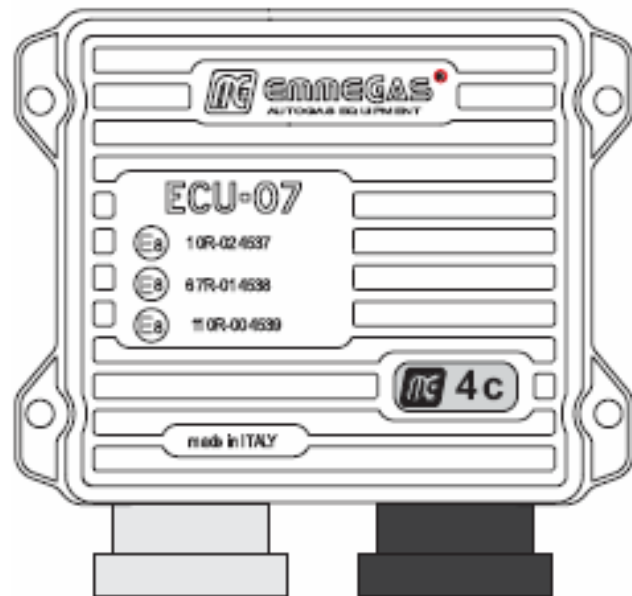


HP 07

High Performance Injection system



EN

PROGRAMMING MANUAL

NOTE

INTRODUCTION

The initial window shows the software name and relevant release

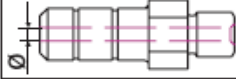
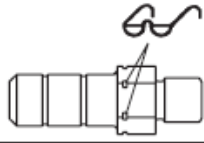
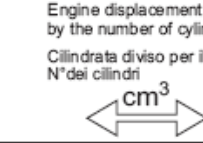
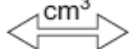
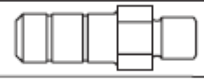
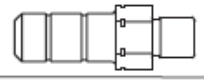
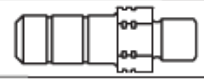
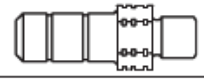
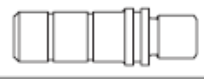
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CONNECTIONS

- Start the PC
- Connect the USB interface to the PC and to the ECU07 c/u
- Start the program and wait for the connection (or select manually the communication port – window 'Overview')
- In case of available software update, the system will be automatically positioned on the 'Overview' page and after that it will be necessary to follow the instruction showed into the white window

NOZZLE DIAMETER CALCULATION (based on displacement & power)

NOZZLES Ø / VEHICLE DISPLACEMENT & POWER correspondence table TABELLA di corrispondenza Ø UGELLI / CILINDRATA E POTENZA VEICOLO					
					
		Engine displacement divided by the number of cylinders Cilindrata diviso per il N° dei cilindri 		Power divided by the number of cylinders Dividere la Potenza per il N° dei cilindri 	
1,8 mm		0	350	10	20
2,25 mm		>350	500	>20	32
2,5 mm		>500	650	>32	39
2,7 mm		>650	800	>39	46
3,5 mm		>800		>46	

The total displacement and the total Power must be divided by the number of the cylinders.
A > if the two results belong to the same line, use the corresponding nozzle;
B > if further to the item A, the two results are on the upper boundary, use the bigger hole diameter of the next line;
C > if the two results belong to different lines, use the nozzle with the bigger hole diameter.
Note > the conversion Factors "kW<=>CV" are: 1kW=1,36CV ; 1CV=0,735kW

Dividere la cilindrata totale e la potenza per il numero dei cilindri:
A > se entrambi i risultati cadono nella stessa riga, utilizzare il foro corrispondente a quella riga;
B > se, oltre a quanto sopra, entrambi cadono sul limite superiore del proprio intervallo, passare al foro successivo;
C > se i due risultati cadono su righe diverse, dei due utilizzare il foro maggiore.
Nota > I fattori di conversione kW<=>CV sono: 1kW=1,36CV ; 1CV=0,735kW

PRELIMINARY OPERATION

EN

- With vehicle turned off, select on the page 'Configuration'
 - o the number of cylinders present on the vehicle
 - o the type of Gas used
 - o and check the Gas Sensor installed modifying the setting if necessary
- Start the engine and let it on the idle
- Check the RPM value and if wrong modify the number of coils
- Check on page 'Monitor' the presence of all the injector signals and of the analogical input like temperatures, pressures and eventual lambda sensors
- Check that into the 'Errors' page are not present eventual errors; if yes, cancel them and wait some minutes in order to see if they will be showed again

AUTO-TUNING

- The self-learning procedure will start with minimum temperatures of 60°C for Lpg and 50°C for Cng, so wait the necessary temperature
 - Do not switch to Gas before to start the learning procedure (the vehicle will be switched again to petrol, but it is preferable to avoid this switch in order to not modify the petrol map with gas carburation still not finalized)
 - Check that all the services (lights, air conditioned, cooling system, etc.) are OFF before proceeding
 - Then, go to the 'Auto-Tuning' page and press 'Start' to begin the procedure
 - Do not touch the accelerator pedal during the auto-learning process (**at IDLE**)
 - At the end there will be the visualization concerning the correct calibration together with the information about the eventual need to modify the dimension of the nozzles installed on the basis of the result
 - If the final calibration will be not satisfactory, check the gas flow and the correct calibration of the gas injectors compared with the petrol injectors
 - cancel them and wait in order to check if they will be showed again
- NOTE:** at the end of auto-tuning of the system, we recommend to check in the following ways the carburation of the vehicle during the gas operation:
- 1) with a Diagnostic Tester (Emmegas code 117214) check particularly the **slow and fast correctors** that must remain within the tolerance range;
 - 2) trough the monitoring of the **Petrol Injection time** (red window) check that the value during gas operation must be **as close as possible** to the same value during petrol operation.

