VARIANTS FOR GTV 2959 24V

INDEX

ELECTRIC SYSTEM 55

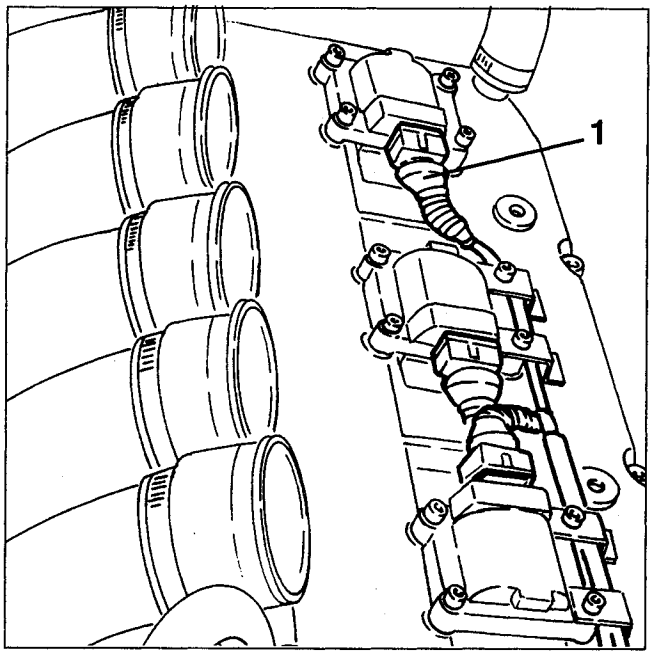
ELECTRIC SYSTEM DIAGNOSIS 55

FOR THE INFORMATION NOT GIVEN HEREIN, REFER TO THE CORRESPONDING GROUP OF "SPIDER-GTV".
THE REFERENCE ENGINE IS THE "6 CYLINDER " (3.0 V6 ENGINE)

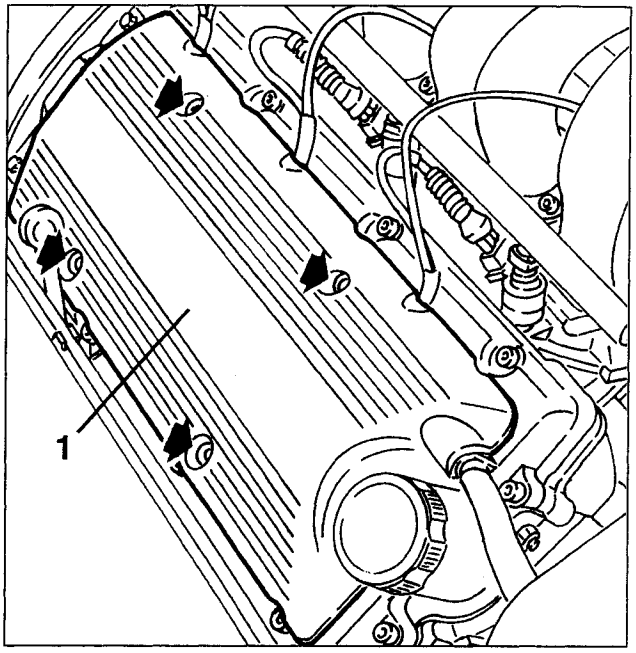
IGNITION COILS

REMOVING/REFITTING

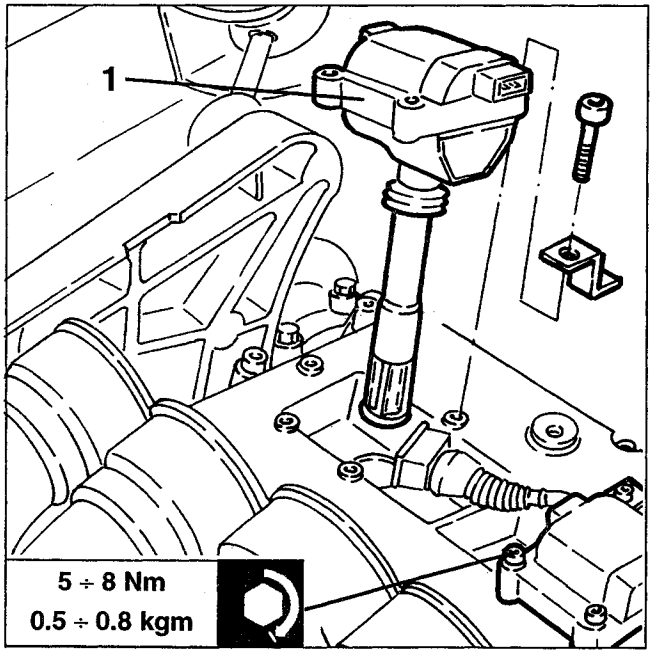
- Remove the intake box (see specific paragraph).
1. Disconnect the electrical connections from the ignition coils of the right cylinder head.



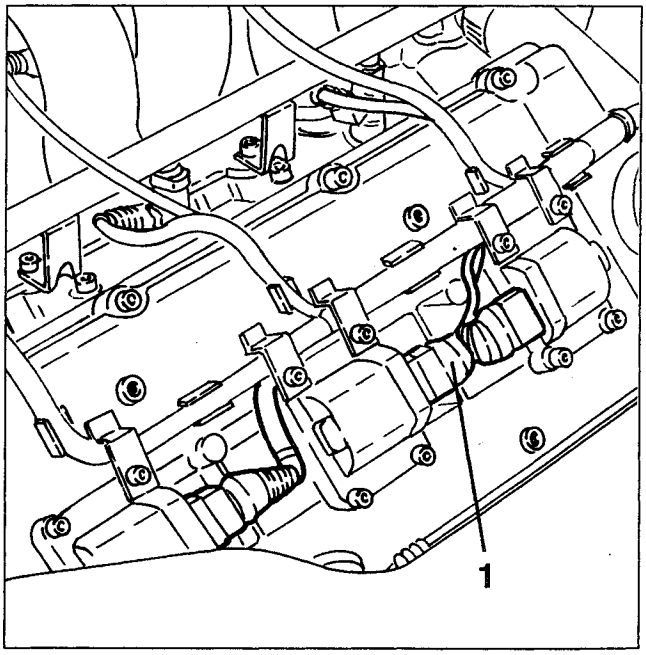
1. Slacken the fastening screws and remove the ignition coil cover of the left cylinder head.



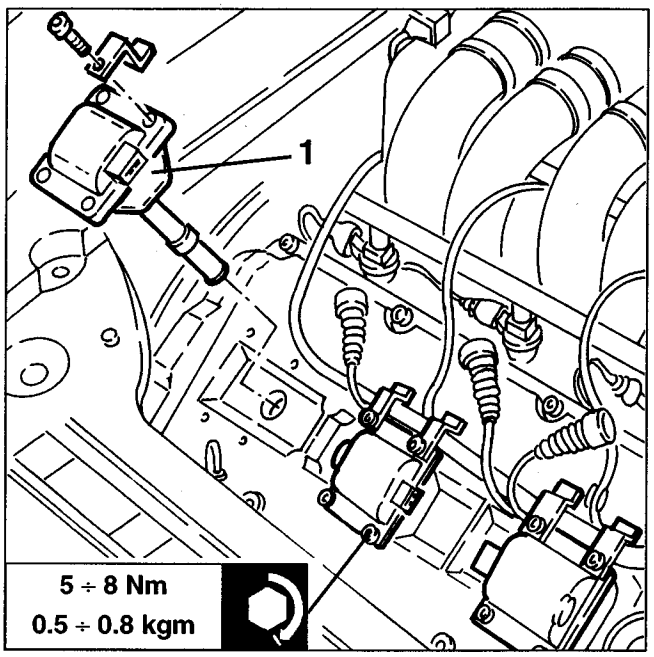
1. Slacken the fastening screws and remove the ignition coils frrom the right cylinder head.

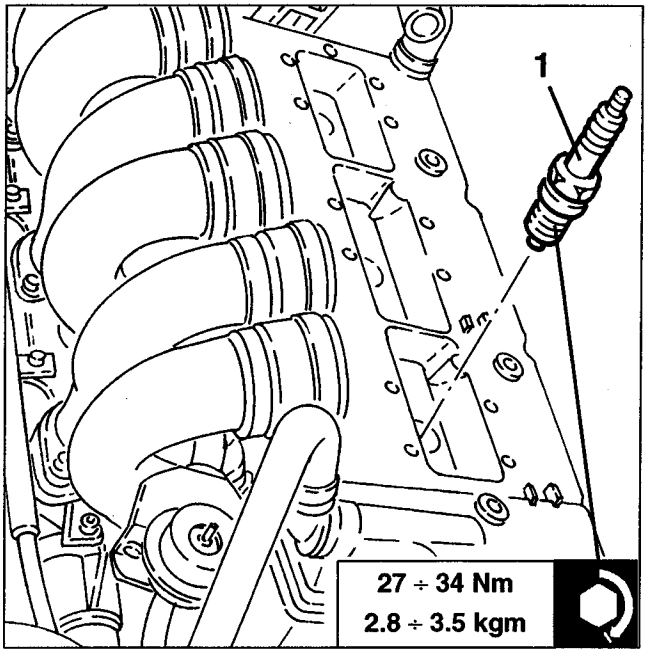


1. Disconnect the electrical connections from the ignition coils of the left cylinder head.



1. Slacken the fastening screws and remove the ignition coils frrom the left cylinder head.



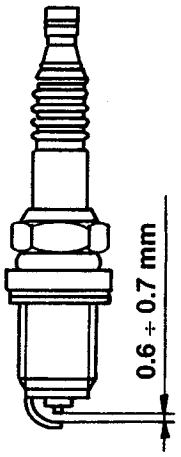


- Check cleaning and for any breaks of the ceramic insulant. In this case change the spark plugs.

WARNING:
The use of spark plugs with characteristics or sizes other than those specified can cause damage to the engine and alter the level of harmful emissions at the exhaust.

SPARK PLUGS

The standard spark plugs are of the type with surface discharge with a peripheral point and one centre electrode.
In order to operate correctly this type of spark plug must have a correct gap between electrodes.



A dirty or burnt spark plug is often a symptom of an engine fault. For example:
• traces of carbon dust: incorrect mixture, air cleaner very dirty;
• oil stains: oil leaks from piston rings;
• formation of ash: presence of aluminium materials in particular in the oil;
• melted electrodes: overheating due to unsuitable fuel, valve defects;
• high electrode wear: harmful additives in the fuel or oil, pinging in the cylinder head, overheating.

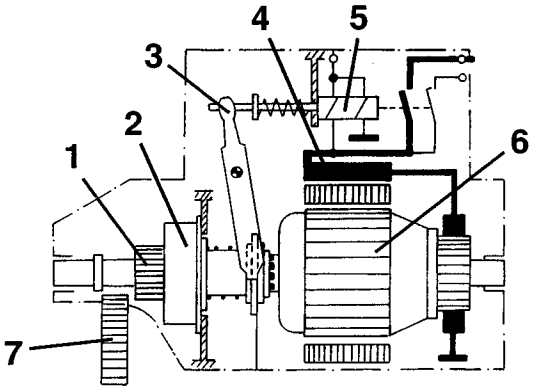
Checking and replacement

- Remove the ignition coils (see specific paragraph).
1. With the engine cold, remove the spark plugs firstly blowing in the recesses to remove any impurity and traces of dirt.

- Install new spark plugs tightening them to the specified torque, then complete refitting reversing the sequence followed for removal.

STARTER MOTOR

The starter motor cranks the engine overcoming the inertia and friction, and bringing it to a determinate rpm that can start the formation of the mixture required for combustion and thus autonomous movement of the engine itself.
The movement is transmitted by an direct current electric motora operated by the battery, through an engagement pinion which turns the special rings gear machined on the flywheel.



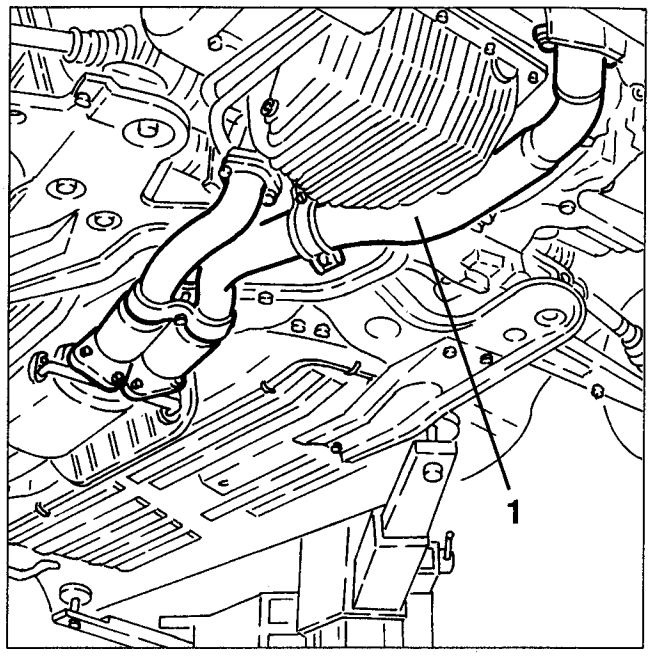
1. Pinion
2. Roller idler wheel
3. Engagement lever
4. Energising winding
5. Relay
6. Stator
7. Flywheel ring gear

Owing to an idler wheel engagement, the pinion disengages when the main engine turns faster than the motor.
A relay energised by the motor current engages the pinion through a fork.
The starter motor is of the translation and screwing type, with relay housed directly above the motor.

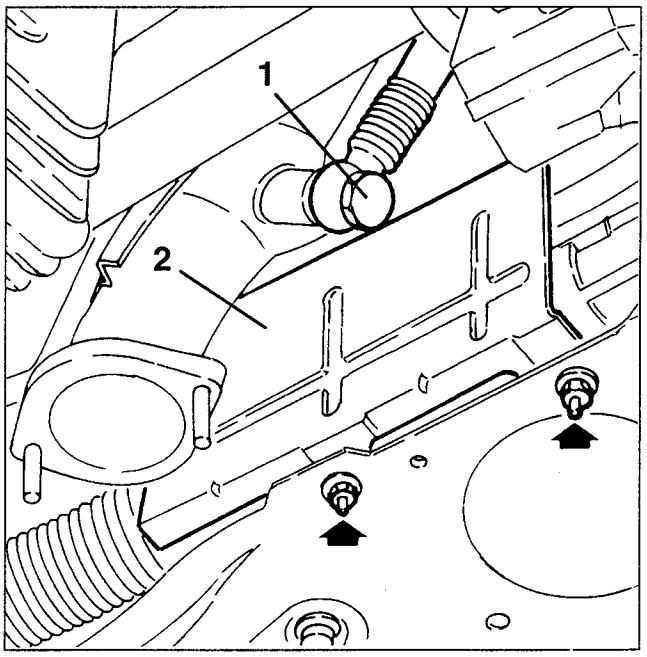
REMOVING/REFITTING

- Set the car on a lift.
- Remove the front wheels and mud flaps.

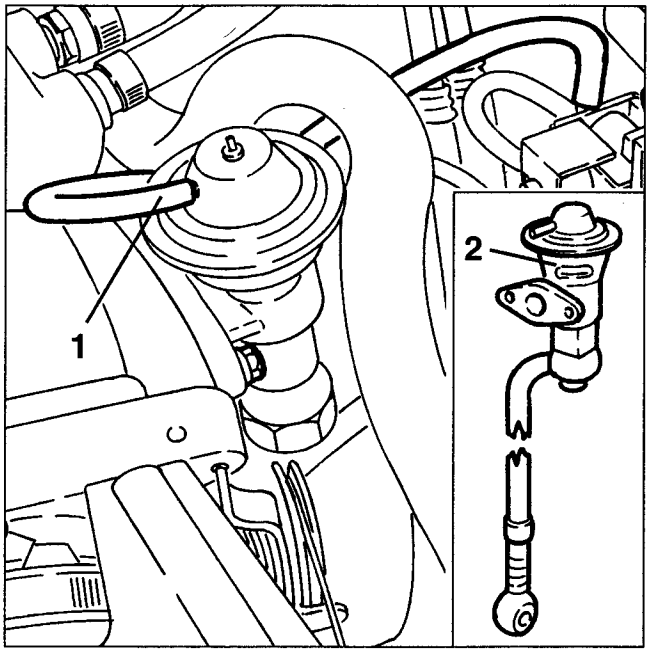
1. Raise the car and remove the front section of the exhaust pipe.



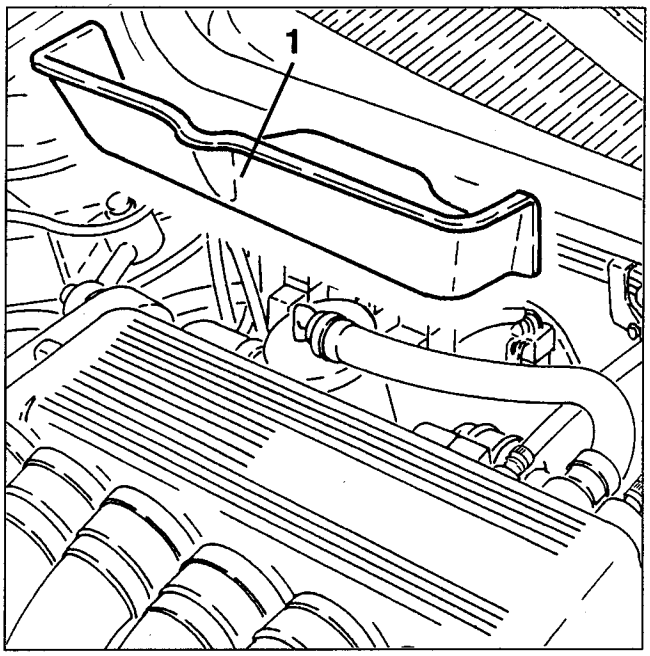
1. From the exhaust manifold of the right cylinder head disconnect the union of the exhaust gas takeoff pipe for E.G.R. valve.
2. Slacken the fastenings and remove the heat guard from the power steering box.



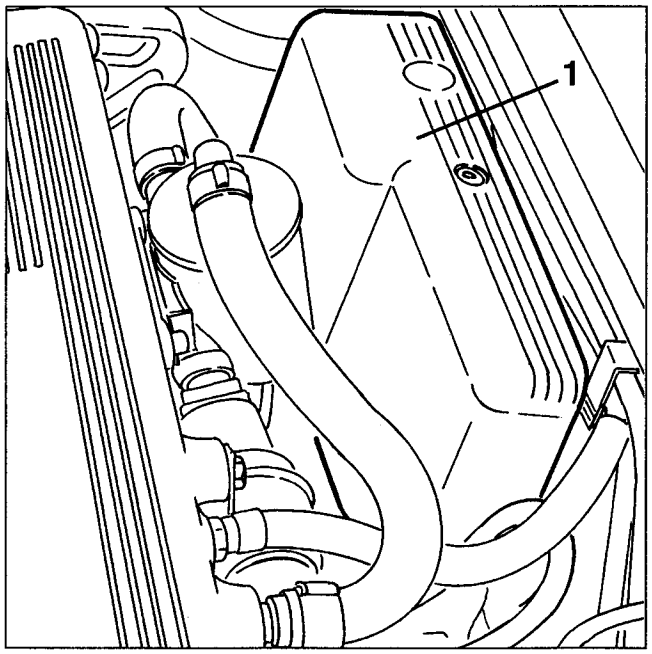
1. Lower the car, then disconnect the vacuum signal tube leading from the modulating solenoid valve from the E.G.R. valve.
2. Slacken the fastening screws and remove the E.G.R. valve complete with exhaust gas takeoff pipe.



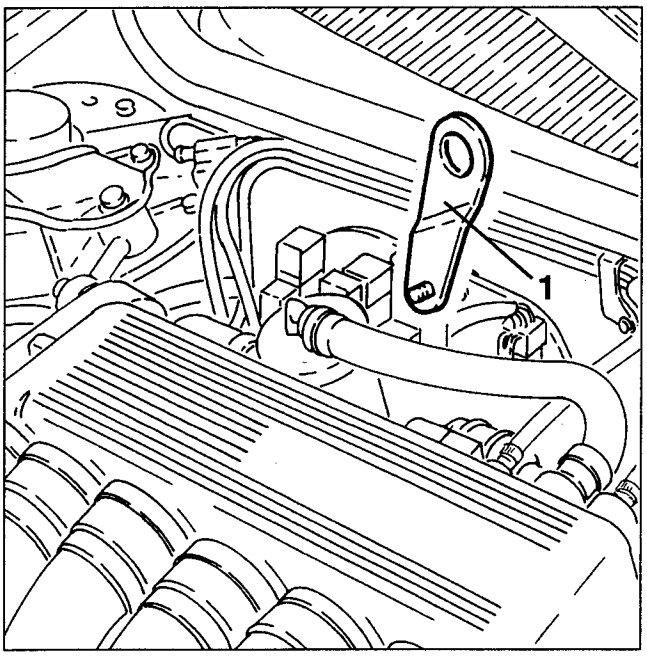
1. Slacken the fastenings and remove the heat guard.



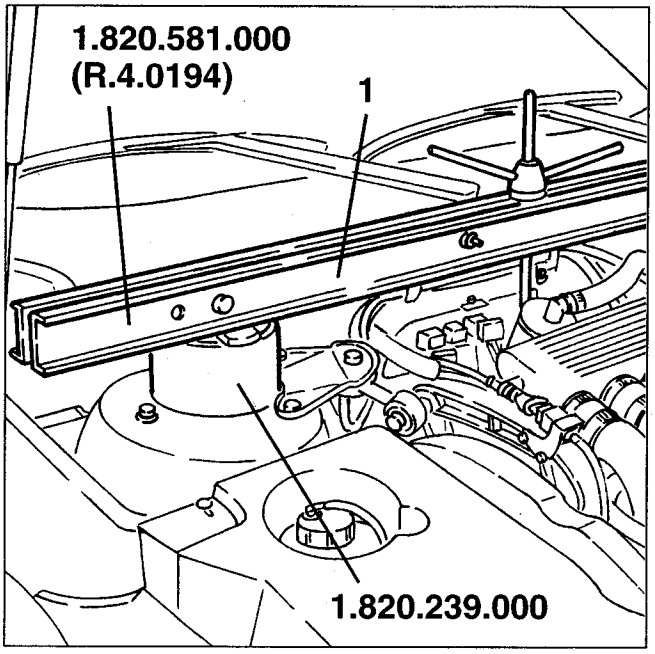
1. Remove the plastic cover protecting the relays, fuses and electrical connections.



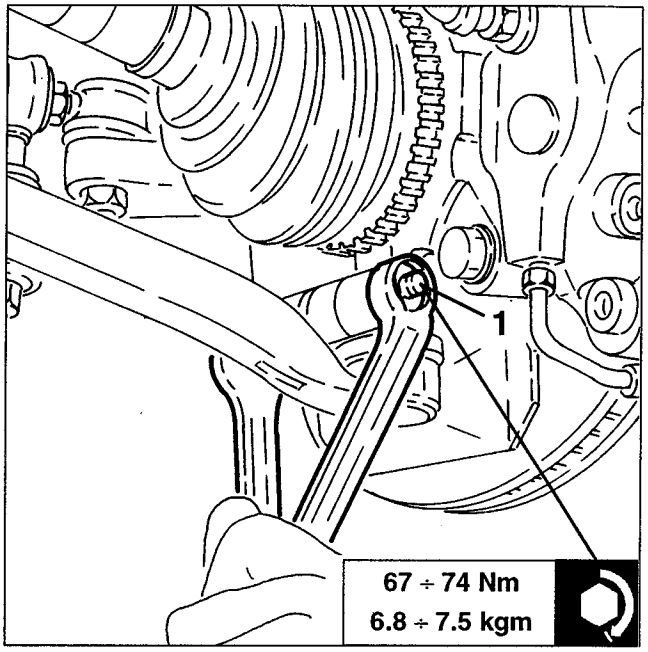
1. Install a special engine support bracket on the cylinder head.



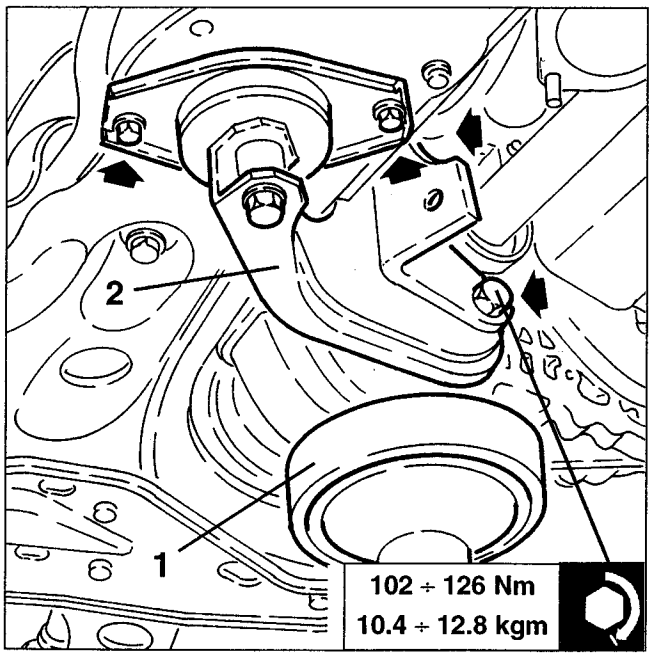
- Working from the engine compartment slacken the nuts fastening the exhaust manifold to the right cylinder head.
1. Install cross rail no.1.820.581.000 (R.4.0194) complete with supports no. 1.820.239.000 for supporting the power unit.



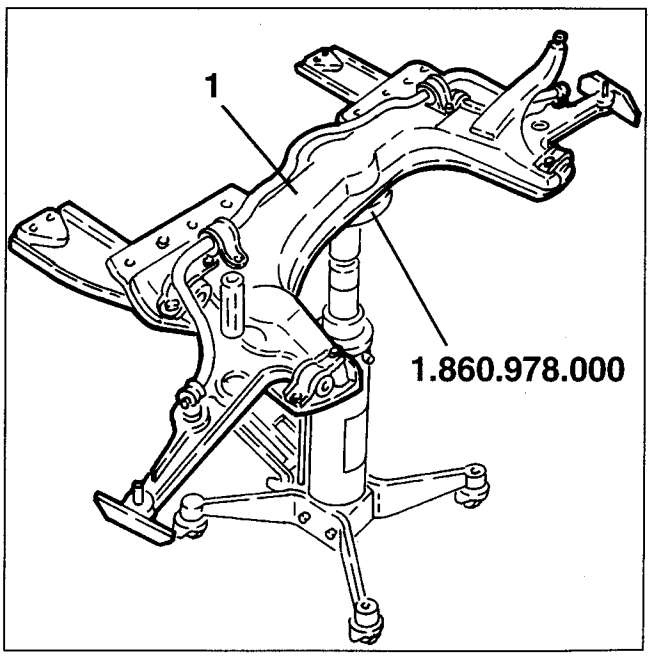
1. Raise the car and slacken the bolts fastening the wishbones to the wheel uprights.



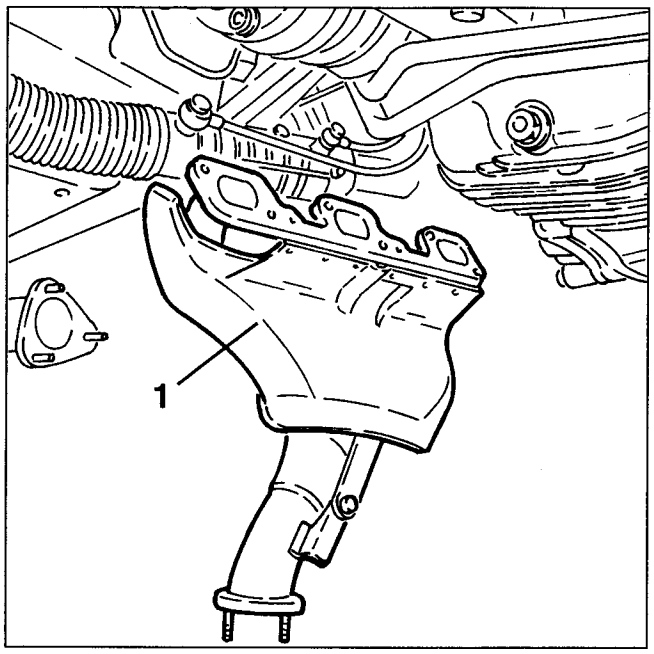
1. Position a hydraulic jack under the gearbox as illustrated.
2. Slacken the fastening screws and remove the rear power unit support.



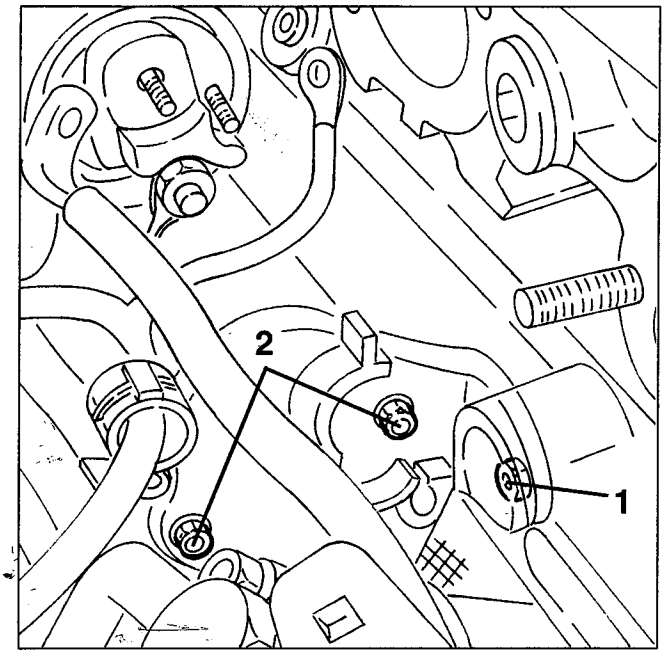
- Using a hydraulic jack support the cross rail using tool no. 1.860.978.000.
1. Slacken the cross rail fastening nuts and screws, then remove it complete with wishbones, stabiliser bar and reinforcements.



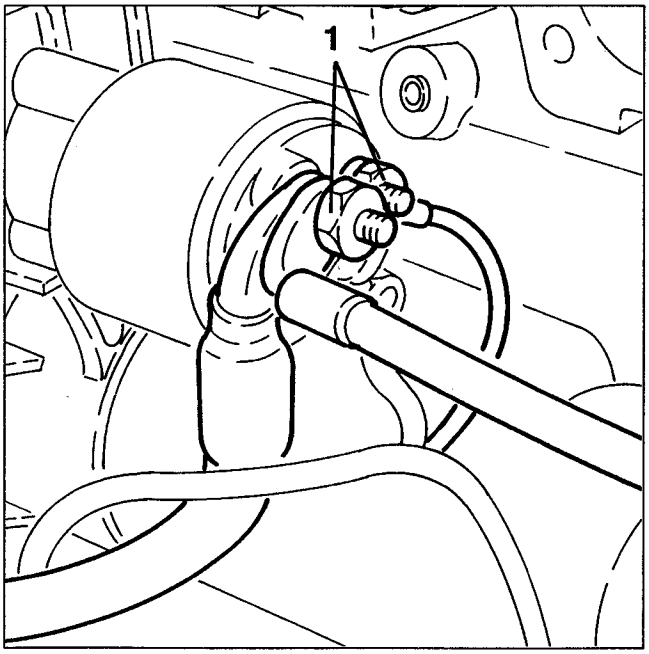
1. Recover the exhaust manifold from the right cylinder head complete with heat shields.



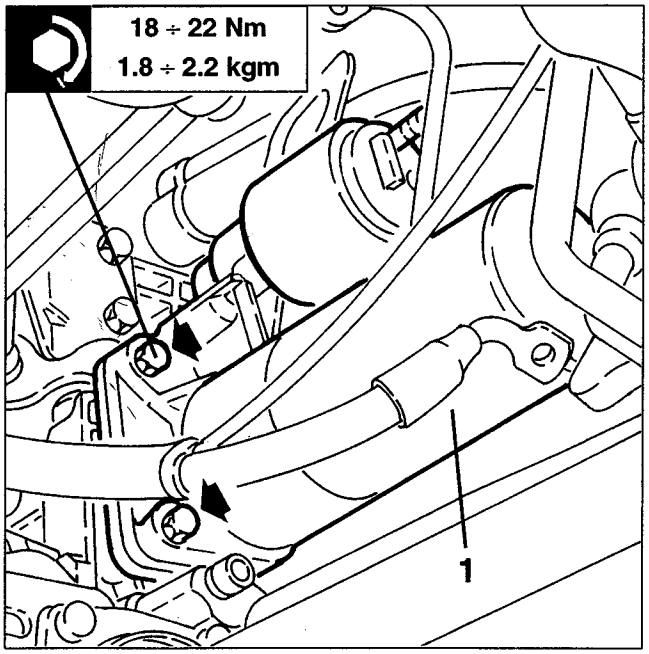
1. Slacken the nut fastening the rear starter motor bracket to the oil filter support.
2. Slacken the two nuts fastening the rear bracket to the starter motor.



