

LGC 720

Fitting Instructions

A AUTOGAS
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PC SERIAL INTERFACE FOR LAMBDA GAS CONTROL LGC-720

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1- INTRODUCTION

AUTOGAS ITALIA SRL thank you for having selected this product: the PC SERIAL INTERFACE - is the control device for Personal Computer designed for the "Lambda Control System LGC 720" central unit.

This product allows to control the different working parameters of the Control Unit and to save the data of the converted vehicles: it represents the most professional and technologically-advanced way to convert a vehicle and to verify the results in the long period too.

With this disposal the accurate control of the emissions and performances (according to laws), it's easy and economical as never before.

The use of AGI-PRO program needs a PC with not many hardware resources and a Windows operative system (3.1x, 95/98 or ME). The step by step instructions, an easy and intuitive display, make this product modern and for everyone.

The use of AGI-PRO program will let you to:

- Setup the LGC-720 central unit;
- Reset the LGC-720 central unit to the default values;
- Save and load the data from the database;
- Display all the parameters and modify them one by one;
- Display the state of the signals used working with petrol or with LPG/CNG.

In the following paragraphs has been explained step by step how to work and interact with the central unit using AGI-PRO program.



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2- AGI - PRO PROGRAM SETUP

The AGI-PRO program setup requires the following resources:

- PC with at least :
 - Processor 486 o superior - 8 Mb Ram - 1 Mb HD - Floppy 1/4" ;
 - Windows Operative System 3.1x or superior; it is preferred Windows 98 operative system;
 - Video resolution minimum: 640x480;
- Kit 'SERIAL LINK' that includes:
 - 1 Serial Interface
 - 1 CD-ROM PROGRAM
 - 1 Floppy KEY
 - 1 Instructions manual (CD)

To install the program on your hard disk, please proceed as follow indicated:

Windows 95/98/ME:

- Start up the computer;
- choose Run from the Start menu;
- BROWSE
- FLOPPY 3,5
- Select SETUP.EXE
- OK

The installation program "AGI-PRO SETUP" is now starting: you have to answer :
→ INSTALL to the question: "Setup Installation Paths"

At the end of the installation program, will be shown a new group **AGI-PRO** in the folder PROGRAMS of the Start menu.

A new directory called C:\AMON will be created on your hard disk.

Windows 3.1x:

- Start-up the computer and start-up Windows 3.1x
- choose RUN in the FILE menu
- BROWSE
- Select A: in the File Manager
- Select SETUP.EXE
- OK to confirm the menu BROWSE
- OK to confirm the menu' RUN

The installation program "AGI-PRO SETUP" is now starting: you have to answer :
→ INSTALL to the question: "Setup Installation Paths"

At the end of the installation program, will be shown a new group **AGI-PRO** in the folder PROGRAM MANAGER.

A new directory called C:\AMON will be created on your hard disk.

3- AGI-PRO PROGRAM USE

3.1- Interface Link

The Interface Link is very simple: the 4th pole connector has to be connected with the connector that comes from cable's cap of LGC-720 unit; the serial connector RS232 has to be connected to the serial port COM1 (or COM2, COM3, COM4 in relation to the availability) of the computer.

This operation must be done with central unit NOT powered and with the PC turned off.

3.2- How to start AGI-PRO program

To start the program (**Windows 3.1x**):

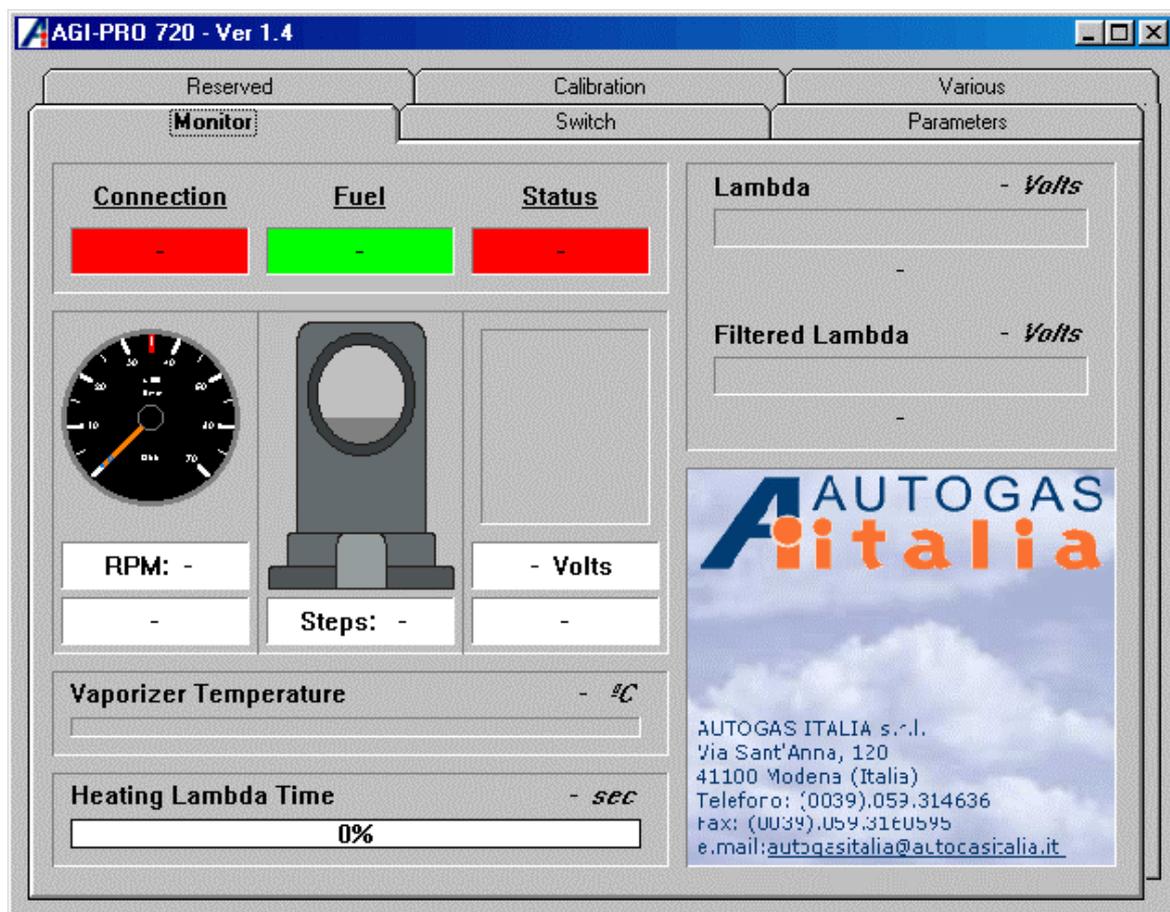
- Start-up the PC in Windows 3.1x mode
- Insert the floppy "KEY"
- From the Menu PROGRAM MANAGER select:
 - AGI-PRO (open the group)
 - AGI-PRO (start the program)

To start the program (**Windows 95/98/ME**):

- Start-up the PC
- Insert the floppy KEY

- From the START menu choose:
 - PROGRAMS
 - AGI-PRO (a window will be opened)
 - AGI-PRO again.

In the monitor will appear the main page of the program as shown below (if LGC-720 unit is disconnected):



This is the main page: we suggest you to study this page and to become friendly with the descriptions and with the commands

Typed in bold are indicated the PAGES: click with the mouse on the NAME of the pages let you enter into the PAGES (and to pass from one page to another page).



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3.2.1 – The page MONITOR

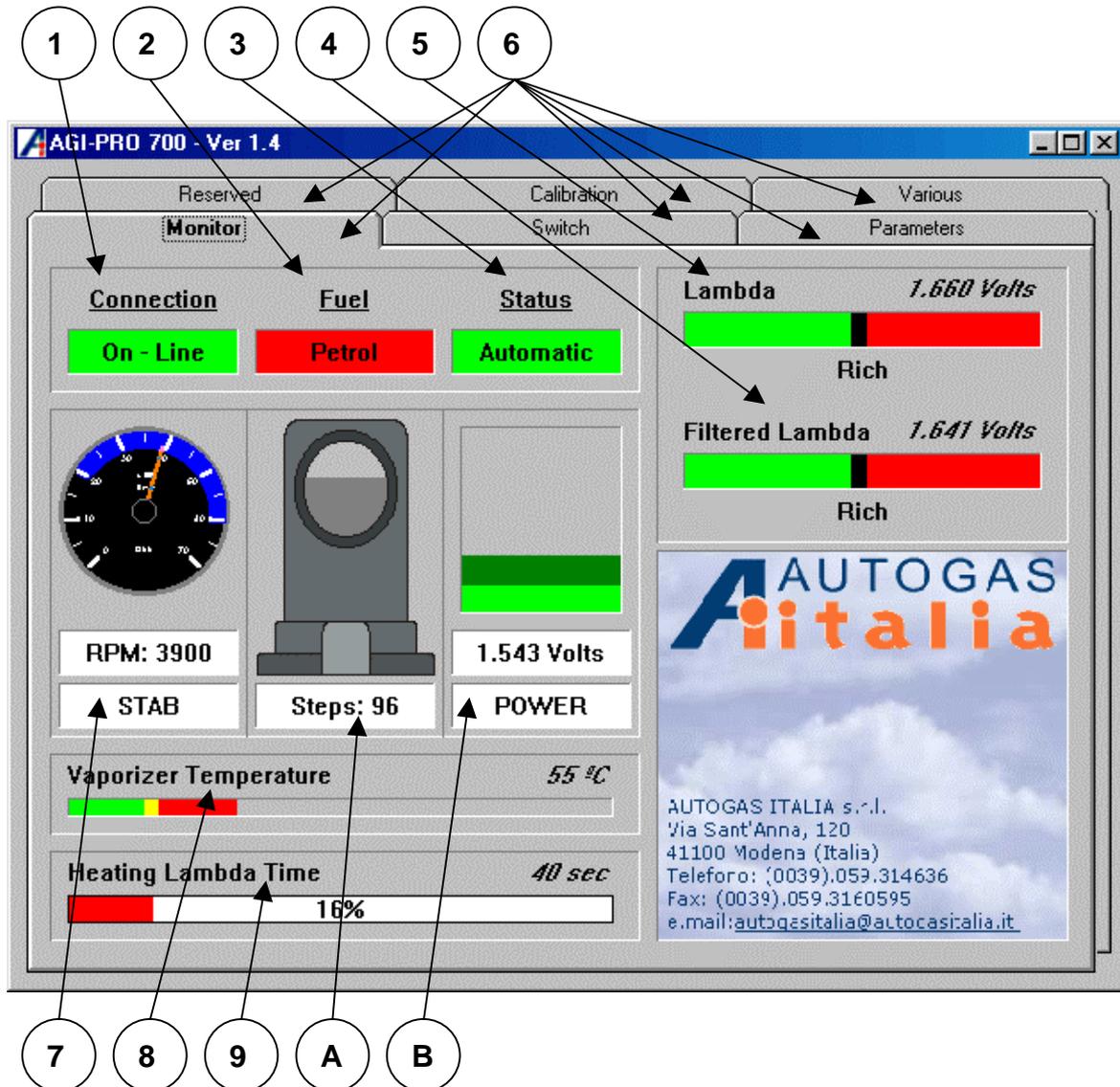
The page indicated in the previous paragraph will appear in the case that LGC-720 unit **IS NOT** powered when the AGI-PRO program starts.
The options indicated in these folders are not active in these conditions.

