Sequential GIS N

Sequential
Gas Injection System

bigas INTERNATIONAL S.R.L. AUTOGAS SYSTEMS

INSTRUCTION MANUAL
PROGRAMMING SOFTWARE

FOR THE "BIGAS 2001n" ECU

Ver. 1.5

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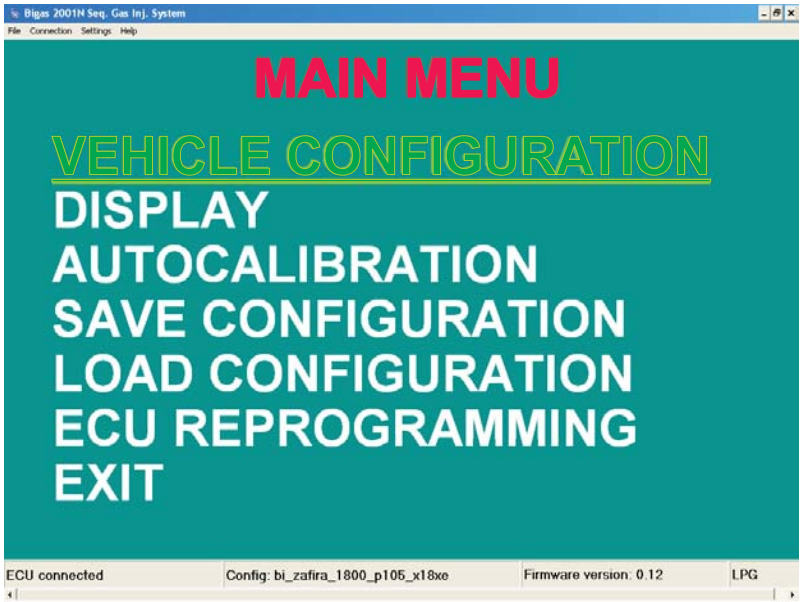
Check that the programming software has been installed correctly.

- Connect the SGIS ECU to the computer through the serial or usb interface.
- Before beginning configuration, check that the system has been installed correctly.
- To test connection with the ECU:
  - Start the vehicle engine.
  - Set the fuel changeover switch to "petrol" (red LED lighted).
  - Double-click the "Bigas 2001" icon on the desktop to launch the program.

  If the program opens correctly (without displaying connection errors) and the changeover switch remains lighted, connection with the ECU has been successfully and correctly established.
- Troubleshooting possible preliminary-phase problems.
  - If the software is unable to establish a connection with the SGIS ECU, check connection of the positive key wire and the positive and negative battery connections. Also check connection of the serial or usb interface.
  - If the changeover switch goes out a few seconds after engine start, there may be problems with the "RPM" signal or the negatives (signal line) of the fuel injectors may not have been connected.
  - If the changeover switch lights and goes out alternately, the probable cause is that an unsuitable vehicle configuration has been loaded. Load a more suitable or standard configuration to eliminate the problem.

Phase 1



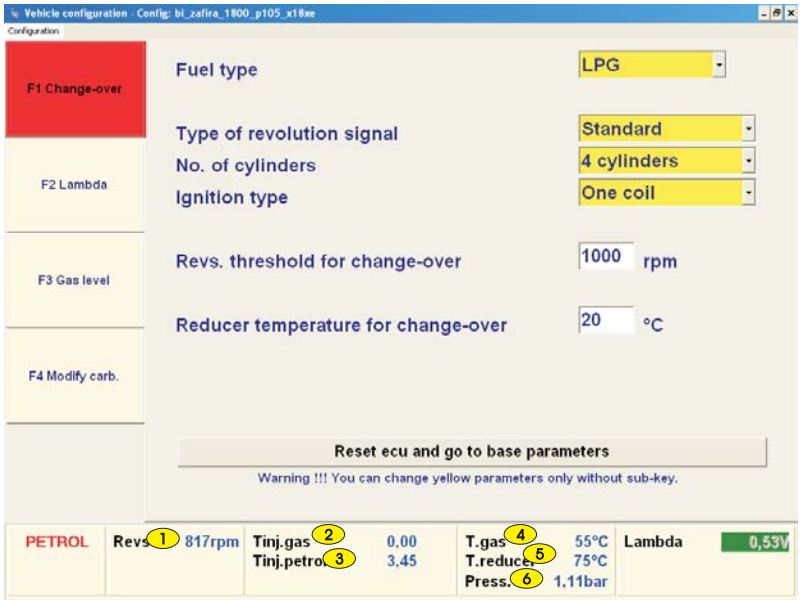
Once the Bigas 2001 (SGIS Plus) program has been launched and correct connection with the ECU has been established, select the type of fuel (methane or LPG) used by the installed system:

- on the main menu, click "VEHICLE CONFIGURATION"
- select "Methane" or "LPG" in the "fuel type" field.
- press "Esc" to return to the main menu.

A configuration may be loaded into memory after the correct fuel type has been selected:

- on the main menu, click "LOAD CONFIGURATION"
- select a file for an identical vehicle or for an engine of the same type; otherwise, select a standard file. Click "OK."
- press "Esc" to return to the main menu.

Phase 1



To set the vehicle parameters (modification of the parameters must be made with the ignition key in the "off" position), click "VEHICLE CONFIGURATION" on the main menu. The various signals displayed along the lower edge of this screen are:

1 Engine "Revs". This is the engine RPM value. It is important that the value displayed on the screen correspond to that shown on the vehicle tachometer. Should this not be the case, change the value in the "Ignition type" field in the "F1Change-over" menu. If, instead, no value is displayed, change the setting in the "Type of revolution signal" field of the "F1Change-over" menu or check connection of the brown wire.

2 "Tinj.gas". Indicates the gas injection time.

3 "Tinj.Petrol". Indicates the petrol injection time.

