DOOR LOCKING SYSTEM

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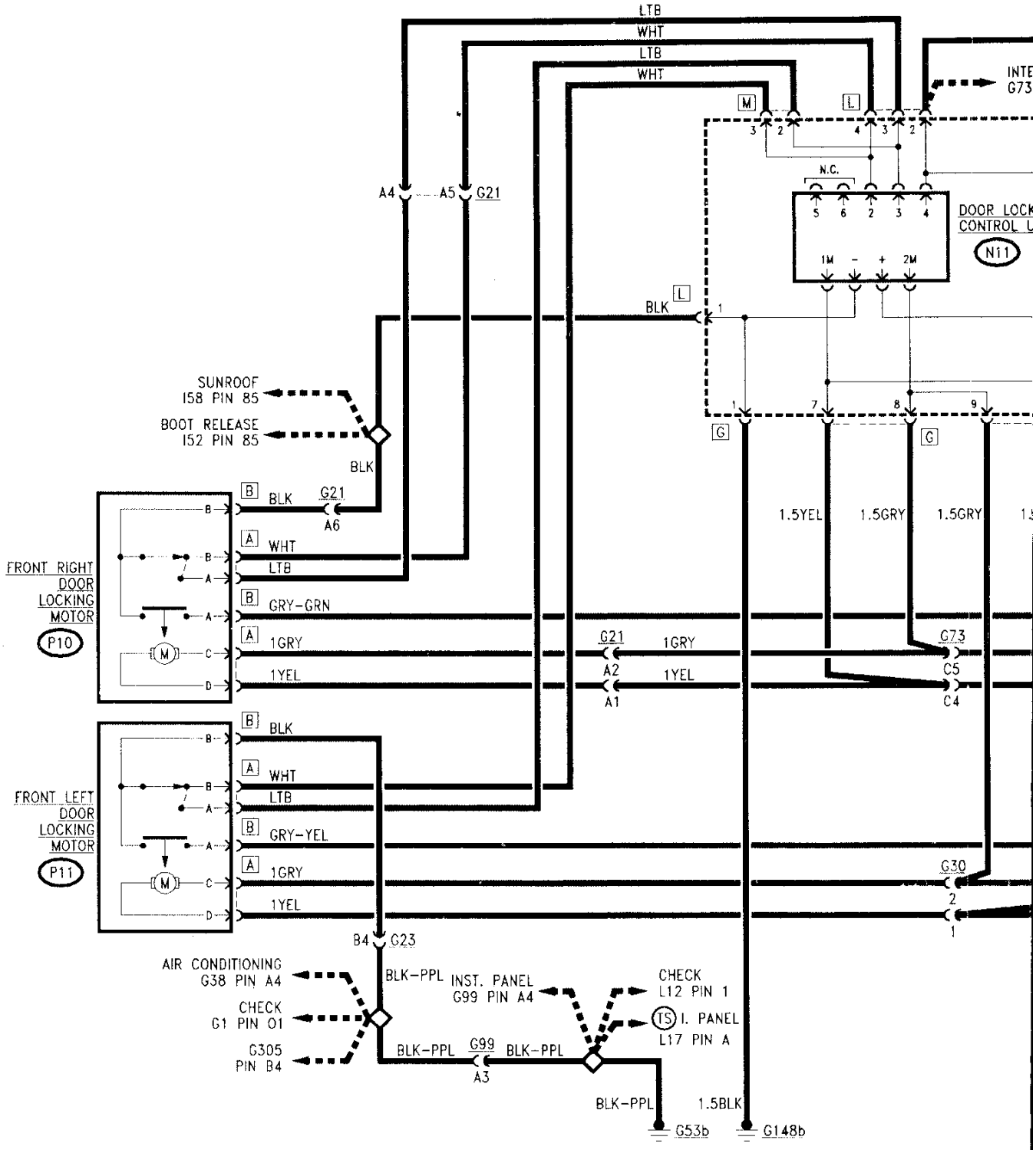
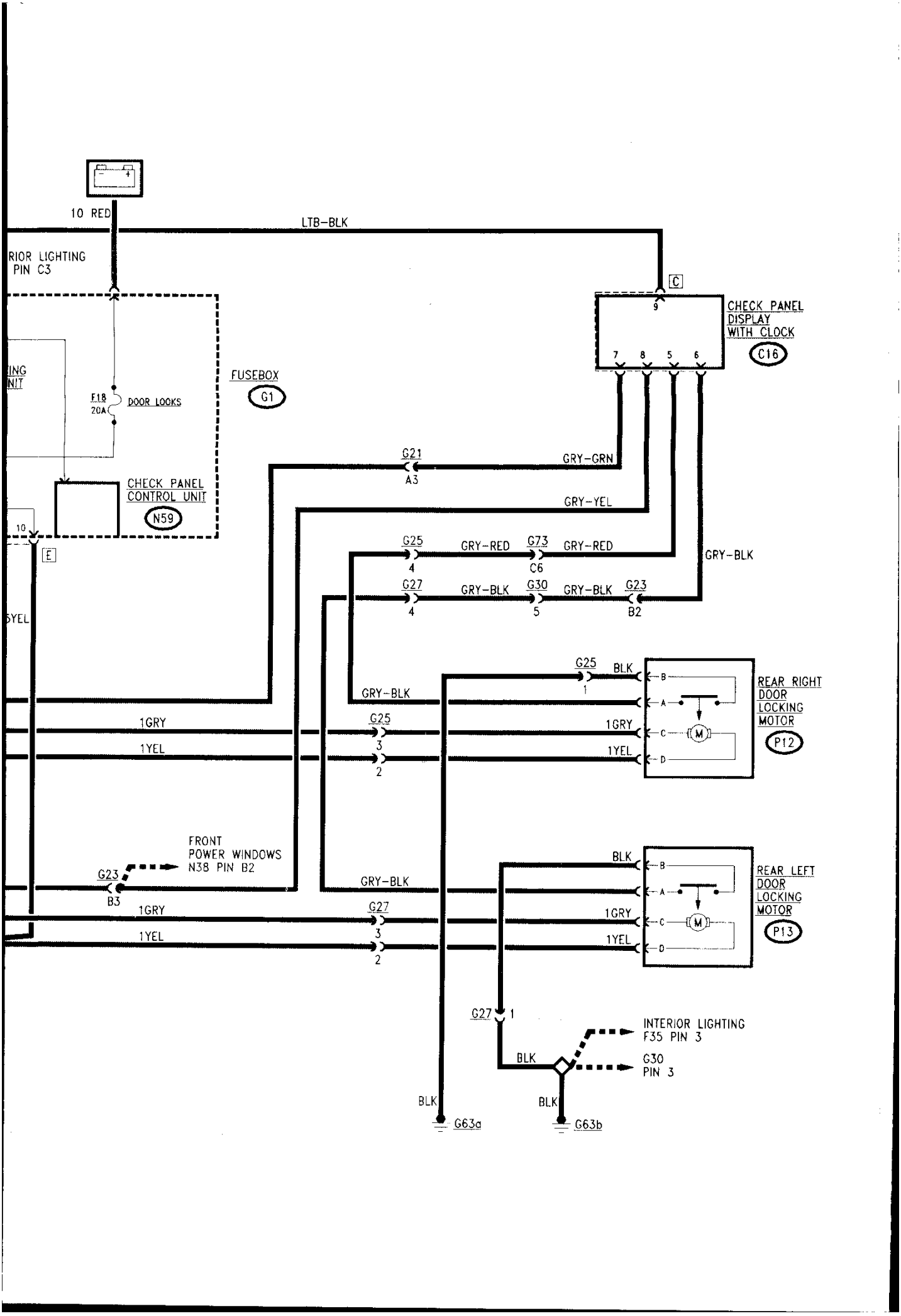
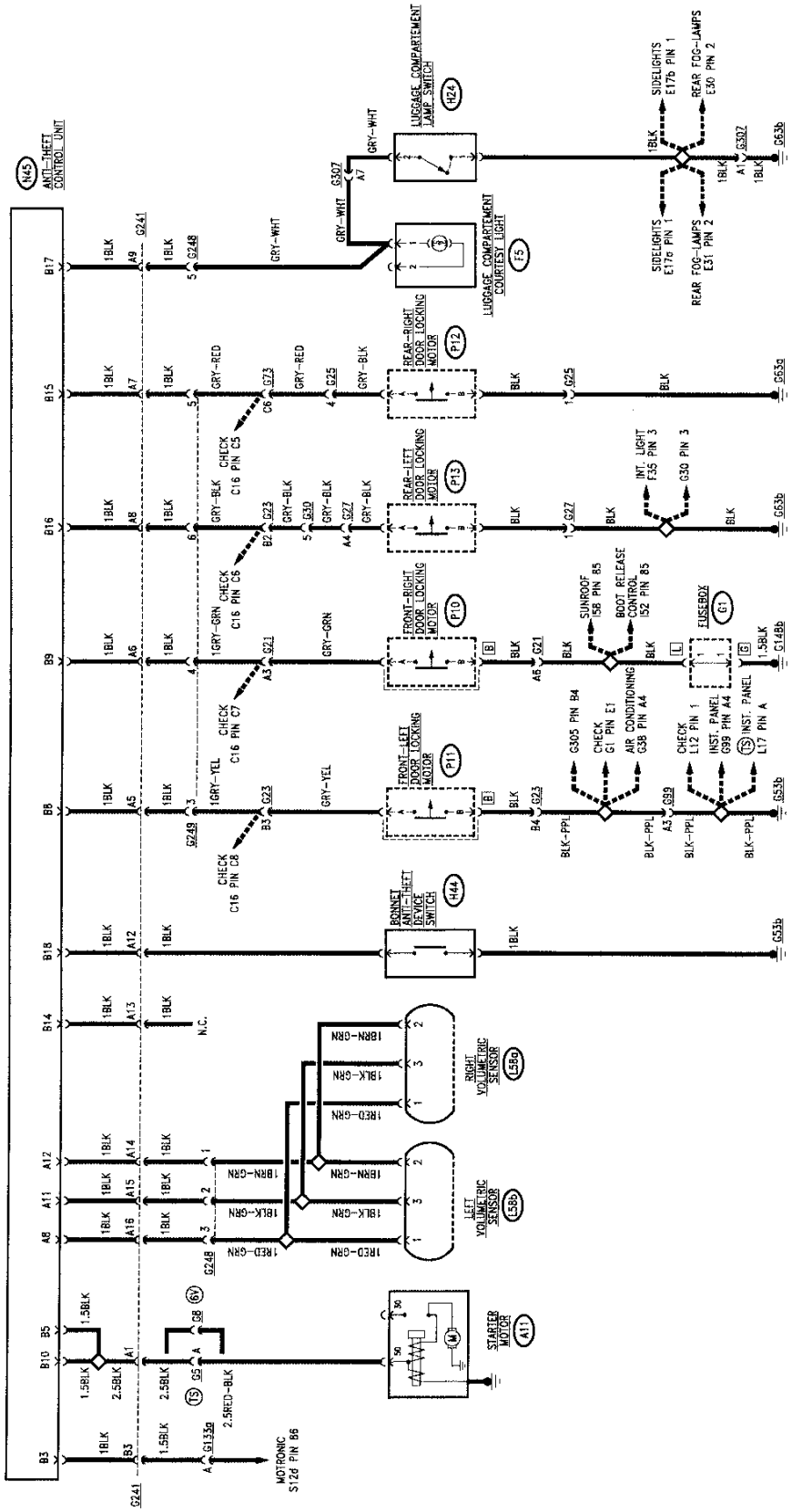
WIRING DIAGRAM




10 RED
LTB-BLK
RIOR LIGHTING
PIN C3
ING
NIT
F18
20A
DOOR LOCKS
FUSEBOX
G1
CHECK PANEL
CONTROL UNIT
N59
10
E
C
9
CHECK PANEL
DISPLAY
WITH CLOCK
C16
7
8
5
6
G21
A3
GRY-GRN
GRY-YEL
G25
4
GRY-RED
G73
C6
GRY-RED
GRY-BLK
G27
4
GRY-BLK
G30
5
GRY-BLK
G23
B2
5YEL
G25
1
BLK
GRY-BLK
1GRY
G25
3
1YEL
2
B
A
C
D
M
REAR RIGHT
DOOR
LOCKING
MOTOR
P12
FRONT
POWER WINDOWS
N38 PIN B2
G23
B3
BLK
GRY-BLK
1GRY
G27
3
1YEL
2
REAR LEFT
DOOR
LOCKING
MOTOR
P13
G27
1
INTERIOR LIGHTING
F35 PIN 3
BLK
G30
PIN 3
BLK
BLK
G63a
BLK
G63b

WIRING DIAGRAM B

N.B: All the wires located in the luggage compartment are BLACK (BLK) in order to decrease the risk of tampering if the luggage compartment is opened without triggering the switch (**H44**)



GENERAL DESCRIPTION

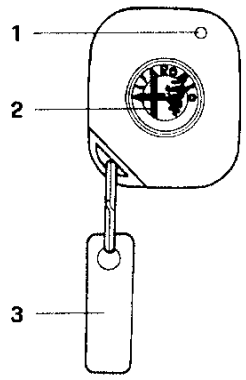
As an optional the vehicle can be set for the installation of an anti-theft device coupled with the remote controlled centralized locking system.

The device used is of the perimeter/volumetric (**V.A.S.**) type fitted with a single compact unit which includes the electronic control unit and the siren. The system is "universal" as it offers the possibility of using the remote control, to set the control unit according to the requirements of the various countries (acoustic level and exclusion of flashing of hazard warning lights).

NOTE: THE V.A.S. ALARM SYSTEM IS, FOR THIS VERSION, COMBINED WITH THE ALFA ROMEO CODE SYSTEM: THIS WAY DOUBLE PROTECTION FOR ENGINE STARTING IS GIVEN:

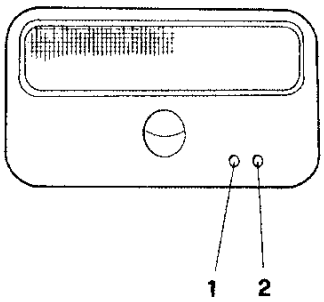
- **INHIBITING OF THE IGNITION/INJECTION CONTROL UNIT (ALFA ROMEO CODE);**
- **IGNITION/INJECTION CONTROL UNIT SUPPLY CUT OFF (V.A.S.).**

The **transmitter**, protected by a rubber shock-proof shell is composed of a printed circuit and an infrared emitter. It is battery powered (2 3 V lithium batteries) and each time the relative button is pressed it sends and infrared beam in the direction in which it is pointed.
It is an infrared device and continually transmits the code number for the entire time during which the button is pressed. A led comes on each time a signal is emitted.

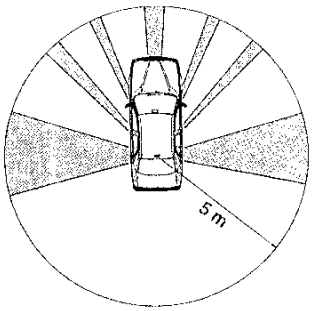


Transmitter
1 - Led
2 - Command button
3 - Plaque showing transmitter code

The **receiver**, built into the rear roof light is an electronic device which captures the infrared signal through a protruding dome on the receiver itself. A led will also come on on the receiver when the signal is received while a button permits the memorization of the secret access code. The particular shape of the dome enables the signal to be captured through 360 degrees as long as the transmitter is no more than 5 metres from the receiver (see shaded area in diagram).



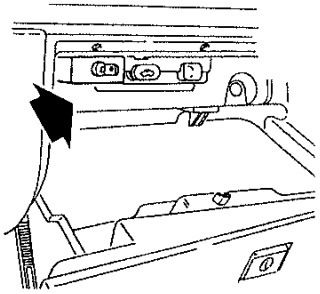
Receiver
1 - Store button
2 - Led



Shadow areas and operating radius of remote control

The **electronic control unit** also includes a **siren** of the compact type and is located under the front left-hand wing behind the lokari.
The siren operates with different intensity depending on the programming for the various countries (see indication given below).

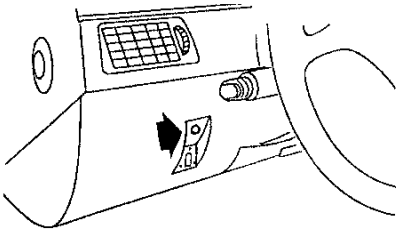
The **emergency key** used to deactivate the system is located in an easily accessible position: in the glovebox next to the glovebox light itself.



The same switches used for the door locking system are used to control the doors and boot (see "Door locking system").
The bonnet is covered by a **switch**.
All the switches signal the "open" state of the doors or bonnet/boot controlled (closed = earth signal to control unit).

The two **volumetric sensors** make it possible to increase the surveillance ensuring that the vehicle is not broken into. These are located above the rear doors, one operating as a transmitter and the other as a receiver. The ultrasound beam which is emitted from the first (that on the left) must be captured in its entirety by the second (on the right-hand side) otherwise an alarm signal is sent to the electronic control unit.

The systems **led** (red, of the high efficiency type) is located on the dashboard to the left of the steering wheel and signals the state of the system and any anomalies (see description below).



OPERATION

ENABLING/DISABLING

It is only possible to enable the alarm when the ignition key is in the STOP position.

ENABLING is possible by pressing the button on the transmitter.

DISABLING is obtained by pressing the same button once again.

To obtain the most efficient switching, press the button until a visual and acoustic signal are noted (feed-back).

N.B. The system is protected against unauthorised recording of the secret code.

Enabling

Press the button whilst pointing the transmitter towards the receiver dome. Acoustic and optical signals will be noted (for the markets/versions foreseen).

Disabling

Press the button pointing the transmitter towards the receiver dome.
Also for disabling acoustic and optical signals will be noted (for the markets/versions foreseen).

COMPLETE DEACTIVATION OF THE SYSTEM

If the batteries of the transmitter are flat or the system is not working properly, the alarm system can be deactivated using the emergency key on the control unit.
When the car is delivered this emergency key must be in the "ON" position.
Turning the key to "OFF" the system is deactivated completely. In the specific version for some markets, only the batteries inside the control unit/siren are deactivated, leaving the alarm system activated as it is still supplied by the car battery.
With the key at "OFF" the surveillance of the cable cutting/battery disconnection is no longer activated.

Set this key to "OFF" and disconnect the battery cable if the vehicle is left unused for long periods (over 1 month).

"SURVEILLANCE" MODE

During the "surveillance" mode (car closed and alarm activated) the dissuasion led flashes at 0.8 Hz, in this conditions, the system;

- checks the doors, bonnet and tailgate;
- checks that the battery is connected and that the leads are intact;
- checks that the ignition key is not being tampered with;
- checks movements inside the passenger compartment (volumetric sensors);
- cuts off the supply to the starter motor (provided that the key is turned to MARCIA)and deactivates the engine electronic control unit.

ALARM MODE

The system enters the alarm mode when one of the surveillance sensors detects an abnormal situation.

The alarm mode can trigger a warning system to the outside (activation of the siren and blinkers, with times varying according to the versions/markets). There are other countermeasures such as: cutting off the engine supply (Motronic control unit supply) and starter motor supply cut off.

The alarm ceases:

- with a command from the transmitter (deactivation);
- 25 min. after the last activation of the alarm mode;
- by turning the emergency key.
  (N.B.: in this case the alarm activated condition is stored in the control unit memory).

SELF-DIAGNOSIS

UPON ACTIVATION the system carries out self-diagnosis (indicated by the flashing of the LED at 4 Hz). If a fault is found, the LED will identify it through a special flashing code as shown in **table 1.**

Table 1: Selfdiagnosis signals

Type of flashing	Meaning
8 Hz, duration 2,5 sec.	Door/bonnet/tailgate left open or faulty switch
Fixed light, duration 2,5 sec.	Faulty volumetric sensors
16 Hz, duration 2,5 sec.	Fault in electronic control unit

When a door or bonnet/tailgate is found to be open/faulty or when a fault is detected on the volumetric sensors, the corresponding sensor is cut off by the surveillance mode and a beep signal is given one second after they are reactivated.

WHEN THE ALARM IS DISABLED the dissuasion LED flashes to indicate which of the sensors triggered an alarm during surveillance (see **table 2**).

N.B.: the signal is cancelled turning the ignition key to MARCIA

Table 2: Signals indicating alarms

N. Flashes*	Component with alarm
1 Flash	Right front door
2 Flashes	Left front door
3 Flashes	Rh door rear
4 Flashes	LH rear door
5 Flashes	Volumetric sensors
6 Flashes	Bonnet
7 Flashes	Tailgate
8 Flashes	Key-operated supply cut off
9 Flashes	Battery supply cut off
10 Flashes	At least 3 causes of alarm contemporaneously

(*) If there is more than one, the alarm codes are presented in sequence.

The flashes last for 0.5 sec. with an interval of 1.5 sec. between them.

In addition to the automatic SELF-DIAGNOIS described here, it is also possible to check the system by MANUAL DIAGNOSIS (see "FAULT-FINDING").

INHIBITING THE INTERIOR SURVEILLANCE SYSTEM

It is possible to inhibit interior surveillance in one of the following ways:

a) in close sequence (prior to enabling the alarm system): starting from the MARCIA position, move the key to: STOP, MARCIA, STOP.

Confirmation of the inhibition of the interior surveillance system is given by the lighting up of the dissuasion LED for appr. 2 sec.

b) starting from the key in the MARCIA position, press the button on the receiver (for less than 0.5 sec.) no longer than 8 sec. before turning the key to STOP. Confirmation that the interior surveillance system is deactivated is given by the lighting up of the LED on the ceiling light for appr. 2 sec.

The next time the key is turned to MARCIA the interior surveillance system is re-enabled.

WARNING: It will be possible to turn the key to MARCIA for a maximum of 30 sec. without re-enabling the interior surveillance system (for example to allow the closing of electric windows which may have been left open accidentally).

SELF-ENABLING (only for certain Markets)

The self-enabling system ensures that the alarm system is partially enabled automatically after a certain period of time - 4 minutes - from when the car is left by the driver.

This takes place under the following two conditions:

- ignition key moved from MARCIA to STOP;
- opening followed by closing of the driver's door.

The surveillance system operates in the same way as when activated by the remote control with the exception of the following points:

- the doors are not locked;
- interior surveillance is not activated.

The opening of the driver's door before the delay time for self-enabling - 4 minutes - stops and resets the counter: the closing of the door will make the counter resume from the beginning.

In order to regain possession of the car, the owner must disable the system via the remote control, which must be pressed twice in two separate phases:

- **the first press activates the alarm system completely;**
- **the second one deactivates the alarm system and opens the doors.**

PROGRAMMING THE TRANSMITTER

Upon leaving the factory the receiver contains a **"UNIVERSAL" code** which can be controlled by a "UNIVERSAL" transmitter for inspection and moving the car in the factory. On delivery it is therefore necessary to reprogramme the receiver with the transmitter code so that only the owner will have authorised use of the vehicle.

There are two possible programming modes:

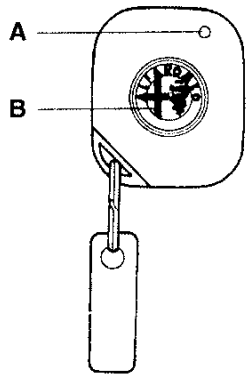
a) before entering the password: **SIMPLIFIED PROGRAMMING**;

b) after entering the password: **PROTECTED PROGRAMMING**;

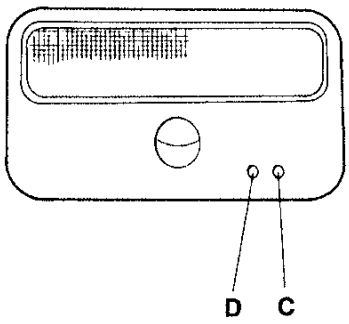
The memorising of a transmitter must be carried out with:

- the alarm system deactivated (by remote control); the warning led on the panel must be off;
- the emergency key at "ON";
- the ignition key at STOP.

Each transmitter has a label with a four-figure number to protect the system from unauthorised programming (protected programming) which must be removed by the customer on delivery of the vehicle and kept in a safe place.



Transmitter
A - Luminous led
B - Control button



Receiver
C - Luminous led
D - memorising button

SIMPLIFIED PROGRAMMING

Simplified programming is for use when no remote controller data has previously been entered in the memory and the system needs to accept all transmitters, i.e. when the memory has not yet been "locked" by protected programming.

In this programming mode as many codes as required are recognised, but only the last four are memorised.

Proceed as follows:

1. press button **D** on the ceiling light: LED **C** flashes;
NOTE: if the led does NOT flash, check that the alarm system is de-activated or that the receiver on the ceiling lamp is correctly powered.

2. keeping the receiver button **D** pushed, press the transmitter button **B**, point it towards the receiver, but at least 20 cm. from it: the led of transmitter **A**, must flash no more than once;

3. LED **C** lights continuously indicating that the code has been memorised: at this point the operator can release button **D** to end programming.
In the 3 sec. following the release of the button, it is possible to programme the country code to suit the country in which the car will be used.

This is performed by pressing in quick succession the button of the receiver **D**, as shown in **table 3**.

If the button is not pressed, the country code defaults to E.E.C. In the event of further memory storage operations, the last one remains in the memory.

If the procedure has been carried out correctly, the LED on receiver **C** will flash 6 times, indicating that the code has been memorised on both the ceiling light receiver and in the control unit, if not, LED **C** will flash 18 times and it will be necessary to repeat the entire procedure starting from point 1 of simplified programming, after checking the correct connection between the control unit and the ceiling lamp

Table 3: Country Codes

No. of presses	Country
1	ITALY
2	GERMANY (*)
3	FRANCE
4	SWITZERLAND
5	UNITED KINGDOM
6	HOLLAND
7	USA
8	EEC
9 / 10	Others

(*) Not used in this country, because in this country a specific control unit with a special operating logic is foreseen.
As it is not easy to carry out this procedure in such a short time as 3 seconds, a **different procedure for entering the Country code** is recommended. To do this, proceed as follows:

- open the bonnet;
- turn the ignition key from MARCIA to STOP: within 15 seconds the bonnet button must be pressed 7 times in quick succession in less than 10 seconds; 5 beeps will indicate entry in MANUAL DIAGNOSIS (see FAULT-FINDING). During these 5 beeps press the bonnet switch once again. A last long beep will signal the acceptance of this new operation;
- keep the button pressed throughout the duration of the long beep. The latter signals entry into the country programming mode, thus the possibility to enter the country code;
- release the switch and press it within 10 seconds the number of times mentioned in table 3 to select the operating mode of the country required (each press will have a feedback beep).

N.B. To enter another remote control repeat the operations from point 1 of simplified programming, provided that the memory has been "loked" as described below.

PROTECTED PROGRAMMING

To prevent unauthorised persons from entering their own code, it is necessary to protect ("lock") the memory; this operation takes place automatically after 256 activations/deactivations of the alarm system, or by entering the password (locking the memory manually).

Locking the memory manually

Protected programming can be entered by the Owner by entering the Password (four digit code on the transmitter label) before 256 activations/deactivations (for example on a new car during pre-delivery, when all the codes of the remote controls given to the Customer have been entered).

To enter the Password:

1. Press the button on receiver **D** for appr. 2 seconds; LED **C** will flash for the whole time in which the button is pressed.

2. Release button **D**: after appr. 2 seconds LED **C** will flash once indicating the possibility to enter the first digit of the password.

3. Press the button of the receiver **D** the number of times corresponding to the first figure of the password (for example if the Password is 5.2.0.3. press 5 times). Each time the button is pressed LED **C** lights up briefly to confirm;

4. After appr. 2 seconds from the last press on button **D** (the fifth in the example) led **C** will flash again to ask for the next figure.

5. Proceed as described above for all the other figures.

NOTE:
When the password (see example) contains a "0" there is no need to press button **D**, simply wait for the request for confirmation of entry indicated by the next flash.

When the four figures of the Password have been entered, the LED on the receiver **C** can behave as follows:

- **it does not light up**: this means that the Password has been entered correctly and that it belongs to one of the codes of the remote controls memorised;
- **it stays on continuously** for several seconds meaning that the password has not been entered correctly or it does not correspond to any of the remote controls memorised. In this case, when LED **C** goes off, the correct Password should be entered beginning from point 1.

With the correct entry of the password the memory is "locked".
From now onwards, if attempts are made to memorise a new remote control, after transmitting the new code, LED **C** on the ceiling light will stop flashing to indicate that the operation is unsuccessful.
In this case, to enter the code of the new remote control the memory has to be "re-opened" by the following procedure.

Memory opening

When the memory has been "locked" further remote control codes are entered by "**manual memory opening**".

The memory is opened as follows:

1. press the button on receiver **D** for appr. 2 seconds; LED **C** will flash for the whole time in which the button is pressed;

2. Release button **D**: after appr. 2 seconds LED **C** will flash once indicating the possibility to enter the first digit of the password.

3. Press the button of the receiver **D** the number of times corresponding to the first figure of the password (for example if the Password is 5.2.0.3. press 5 times). Each time button **D** is pressed LED **C** lights up briefly to confirm;

4. After appr. 2 seconds from the last press on button **D** (the fifth in the example) led will flash again to ask for the next figure.

5. Proceed as described above for all the other figures.It should be noted that when the password (see example) contains a "0" there is no need to press the button, simply wait for the next request.

When the Password hase been entered, the LED **C** can behave as follows:

- **it stays on continuously** meaning that the password has not been entered correctly or it is not present in the memory. Repeat the memory opening operations (with the correct password) from point 1;
- **it starts flashing**; this means that the password has been entered correctly (memory opening) and that it belongs to one of the remote control codes memorised.

At this point to memorise the code of the new transmitter proceed as described at point 1 of "Simplified programming".
When the new remote control has been entered the memory returns to the "locked" mode.

N.B.: The alarm system is activated/deactivated only by the code of the last transmitter memorised correctly (with the key at "ON").
In fact this code is memorised contempraneously by both the receiver and the alarm control unit.
Any transmitters memorised previously in the receiver, though they have different codes, utilise the code of the last transmitter memorised to control the theft alarm.If previously the receiver and alarm system were regularly controlled by a transmitter and subsequently another transmitter is memorised with the alarm system key at "OFF", the code of this subsequent transmitter is memorised by the receiver, which regularly operates central door locking, while the code of the first transmitter remains in the control unit.Under these conditions, the alarm system can no longer be controlled by the transmitter, which can only operate door opening/closing.
Simply setting the alarm system key to "ON" and memorising another new transmitter, the problem remains unsolved, as the system can duly memorise a new code only if this has been memorised with the alarm system key at "ON" and in succession after the first transmitter. It is necessary to "open the memory" (as described previously) with the first transmitter, and then correctly enter the other transmitters.

WARNING: It should be noted that each single component of the anti-theft system installed on the car becomes an integral part of it and must not be altered or tested on other cars, even if of the same model. Therefore, never exchange control units and/or receivers between two vehcicles. If a control unit is replaced, the memorising procedure must be repeated "re-opening" the memory. If a receiver (celing lamp) is changed, simplified programming must be carried out followed by protected programming.

FUNCTIONAL DESCRIPTION

The anti-theft system is controlled by the electronic control unit **N45** which is integrated with the siren.

The control unit is powered directly by the battery at pin A3 and crosses fuse **G258** (15A) at pin B7. The key-activated supply reaches pins B4 and B12.

Pin A9 is earthed (**G53b**).

The system activation signal comes from receiver **N67** to pin A2 of the control unit.

Through the receiver **N67** the opening/closing of the doors using the door locking control unit **N11** in fusebox **G1** is activated (for greater detail see "Door locking devices").

The control unit controls the closing of the doors and bonnet/boot through the door switches **P11, P10, P13, P12** (these are the same as those for the door locking device) which send an earth to pins B8, B9, B16 and B15. The bonnet is controlled by the switch **H44** which is connected to pin B18 and the boot by switch **H24** (which lights the luggage compartment light - see "Internal lighting") which is connected to pin B17.

The two volumetric sensors **L58a** (right, which acts as a receiver) and **L58b** (left, transmitter) receive power supply and earth from pins A8 and A11 of the control unit while the alarm signal returns to pin A12.

In addition to closing the doors, carried out directly by the receiver N67, the control unit activates the "blinker" (flashing of the hazard warning lights) sending a signal to switch **B12** through which these lights are activated manually; from pin B1 for the right-hand lights and from pin B2 for the left-hand lights.

Pin A1 of the control unit sends a 12V signal to the led **D31** when the conditions require it.

The emergency key **B97** makes it possible to disengage the system immediately by connection to the control unit: the common power supply starts from pin B13 and returns to pin A7 when the key is in the ON position and to pin A4 when the key is in the OFF position.

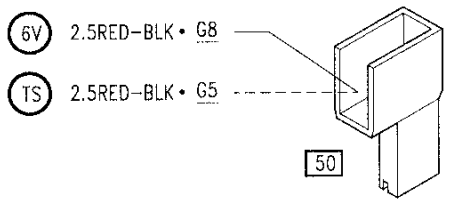
The anti-theft system intercepts the "key to starting position" signal (pins B6 and B11) which is passed on to the starter motor **A11** (from pin B5 to pin B10) only if the system is not subject to an alarm.

In the event of an alarm the power supply to the electronic injection control unit **S11** are cut off. This power supply (12V) is sent from pin B3 to **S11**.

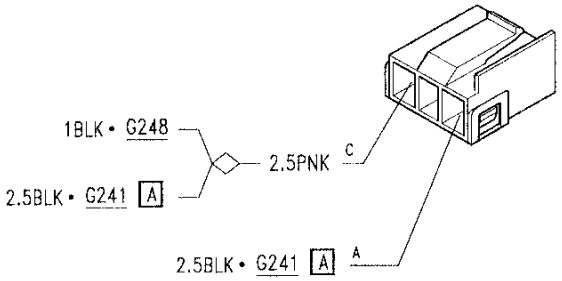
The system can be connected to the Alfa Romeo Tester through connector **T7**. The diagnosis signal - line K - leaves pin A6 of the control unit.

COMPONENTS AND CONNECTORS

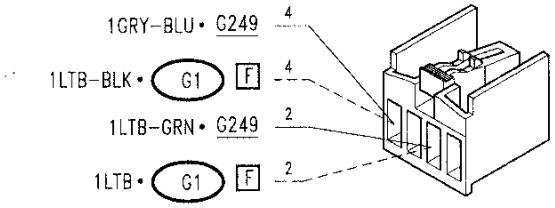
Starter motor	A11



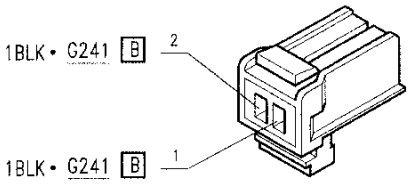
Ignition switch	B1 B



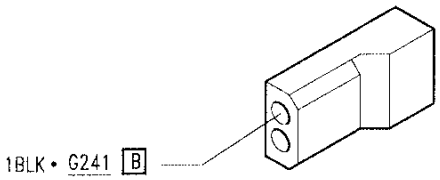
Hazard warning light switch	B12 B



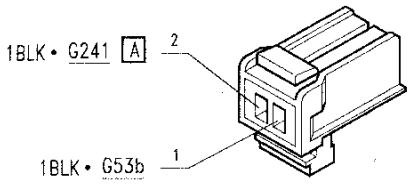
Emergency key switch	B97 A



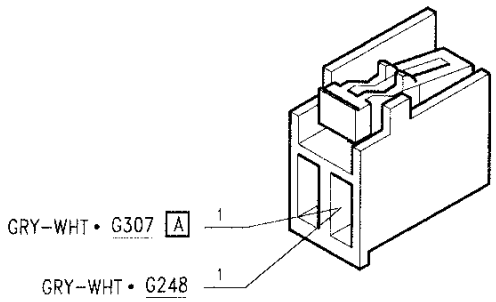
Emergency key switch	B97 B



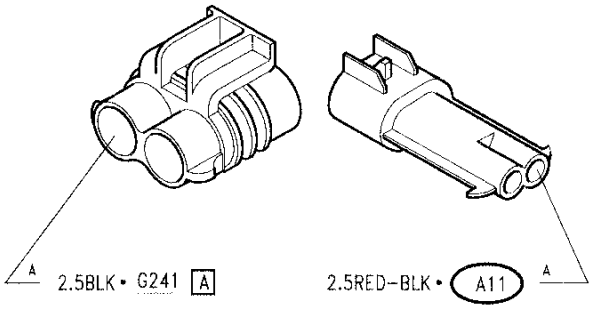
Anti-theft device led	D31



Luggage compartment light	F5



Multiple connection	G5



GENERAL DESCRIPTION

The door locking system is formed by an electronic control unit which controls and commands the door locks; each of these is composed of a gearmotor for blocking/releasing the locks, a control switch (connected to the electric circuit for the front doors only) and a switch signalling that the doors are open.
The logic of the control unit does not permit the blocking/releasing of the locks if a "door open" signal reaches it through the Check Panel (see "Check Panel").
The correct closure of all four doors permits the simultaneous activation of the gearmotors acting on either the control switches, from inside by the buttons, or from the outside with the key.

NOTE: for safety reasons the switches on the rear doors are only mechanical (and act only when when the relative door is closed) and do not act as an electric locking/unlocking control.

FUNCTIONAL DESCRIPTION

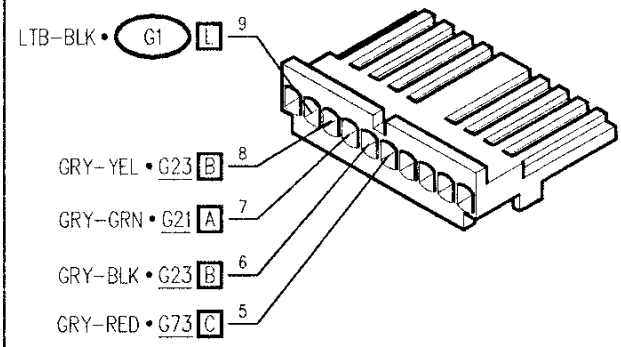
The door locking control unit **N11** is located in the fusebox **G1**.
It is supplied by battery voltage through fuse **F18** (20A) and is grounded.
Pins 2 and 3 receive a signal interpreted as a lock/unlock command originating from the switches of the front right **P10** and front left **P11** door locking motors; this signal is also "controlled" by the Check Panel control unit **N59** (see "Check Panel").
The logic of the control unit **N11** checks that there are no doors open; no signal must therefore reach pin 4 from the Check Panel display **C16** which collects all the signals from the "door open" switches of the four door locks **P10** front right, **P11** front left, **P12** rear right, and **P13** rear left (see also "Check Panel").
If all the doors are closed correctly, the control unit simultaneously sends a lock signal (pin 1M) or an unlock signal (pin 2M) to the gearmotors of the four door locks **P10, P11, P12 and P13.**

TROUBLESHOOTING TABLE

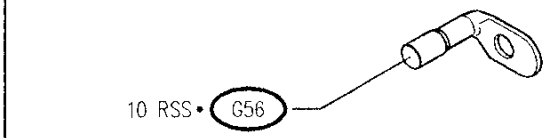
Malfunction	Component						Test
	F18	N11	P10	P11	P12	P13	
Door locks not working	•	•					A
Front left door open				•			B
Front right door open			•				C
Rear left door open						•	D
Rear right door open					•		E
Front left motor		•		•			F
Front right motor		•	•				G
Rear left motor		•				•	H
Rear right motor		•			•		I

COMPONENTS AND CONNECTORS

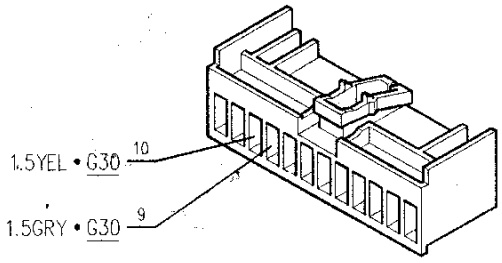
Check panel display with clock C16 C



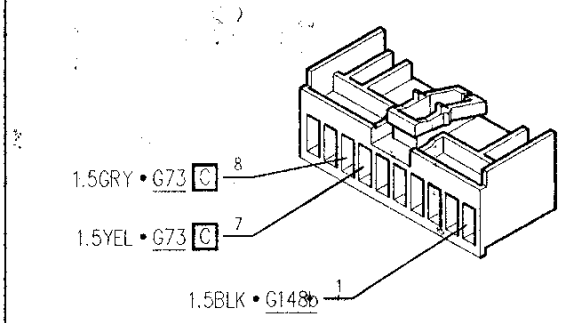
Fusebox G1



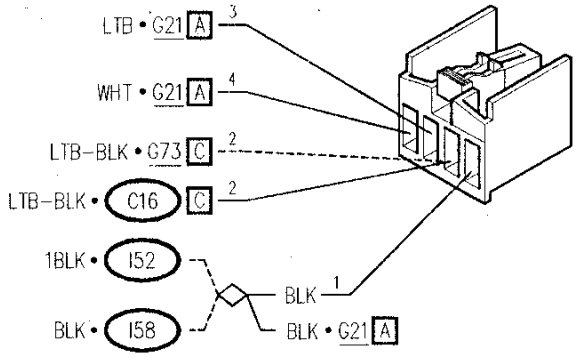
Fusebox G1 E



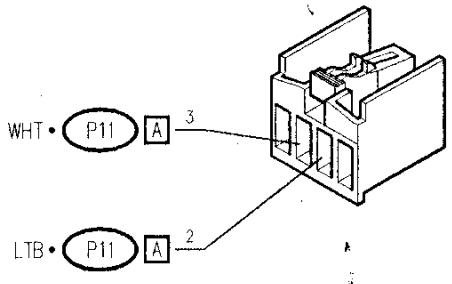
Fusebox G1 G



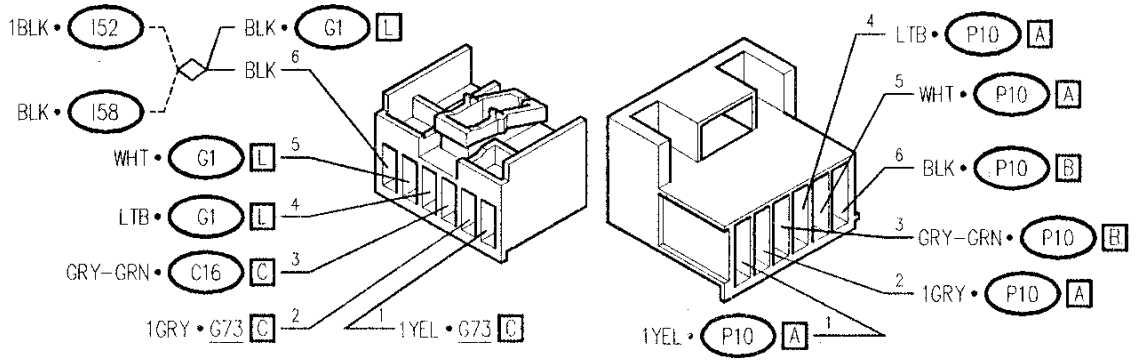
Fusebox G1 L



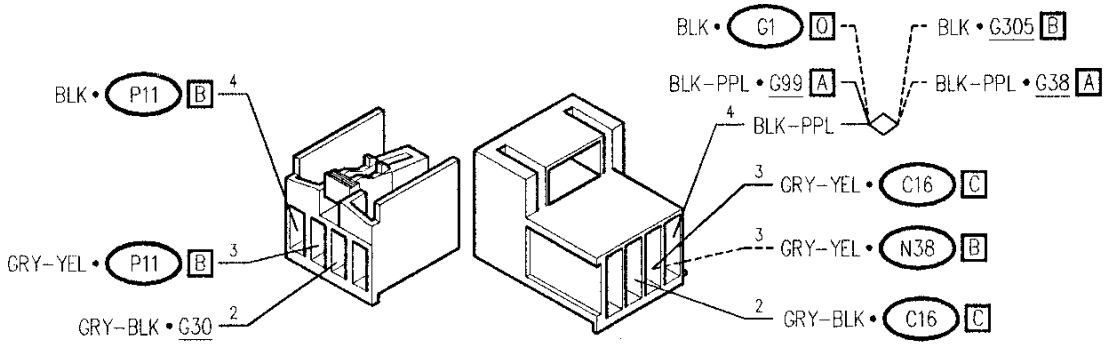
Fusebox G1 M



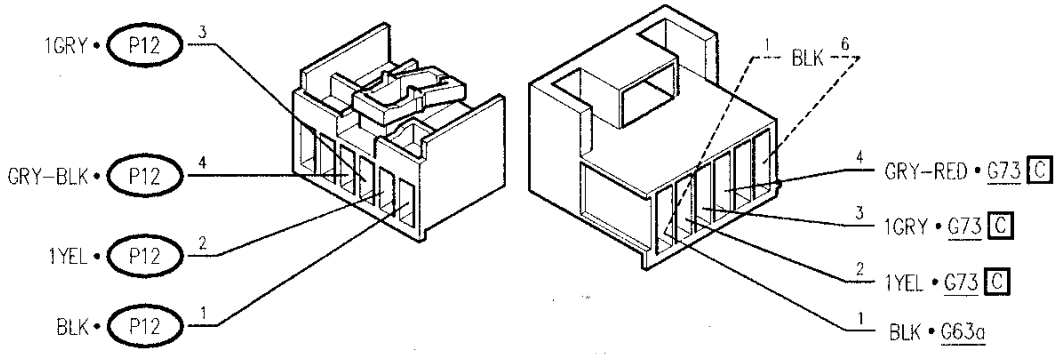
Connector for front right door wiring G21 A



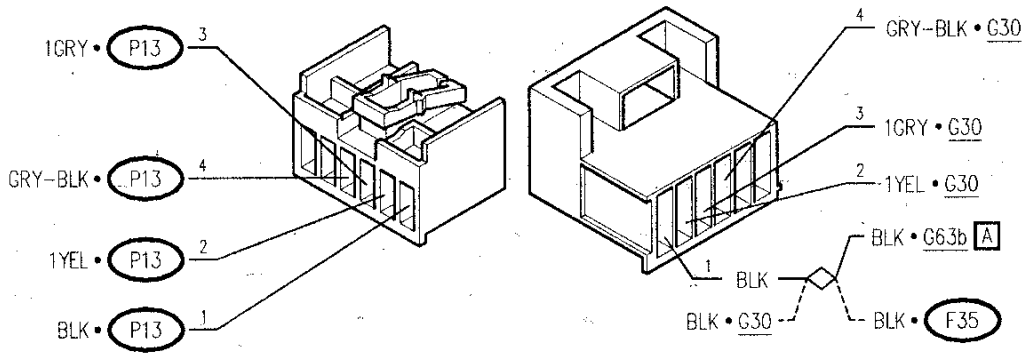
Connector for front left door wiring — G23 B



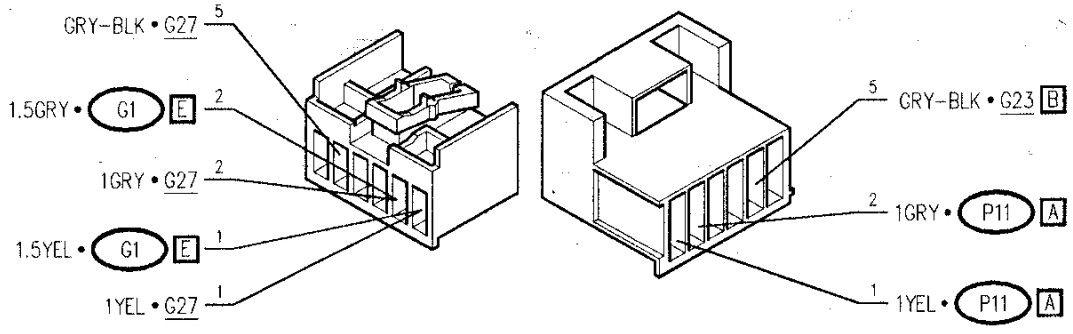
Connector for rear right door wiring — G25



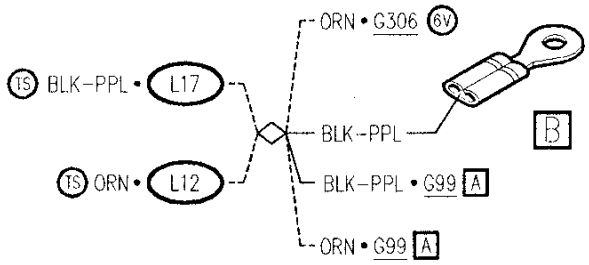
Connector for rear left door wiring — G27



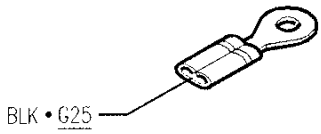
Connector for door lock — G30



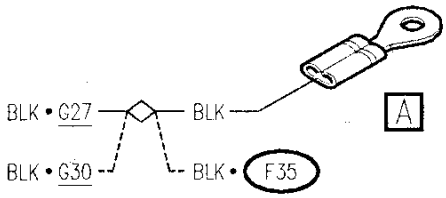
Engine compartment ground-left side	G53b



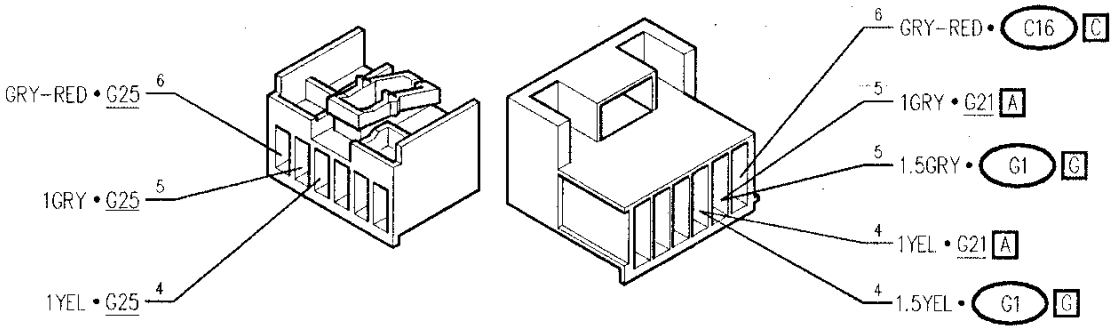
Rear right ground	G63a



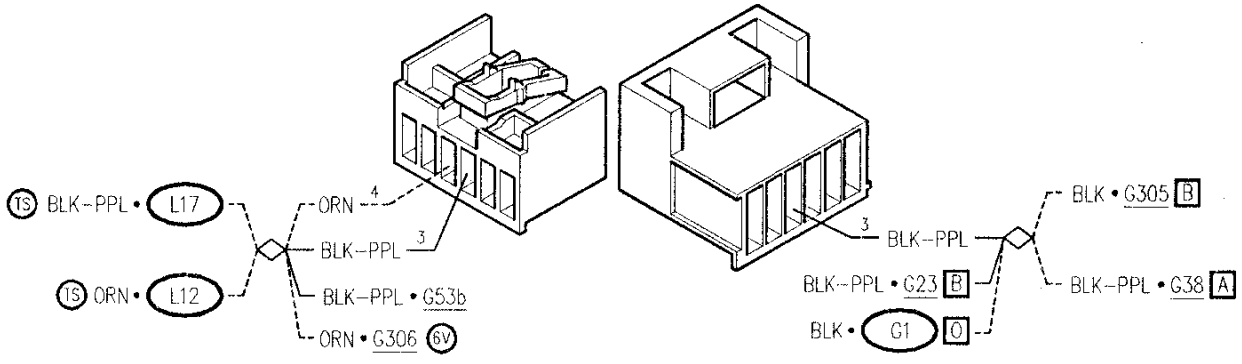
Rear left ground	G63b



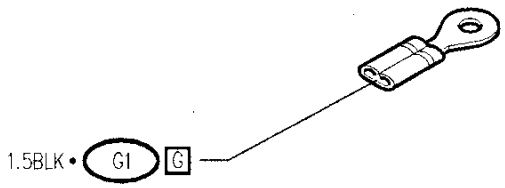
Connector for rear services	G73 C



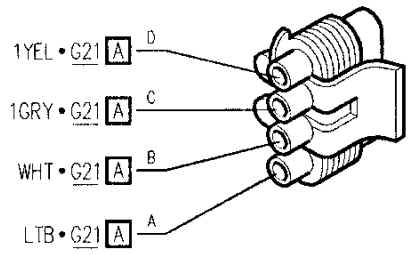
Dashboard/engine connection	G99 A



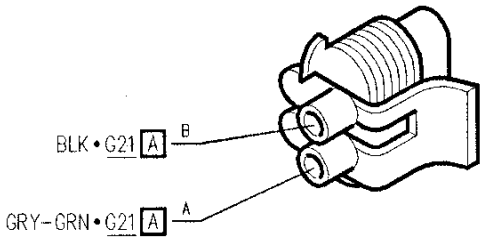
Under-dashboard ground-left side	G148b



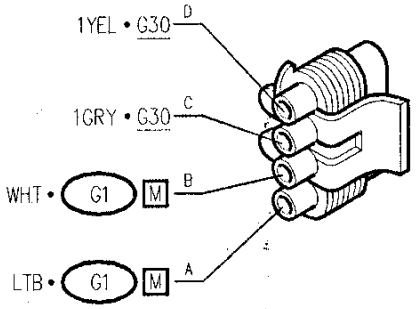
Front-right door locking motor	P10 A



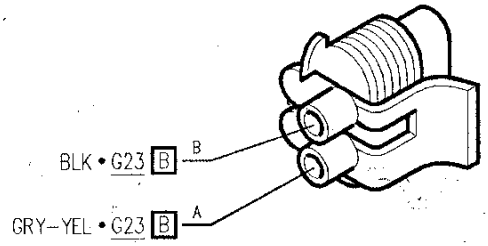
Front-right door locking motor	P10 B



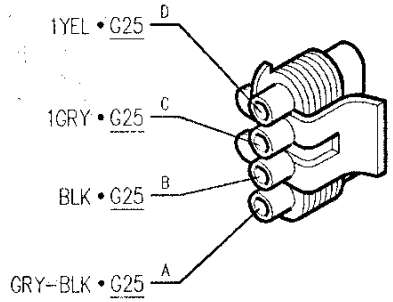
Front-left door locking motor	P11 A



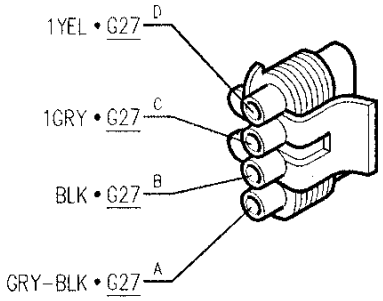
Front-left door locking motor	P11 B



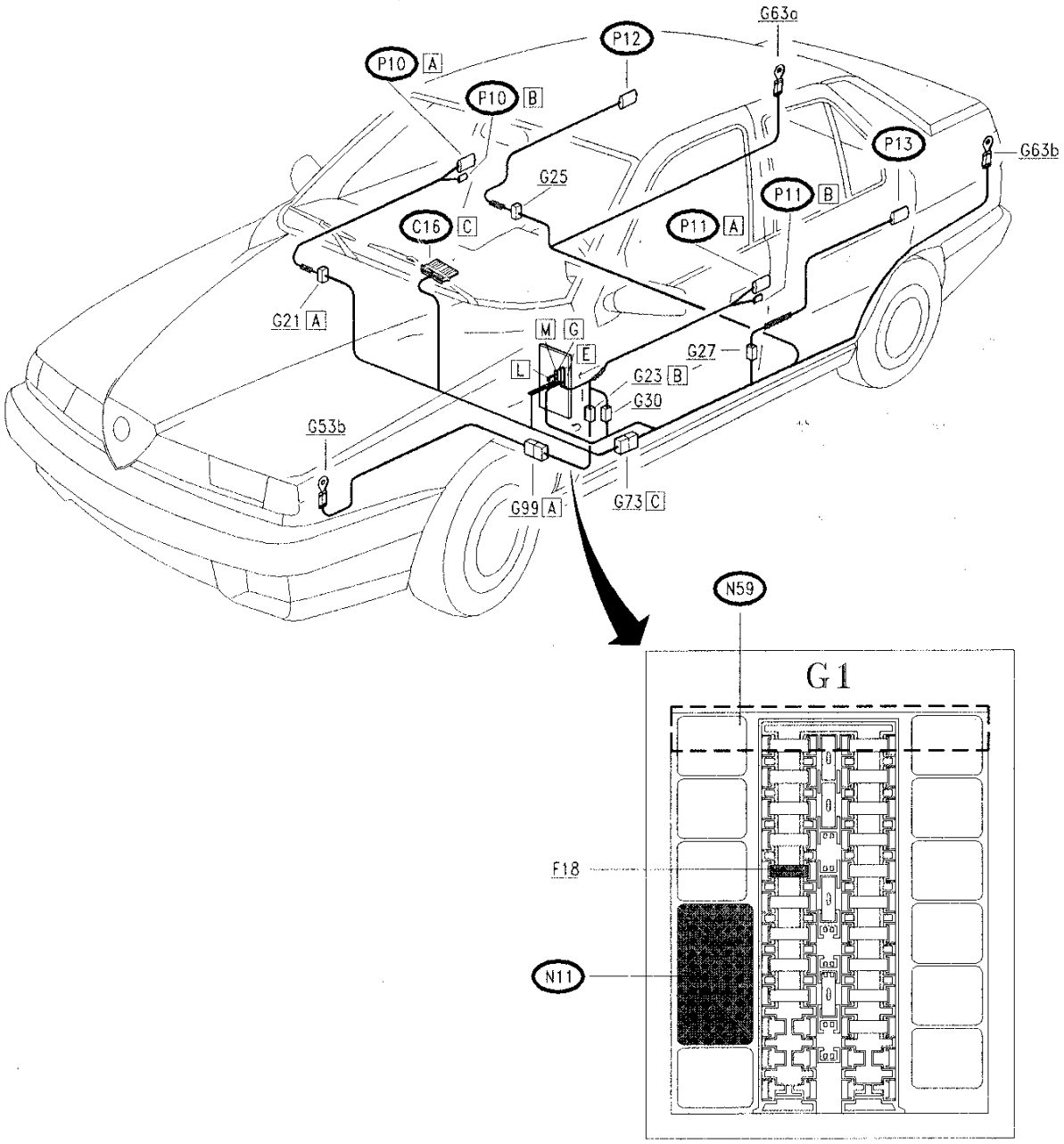
Rear-right door locking motor	P12



Rear-left door locking motor	P13



LOCATION OF COMPONENTS



TROUBLESHOOTING

DOOR LOCKING DEVICE NOT WORKING	TEST A

Note: if the device signalling door open is also not working, first carry out **tests B, C, D or E**