1. Disconnect the electrical connections from the starter motor.



1. Slacken the fastening screws and remove the starter motor complete with rear bracket.



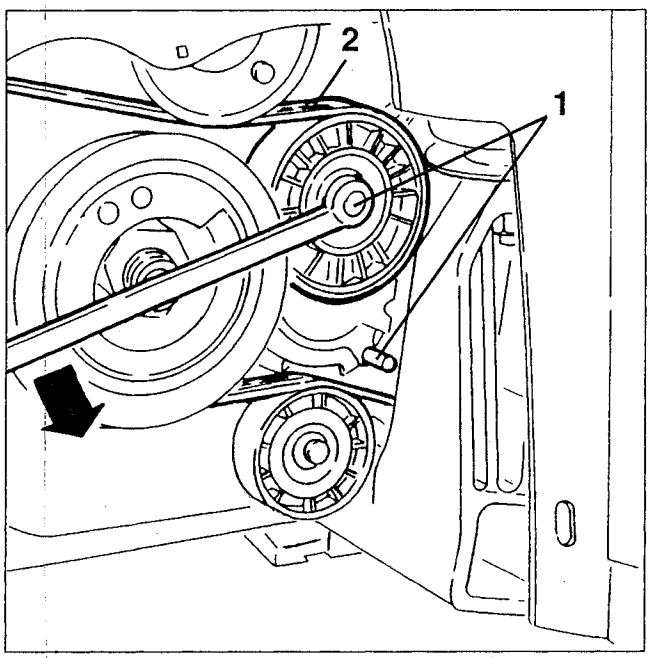
ALTERNATOR

When the engine is running the alternator supplies electric energy to the electronic control units and to the different services that may be activated at all times.
It also supplies the charge to the battery, for dlivering current when the engine is not running.
The electric current is produced by a stator which "cuts" the magnetic field generated by a rotary winding (rotor). The rotor is integral with a pulley operated directly by the crankshaft through a belt. The contact brushes supply the rotor with energising current.
The alternate current generated by the alternator is rectified by the diodes and regulated by the voltage regulator, located on the body of the alternator.
The electronic voltage regulator used, which is compact in size, ensures a constant voltage in all the operating fields of the engine, with the highest number of changes in loadand speed.
A double internal cooling fan turns together with the pulley and allows the alternator to avoid reaching dangerous temperatures that would adversely affect it.
The alternator fitted is of the type with clawed poles with collector rings; it is extremely compact and light weight.
WARNING: The fan cools the alternator correctly if it turns clockwise (seen from the pulley side).

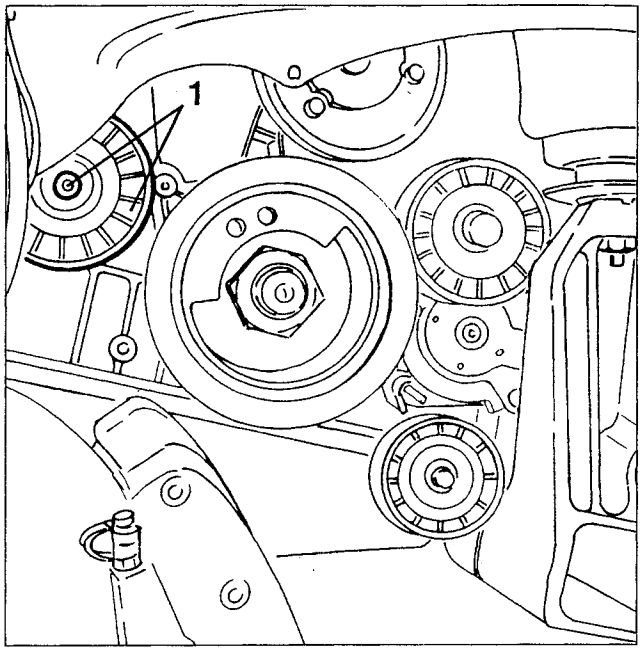
REMOVING/REFITTING

- Set the car on a lift.
- Remove the front wheels and mud flaps.

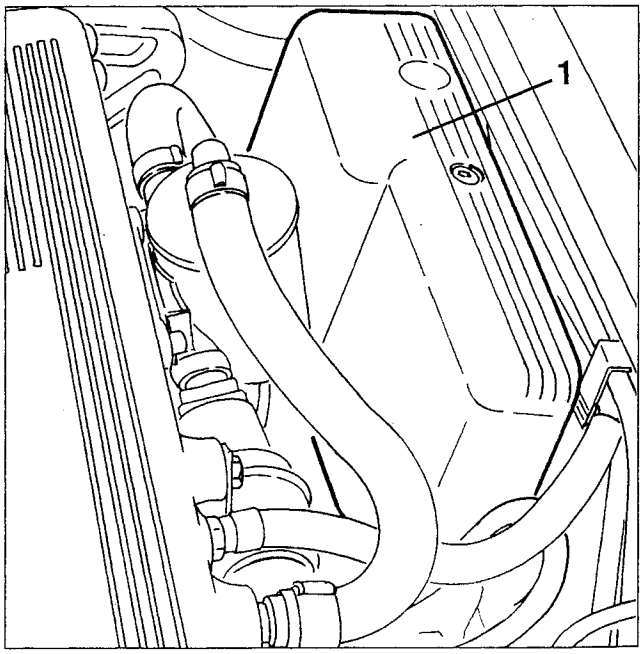
1. Using a wrench on the belt tensioner pulley screw, overcome the force of the automatic tensioner and lock it in this position (belt slack) inserting the special peg as illustrated.
2. Prise and remove the auxiliary components drive belt.



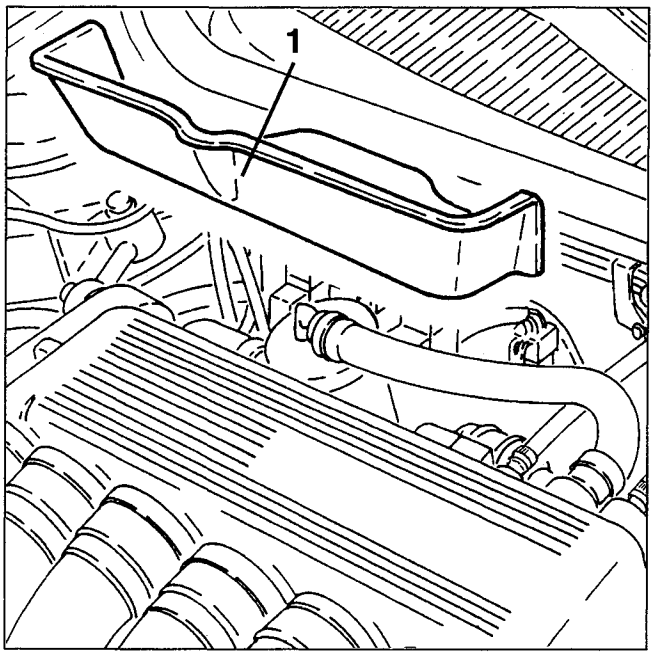
1. Slacken the fastening screw and remove the auxiliary components drive belt guide pulley.



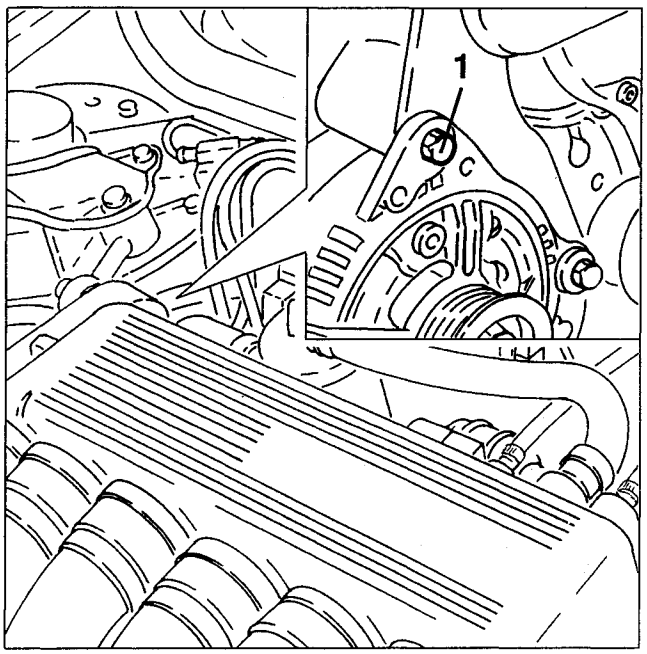
1. Lower the car and remove the plastic cover protecting the relays, fuses and electrical connections.



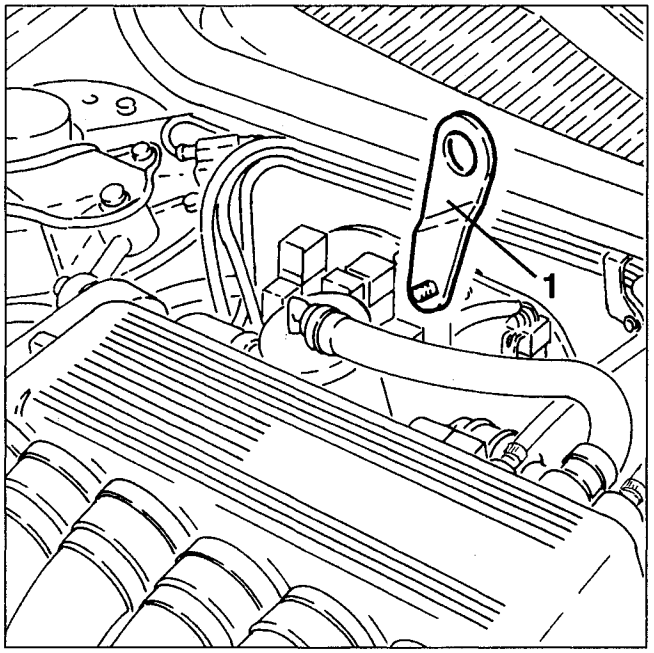
1. Slacken the fastenings and remove the heat guard.



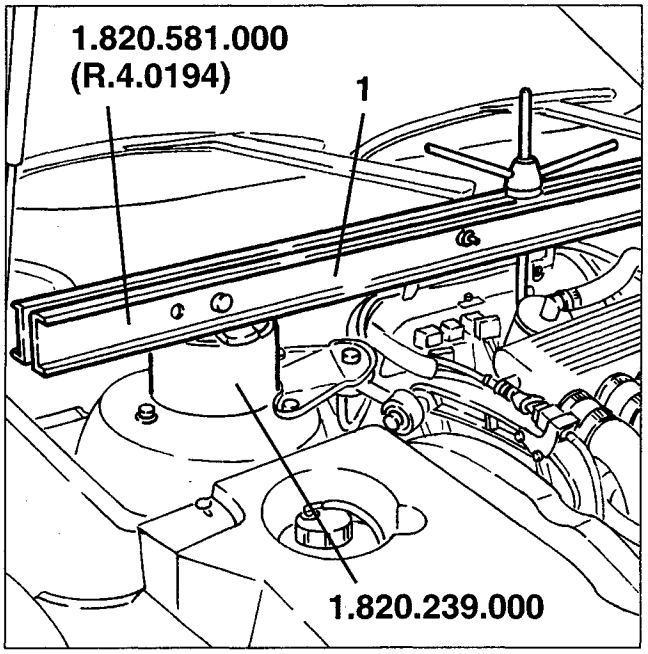
1. Slacken the upper screw fastening the alternator to the support bracket.



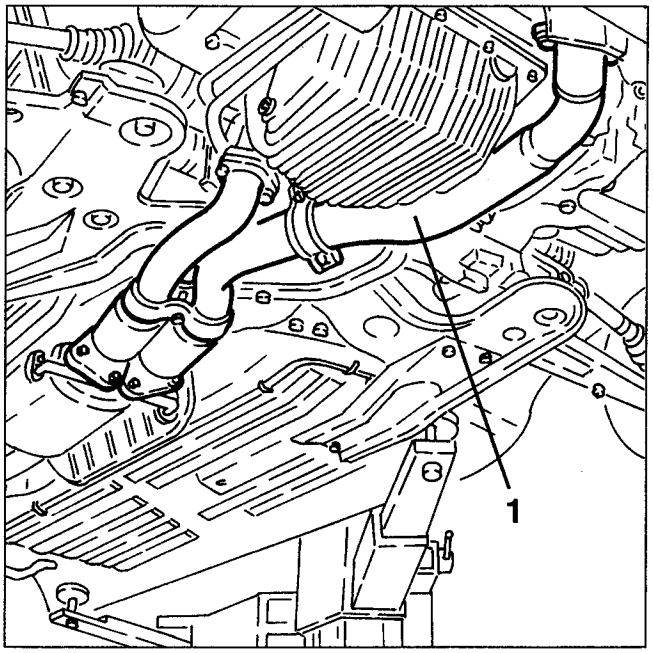
1. Install a special engine support bracket on the cylinder head.



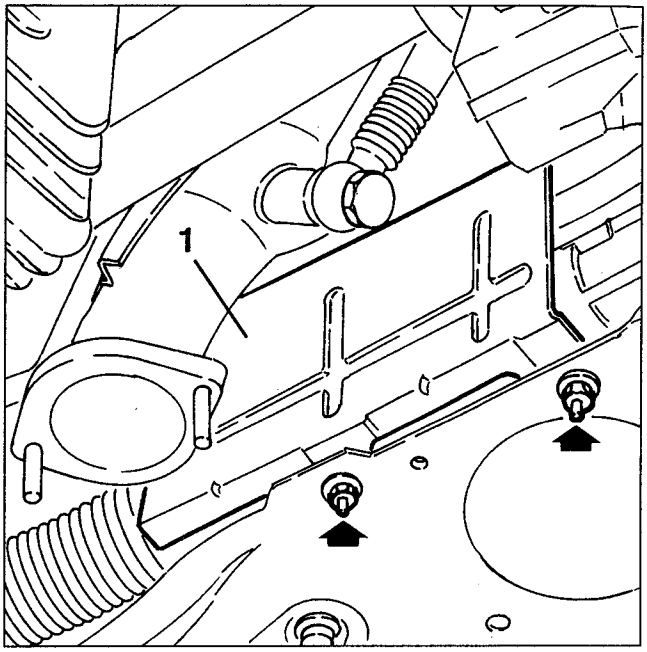
1. Install crossmember no. 1.820.581.000 (R.4.0194) complete with supports no. 1.820.239.000 for supporting the power unit.



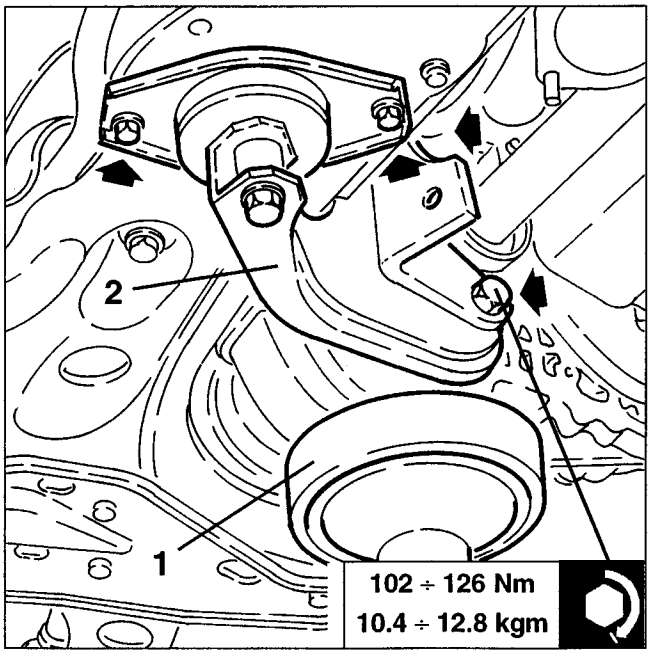
1. Raise the car and remove the front section of the exhaust pipe.



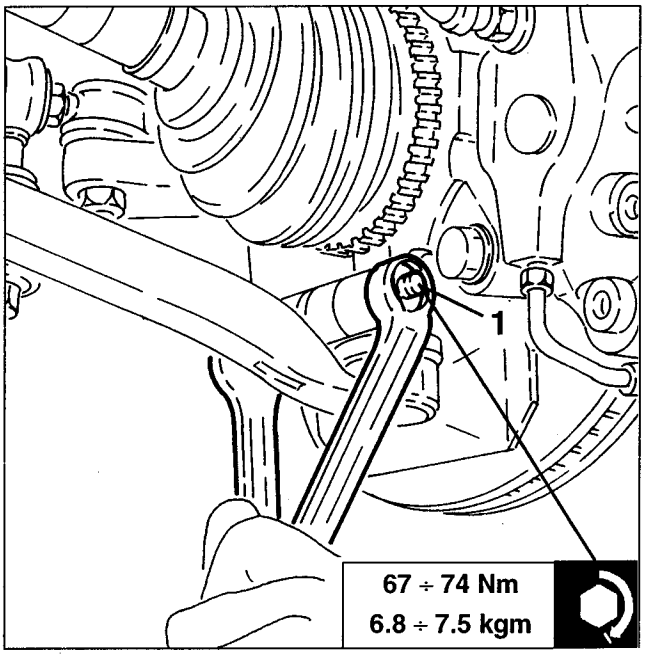
1. Slacken the fastenings and remove the heat guard of the power steering box.



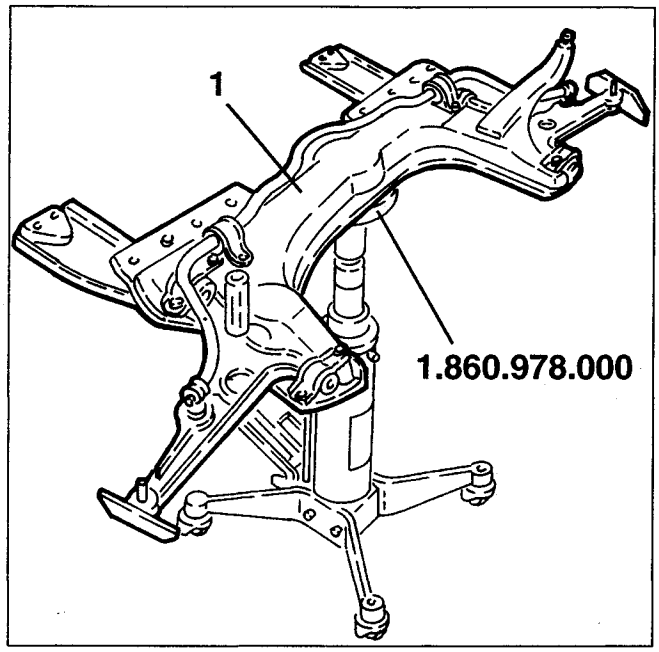
1. Position a hydraulic jack under the gearbox as illustrated.
2. Slacken the fastening screws and remove the rear power unit support.



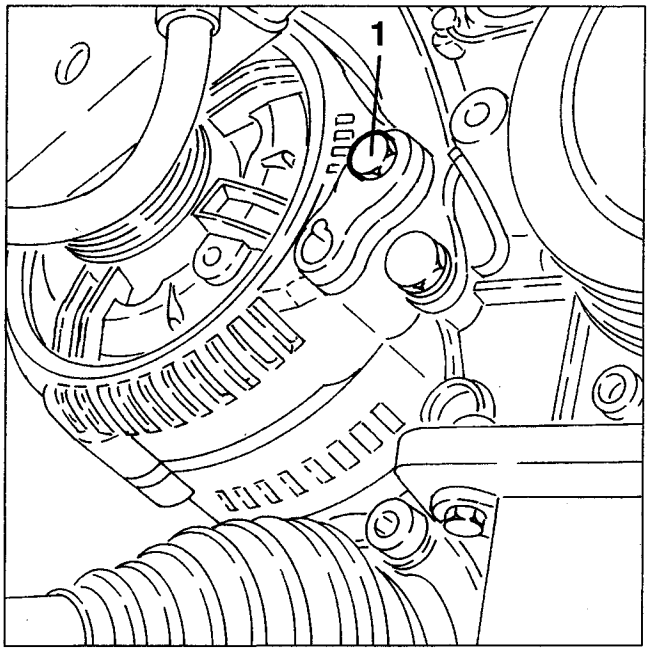
1. Slacken the bolts fastening the wishbones to the wheel uprights.



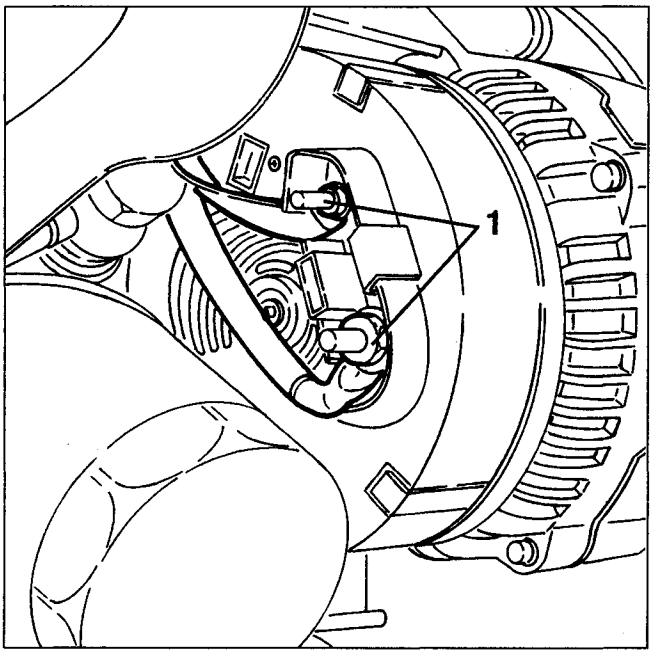
- Using a hydraulic jack support the crossmember using tool no. 1.860.978.000.
1. Slacken the screws and nuts fastening the crossmember, then remove it complete with wishbones, stabiliser bar and reinforcements.



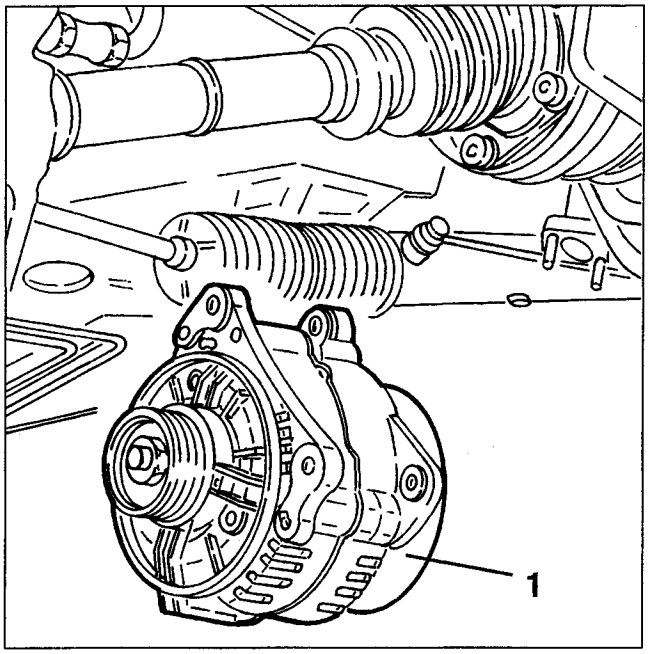
1. Slacken the lower alternator fastening screw.



1. Disconnect the electrical connections from the alternator.



1. Remove the alternator releasing it from its support bracket.



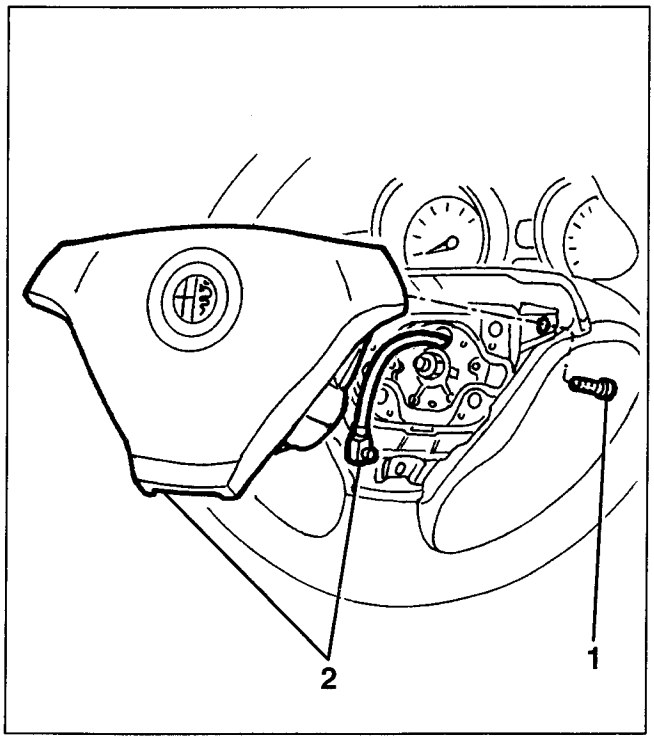
AIR BAG AND PRETENSIONERS

DRIVER'S AIR BAG

REMOVING/REFITTING

- **Before working on the system, closely follow the RULES OF SAFETY given in "Group 55 - ELECTRIC SYSTEM DIAGNOSIS", Section "Air Bag and pretensioners".**
  In particular disconnect both battery terminals, isolate them accurately and wait for 10 minutes before starting to work.
- **If necessary carry out system diagnosis using the ALFA TESTER, disconnect the Air Bag module and replace it with the special dummy resistance (see "Group 55 - ELECTRIC SYSTEM DIAGNOSIS" - Section "Air Bag and Pretensioners").**

1. Slacken the three screws fastening the Air Bag module to the steering wheel.
(N.B. a special Torx wrench should be used).
2. Working with care, disconnect the electrical connection and remove the module.



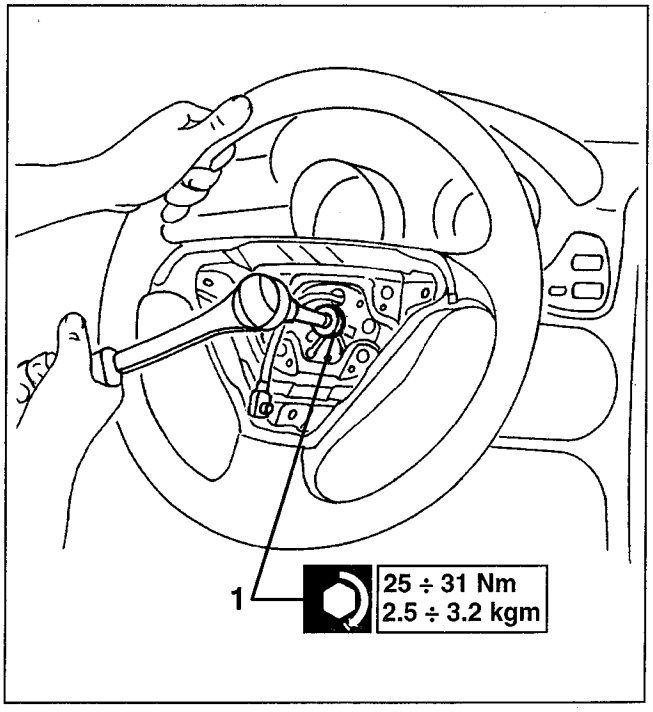
CLOCK SPRING DEVICE

REMOVING/REFITTING

Also for the clock spring device it is necessary to closely follow the RULES OF SAFETY given in "GROUP 55 - ELECTRIC SYSTEM DIAGNOSIS", Section Air Bag and Pretensioners".

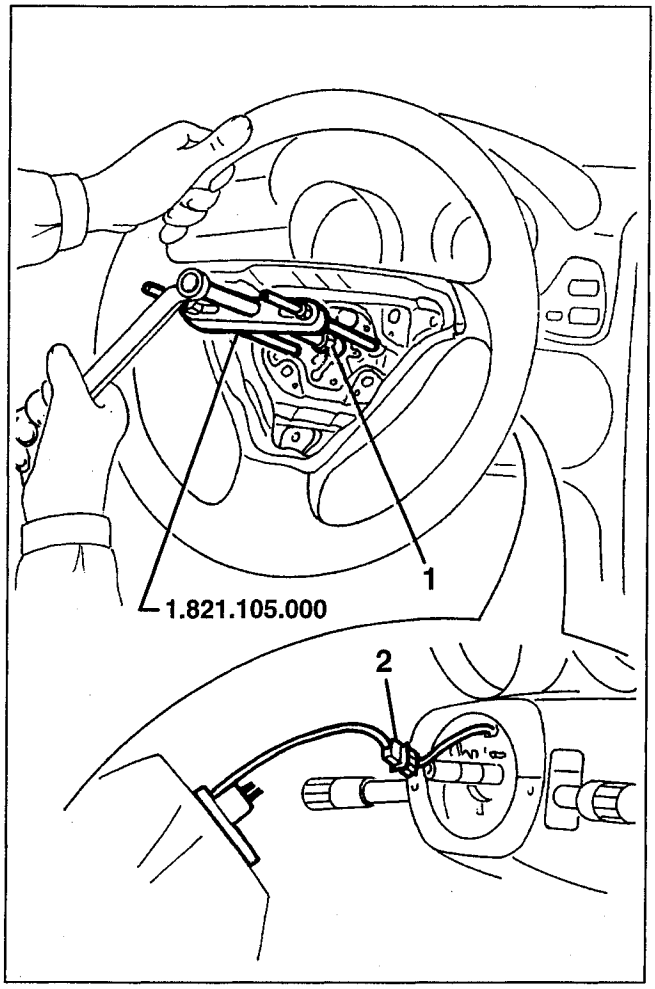
– Remove the Air Bag module.
1. Remove the steering wheel centre fastening nut.

NOTE: before carrying out this operation make sure that the wheels are perfectly straight.

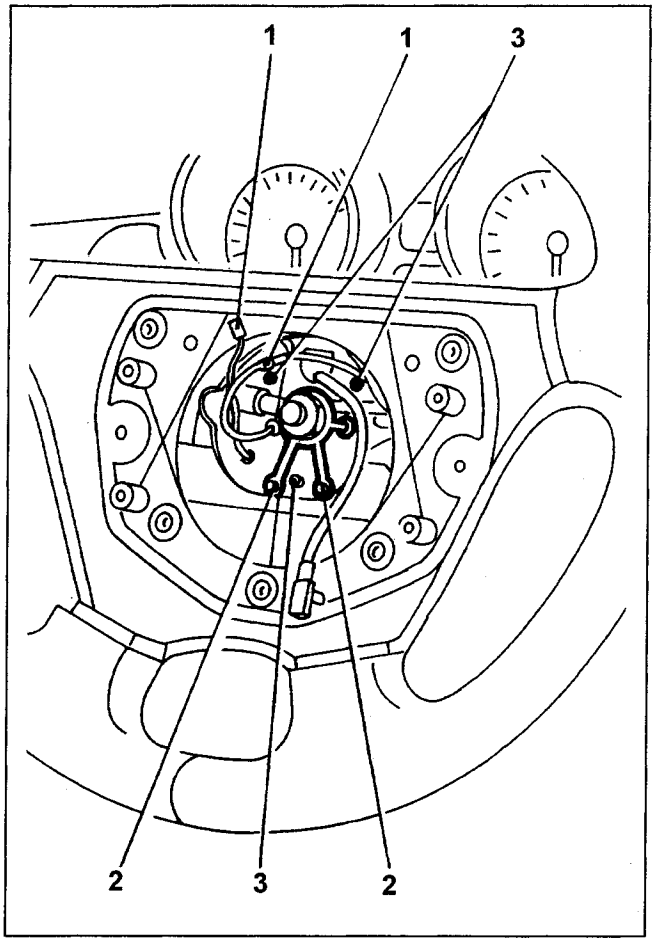


1. Using tool no. 1.821.105.000 remove the steering wheel from the steering column.
2. Disconnect the connection of the clock spring.

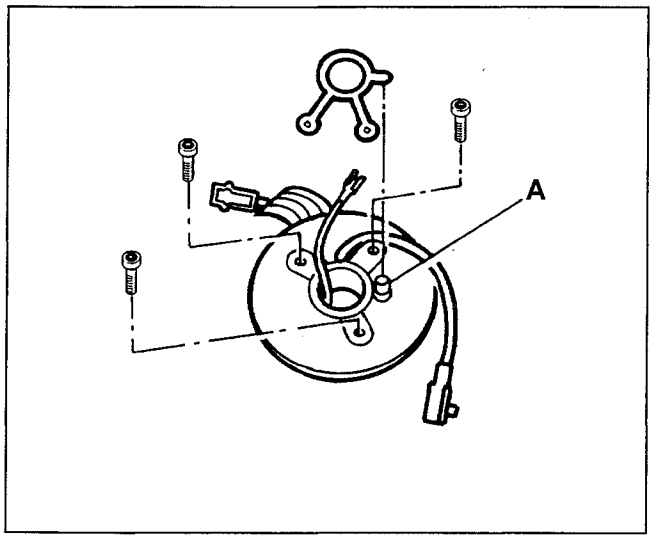
WARNING:
During ths phase be very careful not to turn the clock spring with respect to the steering wheel because the device is locked only when it has been separated from the steering wheel (see next step). Therefore it is advisable to keep the clock spring cable on the steering wheel with adhesive tape for example.



1. Disconnect the connections of the horns.
2. Slacken the two screws and remove the safety spring.
3. Slacken the three screws and remove the clock spring.



NOTE: After removing the safety spring, the clock spring is locked because the safety pin A comes out.



