

Camshafts and Camshaft Adjuster, Right Cylinder Head



Note

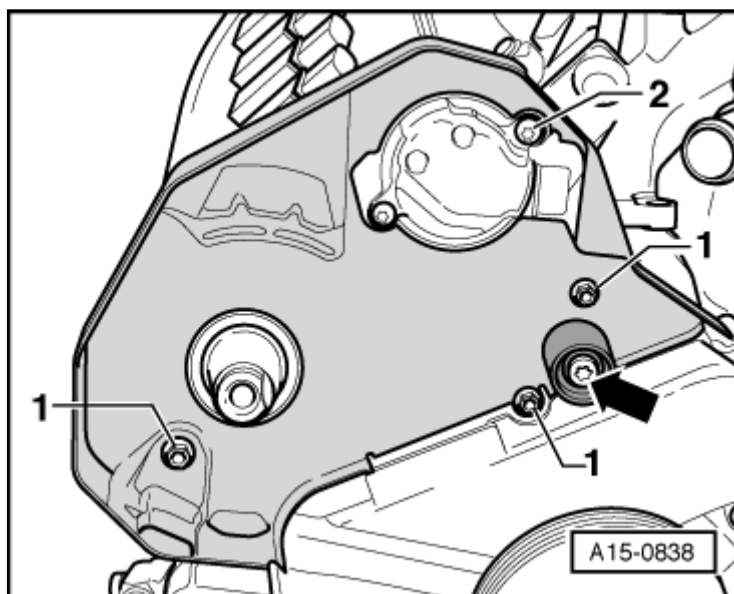
Installation of camshaft drive chain to left and right cylinder heads differ basically. Note different procedures!

Special tools and workshop equipment required

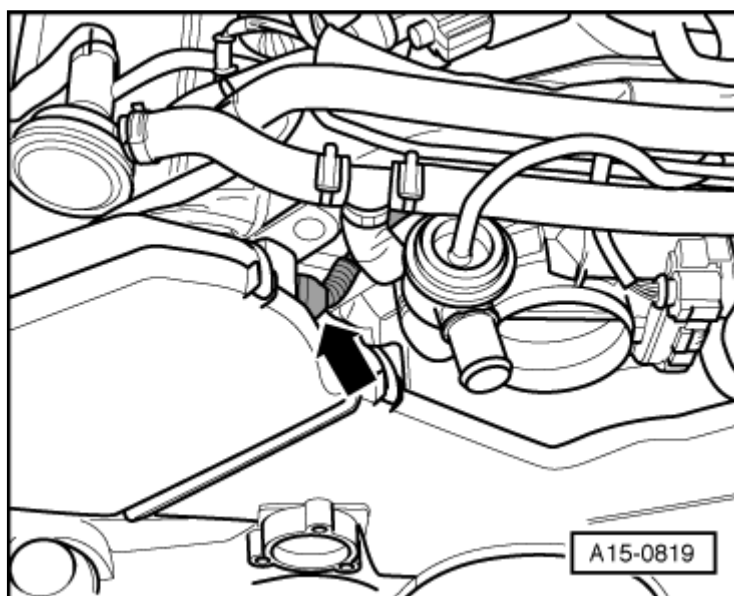
- ♦ Chain Tensioner Retainer -3366-
- ♦ Sealant. Refer to → [Electronic Parts Catalog "ETKA"](#)

Removing

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



- Disconnect electrical harness connector - arrow- at Camshaft Position (CMP) Sensor -G40-.
- Remove housing for Hall sensor.
- Remove washer and cover for Hall sensor.

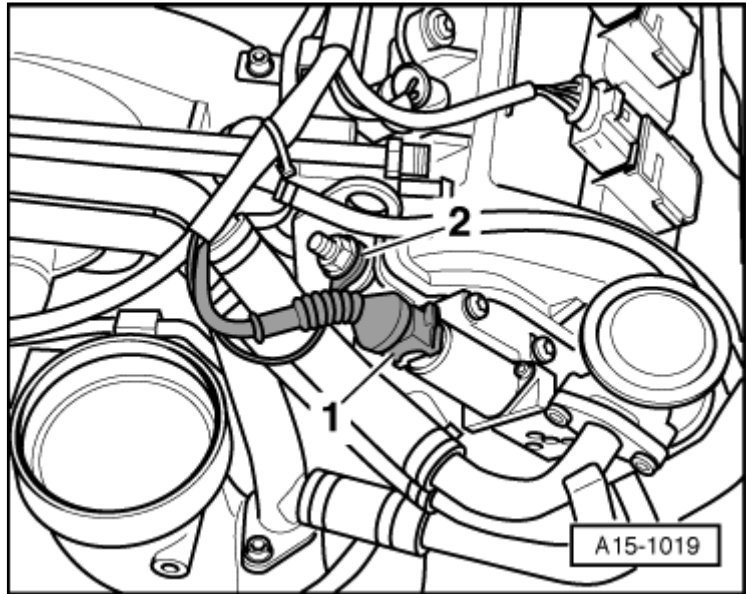


- Disconnect the camshaft adjustment solenoid valve connector -1-.

