

## Camshafts and Camshaft Adjuster, Left Cylinder Head

### Note

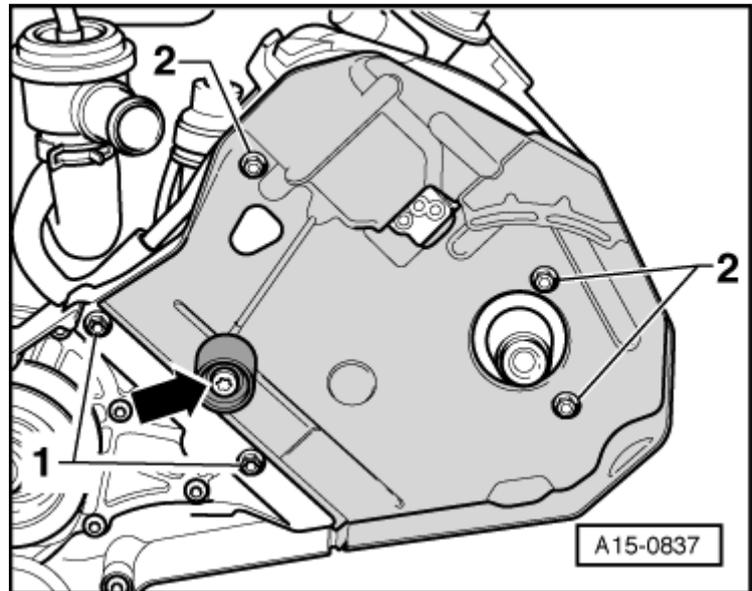
Installation of camshaft drive chain to left and right cylinder heads differ basically. Note different procedures!

### Special tools and workshop equipment required

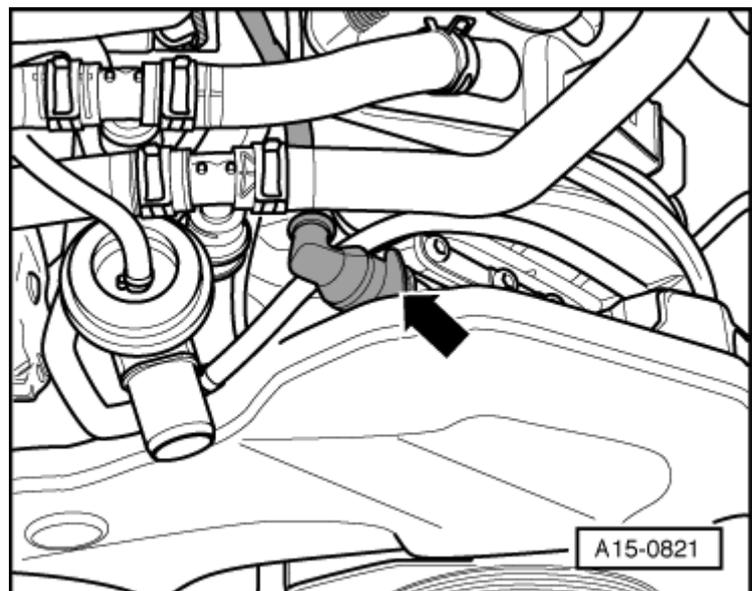
- ◆ Bracket For Chain Adjustment -3366-
- ◆ Sealant, refer to → [Electronic Parts Catalog "ETKA"](#)

