Chapter 5 Part B: Ignition systems

Contents

Degrees of difficulty

Easy, suitable for novice with little experience 

Fairly easy, suitable for beginner with some experience 

Fairly difficult, suitable for competent DIY mechanic 

Difficult, suitable for experienced DIY mechanic 

Very difficult, suitable for expert DIY or professional 

Specifications

5B

General

System type:	
1.1 litre OHV engines	Mechanical contact breaker and coil
1.1 litre CVH engines up to 1986	Mechanical contact breaker and coil
1.1 litre CVH engines from 1986	Electronic breakerless ignition
1.1 litre HCS engines	Distributorless ignition system (DIS/ESC)
1.3 litre OHV engines	Electronic breakerless ignition
1.3 litre CVH engines	Electronic breakerless ignition
1.3 litre HCS engines	Distributorless ignition system (DIS/ESC)
1.4 litre carburettor engines	Electronic breakerless ignition
1.4 litre fuel injection engines	Programmed electronic ignition (EEC IV)
1.6 litre carburettor engines	Electronic breakerless ignition
1.6 litre K-Jetronic fuel injection engines	Electronic breakerless ignition
1.6 litre Electronic Fuel Injection (EFI) engines	Distributorless ignition system (DIS/EEC IV)
1.6 litre RS Turbo engines	Programmed electronic ignition (ESC II)
Location of number No 1 cylinder	Crankshaft pulley end
Firing order:	
OHV and HCS engines	1-2-4-3
CVH engines	1-3-4-2

Spark plugs

Type	See Chapter 1 Specifications

Distributor

Direction of rotor arm rotation (all engines)	Anti-clockwise viewed from cap
Contact breaker points gap:	
Bosch distributor	0.40 to 0.50 mm (0.016 to 0.020 in)
Lucas distributor	0.40 to 0.59 mm (0.016 to 0.023 in)
Dwell angle (contact breaker system)	48° to 52°

Ignition coil - contact breaker ignition system

Type	Low voltage for use with 1.5 ohm ballast resistance
Output:	
OHV engines	23.0 k volt (minimum)
CVH engines	25.0 k volt (minimum)
Primary resistance	1.2 to 1.4 ohms
Secondary resistance	5000 to 9000 ohms

Ignition coil - electronic ignition systems (except DIS)

Type	Oil filled high output
Output	25.0 to 30.0 k volt according to application
Primary resistance:	
All models except RS Turbo 1986 onwards	0.72 to 0.88 ohms
RS Turbo from 1986 onwards	1.0 to 1.2 ohms
Secondary resistance	4500 to 7000 ohms

Ignition coil - DIS

Output	37 k volt (minimum) open circuit
Primary resistance (measured at coil):	
1.1 and 1.3 litre HCS engines	0.50 to 1.00 ohm
1.6 litre Electronic Fuel Injection engines	4.5 to 5.0 ohms

HT leads

Resistance	30 000 ohms maximum per lead (typical value)
Type:	
OHV engines	Champion CLS 8
CVH engines	Champion CLS 9

Torque wrench settings

	Nm	lbf ft
Spark plugs:		
OHV and HCS engines	13 to 20	10 to 15
CVH engines	25 to 38	18 to 28
Distributor clamp pinch bolt (OHV engines)	4	3
Distributor clamp plate bolt (OHV engines)	10	7
Distributor mounting bolts (CVH engines)	7	5

1 General information and precautions

Contact breaker ignition system

The ignition system is divided into two circuits, low tension (primary) and high tension (secondary). The low tension circuit consists of the battery, ignition switch, primary coil windings and the contact breaker points and condenser. The high tension circuit consists of the secondary coil windings, the heavy ignition lead from the centre of the distributor cap to the coil, the rotor arm and the spark plug leads and spark plugs.

When the system is in operation, low tension voltage is changed in the coil into high tension voltage by the opening and closing of the contact breaker points in the low tension circuit. High tension voltage is then fed, via the carbon brush in the centre of the distributor cap, to the rotor arm of the distributor. The rotor arm revolves inside the distributor and each time it comes in line with one of the four metal segments in the distributor cap, which are connected to the spark plug leads, the opening and closing of the contact breaker points causes the high tension voltage to build up and jump the gap from the rotor arm to the appropriate metal segment. The voltage then passes via the spark plug lead to the spark plug, where it finally jumps the spark plug gap before going to earth.

The distributor is driven by a skew gear from the camshaft on the OHV engine and by an offset dog on the end of the camshaft on CVH engines.

The ignition advance is a function of the distributor and is controlled both mechanically and by a vacuum-operated system.

A ballast resistor is incorporated in the low tension circuit between the ignition switch and the coil primary windings. The ballast resistor consists of a grey coloured resistive wire running externally to the main loom between the ignition switch and coil. During starting this resistor is bypassed allowing full available battery voltage to be fed to the coil which is of a low voltage type. This ensures that during starting when there is a heavy drain on the battery, sufficient voltage is still available at the coil to produce a powerful spark. During normal running, battery voltage is directed through the ballast resistor to limit the voltage supplied to the coil to seven volts.

Electronic breakerless ignition

The fundamentals of operation of the electronic breakerless ignition system are similar to those described previously for the contact breaker system, however in the breakerless electronic ignition system, the action of the contact breaker points is simulated electronically within the distributor. Control of ignition advance characteristics is still carried out in the conventional way using mechanical and vacuum systems.

Programmed electronic ignition (RS Turbo models)

The two main components of the system are the electronic control module designated Electronic Spark Control II (ESC II), and a Hall effect electronic ignition distributor.

The distributor is mounted on the flywheel end of the cylinder head, and is driven directly off the camshaft by an offset dog coupling. Contained within the distributor is a trigger vane, permanent magnet and position sensor. The trigger vane is a cylindrical disc attached to the distributor shaft and having four slots on its vertical surface, one for each cylinder. The permanent magnet and position sensor are secured to the distributor baseplate in such a way that the vertical surface of the trigger vane passes between them. As the trigger vane rotates, the magnetic field between the magnet and position sensor is interrupted and a series of square wave electronic pulses are

produced. This output wave form is sent to the ESC II module and from this, engine speed, ignition advance and idle speed are calculated.

A small bore hose connecting the inlet manifold to a vacuum transducer within the module supplies the unit with information on engine load, and a charge air temperature sensor, which is a temperature sensitive resistor located in the air intake duct, provides information on engine intake air temperature. From this constantly changing data the ESC II module selects a particular advance setting from a range of ignition characteristics stored in its memory.

With the firing point established, the module switches off the ignition coil primary circuit, the magnetic field in the coil collapses and the high tension voltage is created. At precisely the right instant the ESC II module switches the coil primary circuit back on and the cycle is repeated for each cylinder in turn.

