Applications:

1.8 & 2.0TFSi Petrol engines in:

**AUDI:**
- A3
- A4
- A5
- A6
- Q3
- Q5
- TT

**SEAT:**
- Leon
- Toledo
- Altea
- Altea XL
- Exeo
- Alhambra

**SKODA:**
- Yeti
- Octavia II
- Octavia III
- Superb

**VOLKSWAGEN:**
- Golf
- Beetle
- Jetta
- Scirocco
- Eos
- Passat
- Passat CC
- Tiguan
- Sharan
- Amarok

Engine codes:

**1,8TFSi**
- BYT  CDAA  CJSA
- BZB  CDAB  CJSB
- CABA  CDHA
- CABB  CDHB
- CABD  CJEB

**2,0TFSi**
- CAWA  CCZB  CDND  CHHA  CPLA
- CAWB  CCZC  CESA  CHHB  CPSA
- CBFA  CCZD  CETA  CJKA
- CCTA  CDNB  CFKA  CJKB
- CCZA  CDNC  CFPA  CNCD

Kit Contents / Spares:

- AST5124 Crankshaft Pulley Holding Tool
- AST5126 Crankshaft Spacer Bush
- AST5127 Camshaft Control Valve Tool
- AST5128 Camshaft Locking Tool
- AST4593-1E Chain Tensioner Locking Pin
- AST4840V4 Auxiliary Belt Tensioner Locking Pin
- AST5125-84 Case + Insert

**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.

AST has a policy of continuous development & reserve the right to change product specification or appearance without prior notice.
Many of the larger VW Group models have the facility to extend the front end of the vehicle, moving it forward to a ‘service position’, improving access to the engine compartment. To minimize disassembly of the front panel and avoid damage to vehicle components, a number of support guide pins have been developed.

**AST4741 Front End Support Guide Set** contains three sets of guide pins covering a wide range of applications, including Audi A4, A5 & A6 as well as Volkswagen Passat, Phaeton & Touareg.

Support guide pins prevent the front end of the vehicle from being moved too far forward, as well as retaining it when the vehicle is raised. Moving the front panel to its Service position forms part of the engine timing procedure for these vehicles.

**AST4519 TDC Positioning Tool and AST3054-10 DTI Gauge**

**AST4519 TDC positioning tool** can be used to quickly and accurately set the piston at TDC position.

To find TDC position, first screw the body of **AST4519** into the spark plug aperture of the cylinder that is to be set at TDC. Fit **AST3054-10 Dial Gauge** into the top of **AST4519** so that the plunger of the DTI just contacts the indicator pin of **AST4519**, lock the DTI in position using the plastic thumbscrew provided.

When the crankshaft is rotated in the normal direction of rotation, the piston moves up inside the cylinder, contacting the indicator pin. This movement can be seen as rotation of the needle on the face of the DTI. When the needle indicates its highest reading, the piston is at TDC position.

**AST4990 Coil Pack Removal Tool Set**

Common across VW group petrol engines, coil packs provide the power required to generate a spark at the plug. Coil packs can become locked into the spark plug aperture over time, making them very difficult to remove without damaging the electronic equipment mounted on the top of each unit.

**AST4990** comprises 4 different coil pack adaptors, plus an interchangeable ‘T’ handle, with quick release button. The adaptors fit onto the top of coil pack units, enabling a straightforward pulling action rather than the twisting motion that can be generated when a screwdriver is used. Also included in the set is a lever, useful for unclipping difficult to reach electrical connections on the coil pack units.
Engine Timing - Check

Remove the cover and the bumper from the front of the vehicle. Fit the appropriate support guide pins, see ‘AST4741 Front End Support Guide Set’. Detach and move the front panel to its service position to allow access to crankshaft pulley and the timing chain covers.

NOTE: It may be difficult to see the timing mark on the lower timing chain cover if there is a build up of dirt. Care must be taken not to confuse the timing mark with other markings on the timing chain cover.

1

Detach the oil dipstick tube and remove the inlet camshaft solenoid control valve from the upper timing chain cover.

2

Remove the upper timing chain cover.

3

Identify the crankshaft timing mark on the lower timing chain cover, positioned at approximately 4 o’clock relative to the crankshaft pulley. Locate the timing notch in the outer diameter of the crankshaft pulley.

4

Using AST5124 Crankshaft Pulley Holding Tool, rotate the engine in the normal direction of rotation until the mark on the crankshaft pulley is aligned with the mark on the lower timing chain cover.

If the crankshaft is moved beyond TDC position, rotate it back to approximately 45º before TDC and repeat the crankshaft positioning procedure.

If it is not possible to accurately locate the crankshaft timing mark on the timing chain cover use a suitable TDC positioning tool, such as AST4519+AST3054-10, in the spark plug aperture of no.1 cylinder to ensure that the crankshaft is in the correct position.
With the crankshaft at TDC position on No.1 cylinder the timing marks on the camshaft sprockets should be towards the top. If the marks are not at the top of the sprockets, rotate the crankshaft one full turn in the normal direction of rotation, returning to piston TDC position. Check that the marks are at the top of the sprockets.

