

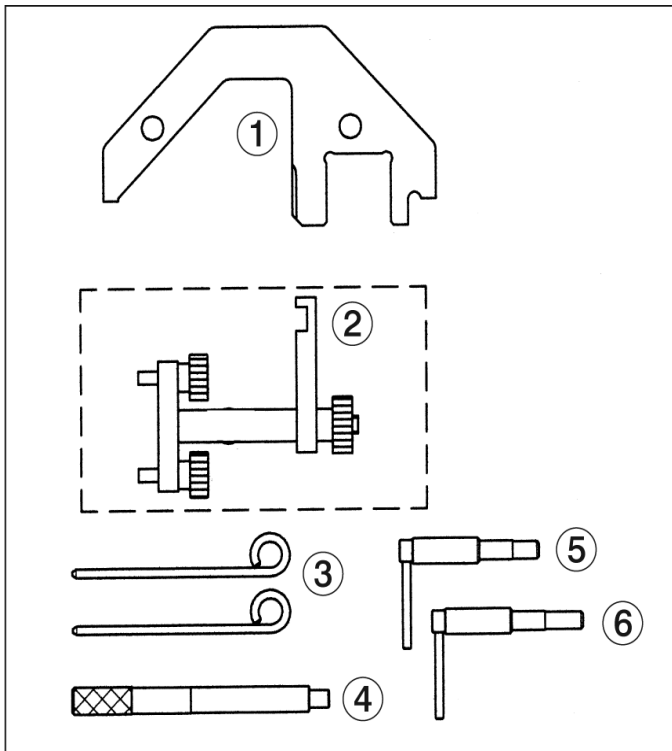
Thank you for purchasing a Sealey product. Manufactured to a high standard this product will, if used according to these instructions and properly maintained, give you years of trouble free performance.



**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.
- DO NOT** attempt to start engine or move vehicle whilst in gear with locking devices fitted.
- Always display warning notification on steering wheel when locking engine components.
- 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

VS4555.V2 Kit includes Camshaft Setting and Flywheel Locking Tools to cover BMW M47 / M57 2.0 and 3.0 diesel engines, including the latest range of common rail diesel engines found in BMW and other vehicle makers models.

#### 2.2 Applications

**BMW M47/M47TU/M47T2 2.0d and M57/M57TU/M57T2 3.0d Diesel engines in:**

##### BMW

- 1 Series** 118d. & 120d. E87
- 3 Series** 318d/td. E46/E90/E91, 320d/cd. E46/E90/E91, 325d. E90/E91/E92/E93, 330d/xd/cd. E46/E90/E91/E92/E93, 335d. E90/E91/E92
- 5 Series** 520d. E39/E60/E61, 525d/xd. E39/E60/E61 530d/xd. E39/E60/E61, 535d. E60/E61
- 6 Series** 635d. E63/E64
- 7 Series** 730d/ld. E38/E65/E66
- X3** 2.0d. & 3.0d/sd. E83
- X5** 3.0d. E53/E70

##### LAND ROVER

- Freelander Td4 (-06) M47
- Range Rover Td6 (-06) M57

##### ROVER

- 75 CDT/CDTi M47R

##### VAUXHALL / OPEL

- Omega 3.0 M57 (02-03)

### 3. CONTENTS/PARTS LIST

1	VS4551	Camshaft Setting Plate
2	VS4552	Camshaft Plate Locking Tool
3	VS4413	Tensioner Retaining Pins Set (pair)
4	VS118/02	Flywheel Locking Pin
5	VS4886	Flywheel Locking Pin (Silver) M47T2
6	VS4887	Flywheel Locking Pin (Gold) M57T2
--	VS4555.V2-84	Case + Insert

### 4. INSTRUCTIONS

These BMW 2.0 and 3.0 diesel engines were first introduced in 1997. There have been a number of technical changes made to the engines over the years, and a number of engine generations have been introduced.

