

Right Camshafts and Camshaft Adjuster, Removing and Installing

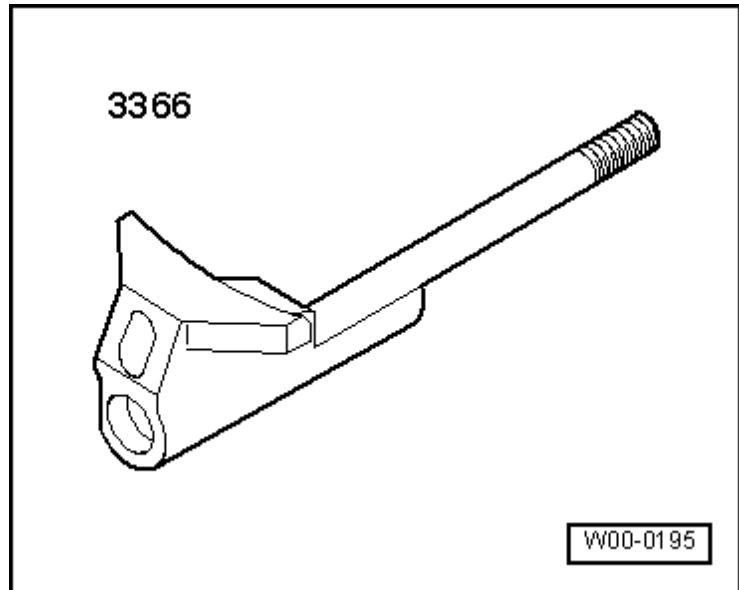


Note

Installation of camshaft drive chain to left and right cylinder heads differ basically. Note different procedures!

