






Chapter 4 Part B:

Fuel system - central fuel injection engines

Contents

Accelerator cable - removal, refitting and adjustment	5	Fuel pump/fuel pressure - checking	7
Accelerator pedal - removal and refitting	6	Fuel system - depressurisation	2
Air cleaner assembly and air inlet components - removal and refitting	4	Fuel tank - removal, inspection and refitting	8
Air cleaner element renewal	.See Chapter 1	Fuel tank filler pipe - removal and refitting	11
Fuel cut-off switch - removal and refitting	12	Fuel tank ventilation tube - removal and refitting	10
Fuel filter renewal	.See Chapter 1	General fuel system checks	.See Chapter 1
Fuel injection system - checking	13	General information and precautions	1
Fuel injection system components - removal and refitting	14	Inlet manifold - removal and refitting	15
Fuel lines and fittings - general information	3	Underbody fuel/brake line check	.See Chapter 1
Fuel pump/fuel gauge sender unit - removal and refitting	9	Underbonnet check for fluid leaks and hose condition	.See Chapter 1

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

General

System type	Central Fuel injection (CFI)
Application	1.1 and 1.3 litre HCS engines and 1.4 litre CVH engines

Fuel grade

Fuel octane requirement	95 RON unleaded
-------------------------	-----------------

Fuel system data

Regulated fuel pressure - engine running at idle speed	1.0 ± 0.1 bars
Hold pressure - engine stopped after 1 minute	0.5 bars minimum

Torque wrench settings

	Nm	lbf ft
CFI unit-to-inlet manifold	12 to 15	9 to 11
Inlet manifold	16 to 20	12 to 15
Inlet air temperature sensor	20 to 25	15 to 18
Oxygen sensor	50 to 70	37 to 52

1 General information and precautions

General information

The fuel system consists of a fuel tank (mounted under the body, beneath the rear seats), fuel hoses, an electric fuel pump mounted in the fuel tank, and a central fuel injection (CFI) system.

Fuel is supplied from the tank by an integral electric fuel pump (and combined fuel gauge sender unit). The fuel is passed through an in-line filter within the engine compartment, then to the fuel injection unit. The fuel is maintained at the required operating pressure by a pressure regulator unit.

The CFI unit itself is a relatively simple device when compared with a conventional carburettor. Fuel is injected by a single solenoid valve (fuel injector) which is mounted centrally on top of the unit. It is this feature which gives the system CFI (or Central Fuel Injection) its name (see illustration).

The injector is energised by an electrical signal sent from the EEC IV engine management module. When energised, the injector pintle is lifted from its seat, and atomised fuel is delivered into the inlet manifold under pressure. The electrical signals take two forms of current - a high current to open the injector, and a low current to hold it open for the duration required. At idle speed, the injector is pulsed at every other inlet stroke, rather than with every stroke as during normal operation.

The air-to-fuel mixture ratio is regulated by the EEC IV module, based on inputs from the various engine sensors. No adjustments to the fuel mixture are possible.

The throttle plate control motor (mounted on the side of the CFI unit) regulates the idle speed by reacting to the signals sent by the EEC IV module. The signals are calculated by the values and information provided from the engine sensors. When the throttle position sensor indicates that the throttle is closed, the module enters the idle speed mode or dashpot mode (according to engine speed). The module maintains the idle speed at a

constant value, making minor adjustments as necessary for different loads and conditions. The base idle speed can only be adjusted by a dealer or fuel injection specialist with the necessary equipment to link up to the engine management module.

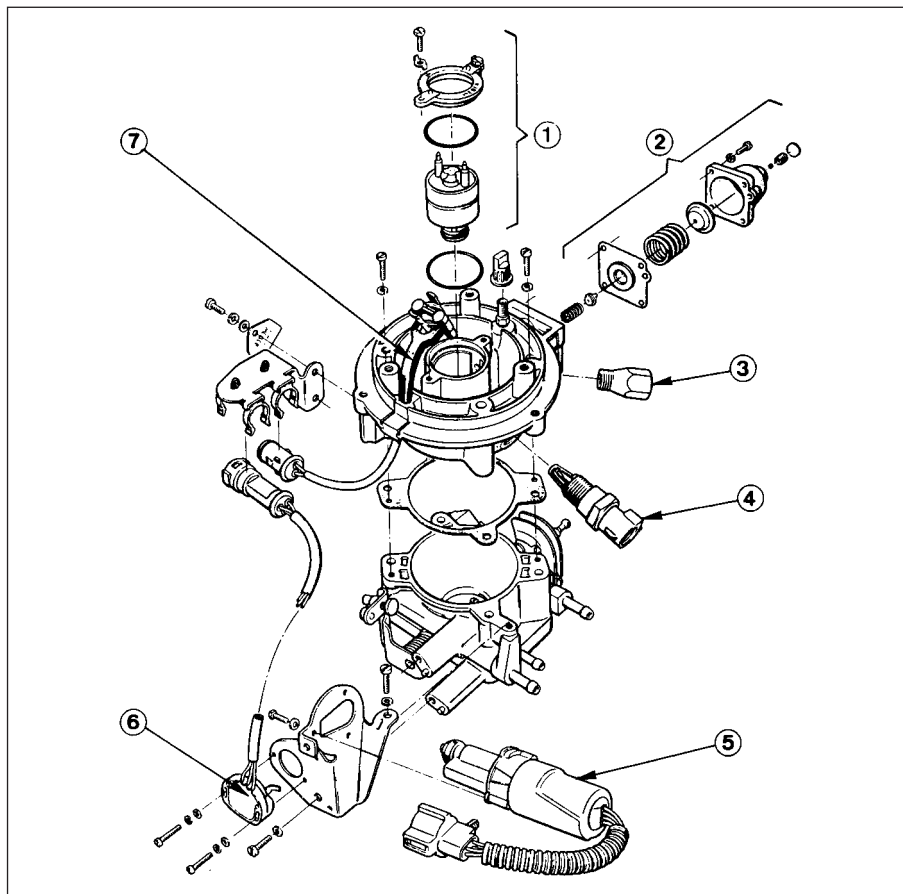
To prevent the engine from running on (or dieseling) when it is switched off, the EEC IV module sends a signal to the throttle plate control motor, to fully close the throttle plate and return it to its preset position ready for restarting. When the ignition is switched on to restart the engine, the motor repositions the throttle plate to the position required according to the prevailing conditions.

