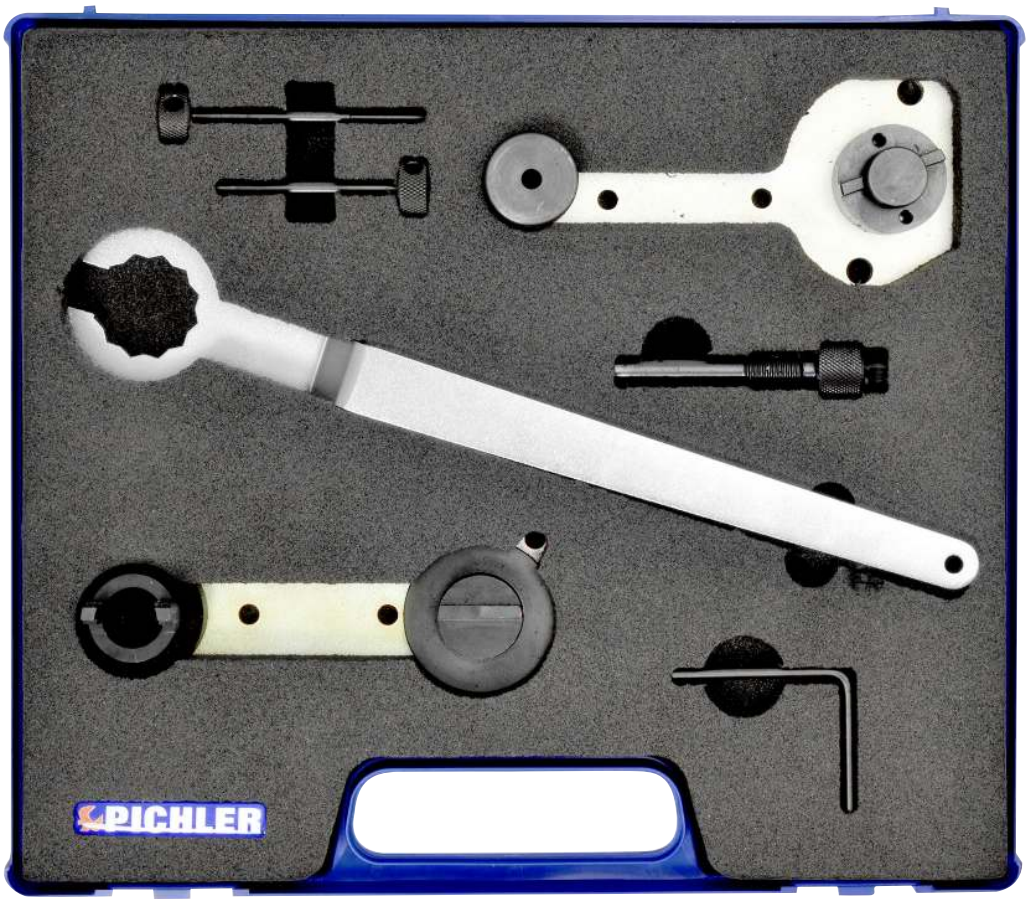


PETROL ENGINE SETTING / LOCKING TOOL KIT

Manual

9431280

PICHLER
tools since 1978.

PICHLER
tools since 1978.

SAFETY NOTICE

To understand the functioning of the tools, it is necessary to read the manual first!

- Read these instructions before assembling, during installation and throughout use and in the proper sequence
- Always refer to the OEM manufacturer's instructions and service manuals for the latest data and to maintain the correct sequence
- These work instructions and the recommended tools are meant to serve as aides only and are by no means a guarantee for certain results.
- This tool kit is a special collection and it has been tested and used successfully on several occasions. It is of the utmost importance to maintain the correct procedure as per the instructions
- The use of the tools should only be carried out by qualified personnel!