Additionally the ESC II module operates in conjunction with the fuel-injection and turbo systems to provide data on engine rpm to the fuel-injection control module, and to provide an overriding control of turbo boost pressure.

Programmed electronic ignition (1.4 litre fuel injection engines)

The ignition system consists of a Hall effect distributor (as described previously for RS Turbo models), TFI IV ignition module, coil and EEC IV module.

The distributor is similar to that used on earlier CVH engine models, but has no centrifugal or vacuum advance mechanisms, the advance functions being carried out by the EEC IV module. The distributor acts as a trigger and provides a pulse signal to the EEC IV module.

The distributor performs the following functions:

a) Sends signals to the EEC IV module to trigger the ignition firing process.
b) Enables the EEC IV module to calculate engine speed from the pulse signals.
c) Distributes HT voltage to the spark plugs.

The TFI (Thick Film Integration) IV module functions as a high current switch by controlling the ignition coil primary LT circuit. The module is controlled by one of two input signals, either from the Hall effect sensor in the distributor, or from the EEC IV module.

The signal from the distributor passes via the TFI IV module to the EEC IV module. The EEC IV module modifies the signal to provide ignition timing advance relative to engine speed, load and temperature, before returning it to the TFI IV module.

The EEC IV module provides total engine management via the ignition and fuel systems. From signals received from the various sensors, the module controls the following functions:

a) Ignition timing.
b) Fuel delivery.
c) Deceleration fuelling.
d) Idle speed.
e) Engine overspeed protection.

If the module should fail, the ignition timing will be switched by the TFI IV module (there will be no ignition advance) and fuel will be delivered at a constant rate. This state is known as the Limited Operation Strategy (LOS) and allows the vehicle to be driven, albeit with greatly reduced engine performance and fuel economy.

Should any of the system sensors fail, the EEC IV module will sense this and substitute a single predetermined value for the failed input. Again, this will allow continued engine operation, with reduced performance and driveability. Under these conditions a self-test code will be stored in the module memory to aid subsequent fault diagnosis by a Ford dealer.

Distributorless ignition system (DIS)

1.4 litre fuel injection engines

The mechanical distribution of high tension voltage (by a rotating distributor) is replaced by "static" solid-state electronic components.

The system selects the most appropriate ignition advance setting for the prevailing engine operating conditions from a three-dimensional map of values stored in the Electronic Spark Control (ESC) module memory. The module selects the appropriate advance value according to information supplied on engine load, speed, and operating temperature by various sensors.

Engine speed is monitored by a sensor mounted in the cylinder block, which is activated by 35 equally-spaced teeth on the flywheel. A gap occupies the position of the 36th tooth, which denotes 90° BTDC for No 1 cylinder. As the engine speed increases, so does the frequency and amplitude of the signal sent to the ESC module (photos).

Engine load information is provided by a pressure sensor which is integral with the ESC module. The sensor monitors vacuum in the inlet manifold via a hose.

Engine temperature is monitored by an Engine Coolant Temperature (ECT) sensor screwed into the bottom of the inlet manifold.

A DIS coil assembly is mounted on the cylinder block next to No 1 cylinder. The coil has two primary and two secondary windings.

One secondary winding supplies current to numbers 1 and 4 cylinders simultaneously, while the other supplies current to numbers 2 and 3 cylinders. Whenever either of the coils is energised, two sparks are generated. For example, one spark is produced in No 1 cylinder on its compression stroke, while the other spark is produced in No 4 cylinder on its exhaust stroke. The spark in No 4 cylinder is "redundant" and has no detrimental effect on engine performance.

1.6 litre Electronic Fuel Injection engines

The ignition system is under the overall control of the EEC IV engine management module. The module compares the signals provided by the various sensors with engine operating parameters stored in its memory, and varies the engine operating settings directly according to engine load and the prevailing operating conditions.

Ignition is via a Distributorless Ignition System (DIS), similar to that described previously for 1.4 litre fuel injection engines. The DIS is controlled by the E-DIS 4 module.

Precautions

Warning: The DIS system carries much higher voltages than conventional systems, and adequate precautions must be taken to avoid personal injury. Refer to the "Safety first!" Section at the beginning of this manual before proceeding, and always disconnect the battery negative lead before working on the system

It is necessary to take extra care when working on the ignition system, both to avoid damage to semi-conductor devices and to avoid personal injury. Refer to the precautions given in "Safety First!" at the beginning of this manual, with particular reference to the warning concerning ignition HT voltage. Also refer to the precautions at the beginning of Chapter 5A.

5B

2 Ignition system - testing

Note: *Refer to the precautions given in Section 1 before proceeding.*

Contact breaker ignition system

1 By far the majority of breakdown and running troubles are caused by faults in the ignition system either in the low tension or high tension circuits.

2 There are two main symptoms indicating faults. Either the engine will not start or fire, or the engine is difficult to start and misfires. If it is a regular misfire (ie the engine is running on only two or three cylinders), the fault is almost sure to be in the secondary or high tension circuit. If the misfiring is intermittent the fault could be in either the high or low tension circuits. If the car stops suddenly, or will not start at all, it is likely that the fault is in the low tension circuit. Loss of power and overheating, apart from faulty carburation settings, are normally due to faults in the distributor or to incorrect ignition timing.

Engine fails to start

3 If the engine fails to start and the car was running normally when it was last used, first check there is fuel in the petrol tank. If the engine turns over normally on the starter

motor and the battery is evidently well charged, then the fault may be in either the high or low tension circuits. First check the HT circuit.

4 One of the commonest reasons for bad starting is wet or damp spark plug leads and distributor. Remove the distributor cap. If condensation is visible internally dry the cap with a rag and also wipe over the leads. Refit the cap. A moisture dispersant can be very effective in these situations.

5 If the engine still fails to start, check the voltage is reaching the plugs by disconnecting each plug lead in turn at the spark plug end, and holding the end of the cable about 3/16 inch (5 mm) away from the cylinder block. Spin the engine on the starter motor.

6 Sparking between the end of the cable and the block should be fairly strong with a strong regular blue spark. (Hold the lead with rubber to avoid electric shocks). If voltage is reaching the plugs, then remove them and clean and regap them. The engine should now start.

7 If there is no spark at the plug leads, take off the HT lead from the centre of the distributor cap and hold it to the block as before. Spin the engine on the starter once more. A rapid succession of blue sparks between the end of the lead and the block indicate that the coil is in order and that the distributor cap is cracked, the rotor arm is faulty, or the carbon brush in the top of the distributor cap is not making good contact with the rotor arm.

