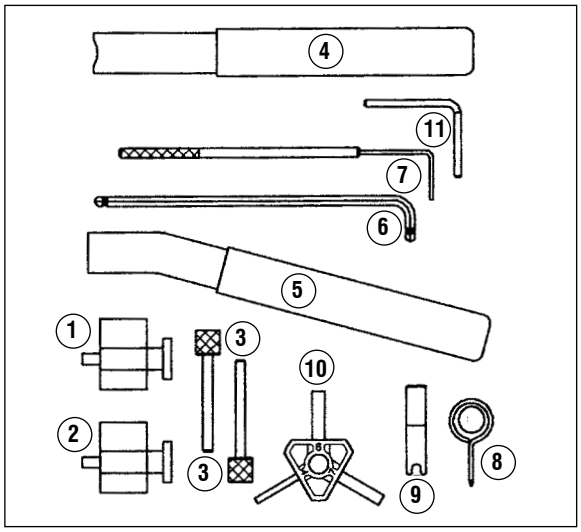
AST4840

Diesel Engine Setting/Locking Tool Kit

Associated Tools: AST4741 Front Panel Support Guide Set

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 'PUMPE DÜSE' (Unit Injection) 1.2TDi, 1.4TDi, 1.9TDi and 2.0 TDi PD Diesel engines in

AUDI:

A2	A3	A4
A6	Cabriolet	

SEAT:

Arosa	Ibiza	Cordoba
Leon	Toledo	Alhambra
Altea		

SKODA

Fabia	Octavia	Superb

VOLKSWAGEN:

Lupo	Polo	Fox
Golf	Bora	Jetta
Golf Plus	Passat	Beetle
Touran	Sharan	Caddy
Transporter		

Also fitted in FORD Galaxy (99-)

For specific engine codes covered by Kit AST4840- refer to 'Engine Code Applications' on following page

Additional AST Tools required:

AST4741 Front Panel Support Guide Set
AST4844 Camshaft Sprocket Holding Tool

Kit contents/spares

Item	Part Number	Description
1	AST4636	Crankshaft Locking Tool (Gold)
2	AST4836	Crankshaft Locking Tool (Silver)
3	AST4440V2	Camshaft Locking Pins (2 per kit)
4	AST4637	Tensioner Adjuster
5	AST4633	Tensioner Adjuster
6	AST4837	Tensioner Adjust Tool
7	AST4838	Tensioner Locking Tool
8	AST4640T7	Tensioner Locking Pin (Mech)
9	AST4638	Tensioner Locking Tool (Hyd)
10	AST4639	Tensioner Setting Tool (Hyd)
11	AST4840V4	Auxiliary Belt Tensioner Locking Pin
--	AST4840-84	Case + Insert

AST4840 Diesel Engine Setting/Locking Tool Kit covers timing belt replacement applications for the Pumpe Düse range of engines in Audi, Seat, Skoda, Volkswagen and Ford Galaxy – see models detailed under "Applications". Specific engine codes covered, are as follows:-

Engine Code Applications

1.2TDi PD
ANY, AYZ

1.4TDi PD
AMF, ATL, BAY, BHC, BMS, BNM, BNV, BWB

1.9TDi PD
AJM, AMG, ANU, ARL, ASZ, ATD, ATJ, AUY, AVB, AVF, AVQ, AWX, AXB, AXC, AXR, BEW, BJB, BKC, BKE, BLS, BLT, BMT, BPX, BRB, BRM, BRR, BRS, BRU, BSU, BSW, BTB, BUK, BVK, BXE, BXF

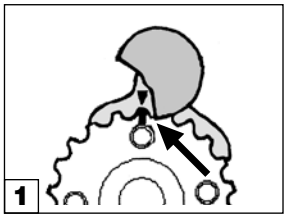
2.0TDi PD
AZV, BDJ, BDK, BGW, BHW, BKD, BKP, BLB, BMA, BMM, BMN, BMP, BMR, BNA, BPW, BRC, BRE, BRF, BRT, BUZ, BE, BVF, BVG, BVH, BWV

IMPORTANT INFORMATION FOR TOOL SELECTION

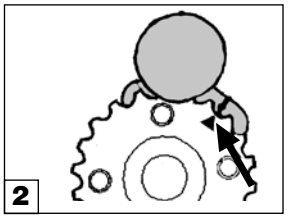
Since their introduction in 1999 these engines have undergone a number of changes some of which dictate which timing tools must be used. These modifications have **not necessarily changed the engine coding** and therefore it is very important that a carefully check of the engine features is made to ensure the correct timing tools are being used.