Special tools and workshop equipment required

- ♦ Bracket For Chain Adjustment -3366-

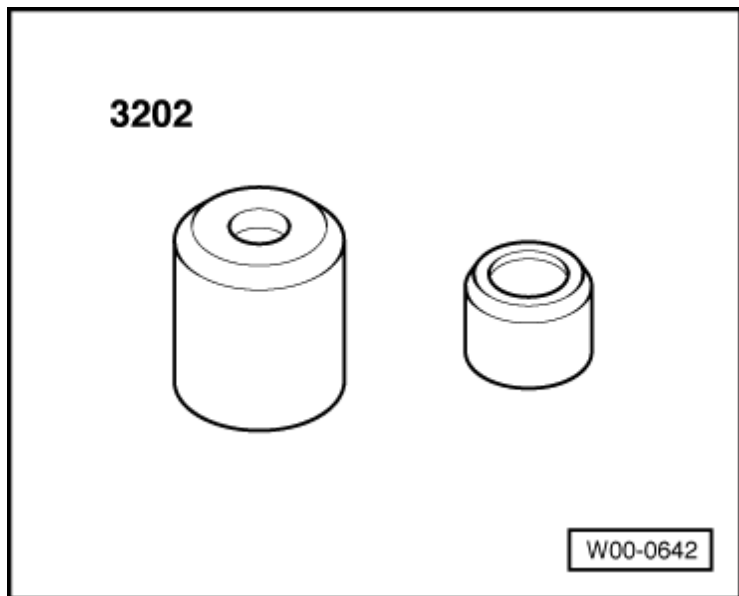


- ♦ Seal installer -3202-

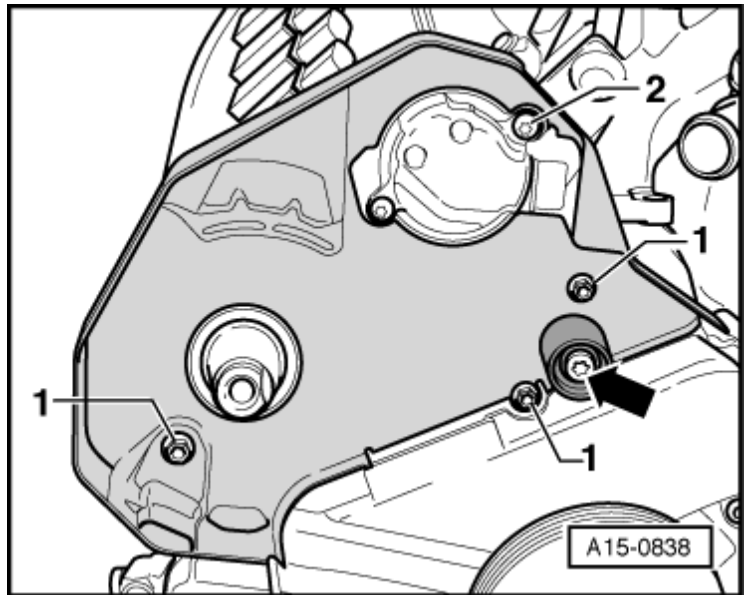
Sealant → [Electronic Parts Catalog "ETKA"](#)

Removing

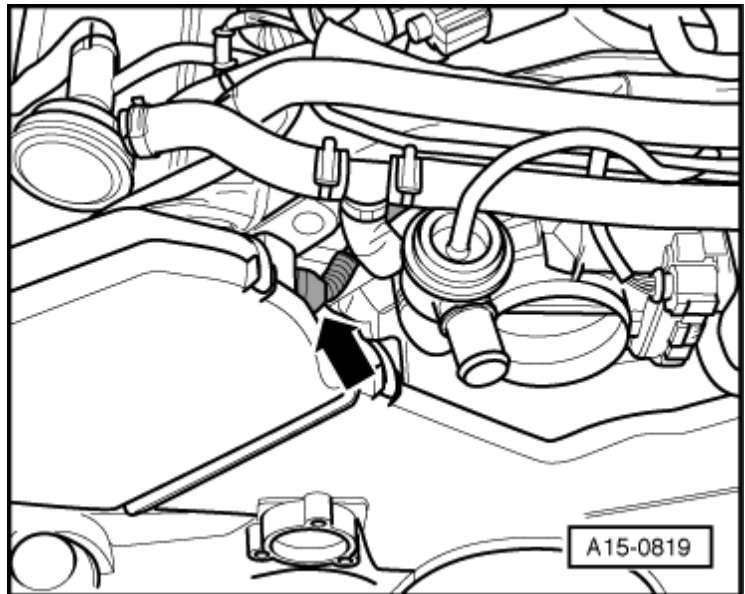
- Remove engine → [Chapter](#).
- Toothed belt, removing → [Chapter](#).
- Remove camshaft gear.



- Remove idler pulley -arrow-.
- Remove bolts -1- and -2- and remove toothed belt guard at rear.