ATTENTION
Special caution

CORRECT

LIGHT BULB
Hint or recommendation

WRONG

SAFETY GOGGLES
Wearing safety goggles necessary

9431280
Petrol Engine Setting / Locking Tool Kit

Applications:

AUDI:
A1, A3, Q3, S3

SEAT:
Alhambra, Ateca, Ibiza, Leon, Toledo

SKODA:
Fabia III, Octavia III, Rapid, Superb III

VOLKSWAGEN:
Arteon, Golf, Jetta, Passat, Polo, Scirocco, Sharan, T-Cross, T-Roc, Tiguan, Touran

Engine Codes:

1.0 TSi:
CHZA, DKLC, DKRA

1.2TSi:
CJZA, CHPA, CMBA

1.4TSi:
CHPA, CPTA, CPVA, CPWA, CRJA, CUKB, CVNA, CXSA, CZCA, CZDA, CZEA

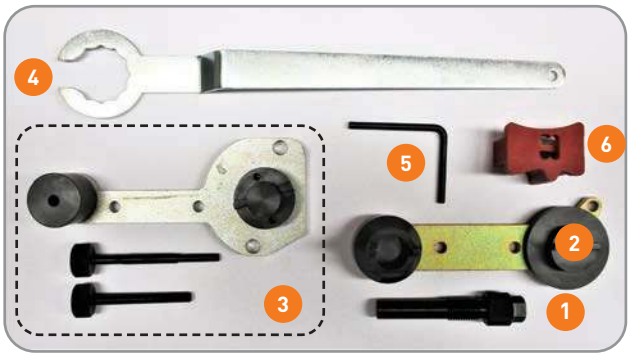
1.5TSi:
DADA, DPCA

Additional required:

Camshaft Sprocket Holding Tool

Crankshaft Pulley Holding Tool
Used in conjunction with Handle

Kit Contents / Spares:



No.	Description
1	Crankshaft Locking Pin
2	Camshaft Setting Tool – 1.0 / 1.2 / 1.4 / 1.5
3	Camshaft Setting Tool - 1.4 (ACT)
4	Tensioner Adjuster
5	Auxiliary Belt Tensioner Locking Pin
6	Camshaft Sprocket Locking Tool

Engine Timing - Check

Remove the air intake pipe, turbo pipe and charcoal filter connection pipe.

IMPORTANT: Cap the ends of all open pipes to prevent ingress of dirt and foreign objects.

Detach the crankcase breather hose from the rear of the camshaft cover.

Drain the coolant system.
Detach the thermostat housing from the rear of the engine and position it to one side to give access to the coolant pump drive belt cover.

WARNING: Ensure that engine is cold before starting work on the coolant system.

Detach the coolant pump drive belt cover from the engine. Position the drive belt cover and the wiring harness to one side to give access to the coolant pump drive belt sprocket.
Remove the end cap from the rear of the inlet camshaft.

Remove all ignition coils and spark plugs from the cylinder head. Using a suitable indicator rod inserted through the spark plug aperture of no.1 cylinder, rotate the crankshaft in the normal direction of engine rotation until the piston is at bottom dead centre on No.1 cylinder.

Note: It is possible to complete engine timing procedures with the ignition coil and spark plug removed from No.1 cylinder only. Removing all spark plugs will make rotation of the crankshaft smoother and easier.

Continue to rotate the crankshaft in the normal direction of engine rotation until the indicator pin rises 30mm.

Remove the crankshaft blanking plug.
Fit **crankshaft locking pin**, ensuring that it is located fully in the engine.

If **crankshaft locking pin** cannot be fully inserted, remove it from the engine. Rotate the crankshaft 90° in the normal direction of engine rotation. Refit **crankshaft timing pin**, ensuring that it is located fully in the engine.

Tighten **crankshaft locking pin** to 30Nm.

Rotate the crankshaft in the normal direction of engine rotation until the crankshaft contacts **crankshaft locking pin**.

Check that the timing hole on the coolant pump drive sprocket is aligned with the hole in the cylinder head and that the timing slot in the rear of the exhaust camshaft is above the centerline of the camshaft.
If the camshafts are not in the correct position, remove **crankshaft locking pin**, then rotate the crankshaft 1 full turn in the normal direction of rotation. Refit the pin and continue to rotate the crankshaft until the crankshaft contacts **crankshaft locking pin**.

Fit **camshaft setting plat**e into the timing slot at the rear of the exhaust camshaft.
Retain in position using the screws removed from the camshaft end cap, tightened finger tight only at this stage.
Fit **timing check pin** through the body of **setting plate** and into the timing hole of the cylinder head.

IMPORTANT: Do not use excessive force when fitting camshaft setting tool. Small adjustments to the camshaft position may be required when fitting the tool.

