MODIFLY SOFTWARE

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OPERATING INSTRUCTIONS OF THE MODIFLY PROGRAMME

INTRODUCTION

The new ModiFly programme enables to easily modify the configuration and some setting-up parameters of a converted vehicle. Regarding the setting-up, it is possible to modify the parameters of the acceleration transient conditions, the cut-off advanced exit and the changing over temperature thresholds.

After a modification it is possible to instantly test the vehicle behaviour before saving it on a new file and permanently store it in the Fly ECU. At the end of the operation it is possible to automatically create the upgrading disk.

The same software enables to carry out acquisitions of the signals read by the FLY ECU on a file, in order to analyse them or to send them to the BRC Servicing.

The ModiFly programme can be used to modify the setting-up of all the vehicles for which the BRC Co. markets the Flying Injection system, provided that the ECU software is upgraded with the same software as the one shown in the figure 1 or with a more updated version.

MODIFICATION OF THE CONFIGURATION

DESCRIPTION OF THE SCREEN

With the programme started the screen of the figure 2 will be displayed. It corresponds to the domain where it is possible to carry out the modification of the configuration.

On the top right side there is a red button for the connection and the disconnection with the Flying Injection ECU.

By starting the communication, the changing over from the gas mode to the petrol mode will automatically take place; it is therefore necessary to avoid such an operation in conditions of critical working which could lead to an engine stop.

It is advisable to operate the communication with the vehicle running on petrol.

All the signals and full information on the vehicle setting-up are displayed in column on the screen left side. They are as follows, from the top to the bottom:

- P1: upstream pressure from the Smart distributor (mbar).
- DeltaP: pressure stage between upstream and downstream from the Smart distributor, (mbar).
- MAP: manifold absolute pressure (mbar).
- Temperature: gas temperature at the Genius reducer-vaporiser outlet (°C).
- Lambda oxygen sensor: electrical value of the lambda oxygen sensor signal (mVolt).
- T.P.S.: throttle position sensor

SOFTWARE TABLE	
L0AA	02.0058AA
L0AC	02.0061AC
L0AE	02.0061AE
L0AJ	02.0060AJ
L0AG	02.0060AG
L0AM	02.0055AM
L0AN	02.0055AN
L0AL	02.0055AL
L0AP	02.0053AP
L0AQ	02.0052AQ
L0AS	02.0052AS

Fig. 1: software table

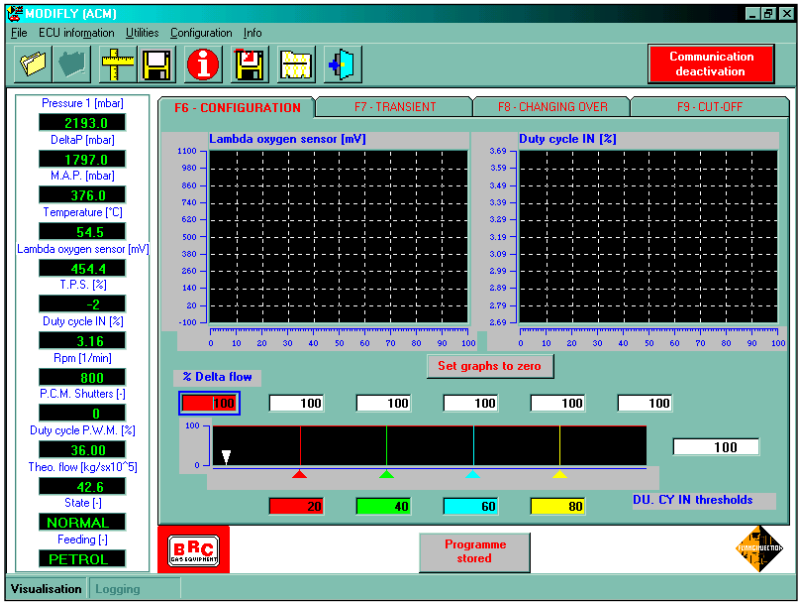

Fig. 2: initial screen

(opening percentage)

• Duty Cycle IN: Duty Cycle of the petrol injectors opening (percentage).

• Rpm: engine revolutions per minute.

• PCM shutter: number of opened PCM shutters of the Smart.

• P.W.M. Duty Cycle: opening Duty Cycle of the PWM shutters of the Smart.

• Theo flow: total gas flow calculated, to be supplied to the engine.

• State: engine working state.

• Feeding: it shows whether the vehicle is running on gas or on petrol.

On the upper side of the card there are two graphs depicting the progress of the Lambda oxygen sensor and of the Duty Cycle, and some squares where it is possible to write the configuration correction percentages (Delta Flow) and the Duty Cycles to which apply them. The applied correction will be also displayed on the graph near the squares and the immediate applied correction will be shown in the last square on the right. The cursor moving inside the graph shows the Duty Cycle the vehicle is working at and therefore which point of the configuration we are modifying.

To modify the numbers inside the squares it is sufficient to 'click' on them (the selected square will be outlined in blue), clear the set figure (by pressing the spacing bar) and enter the new figure. The Delta flow shows the per cent correction of the gas flow supplied at the duty cycle you are working at; if I write 110 I enrich the mixture by the 10%, otherwise, if I write 90 I lean the mixture by the 10%. With the square selected, it is possible to increase or decrease (by one unit) the displayed value, by using respectively the + and – buttons.

The 'Set graphs to zero' button enables to reinitialise the graph screen by narrowing the window limits around the values assumed by the duty cycle in that moment.

CONFIGURATION CHECK AND MODIFICATION

After having checked the correct installation of the equipment and the good reading of the signals, if the vehicle is still having an irregular behaviour, it is necessary to check the configuration and its correction.

With the ModiFly programme and the communication started (by clicking on the 'Communication starting' button), to carry out the configuration correction it is necessary to:

• detect the duty cycle domain the vehicle is working at while it is running on petrol. To do this, read the duty cycle of the idle speed and the maximum duty cycle in an acceleration in the third gear with the throttle valve completely opened. The duty cycle over which the vehicle is out of control ought therefore to be found out. We will call it extreme duty cycle. During the tests it is necessary to check that the lambda oxygen sensor is in control or fixedly rich at 'full load'. If, while testing on petrol, the oxygen sensor's behaviour is not correct, we should eliminate the causes of the malfunction before checking the gas configuration.