The main design / service procedure changes relating to the use of VS4555.V2 Kit and the checking / adjusting engine timing are as follows:

#### M47 2.0d. / M57 3.0d. (97-04)

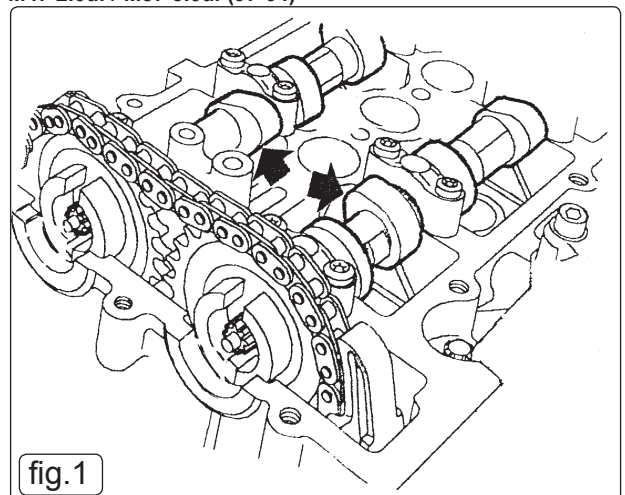


fig.1

Both the inlet and exhaust camshafts / sprockets are directly driven by a timing chain from the diesel pump.  
 The diesel pump is driven by a chain from the crankshaft.  
 TDC position is confirmed by the camshaft lobes on the 1<sup>st</sup> cylinder pointing inwards and towards each other.  
 VS118/02 Flywheel Locking Pin is used.  
**NOTE:** The M47 is not a common rail diesel engine.

**M47TU 2.0d. / M57TU 3.0d. (02-07)**

Only the inlet camshaft / sprocket is driven by a timing chain from the diesel pump.  
 The diesel pump is driven by a chain from the crankshaft.



fig.2

The inlet and exhaust camshafts are connected by gears – the inlet camshaft drives the exhaust camshaft via these gears.  
 TDC position is confirmed by the camshaft lobes on 1<sup>st</sup> cylinder pointing to the left (when viewed from the front sprocket / gears).  
 VS118/02 Flywheel Locking Pin is used.

**M47T2 2.0d. / M57T2 3.0d. (03-08)**

The camshaft sprocket, gears and timing chain configuration is the same as M47TU / M57TU.

Timing marks are provided on the back of the camshaft gears and the inlet camshaft sprocket is fixed to the gear behind through elongated holes providing an “adjustable” position on the gear.

TDC position is confirmed the same as M47TU/M57TU, by the camshaft lobes on 1<sup>st</sup> cylinder pointing to the left (when viewed from the front sprocket / gears).

VS4886 Flywheel Locking Pin is used for M47T2  
 VS4887 Flywheel Locking Pin is used for M57T2

**VS4555.V2 Diesel Engine Setting/Locking Tool Kit**

- Comprises:** VS4551 Camshaft Setting Plate
- VS4552 Camshaft Setting Plate Locking Tool
- VS4413 Tensioner Retaining Pins Set (Pair)
- VS118/02 Flywheel Locking Pin M47/M47TU/ M57/M57TU
- VS4886 Flywheel Locking Pin (Silver) M47T2
- VS4887 Flywheel Locking Pin (Gold) M57T2

The VS4551 Setting Plate and the appropriate Flywheel Locking Pin (VS118/02, VS4886 or VS4887) are used to ‘check’ the timing position of the camshafts and TDC position of the crankshaft (via the flywheel) **on all the above variants** of the M47 2.0 and M57 3.0 BMW diesel engines.  
 In addition to these tools, the kit includes VS4552 Camshaft Setting Plate Locking Tool, which is employed when ‘adjusting’ the camshaft timing and VS4413 Tensioner Retaining Pins used to ‘lock’ the chain tensioner when removing the camshafts, timing chains or sprockets.

**4.1 Checking Timing**

The procedure for ‘checking timing’ is basically the same for all the engine variants, using the appropriate Flywheel Locking Pin and VS4551 Camshaft Setting Plate.

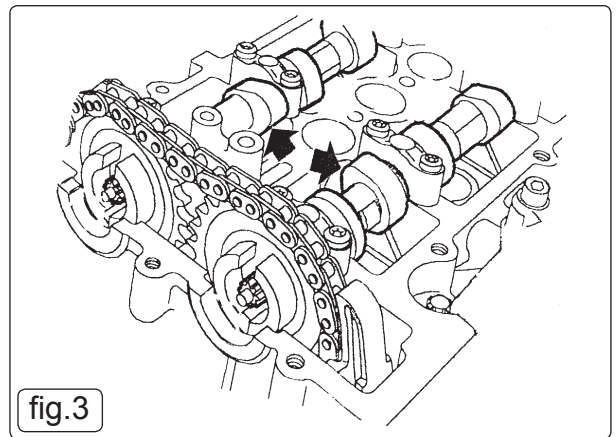


fig.3

4.1.1 Turn the crankshaft, in normal direction of engine rotation, to TDC No1 cylinder.

**On M47 / M57 engines** - the camshaft lobes on the 1<sup>st</sup> cylinder will be pointing inwards and towards each other.

