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**ELECTRIC SYSTEM**

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**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)**

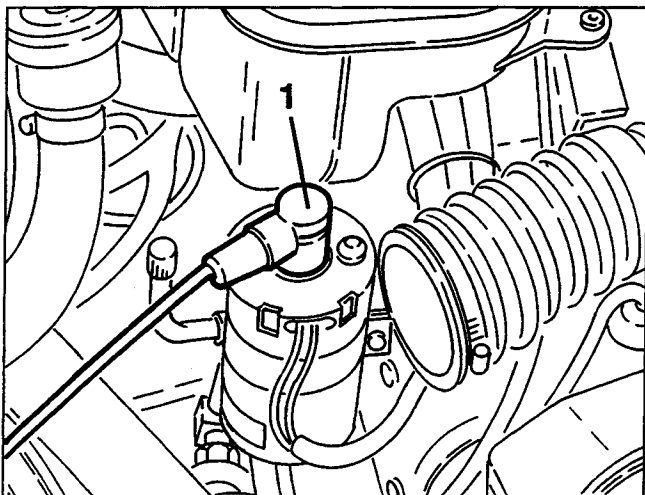
## IGNITION COIL

The high voltage in the ignition system is guaranteed mainly by the energy accumulated in the ignition coil. The coil is formed of two copper windings with an iron core, overlaid on one another and insulated from one another by the different potential.

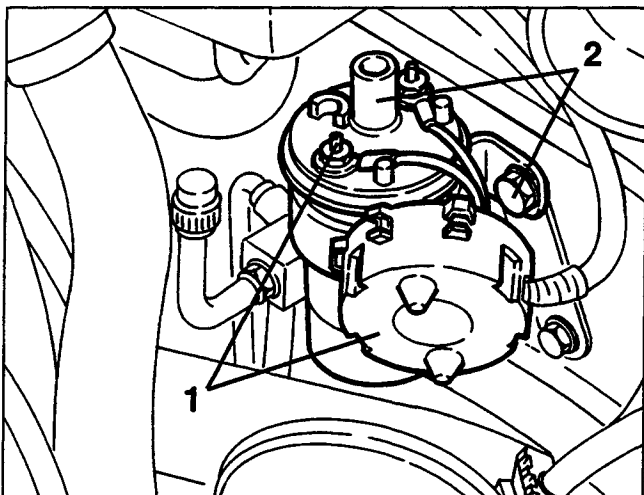
The current of the primary winding is cut off in correspondence of the firing point and after the accumulation phase. In the same instant, the magnetic field drops inducing a spark voltage in the secondary winding.

### REMOVING/REFITTING

- Disconnect the battery (-) terminal.
- Remove the air flow meter (see specific paragraph).
- 1. Disconnect the high voltage cable from the ignition coil.



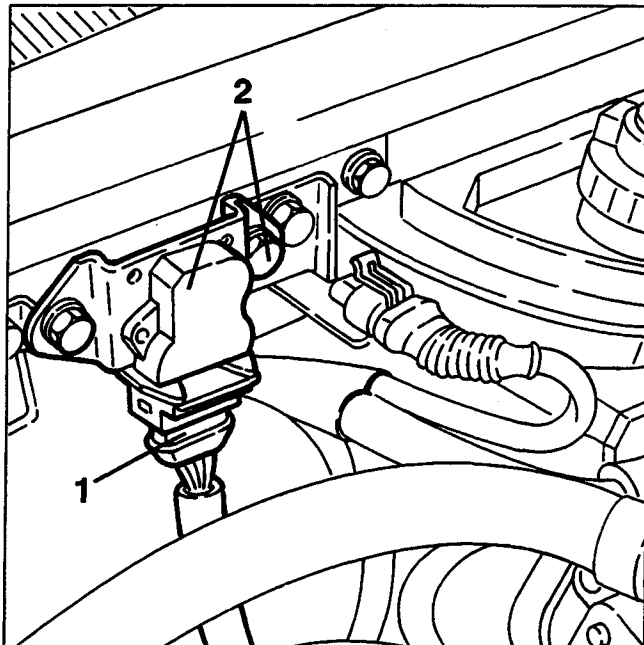
1. Remove the plastic protection, then disconnect the low voltage cables from the ignition coil.
2. Slacken the fastening screws and remove the ignition coil complete with support bracket.



## POWER MODULE

### REMOVING/REFITTING

- Disconnect the battery (-) terminal,
- 1. Disconnect the electrical connection from the power module.
- 2. Slacken the two fastening screws and remove the power module complete with support bracket.

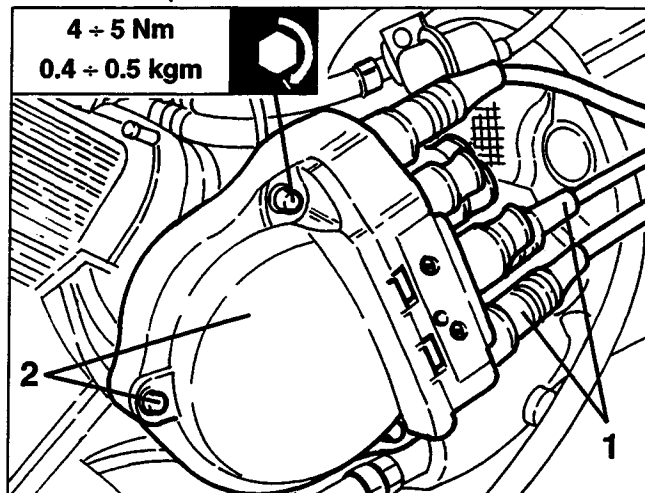


## IGNITION DISTRIBUTOR

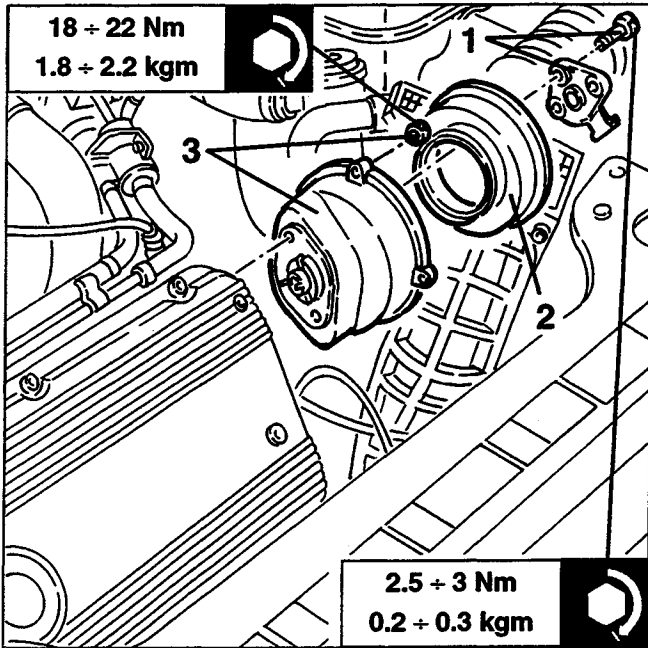
The purpose of the ignition distributor is to distribute the high voltage leading from the ignition coil to the single spark plugs. The ignition distributor is installed on the left-hand cylinder head and its rotary brush is turned directly by the camshaft.

### REMOVING/REFITTING

- Disconnect the battery (-) terminal.
- 1. Disconnect the high voltage cables from the ignition distributor.
- 2. Slacken the three fastening screws and remove the distributor cap.



1. Slacken the three fastening screws and remove the rotary brush.
2. Remove the protection.
3. Slacken the two fastening nuts and remove the ignition distributor body.



### CHECKING AND REPLACEMENT

- With the engine cold, remove the spark plugs, firstly blowing inside the spark plug openings to remove any impurities and traces of dirt.
- Check the spark plugs for dirt and the ceramic insulation for breaks. In this case replace the spark plugs.

**WARNING:**

The use of spark plugs with different characteristics or sizes than those specified can cause serious damage to the engine and change the level of harmful emission at the exhaust.

**WARNING:**

A dirty or worn out spark plug is often the sign of a failure in the engine supply system.

For example:

- Traces of carbon dust: incorrect mixture, air cleaner very dirty.
- Spots of oil: oil leaking from the piston rings.
- Formation of ash: presence of aluminium materials, contained in the oil.
- Burnt electrodes: overheating due to unsuitable fuel, defects in the valves.
- High electrode wear: harmful additives in the fuel or in the oil, pinging in the cylinder head, overheating;
- Etc.

- When installing tighten the spark plugs to a torque of:

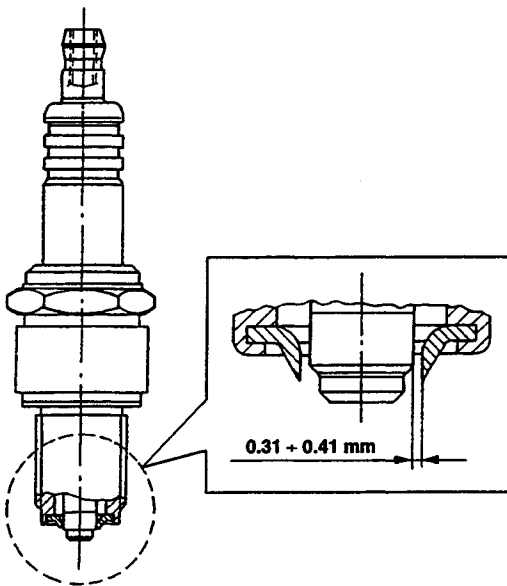


<p>25 ± 34 Nm 2.5 ± 3.5 kgm</p>
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### SPARK PLUGS

The standard spark plugs installed are of the surface discharge type with four peripheral points and a centre electrode.

In order to operate correctly the gap between the peripheral points and the centre electrode must be correct.



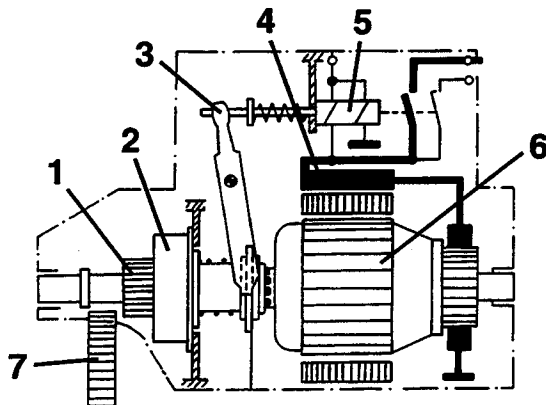
<b>Firing order</b>
---------------------

1 - 4 - 2 - 5 - 3 - 6
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## STARTER MOTOR

The starter motor starts engine rotation, overcoming the inertial forces and friction and bringing it to a determinate rpm to start the formation of the mixture needed for combustion, thus the autonomous motion of the engine.

The motion is transmitted by a direct current electric motor operated by the battery through a coupling pinion which turns the ring gear fitted on flywheel.



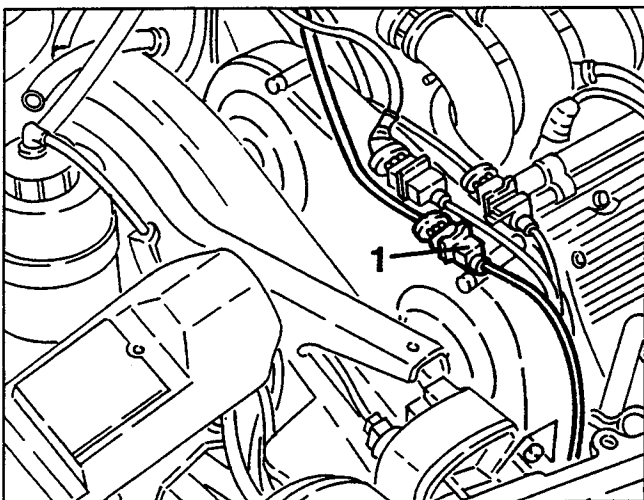
- |                       |                       |
|-----------------------|-----------------------|
| 1. Pinion             | 5. Relay              |
| 2. Roller idler gear  | 6. Rotor              |
| 3. Coupling lever     | 7. Flywheel ring gear |
| 4. Energizing winding |                       |

Owing to an idler gear coupling, the pinion is disengaged when the main engine turns faster than the motor. A relay energized by the motor current engages the pinion through a fork.

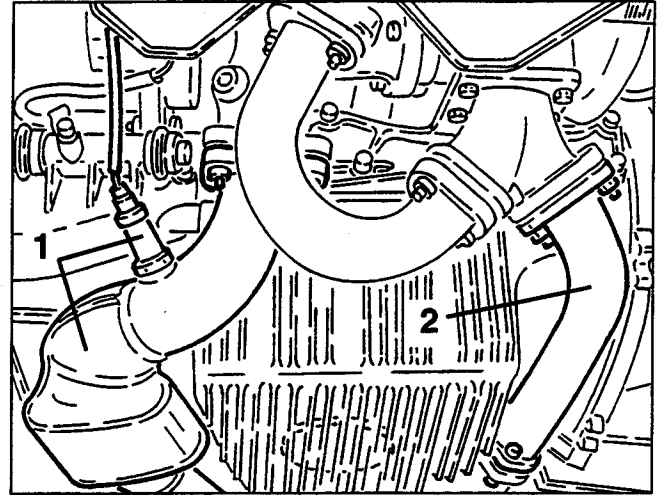
The starter motor is of the pinion screw and translation type, with relay housed directly above the motor itself.

## REMOVING/REFITTING

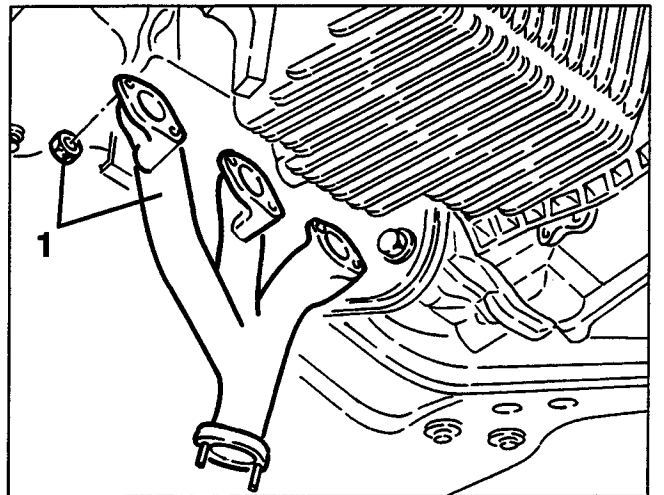
- Set the car on a lift.
  - Disconnect the battery (-) terminal.
1. Disconnect the electrical connection of the lambda sensor



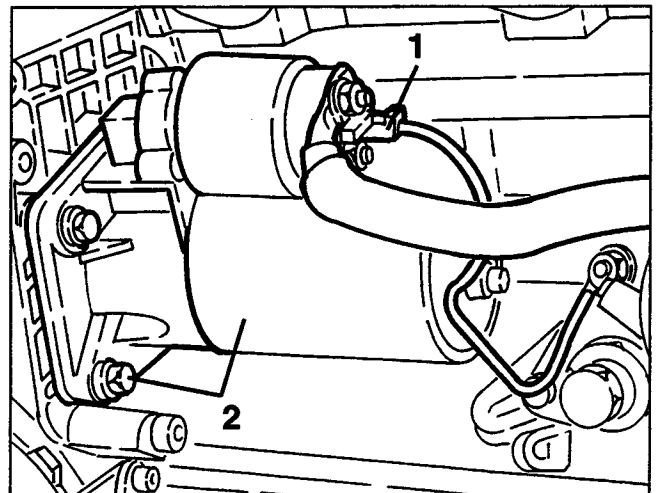
1. Raise the car, slacken the fastenings and remove the front section of the exhaust pipe complete with lambda sensor.
2. Slacken the fastenings and remove the exhaust gas delivery pipe from the right-hand cylinder head manifold to the turbocharger.



1. Slacken the fastening nuts and remove the exhaust manifold from the right-hand cylinder head.



1. Disconnect the electrical connections from the starter motor.
2. Slacken the fastening screws and remove the starter motor.



## BATTERY

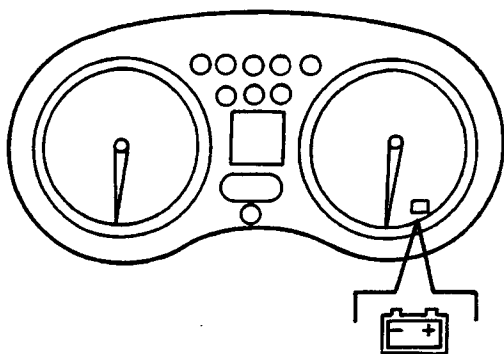
The battery has been designed to ensure that the engine starts in the shortest time possible. For this reason a high torque and a predefined engine rpm are required. This is ensured by the optimal sizing of the 6 elements contained inside the battery, each of which delivers a voltage of ~ 2 V (12 V in all).

It maintains the charge much longer and also contains diluted sulphuric acid; for this reason it is necessary to keep it in the upright position even when it is not installed in the car. The battery body also has small ventilation holes to minimise the formation of gas during charging. Due to the reduction of the of gas produced, there is no corrosion and good contact at the terminals is ensured.

The advantages of this battery are:

- highly reduced water consumption due to the new type of alloy used in the manufacture of the grills and plates, for which reason topping up is no longer necessary;
- excellent starting capacity, as a result of very low self-discharging of up to seven months thus enabling long term storage (at temperatures below 28°C).

When the vehicle is travelling the alternator recharges the battery; whenever the charge is insufficient or the connection between the alternator and the battery is cut off, a warning light on the instrument cluster turns on to indicate a circuit failure.



If the battery appears to be flat, check the charge measuring the loadless voltage on the terminals using a Voltmeter. If the voltage is below 12.30 V it is 50% charged; if it reaches 12.48 V it is 75% charged; and at 12.66 V it is 100% charged.

### WARNING:

If the electrolyte level in one or more cells of the battery has fallen below the minimum mark on the plastic container, carefully open the cap cover and add distilled de-ionized water, as with ordinary batteries.