The control of correct carburation will avoid the turning on of the Check Engine signal of the vehicle, if present; the HPI07 software includes all the programmable parameters necessary to optimize the carburation.

FINAL CHECK

At the end of the calibration, check the gas pressure of the regulator that must be set at:

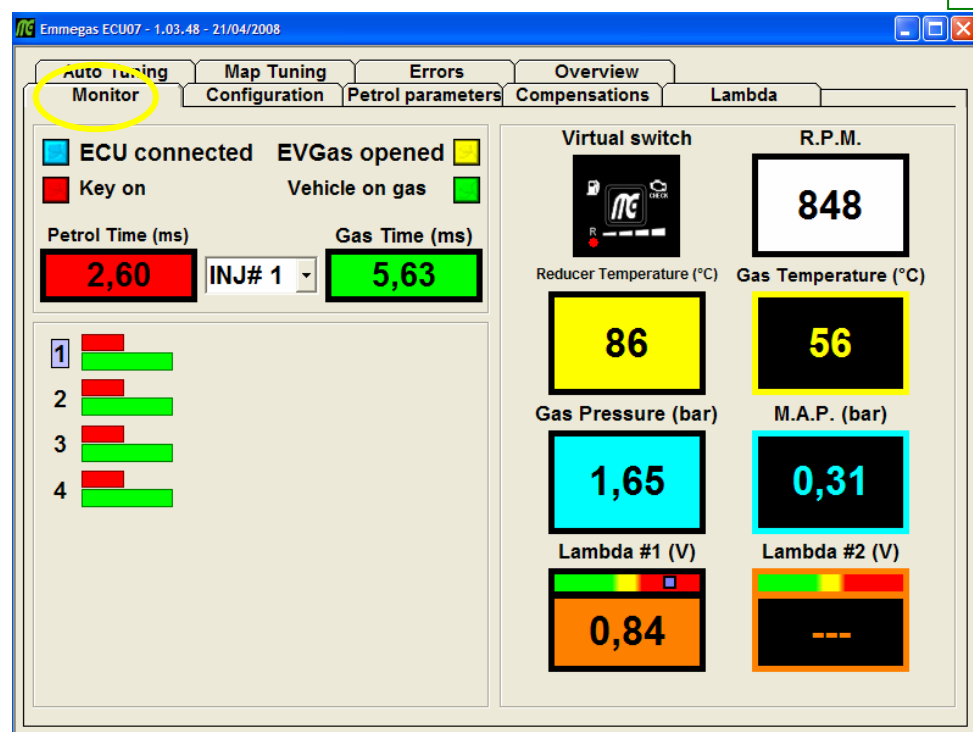
1,1 ÷ 1,2 Bar for Lpg

1,8 ÷ 1,9 Bar for Cng

If you do not get the above values (on idle), proceed with the adjustment of the regulator trough the relevant adjusting screw on top of the regulator

MONITOR

EN



The top/left window represents:

- c/u connected (or disconnected)
- key on (or off)
- Gas cut-off valve open (or closed)
- Vehicle running on Gas (or petrol)
- Petrol injection time (red) and relevant output on the gas injectors (green)
- Between the two above mentioned times is indicated the (selectable) injector

The down/left window represents:

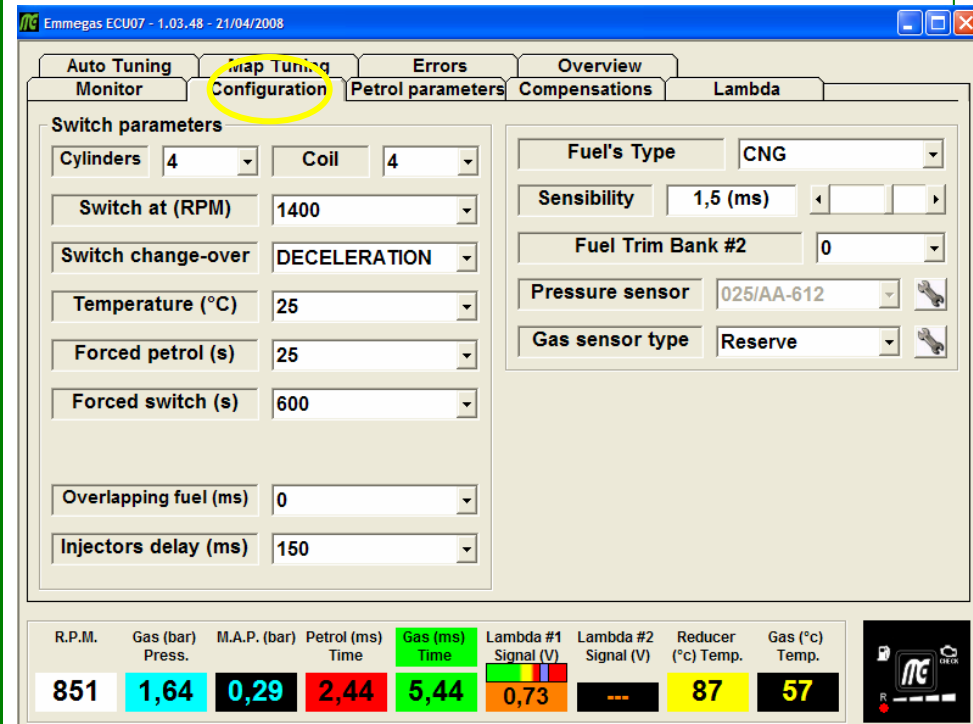
- graphically the petrol/gas injectors
- with pointed out the selected injectors for the values represented

The right window represents:

- the 'virtual' switch that allows to switch between the two fuels
- the R.P.M.
- Gas and Regulator temperatures
- Gas and Intake Manifold pressures
- Lambda with graphic indication (if lambda sensor is connected)

CONFIGURATION

EN



On the left side are present the **SWITCH PARAMETERS**:

- Cylinders: number of cylinders present on the vehicle
- Coils: number of coils present (in order to get the correct RPM signal)
- Switch at (RPM): RPM level where the system automatically switches
- Change-over: the automatic switch can be selected in acceleration/deceleration
- Temperature (°C): temperature to enable the switch
- Forced petrol (s): forced time on which the vehicle run on petrol before to switch to gas
- Forced switch (s): forced time on which the vehicle switch to gas even if the requested temperature has not been reached
- Overlapping fuel (ms): milliseconds of overlapping between the two fuels
- Injectors delay (ms): milliseconds of delay into the fuel switch between the cylinders

NOTE: in the bottom part of each page are always present the functioning parameters

On the right side are present the following parameters:

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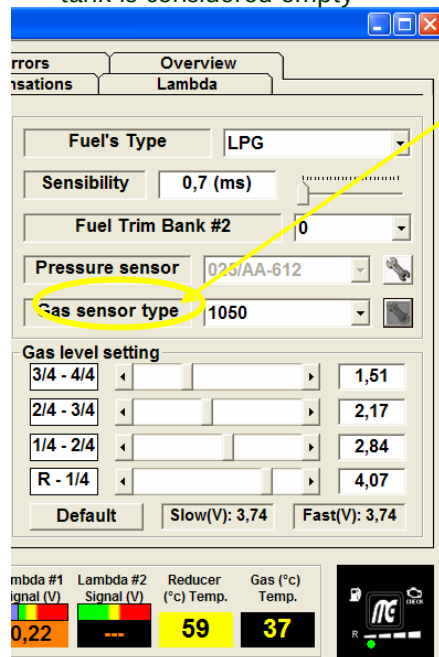
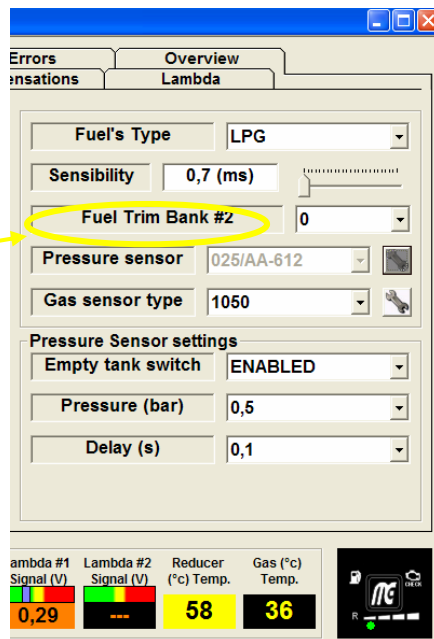
➤ **Fuel's type:** this selection (Lpg or Cng) modifies also the default values related to the selected fuel, i.e. temperature of switch, forced petrol time and all the three compensation prospects (all the other parameters are unchanged)

➤ **Sensibility:** minimum petrol input delay in order to be recognized from the ECU-07 (filter for extra-injections)

➤ **Fuel Trim Bank #2:** correction difference selected for the cylinders of the se-cond bank

➤ **Pressure sensor:** type of pressure sensor used to managed the empty tank switch signal; selecting the following parameters can be programmed:

- o Empty tank switch enabled or disabled
- o Pressure (bar): pressure limit where the tank is considered empty
- o Delay (s): time of lasting of pressure under the above limit, after that the tank is considered empty

