

# CLIMATE CONTROL: MANUAL AIR CONDITIONER - Model Year '97

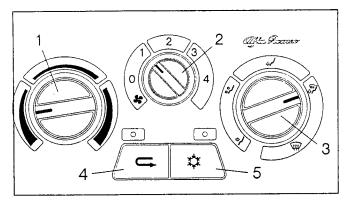
#### **INDEX**

GENERAL DESCRIPTION
FAN AND RECIRCULATION CONTROL
Wiring Diagram
Functional Description
Components and Connectors
COMPRESSOR ENGAGEMENT (Petrol Version)
Wiring Diagram
Functional Description
Components and Connectors
COMPRESSOR ENGAGEMENT (TD Version)
Wiring Diagram
Functional Description
Components and Connectors
COMPRESSOR ENGAGEMENT (JTD Version)
Wiring Diagram
Functional Description
Components and Connectors
ENGINE FAN CONTROL (Petrol version)
Wiring Diagram
Functional Description
Components and Connectors
ENGINE FAN CONTROL (TD version)
Wiring Diagram
Functional Description
Components and Connectors
ENGINE FAN CONTROL (JTD version)
Wiring Diagram
Functional Description
Components and Connectors
LOCATION OF COMPONENTS (petrol versions)
LOCATION OF COMPONENTS (TD versions)
LOCATION OF COMPONENTS (JTD versions)
FAULT-FINDING TABLE
CHECKING COMPONENTS
•



#### **GENERAL DESCRIPTION**

The system with manually operated air conditioner integrates the simple but functional heater with the function of producing cold, dehumidified air obtained by engaging the compressor and the cooling system.



#### Controls

The control unit on the dashboard comprises three knobs and two push-buttons:

 the left hand knob (1) mechanically operates the mixing port between warm air (red) and cold (blue); when turned completely counter-clockwise, it cuts off the radiator closing a special tap.

**NOTE:** the heater comprises a heat exchanger which exploits the engine coolant fluid to release heat to the air that is sent to the passenger compartment: in fact it is supplied by a special pipe of the engine cooling circuit.

- the centre knob (2) mechanically controls the opening of the ports that adjust the flow of air:
  - 0: inlet of outside air without fan (dynamic air)
  - from 1 to 4: a switch is controlled which turns on the fan through a regulator with four speeds. The regulator and its resistor are fitted on the duct near the fan.

**NOTE:** the fan can only be turned on with the ignition key turned.

- the right knob (3), acting on the distribution ports, still by mechanical transmission, sending the air into the passenger compartment in the directions shown on the pictograms.
- the button (4) controls the engagement of the "recirculation" function, by operating a motor which closes the outside air duct port and at the same time opens the air duct for recirculation from inside the passenger compartment. The driver is alerted that the recirculation function is operating by the lighting up of a special led.

(The recirculation function makes it possible to withdraw the air to be treated from inside the passenger compartment, shutting off the flow of air from outside which in certain instances may be undesirable: bad smells, smoke, unventilated tunnels, etc...)

button (5) controls engagement of the cooling system which produces cold, dehumidified air. A special led lights up to warn that it is operating.

#### Air cooling system:

This is a closed loop system in which a fluid condenses and evaporates withdrawing heat from the air in the evaporator.

It mainly comprises the following:

**compressor**, operated by the crankshaft through a belt: it is turned on and off through an electromagneic joint operated by the air conditioning system.

- Petrol version: the compressor is controlled by the engine electronic management system which adapts idle speed when the compressor is engaged, or prevents it from engaging under power absorption conditions that would adversely affect vehicle performance levels.
- TD version: engagement of the compressor is controlled by a special control unit which takes account of a series of operating conditions of the system itself and of the engine which are described below.

#### NOTE

In both cases a variable displacement compressor is used: this configuration is made through a suitable adjustment valve and a sloping plate. This makes it possible to meet the different requirements of cold air without the electromagnetic joint being energised and de-energised continuously: when the requirement is high, the compressor moves to the maximum load configuration and vice versa for low requirements.

condenser, fitted in front of the engine coolant radiator: if the car is stationary, the air needed for thermal exchange is supplied operating the engine radiator fan:

evaporator, exchanger which cools the air, located in the duct-distributor;

accumulator/drier, which separates the fluid in liquid state from gas and also acts as accumulator and filter for any foreign matter

minimum thermostat (antifrost): - this disconnects the compressor when the temperature is too low as it would risk "freezing" the evaporator.

four-level pressure switch (trinary): this controls the safety and correct operation of the fluid circuit.

The 4 levels cut in as follows:

- 1. level = minimum pressure for engaging the compressor.
- 2. level = pressure requiring engagement of the of first speed of the fan.
- 3. level = pressure requiring engagement of the second speed of the fan.



# CLIMATE CONTROL: MANUAL AIR CONDITIONER - Model Year '97

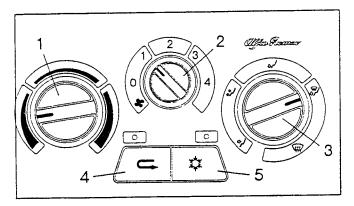
#### **INDEX**

GENERAL DESCRIPTION
FAN AND RECIRCULATION CONTROL
Wiring Diagram
Functional Description
Components and Connectors
COMPRESSOR ENGAGEMENT (Petrol Version)
Wiring Diagram
Functional Description
Components and Connectors
COMPRESSOR ENGAGEMENT (TD Version)
Wiring Diagram
Functional Description
Components and Connectors
ENGINE FAN CONTROL (Petrol version)
Wiring Diagram
Functional Description
Components and Connectors
ENGINE FAN CONTROL (TD version)
Wiring Diagram
Functional Description
Components and Connectors
LOCATION OF COMPONENTS (petrol versions)
LOCATION OF COMPONENTS (TD versions)
FAULT-FINDING TABLE
CHECKING COMPONENTS



#### GENERAL DESCRIPTION

The system with manually operated air conditioner integrates the simple but functional heater with the function of producing cold, dehumidified air obtained by engaging the compressor and the cooling system.



#### Controls

The control unit on the dashboard comprises three knobs and two push-buttons:

- the left hand knob (1) mechanically operates the mixing port between warm air (red) and cold (blue); when turned completely counter-clockwise, it cuts off the radiator closing a special tap.

NOTE: the heater comprises a heat exchanger which exploits the engine coolant fluid to release heat to the air that is sent to the passenger compartment: in fact it is supplied by a special pipe of the engine cooling circuit.

- the centre knob (2) mechanically controls the opening of the ports that adjust the flow of air:
  - 0: inlet of outside air without fan (dynamic air)
  - from 1 to 4: a switch is controlled which turns on the fan through a regulator with four speeds. The regulator and its resistor are fitted on the duct near the fan.

NOTE: the fan can only be turned on with the ignition key turned.

- the right knob (3), acting on the distribution ports, still by mechanical transmission, sending the air into the passenger compartment in the directions shown on the pictograms.
- the button (4) controls the engagement of the "recirculation" function, by operating a motor which closes the outside air duct port and at the same time opens the air duct for recirculation from inside the passenger compartment. The driver is alerted that the recirculation function is operating by the lighting up of a special led.

(The recirculation function makes it possible to withdraw the air to be treated from inside the passenger compartment, shutting off the flow of air from outside which in certain instances may be undesirable: bad smells, smoke, unventilated tunnels, etc...)

- button (5) controls engagement of the cooling system which produces cold, dehumidified air. A special led lights up to warn that it is operating.

#### Air cooling system:

This is a closed loop system in which a fluid condenses and evaporates withdrawing heat from the air in the evaporator.

It mainly comprises the following:

compressor, operated by the crankshaft through a belt: it is turned on and off through an electromagneic joint operated by the air conditioning system.

- Petrol version: the compressor is controlled by the engine electronic management system which adapts idle speed when the compressor is engaged, or prevents it from engaging under power absorption conditions that would adversely affect vehicle performance levels.
- TD version: engagement of the compressor is controlled by a special control unit which takes account of a series of operating conditions of the system itself and of the engine which are described below.

In both cases a variable displacement compressor is used: this configuration is made through a suitable adjustment valve and a sloping plate. This makes it possible to meet the different requirements of cold air without the electromagnetic joint being energised and de-energised continuously: when the requirement is high, the compressor moves to the maximum load configuration and vice versa for low requirements.

condenser, fitted in front of the engine coolant radiator: if the car is stationary, the air needed for thermal exchange is supplied operating the engine radiator

evaporator, exchanger which cools the air, located in the duct-distributor;

accumulator/drier, which separates the fluid in liquid state from gas and also acts as accumulator and filter for any foreign matter

minimum thermostat (antifrost): - this disconnects the compressor when the temperature is too low as it would risk "freezing" the evaporator.

four-level pressure switch (trinary): this controls the safety and correct operation of the fluid circuit.

The 4 levels cut in as follows:

- 1. level = minimum pressure for engaging the compressor.
- 2. level = pressure requiring engagement of the of first speed of the fan.
- -3. level = pressure requiring engagement of the second speed of the fan.

4. level = maximum pressure for engaging the compressor.

compressor cut out thermal contact: - <u>TD version</u> only - : this cuts off the compressor if the engine temperature reaches dangerously high levels (it is a contact on the thermostatic cup, which operates opening the circuit over 111°C.

full load switch - TD version only -: this is a mechanical microswitch on the injection pump, which, through the special compressor cut out control unit, cuts off, even if only temporarily, the compressor when the accelerator pedal is depressed completely (full load).

compressor cut out control unit - TD version only: this momentaneously turns off the cooling system under certain particular conditions in which the engine needs to deliver the maximum power to the wheels, eliminating the absorption of power by the compressor (e.g. when overtaking, fast acceleration, up hills etc.). The control unit carries out the following operating logic, or rather two different operating logics at low and high speeds: below 2000 rpm as soon as the full load switch closes, the compressor electromagnetic joint is de-energised, and energised as soon as the switch opens again; over 2000 rpm the compressor supply cut off lasts only 8 seconds and then it is restored.

#### Engine fan control:

At low car speed the cooling by dynamic air on the condenser lowers and it is necessary to engage the fan that cools the engine radiator and the condenser itself. This takes place through the 4-level pressure switch which cuts in preventing an increase of the pressure at the condenser: engaging the engine fan takes place initially at first speed (level of appr. 15 bar) then, at second speed (level of appr. 20 bar).

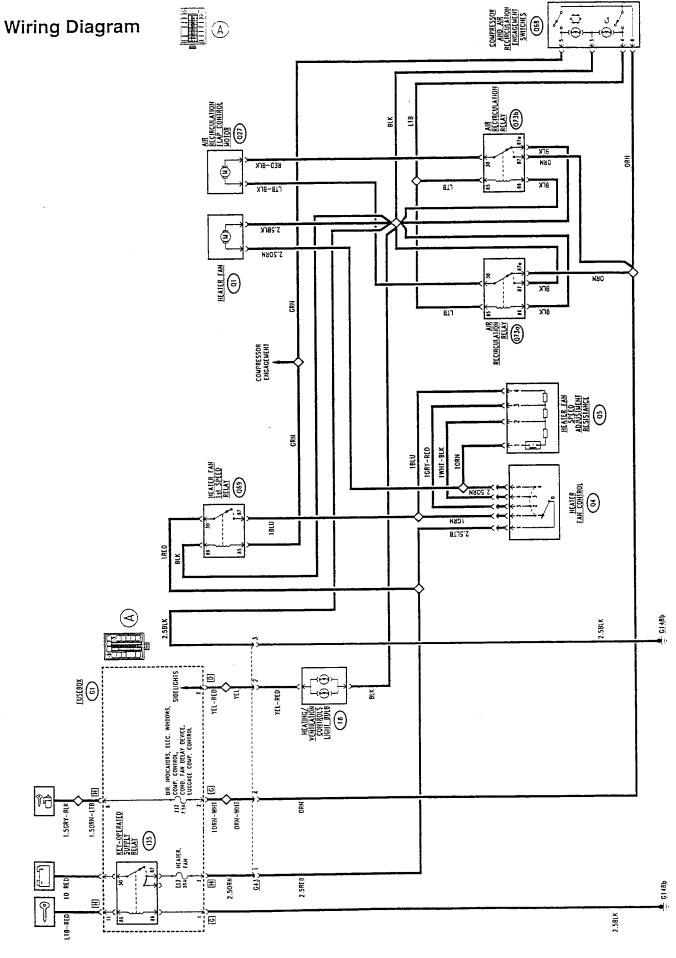
#### Fuses and relays:

