

## Left Camshafts and Camshaft Adjuster, Removing and Installing

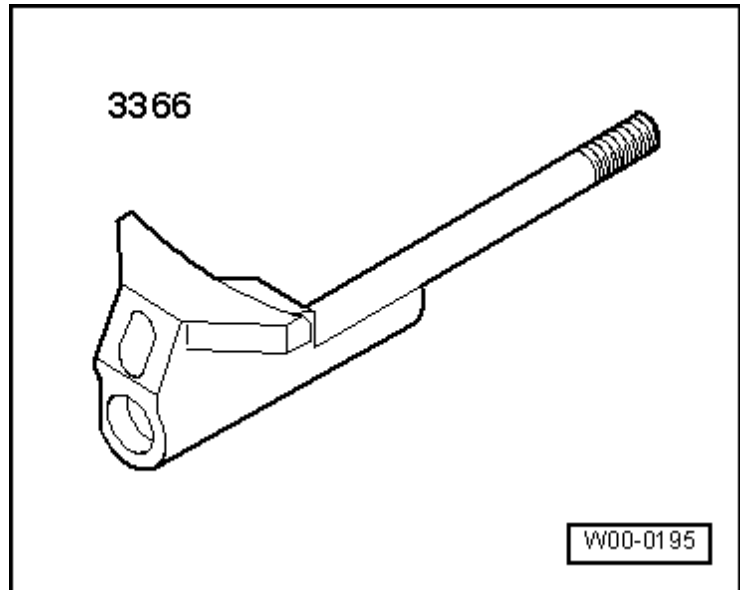


### Note

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

### Special tools and workshop equipment required

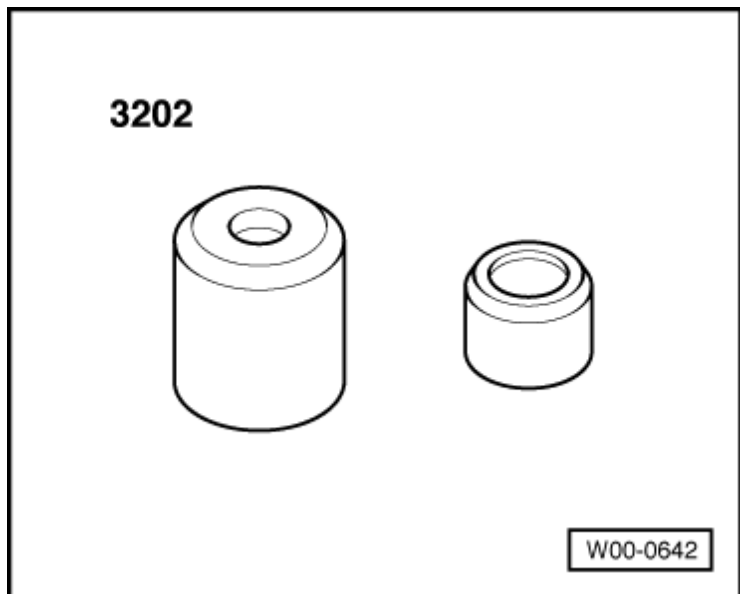
- ◆ Bracket For Chain Adjustment -3366-



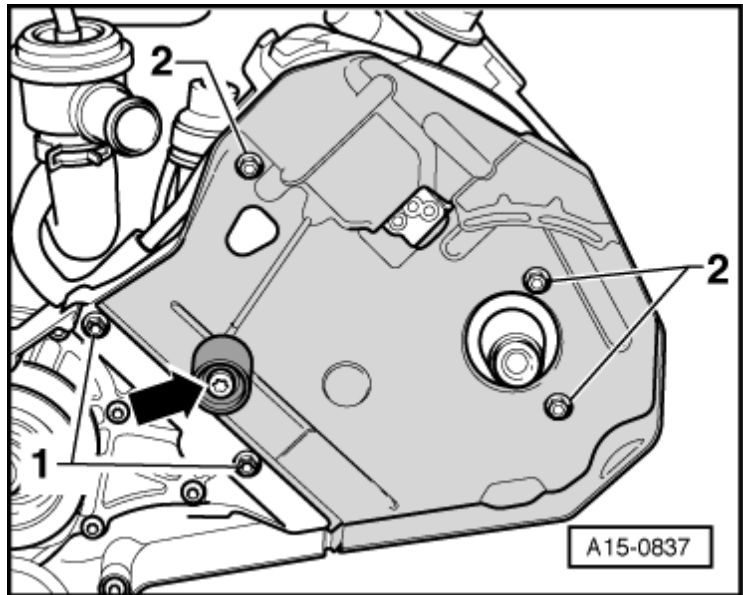
- ◆ Seal installer -3202-
- ◆ Sealant → [Electronic Parts Catalog "ETKA"](#)