Check that **Camshaft Setting Tool** 1.4 (ACT) has been fitted correctly. **Check pin** must be located so that the location groove is level with or deeper than the face of **setting plate**. If the check groove is visible, the engine timing may be incorrect.

If **crankshaft locking pin** and **camshaft setting tool** cannot be fitted as described, the valve timing will require adjustment.

Vehicles without Active Cylinder Technology (ACT)

Engines without ACT follow the same basic timing check procedure but utilize a different camshaft setting tool. **Camshaft setting tool** is included within **engine setting/ locking kit** to enable engine timing procedures to be carried out on engines without ACT. The highlighted text in this instruction is only applicable to engines without ACT.

Check that the timing slots in the rear of both camshafts are positioned above the centerline of the camshafts.

Fit **camshaft setting plate** into the timing slots at the rear of the camshafts and retain in position using one of the screws removed from the camshaft end cap, tightened finger tight only at this stage.

IMPORTANT: Do not use excessive force when fitting camshaft setting tool. If it is not possible to fit Camshaft Setting Tool –1.0 / 1.2 / 1.4 / 1.5 fully into the slots of the camshafts, the engine timing will require adjustment. Small adjustments to the camshaft position may be required when fitting the tool, this can be achieved by applying downward pressure to the timing belt between the camshaft sprockets.

If **crankshaft locking pin** and **camshaft setting tool** cannot be fitted as described, the valve timing will require adjustment.

Engine Timing - Adjustment

This instruction assumes that the engine timing belt will be replaced as part of the engine timing adjustment procedure. If the engine timing belt, belt tensioner and idler pulley are not being replaced the auxiliary belt, alternator, engine mounting bracket and lower timing belt cover do not need to be removed. Rotate the auxiliary drive belt tensioner to release tension, retain the tensioner in position using **auxiliary belt tensioner locking pin**.
Remove the auxiliary drive belt and belt tensioner from the engine.

NOTE: If the auxiliary drive belt is to be refitted, mark the direction of rotation on the belt before removal.

Loosen the lower alternator retaining bolt. Remove the upper alternator retaining bolt, rotate the alternator in a clockwise direction, then tighten the lower retaining bolt to retain the alternator in position.

Using a suitable counterhold, such as **crankshaft pulley holding tool**, release the central bolt of the crankshaft pulley.

IMPORTANT: Engine setting/locking tools **MUST NOT** be used to counterhold the crankshaft when releasing or tightening the crankshaft pulley bolt.

Remove the crankshaft pulley and discard the used crankshaft pulley central bolt.
Loosely fit a new crankshaft pulley central bolt to retain the sprocket on the crankshaft.

WARNING: DO NOT tighten the crankshaft pulley bolt with the pulley removed. Tightening the crankshaft pulley bolt without the pulley fitted could damage the profile face of the crankshaft sprocket.

Remove the lower timing belt cover.

Using a safe, suitable method support the engine.
Remove the engine mounting bracket from the engine to expose the timing belt, tensioner and idler pulley.

Loosen the timing belt tensioner retaining bolt. Using **tensioner adjustment tool**, rotate the tensioner in an anti-clockwise direction to release tension from the belt. Remove the engine timing belt. If the timing belt is to be refitted, mark the direction of rotation on the belt before removing it from the engine.

Ensure that **crankshaft locking pin** is fitted and that the crankshaft is still in the correct position. The web of the crankshaft should contact **locking pin** when the crankshaft is rotated in the normal direction of engine rotation.

Using a suitable counter hold tool, such as **camshaft sprocket holding too**l, remove the blanking plug from the VVT unit on the Inlet camshaft sprocket.

Using a suitable counter hold tool, such as **camshaft sprocket holding tool**, remove the blanking plug from the VVT unit on the Inlet camshaft sprocket and the blanking plate from the VVT unit on the exhaust camshaft sprocket.

IMPORTANT: Engine oil may escape from the VVT units when the blanking caps are removed. Take care not to contaminate the toothed belt sprockets or pulleys.

Using a suitable tool, such as **camshaft sprocket holding tool**, rotate the inlet camshaft until the timing slot in the rear of the camshaft is horizontal and above the centerline of the camshaft.