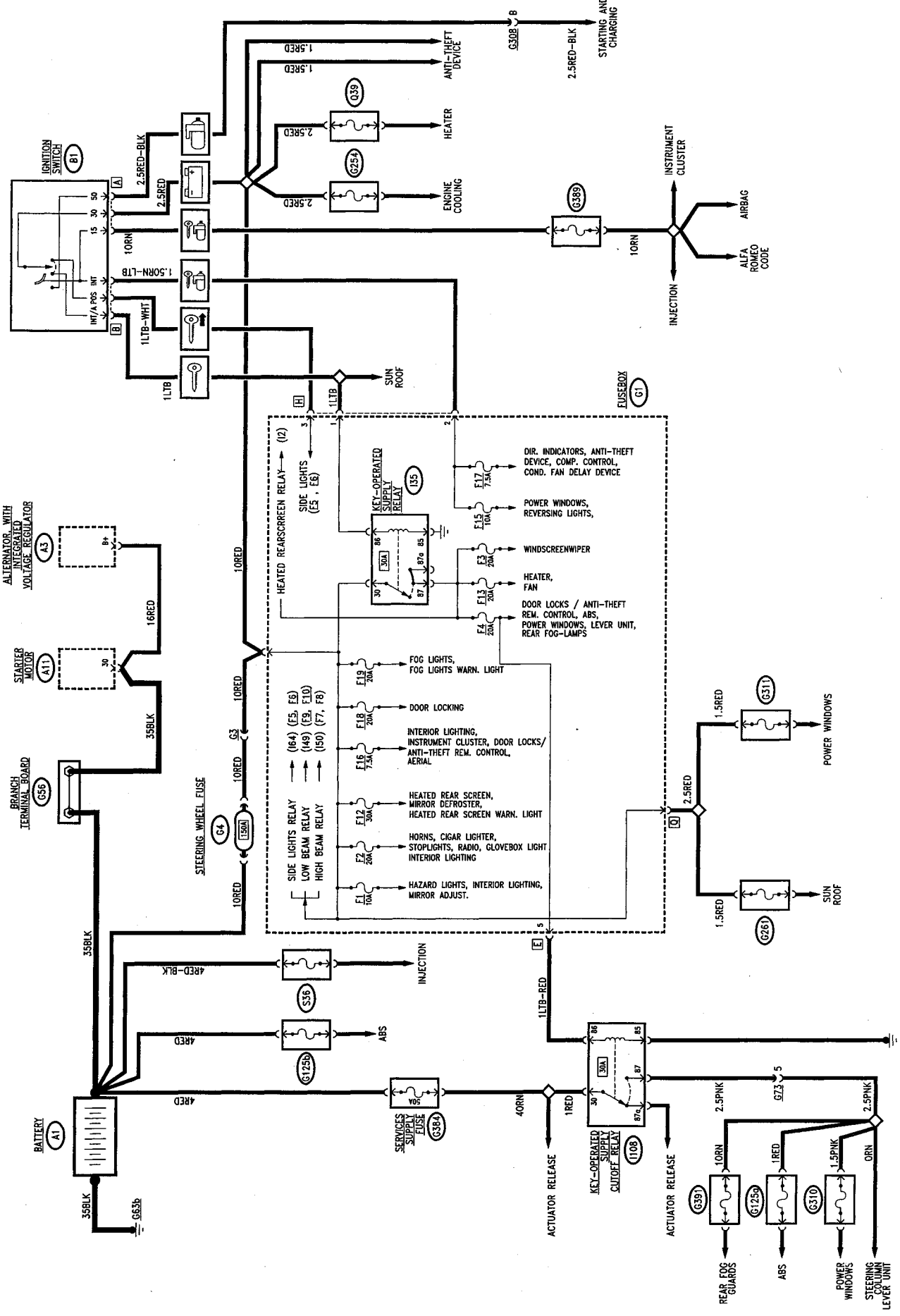
When replacing the clock spring with a **new** one, this is supplied already locked in the correct position by a clamp.
Fit it on the steering wheel as described previously, then remove the clamp and assemble the steering wheel on the steering column **after checking that the wheels are perfectly straight.**
With the device removed, if for any reason the upper plate turns with respect to the lower one - for example if the pin is pressed by accident - the exact position between the two plates is no longer known.
In this case turn the two plates to the end - pressing the pin - then rewind the cable for 3.5 turns: this position corresponds to half of the winding and makes it possible to assemble the device with the wheels perfectly straight.
When in doubt, replace the device.

ELECTRIC SYSTEM OF THE CAR - POWER SUPPLY

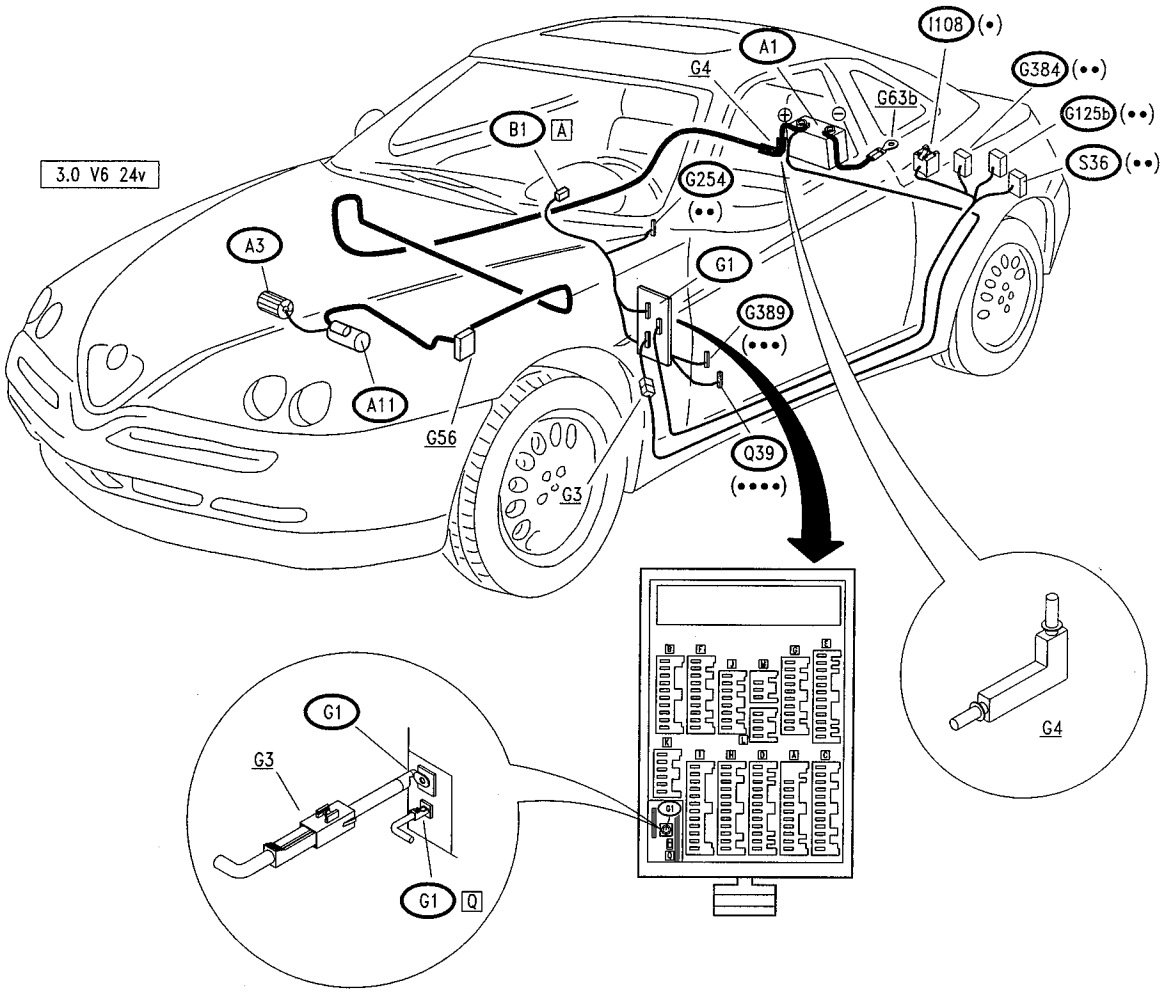
INDEX

(*) See the corresponding section of "Spider - Gtv - ELECTRIC SYSTEM DIAGNOSIS". For item involving the engine refer to the 3.0 V6 engine.

SUPPLY WIRING DIAGRAM



LOCATION OF COMPONENTS



(•) Blue base
(••) Black fuseholder
(•••) Red fuseholder
(••••) Green fuseholder

LOCATION OF EARTHS

INDEX

GENERAL DESCRIPTION

The following diagrams show the different earths on the vehicle and the cable connected for each of them; each cable is marked with the circuits to which it refers with the components that is earthed through that line.

The earths shown are the following:

- **G53a** RH engine compartment earth
- **G53b** LH engine compartment earth
- **G55b** Earth on left wing (*)
- **G63b** LH rear earth (*)
- **G92** Earth for electric aerial (*)
- **G131** Erth on engine upper cover
- **G148b** Earth under LH dashboard (*)
- **G381** Earth for Airbag (*)

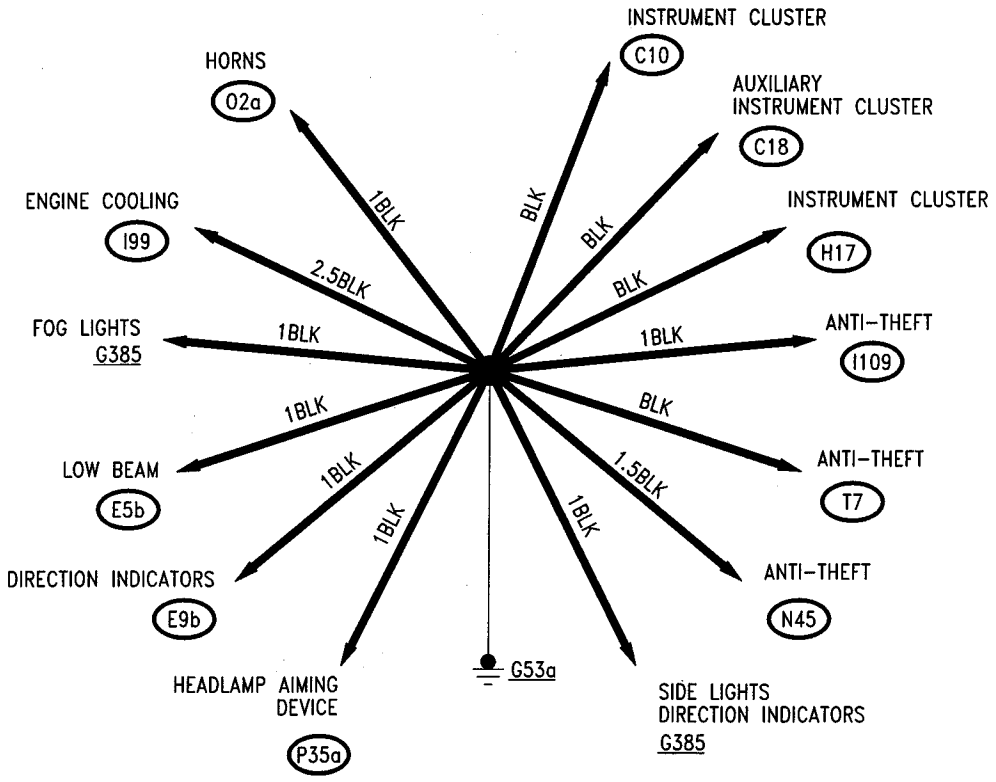
There is also an **earth braid**, which connects the power unit to the body.

NOTE: With these diagrams it is easy to locate the circuits which are connected to earth by the same line: this simplifies fault finding work in the case of problems involving more than one system: for example oxidation of an earth may put different circuits and many functions "out of service" at the same time.

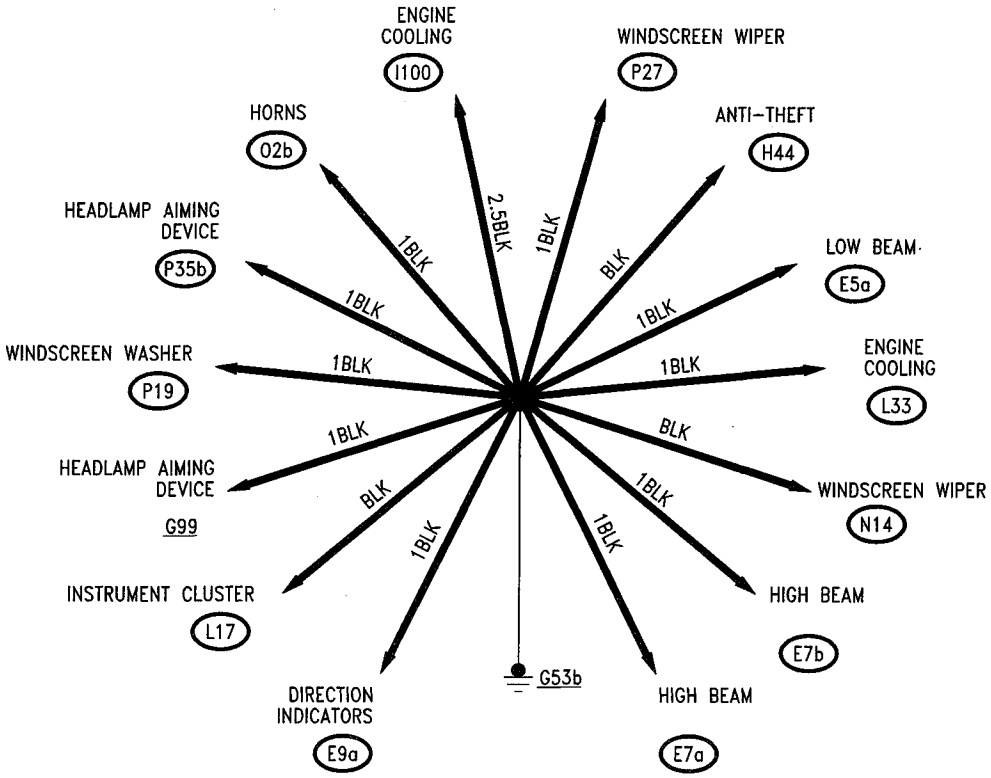
(*) See the corresponding earth in the section "*Spider-Gtv* - ELECTRIC SYSTEM DIAGNOSIS".

WIRING DIAGRAMS

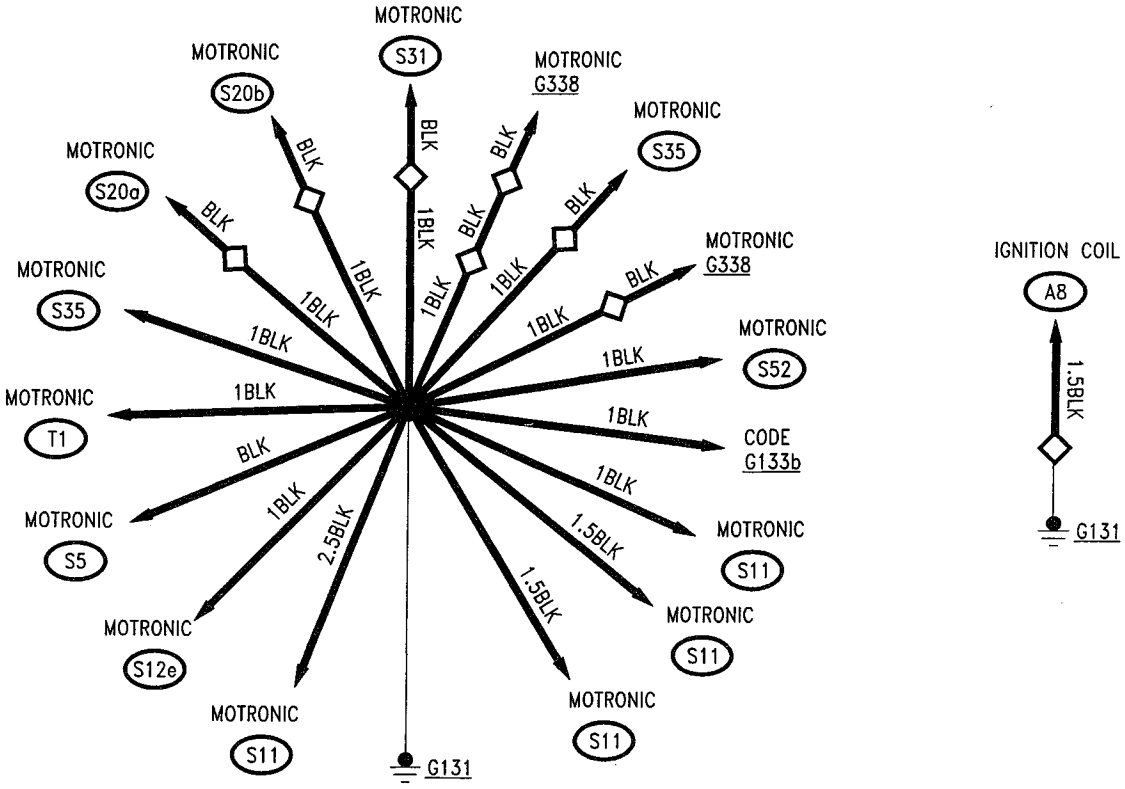
G53a



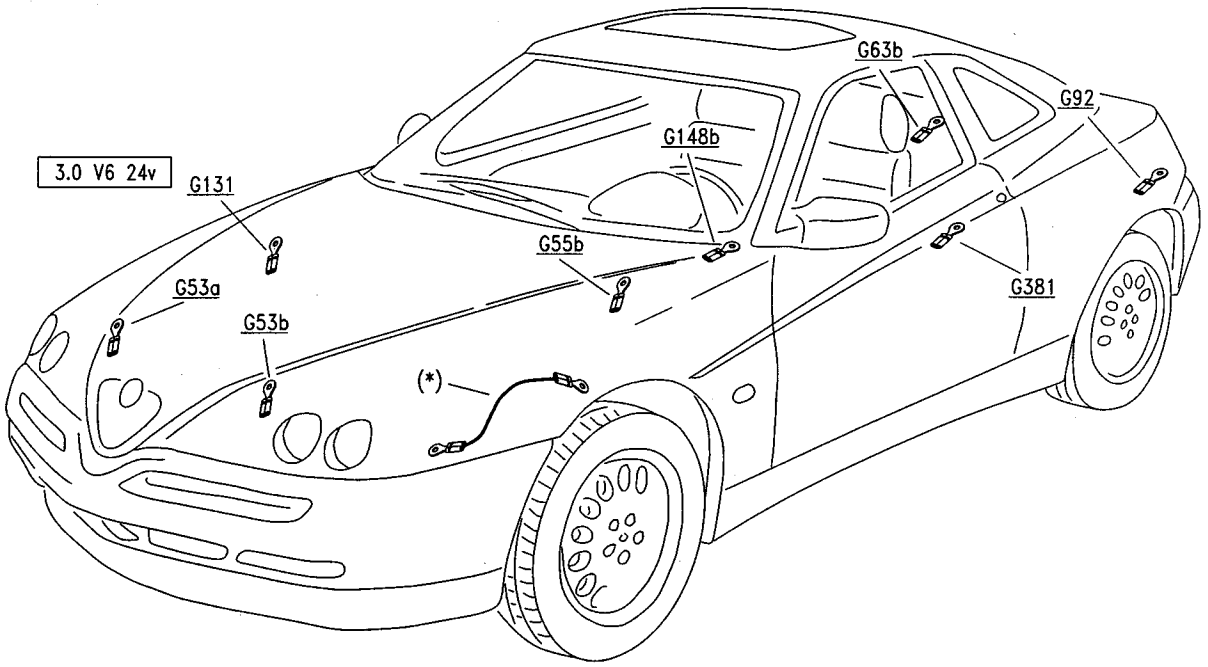
G53b



G131 (3.0 V6 24v engine)



LOCATION OF EARTHS ON THE CAR



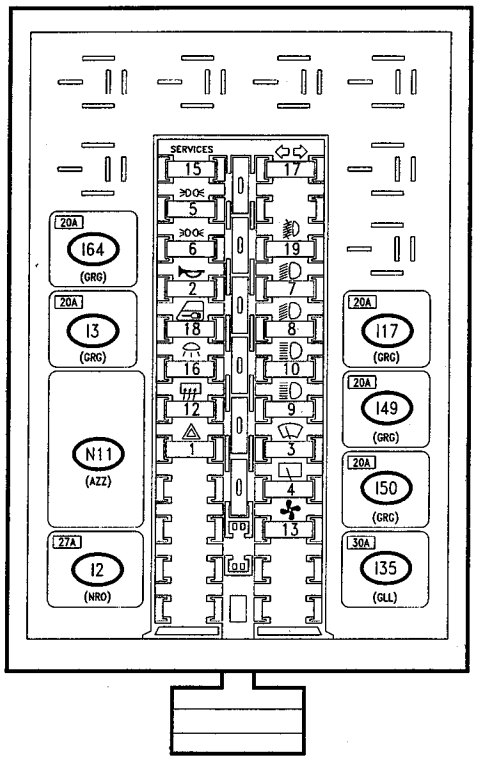
(*) earth braid between gearbox and body

FUSEBOX

INDEX

(*) See the corrresponding section of "Spider-Gtv - ELECTRIC SYSTEM DIAGNOSIS". For item involving the engine refer to the 3.0 V6 engine.

FUSEBOX

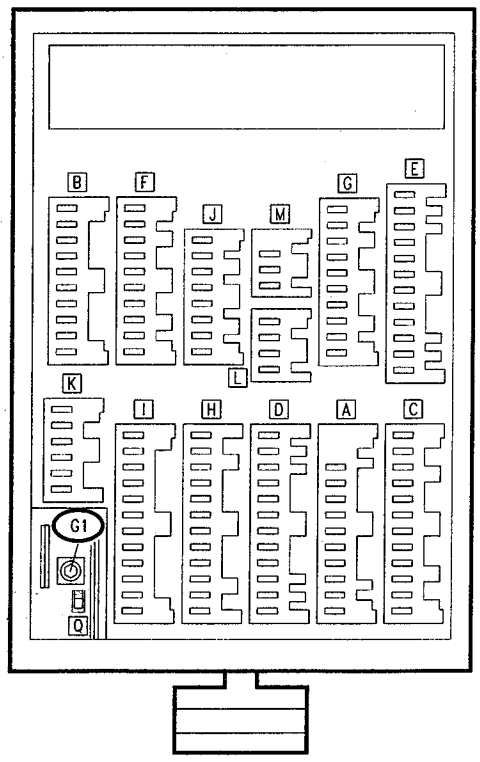


LOCATION OF FUSES AND RELAYS

RELAYS

I2 heated rearscreen relay
I3 horn relay
I17 fog lamp relay
I35 key-operated supply relay
I49 low beam relay
I50 high beam relay
I64 sidelights relay
N11 Door locking control unit

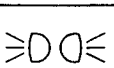
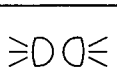
FUSES (see following page)



REAR VIEW, CONNECTOR SIDE

G1:
fusebox supply
Connector Q:
direct supply for other services
Connectors A,I:
Front wiring
Connectors B,D,F,G,H,L,M:
Dashboard wiring
Connectors C,E:
Rear wiring
Connector K:
provision for trailer
Connector J:
provision for bridge for specific regulations (daylights, fog lights, etc..)

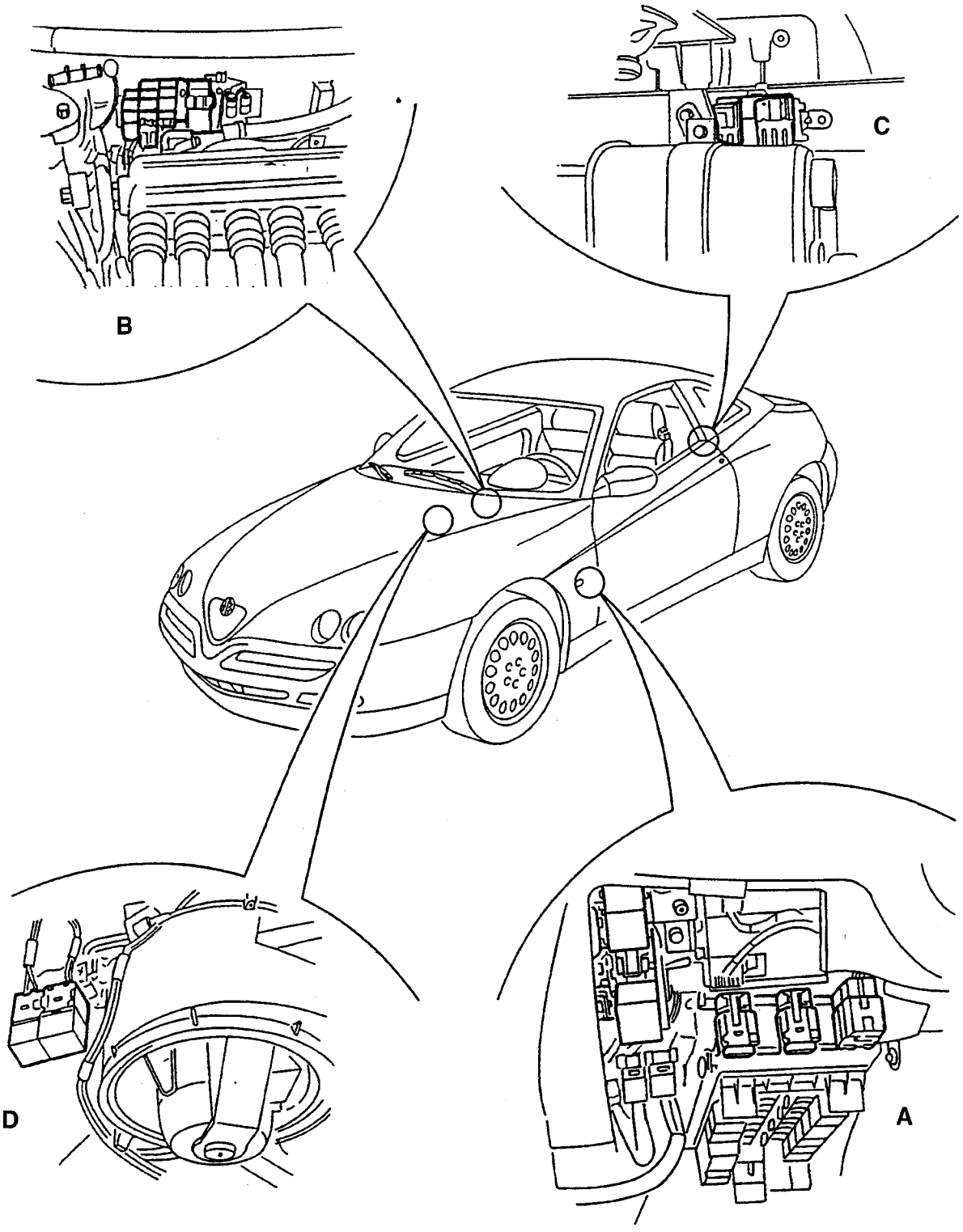
FUSES

FUSE			SUPPLY	SERVICES PROTECTED
SIMBOLO	N°	AMP.		
	1	10A		Hazard warning lights, roof lamps, Door mirror adjustm.
	2	20A		Horns, cigar lighter, stop lights, radio, gtlove box light, roof lamps
	3	20A	 (135)	Windscreen wiper
	4	20A	 (135)	Door lock/alarm remote control, ABS, power windows, lever unit supply, rear fog guards
	5	10A	 (164)	Cluster lighting, controls lighting, LH rear sidelights, RH no. plate light, RH front sidelight, headlamp aiming device
	6	10A	 (164)	Controls lighting, RH rear sidelight, LH no. plate light, LH front sidelight, sidelights warning light
	7	10A	 (149)	RH low beam
	8	10A	 (149)	LH low beam
	9	10A	 (150)	RH high beam
	10	10A	 (150)	LH high beam, high beam warning light
	11	--		NOT USED
	12	30A		Heated rearscreen, mirror defroster, rearscreen/defroster warning light
	13	20A	 (135)	Heater, fan
	14	--		NOT USED
SERVICES	15	10A		Power windows, reversing lights
	16	7.5A		Front roof lamp and boot light, instr. cluster, door locking remote control, electric aerial
	17	7.5A		Direction indicators, alarm control unit, compressor control, engine fan control
	18	20A		Door locking device
	19	20A		Fog lamps, fog lamp warning light

LOCATION OF FUSES AND RELAYS IN THE CAR

This page shows the location in the car of all the fuses and relays which are not to be found in the fusebox.

The fuses and relays may be distinguished by the colour of the base (fuse holder or relay holder) which connects them to the wiring, as specified in the following tables.
In addition to the colour of the base, it is at all events wise to check the exact location of a relay or fuse by the colour of the wires that converge on it (for thes, see the corresponding wiring diagram).



FUSES AND RELAYS ON THE AUXILIARY BRACKET (see position A)

A set of fuses and relays is located on an auxiliary bracket (not removable) at the left of the main fusebox; next to this there is also the power window control unit **N38**, the electronic key control unit **N77** and the windscreen wiper electronic device **N14**.

COMPONENT	AMP.	CODE	COLOUR BASE
roof lamp relay	20A	**I26**	Green
Hazard warning light and direction indicator intermittence	-	**N13**	Black
Rear fog guard device	-	**N25**	White
Engine cooling fan 1st speed relay	30A	**I99**	Yellow
Engine cooling fan 2nd speed relay	50A	**I100**	Black
Sunroof relay relay	30A	**I58**	Red
ABS fuse	10A	**G125a**	Black
power window fuse	25A	**G311**	White
RH power window fuse	25A	**G310**	White
Sunroof fuse	30A	**G261**	Green
Rear fog guard fuse	7.5A	**G391**	Brown
ALFA ROMEO CODE control unit fuse	10A	**G389**	Red
Air conditioning system wander fuse	30A	**Q39**	Green
Engine cooling fan delaying device	-	**Q42**	White

FUSES AND RELAYS IN THE ENGINE COMPARTMENT (See position B)

There is a set of fuses and relays in the engine compartment on the services tray partition.

COMPONENT	AMP.	CODE	COLOUR BASE
Alarm switch relay	20A	**I109**	Red
Engine fan fuse	50A	**G254**	Black
Main relay	30A	**S41**	Grey
Air flow meter relay	30A	**S12e**	Black
Fuel pump relay	30A	**S12a**	Black
Fuel pump fuse	15A	**S47**	Blue
Control unit supply fuse	7.5A	**S46**	Purple
Compressor control relay	20A	**Q22**	Grey
Compressor auxiliary relay	20A	**Q32**	Grey

FUSES AND RELAYS ON REAR BRACKET (See position C)

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

COMPONENT	AMP.	CODE	COLOUR BASE
Boot opening relay	20A	**I52**	Green
Fuel flap opening relay	20A	**I53**	White
Key-operated supply cut off relay	20A	**I108**	Blue
Services supply fuse	40A	**G384**	Black
ABS supply wander fuse	60A	**G125b**	Black
Injection wander fuse	40A	**S36**	Black

RELAYS ON HEATER/AIR DISTRIBUTOR UNIT (See position D)

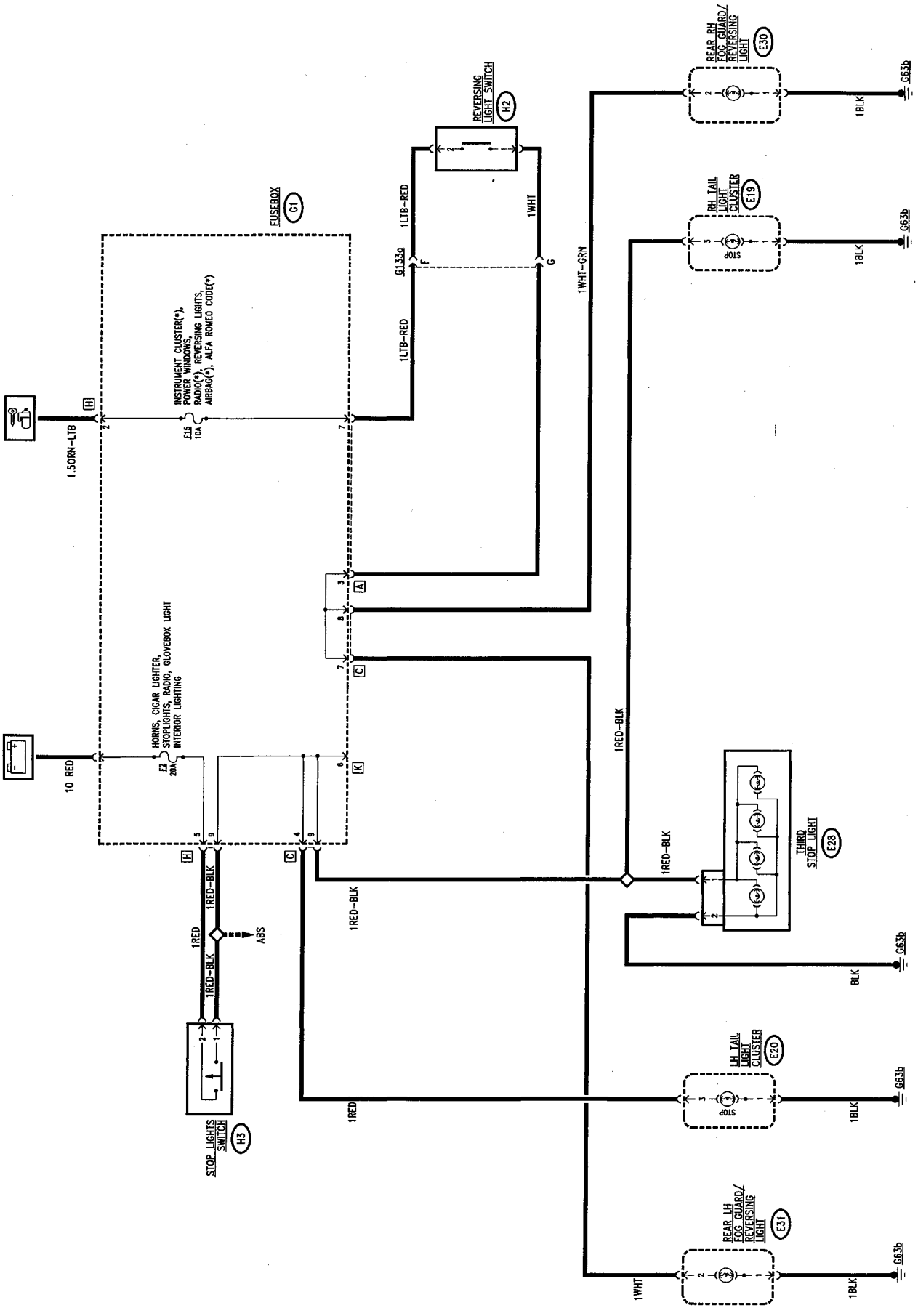
COMPONENT	AMP.	CODE	COLOUR BASE
Climate control fan relay	30A	**Q15**	Yellow
Climate control fan 1st speed relay	30A	**Q69**	Brown

STOP AND REVERSING LIGHTS

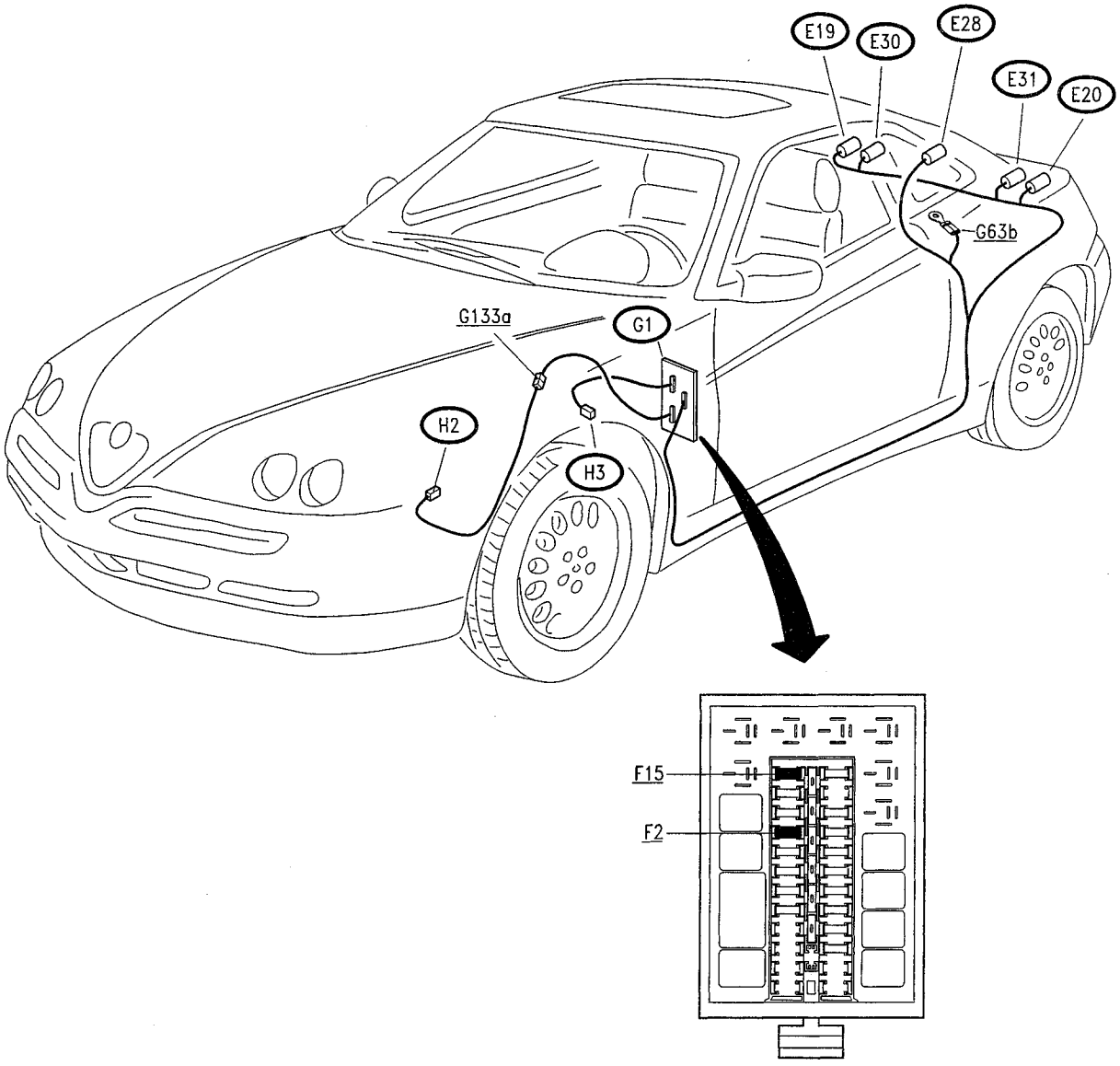
INDEX

(*) See the corresponding section of "Spider - Gtv - ELECTRIC SYSTEM DIAGNOSIS". For item involving the engine refer to the 3.0 V6 engine.

