






Chapter 13

Body electrical systems

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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

System type 12-volt negative-earth

Fuses - early models (pre-March 1994)

No	Circuit(s) protected*	Rating (amps)
A1	Headlight dipped beam and headlight washers	10
A2	Headlight dipped beam	10
A3	Right-hand headlight main beam	10
A4	Left-hand headlight main beam	10
A5	Right-hand front and rear sidelights, facia switches and instrument panel illumination	5
A6	Left-hand front and rear sidelights, number plate lights, radio, cigar lighter, clock and heater control panel illumination	5
A7	Windscreen washer/wiper	20
A8	Air conditioning/heater relay and fan	20
A9	Heated rear window	30
B1	Radio memory, interior lights and clock	5
B2	Rear foglights	10
B3	Direction indicators, stop-lights, reversing lights, headlight levelling system, air conditioning/heater relay and warning lights	15
B4	Trailer socket	15
B5	Horns	15
B6	Tailgate washer/wiper and clock	10
B7	Cigarette lighter	10
B8	Fuel pump relay	10
B9	Radio	10
C1	Electric window relay	30
C2	Electric window relay	30
C3	Central locking system	15
C4	Exterior mirrors	3
C5	Air conditioning fans	20
C6	Air conditioning fans	20
C7	Air conditioning compressor clutch	5
C8	Hazard warning lights	15
C9	- Not used	

*Not all items fitted to all models

Passenger compartment fuses - later models (March 1994 onwards)

Main fuse panel

No	Circuit(s) protected*	Rating (amps)
1	Stop-lights and direction indicators	15
2	Left-hand sidelight	10
3	Radio/cassette, CD player	10
4	Right-hand headlight main beam	10
5	Left-hand headlight main beam	10
6	Cigarette lighter, vanity mirror light, heated seats	20
7	Airbag system	10
8	Right-hand sidelight	10
9	Rear foglights	10
10	Right-hand headlight dipped beam	10
11	Left-hand headlight dipped beam	10
12	Multi-function unit	10
13	Ignition feed for multi-function unit	10
14	Instruments, clock, speed sensor and reversing lights	10
15	Air conditioning and electric windows	10
16	Windscreen washers/wipers	20
17	Starter and pre-heating system	10
18	Tailgate wash/wipe, electric mirrors, cruise control	10

*Not all items fitted to all models

Upper auxiliary fuse panel

No	Circuit(s) protected*	Rating (amps)
1	Front electric windows	30
2	Rear electric windows	30
3	Anti-lock braking system	10
4	Central locking system	15
5	Electric sunroof	30
6	Radio, clock, alarm, interior lights, trailer socket	20

*Not all items fitted to all models

Lower auxiliary fuse panel

No	Circuit(s) protected*	Rating (amps)
1	Anti-theft alarm	15
2	Headlight washers	20
3	Engine management system	10
4	Anti-lock braking system	5
5	Anti-theft alarm	10
6	Rear air conditioning and blower motor	25

*Not all items fitted to all models

Engine compartment fuses and fusible links - later models (March 1994 onwards)

No	Circuit(s) protected*
1	Heated rear window
2	Sidelights
3	Air conditioning
4	Hazard warning lights and horn
5	Anti-lock braking system
6	Fuel pump
7	Fuel injection system
8	Anti-lock braking system pump
9	Ignition system
10	Lighting
11	Electric windows, central locking and rear blower motor
12	Air conditioning/heater
13	Alternator

*Not all items fitted to all models

Relay locations - early models (pre-March 1994)

Component*	Location
Air conditioning compressor clutch relay	Behind passenger compartment fusebox (red wiring connector)
Air conditioning (low-speed) relay	Behind driver's footwell side panel (below the main relay bank)
Air conditioning (medium-speed) relay	Behind driver's footwell side panel (below the main relay bank)
Air conditioning fresh air solenoid relay	Behind passenger footwell side panel (inner red wiring connector)
Air conditioning heater relay	Behind passenger footwell side panel (outer red wiring connector)
Air conditioning/blower motor relay	Behind driver's footwell side panel (below the main relay bank)
Blower motor relay (non-air conditioning models)	Behind driver's footwell side panel (below the main relay bank)
Cooling fan relay	Behind passenger compartment fusebox (red wiring connector)
Direction indicator relay	Behind passenger compartment fusebox (blue wiring connector)
Front electric window relay	Behind driver's footwell side panel (white wiring connector)
Fuel pump relay	Behind passenger footwell side panel (yellow wiring connector)
Headlight levelling relay	Behind driver's footwell side panel (outer black wiring connector)
Headlight washer relay	Behind passenger footwell side panel (blue wiring connector)
Heated rear window relay	Behind driver's footwell side panel (inner black wiring connector)
Pre-heating system relay	On engine compartment bulkhead
Rear electric window relay	Behind driver's footwell side panel (yellow wiring connector)
Starter relay	Behind passenger footwell side panel (black wiring connector)
Tailgate wiper relay	Behind passenger footwell side panel (red wiring connector)
Voltage switch relay	Behind passenger compartment fusebox (yellow wiring connector)
Windscreen wiper relay	Behind driver's footwell side panel (red wiring connector)

*Not all items fitted to all models

Relay locations - later models (March 1994 onwards)

Component*	Location
Accessory relay	Behind passenger footwell side panel
Air conditioning compressor clutch relay	Behind driver's side footwell side panel
Air conditioning logic relay	Behind driver's footwell side panel
Anti-lock braking system load relay	Behind passenger side of facia, on bracket
Anti-lock braking system pump relay	Behind passenger side of facia, on bracket
Anti-lock braking system warning relay	Behind passenger side of facia, on bracket
Anti-theft alarm relay	Behind passenger footwell side panel
Condenser fan relay	Behind passenger side of facia, on bracket
Cooling fan relay	Behind driver's side footwell side panel
Dim/dip relay	Behind passenger side of facia, on bracket
Direction indicator relay	Passenger compartment fusebox
Engine control load relay	Behind driver's side footwell side panel
Front blower motor relay	Behind passenger side of facia

Relay locations - later models (March 1994 onwards) (continued)

Component*	Location
Fuel pump relay	Behind driver's footwell side panel
Headlight washer relay	Behind passenger side of facia, on bracket
Heated rear window relay	Passenger compartment fusebox
Horn relay	Behind passenger footwell side panel
Interlock relay 1	Behind passenger side of facia
Interlock relay 2	Behind passenger side of facia
Multi-function unit	Behind driver's footwell side panel
Power amplifier relay	Behind passenger side of facia
Rear air conditioning control relay	Left-hand side of luggage compartment on rear evaporator
Rear air conditioning fan speed relay	Left-hand side of luggage compartment on rear evaporator
Rear air conditioning illumination relay	Left-hand side of luggage compartment on rear evaporator
Rear blower motor relay	Left-hand side of luggage compartment on rear evaporator
Sounder relay	Behind passenger footwell side panel
Starter relay	Behind driver's footwell side panel
Tailgate wiper relay	Behind passenger footwell side panel
Windscreen wiper relay	Behind driver's footwell side panel

*Not all items fitted to all models

Bulbs

	Wattage
Automatic transmission selector illumination light	5
Direction indicator	21
Direction indicator side repeater	5
Front foglight	55
Front sidelight	5
Headlight	60/55
Instrument panel lights:	
Ignition warning light	2
All other warning/illumination lights	1.2
Interior lights	10
Number plate light	5
Rear foglight	21
Reversing light	21
Stop/tail light	21/5

Torque wrench settings

	Nm	lbf ft
Airbag components:		
Airbag unit screws	8	6
Control unit screws	10	7
Impact sensor screws	10	7

1 General information and precautions

Warning: Before carrying out any work on the electrical system, read through the precautions given in Safety first! at the beginning of this manual, and in Chapter 5A.

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

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

Prior to working on any component in the

electrical system, the battery negative terminal should first be disconnected, to prevent the possibility of electrical short-circuits and/or fires.

Disconnecting the battery - precautions

If the radio/cassette player fitted to the vehicle is with an anti-theft security code, as the unit fitted as standard is, refer to the information given in *Radio/cassette unit anti-theft system - precaution* at the end of this manual before disconnecting the battery.

On models from 1996 onwards, the standard anti-theft alarm system has a battery back-up facility, meaning that the alarm will still sound even if the battery is disconnected. To avoid accidentally setting off the alarm, switch the ignition on, then off, and disconnect the battery terminals **within 15 seconds**. If the alarm sounds, disarm the system with the handset, then reconnect the battery, switch on the ignition, and try again.

2 Electrical fault-finding - general information

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

General

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

2 Before attempting to diagnose an electrical fault, first study the appropriate wiring diagram to obtain a 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); a self-powered test light (sometimes known as a continuity tester); an ohmmeter (to measure resistance); a battery and set of test leads; and a jumper wire, preferably with a circuit breaker or fuse incorporated, which can be used to bypass suspect wires or electrical components. Before attempting to locate a problem with test instruments, use the wiring diagram to determine where to make the connections.

Warning: Under no circumstances may live measuring instruments such as ohmmeters, voltmeters or a bulb and test leads be used to test any of the airbag circuitry. Any testing of these components must be left to a Land Rover dealer, as there is a danger of activating the system if the correct procedures are not followed.

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, but will not cause the relevant circuit fuse to blow.

8 Short-circuit faults are caused by a short somewhere in the circuit, which allows the current flowing in the circuit to escape along

an alternative route, usually to earth. Short-circuit faults are normally caused by a breakdown in wiring insulation, which allows a feed wire to touch either another wire, or an earthed component such as the bodyshell. A short-circuit fault will normally cause the relevant circuit fuse to blow.

Finding an open-circuit

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

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

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

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

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

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

Finding a short-circuit

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

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

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

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

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

Finding an earth fault

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

21 This means that the component mounting and the body form part of that circuit. Loose or corroded mountings can therefore cause a range of electrical faults, ranging from total failure of a circuit, to a puzzling partial fault. In particular, lights may shine dimly (especially when another circuit sharing the same earth 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.

22 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.

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

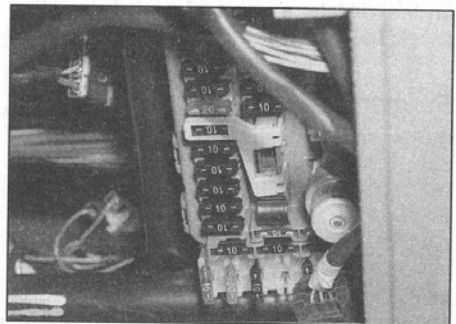
24 If an earth connection is thought to be faulty, dismantle the connection and clean back to bare metal both the bodyshell and the wire terminal or the component earth connection mating surface. Be careful to remove all traces of dirt and corrosion, then use a knife to trim away any paint, so that a clean metal-to-metal joint is made.

25 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. Alternatively, spray on (at regular intervals) a proprietary ignition sealer, or a water-dispersant lubricant.

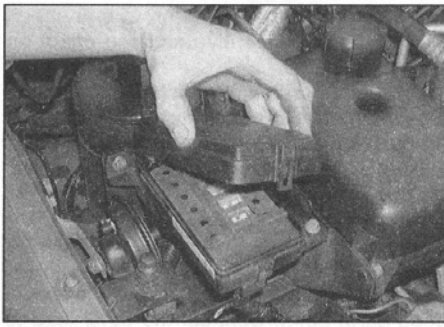
3 Fuses and relays - general information

Fuses

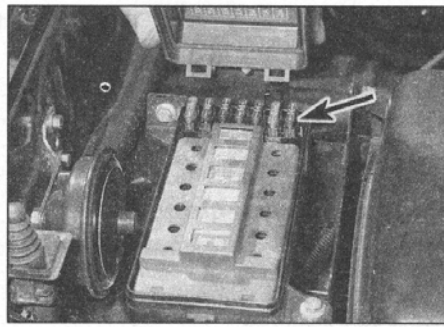
1 On early models (pre-March 1994), the fuses are located behind the driver's side lower facia panel. On later models (March 1994 onwards), most of the fuses are located in the fusebox behind the driver's side lower facia panel, with a few fuses and the main fusible links being located in the engine compartment fusebox (see illustrations).



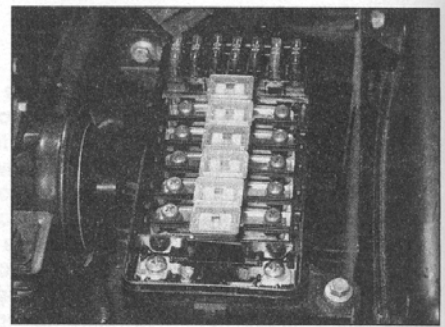
3.1a Passenger compartment fusebox is located behind the driver's side lower facia panel



3.1b On later models, unclip the engine compartment fusebox cover . . .



3.1c . . . to gain access to the fuses (arrowed) . . .



3.1d . . . then remove the inner cover to gain access to the fusible links

2 To gain access to the fusebox, undo the fasteners and release the panel from the driver's side of the fascia. To gain access to those in the engine compartment box, unclip the lid.

3 A label identifying each fuse should be attached to the cover/lid, and a list of the circuits each fuse protects is given in the Specifications at the start of this Chapter.

4 To remove a fuse, first switch off the circuit concerned (or the ignition), then pull the fuse out of its terminals. The wire within the fuse is clearly visible; if the fuse is blown, it will be broken or melted.

5 To renew a fusible link (later models only), prise off its plastic cover, then undo its two retaining screws. The wire within the fuse will be broken if the fusible link has gone.

6 Always renew a fuse/fusible link with one of an identical rating; never use one with a different rating from the original, nor substitute anything else. Never renew a fuse/fusible link more than once without tracing the source of the trouble. The rating is stamped on top of the fuse/fusible link; note that are also colour-coded for easy recognition.

7 If a new fuse/fusible link blows immediately, find the cause before renewing it again - a short to earth as a result of faulty insulation is most likely. Where more than one circuit is protected, try to isolate the defect by switching on each circuit in turn (if possible) until it blows again. Always carry a supply of spare fuses/fusible links of each relevant rating on the vehicle; a spare of each fuse rating should be clipped into the base of the fusebox.

Relays

8 The relay locations are given in the Specifications at the start of this Chapter.

9 If a circuit or system controlled by a relay develops a fault and the relay is suspect, operate the system; if the relay is functioning, it should be possible to hear it click as it is energised. If it clicks, the fault lies with the components or wiring of the system. If the relay is not being energised, then either the relay is not receiving a main supply or a switching voltage, or the relay itself is faulty. Testing is by

the substitution of a known good unit, but be careful; while some relays are identical in appearance and in operation, others look similar but perform different functions.

10 To renew a relay, first ensure that the ignition switch is off. The relay can then simply be pulled out from the socket, and the new relay pressed in (see illustration).

4 Switches - removal and refitting

Note: Disconnect the battery negative lead before removing any switch, and reconnect the lead after refitting the switch. Refer to the precautions in Section 1 before proceeding.

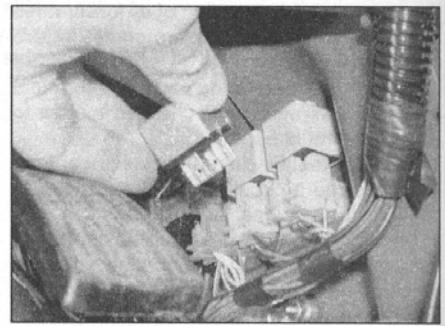
Ignition switch/steering column lock

1 Refer to Chapter 11.

Steering column combination switches

2 Remove the steering wheel as described in Chapter 11.

3 Undo the steering column shroud retaining screws, unclip the shroud halves, and remove both the upper and lower shrouds from the steering column. On early models, it may be necessary to pull off the hazard warning light



3.10 Removing the fuel injection pump relay

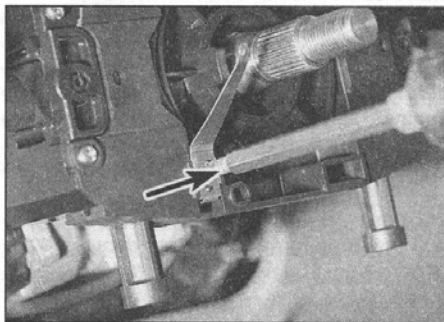
switch to allow the upper shroud to be removed.

4 On early models (pre-March 1994), carefully release the relevant switch retaining clips, and pull the switch guides out from the housing.

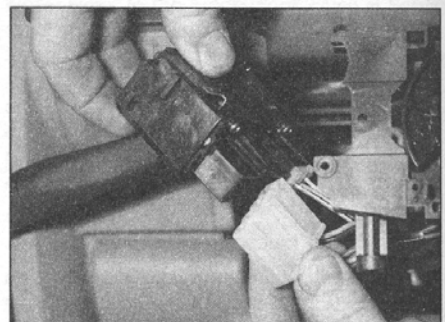
5 On later models (March 1994 onwards), undo the two screws securing the relevant switch assembly in position.

6 On all models, disconnect the wiring connector from the rear of the switch, and remove the switch assembly. On models without an airbag, when removing the left-hand switch assembly, it will also be necessary to remove the horn contact wire (see illustrations).

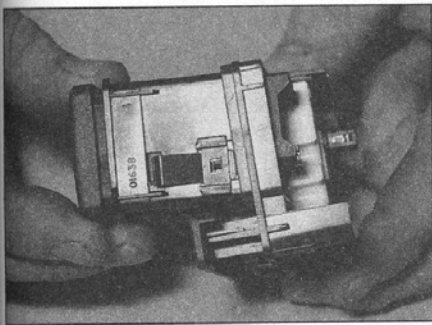
7 Refitting is a reversal of the removal procedure.



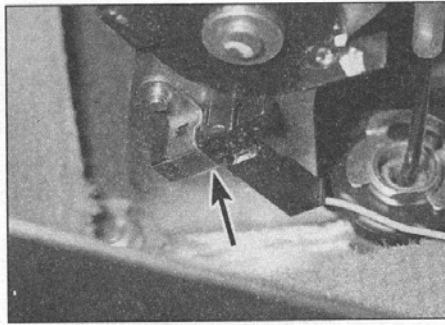
4.6a Where necessary, undo the retaining screw (arrowed) and remove the horn contact from the steering column switch assembly



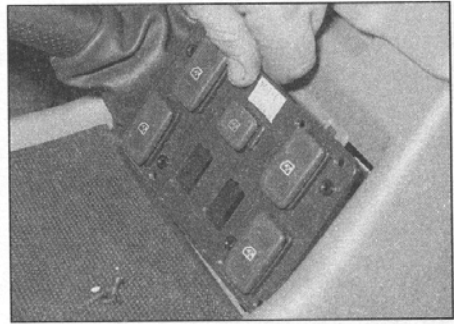
4.6b Release the switch from the steering column, and disconnect its wiring connector



4.18 Removing the hazard warning light switch from the clock - later models



4.22 Handbrake warning light switch is mounted onto the side of the handbrake lever (arrowed)



4.26 On later models, undo the four retaining screws and remove the switch panel from the centre console

Instrument panel surround switches

Early models (pre-March 1994)

8 Slacken and remove the four retaining screws securing the instrument panel surround in position. Move the panel forwards until access can be gained to the panel switch wiring connectors. Disconnect each switch wiring connector, noting its correct fitted location, then remove the panel from the vehicle. Note that the wiring connectors are colour-coded to aid identification.

9 Depress the retaining clips, and slide the relevant switch out from the panel.

10 On refitting, slide the switch in until it clips into position then refit the panel surround, making sure that all wiring connectors are securely reconnected to the correct switches.

Later models (March 1994 onwards)

11 Slacken and remove the retaining screws securing the instrument panel surround in position. Ease the panel out of position, disconnect the wiring connectors from the rear of the switches, and remove the shroud.

12 Release the retaining clips, and push the relevant switch out from the shroud.

13 Refitting is the reverse of removal, ensuring that the wiring connectors are securely reconnected.

Hazard warning light switch

Early models (pre-March 1994)

14 Remove the steering column combination switches as described earlier in this Section.

15 Disconnect the wiring connector from the base of the hazard warning light switch, and remove it from the top of the steering column.

16 On refitting, ensure that the switch is correctly located on the steering column, then reconnect its wiring connector.

17 Refit the steering wheel as described in Chapter 11.

Later models (March 1994 onwards)

18 Remove the clock as described in Section 11, and slide the switch out of the clock (see illustration).

19 Refitting is the reverse of removal.

Stop-light switch

20 Refer to Chapter 10.

Handbrake warning light switch

21 Remove the centre console as described in Chapter 12.

22 Disconnect the wiring connector from the switch, then undo the two retaining screws and remove the switch from the lever (see illustration).

23 Refitting is the reverse of removal.

Electric window switches

Centre console switches

24 Release the handbrake lever gaiter from the switch panel on the centre console.

25 On early models (pre-March 1994), carefully unclip the switch panel from the console.

26 On later models (March 1994 onwards), remove the switch panel trim plate, then undo the retaining screws and remove the switch panel from the console (see illustration).

27 Disconnect the wiring connector from the relevant switch, then depress the retaining clips and push the switch out of position (see illustration).

28 Refitting is the reverse of removal.

Rear door switches

29 Remove the door trim panel as described in Chapter 12.

30 Release the retaining clip, and slide the switch out from the trim panel (see illustrations).

31 On refitting, clip the switch into the trim panel then fit the panel as described in Chapter 12.

Electric mirror switch

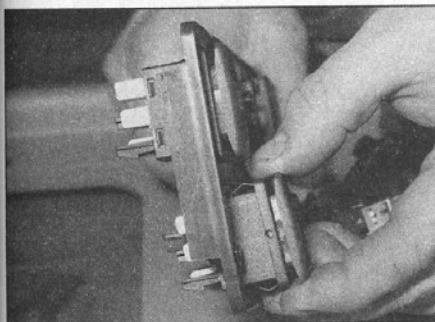
Early models (pre-March 1994)

32 Refer to paragraphs 24 to 28.

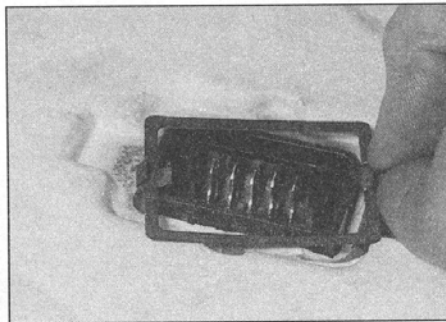
Later models (March 1994 onwards)

33 Undo the fasteners and release the driver's lower fascia panel.

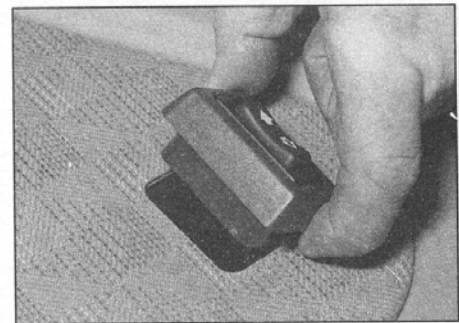
34 Reach in behind the switch, then push it



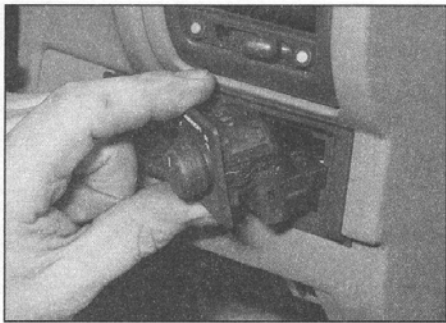
4.27 Depress the retaining clips, and slide the relevant switch out from the panel



4.30a Release the retaining clip . . .



4.30b . . . and remove the window switch from the rear door trim panel



4.34 Removing the exterior mirror switch - later models

out of position and disconnect its wiring connector (see illustration).

35 On refitting, reconnect the wiring connector, clip the switch back into the panel, and secure the fascia panel in position with its fasteners.

Headlight levelling system switch
Early models (pre-March 1994)

36 Release the handbrake lever gaiter from the switch panel on the centre console.

37 Undo the retaining screws (later models only), and unclip the switch panel from the console.

38 Disconnect the wiring connector from the switch.

39 Pull off the levelling switch knob, then unscrew the retaining nut and free the switch from the panel.

40 On refitting, locate the switch in the panel, making sure that it is fitted the correct way around. Securely tighten the switch retaining nut, then refit its control knob.

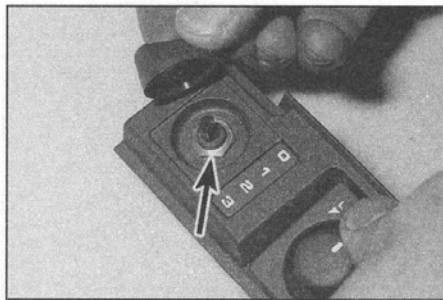
41 Reconnect the wiring connectors, then clip the switch panel back into position, followed by the handbrake lever gaiter.

Later models (March 1994 onwards)

42 Undo the fasteners, and lower the driver's side lower fascia panel. Using a suitable flat-bladed screwdriver, carefully prise the switch panel out from the fascia, taking care not to mark either.

43 Disconnect the wiring connectors from both the mirror and levelling switches, and remove the panel assembly.

44 Pull off the levelling switch knob, then



4.44a On later models, pull off the headlight adjustment switch knob, then unscrew the retaining nut (arrowed) . . .

unscrew the retaining nut and free the switch from the panel (see illustrations).

45 On refitting, locate the switch in the panel, tightening its retaining nut securely, and refit its control knob.

46 Reconnect the wiring connectors, then clip the switch panel back into position on the fascia.

Electric sunroof switch

Front switches

47 Using a suitable flat-bladed screwdriver, carefully prise the switch panel out from the overhead console, taking care not to mark either.

48 Disconnect the wiring connector from the relevant switch, then depress the retaining clips and push the switch out from the panel.

49 On refitting, clip the switch back into the panel, reconnect the wiring connector, then clip the switch panel back into the overhead console.

Rear switch

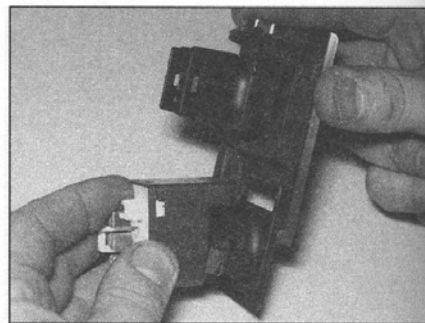
50 Using a suitable flat-bladed screwdriver, carefully prise the switch from the overhead console, taking care not to mark either.

51 Disconnect the wiring connector and remove the switch.

52 On refitting, reconnect the wiring connector, then clip the switch back into the overhead console.

Courtesy light switches

53 Open the door, then undo the retaining screw from the door pillar. Withdraw the switch from the pillar, disconnecting its wiring connector as it becomes accessible (see illustrations). Tape the wiring to the door pillar, to prevent it falling back into the hole.



4.44b . . . and remove the switch from the panel

54 Refitting is a reverse of the removal procedure.

Heater blower motor, air recirculation and front air conditioning system switches

Early models (pre-March 1994)

55 Remove the centre console as described in Chapter 12.

56 Pull the control knobs off the heater levers.

57 Slacken and remove the retaining screws securing the centre panel to the fascia, then ease the panel away from the fascia. Disconnect each of the panel wiring connectors, noting their correct fitted locations, and remove the panel.

58 Undo the relevant switch retaining screws and remove the switch, disconnecting its wiring connector as it becomes accessible.

59 Refitting is the reverse of removal, ensuring that all wiring connectors are reconnected to their original positions.

Later models (March 1994 onwards)

60 Remove the heater control unit as described in Chapter 3.

61 Release the retaining tangs, and slide the relevant switch out of position.

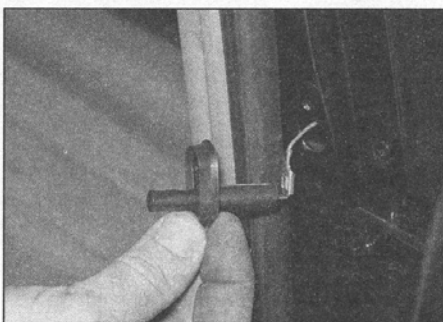
62 Refitting is the reverse of removal.

Centre fascia panel switches - later models (March 1994 onwards)

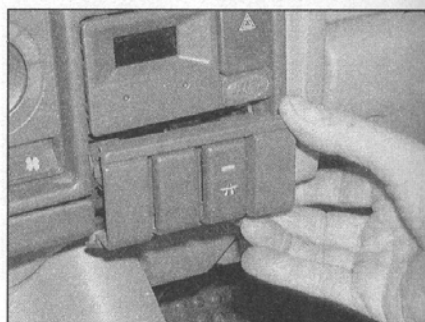
63 Carefully pull the switch panel assembly out from the bottom of the fascia centre panel (see illustration).



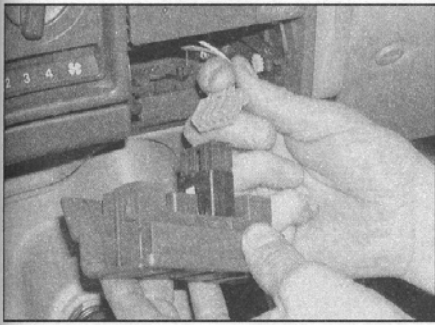
4.53a Slacken and remove the retaining screw . . .



4.53b . . . then withdraw the courtesy light switch and disconnect its wiring connector



4.63 Pull out the switch panel assembly



4.64a Disconnect the wiring plug from the relevant switch . . .

