

Spider
GLV

VOLUME III
SECTION II

REPAIR
INSTRUCTIONS

ELECTRIC SYSTEM DIAGNOSIS

from "May '97" cars

55

ELECTRIC SYSTEM DIAGNOSIS

Differences for Spider - GLV '98

55

Alfa Romeo 

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(*) The alarm system with radio frequency control is described in Publication "ALARM SYSTEM" PA500500000000.

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ELECTRIC SYSTEM OF THE CAR - POWER SUPPLY

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ELECTRIC SYSTEM OF THE CAR

FOREWORD

All the electric/electronic systems and installations of the car are supplied by the battery with 12V current.

The lines through which the battery voltage is distributed to the various services are protected by special wander fuses or fuses in the fusebox which are suitably sized for the foreseen loads.

The fusebox contains a series of relays and fuses and also the lines and control signals from the switches and steering wheel controls (steering column lever unit) converge on it; the supply and control lines for the different services branch off from the fusebox.

PROTECTION AND SAFETY SYSTEMS

The entire electric system for the Spider/GTV has been designed and made taking into consideration the latest directives on the subject of safety and protection, especially against the possibility of fire.

There are two main types of protection:

- **active protection**, to reduce the possible causes of failure "at the source"
- **passive protection**, to minimise the effects of a possible failure.

The first category involves attentive design of the wiring harnesses, accurately positioning and anchoring them, and carefully defining suitably shielded and protected routings.

For this reason, the alternator and starter motor cables have been appropriately modified through the adoption of protection caps, etc.

A "reinforced" sheath has been adopted for certain sections of particularly exposed wiring.

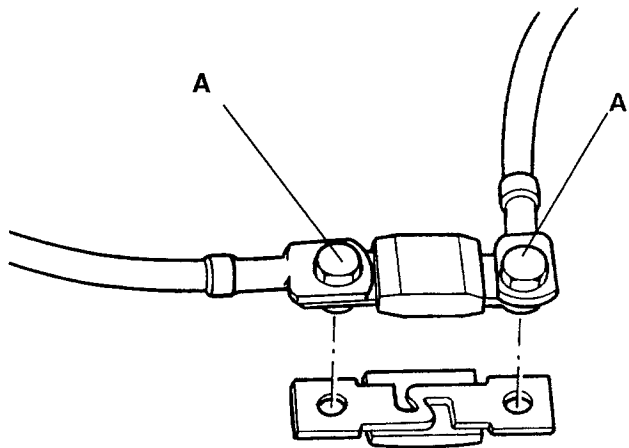
Another form of active protection is the insertion in the original wiring harness of provisions for the more frequently requested optional items (radio, alarm, etc.) to reduce the risk of incorrect work on the cables by unskilled persons.

The passive protections include all the measures, which have always been adopted on vehicles, to reduce high failure currents (overload and short circuit).

All the fuses in the circuit have been sized according to the nominal absorption rating of the loads that can be activated simultaneously and to ensure operation in the event of short circuit.

Some basic supply cables were NOT protected before.

Now, through the adoption of a special **high capacity (150A) fuse**, it is possible to protect all the supply lines, with the exception of the starter motor cable (battery-motor) and the charging cable (motor-alternator): these cables are protected by a fireproof sheath and covered with metal piping.



"MEGA" general supply protection fuse: 150 A

In the event of replacement tighten the two fastening screws (A), working carefully and suitably balancing between the two screws to a torque of appr. 25 Nm, taking care not to use excessive force on the fuse as the copper melting element could get damaged.

IGNITION SWITCH

Some circuits are supplied continuously, also when the vehicle is stopped and the key disengaged, as they are connected directly to the battery (N.B. for safety reasons these lines which are "always hot" have been reduced to the minimum indispensable, in both number and the length of the cables involved: they remain only for those functions for which direct supply is expressly needed).

Other circuits are supplied turning the ignition switch to the various positions:

- inserting the key and turning it to the first position "MAR" supplies a number of circuits, which are indeed defined as "key-operated";
- the second position - "AVV" - supplies the starter motor, disconnecting some of the other circuits (those which absorb a higher amount of power) thereby ensuring the highest flow of current to the starter motor;

- removing the key turning it in the opposite direction (and pressing the special pushbutton) the "PARK" position is engaged which supplies the side lights even when the key is removed.

In the wiring diagrams these different types of supply are shown schematically by the following symbols:



- line always supplied



- line supplied with the key in the "MAR" position



- line supplied with the key in the "AVV" position

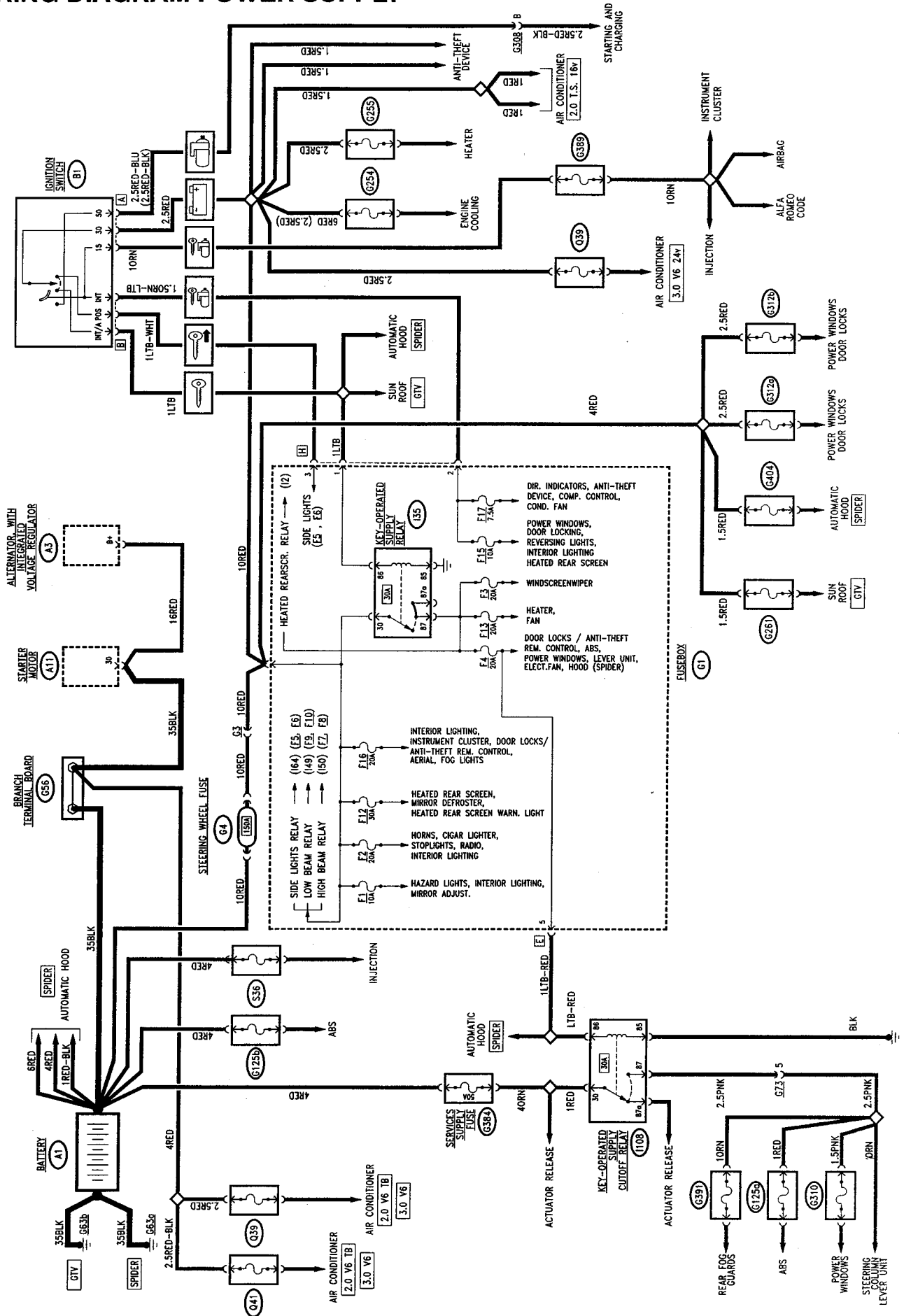


- line supplied with the key engaged in both of the previous positions



- line supplied with the key in the "PARK" position

WIRING DIAGRAM POWER SUPPLY



FUNCTIONAL DESCRIPTION

The supply leading from the battery **A1** is divided among various lines leading from the battery itself and from the branch terminal board **G56**, from where numerous cables lead, directly supplying some systems (protected by special "wander" fuses) and the fusebox **G1** on which the 150A fuse **G4** is to be found; inside the fusebox the power is distributed to the various circuits, protected by the corresponding fuses (see the "Fusebox" section); in addition, some supplies for the various systems lead from the supply branch from the fusebox.

Besides the **key-operated supply relay I35**, located in **G1**, which supplies a series of services when the key is at "RUN", but cut out during starting, there is also the **key-operated cut off relay I08** which operates in the opposite manner, i.e. only supplying certain services when the key is at "STOP" and cutting them off when the key is at "RUN", switching the supply to other services which therefore receive the "key-operated" supply.

This relay is supplied by a special line protected by fuse **G384** (50A).

The battery recharging line leads from the alternator **A3**, through the starter motor **A11**.

The ignition switch **B1** is also supplied via the terminal board **G56** at pin 30 of connector A.

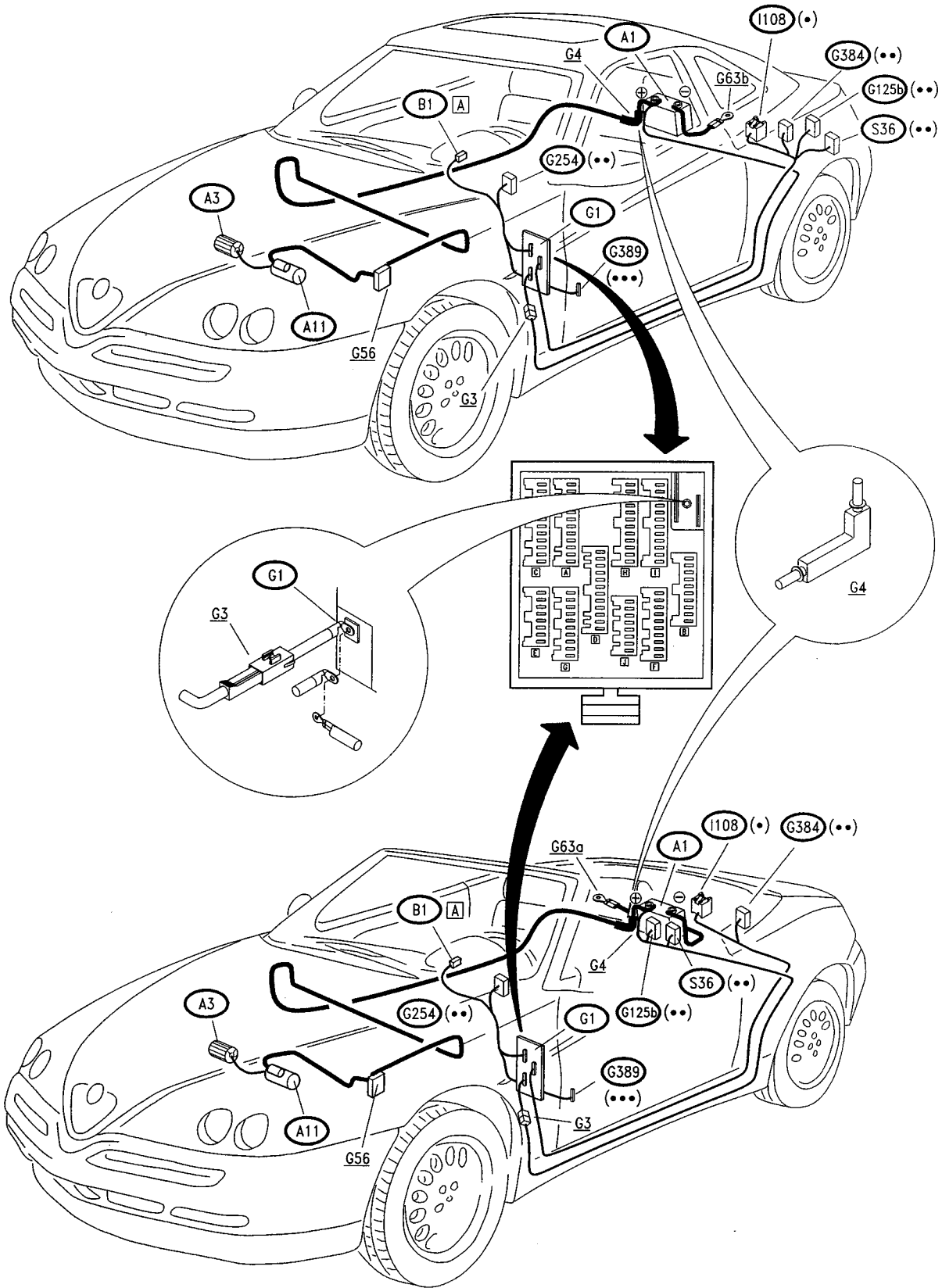
The line that leaves pin 50 of connector A corresponds to the "STARTING" position and it supplies the starter motor **A11**.

The line leaving pin INT/A of connector B - "RUN" position - via the fusebox **G1**, supplies the "key-operated" circuits, which are however disengaged in the "STARTING" position.

The lines that leave pin INT of connector B and pin 15 of connector A supply, either directly or through the fusebox **G1**, the "key-operated" circuits which also remain engaged in the "STARTING" position.

Lastly, the line that leaves pin POS of connector B corresponds to the "PARKING" position and supplies the sidelights circuit inside the fusebox **G1**.

LOCATION OF COMPONENTS



- (*) Blue base
- (**) Black fuse holder
- (***) Red fuse holder

LOCATION OF EARTHS

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GENERAL DESCRIPTION

The following diagrams show the different earths present on the vehicle and the connecting cables for each of them; each cable shows the circuit to which it refers and the component earthed through that line.

The earths shown are the following:

- **G53a** Right-hand engine compartment earth
- **G53b** Left-hand engine compartment earth
- **G55b** Left-hand side panel earth
- **G60** Injection wiring earth
(2.0 T.S. 16v engine)
- **G63a** Right-hand rear earth
(SPIDER only)
- **G63b** Left-hand rear earth

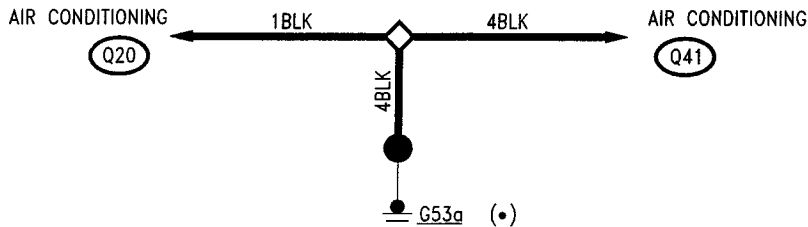
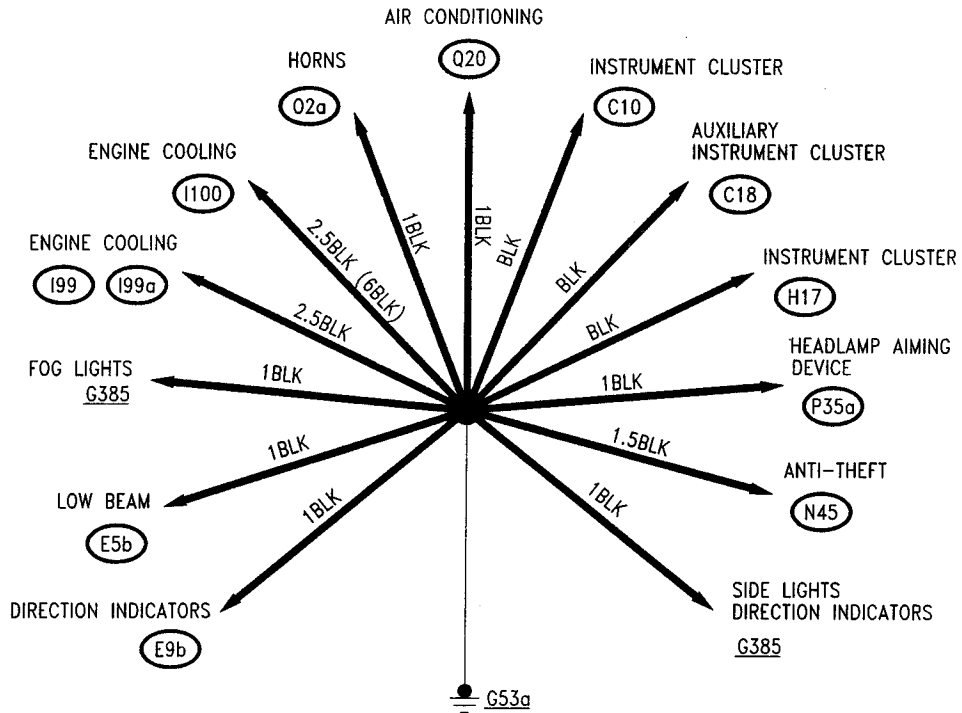
- **G92** Earth for electric aerial
- **G131** Earth on engine upper cover
(3.0 V6 24V engine)
- **G131a/b** Earths on engine upper cover
(3.0 V6 and V6 TB engines)
- **G148b** Earth under left-hand dashboard
- **G381** Airbag earth

There is also an **earth braid**, which connects the power unit to the body.

NOTE: Using these diagrams it is easy to locate those circuits which are connected to earth by the same line: this simplifies faultfinding work in the event of problems affecting more than one system: for instance the oxidation of an earth can put several circuits and numerous functions out of order contemporaneously.

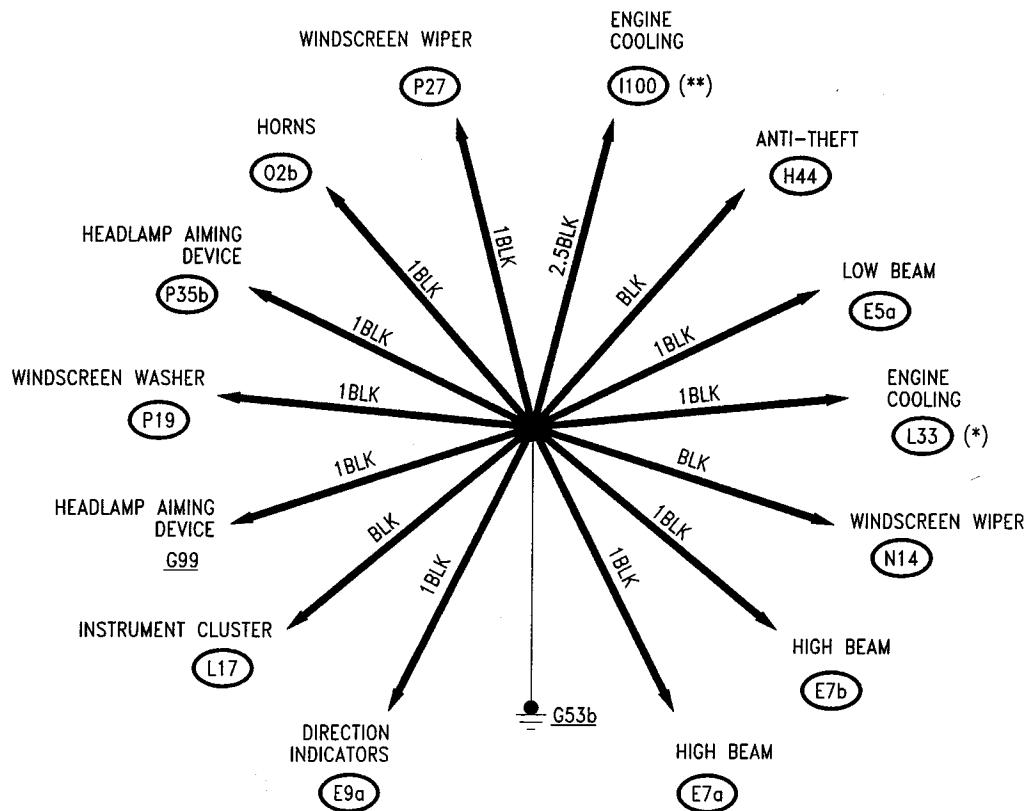
WIRING DIAGRAMS

G53a



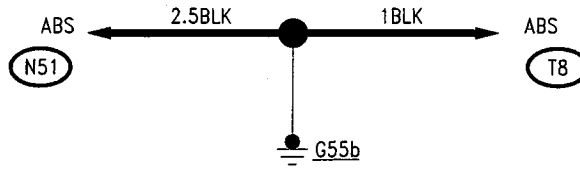
(•) 3.0 V6 and 2.0 V6 TB only

G53b

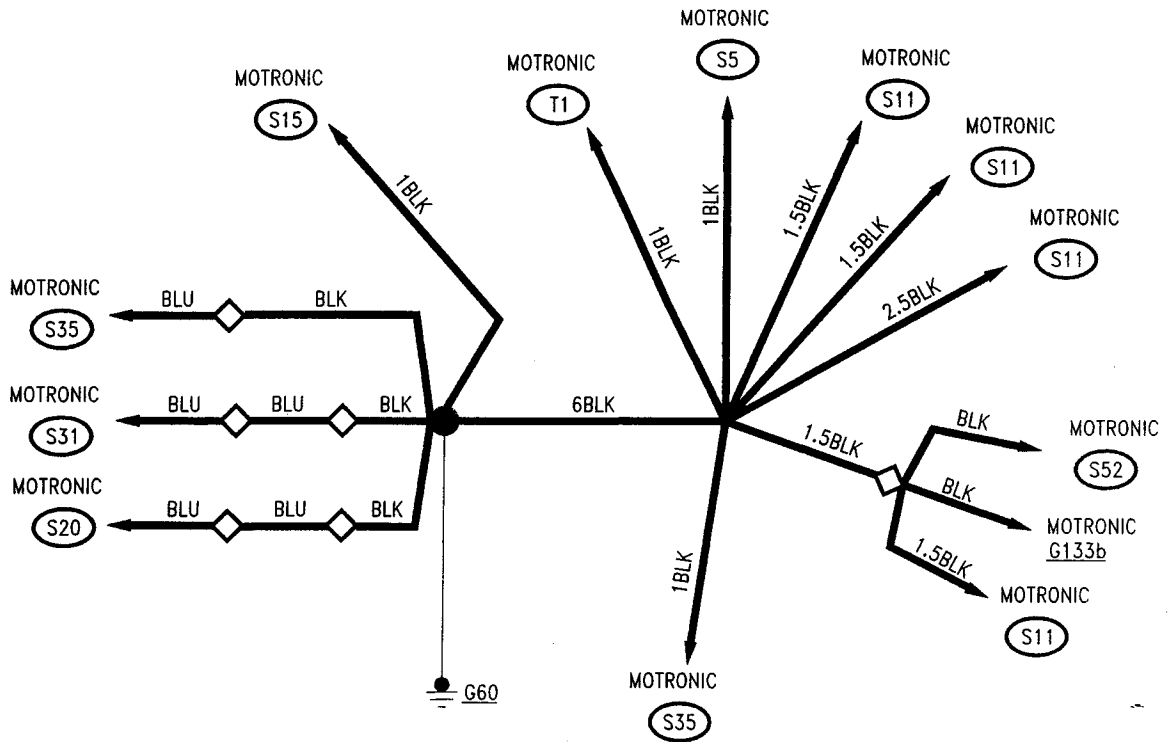


(*) except 2.0 TS 16V
(**) only 3.0 V6 24V

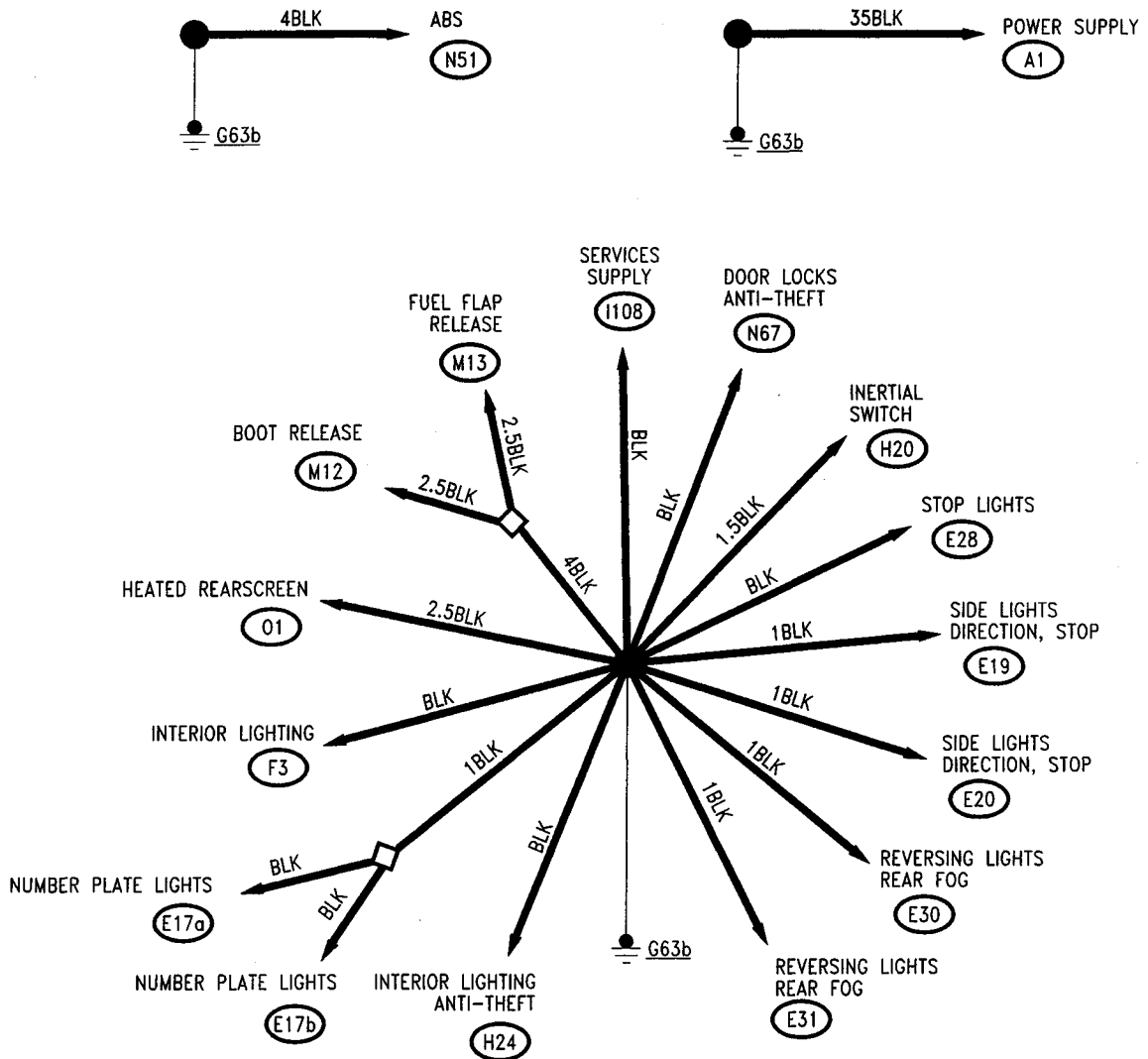
G55b



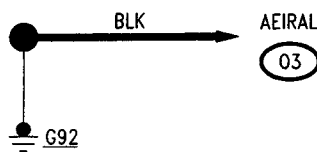
G60 (2.0 T.S. 16v engine)



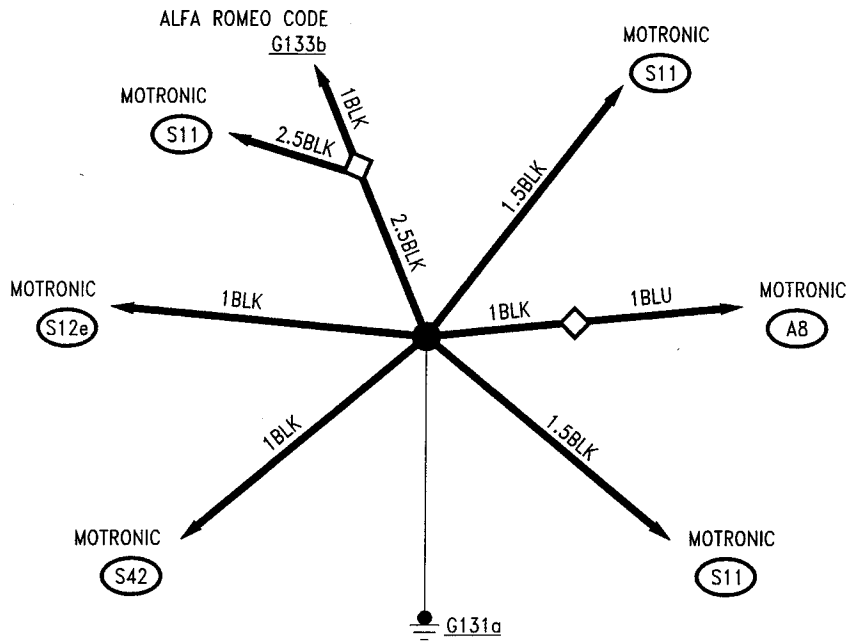
G63b (GTV)



