

Chapter 12

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

Fuses (in vehicle fusebox)

Note: Fuse ratings and circuits are liable to change from year to year. Consult the handbook supplied with the vehicle, or consult a Ford dealer, for specific information.

No	Rating (amps)	Circuit(s) protected	No	Rating (amps)	Circuit(s) protected
1	25	Heated rear window, adjustable door mirrors	17	-	Spare
2	30	Anti-lock braking system	18	15	Left-hand main beam, left-hand auxiliary light
3	10	Oxygen sensor	19*	20	Central locking system, anti-theft alarm, electric door mirrors
4	15	Right-hand main beam, right-hand auxiliary light	19**	3	ABS module
5	20	Fuel pump	20	15	Horn
6	10	Right-hand sidelight	21	15	Interior lights, clock, radio, cigar lighter
7	10	Left-hand sidelight	22	30	Electric windows
8	10	Rear foglight	23	30	Headlight washer system
9	30	Radiator cooling fan	24	10	Right-hand dip beam
10	10	Left-hand dip beam	25	3	EEC IV engine management system
11	15	Front foglights	26	5	Heated front seats
12	10	Direction indicator, reversing lights	27	10	Brake stop-lights
13	20	Wiper motor, washer pump	28	10	Air conditioning system
14	20	Heater blower	29**	20	Central locking system, anti-theft alarm
15	30	Anti-lock braking system			
16	3	Heated windscreen			

* Early models ** Later models

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Additional fuses (in engine compartment)

Note: Fuse ratings and circuits are liable to change from year to year. Consult the handbook supplied with the vehicle, or consult a Ford dealer, for specific information.

No	Rating (amps)	Circuit(s) protected
A	80	Supply cables to main fuse block
B	60	Supply cables to main fuse block
C	60	Supply cables to main fuse block
D	40/50	Cooling fan
E	50	Heated rear window

Relays

No	Colour	Circuit
R1	Grey	Heated windscreen
R2	Red	Windscreen wiper intermittent control
R3	Grey	Heated rear windscreen
R4	Dark green	Anti-lock braking (system)
R5	Violet	Anti-lock braking (pump)
R6	White/Yellow	Main beam
R7	Orange	Rear wiper intermittent control
R8	Green/Red/Yellow	CFI delay relay or EFI supply relay or EEC IV supply relay
R9	Brown	Fuel pump
10	Brown	Magnetic clutch (air conditioning system)
11	Green	Air conditioning system
12	Brown	Engine running
13	Spare	
14	Spare	
15	Spare	
16*	Spare	
16**	Violet	Fuel pump
17	Yellow	Interior light delay
18	Green	Electric windows
19	Grey	Rear foglight (module)
20	Spare	
21	-/White	Busbar/front foglights (module)
22	Blue	Headlight washer system
23	White	Dip beam
24	-/Red or Yellow	Busbar/automatic transmission/alarm
25	White	Front foglights
26	Black	Steering lock/starter switch
27	Spare	

* Early models ** Later models

Bulbs

	Wattage		Wattage
Headlights (halogen H4)	60/65	Rear number plate light	10
Sidelights	5	Instrument panel warning lights	1.3
Front indicator lights	21	Hazard warning light switch bulb	1.3
Side indicator repeater lights	5	Instrument panel illumination bulb	2.6
Tail lights (Hatchback/Saloon)	5	Clock illumination bulb	1.2
Brake stop-lights (Hatchback/Saloon)	21	Cigar lighter illumination bulb	1.4
Brake stop-/tail lights (Estate/Van)	21/5	Glovebox illumination light bulb	10
Reversing lights	21	Luggage area illumination bulb	10
Rear direction indicators	21	Courtesy light	10
Rear foglights	21		

Torque wrench settings

	Nm	lbf ft
Wiper motor (original) to mounting bracket	8 to 12	6 to 7.5
Wiper motor (new) to mounting bracket	10 to 12	7.5 to 9
Wiper motor bracket to bulkhead (or tailgate)	6 to 8	4.5 to 6
Wiper motor arm-to-spindle nut	22 to 24	16 to 17
Wiper arm nut:		
Stage 1	17 to 18	12.5 to 13.5
Stage 2 (after operating wiper)	17 to 18	12.5 to 13.5
Horn-to-body retaining nuts	25 to 35	18 to 26

1 General information



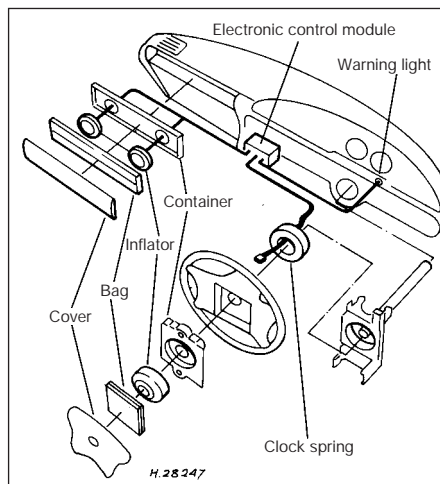
Warning: Before carrying out any work on the electrical system, read through the precautions given in "Safety first!" at the beginning of this manual.

The electrical system is of 12-volt negative earth type. Power for the lights and all electrical accessories is supplied by a lead/acid battery, which is charged by the engine-driven alternator.

This Chapter covers repair and service procedures for the various electrical components not associated with the engine. Information on the battery, ignition system, alternator, and starter motor can be found in Chapter 5.

All 1994-model year Escorts are fitted with a driver's air bag, which is designed to prevent serious chest and head injuries to the driver during an accident. A similar bag for the front seat passenger is also available (see illustration). The combined sensor and electronic for the air bag is located next to the steering column inside the vehicle, and contains a back-up capacitor, crash sensor, decelerometer, safety sensor, integrated circuit and microprocessor. The air bag is inflated by a gas generator, which forces the bag out of the module cover in the centre of the steering wheel. A "clock spring" ensures that a good electrical connection is maintained with the air bag at all times - as the steering wheel is turned in each direction, the spring winds and unwinds.

An anti-theft alarm system is fitted as standard equipment on most models, and is triggered if the vehicle is broken into through the doors, bonnet, boot or tailgate. The alarm will also be triggered if the ignition or audio equipment is tampered with. Additionally, from the 1994 model year onwards, a Passive Anti-Theft System (PATS) is fitted. This



1.3 Air bag system components

system, (which works independently of the standard alarm) prevents the engine from being started unless a specific code, programmed into the ignition key, is recognised by the PATS transceiver.

It should be noted that, when portions of the electrical system are serviced, the cable should be disconnected from the battery negative terminal, to prevent electrical shorts and fires.



Caution: When disconnecting the battery for work described in the following Sections, refer to Chapter 5, Section 1.

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 engine management systems, anti-lock braking systems, etc), particularly where an electronic control module is used. Also refer to the precautions given in Chapter 5, Section 1.

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 manual.

2 Before attempting to diagnose an electrical fault, first study the appropriate wiring diagram, to obtain a complete understanding of the components included in the particular circuit concerned. The possible sources of a fault can be narrowed down by noting if 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 (refer to Section 3 for details of testing relays). 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); an ohmmeter (to measure resistance and check for continuity); 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), a "wiggle" test can be performed on the wiring. This involves wiggling 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.

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.

Finding an open-circuit

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

10 Connect the other lead to a connector in the circuit being tested, preferably nearest to the battery or fuse. At this point, battery voltage should be present, unless the lead from the battery or the fuse itself is faulty (bearing in mind that some circuits are live only when the ignition switch is moved to a particular position).

11 Switch on the circuit, then connect the tester lead to the connector nearest the circuit switch on the component side.

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

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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, as applicable), this means that there is a short-circuit.

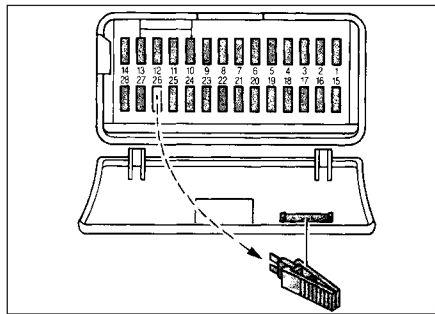
19 If no voltage is present during this test, but the fuse still blows with the load(s) reconnected, this indicates an internal fault in the load(s).

Finding an earth fault

20 The battery negative terminal is connected to "earth" - the metal of the engine/transmission and the vehicle body - and many 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 failure. In particular, lights may shine dimly (especially when another circuit sharing the same earth point 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 (refer to Chapter 5, Section 1) 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 both the bodyshell and the wire terminal (or the component earth connection mating surface) back to bare metal. 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.



3.1 Fuse removal using tweezers

3 Fuses and relays - general information

Note: It is important to note that the ignition switch and the appropriate electrical circuit must always be switched off before any of the fuses (or relays) are removed and renewed. In the event of the fuse/relay having to be removed, the vehicle anti-theft system must be de-activated and the battery earth lead detached. When disconnecting the battery, reference should be made to Chapter 5, Section 1.

1 The main fuse and relay block is located below the facia panel on the driver's side within the vehicle. The fuses can be inspected and if necessary renewed, by unclipping and removing the access cover. Each fuse location is numbered - refer to the fuse chart in the Specifications at the start of this Chapter to check which circuits are protected by each fuse. Plastic tweezers are attached to the inside face of the cover to remove and fit the fuses (see illustration).

2 To remove a fuse, use the tweezers provided to pull it out of the holder. Slide the fuse sideways from the tweezers. The wire within the fuse is clearly visible, and it will be broken if the fuse is blown.

3 Always renew a fuse with one of an identical rating. Never renew a fuse more than once without tracing the source of the trouble. The fuse rating is stamped on top of the fuse.

4 Additional "main" fuses are located separately in a box positioned in front of the battery and these are accessible for



3.4 Additional "main" fuses at the front of the battery

inspection by first raising and supporting the bonnet, then unclipping and hinging back the cover from the fusebox (see illustration). Each of these fuses is lettered for identification - refer to the Specifications at the start of this Chapter to check which circuits they protect. To remove fuses A, B and C, it is first necessary to remove the fusebox. Fuses D and E can be removed from their locations by carefully pulling them free from the location socket in the box. In the event of one of these fuses blowing, it is essential that the circuits concerned are checked and any faults rectified before renewing the faulty fuse. If necessary, entrust this task to a Ford dealer or a competent automotive electrician.

5 With the exception of the indicator flasher relay and where applicable, the Cabriolet powered roof relays, the remainder of the relays are fitted to the reverse side of the "in-vehicle" fuse board. To inspect a relay mounted on the main fuse board, disconnect the battery, remove the fusebox cover and unclip the fusebox. Unscrew the six securing screws to detach and remove the lower facia panel on the driver's side. Carefully withdraw the fuse/relay block.

6 The various relays can be removed from their respective locations on the fuse board by carefully pulling them from the sockets (see illustration).

7 The direction indicator flasher relay is attached to the base of the multi-function switch unit. Access to the relay is made by undoing the retaining screws and removing the steering column lower shroud. The relay can then be withdrawn from the base of the switch (see illustration).



3.6 Relay locations on the underside of the fuse board



3.7 Direction indicator flasher relay removal



4.3A Depress the lock tabs . . .



4.3B . . . and remove the ignition switch

8 The Cabriolet powered roof system has four relays. Relays I and II (and a thermal cut-out) are located beneath the instrument panel, relays III and IV (together with a 15 amp fuse) are located in the left-hand side of the luggage area, next to the powered roof hydraulic pump. Removal of the appropriate trim panel and where applicable, the associated components, gives access to the relay(s) for inspection and renewal (refer to Chapter 11).

9 If a system controlled by a relay becomes inoperative and the relay is suspect, listen to the relay as the circuit is operated. If the relay is functioning, it should be possible to hear it click as it is energised. If the relay proves satisfactory, the fault lies with the components or wiring of the system. If the relay is not being energised, then it is not receiving a main supply voltage or a switching voltage, or the relay is faulty.

4 Switches - removal and refitting



Ignition switch

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

2 Undo the two upper and four lower retaining screws, and remove the upper and lower shrouds from the steering column.

3 Depress the two ignition switch-to-lock securing tabs, and withdraw the switch from the lock (see illustrations).

4 Undo the six retaining screws, and remove the lower fascia panel on the driver's side. Unclip the fusebox panel, then detach the ignition switch wiring multi-plug connector from the fusebox. Release the switch wire from the tie clips and remove the switch.

5 Refitting is a reversal of the removal procedure. When relocating the switch to the steering lock, the barrel driveshaft must align with the switch shaft as it is pushed into position. Check the switch for satisfactory operation on completion.

Steering column multi-function switch

6 Remove the steering wheel as described in Chapter 10.

7 Undo the two upper and four lower retaining screws, and remove the upper and lower steering column shrouds.

8 Undo the single retaining screw, and withdraw the switch upwards from the steering column. Detach the wiring connector and cable tie clips from the switch (see illustrations).

9 Separate the indicator/hazard warning relay and switch from the indicator switch unit.

10 Refit in the reverse order of removal. Refer to Chapter 10 for information required when refitting the steering wheel.

Facia switches

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

12 The facia and associated panel-mounted switches are secured in position by integral plastic or metal retaining clips. In some instances, it is possible to release the switch from the panel using a suitable small screwdriver inserted between the switch and the facia to lever the switch from its aperture, but take care not to apply too much force when trying this method.



HINT Where a switch is reluctant to be released, remove the section of the facia panel or the adjoining panel/component to allow access to the rear side of the switch and compress the retaining clips to enable the switch to be withdrawn.

13 Once the switch is released and partially withdrawn from the panel, detach the wiring connector and remove the switch (see illustration).

14 Refitting is a reversal of removal.

Courtesy light switches

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

16 With the door open, undo the retaining screw and withdraw the switch from the door pillar. Pull out the wiring slightly, and tie a piece of string to it, so that it can be retrieved if it drops down into the door pillar.

17 Disconnect the wiring from the switch.

18 Refitting is a reversal of removal.

Luggage area light switch

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

20 Open the tailgate, undo the two securing screws and remove the rear trim panel to gain access to the rear side of the switch.

21 Release the switch side retaining clips using a thin-bladed screwdriver, and push the switch from its location in the body.



4.8A Undo the retaining screw . . .



4.8B . . . lift the switch clear and detach the wiring connector



4.13 Facia switch removal

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4.22 Luggage area contact switch removal from the rear panel



4.26 Contact switch unit in the tailgate



4.31 Handbrake warning light switch

22 Disconnect the wiring connectors and remove the switch (*see illustration*).

23 Refit in the reverse order of removal.

Rear wiper contact switch

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

25 Open the tailgate and remove its inner trim panel.

26 Working through the access aperture in the tailgate, use a thin-bladed screwdriver to depress the switch retaining clips and extract the switch from the panel (*see illustration*).

27 Disconnect the wiring connectors and remove the switch.

28 Refit in the reverse order of removal. Make sure that the pins and their contacts are clean. On completion, check the operation of the rear wipers, courtesy light, heated rear

window and the tailgate release/central locking system.

Handbrake warning light switch

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

30 Refer to Chapter 11 for details, and remove the front passenger (left-hand) seat and the centre console.

31 Detach the wiring connector from the handbrake warning light switch, then undo the two retaining screws and remove the switch (*see illustration*).

32 Refit in the reverse order of removal. Check that the switch operates in a satisfactory manner before refitting the console and seat.

Brake stop-light switch

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

34 The brake stop-light switch is attached to the brake pedal mounting bracket (*see illustration*).

35 Detach the wiring connector from the switch, then twist the switch through a quarter of a turn (90°) and withdraw it from the bracket (*see illustration*).

36 Refit in the reverse order of removal. Ensure that the neck of the switch is against the pedal before turning the switch 90° to secure it.

37 Check that the switch operates in a satisfactory manner to complete. The switch should not operate during the first 2 mm of

pedal travel, but must operate within 20 mm of pedal travel. If necessary, adjustment can be made by removing the switch from the bracket and turning the adjuster nut as required.

Heater/blower motor switch

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

39 Pull free and remove the heater control knobs.

40 Unscrew and remove the two instrument bezel retaining screws, and remove the bezel.

41 Undo the four retaining screws, and remove the heater panel facia. Detach the wiring connector to the heater panel illumination bulb.

42 Compress the switch tabs to pull free the switch, then detach the wiring multi-plug from the switch (*see illustration*).

43 Refit in the reverse order of removal.

Electric window switches

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

45 Insert a thin-bladed screwdriver between the switch and the console, then carefully prise free the switch from its location. If the switch is reluctant to release, do not apply excessive force; remove the centre console (*see Chapter 11 for details*) and release the switch from the underside.