64 Disconnect the wiring connectors from the relevant switch, then depress the retaining clips and slide the switch out from the panel (see illustrations).

65 Refitting is a reversal of the removal procedure.

Glovebox illumination switch - later models (March 1994 onwards)

66 Release the clips and remove the passenger side lower fascia panel.

67 Open up the glovebox, and release its hinge springs. This will allow the glovebox to be fully opened.

68 Release the clip, withdraw the switch from the fascia, and disconnect its wiring connectors (see illustration).

69 Refitting is the reverse of removal.

Heated seat switches

70 Release the handbrake lever gaiter from the switch panel on the centre console.

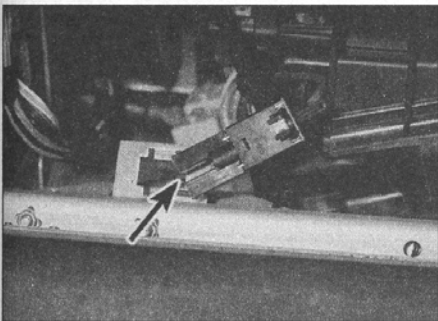
71 Remove the switch panel trim plate, then undo the retaining screws and remove the switch panel from the console.

72 Disconnect the wiring connector from the relevant switch, then depress the retaining clips and push the switch out of position.

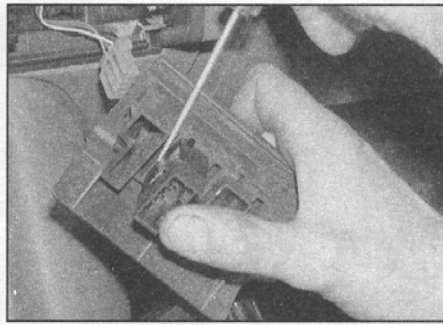
73 Refitting is the reverse of removal.

Electric seat switches

74 Using a small screwdriver, carefully release the two upper and lower retaining clips securing the switch panel to the side of the centre console.



4.68 Release the glovebox illumination light switch from the fascia, and disconnect its wiring connectors (arrowed)



4.64b . . . then use a small screwdriver to release the switch retaining clips . . .

75 Withdraw the switch panel, disconnect the two wiring plugs, and remove it (see illustration).
76 Refitting is a reversal of removal.

Cruise control switches

77 Refer to Chapter 4B or 4C.

Oil pressure warning light switch

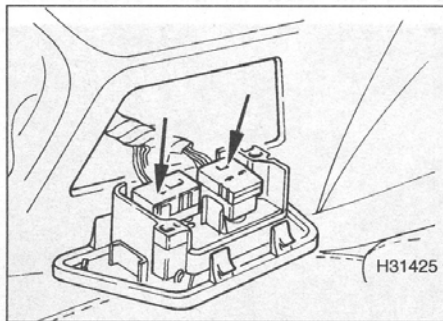
78 Refer to Chapter 2A or 2B.

5 Bulbs (exterior lights) - renewal

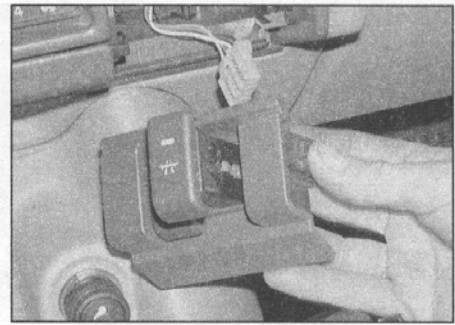
General

1 Whenever a bulb is renewed, note the following points:

- a) Disconnect the battery negative lead before starting work. Refer to the precautions in Section 1 before proceeding.
- b) Remember that if the light has just been in use, the bulb may be extremely hot.
- c) Always check the bulb contacts and holder, ensuring that there is clean metal-to-metal contact between the bulb and its live(s) and earth. Clean off any corrosion or dirt before fitting a new bulb.
- d) Wherever bayonet-type bulbs are fitted ensure that the live contact(s) bear firmly against the bulb contact.
- e) Always ensure that the new bulb is of the correct rating, and that it is completely



4.75 Unclip the electric seat switch panel, then disconnect the wiring plugs (arrowed)



4.64c . . . and slide the switch from the panel

clean before fitting it; this applies particularly to headlight bulbs (see below).

Headlight

Early models (pre-March 1994)

2 Working in the engine compartment, disconnect the wiring connector from the rear of the headlight, then remove the rubber dust cover.

3 Unhook and release the ends of the bulb retaining clip, and release it from the rear of the light unit.

4 Withdraw the bulb.

5 When handling the new bulb, use a tissue or clean cloth to avoid touching the glass with the fingers; moisture and grease from the skin can cause blackening and rapid failure of this type of bulb.



If the headlight bulb glass is accidentally touched, wipe it clean using methylated spirit.

6 Install the new bulb, ensuring that its locating tabs are correctly located in the light cut-outs, and secure it in position with the retaining clip.

7 Refit the dust cover to the rear of the light unit, and reconnect the wiring connector.

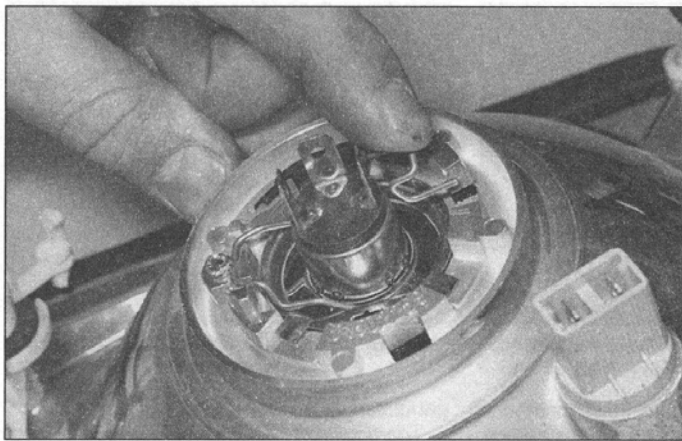
Later models (March 1994 onwards)

8 Remove the headlight unit as described in Section 7.

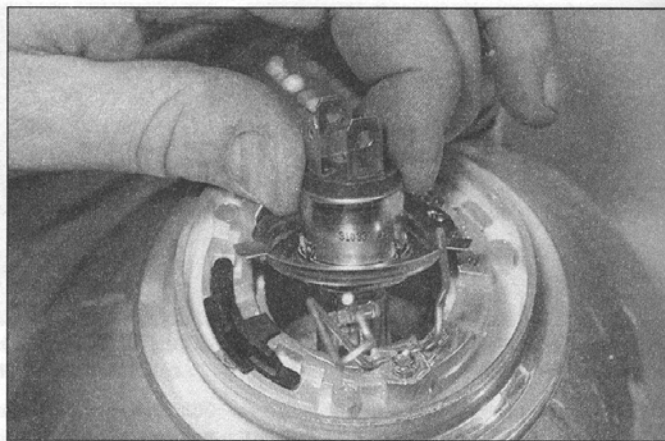
9 Remove the rubber dust cover, and renew the bulb as described above in paragraphs 3 to 6 (see illustrations).



5.9a On later models, with the headlight on the bench, remove the rubber dust cover . . .



5.9b ... then release the retaining clip ...



5.9c ... and withdraw the bulb from the light unit

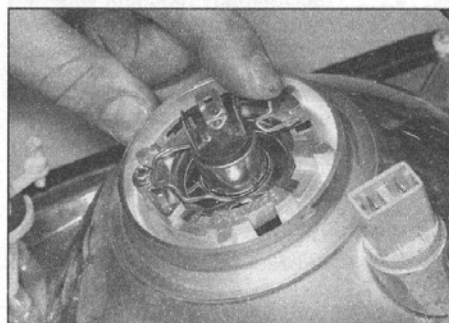
10 Refit the rubber dust cover to the bulb, making sure that it is correctly seated, and fit the headlight unit as described in Section 7.

Front sidelight

Early models (pre-March 1994)

11 Working in the engine compartment, disconnect the wiring connector from the rear of the headlight bulb, then remove the rubber dust cover.

12 Free the sidelight bulbholder, and remove the bulb. The bulb is of the capless (push-fit) type, and can be removed by simply pulling it out of the bulbholder.



5.15 Twist the sidelight bulbholder anti-clockwise and remove it ...

13 Refitting is the reverse of the removal procedure, ensuring that the rubber dust cover is correctly fitted.

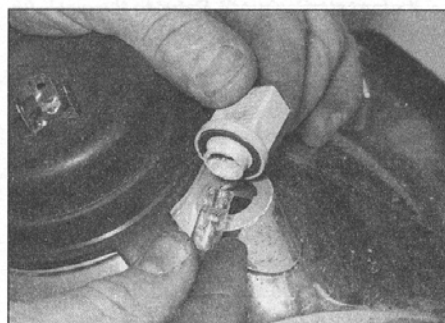
Later models (March 1994 onwards)

14 Remove the headlight unit as described in Section 7.

15 Twist the bulbholder anti-clockwise, and remove it from the rear of the headlight unit (see illustration).

16 The bulb is of the capless (push-fit) type, and can be removed by simply pulling it out of the bulbholder (see illustration).

17 Refitting is the reverse of removal.



5.16 ... then pull the bulb out from its holder

Front direction indicator

Early models (pre-March 1994)

18 Slacken and remove the two screws securing the headlight surround in position, and pull the surround forwards.

19 Twist the bulbholder anti-clockwise, and remove it from the rear of the surround.

20 The bulb is a bayonet fit in the holder, and can be removed by pressing it and twisting in an anti-clockwise direction.

21 Refitting is the reverse of removal.

Later models (March 1994 onwards)

22 From within the engine compartment, unhook the direction indicator light retaining spring, and release the light unit from the vehicle (see illustrations).

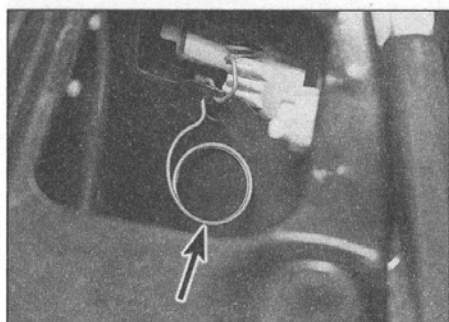
23 Twist the bulbholder anti-clockwise, and remove it from the rear of the light unit (see illustration).

24 The bulb is a bayonet fit in the holder, and can be removed by pressing it and twisting in an anti-clockwise direction.

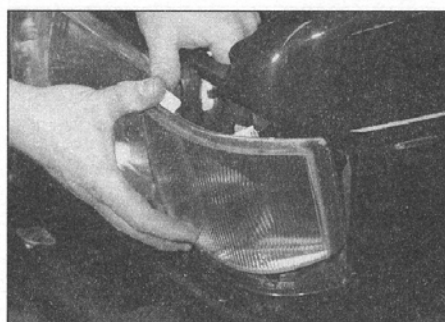
25 Refitting is the reverse of removal, making sure the two locating pegs at the base of the unit engage with the slots on the car body.

Front direction indicator side repeater

26 Carefully push the light unit to the right, to



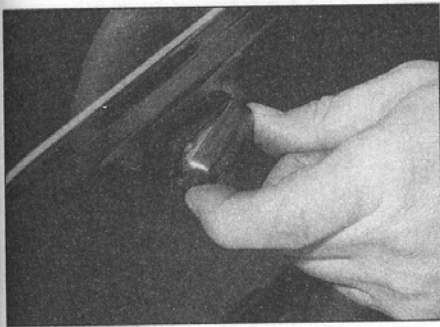
5.22a On later models, release the retaining spring (arrowed) ...



5.22b ... then remove the direction indicator light unit from the wing ...



5.23 ... and free the bulbholder from the rear of the light unit



5.26 Push the side repeater light to the right to release its retaining clip ...

release its retaining clip, then withdraw the unit from the wing (see illustration).

27 Turn the lens unit anti-clockwise to release it, then remove it from the bulbholder (see illustration).

28 The bulb is of the capless (push-fit) type, and can be removed by simply pulling it out of the bulbholder (see illustration).

29 Refitting is a reverse of the removal procedure.

Rear light cluster

30 Pull out the side-facing seat/pocket cover (as applicable), then undo the fastener and remove the access panel to reveal the rear of the light cluster assembly (see illustration). To improve access, the seat can be removed (see Chapter 12).

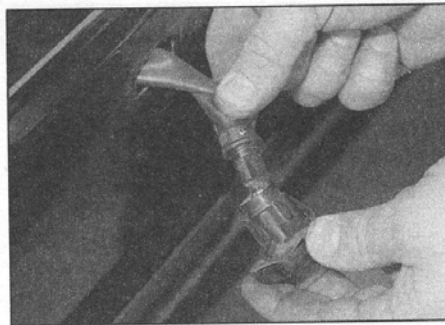
31 Twist the relevant bulbholder anti-clockwise, and withdraw it from the rear of the light unit (see illustration). The bulb is a bayonet fit in the holder, and can be removed by pressing it and twisting in an anti-clockwise direction.

32 Refitting is a reverse of the removal procedure.

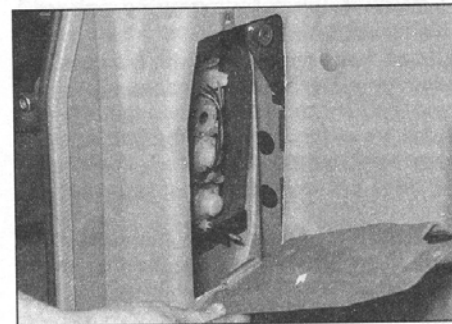
Bumper-mounted rear lights - later models (March 1994 onwards)

33 Reach up behind the bumper, then twist the relevant bulbholder anti-clockwise and withdraw it from the rear of the light unit. The bulb is a bayonet fit in the holder, and can be removed by pressing it and twisting in an anti-clockwise direction.

34 Refitting is a reverse of the removal procedure.



5.27 ... then free the bulbholder from the rear of the light unit ...



5.30 Remove the access cover ...

High-level stop-light - later models (March 1994 onwards)

35 Undo the two retaining screws, and detach the rear of the light unit.

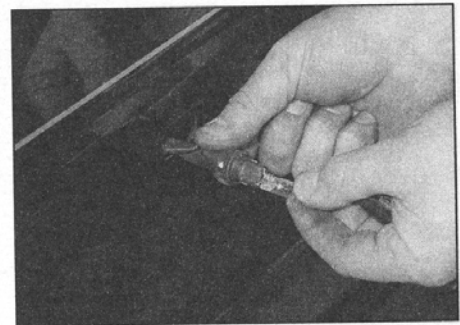
36 Twist the bulbholder anti-clockwise, and withdraw it from the rear of the light unit.

37 The bulb is a bayonet fit in the holder, and can be removed by pressing it and twisting in an anti-clockwise direction.

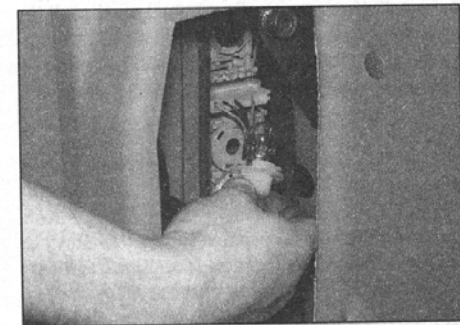
38 Refitting is a reverse of the removal procedure.

Bumper-mounted sidelights - later models (March 1994 onwards)

39 Reach up behind the bumper, then twist the bulbholder anti-clockwise and withdraw it from the rear of the light unit. The bulb is of the capless (push-fit) type, and can be



5.28 ... and pull out the bulb



5.31 ... and twist the relevant bulbholder anti-clockwise to release it from the rear of the rear light unit

removed by simply pulling it out of the bulbholder.

40 Refitting is a reverse of the removal procedure.

Door edge light

41 Using a small screwdriver, carefully prise the lens out from the door to reveal the bulb.

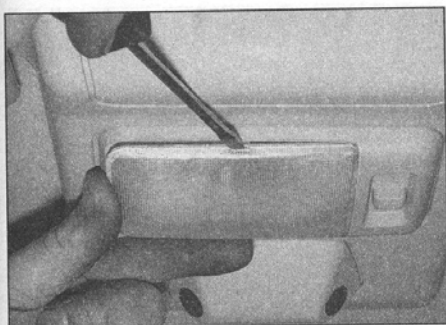
42 The bulb is a bayonet fit in the holder, and can be removed by pressing it and twisting in an anti-clockwise direction.

43 Refitting is the reverse of removal.

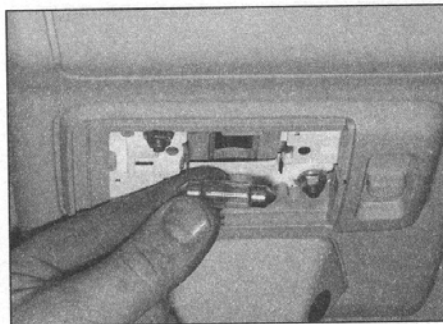
Number plate light

44 Slacken and remove the two retaining screws, then lift out the light unit and release the bulb from its contacts.

45 On refitting, ensure that the contacts securely grip the bulb ends (bend them carefully if necessary), then refit the light unit and tighten its retaining screws.



6.2a Carefully prise out the light lens ...



6.2b ... then remove the bulb from the courtesy light unit

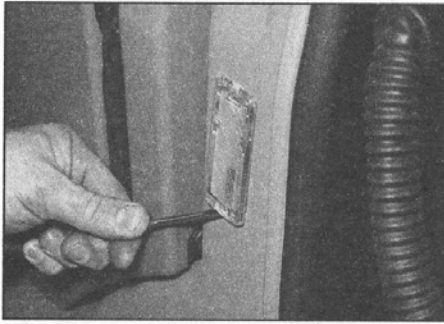
6 Bulbs (interior lights) - renewal

General

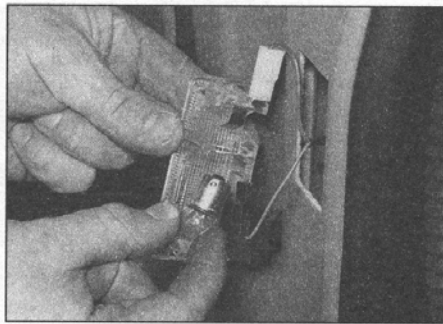
1 Refer to Section 5, paragraph 1.

Courtesy light

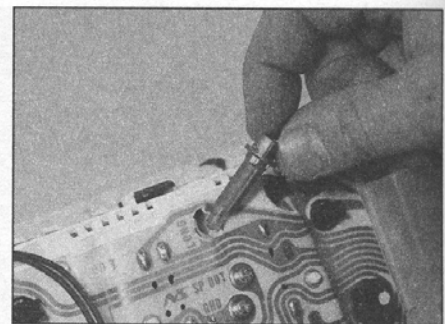
2 Using a suitable screwdriver, carefully prise the light unit lens out of position, and release the bulb from the light unit contacts (see illustrations).



6.4 Carefully prise the luggage compartment light unit out from the trim panel . . .



6.5 . . . then twist the bulb and remove it from the light unit



6.8 Removing an instrument panel bulb

3 Install the new bulb, ensuring that it is securely held in position by the contacts (bend them carefully if necessary), then clip the lens back into position.

Luggage compartment light

- 4 Using a suitable screwdriver, carefully prise the light unit out of position (see illustration).
- 5 Disconnect the wiring connector, then remove the bulb by pressing it and twisting in an anti-clockwise direction (see illustration).
- 6 Refitting is the reverse of removal.

Instrument panel illumination/warning lights

Note: On models with an airbag, refer to Section 25 for information on airbag system warning light bulb renewal.

- 7 Remove the instrument panel as described in Section 9.
- 8 Twist the relevant bulbholder anti-

clockwise, and withdraw it from the rear of the panel (see illustration).

9 Most bulbs are integral with their holders, although a few are of the capless (push-fit) type. Be very careful to ensure that the new bulbs are of the correct rating, the same as those removed; this is especially important in the case of the ignition/no-charge warning light.

10 Refit the bulbholder to the rear of the instrument panel, then refit the instrument panel as described in Section 9.

Glovebox illumination light bulb

11 Open the glovebox. Using a small flat-bladed screwdriver, carefully prise the light unit out of position, then release the bulb from its contacts (see illustrations).

12 Install the new bulb, ensuring that it is securely held in position by the contacts, and clip the light unit back into position.

Cigarette lighter, heater control panel and clock illumination bulbs - early models (pre-March 1994)

13 Remove the centre console as described in Chapter 12.

14 Pull the control knobs off the heater levers, then slacken and remove the retaining screws securing the centre panel to the fascia. Ease the panel away from the fascia.

15 To renew the cigarette lighter bulb, pull the bulbholder out from the cigarette lighter. The bulb is of the capless (push-fit) type, and can be removed by pulling it out of the bulbholder.

16 To renew the heater control panel bulb(s), pull the bulbholder from the rear of the panel. The bulbs are of the capless (push-fit) type, and can be removed by simply pulling out of the bulbholder.

17 To renew the clock illumination bulb, twist the bulbholder anti-clockwise and withdraw it from the rear of the clock. The bulb is integral with the holder.

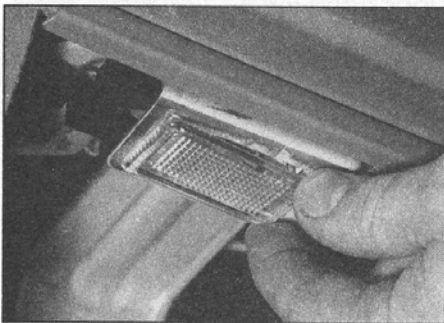
18 Refitting is the reverse of removal.

Heater control panel illumination bulb - later models (March 1994 onwards)

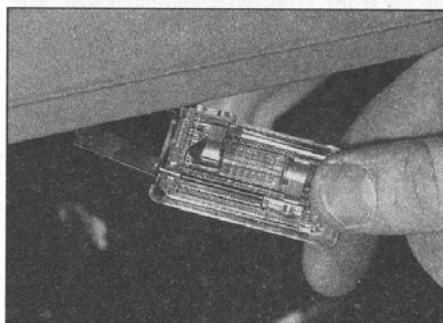
19 Pull off the control knobs from the three heater controls, and the knob from the blower motor switch (see illustration).

20 Undo the two retaining screws, then carefully ease the front plate away from the heater control panel to reveal the illumination bulb (see illustration).

21 The bulb is of the capless (push-fit) type, and can be removed by simply pulling it out of the bulbholder (see illustration).



6.11a Release the glovebox illumination light from the fascia frame . . .



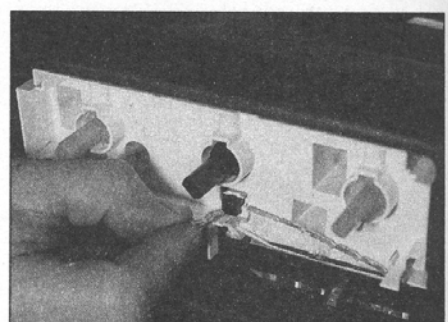
6.11b . . . then remove the bulb from the light contacts



6.19 On later models, pull the control knobs off from the heater controls and the blower motor switch . . .



6.20 . . . then undo the retaining screws and remove the front plate from the heater control unit



6.21 The illumination bulb is a push-fit in the panel



6.28 Removing the clock illumination bulb - later models

- 22 Carefully push the new bulb into position, then refit the front plate to the control panel
- 23 Securely tighten the panel retaining screws, then refit the control knobs.

Cigarette lighter illumination bulb - later models (March 1994 onwards)

- 24 Remove the centre console as described in Chapter 12.
- 25 Pull the bulbholder out from the rear of the lighter. The bulb is of the capless (push-fit) type, and can be removed by simply pulling it out of the bulbholder.
- 26 Refitting is the reverse of removal.

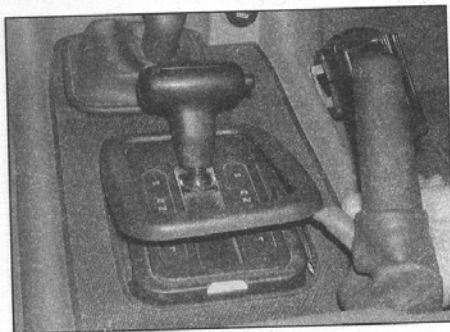
Clock illumination bulb - later models (March 1994 onwards)

- 27 Remove the clock as described in Section 11.
- 28 Twist the bulbholder anti-clockwise, and withdraw it from the rear of the clock. The bulb is integral with the holder (see illustration).
- 29 Fit the new bulb to the rear of the clock, and refit the clock as described in Section 11.

Switch illumination bulbs

Hazard warning light switch bulb - early models (pre-March 1994)

- 30 Pull the knob off the hazard warning light switch.
- 31 Remove the bulb by carefully pulling it upwards and out of position.
- 32 Carefully push the new bulb into place, and refit the knob.



6.45 Unclip the selector panel surround

Steering column switch illumination bulb - early models (pre-March 1994)

- 33 Undo the steering column shroud retaining screws, unclip the shroud halves, and remove both the upper and lower shrouds from the steering column. It may be necessary to pull off the hazard warning light switch button to allow the upper shroud to be removed.
- 34 Twist the bulbholder anti-clockwise, and withdraw it from the rear of the switch housing.
- 35 The bulb is of the capless (push-fit) type, and can be removed by simply pulling it out of the bulbholder.
- 36 Refitting is the reverse of removal.

Instrument panel surround switch illumination bulbs - early models (pre-March 1994)

- 37 Slacken and remove the four retaining screws securing the instrument panel surround in position. Move the panel forwards until access can be gained to the panel switch wiring connectors. Disconnect each switch wiring connector, noting its correct fitted location, then remove the panel from the vehicle. Note that the wiring connectors are colour-coded to aid identification.
- 38 Each bulb is of the capless (push-fit) type, and can be removed by simply pulling it out of the bulbholder.
- 39 Carefully push the new bulb into position then refit the surround panel, making sure that each wiring connector is securely connected to the correct switch.

Electric window/heated seat switch illumination bulbs

- 40 Using the information in Section 4, withdraw the switch from the switch panel - the wiring plug does not have to be removed.
- 41 The bulbholder is fitted to the side of the switch - using a small screwdriver, turn the bulbholder through 90° and remove it from the switch.
- 42 The bulb and holder are one unit - the bulb cannot be replaced separately. Fit a new bulb and holder, then refit the switch as described in Section 4.

All other switches

- 43 All of the switches are fitted with illuminating bulbs; some are also fitted with a bulb to show when the circuit concerned is operating. These bulbs are an integral part of the switch assembly, and cannot be obtained separately. Bulb replacement will therefore require the renewal of the complete switch assembly.

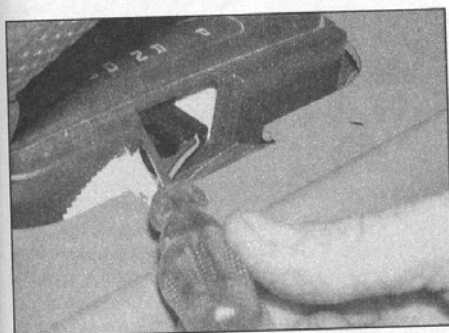
Automatic transmission selector panel bulb

- 44 On early models, slacken and remove the selector lever trim panel retaining screws; carefully unclip the panel.
- 45 On later models, carefully unclip the panel at the rear, using a piece of card to protect the trim; release the panel from the front clips once the rear edge is free (see illustration). Fold back the console rubber mat to improve access.
- 46 There is a bulbholder on either side of the selector panel. Remove the relevant bulbholder from the selector lever surround, using a small screwdriver to prise it out from behind. The bulb is of the capless (push-fit) type, and can be removed by simply pulling it out of the bulbholder (see illustrations).
- 47 Refitting is the reverse of removal.

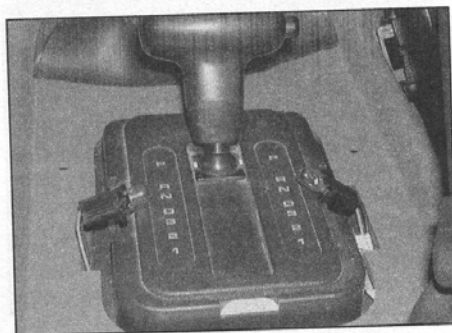
7 Exterior light units - removal and refitting



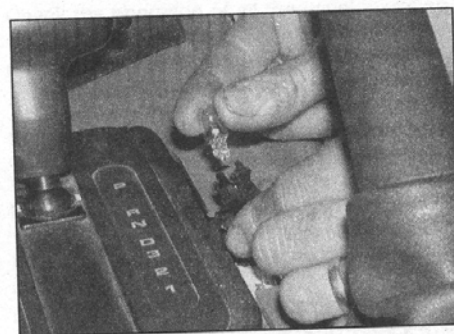
Note: Disconnect the battery negative lead before removing any light unit, and reconnect the lead after refitting the light. Refer to the precautions in Section 1 before proceeding.



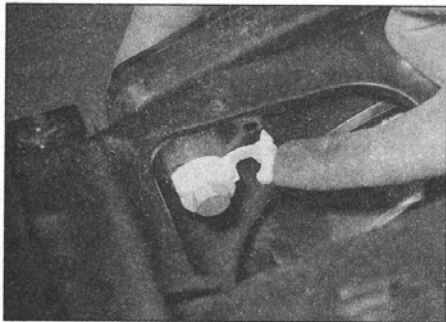
6.46a Using a small screwdriver ...