Using a suitable tool, such as **camshaft sprocket holding tool**, rotate the inlet and exhaust camshafts until the timing slots in the rear of the camshafts are horizontal and above the centerline of the camshafts.

Using a suitable tool, such as **camshaft sprocket holding tool**, rotate the exhaust camshaft until the timing hole in the coolant pump is aligned with the timing hole in the cylinder head.

Fit **camshaft setting tool plate** into the timing slots in the rear of the inlet camshaft. Retain camshaft setting tool plate in position using the screws removed from the camshaft end cap, tightened finger tight only at this stage.

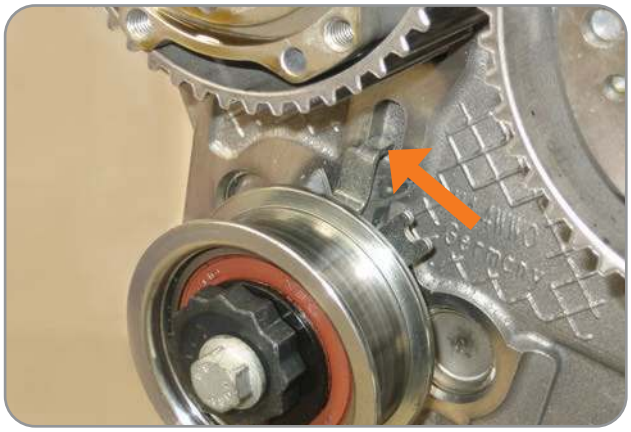
Fit **camshaft setting pin** through the body of **setting plate** and into the timing hole of the cylinder head. The head of **camshaft setting pin** must contact **setting plate**. If the setting pin is not fully located in the hole of the cylinder head, incorrect camshaft timing may result.

Fit **camshaft setting tool** into the timing slots in the rear of the inlet and exhaust camshafts. Retain **camshaft setting tool** in position using one of the screws removed from the camshaft end cap.

NOTE: When fitting **Camshaft Setting Tool –** 1.0 / 1.2 / 1.4 / 1.5 or **camshaft setting tools**, the assistance of a second technician is recommended in order to fit the tool to the camshafts while the camshaft timing position is maintained.

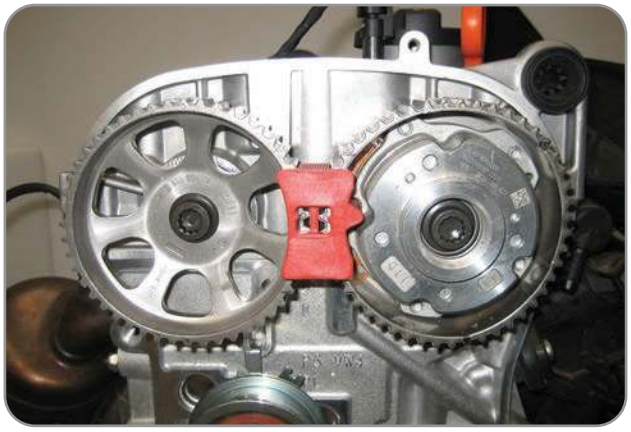
Using a suitable counterhold tool, such as **camshaft sprocket holding tool**, remove the central bolt of the inlet and exhaust camshaft sprockets.

IMPORTANT: Engine setting/locking tools **MUST NOT** be used to counterhold the camshaft when releasing or tightening the camshaft sprocket bolts.



Replace the timing belt tensioner and idler pulley. Tighten the guide pulley retaining bolt to 45Nm. Ensure that the metal location tab of the tensioner is located in the aperture of the engine block. Tighten the belt tensioner retaining bolt hand tight only at this stage.

Ensure that the crankshaft is set in the correct position, contacting **crankshaft locking pin** and that the camshaft sprockets are free to rotate on the camshafts.



