

# LASER<sup>®</sup>

Part No. 8824

## Instructions

### Engine Timing Tool Kit for VW Group 1.5 TSi Petrol



**UK** REGISTERED  
DESIGN

**EU** REGISTERED  
DESIGN

[www.lasertools.co.uk](http://www.lasertools.co.uk)

## Description

The Laser 8824 kit has been developed to allow the user to align, set and check the engine timing of the Volkswagen group EA 211, 4-cylinder TSI petrol engines without the need to resort to computer- based alignment tools. Made in Sheffield.

The 8824 utilises a battery-powered digital inclinometer combined with precision manufactured adaptors and alignment tooling to ensure the camshafts are set to the manufacturer's specification. There should be no requirement for interaction with the vehicle's OBD system when following the Laser Tools procedures detailed below.

- Applications include Audi (from 2017), Seat (from 2017), Skoda (from 2017) & Volkswagen (from 2017).
- Engine Applications include: 1.5L TSi petrol engines -DACA, DACB, DADA, DFYA, DHFA, DPBA, DPCA & DPBE.
- Engine variants include EA211, EVO 4-cylinder TSi ACT.
- Use only in connection with Laser Tools 8824 instructions.
- Camshaft pulley holding tools (Laser 7279 and 8421) or similar must be used when loosening or tightening the camshaft pulleys.

**NOTE:** For 1.0L, 1.2L, 1.4L, & 1.6L TSi petrol engine variant use 8824 with 8866.

**Warning:** Hybrid Vehicles use a high voltage system. Please ensure the proper precautions are taken when working on hybrid vehicles to avoid the risk of shock and injury.

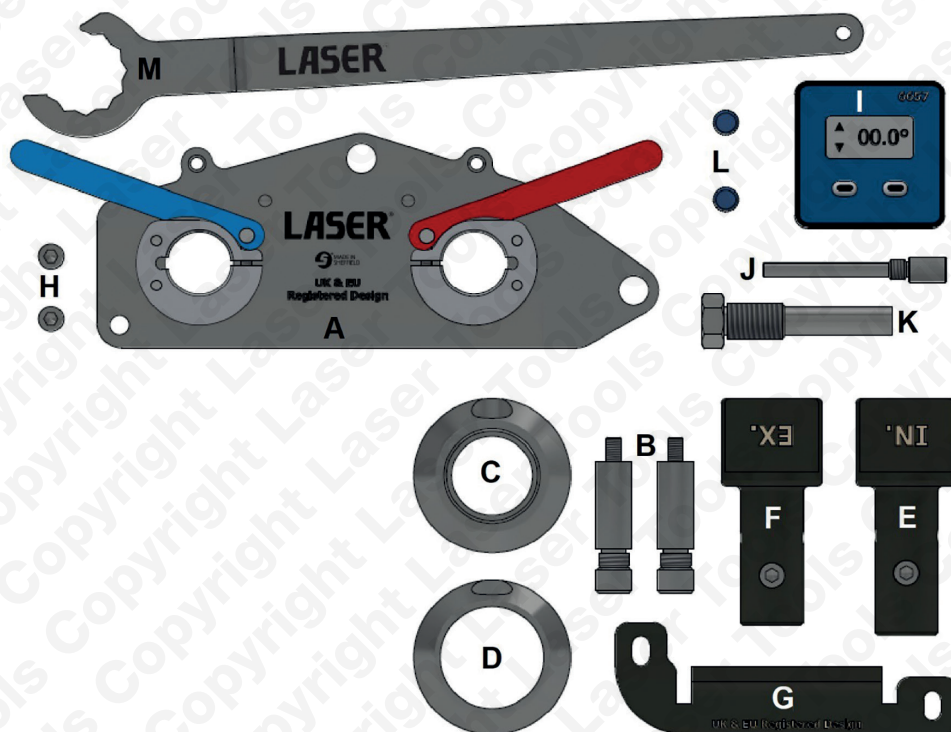
Personnel working with hybrid and PHEV vehicles must be trained to the level required by the vehicle manufacturer.

## Applications

Make	Model	Year
AUDI	A1	FROM 2018
	A3	FROM 2017
	Q2	FROM 2018
	Q3	FROM 2018
SEAT	ARONA	2017 TO 2021
	ATECA	FROM 2018
	IBIZA	2017 TO 2021
	LEON	FROM 2018
	TARRACO	FROM 2019
SKODA	KAMIQ	FROM 2019
	KAROQ	FROM 2017
	KODIAQ	FROM 2019
	OCTAVIA III/IV	FROM 2017
	SCALA	FROM 2019
	SUPERB III	2017 TO 2020
VOLKSWAGEN	ARTEON	2018 TO 2020
	GOLF VII/VIII	FROM 2017
	PASSAT	FROM 2018
	POLO	2017 TO 2021

