SEALEY

INSTRUCTIONS FOR:

PETROL ENGINE SETTING /LOCKING KIT - ALFA ROMEO 1.4, 1.6, 1.8, 2.0 TWIN SPARK, 2.0JTS - BELT DRIVE

Model No: **VS4910**

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 & 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. KEEP THESE INSTRUCTIONS SAFE FOR FUTURE USE.

1. SAFETY

Refer to instruction manual.

Wear eye protection.

VS4910

❒ **WARNING!** Wear approved eye protection. Wear appropriate Personal Protective Equipment. A full range of Personal Protective Equipment is available from your Sealey dealer.

❒ **WARNING!** Ensure that Health & Safety, Local Authority Regulations and general workshop practice Regulations are adhered to when using tools.

✗ **DO NOT** use tools if damaged.

✓ Maintain tools to ensure that they are in an adequate condition for safe use and optimum performance.

✓ Ensure that a vehicle that has been raised by a jack is adequately supported.

✓ Use axle stands.

✗ **DO NOT** attempt to start or move a vehicle whilst in gear and with timing devices fitted.

✓ Wear suitable clothing to avoid snagging. **DO NOT** wear jewellery. Tie back long hair.

✓ Account for all tools, parts and components being used. **DO NOT** leave these in or near the engine. Return tools to suitable storage after use.

✓ When not in use, store in a safe, dry childproof place.

✓ Keep children and unauthorised persons away from the work area.
   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 correct procedure and data.

❒ **WARNING!** *The warnings, cautions and instructions in this manual cannot cover all possible conditions and situations. The Operator / user must apply caution and common sense (good practical sense).*

✓ When timing an engine, always prevent the engine from being turned over. Use a notice and / or inhibit the engine.

❒ **WARNING!** Incorrect or out of phase camshaft timing can result in contact between the valve head and the piston crown. This will cause damage to the engine.

2. INTRODUCTION

Locking tools suitable for Alfa Romeo engines. Kit includes two pairs of camshaft locking plates and timing/balancer shaft belt tensioner tools.

3. APPLICATIONS

Alfa Romeo Twin Spark twin cam petrol engines in;

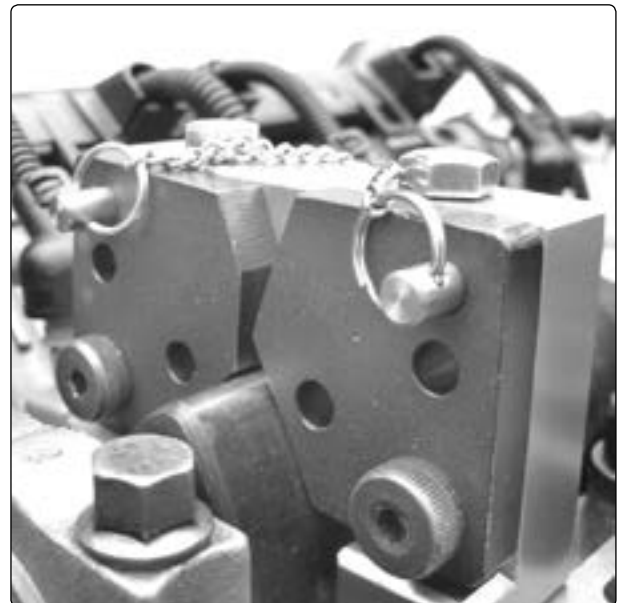145 (96-01), 146 (96-01), 147 (01-11), 155 (95-98), 156 (97-06),

166 (98-07), Spider (95-06), GTV (98-06), GT (04-10)