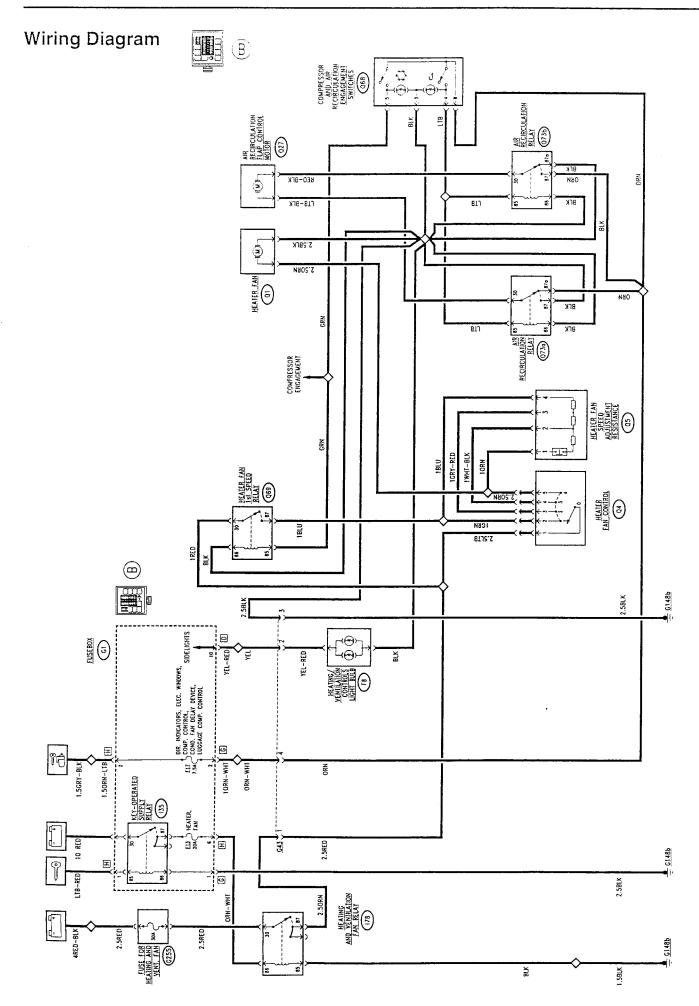
The system fuses and relays are grouped as follows:

- next to the fusebox G1: 30A fusebox G255 (only G1, B), 10A fuse Q65, relay I78 (only G1, B), relay I99 (only G1, B), relay Q22 (only TD);
- in the "maxi fuse" bos G56: 50A fuse G254;
- on the fan duct: relay I100 (only TD);
- next to the i.e. fuses and relays (only petrol version): relays Q22 and I100;
- on the duct/distributor unit: relays Q69, Q73a and Q73b.

For further details concerning this system, refer to Group 50 "CLIMATE CONTROL".

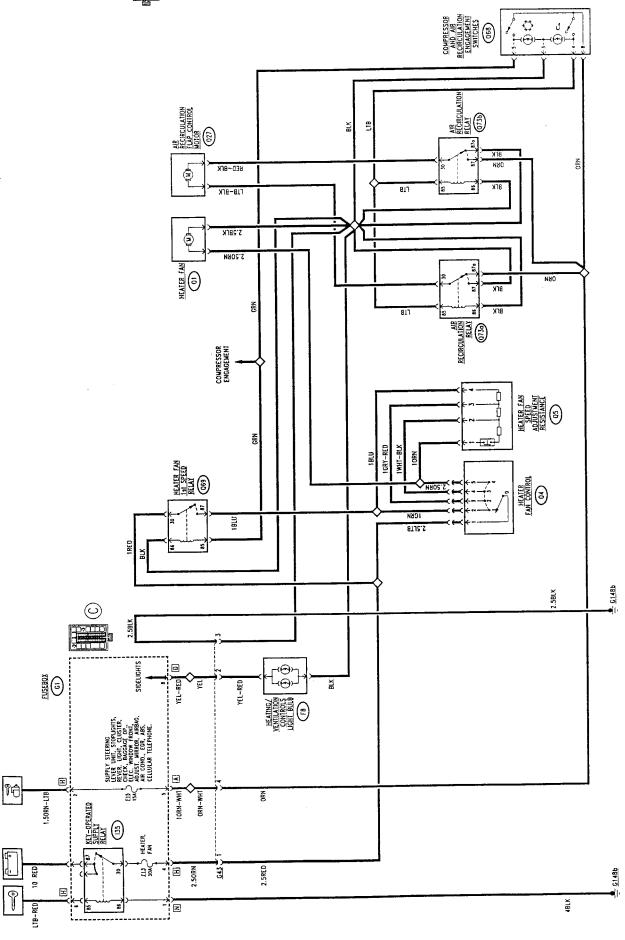
#### FAN AND RECIRCULATION CONTROL





Wiring Diagram







#### **Functional Description**

#### Fan:

The climate control fan Q1 is supplied with battery voltage through the key-operated services relay I35 - located in fusebox G1 -; in addition to the relay the supply line also crosses fuse F13 of fusebox G1.

In the versions with fusebox "B" downstream of fuse F13, there is also a special relay I78 which controls the fan Q1 with a supply protected by fuse G255 (30A).

The fan motor Q1 is operated with an earth signal leading from the control knob Q4. This signal crosses the speed regulator Q5, formed of three resistances in series and the crossing of them determines the four different speeds, depending on the signal leading from the knob Q4.

### First fan speed, with the compressor engaged:

With control Q4 in position "0" the fan Q1 is stationary but it is operated at first speed if the compressor is enagged: in this case a special relay Q69 controls the fan supply at first speed. In fact this relay receives the "key-operated" supply-via fuse F17 of G1 box "A" (F15 for box "C") is energised by the same earth signal that controls engagement of the compressor (switch Q68) and sends a signal to the regulator Q5 in correspondence of the 1st speed.

#### Recirculation

The recirculation function is made by operating the motor Q27, controlled by two switches Q73a and Q73b according to the following logic: through the switch on Q68 the two switches Q73a and Q73b are energised which switch respectivel positive and earth to the motor making it turn in one direction: if they are de-energised they switch the opposite positive and earth making the port turn in the opposite direction.

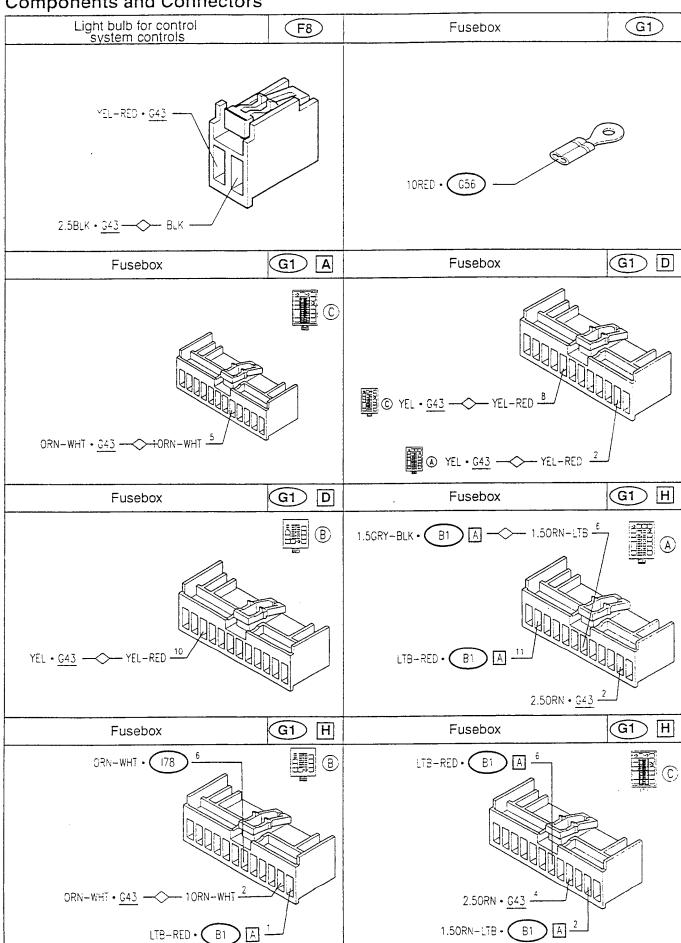
#### Lighting controls:

The lights F8, inside the control panel are supplied by the sidelights circuit - connector D of fusebox G1.



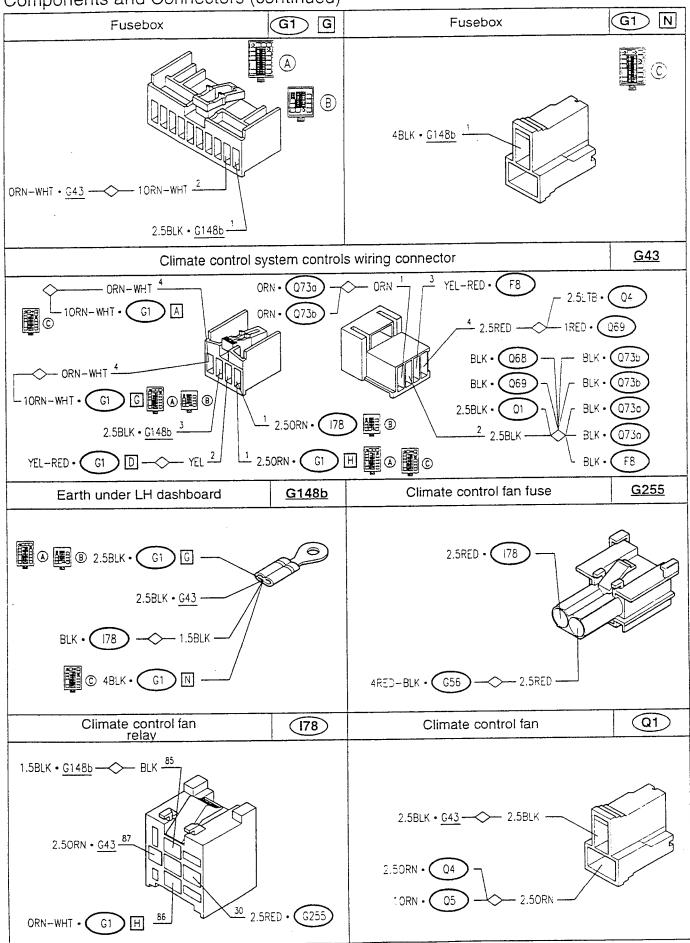


Components and Connectors



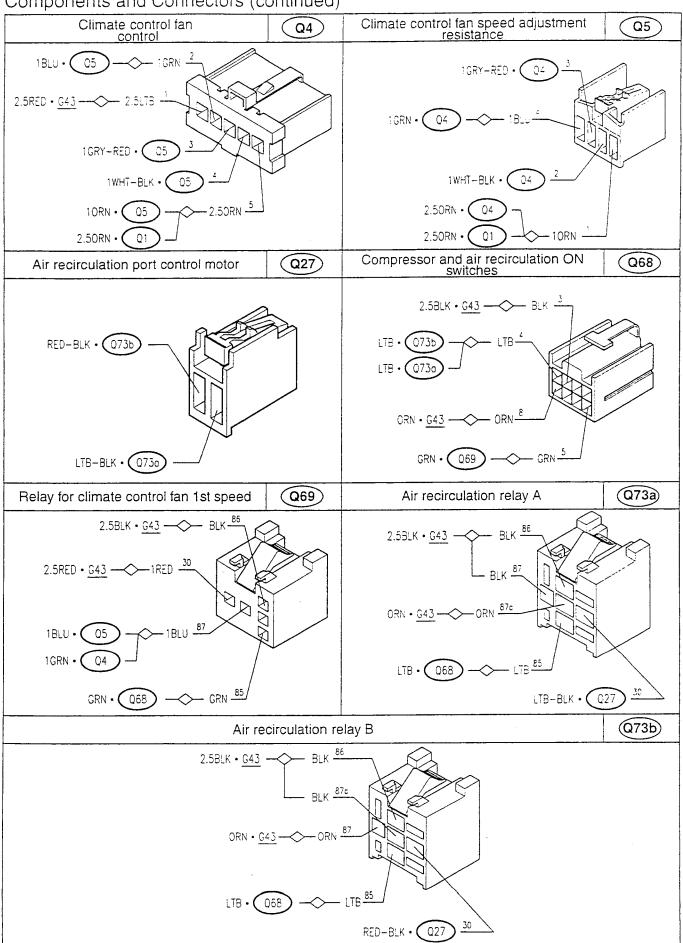


Components and Connectors (continued)



