






Chapter 5

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

General

System type	12 volt, negative earth, with alternator and pre-engaged starter motor
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Battery capacity:

Visa	42Ah
BX	50Ah or 83Ah

Alternator

Make	Visa	BX
Make	Bosch, Melco or Paris-Rhone	Melco or Bosch
Output	47 amps	50 amps
Regulated voltage (warm)	13.5 volts	13.8 to 14.5 volts

Starter motor

Make	Bosch or Mitsubishi/Melco
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Fuses (Visa models)

No	Amps	Circuits protected
1	10	RH side and tail lamps, RH number plate lamp, ignition switch lighting
2	16	LH and RH direction indicators, rear screen wash/wipe, electric window relay, instrument lighting, all warning lamps
3	20	Stop-lamps, heated rear screen, electric cooling fan, windscreen wiper and washer
4	16	Cigar lighter, interior lamps, radio, horn, clock, hazard warning
5	10	Rear foglamps
6	10	Reversing lamps
7	20	Front electric windows, central door locking
8	10	LH side and tail lamps, LH number plate lamp, switch illumination

Fuses (BX models), (depending on level of equipment)

No	Amps	Circuits protected
1	10	Reversing lamps, electric cooling fan relay, water temperature control, oil pressure gauge, tachometer, water level warning
2	25	Heater motor, air conditioning, direction indicators, instrument lighting, all warning lamps
3	25	Heated rear screen relay, power window relays, stop-lamps, door warning, front and rear wash/wipe, glovebox lamp, spotlamps, lighting rheostat, clock, ABS warning, sunroof
4	30	Electric cooling fans
5	10	Hazard warning lamps
6	30	Electric rear window winders
7	30	Central door locking, interior lamps, glovebox lamp, cigar lighter, radio, clock
8	25	Heated rear screen, horn
9	30	Electric front window winders
10	5	Rear fog lamps
11	5	RH rear lamp
12	5	LH rear lamp, rear number plate lamp
13	5	LH and RH sidelamps, digital clock, lighting dimmer, illumination for hazard warning switch, heated rear screen, rear fog-lamps and screen wiper, sidelamp indicator
14	10/25	ABS system

Bulbs (watts)

	Visa	BX
Boot lamp	5	5
Direction indicators	21	21
Glovebox lamp	2	2
Headlamps	45/40 (17D) 60/55 (17 RD)	55/60
Interior lamps	7	7
Map reading lamp	7	7
Number plate lamps	5	5
Rear foglamp	21	21
Reversing lamps	21	21
Sidelamps	4	4
Side repeaters	4	4
Stop-lamps	21	21
Tail lamps	5	5

Torque wrench settings

	Nm	lbf ft
Alternator mountings	35	26
Starter motor bolts	34	25

1 Description - general

The electrical system is of 12 volt negative earth type. The main components are a 12 volt battery, an alternator with integral voltage regulator, and a pre-engaged starter motor (with reduction gears on some models). The starter motor incorporates a one-way clutch on its pinion shaft to prevent the engine driving the motor when it starts.

It is important to disconnect the battery leads before charging the battery, removing the alternator, or working on wiring circuits that are permanently live. Additionally the alternator wiring must be disconnected before using electric arc welding equipment.

From late 1986 onwards (1987 model year), all models are equipped with a dim-dip lighting system to comply with UK regulations. The function of the system is to prevent the vehicle being driven with only the

sidelights illuminated.

The system uses a relay-controlled resistor circuit. When the sidelights are on, with the ignition also on, the headlights are automatically illuminated at approximately one-sixth their normal dipped beam power.

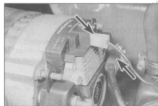
2 Alternator - removal and refitting**Removal**

- 1 Disconnect the battery negative lead.
- 2 Disconnect the wiring from the back of the alternator (see illustration).
- 3 Loosen the pivot bolt and adjustment locknut.
- 4 Unscrew the adjustment bolt to release the tension then slip the drivebelt from the pulleys.
- 5 Remove the adjustment locknut, swivel the alternator outwards, and lift it from the engine.

Note that the alternator is slotted to allow removal without removing the pivot bolt.

Refitting

- 6 Refitting is a reversal of removal. Tension the drivebelt so that there is approximately 6.0 mm deflection under moderate thumb pressure midway between the pulleys.