CRANKSHAFT LOCKING: Check if a Round or an Oval Crankshaft Gear is fitted.

Original crankshaft gears are ROUND.
Use Tool **AST4636** to position crankshaft at TDC – timing marks must align at 12-0-clock position

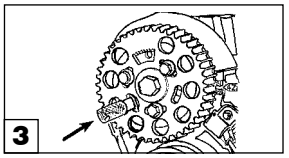


Gradual introduction of OVAL crankshaft gears
Use Tool **AST4836** to position crankshaft at TDC – timing marks MUST align at 1-0-clock position.

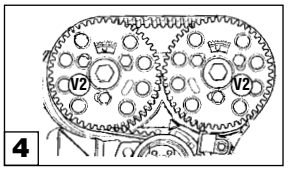


CAMSHAFT SETTING: Check if Single or Twin Camshaft Engine

1.2TDi, 1.4TDi and 1.9TDi PD engines are Single Camshaft (8v.)
Use **1 x AST4440V2** Locking Pin



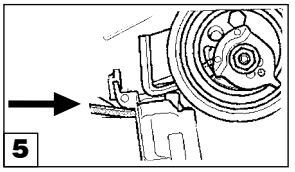
2.0TDi PD engines can be Single (8v.) or Twin Camshaft (16v.) engines
For Twin Cams –
Use **2 x AST4440V2** Locking Pins



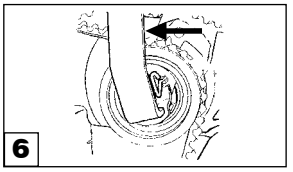
TIMING BELT TENSIONING: Check if Hydraulic or Mechanical Tensioner is fitted

In 2002 some of the 1.2, 1.4 & 1.9 engines changed from a hydraulic belt tensioner to a mechanic tensioner. 2.0TDi PD engines have a mechanical tensioner

Hydraulic Tensioners -
Use tools **AST4637** Adjuster, **AST4638** Locking Tool and **AST4639** Setting Tool



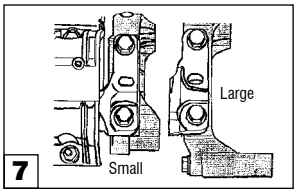
Mechanical Tensioners –
Use tools **AST4633** Adjuster & **AST4640T7** Locking Pin



ENGINE MOUNTING (REMOVAL)- BELT TENSIONING: Check if support is "Large" or "Small" type of engine mounting

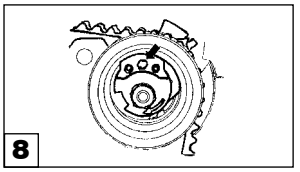
From June 2005 some models have a modified "Larger" engine mounting fitted.

This avoids having to remove the mounting and support the engine, for belt replacement applications.



Plus -

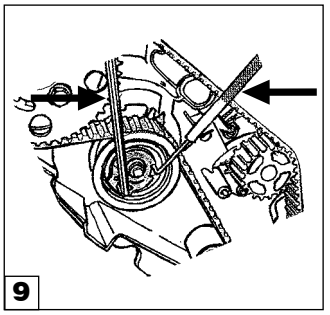
In 2004 the mechanical tensioner design was revised to include an additional hexagon hole for turning to tension the belt.



Therefore-

Alternative Belt Tensioning Tools are used to give access to the mechanical tensioner when the larger engine mounting is fitted and remains in place. These use the additional hexagon hole in the tensioner.

