SEALEY Professional TOOLS
AUTO SERVICE LINE

INSTRUCTIONS FOR:

DIESEL ENGINE SETTING / LOCKING TOOL KIT - RENAULT / NISSAN / VAUXHALL / 2.0 dCi

MODEL No: **VS4975**

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. CONTENTS & APPLICATIONS

Applications:
RENAULT 2.0 dCi Twin Camshaft CHAIN DRIVE diesel engine in

RENAULT

Megane	Scenic	Laguna
Vel Satis	Espace	Koleos
Trafic		

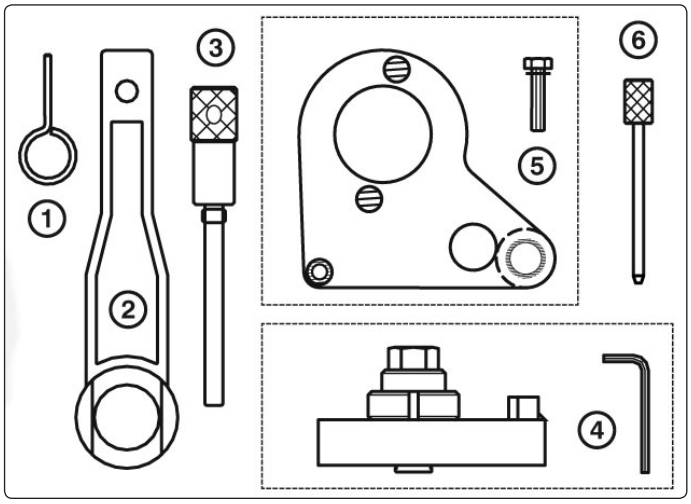
NISSAN

Qashqai	X-Trail	Primastar

VAUXHALL/OPEL
Vivaro

M9R engines

Additional VS Tools required:
VS4939 Crank Pulley Holding Tool Handle



Kit contents/spares

Item	Part Number	Description
1	VS4975T8	Chain Tensioner Locking Pin
2	VS4976	Crankshaft Pulley Holding Tool
3	VS4977	Crankshaft Locking Pin
4	VS4978	Camshaft Gear Alignment Fixture
5	VS4979	Camshaft Setting Tool
6	VS3032-20	Auxiliary Belt Tensioner Locking Pin
-	VS4975-84	Case + Insert

3. INSTRUCTIONS

AST4975 Diesel Engine Setting/Locking Tool Kit
Comprises: VS4975T8 Chain Tensioner Locking Pin
VS4976 Crankshaft Pulley Holding Tool
(use with VS4939 Handle)
VS4977 Crankshaft Locking Pin
VS4978 Camshaft Gear Alignment Fixture
VS4979 Camshaft Setting Tool
VS3032-20 Auxiliary Belt Tensioner Locking Pin

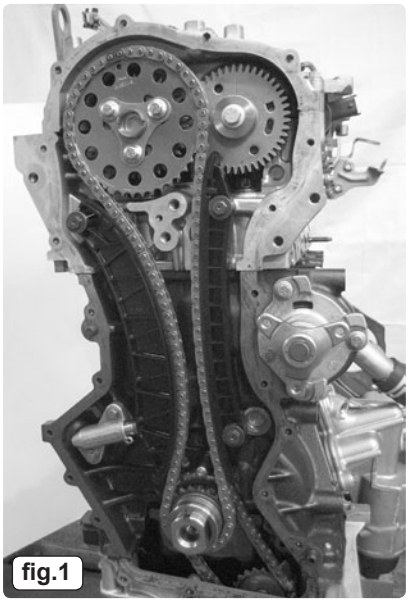


fig.1

The Renault 2.0dCi (M9R) common rail diesel is a twin camshaft 16v. engine.
The exhaust camshaft is driven directly from the crankshaft by a timing chain and has a front camshaft sprocket with a gear behind it.
The inlet camshaft is driven from the exhaust camshaft, via gears at the front of the camshafts.
The inlet camshaft has a scissor gear (wear compensation gear), which connects to the exhaust camshaft gear.

Timing applications on this engine require removal of the timing chain front cover plate, exposing the camshaft sprocket/gears, crankshaft gear and timing chain/tensioner.
If the specific repair/overhaul application being carried out allows the engine to remain in the vehicle, then it will be necessary to support the engine and remove the engine mounting bracket and torque stabiliser.

3.1 Checking valve timing

In order to remove the front cover plate the engine oil must be drained and the auxiliary belt and front pulleys removed.