The EEC IV module is the heart of the entire engine management system, controlling the fuel injection, ignition and emissions control systems. The module receives information from various sensors to determine engine temperature, speed and load, and the quantity of air entering the engine. The sensors also inform the module of throttle position, inlet air temperature and exhaust gas oxygen content. All the information supplied to the module is computed and compared with pre-set values stored in its memory, to determine the required period of injection.

Information on crankshaft position and engine speed is generated by the distributor on pre-1990 CVH engine models, or by a crankshaft position sensor on all other models. The inductive head of the crankshaft position sensor runs just above the engine flywheel and scans a series of 36 protrusions on the flywheel periphery. As the crankshaft rotates, the sensor transmits a pulse to the system's ignition module every time a protrusion passes it. There is one missing protrusion in the flywheel periphery at a point corresponding to 90° BTDC. The ignition module recognises the absence of a pulse from the crankshaft position sensor at this point to establish a reference mark for crankshaft position. Similarly, the time interval between absent pulses is used to determine engine speed. This information is then fed to the EEC IV module for further processing.

Engine temperature information is supplied by the coolant temperature sensor. This component is an NTC (Negative Temperature Coefficient) thermistor - that is, a semiconductor whose electrical resistance decreases as its temperature increases. It provides the EEC IV module with a constantly-varying (analogue) voltage signal, corresponding to the temperature of the engine coolant. This is used to refine the calculations made by the module, when determining the correct amount of fuel required to achieve the ideal air/fuel mixture ratio.

Inlet air temperature information is supplied by the inlet air temperature sensor. This component is also an NTC thermistor - see the previous paragraph - providing the EEC IV module with a signal corresponding to the temperature of air passing into the engine.



1.3 Exploded view of the CFI unit

- | | | |
|------------------------------------|---------------------------------|--------------------------------|
| 1 Fuel injector assembly | 3 Fuel feed connector | 5 Throttle-plate control motor |
| 2 Fuel pressure regulator assembly | 4 Intake air temperature sensor | 6 Throttle position sensor |
| | | 7 Fuel injector wiring |

This is used to refine the calculations made by the module, when determining the correct amount of fuel required to achieve the ideal air/fuel mixture ratio.

A throttle position sensor is mounted on the end of the throttle valve spindle, to provide the EEC IV module with a constantly-varying (analogue) voltage signal corresponding to the throttle opening. This allows the module to register the driver's input when determining the amount of fuel required by the engine.

Road speed is monitored by the vehicle speed sensor. This component is a Hall-effect generator, mounted on the transmission's speedometer drive. It supplies the EEC IV module with a series of pulses corresponding to the vehicle's road speed, enabling the module to control features such as the fuel shut-off on overrun.

A manifold absolute pressure sensor measures inlet manifold vacuum, and supplies this information to the module for calculation of engine load at any given throttle position.

Where power steering is fitted, a pressure-operated switch is screwed into the power steering system's high-pressure pipe. The switch sends a signal to the EEC IV module to reduce engine speed should the power steering fluid pressure become excessively high.

Certain later engines may be fitted with a heater in the inlet manifold. This is controlled by the EEC IV module to ensure that, even before the effect of the coolant heating becomes apparent, the manifold is warmed-up. This prevents fuel droplets condensing in the manifold, thus improving driveability and reducing exhaust emissions when the engine is cold.

The oxygen sensor in the exhaust system provides the EEC IV module with constant feedback - "closed-loop" control - which enables it to adjust the mixture to provide the best possible conditions for the catalytic converter to operate.

Precautions



Warning: Petrol is extremely flammable - great care must be taken when working on any part of the fuel system. Do not smoke or allow any naked flames or uncovered light bulbs near the work area. Note that gas powered domestic appliances with pilot flames, such as heaters, boilers and tumble dryers, also present a fire hazard - bear this in mind if you are working in an area where such appliances are present. Always keep a suitable fire extinguisher close to the work area and familiarise yourself with its operation before starting work. Wear eye protection when working on fuel systems and wash off any fuel spilt on bare skin immediately with soap and water. Note that fuel vapour is just as dangerous as liquid fuel; a vessel that has just been emptied of liquid fuel will still contain

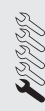
vapour and can be potentially explosive. Petrol is a highly dangerous and volatile liquid, and the precautions necessary when handling it cannot be overstressed.

