Installers' Software Version 2.6

INSTRUCTION HANDBOOK

CONTENTS

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A NEW INSTALLATION PHILOSOPHY

To the installer

We compliment you on your choice, however, we would like to call your attention on a few aspects designed into the new vapour phase **LPG** and **CNG** injection system.

FLYING INJECTION is a completely new and innovative product, whose technical characteristics and performances are highly advanced. In order to guarantee the best results and to assure complete satisfaction to the end user (your customer), we recommend that you read carefully the Installation Guide and the assembly instructions specific to each vehicle.

With the purchase of your first new Flying Injection system, **your methods of fitting and setting are now going to change.** In a traditional induction system the characterising element was the mixer, now, for the Flying Injection system, it is **the cartography inside Fly Gas ECU.**

This difference as against the traditional system requires a new installation philosophy: **components cannot be purchased separately** and fitted according to professional skills and experience, the system is designed in such a way that you are able to purchase **two kits**, a common kit containing the basic components for installation (basic kit) available both in the LPG version than in the CNG one, and another kit specific to each application (dedicated kit).

A basic LPG kit contains:

- 1 Fly Gas ECU without cartography
- 1 harness
- 1 LPG Genius reducer with temperature sensor integrated
- 1 Smart distributor
- 1 LPG Pressure sensor
- 1 specific ET98 solenoid valve
- 1 bag containing the standard clamps for Genius and Smart, a fuse holder, 4 nozzles, screws and small parts for general installation.

A basic CNG kit contains:

- 1 Fly Gas ECU without cartography
- 1 harness
- 1 CNG Genius reducer with temperature sensor integrated
- 1 Smart distributor
- 1 CNG Pressure sensor
- 1 CNG charge solenoid valve
- 1 bag containing the standard clamps for Genius and Smart, a fuse holder, 4 nozzles, screws and small parts for general installation.

A dedicated kit contains:

- 4 (or 5 or 6, according to the number of cylinders) 4x10 gas pipes and the relative swaged fittings
- The dedicated clamps for Genius and Smart units with the relative screws
- 1 10x17 gas pipe of correct length with relative swaged fittings
- 2 4x10 gas pipes of the correct length with relative swaged fittings
- 1 personalized changeover switch (where it is possible) or a standard one
- 1 MAP (if necessary)
- 1 4x10 gas tube of the correct length with pipe-fittings (if necessary)
- 2 120° elbows for Smart distributor (if necessary)
- the necessary modulars

any other component necessary for each specific vehicle.

The **use of the dedicated kit**, although not compulsory (some of these components may be purchased separately) is **highly recommended**, as the components are pre-manufactured to make installation easier and to cut down installation time.

The reduction of the installation time, along with the **setting procedure, simple and fast because of the absence of adjustment,** will give you a noticeable **saving** in labour costs plus reducing the time a client vehicle will be in your workshop.

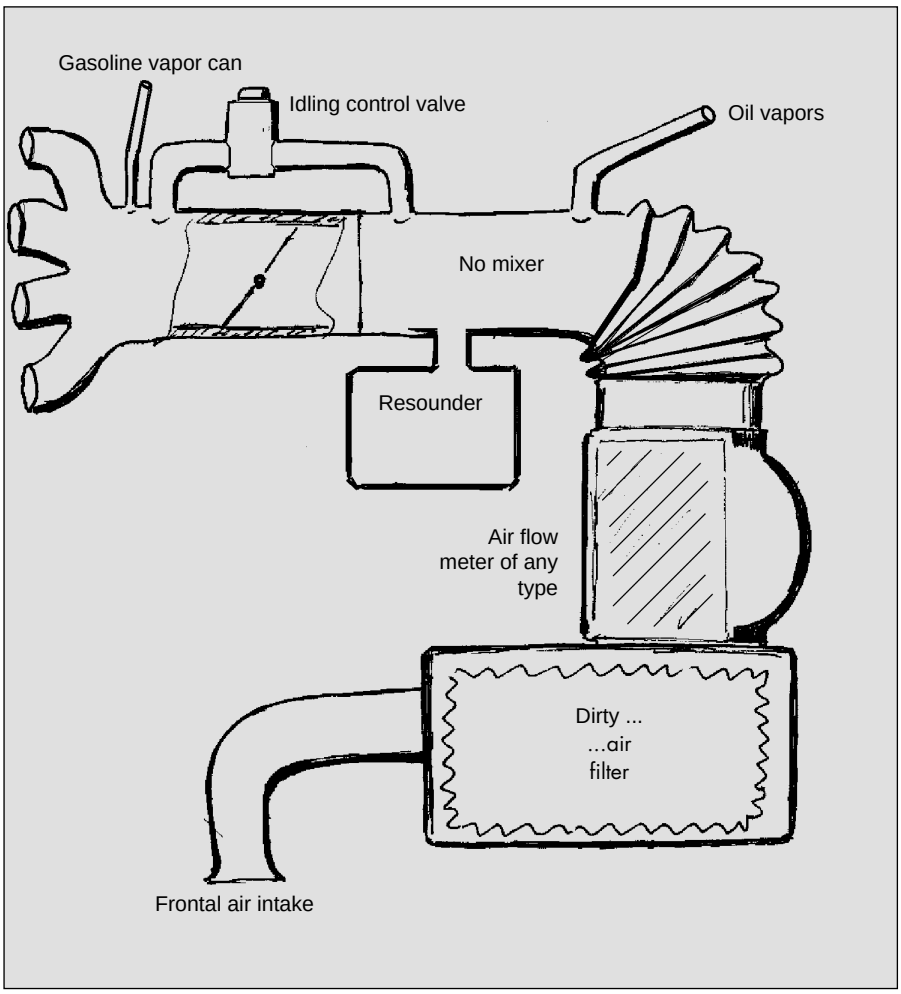
To assist you with these savings BRC can offer you a **toolbox** with all the **specific tools** for the correct installation procedure of Flying Injection.

Finally, to guarantee a good quality installation it is **essential** to equip **only those cars for which a developed cartography is available**, by following attentively the instructions contained in the installation guide specific for each car.

This guidebook will be handed to you by the BRC representative when you buy the kit. In any case, before deciding to carry out any new installation, refer to BRC After Sale Service, **quoting them the car make, the model, the displacement, the engine number and the petrol injection ECU**.

We hope you'll enjoy fitting the new Flying Injection System!

1. WHY THE INJECTION IS PREFERABLE



Pic. 1 - The whole induction system is unchanged

It is only natural that the evolution of gas equipment should now be represented by gas injection. **In the Flying Injection system, the gaseous fuel does not require a mixer, but the correct requirement is constantly determined by calculations carried out by a special ECU**. The desired flow is immediately delivered by a device which reacts instantaneously to the ECU commands. This device is constantly changing to allow the correct metering as required by varying vehicle conditions.

This installation **does not need any mixer** and the advantages are clear:

• no penalisation of the petrol performances
• increased gas performances due to an efficient filling of the cylinders
• no obstacles in the air induction systems
• no need for a different mixer for each vehicle

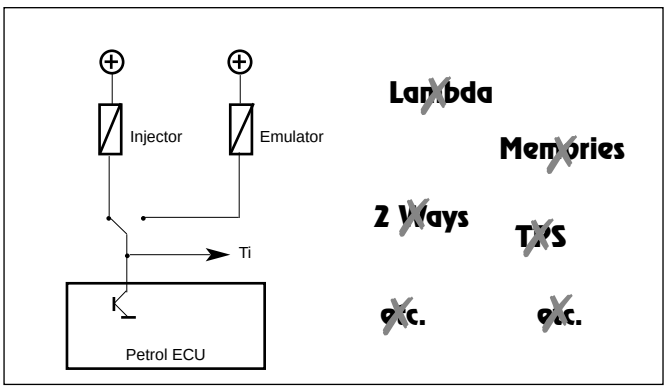
The Flying Injection system has another important advantage: it does not involve **any alteration to the original working of the car** (pic.1):

• the aspiration ducts are unchanged (the air inlet is not modified, the tubes of the oil vapours, of the petrol vapours, of the air and of the idle are not moved) making the installation of the system more professional and neat
• any blade air flow meters go on working regularly
• the working of variable geometry manifolds is not altered
• possible resounders remain unchanged at their place.

Flying Injection offers **relevant advantages** for the petrol injection system (pic.2):

• no emulation is necessary, with the obvious exception of the number one injector
• less error codes in the petrol ECU
• all functions of the petrol ECU remain perfectly efficient when running on gas
• there is no need for any adjustment.

Finally, one of the main reasons to prefer Flying Injection: **the risks of damage due to backfires are eliminated**. Since the gas is delivered to the engine through hoses which get very close to the air inlet



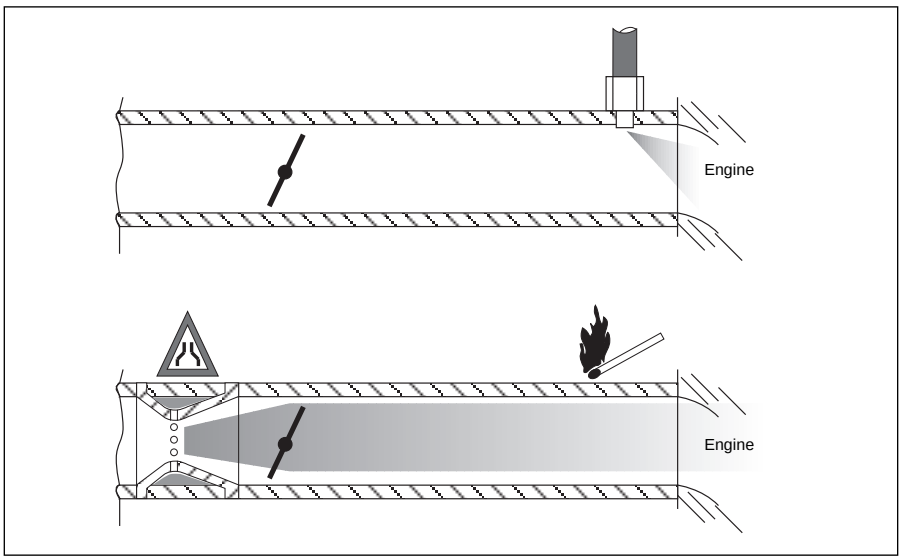
Pic. 2
No emulation
except the injectors

valves, inside the manifold, in the other aspiration tubes there is no gas, so a possible backfire will not spread (pic.3).

To summarise: Flying Injection improves the performances and simplifies assembly and working problems, it also makes possible the convertion of vehicles considered difficult or disadvantaged.

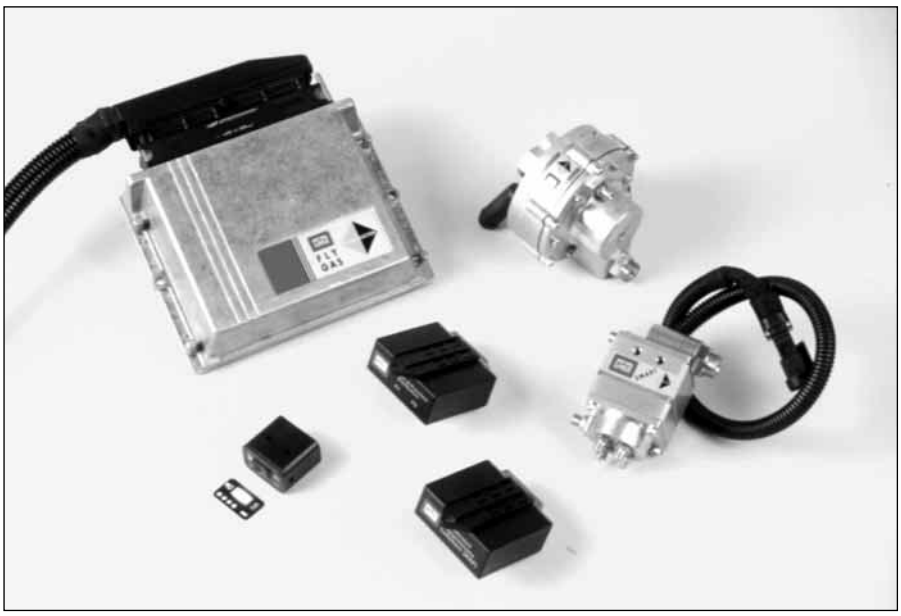
The installation must be carried out according to the following procedures and in accordance with the specific instructions that BRC provides for the various car models.

To determine if the Flying Injection system is suitable for the vehicle, please refer to the BRC technical documentation or call the BRC After Sales service or agent.

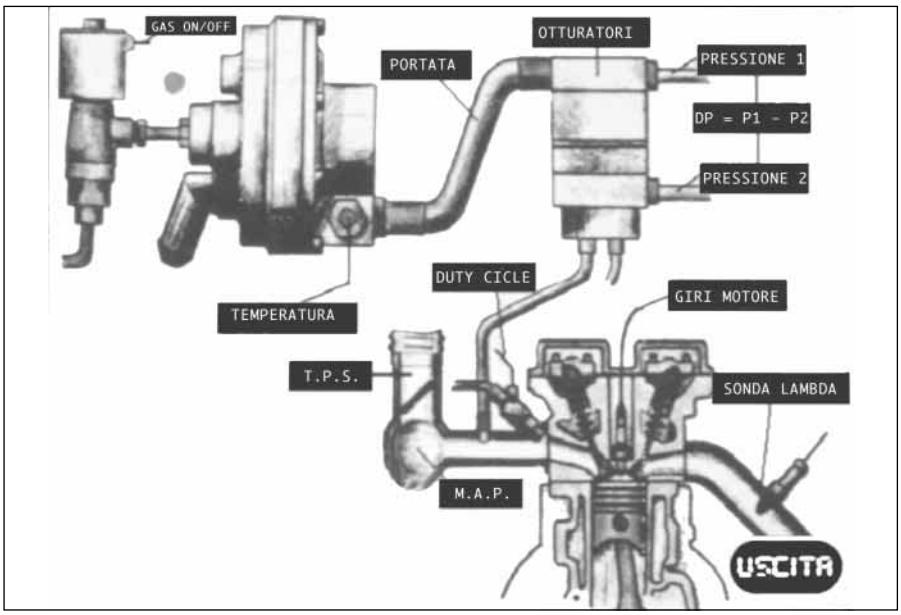


Pic. 3 - No choke and no risk of damages due to backfires

2. UNDERSTANDING THE FLYING INJECTION SYSTEM



Pic. 4 - The components of the Flying Injection system



Pic. 5 - Components and parameters of the Flying Injection system

2.A. STRUCTURE

From the gas tank up to the reducer (excluded), the installation is no different from the traditional LPG/ CNG installations.

The Flying Injection system (pic. 4 and 5) begins from the Genius vaporiser which, in the LPG version has one stage only and in the CNG version has two stages, with pressure outlet retroactioned on the pressure value on the aspiration manifold and temperature sensor. Then a pipe follows, which delivers the gas to Smart, the device which meters and sends out the gas flow to the different cylinders. Absolute and differential pressure sensors are connected to Smart.

Finally, there is the Fly Gas electronic control unit, highly powerful and versatile, strong, tight, entirely manufactured with automotive components, tested according to the current norms concerning the electromagnetic compatibility. The ECU gathers and processes all the information and controls Smart (as well as the solenoid valve and other possible accessories) to generate the desired gas flow. The gas is delivered directly to the aspiration manifold downstream the throttle body through special pipes.

The changeover switch with level indicator is the same as used in BRC traditional systems.

The Flying Injection system interacts with the exterior by a personal computer, which allows both the system set up and the checking of the correct working. None of the BRC diagnosis systems previously used may be connected to Flying Injection.

2.B. WORKING PRINCIPLE

Flying Injection is a system which is placed "in series" to the petrol system, and while working on gas it is the petrol ECU which determines the quantity of fuel delivered to the engine.

(Normally the gas system excludes the petrol system and, by the right emulation, tries to avoid working anomalies).

(We can also assume that Flying Injection is a "**passive system**" or that it works as an "**interpreter**" between the petrol system and the control of the gaseous fuel).

This choice represents the great merit of Flying Injection: since the petrol ECU is constantly working and controls the gas metering, it clearly performs functions as the stoichiometric control, the full charge enrichment and the cut-off according to the manufacturer's criteria, the maximum rpm, the coherent control of the petrol vapour bleeding, the correct dialogue with the air-conditioning system, etc. All

this, without causing error codes. As per the petrol installation, everything remains unchanged, so possible error messages while running on petrol or on gas has to be considered credible.

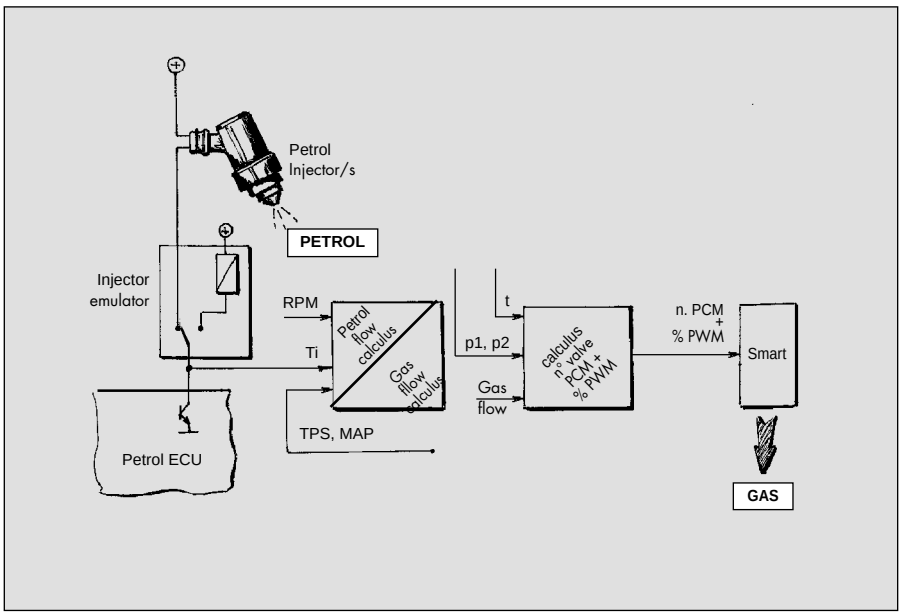
The main feature of Flying Injection is that the Fly Gas ECU is connected to the terminal/s of the petrol ECU which controls the injectors (pic.6)**. This way, it recognises the petrol injection time (Ti).** (While running on gas, the injector signal will be recognised due to the presence of the injector emulator).

Due to the Ti and the rpm signal, the Fly Gas ECU calculates the petrol flow which the original ECU intends to deliver to the engine. It transforms it into a gas flow and carries it out by controlling the Smart device.

