

1. GENERAL INFORMATION

Electronic Control Unit is a device for sequential gas injection (propane-butane or methane) in gaseous phase for full-group, semi-sequential and sequential petrol injection

ECU consists of:

- aluminum or plastic case
- wire harness with connectors
- Manifold Absolute Pressure (MAP) sensor
- reducer temperature sensor
- gas temperature sensor
- remote control (change-over switch)
- installation set

1.1. TECHNICAL FEATURES

Supply Voltage	12 V with minus on car body
Minimal resistance of gas injector	1 Ohm
Maximal current	15 A
Current when ignition off	0 mA
Ambient temperature	-40 °C ... +110 °C
Inner emulator resistance	100 Ohm
Protection class	IP54

2. SAFETY REQUIREMENTS DURING INSTALLATION

- Make sure that CD or tape recorder in car is not encoded. Disconnect battery terminals. Battery terminals must be re-connected only after full checking that installation of hardware was done properly.
- Do not left tools (screwdrivers, spanners, etc.) in engine compartment.
- Do not turn on reducer heating until engine because cold.
- Use only fuses of proper value after full hardware installation in reachable places.
- Do not drill holes until you are sure that this place do not harm car's unit and wiring.
- Do not look for proper wires with car's control lamp. Use multimeter, oscilloscope and car's electric diagrams.
- During wiring within passenger compartment use available blind-end caps. Make sure do not spoil car's unit and wiring.
- After hardware installation pour coolant, leave car to work on idling until electric fan starts and shuts down. Drive some distance (some kilometers) on petrol before calibration.
- After hardware installation check leak proofness with special spray or soap solution.

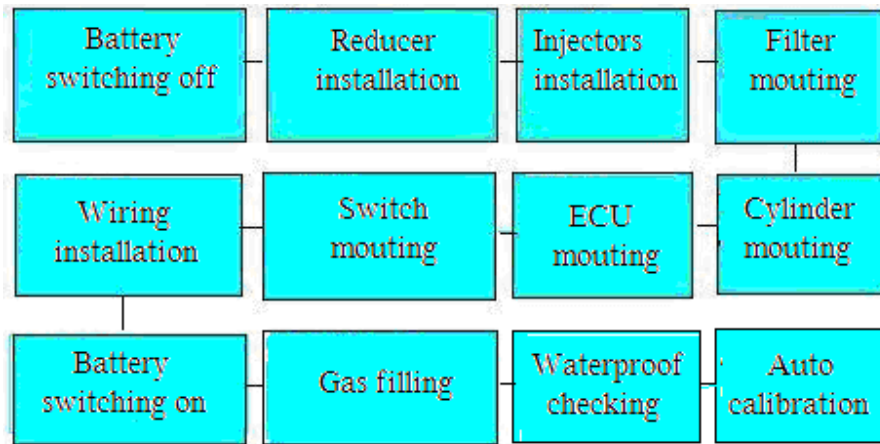
3. REQUIREMENTS TO CAR

-High voltage wiring must be in good order. It is advisable to replace sparking plugs before installation and replace every 20 000 km.

- Wind suction into inlet manifold must absolutely be absent (check with special sprays)
- Make sure that EGR valve is tightly closed on idling and works properly.
- Idling is supplied to common round but not to specific cylinder. If no, change air supply configuration that air to be supplied just after throttle and distributed in all cylinders evenly.

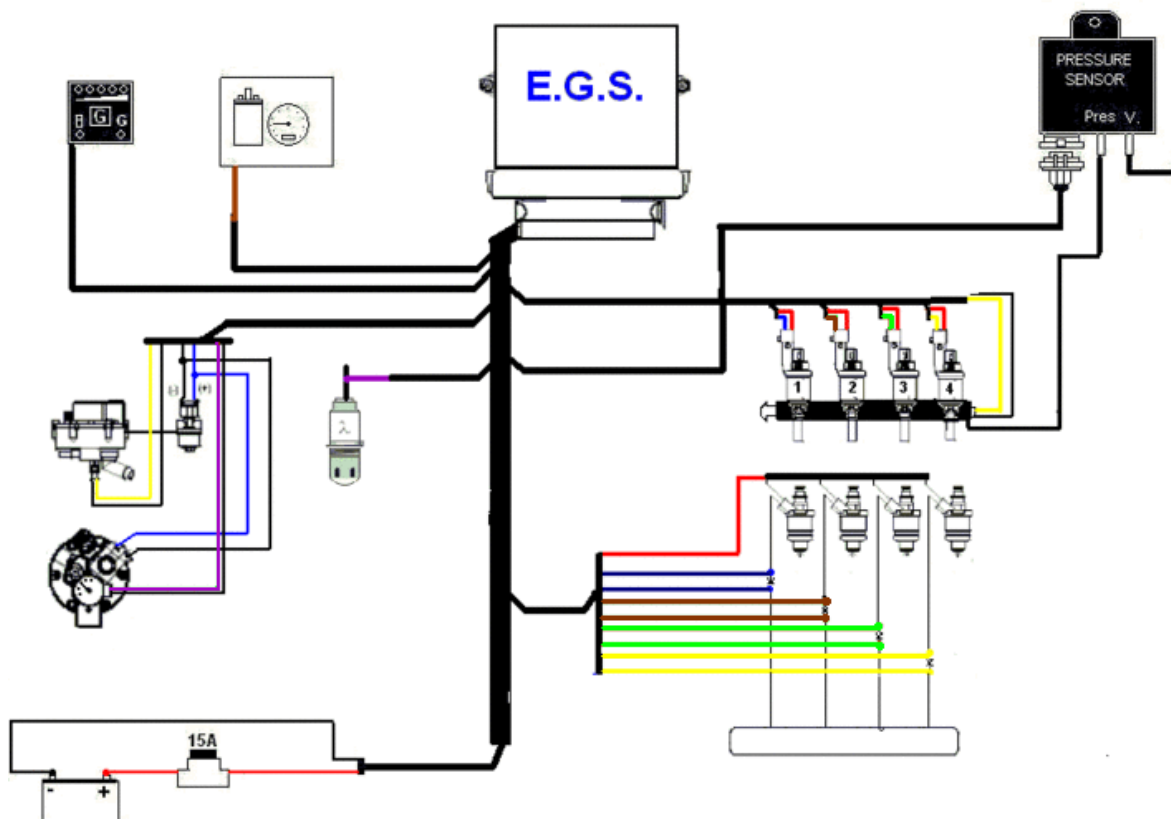
ATTENTION: This system cannot be used with cars with direct petrol injections (FSI, DGI, DISI, etc.) and Wankel.

4. SIMPLIFIED LPG KIT INSTALLATION PROCEDURE



5. SYSTEM CONNECTION

5.1. Connection Circuitry



Pic 1.Connection diagram

6. Reducer



Reducer with gas valve and temperature sensor



Pressure adjusting

Reducer (vaporizer) is meant to convert liquid phase onto gaseous one and maintain constant pressure in the system where the pressure difference between reducer and inlet manifold is about 0.9...1. atmosphere. For that purpose, reducer is connected to vacuum hose from inlet manifold.

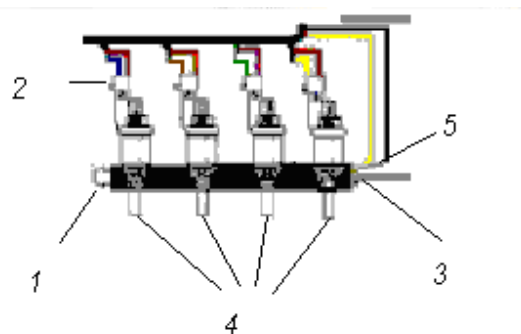
Reducer has to be installed according to installation diagram. If possible, it has to be installed in achievable place. Electric valve could be installed separately from reducer. All connected hoses must be installed far from (at least 10 cm) outlet manifold. Reducer temperature sensor is mounted onto reducer with screws

7. Injectors Rail

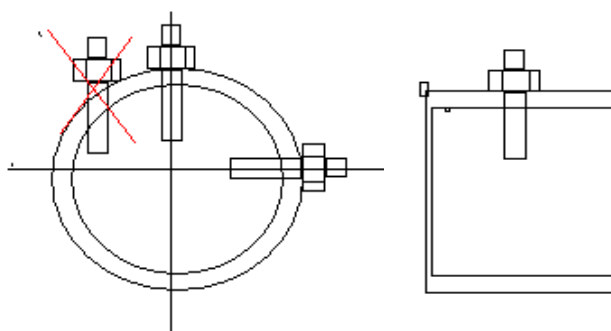


The unit that is controlled by ECU which is meant for supply of necessary quantity of fuel to each cylinder separately.

- 1) Gas inlet
- 2) Electric connectors
- 3) Nipple for gas pressure measuring
- 4) Calibrated nipples for gas supply towards manifold
- 5) Gas temperature sensor



Holes in intake manifold to be drilled as close as possible to intake valves. Drill holes in the middle of manifold straight to air flow. Make sure that chips have not fallen to manifold..



