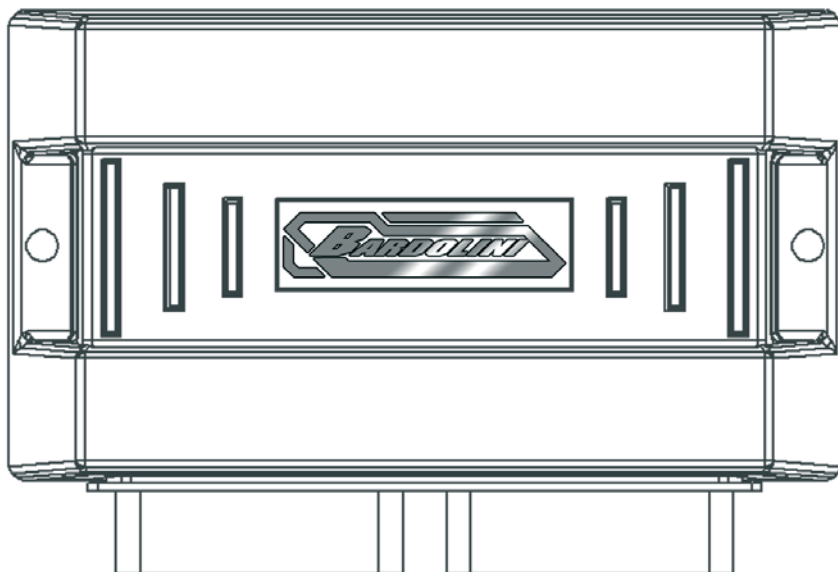




Installing & Adjustment manual



Multipoint Sequential LPG Injection System

E4 - 67R-010041, E6 - 67R-010025, E8 - 67R-014303
E20 - 67R-010663, E8 - 67R-014473

Sofia, December 2007

This mini kit contains:

- 1. ECU***
- 2. Reducer***
- 3. Injector rail - 4 cylinders***
- 4. Cables with connectors***
- 5. Temp/Pressure sensor installed on the rail***
- 6. Vacuum sensor***
- 7. Nozzles - 8***
- 8. LPG valve***
- 9. Filter***
- 10. Hoses - 4 types***
- 11. Accessories***
- 12. Installing and setting manual***

Preparations for the system settings

After all parts of the system have been properly installed, detailed check of the mechanical and electrical parts of the system must be done separately. When the mechanical installation is properly done check of the electric connections of the following elements is followed:

- **Powering both electric valves** (particular attention should be granted to their ground witch must be independent from the connection of the measuring sensors with a separate cable to a substantial ground from the body of the car or directly from the terminal of the accumulator)

- **Cut-off of the petrol injectors** (in some cars an inversion of the entering connectors is required – connected to the petrol computer). When connecting the LPG electronic control unit (ECU) with cables without injector connectors (particularly with Japanese, Americans and Korean cars) be careful for the sequence and the equality of the connections for every separate cylinder

- **Supply of the injector rail** – in this case the possibility for a mistake is reduced to the minimum. Attention should be granted to sequence of the cylinders. Much more attention should be granted to the ground connection of the rail. Here should be used cable terminals and screws with nuts. In some places the paint, dirt and anticorrosion plate must be

cleaned where is needed.

- **Connecting of the sensors** – an independent supply is provided by separate cables, terminals and connectors directly from the ECU. It is important to know that the ground of these sensors should not be used for supplying other elements of the system – injectors, valves, common power of the ECU etc.

- **Level meter with turnover switch and buzzer** – separated cables are provided for them directly from the ECU and from the level meter sensor, mounted on the gas tank.

- **Interface connection between the programming computer and the LPG ECU** – special cable and connectors

