

Kit Option: VS4731 Engine/Locking Tool Set (Timing Pins only from VS4730 Kit)

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.

X 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.

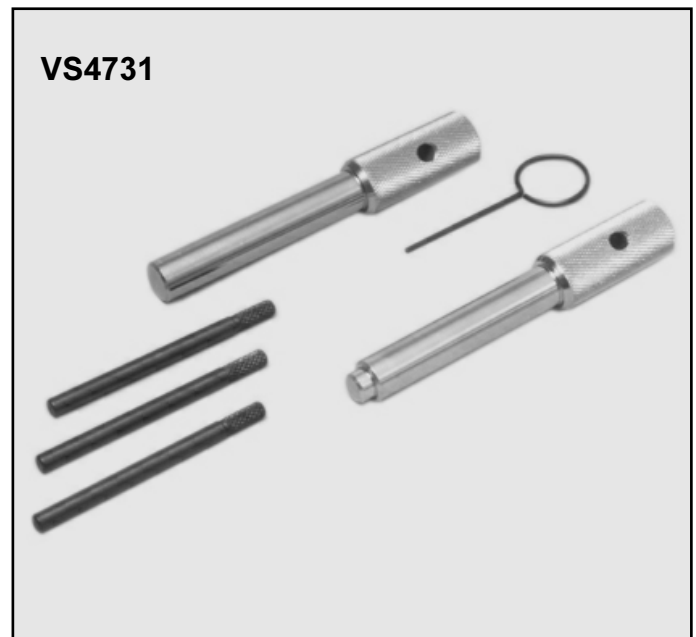
✓ Account for all tools, locking bolts, pins and parts being used and do not leave them in or near the engine.

⚠ 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 vehicle manufacturer's service instructions, or a proprietary manual, to establish the current procedure and data.



VS4730



VS4731

2. INTRODUCTION & APPLICATION

2.1 Introduction

The Ford Duratorq 2.0 and 2.4 diesel engines are twin camshaft, chain drive, direct injection diesel engines. The chain drive operates both camshafts and the injection pump. When carrying out service work on the cylinder head, front end, timing cover, chains, tensioners etc., crankshaft, camshaft and injection pump timing positions are retained with locking pins.

The engine design allows the injection pump to be removed and installed without disturbing the engine timing.

An aperture providing access to the injection pump sprocket is provided in the front cover and the pump sprocket can be retained in place whilst the pump is removed.

2.2 Applications:

FORD DURATORQ 2.0 & 2.4 Diesel engines in FORD Mondeo, Transit & LDV Convoy.

D5BA, D6BA, FMBA, D2FA, D4FA, F4FA engines.

3. CONTENTS

VS4730 Kit

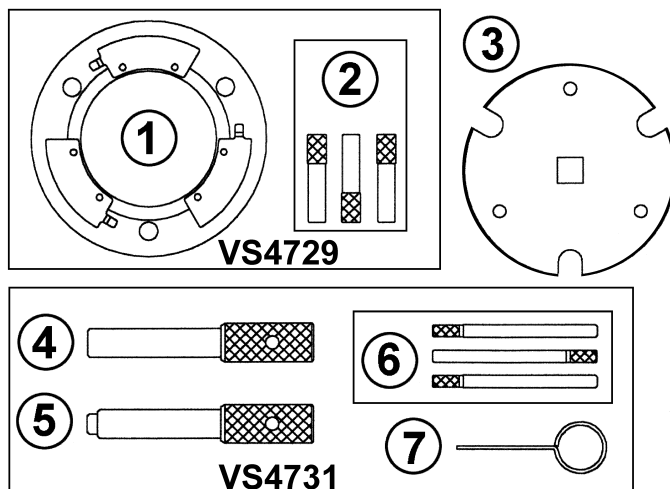
Note: VS4730 Engine Setting/Locking & Pump Removal/Installation Kit includes all the Pins from VS4731 Set.