8 If there are no sparks from the end of the lead from the coil, check the connections at the coil end of the lead. If it is in order start checking the low tension circuit.

9 Use a 12v voltmeter or a 12v bulb and two lengths of wire. With the ignition switched on and the points open, test between the low tension wire to the coil and earth. No reading indicates a break in the supply from the ignition switch. Check the connections at the switch to see if any are loose. Refit them and the engine should run.

10 With the points still open take a reading between the moving point and earth. No reading here indicates a break in the wire or poor connections between the coil "-" terminal and distributor, or a faulty coil. Take a further reading between the coil "- " terminal and earth. No reading confirms a faulty coil. For these tests it is sufficient to separate the points with a piece of dry paper while testing with the points open.

Engine misfires

11 If the engine misfires regularly, run it at a fast idling speed. Pull off each of the plug caps in turn and listen to the note of the engine. Hold the plug cap in a dry cloth or with a rubber glove as additional protection against a shock from HT supply.

12 No difference in engine running will be noticed when the lead from the defective circuit is removed. Removing the lead from one of the good cylinders will accentuate the misfire.

13 Hold the lead about 3/16 inch (5 mm) away from the block. Re-start the engine. If the sparking is fairly strong and regular, the fault must lie in the spark plug.

14 The plug may be loose, the insulation may be cracked, or the points may have burnt away giving too wide a gap for the spark to jump. Worse still, one of the points may have broken off. Either renew the plug, or clean it, reset the gap and then test it.

15 If there is no spark at the end of the plug lead, or if it is weak and intermittent, check the ignition lead from the distributor to the plug. If the insulation is cracked or perished, renew the lead. Check the connections at the distributor cap.

16 If there is still no spark, examine the distributor cap carefully for tracking. This can be recognised by a very thin black line running between two or more electrodes, or between an electrode and some other part of the distributor. These lines are paths which now conduct electricity across the cap thus letting it run to earth. The only answer is a new distributor cap.

17 Apart from the ignition timing being incorrect, other causes of misfiring have already been dealt with under the Section dealing with the failure of the engine to start. To recap, these are that

a) The coil may be faulty giving an intermittent misfire;
b) There may be a damaged wire or loose connection in the low tension circuit;
c) The condenser may be faulty; or
d) There may be a mechanical fault in the distributor (broken driving spindle or contact breaker spring).

18 If the ignition timing is too far retarded, it should be noted that the engine will tend to overheat, and there will a quite noticeable drop in power. If the engine is overheating and the power is down, and the ignition timing is correct, then the carburettor should be checked, as it is likely that this is where the fault lies.

Electronic breakerless ignition

19 Testing of the electronic ignition system can only be accurately carried out using Ford dedicated test equipment and a systematic test procedure. For this reason any suspected faults in the system must be referred to a Ford dealer.

Programmed electronic ignition (RS Turbo models)

20 Refer to paragraph 19.

Programmed electronic ignition (1.4 litre fuel injection models)

21 Complete and accurate fault diagnosis is only possible using special test equipment available to a Ford dealer.

22 Where a component is obviously defective, it can be removed and a new component fitted in its place.

23 Although certain electrical checks can be carried out to establish continuity or resistance, this is not recommended as the incorrect use of test probes between component connector pins can cause damage to the internal circuitry of some components.

24 Following the disconnection of the battery, all of the system Keep Alive Memory (KAM) values will be erased from the EEC IV module memory, which may result in erratic idle, engine surge, hesitation and a general deterioration of driving characteristics.

25 After reconnecting the battery, start the engine and allow it to idle for at least three minutes. After normal operating temperature is reached, increase the engine speed to 1200 rpm and maintain this speed for at least two minutes.

26 This procedure will allow the module to "re-learn" its reference values. It may be necessary to drive the vehicle for approximately five miles of varied driving to complete the learning process.

Distributorless ignition system (DIS)

All engines

27 Refer to paragraphs 21 to 23.

1.6 litre Electronic Fuel Injection engines

28 Refer to paragraphs 24 to 26.

3 Condenser (contact breaker system) - testing, removal and refitting

Note: *Refer to the precautions given in Section 1 before proceeding.*

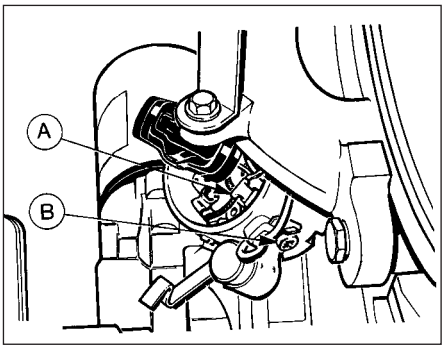
Testing

1 The purpose of the condenser is to prevent excessive arcing of the contact breaker points, and to ensure that a rapid collapse of the magnetic field, created in the coil, and necessary if a healthy spark is to be produced at the plugs, is allowed to occur.

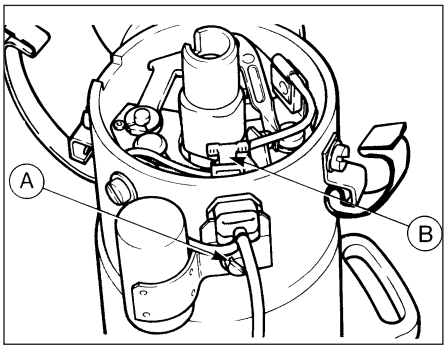
2 The condenser is fitted in parallel with the contact breaker points. If it becomes faulty it will lead to ignition failure, as the points will be prevented from cleanly interrupting the low tension circuit.

3 If the engine becomes very difficult to start, or begins to miss after several miles of running, and the contact breaker points show signs of excessive burning, then the condition of the condenser must be suspect. A further test can be made by separating the contact breaker points by hand, with the ignition switched on. If this is accompanied by an excessively strong flash, it indicates that the condenser has failed.

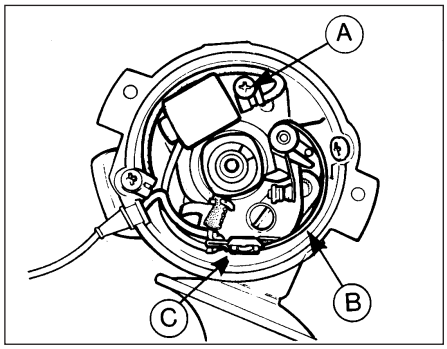
4 Without special test equipment, the only reliable way to diagnose condenser trouble is to renew the suspect unit and note if there is any improvement in performance. To do this proceed as follows according to engine type.