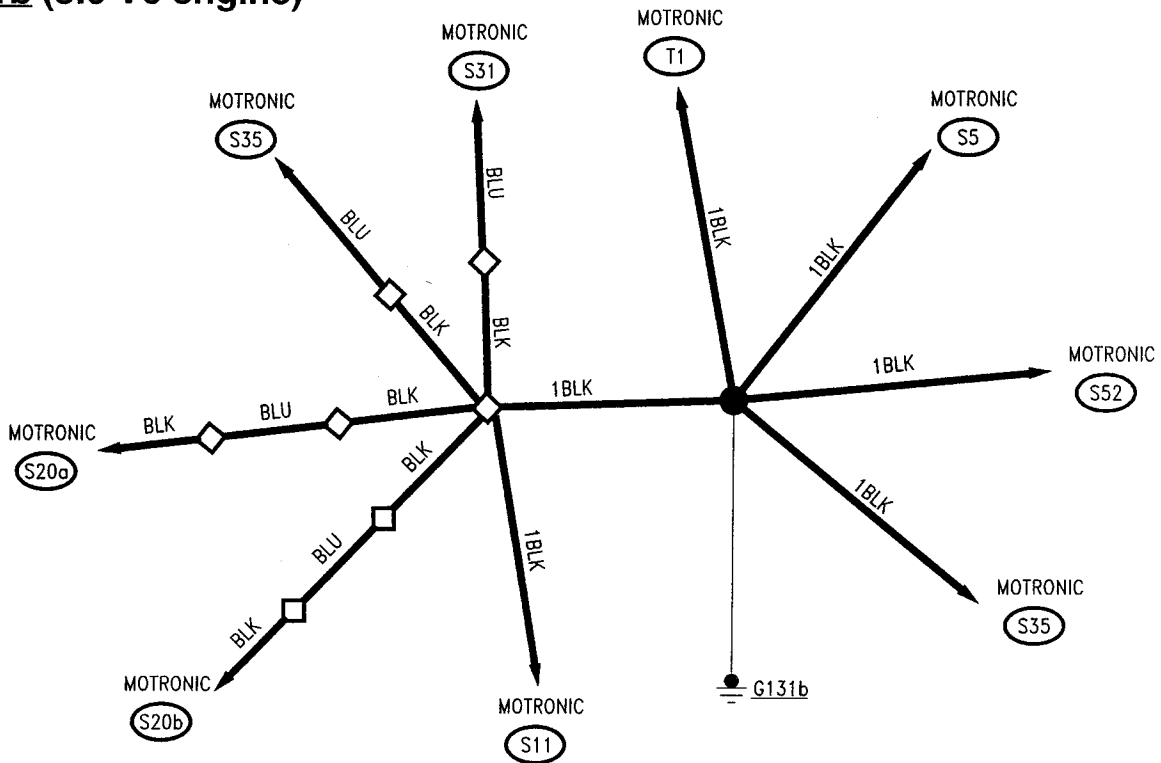
G92



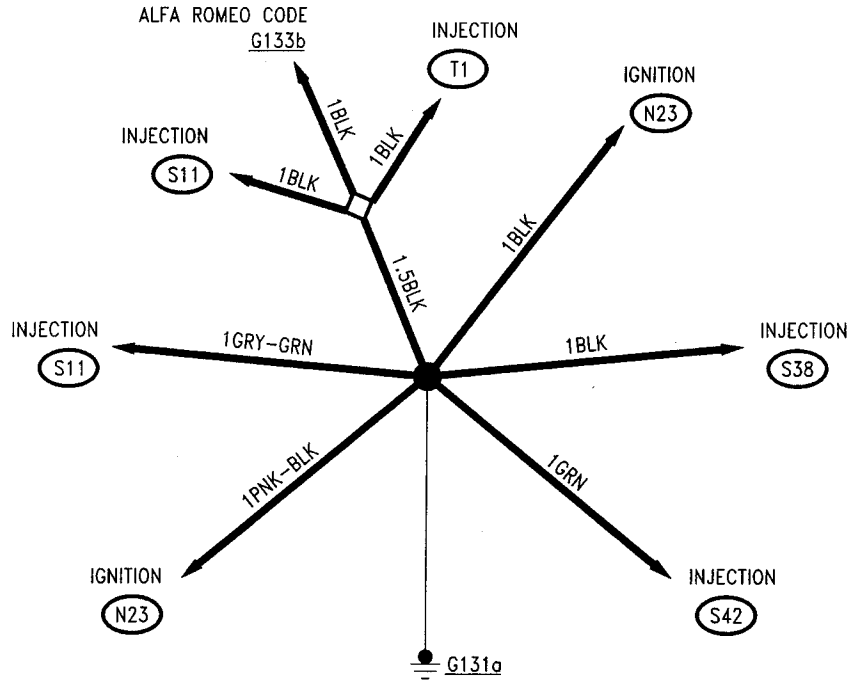
G131a (3.0 V6 engine)



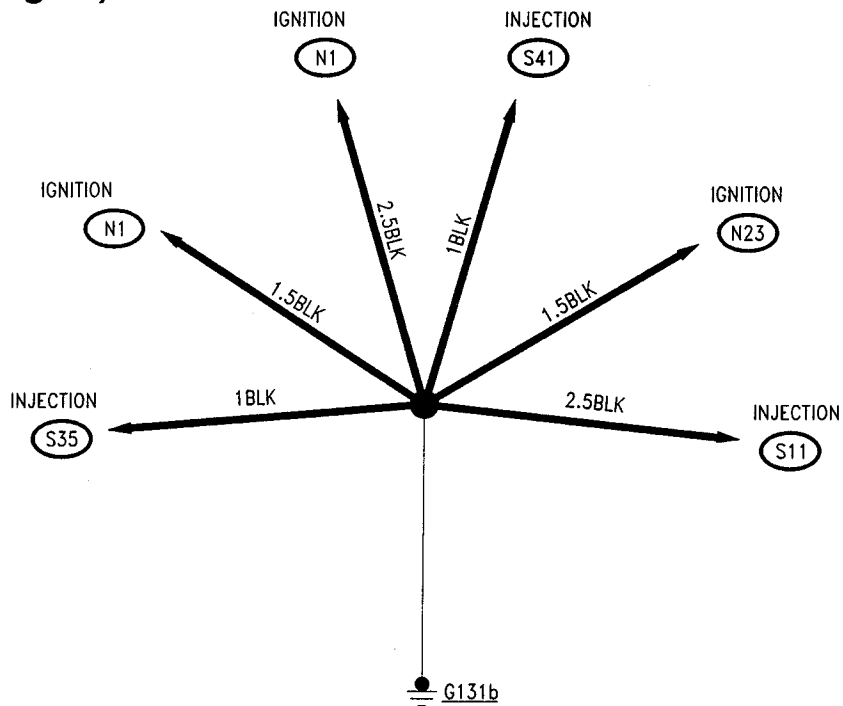
G131b (3.0 V6 engine)



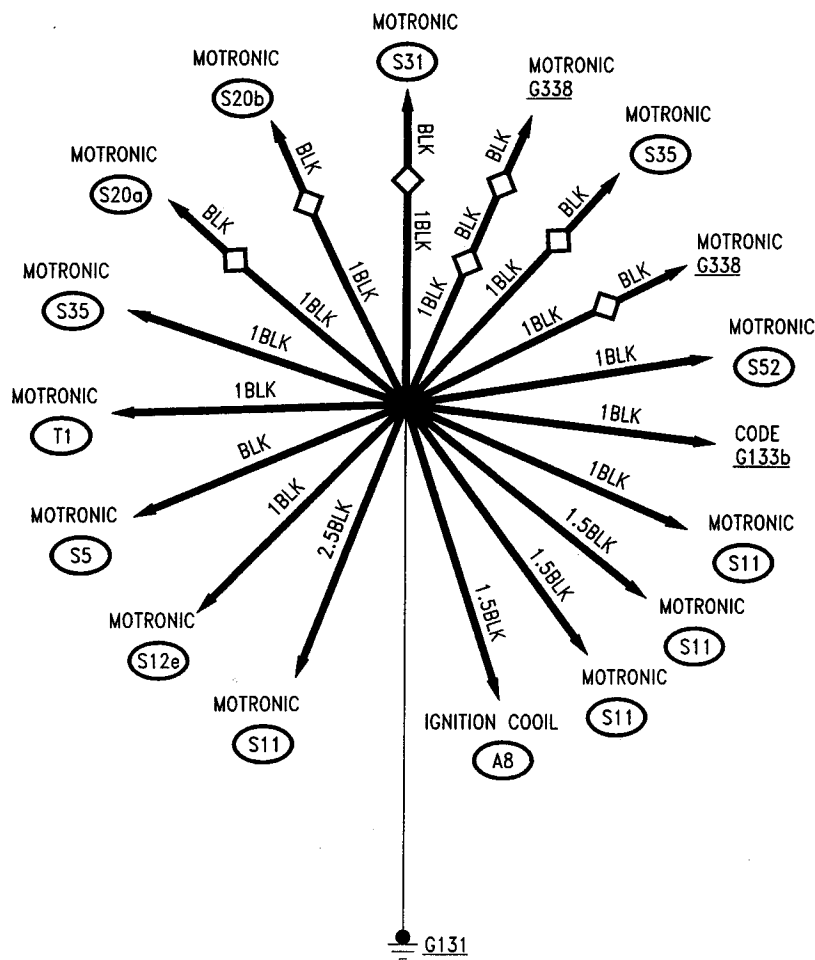
G131a (V6 TB engine)



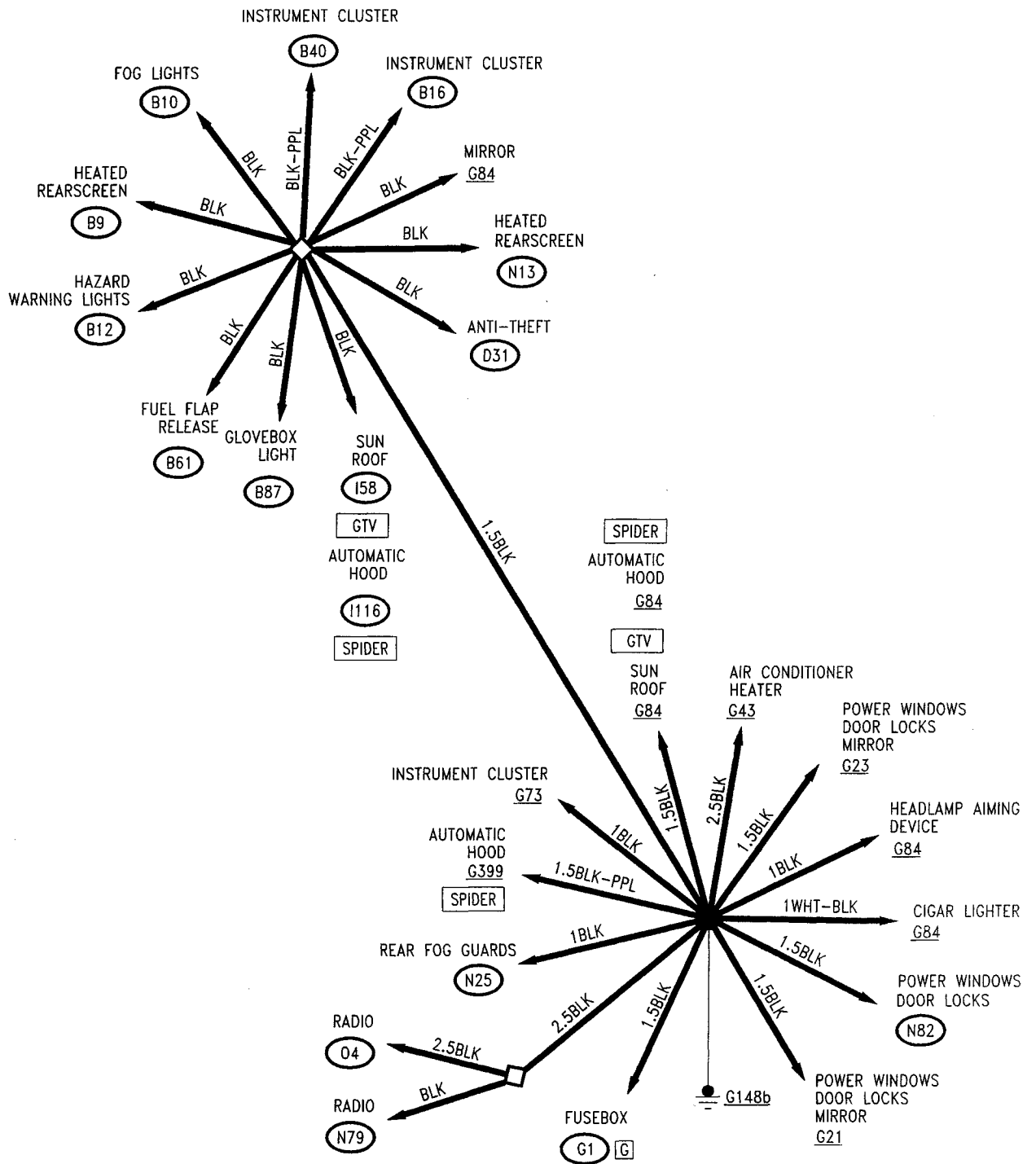
G131b (V6 TB engine)



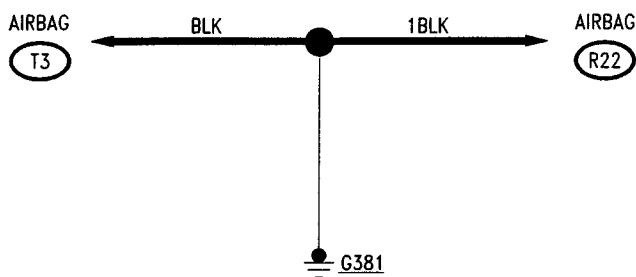
G131 (3.0 V6 24v)



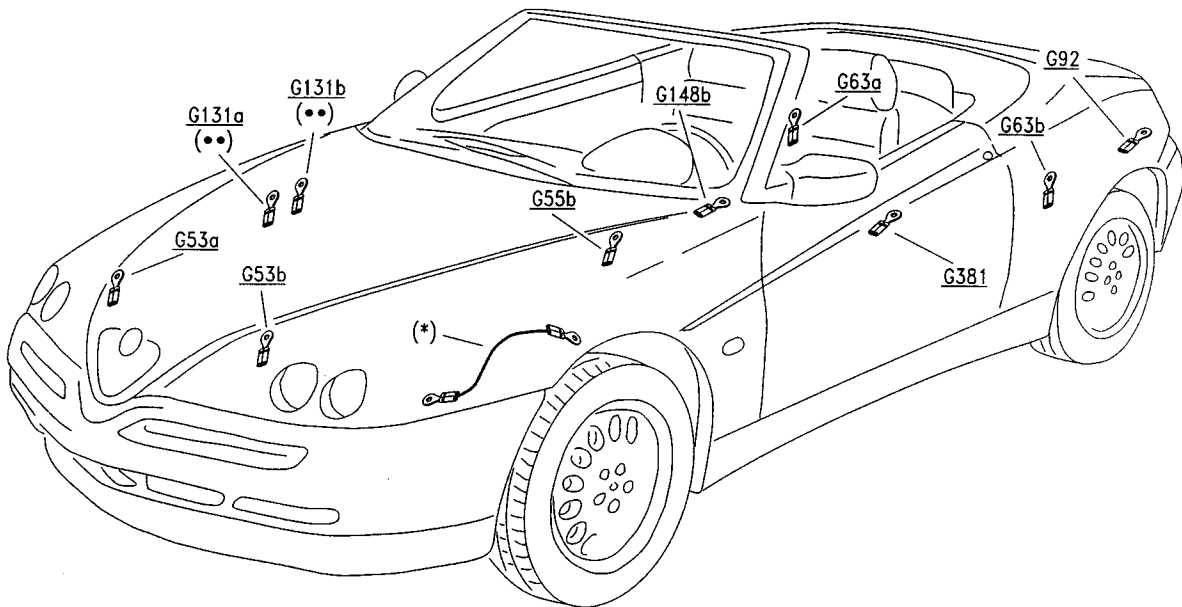
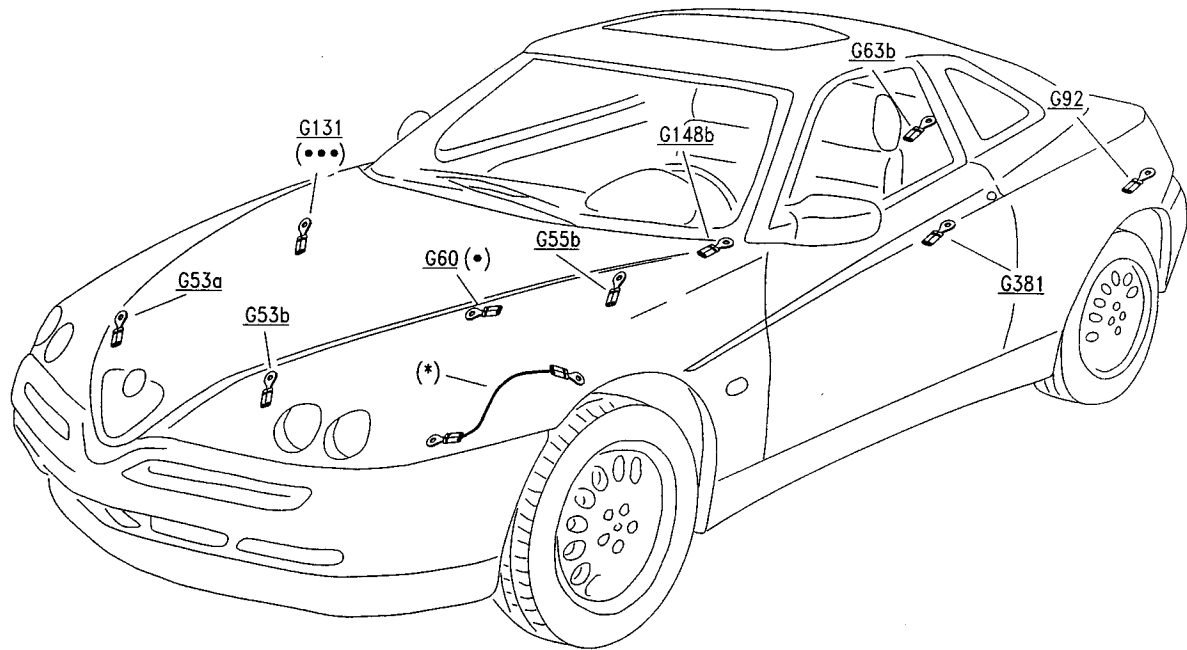
G148b



G381



LOCATION OF EARTHS ON THE CAR



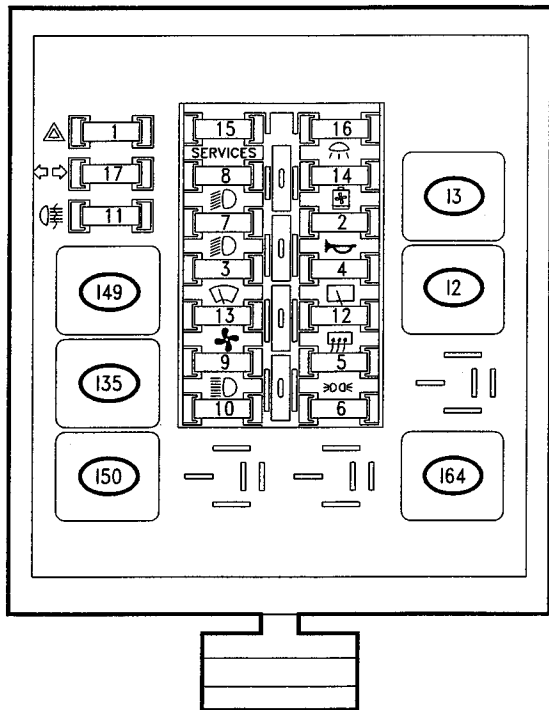
- (*) earth braid between gearbox and body
- (•) 2.0 TS 16v
- (••) 3.0 V6, V6 TB
- (•••) 3.0 V6 24v

FUSEBOX

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FUSEBOX

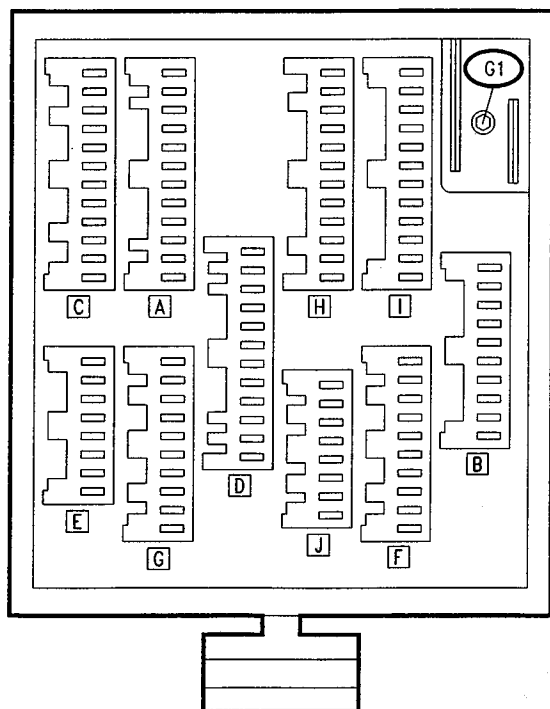


**LOCATION OF FUSES
AND RELAYS**

RELAYS

- I2** Heated rearscreen relay
- I3** Horns relay
- I35** Key-operated supply relay
- I49** Low beam headlamp relay
- I50** High beam headlamp relay
- I64** Side lights relay










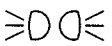
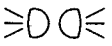




















FUSES (see following page)



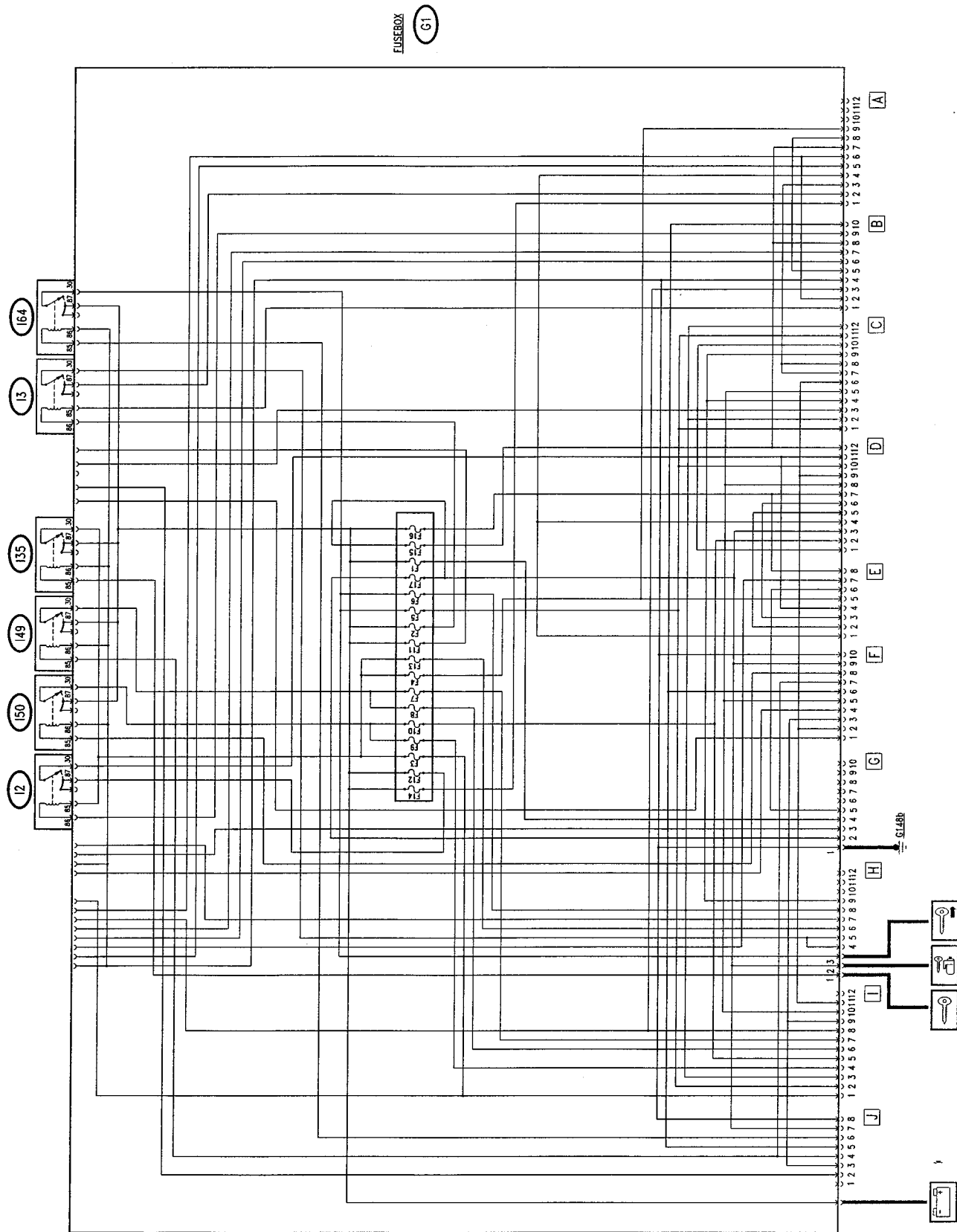
**REAR VIEW,
CONNECTOR SIDE**

- G1:**
fusebox supply
- Connectors A,I:**
Front wiring
- Connectors B,D,F,G,H:**
Dashboard wiring
- Connectors C,E:**
Rear wiring
- Connector J:**
provision bridge required by specific regulations (daylights, fog lights, etc..)

FUSES

FUSE			SUPPLY	PROTECTED SERVICES
SYMBOL	N0.	AMP.		
	1	10A		Hazard warning lights, ceiling lights, wing mirror adjustment
	2	20A		Horns, cigar lighter, braking lights, radio, ceiling lights
	3	20A	 (135)	Windscreen wiper
	4	20A	 (135)	Door lock/alarm remote control, ABS, power windows, steering column lever unit supply, engine fan, hood (SPIDER)
	5	10A	 (164)	Instr. cluster lighting, Controls lighting, LH rear side light, RH no. plate light, RH front sidelight, headlamp aiming device
	6	10A	 (164)	Controls lighting, RH rear side light, LH no. plate light, LH front side light, glove compartment light side lights warning light
	7	10A	 (149)	Right low beam headlight
	8	10A	 (149)	Left low beam headlight
	9	10A	 (150)	Right high beam headlight
	10	10A	 (150)	Left high beam, high beam warning light
	11	--		NOT USED
	12	30A		Heated rearscreen (GTV only), mirror defroster, rearscreen/defroster warning light
	13	20A	 (135)	Heater, fan
	14	--		NOT USED
SERVICES	15	10A		Power windows, door locking device, roof lights, rearscreen, reversing lights
	16	20A		Ceiling lights, instr. cluster, door remote lock control, electric aerial, fog lights
	17	7.5A		Direction indicators, alarm control unit, compressor control, engine fan

WIRING DIAGRAM



GENERAL DESCRIPTION

This section describes the complete printed circuit that makes the connections inside the FUSEBOX G1.

In the various diagrams referring to the individual systems and circuits only the lines associated with the case under examination are shown: this chart gives a complete, overall view of the entire fusebox G1.

The fusebox houses a number of relays and other devices, shown here with the corresponding codes, and the fuses (F1,....., F24).

NOTE: not all the output pins of the box G1 are actually connected for all versions of the car: some lines therefore may be found to be redundant though they will be present on the printed circuit.

Next to the schematic drawings of the connectors a **list of output signals** from the different pins is given: this simplifies for instance faultfinding work on the different circuits affected. (NOTE: the letters N.C. indicate pins connected inside the fusebox but not used for the present versions of the car).

SUPPLY TO FUSEBOX		
PIN	CIRCUITS	
-	Fusebox supply from terminal board	
-	Direct supply for ignition switch, engine cooling fan, heater/conditioner fan, alarm control unit	
-	Supply for power windows, door locking device, rearscreen, roof lights, sun roof (Gtv), automatic hood (Spider)	

(*) 3.0 V6 24v only

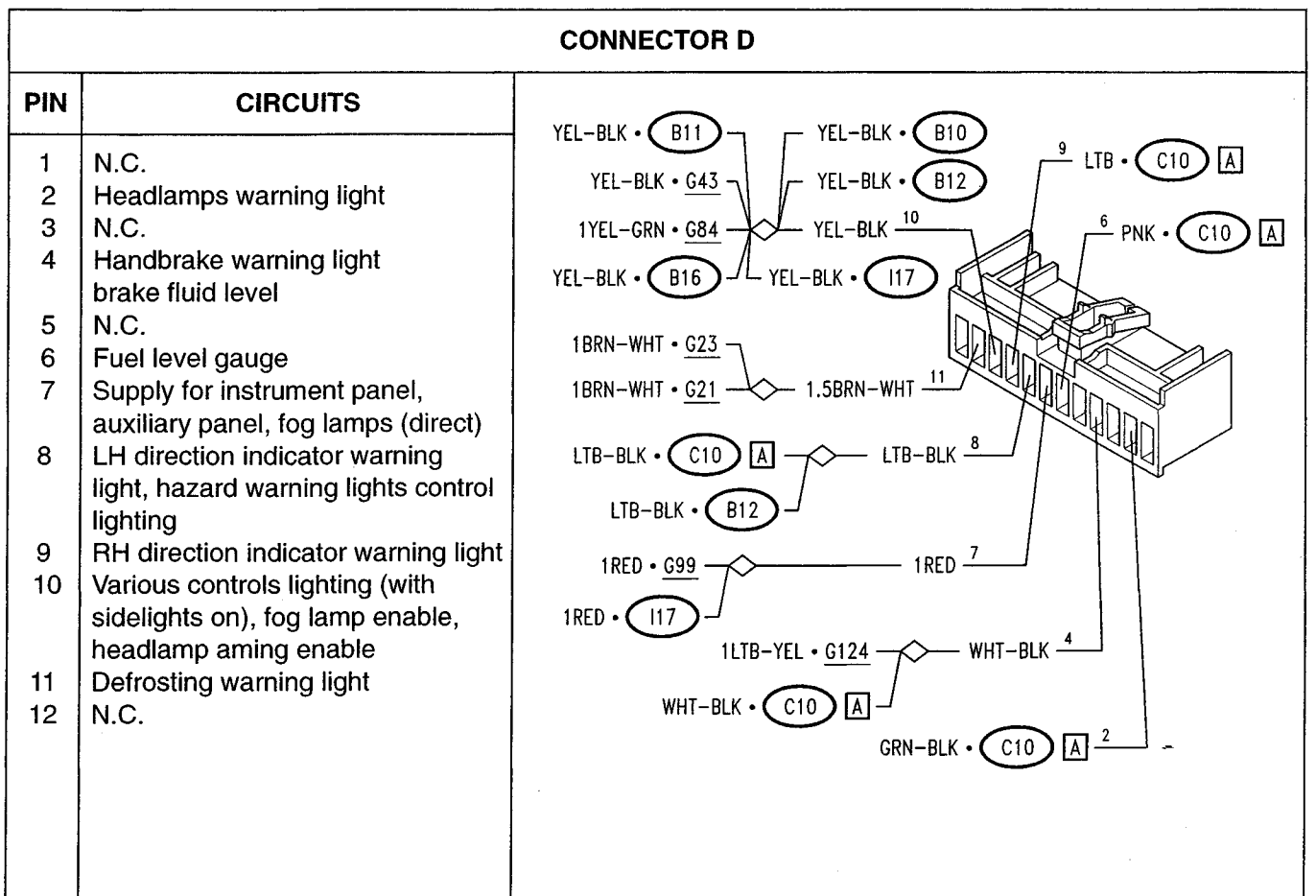
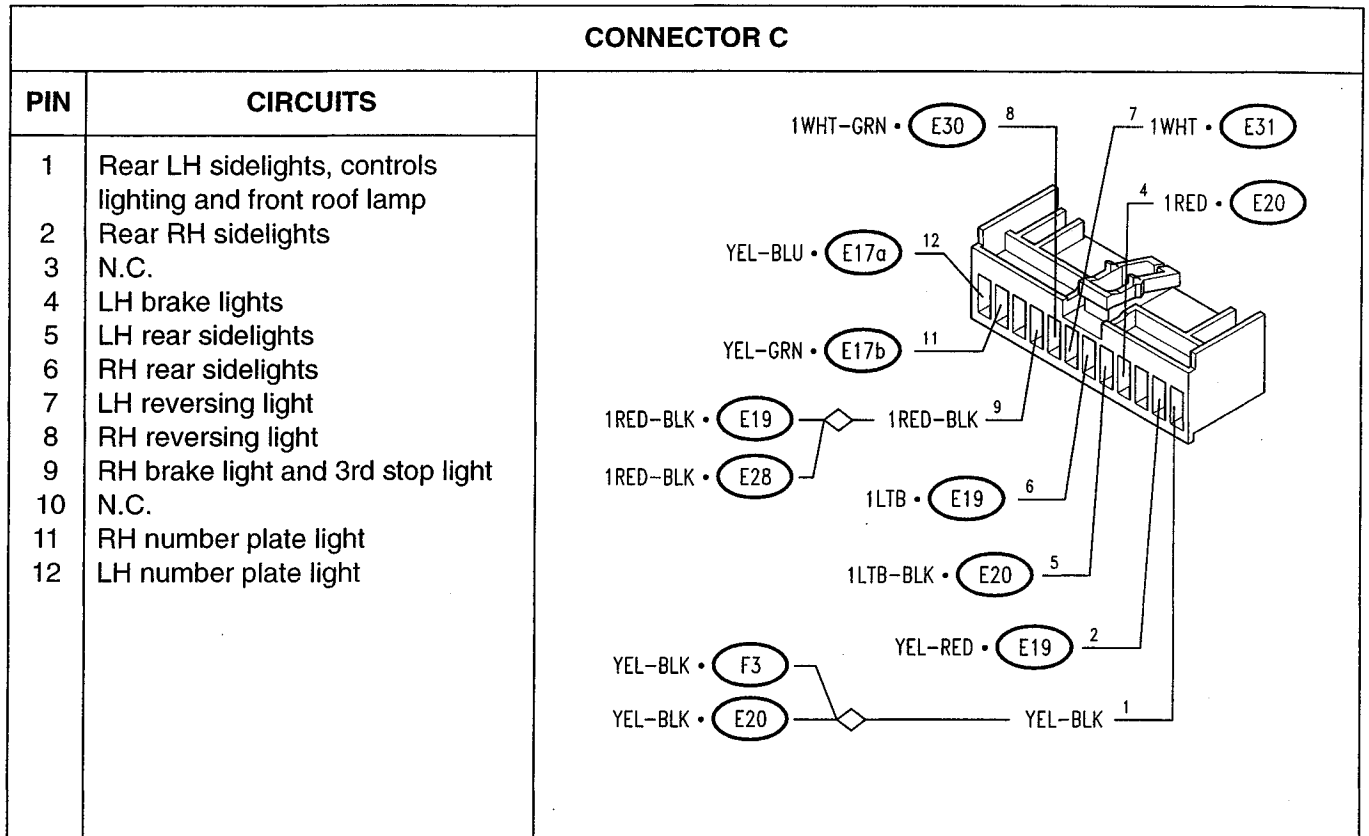
(**) 2.0 TS 16v only

CONNECTOR A		
PIN	CIRCUITS	
1	N.C.	<p>1LTB-RED • I99</p> <p>1LTB-RED • I100</p> <p>1.5RED 9</p> <p>9 1RED • I99a (**)</p> <p>7 1LTB-RED • G133a (*)</p> <p>1LTB-RED • H2</p> <p>1.5LTB-RED 7</p> <p>WHT-BLK • H17 4</p> <p>(*) 1WHT • G133a 3</p> <p>1WHT • H2 3</p> <p>1PPL • O2b</p> <p>1PPL • O2a</p> <p>1PPL 2</p>
2	Horns	
3	Reversing lights	
4	Brake fluid level sensor	
5	N.C.	
6	N.C.	
7	Supply for reversing lights, (key-operated)	
8	N.C.	
9	Supply for engine cooling fan relay (key-operated)	
10	N.C.	
11	N.C.	
12	N.C.	