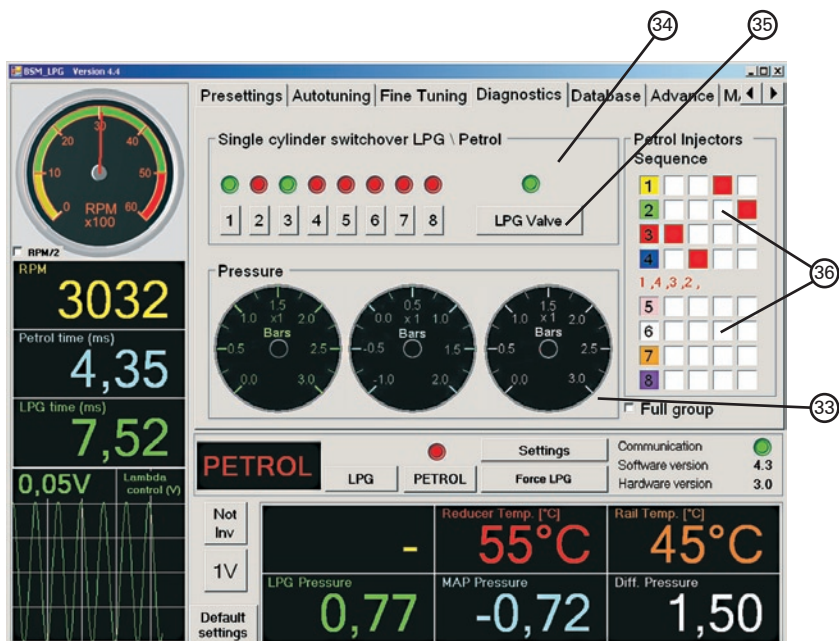
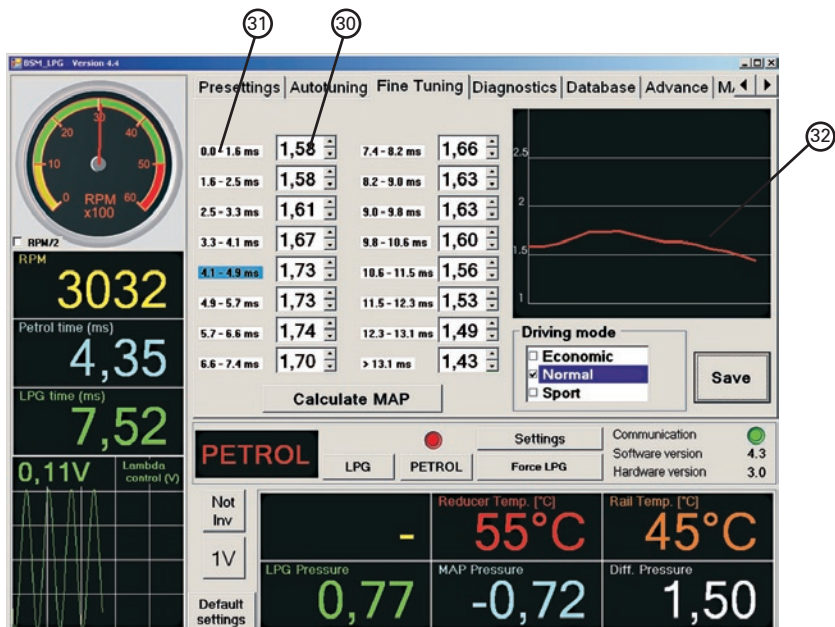
- **Supplying and information cables** – “+12V”, “+12V engine on”, “+12V from the fuel pump” and “ground cable”. The ground cable should be connected directly and stable to the terminal of the battery and the other 3 are not to be connected together, because they have their own object. The “+12V engine on” cable should not be mistaken with the “ACC” terminal.

When the mechanical and electrical parts are properly installed you can go to starting the engine on petrol, warming it up, and primary checks and settings. To guarantee the automatic tuning some general car data is being required.

Legend

Menu tuning and autotuning

1. RPM meter
2. Petrol injection time in milliseconds (ms)
3. LPG injection time in milliseconds (ms)
4. O2 sensor curve (in upper left corner current value in volts)
5. Switch for O2 sensor range (0-1V), (0-5V) – most cars are supplied with 1V sensor
6. Button for factory settings
7. LPG pressure (0-3bar)
8. Vacuum (-1 – 2bar)



- 9.** Differential pressure (0-3bar)
- 10.** Current temperature on the reducer
- 11.** Current temperature on the LPG rail
- 12.** Fuel mode (Petrol/LPG)
- 13.** Button LPG – it working when reducer temp is reached or 10 seconds after the engine is on
- 14.** Button Petrol
- 15.** LPG lamp – it's green when the engine is working on LPG, it's blinking when the reducer temp. is not reached or wait 10 seconds after switching from Petrol
- 16.** Petrol lamp – it's red when the engine is working on Petrol
- 17.** Force LPG – you can switch over anyway to LPG
- 18.** Slider for switchover temperature Petrol/LPG
- 19.** Button for language and "COM Port" setting.
- 20.** Slider for setting the switchover pressure from LPG to Petrol (when the LPG tank is empty)
- 21.** Reducer temp. sensor type
- 22.** Engine power
- 23.** Number of cylinders
- 24.** Switchover delay warm engine
- 25.** Switchover delay cold engine
- 26.** Communication - lights on green when is normal, lights red when is missing or is incorrect
- 27.** Auto tuning button
- 28.** Button "Save" for generated coefficients when auto tuning is completed
- 29.** Driving mode

Menu fine tuning:

- 30.** Detailed coefficients according to different ECU times
- 31.** Current petrol time (colored in light blue)
- 32.** Coefficient diagram

Menu diagnostic:

- 33.** Barometers for three types of pressures
- 34.** Separated cylinder switchover buttons
- 35.** Button LPG valve
- 36.** This screen shows the petrol cylinders separately

Menu autotuning:

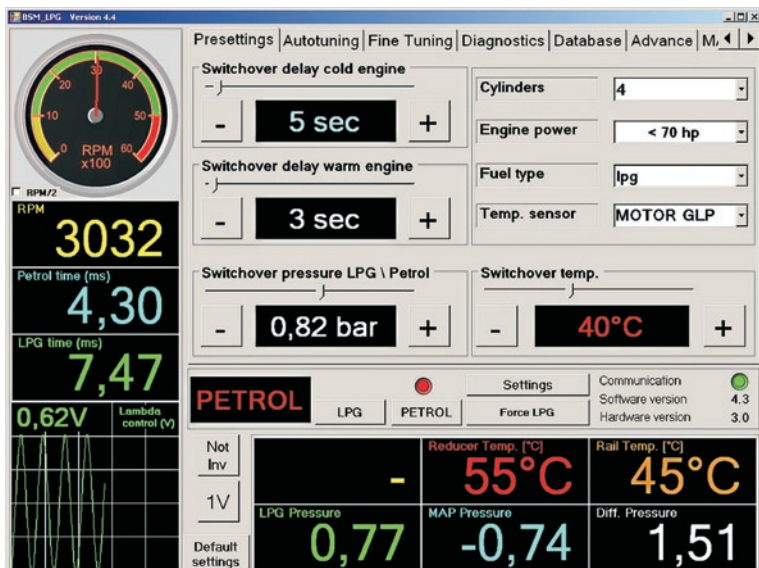
- 37.** Field for "Auto tuning" messages
- 38.** Calculated coefficient from "Auto tuning" mode

Presettings of the system

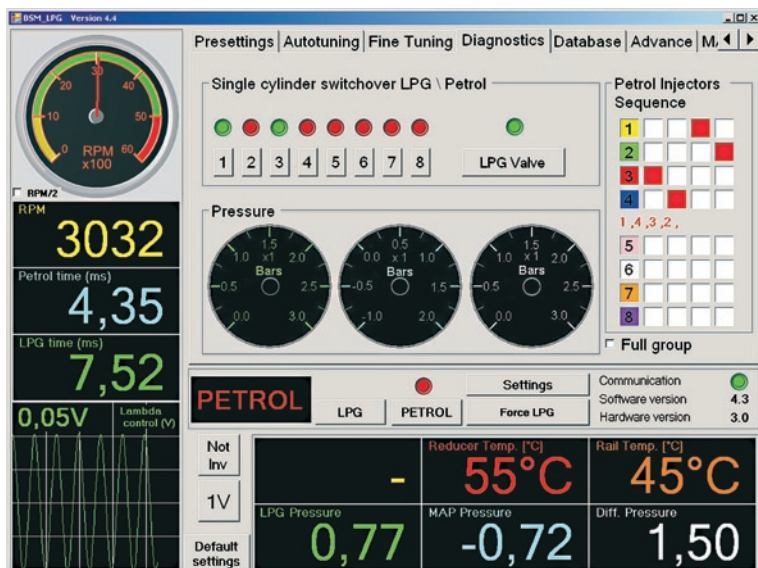
It is necessary to select from the first menu **"PRESETTINGS"** number of the cylinders, app. power in h.p., the type of temperature sensor of the reducer, pressure of the automating switchover "LPG/Petrol", time for switching over after warming up the engine from "Petrol/LPG" with cold and warm engine, temperature of the automatic switchover from Petrol to LPG.

After completing the initial settings you can select menu 4 – **"DIAGNOSTICS"** in order to check to correct cut-off of petrol injectors, their sequence and proper temperatures. If there is a sequential type of control of the petrol injectors you'll see on the left side of the screen and on the round display the real RPM, also you'll see sequential movement of the colored squares in the right side of the screen (36) for each cylinder separately. When the control is parallel 2/2 or "full group" you'll see it clearly on screen (33) – Petrol injector sequence. In this case you'll have to switch the RPM to real values by using the checkbox in RPM meter (1). If there is a missing colored square for some cylinder you have to check the electrical connections for petrol injectors, if all the squares are missing – you have to turn over the input connectors to petrol ECU side.