3.7 Distributor turned through 120° for condenser renewal - Bosch distributor, OHV engines
A LT lead connector
B Condenser retaining screw



3.13 Bosch distributor condenser renewal - CVH engines
A Condenser retaining screw
B LT lead connector



3.14 Lucas distributor condenser renewal - CVH engines
A Condenser retaining screw
B Contact breaker spring arm
C Hooked end of spring arm

Removal

OHV engines

5 Spring back the retaining clips and lift off the distributor cap. Withdraw the rotor arm from the distributor shaft.
6 Accurately mark the position of the distributor body in relation to the clamp plate, then slacken the clamp plate pinch bolt.
7 Turn the distributor body approximately 120° in a clockwise direction to expose the externally mounted condenser **(see illustration)**.
8 Disconnect the contact breaker points LT lead from the spade terminal, and the ignition LT lead at the coil.
9 Undo the retaining screw and withdraw the condenser from the side of the distributor body.
10 Place the new condenser in position and secure with the retaining screw.
11 Reconnect the LT leads, then turn the distributor back to its original position and align the marks made during removal. Tighten the clamp plate pinch bolt.

CVH engines

12 Spring back the retaining clips or undo the screws as appropriate and lift off the distributor cap.
13 On the Bosch distributor disconnect the contact breaker points LT lead from the spade terminal, undo the retaining screw and withdraw the condenser from the side of the distributor body. Disconnect the ignition LT lead at the coil and remove the condenser **(see illustration)**.
14 On the Lucas distributor ease the contact breaker spring arm out of the plastic insulator and slide the combined LT and condenser lead out of the hooked end of the spring arm. Undo the condenser retaining screw and earth lead, disconnect the ignition LT lead at the coil, and withdraw the condenser and wiring from the distributor **(see illustration)**.

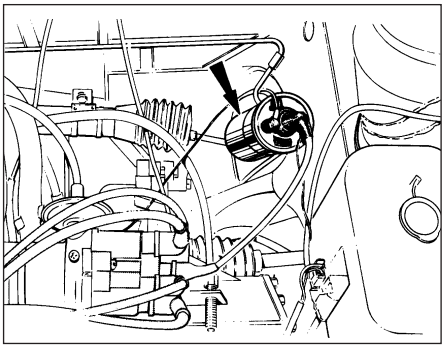
Refitting

OHV engines

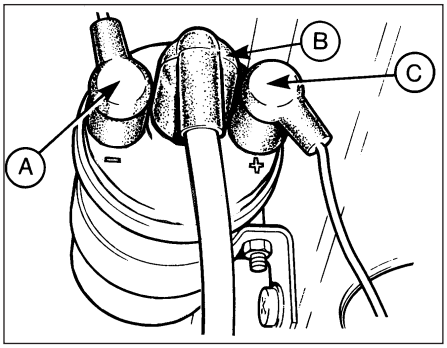
15 Refit the rotor arm and distributor cap. If in any doubt about the distributor position, check the ignition timing as described in Chapter 1.

CVH engines

16 On all distributors refitting is the reverse sequence to removal.



4.2a Ignition coil location (arrowed) - CVH engines with contact breaker ignition system



4.2b Ignition coil terminal identification - contact breaker ignition system
A Negative LT terminal to distributor
B HT terminal to distributor cap
C Positive LT feed terminal

4 Ignition HT coil - testing, removal and refitting

Note: *Refer to the precautions given in Section 1 before proceeding.*

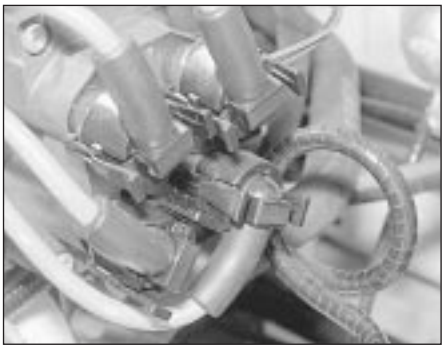
All except models with DIS ignition system

Testing

1 Accurate checking of the coil output requires the use of special test equipment and should be left to a dealer or suitably equipped automotive electrician. It is however possible to check the primary and secondary winding resistance using an ohmmeter as follows.
2 To check the primary resistance disconnect the LT and HT wiring at the coil and connect the ohmmeter across the coil positive and negative terminals **(see illustrations)**. The resistance should be as given in the Specifications at the beginning of this Chapter.
3 To check the secondary resistance, connect one lead from the ohmmeter to the coil negative terminal, and the other lead to the centre HT terminal. Again the resistance should be as given in the Specifications.
4 If any of the measured valves vary significantly from the figures given in the Specifications, the coil should be renewed.
5 If a new coil is to be fitted, ensure that it is of the correct low voltage type suitable for use in conventional ignition systems equipped with ballast resistance.

Removal

6 The ignition coil is mounted on the engine compartment right-hand inner valance on OHV engine models, and on the left-hand inner valance on CVH engine versions.
7 To remove the coil, disconnect the LT leads at the coil positive and negative terminals and the HT lead at the centre terminal.
8 Undo the mounting bracket retaining bolts and remove the coil.



4.12 DIS coil location (plastic cover removed) - 1.6 litre Electronic Fuel Injection engine

Refitting

9 Refitting is the reverse sequence to removal.

DIS ignition system

Testing

10 Testing of the DIS type ignition coil requires the use of specialist equipment, and should be entrusted to a Ford dealer.

Removal

11 On 1.1 and 1.3 litre HCS engines, the coil is mounted on the cylinder block, above the oil filter.

12 On 1.6 litre Electronic Fuel Injection (EFI) engines, the coil is mounted on the left-hand side of the cylinder head **(see illustration)**.

13 Disconnect the battery negative lead.

14 If applicable, remove the securing screw(s) and withdraw the plastic cover from the coil.

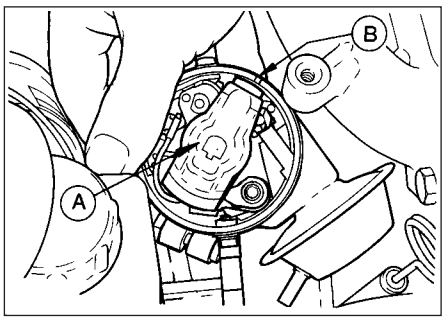
15 Release the retaining clip, and disconnect the coil wiring plug.

16 Compress the retaining clips on each side of the HT lead connectors, and disconnect the HT leads from the coil. Note the location of each lead to ensure correct refitting.