Many of the operations described in this Chapter involve the disconnection of fuel lines, which may cause an amount of fuel spillage. Before commencing work, refer to the above Warning and the information in "Safety first" at the beginning of this manual.

When working with fuel system components, pay particular attention to cleanliness - dirt entering the fuel system may cause blockages which will lead to poor running.

Note: Residual pressure will remain in the fuel lines long after the vehicle was last used, when disconnecting any fuel line, it will be necessary to depressurise the fuel system as described in Section 2.

2 Fuel system - depressurisation



Note: Refer to the warning note in Section 1 before proceeding.



Warning: The following procedure will merely relieve the pressure in the fuel system - remember that fuel will still be present in the system components, and take precautions accordingly before disconnecting any of them.

1 The fuel system referred to in this Chapter is defined as the fuel tank and tank-mounted fuel pump/fuel gauge sender unit, the fuel filter, the fuel injector, fuel pressure regulator, and the metal pipes and flexible hoses of the fuel lines between these components. All these contain fuel, which will be under pressure while the engine is running and/or while the ignition is switched on.

2 The pressure will remain for some time after the ignition has been switched off, and must be relieved before any of these components is disturbed for servicing work.

3 The simplest depressurisation method is to disconnect the fuel pump electrical supply by removing the fuel pump fuse (No 19) and starting the engine; allow the engine to idle until it dies through lack of fuel pressure. Turn the engine over once or twice on the starter to ensure that all pressure is released, then switch off the ignition; do not forget to refit the fuse when work is complete.

4 Note that, once the fuel system has been depressurised and drained (even partially), it will take significantly longer to restart the engine - perhaps several seconds of cranking - before the system is refilled and pressure restored.

3 Fuel lines and fittings - general information

Note: Refer to the warning note in Section 1 before proceeding.

Disconnecting and connecting quick-release couplings

1 Quick-release couplings are employed at many of the unions in the fuel feed and return lines.

2 Before disconnecting any fuel system component, relieve the residual pressure in the system (see Section 2), and equalise tank pressure by removing the fuel filler cap.



Warning: This procedure will merely relieve the increased pressure necessary for the engine to run - remember that fuel will still be present in the system components, and take precautions accordingly before disconnecting any of them.

3 Release the protruding locking lugs on each union, by squeezing them together and carefully pulling the coupling apart. Use rag to soak up any spilt fuel. Where the unions are colour-coded, the pipes cannot be confused. Where both unions are the same colour, note carefully which pipe is connected to which, and ensure that they are correctly reconnected on refitting.

4 To reconnect one of these couplings, press them together until the locking lugs snap into their groove. Switch the ignition on and off five times to pressurise the system, and check for any sign of fuel leakage around the disturbed coupling before attempting to start the engine.

Checking

5 Checking procedures for the fuel lines are included in Chapter 1.

Component renewal

6 If any damaged sections are to be renewed, use original-equipment replacement hoses or pipes, constructed from exactly the same material as the section being replaced. Do not install substitutes constructed from inferior or inappropriate material; this could cause a fuel leak or a fire.

7 Before detaching or disconnecting any part of the fuel system, note the routing of all hoses and pipes, and the orientation of all clamps and clips. Replacement sections must be installed in exactly the same manner.

8 Before disconnecting any part of the fuel system, be sure to relieve the fuel system pressure (see Section 2), and equalise tank pressure by removing the fuel filler cap. Also disconnect the battery negative (earth) lead - see Chapter 5A, Section 1. Cover the fitting being disconnected with a rag, to absorb any fuel that may spray out.

4 Air cleaner assembly and air inlet components - removal and refitting



Note: Air cleaner element renewal and air cleaner temperature control system checks (where applicable) are described in Chapter 1.

Air cleaner assembly

- 1 Disconnect the battery negative (earth) lead (refer to Chapter 5A, Section 1).
- 2 Undo the retaining bolts and partially lift the air cleaner from the CFI unit, so that the hose and wiring connections to the underside of the air cleaner body are accessible.
- 3 Note their connections and routings, then detach the wiring and hoses from the underside of the air cleaner.
- 4 Lift the air cleaner clear from the CFI unit.
- 5 Refit in the reverse order of removal.
- 6 Renew any hoses that are perished or cracked, and ensure that all fittings are securely and correctly reconnected.

Air inlet components

- 7 The air cleaner inlet spout and related components are removed with the air cleaner assembly as described above.

5 Accelerator cable - removal, refitting and adjustment



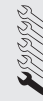
Removal

- 1 Disconnect the battery negative (earth) lead (refer to Chapter 5A, Section 1).
- 2 Fold back the carpet and insulation in the driver's footwell to gain access to the accelerator pedal.
- 3 Detach the accelerator cable from the pedal.
- 4 Remove the air cleaner assembly as described in Section 4.
- 5 Working at the throttle housing end of the cable, pivot the throttle quadrant by hand to release the tension from the cable, then detach the inner cable nipple from the throttle lever.
- 6 Detach the outer cable from the adjuster/support bracket, then remove the cable.

Refitting and adjustment

- 7 Refit in the reverse order of removal. When the cable is reconnected at each end, have an assistant depress the accelerator, and check that the throttle fully opens and shuts without binding. Ensure that there is a small amount of slack in the inner cable when the throttle is fully released. If adjustment is required, release the outer cable retaining clip from the cable at the adjustment/support bracket, slide the cable through the adjuster grommet to the point required, then refit the retaining clip to secure it in the set position.

