SEQUENTIAL INJECTION SYSTEM

SET UP MANUAL

INDEX

1 – Introduction

Here below the instruction to use the POWERJET PLUSPLUSsoftware.

1.1 Software features

Using the software you can adjust for example:

- Engine 4-6-8 ECU strategies
- Map
- Automatic calibration
- Change-over petrol gas
- Software adjustment for lpg and cng
- Visual of lambda probe
- Rail temperature sensor
- Safety Car
- Error checking

2- Software installation

To install the software it is necessary:

Configuration PC:
- o Processor 486
- o 5 Mb free hard disk
- o Windows XP, Windows 98 / 98SE, Windows Millenium, Windows NT, Windows 2000.
- o Video resolution: 800x600 pixels
- o COM port

POWERJET PLUS"**Serial Link Kit**":
- o 1 serial interface
- o CD with software

To install the software:
- o Insert CD-ROM
    - - Double click My computer
    - - Select **CD unit**
    - - Find the **Software**
    - - When request click execute

- o Wait for the **Wizard** and follow the instructions

At the end of the installation a new voice will be present on the menu start→ programs → YYY → XXX and a new directory C:\Program Files\YYY\XXX_YYY will present on the Hard Disk.

> △ **NOTE**: *Please uninstall all old version of this software, if present, before to install it.*

> △ **NOTE**: *In order to avoid any inconvenience during the use of the software please disable the screensaver and check the PC level battery.*

3 – Start the program

➜ Connect the serial interface between PC and gas ECU.

△ **NOTE**: Connect the serial interface before to start the program.

- Click **Start**
- Click **Programs**
- Click **Powerjet**

△ **NOTE:** *Before to use the program please close others open applications.*

3.1 Language

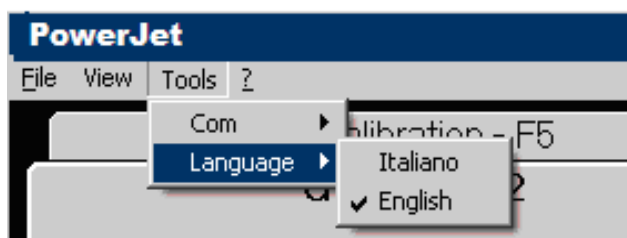To change the language select the Tools -> language

Fig. 3.1 - 1

3.2 Connection

- **Opening**: The program will search the gas ECU to show the system configuration. The following window will appear:
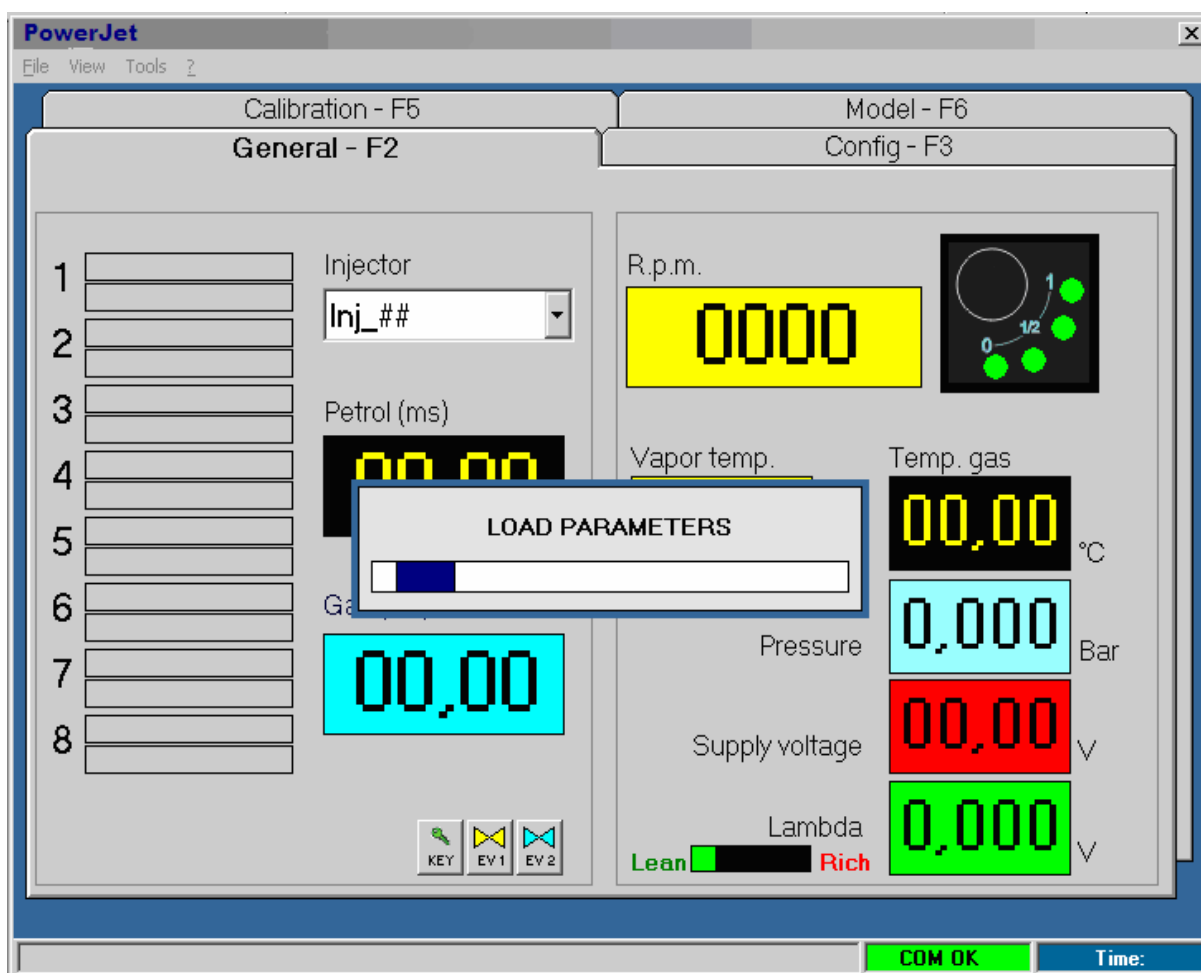

Fig. 3.2 - 1

- **Program connected**:   The program it makes a test of the various parameters present in the ECU. This procedure will recognize the Hardware, Software and Firmware version checking their compatibility.

➔ If update is necessary a window will be automatically opened. The DIAGNOSIS screen will appear.

- **The program it cannot connect**: after few seconds the message **"READING PARAMETERS"** change in **"COMMUNICATION ERROR"**
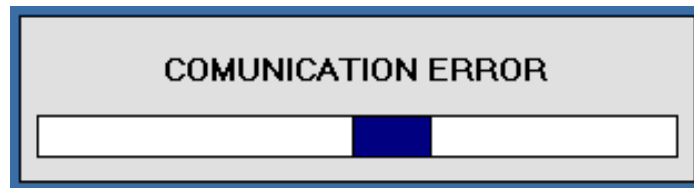
Fig. 3.2 - 2

Moreover the **VISUALISATION CONNECTION STATUS** (right side of the window) changes the colour and message:

Fig. 3.2 – 3

- **The ECU is not connected** for one of the following reason:
    1. Serial interface not connected.
    2. The ECU it is not feed.
    3. The selected COM port it is not correct. Change the COM by the relative Menu Tools→*Com*
    4. The Com PORT is busy. Please close all the other software and try again.