Until now all the operations are executed in "Petrol" mode, which is indicated by a red light and a label "Petrol". When the temperature



is minimum 20°C you can switch over in “LPG” mode looking for the differential pressure to be near to 1.5bar. When you have normal RPM in idle, pressure, working engine with increased temperatures over 70C on the reducer and at least 50°C on LPG rail, you can go to auto tuning mode. Anyway, from the menu “**DIAGNOSTICS**” you can switch each cylinder



separately on LPG, looking for normal engine behavior in this case you can catch eventually not working LPG injector or improper sequence which could be easily normalized by using the injector terminals. The real sign for improper sequence of the cylinder arrangement you can find when switchover LPG/Petrol or vice versa in case the petrol inj. times in "Petrol" mode and in LPG mode are equal. You can adjust this equality by using the arrows near by the blue colored row in the **"FINE TUNING"** menu, waiting near 10 seconds and switching over a few times Petrol/LPG. If after this procedure the engine is shaking for a second when switchover the fuels you must check the sequence of the LPG injectors. Rarely the mistake could be from the pipes row to intake manifold, it is easy to correct by rearranging the terminals on the LPG rail. If the engine is working well you can go to "Auto tuning mode".

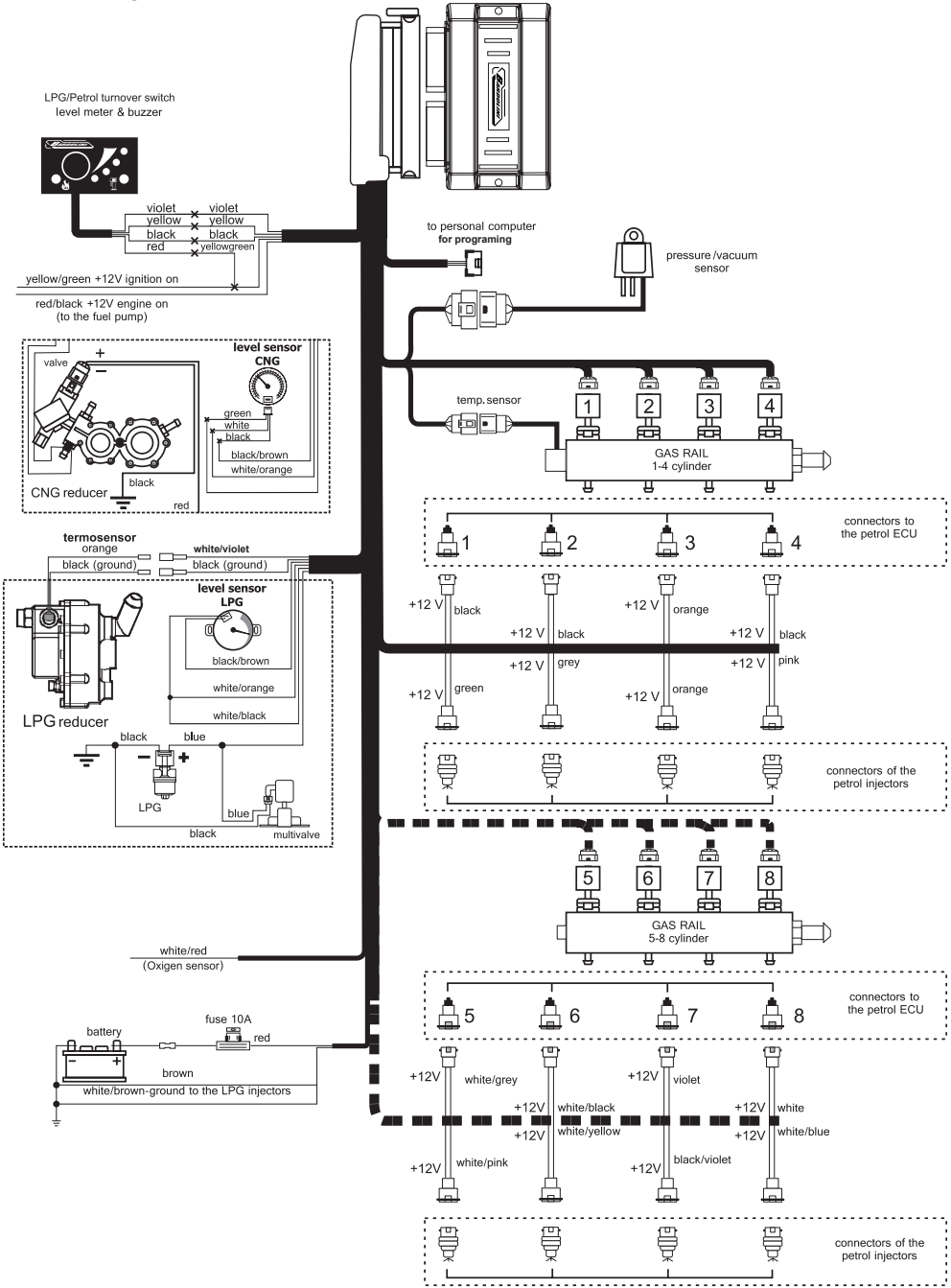
It is realized when all the power consumers are switched off (A/C, window, seat and mirror heaters, lights, cooling fan of the radiator). When reach 3000 +/- 500 RPM without load and keep it permanent, you can push the "Start auto tuning" button (27). After 20-50 seconds in the dark field (38) you'll see the number between 1-2.5 and message "OK" under it, which means the auto tuning is finished. There is a possibility to choose 3 different ways of driving depending on the driver's preferences, conditionally called "Economic", "Normal", "Sport". They could be chosen by using the checkboxes in screen (29).

