



PETROL ENGINE TWIN CAMSHAFT SETTING/LOCKING TOOL KIT

Manual

43023350



PICHLER
built to succeed.

SAFETY NOTICE

To understand the functioning of the tools, is it 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

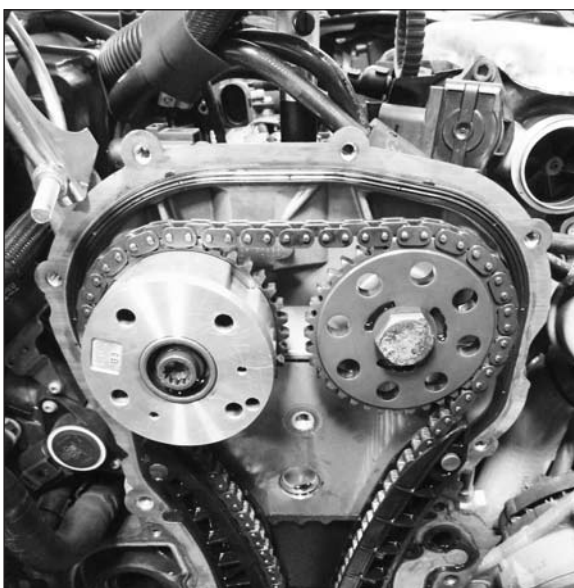


SAFETY GOGGLES

Wearing safety goggles
necessary



IMPORTANT: Always refer to the vehicle manufacturer's service instructions, or proprietary manual, to establish the current procedures and data. Product Information Sets detail applications and use of the tools with any general instructions provided as a guide only.



Applications:

V W GROUP 1.4/1.6 FSi and 1.4 T(F)Si Petrol engines (CHAIN DRIVE) in

AUDI A3

SEAT

Ibiza	Leon	Altea/XL
SKODA		
Fabia II Superb	Roomster	Octavia II

VOLKSWAGEN

Polo	Golf	Golf Plus
Jetta	Eos	Scirocco
Tiguan	Passat	Touran

FSi engines -

AXU, BAG, BKG, BLF, BLN, BLP and BTS TFSi engines -

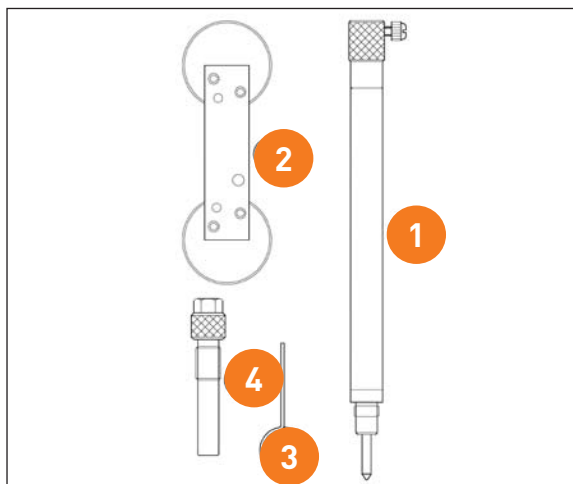
BLG, BMY, BWK, CAVA, CAVB, CAVC, CAVD, CAVE, CAVF, CAXA, CAXC, CDGA

Additional Tools required:

43012860 Camshaft Sprocket Holding Tool

Crankshaft Pulley Holding Tool

DTI or other suitable Dial Gauge



Nr.	Description
1	TDC Positioning Tool - use with a suitable DTI
2	Camshaft Setting Plate
3	Tensioner Locking Pin
4	Crankshaft Locking pin