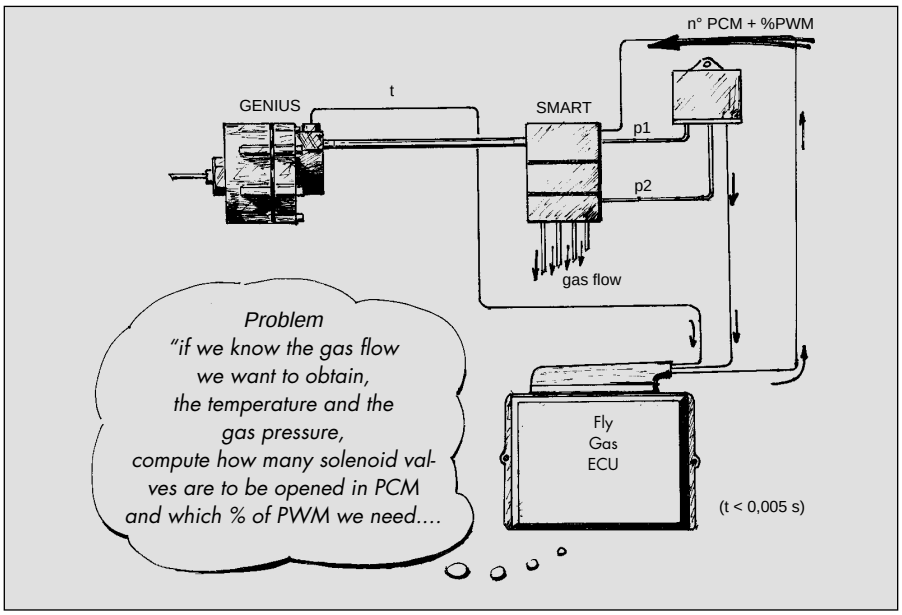
Smart is controlled in "PWM" and "PCM" (see §3.B) considering the gas physical parameters (temperature, absolute and differential pressure) read in real time by the Fly Gas ECU (pic. 7).

It is important to understand that the Ti is a precise and precious parameter, the result of sophisticated calculus processes actuated by the petrol ECU on the basis of complete and specific sensors.

Since the gas temperature and pressure conditions may vary according to the vehicle use conditions, the system has a sensor temperature at the Genius reducer outlet and suitable absolute and differential pressure sensors placed upstream and downstream Smart. The Fly Gas ECU may adjust its own calculi in real time and, above all, it may work correctly also in the presence of heavy creeps of the above parameters.



Pic. 6 - The petrol flow is translated into gas flow



Pic. 7 - The Fly Gas ECU controls the Smart considering t, p1, p2

The Genius reducer tends to keep a pressure differential practically constant between the outlet gas pressure and the aspiration manifold, as it happens within the petrol system. This contributes to optimise the system working, but it is not indispensable, since the control electronics work much faster as per the pressure variation times. For instance, after a sudden acceleration, the pressure inside the reducer rises taking a split second. In this time, the ECU carries out various calculus cycles and compensates any mechanical delays.

Another important aspect of the Flying Injection system is the use of the Smart actuator. As we will explain later on, it is made up of a group of 9 solenoid valves placed in parallel, able to react in opening and closing at the rate of a millisecond.

Smart is able to answer very rapidly and repetitively to the commands from the Fly Gas ECU. In particular, it may be stated that it allows any flow variation in a millisecond time. Also between the maximum flow and the null flow or vice-versa there is the same time.

As you may assume, the Fly Gas ECU, in addition to the working general programme, must contain the specific data of

the car model on which it is installed (it's a complex set of cartographies and other setting parameters).

The preparation of these data is up to BRC. The installer must connect the portable personal computer to the ECU, select the feeding type (LPG or CNG), the correct car model and start the automatic transmission of the data.

The personal computer is also necessary as a diagnosis instrument to check the correct working of the system or to spot possible anomalies. The computer memory must be periodically updated with the data concerning the new car models set up by BRC.

2.C. CHANGEOVER

The changeover switch (pic.8) has three positions which allow

a- working on gas with start on petrol and automatic changeover

b- working on petrol

c- working on gas.

We suggest the first type of working (a) for a correct use of the car.

2.C.1. WORKING ON GAS WITH START ON PETROL AND AUTOMATIC CHANGEOVER

With the changeover button in the central position the car starts on petrol and passes automatically to gas. The changeover takes place in deceleration, after having passed 2000 rpm, the engine has had a revolution decrease of 200 rpm and the LPG reducer has reached a working temperature of at least 25°C.

If the reducer temperature is between 25°C and 60°C there is a delay of about 60 seconds before the changeover takes place. If the temperature is over 60°C the delay does not occur.

While the engine works on petrol, the changeover switch check-light turns red; it turns green when the engine works on gas. It is possible to select the petrol forced working, or the gas forced working, due to the availability of fuels.

2.C.2. WORKING ON PETROL

With the changeover switch button in the left position, its check-light turns red, the injectors are working, the gas solenoid valves are closed and the gas flow control system is disconnected.

The car runs regularly on petrol, as if the gas installation were not present.

2.C.3 WORKING ON GAS

This function has to be considered as an emergency solution, to use only in case of malfunction within the petrol feeding installation.

With the changeover switch button in the right position, its check-light turns green and the engine works only on gas, when the reducer has reached a working temperature of at least 50°C. Until it gets to 50°C the vehicle will work as described at §2.C.1.

The system is programmed to get back to the petrol running in case of failed starting or sudden switch-off.

2.C.4. LEVEL INDICATOR LPG VERSION

The changeover switch also works as a level indicator by the four green LEDS. To know the LPG content in the tank check how many lights are on. Four LEDS on mean full tank (80% of its capacity), three LEDS on mean 3/4 of the tank, two LEDS on half tank and one LED 1/4 of the tank.

The reserve indication is showed by the first LED blinking and is just approximate. The correct indication is showed with your car on level ground, a short time after the starting. We suggest that you also refer to the trip odometer as a precaution. Four LEDS blinking at once might indicate an excessive quantity of LPG inside the tank. In this case, after travelling some miles the blinking should stop.

2.C.5. LEVEL INDICATOR CNG VERSION

To know the CNG content in the bottles it is necessary to connect the level indicator manifold to a BRC manometer equipped with a sensor.

The four green LEDS on mean the max. pressure inside the bottles; the gradual switching off of the LEDS refers to lower pressures inside the bottles.

Pic. 8
Flying Injection
changeover switch

Like in the LPG version, in this case too the reserve indication is showed by the first LED blinking and is just approximate.

We suggest that you also refer to the trip odometer to control the car autonomy.

Avoid the petrol tank becoming totally empty.

Both for the LPG version and for the CNG one it is necessary to keep always 1/4 or 1/2 tank petrol and renew it periodically.

3. COMPONENT DESCRIPTION

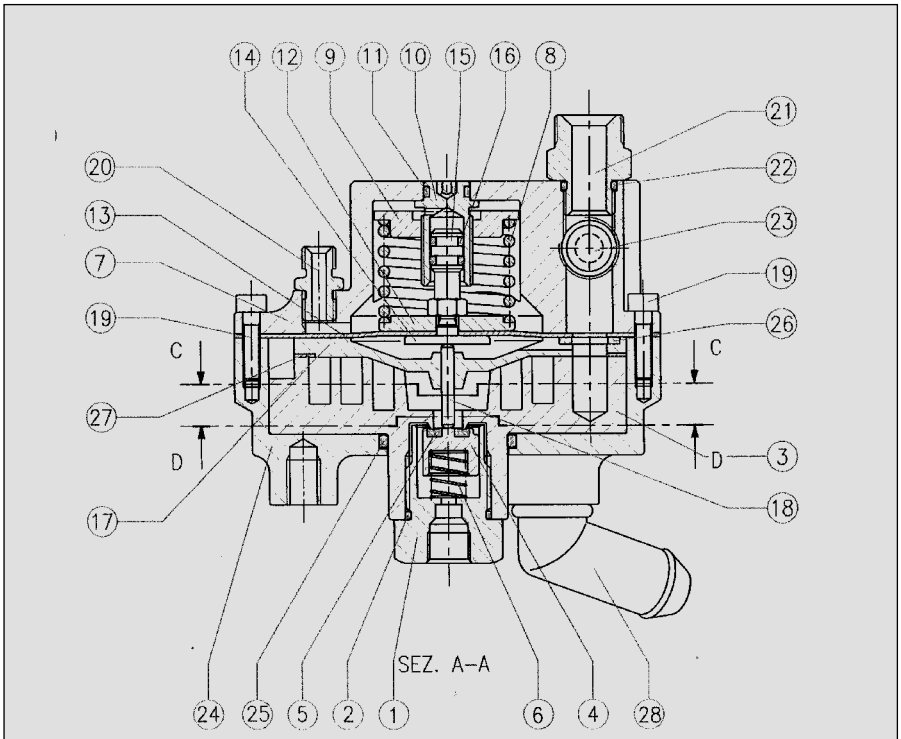
Pic. 9
Genius Reducer
(LPG version)

3.A. GENIUS REDUCER (LPG VERSION)

In the LPG version, the Genius reducer (pic.9) is made up of one stage only, with an outlet pressure of about 1 bar. In this environment the LPG evaporates due to the thermal exchange with the coolant, as in an ordinary reducer. The gas outlet pressure is controlled by a spring-diaphragm-shutter system, with suitable vibration-damping systems.

It is necessary to note (pic.10) that, on the side of the diaphragm opposite that on which the gas pressure acts, there is a chamber connected to the aspiration manifold by a pipe. This makes the gas outlet pressure inconstant, in accordance with the aspiration manifold pressure flow. For instance, in idle conditions, as per the environment, the pressure of the manifold will be of –0.6 bar and the reducer outlet pressure of +0.4 bar. By fully accelerating, on the other hand, the manifold pressure will be about 0 bar and the gas pressure of +1 bar. Regardless of the very compact dimensions, the reducer guarantees high gas flows to satisfy powers over 150 kW. There is a temperature sensor near the gas outlet hole (pic.11) which gives the Fly Gas ECU the information necessary for a correct flow control. Also the petrol-gas changeover is affected by temperature, to avoid the passage of LPG not completely vaporised.

Pic. 10
Genius Reducer
section and details



1 Gas inlet fitting
2 OR 2062 Viton
3 Reducer body
4 Shutter
5 Shutter gasket
6 Shutter returning spring
7 Reducer cover
8 Main spring
9 Spring washer adjusting screw side
10 Adjusting screw
11 OR 2031
12 Spring washer diaphragm side
13 Diaphragm
14 Diaphragm holder washer
15 Damper piston - diaphragm cllamping system
16 OR 2018 Viton
17 Intermediate plate
18 Rod
19 TCEI M4x16 UNI 3740-74 screw
20 Vacuum fitting
21 Gas outlet fitting
22 OR 2037 NBR
23 Temperature sensor
24 Water cover
25 OR 3112 NBR
28 Water elbow

Pic. 11
Genius reducer
temperature sensor

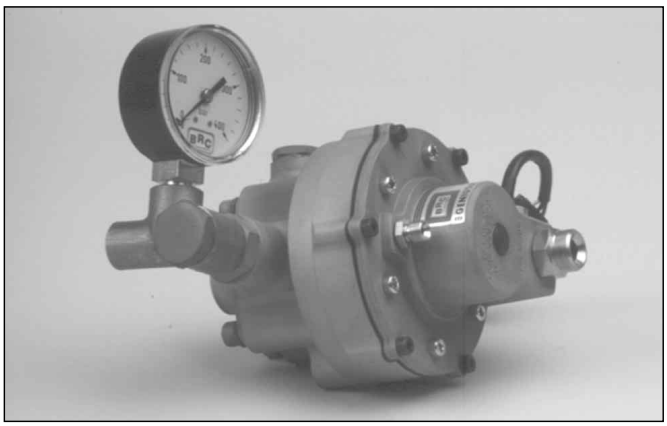
3.B. GENIUS.M REDUCER (CNG VERSION)

In the CNG version, the reducer, called Genius.M (pic.12) is made up of two reduction stages.

The tasks of this pressure reducer are therefore the following ones:

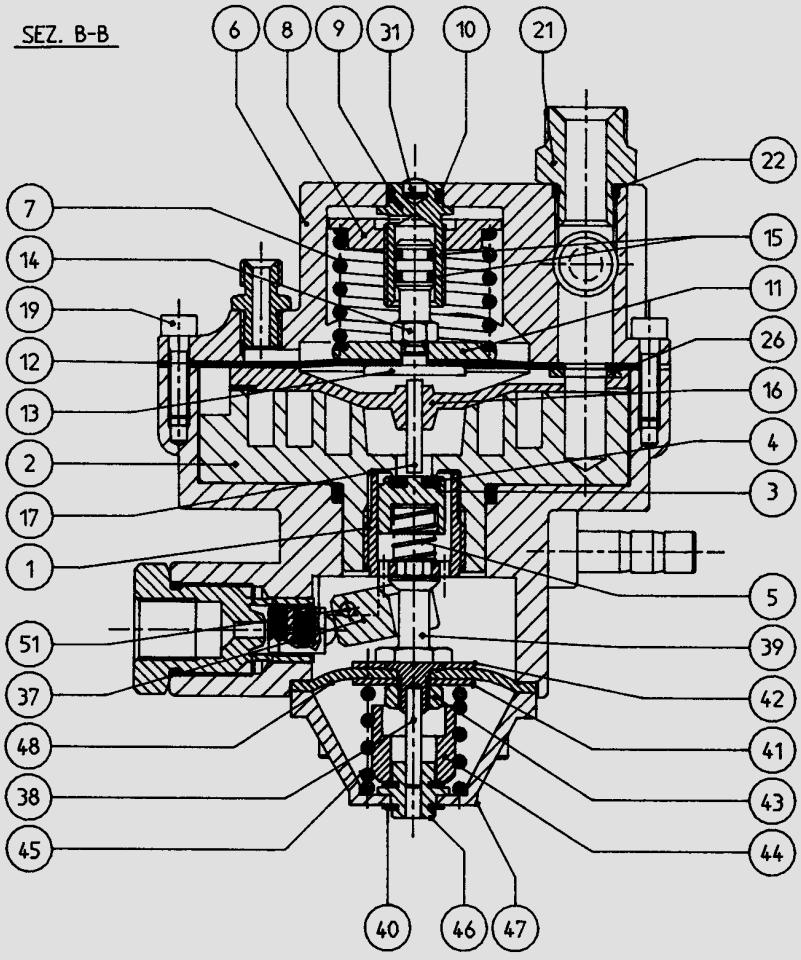
- facing any pressure level of the CNG coming from the tank, up to a max. charge pressure (approx. 20 Mpa);
- spreading the CNG at an intermediate pressure, of 500-600 kPa in a first stage;
- bringing the heat necessary to avoid an excessive cooling of the carburant due to the sudden expansion;
- spreading more the CNG at a requested pressure, of 200 kPa, useful to feed the injection system. Such a value of outlet pressure is conditioned by the pressure signal of the air intake manifold: in practice the differential pressure is kept constant between the CNG pipe at the exit of the reducer and the air intake manifold.

It is to be noticed (pic. 13) that the second stage of the Genius.M CNG reducer is very similar to the first and only stage of the Genius LPG reducer.



Pic. 12
Genius.M reducer (CNG version)

Pic. 13
Genius.M reducer sections and details



1 Pipe fitting 1-2° stage
2 CNG Genius reducer body
3 Genius reducer shutter
4 Genius reducer shutter gasket
5 Shutter returning spring
6 Genius reducer gas side cover
7 3 bar CNG Genius reducer Spring 2° stage
8 Adjusting screw spring side supporting washer
9 Genius reducer adjusting screw
10 Gas ring OR2031 green viton 70sh. 7,66x1,78
11 Genius reducer diaphragm supporting washer
12 Genius reducer diaphragm
13 Genius reducer diaphragm supporting washer
14 Genius reducer piston
15 Gas ring OR2018 green viton 70sh. 4,48x1,78
16 Genius reducer intermediate plate
17 Diaphragm rod-Genius shutter
19 TCEI M4x18 screw cl. 8.8 w.g. UNI 5931
21 Genius reducer gas outlet connection
22 Gas ring OR2037 NBR 9,25x1,78
26 Diaphragm supporting washer
28 Water tube rubber-holder
31 Plate-holder
37 1° stage lever
38 Parallel pin d.3x20 (0/+0,008)
39 Pivot of 1° stage lever
40 Seeger type RSM 6 fished din6799
41 Diaphragm washer di=6,5 1° stage
42 Diaphragm washer di=11,5 1° stage
43 M6 screw nut uni 5588 y.g.
44 Vibration-damping d.16x9 h.15 1° stage
45 Spring f=2,6 ed=20,6 l=32,6 steel. cl.d y.g.
46 Vibr.-damping teflon bush 1° stage
47 Al. print. cover 1° stage
51 Rotary pivot of 1° stage lever

3.C. SMART ACTUATOR-DISTRIBUTOR

Smart actuator-distributor (Pic.14 and 15) **is covered by various patents** which protect its working, its constructive details and, finally, its exclusive use in the gas automotive field.

This device contains 9 small solenoid valves displayed in parallel. They are controlled by the Fly Gas ECU. Some of them are controlled individually, others by groups, according to the connection made in the pre-wired connector.

The opening of 1, 2, 3, etc. solenoid valves (**PCM**) corresponds to the passage of increasing quantities of gas, but it does not allow a fine metering of the flow (pic.16).

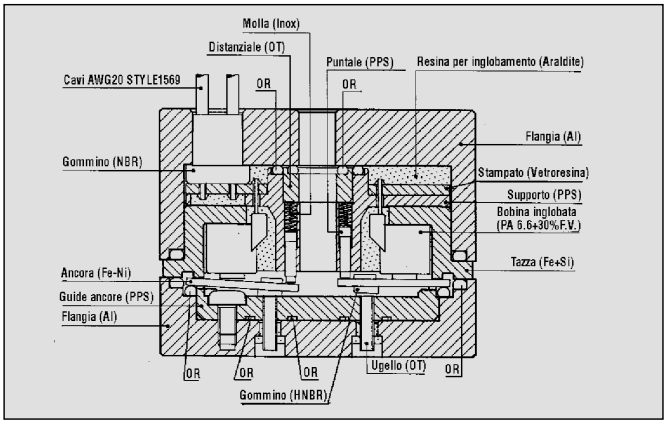
For this reason, one or two solenoid valves work in frequency, with variable duty cycle (**PWM**) (pic.17). In other words, these solenoid valves **vibrate** at a frequency of 25 – 50 Hz and, during a cycle, **may stay open or closed longer**, according to the necessity. You then obtain a "**fine adjustment**" behaviour which fills the gap between, for instance, 1 and 2 solenoid valves or 5 and 6 solenoid valves.

The solenoid valve anchors and the other mechanical parts are highly precise and reliable. They are tested for a long time use. The time which occurs to open and close the solenoid valve is about 1 ms (pic.18, page 2). It is clear that the gaseous flow may vary its intensity very rapidly.

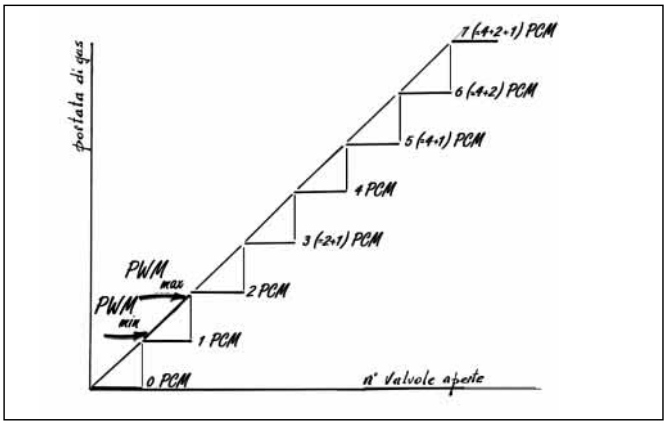
The gas pressure determines a strength at the solenoid valves closing. The Smart device works as a safety valve too.