If possible, remove intake manifold

At improper injectors mounting gas is mixed with air improperly and as result, mixture will not burn (HC. is too high).

In some cars, especially with parallel injection, where the length of inlet manifold is very small (volume of combustion chamber is comparable with volume of inlet manifold) it takes place gas **drain** from one cylinder to the other. Then engine works unstably on idling. In order to avoid it, supply gas as close to inlet valves as possible by means of special extension pipes.

For manifolds with air flow separation (in engines where there are extra throttles) it is necessary to install injectors after these throttles.

Nozzles on injectors have to be installed with cross-section that corresponds to engine power. Nozzles have to be selected in such way that at maximal values of petrol pulses, rate will be about 1.1.

Nozzle diameter (mm)	Power in 1 cyl. (kW)
1,8-2	12 – 17
2,1-2,3	18 – 24
2,4-2,6	25 – 32
2,7-2,9	33 – 40
3,0	41 – 48

Data in the table are approximate and could sometimes differ. For example, in cars with parallel or combined injection nozzles sizes have to be as less as gas quantity is injected to 2 or 4 times compared to shown in the table.

Injectors to be connected to injectors rail with gas hoses. Hoses to be of the same length as short as possible (if possible, 10...15 cm). Cross section is not less 3 mm. All connections to be tighten with hose clamps.

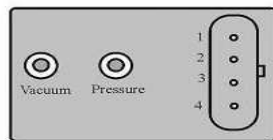
Temperature sensor is fixed to injectors rail. Injectors rail is fastened to engine on the bracket through rubber shock absorbers.

8. Filter of fine cleaning

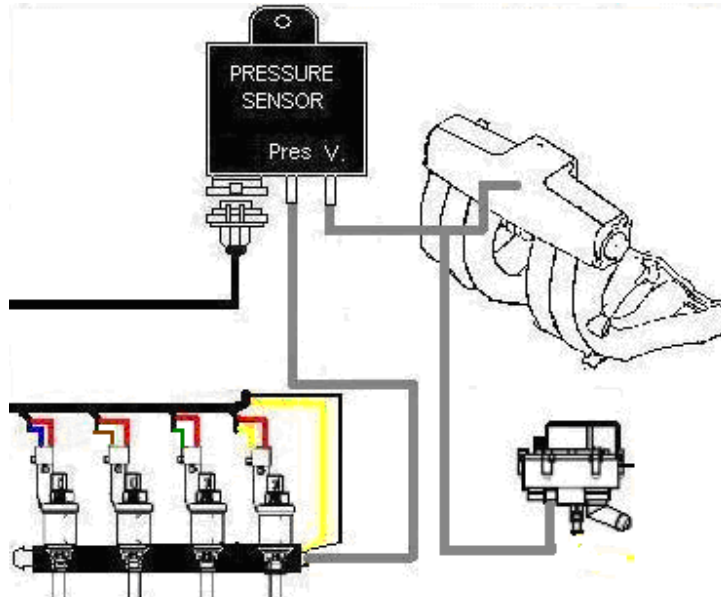
In order to keep injectors line pure, install fine cleaning filter of fine cleaning. Keep proper direction by use of arrow on the filter. Replace it every 10, 000...15, 000 km.



9. Manifold Absolute Pressure (MAP) sensor



RED +5V
BLUE Vacuum
Yellow Pressure
Black Ground



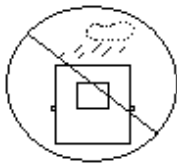
MAP sensor informs gas ECU of pressure volume in gas injectors line and vacuum in inlet manifold. Lower part of MAP has two pipe nipples which are marked with "Pres" and "V". Take vacuum in the inlet manifold as close to throttle as possible. It is recommended to mount pipe nipple separately instead of connecting through T-joint to other parts because connecting to them requires deep knowledge of engine theory and practice. As well, vacuum is supplied to reducer through T-joint.

Take pressure directly from gas injectors line. Use special gas hose and fasten it with metallic clamps. In order to keep fast response of the system, use hoses as short as possible. Mount MAP sensor far from heat and high voltage sources.

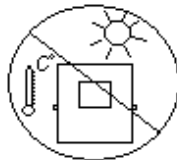
10. ECU installation



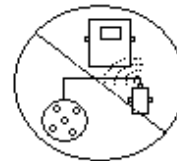
10.1 . Where to install ECU ?



Avoid moisture infiltration .



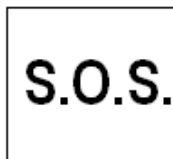
Avoid overheating (more 85 °C)



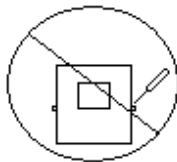
Avoid high voltage !



Assure good electric contact and connection isolations



Inform the customer that if the GAS system fuse blows, the Control Unit restores the System onto Petrol mode.

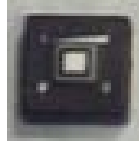


Do not open ECU ! The factory's warranty is void.

Install ECU far from electromagnetic emission sources (spark coils, generator, high voltage wires, ABS unit, commutator, etc.) and high temperature sources. Fasten ECU connector to car body downwards in the place where moisture cannot get within ECU. Mount ECU on metallic bracket or with screws, assure good electrical contact between ECU case and car ground. Programming connector has to be in achievable place.

11. Changeover switch

Mount changeover switch on center console or dashboard in achievable and observable place. Use double-sided tape or self-tapping screws of the kit.



12. Electric wiring connection



Before installation, think how to mount wires from ECU in engine compartment. Mount them far from sources of heat and electromagnetic emission. Mount wires without loops. All connections must be soldered and isolated with thermo shrinking PVC hoses. Connect minus terminals to minus of battery or directly to car body. **Never connect terminals to the components of gas line!** Insert the fuse into the holder only after full check of installation.

12.1. CONNECTION CABLE LAYOUT (56-Pins Connector) for 4 cyl.

1 in 1 from ECU
 2 in 2 from ECU
 3 in 3 from ECU
 4 in 4 from ECU
 5 not used
 6 not used
 7 RPM in
 8 Key voltage in
 9 MAP +5V out
 10 MAP sensor in
 11 Lambda BANK1
 12 not used
 13 Switch +5V out
 14 Switch signal in

15 PC diagnostics
 16 PC diagnostics
 17 water temperature in
 18 gas solenoid out
 19 level sensor
 20 battery in +12V
 21 battery in +12V
 22 gas temperature in
 23 not used
 24 not used
 25 gas injector 4 neg.
 26 gas injector 3 neg.
 27 gas injector 2 neg.
 28 gas injector 1 neg.



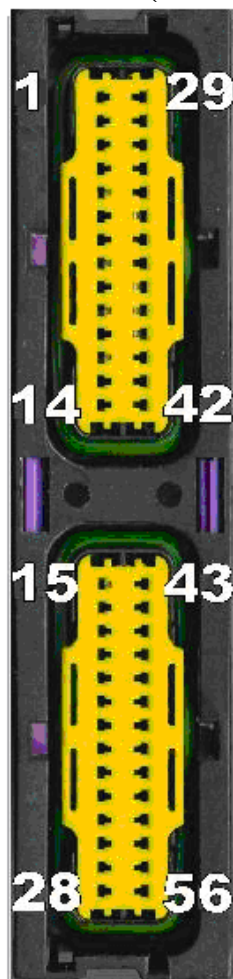
29 in from injector 1
 30 in from injector 2
 31 in from injector 3
 32 in from injector 4
 33 not used
 34 not used
 35 not used
 36 not used
 37 gas pressure sensor in
 38 MAP GND
 39 Lambda BANK2 (option)
 40 not used
 41 Switch GND
 42 not used

43 diagnostics GND
 44 diagnostics +12V out
 45 GND
 46 GND
 47 not used
 48 GND
 49 GND
 50 GND
 51 not used
 52 not used
 53 +12V gas injector pos.
 54 +12V gas injector pos.
 55 +12V gas injector pos.
 56 +12V gas injector pos.

12.2. CONNECTION CABLE LAYOUT (56-Pins Connector) for 6 cyl.

1 in 1 from ECU
2 in 2 from ECU
3 in 3 from ECU
4 in 4 from ECU
5 in 5 from ECU
6 in 6 from ECU
7 RPM in
8 Key voltage in
9 MAP +5V out
10 MAP sensor in
11 Lambda BANK1
12 not used
13 Switch +5V out
14 Switch signal in

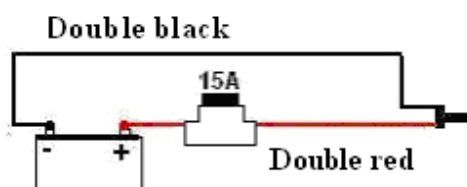
15 PC diagnostics
16 PC diagnostics
17 water temperature in
18 gas solenoid out
19 level sensor in
20 battery in +12V
21 battery in +12V
22 gas temperature in
23 gas injector 6 neg.
24 gas injector 5 neg.
25 gas injector 4 neg.
26 gas injector 3 neg.
27 gas injector 2 neg.
28 gas injector 1 neg.