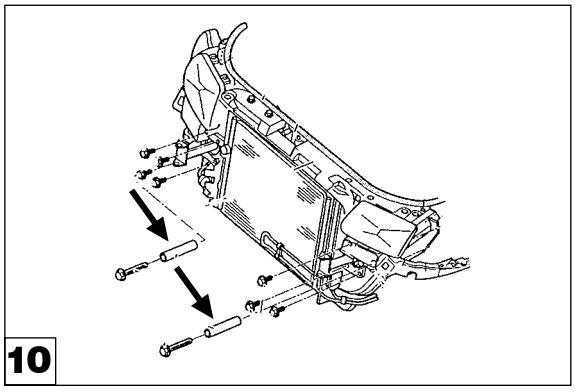
Use tools **AST4837** Adjuster & **AST4838** Locking Tool



AST4741 Front End Support Guides – Service Position (Associated Tool, not in kit)

Almost all V W Group models have the facility of extending the front panel of the vehicle to provide increased access space in the engine compartment to carry out various service applications.

On a number of models, including V W Passat and Audi A4/A6 models moving the front end out to the "Service Position" is part of the timing belt replacement procedure. Use AST4441 Front Panel Support Guides for Audi and Passat (-00) and AST4742 Guides for Passat (00-). Both Guides are included in AST4741 Set.

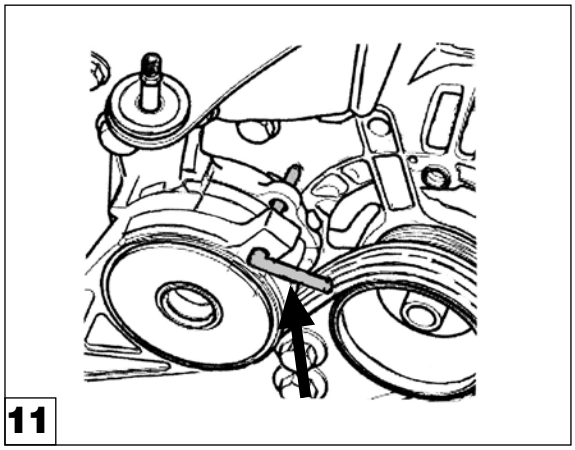


AST4441 *Support Guides from AST4741 Set*

Preparation of the engines and removal of obstructing components for belt replacement, varies according to model/engine but generally turbocharger and intercooler hoses will need to be removed along with timing covers and the crankshaft pulley. It will be necessary to correctly support the engine as mounting brackets will require removal, unless the new "Larger style" mounting has been fitted (see 'Important information for tool selection').

WARNING: On some models the fuel lines will need to be detached from the engine cover. The fuel is pressurised and can be VERY HOT. Take great care to contain any escaping fuel spray and avoid spillage when detaching lines.

On models with AJM, ASZ, ATD, AUY engines the R-H headlight will need to be removed.



AST4840V4 Auxiliary Belt Tensioner Locking Pin

On most of the applications, the tensioner of the auxiliary drive belt is 'locked' down using AST4840V3 Locking Pin and then the tensioner unit removed, allowing access to the front of the engine.

Timing Belt Replacement

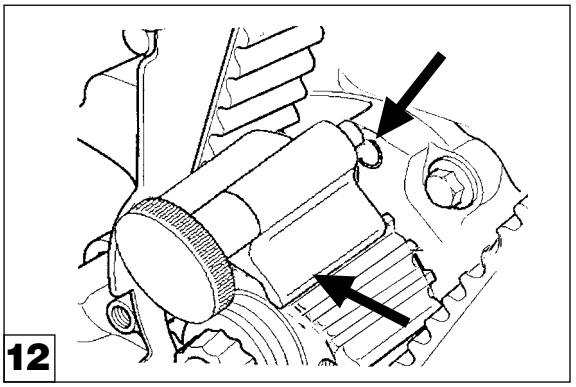
The Pumpe Düse range of diesel engines all have very similar procedures for timing belt replacement and timing adjustment.

A number of the timing tools are common to all engines and tool use is detailed in these instructions, in the following procedural order:-

Crankshaft Locking	– use AST4636 (Gold) on engines with 'Round' crank gear
	- use AST4836 (Silver) on engines with 'Oval' crank gear
Camshaft Locking	– Single camshaft engines 1.2, 1.4, 1.9TDi, 2.0TDi (8v) PD
	– Twin camshaft engines – 2.0TDi PD (16v)
Timing Belt Tensioners	– Hydraulic Tensioner – Mechanical Tensioners (02- & 04-)
Checking & Adjusting Timing	– Single camshaft engines 1.2, 1.4, 1.9 & 2.0TDi PD
	– Twin camshaft engines – 2.0TDi PD

IMPORTANT: The engine must be **COLD** when carrying out timing belt replacement applications.