When is activated, the page MONITOR let you to display all the significant data on which LGC-720 unit works in real time to verify the correct calibration of the central unit and of the vaporizer. Any modifications of the parameters (see paragraphs at the pages PARAMETERS and SWITCH), are immediately stored in the central unit; you can check the modifications with the page MONITOR.

Below it is shown a page that represent an operative situation; **the images shown in these paragraphs are only for example and do not represent all the situations that you can meet using the program.**

To activate the link with the central unit, you must TURN ON the key.

WARNING: *if you start the program with the central unit LGC-720 powered, you must turn off and turn on again the key to let the program know the presence of LGC-720.*



1	<p><u>CONNECTION</u></p> <p>It displays the state of the connection between PC and central unit LGC-720 as follow:</p> <p>ON-LINE: central unit connected (background GREEN) OFF-LINE: central unit not connected (background RED)</p> <p><i>Note: in order to activate the connection turn on the key; if you start the program with the central unit LGC-720 powered, you must turn off and turn on again the key to let the program know the presence of LGC-720.</i></p>
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2	<p><u>FUEL</u></p> <p>It displays the fuel which supplies the engine as follow: PETROL: the engine works with petrol (background RED) GAS: the engine works with LPG/CNG (background BLUE)</p>
3	<p><u>STATUS</u></p> <p>It displays the state of the switch in the follow cases: AUTOMATIC: prepared to change automatically (background GREEN) FUEL: prepared for fuel working (background RED) EMERGENCY: prepared for CNG/LPG starting (background DARK BLUE)</p>
4	<p><u>FILTERED LAMBDA</u></p> <p>It shows the filtered value (average) of lambda sensor and it is useful to control the trend of the mixture (RICH or LEAN) during LGC-720 working. It is also useful to obtain carburation near LAMBDA=1. It is displayed in two different ways:</p> <ul style="list-style-type: none"> - VALUE indicated in Volt (at the right top over the graphic bar) - COLOURED GRAPHIC BAR: <ul style="list-style-type: none"> GREEN: mixture type LEAN RED: mixture type RICH BLACK: ideal mixture type <p>The inscription under the bar change from RICH to LEAN according to collect data.</p>
5	<p><u>LAMBDA</u></p> <p>This is the PRESENT value, the real value STEP by STEP, of lambda Sensor. It is displayed in two different ways:</p> <ul style="list-style-type: none"> - VALUE indicated in Volt (at the right top over the graphic bar) - COLOURED GRAPHIC BAR: <ul style="list-style-type: none"> GREEN: mixture type LEAN RED: mixture type RICH BLACK: ideal mixture type <p>The inscription under the bar change from RICH to LEAN according to collect data.</p>

6	<p><u>PAGES SELECTION</u></p> <p>Click with the mouse on the name of the page, you can select one of the six pages below indicated:</p> <ul style="list-style-type: none"> - MONITOR - SWITCH - PARAMETERS - CALIBRATION - VARIOUS - RESERVED <p>The access to the page RESERVED permits to enter and change some 'delicate' parameters: it is necessary an activation code, that must be requested directly to Autogas Italias.r.l. – Italy.</p>
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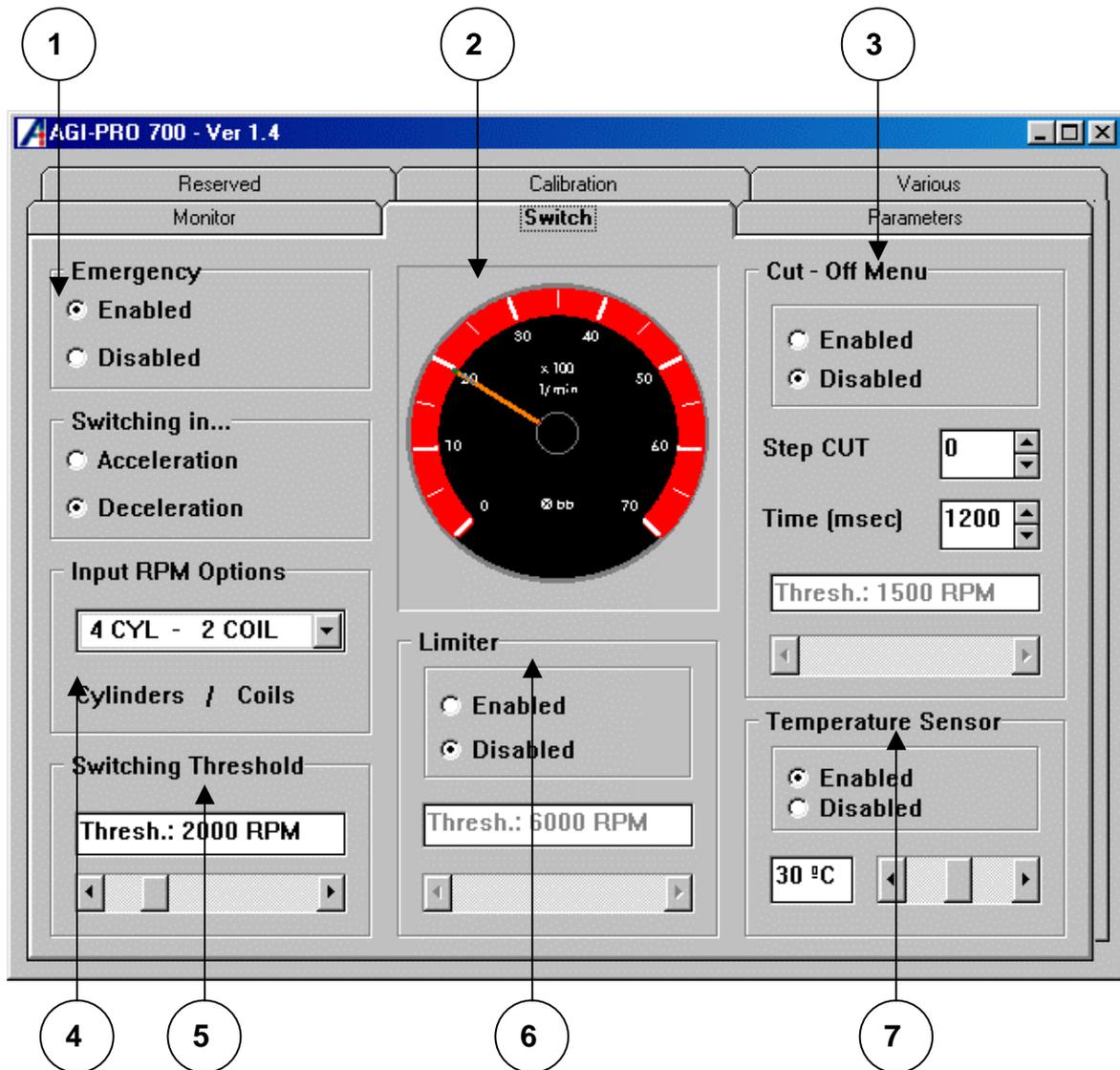
7	<p><u>RPM</u></p> <p>This is the PRESENT value, the real value STEP by STEP of the engine rpm. It is displayed in three different ways:</p> <ul style="list-style-type: none"> - VALUE expresses in rpm - STATUS <ul style="list-style-type: none"> ACC: engine in acceleration DEC: engine in deceleration STAB: rpm steady CUT-OFF: cut-off (if enabled) - REV COUNTER in graphic form; the pointer represents a rev counter. <p><i>Note: the graphic rev counter has a blue band; the beginning of the blue band indicates the switch threshold from Petrol to LPG/CNG; the rpm limiter starts at the end of the blue band. During the cut-off the blue band become red and shows the parameters and the cut-off status.</i></p>
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8	<p><u>VAPORIZER TEMPERATURE</u></p> <p>This is the PRESENT value, the real value STEP by STEP of the vaporizer temperature (if enabled); <u>if the temperature is not active, there is not any indication.</u></p> <p>It is displayed in two different ways:</p> <ul style="list-style-type: none"> - VALUE expressed in centigrade degrees - COLOURED GRAPHIC BAR: <ul style="list-style-type: none"> GREEN: the vaporizer is cold (switch not permitted) YELLOW: the vaporizer is near the right temperature (switch not permitted) RED: the vaporizer is at the right temperature (switch permitted)
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9	<p><u>HEATING LAMBDA TIME</u></p> <p>This is the PRESENT value, the real value STEP by STEP, of the elapsed time when the key has been turned on. During this time LGC-720 do not control the mixture AIR/LPG(CNG). It is displayed in two different ways:</p> <ul style="list-style-type: none"> - VALUE expressed in remaining seconds <p>COLOURED GRAPHIC BAR: WHITE/RED: the Bar from white become red in relation to the elapsed time. When the time is finished the Bar become green.</p>
A	<p><u>STEPS</u></p> <p>This is the PRESENT value, the real value STEP by STEP, of the position expressed step of the Step Motor. If the numbers increase, increases also the afflux of LPG/CNG; if the numbers decrease, decreases also the afflux of LPG/CNG. It is displayed in two different ways:</p> <ul style="list-style-type: none"> - VALUE expressed in steps - GRAPHIC: the section of the Step Motor change in relation to the steps.
B	<p><u>TPS</u></p> <p>This scale shows the PRESENT value, the real value STEP by STEP, of TPS position. There are three different indications:</p> <ul style="list-style-type: none"> - VALUE expressed in Volt <p>COLOURED GRAPHIC BAR: LIGHT GREEN under the threshold (IDLE) DARK GREEN over the threshold (POWER)</p> <ul style="list-style-type: none"> - STATUS: IDLE under the threshold POWER over the threshold