29 in from injector 1
30 in from injector 2
31 in from injector 3
32 in from injector 4
33 in from injector 5
34 in from injector 6
35 not used
36 not used
37 gas pressure sensor in
38 MAP GND
39 Lambda BANK2 (option)
40 not used
41 Switch GND
42 not used

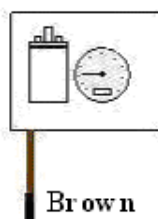
43 diagnostics GND
44 diagnostics +12V out
45 GND
46 GND
47 not used
48 GND
49 GND
50 GND
51 +12V gas injector pos.
52 +12V gas injector pos.
53 +12V gas injector pos.
54 +12V gas injector pos.
55 +12V gas injector pos.
56 +12V gas injector pos.

Electric wiring connection is carried out according to the following scheme:



Double red wire is for plus of battery and must be connected directly to plus of the battery via fuse 15 A on the double red wire.

Double black wire must be connected directly to minus of battery.



Brown wire- is used to read the engine RPM. It can be connected to signal wire of spark coil, RPM wire or Hall sensor output. It reads impulses with voltage above 4 Volt. Pay attention that on some cars in the

CUT-OFF mode the impulse of ignition disappears and the system switches to the petrol mode. In this case, the connect wire to the Hall sensor or a tachometer wire.

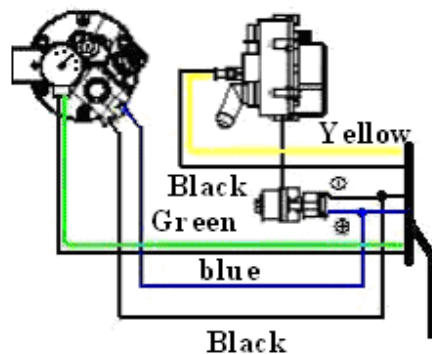


Violet wire is used for oxygen sensor signal. Connect it to Bank 1 in case of separate tuning.

Violet wire with PVC hose is used for oxygen sensor signal. Do not connect it in general tuning. In case of separate tuning, connect it to Bank 2.

Pay attention that in some cars it can disturb the work of the petrol ECU. After programming disconnect this wire because the signal itself is an informational only and does not affect the work of the system.

Wiring with 5 wires

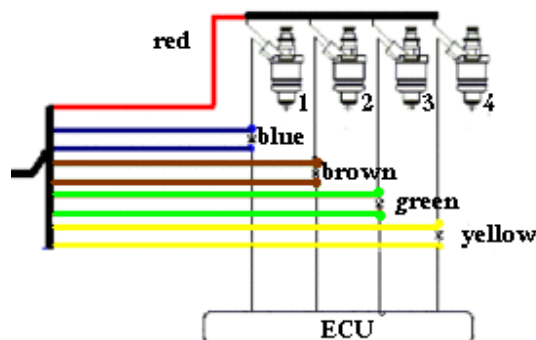


Dark blue wire – controls the pressure regulator solenoid valve, gas multivalve and other various gas devices (i.e. timing advance processor, etc.).

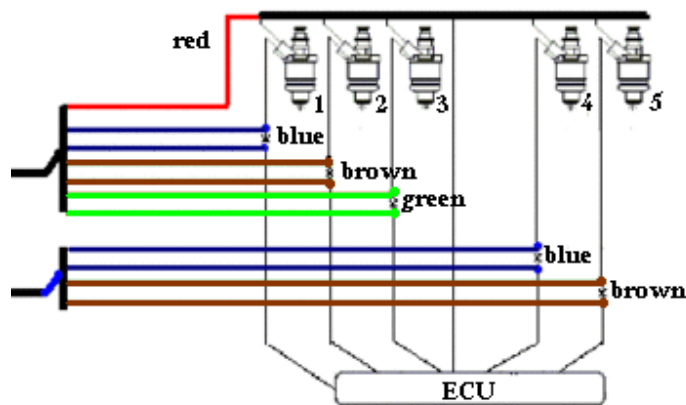
Yellow wire- is used to read the temperature of the reducer. Connect it to the temperature sensor located on the reducer.

Green or violet wires are used to read the GAS level in tank.

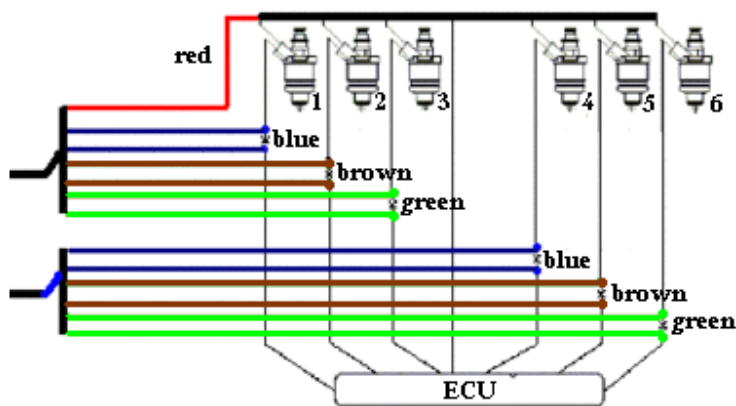
Black wire is for negative of the gas valve, multivalve, sensors of temperature and gas level.



Wiring diagram for 4-cylinder cars



Wiring diagram for 5-cylinder cars



Wiring diagram for 6-cylinder cars

Wiring with 9 wires (petrol injectors emulation). To install this wiring, cut the signal wires of the original injectors.

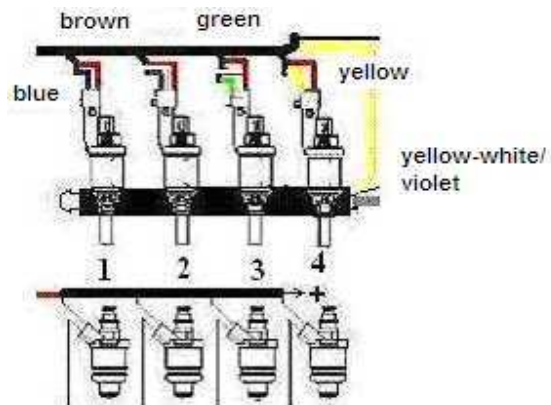
The wiring with colored PVC hose must be connected to bank 2 of the engine in case of separate side regulation, otherwise, connect it to bank 1.

ATTENTION: No matter which direction of emulation wires takes place in last modifications of gas ECU. They may be of the same color in wire harness.

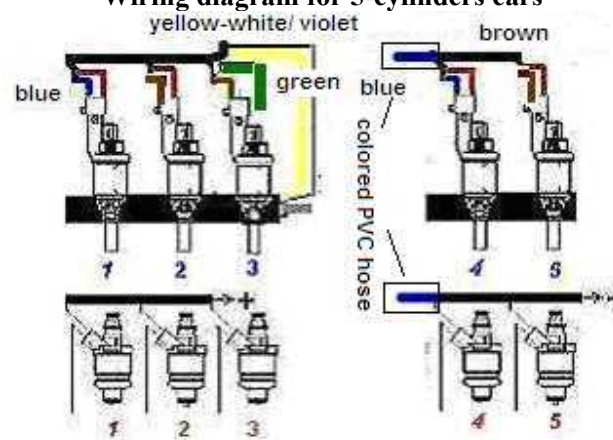
Red wire must be connected to any of the petrol injector positive sides.

This wire supplies windings of the relay of emulators, gas valve and gas injectors. It is also used for turning on/off the gas ECU. The red wire must be connected to plus of the ignition wire in those cars where, for some reasons, plus of the petrol injectors does not disappear when car turning off, or plus of the petrol injectors is connected via extinguishing resistors (bleeders). It takes place in some HONDA and MITSUBISHI cars.

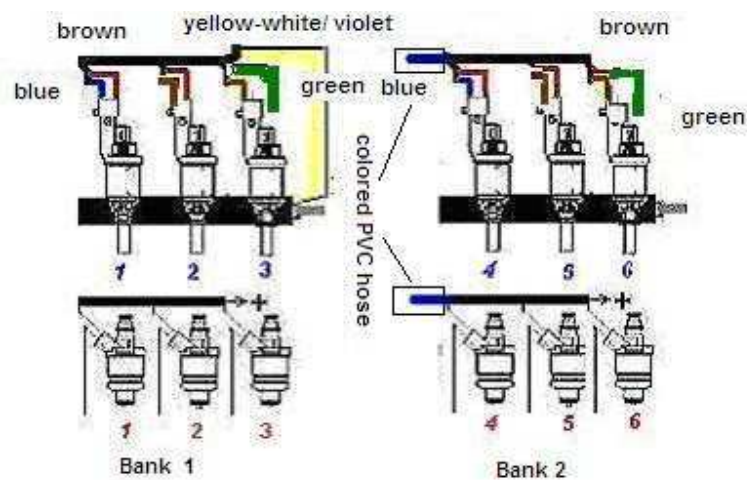
. Wiring diagram for 4-cylinder cars



Wiring diagram for 5-cylinders cars



Wiring diagram for 6-cylinders car



12.3. Wiring of gas injectors

The wiring must be connected to the gas injectors according to the colors of the wires of petrol injector emulation. In case of separate tuning, connect wires without colored PVC hose to BANK 1, and wires with colored PVC hose to BANK 2.

