

Chapter 13

Body electrical system

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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 
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Specifications

General

System type 12 volt, negative earth

Light bulbs (typical)

	Fitting	Wattage
Headlights	H4	60/55
Auxiliary driving lights and front foglights	H3	55
Side/parking lights	Glass base	5
Direction indicators, reversing light and rear foglight	Bayonet	21
Stop and tail lights	Bayonet	21/5
Door open/kerb illumination lights, luggage area light	Bayonet	5
Number plate lights, reading light and footwell lights	Glass base	5
Engine bay light	Bayonet	10
Interior lights	Festoon	10
Vanity mirror light	Festoon	3
Glovebox light	Glass base	3
Ashtray light	Glass base	1.2
Instrument illumination, pilot and warning lights	Glass base	1.2/2.5
Heater control light	Glass base	1
Automatic transmission selector light and clock light	Bayonet	1.4

Fuses and circuit breakers- main fuse box

Fuse No Rating (A)

1	20
2	20
3	10
4	10
5	10
6	10

Circuit(s) protected

LH main beam, LH auxiliary driving light
 RH main beam, LH auxiliary driving light
 LH dipped beam
 RH dipped beam
 LH side and tail lights
 RH side and tail lights

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Fuses and circuit breakers- main fuse box (continued)

Fuse No	Rating (A)
7	15
8	10
9	30
10	20
11	20
12	10
13	30
14	30
15	30
16	30
17	20
18	30
19	10
20	15
21	15
22	10
23	C20
24	C20

C = Circuit breaker

Fuses and circuit breakers - auxiliary fuse box

Colour	Rating (A)
Black	20
Pink	20
Yellow	20
Green	30
Brown	30
Brown	30
Grey	C20
Orange	20

C = Circuit breaker

Relays in main fuse box

Identification
I
II
III
IV
V
VI
VII
VIII
IX
X
XI
XII
A
B
C
D
E
F
G
H

Other relays and modules

Identification
Behind facia (centre):
L1
L2
L3
L4
L5
L6
Behind facia (passenger side):
M1
M2
M3

Circuit(s) protected

Instrument illumination, number plate lights
 Control circuits for air conditioning, heated windscreen and ride height control
 Headlight washer pump, tailgate and fuel filler flap release
 Central locking system, interior lights, clock, mirror adjustment
 Fuel pump (with air conditioning), taxi circuits
 Hazard warning flasher
 Heated seats, cigarette lighters
 Horn
 Wiper motors and screen washer pumps
 Heated rear window, heated mirrors
 Front foglights
 Heater blower
 Accessory circuits
 Direction indicators, reversing lights
 Stop-lights
 Instrument and controls
 Power windows (front) and sliding roof
 Power windows (rear) and rear seat adjustment

Circuit(s) protected

Fuel-injection pump
 Air conditioning cooling fan
 Anti-lock braking system control circuitry
 Anti-lock braking system pump
 Heated windscreen (left-hand side)
 Heated windscreen (right-hand side)
 Front seat adjustment
 Ride height control

Function

Ignition circuit
 Heated rear window and mirrors
 Power windows and sliding roof
 Seat belt warning
 Intermittent wipe - front
 Intermittent wipe - rear
 Headlight washer
 Interior light delay
 Rear seat adjustment
 Headlights (main beam)
 Engine auxiliary
 Automatic transmission inhibitor
 Spare
 Radio
 Horn
 Tailgate release
 Spare
 Headlights (dipped beam)
 Seat heaters
 Front foglights

Function

Lights on buzzer
 Rear fog light control
 Automatic transmission kickdown time
 Fuel pump (with air conditioning)
 Hydraulic switch
 Anti-theft alarm
 Manifold heater (carburettor) or fuel pump (fuel-injection)
 Power hold (carburettor) or inspection valve (fuel-injection)
 Heated windscreen (power)

Other relays and modules (continued)

Identification

Behind facia (passenger side) (continued):

M4
M5
M6
M7
M8
M9

Below instrument panel (driver's side):

N1

Below facia (passenger side):

P1
P2

Behind facia (passenger side):

R1
R2
R3

Function

Heated windscreen (timer)
Air conditioning cooling fan
ABS pump relay
ABS main relay
ABS control unit
Ride height control
Bulb failure warning unit
ABS module
Fuel-injection system module
Speed control system module
Auxiliary warning system module
Rear audio console module

Torque wrench settings

Alternator adjusting strap:

To steering pump bracket (SOHC)
To front cover (V6)

Nm	lbf ft
21 to 26	16 to 19
41 to 51	30 to 38

1 General information

The electrical system is a 12 volt, negative earth type. Electricity is generated by an alternator, belt-driven from the crankshaft pulley. A lead-acid battery provides a reserve of power for starting and when the demands of the system temporarily exceed the alternator output.

The battery negative terminal is connected to "earth" - vehicle metal - and most electrical system components are wired so that they only receive a positive feed, the current returning via vehicle metal. This means that the component mounting forms part of the circuit. Loose or corroded mountings can therefore cause apparent electrical faults.

Many semiconductor devices are used in the electrical system, both in the "black boxes" which control vehicle functions and in other components. Semiconductors are very sensitive to excessive (or wrong polarity) voltage, and to extremes of heat. Observe the appropriate precautions to avoid damage.

Although some repair procedures are given in this Chapter, sometimes renewal of a well-used item will prove more satisfactory. The reader whose interests extend beyond component renewal should obtain a copy of the "Automobile Electrical Manual", available from the publishers of this book.

Before starting work on the electrical system, read the precautions listed in "Safety first!" at the beginning of the manual.

2 Electrical fault-finding - general information



Note: Refer to the precautions given in "Safety first!" and in Section 1 of this Chapter before starting work. The following tests relate to testing of the main electrical circuits, and should not be used to test delicate electronic circuits (such as anti-lock braking systems), particularly where an electronic control unit (ECU) is involved.

General

1 A typical electrical circuit consists of an electrical component, any switches, relays, motors, fuses, fusible links or circuit breakers related to that component, and the wiring and connectors which link the component to both the battery and the chassis. To help to pinpoint a problem in an electrical circuit, wiring diagrams are included at the end of this Chapter.

2 Before attempting to diagnose an electrical fault, first study the appropriate wiring diagram, to obtain a more complete understanding of the components included in the particular circuit concerned. The possible sources of a fault can be narrowed down by noting whether other components related to the circuit are operating properly. If several components or circuits fail at one time, the problem is likely to be related to a shared fuse or earth connection.

3 Electrical problems usually stem from simple causes, such as loose or corroded connections, a faulty earth connection, a blown fuse, a melted fusible link, or a faulty relay. Visually inspect the condition of all fuses, wires and connections in a problem circuit before testing the components. Use the wiring diagrams to determine which terminal connections will need to be checked in order to pinpoint the trouble-spot.

4 The basic tools required for electrical fault-finding include: a circuit tester or voltmeter (a 12-volt bulb with a set of test leads can also be used for certain tests), a self-powered test light (sometimes known as a continuity tester), an ohmmeter (to measure resistance), a battery and set of test leads, and a jumper wire, preferably with a circuit breaker or fuse incorporated, which can be used to bypass suspect wires or electrical components. Before attempting to locate a problem with test instruments, use the wiring diagram to determine where to make the connections.

5 To find the source of an intermittent wiring fault (usually due to a poor or dirty connection, or damaged wiring insulation), an integrity test

can be performed on the wiring, which involves moving the wiring by hand, to see if the fault occurs as the wiring is moved. It should be possible to narrow down the source of the fault to a particular section of wiring. This method of testing can be used in conjunction with any of the tests described in the following sub-Sections.

6 Apart from problems due to poor connections, two basic types of fault can occur in an electrical circuit - open-circuit or short-circuit.

7 Open-circuit faults are caused by a break somewhere in the circuit, which prevents current from flowing. An open-circuit fault will prevent a component from working, but will not cause the relevant circuit fuse to blow.

8 Short-circuit faults are caused by a "short" somewhere in the circuit, which allows the current flowing in the circuit to "escape" along an alternative route, usually to earth. Short-circuit faults are normally caused by a breakdown in wiring insulation, which allows a feed wire to touch either another wire, or an earthed component such as the bodyshell. A short-circuit fault will normally cause the relevant circuit fuse to blow. **Note:** A short-circuit that occurs in the wiring between a circuit's battery supply and its fuse will not cause the fuse in that particular circuit to blow. This part of the circuit is unprotected - bear this in mind when fault-finding on the vehicle's electrical system.

Finding an open-circuit

9 To check for an open-circuit, connect one lead of a circuit tester or voltmeter to either the negative battery terminal or a known good earth.

10 Connect the other lead to a connector in the circuit being tested, preferably nearest to the battery or fuse.

11 Switch on the circuit, bearing in mind that some circuits are live only when the ignition switch is moved to a particular position.

12 If voltage is present (indicated either by the tester bulb lighting or a voltmeter reading, as applicable), this means that the section of

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the circuit between the relevant connector and the battery is problem-free.

13 Continue to check the remainder of the circuit in the same fashion.

14 When a point is reached at which no voltage is present, the problem must lie between that point and the previous test point with voltage. Most problems can be traced to a broken, corroded or loose connection.

Finding a short-circuit

15 To check for a short-circuit, first disconnect the load(s) from the circuit (loads are the components which draw current from a circuit, such as bulbs, motors, heating elements, etc).

16 Remove the relevant fuse from the circuit, and connect a circuit tester or voltmeter to the fuse connections.

17 Switch on the circuit, bearing in mind that some circuits are live only when the ignition switch is moved to a particular position.

18 If voltage is present (indicated either by the tester bulb lighting or a voltmeter reading), this means that there is a short-circuit.

19 If no voltage is present, but the fuse still blows with the load(s) connected, this indicates an internal fault in the load(s).

Finding an earth fault

20 The battery negative terminal is connected to "earth" - the metal of the engine/transmission and the car body - and most systems are wired so that they only receive a positive feed, the current returning via the metal of the car body. This means that the component mounting and

the body form part of that circuit. Loose or corroded mountings can therefore cause a range of electrical faults, ranging from total failure of a circuit, to a puzzling partial fault. In particular, lights may shine dimly (especially when another circuit sharing the same earth is in operation), motors (eg wiper motors or the radiator cooling fan motor) may run slowly, and the operation of one circuit may have an apparently-unrelated effect on another. Note that on many vehicles, earth straps are used between certain components, such as the engine/transmission and the body, usually where there is no metal-to-metal contact between components, due to flexible rubber mountings, etc.

21 To check whether a component is properly earthed, disconnect the battery, and connect one lead of an ohmmeter to a known good earth point. Connect the other lead to the wire or earth connection being tested. The resistance reading should be zero; if not, check the connection as follows.

22 If an earth connection is thought to be faulty, dismantle the connection, and clean back to bare metal both the bodyshell and the wire terminal, or the component's earth connection mating surface. Be careful to remove all traces of dirt and corrosion, then use a knife to trim away any paint, so that a clean metal-to-metal joint is made. On reassembly, tighten the joint fasteners securely; if a wire terminal is being refitted, use serrated washers between the terminal and the bodyshell, to ensure a clean and secure connection. When the connection is remade, prevent the onset of corrosion in the future by

applying a coat of petroleum jelly or silicone-based grease, or by spraying on (at regular intervals) a proprietary ignition sealer, or a water-dispersant lubricant.

3 Exterior lights - bulb renewal



Headlight

1 Open and prop the bonnet. Remove the cover from the rear of the headlight unit by twisting it anti-clockwise.

2 Disconnect the wiring plug from the headlight bulb. Release the spring clip by squeezing its legs together and move it clear of the bulb (see illustration).

3 Remove the headlight bulb (see illustration). **Caution: If the lights have just been in use, the bulb may be extremely hot.**

4 When handling the new bulb, use a tissue or clean cloth to avoid touching the glass with the fingers. If the glass is accidentally touched, wipe it clean using methylated spirit. Moisture and grease from the skin can cause blackening and rapid failure of the new bulb.

5 Fit the new bulb, making sure that the legs and cut-outs in the bulb base and the reflector match up. Secure with the spring clip.

6 Reconnect the wiring plug. Check the headlight for correct operation, then refit and secure the rear cover.

Front parking light (sidelight)

7 Gain access as for the headlight bulb, then pull the parking light bulbholder from the headlight reflector.

8 Extract the wedge base bulb from the holder (see illustration). Fit the new bulb, refit the bulbholder and check for correct operation.