Engine Codes
1.5LT
DADA
DFYA
DHFA
DPCA
DACA
DPBA
DACB
DPBE

## Kit List



Item	Comp. No.	Description	OEM.
A	C1052	Adaptor Plate for Camshaft Housing	VAS 611 007
B	C1053	Mounting Spacers & Screws for A	
C	C1056	Inlet Camshaft Spacer Boss (EA211 EVO)	
D	C1057	Exhaust Camshaft Spacer Boss (EA211 EVO)	
E	C1058	Inlet Camshaft Adaptor (EA211 EVO)	
F	C1059	Exhaust Camshaft Adaptor (EA211 EVO)	
G	C1060	Inclinometer Reference Bar (EA211 EVO) 1.5	
H		Fixing Screws for G	T10504/1
I	C784	Inclinometer	
J	C735	Camshaft Rear (water pump) Sprocket Timing Pin	T10340
K	C439	Crankshaft Timing Pin	
L	C1044	Lever Stop Pins x 2	
M	C685	Tensioner Pulley Adjuster Tool	T10499



For torque settings please refer to OEM derived data such as the vehicle manufacturer's own data or Autodata.

The use of this engine timing kit is purely down to the user's discretion and The Tool Connection Ltd. cannot be held responsible for any damage caused whatsoever.

## Instructions for use

**NOTE:** When loosening and tightening any pulley or sprocket fixing, do not use the camshaft or crankshaft alignment tools to torque against. **ALWAYS use the correct sprocket/pulley holding tool.**

### **IMPORTANT: BEFORE EACH USE:**

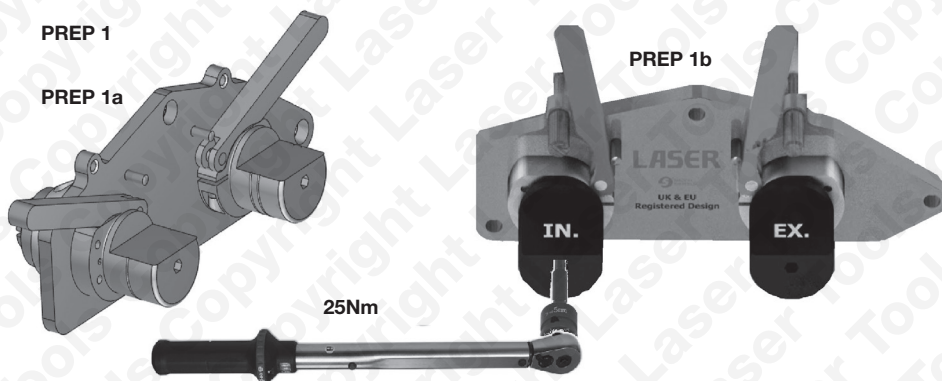
#### **8824 – Digital Camshaft Angle Setting Kit – Preparation and Clamp adjustment.**

Before each use the clamping action of the adaptor locking levers may require adjustment. The following procedure should be used to set the clamping force (see image PREP 1):

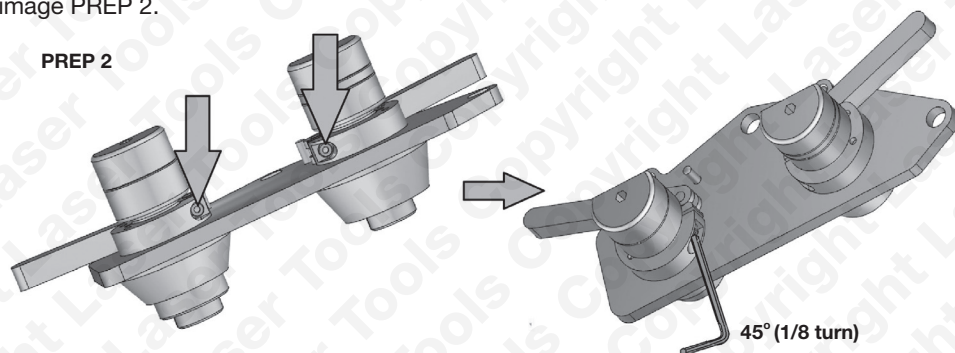
Assemble the 8824 camshaft locking tools on a bench as shown in image PREP 1a, including fitting the camshaft adaptor into the assembly.

Lock the adaptor locking levers and insert the lever stop pins as shown in image PREP 1b.

Using a 6mm hex-key socket and torque wrench check that the adaptors do not rotate when a torque of 25Nm is applied (Image PREP 1b).



If the adaptors rotate at less than 25Nm tighten the clamping adjuster screw as shown in image PREP 2.



#### **Adjusting the Clamping force:**

Unlock the levers and turn the assembly upside down to access the adjuster screws.

**Note: ensure the camshaft adaptors are fully inserted into the clamps.**

Adjust the clamping force using a 3mm hex key as shown in image PREP 2.

Tighten the screw by 1/8 of a turn then recheck the torque figure detailed in image PREP 1b.



## Vehicle Preparation

Access is required to both ends of the cam drive system which may require the removal of some or all of the following dependent on vehicle model:

- Engine coolant.
- Engine top and bottom covers.
- Right hand front wheel and inner wheel arch.
- Coolant expansion bottle.
- Air filter housing and turbo charger pipes.
- Water pump drive belt and hoses.

Working from the transmission end of the engine remove:

- The Inlet camshaft end cover.
- Water pump (exhaust camshaft end).