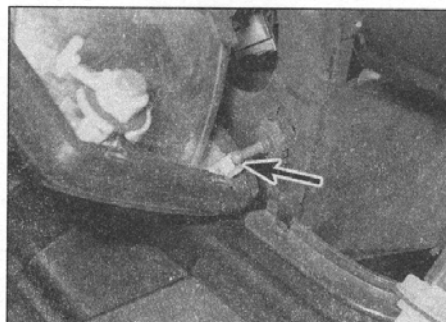
6.46b ... prise out the bulbholders ...



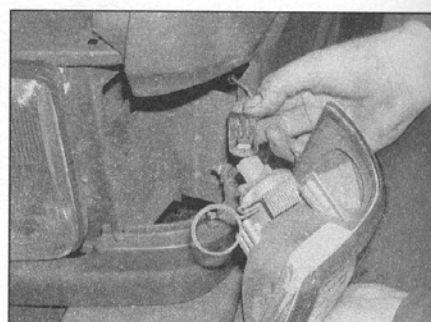
6.46c ... then pull out the wedge-base bulb



7.6 On later models, release the light unit retaining clips . . .



7.7 . . . then pull the headlight unit off from its adjustment motor balljoint (shown with indicator light removed)



7.13 Disconnect the wiring plug from the bulbholder, and remove the front direction indicator

Headlight

Early models (pre-March 1994)

1 Slacken and remove the two screws securing the headlight surround in position, and pull the surround forwards. Disconnect the direction indicator light wiring connector, and remove the surround from the vehicle.

2 Disconnect the wiring connector from the rear of the headlight unit, and remove the rubber dust cover.

3 Free the sidelight bulbholder from the rear of the headlight unit.

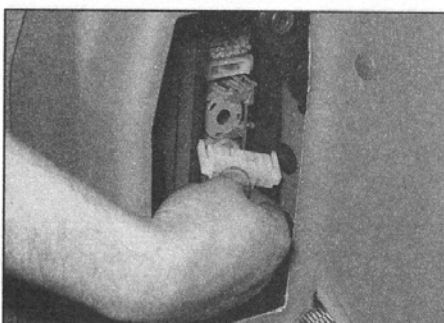
4 Remove the knobs from the headlight alignment adjustment screws, then release the plastic retainers and withdraw the headlight unit from the vehicle.

5 Refitting is a direct reversal of the removal procedure. On completion, check the headlight beam alignment using the information given in Section 8.

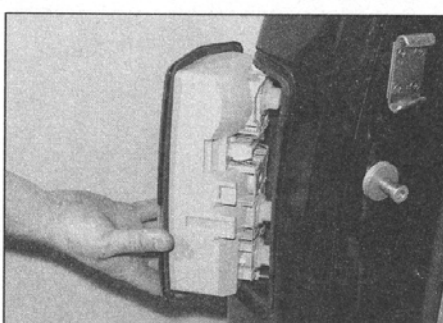
Later models (March 1994 onwards)

6 Rotate the retaining clips through approximately 10° to align with the slots in the headlight mounting plate (see illustration).

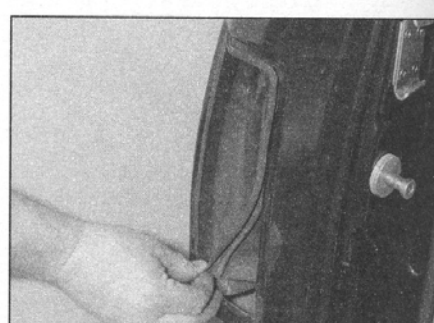
7 Withdraw the headlight unit from its aperture, and disconnect the headlight and sidelight wiring connectors. Note that on models equipped with an electric headlight levelling system, it will be necessary to disconnect the levelling motor link rod balljoint as the headlight is removed (see illustration). To improve access, remove the direction indicator light (see below).



7.19a Disconnect the wiring connector, then undo the retaining nuts . . .



7.19b . . . withdraw the rear light cluster from the vehicle . . .



7.19c . . . and recover the rubber seal

8 Refitting is a direct reversal of the removal procedure. On completion, check the headlight beam alignment using the information given in Section 8. Where necessary, check the operation of the headlight levelling system.

Front direction indicator light

Early models (pre-March 1994)

9 Slacken and remove the two screws securing the headlight surround in position, and pull the surround forwards. Disconnect the direction indicator light wiring connector, and remove the surround from the vehicle.

10 Undo the two retaining screws, and separate the indicator light from the surround.

11 Refitting is the reverse of removal.

Later models (March 1994 onwards)

12 From within the engine compartment, unhook the direction indicator light retaining spring, and release the light unit from the vehicle.

13 Twist the bulbholder anti-clockwise to free it from the rear of the light unit (or alternatively, disconnect the wiring plug from the rear of the bulbholder), and remove the light unit from the vehicle (see illustration).

14 Refitting is the reverse of removal.

Front direction side repeater light

15 Carefully push the light unit to the right, to release its retaining clip, then withdraw the unit from the wing.

16 Turn the lens unit anti-clockwise to release it, then remove the light unit from the vehicle.

17 Refitting is a reverse of the removal procedure.

Rear light cluster

18 Pull out the side-facing seat/pocket cover (as applicable), then undo the fastener and remove the access panel to reveal the rear of the light cluster assembly. To improve access, remove the seat (see Chapter 12).

19 Disconnect the wiring connector, then undo the two retaining nuts and washers and remove the rear light cluster assembly from the vehicle. Recover the rubber seal which is fitted between the light unit and body (see illustrations).

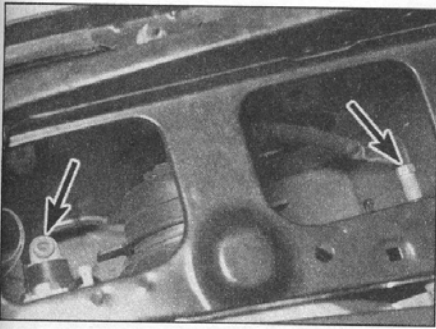
20 Refitting is the reverse of removal. If the rubber seal shows signs of damage or deterioration, renew it.

Bumper-mounted rear lights - later models (March 1994 onwards)

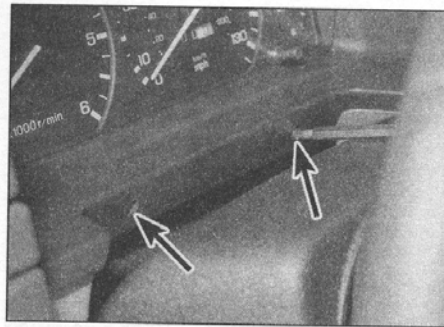
21 Reach up behind the bumper, trace the wiring back from each of the bulbholders to their wiring connectors, then disconnect each wiring connector.

22 Unscrew the two retaining nuts, and remove the light unit from the bumper.

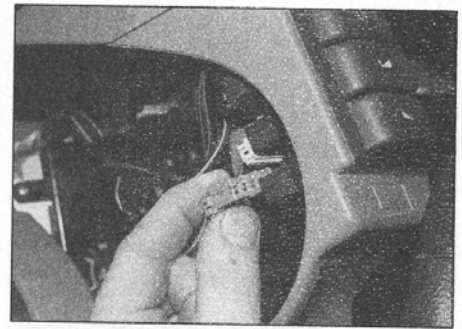
23 Refitting is a reverse of the removal procedure.



8.2 Headlight unit adjustment screws (arrowed) - model with electric headlight adjustment shown



9.6a On later models, undo the retaining screws (arrowed) . . .



9.6b . . . then remove the instrument panel surround, disconnecting the wiring connectors from its switches

High-level stop-light - later models (March 1994 onwards)

- 24 Undo the two retaining screws, and detach the rear of the light unit.
- 25 Undo the retaining nut, and remove the light unit from the window glass.
- 26 Refitting is a reverse of the removal procedure.

Number plate light

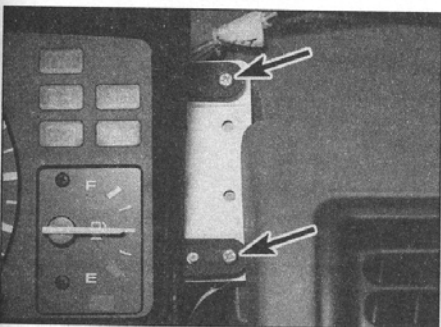
- 27 Slacken and remove the two retaining screws, then lift out the light unit of position.
- 28 Disconnect the wiring connectors from the terminals, and remove the light unit from the vehicle.
- 29 Refitting is the reverse of removal.

8 Headlight beam alignment - general information



Accurate adjustment of the headlight beam is only possible using optical beam-setting equipment, and this work should therefore be carried out by a Land Rover dealer or suitably-equipped workshop.

For reference, the headlights can be adjusted using the adjuster assemblies fitted to the rear of each light unit. On models equipped with electrically-operated headlight beam levelling, one of the adjusters is built into the top of the motor assembly (see illustration).



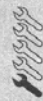
9.7 Undo the panel retaining screws (right-hand screws shown) . . .

Some models are equipped with an electrically-operated headlight beam adjustment system - the recommended settings are as follows:

- 0 Front seat(s) occupied
- 1 All seats occupied
- 2 All seats occupied and load in luggage compartment
- 3 Driver's seat occupied and load in the luggage compartment

When adjusting the headlight aim, ensure that the switch is set in position 0.

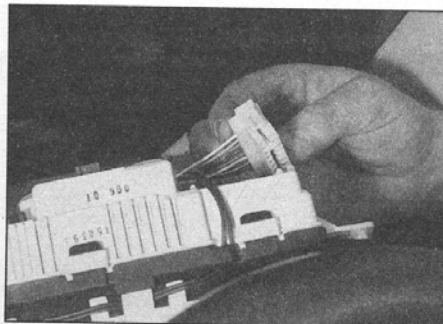
9 Instrument panel - removal and refitting



Removal

Early models (pre-March 1994)

- 1 Disconnect the battery negative terminal.
- 2 Slacken and remove the four retaining screws securing the instrument panel surround in position.
- 3 Move the surround forwards until access can be gained to the switch wiring connectors. Disconnect each switch wiring connector, noting its correct fitted location, then remove the surround; the wiring connectors are colour-coded to aid identification.
- 4 Reach behind the panel, and detach the speedometer cable from the instrument panel by depressing its retaining clip.



9.8 . . . then remove the panel, disconnecting its wiring connectors as they become accessible

- 5 Slacken and remove the four retaining nuts and washers and the two retaining screws, then carefully manoeuvre the instrument panel out of position.

Later models (March 1994 onwards)

- 6 Disconnect the battery negative terminal. Slacken and remove the retaining screws securing the instrument panel surround in position. Ease the panel out of position, disconnecting the wiring connectors from the switches as they become accessible (see illustrations).
- 7 Undo the four panel retaining screws, then carefully manoeuvre the panel assembly out of position until access can be gained to the wiring connectors (see illustration).
- 8 Disconnect each wiring connector, noting their correct fitted positions, and remove the instrument panel from the vehicle (see illustration).

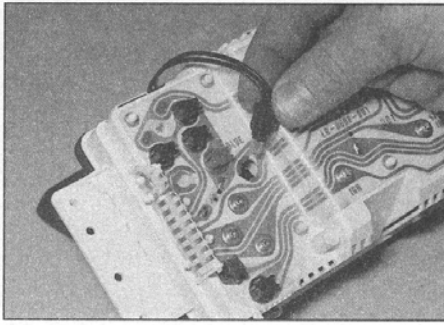
Refitting

Early models (pre-March 1994)

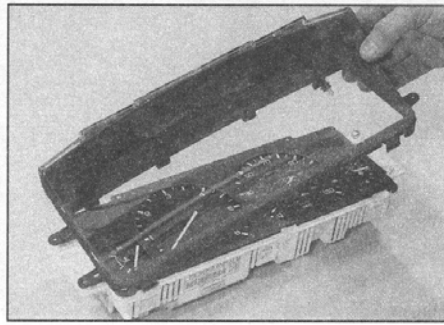
- 9 Ease the instrument panel into position, and reconnect the speedometer cable.
- 10 Refit the panel retaining nuts and screws, and tighten them securely.
- 11 Manoeuvre the surround panel into position and reconnect each switch wiring connector, making sure that they are all connected to the correct switches.
- 12 Seat the panel in position, and securely tighten its retaining screws.
- 13 Reconnect the battery negative terminal. Check the operation of all the panel surround switches and the warning lights.

Later models (March 1994 onwards)

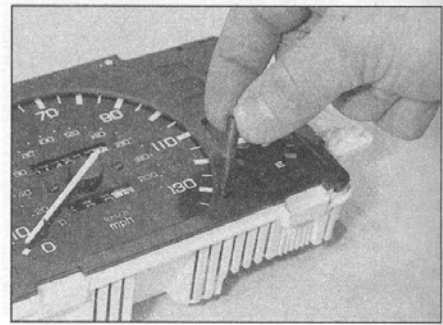
- 14 Ease the instrument panel into position, and securely reconnect all the wiring connectors.
- 15 Refit the panel retaining screws, and tighten them securely.
- 16 Refit the instrument panel surround, not forgetting to reconnect the dimmer switch wiring connector, and securely tighten its retaining screws.
- 17 Reconnect the battery, and check the operation of the instrument panel warning lights.



10.17 Release the illumination bulbholder . . .



10.18 . . . then release the retaining clips and remove the lens unit



10.19 Pull out the trip odometer reset pin, and remove the instrument cover plate

10 Instrument panel components - removal and refitting



1 Remove the instrument panel as described in Section 9, then proceed as described under the relevant sub-heading.

Early models (pre-March 1994)

Speedometer

2 Release the panel illumination bulbs and the speedometer bulb from the panel, then remove the bulbholder and wiring assembly from the panel.

3 Remove the button from the trip odometer reset pin.

4 Undo the retaining screws, then release the retaining clips and remove the lens from the front of the instrument panel.

5 Undo the retaining screws and remove the speedometer from the rear of the instrument panel.

6 Refitting is a reverse of the removal procedure. Do not overtighten the instrument panel fasteners, as the plastic is easily cracked.

Tachometer (incorporating fuel and temperature gauges)

7 Remove the lens from the panel as described in paragraphs 2 to 4.

8 Slacken and remove the seven retaining screws securing the tachometer assembly in position. Note each screw's correct fitted location as it is removed, since three different sizes of screw are used.

9 Lift the tachometer out of position.

10 Refitting is the reverse of removal, making sure that each retaining screw is fitted in its correct location. Do not overtighten the screws, as the plastic is easily cracked.

Warning light panel

11 Remove the speedometer and tachometer as described above, and lift the panel out of position.

12 On refitting, ensure that the panel is correctly seated and fitted the correct way around, then refit the tachometer and speedometer.

Printed circuit

13 Remove all bulbholders from the rear of the panel, noting each one's correct fitted position.

14 Slacken and remove the five tachometer retaining screws which secure the printed circuit in position, noting each screw's correct fitted position.

15 Release the resistor from its retaining clips, and carefully withdraw the printed circuit assembly from the instrument panel.

16 Refitting is a reversal of the removal procedure, ensuring that the printed circuit is correctly located on all the necessary retaining pins, and that its retaining screws are refitted in their correct positions.

Later models (March 1994 onwards)

Speedometer

17 Release the illumination bulbholder from

the rear of the instrument panel so that it is free to be removed with the lens unit (see illustration).

18 Release the retaining clips, and remove the lens assembly from the front of the panel (see illustration).

19 Remove the button from the trip odometer reset pin, then lift off the instrument cover plate (see illustration).

20 Undo the retaining screws and remove the speedometer from the instrument panel (see illustration).

21 Refitting is a reverse of the removal procedure. Do not overtighten the instrument panel fasteners, as the plastic is easily cracked.

Tachometer

22 Remove the instrument panel lens and cover plate as described in paragraphs 17 to 19.

23 Remove the circuit board as described in paragraph 33.

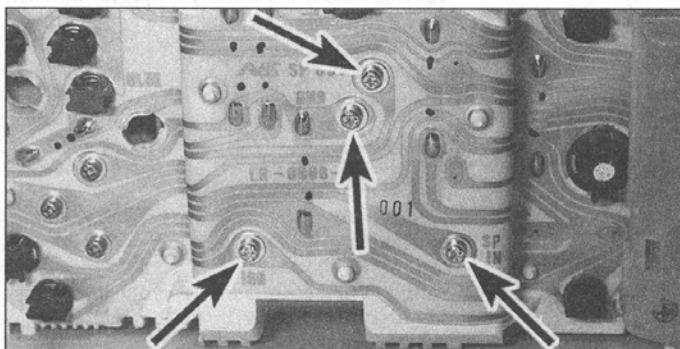
24 Undo the retaining screws and remove the tachometer from the housing (see illustration).

25 Refitting is the reverse of removal. Do not overtighten the screws, as the plastic is easily cracked.

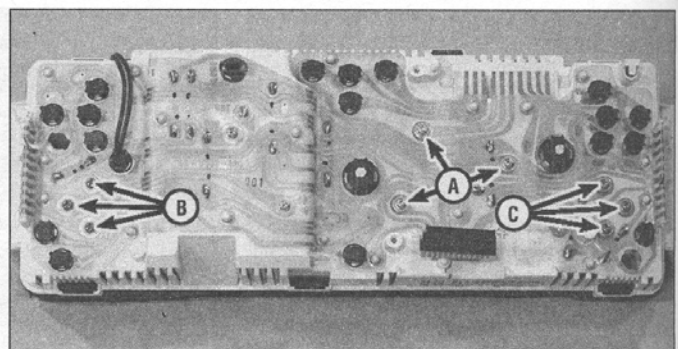
Coolant temperature gauge

26 Remove the instrument panel lens and cover plate as described in paragraphs 17 to 19.

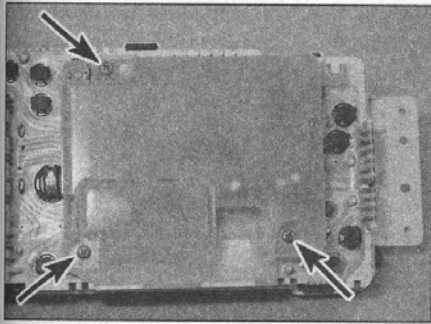
27 Remove the circuit board as described in paragraph 33.



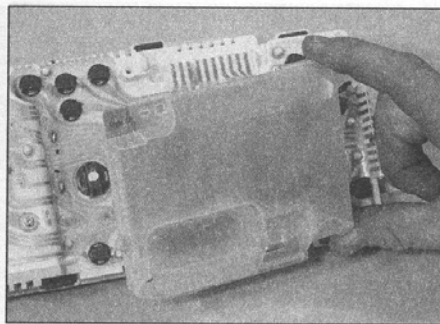
10.20 Speedometer retaining screws (arrowed)



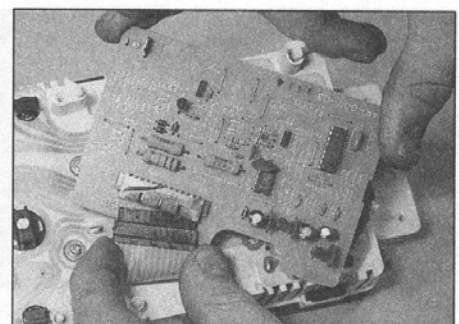
10.24 Tachometer retaining screws (A), coolant temperature gauge retaining screws (B) and fuel gauge retaining screws (C)



10.33a Undo the retaining screws (arrowed) . . .



10.33b . . . then lift off the plastic cover . . .



10.33c . . . and disconnect the wiring connector from the circuit board

28 Undo the gauge retaining screws, and lift it out from the housing (refer to illustration 10.24).

29 Refitting is the reverse of removal. Do not overtighten the screws, as the plastic is easily cracked.

Fuel gauge

30 Remove the instrument panel lens and cover plate as described in paragraphs 17 to 19.

31 Undo the gauge retaining screws, and lift it out from the housing (refer to illustration 10.24).

32 Refitting is the reverse of removal. Do not overtighten the screws, as the plastic is easily cracked.

Circuit board

33 Undo the three retaining screws securing the circuit board to the rear of the panel. Unclip the plastic cover, then disconnect the wiring connector and remove the board (see illustrations).

34 On refitting, ensure that the wiring connector is securely reconnected. Take care not to overtighten the retaining screws.

Printed circuit

35 Remove the instrument panel lens and cover plate as described in paragraphs 17 to 19.

36 Remove the circuit board as described in paragraph 33.

37 Remove all bulbholders from the rear of the panel, noting each one's correct fitted position.

38 Slacken and remove the printed circuit retaining screws, then carefully withdraw the printed circuit assembly from the instrument panel.

39 Refitting is a reversal of the removal procedure, ensuring that the printed circuit is correctly located on all the necessary retaining pins. Do not overtighten any screws, as the plastic is easily cracked.

11 Clock - removal and refitting

Removal

Early models (pre-March 1994)

1 Remove the centre console as described in Chapter 12.

2 Pull the control knobs off the heater levers.

3 Slacken and remove the retaining screws securing the centre panel to the facia, then ease the panel away from the facia.

4 Disconnect the wiring connector from the rear of the clock, then depress the retaining tang and push the clock out from the centre panel.

Later models (March 1994 onwards)

5 Using a suitable screwdriver, carefully prise the facia (dummy) switch panel assembly out from the centre panel, taking great care not to mark either (see illustration). Disconnect the

wiring connectors (where necessary) and remove the panel.

6 Reach in behind the clock, release its lower retaining clips, then push the clock assembly out from the facia (see illustration).

7 Disconnect the wiring connectors, and remove the clock from the vehicle (see illustration).

Refitting

Early models (pre-March 1994)

8 Slide the clock back into position in the panel, and reconnect its wiring connector.

9 Refit the centre panel to the facia, and securely tighten its retaining screws.

10 Refit the knobs to the heater controls, then install the centre console as described in Chapter 12.

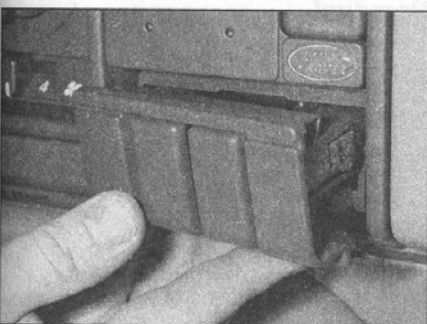
Later models (March 1994 onwards)

11 Reconnect the wiring connector, then slide the clock back into position in the facia.

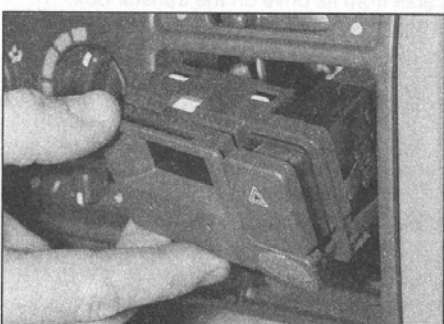
12 Reconnect the wiring connectors (where applicable), then the (dummy) switch panel back into place.

12 'Lights-on' warning system - general information

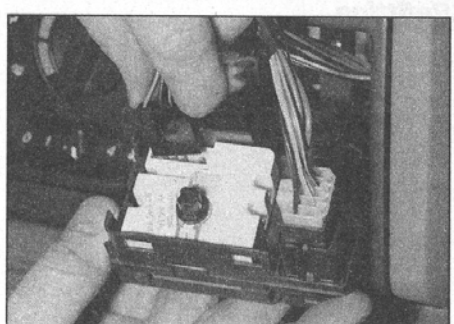
Most vehicles covered in this manual have a 'lights-on' warning system. The purpose of the system is to inform the driver that the lights have been left on - if the ignition switch



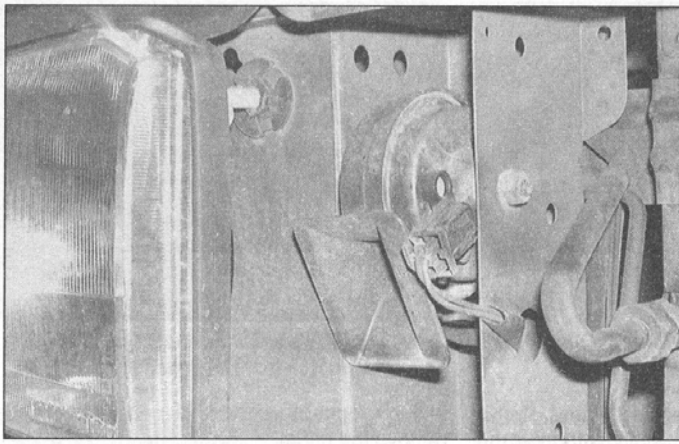
11.5 On later models, unclip the (dummy) switch panel . . .



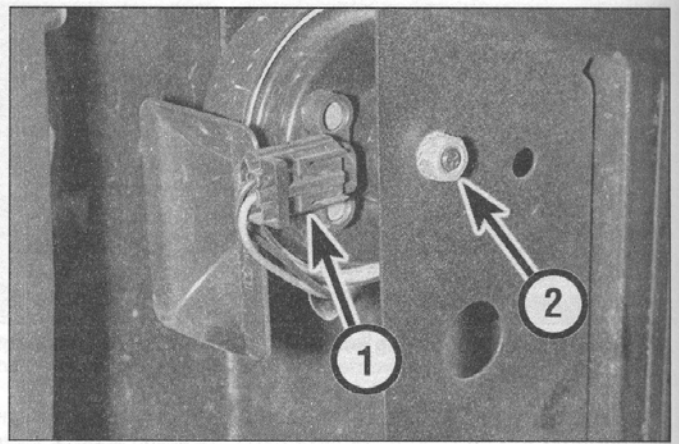
11.6 . . . then remove the clock unit from the facia . . .



11.7 . . . and disconnect its wiring connectors



14.3 Horn unit seen with radiator grille removed



14.4 Horn wiring connectors (1) and retaining nut (2)

is turned off with the lights still switched on; the buzzer will sound when a door is opened. The system consists of a buzzer relay unit which is linked to the driver's door courtesy light switch.

13 Cigarette lighter - removal and refitting



Removal

Early models (pre-March 1994)

- 1 Remove the centre console as described in Chapter 12.
- 2 Pull the control knobs off the heater levers.
- 3 Slacken and remove the retaining screws securing the centre panel to the fascia, then ease the panel away from the fascia.
- 4 Disconnect the wiring connectors from the rear of the lighter, then depress the retaining tangs and push the lighter out from the centre panel.

Later models (March 1994 onwards)

- 5 Remove the centre console as described in Chapter 12.
- 6 Depress the retaining tangs, then push the lighter out from the centre console.

Refitting

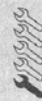
Early models (pre-March 1994)

- 7 Clip the lighter back into position in the centre panel, and reconnect its wiring connectors.
- 8 Refit the centre panel to the fascia, and securely tighten its retaining screws.
- 9 Refit the knobs to the heater controls, then install the centre console as described in Chapter 12.

Later models (March 1994 onwards)

- 10 Clip the lighter back into position, then refit the centre console as described in Chapter 12.

14 Horn - removal and refitting



Removal

- 1 Disconnect the battery negative terminal.
- 2 Remove the radiator grille as described in Chapter 12.
- 3 Disconnect the wiring connector from the relevant horn (*see illustration*).
- 4 Slacken and remove the retaining nut and washer, then remove the horn from the vehicle (*see illustration*).

Refitting

- 5 Refitting is the reverse of removal.

15 Speedometer drive cable - removal and refitting



Early models (pre-March 1994)

Removal

- 1 Firmly apply the handbrake, then jack up the front of the vehicle and support it on axle stands.
- 2 Detach the lower end of the speedometer cable from its drive on the transfer box.
- 3 Remove the instrument panel as described in Section 9. Tie a piece string to the upper end of the cable - this can then be used to draw the cable back into position.
- 4 From within the engine compartment, free the speedometer cable from any relevant retaining clips and ties, noting its correct routing.
- 5 Release the cable grommet from the engine compartment bulkhead, and withdraw the cable forwards and out through the bulkhead. Once the cable is free, untie the string and leave it in position in the vehicle; the string can then be used to draw the new cable back into position.

Refitting

- 6 Tie the end of the string to the end of the cable, then use the string to draw the speedometer cable through from the engine compartment and into position. Once the cable is through, untie the string.
- 7 Ensure that the cable is correctly routed and retained by all the relevant clips and ties, then seat the outer cable grommet in the engine compartment bulkhead.
- 8 Reconnect the lower end of the cable to its drive, ensuring it is securely reconnected, then lower the vehicle to the ground.
- 9 Refit the instrument panel as described in Section 9.

Later models (March 1994 onwards)

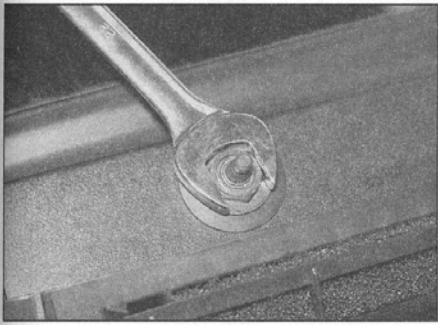
- 10 On later models, the speedometer is of the electronic type, and has no drive cable. If the speedometer fails, the fault must be due either to a faulty vehicle speed sensor (*see* Chapter 4B, Section 6, or Chapter 4C, Section 21) or speedometer unit, or in the wiring connecting the two components.