Yellow/white or violet are used to read the GAS temperature. Connect it to the temperature sensor that is located on the GAS injector rail.

Black wire is for negative of the gas temperature sensor.

Attention! If the sensor of gas temperature is absent, connect black and yellow-white (or violet) wires.

Wiring with 4-pins connector –Connect it to the pressure sensor that is supplied with the kit.

Pressure sensor informs the GAS central unit about the pressure differences between the GAS injectors and the inlet manifolds.

Bottom side of pressure sensor has two nozzles that are marked with **PRES.** and **V.:**

-connect the GAS pressure hose coming from the GAS injector rail to the **Pres.** nozzle:

-connect the vacuum hose coming from the inlet manifolds to the **V.** nozzle:



Wiring with 3-pins connector must be connected to the **Changeover switch**. The **Changeover switch** must be installed in an accessible place of dashboard of the car. Avoid direct sunlight.

After installation ends all the plaits have to be fixed by means of plastic collars so that they do not touch strongly heated or moving details of the car. Insert the fuse.

13. PROGRAM INSTALLATION

The program has no auto installation function. So, insert CD ROM into CD drive.

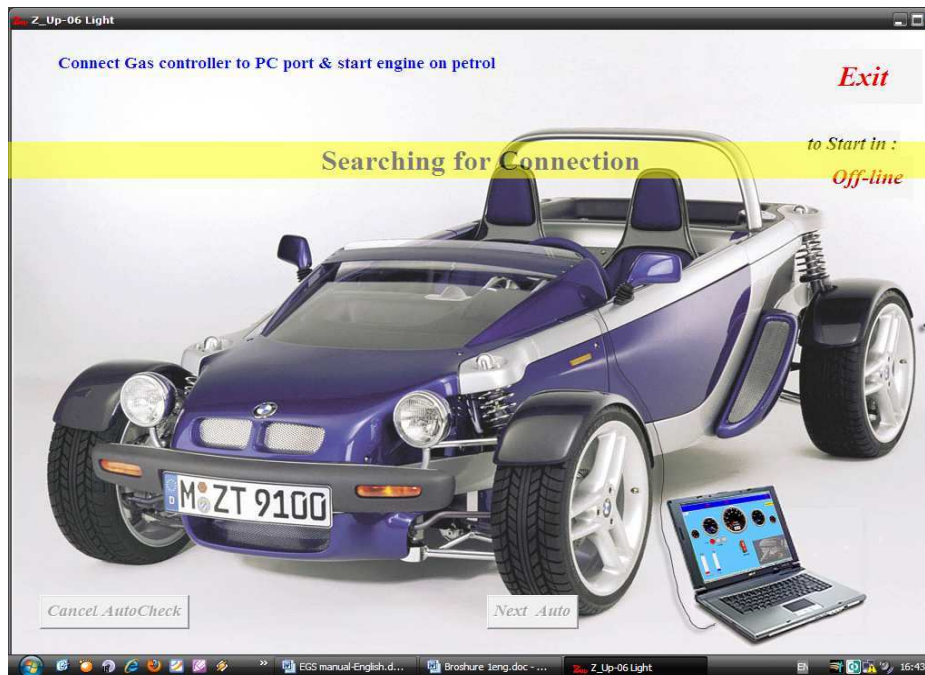
1. Start CD ROM that is supplied.
2. Select the language and disc where you want to write the program.
3. Click button “install.”
4. After successful installation click the button EXIT.
5. Icon EGS will appear on the desktop.

13.1. SOFTWARE DESCRIPTION

13.1.1. Software installation procedure

It is necessary to install software to PC for ECU programming. Minimal requirements to PC: Windows 95 and later versions, Processor: 500 MHz, memory 256 MB RAM, hard drive 25 MD, CD ROM availability, COM or USB port.

In order to entry software, connect interface cable to COM or USB port and to PC. Start car engine and double click mouse. By this, you will start the program.



13.1.2. AUTOMATIC CALIBRATION

After LPG kit installation and LPG fuelling you have to:

1. Start engine on petrol and leave it working on idling. Switch off all extra equipment (headlights, heaters, etc.)
2. Connect diagnostic connector to PC and gas ECU.
3. Start diagnostic program EGS by double clicking on desktop.
4. After automatic search of connection, by key or mouse, select AUTOMATIC ↓ (backlight in green). Press the button ENTER.
5. The system automatically counts the number of cylinders, injection type, rate of RPM, checks vacuum and pressure sensors, temperature sensors as well as air-tightness of the system from reducer to injector tubes. If the system detects errors it warns you.
6. If the system did not find any error it asks you whether you accept testing. If so, click YES and press ENTER.
7. Enter type of installed injectors and press ENTER.
8. The system comes into automatic calibration. The temperature of reducers has to be higher 50 °C. If temperature is less 50 °C, the system will wait for temperature rising.
9. After automatic calibration completing the system informs you that automatic calibration completed successfully. Otherwise the system informs you by other messages. After their finishing start AUTOMATIC CALIBRATION once again, by clicking START.

13.1.3. Autocheck. Options

“Autocheck” - The system reads all curves and data from gas ECU, checks all peripheral units and gives all information of it. If you are sure that all is OK and the system detected all correctly, press button ENTER and, automatically, all data will be transmitted to ECU. The software asks which type of injectors do you use. After this selection and pressing ENTER program goes to Auto Calibration..

“Parameters Selection” – the system will check all parameters which are check marked.

“Automatic mode”. Autocheck the system goes to **Auto Calibration** automatically.

”With Lambda checking” – the system will check lambda sensors.

“Remote Help” remote programming from distant PC.

“Repeat Autocheck” - if after autochecking the system found faulty sensors or other faulty components and you repaired them, press this button.

“Cancel Autocheck” – if you decided do not continue **Autocheck** , press this button and the program gives window **“Enter parameters”** . After pressing it the program goes to window **“Parameters”**

“Next car” on the working program during next car tuning connect the cable, turn ignition on and press this button. Software will count all curves and parameters from gas ECU and will be ready for work.

“Exit” – to close the program. For correct exit use this button not Cross.

OFF-Line - no connection between PC and gas ECU.

ON-Line – there is connection between PC and gas ECU.

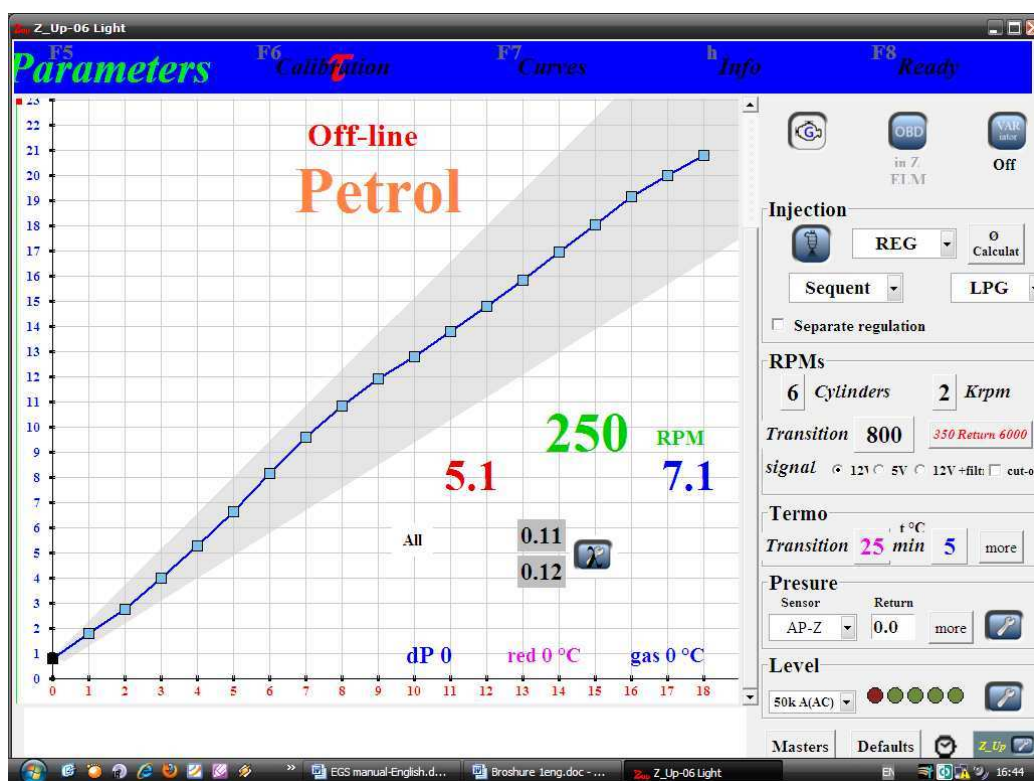
Main rule: values for petrol are marked in red, values for gas are marked in blue.

