

Instructions for:
Petrol Engine Twin VANOS
Service Tool Kit -
BMW M52TU, M54 & M56
Model No: VS4895

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

IMPORTANT: PLEASE READ THESE INSTRUCTIONS CAREFULLY. NOTE THE SAFE OPERATIONAL REQUIREMENTS, WARNINGS AND 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. PLEASE KEEP INSTRUCTIONS SAFE FOR FUTURE USE.

1. SAFETY INSTRUCTIONS

- 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.
- ✓ Account for all tools, locking bolts, pins and parts being used and do not leave them in or near the engine.
- WARNING!** Incorrect or out of phase camshaft timing can result in contact between valve head and piston crown causing damage to the engine.

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.

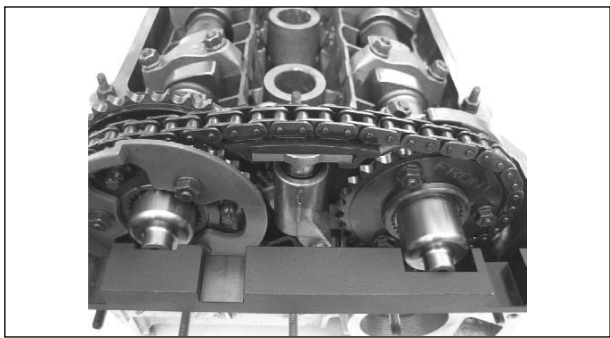


2. INTRODUCTION & APPLICATIONS

2.1 Introduction
 In 1998 BMW introduced a Twin Vanos System (Variable Valve Control) on their 6 cylinder twin camshaft petrol engines. Vanos Adjustment Units are fitted to both inlet and exhaust camshafts and must be set in relation to the camshafts when adjusting engine timing or re-assembling the engine after overhaul/repair work.

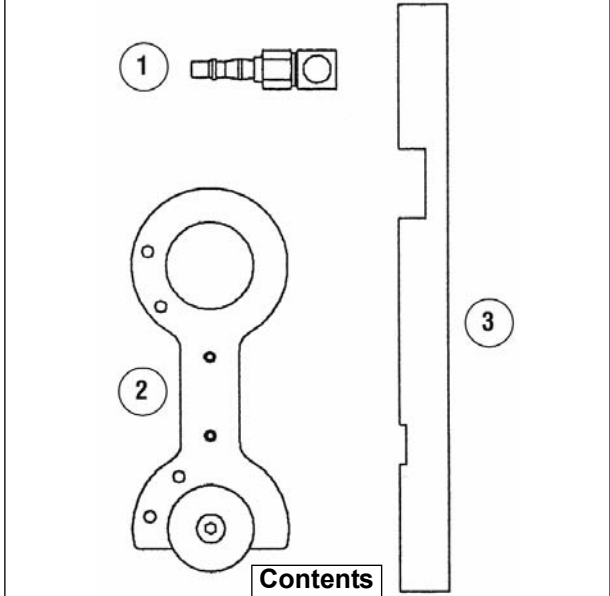
2.2 Applications
 BMW M52TU, M54 and M56 Twin Camshaft Petrol engines fitted to:
 3 Series: E46 / Z3
 5 Series: E39 / E60 / E61
 7 Series: E38 / E65 / E66
 X3: E83
 X5: E53
 Z4: E85
 Engine Codes: 20 6S 4, 22 6S 1, 25 6S 4, 25 6S 5, 28 6S 2, 30 6S 3.

2.3 Additional Sealey tool kit required:
 VS4425 Engine Setting/Locking Tool Kit will be required to cover the engine timing setting/locking applications on these engines.



3. CONTENTS

ITEM	PART NO.	DESCRIPTION
1	VS4896	Compressed Air Connector
2	VS4897	Twin VANOS Setting Tool
3	VS4898	Sprocket/Chain Assembly Fixture
--	VS4895-84	Case and Insert (not shown)



4. INSTRUCTIONS

VS4895 must be used in conjunction with VS4425 kit for engine timing applications involving the Vanos Adjustment Units (Variable Valve Control System).

