



INSTRUCTIONS FOR:
**PETROL ENGINE SETTING/LOCKING KIT -
 BMW CHAIN DRIVE**

MODEL NO: **VSE135.V3**

Thank you for purchasing a Sealey product. Manufactured to a high standard, this product will, if used according to these instructions and maintained properly, give you years of trouble free performance.

IMPORTANT: PLEASE READ THESE INSTRUCTIONS CAREFULLY. NOTE THE SAFE OPERATIONAL REQUIREMENTS, WARNINGS & CAUTIONS. USE THE PRODUCT CORRECTLY AND WITH CARE FOR THE PURPOSE FOR WHICH IT IS INTENDED. FAILURE TO DO SO MAY CAUSE DAMAGE AND/OR PERSONAL INJURY AND WILL INVALIDATE THE WARRANTY. KEEP THESE INSTRUCTIONS SAFE FOR FUTURE USE.



Refer to
Instructions



Wear Eye
Protection

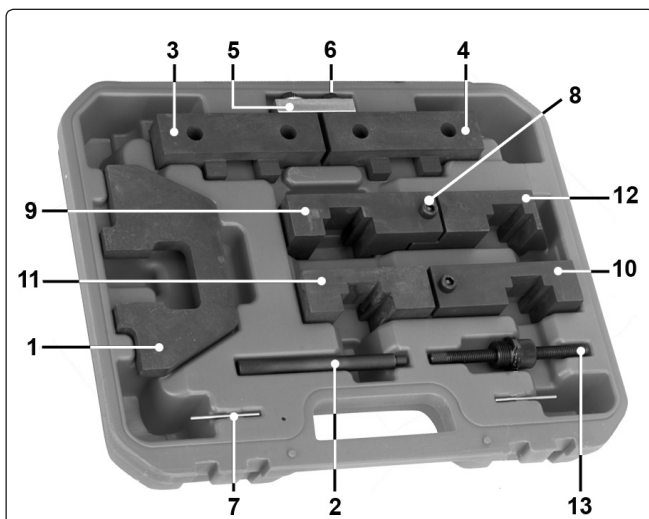
1. SAFETY

- WARNING!** Ensure Health and Safety, local authority and general workshop practice regulations are adhered to when using tools.
- DO NOT** use tools if damaged.
- Maintain tools in good and clean condition for best and safest performance.
- Ensure that a vehicle which has been jacked up is adequately supported with axle stands.
- Wear approved eye protection. A full range of personal safety equipment is available from your Sealey dealer.
- Wear suitable clothing to avoid snagging. **DO NOT** wear jewellery and tie back long hair.
- DO NOT** attempt to start engine or move vehicle whilst in gear with timing devices fitted.
- Always display a warning notification on steering wheel when timing engine components.
- Account for all tools, locking bolts, pins and parts being used and **DO NOT** leave them in or near the engine.
- Ensure all pieces are returned to the case and stored in a safe, dry, childproof location.
- WARNING!** Incorrect camshaft timing can result in contact between valve head and piston crown causing damage to the engine.
- IMPORTANT:** Always refer to the vehicle manufacturer's service instructions, or a proprietary manual, to establish the current procedure and data.
- IMPORTANT:** These instructions are provided as a guide only. Always refer to the vehicle manufacturer's service instructions, or a proprietary manual, to establish the current procedure and data.
- WARNING!** The warnings, cautions and instructions discussed in this manual cannot cover all possible conditions and situations that may occur. It must be understood that common sense and caution are factors which cannot be built into this product, but must be applied by the operator.

2. INTRODUCTION

Wide ranging kit for BMW engines. Includes tools for setting and locking camshafts and also tools for setting up timing chain tension.

3. CONTENTS



| Item: | Part No: | Description: | VM Part No: |
|-------|--------------|------------------------------|-------------|
| 1 | VSE135.V3-01 | Camshaft Alignment Tool | 11 3 390 |
| 2 | VSE135.V3-02 | Flywheel Locking Pin | 11 2 300 |
| 3 | VSE135.V2-01 | LH Camshaft Locking Plate | 11 3 241 |
| 4 | VSE135.V2-02 | RH Camshaft Locking Plate | 11 3 242 |
| 5 | VSE135.V2-03 | Camshaft Locking Plate Joint | 11 3 244 |
| 6 | VSE135.V2-05 | M8 Screw | |
| 7 | VSE135.V2-07 | Tensioner Locking Pin | 11 4 120 |
| 8 | VSE135.V2-10 | M8 Hex Head Screw P1.5x30 | |
| 9 | VSE135.V2-11 | Block Inlet 5-8 | 11 2 442 |
| 10 | VSE135.V2-12 | Block Inlet 1-4 | 11 2 |
| 11 | VSE135.V2-13 | Block Exhaust 1-4 | 11 2 445 |
| 12 | VSE135.V2-14 | Block Exhaust 5-8 | 11 2 446 |
| 13 | VSE135.V3.07 | Timing Chain Tensioner | 11 3 390 |