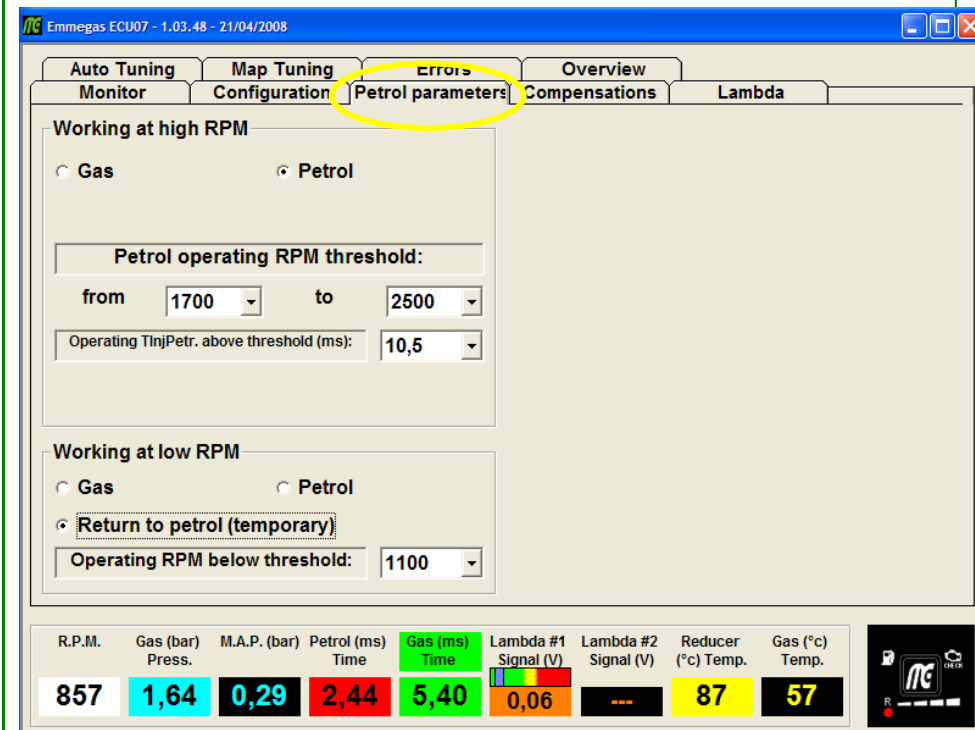


➤ **Gas sensor type:** to select the gas level sensor used in the system; selecting the following parameters can be programmed:

- o Programmable Limits (in Volts) related to the 5 possible fuel levels
- o Default: standard limit from factory
- o Fast/Slow: Volt value detected by the level sensor;
 - Slow means that the Level indication on the switch is filtered (and slower) than the value detected;
 - Fast means that the immediate value is detected by the level sensor

PETROL PARAMETERS

EN



It is possible to select the petrol intervention at high and low RPM on the basis of following modalities:

- **HIGH RPM:** the petrol intervention will be activated if following both condition are satisfied:
 - o RPM into the programmable interval (from / to)
 - o Petrol injection time above the programmable limit (ms)
- **LOW RPM:** the petrol intervention will be activated once that RPM will be below the programmable limit; it is possible to select the
 - o PETROL intervention: the vehicle will run always with petrol below the RPM limit
 - o RETURN TO PETROL (temporary): the vehicle will run with petrol below the RPM limit for some second and then will switch again to Gas, even if RPM are still below the limit.

COMPENSATIONS

EN

Emmegas ECU07 - 1.03.00 - 24/07/2007

Auto Tuning Monitor | Map Tuning Configuration | **Errors Compensations** | Overview Lambda

Reducer temperature compensation

☒ Enabled

°C	20	25	27	30	33	35	37	40	45	50	55	60	65	70	80
%	-6	-5	-5	-4	-4	-3	-3	-2	-2	-2	-1	-1	0	0	0

Gas temperature compensation

☒ Enabled

°C	0	10	15	20	25	30	35	40	45	50	55	60	65	70	80
%	-10	-8	-7	-5	-4	-3	-1	0	1	3	4	5	6	7	7

Select a cell and press (-) or (+) keys to change values. Press shift to increase by 10 unit.

R.P.M. 860 | Gas (bar) Press. 1,11 | M.A.P. (bar) 0,31 | Petrol (ms) Time 2,79 | Gas (ms) Time 4,32 | Lambda #1 Signal (V) 0,63 | Lambda #2 Signal (V) --- | Reducer (°c) Temp. 61 | Gas (°c) Temp. 39

Reducer and Gas temperature Compensation Tables:

- On the tables are indicated on the first line (grey) the values of reference and on the second line (white) the relevant % of correction values
- Once a cell is selected, it is pointed in evidence in yellow and then it will be possible to increase/decrease the values of 1 unit pressing (+) or (-) and of 10 units pressing 'shift' (+) / (-)
- The 'Enabled' windows activate (green colour) and deactivate (red colour) the compensations

LAMBDA

EN

Emmegas ECU07 - 1.03.48 - 21/04/2008

Auto Tuning Monitor | Map Tuning Configuration | Errors Petrol parameters | Overview Compensations | **Lambda**