Above the centre of the Smart there is an aluminium head which

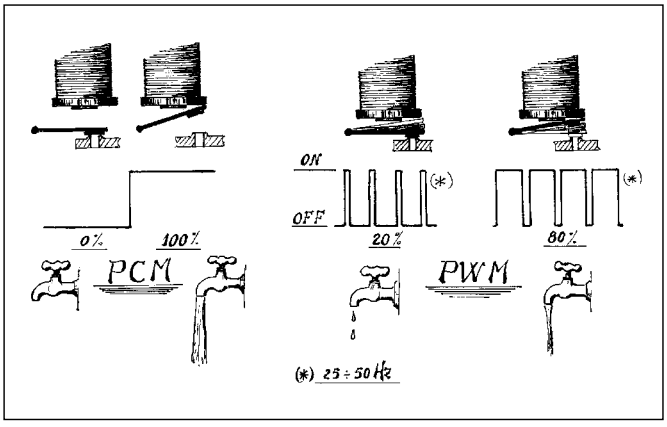
Pic. 14
The Smart distribu-



Pic. 15
Smart in section



Pic. 16
The valves controlled in PCM realize a gas flow step-by-step. The PWM fills the gap up.



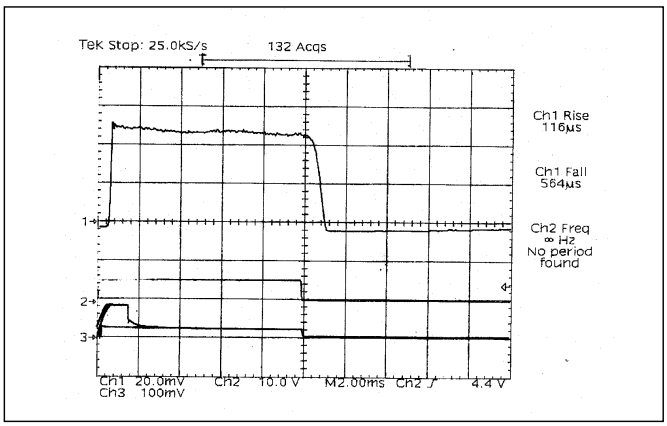
Pic. 17
PCM, PWM

holds the gas inlet fitting towards the pressure sensor. Inside it there is a filter with a magnetic trap. **It is important to catch possible ferrous fragments coming from the tank**, so that the solenoid valve is not damaged.

Below the centre of the Smart there is an aluminium manifold which collects the gas coming from the different solenoid valves and sends it out to the various cylinders. It holds the fittings of the tiny pipelines which go towards the engine and a pipeline which is connected to the pressure sensor.

Regardless of the extreme compactness of the device, its flow rate can feed engines up to 100 kW.

Smart has been conceived to be a modular device. There may occur some applications in which more central bodies are gathered by one head only and one manifold-distribution frame or they are structured in a different way (obviously they are devised to fit highly powerful engines).



Pic. 18
Smart
reaction times

Pic. 19
Smart distributor
pressure sensor

Pic. 20
Manifold vacuum
sensor
(MAP)

3.D. SMART PRESSURE SENSOR

Its function is to meter the absolute pressure before the Smart and the pressure in it. The device (pic.19) is pre-amplified so that the signal is not easily jammed. The pre-wired connection makes the installation very easy.

3.E. MANIFOLD VACUUM SENSOR (MAP)

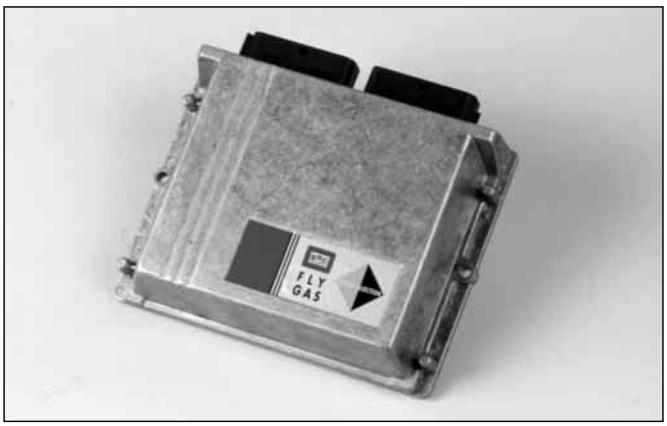
This device (pic.20) gives the Fly Gas ECU the information relative to the vacuum inside the aspiration manifold. It is installed only when this signal is not available yet in current production in the car. In any case, check BRC installation plans.

3.F. FLY GAS ECU

The ECU is entirely manufactured with automotive components, so it is suitable for the engine compartment temperature. However, do not install it near hot devices like the exhaust manifold. It is waterproof and is in accordance with the norms on the electromagnetic compatibility. Inside it there are recently devised components (32 bit Motorola microprocessor), with a process speed higher than most original petrol ECU's. The memory is permanent: once it is programmed, the Fly Gas ECU (pic. 21, page 13)) may be disconnected from the battery without any loss of data. It may be reprogrammed many times without any problem and, for instance, it may be transferred from one car to another and reprogrammed.

Some data acquisition channels are devised to be connected to dif-

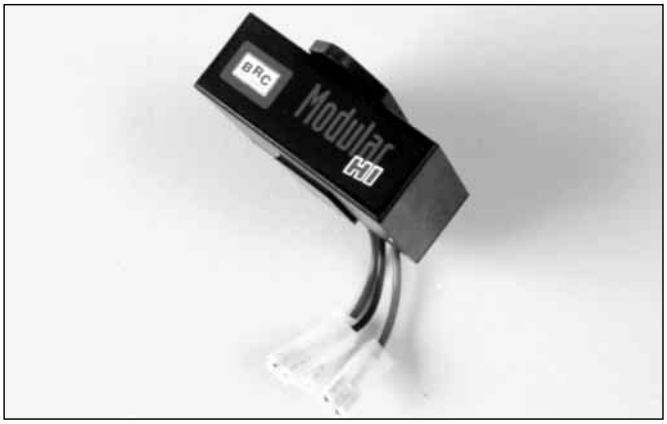
ferent signals according to the various cars (e.g. TPS, MAP, etc.). The installer must follow rigorously the installation plans and the ECU, once it is programmed, will recognise and correctly interpret the signals.



Pic. 21
Fly Gas ECU

3.G. CHANGEOVER SWITCH WITH LEVEL INDICATOR

Full compatibility with the whole series of changeover switches (see § 2.C), devised for Ecogas and Lambda Gas.



Pic. 22
Injector emulator
Modular series

3.H. INJECTOR EMULATOR

We recommend the use of the Modular series (pic.22). For further details, refer to the specific instructions.

3.I. HARNESS

On the Fly Gas ECU harness there is a 56 way connector recently developed, used by some of the most important European car manufacturers. To comply with the electromagnetic compatibility norms the conductors used are shielded.

The connectors present on the harness are waterproof, except those of the level sensor and of the pressure sensor. We therefore recommend to install them in a place protected from direct or indirect water contacts.

Concerning the cable connections and the harness connectors refer to § 5 of the present handbook.

3.L. “ET98 F.I.” LPG SOLENOID VALVE

The LPG solenoid valve used in the Flying Injection system is an evolution of the already tested BRC ET98 LPG solenoid valve, from which it differs externally by its white galvanising.

Inside the LPG Flying Injection solenoid valve some improvements have been realised in the filtering system of ferromagnetic particles.

Considering the working precision of the Smart distributor, the use of this type of solenoid valve inside the Flying Injection system is **compulsory**.

3.M. “BRC A3” CNG CHARGE SOLENOID VALVE

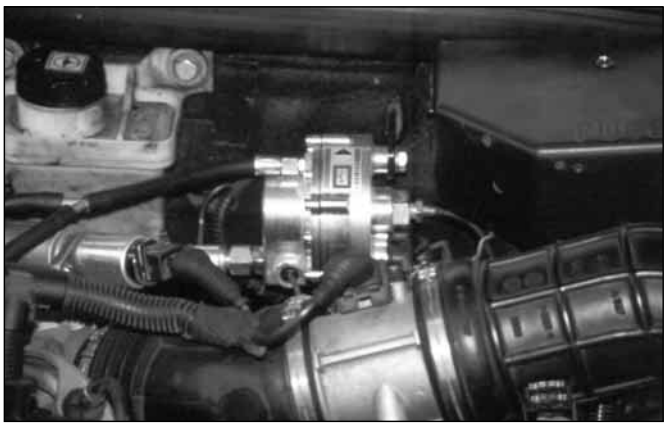
The “BRC A3” CNG charge solenoid valve used in the Flying Injection system is the same which is normally marketed by BRC. The solenoid valve to be installed normally inside the engine compartment, along the pipes which connect the CNG bottle/s to the reducer, allows the refuelling and, at the same time, the free passage of the feeding flow.

The solenoid valve is equipped with a special device allowing to determine the CNG remainder inside the bottle/s, when the refuelling is carried out at a distributor without this function.

The utilization of this type of solenoid valves, in the Flying Injection system, is significant since the solenoid valve is controlled and operated by the electronic control system.

It opens while starting and closes in case of engine stop, even if the driver has not put the ignition key again in the closing position (as it may happen, for example, in case of accidents).

4. INSTALLATION OF MECHANICAL PARTS



Pic. 23
Installation position with a diaphragm parallel to the car running direction

4.A. GENIUS REDUCER

The following installation rules are to be considered effective both for the LPG version and for the CNG one.

The reducer must be firmly fixed to the bodywork so that it is not subjected to vibrations during its working. With the engine under stress, the reducer must not hit any other device. We recommend the use of the specific BRC clamps.

The Genius may be installed with **any orientation** (pictures 23, 24 and 25). It is not important that the diaphragm is parallel to the running direction. The area to install Genius is usually suggested by BRC. In any case there ought not to be an excessive distance between Genius and Smart. The connecting pipe should not be over 400 – 600 mm.

If you need to tighten or loosen the gas inlet fitting or any other fitting, we recommend to always use **two spanners** in order not to move the component screwed on the reducer body.

The usual criteria concerning a correct installation of the pipelines must be followed. There ought not to be movements while running which may produce **rubbing, wearing and contact against sharp edges or driving belts**, etc. **The gas** (pic.26) **and the engine coolant pipes, should not be to tight, nor should they have any ripples or folds.**

The temperature sensor wire should not be too tight, nor twisted, nor should it make sudden folds at the outlet of the sensor.

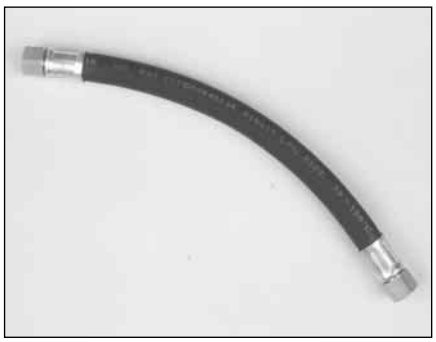
Pic. 24
Installation position with diaphragm perpendicular to the car running direction

Pic. 25
Further installation position

The copper pipe which goes from the solenoid valve to Genius must not pass in very hot areas of the engine compartment.

As no adjustments are contemplated on the Genius, it is not essential that it is assembled in an accessible area.

However the installer should avoid uneasy places, in order to get to it in case of repairs.



Pic. 26 - Genius reducer tube ø 17

4.B. SMART ACTUATOR-DISTRIBUTOR

This device may be fixed either to the bodywork or to the engine (pic.27)**. It is not affected by the engine vibrations. Its orientation is not relevant**.

It is important to fix it steadily and find a position according to which you may **use the pipes as short as possible to get to the drilling points of the aspiration manifold**. Refer always to BRC documentation and use the specific clamps.

The pipes must be **all the same length** and be straight in order not to generate **narrow folds which deform the internal section of the pipe or may deform it later on**.

The pipe length between Smart and the aspiration manifold **must not be over 300 – 400 mm**.

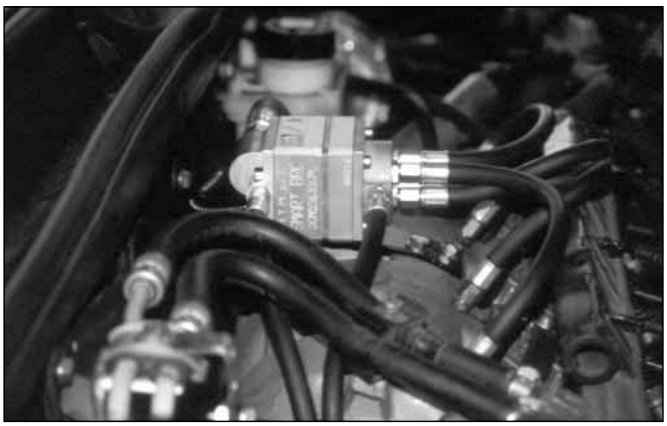
Smart must be placed far away from the exhaust manifold.

Remember the criteria for a good installation of pipes and electrical wires already explained in the paragraph concerning Genius.

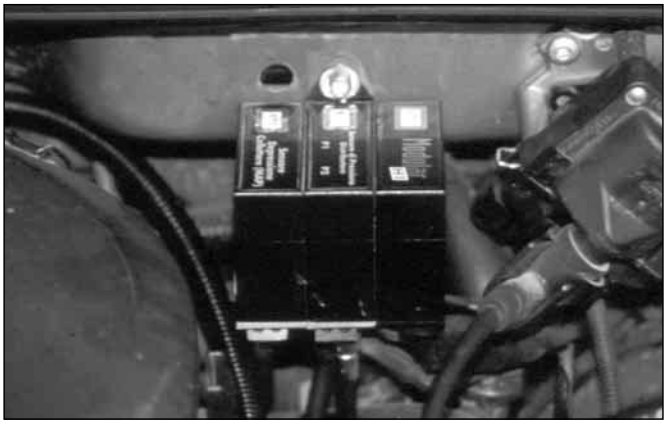
Since some solenoid valves of Smart work in frequency, it produces a buzz which might be heard from the passenger compartment. This is mainly if the device has been fixed to the bodywork. In this case, the fixing clamp must be provided with suitable damping systems (silent-block).

The terminal part of Smart, from which the pipes start and are directed to the engine, **may be replaced** by others with a different number of fittings (3, 4, 5, 6…) and a different orientation of the fittings, in order to optimise the pipe position.

The filter inside the Smart head (see § 3.B) **must be easily accessible for the programmed maintenance.**



Pic. 27
Smart distributor installation



Pic. 28
Installation of the Flying Injection sensors

<u>Be careful: never disassemble the upper part and the central part of Smart, otherwise any BRC warranty on the whole Flying Injection system will be lost.</u>

4.C. SMART PRESSURE SENSOR

It must be installed not too far from Smart, so that the connection pipes **do not usually overpass 400 – 700 mm**.

The pressure sensor of the Smart distributor is fixed to the bodywork (pic.28) or to fixed walls inside the engine compartment.

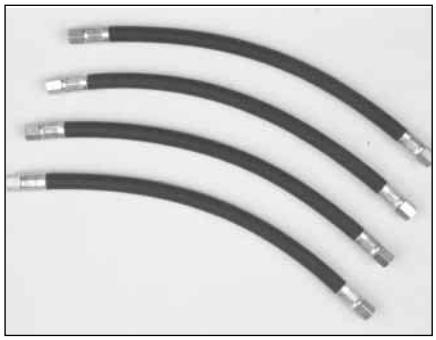
Refer to BRC instructions and avoid installation in places subject to high radiation. Concerning pipes and electrical wires, refer to the above recommendations.

4.D. VACUUM SENSOR (MAP)

Normally it is installed beside the Smart pressure sensor (pic.28), by following the same installation criteria. Refer to the plans to connect the pipeline to the manifold. Generally, the sensor should feel the average vacuum, rather than the throbs generated near the aspiration valves.

4.E. PIPING

The pipes which belong to the Flying Injection system **are manufactured by BRC and have fittings easy to connect** (pic. 29).



Pic. 29 - Tubes ø 10

We recommend not to use other pipes and assemble them with quality spanners, in order not to damage the hexagons.

Any time you need to remove a fitting, use two spanners to keep still the part that must not be unscrewed. The fittings are waterproof and they are tight on conical-spherical surfaces. Avoid applying excessive torque wrenches in order not to damage the fittings.

No sealing products are needed.

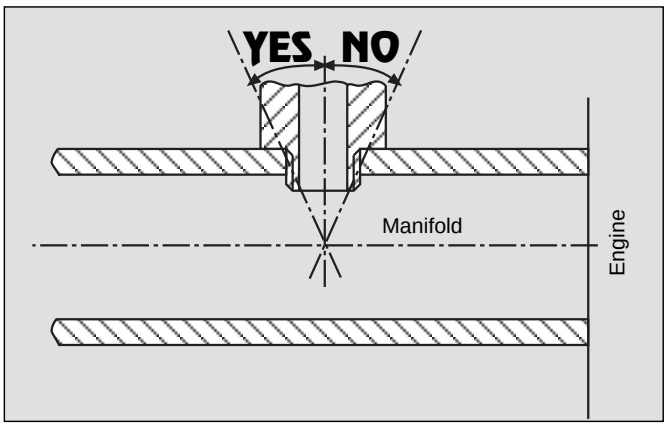
4.F. NOZZLES

The installation of the nozzles is one of the most important features of the work.

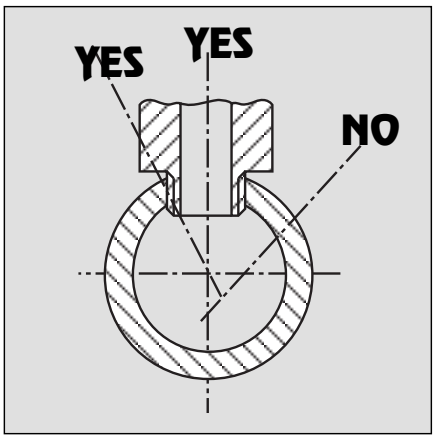
Identify all the points of the manifold which will be drilled, before drilling commences.

Use the specific tools included in the tool case for Flying Injection system code 90AV99004028.

Follow precisely the instructions relative to the car model. In any case, drilling must be done **near the engine head, ensuring the same distance on every branch of the manifold and the same orientation of the nozzles. Each nozzle must be perpendicular to the axis of the aspiration duct or, at least, it must make an angle to direct the flow towards the engine, not towards the throttle body** (pic. 30A and 30B).



Pic. 30A - Manifold drilling inclination



Pic. 30B - Orientation of holes on manifolds

Pic. 31 - Manifold drilling

On the plastic manifolds, find the thickest area on the wall.

Mark the drilling points with a felt tup pen and, **before drilling it**, check with the twist drill that there is no obstruction to hamper the correct drilling of all the branches according to the desired direction. **Make a light marking with drill point before drilling** (pic. 31).

Use a 5 mm twist drill correctly sharpened and then thread M6 (pic.32).

During the drilling and the threading **be careful to avoid swarf going into the manifold**. Remove the swarf while you are drilling and grease the drill during the last phase of the wall breaking, so that the swarf is stuck to the drill itself. Be careful in breaking the last part of the wall, so that the swarf is very thin. This way they will stick to the drill. Also during the M6 tapping, grease the tap thread to help remove swarf.