Engine Codes:
1.4 16v TS: 335.03
1.6 16v TS (105CV): 372.03
1.6 16v TS (120CV): 321.02, 321.03, 321.04, 671.06
1.8 16v TS: 322.01, 322.05 (156) , 671.06
2.0 16v TS: 162.01, 323.01, 323.10, 341.03, 363.01, 672.04
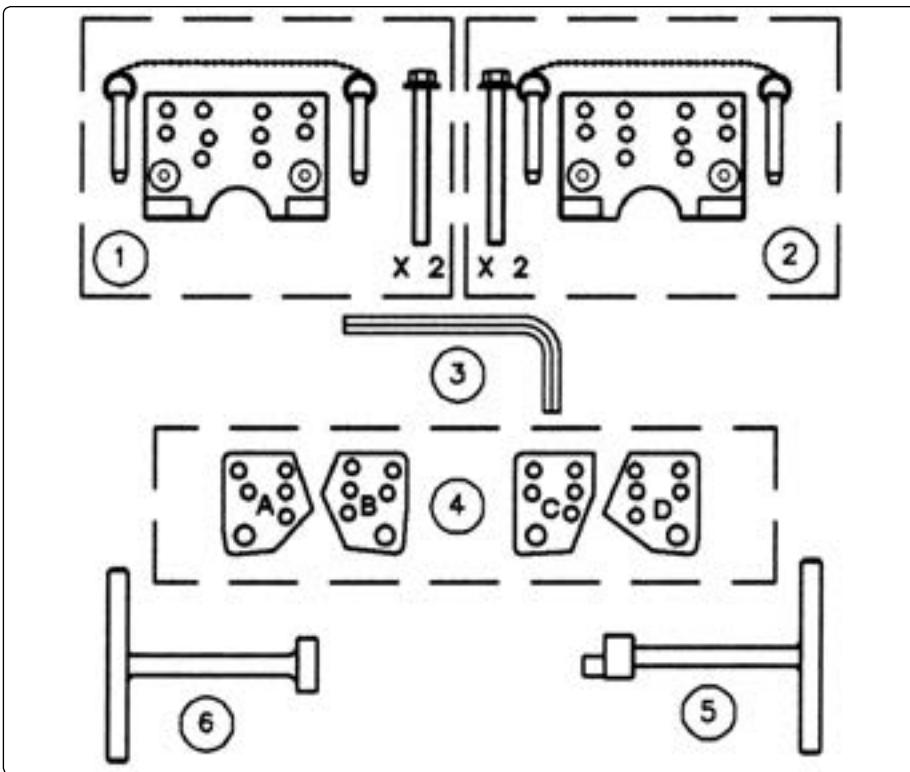2.0 JTS: 932A2.000, 937A1.000

VS4910 Kit for ALFA ROMEO is based on the AL-Fi UNIVERSAL CAMSHAFT SETTING PLATE SYSTEM. **PATENTS APPLIED FOR.**

4. CONTENTS

Item	Part no.	Description	OEM no.
1	VS4900/1	Support block assembly (inlet camshaft) c/w retaining bolts (2), securing screws (2) & location pin assy.	1.825.042.000
2	VS4900/2	Support block assembly (exhaust camshaft) c/w retaining bolts (2), securing screws (2) & location pin assy.	1.870.797.000
3	VS900/6	Hex key	
4	VS4901	Set of 4 setting plates A & B inlet camshaft C & D exhaust camshaft	1.870734.0000 1.825.041.0000 1.870.859.000 (2.0JTS)
5	VS1403/04	Timing belt tensioner adjuster	1.822.149.000
6	VS1409/03	Balancer shaft belt tensioner adjuster	1.822.154.000
Associated Tools			
	AK9634M	Dial gauge metric 8mm deflection	
	VSE2515	TDC position tool - Alfa Romeo, Fiat	
	VSE5885	Variator socket - variable camshaft/valve timing unit - Alfa Romeo , Fiat	

5. INSTRUCTIONS

Alfa Romeo 1.4, 1.6, 1.8 & 2.0 Twin Spark + 2.0JTS petrol engines.

5.1   General Guide - Setting & Locking engines.
Timing belt replacement on these Alfa Romeo twin cam engines is carried out with the crankshaft at TDC No.1 cylinder, established by using VS1404 TDC Position Tool together with a Dial Gauge (AK9634M), to determine the piston position.

5.1.1 **VS1404 TDC Position Tool - Associated Tool - not in kit.**
The correct engine/crank TDC position is established using VS1404 tool together with a suitable Dial Gauge such as AK9634M.
VS1404 Tool determines when the piston of No.1 cylinder is at its highest point - **NOTE: piston must be on its ignition stroke.**

Remove the spark plugs and install the Dial Gauge into VS1404 and secure with the thumbscrew.
Screw the VS1404 fully into the centre spark plug hole of No.1 cylinder, taking care not to over tighten (Fig.1).

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 Dial Gauge.
TDC is achieved when the Dial Gauge needle reaches its highest reading and starts to move in the reverse direction.
Check that all timing marks align.