VS4729 Pump Sprocket Retaining Plate Set - items 1 & 2

1. VS4729/1 Sprocket Retaining Plate
2. VS4729/2 Location Pins (Set of 3)
3. VS4726 Access Cover Removal Plate

VS4731 Engine Setting/Locking Tool Set - items 4, 5, 6 & 7

4. VS4727 Flywheel Locking Pin (GOLD)
5. VS4728 Flywheel Locking Pin (SILVER)
6. VS4730F1 Locking Pin Set (3)
7. VS4593/1F Tensioner Locking Pin
- VS4730-84 Case + Insert.



4. INSTRUCTIONS

VS4730 Diesel Engine Setting/Locking & Injection Pump Removal/Installation Tool Kit.

Comprises:

- VS4726 Access Cover Removal Plate
- VS4729 Inj. Pump Sprocket Retaining Plate Set
- VS4731 Engine Setting/Locking Tool Set

Comprises:

- VS4727 Flywheel Locking Pin
- VS4728 Flywheel Locking Pin
- VS4730F1 Locking Pins Set (3)
- VS4593/1F Tensioner Locking Pin

Note: VS4731 Engine Setting/Locking Tool Set is available separately for engine timing applications only.

4.1 Engine Timing (Setting & Locking engine)

When carrying out service work on the cylinder head, front end, timing cover, chains, tensioners etc., crankshaft, camshaft and injection pump timing positions are retained with locking pins. The 3 x pins of VS4730F1 Set, are required for the camshafts (2) and injection pump (1). A larger locking pin is required for the flywheel (crankshaft). There are two types of Flywheel Locking Pin, one for the 2.0 litre common rail engine (Silver), and one for the 2.0 and 2.4 litre non-common rail engines (Gold).

The timing cover must be removed to gain access to the camshaft sprockets, injection pump, timing chains etc. Removal of the timing cover requires dis-assembly of a number of components including EVR valves, air intake ducting, the radiator, viscous fan and drive belt. Additionally, the outlet hose of the thermostat housing must be released and the water and vacuum pumps removed. The fan idler pulley and crankshaft pulley must be removed.

IMPORTANT: When removing the timing cover, great care must be taken not to distort it.

4.1.1 VS4727 and VS4728 Flywheel Locking Pins (Fig. 1)

To insert VS4727 or VS4728 Flywheel Locking Pin in the correct datum hole, first remove the crankshaft position sensor and then position the flywheel by turning the crankshaft clockwise until the timing hole in the injection pump sprocket is positioned at a point **just before** it is fully aligned (Fig. 2).