2.2 Alternator wires (arrowed)



3.3A Starter motor solenoid wiring (Bosch)



3.3B Starter motor solenoid wiring (Mitsubishi/Melco)



3.4 Removing the starter motor mounting bolts on BX models



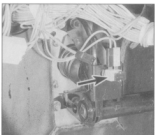
3.5 Removing the starter motor (Mitsubishi/Melco)

3 Starter motor - removal and refitting

FFR 800

Removal

- 1 Disconnect the battery negative lead.
- 2 Remove the air cleaner (Chapter 4).
- 3 Unscrew the nut and disconnect the large cable from the solenoid. Also disconnect the small trigger wire (see illustrations).
- 4 Using a hexagon key, unscrew the three support bolts. On BX models note the location of the hydraulic pipe support bracket (see illustration).
- 5 Withdraw the starter motor from the transmission (see illustration).



5.2 Stop-lamp switch - Visa models (arrowed)



6.2 Removing the turbo over-pressure warning switch

5 Stop-lamp switch (Visa models) - removal and refitting

FFR 800

Removal

- 1 Extract the cross-head screws and withdraw the left-hand side shelf inside the vehicle.
- 2 Disconnect the wiring from the stop lamp switch (see illustration).
- 3 Unscrew the locknuts and remove the switch from the bracket.

Refitting

- 4 Refitting is a reversal of removal, but adjust the switch so that the brake pedal has free movement of 2.5 mm.

6 Turbo over-pressure warning switch - removal and refitting

FFR 800

Removal

- 1 Unbolt the switch from the battery carrier.
- 2 Disconnect the hose and the wiring from the switch, and remove it (see illustration).

Refitting

- 3 Refit by reversing the removal operations.

7 Speedometer cable - general

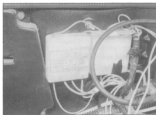
FFR 800

The procedure is similar to that described for petrol models, but to disconnect the speedometer cable from the transmission pull out the rubber cotter (see illustration). Access may be found easier from beneath the vehicle.

5



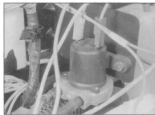
7.1 Disconnecting the speedometer cable from the transmission



8.1 Fusebox location (Visa models)



8.2 Relay location (Visa models)



9.1 Washer pump (Visa models)

8 Fuses and relays (Visa models) - general

- 1 The fuses are located on the bulkhead as on petrol models (see illustration).
- 2 Relays are located under a polythene cover beside the preheater relay on the left-hand side of the engine compartment (see illustration).

9 Washer pump - removal and refitting

Removal

- 1 The washer pump is located near the fluid reservoir on the bulkhead (see illustration). First note the location of the two wires then disconnect them from the terminals.

- 2 Note the location of the inlet and outlet pipes, and disconnect them.
- 3 Unbolt and remove the pump.

Refitting

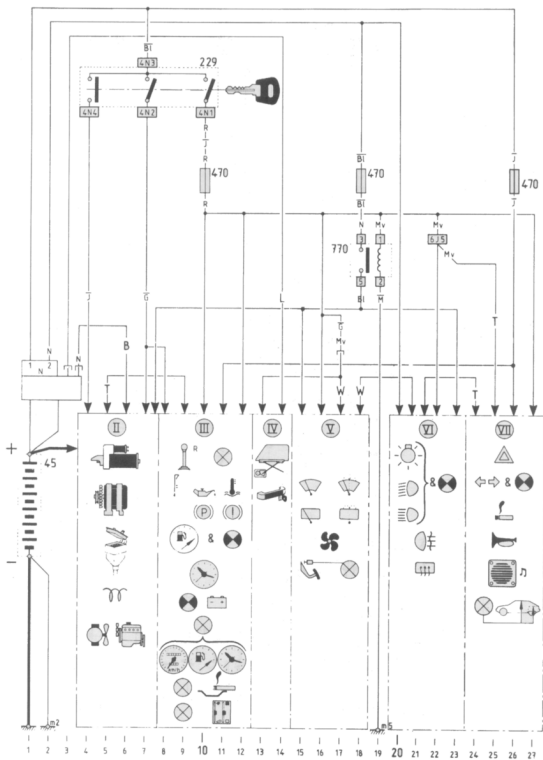
- 4 Refitting is a reversal of removal.

10 Wiring diagrams - general

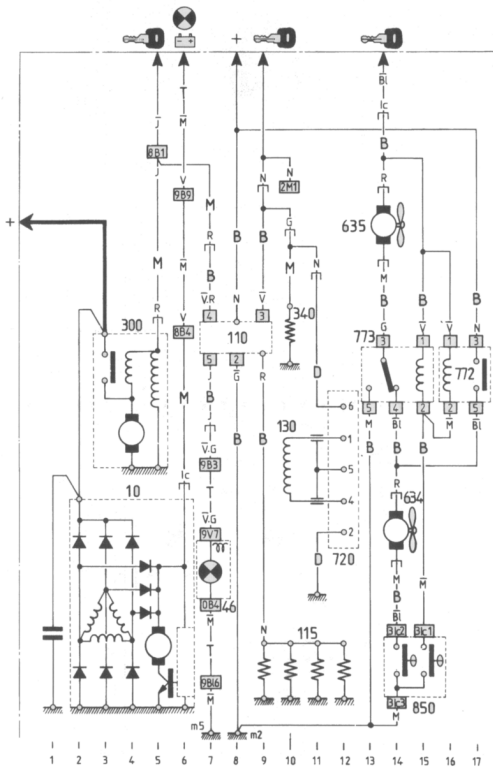
- 1 The wiring diagrams appear on the following pages.
- 2 To assist you in using the diagrams, here is an explanation of the various letters and their use in conjunction with the wiring diagram keys.