16 Wiper arm - removal and refitting

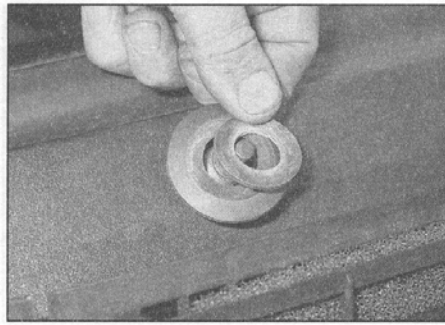


Removal

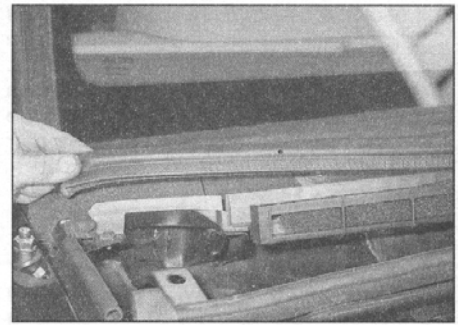
- 1 Operate the wiper motor, then switch it off so that the wiper arm returns to the at rest (parked) position.
- 2 Stick a piece of masking tape to the windscreen along the edge of the wiper blade, to use as an alignment aid on refitting. If the tailgate wiper arm is being removed, remove the spare wheel.
- 3 Lift up/remove (as applicable) the wiper arm spindle nut cover, then slacken and remove the spindle nut. Lift the blade off the glass, and pull the wiper arm off its spindle. If necessary, the arm can be levered off the spindle using a suitable flat-bladed



17.3a Unscrew the large nut from each wiper spindle ...



17.3b ... and remove the washers, noting their correct fitted locations



17.4 Remove the bonnet seal from the bulkhead ...

screwdriver. Where necessary, remove the rubber seal which is fitted to the spindle.

Refitting

4 Ensure that the wiper arm and spindle splines are clean and dry and, where necessary, refit the rubber seal.

5 Locate the wiper arm on the spindle, aligning the wiper blade with the tape fitted on removal.

6 Refit the spindle nut, tightening it securely, and clip the nut cover back in position.

2 Remove both windscreen wiper arms as described in Section 16.

3 Undo the large nut from each wiper spindle, and remove the washers, noting each one's correct fitted position (see illustrations).

4 Open the bonnet, and remove the bonnet seal from the engine compartment bulkhead (see illustration).

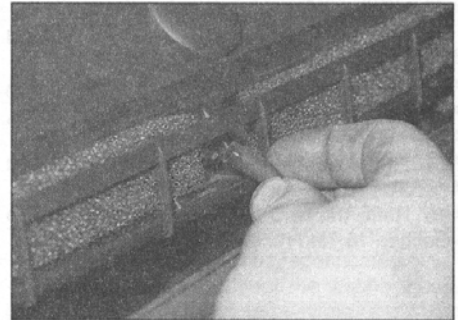
5 Disconnect the washer hoses from the windscreen washer jets (see illustration).

6 Slacken and remove the bolt securing the centre of the windscreen motor cowl in position. Release the fasteners securing the centre cowl section to the outer sections, and remove it from the vehicle (see illustrations).

7 Slacken and remove the nut securing the wiper motor earth lead to the vehicle body (see illustration).

8 Undo the wiper motor mounting plate retaining bolts, then remove the assembly from the vehicle, disconnecting its wiring

connector as it becomes accessible. Recover the motor rubber gasket. Inspect the gasket for signs of damage or deterioration, and renew if necessary (see illustrations).

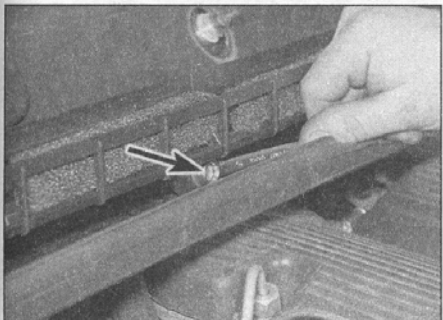


17.5 ... and disconnect the hoses from the washer jets

17 Windscreen wiper motor and linkage - removal and refitting

Removal

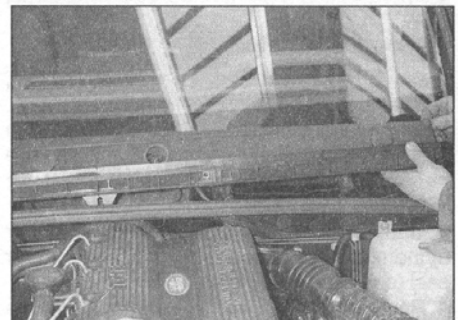
1 Disconnect the battery negative terminal.



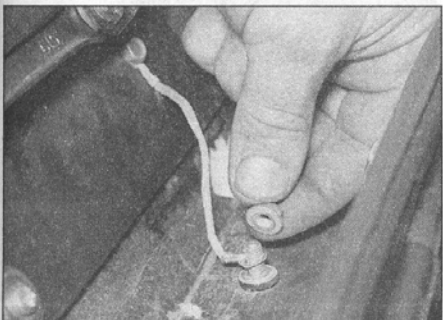
17.6a Undo the centre retaining bolt ...



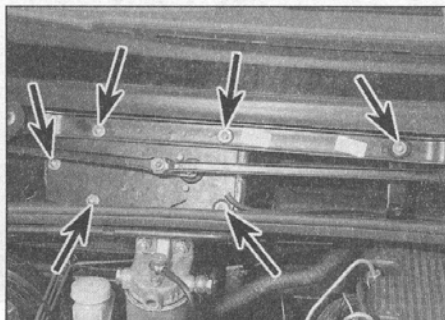
17.6b ... then prise out the retaining clips ...



17.6c ... and remove the windscreen motor cowl from the vehicle



17.7 Release the earth lead from the body ...



17.8a ... then undo the retaining bolts (arrowed) ...



17.8b ... and remove the wiper motor ...

9 If necessary, mark the relative positions of the motor shaft and linkage arm, then unscrew the retaining nut from the motor spindle. Free the wiper linkage from the spindle, then remove the motor retaining bolts and separate the motor and linkage. Recover the motor earth lead, noting its correct fitted position.

Refitting

10 Where necessary, assemble the motor and linkage, not forgetting the motor earth lead, and securely tighten the motor retaining bolts. Locate the linkage arm on the motor spindle, aligning the marks made prior to removal, and securely tighten its retaining nut.

11 Position the rubber gasket on the bulkhead, then manoeuvre the motor assembly back into position in the vehicle and reconnect the wiring connector (see illustration). Refit the three retaining bolts and tighten them securely.

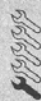
12 Refit the earth lead retaining bolt, and tighten it securely.

13 Refit the centre cowl section, securing it in position with the retaining bolt and fasteners, and reconnect the washer hoses.

14 Fit the washers to the wiper spindles, and secure them in position with the large nuts.

15 Refit the wiper arms as described in Section 16, and reconnect the battery.

18 Tailgate wiper motor - removal and refitting



Removal

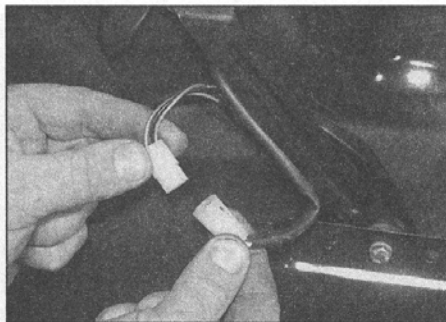
1 Disconnect the battery negative terminal, and remove the spare wheel.

2 Remove the wiper arm as described in Section 16. On most models, it will be necessary to remove the spare wheel for access.

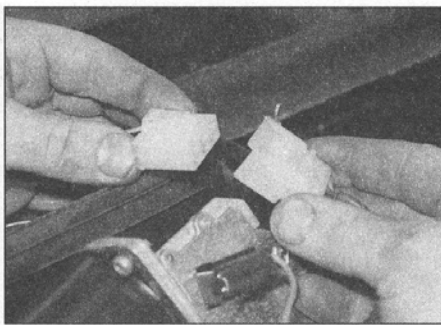
3 Unscrew the large nut from the wiper spindle, and recover the washer and rubber seal (see illustrations).

4 Remove the tailgate inner trim panel as described in Section 15 of Chapter 12.

5 Disconnect the motor wiring connector,



18.5a Disconnect the wiring connector ...



17.8c ... disconnecting its wiring connector as it becomes accessible

then slacken and remove the wiper motor mounting bolts, noting the correct fitted position of the earth lead (see illustrations).

6 Manoeuvre the motor assembly out from the tailgate, and recover the spindle spacer and washer (see illustration).

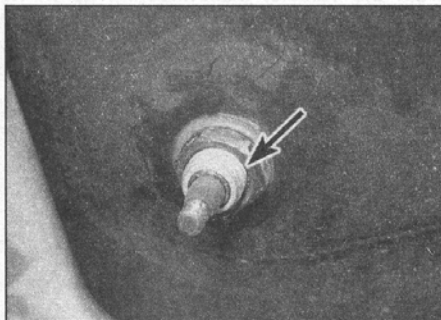
7 If necessary, undo the retaining nuts and bolts, and separate the motor and its mounting bracket.

Refitting

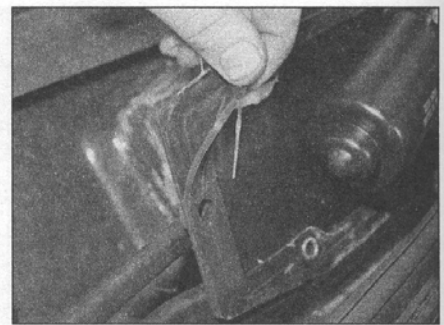
8 Where necessary, reassemble the motor and its mounting bracket, and securely tighten the retaining nuts and bolts.

9 Ensure that the spindle spacer and washer are correctly fitted, and manoeuvre the assembly into position in the tailgate.

10 Refit the motor mounting bolts, not forgetting the earth lead, and tighten them securely.



18.3a Unscrew the nut (arrowed) from the wiper spindle ...



17.11 On refitting, ensure that the motor seal is in good condition

11 Reconnect the wiring connector, then refit the inner trim panel as described in Chapter 12.

12 Slide the rubber seal and washer onto the outside of the spindle, and securely tighten the spindle nut.

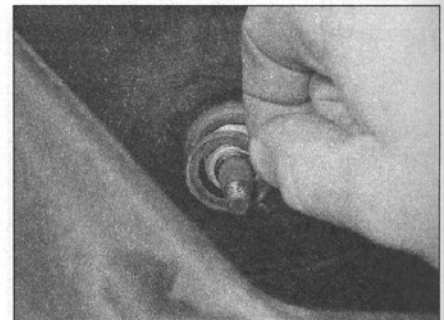
13 Refit the wiper arm as described in Section 16, then refit the spare wheel and reconnect the battery.

19 Windscreen/tailgate washer system components - removal and refitting

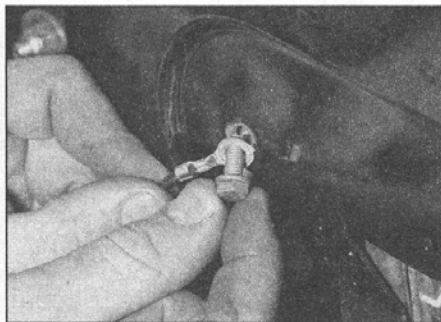


Washer system reservoir

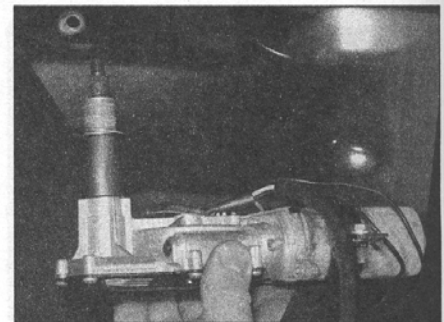
1 Disconnect the battery negative lead, then proceed as described under the relevant sub-heading.



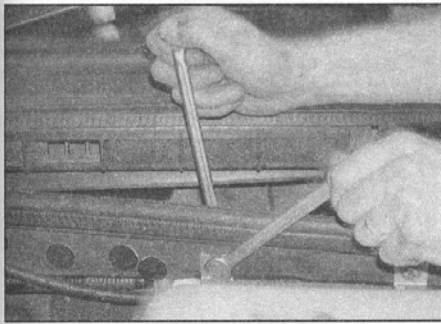
18.3b ... and remove the rubber seal



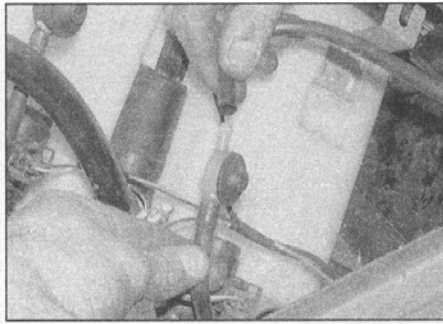
18.5b ... then undo the retaining bolts, noting the correct fitted position of the earth lead



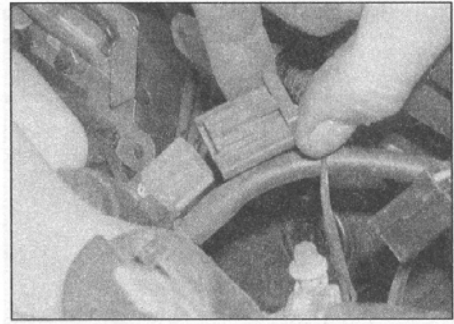
18.6 Remove the wiper motor from the tailgate, and recover the washer and spacer from its spindle



19.5 Unscrew and remove the upper mounting bolts



19.7 Disconnect the washer hoses, noting their positions



19.8 Disconnect the washer pump wiring plugs

Early models (pre-March 1994)

2 Slacken the retaining clips (where fitted), and disconnect the hoses from the washer pumps. Mark each hose for identification purposes, to avoid the possibility of incorrectly reconnecting the hoses on refitting.

3 Disconnect the wiring connector from each washer pump.

4 From underneath the wheelarch, slacken and remove the two retaining bolts, then remove the washer reservoir from the engine compartment.

Later models (March 1994 onwards)

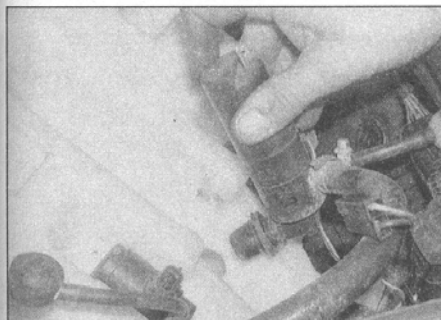
5 Slacken and remove the two bolts securing the top of the reservoir to the bulkhead (see illustration).

6 From underneath the wheelarch, slacken and remove the two retaining nuts securing the reservoir to the body.

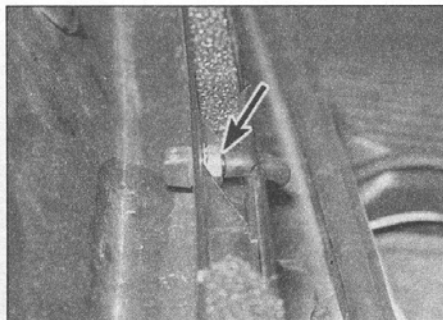
HAYNES HINT

We had some difficulty with this on our project car, as the nuts in the wheelarch would not loosen, and the bolts turned (these are screwed into the plastic of the reservoir, and had stripped their threads). In the end, the nuts had to be drilled and split off, and new conventional nuts and bolts fitted on reassembly.

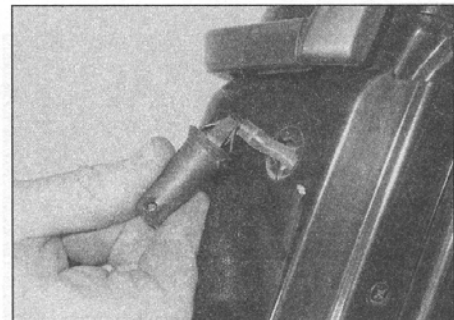
7 Withdraw the reservoir, and disconnect the hoses from the washer pumps (see illustration). Mark each hose for identification



19.10 Ease the pump out of the reservoir body



19.15 The windscreen washer jets (arrowed) are located in the windscreen cowl panel



19.17 Twist the tailgate washer jet to release it from the vehicle

purposes, to avoid the possibility of incorrectly reconnecting the hoses on refitting.

8 Disconnect the wiring connector from each washer pump (see illustration), and remove the reservoir from the engine compartment.

Washer pump

9 Remove the washer reservoir as described above.

10 Tip out the contents of the reservoir, then carefully ease the pump out from the reservoir, and recover its sealing grommet (see illustration).

11 Refitting is the reverse of removal, using a new sealing grommet if the original one shows signs of damage or deterioration.

Non-return valves

12 A non-return valve is fitted to both the windscreen and tailgate washer hoses.

13 To remove the valve, trace the hose back from the relevant pump to the valve, then disconnect the hoses and remove the valve from the vehicle.

14 On refitting, ensure that the valve is fitted the correct way around.

Windscreen washer jets

15 Disconnect the washer hose from the base of the jet, then unscrew the retaining nut and washer and remove the jet from the cowl panel (see illustration).

16 On refitting, refit the washer and retaining nut, tightening it securely. Reconnect the washer hose, then check the operation of the

jet. If necessary adjust the nozzle using a pin, aiming the spray to a point slightly above the centre of the wiper blade swept area.

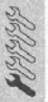
Tailgate washer jet

17 Rotate the washer jet to release it from the body (see illustration).

18 Withdraw the washer jet and disconnect it from the washer hose, taking great care not to allow the hose to fall back into the body. While the jet is removed, tie a piece of string to the supply pipe (or tape it to the vehicle body) to ensure that it does not disappear. If the hose does fall back into the hole, the interior trim panel will have to be removed (see Chapter 12, Section 26) to allow it to be reconnected.

19 On refitting, reconnect the washer hose, then clip the jet back into position. Check the operation of the jet and, if necessary, adjust the nozzle using a pin, aiming the spray to a point slightly above the centre of the swept area.

20 Headlight washer system components - removal and refitting



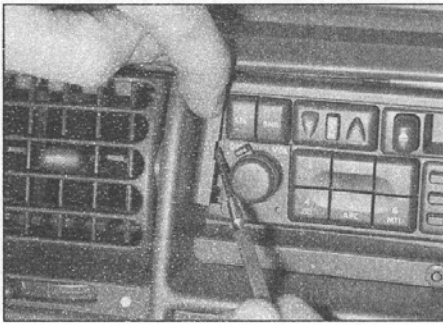
Washer system reservoir

1 Refer to Section 19.

Washer pump

Early models (pre-March 1994)

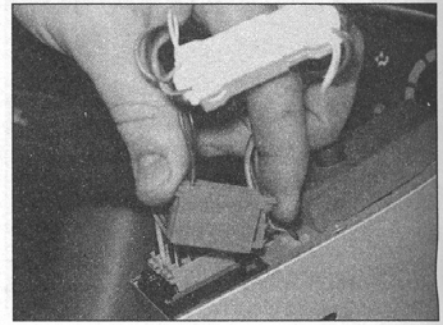
2 Slacken the retaining clip (where fitted), and disconnect the hose from the washer pump.



21.3 Prise out the cover plates . . .



21.4a . . . then insert the removal tools and slide out the radio/cassette unit . . .



21.4b . . . disconnecting its wiring connectors and aerial lead as they become accessible

- 3 Disconnect the wiring connector from the pump.
- 4 Undo the screws and remove the pump retaining bracket.
- 5 Carefully ease the pump out from the reservoir, and recover its sealing grommet.
- 6 Refitting is the reverse of removal, using a new sealing grommet if the old one shows signs of damage or deterioration.

Later models (March 1994 onwards)

- 7 Refer to Section 19.

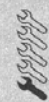
Washer jet

- 8 If necessary to improve access, chock the rear wheels, then jack up the front of the vehicle and support it on axle stands.
- 9 Slacken the retaining clip, and detach the

washer hose from the rear of the relevant washer jet.

- 10 Unscrew the retaining nut, and remove the washer jet from the bumper.
- 11 Refitting is the reverse of removal.

21 Radio/cassette and CD player - removal and refitting



Note: The following removal and refitting procedure is for the range of radio/cassette units which Land Rover fit as standard equipment. Removal and refitting procedures of non-standard units may differ slightly. Before removing the unit, refer to Radio/cassette unit anti-theft system - precaution at the end of this manual.

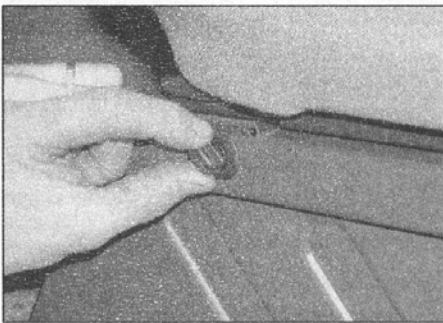
Removal

Radio/cassette player

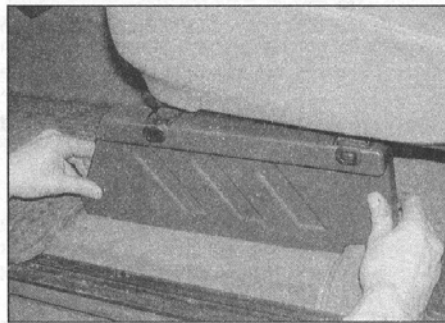
- 1 All the radio/cassette players fitted by Land Rover have DIN standard fixings. Two special tools, obtainable from most car accessory shops, are required for removal. Alternatively, suitable tools can be fabricated from 3 mm diameter wire, such as welding rod.
- 2 Disconnect the battery negative lead.
- 3 Unclip the small access covers (where fitted) from either side of the radio/cassette unit, to reveal the fixing holes (see illustration).
- 4 Insert the tools into the holes, and push them until they snap into place. The radio/cassette player can then be slid out of the fascia, and the aerial lead and wiring connectors disconnected (see illustrations).

CD autochanger

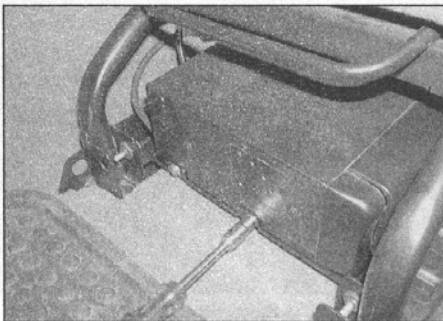
- 5 Disconnect the battery negative lead.
- 6 The autochanger unit is located under the right-hand front seat. To gain access to the unit, release the top catches and drop down the seat outer side panel, which is further located by a velcro pad (see illustrations).
- 7 The unit is mounted in a cradle bracket, and is secured by four bolts (two at the front, two at the rear). Check that the unit is free to move, then slide it out from the front of the seat (see illustrations).



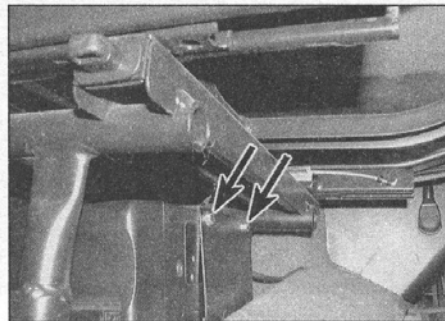
21.6a Twist the top catches to release . . .



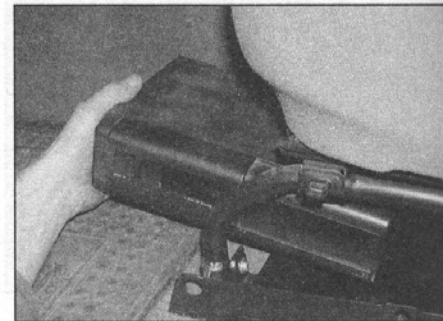
21.6b . . . then lower the seat side panel, and detach the velcro pad



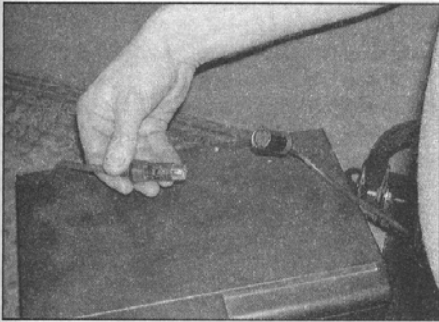
21.7a The autochanger is secured by two bolts at the front . . .



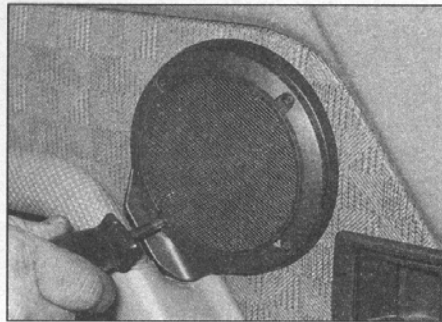
21.7b . . . and two more at the rear



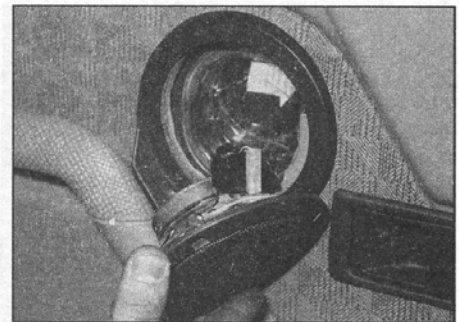
21.7c Slide the autochanger out from the front



21.8 Disconnect the main data lead



22.1a Undo the retaining screws . . .



22.1b . . . then withdraw the speaker from the door panel, and disconnect its wiring connectors

8 Unplug the main data lead from the autochanger unit (see illustration).

9 At this stage, the mounting bracket retaining nuts and bolts can also be removed, and the bracket taken out if required.

Refitting

Radio/cassette player

10 To refit the radio/cassette player, reconnect the aerial lead and wiring connectors, then push the unit into the fascia until the retaining lugs snap into place.

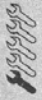
11 Refit the access covers and reconnect the battery.

12 Enter the radio security code using the information supplied in the owner's handbook supplied with the vehicle. For security reasons, the procedure is not given here - refer to a Land Rover dealer in case of difficulty.

CD autochanger

13 Refitting is a reversal of removal. Make sure the data lead connection is securely made.

22 Speakers - removal and refitting



Door speakers

1 Undo the retaining screws, then withdraw

the speaker from the door panel, disconnecting its wiring connectors as they become accessible (see illustrations).

2 Refitting is the reverse of removal.

Rear speakers

3 On early models, prise out the retaining clips, undo the relevant retaining screw, and remove the trim panel to gain access to the speaker. Disconnect the speaker wiring connectors, then drill out the pop-rivets and remove the speaker assembly from the vehicle.

4 On later models, slacken and remove the retaining screws, then withdraw the speaker assembly from the rear trim panel, disconnecting its wiring connectors as they become accessible (see illustrations).

5 Refitting is the reverse of removal. On early models, secure the speaker in position with new pop-rivets.

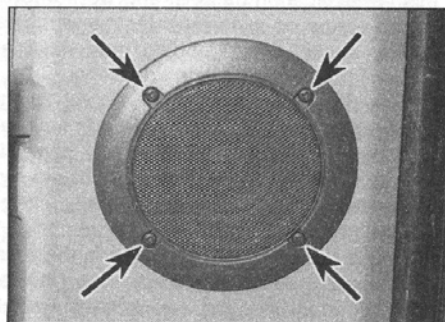
Tailgate speakers - later models (March 1994 onwards)

6 Undo the retaining screws, and remove the speaker grille from the tailgate (see illustration).

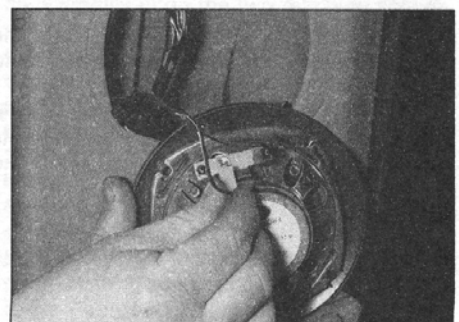
7 Slacken and remove the retaining screws, and withdraw the trim panel from around the speakers (see illustration).

8 Undo the retaining screws, then withdraw the speakers from the tailgate, disconnecting the wiring connectors as they become accessible (see illustrations).

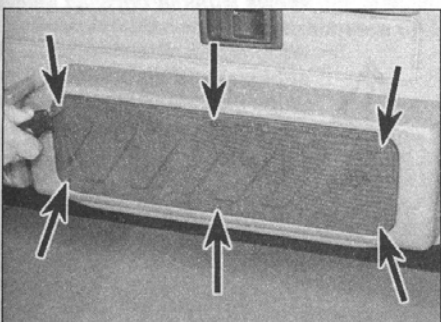
9 If necessary, undo the retaining screws and



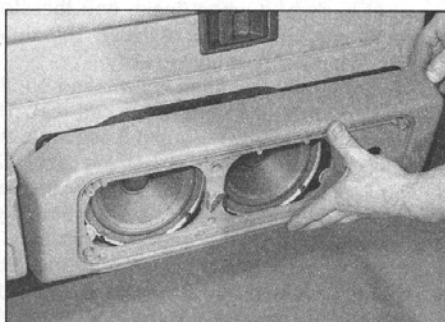
22.4a On later models, undo the retaining screws (arrowed) . . .