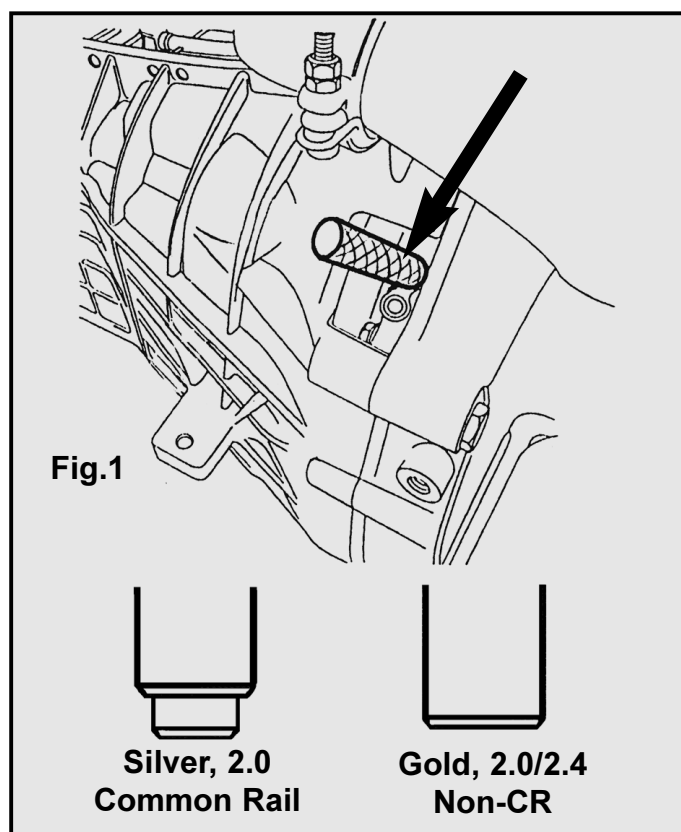


Fig.1

Fig.2

Use the injection pump timing hole to help find the flywheel position for inserting the Locking Pin.

Insert the Flywheel Pin through the sensor holder so it rests on the flywheel ring. Apply slight pressure to the end of the pin and turn the crankshaft slowly until the Pin engages the slot in the flywheel ring.

The crankshaft is now at 50° BTDC.

WARNING: DO NOT use the Flywheel Locking Pin to counter-hold the crankshaft when releasing or tightening the crank pulley bolt. The Flywheel Pin is located through the sensor holder which will be damaged if used to restrain the crankshaft. DO NOT turn the engine with the Flywheel Pin fitted.

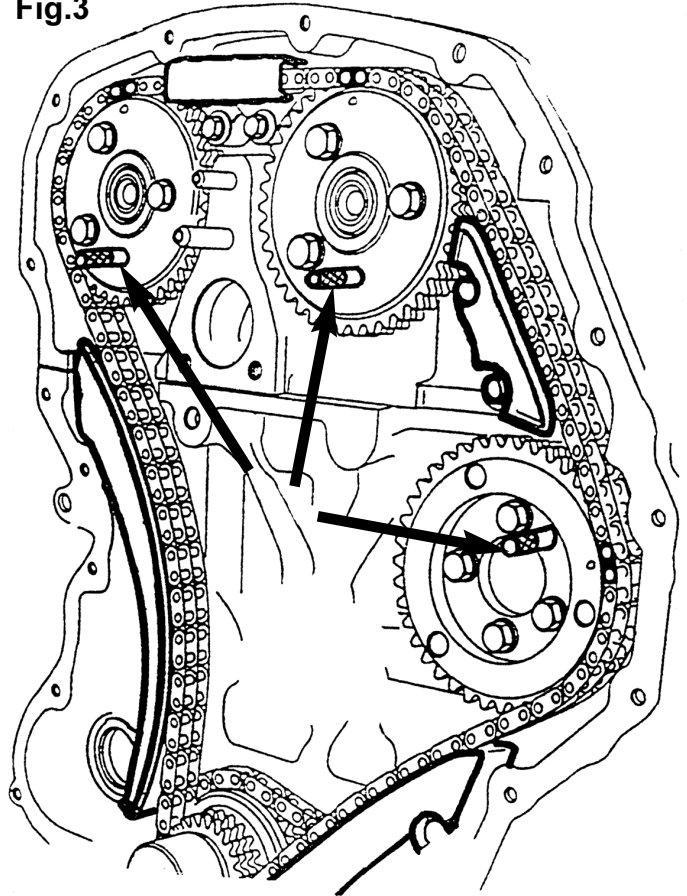
4.1.2 VS4730F1 Locking Pin Set (Fig. 3)

Camshafts and Injection Pump

VS4730F1 Pin Set comprises 3 x identical locking pins, 1 for each of the camshafts and 1 for the injection pump timing.

Fit the 3 pins in position and release the camshaft sprocket bolts and the 4 x injection pump sprocket bolts.

Fig.3



4.1.3 VS4593/1F Chain Tensioner Locking Pin (Fig. 4)

To remove the timing chain, the chain tensioner must be 'locked back' and removed.

Release (A) and simultaneously push back (B) and insert VS4593/1F Pin through the hole (C) to lock back tensioner.

Remove the tensioner, rail and chain guides, mark the camshaft sprockets as "Inlet" and "Exhaust" and remove the camshaft and injection pump sprockets with the chain.