46 Detach the wire connector from the switch, and remove it (*see illustration*).

47 Refit in the reverse order of removal, then check the switch for satisfactory operation.



4.34 Brake stop-light switch location



4.35 Brake stop-light switch removal



4.42 Heater blower motor switch removal



4.46 Electric window switch removal



4.50 Electric door mirror switch



5.1 Detach the wiring connector . . .



5.2A . . . remove the rubber protector cap . . .

Electric door mirror switch

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

49 Carefully prise free the switch using a thin-bladed screwdriver as a lever, but insert a suitable protective pad between the screwdriver and the housing to avoid damage.

50 Detach the wiring multi-plug connector and remove the switch (see illustration).

51 Refit in the reverse order of removal, then adjust the mirror and check that the operation of the switch is satisfactory.

Powered roof switch (Cabriolet)

52 This switch is removed in the same manner as that described for the electric window switches in paragraphs 44 to 47 above.

Starter inhibitor switch (automatic transmission)

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

54 The starter inhibitor switch is located on the transmission housing, and prevents the engine from being started with the selector lever in any position except "P" or "N". Access to the switch is gained after raising and supporting the vehicle at the front end on axle stands.

55 Detach the switch multi-plug, then unscrew and remove the switch from the transmission, together with its O-ring. As the switch is removed, catch any fluid spillage in a suitable container, and plug the switch aperture in the transmission to prevent any further loss.

56 Refitting is a reversal of the removal procedure. Use a new O-ring, and tighten the switch securely. Ensure that the wiring connection is securely made. On completion, check that the engine only starts when the selector is in the "P" or "N" position.

5 Bulbs (exterior lights) - renewal

Note: Ensure that all exterior lights are switched off before disconnecting the wiring connectors to any exterior light bulbs. The headlight and front sidelight bulbs are removable from within the engine compartment with the bonnet raised. Note that if a bulb fails, and has just been in use, it will still be extremely hot, particularly in the case of a headlight bulb.

Headlight

1 Pull free the wiring connector from the rear of the headlight on the side concerned (see illustration).

2 Prise free the protector cap from the rear of the headlight unit, then compress the retaining wire clips and pivot them out of the way (see illustrations).

3 Withdraw the bulb from its location in the headlight (see illustration).

4 Fit the new bulb using a reversal of the removal procedure. Make sure that the tabs on the bulb support are correctly located in the lens assembly.



Take care not to touch the bulb glass with your fingers - if accidentally touched, clean the bulb with methylated spirit.

5 Check the headlight beam alignment as described in Section 8.

Front sidelight

All models except XR3i

6 Compress the wire retaining clip, and detach the wiring connector from the sidelight (see illustration).

7 Pull free the sidelight bulbholder from its location in the rear of the headlight (see illustration).

8 Remove the bulb from the bulbholder.



5.2B . . . compress the clips . . .



5.3 . . . and withdraw the headlight bulb



5.6 Detach the wiring connector . . .



5.7 . . . and withdraw the sidelight bulbholder

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5.14 Front indicator unit retaining spring



5.16 Front indicator bulb renewal



5.17 Engage the tags in their locating slots when refitting the front indicator unit

9 Fit the new bulb using a reversal of the removal procedure. Check for satisfactory operation on completion.

XR3i models

10 Unhook the retaining spring from the rear of the sidelight, and move the sidelight forwards in order to release it.

11 Grip the bulbholder and pull it free from the sidelight (do not pull on the wire).

12 Depress and twist the bulb to remove it from the bulbholder.

13 Fit the new bulb using a reversal of the removal procedure. As the light is fitted into position, engage its tags in the slots of the headlight unit. Check for satisfactory operation on completion.

Front direction indicator**All models except XR3i**

14 Unhook the retaining spring from the rear of the direction indicator, and move the

direction indicator forwards in order to release it (see illustration).

15 Grip the bulbholder and pull it free from the indicator (do not pull on the wire).

16 Depress and twist the bulb to remove it from the bulbholder (see illustration).

17 Fit the new bulb using a reversal of the removal procedure. As the light is fitted into position, engage its tags in the slots of the headlight (see illustration). Check for satisfactory operation on completion.

XR3i models

18 Insert a small screwdriver between the top edge of the direction indicator light and the bumper, and lift up the retaining clip (see illustration).

19 Carefully withdraw the light unit from the bumper.

20 Turn the bulbholder and release it from the rear of the light unit.

21 Withdraw the old bulb and fit the new.

22 Guide the indicator back into the bumper until the retaining clip engages.

23 Check for satisfactory operation.

Front direction indicator side repeater

24 Carefully prise the light from the front wing, taking care not to damage the paintwork.

25 Pull out the bulbholder and wiring, then remove the bulb (see illustration).

26 Fit the new bulb using a reversal of the removal procedure, and check for satisfactory operation.

Front foglight (XR3i models)

27 Withdraw the front direction indicator as described previously.

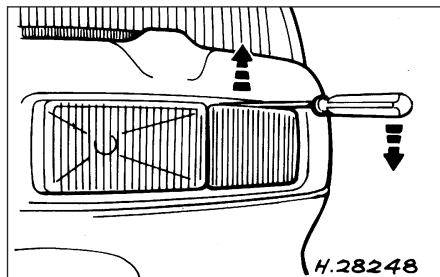
28 Swing back the direction indicator retaining spring clip then ease the foglight out on the spring clip side, and pull it forward (see illustration).

29 Detach the bulbholder and remove the bulb.

30 Refitting is a reversal of removal. Check that the operation of the foglight is satisfactory on completion.

Rear light cluster**Hatchback and Saloon models**

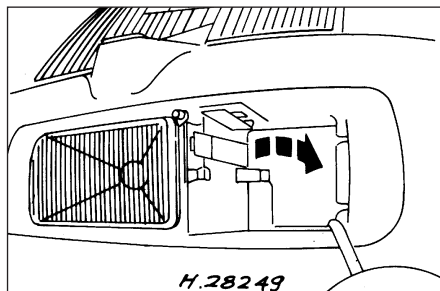
31 On pre-1993 model year vehicles, working in the luggage area, press the lock tabs (recessed in the rear face of the bulbholder on the side concerned) in towards the centre, and pull free the bulbholder. On later models, release the two clips and remove the light cluster trim. Disconnect the wiring multi-plug, press the bulbholder retainer upwards, and pull free the bulbholder (see illustrations).



5.18 Using a screwdriver to release the direction indicator light unit on XR3i models



5.25 Side repeater light assembly



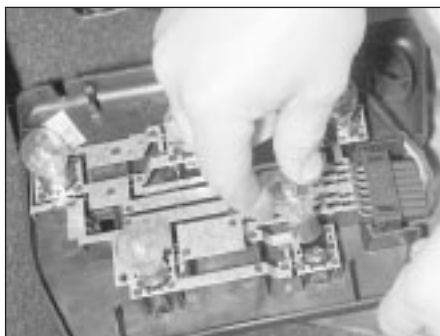
5.28 On XR3i models, swing back the direction indicator unit retaining spring clip, then ease the foglight out on the spring clip side



5.31A Rear bulbholder removal on pre-1993 Saloon and Hatchback models



5.31B On later models, press the bulbholder retainer (arrowed) upwards and pull free the bulbholder



5.32 Removing a bulb from the bulbholder



5.34 Rear light cluster removal on Estate models



5.40 Number plate light removal from the bumper on Estate models



5.42A Prise open the clip . . .

32 Depress and twist the bulb concerned to remove it from the holder (**see illustration**).

33 Fit the new bulb using a reversal of the removal procedure. Relocate the holder by pressing it in until the retainers engage. Refit the multi-plug, where applicable. Check the operation of the rear lights on completion.

Estate models

34 Prise back the rear trim cover on the side concerned to gain access to the light from within the luggage area. Press the lock tab down, lift the holder a fraction and withdraw it (**see illustration**).

35 Depress and twist free the bulb concerned from the holder.

36 Fit the new bulb using a reversal of the removal procedure. Relocate the holder by sliding the lower end into position first, then

press the upper end into position so that it clicks into place. Check the operation of the rear lights on completion.

Van models

37 Working from within the rear of the vehicle on the side concerned, turn the appropriate bulbholder in an anti-clockwise direction and withdraw the holder.

38 Depress and untwist the bulb to release it from its holder.

39 Fit the new bulb using a reversal of the removal procedure. Check the rear lights for satisfactory operation on completion.

Number plate lights

40 Prise the number plate light from the rear bumper using a small screwdriver (**see illustration**).

41 Disconnect the wiring plug and earth lead from the light.

42 On Hatchback, Saloon and Estate models, prise open the plastic retaining clip to withdraw the bulbholder from the light unit, then depress and untwist the bulb to remove it from the holder (**see illustrations**).

43 To remove the bulb on Van models, twist the bulbholder anti-clockwise and withdraw it, then pull free the bulb.

44 Fit the new bulb using a reversal of the removal procedure. Check the operation of the lights on completion.

Rear foglight (1993 model year onwards)

45 With the tailgate open, release the cover from the inner trim panel to access the bulbholder.

46 Twist the bulbholder anti-clockwise and withdraw it, then pull free the bulb.

47 Fit the new bulb using a reversal of the removal procedure. Check the operation of the light on completion.

6 Bulbs (interior lights) - renewal



Courtesy lights

1 Prise out the light using a small flat-bladed screwdriver (**see illustration**).

2 Release the festoon-type bulb from the spring contacts.

3 Fit the new bulb using a reversal of the removal procedure. Check the tension of the spring contacts, and if necessary bend them so that they firmly contact the bulb end caps.

Luggage area light

4 Prise free and withdraw the light (**see illustration**).

5 Pull free the bulb from its holder and remove it.

6 Fit the new bulb and refit the light using a reversal of the removal procedure.

Instrument panel illumination and warning lights

7 Remove the instrument panel as described in Section 9.



5.42B . . . and separate the number plate light unit and bulbholder



6.1 Roof-mounted courtesy light removal



6.4 Luggage area light removed for bulb replacement

12•10 Body electrical system



6.8 Bulbholder removal from the instrument panel

8 Turn the bulbholder a quarter-turn to align the shoulders with the slots, then remove it and pull the capless bulb from the bulbholder (see illustration).

9 Fit the new bulb in reverse order.

Heater control panel illumination

10 Undo the two retaining screws from its upper edge, and withdraw the instrument panel surround.

11 Pull free the heater control knobs, then undo the heater control panel retaining screws. Withdraw the panel from the facia just enough to gain access to the bulbs on its rear face (see illustration).

12 Twist the bulbs anti-clockwise to remove them.

13 Refit in the reverse order of removal, and check for satisfactory operation on completion.

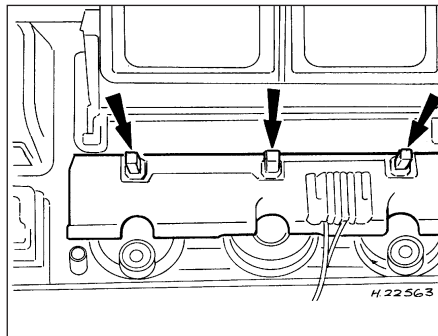
Automatic transmission selector illumination

14 Prise out the lever quadrant cover (taking care not to scratch the console), then pull the bulbholder from under the selector lever position indicator, untwist and remove the bulb from the holder.

15 Fit the new bulb in the reverse order of removal.

Glovebox light

16 Open the glovebox, then undo the two



6.11 Heater control panel illumination bulb locations (arrowed)

retaining screws and withdraw the light/switch unit.

17 Prise free the switch/bulbholder, then untwist and remove the bulb from the holder (see illustration).

18 Fit the new bulb using a reversal of the removal procedure.

Hazard warning light tell-tale

19 Pull free the cover from the switch, then pull free the bulb from the switch/holder.

20 Refit in the reverse order of removal, and check for satisfactory operation.

Clock illumination

21 Engage the hooked ends of a pair of circlip pliers in the two holes in the underside of the clock bezel as shown, and carefully pull free the clock from its aperture in the facia. The bulbholder can then be untwisted and withdrawn from the rear face of the clock and the bulb renewed (see illustrations).

22 Refit in the reverse order of removal.

Cigar lighter illumination

23 Remove the lighter (Section 12), then withdraw the illumination ring from the facia. Remove the bulb from the illumination ring.

24 Refit in the reverse order of removal. Check for satisfactory operation on completion.



6.17 Glovebox light switch/bulbholder removal

7 Exterior light units - removal and refitting



1 Disconnect the battery negative (earth) lead (refer to Chapter 5, Section 1), before removing any of the light units.

Headlight

2 Open and support the bonnet, then on pre-1993 models, undo the four retaining screws along the top edge of the grille panel, and lift the panel clear. On 1993-on XR3i models, undo the four screws, release the two clips and remove the plastic support bracket above the radiator.

3 Remove the front indicator as described later in this Section.

4 Detach the wiring connections from the headlight and sidelight in the rear of the appropriate headlight unit.

5 Working through the cut-out of the direction indicator, unscrew the headlight lower retaining screw, then undo the two upper securing screws from the points indicated (see illustration). On later models, there is an additional upper retaining screw. Withdraw the headlight forwards from the vehicle.

6 If a new headlight is to be fitted, remove the headlight and sidelight bulbs/holders, and transfer them to the new light unit as described in Section 5. The individual parts of the headlight are not otherwise renewable.



6.21A Pull free the clock from the facia . . .



6.21B . . . for access to the bulbholder



7.5 Headlight unit retaining screws (arrowed)



7.7A Headlight engagement pin

7 Refitting is a reversal of the removal procedure. When fitting the headlight into position, ensure that the location pin sits in its recess, and note the arrangement of the insulating washers on the retaining screws (see illustrations). Loosely locate the headlight, and temporarily fit the indicator to check that the gap between the headlight and the indicator is even. Fully tighten the upper retaining screws, then remove the indicator to tighten the lower headlight screw.

8 When the headlight and indicator units are fitted and their wiring connectors attached, check the lights for satisfactory operation before fitting the front grille panel.

9 Finally adjust the headlight beam alignment as described in Section 8.

Front direction indicator

All models except XR3i

10 Unhook the retaining spring from the rear of the direction indicator (see illustration 5.14).

11 Move the direction indicator forwards in order to release it.

12 Turn the bulbholder and release it from the rear of the direction indicator.

13 Remove the direction indicator from the vehicle.

14 Refitting is a reversal of removal. Check that the operation of the indicator is satisfactory on completion.

XR3i models

15 Insert a small screwdriver between the top edge of the light and the bumper, and lift up the retaining clip (see illustration 5.18).

16 Carefully withdraw the indicator assembly from the bumper.

17 Turn the bulbholder and release it from the rear of the direction indicator.

18 Refitting is a reversal of removal. Check that the operation of the indicator is satisfactory on completion.

Front sidelight (XR3i models)

19 Unhook the retaining spring from the rear of the sidelight unit.

20 Move the sidelight forwards in order to release it.

21 Turn the bulbholder and release it from the rear of the sidelight.

22 Remove the sidelight from the vehicle.



7.7B Headlight retaining screw showing washer arrangement

23 Refitting is a reversal of removal. Check that the operation of the sidelight is satisfactory on completion.

Front foglight (XR3i models)

24 Insert a small screwdriver between the top edge of the direction indicator light and the bumper, and lift up the retaining clip (see illustration 5.18).

25 Carefully withdraw the direction indicator from the bumper.

26 Turn the bulbholder and release it from the rear of the direction indicator.

27 Swing back the direction indicator retaining spring clip then ease the foglight out, on the spring clip side, and pull it forward (see illustration 5.28).

28 Detach the bulbholder and remove the unit.

29 Refitting is a reversal of removal. Check that the operation of the foglight is satisfactory on completion.

Direction indicator side repeater

30 Raise and support the bonnet. Detach the indicator wiring multi-plug at the bulkhead, and attach a length of string to the connector end of the wire going to the side repeater. This will act as a guide to feed the wire back through the body channels when refitting the repeater unit.

31 Rotate the light in a clockwise direction to release it from the body panel, and withdraw it from the vehicle. When the wiring connector and string are drawn through, they can be separated and the string left in position.



7.34 Rear light lens showing the retaining nuts

32 Refitting is a reversal of removal. Attach the wire to the string and draw it through the body panels, then disconnect the string and reconnect the light multi-plug at the bulkhead. When the light is refitted, check for satisfactory operation.

Rear light cluster

33 Working in the luggage area, release the rear bulbholder (according to type) from the side concerned as described in Section 5.

34 Unscrew the mounting nuts and withdraw the rear light lens from the rear of the vehicle (see illustration).

35 Renew the seal gasket if it is in poor condition. Refit in the reverse order to removal, and check for satisfactory operation of the rear lights on completion.