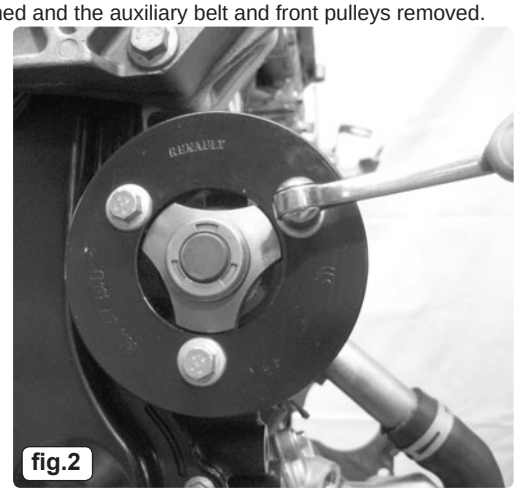


fig.2

3.1.1 Release the 3 bolts (fig.2) of the coolant pump pulley (do not remove the pulley at this stage).

3.1.2 Turn the auxiliary belt tensioner roller **clockwise** and 'lock' using VS3032-20 Tensioner Locking Pin. Remove the auxiliary belt.

3.1.3 Turn the tensioner roller **clockwise** and remove the Locking Pin. Remove the belt tensioner unit and the coolant pump pulley.


fig.3

AST4976 Crankshaft Pulley Holding Tool
(use with VS4939 Handle – Associated Tool –not in kit)

3.1.4 Using VS4976 Crankshaft Pulley Holding Tool and a suitable handle, such as VS4939, to counter-hold the crankshaft pulley (fig.3), release the centre bolt and remove the bolt, pulley and spacer sleeve.

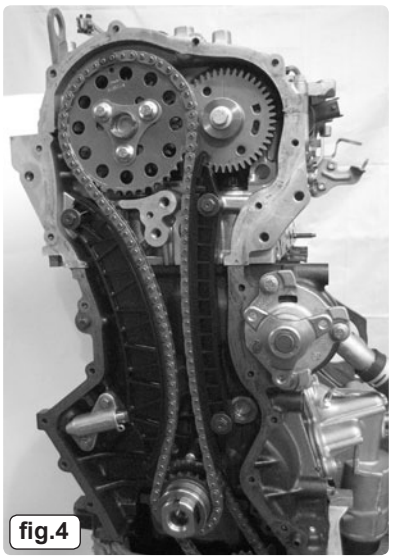


fig.4

3.1.5 Remove the timing chain front cover plate to provide access to the camshaft gears and timing chain/chain tensioner (fig.4).

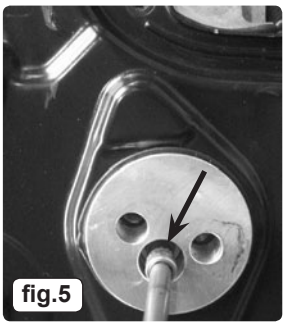


fig.5

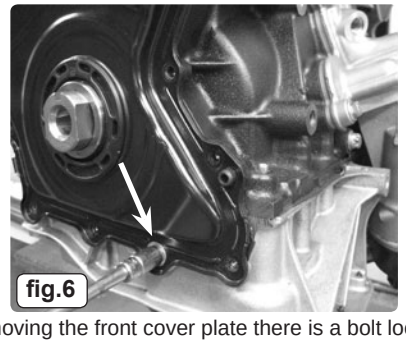


fig.6

NOTE: When removing the front cover plate there is a bolt located behind the engine mounting (fig.5). There is also a large bolt (larger than the other cover plate bolts) on the sump (fig.6).

3.1.6 Rotate the engine to TDC No.1 cylinder position.

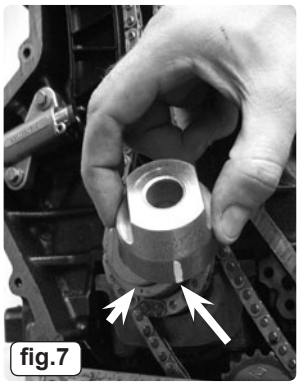


fig.7

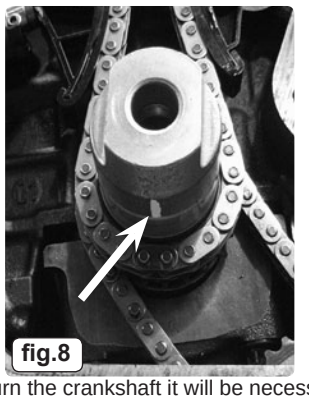


fig.8

NOTE: In order to turn the crankshaft it will be necessary to install the crankshaft spacer sleeve on to the end of the crankshaft (fig.7) and use Tool VS4976. The spacer sleeve will cover the crankshaft gear timing mark, therefore paint a mark on the sleeve aligned with the crankshaft gear timing mark to assist in identifying crankshaft positioning.