The duty cycle value detected at the idle speed is to be entered in the first (red coloured) square on the x-axis of the graph whereas the extreme duty cycle value is to be written in the last (yellow coloured) square. In the second (green coloured) square you should enter a value approximately corresponding to the duty cycle of the idle speed + 10; in the third square you should enter an average value between the second and the fourth square.

For example, if you have a vehicle with a duty cycle at the idle speed of the 3%, maximum duty cycle of the 70% and extreme duty cycle of the 45%, the 4 values to be entered in the squares will be the following: 3% - 13% - 31% - 55% (figure 3).

• The configuration is therefore checked by comparing the duty cycle value of the injectors while running on petrol with the one obtained while running on gas. If the configuration is too lean, the duty cycle while running on petrol is lower than the one obtained while running on gas and it will be then necessary to enrich the configura-

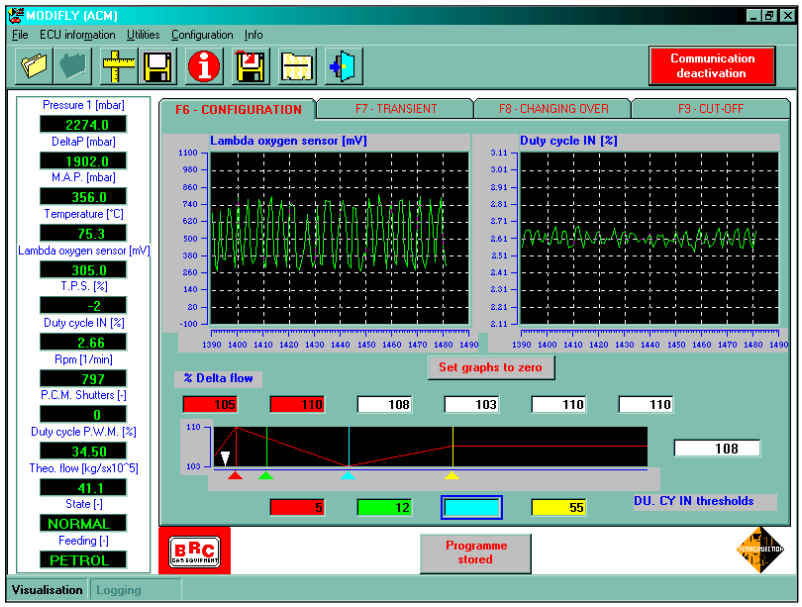

Fig. 3: screen of the configuration correction

tion. To do this, you should increase the Delta flow in the square corresponding to the duty cycle which is the closest to the running one. In order to simplify the identification of the Delta flow to be modified, the squares of the Delta flow acting on the point you are working in are coloured in red. Otherwise, if the duty cycle while running on petrol is higher than the one obtained while running on gas, it means that the configuration is rich. The Delta flow of the squares outlined in red ought therefore to be decreased.

• Check and correct the configuration in a certain number of points where the vehicle is in control. Be sure that the mixture is always rich at the full load. To do this, the lambda oxygen sensor signal is observed during an acceleration with the throttle valve totally opened, from 1000 rpm up to the runaway speed rate (preferably in the third gear). If the lambda oxygen sensor signal doesn't remain rich, the configuration ought to be enriched at the duty cycles where the vehicle ran in lean conditions. The squares of the Delta flow to be modified for the enrichment adjustment at full load are generally the last two ones.

SAVING THE NEW CONFIGURATION ON THE ECU AND PC

After the corrections and the inspections, it is possible to create a file containing the new configuration or to go to another of the four cards.

To save the configuration in a new file it is necessary to click on the function-button on the left top, identified by the rule-shaped icon. In the screen that will appear it will be necessary to enter the vehicle's data and other useful suggestions to distinguish the new configuration from the others. For example, if one has worked on a Fiat Bravo 1.6 with Magneti Marelli injection ECU n° IAW 49F B9, the screen will be filled in as shown in the figure 4. The 'Smart to be mounted' and 'Installation type' domains are automatically filled in by the programme on the basis of the data already in the ECU. To save, you will have to click on the 'Save' button or on the 'Quit' button to go back to the previous screen without saving.

On the contrary, if you want to go to another card, you will be asked whether you want to reprogram the Fly ECU with the new configuration or to go on working with the old one (figure 5). By clicking on the 'YES' button, the Fly ECU will be reprogrammed, so that the following set-up operations will be carried out by using the new configuration. On the contrary, if you click on the 'NO' button, you will go on working with the old configuration.

The storage of the new configuration in the ECU can be started also by clicking on the 'Programme stored' button, positioned in the screen lower part.

We advise to change over the feeding on petrol before reprogramming the ECU because such an operation could cause the vehicle