4 - General - F2

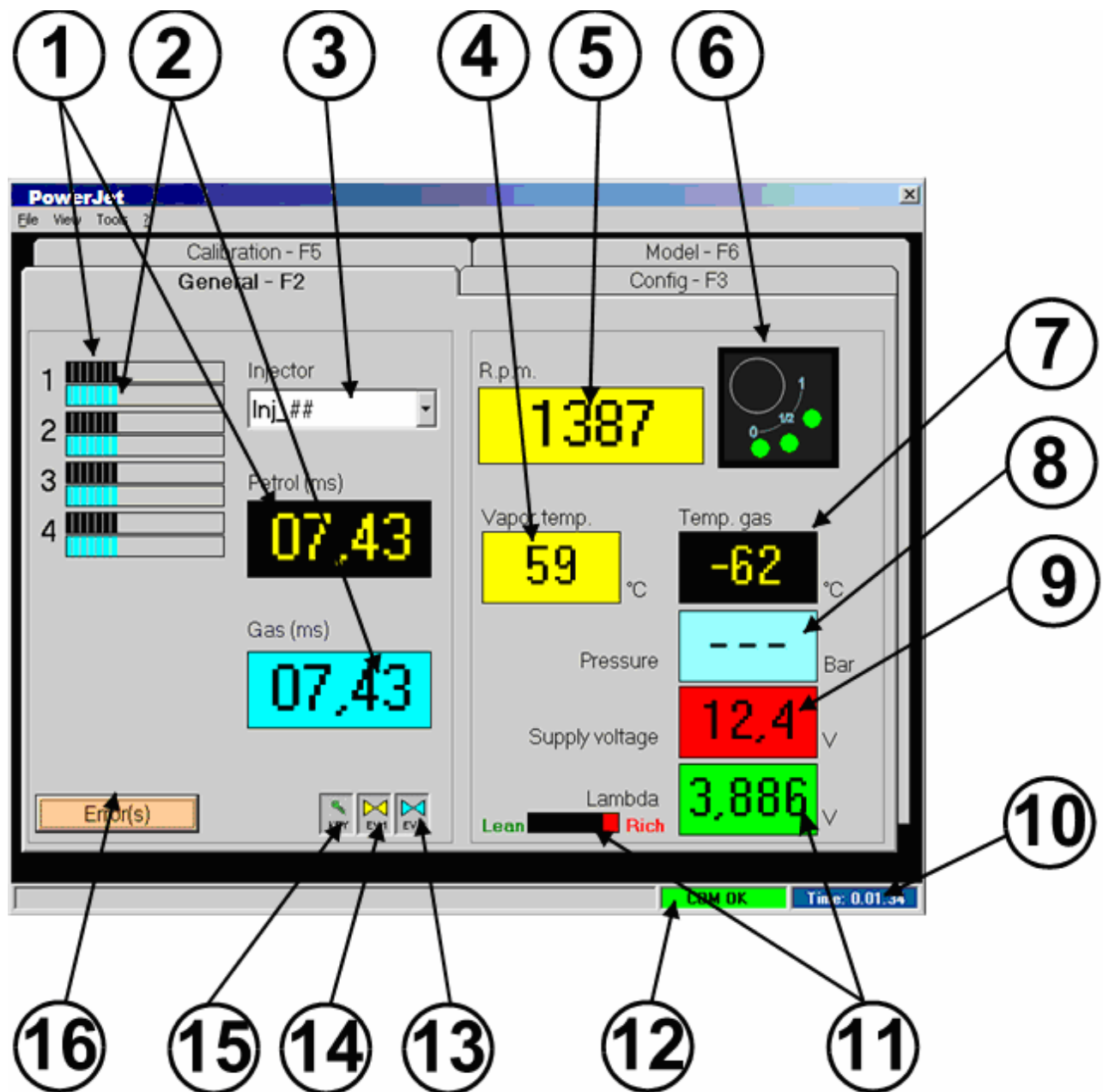As soon as the ECU is connected the window General - F2 will be opened

Fig. 4 - 1

1	**Petrol injection time** Graphic visualisation of petrol injection time.	**milliseconds**
2	**Gas injection time** Graphic visualisation of gas injection time.	**milliseconds**
3	**Selection of the injector to display** It allows to choose if in the holes 1 -.2 it must be displayed the injection time or the medium time of a single injectors	**Inj_## = Injection time medium** **Inj_1, 2, etc. = injector**
4	**Temp. Vapour. (disable)** Temperature in the reducer.	**Degrees centigrade** **- 62 = Not connected**
5	**R.p.m**. **RPM display**	**RPM**
6	**Switch software** It exactly repeats the function of the switch. With a click on switch on.	**- - -**
7	**Gas temperature** Temperature of the rail injectors	**Degrees centigrade** **- 62 = Not connected**
8	**Pressure (disable)** It displays the reducer pressure (only if dedicated pressure sensor is connected).	**Bar, '- - -' = Not connected or function disable**
9	**Battery** Battery tension	**Volt**
10	**Time of connection** It display the time spent from the last connection between PC and ecu	**hours:minuts:seconds**
11	**Lambda (not necessary to connect)** Graphic Visualization of the sonda lambda volt tension. The visualization is filtered.	**Green = Poor** **Red = Rich**
12	**Communication status** It show the status between ECU and PC	**Green=connection OK** **Red = No connection**
13	**EV2** Opening of the solenoid valve 2 (multivalve)	**Button down =Open** **Button up =Close**
14	**EV1** Opening of the solenoid valve 1 (front solenoid valve)	**Button down =Open** **Button up =Close**
15	**KEY** It show the key contact	**Button down =Open** **Button up =Close**
16	**Errors** If enable, it means that there are errors recorded in the ECU.	**Disable = No errors**

Service – General F2

Please, check that the nozzle previously fitted on the manifold are the right one's suitable to the converted engine. Click the "car button":   the following window will appear:

Please select and fill in the form with the required data then click "Select" button to check the nozzle size.

MAINTENANCE SERVICE ALERT

Please, enable the "SERVICE" function in order to keep your engine always in the better condition following the scheduled maintenance program.

Click the "watch button":   the following window will appear:

Enable the maintenance program selecting : **"Enable"** and complete by writing the kilometres (driving) foreseen before every check then click **"Ok".**

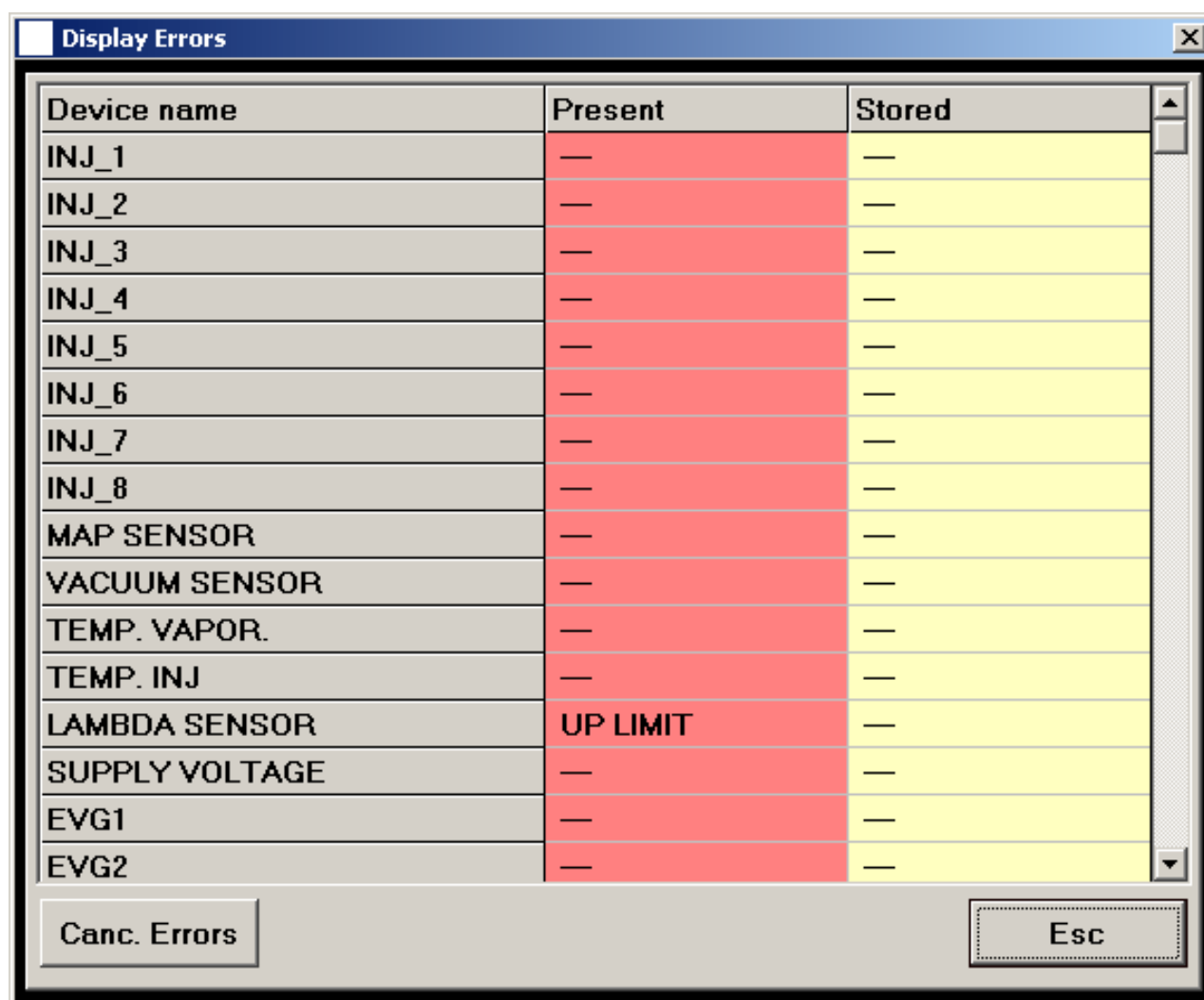The driver will be informed by "beep" as soon as driven the scheduled kilometres.