When the engine is a TDC No.1 cylinder the crankshaft gear timing mark is at the **6-o-clock** position (fig.8) and the inlet camshaft gear timing mark is at **12-o-clock.**

3.2 VS4977 Crankshaft Locking Pin

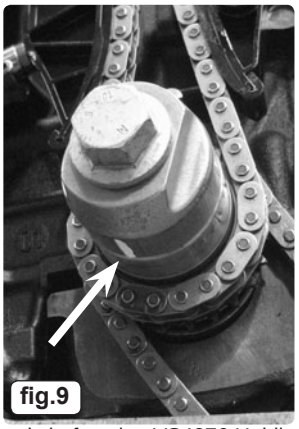


fig.9

3.2.1 Rotate the crankshaft, using VS4976 Holding Tool, to move the 'paint mark', on the crankshaft spacer sleeve (crankshaft gear timing mark), to the **7-o-clock position** (fig.9).

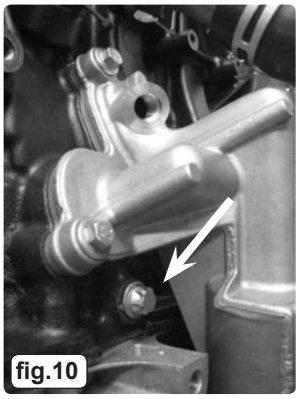


fig.10

3.2.2 Remove the bolt (fig.10) from the hole in the engine block which accepts the VS4977 Crankshaft Locking Pin.


fig.11

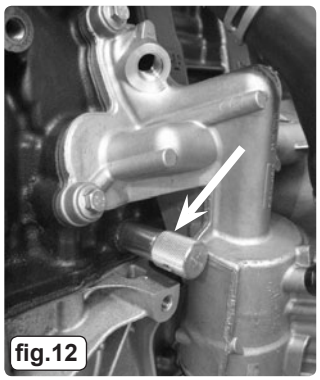


fig.12

3.2.3 Insert VS4977 Crankshaft Locking Pin (fig.11).
IMPORTANT: Ensure the Locking Pin is **fully** screwed in to the hole in the engine block (fig.12).

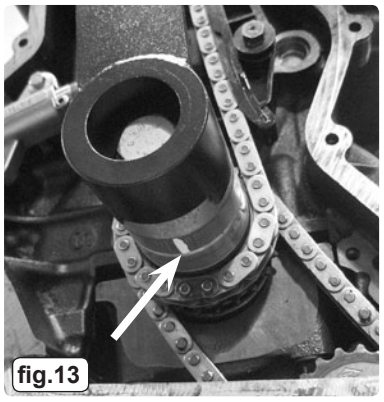


fig.13

3.2.4 Turn the crankshaft **anti-clockwise** until the 'paint mark' on the spacer sleeve is in the **6-o-clock position**. The VS4977 Crankshaft Pin will 'lock' the engine at this point (fig.13).

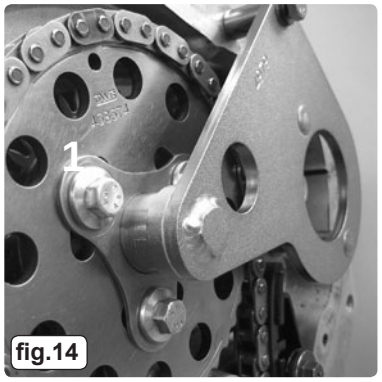


fig.14

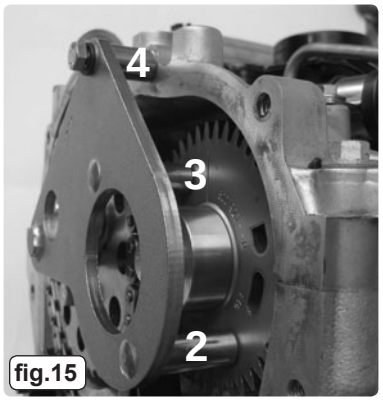
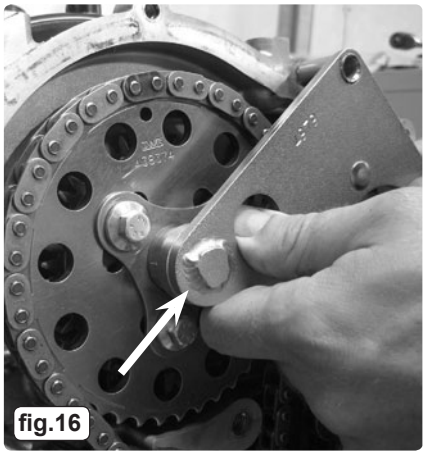


