

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.

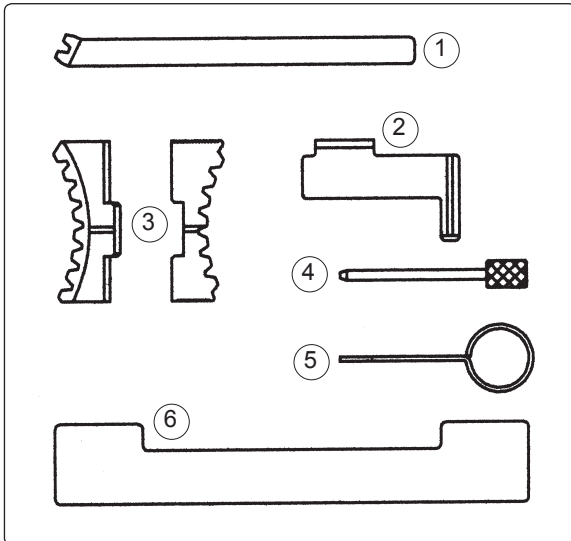


IMPORTANT: PLEASE READ THESE INSTRUCTIONS CAREFULLY. NOTE THE SAFE OPERATIONAL REQUIREMENTS, WARNINGS AND CAUTIONS. USE THE PRODUCT CORRECTLY AND WITH CARE FOR THE PURPOSE FOR WHICH IT IS INTENDED. FAILURE TO DO SO MAY CAUSE DAMAGE AND/OR PERSONAL INJURY AND WILL INVALIDATE THE WARRANTY. PLEASE KEEP 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:
VAUXHALL-OPEL 1.6 and 1.8 "Twinport" 16v. Petrol engines in

VAUXHALL-OPEL

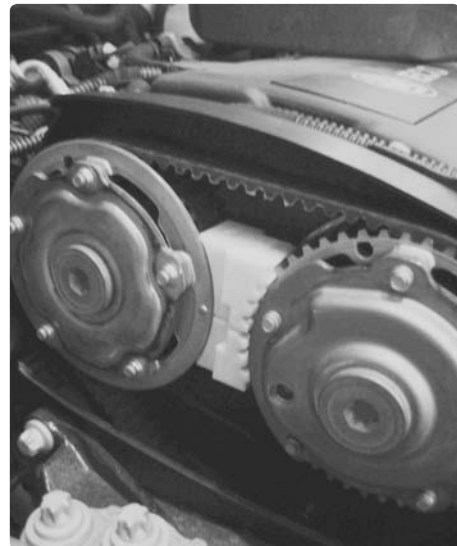
Corsa-D	Astra G+H	Meriva
Zafira-B	Vectra-C	Signum

Z16LEL, Z16LER, Z16LET, Z16XE1, Z16XEP, Z16XER, Z18XER engines

XER engines have VVT (variable valve timing) on both inlet and exhaust camshafts.

Additional Tools required:

VS4742 Ignition Module Removal Tool Set – required for Timing Adjustment applications (XER).



Kit contents/spares

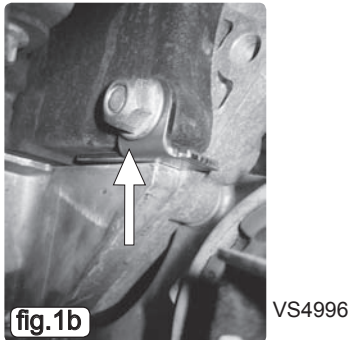
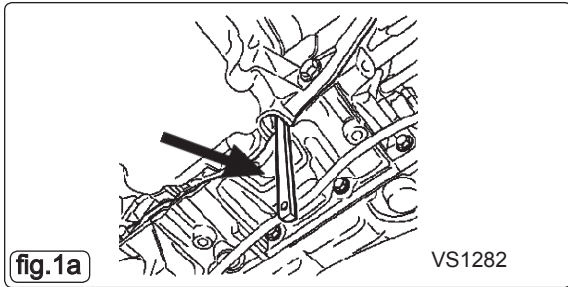
Item	Part Number	Description
1	VS1282	Flywheel Holding Tool
2	VS4996	Flywheel Holding Tool
3	VS4997	Camshaft Sprocket Locking Tool
4	VS3032.20	Auxiliary Belt Tensioner Locking Pin
5	VS4593.1F	Timing Belt Tensioner Locking Pin
6	VS4998	Camshaft Setting Plate
--	VS4995-84	Case + Insert