### Removing

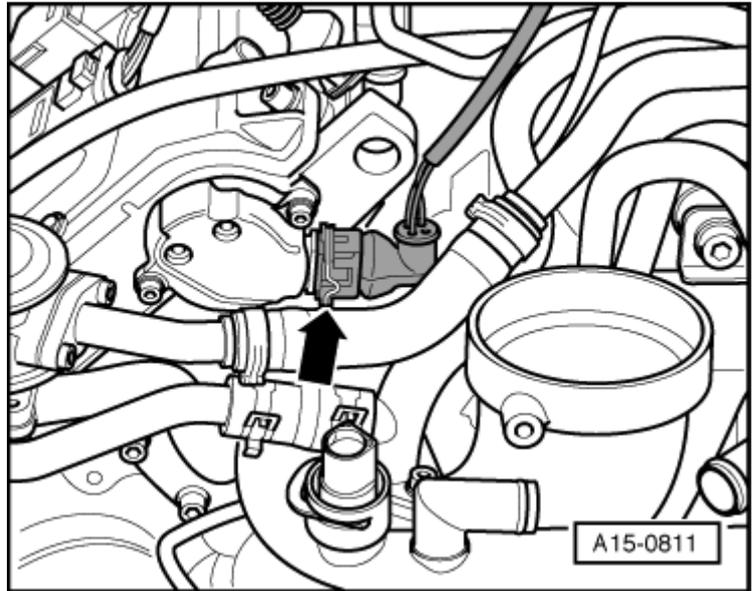
- Engine installed.
- Remove the lock carrier. Refer to → [Chapter „Lock Carrier, Removing“](#).
- Toothed belt, removing. Refer to → [Chapter „Toothed Belt“](#).
- Remove camshaft gear.
- Remove idler pulley -arrow-.
- Loosen nuts -1-.
- Remove the bolts -2- and remove the rear toothed belt guard.



- Disconnect electrical harness connector - arrow- from Camshaft Adjustment Valve 2 -N208-.
- Remove left cylinder head cover. Refer to → [Chapter „Left Cylinder Head Cover“](#).



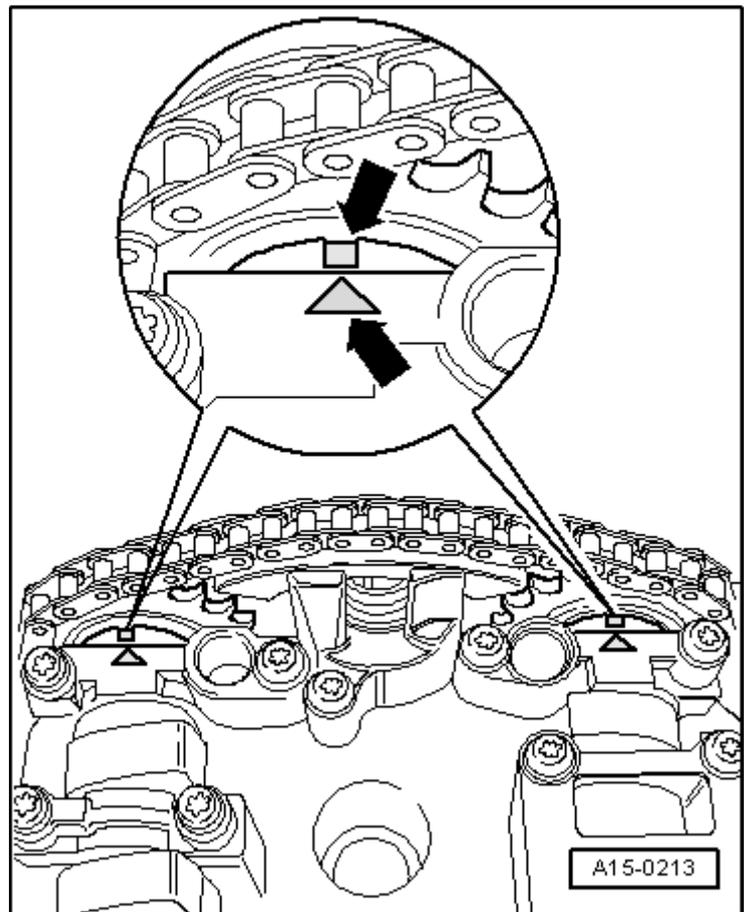
- Disconnect electrical harness connector - arrow- at Camshaft Position (CMP) Sensor 2 -G163-.
- Remove housing for Hall sensor.
- Remove washer and cover for Hall sensor.