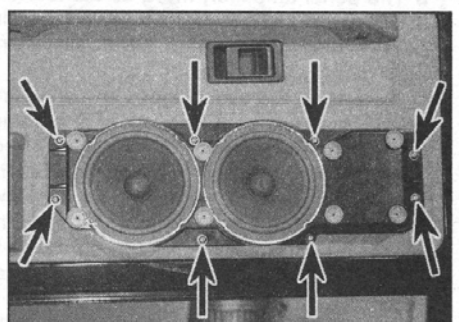
22.4b . . . then withdraw the speaker from the rear pillar, and disconnect its wiring connectors



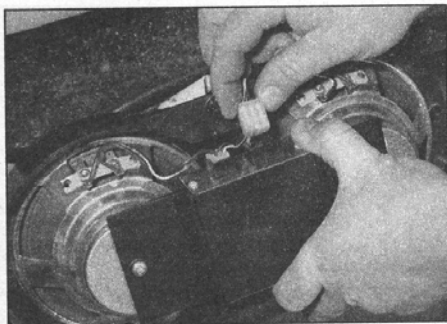
22.6 Undo the retaining screws (arrowed) and remove the speaker grille from the tailgate



22.7 Remove the trim panel . . .



22.8a . . . then undo the retaining screws (arrowed) . . .



22.8b ... and withdraw the speakers, disconnecting the wiring connectors as they become accessible

remove the amplifier module (see illustration).

10 Refitting is the reverse of the removal procedure.

23 Radio aerial and amplifier - removal and refitting

Aerial

Removal

- 1 Disconnect the battery negative terminal.
- 2 Prise out the retaining clips, and drill out the pop-rivets securing the wheelarch liner in position. Unclip the liner, and remove it from the wing.
- 3 From underneath the wing, release the grommet, then withdraw the aerial lead and disconnect it at its connector.
- 4 Unscrew the aerial nut, remove the washer and rubber, then release the aerial from its lower retaining clip. Remove the aerial and lead from underneath the wing.

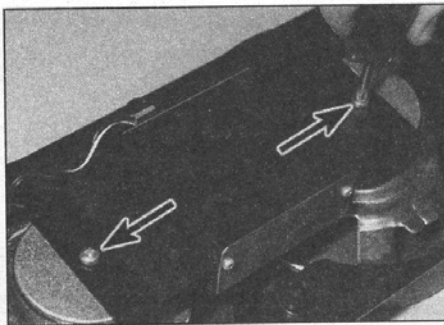
Refitting

- 5 Refitting is the reverse of removal.

Amplifier (1997 models onwards)

Removal

- 6 The aerial amplifier, fitted as standard to models from 1997, is located behind the trim panel surrounding the right-hand rear 'alpine light' glass.
- 7 To remove the alpine light trim panel, first unbolt the rear seat belt upper mounting, using the information in Chapter 12, Section 25. Remove the screw which secures the E-pillar trim panel to the alpine light surround. Prise out the two upper trim panel securing studs, then carefully prise the surround to release the two clips next to the seat belt mounting.
- 8 Carefully disconnect the wiring plug from the aerial element in the side glass, and feed the wiring though the seal.
- 9 Remove the amplifier retaining bolt, and



22.9 Amplifier unit is secured to the rear of the tailgate speakers by two screws

release the amplifier from the roof location (see illustration).

10 Disconnect the co-axial cable and the Lucar connector from the amplifier, and remove it from the car.

Refitting

11 Refitting is a reversal of removal. Tighten the seat belt upper mounting bolt to the torque specified in Chapter 12.

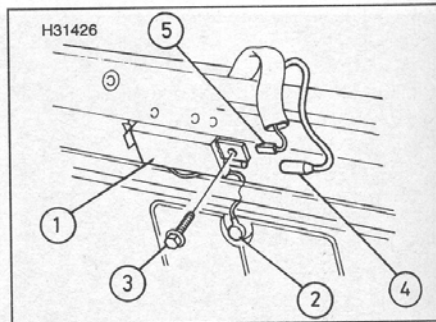
24 Airbag system - general information and precautions

Driver's and passenger's airbags are fitted as standard to later (March 1994 onwards) high-specification models, and were offered as an option on lower-specification models. Lower-specification models may have an airbag fitted to the driver's side alone.

The driver's airbag unit is fitted to the steering wheel, and the passenger's airbag unit is fitted to the top of the fascia panel. In addition to the airbag unit(s), there are two impact sensors, the control unit, and a warning light in the instrument panel.

The airbag system is triggered in the event of a frontal impact. The airbag(s) is/are inflated (by a built-in gas generator) within milliseconds, and forms a safety cushion between the driver and steering wheel/passenger and fascia. This prevents contact between the driver's/passenger's upper body and wheel/facia, and therefore greatly reduces the risk of injury. The airbag then deflates almost immediately.

Every time the ignition is switched on, the airbag control unit performs a self-test. The self-test takes between 5 and 8 seconds, and during this time, the airbag warning light in the instrument panel is illuminated. After the self-test has been completed, the warning light should go out. If the warning light fails to come on, remains illuminated after the initial period, or comes on at any time when the vehicle is being driven, there is a fault in the airbag system. The vehicle should be taken to a Land Rover dealer for examination at the earliest possible opportunity.



23.9 Aerial amplifier unit details

- 1 Amplifier
- 2 Element wiring plug
- 3 Amplifier bolt
- 4 Co-axial cable
- 5 Lucar connector



Warning: Before carrying out any operations on the airbag system, disconnect the battery positive and negative terminals, and wait AT LEAST 20 minutes, to ensure that the system capacitor has been discharged.



Warning: Note that the airbag must not be subjected to temperatures in excess of 90°C (194°F). When the airbag is removed, ensure that it is stored the correct way up, to prevent possible inflation.



Warning: Do not use electrical test equipment on the airbag system components or wiring connectors, as this could lead to the system being accidentally triggered. Testing of the airbag system can only be carried out by a Land Rover dealer with access to the special electronic test equipment.



Warning: Do not allow any water, solvents or cleaning agents to contact the airbag unit(s). They must only be cleaned using a damp cloth.



Warning: The airbag(s) and control unit are both sensitive to impact. If either is dropped or shows signs of physical damage or deterioration, they must be renewed.



Warning: Disconnect the airbag(s) and control unit wiring plugs prior to using arc-welding equipment on the vehicle.

25 Airbag system components - removal and refitting

Note: Refer to the warnings given in the previous Section before carrying out the following operations.

Note: A special Torx socket will be required to remove the retaining screws used to secure each of the airbag system components in position. Refer to your Land Rover dealer for further details. New airbag retaining screws will be required on refitting.

1 Disconnect the battery negative then positive leads, and wait at least 20 minutes before proceeding as described under the relevant sub-heading.

Driver's airbag unit

Note: New airbag retaining screws will be required on refitting.

2 Release the two fasteners and release the driver's side lower fascia panel.

3 Disconnect the airbag unit wiring connector from the steering column harness.

4 Position the steering at 90° from the straight-ahead position, then slacken and remove the two special retaining screws.

5 Lift off the airbag unit, disconnecting its wiring connector as it becomes accessible.

6 On refitting, reconnect the wiring connector, then fit the airbag unit to the centre of the steering wheel.

7 Install the new airbag unit retaining screws, and tighten them to the specified torque setting.

8 Reconnect the airbag unit wiring connector to the steering column harness, then refit the lower fascia panel. **Note:** The vehicle should be taken to a Land Rover dealer at the earliest possible opportunity, to have the airbag system checked using the special electronic test equipment. This will ensure that the airbag system is fully operational.

Passenger's airbag unit

9 Open the glovebox, to gain access to the airbag unit retaining screws.

10 Using the special socket, slacken and remove the four airbag unit retaining screws.

11 Lift the airbag unit away from the fascia, disconnecting its wiring connector as it becomes accessible.

12 Refitting is the reverse of removal, tightening the airbag retaining screws to the specified torque setting. **Note:** The vehicle should be taken to a Land Rover dealer at the earliest possible opportunity, to have the airbag system checked using the special electronic test equipment. This will ensure that the airbag system is fully operational.

Airbag control unit

13 Remove the centre console as described in Chapter 12.

Up to 1997 model year

14 Undo the retaining screws, and release both rear passenger air ducts.

15 Using a flat-bladed screwdriver, prise out the retaining clip (the clip should be coloured yellow) and extend it fully. The wiring connector can then be disconnected from the control unit.

16 Using the special socket, undo the retaining bolts and remove the control unit.

1997 model year onwards

17 Disconnect the control unit wiring plug.

18 Unscrew and remove the two Torx retaining bolts, then remove the unit from the car.

All models

19 Refitting is the reverse of removal, tightening the retaining screws to the specified torque setting. Ensure that the wiring connector is securely reconnected and its retaining clip is correctly seated. **Note:** The vehicle should be taken to a Land Rover dealer at the earliest possible opportunity, to have the airbag system checked using the special electronic test equipment. This will ensure that the airbag system is fully operational.

Driver's airbag wiring contact unit

20 Remove the driver's airbag unit as described above.

21 Remove the steering wheel as described in Chapter 11.

22 Undo the steering column shroud retaining screws, unclip the shroud halves, and remove both the upper and lower shrouds from the steering column.

23 Trace the wiring back from the contact unit, and disconnect it at the wiring connector.

24 Release the two retaining clips, then free the contact unit from the top of the combination switch assembly. If the contact unit is to be re-used, wrap adhesive tape around the unit as shown (see illustration). This will prevent unnecessary rotation of the wiring unit, and ensure that it remains correctly positioned until it is refitted.

25 If a new contact unit is being installed, ensure that the tape on the unit is unbroken. Do not install the unit if the tape has been broken.

26 Ensure that the front wheels are positioned in the straight-ahead position, then remove the tape from the contact unit.

27 Clip the contact into position on the steering column combination switch assembly, and connect its wiring connector.

28 Refit the steering column shrouds, and securely tighten the retaining screws.

29 Refit the steering wheel as described in Chapter 11, making sure that it engages correctly with the contact unit.

30 Refit the driver's airbag unit as described above.

Impact sensors (up to 1997 model year)

Note: The impact sensors are incorporated into the control unit from 1997 model year onwards.

31 There are two impact sensors - one is fitted behind each headlight assembly. To gain access to the left-hand sensor, it will first be necessary to remove the jack, and the jack mounting bracket.

32 Disconnect the sensor wiring connector then, using the special socket, slacken and remove the two retaining screws and remove the impact sensor from the vehicle.

33 Refitting is the reverse of removal, tightening the retaining screws to the specified torque setting. **Note:** The vehicle should be taken to a Land Rover dealer at the earliest possible opportunity, to have the airbag system checked using the special electronic test equipment. This will ensure that the airbag system is fully operational.

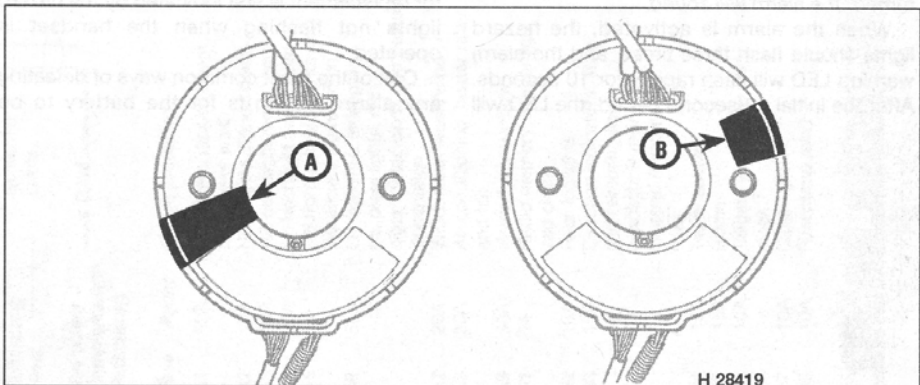
Airbag system warning light bulb renewal

34 Remove the tachometer from the instrument panel as described in Section 10.

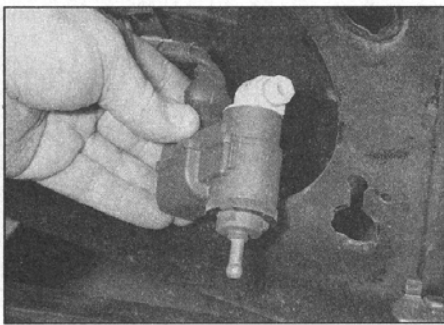
35 Carefully undo the two retaining screws securing the tachometer face plate in position then, taking great care not to damage the tachometer needle, unclip the airbag warning light bulbholder from the rear of the tachometer.

36 Remove both warning light bulbs from the holder.

37 On refitting, ensure that the bulbs are correctly fitted, then carefully clip the bulbholder back into position. Refit the face plate retaining screws, but do not overtighten them. Refit the tachometer as described in Section 10.



25.24 On removal, wrap adhesive tape (A) around the contact unit as shown in the left-hand illustration, to prevent rotation. If a new unit is being installed, make sure that the tape (B) is in position and unbroken, as shown in the right-hand illustration



27.2 Removing the electric headlight levelling system motor

26 Anti-theft alarm system - general information

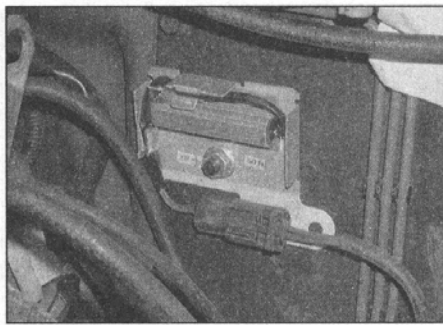
Note: This information is applicable only to the anti-theft alarm system fitted by Land Rover as standard equipment.

Most later models in the range are fitted with an anti-theft alarm system as standard equipment. The alarm system has ultrasonic (movement) sensing, as well as switches on all the doors (including the tailgate) and the bonnet. If movement is detected inside the vehicle, or if the tailgate, bonnet or any of the doors are opened whilst the alarm is set, the alarm siren will sound and the hazard warning lights will flash. The alarm also has an immobiliser function, which makes the ignition and starter circuits inoperable whilst the alarm is triggered.

Models up to 1996

The alarm can be activated in either of two ways. The first is by using the remote control unit, this turns on the ultrasonic (movement) sensing facility, as well as all the door switches. The second way is to lock the doors using the key in the driver's door lock, this will only turn on the door switches, leaving the ultrasonic (movement) sensing facility disabled. **Note:** If the key is left in the door lock for more than 5 seconds without being turned, the alarm will sound.

When the alarm is activated, the hazard lights should flash three times, and the alarm warning LED will flash rapidly for 10 seconds. After the initial 10-second period, the LED will



28.1 Headlight dim-dip resistor on engine compartment bulkhead

flash at a slower rate, to indicate that the alarm is active. On disarming the alarm, the hazard warning lights will flash once, and the LED will go out.

Models from 1996 onwards

The system fitted to later models is a development of the earlier system, and features a number of key upgrades.

If the alarm handset is not pressed, or the doors are not locked, the immobiliser function still cuts in automatically on leaving the car. This occurs either after 30 seconds (when the engine is switched off and the driver's door is opened), or after 5 minutes following the engine being switched off or the alarm being deactivated. This passive arming feature means that the car cannot be left for long periods without at least being immobilised.

The passive immobiliser disables the starter circuit, and the ignition circuit (petrol models) or fuel supply using the injection pump stop solenoid (diesel models). The system is disarmed as follows. The alarm handset contains a transponder micro-chip, and the ignition switch contains a reader coil. When the handset is close to the ignition switch, the reader coil recognises the signal from the micro-chip, and de-activates the immobiliser. For this reason, it is essential that the handset is kept on the same key ring as the rest of the car keys. It is also essential that the handset battery is replaced when necessary - the need for replacement is first indicated by the hazard lights not flashing when the handset is operated.

One of the most common ways of defeating any alarm system is for the battery to be

disconnected. The alarm siren on later models has a battery back-up feature, and will sound the alarm if the vehicle battery is tampered with. If the vehicle battery is disconnected for repair work, there is a procedure to be followed, to avoid setting off the alarm - see Chapter 5A, Section 4.

All models

Should the alarm system develop a fault, the vehicle should be taken to a Land Rover dealer for examination.

27 Electric headlight levelling system components - removal and refitting

Electric motor

- 1 Remove the headlight as described in Section 7.
- 2 The motor is a bayonet fit in the body; twist the motor to free it, and disconnect its wiring connector (see illustration).
- 3 Refitting is the reverse of removal.

Switch

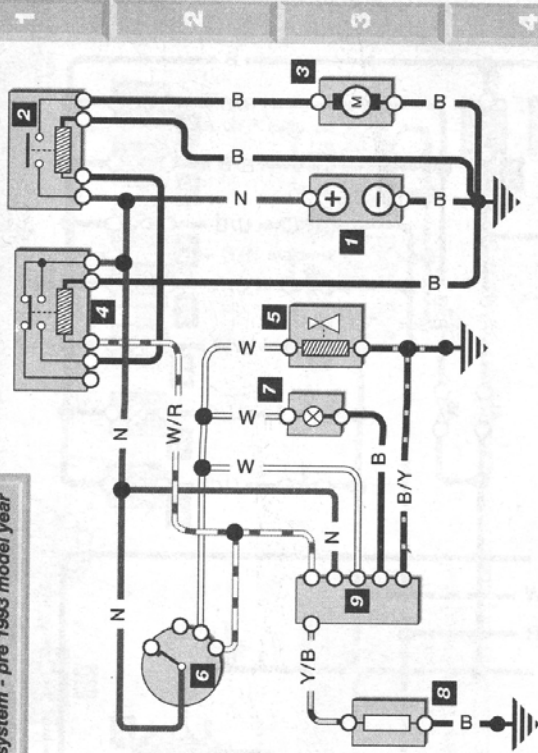
- 4 Refer to Section 4.

28 Dim-dip lighting system (UK models only) - general information

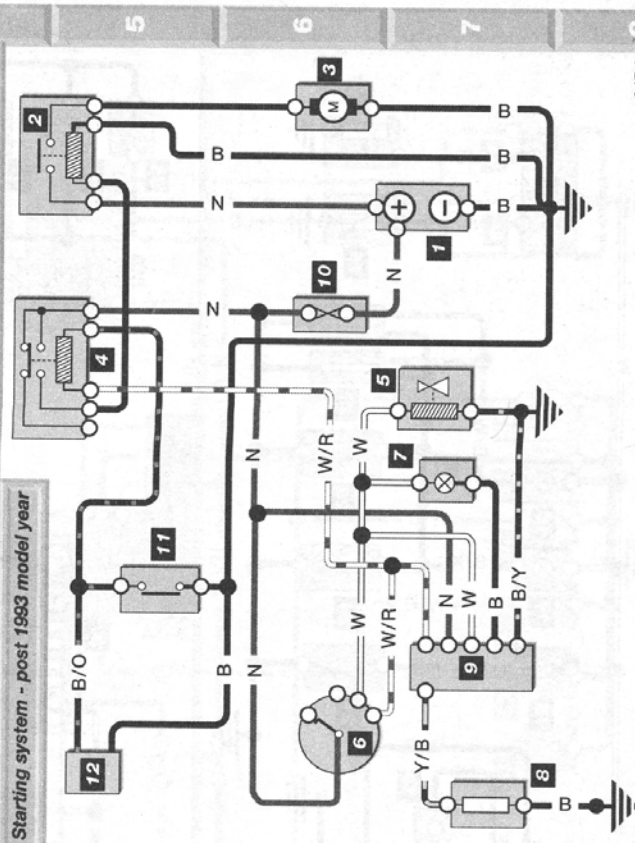
To comply with UK regulations, a dim-dip lighting system is fitted to most UK models. On early models (pre-March 1994), the system comprises a control unit which is mounted onto the rear of the steering column support bracket. Later models use a relay (see Specifications for location) and a resistor unit situated at the rear left-hand corner of engine compartment, mounted onto the bulkhead (see illustration).

The system is supplied with current from the sidelight circuit, and energised by a feed from the ignition switch. When energised, the unit allows battery voltage to pass through the resistor to the headlight dipped-beam circuits; this lights the headlights with approximately one-sixth of their normal power, so that the car cannot be driven using sidelights alone.

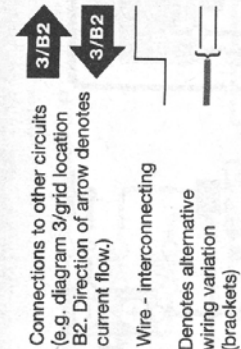
Starting system - pre 1993 model year



Starting system - post 1993 model year



C.J. Turk
NS12/1



Key to symbols

Item no.	Symbol	Item no.	Symbol
7	Bulb	7	Pump/motor
	Switch		Earth
	Multiple contact switch (ganged)		Gauge/meter
	Fuse/fusible link (F10)		Diode
	Resistor		Solenoid actuator
	Variable resistor		Wire splice
	Connecting wires		Screened cable
	Wire colour (Green wire with white tracer)		G/W

Wire colours

B	Black	P	Purple
G	Green	R	Red
K	Pink	S	Grey
L	Light Blue	U	Blue
N	Brown	W	White
O	Orange	Y	Yellow

Fuse	Rating	Circuit protected	Fuse	Rating	Circuit protected
A1	10A	Headlights dipped beam and power wash	B9	10A	Radio
A2	10A	Headlights dipped beam RH	C1	30A	Electric window relay
A3	10A	Headlights dipped beam LH	C2	30A	Electric window relay
A4	10A	Front/rear sidelights and instrument illumination	C3	15A	Central locking
A5	5A	LH front/rear sidelights, no. plate lights, radio, cigar lighter, clock and heater illumination	C4	3A	Electric mirrors
A6	5A	Windscreen wash/wipe and fan	C5	20A	Air conditioning fans
A7	20A	Heated rear window	C6	20A	Air conditioning
A8	20A	Radio memory, interior light and clock	C7	5A	Air conditioning compressor clutch
A9	30A	Rear foglights	C8	15A	Hazard warning lights
B1	5A	Direction indicators, stop and reversing lights, headlight levelling, air cond./heater relay	C9		Not used
B2	10A	Trailer socket			
B3	15A	Horns			
B4	15A	Tailgate wash/wipe and clock			
B5	15A	Cigar lighter			
B6	10A	Fuel pump relay			
B7	10A				
B8	10A				

Key to items

1	Battery
2	Starter solenoid
3	Starter motor
4	Starter relay
5	Fuel shut-off solenoid
6	Ignition switch
7	Cold start W/L
8	No 1 glow plug
9	Glow plug timer
10	Fusible link (post 1993 model)
11	Inhibitor switch (automatic transmission)
12	Alarm ECU

Diagram 1 : Information for wiring diagrams - pre-1995

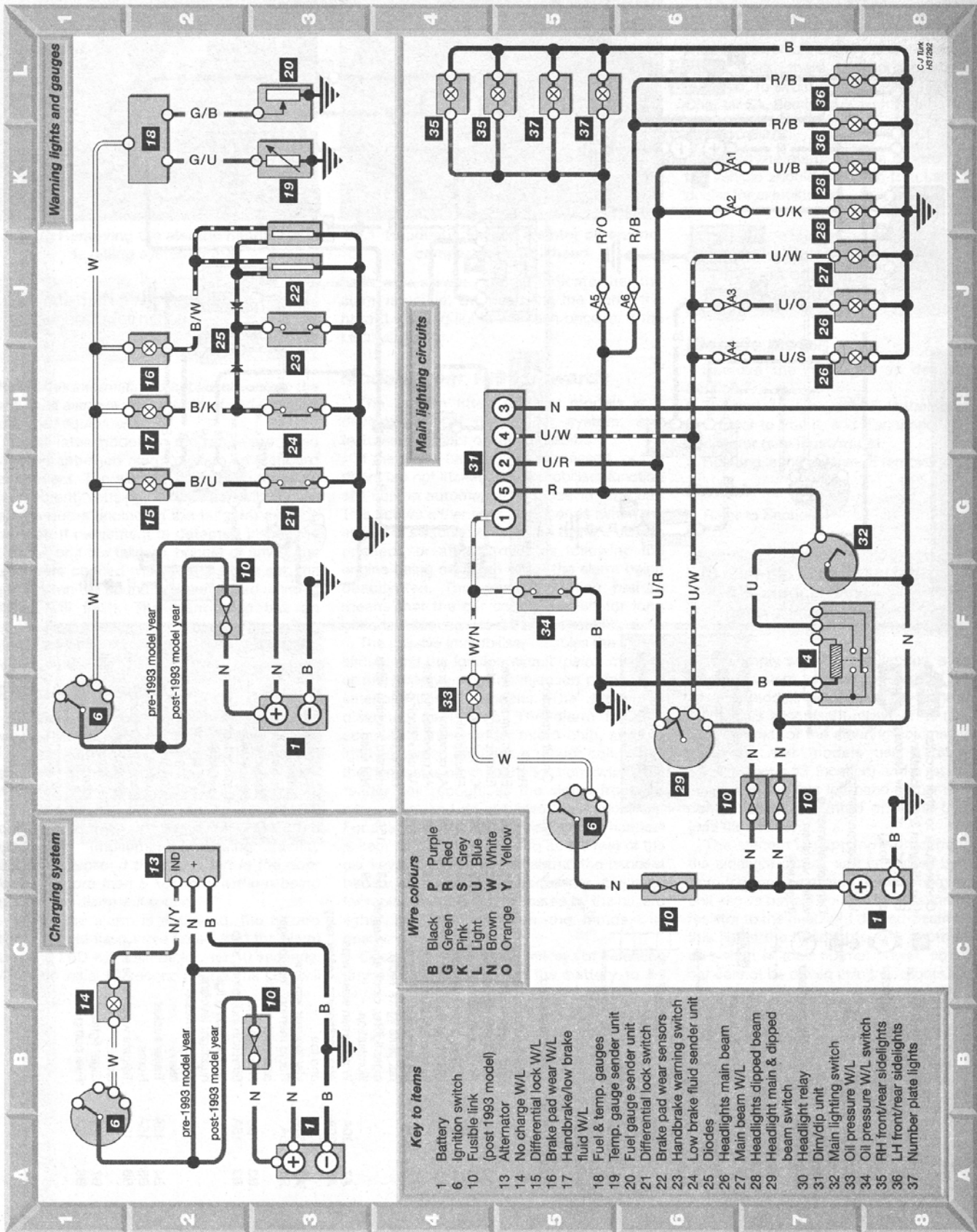
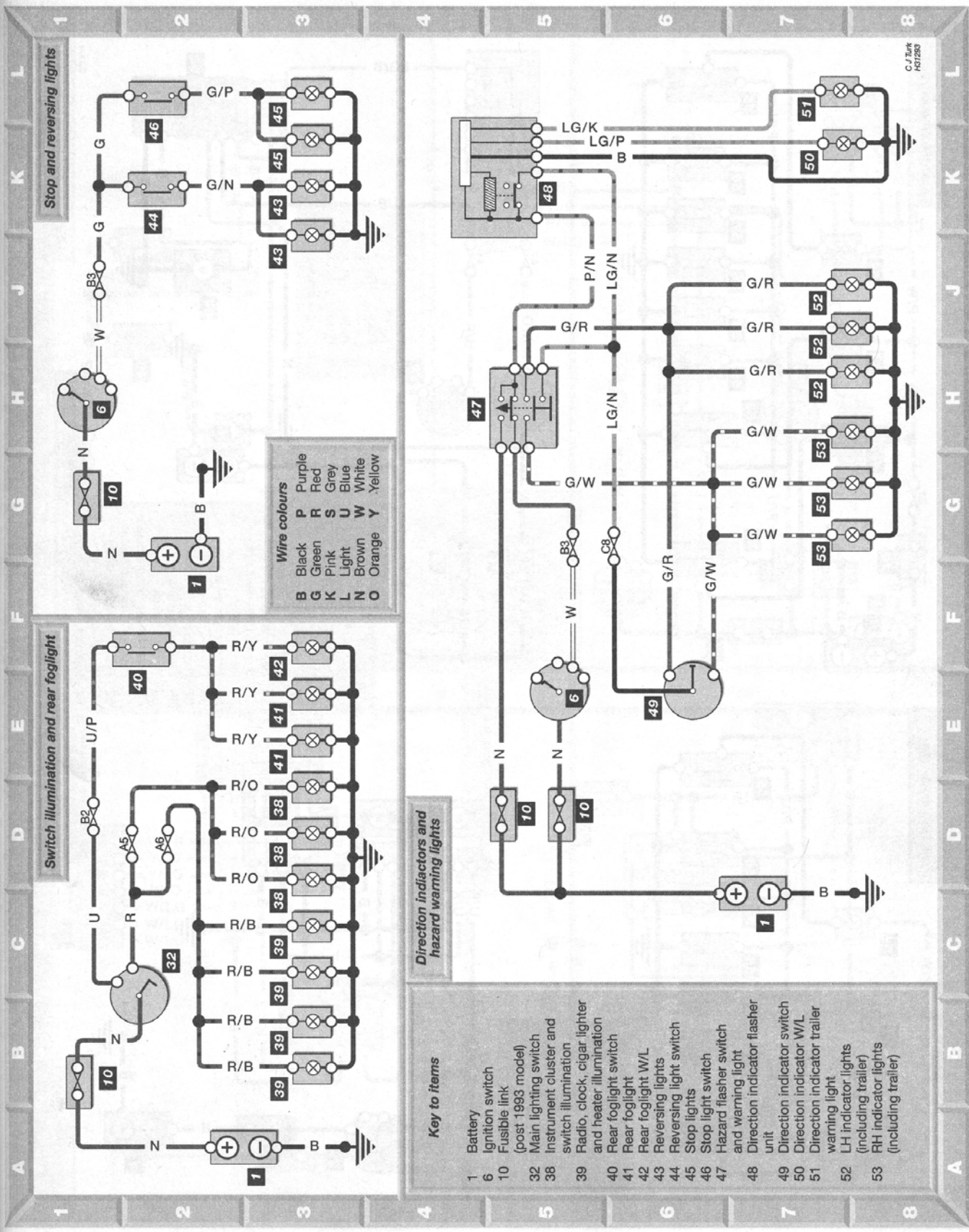