Number plate lights

36 Prise the number plate light from the rear bumper using a small screwdriver, then disconnect the wiring plug (see photo 13.26).

37 Refitting is a reversal of removal.

Rear foglight (1993 model year onwards)

38 With the tailgate open, undo the ten retaining screws and withdraw the tailgate inner trim panel.

39 Disconnect the bulbholder multi-plug, then undo the retaining nut and remove the foglight.

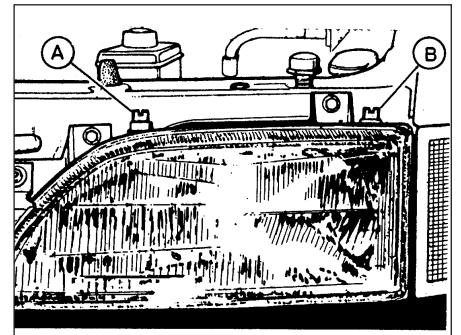
40 Refitting is a reversal of removal.

8 Headlight beam alignment - checking and adjustment



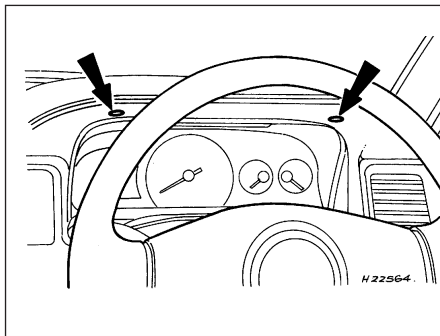
1 Accurate adjustment of the headlight beam is only possible using optical beam-setting equipment, and this work should therefore be carried out by a Ford dealer or service station with the necessary facilities.

2 Temporary adjustment can be made when the headlight has been removed and refitted, or to compensate for normal adjustment whenever a heavy load is being carried. Turn the adjustment screws on the top and rear of the headlight to make the adjustment (see illustration).



8.2 Horizontal (A) and vertical (B) headlight beam adjustment screws

12•12 Body electrical system



9.3 Instrument panel bezel retaining screw locations (arrowed)



9.4A Instrument cluster retaining screws



9.4B Detach the wiring multi-plugs from the instrument panel

3 Before making any adjustments to the headlight settings, it is important that the tyre pressures are correct, and that the vehicle is standing on level ground. Bounce the front of the vehicle a few times to settle the suspension. Ideally, somebody of normal size should sit in the driver's seat during the adjustment, and the vehicle should have a full tank of fuel.

4 Whenever temporary adjustments are made, the settings must be reset as soon as possible once the vehicle is in normal use.

9 Instrument panel - removal and refitting



Removal

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

2 Although not strictly necessary, in order to withdraw the instrument panel, the removal of the steering wheel will provide much improved access, particularly when detaching (and subsequently reconnecting) the speedometer cable and wiring multi-plugs from the rear of the unit. Refer to Chapter 10 for steering wheel removal and refitting procedures.

3 Undo the two retaining screws from the underside top edge of the instrument panel bezel and withdraw the bezel, releasing it from

the location clips each side and underneath (see illustration).

4 Unscrew and remove the four instrument panel retaining screws, and carefully withdraw the panel to the point where the wiring multi-plugs and the speedometer cable can be detached from the rear (see illustrations). Note that it may be necessary to push the speedometer cable through the from the engine compartment side to allow the instrument panel to be sufficiently withdrawn. Take care when handling the instrument panel whilst it is removed, and position it in a safe place where it will not get knocked or damaged. If a tachometer is fitted, do not lay the panel on its face for extended periods, as the silicone fluid in the tachometer may well be released.

Refitting

5 Refitting is a reversal of removal. On completion check the function of all electrical components.

10 Instrument panel components - removal and refitting

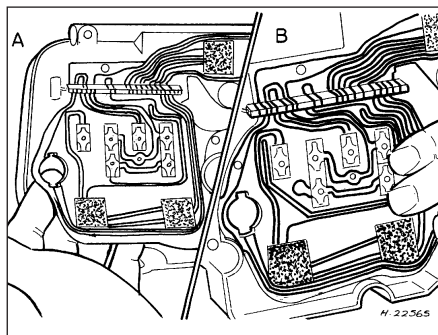


Removal

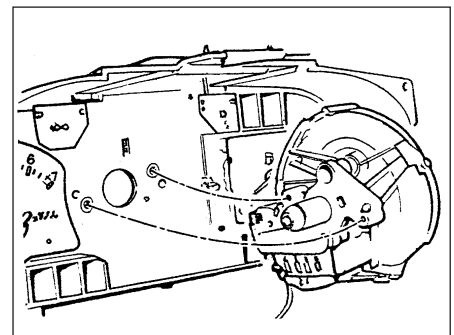
1 Remove the instrument panel as described in Section 9. As mentioned, take particular care when handling the panel.



10.2 Rear face of the instrument panel showing bulbholder locations



10.3 Printed circuit removal (A) and refitting (B) to/from the rear face of the instrument panel



10.4 Speedometer removal from the instrument cluster

Printed circuit

2 Untwist and remove all of the illumination light bulbs/holders from the rear of the instrument panel (see illustration).

3 Carefully release and remove the wiring multi-plug connector from the rear face of the panel. Pull free the printed circuit, releasing it from the securing pins and the air-cored gauge terminals on the rear face of the panel (see illustration).

Speedometer

4 Remove the odometer reset knob, then release the four securing clips and remove the two bulbs and the panel surround from the panel. Withdraw the speedometer (see illustration).

Tachometer

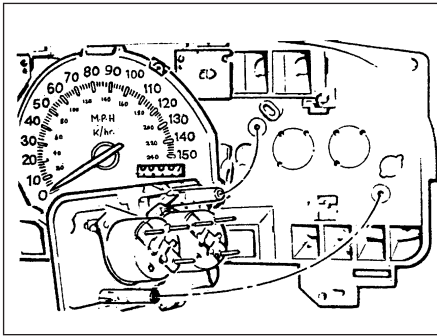
5 Remove the odometer reset knob, release the securing clips, remove the two bulbs and the panel surround from the panel.

6 Applying great care, detach the printed circuit from the air-cored gauge terminals, and remove the tachometer from the panel. Do not lay the gauge on its face for extended periods, as the silicone fluid in the tachometer may well be released.

Fuel/temperature gauge

7 Remove the odometer reset knob, release the securing clips, remove the two bulbs and the panel surround from the panel.

8 Applying great care, detach the printed



10.8 Air-cored fuel/temperature gauge removal from the instrument cluster

circuit from the air-cored gauge terminals. Undo the two retaining screws, and remove the fuel/temperature gauge from the panel (see illustration).

Refitting

9 Refitting is a reversal of removal. When refitting the printed circuit, ensure that it is gently pushed back into contact with the securing pins and gauge terminals.

11 Speedometer cable - removal and refitting

- 1 Remove the instrument panel as described in Section 9.
- 2 Unscrew the speedometer cable from the pinion/speed sensor on the transmission.
- 3 Release the cable ties and retaining clips in the engine compartment, and withdraw the cable grommet from the bulkhead.
- 4 Note the cable routing for use when refitting. Pull the speedometer cable through into the engine compartment, and remove it from the car (see illustration).
- 5 Refitting is the reversal of removal. Ensure that the cable is routed as noted before removal, secured with the relevant clips and cable ties, and that the grommet is properly located in the bulkhead.

12 Cigar lighter - removal and refitting

Removal

- 1 Disconnect the battery negative (earth) lead (refer to Chapter 5, Section 1).
- 2 Pull out the ashtray and reaching through its aperture in the fascia, disconnect the wiring from the cigar lighter.
- 3 Push the cigar lighter out of its location, and disconnect the wiring (see illustration).
- 4 Extract the lighter element, then reaching through with a thin-bladed screwdriver, unclip



11.4 Withdrawing the speedometer cable through the bulkhead

and release the lighter body from the illumination ring.

- 5 If required, the lighter illumination ring can be pulled free and withdrawn from the fascia.

Refitting

- 6 Refitting is a reversal of removal.

13 Clock - removal and refitting

Removal

- 1 Disconnect the battery negative (earth) lead (refer to Chapter 5, Section 1).
- 2 Proceed as described in Section 6, paragraph 21, and carefully prise the clock from the fascia. Disconnect the wiring plug from the rear face of the clock.

Refitting

- 3 Refitting is a reversal of removal. Reset the clock on completion.

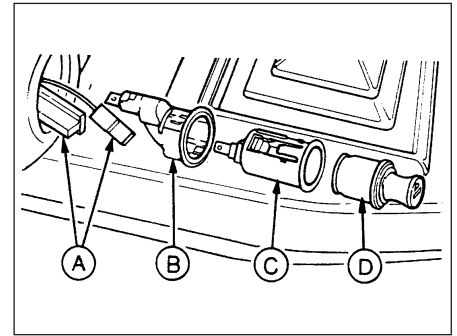
14 Horn - removal and refitting

Removal

- 1 The horn(s) are located on the body front valance, behind the front bumper (see



14.1 Horn location



12.3 Cigar lighter components

A Wiring connectors C Lighter body
B Illumination ring D Element

illustration). To remove a horn, first apply the handbrake, then jack up the front of the vehicle and support it on axle stands.

- 2 Disconnect the horn wiring plug(s).
- 3 Unscrew the nut securing the horn(s) to the mounting bracket, and remove the horn(s) from the vehicle.

Refitting

- 4 Refitting is a reversal of removal.

15 Wiper arms - removal and refitting

- 1 With the wiper(s) "parked" (ie in the normal at-rest position), mark the positions of the blade(s) on the screen, using a wax crayon or strips of masking tape.
- 2 Lift up the plastic cap from the bottom of the wiper arm, and loosen the nut one or two turns (see illustration).
- 3 Lift the wiper arm, and release it from the taper on the spindle by moving it from side to side.
- 4 Completely remove the nut and washer, then withdraw the wiper arm from the spindle.

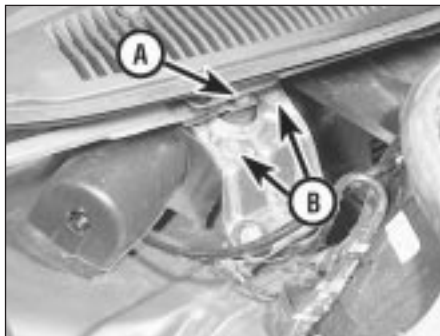
Refitting

- 5 Refitting is a reversal of the removal procedure. Make sure that the arm is fitted in the previously-noted position.

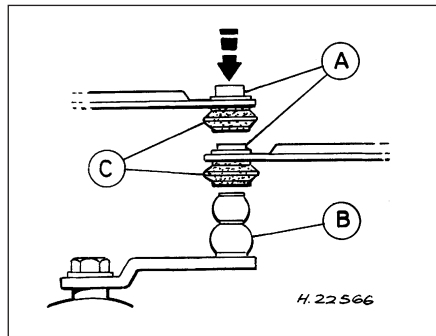


15.2 Windscreen wiper arm retaining nut

12•14 Body electrical system

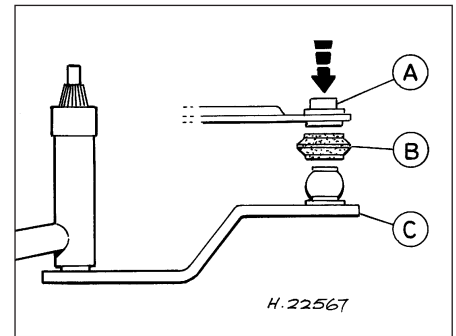


16.3 Windscreen wiper motor showing link arm-to-spindle connection (A) and two of the wiper motor-to-mounting retaining bolts (B)



16.7A Windscreen wiper linkage to motor balljoint connection

A Pivot bush C Rubber seal
B Wiper motor arm



16.7B Windscreen wiper linkage-to-pivot shaft connection

A Pivot bush C Pivot shaft
B Rubber seal

16 Windscreen wiper motor and linkage - removal and refitting



Removal

Wiper motor

- 1 Operate the wiper motor, then switch it off so that it returns to its rest position.
- 2 Disconnect the battery negative (earth) lead (refer to Chapter 5, Section 1).
- 3 Unscrew and remove the link arm-to-motor spindle retaining nut (see illustration). Disengage the arm from the spindle.
- 4 Undo the three wiper motor retaining bolts, then move the wiper motor sideways from its mounting bracket.
- 5 Detach the wiper motor wiring multi-plug, withdraw the wiper motor and remove its insulating cover.

Linkage

- 6 Remove the windscreen wiper arms (and blades) from the pivots as described in Section 15.
- 7 Disconnect the battery negative (earth) lead (refer to Chapter 5, Section 1). Move the wiper linkage to the required position for access to the linkage balljoints, then carefully prise free

the linkages from their ball pins using a suitable open-ended spanner as a lever (see illustrations).

8 Remove the rubber seal from the pivot bushes. Where the surfaces of the ball pins are damaged, the pivot shaft and/or motor must be renewed. The rubber seals which are located over the edge of the pivot bushes must be renewed during refitting.

Refitting

- 9 Refitting is a reversal of removal. Lubricate the pivot bushes and the rubber seals during reassembly. When reconnecting the link arm on the motor spindle, ensure that the arm lug engages in the slot in the taper of the motor spindle. Check for satisfactory operation on completion.

- 3 Remove the windscreen wiper arms as described in Section 15.

4 Detach and remove the cowl grille. This is secured by six plastic screws and two cross-head screws located under plastic caps (see illustration).

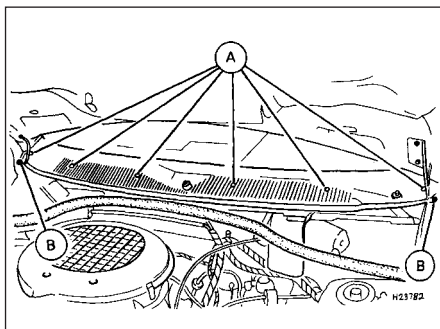
5 Unscrew and remove the four wiper motor bracket retaining bolts, then remove the wiper motor bracket assembly (see illustration). Disconnect the wiring multi-plug as the motor bracket assembly is withdrawn.

6 Prise free the wiper linkage from the pivot shaft using a suitable open-ended spanner.

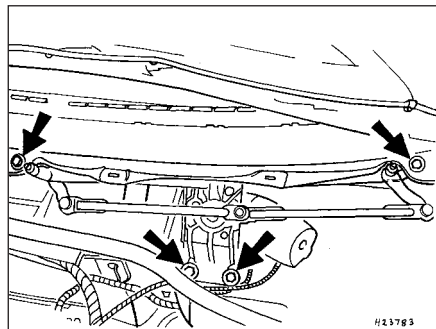
7 Pull free the pivot shaft cap from the housing, release the circlip, withdraw the two special washers and remove the pivot shaft. The special washer and spring washer can then be removed from the shaft (see illustration).

Refitting

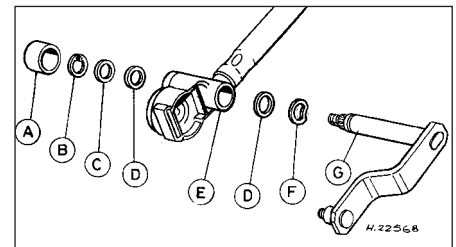
8 Refitting is a reversal of removal. Lubricate the pivot shaft, bushes and rubber seals during reassembly. When reconnecting the link arm on the motor spindle, ensure that the arm lug engages in the slot in the taper of the motor spindle. Check for satisfactory operation on completion.



17.4 Remove the plastic screws (A) and the cross-head screws (B) to remove the cowl grille



17.5 Wiper motor bracket retaining bolt locations



17.7 Wiper pivot shaft components

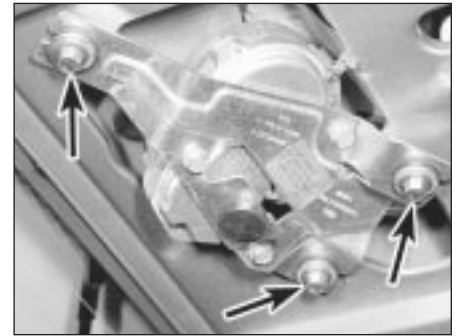
A Cap D Special washer
B Circlip E Bush
C Special washer (1.8 mm) F Wave washer
G Pivot shaft



18.6 Tailgate wiper earth lead and in-line connector



18.7A Tailgate wiper motor and mounting bolts (arrowed) on Hatchback models



18.7B Tailgate wiper motor and mounting bolts (arrowed) on Estate models

18 Tailgate wiper motor assembly - removal and refitting



Removal

- 1 Operate the wiper, then switch it off so that it returns to its rest position. Note that the wiper motor will only operate with the tailgate shut, as the spring-tensioned connector pins must be in contact with the contact plates.
- 2 Disconnect the battery negative (earth) lead (refer to Chapter 5, Section 1).
- 3 Remove the wiper arm with reference to Section 15.
- 4 Unscrew the nut from the spindle housing protruding through the tailgate.
- 5 Undo the eight plastic screws (early models), ten screws (later models) and remove the trim panel from inside the tailgate.