Please note that the first checking is after 1000 km and it cannot be modified.

4.1 The folder Errors visualization

During the normal operation, the ECU periodically check the functionning of some component the equipment.
In case of bad working , in the main screen General–F2 it appears the message Errors

Clicking the button Errors the following window will be opened:

Fig. 4.1 - 1

- Click **Canc. Errori** to eliminate all the errors**.**

For every row starting from the left colums:
- **Column "A" -Device name-:** name of the monitored device.
- **Column "B" -Present-:** error present.
- **Column "C" -Recorded-:** error recorded.

ERRORS DATA'S			
DEVICE	**DESCRIPTION**	**POSSIBLE ERRORS**	**ACTIONS**
INJ FROM 1 TO 8	*Gas injectors*	• **---:** no errors. • **NOT CONNECTED:** device not connected. • **SHORT-CIRCUIT:** device in short-circuit.	- Check the injectors connections. - Replace the injector.
MAP SENSOR	*Reducer pressure sensor*	• **---:** no errors • **UP THRESHOLD:** value too high • **DOWN THRESHOLD:** value too low.	- Check the sensor connections. - Replace the sensor.
MAP SENSOR	*Reducer pressure sensor*		
VACUUM SENSOR	*Manifold pressure sensor*		
TEMPER. VAPORIZ.	*Reducer temperature sensor*		
TEMPER. INJ	*RAIL temperature sensor*		
SONDA LAMBDA	*Lambda sensor*		
TENSION BATT.	*Battery tension*		
SOLENOID VALVE REDUCER	*Reducer solenoid valve*	• **---:** no errors. • **NOT CONNECTED:** device not connected. • **SHORT-CIRCUIT:** device in short-circuit.	- Check the solenoid valve connection. - Replace the solenoid valve.
SOLENOID VALVE MULTIVALVE	*Solenoid valve multivalve*	• **---:** no errors. • **NOT CONNECTED:** device not connected. • **SHORT-CIRCUIT:** device in short-circuit.	

5 - Parameters - F3

It allows to adjust:
- The switch on parameters
- The injectors used
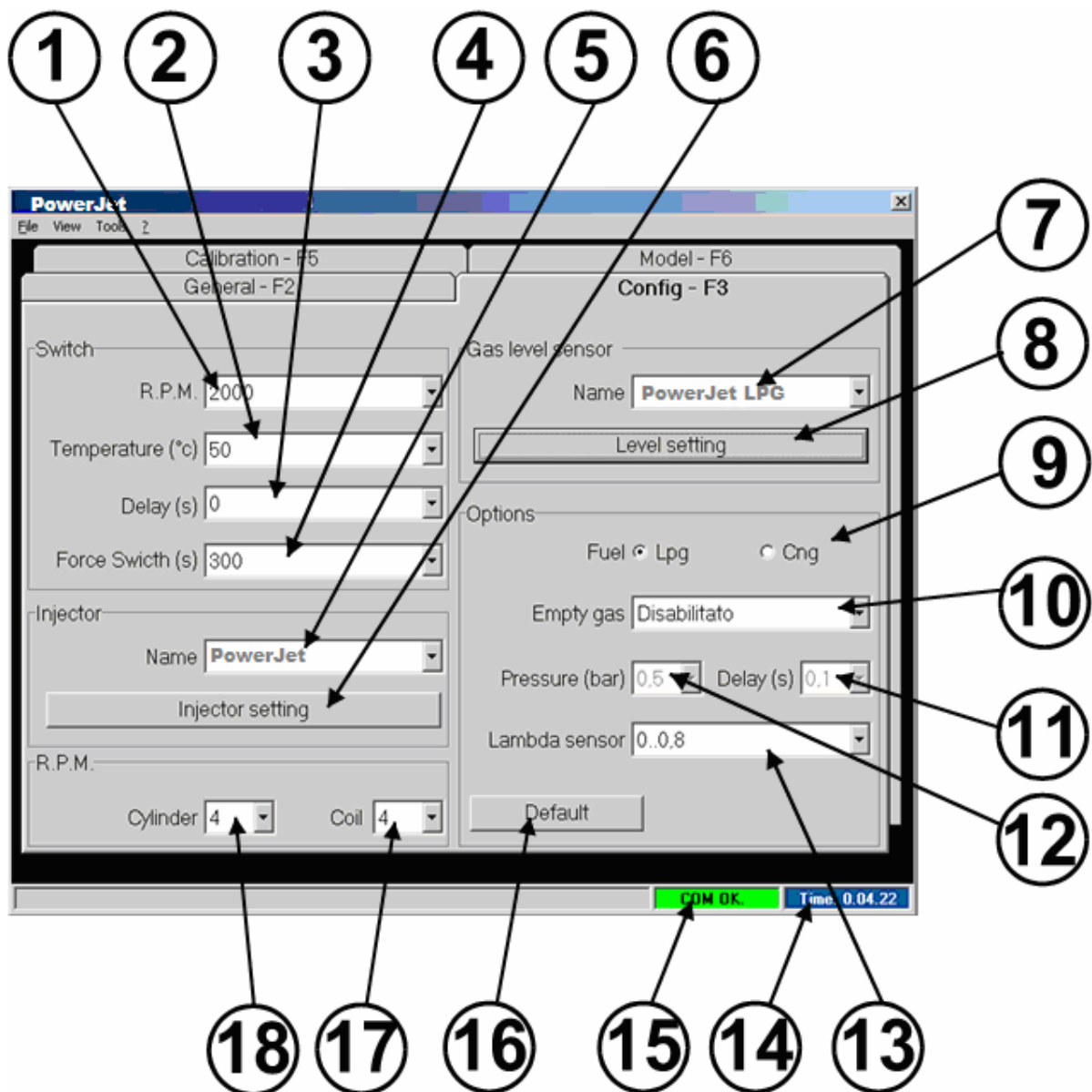- Display the RPM
- The level sensor
- Optional parameters

Fig. 5 - 1	**R.P.M.** Allows to select the RPM number to switch on gas considering also temperature and time.	**RPM**
2	**Temperature (°C)** Allows to select the temperature degree to switch on gas.	**Degrees centigrade**
3	**Delay (s)** Time to wait before to switch on gas, reached right temperature.	**Seconds**
4	**Force (s)** The switch on gas is forced after the settled time.	**Seconds**
5	**Type** It displays the used POWERJET PLUSPLUSinjectors.	
6	**Injectors configuration** It allows to change the functioning of the injectors. It is possible to to add the offset time to the normal injection time.	
7	**Type** – *gas level sensor* Select the lpg level sensor.	**Pre-settled:** - **PJ Lpg** - **0..90 Ohm** - **1050** - **1060** - **Reserve**
8	**Sensor parameters adjustment** It is possible to change the degree value for the level sensor.	
9	**Feeding** It is possible to select the type of gas to use.	**LPG** **CNG**
10	**End gas** It allows to enable the optional gas pressure sensor installed. This function allows to automatically switch on petrol when the gas pressure drop down the settled value for the time indicated in the hole "wait".	**Default** - **Disable**
11	**Wait (s)** It allows to select the end gas time.	**Default** - **O,1 seconds**
12	**Pressure (bar)** It allows to select the end gas pressure.	**Default** **0,5 bar**
13	**Lambda sensor** It is possible to select the type of lambda sonde installed on the car.	**Default** - Disable
14	**Connection time** It display the time spent from the last connection between PC and ecu	**Hour:Minutes:Seconds**
15	**Communication status** It show the status between ECU and PC	**Green = OK** **Red = NOT OK**