### Removing

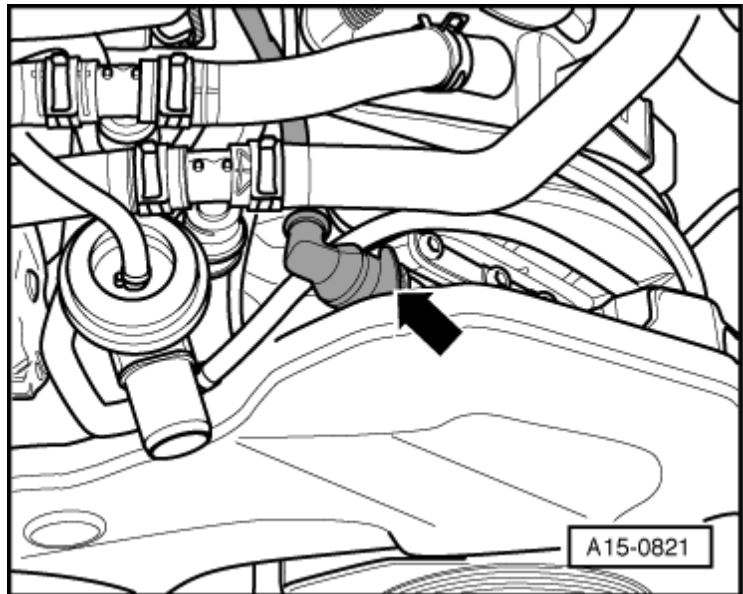
- Engine installed.
- Remove toothed belt from camshaft gears  
→ [Chapter](#).
- Remove camshaft gear.



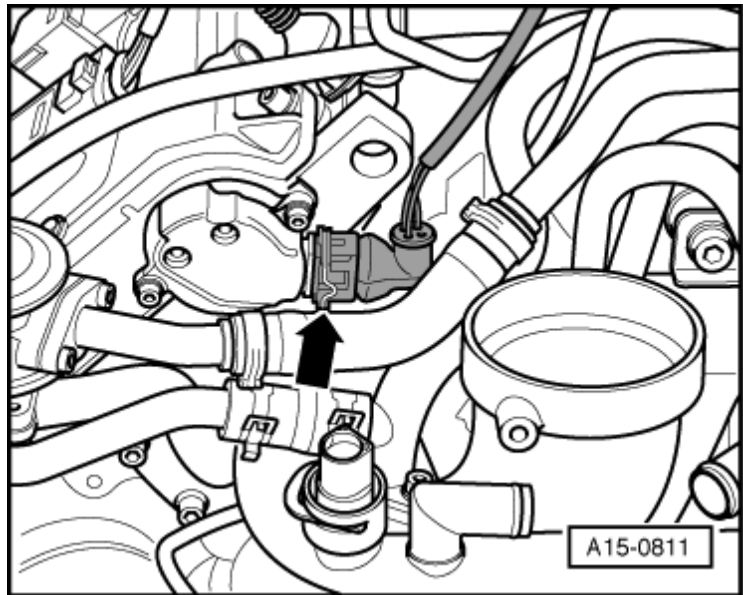
- Loosen nuts -1-.
- Remove idler roller -arrow- if applicable.
- Remove bolts -2- and remove toothed belt cover.



- Disconnect electrical harness connector - arrow- from Camshaft Adjustment Valve 2 - N208-.
- Remove left cylinder head cover → Chapter.