To check that the camshaft timing is correct, take a measurement from the timing mark of the inlet camshaft sprocket to the far side of the rib on the upper chain guide. This distance should be 61-64mm. Take a second measurement from the timing mark of the inlet camshaft sprocket to the timing mark of the exhaust camshaft sprocket. This distance should be 124-126mm.

**NOTE:** If the engine timing is out of position by one tooth/one chain link, this is approximately equal to 6mm deviation in measurement.

If the crankshaft is set at TDC position and either of the camshaft position measurements are incorrect, engine timing will need to be adjusted.

### Engine Timing – Adjustment

Engine timing adjustment requires the removal and refitting of the camshaft timing chain. Therefore, the following procedure is applicable to timing chain replacement as well as engine timing adjustment.

Using **AST5127 Camshaft Adjuster Tool Set**, remove the control valve from the Inlet camshaft.

**WARNING:** The control valve has a **LEFT HAND THREAD**. Rotate the tool in a clockwise direction to remove the valve.

Remove the retaining bolt and washer from the exhaust camshaft.

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AST5125.01
Remove the bearing saddle.

**IMPORTANT:** A gauze filter and ball bearing are located at the rear of the bearing saddle. Take care not to allow these or any other components to fall into the chain drive assembly or the engine sump when removing or fitting the bearing saddle.

**NOTE:** An inspection of the camshaft diameters and the bores of the bearing saddle can be performed at this point. A technical product information notice (TPI) was issued by VW group regarding failure of the gauze filter & ball bearing assembly, leading to blocked oil-ways and damaged bearing saddle & camshafts.

Rotate the auxiliary belt tensioner in an anti-clockwise direction to release tension from the belt. Retain the tensioner in position using **AST4840V4 Tensioner Locking Pin** and remove the auxiliary belt.

Remove the auxiliary belt tensioner and the auxiliary belt idler pulley.

Using **AST5124** as a counterhold, release the central bolt of the crankshaft pulley. Do not remove the crankshaft pulley at this stage.

**IMPORTANT:** When the crankshaft pulley central bolt is removed, the crankshaft sprocket is not positively retained on the crankshaft. Do not disturb the engine timing or the chain drive when the bolt is removed.
Ensure that the crankshaft timing marks are aligned, or that the needle of AST3054-10 is in the correct position, with the engine at TDC position on No.1 cylinder. Remove the crankshaft pulley central bolt and the crankshaft pulley.

Fit AST5126 Crankshaft Spacer Bush onto the crankshaft pulley central bolt. Refit the bolt, finger tight only at this stage, to retain the crankshaft sprocket on the crankshaft. Ensure that the crankshaft remains in the correct timing position throughout.

Detach and remove the oil dipstick guide tube.

Remove the bolts that retain the lower timing chain cover. Using a suitable lever, remove the lower timing chain cover starting at points 1 and 2. Take care not to damage the sealing face of the cylinder block or the timing chain cover when removing it from the engine.
Compress the oil pump drive chain tensioner and retain in position using AST4593-1E Tensioner Locking Pin.

Remove the oil pump drive chain tensioner and detach the pump drive chain from the crankshaft sprocket.

Check for elongation of the timing chain. If the timing chain has exceeded its maximum permitted elongation then it must be replaced.

Lift the retaining clip and non-return block of the timing chain tensioner. Fully compress the tensioner plunger and retain in position using AST4593-1E Tensioner Locking Pin.

**NOTE:** When the timing chain tensioner is compressed and chain tension is relieved, the inlet camshaft may rotate in the direction of engine rotation due to valve spring pressure.
Remove the tensioner rail and guide rail for the timing chain.
Remove the timing chain.

**NOTE:** If the chain is to be refitted, note the direction of rotation before removal.

If the balance shaft timing chain is to be adjusted or replaced, refer to section: "Balance Shaft Timing Chain" on page 20.

Using a spanner on the camshaft, rotate the inlet camshaft until the camshaft timing mark is aligned with the cut-out in **AST5128 Camshaft Locking Tool**. Lock the camshaft in position using the locking wedge of **AST5128**. Repeat this process for the exhaust camshaft.

Fit **AST5128 Camshaft Locking Tool** on the camshafts, retain in position using one of the bolts from the bearing saddle. Ensure that the locking wedges are positioned between the sprockets and that the camshafts are free to rotate.

With the camshafts locked in position, fit the timing chain onto the camshaft sprockets, ensuring that two of the coloured links of the chain are aligned with the timing marks of the sprockets.
Petrol Engine Setting/Locking Tool Kit

Fit the timing chain tensioner rail and the chain guide rail, ensuring that the third coloured link is aligned with the mark on the crankshaft sprocket. Tighten the bolts of the timing chain tensioner rail and guide rail to 20Nm.