Diagram 2 : Charging system, warning lights and gauges, and main lighting circuits - pre'95



Wire colours

Black	P	Purple
Green	R	Red
Pink	S	Grey
Light	U	Blue
Brown	W	White
Orange	Y	Yellow

- Key to items**
- 1 Battery
 - 6 Ignition switch
 - 10 Fusible link
 - 32 Main lighting switch
 - 38 Instrument cluster and switch illumination
 - 39 Radio, clock, cigar lighter and heater illumination
 - 40 Rear foglight switch
 - 41 Rear foglight
 - 42 Rear foglight W/L
 - 43 Reversing lights
 - 44 Reversing light switch
 - 45 Stop lights
 - 46 Stop light switch
 - 47 Hazard flasher switch and warning light
 - 48 Direction indicator flasher unit
 - 49 Direction indicator switch
 - 50 Direction indicator W/L
 - 51 Direction indicator trailer warning light
 - 52 LH indicator lights (including trailer)
 - 53 RH indicator lights (including trailer)

Diagram 3 : Direction indicators, fog, stop and reversing lights - pre '95

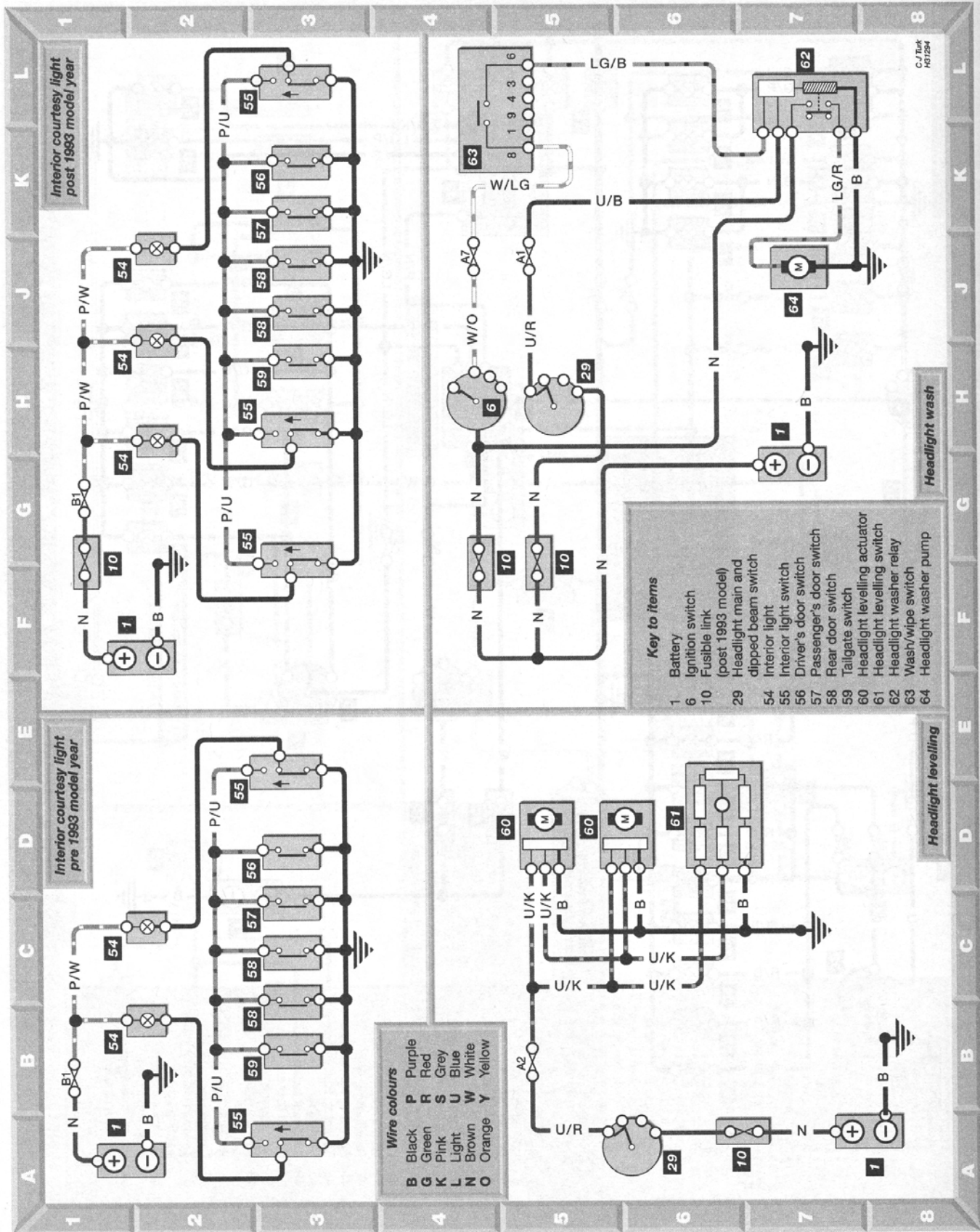


Diagram 4 : Interior courtesy lighting, headlight wash and levelling - pre '95

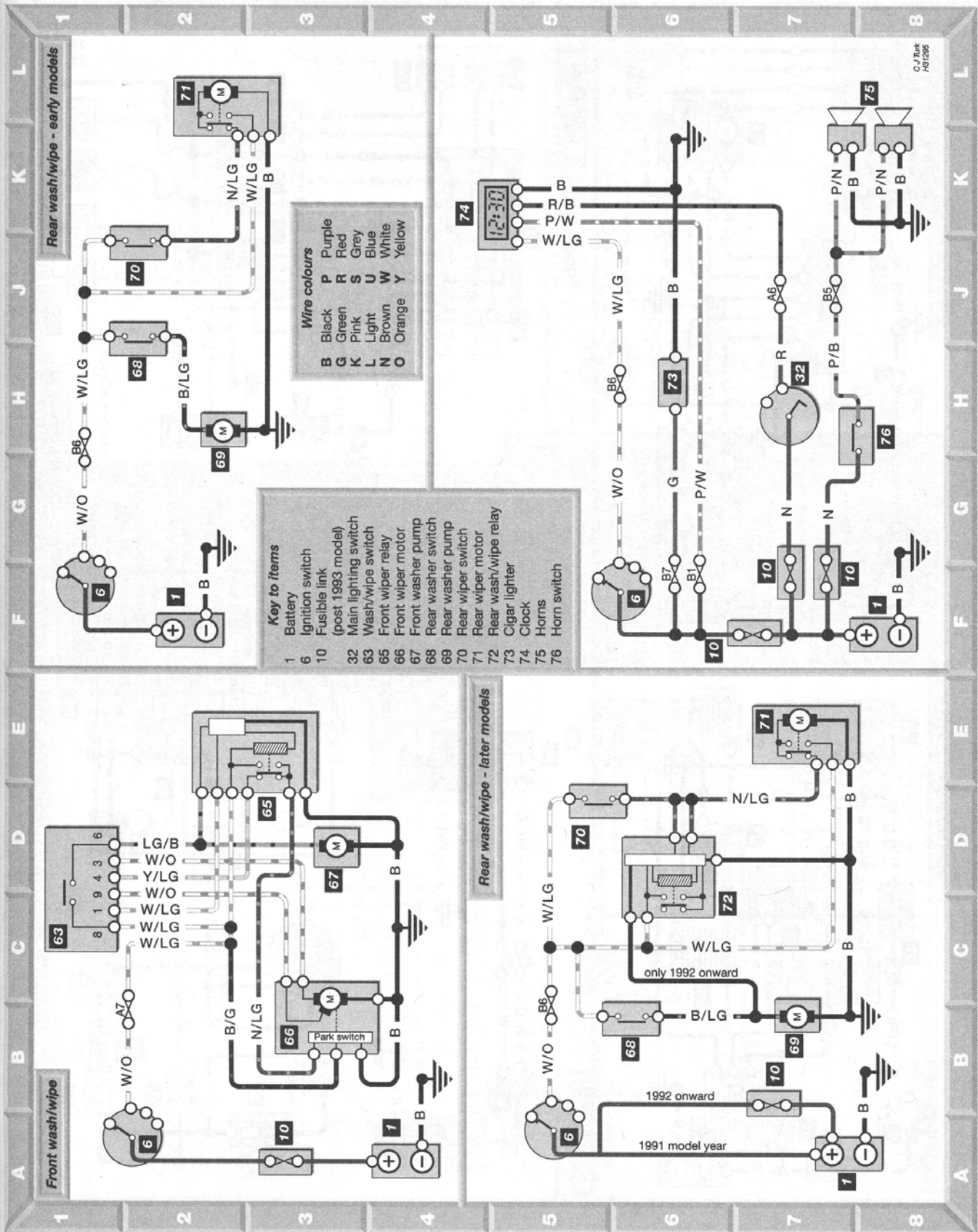


Diagram 5 : Front and rear wash/wipe, horn, clock and cigar lighter - pre'95

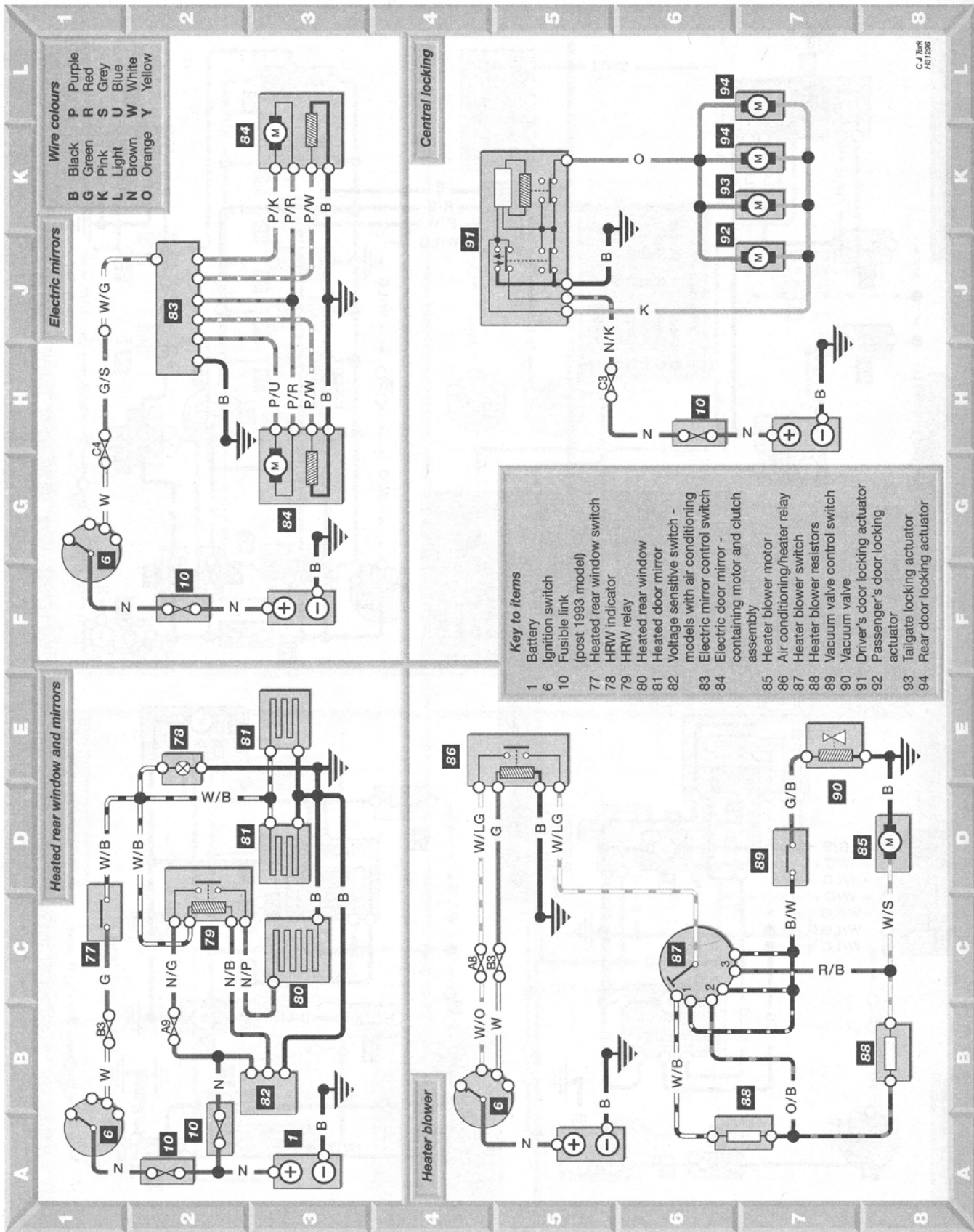


Diagram 6 : Heated rear window, electric mirrors, heater blower and central locking - pre'95

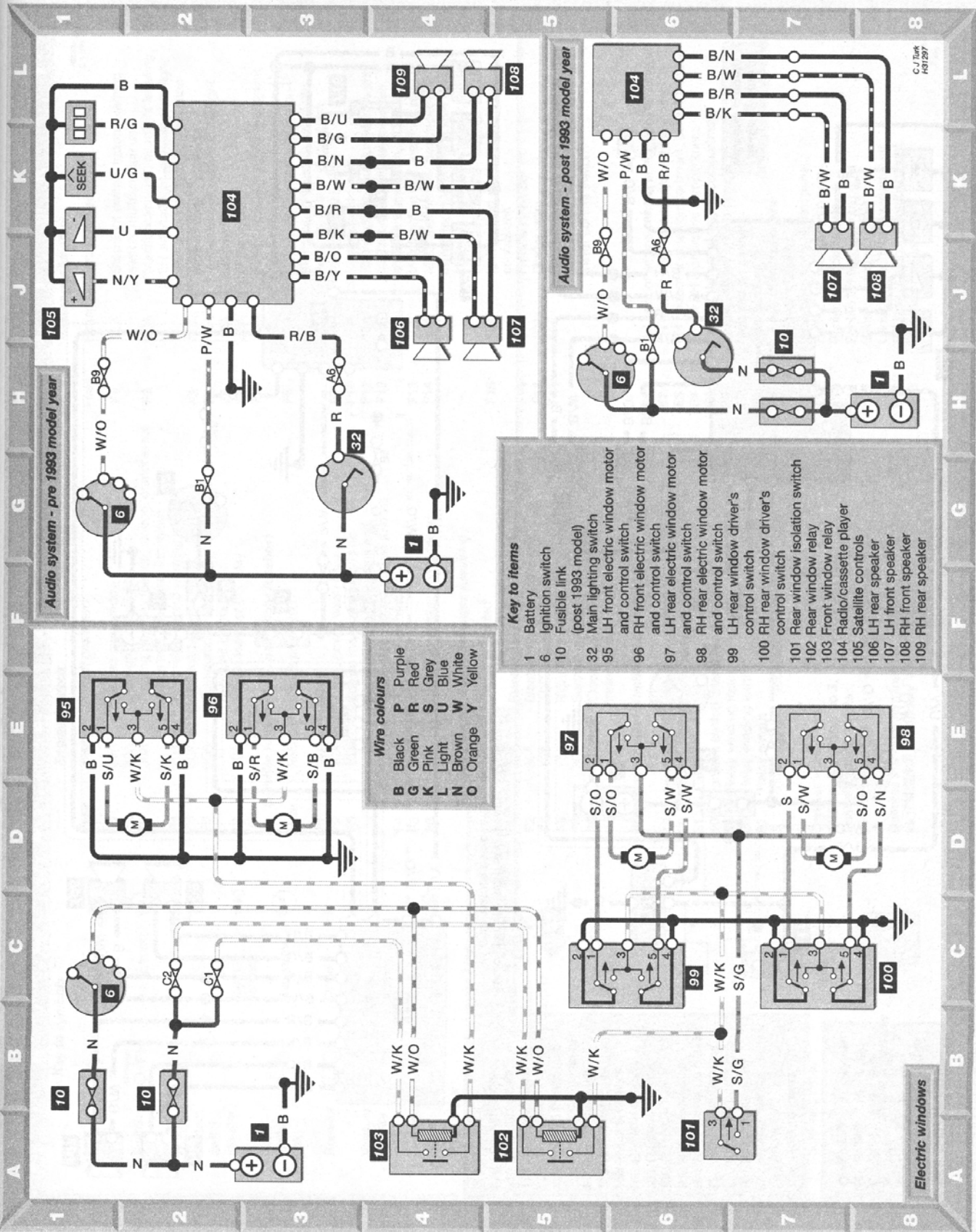
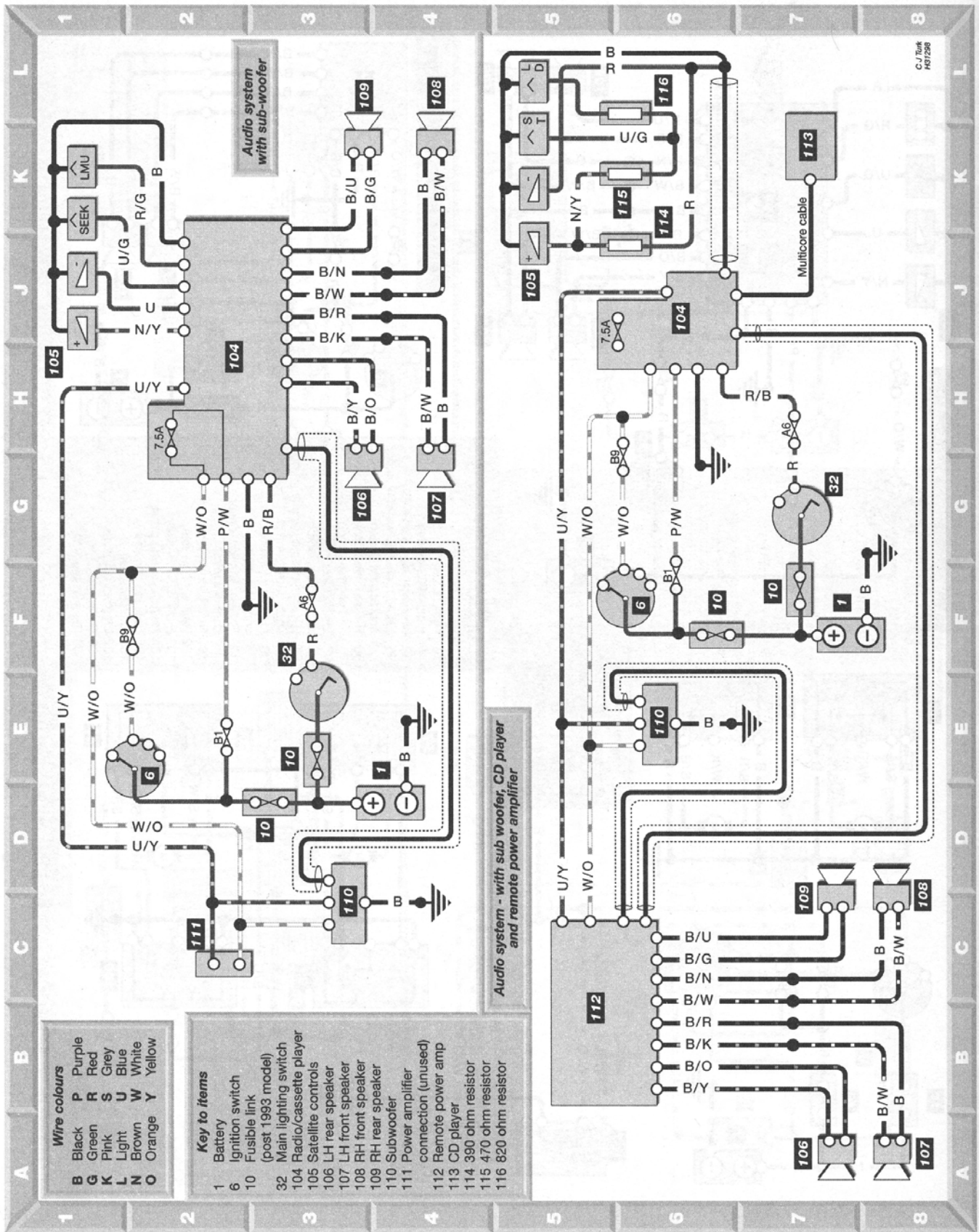
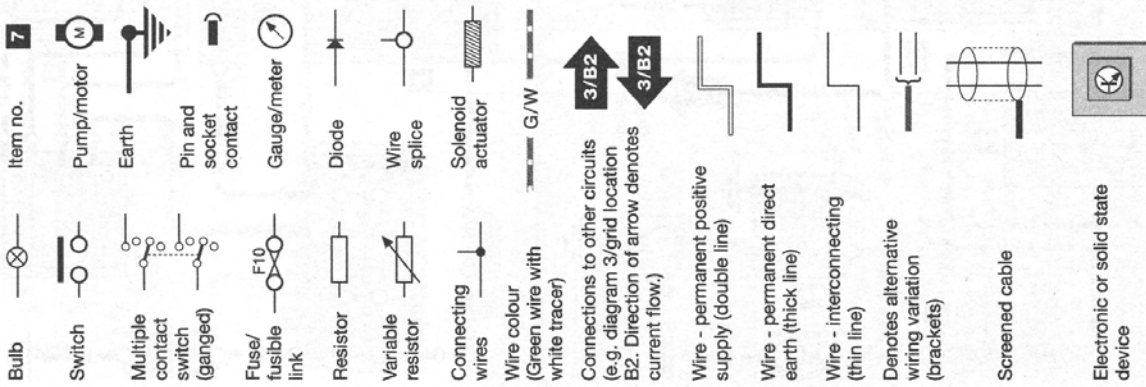


Diagram 7 : Electric windows and low specification audio systems - pre'95



Key to symbols



Engine fusebox

Fuse	Rating	Circuit protected
F1	30A	Heated rear window
F2	20A	Sidelights, headlights
F3	30A	Cooling fan relay (petrol), air con. compressor clutch and condenser fan relays
F4	20A	Horn relay, hazard warning switch
F5	30A	ABS load relay
F6	15A	Fuel pump relay (petrol), multifunction relay unit (petrol)
F7	20A	Engine load control relay

Satellite fusebox 1 (on passenger fusebox)

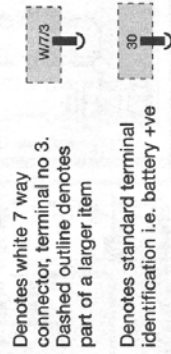
Fuse	Rating	Circuit protected
F1	15A	Alarm
F2	20A	Alarm, power wash relay
F3	10A	Engine management and air cond. (petrol), glow plugs and EGR valve control module (Diesel)
F4	5A	Stop light switch, ABS
F5	10A	Alarm
F6	25A	Ignition load relay and air cond.

Satellite fusebox 2 (on passenger fusebox)

Fuse	Rating	Circuit protected
F1	30A	Electric window control unit
F2	30A	Electric window control unit
F3	10A	ABS diagnostic connector
F4	15A	Right front door lock actuator
F5	30A	Sunroof control unit
F6	20A	Clock, radio, interior lighting, alarm, trailer socket

Standard terminal identification (typical)

- 15 Ignition switch 'ignition' position
- 30 Battery +ve
- 31 Earth
- 50 Ignition switch 'start' position
- 85 Relay winding input
- 86 Relay winding earth
- 87 Relay output
- R Ignition switch 'accessory' position



Passenger fusebox

Fuse	Rating	Circuit protected
F1	15A	Stop light switch, hazard warning switch, multifunction unit
F2	10A	Multifunction unit, headlight levelling, LH side/tail light, number plate light, rear air cond. switch illumination
F3	10A	Radio
F4	10A	Instrument cluster, RH headlight
F5	10A	LH headlight
F6	20A	Cigar lighter
F7	10A	Airbag control module, instrument cluster
F8	10A	RH side/tail light, multifunction unit, glovebox light switch, headlight levelling, interior illumination
F9	10A	Rear foglight switch
F10	10A	LH headlight
F11	10A	RH headlight, multifunction switch
F12	10A	Multifunction unit, key in switch, shiftlock illumination, CD changer
F13	10A	Multifunction unit, interlock relay 2
F14	10A	Multifunction unit, park/neutral switch (auto.), reversing light switch (manual), instrument cluster, airbag, clock
F15	10A	Ignition load relay, electric window control unit
F16	20A	Front wash/wipe
F17	10A	Starter relay
F18	10A	Rear wash/wipe, gear selector illumination, cruise control switch, mirror control switch

Earth locations

- E1 RH front of engine compartment, behind battery
- E2 LH front of engine compartment inner wing
- E3 RH front of engine compartment, behind battery
- E4 Lower RH rear engine compartment
- E5 Lower LH front of engine compartment
- E6 Lower RH rear engine compartment
- E7 Mounted on bonnet
- E8 Near starter
- E9 LH rear corner of engine
- E10 RH side of bulkhead
- E11 Behind RH footwell trim panel
- E12 Behind LH footwell trim panel
- E13 Behind LH side of fascia
- E14 Behind LH footwell trim panel
- E15 Beneath centre console
- E16 LH side of luggage compartment
- E17 RH side of luggage compartment
- E18 RH side of tailgate

Diagram 9 : Information for wiring diagrams - 1995 on

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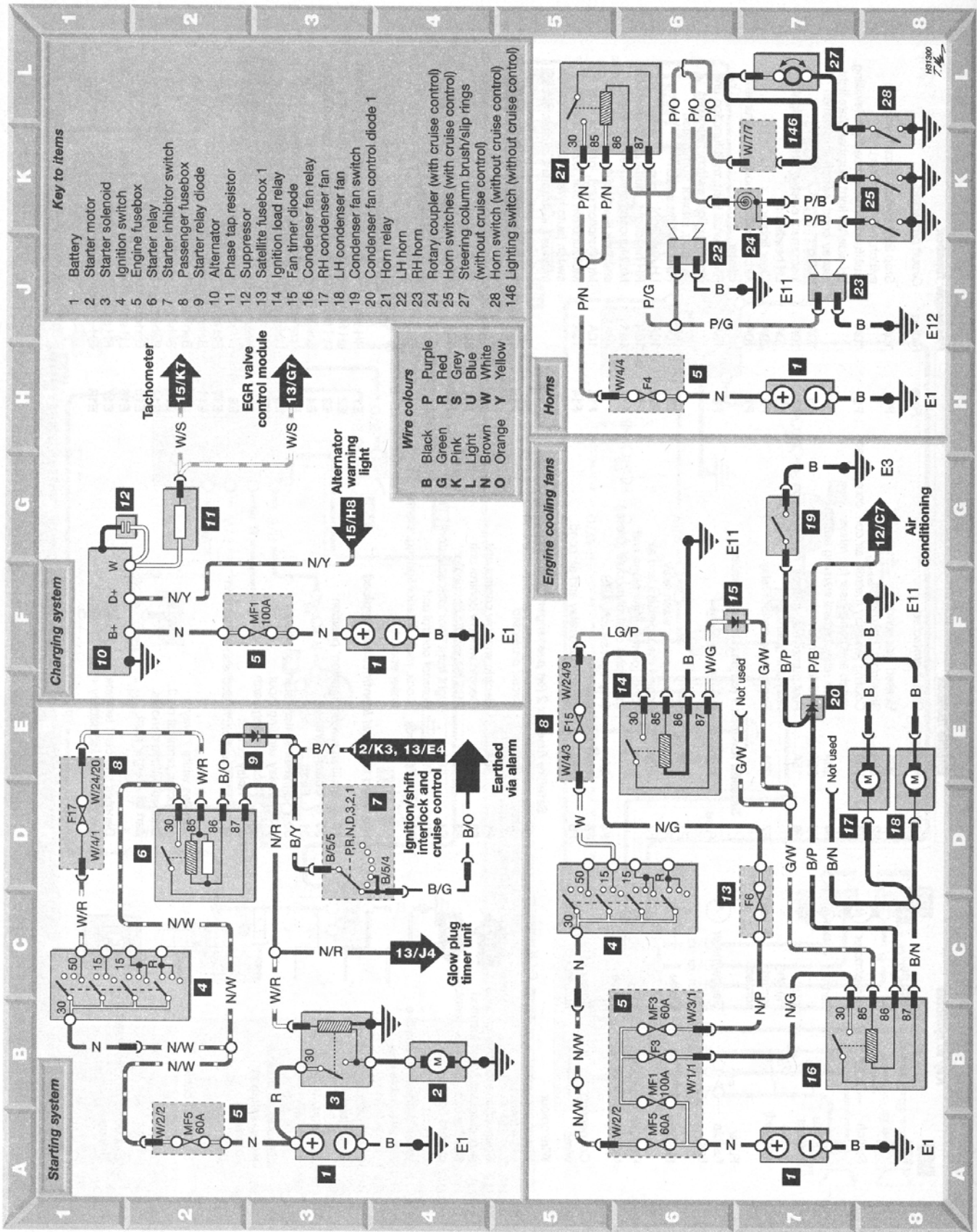


