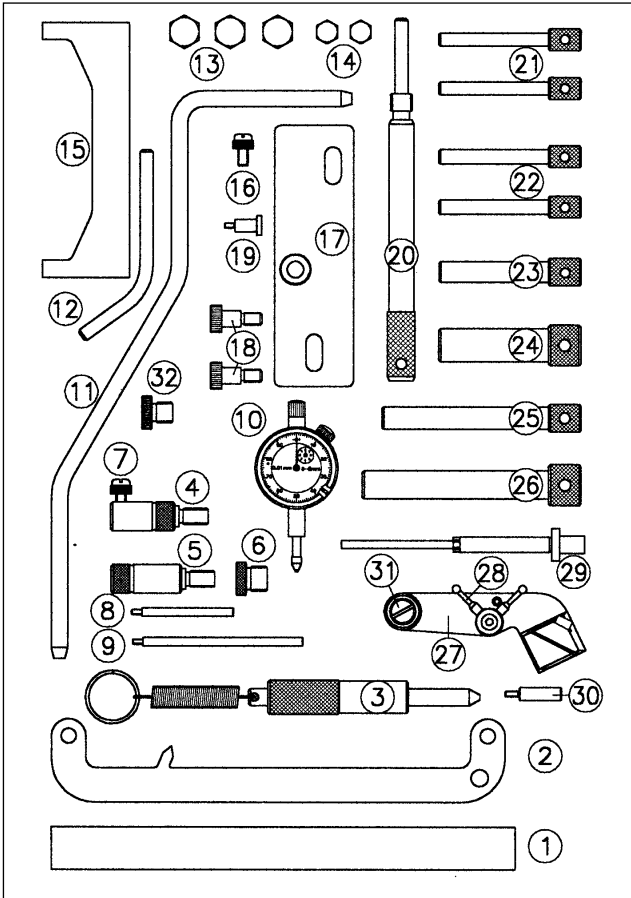


DIESEL ENGINE UNIVERSAL SETTING/LOCKING & FUEL INJECTION PUMP TIMING KIT. For: CAR & VAN DIESEL ENGINES.



PARTS LIST

1.	VS115/01	Camshaft Setting Plate
2.	VS117/01	Flywheel TDC Setting Tool
3.	VS117/02	Locking Pin
4.	VS1079/01	Short Timing Adaptor
5.	VS1079/02	Extension Adaptor
6.	VS1079/03	M12 Thread Adaptor
7.	VS114B/04	Thumbscrew
8.	VS107/3	Indicator Pin
9.	VS108/3	Indicator Pin
10.	AK9634M	Dial Test Indicator (DTI)
11.	VS125/C7	Flywheel Locking Pin
12.	VS125/P8	Flywheel Locking Pin (short)
13.	VS102/3	M8 Locking Bolts (3)
14.	VS103/1	M6 Locking Bolts (2)
15.	VS101/1	Camshaft Setting Plate
16.	VS114B/04	Thumbscrew
17.	VS114B/01	Camshaft Setting Plate
18.	VS114B/02	Shoulder Lock Screws (2)
19.	VS114B/03	DTI Foot
20.	VS101/2	Crankshaft TDC Pin
21.	VS101/3	Locking Pins - Ø6.0mm (2)
22.	VS103/2	Locking Pins - Ø6.6mm (2)
23.	VS101/4	Locking Pin - Ø9.5mm
24.	VS101/5	Locking Pin - Ø15.4mm
25.	VS101/6	Locking Pin - Ø8.25mm
26.	VS101/7	Locking Pin - Ø12.7mm
27.	VS110/1	Main Body Assembly
28.	VS110/2	Toggle
29.	VS110/3	Indicator Pin
30.	VS110/4	DTI Extension
31.	VS	M10 Thread Adaptor
32.	VS110/05	Thumbscrew
-	VS100/84	Case + Insert

1. INTRODUCTION & APPLICATION

1.1. INTRODUCTION

Engine performance is dependent on ensuring correct engine timing; the co-relation of parts operating at precise times during each cycle. Some of these relationships are fixed by engine design, but others are affected when parts are removed from the engine.