6 Accelerator pedal - removal and refitting



Refer to Part A, Section 5.

7 Fuel pump/fuel pressure - checking



Note: Refer to the warning note in Section 1 before proceeding.

Fuel pump operation check

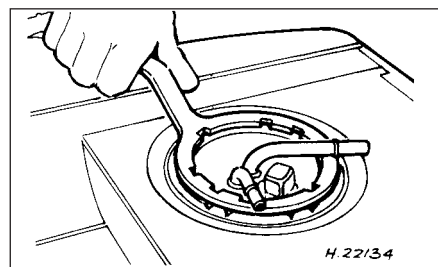
- 1 Switch on the ignition, and listen for the fuel pump (the sound of an electric motor running, audible from beneath the rear seats). Assuming there is sufficient fuel in the tank, the pump should start and run for approximately one or two seconds, then stop, each time the ignition is switched on. **Note:** If the pump runs continuously all the time the ignition is switched on, the electronic control system is running in the backup (or "limp-home") mode referred to by Ford as "Limited Operation Strategy" (LOS). This almost certainly indicates a fault in the EEC IV module itself, and the vehicle should therefore be taken to a Ford dealer for a full test of the complete system, using the correct diagnostic equipment; do not waste time or risk damaging the components by trying to test the system without such facilities.

- 2 Listen for fuel return noises from the fuel pressure regulator. It should be possible to feel the fuel pulsing in the regulator and in the feed hose from the fuel filter.

- 3 If the pump does not run at all, check the fuse, relay and wiring (see Chapter 12). Check also that the fuel cut-off switch has not been activated and if so, reset it.

Fuel pressure check

- 4 A fuel pressure gauge will be required for this check and should be connected in the fuel line between the fuel filter and the CFI unit, in accordance with the gauge maker's instructions.
- 5 Start the engine and allow it to idle. Note the gauge reading as soon as the pressure stabilises, and compare it with the figures given for regulated fuel pressure in the Specifications. If the pressure is high, check for a restricted fuel return line. If the pressure is low, renew the fuel pressure regulator.



9.2 Ford Special tool engaged on the fuel pump/sender unit

- 6 Switch off the engine, and check that after one minute, the hold pressure has not fallen below that specified. If it has, check the seals on the fuel injector (see Section 14) and renew them if they appear in any way suspect. If the seals are okay, then the fuel pressure regulator or CFI unit are suspect.

- 7 Carefully disconnect the fuel pressure gauge, depressurising the system first as described in Section 2.

- 8 Run the engine, and check that there are no fuel leaks.

8 Fuel tank - removal, inspection and refitting



Proceed as described in Part A, Section 8, but before disconnecting the battery, relieve the residual pressure in the fuel system (see Section 2), and equalise tank pressure by removing the fuel filler cap. Note also that it will be necessary to release any additional ventilation tubes from their retaining clips, and to reposition or remove the underbody heat shields on certain models for access to the tank retaining bolts.

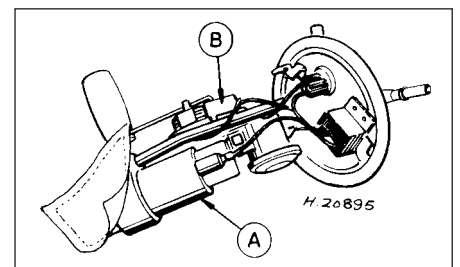
9 Fuel pump/fuel gauge sender unit - removal and refitting



Note: Refer to the warning note in Section 1 before proceeding. Ford specify the use of their service tool 23-026 (a large box spanner with projecting teeth to engage the fuel pump/sender unit retaining ring's slots) for this task. While alternatives are possible, in view of the difficulty experienced in removing and refitting the pump/sender unit, it is strongly advised that the correct tool is obtained before starting work.

Removal

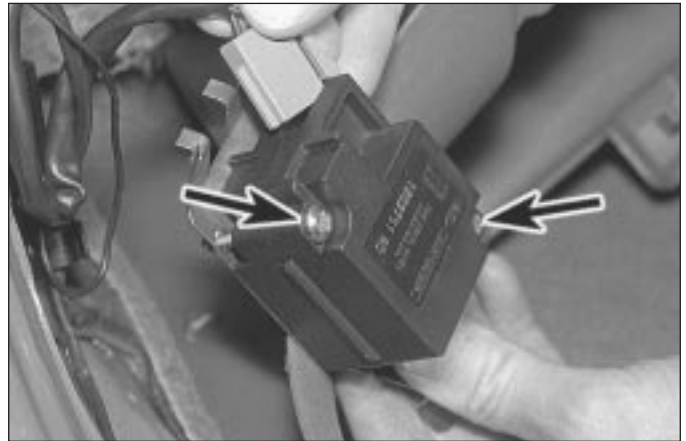
- 1 A combined fuel pump and fuel gauge sender unit are located in the top face of the fuel tank. The combined unit can only be detached and withdrawn from the tank after the tank is released and lowered from under the vehicle. Refer to Section 8 and remove the fuel tank, then proceed as follows.
- 2 With the fuel tank removed, the pump/sender unit can be unscrewed using the special tool (see illustration).
- 3 Withdraw the unit upwards from the tank (see illustration), and detach the seal ring.



9.3 Fuel pump (A) and sender unit (B)



12.3a Remove the screw securing the inertia switch bracket . . .