3.2.2 – Page SWITCH

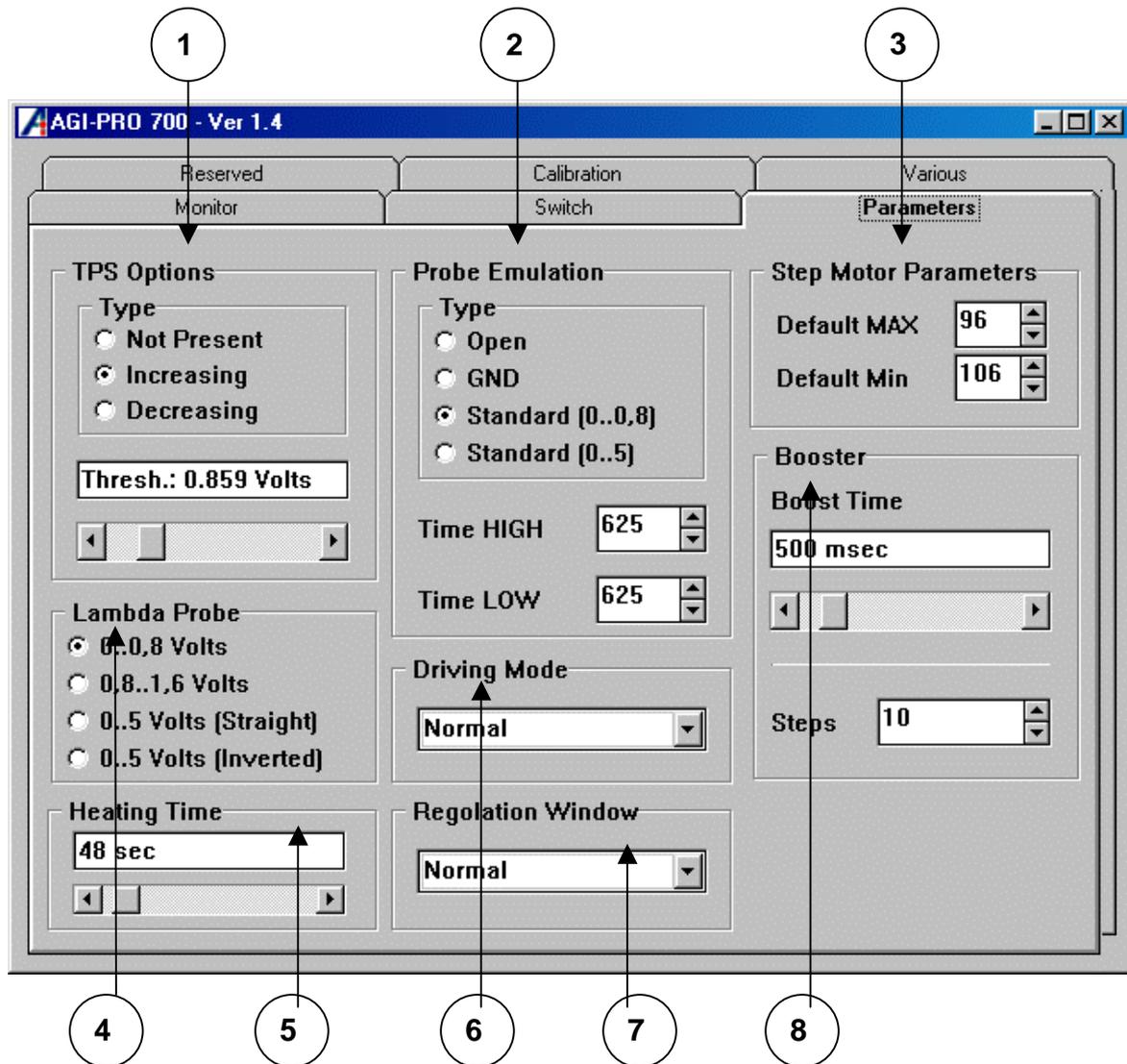
In the page SWITCH it is possible to modify all the parameters of the switching from petrol to LPG/CNG and to set-up the CUT-OFF.



0	<u>SWITCH POSITIONS</u> Position I: the vehicle run with petrol and the yellow LED is switched off. Position II: the vehicle run with gas, with petrol starting. The yellow LED blink till the switch to gas. Posizione 0: gas emergency starting; yellow LED with fixed light. BEWARE: The LEDs of the electronic switch remain switched on, during the petrol running in order to check the level of the gas in the tank.
1	<u>SWITCHING (DIRECTION)</u> Allows to select the type of switching from petrol to LPG/CNG: ACCELERATION: switching in acceleration DECELERATION: switching in deceleration
2	<u>RPM INDICATOR</u> Permits to check the status of the parameters of this page (IT DOES NOT INDICATE THE PRESENT RPM). POINTER: the position shows the switching threshold from petrol to LPG/CNG RED BAND (counterclockwise limit): indicates the rpm under which the cut-off it's removed (if enabled) RED BAND (clockwise limit): indicates the rpm over which the rpm limiter starts (if enabled)
3	<u>CUT-OFF MENU</u> Permits to enable or to disable the cut-off and the relative parameters. DISABLED: disables the cut-off function ENABLED: enables the cut-off function according to the following parameters: - STEP CUT number of closing step in relation to the actual position. - TIME (msec) elapsed time before cut-off intervention - THRESHOLD move the bar to change the threshold under which the cut-off is removed.
4	<u>INPUT RPM OPTIONS</u> Permits to change the reading of rpm selecting the correct combination of cylinders and coils in relation to the output signal. This operation is usually automatically executed during the calibration session. If you want to change the value, please read the following instructions: click on the down-arrow to make the menu appear with all the combinations and select the right combination for the transformed vehicle.

5	<p><u>SWITCHING THRESHOLD</u></p> <p>Permits to change the setup switching threshold from petrol to LPG/CNG.</p> <p>In case of changing of the setup switching threshold, proceed as indicated in the following instructions: click with the mouse on the bar to increase or decrease the threshold. The value on the bar and on the rev counter pointer (which indicates the threshold) are updated.</p>
6	<p><u>LIMITER</u></p> <p>Permits to enable or to disable the rpm limiter; if rpm limiter is enabled and the rpm threshold is overcome, the fuel supply change to petrol automatically.</p> <p>ENABLED: disables the rpm limiter function.</p> <p>DISABLED: enables the rpm limiter function according to the following parameter:</p> <ul style="list-style-type: none">- THRESHOLD move the bar in order to modify the rpm threshold over which the limiter works; the indication on the bar is updated; the clockwise limit of the red band is updated.
7	<p><u>TEMPERATURE SENSOR</u></p> <p>Permits to enable or to disable the temperature sensor of the vaporizer; if it's enabled the automatic switching from petrol to LPG/CNG do not have place until the overcoming of the setup temperature.</p> <p>DISABLED: disables the temperature sensor</p> <p>ENABLED: enables the temperature sensor according to the following parameter:</p> <ul style="list-style-type: none">- THRESHOLD move the bar to modify the temperature threshold over which the switching is allowed.

3.2.3 – Page PARAMETERS

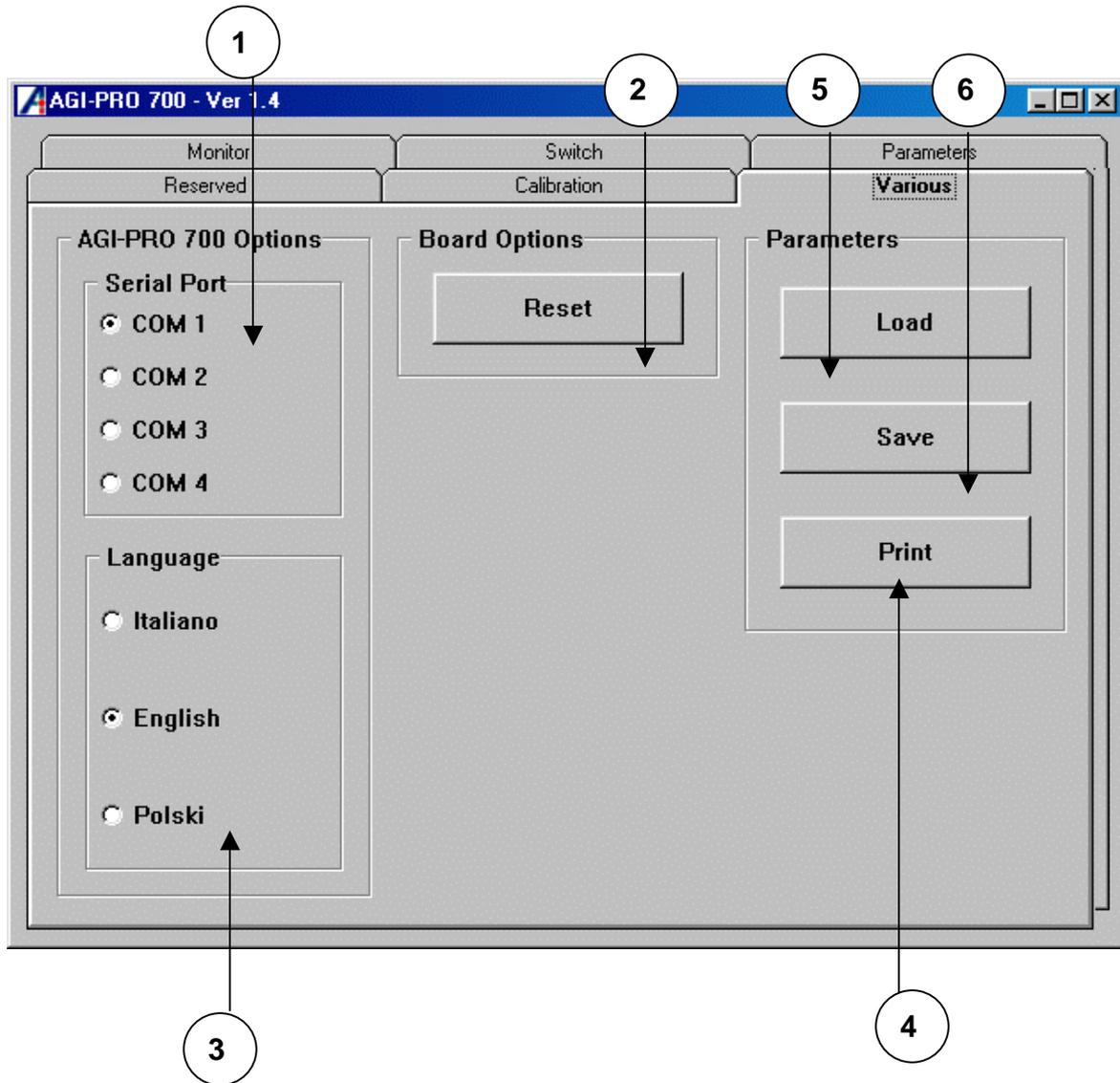


1	<p><u>TPS OPTIONS</u></p> <p>The PARAMETERS are automatically setup during the calibration and may be manually forced. Possible values: min 0, max 5 Volts.</p> <p>Permits to set the TPS parameters: there are 3 possible options and the threshold adjustment of IDLE and POWER. NOT PRESENT: in case of TPS not present or not captured by the calibration procedure. INCREASING: select with increasing TPS signal (the signal increases pushing the accelerator) DECREASING: select with decreasing TPS signal (the signal decreases pushing the accelerator)</p> <p>In case of changing of the set-up IDLE and POWER threshold, proceed as indicates in the following instructions: click with the mouse on the bar to increase or decrease the threshold; the value on the bar, in Volts, indicates that the threshold is updated.</p>
2	<p><u>PROBE EMULATION</u></p> <p>The PARAMETERS are automatically set-up during the calibration and may be manually forced. Permits to set the kind of lambda probe emulation.</p> <p>TYPE:</p> <ul style="list-style-type: none"> - OPEN open emulation (recovery) - GND ground emulation (Bosch) - Standard [0..0,8] square wave between 0 and 0,8V built with TIME HIGH and TIME LOW - Standard [0..5] square wave between 0 and 5V built with TIME HIGH and TIME LOW <p>TIME HIGH time in msec for standard emulation TIME LOW time in msec for standard emulation</p>

3	<p><u>STEP-MOTOR PARAMETERS</u></p> <p>The PARAMETERS are automatically set-up during the calibration and may be manually forced. Possible Values: min 0, max 200 step Permits to set the IDLE and POWER reference values. DEFAULT MAX click with the mouse on the arrows at the side of the cell, it is possible to change the POWER reference value. DEFAULT MIN click with the mouse on the arrows at the side of the cell, it is possible to change the IDLE reference value.</p> <p><i>Note: it is well-recommended not to modify these values. In case of changes, verify that the difference between the values is not higher than 10 steps</i></p>
4	<p><u>LAMBDA PROBE</u></p> <p>The PARAMETERS are automatically set-up during the calibration and may be manually forced. Permits to set the model of lambda probe.</p> <p>MODEL:</p> <ul style="list-style-type: none">- 0..0,8 V probe model 0..0,8 V- 0,8..1,6 V probe model 0,8..1,6 V- 0..5 V probe model 0..5 V (straight)- 0..5 V probe model 0..5 V (inverted)
5	<p><u>HEATING TIME</u></p> <p>Permits to change the preset lambda probe heating time. It is the time required for the heating of Lambda Probe, during which the central unit does not regulate: the Step Motor go to RESET MAX position, waiting "to connect" to Lambda Probe and to start the control. The kind of vehicle or the external temperature may influence the choices for this parameter.</p> <p>If you change the set-up values, proceed as indicated in the following instructions: click with the mouse on the bar to increase or decrease the time. The value on the bar is updated.</p>

6	<u>DRIVING MODE</u> Selection of the threshold RICH-LEAN . There are three different choices: ECO, NORMAL, SPORT. The best-performance choice will have influence on the kilometric output, but not on the overcoming of the emission's limits. The SPORT choice is recommended for automatic speed-gear.
7	<u>REGULATION WINDOW</u> Permits to modify the range of operation of the central-unit, over which works in "open-loop". Three different choice: SMALL, NORMAL, WIDE. These options may help to compensate between TPS group and mixer or between mixer and suction valves. As far as they are, as the window must be "wider".
8	<u>BOOSTER</u> Permits to modify the Booster parameters. Booster function increases the number of the STEPS (which is added to the DEFAULT MAX position) indicated for the set BOOST TIME.