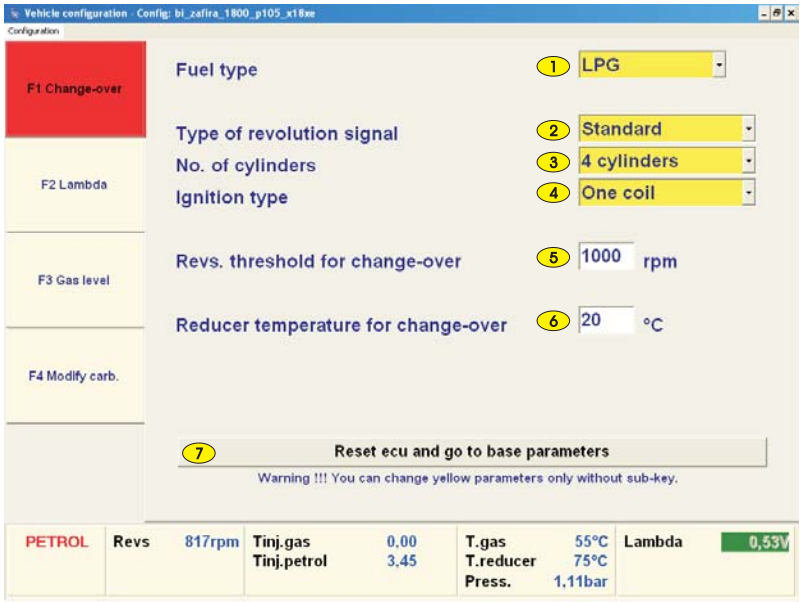
4 "T.gas". Measured temperature of the gas in the injector rails.

5 "T.reducer". Measured temperature in the reducer.

6 "Press.". Pressure relative to gas injection.

All these values must be correctly display before proceeding with self-calibration.

Phase 1 - "F1Change-over"



The "F1Change-over" menu permits setting:

1. "Fuel type". Select LPG or methane.
2. "Type of revolution signal". Select standard or "low" RPM signal.
3. "No. of cylinders» Set the number of cylinders for the vehicle engine.
4. "Ignition type". Set the type of ignition. Select "two coils", "one coil", "RPM sensor" or "RPM sensor 2". (Select RPM sensor
5. 2 for 6-8 cylinder engine that has RPM signals like 4 cylinder engine, ex. Chevrolet, Range Rover)
   "Revs. threshold for change-over". This is the threshold, expressed in RPM, beyond which the system switches from
6. petrol to gas fueling. We recommend setting a value of 1000 RPM.
   "Reducer temperature for change-over". This value indicates the temperature that must be reached by the reducer before switching over to gas fueling. For small engines, we
7. recommend setting values between 20 °C and 30°C; for more powerful engines, values between 30°C and 50°C.

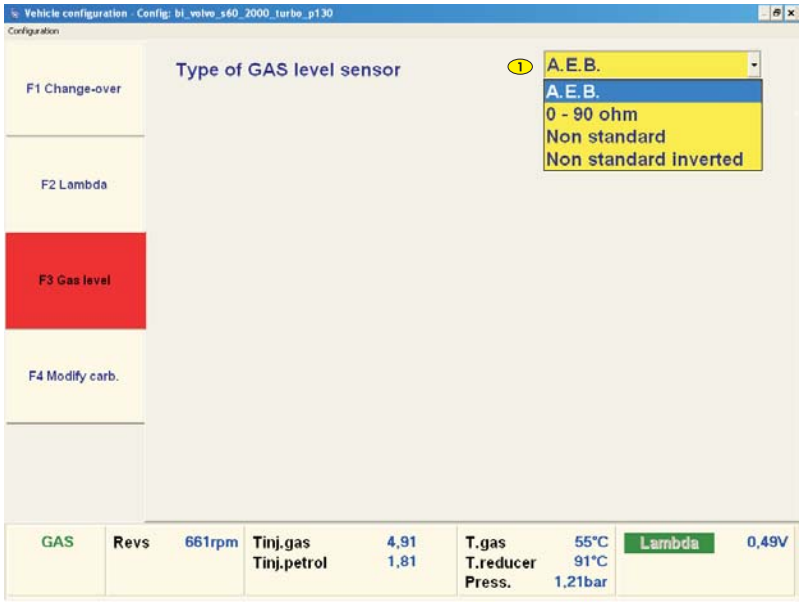
Phase 1 - “F2-Lambda”

For the self-calibrating system to operate it is not necessary that the lambda sensor be connected. Connection is required only in order to display its operation and has no influence whatsoever on carburetion. If the 4-wire lambda sensor is connected, this menu permits setting the type. Select among: (1) 0-1 Volt; 0-5 Volt; 5-0 Volt, 0.8-1.6 Volt.

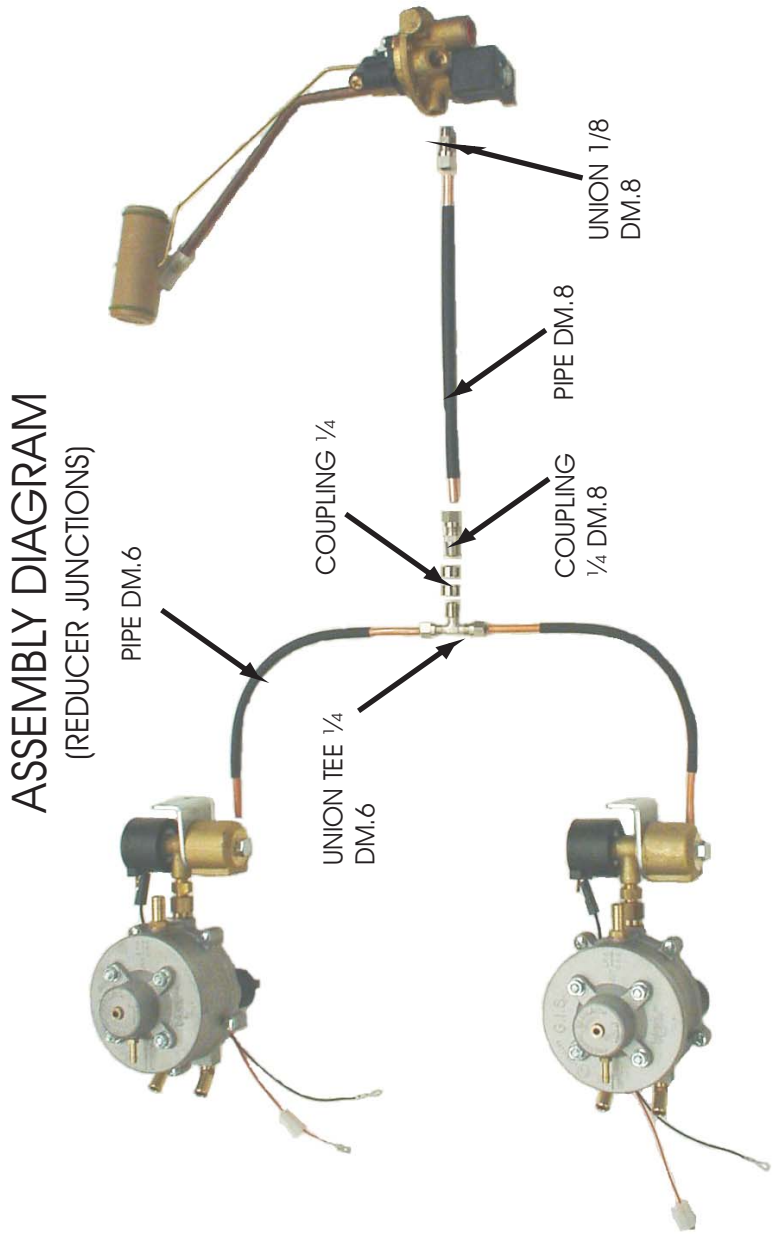
It is very important that only the purple wire be connected.