Maintaining, or re-establishing, camshaft, injection pump, crankshaft timing is essential when removing the timing belt or injection pump. VS100A kit provides a comprehensive range of engine setting and locking tools to maintain the datums and adjust timing on the engine and fuel injection pump.

1.2. APPLICATION

Engine Setting and Locking Tools for AUDI, CITROËN, FIAT, FORD, MAZDA, PEUGEOT, ROVER, SEAT, VAUXHALL/OPEL, VOLKSWAGEN and VOLVO and Fuel Injection Pump Timing Tools for BOSCH, DIESEL KIKI, NIPPONDENSO VE ROTARY and CAV/ROTODIESEL pumps (top entry). An application list is provided, by vehicle model for the setting/locking tools and by injection pump type for the timing tools. See Section 2.

1.3. USE PRODUCT WITH THE FOLLOWING TOOLS

Camshaft Alignment/Locking Tool Assembly - Vauxhall/OpelVS1065
Flywheel Holding Tool - Citroën/PeugeotVS1283
Flywheel Holding Tool - Vauxhall/OpelVS1280

1.4. ASSOCIATED TOOLS & APPLICATIONS

Bosch Rotary Injection Pump Timing Tool - M10 Service PortVS1070
Camshaft Locking Plate - Vauxhall/Opel (pre '87)VS105
Water Pump/Camshaft Belt Adjusters - Vauxhall/OpelVS092, VS093
Piston Travel Adaptor - Early XUD Engines (pre '87)VS109

2. APPLICATION DETAILS

2.1. ENGINE SETTING/LOCKING

AUDI

A4 1.9 T/Di, 80 1.9D/Turbo D, 80 1.9 TDi, 100 5D, 100D/CD, 100D Turbo VS101/1 + VS101/5
100 2.5 TD/TDi, A6 2.5 TDi VS101/1

CITROEN

Visa 1.7D, BX 1.7D/TD, BX 1.9D, ZX 1.9D/TD, Xantia 1.9D/TD, C15D Berlingo 1.8D/1.9D
Dispatch/Jumpy ZX1.4D 1.9D/TD, Synergie/Evasion 1.9 TD, Relay (1000) 1.9D/TD VS102/3 + VS125/C7
AX 1.4D VS125/P8 + VS102/3
XM 2.1/2.2D/TD VS125/C7 + VS102/3
XM 2.5 Turbo D, Relay 2.5D/Turbo D VS125/C7

FIAT

Ducato (10) 1.9D/TD, Ulysse Scudo 1.9D/TD VS125/C7 + VS102/3

FORD

Fiesta 1.6D, Escort 1.6D, Orion 1.6D VS101/1 + VS101/2
Fiesta 1.8, Mondeo 1.8TD, Escort 1.8D/TD (-96), Sierra 1.8TD, P100 1.8TD VS101/2 + VS101/3 + VS101/4
NOTE: CAV Inj. Pump - Ø6.0mm Pin. Bosch Inj. Pump - Ø9.5mm Pin
Fiesta 1.8D, Escort 1.8D/TD, Mondeo 1.8 TD (96-) VS115/01 + VS101/2
Galaxy 1.9TD VS101/1 + VS101/5
Transit 2.4D (-86) VS101/6
Transit 2.5 Di/Turbo (84-) / Frareside 2.5D VS101/3 + VS101/4 + VS101/6 + VS101/7
NOTE: CAV Inj. Pump - Ø6.0mm Pin. Bosch Inj. Pump - Ø9.5mm Pin

FSO

Caro 1.9D VS125/C7 + VS102/3

LDV

Sherpa 200 TDi VS101/3 + VS171/1 (optional)
200 1.9D, Pilot 1.9D VS125/C7 + VS102/3

