

## JTD ELECTRONIC INJECTION

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## INTRODUCTION

An electronic control system supervises and adjusts all the engine parameters, optimising performance and consumption through response in real time to the different operating conditions.

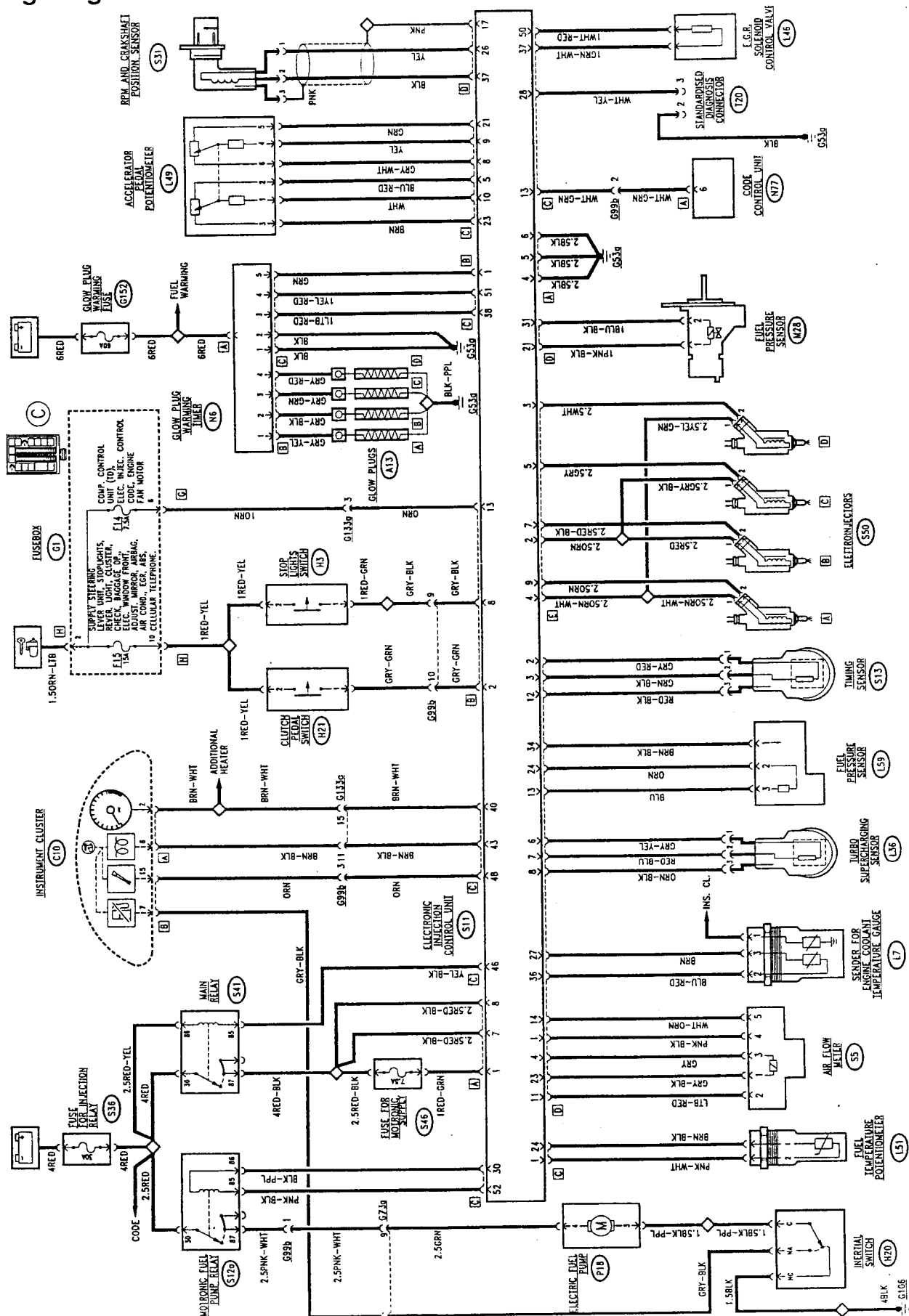
The Diesel engine is fitted with a UNIJET "COMMON RAIL" injection system. This features the use of a high injection pressure controlled electronically. Fuel delivery, called pilot injection, is optimised by the electronic control unit through the injector rather than being controlled by the pump.

Depending on the signals received from a number of sensors, the control unit drives the actuators connected to it, controlling the following systems:

- fuel supply;
- air supply;
- glow plug warming;
- accelerator pedal;
- engine cooling;
- fuel warming.

## JTD DIRECT INJECTION

## Wiring Diagram



## General Description

The system controls the engine and all the systems that make it run:

- fuel supply system;
- air supply system;
- engine cooling system;
- exhaust system with catalytic silencer;
- oil vapour recirculation system;
- exhaust gas recirculation system (E.G.R.).

Operation of these systems is optimised by an electronic control system governed by a control unit.

This is a high pressure electronic injection system for fast diesel engines with direct injection.

Its main features are:

- high injection pressures (1350 bar);
- possibility of modulating these pressures between 150 bar up to the maximum operating pressure of 1350 bar, regardless of the engine speed and load;
- capability of working at high engine speeds (up to 6000 rpm);
- injection control precision (advance and length of injection);
- reduction of consumption levels;
- reduction of emissions.

The main functions of the system are the following:

- fuel temperature control;
- engine coolant fluid temperature control;
- injected fuel quantity control;
- idle speed control;
- fuel cut-off during deceleration;
- cylinder balancing control at idle speed;
- anti-sawing control;
- smoke control at the exhaust during acceleration;
- exhaust gas recirculation control (E.G.R.);
- maximum torque limiting control;
- maximum rpm limiting control;
- glow plug control;
- climate control system engagement control;

- auxiliary fuel pump control;
- cylinder position control;
- main and pilot injection advance control;
- injection pressure closed loop control;
- electrical balance control;
- supercharging pressure control;
- self-diagnostics;
- connection with Alfa Romeo CODE control unit.

## Operation

The control unit controls the amount of fuel injected, adjusting the line pressure and injection times.

The information processed by the control unit to control the amount of fuel to be injected is the following:

- engine rpm;
- coolant fluid temperature;
- supercharging pressure;
- air temperature;
- intake air quantity;
- battery voltage;
- fuel pressure;
- accelerator pedal position.

## Self-diagnostics

The control unit self-diagnostic system checks the signals leading from the sensors comparing them with the allowed limit data and carries out the following

- warning of faults at starting
  - warning light on for 4 seconds: indicates testing;
  - warning light off after 4 seconds: indicates no fault to components which may affect the values required by antipollution regulations;
  - warning light on after 4 seconds: indicates a fault.
- fault signalling when the engine is running:
  - warning light on: indicates a fault;
  - warning light off: indicates no fault to components which may affect the values required by antipollution regulations.

## Functional Description

The engine control unit **S11** controls and adjusts the entire electronic injection and ignition system.

The control unit receives the key-operated supply at pin 13 of connector B from the line protected by fuse **F14** of fusebox **G1**.

Relay **S41** controls the system supply: it is supplied from the battery, by the line of fuse **S36**. The enable signal from pin 46 of connector C of the control unit **S11** energises relay **S41** and sends the supply to the control unit itself, at pins 7, 8 and 1 of connector A (the line that leads from **S41** to pin 1 is also protected by wander fuse **S46**).