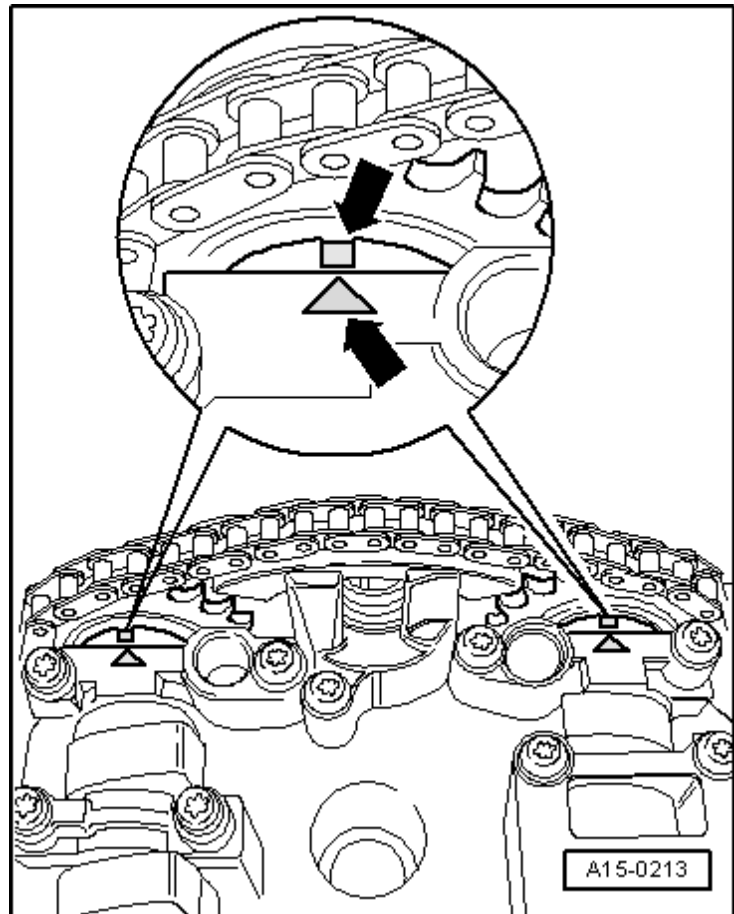
- Disconnect electrical harness connector - arrow- at Camshaft Position (CMP) Sensor - G40-.
- Remove housing for Hall sensor.
- Remove washer and cover for Hall sensor.
- Disconnect electrical harness connector at camshaft adjustment solenoid valve.
- Remove right cylinder head cover → Chapter.
- Rotate crankshaft at mounting bolt for toothed belt sprocket counterclockwise approximately 45° so that no pistons stand at TDC.



- Verify camshaft TDC position again:
 - ♦ The two camshaft markings must align with both arrows on bearing caps.

When reusing old drive chain:

- Clean drive chain and camshaft chain sprockets across from both arrows on the bearing caps and mark installed position with a color marking.

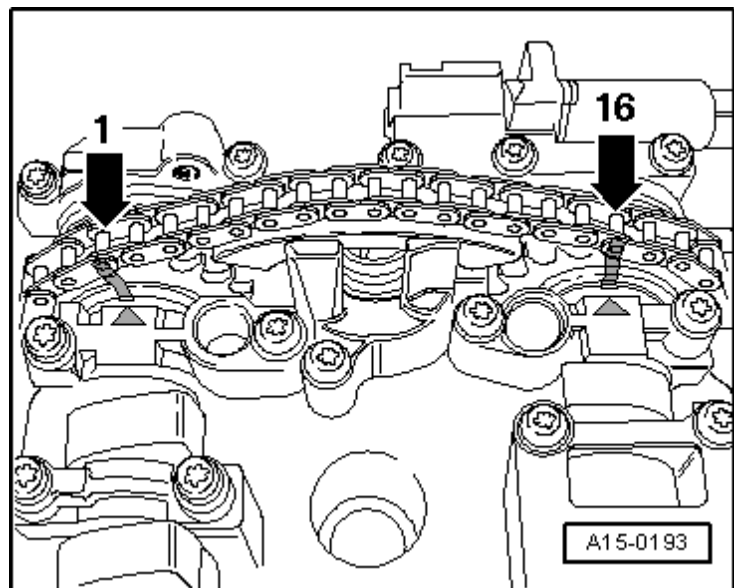


- ♦ The distance between both arrows or colored markings consists of 16 rollers of the drive chain.
- ♦ The notch on intake camshaft is slightly offset inward toward drive chain roller -16-.

**Note**

Do not mark chain using a center punch or similar means!