Working from the belt end of the engine:

- Remove the timing belt cover.
- Remove the 5 fixing screws from the exhaust camshaft adjuster cover plate.

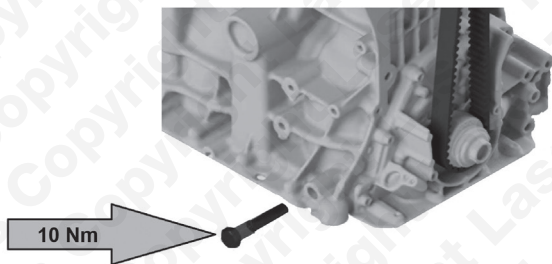
### Initial setting of the engine (old belt in place):

#### Component K – Crankshaft locking pin

Locate the crankshaft locking pin blanking plug on the rear of the engine block and remove it. Screw the crankshaft locking pin (K) into the threaded hole and tighten to 10Nm. If (K) will not screw fully in remove it and turn the crankshaft through  $\frac{1}{4}$  of a turn clockwise. Refit (K) and tighten to 10Nm. Now turn the crankshaft clockwise until it locks against the nose of (K).

See figure 1.

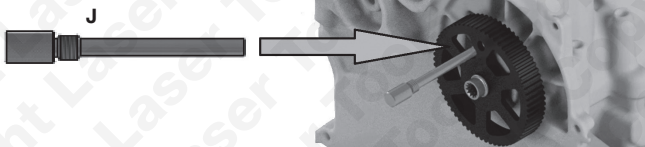
FIG: 1



#### Component J – Exhaust camshaft rear sprocket timing pin:

Fit the exhaust camshaft rear sprocket timing pin (transmission end) as shown in figure 2. If the hole in the pulley is 180 degrees out, remove (K) and rotate the crankshaft 360 degrees. Refit (K) and fit (J) as shown.

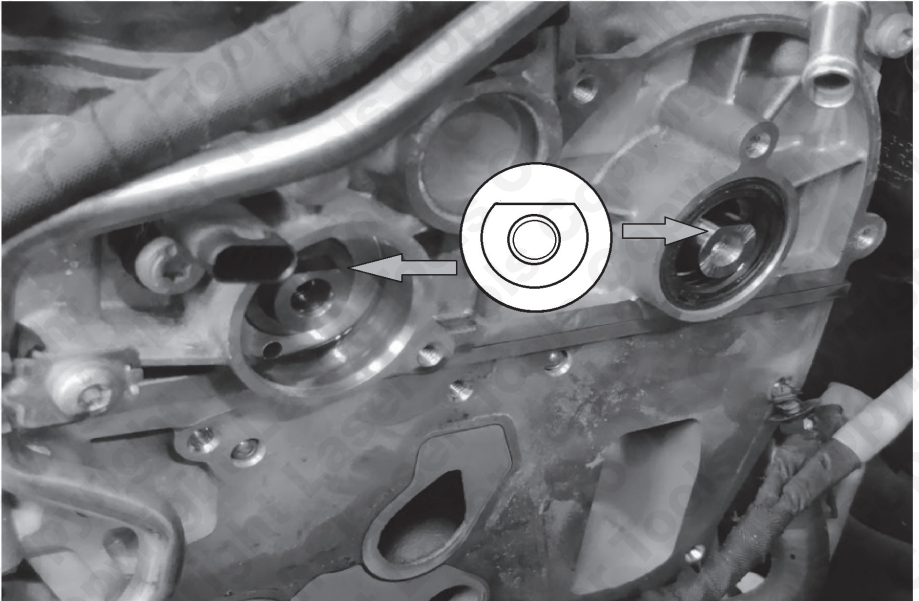
FIG: 2



Once the initial mechanical alignment has been set remove (J) and using a suitable pulley holding tool remove the water pump drive pulley from the camshaft.

Check both camshaft flats are in the 12 o'clock (horizontal) position as shown in Figure 3.

FIG: 3



#### Fitting Camshaft Timing kit:

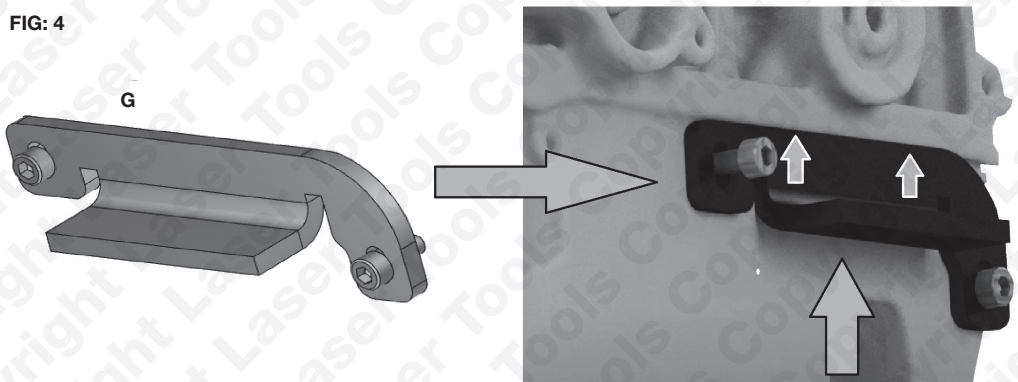
To accurately check the camshaft timing, it is necessary to fit the full 8824 kit to the transmission end of the camshafts as follows:

#### Components G & H – Inclinator Reference Bar:

First fit the reference bar (G) using fixing screws (H) as shown in Figure 4.

