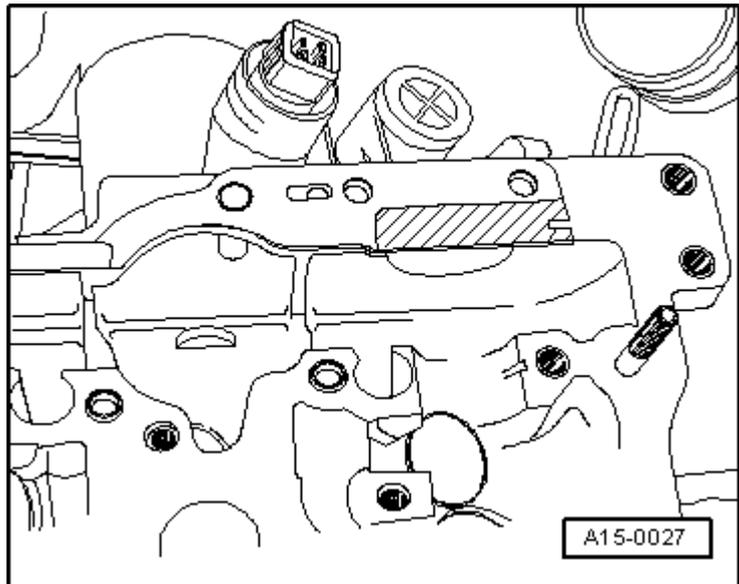


Installing

- Renew bolts for camshaft bearings and camshaft adjuster.
- Renew the semi-circular sealing plug.
- Remove all sealant residue from cylinder head and from bearing caps.

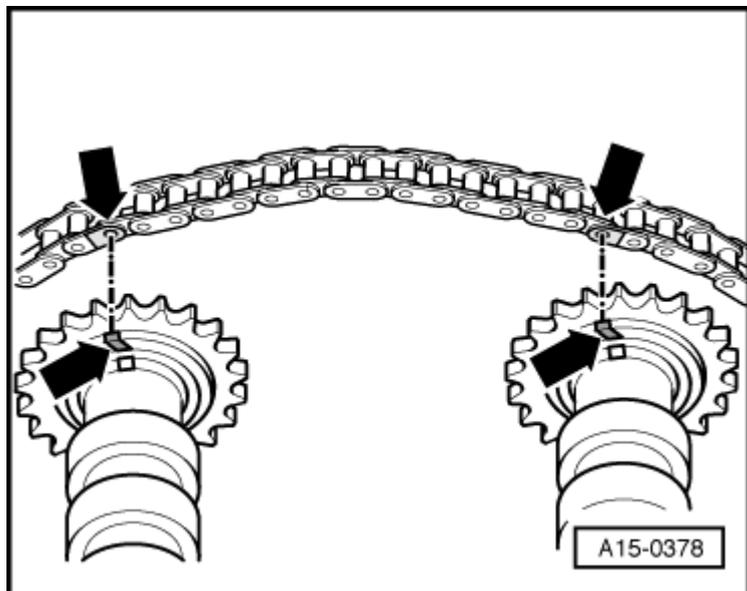
- Renew rubber/metal gasket for camshaft adjuster and apply a thin coat of sealant to the shaded area.
- ◆ Sealant → [Parts catalogue](#)
- Position drive chain on camshaft chain sprockets as follows:

If old drive chain is being used:



- ◆ Adjust the colour markings -arrows- so they are aligned.

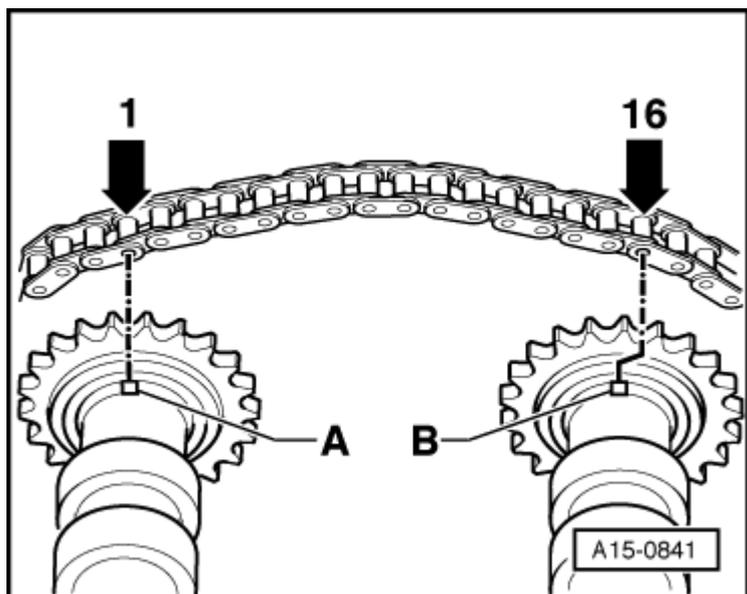
If new drive chain is being used:



- ◆ The distance between notches -A- and -B- on the camshafts must be 16 drive chain rollers. The illustration shows the exact positions of the 1st and 16th rollers on the sprockets.
- ◆ Notch -B- is offset slightly towards the inside in relation to chain roller -16-.

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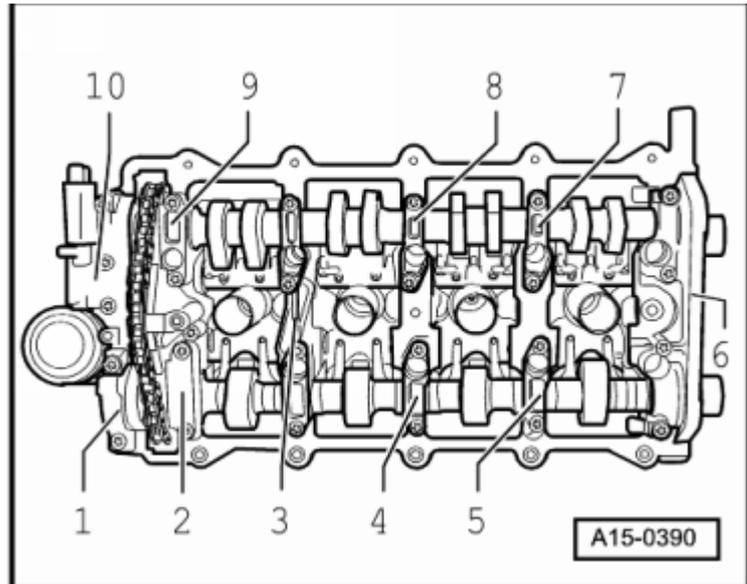
- Insert camshaft adjuster into the chain (2nd mechanic required).
- Insert camshafts with drive chain and camshaft adjuster into cylinder head.
- Oil running surfaces of both camshafts.



Note

Dowel sleeves for bearing caps and camshaft adjuster must be positioned in cylinder head

- Fit bearing caps 3, 5 and 7 as per marking.
- Tighten bearing caps 3, 5 and 7 on inlet and exhaust camshafts diagonally in alternating sequence.
- Secure camshaft adjuster -10-.
- Remove chain tensioner retainer -3366-.
- Check correct setting of camshafts:

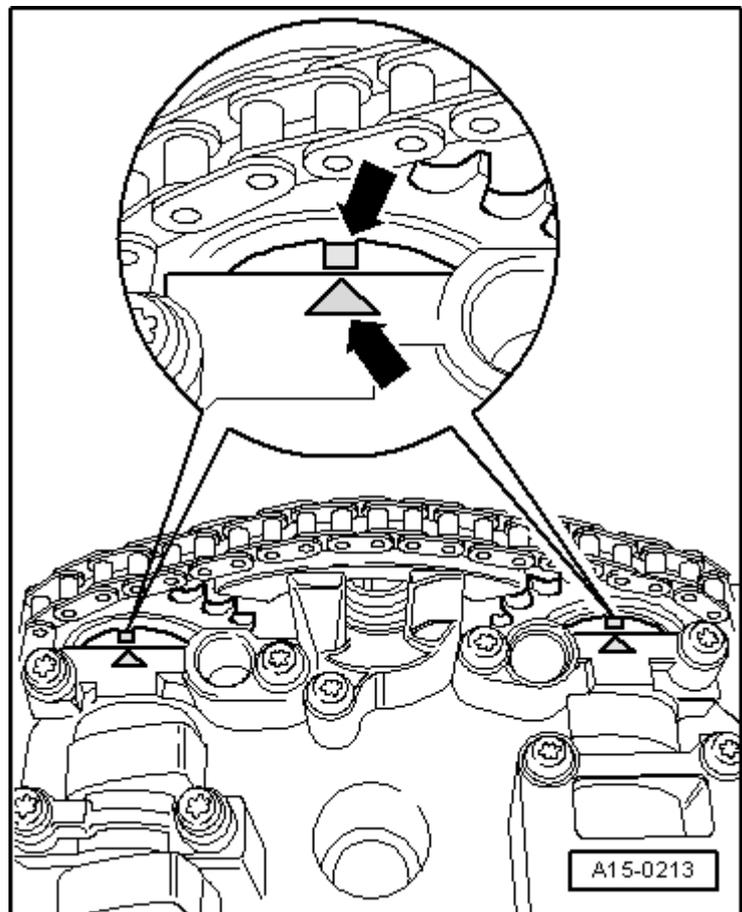


- ◆ The two markings on the camshafts must be in line with the two arrows on the bearing caps -arrows-.

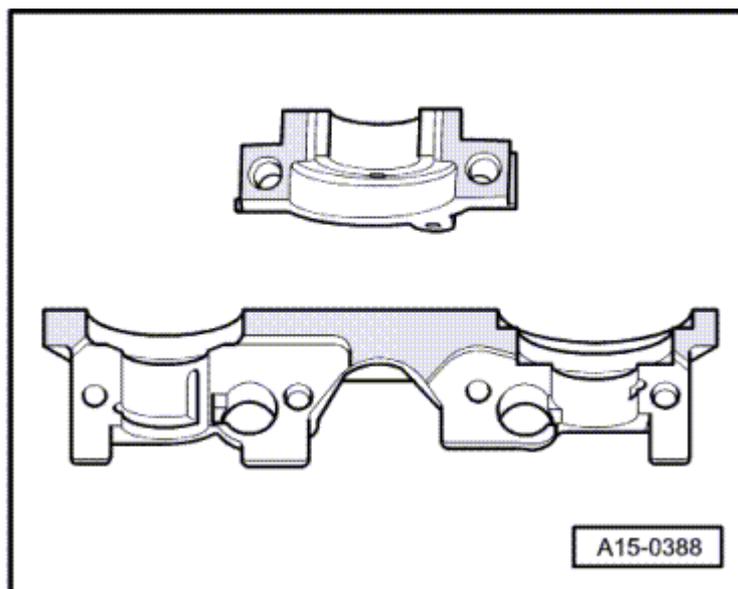


Note

If necessary, turn camshaft slightly backwards or forwards so that the two marks coincide.



- Apply a small quantity of sealant to the hatched areas on the double bearing cap and the outer bearing cap adjacent to the camshaft adjuster and fit the bearing caps.
- ◆ Sealant → [Parts catalogue](#)
- Fit the remaining bearing caps.
- Renew oil seals for inlet and exhaust camshafts; installing → [Chapter](#), renewing Hall sender oil seal → [Chapter](#).
- Drive sealing cap in carefully using fitting sleeves -3202-.
- Turn the crankshaft approx. 45° clockwise back to TDC at the toothed belt sprocket bolt and secure crankshaft with locking pin.



Perform further installation in reverse order, paying attention to the following:

- Fit toothed belt → [Anchor](#).
- Install cylinder head cover → [Chapter](#).
- Install engine → [Chapter](#).

Note

- ◆ *After installing camshafts, wait for approx. 30 minutes before starting engine. Hydraulic valve compensation elements have to settle (otherwise valves will strike pistons).*
- ◆ *After working on the valve gear, turn the engine carefully at least 2 rotations by hand to ensure that none of the valves make contact when the starter is operated.*

Tightening torques

Component	Nm	
Bearing cap to cylinder head	5 + 90° ¹⁾²⁾	
Camshaft adjuster to cylinder head	5 + 90° ¹⁾²⁾	
Toothed belt cover (rear) to:	Cylinder head	10 ³⁾
	Coolant pump	10
Idler roller to cylinder head	22	

- ¹⁾ Renew bolt
- ²⁾ 90° = one quarter turn.
- ³⁾ Install using locking fluid; for locking fluid refer to → [Parts catalogue](#).