(*) 3.0 V6 24v

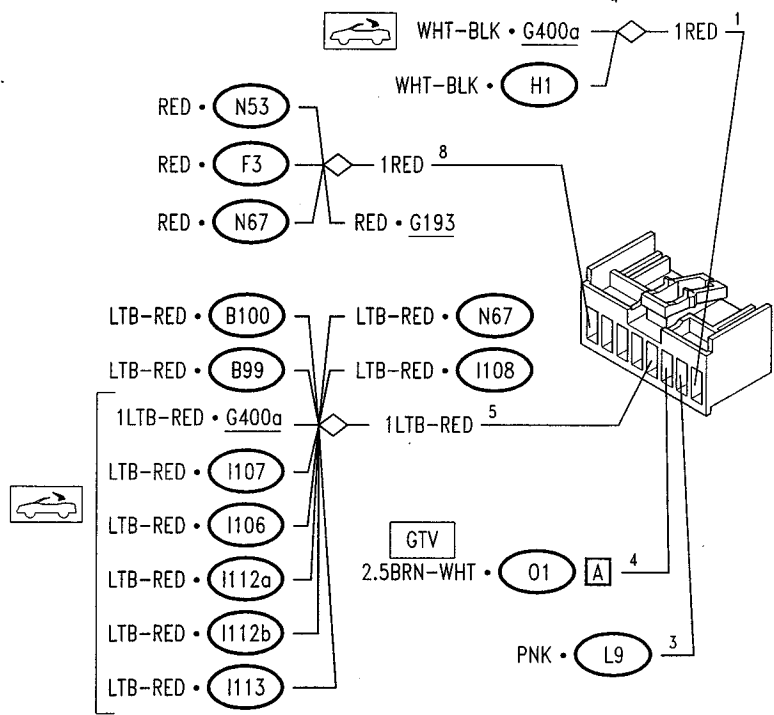
(**) 2.0 V6 and 2.0 V6 TB cond.

CONNECTOR B		
PIN	CIRCUITS	
1	Horns control	<p>BRN-BLK • N82 [B] 9</p> <p>LTB-RED • N82 [B] 8</p> <p>BLU-WHT • B68 [C] 1</p>
2	N.C.	
3	N.C.	
4	N.C.	
5	N.C.	
6	N.C.	
7	N.C.	
8	Supply for power windows, door locking device, rearscreen, roof lights (key-operated)	
9	Rearscreen heating/door mirror defrosting control	
10	N.C.	



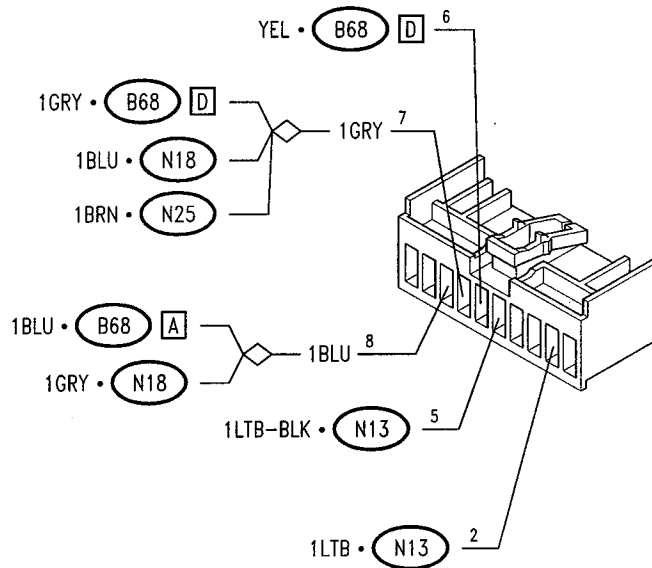
CONNECTOR E

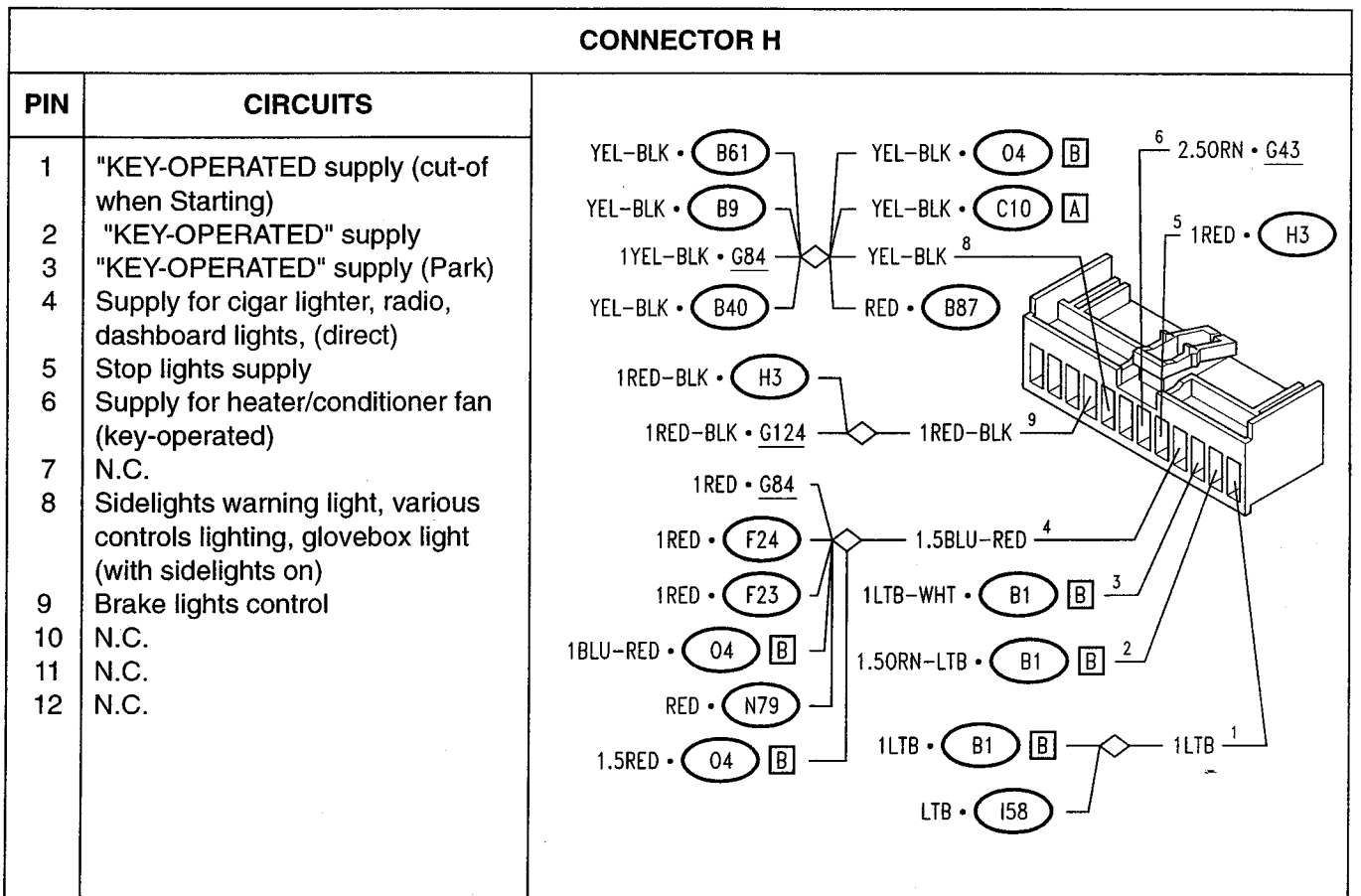
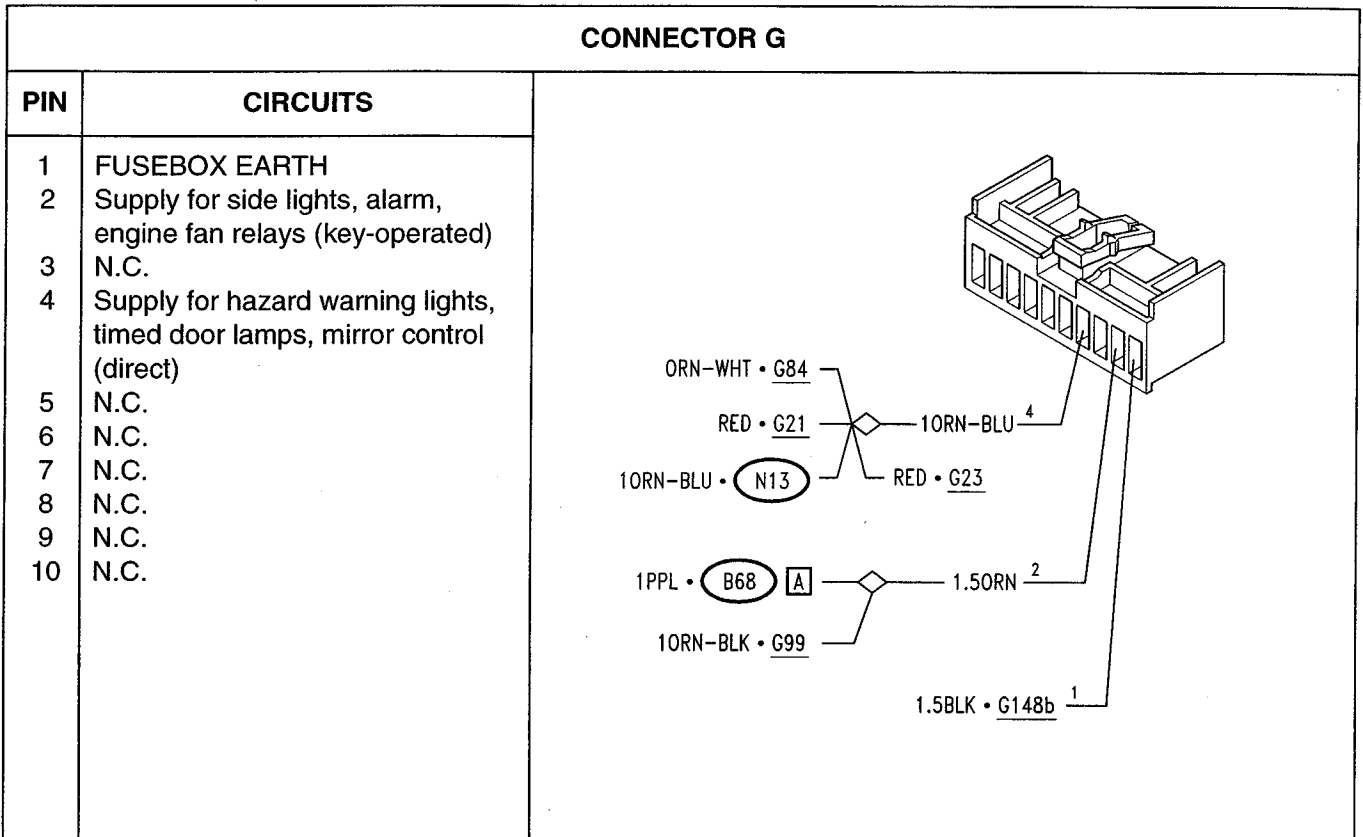
PIN	CIRCUITS
1	Handbrake switch
2	N.C.
3	Fuel level sender
4	Heated rearscreen
5	Supply for power windows, ABS, door lock, steering column lever unit, hood release, automatic hood control unit and relays (SPIDER) (key-operated)
6	N.C.
7	N.C.
8	Supply for front roof lamp, electric aerial, door lock remote control (direct)



CONNECTOR F

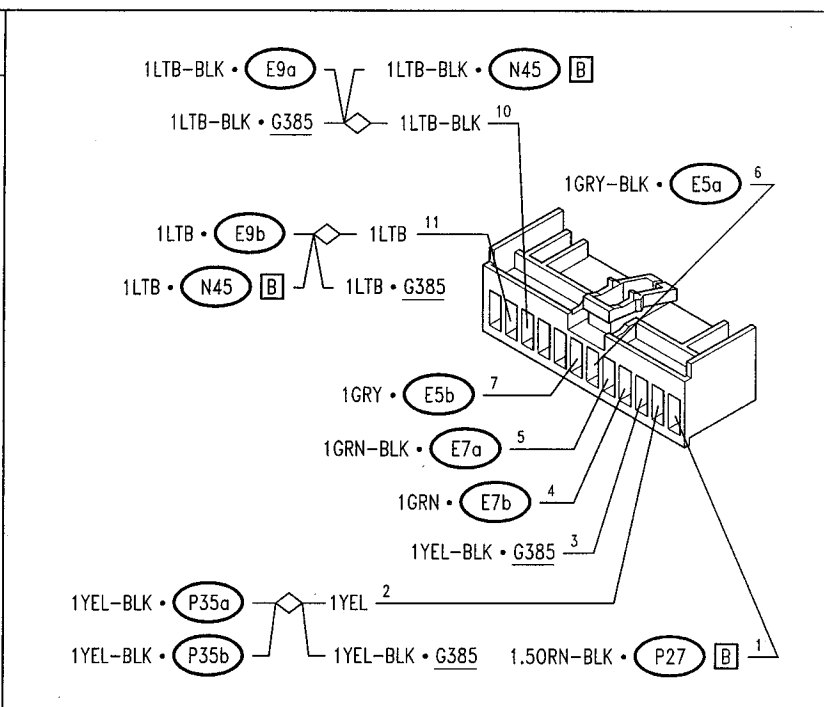
PIN	CIRCUITS
1	N.C.
2	RH direction indicator control
3	N.C.
4	N.C.
5	LH direction indicator control
6	Sidelights control
7	Low beam control
8	High beam control
9	N.C.
10	N.C.





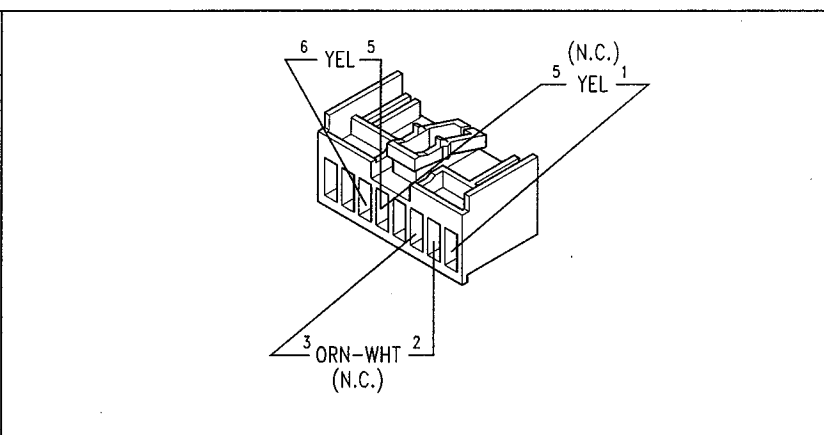
CONNECTOR I

PIN	CIRCUITS
1	Windscreen wiper supply
2	RH front sidelight, headlamp aiming device
3	LH front sidelight
4	RH high beam
5	LH high beam
6	LH low beam
7	RH low beam
8	N.C.
9	N.C.
10	LH front direction indicator
11	RH front direction indicator
12	N.C.



CONNECTOR J

PIN	CIRCUITS
1	(*)
2	(*)
3	(*)
4	N.C.
5	Side lights control
6	Sidelights relay consent
7	N.C.
8	N.C.
(*) not used	

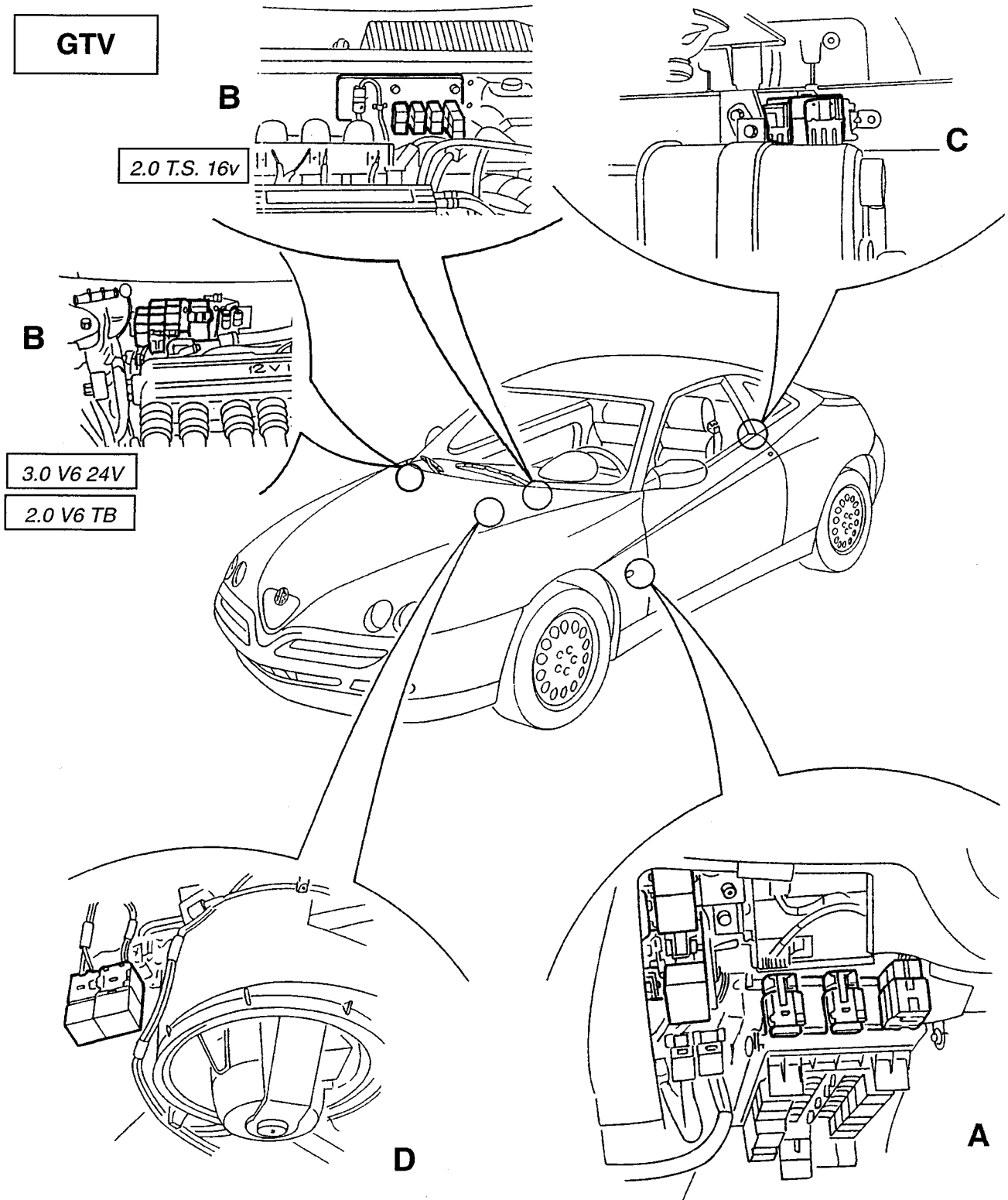


LOCATION OF FUSES AND RELAYS

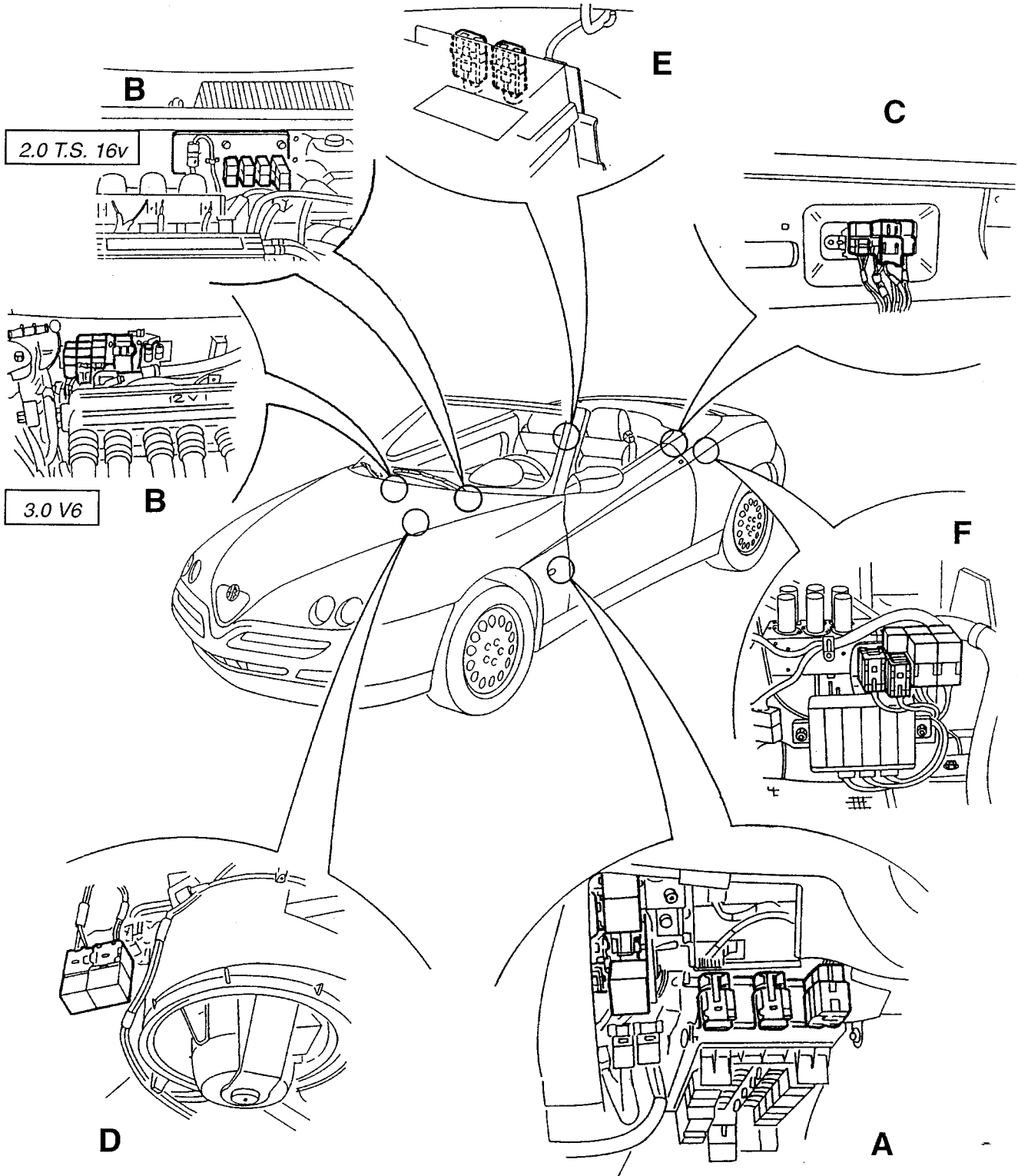
This section shows the locations in the car of all the fuses and switches that are not to be found in the fusebox.

The fuses and relays are distinguished by the colour of the base (fuse holder or relay carrier) which connects them to the wiring harness, as described later.

In addition to the colour of the base, it is always wise to check the exact location of a relay or fuse by the colour of the wires that converge on it (for these - see the wiring diagram concerned).



Spider



FUSES AND RELAYS ON AUXILIARY BRACKET (see fig. position A)

A set of fuses and relays is positioned on an auxiliary bracket (not removable) on the left-hand side of the main fusebox; next to this there is also the integrated services control unit **N82**, the electronic key control unit **N77** and the electronic windscreen wiper device **N14**.

COMPONENT	AMP.	SYMBOL	COLOUR OF BASE
Fog lamp relay	20A	I17	Green
Hazard warning light & direction indicator intermittent device	-	N13	Black
Rear fog guard device	-	N25	White
Engine cooling fan 2nd speed relay	50A	I100	Black
Engine cooling fan 1st speed relay	30A	I99/I99a	Yellow
Sunroof relay (*)	30A	I58 (*)	Red (*)
Automatic hood control relay (***)	30A	I116 (***)	Red (***)
ABS fuse	10A	G125a	Red
Power window fuse, door locking device	25A	G312a	White
Power window fuse, door locking device	25A	G312b	White
RH power window fuse	25A	G310	White
Sunroof fuse (*)	30A	G261 (*)	Green
Fuse for automatic hood switch (***)	30A	G404 (***)	Green
Climate control fan fuse	30A	G255	Green
Air conditioner system fuse (•)	30A	Q39	Green
Rear fog guard fuse	7.5A	G391	Brown
ALFA ROMEO CODE control unit fuse	10A	G389	Red
Engine fan delay device (•)	-	Q42	White

(*) GTV only

(•) 3.0 V6 24v only

(***) Spider with automatic hood

FUSES AND RELAYS IN ENGINE COMPARTMENT (see fig. position B)

A set of fuses and relays is located in the engine compartment on the services container wall.

COMPONENT	AMP.	SYMBOL	COLOUR OF BASE
Engine fan fuse	50A	G254	Black
Air conditioner wander fuse (•)	30A	Q39	Green
3.0 V6 Engine			
Main relay	30A	S41	Grey
Secondary relay	30A	S42	Black
Air flow meter relay	30A	S12e	Black
Motronic supply fuse	7.5A	S46	Brown
Fuel pump fuse	10A	S47	Red
2.0 16v T.S. Engine			
Main relay	30A	S41	Black
Phase variator relay	30A	S12c	Black
Motronic supply fuse	15A	S46	Black
Compressor electromagnetic coupling relay	20A	Q22	Grey
Compressor auxiliary relay	20A	Q32	Grey
2.0 V6 TB Engine			
Main relay	30A	S41	Grey
Secondary relay	30A	S42	Black
Fuel pump fuse	15A	S47	Blue

(continue)

(•) only for certain cars

(Continue)

COMPONENT	AMP.	SYMBOL	COLOUR OF BASE
3.0 V6 24V Engine			
Main relay	30A	S41	Grey
Air flow meter relay	30A	S12e	Black
Fuel pump fuse	15A	S47	Blue
Control unit supply fuse	7.5A	S46	Purple
Compressor control relay	20A	Q22	Grey
Compressor auxiliary relay	20A	Q32	Grey

FUSES AND RELAYS ON REAR BRACKET (see fig. position C)

A set of fuses and relays is located in the luggage compartment on a special bracket.

COMPONENT	AMP.	SYMBOL	COLOUR OF BASE
Hood release relay (*)	20A	I106	Black
Hood cover release relay (*)	20A	I107a	Red
Hood cover release relay (*)	20A	I107b	Black
Luggage compartment opening relay	20A	I52	Green
Fuel flap opening relay	20A	I53	White
key-operated supply cut-off relay	20A	I108	Blue
Fuel pump relay	30A	S12a	Black
Hood cover release timer (*)	27A	N80	Black
Services supply fuse	50A	G384	Black
ABS supply wander fuse (**)	60A	G125b	Black
Injection wander fuse (**)	40A	S36	Black
Hood release relay (***)	20A	I106	Red
Hood cover release relay (***)	20A	I107	Brown
RH hood closing relay (***)	20A	I112a	Red
LH hood closing relay (***)	20A	I112b	Red
Hood cover closing relay (***)	20A	I113	Brown
Automatic hood emergency relay (***)	20A	I106b	Grey
Automatic hood electric pump relay (***)	20A	I117	Black
Hood control unit fuse (***)	7.5A	G402	Brown

- (*) Spider only
- (**) GTV only
- (***) Spider with automatic hood

RELAYS ON HEATER/AIR DISTRIBUTOR UNIT

(only versions with air conditioner) (see fig. position D)

COMPONENT	AMP.	SYMBOL	COLOUR OF BASE
Climate control solenoid valve relay	30A	Q15	Yellow
Climate control solenoid valve 1st speed relay	30A	Q69	Brown

FUSES ON BRACKET IN REAR TRAY (Spider only) (see fig. position E)

In the Spider two wander fuses are to be found near the battery, in the rear tray.