**NOTE:** It is highly inadvisable to recharge the battery quickly at voltages above 15.5 V.

When recharging use a normal 12 V battery charger, connecting the positive cable (red) to the battery (+) terminal and the negative cable (black) to the battery (-) terminal.

If the battery of the vehicle is connected temporarily to an external battery, connect the positive terminal to the positive terminal and the negative terminal to the negative terminal.

### WARNING:

- Do not connect or disconnect the battery to or from the electrical system of the car when the engine is running.
- Do not invert the terminal connections (even for a moment) as this would damage the alternator rectifier.
- When connecting the battery charger to the battery, firstly connect the cables and then start the battery charger.
- If it becomes necessary to start the engine with temporary cables and with an auxiliary battery, the voltage of the latter must not exceed 12 V.
- Before recharging the battery the clamp should be removed from the negative terminal.
- When charging make sure that the temperature of the electrolyte does not exceed 45°C.
- Do not touch the positive and negative terminals at the same time with the hands.
- Keep all naked flames away from the battery when recharging.

When replacing the battery follow the directions for use.

If the charge of the replacement battery is potentially higher than that of the old one, the higher voltage might cause melting of the starter motor induction coil, or damage to the pinion or ring gear.

## MAINTENANCE

The capacity of the battery to start the engine depends on the charge within it; it is therefore necessary to check it regularly and carry out any maintenance, especially in winter due to the greater load exerted on the starter motor and the reduced battery capacity at low temperatures.

Clean the surface of the battery, the terminals and clamps with a solution of water and sodium bicarbonate.

Before reconnecting the terminals, coat them with a layer of grease.

### WARNING:

Do not let any of the fluid used for cleaning get into the battery as it will react with the electrolyte. The electrolyte fluid is an acid, therefore dangerous for the eyes, hands and clothes.

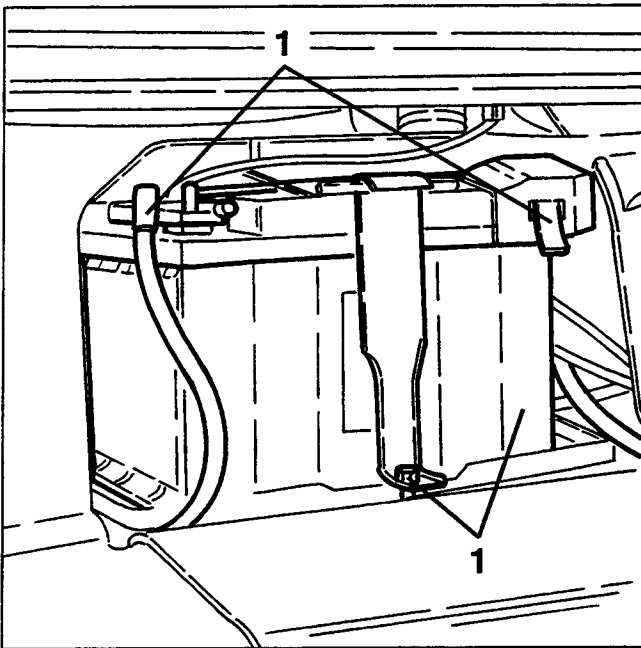
**NOTE:**

Batteries stored in a warehouse or installed on cars left unused for long periods will slowly lose their charge, so it will be necessary to recharge them before use.

**REMOVING/REFITTING**

- Working from the boot, remove the spare wheel and gain access to the battery tilting the special cover.

1. Firstly disconnect the battery (-) terminal and then the (+) terminal, then remove it after slackening the fastening clamp screw.



**ALTERNATOR**

When the engine is running the alternator supplies electrical energy to the electronic control units and to the various services which can be operated at all times.

It also charges the accumulator (battery), so that it can deliver current when the engine is stationary.

The electric current is produced by a stator which "cuts" the magnetic field generated by a rotary coil (rotor). The rotor is integral with a pulley operated directly by the crankshaft through a belt.

The contact brushes supply the rotor with the excitation current.

The alternate current generated by the alternator is rectified by the diodes and adjusted by the voltage regulator located on the alternator body.

The electronic voltage regulator used is compact in size and it warrants constant voltage in all fields of operation of the engine, regardless of the changes in load and rpm.

A cooling fan turns together with the pulley to prevent

the alternator from reaching dangerous temperatures that might adversely affect its operation.

The alternator installed is of the type with claw terminals and collector rings; it is very light and compact.

**WARNING:**

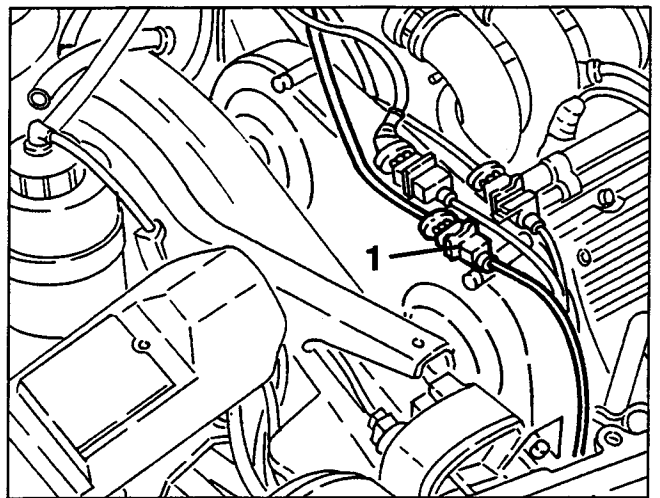
The fan will correctly cool the alternator if it turns clockwise (seen from pulley side).

**REMOVING/REFITTING**

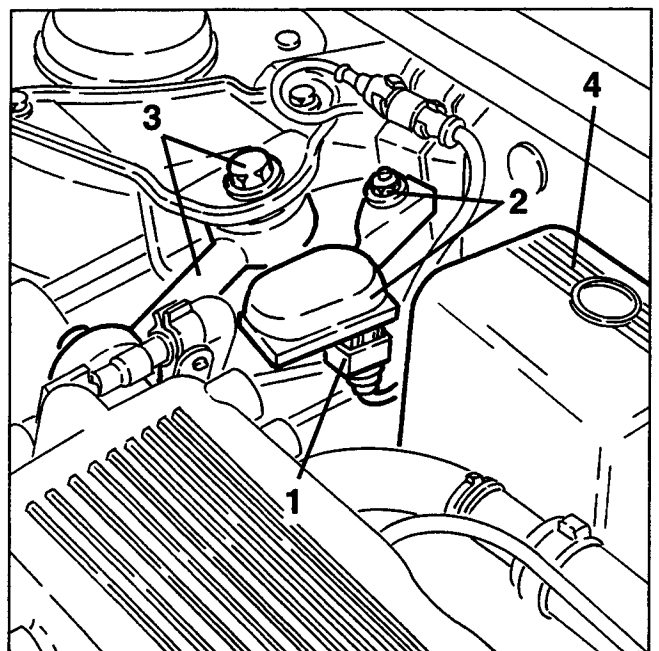
- Set the car on a lift.

- Disconnect the battery (-) terminal.

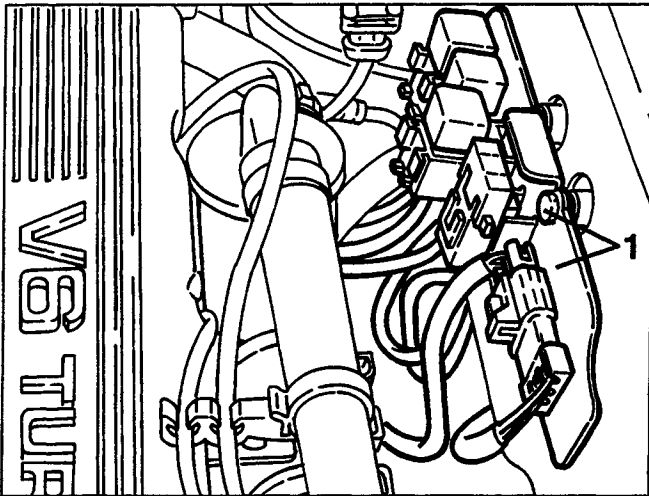
1. Disconnect the lambda sensor electrical connections.



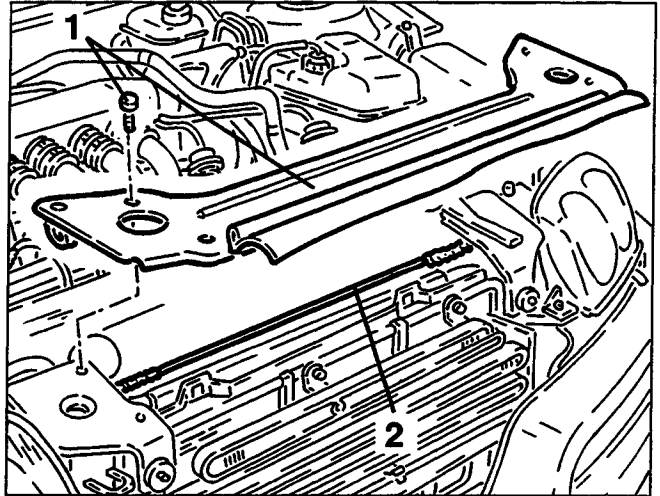
1. Disconnect the altitude sensor.
2. Slacken the fastening screw and remove the altitude sensor complete with support bracket.
3. Remove the engine stay connecting rod.
4. Remove the protective cover from the relay support bracket.



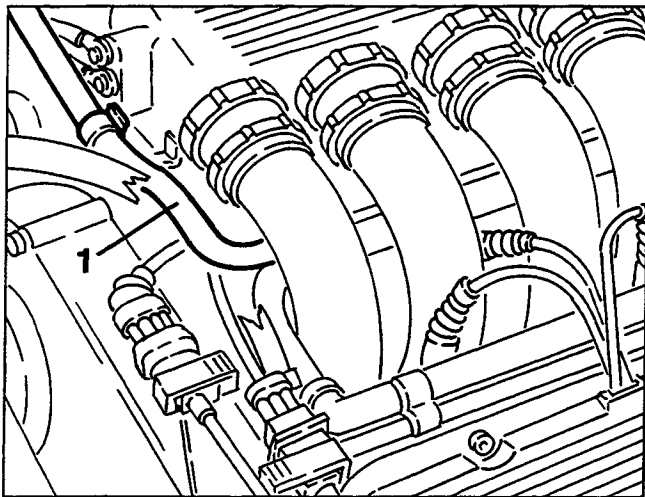
1. Slacken the fastening screws and move aside the relay support bracket and electrical connections.



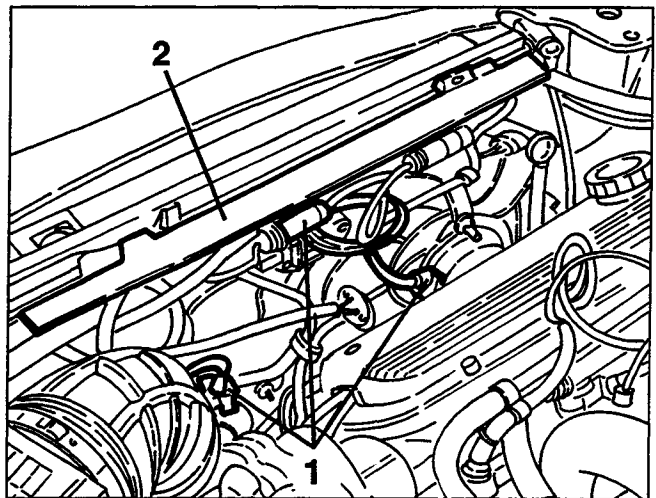
1. Slacken the fastening screws and remove the upper radiator crossmember.
2. Disconnect and move to one side the bonnet lock opening cable.



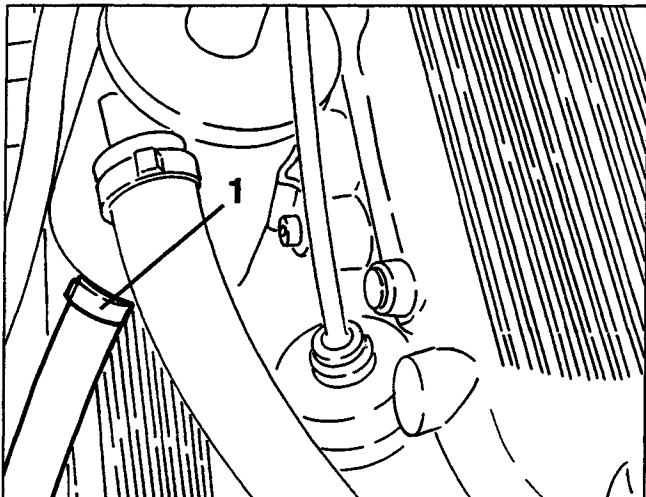
1. Disconnect the fuel vapour recovery pipe from the fuel distributor manifold



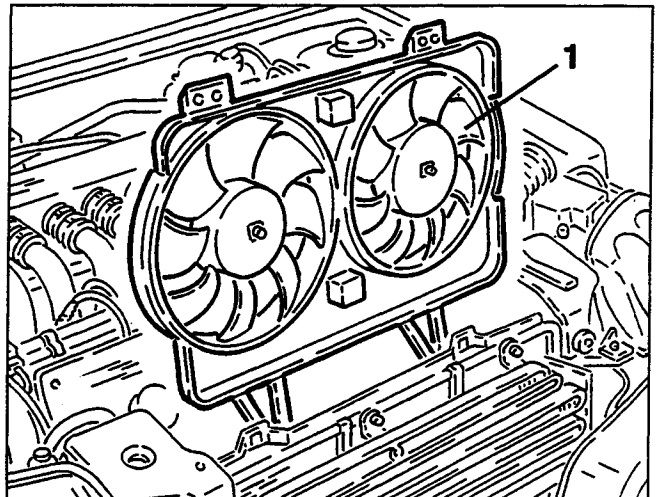
1. Disconnect the electrical connections from the cooling fans.
2. Slacken the fastening screw, then move aside the cable fairing complete with electric cables.



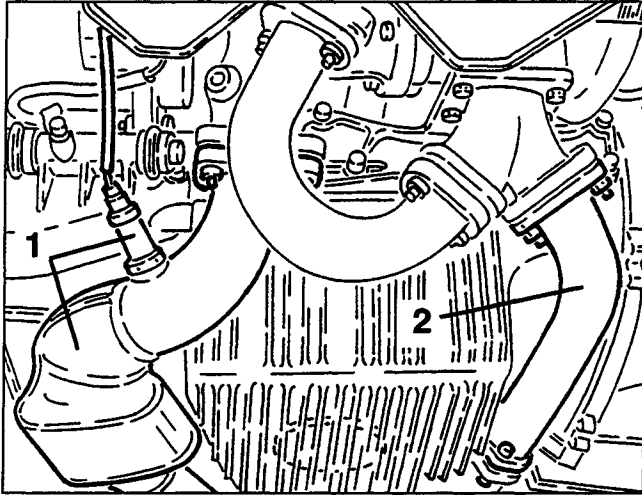
1. Disconnect the oil vapour recovery pipe from the oil vapour separator.



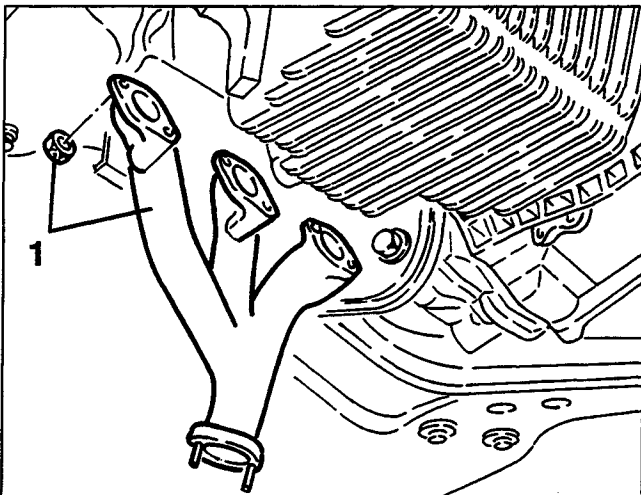
1. Withdraw and remove the cooling fans.



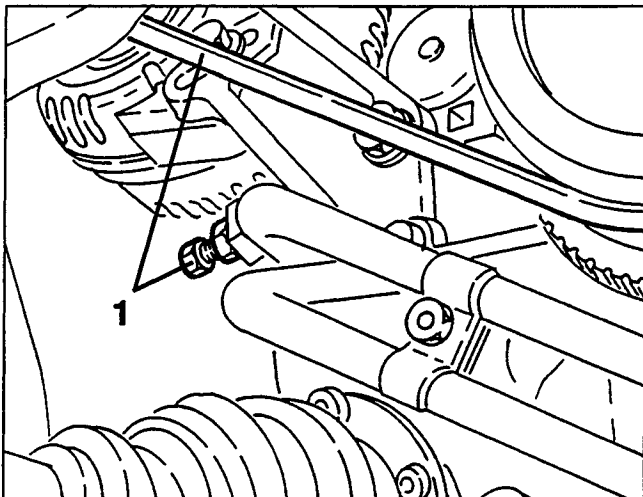
1. Raise the car, slacken the fastenings and remove the front section of the exhaust pipe complete with lambda probe.
2. Slacken the fastenings and remove the exhaust gas delivery pipe from the righthand cylinder head manifold to the turbocharger.



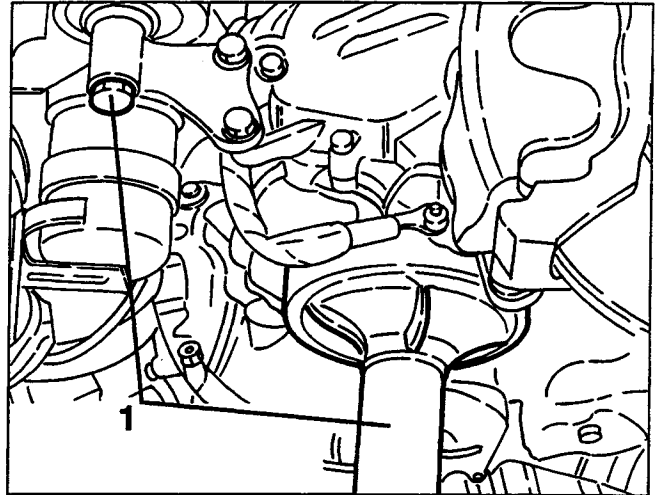
1. Slacken the fastening nuts and remove the righthand cylinder head exhaust manifold.