Note

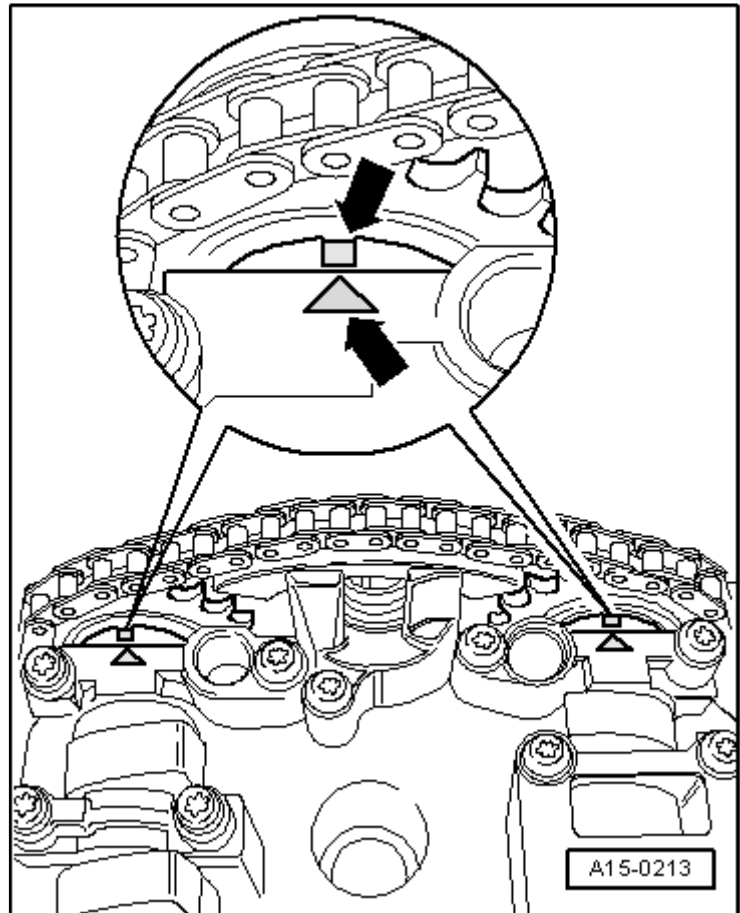
Ignore -2-.

- Remove right cylinder head cover. Refer to → Chapter „Right Cylinder Head Cover“.



- Rotate crankshaft at mounting bolt for toothed belt sprocket counterclockwise approximately 45° so that no pistons stand at TDC.
- Verify camshaft TDC position again:
 - Both markings on the camshafts must align with both markings -arrows- on the bearing caps.

When reusing the old drive chain:

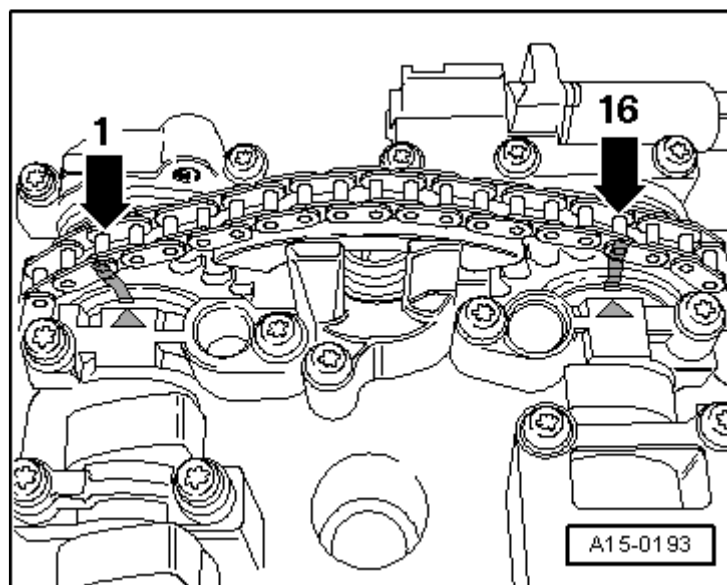


- Clean the drive chain and camshaft chain sprockets across from both -arrows- on the bearing caps and mark installed position with a color marking.
- The distance between both -arrows- or colored markings consists of 16 rollers of the drive chain.
- The notch on intake camshaft is slightly offset inward toward drive chain roller -16-.