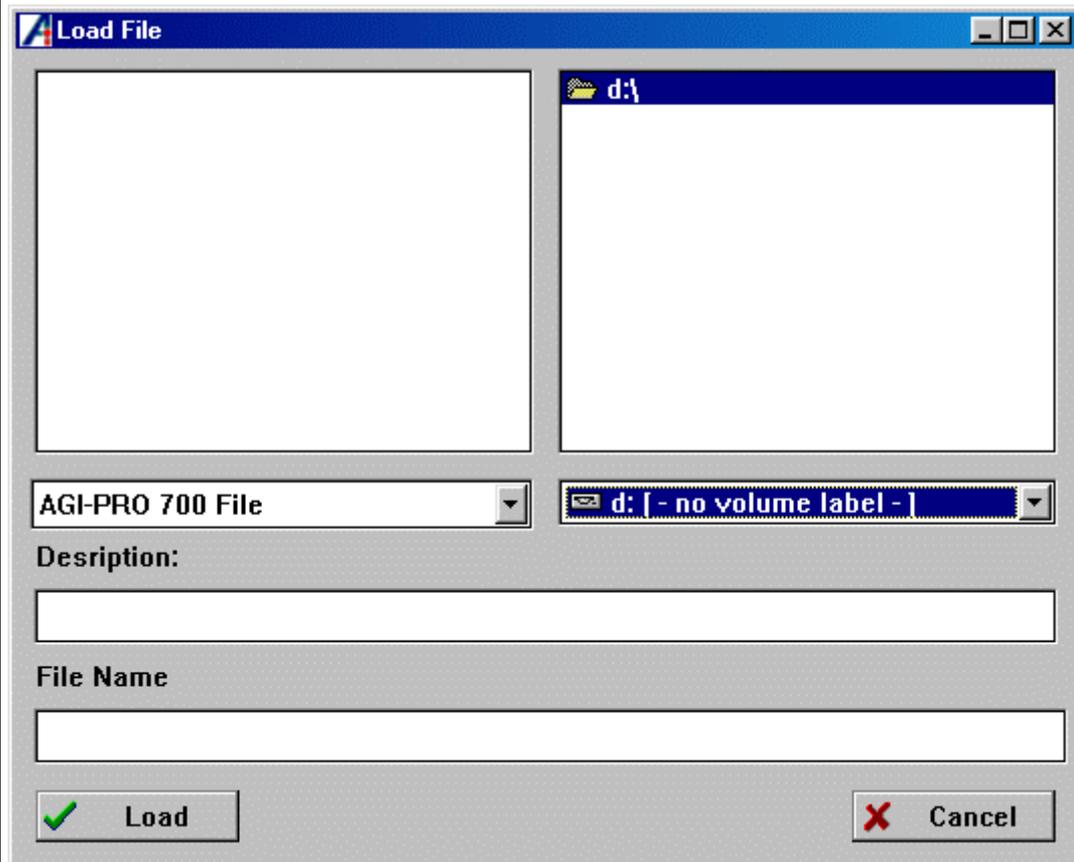
3.2.4 – Page VARIOUS



1	<p><u>SERIAL PORT</u></p> <p>The parameter SERIAL PORT identifies the COM port of the PC which is connected to LGC-720 central unit (as default is preset on COM1 serial port). If LGC-720 central unit does not connect with the right key-signal, try to change this parameter.</p> <p><i>NOTE: only on few PC it will be necessary to use COM3 and COM4 Serial port.</i></p>
2	<p><u>RESET</u></p> <p>The RESET procedure restore the original configuration of the central unit.</p> <p><i>Note: WARNING! This procedure overwrites previous values, without any possibility the save the old data.</i></p>
3	<p><u>LANGUAGE</u></p> <p>From this panel can be selected all the available languages: at every selection all the items change in real time. At the next restart of the program, will be not necessary to select the language again. It is possible to get new languages with simple upgrades of the program.</p>
4	<p><u>PRINT</u></p> <p>This procedure allows to print some parameters of the central unit. It is mainly used for technical assistance purposes.</p>

5

LOAD



This function allows to load a configuration previously saved through the button **SAVE**.

In the top left square there are the list of the available configuration files; in the top right square it is shown the structure of the directory. Selecting the available files, it is possible to read a short description in the field **Description**. In the field **File Name** it is indicated the name of the selected file. When the correct configuration file has been selected, click on the button **Load** to change the values of the central unit with the values of the loading file. To exit without any changes, click on the button **Cancel**.

Note: WARNING! This procedure overwrites previous values, without any possibility the save the old data.

6

SAVE FILE

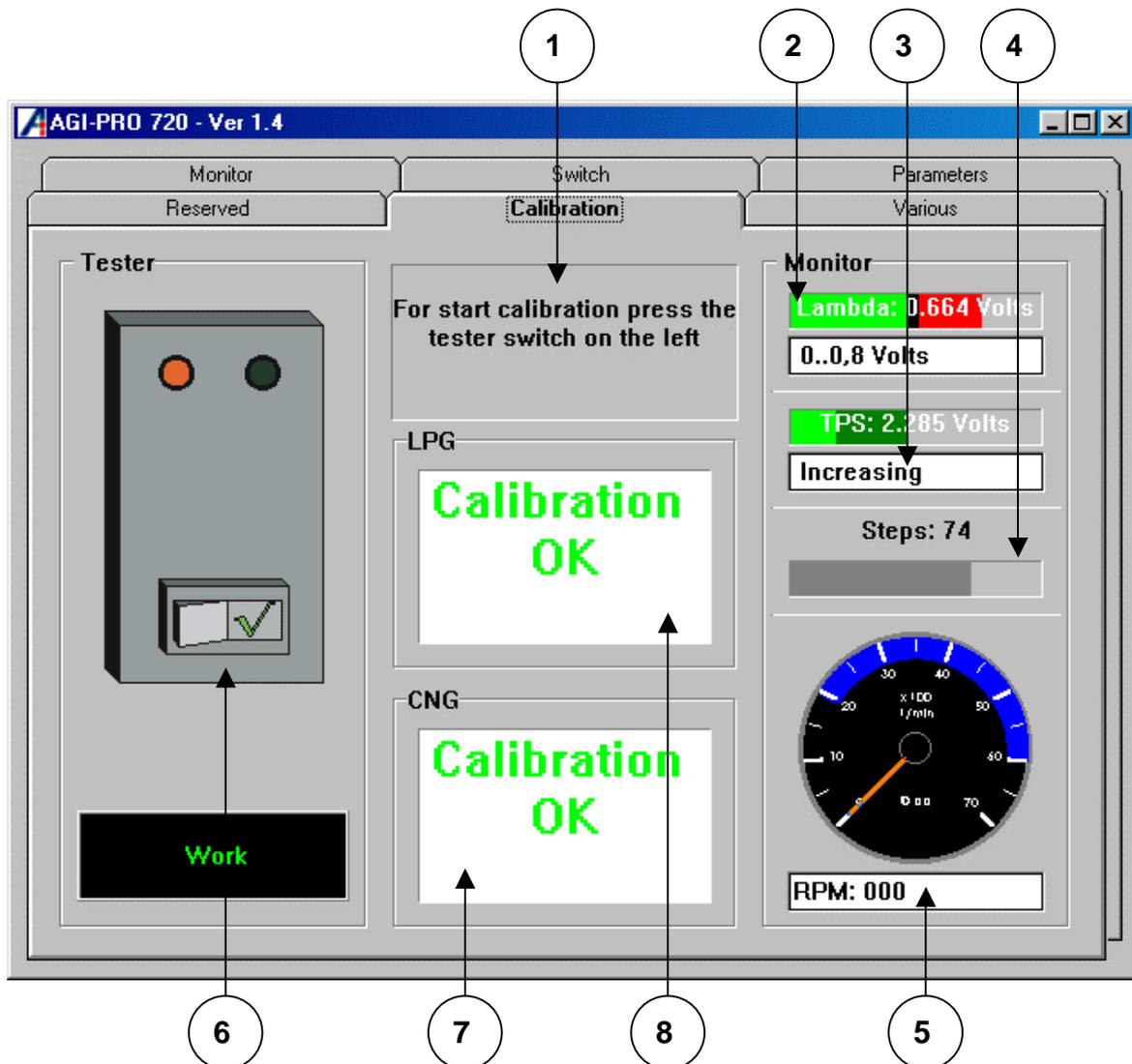
The screenshot shows a standard Windows-style 'Save File' dialog. The top-left pane is empty, indicating no files are currently listed. The top-right pane shows the current directory path as 'd:\'. The file type is set to 'AGI-PRO 700 File'. The drive selection is 'd: [- no volume label -]'. The 'Type a brief description:' field and the 'File Name' field are both empty. The 'Save' button is highlighted with a green checkmark, and the 'Cancel' button is highlighted with a red X.

This function allows to save a configuration file present in the connected central unit. This operation is very useful as allows to copy in other central units an already tested configuration, or, in case of trials, allows to come back to the original configuration in order to find the best settings of the central unit. In the top left square there are the list of the configuration files (if available); in the top right square it is shown the structure of the directory. To save a file, insert a description in the field **Type a brief description**, and insert the file name in the field **File Name** (the extension is optional). When the configuration file has been selected, click the **Save** button to save the file, or the **Cancel** button to exit.

3.2.5 Page RESERVED

This page includes options that can be modified ONLY by expert users; for this reason the access is allowed only through a code provided by Autogas Italias.r.l.-Italy.