Diagram 10 : Starting, charging, engine cooling fans and horns - 1995 on

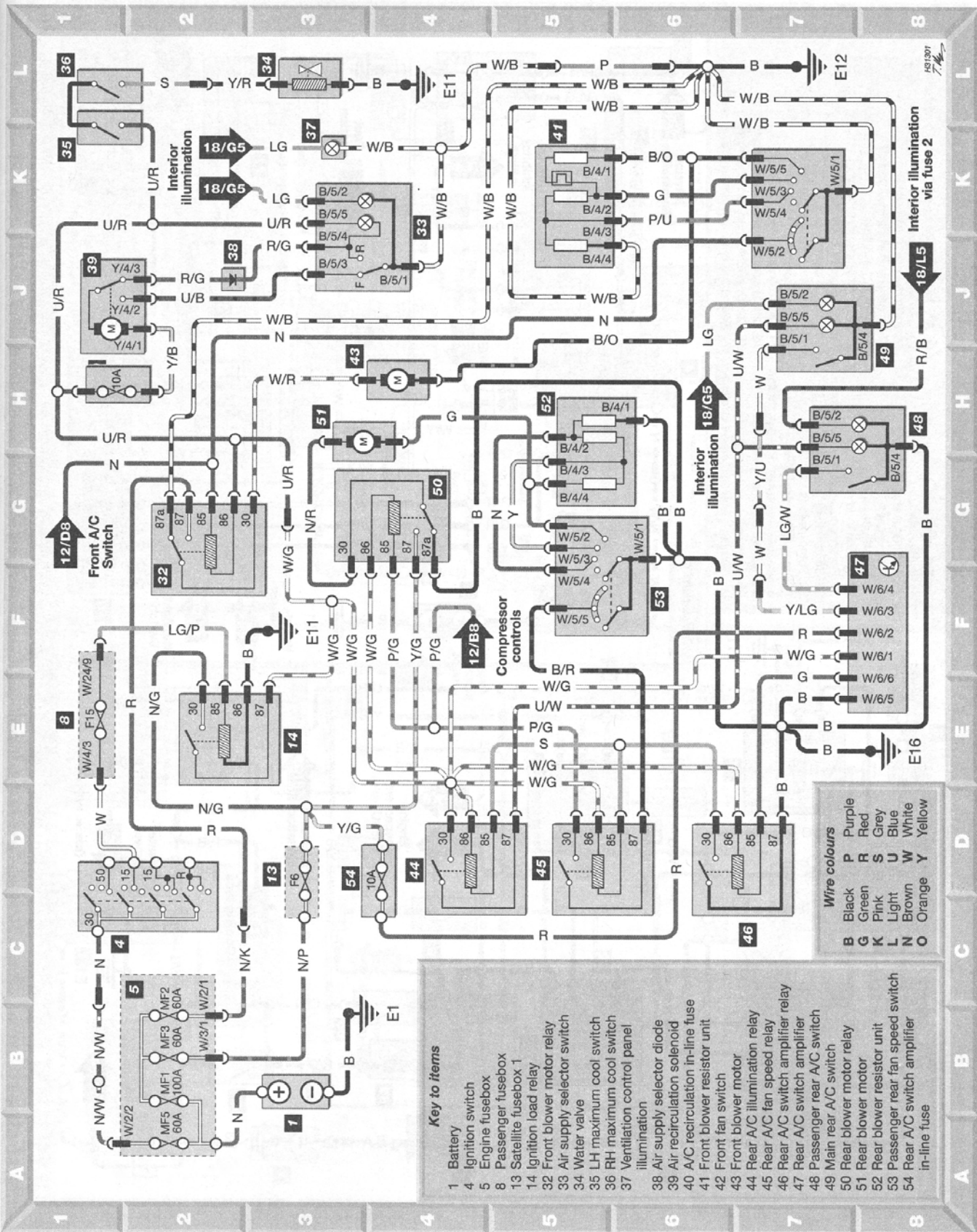


Diagram 11 : Air conditioning and blower controls - 1995 on

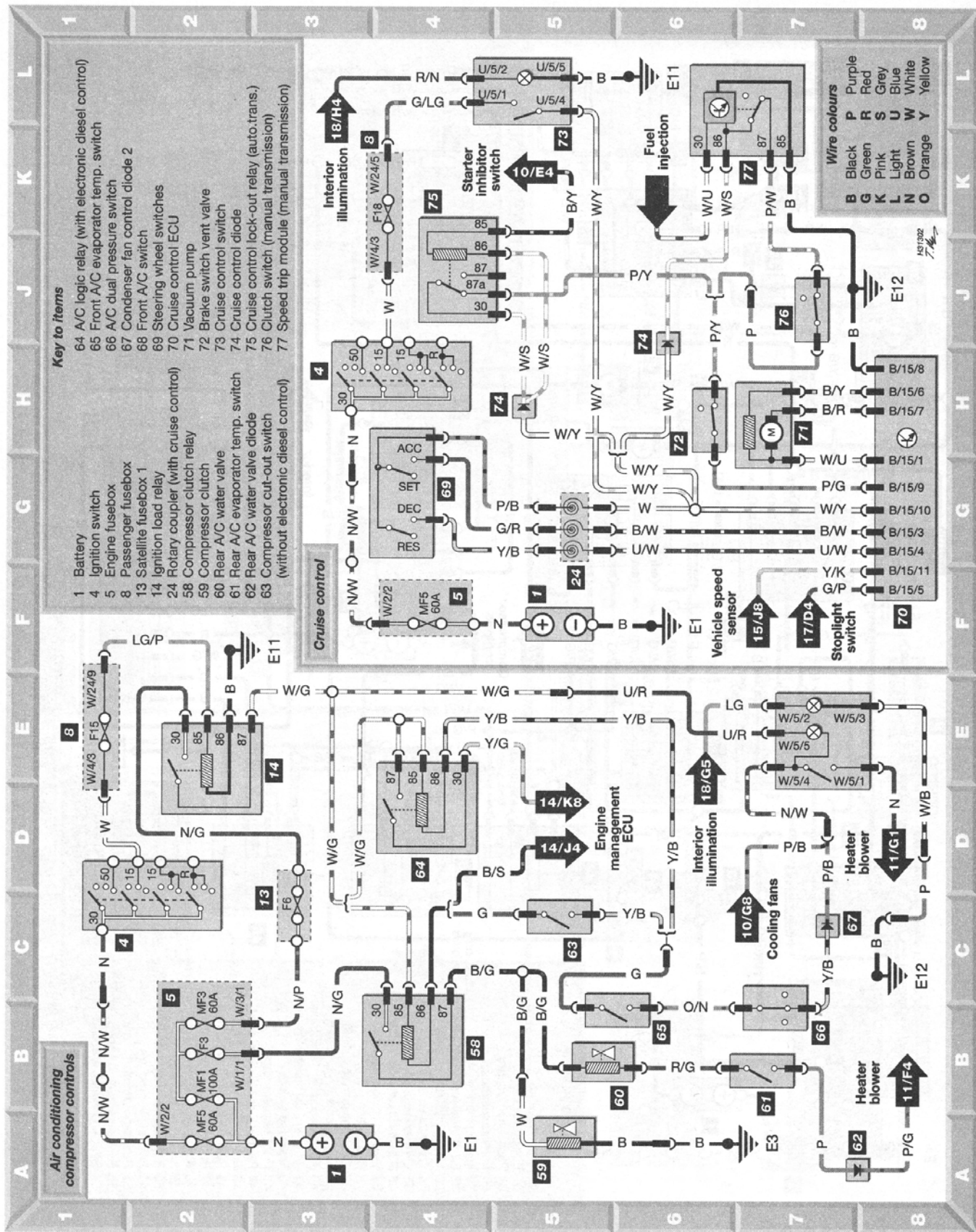


Diagram 12 : Air conditioning compressor controls and cruise control - 1995 on

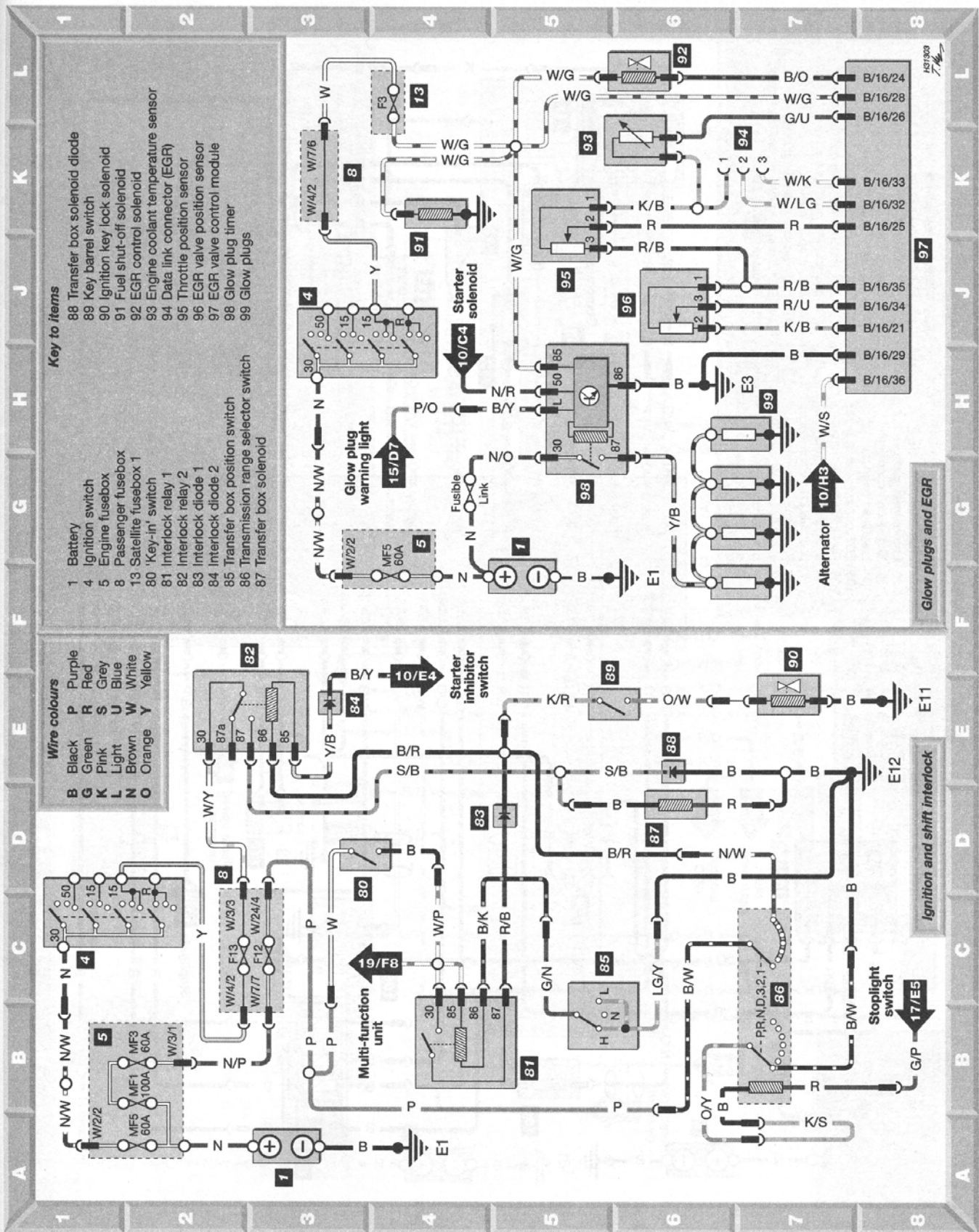


Diagram 13 : Ignition and shift interlock, glow plugs and exhaust gas recirculation - 1995 on

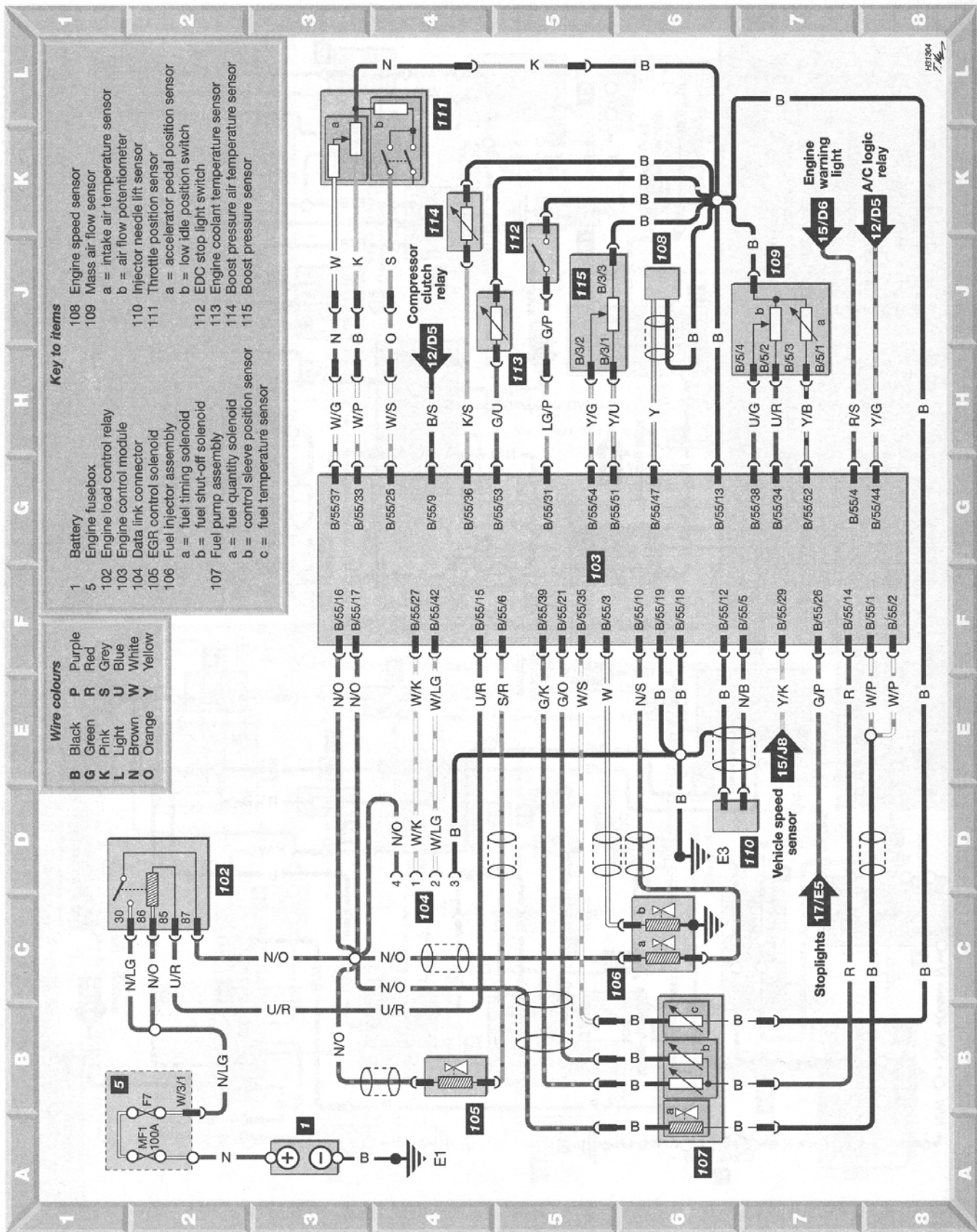


Diagram 14 : Electronic Diesel control - 1995 on

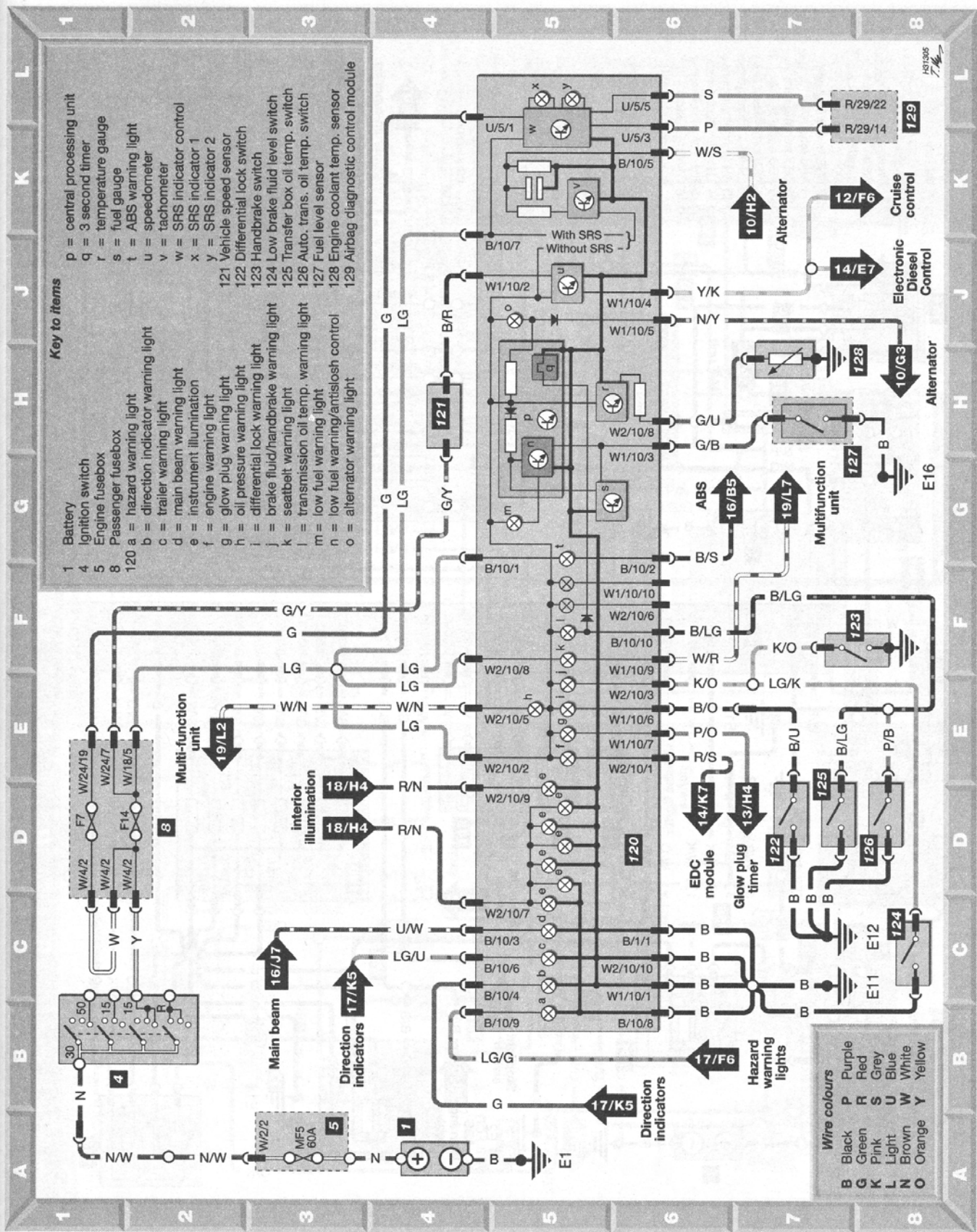
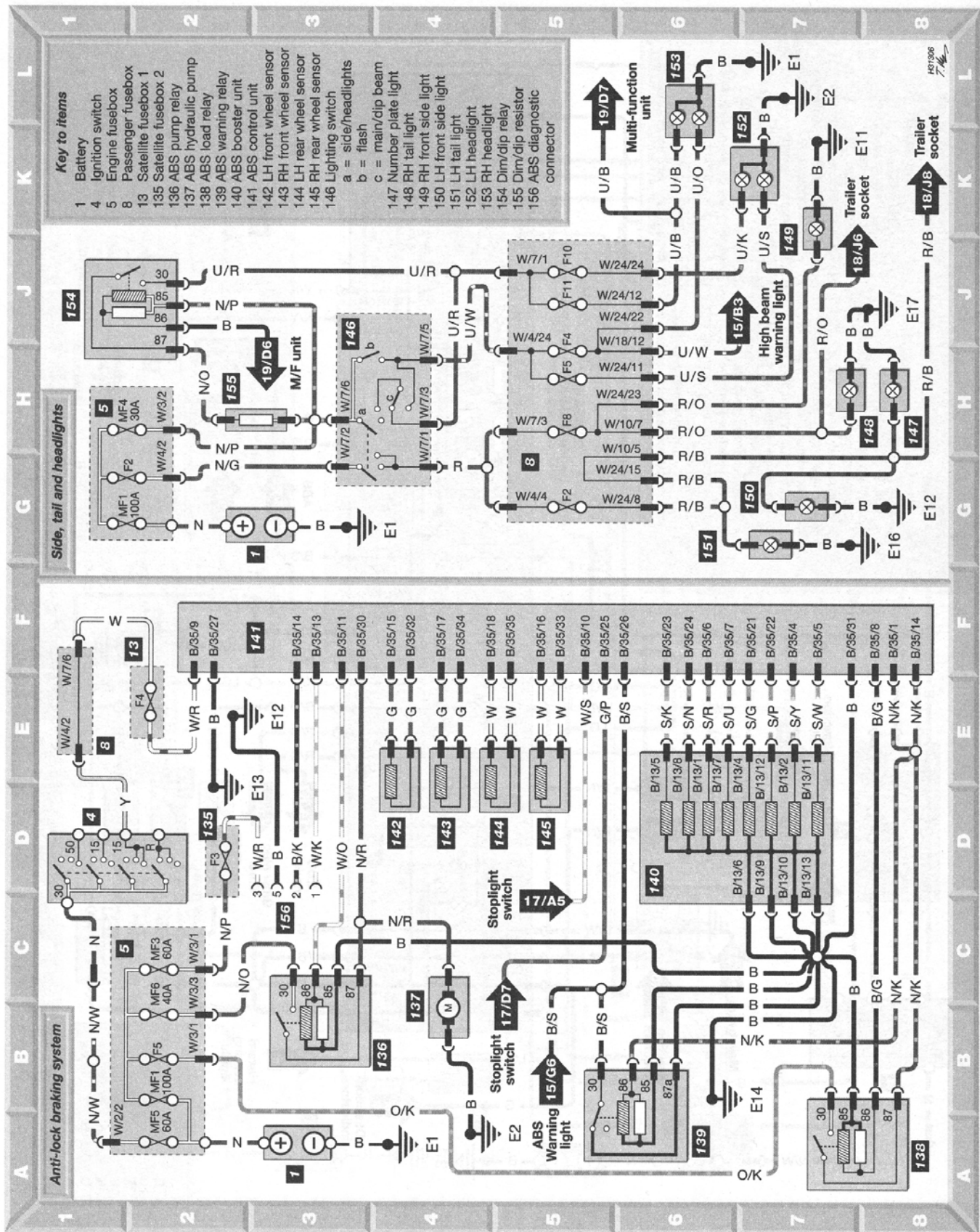
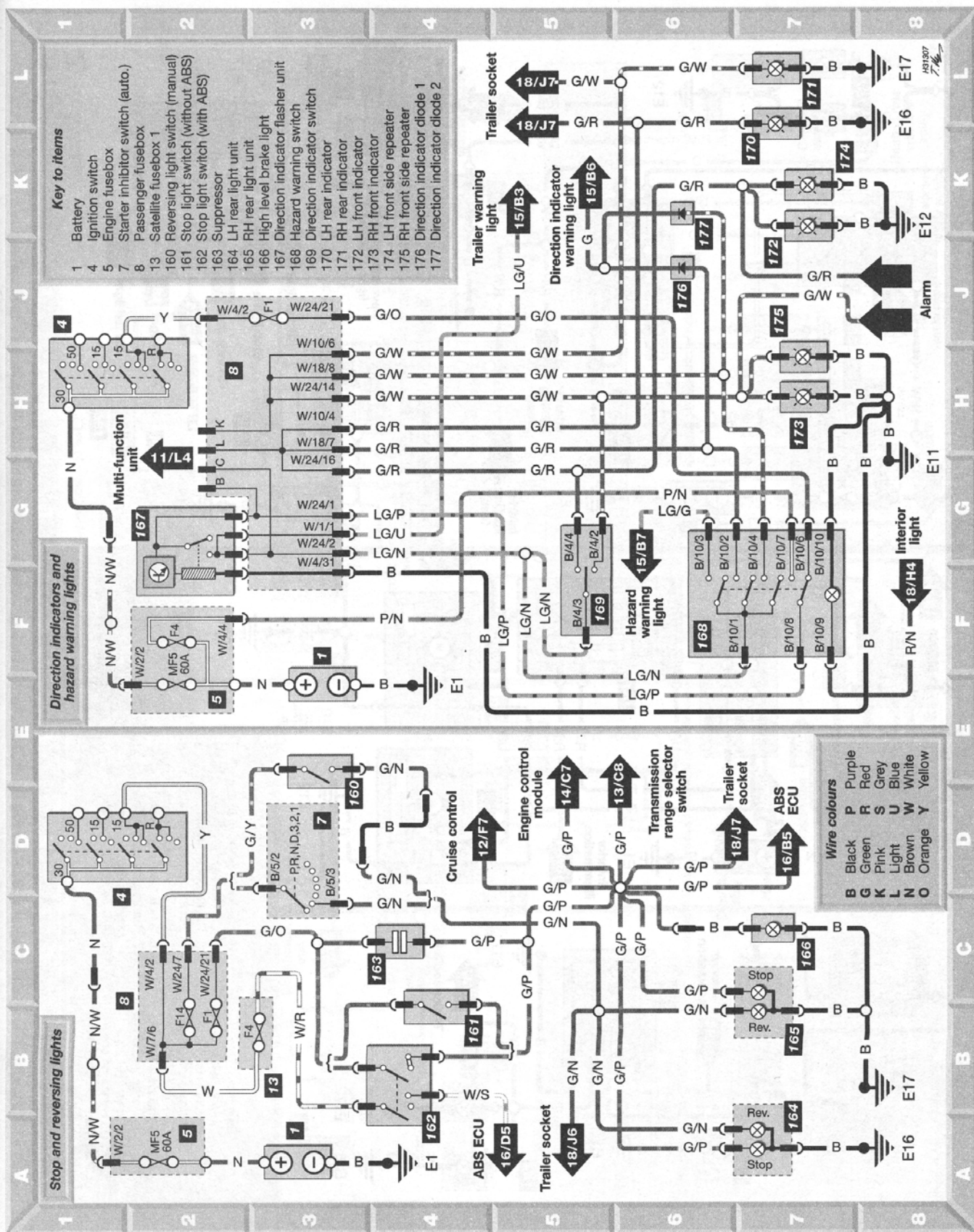


Diagram 15 : Warning lights and gauges - 1995 on





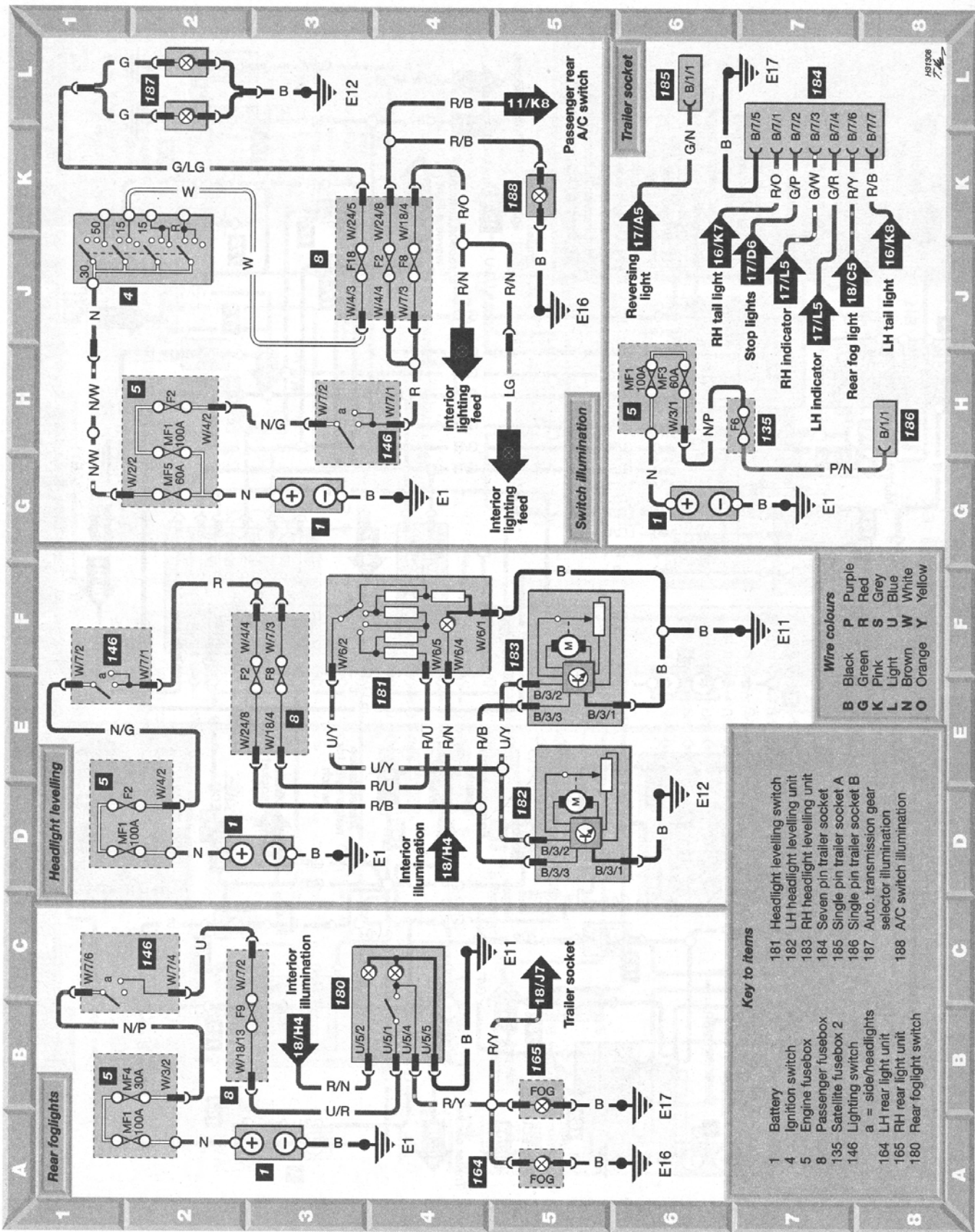


Diagram 18 : Rear fog lights, headlight levelling, trailer socket and switch illumination - 1995 on