- 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 the old drive chain:**

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

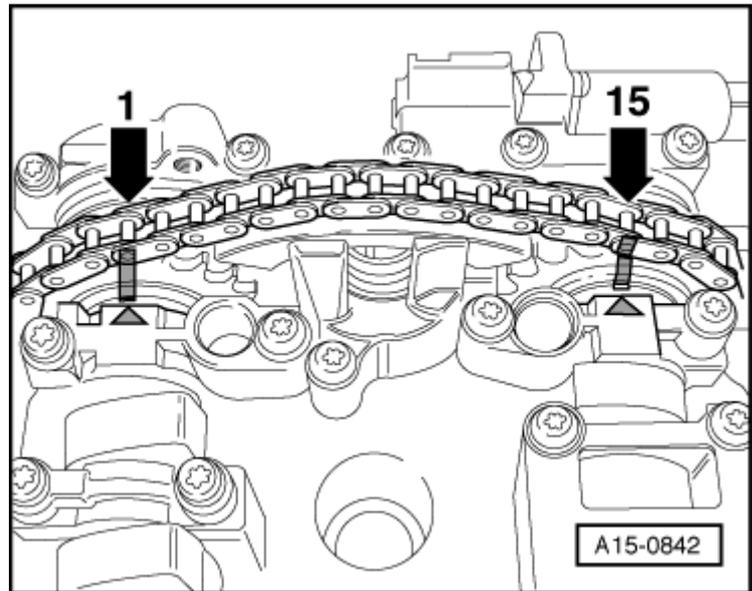


- The distance between both -arrows- or colored markings consists of 15 rollers of the drive chain.

**Note**

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

**Continued:**

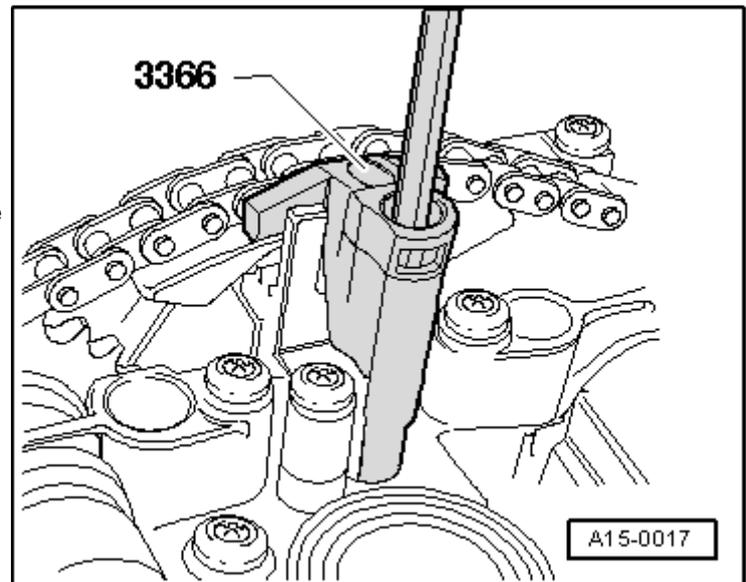


- Secure camshaft adjuster using -3366-

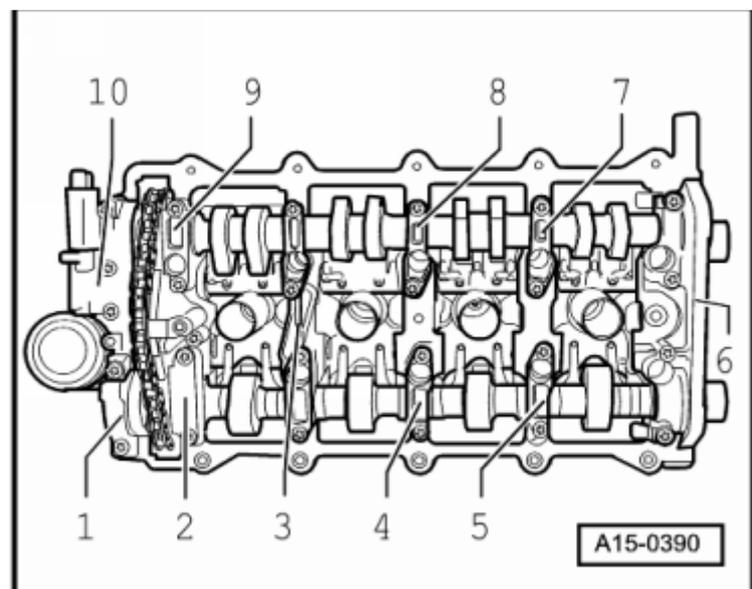
**Note**

*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 illustrated.
- For marking, clean bearing cap and use waterproof felt pen.