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
A1 CHECK FUSE – Check for damage of fuse **F18** in fusebox **G1**	OK ➡ ~~OK~~ ➡	Carry out **step A2** Replace fuse (20A)
A2 CHECK DOOR OPEN SIGNAL – Check signal at pin 4 of door locking device **N11**: • with all doors closed, no signal • with one door open, ground signal (0V)	OK ➡ ~~OK~~ ➡	Carry out **step A3** Restore wiring between pin L2 of **G1** and pin C9 of Check Panel display **C16** (LTB-BLK)
A3 CHECK FRONT RIGHT DOOR SWITCH – Check switch of **P10**: • With switch **P10** in locked position check the continuity between pins BB and AA. • With switch **P10** in unlocked position check the continuity between pins BB and AB	OK ➡ ~~OK~~ ➡	Carry out **step A4** Replace door locking device **P10**
A4 CHECK FRONT LEFT DOOR SWITCH – Check switch of **P11**: • With switch **P11** in locked position check the continuity between pins BB and AA. • With switch **P11** in unlocked position check the continuity between pins BB and AB	OK ➡ ~~OK~~ ➡	Carry out **step A5** Replace the door locking device **P11**

(continues)

DOOR LOCKING DEVICE NOT WORKING	TEST A

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
A5 CHECK LOCKING SIGNAL – Check signal at pin 3 of door locking device **N11**: • actuating the door lock, passes from no signal to ground signal (0V)	OK ➡	Carry out **step A6**
	~~OK~~ ➡	Restore wiring between pin L3 of **G1** and pin AA of **P10**, across pin A4 of connector **G21** (LTB) and between pin M2 of **G1** and pin AA of **P11** (LTB)
A6 CHECK UNLOCK SIGNAL – Check signal at pin 2 of door locking device **N11**: • actuating the door lock, passes from no signal to ground signal (0V)	OK ➡	Check and if necessary replace door lock control unit **N11**
	~~OK~~ ➡	Restore wiring between pin L4 of **G1** and pin AB of **P10**, across pin A5 of connector **G21** (WHT) and between pin M3 of **G1** and pin AB of **P11** (WHT)

ON OPENING FRONT LEFT DOOR, CORRESPONDING LED ON DISPLAY NOT WORKING	TEST B

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
B1 CHECK GROUND – Opening front left door, verify 0V at pin BA of door locking device **P11**	OK ➡	Restore wiring between pin BA of **P11** and pin C8 of Check Panel display **C16**, across pin B3 of connector **G23** (GRY-YEL)
	~~OK~~ ➡	Carry out **step B2**
B2 CHECK GROUND – Verify 0V at pin BB of door locking device **P11**	OK ➡	Replace door locking device **P11**
	~~OK~~ ➡	Restore wiring between pin BB of **P11** and ground **G53b**, across pin B4 of connector **G23**, pin A3 of connector **G99** and the two solders (BLK)

ON OPENING FRONT RIGHT DOOR, CORRESPONDING LED ON DISPLAY NOT WORKING	TEST C

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
C1 CHECK GROUND – Opening the front right door, verify 0V at pin BA of door locking device **P10**	OK ➡	Restore wiring between pin BA of **P10** and pin C7 of Check Panel display **C16**, across pin A3 of connector **G21** (GRY-GRN)
	~~OK~~ ➡	Carry out **step C2**
C2 CHECK GROUND – Verify 0V at pin BB of door locking device **P10**	OK ➡	Replace door locking device **P10**
	~~OK~~ ➡	Restore wiring between pin BB of **P10** and pin L1 of **G1**, across pin A6 of connector **G21** and the solder (BLK)

ON OPENING REAR LEFT DOOR, CORRESPONDING LED ON DISPLAY NOT WORKING	TEST D

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
D1 CHECK GROUND – Opening rear left door, verify 0V at pin A of door locking device **P13**	OK ➡	Restore wiring between pin A of **P13** and pin **C6** of Check Panel display **C16**, across pin 4 of connector **G27**, pin 5 of connector **G30** and B2 of connector **G23** (GRY-BLK)
	~~OK~~ ➡	Carry out **step D2**
D2 CHECK GROUND – Verify 0V at pin B of door locking device **P13**	OK ➡	Replace door locking device **P13**
	~~OK~~ ➡	Restore wiring between pin B of **P13** and ground **G63b**, across pins 1 and 6 of connector **G27** and the solder (BLK)

ON OPENING REAR RIGHT DOOR, CORRESPONDING LED ON DISPLAY NOT WORKING	TEST E

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
E1 CHECK GROUND – Opening the rear right door, verify 0V at pin A of door locking device **P12**	OK ➡	Restore wiring between pin A of **P12** and pin C5 of Check Panel display **C16**, across pin 4 of connector **G25**, pin C6 of connector **G27** (GRY-BLK and GRY-RED)
	~~OK~~ ➡	Carry out **step E2**
E2 CHECK GROUND – Verify 0V at pin B of door locking device **P12**	OK ➡	Replace door locking device **P12**
	~~OK~~ ➡	Restore wiring between pin B of **P12** and ground **G63a**, across pin 1 of connector **G25** (BLK)

FRONT LEFT DOOR LOCK MOTOR NOT WORKING	TEST F

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
F1 CHECK MOTOR – Check for damage of door lock motor **P11**: the circuit between pins AC and AD of **P11** must not be open	OK ➡ OK ➡	Carry out **step F2** Replace complete device **P11**
F2 CHECK VOLTAGE – Actuating door locking (or unlocking), verify 12V between pin E9 and E10 of **G1**	OK ➡ OK ➡	Restore wiring between: - pin E9 of **G1** and pin AC of **P11**, across pin 2 of connector **G30** (GRY) - pin E10 of **G1** and pin AD of **P11**, across pin 1 of connector **G30** (YEL) Check and if necessary replace door lock control unit **N11**

FRONT RIGHT DOOR LOCK MOTOR NOT WORKING	TEST G

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
G1 CHECK MOTOR – Check for damage of door lock motor **P10**: the circuit between pins AC and AD of **P10** must not be open	OK ➡	Carry out **step G2**
	OK ➡	Replace complete device **P10**
G2 CHECK VOLTAGE – Actuating door locking (or unlocking), verify 12V between pin G7 ed G8 of **G1**	OK ➡	Restore wiring between: - pin G8 of **G1** and pin AC of **P10**, across pin C5 of connector **G73** and pin A2 of connector **G21** (GRY) - pin G7 of **G1** and pin AD of **P10**, across pin C4 of connector **G73** and pin A1 of connector **G21** (YEL)
	OK ➡	Check and if necessary replace door lock control unit **N11**

REAR LEFT DOOR LOCK MOTOR NOT WORKING	TEST H

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
H1 CHECK MOTOR – Check for damage of door lock motor **P13**: the circuit between pins C and D of **P13** must not be open	OK ➡ OK ➡	Carry out **step H2** Replace complete device **P13**
H2 CHECK VOLTAGE – Actuating door locking (or unlocking), verify 12V between pin E9 and E10 of **G1**	OK ➡ OK ➡	Restore wiring between: - pin E9 of **G1** and pin C of **P13**, across pin 2 of connector **G30** and pin 3 of connector **G27** (GRY) - pin E10 of **G1** and pin D of **P13**, across pin 1 of connector **G30** and pin 2 of connector **G27** (YEL) Check and if necessary replace door lock control unit **N11**

REAR RIGHT DOOR LOCK MOTOR NOT WORKING	TEST I

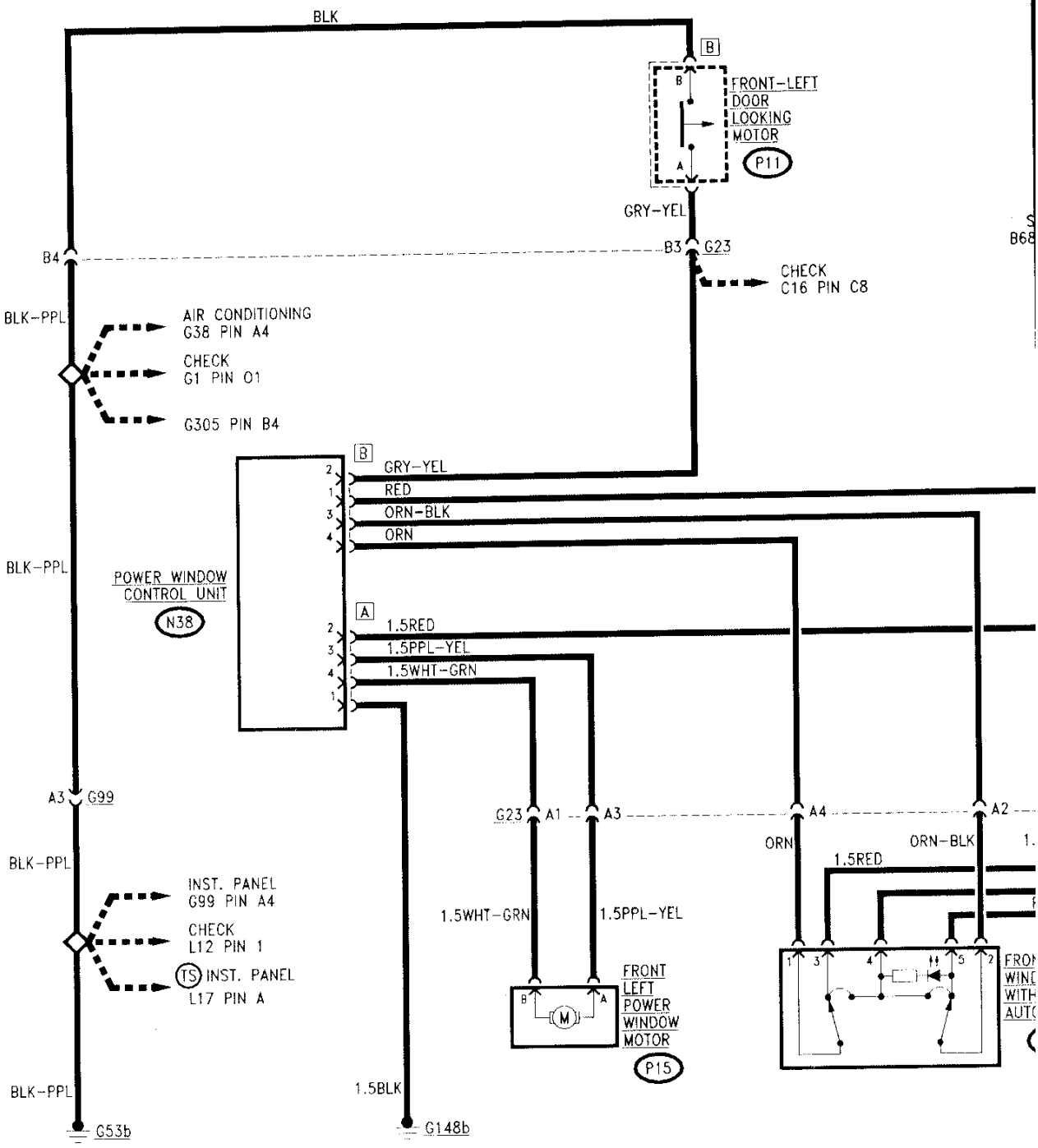
TEST PROCEDURE	RESULT	CORRECTIVE ACTION
I1 CHECK MOTOR – Check for damage of door lock motor **P12:** the circuit between pins C and D of **P12** must not be open	OK ➡	Carry out **step I2**
	OK ➡	Replace complete device **P12**
I2 CHECK VOLTAGE – Actuating door locking (or unlocking), verify 12V between pin G7 and G8 of **G1**	OK ➡	Restore wiring between: - pin G8 of **G1** and pin C of **P12** across pin C5 of connector **G73** and pin 3 of connector **G25** (GRY) - pin G7 of **G1** and pin D of **P12** across pin C4 of connector **G73** and pin 2 of connector **G25** (YEL)
	OK ➡	Check and if necessary replace door lock control unit **N11**

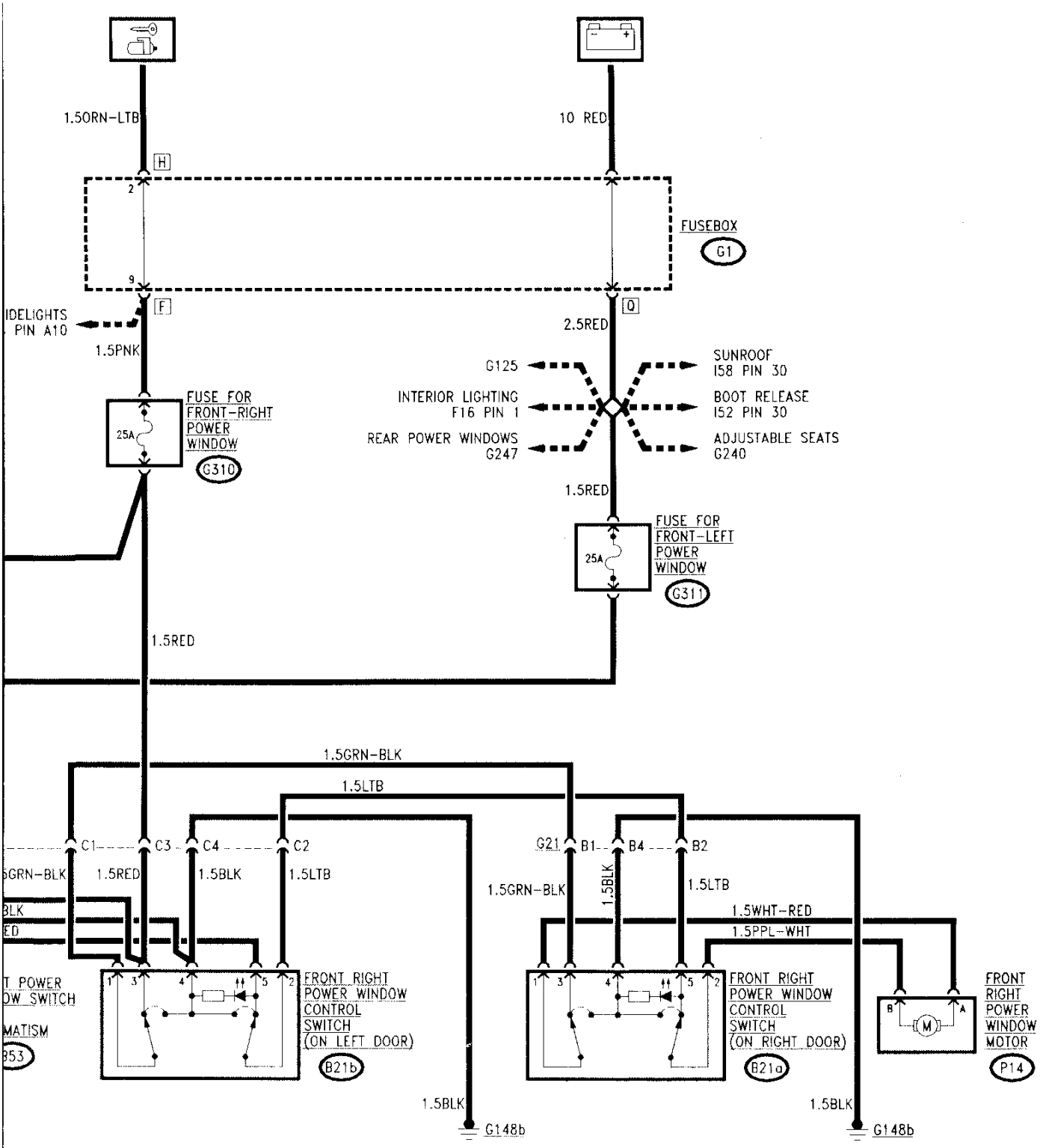
FRONT POWER WINDOWS

NDEX

/IRING DIAGRAM 22-2
ENERAL DESCRIPTION 22-3
UNCTIONAL DESCRIPTION 22-3
ROUBLESHOOTING TABLE 22-3
OMPONENTS AND CONNECTORS 22-4
OCATION OF COMPONENTS 22-8
ROUBLESHOOTING 22-9

WIRING DIAGRAM




1.5ORN-LTB
10 RED
H
2
9
FUSEBOX
G1
F
Q
IDELIGHTS
PIN A10
1.5PNK
2.5RED
G125
SUNROOF
I58 PIN 30
INTERIOR LIGHTING
F16 PIN 1
BOOT RELEASE
I52 PIN 30
REAR POWER WINDOWS
G247
ADJUSTABLE SEATS
G240
1.5RED
FUSE FOR
FRONT-RIGHT
POWER
WINDOW
25A
G310
FUSE FOR
FRONT-LEFT
POWER
WINDOW
25A
G311
1.5RED
1.5GRN-BLK
1.5LTB
C1
C3
C4
C2
G21
B1
B4
B2
1.5RED
1.5BLK
1.5LTB
1.5GRN-BLK
1.5BLK
1.5LTB
1.5WHT-RED
1.5PPL-WHT
FRONT RIGHT
POWER WINDOW
CONTROL
SWITCH
(ON LEFT DOOR)
B21b
FRONT RIGHT
POWER WINDOW
CONTROL
SWITCH
(ON RIGHT DOOR)
B21a
FRONT
RIGHT
POWER
WINDOW
MOTOR
P14
1.5BLK
G148b
1.5BLK
G148b

GENERAL DESCRIPTION

Operation of the left-hand power window (driver's side) is of the automatic type, controlled by a control unit which actuates it in accordance with the following logic:

- acting on one of the two buttons and keeping it pressed, the window is raised or lowered normally until the button is released;
- a short impulse (less than 300 ms. approx.) actuates the electric motor which automatically stops when the stop limit is reached (window completely open or closed);
- an even shorter impulse (less than 50 ms. approx.) is considered by the control unit as an accidental shock and no action will result.

All the power windows are turn-key operated but the control unit allows the front left window to be actuated even when the ignition key is disengaged as long as the door is open.

The electronic mechanism which actuates the front right-hand window is of the traditional type: when the button is pressed the window is raised or lowered; it is equipped with two control switches, one on the right-hand door and one on the left-hand door.

FUNCTIONAL DESCRIPTION

The power window control unit **N38** is supplied at pin 2 of connector A by voltage from the battery via fuse **G311** (25A) protecting the left- hand power window: this voltage is used only when the front left door is open and when a door open signal reaches pin 2 of connector B of the control unit from the relative door locking device **P11** (see "Door locking system").

The key operated supply reaches pin 1 of connector B via fuse **G310** (25A) which also protects the right-hand power window.

Consensus signals for the raising and lowering of the window reach pins 3 and 4 of connector B from the left-hand window control switch **B53**.

This double switch sends and ground to the control unit and then to the electric motor **P15** on the side where the contact was closed, determining in this way the direction of rotation of the motor.

The actuation signals (raising or lowering) for the left-hand window motor **P15** leave from pins 3 and 4 of connector A of **N38**.

Pin 1 of connector A of **N38** is connected to ground.

The actuation of the right-hand power window is directly controlled by one of the two switches **B21** (**B21a** located on the right-hand door, **B21b** on the left) connected in series.

The key opertated supply passes fuse **G310** (25A) and the negative signal from ground **G148b**.

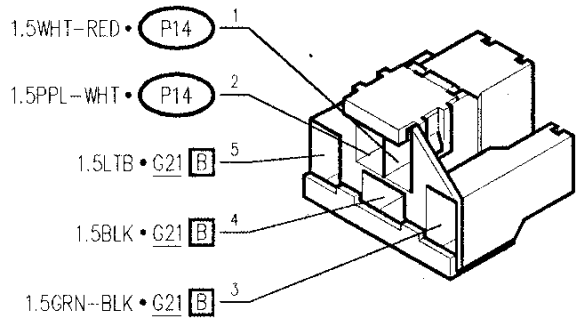
The motor of the right-hand window **P14** is in this way actuated by the double switch **B21** in either one direction or the other depending on the origin of the positive or negative signal.

TROUBLESHOOTING TABLE

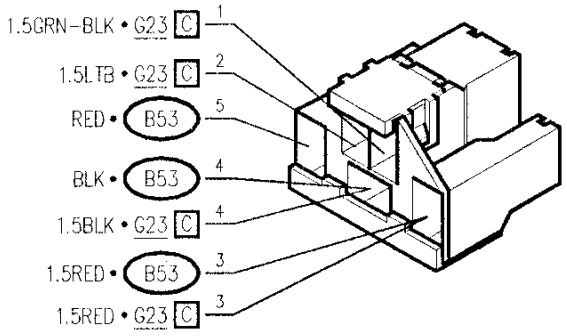
Malfunction	Component							Test
	N38	G310	G311	B21	B53	P14	P15	
Front left power window	•	•	•		•		•	A
Front right power window		•		•		•		B

COMPONENTS AND CONNECTORS

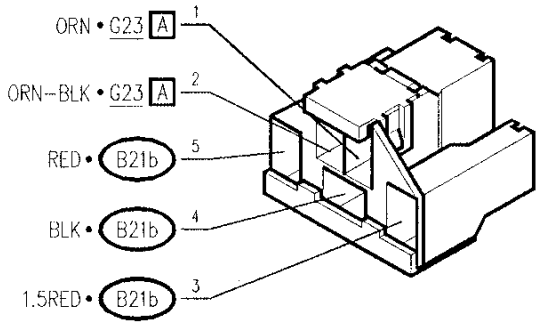
Front right power window control switch (on right door) B21a



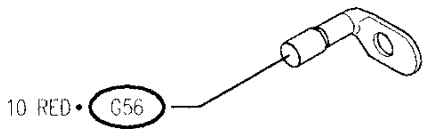
Front right power window control switch (on left door) B21b



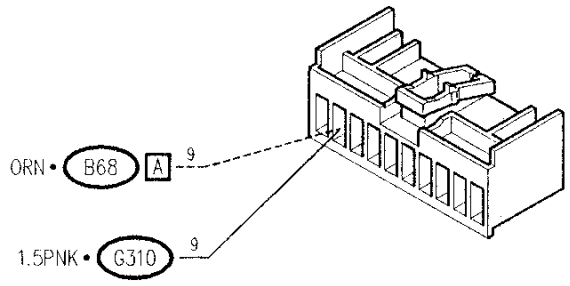
Front power window switch with automatism B53



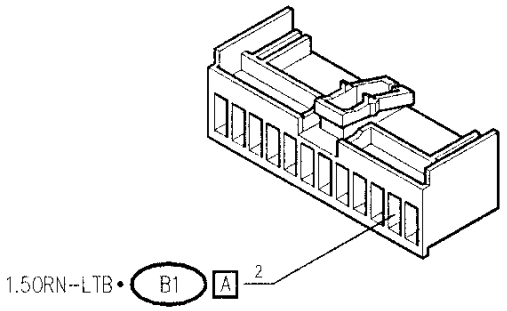
Fusebox G1



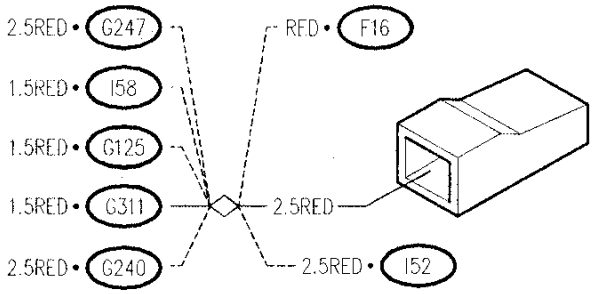
Fusebox G1 F



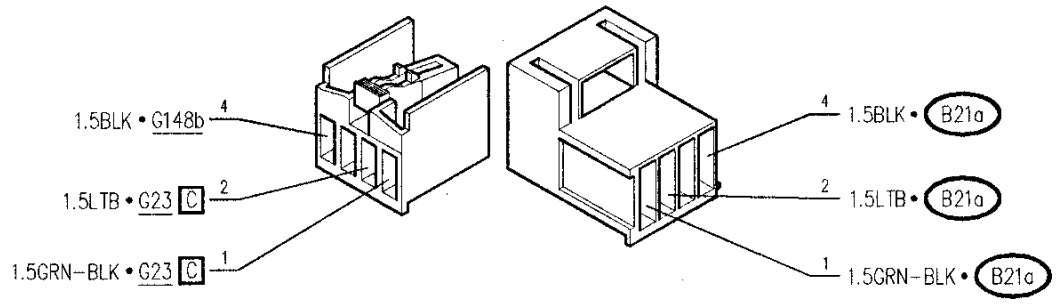
Fusebox G1 H



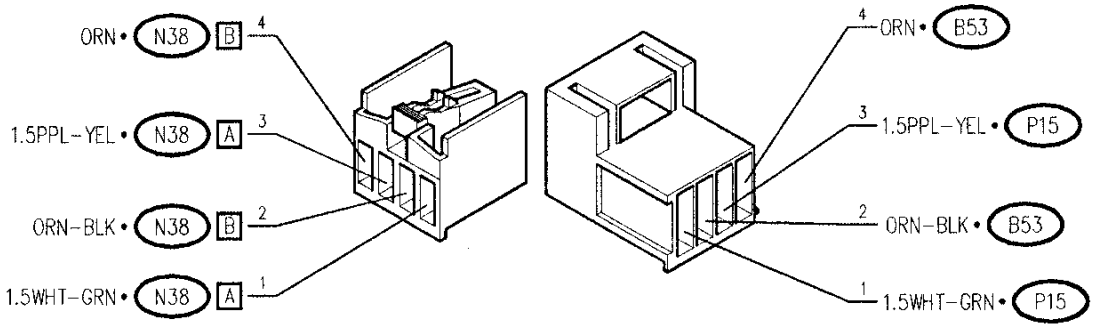
Fusebox G1 Q



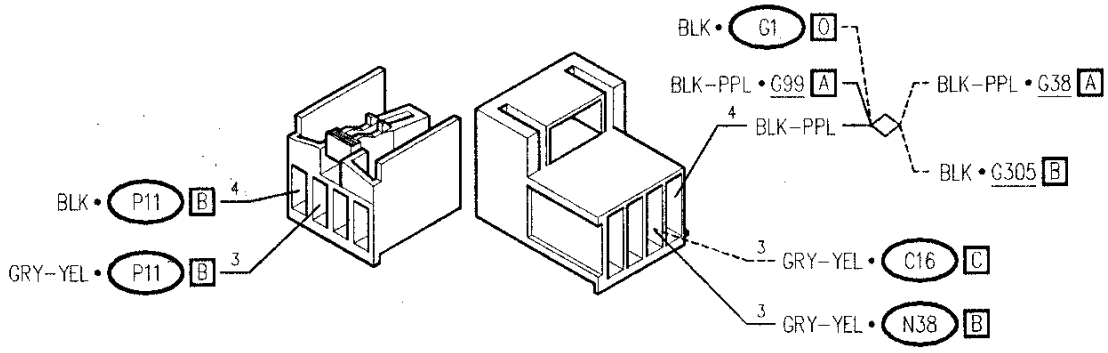
Connector for front right door wiring — G21 B



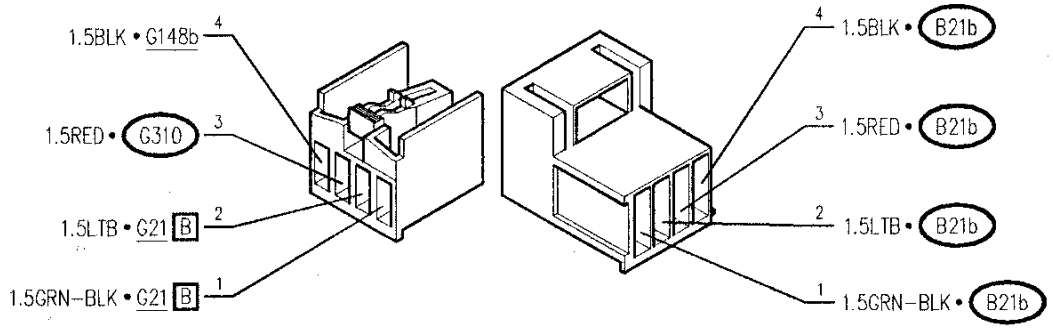
Connector for front left door wiring — G23 A



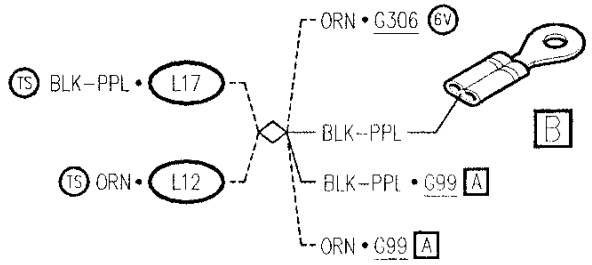
Connector for front left door wiring — G23 B



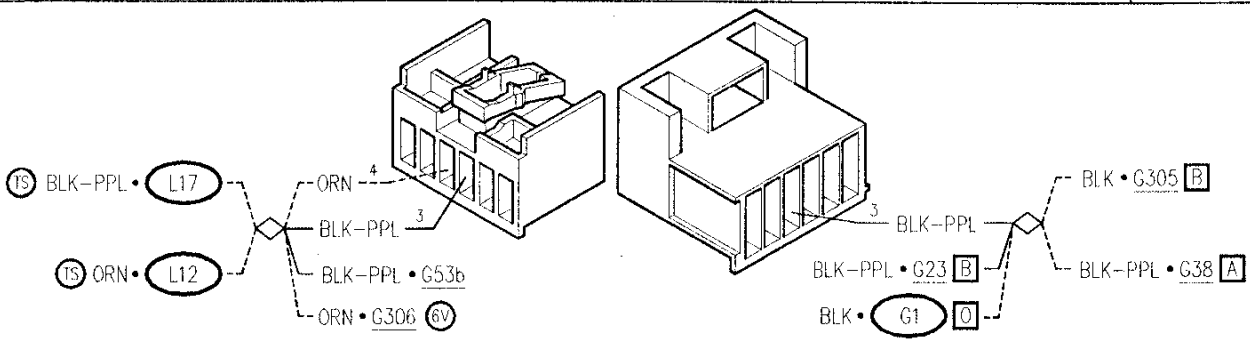
Connector for front left door wiring — G23 C



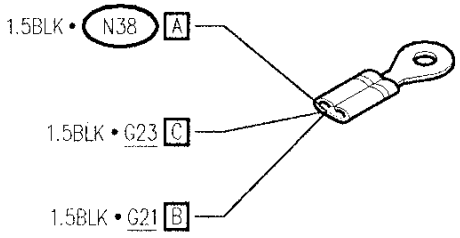
Engine compartment ground - left side | G53b



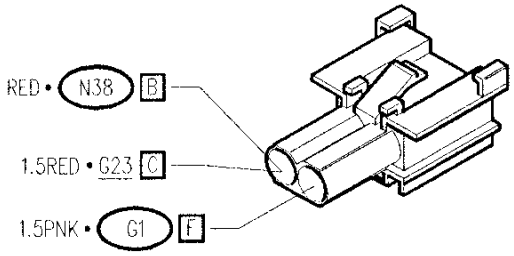
Dashboard/engine connection | G99 A



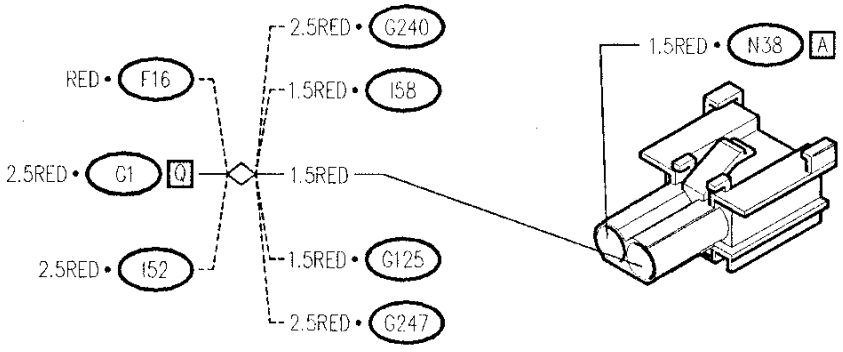
Under-dashboard ground - left side | G148b



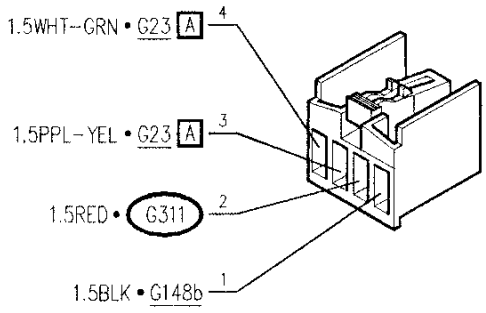
Fuse for front-right power window | G310



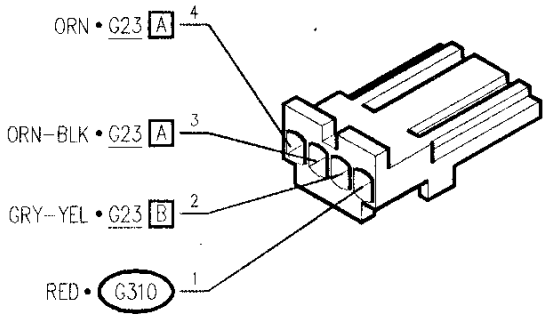
Fuse for front-left power window | G311



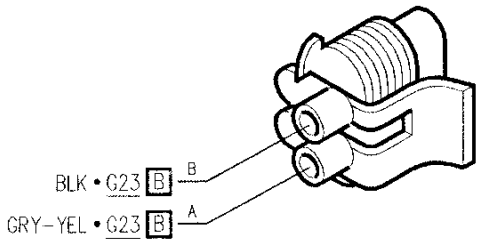
Power window control unit	N38 A



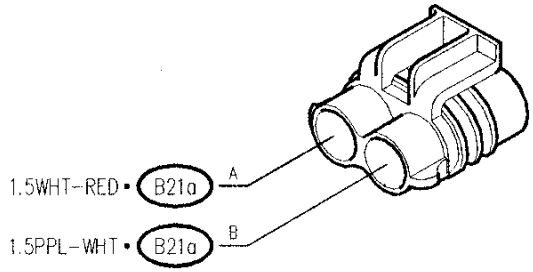
Power window control unit	N38 B



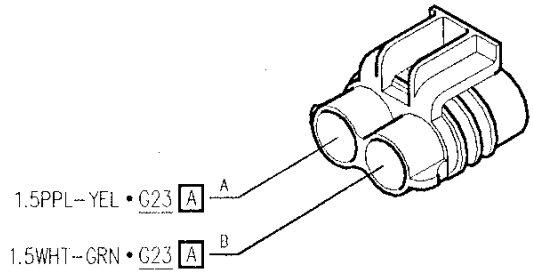
Front-left door locking motor	P11 B



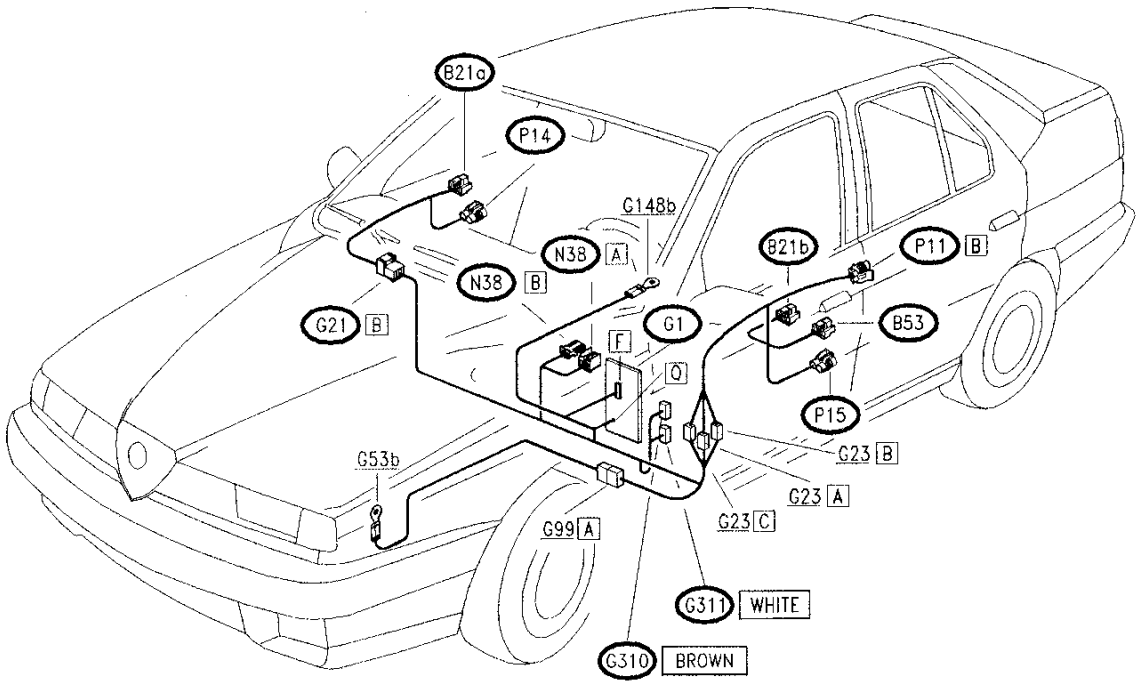
Front-right power window motor	P14



Front-left power window motor	P15



LOCATION OF COMPONENTS



TROUBLESHOOTING

FRONT LEFT-HAND POWER WINDOW NOT WORKING	TEST A

NOTE: If the power window functions correctly with the door closed and the ignition key engaged and not with the door open and the key removed, check the wiring between the door locking motor **P11** and pin B2 of the power windows control unit **N38**, across pin B3 of connector **G23** (GRY-YEL); or refer to the section "Door locking system", or else replace the control unit **N38**.

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
A1 CHECK FUSE – Check for damage of wander fuse **G311**	OK ➡	Carry out **step A2**
	~~OK~~ ➡	Replace fuse (25A)
A2 CHECK FUSE – Check for damage of wander fuse **G310**	OK ➡	Carry out **step A3**
	~~OK~~ ➡	Replace fuse (25A) **N.B.** in this case the front right-hand power window will also not be working (see successive **test B**)
A3 CHECK VOLTAGE – Verify 12V between pins A2 and A1 of power windows control unit **N38**	OK ➡	Carry out **step A5**
	~~OK~~ ➡	Carry out **step A4**

(continues)

FRONT LEFT-HAND POWER WINDOW NOT WORKING	TEST A

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
A4 CHECK VOLTAGE – Verify 12 V at pin A2 of control unit **N38**	OK ➡	Restore wiring between pin A1 of **N38** and ground **G148b** (BLK)
	~~OK~~ ➡	Restore wiring between pin A2 of **N38** and pin Q of **G1**, across wander fuse **G311** and the solder (RED)
A5 CHECK VOLTAGE – With ignition key engaged, verify 12 V at pin B1 of control unit **N38**	OK ➡	Carry out **step A6**
	~~OK~~ ➡	Restore wiring between pin B1 of **N38** and pin F9 of **G1**, across wander fuse **G310** (RED and PNK)
A6 CHECK VOLTAGE – With ignition key engaged and activating switch **B53** in one of the two directions, verify 12 V between pins B3 and B4 of control unit **N38**	OK ➡	Carry out **step A10**
	~~OK~~ ➡	Carry out **step A7**

(continues)

FRONT LEFT-HAND POWER WINDOW NOT WORKING	TEST A

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
A7 CHECK VOLTAGE – With ignition key engaged and activating switch **B53** in one of the two directions, verify 12 V between pins 1 and 2 of switch **B53**	OK ➡ OK ➡	Restore wiring between: • pin 1 of **B53** and pin B4 of **N38**, across pin A4 of connector **G23** (ORN) • pin 2 of **B53** and pin B3 of **N38**, across pin A2 of connector **G23** (ORN-BLK) Carry out **step A8**
A8 CHECK GROUND – Check that pin 4 of **B53** is grounded (0V)	OK ➡ OK ➡	Carry out **step A9** Restore wiring between pin 4 of **B53** and ground **G148b**, across pin 4 of **B21b** and pin C4 of connector **G23**(BLK)
A9 CHECK VOLTAGE – With ignition key engaged,verify 12 V at pins 3 and 5 of **B53**	OK ➡ OK ➡	Replace switch **B53** Restore wiring between: • pin 3 of **B53** and fuse **G310**, across pin 3 of **B21b** and pin C3 of connector **G23** (RED) • pin 5 of **B53** and pin 5 of **B21b** (RED)

(continues)

FRONT LEFT-HAND POWER WINDOW NOT WORKING	TEST A

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
A10 CHECK VOLTAGE – With ignition key engaged and activating switch **B53** in one of the two directions, verify 12 V between pins A4 and A3 of control unit **N38**	OK ➡	Carry out step **A11**
	~~OK~~ ➡	Replace control unit **N38**
A11 CHECK MOTOR – With ignition key engaged and activating switch **B53** in one of the two directions, verify 12 V between pins A and B of motor **P15**	OK ➡	Replace motor **P15**
	~~OK~~ ➡	Restore wiring between: • pin A4 of **N38** and pin B of **P15**, across pin A1 of connector **G23** (WHT-GRN) • pin A3 of **N38** and pin A of **P15**, across pin A3 of connector **G23** (PPL-YEL)

FRONT RIGHT-HAND POWER WINDOW NOT WORKING	TEST B

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
B1 CHECK FUSE – Check for damage of wander fuse **G310**	OK ➡	Carry out **step B2**
	OK ➡	Replace fuse (25A)
B2 CHECK VOLTAGE – With ignition key engaged and activating switch **B21a** in one of the two directions, verify 12 V between pins 1 and 2 of switch **B21a**	OK ➡	Carry out **step B3**
	OK ➡	Carry out **step B4**
B3 CHECK MOTOR – With ignition key engaged and activating switch **B21a** in one of the two directions, verify 12 V between pins A and B of motor **P14**	OK ➡	Replace motor **P14**
	OK ➡	Restore wiring between: • pin 1 of **B21a** and pin A of **P14** (WHT-RED) • pin 2 of **B21a** and pin B of **P14** (PPL-WHT)
B4 CHECK VOLTAGE – With ignition key engaged, verify 12 V between pin 3 and 4 of switch **B21a**, and between pin 5 and 4 of the same switch	OK ➡	Replace switch **B21a**
	OK ➡	Carry out **step B5**

(continues)

FRONT RIGHT-HAND POWER WINDOW NOT WORKING	TEST B

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
B5 CHECK GROUND – Check that pin 4 of **B21a** is grounded (0V)	OK ➡	Carry out **step B6**
	OK ➡	Restore wiring between pin 4 of **B21a** and ground **G148b**, across pin B4 of connector **G21** (BLK)
B6 CHECK VOLTAGE – With ignition key engaged and activating switch **B21b** in one of the two directions, verify 12 V between pins 1 and 2 of switch **B21b**	OK ➡	Restore wiring between: • pin 1 of **B21b** and pin 3 of **B21a**, across pin C1 of connector **G23** and pin B1 of connector **G21** (GRN-BLK) • pin 2 of **B21b** and pin 5 of **B21a**, across pin C2 of connector **G23** and pin B2 of connector **G21** (LTB)
	OK ➡	Carry out **step B7**

(continues)

FRONT RIGHT-HAND POWER WINDOW NOT WORKING	TEST B

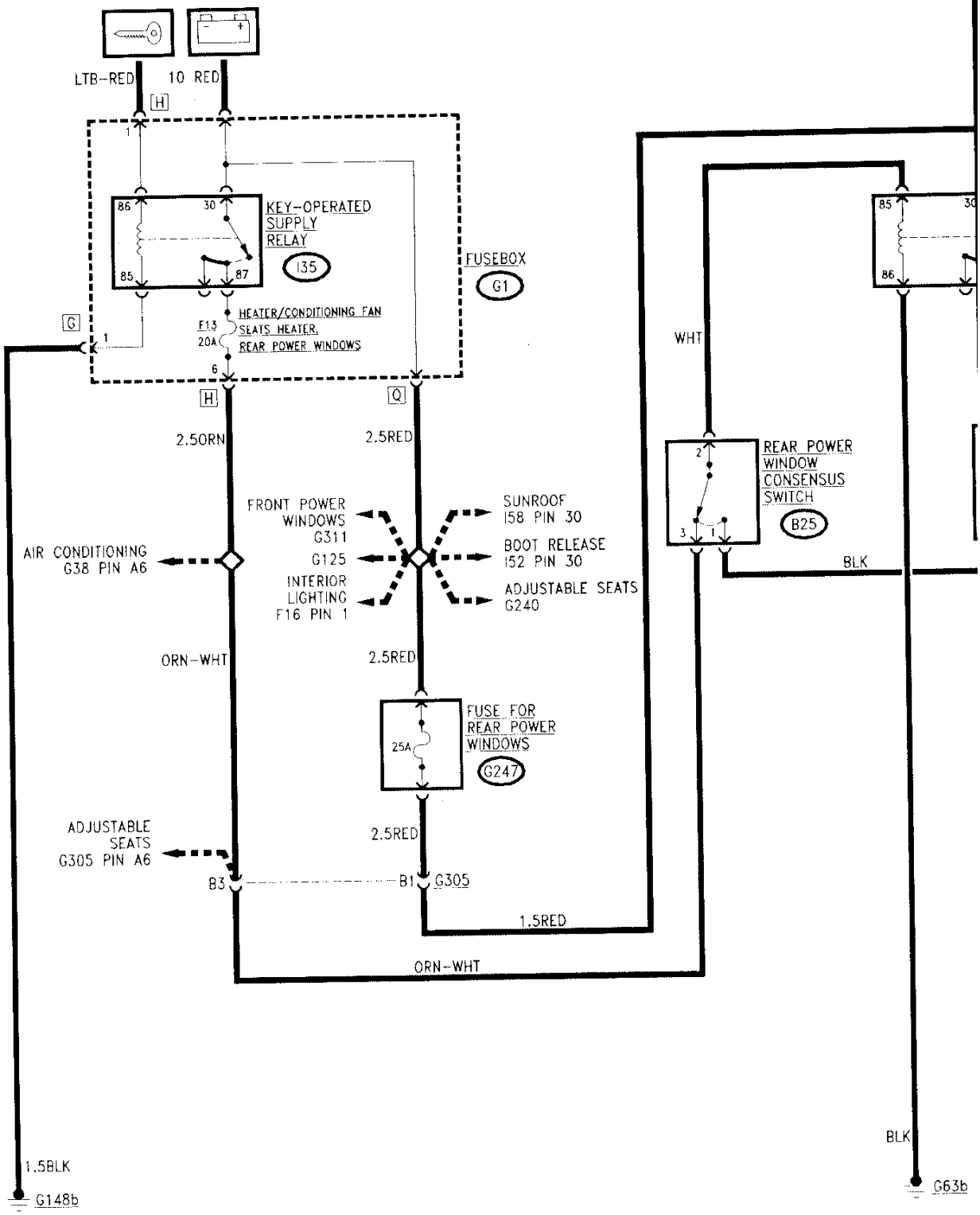
TEST PROCEDURE	RESULT	CORRECTIVE ACTION
B7 CHECK VOLTAGE – With ignition key engaged, verify 12 V between pin 3 and 4 of switch **B21b**, and between pin 5 and 4 of the same switch	OK ➡	Replace switch **B21b**
	~~OK~~ ➡	Carry out **step B8**
B8 CHECK GROUND – Check that pin 4 of **B21b** is grounded (0V)	OK ➡	Restore wiring between: • pin 3 of **B21b** and fuse **G310**, across pin C3 of connector **G23** (RED)
	~~OK~~ ➡	Restore wiring between pin 4 of **B21b** and ground **G148b**, across pin C4 of connector **G23** (BLK)

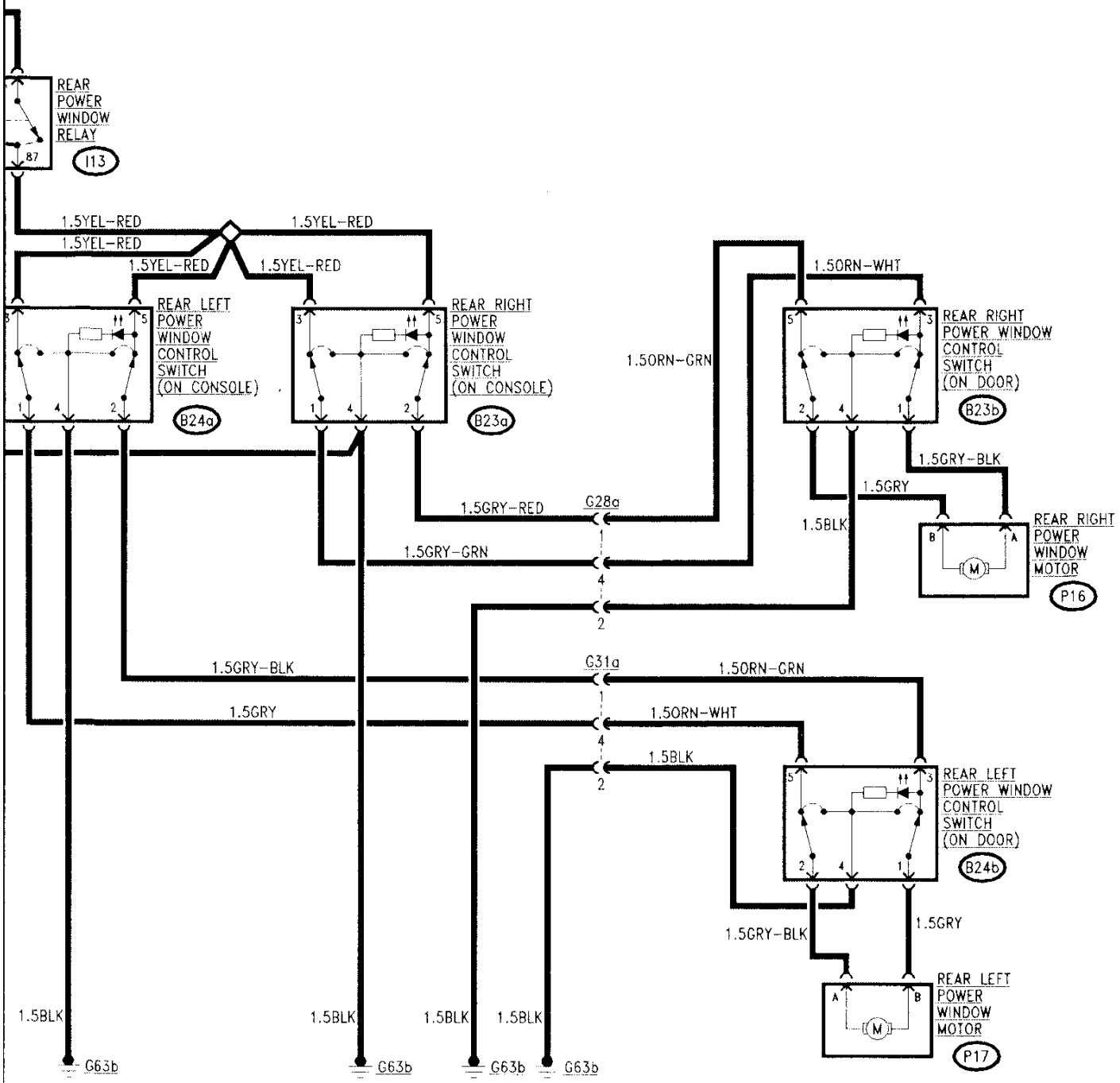
REAR POWER WINDOWS

NDEX

/IRING DIAGRAM 23-2
ENERAL DESCRIPTION 23-3
UNCTIONAL DESCRIPTION 23-3
ROUBLESHOOTING TABLE 23-3
OMPONENTS AND CONNECTORS 23-4
OCATION OF COMPONENTS 23-8
ROUBLESHOOTING 23-9

WIRING DIAGRAM




REAR POWER WINDOW RELAY
87
I13
1.5YEL-RED
1.5YEL-RED
1.5YEL-RED
1.5YEL-RED
1.5YEL-RED
REAR LEFT POWER WINDOW CONTROL SWITCH (ON CONSOLE)
B24a
REAR RIGHT POWER WINDOW CONTROL SWITCH (ON CONSOLE)
B23a
1.5ORN-GRN
1.5ORN-WHT
REAR RIGHT POWER WINDOW CONTROL SWITCH (ON DOOR)
B23b
1.5GRY-BLK
1.5GRY
1.5BLK
REAR RIGHT POWER WINDOW MOTOR
P16
1.5GRY-RED
G28a
1.5GRY-GRN
1.5GRY-BLK
G31a
1.5ORN-GRN
1.5GRY
1.5ORN-WHT
1.5BLK
REAR LEFT POWER WINDOW CONTROL SWITCH (ON DOOR)
B24b
1.5GRY-BLK
1.5GRY
REAR LEFT POWER WINDOW MOTOR
P17
1.5BLK
1.5BLK
1.5BLK
1.5BLK
G63b
G63b
G63b
G63b

GENERAL DESCRIPTION

The electric mechanism which actuates the rear power windows is of the traditional type (when a button is pressed the window is raised or lowered) with two control switches for each window; one on the ralative door and one on the central console operable from the front seats.

For safety reasons a consensus switch, located on the central console, makes it possible to cut off the power supply to all the switches.

Operation of the rear power windows is only possible when the ignition key is inserted.

FUNCTIONAL DESCRIPTION

The rear power windows relay **I13** supplies and controls the entire system.

The coil of the relay is excited by a key-operated signal coming from the key-operated supply relay **I35** and by fuse **F13** (20A) in fusebox **G1**; this supply passes via the rear power windows consensus safety switch **B25**: when actuated, this removes the excitation from the coil of **I13**, and interrupts the power supply to the circuit.