- 7 Unbolt and remove the wiper assembly from inside the tailgate (see illustrations).
- 8 If necessary, the wiper motor can be detached from its mounting bracket by unscrewing the three retaining bolts (see illustration). As they are detached, note the location of the washers and insulators.

Refitting

- 9 Refitting is a reversal of removal. When the wiper arm is refitted, its park position should

be set correctly. On Hatchback models, the distance from the point where the arm meets the centre of the wiper blade should be 90 ± 5 mm from the bottom of the rear window. On Estate models, this distance should be 75 ± 5 mm.

19 Windscreen/tailgate washer system components - removal and refitting



Removal

Washer pump

- 1 To remove the pump from the reservoir, first syphon out any remaining fluid from the reservoir, then detach the washer hoses and the wiring multi-plug to the washer pump. The pump can now be pulled (or if required), levered free from the reservoir (see illustration).

Reservoir and pump

- 2 To remove the washer reservoir and pump, first unscrew and remove the reservoir retaining bolt in the engine compartment (see illustration).
- 3 Refer to Chapter 11 for details, and remove the wheel arch liner trim on the left-hand side.
- 4 Detach the pump multi-plug, the washer low fluid level switch multi-plug (where fitted) and the pump hoses, and disconnect them from the reservoir. Drain any fluid remaining in



18.7C Removing the wiper motor from the tailgate (Hatchback models)

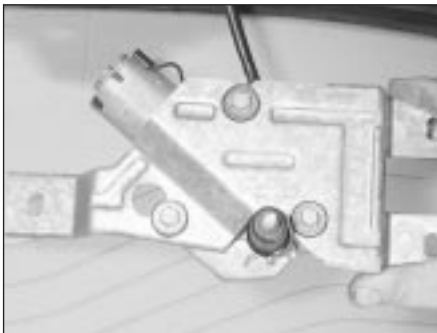
the reservoir/pump into a suitable container.

- 5 Unscrew and remove the two reservoir retaining bolts from under the wheel arch, then remove the reservoir and pump from the vehicle.

- 6 If required, pull or prise free the pump to remove it from the reservoir.

Hoses

- 7 The hose system to the windscreen washers is in sections, with nylon connector pieces where required. This means that any section of hose can be renewed individually when required. Access to the hoses in the engine compartment is good, but it will be necessary to detach and remove the insulation panel from the underside of the bonnet to allow access to the hoses and connections to the washer nozzles.



18.8 Tailgate wiper motor-to-mounting bracket bolts (Hatchback models)



19.1 Washer pump and hose locations under the front wheel arch



19.2 Washer reservoir retaining bolt in the engine compartment

12•16 Body electrical system



19.9 Remove trim for access to the tailgate washer nozzle

8 The front washer reservoir also supplies the rear tailgate washer by means of a tube running along the left-hand side within the body apertures.

Nozzles

9 These are secured to the body panels by retaining tabs which are an integral part of the washer nozzle stem. To remove a washer nozzle, first detach and remove the insulation from the underside of the bonnet, or the appropriate trim piece (according to type) for the tailgate washer (**see illustration**).

10 Using suitable needle-nosed pliers, squeeze together the nozzle retaining tabs, twist the nozzle a quarter of a turn, and withdraw it from its aperture in the body (**see illustration**). Once withdrawn, the hose can be detached and the nozzle removed. Do not allow the hose to fall into the body whilst the nozzle is detached - tape the hose to the body to prevent this.

Refitting

11 Refitting is a reversal of removal. Always renew the pump-to-reservoir seal washer, and ensure that all connections are securely made. When reconnecting the pump hoses, ensure that the hose marked with white tape is connected to the corresponding white connection on the pump.

12 On completion, top-up the washer reservoir using a suitable washer additive and check that the operation of the washers is satisfactory. If necessary, adjust the washer



19.10 Washer nozzle removal

jets by inserting a pin into the centre of the jet and directing the flow at the top part of the windscreen/rear window.

20 Radio/cassette player - removal and refitting**Removal**

1 Disconnect the battery negative (earth) lead (refer to Chapter 5, Section 1). If the radio has a security code, make sure this is known before disconnecting the battery.

2 In order to release the radio retaining clips, two U-shaped rods must be inserted into the special holes on each side of the radio (**see illustration**). If possible, it is preferable to obtain purpose-made rods from an audio specialist, as these have cut-outs which snap firmly into the clips so that the radio can be pulled out. Pull the unit squarely from its aperture, or it may jam. If the unit proves difficult to withdraw, remove the cassette tray (or where applicable, the CD player) from beneath the unit, then reach through the aperture and ease it out from behind. From 1993 model year onwards, it will first be necessary to remove the two side bezels using a Ford tool, to gain access to the removal tool holes.

3 With the radio/cassette sufficiently withdrawn, disconnect the feed, earth, aerial

and speaker leads (**see illustration**). Where applicable, also detach and remove the plastic support bracket from the rear of the unit.

Refitting

4 Refitting is a reversal of removal. When the leads are reconnected to the rear of the unit, press it into position to the point where the retaining clips are felt to engage. Reactivate the unit in accordance with the code and the instructions given in the Ford Audio Operating Manual supplied with the vehicle.

21 Compact disc player - removal and refitting

The removal and refitting procedures for this (where fitted) are similar to those described for the radio/cassette player in the previous Section, but do not remove the bezel securing screws above the CD player.

22 Speakers - removal and refitting**Removal****Door-mounted speaker**

1 Remove the trim panel from the door concerned as described in Chapter 11. Undo the speaker retaining screws, then withdraw the speaker from the door and disconnect the wiring (**see illustration**). Note that the speaker must not be detached from its moulding.

Rear quarter panel-mounted speaker (Cabriolet models)

2 Lower the hood. If the hood is manually-operated, lock it in the lowered position, then pull free the roof release lever knob.

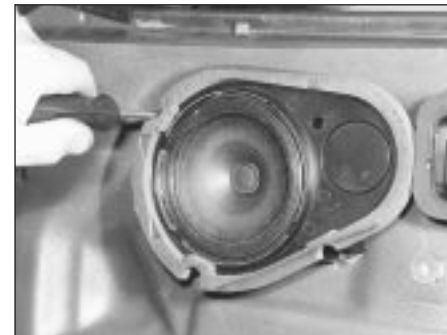
3 Remove the quarter window regulator or lift switches (according to type), and remove the rear quarter trim panel as described in Chapter 11. Undo the three retaining screws



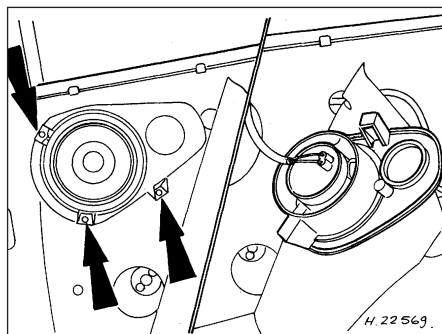
20.2 Radio/cassette removal



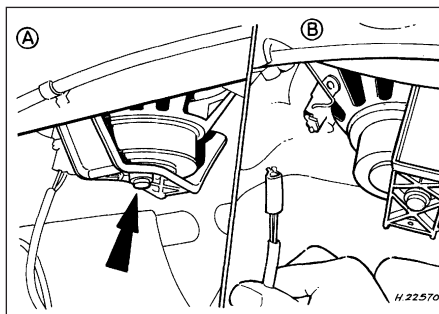
20.3 Wiring and aerial lead connections on the rear face of the radio/cassette



22.1 Door-mounted speaker removal



22.3 Rear quarter panel speaker retaining screws and wiring connector on Cabriolet models



22.4 Remove the retaining bolt (A) and detach the wiring connector (B) to remove the rear parcel shelf-mounted speaker on Saloon models



22.5 Rear parcel shelf-mounted speaker (Hatchback models)

and withdraw the speaker (see illustration). Disconnect the wiring from the speaker. Note that the speaker must not be detached from its moulding.

Rear parcel shelf-mounted speaker (Saloon models)

4 Detach the wiring connector from the speaker, then loosen off (but do not remove), the speaker retaining bolt sufficiently to allow the speaker to be withdrawn, leaving the bracket and bolt in position in the speaker recess (see illustration).

Rear parcel tray-mounted speaker (Hatchback models)

5 Unscrew the three retaining screws, lower the speaker from the parcel tray, then detach the wiring connections (see illustration). Note that the speaker and its moulding must not be separated.

Luggage area trim-mounting speaker (Estate models)

6 Remove the appropriate luggage area side trim panel as described in Chapter 11 for access to the speaker.

7 Unscrew the three retaining screws, withdraw the speaker and detach the wiring connections (see illustrations). Note that the speaker and its moulding must not be separated.

Refitting

8 Refitting is a reversal of removal.



22.7A Luggage area-mounted speaker (Estate models)



22.7B Detach the wiring from the speaker

23 Radio aerial - removal and refitting

Removal

Manual type (Hatchback, Saloon and Estate models)

1 Remove the trim cover from the access aperture in the headlining beneath the aerial by carefully prising it free.

2 Working through the aperture in the headlining, undo the single retaining screw, withdraw the aerial and detach the cable base from the roof (see illustration).

Manual type (Cabriolet models)

3 Open the boot lid, disconnect its support strut from the left-hand side panel, then undo the two retaining screws and remove the luggage area side trim panel.

4 Unscrew and remove the aerial mast, then unscrew and remove the collar retaining nut to remove the spacer and upper seal washer (see illustration).

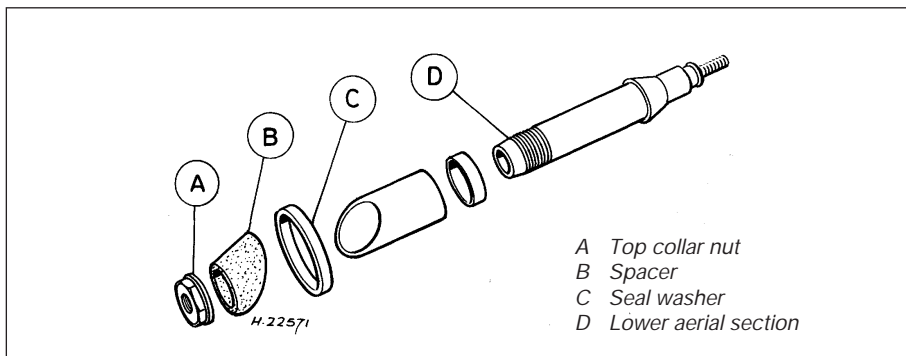
5 Working within the luggage area side of the quarter panel, unscrew the lead and remove the aerial.

Electric aerial (Cabriolet models)

6 Open the boot lid, disconnect its support strut from the left-hand side panel, then undo the two retaining screws and remove the luggage area side trim panel.

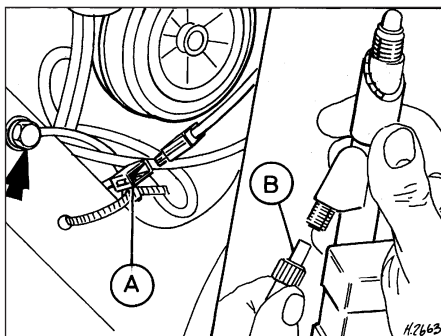


23.2 Roof-mounted aerial retaining screw



23.4 Manual aerial components on Cabriolet models

12•18 Body electrical system



23.9 Electric aerial wiring (A) and aerial (B) connections

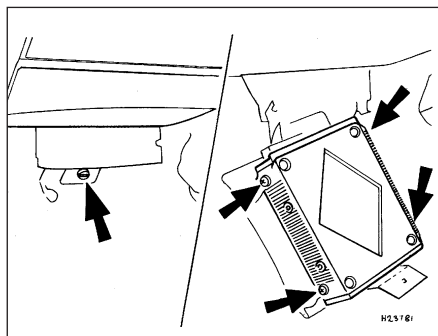
7 Unscrew the aerial upper retaining nut, then remove the bezel and the seal washer.

8 Working from the luggage area side, unscrew and remove the self-tapping screw securing the aerial bottom bracket to the apron.

9 Unscrew the knurled type nut to detach the aerial from the base of the unit, then detach the wiring and aerial lead at their connections, and withdraw the aerial from the vehicle (see illustration).

Refitting

10 Refitting is a reversal of removal. Ensure



24.2 Power amplifier securing bolts

that the contact surfaces of both the body panel and the aerial are clean before fitting the aerial into position.

24 Power amplifier - removal and refitting

Removal

1 This is fitted to models equipped with the Premium Sound System, and is located in the area between the glovebox and the bulkhead.

2 To remove the amplifier, undo the retaining screw, lower the unit complete with its support bracket, and detach the wiring multi-plug connectors (see illustration). If required, the bracket and the amplifier can be separated by unscrewing the four Torx screws.

Refitting

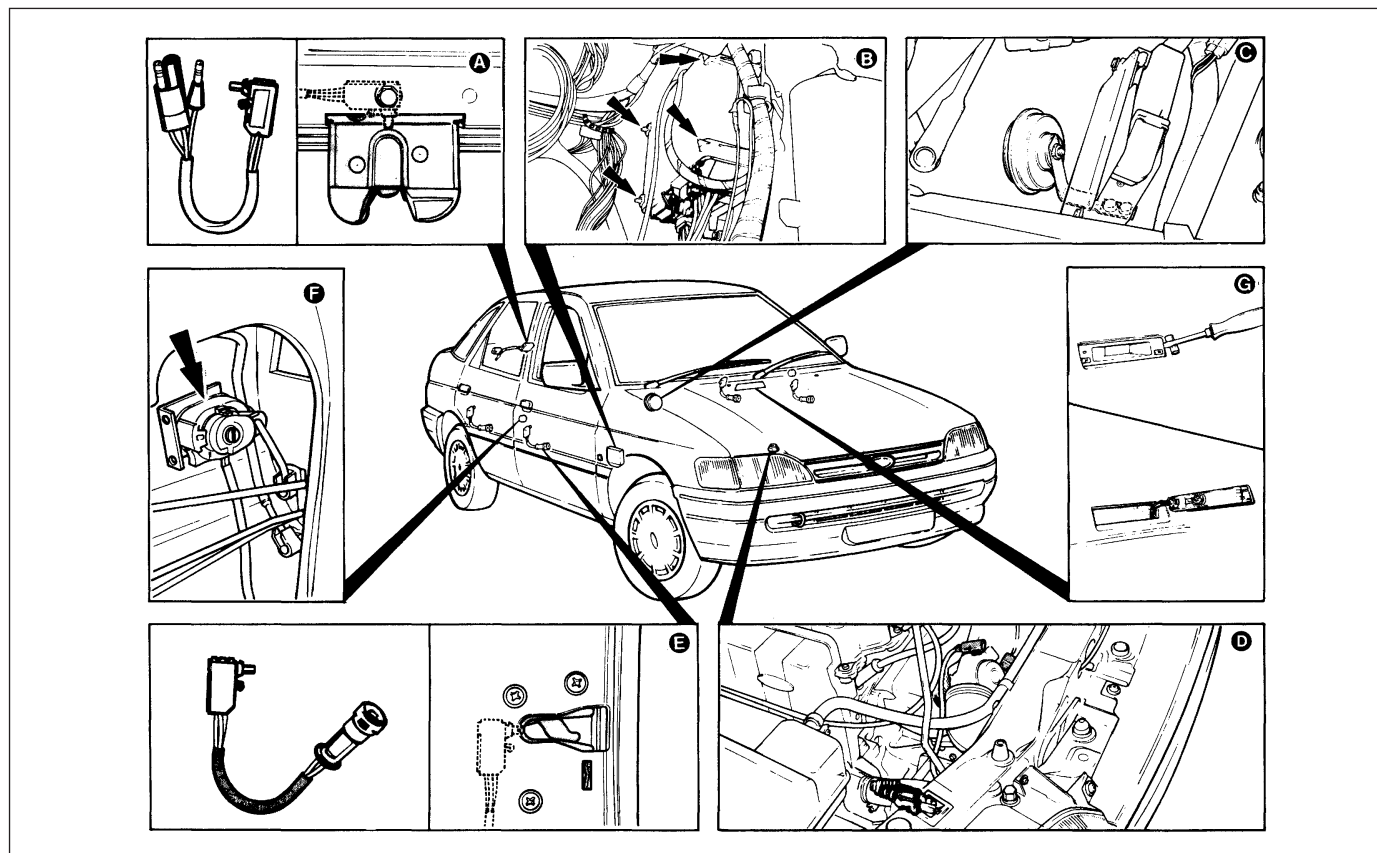
3 Refit in the reverse order of removal.