MAZDA

121 1.8D (95-) VS101/2 + VS101/3 + VS101/4

PEUGEOT

106D VS125/P8 + VS102/3
205 1.7/1.9D, 305 1.7/1.9D/TD, 306 1.8D/1.9D/TD, 309 1.7/1.9D/1.8TD
405 1.8TD, 405 1.9D, 406 1.9D, Talbot/Horizon/Solara 1.9D, Partner 1.9D
J5/Talbot Express 1.9D, 605D/TD, 806 1.9TD, Expert 1.9D, Boxer 1.9D/TD VS102/3 + VS125/C7
Boxer 2.5D/Turbo D VS125/C7

ROVER

Metro 1.4D, 115 VS125/P8 + VS102/3
218SD, 218/418D Turbo, 418SLD/GSD, 418/Tourer D/Turbo VS125/C7 + VS102/3
Maestro 2.0D/Van, Maestro 2.0D Turbo, Montego 2.0D Turbo VS103/2

SEAT

Terra 1.3D/1.4D, Ibiza 1.9D/Turbo, Cordoba 1.9D/Turbo, Toledo 1.9D/TD, Alambra 1.9TDi VS101/1 + VS101/5

VAUXHALL/OPEL

Nova 1.5TD, Corsa-B 1.5D/TD VS102/3
Corsavan/Combo 1.7D, Astra-F 1.7TD, Cavalier 1.7TD (17D/DT. 4EE1 engines)
Vectra 1.7TD (X17DT engine) VS102/3 + VS103/1
Astra 1.6/1.7D, Astravan 1.6/1.7D, Astramax 1.6/1.7D, Cavalier 1.6/1.7D
Vectra 1.7D (16DA/17D engines 86-96) **AST4130** + AK9634M + VS1065 (optional)
NOTE: Pre '87 model year engines use VS105 Camshaft Locking Plate - an optional tool not included in this kit.
Astra-F 1.7D/TD, Astravan 1.7D, Cavalier 1.7D (17DR/X17DTL engines 93-) **AST4130** + AK9634M + VS117/01(-97)/VS117/02(97-) + VS1065 (optional)
Frontera 2.8TD, Monterey 3.1 Turbo D, Midi 2.0/2.4 TD, Midi 2.2D
Brava 2.3.D, Brava 2.5D.DT/3.1TD VS102/3

VOLKSWAGEN

Polo 1.3D/1.4D/1.9SDi (AGD), Polo Classic 1.7 SDi/1.9 SDi (AEY)
Golf/Jetta/Caddy 1.5D/1.6D Turbo, Caddy 1.7SDi/1.9SDi (AEY)
Golf/Vento 1.9 TD/TDi(-94) 1.9SDi, Passat/Santana D/Turbo, Passat TD/TDi,
Sharan 1.9TDi, Transport 1.6D/1.7D, 1.9D/Turbo(-94), 2.4D(-95), LT 2.4.D/Turbo D VS101/1 + VS101/5
Transporter 1.9TD/LT 2.5TDi VS101/1

VOLVO

240D/Turbo, 740D/Turbo, 760D/Turbo, 940D/Turbo, 960D/Turbo VS101/1 + VS101/5

2.2. FUEL INJECTION PUMP TIMING

BOSCH/DIESEL KIKI/NIPPONDENSO

VE/EPVE Rotary Fuel Injection Pumps - M8, M10 and M12 service ports VS1079 or VS1259 Timing Adaptors + AK963M DTI

CAV/ROTODIESEL

DPC Rotary Fuel Injection Pump - top entry VS110 Timing Adaptor Kit + AK9634M DTI

NOTE: A combined kit covering the above Bosch, CAV/Rotodiesel pump timing is available under ref: VS1131

2. APPLICATION DETAILS continued

2.3. XUD PEUGEOT DIESEL ENGINE TIMING (Pre 87)

VS109 Piston Travel Adaptor - optional tool, not included in kit.

Early XUD engines require the injection pump timing to be set at a position before TDC. VS109 Piston Travel Adaptor is required to accurately determine the piston position on these engines, when setting the fuel pump timing. Optional tool, not included in VS100A kit.