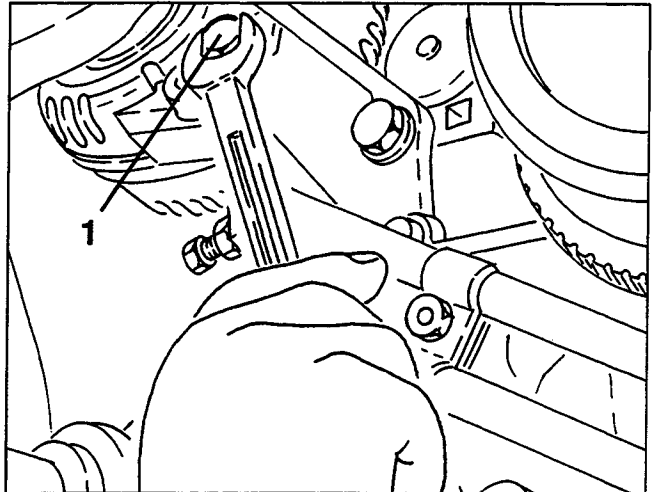
1. Slacken the locknut, then working on the screw of the micrometric belt tensioner slacken the tension of the alternator- water pump drive belt, then remove it.



1. Position a hydraulic jack under the gearbox, then slacken the screw fastening the gearbox side power unit support.
- Lower the hydraulic jack just enough to be able to remove the alternator.

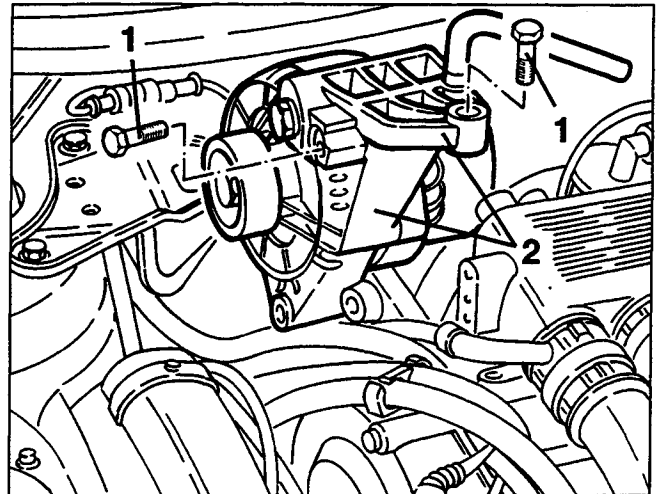


1. Slacken and remove the lower nut fastening the alternator.



- Disconnect the electrical connections from the alternator.

1. Slacken the two screws fastening the upper alternator support bracket
2. Remove the alternator complete with upper support bracket and dis-assemble them on the bench.





## ELECTRONIC CONTROL UNITS



**WARNING:**

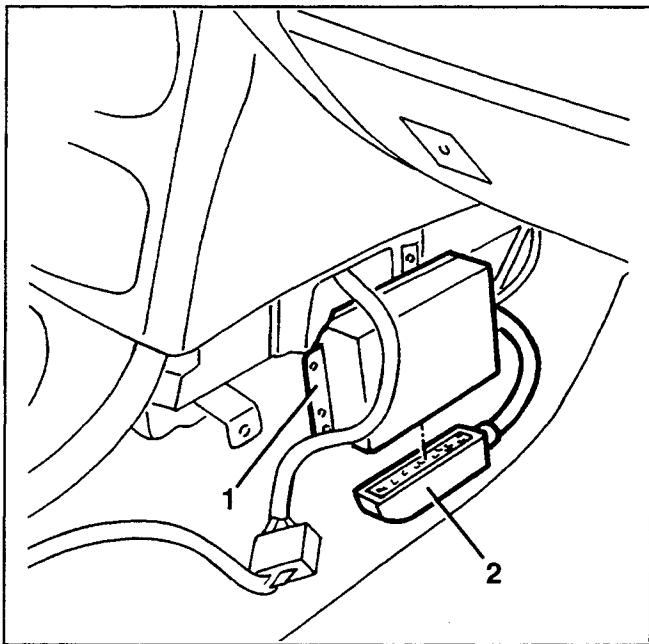
The following pages describe the procedures necessary for removing and refitting the electronic control units fitted on the vehicle with the exception of some devices inserted directly in the fusebox.

For the location of the various devices (control units, relays, etc.) and for any other functional information see "Group 55 - ELECTRIC SYSTEM DIAGNOSIS".

### INJECTION CONTROL UNIT

#### REMOVAL/REFITTING

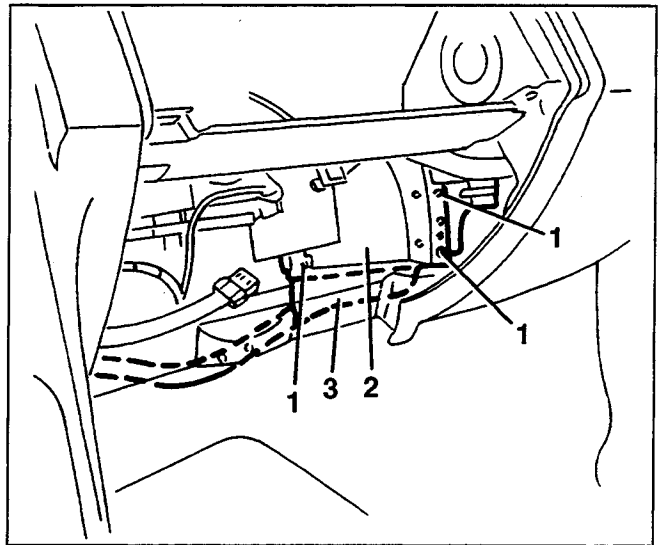
- Disconnect the battery
  - Remove the trim.
1. Slacken the fastening nuts and disconnect the control unit from the tunnel console.
  2. Disconnect the combs and remove the control unit.



### IGNITION CONTROL UNIT

#### REMOVAL/REFITTING

- Disconnect the battery.
  - Remove the glovebox (see specific paragraph).
  - Working under the dashboard, on the right-hand side panel of the passenger compartment, move aside the trim.
1. Slacken the fastening screws.
  2. Detach the control unit from the side panel.
  3. Disconnect the combs and remove the control unit.



**NOTE:**

for all the other control units, refer to the corresponding Group 55 of "Spider - Gtv".



## LOCATION OF EARTHS

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## GENERAL DESCRIPTION

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

The earths shown are the following:

- **G53a** Right-hand engine compartment earth (\*)
- **G53b** Left-hand engine compartment earth (\*)
- **G55b** Left-hand side panel earth (\*)
- **G63b** Left-hand rear earth (\*)
- **G92** Earth for electric aerial (\*)
- **G131a/b** Earths on engine upper cover
- **G148b** Earth under left-hand dashboard (\*)

- **G381** Airbag earth (\*)

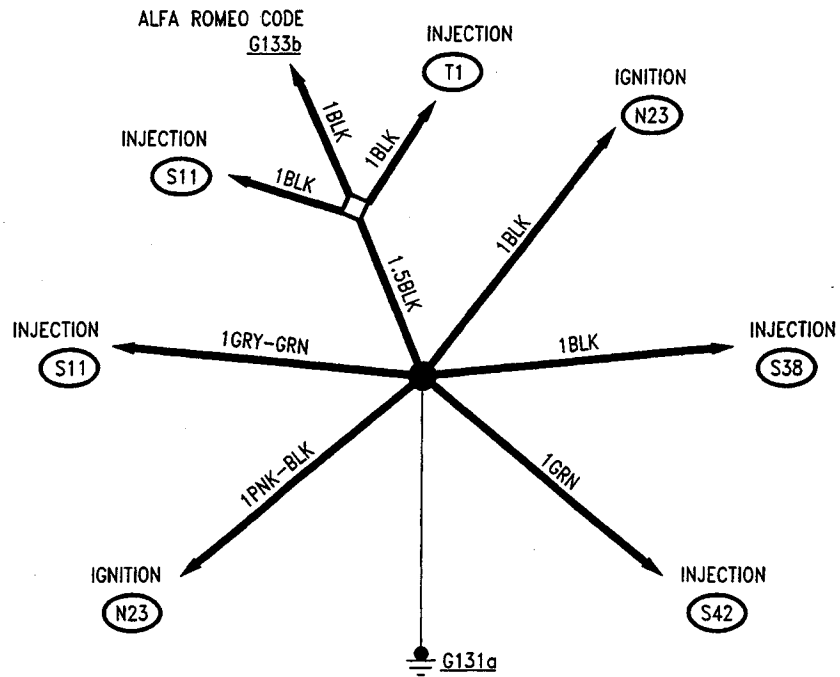
There is also an **earth braid**, which connects the power unit to the body.

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

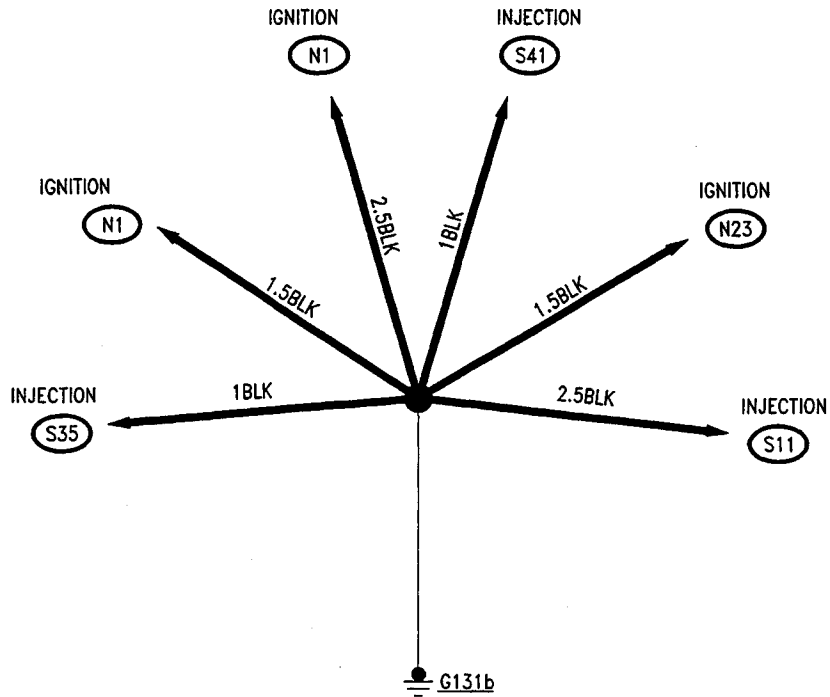
(\*) See the corresponding earth in the section of "Spider-Gtv - ELECTRIC SYSTEM DIAGNOSIS".

**WIRING DIAGRAMS**

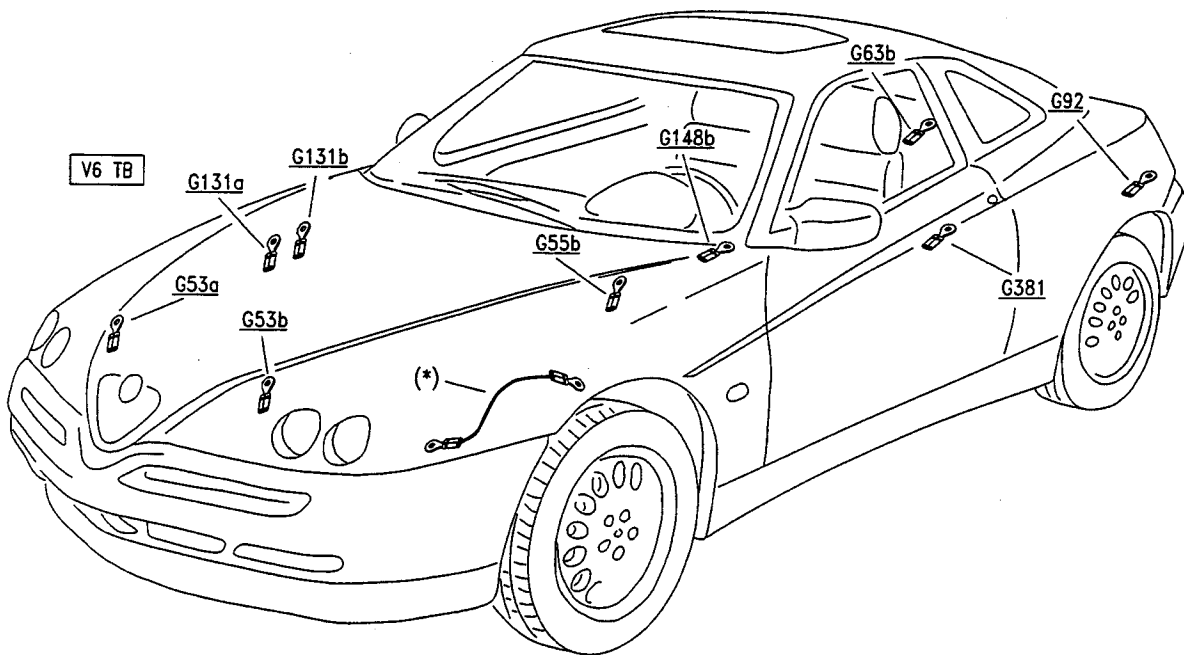
**G131a (3.0 V6 TB engine)**



**G131b (3.0 V6 TB engine)**



**LOCATION OF EARTHS ON THE CAR**



(\*) earth braid between gearbox and body

# FUSEBOX

## INDEX

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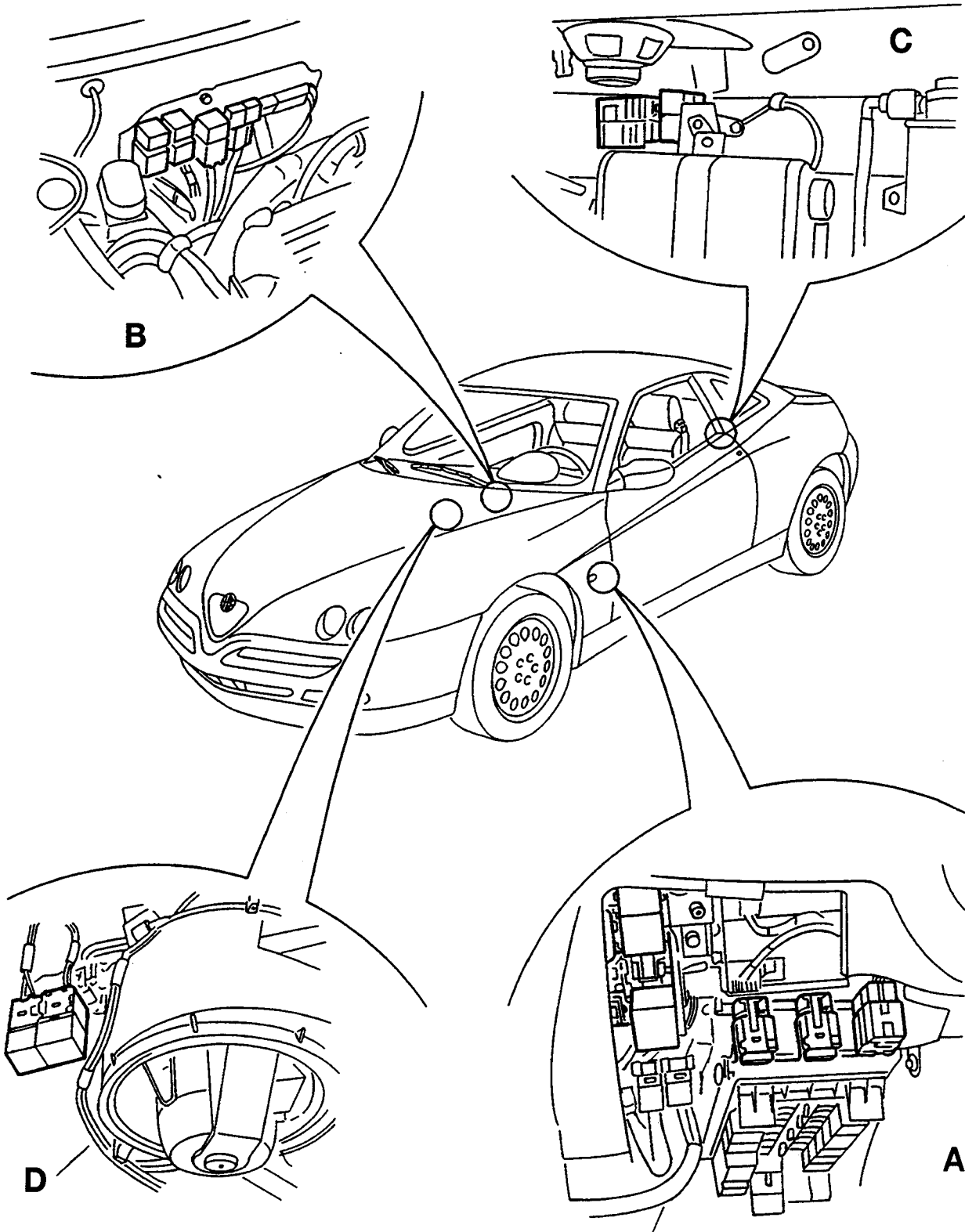
(\*) See the corresponding section of "Spider-Gtv - ELECTRIC SYSTEM DIAGNOSIS". For item involving the engine refer to the 3.0 V6 engine.