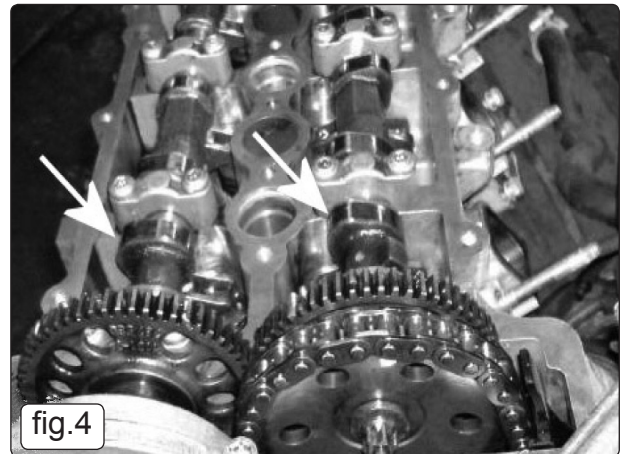


fig.4

**On M47TU/T2 & M57TU/T2 engines** – the camshaft lobes on the 1<sup>st</sup> cylinder will both point to the left, (when viewed from the front camshaft sprocket/gears).

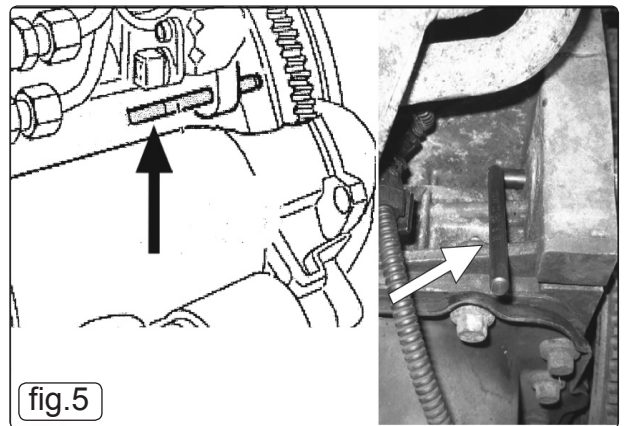


fig.5

**VS118/02, VS4886 and VS4887 Flywheel Locking Pins**

4.1.2 Remove the protective cap from the flywheel timing hole and insert the appropriate Flywheel Locking Pin to hold the crankshaft in TDC position.

**On M47/M47TU & M57/M57TU engines** – use VS118/02 Locking Pin

**On M47T2 engines** – use VS4886 (Silver) Locking Pin

**On M57T2 engines** – use VS4887 (Gold) Locking Pin

**4.2 VS4551 Camshaft Setting Plate**

The accuracy of both camshaft timing positions is confirmed by fitting VS4551 Camshaft Setting Plate, first, onto the Inlet camshaft, and then onto the exhaust camshaft, in turn.

4.2.1 The VS4551 Setting Plate is located on the inlet camshaft in the position shown in Fig.6.

For the inlet camshaft to be timed correctly the Setting Plate must **fully contact** both sides of the cylinder head and lie flush on the head, without a gap.

- 4.2.2 Remove the Setting Plate, reverse its position and fit onto the exhaust camshaft as shown in Fig.7.  
For the exhaust camshaft to be timed correctly the Setting Plate must **fully contact** both sides of the cylinder head and lie flush, without a gap.  
If the Camshaft Setting Plate does not fully contact the cylinder head on either the inlet or exhaust camshafts, timing adjustment will be required.