Remove AST5125 Petrol Engine Setting/Locking Tool Kit. Small movement of the camshafts may occur when the tool is removed. Refit the bearing saddle, finger tight only at this stage, ensuring that the retaining pin is located in the timing chain guide rail and that the gauze filter assembly is in position.

Refit the exhaust camshaft retaining washer, finger tight only at this stage, using a new bolt.

Check that slack within the chain has been removed and that the three coloured chain links are aligned with the timing marks of the camshaft and crankshaft sprockets.

Remove AST4593-1E Tensioner Locking Pin to apply tension to the chain. Ensure that the non-return block and retaining clip are fitted to the tensioner and operating correctly, it should not be possible to fully compress the tensioner.

Refit the oil pump drive chain and chain tensioner, ensuring that the chain is correctly located in the teeth of the crankshaft sprocket and oil pump. Tighten the oil pump chain tensioner bolt to 20Nm. Remove AST4593-1E Tensioner Locking Pin to apply tension to the chain.
Ensure that the sealing surfaces of the cylinder block and the lower timing chain cover are clean and free from oil or used sealant.

Apply a 2-3mm bead of sealant to the sealing face of the lower timing chain cover.
Fit the timing chain cover to the engine, locating on the dowel pins that protrude from the block.

**IMPORTANT:** The cover must be fitted within 5 minutes of applying the sealant. Do not apply more sealant than specified, excess sealant can damage engine components.

Fit the chain cover retaining bolts, tightening to an initial torque of 8Nm, in the sequence shown (1 - 15). Repeat the sequence, tightening the retaining bolts a further 45º to achieve the final torque setting.

Remove the crankshaft pulley central bolt and **AST5126 spacer bush**.

**IMPORTANT:** A new bolt must be fitted. The used crankshaft pulley bolt must be discarded.

Fit a new crankshaft pulley central bolt and refit the crankshaft pulley, finger tight only at this stage.
Ensure that the spline of the pulley is fully located in the spline of the crankshaft.
Check engine timing, refer to section “Engine Timing – Check” on page 3.
Using AST5124 Crankshaft Pulley Holding Tool as a counterhold, tighten the crankshaft pulley central bolt to a final torque of 150Nm + 90°.

Tighten the bolts of the bearing housing to 9Nm.

Tighten the exhaust camshaft retaining bolt to 8Nm + 90° (1.8 engine), or 20Nm + 90° (2.0 engine).

Tighten the inlet camshaft control valve to 35Nm.

**WARNING:** The control valve has a LEFT HAND THREAD. Rotate the tool in an anti-clockwise direction to tighten the valve.

Remove AST4519 TDC Positioning Tool, refit the spark plug and coil pack.

Refit the upper timing chain cover, tighten the bolts to 9Nm in the sequence shown (1-5).

Refit the dipstick guide tube and the solenoid control valve, tightening the bolts to 9Nm.

Refit the auxiliary belt drive tensioner (40Nm) and idler pulley (20Nm), then refit the auxiliary belt.

Remove AST4840V4 Auxiliary Belt Locking Pin to apply tension to the belt.

Reassemble engine components and vehicle front end panel.
**Balance Shaft Timing Chain**

In order to remove the balance shaft chain or adjust the timing of the balance shafts, the timing chain must be removed.

To remove the engine timing chain refer to section “Engine timing – Adjustment” on page 4. With the engine timing chain removed, proceed as follows.

1. Remove the timing chain tensioner and the balance shaft chain tensioner.
2. Remove the balance shaft tensioner rail, followed by the upper guide rail and finally the lower guide rail. Remove the balance shaft timing chain.
3. Align the timing mark (dot) of the inlet side balance shaft sprocket with the mark of the idler sprocket.
4. Fit the balance shaft chain on to the inlet side balance shaft idler, aligning the coloured chain link with the mark on the sprocket at the 1 o’clock position.
5. Fit the balance shaft chain on to the exhaust side balance shaft, aligning the mark on the shaft sprocket with the coloured link of the chain. This mark is approximately at the 12 o’clock position.
6. Align the timing mark (dot) of the inlet side balance shaft sprocket with the mark of the idler sprocket.
Fit the balance shaft chain onto the crankshaft sprocket.

Ensure that the threads of the balance shaft chain tensioner are clean and dry. Apply VW specification locking fluid to the thread balance shaft chain tensioner. Refit the chain tensioner, tightening to 65Nm.

Refer to section “Engine Timing – Adjust” on page 4 for instructions on refitting the engine timing chain.

Fit the balance shaft chain lower guide rail, ensuring that the coloured link of the balance shaft chain is aligned with the mark of the crankshaft sprocket. Fit the upper chain guide rail followed by the tensioner rail. Tighten the tensioner rail and guide rail retaining bolts to 20Nm.