Pic. 32 - Manifold threading

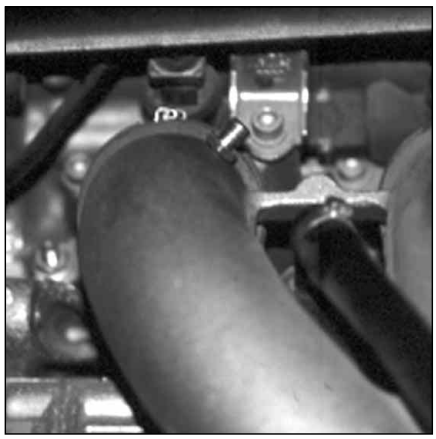
Screw the nozzles using a lock sealer product (use that provided in the case code 90AV99004028) (pic. 33 and 34, page 17). **Assure correct fitting and avoid excessive tightening in order not to damage the nozzles.**

Screw the piping directly to the Smart distributor on the nozzles. While tightening them always use two spanners to keep tight the particular screwed on the manifold (pic. 35).

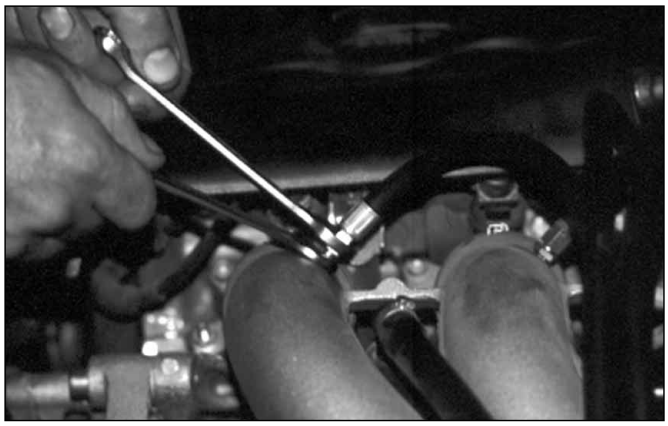
Do not modify for any reason the internal diameter of the nozzles, nor their external shape.

NOTE. With small diameter aspiration manifolds you may need special nozzles shorter than the standard ones. Check the specific instructions.

Pic. 33 - Thread sealer



Pic. 34 - A nozzle screwed on the manifold



Pic. 35 - Nozzles-pipe fittings tightening

4.G. FLY GAS ECU

Use the fixing holes on the aluminium body to fit it on a level surface **either in the passenger compartment or in the engine compartment** (pic. 36 and 37). Always refer to the specific instructions by BRC.

Avoid hot areas or places subjected to high thermal radiation.

Even though the ECU is waterproof, avoid installing it in areas where there may be water or dampness.

No adjustment is needed on the ECU, so it is not necessary to install it in an easily accessible place. On the other hand, it is important that the cable which starts from the ECU and goes to the PC is situated in an accessible area protected from possible water seepage.

Pic. 36
ECU assembling in the passenger compartment

4.H. CHANGEOVER SWITCH WITH LEVEL INDICATION

Follow the usual instructions of this device, in its different versions.

Pic. 37
ECU assembling in the engine compartment

4.I. INJECTOR EMULATOR

Follow the usual installation

instructions.

4.L. ELECTRICAL HARNESS

The harness of the Flying Injection system (pic. 38) is specially devised to allow the correct transmission of all the ECU inlet and outlet signals. From a "mechanical" point of view, we recommend installing the harness carefully and **avoiding to force on the connections** (never pull on the wires to let a connector pass through a hole or to disconnect it!!!).

- keep wires as straight as possible and avoid frictions with moving parts

- when the engine is under stress wires must be flexible

- clip the electrical wires near connectors to avoid excessive movement and disconnection

- avoid contact with sharp edges (burr the edges of the holes and install grammets).

- avoid placing the wires of the Flying Injection system near the spark plug leads or other parts subjected to high voltage

- each connector is polarised, for ease of connection.

Important: all non- pre-cabled connections must be soft soldered and adequately insulated. Be careful that the soldering is not "cold" and that it's permanent. Harness wires not used must be shortened and insulated. Never use the welders which are connected on the battery of the same car, nor rapid welders.

Pic. 38
Fly Gas harness

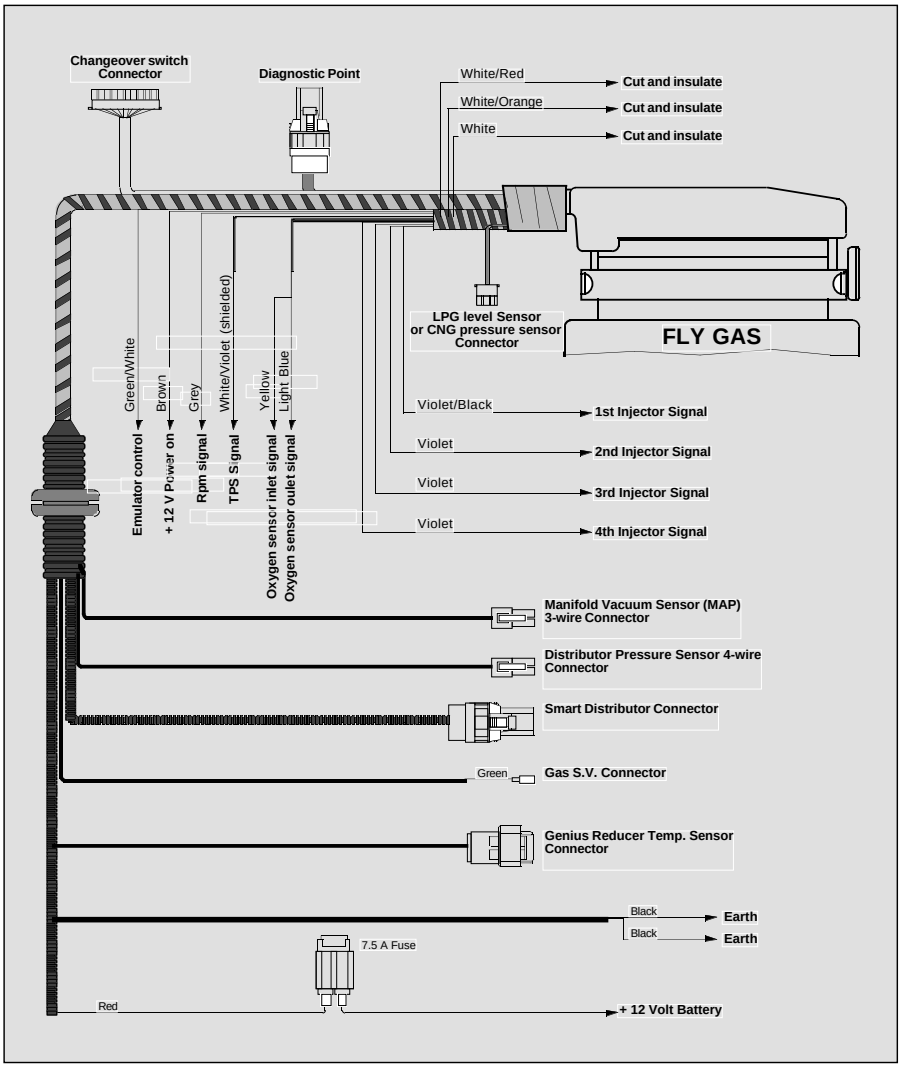
5. ELECTRICAL CONNECTIONS

Part of the electrical connection is through pre-cabled connectors. They are the connections with the Fly Gas ECU, Smart, the Smart pressure sensor, the manifold vacuum sensor, the temperature sensor, the changeover switch and the level sensor.

Other connections that take energy and signals from the car, must be done according to the BRC specific connection plans. In general, you can refer to the following chart, which explains the meaning of each connection and the colour of the relative wire.

The aim of the screened wires is to protect the most delicate signals from possible interference. They are made up of an external “braiding” or “screen” carrying one or more internal leads. Usually, the braiding is earthed and the internal leads carry the signals. **Be careful when stripping these wires**, in order to avoid short circuits.

COLOUR	TYPE	DESCRIPTION
White/Violet	in	TPS Signal
Yellow	in	Lambda oxygen sensor inlet signal
Light Blue	out	Lambda oxygen sensor outlet signal
Grey	in	Rpm signal
Violet/Black	in	1st injector signal
Violet	in	2nd injector signal
Violet	in	3rd injector signal
Violet	in	4th injector signal
Black	-	Earth
Black	-	Earth
Green	out	GAS S.V.
White/Green	out	Emulator Control
Brown	in	+ 12 Volts power on
Red	in	+ 12 Volts Battery
White/Red	-	Cut and insulate
White/Orange	-	Cut and insulate
White	-	Cut and insulate



Pic. 39 - Fly Gas ECU general connection plan

6. USE OF THE PERSONAL COMPUTER

After installation, you need to connect the personal computer to the Fly Gas ECU and transfer it the specific set up data relative to the equipped car. It is an extremely simple and rapid operation. To understand its procedure, it is necessary to refer to the following paragraphs.

6.1 THE PERSONAL COMPUTER (PC)

The PC supplied to the installer is a portable computer with the characteristics explained in the enclosed handbooks. It has two feeding cables for the connection both to the electrical network and to the car lighter intake.

The mouse consists of a pointing system to move the arrow and of two or three buttons to “click” on the pointed items. The mouse buttons may be placed horizontally (left, right) or vertically (upper, lower). The most used button is the left (upper) one.

The pointing is realised by the coloured pin in the middle of the keyboard. The PC is the main working instrument for those who install BRC Flying Injection. Your personal computer allows the installer to program the FLY GAS ECU and is an essential support in diagnosing malfunctions.

6.2. FLY-INJECTION VER.2.6 PROGRAMME START

Introduction. The FLY GAS ECUs are not like each other; in particular there are two types: “Motorola-01” and “Motorola-02”. Only the latter type currently remains in production.

The installers’ Flying-Injection programme works in a different way according to the ECU type the connection is made with; in this handbook, in case of need, distinctions are therefore made depending on whether you are working with a type or another.

There are two methods enabling to recognise the ECU type:

1. Reading on the ECU test label. Such a label is placed beside the ECU aluminium framework. It is necessary to read the domain “Software Version”: if it begins with “01” it is a “Motorola-01”, whereas if it begins with “02” it is a “Motorola-02”.

2. The PC is connected to the ECU, you enter the F1 option, choose the F2 sub-directory, activate the communication and press the “ECU information” key; among the different entries appearing, you can also find the one showing the ECU version.

Contrary to the previous versions of the Flying Injection programme, when starting the PC the FLY INSTALL programme doesn’t automatically start, but it is necessary to select the BRC_Inst yellow and black lozenge-shaped icon on the desktop (if present) or to select Start -> Program Files -> BRC_Inst -> BRC_Inst. The fig. 01 appears on the screen.

The software which is used while installing the Flying Injection system is subdivided in several parts:

- “Motorola01” ECUs

1. The Fly Install Programme, installed on the PC, allowing to carry out all the operations described in the continuation of this handbook.

2. The FLY GAS ECU memory-resident programme, allowing the ECU to manage the injection system. This programme is the same for all the models of equipped vehicles and is transferred in memory through the option “ECU Software Updating” described in the paragraphs 6.4.1.1 and 6.4.1.2.

3. The ECU memory-resident data relative to each car, transferred in memory to the ECU through “DATA ENTER” (paragraph 6.3.1).

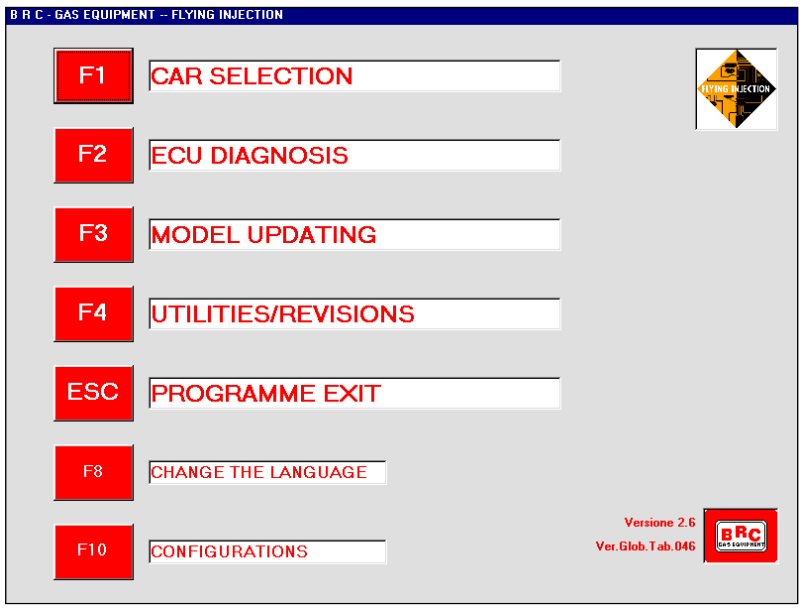


Fig. 01

- "Motorola02" ECUs

1. The Fly Install Programme, installed on the PC, allowing to carry out all the operations described in the continuation of this handbook.

2. The loader

3. The FLY GAS ECU memory-resident programme, allowing the ECU to manage the injection system. This programme is not the same for all the models of equipped vehicles and is transferred in a single operation together with the data relative to the equipped car as per the point 4, if you have a version exceeding or being equal to the version 2.6 of the installers' programme.

4. The ECU memory-resident data relative to each car, transferred in memory to the ECU through "DATA ENTER" (paragraph 6.3.1).

In the starting screen of the BRC_Inst programme (fig. 01), the versions installed on the PC of two programme sections are reported:

Ver. - X.XXx – showing the BRC_Inst. Programme version – e.g. "Ver2.6"

Ver.Glob. Tab. XXX - showing to which version of charts the PC has been updated, by updating the available maps – e.g. "Ver.Glob.Tab.046".

6.3 EQUIPPED CAR SET-UP AND CHECK-OUT PROCEDURE

After completing the mechanical and electrical installation, set-up the ECU. To make a careful adjustment of the LPG level or CNG pressure gauge, carry out the following procedure with the empty (or nearly empty) tank, so that the float rests on the bottom (LPG) or the pressure in the bottle is insignificant (CNG).

6.3.1. CAR SELECTION

Connect the PC to the FLY GAS ECU through the serial communicating cable and switch the car board on without starting the engine. From the opening screen (fig.01) choose the CAR SELECTION function.

Press the F1 key or point the F1 key on the screen by clicking once with the mouse left button. Either way is possible for all the function keys and for the ESC key. At this point the figure 02 appears on the screen. Please note that the screen of the figure 02 depicts a folder containing two directories. The one identified by F1 out in front, overlapping the one indicated by F2. The data relative to the equipped vehicle are entered on the first one, whereas the ECU set-up in carried out on the second one. Then the data of the equipped car and of its owner are entered, by pressing the Enter key on the PC keyboard, after having typed the numberplate. This allows to create a file of all the cars equipped with the F.I. system.

Select F2 (fig.03) to set-up the

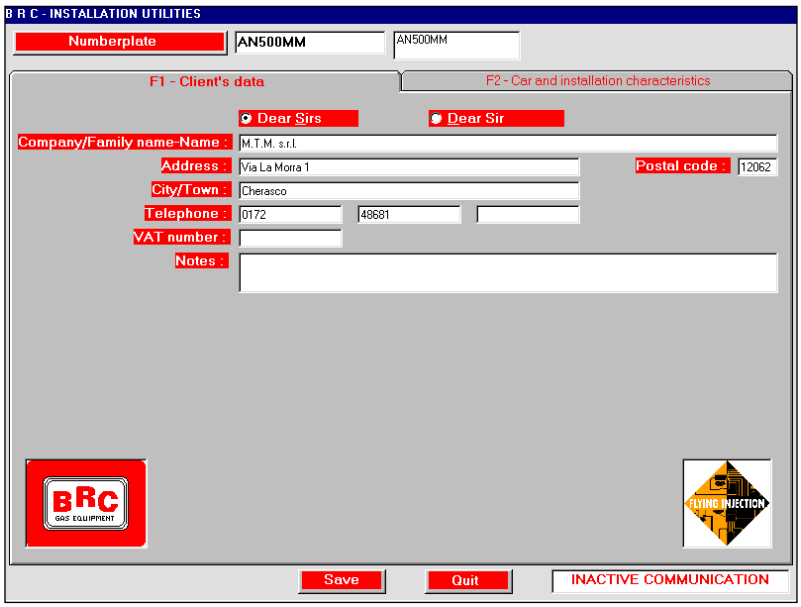


Fig. 2

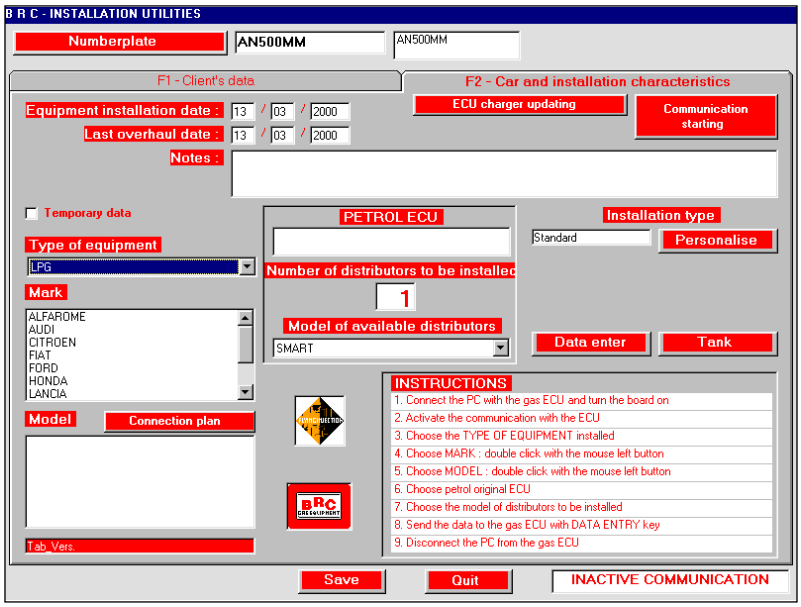


Fig. 3

ECU and select the type of installation (LPG or CNG) (fig.04). The PC automatically proposes the LPG installation. Find out the equipped car in the list of the available ones, by clicking twice on the car make, model, petrol ECU type and on the type of the installed distributor, by following the assembly diagram supplied by BRC Co.

Every selected item is marked with blue (fig. 05).

At this point it is necessary to activate the PC communication with the FLY GAS ECU through the special “Communication starting” key placed above on the right.

The screen appearing when the communication is activated is different depending on whether you are using a “Motorola-01” ECU or a “Motorola-02” one.