## LOCATION OF FUSES AND RELAYS

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

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

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



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

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

COMPONENT	AMP.	SYMBOL	COLOUR OF BASE
Ceiling light relay	20A	<b>I26</b>	Green
Hazard warning light & direction indicator intermittent device	-	<b>N13</b>	Black
Rear fog guard device	-	<b>N25</b>	White
Engine cooling fan 1st speed relay	30A	<b>I99/I99a</b>	Yellow
Sunroof relay	30A	<b>I58</b>	Red
ABS fuse	10A	<b>G125a</b>	Black
Power window fuse	25A	<b>G311</b>	White
RH power window fuse	25A	<b>G310</b>	White
Sunroof fuse	30A	<b>G261</b>	Green
Climate control fan fuse	30A	<b>G255</b>	Green
Rear fog guard fuse	7.5A	<b>G391</b>	Brown
ALFA ROMEO CODE control unit fuse (•)	10A	<b>G389</b>	Red

(•) from chassis no. \_\_\_\_

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

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

COMPONENT	AMP.	SYMBOL	COLOUR OF BASE
Antitheft switch relay	20A	<b>I109</b>	Red
Engine fan fuse	50A	<b>G254</b>	Black
Air conditioner wander fuse	30A	<b>Q39</b>	Green (Black) (•)
Main relay	30A	<b>S41</b>	Grey
Secondary relay	30A	<b>S42</b>	Black
Fuel pump relay	30A	<b>S12a</b>	Black
Fuel pump fuse	15A	<b>S47</b>	Blue

(•) from chassis no. \_\_\_\_



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

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

COMPONENT	AMP.	SYMBOL	COLOUR OF BASE
Luggage compartment 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 fig. position D)**

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

# INDICATORS AND WARNING LIGHTS

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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.

## MAIN INSTRUMENT CLUSTER: INDICATORS AND WARNING LIGHTS

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

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


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


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

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


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


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

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


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

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

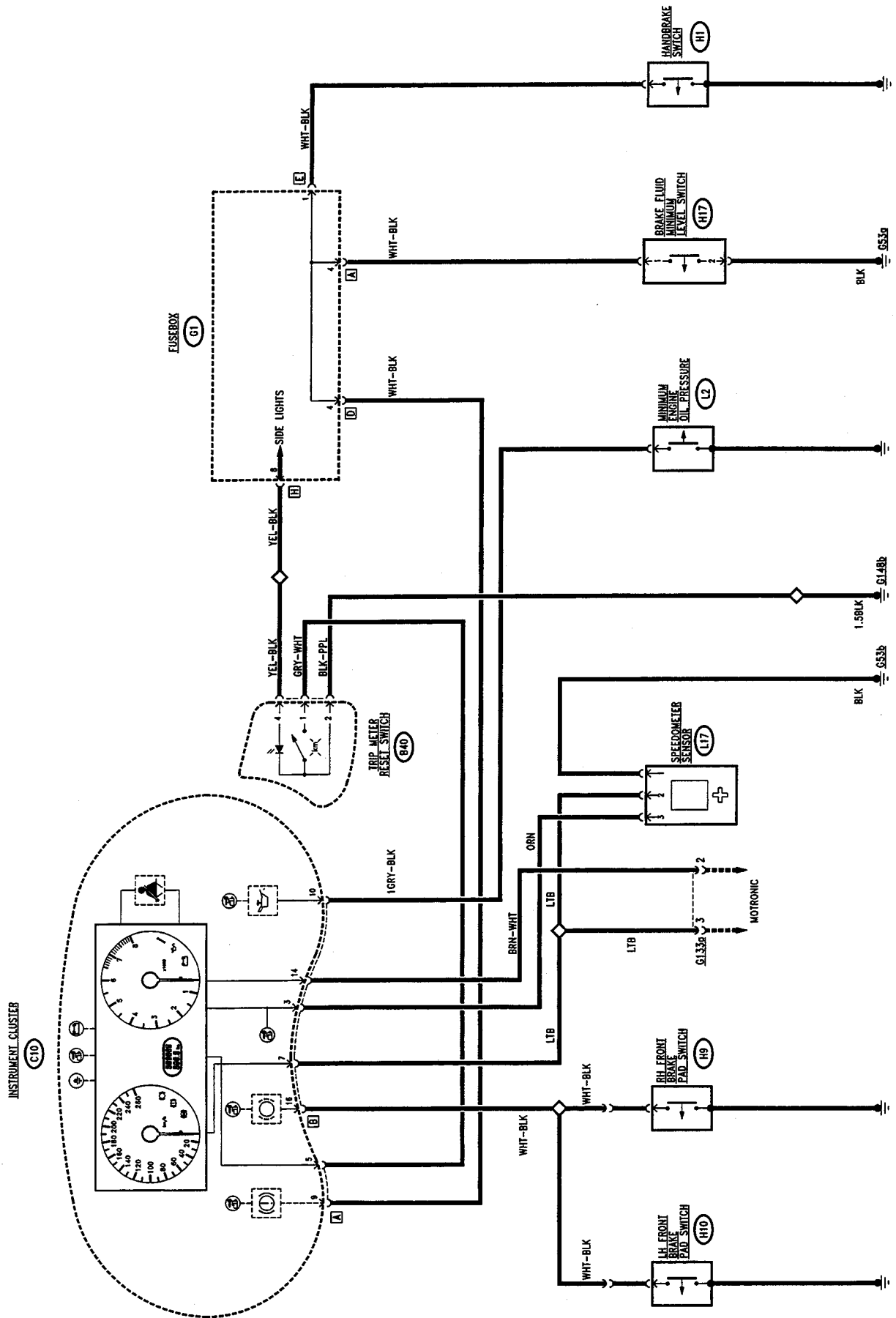
The two brake pad switches **H9** right and **H10** left are formed of a microswitch on the pad that closes to earth when the thickness of the pad thins, sending a signal to the instrument cluster **C10** at pin 16 of connector B, thereby turning on the "brake pad wear"  warning light.

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

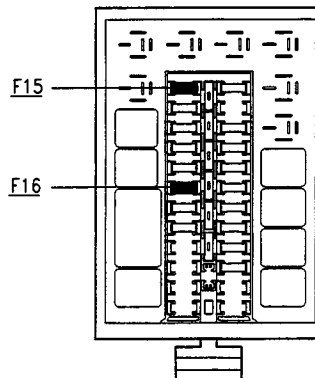
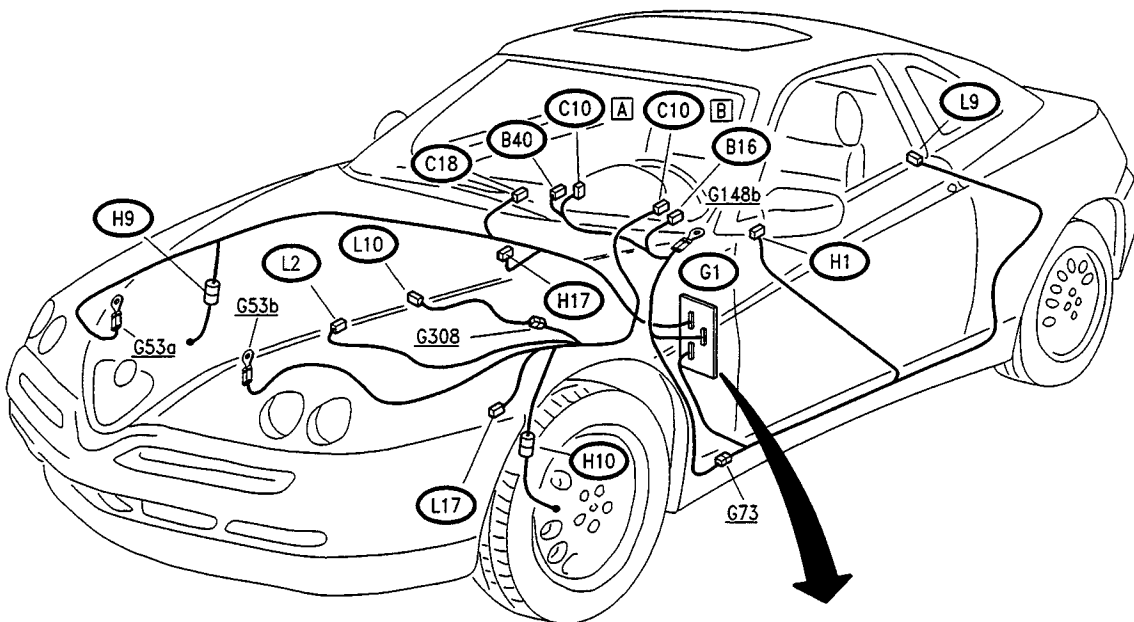
The same warning light is also turned on to indicate "low brake fluid level" through switch **H17** located in the fluid reservoir: this is a float device which closes a contact when the level of the fluid in the brake fluid reservoir falls below a certain reference.

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

Wiring diagram

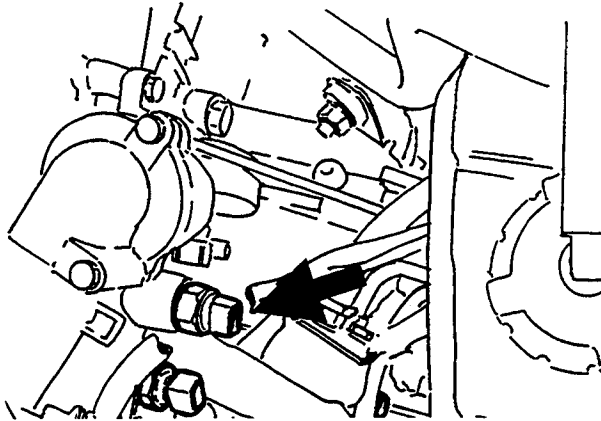


**LOCATION OF COMPONENTS**



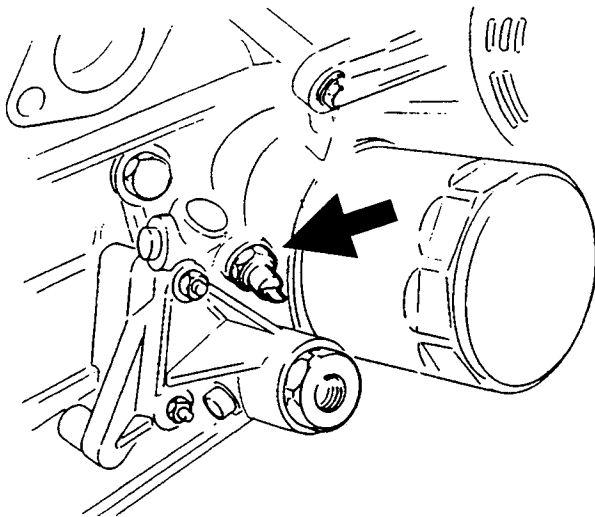
**CHECKING COMPONENTS**

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



SPECIFICATIONS		
Sender		
Temperature °C	Resistance Ω	Type of fluid for check
60	525 ÷ 605	Water
90	195 ÷ 245	Water
120	82 ÷ 94	Glycerine
Contact		
Contact closes	115 ± 3°C	
Contact opens	≥ 102°C	

Min. engine oil pressure contact **L2**



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

# HEATING AND VENTILATION:

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LOCATION OF COMPONENTS . . . . .	(*)
CHECKING COMPONENTS . . . . .	(*)

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



## COMPRESSOR CONNECTION

The electromagnetic joint which operates the compressor **Q11** is controlled by relays **Q22** and **Q32**, to be found in the set of relays and fuses **Q41**.

Relays **Q22** and **Q32**, have the coil supplied from the ignition switch (line protected by fuse **F17** of **G1**); their power line is supplied by battery voltage through fuse **Q65** (7.5A), also located in group **Q41**.

Relay **Q22** is energized and consequently supplies 12V to the electromagnetic joint **Q11**, by an earth signal leading from relay **Q69**, which is in turn energized with a positive signal leading from the compressor operating switch **Q68**; this signal crosses the control knob **Q4** which interrupts it when the knob itself is in the "OFF" position: in fact, in this condition, the compressor cannot be turned on. It should be

remembered that the same signal controls the first speed of the fan contemporaneously ("Fan and Recirculation Control").

This signal also crosses the minimum and maximum pressure switch (trinary) **Q20** which comes into operation if the pressures in the cooling system are too high or too low: in this case the signal is cut off and the compressor is not engaged.

The "compressor cut-in" signal from pin 87 of **Q22** to **Q11** is also sent to the Motronic control unit **S11** pin 29.

The other relay **Q32** is energized by the control signal leading from relay **Q69** and sends a "compressor cut-in request" signal to the Motronic control unit **S11** - pin 32 - which adjusts the engine speed accordingly.





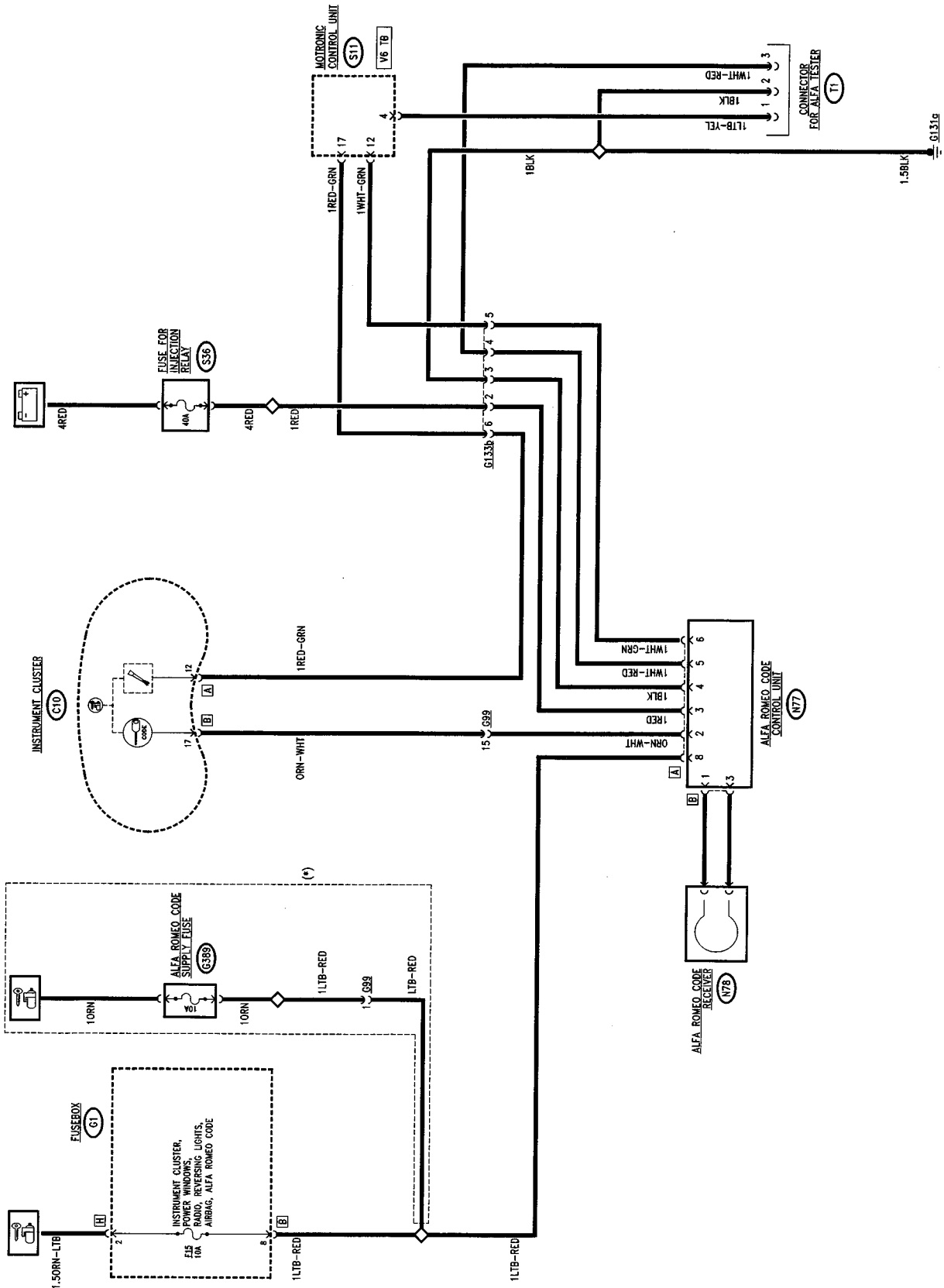
# ALFA ROMEO CODE

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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



(\*) from chassis no. \_\_\_\_\_

## FUNCTIONAL DESCRIPTION

The ALFA ROMEO CODE control unit **N77**, to be found next to the fusebox **G1**, is connected via connector **B** to a special pair of cables to the receiver **N78**, consisting in a coaxial aerial 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 via the line of fuse **F15** of **G1** - up to chassis no.\_\_\_\_ - and from wander fuse **G389** - from chassis no.\_\_\_\_ - while at pin 3 it

receives the direct supply via fuse **S36** of the Motronic system, and pin 4 is connected to earth.