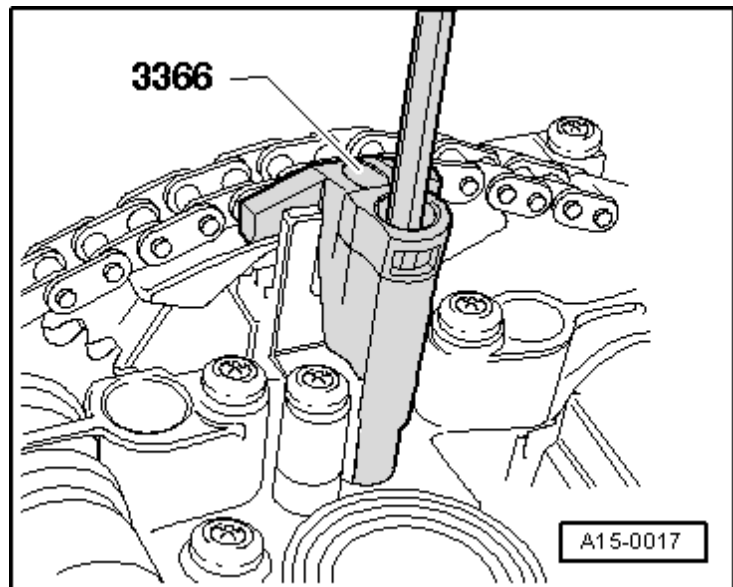
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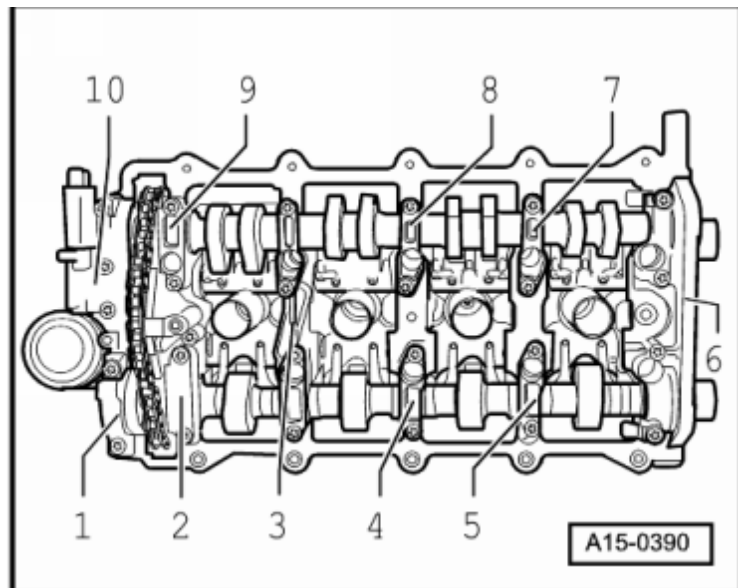
- Secure camshaft adjuster using Bracket For Chain Adjustment -3366-.

**Note**

If the chain tensioner retainer is fastened too tightly, the camshaft adjuster can be damaged.

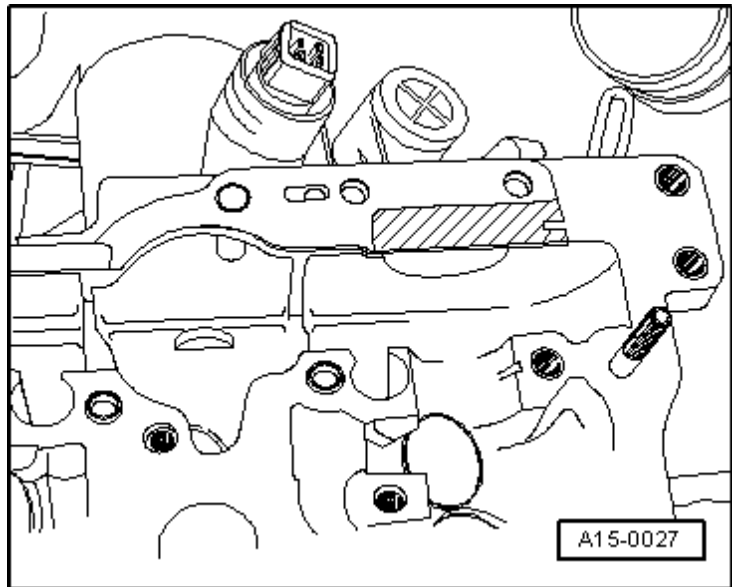


- Independent of the existing markings on the bearing caps, mark the sequence and installation position on all bearing caps, as shown in the illustration.
- For marking, clean bearing cap and use waterproof felt pen.
- Remove mounting bolts of camshaft adjuster-10-.
- Remove bearing cap 1.
- Remove bearing caps 2, 4, 6, 8 and 9 and lay on a clean surface in the corresponding sequence.
- Alternating in diagonal sequence, loosen bearing caps 3, 5 and 7 of intake and exhaust camshafts and remove.
- Raise both camshafts with camshaft adjuster.