VS109
with DTI



3. 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.

If required, ensure the vehicle to be worked on is adequately supported with axle stands, ramps and chocks.

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 the valve head and the piston crown causing possible damage to the engine. Incorrect injection pump timing may cause excessive smoke emissions, poor starting and low power output.

IMPORTANT: Always refer to the vehicle manufacturer's service instructions, or proprietary manual to establish the current procedure and data. These instructions for use are provided as a guide only.

4. INSTRUCTIONS FOR USE

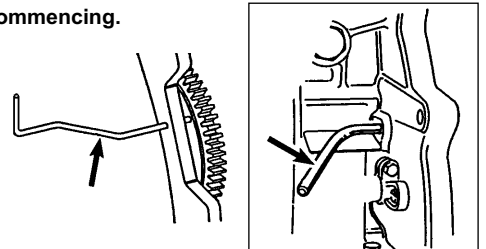
VS100A ENGINE SETTING/LOCKING TOOLS

WARNING! Ensure you have read and understood Section 3 safety instructions before commencing.

4.1. VS125/C7, VS125/P8 and VS117/02 Flywheel TDC Locking Pins

Multi vehicle use (see Application Details - Section 2).

These are designed to pin point and lock the engine at TDC by alignment of a datum hole in the flywheel with a datum hole in the engine. Position the locking pin in the access drilling behind the starter motor or wherever the manufacturer has provided the access point. Rotate the engine by hand until the locking pin engages with the flywheel timing hole, the engine is now locked in correct timing position.

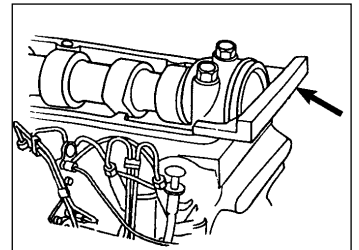


4.2. VS101/1, VS115/01 Camshaft Setting/Locking Plates

Multi vehicle use (see Application Details - Section 2).

Camshaft setting/locking plates are used to accurately align a datum slot, located in the end of the camshaft, with the top face of the camshaft housing to hold the camshaft at the TDC position.

1. Follow the service manual instructions to remove the camshaft cover and timing belt cover.
2. Turn engine in the normal direction of rotation until the camshaft setting/locking plate can be inserted into the machined slot in the end of the camshaft.
3. When fitting VS101/1, feeler gauges of equal thickness can be inserted on either side of the plate until all free play has been eliminated. The camshaft is now locked in its timing position and service work can now be carried out.

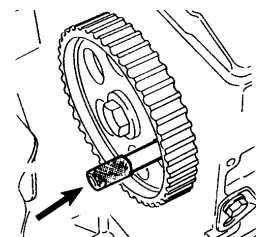


4.3. VS101/3, VS101/4, VS101/5, VS101/6, VS101/7, VS103/2, Locking Pins

Multi vehicle use (see Application Details - Section 2).

Locking pins are designed to pass through datum holes in timing belt pulleys into fixed timing holes on the engine. These can be used at the injection pump pulley, the camshaft sprocket or the flywheel. Follow the service manual instructions to remove the engine timing cover where necessary.

1. Insert the locking pin through the timing pulley or fixed timing hole.
2. Rotate the engine slowly in the normal direction of rotation until the point at which the pulley timing holes and the engine timing holes are aligned. The locking pins can now be engaged to lock the engine in the correct timing position.

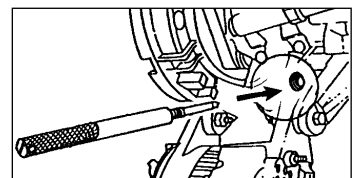


4.4. VS101/2 Crankshaft TDC Location Pin

Ford (see Application Details - Section 2).

VS101/2 is designed to screw into the cylinder block and provide a stop for the crank to be positioned against in order to set the TDC position.