It is not possible to directly connect 5-wire sensors. This type of sensor must be connected to the 4-wire sensor below the catalyzer in order to obtain an indicative value for carburetion.

Phase 1 - “F3-Gas level”



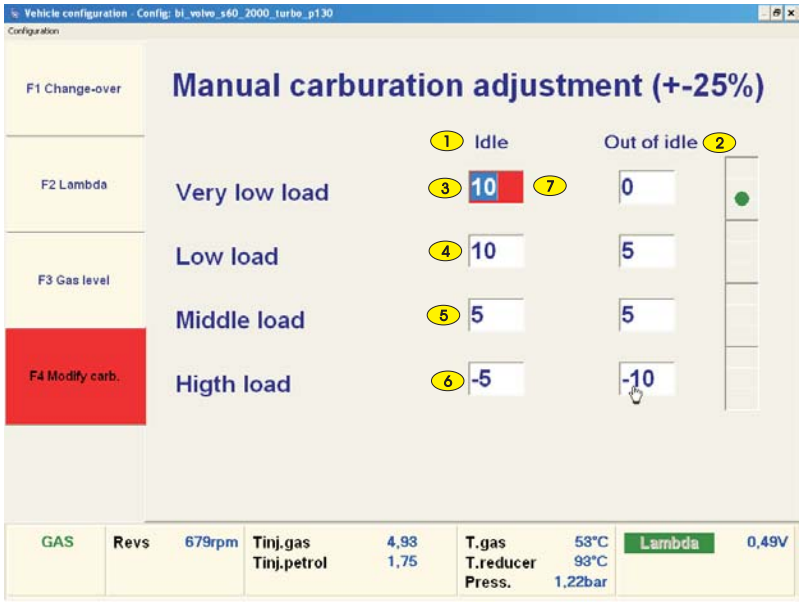
This menu permits entering the type of gas level sensor used. Select between: (1) A.E.B; 0-90 Ohm.
Suitable adapters are available for other standards.



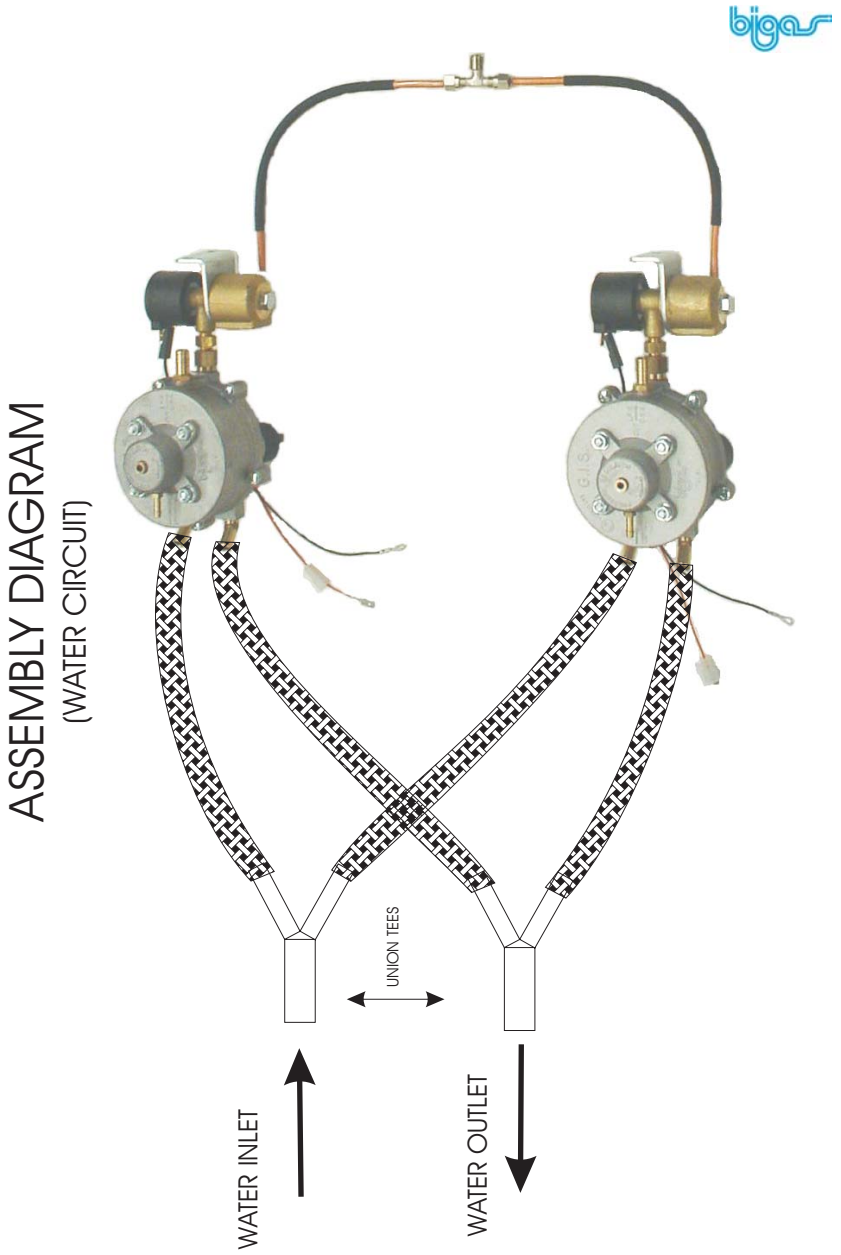
Phase 2

Once the correct vehicle parameters have been set, wait until the reducer reaches a temperature of at least 60C° and the distributor at least 30C°; then press the "ESC" key to return to the main menu.
Click "SELF-CALIBRATION" to access the guided self-calibration procedure. Press "Enter" to begin.
On the first screen (1) the software will request that you accelerate the vehicle to about 2800 RPM in neutral gear. Once this speed is reached, a second screen (2) will request that you neither accelerate nor decelerate. A few seconds later a third screen (3) will confirm that calibration has been completed. The last screen (4) will confirm that calibration is ended correctly. Click on "Exit" to return to the main menu.
If the program stops during self-calibration, it is probable that an unsuitable configuration has been loaded or that incorrect parameters have been set. To resolve the problem, load a different configuration and restart the self-calibration procedure.
NB: (5) means that the GIS ECU cannot switch to gas before 20-30 seconds from the end of calibration, as though the vehicle had been restarted at

