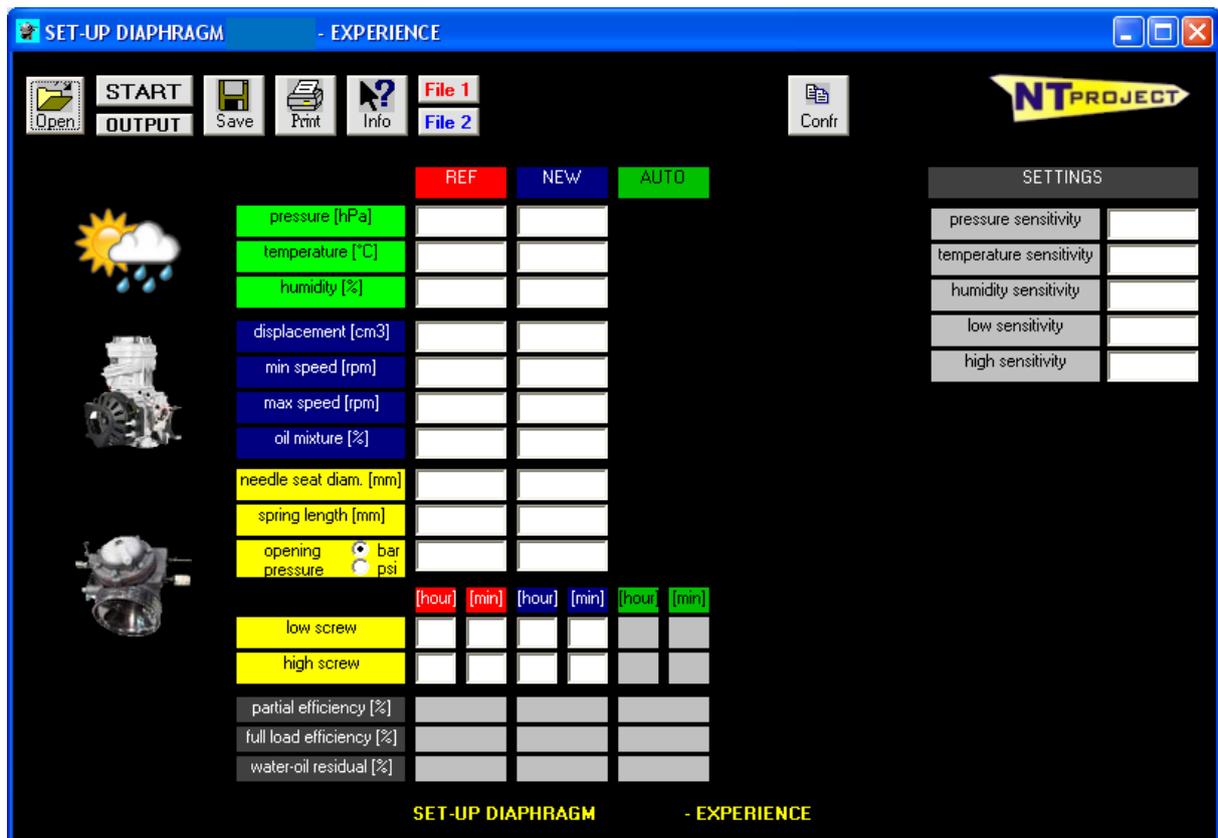


SOFTWARE SET-UP DIAPHRAGM – EXPERIENCE

Presentation

At opening the software screenshot is this:



input data

The software is subdivided into three main areas, one for WEATHER condition, one for ENGINE parameters, and one for CARBURETOR setting.