25 Anti-theft systems - general information

Anti-theft alarm system

1 This system provides an added form of vehicle security (see illustration). When the system is activated, the alarm will sound if the vehicle is broken into through any one of the doors, the bonnet, boot (or tailgate). The alarm will also be triggered if the ignition system is turned on or the radio/cassette disconnected whilst the system is activated.

2 This system is activated/de-activated whenever one of the front doors is locked/unlocked by the key. The system operates on all doors, the bonnet and boot lid (or tailgate) whenever each door is individually



25.1 Anti-theft alarm system components and their locations

A Trip switch (luggage compartment)

B System module
C Alarm horn

D Alarm switch (bonnet)
E Alarm switch (doors)

F Activation switches
G Clock

locked (or, in the case of central locking, when the central locking is engaged). It is important to note that opening the bootlid/tailgate first when the system is activated will trigger the alarm. In addition to the alarm being sounded, the ignition/starting system is also immobilised when the system is activated.

3 A further security feature included is that even though the battery may be disconnected whilst the system is activated, the alarm activation continues as soon as the battery is reconnected. Because of this feature, it is important to ensure that the system is deactivated before disconnecting the battery at any time, such as when working on the vehicle.

4 The system incorporates a diagnostic mode to enable Ford technicians to quickly identify any faults in the system.

Anti-theft alarm system activation and check

5 Fully insert the door lock key into the lock of the front door (driver's or passenger side), turn the key as far as possible, and hold in this position for one second. With the doors, bonnet and boot lid/tailgate all closed, a twenty-second activation delay starts from this point, although access to the luggage area is still possible within the activation period without triggering the alarm. When the bootlid/tailgate is closed, the activation period of twenty seconds restarts.

6 The initial activating period is confirmed by the control light in the clock flashing on and off rapidly; when the activation period is complete, the control light flashes at a reduced rate.

7 De-activation of the alarm system can only be made by unlocking either of the front doors with the key. This also applies when the alarm has been triggered. If the bootlid/tailgate is opened before one of the front doors is unlocked, the alarm will be tripped, and can only be stopped by unlocking one of the front doors.

8 Any malfunctions in the system will be indicated by the action of the control light as soon as the ignition is switched on. When the system is in good order, the control light will come on for five seconds; where a system fault exists, the light will stay on for twenty seconds.

9 As well as the above-mentioned features, models fitted with central locking incorporate a double locking system, whereby the inner door handles are also locked. This system is activated by turning the door key fully to the rear (unlocked) position, then to the front (locked) position within a period of four seconds. A sound buzzer indicates that the vehicle is double-locked. When this system is in operation, it can only be de-activated using the door key to unlock one of the front doors. In the event of the battery going flat or an electrical fault in the system developing whilst the system is activated, the doors can still be unlocked in the normal manner using the key.

10 The bootlid/tailgate remote release fitted to the centre console is only active when the ignition is switched off and double locking is not engaged.

11 Any malfunctions in this system are indicated by the control light in the clock in the same manner as that described for the conventional anti-theft alarm system (paragraph 8).

12 In the event of a fault in the system being indicated, first check that all doors, the bonnet and the bootlid/tailgate are fully closed. If the system switches are checked, ensure that their wiring connections are good and secure, also that the switch plungers are clean and are able to move freely.

Passive Anti-Theft System (PATS)

13 From 1994 model year onwards, a Passive Anti-Theft System (PATS) is fitted. This system, (which works independently of the standard alarm system) is a vehicle immobiliser which prevents the engine from being started unless a specific code, programmed into the ignition key, is recognised by the PATS transceiver.

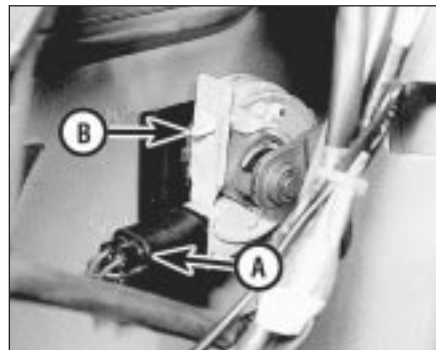
14 The PATS transceiver, fitted around the ignition switch, decodes a signal from the ignition key as the key is turned from position "O" to position "II". If the coded signal matches that stored in the memory of the PATS module, the engine will start. If the signal is not recognised, the engine will crank on the starter but will not fire.

15 The PATS status is indicated by the LED control light in the clock as used for the anti-theft alarm system.

26 Anti-theft system components - removal and refitting

Removal

1 Before disconnecting any components of the anti-theft alarm system, first check that the system is de-activated, then disconnect the battery negative (earth) lead (refer to Chapter 5, Section 1).



26.3 Door lock switch wiring connector (A) and retaining catch (B)

Door lock switch

2 Remove the trim panel and the insulation sheet from the door, as described in Chapter 11.

3 Detach the wiring multi-plug connector from the alarm switch in the door (see illustration).

4 Release the snap-lock catch, withdraw the switch from the door lock cylinder, and remove it from the door.

Door lock ajar switch

5 Remove the trim panel and the insulation sheet from the door, as described in Chapter 11.

6 Detach the wiring multi-plug from the door lock ajar switch.

7 Remove the door lock as described in Chapter 11.

8 Release the retaining clip, and detach the door ajar switch from the door lock. It is probable that the retaining clip will break when releasing the switch, in which case it will need to be renewed.

Bootlid/tailgate ajar switch

9 Undo the retaining screws, and remove the trim panel from the bootlid or tailgate (as applicable).

10 Detach the wiring loom multi-plug, then referring to Chapter 11 for details, remove the lock from the bootlid/tailgate.

11 Release the retaining clip and detach the ajar switch from the lock unit. It is probable that the retaining clip will break when releasing the switch, in which case it will need to be renewed.

Bonnet alarm switch

12 Grip the switch flange, and pull the switch up and clear of its aperture in the front cross-panel (see illustration).

13 Disconnect the wiring connector and remove the switch.

Alarm horn

14 Where the vehicle is fitted with ABS, detach and remove the ABS module as described in Chapter 9.

15 Detach the wiring from the horn, undo the horn bracket retaining bolts, and remove the



26.12 Bonnet alarm switch removal (anti-theft alarm system)

12•20 Body electrical system



26.15 Alarm system horn

horn together with its retaining bracket (see illustration).

Alarm system module

16 Detach and remove the cowl side trim kick panel.

17 Detach the wiring multi-plug from the module, then release the module from the four retaining clips and remove it.

PATS transceiver

18 Undo the two upper and four lower retaining screws, and remove the steering column upper and lower shrouds.

19 Undo the five screws and withdraw the detachable lower facia panel from beneath the steering column.

20 Undo the single screw, and withdraw the PATS transceiver from the ignition switch/steering lock barrel (see illustration).

21 Release the wiring harness from the clips on the steering column, trace the harness under the facia, and disconnect the wiring multi-plug. Remove the transceiver from the car.

PATS module

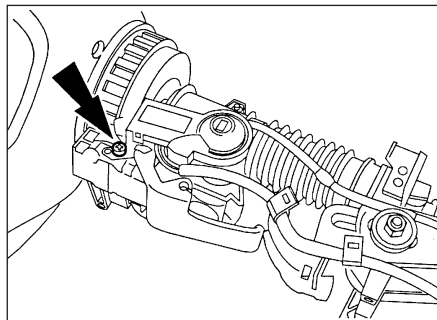
22 Refer to Chapter 11 and remove the facia.

23 Disconnect the wiring multi-plug from the PATS module, located on the bulkhead on the passenger's side.

24 Pull the module downwards to remove it from the mounting bracket.

Refitting

18 The refitting of the respective components



26.20 Undo the screw (arrowed) and withdraw the PATS transceiver from the ignition switch/steering lock barrel

is a reversal of the removal procedure. Ensure that all component retaining clips are secure, that the wiring looms are correctly routed, and that the wiring connections are secure. Check for satisfactory operation of the systems to complete.

27 Air bag (driver's side) - removal and refitting



Warning: Handle the air bag with extreme care as a precaution against personal injury, and always hold it with the cover facing away from your body. If in doubt concerning any proposed work involving the air bag or its control circuitry, consult a Ford dealer or other qualified specialist.

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



Warning: Before proceeding, wait a minimum of 15 minutes, as a precaution against accidental firing of the air bag unit. This period ensures that any stored energy in the back-up capacitor is dissipated.

2 Undo the two screws, and remove the steering column upper shroud.

3 Turn the steering wheel as necessary so that one of the air bag retaining bolts becomes accessible from the rear of the steering wheel. Undo the bolt, then turn the steering wheel again until the second bolt is accessible. Undo this bolt also.

4 Withdraw the air bag from the steering wheel far enough to access the wiring multi-plug (see illustration). Some force may be needed to free the unit from the additional steering wheel spoke retainers.

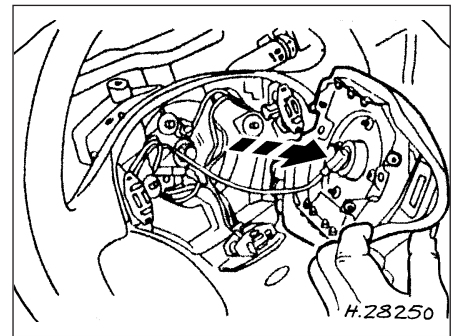
5 Disconnect the multi-plug from the rear of the unit, and remove it from the vehicle.



Warning: Position the air bag in a safe place, with the mechanism facing downwards as a precaution against accidental operation.



Warning: Do not attempt to open or repair the air bag unit, or apply any electrical current to it. Do not use any air bag which is visibly



27.4 Withdrawing the air bag module from the steering wheel

damaged or which has been tampered with.

Refitting

6 Refitting is a reversal of the removal procedure.

28 Air bag control module - removal and refitting

**Removal**

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

Warning: Before proceeding, wait a minimum of 15 minutes, as a precaution against accidental firing of the air bag unit. This period ensures that any stored energy in the back-up capacitor is dissipated.

2 Undo the six screws and withdraw the detachable lower facia panel from beneath the steering column.

3 Disconnect the multi-plug from the module, by pressing the locking tab upwards and swivelling the retaining strap.

4 Unscrew the mounting bolts and remove the module from the vehicle.

Refitting

5 Refitting is a reversal of the removal procedure.

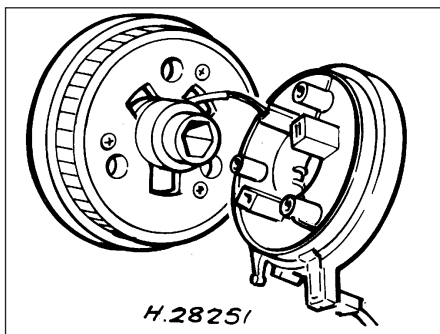
29 Air bag clock spring - removal and refitting

**Removal**

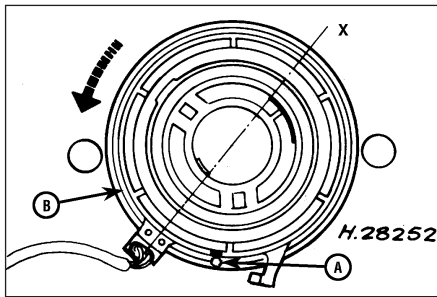
1 Remove the steering wheel as described in Chapter 10.

2 Disconnect the wires at the two horn terminals in the centre of the steering wheel.

3 Undo the three retaining screws, and remove the clock spring/horn slip ring from the steering wheel (see illustration). As the unit is withdrawn, note which aperture in the steering wheel the air bag wiring passes through, as an aid to reassembly.



29.3 Removing the air bag clock spring assembly from the steering wheel



29.8 Centring the air bag clock spring. Depress locking pin (A) and rotate outer rotor (B) anti-clockwise ("X" indicates relative position of the direction indicator cancelling cam to the cable connector - see text)

Refitting

4 Apply a smear of molybdenum disulphide grease to the horn slip rings.

5 Position the clock spring/horn slip ring on the steering wheel, and secure with the retaining screws.

6 Reconnect the two horn wires to their terminals.

7 The clock spring must now be centred as follows.

8 Depress the locking pin, and rotate the clock spring outer rotor fully anti-clockwise until it is tight (**see illustration**).

9 Now turn the outer rotor approximately 3.75 turns clockwise, then release the locking pin. Ensure that the locking pin engages when it is released.

10 Check that the relative position of the direction indicator cancelling cam to the cable connector on the clock spring assembly is as shown (**see illustration 29.8**).

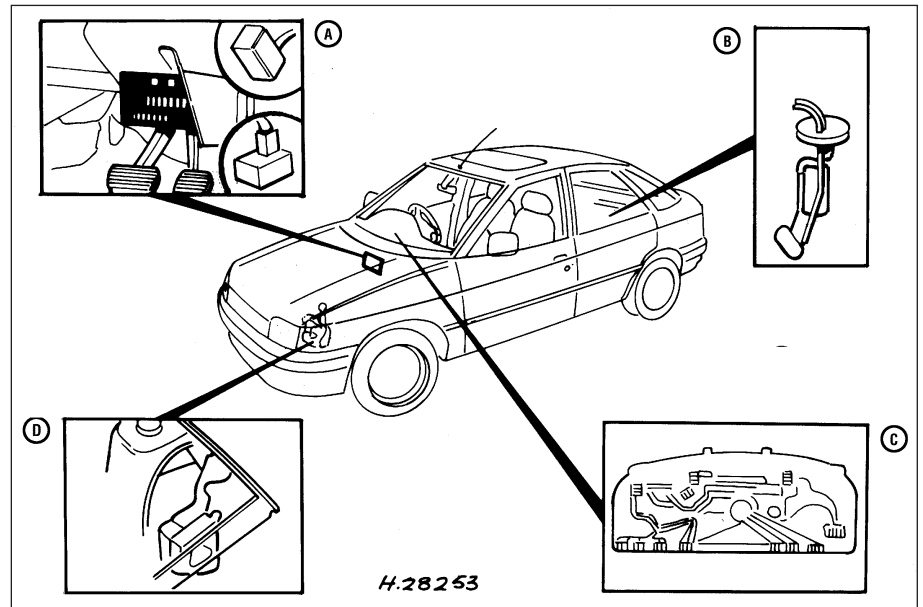
11 Refit the steering wheel as described in Chapter 10.

30 Auxiliary warning system - general information and component renewal



1 An auxiliary warning system is available as an option on certain models (**see illustration**). The system has three functions - low fuel warning, low washer fluid level warning, and an "ignition off, lights on, driver's door open" warning.

2 The low fuel and washer fluid level warnings are provided by warning lights in the instrument panel and the "ignition off, lights



30.1 Auxiliary warning system components

A Control module

B Low fuel level float

C Instrument panel warning lights

D Low washer fluid level switch

on, driver's door open" warning is provided by an audible alarm tone.

3 The warning lights are activated by floats which monitor the fuel and fluid levels. The float for the low fuel level is an integral part of the fuel gauge sender, and activates the warning light when the fuel level in the tank drops to below 10 litres (2.2 gallons). The float for the washer fluid level is contained in the fluid reservoir, and consists of a magnet which operates a reed switch inserted in the side of the reservoir. When the fluid level falls to the level of the reed switch, the magnet on the float activates the switch to illuminate the warning light.

4 The alarm tone for the "ignition off, lights on, driver's door open" warning is activated by the driver's door courtesy light switch if the door is opened with the ignition switched off and the lights left on.

5 The operation of the system is controlled by a control module assembly located under the facia above the fusebox.

Component renewal

Warning lights

5 The procedure for warning light bulb renewal is contained in Section 6.

Low fuel level float

6 The low fuel level float is part of the fuel gauge sender - removal and refitting procedures are contained in Chapter 4.

Low washer fluid level reed switch

7 Remove the windscreen washer reservoir as described in Section 19.

8 Withdraw the switch from the side of the reservoir by levering against the switch body.

9 Ensure that the sealing grommet is correctly fitted in the reservoir, then push the switch fully into the grommet to refit.