Auxiliary driving light (when fitted)

9 From above the auxiliary light unit, release the cover spring clip and remove the cover (see illustration).

10 Release the spring clip from the bulb. Withdraw the bulb and unplug its wiring connector (see illustration). **Caution: If the lights have just been in use, the bulb may be extremely hot.**

11 Do not touch the glass of the new bulb with the fingers.



3.2 Squeeze the spring clip legs (arrowed) to remove the headlight bulb



3.3 Removing a headlight bulb



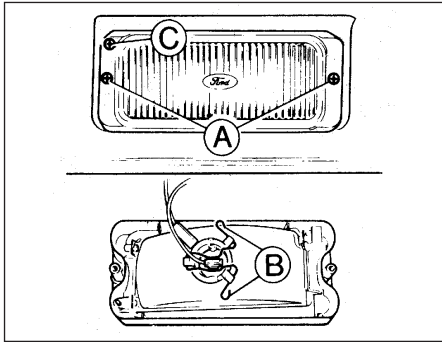
3.8 Removing the front parking light bulb from the holder



3.9 Auxiliary driving light cover



3.10 Removing the auxiliary driving light bulb



3.14 Front foglight bulb renewal

A Rotating screws C Alignment screw
B Spring clip

- 12 Connect the new bulb, fit it and secure it with the spring clip.
- 13 Check the light for correct operation, then refit and secure the cover.

Front foglight (when fitted)

- 14 Remove the lens and reflector together by undoing the two retaining screws. Do not disturb the alignment screw (see illustration).
- 15 Disconnect the wiring from the bulb. Release the spring clip and extract the bulb.
- Caution:** If the lights have just been in use, the bulb may be extremely hot.
- 16 Do not touch the glass of the new bulb with the fingers.
- 17 Fit the new bulb and secure it with the spring clip. Reconnect the wiring.



3.19 Unhook the spring (arrowed) to release the front indicator light unit

- 18 Refit the lens and reflector and secure it with the two screws. Check for correct operation.

Front direction indicator

- 19 From under the bonnet, unhook the spring which secures the direction indicator light unit (see illustration).
- 20 Withdraw the light unit and free the bulbholder from it by twisting it anti-clockwise (see illustration).
- 21 Remove the bulb from the holder by pushing and twisting anti-clockwise. Fit the new bulb to the holder, refit the bulb and holder to the light unit and refit and secure the light unit.
- 22 Check the direction indicators for correct operation.

Direction indicator side repeaters

- 23 Reach up behind the wing and release the light unit by squeezing the two release tags together.
- 24 Pull the light unit out of the wing. Twist the bulbholder anti-clockwise to release it. Pull out the old bulb and press in the new one (see illustrations).
- 25 Refit the bulbholder, then insert the light unit into its hole and press it home.

Rear light cluster

- 26 Access to rear light cluster bulbs is gained from within the luggage area. First remove the



3.20 Removing the bulb and holder from the direction indicator light unit

- access cover on the side concerned; on the right-hand side, also remove the jack.
- 27 Grasp the bulbholder in the apertures provided, squeeze the retaining lugs together and withdraw the bulbholder (see illustration).
- 28 The appropriate bulb(s) can now be renewed, and the bulbholder refitted (see illustration).

Number plate light

- 29 Carefully prise the light unit out of the bumper with a screwdriver.
- 30 Twist the light unit and bulbholder anti-clockwise to separate them (see illustration). Pull out the wedge base bulb and press in the new one.
- 31 Reassemble the light unit and bulbholder, then push the assembly home.



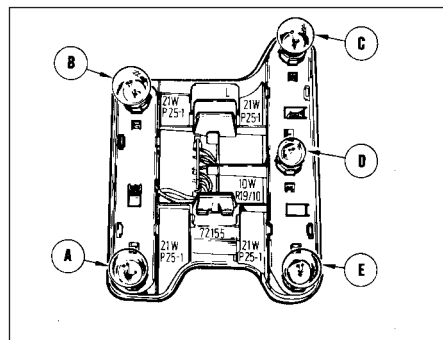
3.24a Removing a direction indicator side repeater



3.24b Fitting a new side repeater bulb



3.27 Rear light cluster bulbholder retaining lugs (arrowed)



3.28 Identification of rear light bulbs

A Reversing light D Tail light
B Direction indicator E Rear foglight
C Stop-light



3.30 Separate the unit to gain access to the number plate light bulb



4.6a Headlight top mounting screw



4.6b Headlight bottom mounting screw



4.6c Headlight side mounting nut

4 Exterior light units - removal and refitting



1 For removal and refitting of the front foglights, front direction indicators, direction indicator repeaters and the number plate lights, refer to the previous Section.

Headlight

2 Unhook the direction indicator light unit retaining spring. Withdraw the direction indicator unit and allow it to hang.

3 Pull out the rubber moulding from between the base of the headlight and the bumper. (This moulding may in fact be stuck to the headlight surround.)

4 Release the headlight surround retaining

lugs, prising them carefully with a screwdriver. Work from the outside towards the centre of the vehicle. Remove the surround by pulling it forwards and then sideways.

5 Remove the radiator grille, secured by two screws.

6 Disconnect the headlight wiring connector. Remove the two retaining screws, and the nut on the side mounting (see illustrations). Draw the headlight unit forwards and twist it to remove it.

7 Refit by reversing the removal operations. Make sure that the locating pin on the outside of the headlight unit engages in the hole in the apron panel.

8 If the new unit has been fitted, or if the adjusting screws have been disturbed, have the beam alignment checked without delay.

9 Note that the headlight lens can be renewed independently of the rest of the unit, once the securing clips have been removed (see illustration).

Auxiliary driving light

10 This is integral with the headlight unit.

Rear light cluster

Hatchback

11 Remove the rear light cluster bulbholder as described in the previous Section.

12 Remove the six nuts which secure the rear light unit (see illustration).

13 Withdraw the light unit from the vehicle and disconnect the multi-plug and wiring harness from it (see illustration).

14 Fit a new gasket to the light unit if the old one was damaged.

15 Refit by reversing the removal operations.

Saloon

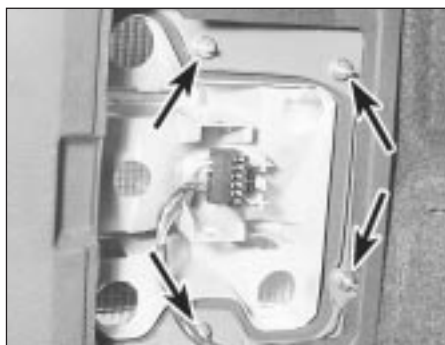
16 Remove the relevant trim panel from the rear corner of the boot, noting that it may be necessary to remove one or more of the rear lower trim panel retaining screws (see illustration).

17 Disconnect the wiring connector from the rear light cluster, then undo the four retaining nuts and withdraw the light unit from the car along with the rubber sealing gasket (see illustration).

18 Refitting is a reverse of removal ensuring that the light unit rubber sealing gasket is in good condition.



4.9 Removing a headlight lens securing clip



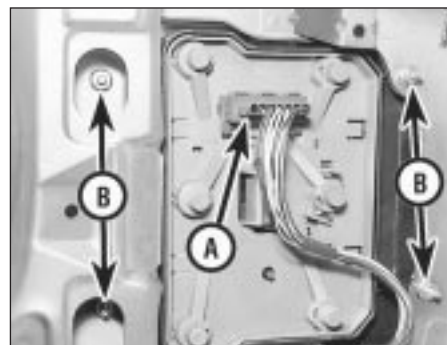
4.12 Four rear light unit securing nuts (arrowed) - there are two more out of sight



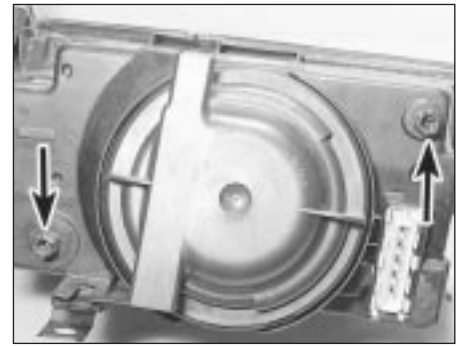
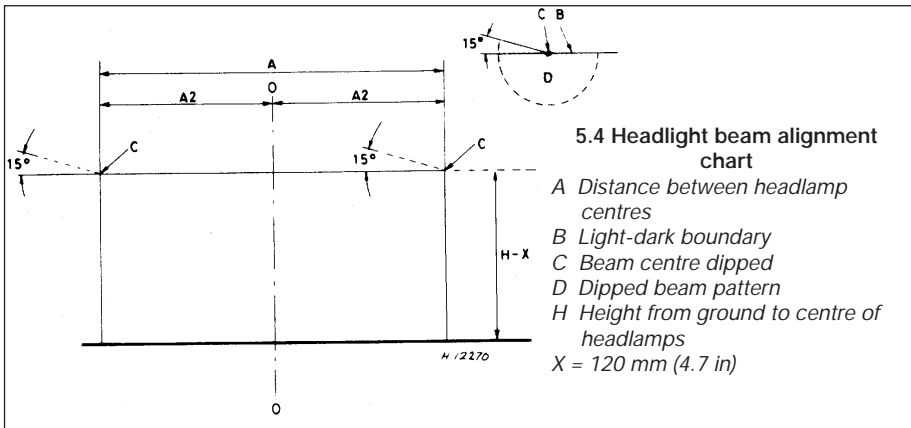
4.13 Disconnecting the multi-plug from the rear light unit



4.16 Remove the trim panel for access to the rear light cluster retaining nuts



4.17 Rear light cluster wiring connector (A) and retaining nuts (B)



5.5 Headlight beam adjustment screws (arrowed)

Estate

19 This procedure is the same as described above for the Saloon models noting that it is necessary to remove the luggage compartment side trim panel to gain access to the light cluster retaining nuts.

the lens from the inside edge (see illustration).

9 Renew the bulb and press the lens home.

10 The kerb illumination light is renewed in a similar way. Prise out the lens using the slot provided, renew the bulb and refit the lens (see illustration).

5 Headlight beam alignment

1 It is recommended that beam adjustment be carried out by a Ford garage using optical alignment equipment. In an emergency, however, the following procedure will produce acceptable results.

2 The vehicle should be normally laden and the tyre pressures must be correct. Park the vehicle on level ground, approximately 10 metres (33 feet) in front of a flat wall or garage door.

3 Draw a vertical line on the wall or door corresponding to the centre-line of the vehicle. (The position of this line can be determined by marking the centres of the windscreen and rear window with crayon, then viewing the wall or door from the rear of the vehicle.)

4 With the centre-line established, construct the other lines shown (see illustration).

5 Switch the headlights on to dipped beam. Cover one headlight with cloth and adjust the other, using the two screws at the rear of the unit, to bring the centre of the beam to the point C on the appropriate side of the alignment chart (see illustration).

6 Transfer the cloth to the adjusted headlight, and repeat the adjustment on the other headlight.
7 Have the alignment checked professionally at the first opportunity.

6 Interior lights - bulb renewal

1 Always switch the light off, or disconnect the battery negative lead, before changing a bulb.

Courtesy light

2 Carefully prise the light unit from its location. If reading (spot) lights are fitted, prise from the middle; if not, prise from one end (see illustration).

3 Renew the bulb(s), detaching the reflector or contact plate as necessary.

4 Reassemble the light unit and press it home.

Vanity mirror light

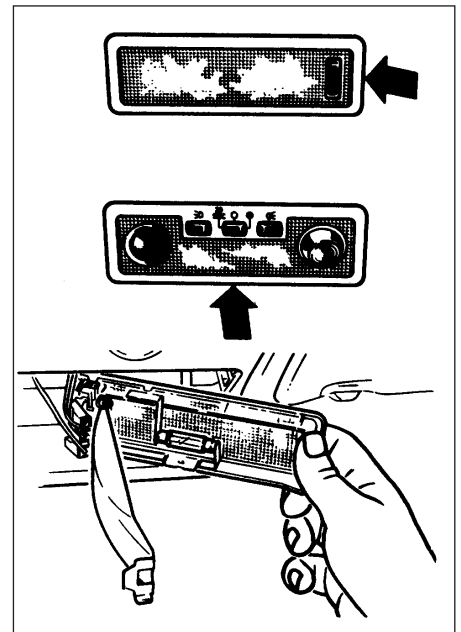
5 Carefully prise the frame off the mirror to expose the bulbs (see illustration).

6 Unclip the blown bulb(s) and press in the new ones. Make sure that the spring contacts which secure the bulb are clean and tight; bend them slightly to improve their tension if necessary.

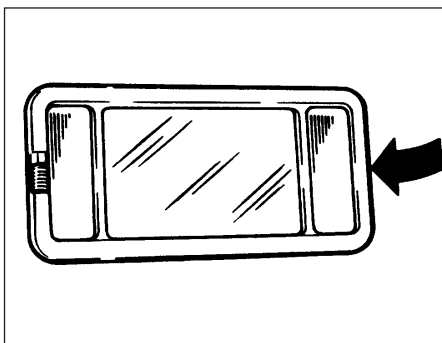
7 Check for correct operation, then snap the mirror frame home.