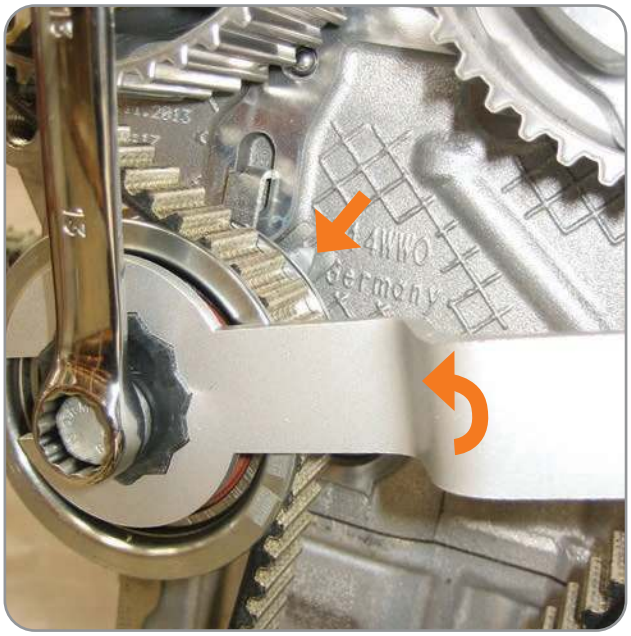
For the 1.0 engine, fit **camshaft sprocket locking tool** onto the front of the camshaft sprockets.
Ensure that the timing arrows of **camshaft sprocket locking tool** are aligned with the timing marks on the camshaft sprockets.

Install the timing belt in the following order:

- Crankshaft Sprocket – ensure the teeth of the belt are fully located in the teeth of the crankshaft sprocket
- Tensioner Pulley
- Exhaust Camshaft Sprocket
- Inlet Camshaft Sprocket
- Idler Pulley

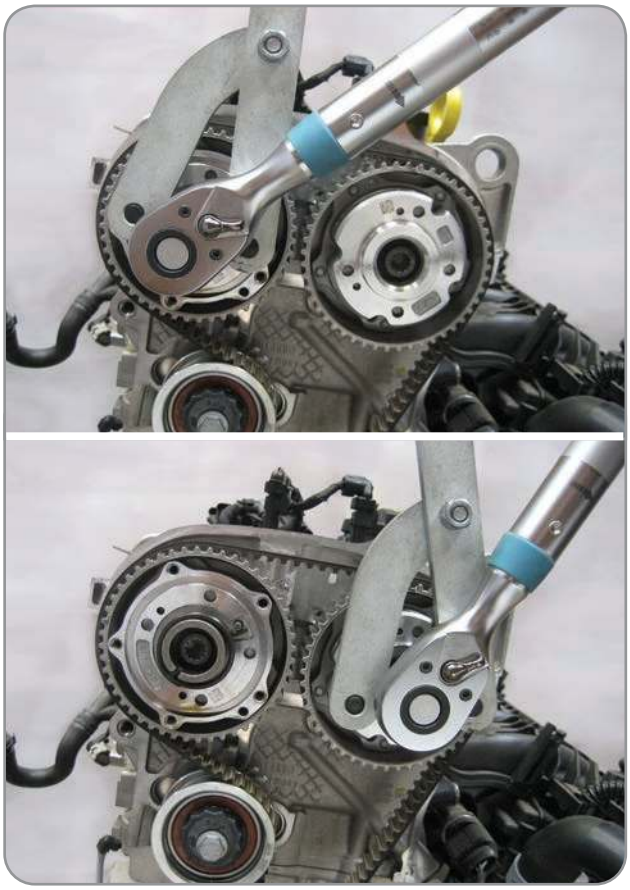
WARNING: The timing belt is manufactured from glass fibre material. DO NOT force the belt over the teeth of the sprockets as this can cause damage to the teeth of the belt. DO NOT bend the belt to less than a 50mm diameter circle. Take care not to cause damage to the belt when fitting as this will reduce the service life of the belt.

Using **tensioner adjustment tool**, rotate the eccentric central mandrel of the timing belt tensioner in a clockwise direction until the pointer is approximately 10mm past the adjustment indicator groove.



Rotate the mandrel in an anti-clockwise direction until the pointer is aligned with the indicator groove.
Maintaining the position of the tensioner, tighten the tensioner locking bolt to 25Nm.

NOTE: Belt tension may settle during initial rotation of the engine. The tension indicator may not return to the same position. Slight differences in tension indicator position are normal and do not affect the operation of the tensioner or the timing belt.



Using a suitable counter hold tool, such as **camshaft sprocket holding tool**, tighten the central bolts of the camshaft sprockets to 50Nm.

IMPORTANT: Engine setting/locking tools MUST NOT be used to counterhold the camshaft when releasing or tightening the camshaft sprocket bolts.