Crankshaft Locking



AST4636 (Gold) and AST4836 (Silver) Crankshaft Locking Tools

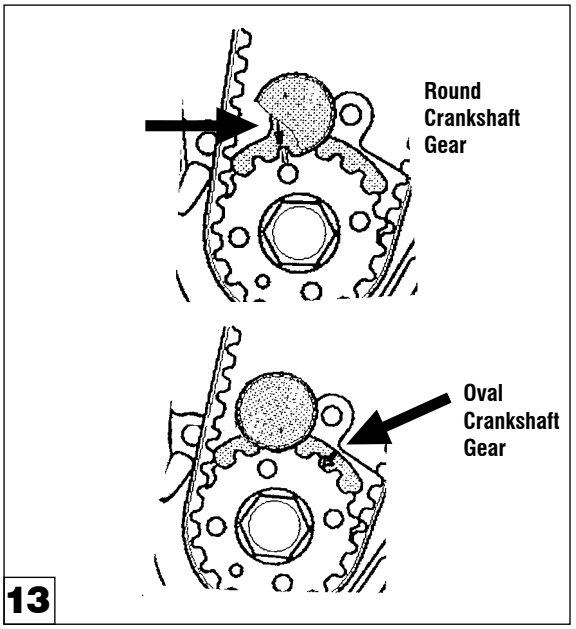
The crankshaft is turned **clockwise** to TDC position, No.1 cylinder. TDC position can be confirmed by:-

Checking that the gear segment in the camshaft sprocket window is on top and that the mark on the rear belt guard is aligned to the marking on the camshaft sensor wheel located behind the sprocket - see diagram 14, 15 and 16.

WARNING: Ensure that the correct Crankshaft Locking Tool is used for the type of crank gear fitted.

The crankshaft is locked in timed position using AST4636 Locking Tool (Gold) for engines with a 'Round' crankshaft gear, or AST4836 Locking Tool (Silver) for engines with an 'Oval' crankshaft gear. The tool locates into the gear teeth and at the same time into the hole in the oil seal housing.

NOTE: The tool **slides** into the gear teeth **from the front face** of the crankshaft gear. It cannot locate correctly if only placed directly on to the top of the gear.

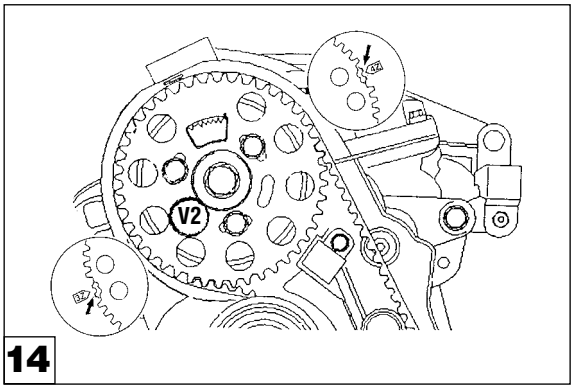


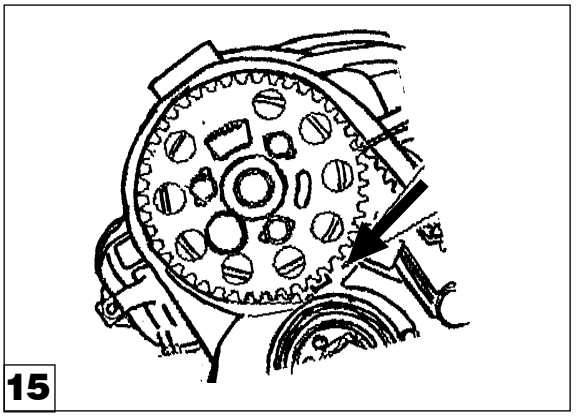
Timing marks on the Crankshaft Locking Tools and gear must align

WARNING: The timing mark "arrow" on the Crankshaft Locking Tools MUST align with the timing mark on the crankshaft gear. If the incorrect tool has been selected, the timing marks will not align. Temporarily remove the plastic knob off AST4636 to improve visibility of the timing marks.