- a **Large numbers** - identify the various components.
- b **Capital letters printed in the middle of a wire** - indicate which harness the wire is located in.

- c **Small letters located at the connection points** - indicates the colour of either the wire itself or of the marking on the wire. If the letter has a line drawn above it, this indicates the colour of the wire itself; if there is no line above, the letter indicates the colour of the marking on the wire.
- d **Connecting blocks** - the first number and letter(s) inside the box indicates the size and colour of the connecting block. The last number gives the exact location of the relevant wire in that connecting block.
For example:
3 B1 2 - shows that the wiring connector is blue in colour, and contains three wiring channels; the wire shown in the diagram is located in the second channel of the connector.



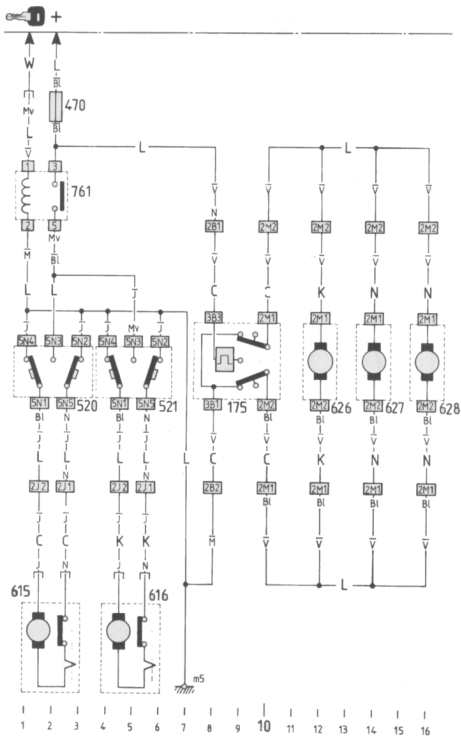
10.3A Wiring diagram for Visa diesel Saloons



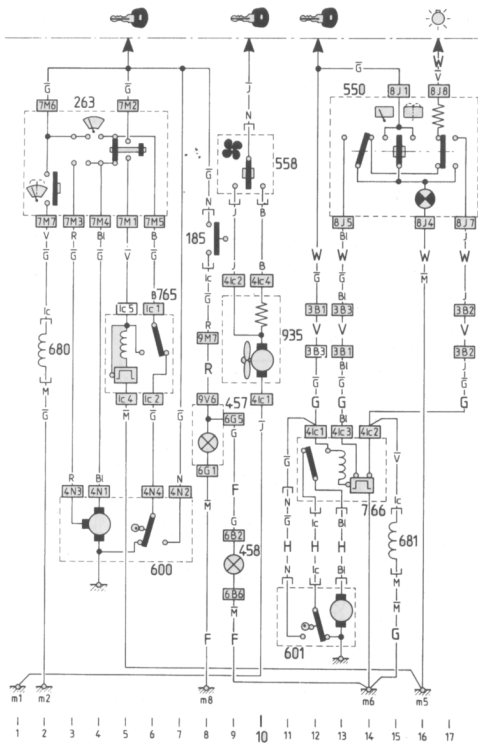
10.3B Wiring diagram for Visa diesel Saloons (continued)



10.3C Wiring diagram for Visa diesel Saloons (continued)

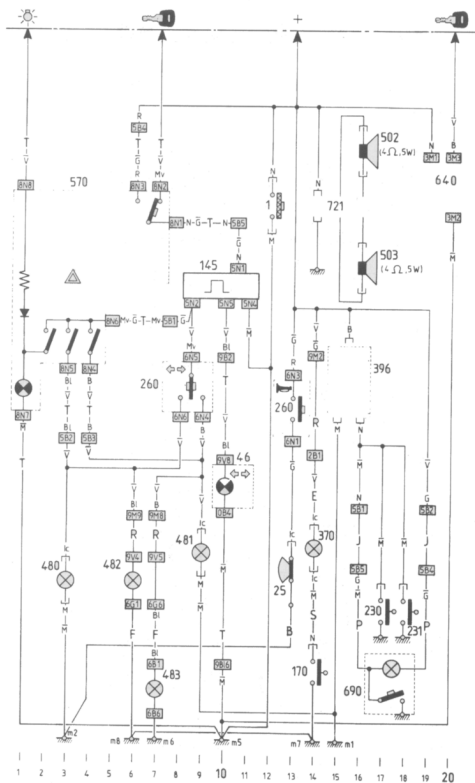


10.3D Wiring diagram for Visa diesel Saloons (continued)