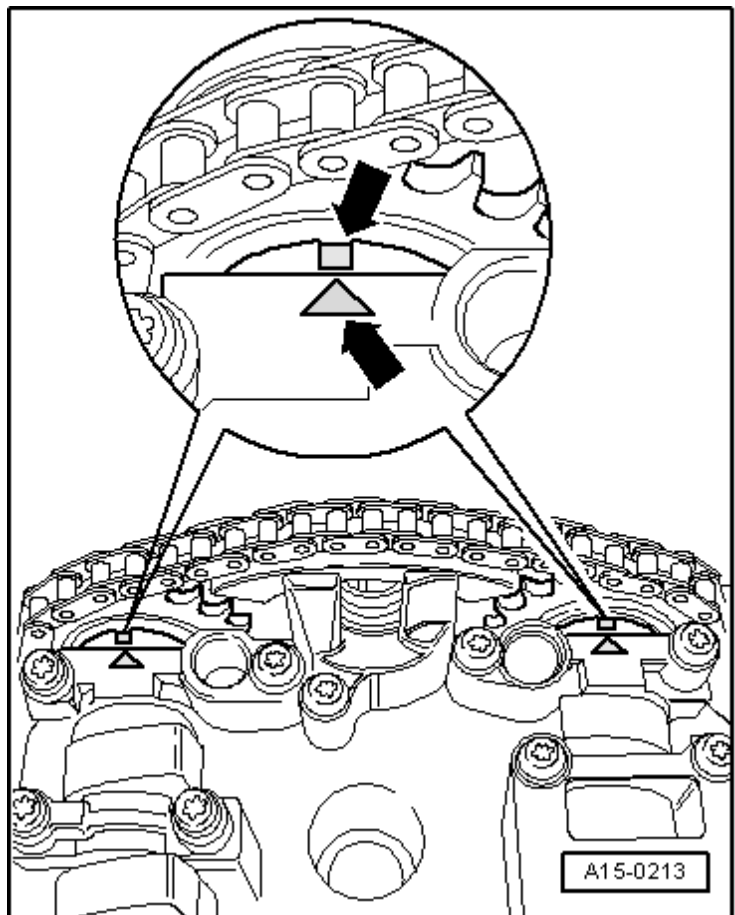
- Disconnect electrical harness connector - arrow- at Camshaft Position (CMP) Sensor 2 - G163-.
- Remove housing for Hall sensor.
- Remove washer and cover for Hall sensor.
- Rotate crankshaft at mounting bolt for toothed belt sprocket counterclockwise approximately 45° so that no pistons stand at TDC.



- 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.



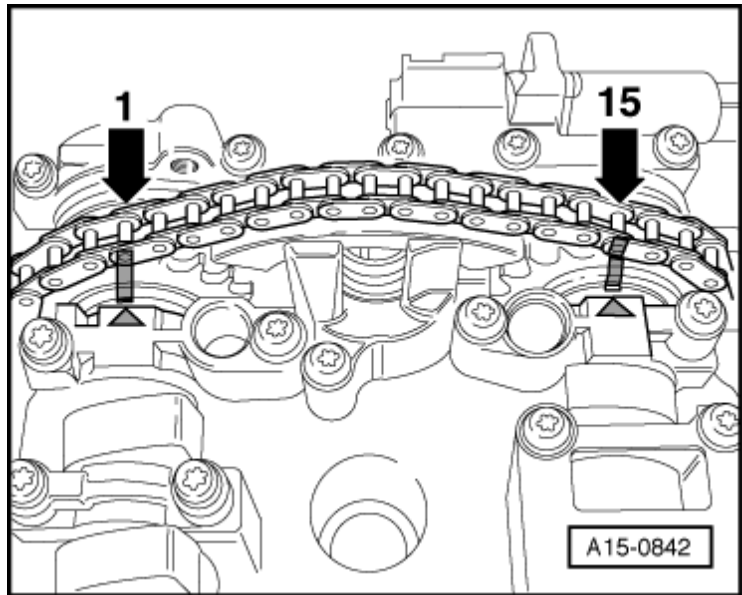
- ♦ The distance between both -arrows- or colored markings consists of 15 rollers of the drive chain.



**Note**

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

Continued:

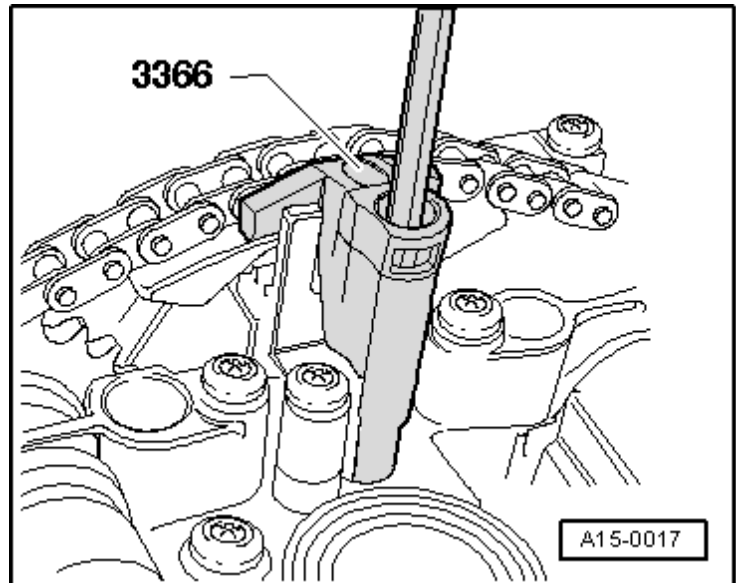


- Secure camshaft adjuster using Bracket For Chain Adjustment -3366-.