17 Remove the securing screws, and withdraw the coil **(see illustration)**.

Refitting

18 Refitting is a reversal of removal, ensuring that the HT leads are correctly reconnected.



5.8 Rotor arm position marked on distributor body after removal - OHV engines (contact breaker system)

A Rotor arm

B Mark made on distributor body rim

4.17 Removing a DIS coil securing screw - 1.3 litre HCS engine

5 Distributor - removal and refitting

Contact breaker ignition system

OHV engines

Removal

1 Disconnect the leads from the spark plugs, spring back the retaining clips and lift off the distributor cap.

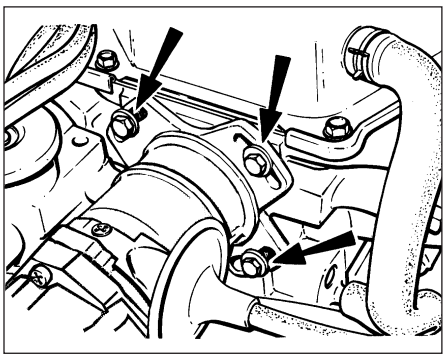
2 Disconnect the LT lead at the coil negative terminal and the vacuum hose at the distributor vacuum unit.

3 Remove No 1 spark plug (nearest the crankshaft pulley).

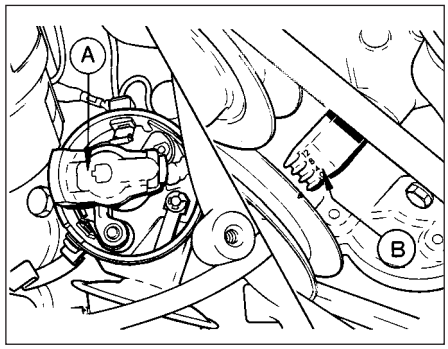
4 Place a finger over the plug hole and turn the crankshaft in the normal direction of rotation (clockwise viewed from the crankshaft pulley end) until pressure is felt in No 1 cylinder. This indicates that the piston is commencing its compression stroke. The crankshaft can be turned with a spanner on the pulley bolt.

5 Continue turning the crankshaft until the notch in the pulley is aligned with the "O" mark on the timing scale just above the pulley. In this position No 1 piston is at Top Dead Centre (TDC) on compression **(see illustration)**.

6 Using a dab of quick drying paint, mark the position of the rotor arm on the rim of the distributor body. Make a further mark on the distributor body and a corresponding mark on the cylinder block.



5.17 Distributor flange retaining bolt locations - CVH engines (contact breaker system)



5.5 Distributor removal - OHV engines (contact breaker system)

A Rotor arm facing distributor cap No 1 spark plug lead segment

B Pulley notch aligned with TDC mark on timing scale

7 Undo the bolt securing the distributor clamp plate to the cylinder block. Do not remove the distributor by releasing the clamp plate pinch bolt.

8 Withdraw the distributor from the cylinder block. As the distributor is removed, the rotor arm will move a few degrees clockwise. Note the new position of the rotor arm and make a second mark on the distributor body rim **(see illustration)**.

Refitting

9 Before installing the distributor make sure that the crankshaft is still positioned at TDC as previously described. If a new distributor is being fitted, transfer the markings made during removal to the new unit.

10 Hold the distributor over its hole in the cylinder block with the mark made on the distributor body aligned with the mark on the cylinder block.

11 Position the rotor arm so that it points toward the mark made on the distributor rim after removal and push the distributor fully home. As the skew gears mesh the rotor arm will move anti-clockwise and should align with the first mark made on the distributor rim.

12 With all the marks aligned, refit and tighten the distributor clamp plate retaining bolt.

13 Reconnect the LT lead and vacuum hose, then refit the distributor cap, spark plug and plug leads.

14 Refer to Chapter 1 and adjust the ignition timing.

CVH engines

Removal

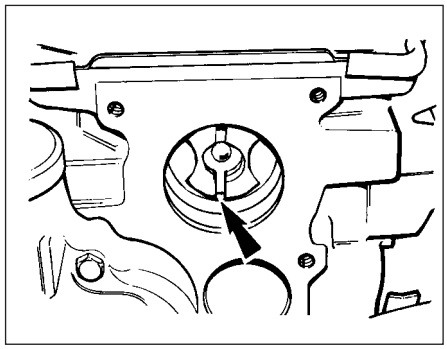
15 Spring back the retaining clips, or undo the retaining screws and lift off the distributor cap.

16 Disconnect the LT lead at the coil negative terminal and the vacuum hose at the distributor vacuum unit.

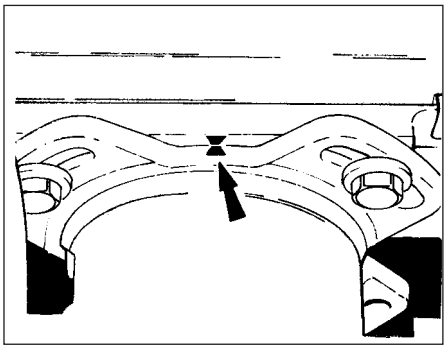
17 Undo the three distributor flange retaining bolts and withdraw the distributor from the cylinder head **(see illustration)**.

Refitting

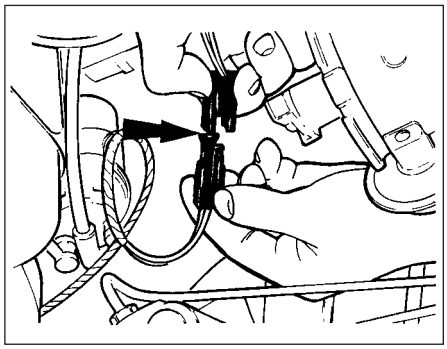
18 Before refitting, check the condition of the



5.19 Align distributor shaft drive dog with slots in camshaft - CVH engines (contact breaker system)



5.21 Distributor mounting flange and cylinder head punch mark locations - CVH engines (contact breaker system)



5.25 Disconnecting the distributor LT wiring multi-plug - CVH engines (electronic breakerless system)

O-ring oil seal at the base of the distributor and renew it if necessary.

19 Hold the distributor with the vacuum unit towards the inlet manifold side of the engine. Align the distributor shaft drive dog with slots in the end of the camshaft **(see illustration)**.

20 Insert the distributor and turn the rotor arm slightly so that the drive dogs engage and the distributor moves fully home. Refit but do not tighten the three retaining bolts.

21 During production the distributor is precisely positioned for optimum ignition timing and marked accordingly with a punch mark on the distributor mounting flange and the cylinder head **(see illustration)**.

22 If the original distributor is being refitted, align the punch marks, tighten the distributor flange mounting bolts and refit the distributor cap, LT lead and vacuum hose.

23 If a new distributor is being fitted, turn the distributor body so that the mounting bolts are positioned centrally in their elongated slots, then tighten the bolts just over finger tight. Refit the distributor cap, LT lead and vacuum hose, then adjust the ignition timing as described in Chapter 1.