IMPORTANT: VS4730F1 Locking Pins are designed to allow removal of the sprockets without removing the inserted pins. **DO NOT remove the pins from their timing holes.** When re-assembling the sprockets, chain and front end, ensure that the 3 copper links on the timing chain align with the timing marks on all three sprockets, and the chain is taut on the non-tensioned side. Loosely tighten the camshaft and injection pump sprocket bolts, re-fit guides and tensioner and withdraw the VS4593/1F Pin from tensioner to activate it. Fully tighten all sprocket bolts and then remove the 3 locking Pins.

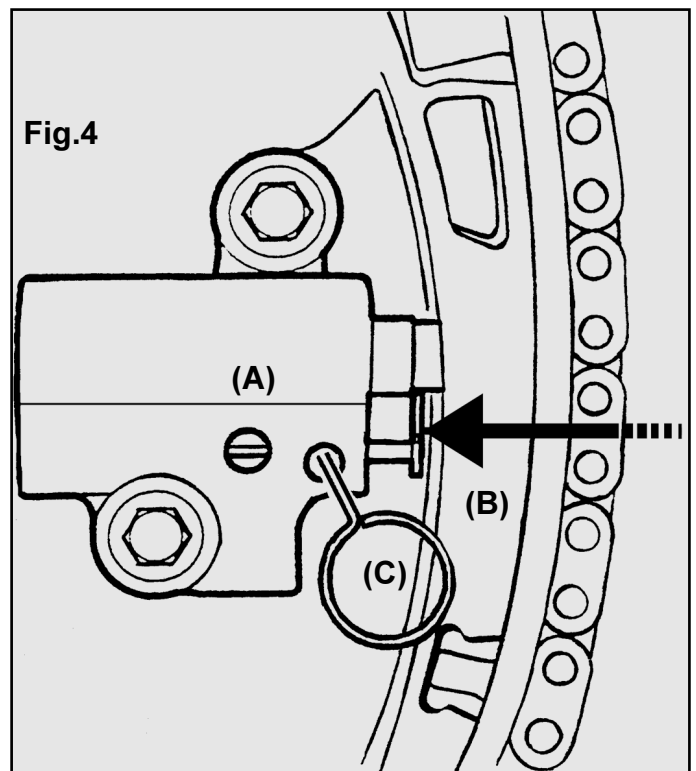
4.1.4 Timing check

To ensure engine timing is correct, turn the engine over, by hand, two revolutions, returning to 50° BTDC and insert the correct Flywheel Locking Pin for the engine. Check that the 3 x VS4730F1 Locking Pins can be inserted into the camshafts and injection pump timing holes.

If none of the F1 pins will enter - remove the chain and start again. **IMPORTANT:** Do not slacken the sprocket bolts unless the locking pins are fitted.

If only the injection pump locking pin will not enter, slacken the 4 sprocket bolts, turn pump shaft nut slightly until the pin enters, then tighten sprocket bolts.

Fig.4



4.2 Fuel Injection Pump Removal and Installation

NOTE: If a new injection pump is to be fitted, it must be configured to the PCM (powertrain module) using Ford special equipment.

The engine design allows the injection pump to be removed and installed without disturbing the engine timing.

An aperture providing access to the injection pump sprocket is provided in the front cover and by using Retainer Set VS4729 the pump sprocket can be retained in place whilst the pump is removed.

4.2.1 Fuel Injection Pump Removal

Ensure the engine is cold.

Disconnect the battery and drain coolant via the lower hose.

Remove the radiator and detach the PAS reservoir (move to one side).

Remove bonnet lock platform and disconnect pipes/plug from EVR valve.

In addition, detach fuel filter, air intake duct and fuel pipes from pump.

Remove EGR valve, inlet manifold and disconnect cylinder head temperature sensor lead.

Remove the injector pipes from pump.

NOTE: Remove pipes 1 and 2, followed by 3 and 4, and disconnect injection pump electrical connector.