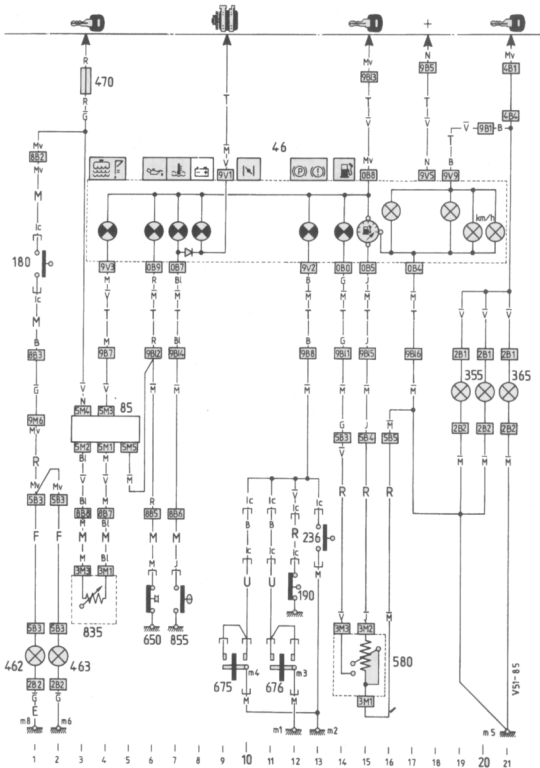




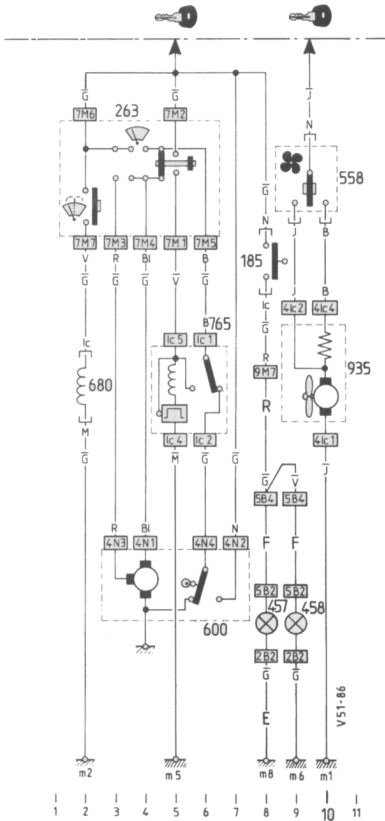
10.3F Wiring diagram for Visa diesel Saloons (continued)



10.3G Wiring diagram for Visa diesel Saloons (continued)



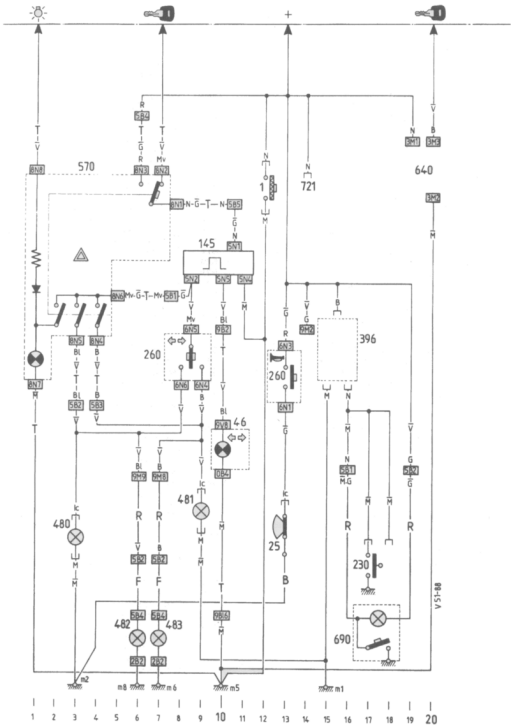
10.3H Wiring diagram for Visa diesel Vans to early 1993



10.3J Wiring diagram for Visa diesel Vans to early 1993 (continued)



10.3K Wiring diagram for Visa diesel Vans to early 1993 (continued)



10.3L. Wiring diagram for Visa diesel Vans to early 1993 (continued)