10 Refit the washer reservoir as described in Section 19.

Control module assembly

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

12 Undo the six screws and withdraw the detachable lower facia panel from beneath the steering column.

13 Unclip the control module, and disconnect the multi-plug.

14 Refitting is a reversal of removal.

12•22 Wiring diagrams

1. All diagrams are divided into numbered circuits depending on function e.g. Diagram 18 : Typical Interior lighting.
2. Items are arranged in relation to a plan view of the vehicle.
3. Items may appear on more than one diagram so are found using a grid reference e.g. 2/A1 denotes an item on diagram 2 grid location A1.
4. Complex items appear on the diagrams as blocks and are expanded on the internal connections page.
5. Feed wires are coloured red (black when switched) and all earth wires are coloured brown.
6. Brackets show how the circuit may be connected in more than one way.
7. Not all items are fitted to all models.

CENTRAL ELECTRIC BOX
FUSE RATING CIRCUIT

1	30A	Heated Rear Window And Electric Mirrors
2	30A	Anti-lock Braking System
3	10A	Lambda Sensor
4	15A	Main Beam RH
5	20A	Fuel Pump
6	10A	Side Light LH, Instrument Illumination
7	10A	Side Light RH
8	10A	Foglight Rear
9	30A	Cooling Fan
10	10A	Dip Beam LH
11	15A	Foglight Front
12	10A	Direction Indicator, Reversing Lights
13	20A	Wiper Motor, Washer Pump
14	20A	Heater Blower
15	30A	Anti-lock Braking System
16	3A	Windscreen De-ice
17	3A	Windscreen De-ice Relay
18	15A	Main Beam LH
19	20A	Central Door Locking/Anti-theft Alarm
20	15A	Horn, Hazard Flashers
21	15A	Interior Lights, Cigar Lighter, Radio, Clock
22	30A	Electric Windows
24	10A	Dip Beam RH
25	3A	EEC IV Module
27	10A	Stop Lights, Heated Washer Jets

KEY TO SYMBOLS

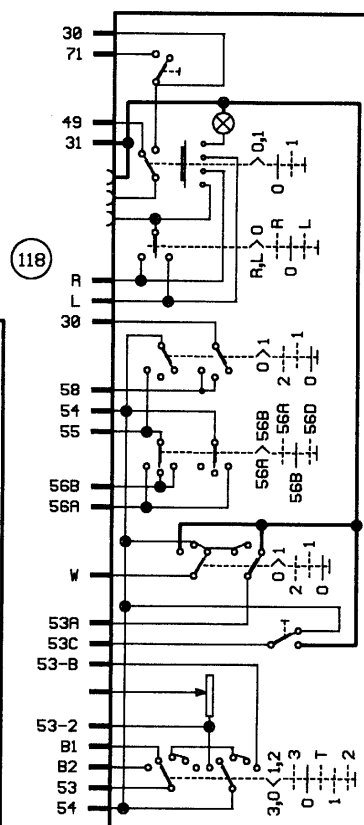
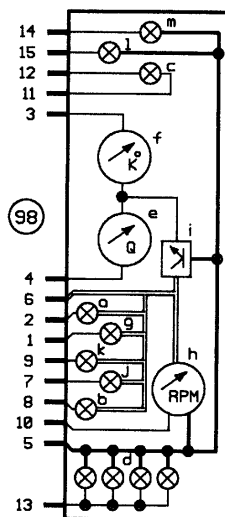
PLUG-IN CONNECTOR	
EARTH	
BULB	
DIODE	
FUSE	
SOLDERED JOINT	

MAXI-FUSEBOX
FUSE RATING CIRCUIT

A	80A	Central Electric Box
B	60A	Central Electric Box
C	60A	Central Electric Box
D	50A	Cooling Fan Motor
E	50A	Heated Windscreen
F	50A	Glow Plug Relay (Diesel)

INTERNAL CONNECTION DETAILS

- a = Alternator Warning Light
 b = Handbrake Warning Light
 c = Main Beam Warning Light
 d = Instrument Illumination
 e = Fuel Gauge
 f = Temperature Gauge
 g = Oil Pressure Light
 h = Tachometer
 i = Voltage Stabilizer
 j = ABS Warning Light
 k = Choke Warning Light
 l = Flasher Warning Light LH
 m = Flasher Warning Light RH

KEY TO INSTRUMENT CLUSTER
(ITEM 98)

H24988

T.M.MARKE

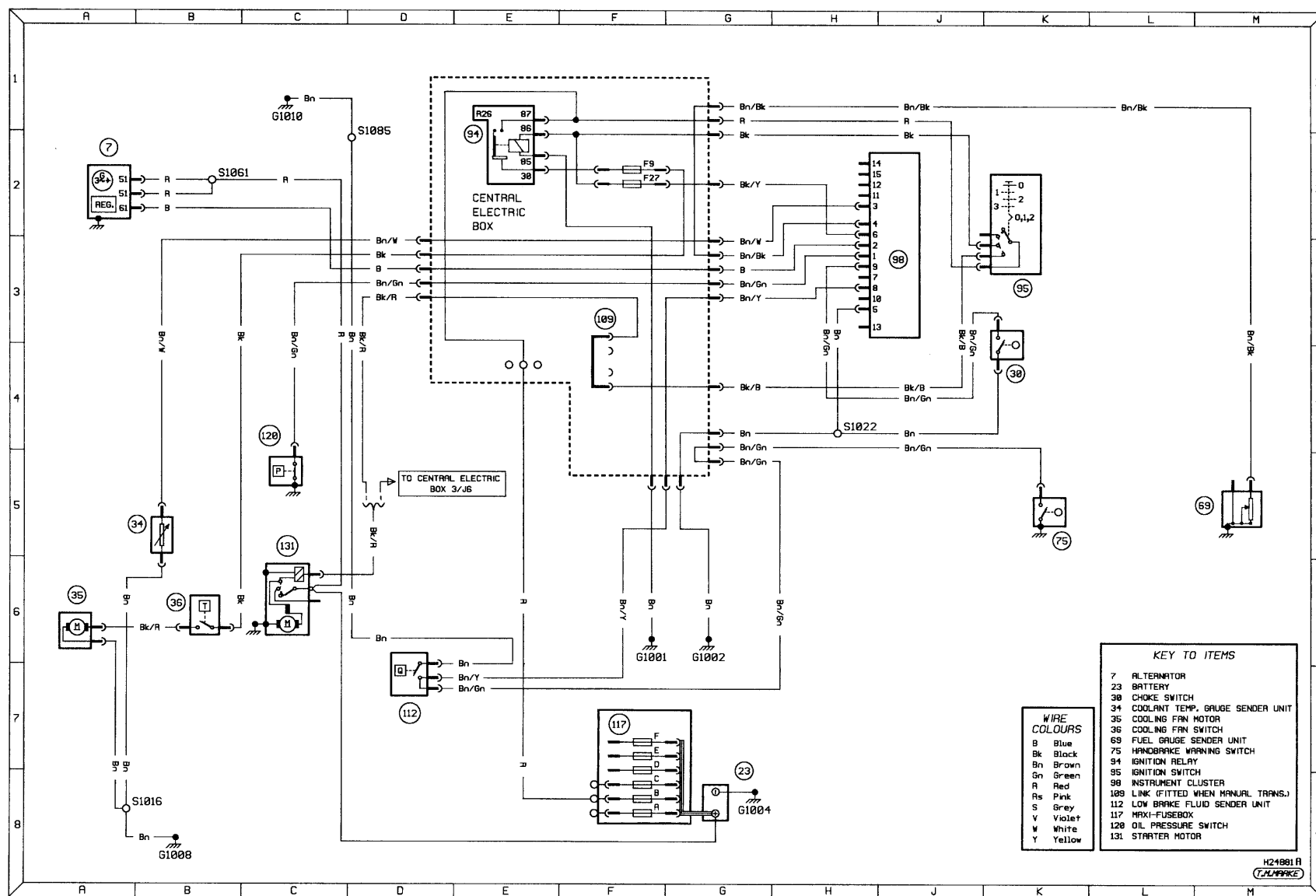


Diagram 1: Typical starting, charging, cooling fan, gauges and warning lights

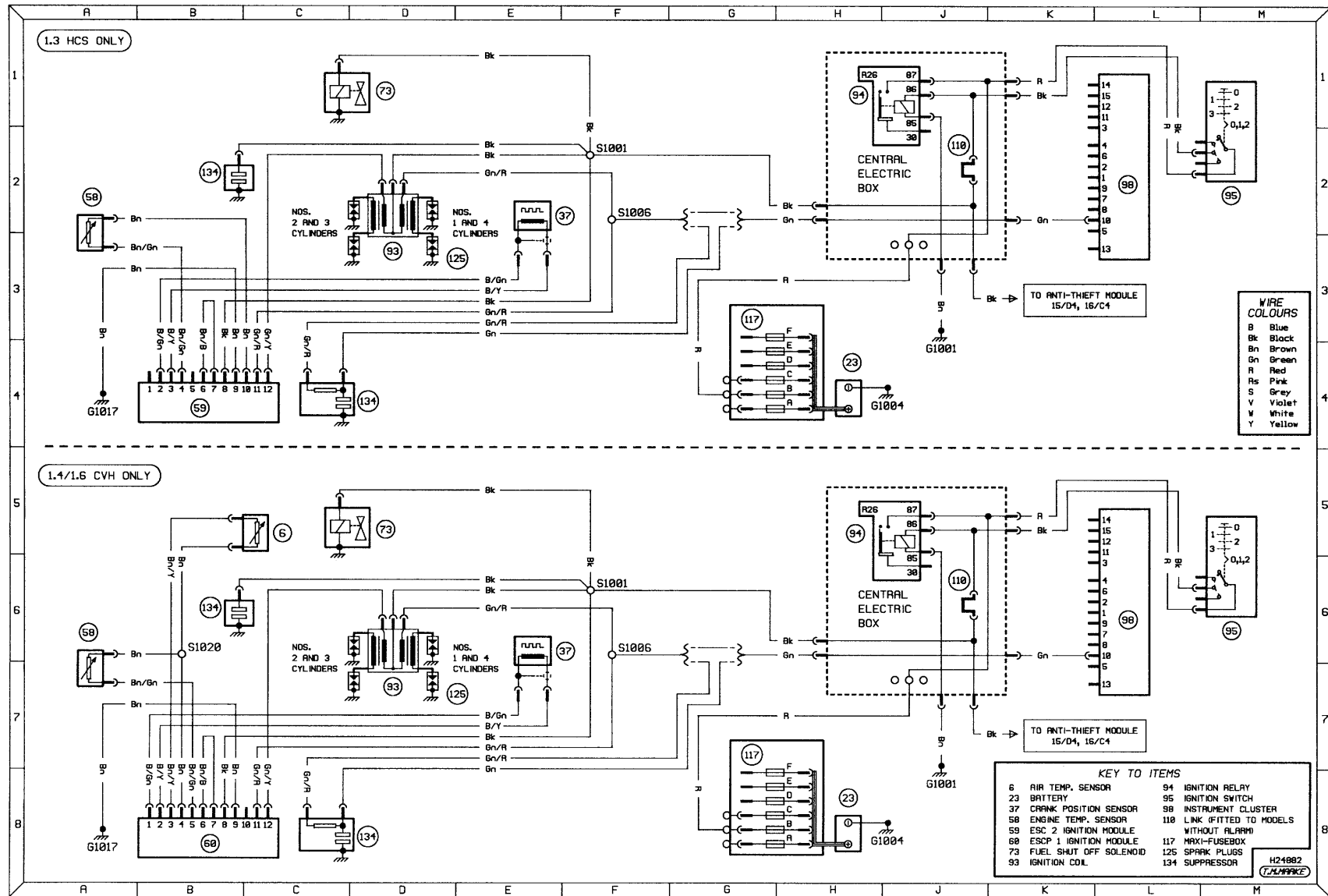
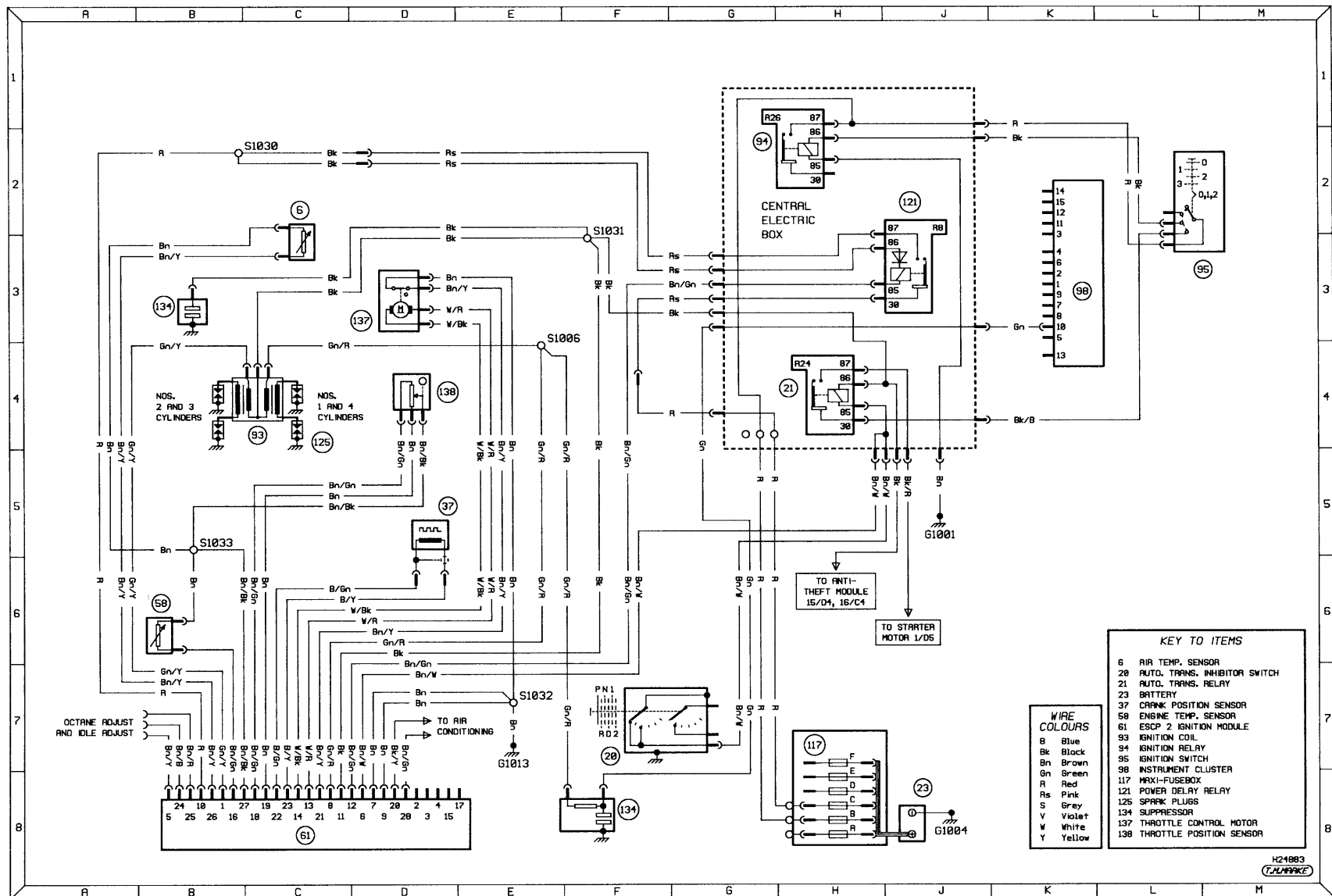
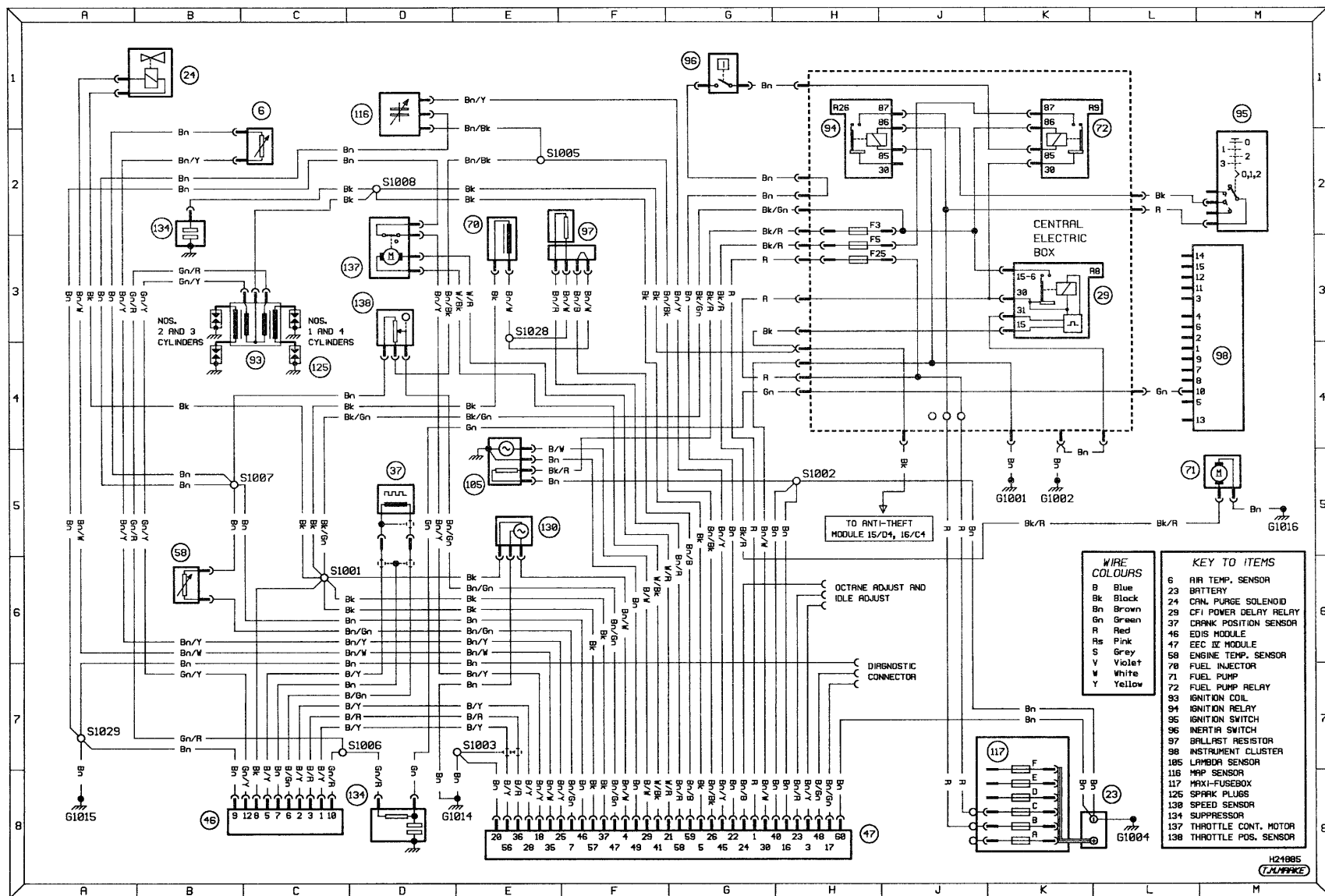