Refit the crankshaft pulley, tightening the crankshaft central bolt hand tight only at this stage, in order to retain the crankshaft pulley while rotating the crankshaft.
Remove all engine setting/locking tools.

Rotate the engine two full turns in the normal direction of engine rotation.
Refit **crankshaft locking pin** and rotate the crankshaft in the normal direction of engine rotation until the crankshaft web contacts **crankshaft locking pin**.

Fit **camshaft setting plate** into the timing slot at the rear of the exhaust camshaft.
Retain in position using the screws removed from the camshaft end cap, tightened finger tight only at this stage.
Fit timing check pin through the body of **setting plate** and into the timing hole of the cylinder head.

IMPORTANT: Do not use excessive force when fitting camshaft setting tool. Small adjustments to the camshaft position may be required when fitting the tool.

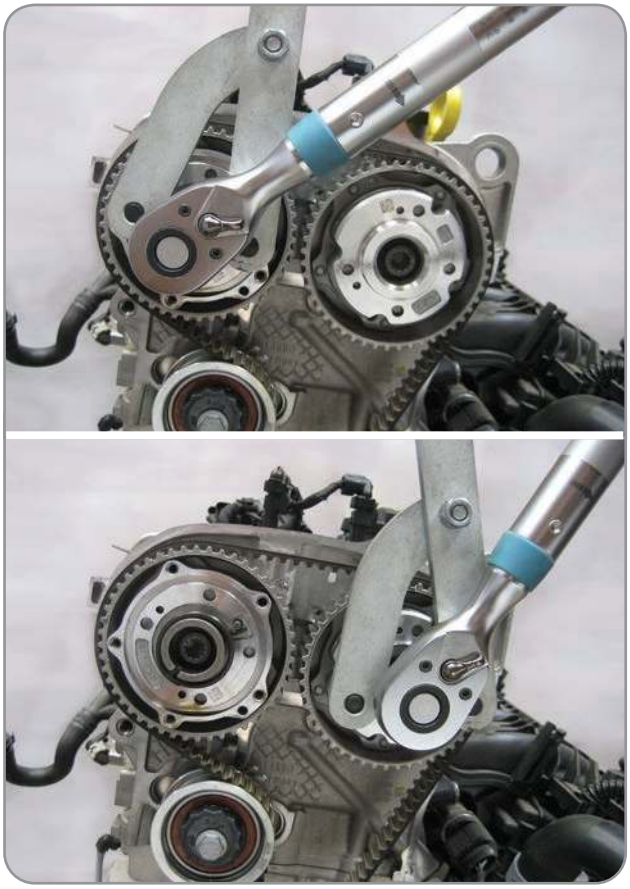
Check that **Camshaft Setting Tool -**1.4 (ACT) has been fitted correctly. ´**Check pin** must be located so that the location groove is level with or deeper than the face of **setting plate**. If the check groove is visible, the engine timing may be incorrect.

If **crankshaft locking pin** and **camshaft setting tool** cannot be fitted as described, the valve timing will require adjustment.

Fit **camshaft setting plate** into the timing slots at the rear of the camshafts and retain in position using one of the screws removed from the camshaft end cap, tightened finger tight only at this stage.

IMPORTANT: Do not use excessive force when fitting camshaft setting tool. If it is not possible to fit fully into the slots of the camshafts, the engine timing will require adjustment. Small adjustments to the camshaft position may be required when fitting the tool, this can be achieved by applying downward pressure to the timing belt between the camshaft sprockets.

If **crankshaft locking pin** and **camshaft setting tool** cannot be fitted as described, the valve timing will require adjustment.