**IMPORTANT:** Ensure this area is clean so that the bar fits flush and touching against the bottom of the cylinder head for the full length of the top of (G) as shown.

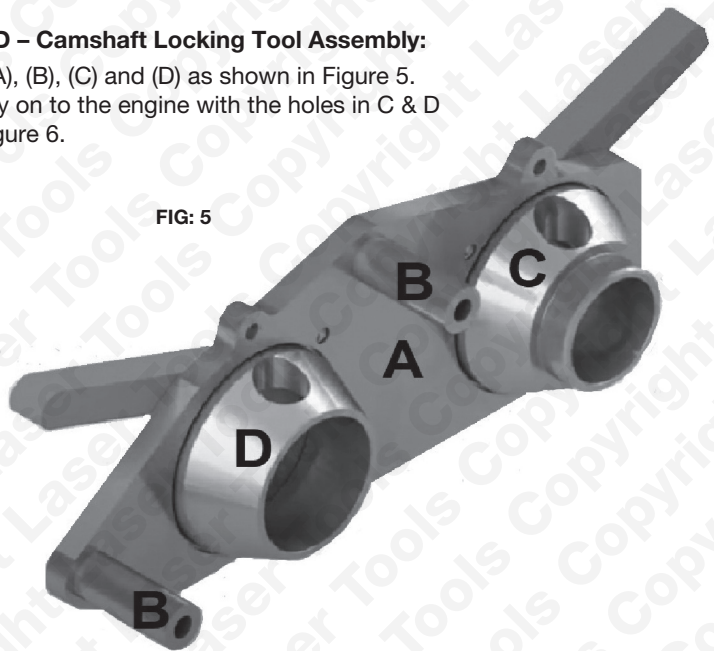
FIG: 4



### Components A, B, C & D – Camshaft Locking Tool Assembly:

Assemble components (A), (B), (C) and (D) as shown in Figure 5.  
Then mount the assembly on to the engine with the holes in C & D facing up as shown in Figure 6.

FIG: 5



### Components E & F – Camshaft Adaptors:

Insert the 2 camshaft adaptors (E & F). See Figure 6.

**NOTE:** it is important that (E) & (F) are fitted to the correct camshaft as dictated by the markings. (E) must be fitted to the inlet camshaft and (F) to the exhaust camshaft. The ends of (E) & (F) must engage properly with the camshafts.

Tighten the clamping screws on both (E) & (F) using a 6mm hex key as shown in Figure 7.  
Max torque 15Nm.

FIG: 6

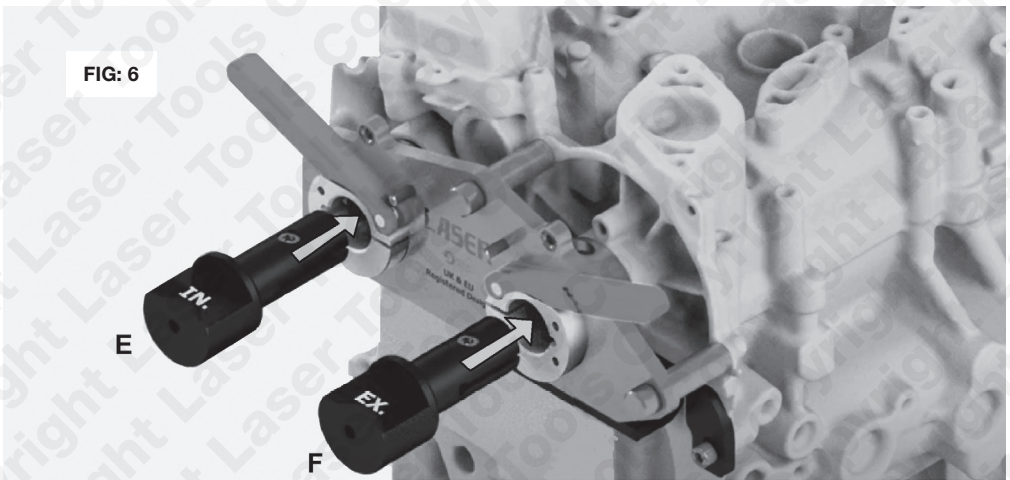
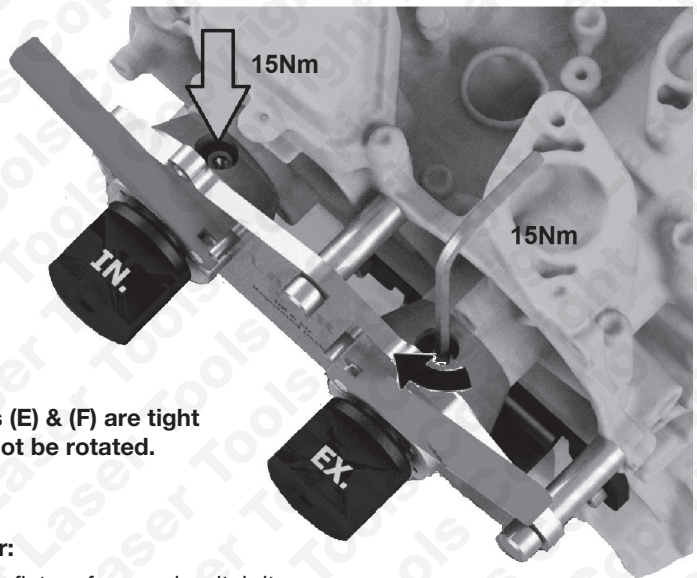