4.1. Checking camshaft timing

On M52TU, M54 and M56 engines, with Twin Vanos Adjustment Units, the procedure for checking camshaft timing is identical to the range of engines - M42, M44, M50 and M52 which have a single Vanos unit - using the Flywheel Locking Pin **VS118/02**, Camshaft Setting Plate Assembly (**VS4310.01**, **VS4310.02**, **VS4309.04** and **VS4309.05**), and Tensioner Pre-load Tool **VS4323** from Setting/Locking Kit **VS4425**.

However, for M52TU, M54 and M56 engines with a Twin Vanos Unit, it is also necessary to use the special tools from **VS4895** kit in conjunction with those in **VS4425** kit, as it is necessary to ensure that the Vanos Units are positioned correctly relative to the camshafts.

Remove the timing chain tensioner and insert in its place **VS4323** Pre-load Tool (from **VS4425** kit) (**Fig.1**).

Pre-load the tensioning rail by applying a torque of 0.7Nm to the Adjusting Screw of **VS4323**.

VS4896 Compressed Air Connector.

Unscrew the oil pressure pipe to the Vanos Unit and insert **VS4896** Connector and connect a compressed air supply to pressurise the Vanos unit between 2 and 8 bar (**Fig.2**).

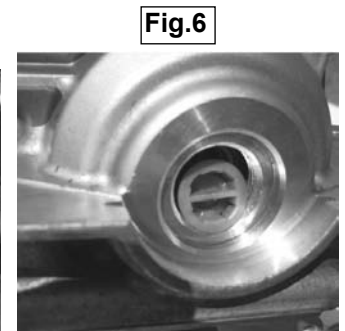
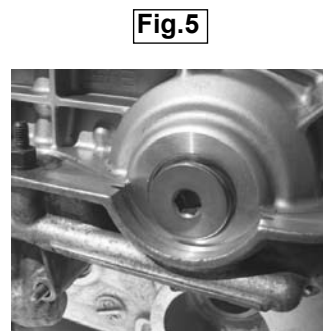
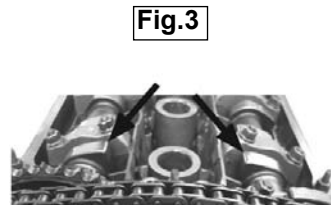
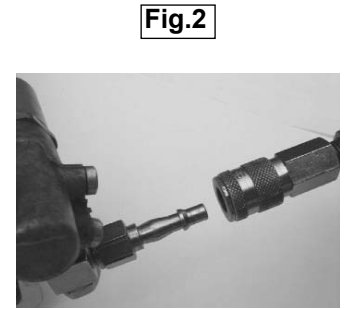
WARNING: Some oil may be forced out of the Vanos Unit when compressed air is introduced. Cover unit with a suitable cloth.

It is possible that the camshafts will not be in the correct position when the engine is switched off.

Therefore, with the compressed air supply connected, turn the engine over at least two revolutions, in the normal direction of rotation, and return to a position where the camshaft lobes of the inlet and exhaust camshafts on the first cylinder, face each other (**Fig.3**).

Check engine timing position by fitting **VS118/02** Flywheel Locking Pin and **VS4309** Camshaft Setting Plate Assembly (**VS4310.01**, **VS4310.02**, **VS4309.04**, **VS4309.05**) from **VS4425** kit (**Fig.4**).

NOTE: The Camshaft Setting Plate Assembly must rest fully on the surface of the cylinder head for engine timing position to be correct. Remove all tools and install the timing chain tensioner



4.2. Removing and Replacing the Twin Vanos Adjustment Unit

Remove intake filter housing with mass sensor, fan assembly/fan cowl, cylinder head cover and spark plugs.

Remove the plastic cover for the inlet camshaft.

4.2.1. Removal

Follow the same procedure as described for - **4.1. Checking camshaft timing**.

When procedure has been completed, leave the **VS118/02** Flywheel Locking Pin and the Camshaft Setting Plate Assembly in-situ and disconnect the compressed air supply (leave **VS4896** Connector in place).

Remove the Vanos Adjustment Unit sensor plugs (**Fig.5**).