Door lights

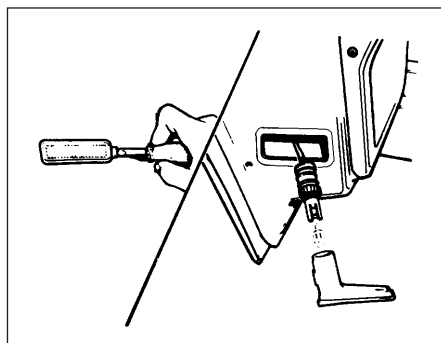
8 The door open warning light can be removed from the edge of the door by prising



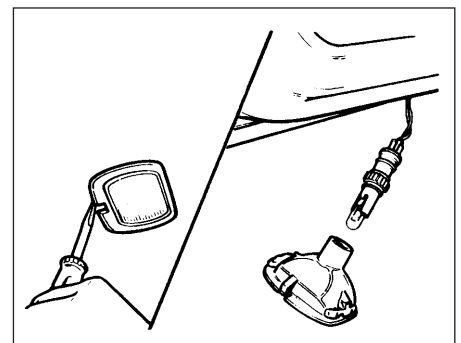
6.2 Courtesy light bulb renewal
Prise at points arrowed



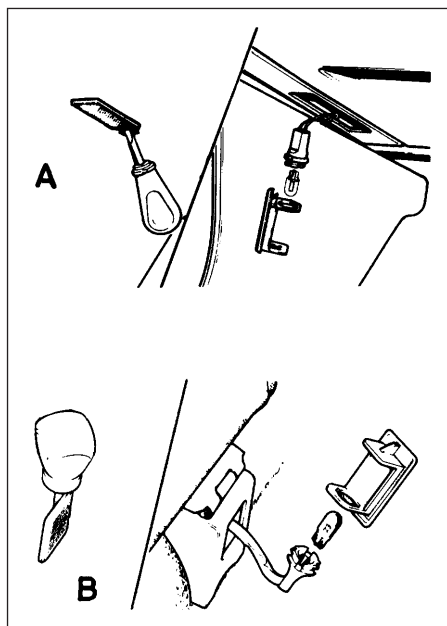
6.5 Mirror light bulb renewal
Prise frame at point arrowed



6.8 "Door open" light bulb renewal



6.10 Kerb illumination light bulb renewal



6.11 Footwell light bulb renewal - front (A) and rear (B)

Footwell lights

11 Free the light unit by carefully prising with a screwdriver (see illustration).

12 Extract the bulbholder by twisting and pulling. Renew the bulb, refit the holder and press the light unit home.

Luggage area light

13 Carefully prise free the light unit (see illustration).

14 Pull out the old bulb, press in the new one and refit the light unit.

Engine bay light

15 This light bulb is directly accessible once the bonnet is opened. It is of the bayonet type.

Instrument panel lights

16 Remove the instrument cluster.

17 Extract the appropriate bulb and holder by twisting it 90° anti-clockwise (see illustration).

18 Large bulbs are of the wedge base type



6.13 Luggage area light unit

and can be pulled out of their holders. Small bulbs and holders cannot be separated, but must be renewed complete.

19 Refit the bulbs and holder, then refit the instrument panel.

Switch illumination lights

20 The pilot lights in the minor switches cannot be renewed independently of the switch.

21 The bulbs which illuminate the lighting master switch and the heater blower switch can be renewed after pulling off the switch knob (see illustration).

22 The switch symbols in the instrument panel surround are illuminated by a single bulb. To gain access to the bulb, remove the instrument panel surround, which is secured by four screws. The bulb is of the wedge base type (see illustration).

Glovebox light

23 Open the glovebox. Remove the combined switch/light unit, which is secured by two screws (see illustration).

24 Prise out the switch, renew the bayonet fitting bulb and refit the switch

25 Refit and secure the light unit with the two screws.

Ashtray light

26 Remove the storage box or audio unit from just above the ashtray (see illustration).

27 Free the bulbholder from above the ashtray, either by pulling it outwards (low series trim) or by carefully prising it away from its housing using a screwdriver (high series trim).



6.17 Instrument panel lights

28 Renew the wedge base bulb. Refit the bulbholder and the other disturbed components.

Radio fader light

29 Carefully prise off the fader surround.

30 Extract the bulbholder by twisting it anti-clockwise. Disconnect its wiring plug and remove it.

31 The bulb and holder cannot be separated. Fit the new bulbholder unit, check for correct operation, then refit the fader surround.

Heater control light

32 Remove the instrument panel surround.

33 Pull off the heater control knobs, then prise the display panel off the heater controls to expose the bulb.



6.21 Pull off the switch knob to expose the bulb



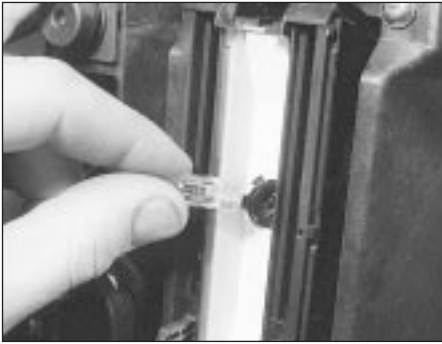
6.22 Removing the switch symbol illumination light



6.23 The glovebox light unit



6.26 Ashtray light bulb seen through radio aperture



6.34 Renewing the heater control light bulb

34 Renew the bulb, check for correct operation, then refit the disturbed components (see illustration).

Automatic transmission selector light

35 Carefully pull off the selector housing. Remove the selector knob by unscrewing it.

36 Release the selector indicator plate, which is secured by two clips. Remove the indicator plate by sliding it up the selector stalk.

37 Remove the selector guide plate, which is secured by four screws. Extract the bulbholder and renew the bulb (see illustration).

38 An alternative means of access is by removing the centre console.

39 Refit by reversing the removal operations.

Rear console light

40 Remove the rear heater control lever knob by pulling it off.

41 Remove the rear console panel, which is secured by two screws at the top.

42 Free the bulbholder by twisting it anti-clockwise. Renew the wedge base bulb.

43 Refit the bulbholder and the other disturbed components.

Hazard warning switch light

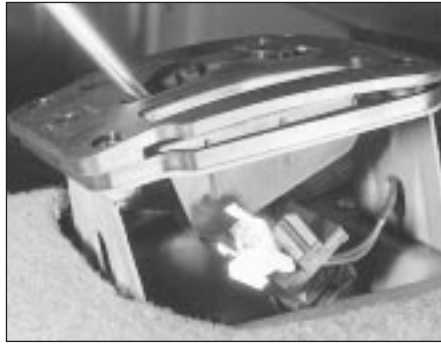
44 Remove the steering column upper shroud, which is secured by three screws.

45 Make sure that the switch is in the "off" position, then pull off the switch cap.

46 Pull out the wedge base bulb and press in the new one.



7.4b Removing the instrument cluster



6.37 Automatic transmission selector with bulbholder displaced

47 Refit the switch cap and the steering column upper shroud.

Clock light

48 If the clock is in the instrument panel, renewal is as described for the other instrument panel lights.

49 To renew the light bulb in the overhead type of clock, first remove the overhead console.

50 Remove the back of the clock, which is secured by two screws, for access to the bulb.

51 Renew the bayonet fitting bulb (see illustration). Refit the back of the clock, then refit the overhead console.

7 Instrument cluster - removal and refitting



Models before April 1992

1 Although not essential, it is wise to disconnect the battery negative lead.

2 Remove the instrument panel surround, which is secured by four screws. Disengage the switch symbol illumination light from the surround.

3 Remove the four screws which secure the instrument cluster.

4 Partly withdraw the instrument cluster, disconnect the multi-plugs and remove the cluster (see illustrations). The multi-plugs are colour coded and not interchangeable; when a graphic display module is fitted, its multi-plug



7.6a Disconnect the dimmer switch wiring connector as the surround is removed



6.51 Renewing the clock bulb

has a red locking mechanism which must be retracted before the plug can be disconnected.

5 Refit by reversing the removal operations.

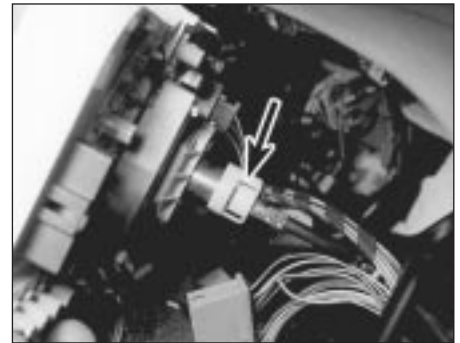
Models from April 1992

6 For these models, note the following points:

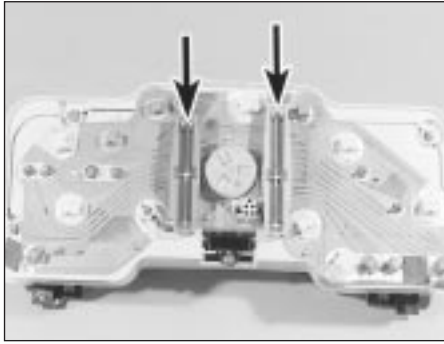
- a) The instrument cluster surround is retained by two screws and two clips. It will also be necessary to disconnect the panel dimmer switch (see illustration).
- b) When removing the cluster note that it will also be necessary to release the retaining clip and disconnect the speedometer cable (see illustration). On refitting push the cable back into position and check that it is securely held in position with the retaining clip.



7.4a Instrument cluster viewed through windscreen to show multi-plugs



7.6b Release the retaining clip and disconnect the cable from the cluster



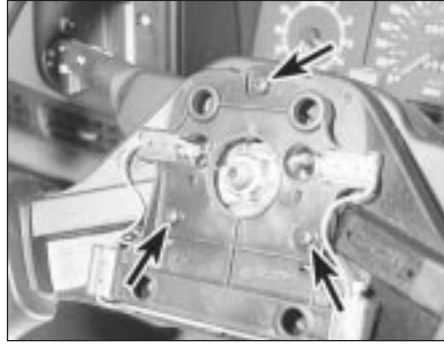
8.3 Instrument cluster printed circuit
Unclip retainers at their top ends (arrowed)

8 Instrument cluster - dismantling and reassembly

- 1 With the instrument cluster removed, a particular gauge or other component can be renewed by following the appropriate parts of this Section.
- 2 Remove all the light bulbs and holders from the rear of the panel by twisting them anti-clockwise.
- 3 To remove the printed circuit, unclip and remove the two multi-plug terminal retainers. Remove all the nuts and washers from the printed circuit terminals, then unclip and remove the printed circuit. Be careful with it, it is fragile (see illustration).
- 4 To remove the instrument cluster glass, release the two securing clips from the bottom edge of the glass. Swing the glass upwards and remove it.
- 5 With the glass removed, the speedometer, fuel and temperature gauges can be removed individually after undoing their securing nuts or screws. To remove the clock or tachometer, the printed circuit must be removed as well.
- 6 When fitted, the low fuel/high temperature warning light bulbs can be renewed after removing the combined gauge unit. Use tweezers to extract the old bulb and to fit the new one.
- 7 The graphic display module, when fitted, can be removed after undoing its two securing screws.
- 8 Reassemble the instrument cluster by reversing the dismantling operations.

9 Clock - removal and refitting

- 1 To remove the clock from the instrument panel, refer to the previous Section.
- 2 To remove the clock from the overhead console, first remove the console.
- 3 Remove the clock rear cover, which is secured by two screws.
- 4 Remove the two screws which secure the clock itself, then withdraw the clock.
- 5 Refit by reversing the removal operations.



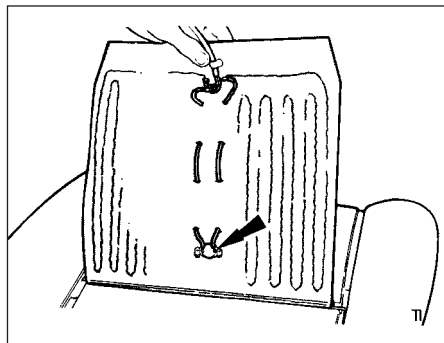
12.3 Three screws (arrowed) secure the horn switch plate

10 Cigarette lighter - removal and refitting

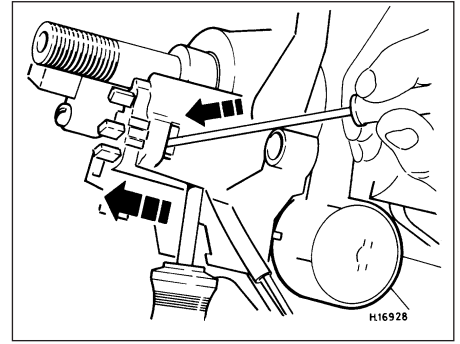
- 1 Disconnect the battery negative lead.
- Front lighter**
- 2 On models with high level trim, pull the centre console surround away from the radio to gain access to the lighter. On models with low level trim, remove the radio/cassette unit.
 - 3 Disconnect the wires from the cigarette lighter and push it out of the illuminated ring.
 - 4 Refit by reversing the removal operations.
- Rear lighter**
- 5 Pull off the rear heater control lever knob.
 - 6 Remove the rear console panel, which is secured by two screws.
 - 7 Disconnect the wires from the lighter and push it out of the illuminated ring.
 - 8 Refit by reversing the removal operations.