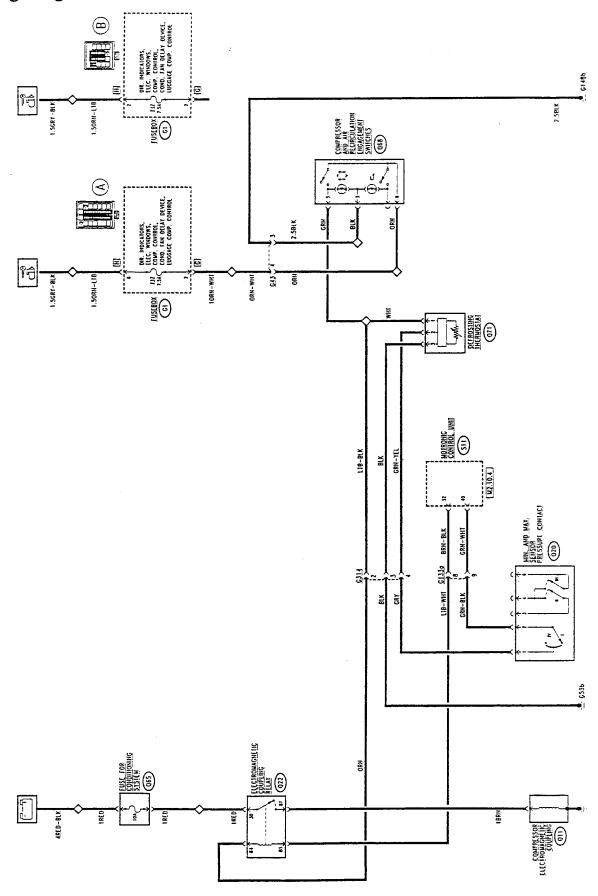


Components and Connectors (continued)



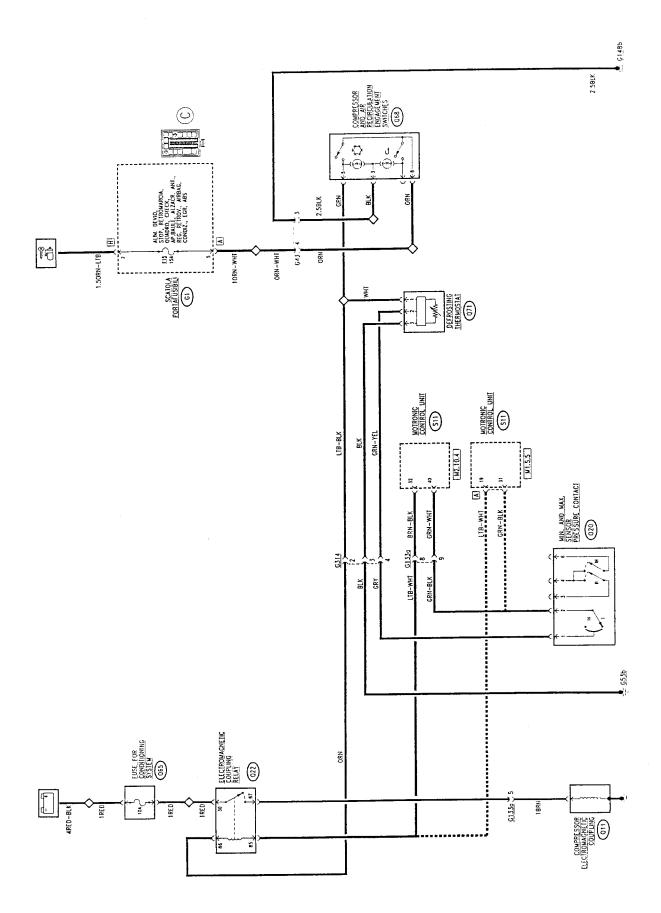
#### COMPRESSOR ENGAGEMENT (Petrol Version)

#### Wiring Diagram



Wiring Diagram





6-1997



#### **Functional Description**

The electromagnetic joint that operates the compressor Q11 is controlled by relay Q22 located next to the relays and fuses for injection/ignition.

The coil of relay Q22 receives the key-operated supply (line protected by fuse F17 of G1 (box "A" and "B") or by fuse F15 box "C"; conversely the power line is supplied by battery current through wander fuse Q65.

The relay **Q22** is energised, thus it supplies 12V current to the electromagnetic joint **Q11**, according to the following logic, managed by the injection - ignition control unit, which is connected with the air conditioning system through:

 pin 40 (M2.10.4) or pin A31 (M1.5.5) which receives the request signal for engaging the system from the air conditioning system circuit;  pin 32 (M2.10.4) or pin A19 (M1.5.5) from which a Elow<sup>a</sup> signal (earth) leads that controls relay Q22 for engaging the conditioner compressor Q11.

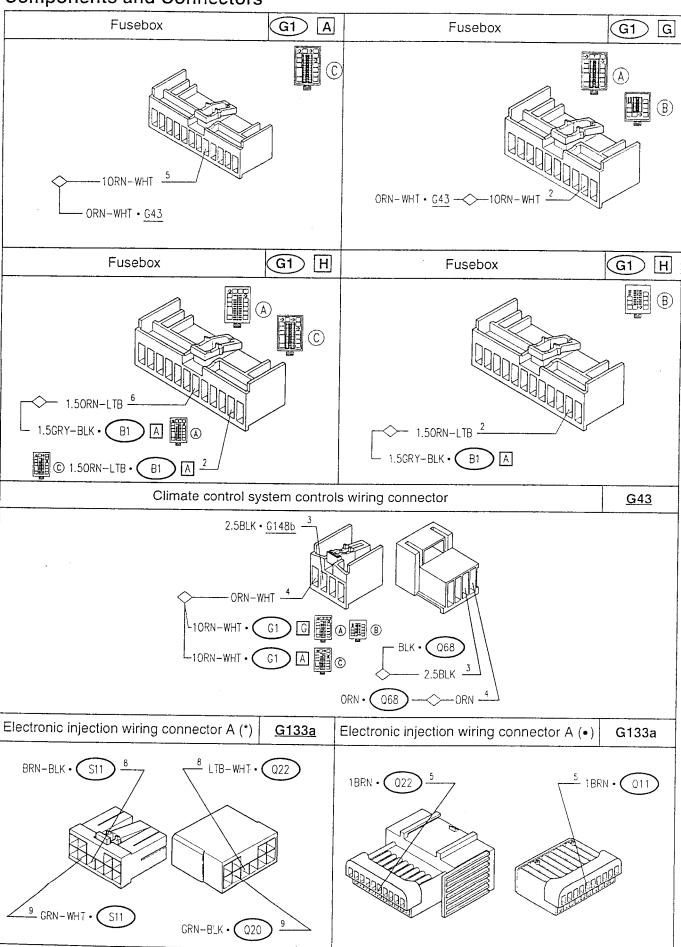
A special logic enables this engagement. In particular:

- it adapts idle speed to compensate the increased power absorption caused by engaging the compressor;
- if the engine needs power (high throttle opening speed), full load, or high engine temperature, it momentaneously stops engaging the compressor.

The positive signal leading from the compressor engagement switch Q68 crosses the antifrost thermostat Q71 which cuts in if the temperature is too low and the pressure switch Q20 which cuts in if the cooling system pressure is too high or too low: in this case the signal does not reach the control unit and it does not command engagement of the compressor.

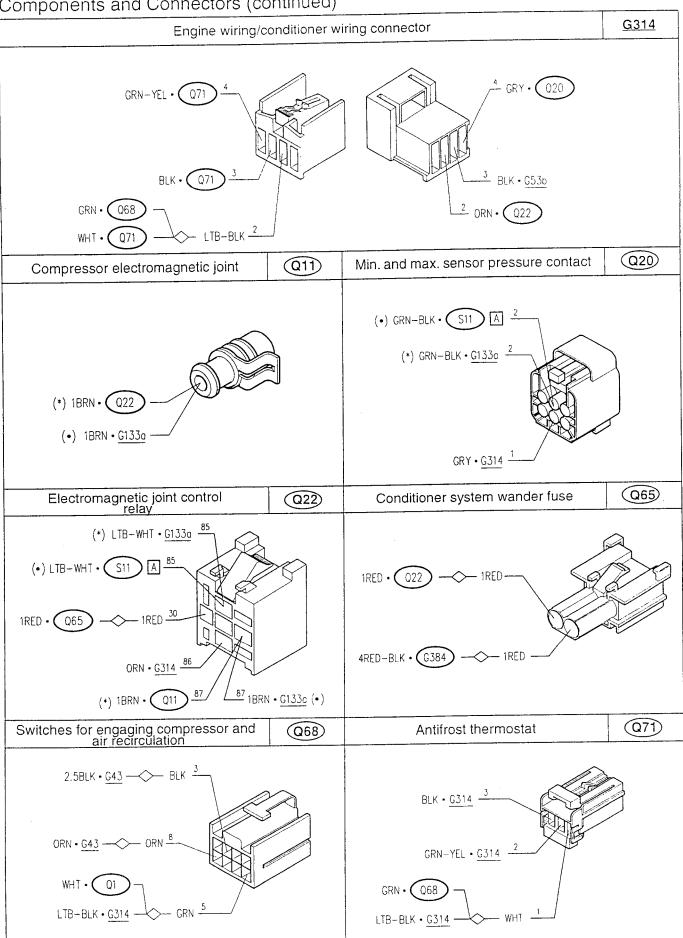


#### Components and Connectors



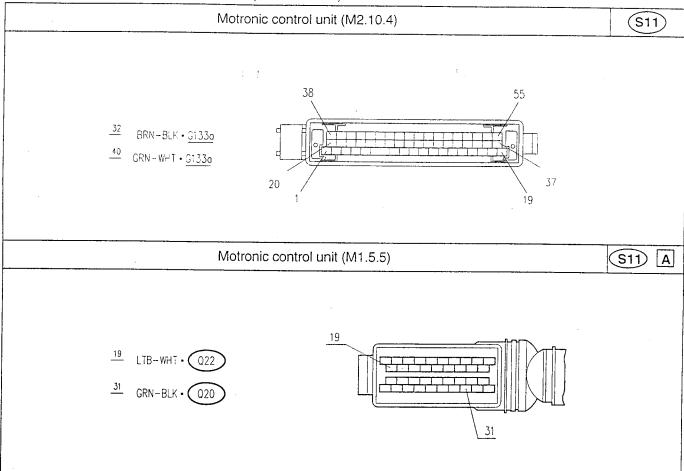


Components and Connectors (continued)



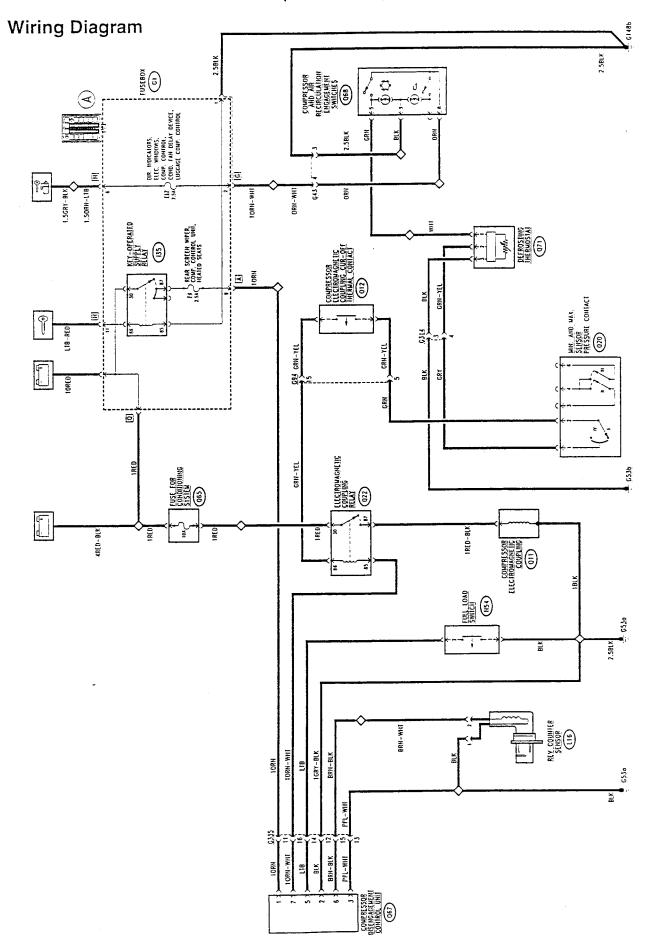


### Components and Connectors (continued)





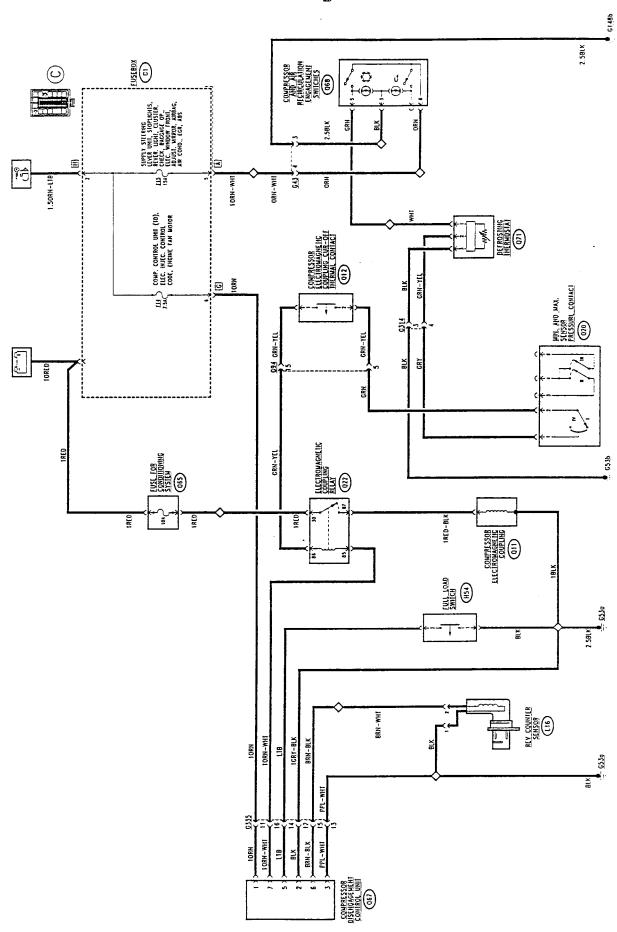
#### COMPRESSOR ENGAGEMENT (TD Version)



PA493000000008

Wiring Diagram (TD-CAT Version)





- 14/2 -



#### **Functional Description**

The electromagnetic joint which operates the compressor Q11 is operated by the corresponding relay Q22.