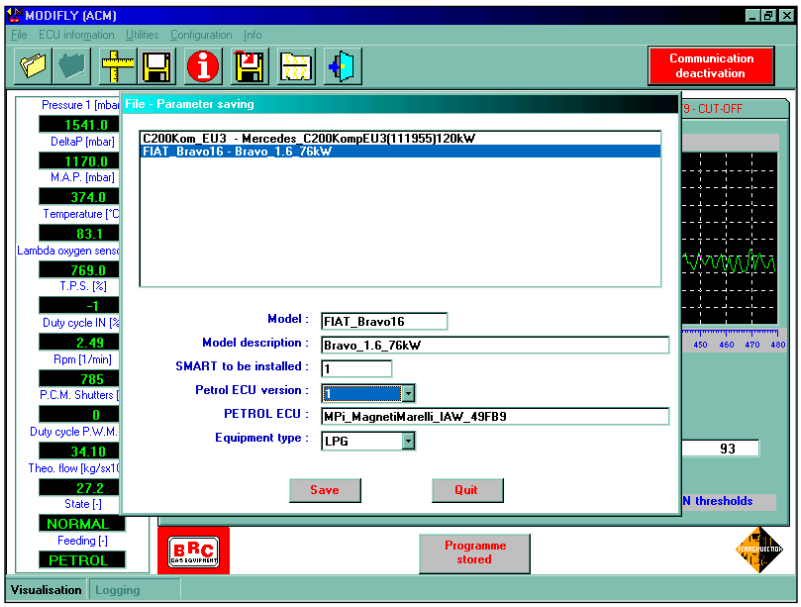

Fig. 4: screen for saving the new configuration

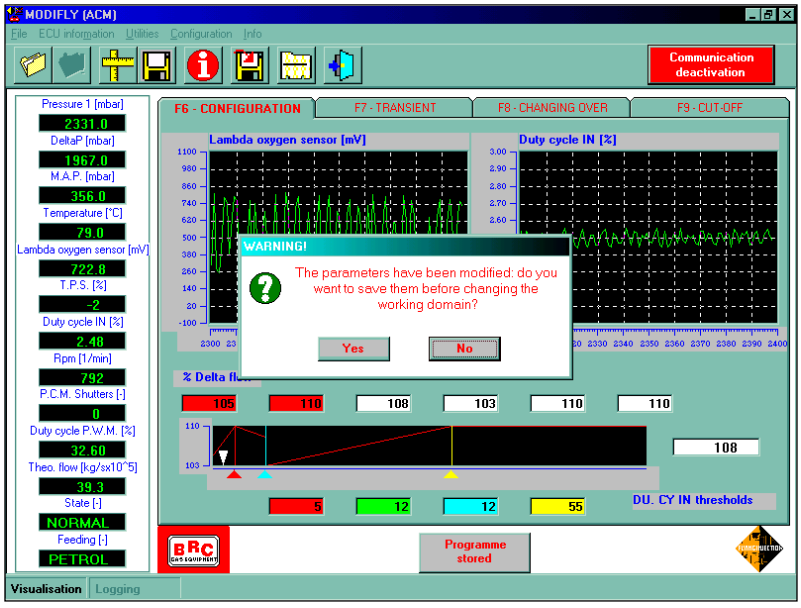

Fig. 5: screen for saving the new configuration in the Fly Gas memory

stop.

TRANSIENT CONDITIONS

DESCRIPTION OF THE SCREEN

In the transient condition set-up directory (figure 6), you can amend four parameters in percentage. Every parameter can be modified by clicking on the attendant cursor and dragging it to the right (to increase) or to the left (to decrease) or by directly writing the wanted value in the blank square. With the modified parameter, the attendant square turns red and shows the correction percentage to be applied. To test the modification it is necessary to press the 'Apply the modified values' button (in the left lower part), whereas if you press the 'Apply initial values' button the original parameters are applied again. During these tests, the modifications are not stored in the ECU in a permanent way, if you switch off the ignition they are lost. With a satisfactory set-up it is necessary to store it in the ECU by clicking on the 'Programme stored' button in the right lower part.

The black squares contain the extreme values which can be assigned to the various parameters.

On the left there are always the numerical values of all the useful signals to check the system correct working.

DESCRIPTION OF THE PARAMETERS AND THEIR USE

Enrichment.

The enrichment enables to adjust the transient condition richness. Setting this parameter to zero the transient conditions will be very lean whereas by setting the enrichment to 400 the richness of the original transient condition increases, by multiplying the add-on by four.

Pumping.

The pumping is a second manner of enrichment acting in a more marked way on the initial phase of the transient condition. The pumping is only positive, that is it only enables to enrich. It is to be used to compensate any 'lean mixture drops' in the early instants of an acceleration transient condition or at the pickup.

Sensitivity.

The transient conditions are started by increasing the TPS signal; the sensitivity adjusts the strategy starting threshold; if you decrease it, the entry in a transient condition at the minimum movement of the TPS signal is easier. On the contrary, if you increase the sensitivity, the transient condition starting is more difficult or late.

The correct calibration of this parameter becomes extremely important when the TPS signal is very variable, even in stationary conditions.

In such conditions, if the sensitivity is too low, the transient conditions are actually likely to start in stationary idling conditions, by provoking r.p.m. fluctuations. If the sensitivity is too high, the transient condition strategy is not likely to start for slow movements of the accelerator and can cause 'mixture drops' at the pickup or while accelerating.

Transient condition duration.

This parameter enables to adjust the transient condition duration. If you set the parameter to zero, the transient condition is almost inexistent, whereas with a value of 400 the transient condition duration is quadrupled.

The good adjustment of such a parameter is very important to make the passage from the transient condition to the normal or stationary working imperceptible. An incorrect transient condition duration can cause jerking, sagging and mixture drops while accelerating or even the engine stalling.

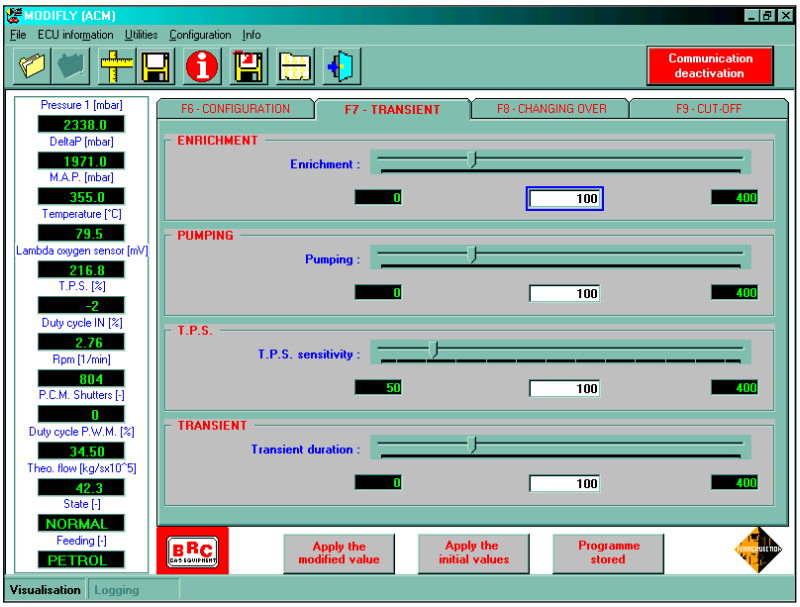

Fig. 6: screen for setting up the transient conditions

GENERAL NOTIONS FOR THE TRANSIENT CONDITION ADJUSTMENT

For a correct use of the transient conditions it is first of all necessary to calibrate the sensitivity so that the strategy intervenes with a minimum delay at every movement of the accelerator but that it is not started by the ignition of loads such as air conditioning, driving steering or electrical windows. Such an adjustment is to be carried out by checking the square of the state that points out when the transient condition intervenes and how long it lasts.