Phase 3

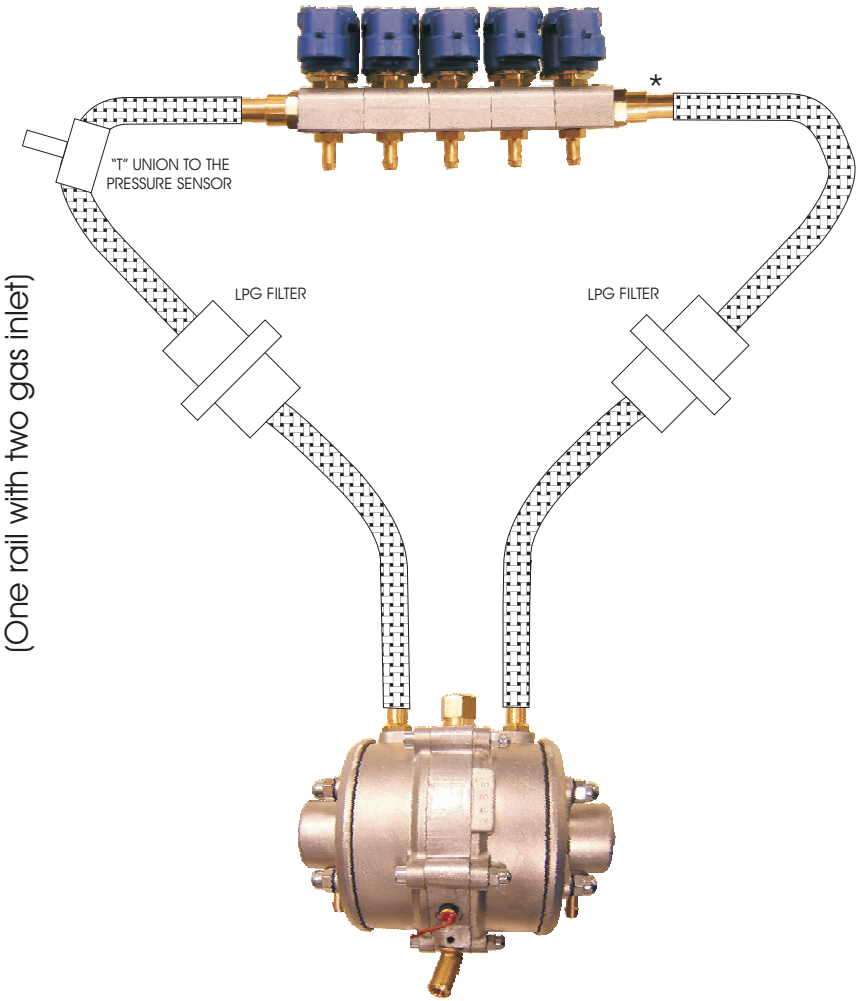


After the self-calibration procedure has been run, it is possible to further improve carburetion, in the following manner. Click "VEHICLE CONFIGURATION" on the main menu, and then click "F4-MODIFY CARB".
The menu displays the carburetion correction cells, divided by injection ranges at idling speed and higher speeds.
The "Idle" column (1) indicates an engine speed of up to 1400 RPM; the "Out of idle" column (2) indicates an engine speed of more than 1400 RPM. The "Very low load" line (3) indicates injection times of up to 3 milliseconds; "Low load" (4) indicates injection times greater than 3 milliseconds up to 6 milliseconds; "Middle load" (5) indicates injection times greater than 6 milliseconds up to 12 milliseconds, "Higth load" (6) indicates injection times greater than 12 milliseconds up to 18 milliseconds.
The red cell (7) indicates the range of times and RPMs that the system is detecting at any moment.
For each cell, correction may have values of +-25% with respect to the configuration loaded or created with the self-calibration procedure.



DOUBLE REDUCER ASSEMBLY DIAGRAM

(One rail with two gas inlet)



* N.B. The second inlet gas is an optional

Phase 3

In order to ascertain whether the map acquired automatically, using one of the available configurations, is suitable for the vehicle being tuned, the vehicle must be run on the road or on a roller test bench. At constant speed and with constant accelerator position, switch back and forth from gas to petrol one every 4-5 seconds, and at the same time check that the petrol injection time value " Tinj.Petrol" remains almost constant, with a maximum variation of +-20%. Repeat the carburetion check with the accelerator in a number of different positions.

To better explain, let us consider **Tinj.PetrolGas** as the **petrol** injection time when the vehicle is gas fueled, and **Tinj.PetrolPetrol** as the **petrol** injection time when the vehicle is **petrol**-fueled. We may thus say that the values are correct when:

(Tinj.PetrolPetrol-20%) <= Tinj.PetrolGas <= (Tinj.PetrolPetrol+20%)

Thus, if Tinj.PetrolGas < (Tinj.PetrolPetrol-20%) in a given cell (range/RPM), we will have to decrease the correction value in that cell (max -25) so as to bring the injection times back within the 20% admissible variation.

Contrariwise, if Tinj.PetrolGas > (Tinj.PetrolPetrol+20%) in a given cell (range/RPM), we will have to increase the correction value in that cell (max +25) so as to bring the injection times back within the 20% admissible variation.

In the "Higth load" range it is, however, preferable modifying the equation as shown below.

(Tinj.PetrolPetrol- 10%) <= Tinj.PetrolGas <= (Tinj.PetrolPetrol+10%).

Example 1:

Let us suppose that during petrol-fueled operation the petrol injection time (Tinj.PetrolPetrol) = 7 milliseconds. Switch the vehicle to gas fueling and read the petrol injection time (Tinj.PetrolGas).
Remember that carburetion is correct if the Tinj.PetrolGas value remains in the interval

5.6 (7-20%) <= Tinj.PetrolGas <= 8.4 (7+20%).

Phase 3

Thus, if the Tinj.PetrolGas value is less than 5.6 in a given cell (range/RPM), it will be necessary to decrease the correction value in that cell (max -25) so as to bring the values to Tinj.PetrolGas >= 5.6.
If Tinj.PetrolGas is greater than 8.4 in a given cell (range/RPM), it will instead be necessary to increase the correction value in that cell (max 25) so as to bring the values to Tinj.PetrolGas <= 8.4.