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

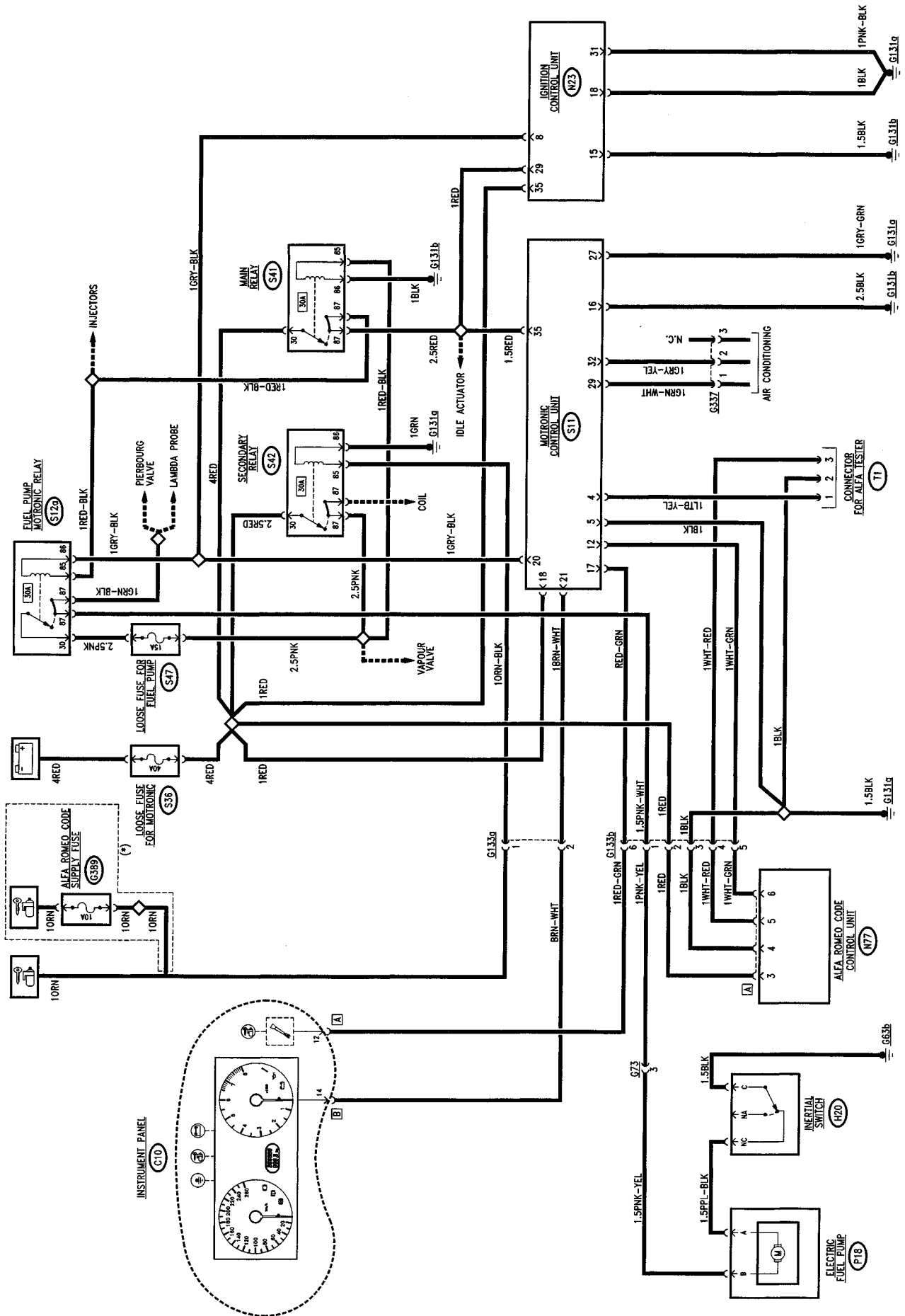
Pins 5 and 6 manage communication between the ALFA ROMEO CODE control unit **N77** and the Motronic control unit **S11**: this communication takes place "cutting off" the diagnosis line **K** which leads from **S11** to the diagnosis connector **T1**.

# **CONTROL SYSTEM - V6 TB Engine: MOTRONIC ML4.1 / EX212K**

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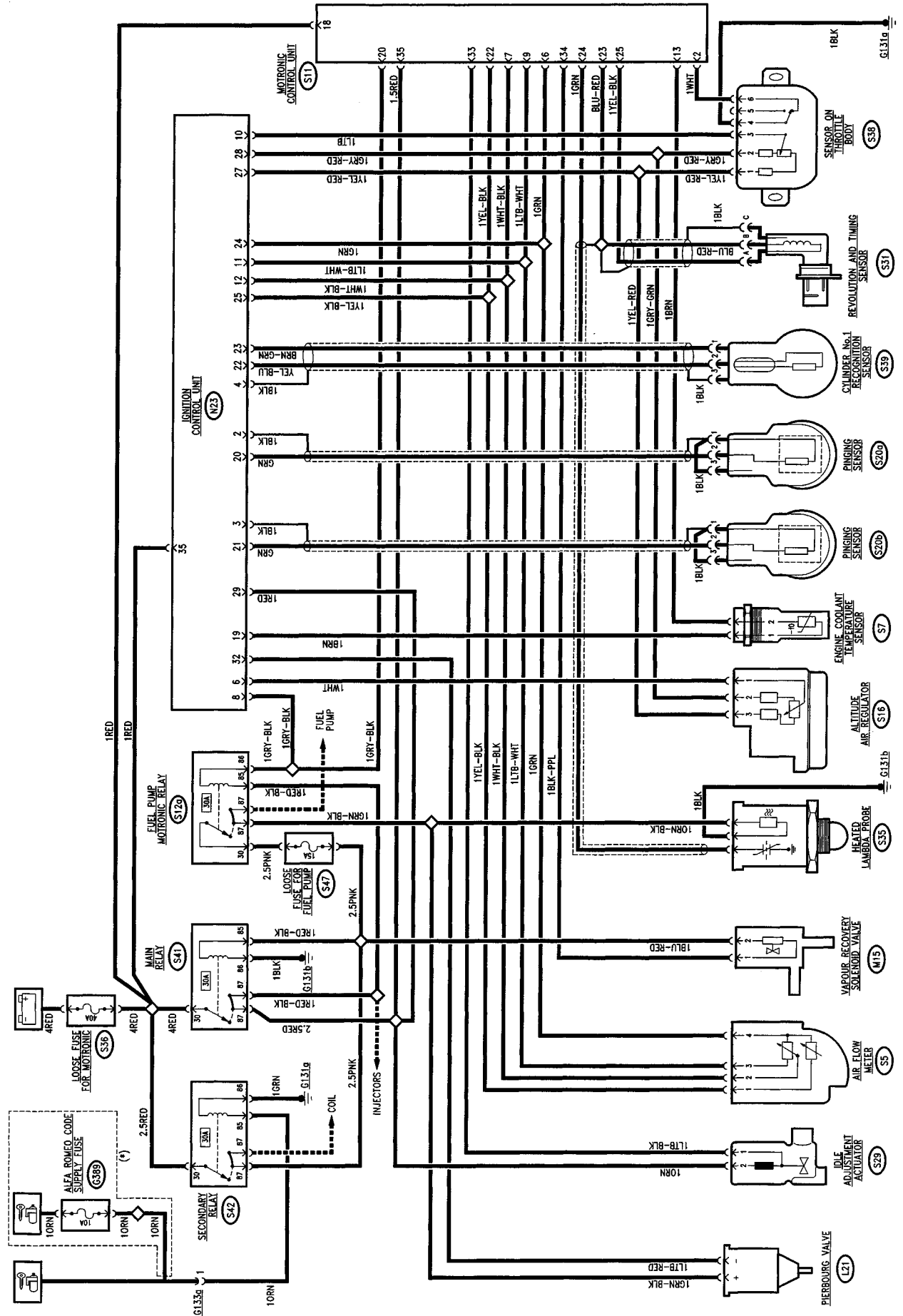
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**WIRING DIAGRAM A**



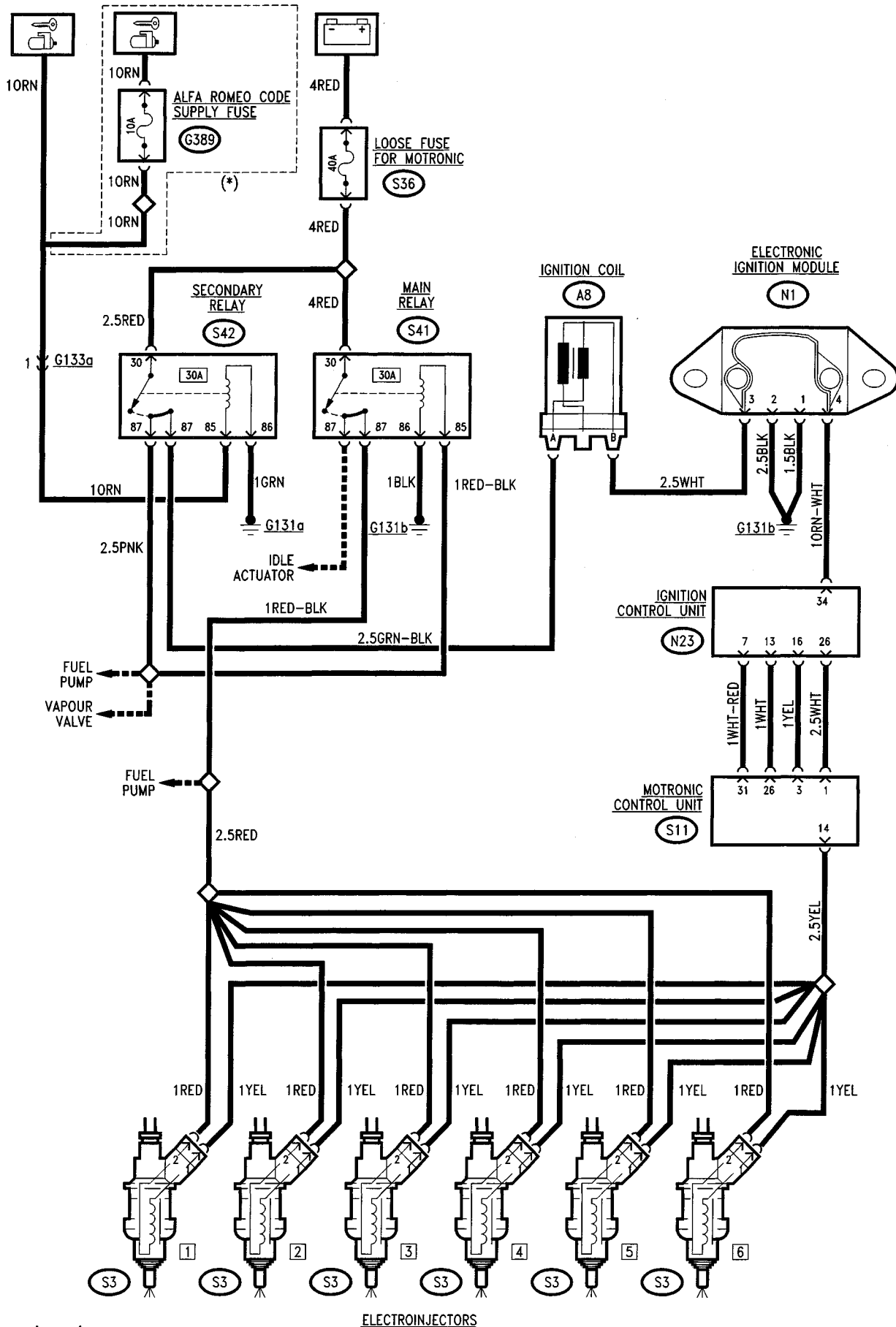
(\*) from chassis no. \_\_\_\_\_

**WIRING DIAGRAM B**



(\*) from chassis no. \_\_\_\_\_

**WIRING DIAGRAM C**



(\*) from chassis no. \_\_\_\_\_



## GENERAL DESCRIPTION

In this system the ignition and injection functions are operated by two control units, the Motronic ML4.1 and EZ212K both made by BOSCH. The experience acquired and the continuous research developed in this sector have made it possible to bring forward an up-dated, fine-tuned system, simplifying and reducing as far as possible the data detection sensors and making the control actuators more precise and powerful. In order to optimise the performance of the vehicle during acceleration and at top speeds, in the EZ212K control unit, a new OVERBOOST function control has been implemented which makes it possible to increase the supercharging pressure according to a certain logic, while the ML4.1 control unit determines the necessary fuel enrichment.

## SYSTEM FUNCTIONS

The system functions are essentially the following:

- injection times adjustment;
- spark advance adjustment;
- cold starting control;
- control of enrichment during acceleration;
- fuel cut-off during deceleration;
- constant idle speed control;
- maximum rpm limiting;
- evaporative solenoid valve control;
- lambda probe control;
- CONNECTION WITH THE alfa romeo code system.
- self-diagnosis.

### Injection times adjustment

Digital technology has made it possible to optimise consumption and performance levels through programmed maps memorised inside the electronic control unit, in relation to engine rpm and load.

With the help of sensors which detect the many variables involved, the ML4.1 control unit controls the electroinjectors extremely quickly and accurately.

The injection time is mainly corrected on the basis of the battery voltage and engine temperature.

### Spark advance adjustment

The gap on the phonic wheel due to the lack of two teeth gives the ML4.1 control unit a reference; each side of the subsequent tooth determines the angular position of the crankshaft. This reference is sent to the ML4.1 control unit, which, according to a map pro-

grammed inside the control unit itself and in relation to the engine rpm and load, establishes the correct advance rate. The advance determined in this way is transferred to the EZ212K control unit which, on the basis of the signals received from the pinging, temperature and throttle angle sensors, delays the advance if necessary, selectively on the cylinder that needs it.

### Control of cold starting

During cold starting, the system controls the spark advance and the injection time. The spark advance depends solely on engine rpm and temperature and the advance rate is at its highest at a temperature of -30°C. The injection time is obtained from a value programmed in the ML4.1 control unit and corrected through the measurement of the intake air temperature, engine temperature, battery voltage and engine rpm. During starting, the control unit provides injection at each ignition pulse, therefore in four phases per engine cycle. Once a pre-established rpm (depending on the engine temperature) has been reached, the control unit operates injection at each turn of the crankshaft.

### Control of enrichment during acceleration

Each time acceleration is required if the change in the signal of the air-flow meter exceeds a predetermined increase, the ML4.1 control unit not only adapts injection to the new requirement, but increases it further in order to quickly reach the rpm required. When nearing the established rpm, the increase of injection is gradually eliminated.

### Fuel cut-off during deceleration

Fuel cut-off during deceleration is of the adapted type. With the detection of the throttle closed condition and engine speeds above 1080, fuel injection is de-activated. As the supply is lacking, the engine rpm will fall more or less rapidly according to the conditions of the vehicle. Before reaching idle speed, the dynamics of the lowering of the rpm is monitored. If this is above a certain value, the fuel supply is partially re-activated according to a logic which involves smoothly accompanying the engine to idle speed. Once this condition has been reached, the normal idle speed functions are reactivated and fuel cut-off will only be reactivated after exceeding the fuel cut-off threshold to prevent the engine from "gasping". The thresholds for resuming the fuel supply and cut off vary depending on the temperature of the engine. Another fuel cut off logic is developed inside the ML4.1 control unit which comes into operation during partial deceleration, i.e. when a lower engine load is required. This function is active only if the new condition lasts for a pre-established length of time and after adapting the ignition angle to the new situation.

### Constant idle control

The adjustment of idle speed is controlled under all operating conditions by the constant idle speed actuator with single coil. When the engine is running at idle speed, the purpose of the actuator is to bring the real rpm to the nominal rpm rating acting on the throttle by-pass. In addition to controlling the idle speed, it also acts as an additional air valve and regulator for the cutting in of the air conditioner compressor. In addition to the constant idle speed actuator, idle rpm is also corrected by the adjustment of the spark angle (advance) as this has a more rapid effect.

### Maximum rpm limiting

After exceeding a maximum rpm threshold (6,500 rpm) the injection of fuel is cut off to prevent the engine from over-loading.

Adaptation of idle speed with air conditioning system.

When the conditioner is turned on, the compressor absorbs power from the engine, which at idle speed would tend to stop. To avoid this drawback, 12V is supplied to pins 29 and 32 of the ML4.1 control unit which will adapt the idle speed to the new requirement for power, operating the corresponding actuator.

### Evaporative solenoid valve control

The fuel vapours gathered by the various points of the circuit in a special active carbon canister are sent 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 to allow correct combustion without "disturbing" it: in fact, the control unit compensates this amount of incoming fuel by reducing delivery to the injectors.

### Lambda probe control

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

The optimum mixture is obtained when the lambda coefficient = 1 (optimum stoichiometric ratio).

The electric signal that the probe sends to the control unit changes abruptly when the mixture composition departs from lambda = 1. When the mixture is "lean" the control unit increases the amount of fuel and reduces it when the mixture is "fat": this way the engine always operates as far as possible around the ideal lambda rating.

The lambda probe signal is processed inside the control unit by a special integrator which prevents sharp "oscillations".

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

Therefore through this probe it is possible to adjust engine carburetion accurately, thereby keeping exhaust emission within the specified limits.

## Connection with the ALFA ROMEO CODE system

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

## Self-diagnosis

The Motronic ML4.1 and EZ212K control units are fitted with a self-diagnosis system. In the event of a system malfunction, the control units detect the fault and, where possible, they replace the missing signals with fixed parameters. However, only the Motronic ML4.1 control unit is capable of memorising and maintaining the data also when the engine is turned off. Therefore, also the errors of the EZ212K control unit are stored in the ML4.1 control unit, via the serial line which connects them. When required by the operator, the faults can be read on the Motronic ML4.1 control unit using the Alfa Romeo Tester.

## FUNCTIONAL DESCRIPTION

The engine is supplied with a Motronic ML4.1 injection and ignition system controlled by control unit **S11**. The control unit **S11** contains a memorised programme which manages the injection time and the firing of the spark plugs in relation to the engine rpm and load, the intake air temperature and the temperature of the engine. The ignition signal and the spark advance supplied by the ML4.1 control unit is optimised for each cylinder by another control unit **EZ212K (N23)** on the basis of the signals received from the pinging, engine temperature and throttle angle sensors.

All the system supplies are protected by fuse **S36** (40A), - from chassis no. \_\_\_ - from fuse **G389** (10A).

The control unit **S11** is supplied at pin 18 directly from the battery via fuse **S36**. At pin 35 it receives the "key-operated" supply from the main relay **S41**.

Pins 5, 16 and 27 are earthed.

Control unit **N23** is supplied at pin 35 directly from the battery via fuse **S36**. At pin 29 it receives the "key-operated" supply from the main relay **S41**.

Pins 15, 18 and 31 are earthed.

The control unit **S11** activates the electric fuel pump through relay **S12a**: this relay is energized when pin 20 of the control unit is connected to earth; the relay supply line is protected by a special fuse **S47** (15A).

In addition, the earth to the pump **P18** passes through the inertial switch **H20** which cuts off the circuit in the event of a crash.

The control unit **S11** calculates and controls the opening time of the electroinjectors **S3** (pin 14) on the basis of the internal programme and the information received from the different sensors.