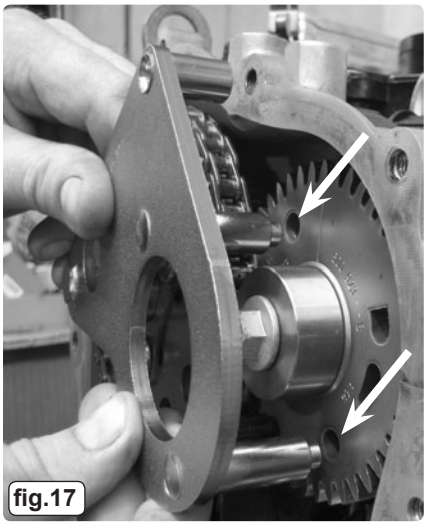
fig.15

3.3 VS4979 Camshaft Setting Tool
The VS4979 Camshaft Setting Tool has 4 location points – (1) the exhaust camshaft sprocket centre slot, (2 and 3) the inlet camshaft gear two holes. (4) the retention bolt to the cylinder head, see figs.14 & 15.
The Tool is used to both check and adjust camshaft / valve timing position.

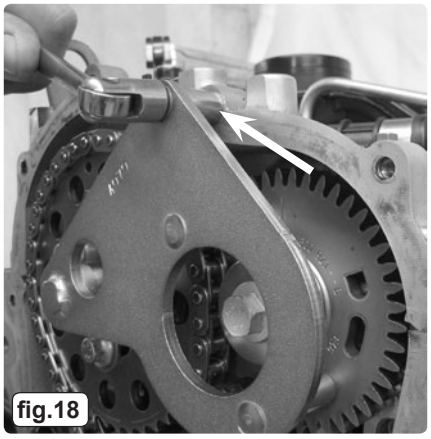
IMPORTANT: The Camshaft Setting Tool MUST BE able to achieve location at all 4 points simultaneously, for timing to be correct.



3.3.1 To check that valve timing is correct - fit VS4979 Setting Tool in to the slot at Point 1 (exhaust sprocket centre slot) (fig.16).



3.3.2 Whilst located in this slot (Point 1) fit the two pillars of the Tool in to the two holes in the inlet camshaft gear (Points 2 and 3) (fig.17).



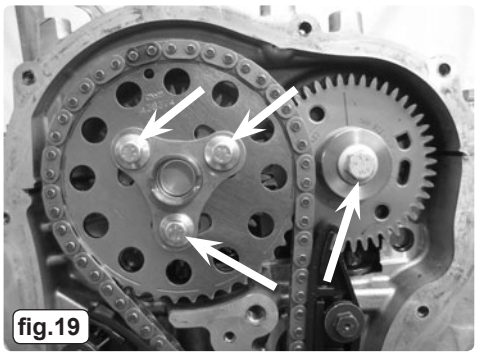
3.3.3 Finally, secure the Setting Tool to the cylinder head at Point 4, with the bolt provided in the kit (fig.18).

If all 4 location points are achieved, then the valve timing is correct. If not, then valve timing adjustment will be necessary.

3.4 Valve timing adjustment

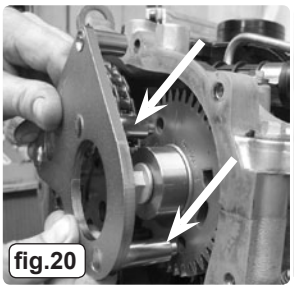
The following procedure covers valve timing adjustment and also applies to setting up the valve timing when installing the camshafts, gears after cylinder head overhaul etc.

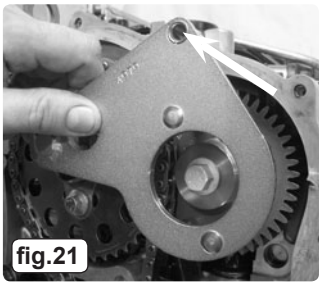
3.4.1 Ensure the engine / crankshaft is at TDC No.1 cylinder and that VS4977 Crankshaft Locking Pin is correctly inserted and the crankshaft is 'locked' in position.



3.4.2 Slacken the centre bolt (x1) of the inlet camshaft gear (fig.19).

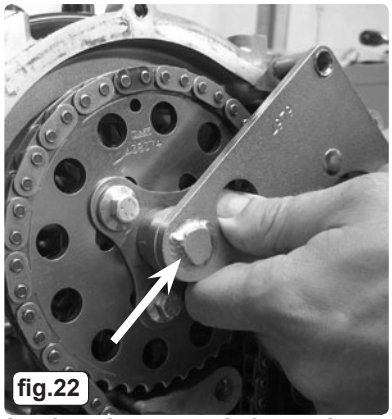
3.4.3 Slacken the 3 bolts of the exhaust camshaft front sprocket.