- Remove mounting bolts of camshaft adjuster -10-.
- Remove bearing cap -1-.
- Remove the bearing caps -2, 4, 6 and 8- and -9- and lay them on a clean surface in a corresponding sequence.
- First loosen and then remove the bearing caps -3, 5- and -7- for the intake and exhaust camshafts alternating in a diagonal sequence.
- Raise both camshafts with camshaft adjuster.



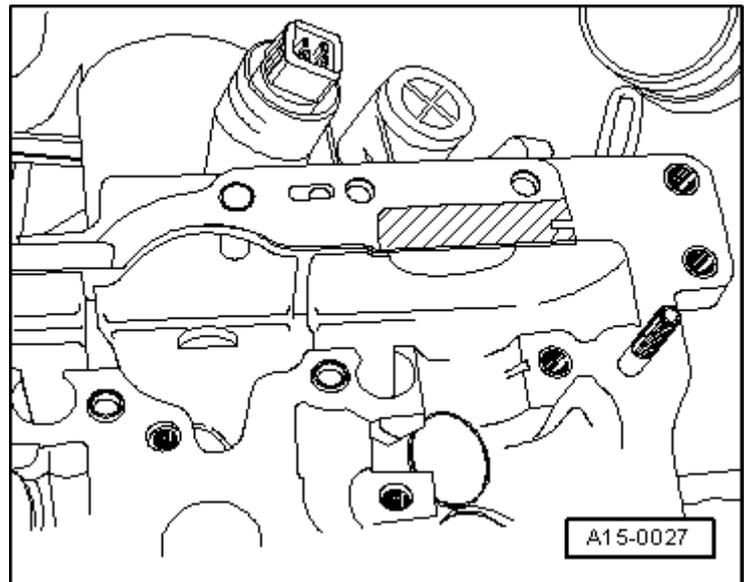
### Installing

- Replace bolts for camshaft bearing and

camshaft adjuster.

- Replace the half-round sealing plugs.
- Remove sealant residue from cylinder head and bearing caps.
- Replace the camshaft adjuster bonded rubber seal and lightly coat the coat hatched surface with sealant; for the correct sealant. Refer to → [Electronic Parts Catalog "ETKA"](#).
- Mount the drive chain onto the camshaft chain sprocket:.

**When using the old drive chain:**

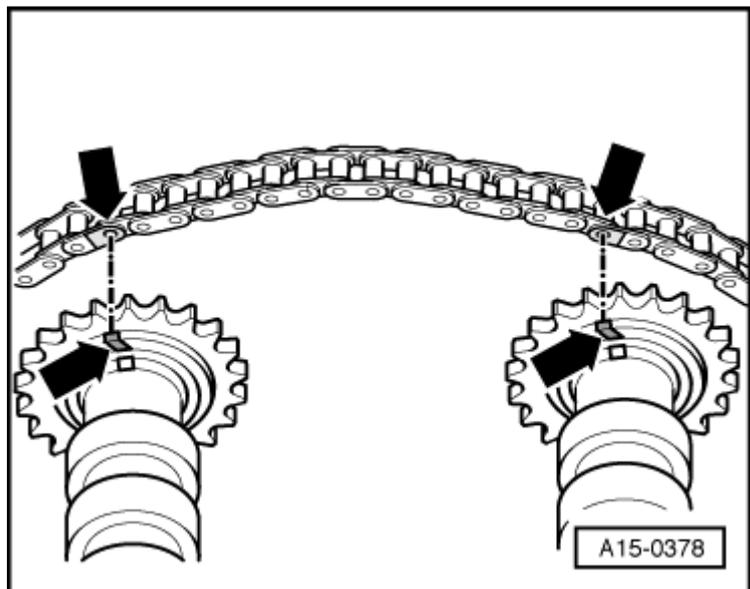


- Align color markings -arrows-.