- Key to items**
- 1 Battery
 - 4 Ignition switch
 - 5 Engine fusebox
 - 8 Passenger fusebox
 - 135 Satellite fusebox 2
 - 146 Lighting switch
 - 164 LH rear light unit
 - 165 RH rear light unit
 - 180 Rear foglight switch
 - 181 Headlight levelling switch
 - 182 LH headlight levelling unit
 - 183 RH headlight levelling unit
 - 184 Seven pin trailer socket
 - 185 Single pin trailer socket A
 - 186 Single pin trailer socket B
 - 187 Auto. transmission gear selector illumination
 - 188 A/C switch illumination

Wire colours

Black	Purple
Green	Red
Pink	Grey
Light Blue	Blue
Brown	White
Orange	Yellow

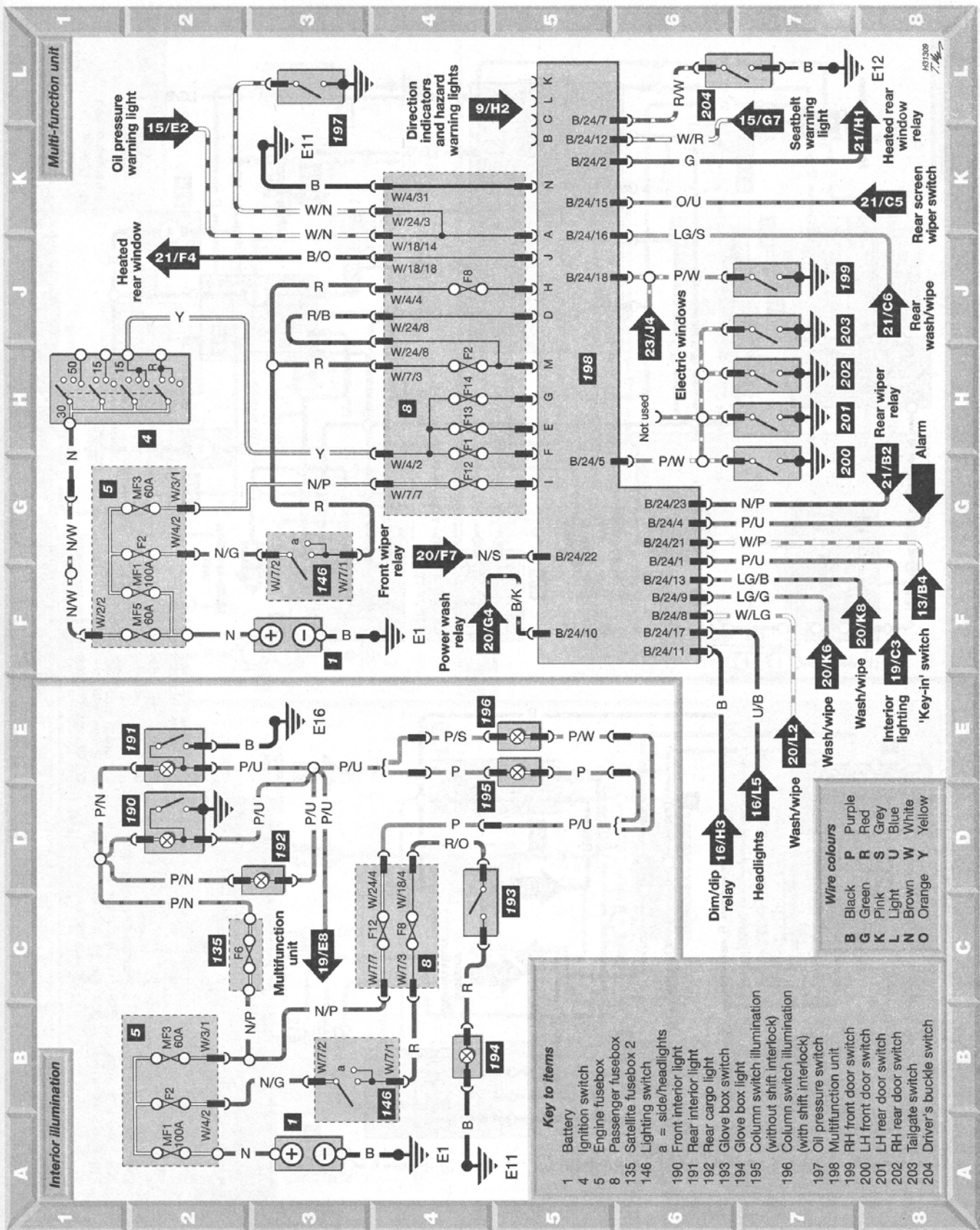


Diagram 19 : Interior illumination and multi-function unit - 1995 on

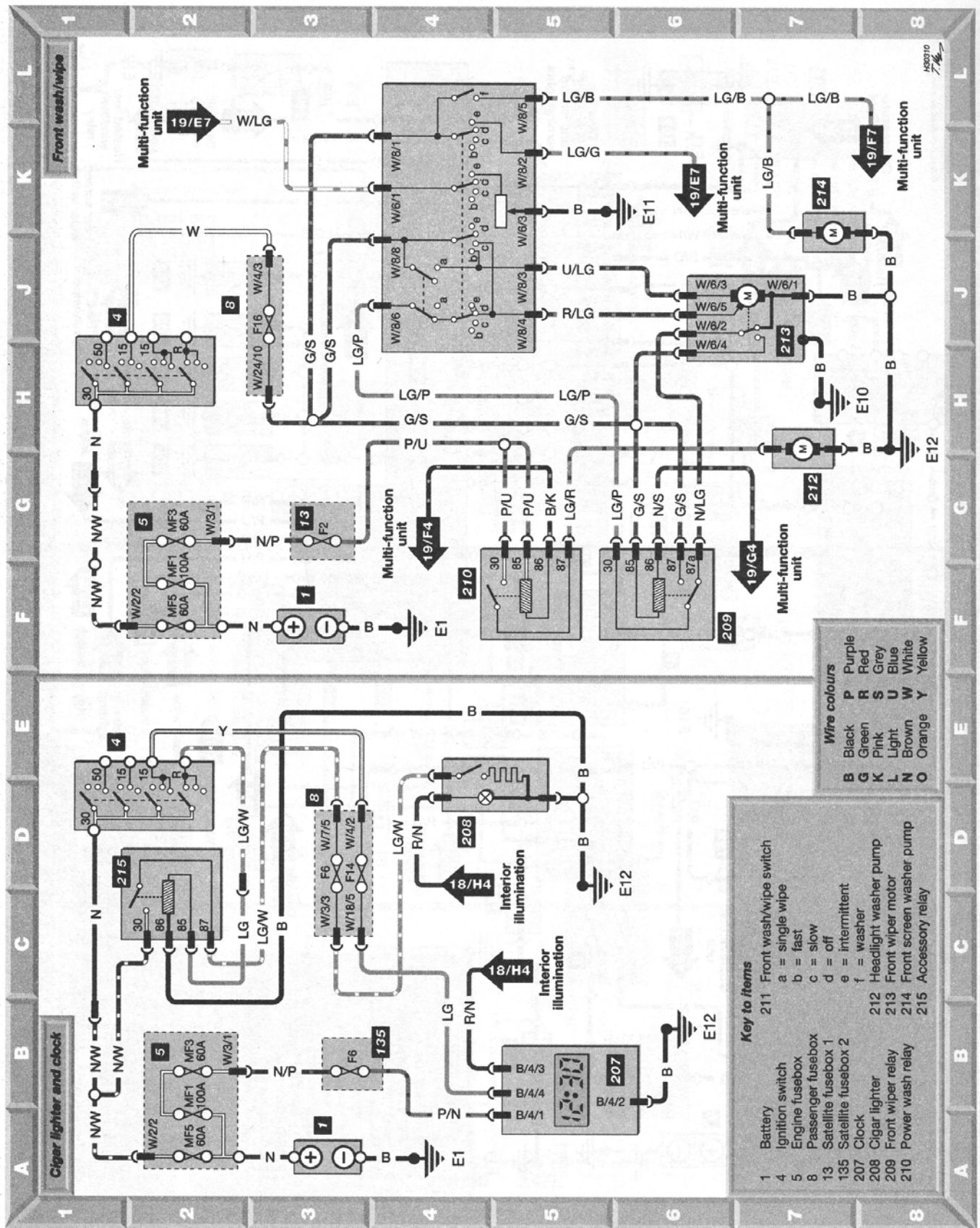


Diagram 20 : Clock, cigar lighter and front wash/wipe - 1995 on

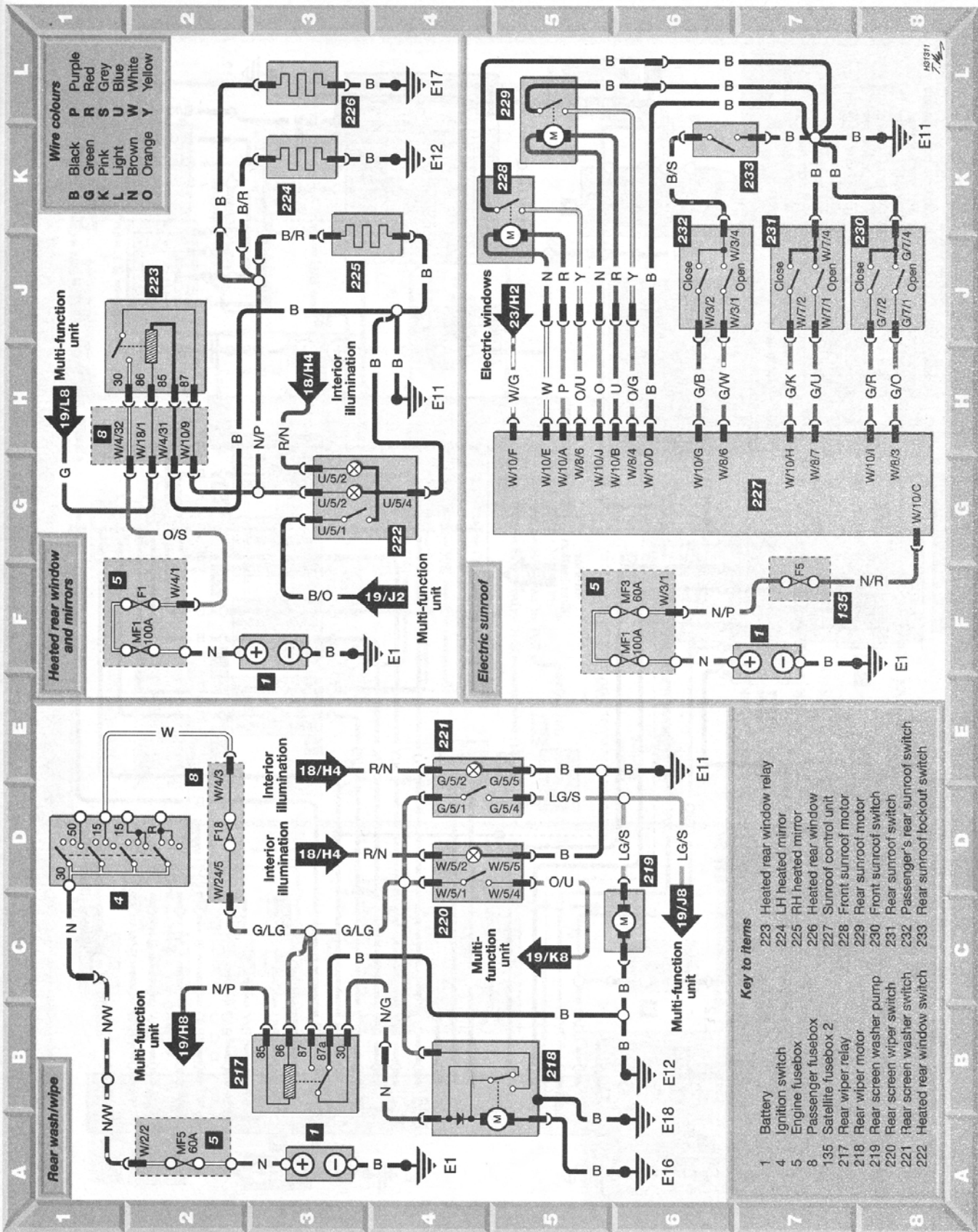


Diagram 21 : Rear wash/wipe, heated rear window/mirrors and electric sunroof

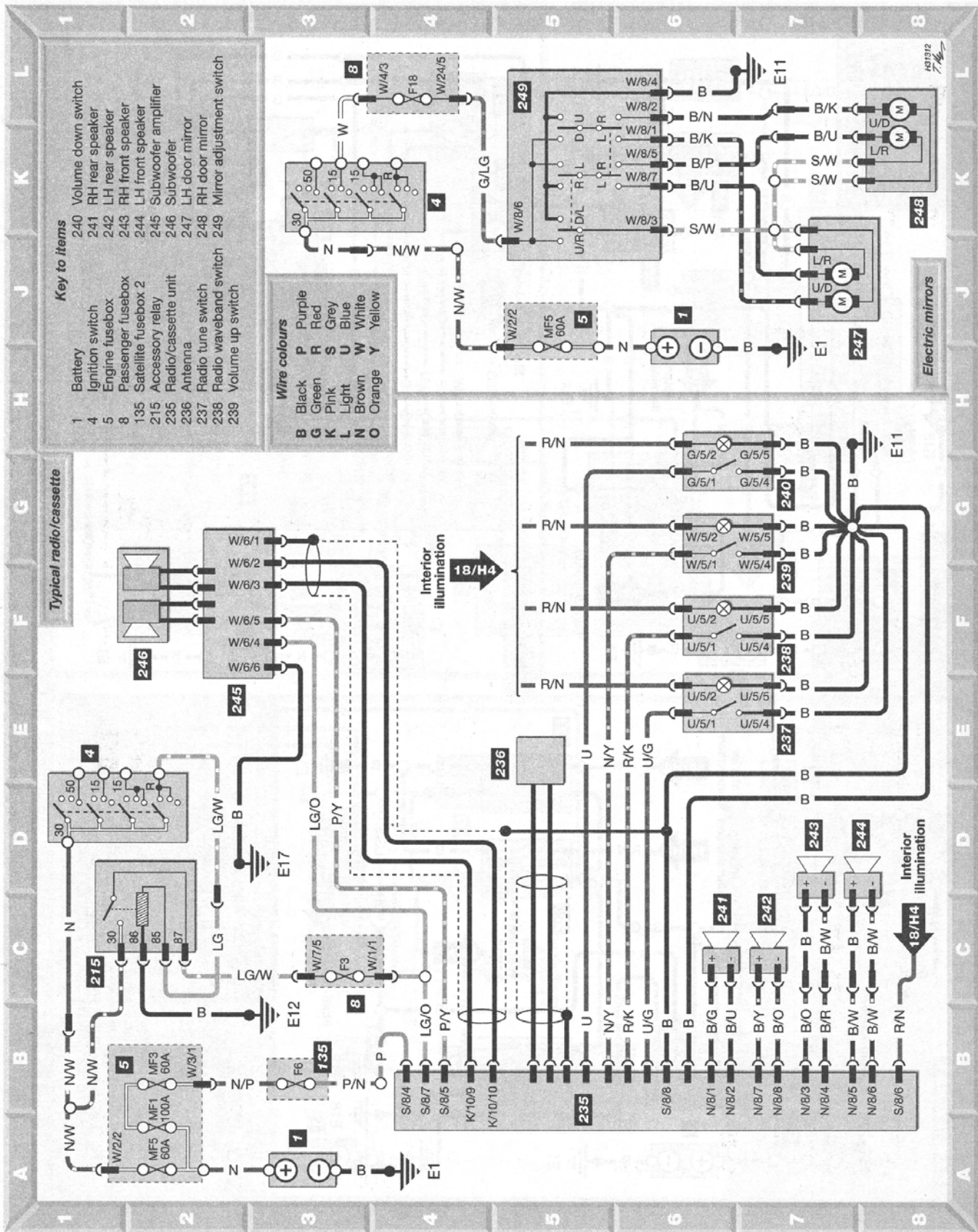


Diagram 22 : Radio/cassette and electric mirrors - 1995 on

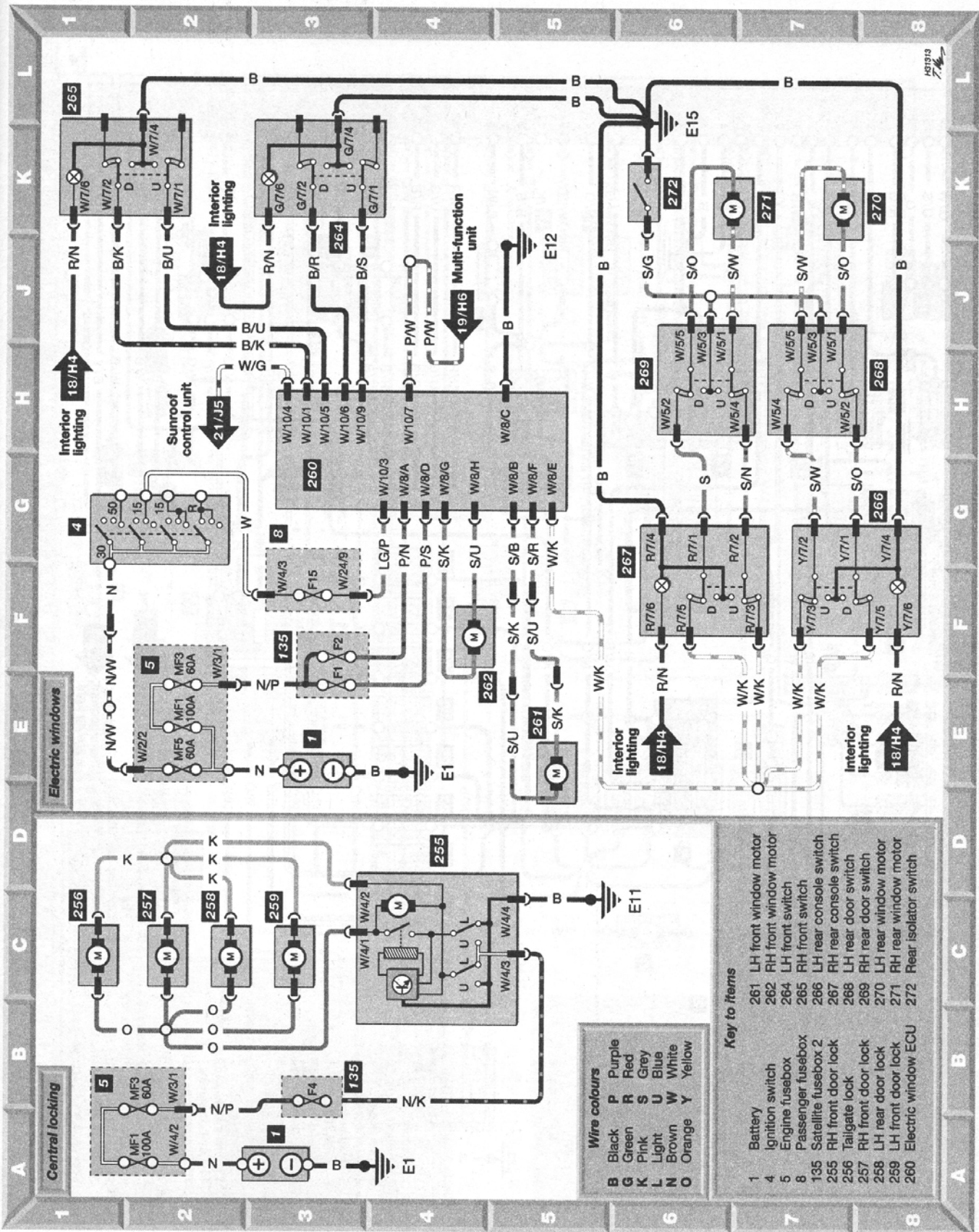


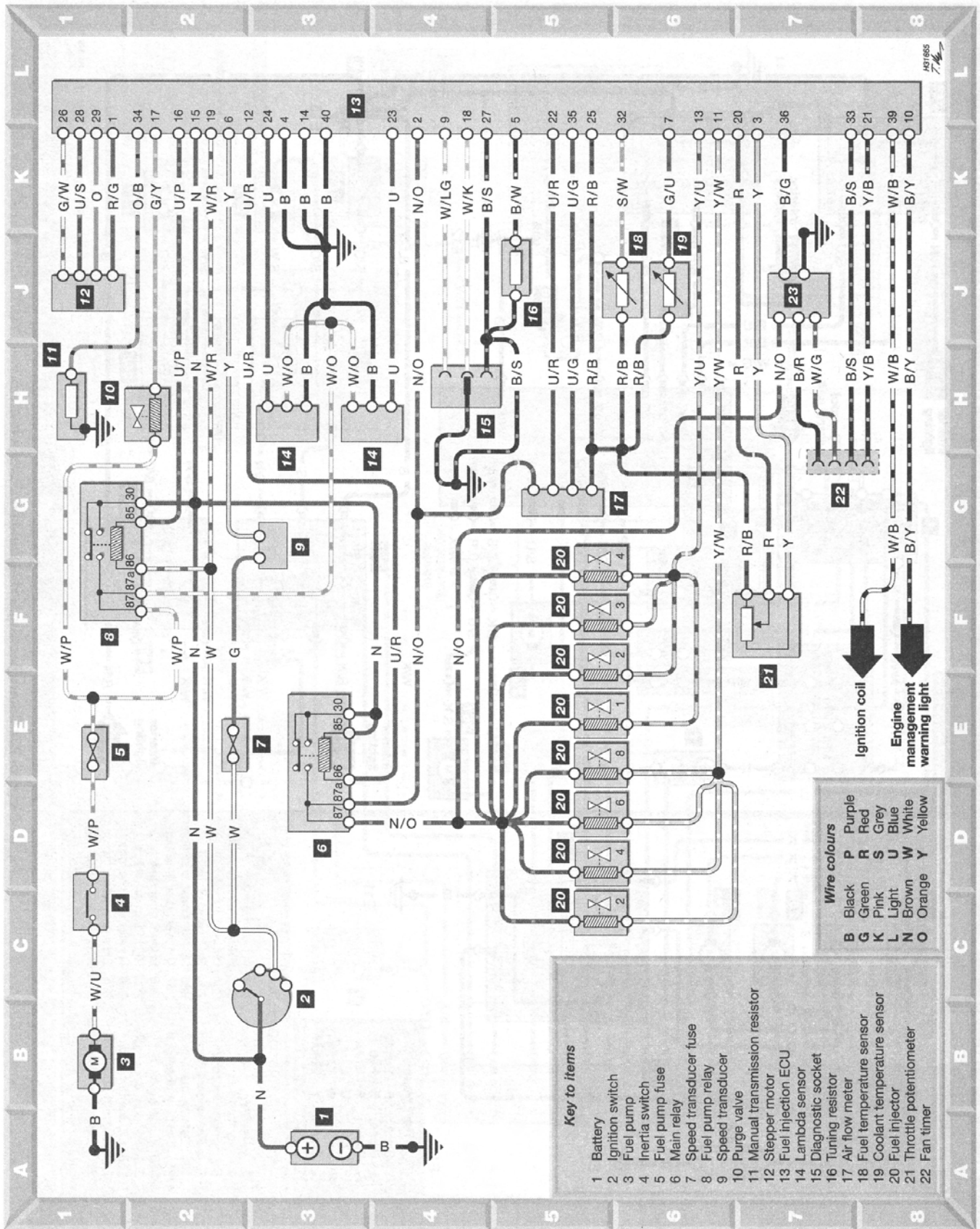
Diagram 23 : Central locking and electric windows - 1995 on

Wire colours

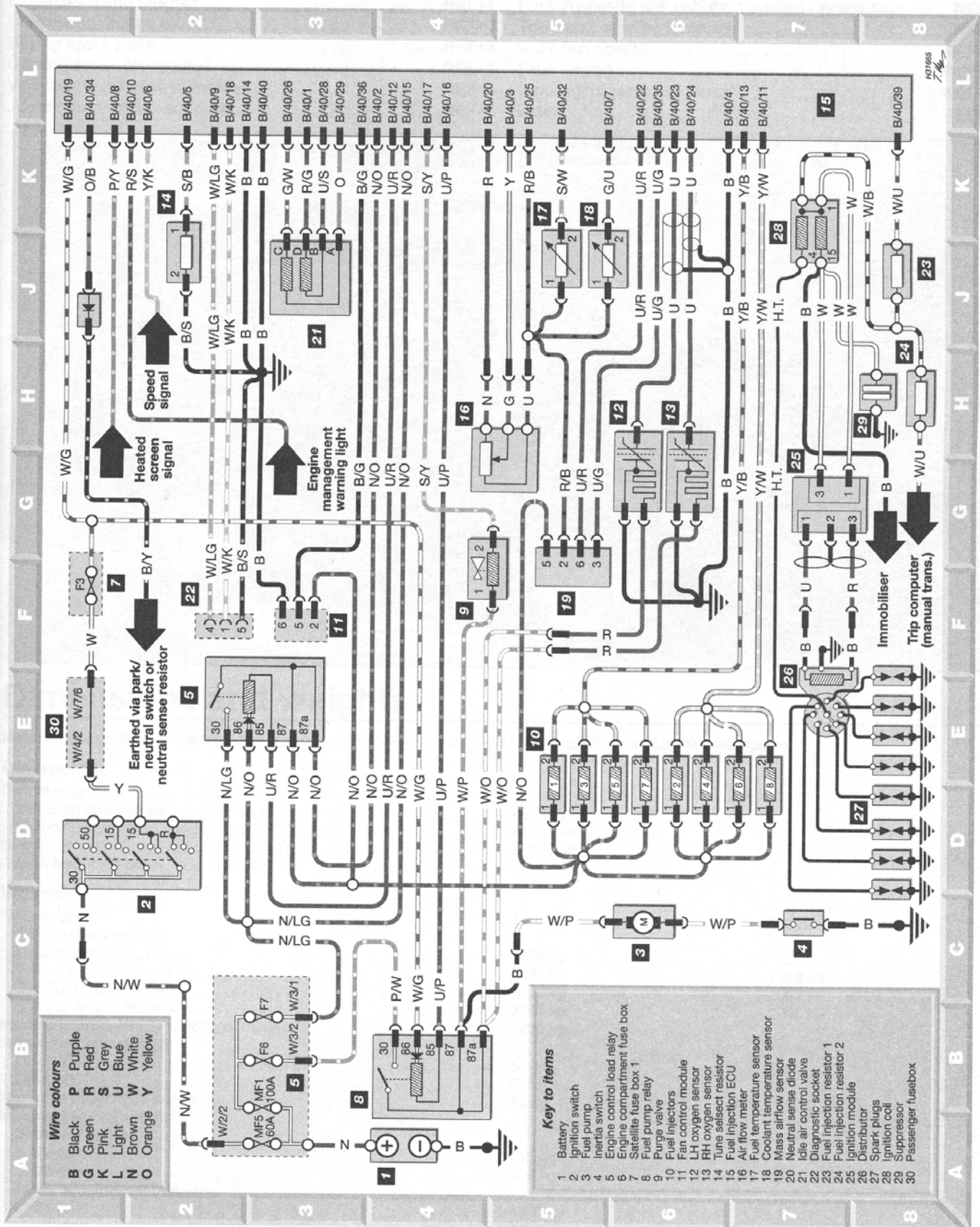
B	Black
G	Green
K	Pink
L	Light
N	Brown
O	Orange
P	Purple
R	Red
S	Grey
U	Blue
W	White
Y	Yellow

Key to items

- 1 Battery
- 4 Ignition switch
- 5 Engine fusebox
- 8 Passenger fusebox
- 135 Satellite fusebox 2
- 255 LH front door lock
- 256 Tailgate lock
- 257 RH front door lock
- 258 LH rear door lock
- 259 RH rear door lock
- 260 Electric window ECU
- 261 LH front window motor
- 262 RH front window motor
- 264 LH front switch
- 265 RH front switch
- 266 LH rear console switch
- 267 RH rear console switch
- 268 LH rear door switch
- 269 RH rear door switch
- 270 LH rear window motor
- 271 RH rear window motor
- 272 Rear isolator switch



Supplementary diagram for fuel injection - pre '95



Supplementary diagram for fuel injection - 1995 on