3. INSTRUCTIONS

Vauxhall-Opel 1.6 "Twinport" engines were introduced in 2003 in the Astra-G (Z16XEP), with a number of 1.6 variants following in the Astra H, Zafira, Meriva and Corsa-D models. These 1.6 engines did not have VVT (variable valve timing) which was first introduced in the 1.6 engine in the Astra-H in 2007 (Z16XER), followed by the Zafira-B. The 1.8 "Twinport" engine (Z18XER) launched in 2005 has VVT and is fitted in Astra-H, Vectra-C/Signum and Zafira-B models.

VS4995 Petrol Engine Twin Camshaft Setting/Locking Tool Kit

Comprises: VS4997 Camshaft Sprocket Locking Tool
 VS4998 Camshaft Setting Plate
 VS4593.1F Timing Belt Tensioner Locking Pin
 VS3032.20 Auxiliary Belt Tensioner Locking Pin
 VS1282 Flywheel Holding Tool
 VS4996 Flywheel Holding Tool



NOTE: Flywheel Holding Tool Applications:- VS4995 Kit contains two Flywheel Holding Tools, each used to 'lock' the flywheel for removal and installation of the crankshaft pulley which must be removed in order to remove the timing belt. VS1282 Holding Tool is used on Astra-G applications. On Astra-H either the VS1282 or VS4996 Holding Tools can be required depending on access, whilst VS4996 will be needed for all 1.8XER engines and later 1.6 engines in Zafira, Meriva and Vectra models.

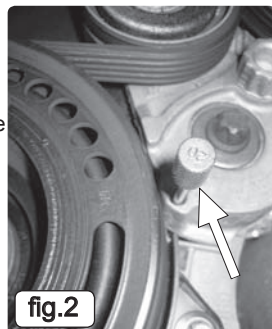
NOTE: For "Timing Check" and "Timing Adjustment" applications on engines with VVT, both the VS4997 Camshaft Sprocket Locking Tool and the VS4998 Camshaft Setting Plate are required.

"Timing belt replacement", "Timing Check" and "Timing Adjustment" applications will require the vehicle to be raised and lowered on numerous occasions during the procedure in order to gain access to the camshafts or crankshaft pulley area and auxiliary belt/tensioner.

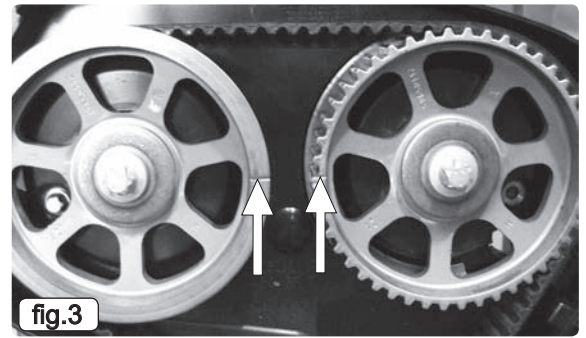
3.1 Timing Belt Replacement

The timing belt replacement procedures for 1.6 and 1.8 "Twinport" engines are basically the same.

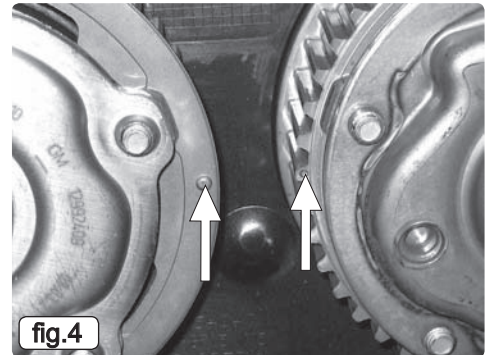
- 3.1.1 Remove the air cleaner housing and upper timing belt cover.
- 3.1.2 Raise the vehicle in order to remove the lower belt cover, engine splash guard and auxiliary belt.
- 3.1.3 To remove the auxiliary belt, apply tension to the belt to activate the tensioner and use VS3032.20 Locking Pin (fig.2) to "lock back" the tensioner unit off the belt. Remove the belt and remove the tensioner unit with the VS3032.20 Pin in place.
- 3.1.4 Turn the engine to TDC No.1 cylinder and check timing mark alignment on the crankshaft pulley.