WEATHER

If you have the weather station enter the value of:

pressure [hPa] -> for example 1013

temperature [°C] -> for example 20

humidity [%]-> for example 40

ENGINE

displacement [cm3] -> enter the engine displacement where is installed the carburetor;
minimum speed [rpm] -> enter the engine operating minimum speed during the track lap, for example 7000;

maximum speed [rpm] -> enter the engine operating maximum speed during the track lap, for example 16000;

oil mixture [%] -> enter the value of your oil mixture, for example 4;

CARBURETOR

needle seat diameter [mm] -> enter the diameter of the seat where goes the needle valve that close the flow of the fuel;

spring length [mm] -> enter the length of the contrast spring of the rocker arm that closes of the flow fuel;

opening pressure [bar o psi] -> enter the pressure that you measure with the specific instrument to open the needle valve, this value in addition with the spring length allows to calculate the spring stiffness that you're using;

low screw [hour] [minutes] -> enter the adjustment of the low screw that you're using, from screw all closed, measure what you open it, each turn corresponds at one hour, instead the intermediate positions are indicated as the minutes of a clock (from 0 to 59), for example 1 hour and 30 minutes corresponds at the screw opens of one turn and half;

high screw [hour] [minutes] -> enter the adjustment of the high screw that you're using, from screw all closed, measure what you open it, each turn corresponds at one hour, instead the intermediate positions are indicated as the minutes of a clock (from 0 to 59), for example 1 hour and 30 minutes corresponds at the screw opens of one turn and half;

How you see, there are two columns for the data entering, one named REF, and the other NEW

| | REF | NEW |
|--|--------------|--------------|
| pressure [hPa] | | |
| temperature [°C] | | |
| humidity [%] | | |
| displacement [cm3] | | |
| min speed [rpm] | | |
| max speed [rpm] | | |
| oil mixture [%] | | |
| needle seat diam. [mm] | | |
| spring length [mm] | | |
| opening pressure <input type="radio"/> bar <input type="radio"/> psi | | |
| | [hour] [min] | [hour] [min] |
| low screw | | |
| high screw | | |

The column REF can be left empty, in this case the reference setting with the relative conditions will be the one entered internally in the software on the base advised from the engine manufacturer, or on the base of our specific test.

The internal reference data can be recalled clicking on:



In the first column will be then shown the reference setting with the relative WEATHER conditions, and of ENGINE operation

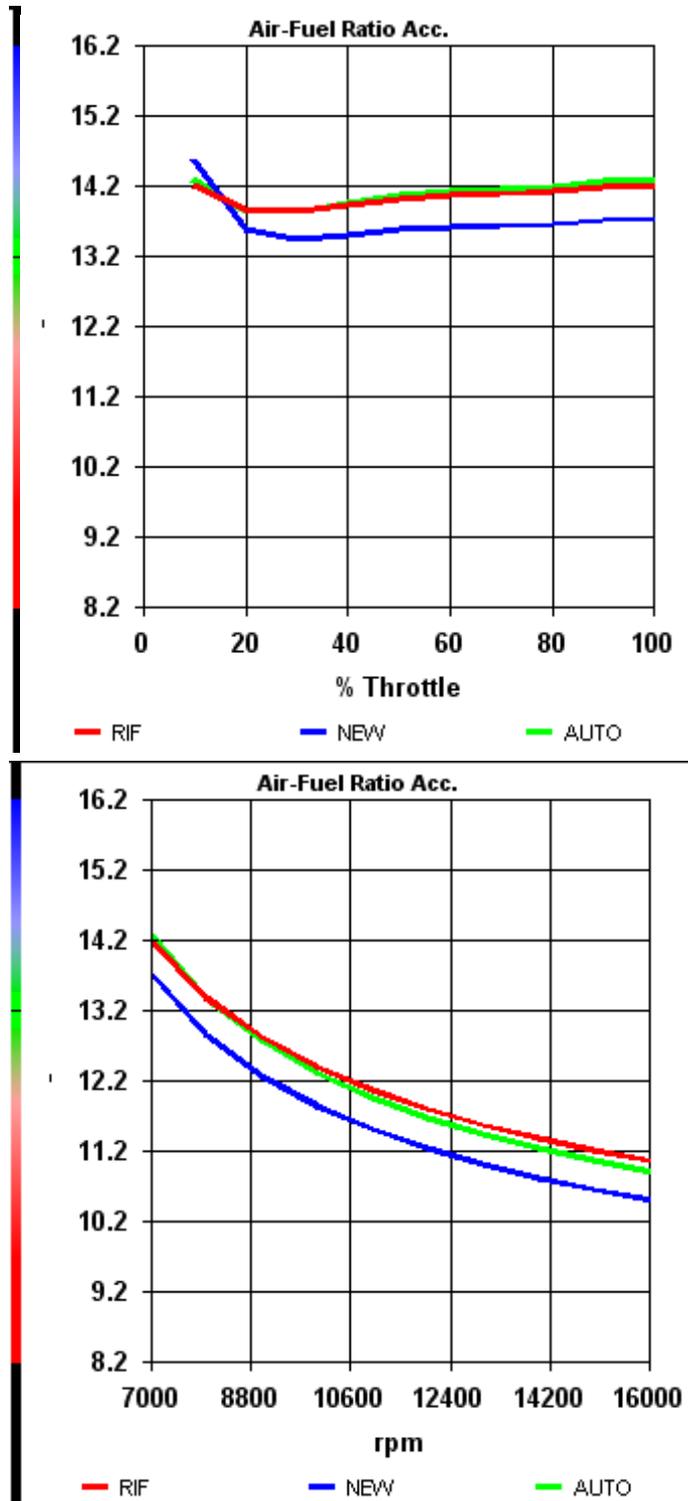
If for your engine and driver, you've found an effective setting different, and you want that the software take this as reference, you should simply enter it in the first column, with the relative WEATHER conditions, and of ENGINE operation.