**Note**

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



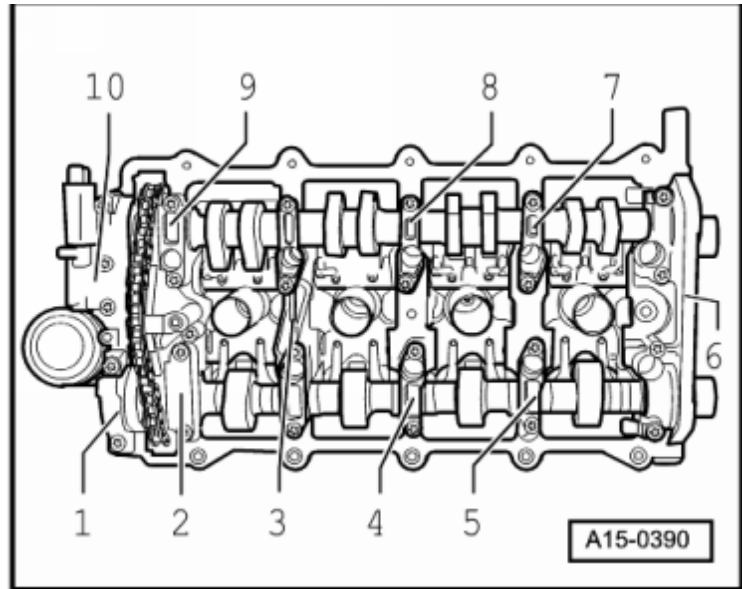
- Independent of the existing markings on the bearing caps, mark the sequence and installation position on all bearing caps, as shown in the illustration.
- For marking, clean bearing cap and use waterproof felt pen.
- Remove mounting bolts of camshaft adjuster-10-.
- Remove bearing cap 1.
- Remove bearing 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.

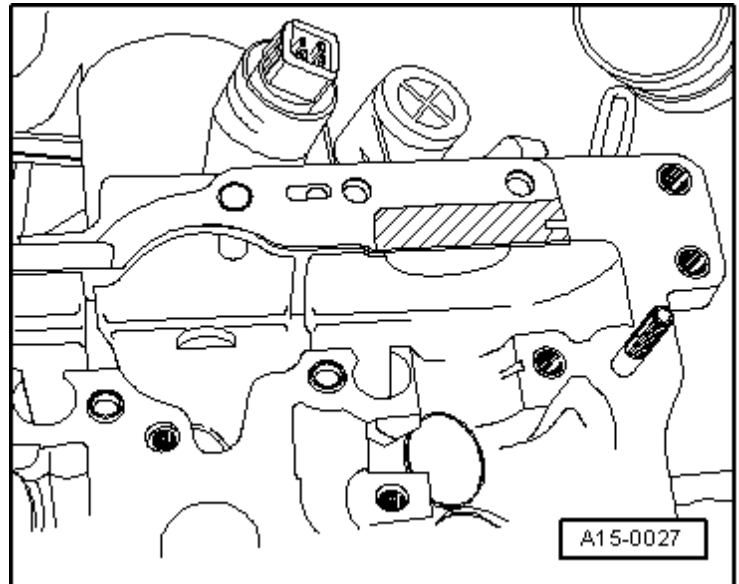
### Installing

- Replace bolts for camshaft bearing and camshaft adjuster.
- Replace half-round sealing plugs.
- Remove sealant residue from cylinder head and bearing caps.