The pump relay **S12a** is also supplied from the battery, by the line of fuse **S36**: the signals that energise the pump relay **S12a**, which supplies the electric fuel pump **F18** lead from pins 30 and 52 of connector C of the control unit. The fuel pump is connected to an inertial switch **H20**, which in the event of a crash cuts off the circuit, thereby stopping the dangerous flow of fuel.

In case of intervention on switch **H20**, the relative telltale light on the panel **C10** is also turned on.

The control unit **N6** controls glow plug warming **A13**: this is supplied directly by the battery through the line protected by fuse **G352**. It receives the commands from pin 38 and 51 of connector C of **S11** and sends a feedback signal to pin 1 of connector B of the control unit.

Pins 4, 5 and 6 of connector A of **S11** are earthed.

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

The rpm sensor **S31** supplies information about the engine speed, through a frequency signal sent to pin 26 of connector D of the control unit **S11**. From pin 37 of connector D of the control unit it receives an earth signal. Both signals are weak in intensity and are, therefore, suitably screened.

The timing sensor **S13** is supplied from pin 12 of connector D of **S11**. It receives a reference earth signal from pin 2 of connector D of the control unit to which it sends a frequency signal at pin 3 of the same connector.

The engine temperature transmitter **L7**, receives a reference earth from pin 27 of connector D of the control unit, and supplies a signal proportionate with the temperature of the engine fluid to pin 36 of the same connector.

The air flow meter **S5** receives the main supply from pin 11 of connector D of the control unit and a reference voltage from pin 1 of the same connector. To pin 14 of connector D it sends a signal proportionate with the flow of air. Inside **S5** there is also an air tempera-

ture sensor: the reference earth of the sensor is supplied by pin 4 of connector D of **S11**, while pin 23 of the same connector receives the air temperature signal.

The accelerator pedal **L49** is fitted with two integrated potentiometers (a main one and a safety one). The main one receives the supply and earth respectively from pin 5 and 23 of connector C of **S11** and sends the corresponding signal to pin 10 of the same connector. The other one receives the supply and earth respectively from pin 21 and 8 of connector C and it sends the signal to pin 9 of connector C of **S11**.

The fuel temperature sensor **L51**, fitted on the return manifold, detects the temperature of the fuel oil leaving the injectors. It receives a reference earth from pin 1 of connector C of **S11** and sends the fuel temperature signal to pin 24 of the same connector.

The supercharging sensor **L36** detects the turbo charger (activated) pressure. It is supplied from pin 8 of connector D of **S11** and receives a reference earth from pin 7 of the same connector. The signal is sent to pin 6 of connector D of the control unit itself.

The fuel pressure sensor **L59** has the task of sending the injection control unit a feedback signal for regulating the pressure and length of injection. It receives the supply and the reference earth respectively from pin 13 and 34 of connector D of **S11**; then it sends the pressure signal to pin 24 of the same connector.

The task of the fuel pressure regulator **M28** is to keep the pressure of the fuel in the accumulator constant. The two command signals lead from pin 31 and 21 of connector D of the control unit.

The EGR solenoid valve **L46** controls exhaust gas recirculation- It is supplied by pin 37 of connector C of **S11** and sends a signal to pin 50 of the same connector.

Pin 8 of connector C of **S11** receives the signal leading from the brake light switch **H3**, which receives the "key-operated" supply from fuse **F15** of fusebox **G1**.

Pin 2 of connector C of **S11** receives the signal leading from the clutch pedal switch **H21**, which also receives the "key-operated" supply from fuse **F15**.

The injectors **S50** receive the supply to enable opening from pin 2 (cylinders 1 and 4) and 4 (cylinders 2 and 3) of connector E of **S11**.

The engine control unit sends the commands to the injectors from pin 9, 7, 5 and 3 of connector E, respectively for cylinders 1, 2, 3 and 4.

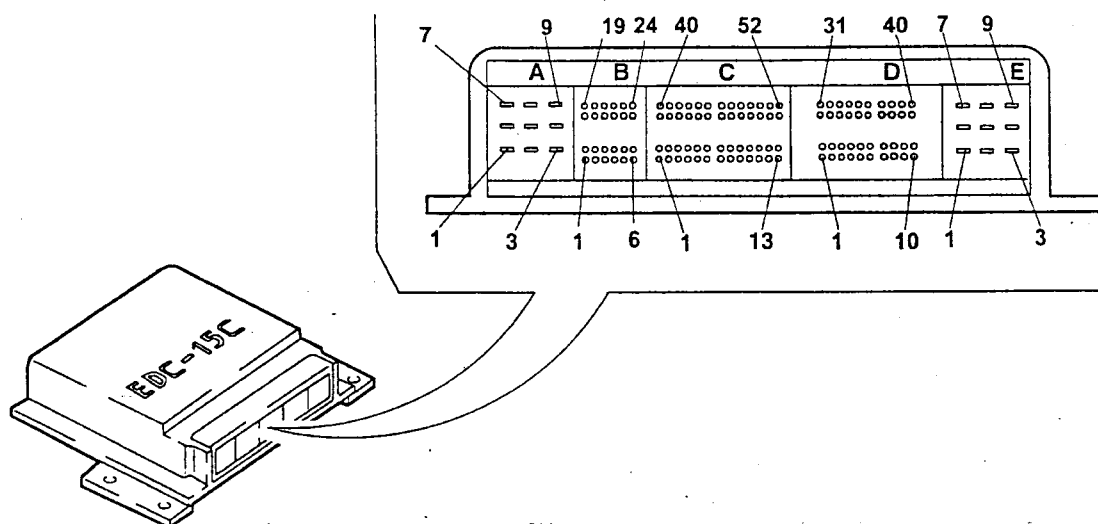
When the instrument cluster **C10** receives (pin 15 of connector B) the earth signal from pin 48 of connector C of **S11**, it turns on the "injection failure" warning light"; in the same way at pin 8 of connector A of **C10**, when the earth signal reaches pin 43 of connector C, the "glow plug warming" warning light turns on.

The control unit S11 connects with the ALFA ROMEO CODE control unit N77 through the special line from pin 13 of connector C; this way, if the ALFA ROMEO CODE system does not detect a correct code it will not send its enable signal and the engine is not started.

The control unit is fitted with a self-diagnostics system which can be used connecting to connector T1, through pin 28 of connector C.

Lastly from pin 40 of connector C the control unit S11 sends a signal proportionate with the engine rpm to the instrument cluster C10.

### Control unit Pin-out



#### CONNECTOR A

1. Supply from main relay
2. N.C.
3. N.C.
4. Earth
5. Earth
6. Earth
7. Supply from main relay
8. Supply from main relay
9. N.C.

#### CONNECTOR B

1. Glow plug timing signal
2. Clutch pedal switch
3. Air conditioner engagement request
4. N.C.
5. N.C.
6. N.C.
7. N.C.
8. Brake pedal switch
9. N.C.
10. N.C.
11. N.C.
12. N.C.
13. Key-operated supply
14. N.C.
15. N.C.
16. N.C.
17. N.C.