12.3b . . . and disconnect the multi-plug as it is withdrawn. Switch to bracket retaining screws (arrowed)

The seal ring must be renewed whenever the pump/sender unit is withdrawn from the tank.

Refitting

4 Refit in the reverse order of removal. Lightly coat the new unit seal ring with grease to ease fitting, and ensure that the seal is not distorted as the unit is fitted into position. Insert the unit so that the lug of the unit is in engagement with the slot in the tank aperture, then turn the unit to lock and secure.

10 Fuel tank ventilation tube - removal and refitting



Refer to Part A, Section 10, but note that on models with evaporative emission control, the ventilation tube connects to the combined roll-over/anti-trickle-fill valve assembly but, instead of venting to atmosphere, a further tube runs the length of the vehicle to a carbon canister in the front right-hand corner of the engine compartment.

Further information on the evaporative emission control system is contained in Part E of this Chapter.

11 Fuel tank filler pipe - removal and refitting



Refer to Part A, Section 11.

12 Fuel cut-off switch - removal and refitting



Removal

- 1 Disconnect the battery negative (earth) lead (refer to Chapter 5A, Section 1).
- 2 Remove the left-hand sill scuff plate as described in Chapter 11, Section 42.

- 3 Undo the retaining screws and withdraw the cut-off (inertia) switch and bracket assembly. As it is withdrawn, disconnect the wiring multi-plug from the switch (see illustrations).

4 The switch may be separated from the bracket by removing the two securing screws.

Refitting

- 5 Reconnect the wiring multi-plug to the switch, ensuring that it is felt to snap securely into position.
- 6 Refit the switch to the bracket then relocate the bracket, and refit the screw to secure it.
- 7 Reset the switch by pushing the top button down, then refit the sill scuff plate.
- 8 Reconnect the battery and restart the engine to ensure that the switch has reset.

13 Fuel injection system - checking



Note: Refer to the warning note in Section 1 before proceeding.

If a fault appears in the fuel injection system, first ensure that all the system wiring connectors are securely connected and free of corrosion. Ensure that the fault is not due to poor maintenance; ie, check that the air cleaner filter element is clean, the spark plugs are in good condition and correctly gapped, the valve clearances are correctly adjusted (where adjustable), the cylinder compression pressures are correct, the ignition timing is correct (where adjustable), and that the engine breather hoses are clear and undamaged, referring to Chapters 1, 2 and 5 for further information.

If these checks fail to reveal the cause of the problem, the vehicle should be taken to a suitably-equipped Ford dealer for testing. A wiring block connector is incorporated in the engine management circuit, into which a special electronic diagnostic tester can be plugged. The tester will locate the fault quickly and simply, alleviating the need to test all the

system components individually, which is a time-consuming operation that also carries a risk of damaging the EEC IV engine management module.

14 Fuel injection system components - removal and refitting



Note: Refer to the warning note in Section 1 before proceeding.

Fuel injector

- 1 Relieve the residual pressure in the fuel system (see Section 2), and equalise tank pressure by removing the fuel filler cap.

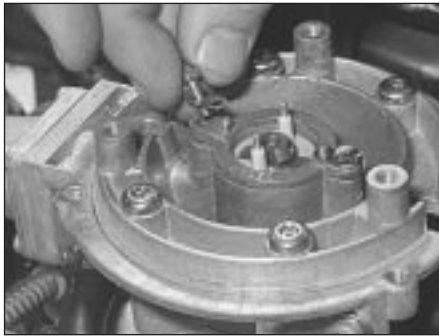


Warning: This procedure will merely relieve the increased pressure necessary for the engine to run - remember that fuel will still be present in the system components, and take precautions accordingly before disconnecting any of them.

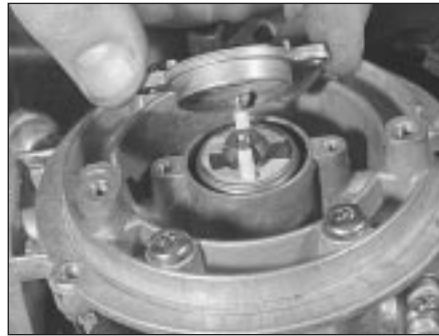
- 2 Disconnect the battery negative (earth) lead (refer to Chapter 5A, Section 1).
- 3 Refer to Section 4 and remove the air cleaner.
- 4 Release the injector feed wiring multi-plug, and detach it from the injector (pulling on the plug - not the wire) (see illustration).



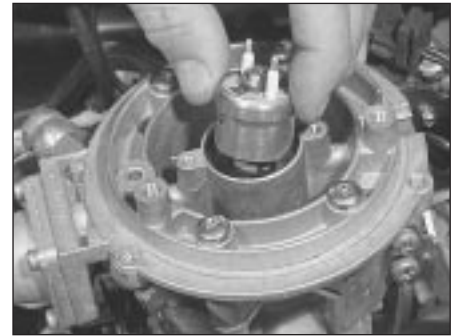
14.4 Disconnect the multi-plug from the injector



14.5a Removing an injector retaining collar securing bolt and its locktab



14.5b Removing the injector retaining collar



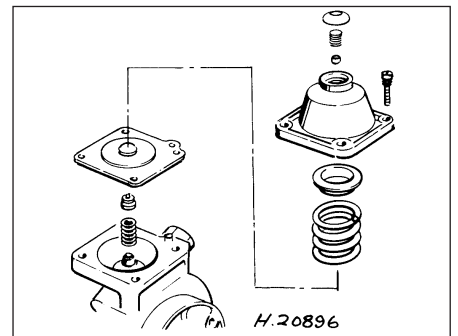
14.5c Withdrawing the injector from the CFI unit



14.5d Injector seals in the CFI unit



14.5e Withdrawing the seal from the injector retaining collar



14.8 Exploded view of the fuel pressure regulator assembly

5 Bend over the locking tabs retaining the injector screws, then undo and remove the screws. Withdraw the injector retaining collar, then carefully withdraw the injector from the CFI unit (noting its orientation) followed by its seals. Withdraw the seal from the retaining collar (see illustrations).