11 Horn - removal and refitting

- 1 Two horns are fitted as standard. The high tone horn is located to the right of the radiator and is accessible from under the bonnet. The low tone horn is located below and to the left of the radiator and is accessible from below.
- 2 Remove the horn securing nut or bolt and recover the shakeproof washer.
- 3 Disconnect the wiring and remove the horn.



13.3 Seat heating element
Thermostat (arrowed) must face the foam



12.10 Removing the horn brush unit

- 4 When refitting the horn, make sure it is correctly positioned before tightening the securing nut or bolt.

12 Horn switch plate, slip rings and brushes - removal and refitting

- 1 Disconnect the battery negative lead.
- Switch plate**
- 2 Pull off the steering wheel centre cover.
 - 3 Undo the three screws which retain the switch plate. Disconnect and remove the switch plate (see illustration).
 - 4 Refit by reversing the removal operations.
- Slip rings**
- 5 Remove the steering wheel.
 - 6 Release the tangs which secure the slip rings to the underside of the steering wheel. Disconnect the slip rings from the switch plate and remove them.
 - 7 Refit by reversing the removal operations.

Brushes

- 8 Remove the steering wheel.
- 9 Remove the steering column upper and lower shrouds.
- 10 Disconnect the wiring from the horn brushes. Carefully lever out the brush unit, using a thin screwdriver inserted into the bottom edge of the unit (see illustration).
- 11 Refit by reversing the removal operations.

13 Seat heating elements - removal and refitting

- 1 Remove the seat.
- 2 Remove the seat cushion or backrest trim.
- 3 Note which way round the heating element is facing (see illustration), then remove the wire clips and adhesive tape which secure it to the seat. Retrieve the tie-rod and fit it to the new element.
- 4 Fit the new element with the thermostat facing the cushion foam. Secure the element with wire clips and tape, ensuring that it is not too tight - it must be able to flex under load.
- 5 Refit the cushion or backrest trim.
- 6 Refit the seat and check the heating elements for correct operation.



14.3 Ignition/starter switch removal
Depress the retaining tabs to lift off the switch

14 Ignition/starter switch - removal and refitting



- 1 Disconnect the battery negative lead.
- 2 Remove the steering column upper and lower shrouds.
- 3 Remove the switch by depressing its two retaining tabs. Unplug the wiring connector and remove the switch (see illustration).
- 4 When refitting, make sure that the slot in the centre of the switch is aligned with the driver on the lock.
- 5 Reconnect the switch and push it home until the retaining tabs click into place.
- 6 Reconnect the battery and check the switch for correct operation, then refit the steering column shrouds.

15 Switches - removal and refitting

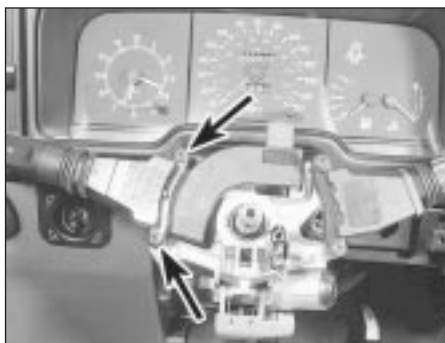


- 1 Disconnect the battery negative lead, or satisfy yourself that there is no risk of a short-circuit, before removing any switch.
- 2 Except where noted, a switch is refitted by reversing the removal operations.

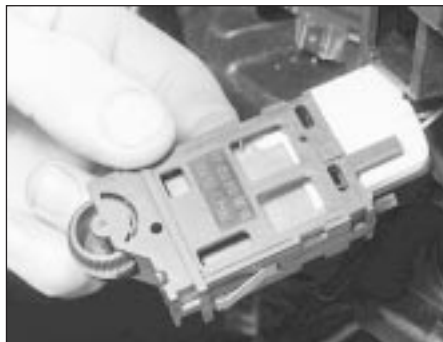
Lighting master switch

Models before April 1992

- 3 Pull the knob off the lighting switch.
- 4 Depress the two retaining lugs and pull the switch out of the instrument panel surround.



15.18 Two screws (arrowed) secure the switch. Steering wheel removed for clarity



15.10 Removing the instrument illumination dimmer switch

- 5 Disconnect the multi-plug from the switch and remove it.

Models from April 1992

- 6 Note that there is a retaining lug on the bottom of the switch knob which must be depressed before the knob can be removed.

Heater blower switch

Models before April 1992

- 7 This is removed in the same way as the lighting master switch.

Models from April 1992

- 8 The switch can be removed and refitted as described for the heater controls in Chapter 3.

Instrument illumination dimmer switch

- 9 Remove the instrument panel surround, which is retained by four screws.

- 10 Pull the dimmer switch from its location and disconnect the multi-plug (see illustration).

- 11 Although the switch looks as if it can be dismantled, this should not be attempted unless the switch is surplus to requirements, and a new unit is readily available.

Models up to April 1992

- 12 On these models, remove the four instrument cluster surround retaining screws and remove the surround from the fascia. Carefully prise the switch out of the aperture and disconnect the wiring connector.



15.19a Disconnecting a steering column switch multi-plug



15.15 Removing a mirror control switch

Models from April 1992

- 13 On these models, remove the two instrument cluster surround retaining screws and release the two retaining clips. Remove the surround from the fascia and disconnect the wiring connector from the dimmer switch. Depress the dimmer switch retaining tangs and slide the switch out of the surround.

Mirror control switch

- 14 Carefully prise the switch out of the armrest using a thin-bladed screwdriver. Protect the armrest with a piece of cloth or thick card.

- 15 Disconnect the multi-plug and remove the switch (see illustration).

Direction indicator/headlight flasher switch and unit

Models before April 1992

- 16 Remove the steering wheel centre cover.
- 17 Remove the steering column upper and lower shrouds, which are secured by a total of six screws.

- 18 Unlock the steering and turn the steering wheel to gain access to the two screws which retain the switch (see illustration). Remove the screws.

- 19 Withdraw the switch from the steering column and disconnect its multi-plug (see illustration). It may be necessary to release some cable-ties in order to free the multi-plug. The flasher unit is plugged into the side of the switch furthest from the wheel (see illustration).



15.19b Unplugging the direction indicator flasher unit



15.24 Door pillar switch securing screws (arrowed)

20 When refitting, check the switch for correct operation before refitting the shrouds and steering wheel centre cover. When fitting the shrouds, be careful not to trap the switch rubber gaiter.

Models from April 1992

21 Note that if access to the switch retaining screws cannot be gained with the steering wheel in position, then the steering wheel must first be removed.

Windscreen wipe/wash switch

Models before April 1992

22 Proceed as described in the previous subsection for the direction indicator switch. Depending on equipment, the wipe/wash switch may have more than one multi-plug connected to it.

Models from April 1992

23 Note that if access to the switch retaining screws cannot be gained with the steering wheel in position, then the steering wheel must first be removed.

Door pillar switch (for courtesy light)

24 Remove the single securing screw and pull the switch from its location (see illustration).

25 Retain the wiring with (for instance) string or a clothes peg, so that it cannot fall into the door pillar, then disconnect the switch.

26 Lubricate the plunger of the switch with a little petroleum jelly when refitting



15.43 Stop-light switch fitted to brake pedal bracket



15.31 Removing a window operating switch

Reversing light switch (manual gearbox)

27 Raise the front of the vehicle and support it securely.

28 Locate the reversing light switch, which is located on the right-hand side of the gearbox.

29 Disconnect the wiring from the switch, wipe clean around it and unscrew it.

30 When refitting, make sure that the switch wiring is routed sufficiently far from the exhaust system to avoid damage due to heat.

Window operating switch

31 The window operating switch is removed from the armrest or console in the same way as the mirror control switch previously described (see illustration).

Sliding roof switch

32 Carefully prise the switch from the overhead console using a thin-bladed screwdriver.

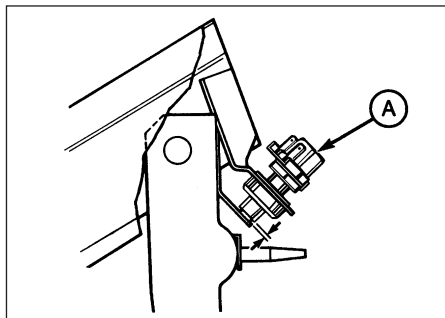
33 Disconnect the multi-plug and remove the switch.

Tailgate lock switch

34 The tailgate lock switch controls the luggage area lights. When appropriate, it also provides inputs to the auxiliary warning and anti-theft systems.

35 To avoid damage to other components, the battery must be disconnected before the tailgate lock switch is removed.

36 Remove the tailgate interior trim panel, which is secured by eleven screws.



15.44 Fitting the stop-light switch (A)
Plunger protrusion (between arrows) must be at least 2 mm (0.08 in)



15.39 Handbrake "On" switch

37 Release the switch locking tab, pivot the switch away from the lock and disconnect it.

38 When refitting, make sure that the slot on the switch engages with the operating lug on the lock barrel.

Handbrake "ON" switch

39 Gain access to the base of the handbrake lever by removing the rubber gaiter and (if necessary) the centre console or switch panel (see illustration).

40 Disconnect the wiring from the handbrake switch. Undo the two screws and remove the switch, noting how the screws do not pass through holes in the lever but engage in slots.

41 After refitting the switch, check for correct operation before refitting the surrounding trim.

Stop-light switch

42 Remove the under-dash trim on the driver's side. The trim is secured by plastic clips.

43 Disconnect the wiring from the switch. Turn the switch 90° anti-clockwise and remove it from the brake pedal bracket (see illustration).

44 When refitting, hold the pedal in the fully raised position, push in the switch and turn it clockwise to lock it. Release the pedal and check that at least 2 mm (0.08 in) of the switch plunger is visible (see illustration).

Oil pressure warning switch

All engines except DOHC

45 This switch is located on the left-hand side of the cylinder block. Access may be impeded by one of the manifolds and associated equipment.

46 Disconnect the wire from the switch, then unscrew the switch and remove it.

47 Clean the switch and its seat before refitting. Apply a little sealant to the switch threads if wished.

48 Run the engine and check that there are no oil leaks from the switch. Stop the engine and check the oil level.

DOHC engines

49 On these engines the switch is located on the right-hand side of the cylinder block between the core plugs.

Heated rear window switch

Models before April 1992

50 Remove the instrument panel surround, which is secured by four screws.

51 Carefully prise the switch from its location, disconnect the multi-plug and remove it.

Models from April 1992

52 Using a small flat-bladed screwdriver, carefully prise the switch out of the centre fascia vent panel and disconnect the wiring connector.

53 On refitting, reconnect the wiring connector and push the switch in until it clicks into position.

Foglight switch(es)

54 These are removed in the same way as the heated rear window switch (see illustration).

Hazard warning switch

55 This is integral with the direction indicator switch.

Front seat adjusting switch

56 Remove the seat trim panel.

57 Prise the operating levers off the switch with a thin-bladed screwdriver (see illustration).

58 Remove the two securing screws, withdraw the switch and unplug it.

Rear seat adjusting switch

59 This is removed in the same way as the mirror control switch already described in paragraphs 10 and 11.

Heated seat control switches

60 These are removed in the same way as the mirror control switch already described in paragraphs 10 and 11.

Starter inhibitor/reversing light switch (automatic transmission)

61 Refer to Chapter 7 part B.

16 Fuses, relays and control units - removal and refitting



Fuses

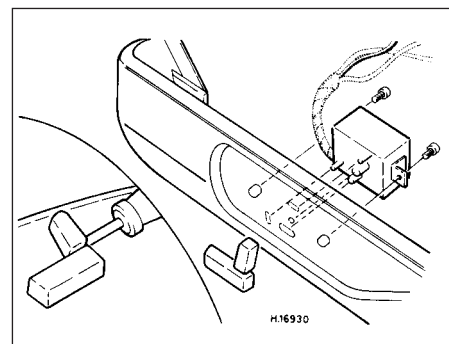
1 The battery positive (live) lead is protected by a fusible link. If this link melts, a major short-circuit is indicated and expert advice should be sought before repairing it.

2 The main fuse/relay box is located under the bonnet, near the bulkhead on the right-hand side. It contains up to 24 fuses and nearly as many relays (according to equipment). Fuse applications are listed on the underside of the fuse box lid (see illustration).

3 There is an auxiliary fuse box inside the vehicle, accessible after opening the glovebox (see illustration). An in-line fuse for the radio is located under the fascia on the left-hand side, near the heater.



15.54 Removing a foglight switch



15.57 Removing the front seat adjusting switch

4 The "blade" type fuses are colour-coded to show their current rating. A blown fuse can be recognised by the melted wire link in the middle.