Should the sensitivity be too low, you run the risk of provoking oscillations at the idle speed, caused by the starting of the transient conditions with a stationary working; if not, should the sensitivity be too high, it can cause an excessive delay or even exclude the strategy for little movements of the accelerator.

To adjust the richness of the transient condition it is necessary to observe the behaviour of the lambda oxygen sensor and be sure that it doesn't remain lean for a too long time. To know which is the correct behaviour of the lambda oxygen sensor, it is advisable to observe its behaviour while running on petrol and to try to recopy it while running on gas.

In general, by increasing the enrichment the whole transient condition is enriched, whereas by increasing the pumping parameter its initial part is enriched to a greater extent.

To check the effect of the modifications it is sufficient to click on the 'Apply the modified values' button and if you want to use the initial parameters again you will click on 'Apply the initial values' button. To save the new transient conditions in the ECU memory, it is necessary to click on 'Stored programme'; at this point you will be asked to confirm by choosing whether to send the 'modified values' or the 'initial values' or to undo the operation (figure 7).

It is finally possible to save all the modifications on a new file by clicking on the disk-shaped icon (in the left upper side), as explained in the paragraph regarding the modification of the configuration.

CUT-OFF

DESCRIPTION OF THE SCREEN

The cut-off modification directory and the transient condition directory are structured in a similar way.

You can modify three parameters. Every parameter can be increased or decreased by clicking on the attendant cursor and dragging it respectively rightwards or leftwards; otherwise, the modification value can be written directly in the blank square.

In the lower part of the card you will find the 'Standard values' followed by a small square. By clicking on the small square it is possible to assign a standard value to all the parameters controlling the Cut-Off strategy, that is a suitable value for most motor vehicles.

DESCRIPTION OF THE MODIFIABLE PARAMETERS AND THEIR USE

The Fly system normally recopies the strategies applied by the petrol injection control system. Sometimes it can be nevertheless useful to leave them out in order to obtain a better behaviour or to prevent the engine from stalling. One of the working conditions where it is often necessary is the Cut-Off. By "Cut-Off" we mean the running condition of the vehicle where the injection time is null and therefore no fuel enters the cylinders. In order to slow down the r.p.m. drop and enable a better return to the idle speed, it can be useful to leave the Cut-Off in advance if compared with the normal running on petrol. It can be obtained by properly adjusting the following parameters (figure 8 on page 8).

Cut-Off exit r.p.m. threshold.

The Cut-Off exit threshold shows the r.p.m. at which the gaseous injection starts injecting again. A typical value assigned to this parameter is 2,000 r.p.m.

Sensitivity on the r.p.m. drop.

To start the Cut-Off advanced exit it is not sufficient that the r.p.m.

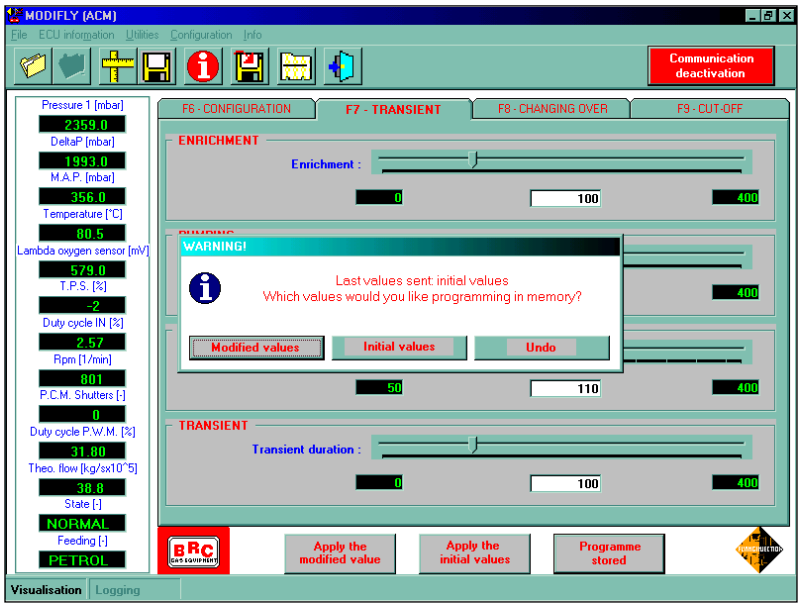

Fig. 7: screen for the permanent programming of the transducers setting up

is lower than the threshold, but it is also necessary that it is decreasing with a certain quickness. This condition is requisite in order to avoid an excessive enrichment which would prejudice the correct return to the idle speed. The 'Sensitivity on the r.p.m. drop' is the parameter defining the r.p.m. drop speed over which the Cut-Off advanced exit starts.

If you want to slow down the r.p.m. drop substantially it is therefore necessary to set a low Sensitivity in the absolute value, by using correction percentages lower than 100. Too low sensitivities can nevertheless lead to an excessive enrichment and therefore to problems related to the wear and tear of the engine brake, to the tip-out and to the return to the idle speed.

Cut-Off exit enrichment.

The enrichment of the Cut-Off advanced exit enables the mixture enrichment adjustment when leaving the Cut-Off. This parameter shows a per cent correction of the original value too.

Standard values.

By clicking on the small square beside the 'Standard values' it is possible to send the standard values of the parameters controlling the Cut-Off advanced exit to the ECU memory. This operation is always to be carried out in case the strategy is not active yet.

GENERAL NOTIONS FOR THE CUT-OFF ADJUSTMENT

Before adjusting the Cut-Off exit, it is necessary to check whether the strategy is already active, by accelerating with the stationary vehicle at the idle speed and in neutral. If the strategy is already started the Usc Cut-Off state will appear in the state square.

Should the Cut-Off advanced exit not be used yet, it is necessary to send the standard parameters to the ECU by clicking on the small square beside the 'Standard values'.

Once the strategy is active, the parameters can be calibrated. To reduce the r.p.m. dropping speed, you can: increase the 'Cut-Off exit threshold', decrease the 'Sensitivity' and increase the 'Cut-Off exit enrichment'. It is therefore necessary to try the strategy correct behaviour for a certain number of times, both by accelerating in neutral and with the stationary car, and by doing long tip-outs with the engine brake, repeated with different gears in. If during these tests of the engine brake you notice some jerks, it will be necessary to increase the sensitivity and decrease the enrichment.