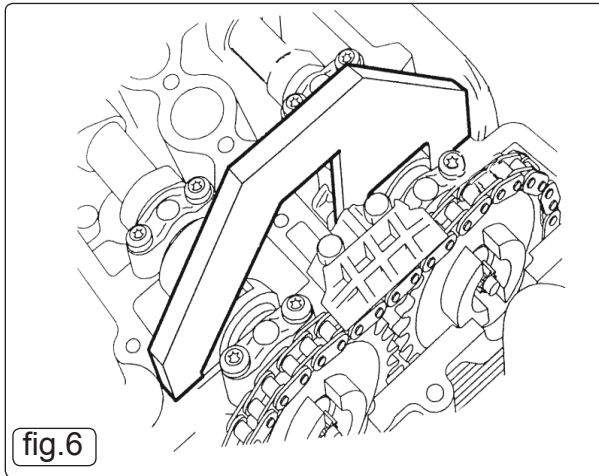


fig.6

Checking timing on inlet camshaft

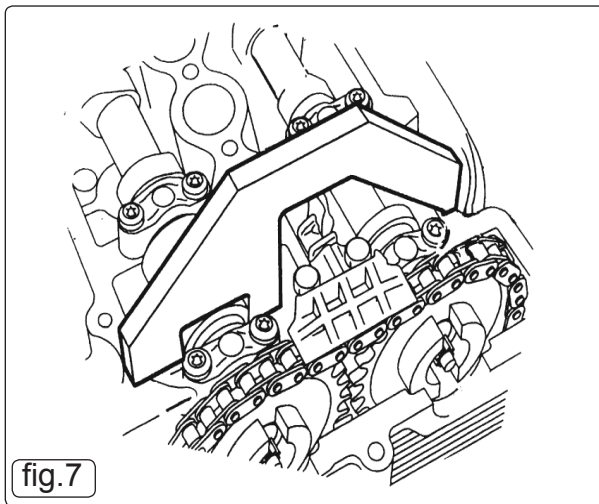


fig.7

Checking timing on exhaust camshaft

#### 4.3 Timing Adjustment

The camshaft timing adjustment procedures differ slightly, and are dependant on the engine variant (refer to procedures below), but in general "adjustment" is achieved by releasing the camshaft sprocket from the camshaft and adjusting the position of the camshafts using VS4551 Camshaft Setting Plate and VS4552 Camshaft Plate Locking Tool.

**WARNING: On T2 variants the exhaust camshaft gear bolt must NOT be released.**

**IMPORTANT:** Always discard the old bolts and fit new ones finger-tight to retain sprockets loosely on the camshafts. The camshaft sprockets should be free to rotate but should not be able to tilt on the camshaft.

**WARNING: When releasing/tightening a camshaft sprocket bolt the camshaft MUST BE counter-held using a spanner at the hexagon provided on the camshaft. Timing tools MUST NOT be used to counter-hold as damage will result.**

**On M47 / M47TU and M57 / M57TU engines** – ensure that TDC No.1 cylinder timing position has been established correctly for the engine variant being worked on, and that the appropriate Flywheel Locking Pin is inserted – **procedure as detailed in "Checking timing"**

- 4.3.1 Counter-hold each camshaft in turn, with a spanner, at the hexagon provided on the camshafts, whilst releasing **both the inlet and exhaust camshaft sprocket bolts.**

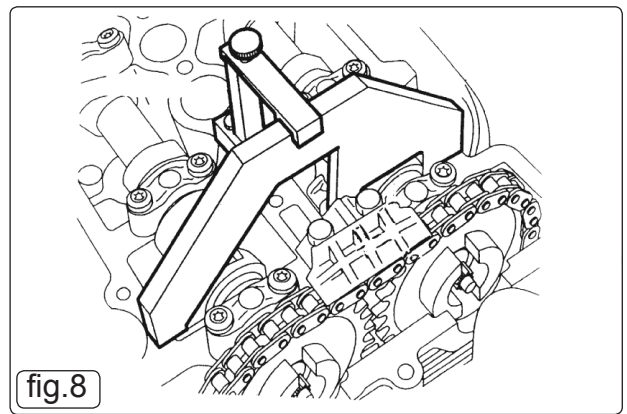


fig.8

Cam Plate Locking Tool securing Setting Plate on inlet camshaft.

- 4.3.2 Fit the VS4552 Camshaft Plate Locking Tool by securing its base to the engine, but with its top clamping arm remaining loose. Carefully align the **inlet** camshaft to allow VS4551 Setting Plate to be fitted, ensuring the Setting Plate **rests fully** on both sides of the cylinder head. Clamp the Setting Plate in place by fixing with the top clamping arm of VS4552, and secure the arm tightly.
- 4.3.3 Counter-hold the inlet camshaft with a spanner at the hexagon provided, and using a suitable angle torque gauge, tighten the new sprocket bolt to specified torque.