IMPORTANT: Check that the timing marks on camshaft sprockets align correctly –



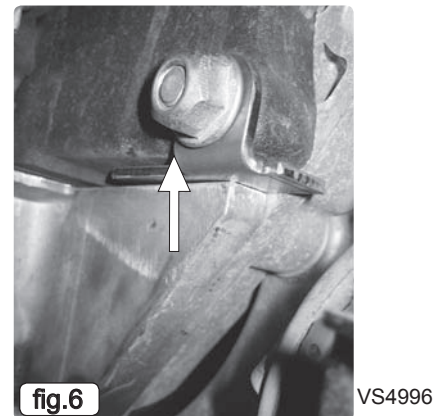
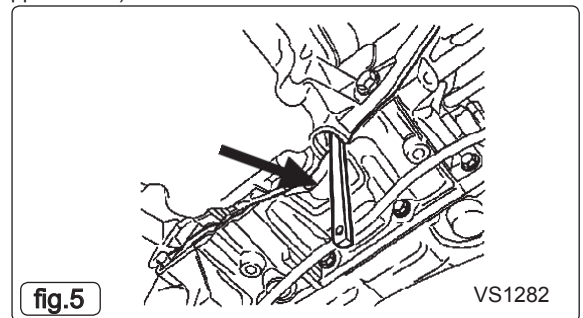
On 1.6 non-VVT engines - sprockets have "timing lines" which should be horizontally level and face each other (fig.3).



On VVT engines (XER) - sprockets have "timing spots" – the inlet (left-hand) sprocket "timing spot" will be slightly above horizontal level, whereas the exhaust (right-hand) sprocket "timing spot" (located on the sprocket tooth), will be at a horizontal level position (fig.4).

3.2 VS1282 and VS4996 Flywheel Holding Tools

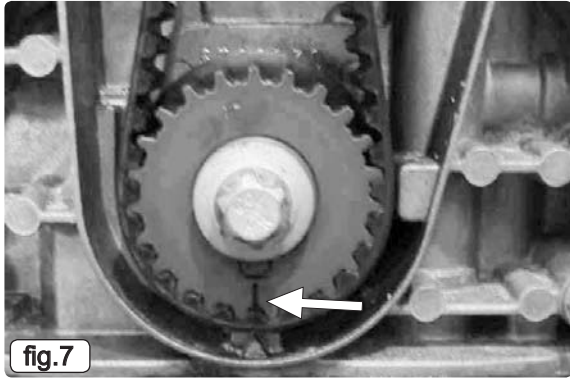
- 3.2.1 Insert VS1282 or VS4996 Flywheel Holding Tool, dependant upon the engine/model being worked on (visual check of flywheel area required – refer to "Flywheel Holding Tool Applications").



NOTE: The protective cap cover will need to be removed in order to insert VS1282 (fig.5), whereas VS4996 (fig.6) must be bolted in place to retain its position in the flywheel.

- 3.2.2 Release the crankshaft pulley bolt and remove crankshaft pulley and belt cover. Screw the old pulley bolt back in to aid in turning the crankshaft.