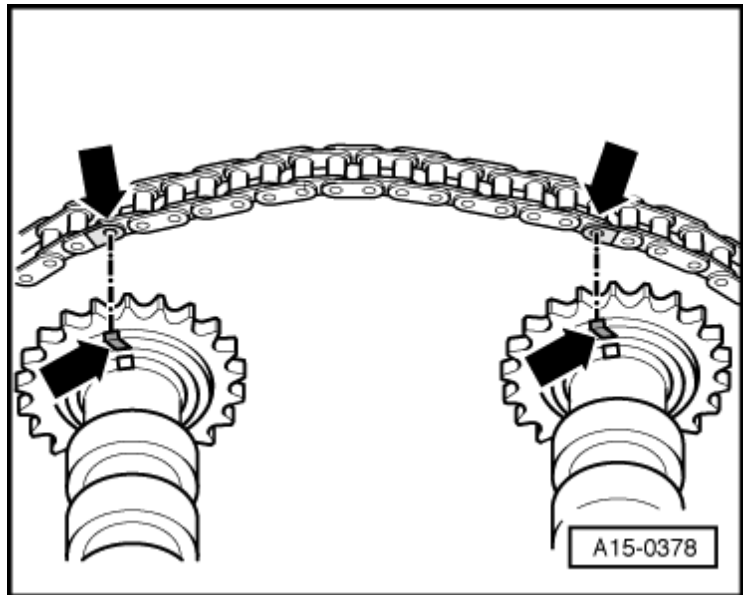
- Replace rubber/metal camshaft adjuster gasket and spread thin layer of sealant on hatched surface.
- ♦ Sealant → [Electronic Parts Catalog "ETKA"](#)
- Place drive chain onto camshaft chain sprockets as follows:

**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 15 rollers at drive chain. Illustration shows where first and fifteenth drive chain rollers must be installed on chain gears.

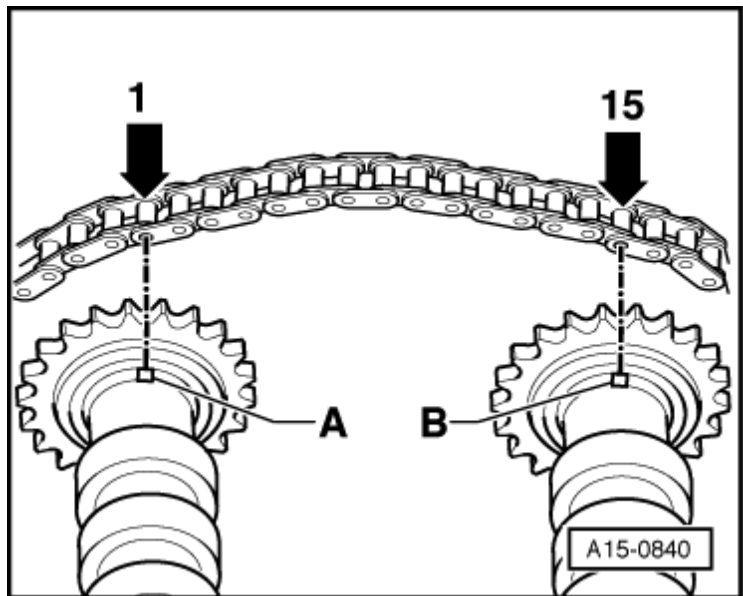
**Continued:**

- 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.



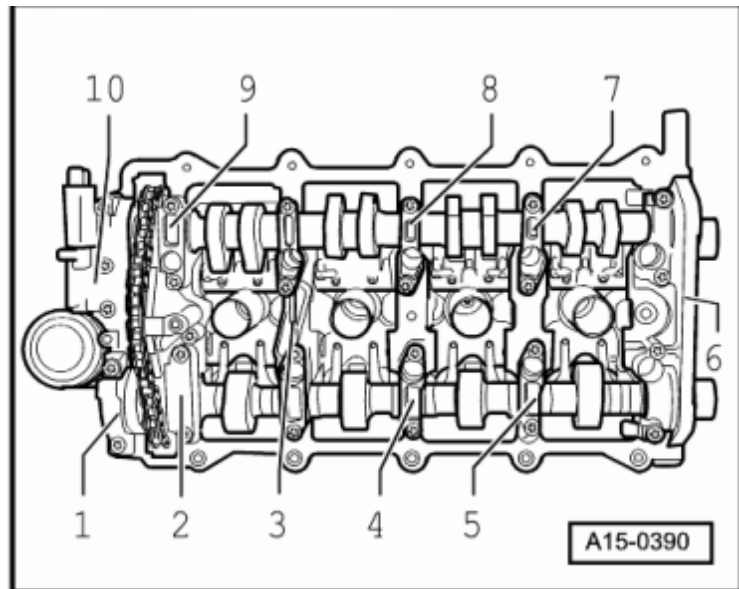
**Note**

*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 Bracket For Chain Adjustment -3366-.
- Check whether the camshafts are correctly adjusted:

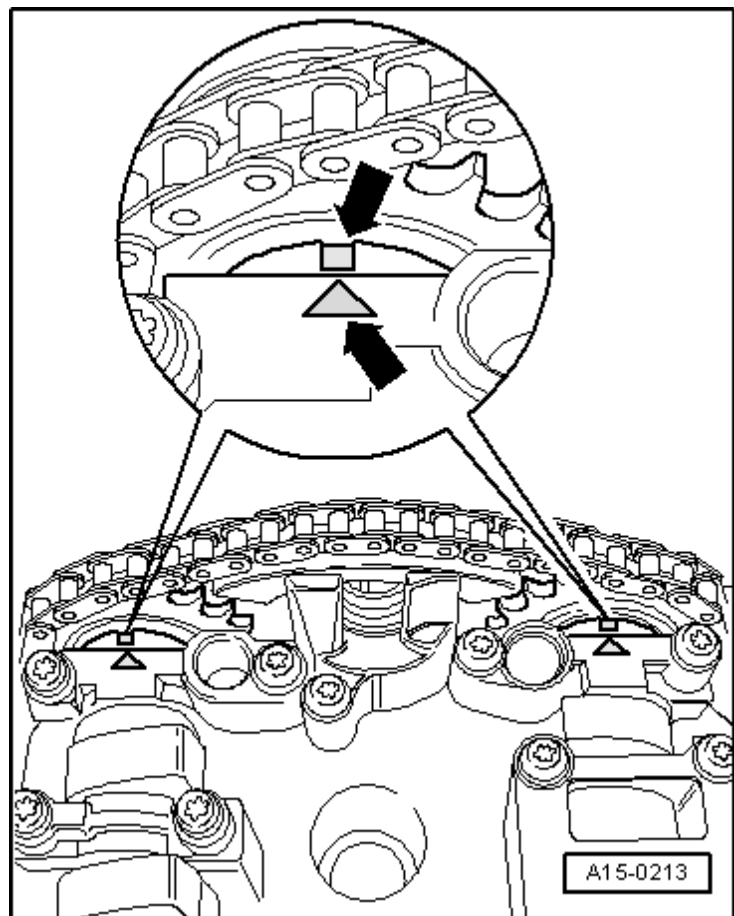




- ◆ The two camshaft markings must align with both arrows on bearing caps -arrows-.

**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.

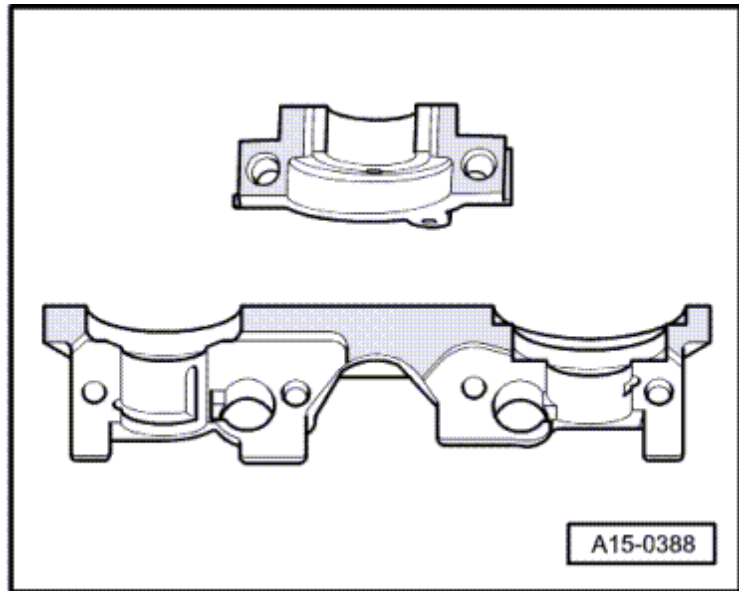
Further installation is in reverse order of removal, noting the following:

- Install toothed belt → **Anchor**.
- Install cylinder head cover → **Chapter**.



#### 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° <sup>1)2)</sup>
Camshaft adjuster to cylinder head		5 + 90° <sup>1)2)</sup>
Toothed belt guard at rear on	Cylinder Head	10 <sup>3)</sup>
	Coolant pump	10
Idler roller to cylinder head		22

- <sup>1)</sup> Replace bolt
- <sup>2)</sup> 90° corresponds to a quarter turn.
- Insert <sup>3)</sup> using locking compound; locking compound  
→ **Electronic Parts Catalog "ETKA"**