4. APPLICATIONS

| Models: | Engines: |
|------------------------------|------------|
| BMW | 1.6 |
| 316i 1.6 E36 (93-99) | 16 4E 2 |
| 316i Compact 1.6 E36 (94-00) | 16 4E 3 |
| 318i 1.8 E36 (94-99) | 1.8 |
| 318iS 1.8 E36 (92-98) | 18 4E 2 |
| 318i Compact 1.8 E36 (94-98) | 18 4S 1 |
| 316i Compact 1.9 E36 (98-01) | 1.9 |
| 318iS 1.9 E36 (96-99) | 19 4E 1 |
| 318i Compact 1.9 E36 (96-01) | 19 4S 1 |
| 320i 2.0 E36 (94-99) | 2.0 |
| 323i 2.5 E36 (95-99) | 20 6S 3 |
| 323i Compact 2.5 E36 (95-01) | 2.0 |
| 328i 2.8 (95-99) | 20 6S 3 |
| 316i 1.6 E46 (99-01) | 2.8 |
| 316i 1.9 (99-02) | 28 6S 1 |
| 318i 1.9 (98-01) | 3.5 |
| 520i 2.0 E39 (96-00) | 35 8S 1 |
| 523i 2.5 E39 (96-00) | 4.0 |
| 528i 2.8 E39 (96-00) | 40 8S 1 |
| 535i 3.5 E39(96-01) | 4.4 |
| 540i 4.4 E39 (96-03) | 44 8S 1 |
| Z3 1.8 E36 (96-99) | 5.0 |
| Z3 1.9 E36 (96-03) | 50 12 A |
| Z3 2.8 E36 (97-99) | 5.4 |
| 840i 4.0 E31 (93-99) | 54 12 1 |
| 840i 4.4 E31(95-99) | 54 12 2 |
| 850i 5.0 E31 (90-99) | |

Associated Tools:

VSE5906

Description:

Petrol Twin Vanos Service Tool Kit - Chain Drive

VM Tool Ref:

11 6 150

11 3 450

11 6 180

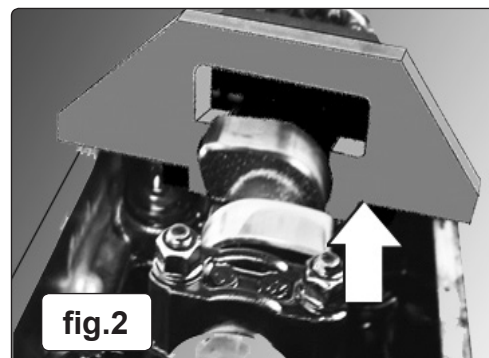
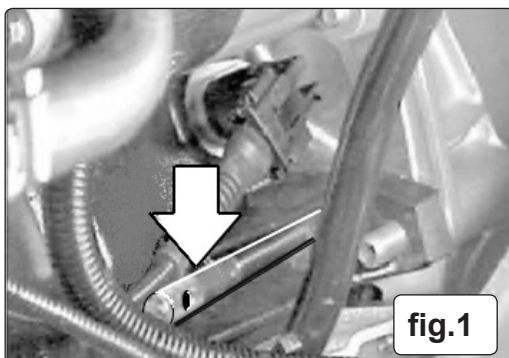
5. INSTRUCTIONS

5.1. This kit has the necessary tools to set and lock the engines on a wide variety of BMW vehicles ranging from 1.6 to 5.0 litres in size. As there will be many variations on these applications, these instructions have been produced as a guide only to the most popular applications. For further and more detailed information, the use of a manufacturer's or a suitable proprietary manual is strongly advised.