16	**Default** Reset all the parameters to the origin.	**Reset production parameters**
17 18	**Cylinders and Coil** Parameters used to select the number of cylinders and ignition system or coils number. The example shows an engine with 4 cylinders and 4 coils. This functions it is very important to determinate the correct RPM.	**Default** - **4 cylinders** - **4 coils**

5.1 INJECTORS

It is possible to:
- Display the gas injection time.
- To select the functioning mode of the injectors
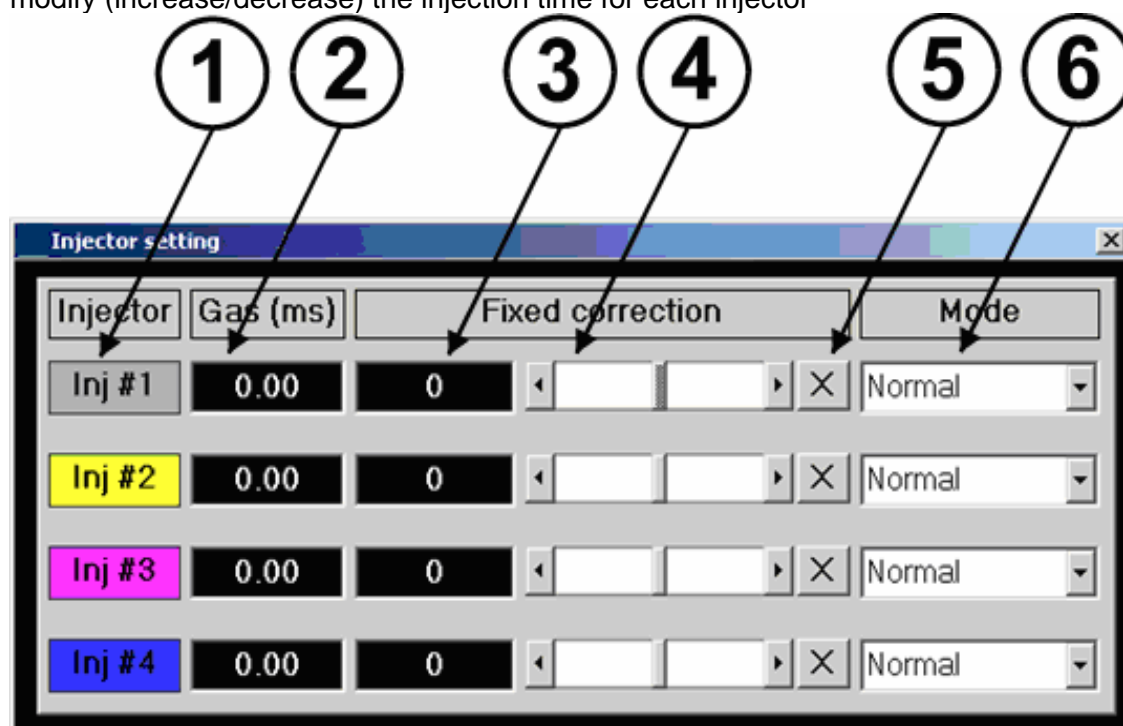- modify (increase/decrease) the injection time for each injector

Fig. 5.1 - 1

1	**Injector** It displays the injector number. The colour that appears it is the same colour of the cylinder wiring.	**----**
2	**Gas** It display the gas injection time.	**If 0 = car feed with petrol**
3	**Correction fix** It displays the correction of the gas injection time made by the bar.	**Milliseconds**

4	**Fix correction adjustment** It allows to modify (increase/decrease) the injection time of each single injector without to consider the relative petrol injection time. Example: to use, only if necessary, to settled different cylinder power request.	*from -4 to +4 ms.* **Default = 0**
5	**Reset correction** It reset automatically the fix correction to "0"	**. . .**
6	**Enable** *Normal* = The gas injection time are realized considering the calibration time more fixed correction. *Bypass* = gas injection time = petrol injection time. The calibration time and corrections are not considered *Disable* = it allows to disable the gas injectors.	*Normal* **(Default)** *Bypass* *Disable*

5.2 Level

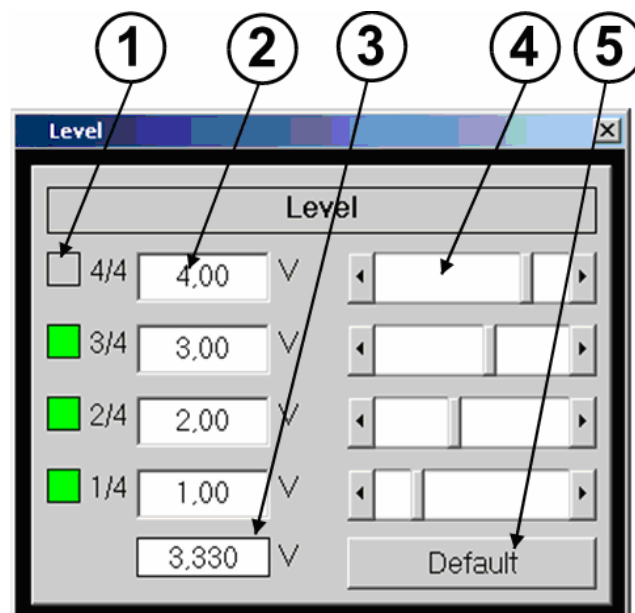It is possible to modify the lpg level sensor step

Fig. 5.2 - 1

1	It displays the reached level.	**Green: level reached.** **Grey: level not reached**
2	Value settled.	*from 0 to 5 Volt*
3	Value in real time of the level sensor. It is possible to change the limit. △ **NOTE:** In case of lpg level sensor different from POWERJET PLUSPLUSlevel sensor, the procedure it is always the same but the value could be different.	*Volt*
4	Point to move the levels	----
5	Reset to default level.	----

6 - Calibration - F5

Before to start it is necessary to verify the following:
- **Drive** the vehicle on **PETROL** for 2-3 KM in order to reach the **working temperature**. **DO NOT HEAT THE CAR** with the vehicle still.
- **Stop** the car and turn off the service, both electrics and mechanics. For example, do not move the steering wheel, turn off the venting and A/C, do not light the lighter, etc.
- Do not heats the engine with a long stop on idle: if necessary, **drive for 2 minutes** on petrol to reach normal temperature value.