WIRING DIAGRAM



LOCATION OF COMPONENTS



INDICATORS AND WARNING LIGHTS

INDEX

(*) See the corrresponding section of "Spider-Gtv - ELECTRIC SYSTEM DIAGNOSIS". For item involving the engine refer to the 3.0 V6 engine.

AUXILIARY INSTRUMENT CLUSTER: INDICATORS AND WARNING LIGHTS

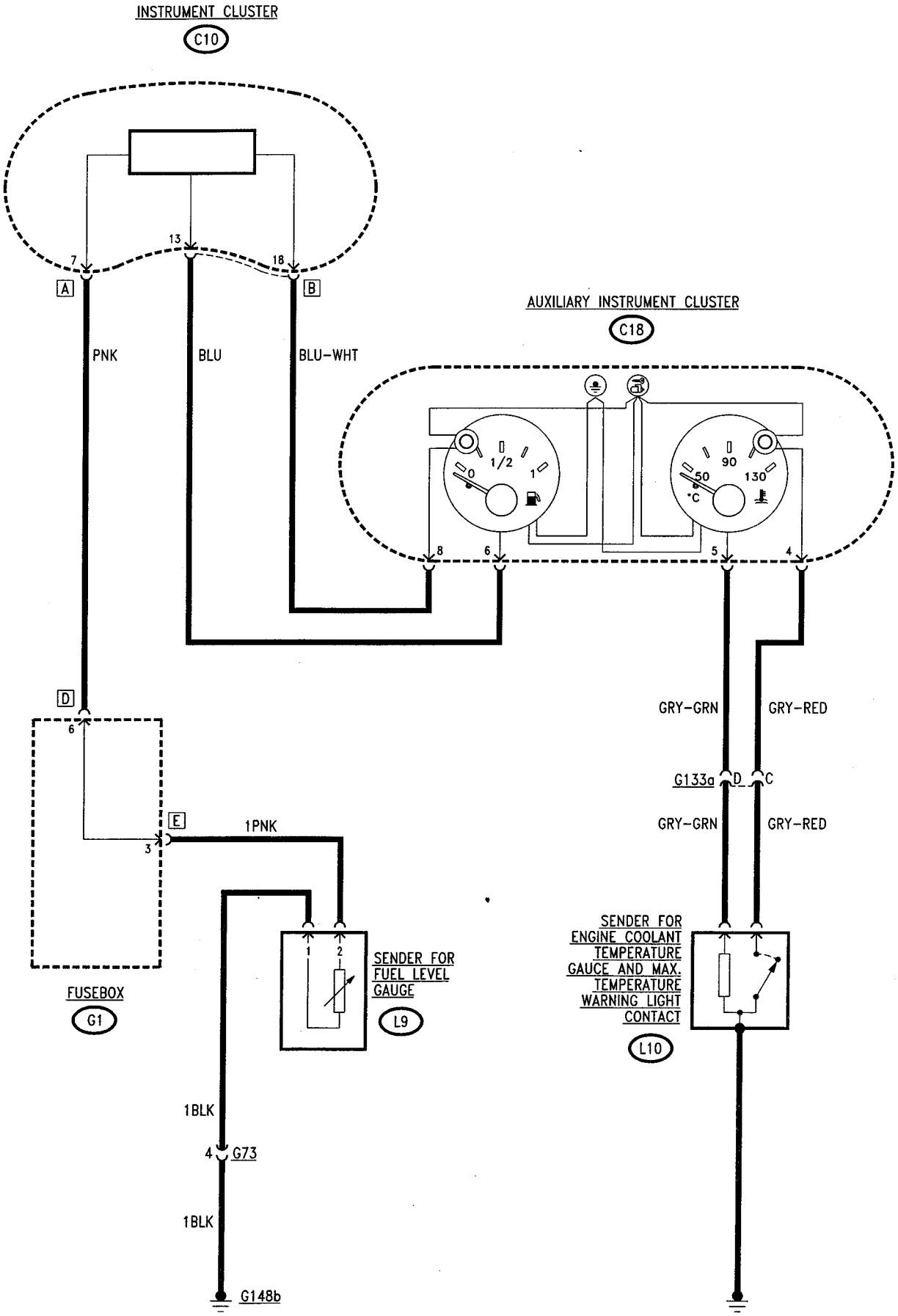
The auxiliary cluster **C18** contains two indicators with corresponding warning lights.

The **temperature of the engine coolant fluid** is continuously displayed by the special analogue indicator, while high temperature is indicated by the "**maximum coolant tenperature**" warning light " ".

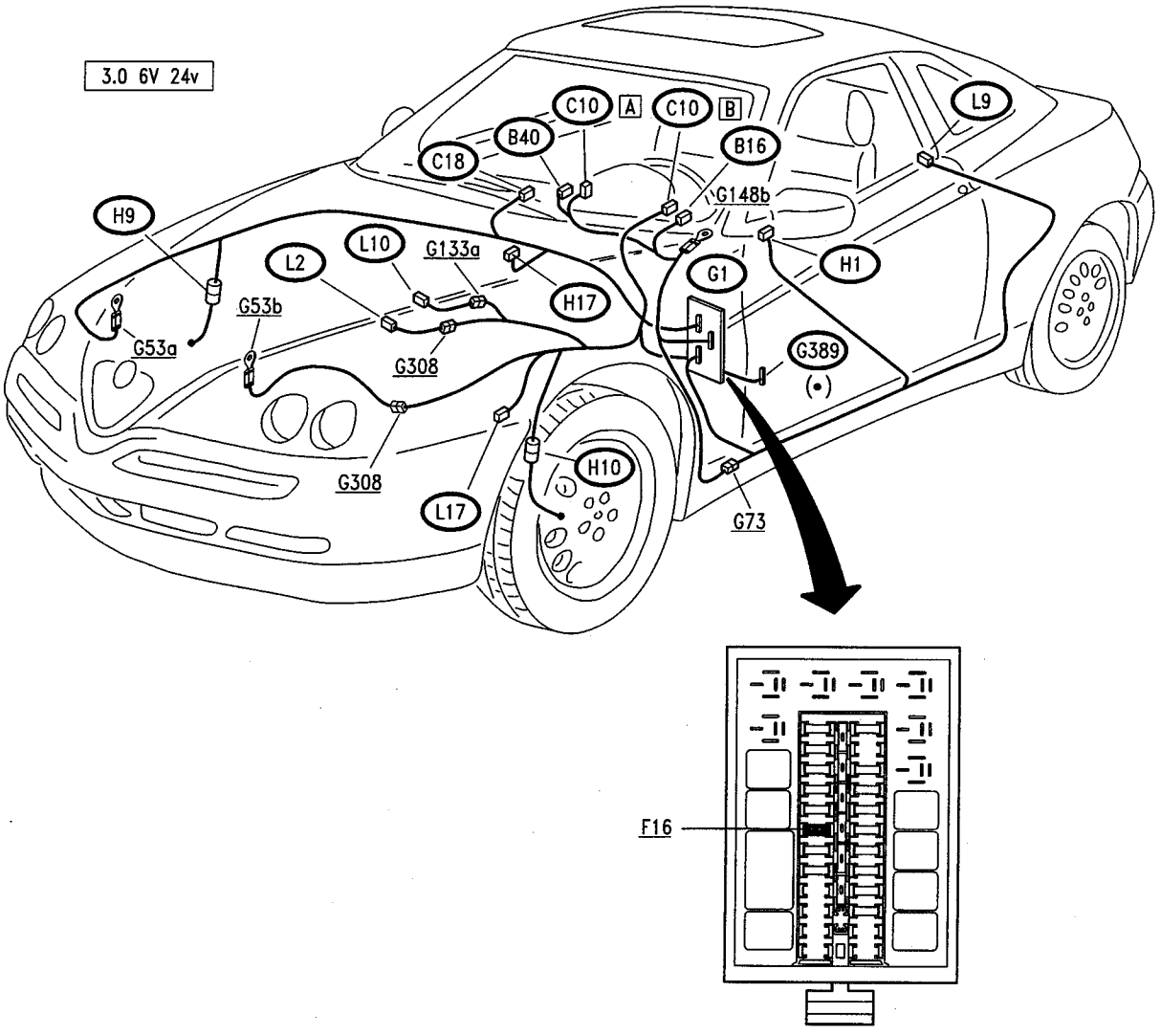
The engine coolant temperature transmitter and maximum temperature warning light contact **L10** is fitted on the engine head and comprises a thermistor which generates a signal proportionate with the temperature of the fluid and a contact that closes to earth when the temperature of the fluid gets too high. The first signal is sent to the cluster **C18** at pin 5, and the second to pin 14.

The **fuel level** transmitter **L9** is a sensor submerged in the fuel tank and its resistance changes as the level in the tank changes.
An earth signal reaches pin 1 of **L9**, while a signal proportionate with the level is sent from pin 2, through the fusebox **G1**, to the cluster **C10**, to pin 7 of connector A.
Inside the cluster **C10** an electronic device processes this signal and sends two pieces of information to cluster **C18**: the first proportionate with the **level**, from pin 13 of connector B of **C10** at pin 6 of **C18**; the second concerning the "**riserve**" from pin 18 of connector B of **C10** at pin 8 of **C18** .

Wiring diagram



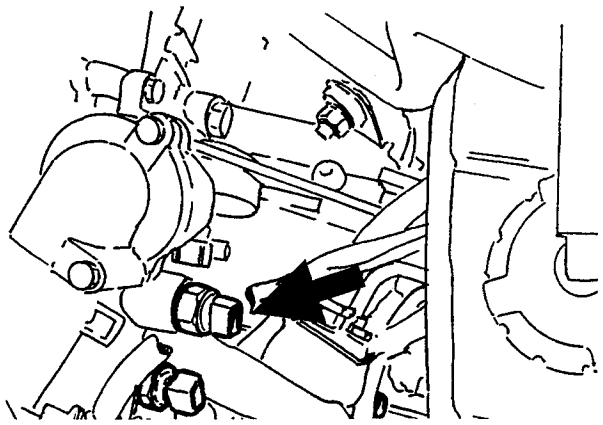
LOCATION OF COMPONENTS



(•) Red fuseholder

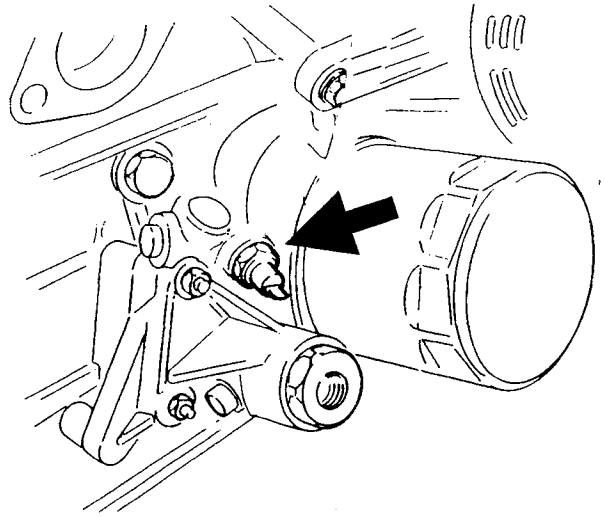
CHECK COMPONENTS

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



SPECIFICATIONS		
Transmitter		
Temperature °C	Resistance Ω	Type of test fluid
60	525 ÷ 605	Water
90	195 ÷ 215	Water
120	82 ÷ 94	Glycerine
Contact		
Contact closes	115 ± 3°C	
Contact opens	≥ 102°C	

Engine oil min. pressure contact (L2)



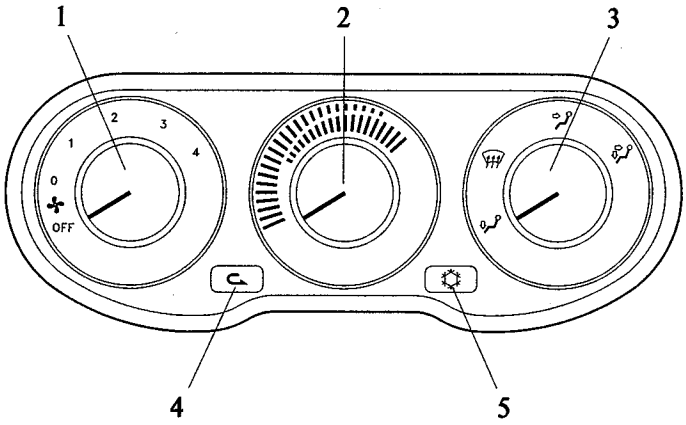
SPECIFICATIONS	
Contact closes (pressure falling)	0.15 ÷ 0.35 bar
Contact opens (pressure rising)	0.15 ÷ 0.35 bar

CLIMATE CONTROL: AIR CONDITIONER 

INDEX

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.



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

- the left hand knob (1) - operates - mechanically through a bowden cable - firstly opening of the ports which adjust the flow of air:
  - OFF: air inlet shut off
  - 0: inlet of outside air without fan (dynamic air)
  - from 1 to 4: a switch is controlled electronically 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 centre knob (2) mechanically operates the mixing port between warm air (red) and cold (blue); when turned completely to the left, 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 right knob (3) adjusts the distribution of the flow, acting on the distribution ports, still by mechanical transmission, sending the air into the passenger compartment in the directions shown on the pictograms.
- the special 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 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 smalls, smoke, unventilated tunnels, etc...)
- the special button (5) controls engagement of the cooling system which produces cold, dehumidified air.

Air cooling system:

This is a closed cycle 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 (as described below) and it is also 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.

NOTE:
For the 3.0 V6 24V engine a **variable displacement compressor** is used, which 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;

expansion valve, which suitably lowers the fluid pressure and temperature, aiding passage from fluid to vapour;

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

- it turns on the radiator fan when necessary (e.g. if the car is stationary) thereby preventing pressure increase at the condenser (cut in at 15 bar appr.);

– it stops the compressor, de-energising the electromagnetic joint, if the pressure reaches very high, thus dangerous ratings (over 28 bar appr.), or ratings too low to ensure correct operation (below 2.45 bar appr.);

Engine fan control:

In the case of low car speed the cooling carried out by the dynamic air on the condenser lowers and engagement of the two engine radiator cooling fans and of the condenser itself. This takes place through the three-level pressure switch which cuts in preventing an increase of the pressure at the condenser (over 15.2 bar).

Engagement of the engine fans takes place firstly at first speed, then through a special timer, the gradual passage to second speed takes place, avoiding sharp operation and electrical overloads at the contacts of the relays.

The delaying device works according to the following logic:

– The first speed engages with a signal leading from the pressure switch on the coolant fluid circuit: after appr. 8-12 seconds, if this signal persists, the delaying device operates the second speed.

– When the signal from the pressure switch ceases, it immediately disengages the second speed, while the delaying device still operates first speed for a maximum of 1 second.

Fuses and relays

The fuses and relays are grouped in the engine compartment, near those of the ignition/injection system:

– relay (**Q22**);

– relay (**Q32**);

– 50A fuse (**G254**);

or under the dashboard, on the bracket next to the fusebox:

– relay (**I99**);

– relay (**I100**);

– 30A fuse (**Q39**).

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

FAN AND RECIRCULATION CONTROL

Fan:

The climate control fan **Q1** is supplied through relay **Q15** and the line leading from fuse **G39**; the relay is energised with a "key- operated" signal with the line that crosses the ignition key services relay **I35** and fuse **F13** of the fusebox **G1**.

The fan motor **Q1** is operated with an earth signal leading from the control knob **Q4**. This signal crosses the speed regulator **Q5**, comprising three resistances in series the crossing of which determines the four different speeds, depending on the signal leading from the knob **Q4**: from pin 2 of connector B (1st speed), from pin 1 of connector B (2nd speed), from pin C of connector A (3rd speed) and lastly from pin B of connector A (4th speed) with a direct signal that does not cross the regulator **Q5**.

NOTE : the regolator **Q5** incorporates a thermometric safety switch which deactivates the circuit if, owing to over- voltage, 90±5°C is exceeded (it closes again when by appr. 10°C).

First fan speed, with compressor engaged:

With control **Q4** in position "0", the fan **Q1** is stationary but the first speed is operated if the compressor is engaged: in this case a special relay **Q69** commands fan supply at first speed. This relay is in fact energised by the signal (12V) that controls engagement of the compressor (from switch **Q68** through pins 7 and 8 of connector B of knob **Q4**) and sends a signal to the regulator **Q5** in correspondence with 1st speed.

Recirculation:

The recirculation function operates through the engagement of the motor **Q27**, according to the following supply logic:

- pin 2 of **Q27** always at earth;
- 12 V at pin 3 of **Q27**: the motor turns engaging recirculation;
- 12 V at pin 1 of **Q27**: the motor turns shutting off recirculation.

Engagement takes place via switch **Q68** but with switch **Q4** on "0", "1", etc...:

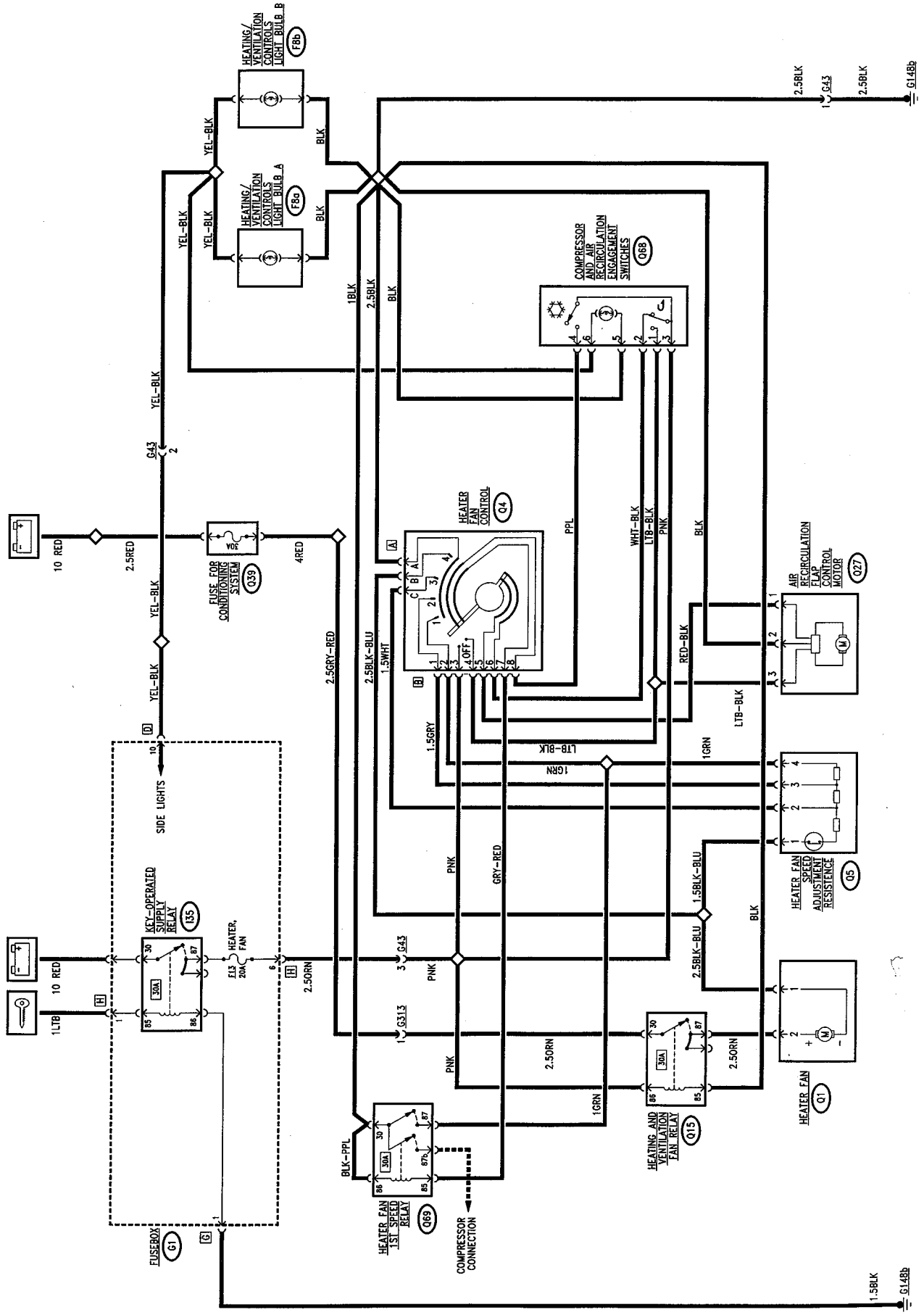
- switch **Q68** not pressed: recirculation not engaged;
- switch **Q68** pressed: recirculation engaged.

N.B.: With switch **Q4** at "OFF" recirculation is engaged, regardless of the position of switch **Q68**.

Controls lighting:

The lights **F8a** and **F8b**, inside the control panel, together with the led next to switch **Q68** are supplied by the sidelights circuit - connector D of fusebox **G1**.

Wiring Diagram



COMPRESSOR ENGAGEMENT

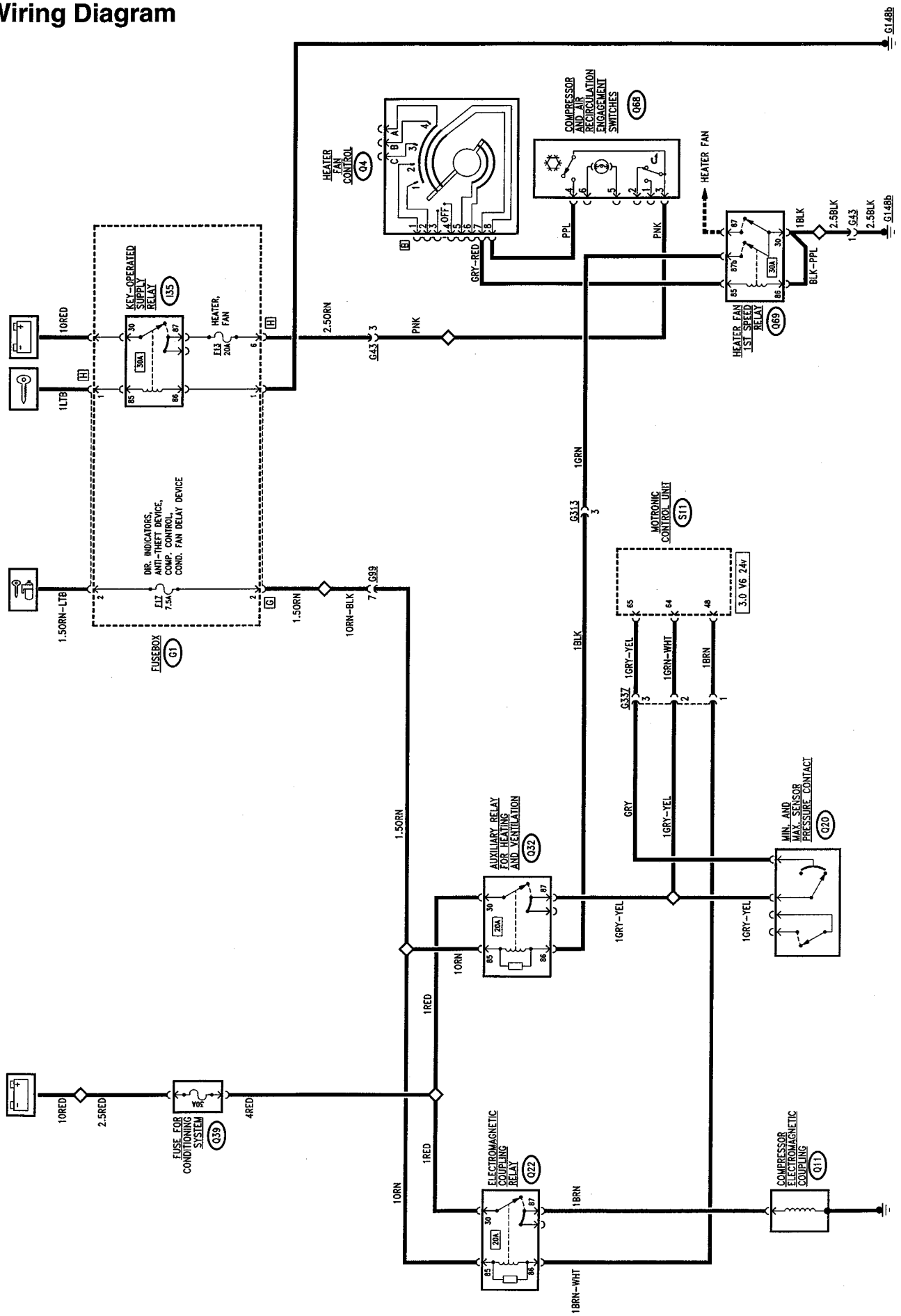
The electromagnetic joint that operates the compressor **Q11** is controlled by relays **Q22** and **Q32**.

The coil of relays **Q22** and **Q32** receive the key-operated supply (line protected by fuse **F17** of **G1**); their power line is supplied with battery voltage through fuse **Q39** (30A).

Relay **Q22** is energised, consequently it supplies 12V current to the electromagnetic joint **Q11**, according to the following logic:

- relay **Q32** is energised by an earth signal leading from **Q69**, which is in turn energised with a positive signal leading from the compressor engagement switch **Q68**; this signal crosses the control knob **Q4** which cuts it off when the knob is at "OFF": in fact in this condition, the compressor cannot be engaged. The same signal simultaneously controls fan engagement at 1st speed ("Fan and Recirculation Control")
- relay **Q32** consequently sends two signals to the Motronic control unit **S11**: a direct signal to "request compressor engagement" - pin 64 - and a second signal that crosses the minimum and maximum pressure switch (trinary) **Q20** which cuts in in the event of high or low pressure in the cooling system: in this case the signal does not reach the control unit - pin 65 - which does not command the compressor
- at relay **Q22** which is energised and supplies the joint **Q11** which thus engages the compressor, but only when the internal logic has checked determinate conditions (e.g. the compressor is not engaged in the event of the need for full power at the engine, etc..)

Wiring Diagram



ENGINE COOLING FAN CONTROL

Two fans **P2a** and **P2b** ensure the necessary ventilation of the cooling air for the engine radiator and air conditioning system condenser.

N.B.: the two fans are in parallel, therefore they are operated together, always following the same logic.

The two fans are always supplied by battery voltage, through the line protected by wander fuse **G254**; they are operated by an earth command signal: this signal arrives directly (2nd speed) or through the additional resistances **O22a** and **O22b** (1st speed), fitted with a thermal safety fuse.

The delaying device **Q42** controls the gradual engagement of the fans which are operated at two different speeds, also via two relays **I99b** and **I100**, the three devices are located on the auxiliary bracket next to the fusebox.

The delaying device works according to the following logic:

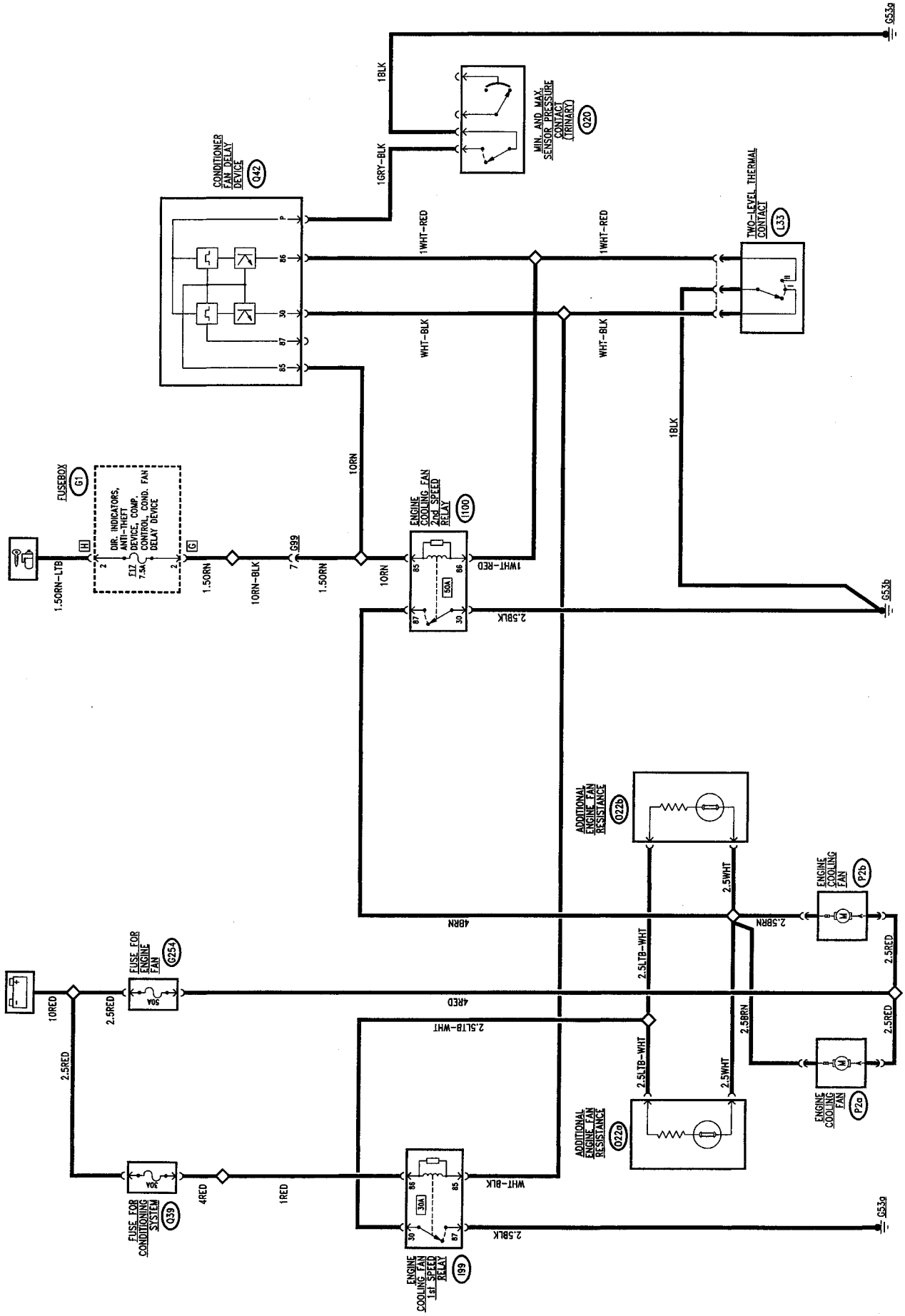
The "key-operated" voltage (line protected by fuse **F17** of **G1**) supplies the coil and the electronic devices of the delaying device **Q42** -pin 85, and relay **I100**; the coil of the delaying device **Q42** is energised by an earth signal -pin P- which leads from the trinary pressure switch **Q20**: this causes the immediate sending of an earth signal - pin 30 - to energise relay **I99** which sends the earth command to the two ngine cooling fans **P2a** and **P2b** through the additional resistances **O22a** and **O22b**: 1st speed.

After appr. 12 seconds, if the signal from the trinary persists, the delaying device operates the second speed: in fact, the earth signal is cut off from pin 30 and a signal leaves pin 86, which energises **I100** which sends the earth command directly to the two engine cooling fans **P2a** and **P2b**: 2nd speed.
When the signal from the pressure switch ceases, the fans are disengaged.