COMPONENT	AMP.	SYMBOL	COLOUR OF BASE
ABS supply wander fuse	60A	G125b	Black
Injection wander fuse	40A	S36	Black
Automatic hood system fuse (***)	40 A	G401	Black
Hood relays supply fuse (***)	40 A	G403	Black

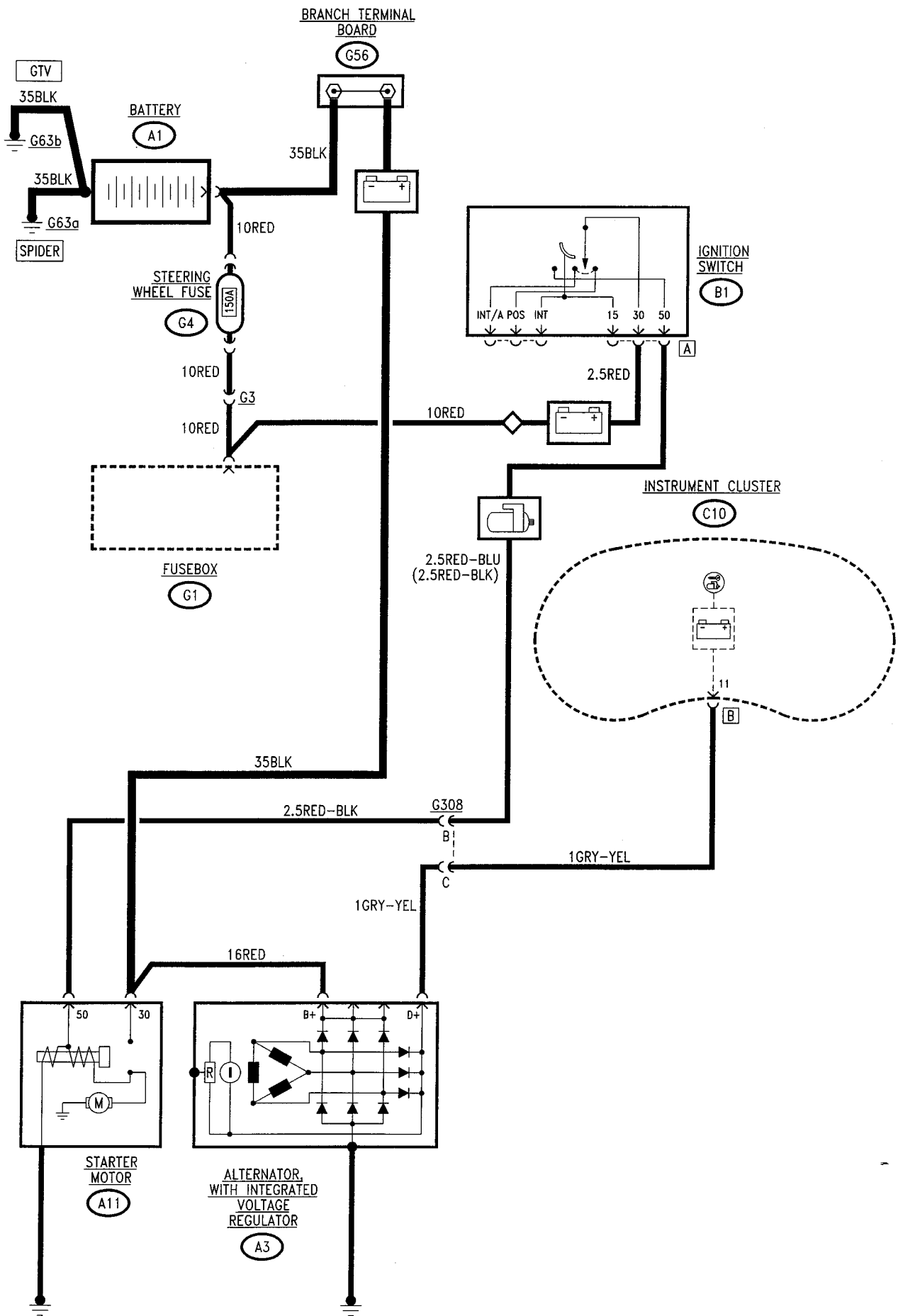
(***) Spider with automatic hood

STARTING AND CHARGING

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FUNCTIONAL DESCRIPTION	4-3
LOCATION OF COMPONENTS	4-4
FAULT-FINDING TABLE	4-5
CHECKING COMPONENTS	4-5

WIRING DIAGRAM



GENERAL DESCRIPTION

The starting and charging circuit comprises the battery, starter motor and the alternator.

The **battery** (12V) is sealed and maintenance-free.

The **starter motor** comprises a direct current motor supplied by the battery and a control and engagement solenoid.

By turning the ignition key, the voltage leading from the battery supplies the windings of the motor, generating the electromagnetic forces which turn the pinion of the motor itself: simultaneously, the solenoid is energized which operates the mechanism engaging the pinion in the flywheel ring gear, thereby setting the crankshaft into rotation.

The **alternator** recharges the battery during the normal rotation of the engine: the alternator shaft (rotor) turned directly by the crankshaft through a belt is supplied with the excitation current and generates a magnetic field which induces an alternate current on the fixed winding (stator); this is transformed into direct current by a rectifier bridge with diodes and sent to recharge the battery.

A voltage regulator built into the alternator makes it possible to maintain a constant voltage supply (appr. 12 V) for all the fields of load changes and engine speed.

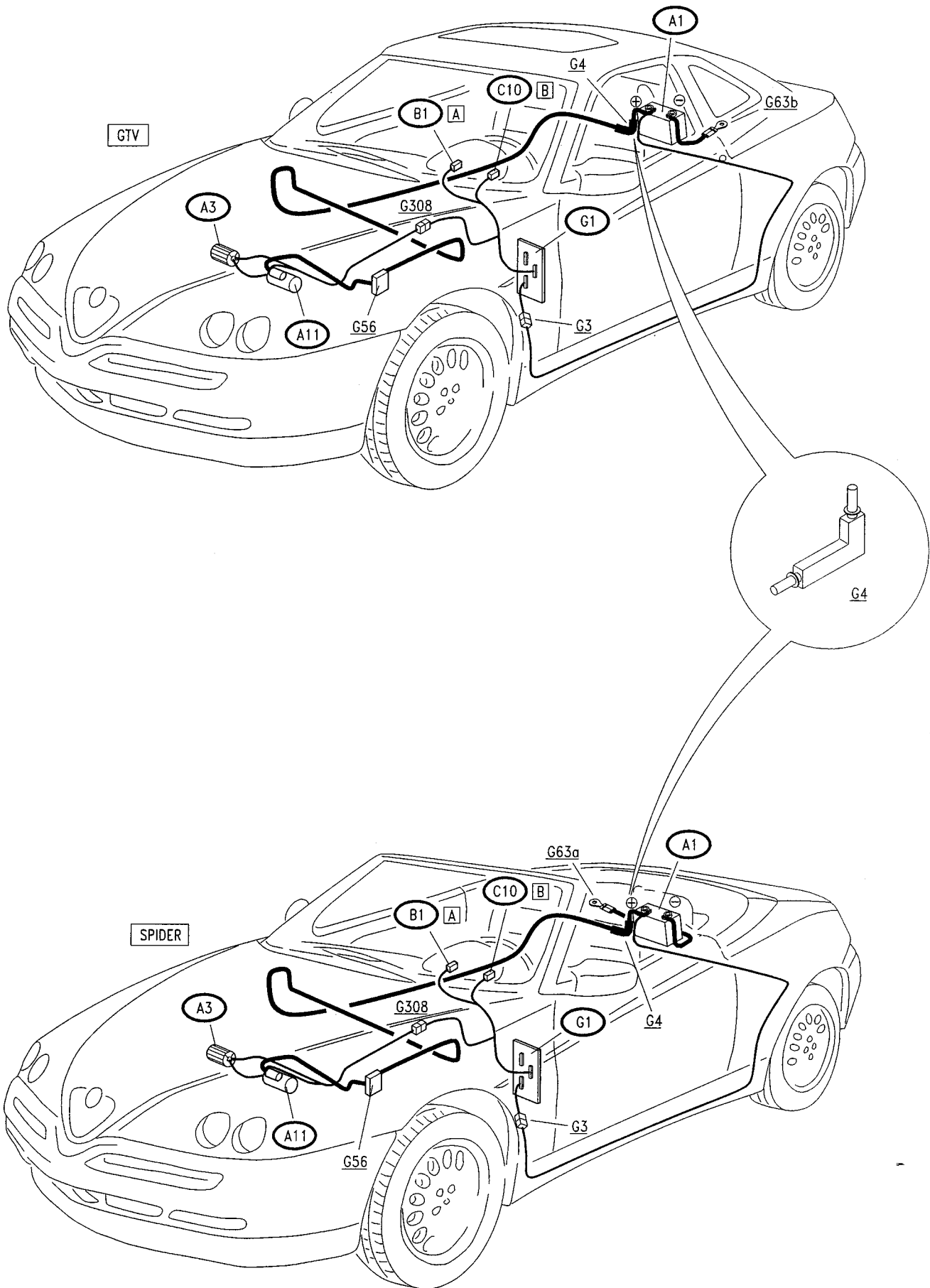
FUNCTIONAL DESCRIPTION

When the ignition key is turned in the ignition switch **B1** right round to the "STARTING" position, the windings of the solenoid (pin 50) of the starter motor **A11** are energized and the actual motor is supplied (pin 30) with the voltage leading from the battery **A1** in this way cranking the engine.

When the engine is running, the direct current generated by the alternator **A3** (pin B+) is sent via the starter motor **A11** and the terminal block **G56**, to recharge the battery **A1**.

All the lines for supplying the various electric systems of the car branch from the terminal board **G56** and from the + post of the battery **A1** (see "Power Supply"). When the alternator is not turning and therefore not charging the battery, an earth signal is sent from pin D+ to the instrument cluster **C10** to turn on the corresponding warning light; once the engine has started this signal becomes 12 V and the warning light goes off.

LOCATION OF COMPONENTS



FAULT-FINDING TABLE

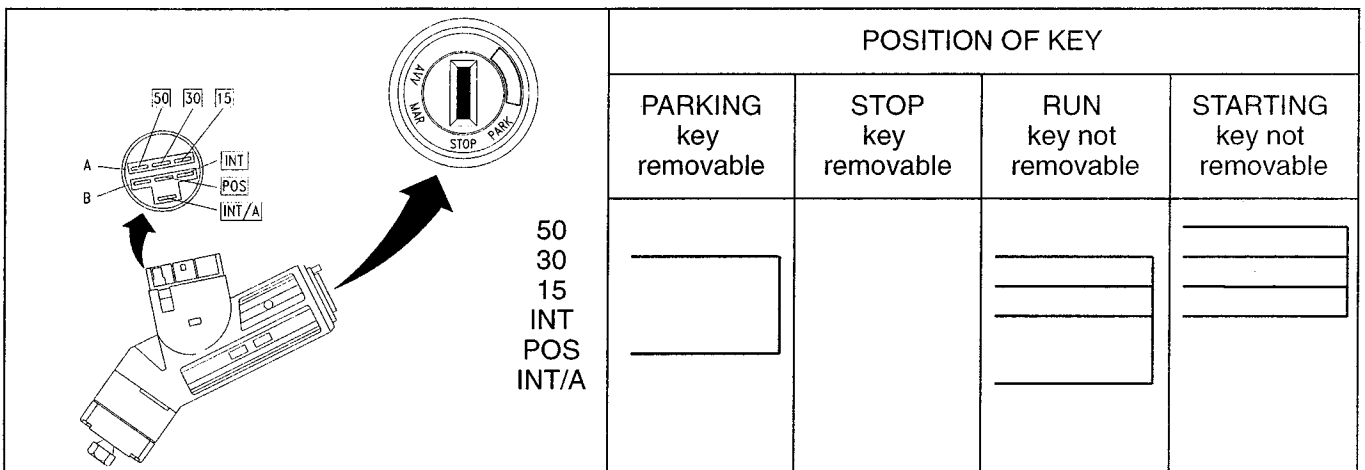
Fault	Component to be checked					
	A1	B1	A11	A3	G56	C10 (1)
Engine starting	•	•	•		•	
Engine recharging	•			•	•	
Charging warning light				•		•

(1) The instrument cluster C10 cannot be overhauled. Therefore in the event of a failure individual warning lights cannot be replaced and a new complete cluster must be fitted.

CHECKING COMPONENTS

Ignition switch (B1)

Check the internal connections as shown below:



Starter motor (A11)

If necessary, see the specifications and overhauling of the motor in the section "ELECTRIC SYSTEM-ENGINE STARTING"

Alternator (A3)

If necessary, see the specifications and overhauling of the alternator in the section "ELECTRIC SYSTEM-CURRENT GENERATION SYSTEM"

Battery (A1)

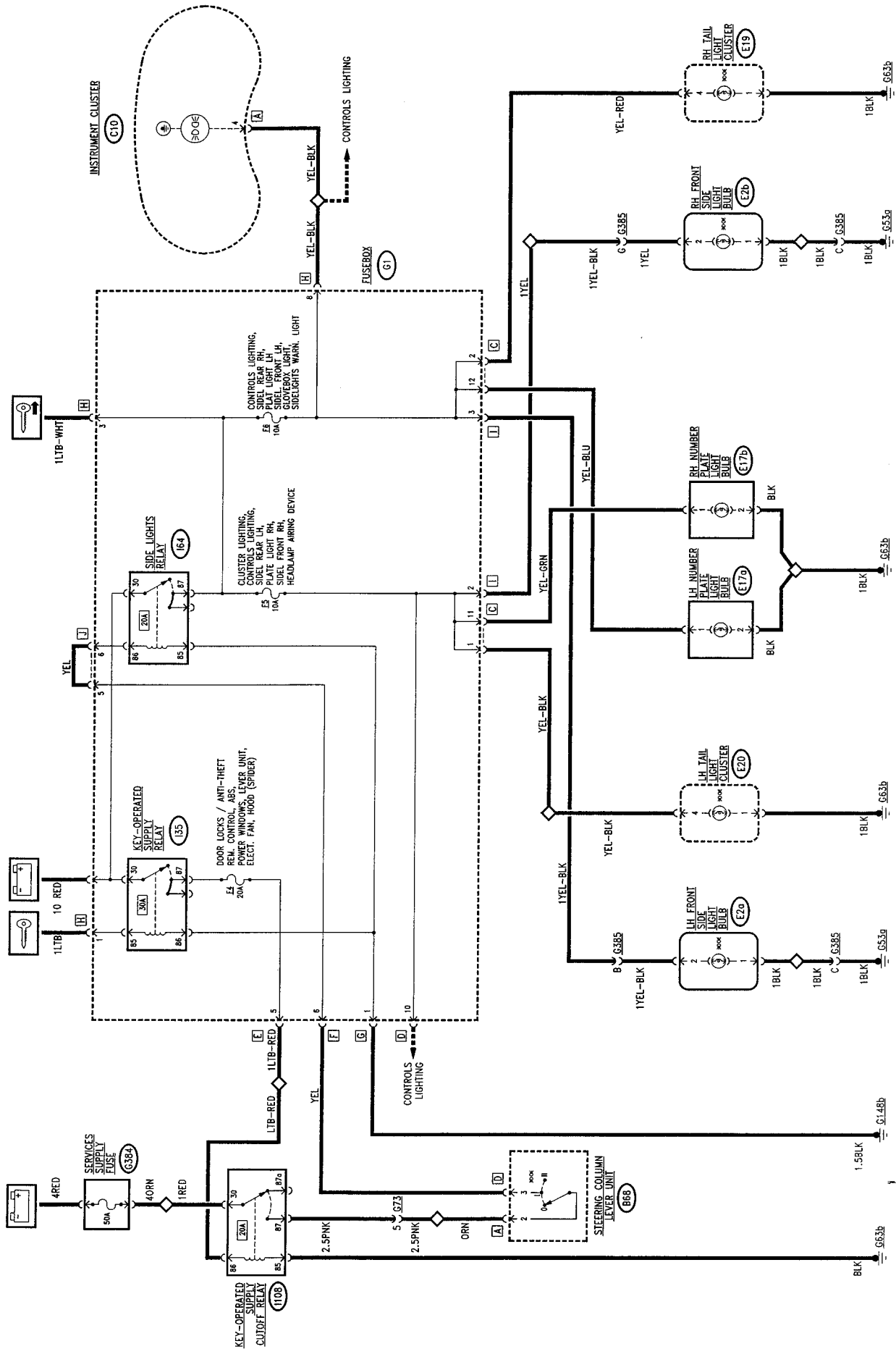
If necessary, see the battery specifications in the section "ELECTRIC SYSTEM-CURRENT GENERATION SYSTEM"

SIDE LIGHTS

INDEX

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FUNCTIONAL DESCRIPTION	5-3
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WIRING DIAGRAM



GENERAL DESCRIPTION

The side lights are turned on when the switch on the lever unit is turned to the first position and only when the ignition key is engaged: this prevents the battery from discharging if the lights are inadvertently left on when leaving the car.

N.B.: They can also be turned on by withdrawing the ignition key and turning it in the opposite direction holding down the special button: key in the "PARKING" position (see also "Power supply").

When the side lights are turned on, the number plate lights and numerous interior lights for lighting the passenger compartment, instruments and controls are also turned on with "consent" signals (eg. circuits which operate only with the sidelights on): for these functions see the wiring diagrams of the components concerned: eg. instrument cluster lighting: see "Instrument Cluster".

A warning light on the instrument panel indicates that the side lights are on.

For safety reasons the circuit is protected by two "crossed" fuses: one for the right front and left rear lights etc., the other for the left front and right rear lights, etc..

FUNCTIONAL DESCRIPTION

The side lights circuit is activated by the corresponding relay switch **I64** located in fusebox **G1**.

Moving the switch on the lever unit **B68** to position "I" when the ignition key is engaged the coil of relay switch **I64** is supplied thereby closing the circuit that supplies the side lights; this circuit is protected by two fuses in fusebox **G1**: **F5** for the right front and left rear lights, **F6** for the left front and right rear lights. In this way the front side lights **E2b** (right) and **E2a** (left), the rear lights **E19** (right) and **E20** (left) and the number plate lights **E17a** and **E17b** are supplied.

The line supplying fuse **F6** also sends a signal to the instrument cluster **C10** to turn on the corresponding warning light.

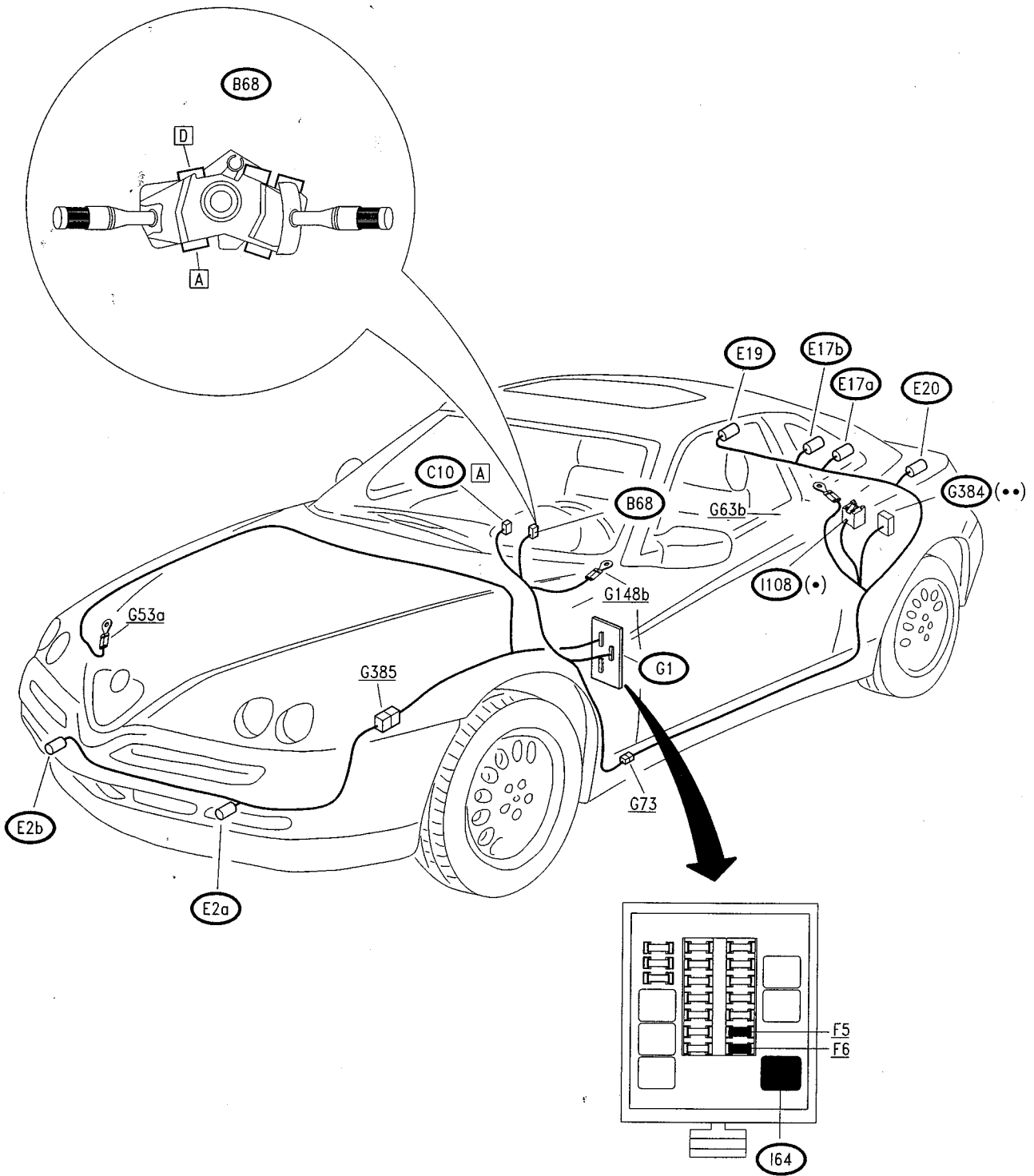
When the ignition key is at the "PARKING" position all the side lights are turned on as a direct supply is sent to fuses **F5** and **F6** in fusebox **G1**, "by-passing" relay switch **I64**.

FAULTFINDING TABLE

Failure	Component to be checked										
	F5	F6	E2b	E2a	E19	E20	E17a	E17b	I64	B68	C10 (1)
All the side lights									•	•	
Front right	•		•								
Front left		•		•							
Right rear		•			•						
Left rear	•					•					
Right number plate	•							•			
Left number plate		•					•				
Side lights warning light	•										•

(1) The instrument cluster **C10** cannot be repaired. Therefore, in the event of a failure it is not possible to change the single warning light and a new complete cluster must be fitted.

LOCATION OF COMPONENTS



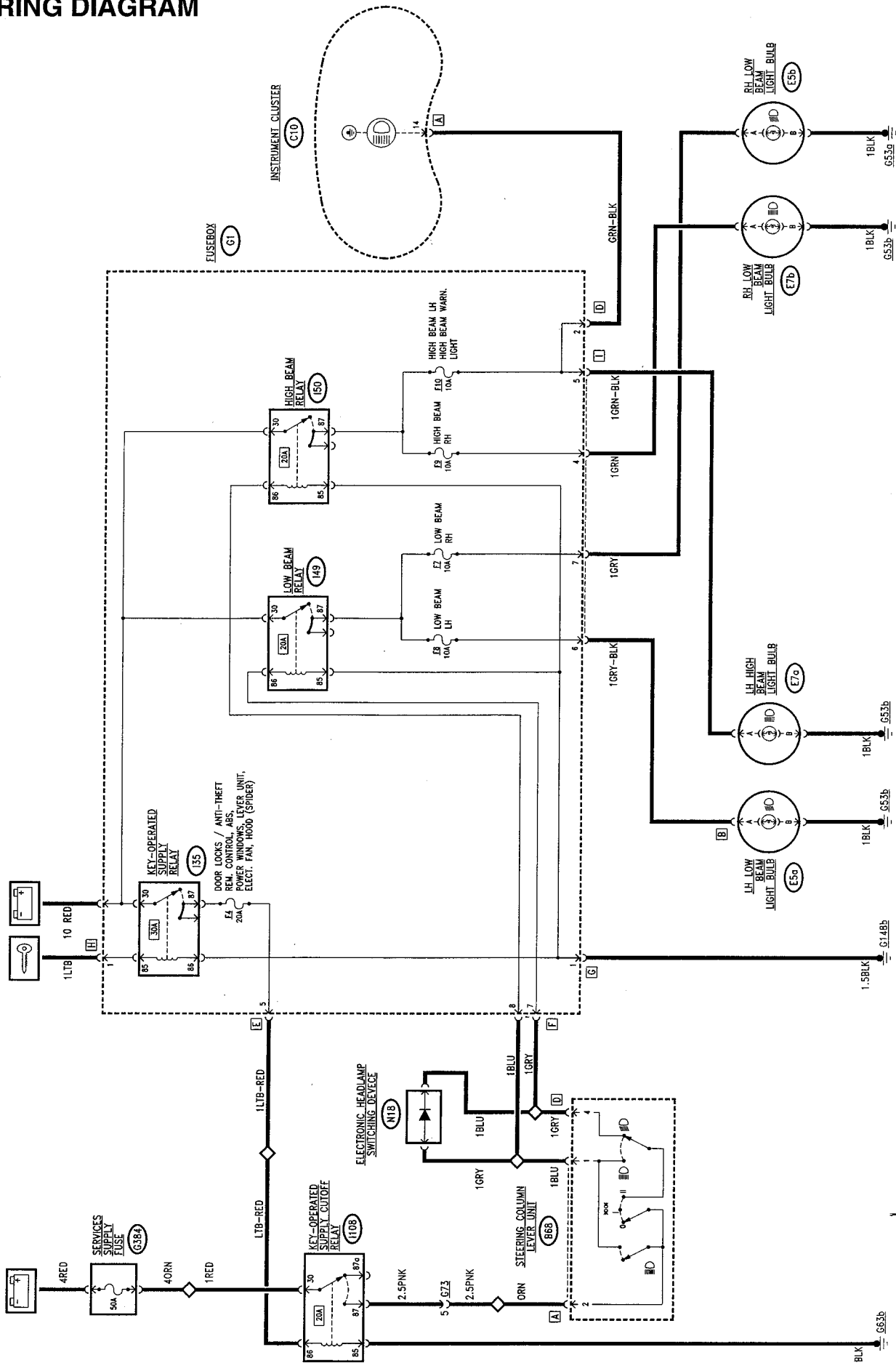
(•) Blue Base
(••) Black fuseholder

HIGH AND LOW BEAM HEADLAMPS

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FUNCTIONAL DESCRIPTION	6-3
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LOCATION OF COMPONENTS	6-5

WIRING DIAGRAM



GENERAL DESCRIPTION

The car is fitted with two separate lamps for the low beams and two for the high beams.

The low beams are turned on by the switch on the steering column lever unit one position on from the sidelights; from this position the high beam can be permanently selected operating the high/low beam switch; lightly pulling the lever towards the steering wheel activates the high beam "flashing" function for as long as the lever is pulled.


A warning light on the dashboard indicates when the high beams are on.

For safety reasons each single high and low beam lamp is protected by a fuse.

NOTE: some versions are equipped with an electrically-operated headlamp aiming device (see "Headlamp aiming device"); however a manual device enables quick and simple adjustment of the beam to the loading conditions of the vehicle.


FUNCTIONAL DESCRIPTION

The circuit of the low beam headlamps is operated by relay switch **I49** located in fusebox **G1**.

Moving the lever unit switch **B68** to position II  and with the switch in the low beam position the coil of relay switch **I49** is "turn key" supplied thereby closing the circuit supplying the left headlamp **E5a** and the right headlamp **E5b**.

Each circuit is protected by a fuse in fusebox **G1**: **F7** for the right headlamp and **F8** for the left one.

The high beam circuit is operated by relay switch **I50** located in fuse box **G1**.

Moving the switch to the high beam position  with the lever unit switch **B68** on position II, or closing the "flashing" contact, the coil of relay switch **I50** is "turn key" supplied thereby closing the circuit that supplies the left headlamp **E7a** and the right one **E7b**. Each circuit is protected by a fuse in fusebox **G1**: **F9** for the right headlamp and **F10** for the left one.

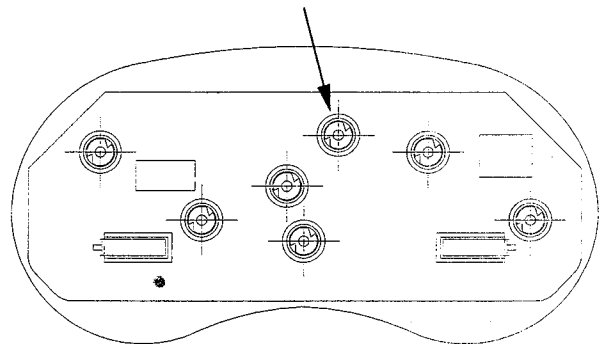
The left high beam headlamp supply line also sends a signal to the instrument panel **C10** to turn on the high beam on warning light.

As the arrangement of the internal contacts of the steering column lever switch **B68** does not maintain the supply to the low beam lights when the high beams are switched on a suitable diode **N18** has been added which supplies the low beam lamps when the high beam lamps are on.