The procedure will be automatically stopped when:
1. The engine turns off.
2. The key is turn off;

To start the calibration:
- Select the Calibration folder – F5
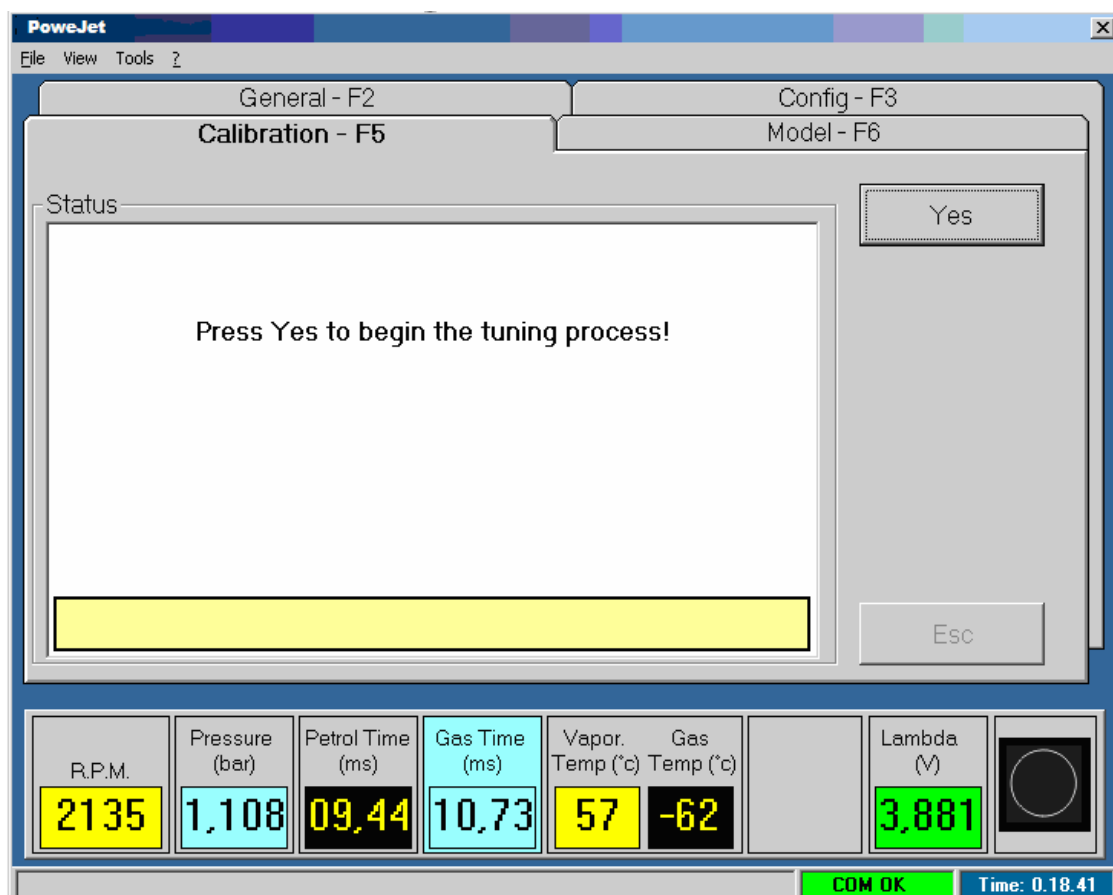- Click Yes
- Follow the instructions on the screen

Fig. 6 - 1

7 - Model - F6

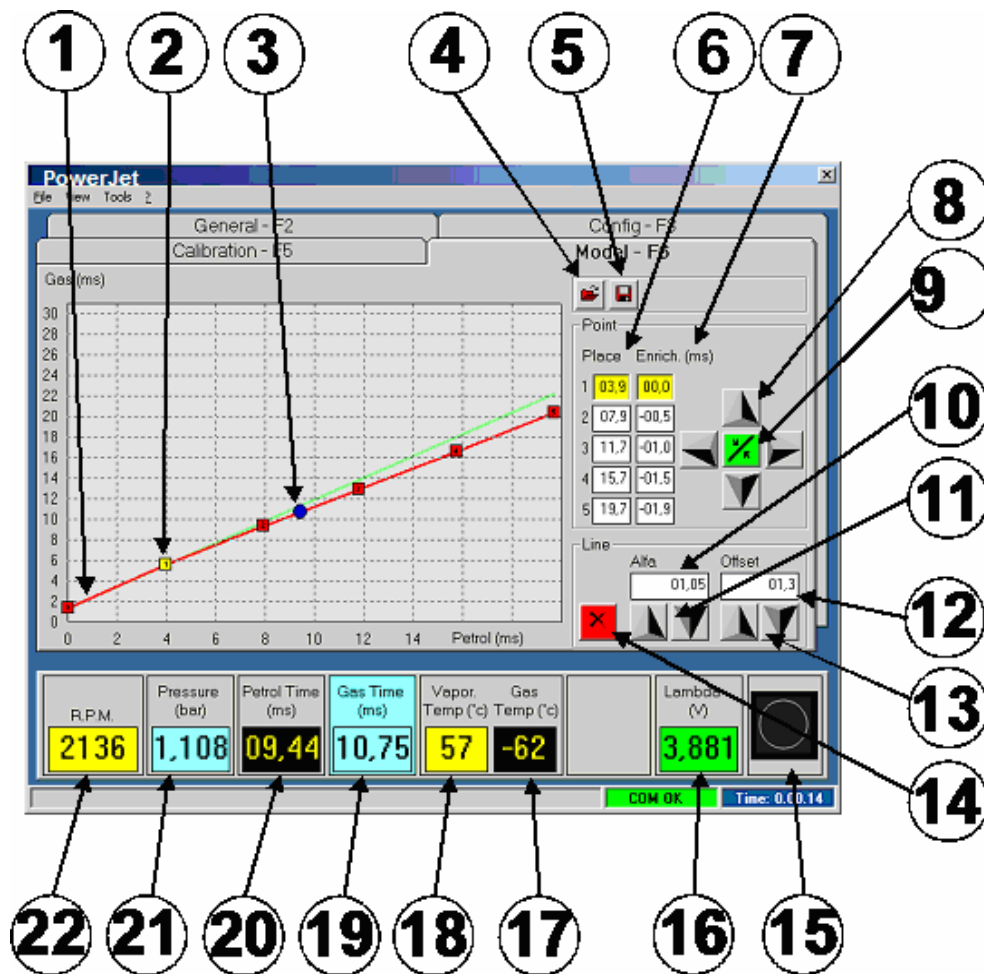Here it is possible to adjust manually the calibration of the system.

Fig. 7 - 1

1	**Calibration line** Relations between petrol injection time (horizontal axis) and gas injection time (vertical axis).
2	**Calibration point** It found a point on the calibration line for a fine car calibration.
3	**Working point** It displays the point where we are during the driving. It is displayed only with engine start and in real time. If the engine stops the point will be at the axis intersection.
4	**Open** It allows to load a saved file.

5	**Save** It save the calibration line together all the calibration parameters in a file *.var. By the SAVE button you can create a folder with all the calibrations that they could be used later for further calibration.		
6	**Calibration points** The calibration line could be splitted in 5 parts delimited in 6 points. 5 of these parts could be moved as preferred. The parts on the horizontal axis could be modify increasing/decreasing the sector. Click on the box to select the point you want to modify. The yellow colour shows that the selected point it could be moved.		
7	**Correction of the calibration point** This column show the corrections made to the calibration points. Click the box to select the point you want to modify. The yellow colour shows that the selected point it could be moved.		
8	**Positioning of the calibration point** These buttons allows to modify the position of the points The arrows **right – left** allows the horizontal moving, so to modify the petrol injection time. The arrows **high – down** allows a vertical moving, increasing or decreasing the gas injection time.		
9	**Reset** Green button, it reset all the settled modification on the single points. All the points will return on the green reference line.		
10 11	**Alpha** It shows the actual alpha value, it means the slope of the line. The arrows allows to modify the alpha value (see chap. 7.1)	**1 = default**	
12 13	**Offset increaser decrease all the line** It shows the actual offset value in the calibration line. The arrows allows to modify the offset value (see chap. 7.1)	**0 = default**	
14	**Reset line** It reset all the modifications. The line comes back to the default position.	**Default Offset= 0, Alfa = 1**	
15	**Software switch** It exactly replies the functions of the real electronic switch. It is active to select the switch of fuel.		
16	**Lambda tension** Numeric volt visualization of the lambda tension. The visualization is slow because is filtered.	**volt**	
17	**Gas temperature** Temperature of the rail injectors.	**'- 62' = Not connected**	
18	**Reducer temperature (optional)** Temperature of the reducer	**'- 62' = Not connected**	
19	**Gas time** It display by numbers and graphics the gas inject. time.	**Milliseconds**	

20	**Petrol time** It display by numbers and graphics the petrol injection time.	**Milliseconds**
21	**Pressure (optional)** It display the pressure regulator (only when connected the optional pressure sensor)	**'---' = Not connected or end gas function not activated**
22	**R.P.M.** It display the RPM	**RPM**