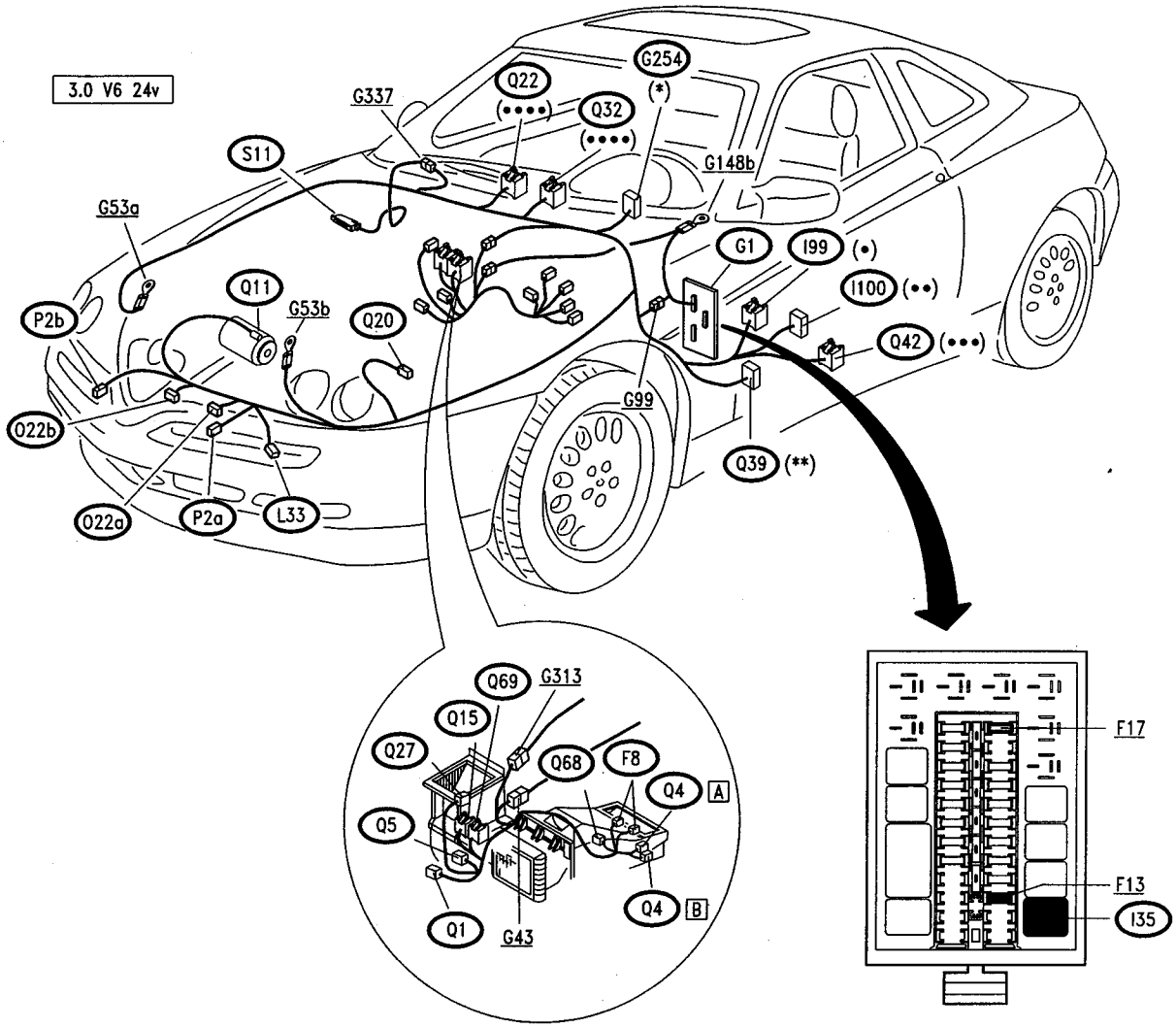
The two fans are operated at the two different speeds also by the two-level thermal contact **L33** which controls the temperature of the coolant in the engine radiator: when a first level is reached, relay **I99** is energised which sends the earth command to the two engine cooling fans **P2a and P2b** via resistances **O22a** and **O22b**: 1st speed. Relay **I99** is supplied by the line protected by fuse **Q39** (30A).

If the second temperature level is reached, relay **I100** is energised which sends the earth command directly to the two engine cooling fans **P2a and P2b**: 2nd speed.

Wiring Diagram



LOCATION OF COMPONENTS



(•) Yellow base
(••) Black base
(•••) White base
(••••) Grey base

(*) Black fuse holder
(**) Green fuse holder

FAULT-FINDING TABLE

NOTE:
For better clarity, the fault-finding table concerning the air conditioner has been subdivided into three parts which comprise the three functions described separately also in the wiring diagrams:

– **Fan and recirculation control**

– **Compressor engagement**

– **Engine cooling fan/s control.**

Fan and recirculation control

Fault	Component to be checked										
	F13	Q39	Q1	Q15	Q5	Q4	Q27	Q68	F8a (1)	F8b (1)	Q69
Engagement of fan	•	•	•	•							
Engagement of fan at the different speeds					•	•					
Engagement of fan at 1st speed with compressor engaged						•		•			•
Recirculation function						•	•	•			
Climate control panel lighting									•	•	

(1) It is possible to replace only the bulbs with their bulb holder

Compressor engagement

Fault	Component to be checked										
	Q39	F17	F13	Q11	Q20	Q22	Q32	Q69	Q4	Q68	S11
Engagement of compressor (under all circumstances)	•	•	•	•		•	•	•	•	•	•
Engagement of compressor (only under certain circumstances) (•)					•						•

(•) Operation of the compressor is excluded from the system logic under the following conditions:

– coolant fluid pressure > 28 bar appr.;

– coolant fluid pressure < 2.5 bar appr. (circuit drained);

In addition the operation of this device is also determined by the logic of the ignition/injection control unit (see corresponding section).

Engine cooling fan/s control

Fault	Component to be checked									
	Q39	G254	F17	P2a/b	O22a/	L33	Q20	Q42	I99	I100
Engagement of fans (under all circumstances)	•	•		•						
Engagement of fans at two different speeds (only one speed works)			•		•			•	•	•
Engagement of fans due to high engine temp. (at two speeds)						•				
Engagement of fans due to high coolant fluid pressure (at two speeds)							•			

ENGINE COOLING
(versions with heater)

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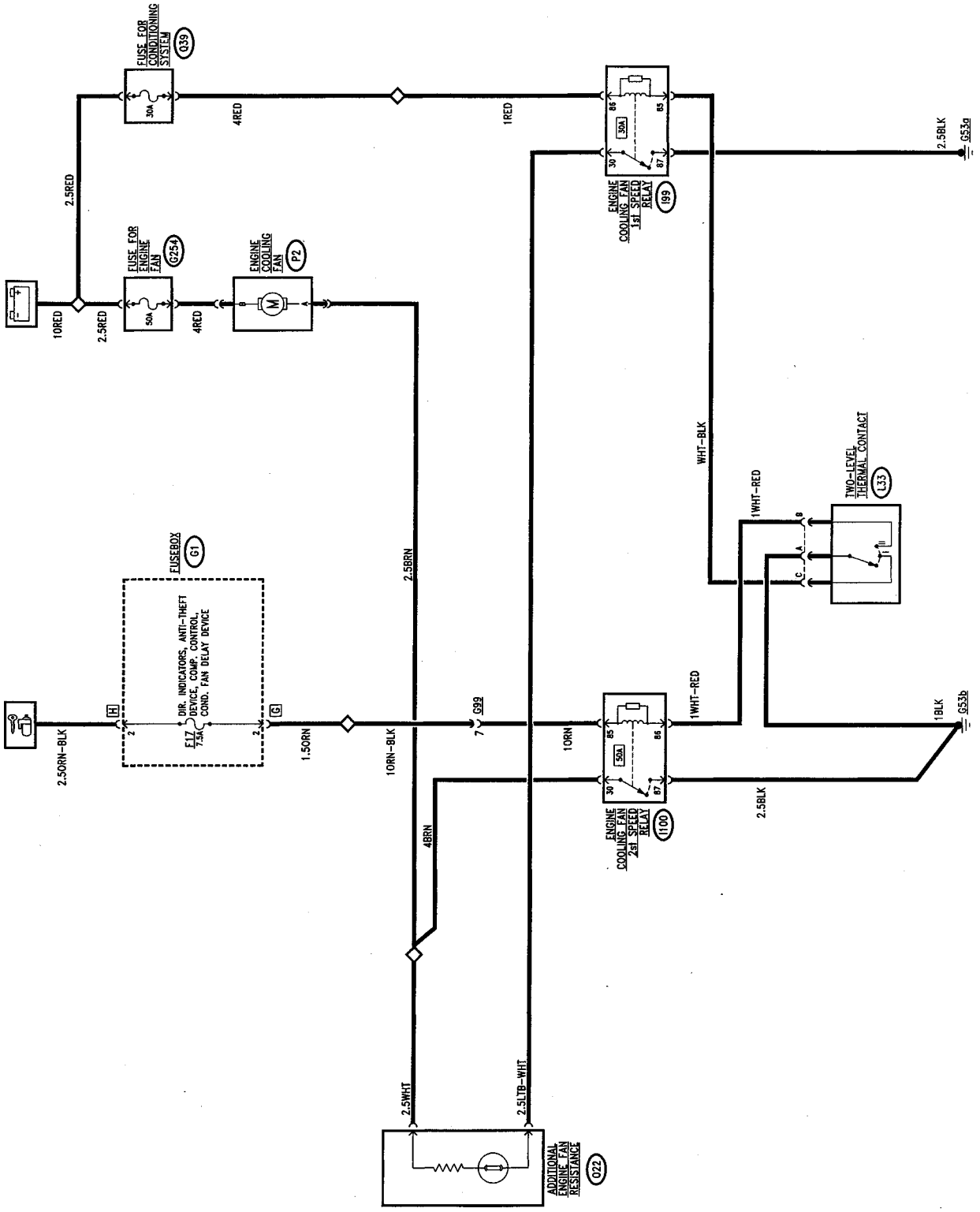
(*) See the corresponding section of "Spider - Gtv - ELECTRIC SYSTEM DIAGNOSIS". For item involving the engine refer to the 3.0 V6 engine.

WIRING DIAGRAM



GENERAL DESCRIPTION

An electric fan increases the dispersion of heat by the engine coolant fluid radiator because of a thermometric switch which detects high coolant fluid temperature and operates the fan at two different speeds: the first is operated at a first temperature level of the coolant; the second speed is engaged at a higher temperature.
N.B. This wiring diagram only refers to cars with heater: for cars fitted with air conditioner, see the corresponding electric circuit "engine cooling fan control" given in the section "Air Conditioner".

FUNCTIONAL DESCRIPTION

The fan **P2** is supplied with battery voltage through a special fuse, **G254** (50A), and it is operated an earth at the opposite terminal: if this earth signal leads directly from relay **I100** the 2nd speed is operated; when it leads from relay **I99** and crosses the additional resistance **O22**, it operates 1st speed.

In fact the fan works at two different speeds, thanks to an additional resistance: the first speed is engaged at the first coolant temperature level detected by the thermal contact; second speed is engaged at a higher temperature (second level). The additional resistance is protected inside bt a thermal fuse which cuts off the circuit if the temperature exceeds appr. 126°C.

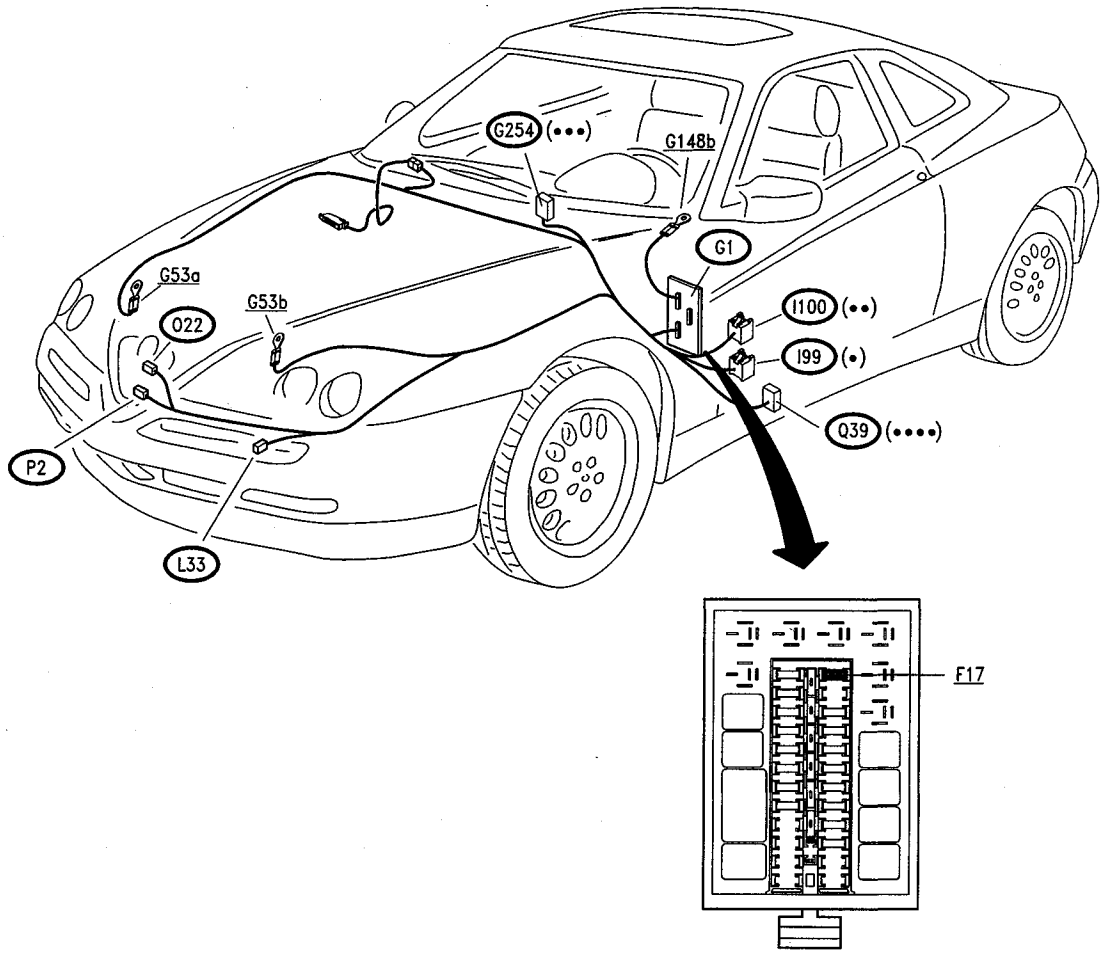
The signal leading from the 1st level (87-92°C) of the two-level thermal contact **L33** energises relay **I99** - supplied by the line of wander fuse **Q39** (30A) - thereby sending an earth signal to the additional resistance **O22** and from this to the fan, which is operated at 1st speed.

If the coolant fluid reaches the 2nd level (92 - 97°C) of thermal contact **L33**, the earth signal energises the coil of relay **I100** - supplied from the ignition key through the line of fuse **F17** of **G1** - directly operating the fan **P2** at 2nd speed.

FAULT-FINDING TABLE

Fault	Component to be checked							
	F17	Q39	G254	P2	L33	O22	I99	I100
Fan (under all circumstances)	•		•	•				•
Fan (fails to start even though the coolant fluid temperature is high)	•	•			•	•	•	
Fan, at 2 different speeds		•			•	•		•

LOCATION OF COMPONENTS



(•) Yellow base
(••) Black base
(•••) Black fuseholder
(••••) Green fuseholder

ALFA ROMEO CODE

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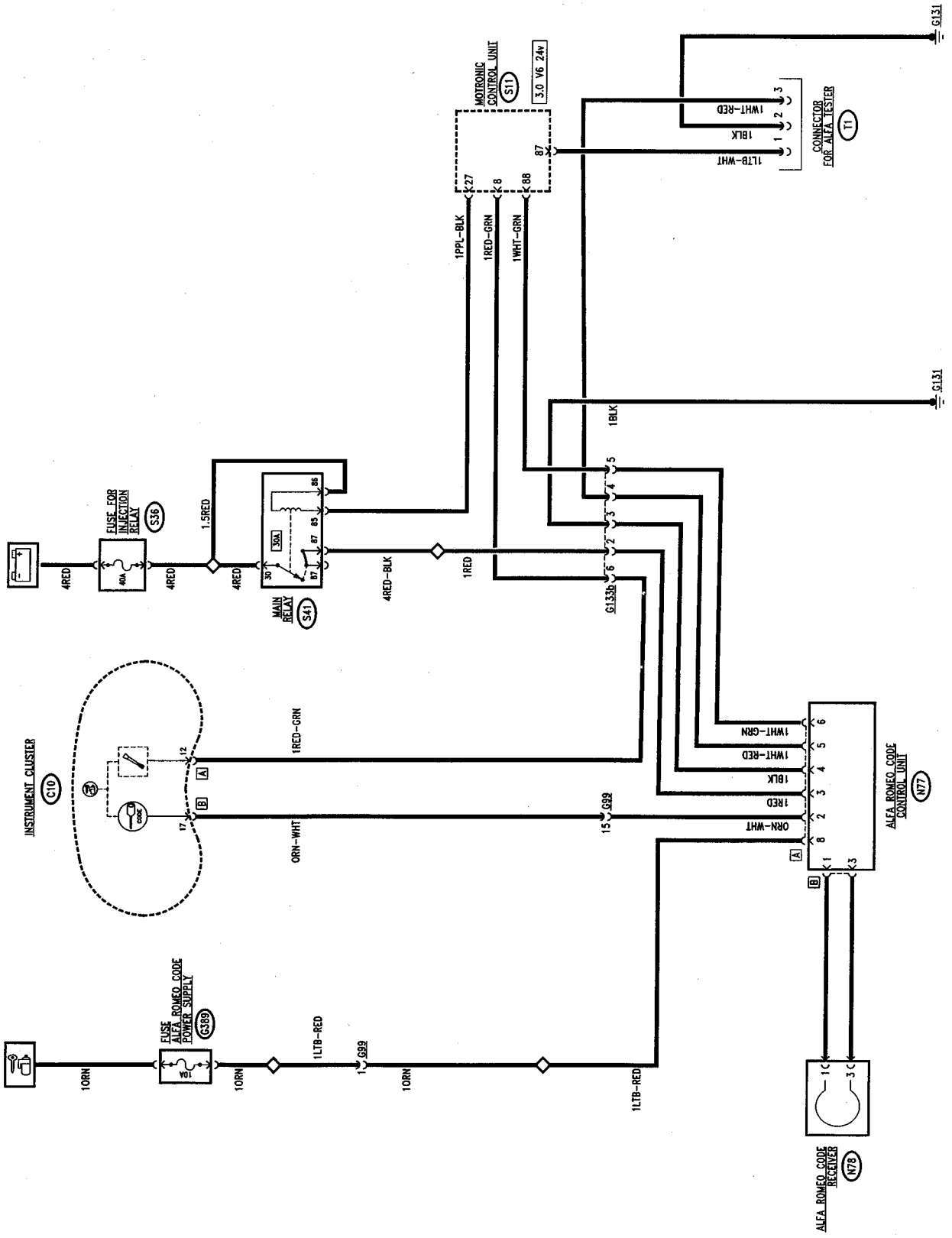
(*) See the corresponding section of "Spider - Gtv - ELECTRIC SYSTEM DIAGNOSIS". For item involving the engine refer to the 3.0 V6 engine.

WIRING DIAGRAM



DESCRIZIONE FUNZIONALE

The ALFA ROMEO CODE control unit **N77**, to be found next to the fusebox **G1**, is connected through connector B to a special pair of cables to the receiver **N78**, consisting in a an aerial coaxial with the ignition switch.

Through connector A it is connected to the Motronic control unit **S11** and to the other systems: at pin 8 it receives the "key-operated" supply through the line of wander fuse **G389**, while at pin 3 it receives the direct supply through fuse **S36** and relay **S41** of the Motronic system; pin 4 is earthed.

The connection line with the ALFA ROMEO CODE warning light on the instrument cluster leads from pin 2.

Pins 5 and 6 handle communication between the ALFA ROMEO CODE control unit **N77** and the Motronic control unit **S11**: this communication takes place by "intercepting" the diagnosis line K which leads from **S11** - pin 88 - to the diagnosis connector **T1**.

CONTROL SYSTEM - 3.0 V6 24v engine: BOSCH MOTRONIC M3.7.1

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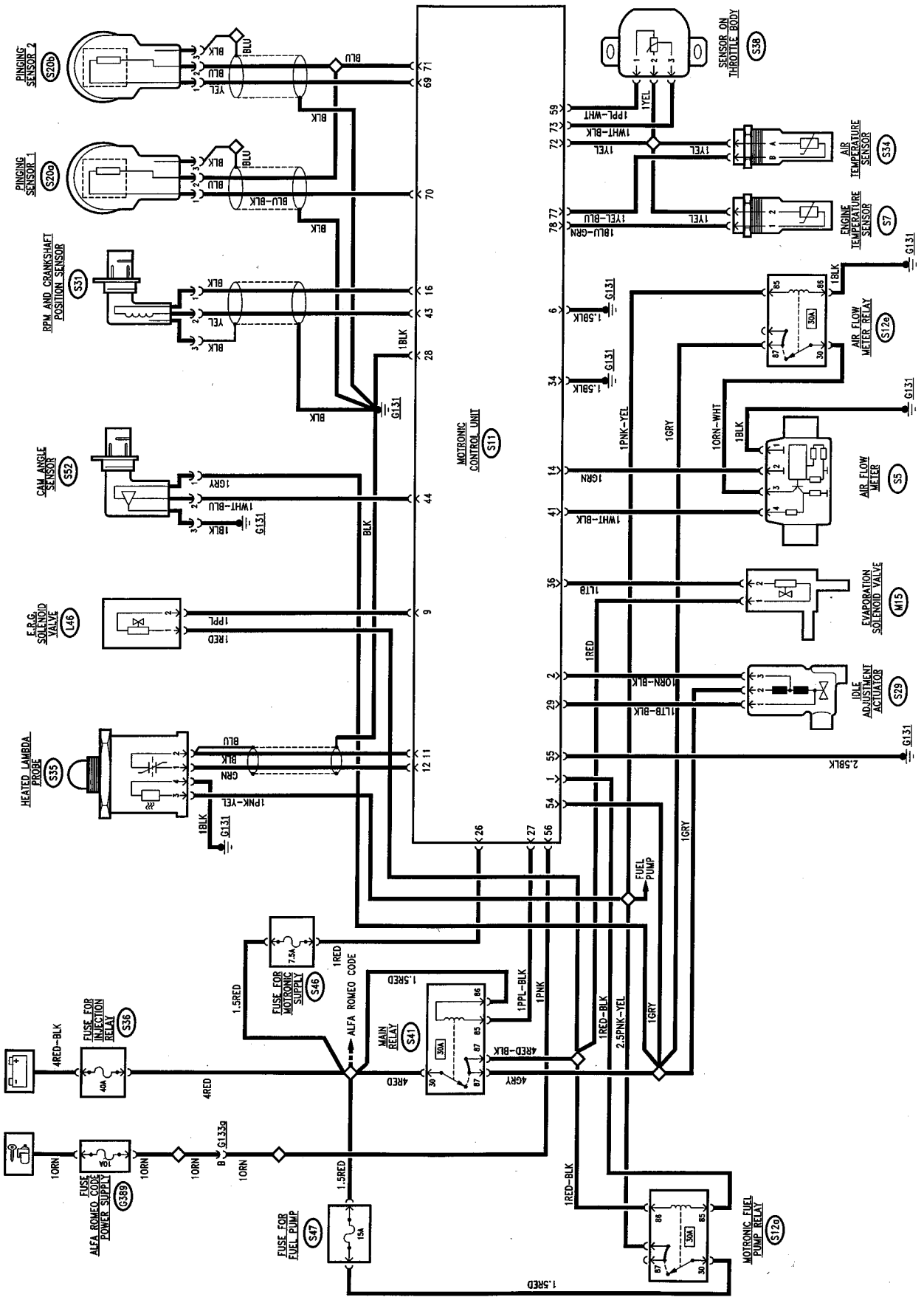
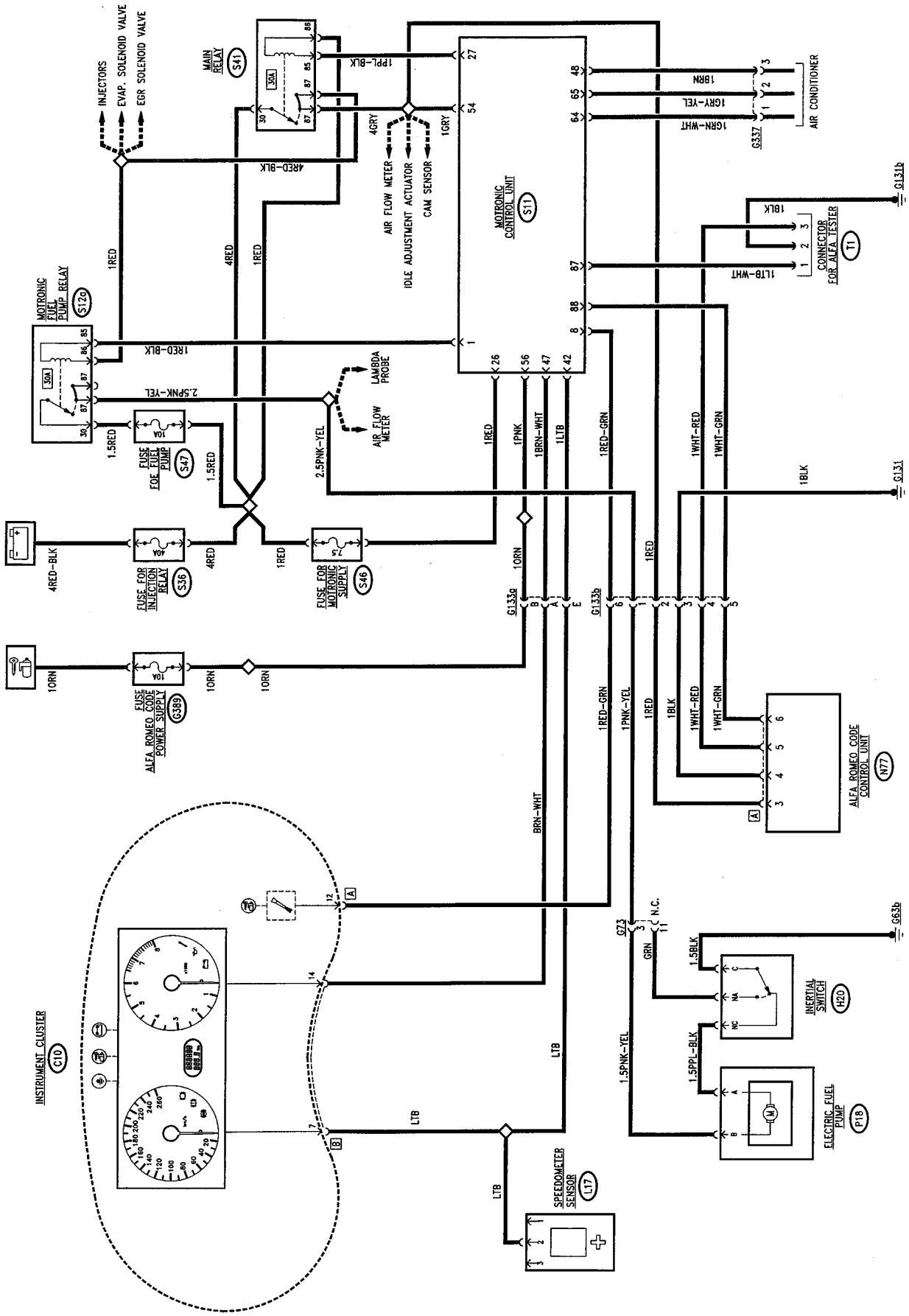
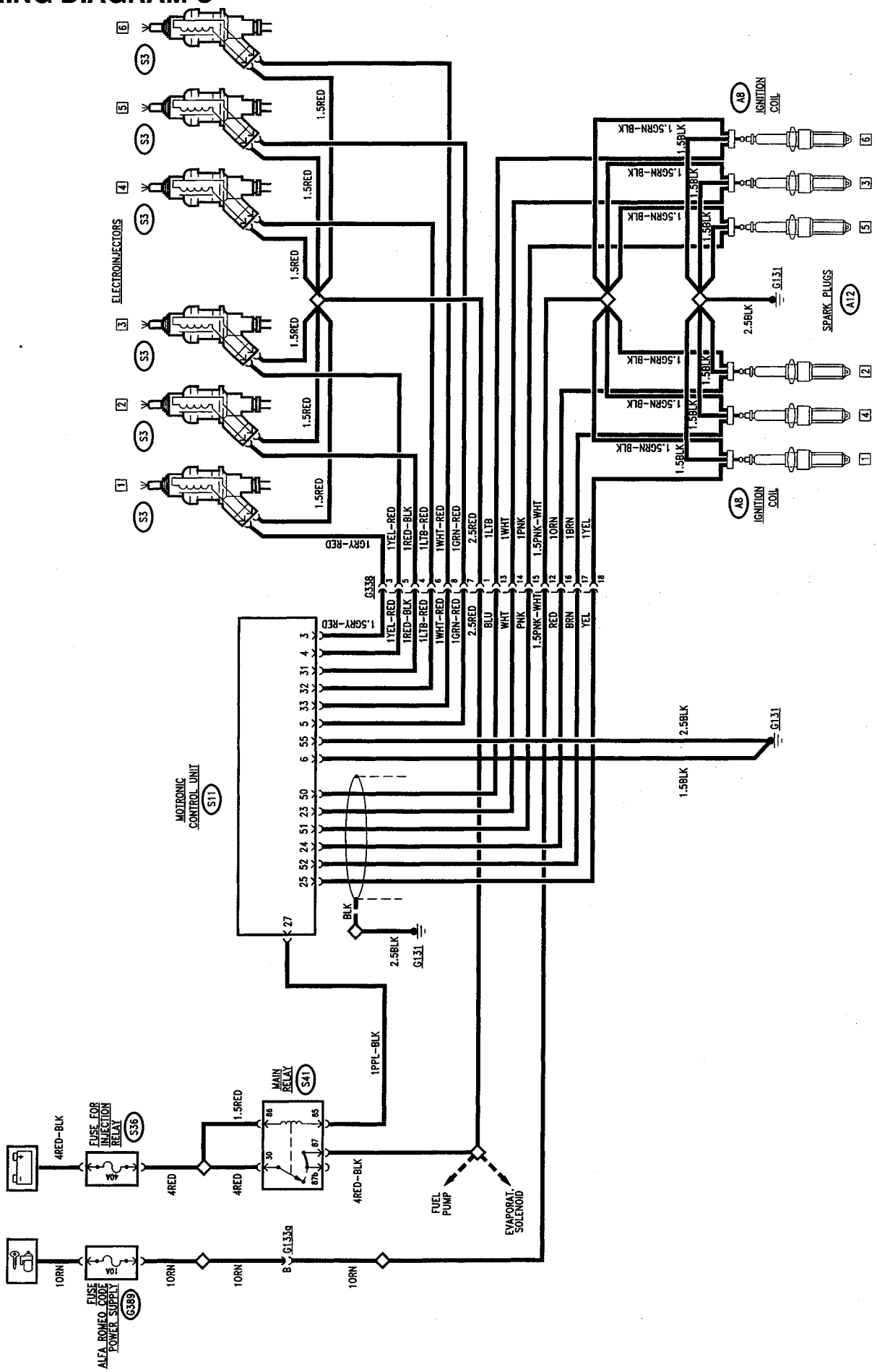
WIRING DIAGRAM A



WIRING DIAGRAM B



WIRING DIAGRAM C



GENERAL DESCRIPTION

An electronic control system supervises and regulates all the parameters of the engine, optimising performance and consumption levels through response in real time to the different operating conditions: this sophisticated latest generation system comprises a single control unit which controls both ignition and injection.

This is the M 3.7.1 version of the proven and reliable BOSCH MOTRONIC system.

FUNCTIONS OF THE SYSTEM

Sequential and timed injection (S.E.F.I.)

With this control unit injection is sequential and timed for each cylinder: the injection instant (delivery of fuel into the intake manifolds through the opening of the injectors) is not simultaneous for all the cylinders, but takes place for each cylinder in correspondence with the optimal point of injection, calculated by the control unit following special maps according to the load, speed and temperature of the engine.

Static ignition

An ignition system has been adopted with "static distribution" (with semi-conductors, without distributor). This solution makes it possible to eliminate rotary components; in addition, it does not produce external sparks thus reducing the risk of interferences; lastly it reduces the number of high voltage cables and connectors; as the power modules for controlling the primary windings of the coil are inside the control unit.

Static ignition takes place through six coils located on the cylinder head.

Each coil directly supplies a spark plug without intermediate cables.

Metering the air flow rate

The air flow meter adopted is of a more modern design known as the "hot film" type. Outside, the air-flow meter looks like a part of duct between the intake manifold and the air cleaner.

Inside the air-flow meter there is an electronic circuit and a plate that is crossed by the air which passes in the duct.

The film plate is kept at a constant temperature (appr. 120°C above the temperature of the incoming air) by a heating resistance placed in contact with it.

The mass of air flowing through the manifold tends to withdraw heat from the plate: therefore, to keep its temperature constant, a certain current needs to flow through the heating resistance: this current, suitably measured, is proportionate with the mass of flowing air.

N.B. This air flow meter measures directly the mass of air (and not the volume as in the previous versions with "floating port"), thereby eliminating problems of temperature, altitude, pressure, etc.

Cylinder detection

Following the sequential and timed injection system, a timing sensor has been introduced (cam angle sensor): this makes it possible to detect which cylinder is in the bursting stroke when the engine is started, in order to be able to start the correct injection sequence. The sensor is formed of a Hall-effect device by which the voltage signal sent to the control unit "lowers" suddenly when the tooth machined on the camshaft passes in front of the actual sensor; therefore a signal is sent every two turns of the crankshaft.

Conversely, the rpm sensor sends a reference signal for each turn of the engine and each subsequent tooth of the phonic wheel on the flywheel informs the control unit of an increase of the angular position of the crankshaft, so that injection is sent correctly to the suitable cylinder and the spark to the corresponding pair of cylinders.

