

## ALFA ROMEO V6 PETROL ENGINE SETTING/LOCKING TOOL KIT

### 1. INTRODUCTION & APPLICATIONS

#### 1.1. INTRODUCTION

The VS1410 Kit incorporates Camshaft Setting Plates, which are fixed in place of the camshaft bearing caps to accurately position the four camshafts in their timed positions. The kit also includes the specialised Tensioner Tool required to correctly adjust belt tension on this engine.

NOTE: TDC position is established using VS1404 TDC Positioning Tool - an associated tool, not included in this kit. VS1404 requires a suitable Dial Test Indicator, such as AK9634M.

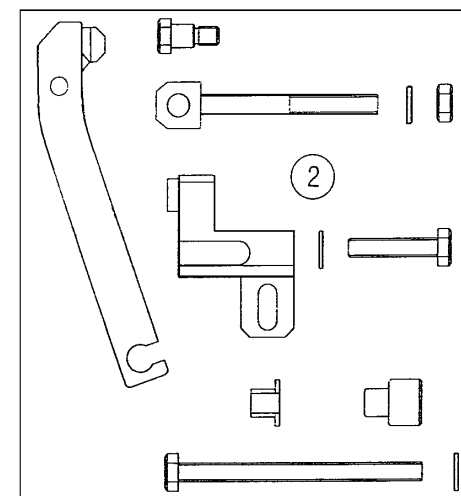
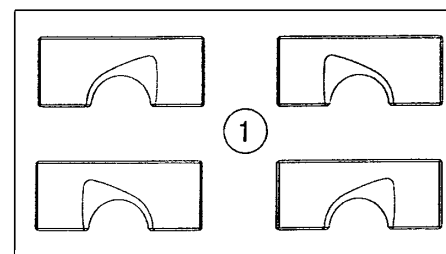
#### 1.2. APPLICATION

ALFA ROMEO: 156 (97-) V6 2.5 Quad Cam 24v. Petrol Engine. AR324.01 2.5 engine.

### 2. SAFETY INSTRUCTIONS

- WARNING!** Ensure that 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 the ignition key is removed, to prevent inadvertent engine cranking.
- ✓ If the vehicle to be worked on is raised, ensure that it is adequately supported with axle stands or ramps and chocks.
- ✓ 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.
- ✓ Account for all tools, locking bolts, pins and parts being used and do not leave them on or near the engine.
- \* **IMPORTANT:** Always refer to the vehicle manufacturer's service instructions, or a proprietary manual, to establish the current procedure and data. These instructions are provided as a guide only.

### 3. CONTENT & ASSOCIATED TOOLS



#### 3.1. Content

1. VS1410/01 Camshaft Setting Plate Set - Green (4)
2. VS1410/02 Tensioner Tool
- VS1410/84 Case + Insert

#### 3.2. Associated Essential Tool

TDC Positioning Tool (use with AK9634M DTI).....VS1404



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## 4. INSTRUCTIONS

### General Guide - Setting & Locking 2.5 V6

Timing belt replacement on this Alfa Romeo 2.5 V6 engine is carried out with the crankshaft at TDC, established by using VS1404 TDC Position Tool to determine the piston position in No.1 cylinder.

Note: To avoid kit contents duplication, VS1404 TDC Position Tool is not included in individual kits but is available as an Associated Tool. It is used on Alfa Twin Spark/Twin Cam engines and Fiat 1.6, 1.8 and 2.0 multi-valve engines.

Each camshaft is retained in the timing position by use of Special Cam Setting Plates - VS1410/01 (set of 4), fixed in place of designated bearing caps.

Once the crankshaft and camshafts are set in the timing positions the belt tensioner securing bolts can be loosened and the timing belt removed.

All four camshaft sprockets are released and free to turn on the camshafts whilst the new belt is fitted in an anti-clockwise direction starting at the crankshaft gear.

VS1410/02 Tensioner Tool is fitted and the tensioner adjusted to align its marks. The camshaft sprocket bolts are then tightened.

**WARNING: These timing tools must NOT be used to counterhold the crank or camshafts for removing/releasing pulleys or sprockets. They are for retention of engine timing positions only. Use the appropriate Holding Tool.**

#### 4.1. VS1410/01 Camshaft Setting Plate Set (GREEN)

On this Alfa Romeo V6 Quad Cam engine the four camshafts are retained in the timing positions by Cam Setting Plates which are bolted in position in place of designated bearing caps on both inlet and both exhaust camshafts - figs. 1 & 2.

Each Setting Plate is machined to provide the exact profile and timing position of the cam at the designated bearing location.

**IMPORTANT:** Care **MUST BE** taken when fitting Cam Setting Plates to ensure that:

- (1) The correct set of plates are being used for the engine being worked on - plates are part numbered and colour coded.
- (2) The correct plates are used on the Inlet camshafts and Exhaust camshafts - plates are clearly marked "Inlet" and "Exh".
- (3) Each plate is fitted in place of the bearing cap of the designated cylinder only - plates are marked eg. "6 Cyl".
- (4) Fixing holes in the plates match the off-set bearing cap holes and the profiles exactly match the cam lobes.