IMPORTANT: Crankshaft Locking Tools **MUST NOT** be located in position whilst the engine is being rotated. The engine must be positioned at TDC **BEFORE** the tool is fitted. If the engine is turned passed the TDC position, turn the crankshaft back ¼ turn and then forward again to insert the Tool.

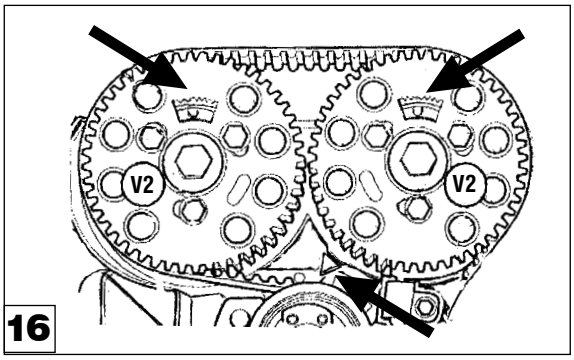
Camshaft Locking





Single camshaft engines - 1.2, 1.4 & 1.9 & 2.0TDi PD

Check that the gear segment in the camshaft sprocket window is on top and the mark on the rear belt guard is aligned with the marking on the camshaft sensor wheel, located behind the sprocket. On some engines the marks are "**3Z**" (on left) for 3 cylinder engines, or with '**4Z**' (on right) for 4 cylinder engines (as diagram 14.) On other engines the mark position will be as diagram 15.



Twin camshaft engines – 2.0TDi PD
Check that the gear segments in the 'windows' are on top (in both camshaft sprokets) and that the timing marks on the rear cover and camshaft sensor wheel align.

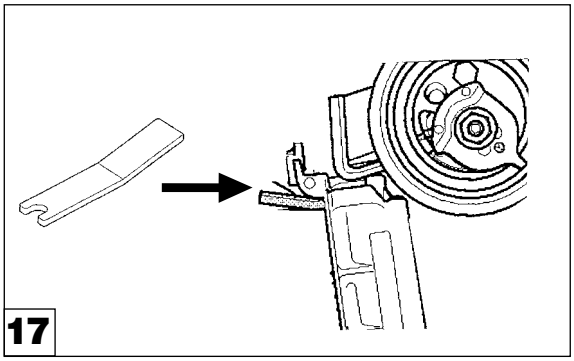
AST4440V2 Camshaft Locking Pins

Single camshaft engines – AST4440V2 Locking Pin is inserted through the free elongated hole on the left hand side of the camshaft sprocket and passes through the sprocket/sprocket carrier and into the datum hole in the cylinder head.

Twin camshaft engines – The kit includes 2 x AST4440V2 Pins. Both Pins are required for the 2.0TDi PD twin camshaft engine. Insert in to the free elongated holes – on the left hand side of the Exhaust camshaft sprocket and on the right hand side of the Inlet camshaft sprocket.

Hydraulic Timing Belt Tensioners (Automatic)
Single camshaft engines

The hydraulic (automatic) timing belt tensioner requires special tools AST4638 Locking Tool, AST4639 Setting Tool (Gap Setting) and AST4637 Tensioner Adjuster which locates in to the two holes in the tensioner pulley.



AST4638 Tensioner Locking Tool

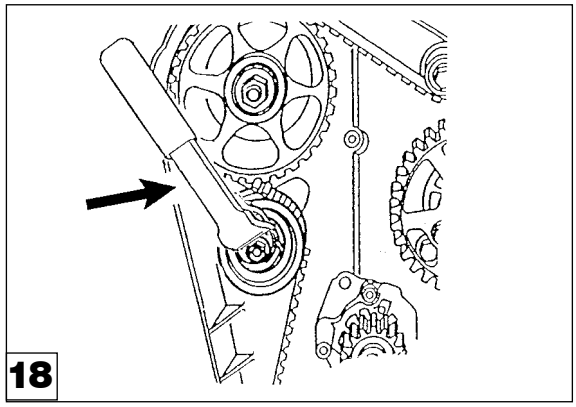
Using a suitable allen key locate onto the tensioner and turn it **anti-clockwise** to depress the tensioner until AST4638 Tensioner Locking Tool can be inserted.