18. N.C.
19. N.C.
20. N.C.
21. N.C.
22. N.C.
23. Request to engage fan 1st speed
24. N.C.

#### CONNECTOR C

1. Fuel temperature sensor earth
2. N.C.
3. N.C.
4. N.C.
5. Sensor 1 supply - accelerator pedal
6. N.C.
7. N.C.
8. Sensor 2 earth - accelerator pedal
9. Sensor 2 signal - accelerator pedal
10. Sensor 1 signal - accelerator pedal
11. N.C.
12. N.C.
13. Alfa Romeo Code
14. N.C.
15. N.C.
16. N.C.
17. N.C.
18. N.C.
19. N.C.
20. Enable from 4-level pressure switch

21. Sensor 2 supply - accelerator pedal
22. N.C.
23. Sensor 1 earth - accelerator pedal
24. Fuel temperature sensor signal
25. N.C.
26. Car speed signal
27. N.C.
28. Diagnostics connection (line K)
29. N.C.
30. Electric fuel pump supply
31. N.C.
32. N.C.
33. N.C.
34. N.C.
35. N.C.
36. N.C.
37. E.G.R. drive supply
38. Glow plug timer command (+)
39. N.C.
40. Rpm signal
41. N.C.
42. N.C.
43. Glow plug warning light
44. N.C.
45. Request to engage fan 2nd speed
46. Enable for main relay
47. N.C.
48. "i.e." failure" warning light
49. Water temperature sensor
50. E.G.R. drive
51. Glow plug temperature command (-)
52. Electric fuel pump

**CONNECTOR D**

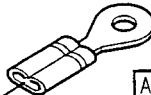
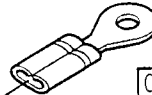
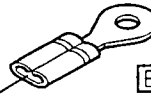
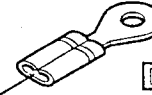

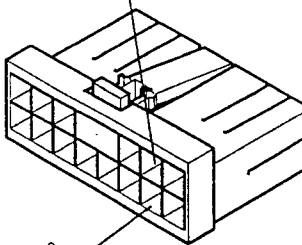
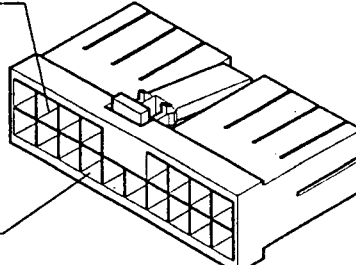

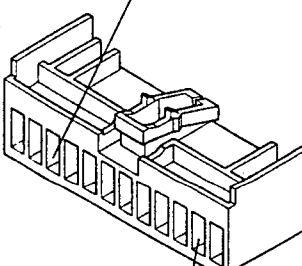
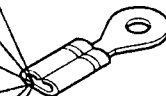
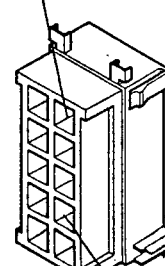
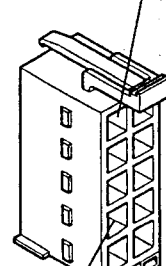
1. Air flow meter supply
2. Timing sensor earth
3. Timing sensor signal
4. Air temperature sensor earth
5. N.C.
6. Supercharging pressur sensor signal
7. Overpressure sensor earth
8. Overpressure sensor supply
9. N.C.
10. N.C.

11. Air flow meter supply
12. Timing sensor supply
13. Supply (5V) for fuel pressure sensor
14. Air flow meter signal
15. Quadrinary signal
16. N.C.
17. Rpm sensor screening
18. N.C.
19. N.C.
20. N.C.
21. Fuel pressure regulator command
22. N.C.
23. Air temperature sensor signal
24. Fuel pressure sensor signal
25. N.C.
26. Rpm sensor signal
27. Engine temperature sensor earth
28. N.C.
29. N.C.
30. N.C.
31. Pressure regulator command
32. Air conditioning system relay
33. N.C.
34. Fuel pressure sensor earth
35. N.C.
36. Engine temperature sensor signal
37. N.C.
38. N.C.
39. N.C.
40. N.C.

**CONNECTOR E**

1. N.C.
2. Supply for injectors cyl. 2 and 3
3. Injector command signal cyl. 4
4. Supply for injectors cyl. 1 and 4
5. Injector command signal cyl. 3
6. N.C.
7. Injector command signal cyl. 2
8. N.C.
9. Injector command signal cyl. 1

## Components and Connectors

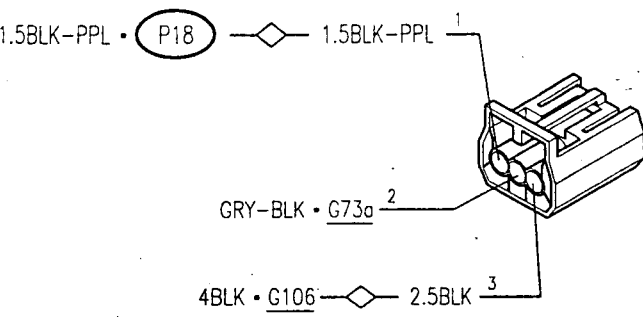
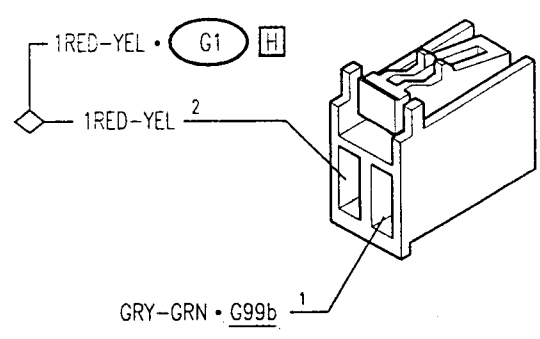
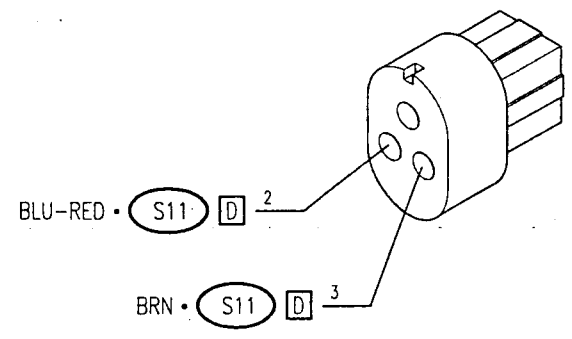
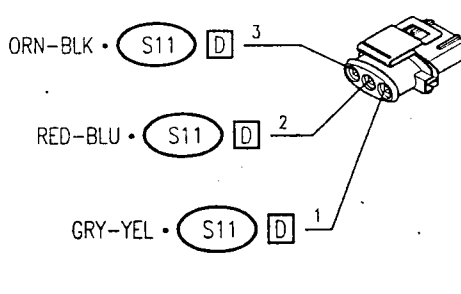
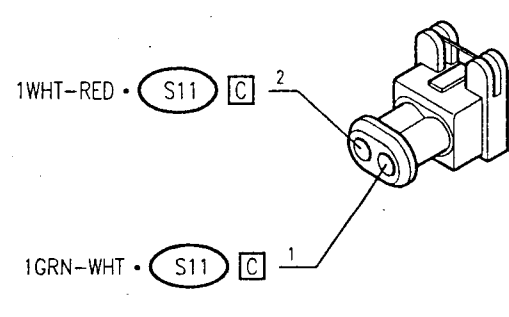
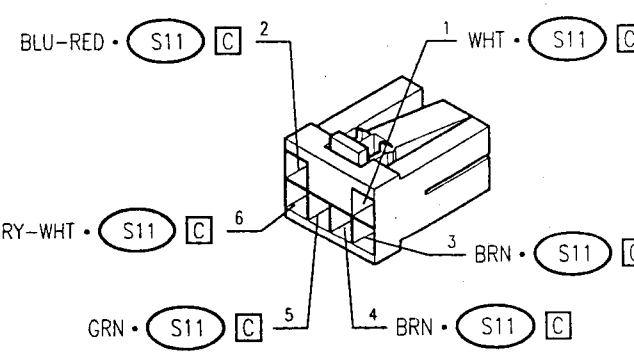
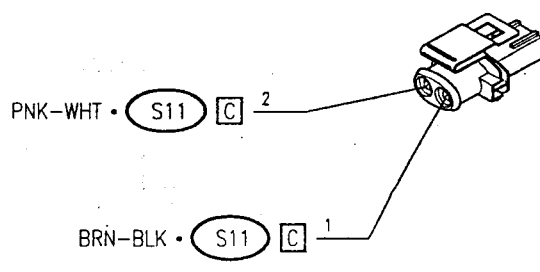
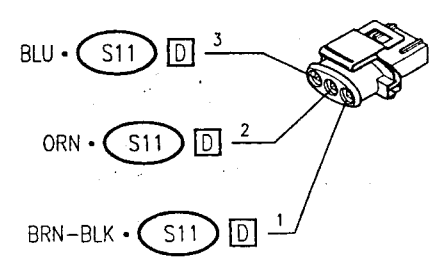
Glow plugs		A13	
<div><div>GRY-YEL • N6 [B] —  A</div><div>GRY-GRN • N6 [B] —  C</div><div>GRY-BLK • N6 [B] —  B</div><div>GRY-RED • N6 [B] —  D</div></div>			
Instrument cluster		C10 A	Instrument cluster
<div>BRN-WHT • G133a —  — BRN-WHT 2</div> <div> 8</div> <div>BRN-BLK • G133a</div>		C10 B	<div>GRY-BLK • G73a 7</div> <div> 15</div> <div>ORN • G99b</div>
Fusebox		G1 H	RH eng. compartment earth
<div>1 RED-YEL • H21 —  — 1 RED-YEL 10</div> <div>1 RED-YEL • H3</div> <div> 2</div> <div>1.50 RN-LTB • B1 [A]</div>		<div>BLK • N6 [C]</div> <div>BLK • N6 [C]</div> <div>2.5 BLK • S11 [A]</div> <div>2.5 BLK • S11 [A]</div> <div>2.5 BLK • S11 [A]</div> <div>BLK • T1</div> <div></div>	
Rear services connector			G73a
<div>2.5 GRN • P18 9</div> <div> 3</div> <div>GRY-BLK • H20</div> <div>2.5 PNK-WHT • G99b 9</div> <div> 3</div> <div>GRY-BLK • C10 [B]</div>			