5.2. M40 and M70 Engines

5.2.1. Position the engine at TDC on number one cylinder. Insert the Crankshaft Timing Pin VSE135.V3-02 through the datum hole in the cylinder block and ensure it correctly locates into the location hole in the flywheel (fig.1)

5.2.2. Fit the Camshaft Alignment Plate VSE135.V3-01 onto the squared are of the camshaft as shown (fig.2). Ensure the camshaft sprocket arrow is pointing upright, (12 o'clock position)



5.2.3. Press the timing chain tensioner rail in to compress the tensioner and insert a suitable locking pin.

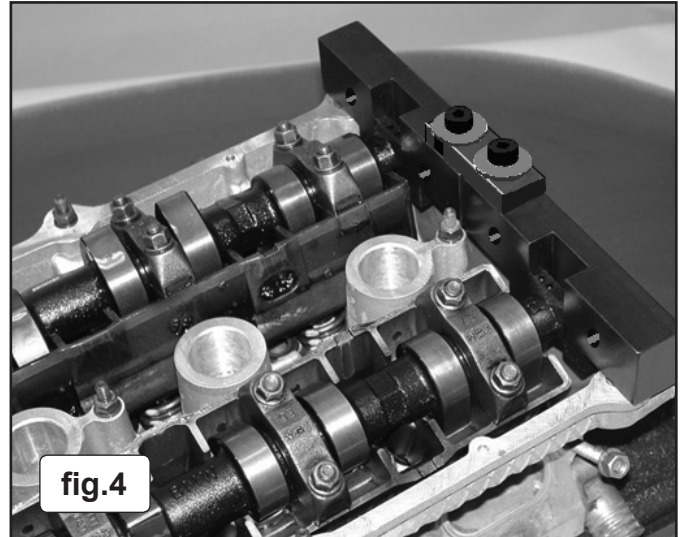
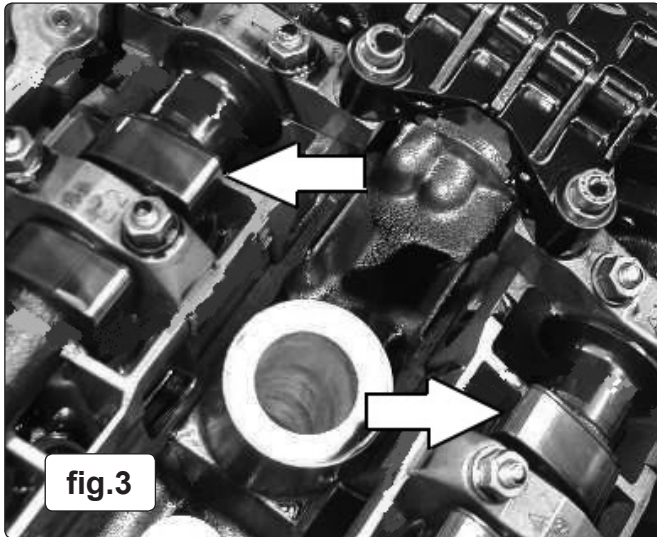
5.2.4. Any engine work required can now be carried out, once completed, reassemble the engine as required and remove the tooling, rotate the crankshaft through two revolutions and recheck the timing using the Crankshaft Timing Pin VSE135.V3-02 and Camshaft Alignment Plate VSE135.V3-01 as previously described. Once the timing is set correctly, remove all tooling and reassemble the engine in the reverse order of dismantling.

5.3. M42 and M50 Engines

5.3.1. Dismantling:

Turn the engine in the direction of rotation and insert the Crankshaft Timing Pin VSE135.V3-02 through the datum hole in the bell housing. (fig.1)

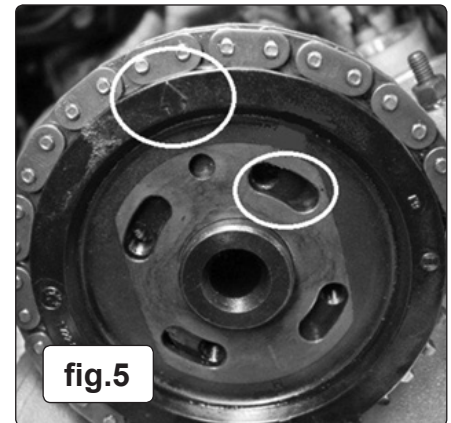
5.3.2. To ensure the engine is correctly positioned at TDC check that the camshaft lobes on number one cylinder are almost facing each other as shown (fig.3)



- 5.3.3. Fit the Camshaft Locking Plate VSE135.V2-01/VSE135.V2-02 (fig.4).
 - 5.3.4. Slacken the exhaust camshaft sprocket fixing bolts.
 - 5.3.5. Compress the secondary timing chain tensioner and lock it in its retracted position using a suitable pin.
 - 5.3.6. On inlet camshaft drive sprockets without a spring plate fitted, remove the Vanos unit, the camshaft sprocket fixing nuts and the thrust washer.
 - 5.3.7. On inlet camshaft drive sprockets that do not have a spring plate fitted, remove the Vanos unit while turning the exhaust camshaft sprocket in a clockwise direction. Remove the camshaft sprocket fixing nuts and the spring plate.
 - 5.3.8. It is now possible to remove the timing chain, sprockets, guides and tensioners.
- ▲ **WARNING:** The tensioner has a very strong spring.