4.2.2 VS4726 Access Cover Removal Plate (Fig. 5)

NOTE: VS4726 Access Cover Removal Plate is also used to adjust the final positioning of VS4729 Sprocket Retaining Plate to allow location pins to be fully inserted, and to remove/install the crankshaft front oil seal.

To remove the pump sprocket access cover, locate the 3 studs on the VS4726 Removal Plate in the recesses in the cover and using the square drive turn the Removal Plate anti-clockwise to remove cover.

Establish the crankshaft timing position, as described in "Engine Timing" section, by using the injection pump timing hole as a guide. Insert the appropriate Flywheel Locking Pin VS4727 or VS4728

The crankshaft is now at 50° BTDC.

4.2.3 The injection pump securing bolts must be released, using a TX45 socket, to achieve disconnection of the pump body. **NOTE:** These securing bolts cannot be fully removed (Fig. 6).

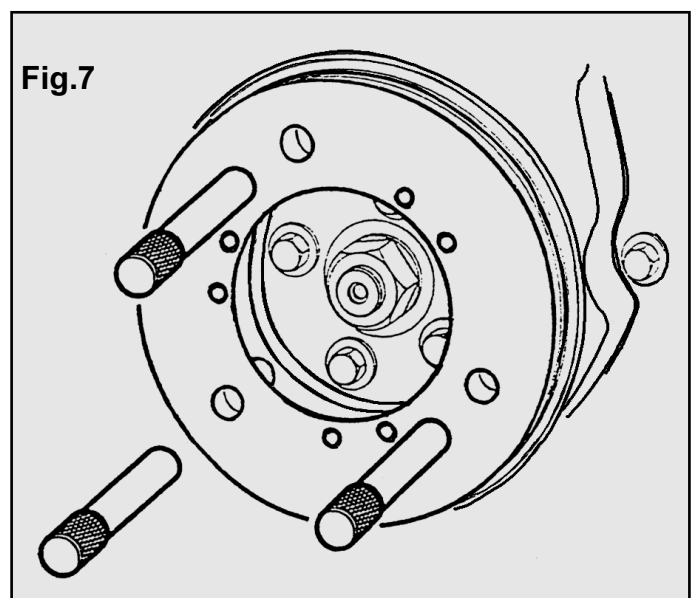
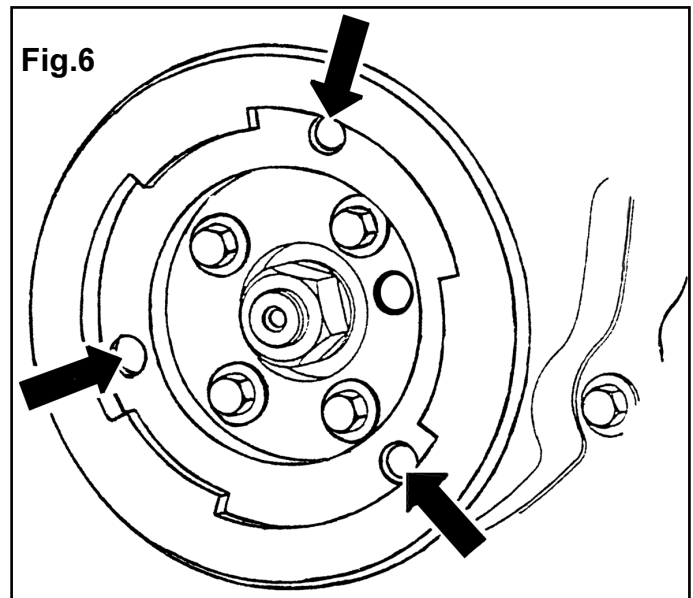
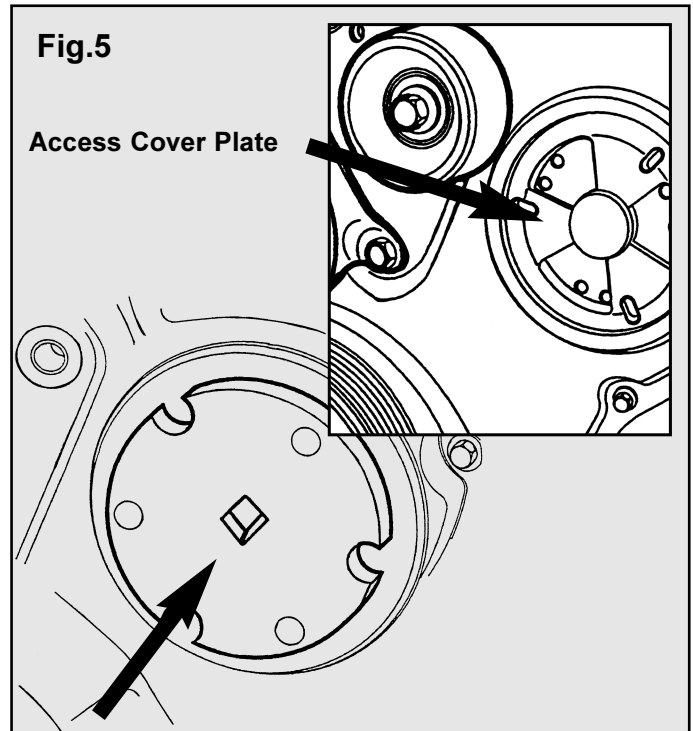
4.2.4 VS4729 Injection Pump Sprocket Retaining Plate Set (Fig. 7) Comprises - Retaining Plate and 3 x Location Pins.