**When using a new drive chain:**

**⚠ Caution**

- ◆ *The number of rollers given only serves an aid when positioning the chain on the camshaft.*
- ◆ *When positioning the camshafts (with chain) in the cylinder head, make sure the arrows on the bearing caps and the notches on the camshafts align → **Anchor**.*



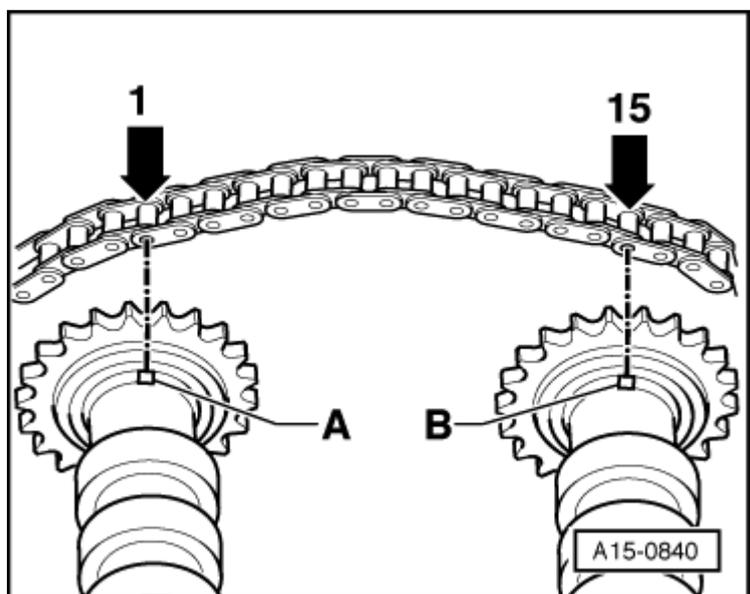
- Distance between notches -A - and -B- at camshafts must be distance of 15 rollers at drive chain. Illustration shows where first and fifteenth drive chain rollers must be installed on chain gears.

**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.

**i Note**

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

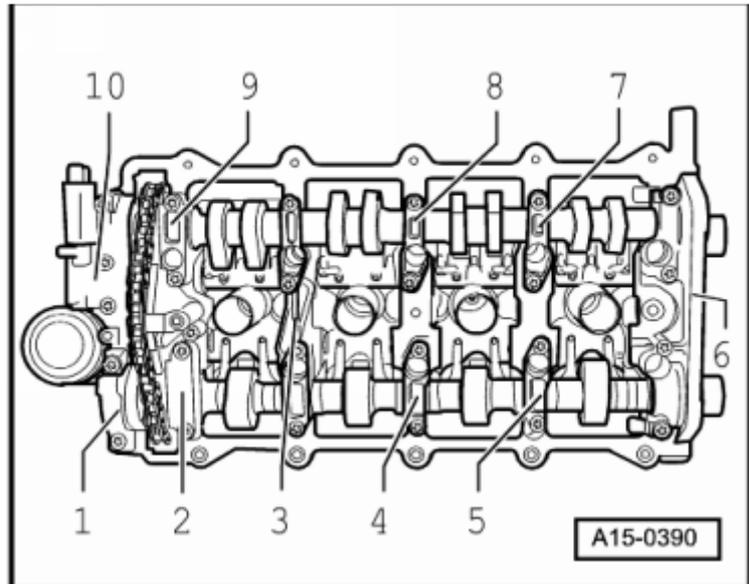


- Install the bearing caps -3, 5- and -7- according to the marking.

- Tighten the bearing caps -3, 5- and -7- on the intake and exhaust camshafts alternating in a diagonal sequence.
- Tighten camshaft adjuster -10-.
- Remove -3366-.