When the coil of the relay is excited, the switches are supplied with voltage from the battery through rear power windows fuse **G247** (25A).

Each window can be controlled by two different switches: one located on the central console (**B23a** right and **B24a** left), and one located on the relative door (**B23b** right and **B24b** left). Each pair of switches is connected in series.

The power supply reaches the switches from relay **I13** and the negative signal from ground **G63b**.

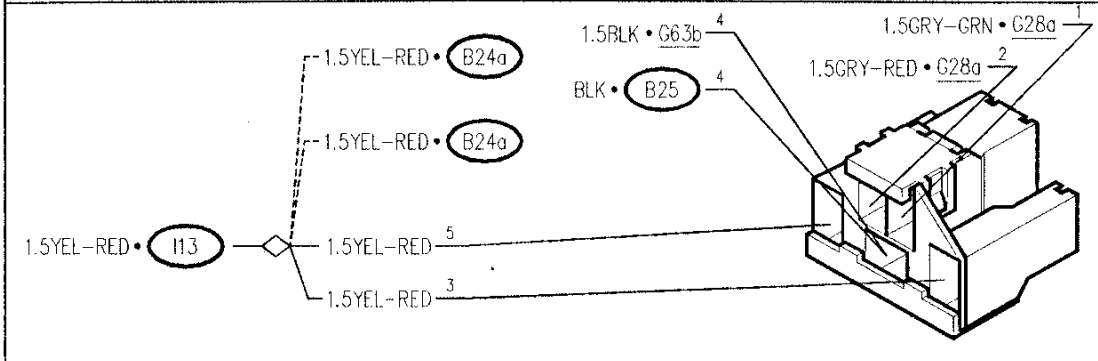
The double switches supplied by motors **P16** and **P17**, send supply and ground, inverting the signals depending on the contact which has been closed and in this way determining the direction of rotation of the motor.

TROUBLESHOOTING TABLE

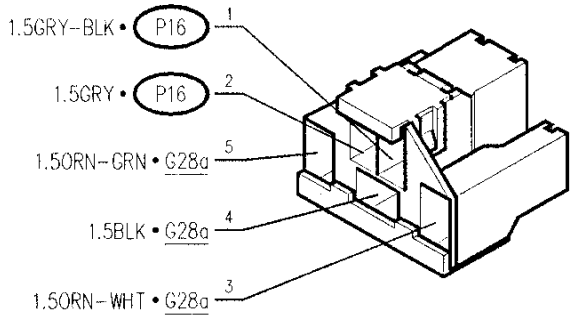
Malfunction	Component								Test
	F13	G247	I13	B25	B24	B23	P16	P17	
Rear power windows	•	•	•	•					A
Rear left power window					•		•		B
Rear right power window						•		•	C

COMPONENTS AND CONNECTORS

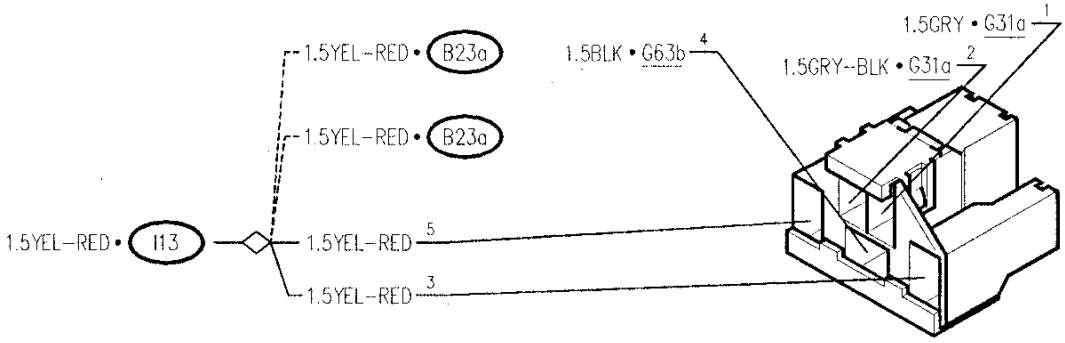
Rear right power window control switch (on console) B23a



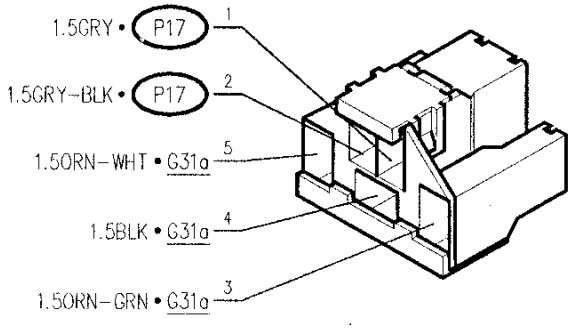
Rear right power window control switch (on door) B23b



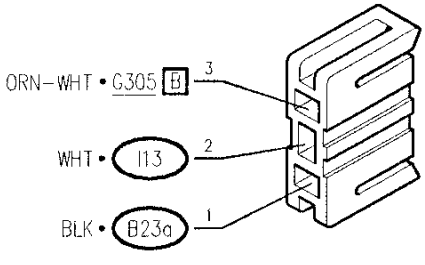
Rear left power window control switch (on console) B24a



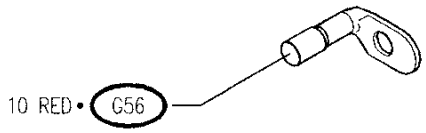
Rear left power window control switch (on door) B24b



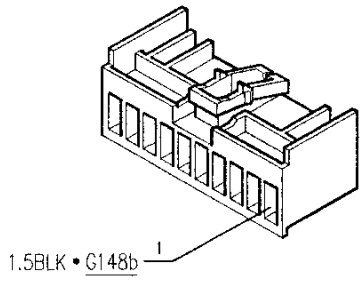
Rear power window consensus switch B25



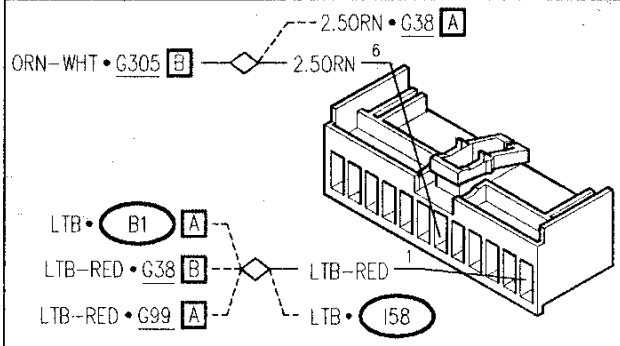
Fusebox	G1



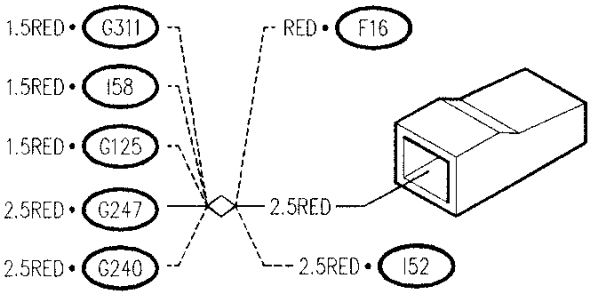
Fusebox	G1 G



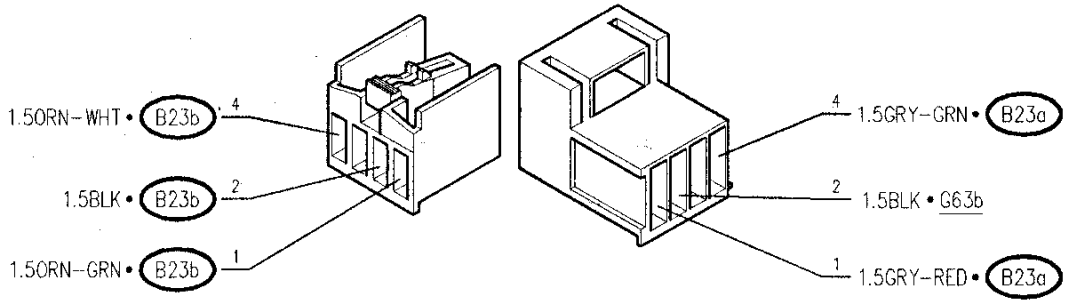
Fusebox	G1 H



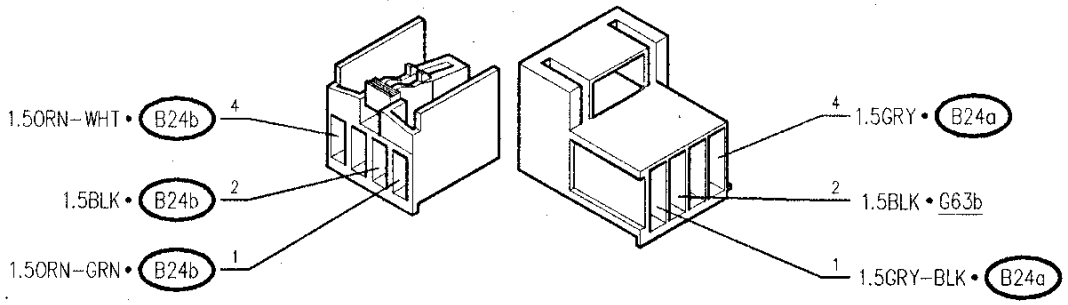
Fusebox	G1 Q



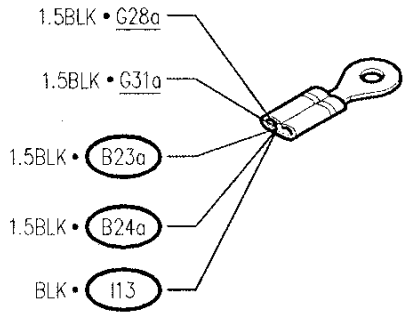
Connector between rear right door wiring and power window switch	G28a



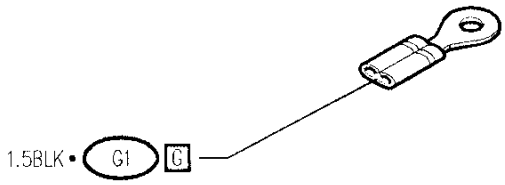
Connector between rear left door wiring and power window switch	G31a



Rear left ground	G63b

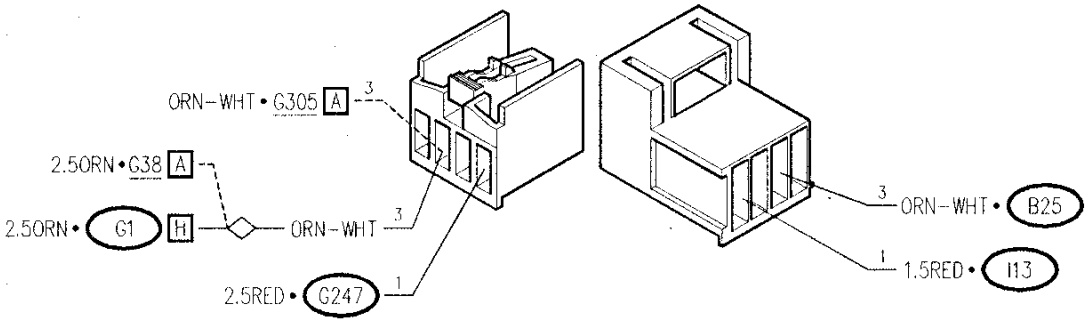


Under-dashboard ground - left side	G148b

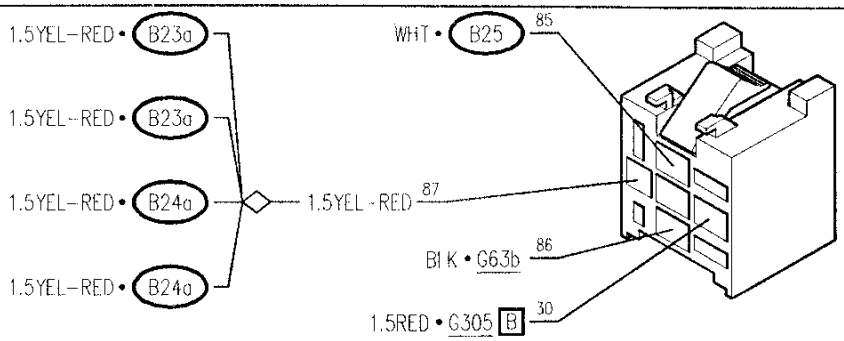


Fuse for rear power windows	G247

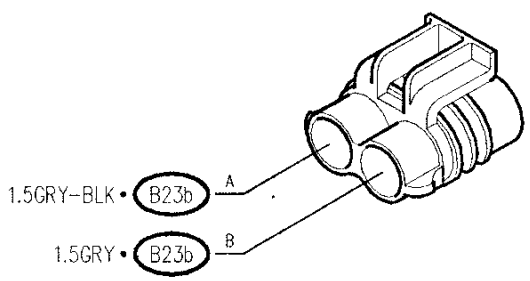
Connector for rear power windows and seat adjustment	G305 B

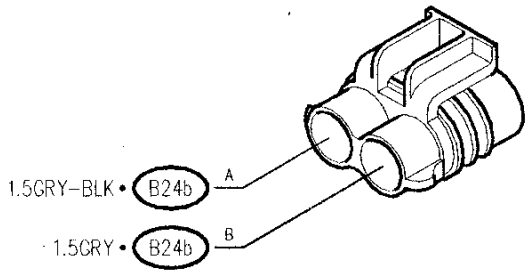


Rear power window relay	I13

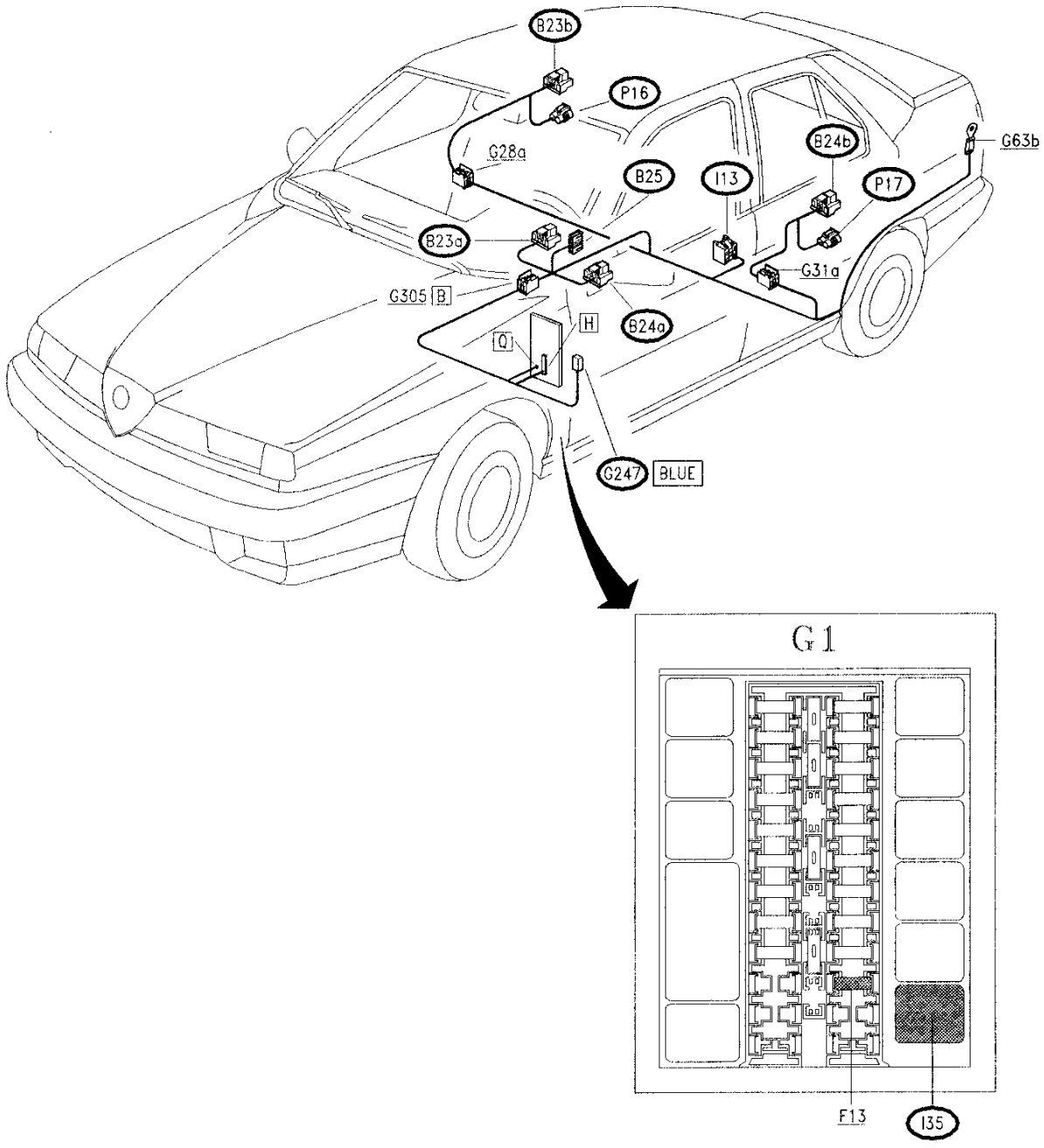


Rear-right power window motor	P16	Rear-left power window motor	P17





LOCATION OF COMPONENTS



TROUBLESHOOTING

REAR POWER WINDOWS NOT WORKING	TEST A

NOTE: if the following circuits are also not working:
windscreen wipers, interior ventilator, rear windscreen and rear view mirror demister, seat adjustment and heating, etc.., check and if necessary replace the key-operated supply relay **I35.**

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
A1 CHECK FUSE – Check for damage of wander fuse **G247**	OK →	Carry out **step A2**
	~~OK~~ →	Replace fuse (25A)
A2 CHECK FUSE – Check for damage of fuse **F13** in fusebox **G1**	OK →	Carry out **step A3**
	~~OK~~ →	Replace fuse (20A)
A3 CHECK RELAY – Check for correct functioning of rear power windows relay **I13**	OK →	Carry out **step A4**
	~~OK~~ →	Replace relay **I13**
A4 CHECK SWITCH – Check for correct functioning of rear power windows consensus switch **B25:** • with switch off check continuity between pins 3 and 2 (and open circuit between pins 1 and 2) • vice-versa with the switch on	OK →	Carry out **step A5**
	~~OK~~ →	Replace switch **B25**

(continues)

REAR POWER WINDOWS NOT WORKING	TEST A

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
A5 CHECK VOLTAGE – With ignition key engaged, verify 12 V at pin 3 of switch **B25**	OK →	Carry out **step A6**
	OK →	Restore wiring between pin 3 of **B25** and pin H6 of **G1**, across pin B3 of connector **G305** and the solder (ORN-WHT and ORN)
A6 CHECK VOLTAGE – With ignition key engaged and switch **B25** in the off position, verify 12V at pin 85 of **I13**	OK →	Carry out **step A7**
	OK →	Restore wiring between pin 2 of **B25** and pin 85 of **I13** (WHT)
A7 CHECK GROUND – With ignition key engaged and switch **B25** at the on position, verify 0 V at pin 85 of **I13**	OK →	Carry out **step A8**
	OK →	Restore wiring between pin 1 of **B25** and ground **G63b**, across pin 4 of **B23a** (BLK)

(continues)

REAR POWER WINDOWS NOT WORKING	TEST A

TEST PROCEDURE		RESULT	CORRECTIVE ACTION
A8	CHECK VOLTAGE		
– Verify 12V at pin 30 of **I13**		OK ➡	Restore wiring between pin 86 of **I13** and ground **G63b** (BLK)
		OK ➡	Restore wiring between pin 30 of **I13** and pin Q of **G1**, across pin B1 of connector **G305**, wander fuse **G247** and the solder (RED)

REAR LEFT-HAND POWER WINDOW NOT WORKING	TEST B

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
B1 CHECK VOLTAGE – With ignition key engaged and activating switch **B24b** in one of the two directions, verify 12 V between pins 1 and 2 of switch **B24b**	OK ➡	Carry out **step B2**
	OK ➡	Carry out **step B3**
B2 CHECK MOTOR – With ignition key engaged and activating switch **B24b** in one of the two directions, verify 12 V between pins A and B of motor **P17**	OK ➡	Replace motor **P17**
	OK ➡	Restore wiring between: • pin 2 of **B24b** and pin B of **P17** (GRY-BLK) • pin 1 of **B24b** and pin A of **P17** (GRY)
B3 CHECK VOLTAGE – With ignition key engaged, verify 12 V between pin 3 and 4 of switch **B24b**, and between pin 5 and 4 of the same switch	OK ➡	Replace switch **B24b**
	OK ➡	Carry out **step B4**
B4 CHECK GROUND – Check that pin 4 of **B24b** is grounded (0V)	OK ➡	Carry out **step B5**
	OK ➡	Restore wiring between pin 4 of **B24b** and ground **G63b**, across pin 2 of connector **G31a** (BLK)

(continues)

REAR LEFT-HAND POWER WINDOW NOT WORKING	TEST B

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
B5 CHECK VOLTAGE – With ignition key engaged and activating switch **B24a** in one of the two directions, verify 12 V between pins 1 and 2 of switch **B24a**	OK ➡	Restore wiring between: • pin 1 of **B24a** and pin 5 of **B24b**, across pin 4 of connector **G31a** (GRY and ORN-WHT) • pin 2 of **B24a** and pin 3 of **B24b**, across pin 1 of connector **G31a** (GRY-BLK and ORN-WHT)
	~~OK~~ ➡	Carry out **step B6**
B6 CHECK VOLTAGE – With ignition key engaged, verify 12 V between pin 3 and 4 of switch **B24a**, and between pin 5 and 4 of the same switch	OK ➡	Replace switch **B24a**
	~~OK~~ ➡	Carry out **step B7**
B7 CHECK GROUND – Check that pin 4 of **B24a** is grounded (0V)	OK ➡	Restore wiring between: • pin 3 of **B24a** and pin 87 of relay **I13**, also across the solder (YEL-RED) • pin 5 of **B24a** and pin 87 of relay **I13**, also across the solder (YEL-RED)
	~~OK~~ ➡	Restore wiring between pin 4 of **B24a** and ground **G63b** (BLK)

REAR RIGHT-HAND POWER WINDOW NOT WORKING	TEST C

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
C1 CHECK VOLTAGE – With ignition key engaged and activating switch **B23b** in one of the two directions, verify 12 V between pins 1 and 2 of switch **B23b**	OK ➡	Carry out **step C2**
	~~OK~~ ➡	Carry out **step C3**
C2 CHECK MOTOR – With ignition key engaged and activating switch **B23b** in one of the two directions, verify 12 V between pins A and B of motor **P16**	OK ➡	Replace motor **P16**
	~~OK~~ ➡	Restore wiring between: • pin 2 of **B23b** and pin B of **P16** (GRY) • pin 1 of **B23b** and pin A of **P16** (GRY-BLK)
C3 CHECK VOLTAGE – With ignition key engaged, verify 12 V between pin 3 and 4 of switch **B23b**, and between pin 5 and 4 of the same switch	OK ➡	Replace switch **B23b**
	~~OK~~ ➡	Carry out **step C4**
C4 CHECK GROUND – Check that pin 4 of **B23b** is grounded (0V)	OK ➡	Carry out **step C5**
	~~OK~~ ➡	Restore wiring between pin 4 of **B23b** and ground **G63b**, across pin 2 of connector **G28a** (BLK)

(continues)

REAR RIGHT-HAND POWER WINDOW NOT WORKING	TEST C

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
C5 CHECK VOLTAGE – With ignition key engaged and activating switch **B23a** in one of the two directions, verify 12 V between pins 1 and 2 of switch **B23a**	OK ➡	Restore wiring between: • pin 1 of **B23a** and pin 3 of **B23b**, across pin 4 of connector **G28a** (GRY-GRN and ORN-WHT) • pin 2 of **B23a** and pin 5 of **B23b**, across pin 1 of connector **G28a** (GRY-RED and ORN-GRN)
	~~OK~~ ➡	Carry out **step C6**
C6 CHECK VOLTAGE – With ignition key engaged, verify 12 V between pin 3 and 4 of switch **B23a**, and between pin 5 and 4 of the same switch	OK ➡	Replace switch **B23a**
	~~OK~~ ➡	Carry out **step C7**
C7 CHECK GROUND – Check that pin 4 of **B23a** is grounded (0V)	OK ➡	Restore wiring between: • pin 3 of **B23a** and pin 87 of relay **I13**, also across the solder (YEL-RED) • pin 5 of **B23a** and pin 87 of relay **I13**, also across the solder (YEL-RED)
	~~OK~~ ➡	Restore wiring between pin 4 of **B23a** and ground **G63b** (BLK)

ADJUSTABLE HEATED SEATING

INDEX

GENERAL DESCRIPTION 24-2
FUNCTIONAL DESCRIPTION 24-2
LEFT-HAND SEAT 24-3
RIGHT-HAND SEAT 24-9
LOCATION OF COMPONENTS 24-15
TROUBLESHOOTING TABLE 24-16
TROUBLESHOOTING 24-17

GENERAL DESCRIPTION

The front seats are available with an electrically operated mechanism enabling both driver and passenger to adjust the seats to the best position for driving and for comfort.

In addition, a heater (composed of two pads located in the cushion and in the backrest) makes it possible to warm the seats, eliminating the disadvantages which, in areas with a harsh climate, are caused by when the inside of the vehicle is cold after it has been left in the open for long periods.

The system of seat regulation is formed by three groups of electric motors which operate respectively on the runners for longitudinal regulation, the height adjustment mechanism and the tilt mechanism for the backrest.

These motors are actuated by special switches and the entire system is managed by a control unit which protects the circuits of the motors themselves and controls the operation (engagement, stop limit etc.). The control unit is located under the rear seat.

The system of seat warming is formed by two resistors actuated by a switch and a relay; heating is interrupted automatically once a certain temperature is reached.

All the switches which control a seat are located on the seat itself one one side. The switches are illuminated.

FUNCTIONAL DESCRIPTION

The seating control unit **N58** is supplied by the battery through fuse **G240** (30A), and is connected to ground **G63b**; it receives a key-operated supply signal through the key-operated supply relay **I35** and fuse **F13** (20A) in fusebox **G1**.

The control unit **N58** "manages" the operation of the three seat regulation groups for each seat, each group composed of two parallel electric motors: (**P30**, **P6** and **P28** for the right-hand seat and **P5**, **P7** and **P29** for the left hand seat).

The motors are actuated by their respective switches (**B63**, **B29** and **B52** for the right-hand seat and **B27**, **B28** and **B54** for the left-hand seat), controlled by the control unit **N58**.

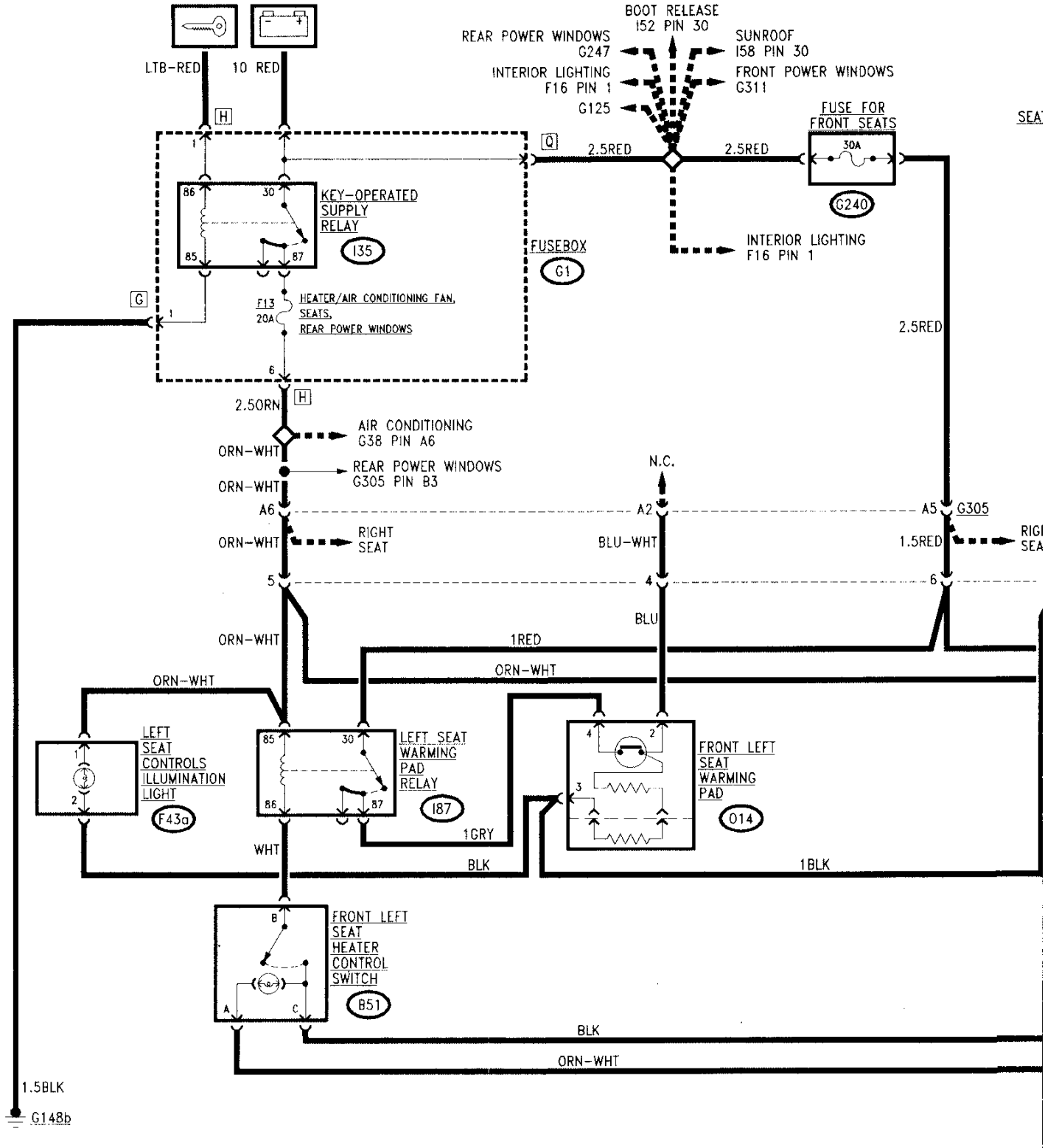
The switches are of the double control type: sending two signals to the motors, inverting positive and negative in order to change the direction of travel.

The seat warming pad relays **I88** (right) and **I87** (left) are turn-key supplied through key-operated supply relay **I35** and fuse **F13** (20A), both located in fusebox **G1**.

The warming pad resistance **O17** (right-hand seat) and **O14** (left-hand seat), connected to ground, are supplied respectively by battery voltage. This is excited by switches **B62** (right) and **B51** (left) which, when closed, send a ground signal to the relative coil.

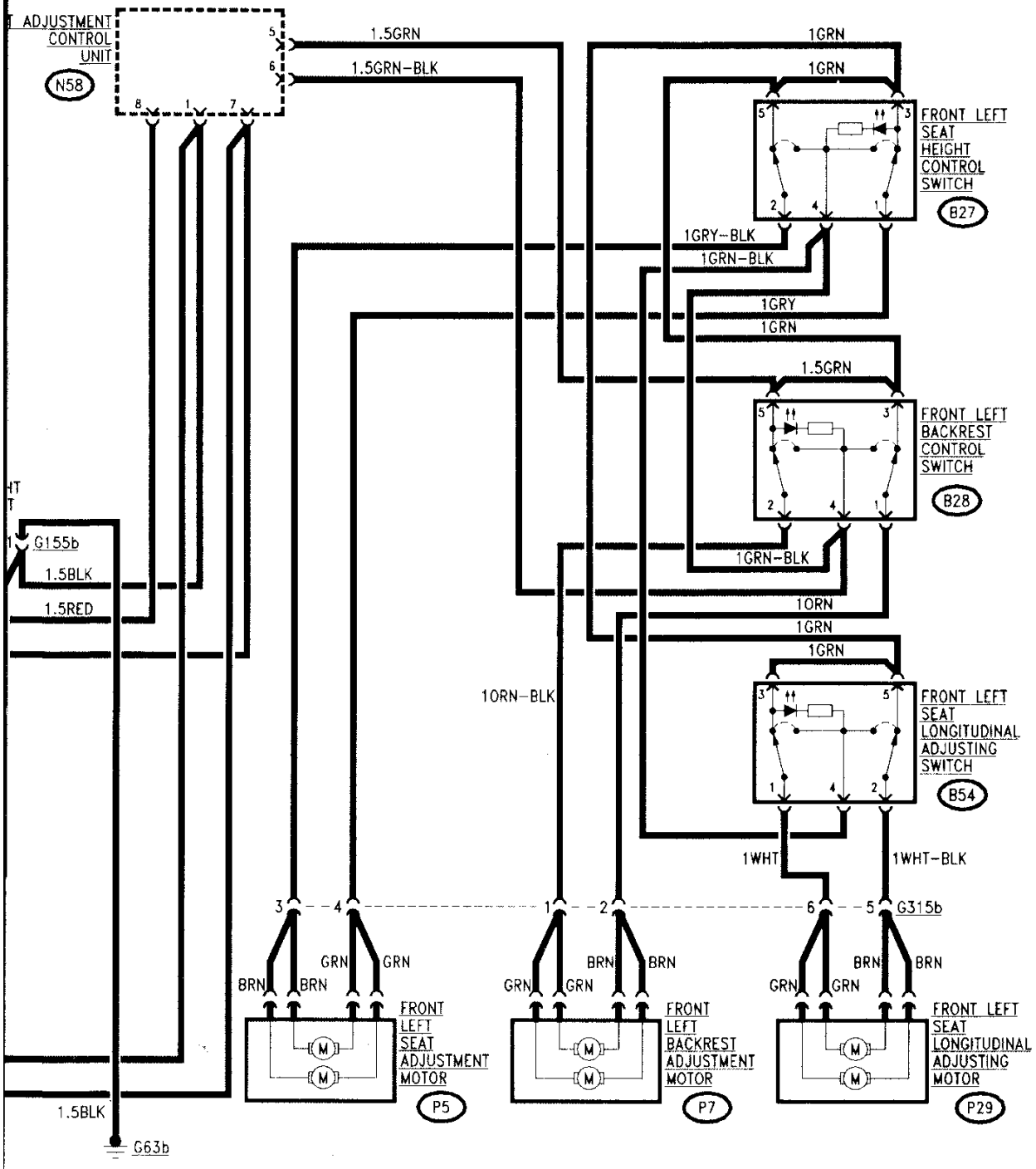
A thermal switch inside the warming pads automatically deactivates the resistances when a temperature of approximately 26°C is reached.

Two lamps light up the seat controls **F43** and those inside switches **B62** and **B51** are turn-key supplied, and light up the ideograms indicating the functions of the various switches.


LTB-RED
10 RED
H
BOOT RELEASE
I52 PIN 30
REAR POWER WINDOWS
G247
INTERIOR LIGHTING
F16 PIN 1
G125
SUNROOF
I58 PIN 30
FRONT POWER WINDOWS
G311
FUSE FOR
FRONT SEATS
30A
G240
Q
2.5RED
2.5RED
KEY-OPERATED
SUPPLY
RELAY
I35
FUSEBOX
G1
INTERIOR LIGHTING
F16 PIN 1
G
F13
20A
HEATER/AIR CONDITIONING FAN,
SEATS,
REAR POWER WINDOWS
2.5RED
2.50RN
H
AIR CONDITIONING
G38 PIN A6
ORN-WHT
REAR POWER WINDOWS
G305 PIN B3
ORN-WHT
N.C.
A6
A2
A5
G305
ORN-WHT
RIGHT
SEAT
BLU-WHT
1.5RED
5
4
6
BLU
ORN-WHT
1RED
ORN-WHT
ORN-WHT
LEFT
SEAT
CONTROLS
ILLUMINATION
LIGHT
F43a
LEFT SEAT
WARMING
PAD
RELAY
I87
FRONT LEFT
SEAT
WARMING
PAD
O14
1GRY
WHT
BLK
1BLK
FRONT LEFT
SEAT
HEATER
CONTROL
SWITCH
B51
BLK
ORN-WHT
1.5BLK
G148b

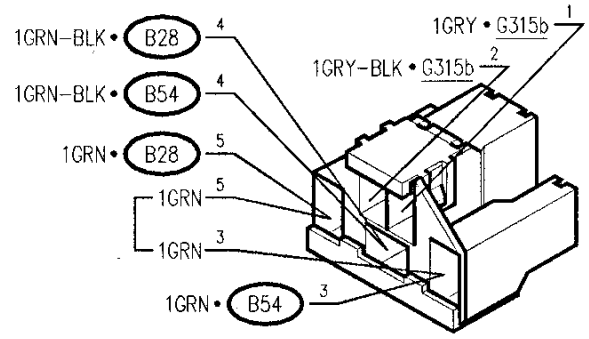
EFT-HAND SEAT

iring Diagram

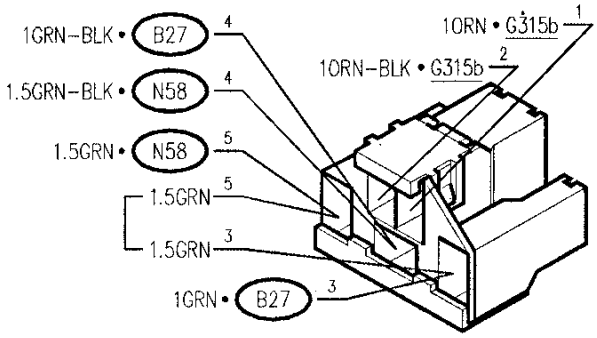


Components and Connectors

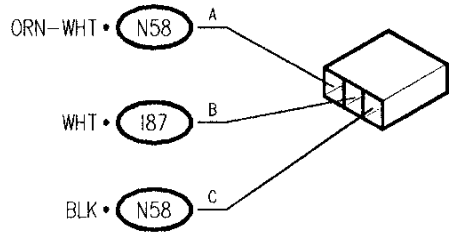
Front left seat height control switch (B27)



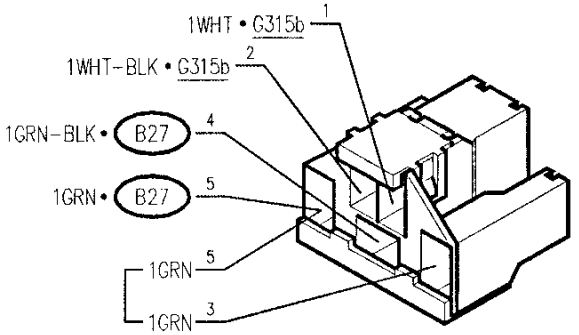
Front left backrest control switch (B28)



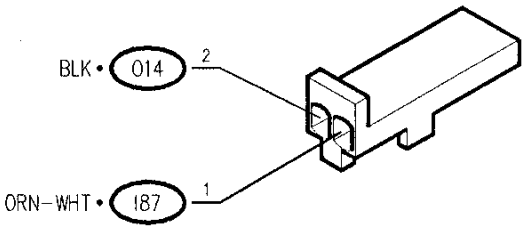
Front left seat heater control switch (B51)



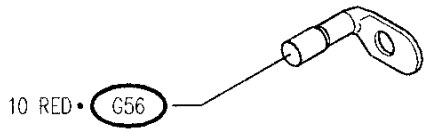
Front left seat longitudinal adjusting switch (B54)



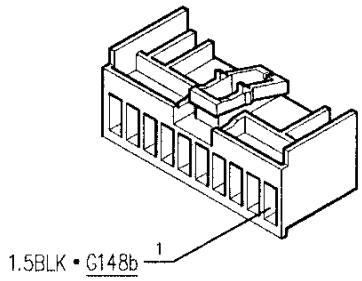
Left seat controls illumination light (F43a)



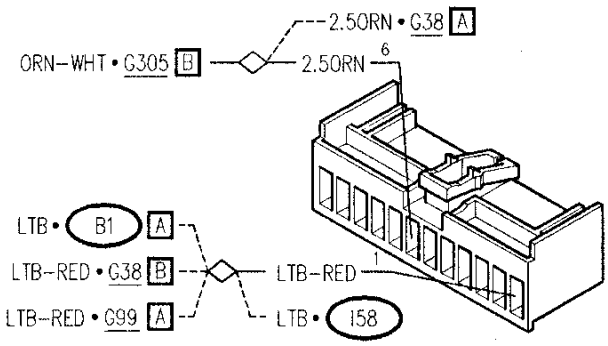
Fusebox (G1)



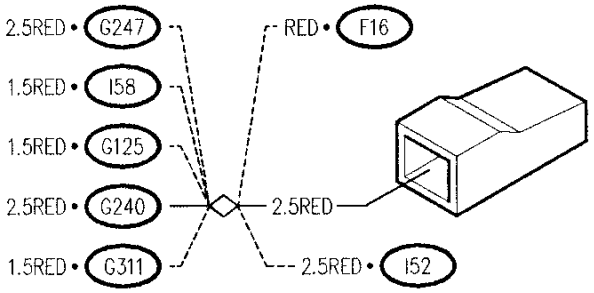
Fusebox (G1) G

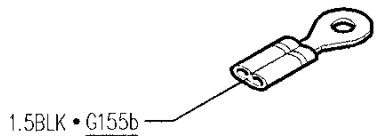


Fusebox (G1) H

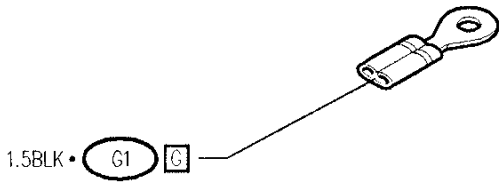


Fusebox	G1 Q	Rear left ground	G63b

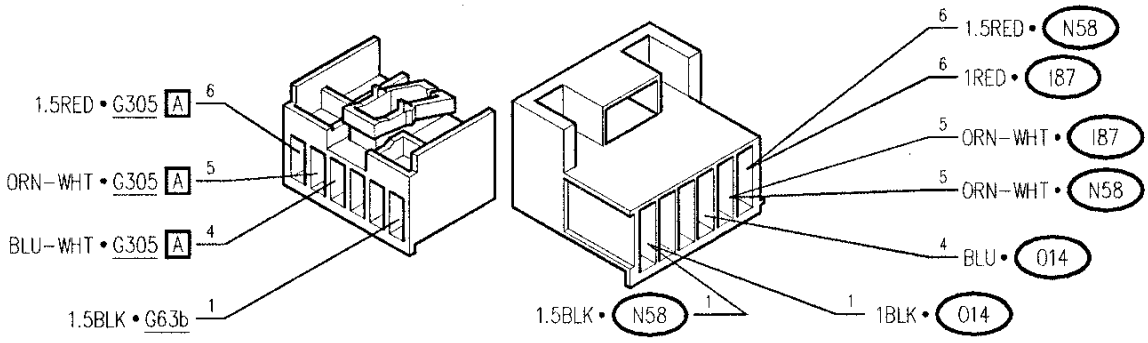




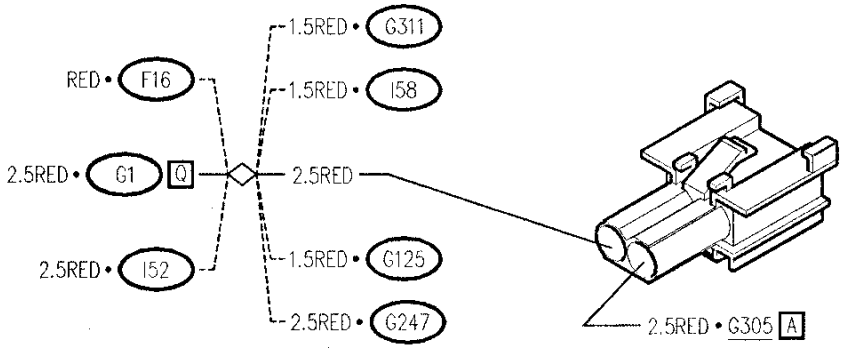
Under-dashboard ground-left side	G148b



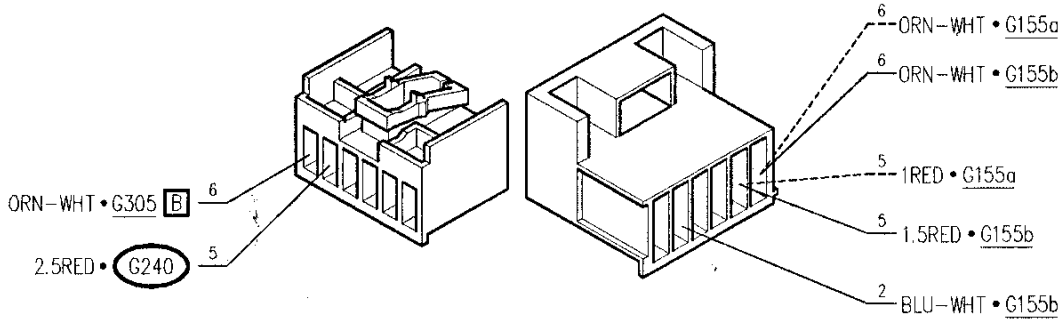
Left seat adjustment wiring connection	G155b



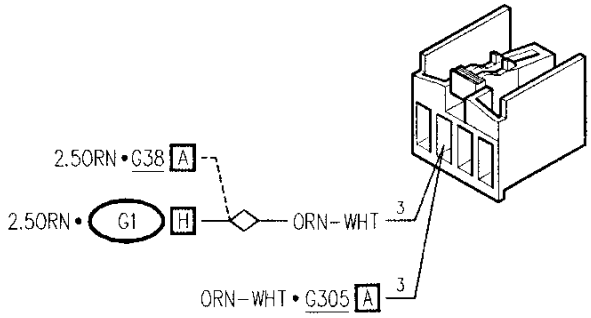
Fuse for front seats	G240



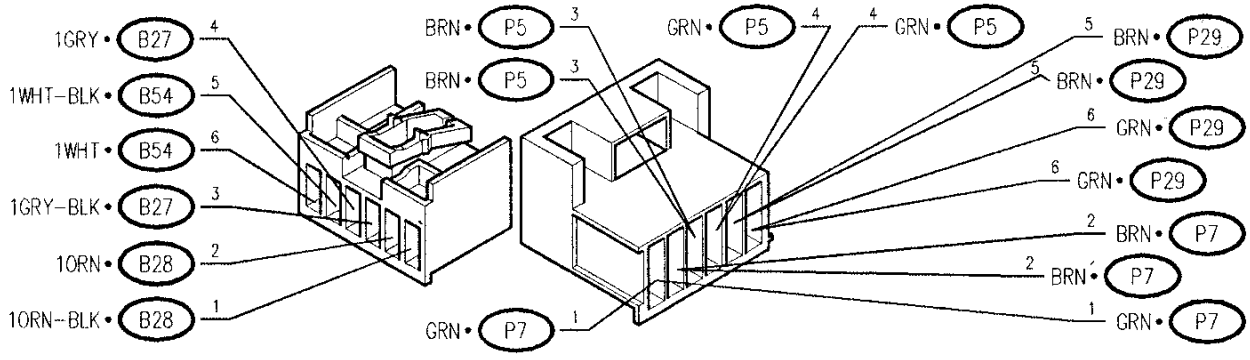
Connector fro rear power windows and seat adjustment | G305 A



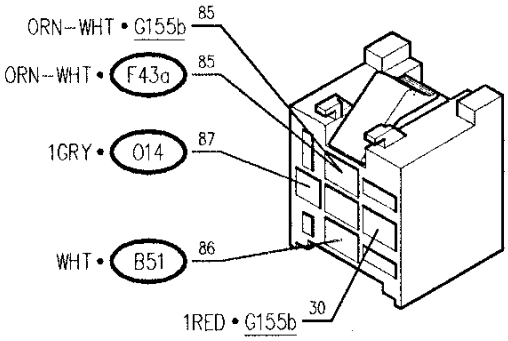
Connector fro rear power windows and seat adjustment | G305 B



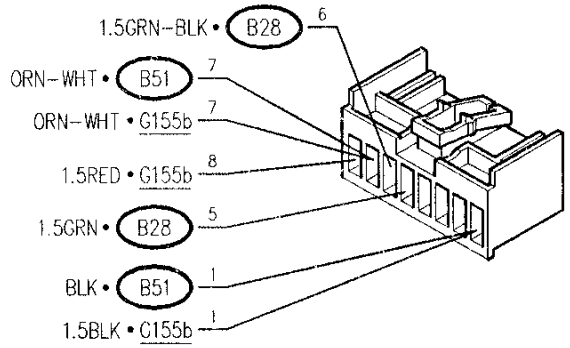
Connection for left seat-adjustment motors | G315b



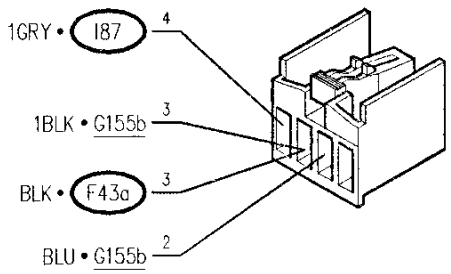
Left seat warming pad relay | I87

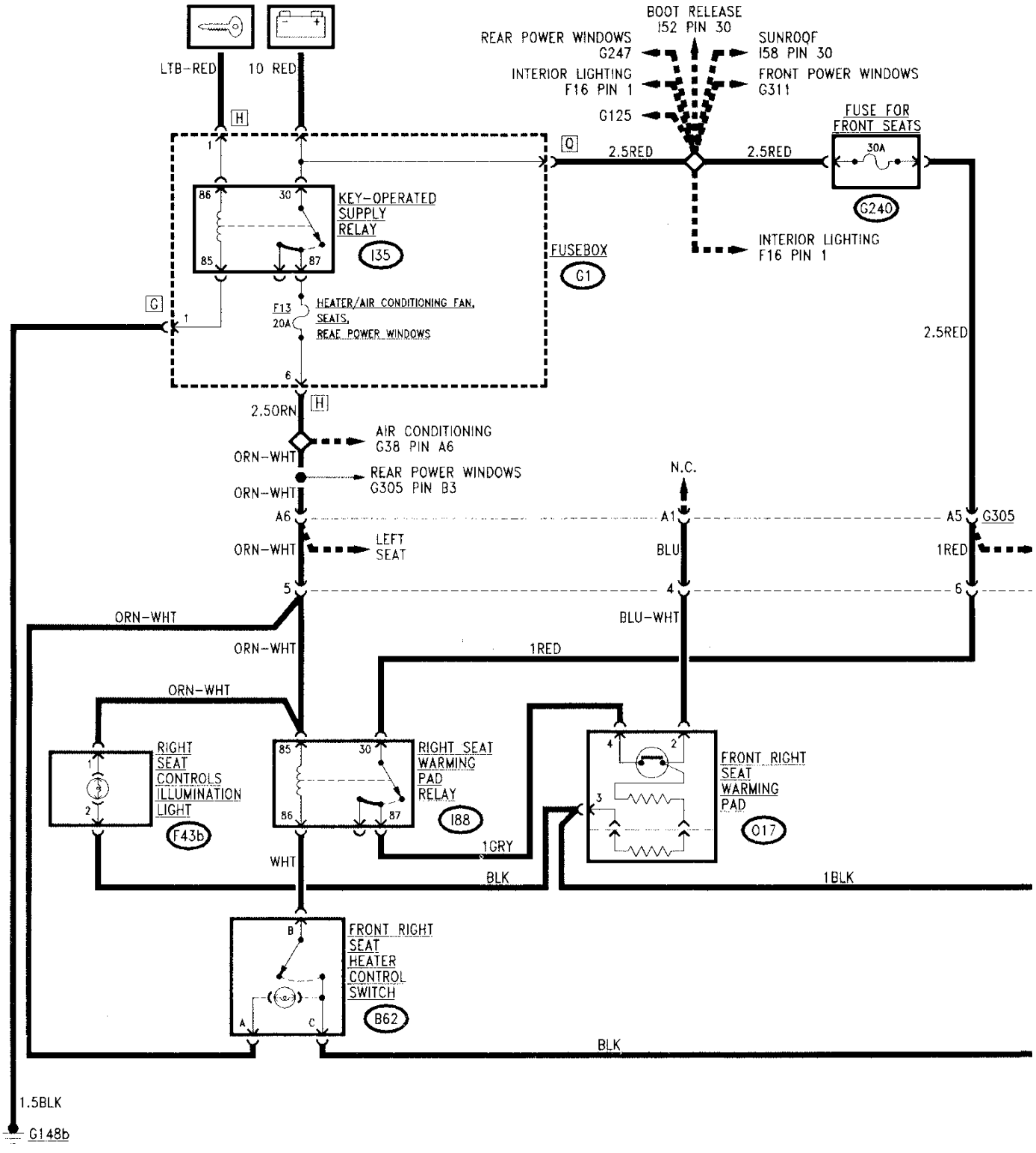


Seat adjustment control unit | N58



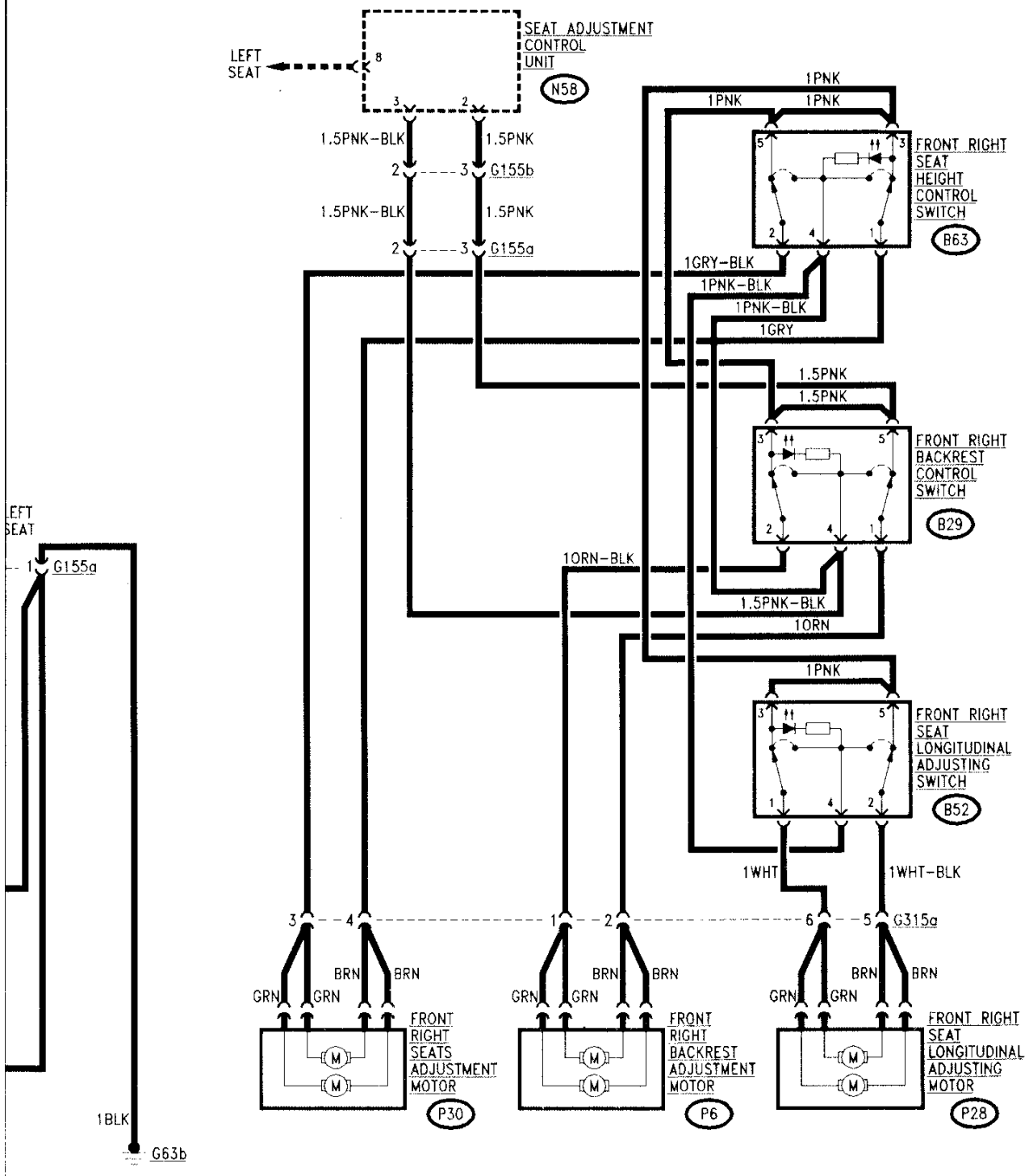
Front-left seat warming pad	O14




LTB-RED
10 RED
H
1
86
30
85
87
KEY-OPERATED SUPPLY RELAY
I35
FUSEBOX
G1
G
F13
20A
HEATER/AIR CONDITIONING FAN, SEATS, REAR POWER WINDOWS
6
2.50RN
H
AIR CONDITIONING G38 PIN A6
ORN-WHT
REAR POWER WINDOWS G305 PIN B3
ORN-WHT
A6
ORN-WHT
LEFT SEAT
5
ORN-WHT
ORN-WHT
ORN-WHT
RIGHT SEAT CONTROLS ILLUMINATION LIGHT
F43b
85
30
86
87
RIGHT SEAT WARMING PAD RELAY
I88
WHT
BOOT RELEASE I52 PIN 30
REAR POWER WINDOWS G247
INTERIOR LIGHTING F16 PIN 1
G125
SUNROOF I58 PIN 30
FRONT POWER WINDOWS G311
FUSE FOR FRONT SEATS
30A
G240
Q
2.5RED
2.5RED
INTERIOR LIGHTING F16 PIN 1
2.5RED
N.C.
A1
BLU
4
BLU-WHT
A5
G305
1RED
6
1RED
1GRY
4
2
3
FRONT RIGHT SEAT WARMING PAD
O17
BLK
1BLK
B
A
C
FRONT RIGHT SEAT HEATER CONTROL SWITCH
B62
BLK
1.5BLK
G148b