Relay Q22 is supplied directly by the battery, via fuse Q65.

The two energising signals (12 V and earth) reach relay Q22 from the compressor disengagement control unit Q67, and from the control switch Q68:

- the positive signal leading from the switch in Q68, before reaching relay Q22 crosses the compressor cut out thermal contact Q12 (which turns off the compressor if the engine is very hot), the pressure switch Q20 and the thermostat Q71 which cut off the signal respectively for high or low pressures and low temperatures;
- the signal leading from the control unit Q67 is either 12 V or 0 V (earth), according to the following logic, depending on engine rpm (information picked up directly by the rev counter sensor L16:

- up to 2000 rpm: when the full load switch H54 closes, an earth signal leaves the control unit -pin 7-, therefore the electromagnetic joint of the compressor is not energised; vice versa as soon as the switch opens again, the signal from pin 7 becomes 12 V, energising the joint;
- over 2000rpm: the earth signal is timed and lasts only 8 seconds, then it becomes 12 V, therefore the joint is energised, thereby engaging the compressor, if this is still requested through the special button Q68.

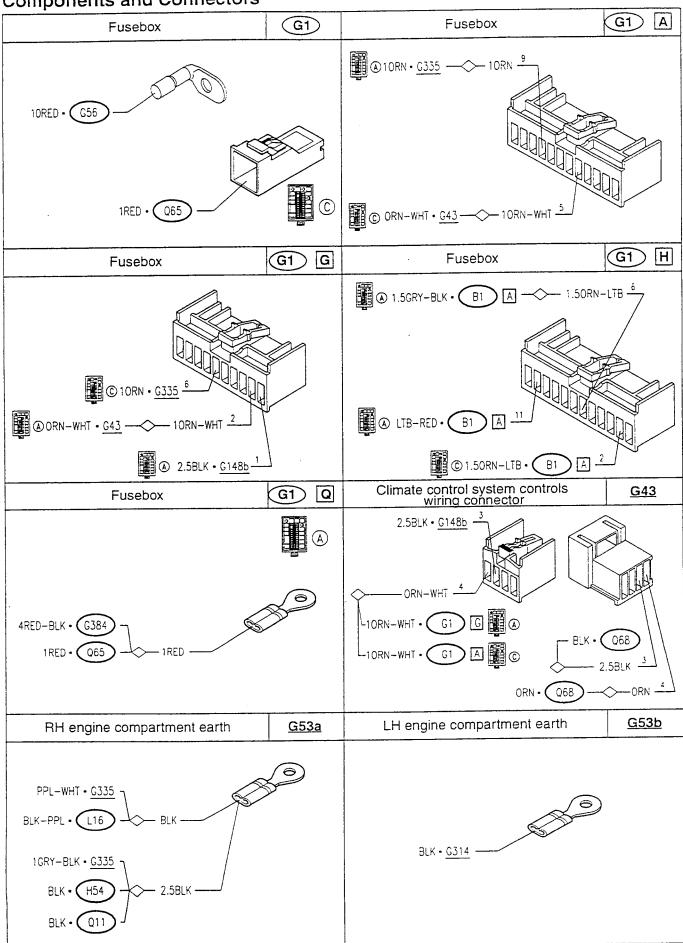
The control unit Q67 is connected, as mentioned previously, with the rev counter sensor L16 at pin 3 and 6, to switch H54 at pin 5; pin 2 is at earth, while pin 1 receives the "key-operated" supply via relay I35 and fuse F4 of box G1 (box "A") or only by fuse F14 still in G1 (box "C"): the compressor engagement signal leads from pin 7 as described above.

When it is energised, relay Q22 operates the electromagnetic joint Q11 which engages the compressor.



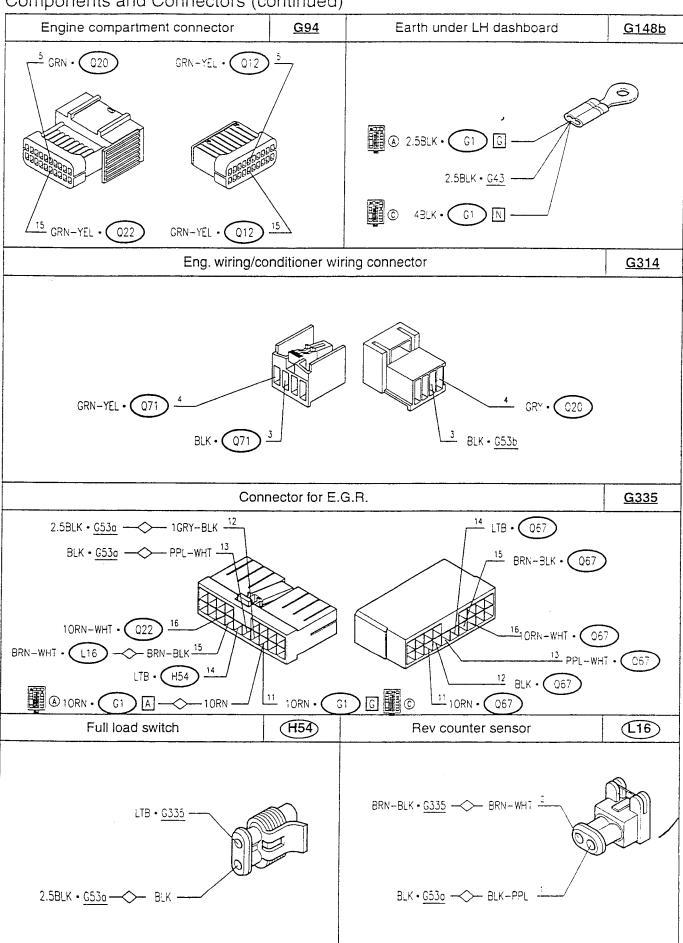
.

Components and Connectors



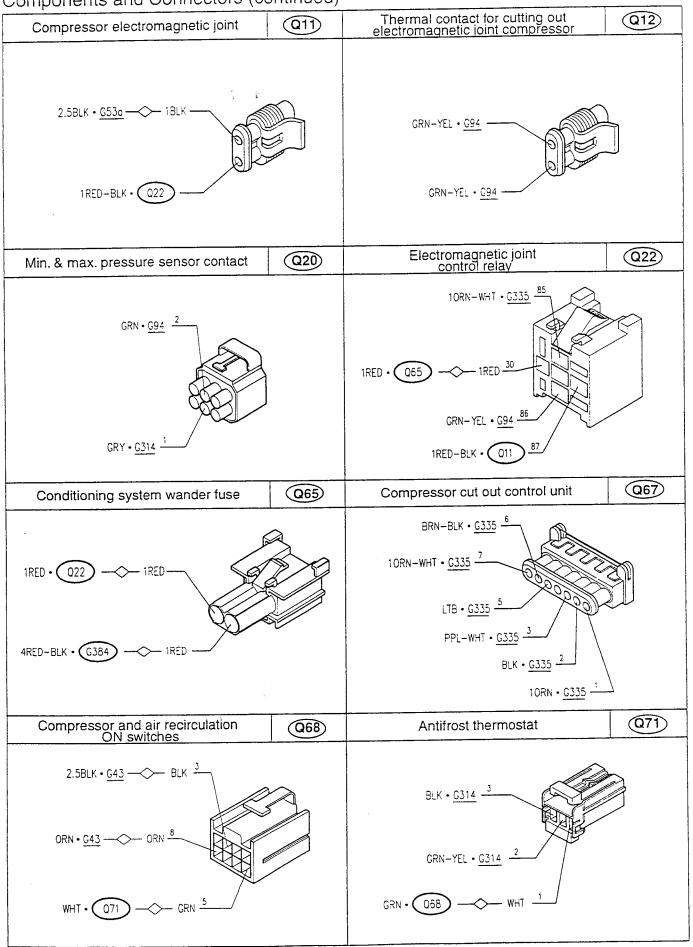


#### Components and Connectors (continued)

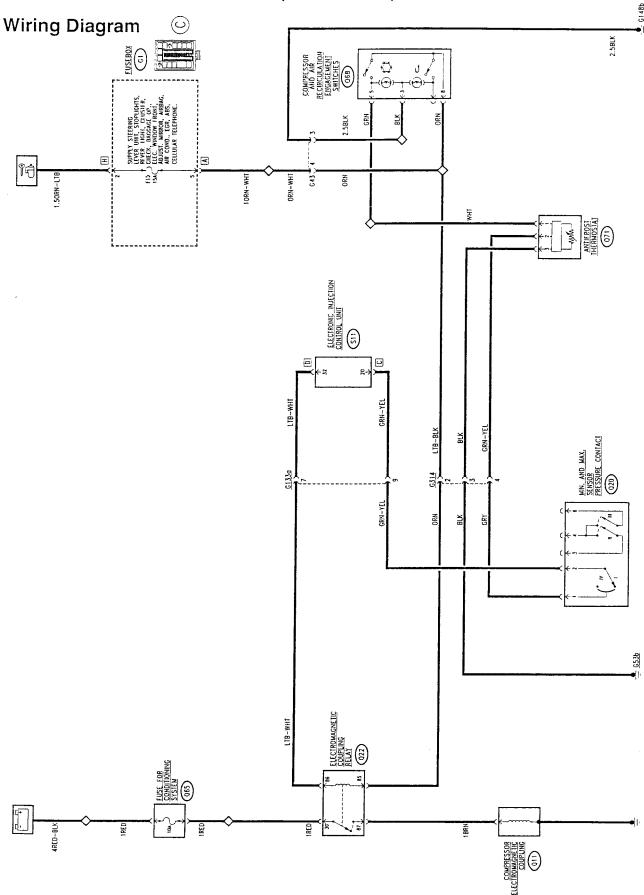




Components and Connectors (continued)



#### COMPRESSOR ENGAGEMENT (JTD Version)





#### **Functional Description**

The electromagnetic joint which operates the compressor Q11 is controlled by relay Q22 located next to terminal strip G56 which contains the MAXI FUSES.

The coil of relay Q22 receives the key-operated supply (line protected by fuse F15 of fusebox G1; while the power line is supplied by battery voltage through wander fuse Q65.

Relay Q22 is energised and consequently supplies 12 V to the electromagnetic joint Q11, according to the following logic, controlled by the injection S11 electronic control unit which is connected with the air conditioning system through:

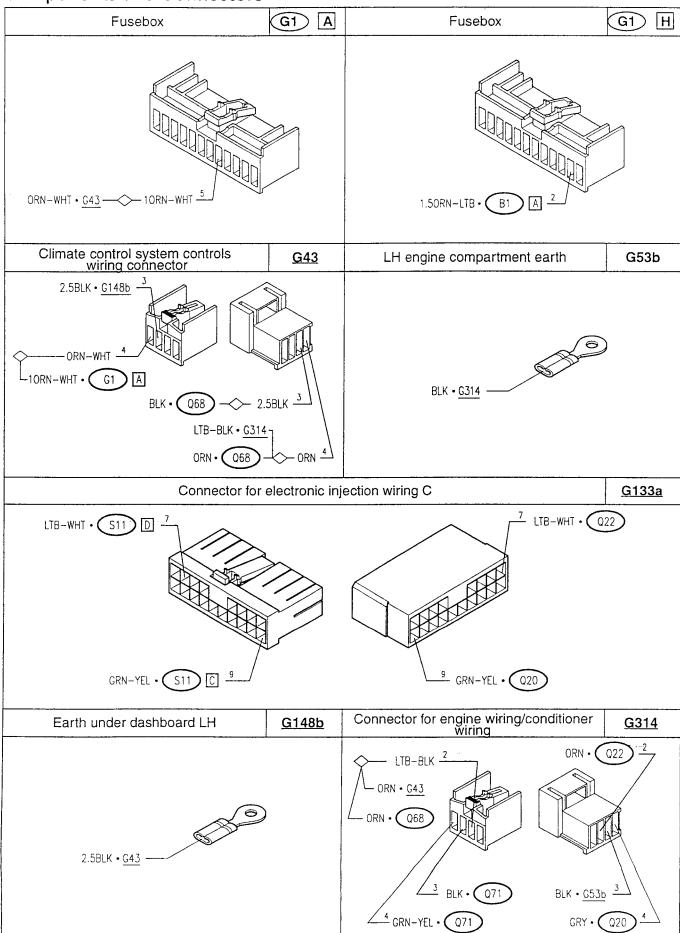
- pin 20 of connector C, which receives the signal requesting engagement of the system from the air conditioning system circuit;
- pin 32 of connector D, from which a "low" (earth) signal leads that controls relay Q22 for engaging the air conditioner compressor Q11.