The program has prompts. In order to activate this function move the mouse to the object of interest. There will text file with explanation appears on the screen.

Use mouse and button **ENTER** for work with software.

Without closing window you cannot open the other window.

13.1.4. Window parameters



The window “Parameters” is meant for entering parameters of the car and install gas equipment.

13.1.5. DEFECTS IN GAS SYSTEM



- If there are defects or errors in gas system the button is enlighten.
- by pressing this button the window opens where there are errors and their number



Valve – the fault of gas valve, multivalve or relay of gas ECU.

Force – the fault of relay of gas injectors in gas ECU.

Memo – errors of reading ROM.

P_lckg- leakage in gas system.

P_lolo- pressure in gas system is low than allowed in settings.

T_lolo- temperature in gas system is low than allowed in settings.

Pd_sens-pressure sensor is faulty

Pm_sens- vacuum sensor in inlet manifold is faulty

T_red_sens- reducer temperature sensor is faulty

T_gas_sens- gas temperature sensor is faulty

Lev_sens- gas level sensor is faulty

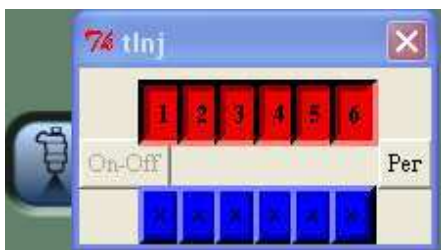
Res-reserved

Emu-1-6-emulator(s) of petrol injectors 1...6 is (are) faulty

Ch-1-6- gas injectors 1...6 are faulty

If necessary, messages of errors could be cleared by button CLEAR

13.1.6. INJECTORS CONTROL MODE



After pressing this button the window appears in order to switch ON/OFF any petrol or gas injector.

The mode ON/OFF allows to switch OFF and ON any gas or petrol injector. If the injector is off it is marked with X sign..

Trigger mode. At switching gas injector ON petrol injector is OFF and vice versa. If injector is OFF it will be marked with X sign. While exit the system automatically goes to the mode of entering, i.e. working on gas or petrol.

13.1.7. Injectors tuning

If it seems that engine works on gas incorrectly, go to fine tuning injectors.

1- Engine works on petrol and previously auto calibration is done.

2- Press button "1".

3- The system calculates average duration of impulse for 1 cyl. and indicates it in the left upper window.

4- The system switches petrol injector for cyl. No. 1 OFF and switches gas injector No. 1 ON and calculates average duration of petrol impulse and indicates it the window No. 2 The window No. 3 shows difference between values in windows 2 and 3. If this difference is not 0, by means regulator and button “Write” eliminate this difference.

Petrol imp duration [ms]	Tolerance	Injector correction %
0.00	0.00	0
0.00	0.00	0
0.00	0.00	0
0.00	0.00	0
0.00	0.00	0
0.00	0.00	0

250 RPM

To Check

P-inj

G-inj

trg

5- Press the button „2“ and the system does the same for cyl. No.2 , etc. , for all cylinders

6- After tuning each gas injector exit this window by pressing X sign.

If you want to clear all previous values of tuning, press the button CLEAR.

Window for selection of installed injectors. In order to replace, put mouse to ↓ and click left mouse. All available types of injectors will be shown. Select proper type. The value will be backlit with green and put in main window. If the value is backlit with red, repeat selection.

CALCUL – The calculator determines diameter of the nozzles depending on engine power and number of cylinders. In order to calculate, input engine unit of measure (kW or HP) and write value into window and press ENTER Recommended value will be lighted in the window. The value in fact should be written into lower window. For example:

Power 120

• kWt
• H.P.

D= 2.00 mm

installed nozzle -mm 2.0

The window of selection of injection type. If Autocheck is ON, the system writes the type of injection in automatically. If **Autocheck** is OFF the type of injection to be written in manually. In order to change the type move the mouse to arrow down ↓ and click left mouse. All types of injection

will be shown. Select proper type and press left button. The value will be backlit with green and input in the main window. If the value is backlit with red, repeat selection.

LPG
LPG
CNG
BI-LPG
BI-CNG -Selection of fuel type

-LPG- Liquefied Petroleum Gas (propane-butane)

-CNG- compressed Natural Gas (methane)

-BI-LPG- engine works only on LPG

-BI-CNG- engine works only on CNG

CYLINDERS – the window of input of engine cylinders number. If Autocheck is ON the system writes the number itself. If Autocheck is OFF, input the number manually (3,4,5 or 6) : move the mouse to the window, click left mouse, input the number of cylinders and push ENTER. The window will be backlit in green. If the window is backlit with red, repeat input.

Krpm - the window of recalculation factor. If Autocheck is ON, the system will input it automatically. If Autocheck is OFF, input it manually. In order to determine it, divide the number of cylinders on the number of coils and input this figure into the window. Put the mouse to this window and click left. Input recalculation factor with keyboard and press ENTER. The window will be backlit with green. If it is backlit in red repeat input. Tachometer has to display actual RPM..

Transition 600 - the window of RPM setting of switching from petrol to gas. When RPM reaches certain value and some other conditions are in force the system goes to gas mode.

350 Return 6000 -the window of setting minimal RPM of switching from gas to petrol and back. When working on gas and decreasing RPM less set the system switches engine onto petrol and RPM is becoming more than set threshold the system switches engine back to gas. Naturally, the system has hysteresis.
- the window of setting maximal RPM on gas. When working engine on gas and increasing RPM more than set threshold the system switches engine to petrol and when RPM is becoming less set threshold switches back to gas. Naturally, the system has hysteresis.

signal 12V 5V 12V filter cut-off input of RPM pulse type. -12 V pulse from 12V spark coil. – 5 V –pulse from +5В-импульс (weak signal 0.4 ...5 V) from 5V spark coil or Hall sensor. 12 V+ filter – pulse from 12V spark coil with extra filtration. Cut-off – if in CUT-OFF mode pulses from spark coil disappear, it is necessary to activate this function. At the same time when RPM disappear the system controls additionally vacuum in inlet manifold and if it is about 0 the system switches engine to petrol.

Transition 30 The window of setting of reducer temperature. As soon temperature reaches set value, the system switches engine to gas.

t °C
min 5 when working on gas if reducer temperature falls low set value the system switches to petrol and when reducer temperature rises again the system switches back to gas (optional function).

more additional temperature parameters.

Tred clbr °C 50 -Value of reducer temperature that was input in Autocheck automatically (possible to be changed manually).

Tgas clbr °C

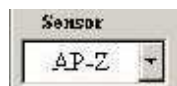
Value of gas temperature that was input in Autocheck automatically (possible to be changed manually).

T fact %

- the factor of gas temperature influence to gas pulses duration (100 % -maximal influence, 0 – no influence). It is calculated on calibration value of gas temperature.

kT [0(gas) - 1(red)]

influence factor of gas and reducer temperatures (0...1) to gas pulses duration (0 for Tgas only , 1 for Tred only).



selection of installed pressure sensor.

Return

minimal value of pressure low which the system switches to petrol. When working on gas, if pressure in system drops below of set value, the system switches to petrol and gives the signal to remote control (long sound) For example, value 0.5 is set in the window. The car works in gas but, by any reason, differential pressure drops below 0.5 engine switches to petrol and the system emits long sound..

more

- additional pressure parameters



pressure sensor calibration.

P clbr

the window for input of calibrated differential pressure. The value could be input automatically during auto calibration or manually.

P lckg

value of gas escape pressure (optional function). If during proofness check the pressure drops more than gas escape, the system will not switch to gas but informs with sound signal. For example, there is value 0.5 in the window The car works on petrol, the system tests proofness and pressure drops more than 0.5 the engine will not be switched to gas and the system emits sound signal.

P fact %

the influence factor of differential pressure on gas impulse duration 100 % - maximal influence, 0 – no influence). It is calculated on calibration value of gas temperature and current differential pressure value.

Pmin delay [s]

time (in sec.) within which differential pressure value will be below minimal value and the system will be switched to petrol.

cut-off Vacuum

value of vacuum when the system will be switched to petrol if the mode CUT-OFF in type of RPM signal is active.

13.1.8. LEVEL INDICATION IN TANK

50k A(AC)

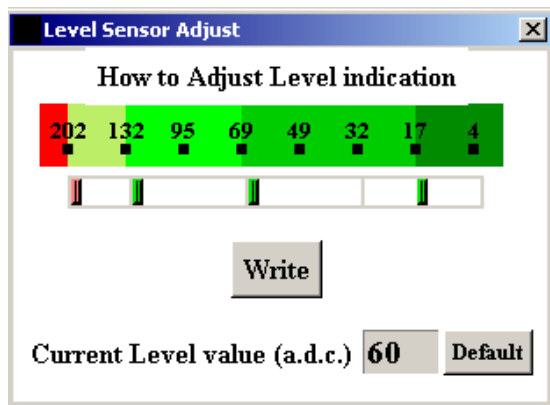
the window of type of level sensor.