3.2.3 Remove the Flywheel Holding Tool.

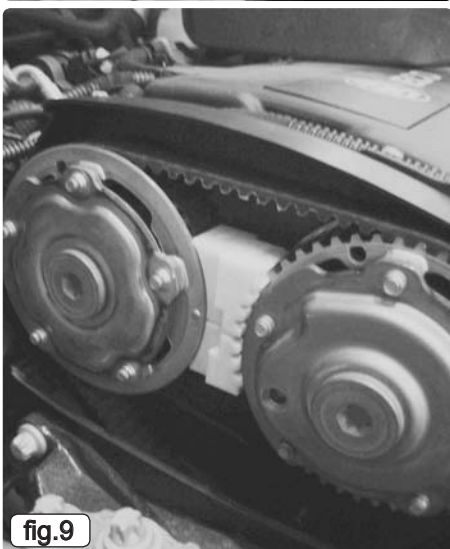


3.2.4 Check that the engine is at TDC No.1 cylinder via the timing mark on the crankshaft gear (fig.7).

3.3 VS4997 Camshaft Sprocket Locking Tool

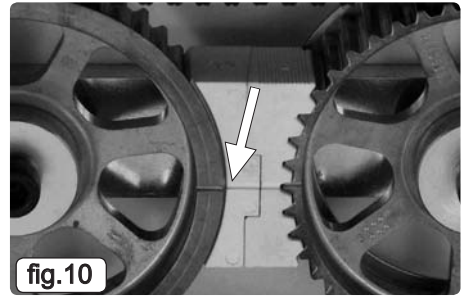
The VS4997 Camshaft Sprocket Locking Tool comprises two parts (marked "1" and "2"), which 'lock' the camshaft sprockets in timed position by locating in to the sprocket teeth.

IMPORTANT: Always insert VS4997 Sprocket Locking Tool with the identifying numbers "1" and "2" on top (uppermost) and with its central timing mark lines visible.

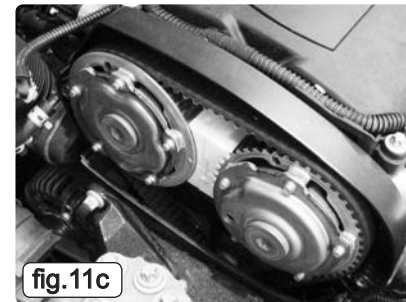
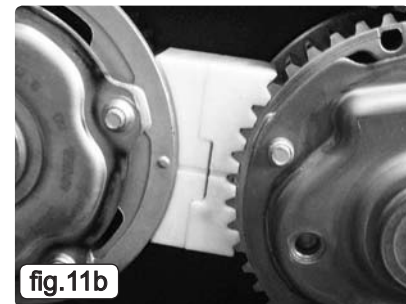
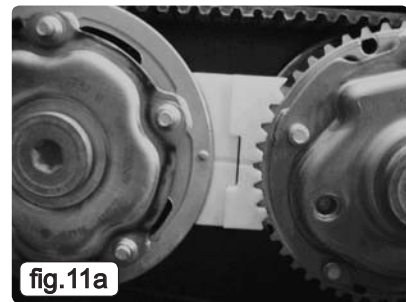


3.3.1 The inlet sprocket of these "Twinport" engines has a flanged front face and therefore it is necessary to insert Part 1 of the VS4997 Tool first, fitting it into the teeth of the inlet (left-hand) sprocket (fig.8), followed by Part "2" of the Tool in to the teeth of the exhaust (right-hand) sprocket (fig.9). Parts "1" and "2" slide together and align via a central tongue, and have an angled face, which increases the pressure of the Tool in to the sprocket teeth as Part "2" is inserted. The "timing lines" on VS4997 Locking Tool should be in a horizontal plain and align to the timing marks on the sprockets.

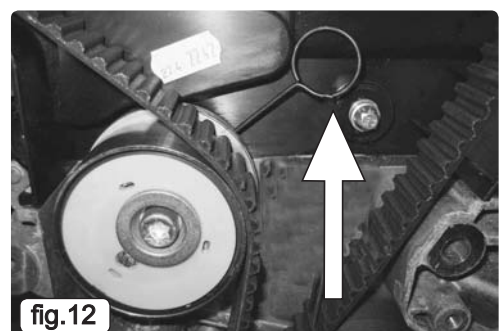
IMPORTANT: Sprocket Timing marks – VS4997 Sprocket Locking Tool has horizontal timing mark lines on both Parts "1" and "2". The Tool is inserted so that the timing marks are horizontally level to each other.



3.3.2 The camshaft sprocket timing lines on non-VVT sprockets must be horizontal and level and aligned to the timing lines on the VS4997 Tool for camshaft timing to be correct (fig.10).



3.3.3 VVT sprockets have "timing spots" – the inlet (left-hand) sprocket "spot" should be very slightly higher (on the upper edge of the Tool's timing line), whereas the exhaust (right-hand) sprocket "spot" (located on the sprocket tooth), should be level with the VS4997 timing line, for camshaft timing to be correct (figs.11a - c).



3.4 VS4593.1F Timing Belt Tensioner Locking Pin

3.4.1 Using an allen key, turn the belt tensioner **clockwise** to expose the locking pin hole and insert VS4593.1F Locking Pin (fig.12).