3.2.6 – Page CALIBRATION



1	<p><u>INSTRUCTIONS</u></p> <p>In this panel it is explained how to active the calibration procedure.</p>
2	<p><u>MONITOR LAMBDA</u></p> <p>It is a little monitor of the lambda probe. It shows as the model of lambda probe (lower square), as its value (green/black/red bar).</p>
3	<p><u>MONITOR TPS</u></p> <p>It is a monitor for TPS. It shows as the present value on the bar, as the kind of TPS (increasing, decreasing, absent).</p>
4	<p><u>MONITOR STEP MOTOR</u></p> <p>This is a graphic and numeric representation of the step-motor position.</p>
5	<p><u>MONITOR RPM</u></p> <p>In this panel it is possible to follow the noticed rpm.</p>
6	<p><u>TESTER</u></p> <p>This is a graphic representation of the TESTER of central unit. The two leds, in the upper part of the design, work as monitor of the Lambda Probe and indicate the RICH/LEAN signal.</p> <p>The square in the lower part of the TESTER indicates if the tester is in the <i>Calibration</i> or <i>Work</i> status.</p> <p>The red button below, activates directly the calibration procedure.</p> <p>IMPORTANT: it is possible to calibrate the central unit only in AUTOMATIC (LPG/CNG) and PETROL position.</p> <p>Owing to safety purposes, the other positions EMERGENCY and AUTOMATIC (PETROL), will not activate any calibration procedure.</p>

7	<p><u>CNG ADVICE</u></p> <p>In this window may appear three kind of message:</p> <ul style="list-style-type: none">- <i>Warning: lack of air</i>- <i>Warning : too much air</i>- <i>Calibration OK</i> <p>The messages refer to the kind of calibration of the central unit. The message <i>Calibration OK</i> means a good calibration; the other messages mean a not so good calibration.</p> <p><i>Note: this 'advice' is to hold in due consideration ONLY if the vehicle is CNG supplied.</i></p>
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8	<p><u>LPG ADVICE</u></p> <p>In this window may appear three kind of message:</p> <ul style="list-style-type: none">- <i>Warning: lack of air</i>- <i>Warning : too much air</i>- <i>Calibration OK</i> <p>The messages refer to the kind of calibration of the central unit. The message <i>Calibration OK</i> means a good calibration; the other messages mean a not so good calibration.</p> <p><i>Note: this 'advice' is to hold in due consideration ONLY if the vehicle is LPG supplied.</i></p>
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NOTE: as regards the calibration session, please refer to the next chapter.

3.3- Central Unit calibration

The calibration is the process that let the central unit to adapt to the vehicle, to ensure the best performances. There are two ways to do this procedure: with a PC or with the TESTER provided together with the central unit.

3.3.1 – PC Calibration

As previously explained (3.2.6 – par.7), to activate the calibration it is necessary to click on the button of the tester as indicated in the page **Calibration**.

According to the status of the central unit, it is possible to enter in different calibration sections:

- **PETROL**
 - RPM setup
 - Lambda Probe acquisition

- **AUTOMATIC (PETROL)**
 - *CALIBRATION NOT POSSIBLE*

- **AUTOMATIC (LPG/CNG)**
 - *LPG/CNG Calibration*

- **EMERGENCY**
 - *CALIBRATION NOT POSSIBLE*

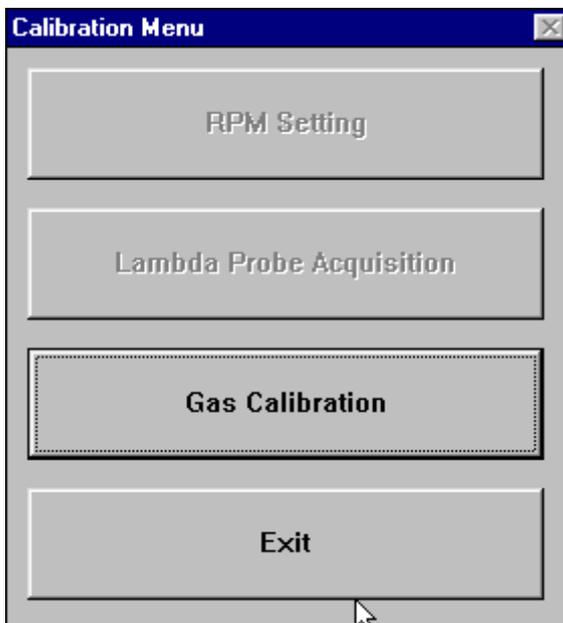
The cases where the calibration it is not possible, have been decided for safety purposes.

Now, step by step, we are going to analyze, in a logical order, all the calibration procedures.

This is the petrol calibration menu.....



...and this is the LPG/CNG calibration menu...

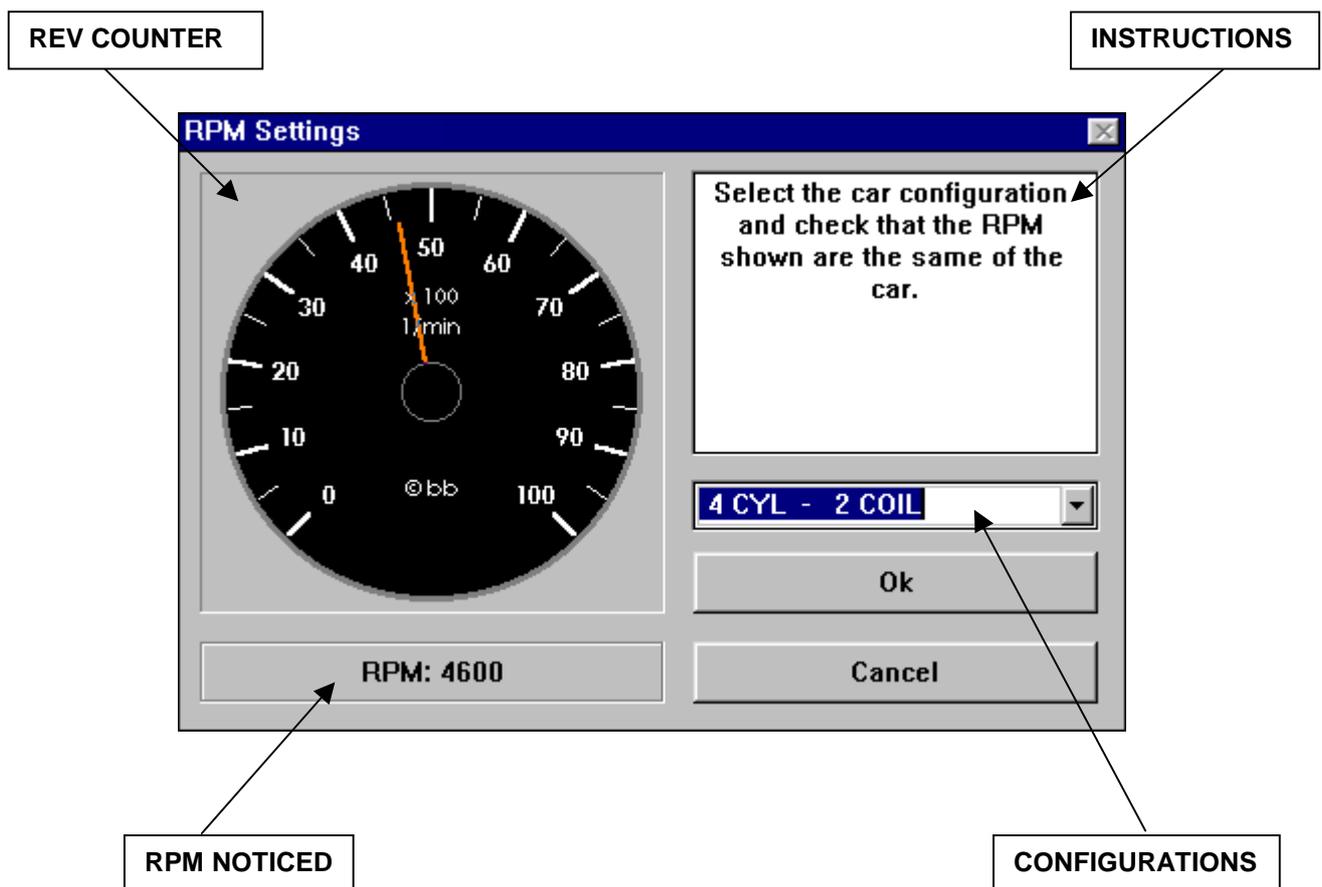


3.3.1.2 – RPM SETTING (PETROL)

This procedure captures the right vehicle's RPM configuration, necessary for the correct working of the switching block, (switching direction, cut-off, limiter, etc....).

As shown in the picture below, we have a rev counter and a list of configurations, where **CYL** means cylinder, and **COIL** means coil of the vehicle. The goal is to find the right configuration. To achieve this goal it is enough to lead the car to different level of RPM and to verify that the selected configuration let the rev counter show *THE SAME RPM* of the true vehicle's rev counter.

Once the correct combination cylinders – coils has been found, click on **OK** to save the selected data, or **Cancel** to come back to the previous status.

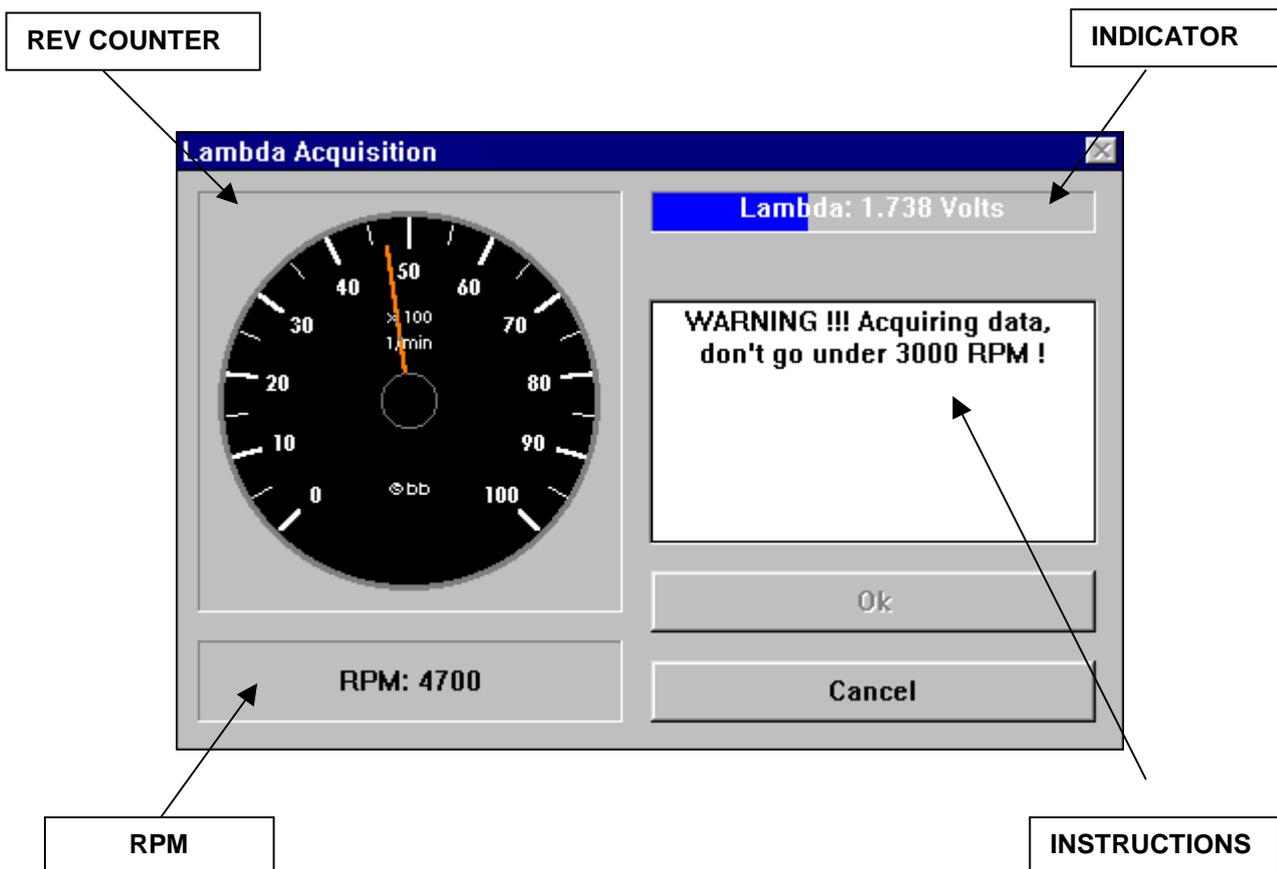


3.3.1.2 LAMBDA PROBE ACQUISITION (PETROL)

This procedure recognizes the lambda sensor. In this case it is necessary to lead the vehicle over the 3000 rpm and wait for the end of the capture. When the lambda probe has been correctly acquired the top right indicator will show the RICH – LEAN flashing of the lambda probe, and in the square below will be indicated the description of the type of lambda probe found. To save the data in the central unit, click **OK**. To restore the previous data click **Cancel**.