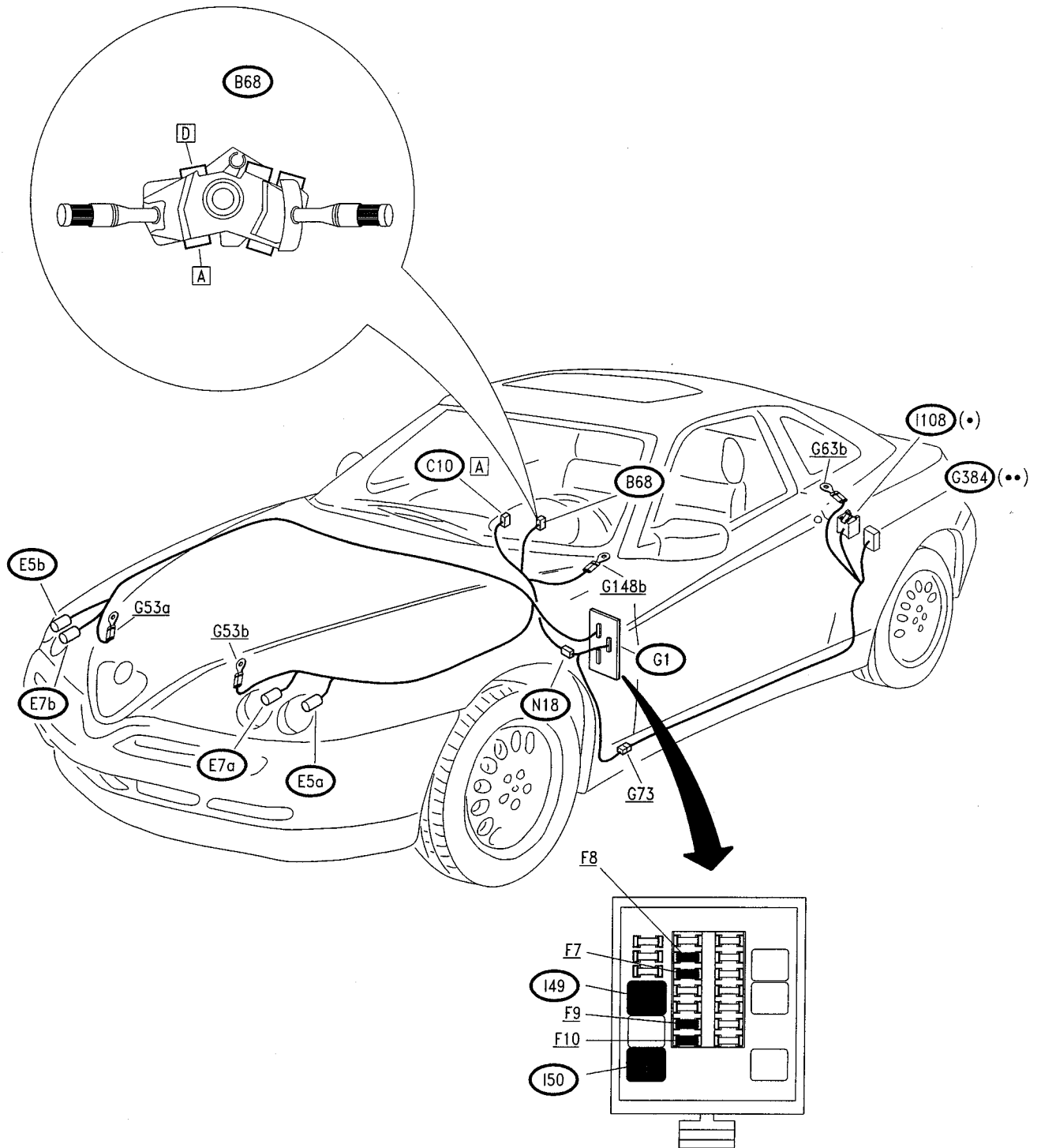
FAULTFINDING TABLE

Failure	Component to be checked												
	F7	F8	F9	F10	(E5b)	(E5a)	(E7b)	(E7s)	(I49)	(I50)	(B68)	(C10) (1)	(N18)
Both low beam lamps									•		•		
RH low beam lamp	•				•								
LH low beam lamp		•				•							
Both high beam lamps										•	•		
RH high beam lamp			•				•						
LH high beam lamp				•			•						
High beam warning light				•								•	
Low beam lamps turn off when high beams are turned on													•

(1) **WARNING:**
The high beam warning light of the instrument cluster C10, shown by the arrow, can be replaced



LOCATION OF COMPONENTS



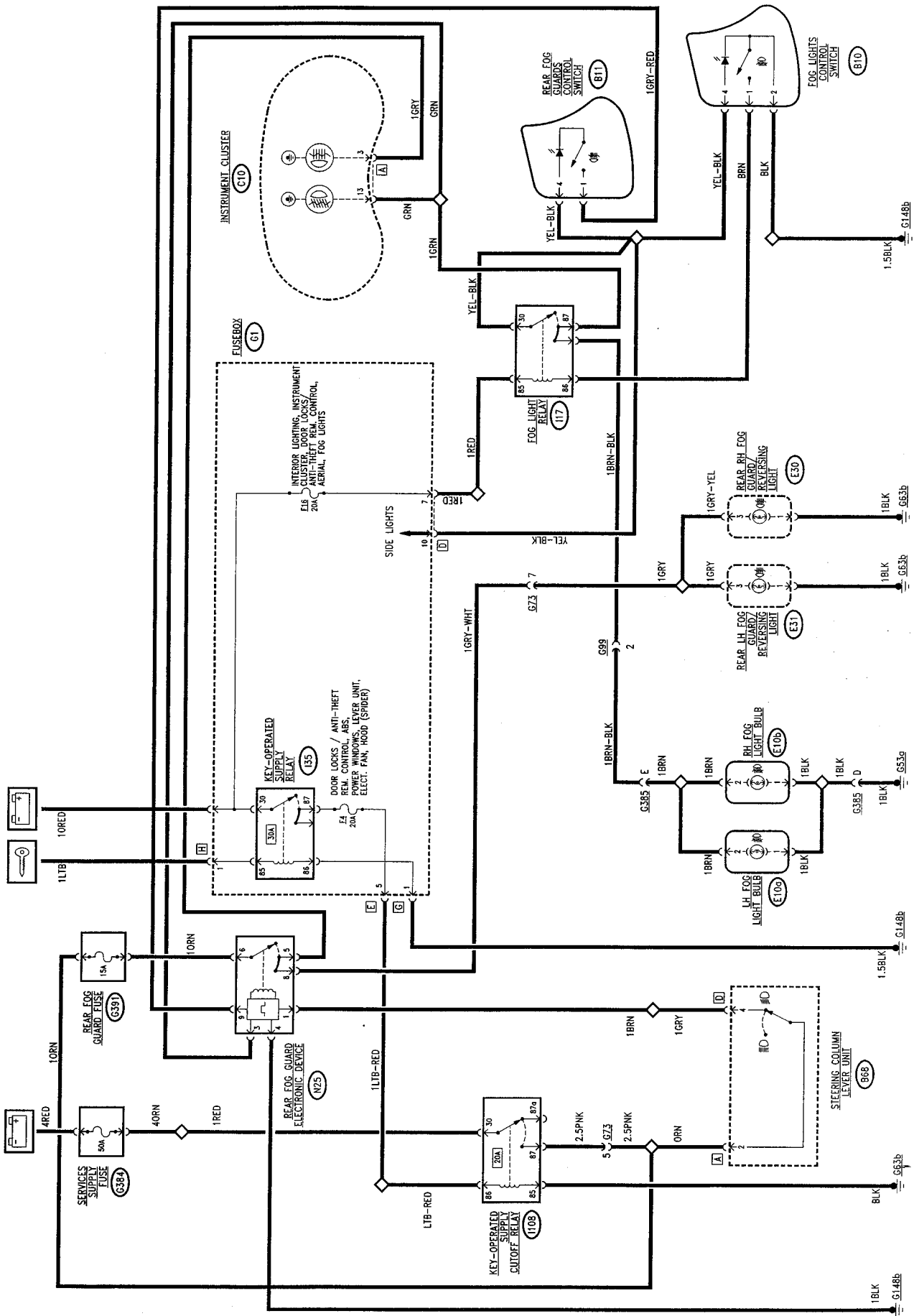
(•) Blue Base
(••) Black Fuseholder

FOG LIGHTS AND REAR FOG GUARDS

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FUNCTIONAL DESCRIPTION	7-3
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CHECKING COMPONENTS	7-5

WIRING DIAGRAM



GENERAL DESCRIPTION

Upon request the car is fitted with special halogen fog lights, while the high luminosity rear fog guard, needed in all cases of poor visibility, is a standard item. Thus the entire system ensures the best possible active and passive visibility under all circumstances.

The fog lights and rear fog guards are turned on by the switches on the left-hand side of the instrument cluster.

The fog lights can be turned on when the side lights are on, while the rear fog guard can be turned on only with the low beam headlights or fog lights on (N.B. they turn off when the ignition key is moved to STOP and must be turned on again afterwards).

A warning light on the instrument panel indicates that the fog lights are on and another one indicates that the rear fog guards are turned on.

FUNCTIONAL DESCRIPTION

Fog lights

The fog lamp circuit is controlled by the corresponding relay **I17** located on the bracket outside fusebox **G1**. By operating the switch **B10** (), with the side lights on an earth and supply are sent which energize the coil of relay switch **I17** thereby closing the circuit which sends the supply to the two fog lights **E10a** and **E10b**.

The switch in **B10** is lit by a led when the side lights are on.

The energising circuit of the relay is protected by fuse **F16** of **G1**.

The supply line also sends a signal to the instrument cluster **C10** to turn on the corresponding warning light.

Rear fog guard

The circuit of the rear fog guards is controlled by the corresponding electronic device **N25** located near fusebox **G1**.

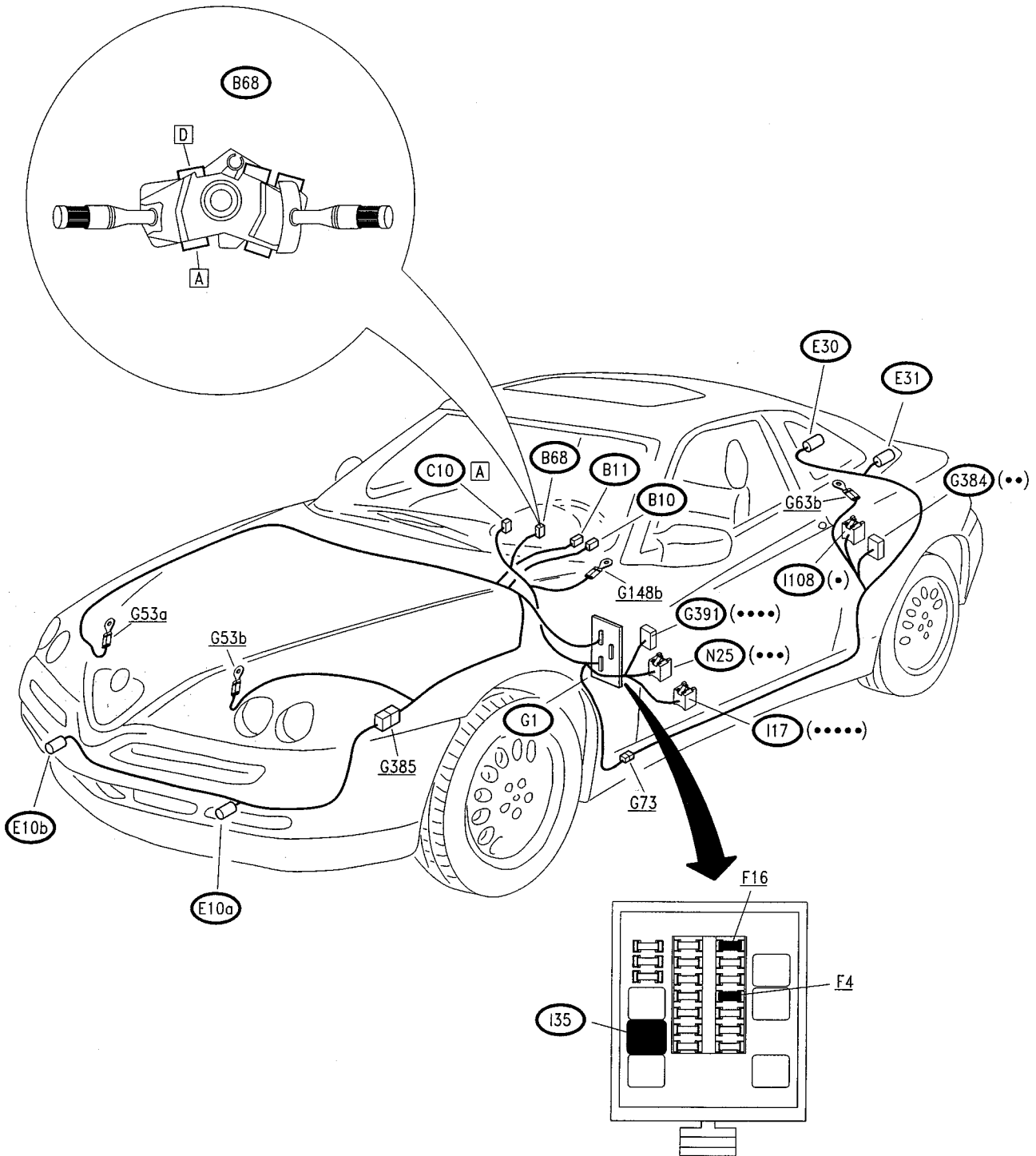
Device **N25** receives the supply from the "key-operated" line of wander fuse **G391** at pin 6; pin 4 is earthed, while pins 9, 3 and 1 receive the control and consensus signals, which are respectively: request to turn on the lamps (from switch **B11** ()); fog lamps on (same signal as for the fog lamp warning light) and low beam lights on (from lever switch **B68**): when the request for turning on is accompanied by one of the two consensus signals, device **N25** closes the circuit on pin 8 which powers the rear fog guards located in the tail lights **E30** (RH) and **E31** (LH).

N.B. The device turns off the lights if it "loses" the "key-operated" signal: when the key is turned to RUN again, the rear fog guards are only turned on by pressing switch **B11**.

The supply line also sends a signal - from pin 5 of **N25** - to the instrument panel **C10** to turn on the corresponding warning light.

Switch **B11** is illuminated by a led when the sidelights are on.

LOCATION OF COMPONENTS



- (•) Blue base
- (••) Black fuseholder
- (•••) White base
- (••••) Brown fuseholder
- (•••••) Green base

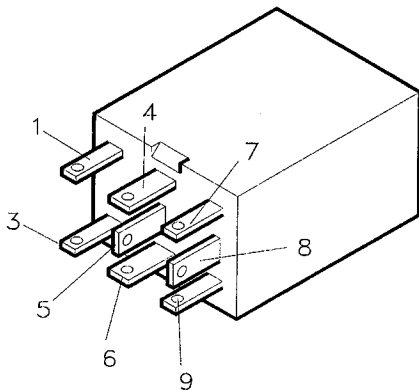
FAULTFINDING TABLE

Failure	Component to be checked											
	G397	E30	E31	F16	E10a	E10b	I17	N25	B68	B11	B10	C10 (1)
Both rear fog guards	•							•	•	•		
RH fog light		•										
LH fog light			•									
Rear fog guards warning light								•				•
Both rear fog guards				•			•		•		•	
RH fog ligh						•						
LH fog light					•							
Fog lights warning light				•								•
Lighting fog light switch (with side lights on)											•	
Rear fog guard switch lighting (with sidelights on)										•		

(1) The instrument cluster **C10** cannot be overhauled. Therefore, in the event of a failure it is not possible to change the single warning light and a new complete cluster must be fitted.

CHECKING COMPONENTS

Rear fog guard electronic device **N25**



Check device: see **TEST A**

CHECK REAR FOG GUARD DEVICE N25	TEST A
---	---------------

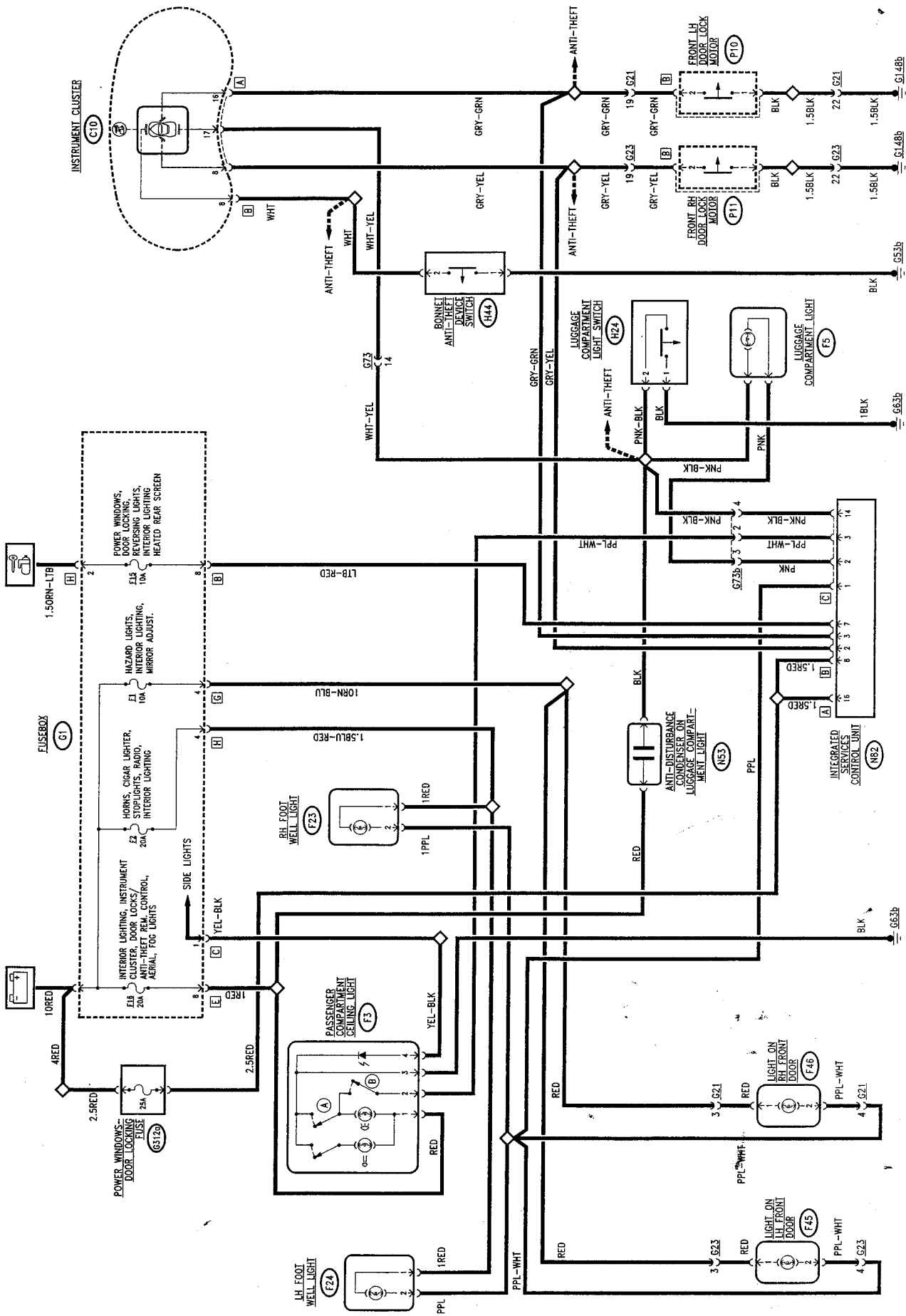
TEST PROCEDURE	RESULT	CORRECTIVE ACTION							
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%; text-align: center;">A1</td> <td>CHECK VOLTAGE</td> </tr> <tr> <td colspan="2" style="padding: 5px;"> – Disconnect device N25 and on the base check for "key- operated" 12V at pin 6 of N25 </td> </tr> </table>	A1	CHECK VOLTAGE	– Disconnect device N25 and on the base check for "key- operated" 12V at pin 6 of N25		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; width: 30px;"> <div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">OK</div> <div style="margin-left: 5px;">▶</div> </td> <td>Carry out step A2</td> </tr> <tr> <td style="text-align: center;"> <div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">OK</div> <div style="margin-left: 5px;">▶</div> </td> <td>Check fuse G391. If necessary replace connection between N25 and relay I108</td> </tr> </table>	<div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">OK</div> <div style="margin-left: 5px;">▶</div>	Carry out step A2	<div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">OK</div> <div style="margin-left: 5px;">▶</div>	Check fuse G391 . If necessary replace connection between N25 and relay I108
A1	CHECK VOLTAGE								
– Disconnect device N25 and on the base check for "key- operated" 12V at pin 6 of N25									
<div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">OK</div> <div style="margin-left: 5px;">▶</div>	Carry out step A2								
<div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">OK</div> <div style="margin-left: 5px;">▶</div>	Check fuse G391 . If necessary replace connection between N25 and relay I108								
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%; text-align: center;">A2</td> <td>CHECK EARTH</td> </tr> <tr> <td colspan="2" style="padding: 5px;"> – Check for 0V at pin 4 of N25 </td> </tr> </table>	A2	CHECK EARTH	– Check for 0V at pin 4 of N25		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; width: 30px;"> <div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">OK</div> <div style="margin-left: 5px;">▶</div> </td> <td>Carry out step A3</td> </tr> <tr> <td style="text-align: center;"> <div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">OK</div> <div style="margin-left: 5px;">▶</div> </td> <td>Restore the wiring between N25 and earth G148b</td> </tr> </table>	<div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">OK</div> <div style="margin-left: 5px;">▶</div>	Carry out step A3	<div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">OK</div> <div style="margin-left: 5px;">▶</div>	Restore the wiring between N25 and earth G148b
A2	CHECK EARTH								
– Check for 0V at pin 4 of N25									
<div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">OK</div> <div style="margin-left: 5px;">▶</div>	Carry out step A3								
<div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">OK</div> <div style="margin-left: 5px;">▶</div>	Restore the wiring between N25 and earth G148b								
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%; text-align: center;">A3</td> <td>CHECK CONSENSUS/CONTROL SIGNALS</td> </tr> <tr> <td colspan="2" style="padding: 5px;"> – Check for the following signals on the pins of N25: <ul style="list-style-type: none"> • 0V at pin 9, engaging switch B11, • 12V at pin 3, engaging the fog lamps, • 12V at pin 1, engaging the low beams </td> </tr> </table>	A3	CHECK CONSENSUS/CONTROL SIGNALS	– Check for the following signals on the pins of N25 : <ul style="list-style-type: none"> • 0V at pin 9, engaging switch B11, • 12V at pin 3, engaging the fog lamps, • 12V at pin 1, engaging the low beams 		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; width: 30px;"> <div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">OK</div> <div style="margin-left: 5px;">▶</div> </td> <td>Insert device N25 on its base and continue with step A4</td> </tr> <tr> <td style="text-align: center;"> <div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">OK</div> <div style="margin-left: 5px;">▶</div> </td> <td>Check the connection between N25 and B11, connector G of G1 and lever unit B68</td> </tr> </table>	<div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">OK</div> <div style="margin-left: 5px;">▶</div>	Insert device N25 on its base and continue with step A4	<div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">OK</div> <div style="margin-left: 5px;">▶</div>	Check the connection between N25 and B11 , connector G of G1 and lever unit B68
A3	CHECK CONSENSUS/CONTROL SIGNALS								
– Check for the following signals on the pins of N25 : <ul style="list-style-type: none"> • 0V at pin 9, engaging switch B11, • 12V at pin 3, engaging the fog lamps, • 12V at pin 1, engaging the low beams 									
<div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">OK</div> <div style="margin-left: 5px;">▶</div>	Insert device N25 on its base and continue with step A4								
<div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">OK</div> <div style="margin-left: 5px;">▶</div>	Check the connection between N25 and B11 , connector G of G1 and lever unit B68								
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%; text-align: center;">A4</td> <td>CHECK VOLTAGE</td> </tr> <tr> <td colspan="2" style="padding: 5px;"> – Switch on the rear fog lights with the low beams on or with the fog lights on, and check for 12V at pins 8 and 5 of N25 </td> </tr> </table>	A4	CHECK VOLTAGE	– Switch on the rear fog lights with the low beams on or with the fog lights on, and check for 12V at pins 8 and 5 of N25		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; width: 30px;"> <div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">OK</div> <div style="margin-left: 5px;">▶</div> </td> <td>DEVICE N25 IS WORKING PROPERLY. Check the connections with the other components</td> </tr> <tr> <td style="text-align: center;"> <div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">OK</div> <div style="margin-left: 5px;">▶</div> </td> <td>CHANGE DEVICE N25</td> </tr> </table>	<div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">OK</div> <div style="margin-left: 5px;">▶</div>	DEVICE N25 IS WORKING PROPERLY. Check the connections with the other components	<div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">OK</div> <div style="margin-left: 5px;">▶</div>	CHANGE DEVICE N25
A4	CHECK VOLTAGE								
– Switch on the rear fog lights with the low beams on or with the fog lights on, and check for 12V at pins 8 and 5 of N25									
<div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">OK</div> <div style="margin-left: 5px;">▶</div>	DEVICE N25 IS WORKING PROPERLY. Check the connections with the other components								
<div style="border: 1px solid black; border-radius: 50%; width: 20px; height: 20px; display: flex; align-items: center; justify-content: center;">OK</div> <div style="margin-left: 5px;">▶</div>	CHANGE DEVICE N25								

ROOF LIGHTS AND TIMED LIGHTS

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WIRING DIAGRAM



GENERAL DESCRIPTION

Roof lights and timed lights

The numerous lighting points provided offer good lighting in the passenger compartment and/or other specific points under all conditions.

The front roof lamp **F3** in the centre above the windscreen, lights **F23** and **F24** under the dashboard, and lights **F45** and **F46** in the lower part of the doors, are timed: they are turned on when one of the two doors is opened, and when the doors are closed again they turn off after a few moments, according to a logic determined by the integrated services electronic control unit **N82**.

Roof lamp timing logic

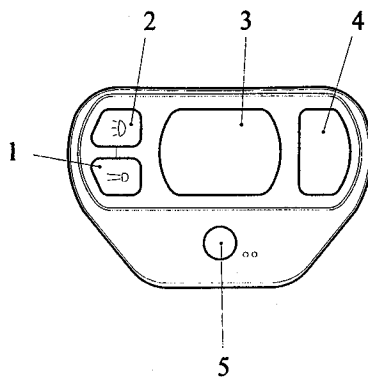
When the doors are opened all the lights are operated and timed according to the following logic:

- timing for 15 SECONDS from when the door is closed again; at all events, timing is stopped when the key is turned to MAR: this makes it possible to get into the car and engage the key;
- timing for 3 MINUTES if the door stays open: this avoids draining the battery if the door is left open.

The front roof lamp may also be turned on by hand using the switch.

There is also a spot light incorporated in the front roof lamp unit which can be used for example for reading without disturbing the driver.

NOTE: The roof lamp unit is different for versions with alarm system. However, there are no changes as far as this description is concerned.



- | | |
|-----------------------|-------------------------|
| 1 - spot light switch | 4 - spot light |
| 2 - roof lamp switch | 5 - alarm I.R. receiver |
| 3 - roof lamp | (See "Alarm system") |

Boot light

When the boot is opened, the boot light is operated with 20 MINUTE timing: timing is however cut out when the boot is closed.

Doors open warning light

A display on the instrument cluster indicates the opening of the doors, bonnet and boot.

FUNCTIONAL DESCRIPTION

Roof lamps and timed lights

The passenger compartment light and spot light **F3** receive a direct supply through fuse **F16** of fusebox **G1**: this makes it possible to turn on the reading light or the roof lamp using switch **A**; with switch **B** closed, the roof lamp is turned on automatically when the doors are opened: the timing signal is generated by the integrated services electronic control unit **N82** - pin C3.

Lights **F23** and **F24** are supplied by the line of fuse **F2** at **G1** and they are only turned on by the timing signal (they can not be turned on by hand) of the control unit **N82** - pin C1.

Similarly, lights **F45** and **F46** are supplied directly via fuse **F1** of fusebox **G1**, and they are only turned on by the timing signal of the control unit **N82** - pin C1.

The boot light **F5** is supplied by **N82** - from pin C2 - at 12V and it is turned on when the boot is opened and switch **H24** sends an earth signal, pin C14.

Next to the roof light **F5** there is a radio anti-disturbance condenser **N53** (for further details see "Radio system").

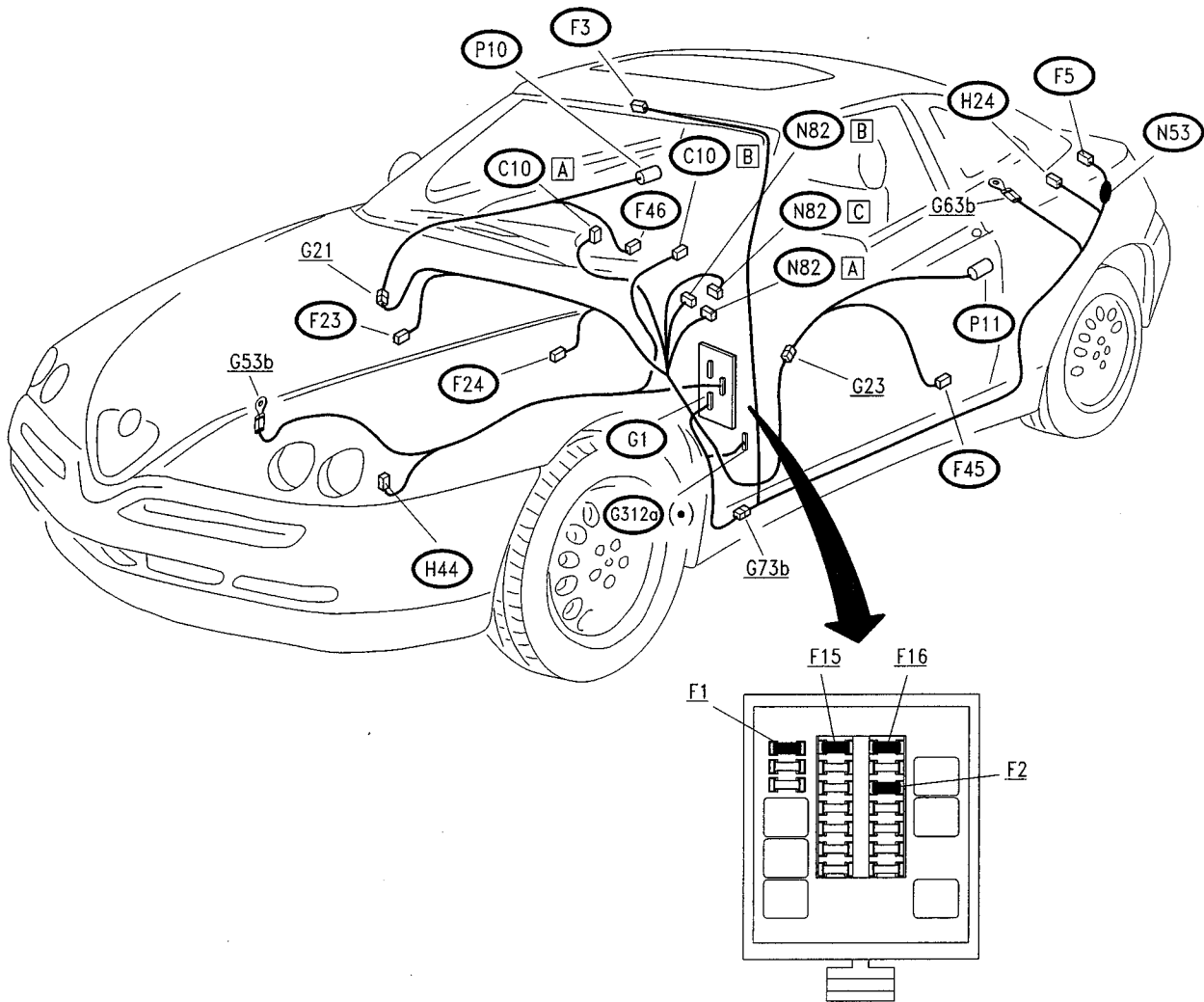
Doors open warning light

The door locking devices **P10** and **P11**, on each door in correspondence with the lock, also contain a micro-switch which closes when the door is opened, thereby sending an earth signal to the instrument cluster **C10**, turning on the corresponding led.