A special logic enables this engagement. In particular:

- it adapts idle speed to compensate the increased power absorption caused by engaging the compressor:
- if the engine needs power (high throttle opening speed), full load, or high engine temperature, it momentaneously stops engaging the compressor.

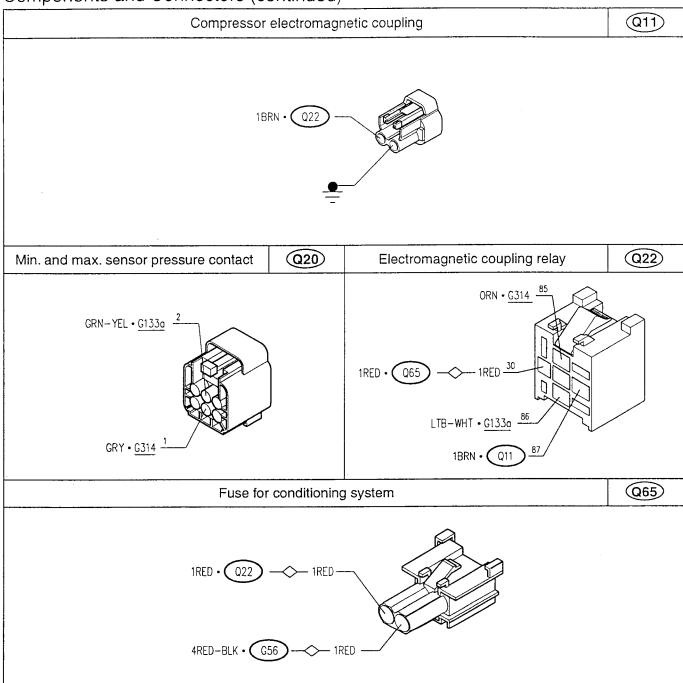
The positive signal leading from the compressor engagement switch Q68 crosses the antifrost thermostat Q71 which cuts in if the temperature is too low and the pressure switch Q20 which cuts in if the cooling system pressure is too high or too low: in this case the signal does not reach the control unit and it does not command engagement of the compressor.

#### **Components and Connectors**



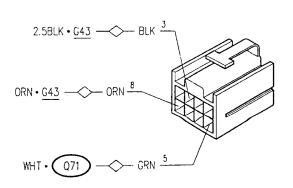


#### Components and Connectors (continued)



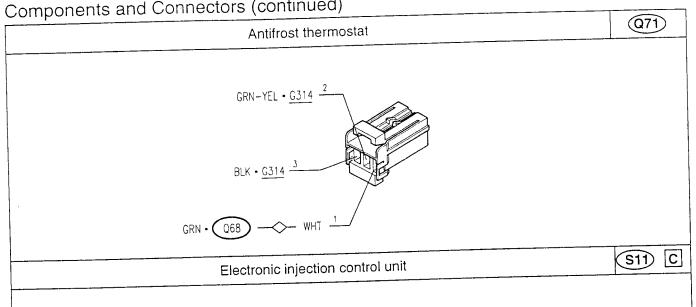
Compressor and air recirculation engagement switches

(Q68)

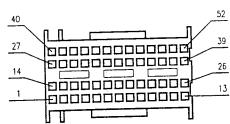




### Components and Connectors (continued)



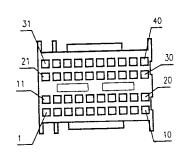
20 GRN-YEL • G133a



Electronic injection control unit

S11) D

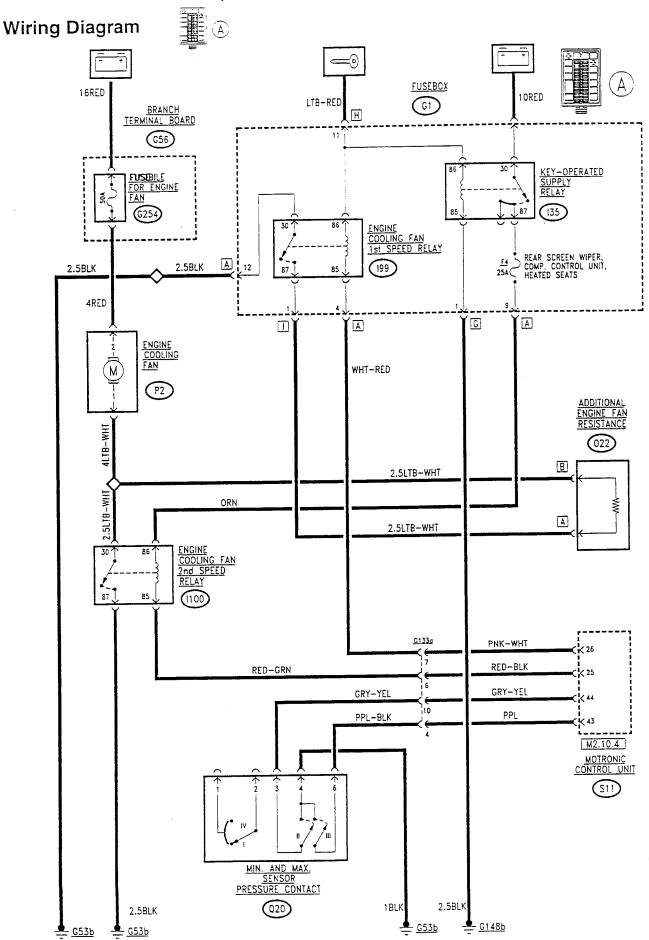
32 LTB-WHT • <u>G133a</u>





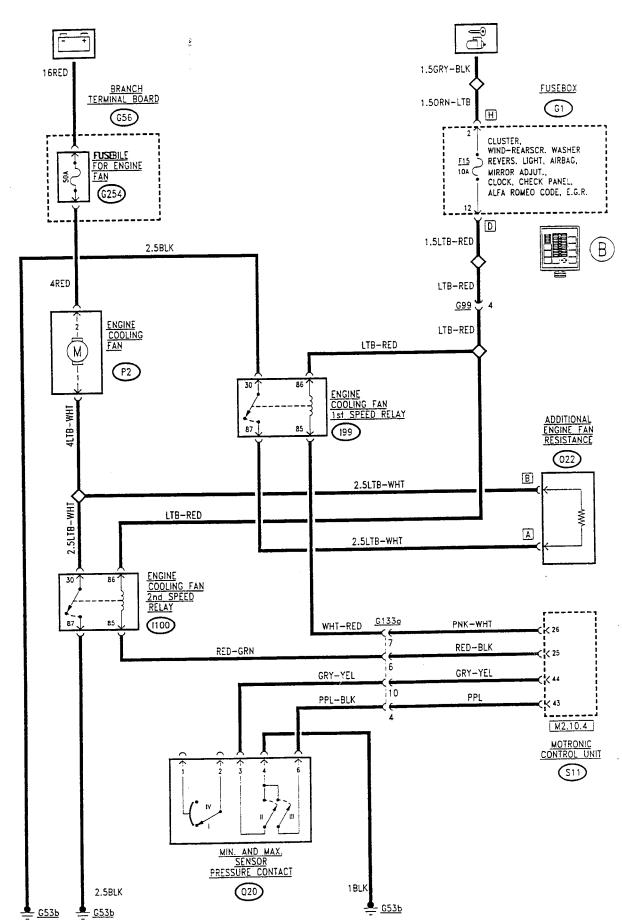
PA493000000010

#### **ENGINE FAN CONTROL (Petrol version)**



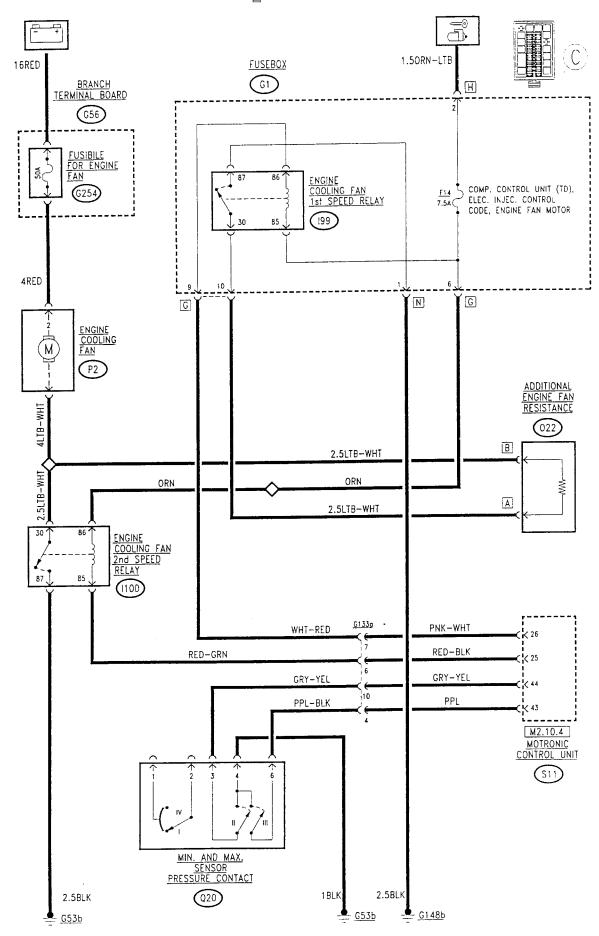
#### Wiring Diagram





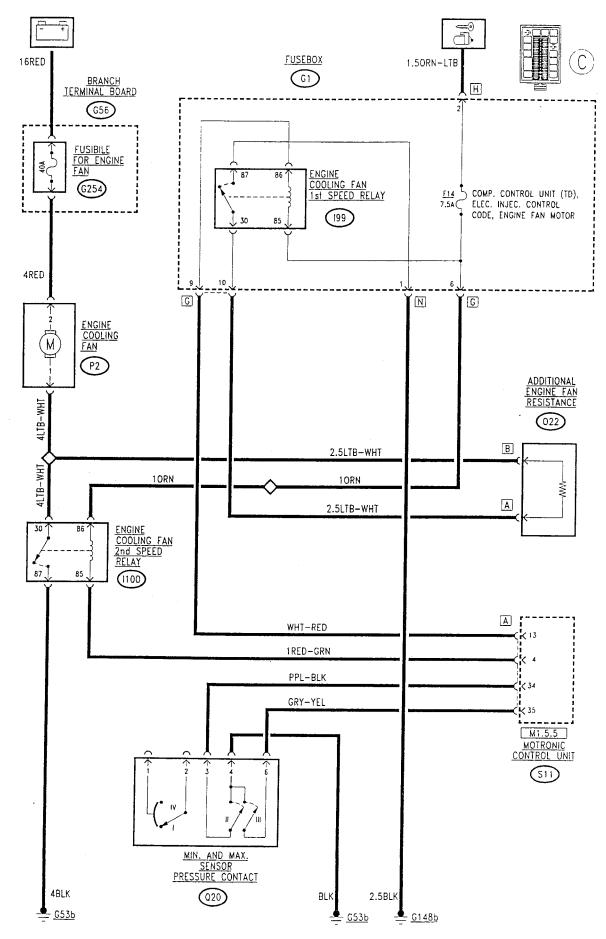
#### Wiring Diagram (Model Year '97)





#### Wiring Diagram (Model Year '98)







#### **Functional Description**

The fan P2 provides the necessary ventilation for cooling the engine radiator and air conditioning system condenser.

This fan is always supplied by battery voltage through the line protected by the specific wander fuse G254, located in the branch terminal strip: it is operated by an earth signal: this signal arrives directly (2nd speed) or via the additional resistance O22 (1st speed).

The M2.10.4 injection - ignition control unit controls the fan for cooling the engine coolant fluid and the conditioning system coolant fluid.