Entering a new setting, or new conditions in the column NEW you can see how works the carburetor compared to the reference configuration



results

After that you've entered that you want test, and the relative weather and engine conditions, clicking the button START, the software will show the carburation graph, both varying the throttle opening [% throttle], both varying the engine speed [rpm]



The software shows the result of the carburation for the setting and the relative conditions of reference (red line REF), the one of the carburation for the new setting with the relative conditions (blue line NEW), and last the carburation for a setting calculated automatically from the software optimized for the new conditions. (green line AUTO).

The carburation for an optimal combustion must create an air fuel ratio near to 13.2 Obviously being a carburetor is necessary to find the best compromise to have carburations acceptables in all the operation conditions.

In addition to the graphs with the carburation, the software provides also indications on the efficiency level, both at partial load, both at full load. Moreover in function of the air humidity, and of the oil percentage in the mixture, show the residual quantity that will be in the combustion chamber, slowing down the combustion.

| | REF | NEW | AUTO |
|--------------------------|-------|-------|-------|
| partial efficiency [%] | 93.47 | 96.12 | 93.14 |
| full load efficiency [%] | 90.58 | 87.46 | 89.80 |
| water-oil residual [%] | 0.89 | 2.43 | 2.43 |

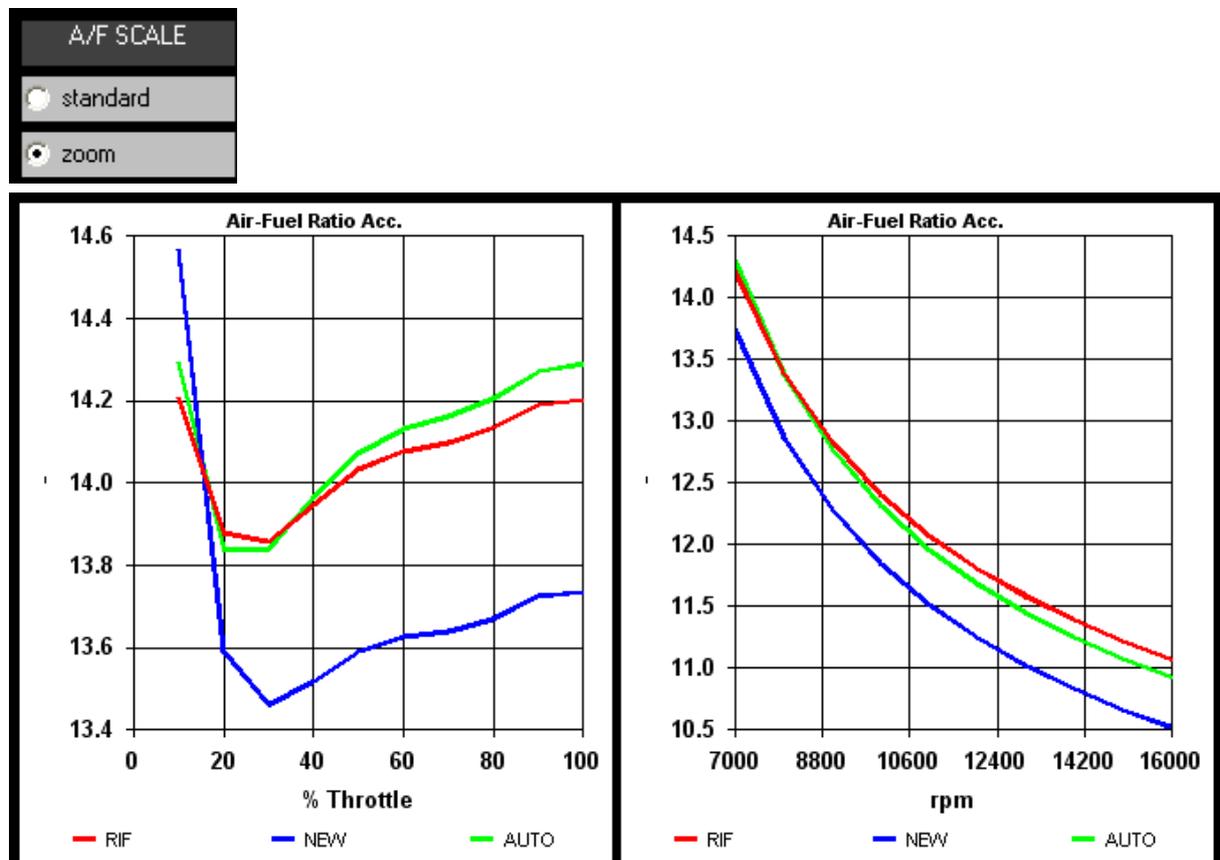
Final the software shows the setting calculated to optimize the carburation in the new conditions of WEATHER, ENGINE, and CARBURETOR.

| | |
|-------|-------|
| AUTO | |
| [ore] | [min] |
| 1 | 1 |
| 1 | 26 |

main uses

- optimize the setting varying the WEATHER conditions → in the column NEW you must simply enter the new values of pressure, temperature, and humidity, detected from your weather station. Clicking START in the column AUTO you'll have immediately the new setting of the screws that you should use;
- optimize the setting varying the ENGINE conditions → in the column NEW you must simply enter the new values of minimum and maximum engine speed detected from your acquisition system in the lap, in function of the track features. Clicking START in the column AUTO you'll have immediately the new setting of the screws that you should use;
- optimize the setting in function of your needs → how we've written above, the software calculates a setting that provides the best compromise for all the operation conditions, but thanks to the software is possible to customize the setting to optimize the carburation only in some operation areas, that could be more useful for the features of your engine, or your driver, then you can act manually on the setting to see the effects on the carburation in the different operation points.

At this regard the software allows to analyze even more in detail the carburation, in fact selecting "zoom" you can see better the difference of behavior with the different settings.