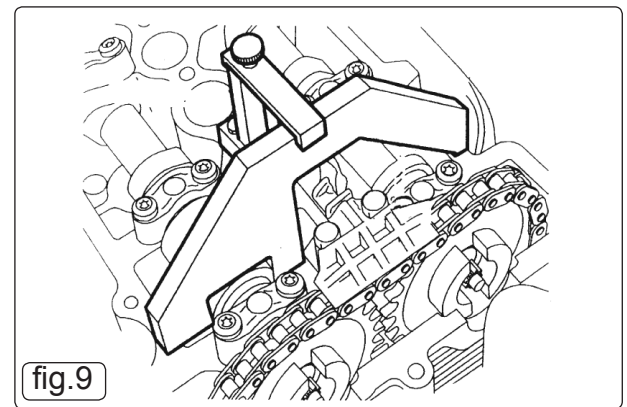


fig.9

Secure Setting Plate on the exhaust camshaft.

- 4.3.4 Release the top clamping arm of VS4552, reverse VS4551 Setting Plate and position onto the exhaust camshaft ensuring the Plate **rests fully** on both sides of the cylinder head. Clamp firmly in place with VS4552.

Counter-hold the exhaust camshaft with spanner and repeat the procedure for tightening the sprocket bolt, as employed on the inlet camshaft.

Remove Holding Tool, Setting Plate and Flywheel Locking Pin and turn the crankshaft two revolutions, in direction of normal engine rotation, and return to TDC position at No1 cylinder. Insert the Flywheel Pin and check both camshaft positions using VS4551 Plate as per '**Checking Timing**' procedure

- 4.4 **On M47T2 and M57T2 engines** – These engines have an "adjustable" camshaft sprocket on the **inlet camshaft**. The sprocket is fixed to the camshaft gear behind by 3 bolts through elongated holes. These bolts are slacked during the timing adjustment procedure but due to access difficulty when the engine is positioned at TDC, one of the bolts must be removed prior to establishing TDC and inserting the Flywheel Locking Pin.
- 4.4.1 Turn the engine so the inlet camshaft lobe on the 1<sup>st</sup> cylinder faces downwards – release and remove the visible right-hand bolt only, of the camshaft sprocket.

**WARNING: DO NOT release the bolt on the exhaust camshaft gear.**

Ensure that TDC No.1 cylinder timing position is established correctly for the engine variant being worked on, and that the appropriate Flywheel Locking Pin is inserted – procedure as detailed in "Checking timing"

**NOTE:** These engines have timing marks on the rear of the camshaft gears.



4.4.2 Slacken the remaining 2 bolts of the **inlet camshaft sprocket only** (not exhaust gear bolt).

Ensure that the timing mark on the outer edge of the **inlet** camshaft gear is flush with the cylinder head.

Ensure that the timing mark on the outer edge of the **exhaust** camshaft gear is flush with the cylinder head.

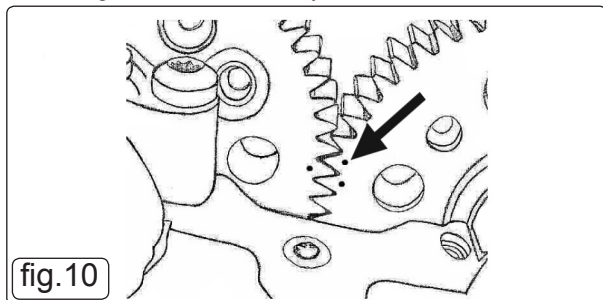


fig.10  
The inner timing mark on the inlet gear should be aligned between the two inner timing marks on the exhaust gear.

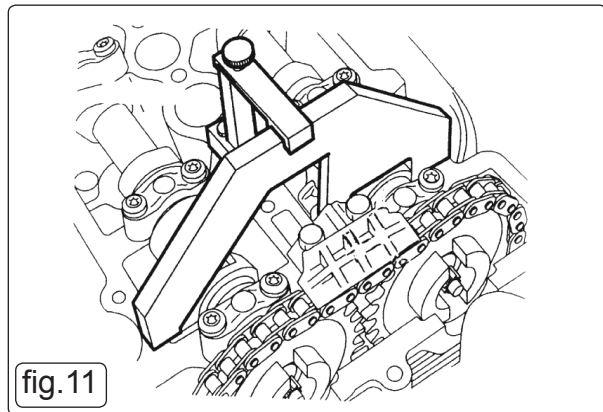


fig.11  
Cam Plate Locking Tool securing Setting Plate on inlet camshaft.

4.4.3 Fit the VS4552 Camshaft Plate Locking Tool by securing its base to the engine, but with its top clamping arm remaining loose.