## Components and Connectors (continued)

Dashboard/i.e. wiring connector		G99b
Seat crossmember earth		G106
Electronic injection wiring connector A		G133a
Glow plug warming fuse	G152	Brake light switch

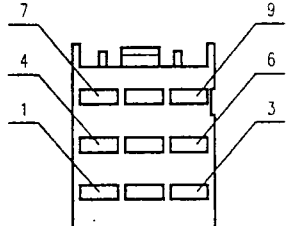
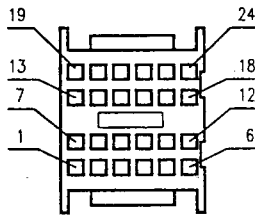
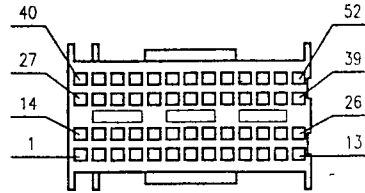
## Components and Connectors (continued)

Inertial switch	(H20)	Clutch pedal switch	(H21)
 <p>1.5BLK-PPL • P18 — 1.5BLK-PPL 1</p> <p>GRY-BLK • G73a 2</p> <p>4BLK • G106 — 2.5BLK 3</p>		 <p>1RED-YEL • G1 1</p> <p>1RED-YEL 2</p> <p>GRY-GRN • G99b 3</p>	
Engine coolant fluid temperature gauge transmitter	(L7)	Turbo supercharging sensor	(L36)
 <p>BLU-RED • S11 1</p> <p>BRN • S11 2</p> <p>BRN • S11 3</p>		 <p>ORN-BLK • S11 1</p> <p>RED-BLU • S11 2</p> <p>GRY-YEL • S11 3</p>	
E.G.R. solenoid control valve	(L46)	Accelerator pedal potentiometer	(L49)
 <p>1WHT-RED • S11 1</p> <p>1GRN-WHT • S11 2</p>		 <p>WHT • S11 1</p> <p>BLU-RED • S11 2</p> <p>GRY-WHT • S11 6</p> <p>GRN • S11 5</p> <p>BRN • S11 3</p> <p>BRN • S11 4</p>	
Fuel temperature sensor	(L51)	Fuel pressure sensor	(L59)
 <p>BRN-BLK • S11 1</p> <p>PNK-WHT • S11 2</p>		 <p>BRN-BLK • S11 1</p> <p>ORN • S11 2</p> <p>BLU • S11 3</p>	

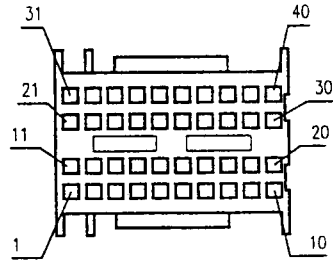
## Components and Connectors (continued)

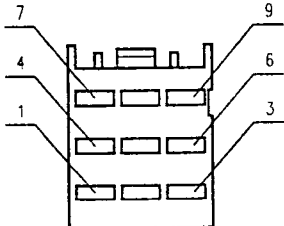
Fuel pressure regulator	M28	Glow plug warming timer	N6	A	
Glow plug warming timer	N6	B	Glow plug warming timer	N6	C
ALFA ROMEO CODE control unit	N77	A	Electric fuel pump	P18	
Air flow meter				S5	

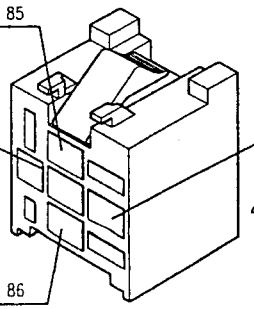
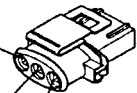
## Components and Connectors (continued)

Electronic injection control unit		S11	A
<p>1 1RED-GRN • S46</p> <p>4 2.5BLK • G53a</p> <p>5 2.5BLK • G53a</p> <p>6 2.5BLK • G53a</p> <p>7 2.5RED-BLK • S41</p> <p>8 2.5RED-BLK</p>			
Electronic injection control unit		S11	B
<p>1 GRN • N6</p> <p>2 GRY-GRN • G99b</p> <p>8 GRY-BLK • G99b</p> <p>13 ORN • G133a</p>			
Electronic injection control unit		S11	C
<p>1 PNK-WHT • L51</p> <p>5 BLU-RED • L49</p> <p>8 GRY-WHT • L49</p> <p>9 YEL • L49</p> <p>10 WHT • L49</p> <p>13 WHT-GRN • G99b</p> <p>21 GRN • L49</p> <p>23 BRN • L49</p> <p>24 BRN-BLK • L51</p> <p>28 WHT-YEL • T1</p> <p>30 BLK-PPL • S12a</p>	<p>37 1GRN-WHT • L46</p> <p>38 1LTB-RED • N6</p> <p>40 BRN-WHT • G133a</p> <p>43 BRN-BLK • G133a</p> <p>46 YEL-BLK • S41</p> <p>48 ORN • G99b</p> <p>50 1WHT-RED • L46</p> <p>51 1YEL-RED • N6</p> <p>52 PNK-BLK • S12a</p>		