Similarly, switch **H24** (on the telescopic boot prop) closes when the boot is open, sending an earth signal to the instrument cluster **C10**, turning on the corresponding led.

Lastly, switch **H44** also sends an earth signal when the bonnet is open turning on the led on the cluster **C10**.

LOCATION OF COMPONENTS



(•)White fuse holder

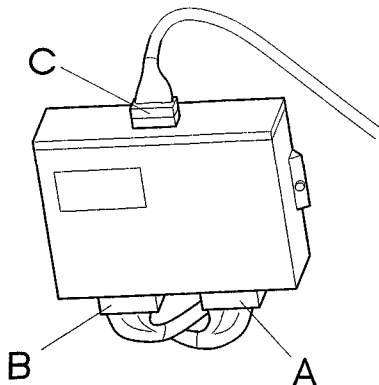
FAULT-FINDING TABLE

Fault	Component to be checked																	
	F15	F1	F16	F2	F3	G312a	F24	F23	F45	F46	F5	H24	N82	C10 (1)	H44	P10	P11	
Passenger compartment roof lamp, under all circumstances			•		•													
Passenger compartment light, timed	•					•							•					
RH light under dashboard				•				•										
LH light under dashboard				•			•											
RH door light		•								•								
LH door light		•							•									
Boot light			•								•	•						
All timed lights			•			•							•					
RH door open indicator led														•		•		
LH door open indicator led														•			•	
Bonnet open indicator led														•	•			
Boot open indicator led												•		•				

(1) The instrument cluster C10 cannot be overhauled. Therefore, in the event of a fault, single leds or the electronic timing device cannot be replaced and a new complete cluster must be installed.

CHECK COMPONENTS

Integrated services control unit (N82)



Check timing test A

CHECK SERVICES CONTROL UNIT N82 - LIGHTS TIMING FUNCTION	TEST A
---	---------------

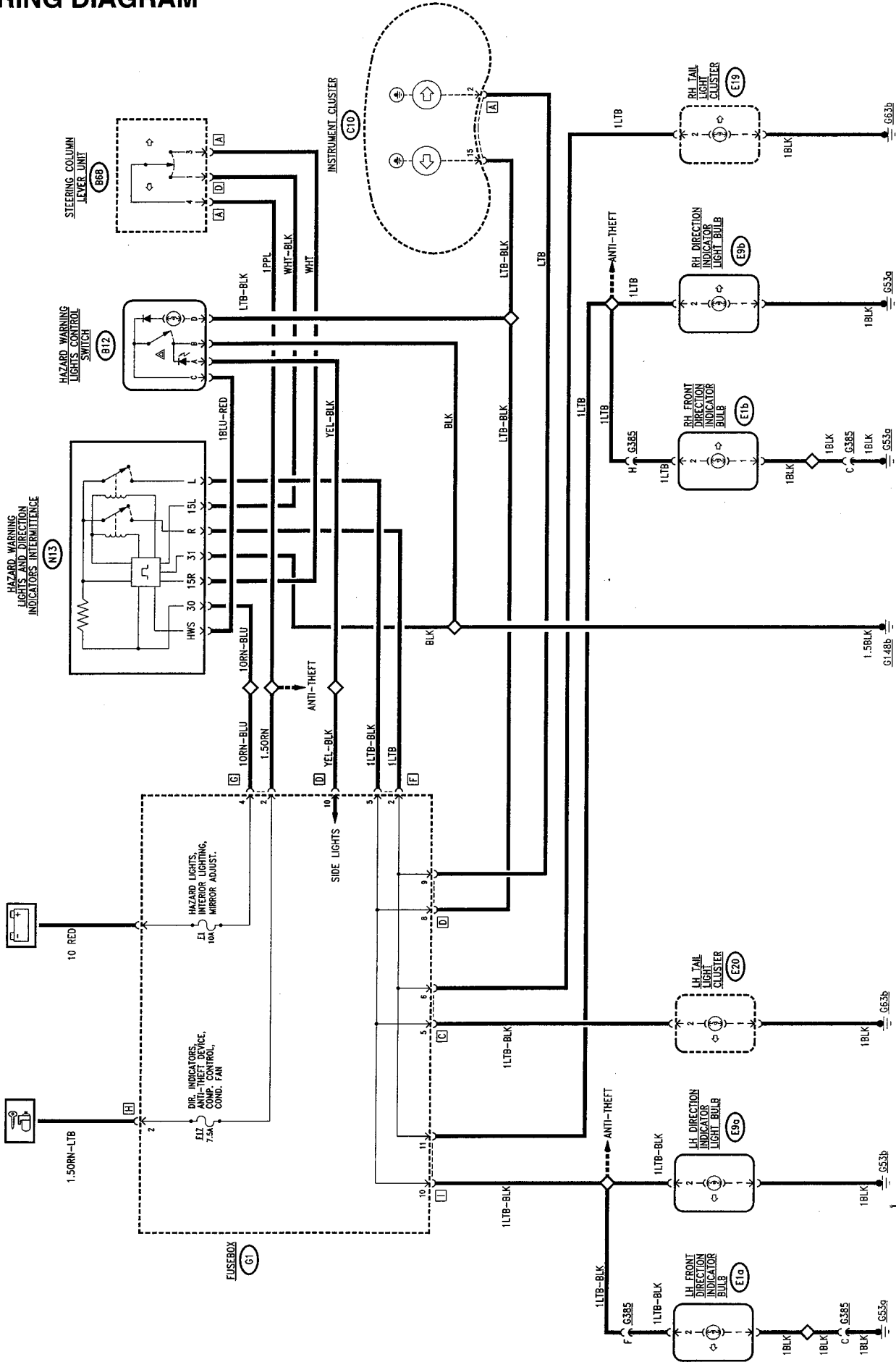
TEST PROCEDURE	RESULT	CORRECTIVE ACTION
A1 CHECK VOLTAGE – Check for 12V at pin A16 and B8 of N82	<input type="radio"/> OK → <input checked="" type="radio"/> OK →	Carry out step A2 Check fuse G312a
A2 CHECK VOLTAGE – With the key at MARCIA, check for 12V at pin B7 of N82	<input type="radio"/> OK → <input checked="" type="radio"/> OK →	Carry out step A3 Check fuse F15 of G1
A3 CHECK ROOF LAMP TIMING SIGNAL – Open a door and for 15 seconds check for an earth signal from pins C1 and C3 of N82	<input type="radio"/> OK → <input checked="" type="radio"/> OK →	Carry out step A4 Carry out step A5
A4 CHECK BOOT TIMING SIGNAL – Open the boot and check for a 12V signal from pin C2 of N82 until the boot is closed	<input type="radio"/> OK → <input checked="" type="radio"/> OK →	The control unit N82 is working normally. Check the connections with other components Restore the wiring between N82 and lamp F5 and switch H24
A5 CHECK DOOR OPEN SIGNAL – Open a door and check for an earth signal at pin B2 or B3 of N82	<input type="radio"/> OK → <input checked="" type="radio"/> OK →	Replace the control unit N82 Restore the wiring between N82 and the switches on the doors P10 and P11

DIRECTION INDICATORS AND HAZARD WARNING LIGHTS

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CHECKING COMPONENTS	9-5

WIRING DIAGRAM



GENERAL DESCRIPTION

The intermittent direction indicators and hazard warning lights delineate the vehicle clearance.

The right or left direction indicators are turned on raising or lowering the lever on the steering column lever unit; the hazard warning lights (right and left indicators activated simultaneously) are switched on from the switch on the centre console.

The direction indicators operate when the ignition key is engaged, for the obvious safety reasons, they are supplied directly by the battery.

Two intermittent warning lights on the instrument cluster flash while the right and left indicators are operating. The hazard warning light switch indicates that these are operating by illuminating when they are turned on.

The circuit of the direction indicators is protected by a special fuse of fusebox **G1** while another fuse protects the circuit for the hazard warning lights.

FUNCTIONAL DESCRIPTION

The circuit is controlled by the hazard warning light and direction indicator flasher **N13** to be found next to the fusebox.

The flasher, earthed at pin 31, is supplied at pin 30 directly from the battery via the line of fuse **F1** of fusebox **G1**.

Pins 15R and 15L receive the signals (12V) from the lever unit **B68** when the line protected by fuse **F17** of **G1** is "key-operated" for turning on the right indicator (pin 15R) and the left indicator (pin 15L).

Pin HWS receives a signal (earth) when the hazard warning light switch **C16** is pressed.

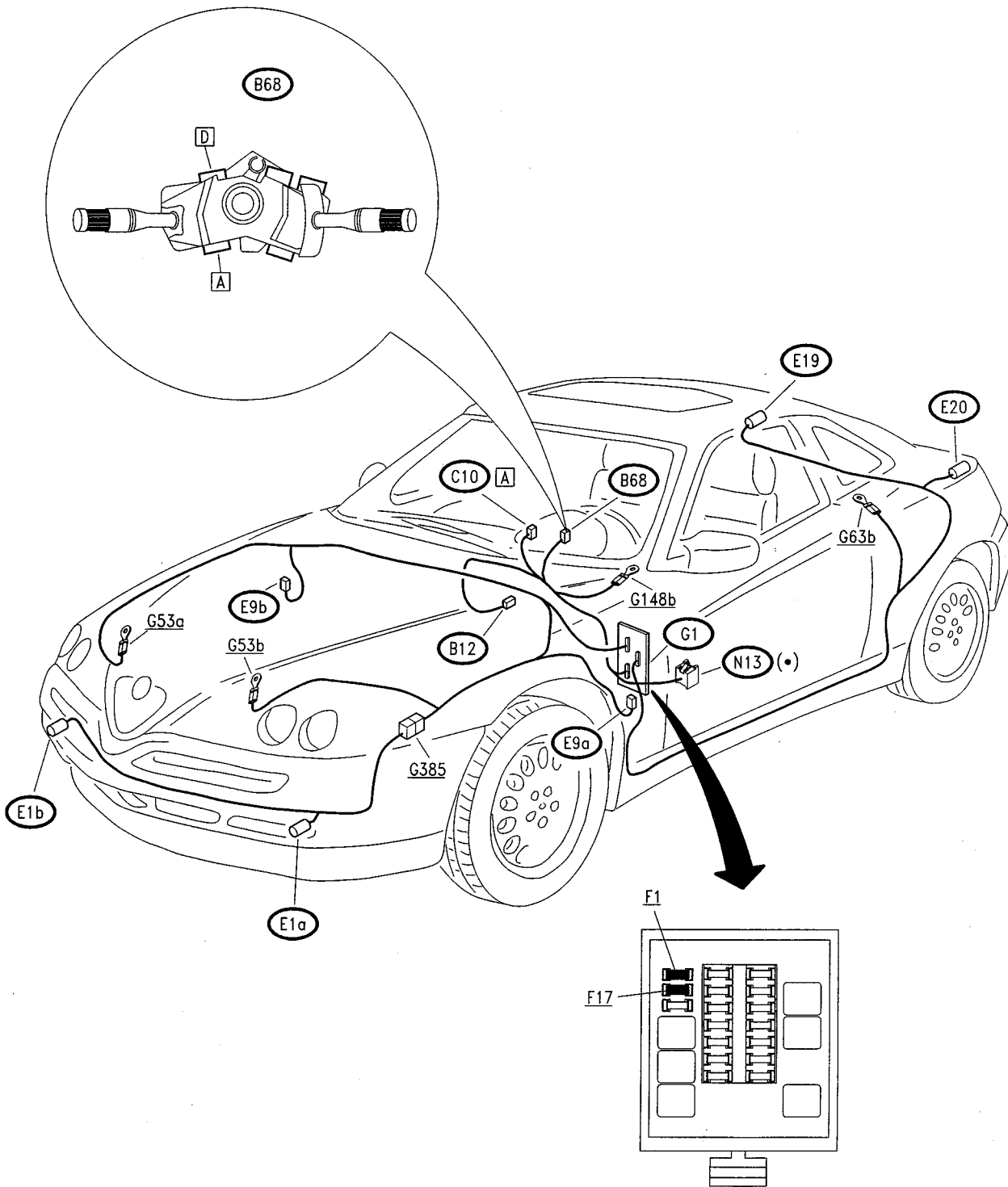
Pins R and L send the intermittent supply signals for all the indicators: from pin R for those on the right, from pin L for those on the left, according to the following logic:

- only pin R (RH) if the signal reaches pin 15R
- only pin L (LH) if the signal reaches pin 15L
- both pins R and L if the signal reaches pin HWS.

This way operating the stalk of the lever unit **B68** turns on the righthand indicators (**E1b**, **E9b** and **E19**) or the left ones (**E1a**, **E9a** and **E20**) and simultaneously the corresponding warning light on the instrument cluster **C10** is turned on.

When switch **B12** is pressed, the right and left direction indicators are supplied contemporaneously; also the special light (pin D3) is supplied which lights up when the hazard warning lights are switched on. A led (pin A) illuminates the ideogram of the switch when the side lights are on.

LOCATION OF COMPONENTS



(•) Black base

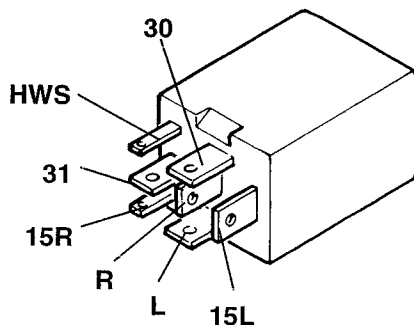
FAULTFINDING TABLE

Failure	Component to be checked											
	F1	F17	E1b	E1a	E9a	E9b	E19	E20	N13	B68	B12	C10 (1)
All the direction indicators	•	•							•	•		
Hazard warning lights	•								•		•	
All the RH direction indicators									•	•		
All the LH direction indicators									•	•		
RH front light			•									
RH side light						•						
RH rear light							•					
LH front light				•								
LH side light					•							
LH rear light								•				
RH indicator warning light												•
LH indicator warning light												•
Hazard warning light switch not illuminated with lights on											•	

(1) The instrument cluster **C10** cannot be repaired. Therefore in the event of a failure it is not possible to change the single warning light and a new complete cluster must be fitted.

CHECKING COMPONENTS

Hazard warning light and indicator flasher **(N13)**



Checking the device: see **TEST A**

HAZARD WARNING LIGHT AND INDICATOR FLASHER (N13)	TEST A
---	---------------

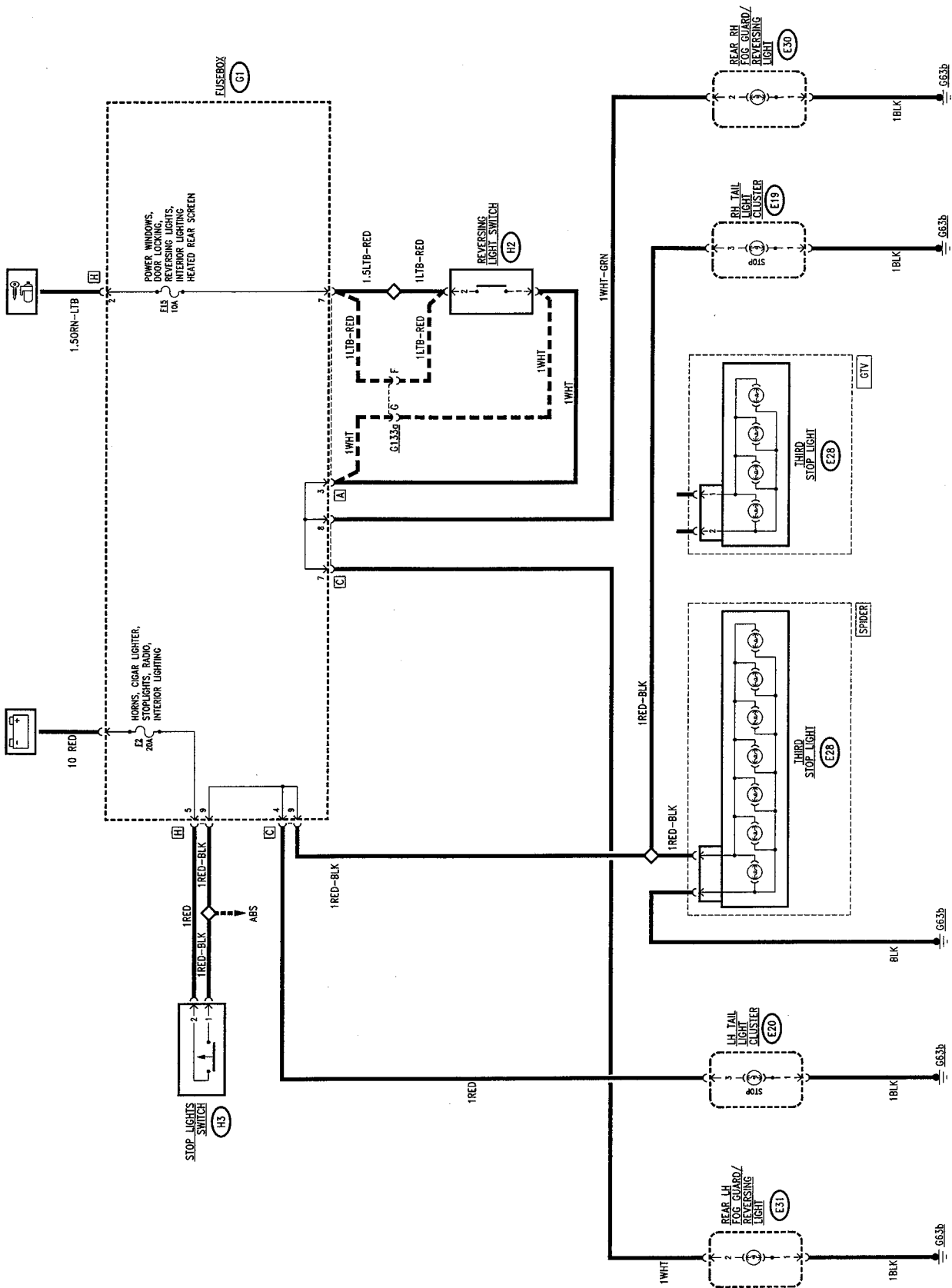
	TEST PROCEDURE	RESULT	CORRECTIVE ACTION
A1	CHECK VOLTAGE	(OK) ➔	Carry out step A2
	– Disconnect the flasher N13 and on the base check for 12V at pin 30 of N13	(OK) ➔	Check fuse F1 from fusebox G1 . If necessary replace connection between N13 and G1
A2	CHECK EARTH	(OK) ➔	Carry out step A3
	– Check for 0 V at pin 31 of N13	(OK) ➔	Restore the wiring between N13 and earth G148b
A3	CHECK INTERMITTENT VOLTAGE	(OK) ➔	Carry out step A4
	– With the ignition key turned, operate the RH indicator and check for 12 V at pin 15R of N13 ; operate the LH indicator in the same way, check pin 15L of N13	(OK) ➔	Restore the wiring between N13 and lever unit B68 , or replace the latter
A4	CHECK EARTH	(OK) ➔	Insert device N13 on its base and continue with step A5
	– Operate the hazard warning light switch and check for 0V at pin HWS of N13	(OK) ➔	Restore the wiring between N13 and switch B12 , or change the latter
A5	CHECK INTERMITTENT VOLTAGE	(OK) ➔	DEVICE N13 IS WORKING PROPERLY. Check the connections with the other components
	– Operate the RH indicator and check for intermittent 12V at pin R of N13 ; do the same operating the LH indicator at pin L and operating the hazard warning lights at both pin R and pin L	(OK) ➔	CHANGE DEVICE N13

STOP LIGHTS AND REVERSING LIGHTS

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WIRING DIAGRAM



--- variance for Gtv 3.0 24V

GENERAL DESCRIPTION

Stop lights

The car stop lights are operated each time the brake pedal is pressed; two of them are located at the rear in the side lights, one is located in the centre (the so-called "third stop" light).

The lights are turned on automatically through the switch on the brake pedal: it is operated under all conditions, even with the ignition key off.

The circuit is protected by a special fuse.

The braking signal from the switch is also sent to the ABS system control unit which "recognizes" the situation and controls braking accordingly (see "ABS").

Reversing lights

The car is fitted with two reversing lights located in the right and left tail lights.

When reversing gear is selected, they are turned on automatically through a special switch on the gearbox.

The circuit is protected by a special fuse.

The reversing light is operated with the ignition key engaged, regardless of the other lights.

FUNCTIONAL DESCRIPTION

Stop lights

The stop lights circuit is supplied directly by the battery through fuse **F2** of fusebox **G1**.

The stop lights switch **H3** comprises a contact which closes when the brake pedal is pressed, through which the stop lights are supplied in the rear side lights **E19** (right), **E20** (left) and centre **E28**; this is different in shape for the Spider and GTV.

Reversing lights

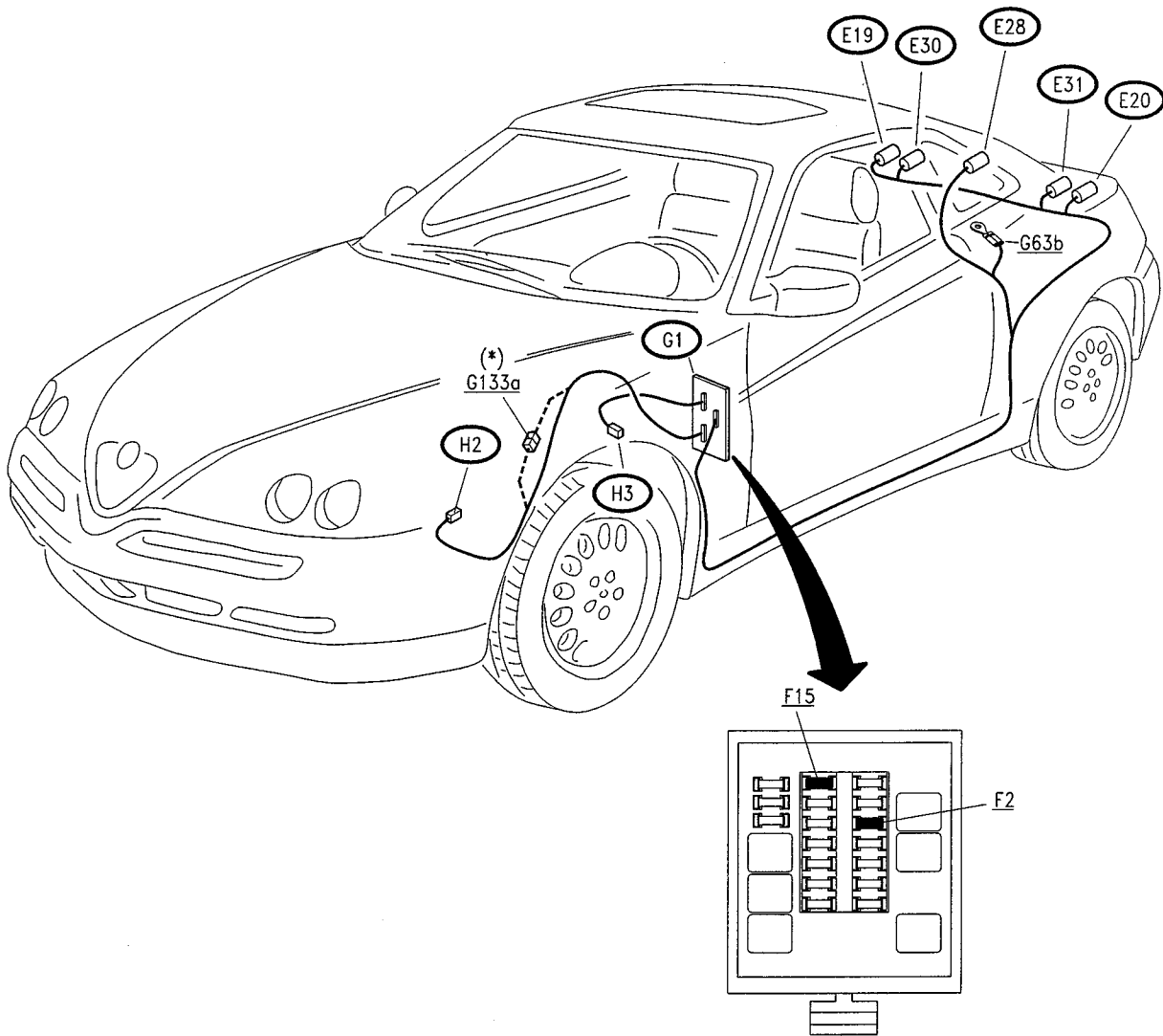
The reversing light circuit is "turn-key" supplied via fuse **E15** of fusebox **G1**.

When reverse gear is engaged switch **H2** supplies the right reversing light **E30** and the left one **E31**.

FAULTFINDING TABLE

Failure	Component to be checked								
	F2	E20	E19	E28	H3	F15	E30	E31	H2
All the stop lights	•				•				
RH stop light			•						
LH stop light		•							
Third stop light				•					
Both reversing lights						•			•
RH reversing light							•		
LH reversing light								•	

LOCATION OF COMPONENTS



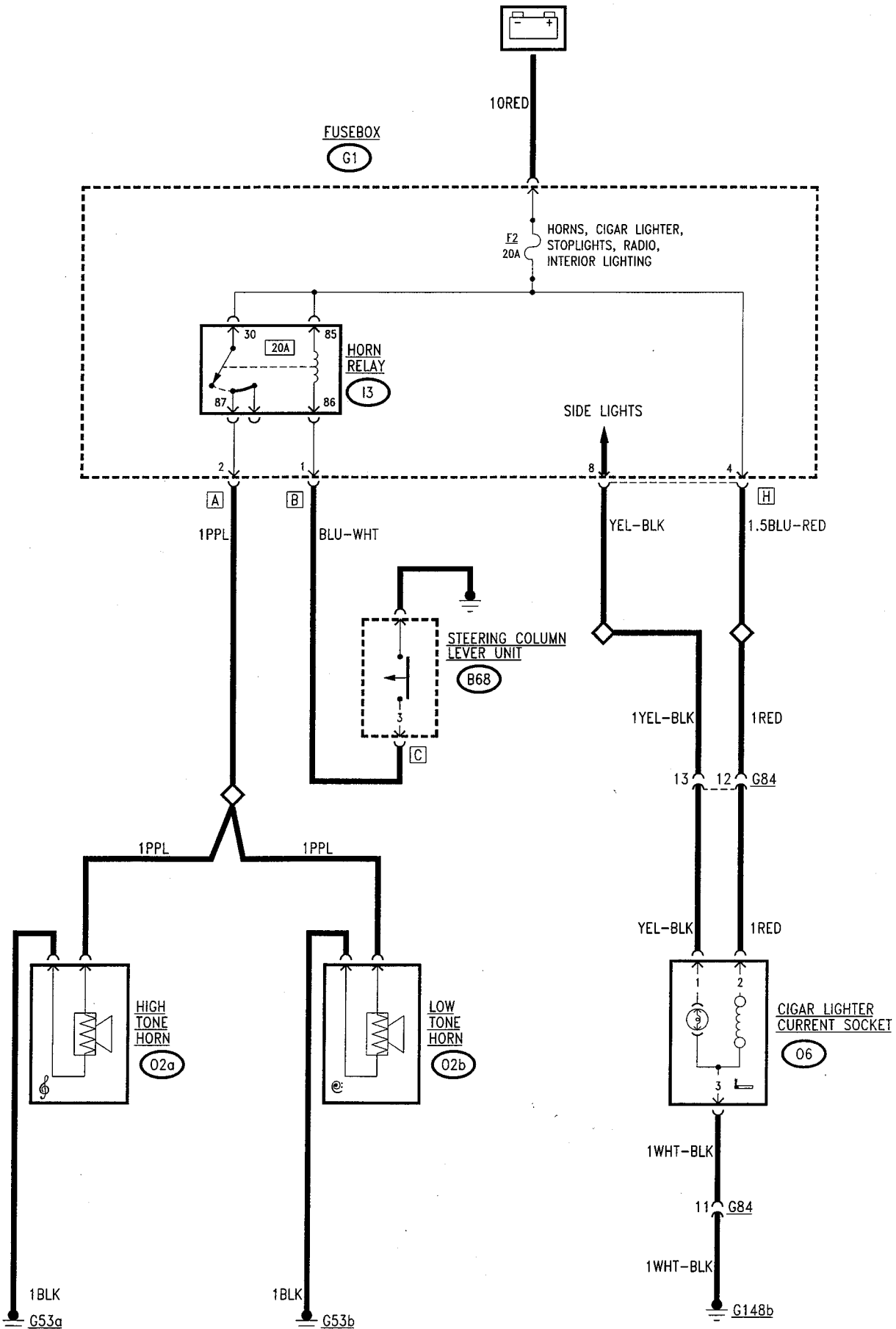
— — — variance for Gtv 3.0 24V

HORNS, CIGAR LIGHTER/ CURRENT SOCKET

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WIRING DIAGRAM



GENERAL DESCRIPTION

Horns

The car horn system is formed of two horns with different tones: one high tone and the other low tone: they are both activated simultaneously.

The horns are operated pressing one of the two switches on the spokes at the sides of the Air Bag cushion.

For the obvious safety reasons the horns can be activated at all times even if the ignition key is not engaged.

Cigar lighter/current socket

The car offers the occupants an ashtray in the centre console; next to it there is the "cigar lighter" resistance, which is turned on pressing it into its socket: after a few seconds it pops out automatically, ready for use. This standard socket may also be used for connecting other instruments or devices (provided that they work at 12V).

N.B.: The socket is provided with a thermal protection device: in the event of connections with devices that absorb a high amount of energy, this connection may "trip".

The socket is always supplied and may therefore be used at all times, even with the ignition key disengaged.

FUNCTIONAL DESCRIPTION

Horns

The horns relay switch **I3**, located in fusebox **G1**, is supplied by the battery through fuse **F2**, also in **G1**.

The coil of relay switch **I3** is energized with an earth signal leading from the horn control switch which is connected to the lever unit **B68**. This connection is made in a special way due to the presence of the Air Bag: see "Checking Components" in this section).

This way the supply is sent by the relay switch to the horns **O2**, which are already connected to earth.