In case the "Auto tuning" mode is not working, you'll see the message into screen (37). After eliminating the problem you can start the "Auto tuning" mode again.

For a more precise adjustment of the system you can go and execute it by using the **"FINE TUNING"** menu. In this case you have to ensure driving conditions with proper different loads for the engine, adjusting each coefficient to equalize the petrol times on "Petrol" and "LPG" modes. It is a hard procedure, but it ensures the right adjustment in any loads of the car engine. You also have to make fine tuning when you notice the change in the way of working of the engine (loosing power or increasing the consumption of LPG fuel).

From the **"FINE TUNING"** menu use the checkbox labeled "Nor-

Installation diagram



The scheme of the cables tuft

1 PIN

1.	YELLOW	GAS INJECTOR 1	
2.	WHITE	GAS INJECTOR 2	
3.	VIOLET	GAS INJECTOR 3	
4.	BLACK/BLUE	GAS INJECTOR 4	
5.	BLACK/BROWN	GAS INJECTOR 5	
6.	BLACK/YELLOW	GAS INJECTOR 6	
7.	GREY/BLACK	GAS INJECTOR 7	
8.	WHITE/BLUE	GAS INJECTOR 8	
9.	WHITE/BROWN	INJECTOR GND	
10.			
11.	BLUE		
12.	BLUE	LPG VALVE	
13.	YELLOW/GREEN	+ ON CONTACT 1	CN
14.	RED	+12V FROM ACCUMULATOR	
15.	GREEN	CUT PETROL INJECTOR 1 TO PETROL INJECTOR	CUT1_A
16.	BLACK/GREEN	CUT PETROL INJECTOR 1 TO CAR'S ECU	CUT1_B
17.	WHITE/PINK	CUT PETROL INJECTOR 5 TO PETROL INJECTOR	CUT5_A
18.	WHITE/GREY	CUT PETROL INJECTOR 5 TO CAR'S ECU	CUT5_B
19.	GREY	CUT PETROL INJECTOR 2 TO PETROL INJECTOR	CUT2_A
20.	BLACK/GREY	CUT PETROL INJECTOR 2 TO CAR'S ECU	CUT2_B
21.	WHITE/YELLOW	CUT PETROL INJECTOR 6 TO PETROL INJECTOR	CUT6_A
22.	WHITE/BLACK	CUT PETROL INJECTOR 6 TO CAR'S ECU	CUT6_B
23.	ORANGE	CUT PETROL INJECTOR 3 TO PETROL INJECTOR	CUT3_A
24.	BLACK/ORANGE	CUT PETROL INJECTOR 3 TO CAR'S ECU	CUT3_B
25.	VIOLET	CUT PETROL INJECTOR 7 TO PETROL INJECTOR	CUT7_A
26.	BLACK/VIOLET	CUT PETROL INJECTOR 7 TO CAR'S ECU	CUT7_B
27.	BLACK/PINK	CUT PETROL INJECTOR 4 TO CAR'S ECU	CUT4_B
28.	PINK	CUT PETROL INJECTOR 4 TO PETROL INJECTOR	CUT4_A

29.	BROWN	ECU GROUND	
30.			
31.			
32.			
33.	WHITE/BLACK	LEVEL SENSOR +5	
34.	BLACK	GROUND	
35.	YELLOW	BUTTON (TO LEVEL SWITCH)	
36.			
37.	VIOLET	COMMUNICATION (TO LEVEL SWITCH)	
38.			
39.	BLACK		
40.	WHITE		TX
41.	YELLOW		RX
42.	BLACK/RED	+ 12V WORKING ENGINE (+AT FUEL PUMP)	CN
43.			
44.	WHITE/VIOLET	TERMOSENSOR	ADC4
45.	RED/WHITE	LAMBDA SENSOR	ADC1
46.	WHITE/GREEN	PRESSURE SENSOR	ADC3
47.	WHITE/ORANGE	CONTROLLER	ADC2
48.	BLACK/YELLOW	THERMOSENSOR TO GAS INJECTOR	IN PL
49.	BLACK	SENSOR'S GROUND	
50.	BLACK	SENSOR'S GROUND	
51.	BLACK/BROWN		
52.	BROWN	GROUND THERMOSENSOR TO GAS INJECTOR	
53.	WHITE/BLUE	MAP SENSOR SUPPLY VOLTAGE	OUT5V
54.			
55.	WHITE	CUT PETROL INJECTOR 8 TO PETROL INJECTOR	CUT8_A
56.	WHITE/BLUE	CUT PETROL INJECTOR 8 TO CAR'S ECU	CUT8_B