During the strategy set-up you are recommended to modify only a parameter at a time and to check immediately the changes on the vehicle's behaviour. To do this, it is sufficient to click the 'Apply the modified values' button; then, if you want to use the initial parameters again, you will click the 'Apply the initial values' button. To save the changes in the ECU memory it is necessary to click on the 'Programme stored' button; at this point you will be asked to confirm by choosing whether to send the 'Modified values' or the 'Initial values' or to undo the operation.

It is then possible to save all the modifications made on a new file by clicking on the disk-shaped icon (on the left top), as already explained in the paragraph regarding the configuration modification.

CHANGING OVER

DESCRIPTION OF THE SCREEN

The changeover adjustment directory and the Cut-Off directory are structured in a similar way.

It is possible to modify four parameters. Each parameter can be increased or decreased by clicking on the attendant cursor and dragging it respectively rightwards or leftwards; otherwise, the modification value can be written directly in the blank square. Some black squares containing the initial values of the modifiable parameters are lined-up on the right side (figure 9).

In the lower part of the screen you will find again the buttons for the Application of the modified values, the Application of the initial values and the Programming in memory of the new parameters.

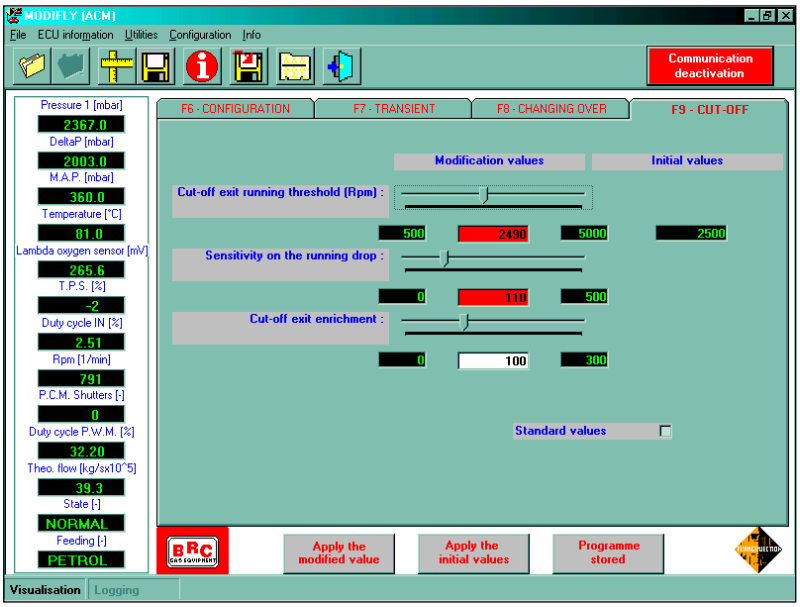

Fig. 8: screen for setting up the Cut-Off advanced exit

DESCRIPTION OF THE MODIFIABLE PARAMETERS AND THEIR USE

Changing over temperature for cold vehicle.
This parameter represents the temperature that gas has to attain at the reducer outlet to start changing over after the 'Cold vehicle changing over delay'. The typical value of this parameter is 25°C.

Changing over temperature for warmed up vehicle.
This parameter represents the temperature that gas has to attain at the reducer outlet to start changing over before the 'Cold vehicle changing over delay'. This parameter is usually set at 40°C.

Changing over delay for cold vehicle.
The changing over delay for cold vehicle is the time (in seconds) from the engine starting up to pass from the changing over threshold for warmed up vehicle to the changing over threshold for cold vehicle. A 30-second delay is usually set.

Changing over temperature with the forced gas mode.
This parameter represents the temperature above which the forced gas changing over starts. The typical value assigned to this parameter is 40°C.
For example, with the values observed in the figure 9 a vehicle which has just been started up will change over to gas only if temperature is above 34°C (changing over temperature for warmed up vehicle). After 30 seconds (Changing over delay for cold vehicle) it changes over if the gas temperature is above 24° C (Changing over temperature for cold vehicle).
The forced gas changing over will be possible only when the gas temperature is above 34° C.

FUNCTION BUTTONS

The function buttons are aligned on the screen upper part, below the curtain menus. They rapidly resume some programme functions.

ACQUISITION AND SAVING OF AN ACQUISITION FILE

The first two function buttons, characterised by a folder-shaped icon, start and stop the acquisition of the signals processed by the Flying Injection ECU.

By clicking on the first button you open a screen where you have to enter the vehicle data and the name for the acquisition file. The figure 10 on page 10 depicts an example of card filling in. If you want to start the acquisition you just have to click on the 'Store' button (on the left bottom), if you want to go back to the previous screen without acquiring you have to click on the 'Quit' button. To stop acquiring you have to click on the second function button characterised by a crossed folder. At this point the programme has created an acquisition file and has recorded it.

After an acquisition it is possible to restart it by saving data on a new file, or on an already created one. To go on saving on an existing file, it is sufficient to select it, by clicking on its name in the 'Acquisition start' screen and to confirm by clicking on the 'Store' button. At this point you will be asked whether you want to reopen the old file (losing the previously acquired data) or to go on writing the new data at the bottom of the already stored ones or whether you want to undo by going back to the previous screen (fig. 11).

If you wish to read the file or to send it to the servicing you just have to take the wanted file and to save it in a working directory or on a disk. To carry out this operation it is necessary to click on the sixth function button (characterised by the disk icon with a red arrow) and select the 'Save acquisitions' option. At this point you will open the screen depicted in the figure 12, in whose upper part you will find the list of the filed acquisitions. You select the wanted file by clicking on the small square beside and full information on the acquisition will be displayed in the central part of the screen. In the lower part of the screen it is possible to chose where to save the acquisition file. With the configurations carried out, it is sufficient to click on the 'Save' button to save the wanted file, or to