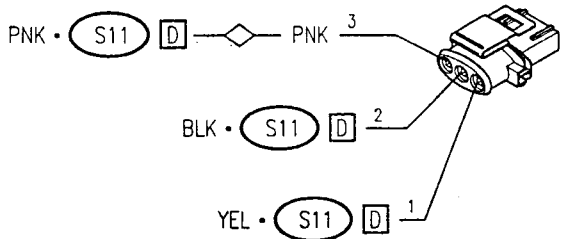
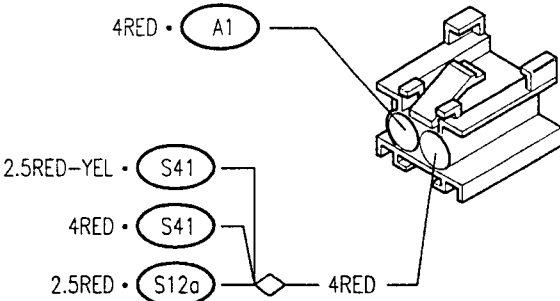
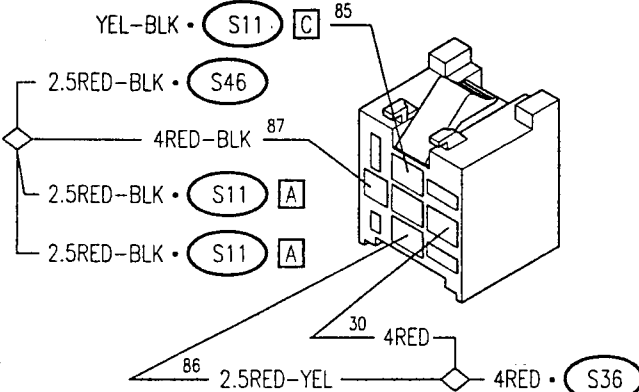
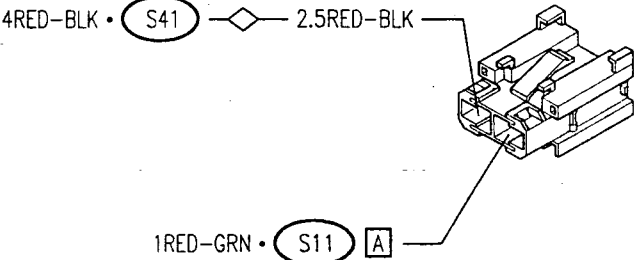
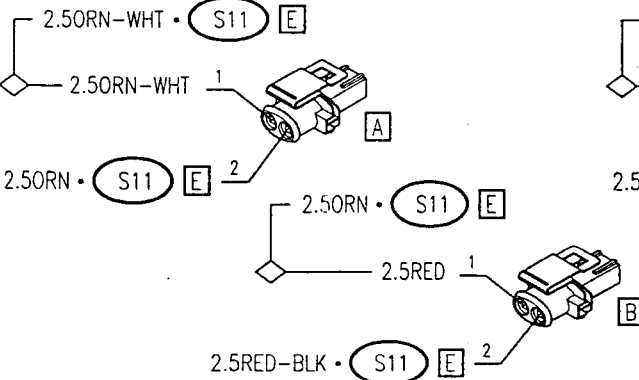
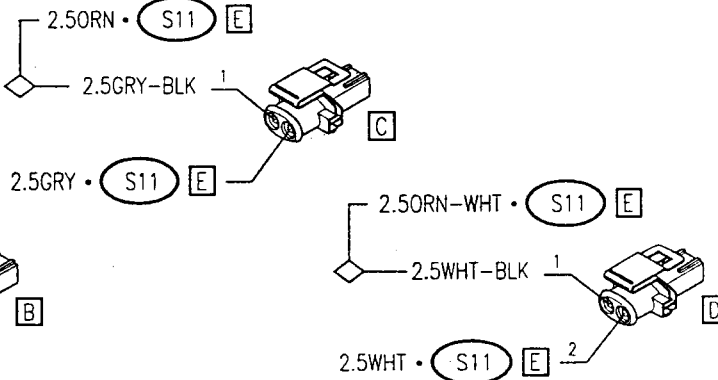
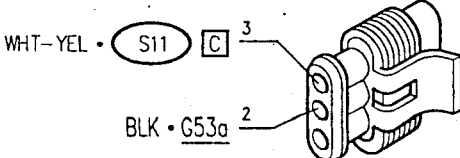
### Components and Connectors (continued)

Electronic injection control unit		S11	D
<p>1 PNK-BLK • S5</p> <p>2 GRY-RED • S13</p> <p>3 GRN-BLK • S13</p> <p>4 GRY • S5</p> <p>6 GRY-YEL • L36</p> <p>7 RED-BLU • L36</p> <p>8 ORN-BLK • L36</p> <p>11 LTB-RED • S5</p> <p>12 RED-BLK • S13</p> <p>13 BLU • L59</p> <p>14 WHT-ORN • S5</p> <p>17 PNK —◇— PNK • S31</p>	<p>21 1PNK-BLK • M28</p> <p>23 GRY-BLK • S5</p> <p>24 ORN • L59</p> <p>26 YEL • S31</p> <p>27 BRN • S7</p> <p>31 1BLU-BLK • M28</p> <p>34 BRN-BLK • L59</p> <p>36 BLU-RED • S7</p> <p>37 BLK • S31</p>		

Electronic injection control unit		S11	E
<p>2 2.5ORN —◇— 2.5GRY-BLK • S50 C</p> <p>2.5RED • S50 B</p> <p>3 2.5WHT • S50 D</p> <p>4 2.5ORN-WHT —◇— 2.5WHT-BLK • S50 D</p> <p>2.5ORN-WHT • S50 A</p>	<p>5 2.5GRY • S50 C</p> <p>7 2.5RED-BLK • S50 B</p> <p>9 2.5ORN • S50 A</p>		