6 Refit in the reverse order of removal. Always use new seals in the CFI unit and the retaining collar, and lightly lubricate them with clean engine oil prior to assembly. Take care not to damage the seals as they are fitted and as the injector is fitted, check that the location peg engages correctly.

Fuel pressure regulator

7 Refer to paragraphs 14 to 22 in this Section and remove the CFI unit from the vehicle.

8 Unscrew and remove the four regulator retaining screws, and remove the regulator (see illustration). As they are removed, note the fitting positions and the orientation of the components. **Do not** (unless absolutely necessary) attempt to prise out the plug or adjust the screw in the centre of the housing (if no plug is fitted), as this will alter the system pressure.

9 Examine the components, and renew any that are defective or suspect.

10 To refit, position the regulator on its side, then insert the small spring, the valve, diaphragm (ensuring that it seats correctly), large spring, cup and then the regulator cover. Insert and tighten the retaining screws, but

take care not to overtighten them, or the cover will be distorted.

11 Carefully place the ball into position on the spring cup, and ensure that it seats correctly.

12 If removed, fit the central Allen type adjuster screw, hand-tighten it and then unscrew it (from the hand-tight position) three full turns to make a provisional adjustment.

13 Refit the CFI unit in accordance with paragraphs 23 to 25 in this Section, but note that further checks for fuel leaks must be made with the engine running. The fuel system pressure must be checked by a Ford dealer or other suitable specialist at the earliest opportunity.

CFi unit

14 Relieve the residual pressure in the fuel system (see Section 2), and equalise tank pressure by removing the fuel filler cap.

Warning: This procedure will merely relieve the increased pressure necessary for the engine to run - remember that fuel will still be present in the system components, and take precautions accordingly before disconnecting any of them.

15 Disconnect the battery negative (earth) lead (refer to Chapter 5A, Section 1).

16 Refer to Section 4 and remove the air cleaner.

17 Position a suitable drain tray under the coolant hose connections to the CFI unit.

Ensure that the cooling system is not pressurised (see Chapter 1), then detach the hoses from the unit. Plug or clamp the hoses to prevent further coolant spillage whilst the hoses are detached.

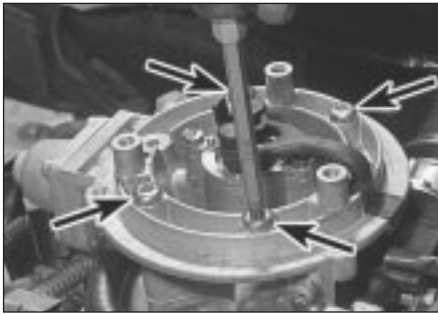


Warning: DO NOT attempt to remove the expansion tank filler cap, or to disturb any part of the cooling system, while it or the engine is hot, as there is a very great risk of scalding. If the expansion tank filler cap must be removed before the engine and radiator have fully cooled down (even though this is not recommended) the pressure in the cooling system must first be released. Cover the cap with a thick layer of cloth, to avoid scalding, and slowly unscrew the filler cap until a hissing sound can be heard. When the hissing has stopped, showing that pressure is released, slowly unscrew the filler cap further until it can be removed; if more hissing sounds are heard, wait until they have stopped before unscrewing the cap completely. At all times, keep well away from the filler opening.

18 Disconnect the fuel return pipe from the CFI unit.

19 Refer to Section 5 and disconnect the accelerator cable from the CFI unit.

20 Disconnect the inlet air temperature sensor, throttle plate control motor and throttle position sensor wiring multi-plug connectors.



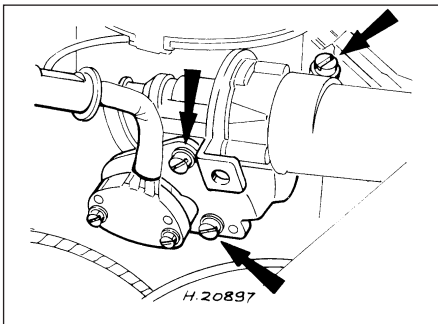
14.22 CFI unit securing screws (arrowed)



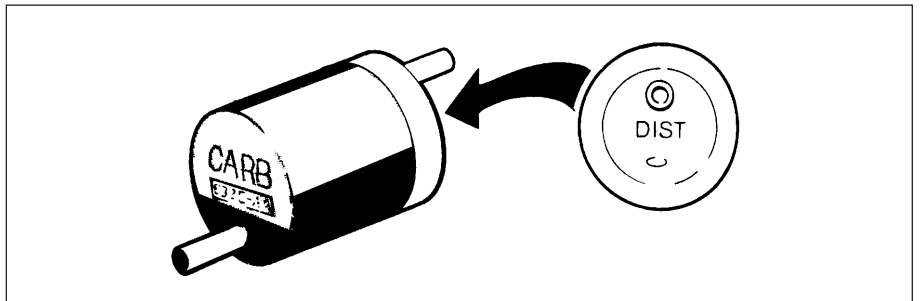
14.28a Release the throttle position sensor multi-plug from its retaining clip and disconnect it



14.28b Disconnecting the throttle plate control motor multi-plug



14.29 Throttle-plate control motor and throttle position sensor assembly mounting bracket securing screws (arrowed)



14.34 Fuel trap vacuum connection markings

21 Disconnect the vacuum hose from the CFI unit.

22 Unscrew and remove the four retaining screws, and remove the CFI unit from the inlet manifold (see illustration). Remove the gasket.