5.1.2 **Camshaft timing.**
The camshafts are retained in their 'timed' positions by use of Camshaft Setting Plate Assemblies which are fixed on the engine in place of designated bearing caps, at specified cylinder locations (Fig.2).
The VS4910 Timing Kit is based on the unique AL-Fi Camshaft Setting Plate System.

The AL-Fi range of Universal Camshaft Setting Plates provide wide application coverage across engine ranges by utilising common Support Blocks - one for all Inlet Camshafts, and one for all Exhaust Camshafts.
Interchangeable Setting Plates are mounted onto these support blocks
The position of the Setting Plates on the Support Blocks is adjustable in order to provide maximum coverage of engine ranges.
Refer to 4.3 "The AL-Fi System Of Camshaft Setting Plates"

5.1.3 Both camshaft sprockets are released and free to turn on their camshafts, when fitting new belt.
Marks on the new belt are aligned to marks on the sprockets/pulley and fitted in the following order: crankshaft, guide, camshaft (exhaust), camshaft (inlet), tensioner, water pump. Initially the timing belt tension is adjusted to maximum using Tensioner Adjuster VS1403/04.
The camshaft sprocket bolts are then tightened, and all setting/locking tools removed and bearing caps re-fitted. The engine is rotated by hand, and VS1404 re-fitted to ensure return to TDC position.
The tensioner is adjusted so the pointer aligns with hole, the engine is rotated again and returned to TDC. All timing marks must align.

5.1.4 For 2.0 engines the balancer shaft belt is tensioned using VS1409/03 Adjuster. With the crankshaft at TDC, align the balancer shaft timing marks and fit the belt. Adjust tensioner to position detailed below.

5.2   VS1403/04 Timing Belt Tensioner Adjuster & VS1409/03 Balancer Shaft Belt Tensioner Adjuster (Fig.3).

1403/04 Adjuster is used for all these twin cam engines. The correct final adjustment for the timing belt tensioner is with the pointer of the tensioner aligned with the reference hole - see fig.3.

VS1409/03 adjusts the tensioner of the balance shaft belt on 2.0 engines. The correct final position is with the hole on the tensioner aligned to the centre point of the tensioner movement - see fig.3.