Fit the VS4729-1 Retaining Plate into the access cover aperture and turn the Plate clockwise so that the 'spring clips' mounted on the rear of the Plate locate behind the aperture 'lugs' and secure the Plate in the aperture.

Continue to turn the Plate until the 3 x holes in the Plate align with the 3 x securing bolt holes.

Insert the 3 x VS4729 Location Pins through the holes in the Plate and, if possible, into the securing bolt holes

IMPORTANT: At this stage you must ensure that at least one of the pins is fully located.



Fit the VS4726 Access Cover Removal Plate over the Retaining Plate Assembly with the 3 semi-circular cut-outs on its circumference located over the 3 pins (Fig. 8).

Using the square drive of this Plate turn it slightly in either direction to adjust the Retaining Plate's position so that **all 3 Location Pins can be fully inserted (Fig. 9)**. Remove VS4726 Plate.

WARNING: All 3 x Location Pins MUST BE fully inserted before undoing the sprocket retaining bolts. If the pump sprocket is not secured correctly and moves, the timing cover will need to be removed and the chain tensioner re-set.

Remove the 4 x injection pump sprocket retaining bolts releasing the pump from the sprocket.

At the rear of the pump - slacken the bolts fixing the pump to its mounting bracket and also remove the bolts fixing the bracket to the cylinder block.

Remove the pump ensuring the spacer remains on the front flange

Remove injection pipes from pump.

4.2.5 Fuel Injection Pump Installation

Fit the supply and return pipes to the pump using new washers and fit spacer and new gasket.

Fit one of the VS4730F1 Locking Pins through the slot in the pump flange prior to re-locating the pump (Fig. 10).

Clean and Loctite (270) the 3 x securing bolts and relocate the pump in its position passing the VS4730F1 Pin fitted in the pump through the sprocket timing hole. Loosely secure the mounting bracket to the cylinder block.

Fully screw in the 4 x sprocket retaining bolts, then release them back ¼ turn.

Remove the 3 x Location Pins securing the pump sprocket and remove Retaining Plate VS4729.

Tighten the 3 x injection pump securing bolts (T45) and then fully tighten the sprocket retaining bolts.

Remove the F1 Injection Pump Locking Pin.

4.3 Checking pump timing

Paint mark the crankshaft position on crank pulley and timing cover.