7.1 Calibration line - offset & alfa

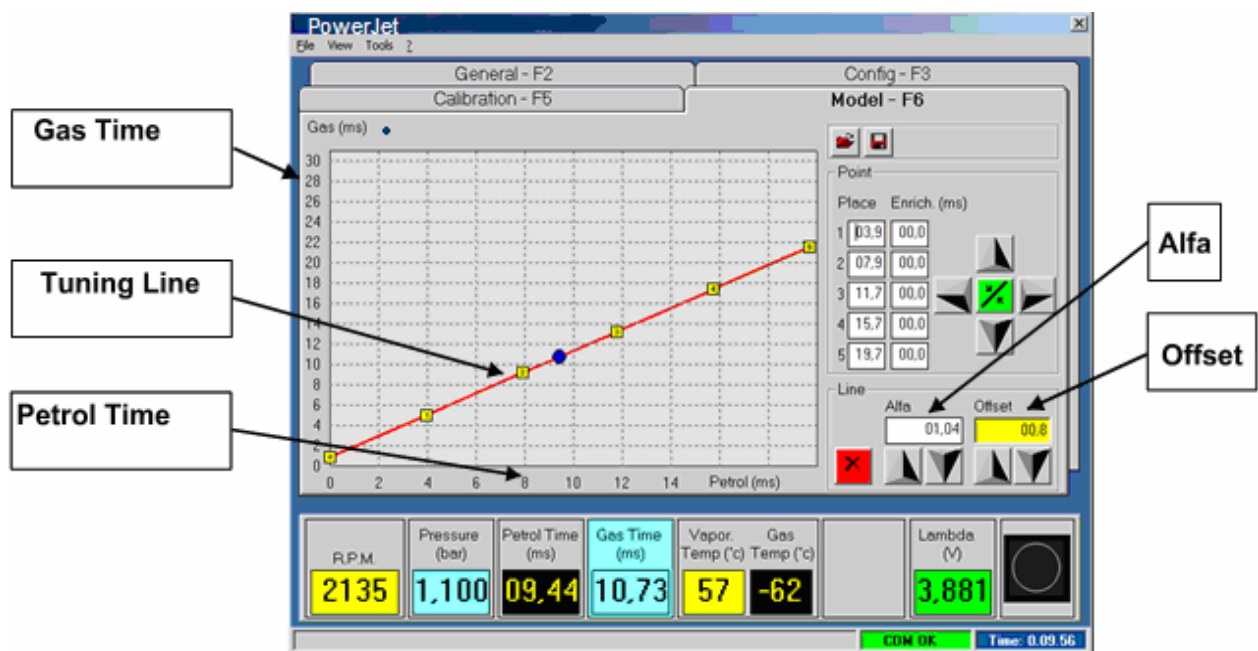In order to use these instruments it is necessary to understand the working philosophy of the gas injectors.
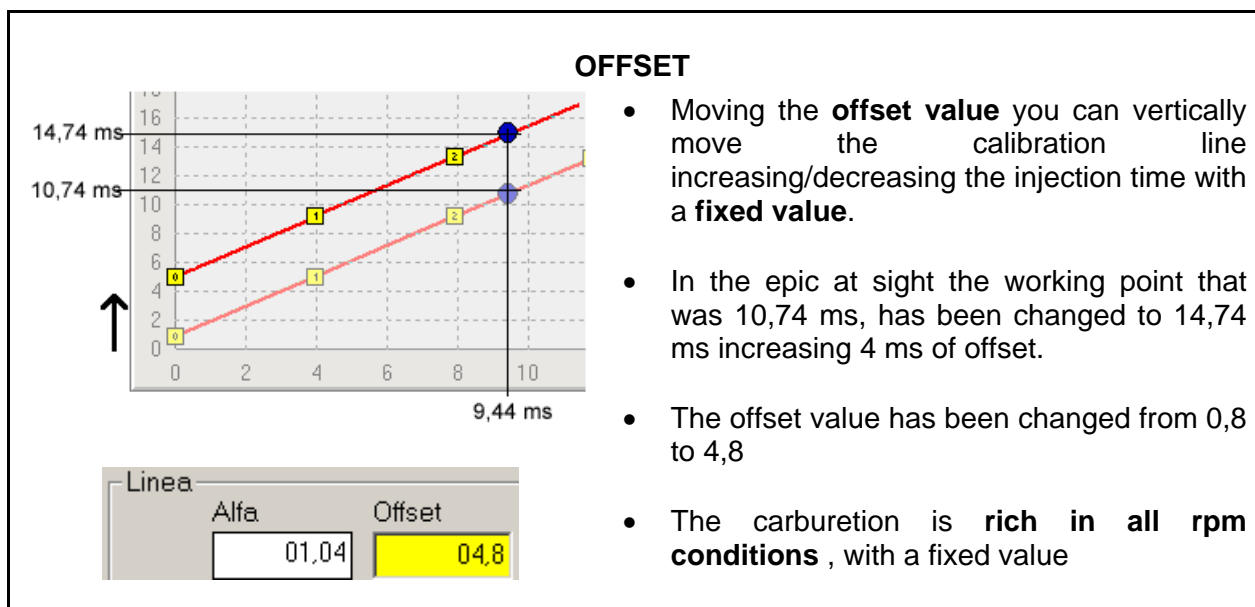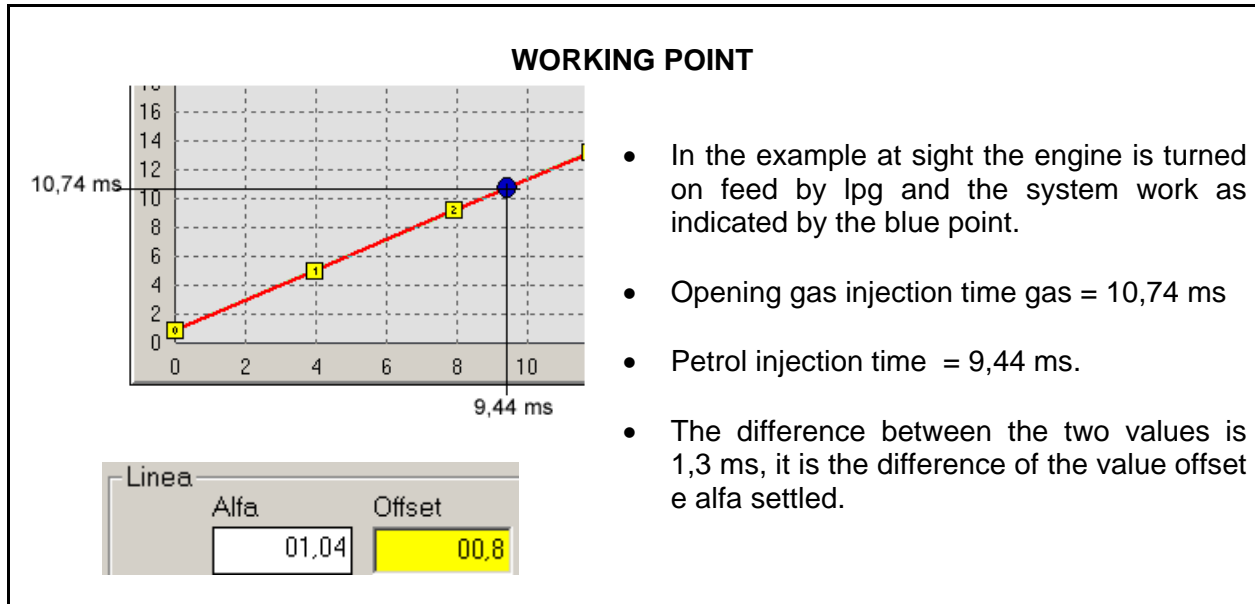