Example 2: "Higth load" range
Let us suppose that during petrol-fueled operation in the "Higth load" range, the petrol injection time (Tinj.PetrolPetrol) = 15 milliseconds. Switch the vehicle to gas fueling and read 13 milliseconds as the petrol injection time (Tinj.PetrolGas). Remember that carburetion is correct if the Tinj.PetrolGas value remains in the interval

13.5 (15-10%) <= Tinj.PetrolGas <= 16.5 (15+10%).

We may thus say that Tinj.PetrolGas =13 milliseconds is an excessively short injection time and that the mixture is too rich.

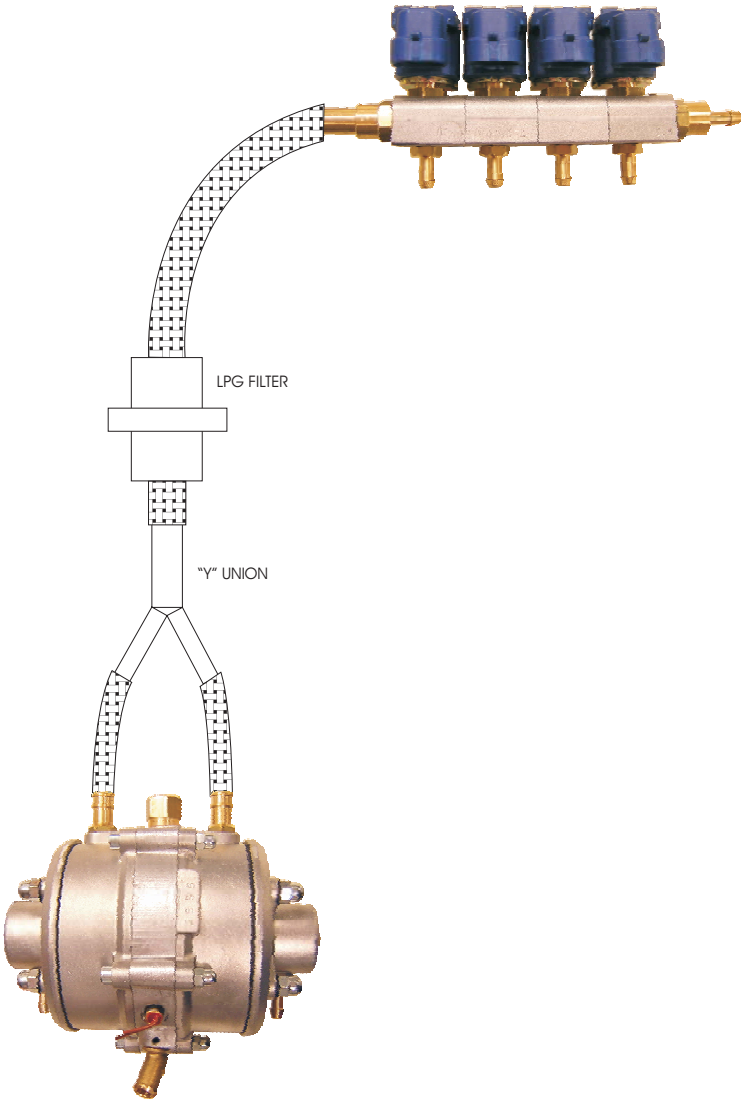
Often correction will be necessary only in the "Middle load" range in order to reduce fuel consumption, or in the "Higth load" range at higher than idling speeds in order to increase engine response. If 25% adjustments are not sufficient, it will be necessary to load a new standard configuration (richer or leaner according to need), run the self-calibration procedure again, and then go on to manual regulation.

The "Tinj.Gas" value is used to verify whether the diameter of the gas injector nozzles (or the reducer outlet pressure) is adequate to meet engine demands. For example, if the "Tinj-Gas" value is less than 4 milliseconds, it is probable that the injectors being used have an excessively large outlet. Contrariwise, if at " Higth load" the "Tinj-Gas" value is greater than 24 milliseconds, the injector diameter is probably too small or the reducer pressure is too low. It may also be that the feed from the tank to the reducer is insufficient.

The exact pressures for reducer are:
- RI-21 (LPG) reducer for engines with power up to 100 KW, right pressure is 1 Bar;
- RI-21 (LPG) reducer for turbo or with power over 100 KW engines, right pressure is 1,6 Bar;
- RI-23 (CNG) reducer for engines with power up to 100 KW, right pressure is 1,6 Bar;
- RI-23 (CNG) reducer for turbo or with power over 100 KW engines, right pressure is2-2,5 Bar.

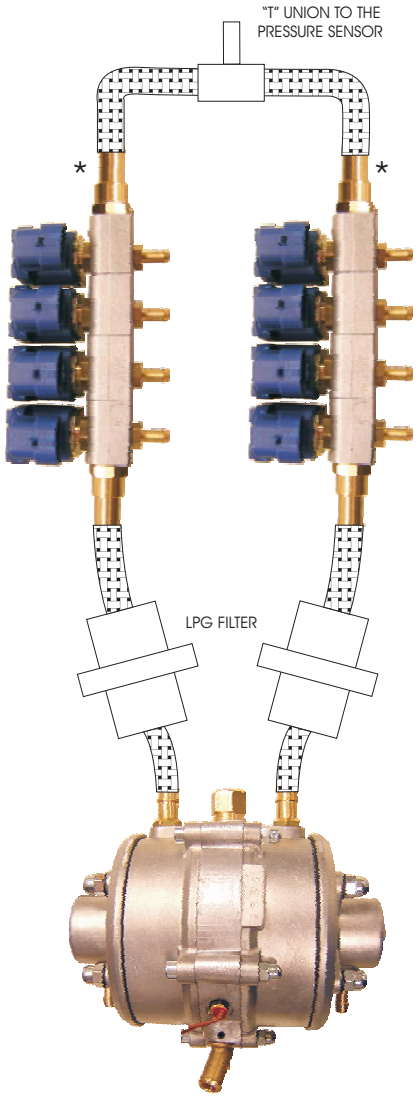
If in this condition the system automatically changeover on petrol, it means that the Tinj.gas value is too high. To solve the problem is necessary open a configuration file more suitable for the vehicle.