NOTE: When turning the tensioner there is an initial 1st stage of resistance and then a further amount of turning necessary to align the small hole in the rear plate with the corresponding hole in the tensioner assembly (at approx the 2-o-clock position), so Locking Pin can be inserted.

3.4.2 Remove the old timing belt.

3.5 Installing New Timing Belt

WARNING: Fitting the new belt must be carried out using the installing tool (sleeve) supplied with the belt in order to protect it when threading through the engine mounting support to avoid damage to the belt caused by kinking.

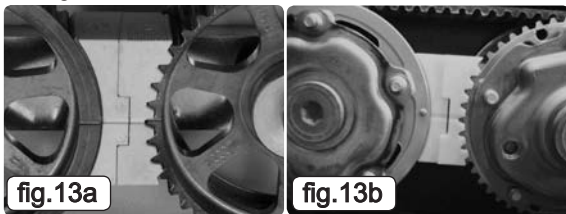
3.5.1 Fit new belt over inlet camshaft sprocket, exhaust camshaft sprocket, belt tensioner/guide roller and crankshaft gear.

3.5.2 Apply tensioner to belt and pull out VS4593.1F Locking Pin to activate.

3.5.3 Install lower belt cover, and fit VS1282 or VS4996 Flywheel Locking Tool and install crankshaft pulley using new bolt to specified torque – 95Nm.+45 degrees + 15 degrees.

3.5.4 Remove Flywheel Holding Tool and Camshaft Sprocket Locking Tool.

3.5.5 Turn the engine over twice, in direction of normal engine rotation, and return to TDC No.1 cylinder and check crankshaft timing marks align.



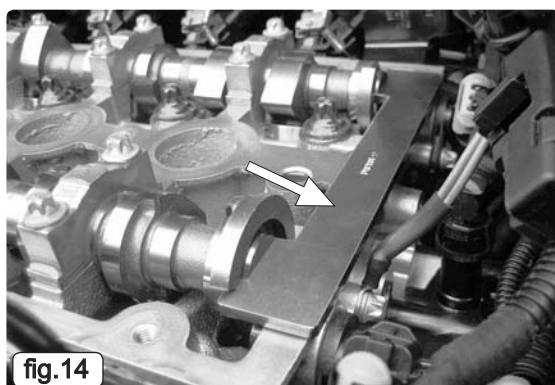
3.5.6 Check that the camshaft sprocket timing marks are in line with positions advised earlier (VVT or non-VVT engines), and fit VS4997 Camshaft Sprocket Locking Tool, to confirm correct timing position of camshafts/sprockets (figs.13a & 13b).

3.5.7 Install auxiliary belt tensioner unit. Install auxiliary belt and apply tension by removing the VS3032.20 Locking Pin from the tensioner unit.

3.6 Checking Timing

3.6.1 **On non-VVT engines**, checking the valve timing involves positioning the crankshaft at TDC No.1 cylinder and fitting the VS4997 Camshaft Sprocket Locking Tool into the camshaft sprockets.

3.6.2 Check that the timing marks on the sprockets and the marks on VS4997 Tool align correctly. If the marks do not align, then "Timing Adjustment" will be necessary.



3.7 VS4998 Camshaft Setting Plate

3.7.1 For checking timing on VVT engines, follow the same checking procedure as non-VVT, but note that the camshaft sprockets have "timing spots" the timing position of which, relevant to the timing mark lines on Tool VS4997, has been described earlier.

3.7.2 It is necessary to additionally remove the cylinder head cover and insert VS4998 Setting Plate in to the "slots" in the rear of the camshafts to check they are aligned correctly (fig.14).

3.7.3 Check that the crankshaft timing marks are aligned.

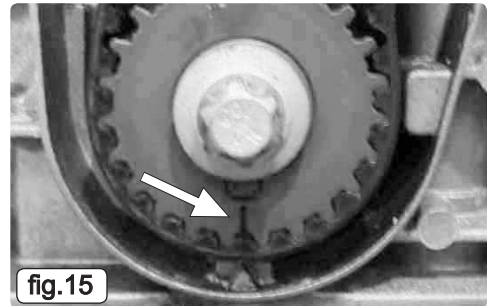
3.7.4 If the camshaft sprocket marks do not position correctly to Tool VS4997, or the VS4998 Setting Plate cannot be inserted, then "Timing Adjustment" will be necessary.