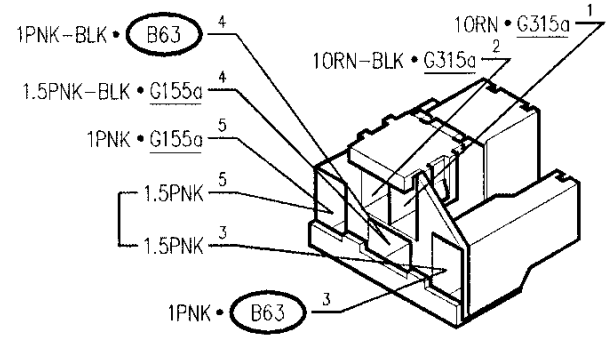
IGHT-HAND SEAT

iring Diagram

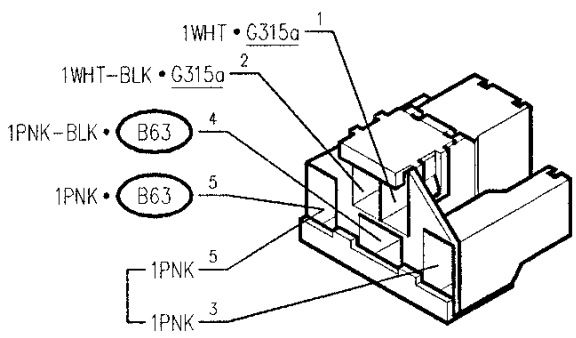


Components and Connectors

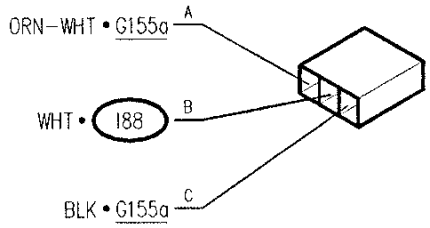
Front right backrest control switch	B29



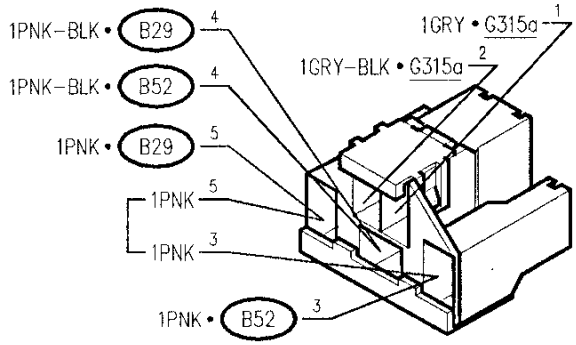
Front right seat longitudinal adjusting switch	B52



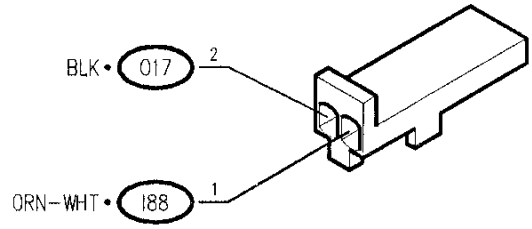
Front right seat heater control switch	B62



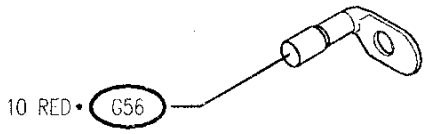
Front right seat height control switch	B63



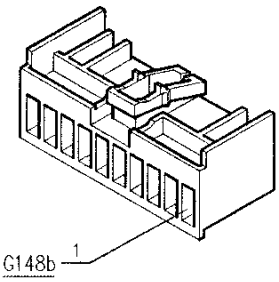
Right seat controls illumination light	F43b



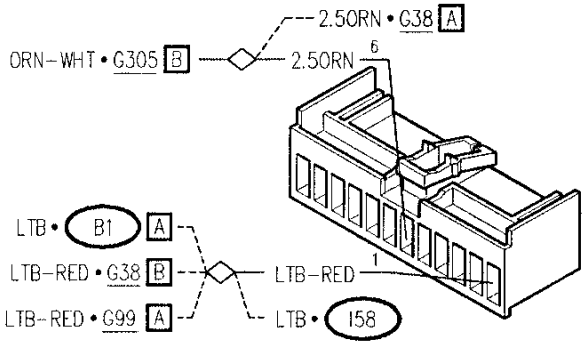
Fusebox	G1



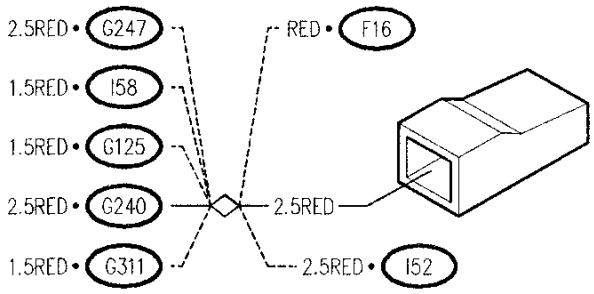
Fusebox	G1 G

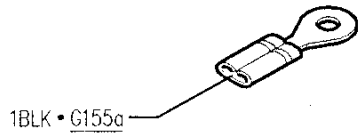


Fusebox	G1 H

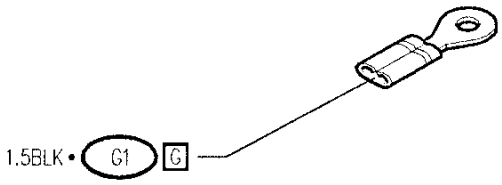


Fusebox	G1 Q	Rear left groud	G63b

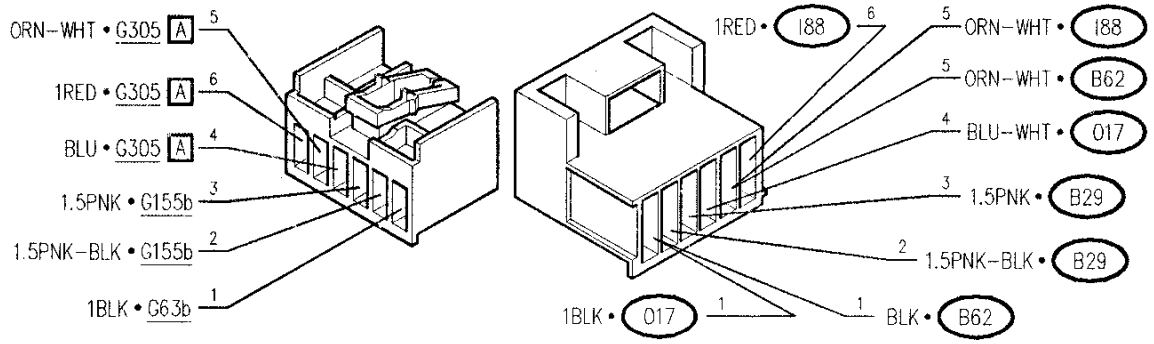




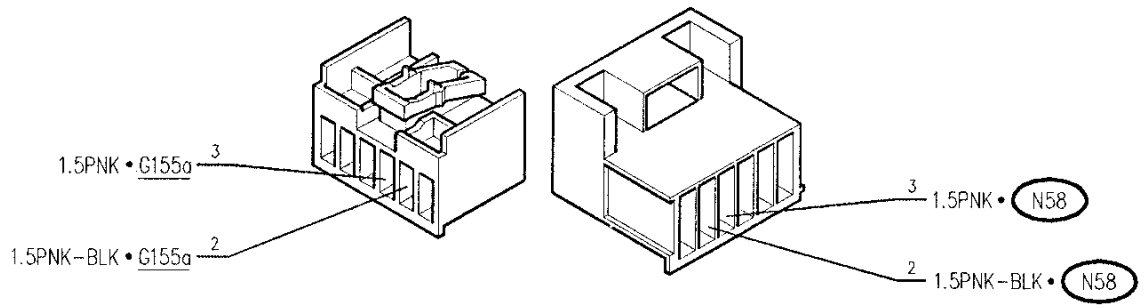
Under-dashboard ground-left side	G148b



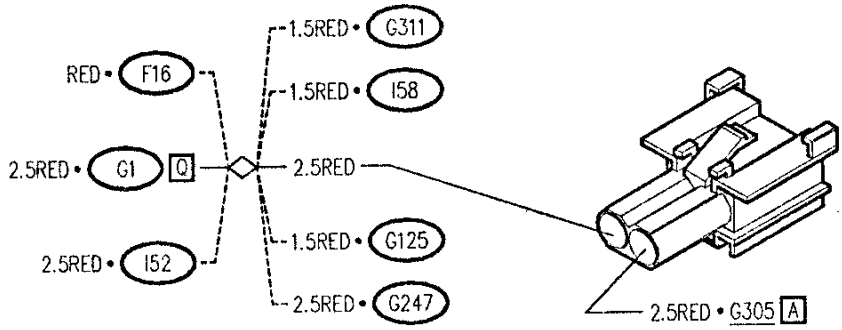
Right seat adjustment wiring connection	G155a



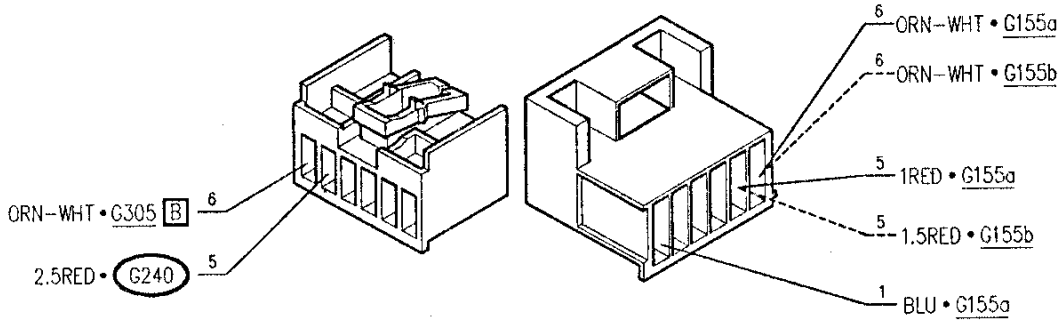
Left seat adjustment wiring connection	G155b



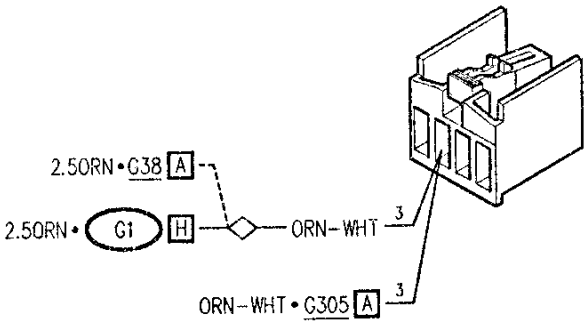
Fuse for front seats — G240



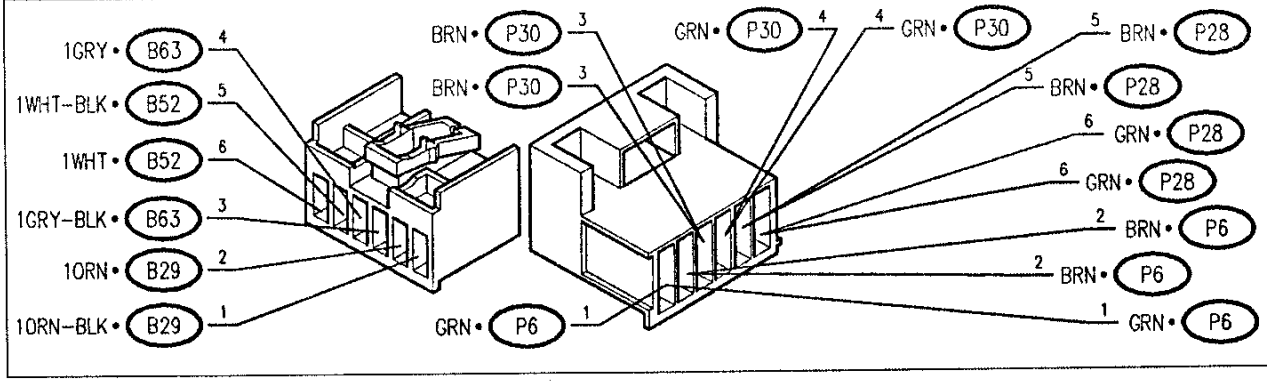
Connector for rear power windows and seat adjustment — G305 A



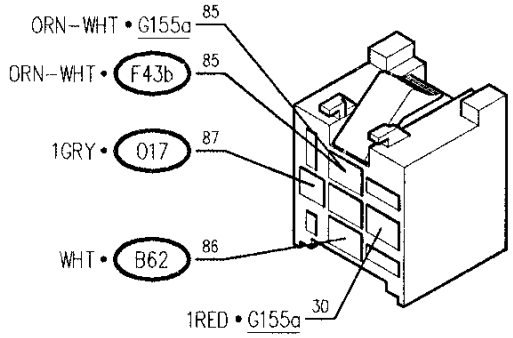
Connector for rear power windows and seat adjustment — G305 B



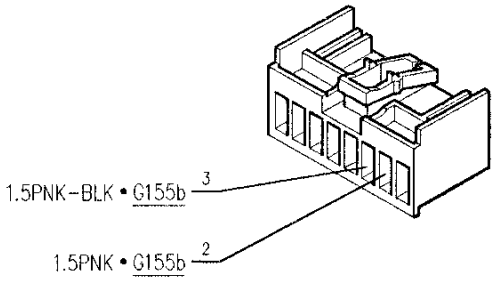
Connection for right seat-adjustment motors — G315a



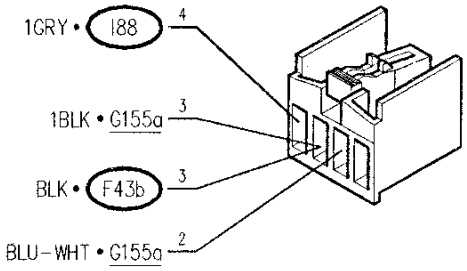
Right seat warming pad relay	I88



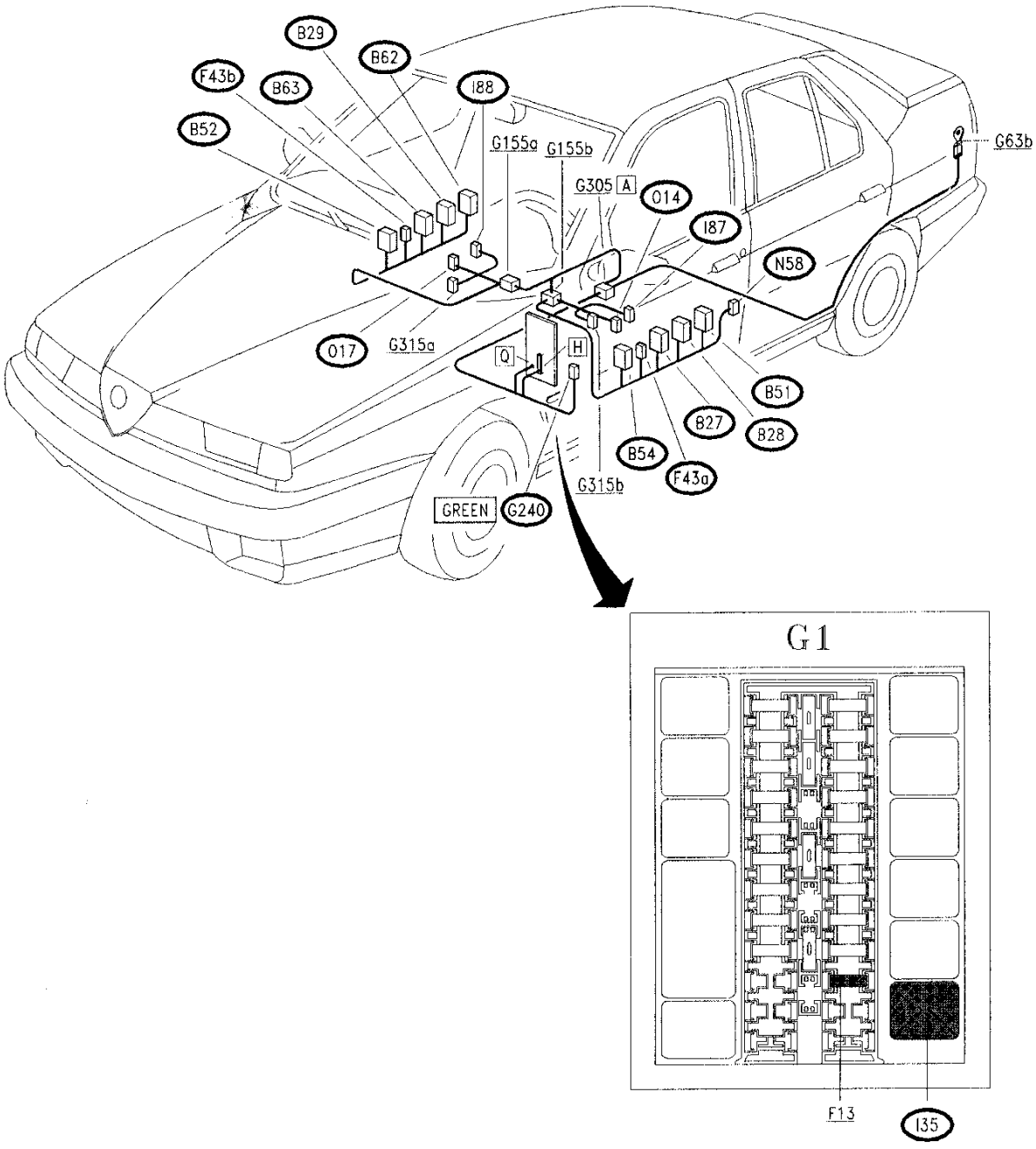
Seat adjustment control unit	N58



Front-right seat warming pad	O17



LOCATION OF COMPONENTS



TROUBLESHOOTING TABLE

Malfunction	Component															
	G240	N58	B63	B29	B52	P30	P6	P28	B27	B28	B54	P5	P7	P29	F13	
Seat adjustment (both seats)	•	•													•	A
RH seat longitudinal adj.		•			•			•								B
RH seat backrest adj.		•		•			•									C
RH seat height adj.		•	•			•										D
LH seat longitudinal adj.		•									•			•		E
LH seat backrest adj.		•								•			•			F
LH seat height adj.		•							•			•				G

(continues)

Malfunction	Component										Test
	G240	F13	I88	O17	I87	O14	F43a	F43b	B51	B62	
RH seat heating	•	•	•	•						•	H
LH seat heating	•	•			•	•			•		I
RH seat adj. control lighting								•			J
RH seat adj. control lighting							•				K
RH seat heating control lighting										•	L
LH seat heating control lighting									•		M

TROUBLESHOOTING

SEAT ADJUSTMENT NOT WORKING	TEST A

NOTE: if the windscreen wiper, interior ventilator, heated rear window, rear-view mirror, rear power window etc. circuits are also not working, check, and if necessary replace the key operated supply relay **I35.**

TEST PROCEDURE		RESULT	CORRECTIVE ACTION
A1	CHECK FUSE		
– Check for damage of wander fuse **G240**		OK ➡	Carry out **step A2**
		~~OK~~ ➡	Replace fuse (30A)
A2	CHECK FUSE		
– Check for damage of fuse **F13** in fusebox **G1**		OK ➡	Carry out **step A3**
		~~OK~~ ➡	Replace fuse (20A)
A3	CHECK GROUND		
– Check that pin 1 of **N58** is grounded (0V)		OK ➡	Carry out **step A4**
		~~OK~~ ➡	Restore wiring between pin 1 of **N58** and ground **G63b**, across pin 1 of connector **G155b** (BLK)
A4	CHECK VOLTAGE		
– Verify 12V at pin 8 of seat control unit **N58**		OK ➡	Carry out **step A6**
		~~OK~~ ➡	Carry out **step A5**

(continues)

SEAT ADJUSTMENT NOT WORKING	TEST A

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
A5 CHECK VOLTAGE – Verify 12V at one of the wander fuse terminals **G240**	OK →	Restore wiring between pin 8 of **N58** and fuse **G240**, across pin 6 of connector **G155b** and pin A5 of connector **G305** (RED)
	~~OK~~ →	Restore wiring between fuse **G240** and pin Q of **G1**, also across the solder (RED)
A6 CHECK VOLTAGE – With ignition key engaged, verify 12V at pin 7 of seat control unit **N58**	OK →	Check and if necessary substitute the seat control unit **N58**
	~~OK~~ →	Restore wiring between pin 7 of **N58** and pin H6 of **G1**, across pin 5 of connector **G155b**, pins A6 and B3 of connector **G305** and the solder (ORN- WHT and ORN)

LONGITUDINAL ADJUSTMENT OF RIGHT-HAND SEAT NOT WORKING	TEST B

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
B1 CHECK VOLTAGE – With ignition key engaged, verify 12V between pins 3 and 2 of control unit **N58**	OK ➡	Carry out **step B2**
	OK ➡	Check and if necessary replace control unit **N58** **N.B.** In this case the other right-hand seat adjustment functions will also not be working
B2 CHECK VOLTAGE – With ignition key engaged, verify 12V between pins 3 and 4 of switch **B52**, and also between pins 5 and 4 of the same	OK ➡	Carry out **step B3**
	OK ➡	Restore wiring between: • pin 4 of **B52** and pin 3 of control unit **N58**, across pin 4 of **B63**, pin 4 of **B29**, pin 2 of connector **G155a** and pin 2 of connector **G155b** (PNK-BLK) • pin 3 and 5 of **B52** and pin 2 of control unit **N58**, across pin 3 and 5 of **B63**, pin 3 and 5 of **B29**, pin 3 of connector **G155a** and pin 3 of connector **G155b** (PNK)

(continues)

LONGITUDINAL ADJUSTMENT OF RIGHT-HAND SEAT NOT WORKING	TEST B

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
B3 CHECK SWITCH – With ignition key engaged and operating switch **B52** in one of the two directions, verify 12 V between pins 1 and 2 of **B52**	OK ➡	Carry out **step B4**
	~~OK~~ ➡	Substitute switch **B52**
B4 CHECK MOTORS – With ignition key engaged and operating switch **B52** in one of the two directions, verify 12 V between pins 6 and 5 of connector **G315a**	OK ➡	Check wiring between connector **G315a** and motors **P28** (GRN and BRN), or replace **P28** motors if faulty
	~~OK~~ ➡	Restore wiring between: • pin 2 of **B52** and pin 5 of **G315a** (WHT-BLK) • pin 1 of **B52** and pin 6 of **G315a** (WHT)

BACKREST ADJUSTMENT OF RIGHT-HAND SEAT NOT WORKING	TEST C

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
C1 CHECK VOLTAGE – With ignition key engaged, verify 12V between pins 3 and 2 of control unit **N58**	OK ➡ ~~OK~~ ➡	Carry out **step C2** Check and if necessary replace control unit **N58** **N.B.** In this case the other functions of the right-hand seat will also not be working
C2 CHECK VOLTAGE – With ignition key engaged, verify 12V between pins 3 and 4 of switch **B29**, and also between pins 5 and 4 of the same	OK ➡ ~~OK~~ ➡	Carry out **step C3** Restore wiring between: • pin 4 of **B29** and pin 3 of control unit **N58**, across pin 2 of connector **G155a** and pin 2 of connector **G155b** (PNK-BLK) • pin 3 and 5 of **B29** and pin 2 of control unit **N58**, across pin 3 of connector **G155a** and pin 3 of connector **G155b** (PNK)

(continues)

BACKREST ADJUSTMENT OF RIGHT-HAND SEAT NOT WORKING	TEST C

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
C3 CHECK SWITCH – With ignition key engaged and operating switch **B29** in one of the two directions, verify 12 V between pins 1 and 2 of **B29**	OK ➡	Carry out **step C4**
	~~OK~~ ➡	Substitute switch **B29**
C4 CHECK MOTORS – With ignition key engaged and operating switch **B29** in one of the two directions, verify 12 V between pins 1 and 2 of connector **G315a**	OK ➡	Check wiring between connector **G315a** and motors **P6** (GRN and BRN), or replace faulty motors **P6**
	~~OK~~ ➡	Restore wiring between: • pin 1 of **B29** and pin 2 of **G315a** (ORN) • pin 2 of **B29** and pin 1 of **G315a** (ORN-BLK)

HEIGHT ADJUSTMENT OF RIGHT-HAND SEAT NOT WORKING	TEST D

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
D1 CHECK VOLTAGE – With ignition key engaged, verify 12V between pins 3 and 2 of control unit **N58**	OK →	Carry out **step D2**
	~~OK~~ →	Check and if necessary replace control unit **N58** **N.B.** In this case the other functions of the right-hand seat will also not be working
D2 CHECK VOLTAGE – With ignition key engaged, verify 12V between pins 3 and 4 of switch **B63**, and also between pins 5 and 4 of the same	OK →	Carry out **step D3**
	~~OK~~ →	Restore wiring between: • pin 4 of **B63** and pin 3 of control unit **N58**, across pin 4 of **B29**, pin 2 of connector **G155a** and pin 2 of connector **G155b** (PNK-BLK) • pin 3 and 5 of **B52** and pin 2 of control unit **N58**, across pin 3 and 5 of B29, pin 3 of connector G155a and pin 3 of connector **G155b** (PNK)

(continues)

HEIGHT ADJUSTMENT OF RIGHT-HAND SEAT NOT WORKING	TEST D

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
D3 CHECK SWITCH – With ignition key engaged and operating switch **B63** in one of the two directions, verify 12 V between pins 1 and 2 of **B63**	OK ➡	Carry out **step D4**
	OK ➡	Substitute switch **B63**
D4 CHECK MOTORS – With ignition key engaged and operating switch **B63** in one of the two directions, verify 12 V between pins 3 and 4 of connector **G315a**	OK ➡	Check wiring between connector **G315a** and motors **P30** (GRN and BRN), or replace **P30** motors if faulty
	OK ➡	Restore wiring between: • pin 2 of **B63** and pin 3 of **G315a** (GRY-BLK) • pin 1 of **B63** and pin 4 of **G315a** (GRY)

LONGITUDINAL ADJUSTMENT OF LEFT-HAND SEAT NOT WORKING	TEST E

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
E1 CHECK VOLTAGE – With ignition key engaged, verify 12V between pins 6 and 5 of control unit **N58**	OK ➡	Carry out **step E2**
	OK ➡	Check and if necessary replace control unit **N58** **N.B.** In this case the other functions of the left-hand seat will also not be working
E2 CHECK VOLTAGE – With ignition key engaged, verify 12V between pins 3 and 4 of switch **B54**, and also between pins 5 and 4 of the same	OK ➡	Carry out **step E3**
	OK ➡	Restore wiring between: • pin 4 of **B54** and pin 6 of control unit **N58**, across pin 4 of **B27** and pin 4 of **B28** (GRN-BLK) • pin 3 and 5 of **B54** and pin 5 of control unit **N58**, across pin 3 and 5 of **B27**, and pin 3 and 5 of **B28** (GRN)

(continues)

LONGITUDINAL ADJUSTMENT OF LEFT-HAND SEAT NOT WORKING	TEST E

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
E3 CHECK SWITCH – With ignition key engaged and operating switch **B54** in one of the two directions, verify 12 V between pins 1 and 2 of the same **B54**	OK ➡	Carry out **step E4**
	OK ➡	Substitute switch **B54**
E4 CHECK MOTORS – With ignition key engaged and operating switch **B54** in one of the two directions, verify 12 V between pins 6 and 5 of connector **G315b**	OK ➡	Check wiring between connector **G315b** and motors **P29** (GRN and BRN), or replace motors **P29** if faulty
	OK ➡	Restore wiring between: • pin 2 of **B54** and pin 5 of **G315b** (WHT-BLK) • pin 1 of **B54** and pin 6 of **G315b** (WHT)

BACKREST ADJUSTMENT OF LEFT-HAND SEAT NOT WORKING	TEST F

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
F1 CHECK VOLTAGE – With ignition key engaged, verify 12V between pins 6 and 5 of control unit **N58**	OK ➔	Carry out **step F2**
	~~OK~~ ➔	Check and if necessary replace control unit **N58** **N.B.** In this case the other functions of the left-hand seat will also not be working
F2 CHECK VOLTAGE – With ignition key engaged, verify 12V between pins 3 and 4 of switch **B28**, and also between pins 5 and 4 of the same	OK ➔	Carry out **step F3**
	~~OK~~ ➔	Restore wiring between: • pin 4 of **B28** and pin 6 of control unit **N58**, (GRN-BLK) • pin 3 and 5 of **B28** and pin 5 of control unit **N58** (GRN)
F3 CHECK SWITCH – With ignition key engaged and operating switch **B28** in one of the two directions, verify 12 V between pins 1 and 2 of **B28**	OK ➔	Carry out **step F4**
	~~OK~~ ➔	Substitute switch **B28**

(continues)

BACKREST ADJUSTMENT OF LEFT-HAND SEAT NOT WORKING	TEST F

TEST PROCEDURE		RESULT	CORRECTIVE ACTION
F4	CHECK MOTORS		
– With ignition key engaged and operating switch **B28** in one of the two directions, verify 12 V between pins 1 and 2 of connector **G315b**		OK ➔	Check wiring between connector **G315b** and motors **P7** (GRN and BRN), or replace **P7** motors if faulty
		OK ➔	Restore wiring between: • pin 1 of **B28** and pin 2 of **G315b** (ORN) • pin 2 of **B28** and pin 1 of **G315b** (ORN-BLK)

HEIGHT ADJUSTMENT OF LEFT-HAND SEAT NOT WORKING	TEST G

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
G1 CHECK VOLTAGE – With ignition key engaged, verify 12V between pins 6 and 5 of control unit **N58**	OK ➡ ~~OK~~ ➡	Carry out **step G2** Check and if necessary replace control unit **N58** **N.B.** In this case the other functions of the left-hand seat will also not be working
G2 CHECK VOLTAGE – With ignition key engaged, verify 12V between pins 3 and 4 of switch **B27**, and also between pins 5 and 4 of the same	OK ➡ ~~OK~~ ➡	Carry out **step G3** Restore wiring between: • pin 4 of **B27** and pin 6 of control unit **N58**, across pin 4 of **B28** (GRN-BLK) • pin 3 and 5 of **B27** and pin 5 of control unit **N58**, across pin 3 and 5 of **B28** (GRN)
G3 CHECK SWITCH – With ignition key engaged and operating switch **B27** in one of the two directions, verify 12 V between pins 1 and 2 of **B27**	OK ➡ ~~OK~~ ➡	Carry out **step G4** Substitute switch **B27**

(continues)

HEIGHT ADJUSTMENT OF LEFT-HAND SEAT NOT WORKING	TEST G

TEST PROCEDURE		RESULT	CORRECTIVE ACTION
G4	CHECK MOTORS		
– With ignition key engaged and operating switch **B27** in one of the two directions, verify 12 V between pins 3 and 4 of connector **G315b**		OK ➡	Check wiring between connector **G315b** and motors **P5** (GRN and BRN), or replace faulty motors **P5**
		OK ➡	Restore wiring between: • pin 2 of **B27** and pin 3 of **G315b** (GRY-BLK) • pin 1 of **B27** and pin 4 of **G315b** (GRY)

RIGHT-HAND SEAT HEATER NOT WORKING	TEST H

NOTE: before carrying out this test, ensure that the seat adjustment mechanism is operating correctly; if not carry out **test A** and, if necessary, the successive tests before following the indications given below.

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
H1 CHECK RELAY – Check for correct operation of right-hand seat heater relay **I88**	OK ➡	Carry out **step H2**
	OK ➡	Replace relay **I88**
H2 CHECK HEATER – With ignition key engaged, switch on the seat heater and verify 12 V between pins 3 and 4 of heater **O17**	OK ➡	Check and if necessary replace the resistances of heater **O17.** **N.B.** If the heater is working, but doesn't switch off automatically when a set temperature is reached (approx. 26°C), check the thermal switch and if necessary replace it
	OK ➡	Carry out **step H3**
H3 CHECK GROUND – Check that pin 3 of **O17** is grounded (0V)	OK ➡	Carry out **step H4**
	OK ➡	Restore wiring between pin 3 of **O17** and ground **G63b**, across pin 1 of connector **G155a** (BLK)

(continues)

RIGHT-HAND SEAT HEATER NOT WORKING	TEST H

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
H4 CHECK VOLTAGE – With ignition key engaged and heater on, verify 12 V at pin 87 of relay **I88**	OK →	Restore wiring between pin 87 of **I88** and pin 4 of **O17** (GRY)
	OK →	Carry out **step H5**
H5 CHECK VOLTAGE – With ignition key engaged, verify 12V at pin 85 of relay **I88**	OK →	Carry out **step H6**
	OK →	Restore wiring between pin 85 of **I88** and pin H6 of **G1**, across pin 5 of connector **G155a**, pins A6 and B3 of connector **G305** and the solder (ORN-WHT and ORN)
H6 CHECK VOLTAGE – Verify 12 V at pin 30 of relay **I88**	OK →	Carry out **step H7**
	OK →	Restore wiring between pin 30 of **I88** and pin Q of **G1**, across pin 6 of connector **G155a**, pin A5 of connector **G305**, wander fuse **G240** and the solder (RED)

(continues)

RIGHT-HAND SEAT HEATER NOT WORKING	TEST H

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
H7 CHECK SWITCH – With heater on, check continuity between pins B and C of right hand seat heater control switch **B62**	OK ➡	Carry out **step H8**
	~~OK~~ ➡	Substitute switch **B62**
H8 CHECK GROUND – Check that pin C of switch **B62** is grounded (0V)	OK ➡	Restore wiring between pin B of **B62** and pin 86 of relay **I88** (WHT)
	~~OK~~ ➡	Restore wiring between pin C of **B62** and ground **G63b**, across pin 1 of connector **G155a** (BLK)

LEFT-HAND SEAT HEATER NOT WORKING	TEST I

NOTE: before carrying out this test, ensure that the seat adjustment mechanism is operating correctly; if not carry out **test A** and, if necessary, the successive tests before following the indications given below.

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
I1 CHECK RELAY – Check for correct operation of left-hand seat heater relay **I87**	OK ➔	Carry out **step I2**
	~~OK~~ ➔	Substitute relay **I87**
I2 CHECK HEATER – With ignition key engaged, switch on the seat heater and verify 12 V between pins 3 and 4 of heater **O14**	OK ➔	Check and if necessary replace the resistances of heater **O14.** **N.B.** If the heater is working, but doesn't switch off automatically when a set temperature is reached (approx. 26°C) check the thermal switch and if necessary replace it
	~~OK~~ ➔	Carry out **step I3**
I3 CHECK GROUND – Check that pin 3 of **O14** is grounded (0V)	OK ➔	Carry out **step I4**
	~~OK~~ ➔	Restore wiring between pin 3 of **O14** and ground **G63b**, across pin 1 of connector **G155b** (BLK)

(continues)

LEFT-HAND SEAT HEATER NOT WORKING	TEST I

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
I4 CHECK VOLTAGE – With ignition key engaged and heater on, verify 12 V at pin 87 of relay **I87**	OK ➡	Restore wiring between pin 87 of **I87** and pin 4 of **O14** (GRY)
	~~OK~~ ➡	Carry out **step I5**
I5 CHECK VOLTAGE – With ignition key engaged, verify 12V at pin 85 of relay **I87**	OK ➡	Carry out **step I6**
	~~OK~~ ➡	Restore wiring between pin 85 of **I87** and pin H6 of **G1**, across pin 5 of connector **G155b**, pins A6 and B3 of connector **G305** and the solder (ORN-WHT and ORN)
I6 CHECK VOLTAGE – Verify 12 V at pin 30 of relay **I87**	OK ➡	Carry out **step I7**
	~~OK~~ ➡	Restore wiring between pin 30 of **I87** and pin Q of **G1**, across pin 6 of connector **G155b**, pin A5 of connector **G305**, wander fuse **G240** and the solder (RED)

(continues)

LEFT-HAND SEAT HEATER NOT WORKING	TEST I

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
I7 CHECK SWITCH – A heater on, check continuity between pins B and C of left-hand seat heater control switch **B51**	OK ➡	Carry out **step I8**
	~~OK~~ ➡	Substitute switch **B51**
I8 CHECK GROUND – Check that pin C of switch **B51** is grounded (0V)	OK ➡	Restore wiring between pin B of **B51** and pin 86 of relay **I87** (WHT)
	~~OK~~ ➡	Restore wiring between pin C of **B51** and ground **G63b**, across pin 1 of control unit **N58** and pin 1 of connector **G155b** (BLK)

RIGHT-HAND SEAT CONTROLS DO NOT LIGHT UP	TEST J

NOTE: however seat adjustment functions normally

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
J1 CHECK BULB – Verify, with ignition key engaged, 12 V between pins 1 and 2 of light **F43b**	OK ➡	Substitute bulb of **F43b**
	~~OK~~ ➡	Carry out **step J2**
J2 CHECK GROUND – Check that pin 2 of **F43b** is grounded (0V)	OK ➡	Restore wiring between pin 1 of **F43b** and pin 85 of relay **I88** (ORN-WHT)
	~~OK~~ ➡	Restore wiring between pin 2 of **F43b** and pin 3 of **O17** (BLK)

LEFT-HAND SEAT CONTROLS DO NOT LIGHT UP	TEST K

NOTE: however seat adjustment functions normally

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
K1 CHECK BULB – Verify, with ignition key engaged, 12 V between pins 1 and 2 of light **F43a**	OK ➡	Substitute bulb of **F43a**
	~~OK~~ ➡	Carry out **step K2**
K2 CHECK GROUND – Check that pin 2 of **F43a** is grounded (0V)	OK ➡	Restore wiring between pin 1 of **F43a** and pin 85 of relay **I87** (ORN-WHT)
	~~OK~~ ➡	Restore wiring between pin 2 of **F43a** and pin 3 of **O14** (BLK)

RIGHT-HAND SEAT HEATER CONTROLS DO NOT LIGHT UP	TEST L

NOTE: however the seat heater functions normally

TEST PROCEDURE		RESULT	CORRECTIVE ACTION
L1	CHECK BULB		
– Verify, with ignition key engaged, 12 V between pins A and C of switch **B62**		OK ▶	Substitute bulb in **B62**
		OK ▶	Restore wiring between pin A of **B62** and pin 5 of connector **G155a** (ORN-WHT)

LEFT-HAND SEAT HEATER CONTROLS DO NOT LIGHT UP	TEST M

NOTE: however seat heating functions normally

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
M1 CHECK BULB – Verify, with ignition key engaged, 12 V between pins A and C of switch **B51**	OK ➡	Substitute bulb in **B51**
	~~OK~~ ➡	Restore wiring between pin A of **B62** and pin 5 of connector **G155b**, across pin 7 of control unit **N58** (ORN-WHT)

SUNROOF

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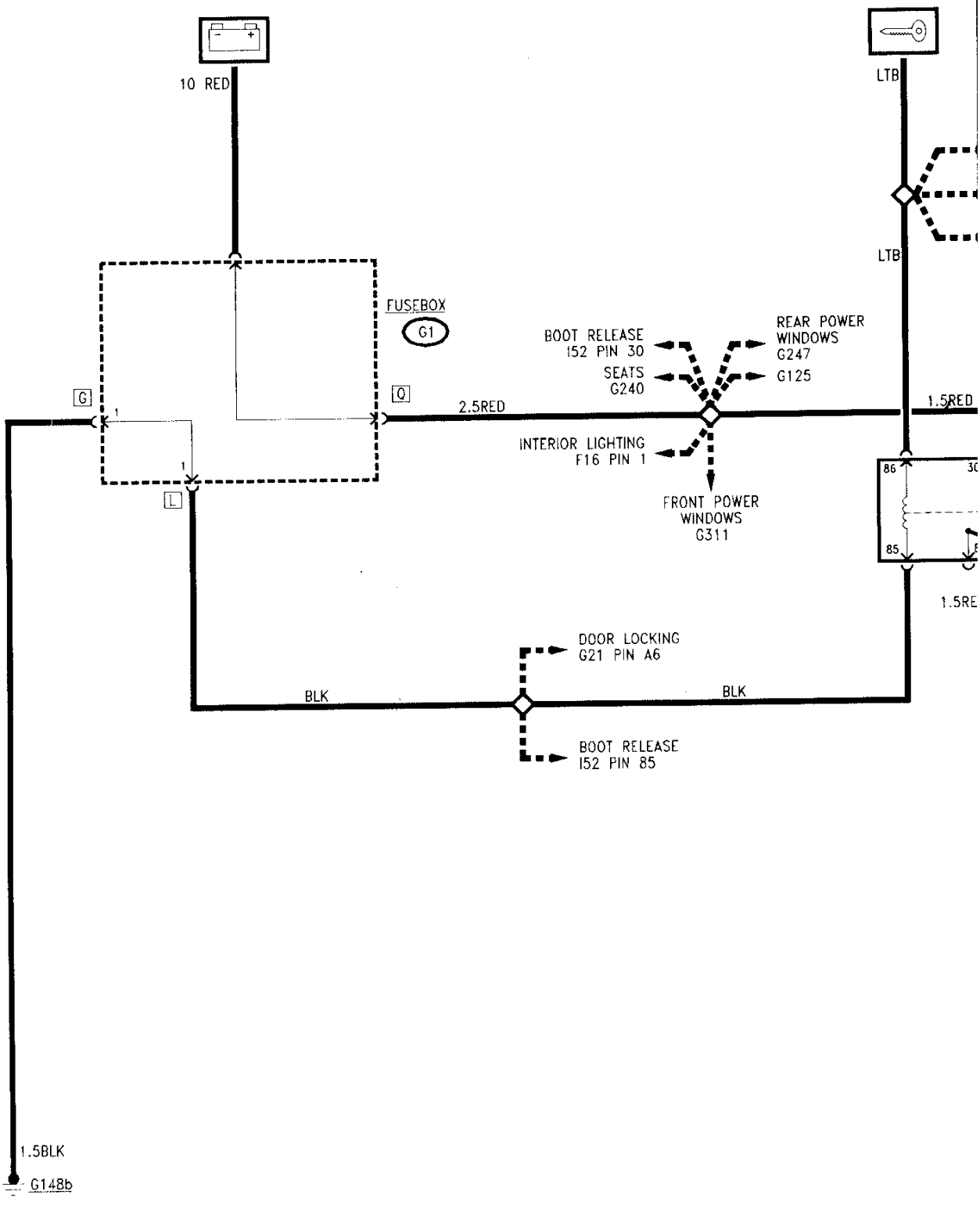
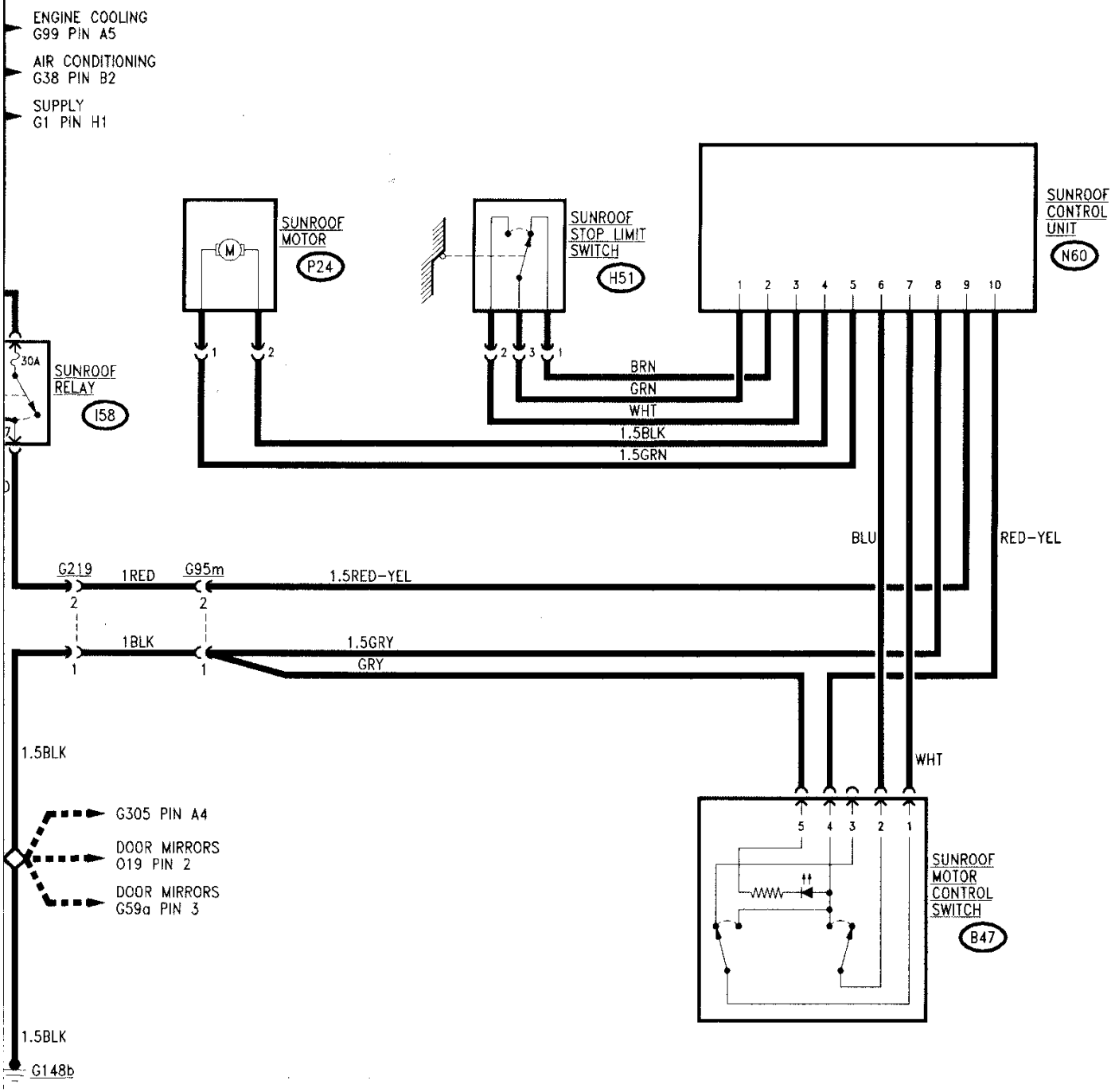
/IRING DIAGRAM 25-2
ENERAL DESCRIPTION 25-3
UNCTIONAL DESCRIPTION 25-3
ROUBLESHOOTING TABLE 25-3
OMPONENTS AND CONNECTORS 25-4
)CATION OF COMPONENTS 25-7
ROUBLESHOOTING 25-8

WIRING DIAGRAM




ENGINE COOLING
G99 PIN A5
AIR CONDITIONING
G38 PIN B2
SUPPLY
G1 PIN H1
SUNROOF
MOTOR
P24
SUNROOF
STOP LIMIT
SWITCH
H51
SUNROOF
CONTROL
UNIT
N60
30A
SUNROOF
RELAY
I58
BRN
GRN
WHT
1.5BLK
1.5GRN
BLU
RED-YEL
G219
1RED
G95m
1.5RED-YEL
1BLK
1.5GRY
GRY
1.5BLK
WHT
G305 PIN A4
DOOR MIRRORS
O19 PIN 2
DOOR MIRRORS
G59a PIN 3
SUNROOF
MOTOR
CONTROL
SWITCH
B47
1.5BLK
G148b

GENERAL DESCRIPTION

The sliding roof permits an additional ventilation of the passenger compartment during warm weather and when necessary will guarantees a rapid air recirculation, and therefore increase passenger comfort.

The mobile part of the roof is composed of a plexiglass panel and an interior sliding blind which enters the space between roof and interior roof panel.

A double switch located near the central front roof light activates an electric motor which operates in two different ways: in the first, the motor raises the panel to the "quarter light" position and in the second opens the panel while at the same time drawing back the blind.

When the roof is subsequently closed, the blind, which can also be manually operated, is "accompanied" for a short stretch of the advancing panel (for greater details refer to "REPAIR MANUAL-BODY", Group 75)

The entire system is electronically controlled by a control unit which regulates the various functions.

The roof can only be opened when the ignition key is inserted.

FUNCTIONAL DESCRIPTION

The sunroof control system is supplied by a relay **I58**, with an incorporated 30A protecting fuse. The relay **I58** is turn-key excited and supplies the sunroof control unit **N60**.

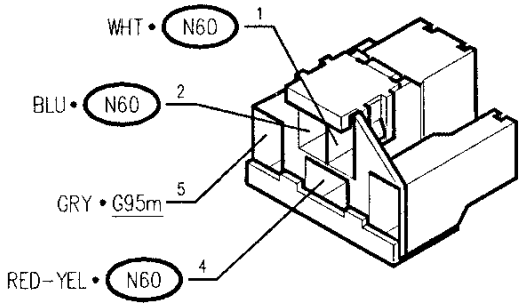
This control unit **N60** receives the actuation signals via switch **B47**, and sends command signals to the motor **P24**; the stop limit switch **H51** signals the position of the sunroof to the control unit and stops the motor as necessary.

TROUBLESHOOTING TABLE

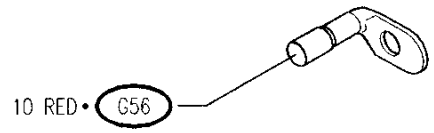
Malfunction	Component					Test
	I58	N60	P24	B47	H51	
Sunroof not working	•	•	•	•		A
Sunroof does not close correctly		•			•	B

COMPONENTS AND CONNECTORS

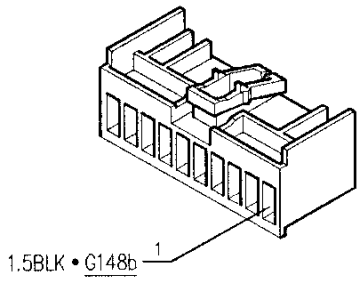
Sunroof motor control switch	B47



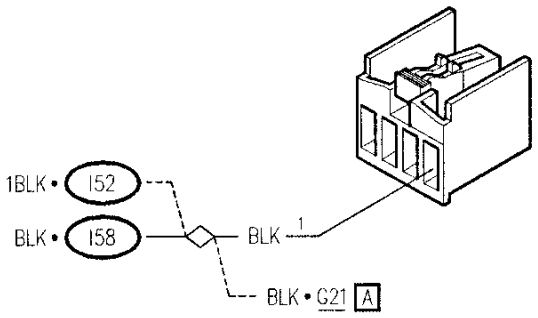
Fusebox	G1



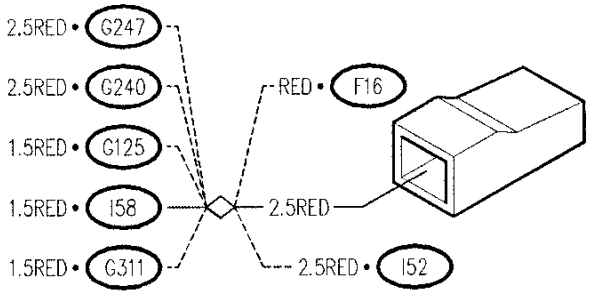
Fusebox	G1 G



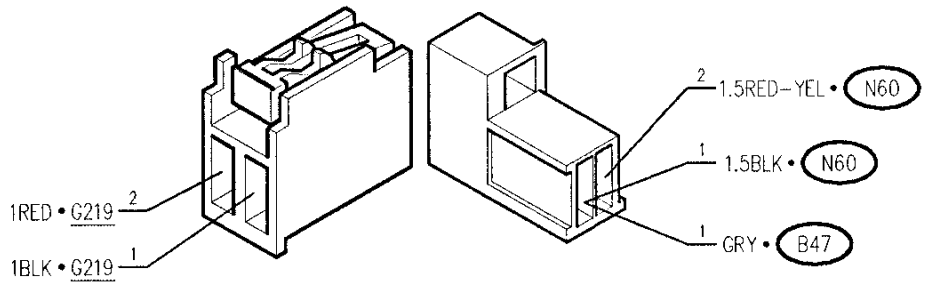
Fusebox	G1 L



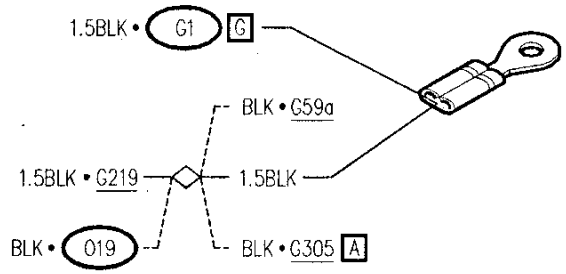
Fusebox	G1 Q



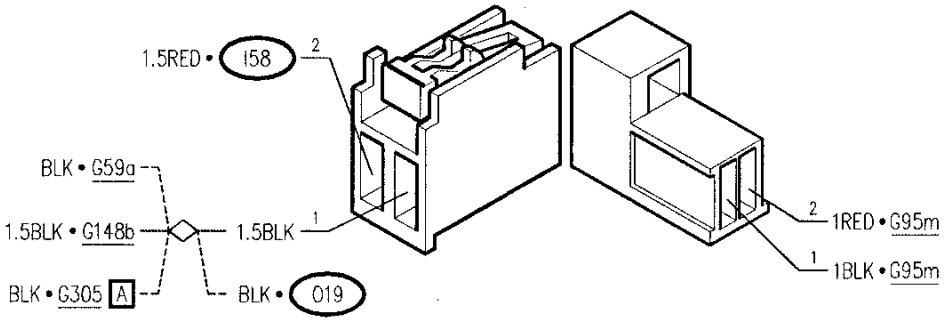
Connector for sunroof	G95m



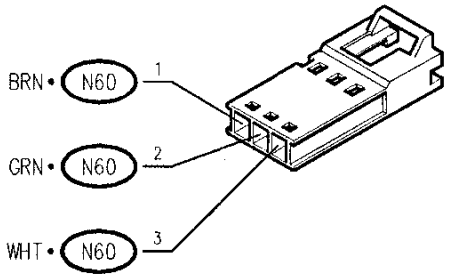
Under-dashboard ground-left side — G148b



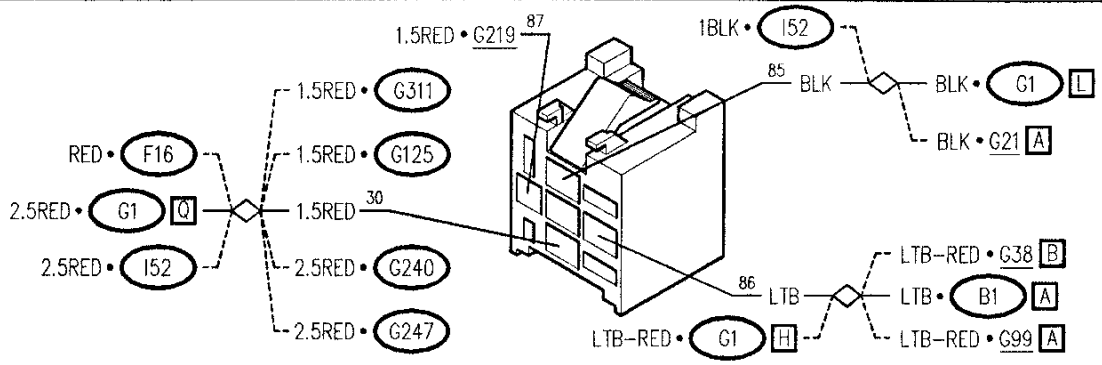
Connector for sunroof — G219



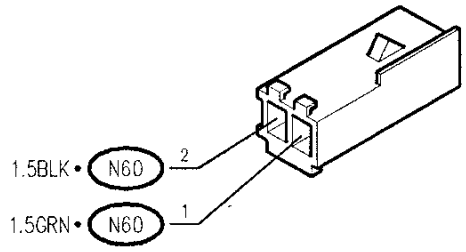
Sunroof stop limit switch — H51



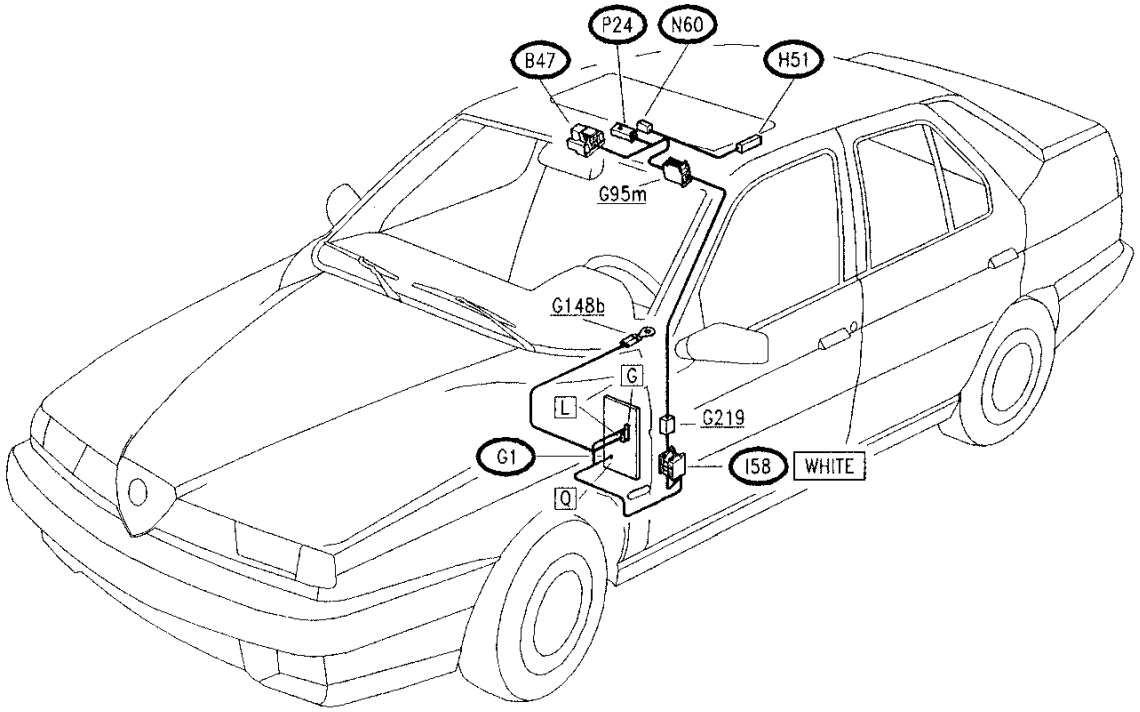
Sunroof relay — I58



Sunroof motor	P24



LOCATION OF COMPONENTS



TROUBLESHOOTING

SUNROOF NOT WORKING	TEST A

NOTE: the sun roof may suffer malfunctions affecting the mechanical parts: blockage, noises, vibrations etc. In this test only the malfunctions of an electric type are considered: if no solution is found refer to the "REPAIR MANUAL - BODY", Group 75.