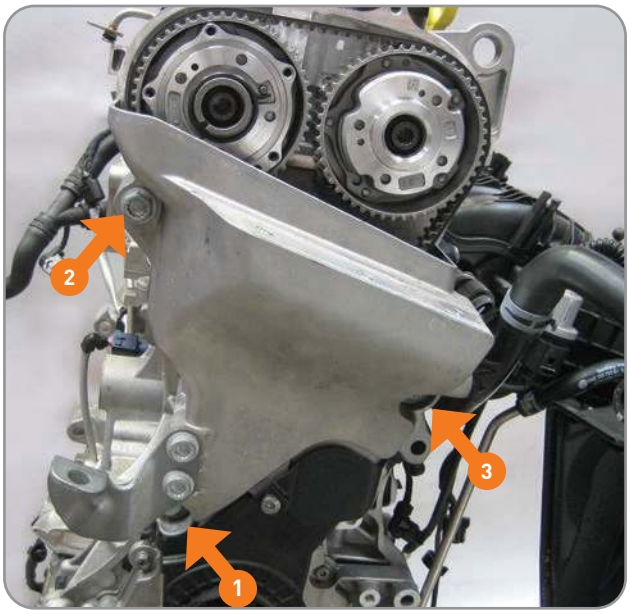
Using a suitable counter hold tool, such as **camshaft sprocket holding tool**, tighten the central bolts of the camshaft sprockets to 50Nm+135°.

Using a suitable counter hold tool, such as **camshaft sprocket holding tool**, tighten the central bolts of the inlet camshaft sprocket / VVT unit to 50Nm+135°.
Tighten the central bolt of the exhaust camshaft sprocket to 50Nm+90°.

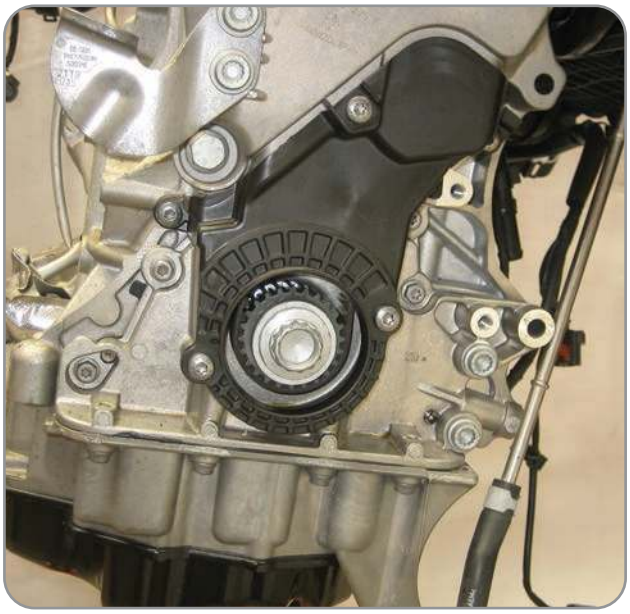
Refit the blanking plug from the VVT unit of the Inlet camshaft sprocket.
Using a suitable counter hold tool, such as **camshaft sprocket holding tool**, tighten blanking plug to 20Nm.

Refit the blanking plate from the VVT unit of the exhaust camshaft sprocket.
Using a suitable counter hold tool, such as **camshaft sprocket holding tool**, tighten the blanking plate retaining bolts to 8Nm+45°.

Remove **crankshaft timing pin** and refit crankshaft blanking plug, tighten to 30Nm.
Remove the crankshaft pulley.



Refit the aluminium engine mount bracket.
Starting at the lower retaining bolt and working in a clockwise direction, initially tighten the three bolts to 7Nm. Repeat the sequence, tightening each bolt to a torque of 40Nm.
Repeat the sequence, finally tightening each bolt by a further 90°.



Refit the plastic lower timing belt cover, tightening the retaining bolts to 8Nm.

Refit the crankshaft pulley and pulley central bolt. Ensure that the profiled face of the crankshaft pulley is located correctly against the profiled face of the crankshaft sprocket. Using a suitable counterhold tool such as **crankshaft pulley holding tool**, tighten the central bolt of the crankshaft pulley to 150Nm+180°.

IMPORTANT: Engine setting/locking tools MUST NOT be used to counterhold the crankshaft when releasing or tightening the crankshaft pulley bolt.

Refit the alternator, tightening all retaining bolts to the manufacturer's torque settings.
Refit the auxiliary belt, ensuring that the auxiliary belt is correctly located on the tensioner pulley and in the grooves of the crankshaft, alternator and air conditioning compressor pulleys.

Refit the camshaft end cap and coolant drive belt cover to the rear of the engine and the timing belt cover to the front of the engine.

Refit the thermostat cover, coolant pipes, breather pipes and air intake pipes.
Refill the coolant system to the manufacturer's specification.

Further assembly is carried out in the reverse order of removal.

NOTES

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