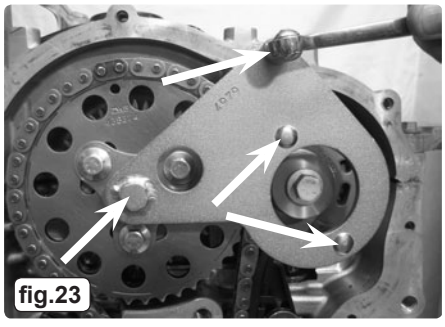
3.4.4 **1st- position the inlet camshaft gear:**
Fit VS4979 Camshaft Setting Tool in to the 2 holes (Points 2 and 3) in the inlet camshaft gear (fig.20) and rotate the Setting Tool to align the Tool to the bolt hole (Point 4) in the cylinder head Fig.21).

IMPORTANT: At this stage the Setting Tool is not inserted in to the exhaust camshaft sprocket slot (Point 1).



3.4.5 **2nd – position the exhaust camshaft sprocket**:
Remove the Camshaft Setting Plate from the inlet camshaft gear and fit it in to the slot in the exhaust camshaft sprocket (Point1). Rotate the Setting Tool to align the Tool to the bolt hole (Point 4) in the cylinder head (fig.22).

IMPORTANT: At this stage the Setting Tool is not inserted in to the inlet camshaft gear holes (Points 2 and 3).



3.4.6 **Finally insert Setting Tool to both camshafts and secure to the cylinder head:**
Fit the VS4979 Camshaft Setting Tool in to both the exhaust camshaft sprocket slot (Point 1) and the inlet camshaft gear – 2 holes (Points 2 and 3), and secure the Tool to the cylinder head (Point 4) using the bolt provided (fig.23).

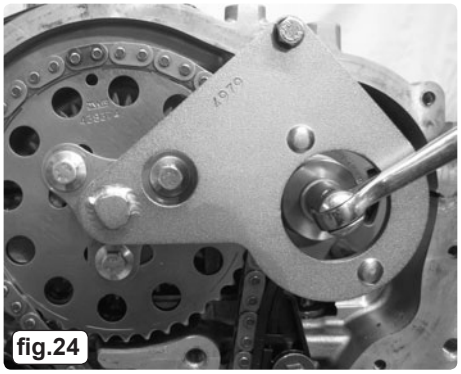


fig.24

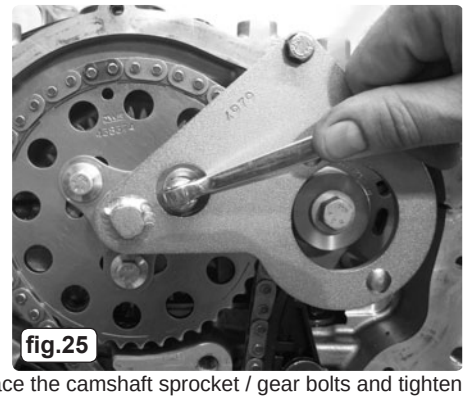


fig.25

3.4.7 Replace the camshaft sprocket / gear bolts and tighten the new bolts to the specified torque.

Procedure for removing / re-fitting the camshaft gears / timing chain after overhaul applications on camshafts, cylinder head etc.

3.5 Dismantling / Removal of gears

3.5.1 Ensure the engine / crankshaft is at TDC No.1 cylinder and that VS4977 Crankshaft Locking Pin is correctly inserted and the crankshaft is 'locked' in position.

3.5.2 Slacken and remove the 3 bolts retaining the exhaust camshaft sprocket and remove the triangular plate (fig.26).

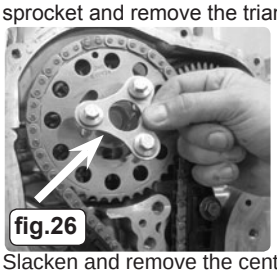


fig.26

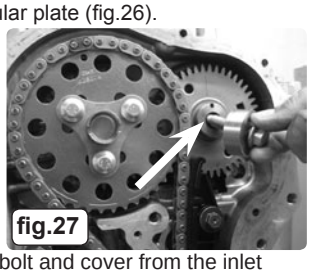


fig.27

3.5.3 Slacken and remove the centre bolt and cover from the inlet camshaft gear (fig.27).

VS4975T8 Timing Chain Tensioner Locking Pin

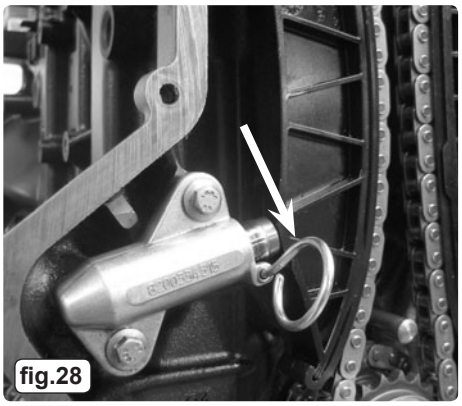


fig.28

3.5.4 Push in the timing chain tensioner plunger and insert VS4975T8 Locking Pin to 'lock' the plunger in a retracted position. Remove the chain tensioner unit (fig.28).