Sensor type 0..1 | Lambda sensor #1 Front

Lambda emulation ENABLED | Lambda sensor #2 Not connected

R.P.M. 856 | Gas (bar) Press. 1,61 | M.A.P. (bar) 0,29 | Petrol (ms) Time 2,42 | Gas (ms) Time 5,52 | Lambda #1 Signal (V) 0,81 | Lambda #2 Signal (V) --- | Reducer (°c) Temp. 87 | Gas (°c) Temp. 57

In this page are present the following programmable parameters:

- **Sensor Type:** allows to select the type of lambda sensor present on the vehicle: this function enable the visualization of the lambda sensor functioning during the gas and petrol operation.
- **Lambda Sensor #1:** if connected (see electric scheme), this function enable the visualization of functioning of only Lambda sensor #1.
- **Lambda Sensor #2:** if connected (see electric scheme), this function enable the visualization of functioning of only Lambda sensor #2.

NOTE: if both lambda sensors are connected the visualization will be double.

- **Lambda Emulation:** trough this selection, some specific emulation signal are sent to the Petrol ECU; this function must be used only in some specific application and accordingly to the Emmegas instructions.

ATTENTION: the selection "Lambda Emulation" is operative only if the lambda sensor#1 or lambda sensor#2 are activated, otherwise the emulation is not operative.

AUTO TUNING

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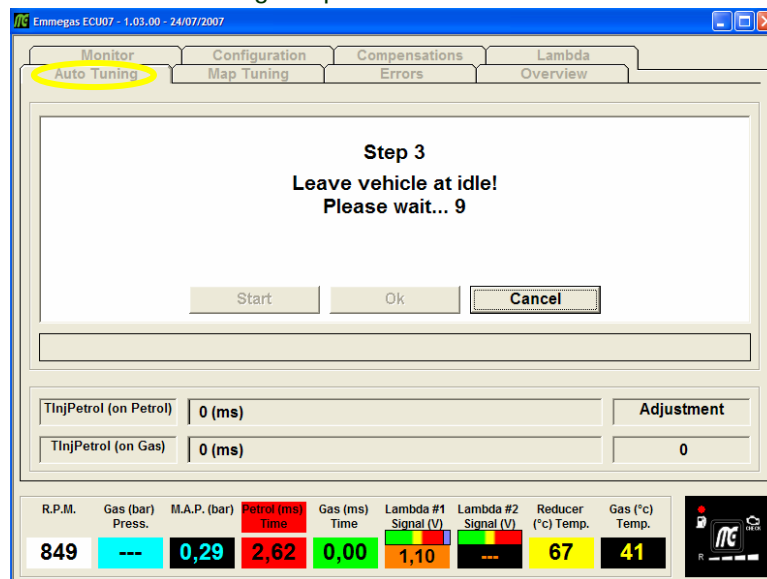
Proceed as below indicated for the auto calibration of the system:

- With the vehicle in temperature (60° with Lpg and 50° with Cng), press 'START'
- Let the engine at idle and the learning will proceed

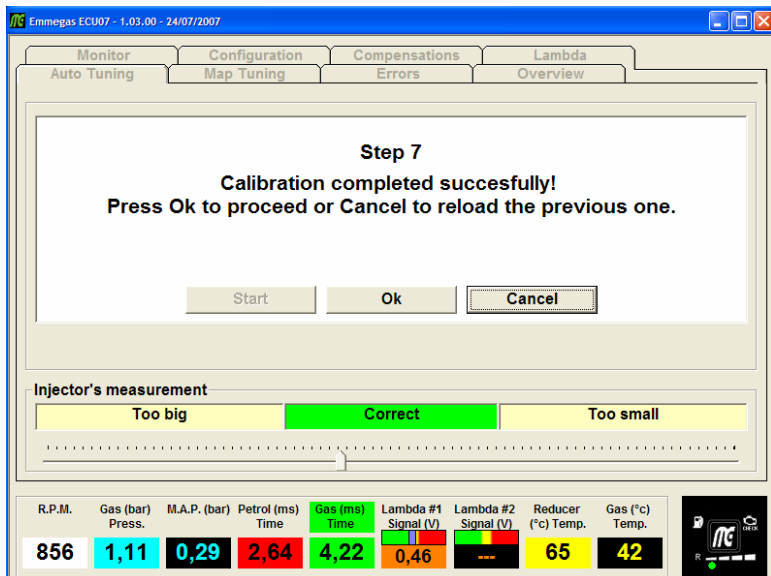
On the white window are indicated the status and instructions

Below are presented the Petrol injection times (red) & the Gas inj. times (green)

On the right is presented the actual correction



- At the end of the calibration into the white window is indicated the final status.