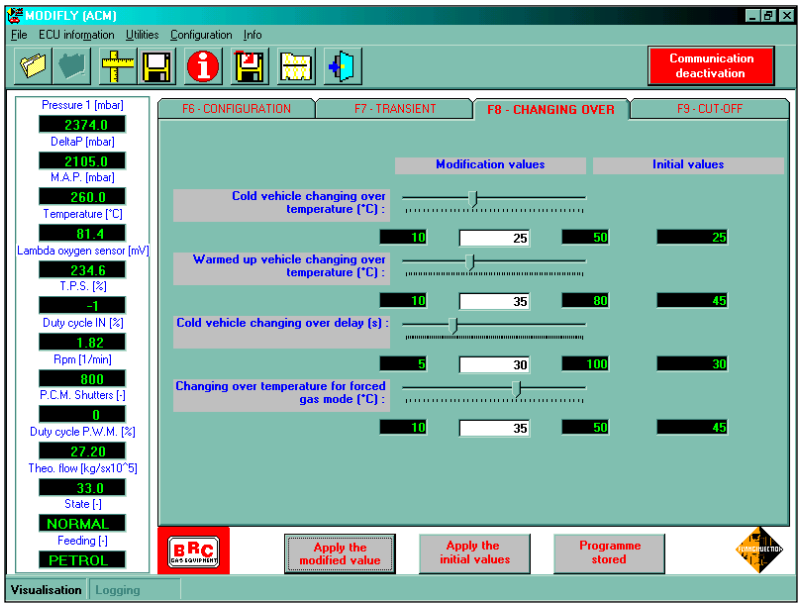

Fig. 9: screen for setting up the changing over temperatures

click on ‘Quit’ to go back to the previous screen.

If you want to read the acquisition file, it is sufficient to open the file with the ‘.dat’ extension; the first line contains the description of the acquired quantities, in columns; the second line contains the referred unit of measure.

SAVING THE SETTING-UP AND CREATION OF THE UPGRADING DISK

By clicking on the third function button or by selecting from the ‘File’ – ‘Configurations’ – ‘Parameter saving’ curtain menu, it is possible to create a new file where to save the carried out set-up.

Before saving, a card will be displayed (figure 13 on page 10) in whose upper part there is the list of the existing files and in whose central part there are the domains where to enter the set-up vehicle characteristics. The ‘Petrol ECU version’ domain enables to associate three different petrol ECU versions to the same model. With the card filled in, to save it is necessary to click on the ‘Save’ button.

A new set-up file has been like this filed in the ModiFly programme.

By clicking on the fourth function button, characterised by a disk, you can create an upgrading disk to move the new configuration to the BRC Flying Injection programme for installers. The card that is displayed is depicted in the figure 14; by clicking on the small square beside the file name it is possible to select the configurations to be moved to the upgrading disk. At this point you just have to enter a blank disk into the “A” driver and to click on the ‘Create’ button.