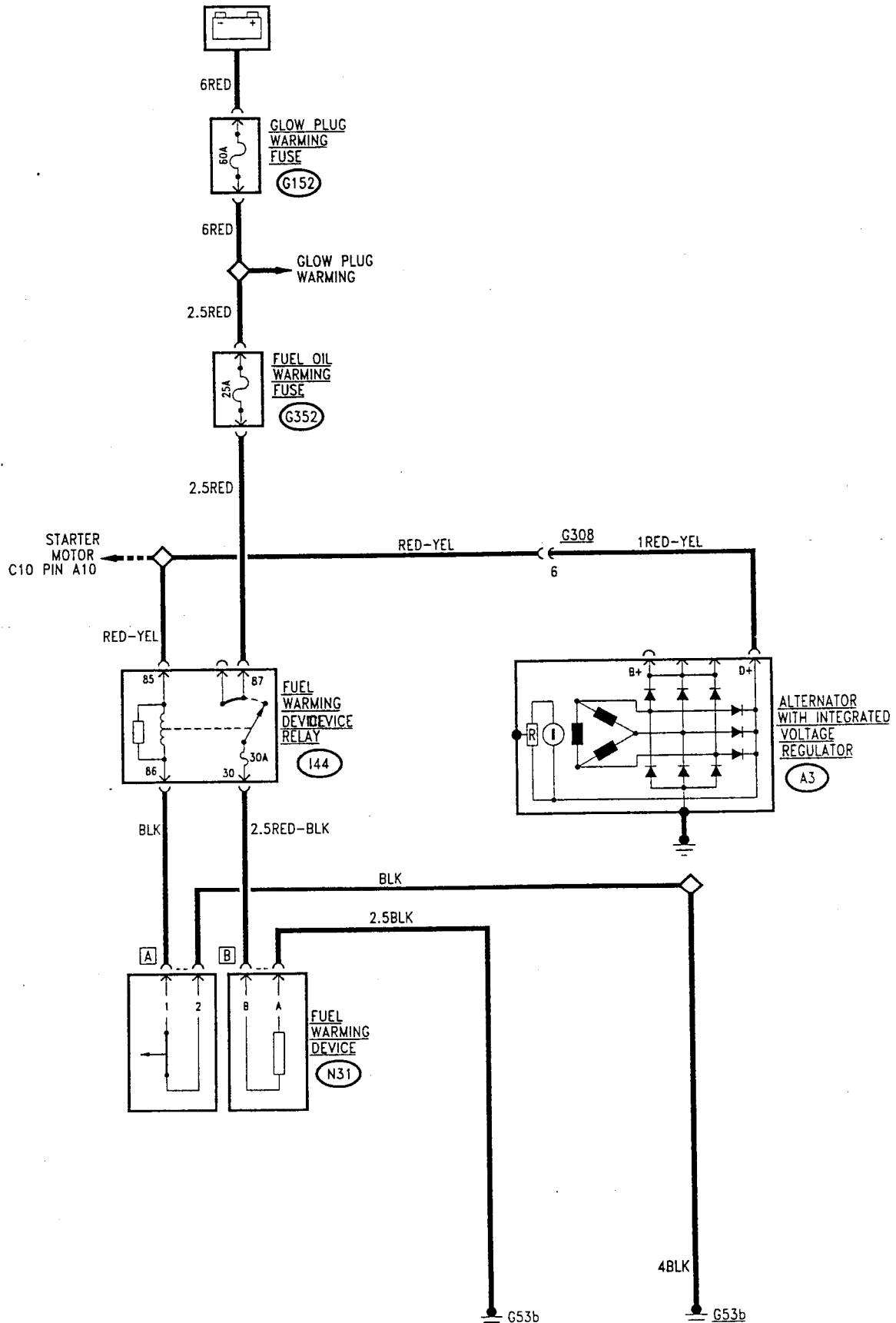
Fuel pump relay	S12a	Timing sensor	S13
<p>PNK-BLK • S11 C</p> <p>2.5PNK-WHT • G99b</p> <p>BLK-PPL • S11 C</p> <p>85</p> <p>87</p> <p>86</p> <p>30 2.5RED —◇—</p> <p>4RED • S36</p>		<p>RED-BLK • S11 D</p> <p>GRN-BLK • S11 D</p> <p>GRY-RED • S11 D</p> <p>3</p> <p>2</p> <p>1</p>	

## Components and Connectors (continued)

Rpm sensor	S31	Injection relay wander fuse	S36	
 <p>PNK • S11 D — 3</p> <p>BLK • S11 D — 2</p> <p>YEL • S11 D — 1</p>		 <p>4RED • A1</p> <p>2.5RED-YEL • S41</p> <p>4RED • S41</p> <p>2.5RED • S12a — 4RED</p>		
Main relay	S41	Injection supply wander fuse	S46	
 <p>YEL-BLK • S11 C — 85</p> <p>2.5RED-BLK • S46 — 87</p> <p>2.5RED-BLK • S11 A</p> <p>2.5RED-BLK • S11 A</p> <p>30 — 4RED — S36</p> <p>86 — 2.5RED-YEL — 4RED</p>		 <p>4RED-BLK • S41 — 2.5RED-BLK</p> <p>1RED-GRN • S11 A</p>		
Injectors (JTD)				S50
 <p>2.5ORN-WHT • S11 E — 1</p> <p>2.5ORN • S11 E — 2</p> <p>2.5RED • S11 E — 1</p> <p>2.5RED-BLK • S11 E — 2</p>		 <p>2.5ORN • S11 E — 1</p> <p>2.5GRY-BLK • S11 E — 2</p> <p>2.5WHT-BLK • S11 E — 1</p> <p>2.5WHT • S11 E — 2</p>		
Connector for ALFA TESTER (engine and electronic key management)				T1
 <p>WHT-YEL • S11 C — 3</p> <p>BLK • G53a — 2</p>				

## FUEL WARMING

## Wiring diagram



## General Description

The performance of a Diesel engine at low temperatures may be compromised by the possible solidification of the paraffins contained in the fuel oil which prevents it from flowing correctly.

Therefore, the engine is fitted with a fuel warming device on the fuel filter.

A thermal switch on the filter support detects low fuel oil temperatures: in fact this device is a thermal contact which closes for very low temperatures.

If the engine is running (information given by the turning off of the alternator "battery charging" signal) a relay engages the warming module in the upper part of the fuel oil filter: this module comprises two variable PTC resistances which, when crossed by current, warm the fuel that passes through the filter: initially, at low temperature, the resistance is low and the current is high with considerable heating power; gradually the resistance increases and the heating is reduced.

## Functional Description

The fuel warming device relay **I44** controls operation of the whole system; the relay is supplied by the line protected by a specific fuse **G352** and by fuse **G152** which also protects the glow plug warming system.

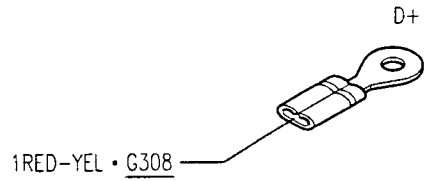
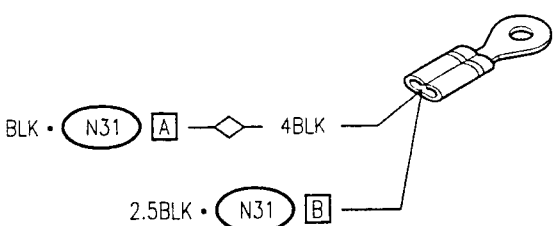
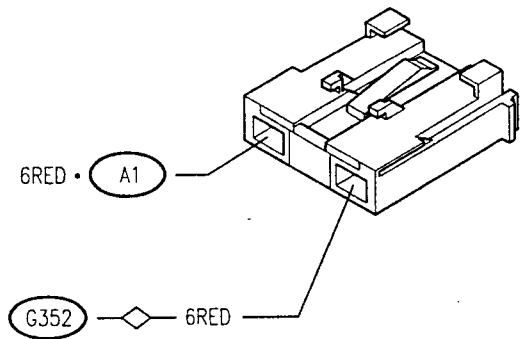
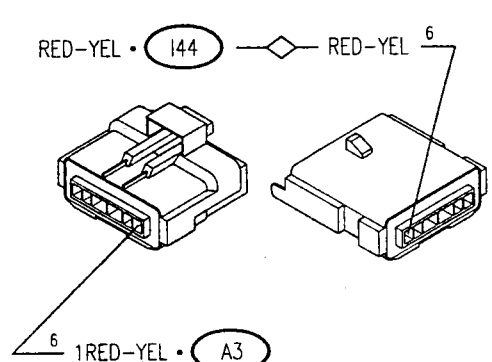
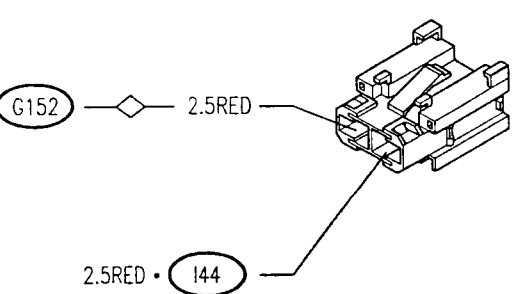
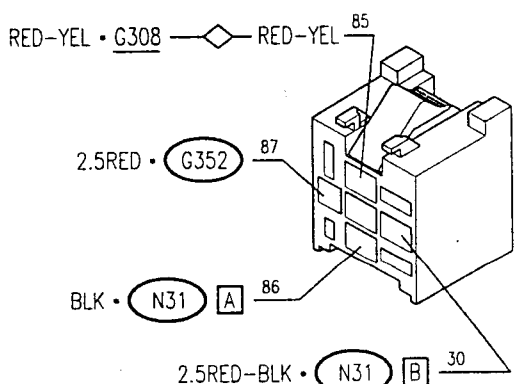
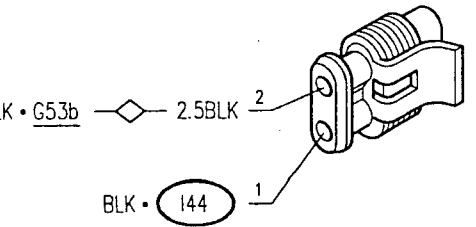
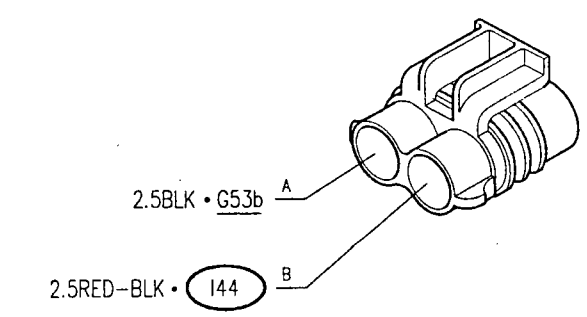
When (below 6°C) the thermal switch contact - connector A of device **N31** - closes and at the same time the engine is running (12 V signal leading from pin D+ of the alternator), relay **I44** is energised.