Electronic breakerless ignition

OHV engines

Removal

24 Disconnect the leads from the spark plugs, spring back the retaining clips and lift off the distributor cap.

25 Disconnect the distributor LT wiring multi-plug and the vacuum hose at the distributor vacuum unit **(see illustration)**.

26 Proceed as described in paragraphs 3 and 4.

27 Refer to Chapter 1 and look up the ignition timing setting for the engine being worked on.

28 Continue turning the crankshaft until the notch in the pulley is aligned with the correct setting on the scale located just above and to the right of the pulley. The “O” mark on the scale represents Top Dead Centre (TDC) and the raised projections to the left of TDC are in increments of 4° BTDC **(see illustration 5.5)**.

29 Check that the rotor arm is pointing to the notch on the rim of the distributor body **(see illustration)**.

30 Make a mark on the distributor body and a corresponding mark on the cylinder block to aid refitting.

31 Undo the bolt securing the distributor clamp plate to the cylinder block, then withdraw the distributor from its location. As the distributor is removed, the rotor arm will move a few degrees clockwise. Note the new position of the rotor arm and make an alignment mark on the distributor body rim.

Refitting

32 Before installing the distributor, make sure that the crankshaft is still positioned at TDC as previously described. If a new distributor is being fitted, transfer the markings made during removal to the new unit.

33 Hold the distributor over its hole in the cylinder block with the mark made on the distributor body aligned with the mark made on the cylinder block.

34 Position the rotor arm so that it points to the mark made on the distributor rim after removal, and push the distributor fully home **(see illustration)**. As the skew gears mesh, the rotor arm will move anti-clockwise and should align with the manufacturer’s mark on the distributor rim.

35 With the distributor in place, turn the body slightly, if necessary so that the arms of the trigger wheel and stator are aligned, then refit and tighten the clamp plate bolt.

36 Reconnect the LT wiring multi-plug and vacuum hose, then refit the distributor cap, spark plug and plug leads.

37 Refer to Chapter 1 and adjust the ignition timing.

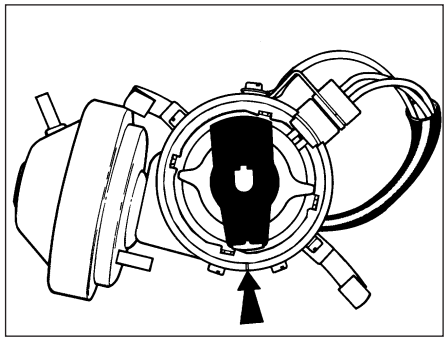
CVH engines

Removal

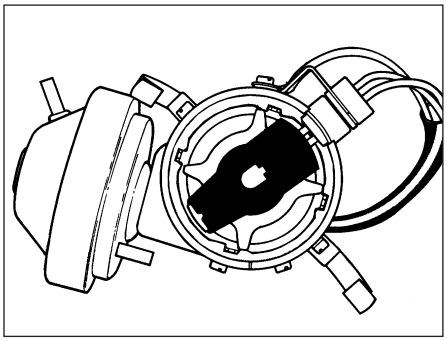
38 Spring back the retaining clips or undo the retaining screws and lift off the distributor cap.

39 Disconnect the LT wiring multi-plug and the vacuum hose(s) at the distributor vacuum unit (where applicable).

40 Undo the distributor flange retaining bolts and withdraw the distributor from the cylinder head **(see illustration)**.



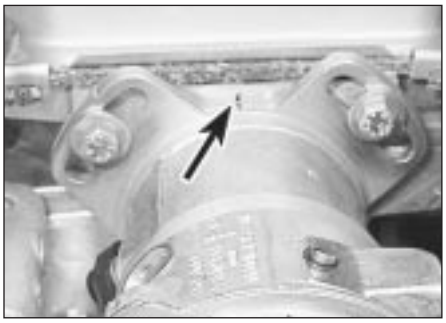
5.29 Rotor arm aligned with manufacturer’s mark on distributor body rim - OHV engines (electronic breakerless system)



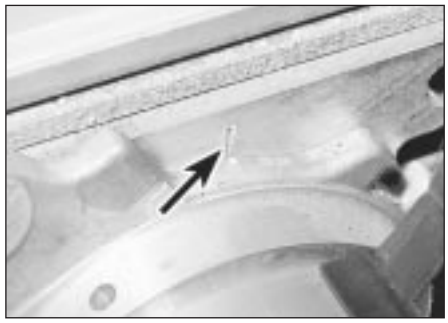
5.34 Rotor arm position prior to refitting - OHV engines (electronic breakerless system)

5.40 Distributor flange upper retaining bolts (arrowed) - CVH engines (electronic breakerless system)

5.42 Checking the distributor O-ring seal condition - CVH engines (electronic breakerless system)



5.45a Distributor mounting flange and cylinder head punch marks (arrowed) - CVH engines (electronic breakerless system - early type distributor shown)



5.45b Distributor mounting flange and cylinder head punch marks (arrowed) - CVH engines (electronic breakerless system - later type distributor shown)

Refitting

41 At the beginning of 1985 a modified distributor of either Bosch or Lucas manufacture was introduced for all CVH engines equipped with electronic ignition. The modified unit is identifiable from the earlier type by only having no retaining bolt flanges instead of the three used previously. If an early type distributor is being renewed, only the modified type will be supplied by Ford parts dealers and it will therefore also be necessary to obtain an LT wire assembly (part No. 84AG-12045-BA) to adapt the existing wiring on the car to suit the modified distributor. It is also recommended by the manufacturers that a complete new set of HT leads to the latest Ford specification is obtained at the same time. Apart from connecting the new LT wire assembly which is described later in this Section, fitting the new distributor is the same as for earlier units, as follows.

42 Before refitting check the condition of the O-ring seal at the base of the distributor and renew it if necessary **(see illustration)**.

43 Hold the distributor with the vacuum unit (where fitted) towards the inlet manifold side of the engine and align the distributor shaft drive dog with the slot in the end of the camshaft.

44 Insert the distributor and turn the rotor arm slightly so that the drive dogs engage and the distributor moves fully home. Refit but do not tighten the retaining bolts.

45 During production the distributor is precisely positioned for optimum ignition timing and marked accordingly with punch marks on the distributor mounting flange and the cylinder head **(see illustrations)**.

46 If the original distributor is being refitted, align the punch marks, tighten the distributor flange retaining bolts and refit the distributor cap, wiring multi-plug and vacuum hose(s) as applicable.

47 If a new distributor is being fitted, turn the distributor body so that the retaining bolts are positioned centrally in their elongated slots, then tighten the bolts just over finger tight.

