






Chapter 12

Body electrical system

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Degrees of difficulty

Easy , suitable for novice with little experience 	Fairly easy , suitable for beginner with some experience 	Fairly difficult , suitable for competent DIY mechanic 	Difficult , suitable for experienced DIY mechanic 	Very difficult , suitable for expert DIY or professional 
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Specifications

Fuses (in vehicle fusebox)

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

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

* Early models ** Later models

12•2 Body electrical system

Additional fuses (in engine compartment)

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

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

Relays

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

* Early models ** Later models

Bulbs

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

Torque wrench settings

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

1 General information



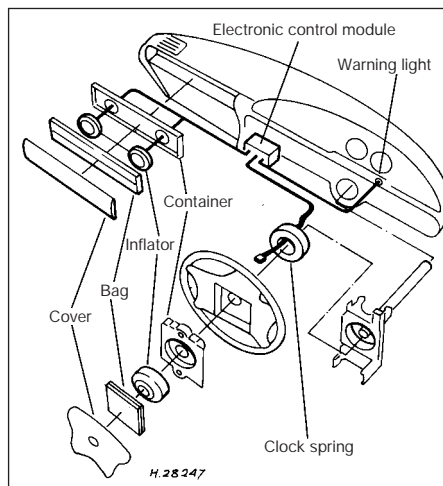
Warning: Before carrying out any work on the electrical system, read through the precautions given in "Safety first!" at the beginning of this manual.

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

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

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

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



1.3 Air bag system components

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

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



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

2 Electrical fault-finding - general information

Note: Refer to the precautions given in "Safety first!" and in Section 1 of this Chapter before starting work. The following tests relate to testing of the main electrical circuits, and should not be used to test delicate electronic circuits (such as engine management systems, anti-lock braking systems, etc), particularly where an electronic control module is used. Also refer to the precautions given in Chapter 5, Section 1.

General

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

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

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

4 The basic tools required for electrical fault-finding include a circuit tester or voltmeter (a 12-volt bulb with a set of test leads can also be used for certain tests); an ohmmeter (to measure resistance and check for continuity); a battery and set of test leads; and a jumper

wire, preferably with a circuit breaker or fuse incorporated, which can be used to bypass suspect wires or electrical components. Before attempting to locate a problem with test instruments, use the wiring diagram to determine where to make the connections.

5 To find the source of an intermittent wiring fault (usually due to a poor or dirty connection, or damaged wiring insulation), a "wiggle" test can be performed on the wiring. This involves wiggling the wiring by hand to see if the fault occurs as the wiring is moved. It should be possible to narrow down the source of the fault to a particular section of wiring. This method of testing can be used in conjunction with any of the tests described in the following sub-Sections.

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

7 Open-circuit faults are caused by a break somewhere in the circuit, which prevents current from flowing. An open-circuit fault will prevent a component from working.

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

Finding an open-circuit

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

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

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

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

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

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

Finding a short-circuit

15 To check for a short-circuit, first disconnect the load(s) from the circuit (loads