1. Turn engine in the normal direction of rotation until the timing mark on the injection pump sprocket lines up with the cast lug on the timing cover. Remove the plug from the cylinder block access hole and screw in VS101/2 Location Pin. Slowly turn the crankshaft clockwise until contact is made with the pin. No. 1 cylinder is now set at TDC on ignition stroke.



4.5. VS103/1 and VS102/3 Locking Bolts

Multi vehicle use (see Application Details - Section 2).

These are used as an alternative to locking pins for positioning the camshaft and injection pump sprockets in the TDC position. Follow service manual instructions to remove engine timing covers where necessary.

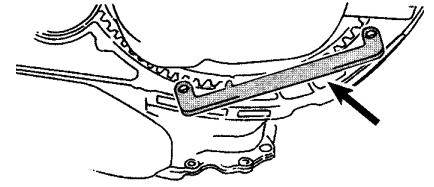
1. Set engine to the correct point of timing using the engine timing marks (refer to workshop manual).
2. Screw the locking bolts into position, the engine is now locked and the timing belt can be removed without disturbing the engine timing.



4.6. VS117/01 Flywheel TDC Setting Tool

Vauxhall/Opel (see Application Details - Section 2).

When removing/installing timing belt and establishing or checking correct timing position, the VS117/01 Setting Tool is used to determine the flywheel/crankshaft TDC position. It is attached to the flywheel housing and provides the "pointer" position on which to align the TDC mark.



4.7. VS106A Camshaft Setting Tool

Vauxhall/Opel (87-)(see Application Details - Section 2).

VS106A is used with VS1065 Alignment/Locking Tool Assembly when timing adjustment is required.

NOTE: Camshaft Locking Plate VS105 is used for pre '87 models (optional tool, not included in kit).

VS106A is used with Dial Test Indicator AK9634M Foot to check and adjust the camshaft timing.

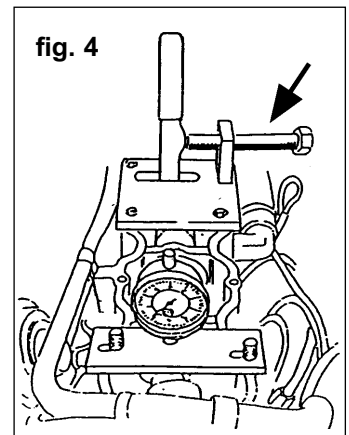
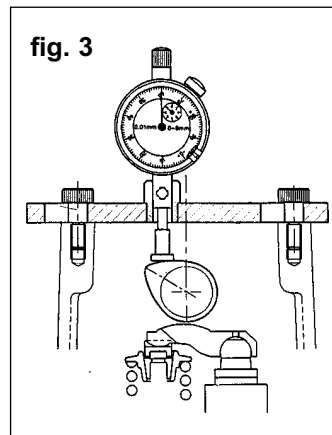
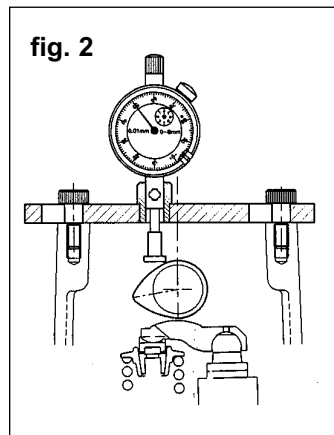
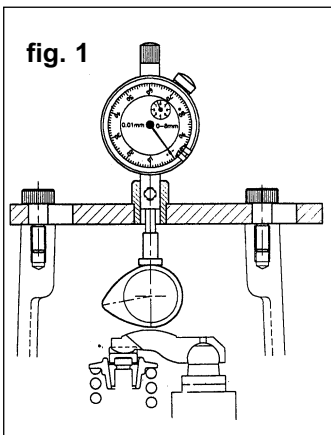
4.7.1. Checking Timing