Fuel pump

The control logic of the fuel pump carried out by the control unit which is mainly based on the rpm signal immediately cuts off the supply to the pump as soon as the engine stops.
Moreover, the pump will not operate with the key engaged and the engine not running.

In this car, this logic is integrated - in order to further higher the standards of safety - by the **inertial switch** device: this is an electromechanical switch which, in the event of heavy shocks, opens to cut off the circuit that takes the earth to the fuel pump, which stops instantaneously. This device is particularly important as an integration of the safety guaranteed by the logic of the control unit, especially if the car is hit from behind or in the case of other accidents in which the engine does not stop immediately.

Percentage of exhaust gas recirculation

Nox (nitric oxide) is developed at high temperatures in the combustion chambers.

To reduce these emissions an E.G.R. (Exhaust Gas Recirculation) system is adopted which by recirculating part of the exhaust gases, lowers the temperature, thus the Nox produced, in the combustion chambers. In fact, part of the exhaust gas is withdrawn through the special EGR Valve and re-admitted to the intake box where it is mixed with the intaken air and burnt again in the engine. The EGR valve is modulated by a solenoid valve controlled by the injection control unit and, as a result of the type of control, in addition to reducing the amount of Nox, consumption levels are also optimised.

The percentage of exhaust gas to be returned to the engine is established by the control unit taking account of a specific characteristic curve which depends on the load, speed and temperature of the engine.

OPERATING LOGIC

– Identification of the "operating point":

the "point of operation of the engine" is located mainly through two sensors: the rpm sensor informs the control unit of the speed of rotation of the engine; the air flow meter supplies the value of the mass of air actually entering the cylinders, defining the instantaneous volumetric yield of the engine.

– **Adjustment of injection times (quantity of fuel):** the control unit controls the injectors extremely quickly and precisely, calculating the opening time on the basis of engine load (rpm and air flow), also taking into account the battery voltage and the temperature of the engine. Injection is "sequential", i.e. the injectors are opened in correspondence of the exhaust stroke of the corresponding cylinder.

– Ignition adjustment (calculation of advances):

the control unit calculates the advance on the basis of the engine load (rpm and air flow); the value is also corrected according to the temperature of the intaken air and that of the engine.

– Cold starting control:

during cold starts the control unit uses special advance values and injection times.

When a determinate temperature/rpm ratio is reached, the control unit resumes normal operating conditions.

– Control of enrichment during acceleration:

upon the need for acceleration, the control unit increases injection in order to reach the required rpm as quickly as possible.
This function takes place through the potentiometer located on the throttle which instantaneously informs the control unit of the need to accelerate.

– Fuel cut-off during deceleration:

with the throttle closed and an engine speed above a certain threshold, the control unit de-activates fuel injection; this way the rpms decrease rapidly towards idle speed reducing the speed and fuel consumption. The cutoff threshold value varies according to the temperature of the engine and the speed of the car.

– Control of idle speed:

the adjustment of the engine idle speed is carried out through the special actuator which acts on the throttle by- pass.

This device acts as a regulator for cutting in the various services (e.g. conditioner compressor): in fact, when the throttle is closed, the actuator adjusts the by-pass gap compensating the load required by the services in order to ensure that idle speed is as constant as possible.

– Maximum Rpm limiting:

above a certain threshold the control unit automatically stops the injection of fuel preventing the engine from "over-revving".

– Combustion control -lambda sensor-:

the oxygen sensor (or "lambda" sensor) informs the control unit of the amount of oxygen at the exhaust, and therefore the correct air-fuel metering.

The optimum mixture is obtained when the lambda coefficient = 1 (optimum stoichiometric mixture). The electric signal sent by the sensor to the control unit changes abruptly when the composition of the mixture departs from lambda = 1. When the mixture is "lean" the control unit increases the amount of fuel, reducing it when the mixture is "rich" so that in this way the engine operates as far as possible around the ideal lambda rating.

The signal from the lambda sensor is processed inside the control unit by a special integrator which prevents sudden "oscillations".

The sensor is heated by an electrical resistance so that it quickly reaches the correct operating temperature (appr. 300 °C).

Through this probe it is therefore possible to adjust engine carburetion precisely. Among other items, this makes it possible to meet emission limit regulations.

– Pinging control:

Through pinging sensors the control unit is informed if any pinging or "knocking" occurs and it corrects the spark advance "delaying" it accordingly; a further correction also takes account of the air temperature, in fact when the temperature of the intake air is high, pinging is more accentuated.

The intaken air temperature sensor, to be found just downstream of the air-flow meter, is not used to calculate the engine load but to control the pinging parameters and spark advances.

– **Fuel vapour recovery:**

the fuel vapours collected from the various points of the supply circuit in a special activated carbon canister are ducted to the engine where they are burnt: this takes place through a solenoid valve which is opened by the control unit only when the engine is in a condition that allows correct combustion without adversely affecting the operation of the engine: in fact the control unit compensates this amount of incoming fuel by reducing delivery to the injectors.

– **E.G.R. valve control**

The percentage of exhaust gas to be returned to the engine is determined by the control unit taking account of a specific characteristic curve which depends on the engine load and speed: recirculation is only activated when the engine speed is between 2500 and 4000 rpm., also in relation to the temperature of the engine (higher recirculation percentage with high temperatures).

– **Connection with the air conditioner compressor:**

the control unit is connected with the air conditioner system and it cuts in the compressor in relation to operation of the engine. As this service absorbs a considerable amount of power, the control unit:

– adapts the engine idle speed each time the compressor cuts in; if the engine speed falls below 700 rpm, the compressor is turned off;

– when there is the need for power (high throttle opening speed starting from below 3500 rpm, or full load, or high engine temperature - over 117°C), it momentaneously cuts out the compressor

– when the engine is being started the compressor is disabled until normal operating conditions have been reached.

– **Connection with the ALFA ROMEO CODE system**

as soon as the Motronic control unit receives the signal that the key has been turned to MARCIA, it "asks" the ALFA ROMEO CODE system for consent to start the engine: this consent is given only if the ALFA ROMEO CODE control unit recognizes the code of the key engaged in the ignition switch as correct. This dialogue between the control units takes place on diagnosis line K already used for the Alfa Romeo Tester.

– **Self-diagnosis:**

the key has a **self-diagnosis system**, which continuously monitors the plausibility of the signals from the various sensors and compares them with the limits allowed: if these limits are exceeded, the system detects a fault and turns on the corresponding warning light on the instrument cluster.

The warning light turns on when the engine is started to indicate the initial test of the entire system (appr. 4 seconds), it then turns off if no errors have been memorised: otherwise it stays on.

For certain parameters, the control unit replaces the abnormal values with suitable mean ones so that the car can "limp" to a point of the Service Network.

These "recovery" values depend on the other correct signals and they are defined individually by the control unit operating logic.

The self-diagnosis system also enables quick and effective location of faults connecting with the ALFA ROMEO Tester (see "Fault-finding"), through which all the errors memorised can be "read". It is also possible to check the operating parameters recorded by the control unit and operate the single actuators to check whether they are working properly.

COMPONENTS

The electronic control unit receives the signals leading from the **sensors** which "read" the engine operating parameters. It processes them according to a logic stored inside in "maps" which correlate the different parameters in the best way possible and it operates the **actuators** accordingly so that the engine always works with the highest level of regularity and yield.

The sensors are the following:

– engine temperature sensor (**S7**);

– air temperature sensor (**S34**);

– sensor on throttle body (**S38**);

– rpm sensor (**S31**);

– cam angle sensor (**S52**);

– heated lambda sensor (**S35**)

– air-flow meter (**S5**);

– pinging sensors (**S20a** and **s20b**);

The actuators are the following:

– injectors (**S3**);

– ignition coils (**A8**);

– fuel pump (**P18**);

– idle adjustment actuator (**S29**);

– vapour recovery solenoid valve (**M15**) ;

– E.G.R. solenoid valve (**L46**);

The control unit is also connected with:

– the climate control unit;

– the ALFA ROMEO CODE control unit (**N77**);

– the instrument cluster (**C10**) to which it supplies the signal for turning on the diagnosis warning light and for the rev counter;

– the sensor (**L17**) from which it receives the car speed signal.

The system is completed by three relays: the first two - the main relay (**S41**), and the fuel pump relay **S12a** operate the fuel pump, the injectors, the coils and the other components of the system, while the third - the air-flow meter relay (**S12e**) supplies the corresponding component.

The supply line for the entire system is protected by fuse **S36**, while the control unit is protected by wander fuse (**S46**); another fuse protects the pump (**S47**). Lastly, there is an earth point (**G60**) on the engine. Connector **T1** enables connection with the ALFA ROMEO Tester: this is located inside the car next to the control unit.

FUNCTIONAL DESCRIPTION

The Motronic control unit **S11** controls and adjusts the entire electronic ignition and injection system; all the system supplies are protected by fuse **S36** (40A).

The control unit is supplied at pin 26 directly by the battery through fuse **S46** (7.5A). At pin 54 it receives the supply from the main relay **S41**, while at pin 56 it receives the "key- operated" supply.

Pins 55, 6, 28 and 34 are earthed and serve as reference respectively for the ignition coils, the injectors, electronic screening and the final power stages.

The main relay **S41**, acts as supply relay for the whole system; it is energized by a control signal - earth - leading from pin 27 of the control unit and consequently sends the supply (12V) to pin 54 of the control unit itself, to the fuel pump relay **S12a**, to the air-flow meter relay **S12a** to the vapour recovery solenoid valve **M15**, to the idle speed actuator **S29**, to the cam angle sensor **S52**, to the EGR solenoid valve **L46** and lastly to the injectors **S3**.

The "key-operated" supply crosses fuse **G389** and supplies the control unit at pin 56 and the primary windings of the coils **A8**.

The supply of the main relay **S41** is energized by a control signal - earth - leading from pin 1 of the control unit **S11**. Consequently, the relay supplies the resistance of the lambda sensor **S35**, the air flow meter relay **S12e**, and of course the fuel pump **P18**; this supply line is protected by a special fuse **S47** (15A).

The earth reaches the pump **P18** via the inertial switch **H20** which cuts off the circuit in the event of impact.

The control unit **S11** receives numerous signals from the different sensors, thereby keeping all the engine operating parameters under control.

Through a frequency signal sent to pins 43 and 16 of the control unit, the rpm sensor **S31** supplies information about the engine rpm; the two above-mentioned signals are very low in intensity and are therefore suitably screened.

The sensor is inductive and detects the number of revolutions of the engine through the change in a magnetic field produced by the passage of the teeth of a "phonic" wheel (60-2 teeth) fitted on the flywheel.

The cam angle sensor **S52** (timing sensor), is supplied at 12 V by the main relay **S41**, and sends a signal in frequency corresponding to the phase to pin 44 of the control unit itself.

The sensor comprises a Hall effect device due to which the voltage signal sent to the control unit "lowers" abruptly when the tooth machined on the camshaft passes in front of the sensor.

The heated lambda sensor **S35** supplies the control unit information about the correct composition of the air-fuel mixture detecting the concentration of oxygen in the exhaust gas; this takes place through the signal sent to pin 12 of the control unit, while pin 11 supplies the reference earth; The sensor is heated by a resistance to make sure that it operates correctly also when the engine is cold; the resistance is supplied by the fuel pump relay **S12a.**

The throttle body sensor **S38**, is supplied by the control unit from pin 59 and connected to the electronic earth at 72 and it sends a signal to pin 73 which is proportionate with the degree of opening of the throttle itself.

The engine temperature sensor **S7**, connected to the electronic earth at pin 72, supplies a signal to pin 78 proportionate with the temperature of the engine coolant, detected with an NTC material (resistance that lowers with the temperature).

The intaken air temperature sensor **S34**, connected to the electronic earth at pin 72, supplies a signal at pin 77 that is proportionate with the temperature of the air entering the intake box, detected with an NTC material (resistance that lowers with the temperature).

The pinging sensors **S20a and S20b**, through a frequency signal sent to pins 69 and 70 of the control unit, supplies information about the pinging conditions, while a reference earth leads from pin 71; these two signals are very low in intensity and are therefore suitably screened.

The sensor comprises a piezoelectric plate which detects the vibrations produced when the engine is running, exploiting a particular characteristic of piezoelectric materials which generate an output voltage when subjected to mechanical stresses; this voltage is filtered and analysed by the control unit which corrects the ignition parameters accordingly.

The air flow meter **S5**, is supplied by the special relay **S12e**: from pin 14 of the control unit it receives the

reference earth, while it sends a signal proportionate with the air flow to pin 41.

The air flow meter is of the "heated film" type: a diaphragm is interposed in a measurement channel, through which the intake air flows: this diaphragm is kept at a constant temperature by a heating resistance; the mass of air that crosses the measurement channel tends to withdraw heat from the diaphragm, therefore, in order to maintain its temperature constant, a certain amount of current must flow through the resistance: this current, appropriately measured, is proportionate with the mass of air flowing in the channel.

Relay **S12e**, supplied directly with 12 V by relay **S41**, is energized by the fuel pump relay **S12a** and thus supplies the meter **S5** itself.

On the basis of the signals received from the sensors and of the calculations carried out, the control unit **S11** controls the opening of the single injectors **S3** through special signals - of the duty-cycle type - pins 3 (cyl. 1), 4 (cyl. 3), 5 (cyl. 5) 31 (cyl. 2), 32 (cyl. 4) and 33 (cyl. 6). The injectors receive consent (12V) to open from the main relay **S41**.

The static ignition system is controlled by the control unit directly which automatically adjusts the advance. N.B. the power modules which generate the high voltage pulses are located inside the control unit. The control signals (earth) for the primary windings of the coil **A8** lead from the control unit, while the secondary winding sends the pulse to the spark plugs **A12**: from pin 23: for cylinder 3, pin 24: cylinder 3, pin 24: cylinder 2, pin 25: cylinder 1; pin 50 cylinder 6; pin 51 cylinder 5 and pin 52 cylinder 4.

The primary windings of the coil **A8** are supplied at 12 V ("key- operated") by relay **S42**.

The power modules inside the control unit are connected to earth via pin 55.

The idle speed adjustment actuator **S29** forms a by-pass line for the flow of air; this comprises two windings: one opens and the other closes a valve that adjusts the gap of the by- pass section; a safety spring establishes a mean opening value in the event of a failure to this device; the actuator, supplied by the main relay, **S41**, is controlled by the control unit through the duty-cycle signals of pins 29 (closing) and 2 (opening).

The vapour recovery solenoid valve **M15** allows the passage of the fuel vapours towards the engine intake where they are added to the mixture entering the combustion chamber; this valve, supplied by the main relay **S41**, is opened by the control unit when the engine is under load through a duty cycle signal from pin 36.

The E.G.R. solenoid valve **L46**, controlled by the control unit, operates the actual E.G.R. valve modulating its opening: the latter is a vacuum-operated diaphragm valve: the electropneumatic valve works by changing this vacuum which is withdrawn from the same "takeoff" used for the servobrake.

The solenoid valve is controlled from pin 9 of the control unit while it is supplied at 12 V by main relay **S41**.

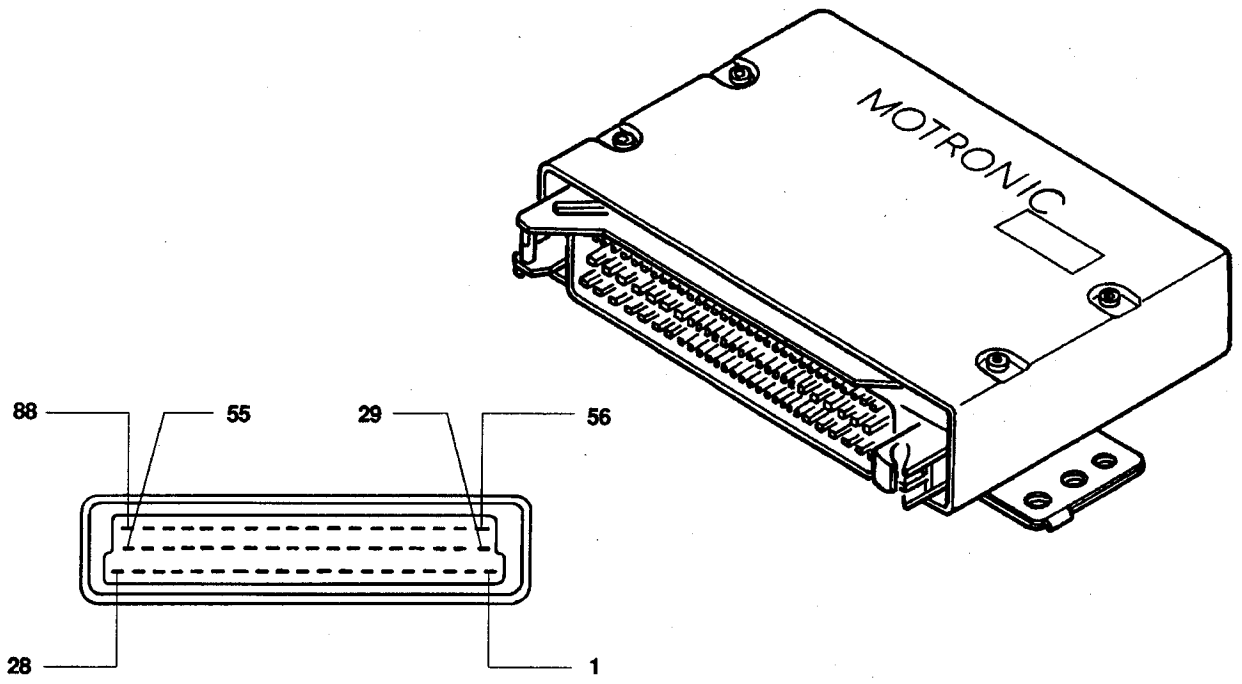
The tachometric signal (car speed) reaches the control unit at pin 42 via sensor **L17**; while from pin 47 the control unit sends a "pulse" signal to the cluster **C10** which is proportionate with the number of revolutions of the engine; the signal for the "Check Engine" diagnosis warning light on the cluster **C10** leads from pin 8.

The control unit **S11** is connected with the air conditioning system through pins 48, 64 and 65.
This makes it possible to adapt the engine idle speed to the increased power each time the compressor cuts in, or to cut it out in the case of high speed or engine loads. For further details see the "Climate Control" section.

The control unit **S11** is connected by pin 88 with the ALFA ROMEO CODE control unit **N77** via the diagnosis line K; if the ALFA ROMEO CODE does not recognise a correct "key code" it will not enable the Motronic control unit to start the engine.

The control unit possesses a self-diagnosis system which can be used through connection to the ALFA ROMEO Tester at connector **T1**; the tester receives the fault signals from the control unit through the diagnosis lines L - pin 87 - and K - pin 88 -, while the earth leads from **G131** (line K is also used by the ALFA ROMEO CODE system).

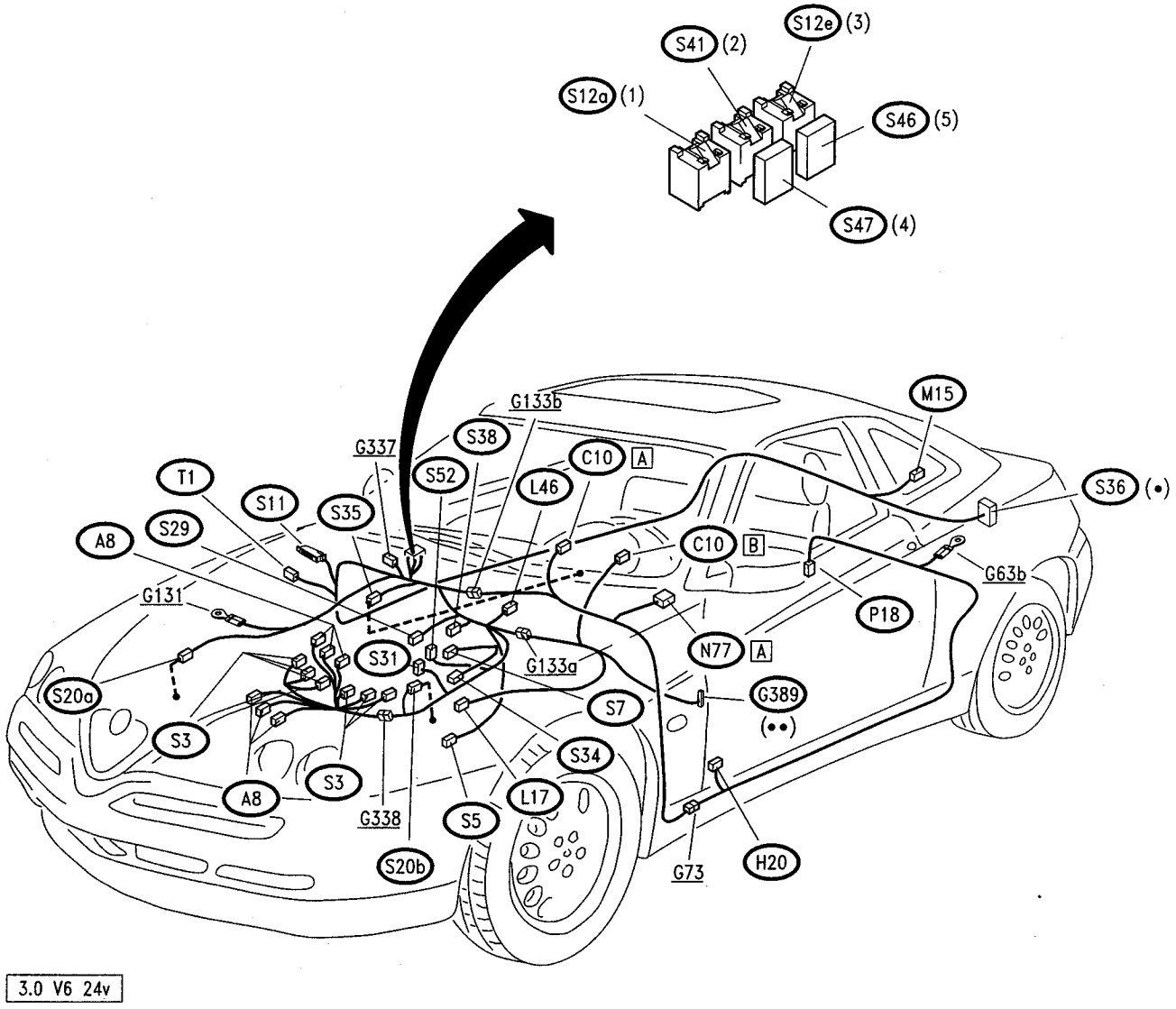
ELECTRONIC CONTROL UNIT



CONTROL UNIT PINOUT

1. Fuel pump relay consent
2. Idle actuator signal (open)
3. Injector control, cylinder no.1
4. Injector control, cylinder no.3
5. Injector control, cylinder no.5
6. Earth for final stages (injectors)
8. "Check Engine" warning light
9. E.G.R. solenoid valve control
11. Lambda sensor earth
12. Lambda sensor signal
14. Earth for air flow meter
16. Rpm sensor signal
23. Ignition cylinder no.3
24. Ignition cylinder no.2
25. Ignition cylinder no.1
26. Direct 12V supply
27. Main relay control
28. Electronic earth (sensor screening)
29. Idle speed actuator signal (closed)
31. Injector control, cylinder no.2
32. Injector control, cylinder no.4
33. Injector control, cylinder no.6
34. Earth for final stages
36. Evaporative solenoid valve signal
41. Air-flow meter signal
42. Car speed signal output
43. Rpm sensor signal
44. Camanglesensor signal
47. Engine rpm signal output
48. Climate control unit relay control
50. Ignition cylinder no. 6
51. Ignition cylinder no. 5
52. Ignition cylinder no. 4
54. Supply from main relay 12V
55. Earth for ignition
56. "Key-operated" supply
59. Reference voltage (5V) for throttle sensor
64. Climate control system signal (compressor cut in request)
65. Climate control system signal (system control)
69. Pinging sensor signal 2
70. Pinging sensor signal 1
71. Earth for pinging sensors
72. Electronic earth for sensors
73. Throttle angle sensor signal
77. Air temperature sensor signal
78. Water temperature sensor signal
87. Diagnosis, line L
88. Diagnosis, line K (also for ALFA ROMEO CODE system)

LOCATION OF COMPONENTS

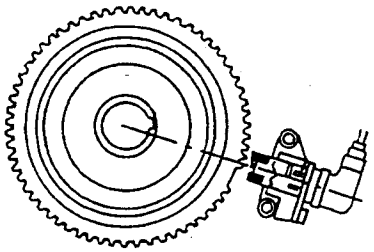


(•) Black fuse holder
(••) Red fuseholder

(1) Black base
(2) Grey base
(3) Black base
(4) Blue fuseholder
(5) Violet fuseholder

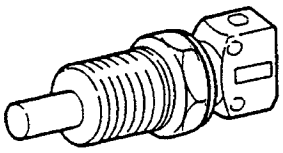
CHECKING COMPONENTS

Rpm sensor (S31)



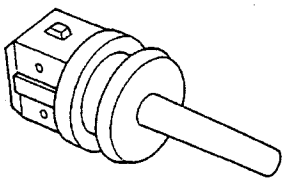
SPECIFICATIONS	
Sensor winding resistance 20 °C	~ 540 Ω
Distance (gap) between sensor and phonic wheel	0.8 ÷ 1.5 mm

Engine temperature sensor (S7)



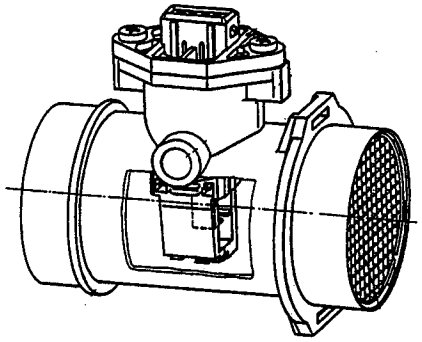
SPECIFICATIONS	
Temperature (°C)	Resistance (Ω)
- 10°C	8100 ÷ 10770 Ω
+ 20°C	2280 ÷ 2720 Ω
+ 80°C	292 ÷ 362 Ω

Intake air temperature sensor (S34)

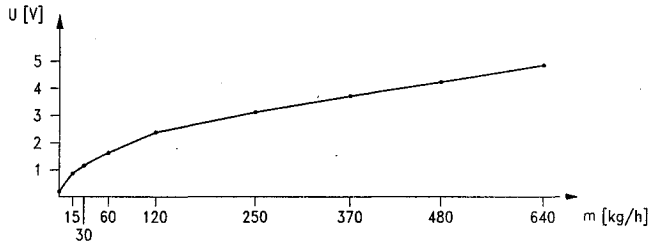


SPECIFICATIONS	
Temperature (°C)	Resistance (Ω)
- 10°C	8100 ÷ 10770 Ω
+ 20°C	2280 ÷ 2720 Ω
+ 80°C	292 ÷ 362 Ω

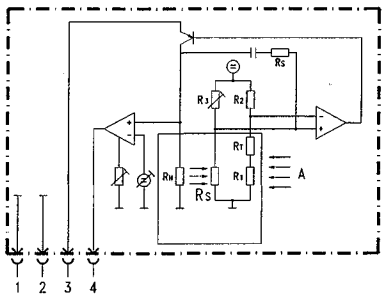
Air flow meter (S5)



SPECIFICATIONS	
Current that crosses the diaphragm:	
capacity (kg/h)	current (A)
0 640	≤ 0.25 ≤ 0.80

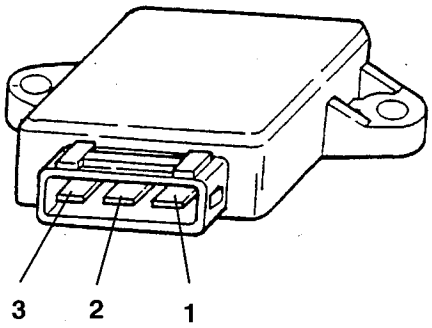


Sensor characteristic curve
m = capacity
U = voltage between pin 4 and 2



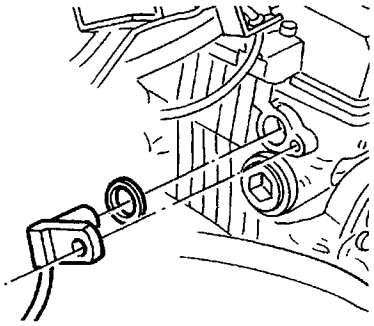
pin 1 - Earth
pin 2 - Reference earth
pin 3 - 12 V supply
pin 4 - Measurement signal
A = air
Rs = hot film sensor

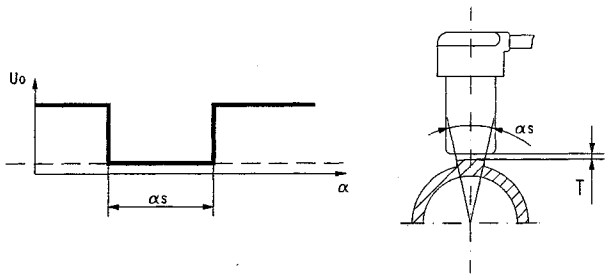
Throttle position sensor (S38)

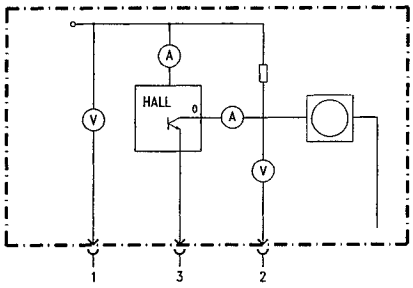


SPECIFICATIONS	
Resistance between terminals:	
1 - 2 (fixed)	≃ 2 kΩ
1 - 3 (throttle closed)	≃ 1 kΩ
1 - 3 (throttle completely open)	≃ 2.7 kΩ

Cam angle sensor (S52)

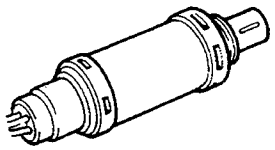


SPECIFICATIONS
The voltage signal "lowers" abruptly when the tooth machined on the camshaft passes in front of the sensor: 
Gap value T ≤ 1.5 mm



pin 1 - Supply
pin 2 - Signal output
pin 3 - Earth

Lambda sensor (S35)

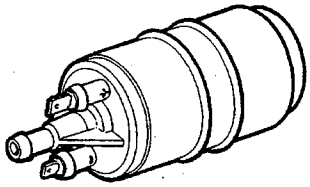


SPECIFICATIONS	
Heating resistance	3 Ω

Injectors (S3)

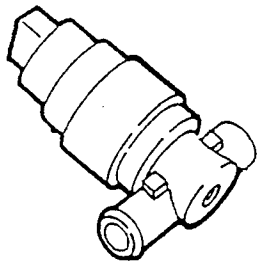
SPECIFICATIONS	
Winding resistance	appr. 6 Ω

Fuel pump (P18)



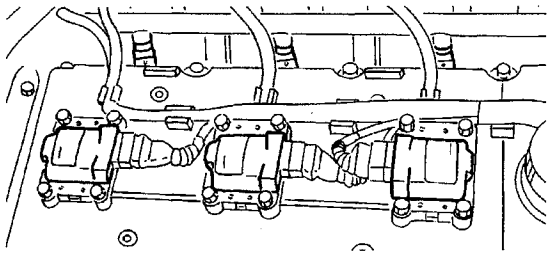
SPECIFICATIONS	
Capacity	≥120 l/h
Pressure	4 bar
Nominal voltage	12V

Idle adjustment actuator (S29)



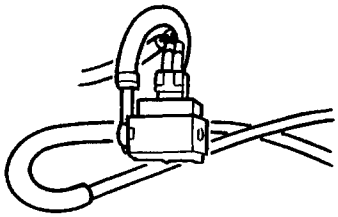
SPECIFICATIONS	
Resistance between terminals:	
1 - 3	~ 26 Ω
1 - 2	~ 13 Ω
2 - 3	~ 13 Ω

Ignition coils (A8)



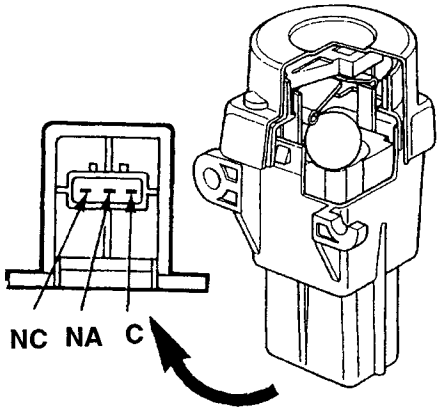
SPECIFICATIONS	
Primary resistance	- Ω
Secondary resistancesecondario	- kΩ

Evaporative solenoid valve (M15)



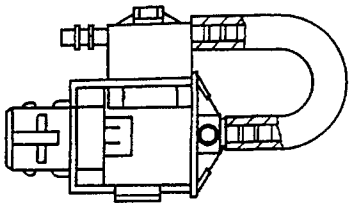
SPECIFICATIONS	
Duty-cycle signal	12 V; 10 Hz
Winding ohmic resistance	26 ± 4 Ω
When not energised the solenoid valve is normally closed	

Inertial switch (H20)



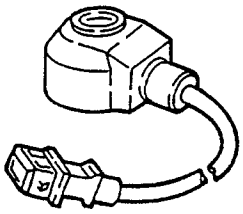
SPECIFICATIONS
Check continuity between pin NC and C: this continuity is interrupted in the event of a crash; the contact is closed again pressing the special button

E.G.R. solenoid valve (L46)



SPECIFICATIONS	
Duty Cycle signal	12V; 15.3 Hz
Winding ohmic resistance	~ 30 Ω

Pinging sensor (S20a) (S20b)



SPECIFICATIONS		
Resonance frequency		> 20 kHz
Impedence		≥ 1 MΩ
Allowed vibration	for long times	≤ 80 g
	for short times	≤ 400 g

FAULT-FINDING

The control unit possesses a self-diagnosis function which continuously checks the signals from the various sensors for plausibility and comparing them with the permissible limits: if these limits are exceeded, the system detects a fault and memorises it. It also turns on the special warning light on the instrument cluster.
For certain parameters the control unit replaces the abnormal values with appropriate mean values so that the car can "limp" to a point of the Service Network.
These values, known as "recovery" depend on the other correct signals and are defined individually by the control unit operating logic.
The self-diagnosis system also enables quick and effective location of faults connecting with the ALFA ROMEO Tester, through which the errors memorised may be "read". It is also possible to check the operating parameters recorded by the control unit and engage the single actuators to check whether they are working properly.