5 To renew a blown fuse, first switch off the circuit concerned. Pull the old fuse out of its holder, using tweezers or long-nosed pliers. Press in a new fuse of the same rating and try the circuit again.

6 If the new fuse blows immediately or within a short time, do not carry on renewing fuses but look for a short-circuit in the wiring to the item(s) protected by the fuse. When more than one item is protected by a single fuse, switching on one item at a time until the fuse blows will help to isolate the defect.

7 Never fit a fuse of a higher rating (current capacity) than specified, and do not bypass fuses with silver foil or strands of wire. Serious damage, including fire, could result.

8 In some positions (such as for power window and seat adjustment motors) circuit breakers are fitted instead of fuses. These are normally self-resetting once the cause of the overload has been cleared.

Relays

9 If a circuit or system served by a relay develops a fault, always remember that the problem could be in the relay. Testing is by substitution of a known good unit. Beware of substituting relays which look the same but perform different functions (see illustration).

10 To renew a relay, simply unplug it from its holder and plug in the new one. Access to the relays in the main fuse box is as described for the fuses. Access to the relays located behind the fascia is achieved by removing the fascia top.

11 The sliding roof relay is located in the overhead console.

Control units and modules

12 The two major modules are the EEC IV module (on fuel-injection models) and the ABS control module. These are located below the glovebox on the passenger side, and are accessible after removing the under-dash trim.

13 As with relays, testing by the home mechanic is limited to substitution of known good units. This is likely to be prohibitively expensive on a trial and error basis so in case of problems a Ford dealer or other competent specialist should be consulted at an early stage.

17 Central locking motor - removal and refitting



1 Disconnect the battery negative lead and unlock all the doors before starting work on the central locking system. Make sure that the keys are outside the vehicle before reconnecting the battery on completion.

2 Remove the door interior trim panel.



16.2 Main fuse/relay box under the bonnet

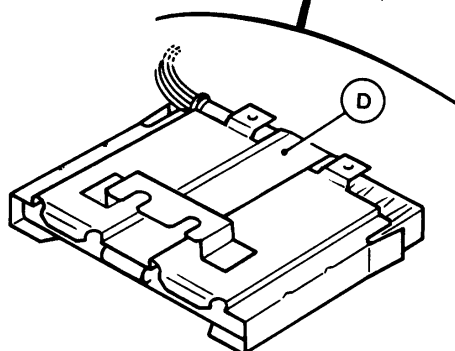
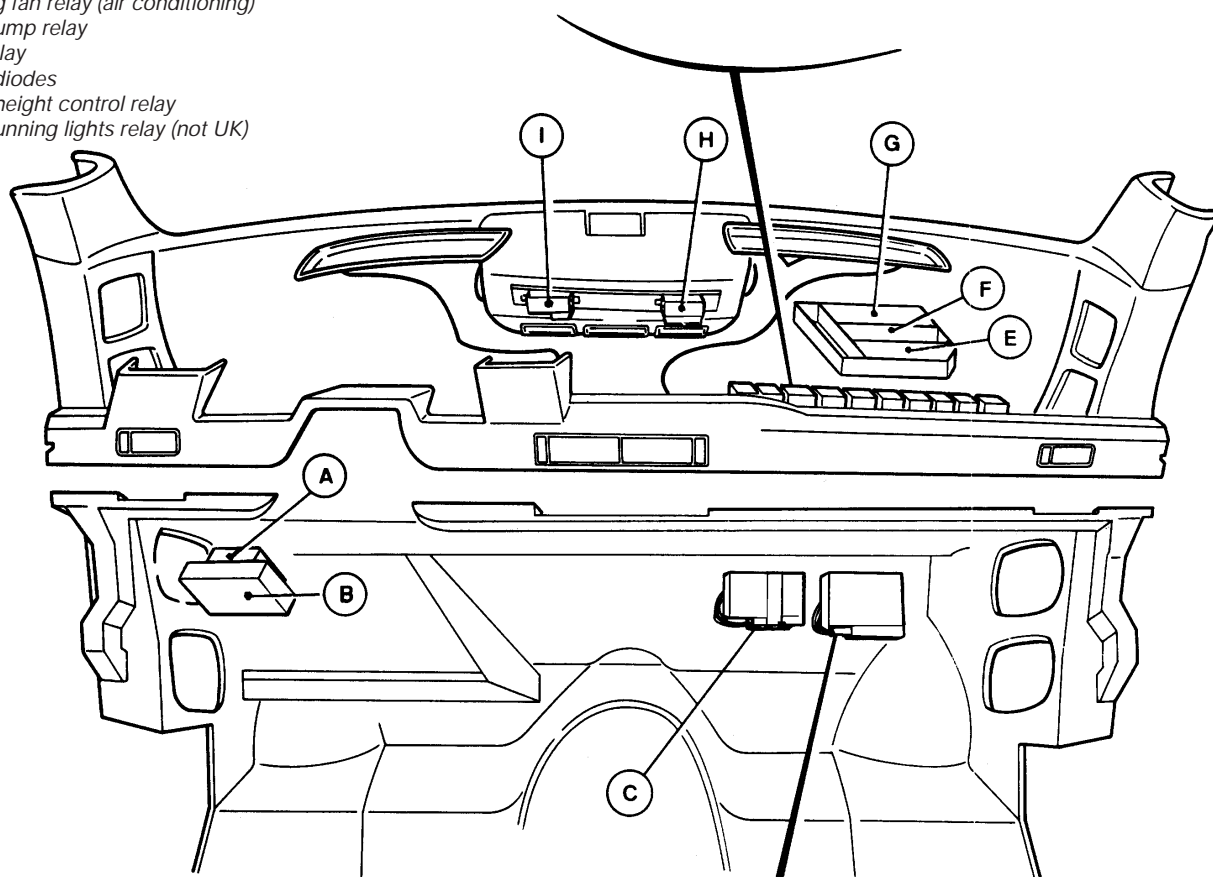
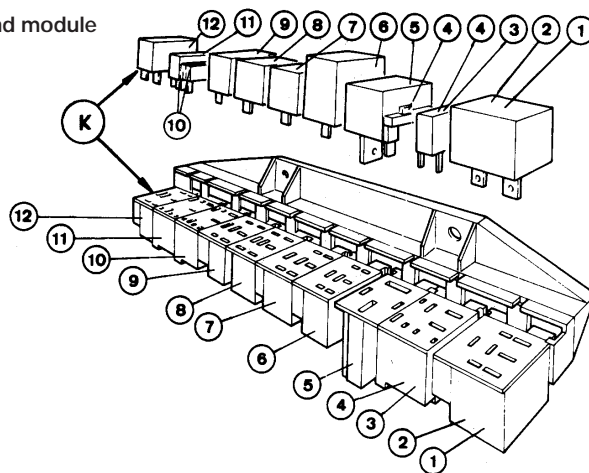


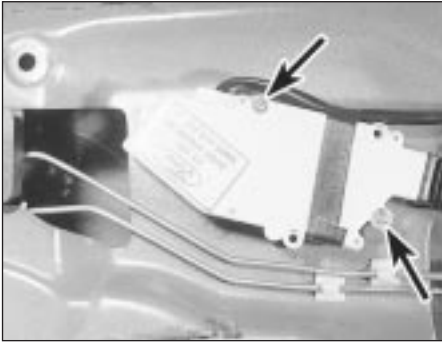
16.3 Auxiliary fuse box in the glovebox

16.9 Typical arrangement of relays, control units and module

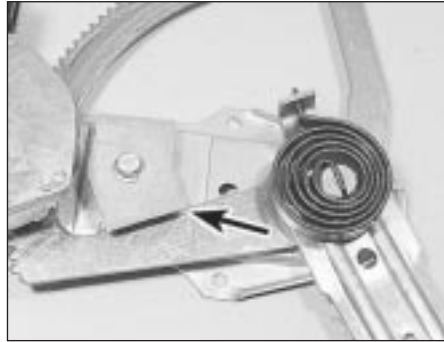
LHD shown - RHD is mirror image

- A Taxi equipment
- B Bulb failure module
- C EEC IV module
- D ABS module
- E Rear headphone relay
- F Auxiliary warning system control unit
- G Speed control system module
- H Anti-theft alarm module
- I Warning display lighting
- K Relay bank
- 1 Inlet manifold heater relay (carburettor)
- 2 Fuel pump relay (fuel-injection)
- 3 Power hold relay (carburettor)
- 4 Injector relay (fuel-injection)
- 5 Heated windscreen relay
- 6 Heated windscreen timer
- 7 Cooling fan relay (air conditioning)
- 8 ABS pump relay
- 9 ABS relay
- 10 ABS diodes
- 12 Ride height control relay
- 12 Day running lights relay (not UK)

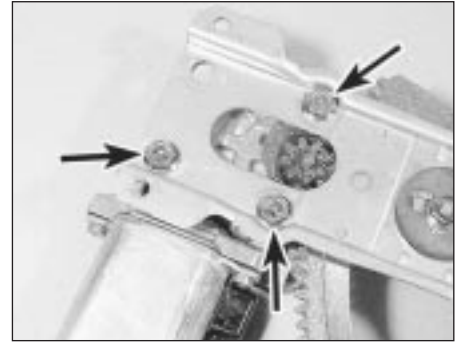




17.4 A door lock motor
Securing screws are arrowed



18.2a Make sure that the lever is against the stop (arrowed) . . .



18.2b . . . then remove the three bolts (arrowed) which secure the motor

3 Carefully peel away the foam rubber sheet in the area of the lock motor.

4 Remove the two securing screws, unhook the motor from the lock operating rod and disconnect the multi-plug. Remove the motor (see illustration).

5 A defective lock motor must be renewed. No spare parts are available.

6 Refit by reversing the removal operations, then adjust the lock linkage as follows.

7 Move the locking lever to the "unlocked" position. Slacken the screw which secures the interior handle/lock lever assembly, push the assembly forwards as far as it will go and tighten the screw.

18 Window operating motor - removal and refitting

1 Remove the window operating mechanism, complete with motor.

2 Make sure that the spring is holding the lever against its stop, then remove the three bolts and separate the motor from the operating mechanism (see illustrations). **Caution:** *Uncontrolled release of the spring can cause injury and damage.*

3 Refit by reversing the removal operations. Check the operations of the motor before refitting the door trim panel.

spade connectors from the common multi-plug washer removing the plug shell (see illustration). It is probably easier to remove both motors and deal with the connectors on the bench.

4 Refit by reversing the removal operations. Check for correct operation of the motors on completion.

Front recline motor

5 Remove the front seat.

6 Remove the seat cover and cushion.

7 Remove the two securing bolts (see illustration), disconnect the multi-plug and withdraw the motor from the reclining mechanism.

8 When refitting, make sure that the motor pinion gear meshes with the reclining mechanism gear. Connect the multi-plug and secure the motor with the two bolts.

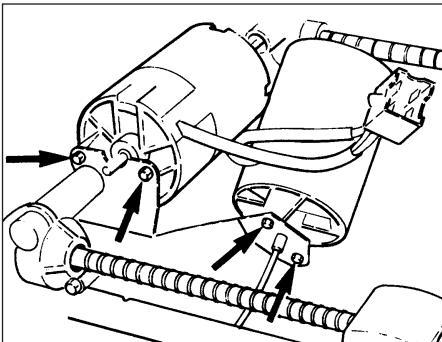
9 Refit the seat cover and cushion, then refit the seat to the vehicle.

Rear recline motor

10 Remove the trim panel from the left-hand side of the luggage area.

11 Remove the three Torx screws which secure the motor and reclining mechanism. Disconnect the multi-plug (next to the seat squab) and remove the motor (see illustration).

12 Refit by reversing the removal operations. Check for correct operation before refitting the luggage area trim panel.



19.2 Seat adjusting motor bolts (arrowed)

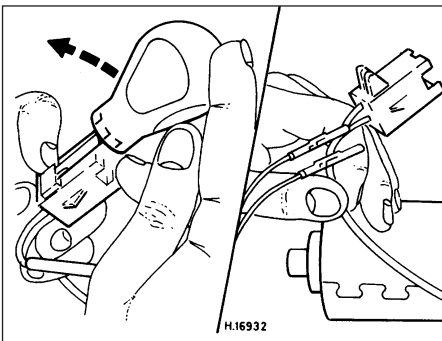
19 Seat adjusting motors - removal and refitting

Front height and fore-and-aft motors

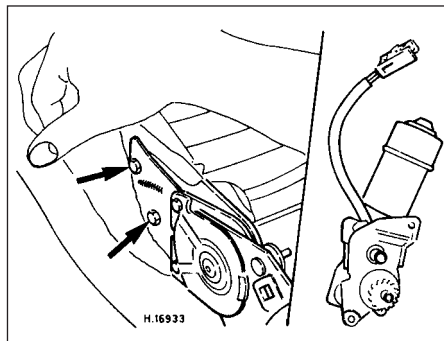
1 Move the front seat rearwards as far as possible to improve access. Remove the two securing bolts from the front of the seat frame and tip the seat backwards.