48 Refit the distributor cap, wiring multi-plug and vacuum hose(s) (as applicable). If an early type distributor is being replaced with the modified type, connect the green wire of the new LT wire assembly to the coil negative terminal, the black wire to the positive terminal and the brown wire to a suitable earth. Join the existing coil wires to the stud terminals of the new wiring assembly, green to green and black to black **(see illustration)**.

49 Adjust the ignition timing (Chapter 1).

Programmed electronic ignition (EEC IV) - 1.4 litre fuel injection engines

Removal

Note: *During production, engines are timed to an accuracy of half a degree using a microwave timing system. Subsequent timing requires the use of special test equipment. Unless absolutely necessary do not remove the distributor*

50 Disconnect the battery negative lead.

51 Disconnect the HT lead from the coil, then remove the distributor cap and position it to one side.

52 Disconnect the distributor wiring plug.

53 Ensure that there are suitable alignment marks between the base of the distributor and the cylinder head. If necessary, make suitable marks using a scribe or a centre punch **(see illustration)**.

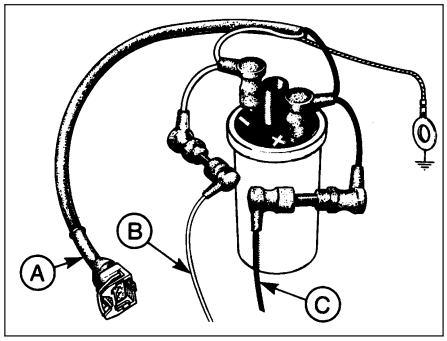
54 Remove the distributor retaining bolts and withdraw the distributor from the cylinder head.

Refitting

55 Commence refitting by checking the condition of the distributor oil seal, renewing it if necessary. Lubricate the seal with clean engine oil.

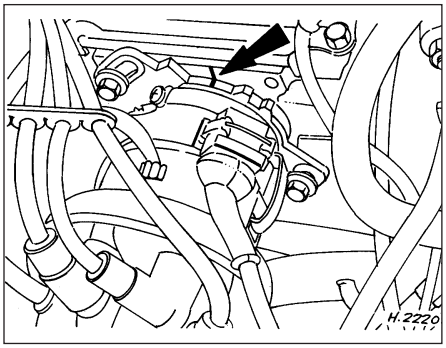
56 Align the distributor drive dog with the slot in the camshaft. The dog will only fit one way, as the slot is offset.

57 Loosely secure the distributor to the cylinder head with the retaining bolts, then turn the distributor body until the marks on the base of the distributor and the cylinder head are aligned. If a new distributor or cylinder

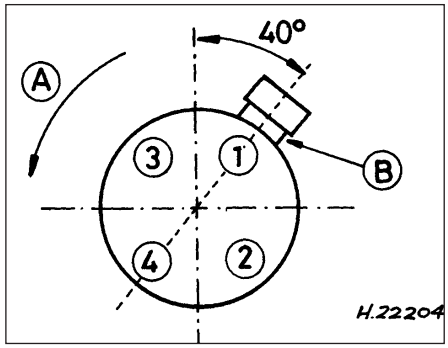


5.48 LT wire assembly to suit modified distributor - CVH engines (electronic breakerless system)

A Wiring multi-plug to amplifier module
B Green wire
C Black wire

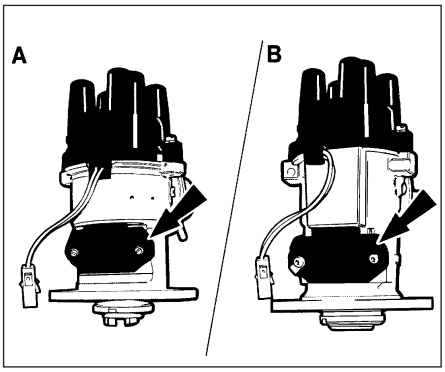


5.53 Make alignment marks (arrowed) between the distributor and cylinder head to assist alignment on refitting - 1.4 litre fuel injection engine



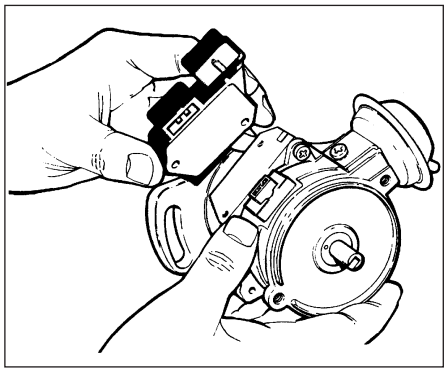
5.57 Correct alignment of distributor wiring plug - 1.4 litre fuel injection engine

A Direction of rotation
B Centreline through distributor wiring plug (40° to the vertical)



6.1 Electronic amplifier module locations
A Early type Bosch distributor
B Early type Lucas distributor

6.3a Electronic amplifier securing screw (arrowed) - later type Bosch distributor



6.3b Removing the electronic amplifier module - later type Lucas distributor

6.10a Release the retaining clips . . .

6.10b . . . and remove the plenum chamber top cover

head has been fitted, position the wiring plug as shown **(see illustration)**. Tighten the retaining bolts.
58 Reconnect the distributor wiring plug, then fit the distributor cap and reconnect the coil HT lead.
59 Reconnect the battery negative lead.
60 Take the vehicle to a Ford dealer at the earliest opportunity to have the ignition timing accurately adjusted.

6 Ignition system electronic modules - removal and refitting

Amplifier module - electronic breakerless system

Removal

1 The amplifier module is located on the side of the distributor **(see illustration)**.
2 If necessary, to improve access remove the distributor as described in Section 5.
3 Remove the two securing screws, and withdraw the module from the side of the distributor **(see illustrations)**.

Refitting

4 Start refitting by cleaning all traces of old heat sink compound from the distributor body.
5 Apply fresh heat sink compound (supplied with new amplifier modules) to the back of the amplifier before fitting.
6 Refit the module and tighten the securing screws.
7 Where applicable, refit the distributor as described in Section 5.