Diagnosis using the ALFA TESTER

N.B. Before carrying out diagnosis with the Tester, carry out the perliminary test described below (**TEST A**).

The Tester and electronic control unit should be connected as follows:

1. Power the Tester either through the cigar lighter socket or connecting it directly to the battery using the special cable.
2. Connect the socket of the Tester to the one for the control unit (to be found next to the control unit).

The information the instrument can provide is:

– display of parameters;

– display of errors;

– active diagnosis.

Error clearing

Before ending diagnosis the contents of the "permanent" memory are cancelled through the Tester.

PRELIMINARY CHECK OF BOSCH M3.7.1 SYSTEM	PROVA A

NOTE: Beforehand check that the ALFA ROMEO CODE system is working properly as it may have cut off the supply to the system!

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
A1 CHECK FUSE – Check the intactness of fuses **S36, S46, S47** and **G389**	OK ▶	Carry out **step A2**
	OK ▶	Replace fuses **S36**: 40A **S46**: 7.5A **S47** : 15A **G389** : 10A
A2 CHECK VOLTAGE – Check for 12 V at pin 30 of relays **S41** and **S12a** and also at pin 86 of **S41**	OK ▶	Carry out **step A3**
	OK ▶	Restore the wiring between the battery **A1** and relays **S41** and **S12a** through fuse **S47**
A3 CHECK VOLTAGE – With the key turned, check for 12 V at pin 56 of the control unit **S11**	OK ▶	Carry out **step A4**
	OK ▶	Restore the wiring between the ignition switch **B1** and the control unit **S11** through fuse **G389** and connector **G133a**
A4 CHECK RELAYS – Check that relays **S41**, **S12e** and **S12a** are working properly	OK ▶	Carry out **step A5**
	OK ▶	Replace any faulty relays
A5 CHECK CONTROL UNIT SUPPLY – Check for 12 V at pin 26 of the control unit **S11**; with the key turned 12 V also at pin 54 and 56 of **S11** and appr. 0 V (very low voltage) at pin 1 and 27 of **S11**	OK ▶	Carry out **step A6**
	OK ▶	Restore the wiring between the control unit **S11** and the relays and between the control unit and fuse **S46**
A6 CHECK EARTH – Check for an earth at pin 6 and 34, 55 e 28. Also check for an earth at pin 85 of **S12e**	OK ▶	CONTINUE DIAGNOSIS USING THE ALFA ROMEO TESTER
	OK ▶	Restore the wiring between **S11** and the relays and earth **G131**

KEY TO COMPONENTS

A STARTING - RECHARGING
A1 Battery
A3 Alternator, with integrated voltage regulator
A8 Ignition coil
A8a Ignition coil A
A8b Ignition coil B
A11 Starter motor
A12 Spark plugs

B MANUAL ELECTRICAL CONTROLS
B1 Ignition switch
B9 Heated rearscreen control switch
B10 Fog lights control switch
B11 Rear fog guards control switch
B12 Hazard warning lights control switch
B16 Instrument panel light dimmer button
B21a Right front power window control switch (on RH door)
B21b Right front power window control switch (on LH door)
B36 Wing mirror control switch
B40 Trip meter reset switch
B47 Sun roof motor control switch
B53 Front power window switch with automatic mechanism
B61 Fuel flap opening switch
B68 Steering column lever unit
B69 Headlamp aiming device
B87 Luggage compartment opening switch with glove box light
B98 Air recirculation switch

C INSTRUMENTATION
C10 Instrument cluster
C18 Auxiliary instrument cluster

D WARNING LIGHTS
D31 Anti-theft device led indicator

E EXTERIOR LIGHTS
E1a LH front direction indicator bulb
E1b RH front direction indicator bulb
E2a LH front side light bulb
E2b RH front side light bulb
E5a LH low beam light bulb
E5b RH low beam light bulb
E7a LH high beam light bulb
E7b RH low beam light bulb
E9a LH direction indicator light bulb
E9b RH direction indicator light bulb
E10a LH fog light bulb
E10b RH fog light bulb
E17a LH number plate light bulb
E17b RH number plate light bulb
E19 RH tail light cluster
E20 LH tail light cluster
E28 Third stop light
E30 Rear RH fog guard/reversing light
E31 Rear LH fog guard/reversing light

F INTERIOR LIGHTS
F3 Passenger compartment ceiling light
F5 Luggage compartment light
F8a Heating/ventilation controls light bulb a
F8b Heating ventilation controls light bulb b
F23 RH foot well light
F24 LH foot well light
F45 Light on LH front door
F46 Light on RH front door

G FUSEBOX - CONNECTORS - EARTHS
G1 Fusebox
G3 Fusebox terminal connector
G4 Free fuse
G21 Connector for RH front door wiring
G23 Connector for LH front door wiring
G43 Connector for heating and ventilation control wiring
G53a RH engine compartment earth
G53b LH engine compartment earth
G55b LH side panel earth
G56 Branch terminal board
G63a RH rear earth
G63b LH rear earth
G65 Coaxial cable for aerial
G73 Connector for rear services
G73b Connector for rear services
G84 Console wiring connector
G92 Luggage compartment earth
G99 Connector for dashboard wiring/engine wiring
G115 Connector for tow bar trailer socket
G124 ABS system connector
G125a ABS system fuse
G125b ABS system fuse
G131 Earth on upper cover
G133a Connector for electronic injection wiring A
G133b Connector for electronic injection wiring B
G148b Earth under dashboard LH
G193 Connector for electric aerial wiring
G202 Connector for ABS system earth
G219 Connector for sun roof
G254 Fuse for engine fan
G261 Fuse for sun roof
G272 Connector for ABS hydraulic unit
G273 ABS control unit connector
G308 Connector for engine sensors
G310 Fuse for RH front power window
G311 Fuse for LH front power window
G313 Connector for additional conditioner wiring
G314a Connector for engine wiring / conditioner wiring A
G314b Connector for engine wiring / conditioner wiring B
G320 Connector for rear loudspeaker cables
G337 Connector for conditioner syst./injection syst.
G338 Connector ignition elettroinjectors
G380 Airbag connector
G380a Airbag connector
G381 Earth for airbag
G383 Connector for airbag capsule
G384 Services supply fuse

G385 Connector for wiring in front bumper
G389 Fuse for ALFA ROMEO CODE unit
G391 Rear fog guard fuse

H SWITCHES
H1 Handbrake switch
H2 Reversing light switch
H3 Stop lights switch
H9 RH front brake pad switch
H10 LH front brake pad switch
H17 Brake fluid minimum level switch
H20 Inertial switch
H24 Luggage compartment light switch
H44 Bonnet anti-theft device switch
H51 Sun roof stroke limit switch

I RELAYS
I2 Heated rearscreen relay
I3 Horn relay
I17 Fog light relay
I26 Ceiling light relay
I29 Fuel pump relay
I35 Key-operated supply relay
I49 Low beam relay
I50 High beam relay
I52 Luggage compartment opening relay
I53 Fuel flap opening relay
I58 Sun roof relay
I64 Side lights relay
I99 Engine cooling fan 1st speed relay
I99a Engine cooling fan 1st speed relay
I99b Engine cooling fan 1st speed relay
I100 Engine cooling fan 2nd speed relay
I108 Key-operated supply cutoff relay
I109 Anti-theft switch relay

L SENDERS
L2 Minimum engine oil pressure
L9 Sender for fuel level gauge
L10 Sender for engine coolant temperature gauge and max. temperature warning light contact
L17 Speedometer sensor
L28 RH front phonic wheel inductive sensor
L29 LH front phonic wheel inductive sensor
L30 RH rear phonic wheel inductive sensor
L31 LH rear phonic wheel inductive sensor
L33 Two-level thermal contact
L46 E.G.R. solenoid valve

M ELETTROMAGNETS - SOLENOID VALVES
M12 Luggage compartment opening actuator electromagnet
M13 Fuel flap opening actuator electromagnet
M15 Evaporation solenoid valve

N ELECTRONIC DEVICES - INTERMITTENCES- TIMERS
N11 Door locking control unit
N13 Hazard warning lights and direction indicators intermittence
N14 Electronic windscreen wiper intermittence
N18 Electronic headlamp switching device
N25 Rear fog guard electronic device
N38 Power window control unit
N45 Anti-theft device control unit
N51 Hydraulic unit with ABS control unit
N53 Anti-disturbance condenser on luggage compartment light
N60 Sun roof control unit
N67 Remote control signal receiver
N77 ALFA ROMEO CODE control unit
N78 ALFA ROMEO CODE receiver
N79 Car radio supply antidisturbance condenser

O SERVICES
O1 Heated rearscreen
O2a High tone horn
O2b Low tone horn
O3 Aerial
O4 Car radio
O5a RH front loud-speaker
O5b LH front loud-speaker
O5c RH rear loud-speaker
O5d LH rear loud-speaker
O6 Cigar lighter - current socket
O18 RH wing mirror defroster
O19 LH wing mirror defroster
O22a Additional engine fan resistance
O22a Additional engine fan resistance
O31a RH Tweeter loud-speaker
O31b LH Tweeter loud-speaker

P ELECTRIC MOTORS
P2 Engine cooling fan
P2a Engine cooling fan
P2b Engine cooling fan
P8 LH wing mirror motor
P9 RH wing mirror motor
P10 Front RH door lock motor
P11 Front LH door lock motor
P14 Front RH power window motor
P15 Front LH power window motor
P18 Electric fuel pump
P19 Windscreen and rearscreen washer pump
P24 Sun roof motor
P27 Windscreen wiper motor with control unit
P35a RH headlamp aiming motor
P35b LH headlamp aiming motor

Q HEATING/VENTILATION - AIR CONDITIONING
Q1 Heater fan
Q4 Heater fan control
Q5 Heater fan speed adjustment resistance
Q11 Compressor electromagnetic coupling
Q15 Heating and ventilation fan relay
Q20 Min. and max. sensor pressure contact (Trinary)
Q22 Electromagnetic coupling relay
Q27 Air recirculation flap control motor
Q32 Auxiliary relay for heating and ventilation
Q39 Fuse for conditioning system (30A)

Q42 Conditioner fan delay device
Q65 Fuse for conditioning system
Q68 Compressor and air recirculation engagement switches
Q69 Heater fan 1st speed relay

R SAFETY DEVICES
R22 Airbag control unit
R23 Capsule on steering wheel for airbag
R27 Passenger's side airbag capsule
R28 Capsule on RH pretensioner
R29 Capsule on LH pretensioner

S ELECTRONIC INJECTION
S3 Elettroinjectors
S5 Air flow meter
S7 Engine temperature sensor
S11 Motronic control unit
S12a Motronic fuel pump relay
S12e Air flow meter relay
S20a Pinging sensor a
S20b Pinging sensor b
S29 Idle adjustment actuator
S31 Rpm and crankshaft position sensor
S34 Air temperature sensor
S35 Heated lambda probe
S36 Fuse for injection relay
S38 Sensor on throttle body
S41 Main relay
S43 Absolute pressure sensor
S46 Fuse for Motronic supply
S47 Fuse for fuel pump
S52 Cam angle sensor

T DIAGNOSIS
T1 Connector for ALFA TESTER (Motronic and ALFA ROMEO CODE)
T3 Connector for ALFA TESTER (airbag)
T7 Connector for ALFA TESTER (anti-theft device)
T8 Connector for ALFA TESTER (ABS)

COMPONENTS AND CONNECTORS

N.B. : **here only the connectors which differ from the "Spider- Gtv" manual are given**

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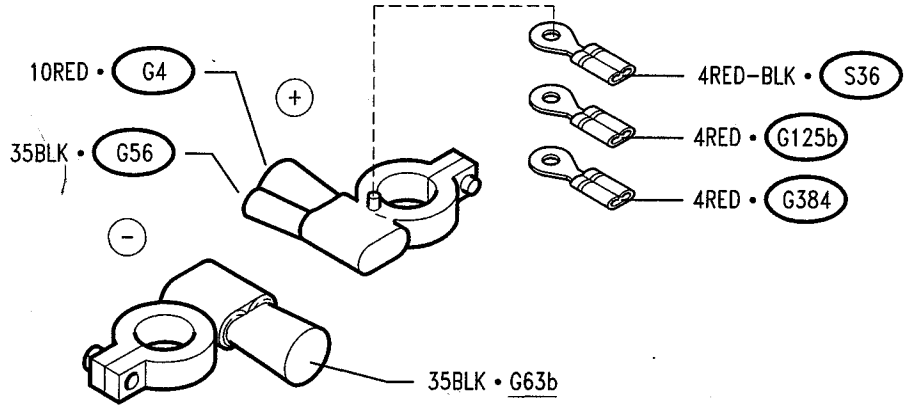
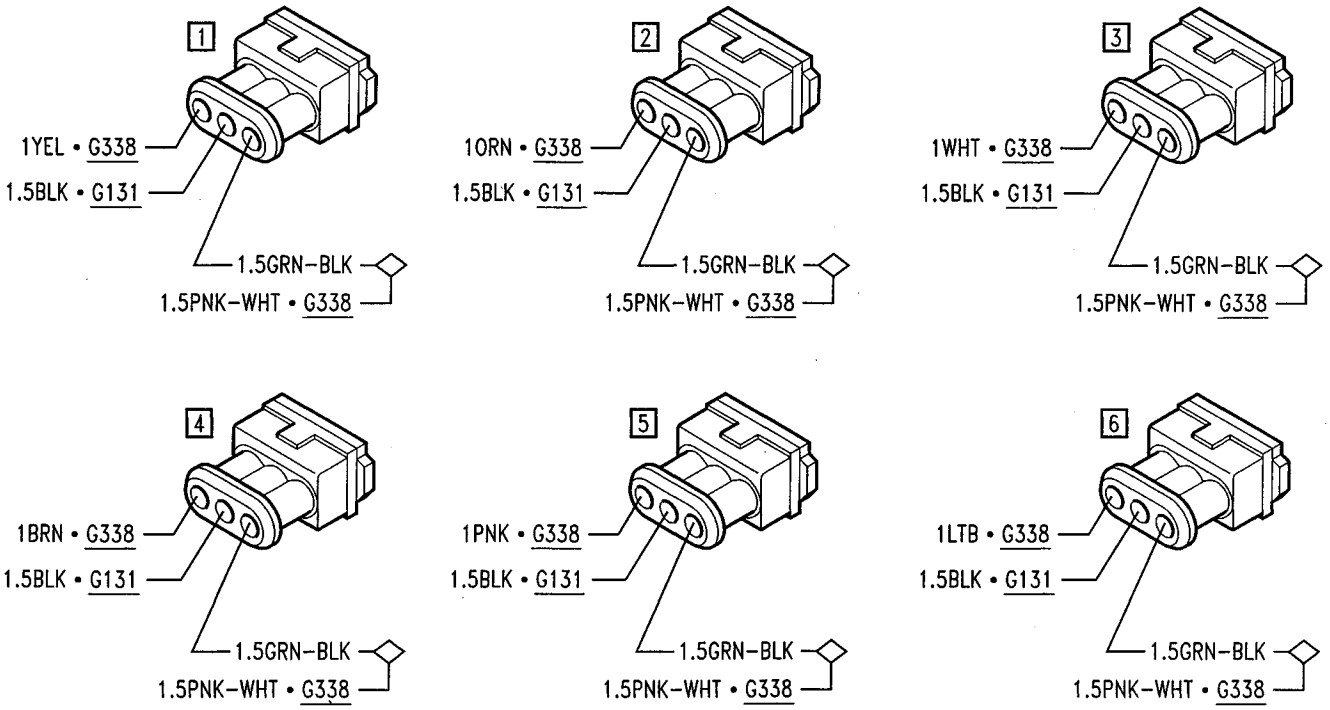
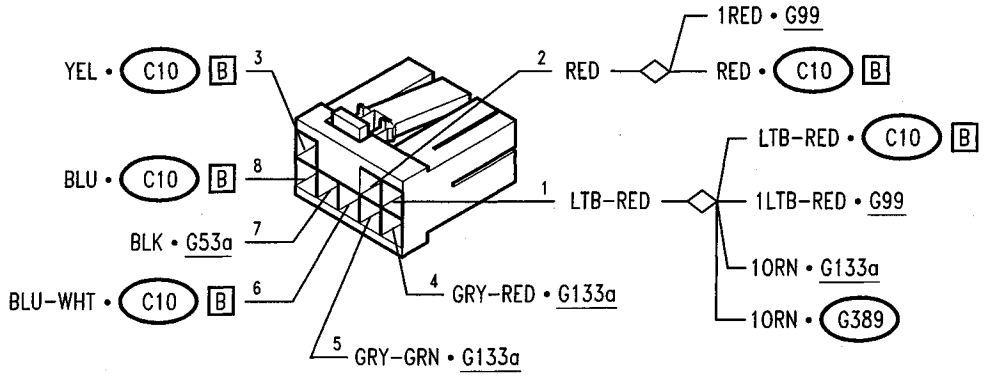
Battery — A1



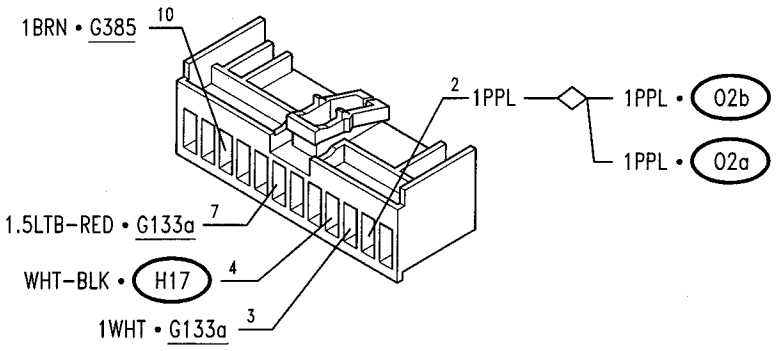
Ignition coil — A8



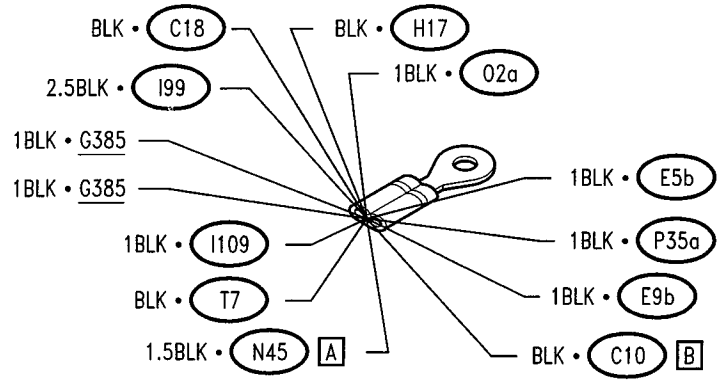
Auxiliary instrument cluster — C18



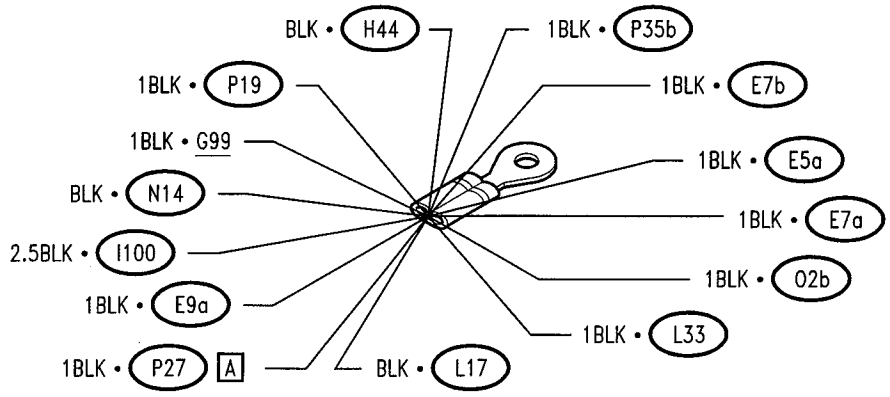
Fusebox — G1 A



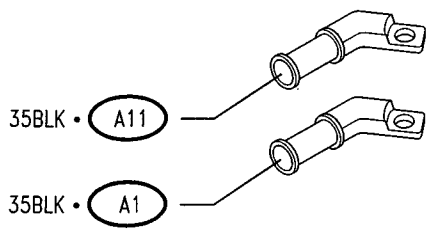
RH engine compartment earth — G53a



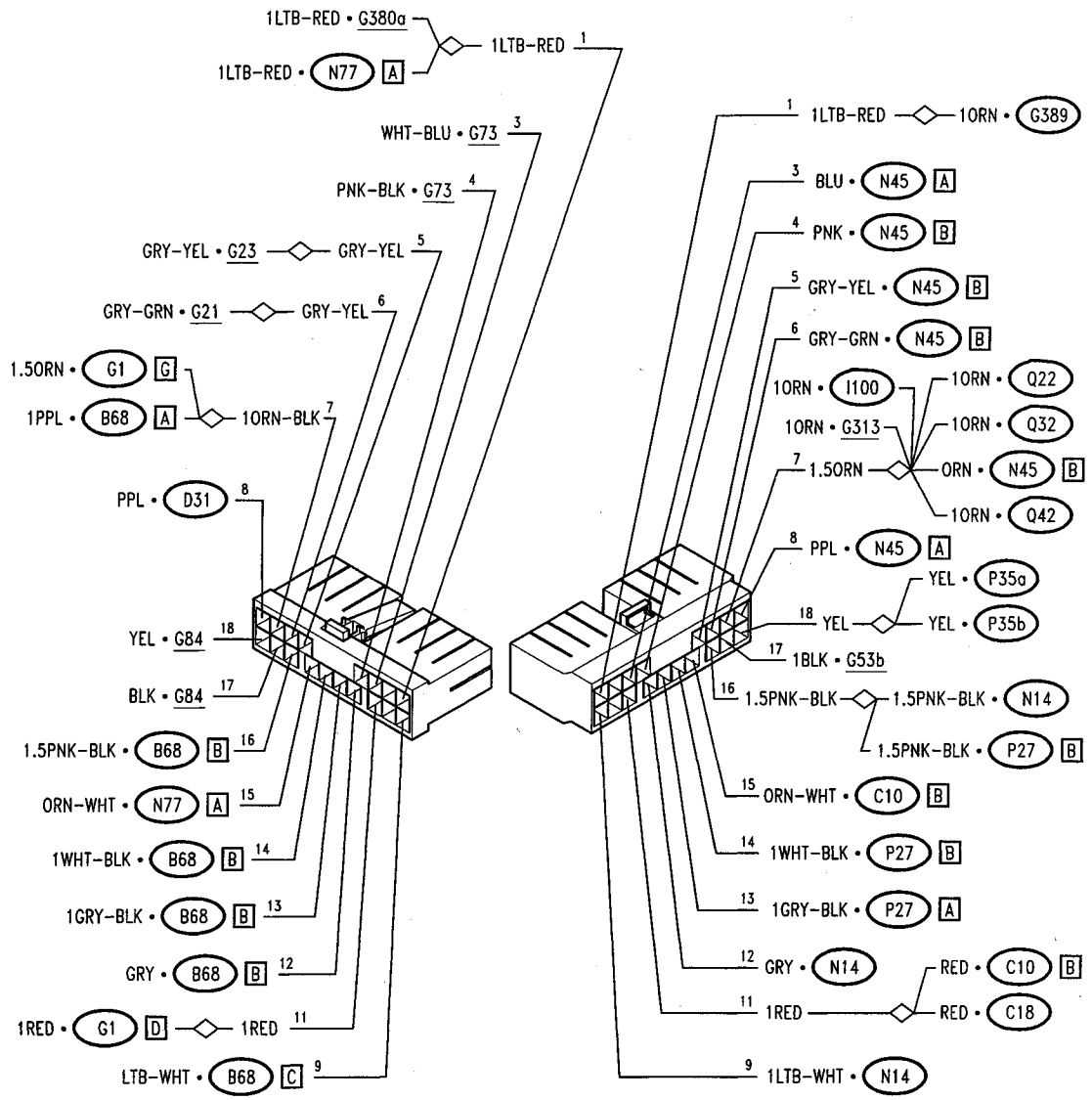
LH engine compartment earth — G53b



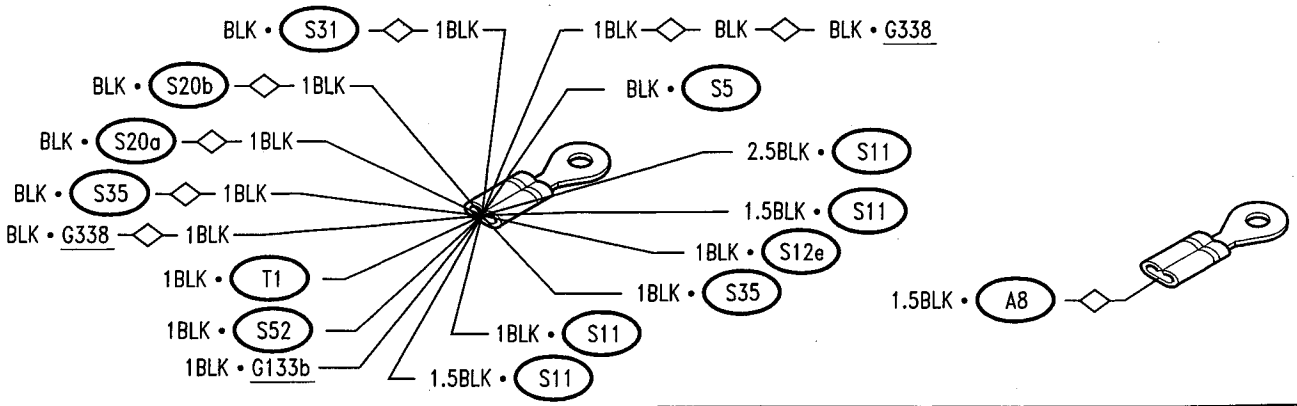
Branch terminal board — G56



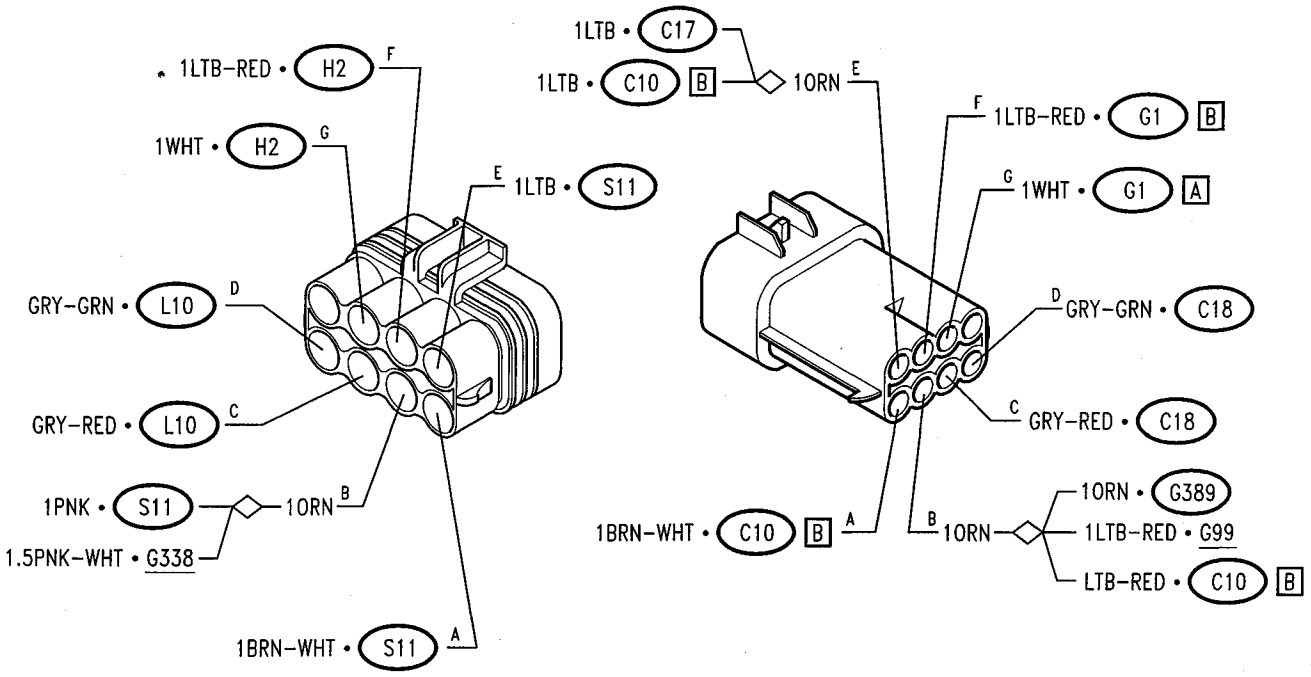
Connector for dashboard wiring/engine wiring — G99



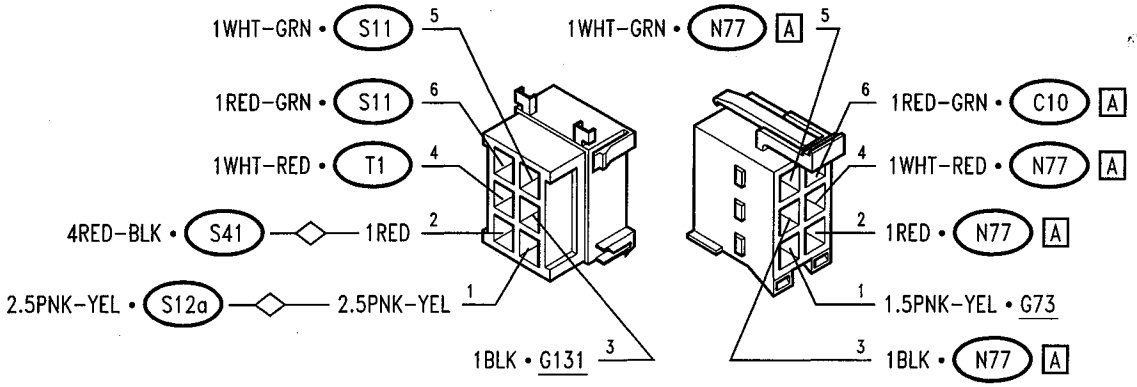
Earth on upper cover — G131



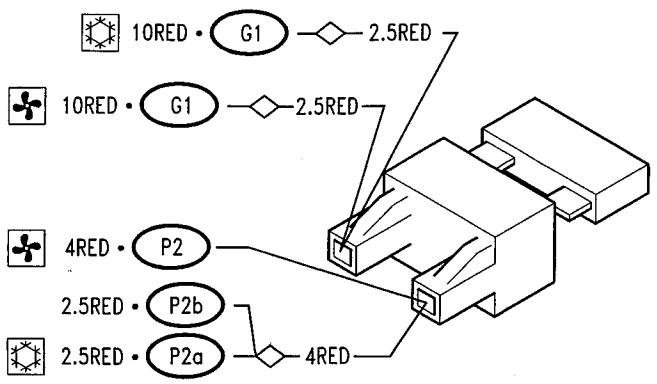
Connector for electronic injection wiring A — G133a



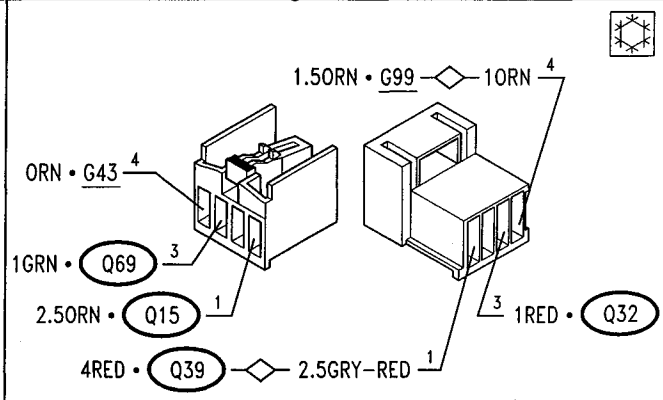
Connector for electronic injection wiring B — G133b



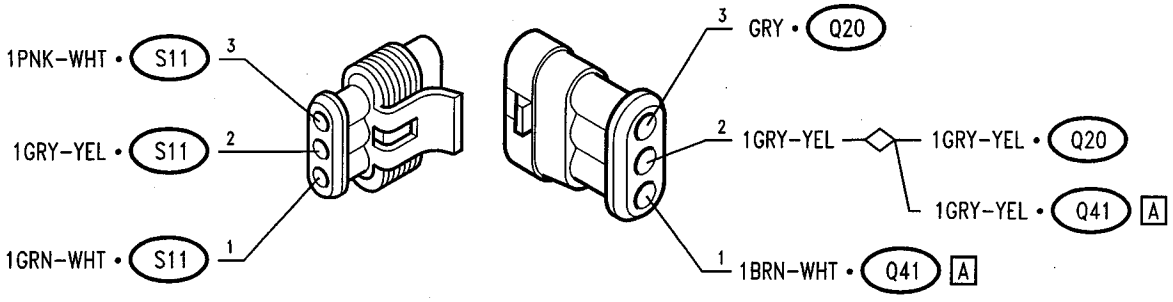
Fuse for engine fan — G254



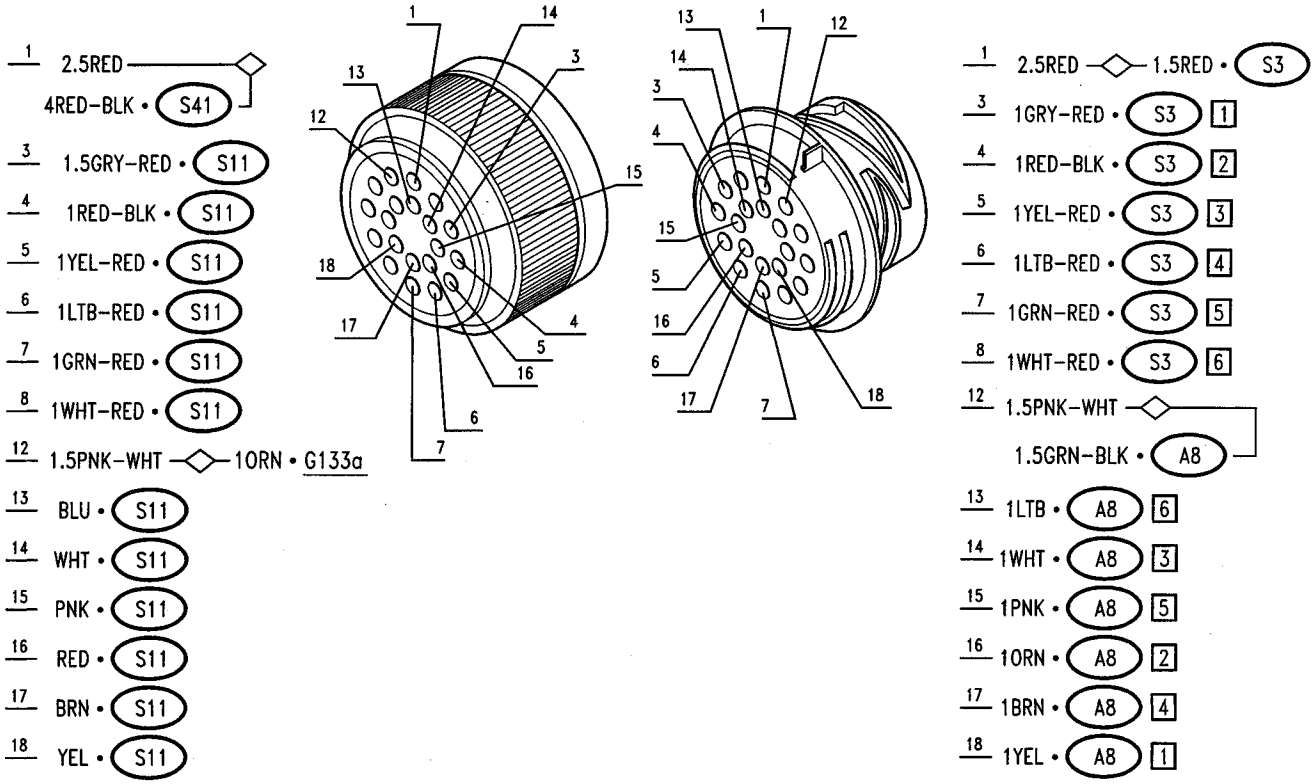
Connector for additional conditioner wiring — G313