2 Unbolt and remove the motor(s). Each motor is secured by two bolts (see illustration). Make sure that the drive cables come away from the worm drives without difficulty - if not, disconnect one end of the worm drive too.

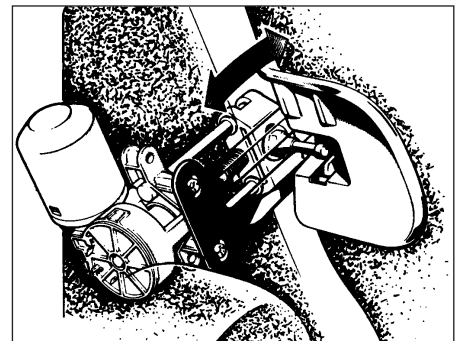
3 If only one motor is being removed, free its



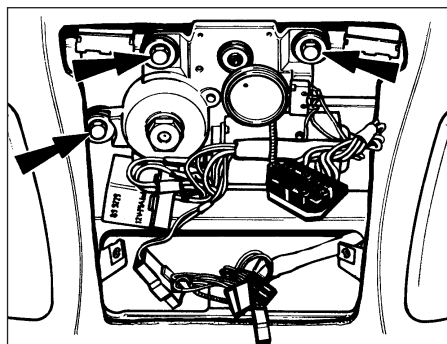
19.3 Removing the spade connectors from the multi-plug



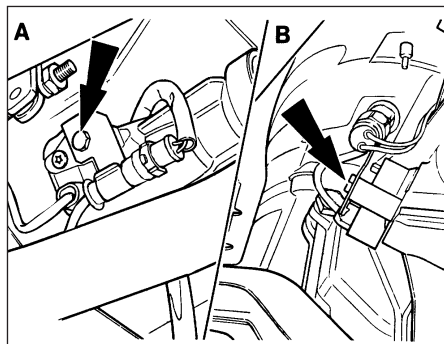
19.7 Front seat recline motor bolts (arrowed)



19.11 Rear seat recline motor

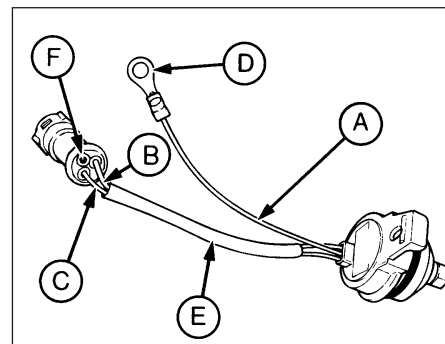


20.2 Sliding roof motor retaining bolts (arrowed)



21.3 Speedometer sender unit securing bolt (arrowed)

A Automatic transmission
B Manual gearbox



21.5 Latest type speedometer sender unit

A Brown wire
B Brown/yellow wire
C Brown/black wire
D Earth tag (see text)
E Sleeve
F Cut brown wire here (see text)

8 If any spillage of gearbox oil or transmission fluid occurred, top-up the level before the vehicle is next run.

20 Sliding roof motor - removal and refitting



- 1 Remove the overhead console.
- 2 Remove the three bolts which secure the motor (see illustration). Lower the motor, disconnect the multi-plug and remove it. Recover the relay.
- 3 When refitting, make sure that the motor drivegear meshes with the roof operating mechanism. Refit the relay, reconnect the multi-plug and secure the motor with the three bolts.
- 4 Check the operation of the motor, then refit the overhead console.



22.3a Lift the cap to expose the nut

21 Speedometer sender unit - removal and refitting



- 1 All vehicles are fitted with an electrical speedometer sender unit instead of a mechanical cable. The sender unit is located on the left-hand side of the transmission extension.
- 2 Raise and securely support the front of the vehicle. Place a drain pan underneath the speedometer sender unit.
- 3 Remove the securing bolt, pull the sender unit out of the transmission and disconnect the multi-plug (see illustration). Be prepared for some spillage of gearbox oil or ATF (automatic transmission fluid).
- 4 If a new sender unit is being fitted, transfer the driven gear and circlip from the old unit. On automatic transmission models, also transfer the O-ring.
- 5 If the old sender unit had two connecting wires and the new unit has three, the brown wire must be cut at the multi-plug and an earth tag fitted (see illustration). Consult a Ford dealer if in doubt.
- 6 Fit the new sender unit, using a new bolt (M6 x 25 mm for manual gearbox, M6 x 35 mm for automatic transmission). Besides the sender unit, the bolt also secures the new earth tag (when applicable), the radio earth strap and the multi-plug retaining bracket.
- 7 Connect the multi-plug and fit it to the bracket.

22 Wiper arms and blades - removal and refitting



All models

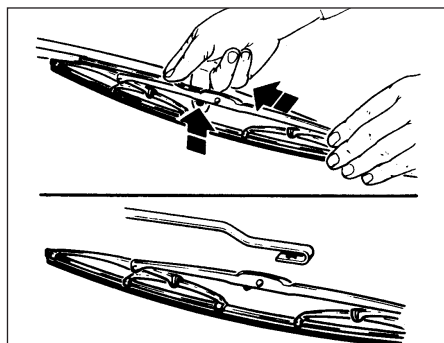
- 1 To remove a windscreen wiper arm, first open the bonnet.

HAYNES HINT Mark the position of the blade on the windscreen or rear window (as applicable) with a piece of masking tape.

- 2 Lift up the plastic cap and undo the wiper arm retaining nut.
- 3 Pull the arm off the drive spindle (see illustrations).
- 4 Refit in the reverse order to removal, using the masking tape to indicate the correct fitted position of the arm and blade.
- 5 To remove a blade alone, hinge the arm and blade away from the screen. Press the tab on the spring clip in the middle of the blade and unhook the blade from the arm (see illustration).
- 6 Refit the blade by sliding it onto the hook on the arm.



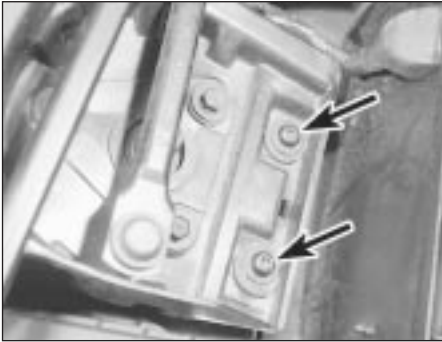
22.3b Pull the arm off the spindle



22.5 Removing a wiper blade



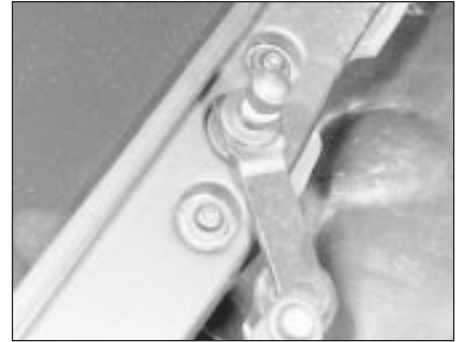
22.7 Disconnecting the rear wiper arm washer hose



23.2a Two screws (arrowed) in the front of the motor . . .



23.2b . . . three screws around the right-hand spindle . . .



23.2c . . . and two screws on the left. Eighth screw is midway between the spindles

Estate

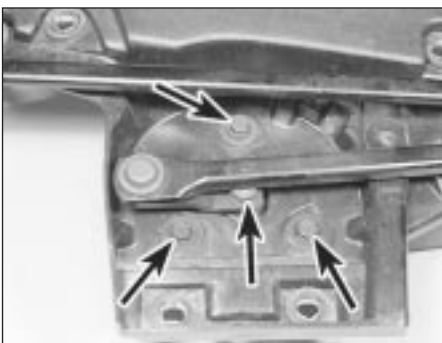
7 Note that when removing the rear window wiper arm, it will be necessary to detach the washer hose from the spindle prior to removing the wiper arm retaining nut (see illustration).

23 Windscreen wiper motor and linkage - removal and refitting

- 1 Remove the windscreen wiper arms as described in the previous Section.
- 2 Undo the eight Torx screws which secure the wiper motor and linkage to the bulkhead (see illustrations).



23.3 Disconnecting the wiper motor multi-plug



23.5 Undo the crank arm nut and the three bolts (arrowed)

3 Disconnect the multi-plug and remove the motor and linkage (see illustration).

4 The linkage arms can be removed by levering them off the pivot pins.

5 To remove the motor, undo the crank arm nut and remove the three securing bolts (see illustration). The motor cover can then be removed. A defective motor must be renewed.

6 Refit by reversing the removal operations. Before refitting the wiper arms, switch the wipers on and then off so that the motor takes up the "parked" position.

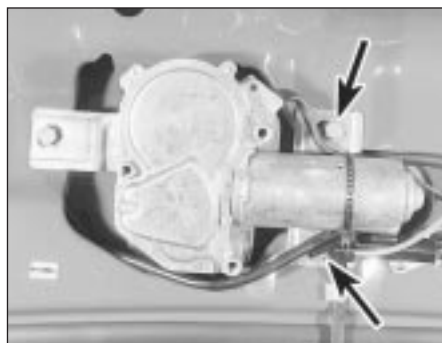
24 Rear window wiper motor - removal and refitting

- 1 Remove the rear wiper arm from the spindle.
- 2 Open the tailgate and remove the interior trim panel, which is secured by eleven screws.
- 3 Remove the three bolts which secure the wiper motor bracket to the tailgate (see illustration). Also remove the screw which secures the earth tag. Disconnect the wiring plug and remove the motor and bracket.

4 The bracket can be unbolted from the motor if wished. No spare parts for the motor are available.

5 Commence refitting by offering the motor and bracket to the tailgate. Secure the assembly with the three bolts, then reconnect the wiring and secure the earth tag.

6 Switch on the ignition and operate the rear wiper control briefly so that the motor stops in the "parked" position.



24.3 Three bolts secure the rear wiper motor (two arrowed)

7 Refit the wiper arm and blade. Wet the window and operate the rear wiper control again to check the function of the motor.

8 Switch off the ignition and refit the tailgate interior trim panel.

25 Windscreen, rear window and headlight washer components - removal and refitting

Windscreen and rear washer jets are removed simply by prising or pulling them from their locations (see illustration). Headlight washer jets can be unclipped from their holders after disconnection of the high pressure hose from the jet.

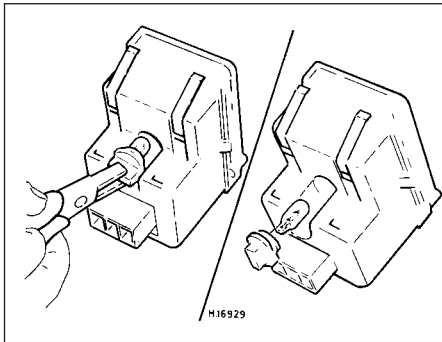
To remove a washer pump, first syphon out the contents of the reservoir. Disconnect the wiring and the hose from the pump, then pull the pump out of its grommet in the reservoir. Renew the grommet if necessary when refitting the pump.

26 Fuel computer components - removal and refitting

1 The fuel tank sender unit, EEC IV module and speedometer sender unit are not peculiar to the fuel computer. Their removal and refitting procedures are given in Chapter 4, Chapter 5 and this Chapter respectively.



25.1 A windscreen washer jet prised out of its location in the bonnet



26.4 Renewing the fuel computer module bulb

Computer module and bulb

Models before April 1992

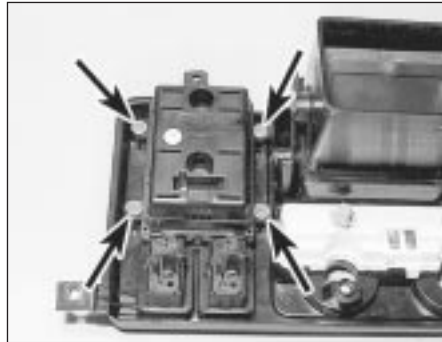
- 2 Remove the instrument panel surround, which is secured by four screws.
- 3 Carefully pull the module from its location. Release the multi-plug by pressing downwards and disconnect it.
- 4 The module illumination bulbholder may now be extracted by gripping it with pliers and twisting it anti-clockwise (see illustration). Extract the old wedge base bulb, press in the new one and refit the bulb and holder.
- 5 Reconnect the multi-plug and press the module back into its hole. Check for correct operation, then refit the instrument panel surround.