DOUBLE REDUCER ASSEMBLY DIAGRAM
(One Rail)

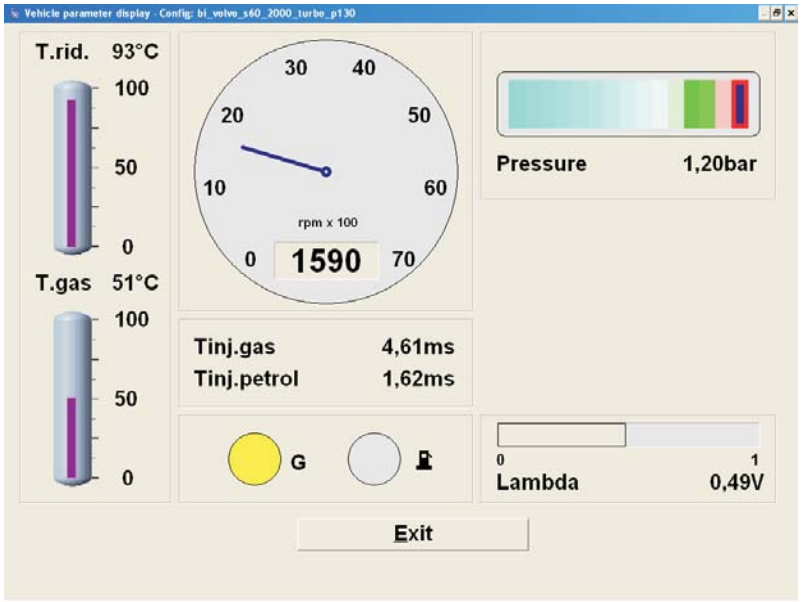


DOUBLE REDUCER ASSEMBLY DIAGRAM

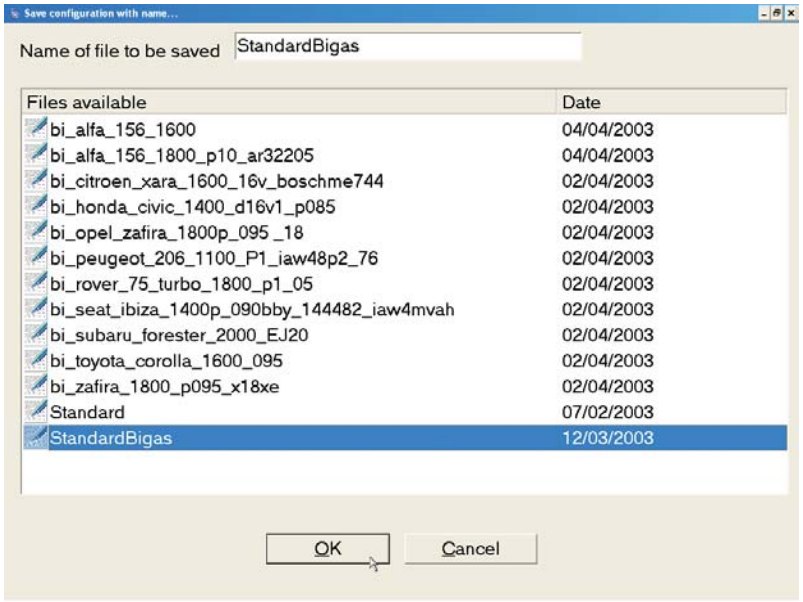
(Two rails with double gas inlet)



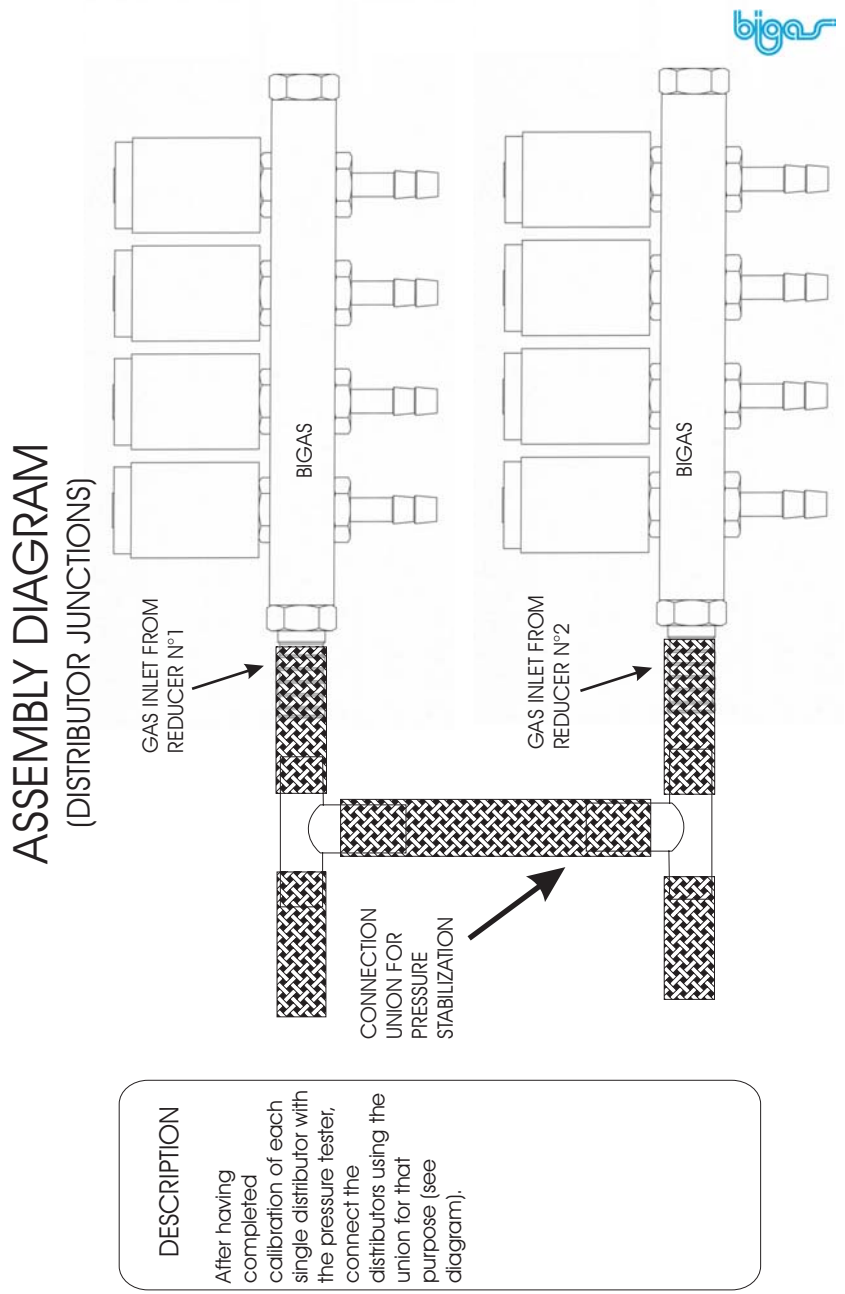
* N.B. The second inlet gas is an optional