23 Clean the CFI unit and the inlet manifold mating faces.

24 Refit in the reverse order of removal. Tighten the retaining bolts to the specified torque wrench setting. Check and top-up the cooling system as required (see "Weekly Checks" and Chapter 1).

25 When the CFI unit is refitted, turn the ignition on and off at least five times to pressurise the system, and check for leaks.

Throttle plate control motor

26 Disconnect the battery negative (earth) lead (refer to Chapter 5A, Section 1).

27 Refer to Section 4 and remove the air cleaner.

28 Detach the wiring multi-plugs from the throttle position sensor and the throttle plate control motor, and release the retaining clips on the bracket (see illustrations).

29 Undo and remove the motor support bracket screws, and remove the bracket complete with the motor from the CFI unit (see illustration).

30 Undo the motor retaining screws and remove it from the support bracket.

31 Refit in the reverse order of removal, but note the following points:

- a) When refitting the motor and its support bracket to the injector unit, the throttle position sensor must locate on the accelerator linkage, and the bracket must align with the pegs.
- b) On completion, the idle speed should be checked by a Ford dealer or fuel injection specialist who has the required equipment to link up with the EEC IV engine management module.

Fuel trap

32 A fuel trap is fitted to the manifold absolute pressure sensor vacuum hose on certain models.

33 To remove the fuel trap, disconnect the vacuum hoses from the fuel trap and withdraw it.

34 Refit in the reverse order of removal. It is important to ensure that the trap is correctly orientated, with the "CARB" mark on one end

face towards the inlet manifold, and the "DIST" mark towards the MAP sensor (see illustration).

EEC IV engine management module

Note: The module is fragile. Take care not to drop it, or subject it to any other kind of impact. Do not subject it to extremes of temperature, or allow it to get wet.

35 Disconnect the battery negative (earth) lead (refer to Chapter 5A, Section 1).

36 Unscrew and remove the two nuts securing the module cover in the engine compartment, then carefully draw the cover away from its location. Unscrew the module multi-plug retaining bolt and disconnect the multi-plug from the module (see illustrations).

37 The aid of an assistant will be required at this stage, to support and withdraw the



14.36a Undoing the EEC IV engine management module cover retaining nuts (vehicle jack removed for clarity)



14.36b Undoing the EEC IV engine management module multi-plug retaining bolt



14.37 Withdrawing the EEC IV engine management module into the passenger footwell



14.42 Disconnecting the intake air temperature sensor multi-plug



14.45 Throttle position sensor retaining screws (arrowed) (shown with throttle plate control motor removed)

module from inside the passenger compartment as its mounting bracket retaining tags are compressed and released from the engine compartment. Do not allow the module to drop into the passenger compartment as irreparable damage is likely to result (see illustration). The module may be separated from its mounting bracket by undoing the securing bolts.

38 Refitting is a reversal of the removal procedure, ensuring that the module mounting bracket retaining tags are felt to snap into position

Crankshaft position sensor

39 Refer to Chapter 5B.

Coolant temperature sensor

40 Refer to Chapter 3.

Inlet air temperature sensor

41 Remove the air cleaner assembly as described in Section 4.

42 Releasing its clip, unplug the sensor's electrical connector, then unscrew the sensor from the CFI unit (see illustration).

43 Refitting is the reverse of the removal procedure. Tighten the sensor to the specified torque wrench setting; if it is overtightened, its tapered thread may crack the resonator.

Throttle position sensor

44 Remove the air cleaner assembly as described in Section 4.

45 Releasing its wire clip, unplug the sensor's wiring connector. Remove the retaining screws, and withdraw the unit from the throttle plate control motor bracket (see illustration). Do not force the sensor's centre to rotate past its normal operating sweep; the unit will be seriously damaged.

46 Refitting is the reverse of the removal procedure, ensuring that the sensor actuating arm is correctly located.

Vehicle speed sensor

47 The sensor is mounted at the base of the speedometer drive cable, and is removed with the speedometer drive pinion. Refer to the relevant Section of Chapter 7A or B, as applicable.

Manifold absolute pressure sensor

48 The sensor is located near the centre of the engine compartment bulkhead.

49 Disconnect the wiring multi-plug, and detach the vacuum hose from the base of the sensor (see illustration).

50 Undo the two retaining screws, and withdraw the sensor from its location.

51 Refitting is the reverse of the removal procedure.

Power steering pressure switch

52 Releasing its clip, unplug the switch's electrical connector, then unscrew the switch from the power steering high pressure pipe. Place a wad of rag underneath, to catch any spilled fluid. If a sealing washer is fitted, renew it if it is worn or damaged.