IMPORTANT: It is necessary to keep the engine over 3000 rpm. If the engine remains below 3000 rpm, the survey WILL BE AUTOMATICALLY CANCELLED!

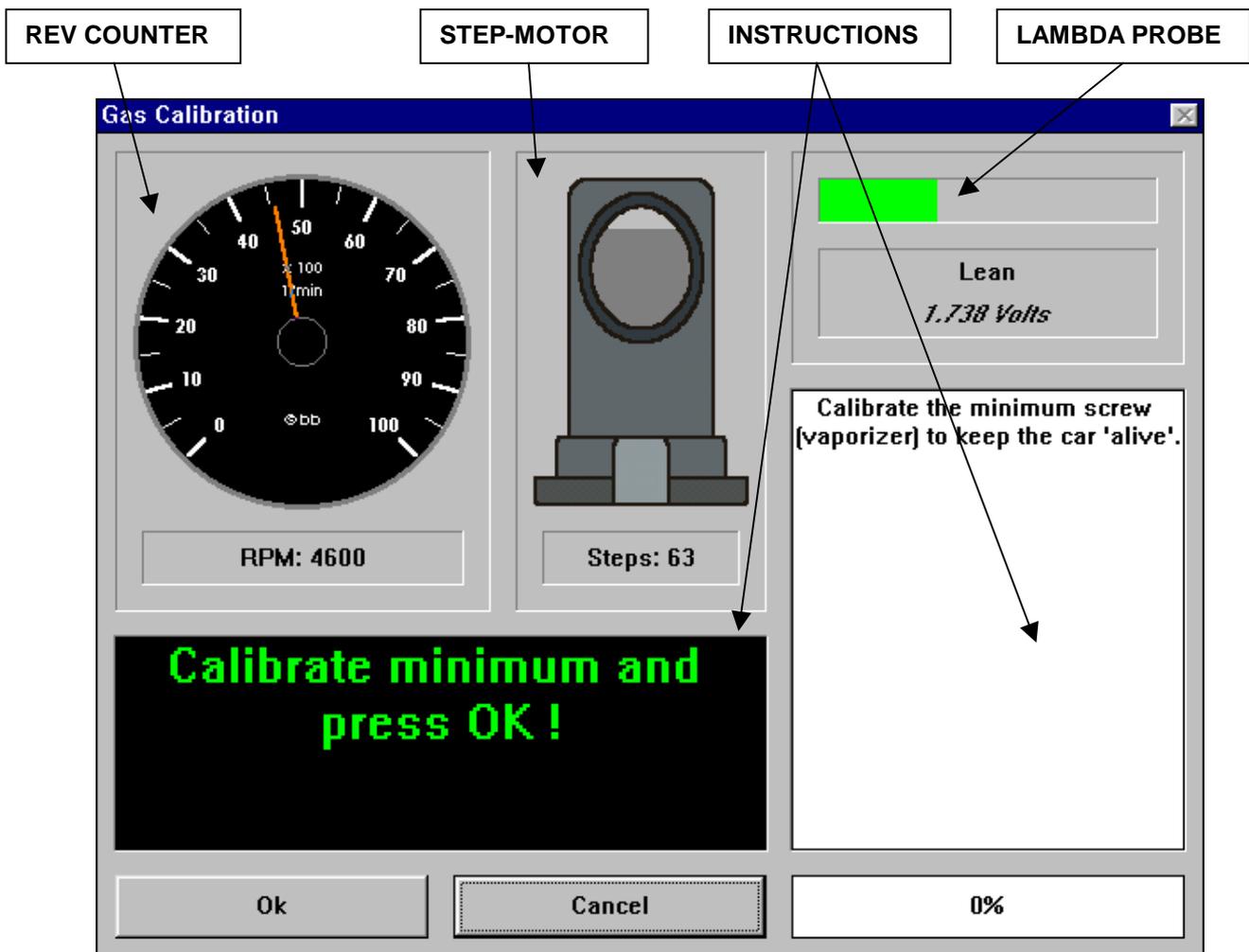
Note: the system is not able to acquire INVERTED lambda probes.



3.3.1.3 LPG/CNG CALIBRATION (AUTOMATIC LPG/CNG)

The LPG/CNG calibration phase develops in different steps and is the most important section of the calibration procedure. It needs the switch in automatic position and requires that it has already switched to LPG/CNG.

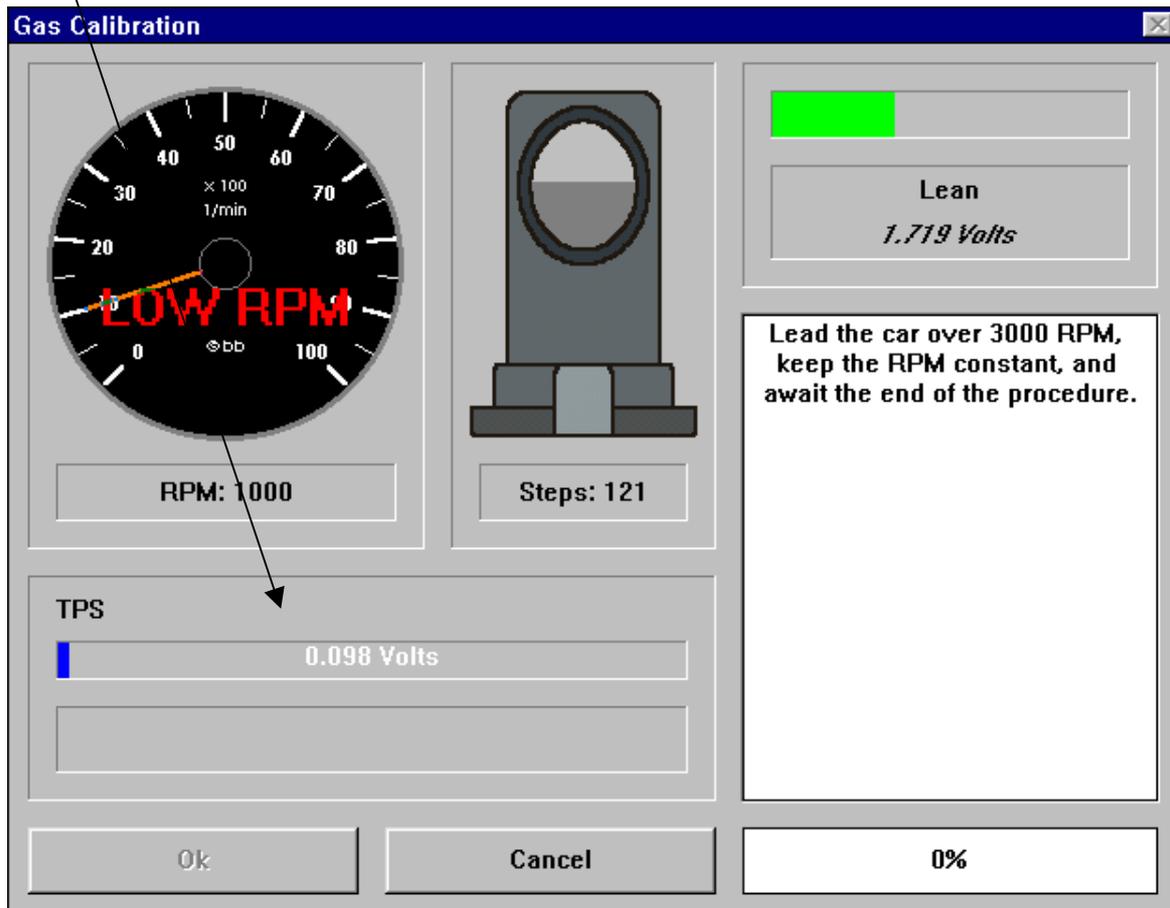
You can find below the first page of the calibration section:



In this first section it is absolutely necessary to calibrate (obviously, in a rough way too), the minimum screw to keep the vehicle "alive". Then click **Ok**.

If the procedure is correct, now would appear the following image:

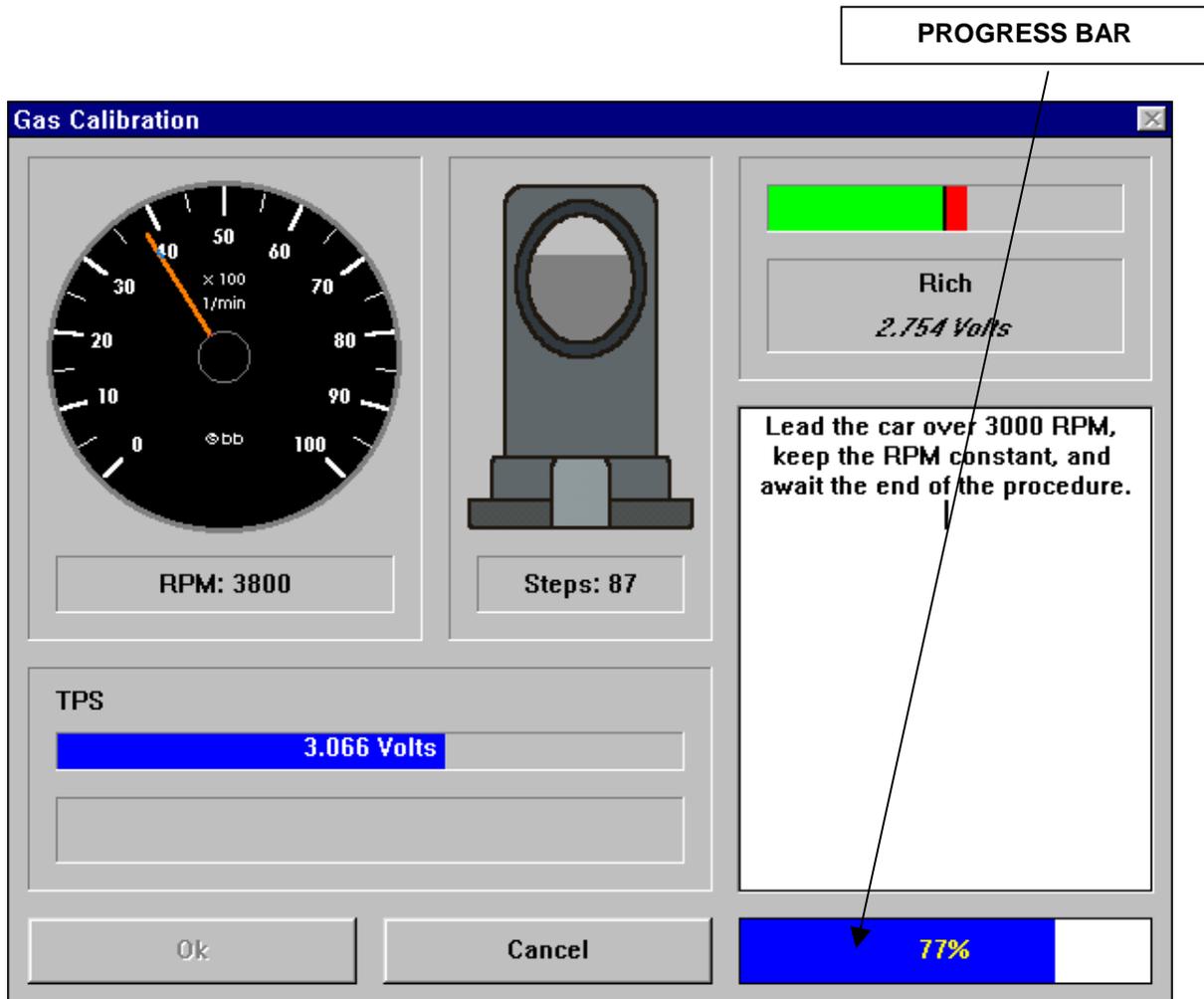
TEMPORARY TPS INDICATOR



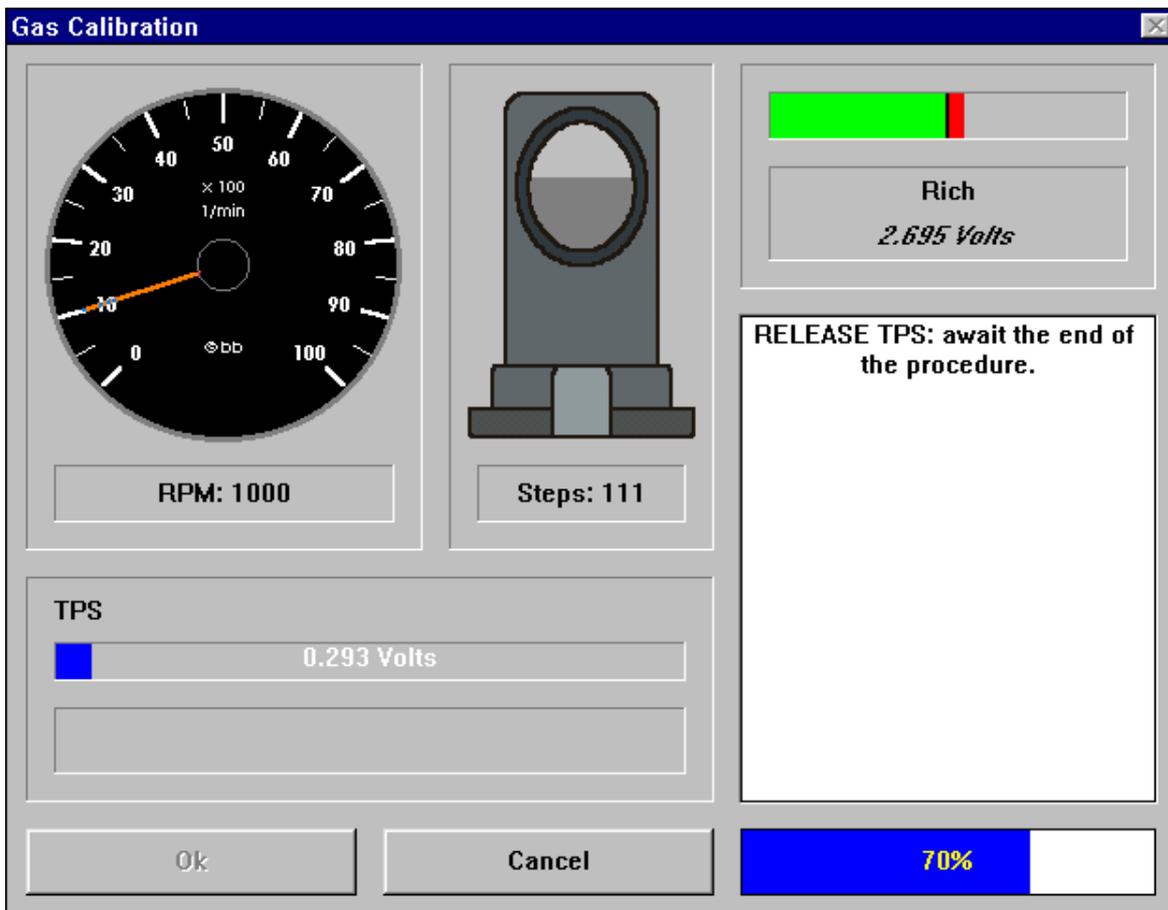
Now, lead the car over 3000 RPM as indicated in the above instructions and wait.

IMPORTANT: It is necessary to keep the RPM constantly over 3000 RPM to complete the calibration! Every time that RPM fall under 3000 RPM, will appear the notice 'LOW RPM', and the survey will start again from the beginning!

Lead the car over 3000 rpm and keep the rpm constant: you would see the step-motor move and the right below bar increases until 100%.



Once terminated the section described in the previous page, RELEASE the accelerator pedal and wait.

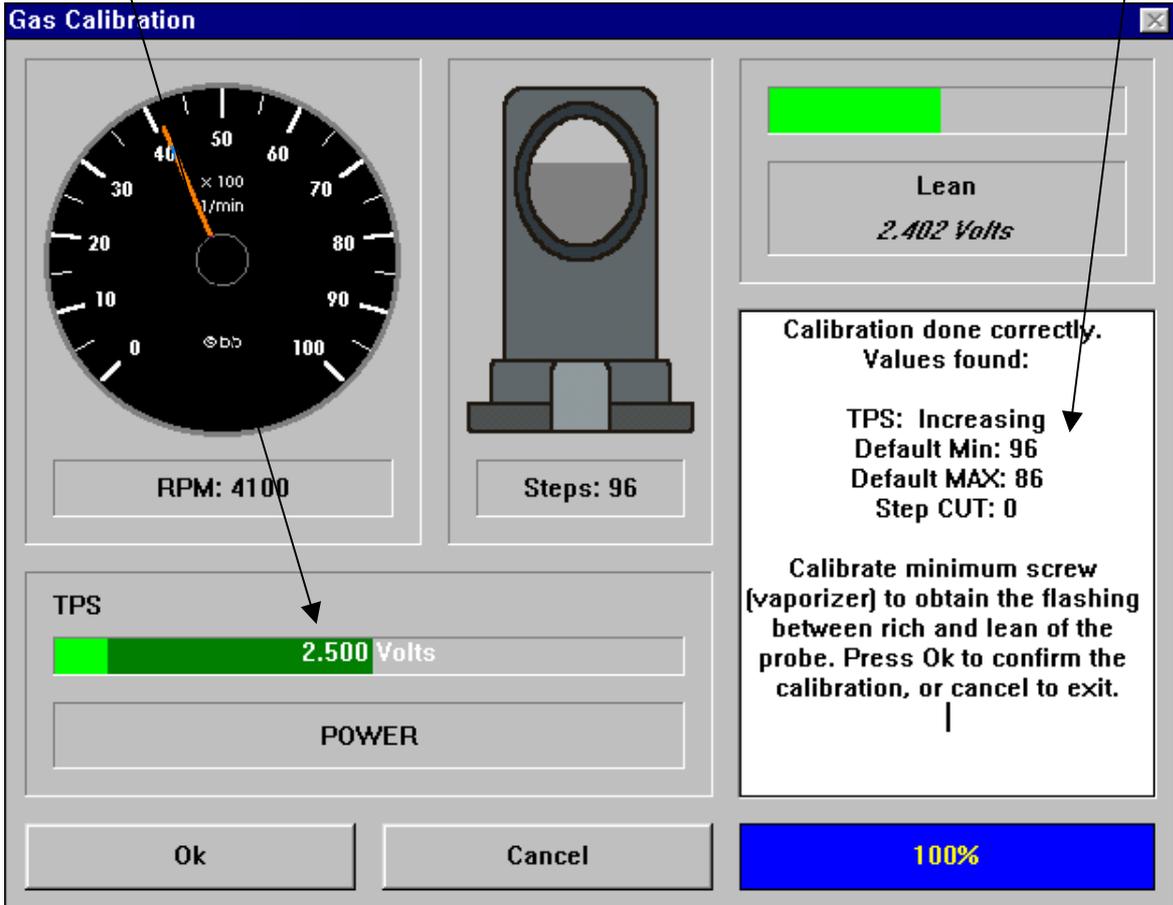


Terminated the waiting time indicated on the progress bar, the central unit will verify that the RPM of the vehicle have fallen down: in this case it will be displayed the result of the calibration procedure (see the next page). Otherwise, the central unit, will force the vehicle's RPM to fall down, and we shall wait once again, that the progress bar will arrive to 100% (without touching the accelerator pedal). In this last case, if the vehicle is recognized to own TPS, the central unit will assign automatically the required cut-off.

Here is the result page:

DEFINITIVE TPS INDICATOR

RECAPITULATION



Now, with the step motor locked, it is necessary to calibrate the minimum screw to obtain the best stoichiometric air-fuel ratio.

In the right window we can see the noticed values: the TPS (absent, increasing, decreasing), the default min and max of the step motor, and the steps of the cut-off (in case the central unit would have indicated a real necessity).

Moreover left-below indicated, we can find the correct TPS survey: with a little pressure of the accelerator pedal, we can control that the indicator changes from IDLE to POWER.

At this point, click on **OK** to save the new parameters, or **Cancel** in order to replace the previous configuration.

3.3.2 – Calibration with TESTER

Even if the calibration with TESTER is not so complete as the calibration with PC, it can be useful for simple calibrations and for little changes to already calibrated central units. The tester is also useful (in WORK position) to test the vehicle's alternate flashing of the lambda probe without the PC.