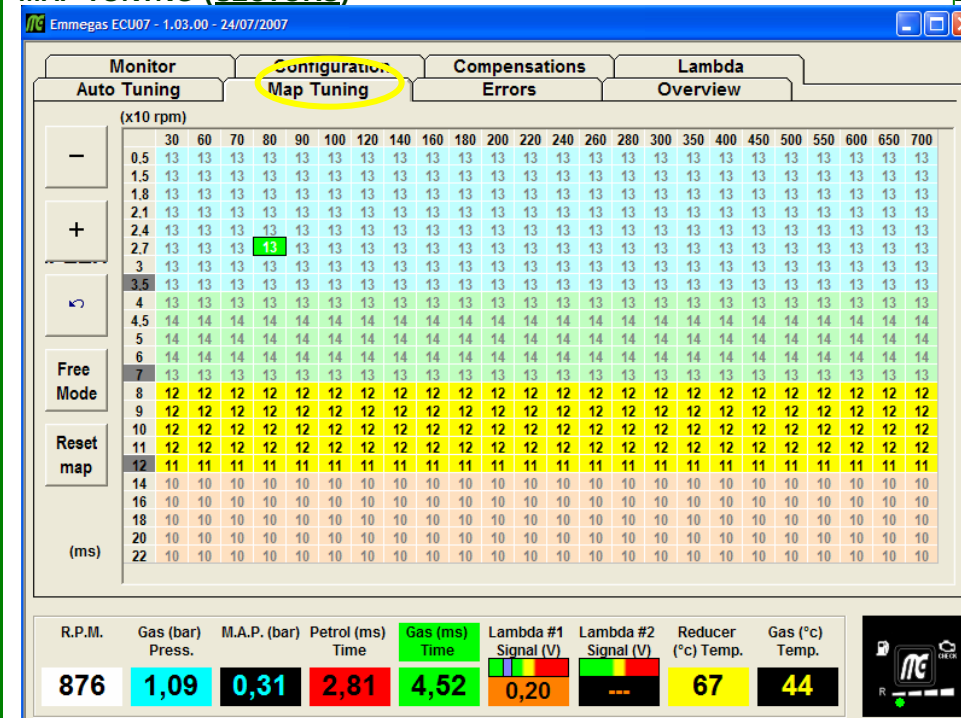
Below will be represented a bar where it is possible to understand if the injectors installed are correct (or too big or too small)

Some functions (like oxygen sensor emulation) are enabled again once finalized the calibration

In case of calibration problems, the sw will always show the relevant messages

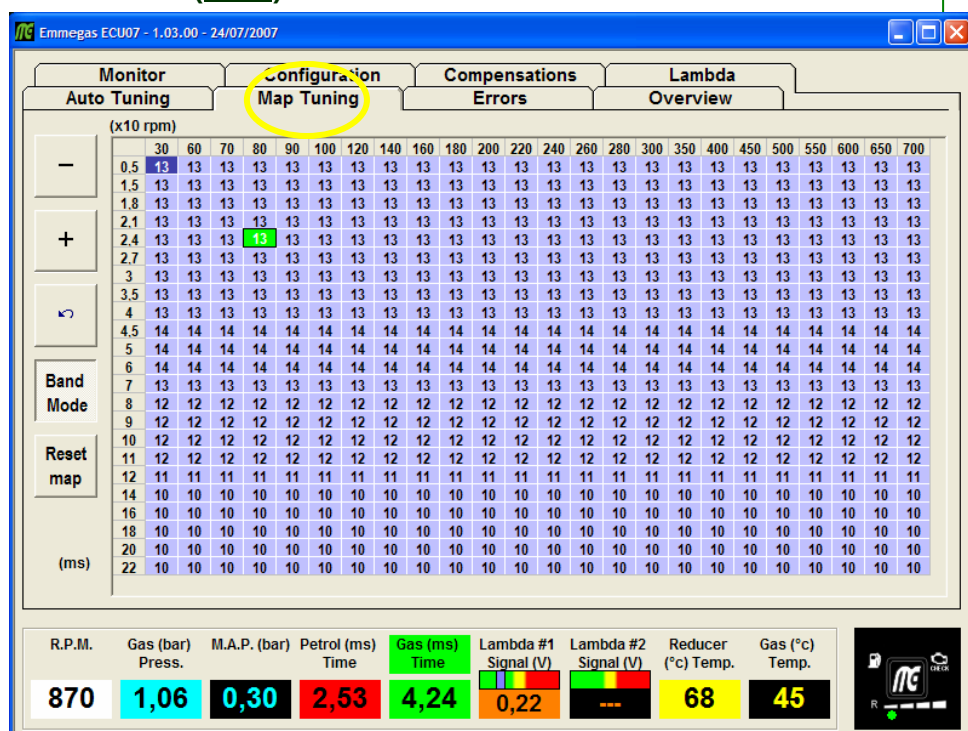
MAP TUNING (SECTORS)

EN



- into the map are presented 4 different sectors (horizontal)
- to modify the values of the map, click into the sector and press '+' or '-' to increase or decrease of 1 unit or press 'enter' and insert the required value
- when you press 'enter', there are three possible change options:
 - o absolute: the value indicated replaces directly the value of the map
 - o linear: increase/decrease the value indicated to the value of the map
 - o percentage: increase/decrease the percentage indicated (calculated on the basis of the map values) to the value of the map
- it is possible to modify the sector dimension by pressing the dark grey cells on the vertical scale and then press '+' / '-' to increase/decrease the sector
- the button  (UNDO) can be pressed in order to cancel the last modification
- the button 'Free Mode' allows to pass to the free map (see later)
- the button 'Reset Map' resets the default values
- the cursor is GREEN when the vehicle is on gas and RED when it is on petrol

MAP TUNING (FREE)



Select the area of interest and modify it as above indicated; if you press the button 'Band Mode', you will be back into the sector management

NOTE: as already indicated into the introduction of present manual, at the end of auto-tuning of the system, we recommend to check in the following ways the carburation of the vehicle during the gas operation:

1) with a Diagnostic Tester (Emmegas code 117214) check particularly the **slow and fast correctors** that must remain within the tolerance range;

2) trough the monitoring of the **Petrol Injection time*** (red window) check that the value during gas operation must be **as close as possible** to the same value during petrol operation.