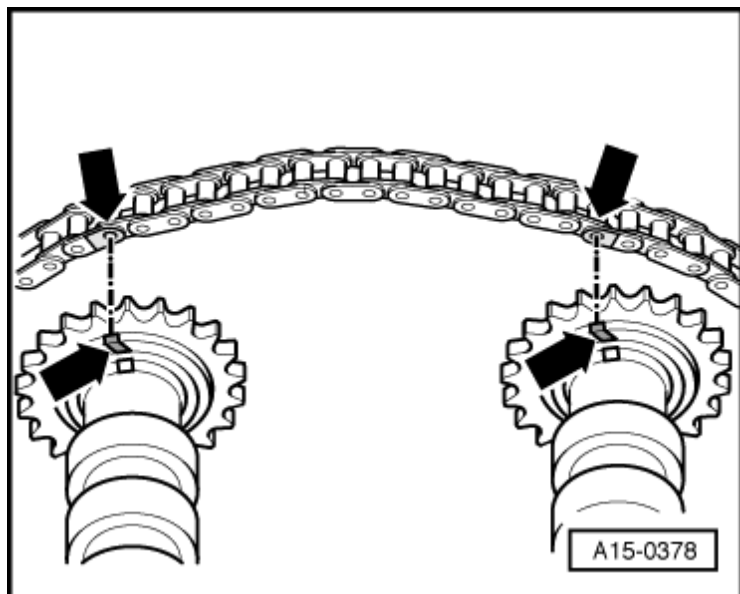


Installing

- Replace bolts for camshaft bearing and camshaft adjuster.
- Replace half-round sealing plugs.
- Remove sealant residue from cylinder head and bearing caps.
- Replace rubber/metal camshaft adjuster gasket and spread thin layer of sealant on hatched surface.
- ♦ Sealant → [Electronic Parts Catalog "ETKA"](#)
- Place drive chain onto camshaft chain sprockets as follows:

When using old drive chain:

- ♦ Align color markings -arrows-.

When using a new drive chain:

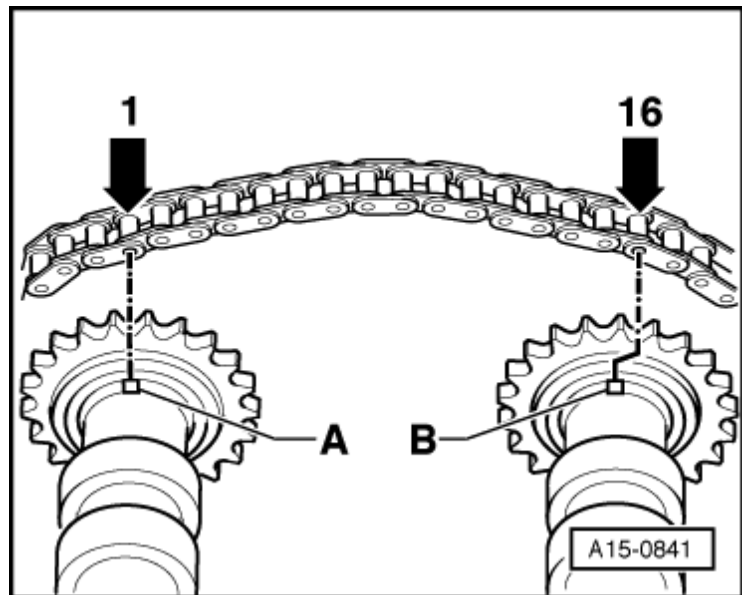
- ♦ Distance between notches -A - and -B- at camshafts must be distance of 16 rollers at drive chain. Illustration shows where first and sixteenth drive chain rollers must be installed on chain gears.
- ♦ Notch -B- is slightly offset inward toward chain roller -16-