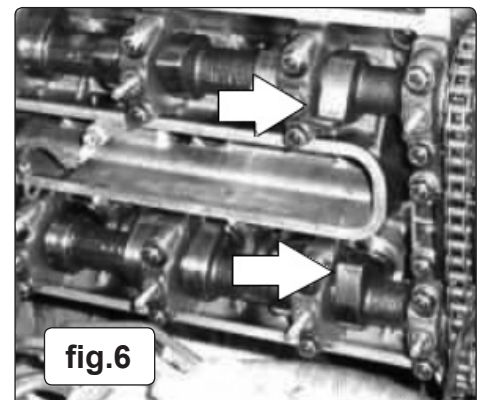
5.4. Reassembly

- 5.4.1. Fit the camshaft drive sprocket, ensure the arrow is pointing upwards and that the threaded holes are positioned on the left side of the slots in the sprocket (fig.5).
- 5.4.2. Fit the Timing Chain Pre-tensioning tool VSE135.V3-07 and screw the adjuster in until it comes into contact with the guide rail; do not tighten further past this point.
- 5.4.3. Fit the timing chain guide and secondary timing chain tensioner.
- 5.4.4. Fit the secondary timing chain and sprocket; ensure that the threaded holes are positioned on the left side of the slots in the sprocket.
- 5.4.4. Fit the thrust washers, and spring plate, to the inlet camshaft and tighten the fixing nuts to 10Nm
- 5.4.5. On inlet camshaft sprockets that do not have a spring plate, turn the sprocket clockwise until the detent position is reached.
- 5.4.6. Turn the sprocket anti-clockwise whilst inserting the Vanos unit, turn the splined shaft until it engages.
- 5.4.7. On inlet camshaft sprockets without the spring plate, turn the sprocket clockwise as far as the stop.
- 5.4.8. Turn the sprocket anti-clockwise whilst inserting the Vanos unit until the unit fits flush with the cylinder head.
- 5.4.8. Tighten the Vanos unit securing bolts.
- 5.4.9. Remove the locking pin from the secondary timing chain tensioner.
- 5.4.10. Preload the timing chain by tightening the Timing Chain Pre-tensioning tool VSE135.V3-07 to 1.3 Nm.
- 5.4.11. Tighten the exhaust camshaft sprocket securing bolts initially to 1.5Nm followed by 2.22 Nm.
- 5.4.12. Remove the timing chain pre-tensioner and refit the timing chain tensioner.
- 5.4.13. Remove all tooling, turn the crankshaft through two revolutions clockwise. Ensure the Crankshaft Timing Pin VSE135.V3-02 and the Camshaft Locking Plate VSE135.V2-01/VSE135.V2-02 can be refitted.
- 5.4.13. Once the timing is confirmed as correct, remove all tooling and reassemble the engine in the reverse order of dismantling.

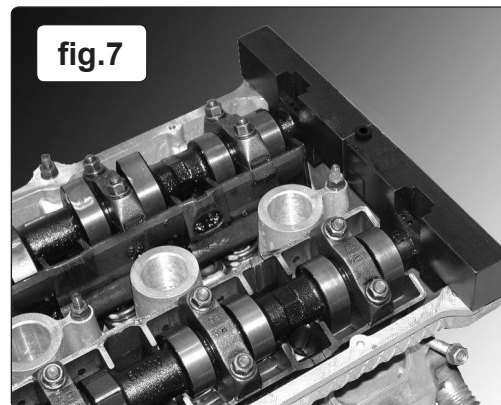


5.5. M60 and M62 Engines

- 5.5.1. **Note:** To remove the timing chain on these engines the sump will need to be removed. This kit does not contain the tooling to set the camshaft sensor plate positions if the engine is so fitted.
- 5.5.2. If the transfer chains need to be removed, their tensioners will need to be locked in their retracted position using suitable tensioner locking pins.
- 5.5.3. **Dismantling**
Turn the engine in the direction of rotation and insert the appropriate Crankshaft Timing Pin VSE135.V3-02 through the datum hole in the bell housing (fig.1).
- 5.5.4. There is a stamped mark on the lower timing case "OT" that must match up with the same mark on the crankshaft pulley "OT".
(DO NOT use the 45 .VOT marking on the pulley).
- 5.5.5. To ensure the engine is correctly positioned at TDC check that the camshaft lobes on number one cylinder are almost facing each other as shown (fig.6)
- 5.5.6. Once the engine is correctly positioned the camshaft locking tools can be fitted.