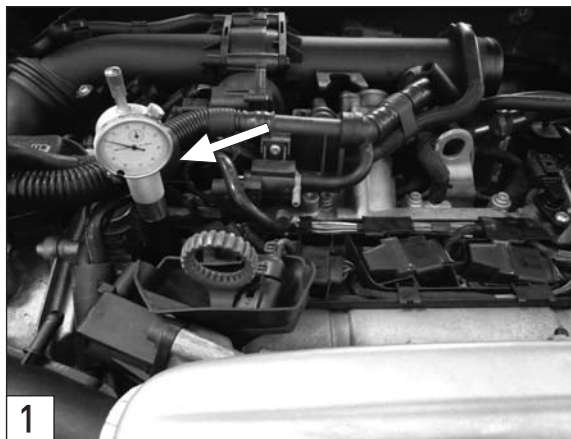
These V W 1.4 & 1.6 Twin Camshaft petrol engines are direct injection with FSi (Fuel Stratified Injection), and are CHAIN DRIVE. Fuel is injected directly into the combustion chamber and a common rail system is used with operating pressures at 40–110 Bar. There are several variants of these engines, some with variable valve timing (VVT) on the inlet camshaft. Turbocharged versions have now also been introduced (TFSi)

43023350 FSi/TFSi Engine Setting/Locking Tool Kit comprises:

- TDC Positioning Tool
- (use with suitable DTI)
- Camshaft Setting Plate
- Chain Tensioner Locking Pin
- Crankshaft Locking pin

Checking valve timing

Remove the air cleaner housing, exhaust gas recirculation valve and the cover plate at the rear of the camshafts.



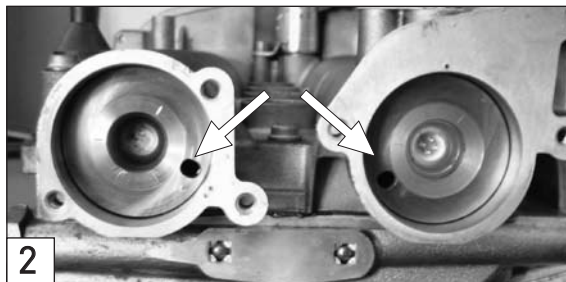
TDC Positioning Tool
(Use with suitable DTI – not included in set)

Correct engine/crankshaft TDC position is established using TDC Positioning Tool together with a suitable DTI (Dial Gauge) such as DZ or other suitable Dial Gauge.

Remove the spark plug from No.1 cylinder.

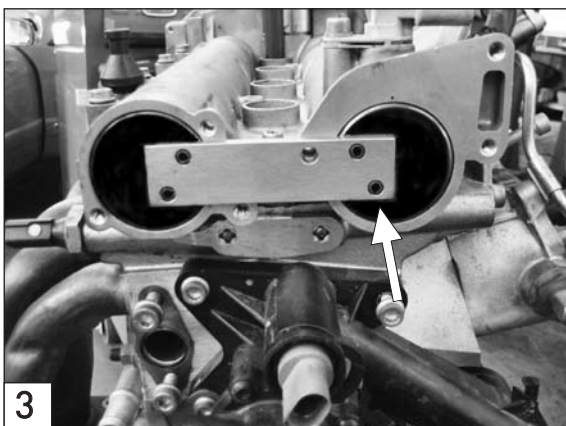
Install the DTI in to TDC Positioning Tool Tool and secure with the Thumbscrew.

Screw TDC Positioning Tool fully in to the spark plug hole of No.1 cylinder. Turn the crankshaft in the normal direction of engine rotation so that the piston reacts on the indicator pin TDC Positioning Tool and in turn moves the needle of the DTI. TDC is achieved when the needle reaches its highest reading and prior to it starting to move in the reverse direction.



IMPORTANT: Check that the holes in the rear of the camshafts are positioned as shown in diagram 2. If not, turn the crankshaft one more turn (360°) and establish TDC No.1 cylinder position, using 4519 and the DTI.

WARNING: Whilst establishing TDC on these engines the crankshaft **MUST NOT** be turned or be allowed to move, more than 0.01mm passed TDC position. If this occurs, turn the crankshaft backwards (against direction of rotation), approx. 45° and then forward again, to TDC No.1 cylinder position.