Carefully align the **inlet** camshaft to allow VS4551 Setting Plate to be fitted, ensuring the Setting Plate **rests fully** on both sides of the cylinder head. Clamp the Setting Plate in place by fixing with the top clamping arm of VS4552, and secure the arm tightly.

4.4.4 Replace the 2 x inlet camshaft sprocket bolts and counter-hold the inlet camshaft with a spanner at the hexagon provided, and tighten the new bolts to specified torque.

4.4.5 Remove Holding Tool, Setting Plate and Flywheel Locking Pin and turn the crankshaft two revolutions, in direction of normal engine rotation, and expose the hole for the 3<sup>rd</sup> inlet camshaft sprocket bolt, and fit new bolt and tighten to specified torque. Return to TDC position at No1 cylinder.

Insert the Flywheel Pin and check camshaft positions using VS4551 Plate as per '**Checking Timing**' procedure.

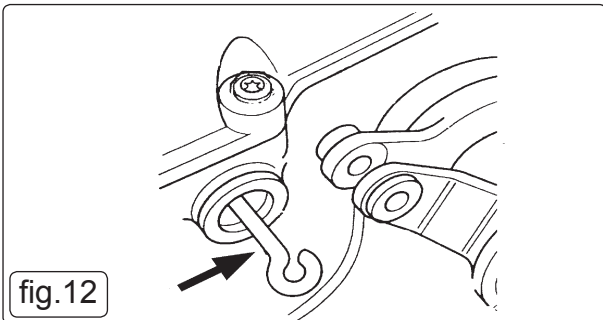


fig.12

**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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4.5 **VS4413 Tensioner Retaining Pins Set**

For removal of camshafts, sprockets, timing chains, the chain tensioner **MUST BE** 'locked back' releasing tension off the timing chain.

With the engine 'locked' at TDC with the appropriate Flywheel Locking Pin, remove the chain tensioner access plug from the timing cover and slowly turn the exhaust camshaft **clockwise** to fully compress the chain tensioner, and lock with one of the VS4413 Retaining Pins.

**WARNING:** If the camshaft sprockets are removed without first locking the hydraulic chain tensioner, its piston will eject. Considerable force will then be required to compress it back in place.

VS4555.V2 Kit contains VS4413 Tensioner Retaining Pins Set (Pair) as two pins are required if the chain tensioner is required to be completely removed from the engine.

4.6 **Diesel Pump Removal**

**Pump Sprocket Retainers - Associated Tools, not in kit**



fig.13

The main purpose of these tools is to retain the position of the pump sprocket in-situ, whilst the pump is removed and off the engine. This allows the front sprockets/timing chain configuration to remain undisturbed and under tension, thus reducing the level of engine dis-assembly required.

**VS4553** Pump Remover & Sprocket Retaining Tool covers injection/HP pump removal on **BMW models** with M47/M47TU/M47T2 and M57/M57TU/M57T2 engines.

**VS4554** Pump Remover & Sprocket Retaining Tool covers injection/HP pump removal on **LAND ROVER Freelander** and **ROVER 75** models with Td4 and M47 engines.

VS4553 and VS4554 are similar, with the VS4554 being shorter in order to accommodate restricted access on the engines fitted transversely. The application procedure for fitting and use of these tools, is identical.

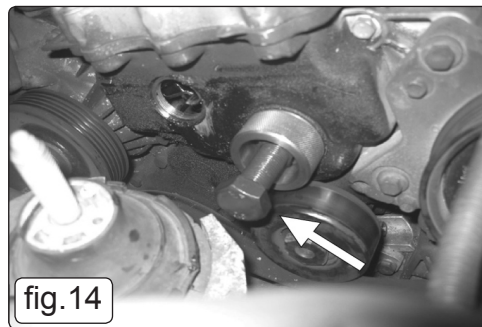


fig.14

**High Pressure (Common Rail) Pump**

If a HP pump is fitted the position of the pump does not affect the valve timing.

**M47 with 'Distributor Type' Injection Pump**

It will be necessary to lock the crankshaft at TDC No.1 cylinder using VS118/02 Pin. Check that the lug on the inlet camshaft, at No.1 cylinder, points upwards, when viewed through the oil filler hole. The injection pump must be 'locked' with its locking screw to secure the pump shaft before removing the pump.

**NOTE:** For this configuration of M47 with 'Distribution Type' pumps, the Support Sleeve of VS4553 will not be required. The 'Distributor Type' pump will require timing when it is re-fitted.