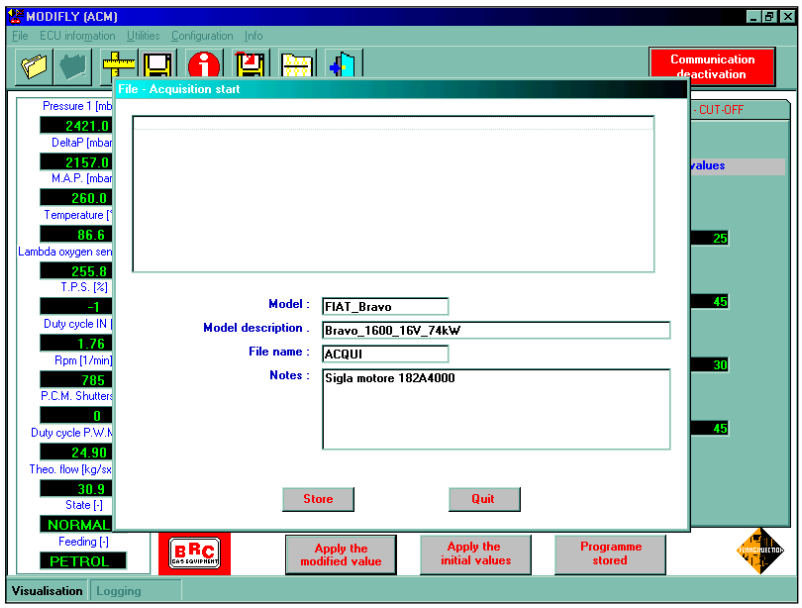

Fig. 10: screen for an acquisition storage

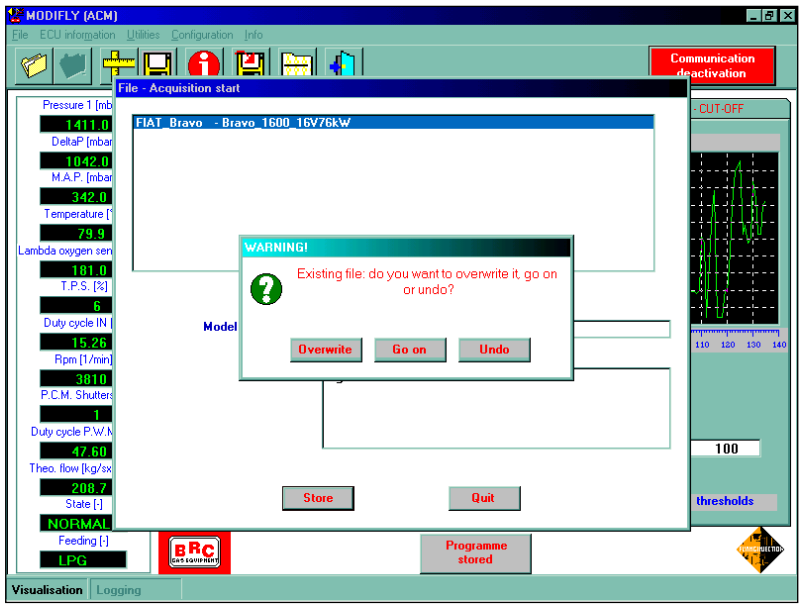

Fig. 11: message for an acquisition storage on an existing file

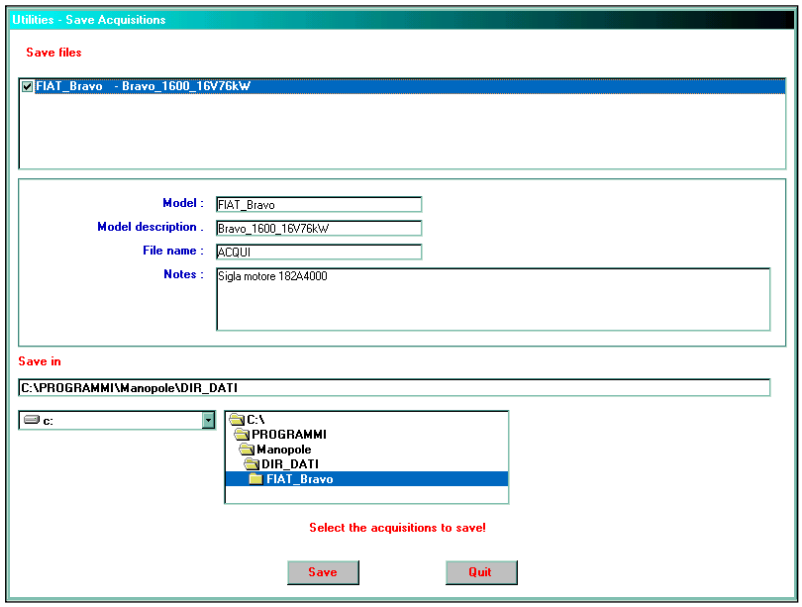

Fig. 12: screen for saving an acquisition file

ECU INFORMATION

By clicking on the fifth function button, characterised by an 'i' inside a red disk, it is possible to open a card summarising all the characteristics of the Flying Injection ECU, of the software and of the stored configuration. The dates of the equipment installation and latest overhauling also appear (figure 15).

CONFIGURATION

By clicking on the seventh function button, characterised by a folder with a black bar, it is possible to open the configuration menu, in order to modify the serial parameters or the language.

Serial.

The serial parameters for the correct working of the ModiFly programme are the following:

- Serial: COM1
- Baud rate: 19200
- Parity: none
- Data bit: 8
- Stop bit: 1

If the configuration of your computer is different you are recommended to modify it according to the above suggested parameters and to save the configuration by clicking on the 'Save' button.

Language.

By selecting the 'Language' option from the configuration menu, the screen of the figure 16 (page 11) will be displayed. From this screen it will be possible to select the programme language. To select a new language it is necessary to click on the attendant symbol and on the 'Save' button. At this point a message will warn you to restart the programme to apply the configuration modification.

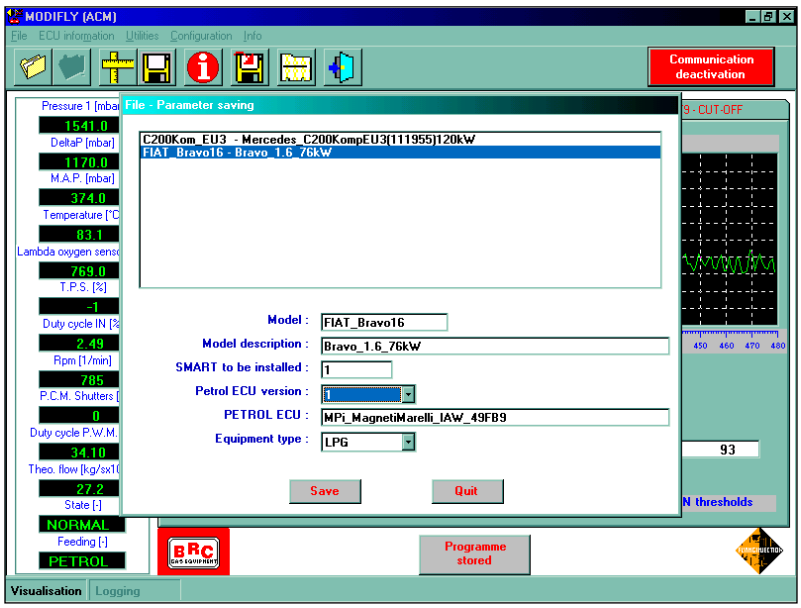

Fig. 13: screen for saving the filed configuration

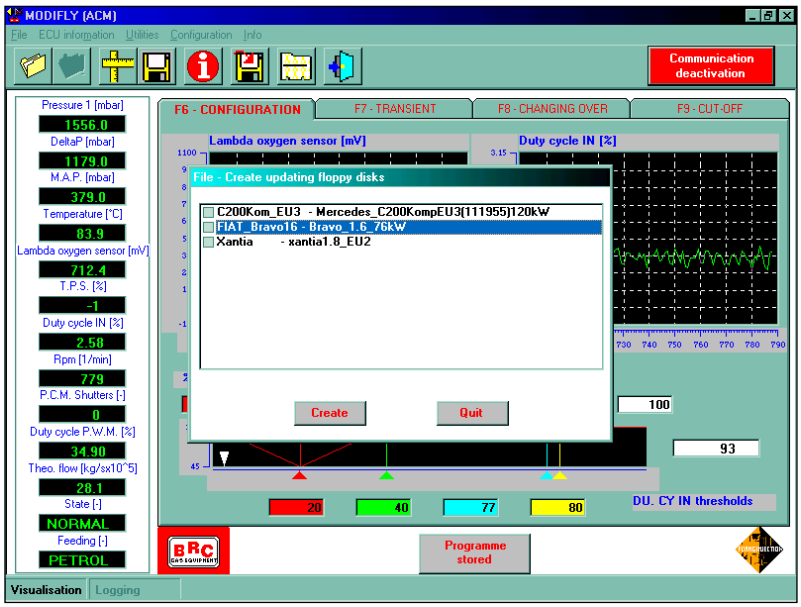

Fig. 14: screen for the upgrading disk creation

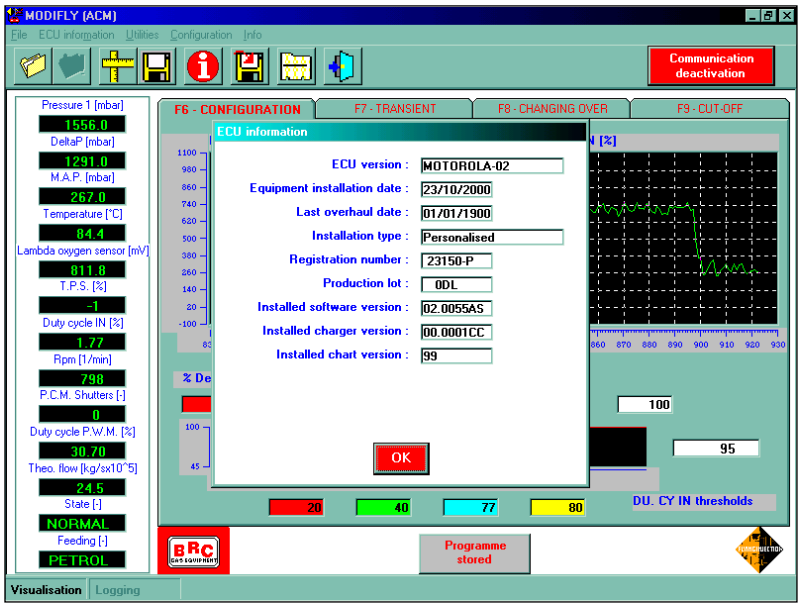

Fig. 15: summarising card of the ECU information

CLEARING THE ACQUISITION FILES.