Fig.1

Fig.2

Fig.3

Timing Belt   Balancer Shaft Belt
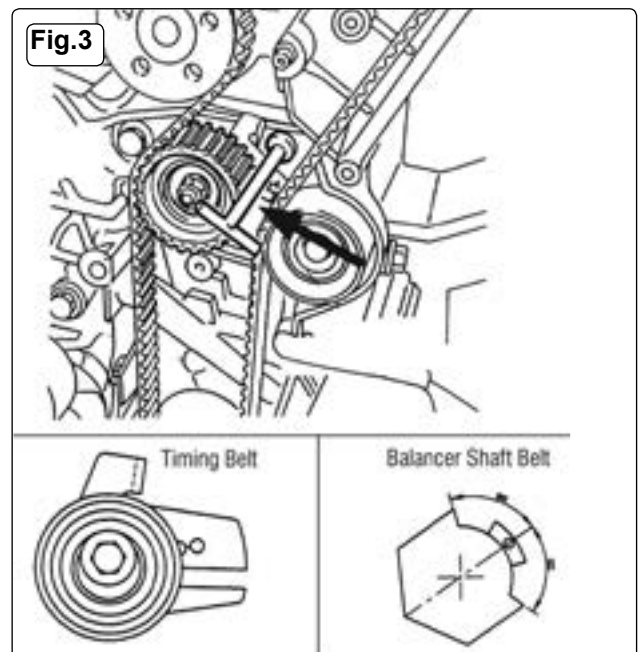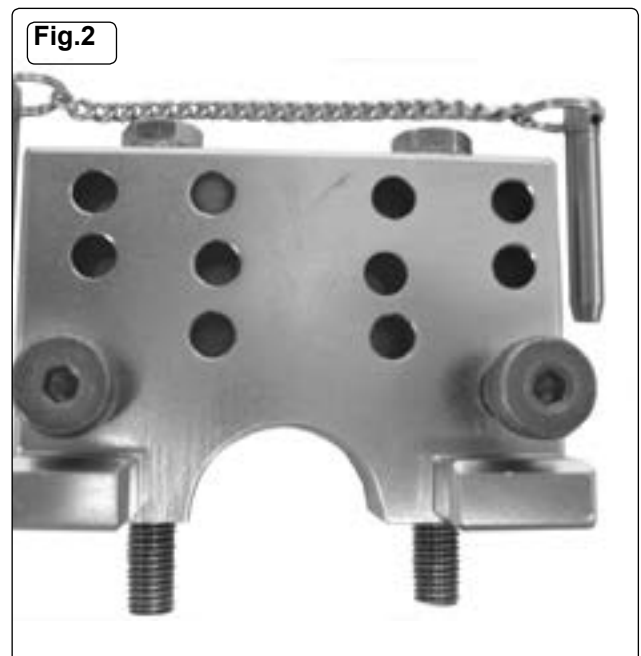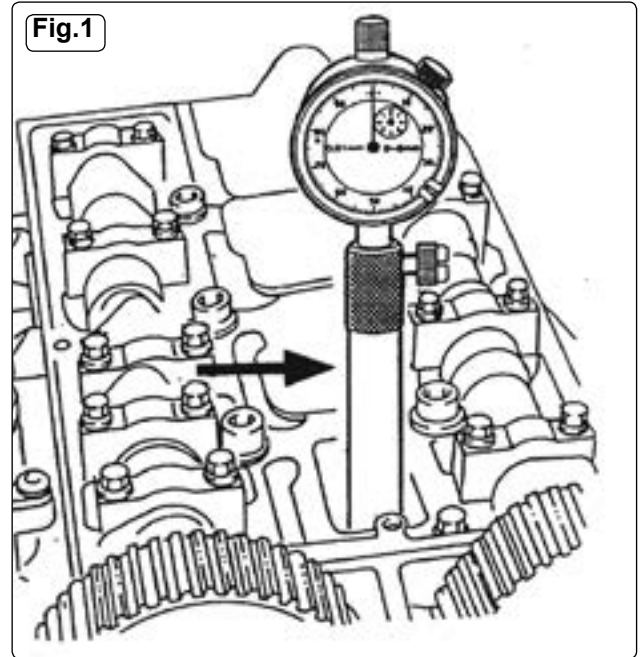
5.3 The AL-Fi System of Camshaft Setting Plates.

The Al-Fi range of Universal Camshaft Setting Plates provides wide application coverage across engine ranges by utilising common Support Blocks - one for all Inlet camshafts, and one for all Exhaust camshafts. Interchangeable Setting Plates are mounted onto these Support Blocks.

The position of the Setting Plates on the Support Blocks is adjustable in order to provide coverage of a range of engines. The required Setting Plate position on the Support Block, is accurately achieved, and maintained, via the 'location pin' which is inserted through a numbered location hole in the Support Block and through a hole in the Setting Plate. When mounted on the engine, this assembly fixes the position of the camshaft lobe to achieve correct camshaft timing position.

5.4 Selecting the correct Al-Fi parts and assembling the Camshaft Setting Plate system for use.

5.4.1 The Inlet Camshaft Setting Plate Assembly.

Select the **"INLET"** Support Block (Fig.4).

Refer to the Data Chart to establish which Setting Plates are required for the application.
Example: Alfa Romeo 145 2.0 16v TS (96-01) Engine code 323.01 = Plates "A" and "B" (Fig.5).

Fix the Setting Plates to the "INLET" Support Block with the securing screws (Do not tighten fully at this stage) (Fig.6).
Note: Plate "A" to the left and Plate "B" to the right, with the "A" and "B" lettering visible.

Refer to Data Chart to establish which hole number location is required for this application.
Example: Alfa Romeo 145 2.0 16v TS (96-01) Engine code 323.01 = Plate A location "6" and Plate B location "6" (Fig.5).

Select the Location Pins/Chain Assembly and pass the pins through the correct hole locations in the Support Block and into the Setting Plates (Fig.7).

Retain the Location Pins in place by applying pressure to the sides of the Setting Plates whilst fully tighten the setting plate Securing Screws using the allen key provided in the kit (Fig.8).

5.4.2 The Exhaust Camshaft Setting Plate Assembly.

Select the **"EXHAUST"** Support Block (Fig.9).

Refer to Data Chart to establish which Setting Plates are required for the application.
Example: Alfa Romeo 145 2.0 16v TS (96-01) Engine code 323.01 = Plates "C" and "D" (Fig.5).