Fig. 7 - 2

The calibration line (pic 7-2) shows the relation between petrol injection time (horizontal axes) and gas injection time (vertical axes).
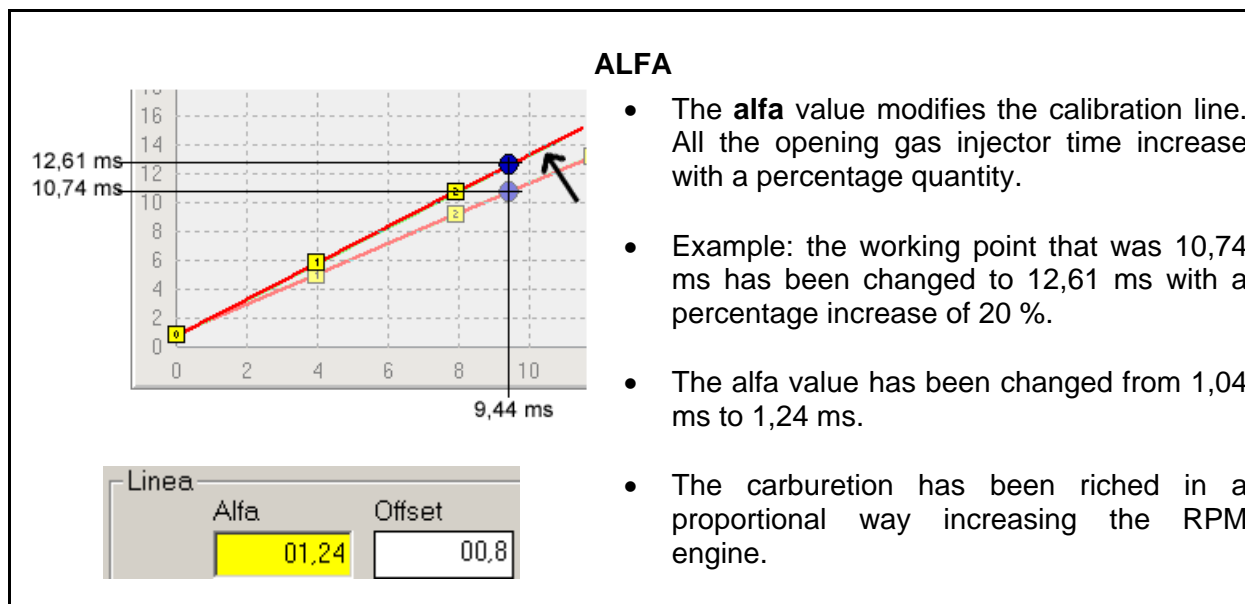Through this line it is possible to calibrate the opening time of the gas injectors respecting the petrol injection time.
The main parameters to settle the calibration line are: alpha and offset.

- **OFFSET:** It specify the origin of the line, it means the vertical position of the point 0.
- **ALFA:** It specifies the inclination of the line.

EXEMPLES:

WORKING POINT

- In the example at sight the engine is turned on feed by lpg and the system work as indicated by the blue point.

- Opening gas injection time gas = 10,74 ms

- Petrol injection time = 9,44 ms.

- The difference between the two values is 1,3 ms, it is the difference of the value offset e alfa settled.

OFFSET

- Moving the **offset value** you can vertically move the calibration line increasing/decreasing the injection time with a **fixed value**.

- In the epic at sight the working point that was 10,74 ms, has been changed to 14,74 ms increasing 4 ms of offset.

- The offset value has been changed from 0,8 to 4,8

- The carburetion is **rich in all rpm conditions** , with a fixed value

ALFA

- The **alfa** value modifies the calibration line. All the opening gas injector time increase with a percentage quantity.

- Example: the working point that was 10,74 ms has been changed to 12,61 ms with a percentage increase of 20 %.

- The alfa value has been changed from 1,04 ms to 1,24 ms.

- The carburetion has been riched in a proportional way increasing the RPM engine.

7.2 When use offset and when use alfa

Engine on idle	Engine in power	Action
CARBURATION POOR	CARBURATION POOR	INCREASE OFFSET
CARBURATION RICH	CARBURATION RICH	DECREASE OFFSET
OK	CARBURATION POOR	INCREASE ALFA
OK	CARBURATION RICH	DECREASE ALFA

△ **NOTE***:*
- With **offset > 4** increase the injectors size or check the right working pressure of the gas system.
- With **alfa > 1,3** increase the injectors size or check the right working pressure of the gas system.
- With **alfa < 0.8** decrease the injectors size.

10 - Map – F7
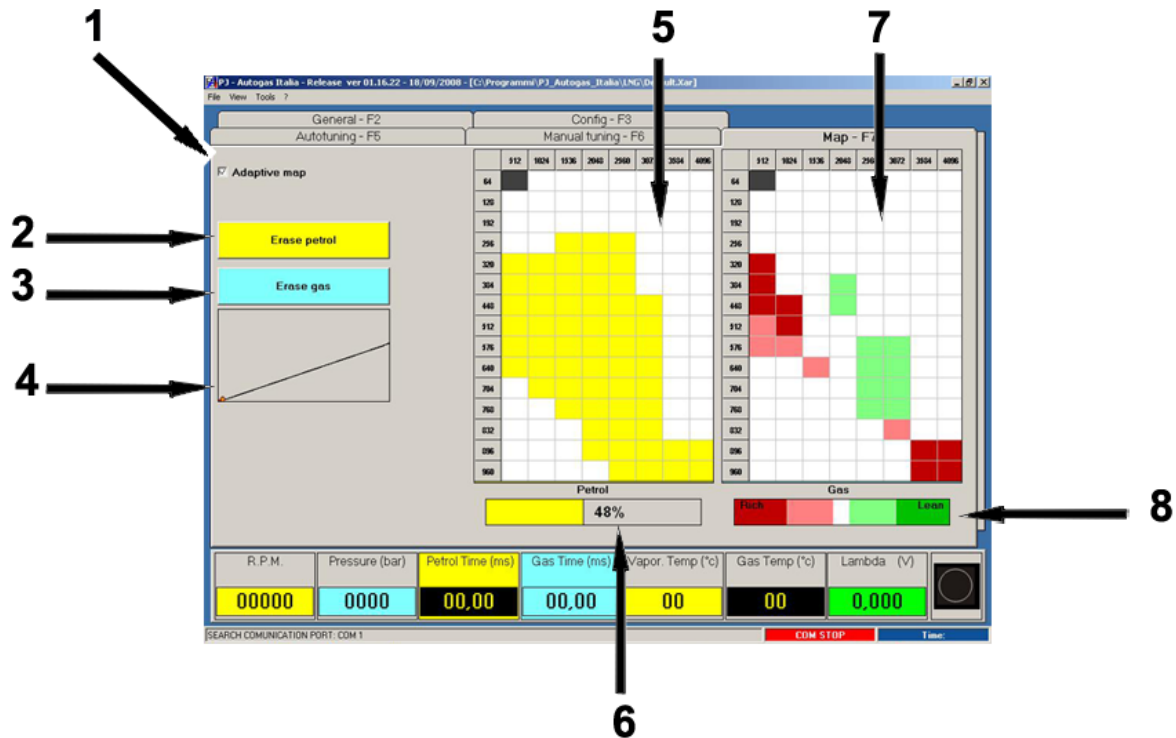
1) Adaptive map:
Selecting the adaptive map will be activated. The system consists of two maps: one petrol map and one gas map. The data are achieved during the petrol driving creating an independent gasoline map. Subsequently, these data are used and processed during the operation to gas, creating a second map which corrects automatically follow the style of driving of the driver and keeping stable the fuel mixture over time.

2) Erase petrol:
Erase the map achieved during the petrol driving.

3) Erase gas:
Erase the map correction achieved during the gas driving.

4) Status:
Shows the line of fuel mixture (carburation), indicating the intervention of adaptive map.

5) Petrol map:
With yellow colour part of the map acquired during the gas driving.

6) State bar:
Petrol map loading condition.

7) Gas map:
Indicates that part of the map acquired during gas driving.

8) Legend:
Indication of the "correction" made by the electronic control unit.
Red - correction status (rich muxture).
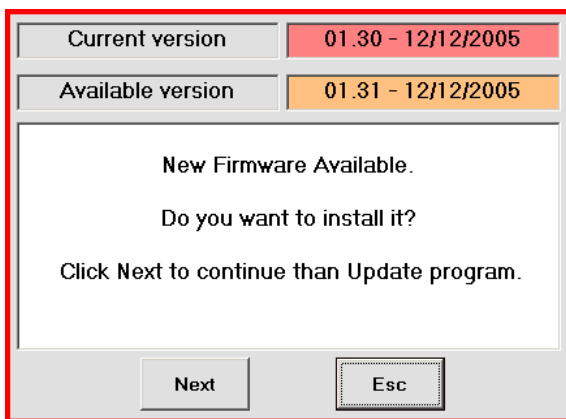Green – correction status (poor mixture).
White – Any correction has been done.