#### 4.2. Camshaft Setting Plates/Locations

VS1410/01 Camshaft Setting Plate Set - GREEN

LEFT-HAND Cylinder Head Inlet: Bearing Cap of No.1 cyl. (Plate 4591/1)  
Exhaust: Bearing Cap of No.1 cyl. (Plate 4591/2)

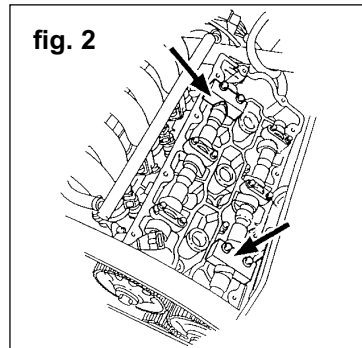
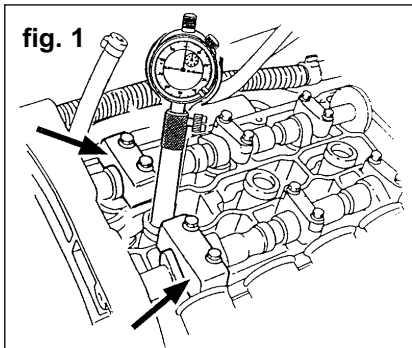
RIGHT-HAND Cylinder Head Inlet: Bearing Cap of No.6 cyl. (Plate 4591/4)  
Exhaust: Bearing Cap of No.4 cyl. (Plate 4591/3)

LEFT-HAND Cylinder Head Camshaft Setting Plates location - fig. 1.

RIGHT-HAND Cylinder Head Camshaft Setting Plates location - fig. 2.

4.2.1. When removing camshaft bearing caps, clearly mark which is left-hand and right-hand, inlet and exhaust and keep clean at all times. When installing Cam Setting Plates and subsequently re-fitting bearing caps, always tighten to the specified torque, 18-20Nm.

**IMPORTANT: DO NOT** use Camshaft Setting Plates to hold camshafts in position whilst releasing or tightening the sprocket bolts. Plates are for retention of timing position only. Use a suitable Sprocket Holding Tool to counter-hold sprockets, taking care not to damage any position sensors located behind the sprockets.



#### 4.3. Timing Belt Tensioner

To remove the timing belt the securing bolts of the tensioner assembly are loosened and the tensioner allowed to move away from the belt. The VS1410/02 Tensioner Tool is attached to the engine and, via a 'pivot action', applies leverage to the back plate of the tensioner assembly which it turn reacts on the eccentric of the tensioner roller and applies tension to the timing belt - fig. 3.

#### 4.4. VS1410/02 Timing Belt Tensioner Tool

Once the new belt has been installed, VS1410/02 Tensioner Tool is assembled and fitted to the engine as follows - **REFER TO FIG. 4 FOR PARTS IDENTIFICATION/ASSEMBLY**

4.4.1. Adjusting Body (1) is attached to the water pump with Bolt/Washer (8-9).

4.4.2. Adjusting Arm (4) is attached to the alternator with Bolt/Washer (7-10) and a spacer - (5) or (6), depending on engine trim.

**Note:** Spacer (5) is fitted to the lower pivot hole of the Adjusting Arm prior to inserting the securing bolt.

**Spacer (6), and the Arm, are fitted to the bolt after it is installed. The spacer is then rotated to close the slot in the Arm to prevent detachment.**

4.4.3. The Adjusting Body and Arm are connected by fitting Tension Bar (2) between them, using Bolt/Washer/Nut (3/10/11).

4.4.4. The right-angle section at the top of the Adjusting Arm is placed against the Back plate of the tensioner assembly and reacts on, and moves the Back plate as the Nut (11) of the Tension Bar is tightened - fig. 5.

4.4.5. As the Back plate moves it applies tension to the belt and correct tension is achieved when the moveable index mark of the tensioner aligns (is directly behind) the fixed notch on the Front Plate of the tensioner. Once correct tension is achieved, tighten the tensioner securing bolts and then tighten the camshaft sprocket bolts.

4.4.6. Remove TDC Tool and Camshaft Plates and re-fit the bearing caps.

4.4.7. Carefully turn the engine over twice, in the normal direction of rotation, and check that the tensioner marks are still correctly aligned. If necessary, re-align them by adjusting via the Tensioner Tool.

#### 4.5. VS1404 TDC Position Tool - Associated Tool, not in kit

The correct engine/crank TDC position is established using VS1404 Tool together with a suitable DTI, such as AK9634M Dial Gauge - fig.6. VS1404 Tool determines when the piston of No.1 cylinder is at its highest point.

**Note: Must be on the ignition stroke i.e. inlet and exhaust valves closed.**

4.5.1. Remove the spark plugs and install the DTI into VS1404 and secure with the thumbscrew.

4.5.2. Screw VS1404 fully into the centre spark plug hole of No.1 cylinder taking care not to overtighten.

4.5.3. By turning the crankshaft, in the normal direction of engine rotation, the piston will raise the indicator pin of VS1404 and in turn move the needle of the DTI. TDC is achieved when the DTI needle reaches its highest reading and starts to move in the reverse direction.

4.5.4. Check that all timing marks align.