Fix the Setting Plates to the "EXHAUST" Support Block with the securing screws (Do not tighten fully at this stage) (Fig.10).
Note: Plate "C" to the left and Plate "D" to the right, with the "C" and "D" lettering visible.

Refer to Data Chart to establish which hole number location is required for this application.
Example: Alfa Romeo 145 2.0 16v TS (96-01) Engine code 323.01 = Plate C location "3" and Plate D location "3" (Fig.5).

Select the Location Pins/Chain Assembly and pass the pins through the correct hole locations in the Support Block and into the Setting Plates (Fig.11).

Retain the Location Pins in place by applying pressure to the sides of the Setting Plates whilst fully tighten the setting plate Securing Screws using the allen key provided in the kit (Fig.12).
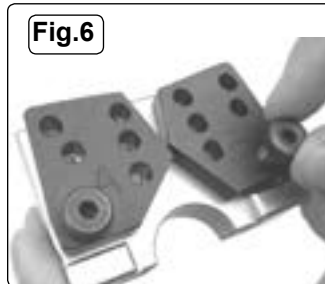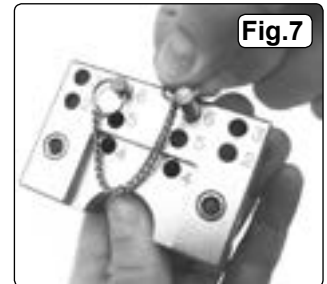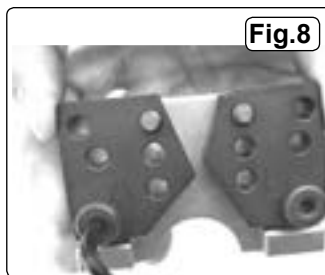
Fig.4

Fig.5

Al-Fi Series
SETTING PLATE DATA

MODEL / engines		Plates / Pin Locations		Cylinder No.Position	
		INLET	EXHAUST	INLET	EXHAUST
ALFA ROMEO					
145 / 146					
1.4 16v TS (96-01)	336.03	A(5) + B(5)	C(4) + D(4)	2	3
1.6 16v TS (96-01)	676.01(to 0064340*)	A(5) + B(5)	C(4) + D(4)	2	3
1.6 16v TS (96-01)	676.01(from 0064340*)	A(4) + B(4)	C(2) + D(2)	2	3
1.8 16v TS (96-01)	322.01 / 671.06	A(5) + B(5)	C(3) + D(3)	2	3
2.0 16v TS (96-01)	323.01 / 672.04	A(5) + B(5)	C(3) + D(3)	2	3
147					
1.6 16v TS (105CV) (01-06)	372.03	A(3) + B(3)	C(5) + D(5)	2	3
1.6 16v TS (120CV) (01-06)	321.0 /321.04	A(4) + B(4)	C(2) + D(2)	2	3
2.0 16v TS (01-06)	323.10	A(5) + B(5)	C(3) + D(3)	2	3
155					
1.6 16v TS (95-96)	676.01	A(5) + B(5)	C(4) + D(4)	2	3
1.8 16v TS (95-96)	671.06	A(5) + B(5)	C(3) + D(3)	2	3
2.0 16v TS (95-96)	672.04	A(5) + B(5)	C(3) + D(3)	2	3
156					
1.6 16v TS (98-01)	321.02	A(4) + B(4)	C(2) + D(2)	2	3
1.6 16v TS (99-06)	321.03 / 321.04	A(4) + B(4)	C(2) + D(2)	2	3
1.6 16v TS (97-01)	676.01(to 0064340*)	A(5) + B(5)	C(4) + D(4)	2	3
1.6 16v TS (97-01)	676.01(from 0064340*)	A(4) + B(4)	C(2) + D(2)	2	3
1.8 16v TS (97-06)	322.01 / 322.05	A(5) + B(5)	C(3) + D(3)	2	3
2.0 16v TS (97-02)	323.01 / 323.10	A(5) + B(5)	C(3) + D(3)	2	3
2.0 JTS (02-06)	932A2.00 / 937A1.00	A(2) +B(2)	C(5) + D(5)	2	3
166					
2.0 16v TS (98-01)	341.03	A(5) + B(5)	C(3) + D(3)	2	3
2.0 16v TS (01-07)	363.01	A(5) + B(5)	C(3) + D(3)	2	3
Spider / GTV					
1.8 16v TS (98-03)	322.01	A(5) + B(5)	C(3) + D(3)	2	3
2.0 16v TS (95-03)	162.01/323.01/323.10	A(5) + B(5)	C(3) + D(3)	2	3
2.0 JTS (03-06)	937A1.000	A(2) + B(2)	C(5) + D(5)	2	3
GT					
2.0 JTS (04-06)	932A2.000/937A1.000	A(2) + B(2)	C(5) + D(5)	2	3