1. Turn crankshaft in the normal engine direction of rotation to 90 degrees before TDC (No.1 cylinder).
2. Insert and fix Dial Test Indicator AK9634M into VS114B/01 Setting Plate. **IMPORTANT: DTI must be held securely with Thumbscrew in the VS114B/01 Plate.**
3. Unscrew plunger end off the DTI gauge and screw in its place indicator Foot VS114B/03. Ensure the foot threads fully up to its shoulder into the DTI.
4. Locate Shoulder Screws VS114B/02 through Setting Plate body into camshaft housing holes at No.1 cylinder over 2nd cam. Push plate to rest against the **right stop** so that the DTI foot rests over base of cam (fig.1). Release thumbscrew and pre-load the indicator to NOT MORE THAN 0.5mm. Re-tighten thumbscrew and **set DTI gauge to zero**. Push plate to rest against the **left stop** so that the DTI rests over the cam lobe (fig.2).
5. Turn crankshaft in the normal engine direction to TDC No.1 cylinder (fig.3). Read off the value on the DTI - nominal value: 0.55 +/- 0.03mm. If nominal value is not obtained timing **must** be adjusted.

4.7.2. Adjusting Timing

1. Ensure timing belt tension is correct.
2. Turn crankshaft in the normal engine direction to TDC No.1 cylinder.
3. Locate spanner on camshaft hexagon and restrain while loosening fastening bolt of camshaft pulley.
4. Break the taper between camshaft and pulley.
5. Remove crankshaft vent hose and fit Alignment Tool VS1065 (optional, not in kit) over No.4 cylinder and secure with three M6 x 1.0P screws (fig.4).
6. Insert Dial Test Indicator AK9634M with 10mm. dia. Foot VS114B/03 into Setting Plate VS114B/01. Locate Shoulder Screws VS114B/02 through Setting Plate body into camshaft housing holes at No.1 cylinder over 2nd cam.
7. Push plate to rest against **right stop** so that DTI foot rests over base of cam (fig.1).
8. Turn camshaft in opposite direction to normal rotation until the DTI foot rests on the base diameter of the cam, with the cam lobe in position as fig.1.
9. Release thumbscrew and pre-load DTI to NOT MORE THAN 0.50mm. Re-tighten thumbscrew and set DTI gauge to **zero (datum point)**.
10. Push plate to rest against **left stop** so that DTI rests over the cam lobe (fig.2). DTI will now read below the zero datum point.
11. Turn camshaft carefully with the spanner of VS1065 in the normal engine direction until the DTI reading returns to zero datum point and then continue to turn until approx. 0.80mm is achieved.
12. Fine adjust with the adjusting bolt on VS1065 to give a DTI reading of 0.60 - 0.64mm (fig.4). Remove VS106A assembly.
13. Leave VS1065 in place whilst fitting new fastening bolt to lock camshaft pulley to camshaft (never refit old bolt), tighten to specified torque.
14. Remove VS1065. Rotate crankshaft and return to alignment of all TDC marks. Repeat "check timing" procedure to ensure 0.55 +/- 0.03mm is achieved.

IMPORTANT: Check diesel fuel injection pump timing using the appropriate VS1079 or VS110 Pump Timing Tool after belt replacement.

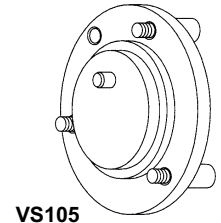


4.8. VS105 Camshaft Locking Plate and Screws

1.6D/1.7D Engines - Vauxhall Astra/Cavalier (pre '87). Optional tool, not included in kit.

VS105 Locking Plate bolts onto the camshaft housing in place of the vacuum pump and carries a peg to locate in a hole at the end of the camshaft to lock it in the TDC position on pre '87 models. Follow the service manual instructions and correctly align the crankshaft and injection pump timing marks.

1. Remove the vacuum pump from the camshaft carrier, offer the tool in place of the vacuum pump.
2. If the tool locates with the peg entering the camshaft hole the valve timing is correct and the camshaft is locked in position. Secure in place with three locking screws provided.
3. If the tool will not align correctly refer to service manual instructions and correctly adjust the camshaft timing.