1	Cigar lighter	457	LH stop-lamp
5	Distributor	458	RH stop-lamp
10	Alternator	460	LH rear foglamp
25	Horn	461	RH rear foglamp
45	Battery	462	LH reversing lamp
46	Monitoring unit	463	RH reversing lamp
50	Ignition coil	470	Fuses reversing lamp
75	Ignition unit (module)	476	LH dipped beams
85	Electronic unit for oil level	477	RH dipped beams
110	Preheater control unit	478	LH main beams
114	Sparkling plugs	479	RH main beams
115	Heater plugs	480	LH front direction indicator
130	TDC sensor	481	RH front direction indicator
131	Ignition pick up No 1	482	LH rear direction indicator
132	Ignition pick up No 2	483	RH rear direction indicator
136	Ignition vacuum sensor	488	LH main and dipped beams
140	Speed sensor	489	RH main and dipped beams
142	Computer	502	LH rear loudspeaker
145	Flasher unit	503	RH rear loudspeaker
158	Tailgate switches on keyboard	511	Rear foglamp switch
170	Tailgate contact switch	520	Switch for LH front window winder
175	Contact switch for door locking device	521	Switch for RH front window winder
180	Contact switch for reversing lamps	532	Switch for heated rear window
185	Stop-lamp contact switch	547	Check button for brake fluid level warning lamp
190	Handbrake contact switch	550	Switch for rear window wipe/wash
192	Contact switch on throttle spindle	551	Switch for rear screen intermittent wiper
225	Choke contact switch	558	Switch for air cooling fan
229	Anti-theft device contact switch	570	Switch for hazard warning signal
230	Door pillar contact switch (LH front door)	576	Injectors
231	Door pillar contact switch (RH front door)	580	Fuel gauge
236	Contact switch for brake fluid level	590	Map reading lamp
237	Contact switch for min water level	600	Windscreen wiper motor
258	Lighting switch	601	Rear window wiper motor
259	Selector switch for window wiper, flasher, horn	615	LH front window winder motor
260	Selector switch for lighting, flasher, horn	616	RH front window winder motor
262	Switch for lighting, windscreen wiper, flasher, horn	626	Motor for RH front door locking device
263	Selector switch for screen wipe/wash	627	Motor for LH rear door locking device
280	Auxiliary-air regulator	628	Motor for RH rear door locking device
285	Condenser coil "+" terminal	634	Engine electric cooling fan, RH
290	Tachometer	635	Engine electric cooling fan, LH
295	Horn compressor	640	Clock
300	Starter motor	650	Oil pressure switch
302	Flowmeter	670	LH headlamp
340	Electric cut-out control on pump	671	RH headlamp
355	Lighting for heater control	675	LH front brake pads
365	Ashtay lighting	676	RH front brake pads
370	Boot lighting	680	Windscreen washer pump
385	Lighting for LH number plate	681	Rear screen washer pump
386	Lighting for RH number plate	683	Petrol pump
390	Lighting for anti-theft switch	690	Centre interior lamp
396	Floor lighting, passenger side	720	Diagnostic socket
420	Idle cut-off	721	Radio terminals
440	LH sidelamp	731	Injection relay
441	RH sidelamp	733	Electric fan relay
442	LH tail lamp	737	Dipped beams relay
443	RH tail lamp	743	Horn compressor relay
445	LH rear lamp (cluster)	761	Front window winder relay
446	RH rear lamp (cluster)	765	Windscreen wiper relay

766	Rear screen wiper relay	840	Water temperature sensor
770	Relays for accesories	841	Water temperature sensor (injection)
772	Relay for electric fan 2nd speed	842	Oil pressure sensor
773	Relay reversing the electric fan speeds	843	Oil temperature sensor
788	Electric fan 2nd speed resistance	850	Electric fan thermal switch on coolant circuit
795	Rheostat for illumination	855	Water temperature switch
810	LH side repeater	935	Air conditioning cooling fan
811	RH side repeater	945	Heated rear window
835	Probe for oil level	958	Preheating warning lamp