Cigar lighter/current socket

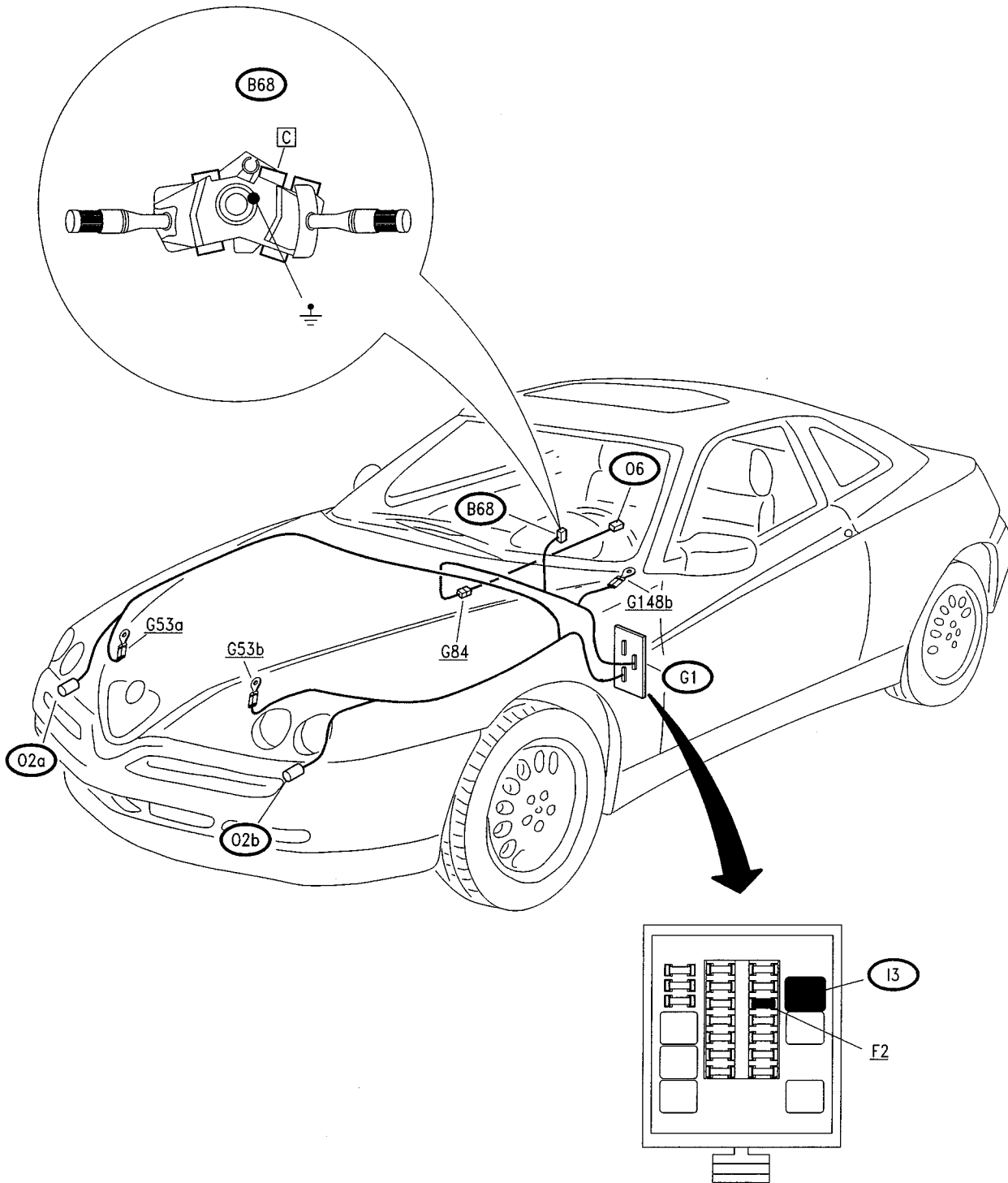
The connection socket for the cigar lighter resistance **O6** is supplied directly by the battery via fuse **F2** of fusebox **G1**, which suitably protects the circuit. The light bulb of the cigar lighter **O6** is turned on when the sidelights are on.

FAULTFINDING TABLE

Failure	Component to be checked				
	F2	O2	I3	B68	O6 (1)
Cigar lighter - current socket	•				•
Cigar lighter light					•
Horns failing to work	•	•	•	•	
Horns working badly (out of tune)		•			

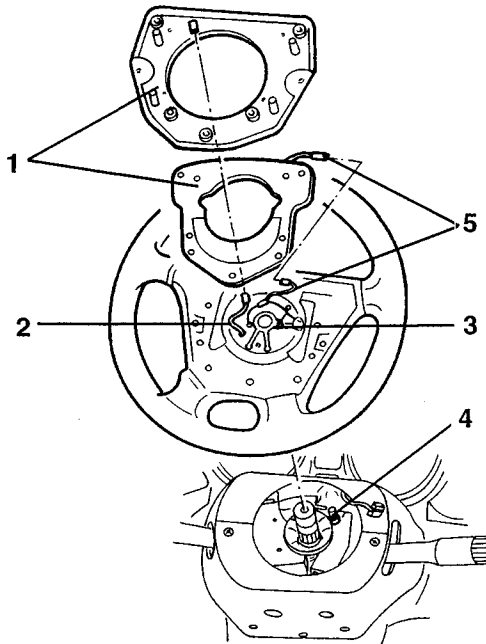
(1) In the event of the cutting in of the current socket **thermal protection device**, this can be replaced at least 5 times without the need to change the complete socket

LOCATION OF COMPONENTS



CHECKING COMPONENTS

Horns control (in B68)

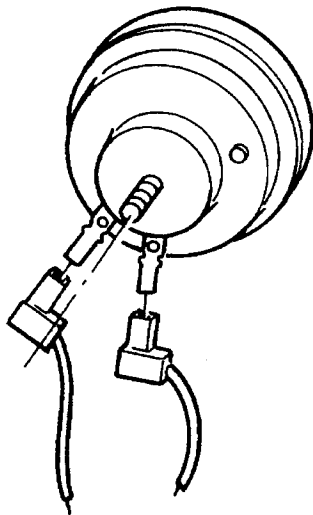


The horn control device comprises two plates (separated by springs): pressing the buttons at the sides of the airbag cushion closes the electrical contact between the plates: the upper plate is connected by the BRN cable (2) and the contact of the clock spring cable (3) with the pushbutton (4) of the steering column lever unit.

The lower plate is connected to earth on the steering column via BLK cable (5).

WARNING: When working on the steering wheel fitted with Air Bag, particularly for removing the clock spring, carefully adhere to the instructions given in the corresponding section.

Horns (O2)



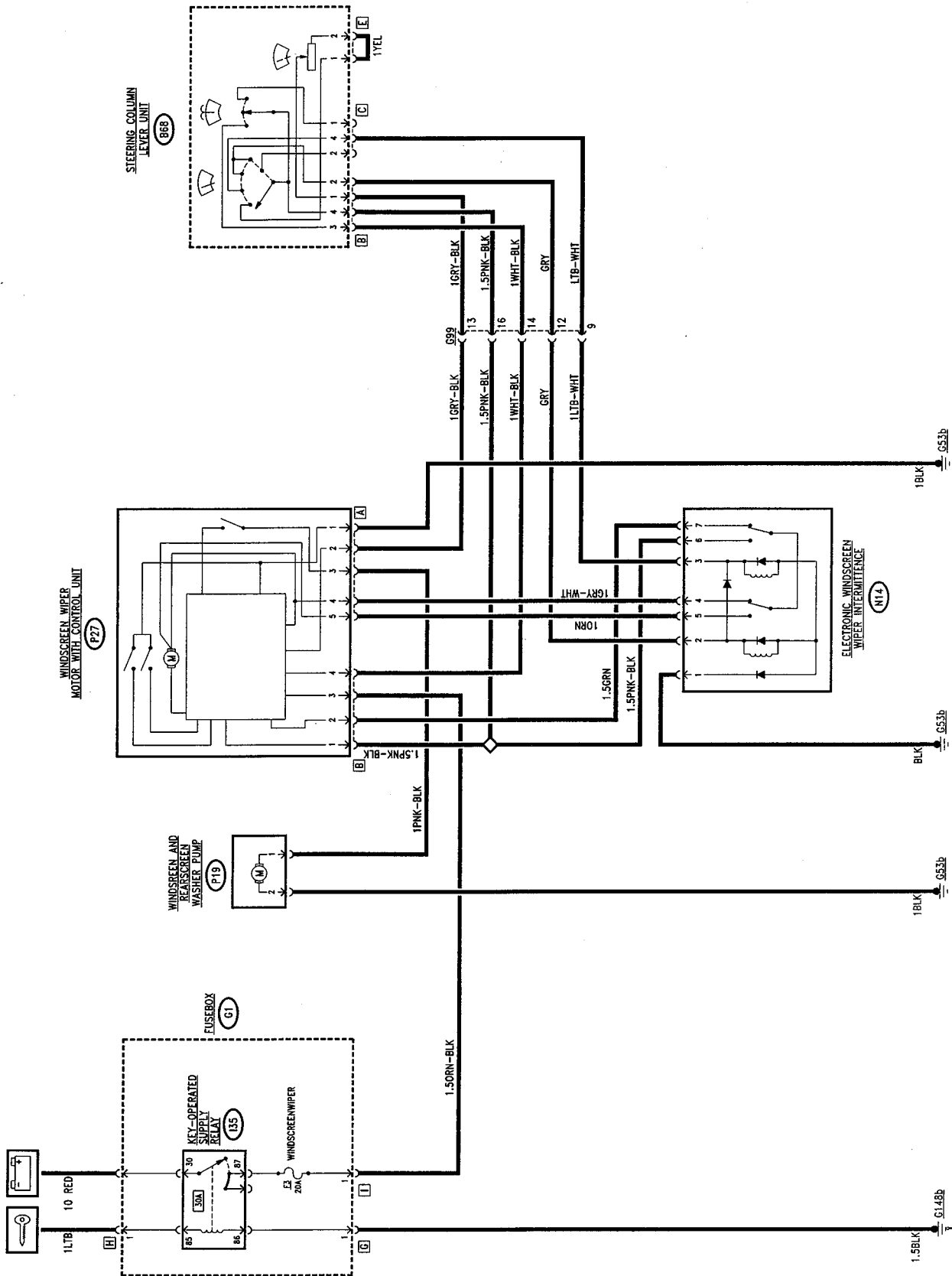
SPECIFICATIONS	
Nominal voltage rating	12V
Current absorbed	<10A (the pair)
Total horn sound level	106 ÷ 118 dB a 2m
Sound level in band 1800 ÷ 3550 Hz	≥ 105 dB a 2m
Horn sound level L-H	≥ 108 dB a 2m
Fundamental frequency type H	480 ÷ 530 Hz
Fundamental frequency type L	380 ÷ 430 Hz

WINDSCREEN WIPER/WASHER

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WIRING DIAGRAM



GENERAL DESCRIPTION

With the lever on the righthand side of the steering wheel it is possible to engage the different functions of the windscreen washer/wiper system.

The windscreen wiper device can work continuously and intermittently at different speeds: moving the lever downwards firstly operates intermittent operation, then continuous operation from the first speed, then at the second speed: these functions remain operation until the lever is pushed upwards again.

With the lever in the intermittent position, through the special ring switch it is possible to select the different lengths of the intermittent functions.

The windscreen washer is engaged slightly pulling the lever towards the steering wheel: this way the windscreen washer pump is operated for a few seconds or until the lever is released.

NOTE: operating the windscreen washer without detergent fluid in the reservoir can damage the pump.

The entire system is regulated by an electronic windscreen wiper device integrated in the wiper motor, with the help of another electronic device to be found near the fusebox; this controls the windscreen wiper motor and the windscreen washer pump.

FUNCTIONAL DESCRIPTION

The control unit in the windscreen wiper motor **P27** is supplied at pin B3 by key-operated voltage via fuse **F3** and relay **I35** of fusebox **G1**.

Pin A1 of **P27** is connected to earth.

The supply for operating the windscreen wiper with lever switch **B68** leads from **P27**, pin 81 and reaches pin 4 of connector B of **B68**; the same supply also reaches device **N14**, pin 6, while pin 1 of the same device is connected to earth.

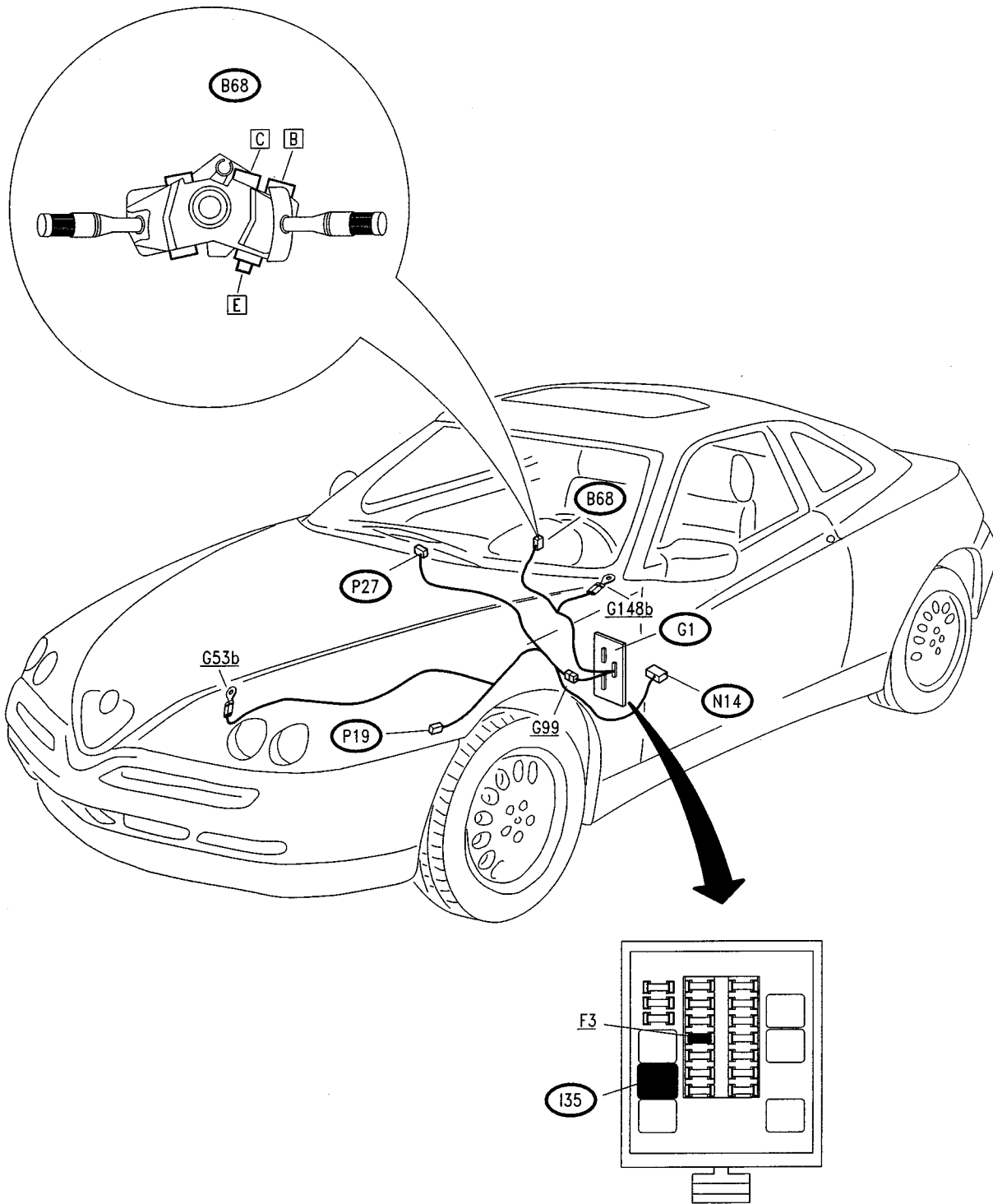
The operating logic of the different functions is as follows:

- windscreen wiper at first speed: the contact at pin 4 of connector C of **B68** closes which sends the supply to pin 3 of **N14**; this "relays" the control from pin 4 to pin A4 of **P27** which operates the motor at first speed.
- windscreen wiper at second speed: the contact at pin 2 of connector B of **B68** closes which sends the supply to pin 2 of **N14**; this "relays" the control from pin 5 to pin A5 of **P27** which operates the second speed motor;
- intermittent wiping operation: the contact at pin 1 of connector B closes also through bridge E of **B68**: this signal differs depending on the position of the potentiometer, and determines the different intermittent speeds: this way the supply is sent to pin A2 of **P27** which operates the windscreen wiper intermittently;
- "end of stroke": the signal from pin B2 of **P27** at pin 7 of **N14** is the "motor stop" command: i.e. it informs that the motor has stopped, which is then activated for another moment to park the blades;
- windscreen washer: the contact closes at pin 3 of connector 8 of **B68** which sends a command to pin B4 of **P27**, which "relays" the supply for the motor **P19**, as well as briefly operating the windscreen wiper.

FAULTFINDING TABLE

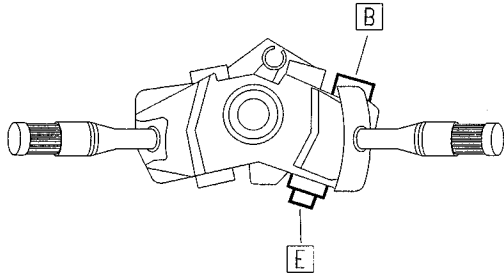
Failure	Component to be checked				
	F3	P27	P19	N14	B68
Windscreen wiper (cont. speed)	•	•		•	•
Windscreen wiper (intermitt. speed)	•	•			•
Windscreen/rearscreen washer	•		•		•

LOCATION OF COMPONENTS



CHECKING COMPONENTS

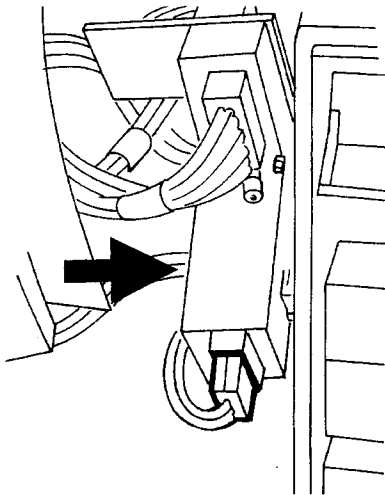
Steering column lever unit **(B68)**



Check operation of intermittence:
 resistance between pins B1 and E2 in relation to
 the position of the ring

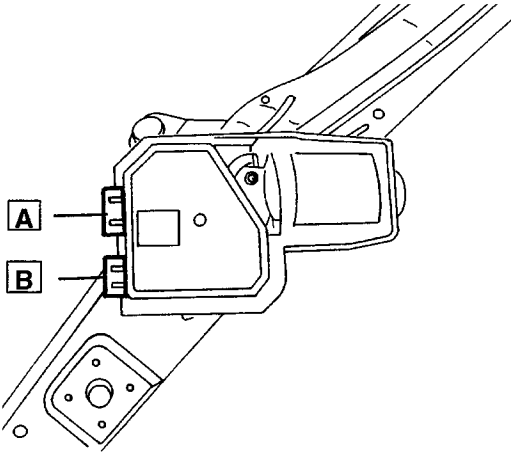
Position	Resistance [kΩ]	Speed [cycles/min]
1	2 ± 20%	27
2	23 ± 20%	15
3	36 ± 20%	12
4	47 ± 20%	10
5	66 ± 20%	8

Electronic windscreen wiper device **(N14)**



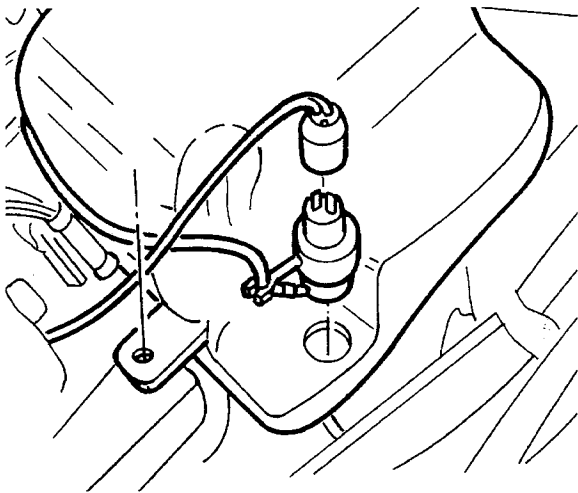
Checking the device: see **TEST A**

Windscreen wiper motor with control unit (P27)



Checking the device: see TEST B

Windscreen washer pump (P19)



SPECIFICATIONS	
Max. voltage	13.5 V
Current	≤ 4 A
Flow rate	≥ 3.5 l/min.
Pressure	≥ 1.7 bar

CHECK ELECTRONIC WINDSCREEN WIPER DEVICE (N14)	TEST A
---	---------------

TEST PROCEDURE		RESULT	CORRECTIVE ACTION
A1	CHECK VOLTAGE	(OK) →	Carry out step A2
	– Disconnect device N14 and check on the base, with the key at RUN, for 12V between pins 1 and 6	(OK) →	
			Check fuse F3 of fusebox G1 ; check device P27 (see TEST B), or the wiring between N14 and P27 and earth G53b
A2	CHECK COMMAND SIGNALS	(OK) →	Carry out step A3
	– Reconnect device N14 . Operating the windscreen wiper at first speed, check for 12V at pin 3; in the same way operating the second speed, for 12V at pin 2	(OK) →	
			Check the wiring between N14 and B68 or change the latter
A3	CHECK ACTUATING SIGNALS	(OK) →	Device N14 IS WORKING PROPERLY. Check motor P27
	– Operating the windscreen wiper at first speed, check for 12V at pin 4 of N14 ; with the second speed at pin 5	(OK) →	
			CHANGE DEVICE N14

CHECK WINDSCREEN WIPER MOTOR WITH CONTROL UNIT (P27)	TEST B
---	---------------

TEST PROCEDURE		RESULT	CORRECTIVE ACTION
B1	CHECK VOLTAGE	(OK) →	Carry out step B2
	– Disconnect device P27 and check, with the key at RUN, for 12V between pins A1 and B3 of P27	(OK) →	
			Check fuse F3 of fusebox G1 ; check the wiring between G1 , P27 and earth G53b
B2	CHECK WINDSCREEN WIPER COMMAND SIGNALS	(OK) →	Carry out step B3
	– Reconnect device P27 . Check the operation of the windscreen wiper at first speed, applying 12V at pin A4 of P27 , at second speed with 12V at pin A5	(OK) →	
			CHANGE DEVICE P27
B3	CHECK INTERMITTENCE SIGNAL	(OK) →	DEVICE P27 IS WORKING PROPERLY. Check the connections with N14 and B68
	– Check intermittent operation applying a variable signal at pin B4 of P27	(OK) →	
			CHANGE DEVICE P27

NOTE: If the windscreen wiper stops along its stroke and does **not** return automatically to the end of the stroke, check the connection between **N14** (pin 7) and **P27** (pin B2)

INDICATORS AND WARNING LIGHTS

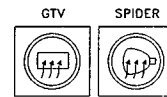
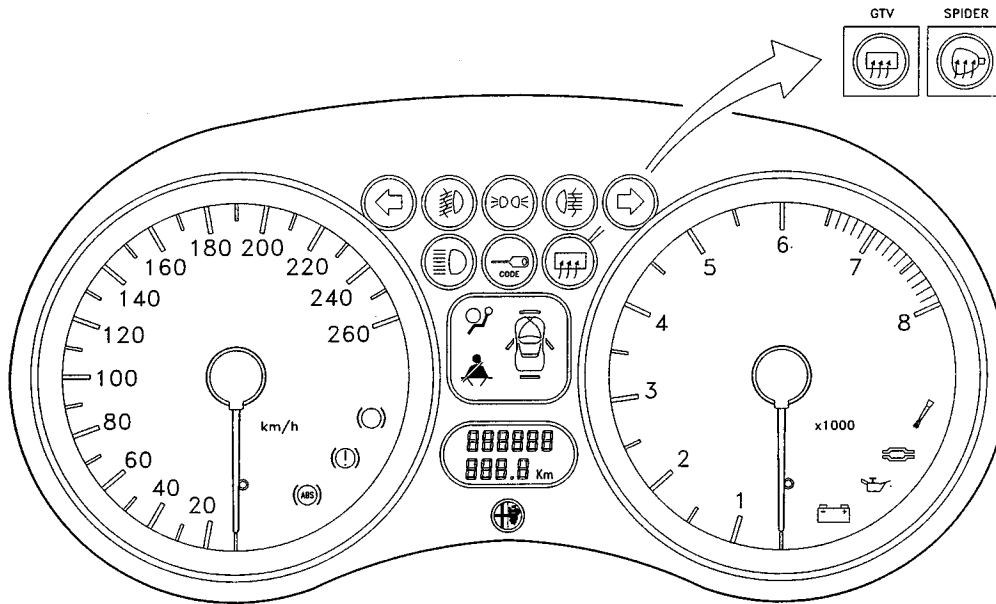
INDEX

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INSTRUMENT CLUSTER

The main instrument cluster C10 provides all the indications and information concerning the conditions of the vehicle needed for safe and troublefree driving. The instrument cluster is of the analogue type, with

two generously-sized indicators for the tachometer and rev counter, and a series of clearly visible warning lights which complete the information for the driver.

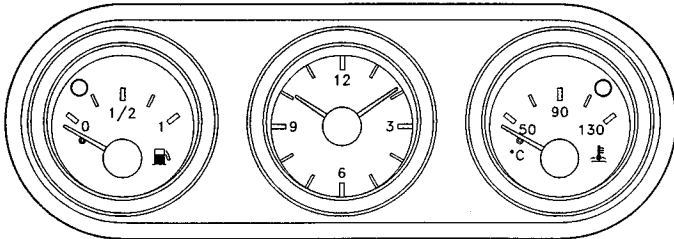


- | | | | |
|--|-----------------------------|--|---|
| | LH direction indicator | | safety belts (*) |
| | fog lights | | doors and bonnets open |
| | side lights | | ABS system failure |
| | rear fog guards | | handbrake and brake fluid level, EBD system fault |
| | RH direction indicator | | brake pad wear |
| | high beams | | generator |
| | electronic key system | | minimum oil pressure |
| | rearscreen defrosting (GTV) | | catalyst temperature (for certain Markets only) |
| | mirror defrosting (Spider) | | injection failure (Check Engine) |
| | Air Bag system fault | | |

AUXILIARY INSTRUMENT CLUSTER

The auxiliary cluster **C18** is located in the centre of the dashboard and contains the coolant temperature gauge and fuel level gauge with the corresponding warning lights.

An analogue clock completes this additional cluster.



INTERNAL WIRING DIAGRAM

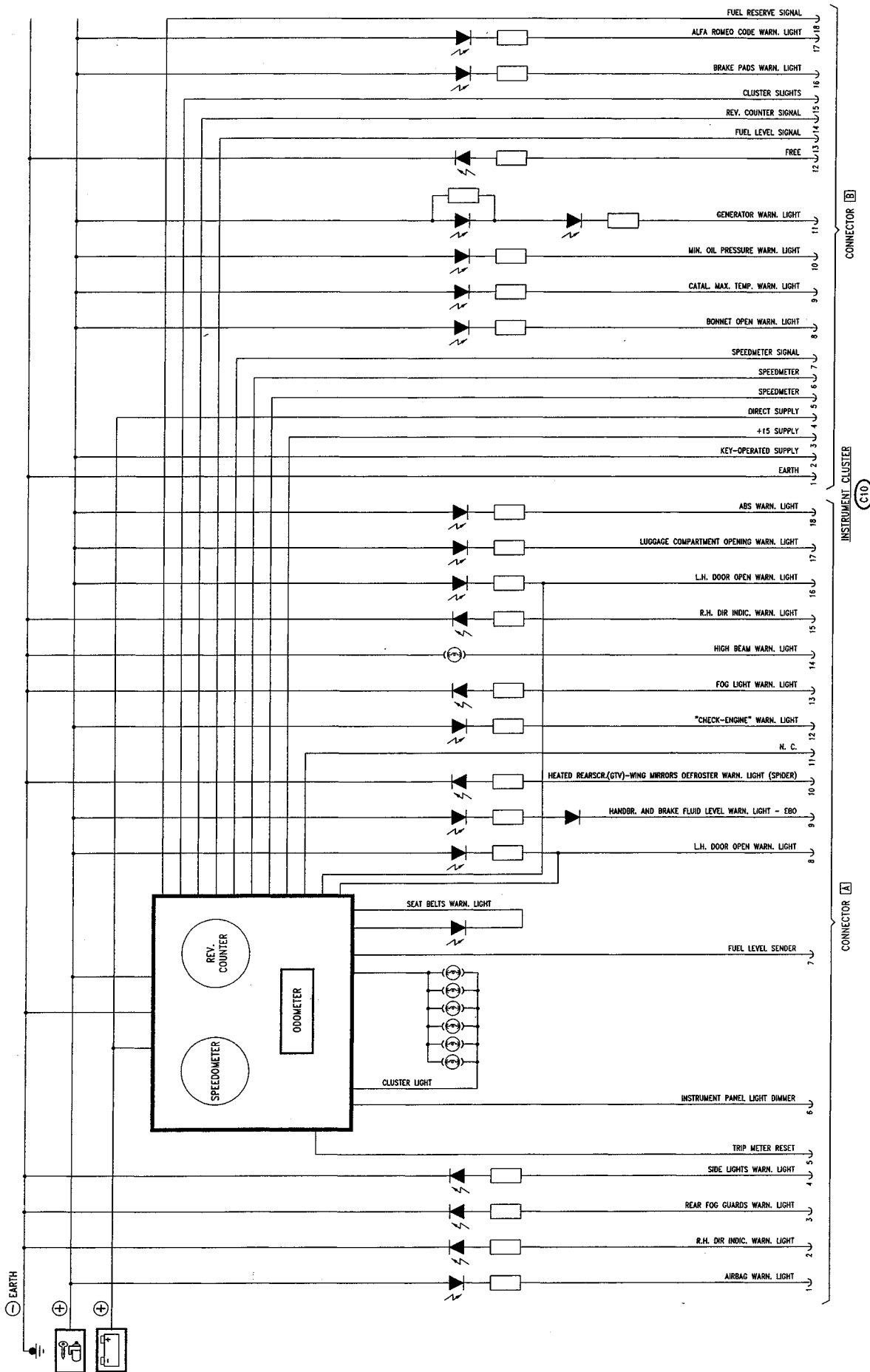
(printed circuit)

These wiring diagrams represent the printed circuit and the connections inside the instrument cluster **C10** and of the auxiliary panel **C18**.