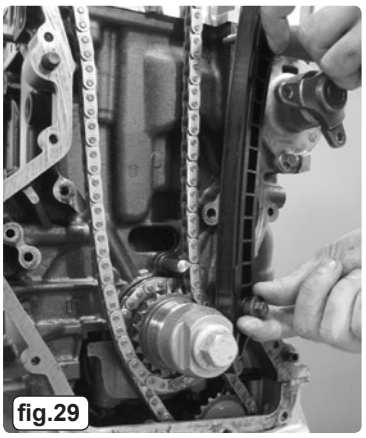


fig.29

3.5.5 Remove the chain guide rails – slacken and remove the upper and lower bolts from the non-tensioned side rail and the upper bolt from the tensioned side rail.

3.5.6 Remove the crankshaft spacer sleeve (fig.29).

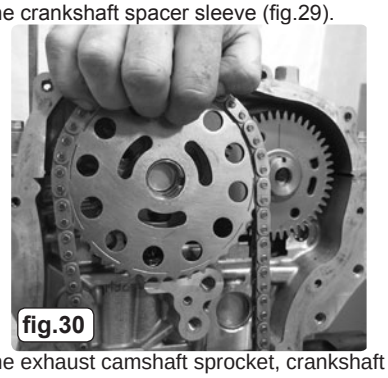


fig.30

3.5.7 Remove the exhaust camshaft sprocket, crankshaft gear and timing chain as one assembly and in one operation (fig.30).

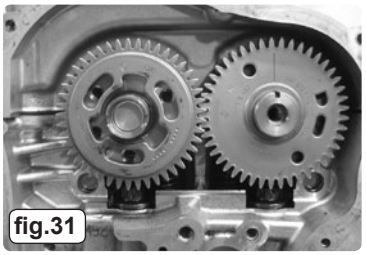


fig.31

The exhaust camshaft gear and inlet camshaft gear will now be exposed on the end of the camshafts (fig.31).

NOTE: The inlet camshaft gear is a scissor gear (wear compensation gear) which is a spring loaded, double gear, configuration.

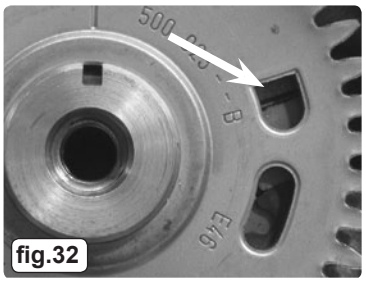


fig.32

3.5.8 Insert a suitable sized screwdriver in to the window in the inlet camshaft gear and apply leverage to turn the lower section of the scissor gear to release tension off the gear teeth (fig.32).

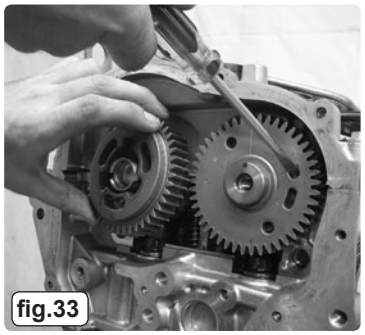
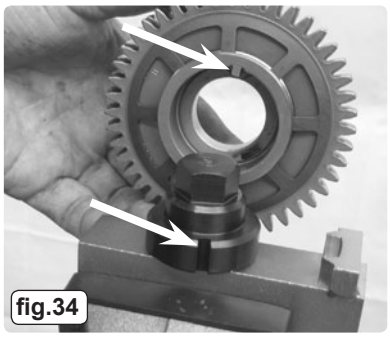


fig.33

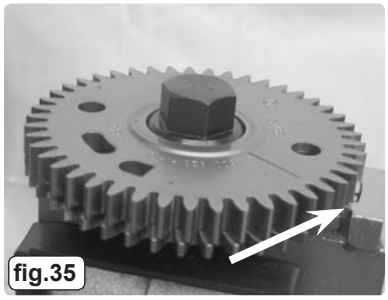
3.5.9 Maintain the leverage and remove the **exhaust** camshaft gear and then remove the **inlet** camshaft gear (fig.33).

3.6 Re assembly

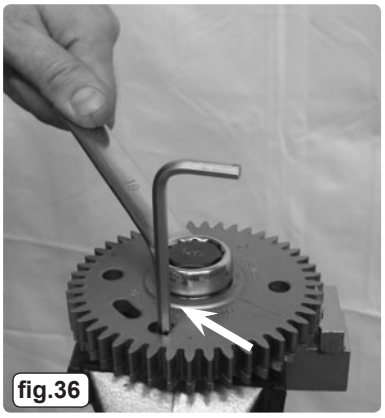


VS4978 Camshaft Gear Alignment Fixture (fig.34).