In case you have any unnecessary acquisition files, it is possible to delete them by clicking on 'Clear acquisition file' from the 'File' – 'Acquisitions' curtain menu; the screen depicted in the figure 17 will then appear. Select the acquisitions to be deleted in the screen upper part where there is the list of the existing files. In the central part the referred vehicle data will appear: if you want to confirm the deletion, click on the 'Clear' button, if you want to go back to the previous screen without deleting the acquisition, click on the 'Quit' button.

CLEARING THE SETTING-UP FILES.

If you have any unnecessary configurations, it is possible to delete them by clicking on 'Clear configuration' from the 'File' – 'Configurations' curtain menu; the screen depicted in the figure 18 will then appear. Select the configurations to be deleted in the screen upper part, where there is the list of the existing files. In the central part the vehicle data of the selected configuration will appear; if you want to confirm the deletion, click on the 'Clear' button, if you want to go back to the previous screen without deleting the file, click on the 'Quit' button.

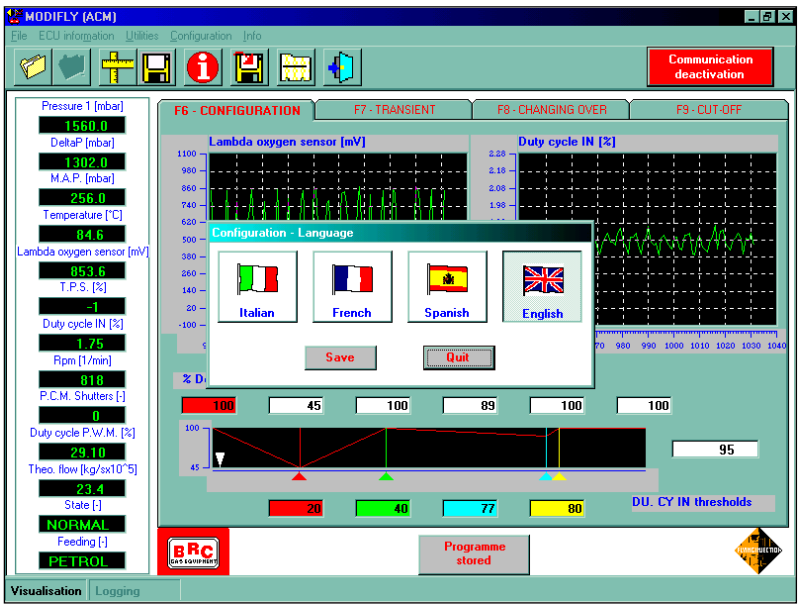

Fig. 16: screen for the language selection

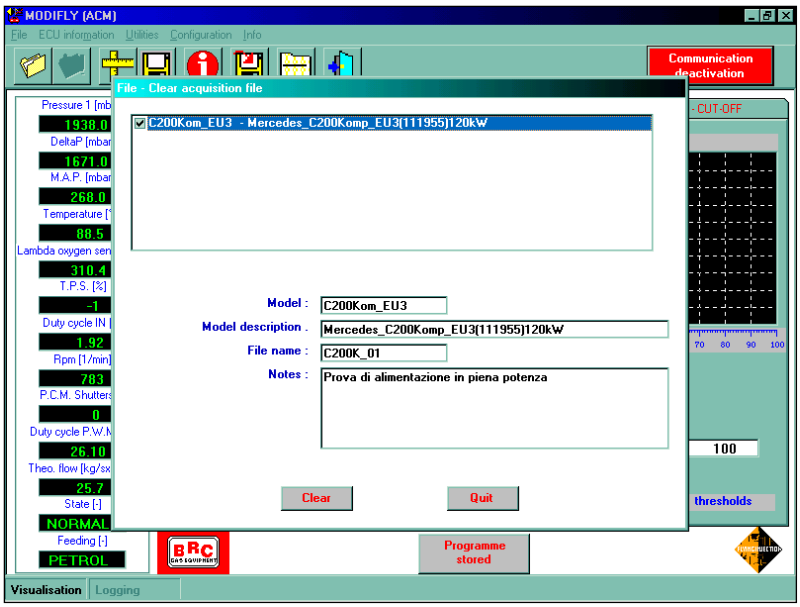

Fig. 17: clearing the acquisition files

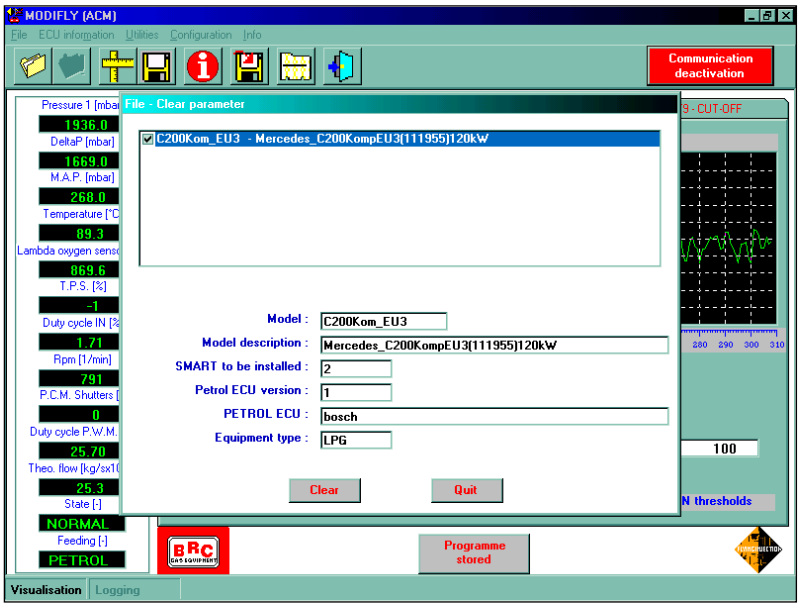

Fig. 18: clearing a setting-up file