3.8 Timing Adjustment

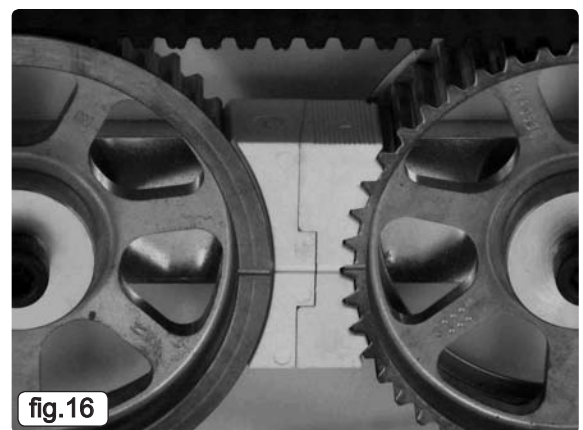
On non-VVT engines, timing adjustment is achieved by removing the timing belt, establishing correct crankshaft and camshaft timing positions and re-fitting the belt.

3.8.1 Remove timing belt covers and auxiliary belt/tensioner as described in "Timing belt replacement".

3.8.2 Fit the appropriate Flywheel Holding Tool and remove the crankshaft pulley.



3.8.3 Remove the Flywheel Holding Tool and turn engine to TDC No.1 cylinder, aligning crankshaft timing marks (fig.15).



3.8.4 Lock the camshaft sprockets with VS4997 Locking Tool and ensure timing marks align (fig.16).

3.8.5 Release tension from timing belt and 'lock the tensioner with VS4593.1F Locking Pin.

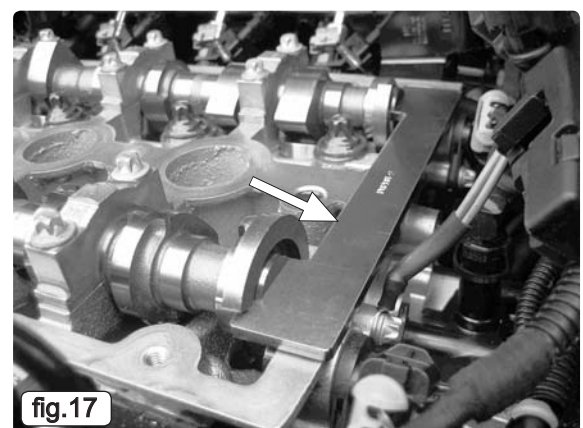
3.8.6 Remove the timing belt.

3.8.7 Check crankshaft is in TDC position by checking timing marks align. Check camshaft sprocket timing marks are horizontal and facing each other, in line with the timing marks on Tool VS4997.

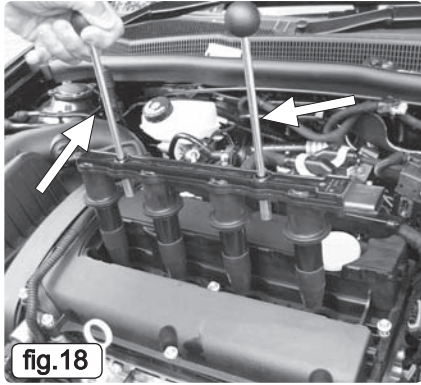
3.8.8 Re-fit the timing belt and apply tension by removing Pin VS4593.1F.

3.8.9 Remove VS4997 Sprocket Locking Tool and turn the engine over twice, returning to TDC No.1 cylinder position.

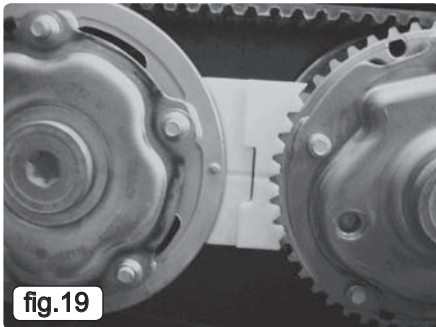
3.8.10 Check crankshaft timing marks align and that Locking Tool VS4997 can be inserted in to the camshaft sprockets and that the timing marks align correctly.