The calibration procedure with TESTER is indicated in the following phase:

Lambda Probe Acquisition MAX-MIN (Phase 1)

- 1- Insert Tester with the switch in "WORK" position
- 2- Lead the engine (at petrol) to the working temperature (wait for radiator fan turns on for two times)
→ *Internal led GREEN= ON*
- 3- Verify the lambda probe working on the tester (the green and yellow+red leds alternate flash)
NOTE: *if the lambda probe does not work, verify and start again from step 1.*
- 4- Lead the engine to 3500 RPM and keep the RPM constant.
→ Tester leds: Green and Red leds alternate flash (real monitor of Lambda Probe) (1)
- 5- Switch the Tester in "CALIBRATION" position and WAIT until you have the following results:
→ *Internal led RED = ON*
→ *Internal led GREEN= ON*
→ Tester leds: Green and Red leds alternate flash (real monitor of Lambda Probe) (1)
- 6- Wait again some other seconds until you have the following results:
→ *Internal led RED = OFF*
→ *Internal led GREEN= OFF*
→ Tester leds: Green and Red leds alternate flash (real monitor of Lambda Probe) (1)
- 7- Lead the engine to the minimum
- 8- Switch the Tester in "WORK" position
- 9- If you do not go on with the next PHASE 2, take off the tester.

TPS Acquisition & Reset (Phase 2)

NOTE: *If this calibration is executed with a new central unit, it is **ABSOLUTELY** necessary to carry out BEFORE THE STEPS 1 + 2 + 3 as over indicated.*

- 10- Verify that the switch of the Tester is in position "WORK".
- 11- Change to LPG/CNG working position
- 12- Calibrate the minimum on vaporizer
- 13- Lead the engine to 3000 RPM and keep the RPM constant.
- 14- Change the switch of the tester in "CALIBRATION" position
 - Internal led RED = ON
 - Internal led GREEN = ON
- 15- Wait until you have the following results:
 - Internal led GREEN = flashing
- 16- Lead the engine to the minimum
- 17- Wait until you have the following results:
 - Internal led GREEN = constant
 - Internal led RED = OFF
- 18- Switch the Tester in "WORK" position
- 19- Verify TPS acquisition
 - Internal led GREEN = **OFF** if at **IDLE**
 - Internal led GREEN = **ON** if at **POWER**

NOTE: *all kind of TPS are automatically acquired. If the threshold is too low, repeat the calibration from step no.7, but at the step no.14 do not remain at the minimum and keep the accelerator pedal lightly pressed.*

Now take off the Tester. Calibration terminated.

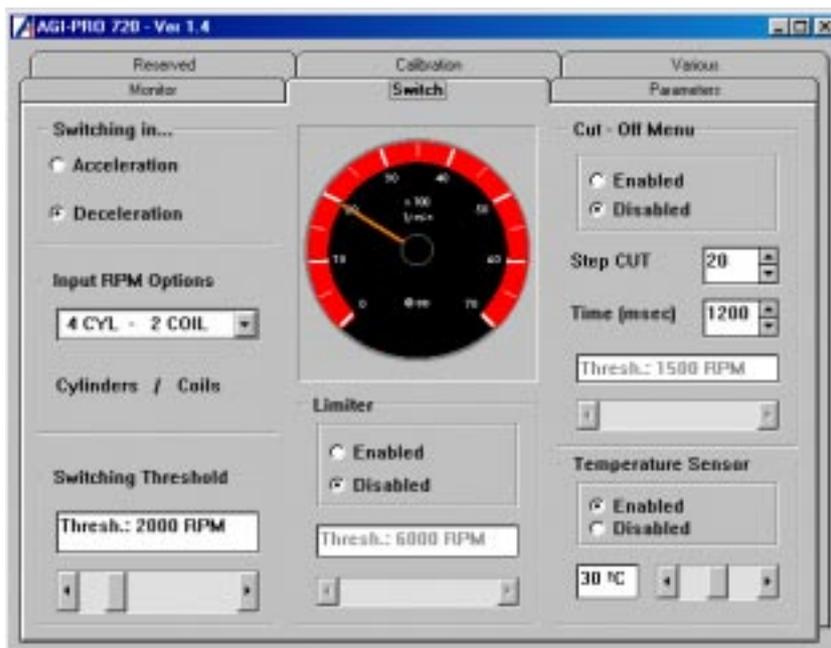
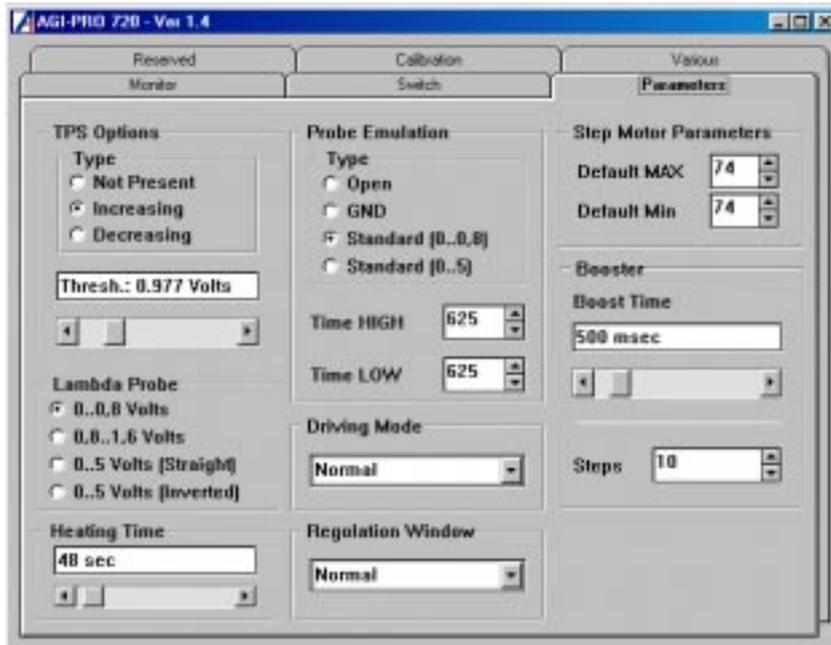
Note: any other calibrations are not allowed with Tester. These two phases (over illustrated) allow the calibration of the following parameters:

- *Lambda Probe threshold (Phase 1)*
- *Reset Step-Motor Minimum (Phase 2)*
- *Reset Step-Motor Maximum (Phase 2)*
- *Presence and Direction of TPS (phase 2)*
- *TPS Threshold (Phase 2)*

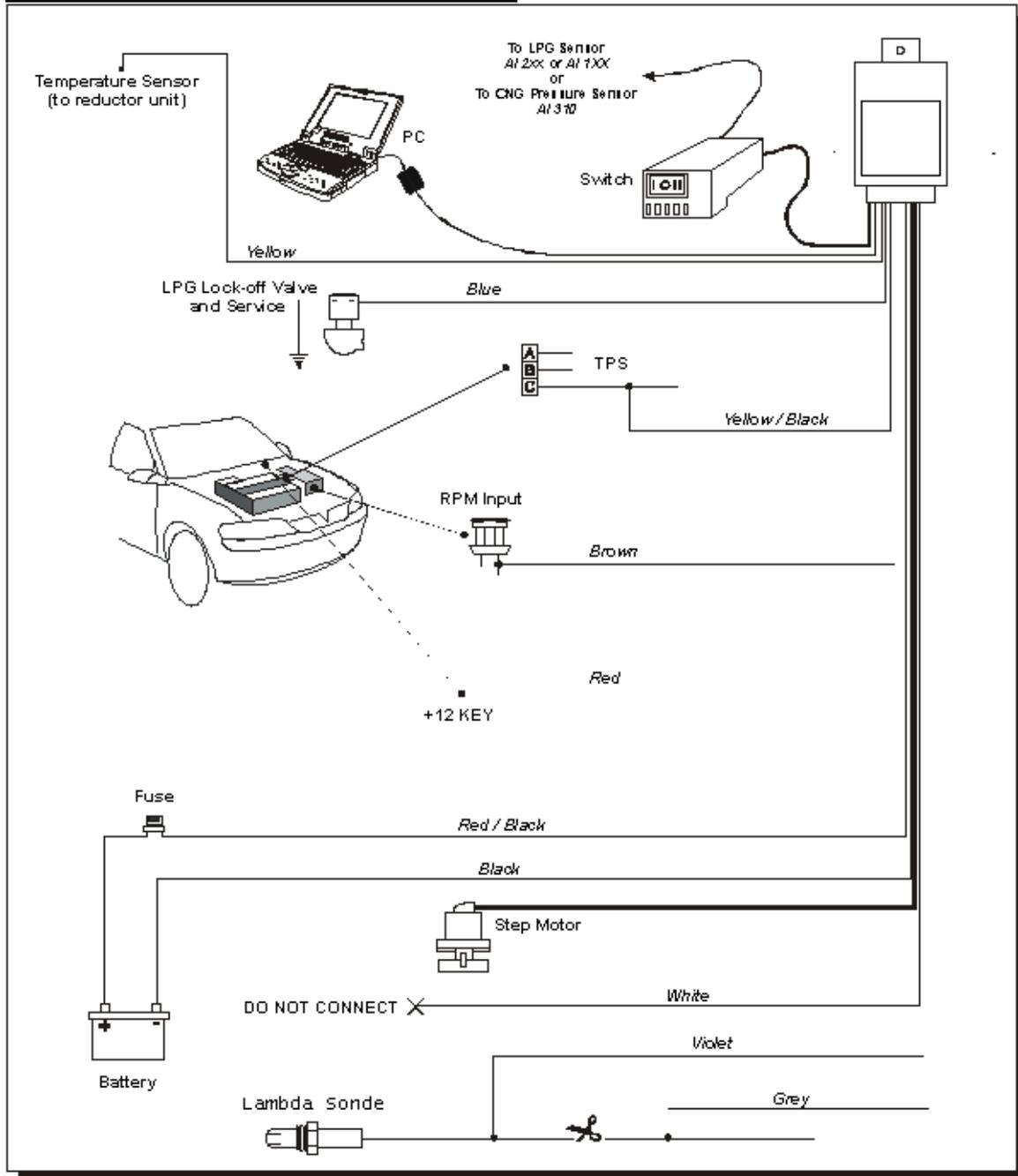
ALL the other parameters will not be modified by these procedures.

4- DEFAULT VALUES

In these two images, are displayed the default values:



5 - CENTRAL UNIT WIRING PLANE ELECTRICAL CHARACTERISTICS



Absolute maximum ratings

Description	Wire	Measure	Value
Board Supply	RED/BLACK	Supply voltage Supply current	0..16 V 1 A
Input 12 Volt under key	RED	Supply voltage Supply current	0..16 V 7,5 A
TPS input	YELLOW/BLACK	Input voltage Input current	0..16 V 0..10 mA
Temperature probe input	YELLOW	Input voltage Input current	0..16 V 0..10 mA
RPM input	BROWN	Input voltage Input current	-1000..+1000V 0..100 mA
Lambda probe input	VIOLET	Input voltage Input current	0..16 V 0..10 mA
Step motor cable	-	Output voltage Output current	0..16 V 0..500 mA
GAS output	BLUE	Output voltage Output current	0..16 V 7,5 A
Operating temperature	-	-	-15..+85 °C
Car safety delay	-	-	< 1 s

Test characteristics

All device are testet individually with this sytem:

1. ATE (Automatic Test Equipment) to perform, verify on 100% of board in terms of presence, value and tolerance of the components.
2. Functional test with custom test system on 100% of board to verify all features (static and dynamic)

Reliability

1. All components have been selected in relation to project specification and purchased from major companies
2. Switch was tested with temperature cycles to test its ageing behaviour (-15..+85 °C for 2160 hours)