FIG: 7



**NOTE:** Ensure the adaptors (E) & (F) are tight on the camshafts and cannot be rotated.

### Checking timing:

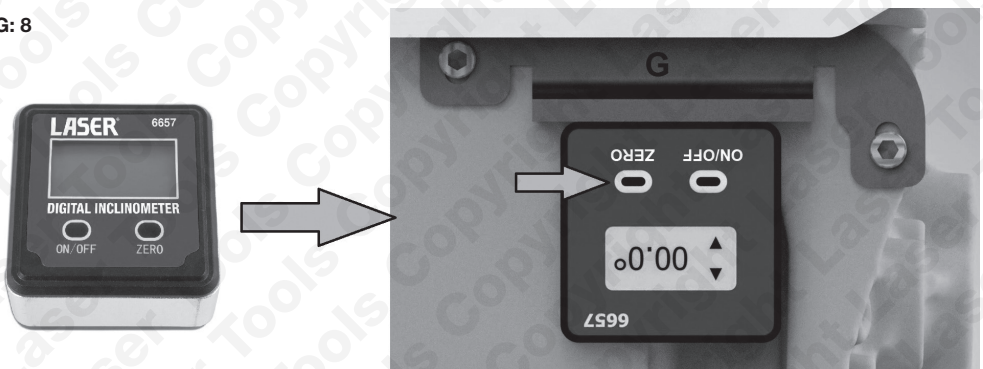
#### Component I – Inclinometer:

Place the inclinometer (I) on a flat surface and switch it on. Allow the reading to stabilise.

With the engine set as detailed above place the inclinometer (I) upside down up against the inclinometer reference bar (G) as shown in Figure 8 and allow to stabilise.

Holding the inclinometer against (G) press ZERO to set the inclinometer to 00.0.

FIG: 8



Move the inclinometer to the flat on the inlet adaptor (the correct way up) and record the value shown. Repeat for the exhaust adaptor and record the readings. See Figure 9.

**NOTE:** always record the direction of the reading.

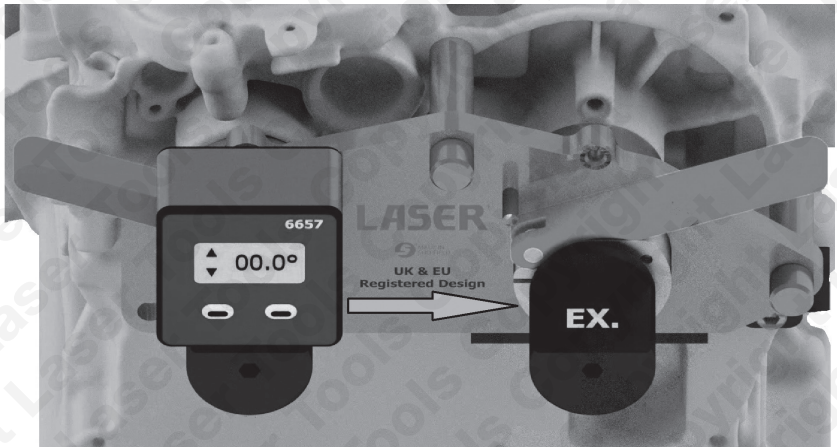
Arrow up (▲) = Negative angle,

Arrow down (▼) = Positive angle.

**NOTE:** The arrows on the inclinometer indicate the direction to go to find zero.



FIG: 9



Compare recorded reading to the vehicle manufacturer engine specific data.

**Example: Engine code DADA (1.5lt)**

**Specified inlet timing angle  $-0.3^\circ \pm 1.2^\circ$  = range of  $-1.5^\circ$  (▲) to  $+0.9^\circ$  (▼)**

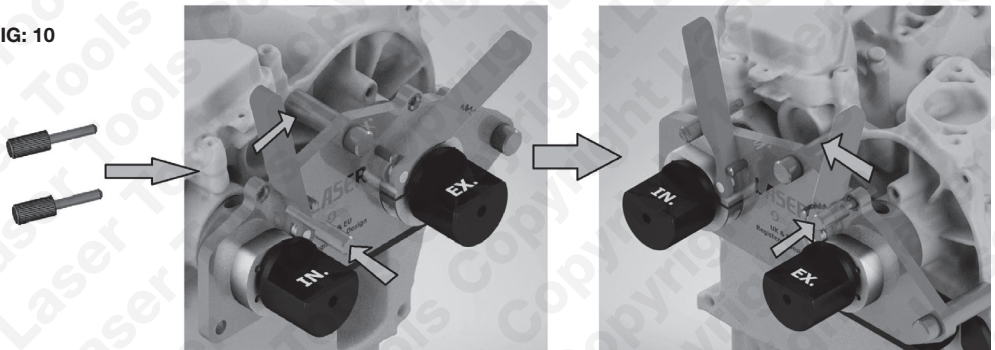
**Specified exhaust timing angle  $+1.1^\circ \pm 1.2^\circ$  = range of  $-0.1^\circ$  (▲) to  $+2.3^\circ$  (▼)**