Models from April 1992

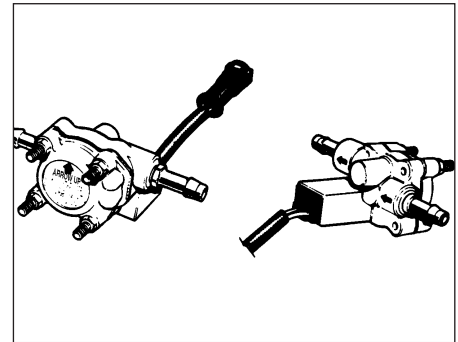
- 6 Disconnect the battery negative terminal.
- 7 Undo the two instrument cluster surround retaining screws then release the two retaining clips and remove the surround. Disconnect the instrument cluster dimmer switch as it is removed.
- 8 Pull off the three knobs from the heater and ventilation controls to gain access to the two hidden central vent panel retaining screws. Slacken and remove the four panel retaining screws and partially withdraw the panel. Disconnect the wiring connectors from the heated window switches and fuel computer and remove the panel from the car.
- 9 Undo the four fuel computer retaining screws and remove the computer from the vent panel (see illustration).
- 10 Refitting is a reverse of the removal procedure.

Fuel flow sensor (carburettor models only)

- 11 The fuel flow sensor is located under the bonnet, on the left-hand inner wing (see illustration).
- 12 Disconnect the battery negative lead.
- 13 Disconnect the multi-plug and the fuel pipes from the sensor. Be prepared for fuel spillage; plug or cap the pipes.
- 14 Remove the three screws which secure the sensor bracket. Remove the sensor and bracket together; they can be separated on the bench if wished.



26.9 Fuel computer retaining screws (arrowed)



26.11 Fuel flow sensor fitted to carburettor models

- 15 Refit by reversing the removal operations. Use new fuel pipe clips if the old ones were damaged during removal.

27 Auxiliary warning system components - testing, removal and refitting

Note that if a fault develops in the AWS, thorough testing and fault finding should be left to a Ford dealer or other competent specialist. Unskilled or uninformed testing may cause further damage. When checking wires or sensors for continuity, disconnect the control assembly and bulb failure module first, otherwise damage may be caused.

Warning light bulbs

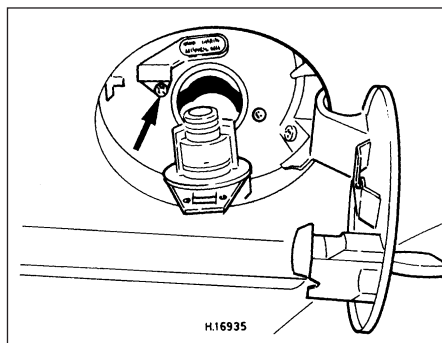
- 1 Refer to Sections 7 and 8.

Graphic display module

- 2 Refer to Sections 7 and 8.
- 3 The bulbs and light emitting diodes (LEDs) can be removed from the module using tweezers or jeweller's pliers. When renewing the fuel filler warning LED, note that the pip on the LED must align with the yellow dot on the circuit board.

Fuel filler switch

- 4 Open the fuel filler flap and remove the cap.
- 5 Inside the luggage area, remove the trim on the right-hand side and disconnect the switch multi-plug (see illustration).



27.5 Fuel filler switch screw (arrowed)

- 6 Remove the screw which secures the switch to the filler neck. Remove the switch and withdraw its wires.
- 7 Refit by reversing the removal operations.

Air temperature sensor

- 8 From under the front bumper, unclip and disconnect the sensor multi-plug.
- 9 Unclip the sensor from its slot by pulling the securing tag inwards. Remove the sensor (see illustration).
- 10 When refitting, first connect the multi-plug. Fit the hook on the end of the sensor into the slot and press the sensor into place, then secure the multi-plug in its clip.

Door/tailgate switch

- 11 Remove the door interior or tailgate interior trim panel (eleven screws).
- 12 Pull the switch to detach it from the lock and disconnect its multi-plug.
- 13 Refit by reversing the removal operations.

Coolant level switch

- 14 Remove the cap from the coolant expansion tank, taking precautions against scalding if the coolant is hot.
- 15 Syphon coolant out of the tank if necessary until the level is below the switch.
- 16 Disconnect the switch multi-plug. Unscrew the retaining ring and pull the switch out of its grommet. Note how flats on the grommet and switch ensure correct fitting (see illustration).



27.9 Removing the air temperature sensor



27.16 Removing the coolant level switch

17 Refit by inserting the switch into the grommet - use a new grommet if necessary - and screwing on the retaining ring. Reconnect the multi-plug and top-up the cooling system.

Washer fluid level switch

18 Syphon the fluid out of the washer reservoir until the level is below the switch.

19 Disconnect the switch multi-plug. Carefully prise the switch out of its grommet and remove it. Note how flats on the grommet and switch ensure correct fitting (see illustration).

20 When refitting, make sure that the grommet is in good condition (renew if necessary) and is correctly seated. Press the switch home, reconnect the multi-plug and refill the reservoir.

Control assembly

Models before April 1992

21 Remove the instrument panel surround and the fascia top.

22 Remove the two nuts which secure the assembly (see illustration). Disconnect the multi-plug by pressing in the locking lever and pulling the plug. Remove the control assembly.

23 Refit by reversing the removal operations. Check the AWS for correct operation before refitting the disturbed trim.

Models from April 1992

24 Unclip and remove the right-hand fascia undercover panel.



27.27 Removing the auxiliary warning system control module



27.19 Removing the washer fluid level switch

25 Carefully prise out the bonnet release lever surround to gain access to the lever retaining screws. Undo the three screws then withdraw the lever. Remove the cable retaining clip and detach the operating lever from the cable.

26 Slacken and remove the five right-hand lower fascia panel retaining screws and remove the panel from the vehicle.

27 Undo the module retaining screw then disconnect the wiring connectors and remove the control module from the vehicle (see illustration).

28 Refitting is a reverse of the removal procedure.

Bulb failure module

Models before April 1992

29 Remove the under-dash trim on the driver's side. This is secured by six screws, one of which is only accessible after removing the air vent grille.

30 Pull the module from its bracket. Disconnect the multi-plug by pressing in the locking lever and pulling the plug. Remove the module (see illustration).

31 Refit by reversing the removal operations.

Models from April 1992

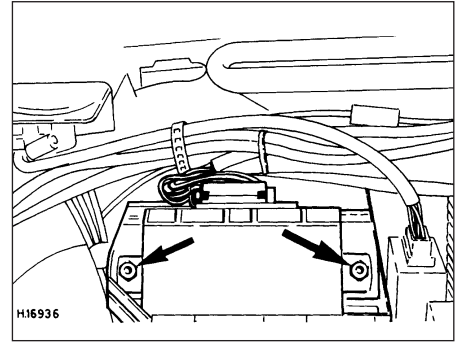
32 Remove the right-hand fascia undercover and lower fascia panel.

33 The bulb failure module is the right-hand of the two modules situated directly above the control pedals. Release the module retaining clips then disconnect the wiring connector and remove the module from the vehicle.

34 Refitting is a reverse of removal.



27.30 The bulb failure module secured to the under-dash trim



27.22 Auxiliary warning system control assembly - retaining nuts arrowed

28 Speed control system components - removal and refitting

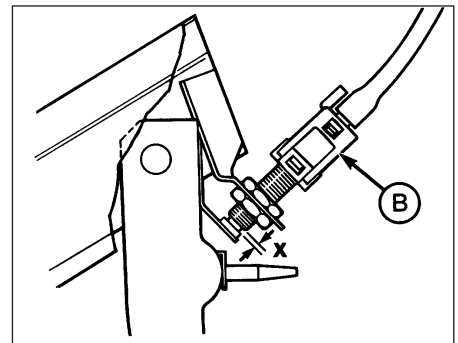


Control switches

- 1 Remove the steering wheel.
- 2 Remove the three screws which secure the horn contact plate. Disconnect the spade terminals and remove the contact plate.
- 3 Carefully prise the switch out of the steering wheel. Disconnect the spade terminals and remove it.
- 4 Refit by reversing the removal operations.

Vacuum dump valve/switch

- 5 Remove the under-dash trim on the driver's side.
- 6 For the brake pedal, slacken the switch top and bottom mounting nuts, then remove the bottom nut completely. Disconnect the wiring plug and vacuum hose from the switch and remove it.
- 7 The clutch pedal switch is mounted in a spring-loaded bracket to allow for small changes in pedal position with the operation of the self-adjusting mechanism. Disconnect the wiring plug and vacuum hose, then push the switch out of its bracket.
- 8 Refit by reversing the removal operations. Adjust the switch position so that there is a gap of at least 1.5 mm (0.06 in) between the switch plunger cap and the body of the switch (see illustration).



28.8 Vacuum dump valve/switch (B)
X = 1.5 mm (0.06 in) minimum



28.10 Removing the speed control module



29.2 Pulling off the rubber sealing strip



29.3 Pulling out a wiring harness clip

Speed control module

Models before April 1992

9 Refer to Section 27. The speed control module shares the same mountings as the AWS module; the AWS module is larger.

Models from April 1992

10 The speed control module fitted to these models is situated behind the glovebox on the left-hand side of the fascia. To gain access to the module remove the left-hand fascia undercover panel. The speed control module is vertically mounted just to the right of the engine management module. Push the module upwards to release the retaining clips then lower it out from under the fascia and disconnect the wiring connector (see illustration).

11 Refitting is a reverse of the removal procedure ensuring that the module is securely retained by the retaining clips.

Vacuum pump

12 The vacuum pump is located behind the left-hand headlight on carburettor models, and behind the right-hand headlight on fuel-injection models. Start by removing the appropriate headlight unit.

13 Disconnect the multi-plug and the vacuum hose from the pump. The multi-plug is released by squeezing and pulling it at the same time.

14 Prise out the three mountings and remove the pump.

15 When refitting, pull the pump mountings into position with pliers.



29.4 One of the plenum chamber cover clips

16 Reconnect the vacuum hose and the multi-plug, then refit the headlight unit.

Vacuum servo

17 Disconnect the servo-to-throttle linkage cable at one end.

18 Disconnect the vacuum hose from the servo.

19 Undo the servo retaining nut and remove the servo from its bracket.

20 Refit by reversing the removal operations. On all but 2.0 litre carburettor models, adjust the cable so that it is slightly slack when the throttle linkage is in the idle position (pedal released).

21 On 2.0 litre carburettor models, the stepper motor plunger must be withdrawn before the cable is adjusted. Proceed as follows.

22 Observe the stepper motor plunger. Have an assistant switch on the ignition for a few seconds, then switch it off again. When the ignition is switched off, the stepper motor plunger will retract fully ("vent manifold" position). Disconnect the battery negative lead while the stepper motor plunger is retracted.

23 Adjust the servo cable so that it is slightly slack, then reconnect the battery negative lead.

Printed circuit board

24 The printed circuit board is located in the steering wheel. It can be removed after detaching the horn contact plate and disconnecting the switch spade terminals as described at the beginning of this Section.



29.5 Blower motor showing wiring connections

29 Heater blower motor - removal and refitting

- 1 Disconnect the battery negative lead.
- 2 Pull off the rubber sealing strip from the top of the plenum chamber (see illustration).
- 3 Pull the two wiring harness clips from the front of the plenum chamber (see illustration).
- 4 Remove the two screws and two clips which secure the plenum chamber cover (see illustration). Lift out the cover.
- 5 Disconnect the multi-plug from the blower motor resistor. Also disconnect the motor earth cable (see illustration).
- 6 Remove the two nuts which secure the motor assembly. Lift out the motor, casing and resistor together.
- 7 The casing halves and the resistor can be separated from the motor after prising open the clamp which holds the casing halves together.
- 8 Refit by reversing the removal operations.

30 Radio or radio/cassette player (original equipment) - removal and refitting

1 Two DIN standard extraction tools will be needed to remove the radio/cassette unit. These tools are available from vehicle audio equipment specialists.

Radio (only)

- 2 Pull off the control knobs, remove the spindle nuts and washers and remove the radio face plate.
- 3 Push the two securing lugs inwards, at the same time pulling the radio from its location. The services of an assistant may be required.
- 4 Withdraw the radio and disconnect the aerial cable and the other wiring plugs from it.
- 5 If a new radio is to be fitted, transfer the support brackets and locating plate from the old unit to the new one.
- 6 Refit by reconnecting the wiring to the radio, then sliding it into its aperture. Press it in until the securing lugs click into position.
- 7 Refit the face plate, spindle nuts and washers and control knobs. The top of the face plate is marked on the side which faces the radio.



30.9 A DIN extraction tool fitted to a radio/cassette unit

8 If a new unit has been fitted, trim it by tuning in a weak medium wave station (around 1500 kHz/200 m) and turning the trimmer screw in either direction until the best reception is obtained. On the radio originally fitted, the trimmer screw is on the front face of the unit; for other types of radio, consult the manufacturer's instructions. Electronic units are normally self-trimming.

Radio/cassette unit

9 Insert the DIN extraction tools (paragraph 1) into the holes at each end of the unit (see illustration). Push the tools home, then pull them apart and rearwards to remove the unit. Pull evenly on each side, otherwise the unit may jam in its slide.

10 Disconnect the aerial cable and other wiring plugs.

11 To remove the DIN tools from the unit, push the clips into which they engage rearwards with a screwdriver (see illustration).