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
A1 CHECK RELAY – Check for correct functioning of sunroof relay **I58**, with relative fuse	OK →	Carry out **step A2**
	OK →	Replace relay **I58** or fuse (30A)
A2 CHECK VOLTAGE – With ignition key engaged, Verify 12V between pins 1 and 2 of connector **G95m**	OK →	Carry out **step A7**
	OK →	Carry out **step A3**
A3 CHECK GROUND – Check that pin 1 of **G95m** is grounded (0V)	OK →	Carry out **step A4**
	OK →	Restore wiring between pin 1 of **G95m** and ground **G148b**, across pin 1 of connector **G219** and the solder (BLK)

(continues)

SUNROOF NOT WORKING	TEST A

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
A4 CHECK VOLTAGE – With ignition key engaged, Verify 12V at pin 87 of relay **I58**	OK →	Restore wiring between pin 87 of **I58** and pin 2 of **G95m**, across pin 2 of connector **G219** (RED)
	~~OK~~ →	Carry out **step A5**
A5 CHECK VOLTAGE – With ignition key engaged, verify 12V at pin 86 of relay **I58**	OK →	Carry out **step A6**
	~~OK~~ →	Restore wiring between pin 86 of **I58** and the ignition switch, also across the solder (LTB)
A6 CHECK VOLTAGE – Verify 12V at pin 30 of relay **I58**	OK →	Restore wiring between pin 85 of **I58** and pin L1 of **G1**, also across the solder (BLK)
	~~OK~~ →	Restore wiring between pin 30 of **I58** and pin Q of **G1**, also across the solder (RED)

(continues)

SUNROOF NOT WORKING	TEST A

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
A7 CHECK VOLTAGE – With ignition key engaged, verify 12V between pins 8 and 9 of sunroof control unit **N60**	OK →	Carry out **step A8**
	~~OK~~ →	Restore wiring between: •pin 2 of **G95m** and pin 9 of **N60** (RED-YEL) •pin 1 of **G95m** and pin 8 of **N60** (GRY)
A8 CHECK VOLTAGE – Actuating the sunroof, verify 12V between pins 4 and 5 of control unit **N60**	OK →	Carry out **step A9**
	~~OK~~ →	Carry out **step A10**
A9 CHECK VOLTAGE – Actuating the sunroof, verify 12V between pins 1 and 2 of motor **P24**	OK →	Replace sunroof motor **P24**
	~~OK~~ →	Restore wiring between: • pin 2 of **P24** and pin 4 of control unit **N60** (GRN) • pin 1 of **P24** and pin 5 of control unit **N60** (BLK)

(continues)

SUNROOF NOT WORKING	TEST A

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
A10 CHECK SWITCH – Operating the sunroof (or lowering it from the quarter light position) check continuity between pins 2 and 4 of switch **B47**; operating in the opposite fashion to close the roof (or opening to the quarter light position) check continuity between pins 1 and 4 of **B47**	OK ➡	Carry out **step A11**
	~~OK~~ ➡	Replace switch **B47**
A11 CHECK CONTINUITY – Operating as for previous step (A10), check continuity between pins 10 and 7 of **N60** (wiring side) during roof opening phase, and between pins 10 and 6 of **N60** during closing phase	OK ➡	Replace control unit **N60**
	~~OK~~ ➡	Restore wiring between: • pin 1 of **B47** and pin 7 of **N60** (WHT) • pin 2 of **B47** and pin 6 of **N60** (BLU) • pin 4 of **B47** and pin 10 of **N60** (RED-YEL)

ROOF DOES NOT CLOSE CORRECTLY	TEST B

NOTE: the sun roof may suffer malfunctions affecting the mechanical parts: blockage, noises, vibrations etc. In this test only the malfunctions of an electric type are considered: if no solution is found refer to the "REPAIR MANUAL - BODY", Group 75.

TEST PROCEDURE		RESULT	CORRECTIVE ACTION
B1	CHECK STOP LIMIT SWITCH		
– With roof completely closed, verify continuity between pins 3 and 2 and open circuit between pins 3 and 1 of switch **H51**; and with roof open, check continuity between pins 3 and 1 and open circuit between pins 3 and 2 of **H51**		OK ➡	Carry out **step B2**
		OK ➡	Replace switch **H51**
B2	CHECK CONTINUITY		
– Operating as at previous step (B1), check continuity between pins 3 and 1 of **N60** (wiring side) with roof closed, and between pins 3 and 2 of **N60** with roof open		OK ➡	Replace control unit **N60**
		OK ➡	Restore wiring between: • pin 2 of **H51** and pin 1 of **N60** (GRN) • pin 1 of **H51** and pin 2 of **N60** (BRN) • pin 3 of **H51** and pin 3 of **N60** (WHT)

HEATING, VENTILATION AND AIR CONDITIONING

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AUTOMATIC HEATING/VENTILATION SYSTEM WITH AIR CONDITIONER 26-8
AUTOMATICALLY REGULATED HEATER 26-51
TROUBLESHOOTING HEATING-VENTILATION SYSTEM 26-55
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3 - Electric fan and compressor controls 26-90

GENERAL DESCRIPTION

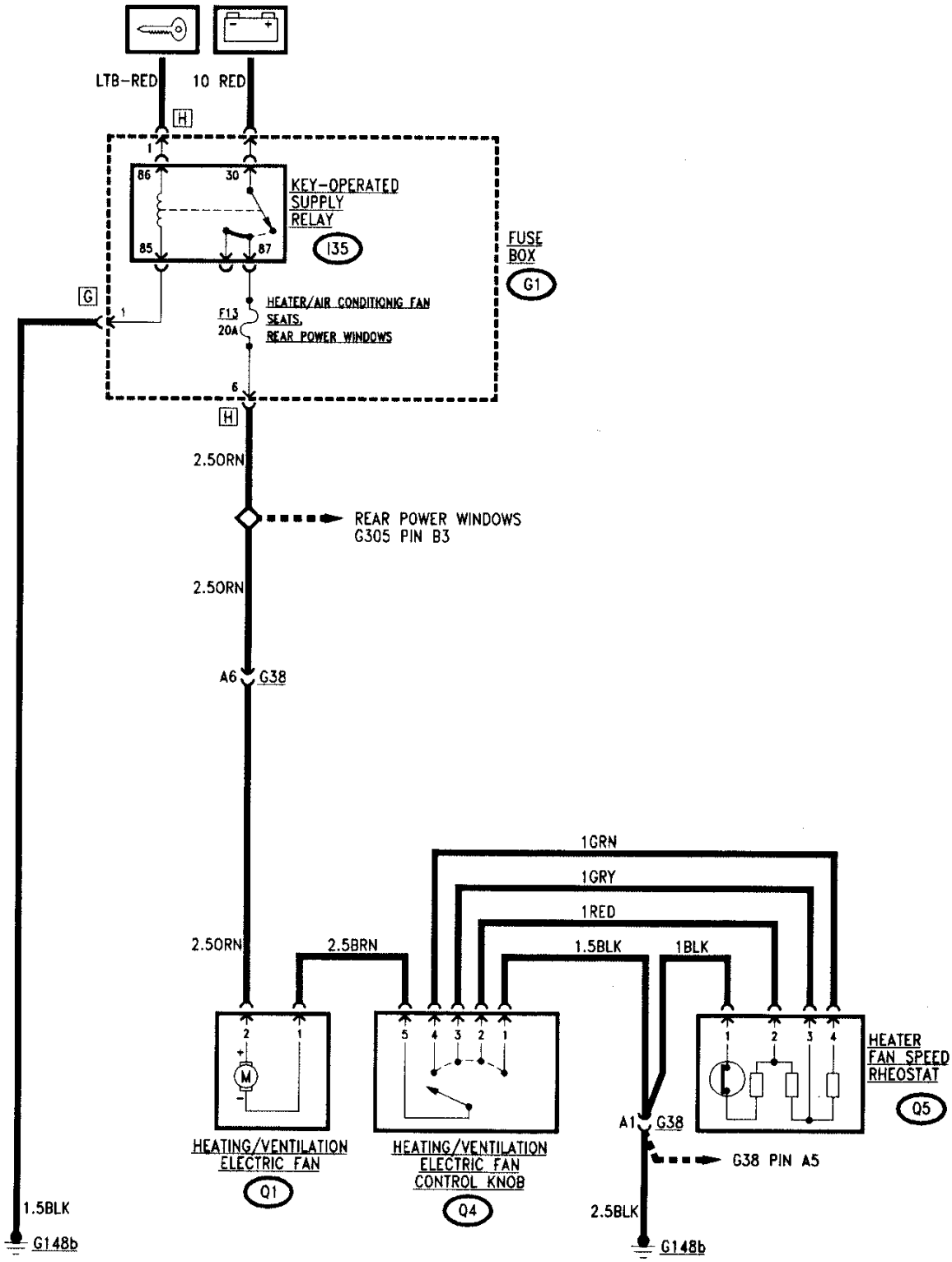
The climate (temperature and humidity) within the passenger compartment is controlled by the following systems:

- MANUALLY CONTROLLED HEATER
- AUTOMATIC HEATING/VENTILATION SYSTEM WITH AIR CONDITIONER
- AUTOMATICALLY REGULATED HEATER

The heater-distribution-conveyor- (manual or automatically regulated by electric motors) group is common to all three systems.
The control panel located on the dashboard is however different.
The system with air conditioner also includes a closed circuit air cooling system employing Freon and composed of a compressor, condenser and evaporator with relative accessories.

MANUALLY CONTROLLED HEATER

Wiring Diagram



Description

Heating and ventilation using the manually regulated heater is controlled by acting on the three knobs of the control assembly located on the dashboard: these controls act on the heater- distributor-conveyer group as described below:

The first knob from the left, by way of a flexible transmission, mechanically controls first the opening of the vent which regulates the flow of air, and then the the rotation of the knob controls a switch which engages the regulated four-speed electric fan.

NOTE: The electric fan can only be operated when the ignition key is engaged.

The central control knob mechanically controls the warm/cold air mixturing vent; if it is rotated fully to the left it cuts out the heater by closing a specific tap.

NOTE: the heater is composed of a heat exchanger which exploits the engine cooling liquid in order to heat the air directed towards the passenger compartment: it is supplied through the engine cooling system piping.

The right-hand knob regulates the distribution of the air flow, again through a mechanical transmission, to the air distribution vents sending air to the passenger compartment following the directions depicted by the ideograms.

Functional Description

NOTE: only the speed of the electric fan is controlled electrically.

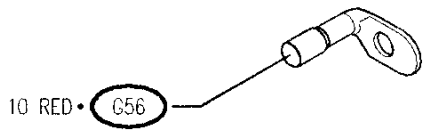
The heating-ventilation electric fan **Q1** is powered by battery voltage through the key-operated services relay **I35** located in fusebox **G1**. Its coil is excited by voltage coming from the ignition block with the key engaged; after passing the relay, the battery voltage also passes fuse **F13** (20A) in fusebox **G1**.

The electric fan motor **Q1** is operated by an ground signal coming from the control knob **Q4**: this ground crosses the fan speed rheostat **Q5**, which is formed by three resistances in series and which determine the four different speeds of the electric motor.

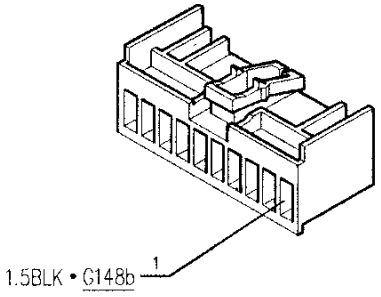
The rheostat **Q5** is incorporated in a thermometric safety switch which deactivates the circuit if a temperature of 90± 5°C is exceeded.

Components and Connectors

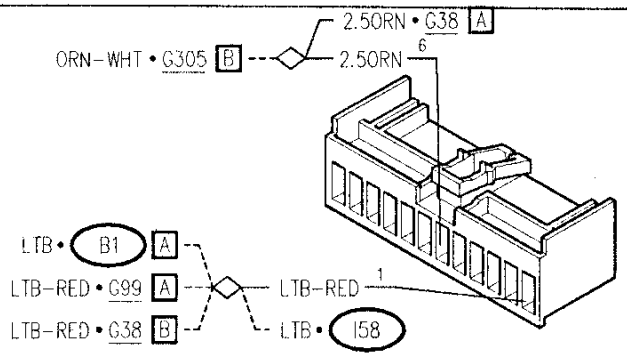
Fusebox	G1



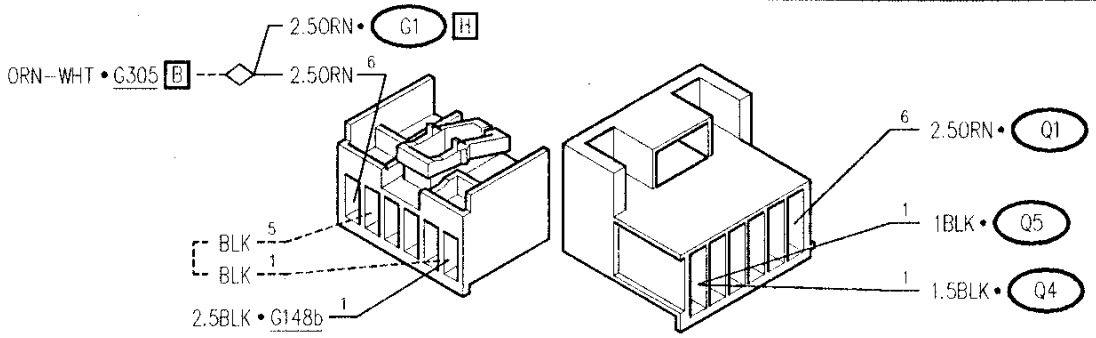
Fusebox	G1 G



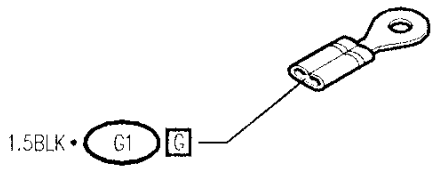
Fusebox	G1 H

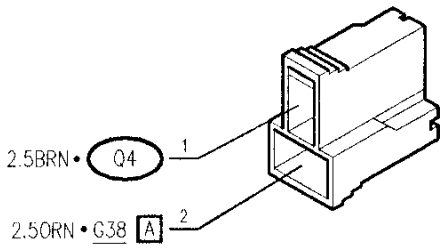


Connector for air conditioner wiring	G38 A

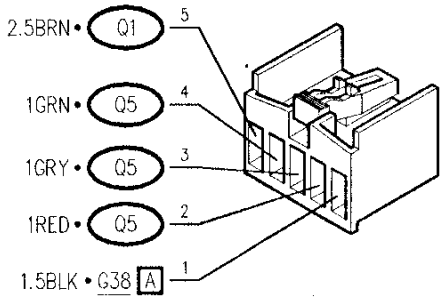


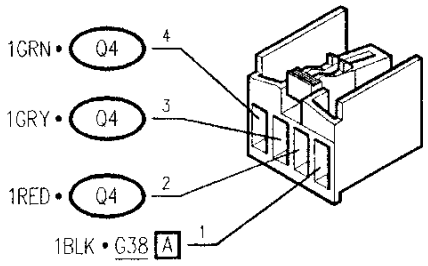
Under-dashboard ground-left side	G148b	Heating/ventilation electric fan	Q1



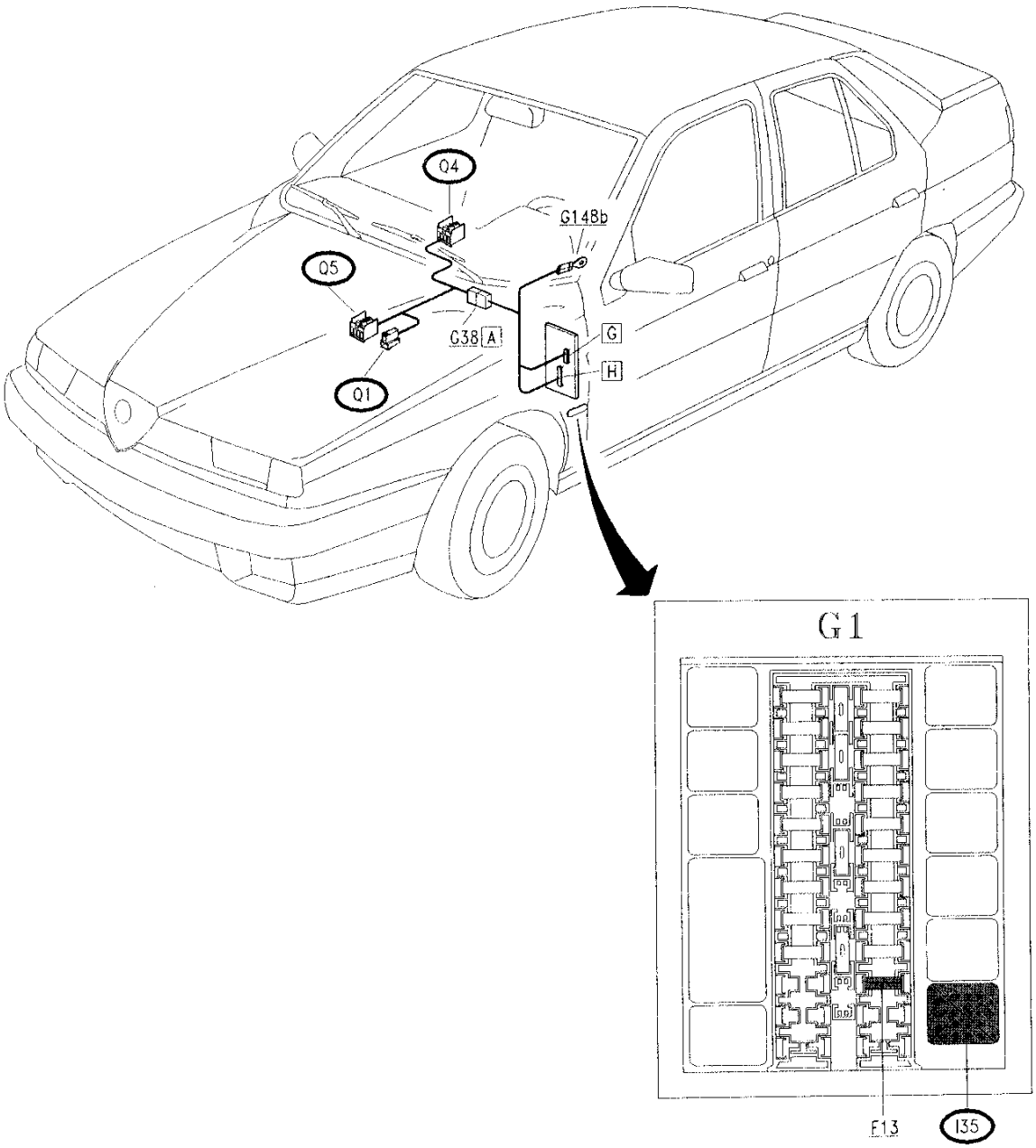


Heating/ventilation electric fan control knob	Q4	Heater fan speed rheostat	Q5





Location of Components



AUTOMATIC HEATING/VENTILATION SYSTEM WITH AIR CONDITIONER

Description

The control panel located on the dashboard is the front part of the electronic unit which automatically regulates the operation of the system.

Once the desired temperature has been set, the control system can either be left to automatic operation (AUTO button) or certain parameters, e.g. air flow, can be modified; in this way the system automatically carries out all the functions necessary to bring the passenger compartment to the temperature selected by the occupants of the vehicle through the button (TEMP) and shown on the relative display.

The electronic system carries out this regulation through information received from temperature sensors (outside, inside and mixtured air),and controlled by the actuators which move the vents of the air conveyor-distributors (air intake, mixturing and distribution); it also actuates the heater if the air needs to be heated or the cooling system compressor if the air needs to be cooled.

In addition, the compressor cut-in signal is "filtered" by the electronic ignition and injection system's control unit (see "Motronic ignition and injection system") for the necessary permit.

The heating-ventilation system control unit also receives the speedometer signal from the relative sensor through which the logic system considers or ignores certain temperature values (e.g. a progressive increase in the outside air temperature will not be considered at speeds lower than 30 km/hr).

The system memorizes the last temperature setting, even if the ignition key is not engaged, and re-sets it again the next time the vehicle is started.

The temperature selected is not always reached immediately; regulation time depends mainly on the difference between the actual temperature and the one which has been set; the various functions are optimized however, by the operation of the control unit, e.g., recirculation, speed of air flow etc., in order to reduce the time to a minumum.

The control unit is equipped with a self-diagnosis system which memorizes faults or malfunctions in the event of anomalous variations in the detected parameters. The self-diagnosis function can be selected through the connector for the ALFA ROMEO Tester, but also directly from the control panel by carrying out the operations given below in order (see Troubleshooting).

Control panel

The following are the button and display functions on the panel:

- temperature display: indicates the set (requested) temperature (in °C) or the temperature of the outside air depending on the position (pressed or not) of the small key on the right-hand side of the display; the outside temperature is indicated by the letters "EXT"
- increase/decrease buttons for temperature selection.
- display: indicates the speed of the electric fan (i.e. the flow of air into the passenger compartment)
- increase/decrease buttons for manual air flow adjustment
- "AUTO" button: switches the management of the system over to the electronic control unit so that the selected temperature is reached as quickly as possible
- "ECON" button: shuts-off the air conditioning compressor: in this case the desired temperature may not be reached as the air will no longer be cooled; this function though, when necessary, makes it possible to avoid draining power from the engine.
- recirculation button: the system only treats air which is drawn from inside the passenger compartment and is not mixed with air from the outside.
- "OFF" button: the system is compltetey deactivated.
- air flow buttons: make it possible to direct air flow in specific directions as shown in the relative ideograms: windscreen demisting, air flow directed forward, directed forward and towards the floor, directed towards the floor only.

Air conveyor-distributor

Both the heater (which heats the air by transferring it from the engine coolant) and the evaporator (which cools the air subtracting heat to the freon in the cooling system) are located in the air conveyor-distributor.
The vents regulating air flow are electrically controlled by actuators: air distribution motor, warm/cold air mixing motor and air recirculation vent control motor.
The air recirculation vent control motor is a simple motor with only two positions (open/closed). The first two actuators are coupled with a potentiometer through which the angles of rotation of the vent are adjusted: specific types of air distribution within the passenger compartment correspond to specific angles of the vent.
The electric fan which sends a flow of air to the passenger compartment is regulated by an electronic variator which is also fixed to the conveyor and constantly varies the speed; the device supplies the control unit with information regarding the operating temperature. A protecting thermocontact intervenes when the temperature reaches the point where it may damage the device itself.
In addition, two mixed air temperature sensors are located on the conveyor: one lower and one upper. These are NTC elements (resistance decreases when the temperature rises) which send a signal to the control unit which is proportional to the temperature of the air passing them.
Another two sensors provide signals which are proportional to the air temperature: the outside air temperature, located in the lower part of the left-hand door mirror, and the passenger compartment air temperature sensor located behind a moulding on the dashboard; this sensor is automatically ventilated by a motor.

Air cooling system

The air cooling system is a closed circuit system in which a fluid (FREON 12) condenses and evaporates drawing off heat from the air in the conveyor-distributor.

It is mainly composed of the following:

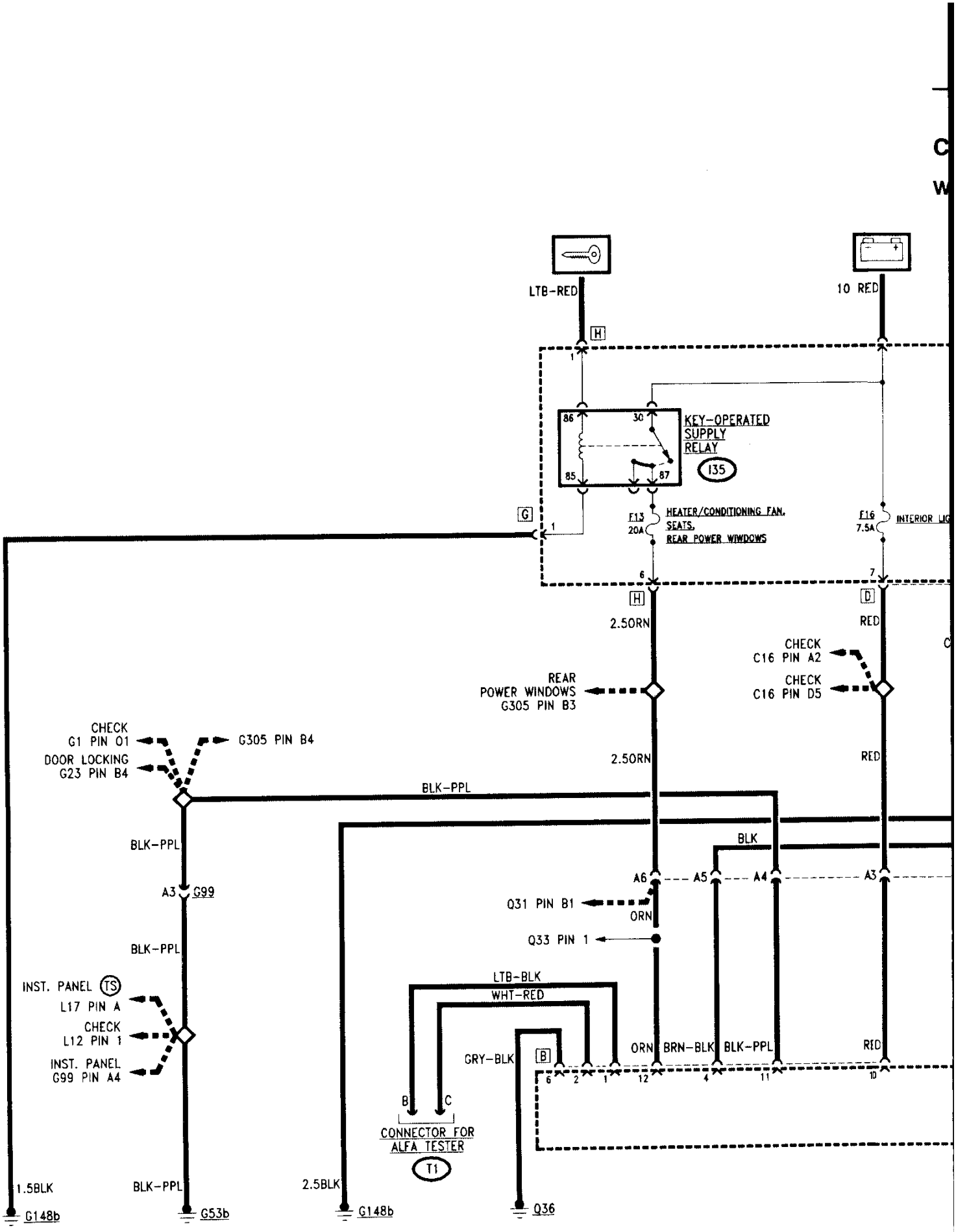
- compressor, actuated by a crankshaft belt and activated or dectivated by an electromagnetic coupling controlled by the conditioning system;
- condenser, installed in front of the engine coolant radiator: when the vehicle is stationary, air necessary for the heat exchange is supplied by actuating the engine radiator fan;
- evaporator, located in the conveyor-distributor this is an exchanger which cools the air
- dehydrator accumulator, which separates the FREON in its liquid and gaseous states. It also serves as an accumulation reservoir;
- expansion valve which diminishes the pressure of the FREON as necessary;
- three-level pressure switch (trinary), controls the safety and correct functioning of the FREON circuit:
  - engages the radiator fan when necessary (e.g. when the vehicle is stationary) which prevents an increase in pressure at the condenser (intervention at 15.5 bars);
  - shuts-off the compressor deactivating the electromagnetic coupling if the pressure reaches excessive and therefore dangerous levels (in excess of 25 bars) or values are reached which are too low to ensure correct operation (below 2.5 bars).
- minimum pressure switch (defroster); shuts-off the compressor when the pressure is too low (< 1.72 bars) as this would risk freezing the evaporator. It also protects the compressor from sudden drops in pressure caused, for example, by a leakage in the system.

A box containing the relays and fuses relative to the conditioning system are located in the engine compartment: supplementary cooling fan relay (only 6V model); electronic cooling delaying device; compressor electromagnetic coupling relay; supplementary compressor relay; 40A fuse for engine electric fan (only 6V model); 30A fuse for passenger compartment heating-ventilation electric fan; 15A fuse for compressor electromagnetic coupling.
An additional 50A fuse is located on the wiring and protects the supply to the entire group.
The fuse protects the most important components while the relays regulate the compressor cut-in and the two operating speeds of the engine electric cooling fan and condenser.
In particular, a delaying device cuts-in automatically de-

pending on the speed of the cooling fan avoiding sudden actuations and electrical overloading at the relay contacts.
The first speed is engaged with a signal coming from the thermocontact on the radiator or from the pressure switch of the FREON circuit: after approximately 10 seconds, if the signal persists, the delaying device actuates the second speed.

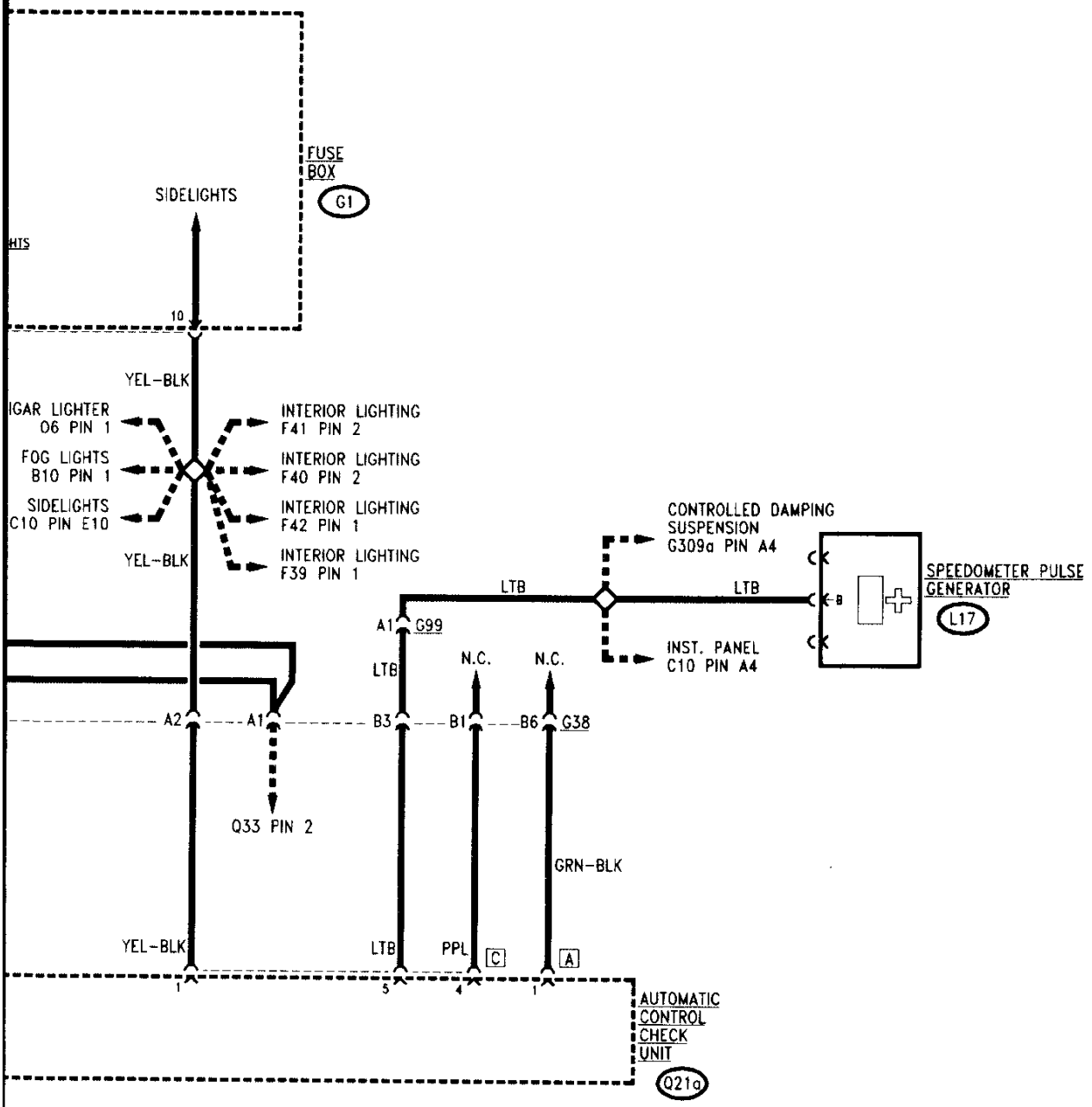
WARNING:
The wiring diagram relative to the automatic heater-ventilator with conditioner has been subdivided into six parts for ease of consultation:

- control unit: supply and diagnosis;
- temperature sensors;
- vent actuators;
- interior electric fan;
- compressor control;
- engine electric fan control.


LTB-RED
10 RED
KEY-OPERATED SUPPLY RELAY
135
HEATER/CONDITIONING FAN, SEATS, REAR POWER WINDOWS
F13 20A
F16 7.5A
2.5ORN
RED
REAR POWER WINDOWS G305 PIN B3
CHECK C16 PIN A2
CHECK C16 PIN D5
CHECK G1 PIN 01
DOOR LOCKING G23 PIN B4
G305 PIN B4
BLK-PPL
BLK
Q31 PIN B1
ORN
Q33 PIN 1
LTB-BLK
WHT-RED
GRY-BLK
BRN-BLK
INST. PANEL TS
L17 PIN A
CHECK L12 PIN 1
INST. PANEL G99 PIN A4
CONNECTOR FOR ALFA TESTER
T1
1.5BLK
2.5BLK
G148b
G53b
Q36

ontrol unit: supply and diagnosis

iring Diagram



Functional Description

The electronic control unit **Q21a** ,by way of the sensors and actuators connected to it, controls and regulates the flow of air into the passenger compartment adjusting the temperature to the set value.

The power supply reaches the control unit **Q21a**:

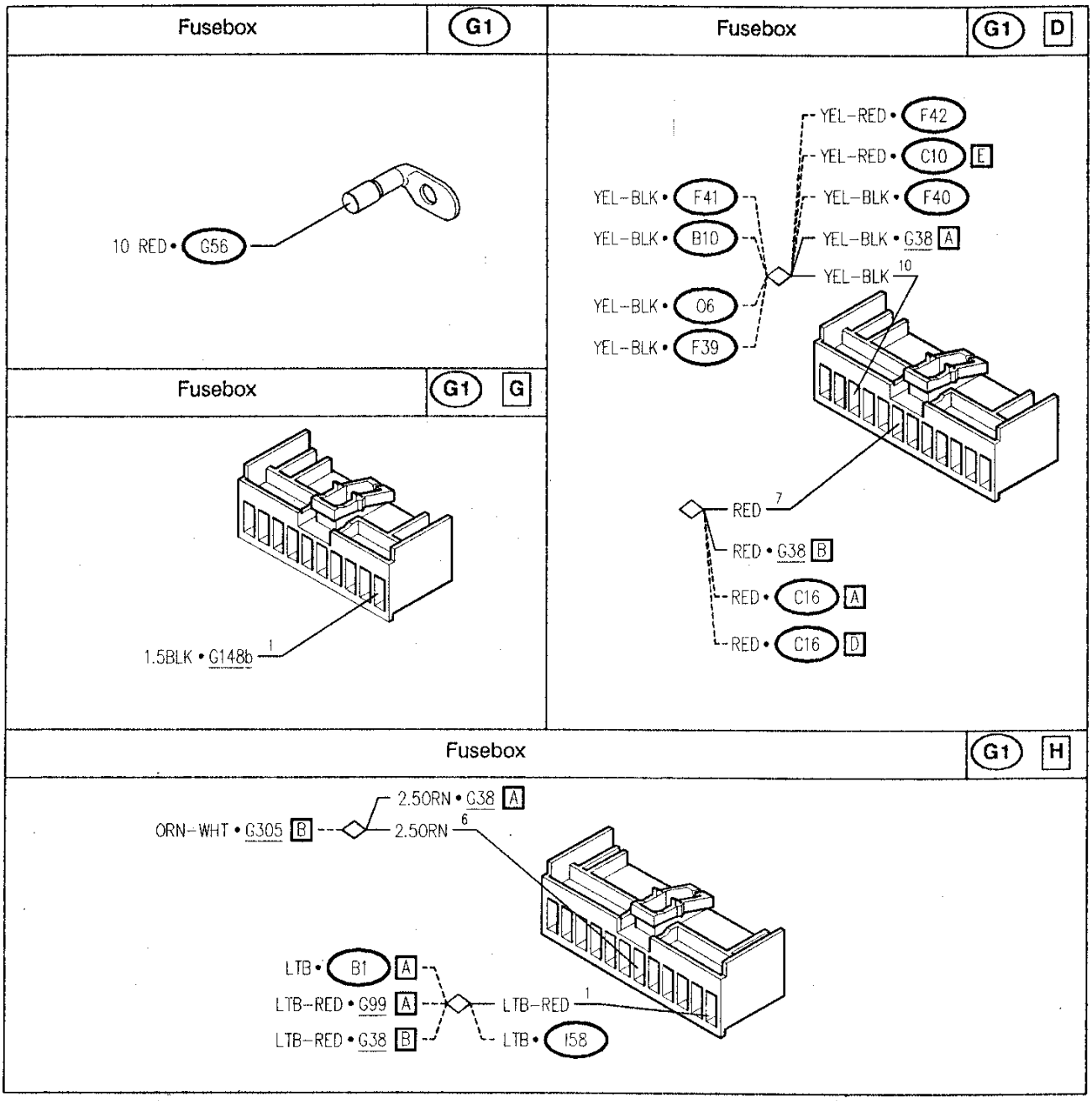
- directly, with battery voltage to pin 10 of connector B after passing fuse **F16** (7.5A) in fusebox **G1**
- with Key-operated supply to pin 12 of connector B, through relay **I35** and fuse **F13** (20A) in fusebox **G1**.

The control panel -the front part of the control unit itself- is lit when the sidelights are on via the line which supplies pin one of connector C of **Q21a**.

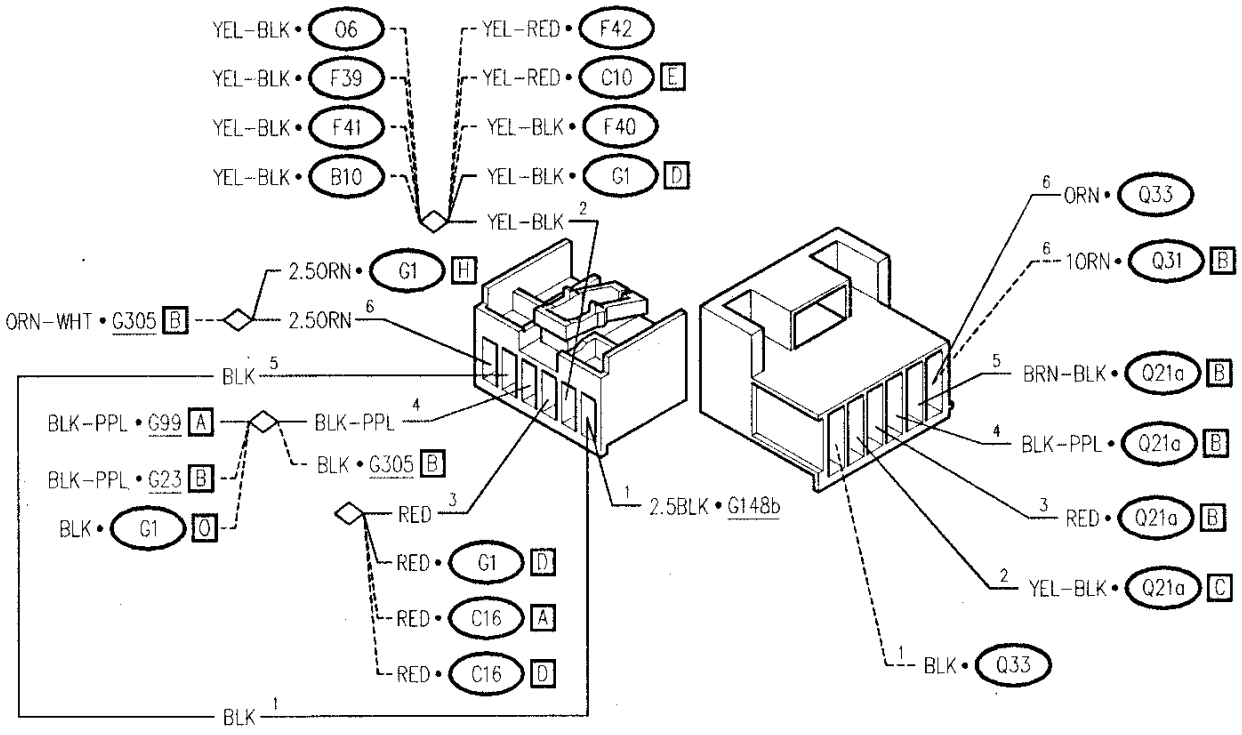
The speedometer signal reaches pin 5 of connector C from the relative sensor **L17**.

Pins 1 and 2 of connector B send two signals to connector **T1** for the ALFA ROMEO Tester, which are used to "read" the self-diagnosis of the system.

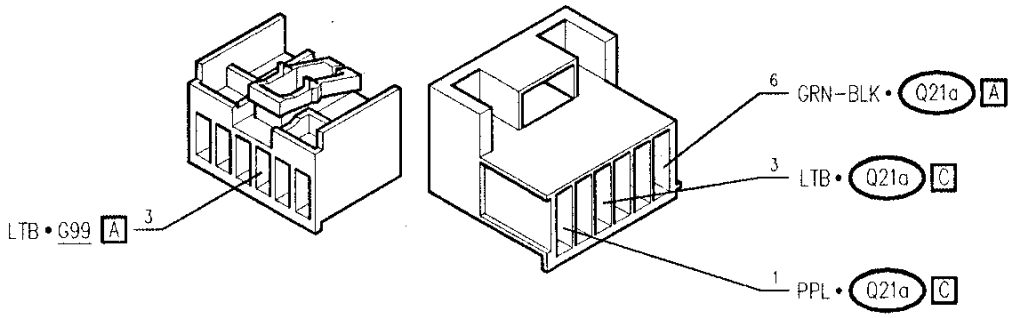
Components and Connectors



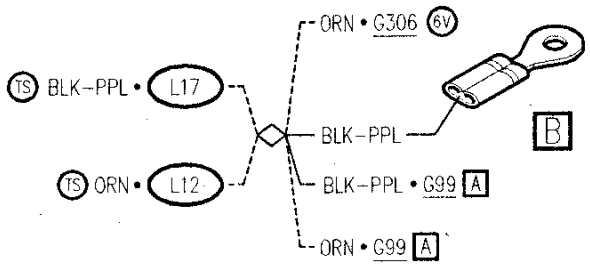
Connector for air conditioner wiring | G38 A



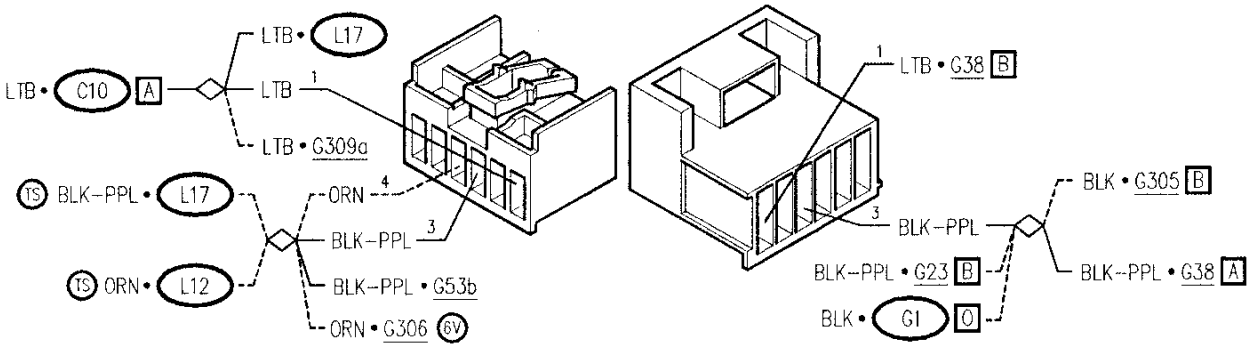
Connector for air conditioner wiring | G38 B



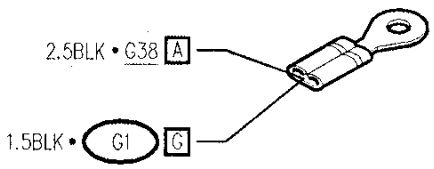
Engine compartment ground-left side | G53b



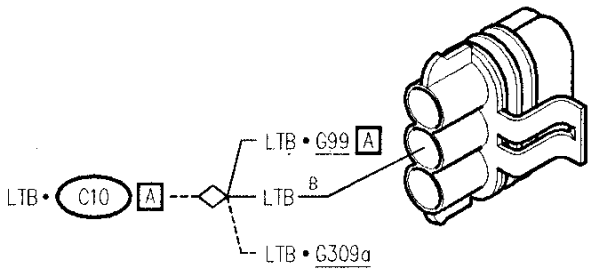
Dashboard/engine connection	G99 A



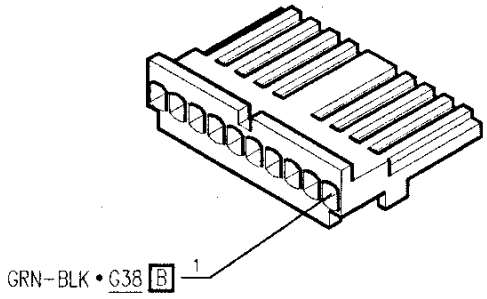
Under-dashboard ground-left side	G148b



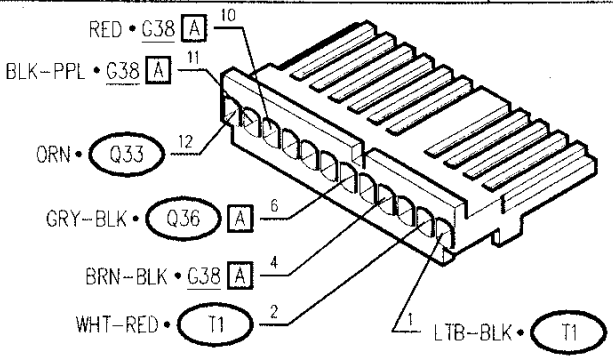
Speedometer pulse generator	L17



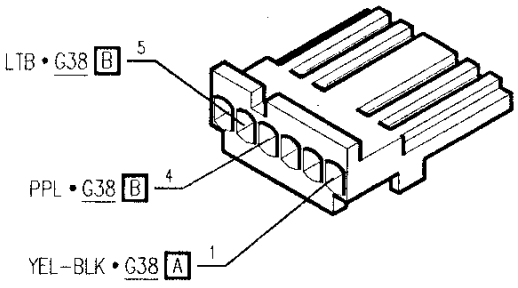
Automatic control check unit	Q21a A



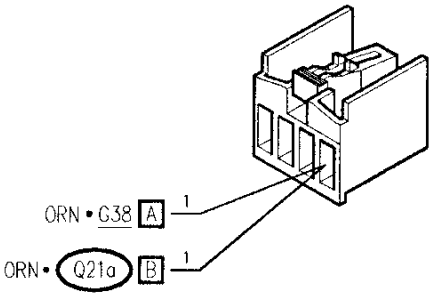
Automatic control check unit	Q21a B

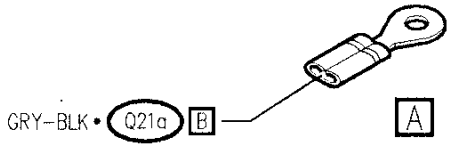
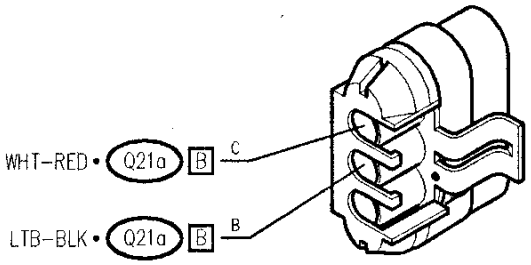


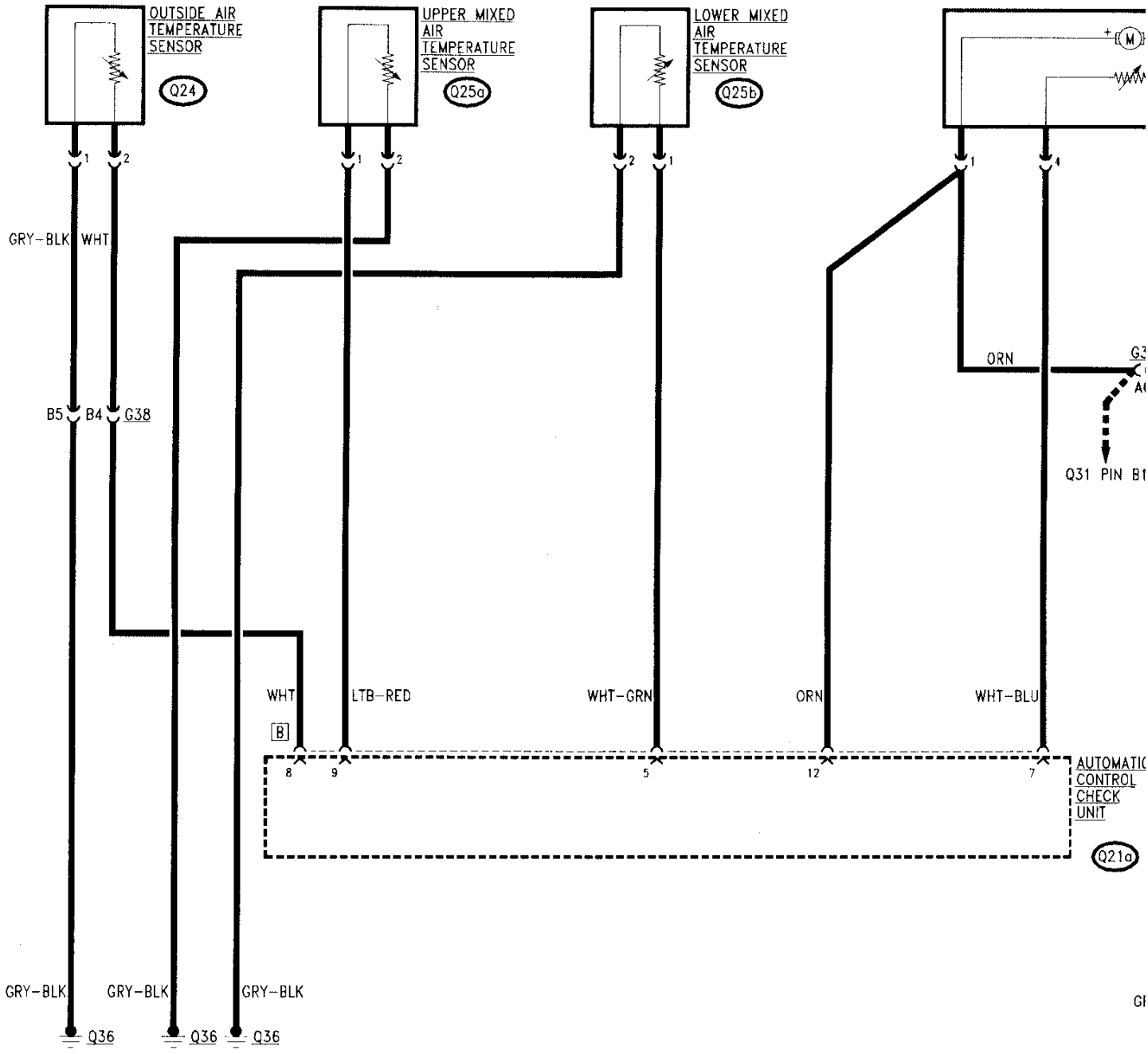
Automatic control check unit	Q21a C



Passenger compartment temperature sensor with motor	Q33

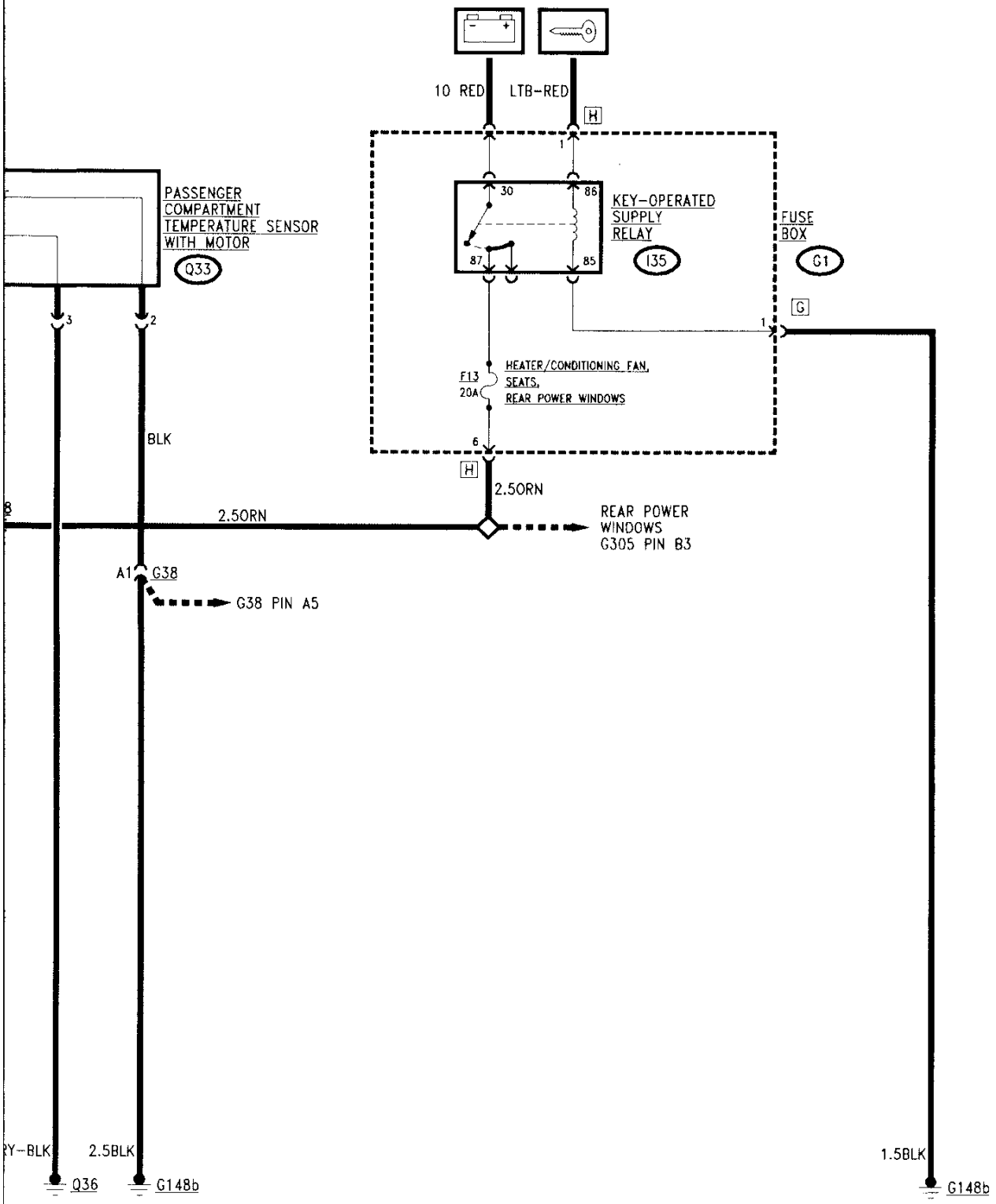


Air conditioning system ground	Q36	Connector for ALFA TESTER	T1
			


OUTSIDE AIR TEMPERATURE SENSOR
Q24
UPPER MIXED AIR TEMPERATURE SENSOR
Q25a
LOWER MIXED AIR TEMPERATURE SENSOR
Q25b
GRY-BLK
WHT
B5
B4
G38
ORN
Q31 PIN B1
WHT
LTB-RED
WHT-GRN
ORN
WHT-BLU
B
8
9
5
12
7
AUTOMATIC CONTROL CHECK UNIT
Q21a
GRY-BLK
GRY-BLK
GRY-BLK
Q36
Q36
Q36

emperature Sensors

iring Diagram



Functional Description

Information regarding air temperature at varius points of the system is sent to the control unit **Q21a** by four sensors.