Camshaft Setting Plate

Insert Setting Plate in to the recesses and the two holes in the rear of the camshafts

NOTE: "TOP" marked on the centre bridge of the Setting Plate, must be at the top. If Camshaft Setting Plate cannot be installed, the engine timing is incorrect and must be adjusted.

Adjusting valve timing



WARNING: On the rear face of the crankshaft gear is a raised lug. This lug locates in to a recess in the crankshaft, setting the position and providing a positive connection between gear and crankshaft. Care must be taken when refitting the crankshaft pulley centre bolt to ensure that the lug on the crankshaft gear is located into the recess in the crankshaft. Failure to do so could result in damage to the engine.



Using Crankshaft Pulley Holding Tool as a counter hold (Associated Tool not in set), release and remove the pulley centre bolt. Remove the crankshaft pulley in order to remove the timing chain cover. Refit the pulley and bolt (ensuring correct crank gear location on the crankshaft) to facilitate rotation of the engine.

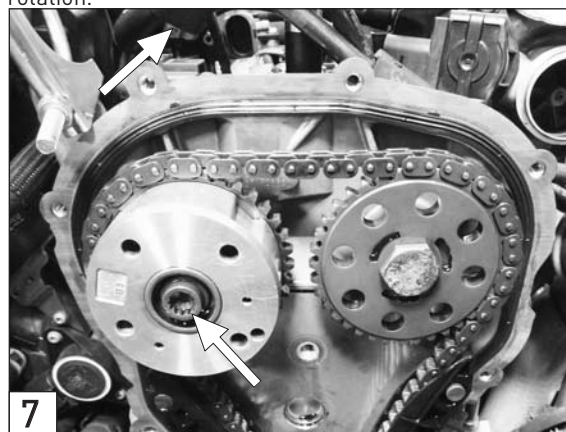
Position the engine at TDC No.1 cylinder using TDC Positioning Tool and DTI, ensuring the piston is at the top of its compression stroke, as described earlier in "Checking valve timing".



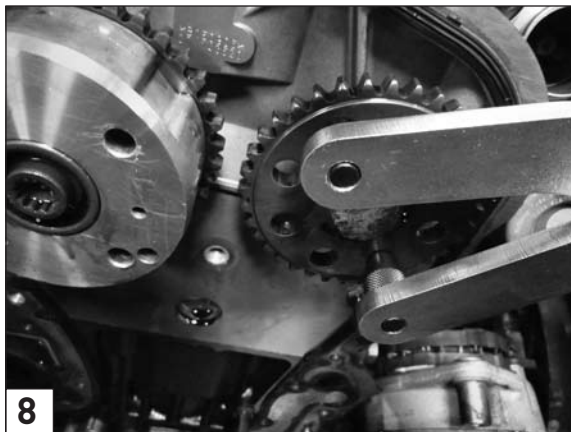
Tensioner Locking Pin

Turn the crankshaft against direction of engine rotation by 45° and push the chain guide rail against the chain tensioner piston. Insert Pin to 'lock' the piston in position.

IMPORTANT: Mark the timing chain with direction of rotation.



WARNING: On engines fitted with VVT, the Camshaft Timing Adjuster bolt (inlet camshaft sprocket) has a LEFT-HAND THREAD.



Remove the camshaft sprockets/VVT unit, timing chain and bolts using 43012860 Sprocket Holding Tool (Associated Tool - not in set), as a counter hold whilst releasing the sprocket bolts. Refit the sprockets/VVT unit with new bolts, DO NOT refit the chain at this stage. Tighten standard camshaft sprocket bolts to 50Nm, and VVT unit bolts to 40Nm.



Turn the camshafts until the Setting Plate can be inserted in to the recesses and the two holes in the rear of the camshafts. NOTE: "TOP" marked on the centre bridge of the Plate, must be at the top. Counter-hold the sprockets using 43012860 Sprocket Holding Tool, and slacken the camshaft sprocket/VVT unit bolts. DO NOT use Setting Plate as a counter-hold tool. Remove one of the camshaft sprockets, install the timing chain and refit the camshaft sprocket. Tighten sprocket bolts finger-tight only so that the camshaft sprockets/VVT unit can still turn freely on the camshafts.