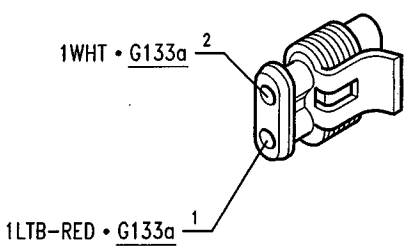
Connector for conditioner syst./injection syst. — G337



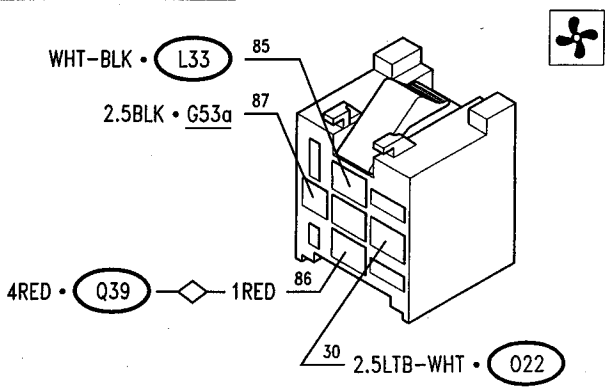
Connector ignition elettroinjectors — G338



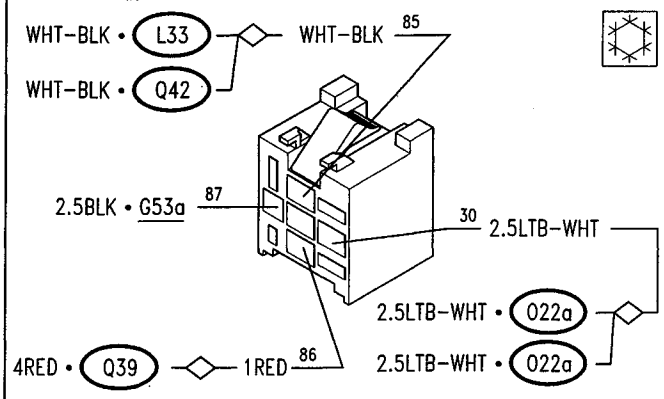
Reversing light switch — H2



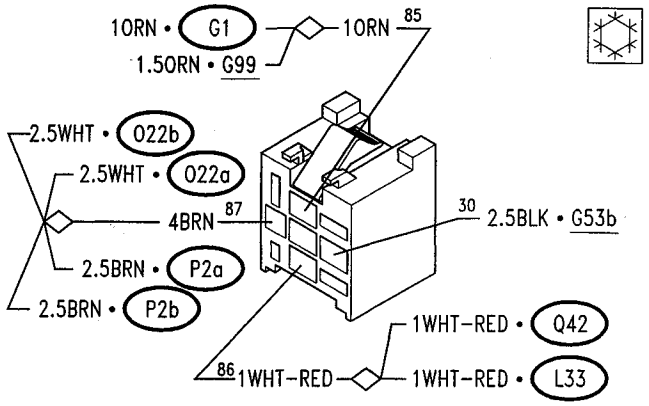
Engine cooling fan 1st speed relay — I99



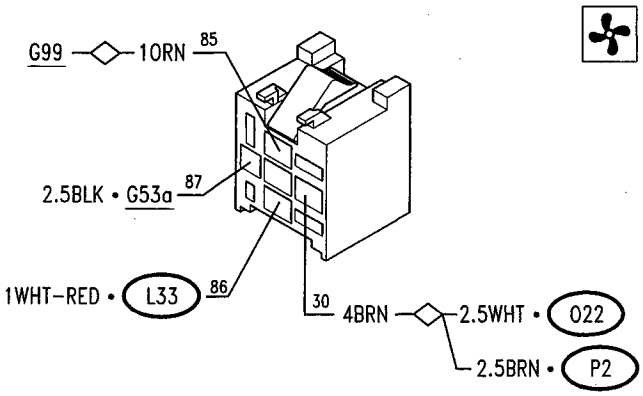
Engine cooling fan 1st speed relay — I99



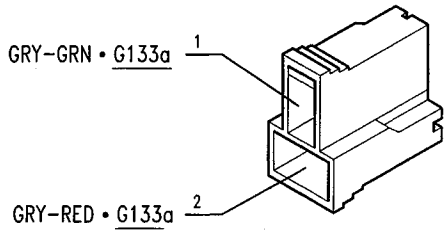
Engine cooling fan 2nd speed relay — I100



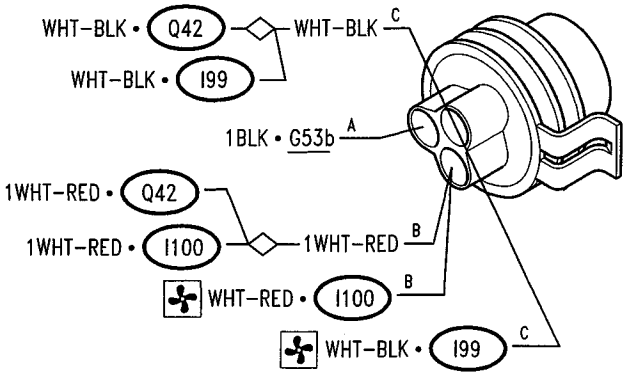
Engine cooling fan 2nd speed relay — I100



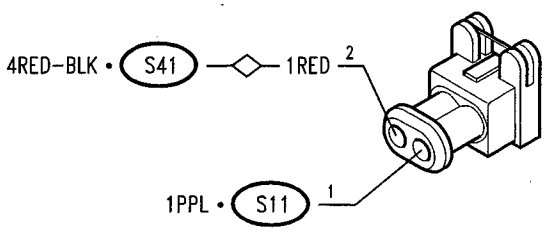
Sender for engine coolant temperature gauge and max. temperature warning light contact — L10



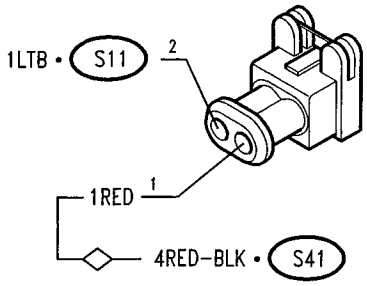
Two-level thermal contact — L33



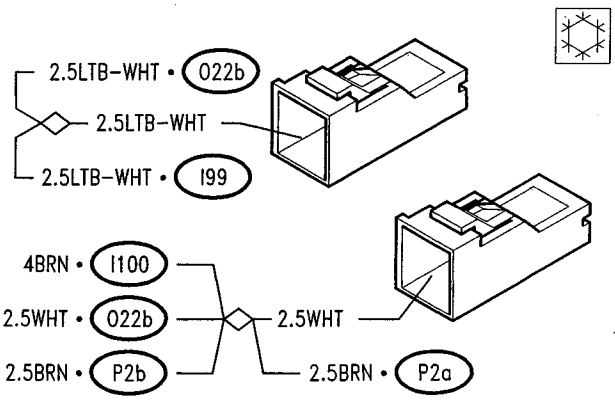
E.G.R. solenoid valve — L46



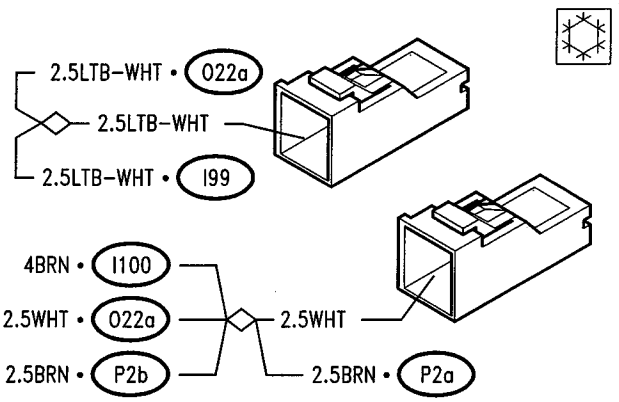
Evaporation solenoid valve — M15



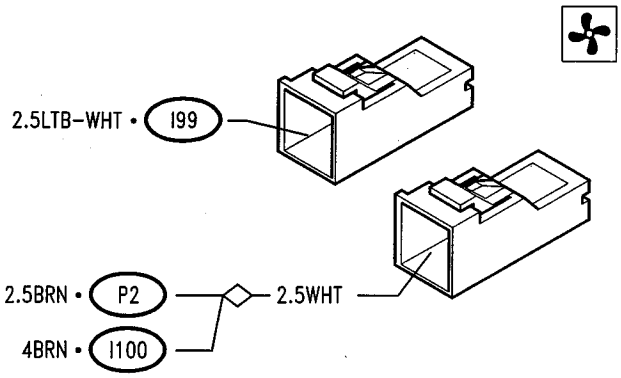
Additional engine fan resistance — O22a



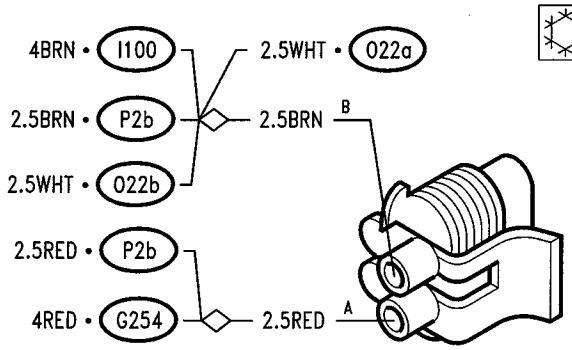
Additional engine fan resistance — O22b



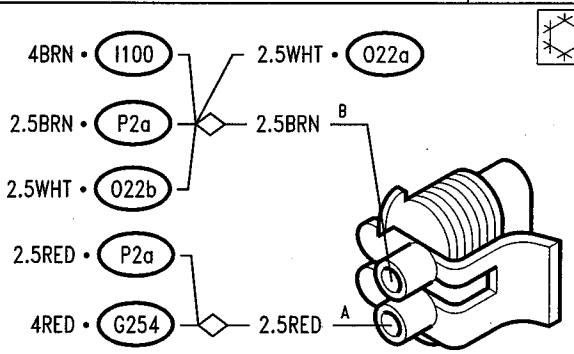
Additional engine fan resistance — O22



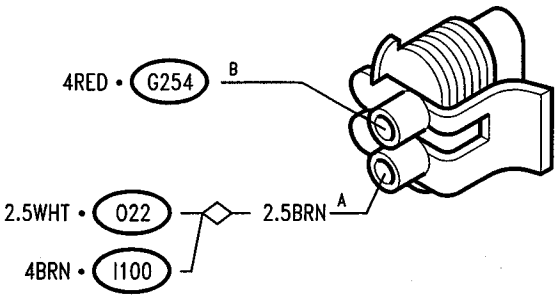
Engine cooling fan — P2a



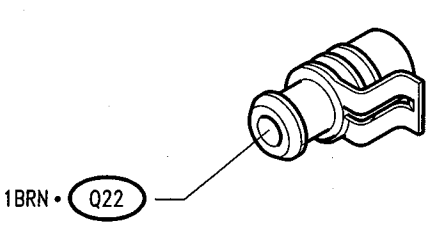
Engine cooling fan — P2b



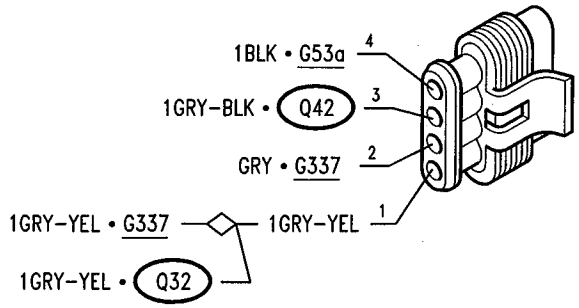
Engine cooling fan — P2



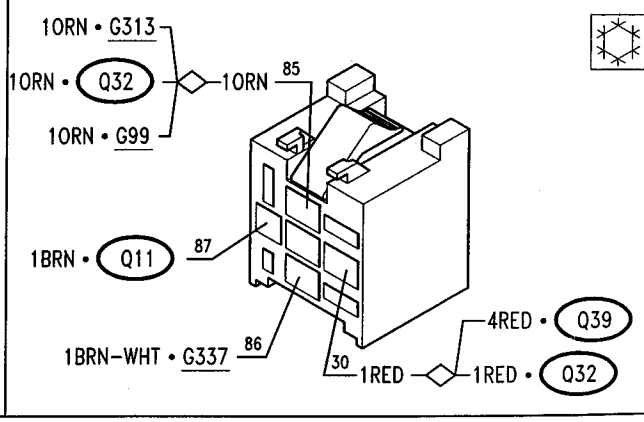
Compressor electromagnetic coupling — Q11



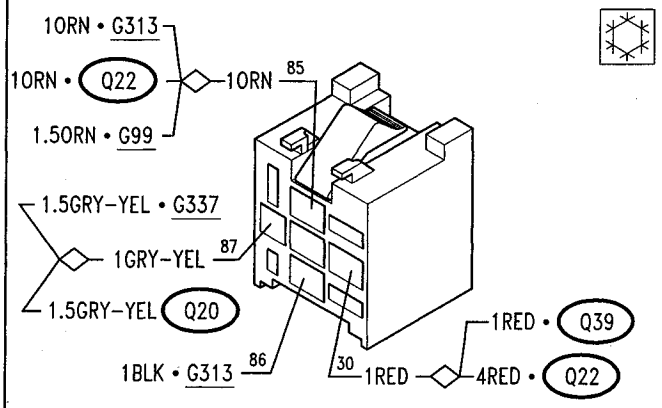
Min. and max. sensor pressure contact — Q20



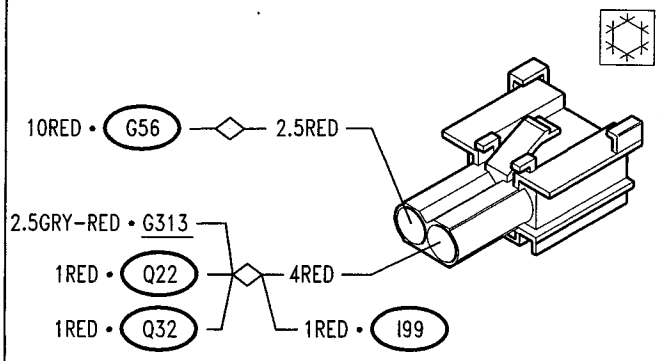
Electromagnetic coupling relay — Q22



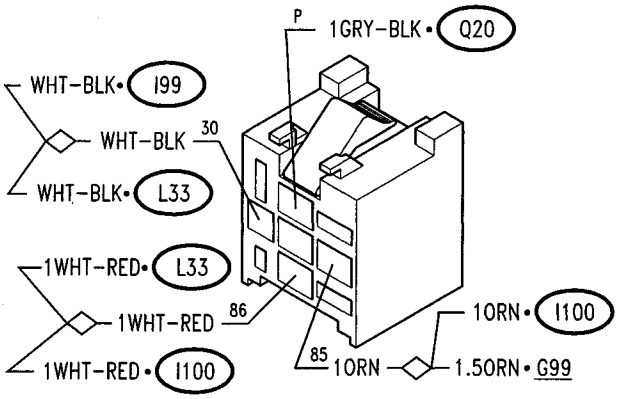
Auxiliary relay for heating and ventilation — Q32



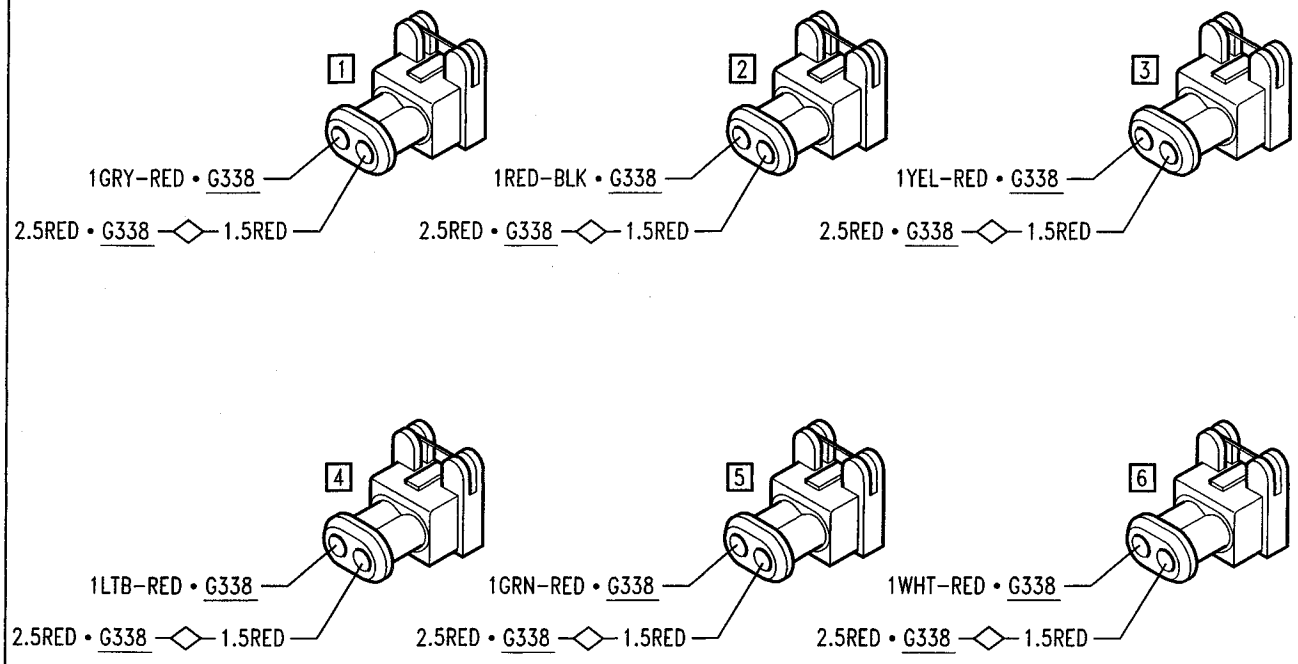
Fuse for conditioning system (30A) — Q39



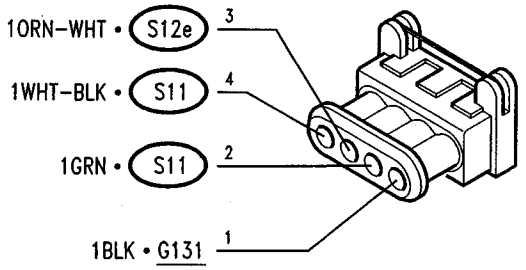
Conditioner fan delay device — Q42



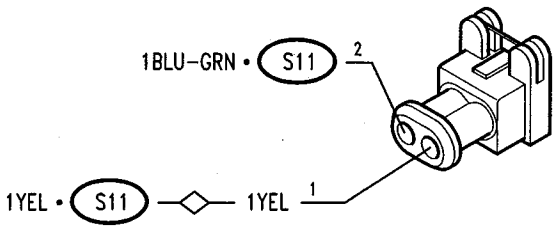
Elettroinjectors — S3



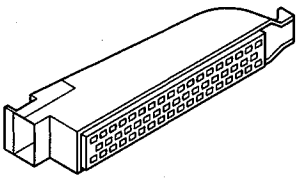
Air flow meter — S5

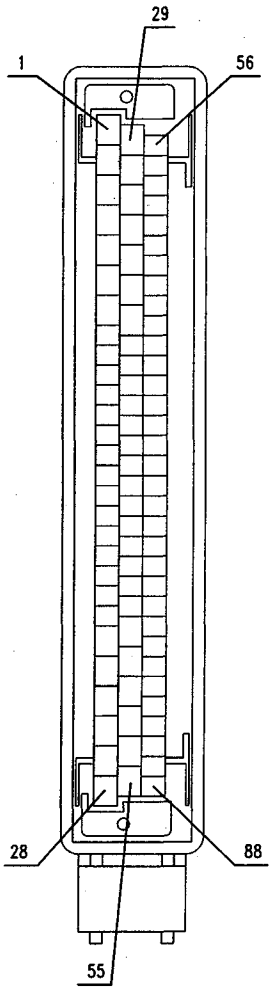


Engine temperature sensor — S7



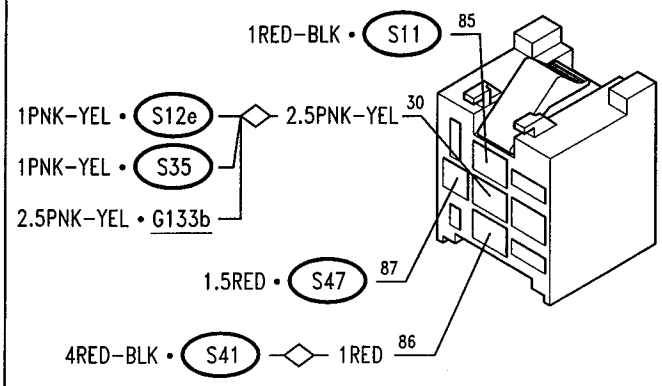
Motronic control unit — S11



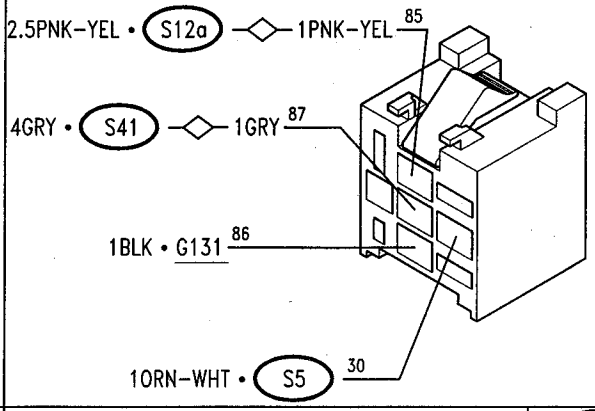


1 1RED-BLK • S12a
2 1ORN-BLK • S29
3 1.5GRY-RED • G338
4 1YEL-RED • G338
5 1GRN-RED • G338
6 1.5BLK • G131
8 1RED-GRN • G133b
9 1GRY-RED • L46
11 BLK • S35
12 GRN • S35
14 1GRN • S5
16 BLK • S31
23 WHT • G338
24 RED • G338
25 YEL • G338
26 1RED • S46
27 1PPL-BLK • S41
28 1BLK • G131
29 1LTB-BLK • S29
31 1RED-BLK • G338
32 1LTB-RED • G338
33 1WHT-RED • G338
34 1.5BLK • G131
36 1LTB • M15
41 1WHT-BLK • S5
42 1LTB • G133a
43 YEL • S31
44 1WHT-BLU • S52
47 1BRN-WHT • G133a
48 1BRN • G337
50 BLU • G338
51 WHT • G338
52 BRN • G338
54 1GRY — 4GRY • S41
55 2.5BLK • G131
56 1PNK — 1ORN • G133a
59 1PPL-WHT • S38
64 1GRN-WHT • G337
65 1GRY-YEL • G337
69 YEL • S20b
70 BLU-BLK • S20a
71 BLU — BLU • S20a; BLU • S20b
72 1YEL — 1YEL • S34; 1YEL • S7; 1YEL • S38
73 1WHT-BLK • S38
77 1YEL-BLU • S34
78 1BLU-GRN • S7
87 1LTB-WHT • T1
88 1WHT-GRN • G133b

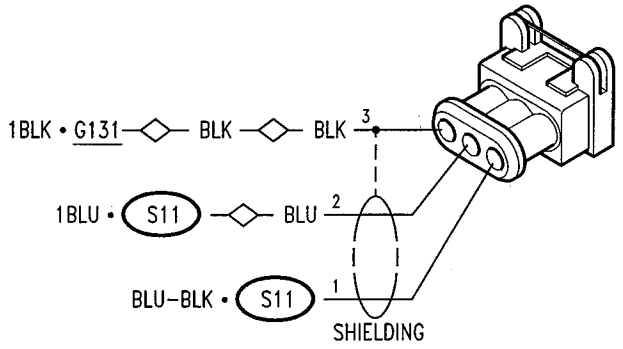
Motronic fuel pump relay — S12a



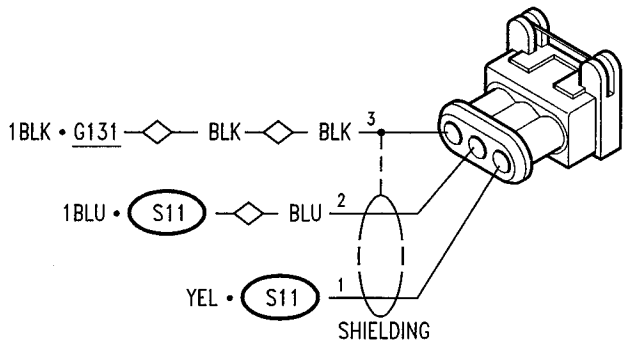
Air flow meter relay — S12e



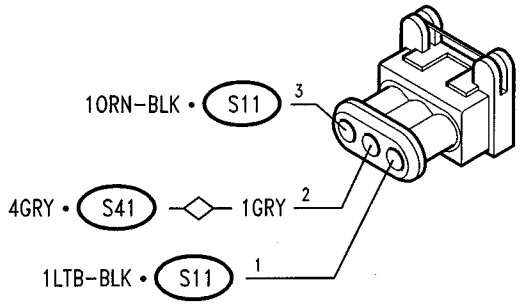
Pinging sensor a — S20a



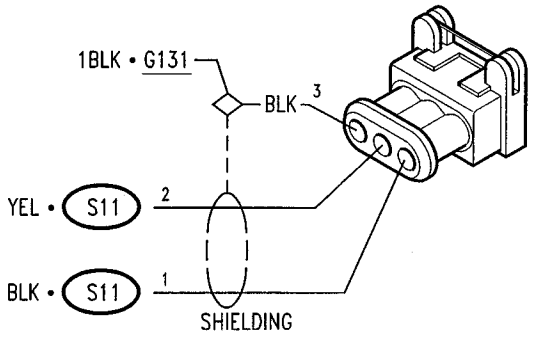
Pinging sensor b — S20b



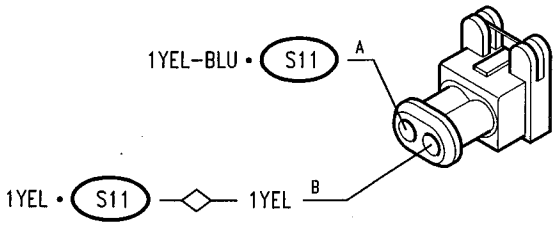
Idle adjustment actuator — S29



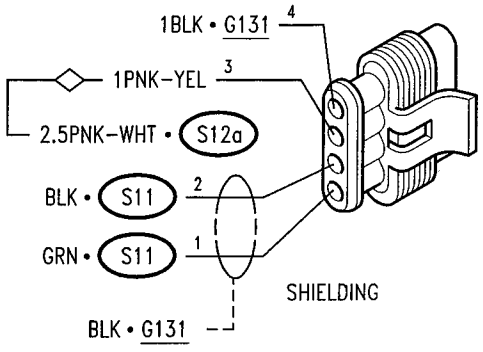
Rpm and crankshaft position sensor — S31



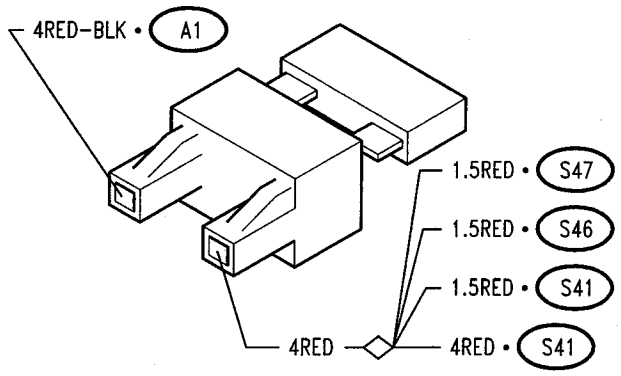
Air temperature sensor — S34



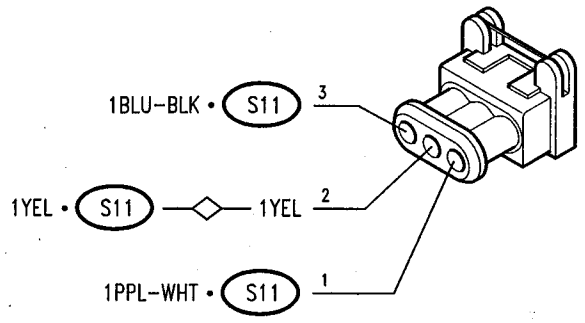
Heated lambda probe — S35



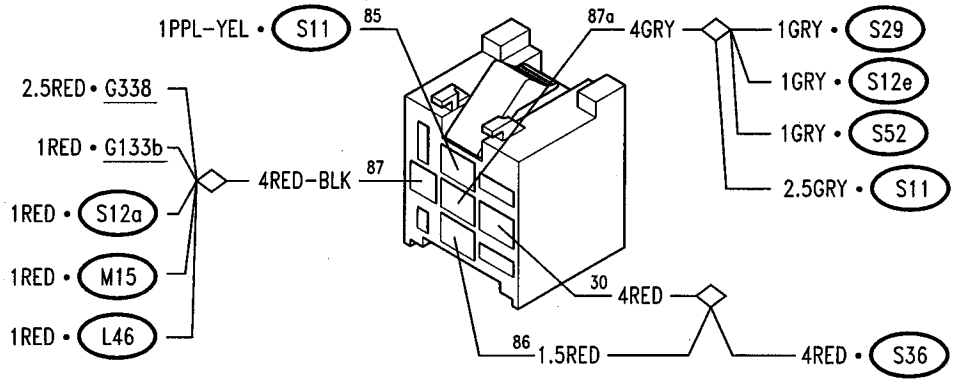
Fuse for injection relay — S36



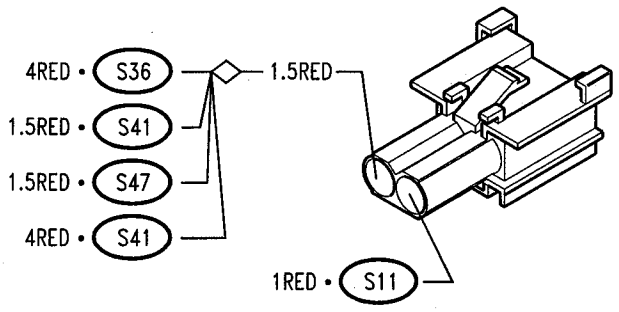
Sensor on throttle body — S38



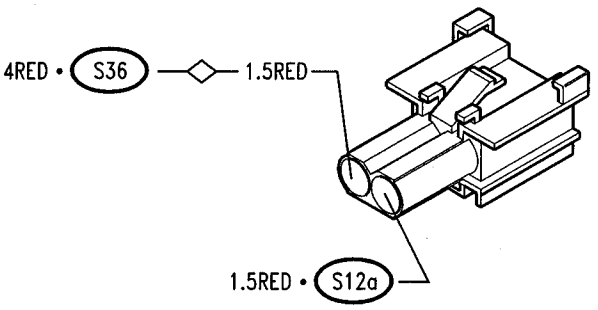
Main relay — S41



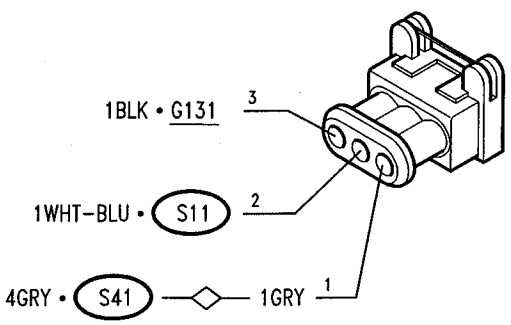
Fuse for Motronic supply — S46



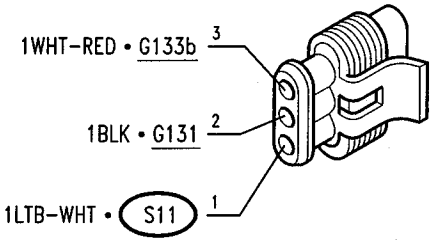
Fuse for fuel pump — S47



Cam angle sensor — S52



Connector for ALFA TESTER (Motronic and ALFA ROMEO CODE) — T1



SERVICE

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