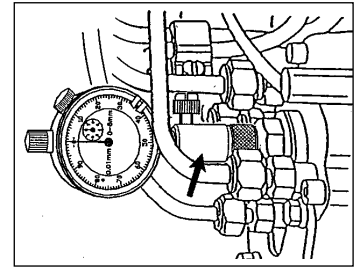
4.9. VS100A Fuel Injection Pump Timing Tools Section

4.9.1. Diesel Injection Pump Timing Tool - Bosch Rotary VE Pumps, M8/M12 Service Ports.

Comprises

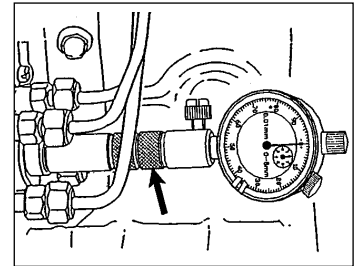
VS1079/01 Short Timing Adaptor	VS1079/04 Thumbscrew
VS1079/02 Extension Adaptor	VS107/3 Indicator Pin-Short
VS1079/03 M12 Thread Adaptor	VS108/3 Indicator Pin-Long

VS1079 is a Timing Adaptor Set which connects to the service port of Bosch VE Rotary Injection Pumps to set the pump static timing position.



VS1079/01 Adaptor can be used as a reach adaptor or extended by adding VS1079/02 according to access capability around service port area. Its M8 thread screws directly into the service port or Adaptor VS1079/03 can be fitted to allow connection into M12 service ports. Use VS1079 with AK9643M Dial Test Indicator.

1. Locate service port, clean and remove the pump blanking plug.
2. Unscrew plunger end off the DTI gauge and screw in its place VS108/3 or VS107/3 Indicator Pin whichever is appropriate to the configuration of timing adaptor being used, (short or extended).
3. Ensure the indicator pin threads fully up to its shoulders into the DTI.
4. Insert the dial test indicator into the timing adaptor and screw it into the service port of the pump.



IMPORTANT: Ensure the timing tool indicator pin can remain in constant contact with the injection pump plunger by pre-loading the dial test indicator with sufficient pre-load to cover the full travel of the pump plunger, plus 1mm. The pre-load is shown on the minor scale of the Indicator gauge.

5. Secure the DTI by clamping with VS1079/04 Thumbscrew.
6. Turn the engine against the normal direction of rotation until the dial indicator needle reaches its lowest reading.
7. Re-adjust the indicator gauge to ensure it has at least 1mm. of pre-load and then **zero the dial indicator gauge.**
8. Turn the engine in the normal direction of rotation to the static timing point and compare the dial test indicator reading against the manufacturer's timing data, allowing for the pre-load.

4.9.2. VS1259 M10 Thread Adaptor -Bosch VE Rotary Pumps, M10 Service Ports.

Required on some later Bosch VE Rotary Injection Pumps with changed service port thread size.

VS1259 is used with either VS1079/01 Short Timing Adaptor, or the combination of VS1079/01 and VS1079/02 Extension Adaptor and screws onto the existing M8 thread to convert to M10.

4.9.3. VS110 Diesel Injection Pump Timing Tool - CAV/Rotodiesel DPC Rotary Injection Pump, top entry.

VS 110 is used for static timing of CAV/Rotodiesel injection pumps after servicing operations which may have affected the timing e.g. removal of the timing belt or pump.