This has made it possible to eliminate the thermal contact usually to be found on the radiator, the two fan speeds are operated depending on the engine temperature, detected by the control unit through the special sensor: a "low" (earth) signal leaves pin 26 which controls the 1st speed relay 199, and a "low"

(earth) signal leaves pin 25 which controls the second speed relay **1100**.

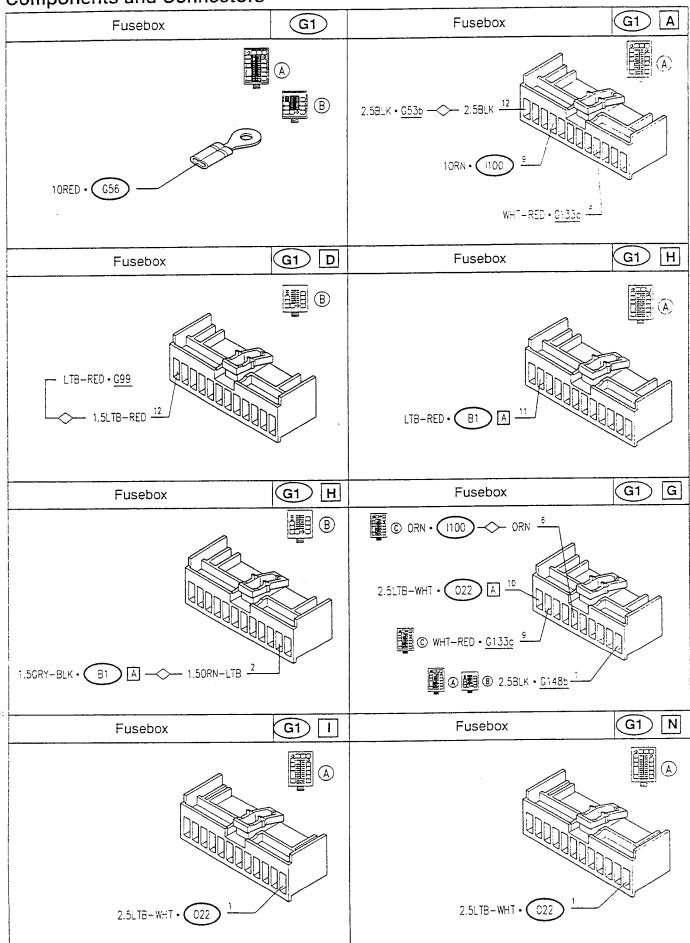
The pressure switch Q20 also sends special signals to the control unit for engaging the fans if the pressure of the coolant fluid in the circuit exceeds certain ratings:

- over 15 bar appr. the signal is sent to pin 44 for engaging 1st speed;
- over 20 bar appr. to pin 43 for the 2nd speed.

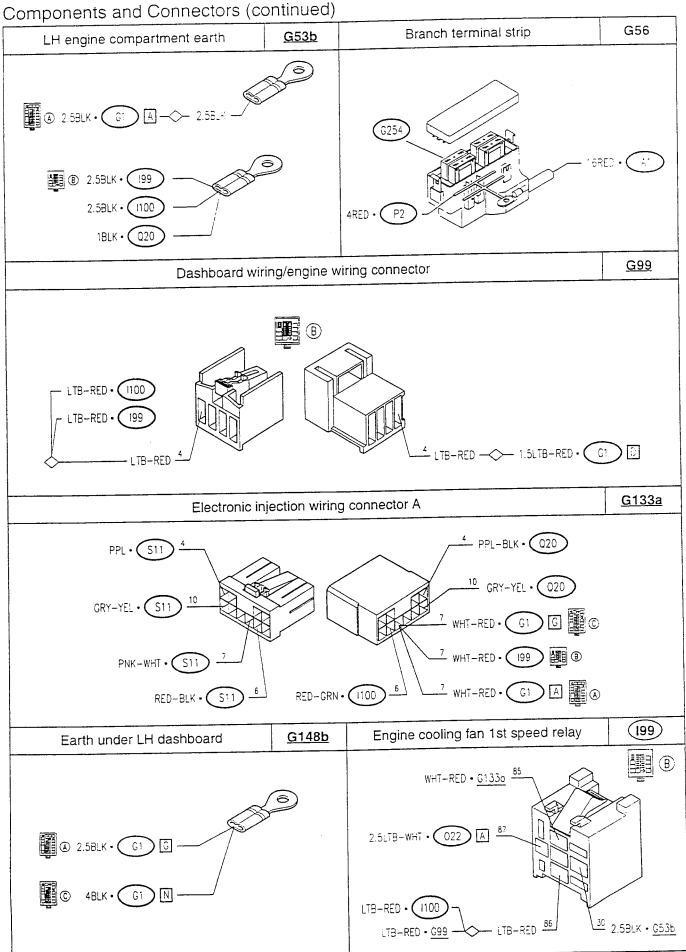
The "key-operated" voltage (line of relay I35 protected by fuse F4 of G1 for box "A" or fuse F17 for "B" or fuse F14 for "C") supplies the coil of relays I99 and I100; which are operated by the above-mentioned earth signals.



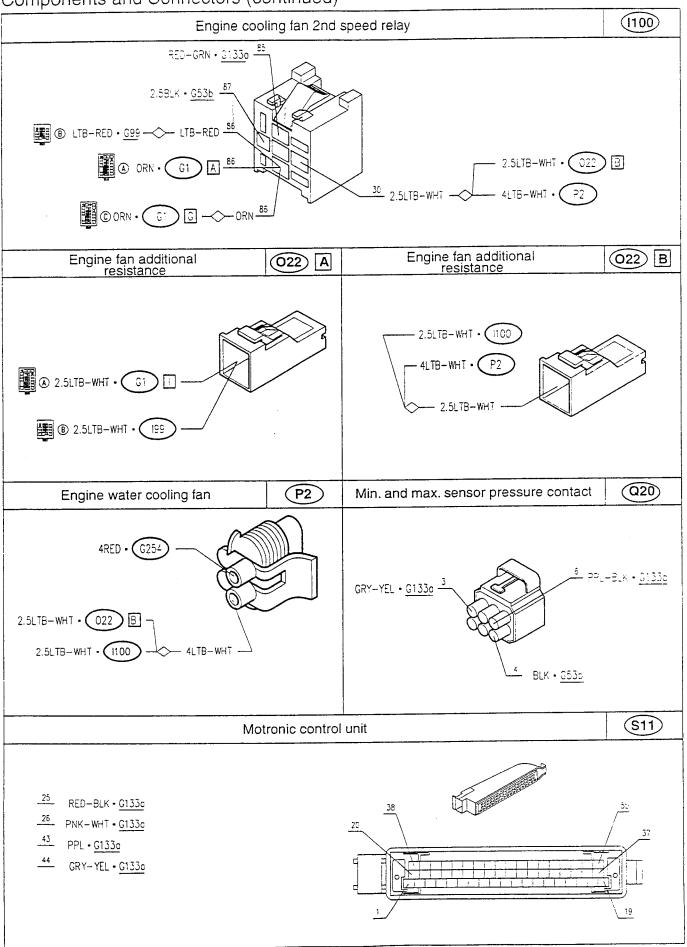
Components and Connectors





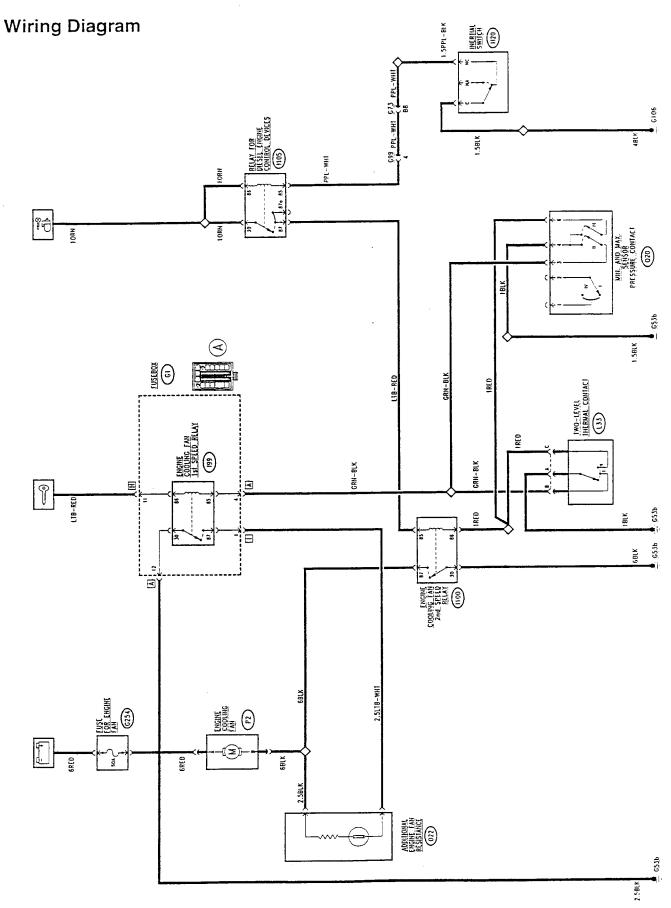






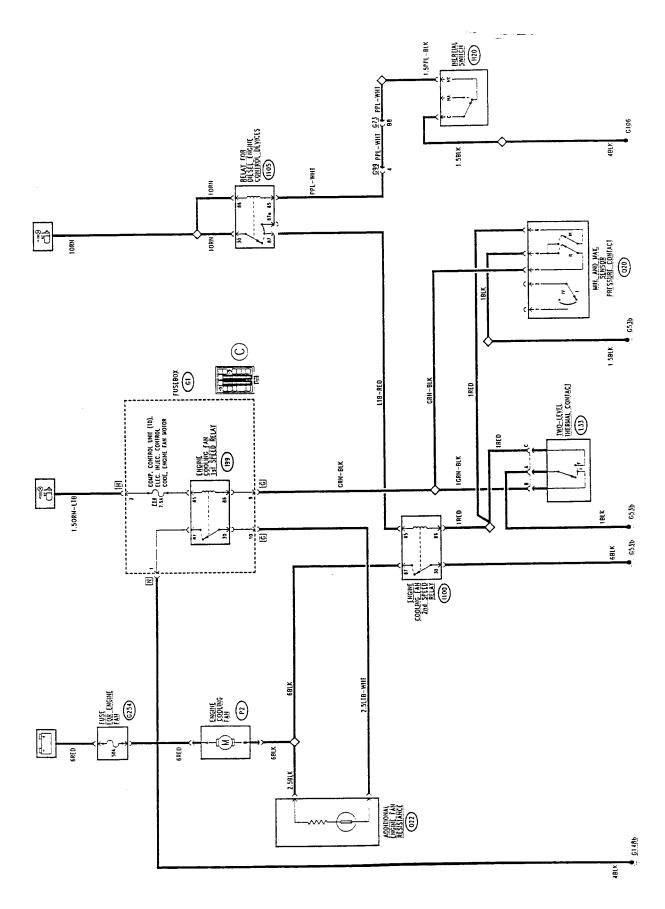


### **ENGINE FAN CONTROL (TD version)**



### Wiring Diagram (TD-CAT version)







PA493000000008

## ELECTRIC SYSTEM DIAGNOSIS Manual air conditioner 55-32A

#### **Functional Description**

The fan P2 provides the necessary ventilation of the air for cooling the engine radiator and the conditioning system condenser.

This fan is always supplied by battery voltage through the line protected by the specific wander fuse G254, located next to the branch terminal strip: it is therefore operated by an earth control signal: this signal arrives directly (2nd speed) or via the additional resistance O22 (1st speed), fitted with a safety thermal contact.

Two relays 199 and 1100, which receive the key-operated supply, the former (line of fuse F14 for fusebox "C") and the latter from relay 1105 (supply controlled

by the inertial switch H20), are energised by thermal contact L33 or by pressure switch Q20.

The fan is operated at the two different speeds by the two-level thermal switch L33 which controls the temperature of the coolant in the engine radiator: when a first level is reached, relay 199, in fusebox G1 is energised, which sends the earth control signal to the fan P2 via resistance O22: 1st speed.