**WARNING: Figures quoted above are for demonstration purpose only. Please refer to specific engine tolerances as quoted by the vehicle manufacturer or Autodata.**

#### Camshaft drive belt removal:

With the 8824 kit fitted as shown in Figure 7, lock the camshaft adaptors (E) and (F) by lifting the red and blue locking levers and inserting the lever stop pins (L) as shown in Figure 10.

FIG: 10

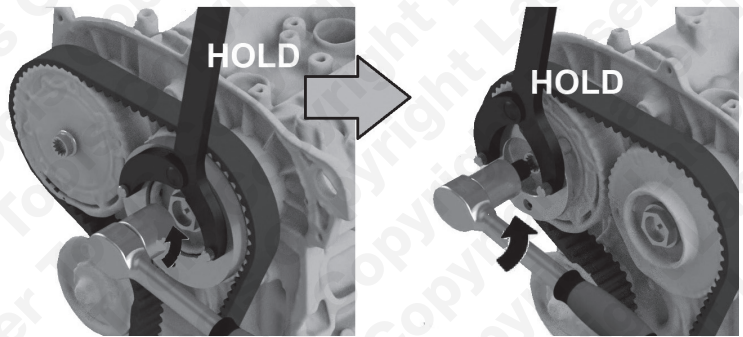


Using an appropriate pulley holding tool loosen the inlet camshaft adjuster control valve. See Figure 11.

Using an appropriate pulley holding tool loosen the exhaust camshaft pulley bolt and replace with new (finger tight only). See Figure 11.

**NOTE: For camshaft holding Laser Tools recommend Laser 8421 used with Laser 7279.**

FIG: 11

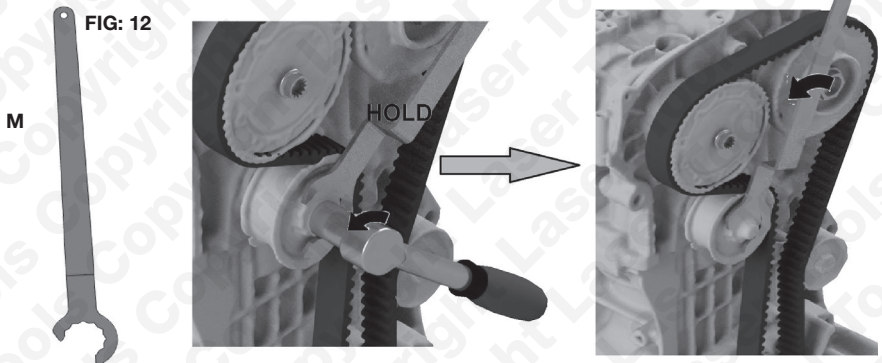


**NOTE:** the exhaust pulley fixing bolt should not be reused.

**WARNING:** Never attempt to loosen or tighten against the 8824 camshaft or crankshaft locking tools.

### Component M – Tensioner Pulley Adjuster Tool

- With the crankshaft still seated against the crankshaft locking pin (K) and the camshaft locked as shown in Figure 10 release the timing belt tensioner using the tensioner adjuster tool (M). See Figure 12.



- Remove the belt leaving the pulleys on the camshaft with their fixings finger-tight.

### Camshaft drive belt fitting:

**NOTE:** Before fitting the new belt ensure the camshaft adjuster control valve and crankshaft sprocket are in good order as described in the manufacturer's instructions.

With the crankshaft still seated against the crankshaft locking pin (K) and both camshafts locked as shown in Figure 10, fit the new belt to the crankshaft pulley only.

Fit the lower timing belt cover and crankshaft pulley as detailed in the manufacturer's instructions using an appropriate crankshaft pulley holding tool (see Laser 6998). Tighten the crankshaft pulley bolt to the correct torque and angle (see manufacturer's data).

Fit the new belt to the rest of the pulleys in the following order – guide pulley, exhaust camshaft and the inlet camshaft.

Check the camshaft pulley fixings are finger-tight only and the pulleys can turn independently of the camshafts. Tension the belt using the tensioner pulley adjuster (M) as detailed in the manufacturer's instructions.

Check the camshaft adaptor angles as detailed in the **Checking Timing** section above to ensure the camshafts have not moved (Figures 8 and 9).