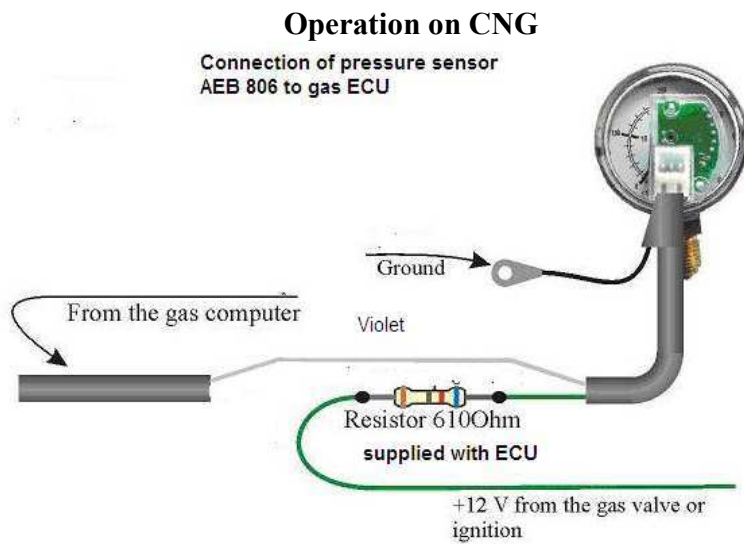
indication of gas level in real time without averaging.



additional settings



You may change scale of gas level. To do it, move slider you need with mouse and press **WRITE**.



13.1.9. Additional Settings

min P-imp [ms]	1.0
min G-imp [ms]	2.0
PWM plato [ms]	4.0
transit. [ms]	160
kick out [s]	0.72
post cutoff [s]	1.68

Masters Defaults

Masters

additional settings which require experience in gas equipment tuning.

min P-imp [ms] 1.0

duration of petrol pulse below which the system will not process it.. Duration of shelf after which PWM is beginning (depends on gas injector parameters).

min G-imp [ms] 2.0

minimal duration of gas pulse

PWM plato [ms] 4.0

duration of plato after which PWM starts (depends on gas injector features).

transit. [ms] 160

time of cylinders switching to gas, one after another.

kick out [s] 0.72

time within which the system supposes that CUT-OFF mode is in action

post cutoff [s] 1.68

time within which the system after exit of CUT-OFF mode does not make correction by pressure.

Defaults

By pressing this window, all default (factory settings) to reload into gas ECU. It is necessary to restart gas ECU.



Output of gas ECU data.

....	
	dd - mm - y
Date of production	10.12.07
Date of installation	10.12.07
Date of service	10.12.07
Operating on G (h)	
Operating on P (h)	

....
version of software

Date of firmware

Date of production	10.12.07
Date of installation	10.12.07
Date of service	10.12.07

Date of first installation

By installer consent, input after software closing. If the car has been served the same day some times, software do not ask for date any time.

Operating on G (h)
Operating on P (h)

running time on gas.

running time on petrol.



Setting of shell

✓ Light	Interface ▾
Rich ▾	Coms ▾

Type of interface (simplified - sophisticated).

COM- name of COM port for shell and OBD (software finds them automatically after connection).

TOPIC - animation – (ON/OFF) . Prompting hints. Does not work in simplified version.

LANGUAGE - selection of software language.

13.1.9. INDICATION OF PULSES DURATION

5.1 **7.1**

- average pulse duration of petrol and gas respectively.

- Button “All” indicates all current values of petrol and gas pulses for any cylinder. Put the mouse on the button “All” , click left mouse and all data for any cylinders will be displayed. In order to remove input click button “All” once again .

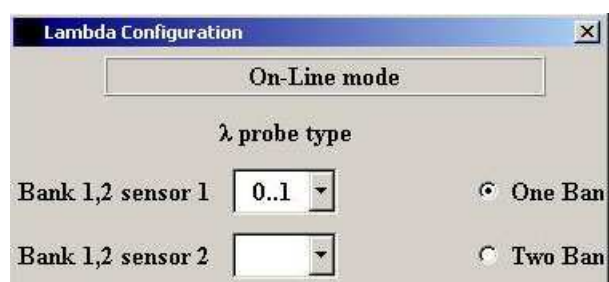
5.1		7.1
5.2		7.2
5.3		7.3
5.4	0.11	7.4
5.5	0.12	7.5
5.6		7.6

- If there are two banks connected , then corresponding pulses values are indicated in appropriate banks windows.

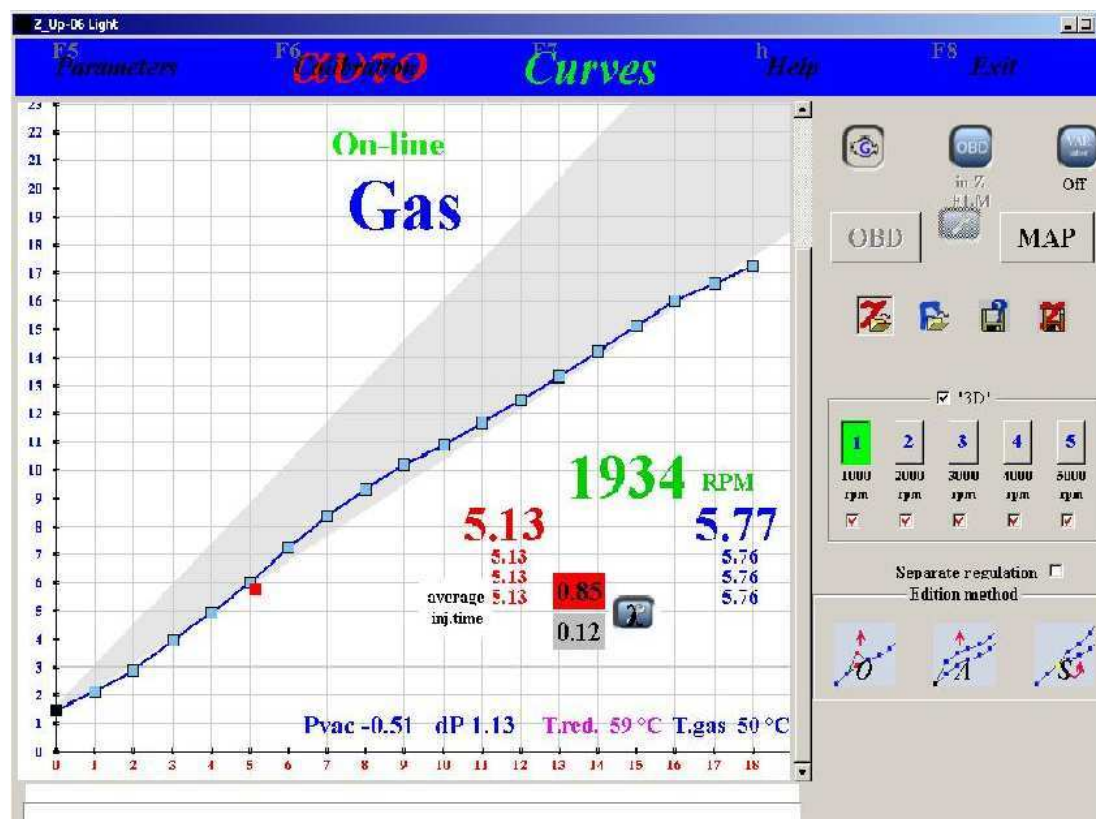
PETROL_GAS - button of petrol-gas switch. If the picture is red the system works on petrol, if the picture is blue the system works on gas.

0.11
0.12

- If there are two banks connected, then corresponding oxygen sensor values are indicated in appropriate banks windows.



13.2. CURVES



This window gives possibility to correct the curves that are done at **Autocalibration**, selected from files or created by the installer. Use mouse or buttons ↓ and ↑ .
Curves have to be positioned on pale field at right tuning.



read curves from ECU



read curves from file



write curve into current file



write curves into selected file



write curve into ECU (double click)



Selection of banks

RPM 1000-5000 – viewing and correction of curves on certain RPM (blue backlit on current RPM)

Editable curves - red check marks that concerns curve to be corrected (on certain RPM). For example, if red mark is places onto 1000 RPM and you have changed diagram, the curve will be changed only for 1000 and left unchanged for other RPM.



correction of one or some points.

Put mouse to certain point, click left mouse in order to fix it (the point becomes red). If you want also to fix other points, move the cursor by buttons ← or → and drag them. Press ENTER to write into gas ECU. If you want to fix some points simultaneously, use button SHIFT.



parallel shift of all points.

Press this button and by ↓ or ↑ change the curve. Offset will be changed this time, Press ENTER in order to write it into gas ECU. This value depends only on difference between opening times of petrol and gas injectors. The initial point will not be changed because its co-ordinates depend only on features of specific gas injectors.