The engine speed is supplied at pin 23 and 25 of the control unit **S11** from the rpm and timing sensor **S31**: this sensor is inductive and detects the changes in the magnetic field caused by the teeth (suitably positioned) of a phonic wheel integral with the crankshaft.

The sensor on the throttle body with potentiometer **S38** makes it possible to inform the injection control unit **S11** (pin 2) on the idle speed condition (from 0 to 1 degree of throttle opening); it also informs the ignition control unit **N23** on the throttle position angle operated by the accelerator (slider of potentiometer of **S38** connected to pin 10 of **N23**).

This parameter is used to change the spark advance.

The engine coolant temperature sensor **S7** is an NTC (Negative Temperature Coefficient) resistance which supplies control unit **S11** (pin 13) and control unit **N23** (pin 19) information about the engine temperature.

The air-flow meter **S5** measures the flow rate of the air admitted to the engine and supplies control unit **S11** (pin 7) and control unit **N23** (pin 12) a signal which enables correct metering of the fuel. The signal is generated by a potentiometer which transmits a voltage to the control units corresponding to the angle of a mobile port.

The air temperature sensor (NTC) located inside the air-flow meter **S5** measures the intake air temperature (pin 22 of **S11** and pin 25 of **N23**).

The electroinjectors **S3** are operated in parallel by the control unit **S11** via pin 14 from relay **S41** on the basis of all the parameters received from control unit **S11**.

When the throttle is closed or only slightly open, control unit **S11** (pin 33) commands a flow of air through the constant idle speed actuator **S29** which acts as a throttle body by-pass line. The constant idle speed actuator **S29** is controlled by a part of the programme of control unit **S11** and it is used to maintain idle speed at a constant rate under all operating conditions of the engine.

The ignition control system is integrated in control unit **S11** and makes it possible to adjust the spark through a memorised programme.

The command signal is sent from pin 1 of **S11** to control unit **N23** (pin 26). Control unit **N23** allows adjustment of the spark advance optimising the yield of each cylinder through information on the magnitude of vibrations of the actual cylinder leading from the two pinging sensors **S20a** and **S20b** (pin 20 and 21). The recognition of the cylinder in question is obtained through the magnetic sensor **S39** (pin 22 and 23) fitted on the exhaust camshaft. Account is also taken of the altitude at which the engine is operating via sensor **S16** (pin 6).

The output of the control unit **N23** (pin 34) is sent to a power module **N1** and from this (pin 3) to the ignition coil **A8**.

The evaporative valve **M15**, supplied at +12V, is opened by control unit **S11** only when the ignition key is at **MARCIA** and the engine is under load; conversely, it is closed when the engine is cold or running at idle speed (command from pin 34).

The pre-heated lambda probe **S35**, placed in contact with the exhaust gas, generates an electric signal, the rating of which depends on the concentration of residual oxygen in the actual exhaust gas. This signal is characterised by an abrupt change when the air-fuel mixture is less than perfect. When the voltage of the signal of the probe **S35** is low, the control unit detects that the mixture is lean and slightly increases the fuel injected. When the voltage of the signal at pin 24 of **S11** is high, the control unit detects that the mixture is rich and slightly reduces the fuel injected. The heated lambda probe **S35** is heated by a resistance supplied by relay **S12a** only when the ignition key is in the **MARCIA** position.

When the air conditioning system is activated a 12V current is applied at pin 29 and 32 of control unit **S11**. Control unit **S11** then adjusts the engine idle speed taking account of the new need for power due to the cutting in of the air conditioner.

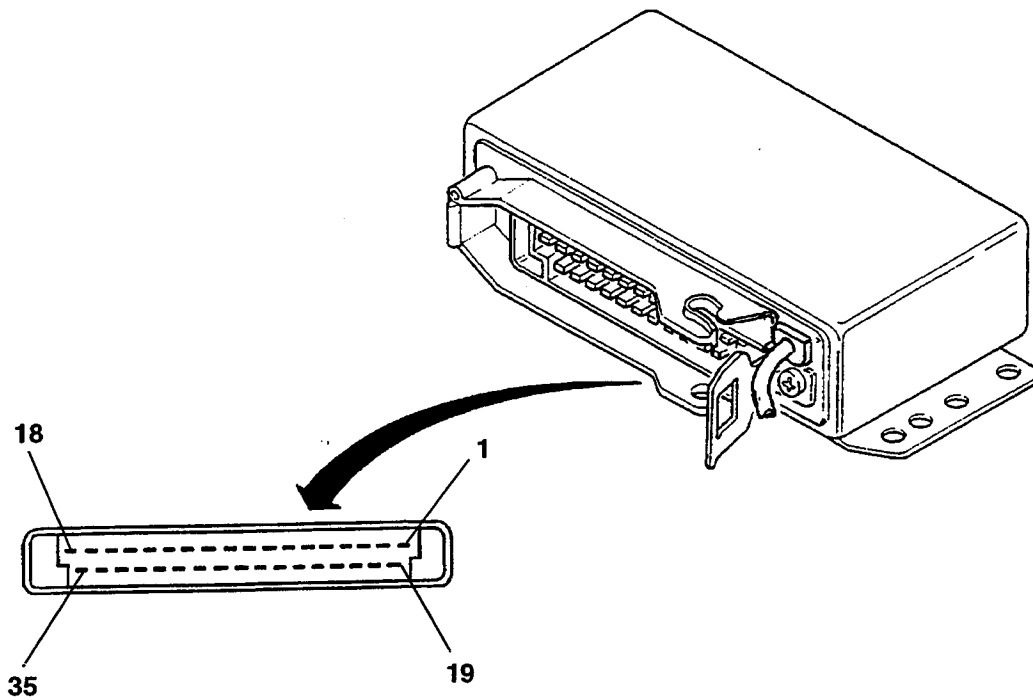
In the case of a heavy need for power, the injection control unit **S11** makes it possible to modulate the opening of the wastegate valve through a Pierburg valve **L21**.

From pin 21 the control unit **S11** sends a "pulse" signal proportionate with the engine rpm to the instrument cluster **C10**; the signal for the diagnosis "Check Engine" warning light on the instrument cluster **C10** leads from pin 17.

Control unit **S11** is connected by pin 12 with the ALFA ROMEO CODE control unit **N77** through diagnosis line K; this way if the ALFA ROMEO CODE does not detect a correct "key code" it will not give consent to the Motronic control unit which will not start the engine.

Control unit **S11** possesses a self-diagnosis system which can be used connecting with the ALFA ROMEO Tester at connector **T1**; it receives the fault signals of the control unit through diagnosis lines L - pin 4 and K - pin 12 (line K is also used by the ALFA ROMEO CODE system).

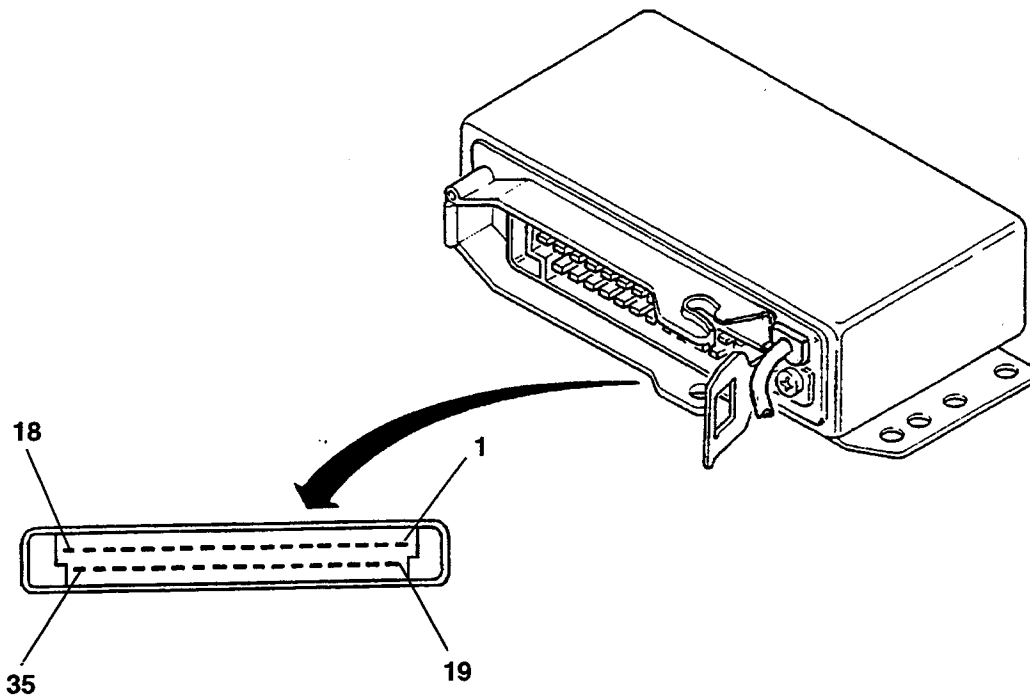
**MOTRONIC ML4.1 ELECTRONIC CONTROL UNIT (S11)**



**CONTROL UNIT PIN-OUTS**

- |                                       |                                |
|---------------------------------------|--------------------------------|
| 1. to pin 26 of N23                   | 19. N.C.                       |
| 2. switch on throttle body            | 20. fuel pump command          |
| 3. to pin 16 of N23                   | 21. rpm signal                 |
| 4. diagnosis line L                   | 22. air temperature sensor     |
| 5. earth                              | 23. rpm and timing sensor      |
| 6. air-flow meter                     | 24. lambda probe               |
| 7. air-flow meter                     | 25. rpm and timing sensor      |
| 8. N.C.                               | 26. to pin 23 of N23           |
| 9. air-flow meter                     | 27. earth                      |
| 10. N.C.                              | 28. N.C.                       |
| 11. N.C.                              | 29. climate control command    |
| 12. diagnosis line K- ALFA ROMEO CODE | 30. N.C.                       |
| 13. water temperature sensor          | 31. to pin 7 of N23            |
| 14. electroinjectors                  | 32. climate control command    |
| 15. N.C.                              | 33. idle speed actuator        |
| 16. earth                             | 34. evaporative solenoid valve |
| 17. "Check Engine" warning light      | 35. key-operated supply        |
| 18. supply from battery               |                                |

**ELECTRONIC IGNITION CONTROL UNIT EZ2121K (N23)**

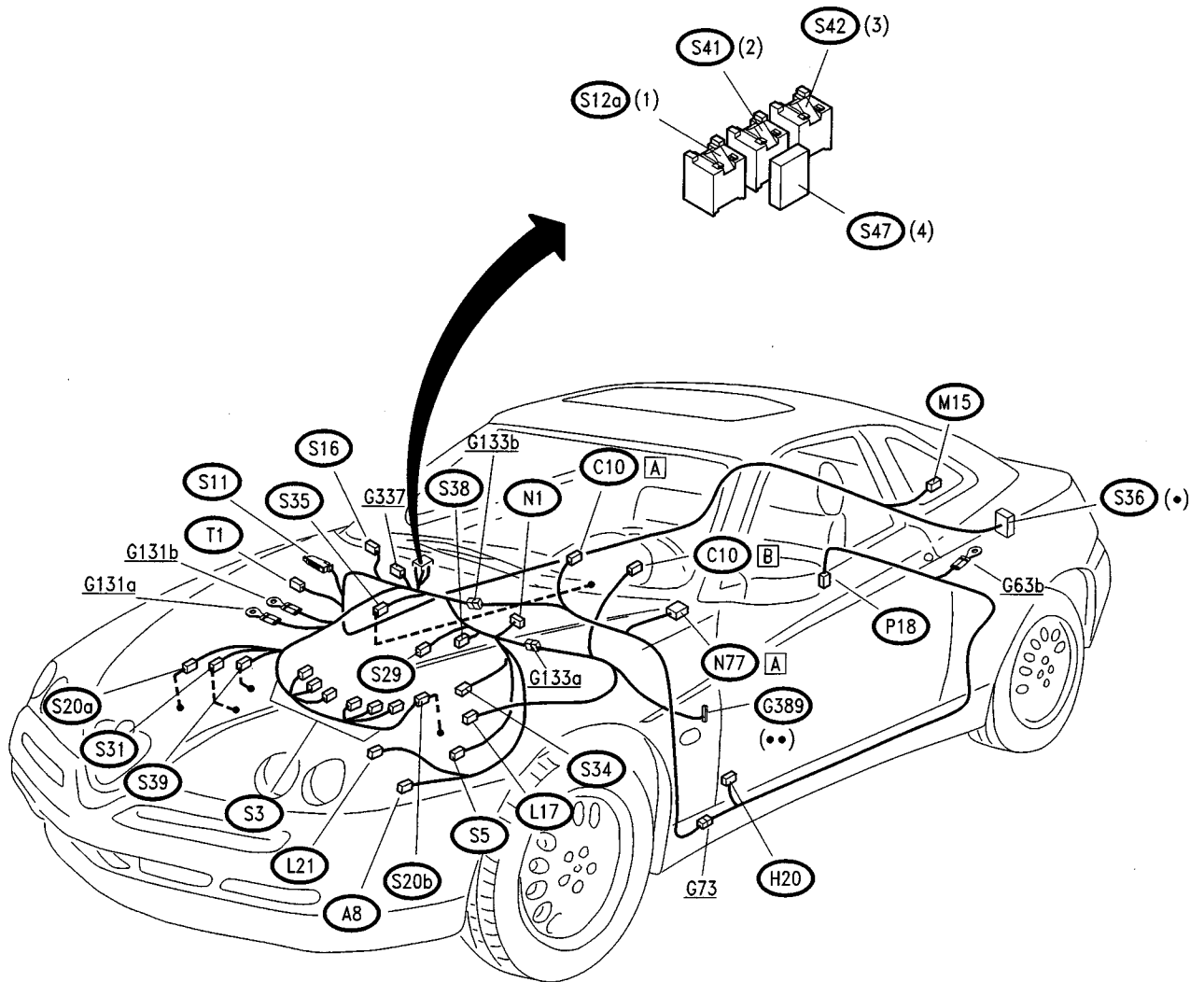


**CONTROL UNIT PIN-OUTS**

- 1. N.C.
- 2. pinging sensor no. 1
- 3. pinging sensor no. 2
- 4. cyl.no. 1 detection sensor
- 5. N.C.
- 6. altitude sensor
- 7. to pin 31 of **S11**
- 8. fuel pump relay
- 9. N.C.
- 10. throttle potentiometer
- 11. air-flow meter
- 12. air-flow meter
- 13. to pin 26 of **S11**
- 14. N.C.
- 15. earth
- 16. to pin 3 of **S11**
- 17. N.C.

- 18. earth
- 19. water temperature sensor
- 20. pinging sensor no. 1
- 21. pinging sensor no. 2
- 22. cyl. no. 1 detection sensor
- 23. cyl. 1 detection sensor
- 24. air-flow meter
- 25. air temperature sensor
- 26. to pin 1 of **S11**
- 27. throttle potentiometer
- 28. throttle potentiometer
- 29. key-operated supply
- 30. N.C.
- 31. earth
- 32. Pierburg valve
- 33. N.C.
- 34. ignition module
- 35. battery supply

**LOCATION OF COMPONENTS**

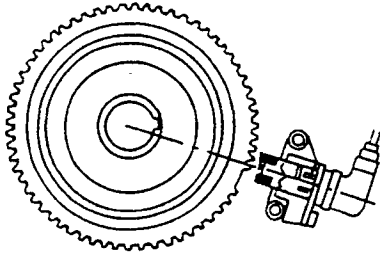


V6 TB

- (•) Black Fuseholder
- (••) Red Fuseholder
- (1) Black Base
- (2) Grey Base
- (3) Black Base
- (4) Blue Fuseholder

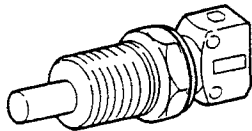
**CHECKING COMPONENTS**

**Rpm and timing sensor (S31)**



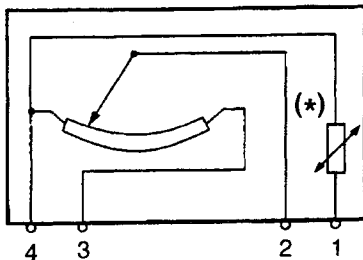
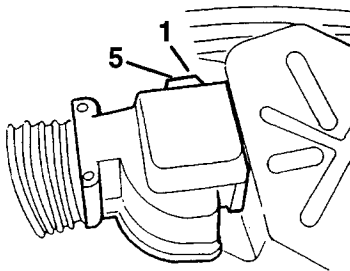
SPECIFICATIONS	
Sensor winding resistance at 20°C	~ 540 Ω
Distance (gap) between sensor and phonic wheel	0.5 ÷ 1.5 mm

**Engine temperature sensor (S7)**



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

**Air flow meter (S5)**



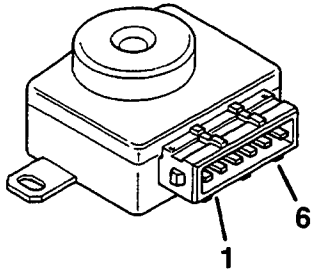
SPECIFICATIONS	
Voltage between Pin 2 e 4:	
with port shut (without air flow)	100 ÷ 300 mV
manually operating the port the voltage gradually increases up	to 4.5V

- pin 1 - air temperature signal
- pin 2 - air flow rate signal
- pin 3 - 5V supply
- pin 4 - reference earth

NOTE: The air temperature sensor (\*) is incorporated in the air-flow meter.



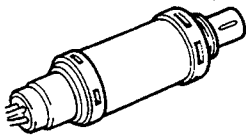
**Throttle position sensor (S38)**



- pin 1 - 5V supply
- pin 2 - reference earth
- pin 3 - throttle opening signal
- pin 4 - earth
- pin 5 - N.C.
- pin 6 - idle switch signal (throttle closed)

SPECIFICATIONS	
Voltage between pin 2 and 3:	
The voltage changes from 0.5V (throttle closed) to 4.5V (throttle open) with no intermediate steps.	