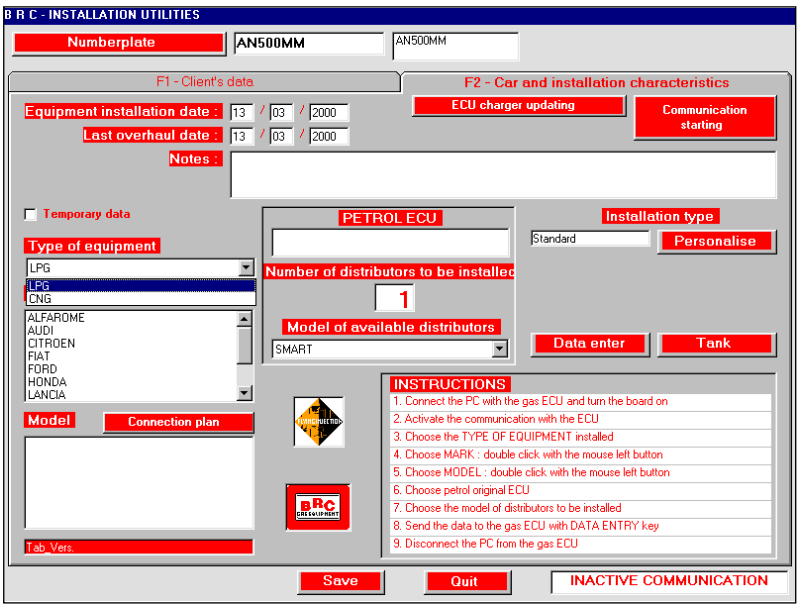


Fig. 04

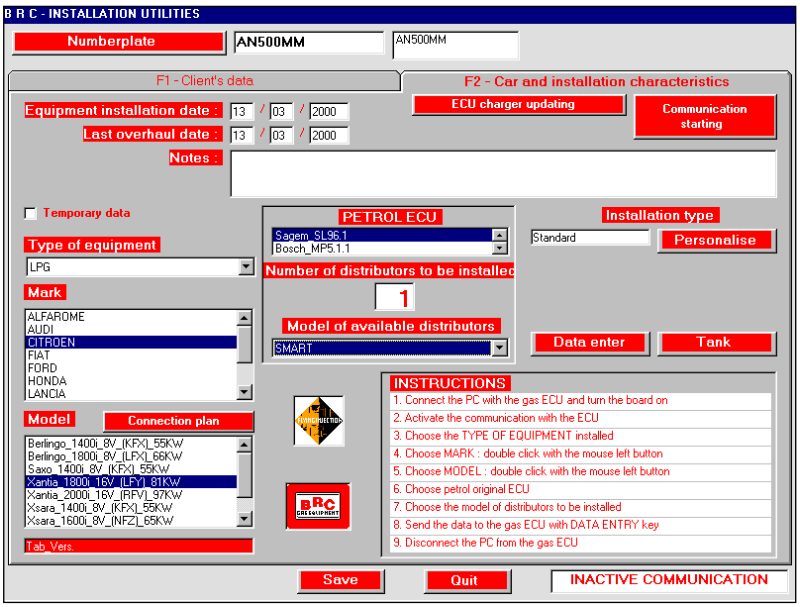


Fig. 05

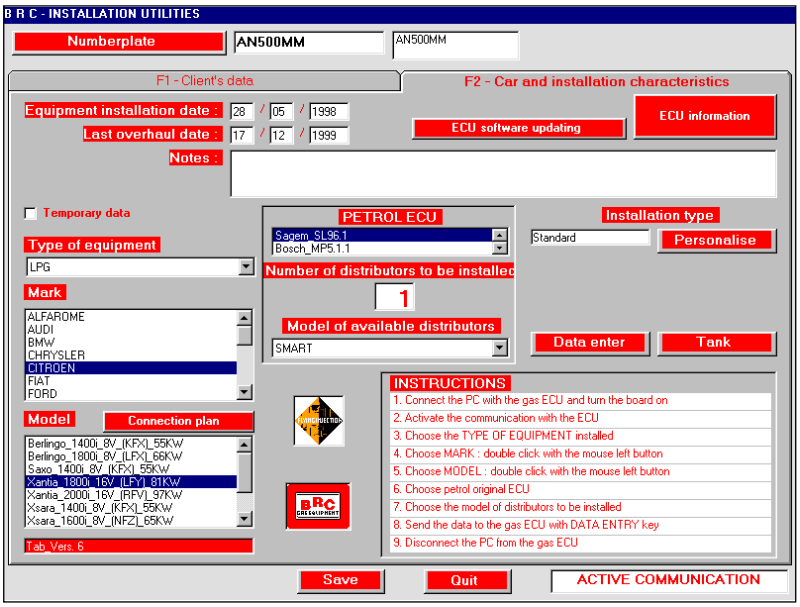


Fig. 06

“Motorola-01” ECU programming

The case of a “Motorola-01” ECU is depicted in the Figure 06.

In this case, as in the previous versions of the BRC installers’ programme, two programming operations are possible:

- ECU Software Updating (see par. 6.4.1.1.)
- Data enter (see par. 6.4.1.1.)

“Motorola-02” ECU programming

The case of a “Motorola-02” ECU is depicted in the Figure 07.

In this case two programming operations are possible:

- ECU Loader Updating (see par. 6.4.1.2.)
- Data enter (see par. 6.4.1.2.)

The installation can be Standard or Personalised. To choose the

standard one it is sufficient to enter the data, whereas to choose the personalised one, it is necessary to press the special key “personalise”.

Personalised installation. Press the key “Personalise”, choose one of them by pointing with the mouse as it is shown in the figure 08.

The standard installation carries out a set-up by using the parameters pre-established by BRC Co.

The personalised installation allows the installer to set some working parameters of the system to a certain extent, as it is described in the figure 09.

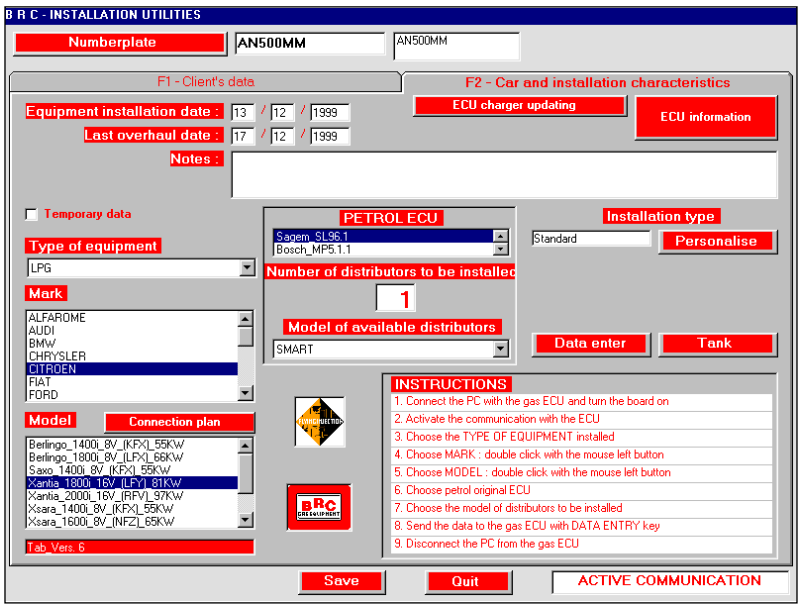


Fig. 07

It is possible to modify the changing over thresholds compared to the standard configuration, as regards the rpm and the temperature, to deactivate the FORCED GAS function (fig. 09) and to activate the BUZZER function if you have decided to use the special change-over switch with a buzzer.

The thresholds can be modified by clicking with the mouse on the case containing the number and modifying it.

The forced gas function is deactivated by clicking on the box on the left side of the FORCED GAS function. A v appears as activated function. The same procedure is necessary to activate the function BUZZER.

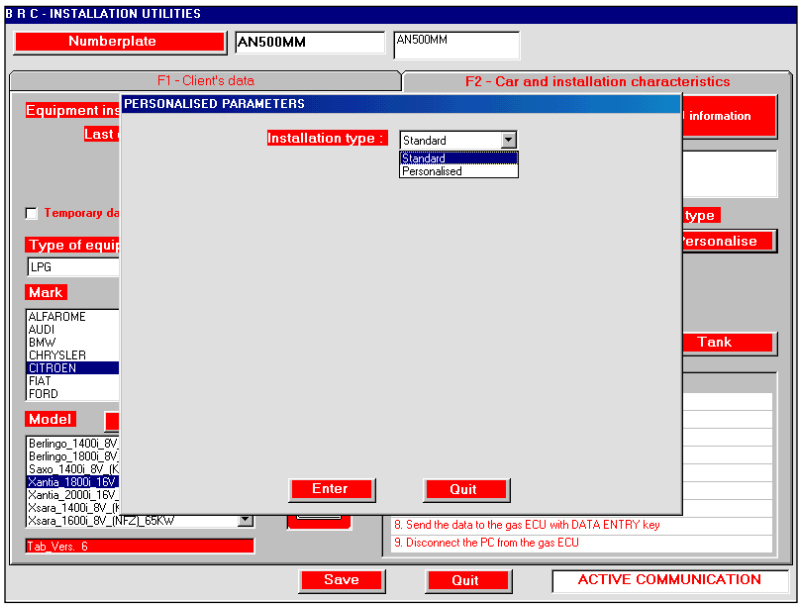


Fig. 08

Set-up of the LPG level gauge or CNG pressure gauge. A gauge signal is acquired with the empty tank by clicking on the key Lowest value acquisition. In this phase the pre-established parameter is left as maximum Level value and the acquisition of the maximum value is postponed to the moment when the tank is filled up.

Once the PERSONALISED PARAMETERS are established, click on the Save key.

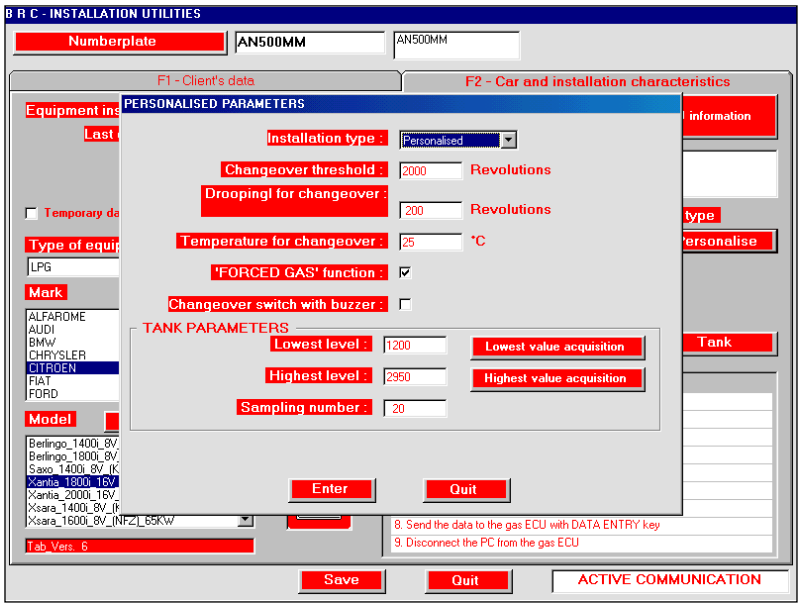


Fig. 09

In case the only parameters you want to personalise are the ones relative to the level gauge set-up, you can use the key “Tank” instead of the personalisations (See the Figure 10)

Enter the data relative to the equipped car by clicking on the key Enter data (fig. 11).

The operation can last up to 2-3 minutes. The data transfer is displayed by a blinking circle together with the message “Chart transmission in progress…”. Wait the end of the operation and the message “Data sending is correct!”.

At the end of the data enter the system carries out a control and a set-up of the pressure Gauge. The figure 12 appears on the screen requiring to put p1 and p2 at the atmospheric pressure, by unscrewing the connections on the gauges or on the SMART side. At the end of this operation, click on the OK key or press the key Enter of the PC.

The ECU sends a message (fig. 13) showing a parameter. If it falls within the limits (normally 20 mbar) the OK key appears and you can click on it. Otherwise, the message “Datum out of bounds“ appears. Check out that p1 and p2 are at the atmospheric pressure and click on Try again.

At the end of this phase, after having clicked on OK, re-screw the connections on the pressure gauges.

You will be requested to switch the ECU off and, later, to re-switch it on; after which, a message will advise the user on the programming result.

All the installation characteristic parameters are logged on the PC file by clicking on the Save key.

Check out that the ECU managing programme is as updated as

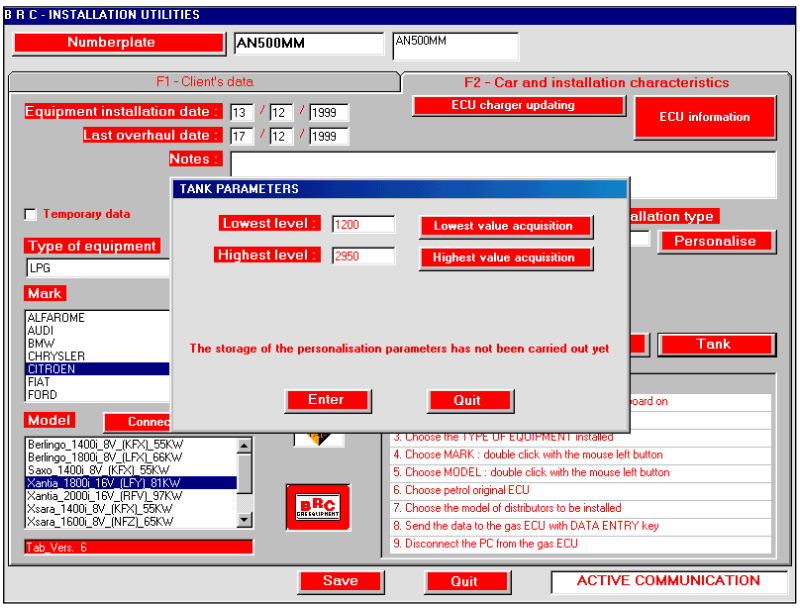


Fig. 10

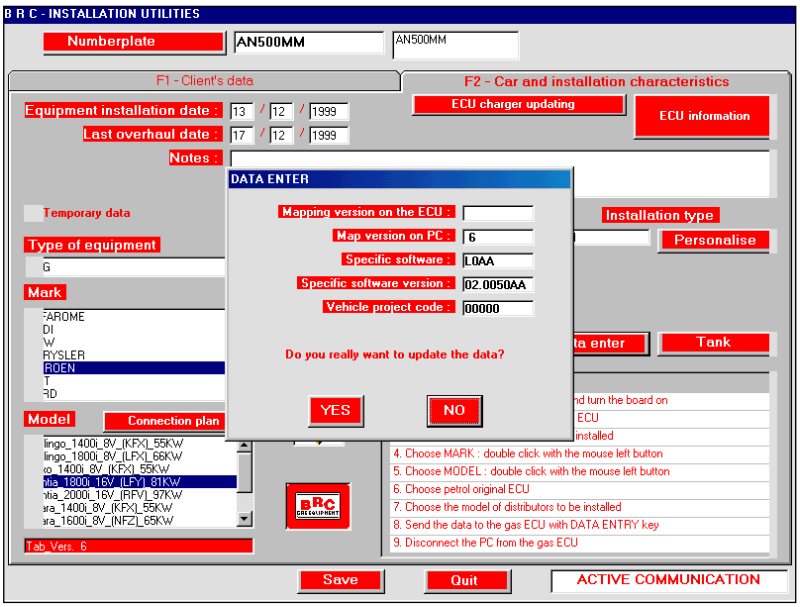


Fig. 11

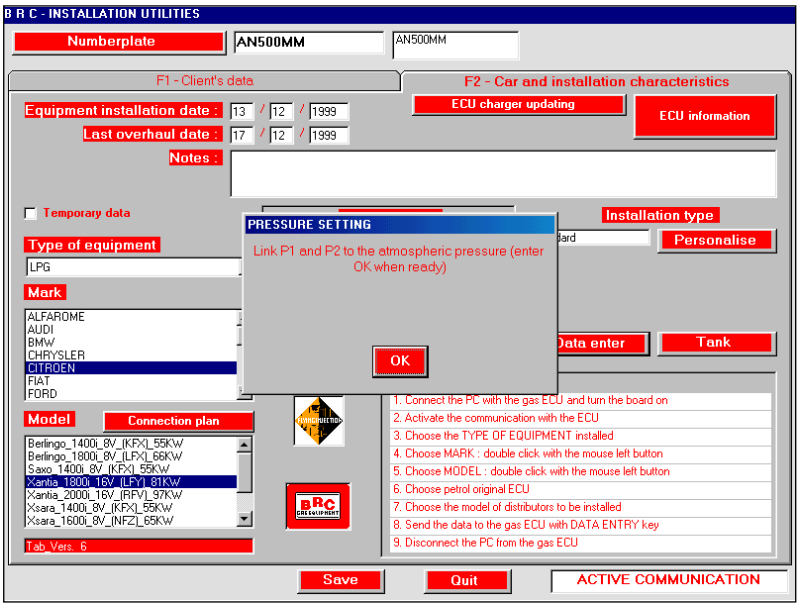


Fig. 12

possible (see § 6.4.1 and § 6.4.2).

Click on the Quit key and go back to the opening screen.

At the end of this operation sequence, the FLY GAS ECU has stored the data relative to the equipped car.

6.3.2 CHECK-OUT OF THE PETROL-RUNNING PARAMETERS

Position the changeover switch on the petrol mode and start the engine. From the opening screen (fig. 01) then choose the function ECU DIAGNOSIS through F2.

A screen opens (fig. 14) depicting the main components of the FLYING INJECTION system and of the engine, with full details on the sizes which characterise their working.

In thirteen boxes there are the values they assume every moment.

The programme moreover allows to display the course of these sizes in time on a graphic, by clicking on the key “Page of Graphs”; by carrying out this operation the boxes will be all moved on the screen left side, by leaving the space to display the graphics in the remaining empty part (Figure 15).

It is sufficient to click on the numeric value of the signal whose graphic is to be displayed; by clicking again on it the graphic will be removed, as per the Figure 16.

It is possible to open up to 4 graphics at the same time (Figure 17).

By clicking on the key “Engine page” it is possible to go back to the page only containing the numeric values of the signals.

By displaying these values while running on petrol it is feasible to immediately detect some possible troubles relating to the installation.