RS Turbo engines (ESC II)

Electronic Spark Control (ESC II) module

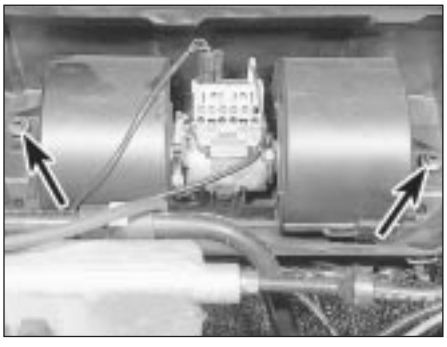
Removal
8 Disconnect the battery negative terminal.
9 Remove the heater plenum chamber top cover rubber seal,
10 Release the five retaining clips and lift off the plenum chamber top cover **(see illustrations)**.
11 Undo the two nuts securing the heater fan motor assembly to the bulkhead. Lift the unit off the studs and place it on the engine. Avoid straining the wiring **(see illustration)**.
12 Unclip and detach the wiring multi-plug from the spark control module **(see illustration)**.
13 Undo the retaining screws and remove the module from the bulkhead. Detach the module vacuum hose.
Refitting
14 Refitting is the reverse sequence to removal. Take care not to trap the motor wiring when refitting the fan motor assembly, and ensure that it is engaged in the slot provided in the housing.

1.1 and 1.3 litre HCS engines (DIS/ESC)

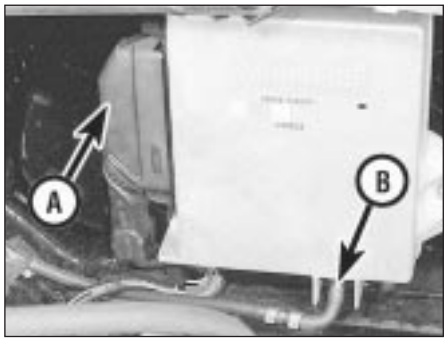
Warning: The DIS system carries much higher voltages than conventional systems, and adequate precautions must be taken to avoid personal injury. Refer to the "Safety first!" Section at the beginning of this manual before proceeding, and always disconnect the battery negative lead before working on the system

ESC module

Removal
15 The module is located on the front left-hand inner wing panel.



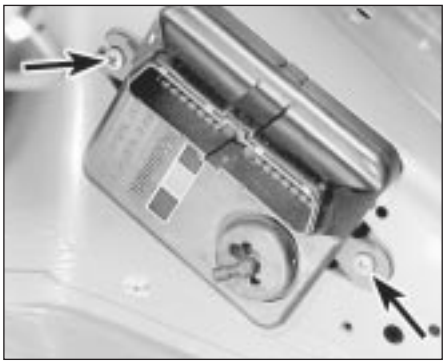
6.11 Undo the fan motor retaining nuts (arrowed)



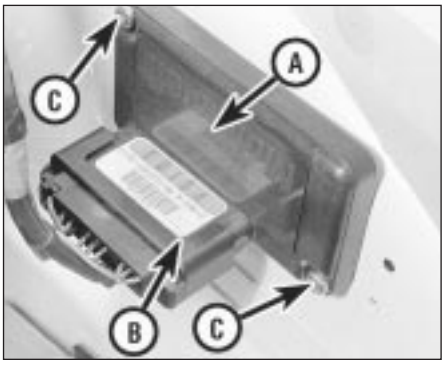
6.12 Spark control module wiring multi-plug (A) and vacuum hose (B)

6.17 Disconnecting the vacuum hose from the ESC module

6.18 Unscrewing the ESC module wiring plug securing screw



6.19 ESC module securing screws (arrowed)



6.29 E-DIS-4 module location

A Module
B Wiring plug
C Securing screws

16 Disconnect the battery negative lead.
17 Disconnect the vacuum hose from the module **(see illustration)**.
18 Unscrew the central securing screw, and disconnect the wiring plug **(see illustration)**.
19 Remove the two screws securing the module to the wing panel, and withdraw the module **(see illustration)**.
Refitting
20 Refitting is a reversal of removal.

Fuel trap

21 A fuel trap is fitted in the vacuum line between the inlet manifold and the ESC module.

22 When refitting the fuel trap, the side marked "DIST" must face the ESC module, and the side marked "CARB" must face the inlet manifold.

1.4 litre fuel injection engines (EEC IV)

TFI IV module

Removal
23 The TFI IV module is located on the front left-hand inner wing panel.
24 Disconnect the battery negative lead.
25 Depress the locking tabs and disconnect the module wiring plug.
26 Remove the retaining screws, and withdraw the module.
Refitting
27 Refitting is a reversal of removal.

EEC IV module

28 Refer to Chapter 4, Part C.

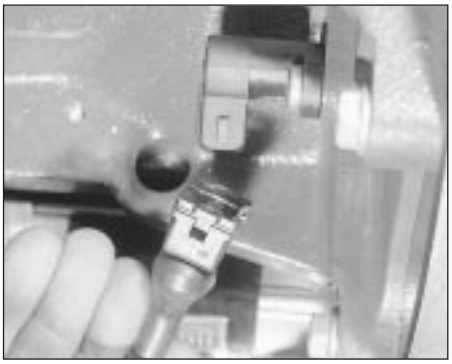
1.6 litre Electronic Fuel Injection engines (EEC IV)

E-DIS 4 module

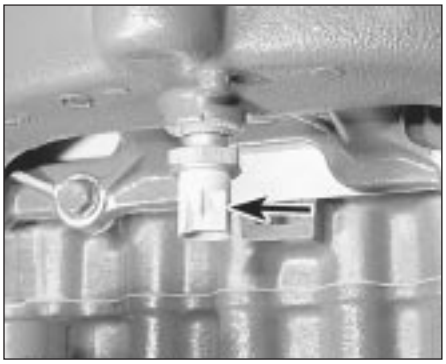
Refitting
29 The module is located on the front left-hand inner wing panel in the engine compartment **(see illustration)**.
30 Disconnect the battery negative lead.
31 Disconnect the module wiring plug. Do not pull on the wiring.
32 Remove the two securing screws and withdraw the module.
Refitting
33 Refitting is a reversal of removal.

EEC IV module

34 Refer to Chapter 4, Part D.



7.4 Disconnecting the engine speed sensor wiring plug - DIS



7.7 Engine coolant temperature sensor location (arrowed) - DIS

7 Distributorless Ignition System (DIS) components - removal and refitting

Electronic modules

1 Refer to Section 6.

DIS coil

2 Refer to Section 4.

Engine speed sensor

Removal

3 Disconnect the battery negative lead.
4 Disconnect the sensor wiring plug **(see illustration)**.
5 Remove the securing screw and withdraw the sensor.

Refitting

6 Refitting is a reversal of removal.

Engine Coolant Temperature (ECT) sensor

Removal

7 The ECT sensor is screwed into the inlet manifold **(see illustration)**.
8 Disconnect the battery negative lead.
9 Partially drain the cooling system as described in Chapter 1.
10 Disconnect the sensor wiring plug.
11 Unscrew the sensor from the inlet manifold.

Refitting

12 Refitting is a reversal of removal, but on completion top up the cooling system as described in "*Weekly checks*".