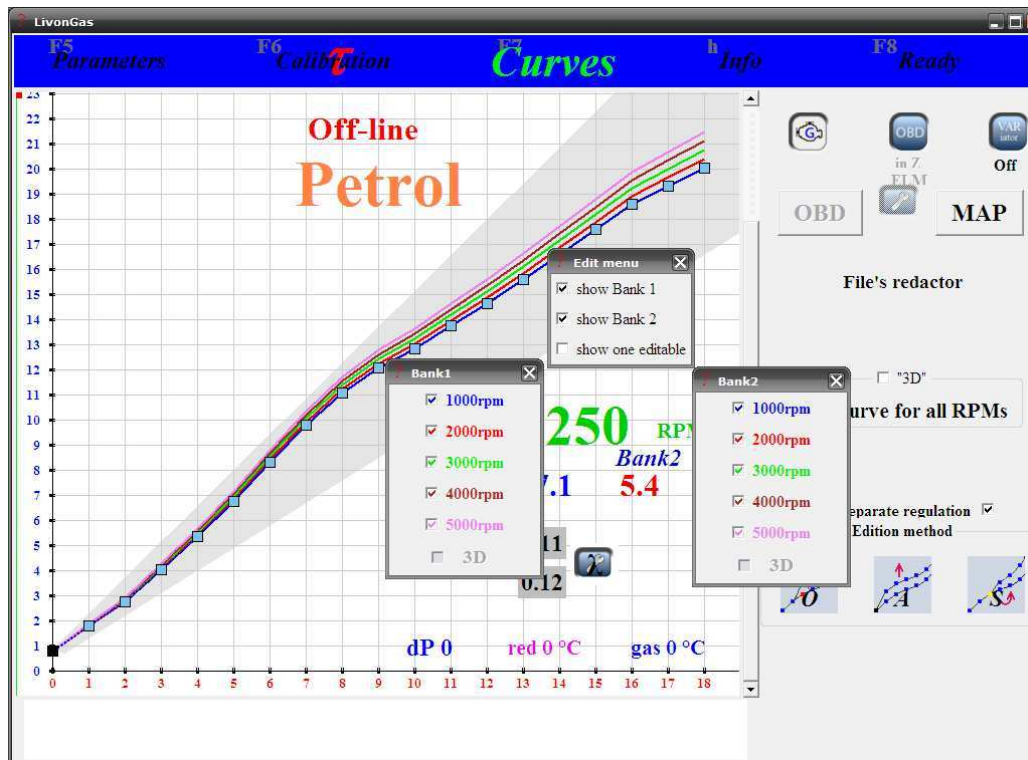


change curve slope from specific point (↓ or ↑).

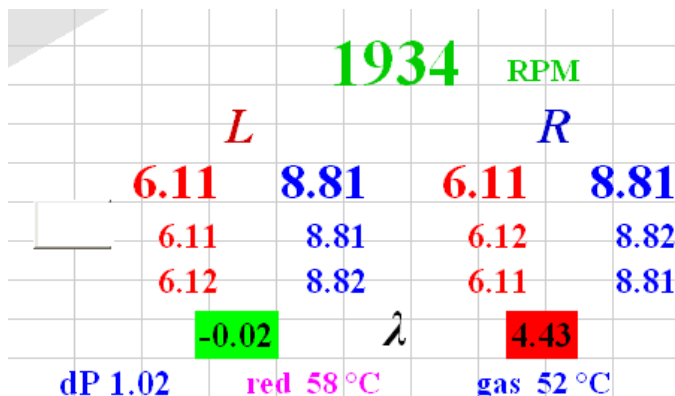
Put mouse to selected point, click right mouse and change the curve by buttons ↓ or ↑. Push ENTER in order to write it into gas ECU. If the curve resembles straight line and we put mouse to initial point, by moving ↓ or ↑ we change slope of the line. This feature depends on power of gas and petrol injectors as well as their frequency responses.

If separate tuning takes place:

- Operation with BANK 1 (continuous lines)
- Operation with BANK 1 (dashed lines)



- show curves selected from BANK 1
- show curves selected from BANK 2



- Engine Rounds Per Minute (RPM)
- average petrol pulses duration (at separate tuning BANK 1 and BANK 2, respectively)
- average gas l pulses duration (at separate tuning BANK 1 and BANK 2, respectively)
- oxygen sensor value (at separate tuning BANK 1 and BANK 2, respectively)
- button ALL outputs all current values of petrol and gas pulses for each cylinder. To do it, put mouse on the button ALL, click left mouse and all data fore ach cylinders will be displayed. In order to close it, press buchton ALL once again.

P.- shows current pressure as well vacuum if MAP sensor available

T.- shows current reducer temperature

T.- shows current gas temperature

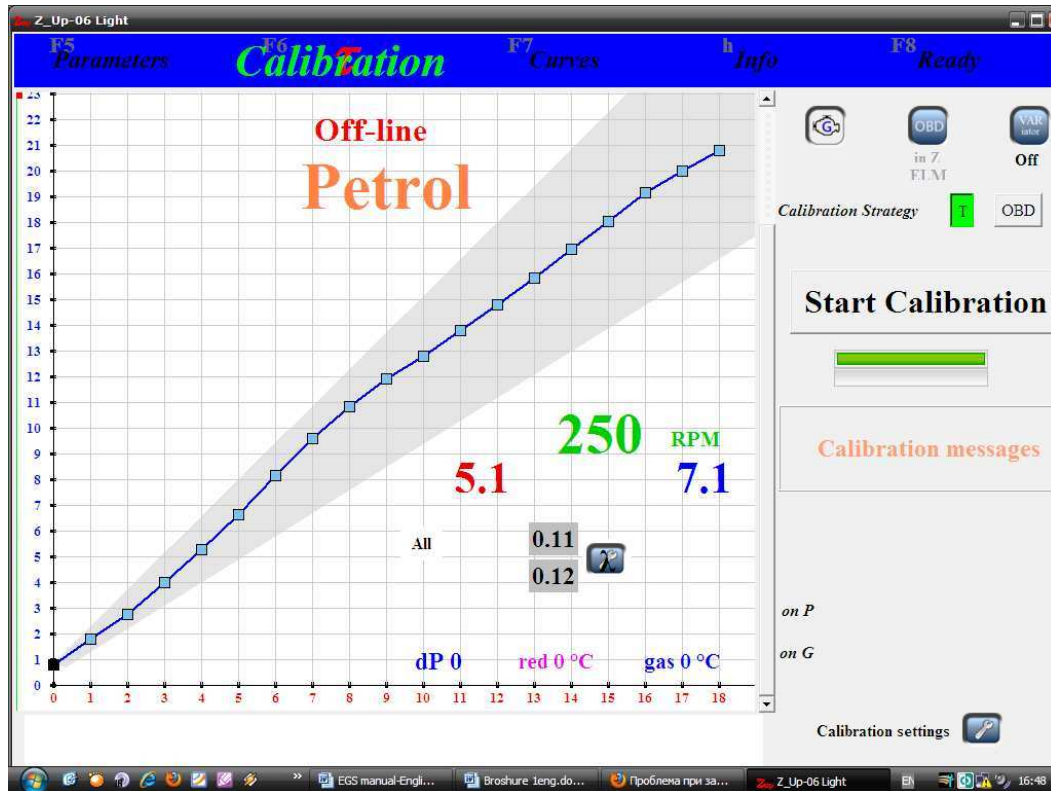
Red point (Bank 1) on curve shows current value of gas pulse with correction on P and T.

Blue point (Bank 2) on curve shows current value of gas pulse with correction on P and T.

Switch gas-petrol operates in the same way as switch on dashboard..



13.3. Calibration on time



This window is meant for ECU calibration in performance on gas.

13.14. Auto Calibration

Before autocalibration start engine on petrol and heat it to proper temperature. Select strategy of auto calibration.

T- Calibration of one and after all injectors.

OBD – calibration at connected OBD (option)

If you understand how to make calibration , do it.

-Autocalibration settings



Button **START** initiates calibration.

Calibration could be canceled any time by pressing the button EXIT CALIBRATION.

The process of calibration is beginning when temperatures of reducers and gas achieve proper values (appr. 55 °C and 20 °C respectively). If it does not happen software gives message.

Wait until calibration ends. At this time, the window with recommendations to increase or decrease diameter of injectors nozzles appears or that the process successfully complete. After diameter changes repeat calibration.

Calibration successfully completed and all parameters are written into gas ECU.

13.15. Manual tuning on gas

After automatic calibration switch engine off.. Start engine and let it to work on idling for one...two minutes and switch it onto gas.

Switch off all auxiliary equipment (heating, light, car stereo, air conditioning, etc.). Enter the window "curves" and memorize duration of petrol pulse.

By button on ECU, switch onto petrol mode. Calculate the difference between durations of petrol pulses on gas and on petrol. If petrol pulse on petrol is more, decline curves down onto this value. For example, if average duration of petrol impulse on gas is 3 msec. and duration of petrol pulse on petrol is 3.5 ms, incline to be decreased.



Press , put mouse on initial point of curve. Fix the point by right clicking. By arrow down change curve slope in order duration of gas pulse at petrol pulse 3 ms would be the same as at 3.5 msec. Press



button "ENTER" or  and record to ECU (by double clicking).