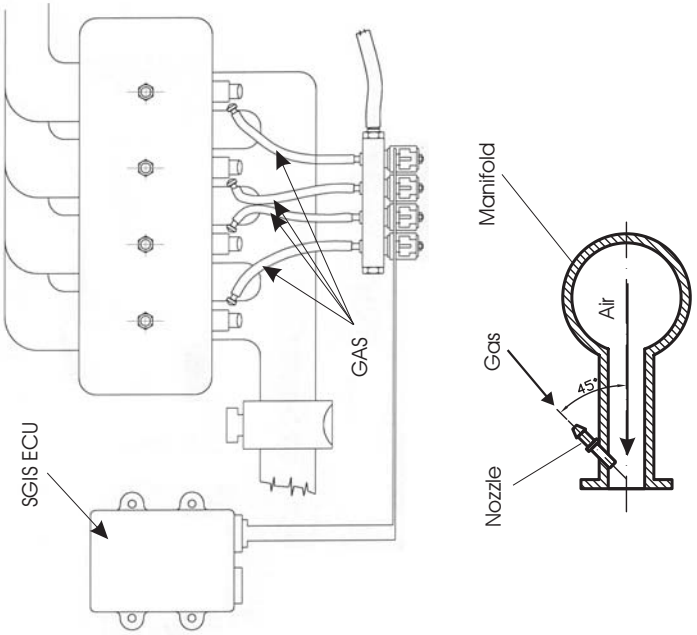
To access the display menu, click "DISPLAY" on the main menu. This menu offers graphics displays of the following signals: RPM, lambda, temperature, pressure, and petrol and gas injection times. Press "Esc" to return to the main menu.



Once a satisfactory calibration has been achieved, it must be saved.
Click "SAVE CONFIGURATION" on the main menu.
In the "Name of file to be saved" field, type in a name for the working file to be saved and click "OK". We recommend establishing a filename list ahead of time, and in any case never using the prefix "bi_", which is used by the system as an abbreviation for Bigas, since our configuration update procedures will overwrite all files with this prefix. For example, if you save a file as "bi_mycar" and then launch the configuration update procedure, your file will be deleted.
We also recommend the system outlined below for naming your files:
"your abbreviation"_"brand"_"model"_"displacement"_"pressure"_"engine type"_"injection type."
For example: xx_seat_ibiza_1400_P090_66y144482_iaw4mvah is a correct filename.
Never use such characters as spaces, any punctuation marks, or special characters; use only the letters of the alphabet, numbers, and the underscore ("_") as a space marker.
WARNING. If the filename is the same as that of a previously existing file and you answer "yes" when asked to overwrite, the earlier file will immediately be deleted.

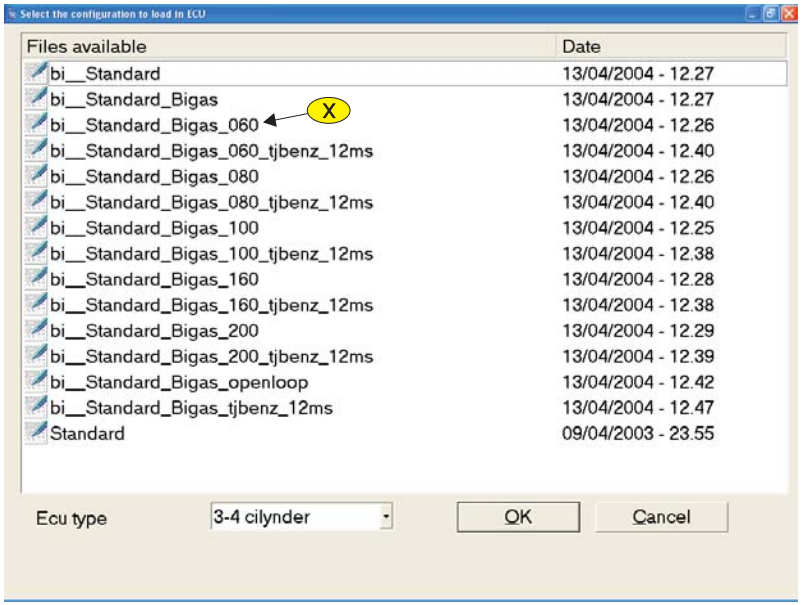


ASSEMBLY DIAGRAM



DESCRIPTION

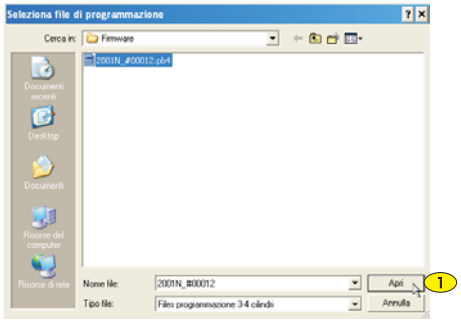
THE GAS PIPES BETWEEN THE RAIL AND THE COLLECTOR MAY BE OF DIFFERENT LENGTHS.

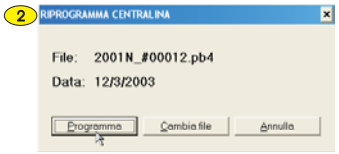


To access this menu, click on "LOAD CONFIGURATION."
Use the arrow keys to move to the desired file; press "ENTER" or left-click with the mouse to select. One you have selected a filename, click "OK" to confirm or "CANCEL" to return to selection

Configurations with "X" valve under 128 have a map more lean than the standard one for valves over 128 the map is more rich than the standard one.