This operation is simplified if a

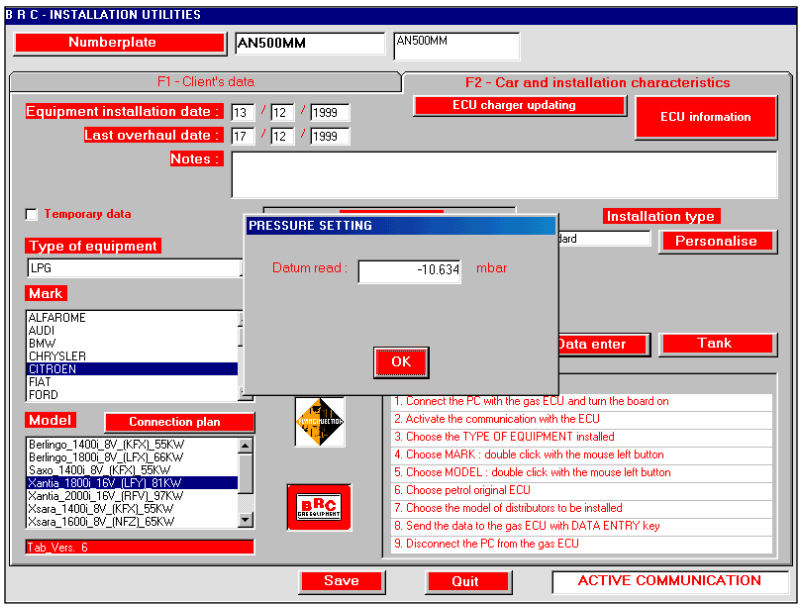


Fig. 13

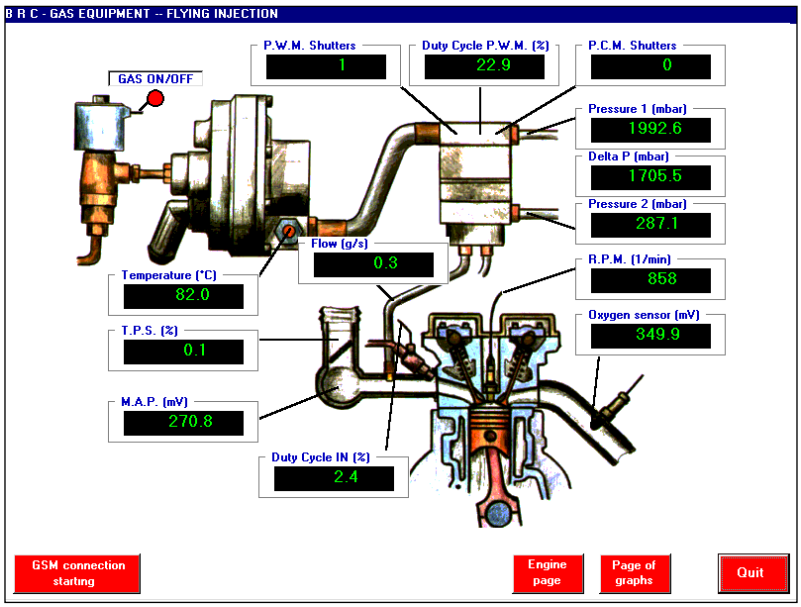


Fig. 14

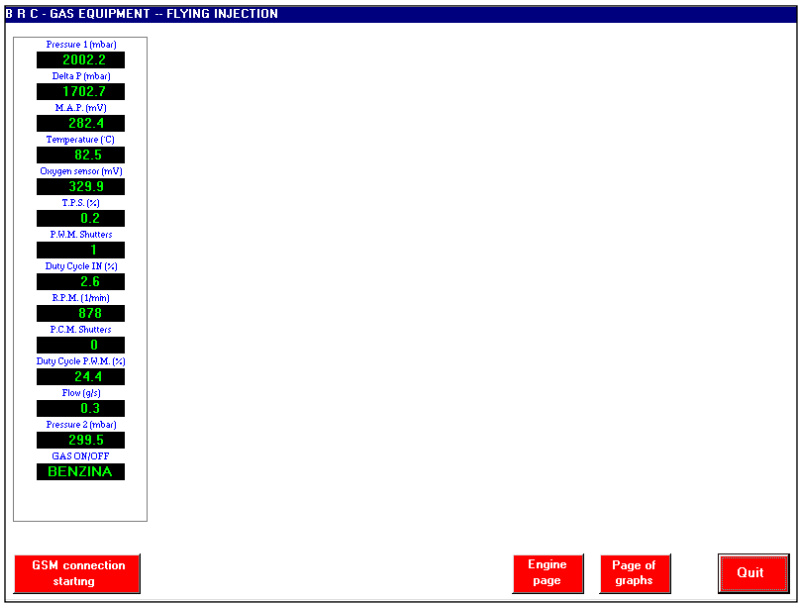


Fig. 15

comparison between the read values and the typical ones listed in the annex B is made.

At the end of this phase, once you have noticed the presence of all the signals and their congruence with the engine working conditions, you can changeover to gas.

Starting from the version 2.6 of the installers' programme, it is possible to send the graphics and the values of the main signals and parameters for the Flying Injection system to the BRC Servicing in real time, in case the car has working troubles (Figure 18).

This operation is only activated if you have the special GSM module connected to the PC and you have previously introduced the telephone number of the BRC Servicing through the option "F10 – Configurations" from the Main Menu (Figure 01).

To activate the connection to the BRC Servicing it is necessary to press the key " GSM Connection Starting", which opens a window "Connessione Modem" as per the Figure 18, where it will be sufficient to press the key "Connect".

6.3.3 CHANGING OVER TO GAS

Now you can refuel with gas. As on any equipment of any type, you check out the absence of leaks.

BRC Co. advises to set-up the level gauge with precision on the maximum level value too.

To do this, it is necessary to fill up till the (LPG) multivalve stops or up to the (CNG) maximum pressure.

The personalising operation is therefore repeated, by acquiring the maximum level signal this time. This acquisition ought to be carried out after one minute at least from the board ignition, in order to allow the signal to optimise. In this phase it is not necessary to repeat all the operations seen at the paragraph

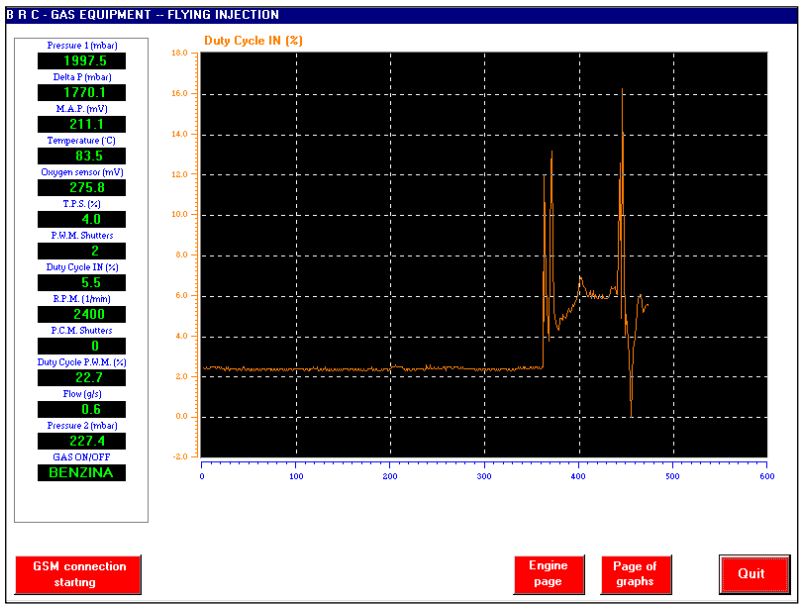


Fig. 16

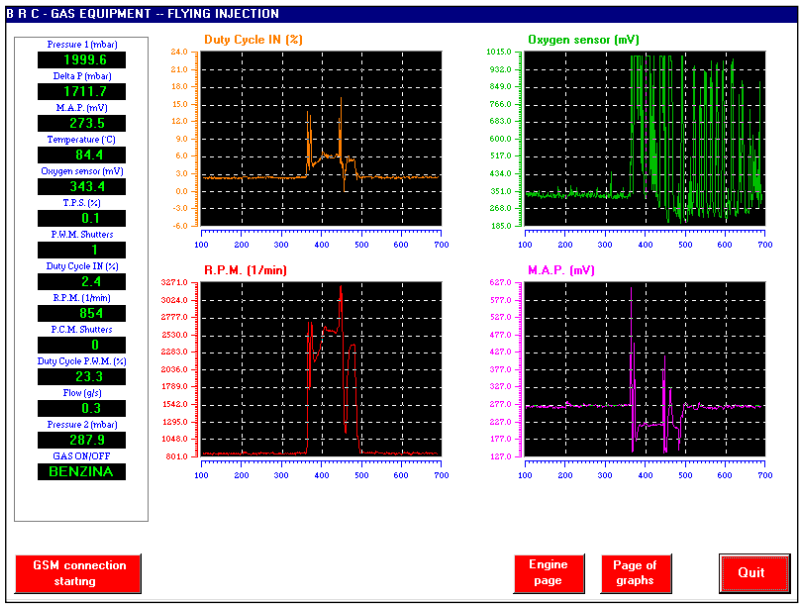


Fig. 17

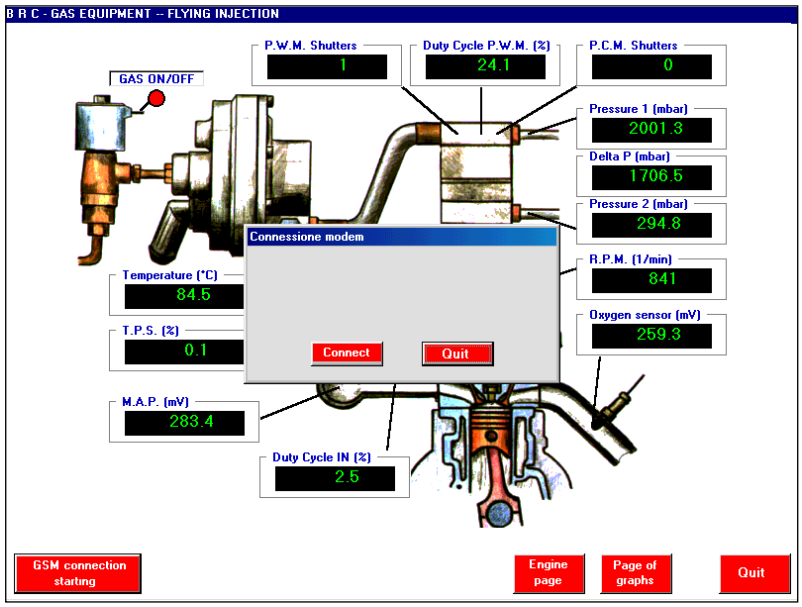


Fig. 18

3.1. It is sufficient to introduce the car numberplate and the programme takes the data relative to it from its file. It is sufficient to repeat the personalisation for the only maximum value of the tank.

Now you can changeover to gas.

6.3.4 CHECK-OUT OF THE GAS-RUNNING PARAMETERS

Act the same way as you did for petrol (see § 6.3.2).

It is now necessary to consider the pressure p1 too.

6.4. OTHER FUNCTIONS OF BRC FLY INSTALL

In the previous chapters we have described the working of the programme supplied to the F.I. installer as to the main operations to complete an installation and check out the working of a car.

It also allows a lot of further functions which will be described in this chapter.

6.4.1 ECU INFORMATION VISUALISATION

The FLY GAS ECU is able to communicate its characteristic data to the PC.

Inside CAR SELECTION, on the F2 directory, after having activated the communication through “Communication starting”, by clicking on the key ECU Information it is possible to check out all the data relative to the ECU, to the charts stored and to the software installed (fig. 19).

6.4.1.1 “MOTOROLA-01” ECUs - ECU Software Updating

The system allows to reprogram the ECU managing software as soon as BRC supplies a software version more updated than the one present on the ECU.

This is a delicate operation, to be carried out with due caution. It is essential that in this phase the communication between PC and ECU is never cut off.

This would determine a damaging in the FLY GAS which would have to be replaced.

It is therefore necessary to make sure that the car board is not switched off and the serial communication cable between PC and ECU is not disconnected.

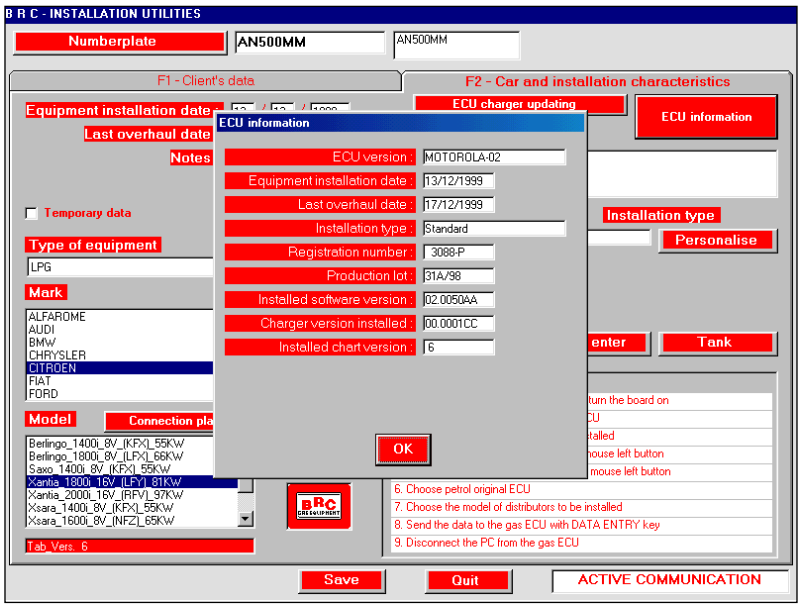


Fig. 19

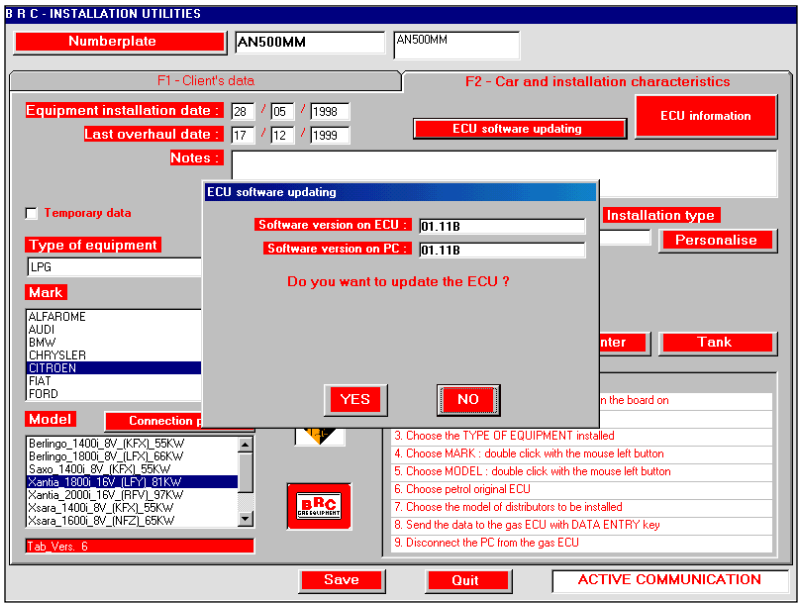


Fig. 20

The ECU reprogramming ought to be carried out with the engine switched off and the board switched on, after having activated the communication and by clicking on the special key (fig. 20).

Then, by clicking on the “YES” key, the reprogramming starts (fig. 21).

When the programming is completed, you are requested to switch the ECU off and to re-switch it on and a message is generated, advising whether the programming has been successful (Fig. 22).

6.4.1.2 “MOTOROLA-02” ECUs – ECU Loader Updating

Starting from the version 2.6 on the FLY GAS ECUs there is a programme called loader or “Kernel” which acts in such a way as not to make the ECUs unusable in case the communication in the programming phase stops for any reason. The Loader supervises the programming and checks out the correctness of the data contained in the ECU at the ignition. This loader can be only downloaded on the ECUs of the “Motorola-02” type.

The Kernel is only activated for a fraction of a second at the ECU ignition and carries out its main task in the reprogramming phase; in the normal working of the ECU it is deactivated. Its replacement hasn’t therefore any influence on the equipment behaviour. For that reason, and bearing in mind that its replacement is a potentially dangerous operation, we advise against replacing it, even if this operation is permitted by the programme.

In any case the programme signals which version is present on the ECU and which version is available for the downloading on PC.

Should you have to reprogram an ECU unprovided with any Loader, it is advisable to install it, as it is suggested by the BRC FLY INSTALL programme as soon as you try to enter data.

This is a delicate operation, to be carried out with due caution. It is essential that in this phase the communication between PC and ECU is never cut off.

This would determine a damaging in the FLY GAS which would have to be replaced.

It is therefore necessary to make sure that the car board is not switched off and the serial communication cable between PC and ECU is not disconnected.

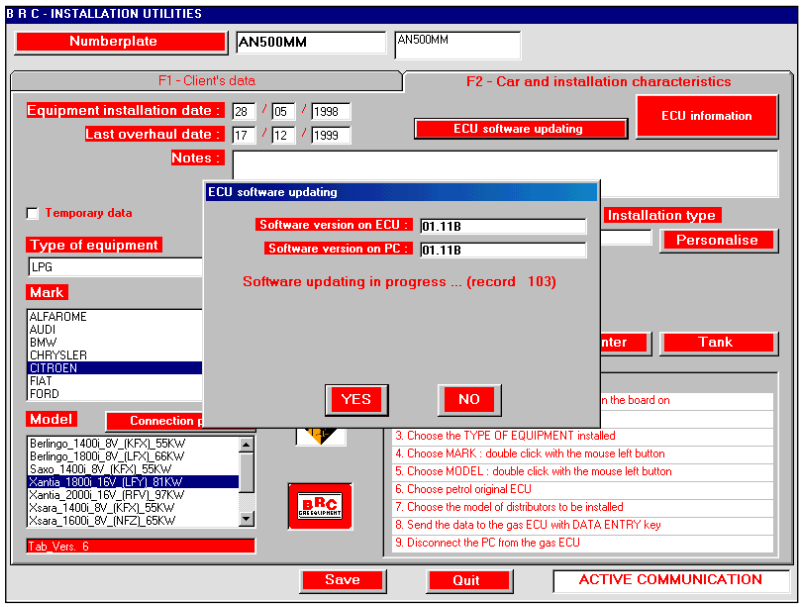


Fig. 21

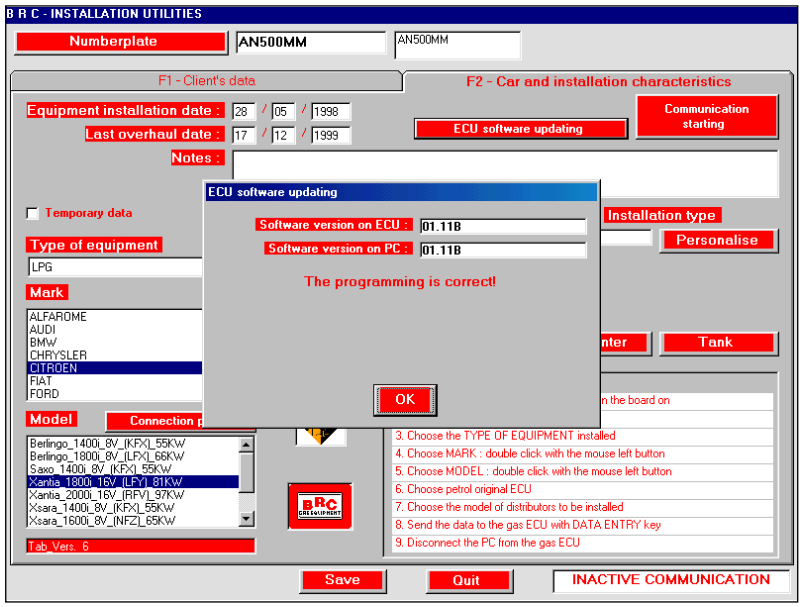


Fig. 22

The Updating or the ECU Loader installation ought to be carried out with the engine switched off and the board switched on, by clicking on the special key after having activated the communication (fig. 23).

Then, by clicking on the “YES” key, the reprogramming starts (fig. 24).