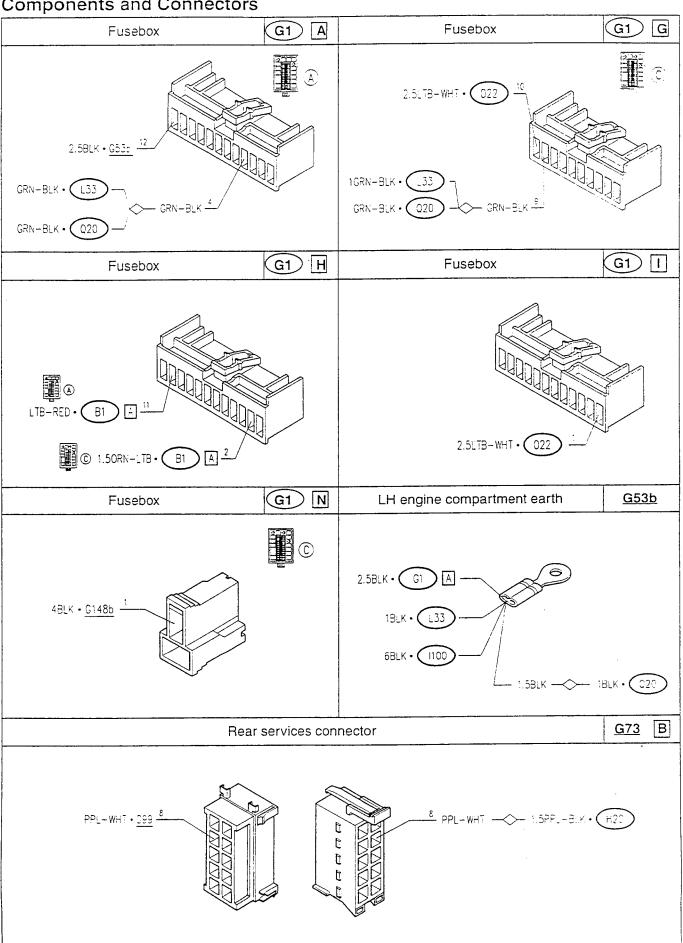
If the second temperature level is reached, relay **!100** on the fan duct is energised, which sends the earth control signal directly to the fan **P2**: 2nd speed.

Similarly, the pressure switch **Q20** sends a signal from pin 3 for the 1st speed and from pin 6 for the 2nd speed.





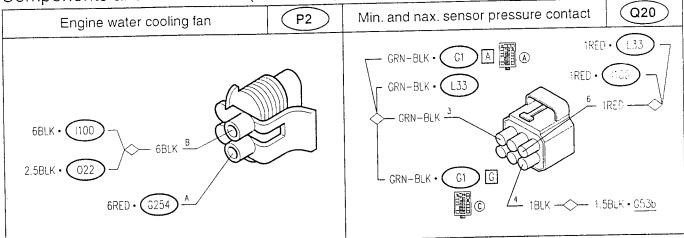
Components and Connectors

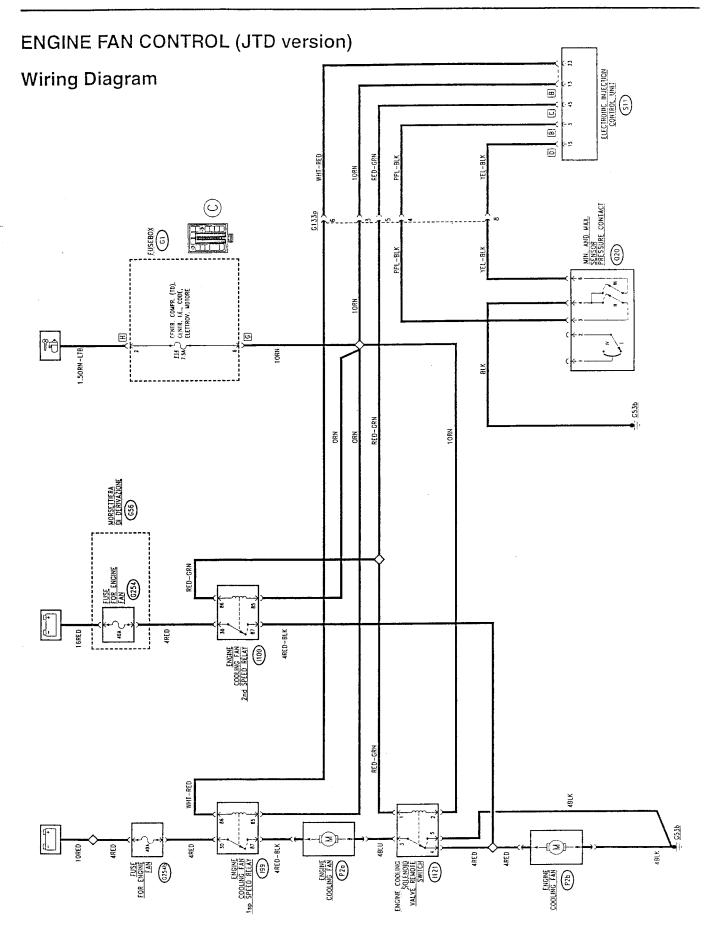




Components and Connectors (continued)	0.100
Dashboard wiring/engine wiring connector G99	Seat crossmember earth G106
PPL-WHT · G73 B 4	1.5BLK • H20
Engine cooling fan 2nd speed relay	Diesel engine control devices relay (105)
6RED • G56	PPL-WHT • <u>G73</u> ■ → 1.5PPL-BLK  4BLK • <u>G106</u> → 1.5BLK
Engine cooling fan 2nd speed relay	Diesel engine control devices relay (105)
2.5BLK • 022 6BLK 87  1RED • 133  1RED • Q20 1RED 86 30 6BLK • G53b	PPL-WHT • <u>G99</u> <u>85</u> LTB-RED • 1100 <u>87</u> 10RN • <u>B1</u> <u>B</u> 10RN <u>30</u>
Two-level thermal contact L33	Engine fan additional resistance O22
1RED • 1100 — 1RED C  1BLK • G53b A  GRN-BLK • G1 A  GRN-BLK • Q20 GRN-BLK • G1 G  GRN-BLK • Q20 GRN-BLK • G1 G	2.5_TB-WHT • G1









#### **Functional Description**

Two coolant fans **P2a** and **P2b** provide the required ventilation for cooling the engine radiator and air conditioning system condenser.

The injection control unit **S11** controls the fan for cooling the engine coolant fluid and the conditioning system coolant fluid.

This way, the thermal contact usually installed on the radio is dispensed with. The two speeds of the fan are controlled on the basis of the engine temperature, detected by the control unit through the special sensor: a "low" signal (earth) leaves pin 23 of connector B which controls the first speed relay 199, and a "low" (earth) signal leaves pin 45 of connector C which controls the second speed relay 1100.

The "key-operated" voltage (line of fuse F14 of control unit G1) supplies the coils of relays I99, I100 and I121.

The first speed signal energizes remote switch 199 which powers – with the G254b maxifuse line – elec-

tric fan P2a: the fan rotates at low speed because it receives a "damped" earth from fan P2b; through the non-energized switch I121, fan P2b also rotates at a low speed.

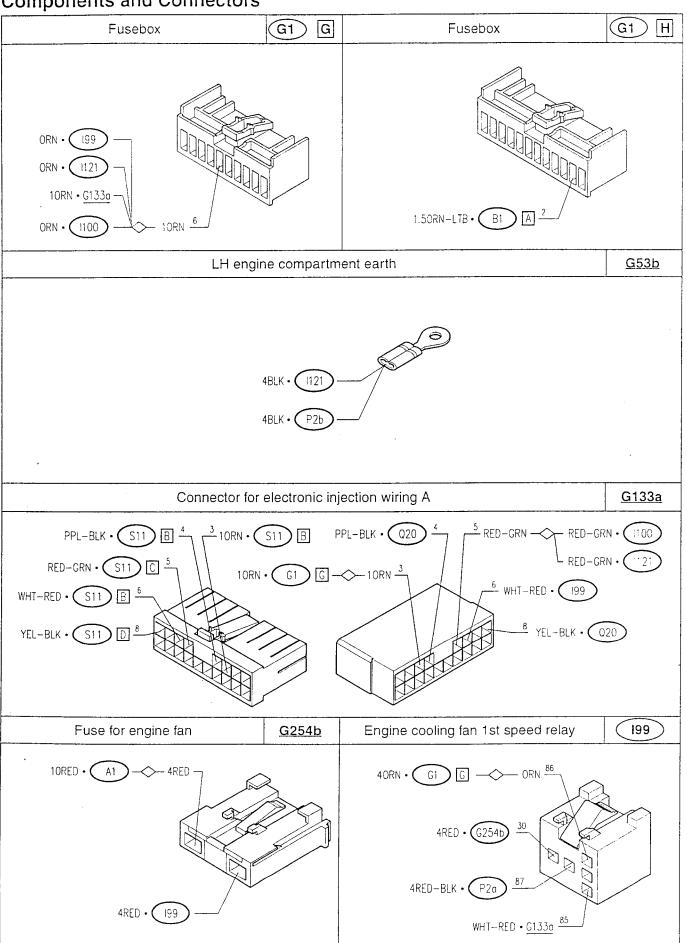
The second speed signal energizes remote switch I100 which powers – with the G254 maxifuse line of G56 – the electric fan P2b at maximum speed; simultaneously the same signal energizes the switch I121 which sends an earth to fan P2a. This fan also rotates at maximum speed.

Pressure switch Q20 also sends special signals to the control unit S11 for engaging the fans if the pressure of the coolant fluid in the circuit exceeds determinate ratings:

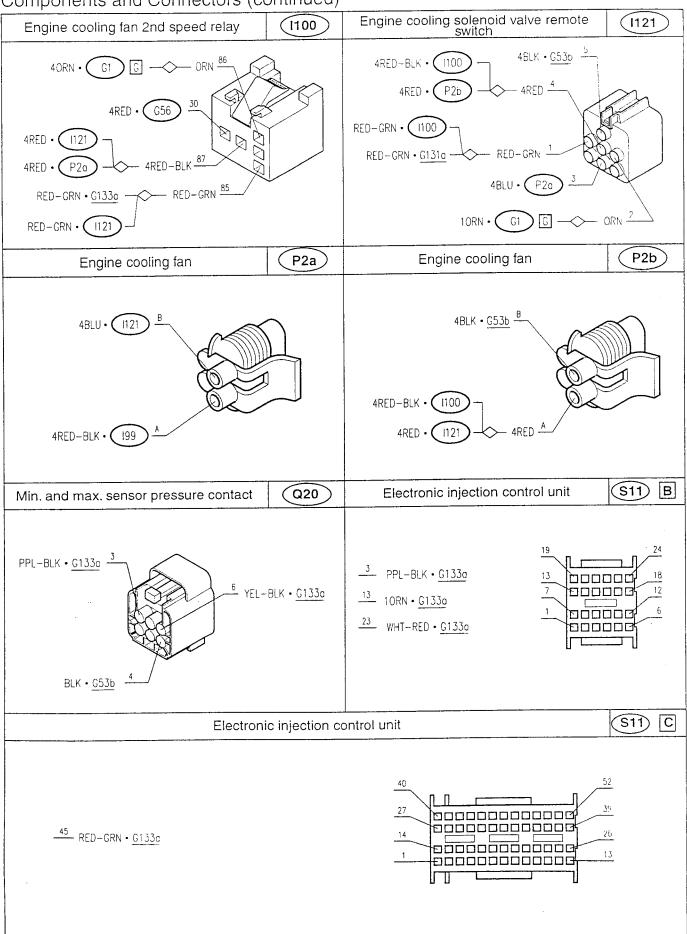
- over approx. 15 bar the signal is sent to pin 3 of connector B for engaging the 1st speed;
- over approx. 20 bar to pin 15 of connector D for the 2nd speed.