**Lambda probe (S35)**



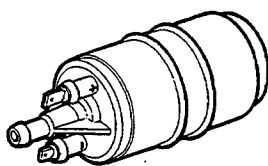
SPECIFICATIONS	
Heating resistance	3 Ω

**Electroinjectors (S3)**



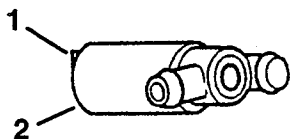
SPECIFICATIONS	
Winding resistance	15.9 ± 0.35 Ω

**Fuel pump (P18)**



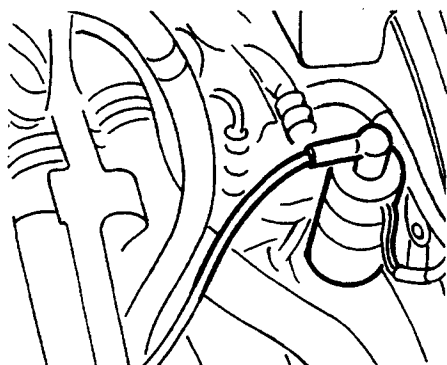
SPECIFICATIONS	
Flow rate	≥ 120 l/h
Pressure	4 bar
Nominal voltage	12V

Idle speed adjustment actuator (S29)



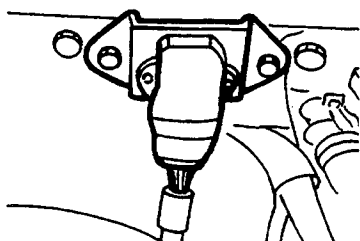
SPECIFICATIONS	
Resistance between terminals 1 and 2	~ 8 Ω

Ignition coil (A8) / Distributor



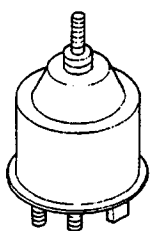
SPECIFICATIONS	
Primary resistance	0.7 + 0.8 Ω
Secondary resistance	5.4 + 6.6 kΩ
Distributor brush resistance	~ 1.1 kΩ

Ignition module (N1)



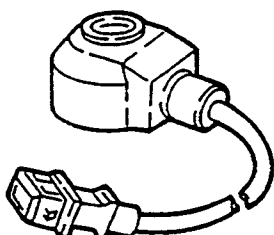
- pin 1 - earth
- pin 2 - earth
- pin 3 - 12V at coil
- pin 4 - control circuit

Pierbourg valve (L21)



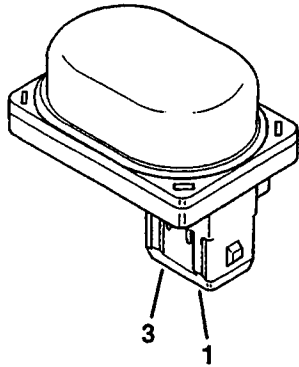
SPECIFICATIONS	
Ohmic resistance of winding	~ 30 Ω

Pinging sensor (S20a) (S20b)



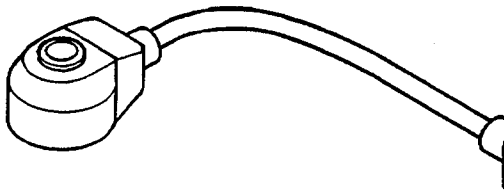
SPECIFICATIONS		
Resistance between terminals	> 20 kΩ	
Indipendence	≥ 1 MΩ	
Vibration allowed	for long periods	≤ 80 g
	for short periods	≤ 400 g

Altitude sensor **(S16)**



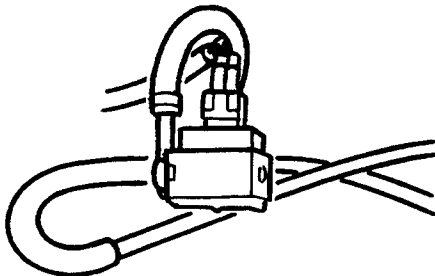
SPECIFICATIONS	
Resistance between	
pin 2 - 3	2 ÷ 3 KΩ
pin 1 - 2	0.5 ÷ 4.5 kΩ below 1.200m 2.5 ÷ 6.5 kΩ abow 1.200m

1st cylinder detection sensor **(S39)**



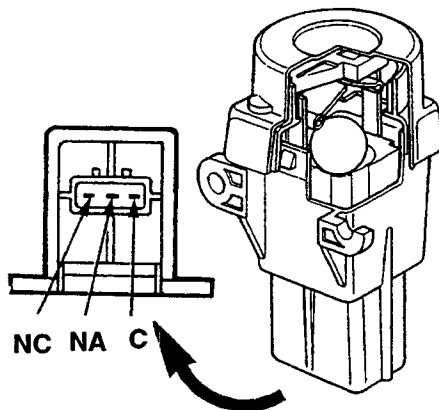
SPECIFICATIONS	
Resistance between pin 1 and 2	0.3 Ω

Evaporative solonoid valve **(M15)**



SPECIFICATIONS	
Flow rate (with voltage of 13.5V and vacuum of 0.6 bar)	≥ 4500 dm <sup>3</sup> /h

Inertial switch **(H20)**



SPECIFICATIONS	
<b>Check the continuity between pins N.C. and C.:</b> this continuity is connected by pressing the special pushbutton	

## FAULT-FINDING

The control unit possesses a self-diagnosis system which continuously monitors the signals leading from the different sensors for plausibility and compares them with the allowed limits: if these limits are exceeded the system detects a fault, memorizes it and turns on the warning light on the instrument cluster.

For certain parameters the control unit replaces the abnormal values with suitable mean values to enable the car to "limp" to a point of the Service Network.

These "recovery" values depend on the other correct signals and are defined each time by the operating logic of the control unit.

The self-diagnosis system also makes it possible to quickly and effectively locate faults by connection with the ALFA ROMEO TESTER, through which all the errors memorised may be "read". It is also possible to check the operating parameters recorded by the control unit and command the engagement of the single actuators to check whether they are working properly.

### Diagnosis using the ALFA TESTER

N.B. Before carrying out diagnosis with the Tester, make the preliminary check given on the next page (TEST A).

The Tester and the 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 Tester socket to that of the control unit (the socket is to be found next to the control unit).

The Tester can give the following information:

- display of parameters;
- display of errors;
- active diagnosis.

### Error clearing

Before ending diagnosis the contents of the "permanent" memory are erased using the Tester.

<b>PRELIMINARY CHECK OF THE BOSCH M 4.1 SYSTEM</b>	<b>TEST A</b>
--	---------------

**NOTE: Check beforehand that the ALFA ROMEO CODE is working properly which might have cut off the supply to the system!**

TEST PROCEDURE	RESULT	CORRECTIVE ACTION
<b>A1</b> CHECK FUSE – Check intactness of fuses <b>S36</b> , <b>S47</b> and <b>G389</b>	(OK) → (OK) →	Carry out <b>step A2</b>  Change fuses <b>S36</b> : 40A <b>S47</b> : 15A <b>G389</b> : 10A (from chassis no. ___)
<b>A2</b> CHECK VOLTAGE – Check 12V at pin 30 of relays <b>S41</b> e <b>S42</b>	(OK) → (OK) →	Carry out <b>step A3</b>  Restore the wiring between the battery <b>A1</b> and relays <b>S41</b> and <b>S42</b>
<b>A3</b> CHECK VOLTAGE – With the key turned, check for 12V at pin 85 of relay <b>S42</b>	(OK) → (OK) →	Carry out <b>step A4</b>  Change any faulty relays
<b>A4</b> CHECK RELAYS – Check the correct operation of relays <b>S41</b> , <b>S42</b> and <b>S12a</b>	(OK) → (OK) →	Carry out <b>step A5</b>  Change any faulty relays
<b>A5</b> CHECK CONTROL UNIT SUPPLY – Check for 12V at pin 18 of <b>S11</b> ; with the key turned 12V also at pins 35 of <b>S11</b> and at pin 29 of <b>N23</b>	(OK) → (OK) →	Carry out <b>step A6</b>  Restore the wiring between control units <b>S11</b> and <b>N23</b> and the relays and between the control units and fuse <b>S36</b>
<b>A6</b> CHECK EARTH – Check for an earth at pins 16 and 27 of <b>S11</b> and at pins 15, 18 and 31 of <b>N23</b> . Also check for an earth at pin 86 of <b>S42</b> and pin 86 of <b>S41</b>	(OK) → (OK) →	<b>CONTINUE DIAGNOSIS USING THE ALFA ROMEO TESTER</b>  Restore the wiring between <b>S11</b> , <b>N23</b> and the relay and earth <b>G131</b>



# **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
- D43 Signalling led for automatic hood

### 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
- G38 Air conditioner wiring connector
- 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
- G60 Injection wiring earth
- 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
- G255 Fuse for heating and ventilation 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.
- 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
- I106 Hood release 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 ELETTRIC MAGNETS - SOLENOID VALVES**

- M12 Luggage compartment opening actuator electromagnet
- M13 Fuel flap opening actuator electromagnet
- M15 Evaporation solenoid valve

### **N ELECTRONIC DEVICES - INTERMITTENCES- TIMERS**

- N1 Electronic ignition module
- N11 Door locking control unit
- N13 Hazard warning lights and direction indicators intermittence
- N14 Electronic windscreen wiper intermittence
- N18 Electronic headlamp switching device
- N23 Ignition control unit
- 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 antisturbance condenser
- N80 Hood cover release timer

### **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
- O37 Rear subwoofer 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
- Q9 Minimum pressure switch
- Q11 Compressor electromagnetic coupling
- Q15 Heating and ventilation fan relay
- Q20 Min. and max. sensor pressure contact (Tri-nary)
- Q22 Electromagnetic coupling relay
- Q27 Air recirculation flap control motor
- Q32 Auxiliary relay for heating and ventilation
- Q39 Fuse for conditioning system (30A)
- Q40 Fuse for conditioning system (15A)
- Q41 Set of relay and fuses for air conditioner
- 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
- S12c Phase variator relay
- S12e Air flow meter relay
- S15 Phase variator
- S20 Pinging sensor
- 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
- S42 Secondary relay
- S43 Absolute pressure sensor
- S45 Lambda probe fuse
- S46 Fuse for Motronic supply
- S47 Fuse for fuel pump
- S52 Cam angle sensor

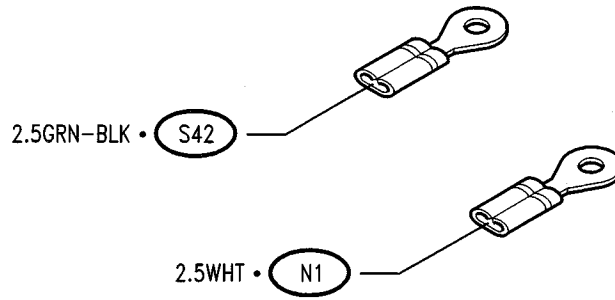
**T DIAGNOSIS**

- 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)

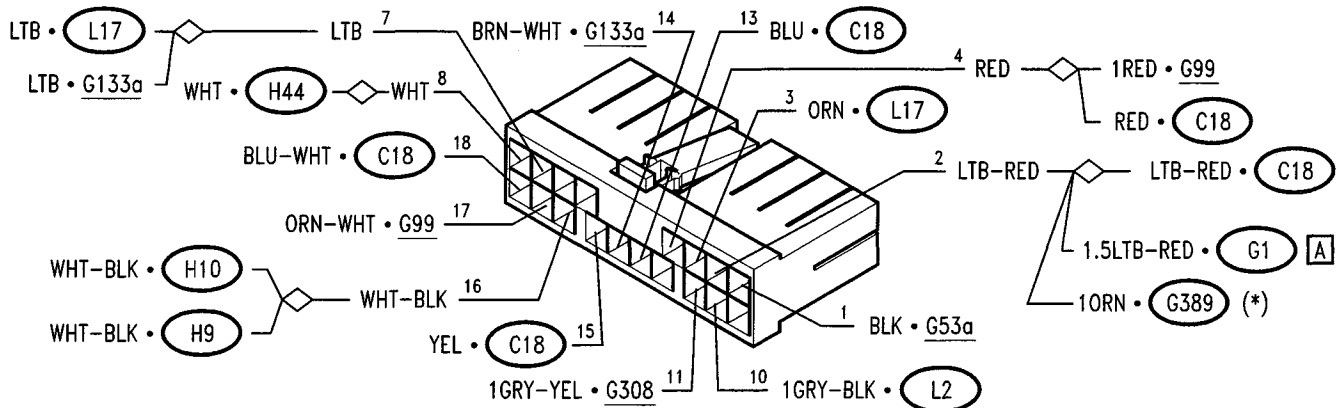
# COMPONENTS AND CONNECTORS

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

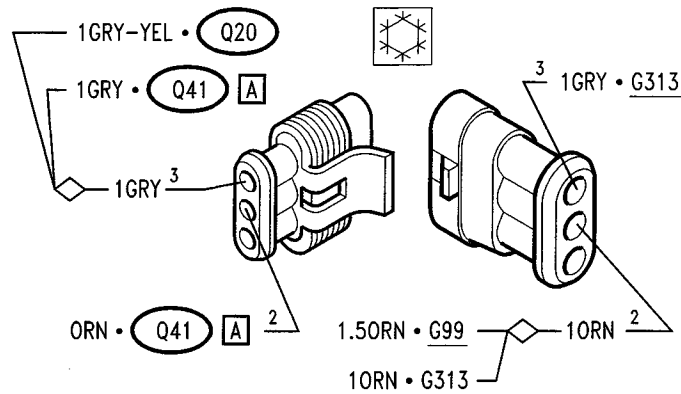
**Ignition coil** **A8**



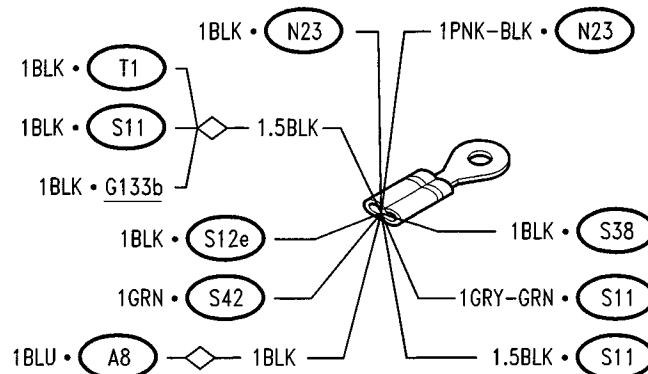
**Instrument cluster** **C10 B**



**Air conditioner wiring connector** **G38**

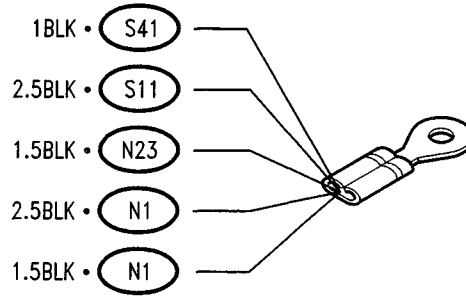


**Earth on upper cover** **G131a**

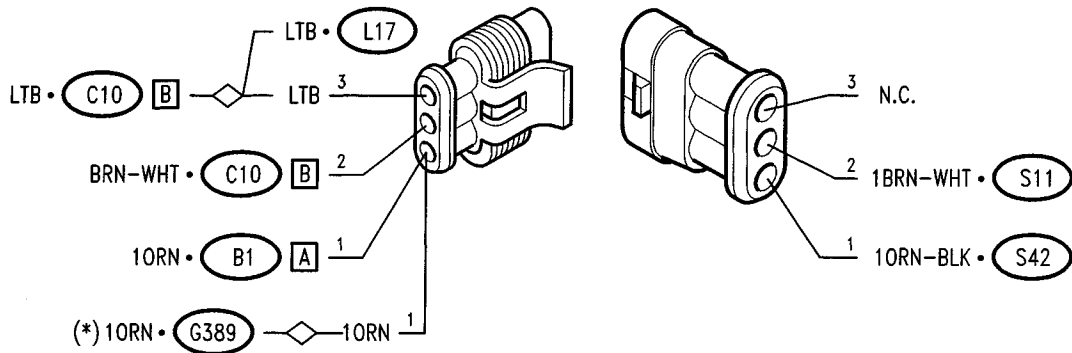


(\*) from chassis no. \_\_\_\_\_  
 PA49720000005

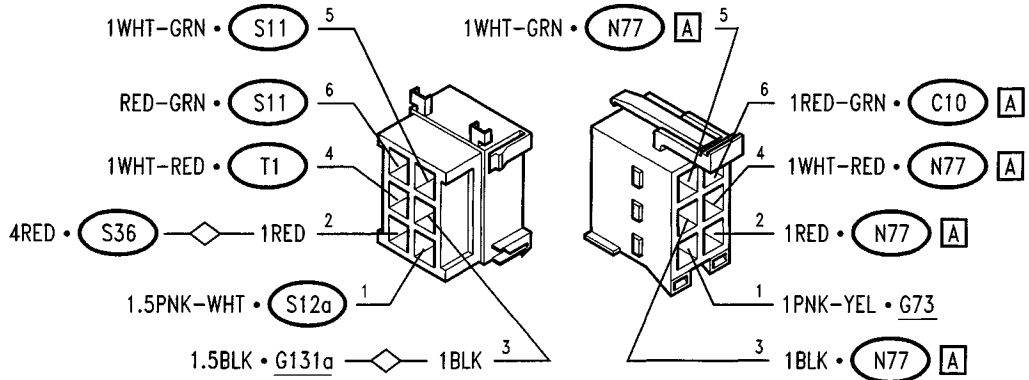
**Earth on upper cover** **G131b**



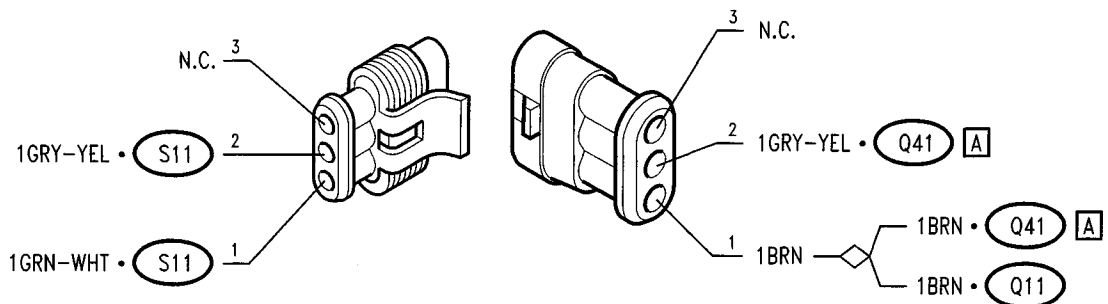
**Connector for electronic injection wiring A** **G133a**