Remove the Flywheel Locking Pin and turn the engine over twice, by hand, returning to the crank paint timing marks.

Insert the Flywheel Locking Pin.

Check that pump timing is correct by ensuring the F1 Pump Locking pin can be fully inserted.

Using VS4726, re-fit the access cover, tighten the 4 x pump mounting bracket bolts to secure the bracket to pump and cylinder block.

Remove all Locking Pins and re-fit all components.

Fig.8

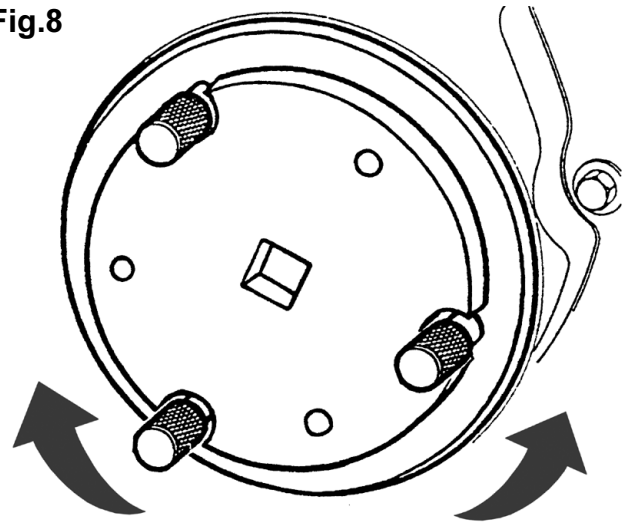


Fig.9

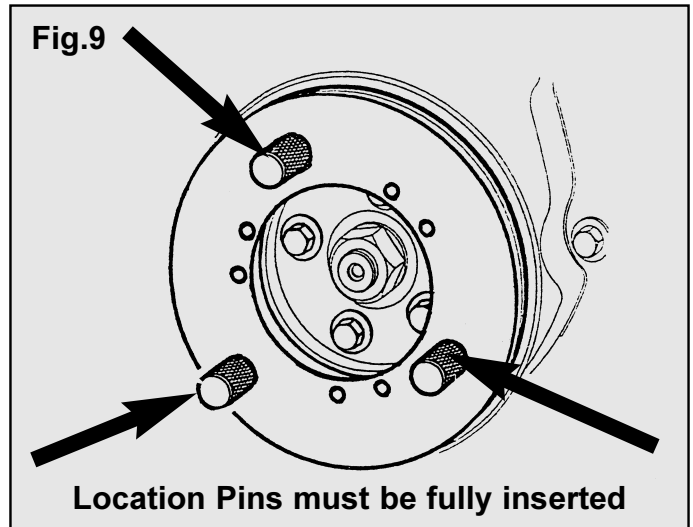
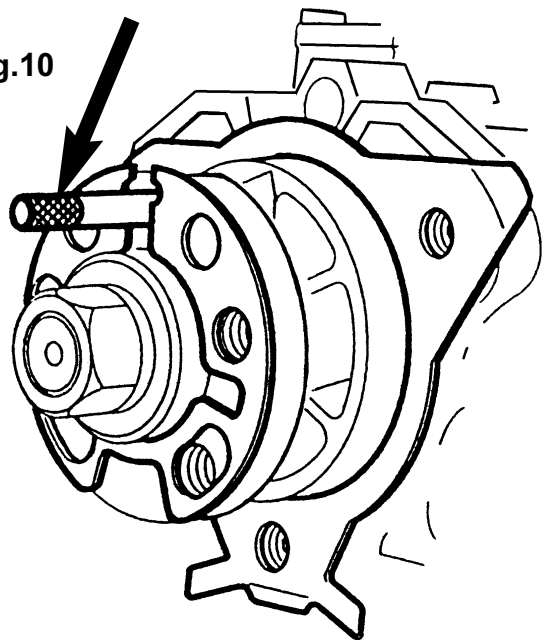


Fig.10



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

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