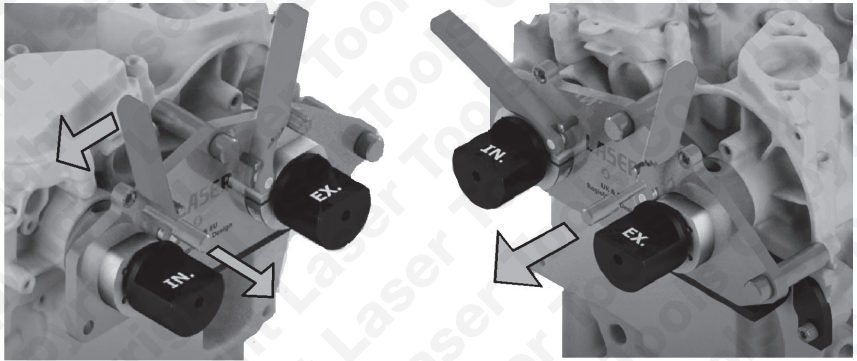
Using the appropriate holding tools tighten the camshaft pulley fixings to the manufacturers specified torque (Assembly torque only, not full final torque, in this example around 20Nm).

**NOTE: Every time the angles are checked always zero the inclinometer using the reference bar (G) figure 8 & 9. This is to ensure any change in the angle of the engine when for example raising or lower the vehicle ramp is compensated for.**

#### **Final checks:**

Release the red and blue locking levers by removing the lever stop pins (L) as shown in Figure 13.

**FIG: 13**



Remove the crankshaft locking pin (K).

Turn the crankshaft 2 complete turns stopping just before returning to the TDC position and reinsert the crankshaft locking pin (K). Turn the crankshaft until it stops against (K).

Recheck the camshaft angles as detailed in the **Checking Timing** section (Figures 8 and 9) on pages 8 and 9.

Compare the reading to the manufacturer specification. If no adjustment is required the camshaft pulleys can be tightened to the manufacturer's full specification.

#### **If adjustment is required perform the following procedure:**

##### **Initial Camshaft Setting & Calculation of Correction Angles:**

With the crankshaft still set against the crankshaft pin (K) lock the camshafts as detailed in Figure 10. Using an appropriate pulley holding tool loosen the inlet camshaft adjuster control valve and finger tighten. See Figure 11.

Using an appropriate pulley holding tool loosen the exhaust camshaft pulley bolt and finger tighten. See Figure 11.

**NOTE: For camshaft holding Laser tools recommend Laser 8421 used with Laser 7279.**

Place the inclinometer (I) upside down up against the inclinometer reference bar (G) as shown in Figure 8 and allow to stabilise.

Holding the inclinometer against (G) press ZERO to set the inclinometer to 00.0° and move the inclinometer to sit it on the flat of the inlet camshaft adaptor (E) (the correct way up).

Insert a 6mm hex key into the end of the inlet camshaft adaptor (E) and while holding the hex key, unlock the inlet camshaft by removing the lever stop pin (L – inlet only).

Adjust the position of the camshaft using the hex key until zero (00.0°) is shown on the inclinometer and then lock the adaptor with the locking lever and reinsert the lever stop pin (L).

Repeat this procedure for the exhaust cam.

Once both camshafts are set to zero and locked, tighten the camshaft pulley fixings to 20Nm.

**NOTE: For camshaft holding Laser Tools recommend Laser 8421 used with Laser 7279. Re-check that both camshafts are still reading Zero, if not repeat the above process.**

Release the red and blue locking levers by removing the lever stop pins (L) as shown in figure 13. Remove the crankshaft locking pin (K).

Turn the crankshaft 2 complete turns stopping just before returning to the TDC position and reinstall the crankshaft locking pin (K). Turn the crankshaft until it stops against (K).

Recheck the camshaft angles as detailed in the **Checking Timing** section (Figures 8 and 9) on pages 8 and 9.

Take note of the recorded values, these will be used to calculate the correction angle.

The correction angles for each camshaft have to be calculated. This is using the following equation.

$(\text{Specified Angle}) - (\text{Current Angle}) = \text{Correction Angle}$

See examples opposite:

### **Example calculation**

Use vehicle manufacturer's engine specific data and measured camshaft timing angle from previous section.



### EXAMPLE ONLY:

Engine code DADA (1.5lt)

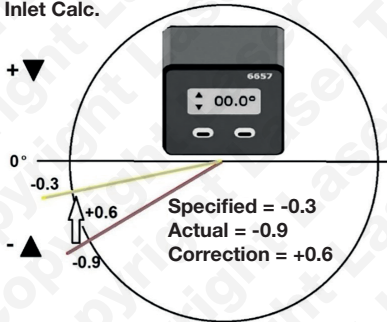
Specified Inlet timing angle  $-0.3^{\circ} \pm 1.2^{\circ}$  (manufacture data, engine specific)

Specified Exhaust timing angle  $+1.1^{\circ} \pm 1.2^{\circ}$

**Current Inlet Camshaft Timing Angle (Measured Angle) = ( $\blacktriangle 0.9^{\circ}$ )  $-0.9^{\circ}$**

(Specified Angle) – (Current Angle) = Inlet Correction Timing Angle  
( $-0.3^{\circ}$ ) – ( $-0.9^{\circ}$ ) =  $+0.6^{\circ}$  **turn  $0.6^{\circ}$  clockwise from Current Angle.**

Inlet Calc.