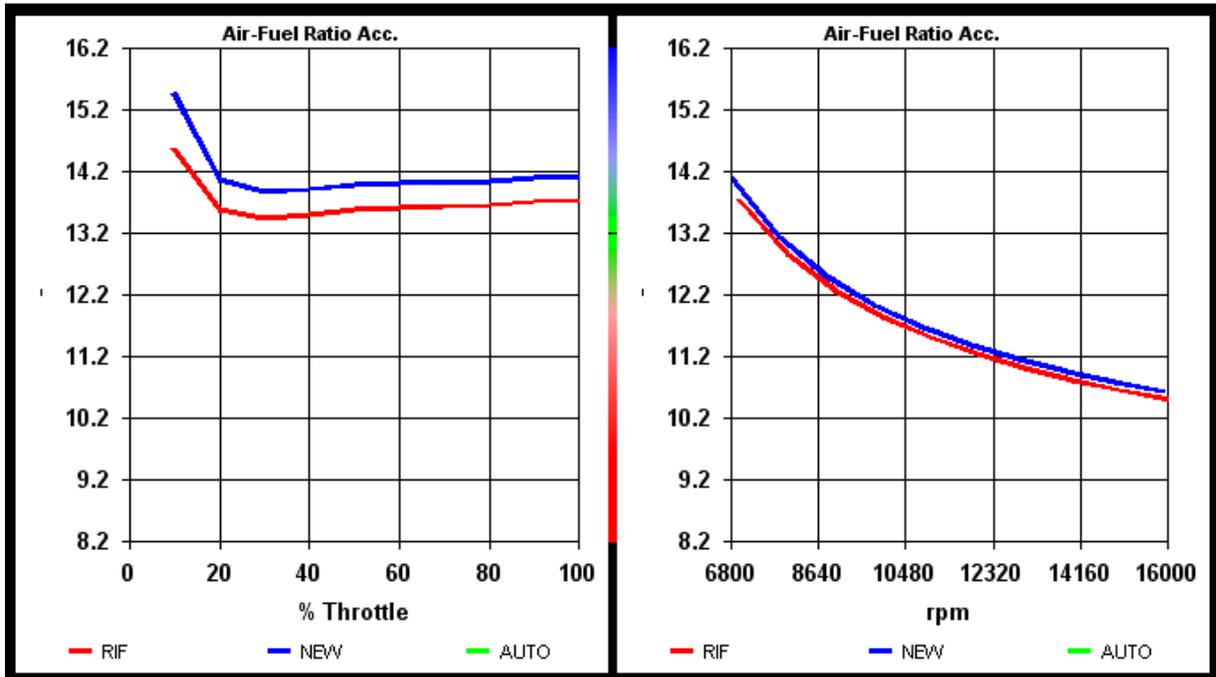
- an other use really important that the software allows, is the individuation of the spring, and of the needle seat diameter, more indicated for your needs → the diaphragm carburetor has two simple circuits to provide the fuel, commanded from the depression that is created in the carburetor, in the venturi, and in the throttle zone, and regulated from the opening of low and high screw. With these simple circuits is difficult to obtain an optimal carburation in all the operation conditions, and how we've written above, is necessary to find a compromise. Therefore the only elements that allows to play to modify this compromise, favoring one area over another, are the spring and the needle seat diameter.

setting comparison

The software SET-UP Diaphragm - Experience allows to compare two setting that you've previously saved. In addition to the file that you open with the button OPEN or the button File1, you must open the comparison file clicking on the button File2.

The software will show the data of the setting that you want compare and the relatives results:

| FILE 1 | | FILE 2 | |
|--------|-------|--------|-------|
| 1013 | | 1009 | |
| 26 | | 23 | |
| 59 | | 68 | |
| 125 | | 125 | |
| 7000 | | 6800 | |
| 16000 | | 15900 | |
| 4 | | 4 | |
| 2.26 | | 2.26 | |
| 14.5 | | 14.5 | |
| 0.7 | bar | 0.7 | bar |
| [ore] | [min] | [ore] | [min] |
| 1 | 0 | 1 | 0 |
| 1 | 35 | 1 | 35 |
| 93.47 | | 93.47 | |
| 90.58 | | 90.58 | |
| 0.89 | | 0.89 | |



open and save data file

If you have already saved a configuration, is advisable to start from that to click OPEN button and selected the saved file.

At this point you can modify the data and clicking on START to have the new simulation.

To save again the data in a new file or overwriting previous to click SAVE button.

print

At the end of the calculation you can print the data entered and the results obtained using the PRINT button.

25/02/2022

*SET-UP DIAPHRAGM - EXPERIENCE
NT-PROJECT di Tabacchi Omar*

System Requirements

The software SET-UP Carburetor PRO can run on all Windows operating systems from 98 to now and requires a minimum screen resolution of 800 x 600 pixels. For memory and cpu all computers, notebooks, netbooks, have characteristics which are sufficient to make work the software correctly.