The control of correct carburation will avoid the turning on of the Check Engine signal of the vehicle, if present; the HPI07 software includes all the programmable parameters necessary to optimize the carburation.

*: the comparison must be done always between

- Petrol Time Injection during gas operation and
- Petrol Time Injection during petrol operation

ERRORS

The errors visualization is organized as follows:

➤ **Error List:** shows the list of all the errors, with pointed out if they are current errors or memorized (occurred during a previous calibration)

➤ **Acoustic signal:** acoustic signal from the switch in case of errors with function enabled

➤ **Erase Errors:** cancel all errors present in the prospect

➤ **Gas Pressure (bar):** visualization of Gas Pressure also during Petrol running

➤ **Show Freeze Frame:** the c/u pass to the Freeze Frame modality below showed

The screenshot shows the 'Error List' screen in the Emmegas ECU07 software. The interface includes a top menu bar with 'Monitor', 'Configuration', 'Petrol parameters', 'Compensations', and 'Lambda'. The 'Configuration' tab is selected, and the 'Errors' sub-tab is active. Below the menu, there is a table with 4 columns: #, Device name, Present, and Stored. The table lists 12 errors, including INJ_1 through INJ_8, MAP SENSOR, MAP1 SENSOR, TEMP. VAPOR., TEMP. INJ., and TEMP. ECU. The 'Present' column is highlighted in orange. At the bottom, there is a status bar showing 'Gas Pressure (bar): 1,61' and buttons for 'Erase Errors' and 'Show Freeze Frame'.

#	Device name	Present	Stored
Err 00	INJ_1	---	---
Err 01	INJ_2	---	---
Err 02	INJ_3	---	---
Err 03	INJ_4	---	---
Err 04	INJ_5	---	---
Err 05	INJ_6	---	---
Err 06	INJ_7	---	---
Err 07	INJ_8	---	---
Err 08	MAP SENSOR	---	---
Err 09	MAP1 SENSOR	---	---
Err 10	TEMP. VAPOR.	---	---
Err 11	TEMP. INJ.	---	---
Err 12	TEMP. ECU	---	---

The screenshot shows the 'Freeze Frame' screen in the Emmegas ECU07 software. The interface includes a top menu bar with 'Monitor', 'Configuration', 'Compensations', and 'Lambda'. The 'Configuration' tab is selected, and the 'Freeze Frame' sub-tab is active. Below the menu, there is a table with 2 columns: Signal name and Value. The table lists various signals like Gas inj time, Petrol inj time, Time between 2 injections Petrol, Correction time, Rpm period, Absolut collector pressure, Collector - Reducer pressure, Lambda sensor voltage, Lambda 2 sensor voltage, Level gas visualized on switching, Level gas read, Reducer temperature, Injectors gas temperature, and Hardware temperature. The 'Value' column is highlighted in orange. At the bottom, there is a status bar showing 'Enable acoustic signal' and buttons for 'Erase Errors' and 'Back to Error Page'.

Signal name	Value
Gas inj time	0,00 (ms)
Petrol inj time	2,67 (ms)
Time between 2 injections Petrol	137,17 (ms)
Correction time	0,00 (ms)
Rpm period	870 (rpm)
Absolut collector pressure	1,12 (bar)
Collector - Reducer pressure	0,68 (bar)
Lambda sensor voltage	1,12 (V)
Lambda 2 sensor voltage	0,93 (V)
Level gas visualized on switching	3,74 (V)
Level gas read	3,73 (V)
Reducer temperature	-62 (°C)
Injectors gas temperature	46 (°C)
Hardware temperature	0 (°C)