“Ecu reprogramming” Menu

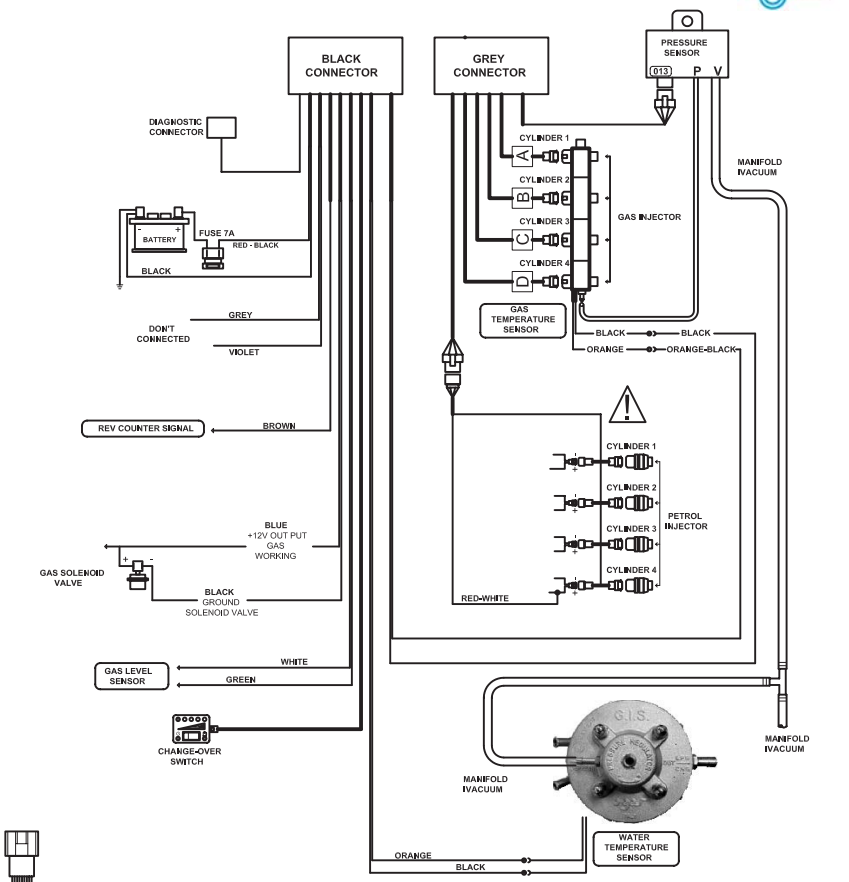


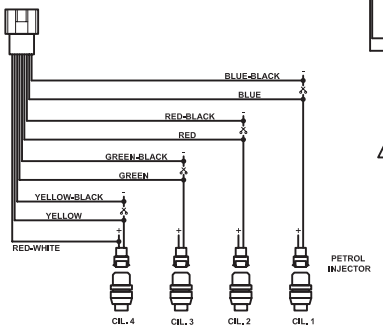


This important function permits updating the EPROM (firmware) of the ECU in order to ensure its continuing compatibility even after a programming software update.
WARNING: It is extremely important that the vehicle be switched off before reprogramming the ECU.
To access the menu, click “ECU REPROGRAMMING” on the main menu.
Use the arrow keys to select the programming file; then press “ENTER” or left-click with the mouse. The filename will appear alongside the “file name” tag. Click “Open”. (1)

A window will then open. (2)
Click on “Program” to program the EPROM, on “Change file” to look for another programming file, or on “Cancel” to terminate the operation.

General diagram for 4 cylinder engine

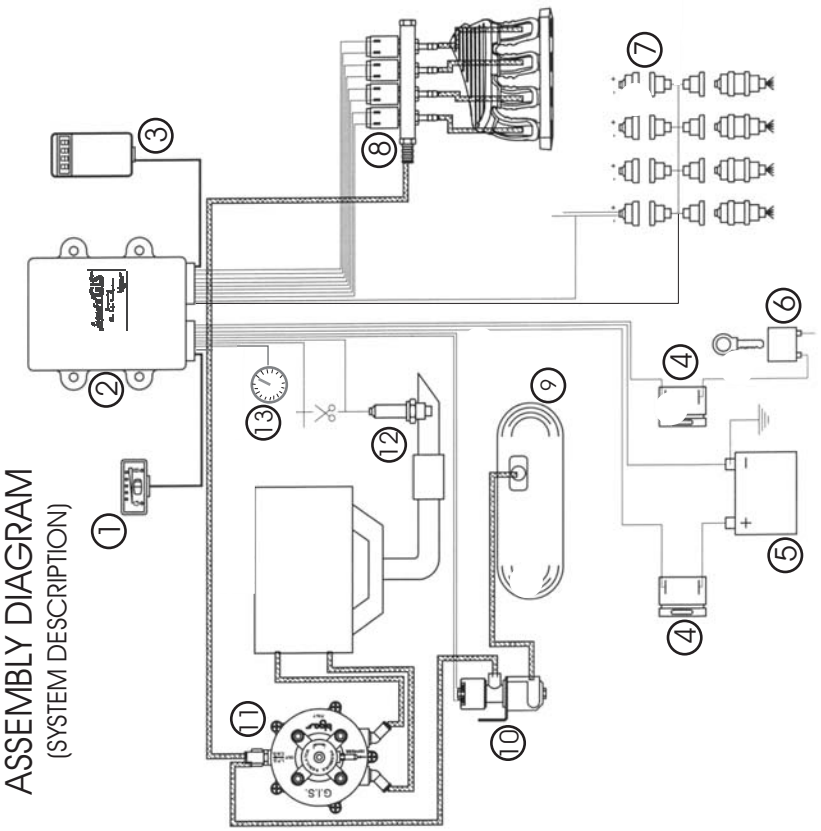




⚠ Perform this type of cabling, cutting the original wires of the injectors, in the case the connectors of the gasoline injectors are not Bosch brand or the cables are difficult to install.

SGIS General diagram

ASSEMBLY DIAGRAM
(SYSTEM DESCRIPTION)



DESCRIPTION

1) Indicator-ready switch
2) AEB ECU E13-67R-010157 BIGAS trade name
3) Connection for computer or tester
4) System protection fuses
5) Battery
6) Ignition coil
7) Petrol (petrol) injectors
8) Gas injectors, E20-67R-010494
9) LPG tank
10) On-off solenoid valve, E20-67R-010389
11) Class 1/2A reducer-vaporizer "E20-67R-010493"
12) Lambda probe
13) Connection for engine speed indicator

MAP Menu - additional functions with 009 hardware key

In this menu you can modify correction values in function of time and petrol injection (Tinj.benz).
To modify values:
- select one or more cells clicking on cell with the left mouse button. For multiple selection click on the first left cell with left mouse button and, taking the button pressed, drag to the bottom right cell you want select, release then the button.
- After cell selection, press "return" on the keyboard.
- In the new window fill a correction value, choose a modify mode and press "OK". Absolute Mode changes the old value with the new one. Linear Mode adds or subtracts the value in the field to the old value. Percentage Mode adds or subtracts the percentage value in the field to the old value.

The growing od decreasing trend of values in the map has to be similar to the one showed on the above figure. Before to modify map values read with attention pages 12-13-14.

APPENDIX