Continued:

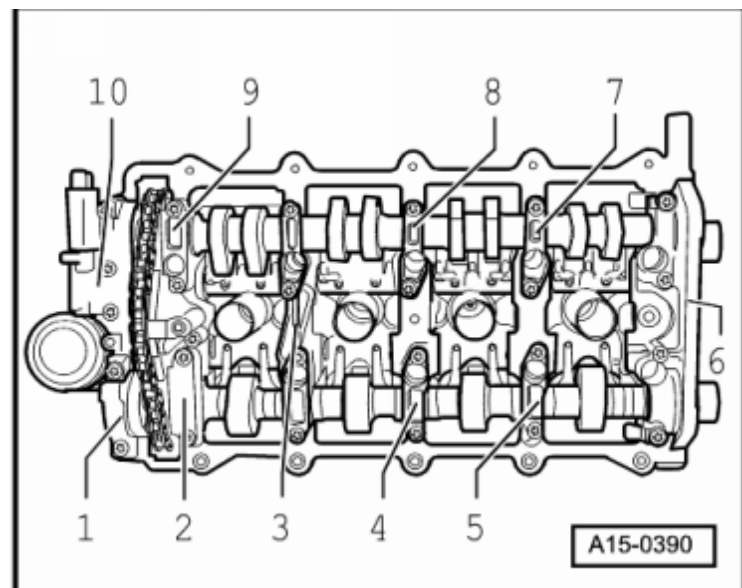
- Slide camshaft adjuster between drive chain (2nd technician needed).
- Install camshafts with drive chain and camshaft adjuster in cylinder head.
- Oil running surfaces of both camshafts.



Alignment bushings for bearing caps and camshaft adjuster must be installed in cylinder head.



- Install bearing caps 3, 5, and 7 according to marking.
- Tighten bearing caps 3, 5 and 7 of intake and exhaust camshafts in alternating diagonal sequence.
- Tighten camshaft adjuster -10-.
- Remove Bracket For Chain Adjustment -3366-.
- Check whether camshafts are correctly adjusted:

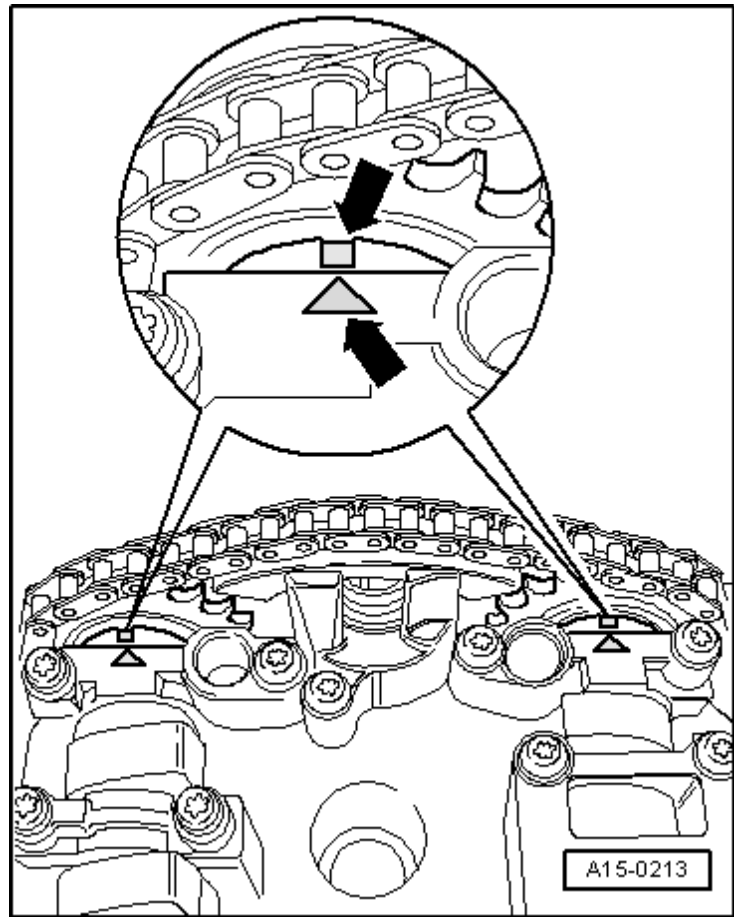


- ♦ The two camshaft markings must align with both arrows on bearing caps -arrows-.



Note

So that both markings line up, turn camshaft slightly back or forth if necessary.



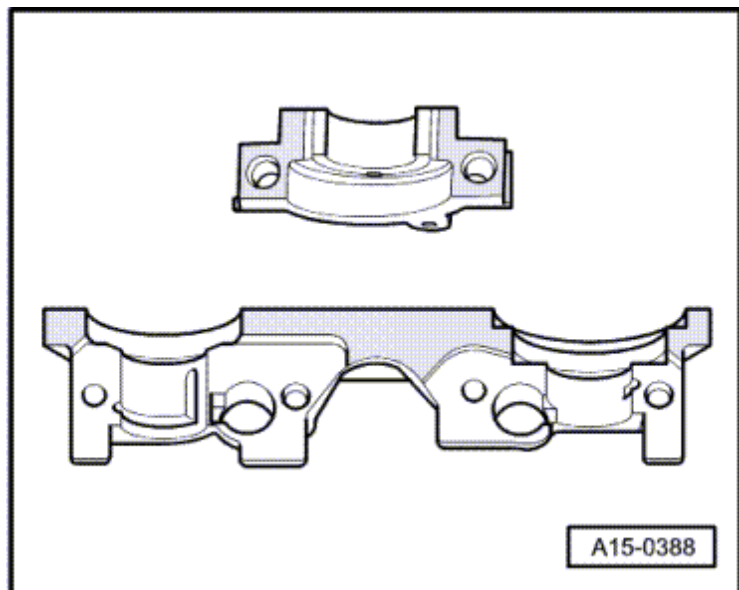
- Lightly coat hatched surface of double bearing cap as well as outer bearing cap next to camshaft adjuster with sealant and install bearing cap.
- ◆ Sealant → [Electronic Parts Catalog “ETKA”](#)
- Install remaining bearing caps.
- Replacing and installing oil seals for intake and exhaust camshafts → [Chapter](#) for Camshaft Position (CMP) sensor → [Chapter](#).
- Carefully drive in cap using retractors -3202-.
- Rotate crankshaft at mounting bolt for toothed belt sprocket clockwise approximately 45° to TDC again and secure crankshaft using locking pin.

Further installation is in reverse order of removal, noting the following:

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



Note



- ♦ *After installing the camshafts, the engine may not be started for approximately 30 minutes. The hydraulic adjusting elements must seat themselves (otherwise the valves will seat themselves on the pistons).*
- ♦ *After working on the valvetrain, carefully rotate engine by hand at least 2 full revolutions to ensure that valves do not strike the pistons when starting.*

Tightening Specifications

Component		Nm
Bearing cap to cylinder head		5 + 90° ¹⁾²⁾
Camshaft adjuster to cylinder head		5 + 90° ¹⁾²⁾
Rear toothed belt cover to	Cylinder Head	10 ³⁾
	Coolant pump	10
Idler roller to cylinder head		22

- ¹⁾ Replace bolt
- ²⁾ 90° corresponds to a quarter turn.
- Insert ³⁾ using locking compound; locking compound
→ [Electronic Parts Catalog "ETKA"](#)