Note

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

Continued:

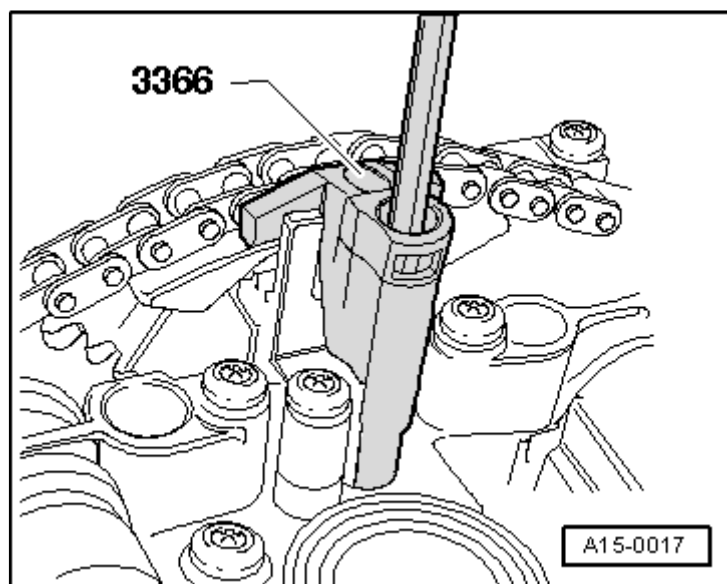


- Secure camshaft adjuster using -3366-.

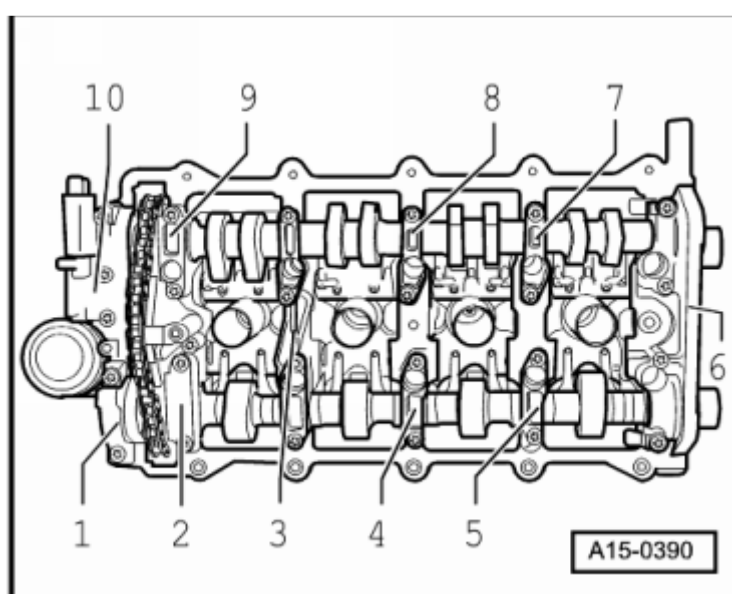
Note

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 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 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:

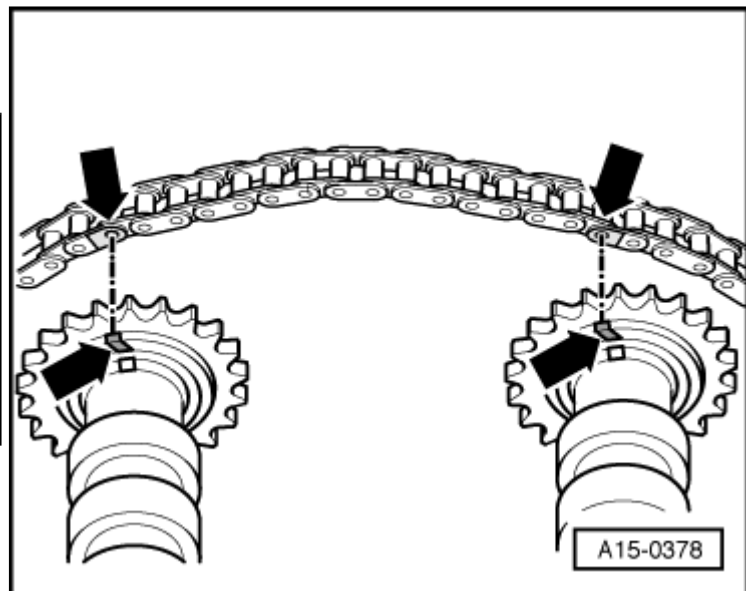
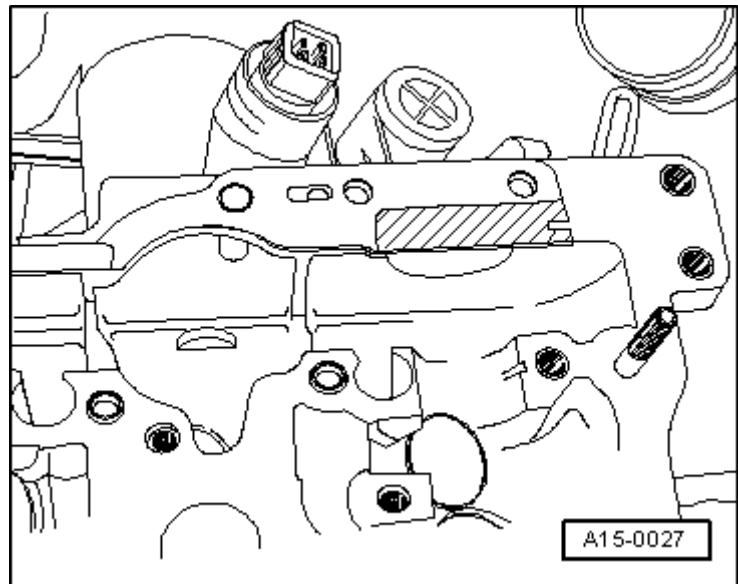
When using the old drive chain:

- Align color markings -arrows-.

When using a new drive chain:

⚠ Caution

- ♦ *The number of rollers given only serves as 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 16 rollers at drive chain. Illustration shows where first and sixteenth drive chain rollers must be installed on chain gears.
- The notch -B- is slightly offset inward toward chain roller -16-.

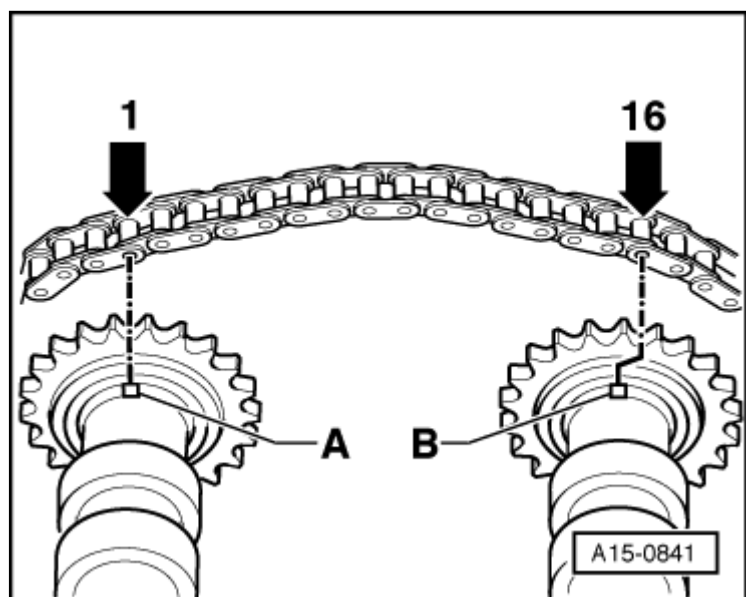
Continued:

- 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.



Note

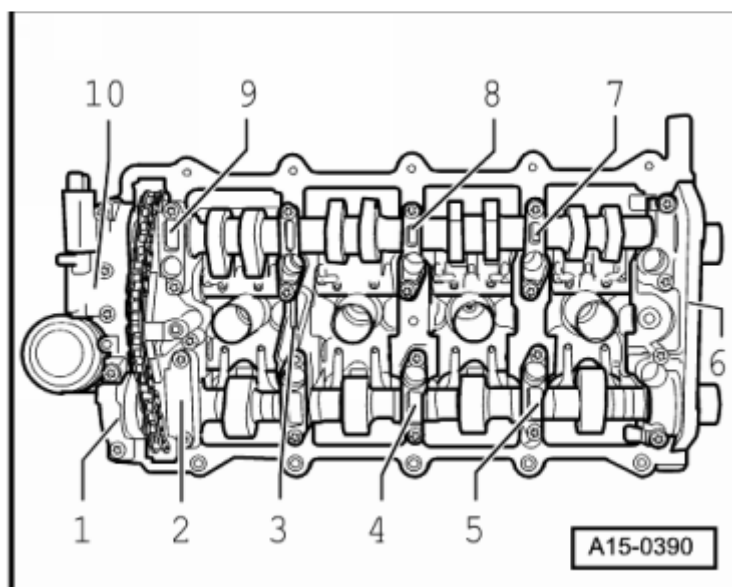
Alignment bushings for bearing caps and camshaft adjuster must be installed in cylinder head.



