Camshaft Timing Chain

Special tools, testers and auxiliary items required

- Locking pin (3242)
- Trim removal wedge (3409) (2x)
- Old oil collecting and extracting device (V.A.G 1782)
- Multi-point socket (T10035)
- Camshaft locator (T40046) (qty. 2)
- Setting gauge (T40047)
- Old oil collecting and extracting device (V.A.G 1782)
- Wrench (T40049)
- Drill bit 3.3 mm dia. (2x)

Removing

- Place old oil collecting and extracting device (V.A.G 1782) under engine and drain engine oil.
- Remove covers for timing chains. Refer to => [Timing Chain Covers] See: Timing Cover\Service and Repair\Timing Chain Covers.
- Install key (T40049) at rear on crankshaft e.g. using 2 old bolts for dual-mass flywheel.
- Rotate crankshaft in direction of engine rotation - arrow - to TDC ignition timing.

- Slits - arrows - at front in camshafts must stand parallel at same height with upper edge of cylinder head.

- Rotate camshafts at hex head slightly back or forth if necessary so that camshaft locator (T40046) can be inserted.
• If camshaft locator (T40046) cannot be inserted, rotate crankshaft 1 rotation (360°) further.
• Remove camshaft locator (T40046) again.
• Remove drain plug from upper section of oil pan.
• Install crankshaft holder (3242) in the hole (20 Nm). Rotate the camshaft back and forth slightly if necessary to completely center the holder.

• Push glide track of chain tensioner for left timing chain in direction of - arrow - and pull off chain tensioner using a drill bit 3.3 mm in dia. - 1 -.
- Mark running direction of left timing chain with paint.
- Remove bolts - 1 - and - 2 - for camshaft chain sprocket or camshaft adjuster using multipoint socket (T10035).

- Remove camshaft chain sprocket, camshaft adjuster and timing chain.
- Push glide track of chain tensioner for right timing chain in direction of - arrow - and pull off chain tensioner using a drill bit 3.3 mm in dia - 1 -.
- Mark running direction of right timing chain with paint.
- Remove bolts - 1 - and - 2 - for camshaft chain sprocket or camshaft adjuster using multipoint socket (T10035).

- Remove camshaft chain sprocket, camshaft adjuster and timing chain.

**Installing**

- Secure crankshaft in TDC position using crankshaft holder (3242).
- Drive chain for timing mechanism installed. Refer to => [ Timing Mechanism Drive Chain ] See: Timing Mechanism Drive Chain.

- Always replace bolts that are tightened to torque as well as O-rings and gaskets.

- When turning camshaft, crankshaft must not be at TDC for any cylinder. Valves and/or pistons may be damaged.

  - Rotate inner part and outer part of both camshaft adjusters against each other up to lock position - arrows -.

- Inner part and outer part must not be able to be against each other in lock position (slight play can still be felt).

  - Check whether camshafts of both cylinder heads stand in TDC position.

- Slits - arrows - at front in camshafts must stand parallel at same height with upper edge of cylinder head.
• Insert **camshaft** locator (T40046) into camshafts of left cylinder head, to do so rotate camshafts back or forth at hex head if necessary.

• Insert **camshaft** locator (T40046) into camshafts of right cylinder head, to do so rotate camshafts back or forth at hex head if necessary.
- Replace all four camshaft bolts.
- Assemble left timing chain with chain sprocket and camshaft adjuster.
- Loosely screw in bolts - 1 - and - 2 -.

- Chain sprocket and camshaft adjuster must be able to still be rotated on camshaft and must not tip.

- Assemble right timing chain with chain sprocket and camshaft adjuster.
- Loosely screw in bolts - 1 - and - 2 -.
Chain sprocket and camshaft adjuster must be able to still be rotated on camshaft and must not tip.

- Remove crankshaft holder (3242).

- Using key (T40049), rotate crankshaft approximately 30° in opposite direction of engine rotation - arrow -.
• Pull drill out of alignment hole, which loosens the left chain tensioner.
• Insert trim removal wedge (3409) as shown in illustration and bring chain tensioner into contact with trim removal wedge (3409).

• Lightly pressing in an extra 0.5 mm is permitted.

• Pull drill out of alignment hole, which loosens the right chain tensioner.
• Insert trim removal wedge (3409) as shown in illustration and bring chain tensioner into contact with trim removal wedge (3409).
- Lightly pressing in an extra 0.5 mm is permitted.