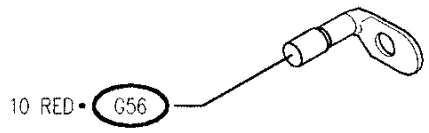
The outside air temperature sensor **Q24** sends a signal which is proportional to to the temperature at pin 8 of connector B.

The upper and lower mixed air temperature sensors, **Q25a** and **Q25b**, are connected at connector B, to pins 9 and 5 respectively.

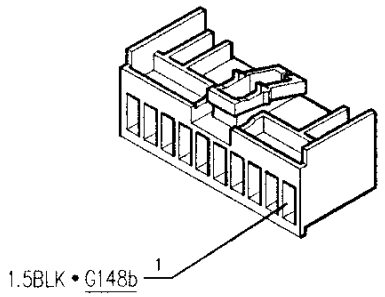
The passenger compartment temperature sensor **Q33** sends the temperature signal to pin 7 of connector B: this sensor has an incorporated ventilation motor supplied by the same line which, coming from relay **I35** and fuse **F13** (20A) in fusebox **G1**, supplies the control unit **Q21a**.

Components and Connectors

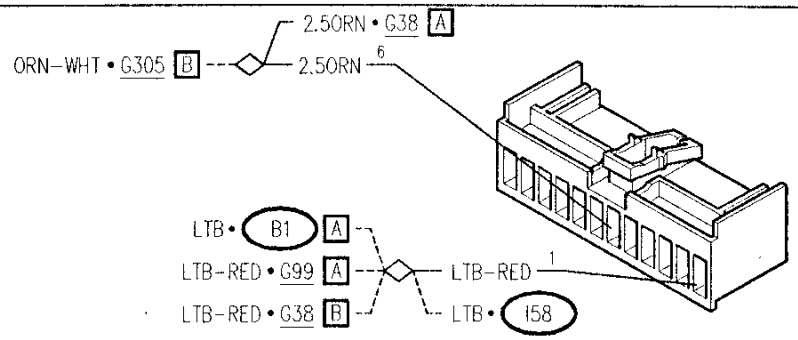
Fusebox	G1



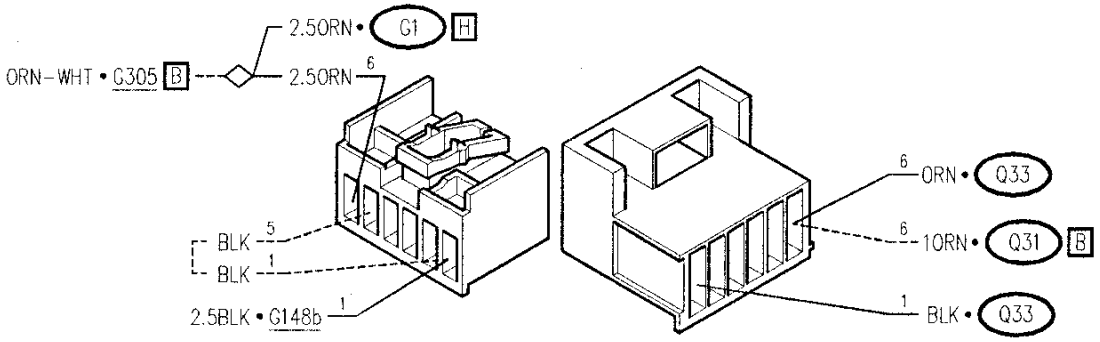
Fusebox	G1 G



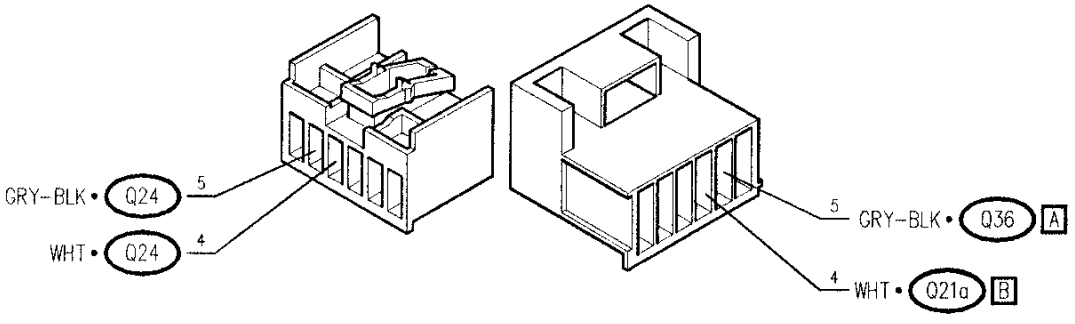
Fusebox	G1 H



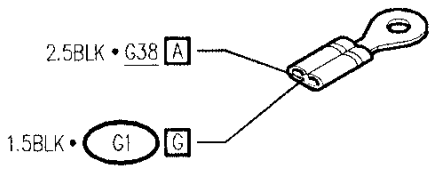
Connector for air conditioner wiring	G38 A



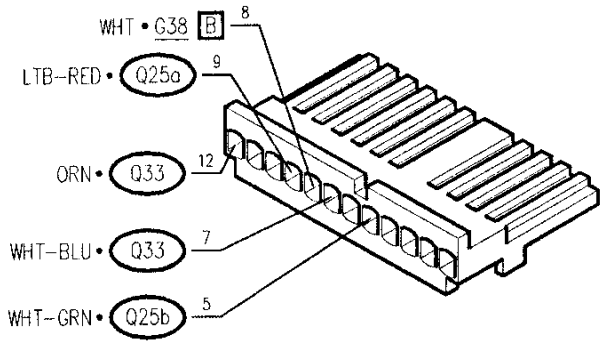
Connector for air conditioner wiring	G38 B



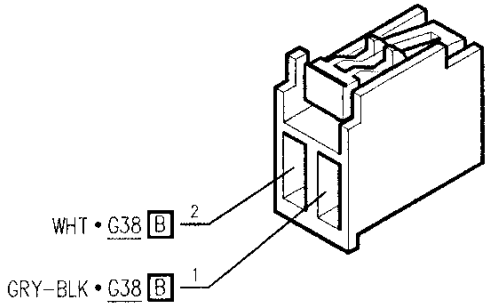
Under-dashboard ground-left side	G148b



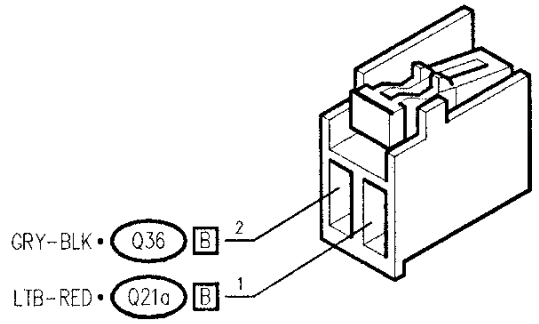
Automatic control check unit	Q21a B



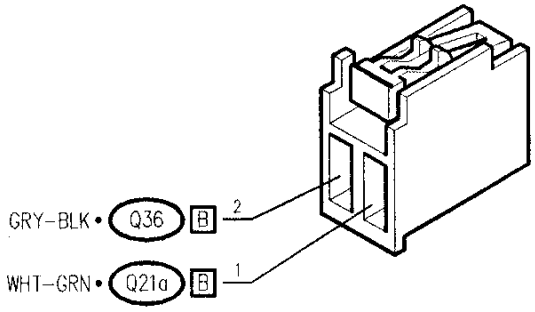
Outside air temperature sensor	Q24



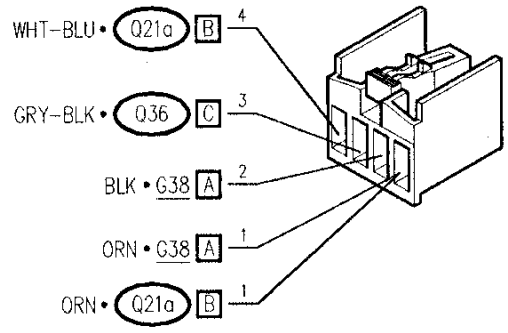
Upper mixed air temperature sensor	Q25a



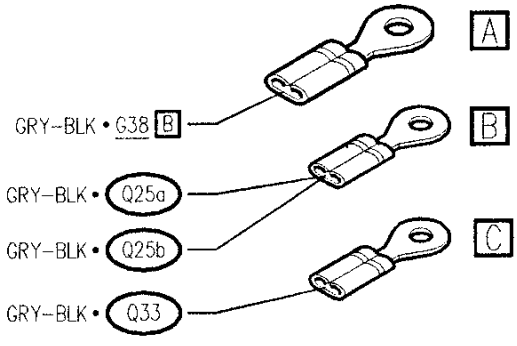
Lower mixed air temperature sensor	Q25b



Passenger compartment temperature sensor with motor	Q33

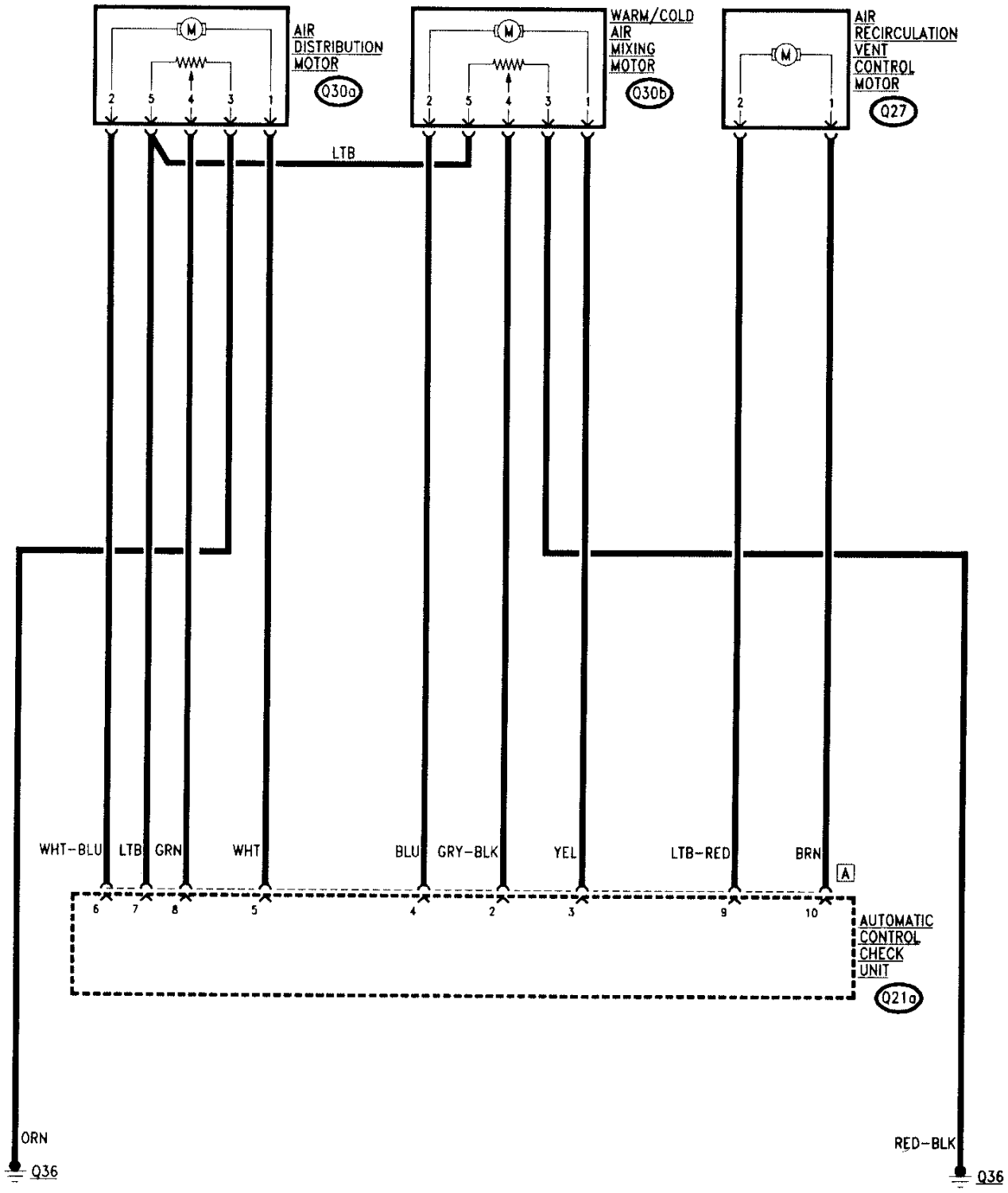


Air conditioning system ground	Q36



Vent Actuators

Wiring Diagram



Functional Description

The vent actuators operate according to the indications supplied by the control unit in order to optimize the air flow in accordance with calculations carried out by the internal logic of the control unit itself.

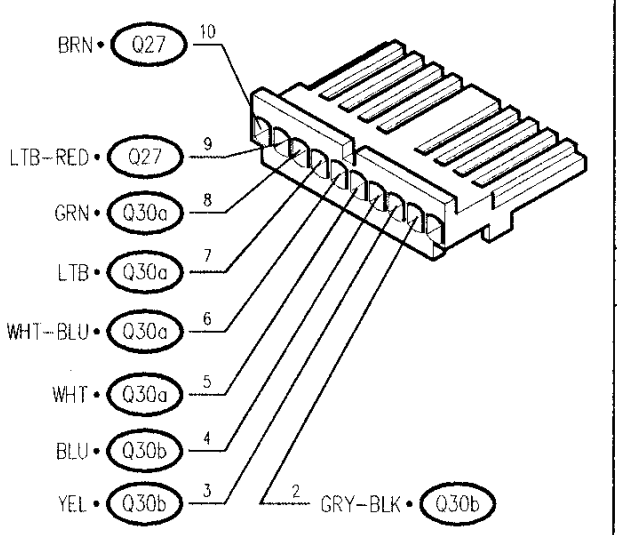
The air distribution motor **Q30a** receives power supply and ground directly from the control unit **Q21a**, at connector A at pins 5 and 6 respectively; the relative adjustment potentiometer is supplied by the control unit by pin 7 of connector A and is directly connected to ground. It sends the regulation signal to pin 8, connector A of control unit **Q21a**.

Similarly the warm and cold air mixing motor **Q30b** receives its power supply and ground at pins 3 and 4 of connector A; the adjustment potentiometer is supplied by pin 7 of connector A and is directly connected to ground. It sends the regulation signal to pin 2 of connector A.

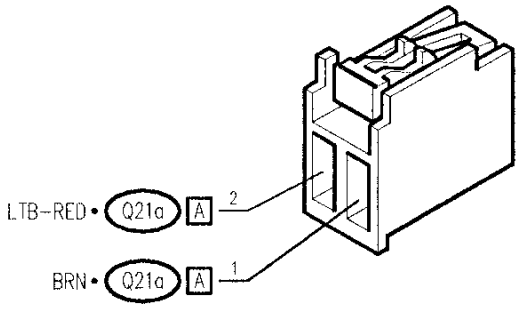
The air recirculation vent control motor **Q27** (of the open/closed type without regulation) receives power from pin 9 of connector A and ground from pin 10 of connector A of control unit **Q21a**

Components and Connectors

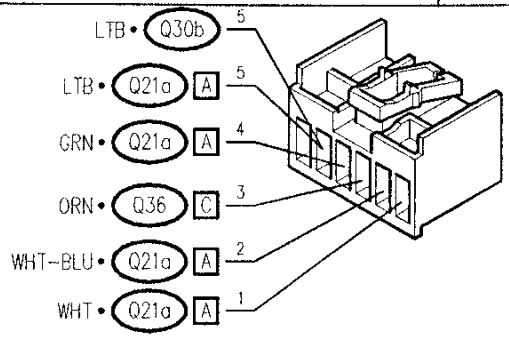
Automatic control check unit	Q21a A



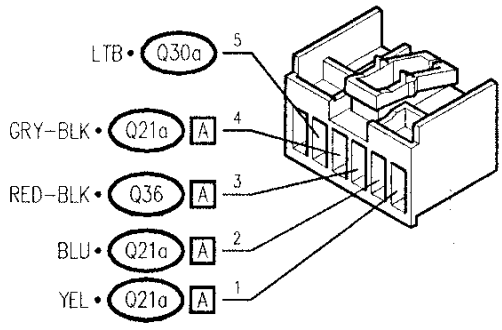
Air recirculation vent control motor	Q27



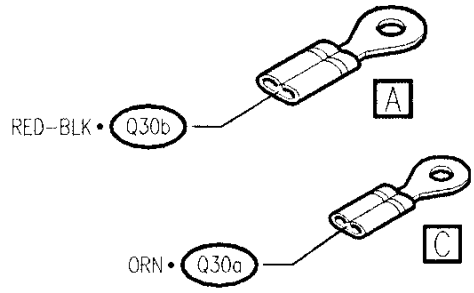
Air distribution motor	Q30a



Warm/cold air mixing motor	Q30b

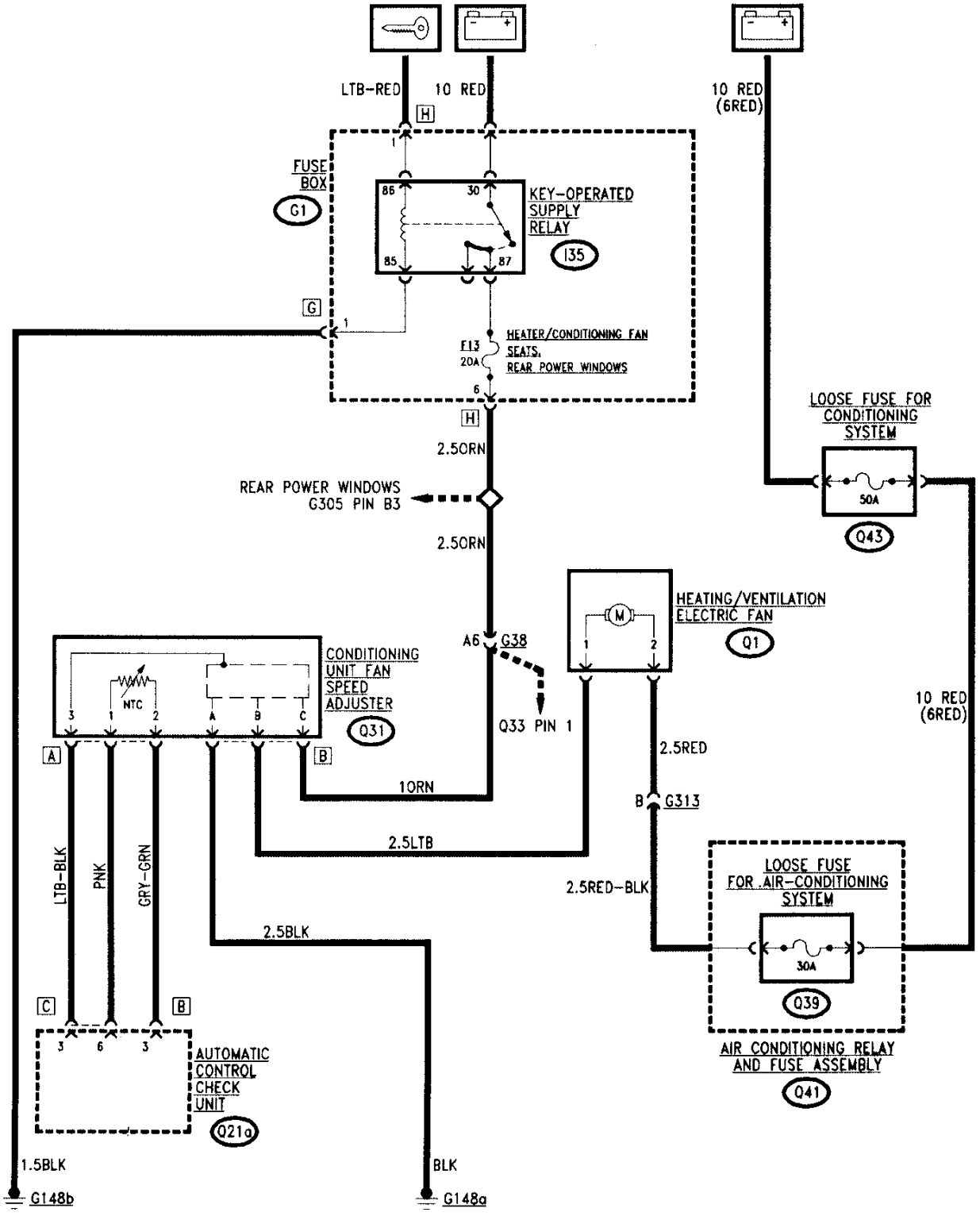


Air conditioning system groud	Q36



Interior Electric Fan

Wiring Diagram



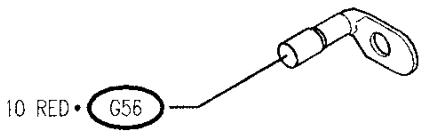
Functional Description

The air conditioner electric fan speed adjuster **Q31** is supplied by the line coming from relay **I35** and fuse **F13** (20A) in fusebox **G1**; it is connected to ground and to the control unit **Q21a** by the signal at pin 3 of the control unit connector; it is also connected to the heating-ventilation electric fan **Q1** to which it sends a negative signal which regulates the speed. The incorporated temperature sensor is connected to the control unit **Q21a** at pin 6 of connector C and pin 3 of connector B.

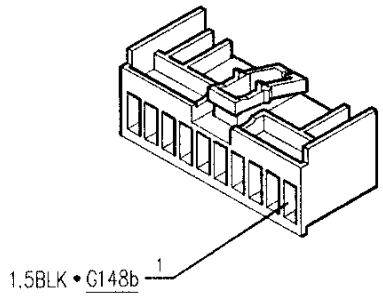
The fan **Q1** is supplied directly by battery voltage via fuse **Q39** (30A) located in the relays and fuses assembly **Q41**.

Components and Connectors

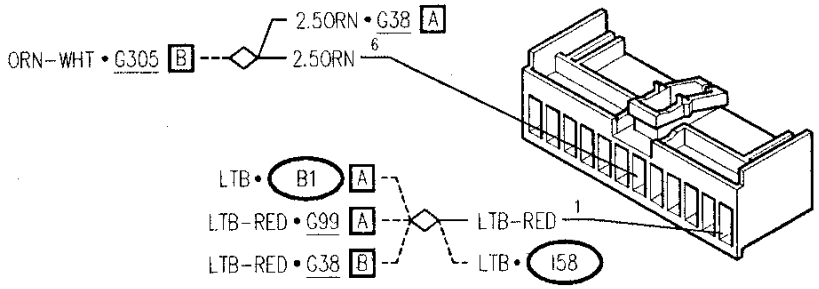
Fusebox	G1



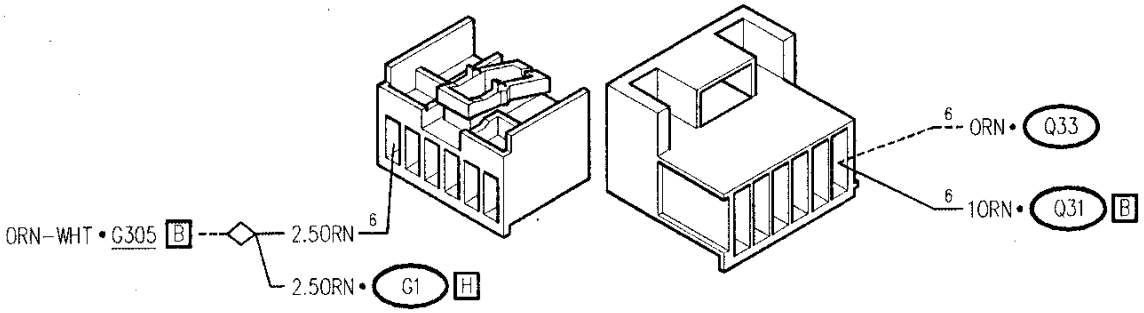
Fusebox	G1 G



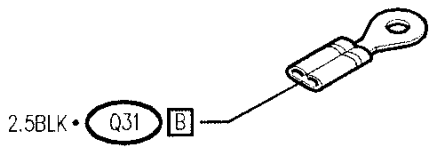
Fusebox	G1 H

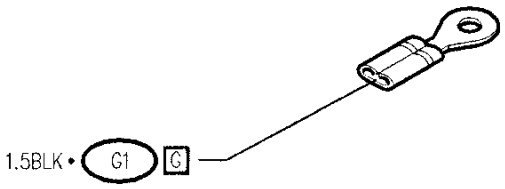


Connector for air conditioner wiring	G38 A

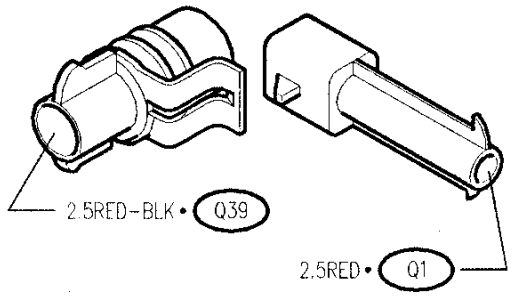


Under-dashboard ground-right side	G148a	Under-dashboard ground-left side	G148b

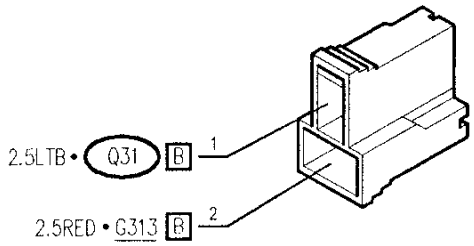




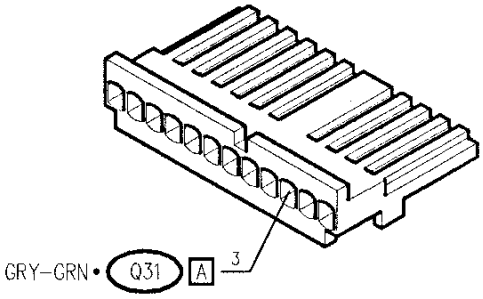
Connector for air conditioner supplemetary wiring G313 B



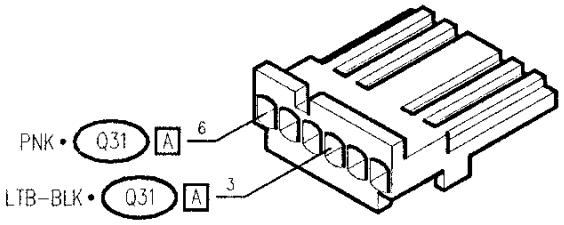
Heating/ventilation electric fan Q1



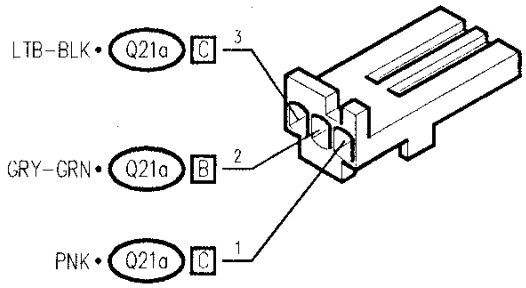
Automatic control check unit Q21a B



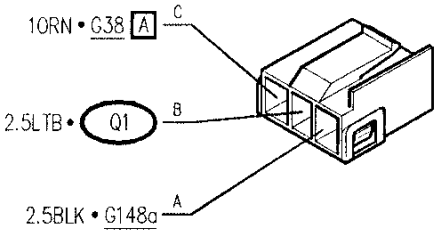
Automatic control check unit Q21a C



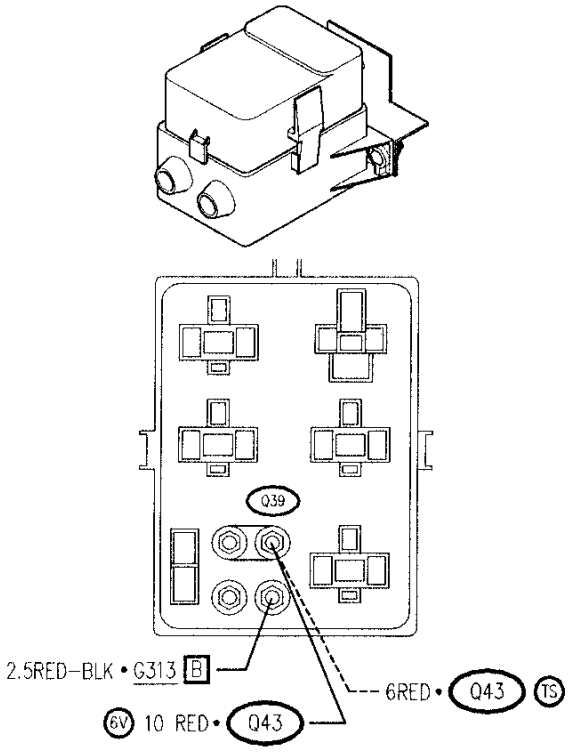
Conditioning unit fan speed adjuster Q31 A



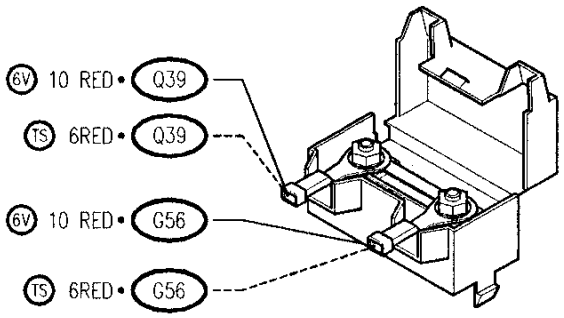
Conditioning unit fan speed adjuster Q31 B

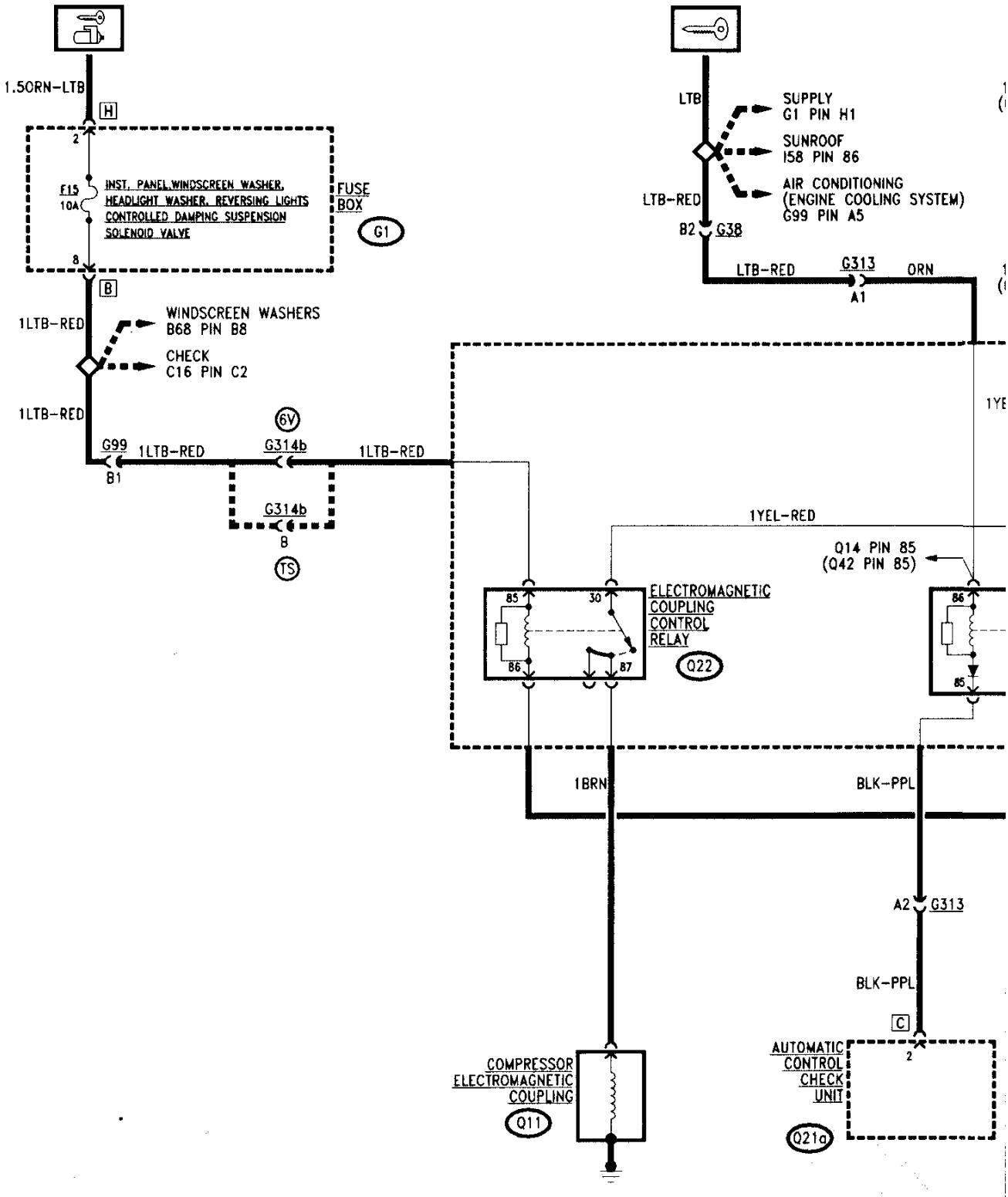


Air conditioning relay and fuses assembly Q41



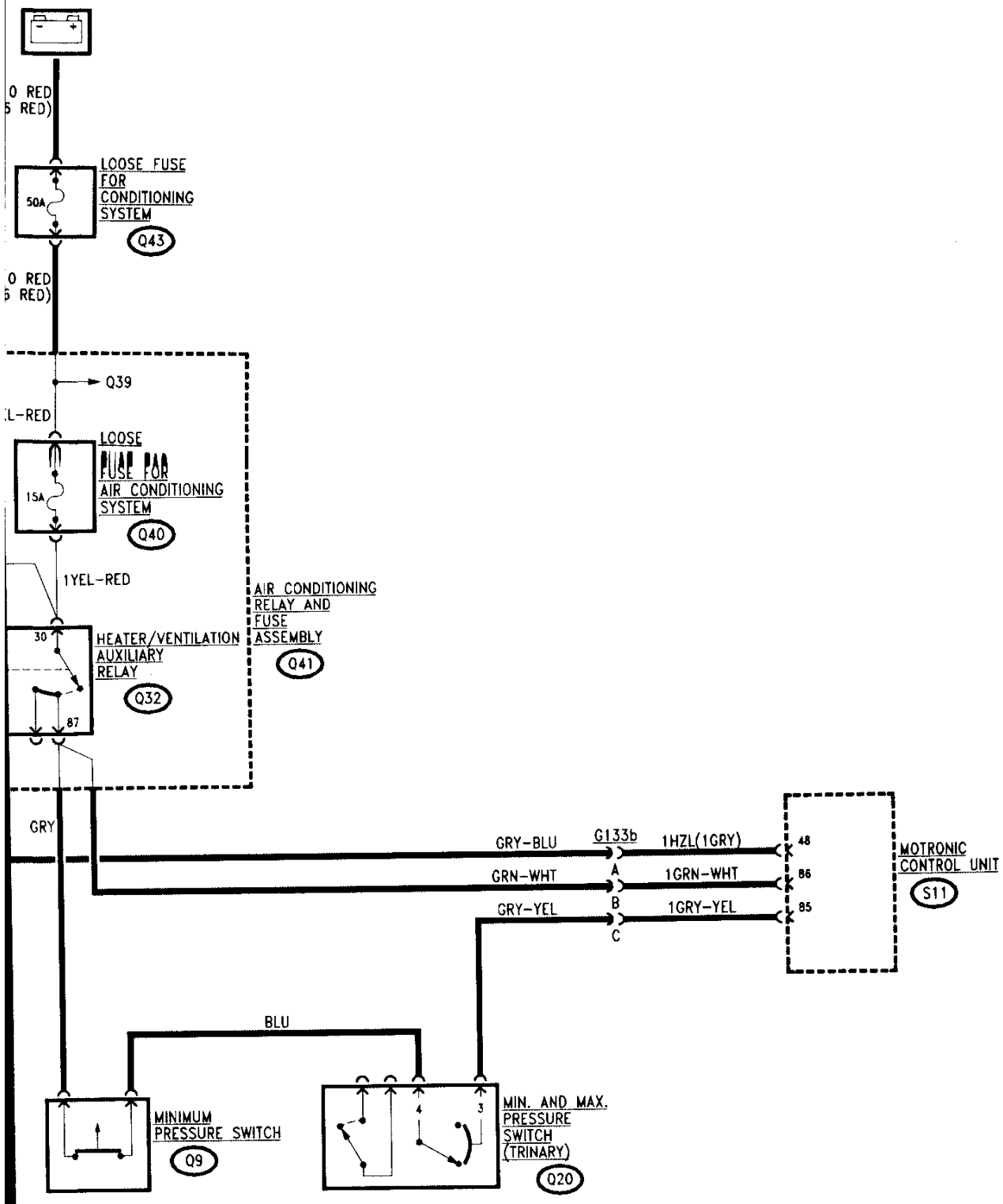
Loose fuse for conditioning system-50A	Q43




1.5ORN-LTB
H
2
F15
10A
INST. PANEL,WINDSCREEN WASHER, HEADLIGHT WASHER, REVERSING LIGHTS CONTROLLED DAMPING SUSPENSION SOLENOID VALVE
FUSE BOX
G1
8
B
1LTB-RED
WINDSCREEN WASHERS
B68 PIN B8
CHECK
C16 PIN C2
1LTB-RED
6V
G99
B1
1LTB-RED
G314b
1LTB-RED
G314b
B
TS
LTB
SUPPLY
G1 PIN H1
SUNROOF
I58 PIN 86
AIR CONDITIONING
(ENGINE COOLING SYSTEM)
G99 PIN A5
LTB-RED
B2
G38
LTB-RED
G313
A1
ORN
1YEL-RED
Q14 PIN 85
(Q42 PIN 85)
85
30
86
87
ELECTROMAGNETIC COUPLING CONTROL RELAY
Q22
86
85
1BRN
BLK-PPL
A2
G313
BLK-PPL
C
2
COMPRESSOR ELECTROMAGNETIC COUPLING
Q11
AUTOMATIC CONTROL CHECK UNIT
Q21a

ompressor Control

iring Diagram



Functional Description

The compressor electromagnetic coupling **Q11** is activated by the relative relay **Q22**, located in the relays and fuses assembly **Q41**.

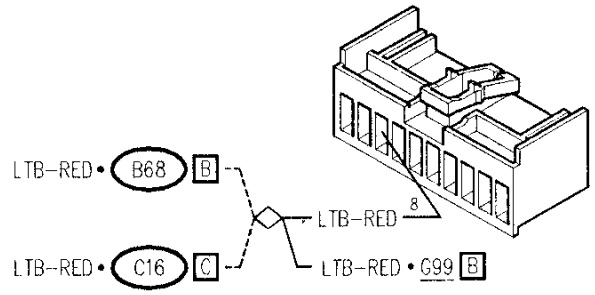
The relays **Q22** and **Q32**, located in group **Q41**, have a key-operated supply to the coils (the line which supplies **Q22** is protected by fuse **F15** (10A) of **G1**); the power line however, is supplied by battery voltage via fuse **Q40** (15A), also located in group **Q41**, and across fuse **Q43** (50A) which protects the entire system.

The relay **Q22** is excited by the Motronic supply and injection system and consequently supplies battery volatge to coupling **Q11**, in accordance with the following logic:

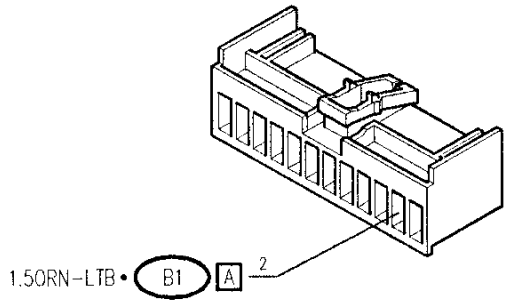
- relay **Q32** is excited by the electronic control unit **Q21a** when the logic system of the control unit requests the intervention of the compressor to actuate the air cooling system;
- relay **Q32** consequently sends a control signal to the Motronic control unit **S11**, pin 86
- the control unit "sends on" this signal, from pin 48 of **S11**, to relay **Q22** which engages the compressor, but only after the internal logic has verified certain conditions (e.g. the compressor does not cut in when maximum power is requested by the engine). Additionally, the control unit checks that the signal at pin 85 of **S11** is not interrupted. This signal comes from the minimum pressure switch (defroster) **Q9** and from the minimum and maximum pressure switch (trinary) **Q20** which intervene when the pressure in the cooling system is too high or too low: in this case the control signal is not sent on to activate the compressor.

Components and Connectors

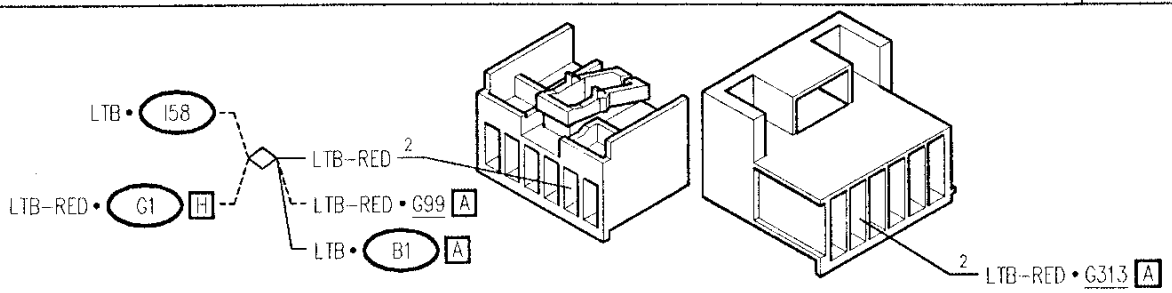
Fusebox	G1 B



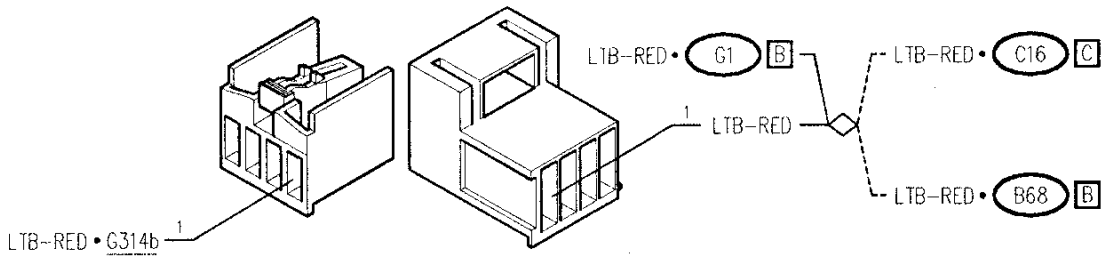
Fusebox	G1 H



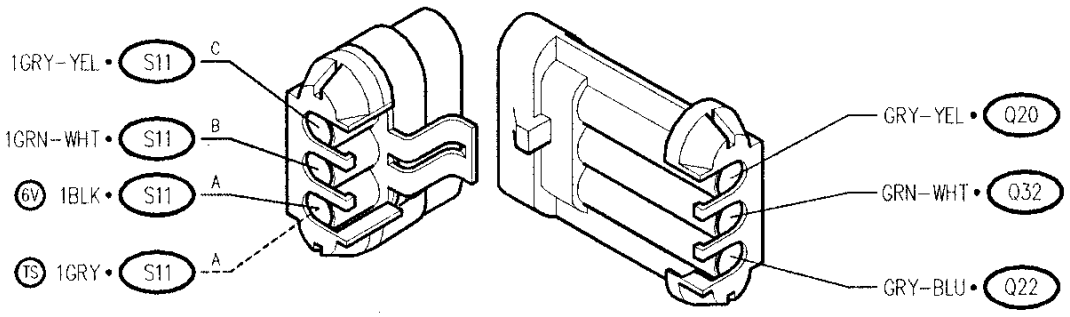
Connector for air conditioner wiring	G38 B



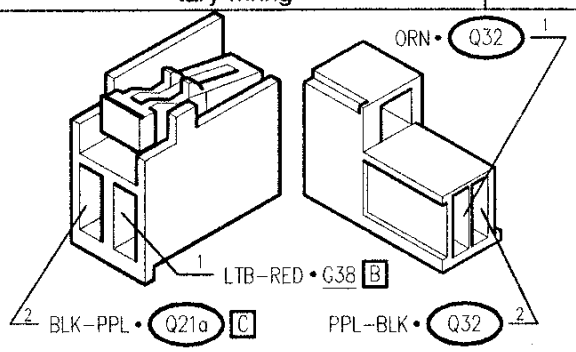
Dashboard/engine connection	G99 B



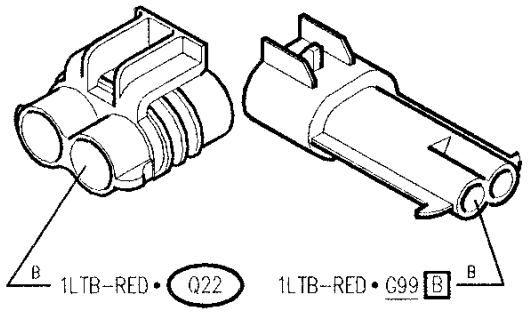
Electronic ignition-injection wiring B connection	G133b



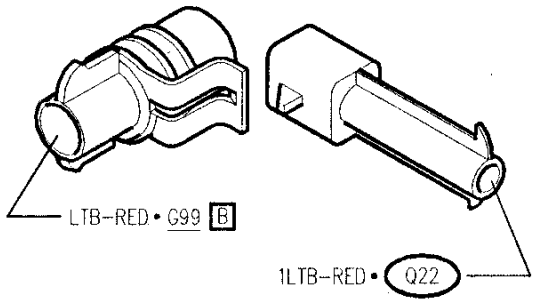
Connector for air conditioner supplementary wiring	G313 A



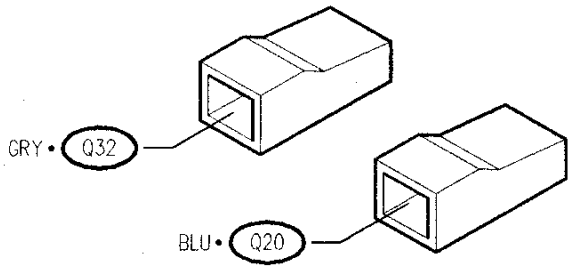
Engine air conditioner wiring B connection TS	G314b



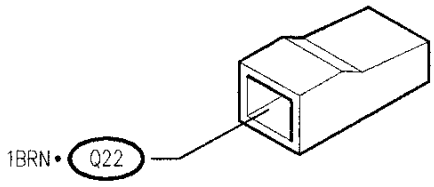
Engine air conditioner wiring B connection 6V	G314b



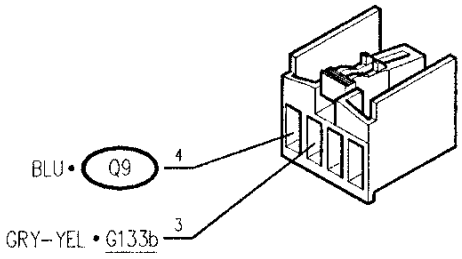
Minimum pressure switch	Q9



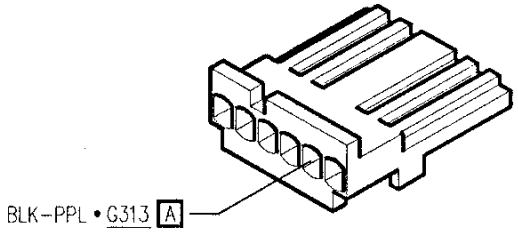
Compressor electromagnetic coupling	Q11



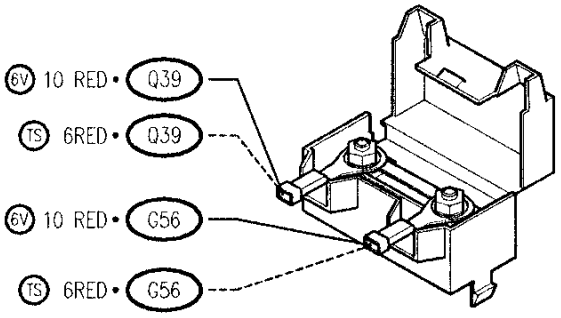
Min. and max. pressure switch (Trinary)	Q20



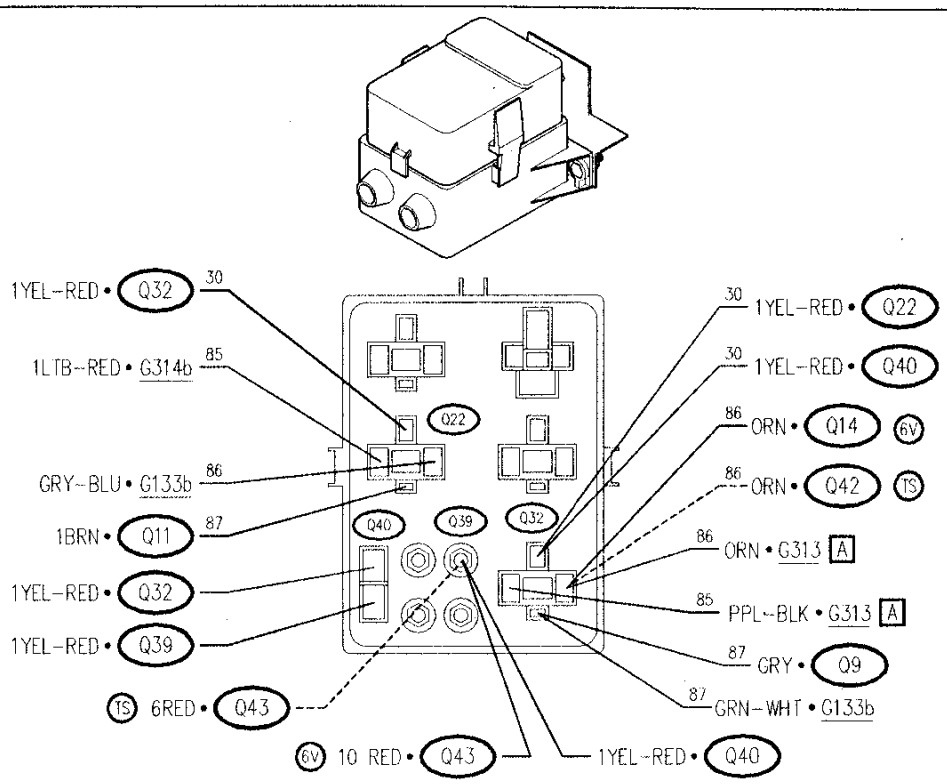
Automatic control check unit	Q21a C



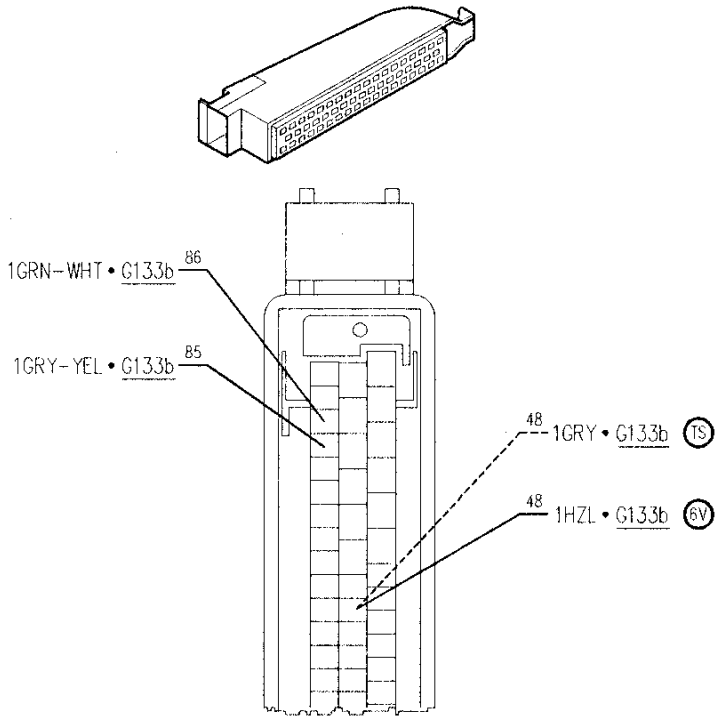
Loose fuse for conditioning system-50A	Q43