During this operation, you see an increasing number of records on the PC. At the end of the programming, you are requested to switch the ECU off and to re-switch it on and a message is generated, advising whether the programming has been successful or not. (Fig. 25)

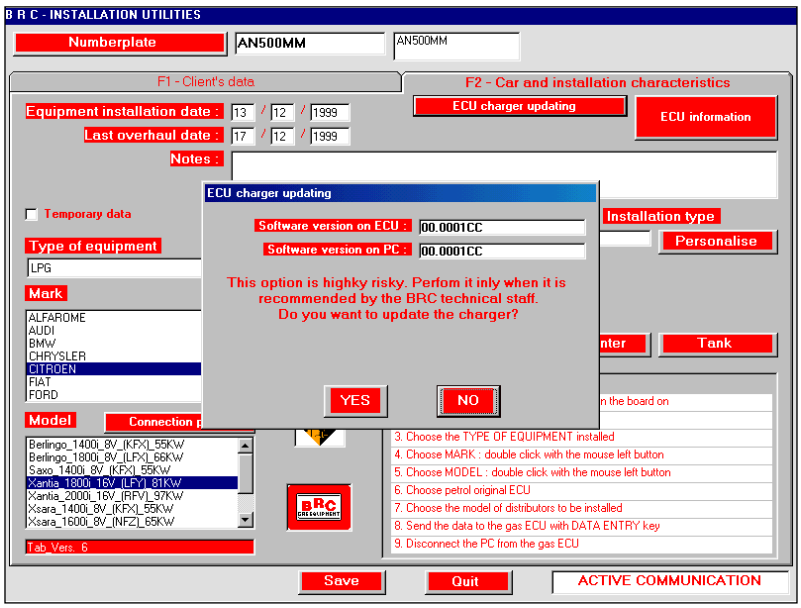


Fig. 23

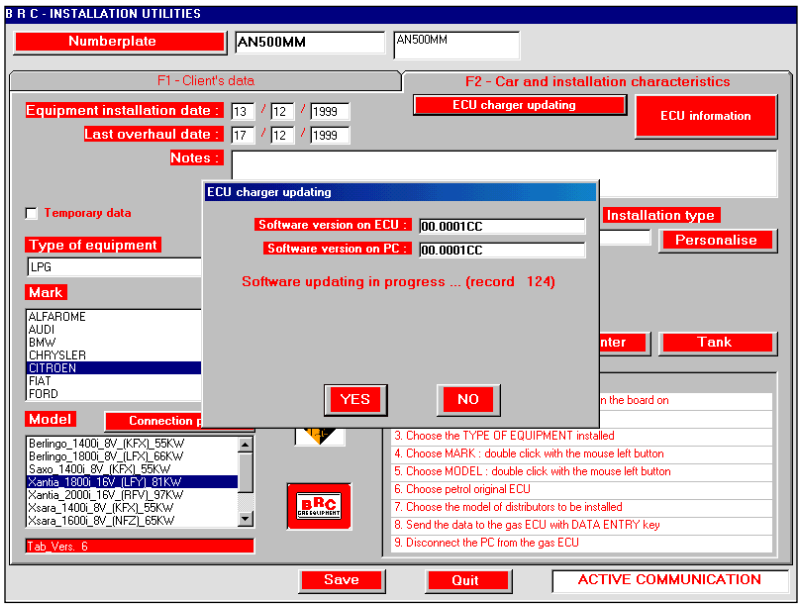


Fig. 24

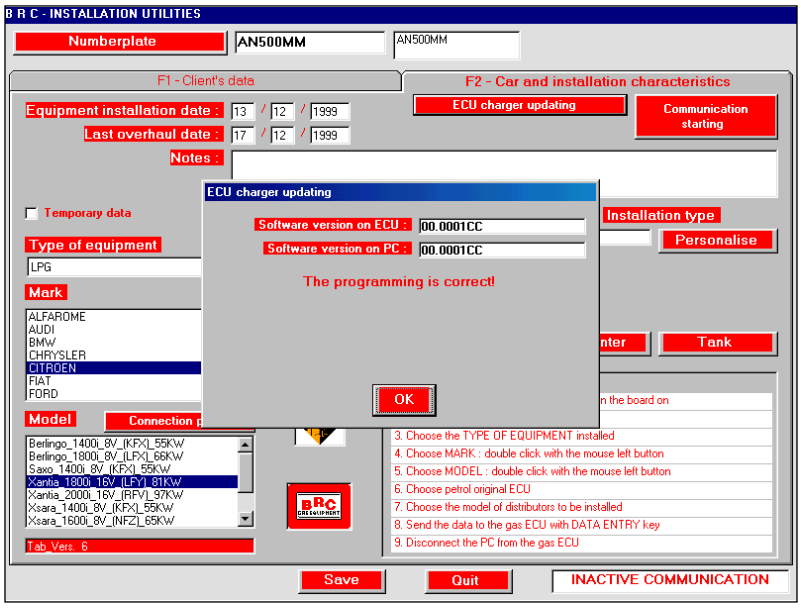


Fig. 25

6.4.2 VISUALISATION OF DIAGRAMS

Inside CAR SELECTION in the F2 directory, after having selected the car model, it is possible to display its assembly diagram by clicking on the key Connection plan (fig. 26)

One can scroll the displayed diagram (fig. 27) by clicking on the right cursor arrows, or “taking” the sheet with the displayed hand, clicking with the mouse left button to grasp and drag it by keeping the key held down.

If you have a printer and you have installed the attendant printing software on the PC, then you can print the diagram by opening the File menu with the mouse and by choosing the Print Option, as it is shown in the figure 28.

To close the diagram and to go back to the previous menu, it is sufficient to click on the x which is above on the right, as per the figure 29.

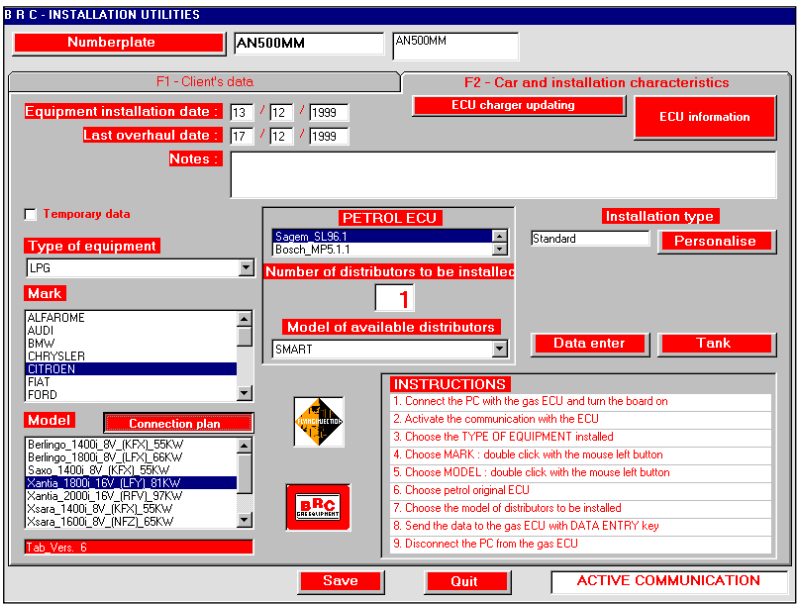


Fig. 26

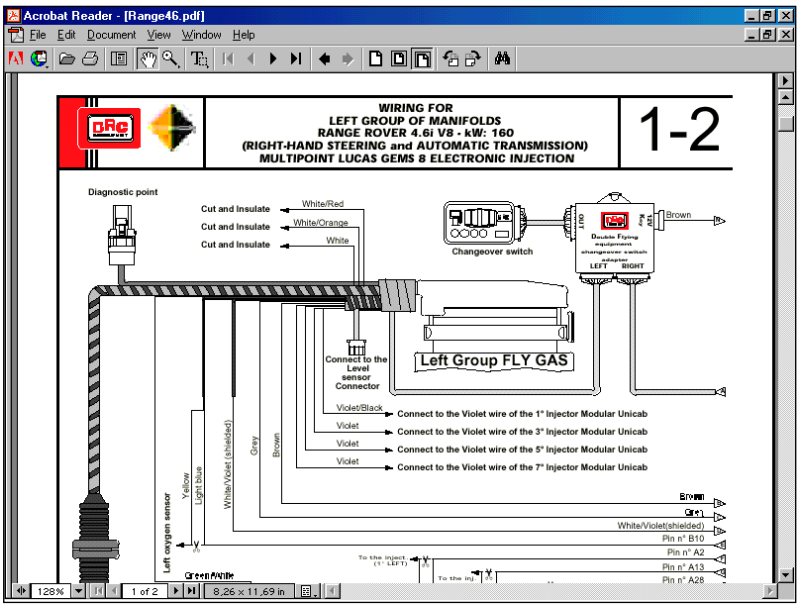


Fig. 27

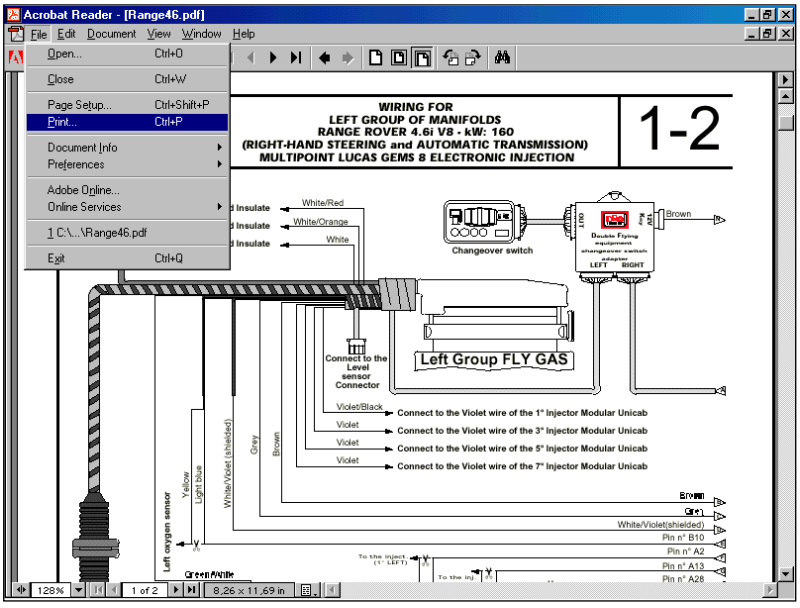


Fig. 28

6.4.3 EQUIPPED CAR DATA RESEARCH

This function is useful during the overhauling phase of the cars equipped with F.I.

The data are available through a research by numberplate or by customer's name.

Inside CAR SELECTION, on the F1 directory, by typing the numberplate, a list of cars having the same initials appears on the right case (fig.30). Once you have located the wanted one, it is sufficient to click twice on the correct numberplate to get all the available data relative to that car.

By clicking on the Numberplate key you pass to the research according to the car owner's name (fig. 31). Act the same way as you did for the research according to the numberplate.

6.4.4 UPDATING OF MODELS ON PC

You can update your PC by downloading the new or revised files from the section reserved to BRC internet site (http://www.brc.it).

You can make a complete updating referred to all the vehicles or just to take the software relative to the car model being converted.

After having typed your own identity with the attendant password, you can accede to the reserved area.

An icon enabling to download the complete software for all the ECU types is immediately displayed, or, by clicking on Complete Table the list of the available cars achieved. Look for the wanted car and click on the "Software" icon placed beside the Kit Code.

The data will be logged on your computer Hard Disk.

Click twice on the icon now present on your Hard Disk after having

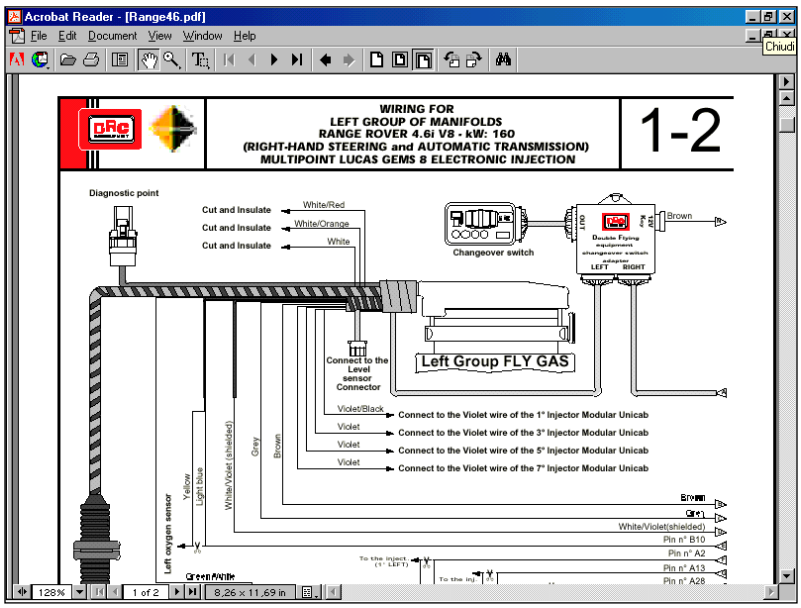


Fig. 29

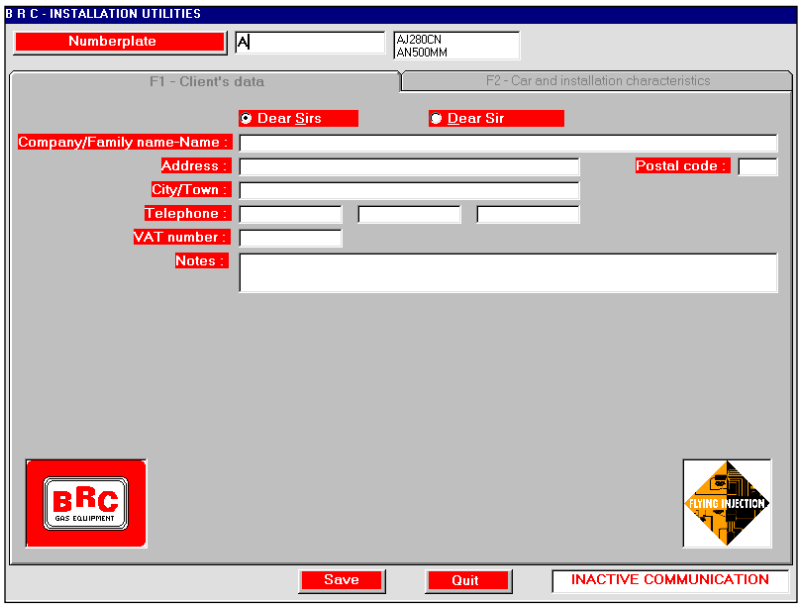


Fig. 30

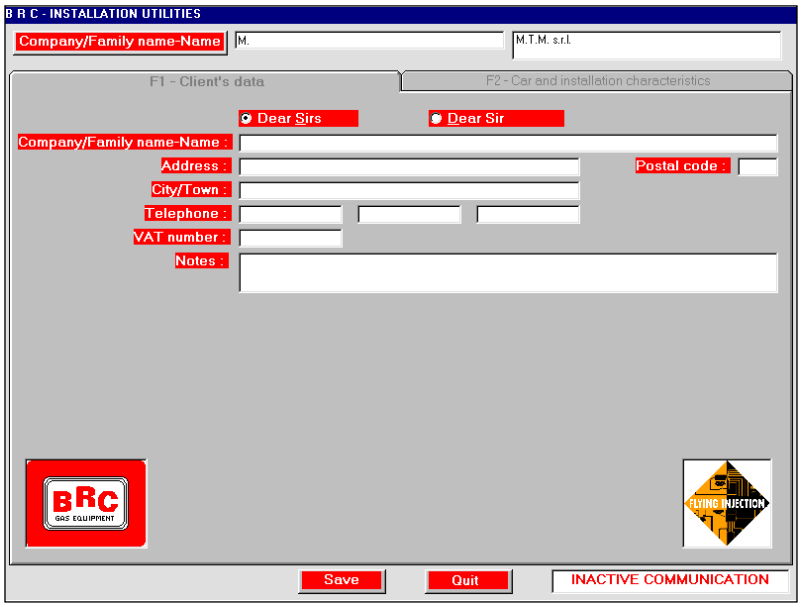


Fig. 31

fed an empty 3,5” MS-Dos formatted disk of the computer “A” Drive.

This way the software/s taken from BRC site is logged on the disk.

It is now possible to update the data on the Flying Injection PC.

Start from the opening screen (fig. 01). By pressing the F3 Key MODEL UPDATING you open the screen of the figure 32. Feed the floppy disk/s in the PC drive, press OK or Enter on the keyboard. The data transfer is displayed by “Software Updating” or “Model Updating” placed under the caption “Operations in progress”. Wait till “Updating finished!” appears. In case of an updating to be carried out through several disks, at this point it is sufficient to eject the disk, feed in the New Disk and click on OK again.

You then go back to the opening screen by clicking on the QUIT key.

Starting from the version 2.6 it is possible to also update any other support as Hard-Disk and CD-Rom by selecting its relative unit through the special icon placed above (See the Figure 33).

Note: This icon is automatically set on “A:” (or rather it looks for the new updating of the maps on the 3.5” Disk) if an updating disk has been previously fed in the computer.

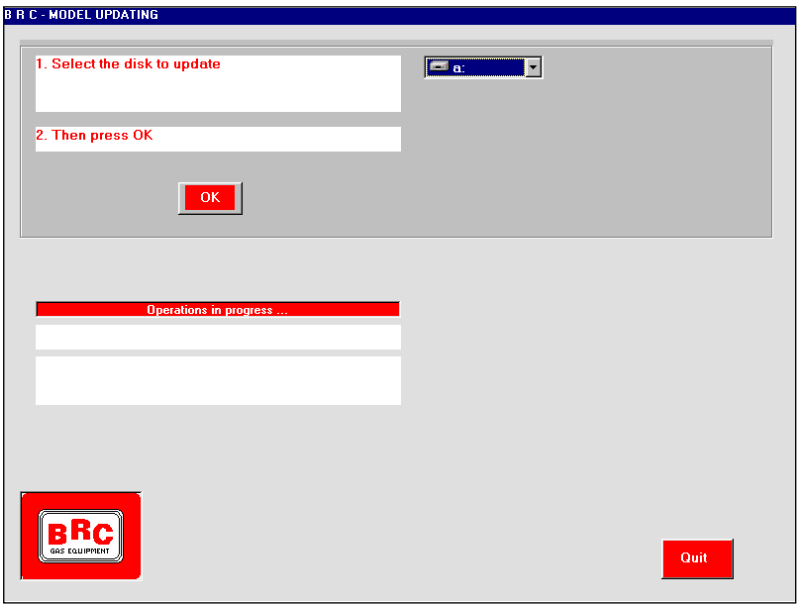


Fig. 32

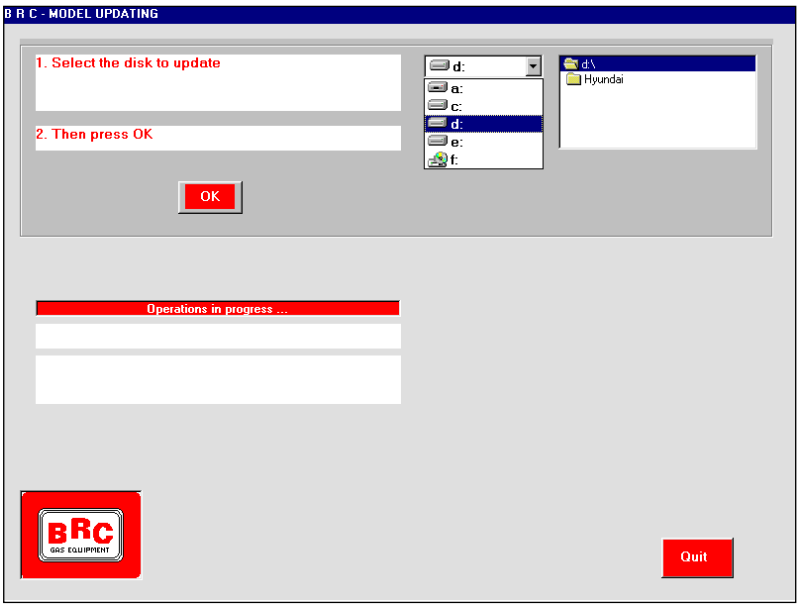


Fig. 33

6.4.5 UTILITIES/REVISIONS

From the opening screen (fig. 01), by pressing the F4 key UTILITIES/REVISIONS you open the screen of the figure 34.