56 PIN

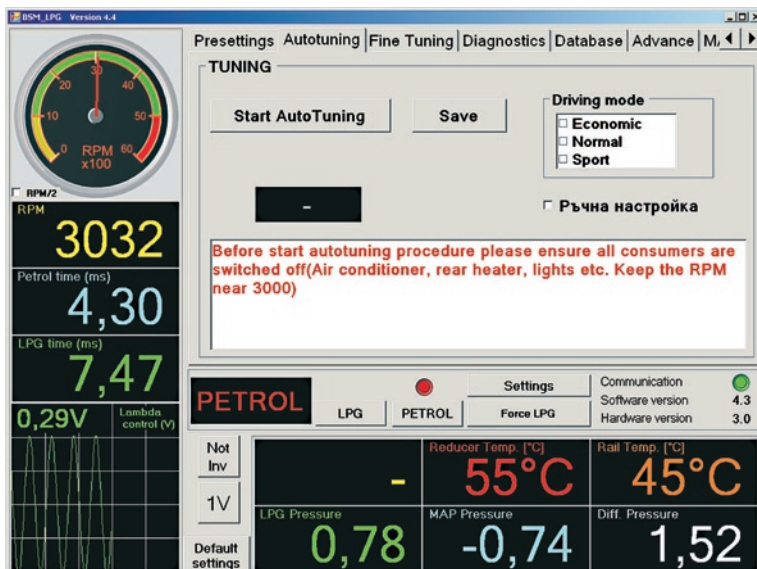
On the screen you see 16 coefficients; the working in each moment is colored in blue. Ensure permanent load, RPM and throttle position (gas pedal) switchover from "Petrol" to "LPG" and if the petrol injector times are changing, correct the colored in blue coefficient simultaneously with switching over. If the petrol time when turn over from "Petrol" to "LPG" is increased you have to increase the coefficient and vice versa till you reach the equality of these petrol times. It is recommended to use this procedure for more load conditions of the engine (at least 6-10). If you didn't manage to cover all driving modes using the arrows adjust all uncalculated coefficients near to the calculated ones. Looking over the curve (32), you'll try to make this curve smoother.

"DATA BASE" – this screen is divided on two: "CAR DATA" and "CLIENT'S DATA"

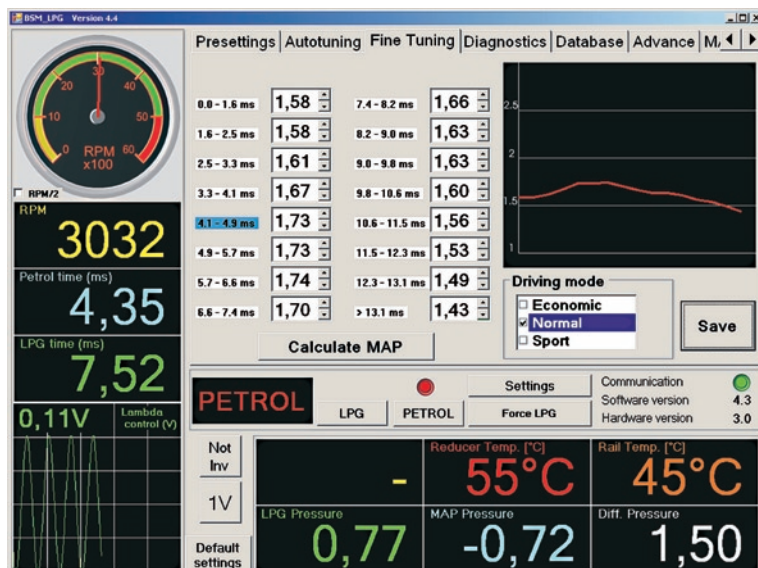
"CAR DATA" – if you want to create new folder with adjustment information for a car, after you fill lines "CAR", "MAKE", "ENGINE TYPE" etc., by "CAR RECORD" button you could save the details for the given car, the software automatically creates the fails with the names of the car (Ford, Opel, Honda etc). The fails are with extension "*.LPG" or "*.CNG" depending on the first menu "PRESETINGS". So the created fails you can use to adjust the next car types from previous ones. By button "LOADING DATA" you choose corresponding fail, on the screen will appear button "LOAD in the ECU" and by pressing it you can load the adjustment parameters into the ECU.