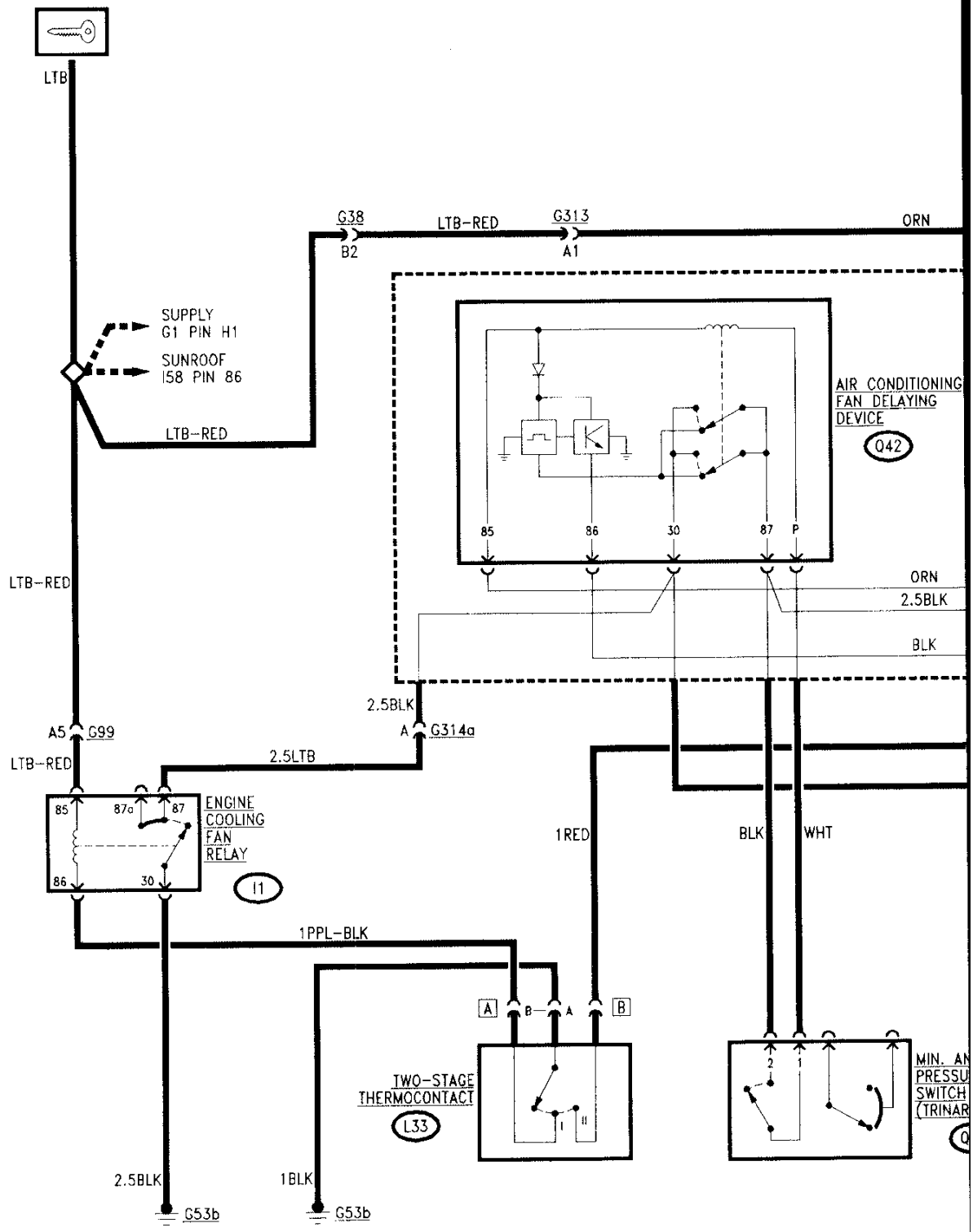


Air conditioning relay and fuses assembly (Q41)



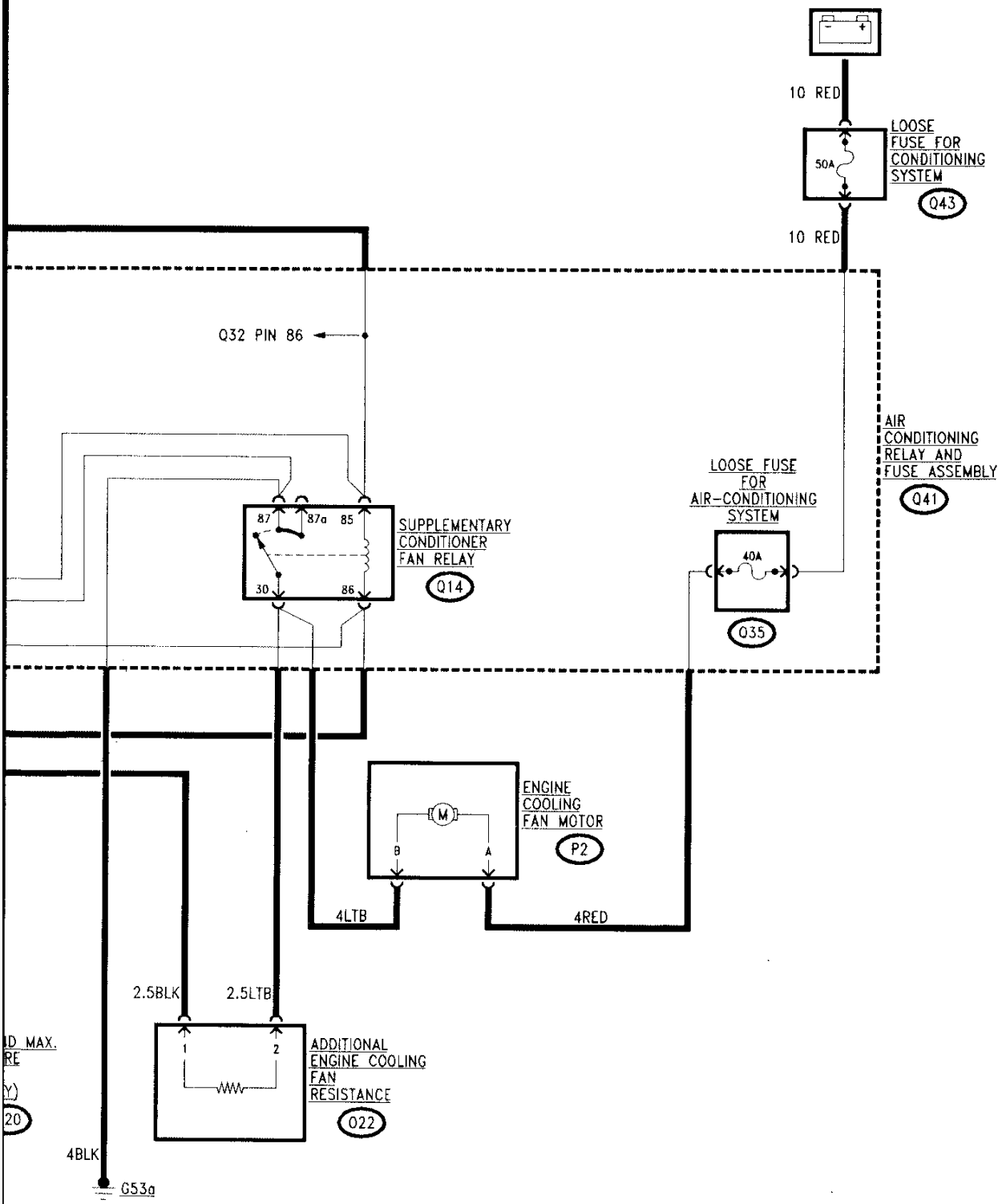
Motronic control unit (S11)




LTB
G38
B2
LTB-RED
G313
A1
ORN
SUPPLY
G1 PIN H1
SUNROOF
I58 PIN 86
LTB-RED
AIR CONDITIONING
FAN DELAYING
DEVICE
042
85
86
30
87
P
ORN
2.5BLK
BLK
LTB-RED
2.5BLK
A5
G99
A
G314a
LTB-RED
2.5LTB
85
87a
87
86
30
ENGINE
COOLING
FAN
RELAY
11
1RED
BLK
WHT
1PPL-BLK
A
B
A
B
TWO-STAGE
THERMOCONTACT
L33
2
1
MIN. AN
PRESSU
SWITCH
(TRINAR
2.5BLK
1BLK
G53b
G53b

ngine electric fan control - Model 6V

iring Diagram



Functional Description

The delaying device **Q42**, located in group **Q41**, controls the cutting-in of the electric fan to improve the cooling of the air conditioning system compressor.

The electric fan **P2** is controlled by a supplementary relay **Q14** , also connected in group **Q41**, and is supplied by battery voltage through fuse **Q35** (40A), also in **Q41**.

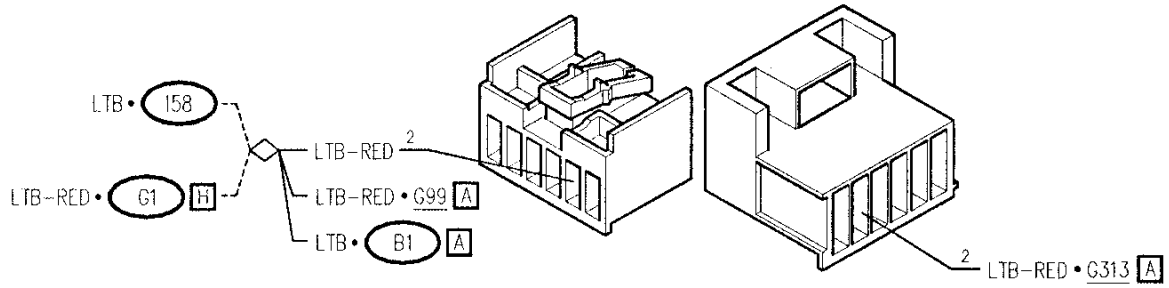
The key-operated voltage supplies the coil and the electronic devices of the delay system, the fan relay **I1** and supplementary relay **Q14** -pin 85; the coil of the delay device **Q42** is excited by an ground signal -pin P- coming from the trinary pressure switch **Q20** provoking the transmission of an ground signal - pin 30- to the additional resistance **O22** and from it to the fan **P2**, which then cuts-in at 1st speed.

Level 1 (87-92°C) of the thermocontact **L33** causes the actuation of the relay **I1** and sends an ground signal directly to the additional resistance **O22**.

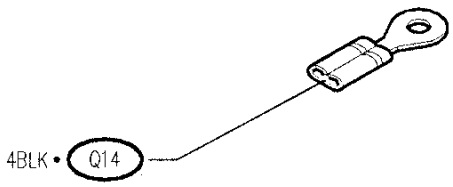
After about 10 seconds, if the control signal persists (or level 2 of thermocontact **L33** is reached (92-97°C)) the delay device **Q42** -pin 86- (or the level 2 contact of **L33**) send an ground signal which excites the coil of the supplementary relay **Q14** and actuates the electric fan **P2** at 2nd speed.

Components and Connectors

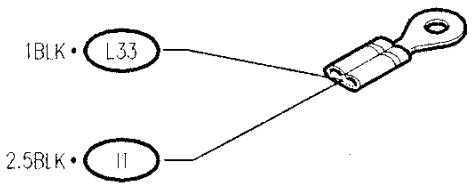
Connector for air conditioner wiring — G38 B



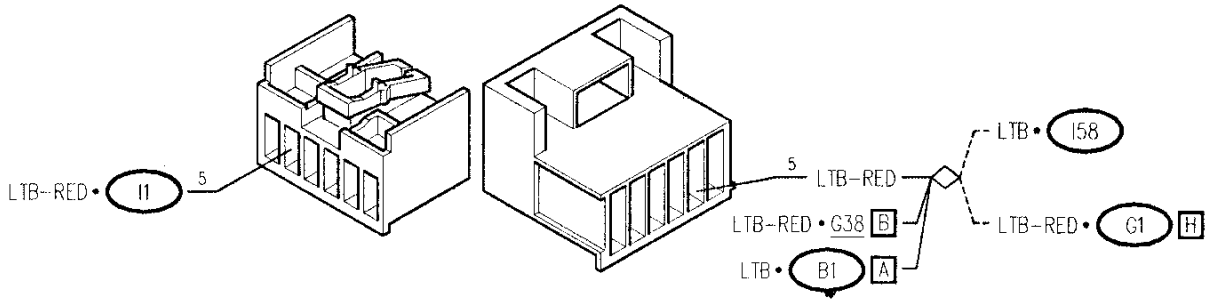
Engine compartment ground-right side — G53a



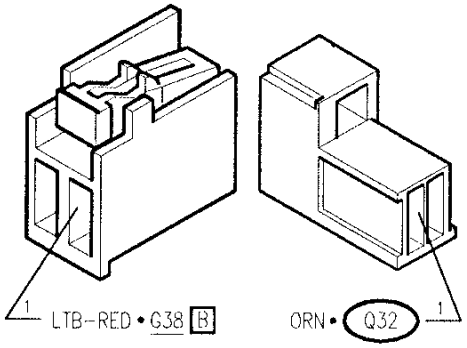
Engine compartment ground-left side — G53b



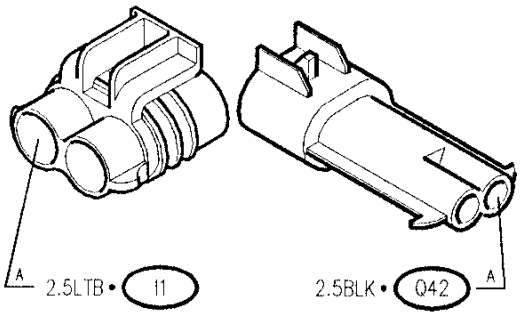
Dashboard/engine connection — G99 A



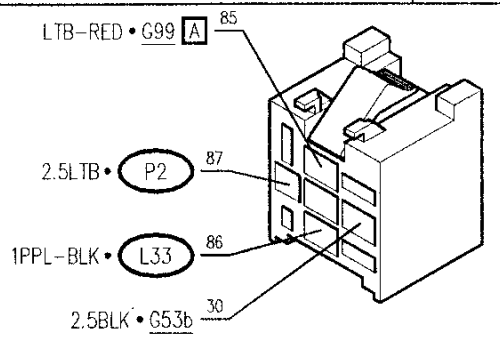
Connector for air conditioner supplementary wiring — G313 A



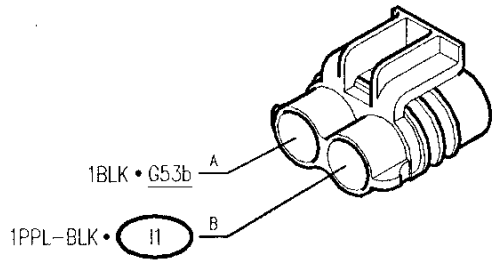
Engine air conditioner wiring A connection — G314a



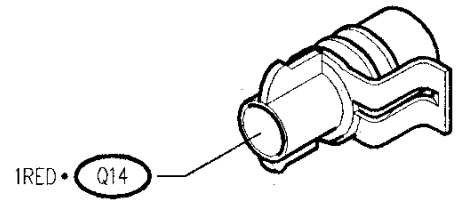
Engine cooling fan relay	I1



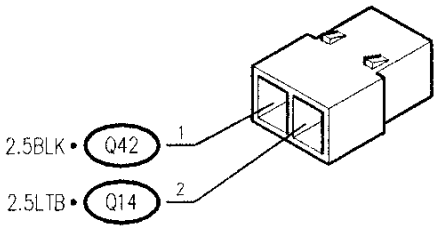
Two-stage thermocontact	L33 A



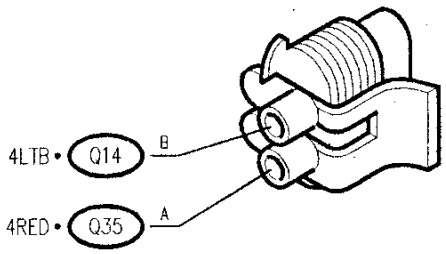
Two-stage thermocontact	L33 B



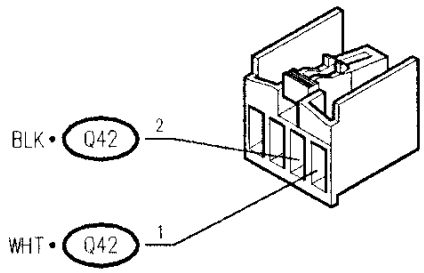
Additional engine cooling fan resistance	Q22



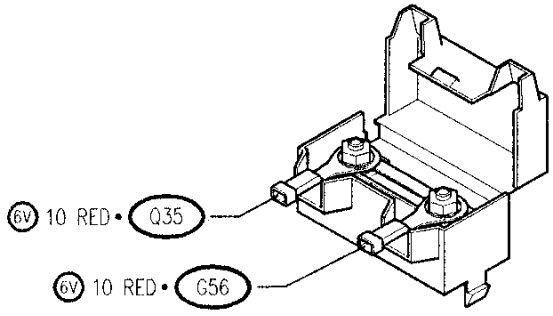
Engine cooling fan motor	P2



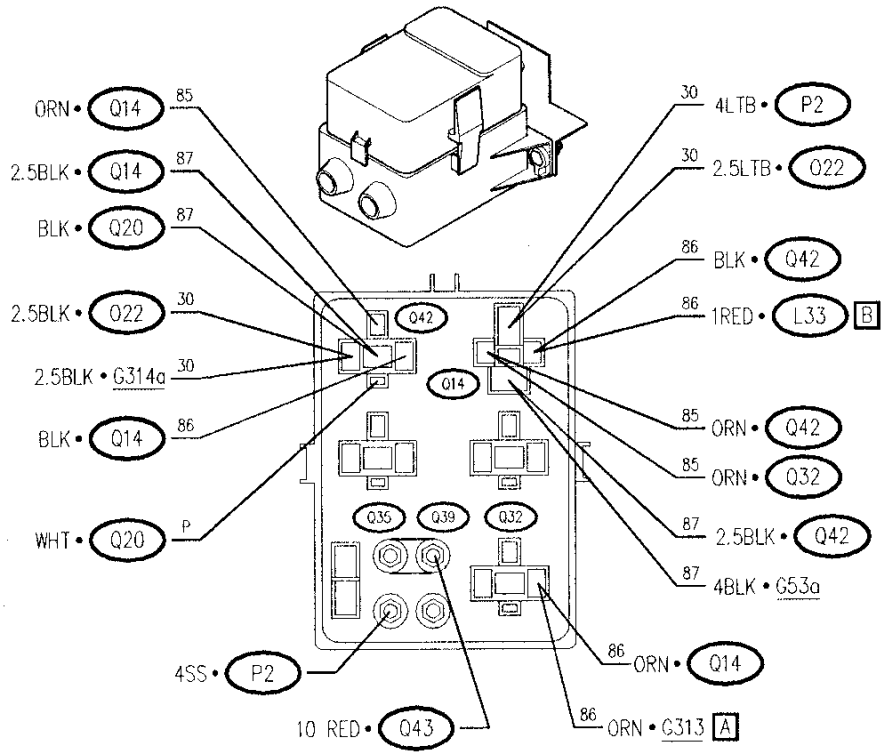
Min. and max. pressure switch (Trinary)	Q20

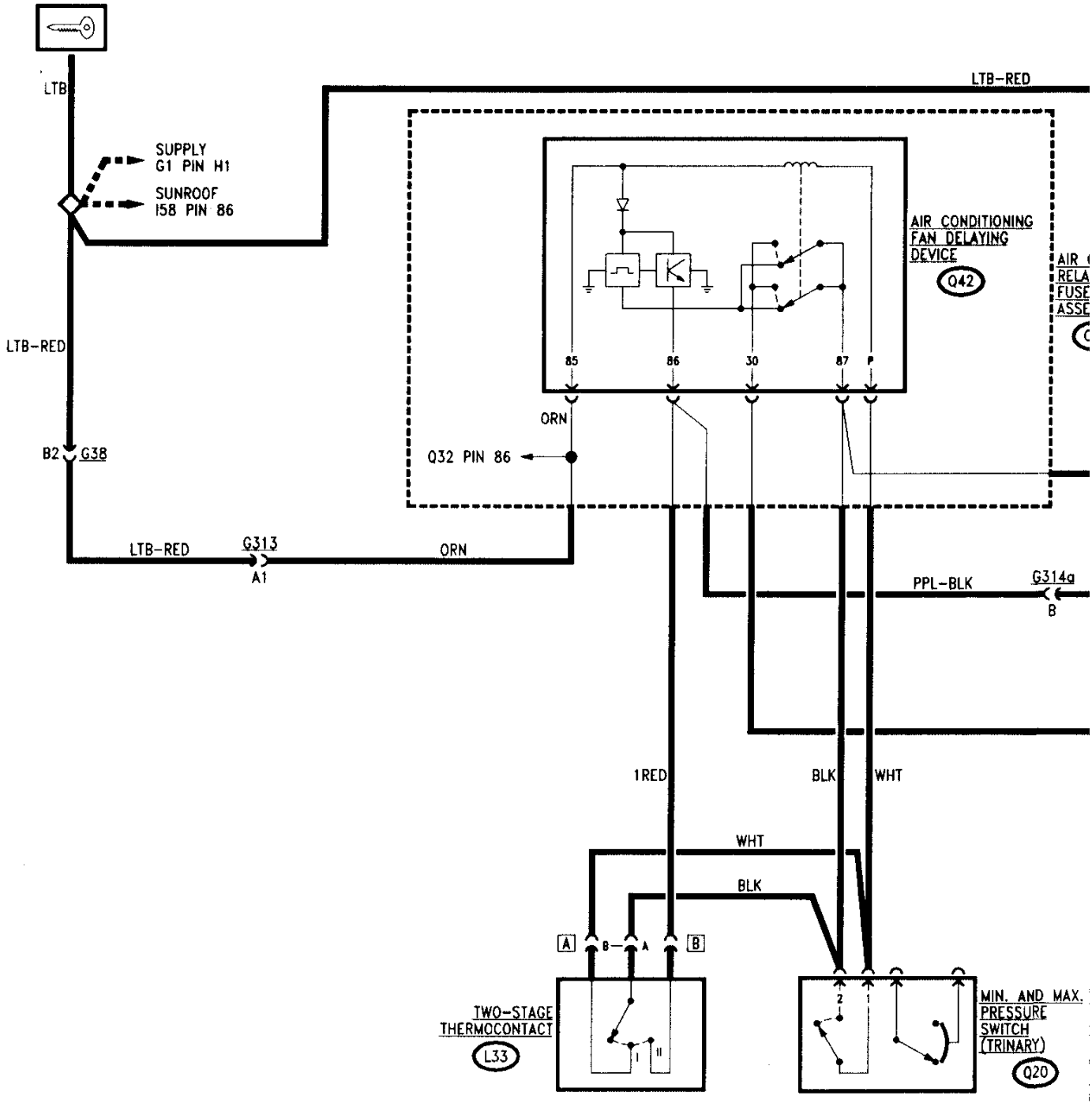


Loose fuse for conditioning system - 50A	Q43



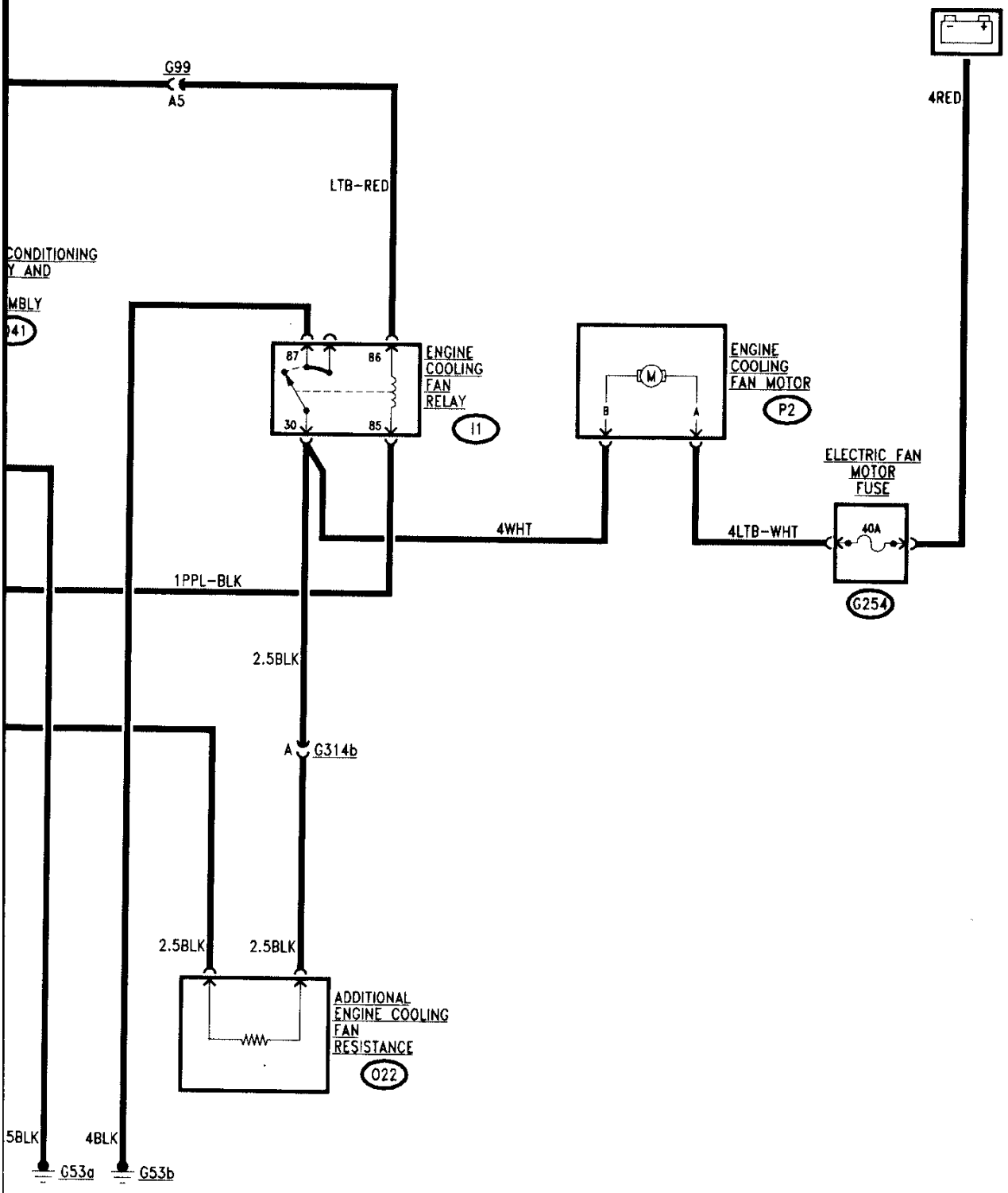
Air conditioning relay and fuses assembly	Q41




LTB
SUPPLY
G1 PIN H1
SUNROOF
I58 PIN 86
LTB-RED
LTB-RED
B2 G38
LTB-RED
G313
A1
ORN
Q32 PIN 86
ORN
AIR CONDITIONING
FAN DELAYING
DEVICE
Q42
85
86
30
87
F
PPL-BLK
G314g
B
1RED
BLK
WHT
WHT
BLK
A
B
A
B
TWO-STAGE
THERMOCONTACT
L33
I
II
2
1
MIN. AND MAX.
PRESSURE
SWITCH
(TRINARY)
Q20

ngine electric fan control - Twin Spark model

iring Diagram



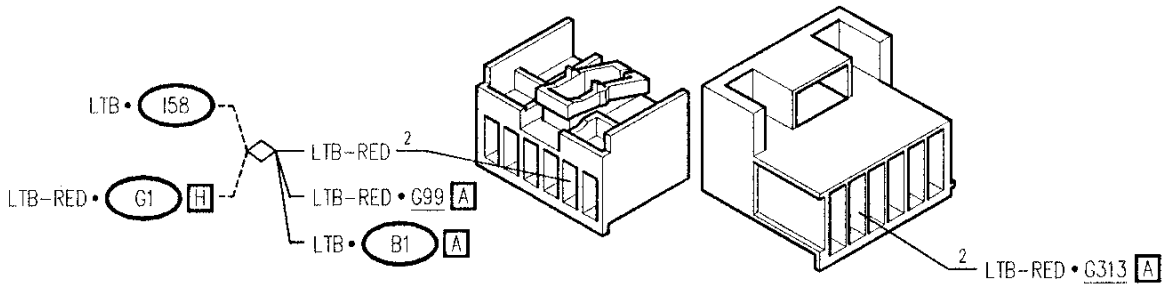
Functional Description

The delaying device **Q42**, located in group **Q41**, controls the cutting-in of the electric fan to improve the cooling of the air conditioning system compressor.
The key-operated voltage supplies the coil and the electronic devices of the delay system **Q42** -pin 85; the coil is excited by an ground signal -pin P- which can come from either the trinary pressure switch **Q20**, or from level 1 (87-92°C) of the two-stage thermocontact **L33**: this causes an ground signal to be sent - pin 30- to the additional resistance **O22** and from there to the electric engine cooling fan **P2**, which is then operated at the 1st speed.

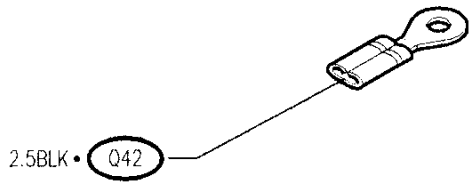
The electric fan **P2** is constantly supplied by battery voltage through the special fuse, **G254** (40A).
After about 10 seconds, if the control signal persists, or if level 2 of thermocontact **L33** is reached (92-97°C), the delay device **Q42** sends -pin 86- an ground signal which excites the coil of the fan relay **I1**, and actuates the fan itself **P2** at the 2nd speed.

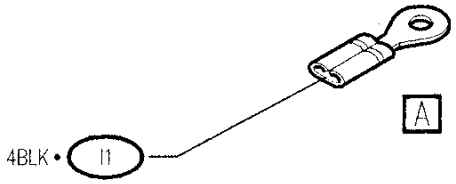
Components and Connectors

Connector for air conditioner wiring	G38 B

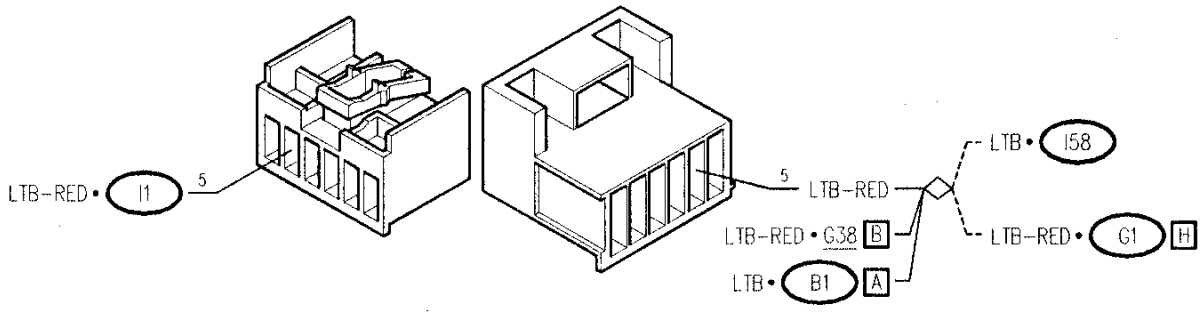


Engine compartment ground-right side	G53a	Engine compartment ground-left side	G53b

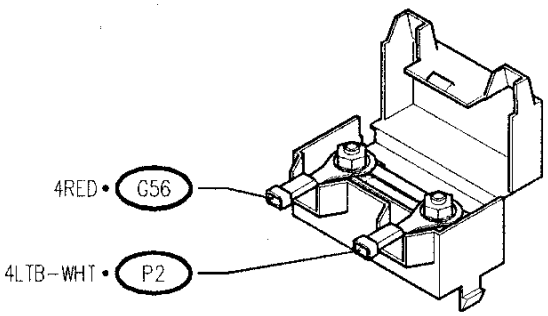


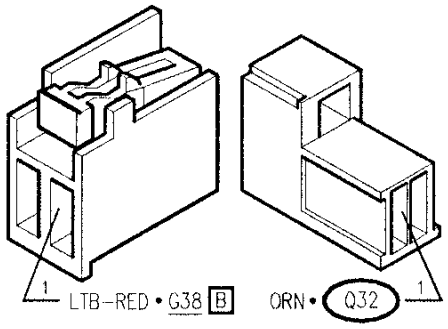


Dashboard/engine connection	G99 A

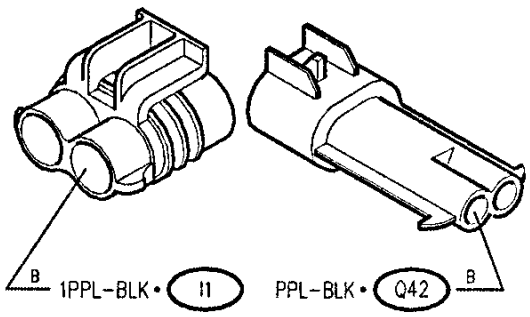


Electric fan motor fuse	G254	Connector for air conditioner supplementary wiring	G313 A

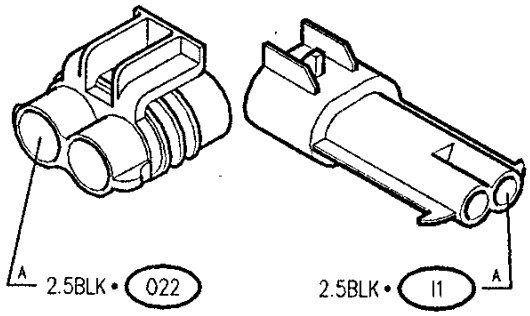




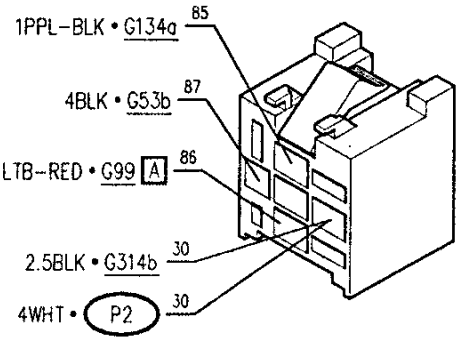
Engine air conditioner wiring A connection	G314a



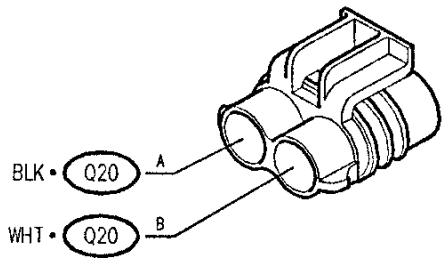
Engine air conditioner wiring B connection	G314b



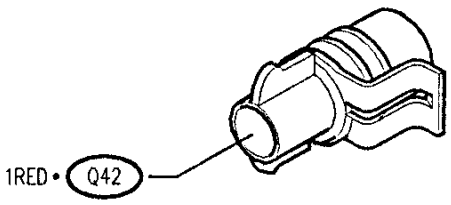
Engine cooling fan relay	I1



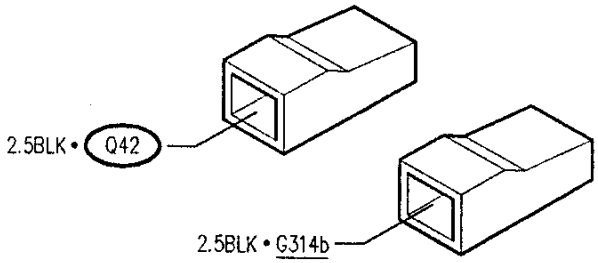
Two-stage thermocontact	L33 A



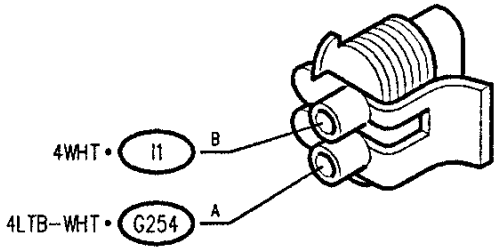
Two-stage thermocontact	L33 B



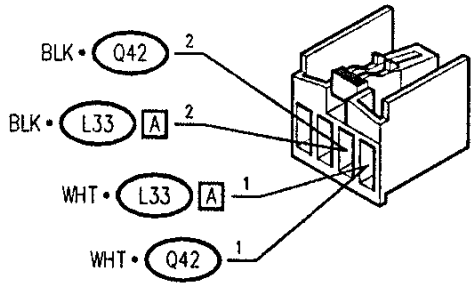
Additional engine cooling fan resistance	O22



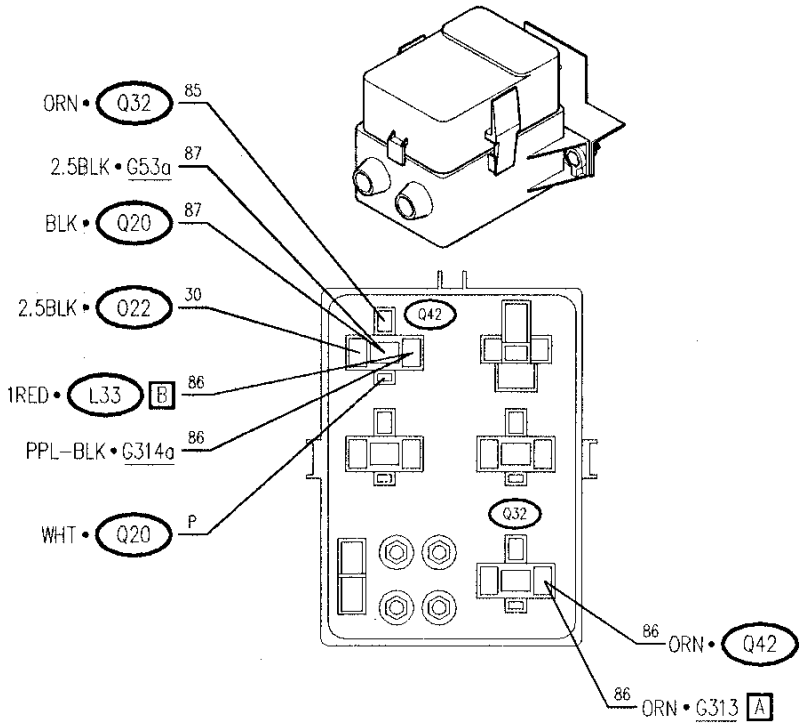
Engine cooling fan motor	P2



Min. and max. pressure switch (Trinary)	Q20



Air conditioning relay and fuses assembly	Q41



AUTOMATICALLY REGULATED HEATER

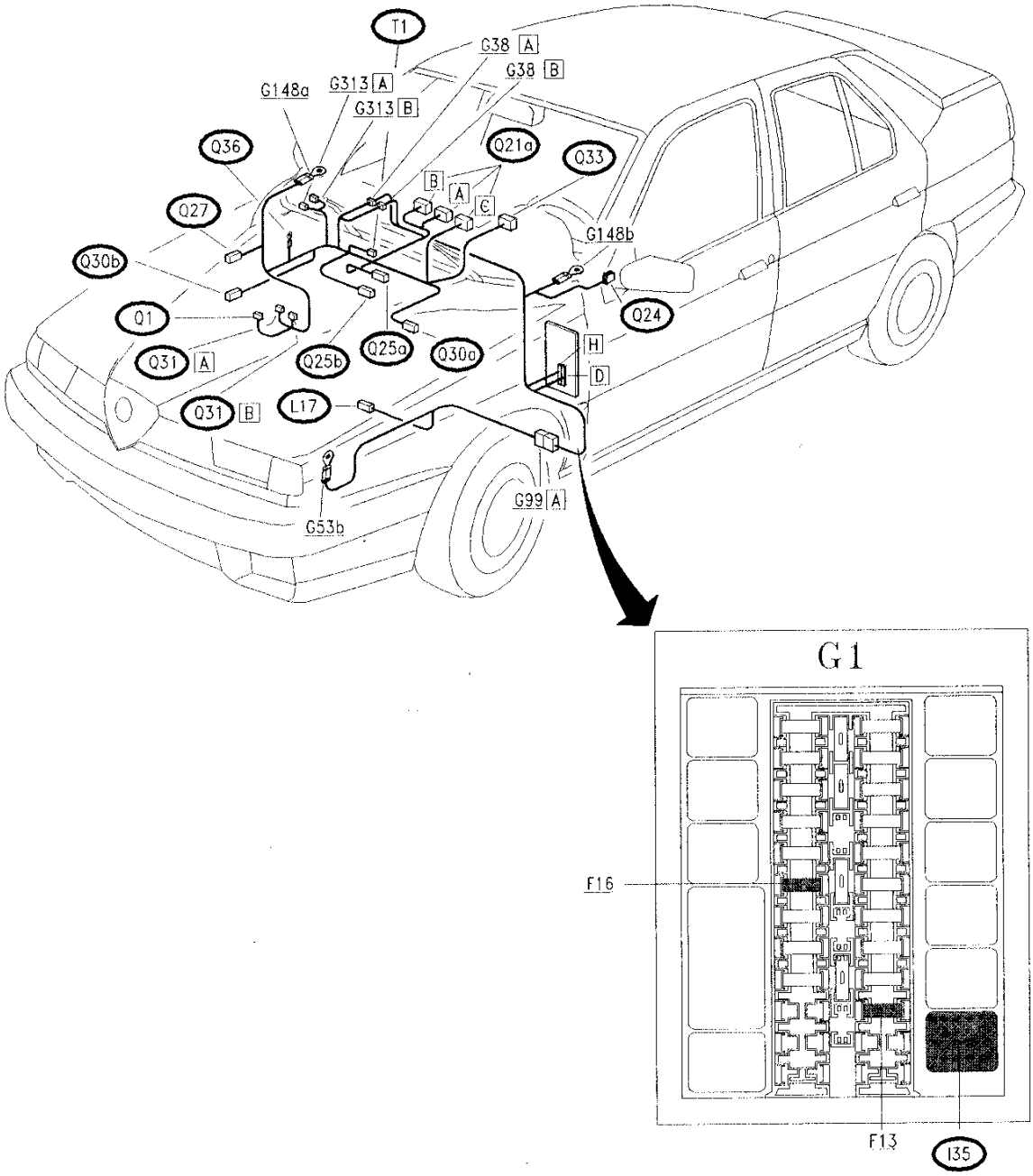
Description

The automatically regulated heater is entirely controlled by the air conditioning electronic control unit but it is not possible to cool the air as there is no compressor or relative system.
The control unit however optimizes the flow of air and provides the exact temperature requested during cold weather, and, as far as possible, attempts to bring the temperature as near as possible to that requested during warm weather.
This logic is governed by the control unit **Q21a**:
pin 2 of connector C, which sends the signal to actuate the compressor, is not connected.
The control panel, the front part of the control unit itself, is slightly different: for obvious reasons the "ECON" button is not present.

The wiring diagram relative to the automatically regulated heater is the same as that for the preceeding air conditioner but only the following should be considered:

- control unit: supply and diagnosis;
- temperature sensors;
- vent actuators;
- interior electric fan;

Location of Components



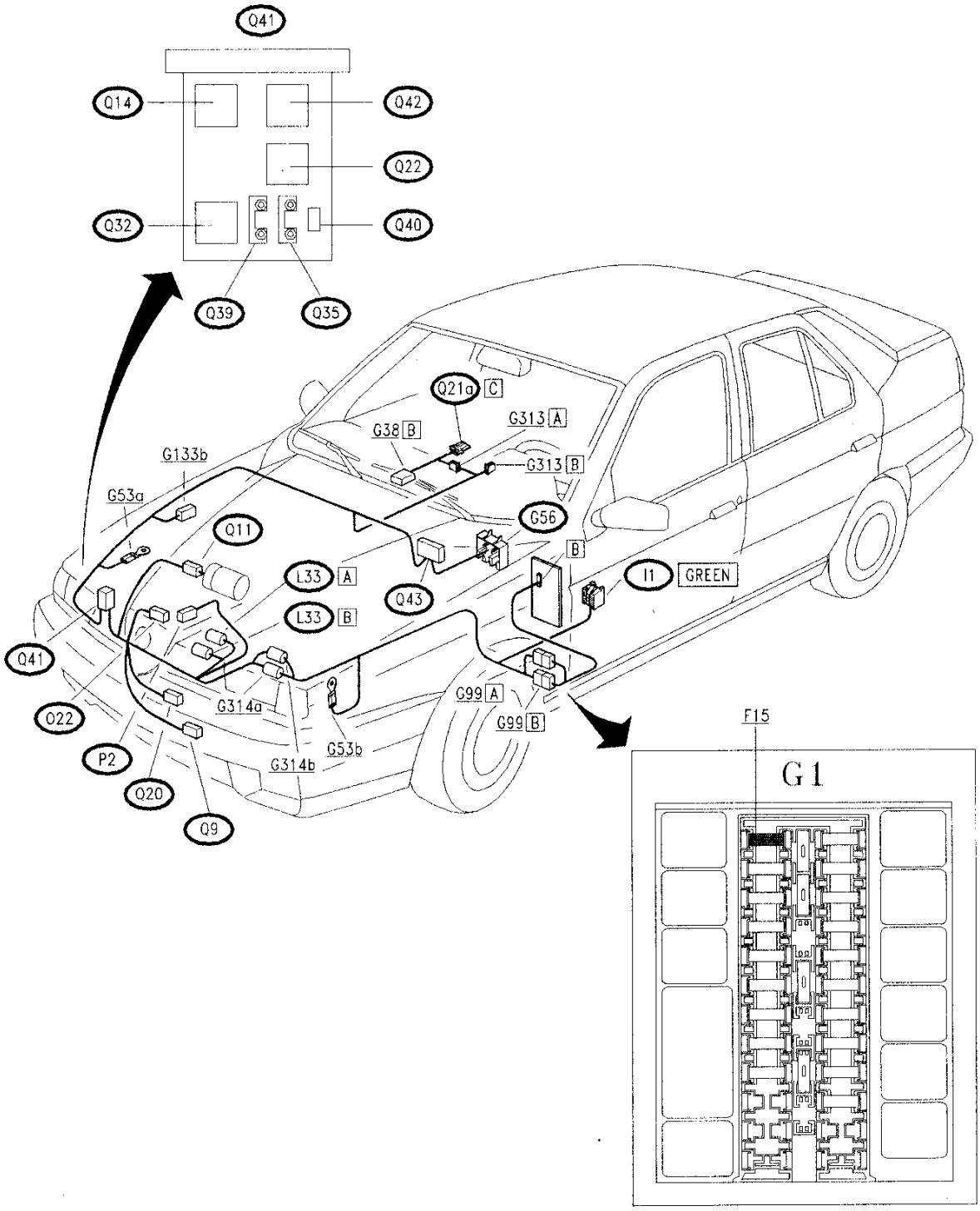
parts common to:

- AUTOMATIC HEATING/VENTILATION SYSTEM WITH AIR CONDITIONER

and

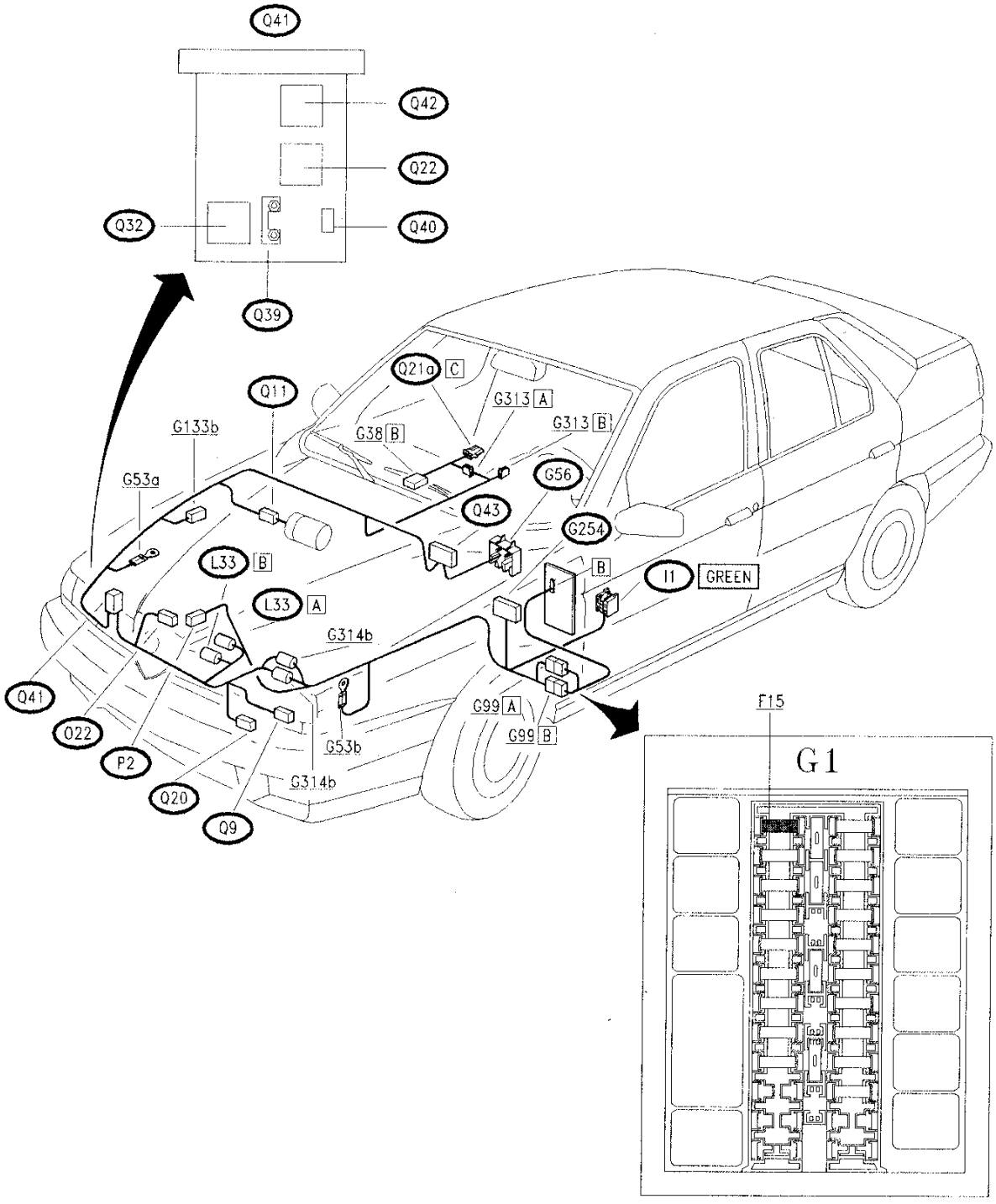
- AUTOMATICALLY REGULATED HEATER

Location of Components (Version 6V)



only
AUTOMATIC HEATING/VENTILATION SYSTEM WITH AIR CONDITIONER

Location of Components (Version Twin Spark)



only

AUTOMATIC HEATING/VENTILATION SYSTEM WITH AIR CONDITIONER

TROUBLESHOOTING HEATING-VENTILATION SYSTEM

NOTE:

Troubleshooting in this section is subdivided into three different parts:

1- Troubleshooting regarding the manual heater

2- Troubleshooting regarding the automatic conditioner following self-diagnosis by the control unit **Q21a**

3- Troubleshooting regarding the automatic conditioner for the part which is not controlled directly by the control unit **Q21a:** compressor control and electric fan control

1- MANUAL HEATER

TROUBLESHOOTING TABLE

Avaria	Componente				Prova
	Q1	Q4	Q5	F13	
Fan does not cut in	•				A
The fan does not cut in at the correct speed		•	•		B

NOTE: Air distribution within the passenger compartment and the heating/cooling of the air are mechanically controlled. For this reason, if anomalies should occur, e.g. heating/cooling not working, incorrect air distribution etc., refer to "REPAIR MANUAL-BODY", Group 80 - Air conditioning.

ELECTRIC FAN DOES NOT CUT IN	TEST A

NOTE: if the following circuits are also not working:
windscreen wipers, front power windows, heated rear windscreen and mirror defrosting, seat adjustment and heating, etc.., check and if necessary replace the key-operated supply relay **I35**.