53 Refitting is the reverse of the removal procedure; tighten the switch securely, then top-up the fluid reservoir (see "Weekly Checks") to replace any fluid lost from the system, and bleed out any trapped air (see Chapter 10).

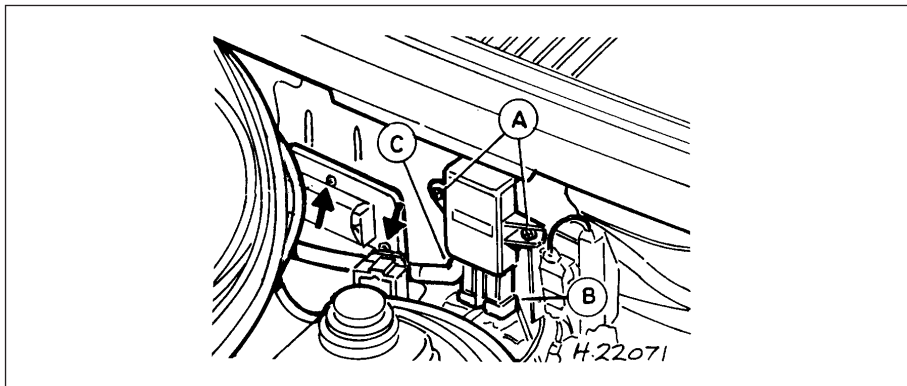
Oxygen sensor

Note: The sensor is delicate, and will not work if it is dropped or knocked, if its power supply is disrupted, or if any cleaning materials are used on it.

54 Release the sensor's electrical connector from its bracket and unplug it to disconnect the sensor (see illustration).

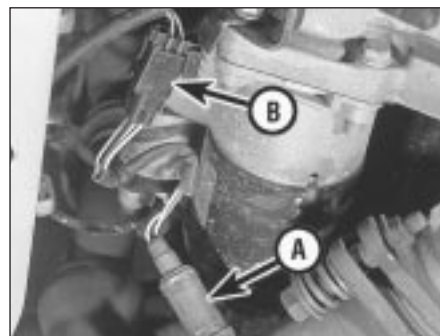
55 Raise and support the front of the vehicle if required to remove the sensor from underneath ("see Jacking and vehicle support"). Remove the sensor heat shield then unscrew the sensor from the exhaust system front downpipe; collect the sealing washer (where fitted).

56 On refitting, clean the sealing washer (where fitted) and renew it if it is damaged or



14.49 Manifold absolute pressure sensor location

A Securing screws B Multi-plug C Vacuum hose
Arrows indicate ignition module retaining screws



14.54 Oxygen sensor (A) (shown with its heatshield removed), and its multi-plug (B)

worn. Apply a smear of anti-seize compound to the sensor's threads, to prevent them from welding themselves to the downpipe in service. Refit the sensor, tightening it to its specified torque wrench setting; a slotted socket will be required to do this. Reconnect the wiring, and heat shield then refit the connector plug.

Inlet manifold heater

57 The heater is located in a recess in the inlet manifold, directly underneath the CFI unit. While access is possible from underneath, it is preferable, depending on the tools available, to remove the complete manifold (Section 15) to reach the heater.

58 Assuming the work is being carried out without removing the manifold, disconnect the battery negative (earth) lead (refer to Chapter 5A, Section 1).

59 Chock the rear wheels then jack up the front of the car and support it on axle stands (see "Jacking and vehicle support").

60 Disconnect the heater wiring, and extract the circlip retaining the heater (see illustration). Withdraw the heater.

61 Refitting is the reverse of the removal procedure. Ensure that both the heater and its circlip are correctly located in the manifold.

Injector ballast resistor

62 When fitted, this component is located on the engine compartment bulkhead, next to the manifold absolute pressure sensor.

63 Disconnect the battery negative (earth) lead (refer to Chapter 5A, Section 1).

64 Disconnect the resistor wiring at its multi-plug, remove the retaining screw and withdraw the resistor.

65 Refitting is the reverse of the removal procedure.

15 Inlet manifold - removal and refitting



Note: Refer to the warning note in Section 1 before proceeding.

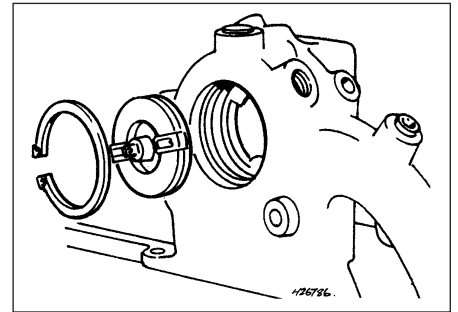
Removal

1 Drain the cooling system as described in Chapter 1.

2 Remove the CFI unit as described in Section 14.

3 Noting their locations, disconnect the coolant, vacuum and breather hoses from the manifold.

4 Disconnect the wiring multi-plugs from the



14.60 Inlet manifold heater components

engine sensors at the inlet manifold. Disconnect the radio earth lead at the inlet manifold connector.

5 Undo the retaining bolts, and withdraw the manifold from the cylinder head. Remove the gasket.

6 With the manifold removed, clean all traces of the old gasket from the mating surfaces of the manifold and the cylinder head.

Refitting

7 Refitting is the reversal of removal. Use a new gasket, and tighten the retaining bolts to the specified torque. Refit the remainder of the components with reference to the appropriate Chapters of this manual.

Notes