IMPORTANT: Ensure the allen key is inserted fully into the hexagon as this is quite shallow and could be rounded off if the allen key slips out.

Slacken the tensioner nut and remove the automatic tensioner device and timing belt.

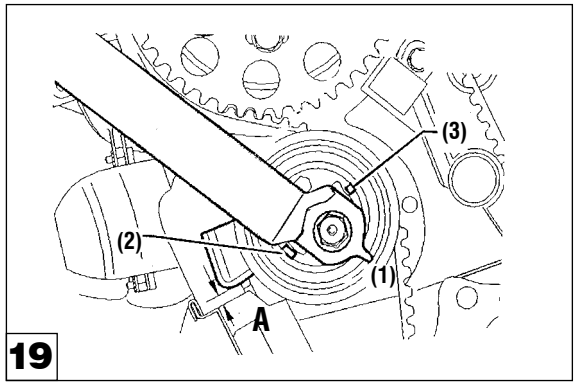
Check that the Crank Locking Tool, Camshaft Locking Pin and Tensioner Locking Tool are all in place and that all timing marks align.

Loosen the 3 x camshaft sprocket bolts and turn the sprocket **fully clockwise** so that the bolts are at the ends of the elongated holes. Tighten bolts finger-tight only.



AST4637 Tensioner Adjuster

Locate AST4637 Adjuster into the two holes in the tensioner eccentric and turn it **clockwise** until pointer **(1)** comes to a stop at position **(2)** - see diagram 19.

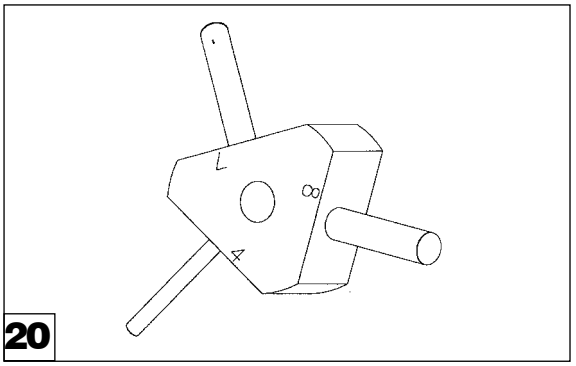


Fit new timing belt in the following order – camshaft sprocket, tensioner, crankshaft gear, water pump sprocket and Install the tensioner device.

IMPORTANT: The belt must be taut between the sprockets on the side opposite the tensioner.

Turn the tensioner eccentric slowly **anti-clockwise**, using AST4637 Adjuster, back towards position **(3)** until the AST4638 Tensioner Locking Tool can be easily removed.

NOTE: Ensure AST4637 Adjuster remains in this position.



AST4639 Tensioner Setting Tool

The AST4639 Setting Tool provides 4mm, 7mm and 8mm pins for setting the gap on the tensioner at position **A**,see diagram 19.

ANY and AYZ engines – 7mm. +- 1mm.

PD Engines with Hyd.Tensioner,
(Except ANY and AYZ) – 4mm. + - 1mm

Insert the appropriate size pin from AST4639 at position "**A**" (see diagram 19), and using AST4637 Adjuster carefully allow the tensioner to slowly move **clockwise** to adjust the distance at position "**A**" to the pin diameter. Tighten tensioner nut.

Tighten camshaft sprocket bolts and remove locking tools from crankshaft and camshaft.

Turn the crankshaft twice, by hand, and return the engine to TDC position.

Check that the tensioner dimension at position "**A"** is correct to size specification.

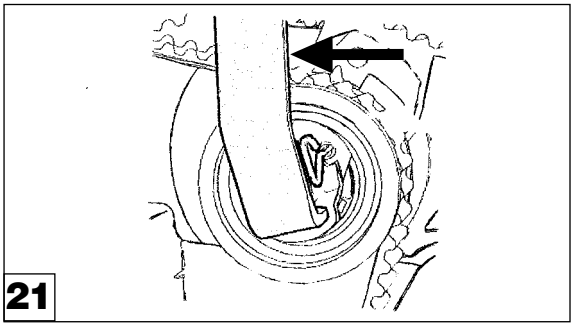
Mechanical Timing Belt Tensioners

Single camshaft engines (02-) and Twin camshaft engines

The mechanical timing belt tensioner requires special tools --
- AST4640T7 Locking Pin
- AST4637 Tensioner Adjuster - 1.2, 1.4 & 1.9TDi PD engines
or AST4633 Tensioner Adjuster – 2.0TDi PD engines

Ensure the crankshaft is 'locked' with AST4636 (Round Gear) or AST4836 (Oval Gear) and the AST4440V2 Locking Pins are locking the camshafts (1 x for single cams and both for twin cams, as described earlier)

Loosen the camshaft sprocket bolts so the sprocket(s) can be moved within the elongated holes, but not tilt.