This function allows to perform some operations on the file of the equipped cars.

Display a both complete and partial list of the equipped cars on the monitor (fig. 35 - 36).

If you own a printer, it is possible to print a paper copy of it, from the screen of the figure 36, by clicking on the below key depicting a

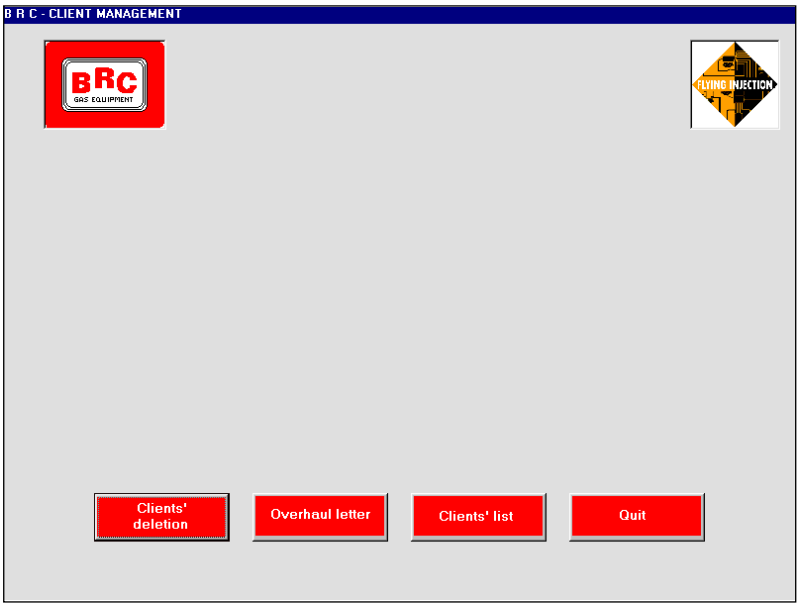


Fig. 34

printer.

Click on Quit to go out from the screen of the figure 35.

By coming back to the screen of the figure 34, it is possible to print overhauling letters to recall the customer for the programmed maintenance (fig. 37).

The text of the letter ought to be personalised by the assembly shop, by pressing the key Overhaul letter modification appearing on the screen of the figure 37.

This personalisation ought to be carried out making sure not to touch the domains in quotes <<xxxx...>>. The text of the screen of the figure 38 is modified.

Once the personalisation is achieved, the screen is closed by clicking on the x placed above on the right. The message: “save changes to...Letters_EN.TXT” will appear. By clicking on the Yes key the new letter will be stored.

6.4.6 CHANGE OF LANGUAGE

The change of language is carried out from the opening screen (fig. 01) by pressing the F8 key and choosing the wanted language.

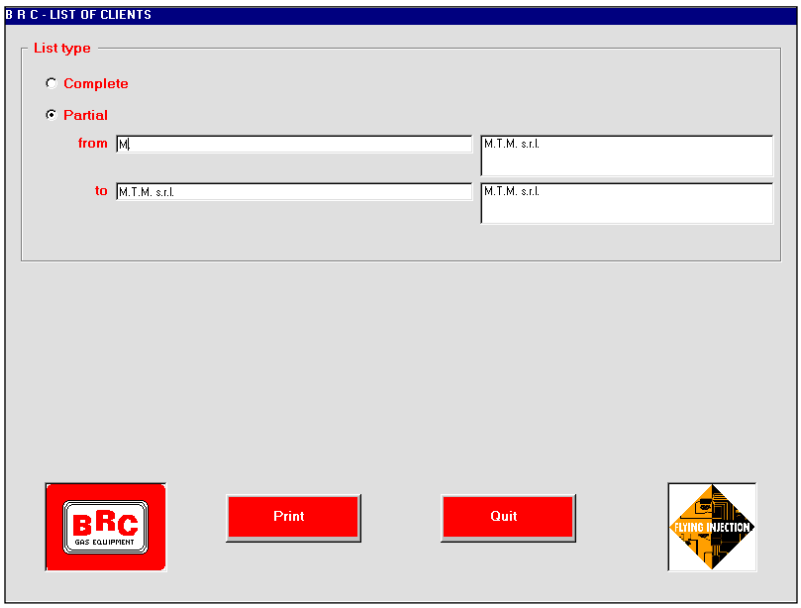


Fig. 35

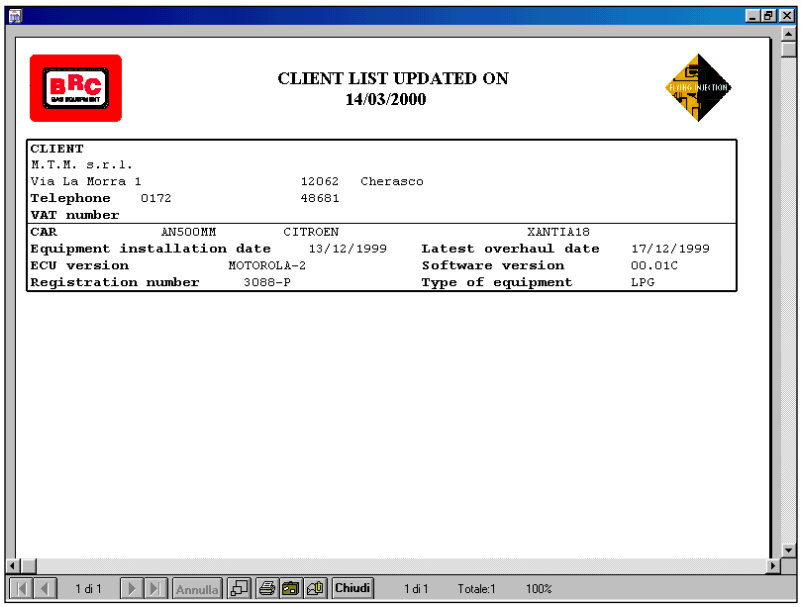


Fig. 36

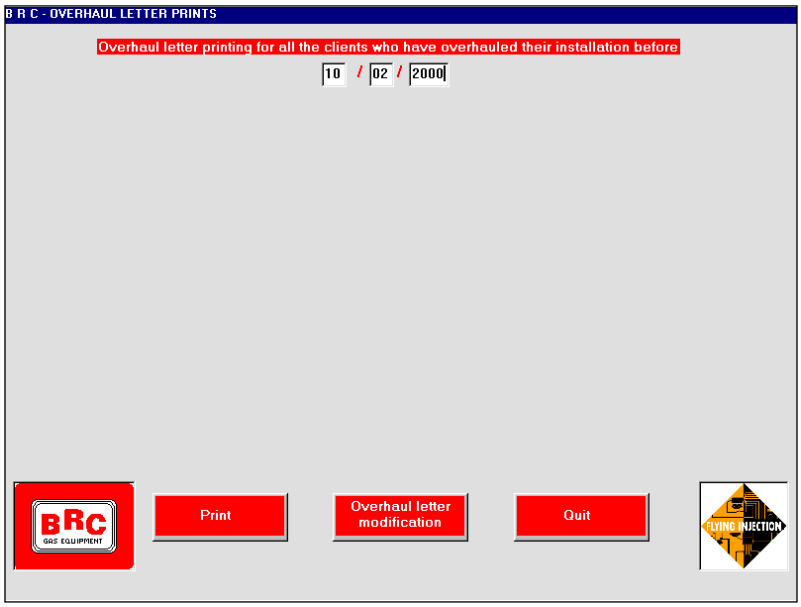


Fig. 37

6.5. PROGRAMME EXIT

The programme exit is carried out from the opening screen (fig. 01) by pressing the Esc key.

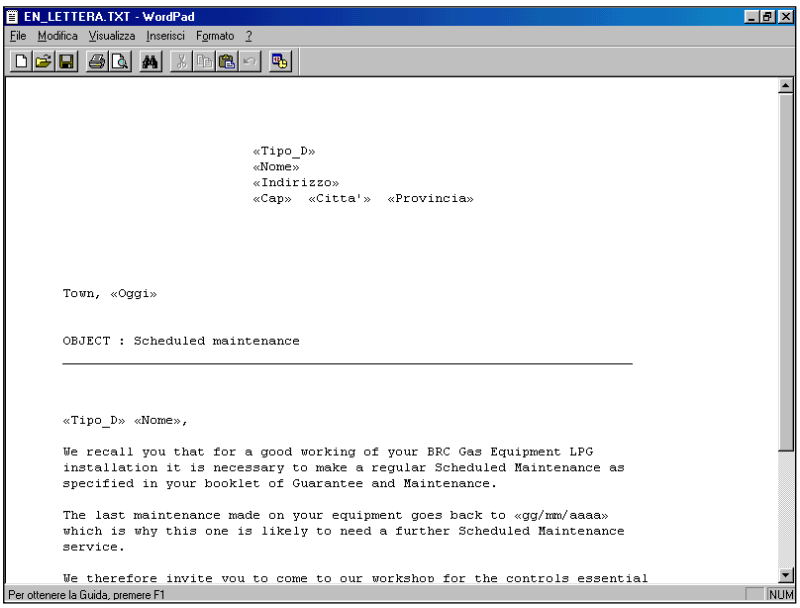
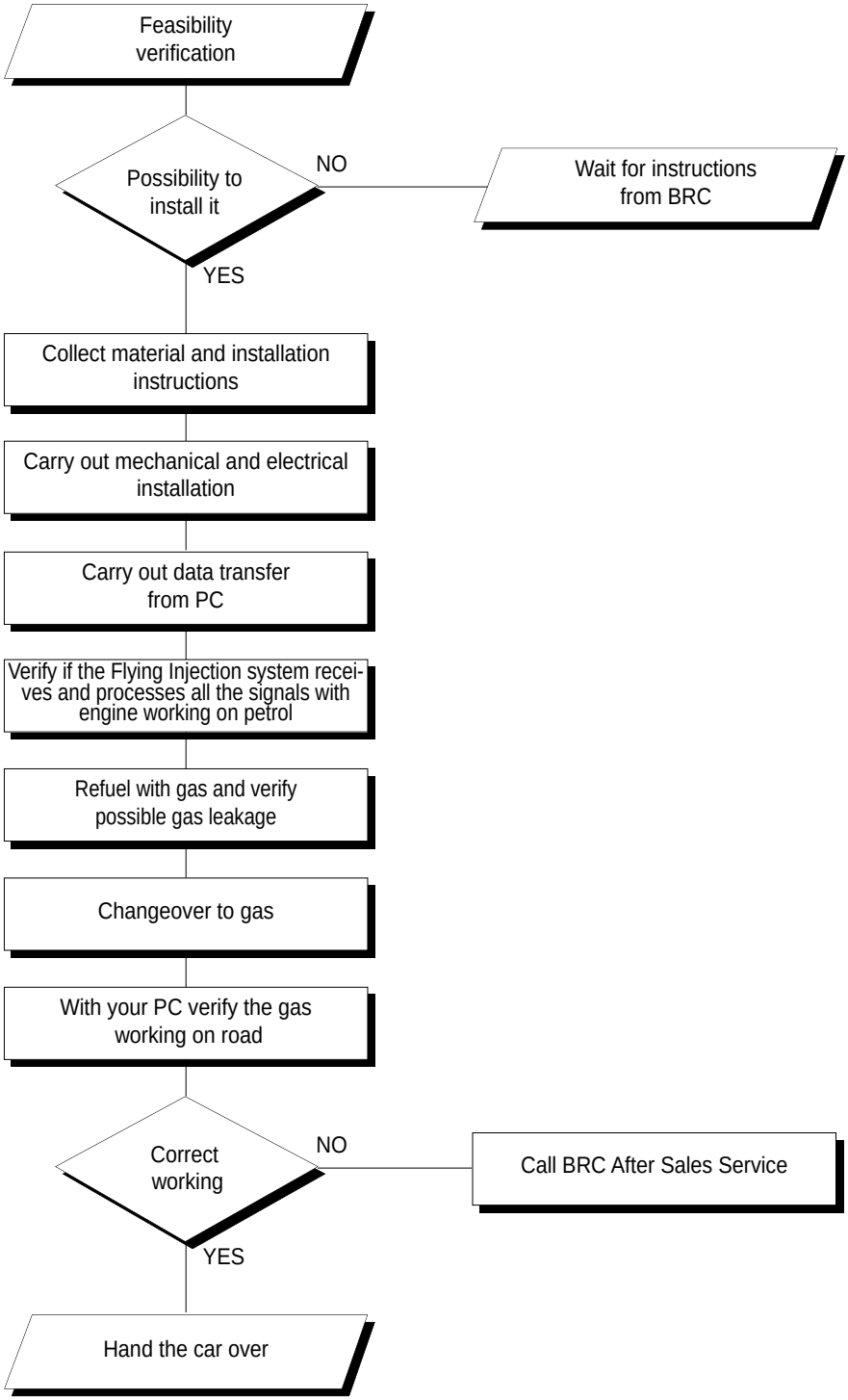


Fig. 38

A. FLYING INJECTION INSTALLATION FLOW-CHART



B. TYPICAL VALUES OF THE SIGNALS WHICH CAN BE DISPLAYED WITH THE ECU DIAGNOSIS

SIGNAL	Minimum value	Maximum value
Temperature (°C)	Ambient temperature	80 (90)
N° PWM Shutters (%)	1	2
PWM Shutters Duty Cycle (%)	20	92
Injectors Duty Cycle (%)	0	100
TPS (%) (**)	0	100
Lambda ox. Sensor (mV) (**)	0	1000
Shutters (n°)	0	7 in case of single SMART 16 in case of double SMART
For the LPG aspirated cars:		
MAP (mbar)	200	1000
Pressure 1 (mbar)	1000	2300
Pressure 2 (mbar)	300	1200
For the LPG Turbo and the CNG cars		
MAP (mbar)	200	1800
Pressure 1 (mbar)	1000	2900
Pressure 2 (mbar)	300	1800

IMPORTANT
All the pressures are detected as absolute pressures, that is to say:
- 0 mbar means the absolute vacuum
- the atmospheric pressure is approx. 1000 mbar (at the sea level)
so, by way of example
- p1 = 1800 mbar means a pressure of approx. 0,8 bar above the atmospheric pressure
- p2 = 700 mbar means a depression of approx. 0,3 bar as to the atmospheric pressure
Note : In the phase of the first analysis of the car correct working, you can check that the M.A.P. value with the engine switched off and the board on is very close to1000 mbar whereas with the engine idling on petrol it ought to be nearly equal to the value of P2.

(**) The read TPS value is not in mV anymore as in the programme previous versions, but it now assumes the meaning of a throttle body opening percentage. Then, reading a TPS value around 0% means that the accelerator pedal is seen as completely released; on the contrary, a value around 100% means that the accelerator pedal is seen as completely pressed. This allows to check the correct connection of the FLY GAS ECU with the car T.P.S. signal with the greatest ease; it is actually sufficient to position with the car switched off and the board on and to press your foot on the accelerator pedal checking that the value varies from approx. 0% to 100% on the PC.

C. UTILITY MESSAGES OR BRC FLY INSTALL ERROR

MESSAGE	WHAT HAPPENED ?	WHAT TO DO
It is already in execution	You tried to start the functions F1 or F4 twice.	The programme overcomes the problem
Connection plan not found	The file with the connection plan is missing	Try to update the PC with the latest disk provided by BRC
Xxxx file wrong length	A file has a wrong length	Try to update the PC with the latest disk provided by BRC
Xxxx: wrong parameter number	A line on the filelimit.txt is missing	Try to update the PC with the latest disk provided by BRC
Changeover threshold data out of limits	A value out of the allowed limits has been input inside the personalisation	Reinsert it, decreasing the pre-set value.
Revolution fall data out of limits	A value out of the allowed limits has been input inside the personalisation	Reinsert it, decreasing the pre-set value.
Temperature data out of limits	A value out of the allowed limits has been input inside the personalisation	Reinsert it, decreasing the pre-set value.
The data of the ECU might be corrupt. For safety's sake the ECU must be restores to the standard conditions	The data memorised in the ECU are damaged	Repeat the ECU set-up with data entering
Mistake in the personalisations	The personalisation data the PC read from the ECU have some mistakes	Repeat the ECU personalised set-up
Mistake in the programming chart	The data sent in the set-up are corrupt	Try to update the PC with the latest disk by BRC
Wrong checksum	The data have been transferred in a wrong way	Verify the communication between the PC and the card. Repeat the ECU set-up with data entering
Request ECU version interrupted	The ECU does not communicate with the PC	Verify the communication between the PC and the ECU
Communication with the ECU not possible	The ECU does not communicate with the PC	Verify the communication between the PC and the ECU
ECU type not identified	The PC has not been able to communicate with the ECU	Restart from the car data input
PC standard programming older than that of the ECU	The ECU has been set up with standard parameters more updated than those in the PC	Do not repeat the ECU set-up but after having updated your PC with the new disk by BRC
PC standard programming more updated than that of the ECU. Reprogram the ECU to get the latest updating	The PC contains set-up data more updated than those in the ECU	If the car owner complains about some malfunctions, repeat the ECU set-up.
PC personalised programming older than that of the ECU	The ECU has been set up with personalised parameters more updated than those memorised	Do not repeat the ECU set-up but after having updated your PC with the new disk by BRC
PC personalised programming more updated than that of the ECU. Reprogram the ECU to get the latest updating	The ECU has been set up with personalized parameters prior to those memoriz ed	If the car owner complains about some malfunctions, repeat the ECU set-up.

Report file not found	Some *.RPT. files are missing or have been deleted	Try to update the PC with the latest disk by BRC
ECU not programmed	New ECU, never set up.	Carry out the set-up as described in this handbook
Software updating transmission interrupted	The communication between the PC and the ECU has been interrupted during the software updating	The ECU must be replaced
Wrong reception	During the software updating the ECU does not communicate with the PC	Check the communication and repeat the operation
Message without initial code	During the software updating some data are missing	Try to update the PC with the latest disk by BRC
Personalisation file updated with the ECU data	The ECU has communicated the personalised parameters to the PC. The installed car file is updated	The programme goes on automatically

D. PROBLEMS WITH YOUR PERSONAL COMPUTER?

PROBLEM	POSSIBLE SOLUTION
The screen is dark	Adjust the brightness with the small wheel at the side of the PC or the monitor
The mouse arrow disappears	Aim with the mouse at any corner of the screen and move slowly until the arrow reappears
At the starting, the PC got jammed	Push at once the keys “Alt”+”Ctrl”+”Del”. Then restart the PC by entering again the keys “Alt”+”Ctrl”+”Del”
The system got jammed and does not react to any command	Follow the previous instructions
Scan-disk	If the PC was switched off incorrectly or if there are problems with the hard-disk, at the start you may be required to run the programme Scan-disk. Push the key ENTER to run it and let it process without any interruption. It may take a couple of minutes.
Starting in temporary mode	If at the start it is shown that the PC is in temporary mode it means that there are problems with some hardware components. In some cases it may involve components which are not in use, anyway call the nearest After Sale Service
Double click	Push rapidly twice the left button of the mouse