*= Chassis Plate Spares Code Reference

Fig.6

Fig.7

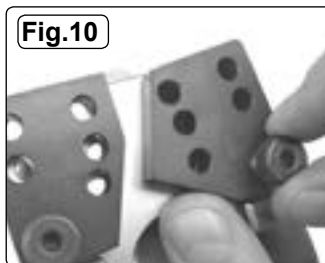

Fig.8
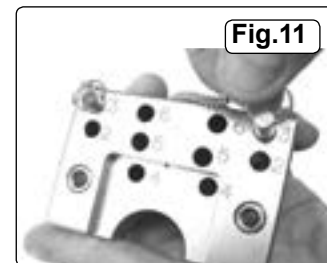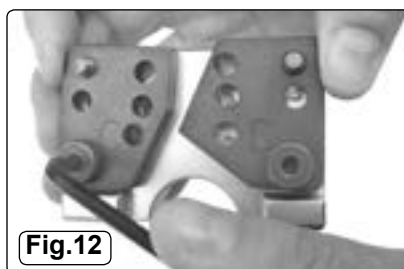

Fig.9

Fig.10

Fig.11

Fig.12

5.5 Fitting the AI-Fi Camshaft Setting Plate Sets to the engine.

Camshaft Setting Plate Assemblies are fixed in place of designated bearing caps, at specified cylinders.

Refer to Data Chart to establish at which cylinder position the "INLET" and the "EXHAUST" Setting Plate Assemblies are to be fitted on to the camshafts for the model/engine.
Example: Alfa Romeo 145 2.0 16v TS (96-01) Engine code 323.01 = Inlet "Cylinder No.2" and Exhaust "Cylinder No.3" (Fig.5).

5.6 For timing belt replacement applications with the old timing belt still in-situ/engine timing correct.

With the crankshaft correctly positioned at TDC No.1 cylinder, the camshaft lobes should be in the correct timed position to accept the AI-Fi Setting Plate Assemblies.

Remove the bearing caps of the inlet and exhaust camshafts at the appropriate cylinder locations.
NOTE: Clearly mark which is the inlet and exhaust, and keep clean at all times (Fig.13).

Place the Inlet and Exhaust AI-Fi Setting Plate Assemblies in position over the appropriate camshaft lobes.
NOTE: Ensure that the fixing holes in the Support Blocks match the offset bearing cap holes in the cylinder head (Fig.14).
When viewed from the camshaft sprockets, the lettering on the Setting Plates should be visible.

CHECK THAT THE BASES OF THE SUPPORT BLOCKS REST ON THE SURFACE OF THE CYLINDER HEAD AND THAT THE SETTING PLATES ARE ALIGNED WITH THE PROFILE OF THE CAMSHAFT LOBES (Fig.15).

Insert the Flanged Securing Bolts (4) and tighten evenly to 10Nm (Fig.16).

The belt tensioner can now be released and the old belt removed.

NOTE: These Alfa Romeo and Fiat timing belt applications require the camshaft sprockets to be 'free to turn' on the camshaft, when fitting the new timing belt, and therefore it is necessary to slacken the camshaft sprocket bolts.
WARNING: DO NOT use AI-Fi Camshaft Setting Plate Assemblies to counter-hold camshafts in position whilst releasing or tightening the sprocket bolts as this will damage the Setting Plates. AI-Fi Assemblies are for retention of timing position only. A suitable sprocket holding tool MUST BE used to counter-hold the sprockets.

5.7 For camshaft timing applications (when timing belt not in place).

AI-Fi Setting Plate Assemblies can be used to 'set' the camshaft timing on these engines after engine overhaul or repair, and prior to installing a new belt.
The preparation involved in establishing the model/engines, selecting the appropriate AI-Fi parts to create the correct camshaft setting plate assemblies, and determining the correct cylinder location, is exactly the same as described earlier.
The appropriate cylinder locations should not have their camshaft bearing caps fitted.