- Using key (T40049), rotate **crankshaft** in direction of engine rotation - **arrow** - to TDC ignition timing.

- If rotated unintentionally beyond TDC, turn back **crankshaft** again approximately 30° and set to TDC again.

  - Install the **crankshaft** holder (3242) in the hole (20 Nm). Rotate the **camshaft** back and forth slightly if necessary to completely center the holder.
- Tighten camshaft bolt - 1 - on exhaust camshaft of left cylinder head to initial tightening specifications.

- Secure Hall sensor wheel on camshaft adjuster of intake camshaft of left cylinder head using setting gauge (T40047).

- Tightening Specifications: 40 Nm.
- Place setting gauge (T40047) on bolt - 1 -.
- Tighten camshaft bolt - 2 - on intake camshaft to initial tightening specifications.

- Tightening Specifications: 40 Nm.

- Secure Hall sensor wheel on camshaft adjuster of intake camshaft of right cylinder head using setting gauge (T40047).

- Place setting gauge (T40047) on bolt - 2 -.
- Tighten camshaft bolt - 1 - on intake camshaft to initial tightening specifications.
- Tightening Specifications: 40 Nm.

- Remove setting gauge (T40047).
- Tighten **camshaft** bolt - **2** - on exhaust camshaft of right cylinder head to initial tightening specifications.

- Tightening Specifications: 40 Nm.
- **Camshaft** locators (T40046) must not be used as counterholder for final tightening of camshaft bolts.

  - Remove **camshaft** locators (T40046) on both cylinder heads.
Tighten *camshaft* bolt - 1 - on exhaust camshaft of left cylinder head to final tightening specifications.

- Tightening Specifications: 100 Nm plus an additional 90° (1/4 turn).

- Secure Hall sensor wheel on camshaft adjuster of intake camshaft of left cylinder head using setting gauge (T40047).

- Place setting gauge (T40047) on bolt - 1 -.
- Tighten *camshaft* bolt - 2 - on intake camshaft to final tightening specifications.
- Tightening Specifications: 100 Nm plus an additional 90° (1/4 turn).

- Secure Hall sensor wheel on camshaft adjuster of intake camshaft of right cylinder head using setting gauge (T40047).

- Place setting gauge (T40047) on bolt - 2 -.
- Tighten camshaft bolt - 1 - on intake camshaft to final tightening specifications.

- Tightening Specifications: 100 Nm plus an additional 90° (1/4 turn).

- Remove setting gauge (T40047).
- Tighten camshaft bolt - 2 - on exhaust camshaft of right cylinder head to final tightening specifications.
- Tightening Specifications: 100 Nm plus an additional 90° (1/4 turn).

- Remove crankshaft holder (3242).

- Using key (T40049) turn crankshaft two complete rotations in direction of engine rotation - arrow - until crankshaft stands at TDC again.
- Slits - arrows - at front in camshafts must stand parallel at same height with upper edge of cylinder head.

- Install crankshaft holder (3242) in the hole (20 Nm). Rotate the camshaft back and forth slightly if necessary to completely center the holder.

- Insert camshaft locator (T40046) into camshafts of left cylinder head.
Insert camshaft locator (T40046) into camshafts of right cylinder head.

If camshaft locators cannot be inserted:

- Repeat adjustment.
- Pull out trim removal wedge (3409).
- Remove camshaft locator (T40046) on both cylinder heads.
- Remove crankshaft holder (3242).
- Screw sealing plug of TDC marking with new sealing ring into upper section of oil pan.

The rest of installation is in reverse order of removal, note the following:
- Install covers for timing chains => [Installing] See: Timing Cover\Service and Repair\Timing Chain Covers.
- Add engine oil and check oil level. Refer to => [Oil Level, Checking] See: Engine Lubrication\Testing and Inspection.

**Tightening Specifications**

<table>
<thead>
<tr>
<th>Component</th>
<th>Nm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Camshaft bolts</td>
<td>100 + 90°**</td>
</tr>
<tr>
<td>Sealing plug in upper section of oil pan</td>
<td>35</td>
</tr>
<tr>
<td>Oil drain plug</td>
<td>50</td>
</tr>
</tbody>
</table>

- 90°corresponds to one quarter rotation.
- Replace bolts.