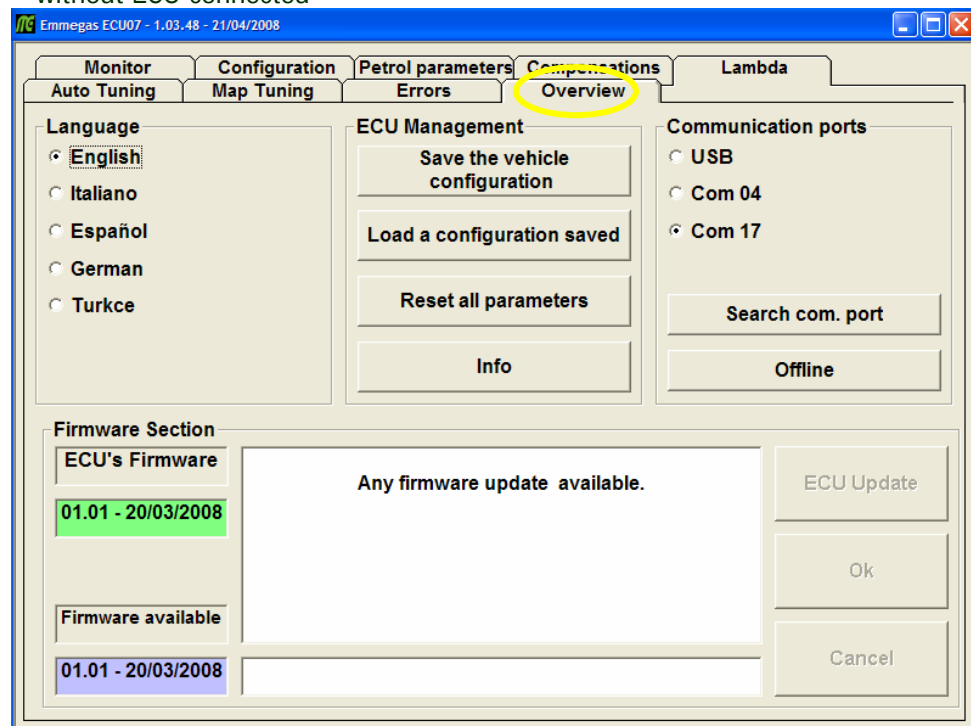
Into the Freeze Frame modality is presented the list showing the condition on which was the vehicle during the last error (instead of the list of errors)

OVERVIEW

EN

Into the top windows are represented the following parameters:

- Language: enable the selection of language
- ECU Management: allows to follow with below indicated options:
 - o Save the vehicle configuration: save the configuration of connected ECU
 - o Load a configuration saved: load on the ECU a previous configuration
 - o Reset all parameters: all values will be reset to the default values
 - o Info: will open the page of the ECU information
- Communication ports: allow the selection of the port required, the possibility of learn automatically the correct port (Search com.port) or to work Offline without ECU connected



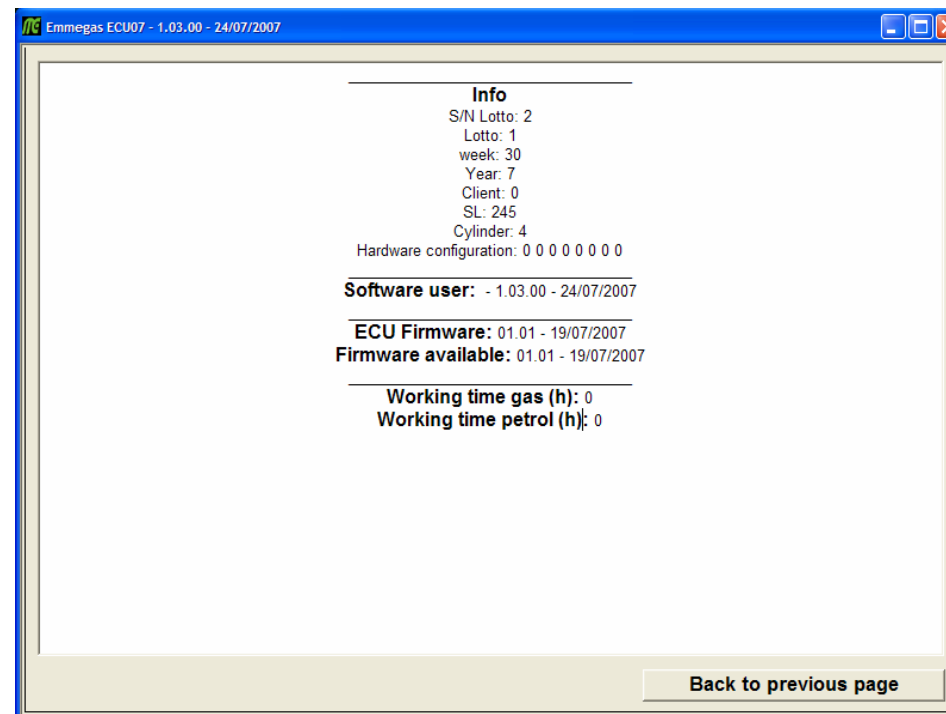
Into the down window are presented all the options concerning the Firmware:

- Version and date of Firmware (present on the ECU and available on pc)
- Instruction for the updating into the central window
- Buttons (on the right side) necessary to proceed with the firmware update
- The update will be possible only if the firmware available is more recent than the ECU firmware

INFO

EN

This page are present all the information concerning the ECU:



- S/N Lot: serial number of production
- Lot: lot of production
- Week: week of production
- Year: year of production
- Client: customer code
- SL: internal manufacturer code
- Cylinder: number of cylinder configuration
- Hardware configuration: internal manufacturer code
- Software user: software release installed on the pc
- Ecu Firmware: firmware release present on the ECU
- Firmware available: firmware release available into the pc
- Working time gas / petrol (h): cumulated working time on the two fuels
- Reset working time: enable the reset of the above times