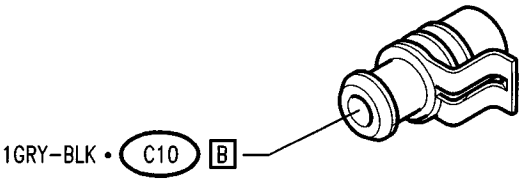
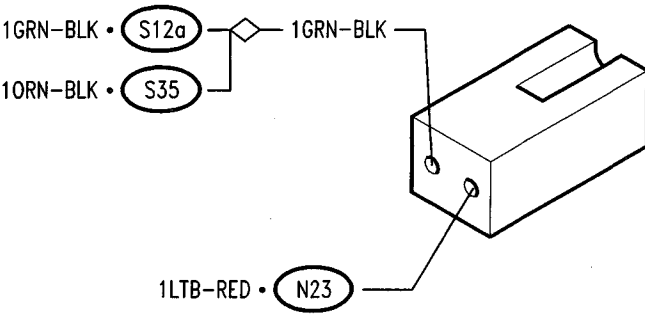
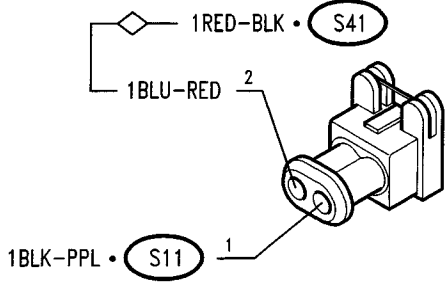
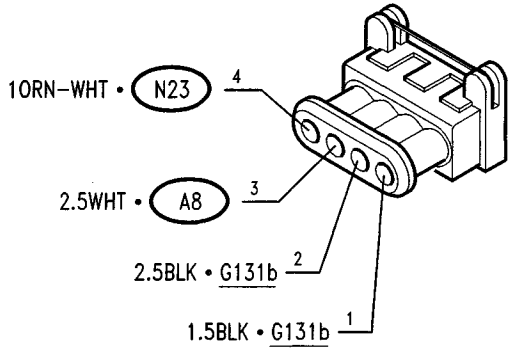
**Connector for electronic injection wiring B** **G133b**



**Connector for conditioner syst./injection syst.** **G337**

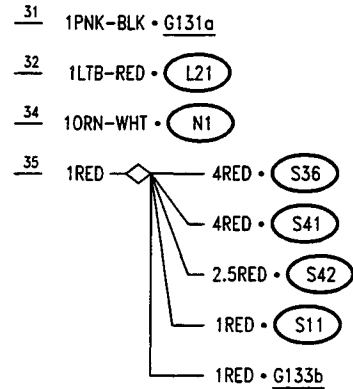
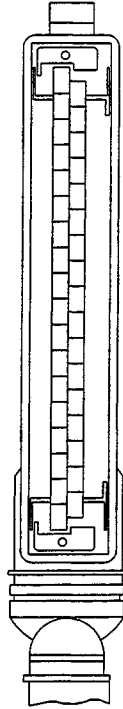
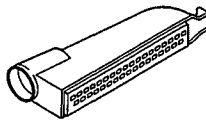
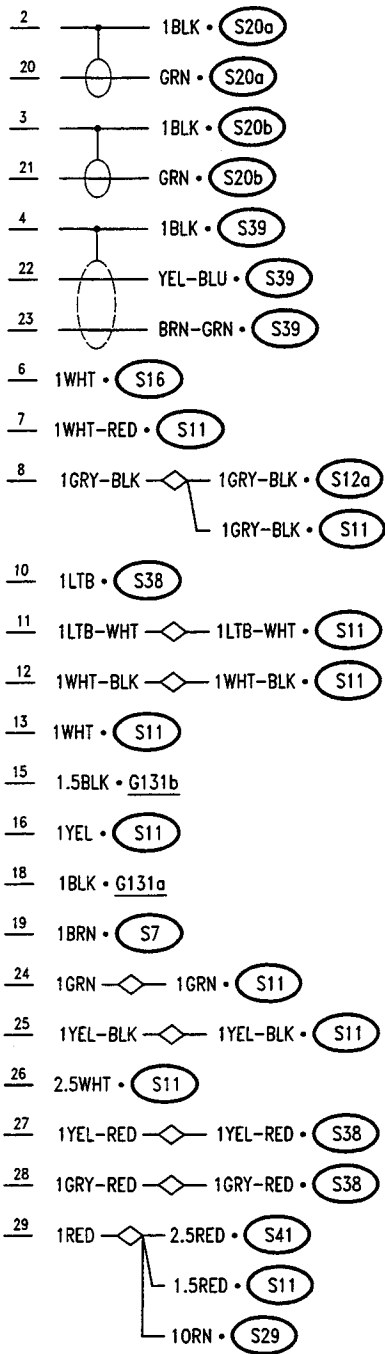


(\*) from chassis no. \_\_\_\_\_  
 PA49720000005

Minimum engine oil pressure	L2	Solenoid valve regulating the supercharging pressure	L21
 <p>1GRY-BLK • C10 B</p>		 <p>1GRN-BLK • S12a  1ORN-BLK • S35  1GRN-BLK  1LTB-RED • N23</p>	
Evaporation solenoid valve	M15	Electronic ignition module	N1
 <p>1RED-BLK • S41  1BLU-RED 2  1BLK-PPL • S11 1</p>		 <p>1ORN-WHT • N23 4  2.5WHT • A8 3  2.5BLK • G131b 2  1.5BLK • G131b 1</p>	

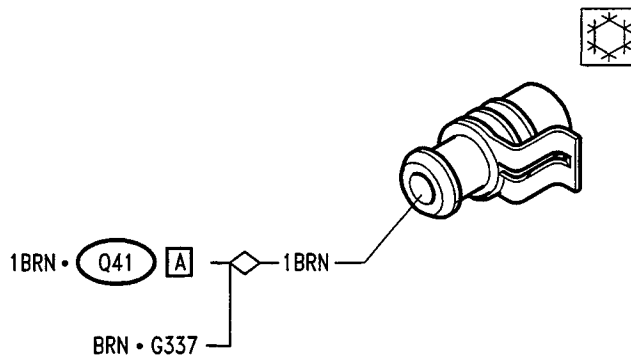
Ignition control unit

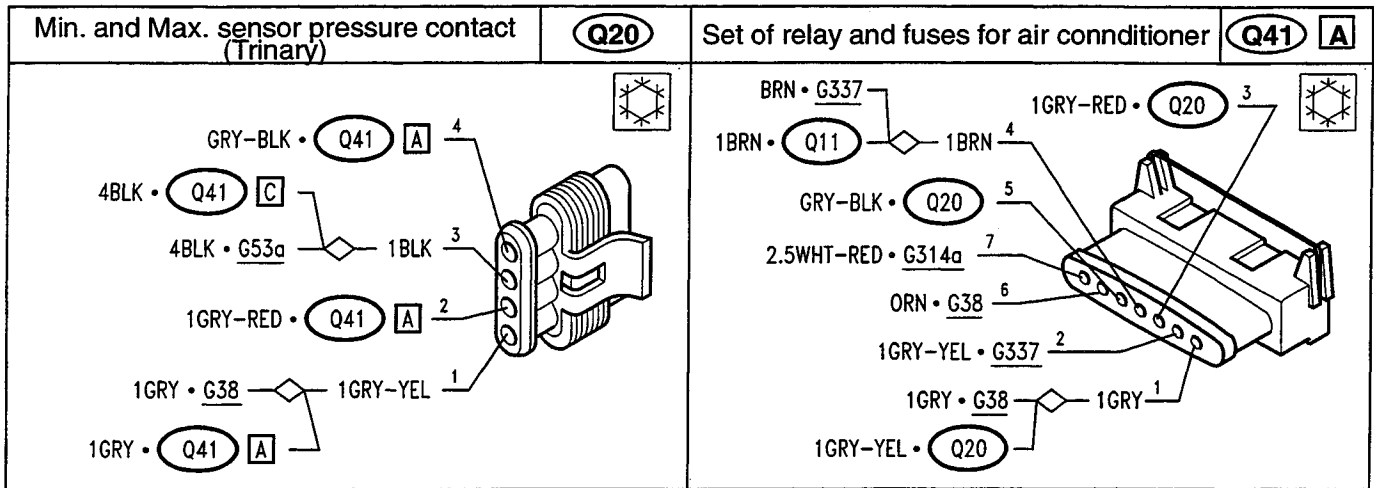
N23



Compressor electromagnetic coupling

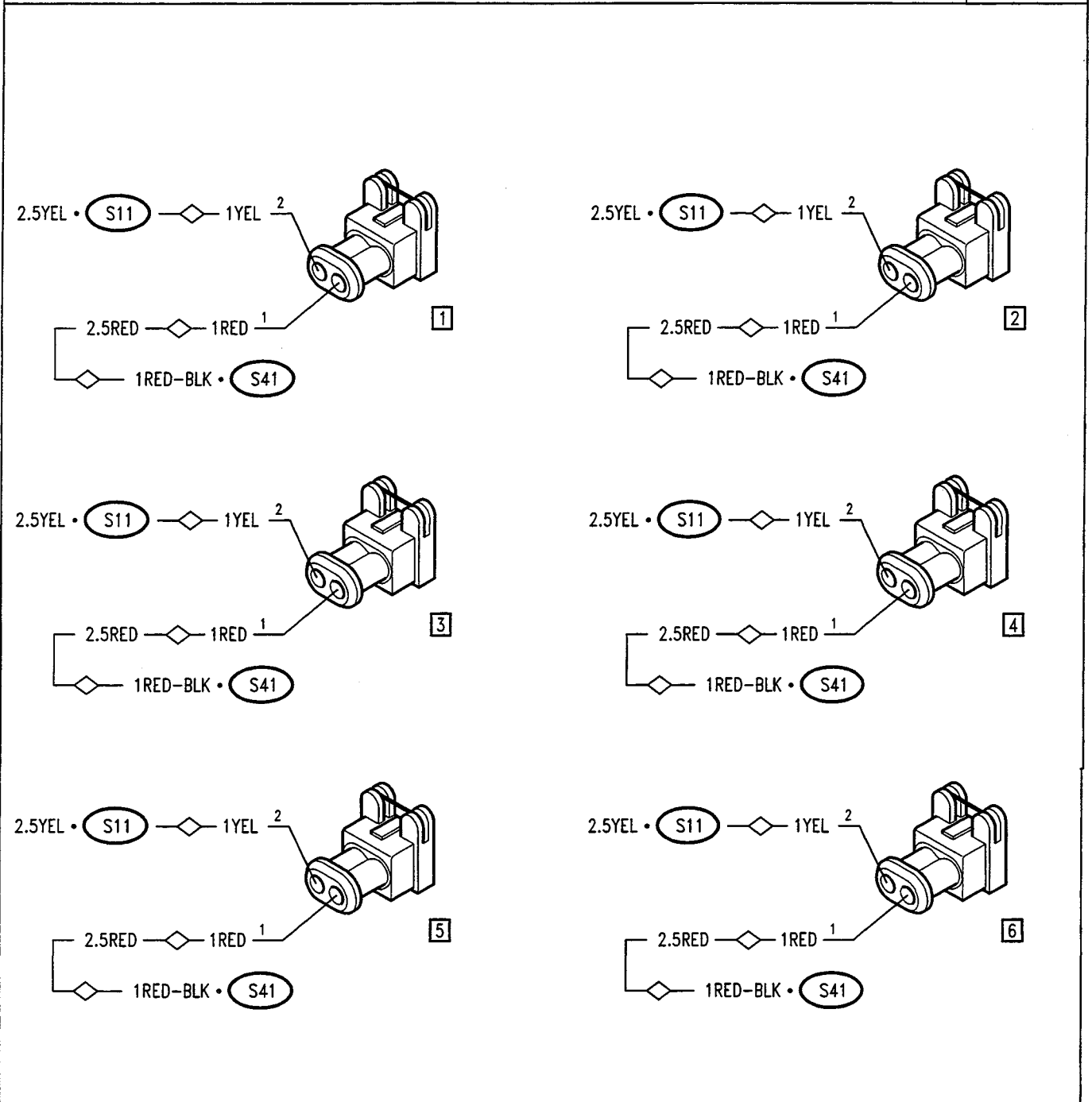
Q11

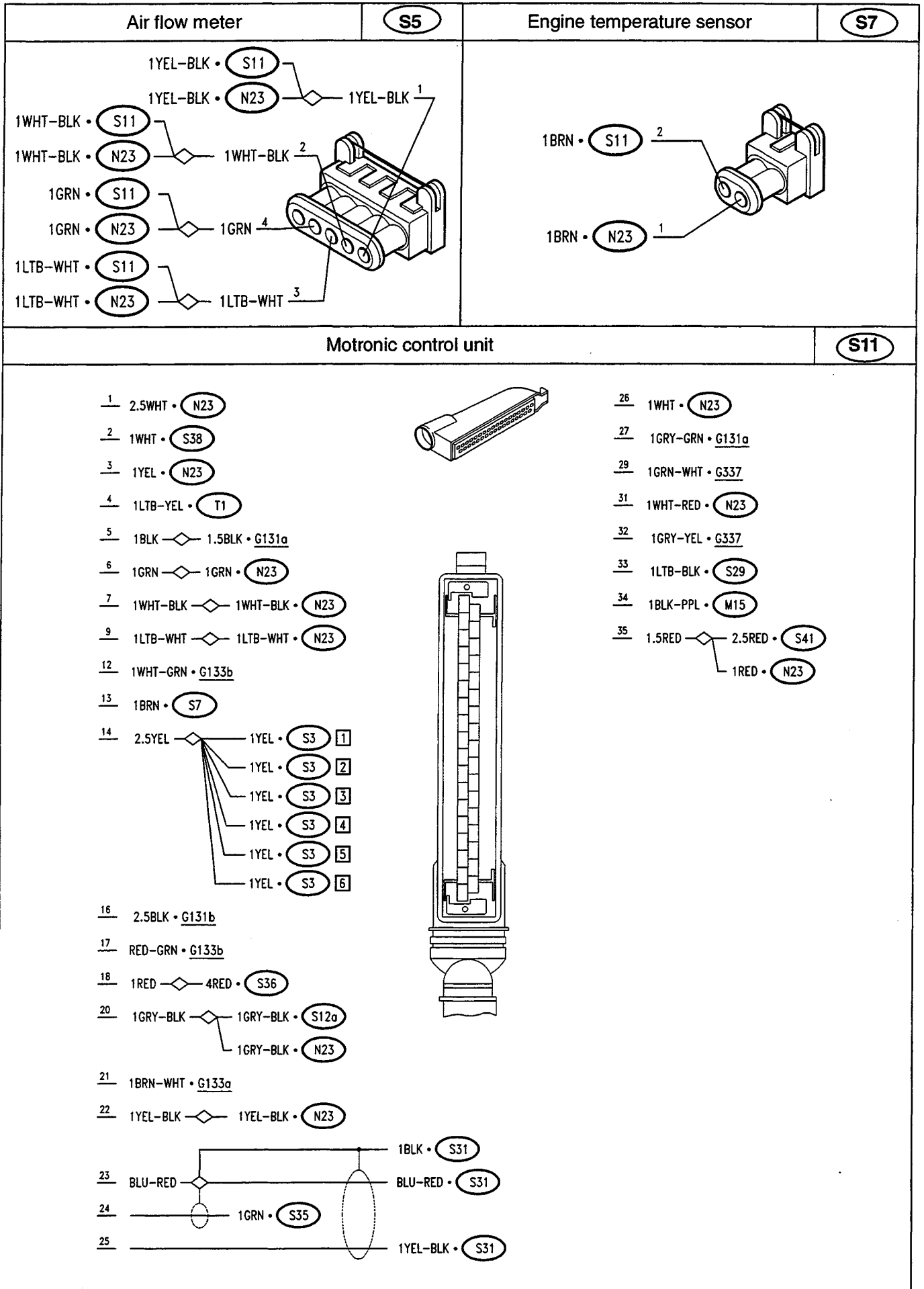




**Electroinjectors**

**S3**







<p>Motronic fuel pump relay</p>	<p>(S12) A</p>	<p>Altitude air regulator</p>	<p>(S16)</p>
<p>1GRY-BLK • S11 1GRY-BLK • N23 1.5PNK-WHT • G133b 1ORN-BLK • S35 1GRN-BLK • L21 1RED-BLK • S41 2.5PNK • S47</p>		<p>1YEL-RED • S38 1YEL-RED • N23 1GRY-RED • S38 1GRY-RED • N23 1WHT • N23</p>	
<p>Pinging sensor a</p>	<p>(S20) A</p>	<p>Pinging sensor b</p>	<p>(S20) B</p>
<p>1BLK 1 GRN • N23 2</p>		<p>1BLK 1 GRN • N23 2</p>	
<p>Idle adjustment actuator</p>	<p>(S29)</p>	<p>Rpm and crankshaft position sensor</p>	<p>(S31)</p>
<p>2.5RED • S41 1ORN 2 1LTB-BLK • S11 1</p>		<p>BLU-RED • S11 1BLK 3 BLU-RED 2 1YEL-BLK • S11 1</p>	
<p>Heated lambda probe</p>	<p>(S35)</p>	<p>Fuse for injection relay</p>	<p>(S36)</p>
<p>1GRN-BLK • S12a 1ORN-BLK 3 1BLK • G131b 2 1GRN • S11 1 BLU-RED • S11</p>		<p>4RED • A1 1RED • G133b 1RED • N23 2.5RED • S42 4RED • S41 1RED • S11</p>	