Apply tension to the timing chain by removing the Pin from the tensioner.

Turn the crankshaft in the normal direction of engine rotation and using TDC Positioning Tool and DTI, establish TDC at No.1 cylinder.

WARNING: Whilst establishing TDC on these engines the crankshaft MUST NOT be turned or be allowed to move more than 0.01mm passed TDC position. If this occurs, turn the crankshaft backwards (against direction of rotation), approx. 45° and then forward again, to TDC No.1 cylinder position.



Oil sump removed to show crankshaft pin locking position against crankshaft web

Crankshaft Locking Pin (1.4 TFSi engines only)

On 1.4 TFSi engines a Crankshaft Locking Pin is used when adjusting the timing. This pin sets the crankshaft at TDC position by contacting a machined face on one of the crankshaft webs with the end of the Pin. Fit Crankshaft Locking Pin and tighten to 30Nm.

Using 43012860 Sprocket Holding Tool to counter-hold the sprockets, tighten standard camshaft sprocket bolts to 50Nm, and VVT unit bolts to 40Nm.

WARNING: When tightening bolts the crankshaft MUST NOT be allowed to turn and the timing chain should remain tensioned on both sides.

For 1.4TFSi engines - Remove Crankshaft Locking Pin.

Remove Camshaft Setting Plate.
Turn the crankshaft two full turns in the normal direction of engine rotation, returning to TDC position No.1. cylinder using and DTI.

Refit Camshaft Setting Plate to check camshaft position. If it is not possible, repeat the "Timing Adjustment" procedure.

For 1.4TFSi engines - Refit Crankshaft Locking Pin and tighten in place to 30Nm.

Remove the Camshaft Setting Plate.
Counter-hold the camshaft sprockets using 43012860 Sprocket Holding Tool, and tighten both sprocket bolts a **further 90°** ensuring that the sprockets do not turn on the camshafts.

NOTE: When installing the rear camshaft cover, new seals will be required.

Refitting the crankshaft pulley/timing chain cover
IMPORTANT: A **NEW** crank pulley bolt **MUST** be fitted.



Later type "drilled head" bolt

Two variants of crankshaft pulley bolt have been used on these engines. The early type is identified by having a solid bolt head, while the later bolt has a drilling in the bolt head. The early type (solid head) is tightened to a torque of 90Nm + 90°. The later type (drilled head) is tightened to a torque of 150Nm + 180°.

Check that the crankshaft is positioned at TDC on No1. cylinder using TDC Positioning Tool and DTI.

For 1.4TFSi engines - fit the Crankshaft Locking Pin and tighten in place to 30Nm.

WARNING: On the rear face of the crankshaft gear is a raised lug. This lug locates in a recess in the crankshaft, setting the position and providing a positive connection between gear and crankshaft. Care must be taken when refitting the crankshaft pulley centre bolt to ensure that the lug on the crankshaft gear is located into the recess in the crankshaft. Failure to do so could result in damage to the engine.

Using Crankshaft Pulley Holding Tool as a counter hold, remove the old crankshaft bolt and pulley, then refit the timing chain cover.

Refit the crankshaft pulley using a new bolt and tighten finger-tight (ensuring correct crankshaft gear location). Re-check camshaft position using Camshaft Setting Plate and crankshaft position using TDC Positioning Tool and DTI.

Remove Camshaft Setting Plate.

Using the Holding Tool as a counter hold, tighten the crankshaft bolt to the specified torque setting.

For 1.4TFSi engines - Remove Crankshaft Locking Pin.

A final stage timing check **MUST** be carried out to check the valve timing is correct. Turn the crankshaft two full turns in the normal direction of engine rotation, returning to TDC No1. cylinder, using TDC Positioning Tool and DTI. Check the camshaft position by fitting Camshaft Setting Plate.

Remove all tools and re-assemble the vehicle.



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