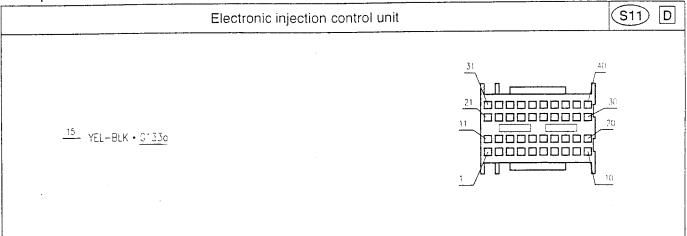
### Components and Connectors



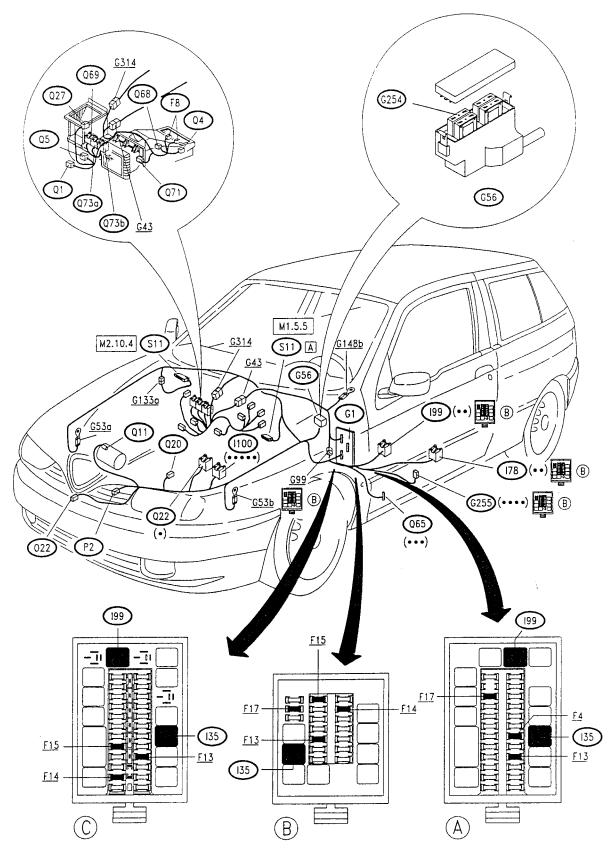








### LOCATION OF COMPONENTS (petrol versions)



(•)

white base

(••<u>)</u>

yellow base

(•••)

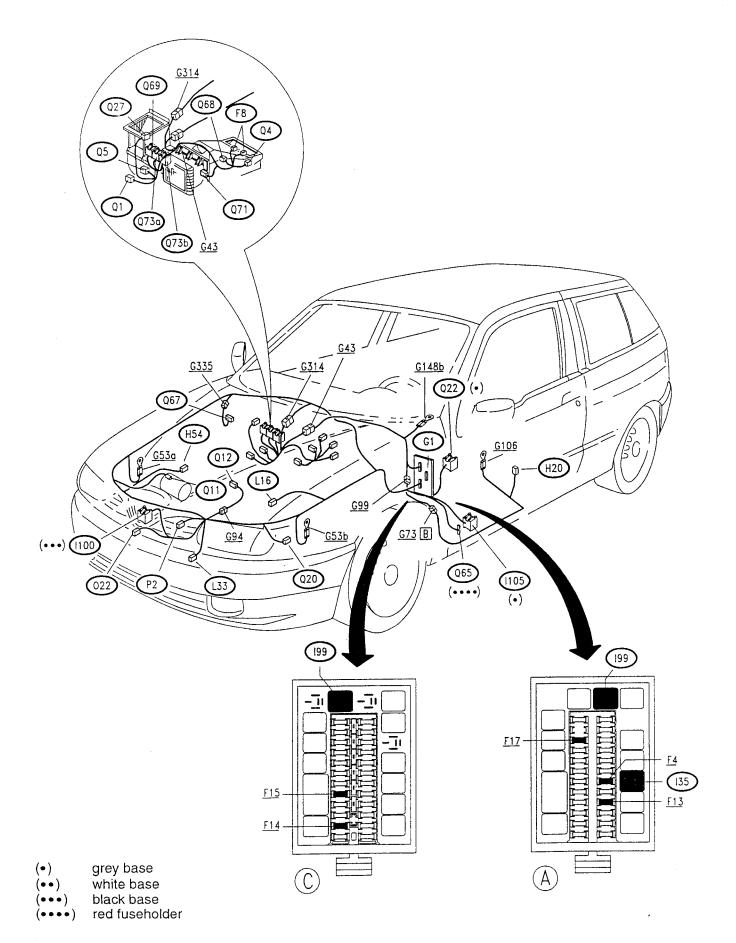
red fuseholder

(••••) gr

green fuseholder

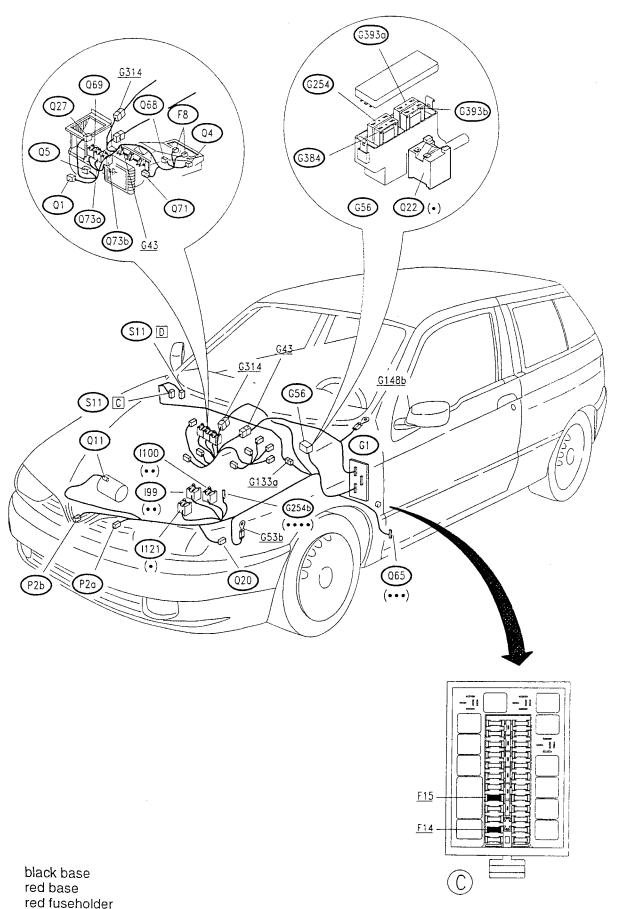
( • • • • • ) black base

### **LOCATION OF COMPONENTS (TD versions)**



- 30 -

### LOCATION OF COMPONENTS (JTD versions)



PA493000000012

black fuseholder

- 30/1 -





#### **FAULT-FINDING TABLE**

- NOTE: To make its interpretation easier, the fault-finding table for the air conditioner has been <u>subdivided into</u> three section which comprise the three functions described separately also in the wiring diagrams:
  - Climate control and recirculation fan
  - Compressor control
  - Engine fan control

#### Climate control and recirculation fan

	Component to be checked											
Fault		F13)	(B)	<u> </u>	(B)	Q5)	Q4)	Q27)	Q68)	F8	Q69)	Q73)
Fan engagement		•	•	•	•		•					
Fan engagement at the different speeds						•	•				<u> </u>	
Fan engagement at 1st speed with the compressor on							•				•	
Recirculation function	•							•	•			•
Climate control panel lighting										•		

<sup>(</sup>B) Only for fusebox "B"

#### Compressor control

			Component to be checked											
Fault	Q65)	<u>F17</u>	<u>F4</u>	<u>F15</u> (C)	Q11)	Q20)	Q71)	Q12)	H54	Q67)	Q22)	Q68)	(S11)	
	petrol	•	•		•	•						•	•	
Compressor engagement (under all circumstances)	TD	•	•	•		•						•	•	
an en earneante e,	JTD				•	•						•	•	
Compressor en-	petrol						•	•						•
Compressor engagement (only in certain circum-	TD						•		•	•	•			
stances) (*)	JTD						•	•						•

(C) Only for fusebox "C"

- (\*) Bear in mind that operation of the compressor is cut off by the system logic in the following conditions:
- coolant fluid pressure > 28 bar appr.;
- coolant fluid pressure < 2.5 bar appr. (circuit discharged);
- engine temperature > 111°C (only TD);
- full load (temporary cut out for appr. 8 sec. with engine speed over 2000 rpm) (only TD).

This operation is also determined by the logic of the injection-ignition control unit (only petrol) (see the corresponding section).



### Engine fan control

			Component to be checked												
Fault		G254)	G254)	<u>F4</u> (A)	<u>F15</u> (B)	<u>F14</u> (C)	P2a/b	<u> </u>	L33	<b>Q20</b>	(S11)	199	(1100)	(105)	(1121)
Fan engage-	TD	•					•								
Fan engage- ment (under all circum-	Petrol	•				•	•								
stances)	JTD	•	•			•	•								-
Fan engage- ment for high	TD	•						•	•			•	•	•	
ment for high engine temp.(2nd	Petrol			•	•			•			•	•	•		
speed)	JTD						•				•	•	•		•
Fan engage-	TD									•				ļ	
Fan engage- ment for high coolant press-	Petrol									•	•				
ure	JTD									•	•	•	•	<u></u>	

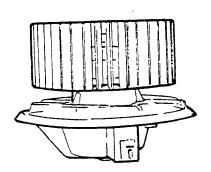
- (A) Only for fusebox "A"
- (B) Only for fusebox "B"
- (C) Only for fusebox "C"



### CHECKING COMPONENTS

Climate control fan Q1

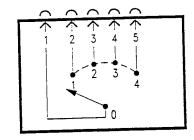




SPECIFICATIONS						
Rated voltage	12V					
Maximum current	25.5 A					
Speed at 12V/25°C in free air with impeller and support	3220 ÷ 3780 rpm					
Motor direction of rotation	left					

Climate control fan control

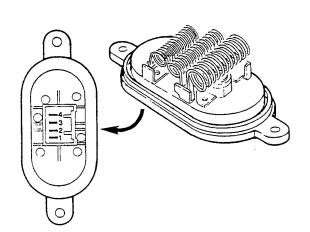




Check the contacts corresponding to the different knob positions.

Climate control fan speed adjustment resistance Q5



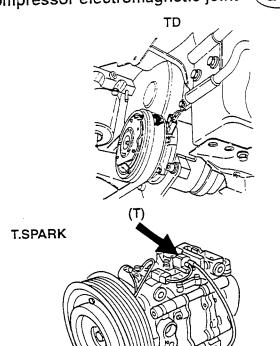


SPECIFICATIONS						
Section crossed	Total resistance	Fan speed				
4-1 3-1 2-1 none	2.9 Ω 0.8 Ω 0.3 Ω	1st 2nd 3rd 4th				
Thermal contact	90 ± 5°C					



### Compressor electromagnetic joint Q11



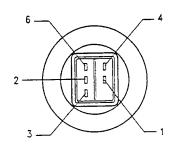


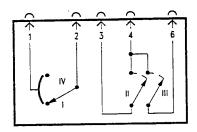
SPECIFICATI	ONS
supply voltage	12 V
absorbed current	4.2 A (TD) 2.2 (T.SPARK)

	Compressor cut out th	ermal contact (T)
Only T.SPARK:	contact opens	>160 °C
	contact closes	<140 °C

### Minimum and maximum pressure switch Q20





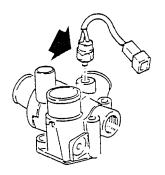


SPECIFICATIONS					
1st level: contact opens contact closes	2.45 ± 0.35 bar max 3.5 bar				
2nd level: contact closes contact opens	15 ± 1 bar 11 ± 2 bar				
3rd level: contact closes contact opens	20 ± 1.2 bar 16 ± 2.2 bar				
4th level: contact opens contact closes	28 ± 2 bar 22 ± 4 bar				



### Compressor cut out thermal contact Q12

(only for TD version)

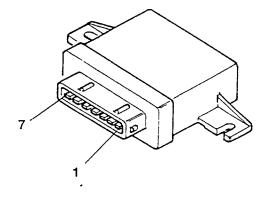


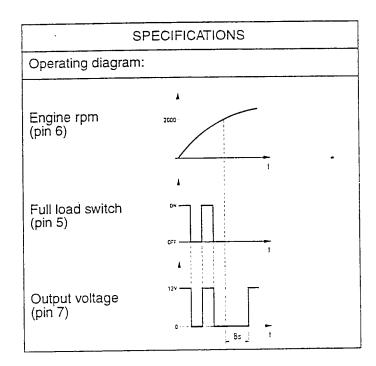
SPECIFICATIONS				
contact opens	111 ± 2 °C			
contact closes	106 ± 2 °C			

### Compressor cut out control unit Q67



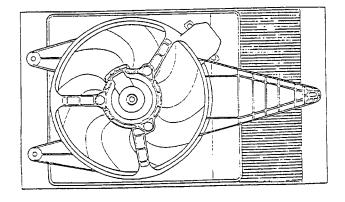
(only per TD version)





### Cooling fan (



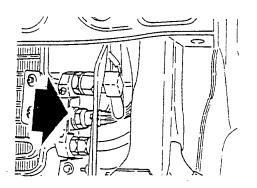


SPECIFICATIONS						
Rated voltage	12V					
Speed at 12V in free air in duct	2350 +150 rpm (minimimum)					
Motor direction of rotation (marked on duct)	right (impeller side)					



### Fan two-level thermal contact (L33) (only TD)

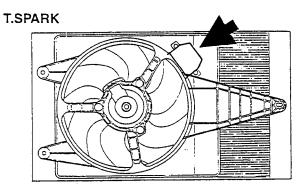


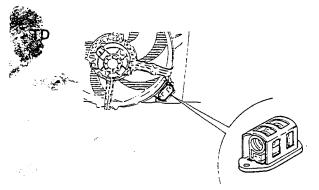


SPECIFICATIONS					
1st level: contact closes contact opens	88 ± 2 °C 83 ± 2 °C				
2nd level: contact closes contact opens	92 ± 2 °C 87 ± 2 °C				

### Fan resistance (022)







T.SPARK version	
resistance	0.18 Ω ± 10%
thermal fuse cut in	< 100 °C
TD version	
resistance	$0.23 \pm 0.02\Omega$
thermal contact opening temperature thermal contact closing temperature	130 ± 10°C 60 ± 10°C