9 – UPDATE and software compatibility

When connected, a compatibility test between software and firmware could display an update software.

9.1 Automatic firmware update

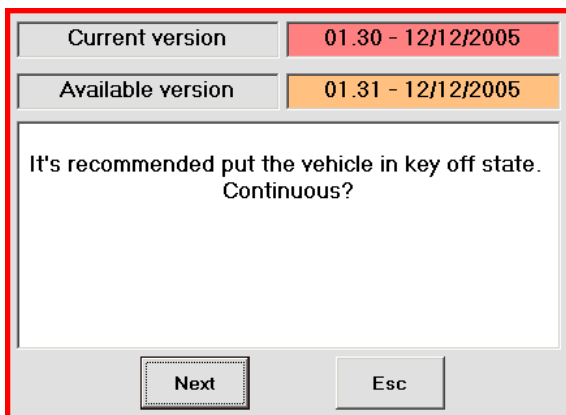If an update it is required, the following window will appear:

Current version	01.30 - 12/12/2005
Available version	01.31 - 12/12/2005

New Firmware Available.

Do you want to install it?

Click Next to continue than Update program.

Next   Esc

The window shows that it is necessary to update the ecu firmware.

The first row shows the version present in the ecu.
The second row shows the version available.

Click **"Next"** to go on.
Click **"Esc"** to stop the procedure; the programme will be closed.

Current version	01.30 - 12/12/2005
Available version	01.31 - 12/12/2005

It's recommended put the vehicle in key off state. Continuous?

Next   Esc

The window shows that it is not possible to complete the update because the car key is turned on. Turn off the key and click **Next** to continue.
Click **"Esc"** to stop the procedure.

Current version	01.30 - 12/12/2005
Available version	01.31 - 12/12/2005

It is strongly recommended that keep the ecu fed during the programming.

Any action could compromise the device!

Click Next to continue than Update program.

Next   Esc
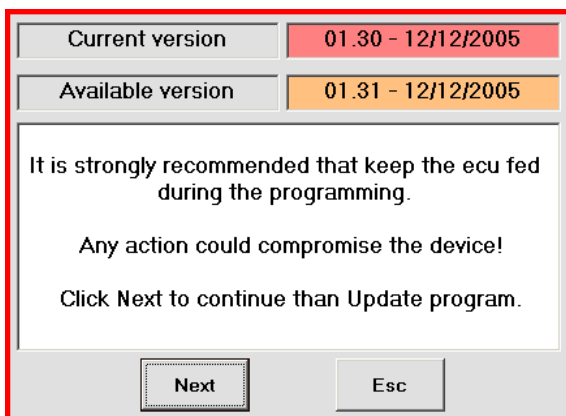
Warning message:
- *Do not disconnect the ecu during the update.*
- *Disable screensaver*
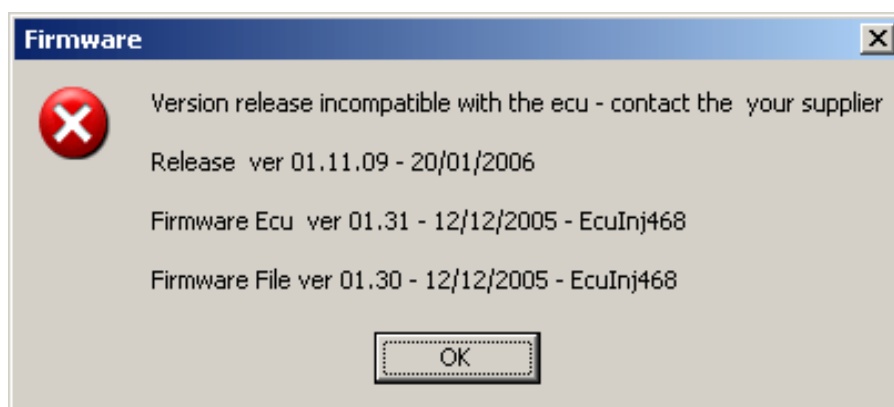- *Check the battery level status of the PC.*
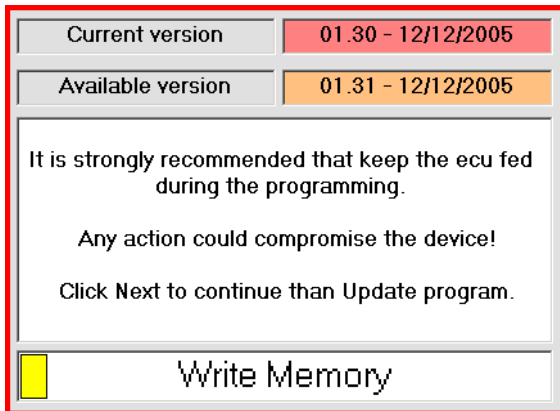
Warning message during the procedure.
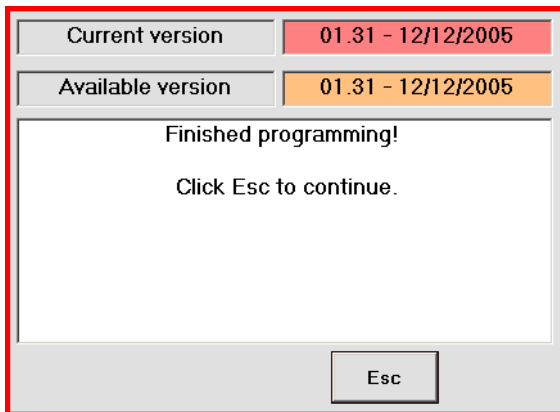
Final message when procedure terminated.

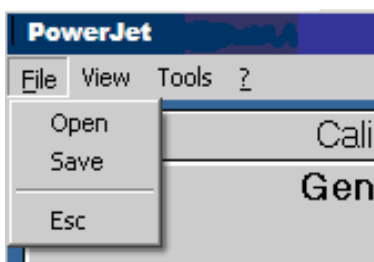### 9.2 Incompatibility of the firmware

This window appears when the PC software it is not compatible with the ECU software. Contact your dealer for an updated version.

△ **NOTE:** It is always better to use latest version of the software available.
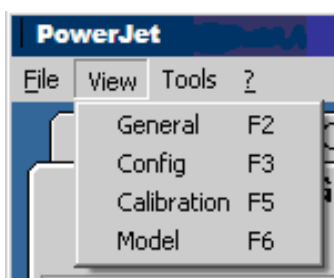
10 – Bar menu
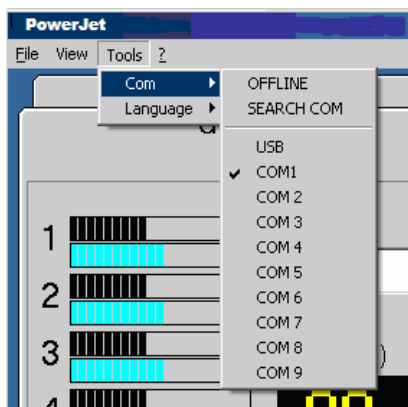
Bar menu, we found the following:

- **FILE**

- **Open:** download a saved file.
- **Save:** it save the car configuration
- **Exit:** close the program.
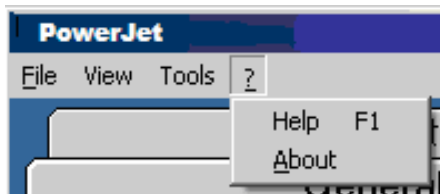
- **VISUALIZZA**

- Select the windows of the software

- **STRUMENTI**

- **Com** selects the mode and COM port.
  - **OFFLINE:** To work without to be connected to the ecu.
  - **SEARCH COM:** automatic searching COM port
  - **USB**: not available. Use adapter
  - **COM1-9** select one COM port for serial interface.
- **Language** selection of the language.

▪ **About**

Product Information. The window it is displayed below.

Fig. 9.4 - 1

These information needs to the technical Assistance dep't.