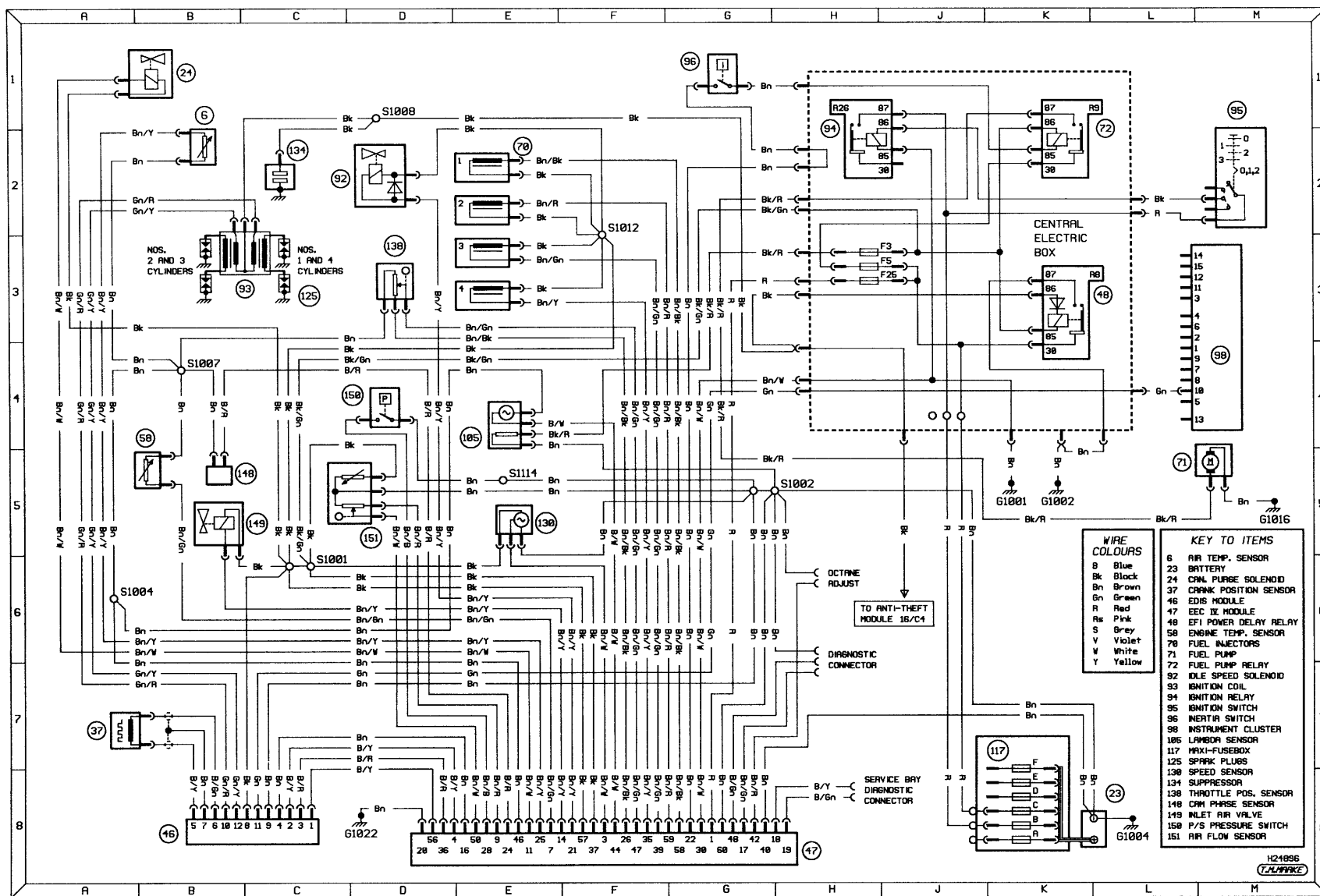
Diagram 2: Typical ignition variation - all carburettor-engined models (manual gearbox)











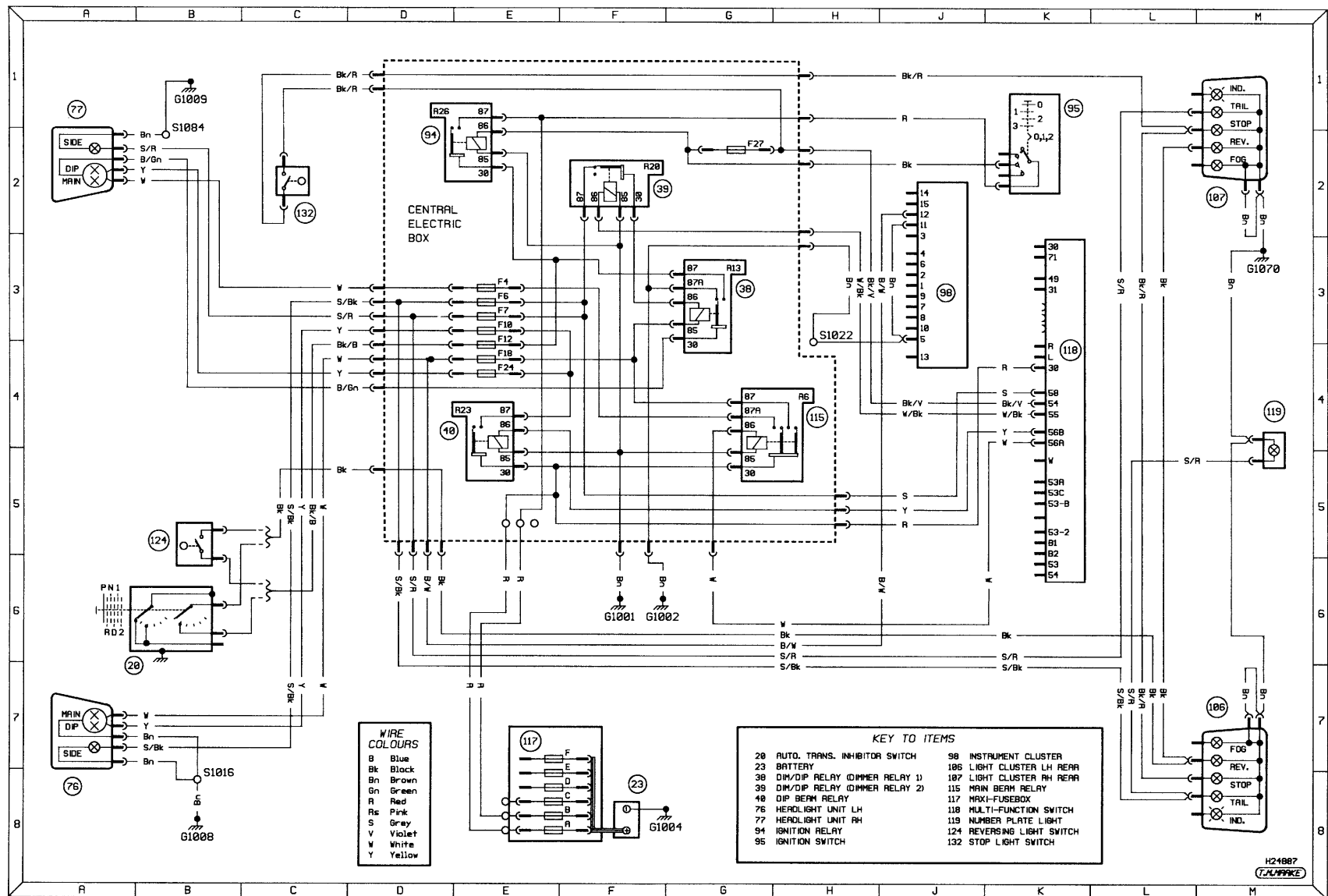


Diagram 8: Typical exterior lighting - head/side, stop and reversing lights (all models)

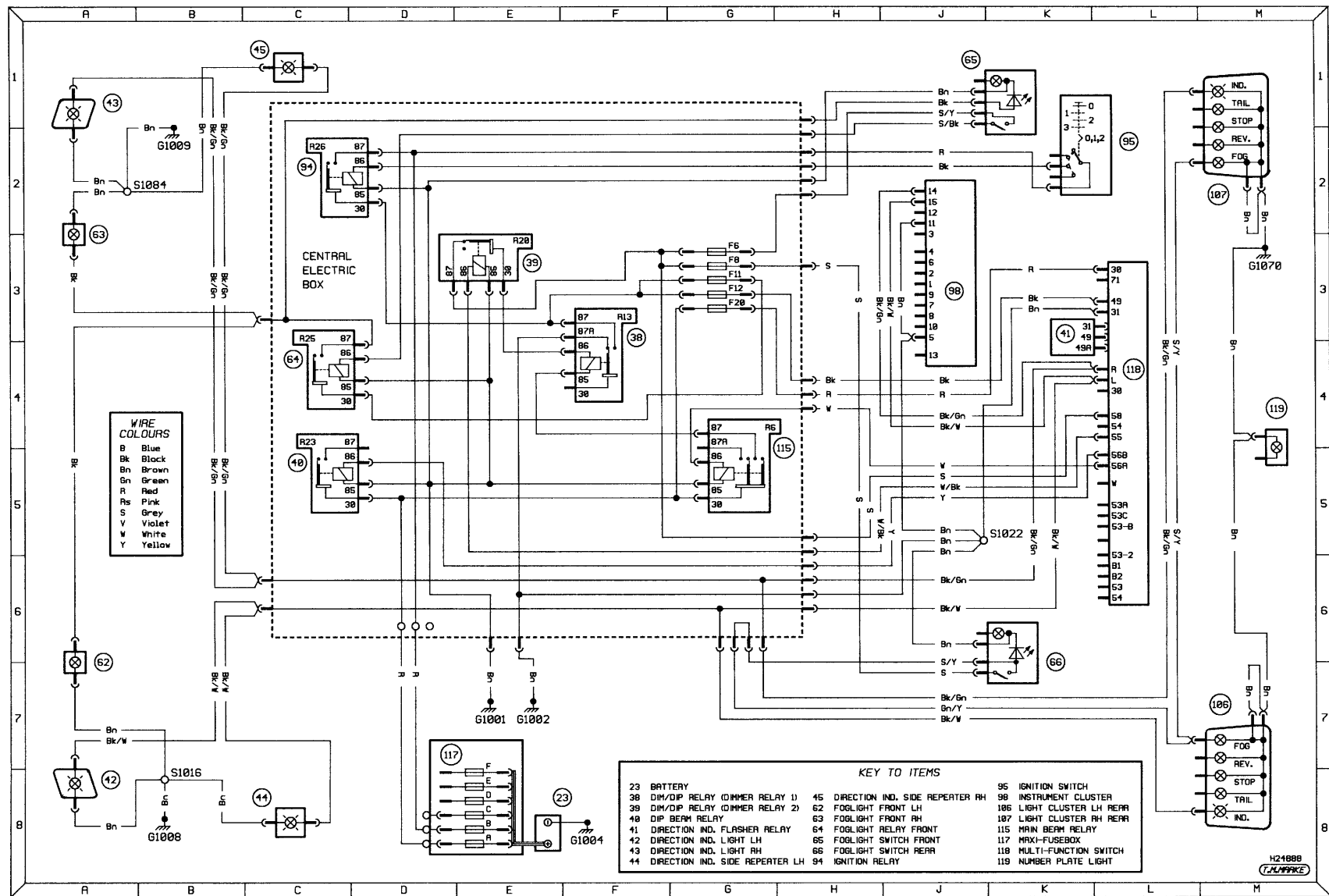


Diagram 9: Typical exterior lighting - fog and direction indicator lights (all models)