3.9 On VVT engines, timing adjustment is achieved by fixing the camshafts in position at the rear using VS4998 Setting Plate and releasing the camshaft sprockets from the camshafts in order to make the required adjustment (fig.17).



3.9.1 Remove the timing belt covers, remove the ignition module, using Tool VS4742, and remove the cylinder head cover (fig.18).



3.9.2 Insert VS4997 Camshaft Sprocket Locking Tool in to the sprockets ensuring the "timing spots" are in timing position detailed in "Timing Belt Replacement" (fig.19).

3.9.3 Using an allen key, turn the belt tensioner and 'lock' with VS4593.1F Locking Pin.

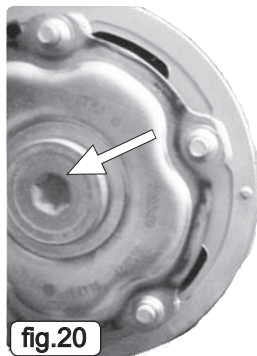
3.9.4 Install the appropriate Flywheel Holding Tool – VS1282 or VS4996 and remove the crankshaft pulley. Remove lower belt cover and belt guide roller.

3.9.5 Remove the timing belt.

3.9.6 Remove the Flywheel Holding Tool.

3.9.7 Turn the crankshaft 60 degrees against the direction of engine rotation.

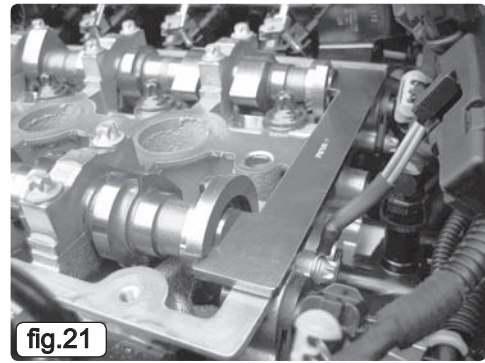
3.9.8 Unscrew the camshaft bolt covers of the exhaust and inlet camshaft sprockets –



NOTE: be prepared for oil to leak out.

3.9.9 Counter-hold the exhaust camshaft with a spanner at the hexagon provided on the camshaft and slacken the exhaust camshaft sprocket bolt.

3.9.10 Counter-hold the inlet camshaft with a spanner at the hexagon provided on the camshaft and slacken the inlet camshaft sprocket bolt (fig.20).



3.9.11 Turn the camshafts, using hexagon, in order to insert VS4998 Camshaft Setting Plate in to the rear of the camshafts (fig.21). **NOTE:** VS4988 Plate must be fully inserted in to both camshafts.

3.9.12 Fit new camshaft bolts.

3.9.13 Counter-hold the exhaust camshaft with a spanner at the hexagon provided on the camshaft and tighten the exhaust camshaft sprocket bolt – 65Nm.+125 degrees + 15 degrees.

3.9.14 Counter-hold the inlet camshaft with a spanner at the hexagon provided on the camshaft and tighten the inlet camshaft sprocket bolt– 65Nm.+125 degrees + 15 degrees.

3.9.15 Replace the seals in the camshaft bolt covers and tighten them to 30Nm.

3.9.16 Remove the VS4998 Camshaft Setting Plate and turn the crankshaft to TDC No.1 cylinder position. Check timing marks align on crankshaft gear and oil pump housing (6-o-clock position).

3.9.17 Fit appropriate Flywheel Locking Tool.

3.9.18 Fit timing belt using assembly tool to avoid damage whilst passing through engine mounting.

3.9.19 Fit belt guide roller and activate belt tensioner by removing VS4593.1F Locking Pin.

3.9.20 Install lower belt cover and crankshaft pulley. Use a new crankshaft pulley bolt and tighten to 95Nm. +45 degrees + 15 degrees.

3.9.21 Remove Flywheel Holding Tool and Camshaft Sprocket Locking Tool.

3.9.22 Turn the engine over twice in normal direction of engine rotation and return to TDC No.1 cylinder.

3.9.23 Check the crankshaft timing marks align and insert AST4997 in to the slots in the rear of the camshaft sprockets, checking timing marks are in correct position (as described earlier), and ensure that VS4998 Setting Plate can be fitted in to the rear of the camshafts.

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 equipment.

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

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