TEST PROCEDURE		RESULT	CORRECTIVE ACTION
A1	CHECK FUSE		
– Check for damage of fuse **F13** in fusebox **G1**		OK ➡	Carry out **step A2**
		~~OK~~ ➡	Replace the fuse (20A)
A2	CHECK VOLTAGE		
– With ignition key engaged, verify 12V between pins 1 and 2 of the fan **Q1**		OK ➡	Replace fan **Q1**
		~~OK~~ ➡	Carry out **step A3**
A3	CHECK CONTINUITY		
– Check continuity between pin 2 of **Q1** and pin H6 of **G1**		OK ➡	Carry out **step A4**
		~~OK~~ ➡	Restore wiring between pin 2 of **Q1** and pin H6 of **G1**, across pin A6 of connector **G38** and the solder (ORN)
A4	CHECK GROUND		
– Check that pin 1 of the fan control **Q4** is grounded (0V)		OK ➡	Carry out **step A5**
		~~OK~~ ➡	Restore wiring between pin 1 of **Q4** and ground **G148b**, across pin A1 of connector **G38** (BLK)

(continues)

ELECTRIC FAN DOES NOT CUT IN	TEST A

TEST PROCEDURE		RESULT	CORRECTIVE ACTION
A5	CHECK CONTROL KNOB		
– Engage maximum speed and check that pin 5 of **Q4** is grounded (0V)		OK ➡	Restore wiring between pin 1 of **Q1** and pin 5 of **Q4** (BRN)
		~~OK~~ ➡	Replace control knob **Q4**

ELECTRIC FAN DOES NOT CUT IN AT DIFFERENT SPEED	TEST B

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
B1 CHECK REGULATOR – Check regulation resistances **Q5**, checking the following values: • between pin 1 and 4: 3.55 Ω approx. • between pin 1 and 3: 1.35 Ω approx. • between pin 1 and 2: 0.35 Ω approx.	OK ➡	Carry out **step B2**
	OK ➡	Replace regulator **Q5**
B2 CHECK CONTROL KNOB – Check the correct functioning of the fan control **Q4**, verifying continuity between the pins in accordance with the following: 1. speed: continuity between pins 5 and 4 2. speed: continuity between pins 5 and 3 3. speed: continuity between pins 5 and 2 4. speed (max) : continuity between pins 5 and 1 Also check that the circuit is open between the pins not indicated	OK ➡	Carry out **step B3**
	OK ➡	Replace control knob **Q4**
B3 CHECK CONTINUITY – Check continuity between: • pin 2 of **Q4** and pin 2 of **Q5** • pin 3 of **Q4** and pin 3 of **Q5** • pin 4 of **Q4** and pin 4 of **Q5**	OK ➡	Restore wiring between pin 1 of **Q5** and ground **G148b**, across pin A1 of connector **G38** (BLK)
	OK ➡	Restore wiring between: • pin 2 of **Q4** and pin 2 of **Q5** (RED) • pin 3 of **Q4** and pin 3 of **Q5** (GRY) • pin 4 of **Q4** and pin 4 of **Q5** (GRN)

2- AUTOMATIC CONDITIONER

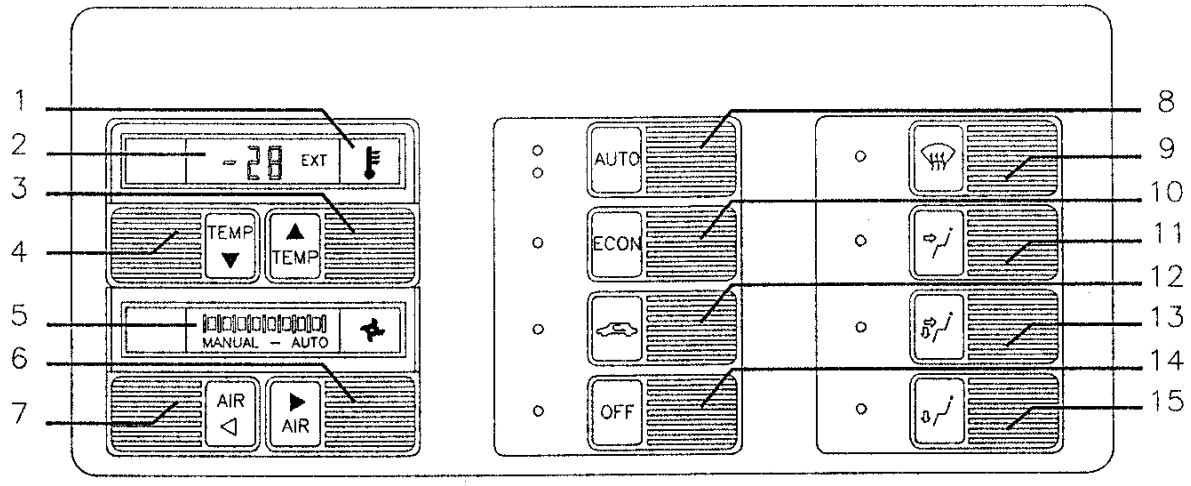
On-board Self-diagnosis

The following automatic diagnosis makes it possible to check the correct functioning of the conditioning system rapidly and without operations on the vehicle. In the event of an anomaly, the function makes it possible to identify the relevant component immediately.
In accordance with the operations below, the following are checked in this sequence:

1. the control unit **Q21a**
2. Control unit control keys
3. sensors (**Q33**, **Q24**, **Q25a**, **Q25b**, **L17**, **Q31**)
4. actuators (**Q1**, **Q31**, **Q30a**, **Q30b**, **Q11**, **Q27**)

If the display values do not correspond to those required, replace the indicated parts or carry out the tests described below.

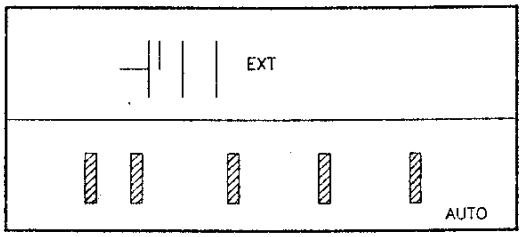
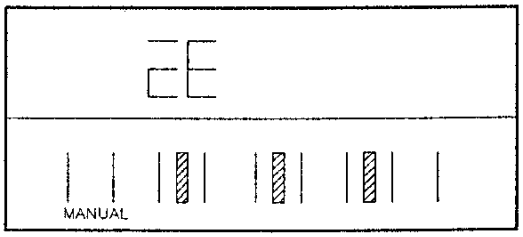
NOTE: the keys and the display of the control unit panel **Q21a** are hereafter identified as in the diagram:



1. Key "**EXT**"
2. Display "**TEMP**"
3. Key "**TEMP +**"
4. Key "**TEMP-**"
5. Display "**AIR**"
6. Key "**AIR +**"
7. Key "**AIR-**"
8. Key "**AUTO**"
9. Key "**DEF**"
10. Key "**ECON**"
11. Key "**VENT**"
12. Key "**RIC**"
13. Key "**BI-LEVEL**"
14. Key "**OFF**"
15. Key "**FLOOR**"

TROUBLESHOOTING TABLE

Self-diagnosis

STEP	SEE TEST
1. Phase: control unit check **1.** Rotate the ignition key to the "RUN" position at the same time holding the "AUTO" key down: the indications shown in the diagram should appear on the display and the leds on the "AUTO", "OFF", "DEF", and "BI-LEVEL" buttons should light up.  **2.** Push the "RIC" button: the indications shown in the diagram should appear on the on the two displays, and the leds on the "AUTO", "RIC", "VENT", and "FLOOR" buttons should light up. Pressing the "RIC" key again will return the system to the state shown in the preceeding diagram  **N.B.:** if no indication appears, check the power supply	If the indications on the display and the leds does not correspond to the above, replace control unit **Q21a** **TEST A**

STEP	SEE TEST
2. Phase: keyboard check **1.** Press the "AUTO" key: four bars should appear on the lower display (AIR) **2.** Press the various keys in succession and check that the letters and numbers shown in the table appear on the upper display (TEMP) for each one: The relative led should light up for each key pushed. **N.B.**: do not press the "AUTO" key: this will advance the system to the next phase!	*If the indications on the display and the leds does not* correspond to the above, replace control unit **Q21a**

KEY	*IDENTIFICATION CODE*
EXT	*E*
TEMP +	*6*
TEMP-	*5*
AIR +	*2*
AIR-	*1*
ECON	*4*
RIC	*d*
OFF	*7*
DEF	*9*
VENT	*b*
BI-LEVEL	*c*
FLOOR	*A*

STEP	SEE TEST
3. Phase: sensor check **NOTE:** all of the following tests should be carried out when the vehicle is in the workshop (external temperature and internal temperature between 10 and 30°C) **1.** Press the "AUTO" key: six bars should appear on the lower display (AIR) **2.** Press the "AIR-" key: the temperature reading inside the passenger compartment should appear on the upper display (TEMP). If not, check the sensor **Q33**	**TEST B**
3. Press the "AIR +" key: the outside air temperature reading should appear on the upper display (TEMP). If not, check the sensor **Q24**	**TEST C**
4. Press the "TEMP-" key and then the "TEMP +" key: the mixed air temperature readings in the upper and lower parts of the heater/conveyor should appear on the upper display (TEMP) If not, check the sensors **Q25a and Q25b**	**TEST E and E**
5. Press the "OFF" key for at least 2 seconds: the value *0* if the vehicle is stationary or *1* if the engine is running (at a minimum speed of 30 Kph) should appear on the upper display (TEMP) If not check the speedometer sensor connection **L17**	**TEST F**
6. Press the "RIC" key: a value representing the position of the air distribution vents should appear on the upper display (TEMP) (see point 10 of phase 4)	
7. Press the "ECON" key: the temperature readings from around the electric fan should appear on the upper display (TEMP) If not, check the regulator **Q31**	**TEST G**

STEP	SEE TEST
4. Phase: actuator check	
1. Press the "AUTO" key: eight bars should appear on the lower display (AIR)	
2. Repeatedly press the "AIR+" key: each time it is pressed 26 identification codes should appear in sequence on the upper display (TEMP) starting from value "*C*" until value "*3F*", and the electric fan should be heard to gradually increase in speed	
If not, check the fan **Q1** and relative regulator **Q31**	**TEST H**
3. Repeatedly press the "AIR-" key: each time it is pressed 26 identification codes should appear in sequence on the upper display (TEMP)starting from value "*3F*" until value "*C*", and the electric fan should be heard to gradually decrease in speed	
If not, check the fan **Q1** and relative regulator **Q31**	**TEST H**
4. Press the "ECON" key a few times: the compressor electromagnetic coupling should engage and disengage (activation and deactivation of the relative relay) and at the same time the relative leds should light up and go out.	
If not check correct cut-in of compressor **Q11**	**TEST I** Refer also to **test A** of the following troubleshooting ("Compressor does not cut-in")
5. Press the "TEMP-" key: each time it is pressed a sequence of identification codes should appear on the upper display (TEMP) up to a value limit of "*32*" (max cold)	
If not, check motors **Q30a and Q30b**	**TEST J and K**
6. Press the "EXT" key: each time this key is pressed a sequence of identification codes should appear on the uppe, display (TEMP) up to a value limit of "*7b*" (mixing tap open, vent intermediate position)	
If not, check motors **Q30a and Q30b**	**TEST J and K**

STEP	SEE TEST
7. Press the "TEMP +" key: each time this is pressed a sequence of identification codes should appear on the upper display (TEMP) up to a value limit of "**C7**" (max. hot) If not, check motors **Q30a and Q30b**	**TEST J and K**
8. Press the "RIC" key: air recirculation within the passenger compartment should be activated and the relative led should light up If not, check motor **Q27**	**TEST L**
9. Press the "RIC" key again: outside air intake should be activated and the relative led should go out If not, check motor **Q27**	**TEST L**
10. Press the "DEF", "VENT", "BI-LEVEL", "FLOOR" keys in sequence. Each time a different key is pressed the relative led should come on on the upper display (TEMP) and a sequence of identification codes should appear which stop when they identify a certain position of the air distribution vents, as illustrated: KEY / IDENTIFICATION CODE DEF — *d5* VENT — *2b* BI-LEVEL — *62* FLOOR — *94* If these codes do not appear correctly, check the motor **Q30a** **NOTE:** The self-diagnosis terminates with this last operation: to return the system to normal operation, press the "AUTO" key. If all the indications correspond, the system is functioning correctly; if not, carry out the tests which follow in order to identify the anomaly and restore correct operation	**TEST M**

MEMORY CHECK

The automatic diagnosis makes it possible to check the capacity to memorize the temperature set by the control unit **Q21a**
Operate as follows:

- Rotate the ignition key to the "RUN" position
- Press the "AUTO" key
- Press the "TEMP +" a few times, until the identification code "HI" appears on the upper display (TEMP)
- Press the "AIR +" key until the fan reaches maximum speed and eight bars appear on the lower display (AIR)
- Press the "RIC" key and one of the right-hand keys (air distribution) the one set automatically.
- Rotate the key to the "STOP" position; a few moments later rotate it to the "RUN" position: the previously stored settings should now be operational once again and no changes should have occured: temperature set to "HI", fan at maximum speed, air flow with recirculation and a certain distribution.

If the settings are not stored replace the control unit **Q21a**

CHECK CONTROL UNIT POWER SUPPLY	TEST A

NOTE: if the following circuits are also not working:
windscreen wipers, front power windows rear windscreen and mirror defrosting, seat adjustment and heating etc., check and if necessary replace the key-operated supply relay **I35**.

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
A1 CHECK FUSE – Check for damage of fuse **F13** in fusebox **G1**	OK ➡	Carry out **step A2**
	OK ➡	Replace the fuse (20A)
A2 CHECK FUSE – Check for damage of fuse **F16** in fusebox **G1**	OK ➡	Carry out **step A3**
	OK ➡	Replace the fuse (7.5A)
A3 CHECK VOLTAGE – Verify 12V at pin B10 of control unit **Q21a**	OK ➡	Carry out **step A4**
	OK ➡	Restore wiring between pin D7 of **G1** and pin B10 of **Q21a**, across pin A3 of connector **G38** and the solder (RED)
A4 CHECK VOLTAGE – With ignition key engaged, verify 12V at pin B12 of control unit **Q21a**	OK ➡	Carry out **step A5**
	OK ➡	Restore wiring between pin H6 of **G1** and pin B12 of **Q21a**, across sensor **Q33**, pin A6 of connector **G38** and the solder (ORN)

(continues)

CHECK CONTROL UNIT POWER SUPPLY	TEST A

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
A5 CHECK GROUND – Check that pins B4, B6 and B11 of control unit **Q21a** are grounded (0V)	OK ➡	Carry out **step A6**
	OK ➡	Restore wiring between: • pin B4 of **Q21a** and ground **G148b** across pins A5 and A1 of connector **G38** (BRN-BLK and BLK) • pin B6 of **Q21a** and ground **Q36** (GRY-BLK) • pin B11 of **Q21a** and ground **G53b** across pin A4 of connector **G38**, pin A3 of connector **G99** and the solders (BLK- PPL)
A6 CHECK VOLTAGE – With sidelights on, verify 12V at pin C1 of control unit **Q21a**	OK ➡	If the displays and leds do not come on, replace the control unit **Q21a**
	OK ➡	Restore wiring between pin D10 of **G1** and pin C1 of **Q21a**, across pin A2 of connector **G38** and the solder (YEL-BLK)

CHECK PASSENGER COMPARTMENT TEMPERATUR SENSOR	TEST B

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
B1 SELF-DIAGNOSIS – During the self-diagnosis procedure an incorrect passenger compartment temperature value appears (even if plausible)	OK ➡	Carry out **step B4**
	OK ➡	Carry out **step B2**
B2 SELF-DIAGNOSIS – During the self-test "*06*" will be displayed	OK ➡	Carry out **step B6**
	OK ➡	Carry out **step B3**
B3 SELF-DIAGNOSIS – During the self-test "*45*" will be displayed	OK ➡	Carry out **step B9**
	OK ➡	Carry out **step B4**
B4 CHECK VOLTAGE – Verify 12 V at pin 1 of sensor **Q33**	OK ➡	Carry out **step B5**
	OK ➡	Restore wiring between pin 1 of **Q33** and pin H6 of **G1**, across pin A6 of connector **G38** and the solder (ORN)

(continues)

CHECK PASSENGER COMPARTMENT TEMPERATURE SENSOR	TEST B

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
B5 CHECK GROUND – Check that pin 2 of sensor **Q33** is grounded (0V)	OK →	Replace sensor **Q33**
	~~OK~~ →	Restore wiring between pin 2 of **Q33** and ground **G148b**, across pin A1 of connector **G38** (BLK)
B6 SELF-DIAGNOSIS (CHECK SENSOR) – Disconnect sensor **Q33** and bridge pins 3 and 4: "*G*" is displayed	OK →	Carry out **step B7**
	~~OK~~ →	("*45*" displayed) Replace sensor **Q33**
B7 CHECK CONTINUITY – Check continuity between pin 4 of **Q33** and pin B7 of control unit **Q21a**	OK →	Carry out **step B8**
	~~OK~~ →	Restore wiring between pin 4 of **Q33** and pin B7 of control unit **Q21a** (WHT-BLU)
B8 CHECK GROUND – Check that pin 3 of sensor **Q33** is grounded (0V)	OK →	Check and if necessary replace control unit **Q21a**
	~~OK~~ →	Restore wiring between pin 3 of **Q33** and ground **Q36** (GRY- BLK)

(continues)

CHECK PASSENGER COMPARTMENT TEMPERATURE SENSOR	TEST B

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
B9 SELF-DIAGNOSIS (SHORT CIRCUIT CHECK) – Disconnect sensor **Q33**:"*G*" displayed	OK ➡	Replace sensor **Q33**
	~~OK~~ ➡	("*45*" displayed) Carry out **step B10**
B10 CHECK VOLTAGE – Check for voltage (> 0V) at pin 4 of sensor **Q33**	OK ➡	Check and if necessary replace control unit **Q21a**
	~~OK~~ ➡	Restore wiring between pin 4 of **Q33** and pin B7 of control unit **Q21a** (WHT-BLU)

CHECK OUTSIDE TEMPERATURE SENSOR	TEST C

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
C1 SELF-DIAGNOSIS – During the self-diagnosis procedure an incorrect outside temperature value appears (even if plausible)	OK ➡	Replace sensor **Q24**
	~~OK~~ ➡	Carry out **step C2**
C2 SELF-DIAGNOSIS – During the self-test "- *29*" will be displayed	OK ➡	Carry out **step C4**
	~~OK~~ ➡	Carry out **step C3**
C3 SELF-DIAGNOSIS – During the self-test "*49*" will be displayed	OK ➡	Carry out **step C7**
	~~OK~~ ➡	Carry out **step C4**
C4 SELF-DIAGNOSIS (CHECK SENSOR) – Disconnect sensor **Q24** and bridge pins 1 and 2: "*-29*" displayed	OK ➡	Carry out **step C5**
	~~OK~~ ➡	("*49*" displayed) Replace sensor **Q24**

(continues)

CHECK OUTSIDE TEMPERATURE SENSOR	TEST C

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
C5 CHECK CONTINUITY – Check continuity between pin 2 of **Q24** and pin B8 of control unit **Q21a**	OK ➡ OK ➡	Carry out **step C6** Restore wiring between pin 2 of **Q24** and pin B8 of control unit **Q21a**, across pin B4 of connector **G38** (WHT)
C6 CHECK GROUND – Check that pin 1 of sensor **Q24** is grounded (0V)	OK ➡ OK ➡	Check and if necessary replace control unit **Q21a** Restore wiring between pin 1 of **Q24** and ground **Q36**, across pin B5 of connector **G38** (GRY-BLK)
C7 SELF-DIAGNOSIS (SHORT CIRCUIT CHECK) – Disconnect sensor **Q24**: "*-29*" displayed	OK ➡ OK ➡	Replace sensor **Q24** ("*49*" displayed) Carry out **step C8**
C8 CHECK VOLTAGE – Check for voltage (> 0V) at pin 2 of sensor **Q24**	OK ➡ OK ➡	Check and if necessary replace control unit **Q21a** Restore wiring between pin 2 of **Q24** and pin B8 of control unit **Q21a**, across pin B4 of connector **G38** (WHT)

CHECK MIXED AIR TEMPERATURE SENSOR (UPPER.)	TEST D

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
D1 SELF-DIAGNOSIS – During the self-diagnosis procedure an incorrect upper heater/conveyor group mixed air temperature value appears (even if plausible)	OK ➡	Replace sensor **Q25a**
	~~OK~~ ➡	Carry out **step D2**
D2 SELF-DIAGNOSIS – During the self-test "- *0*" will be displayed	OK ➡	Carry out **step D4**
	~~OK~~ ➡	Carry out **step D3**
D3 SELF-DIAGNOSIS – During the self-test "79" will be displayed	OK ➡	Carry out **step D7**
	~~OK~~ ➡	Carry out **step D4**
D4 SELF-DIAGNOSIS (CHECK SENSOR) – Disconnect sensor **Q25a** and bridge pins 1 and 2: "*-0*" displayed	OK ➡	Carry out **step D5**
	~~OK~~ ➡	("*79*" displayed) Replace sensor **Q25a**

(continues)

CHECK MIXED AIR TEMPERATURE SENSOR (UPPER)	TEST D

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
D5 CHECK CONTINUITY – Check continuity between pin 1 of **Q25a** and pin B9 of control unit **Q21a**	OK ➡	Carry out **step D6**
	OK ➡	Restore wiring between pin 1 of **Q25a** and pin B9 of control unit **Q21a** (LTB-RED)
D6 CHECK GROUND – Check that pin 2 of sensor **Q25a** is grounded (0V)	OK ➡	Check and if necessary replace control unit **Q21a**
	OK ➡	Restore wiring between pin 2 of **Q25a** and ground **Q36** (GRY- BLK)
D7 SELF-DIAGNOSIS (SHORT CIRCUIT CHECK) – Disconnect sensor **Q25a**: "-0" displayed	OK ➡	Replace sensor **Q25a**
	OK ➡	("79" displayed) Carry out **step D8**
D8 CHECK VOLTAGE – Check for voltage (> 0V) at pin 1 of sensor **Q25a**	OK ➡	Check and if necessary replace control unit **Q21a**
	OK ➡	Restore wiring between pin 1 of **Q25a** and pin B9 of control unit **Q21a** (LTB-RED)

CHECK MIXED AIR TEMPERATURE SENSOR (LOWER)	TEST E

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
E1 SELF-DIAGNOSIS – During the self-diagnosis procedure an incorrect lower heater/conveyor group mixed air temperature value appears (even if plausible)	OK →	Replace sensor **Q25b**
	OK →	Carry out **step E2**
E2 SELF-DIAGNOSIS – During the self-test "- *0*" will be displayed	OK →	Carry out **step E4**
	OK →	Carry out **step E3**
E3 SELF-DIAGNOSIS – During the self-test "*79*" will be displayed	OK →	Carry out **step E7**
	OK →	Carry out **step E4**
E4 SELF-DIAGNOSIS (CHECK SENSOR) – Disconnect sensor **Q25b** and bridge pins 1 and 2: "*-0*" displayed	OK →	Carry out **step E5**
	OK →	("*79*" displayed) Replace sensor **Q25b**

(continues)

CHECK MIXED AIR TEMPERATURE SENSOR (LOWER)	TEST E

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
E5 CHECK CONTINUITY – Check continuity between pin 1 of **Q25b** and pin B5 of control unit **Q21a**	OK ➡	Carry out **step E6**
	~~OK~~ ➡	Restore wiring between pin 1 of **Q25b** and pin B5 of control unit **Q21a** (WHT-GRN)
E6 CHECK GROUND – Check that pin 2 of sensor **Q25b** is grounded (0V)	OK ➡	Check and if necessary replace control unit **Q21a**
	~~OK~~ ➡	Restore wiring between pin 2 of **Q25b** and ground **Q36** (GRY- BLK)
E7 SELF-DIAGNOSIS (SHORT CIRCUIT CHECK) – Disconnect sensor **Q25b**: "-0" displayed	OK ➡	Replace sensor **Q25b**
	~~OK~~ ➡	("79" displayed) Carry out **step E8**
E8 CHECK VOLTAGE – Check for voltage (> 0V) at pin 1 of sensor **Q25b**	OK ➡	Check and if necessary replace control unit **Q21a**
	~~OK~~ ➡	Restore wiring between pin 1 of **Q25b** and pin B5 of control unit **Q21a** (WHT-GRN)

CHECK SPEEDOMETER SIGNAL	TEST F

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
F1 CHECK SPEEDOMETER – On instrument panel **C10** check for correct functioning of speedometer	OK ➡ ~~OK~~ ➡	Carry out **step F2** Refer to the troubleshooting relative to the speedometer in the section "Instrument Panel"
F2 CHECK SENSOR – Check the speedometer signal operating as follows: • connect pins C and A of sensor **L17** to 12V and ground respectively • insert the shaft of an electric motor in the sensor • varying the speed of the electric motor, check that there is a variation in the frequency of the signal (between 1 and 7.5 V) reaching pin C5 of control unit **Q21a**	OK ➡ ~~OK~~ ➡	Check and if necessary replace control unit **Q21a** Restore wiring between pin B of **L17** and pin B5 of **Q21a**, across pin B3 of connector **G38**, pin A1 of connector **G99** and the solder (LTB)

CHECK TEMPERATURE SENSOR IN THE SPEED VARIATOR DEVICE	TEST G

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
G1 SELF-DIAGNOSIS – During the self-diagnosis procedure an incorrect air temperature around the electric fan appears (even if plausible)	OK ➡	Replace il regulator **Q31**
	OK ➡	Carry out **step G2**
G2 SELF-DIAGNOSIS – During the self-test "*0*" will be displayed	OK ➡	Carry out **step G4**
	OK ➡	Carry out **step G3**
G3 SELF-DIAGNOSIS – During the self-test "*FF*" will be displayed	OK ➡	Carry out **step G7**
	OK ➡	Carry out **step G4**
G4 SELF-DIAGNOSIS (CHECK SENSOR) – Disconnect the regulator **Q31** and bridge pins A1 and A2: "*0*" displayed	OK ➡	Carry out **step G5**
	OK ➡	("*FF*" displayed) Replace the regulator **Q31**

(continues)

CHECK TEMPERATURE SENSOR IN THE SPEED VARIATOR DEVICE	TEST G

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
G5 CHECK CONTINUITY – Check continuity between pin A1 of **Q31** and pin C6 of control unit **Q21a**	OK ➡ OK ➡	Carry out **step G6** Restore wiring between pin A1 of **Q31** and pin C6 of control unit **Q21a** (PNK)
G6 CHECK CONTINUITY – Check continuity between pin A2 of **Q31** and pin B3 of control unit **Q21a**	OK ➡ OK ➡	Check and if necessary replace control unit **Q21a** Restore wiring between pin A2 of **Q31** and pin B3 of control unit **Q21a** (GRY-GRN)
G7 SELF-DIAGNOSIS (SHORT CIRCUIT CHECK) – Disconnect the regulator **Q31**: "*0*"displayed	OK ➡ OK ➡	Replace the regulator **Q31** ("*FF*" displayed) Carry out **step G8**
G8 CHECK VOLTAGE – Check for voltage (0V) between pins A1 and A2 of regolatore **Q31**	OK ➡ OK ➡	Check and if necessary replace control unit **Q21a** Restore wiring between: • pin A2 of **Q31** and pin B3 of control unit **Q21a** (GRY-GRN) • pin A1 of **Q31** and pin C6 of control unit **Q21a** (PNK)

CHECK ELECTRIC FAN WITH RELATIVE SPEED REGULATOR	TEST H

NOTE: if the no part of the conditioner is working, first refer to **test A;** if it is only the fan which is not working, carry out the following **test H**.

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
H1 CHECK FUSE – Check for damage of fuse **F13** in fusebox **G1**	OK ➡	Carry out **step H2**
	OK ➡	Replace the fuse (20A)
H2 CHECK FUSE – Check for damage of wander fuse **Q43**	OK ➡	Carry out **step H3**
	OK ➡	Replace the fuse (50 A)
H3 CHECK FUSE – Check for damage of fuse **Q39**, located in group **Q41**	OK ➡	Carry out **step H4**
	OK ➡	Replace the fuse (30 A)
H4 CHECK VOLTAGE – Verify 12V at pin 2 of electric fan **Q1**	OK ➡	Carry out **step H5**
	OK ➡	Restore wiring between pin 2 of **Q1** and the terminal block **G56**, across fuses **Q43** and **Q39** and pin B of connector **G313** (RED, RED-BLK and RED)

(continues)

CHECK ELECTRIC FAN WITH RELATIVE SPEED REGULATOR	TEST H

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
H5 CHECK VOLTAGE – With ignition key engaged, verify 12V at pin BC of regulator **Q31**	OK ➡	Carry out **step H6**
	OK ➡	Restore wiring between pin H6 of **G1** and pin BC of **Q31**, across pin A6 of connector **G38** and the solder (ORN)
H6 CHECK GROUND – Check that pin BA of regulator **Q31** is grounded (0V)	OK ➡	Carry out **step H7**
	OK ➡	Restore wiring between pin BA of **Q31** and ground **G148a** (BLK)
H7 CHECK VOLTAGE – Engage the electric fan and check for voltage (between 0 and 5 V) at pin A3 of regulator **Q31**	OK ➡	Carry out **step H9**
	OK ➡	Carry out **step H8**
H8 CHECK VOLTAGE – Engage the electric fan and check for voltage (between 0 and 5 V) in output from pin C3 of control unit **Q21a**	OK ➡	Restore wiring between pin A3 of **Q31** and pin C3 of **Q21a** (LTB-BLK)
	OK ➡	Check and if necessary replace control unit **Q21a**

(continues)

CHECK ELECTRIC FAN WITH RELATIVE SPEED REGULATOR	TEST H

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
H9 CHECK GROUND SIGNAL – Engage the electric fan and check that the output signal decreases when the speed increases (0V at max speed) from pin BB of regulator **Q31**	OK ➡	Carry out **step H10**
	NOT OK ➡	Replace regulator **Q31**
H10 CHECK GROUND SIGNAL – Engage the electric fan and check that the output signal decreases when the speed increases (0V at max speed) at pin 1 of electric fan **Q1**	OK ➡	Replace electric fan **Q1**
	NOT OK ➡	Restore wiring between pin BB of **Q31** and pin 1 of **Q1** (LTB)

CHECK COMPRESSOR ACTUATING SIGNAL	TEST I

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
I1 CHECK GROUND SIGNAL – Actuating the compressor (e.g. requesting a very cold temperature... - **N.B. the "ECON" key must not be pressed)** check for a ground signal (0V) in output from pin C2 of control unit **Q21a**	OK ➔ ~~OK~~ ➔	Carry out **step I2** Check and if necessary replace control unit **Q21a**
I2 CHECK GROUND SIGNAL – Actuating the compressor (e.g. requesting a very cold temperature) check for and ground signal (0V) at pin 85 of relay **Q32**, contained in group **Q41**	OK ➔ ~~OK~~ ➔	Refer to **test A** of following troubleshooting ("Compressor does not cut in") Restore wiring between pin C2 of **Q21a** and pin 85 of **Q32**, across pin A2 of connector **G313** (BLK-PPL)

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CHECK AIR DISTRIBUTION MOTOR	TEST J

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
J1 CHECK VOLTAGE – Actuate the motor (e.g. requesting air directed towards feet - "FLOOR" key) and verify 12 V between pins 1 and 2 of motor **Q30a** **N.B.:** the voltage is inverted when the motor changes direction	OK ➡	Carry out **step J3**
	OK ➡	Carry out **step J2**
J2 CHECK VOLTAGE – Actuate the motor (e.g. requesting air directed towards feet - "FLOOR" key) and verify 12 V between pins A5 and A6 of control unit **Q21a**	OK ➡	Restore wiring between: • pin 1 of **Q30a** and pin A5 of **Q21a** (WHT) • pin 2 of **Q30a** and pin A6 of **Q21a** (WHT-BLU)
	OK ➡	Check and if necessary replace control unit **Q21a**
J3 CHECK GROUND – Check that pin 3 of motor **Q30a** is grounded (0V)	OK ➡	Carry out **step J4**
	OK ➡	Restore wiring between pin 3 of **Q30a** and ground **Q36** (ORN)

(continues)

CHECK AIR DISTRIBUTION MOTOR	TEST J

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
J4 CHECK VOLTAGE – Actuate the motor (e.g. requesting air directed towards feet - "FLOOR" key) and check that the voltage between pins 4 and 5 of the motor **Q30a**, varies when the vent moves	OK ➔	Carry out **step J5**
	OK ➔	Replace motor **Q30a**
J5 CHECK VOLTAGE – Actuate the motor (e.g. requesting air directed towards feet - "FLOOR" key) and check that the voltage between pins A7 and A8 of control unit **Q21a**, varies when the distribution vent moves	OK ➔	Check and if necessary replace control unit **Q21a**
	OK ➔	Restore wiring between: • pin 4 of **Q30a** and pin A8 of **Q21a** (GRN) • pin 5 of **Q30a** and pin A7 of **Q21a** (LTB)

CHECK AIR MIXING MOTOR	TEST K

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
K1 CHECK VOLTAGE – Actuate the motor (e.g. requesting very cold or very hot air) and verify 12 V between pins 1 and 2 of the motor **Q30b** **N.B.**: voltage is inverted when the motor changes direction	OK ➔ ~~OK~~ ➔	Carry out **step K3** Carry out **step K2**
K2 CHECK VOLTAGE – Actuate the motor (e.g. requesting very cold or very hot air) and verify 12 V between pins A5 and A6 of control unit **Q21a**	OK ➔ ~~OK~~ ➔	Restore wiring between: • pin 1 of **Q30b** and pin A3 of **Q21a** (YEL) • pin 2 of **Q30b** and pin A4 of **Q21a** (BLU) Check and if necessary replace control unit **Q21a**
K3 CHECK GROUND – Check that pin 3 of motor **Q30b** is grounded (0V)	OK ➔ ~~OK~~ ➔	Carry out **step K4** Restore wiring between pin 3 of **Q30b** and ground **Q36** (RED- BLK)
K4 CHECK VOLTAGE – Actuate the motor (e.g. requesting very cold or very hot air) and check that the voltage between pins 4 and 5 of motor **Q30b**, varies when the air mixing vents move	OK ➔ ~~OK~~ ➔	Carry out **step K5** Replace motor **Q30b**

(continues)

CHECK AIR MIXING MOTOR	TEST K

TEST PROCEDURE		RESULT	CORRECTIVE ACTION
K5	CHECK VOLTAGE		
– Actuate the motor (e.g. requesting very cold or very hot air) and check that the voltage between pins A7 and A2 of control unit **Q21a**, varies when the air mixing vents move		OK ➡	Check and if necessary replace control unit **Q21a**
		OK ➡	Restore wiring between: • pin 4 of **Q30b** and pin A2 of **Q21a** (GRY-BLK) • pin 5 of **Q30b** and pin A7 of **Q21a**, across pin 5 of **Q30a** (LTB)

CHECK AIR RECIRCULATION MOTOR	TEST L

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
L1 CHECK VOLTAGE – Operate the motor (opening or closing the recirculation function) and verify 12 V between pins 1 and 2 of motor **Q27** **N.B.:** voltage is inverted when the motor changes direction	OK ➡	Replace motor **Q27**
	~~OK~~ ➡	Carry out **step L2**
L2 CHECK VOLTAGE – Operate the motor (opening or closing the recirculation function) and verify 12 V between pins A9 and A10 of control unit **Q21a**	OK ➡	Restore wiring between: • pin 1 of **Q27** and pin A10 of **Q21a** (BRN-YEL) • pin 2 of **Q27** and pin A9 of **Q21a** (LTB-RED)
	~~OK~~ ➡	Check and if necessary replace control unit **Q21a**

CHECK POSITION OF AIR DISTRIBUTION MOTOR VENTS — TEST M

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
M1 SELF-DIAGNOSIS – During the self-diagnosis procedure identification codes appear which differ by one unit from those indicated in the table corresponding to the various types of air distribution: KEY / IDENTIFICATION CODE DEF – *d5* VENT – *26* BI-LEVEL – *62* FLOOR – *94*	OK ➡ OK ➡	Act on the regulation and setting screws of the motor position transducers (see "REPAIR MANUAL-BODY", Group 80 - Air conditioning) Carry out **step M2**
M2 SELF-DIAGNOSIS – During the self-diagnosis procedure identification codes appear which **differ greatly** from those indicated in the preceeding table	OK ➡ OK ➡	Replace motor **Q30a** Check motor connections (see **test J**)

3 - ELECTRIC FAN AND COMPRESSOR CONTROLS

TROUBLESHOOTING TABLE

Malfunction	Component									Test
	Q11	F15	Q40	Q43	Q22	Q32	Q9	Q20	S11	
Compressor does not cut in	•	•	•	•	•	•	•	•	•	A
Compressor pulley slips	•									B

Malfunction	Component									Test
	G254	P2	I1	Q42	Q35	Q14	Q43	L33	Q20	O22	
Electric fan does not cut in	•	•	•	•						•	*C**
		•		•	•	•	•			•	D**
Electric fan does not cut in for high engine water temperatures			•	•				•			E*
			•	•		•		•			F**
Electric fan does not cut in when the vehicle is stationary and with compressor engaged			•	•					•		G*
				•		•			•		H**

* T. SPARK

*** 6V*

AIR CONDITIONING COMPRESSOR DOES NOT CUT IN	TEST A

NB: Before carrying out this test perform the automatic check using the self-diagnosis of the control unit **Q21a**, and particularly **step 4** of **phase 4**.

NOTE: if the cooling fluid (FREON) in the system is found to be at a **low pressure** (below 1.72 bars) due to leakage for example, **the electromagnetic coupling Q11 will not start the compressor,** as the minimum pressure switch **Q9** prevents its activation: above all check that the freon system is not empty (see "REPAIR MANUAL - BODY" - Group 80: Air conditioning")

	TEST PROCEDURE	RESULT	CORRECTIVE ACTION
A1	CHECK FUSE – Check for damage of wander fuse **Q43**	OK ➡ ~~OK~~ ➡	Carry out **step A2** Substitute fuse (50A)
A2	CHECK FUSE – Check for damage of fuse **Q40,** located in group **Q41**	OK ➡ ~~OK~~ ➡	Carry out **step A3** Substitute fuse (15A)
A3	CHECK FUSE – Check for damage of fuse **F15** in fusebox **G1**	OK ➡ ~~OK~~ ➡	Carry out **step A4** Substitute fuse (10A)
A4	CHECK RELAYS – Check functioning of relays **Q22** and **Q32**, located in group **Q41**	OK ➡ ~~OK~~ ➡	Carry out **step A5** Substitute faulty relays

(continues)

AIR CONDITIONING COMPRESSOR DOES NOT CUT IN	TEST A

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
A5 CHECK GROUND SIGNAL – Operating the compressor (e.g. requesting a very cold temperature - **N.B. the "ECON" button should not be pressed**) check for an ground signal (0V) at pin 85 of relay **Q32**, located in group **Q41**	OK ➡ ~~OK~~ ➡	Carry out **step A6** Restore wiring between pin C2 of **Q21a** and pin 85 of **Q32**, across pin A2 of connector **G313** (BLK-PPL)
A6 CHECK VOLTAGE – Operating the compressor (e.g. requesting a very cold temperature) verify 12 V at pin 87 of relay **Q22**	OK ➡ ~~OK~~ ➡	Carry out **step A7** Carry out **step A8**
A7 CHECK VOLTAGE – Operating the compressor (e.g. requesting a very cold temperature) verify 12 V at electromagnetic coupling **Q11**	OK ➡ ~~OK~~ ➡	Check for correct functioning of compressor engagement coupling **Q11** (refer also to following **test B**) Restore wiring between pin 87 of **Q22** and **Q11** (BRN)

(continues)

AIR CONDITIONING COMPRESSOR DOES NOT CUT IN	TEST A

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
A8 CHECK VOLTAGE – With ignition key engaged, verify 12 V at pin 86 of relay **Q32**	OK ➡ ~~OK~~ ➡	Carry out **step A9** Restore wiring between pin 86 of **Q32** and ignition switch **B1** , across pin A1 of connector **G313**, pin B2 of connector **G38** and the solder (ORN, LTB-RED and LTB)
A9 CHECK VOLTAGE – Verify 12 V at pin 30 of relay **Q32**	OK ➡ ~~OK~~ ➡	Carry out **step A10** Restore wiring between pin 30 of **Q32** and terminal board **G56**, across fuses **Q39** and **Q40**, located in **Q41**, and wander fuse **Q43** (YEL-RED and RED)
A10 CHECK VOLTAGE – Operating the compressor (e.g. requesting a very cold temperature) verify 12 V at pin 86 of Motronic control unit **S11**	OK ➡ ~~OK~~ ➡	Carry out **step A11** Restore wiring between pin 87 of **Q32** and pin 86 of **S11**, across pin B of connector **G133b** (GRN-WHT)

(continues)

AIR CONDITIONING COMPRESSOR DOES NOT CUT IN	TEST A

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
A11 CHECK VOLTAGE – Operating the compressor (e.g. requesting a very cold temperature) verify 12 V at pin 85 of Motronic control unit **S11** **N.B.:** ensure that the operating pressure of the freon circuit is between 1.72 and 25 bars: if not check the circuit (see "REPAIR MANUAL-BODY" - Group 80 - Air conditioning)	OK ➔ OK ➔	Carry out **step A16** Carry out **step A12**
A12 CHECK VOLTAGE – Operating the compressor (e.g. requesting a very cold temperature) verify 12 V at pin with GRY wire of pressure switch **Q9**	OK ➔ OK ➔	Carry out **step A13** Restore wiring between pin 87 of **Q32** and **Q9** (GRY)
A13 VERIFICA PRESSOSTATO – Check that the minimum pressure switch **Q9** is set correctly: when the pressure exceeds 1.72 bars the circuit between the two terminals closes; at low pressures the circuit opens	OK ➔ OK ➔	Carry out **step A14** Substitute pressure switch **Q9**
A14 CHECK VOLTAGE – Operating the compressor (e.g. requesting a very cold temperature) verify 12 V at pin 4 of pressure switch **Q20**	OK ➔ OK ➔	Carry out **step A15** Restore wiring between pin 4 of **Q20** and **Q9** (BLU)

(continues)

AIR CONDITIONING COMPRESSOR DOES NOT CUT IN	TEST A

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
A15 CHECK TRINARY PRESSURE SWITCH – Check for correct setting of minimum and maximum pressure switch (Trinary) **Q20**: when the pressure is between 2.5 and 25 bars the circuit between pins 3 and 4 is closed; the circuit opens at pressures below 2.5 bars or above 25 bars	OK ➡ ~~OK~~ ➡	Restore wiring between pin 3 of **Q20** and pin 85 of **S11**, across pin C of connector **G133b** (GRY-YEL) Substitute trinary pressure switch **Q20**
A16 CHECK VOLTAGE – With ignition key engaged, verify 12 V at pin 85 of relay **Q22**	OK ➡ ~~OK~~ ➡	Carry out **step A17** Restore wiring between pin 85 of **Q22** and pin B8 of **G1**, across connector **G314b** (TS: pin B), pin B1 of connector **G99** and the solder (LTB-RED)
A17 CHECK VOLTAGE – Verify 12 V at pin 30 of relay **Q22**	OK ➡ ~~OK~~ ➡	Carry out **step A18** Restore wiring between pin 30 of **Q22** and pin 30 of **Q32** (YEL- RED)

(continues)

AIR CONDITIONING COMPRESSOR DOES NOT CUT IN	TEST A

TEST PROCEDURE		RESULT	CORRECTIVE ACTION
A18	CHECK GROUND SIGNAL		
– Operating the compressor (e.g. requesting a very cold temperature) verify 0 V at pin 48 of Motronic control unit **S11**. **N.B.:** check that the pressure is correct (see previous **step A11**)		OK ➡	Restore wiring between pin 48 of **S11** and pin 86 of relay **Q22**, across pin A of connector **G133b** (TS: GRY and GRY-BLU; 6V: HZL and GRY-BLU)
		OK ➡	Check and if necessary replace control unit **S11**

AIR CONDITIONING COMPRESSOR PULLEY SLIPS	TEST B

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
B1 CHECK VOLTAGE – Operating the compressor (e.g. requesting a very cold temperature) verify 12 V at electromagnetic coupling **Q11**	OK ➡	Carry out **step B2**
	OK ➡	Check power line of electromagnetic coupling (see also previous **test A**)
B2 CHECK POWER SUPPLY – Operate the compressor (e.g. requesting a very cold temperature): attaching a snap-on ammeter on the power line check for an absorption current of approximately 4A	OK ➡	Check the condition of the drive belt and of the compressor pulley (see "REPAIR MANUAL-BODY"-Group 80 - Air conditioning)
	OK ➡	Substitute electromagnetic coupling **Q11**, if the coil is interrupted (reading of 0A) or if the coils are short circuiting (in excess of 4A)

ELECTRIC COOLING FAN DOES NOT CUT IN (T.SPARK)	TEST C

N.B.: it does not cut in under any circumstances

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
C1 CHECK FUSE – Check for damage of wander fuse **G254**	OK ➡	Carry out **step C2**
	OK ➡	Substitute fuse (40A)
C2 CHECK RELAY – Check functioning of relay **I1**	OK ➡	Carry out **step C3**
	OK ➡	Substitute relay **I1**
C3 CHECK DELAY DEVICE – Check for correct functioning of delay device **Q42**, located in **Q41**: supplying pin 85 with 12 V and grounding pin P, the circuit between pins 30 and 87 closes; there will be a ground signal at pin 86, delayed by 8-12 sec. in relation to the activation of the coil	OK ➡	Carry out **step C4**
	OK ➡	Substitute delay device **Q42**
C4 CHECK ELECTRIC FAN – Paying particular attention, ground pin B of electric fan **P2**, and check that the fan starts	OK ➡	Carry out **step C6**
	OK ➡	Carry out **step C5**

(continues)

ELECTRIC COOLING FAN DOES NOT CUT IN (T.SPARK)	TEST C

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
C5 CHECK VOLTAGE – Verify 12 V at pin A of electric fan **P2**	OK ➡ ~~OK~~ ➡	Substitute fan motor **P2** Restore wiring between pin A of **P2** and terminal board **G56**, across fuse **G254** (LTB-WHT and RED)
C6 CHECK CONTINUITY – Check continuity between pin B of **P2** and pin 30 of **I1**	OK ➡ ~~OK~~ ➡	Carry out **step C7** Restore wiring between pin B of **P2** and pin 30 of **I1** (WHT)
C7 CHECK GROUND – Check that pin 87 of **I1** is grounded (0V)	OK ➡ ~~OK~~ ➡	Carry out **step C8** Restore wiring between pin 87 of **I1** and ground **G53b** (BLK)
C8 CHECK VOLTAGE – With ignition key engaged, verify 12 V at pin 86 of relay **I1**	OK ➡ ~~OK~~ ➡	Carry out **step C9** Restore wiring between pin 86 of **I1** and ignition switch **B1**, across pin A5 of connector **G99** and the solder (LTB-RED and LTB)

(continues)

ELECTRIC COOLING FAN DOES NOT CUT IN (T.SPARK)	TEST C

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
C9 CHECK VOLTAGE – With ignition key engaged, verify 12 V at pin 85 of delay device **Q42**	OK ➡	Carry out **step C10**
	~~OK~~ ➡	Restore wiring between pin 85 of **Q42** and ignition switch **B1**, across pin 86 of relay **Q32**, pin A1 of connector **G313**, pin B2 of connector **G38** and the solder (ORN, LTB-RED and LTB)
C10 CHECK GROUND – Check that pin 87 of **Q42** is grounded (0V)	OK ➡	Carry out **step C11**
	~~OK~~ ➡	Restore wiring between pin 87 of **Q42** and ground **G53a** (BLK)
C11 CHECK CONTINUITY – Check continuity between: • pin 30 of **Q42** and pin 1 of resistance **O22** • pin 2 of **O22** and pin 30 of **I1**	OK ➡	Carry out **step C12**
	~~OK~~ ➡	Restore wiring between : • pin 30 of **Q42** and pin 1 of resistance **O22** (BLK) • pin 2 of **O22** and pin 30 of **I1**, across pin A of connector **G314b** (BLK)

(continues)

ELECTRIC COOLING FAN DOES NOT CUT IN (T.SPARK)	TEST C

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
C12 CHECK RESISTANCE – Check for a resistance of 0.23 Ω between pins 1 and 2 of supplementary resistance **O22**	OK ➡	Restore wiring between pin 86 of **Q42** and pin 85 of **I1**, across pin B of connector **G314a** (PPL-BLK)
	OK ➡	Substitute resistance **O22**

ELECTRIC COOLING FAN DOES NOT CUT IN (6V)	TEST D

N.B.: it does not cut in under any circumstances

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
D1 CHECK FUSE – Check for damage of wander fuse **Q43**	OK ➡	Carry out **step D2**
	~~OK~~ ➡	Substitute fuse (50A)
D2 CHECK FUSE – Check for damage of fuse **Q35**, located in group **Q41**	OK ➡	Carry out **step D3**
	~~OK~~ ➡	Substitute fuse (40A)
D3 CHECK RELAY – Check functioning of relay **Q14,** located in group **Q41**	OK ➡	Carry out **step D4**
	~~OK~~ ➡	Substitute relay **Q14**
D4 CHECK DELAY DEVICE – Check for correct functioning of delay device **Q42**, located in **Q41**: supplying pin 85 with 12 V and grounding pin P, the circuit between pins 30 and 87 closes; there will be a ground signal at pin 86, delayed by 8-12 sec. in relation to the activation of the coil	OK ➡	Carry out **step D5**
	~~OK~~ ➡	Substitute delay device **Q42**

(continues)

ELECTRIC COOLING FAN DOES NOT CUT IN (6V)	TEST D

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
D5 CHECK ELECTRIC FAN – Paying particular attention, ground pin B of electric fan **P2**, and check that the fan starts	OK ➡	Carry out **step D7**
	OK ➡	Carry out **step D6**
D6 CHECK VOLTAGE – Verify 12 V at pin A of electric fan **P2**	OK ➡	Substitute the fan motor **P2**
	OK ➡	Restore wiring between pin A of **P2** and terminal board **G56**, across fuses **Q35** and **Q43** (RED)
D7 CHECK CONTINUITY – Check continuity between pin B of **P2** and pin 30 of **Q14**	OK ➡	Carry out **step D8**
	OK ➡	Restore wiring between pin B of **P2** and pin 30 of **Q14** (LTB)
D8 CHECK GROUND – Check that pin 87 of **Q14** is grounded (0V)	OK ➡	Carry out **step D9**
	OK ➡	Restore wiring between pin 87 of **Q14** and ground **G53a** (BLK)

(continues)

ELECTRIC COOLING FAN DOES NOT CUT IN (6V)	TEST D

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
D9 CHECK VOLTAGE – With ignition key engaged, verify 12 V at pin 85 of relay **Q14**	OK ➡ ~~OK~~ ➡	Carry out **step D10** Restore wiring between pin 85 of **Q14** and ignition switch **B1**, across pin 86 of **Q32**, pin A1 of connector **G313**, pin B2 of connector **G38** and the solder (ORN, LTB-RED and LTB)
D10 CHECK VOLTAGE – With ignition key engaged, verify 12 V at pin 85 of delay device **Q42**	OK ➡ ~~OK~~ ➡	Carry out **step D11** Restore wiring between pin 85 of **Q42** and pin 85 of **Q14** (ORN)
D11 CHECK GROUND – Check that pin 87 of **Q42** is grounded (0V)	OK ➡ ~~OK~~ ➡	Carry out **step D12** Restore wiring between pin 87 of **Q42** and ground **G53a**, across pin 87 of **Q14** (BLK)

(continues)

ELECTRIC COOLING FAN DOES NOT CUT IN (6V)	TEST D

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
D12 CHECK CONTINUITY – Check continuity between: • pin 30 of **Q42** and pin 1 of resistance **O22** • pin 2 of **O22** and pin 30 of **Q14**	OK ➡ ~~OK~~ ➡	Carry out **step D13** Restore wiring between : • pin 30 of **Q42** and pin 1 of resistance **O22** (BLK) • pin 2 of **O22** and pin 30 of **Q14** (LTB)
D13 CHECK RESISTANCE – Check for a resistance of 0.23 Ω between pins 1 and 2 of supplementary resistance **O22**	OK ➡ ~~OK~~ ➡	Restore wiring between pin 86 of **Q42** and pin 86 of **Q14** (BLK) Replace resistance **O22**

THE ELECTRIC FAN DOES NOT CUT-IN AT HIGH ENGINE COOLANT TEMPERATURES (T.SPARK)	TEST E

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
E1 CHECK THERMOCONTACT – Check for correct setting of thermocontact **L33**: • when the bulb reaches 87°C the contact between pins A and B of connector A closes • when it reaches 92°C the contact between pin A of connector A and connector B closes	OK ➔ ~~OK~~ ➔	Carry out **step E2** Substitute thermocontact **L33**
E2 CHECK GROUND – Check that pin AA of **L33** is grounded (0V)	OK ➔ ~~OK~~ ➔	Carry out **step E3** Restore wiring between pin AA of **L33** and ground **G53a**, across pin 2 of **Q20** and pin 87 of **Q42** (BLK)
E3 CHECK CONTINUITY – Check continuity between: • pin AB of **L33** and pin P of delay device **Q42** • pin B of **L33** and pin 86 of delay device **Q42**	OK ➔ ~~OK~~ ➔	Check for correct functioning of delay device **Q42** and of relay **I1** (see previous **test C**) Restore wiring between : • pin AB of **L33** and pin P of delay device **Q42**, across pin 1 of **Q20** (WHT) • pin B of **L33** and pin 86 of delay device **Q42** (RED)

THE ELECTRIC FAN DOES NOT CUT-IN AT HIGH ENGINE COOLANT TEMPERATURES (6V)	TEST F

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
F1 CHECK THERMOCONTACT – Check for correct setting of thermocontact **L33**: • when the bulb reaches 87°C the contact between pins A and B of connector A closes • when it reaches 92°C the contact between pin A of connector A and connector B closes	OK ➡ OK ➡	Carry out **step F2** Substitute thermocontact **L33**
F2 CHECK RELAY – Check functioning of relay **I1**	OK ➡ OK ➡	Carry out **step F3** Substitute relay **I1**
F3 CHECK GROUND – Check that pin AA of **L33** is grounded (0V)	OK ➡ OK ➡	Carry out **step F4** Restore wiring between pin AA of **L33** and ground **G53b** (BLK)
F4 CHECK CONTINUITY – Check continuity between: • pin AB of **L33** and pin 86 of relay **I1** • pin B of **L33** and pin 86 of relay **Q14**	OK ➡ OK ➡	Carry out **step F5** Restore wiring between : • pin AB of **L33** and pin 86 of relay **I1** (PPL-BLK) • pin B of **L33** and pin 86 of relay **Q14** (RED)

(continues)

THE ELECTRIC FAN DOES NOT CUT-IN AT HIGH ENGINE COOLANT TEMPERATURES (6V)	TEST F

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
F5 CHECK GROUND – Check that pin 30 of **I1** is grounded (0V)	OK ➡	Carry out **step F6**
	~~OK~~ ➡	Restore wiring between pin 30 of **I1** and ground **G53b** (BLK)
F6 CHECK VOLTAGE – With ignition key engaged, verify 12 V at pin 85 of relay **I1**	OK ➡	Carry out **step F7**
	~~OK~~ ➡	Restore wiring between pin 85 of **I1** and ignition switch **B1**, across pin A5 of connector **G99** and the solder (LTB-RED and LTB)
F7 CHECK CONTINUITY – Check continuity between pin 87 of **I1** and pin 30 of delay device **Q42**	OK ➡	Check for correct functioning of delay device **Q42** and of relay **Q14** (see previous **test D**)
	~~OK~~ ➡	Restore wiring between pin 87 of **I1** and pin 30 of delay device **Q42**, across pin A of connector **G314a** (LTB and BLK)

THE ELECTRIC FAN DOES NOT CUT-IN WHEN THE VEHICLE IS STATIONARY WITH THE COMPRESSOR IS ENGAGED (i.e. WHEN CONDITIONER FLUID PRESSURE IS HIGH) (T.SPARK)	TEST G

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
G1 CHECK TRINARY PRESSURE SWITCH – Check for correct setting of minimum and maximum pressure switch (Trinary) **Q20**: when the pressure exceeds 15.5 bars the circuit between pins 1 and 2 closes	OK ➡ ~~OK~~ ➡	Carry out **step G2** Substitute Trinary pressure switch **Q20**
G2 CHECK GROUND – Check that pin 2 of **Q20** is grounded (0V)	OK ➡ ~~OK~~ ➡	Carry out **step G3** Restore wiring between pin 2 of **Q20** and ground **G53a**, across pin 87 of **Q42** (BLK)
G3 CHECK CONTINUITY – Check continuity between pin 1 of **Q20** and pin P of delay device **Q42**	OK ➡ ~~OK~~ ➡	Check for correct functioning of delay device **Q42** and of relay **I1** (see previous **test C**) Restore wiring between pin 1 of **Q20** and pin P of delay device **Q42** (WHT)

THE ELECTRIC FAN DOES NOT CUT-IN WHEN THE VEHICLE IS STATIONARY WITH THE COMPRESSOR IS ENGAGED (i.e. WHEN CONDITIONER FLUID PRESSURE IS HIGH) (6V)	TEST H

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
H1 CHECK TRINARY PRESSURE SWITCH – Check for correct setting of minimum and maximum pressure switch (Trinary) **Q20**: when the pressure exceeds 15.5 bars the circuit between pins 1 and 2 closes	OK ➡ ~~OK~~ ➡	Carry out **step H2** Substitute Trinary pressure switch **Q20**
H2 CHECK GROUND – Check that pin 2 of **Q20** is grounded (0V)	OK ➡ ~~OK~~ ➡	Carry out **step H3** Restore wiring between pin 2 of **Q20** and ground **G53a**, across pin 87 of **Q42** and pin 87 of **Q14** (BLK)
H3 CHECK CONTINUITY – Check continuity between pin 1 of **Q20** and pin P of delay device **Q42**	OK ➡ ~~OK~~ ➡	Check for correct functioning of delay device **Q42** and of relay **Q14** (see previous **test D**) Restore wiring between pin 1 of **Q20** and pin P of delay device **Q42** (WHT)