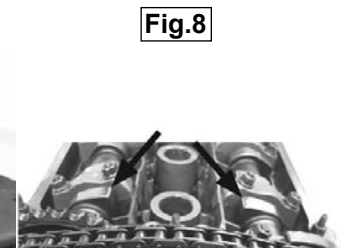
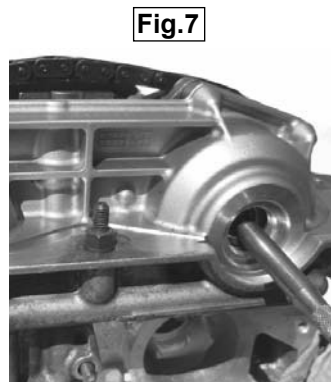
NOTE: Oil will escape from the Vanos Unit when the sensor plugs are removed - catch the oil in a suitable container to ensure that oil does not spill onto the auxiliary belt.

Remove sealing caps using a pair of long nosed pliers (**Fig.6**), and unscrew the screws (TX30) on inlet and exhaust sides (**Fig.7**).

WARNING: These screws have Left-Hand threads.

Detach the camshaft sensor plug and solenoid valve plug on inlet and exhaust and remove the suspending bracket.

Unscrew all the nuts securing the Vanos Adjustment Unit and remove the Unit.



4.2.2. Installation

Prior to installing the Vanos Adjustment Unit, check the dowel sleeves for damage.

Sealing surfaces must be clean. Use recommended sealing compound on contact surface and replace seal.

Install the Vanos Adjustment Unit, screw on nuts tighten to secure unit in place.

Attach the camshaft sensor and solenoid valve plugs.

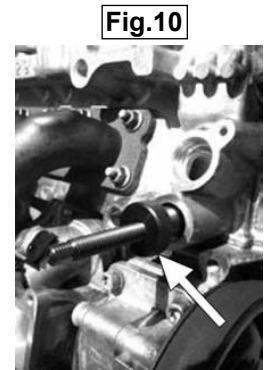
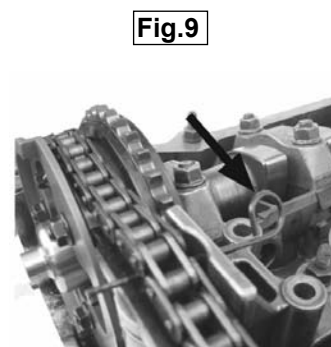
Insert securing screws on inlet and exhaust sides.

WARNING: Left-Hand threads and tighten to specified torque.

Replace the seal caps and screw plugs with new sealing rings.

Tighten to specified torque.

Remove all tools and carry out the procedure for - **4.1 Checking camshaft timing**.



4.3. Adjusting camshaft timing

Once the procedure for checking camshaft timing has been carried out and the camshaft timing has been found to be incorrect, it will be necessary to adjust the timing.

Turn the engine over, in the normal direction of rotation, and return to a position where the camshaft lobes on the inlet and exhaust camshafts on 1st cylinder, face each other (Fig.8).

Fit the VS118/02 Flywheel Locking Pin and remove the Twin Vanos Adjustment Unit as detailed in - 4.2 Removing and Replacing Twin Vanos Adjustment Unit.

Depress the secondary chain tensioner and 'lock' down using VS4311.02 Locking Pin from VS4425 Kit (Fig.9).

Remove the timing chain tensioner and fit VS4323 Pre-load Tool, but DO NOT apply pre-load at this stage (Fig.10).

Release 3 screws ("A") by half a turn, then release 3 nuts ("B") by two turns (Fig.11).

Release 3 nuts ("C") by one turn (Fig.12).

Carefully pull out the Toothed Sleeve (Inlet camshaft) until approx. 1mm of spline is visible (Fig.13).

Pull out Toothed Sleeve (Exhaust camshaft) to the 'stop' (Fig.14).

Fit the Camshaft Setting Plate Assembly at the rear of the camshafts, ensuring it rests fully on the surface of the cylinder head (Fig.4).

Depress the secondary chain tensioner and remove VS4311.02 Locking Pin.

Pre-load the chain tensioner rail to 0.7Nm, using Pre-Load Tool VS4323.

Pre-load cup spring on the exhaust sprocket by pressing it together with the sensor gear and tighten the 3 nuts ("B") to finger-tight only (Fig.15).

IMPORTANT: "Front" must be visible on Inlet sprocket

Remove the gasket and fit the VS4897 Twin Vanos Setting Tool (without gasket fitted), and ensure Tool is in full contact with the cylinder head. Fit and tighten bolts to secure (Fig.16).

Tighten 3 Screws ("A") on exhaust side to 5Nm (Fig.17).

Tighten 3 Nuts ("B") on exhaust side to 5Nm (Fig.18).