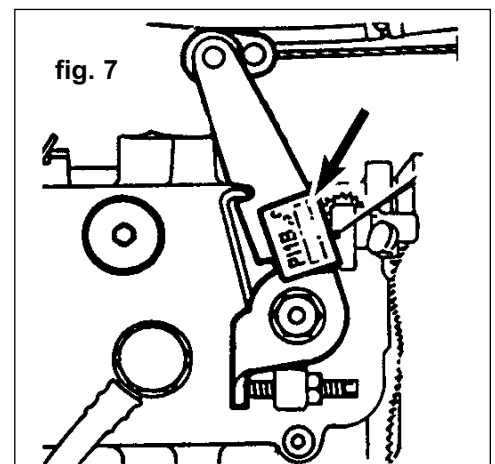
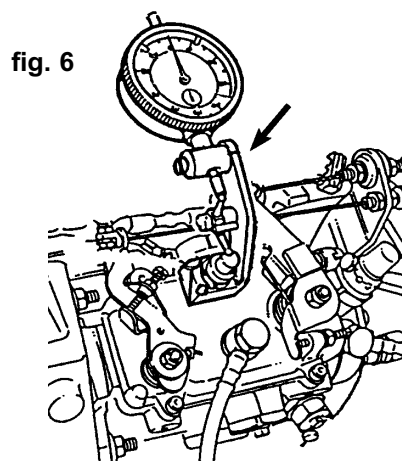
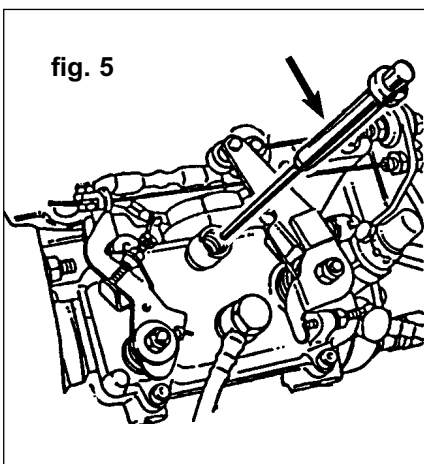
A. Checking the Timing.

1. Set the engine to TDC on No.1 cylinder using the static timing points.
2. Clean top of pump, remove cap from entry port, and insert Pin VS110/3 into hole (fig.5).
3. Unscrew plunger end of AK9634M Dial Test Indicator and screw in its place Indicator Foot VS110/4. Ensure the foot threads fully up to its shoulder into the DTI.
4. Locate and clamp body on pump spigot (fig 6).
5. Fit Dial Test Indicator AK9634M against bell crank and pin VS110/3 and pre-load indicator gauge 1mm. Turn crankshaft 90 degrees anti-clockwise (opposite to normal rotation).
6. Zero dial test indicator gauge.
7. Turn crankshaft slowly in the normal direction of rotation to TDC and, if called for in service instructions, insert appropriate flywheel locking tool and/or injection pump pulley locking bolts.
8. Check that the amount of lift on the indicator gauge corresponds to the figure stamped on the load lever plate (fig. 7), or on side of pump (each pump is calibrated and marked during manufacture), allowing for the pre-load.

B. Timing Adjustment.

1. Set the engine to TDC on No.1 cylinder and, if called for in service instructions, fit flywheel locking pin, injection pump pulley bolts and/or camshaft pulley locking bolt.
2. Ensure injection pump is in the fully retarded position (tilted away from the engine).
3. Clean top of pump, remove cap from entry port (fig.5), and insert Pin VS110/3 into hole.
4. Locate and clamp body VS110 on pump spigot (fig.6).
5. Fit Dial Test Indicator AK9634M with DTI Foot VS110/4 fitted against bell crank and Pin VS110/3 and pre-load indicator gauge 1mm.
6. Remove flywheel locking pin and pulley locking bolts (if previously fitted).
7. Turn crankshaft 90 degrees anticlockwise (opposite to normal rotation).
8. Zero dial test indicator gauge.
9. Turn crankshaft slowly in the normal direction of rotation to TDC and, if called for in service instructions, insert appropriate flywheel locking tool and/or injection pump pulley locking bolts.
10. Turn pump until DTI reading corresponds to figure stamped on load lever plate (fig.7), or on side of pump, allowing for the pre-load.
11. Tighten pump retaining nuts and support bracket bolt to specified torque.
12. Remove flywheel locking pin and pulley bolts (if previously fitted).
13. Turn crankshaft two complete turns in normal direction of rotation.
14. Refit appropriate locking pin/bolts.
15. DTI should indicate specified figure $\pm 0.04\text{mm}$.

IMPORTANT: Remove all locking pins and bolts.



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.

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