Vice versa, if petrol pulse on petrol is less, put curve up.

Do the same at full load. Make sure that auxiliary equipment (fan, air conditioning, etc.) is off..

Main purpose of calibration is that, on all modes of performance on gas, petrol pulse duration has to be the same as on petrol in appropriate mode.

13.16. Adjusting on MAP sensor

After complete of calibration on time it is possible to check and correct resulted curve at different loads. In order to do it press the button MAP in CURVES.

There is button in the left of button MAP that opens the panel that appoints the terms of information collection in the mode MAP.

max 3000

Maximal RPM of chart collection

min 500

Minimal RPM of chart collection

repeats 2

the number of similar repeats for chart collection. The more it is the faster is chart collection but accuracy will be low. Optimal range is 2 to 5.

Switch the car to petrol and drive some kilometers at different loads (drive smoothly, without jerks). There will be red area on the diagram which shows dependence of duration of petrol pulses on values of vacuum in inlet manifold at working on petrol.

P line

Press the button . The software will draw MAP chart on petrol in red.

Clear

Press the button . The software will delete all points on petrol.

Switch the car to gas and do the same for gas. There will be blue area which shows dependence of duration of petrol pulses on values of vacuum in inlet manifold at working gas.

G line

Press the button . The software will draw MAP chart on petrol in blue.

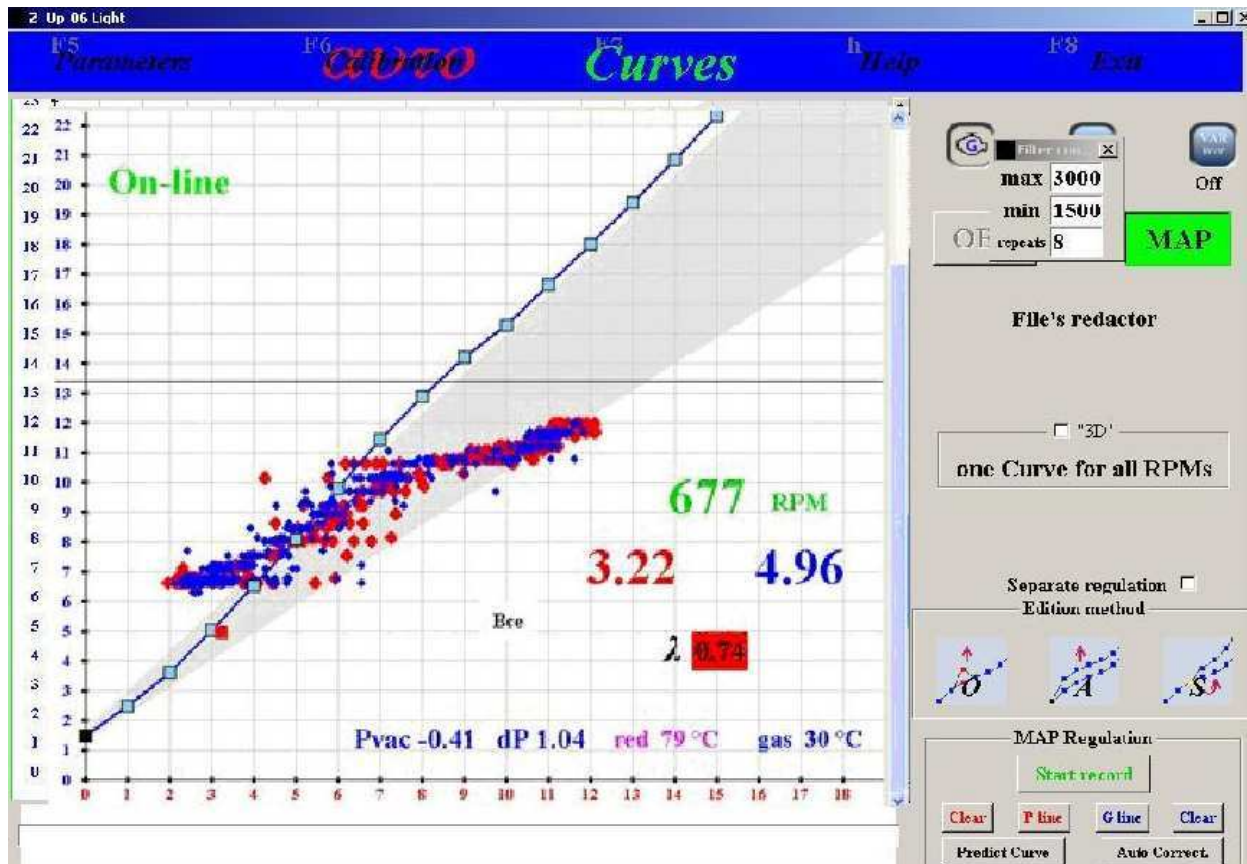
Clear

Press the button . The software will delete all points on gas.

Both areas have to coincide in the whole range. If they do not coincide in some range, correct diagram.

Predict Curve

To do it press , . The software will draw diagram in black. Align black diagram and diagram that obtained from Auto Calibration and write the curve with the button ENTER Erase blue area by pressing button MAP. Drive on gas once again to check the result.



MAP chart could be erased only by exiting the program.

13.7. INFO

Info

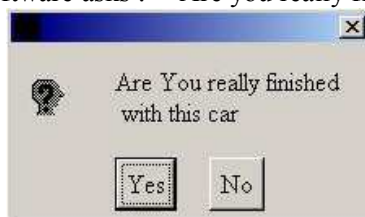
This window contains all technical documentation for installation , adjusting and tuning gas ECU.

13.8. READY

Ready

After tuning and checking the system press the button READY..

Software asks : “ Are you really finished with this car?



If no, software goes to previous status. Now you may disconnect diagnostic cable.

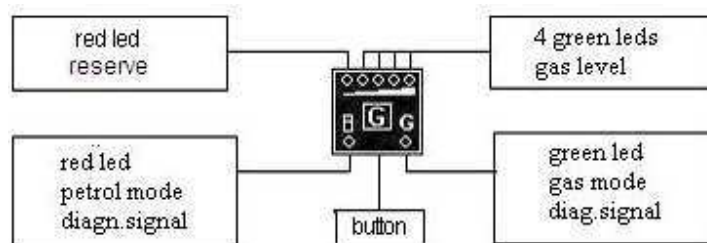
ATTENTION !!! ECU memorizes all changes only after switching ignition OFF. Never disconnect fuse or ECU before ignition OFF and until LEDs on remote control go out.

14 . Changeover switch working

The fuel mode switch is for switching between Petrol mode and Gas mode.

It consists of 7 luminous LEDs, the button and the embedded buzzer. It also carries out memory function which means it can remember the *mode* which was in use before turning off ignition and returns to it after ignition is on again.

The button is used to select PETROL or GAS supply. In 1 sec after pressing , the system changes its current mode to another one (Gas/Petrol). At the same time, the buzzer makes a short sound which means that gas mode is now in use or a long sound which means that petrol mode is on.



Red LED indicates the work of the *Petrol mode* by being permanently on. If it blinks - that the system works in emergency mode due to broken supplied fuse.

Green LED indicates the work of the *Gas mode*. If the system works properly in *Gas mode* the light is permanently on. If it blinks the system experiences difficulties in turning on the *Gas mode*. It could happen because of necessary conditions are not kept. For example, temperature of the reducer is not sufficient or the speed has not reached the value set in the program.

Red LED and 4 green ones indicate the level of the gas in tank. If only red light is on it means that reserve is in use. Four **Green LED** indicate the GAS level ($\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, 1).

Passage to the *Petrol mode* due to a low pressure

When the system works in *Gas mode* and the pressure drops below the set value it will be automatically switched to the *Petrol mode*. At the same time, the buzzer will make a permanent 4 sec signal. This means that there is no more gas in tank or it could also mean that the delicate cleaning filter has to be changed. This is done to avoid that the engine can rotate with a too lean mixture, thus damaging the catalyst.

Passage to the *Petrol mode* in case of breakdown

If during the work on the *Gas mode* the supplied fuse was burnt down or other breakdown occurs, the system will be switched to the *Petrol mode* automatically. At the same time the buzzer will make a permanent signal which could be stopped only by pressing the button. In this case, the button won't be active until the driver switches off the ignition and then turns it on again.

15. Gas ECU (MINI+, MIDI, MAXI)

Electronic Control Unit is a device for sequential gas injection (propane-butane or methane) in gaseous phase for full-group, semi-sequential and sequential petrol injection

ECU consists of:

- aluminum or plastic case
- wire harness with connectors
- Manifold Absolute Pressure (MAP) sensor
- reducer temperature sensor
- gas temperature sensor
- remote control (change-over switch)
- installation set

16. WARRANTY

The manufacturer provides warranty terms 24 months from the date of installation.

The manufacturer bears no responsibility for damage due to incorrect installation or improper use of equipment.

If the case was open the warranty is void.