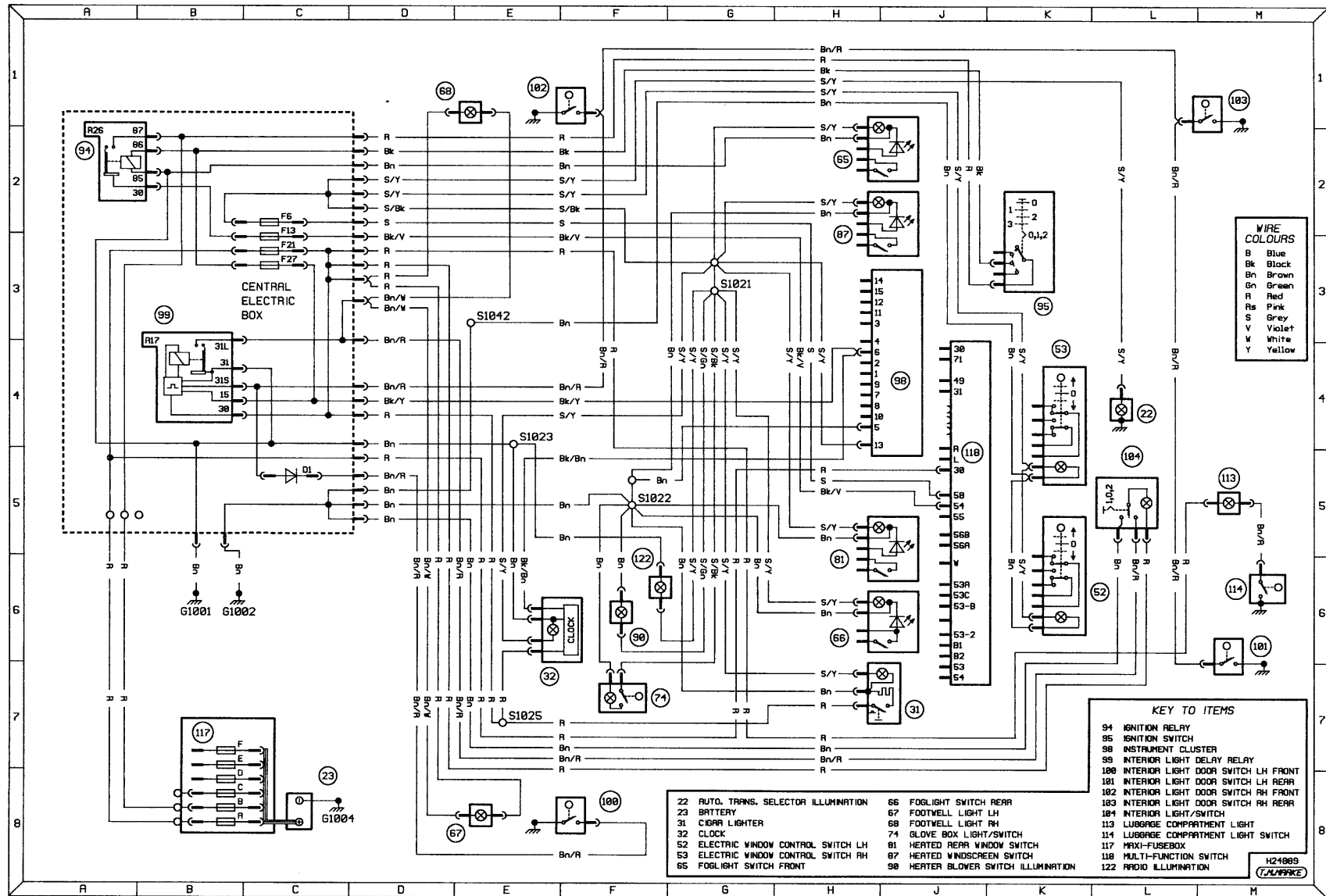


Diagram 10: Typical interior lighting - all models

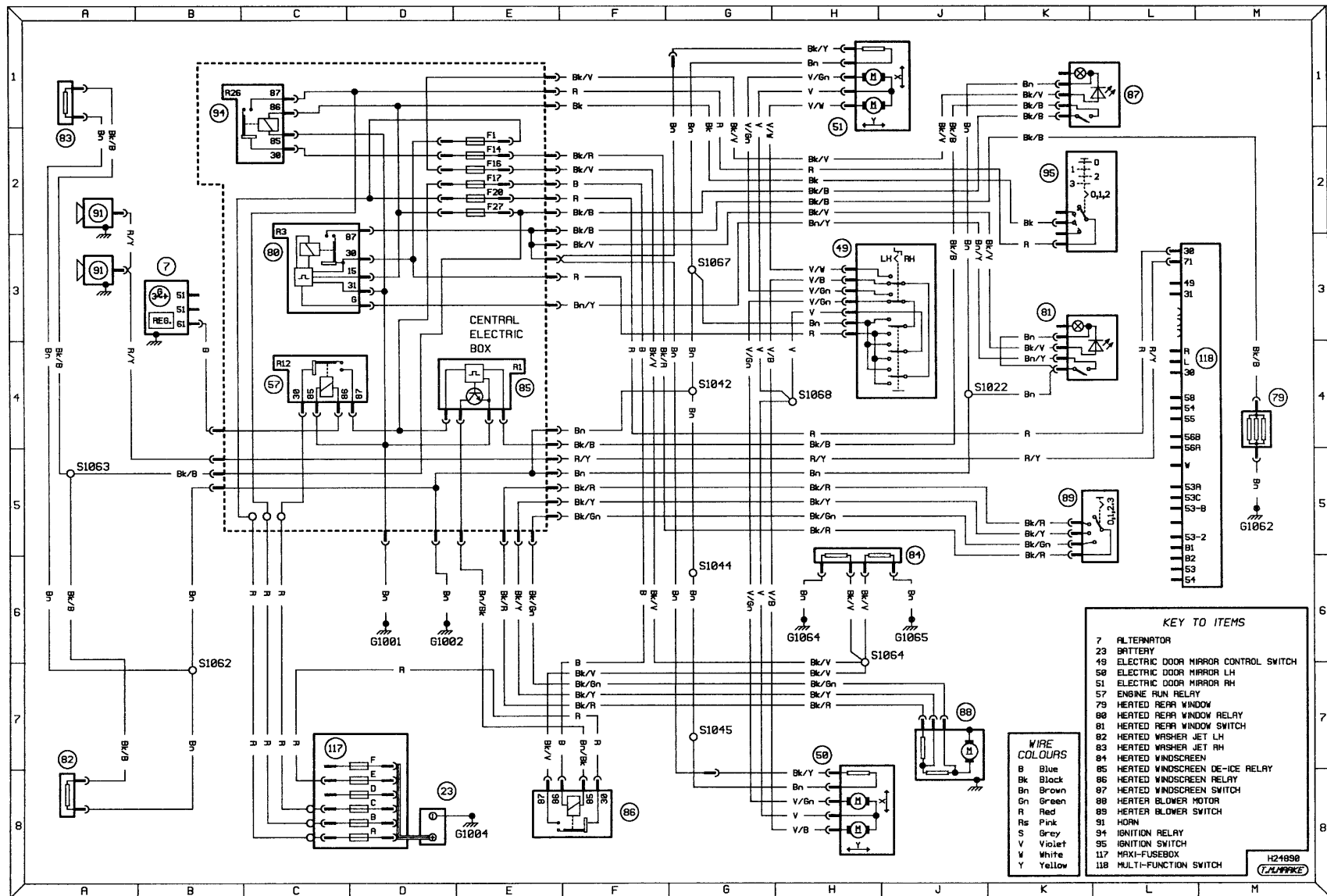


Diagram 11: Typical horn, heater blower, heated mirrors and screens

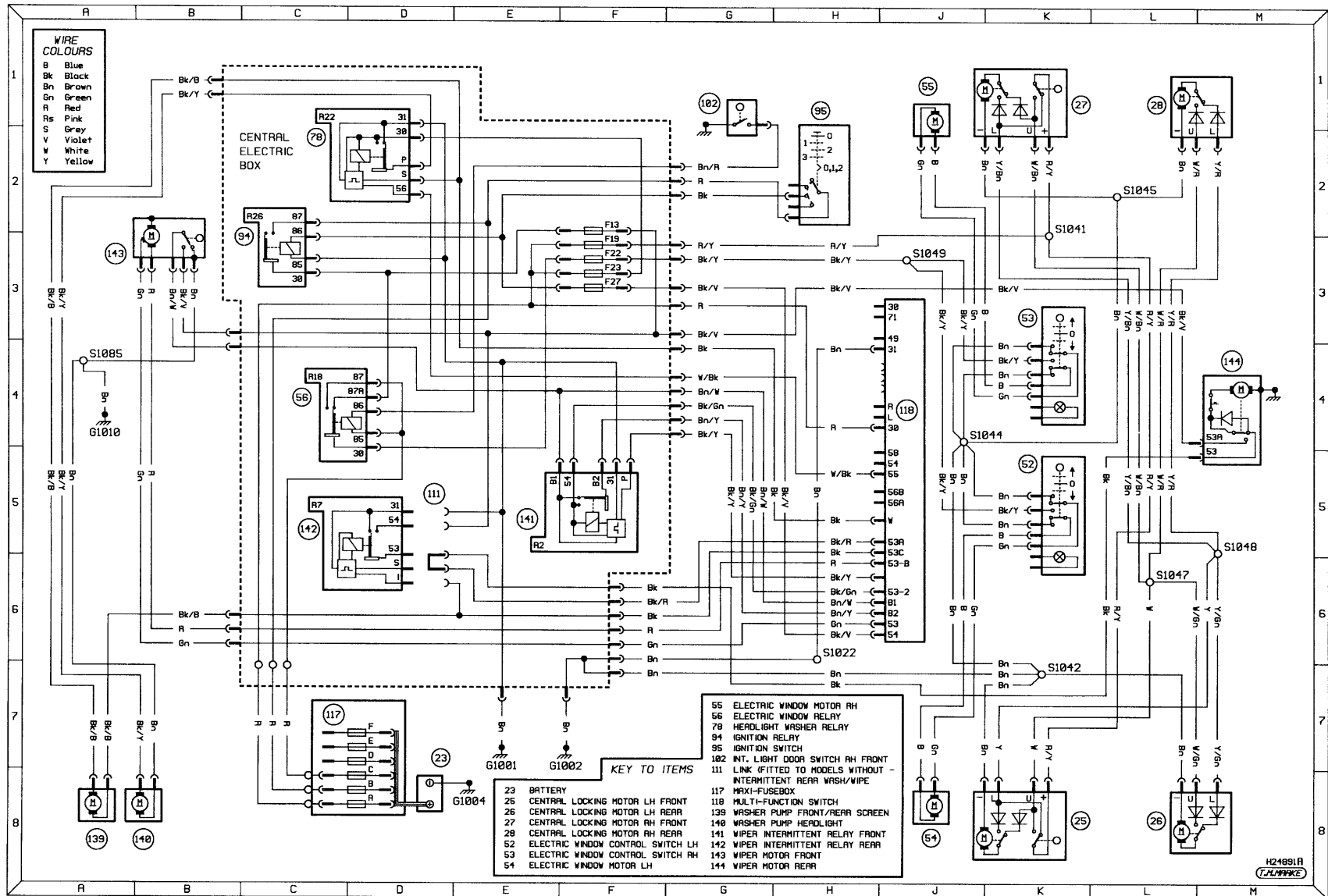
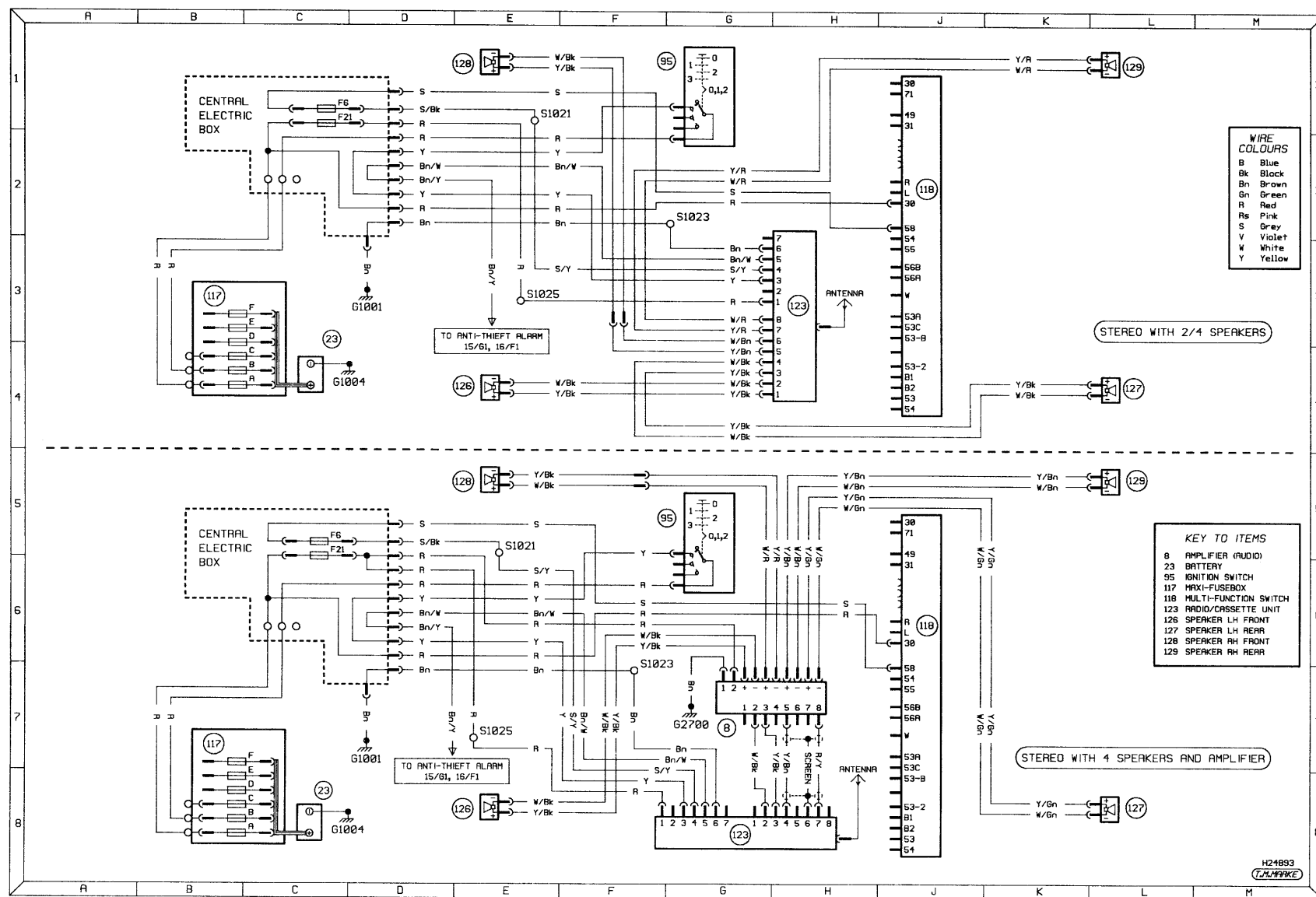


Diagram 12: Typical wash/wipe, central locking and electric windows



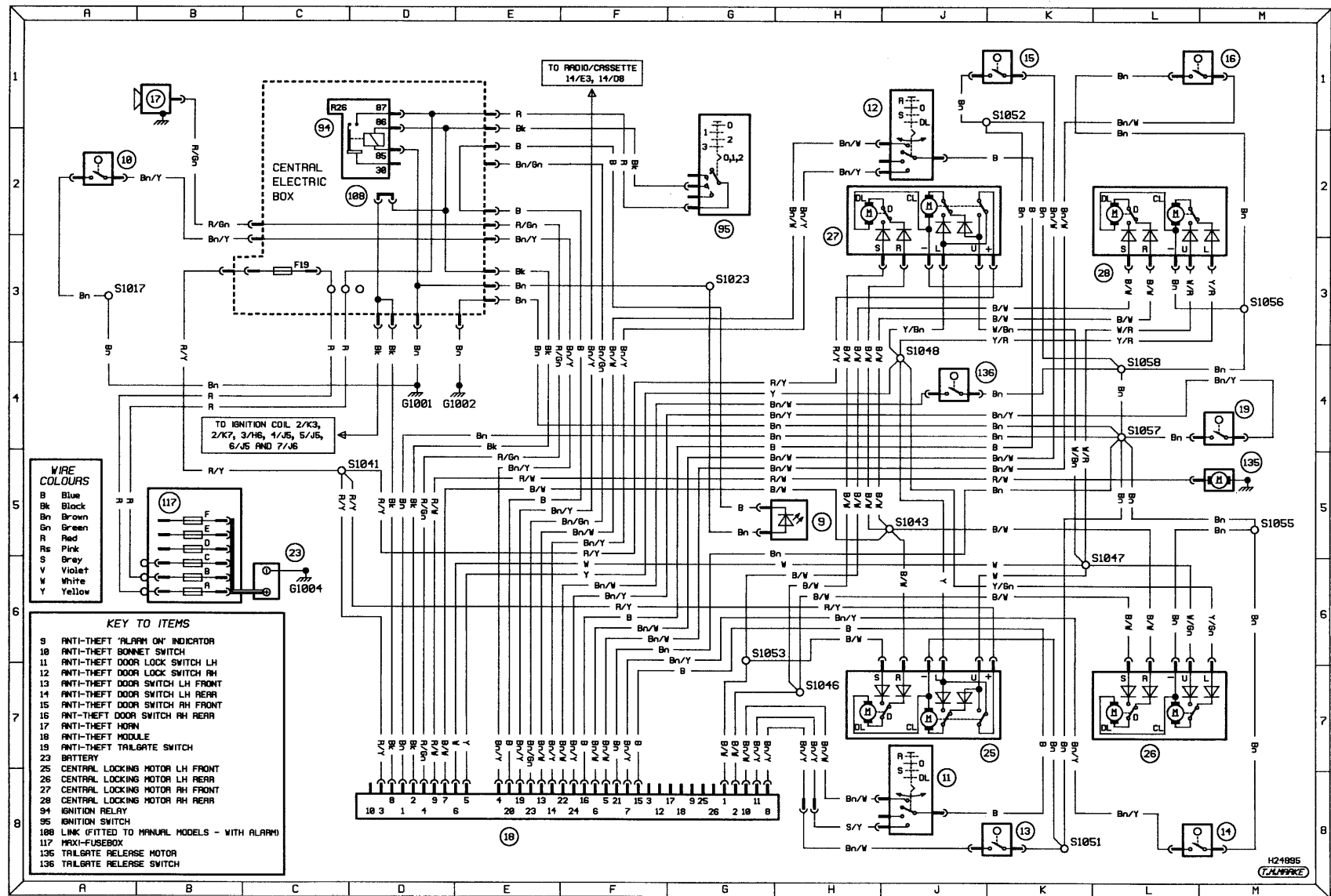


Diagram 14: Typical anti-theft alarm