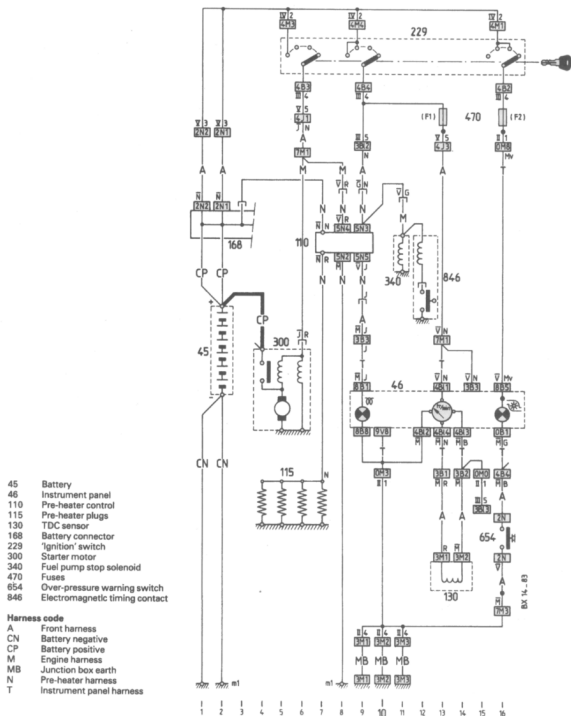
Not all items fitted to all models

Harness code

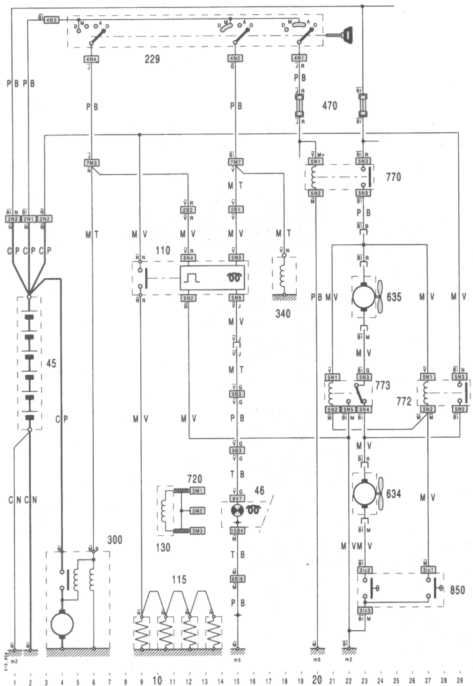
A	Front (no mark on feed and function diagrams)	M	Engine
B	Electric fan	N	Rear door
C	LH front door	P	Interior lamp, gauge
D	Diagnostic	R	Rear
E	Boot lighting	S	Tailgate, LH
F	From LH rear lamp to RH rear lamp	T	Instrument panel
G	Rear screen washer time-delay	U	Brake wear
H	Tailgate, RH	V	Rear window wiper
J	Gauge	W	Rear window wiper switch
K	Passenger's door	Y	Injection
L	Window winder locking device	Z	Ignition

Colour code

B	White	Mv	Maue
BL	Blue	N	Black
G	Grey	Or	Orange
lc	Transparent	R	Red
J	Yellow	V	Green
M	Brown		



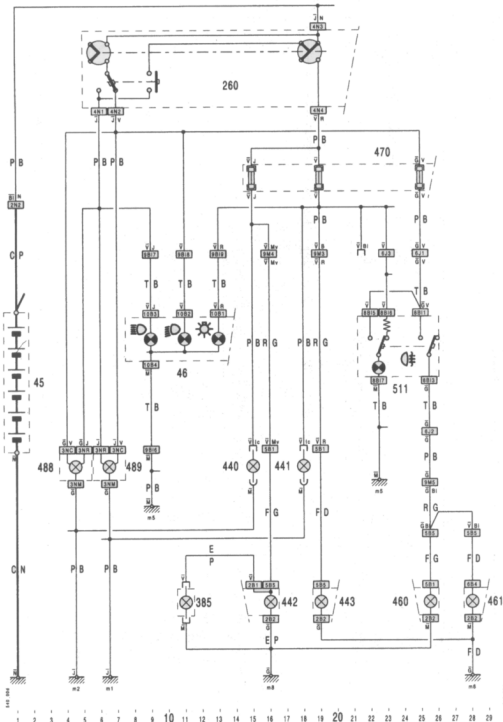
10.30 Wiring diagram - BX Turbo models
For colour code see key to main wiring diagrams



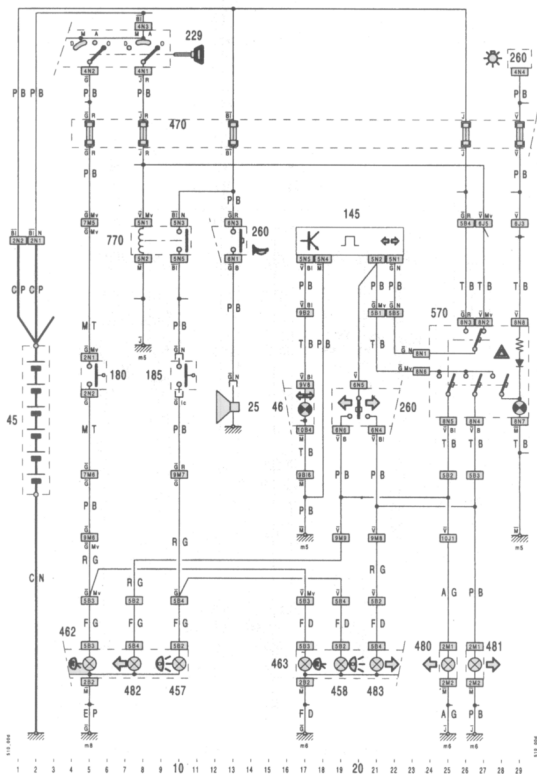
10.3P Wiring diagram for C15/Champ Van from early 1993
Starting, pre-heating and cooling