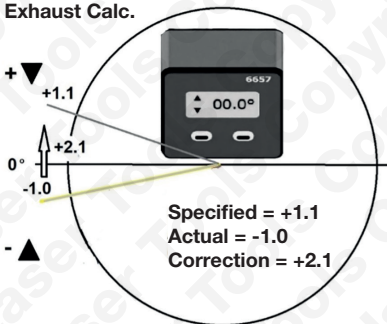


**NOTE:** Arrows indicate the direction to rotate to reach zero.

**Current Exhaust Camshaft Timing Angle (Measured Angle) = ( $\blacktriangle 1.0^{\circ}$ )  $-1.0^{\circ}$**

(Specified Angle) – (Current Angle) = Exhaust Correction Timing Angle  
( $+1.1^{\circ}$ ) – ( $-1.0^{\circ}$ ) =  $+2.1^{\circ}$  **turn  $2.1^{\circ}$  clockwise from Current Angle.**

Exhaust Calc.



**NOTE:** Arrows indicate the direction to rotate to reach zero.

### Final Setting of timing:

**NOTE:** Once the Correction Angle is identified, the camshafts must be set to **Zero** and then adjusted from zero by the Correction Angle to compensate for the engine manufacturer's tolerances.

Using an appropriate pulley holding tool loosen the inlet camshaft adjuster control valve and finger tighten. See Figure 11.

Using an appropriate pulley holding tool loosen the exhaust camshaft pulley bolt and finger tighten. See Figure 11.

**NOTE:** For camshaft holding Laser Tools recommend Laser 8421 used with Laser 7279.

Place the inclinometer (I) upside down up against the inclinometer reference bar (G) as shown in figure 8 and allow to stabilise.

Holding the inclinometer against (G) press ZERO to set the inclinometer to 00.0° and move the inclinometer to sit it on the flat of the inlet camshaft adaptor (E) (the correct way up).

Insert a 6mm hex key in to the end of the inlet camshaft adaptor (E) and adjust the position of the camshaft using the hex key until the corresponding Calculated Correction Timing Angle is shown on the inclinometer and then lock the adaptor with the locking lever and insert the lever stop pin (L).

Repeat this procedure for the exhaust cam.

Once both camshafts are set to zero and locked, tighten the camshaft pulley fixings to 20Nm.

**NOTE: For camshaft holding Laser Tools recommend Laser 8421 used with Laser 7279.**

### **Recheck Timing:**

Recheck the camshaft angles as detailed in the **Checking Timing** section (figures 8 and 9) on pages 8 and 9.

Compare the reading to the manufacturer specification.



## **Safety Warnings - please read**

- If the engine has been identified as an Interference engine, damage to the engine will occur if the timing belt has been damaged. A compression check of all the cylinders should be taken before the cylinder head(s) are removed.
- Do not turn crankshaft or camshaft when the timing belt/chain has been removed.
- To make turning the engine easier, remove the spark plugs/glow plugs or injectors.
- Observe all tightening torques.
- Do not turn the engine using the camshaft or any other sprocket.
- Disconnect the battery earth lead (check Radio code is available).
- Do not use cleaning fluids on belts, sprockets or rollers.
- Some toothed timing belts are not interchangeable. Check the replacement belt has the correct tooth profile.
- Always mark the belt with the direction of running before removal.
- Do not lever or force the belt onto its sprockets.
- Do not use timing pins to lock the engine when slackening or tightening the crankshaft pulley bolts.
- ALWAYS REFER TO A REPUTABLE MANUFACTURERS WORKSHOP MANUAL.

Our products are designed to be used correctly and with care for the purpose for which they are intended. No liability is accepted by the Tool Connection for incorrect use of any of our products, and the Tool Connection cannot be held responsible for any damage to personnel, property or equipment when using the tools. Incorrect use will also invalidate the warranty.

If applicable, the applications database and any instructional information provided has been designed to offer general guidance for a particular tool's use and while all attention is given to the accuracy of the data no project should be attempted without referring first to the manufacturer's technical documentation (workshop or instruction manual) or the use of a recognised authority such as Autodata.

It is our policy to continually improve our products and thus we reserve the right to alter specifications and components without prior notice. It is the responsibility of the user to ensure the suitability of the tools and information prior to their use.



8824\_Instructions



When you have finished with  
this product please recycle it

[www.lasertools.co.uk](http://www.lasertools.co.uk)



Distributed by The Tool Connection Ltd  
Kineton Road, Southam, Warwickshire CV47 0DR  
T +44 (0) 1926 815000 F +44 (0) 1926 815888  
[info@toolconnection.co.uk](mailto:info@toolconnection.co.uk) [www.toolconnection.co.uk](http://www.toolconnection.co.uk)

#### Guarantee

If this product fails through faulty materials or workmanship, contact our service department direct on: **+44 (0) 1926 818186**. Normal wear and tear are excluded as are consumable items and abuse.

**[www.lasertools.co.uk](http://www.lasertools.co.uk)**