Look at the lobe profile form that has been created on the INLET AI-Fi Setting Plate Assembly and using a suitable Sprocket Holding Tool on the camshaft sprockets, turn the INLET camshaft until the camshaft lobe at the appropriate cylinder location is approximately in the same orientation as the Setting Plate Assembly (Fig.17).

Place the INLET and EXHAUST AI-Fi Setting Plate Assemblies in position over the appropriate camshaft lobes.
NOTE: Ensure that the fixing holes in the Support Blocks match the offset bearing cap holes in the cylinder head (Fig.18).

Fig.13

Fig.14

Fig.15

Fig.16

Fig.17

Fig.18
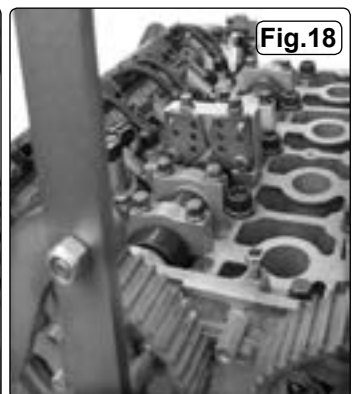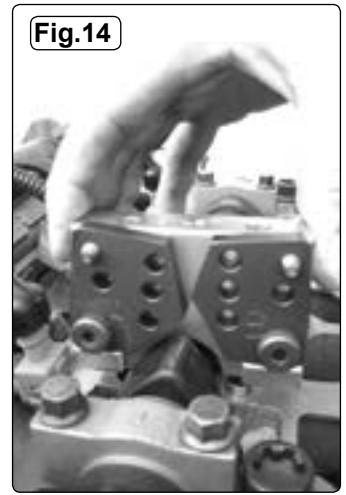
Using the Sprocket Holding Tool, make any final adjustment required to the camshaft position so the lobe aligns with the Setting Plates (Fig.19).
Whilst maintaining this position with the Holding Tool, **CHECK THAT THE BASE OF THE SUPPORT BLOCK RESTS ON THE SURFACE OF THE CYLINDER HEAD AND THAT THE SETTING PLATES ARE ALIGNED WITH THE PROFILE OF THE CAMSHAFT LOBES**, and insert the four Flanged Securing Bolts. Tighten evenly to 10Nm.

Repeat the same procedure with the Exhaust Setting Plate Assembly/camshaft.When fitting the new timing belt the camshaft sprockets must be 'free to turn' on the camshaft and therefore it is necessary to slacken the camshaft sprocket bolts.

WARNING: DO NOT use Al-Fi Camshaft Setting Plate Assemblies to counter-hold camshafts in position whilst releasing or tightening the sprocket bolts as this will damage the Setting Plates. Al-Fi Assemblies are for retention of timing position only. A suitable Sprocket Holding Tool MUST BE used to counter-hold the sprockets.

When fitting the new timing belt the camshaft sprockets must be 'free to turn' on the camshafts and therefore it is necessary to slacken the camshaft sprocket bolts.

5.8   Crankshaft Pulley Removal.

VS1403/03 Flywheel Holding Tool (Crank Pulley removal) - Associated Tool - not in kit.

The crankshaft pulley must be removed in order to replace the timing belt.

On 2.0 engines a centre bolt retains the crankshaft pulley and it will be necessary to firmly and safely 'lock' the flywheel when releasing and tightening the pulley bolt. Flywheel Holding Tool **VS1403/03** can be used to 'lock' the flywheel on this application.

Extend Your AL-Fi Application Coverage.
AL-Fi Setting Plate Sets for Fiat 1.8 16v. and 2.0/2.4 20v. twin cam petrol engines are available to use with the support blocks in this kit, to cover these Fiat applications.

VS4902 for 1.8 16v. Punto, Brava/Bravo, Marea/Weekend, Barchetta, Coupe & Stilo (183A1.000, 182A2.000, 188A6.000 & 192A4.000).

VS4903 for 2.0/2.4 20v. Bravo, Coupe & Stilo (182A1.000, 182B7.000, 192A2.000, 182B3.000 & 175A3.000).

Fig.19

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