Tighten 3 Nuts ("C") on Inlet side to 5Nm (Fig.19).

Finally tighten 3 Screws ("A") and 6 Nuts ("B") and ("C") to specific torque.

Remove the VS118/02 Flywheel Locking Pin and the Camshaft Setting Plate Assembly.

Turn the engine over twice, in the normal direction of rotation, until the camshaft lobes of the inlet and exhaust camshaft on 1st cylinder face each other (Fig.4).

Re-fit the Flywheel Locking Pin and Camshaft Setting Plate Assembly, ensuring that the Setting Plate rests fully on the surface of the cylinder head.

Remove VS4323 Tensioner Pre-Load Tool and replace the chain tensioner.

Remove all tools.

4.4. Removing and Replacing front sprocket assembly to remove/replace camshafts.

4.4.1. Removing

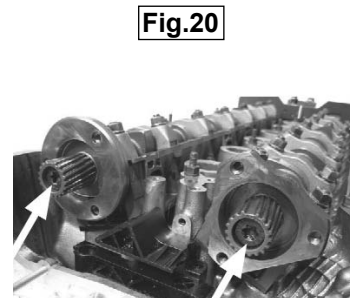
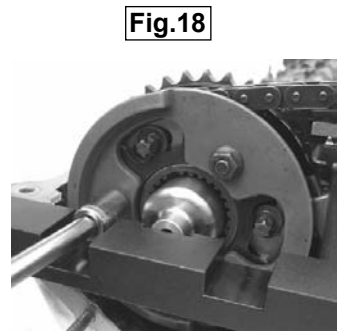
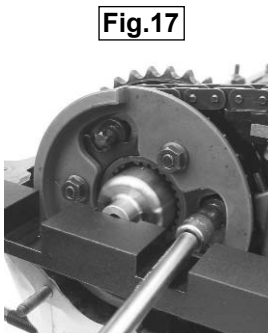
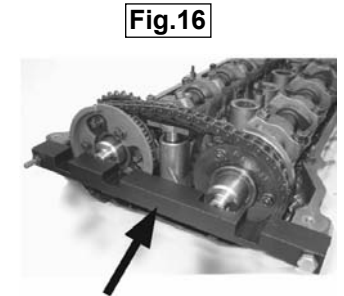
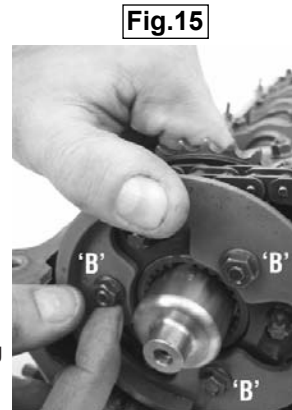
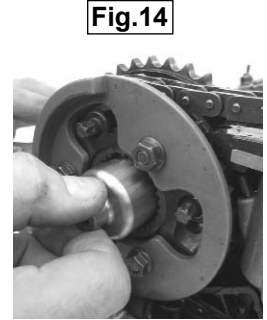
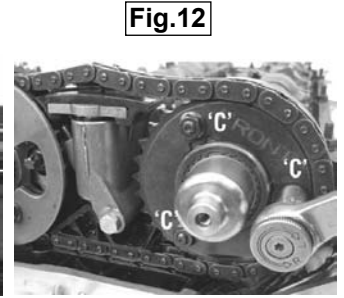
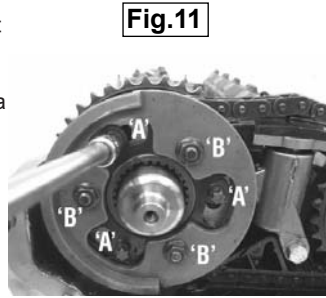
Remove the Twin Vanos Adjustment Unit as described earlier. Remove timing chain tensioner. Depress the secondary chain tensioner and lock with Pin VS4311.02 (from VS4425 kit).

Dismantle the front camshaft sprocket assemblies, ie. sensor gear, plate springs, toothed sleeves and sprockets and sprocket chain. Remove the secondary chain tensioner to achieve the dis-assembled condition as shown in Fig.20.

NOTE: The timing chain should not be allowed to drop into the engine. It can be suspended over the exhaust camshaft.

Remove the thrust washer and sensor gear off the Inlet camshaft.