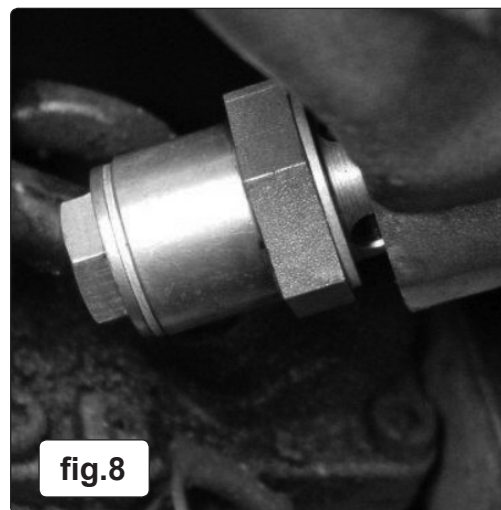


- 5.5.7. The Camshaft Locking Tools are a paired set, one pair is machined for each bank of cylinders.
- 5.5.8. The Camshaft Locking Tools interlock and bolt together and are paired with each other, each pair must only be used with its matching half.
- 5.5.9. The camshafts do have provision to allow them to be turned using a 27mm open ended spanner, this feature should **NOT** be used to attempt to rotate the engine.
- 5.5.10. The intake cam is referred to as the E cam and the exhaust cam is referred to as the A cam.
- 5.5.11. For the right hand bank (Cylinders 1 to 4) use the Camshaft Locking Tools VSE135.V2-12/VSE135.V2-13. For the left hand bank use the Camshaft Locking Tools VSE135.V2-11/VSE135.V2-14.
- 5.5.12. The kit's Camshaft Locking Tools fit over the squared areas at the rear end of the camshafts.
- 5.5.13. The Camshaft Locking Tools lock the camshafts together, after positioning over the camshafts ensure the tooling sits flush against the cylinder head (fig.7).
- 5.5.14. With the engine now set and locked into position; the timing chain and sprockets can be removed.



5.6. Reassembly

- 5.6.1. Before re-assembly work commences, the timing chain tensioner will need to be removed; this is located on the right hand bank (fig.8).
- 5.6.2. Refit the timing chain and sprockets, ensure the threaded holes are in the centre of the slots in the sprockets, do not fully tension the securing bolts. Ensure the sensor gear mark is in the 11 o'clock position (fig.5).
- 5.6.3. Fit the secondary tensioners and guide rails, release the secondary tensioners from their locked position.
- 5.6.4. Once the timing chain has been installed, the timing chain pre-tension needs to be set; it is important to use this method to pre-tension the timing chain, and not to rely on the engine's normal tensioner system as this tensioning method would not be accurate enough.
- 5.6.5. Fit the VSE135.V3-07 assembly in place of the timing chain tensioner, and tighten the centre bolt to 0.7Nm.
- 5.6.6. Tighten the camshaft sprocket bolts.
- 5.6.7. Remove the VSE135.V3-07 assembly and refit the timing chain tensioner.
- 5.6.8. Remove all tooling, turn the crankshaft through two revolutions clockwise and recheck the timing.
- 5.6.9. Once the timing has been confirmed as correct, remove the tooling and reassemble the engine in the reverse order from that used to dismantle.



Environmental Protection



Recycle unwanted materials instead of disposing of them as waste. All tools, accessories and packaging should be sorted, taken to a recycling centre and disposed of in a manner which is compatible with the environment. When the product becomes completely unserviceable dispose of it according to local regulations.

NOTE: It is our policy to continually improve products and as such we reserve the right to alter data, specifications and component parts without prior notice.

IMPORTANT: No liability is accepted for incorrect use of this product.

WARRANTY: Guarantee is 12 months from purchase date, proof of which will be required for any claim.



Sole UK Distributor, Sealey Group,
Kempson Way, Suffolk Business Park,
Bury St. Edmunds, Suffolk,
IP32 7AR



01284 757500



01284 703534



www.sealey.co.uk



sales@sealey.co.uk