3.6.1 Fit VS4978 Gear Alignment Fixture in to a suitable bench vice.



3.6.2 Place the inlet camshaft gear on to the Fixture (fig.35) (timingmark visible), with the keyway in the gear located on to the spindle of the Fixture and the gear teeth located in the base of the Fixture.



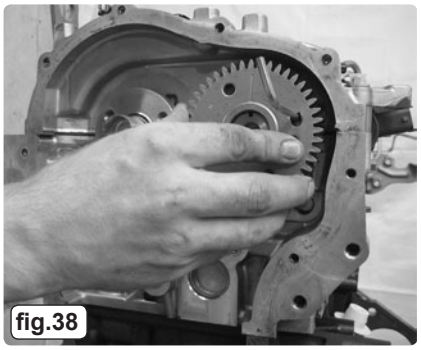
3.6.3 Using a spanner, turn the spindle **anti-clockwise** to align the top and bottom sets of gear teeth (fig.36).

Insert the 4mm Spacer Key provided, in to the window in the gear to maintain the aligned position of the scissor gear teeth.

3.6.4 Remove the inlet camshaft gear from VS4978 Fixture ensuring that the Spacer Key remains in place in the gear window (fig.37).

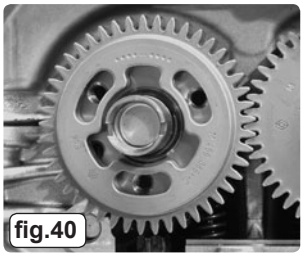
Ensure the crankshaft is locked at TDC with VS4977 Locking Pin.

NOTE: Check crankshaft is locked correctly by trying to turn it in an **anti-clockwise** direction. It should not be possible to turn it.

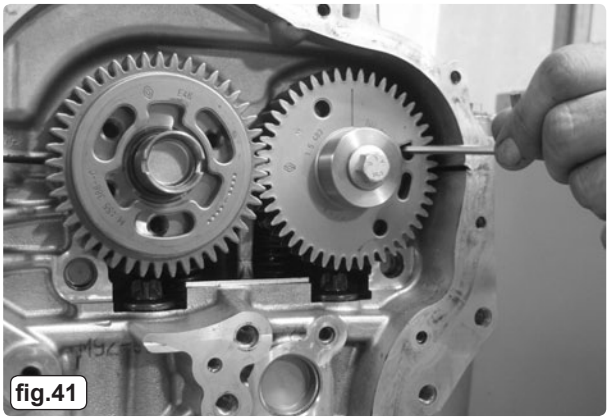


3.6.5 Install the inlet camshaft gear and spacer and screw in a new bolt finger-tight only (fig.38) (do not fully tighten bolt at this stage).

NOTE: The timing mark and keyway of the gear should be in the 12 o-clock position.



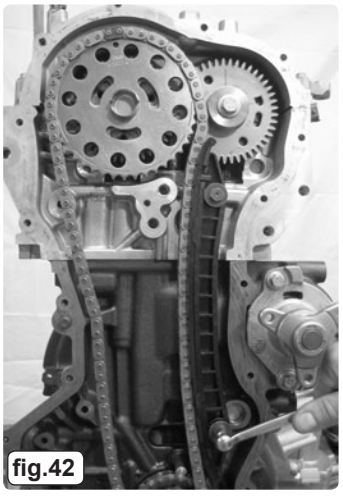
3.6.6 Install the exhaust camshaft gear ensuring that the bolt holes are positioned in the centre of the elongated holes in the gear and that the gear teeth mesh together with the gear teeth of the inlet camshaft gear (fig.39 & fig.40).



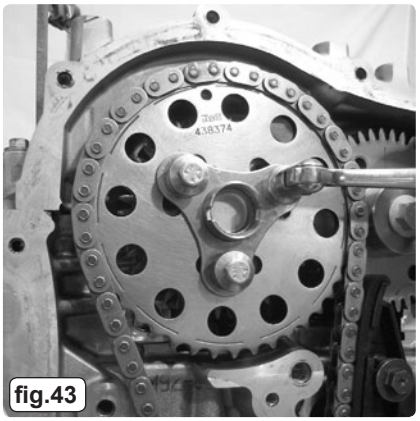
3.6.7 Pull out the Spacer Key from the inlet camshaft gear allowing the teeth of the scissor gear to activate (fig.41).

3.6.8 Prepare the assembly of the crankshaft gear, timing chain and exhaust camshaft sprocket ensuring that the coloured links on the chain are positioned on the timing marks of the sprocket / gear and install the assembly on to the engine.