WARNING: DO NOT release the screws (arrowed) at the ends of the camshafts (Fig.20).



4.4.2. Re-assembly

Fit the Camshaft Setting Plate Assembly ensuring it rests fully on the surface of the cylinder head (Fig.4).

Fit VS118/02 Flywheel Locking Pin and VS4323 Tensioner Pre-Load Tool but do not apply pre-load at this stage.

Fig.21 shows the order in which the front sprocket assembly components are re-assembled.

Points to note when re-assembling the sprockets:-

When the chain drive sprocket (exhaust camshaft) is installed, ensure the arrow is in line with the surface of the cylinder head (Fig.22).

Ensure VS4323 Pre-Load Tool is in contact with the chain rail but no pre-load is applied, then re-check arrow is in line with the surface of the cylinder head.

When re-fitting the toothed sleeve on the exhaust camshaft, align the gaps in the toothed shaft to mark on sprocket (Fig.23).

Push in the Toothed Sleeve to position the threaded holes in sprockets in the centre of the elongated holes (Fig.24).

VS4898 Sprocket/Chain Assembly Fixture.

Use VS4898 on the workbench, or in a vice, to ensure correct relationship is achieved between sprockets and chain prior to assembling them on to camshafts.

NOTE: Position of tooth gap on the Inlet sprocket (Fig.25). When placing the Inlet sprocket on to the fixture, the deepest part of the centre boss faces downwards.

IMPORTANT: Do not allow the position of the sprockets to alter in relation to the chain, when removing the assembly off VS4898 Fixture. When installing the sprocket/chain assembly, align the tooth spaces in the teeth on the inlet camshaft sprocket (Fig.26).

Insert Tooth Sleeve on to Inlet camshaft and push in to leave 1mm of spline visible (Fig.27).

"F" and "FRONT" on washers must be visible when installed (Fig.28).

Position the sensor gear on the exhaust camshaft so that arrow on face aligns with the surface of the cylinder head.

When assembly is completed, press down secondary chain tensioner and remove VS4311.02 Locking Pin.

Apply 0.7Nm of pre-load to Adjusting Screw of VS4323 Tensioner Tool, and complete as detailed procedure for - 4.3 Adjusting camshaft timing.

Fig.21

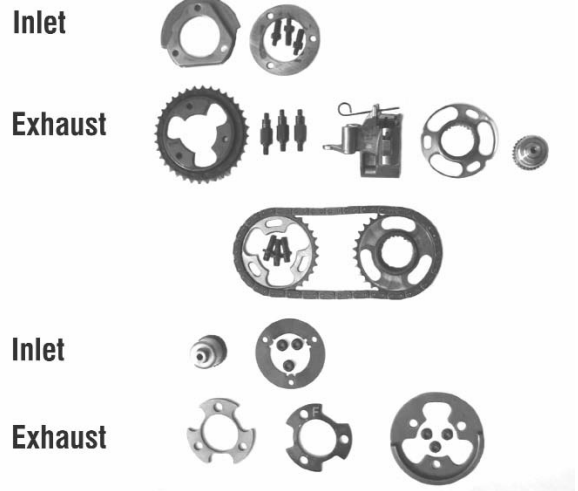


Fig.22



Fig.23



Fig.24



Fig.25

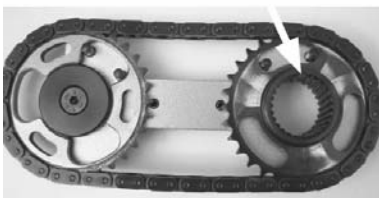


Fig.26

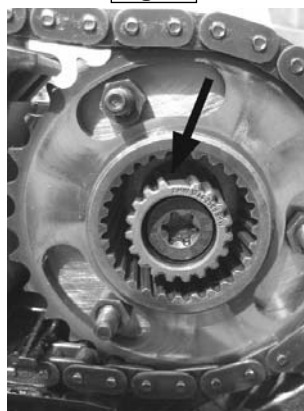
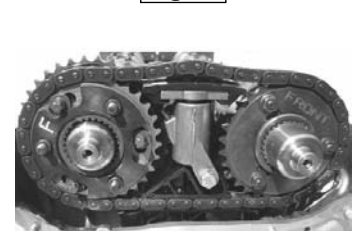


Fig.27



Fig.28



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.

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