12 If a new unit is being fitted, transfer the support bracket and locating plate to it.

13 Reconnect the wiring to the unit, engage it in its slide and press it home until the retaining clips engage.

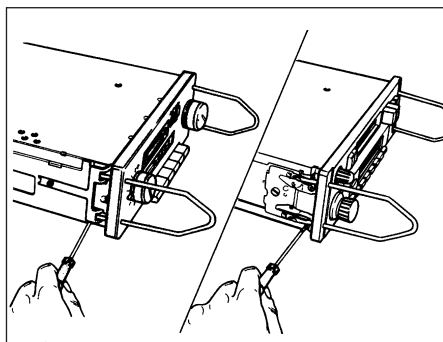
14 Refer to paragraph 8 to trim the new unit.

Radio/cassette unit amplifier

Models before April 1992

15 Remove the fascia top crash pad.

16 Disconnect the wiring connectors from the



30.11 Releasing a DIN extraction tool

amplifier unit then undo the four retaining nuts and remove the amplifier from the fascia.

17 Refitting is a reverse of removal.

Models from April 1992

18 Using a flat-bladed tool carefully prise the left-hand fascia vent panel out from the fascia to gain access to the amplifier unit (see illustration).

19 Slacken and remove the two retaining screws then carefully withdraw the amplifier unit, disconnecting the wiring connectors as they become accessible (see illustrations).

20 Refit by reversing the removal procedure ensuring that the vent panel is held securely in position by the retaining clips.

Graphic equaliser

21 When fitted, the graphic equaliser is removed in the same way as the radio/cassette unit.

31 Loudspeakers (original equipment) - removal and refitting

1 Depending on the level of equipment fitted, loudspeakers may be located in the front door panels, below the rear parcel shelf and in the fascia. Those in the fascia are high frequency units.

Front door speakers

2 Remove the door interior trim panel.

3 Remove the four screws which secure the loudspeaker. Withdraw the speaker, disconnect the wiring and remove it.



30.18 Carefully prise out the left-hand vent panel . . .

4 Refit by reversing the removal operations; observe the TOP marking when fitting the speaker (see illustration).

Rear parcel shelf speakers

Hatchback

5 Remove the speaker cover by twisting it anti-clockwise and pulling it off.

6 Remove the four nuts which secure the speaker, lower the speaker and disconnect the wiring from it. Note that the terminals are different sizes to ensure correct reconnection.

7 Refit by reversing the removal operations.

Saloon

8 From within the boot, slacken and remove the single speaker retaining bolt (see illustration).

9 From inside the car, lift the speaker out of the rear parcel shelf and disconnect the wiring connector.

10 Refitting is the reverse of the removal procedure.

Rear luggage compartment speakers (Estate models)

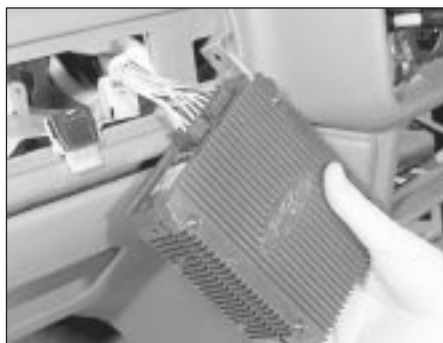
11 Release the retaining clips and remove the relevant luggage compartment interior side trim panel to gain access to the speaker.

12 Undo the two retaining screws then remove the speaker, disconnecting the wiring connector as it becomes accessible.

13 Refitting is the reverse of the removal procedure.



30.19a . . . undo the retaining screws . . .



30.19b . . . then withdraw the amplifier unit and disconnect the wiring connectors



31.4 Front door loudspeaker - note TOP marking



31.8 Removing a rear speaker retaining bolt

High frequency units

14 Remove the instrument panel surround and the fascia top.

15 Remove the two screws which secure the speaker bracket. Disconnect the wiring and withdraw the speaker and bracket together. The screws which secure the speaker to the bracket can then be removed (see illustration).

16 Refit by reversing the removal operations.

32 Radio aerial pre-amplifier (original equipment) - removal and refitting

Hatchback

1 The heated rear window element is used as the radio aerial. To produce a good signal at the radio a pre-amplifier, mounted in the tailgate, is used.

2 Remove the tailgate interior trim panel, which is secured by eleven screws.

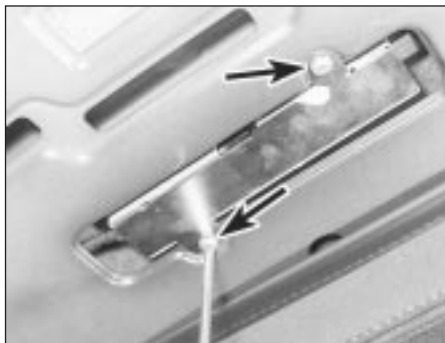
3 Remove the two screws which secure the pre-amplifier (see illustration). Disconnect the wiring from the pre-amplifier and remove it.

4 Refit by reversing the removal operations.

Saloon

5 On these models the pre-amplifier unit is located under the rear parcel shelf and can be accessed from within the boot.

6 To remove the unit, from within the boot, slacken and remove the two retaining screws



32.6 Radio aerial pre-amplifier retaining screws (arrowed)



31.15 High frequency loudspeaker located under the fascia top. One bracket securing screw (arrowed) is visible

then lower the pre-amplifier out of position and disconnect the wiring connectors (see illustration).

7 Refitting is the reverse of removal.

Estate

8 On Estate models the pre-amplifier unit is situated in the roof, just in front of the tailgate.

9 To remove the pre-amplifier, open up the tailgate then carefully release the headlining from all the relevant trim panels and peel it back until access to the unit can be gained.

10 Undo the two retaining screws then lower the unit out from the roof and disconnect the wiring connectors.

11 Refitting is a reverse of the removal procedure ensuring that the headlining is neatly fitted and correctly located behind all the relevant trim panels.

33 Joystick fader control - removal and refitting

1 This Section deals with the facia-mounted control. On models with a graphic equaliser, the joystick fader is incorporated in the equaliser.

2 Remove the instrument cluster.

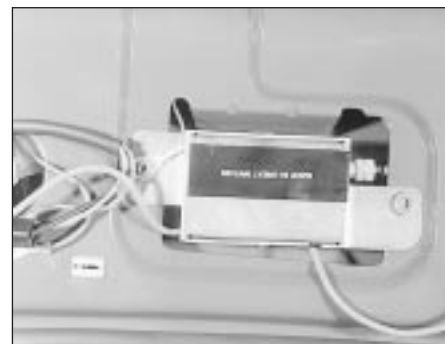
3 Prise out the fader surround and detach the bulbholder (see illustration).

4 Release the fader control by turning its retaining clip anticlockwise. Withdraw it from the facia and disconnect its multi-plug.

5 Refit by reversing the removal operations.



33.3 Removing the joystick fader



32.3 Radio aerial pre-amplifier mounted in the tailgate

34 Rear entertainment console - removal and refitting

1 Pull the heater control knob off its lever. Remove the two retaining screws from the top corners of the rear console faceplate.

2 Pull off the balance and volume control knobs. Withdraw the console and disconnect the wiring from it.

3 The console may be removed from the face plate if wished by undoing the three retaining screws.

4 To renew the console bulbs, extract the bulbholders by grasping with pliers and turning them anti-clockwise.

5 Refit by reversing the removal operations.

35 Rear headphone relay - removal and refitting

1 The rear headphone relay is located behind the facia, next to the AWS control assembly and the speed control module (when fitted). Its function is to mute the loudspeakers when the headphones are plugged into the rear entertainment console.

2 To remove the relay, first remove the AWS control assembly and (if applicable) the speed control unit.

3 Disconnect the relay multi-plug, undo its securing screw and nut and remove it.

4 Refit by reversing the removal operations.

36 Anti-theft alarm system components - removal and refitting

The alarm system is available as an optional extra. On vehicles so equipped, the alarm is automatically set by locking the driver's or front passenger's door with the key. After a brief delay (approximately 20 seconds), the alarm will be set off if the doors, bonnet or tailgate are opened.

The only way to disarm the alarm system is by unlocking one of the front doors with the key. Even if the key is used to open the tailgate, if the alarm is set it will go off.



36.6 Removing the anti-theft alarm control module

The components of the alarm system are a control module, tripping switches, activating switches, an alarm horn and a signal buzzer.

The control module is located behind the fascia. It determines whether the alarm is set or not, monitors the tripping switches and the ignition circuit, and limits the duration of the alarm to 30 seconds. This last item is a legal requirement. The control module also operates the signal buzzer to tell the driver that the alarm is set, and controls the activator delay.

The tripping switches on the doors and tailgate are the same as those used for "open door" warnings in the AWS. The bonnet switch is peculiar to the alarm system.

The activating switches are fitted to the front door lock barrels, where they are activated by a lug on the end of the barrel. They only make contact momentarily as the lock is operated.

The alarm horn is mounted next to the battery. Both the horn and its leads are claimed to be inaccessible without opening the bonnet. The signal buzzer is also mounted under the bonnet.

No service, repair or component renewal procedures have been published for the alarm



36.9 Removing the alarm system warning buzzer

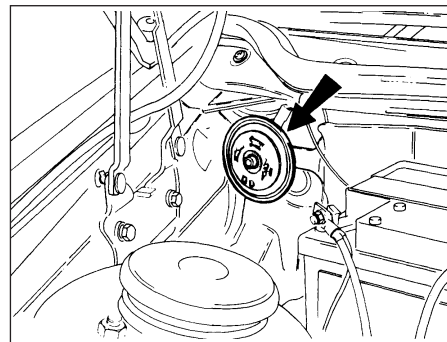
system components on earlier models. Any problems arising which cannot be dealt with by component substitution should therefore be referred to a Ford dealer.

Ultrasonic sensor

- 1 Disconnect the battery negative terminal.
- 2 Prise out the retaining screw trim cap from the centre of the sensor then slacken and remove the retaining screws and lower the sensor away from the headlining, disconnecting the wiring plug as it becomes accessible.
- 3 Refitting is the reverse of the removal procedure.

Anti-theft alarm module (models from April 1992)

- 4 On these models the alarm module is located behind the righthand lower fascia panel.
- 5 To remove the module, remove the right-hand fascia undercover and lower fascia panel.
- 6 The anti-theft alarm module is the left-hand of the two modules situated directly above the control pedals. Release the module retaining clips then disconnect the wiring connector and remove the module from the vehicle (see illustration).



36.11 Alarm horn location

7 Refitting is the reverse of the removal procedure.

Alarm signal buzzer (models from April 1992)

- 8 The alarm signal buzzer is situated under the bonnet where it is mounted on the upper right-hand side of the engine compartment bulkhead.
- 9 To remove the buzzer, open the bonnet then unclip the buzzer from the bulkhead and disconnect the wiring connector (see illustration).
- 10 Refitting is the reverse of the removal procedure.

Alarm system horn (models from April 1992)

- 11 On these models the alarm system horn is mounted in the front right-hand corner of the engine compartment (see illustration).
- 12 To remove the horn, undo the two horn mounting bracket retaining screws then disconnect the wiring connectors and remove the horn from the engine compartment.
- 13 Refitting is the reverse of the removal procedure.


Explanatory notes for wiring diagrams

Each wiring diagram covers a particular system of the vehicle; as indicated in each caption. When a number is shown on a diagram inside a box with an arrow symbol, this indicates that the circuit concerned starts, or is continued, in the diagram having that number.

Space limitations mean that not all diagrams have been included. Therefore the diagram numbers are not consecutive, neither is it always possible to follow a particular circuit to completion. Some diagrams are out of sequence; this is to ensure that the halves of the larger diagrams appear on opposite pages.

The prefix C indicates a connector or multi-plug, S a soldered joint and G an earthing point (ground). The numbers appearing at the break in each wire indicate the circuit number and wire colour.

SYMBOL-EXPLANATION:

 POWER DISTRIBUTION FROM PAGE 2
OR CONTINUATION ON

 SHOWS SPECIFIC LEGAL
REQUIREMENT OF THIS COUNTRY.

 CONNECTION DOES NOT EXIST
IN EVERY VARIATION.

Colour code	Subject	Diagram number
BL Blue	ABS	21
BR Brown	Auxiliary warning system	23
GE Yellow	Central locking system	14
GR Grey	Charge, start and run	3
GN Green	Charge, start and run	3A
RS Pink	Engine management (1.8 litre)	4
RT Red	Engine management (2.0 litre carburettor)	4A
SW Black	Engine management (2.0 litre fuel-injection)	5
VI Violet	Engine management (2.8 litre)	5C
WS White	Exterior lighting	7A
	Heater blower	11
	Interior lighting	10
	Power Operated windows	15
	Power distribution	2
	Power-operated sliding roof	16
	Radio/cassette player and associated circuits	29
	Signalling and warning systems	9
	Wipers and washers	12