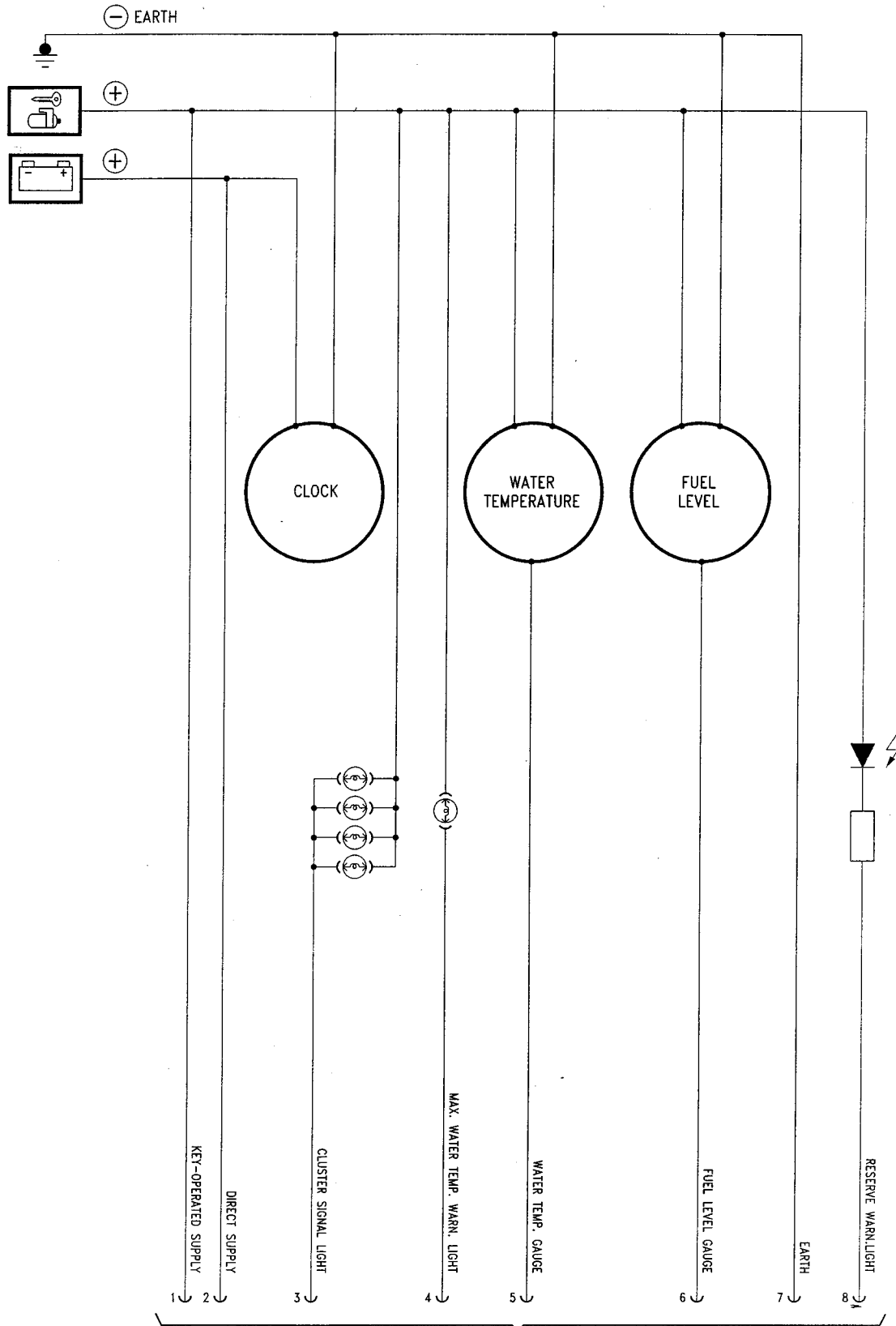
In the other diagrams concerning the outside connections of one of the panels, only the lines concerned are shown, while this diagram gives an overall view of the entire instrument cluster **C10** or panel **C18**.

NOTE: not all the output pins are connected for all the versions of the car: some lines in the diagram of **C10** therefore might not be used (e.g. warning lights not connected) but they are still present on the printed circuit, which is the same for all versions.

Main cluster internal wiring diagram (C10)



Auxiliary panel internal wiring diagram (C18)




AUXILIARY
INSTRUMENT CLUSTER

(C18)

INSTRUMENT CLUSTER - CLOCK SUPPLY AND LIGHTING

The main instrument cluster **C10** and the auxiliary panel **C18** are supplied by direct voltage via fuse **F16** and with "key- operated" voltage via wander fuse **G389** (10A). Connection takes place respectively at pins 4 and 2 of connector B of the cluster **C10** and at pin 2 of panel **C18**.

Cluster **C10** is earthed by the cable leading from pin 1 of connector B, panel **C18** from pin 7, both towards earth **G53a**.

The two panels are lit by a set of bulbs (replaceable) adjusted by switch **B16** which enables the various levels of lighting pressing the pushbutton  a number of times: a signal is sent to pin 6 of connector

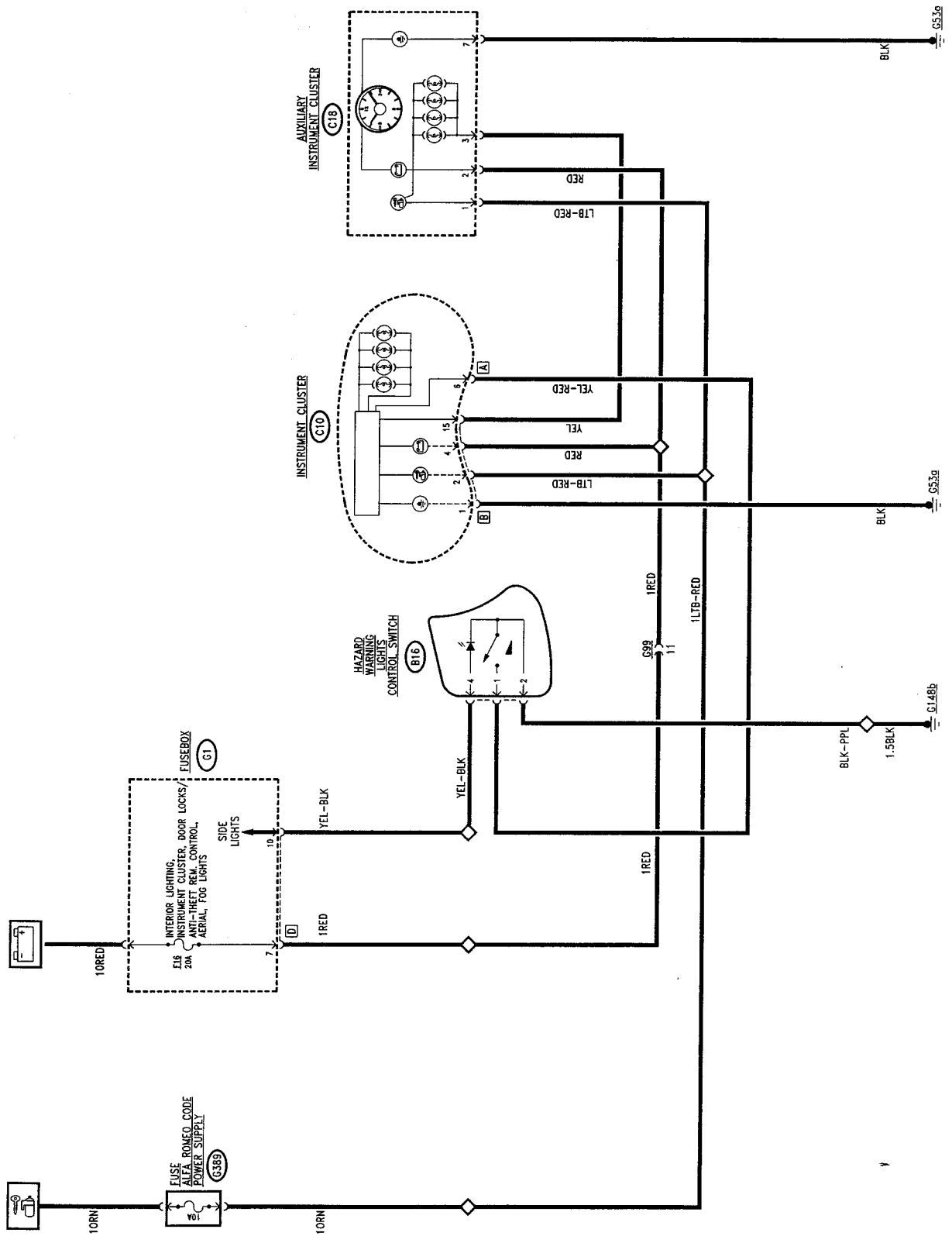
A of **C10** which reaches the electronic device inside the actual cluster. From the device the supply - variable between 12V (max. intensity) and 5V (min. intensity) through 10 intermediate steps - reaches the bulbs of panel **C10** and, via the line from pin 15 connector B of **C10** to pin 3 of **C18**, to panel **C18** itself.

Clock

The clock, located in panel **C18**, is supplied by direct voltage via fuse **F16** of fusebox **G1** which is connected to pin 2, while pin 1 is earthed.

N.B.: disconnecting the battery the clock stops, therefore it must be set using the pin provided when the power is reconnected.

Wiring diagram



MAIN INSTRUMENT CLUSTER: INDICATORS AND WARNING LIGHTS

The main cluster **C10** contains a number of indicators and warning lights.

The **rev counter signal** is supplied to the instrument cluster **C10** by the engine injection/ignition control unit **S11** which processes an "rpm" signal thanks to sensor **S31**.


The signal reaches the cluster **C10** at pin 14 of connector B, leading from connector **G133a** which connects the injection/ignition system with the other circuits; inside the cluster it then reaches the electronic device that operates the rev counter.


The **speedometer signal** is supplied by the speedometer sensor **L17**: this is fitted on the gearbox and detects the speed of the car at all times.

This device is a pulse generator which generates and processes a signal that is proportionate with the speed of the camshaft at the gearbox output, therefore with that of the wheels: it is a "square-wave" signal with 16 pulses per turn generated by a Hall-effect sensor.


The sensor **L17** is supplied at pin 3 with stabilised voltage through an electronic device inside the instrument cluster (from pin 3 of connector B of **C10**); pin 1 is connected to earth **G53b**, while the tachometric signal (proportionate with the speed of the car leaves pin 2 and is sent to the instrument cluster **C10**, pin 7 of connector B, and from here to the electronic device that operates the speedometer and the two mileage recorders (total and trip).


The same signal is also sent to the injection/ignition system which needs the "car speed".

Switch **B40**  makes it possible to **reset the trip meter** sending an earth pulse to the electronic device inside **C10**, pin 5 of connector A.


N.B. The seat belts warning light  is NOT connected to the seat belt buckle: it does not turn on to indicate that the belt has not been fastened, but is turned on by a command from the electronic device of **C10** for six seconds when the engine is started under all circumstances (seat belt fastened or not, engine running or not), and then goes off.


Two warning lights alert the driver in the event of problems on the **braking system**.

The two brake pad switches **H9** right and **H10** left are formed of a microswitch on the pad that closes to earth when the thickness of the pad thins, sending a signal to the instrument cluster **C10** at pin 16 of connector B, thereby turning on the "brake pad wear"  warning light.

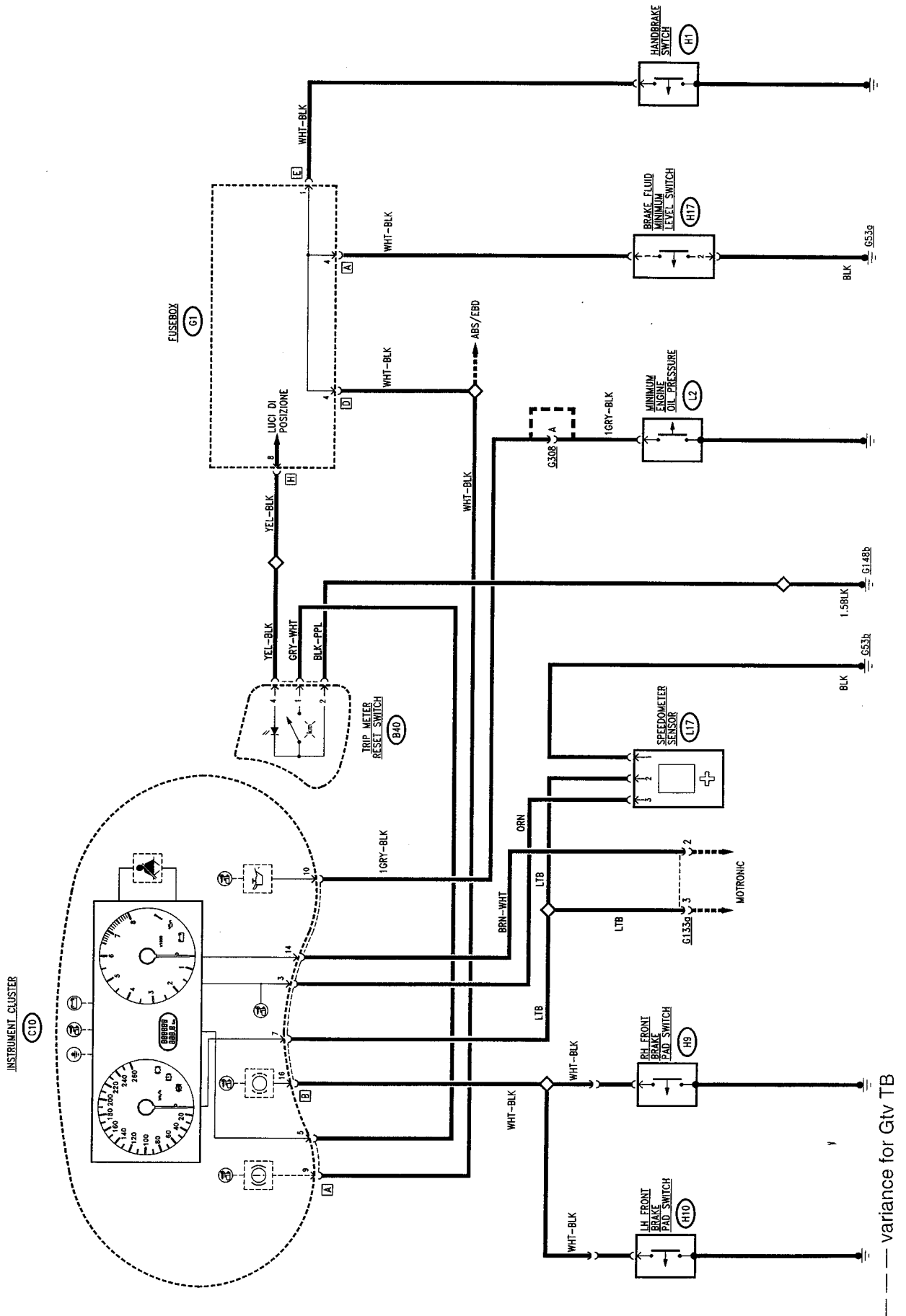
The handbrake switch **H1** closes when the handbrake lever is pulled and supplies a signal to the instrument cluster **C10**, at pin 9 of connector A, turning on the "handbrake engaged"  warning light.

The same warning light is also turned on to indicate "low brake fluid level" through switch **H17** located in the fluid reservoir: this is a float device which closes a contact when the level of the fluid in the brake fluid reservoir falls below a certain reference.

The warning light  is always turned on to indicate a fault on the "EBD" electronic braking control system (see "ABS" section).


The minimum oil pressure contact **L2**, fitted on the crankcase, closes when the pressure falls below a certain limit sending an earth signal to the cluster **C10** at pin 10 of connector B and thereby turning on the "minimum oil pressure"  warning light.

Wiring diagram



AUXILIARY PANEL: INDICATORS AND WARNING LIGHTS

The auxiliary panel **C18** contains two indicators with warning lights.

The **engine coolant temperature** is continuously shown by the special analogue indicator, and if the temperature is too high the "**maximum coolant temperature**"  warning light turns on.

The engine coolant temperature sender and maximum temperature warning light **L10** is fitted on the crankcase and comprises a thermistor which generates a signal proportionate with the temperature of the fluid and a contact which closes to earth when the fluid

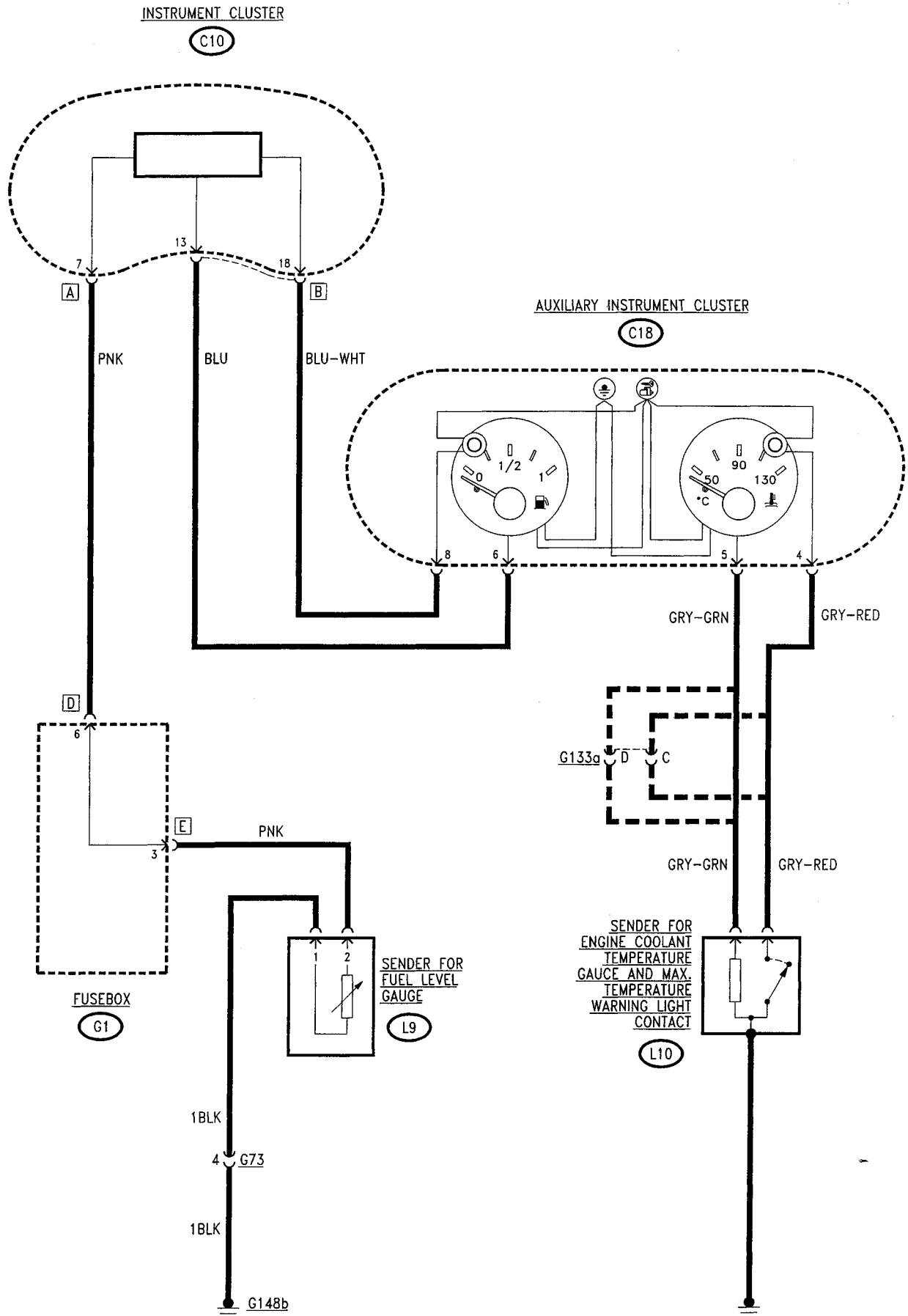
reaches an excessive temperature. The first signal is sent to panel **C18** pin 5, and the second one to pin 14.

The **fuel level** sender **L9** is a sensor submerged in the fuel tank, the resistance of which changes as the level in the actual tank changes.

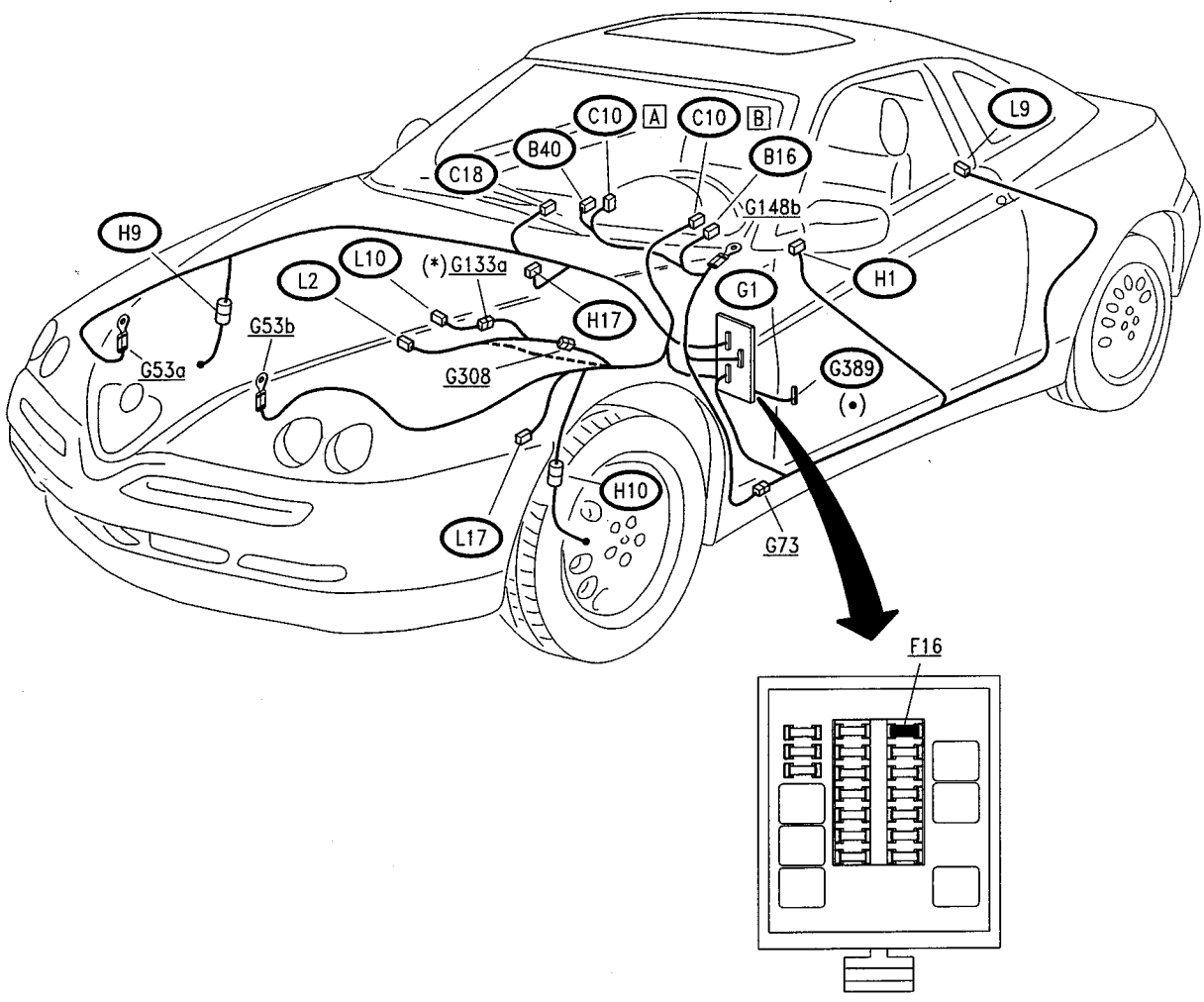
An earth signal reaches pin 1 of **L9**, while a signal proportionate with the level is sent by pin 2, via the fusebox **G1**, to the instrument cluster **C10**, pin 7 of connector A.

Inside the cluster **C10** an electronic device processes this signal and sends two pieces of information to panel **C18**: the first proportionate with the **level**, from pin 13 of connector 8 of **C10** to pin 6 of **C18**; the second concerning the "**reserve**" from pin 18 of connector B of **C10** to pin 8 of **C18** ■

Wiring diagram



LOCATION OF COMPONENTS



- (•) Red fuseholder
- (*) Gtv 3.0 24V only
- — Gtv V6 TB only

FAULT-FINDING TABLE

NOTE: The faults described below ("warning light not working") give a summary of all the cases in which the warning light is not operating correctly: e.g. the warning light turns on to indicate a failure and this failure does not exist, or vice-versa, a function has been switched on and the warning light fails to show it, etc...
 The faults of warning lights not described here are to be found in the section concerning the system to which they refer: eg. for the high-beam warning light, see the section "Low and high-beam headlamps"

Fault	Component to be checked													
	G389	F16	C10 (1)	C18 (2)	B16	B40	L17	L2	L10	L9	H17	H1	H9	H10
All lights on instrument panel are out	•	•	•											
Auxiliary panel off (not working)	•	•		•										
Main cluster fails to light up			•		•									
Auxiliary panel fails to light up			•	•	•									
Speedometer			•				•							
Rev counter			•											
Trip meter reset			•			•								
Clock		•		•										
Water t. gauge				•				•						
Fuel gauge and reserve warning light			•	•					•					
Handbrake & low brake fluid level warning light (*)			•							•	•			
Brake pad wear warning light			•										•	•
Seat belts warning light (**)			•											
Min. oil pressure warning light			•					•						
Max. water t. warning light				•					•					

(*) The warning light in question also turns on to indicate a fault on the electronic braking control system (see "ABS" section).

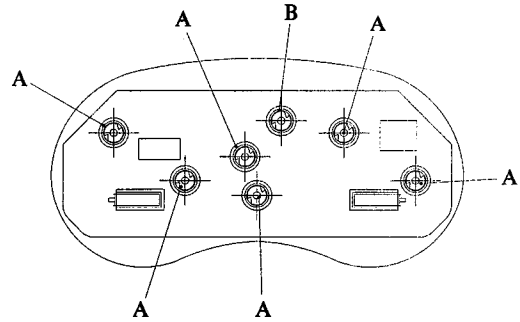
(**) The seat belts warning light is NOT connected to the seat belt buckle: it does not turn on to indicate that the belt has not been fastened, but is turned on by a command from the electronic device of C10 for six seconds when the engine is started under all circumstances (seat belt fastened or not, engine running or not), and then goes off.

N.B.: Both the main cluster and the auxiliary cluster are made as a single component: all the connections inside are made on a printed circuit which connects the contacts of the instruments and of the various warning lights. **Repair operations are therefore not possible, not even changing bulbs, with the exception of the following:**

(1) Main instrument cluster: (C10)

Replaceable:

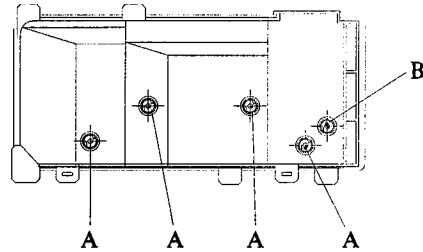
- cluster lighting bulbs (A);
- high beam warning lights (B).



(2) Auxiliary instrument cluster: (C18)

Replaceable:

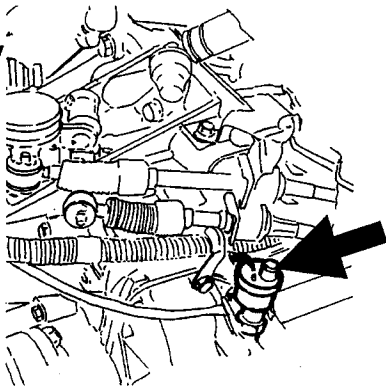
- cluster lighting bulb (A);
- max. coolant temperature warning light (B).



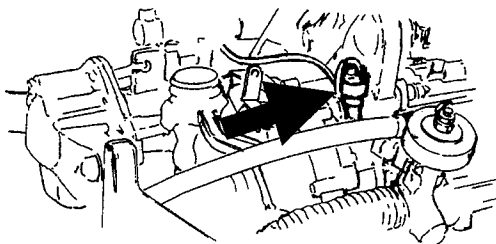
CHECKING COMPONENTS

Speedometer sensor (L17)

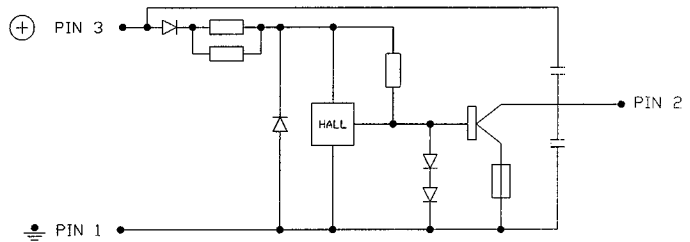
3.0 V6
3.0 V6 24v
2.0 TB



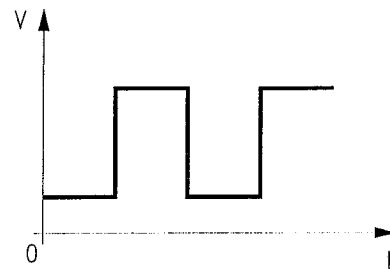
2.0 T.S. 16v



Wiring diagram:

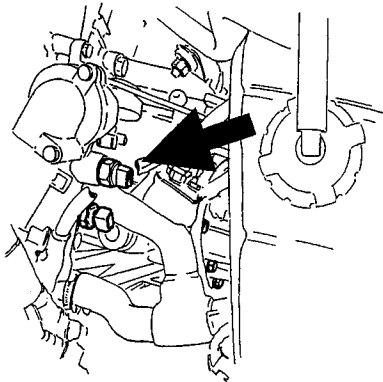


Output signal trend (with car on the move): voltage at pin 2: 16 pulses per turn

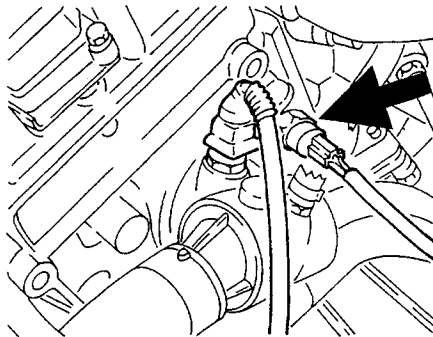


Sender for engine coolant temperature gauge and warning light contact max. temperature **(L10)**

3.0 V6
3.0 V6 24v
2.0 TB

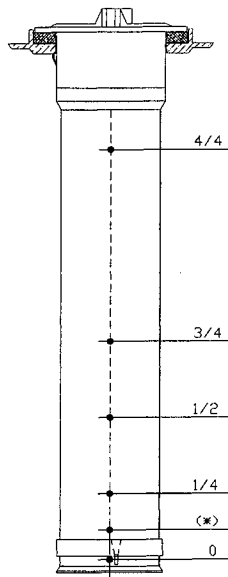


2.0 T.S. 16v



SPECIFICATIONS		
Sender		
Temperature °C	Resistance Ω	Type of fluid for check
60	525 ÷ 605	Water
90	195 ÷ 245	Water
120	82 ÷ 94	Glycerine
Contact		
	3.0 V6-3.0 V6 24v 2.0 TB	2.0 T.S. 16v
Contact closes	115 ± 3°C	122 ± 2°C
Contact opens	≥ 102°C	112 ± 3°C

Fuel level sender **(L9)**



SPECIFICATIONS	
Level (see figure)	Resistance (Ω)
4/4	0 ÷ 6
3/4	59 ÷ 69
1/2	116 ÷ 126
1/4	186 ÷ 201
start of reserve (*)	262
0	295 ÷ 315

(*) 8.5 ÷ 10.5 litres