**Verification:**

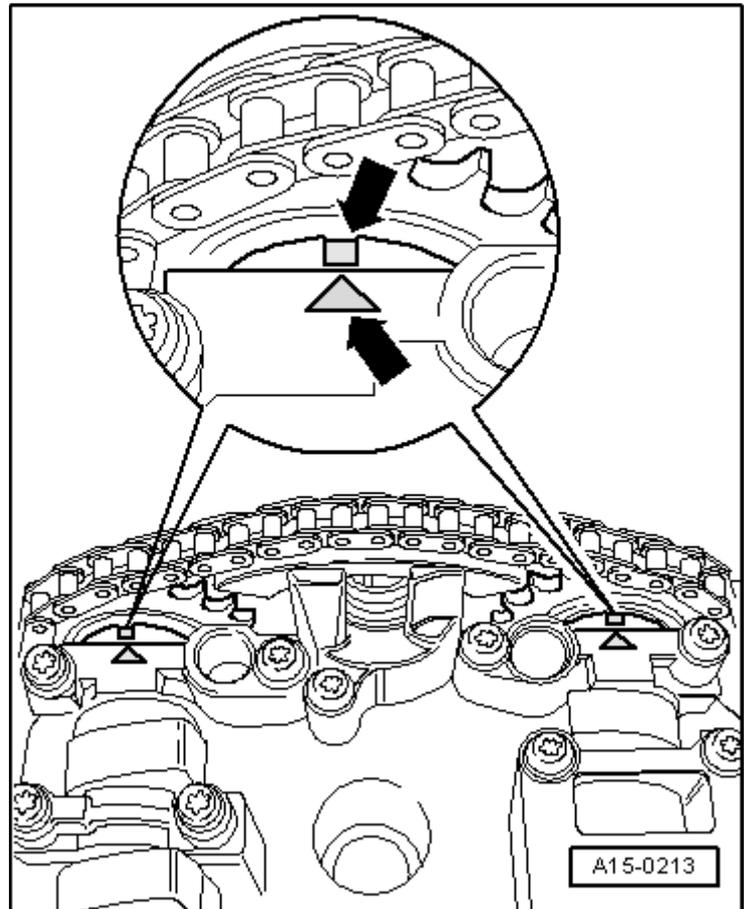
- Check whether the camshafts are correctly adjusted:



- 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 the bearing cap. Refer to → [Electronic Parts Catalog "ETKA"](#).
- Install remaining bearing caps.
- Replace the seals on the intake and exhaust camshafts. For installing refer to → [Chapter „Camshaft Seals“](#) and → [Chapter „Camshaft Position Sensor Gasket“](#).

- Carefully install the cover with a lever.
- Rotate crankshaft at mounting bolt for toothed belt sprocket clockwise approximately 45° to TDC again and secure crankshaft using locking pin.

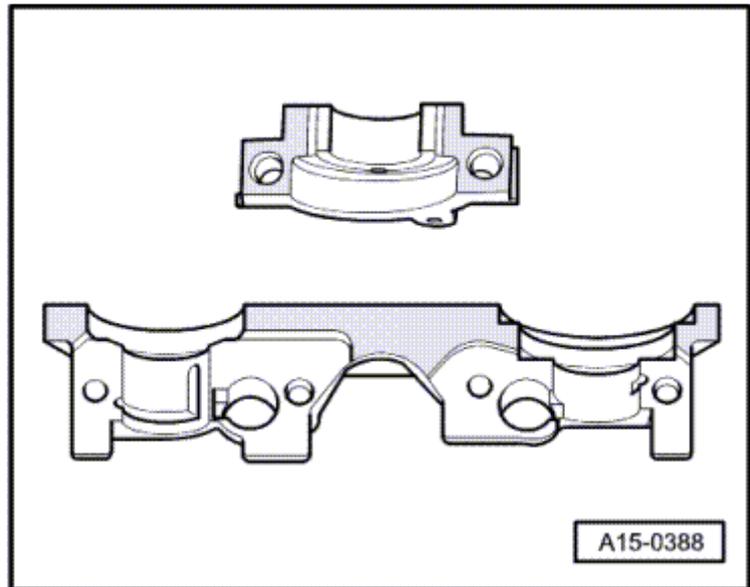
Further installation is performed in reverse order of removal, note the following:

- Install toothed belt (adjust timing)  
→ **Anchor**.
- Install cylinder head cover → **Anchor**.



#### 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.
- Install lock carrier with attachments. Refer to → **Body Exterior; Rep. Gr.50**.
- Install front bumper. Refer to → **Body Exterior; Rep. Gr.63**.
- Install air filter housing → **Anchor**.
- Fill with coolant. Refer to → **Anchor**.
- Adjust headlamps. Refer to → **Electrical Equipment; Rep. Gr.94**.



#### Tightening Specifications

Component	Nm
Bearing Cap to Cylinder Head	5 + 90° → Note → Note
Camshaft Adjuster to Cylinder Head	5 + 90° → Note → Note
Rear Toothed Belt Guard to	
Cylinder Head	10 → Note
Coolant pump	10
Idler Roller to Cylinder Head	22

- 1) Replace bolts.
- 2) 90° corresponds to a 1/4 turn
- 3) Insert using locking compound; locking compound . Refer to → **Electronic Parts Catalog "ETKA"**.