Slacken the tensioner nut and using the appropriate Adjuster (AST4637 or AST4633) turn the tensioner **anti-clockwise** until AST4640T7 Locking Pin can be inserted.

Turn the tensioner **fully clockwise** until it reaches the stop and tighten pulley nut.

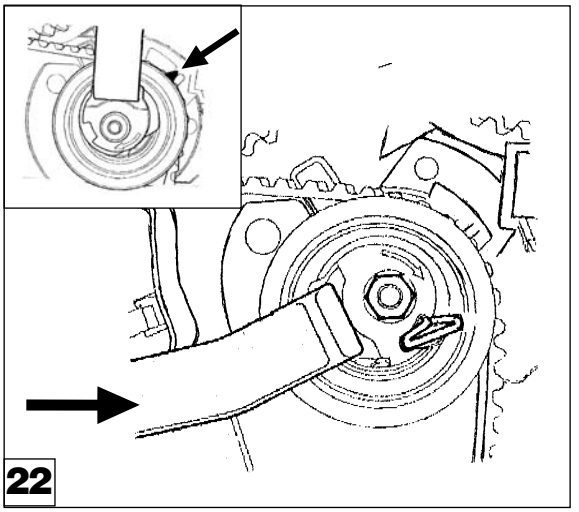
Remove the old timing belt.

Check that crankshaft and camshaft locking tools are in place and timing marks align.

Ensure that the tensioner retaining "lug" is fully engaged. (Seated properly in the rear toothed belt guard).

NOTE: Turn the camshaft sprockets(s) **clockwise** in the elongated holes.

Fit the new timing belt commencing at the crankshaft gear.



Slacken the tensioner nut and using AST4633/AST4637 turn the tensioner **anti-clockwise** until AST4640T7 Locking Pin can be removed. Now turn the tensioner **clockwise** until the tensioner pointer is aligned with the 'notch' in the back plate.

NOTE: Tensioner pulley nut must not be allowed to turn. Restrain movement of the tensioner using the Tensioner Adjuster and tighten pulley nut

IMPORTANT: The tensioner pointer may be allowed to move **clockwise a maximum of 5mm. to the right** of the 'notch' in the back plate DO NOT adjust this position as it will correct and settle after the engine has run for a while.

Using AST4844 Sprocket Holding Tool keep the belt under tension by applying pressure on sprocket anti-clockwise whilst counter-holding the sprockets and tighten camshaft sprocket bolts.

Remove locking tools from crankshaft and camshaft.

Turn the crankshaft over twice, by hand, and return the engine to TDC position fitting the appropriate Crankshaft Locking Tool.

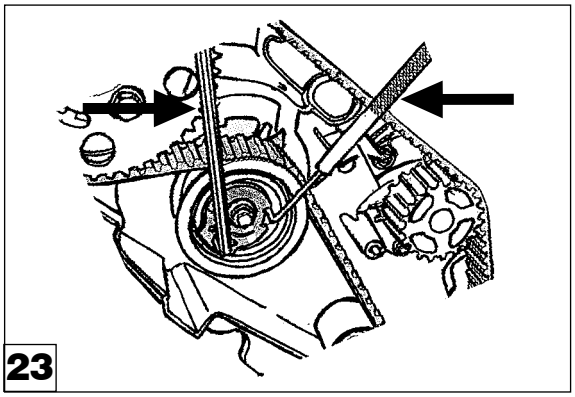
Ensure all timing marks align and check that the Camshaft Locking Pins can be easily inserted.

Check that the tensioner pointer is in line with the 'notch'

Remove all timing tools.