This way the resistances - connector B of device **N31** - are supplied, thereby warming the fuel that crosses the filter.

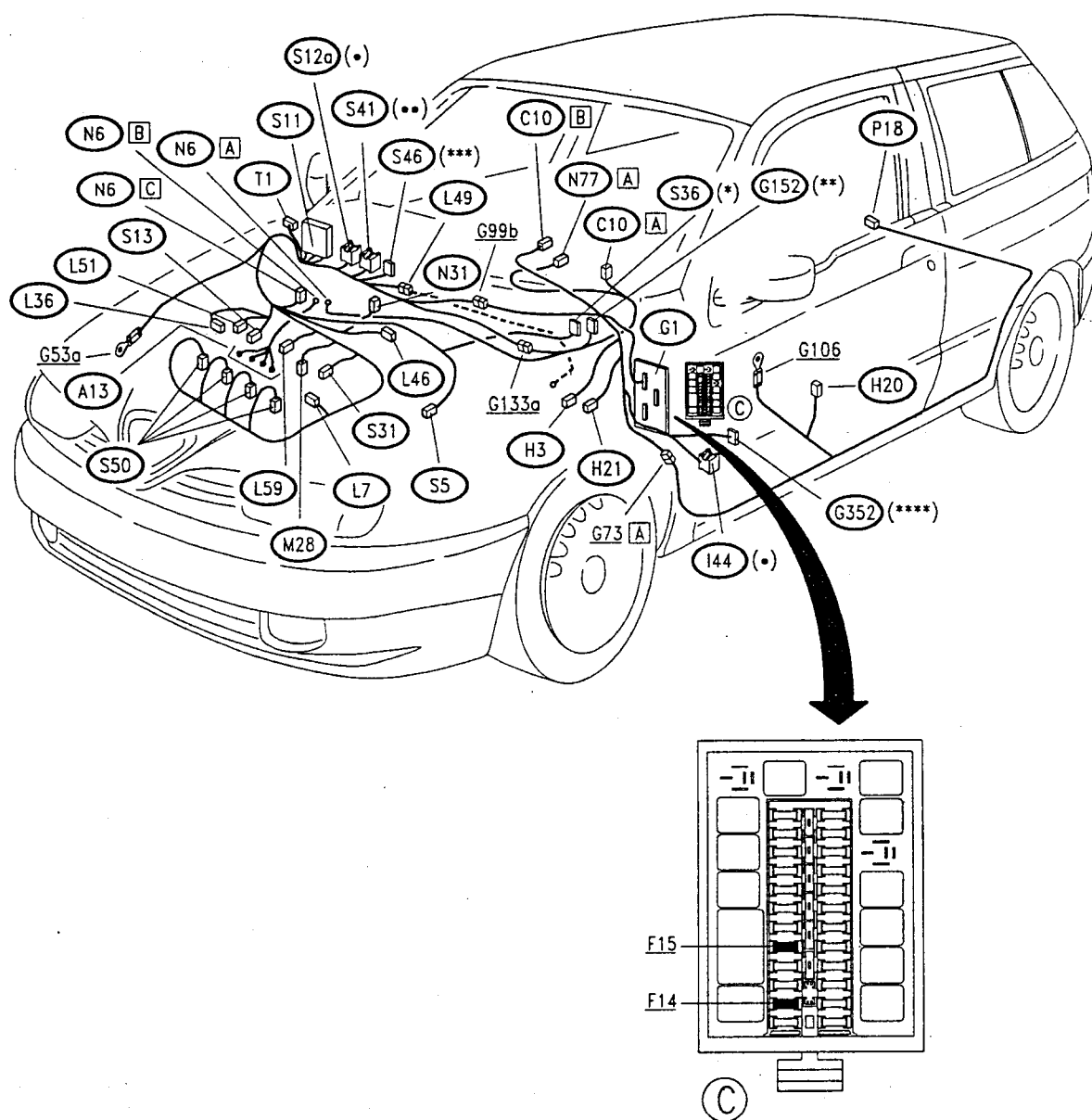
When the thermal switch contact opens (above 15°C), or if the engine is not running, the supply is stopped and warming ceases.



## Components and Connectors

Alternator, with voltage regulator incorporated	<b>A3</b>	RH engine compartment earth	<b>G53b</b>
 <p>1RED-YEL • <b>G308</b> — D+</p>		 <p>BLK • <b>N31</b> <b>A</b> — 4BLK —</p> <p>2.5BLK • <b>N31</b> <b>B</b> —</p>	
Glow plug warming fuse	<b>G152</b>	Engine sensors connector	<b>G308</b>
 <p>6RED • <b>A1</b> —</p> <p>2.5RED • <b>G352</b> — 6RED —</p>		 <p>RED-YEL • <b>I44</b> — RED-YEL 6 —</p> <p>6 1RED-YEL • <b>A3</b> —</p>	
Fuel oil warming fuse	<b>G352</b>	Fuel warming device relay	<b>I44</b>
 <p>6RED • <b>G152</b> — 2.5RED —</p> <p>2.5RED • <b>I44</b> —</p>		 <p>RED-YEL • <b>G308</b> — RED-YEL 85 —</p> <p>2.5RED • <b>G352</b> 87 —</p> <p>BLK • <b>N31</b> <b>A</b> 86 —</p> <p>2.5RED-BLK • <b>N31</b> <b>B</b> 30 —</p>	
Fuel warming device	<b>N31</b> <b>A</b>	Fuel warming device	<b>N31</b> <b>B</b>
 <p>4BLK • <b>G53b</b> — 2.5BLK 2 —</p> <p>BLK • <b>I44</b> 1 —</p>		 <p>2.5BLK • <b>G53b</b> A —</p> <p>2.5RED-BLK • <b>I44</b> B —</p>	