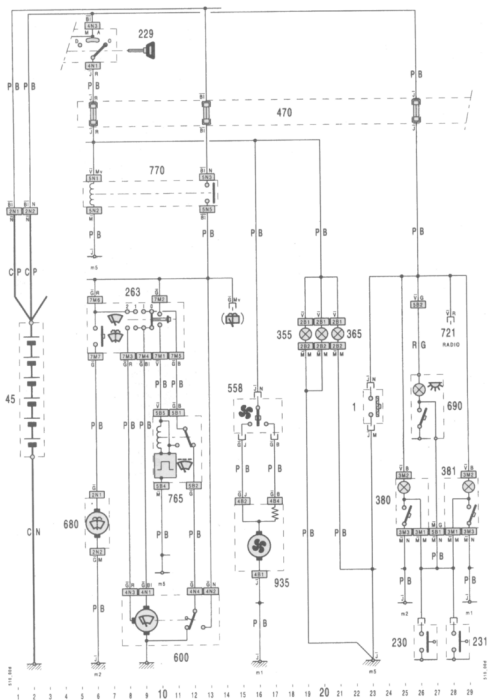
10.3Q Wiring diagram for C15/Champ Van from early 1993
Instrument panel



10.3R Wiring diagram for C15/Champ Van from early 1993
Lighting



10.3S Wiring diagram for C15/Champ Van from early 1993
Signalling

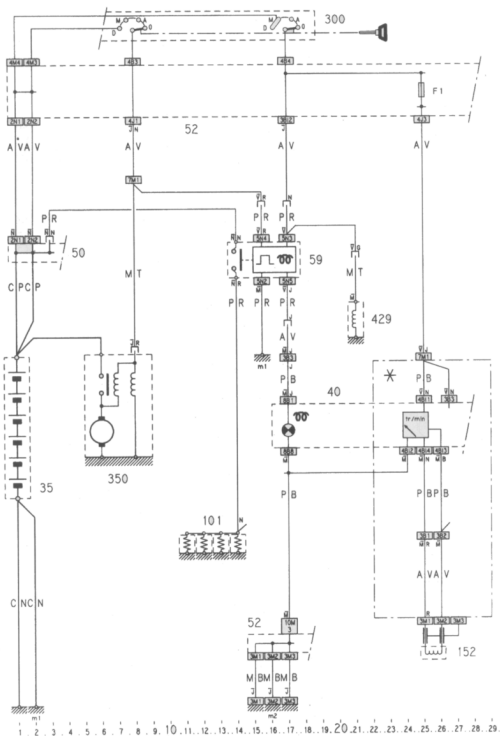


10.3T Wiring diagram for C15/Champ Van from early 1993
Wipers, heating and interior equipment

No	Description	No	Description
1	Cigar lighter	489	RH headlamp
10	Alternator	511	Rear foglamp switch
25	Horn	558	Heater blower switch
45	Battery	570	Hazard warning lamp switch
46	Instrument panel	580	Fuel gauge
110	Pre-heater control unit	600	Windscreen wiper motor
115	Pre-heater plugs	634	LH cooling fan
130	TDC sensor	635	RH cooling fan
145	Flasher unit	640	Clock
180	Reversing lamp switch	650	Oil pressure switch
185	Brake lamp switch	675	LH front brake pad wear indicator
190	Handbrake switch	676	RH front brake pad wear indicator
229	Ignition switch	680	Windscreen washer pump
230	LH front courtesy lamp switch	690	Interior lamp
231	RH front courtesy lamp switch	720	Diagnostic socket (TDC)
236	Brake fluid level switch	721	Radio power supply
260	Lighting switch	765	Windscreen wiper relay
262	Wiper switch	770	Accessory supply relay
300	Starter	772	Cooling fan relay
340	Stop solenoid	773	Cooling fan inverter relay
355	Heater control illumination	850	Two-stage thermo-switch
365	Ashtray illumination	855	Temperature warning lamp switch
380	LH sill panel lamp	935	Heater blower fan
381	RH sill panel lamp	958	Pre-heater plug warning lamp
385	Number plate lamp		
440	LH sidelamp		
441	RH sidelamp		
442	LH tail lamp		
443	RH tail lamp		
457	LH brake lamp		
458	RH brake lamp		
462	LH reversing lamp		
463	RH reversing lamp		
470	Fuses		
480	LH front indicator lamp		
481	RH front indicator lamp		
482	LH rear indicator lamp		
483	RH rear indicator lamp		
488	LH headlamp		