Mechanical Timing Belt Tensioners - (04)

In 2004 the mechanical tensioner was revised to include an additional hexagon hole for tensioning the belt - see diagram 8.



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AST4837 Adjusting Tool and AST4838 Locking Tool

Alternative Belt Tensioning Tools are used to allow access to the mechanical tensioner when the 'larger style' engine mounting is fitted to avoid having to remove the mounting. Use AST4837 Adjuster in the hexagon hole to turn the tensioner and AST4838 to "lock" the tensioner. The procedure for tensioning the time belt when using these tools is the same as the earlier mechanical tensioner

Checking & Adjusting valve timing
Single camshaft engines – 1.2, 1.4, 1.9 & 2.0 (8v) TDi PD

Turn the crankshaft to TDC position and insert the correct Crankshaft Locking Tool.

Check that all timing marks align and that AST4440V2 Locking Pin can be inserted easily to lock the camshaft.

If AST4440V2 Pin cannot be inserted - pull the Crankshaft Locking Tool forward on the crankshaft gear so its lug is no longer engaged in the hole in the oil seal housing.

Turn the crankshaft until AST4440V2 Locking Pin can be inserted in the camshaft.

Loosen the 3 x camshaft sprocket bolts and turn the crankshaft **anti-clockwise** until the lug of the Crankshaft Locking Tool just passes the hole in the oil seal housing. Turn the crankshaft **clockwise** until the Crankshaft Locking Tool can again be inserted into the hole in the oil seal housing, to lock the crankshaft.

Tighten the 3 x camshaft sprocket bolts and remove all timing tools.

Turn the crankshaft over twice, by hand, and return the engine to TDC position fitting the Crankshaft Locking Locking Tool.

Ensure all timing marks align and check that the Camshaft Locking Pin can be easily inserted.

Remove all timing tools.

Checking & Adjusting valve timing
Twin camshaft engines – 2.0TDi PD

Turn the crankshaft, by hand, two turns returning the engine to TDC and just before achieving TDC Insert the AST4440V2 Camshaft Locking Pin to lock **the left hand (Exhaust)** camshaft sprocket.

Check if the right hand sprocket can be locked with the other AST4440V2 Pin and that the Crankshaft Locking Tool can be inserted and the belt tensioner pointer is in the centre or a **maximum of 5mm to the right** of the 'notch' in the base plate.

(1) If the right hand camshaft sprocket CANNOT be locked - Loosen its 3 x bolts and using a spanner on the centre bolt turn the sprocket until AST4440V2 Pin can be inserted. Tighten 3 x bolts.

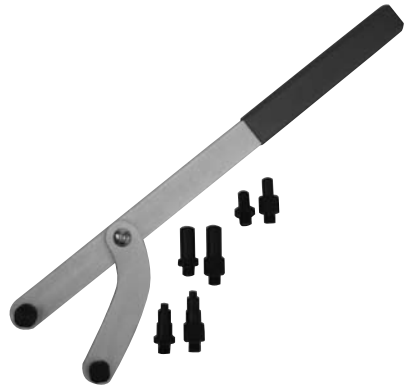
Remove tools, rotate crankshaft, by hand, two turns returning to TDC. Repeat the timing check by inserting crankshaft and camshaft locking tools. Check belt tensioner pointer position - refer to 'Mechanical Timing Belt Tensioners'.

(2) If the crankshaft CANNOT be locked – Insert AST4440V2 Locking Pins to lock both camshaft sprockets and loosen the 6 x camshaft sprocket bolts.

Turn the crankshaft, in the normal direction of rotation until the Crankshaft Locking Tool can be correctly inserted.- see note under "Crankshaft Locking" on action if crankshaft is rotated passed TDC position.

Tighten the 6 x sprocket bolts.

Remove tools, rotate crankshaft, by hand, two turns returning to TDC. Repeat the timing check by inserting crankshaft and camshaft locking tools. Check belt tensioner pointer position - refer to 'Mechanical Timing Belt Tensioners'.



AST4844 Camshaft Sprocket Holding Tool - associated tool - not in Kit

AST4844 is required to counter-hold the camshaft sprockets when releasing or tightening the sprocket bolt(s).

AST4844 Holding Tool is supplied with four pairs of interchangeable location pins to cover numerous VAG camshaft sprockets.

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