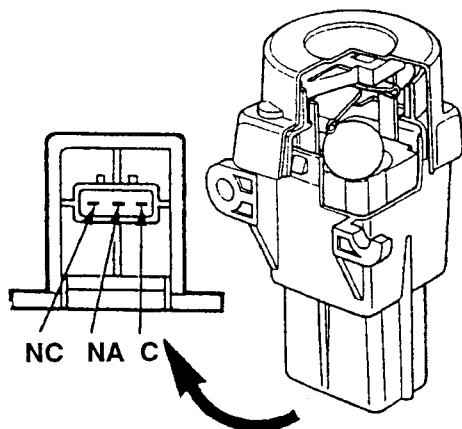
## LOCATION OF COMPONENTS



- (•) White base
- (••) Black base
- (\*) Green fuseholder
- (\*\*) Black fuseholder
- (\*\*\*) Brown fuseholder
- (\*\*\*\*) White fuseholder

### CHECKING COMPONENTS

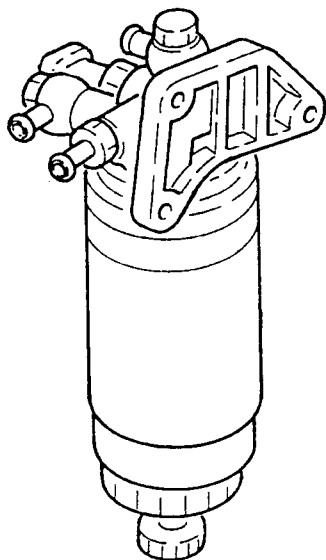
#### Inertial switch (H20)



#### SPECIFICATIONS

**Check the continuity between pin NC and C:** this continuity is cut off in the event of a crash ; The contact is closed again pressing the special button

#### Fuel warming device (N31)



#### SPECIFICATIONS

##### Thermal contact (conn. A)

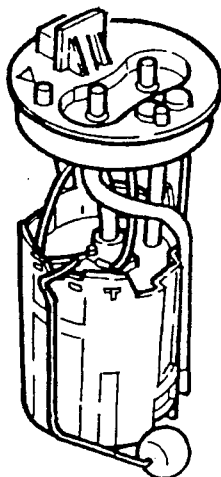
Contact closes (with decreasing temperature)

< 6°C

Contact opens (with increasing temperature)

> 15°C

#### Fuel pump (P18)

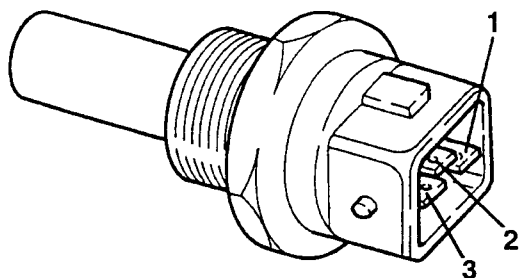


#### SPECIFICATIONS

Fuel pressure at idle speed

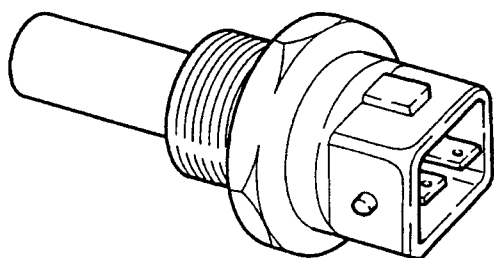
> 2.0 bar

Engine temperature transmitter (L7)



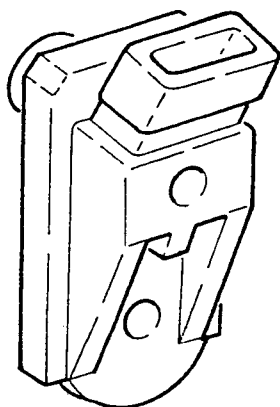
SPECIFICATIONS	
Rated resistance (at 20°C) between pin 2 and 3	2300+2600 Ω

Fuel temperature sensor (L51)



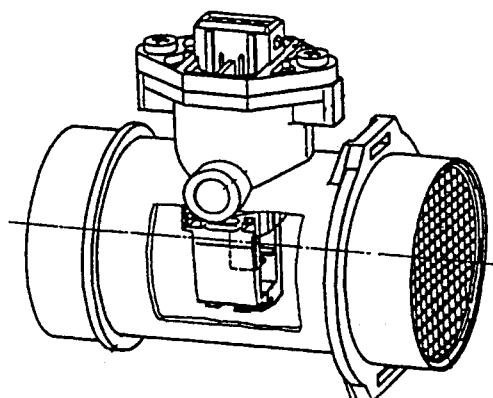
SPECIFICATIONS	
Rated resistance (at 20°C)	2300+2600 Ω

Supercharging sensor (L36)



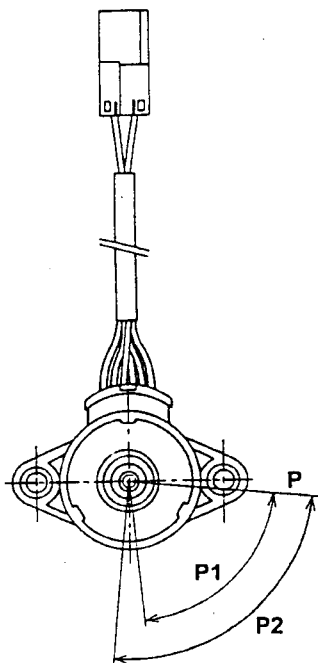
SPECIFICATIONS	
Rated resistance (at 20°C)	2500 ± 5% Ω

Air flow meter (S5)



SPECIFICATIONS	
Resistance between pin 1 and 3: air temperature sensor (at 25°C)	2000 ± 5% Ω

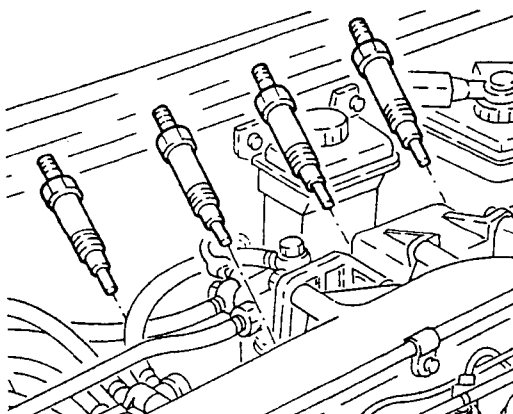
### Accelerator pedal potentiometer (L49)



SPECIFICATIONS		
Voltage ratio of pins 1-3 and 2-3	88°	$0.95 \pm 0.04$
	70°	$0.786 \pm 0.04$
	0°	$0.15 \pm 0.01$
Voltage ratio of pins 4-6 and 5-6	88°	$0.475 \pm 0.06$
	70°	$0.393 \pm 0.06$
	0°	$0.075 \pm 0.02$

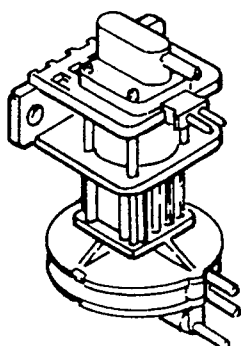
P = 0° (minimum)  
P1 = 0° ÷ 70°  
P2 = 88° (mechanical stop)

### Glow plugs (A13)



SPECIFICATIONS	
Internal resistance	$0.6 \Omega$

### E.G.R. solenoid control valve (L46)



SPECIFICATIONS	
Coil resistance (at 20°C)	$5.5 \pm 0.5 \Omega$