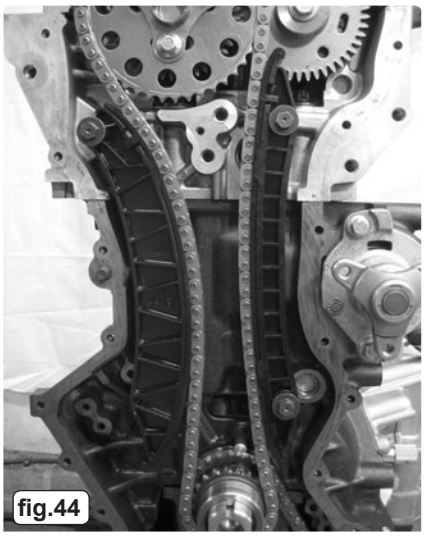
NOTE: The crankshaft gear has a keyway location but the camshaft sprocket is 'free' on the end of the camshaft.



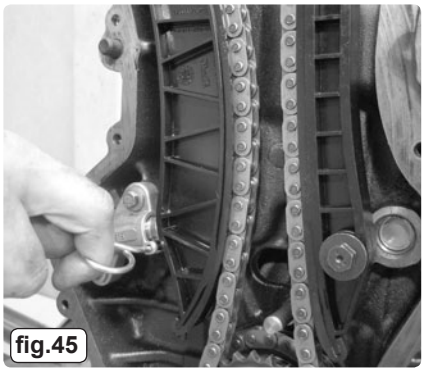
3.6.9 Install the chain guide rail on the non-tensioned side using 2 new bolts and tighten (fig.42).



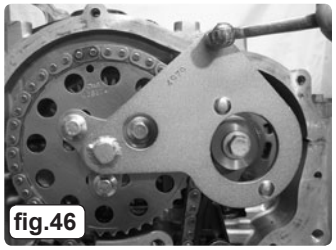
3.6.10 Install the triangular plate onto the exhaust camshaft sprocket using 3 new bolts and tighten finger-tight only (fig.43).



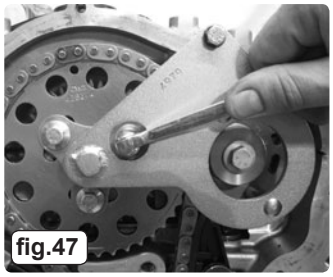
3.6.11 Install the chain guide rail on the tensioned side using a new bolt and tighten (fig.44).

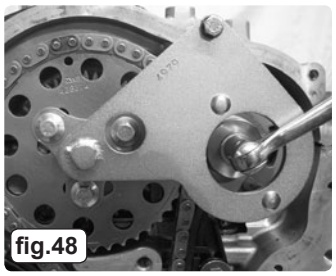


3.6.12 Install the chain tensioner and pull out Pin VS4975T8 to activate the plunger. Ensure the plunger is in contact with the chain guide rail (fig.45).

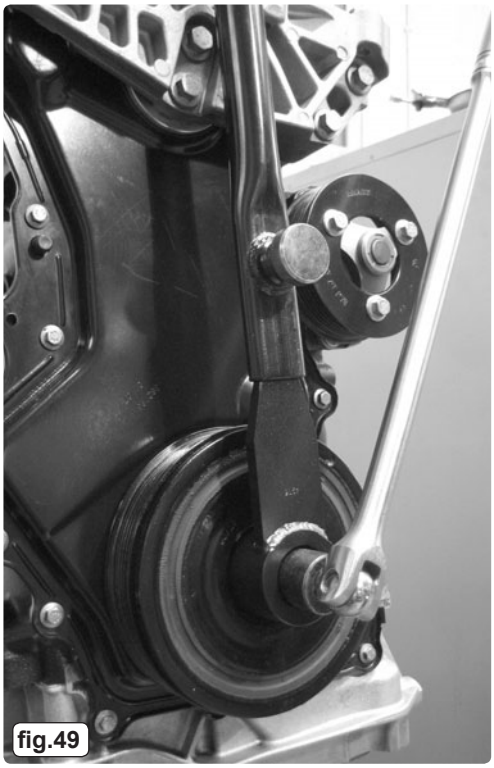


3.6.13 Check that the exhaust camshaft sprocket and inlet camshaft gear are positioned correctly by installing VS4979 Setting Tool (fig.46) and ensuring it can be secured to the cylinder head with the bolt provided **– refer to "Adjusting valve timing".**





3.6.14 Tighten the exhaust camshaft sprocket bolts (x3) to 10Nm. + 40 degrees (fig.47), and then tighten the inlet camshaft gear bolt to 20Nm. + 35 degrees (fig.48).



3.6.15 When the front cover is re-fitted, a new bolt must be used on the crankshaft pulley. This is tightened to 50Nm. + 85 degrees (fig.49).

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