Harness code

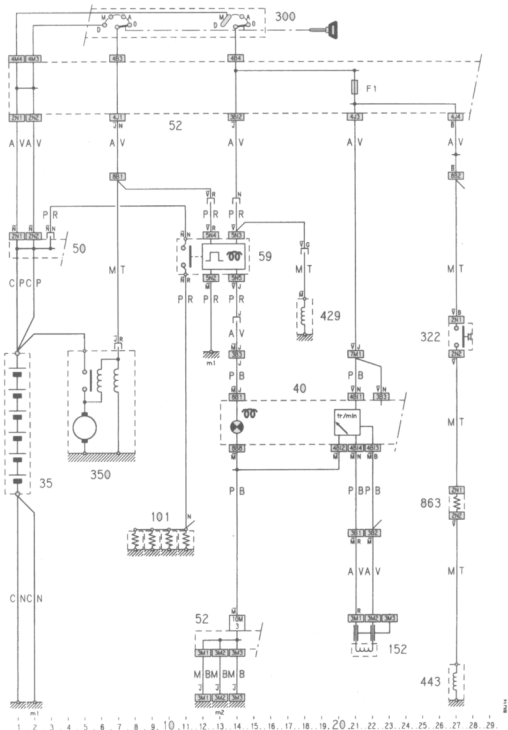
EP	Number plate lamp
FD	RH tail lamp
FG	LH tail lamp
MT	Engine
MV	Cooling fan and pre-heating
PB	Dashboard
RG	LH rear
TB	Instrument panel
UD	RH brake pad wear warning
UG	LH brake pad wear warning
CN	Battery negative
CP	Battery positive



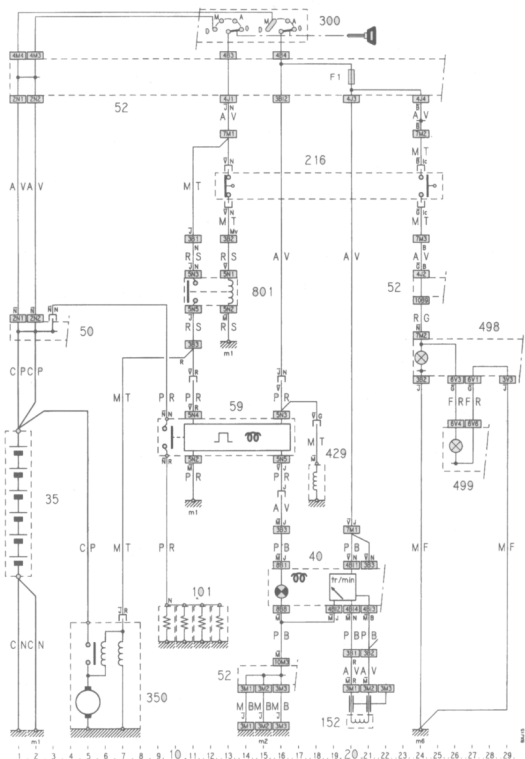
10.3V Wiring diagram for BX models with XUD7 or XUD9 engines



10.3W Wiring diagram for BX models with XUD9 or XUD9A engines (not UK models)



10.3X Wiring diagram for BX Turbo with XUD7TE/Y engine (not UK models)



10.3Y Wiring diagram for BX models with automatic transmission

No	Description
10	Distributor
35	Battery
40	Instrument panel
50	Supply box
52	Junction box
59	Pre-heating control unit
101	Pre-heater plugs
144	Exhaust gas recirculation ECU*
152	Flywheel sensor
216	Automatic gearbox switch
255	Air conditioning compressor
300	'Ignition' switch
317	Hydraulic level switch
322	Enrichment switch
350	Starter motor
429	Stop solenoid
442	Canister-purge solenoid*
443	Advance correction solenoid
498	LH reversing lamp
499	RH reversing lamp

No	Description
672	Hydraulic pressure switch
759	Exhaust gas recirculation pump*
783	Diagnostic socket
801	Automatic gearbox relay
863	Atmospheric pressure switch resistance
974	Coolant thermo-switch*
*	Not UK models

Harness code

AA	'Ignition'
AV	Front
CN	Battery negative
CP	Battery positive
DP	Anti-pollution (not UK)
FR	Rear lamps
MB	Junction box earth
MF	Lighting earth
MT	Engine
PB	Dashboard
PR	Pre-heating
RG	Left rear
RS	Starter inhibitor relay (automatic transmission)