"CLIENT'S DATA":

After the adjustment of the system is made it is possible to save the information for about the client. You have to fill the lines, by button "SAVE" you save information into a different file, useful for the installer. The names of the files with the data about the client are automatically generated like "CAR MAKE MODEL_PLATE NUMBER (for example OPEL_VEC



TRA_CA1234XB) which data you can change for your needs. The fails are with extension *.CNT and they are saved in subdirectory "CLIENT'S DATA". On the time of maintenance of the LPG/CNG systems you can open the fails by button "CLIENT'S DATA" and to refer the adjustment for the car and the client's data – like "kilometres", "installing data" etc.



“MAP” – the system has an option to work with the three size “MAP” – it is the function of the coefficients depending from the revolutions and engine load – ms.

To work with the map, you have to switch to menu “MAP” and the check box “WORK with MAP”. There is also a red point, which is dynamic, signing the three parameters at the present moment. The change of the cell of the map or square of cells you can make by mouse marking (with blue colour) and pushing “ENTER”. You will see the small menu for type of modification of coefficients – linear, percentage and adding of value. These values in the map could be from 1.00 to 2.50. Each of the time when you change some cells, the system is working with these coefficients, you have to save them by pushing “SAVE”. (Fig. 1, Page 16)

SPECIAL ADJUSTMENTS

1. RPM when switch from LPG to PETROL:

You can choose for the system to work on PETROL over given from given from you RPM – by slider. You can switch off this function by leaving the slider in right end position.

2. CYCLES ON PETROL AFTER CUT-OFF - this function is important to use in case the RPM before idle are going deeply down and the engine sometimes stops. (drop-out of RMP – under 500-600 RPM). You can program from 1 to 7 cycles, when 0 function is switched off.

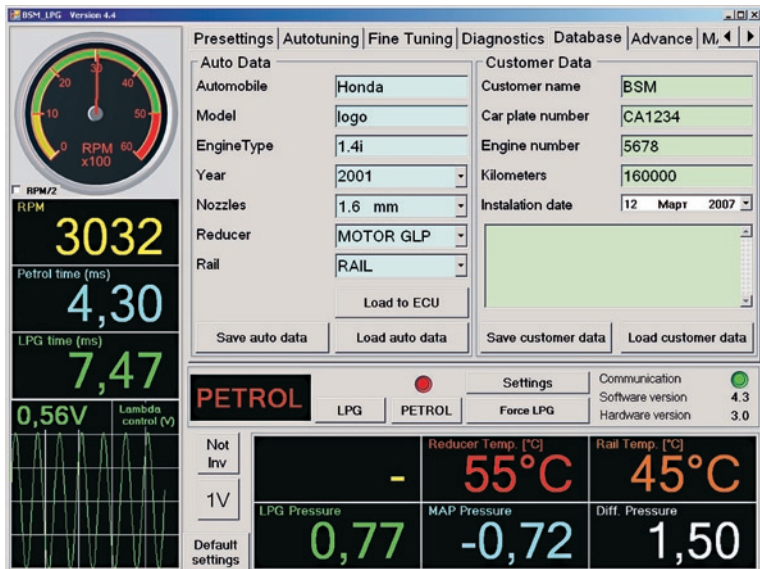
3. SIMULTANEOUSLY switch-over from PETROL to LPG:

It is intended to use when you can separate all petrol injectors for the common wires.

MANUAL ADJUSTMENT

Sometimes the automatic adjustment does not pass, so you have to adjust the coefficients manually. The steps are the following:

1. the engine runs on idle in petrol. In the upper square you see moment petrol injection time. When the petrol ECU starts vary lambda sensors you can switch on LPG.



2. In the down square the petrol injection time when the engine runs on LPG. You have to reach both values almost equal – it could be done by slider changing the current coefficient, push the “SAVE” button to record into the ECU. Far more precise adjustment you can do it by using the coefficients 30 in the menu “Fine tuning” when the car is moving with different road types, to ensure more loads for the engine and speeds. In the menu you have button “calculate map”. this is the connection between the linear adjustment with 16 coefficients and the 3-size map, which is table of coefficients, depending from petrol time and RPM. This button gives you possibility to switch from easy to more detailed adjustment. Driving the car with constant RPM and gas pedal (fixed TPS), you see the blue line on the petrol inj. time. You have to switch from petrol to LPG and move with arrows up or down current coefficient till the valve, when the petrol inj. time is equal on petrol and LPG running. The same procedure for different petrol times will give you more precise adjustment. By arrows of the neighbour coefficients you have to adjust them so, the red curve 32 is slightly falling down to the high P.

ADVANCED

1. RPM for automatic turnover from gas to petrol. The system al-

to turn over from LPG/CNG to petrol over given by slider (2000-8000 RPM). If the running on petrol car goes under the chosen RPM, the ECU turnover automatically to lpg or CNG. This function is switched off when slider is in right end position.