- 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:

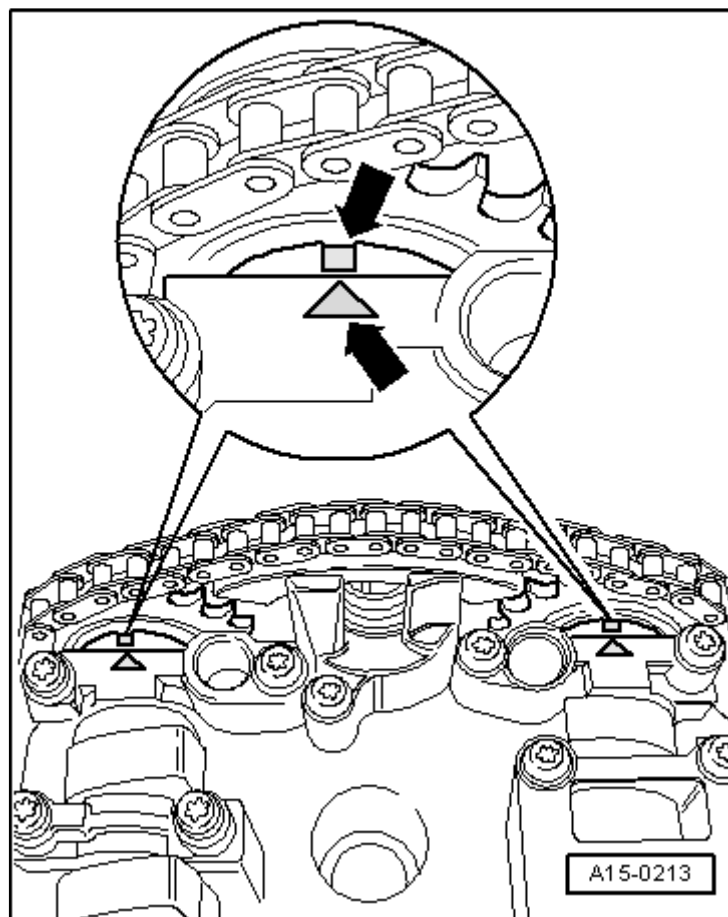


- The two camshaft markings must align with both arrows on bearing caps -arrows-.



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 bearing cap. For the correct sealant. 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“.

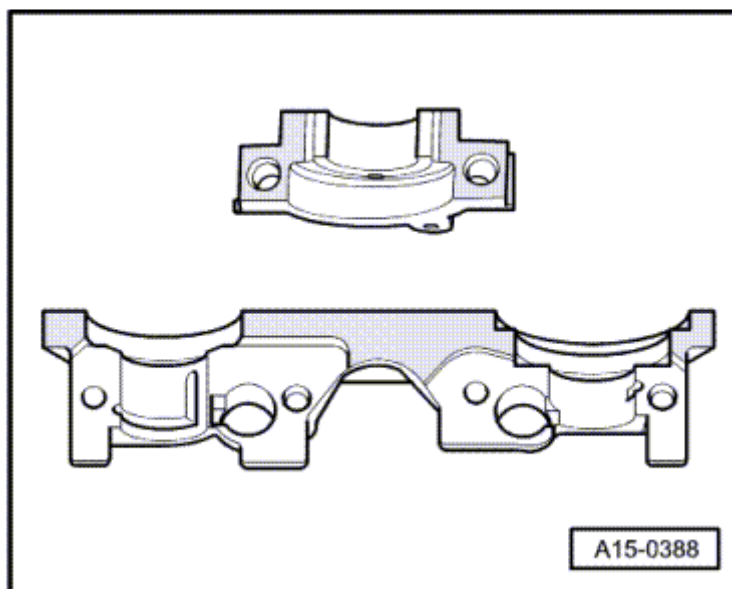
- Carefully install the cover with a lever.
- Rotate crankshaft at mounting bolt for toothed belt sprocket clockwise approximately 45° to TDC again and secure crankshaft using locking pin.

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

- Install toothed belt (adjust timing)
→ **Anchor**.
- Install cylinder head cover → **Anchor**.
- Install engine → **Chapter „Engine, Installing“**.

**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° → 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"**.