2. Strokes on petrol when engine go out from "cut-off". Some en

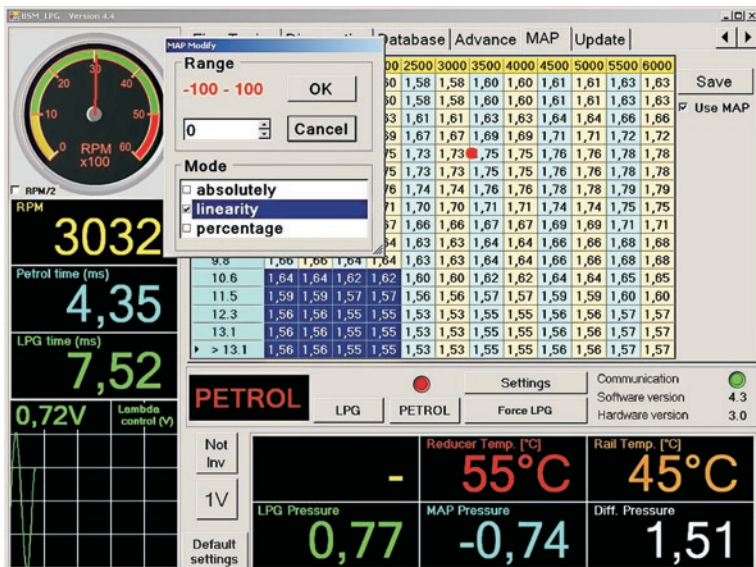
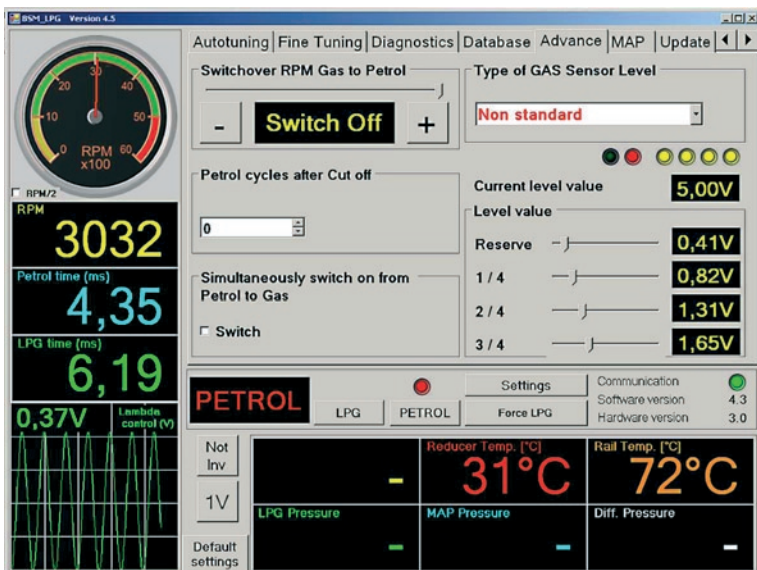


Fig. 1

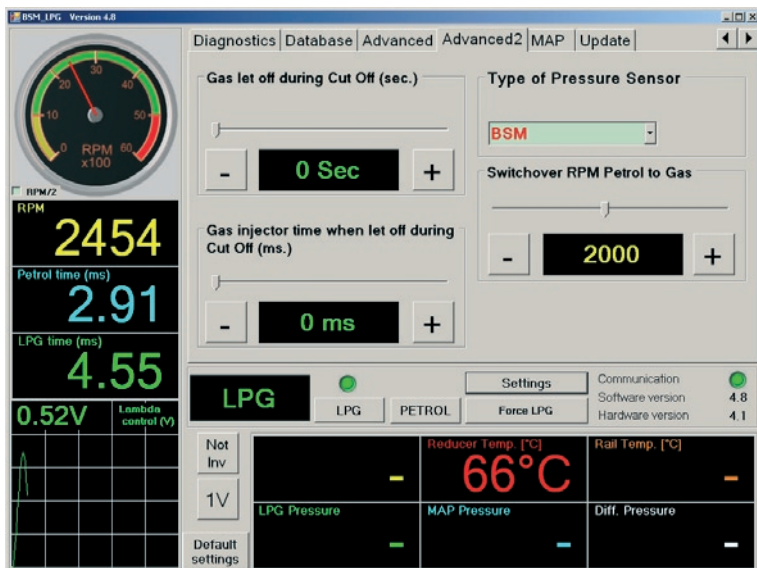
engines have drop out of RPM when go out in "cut-off" regime, so some stroke you can programm (from 0-7) to feed with petrol - it is helpful to keep the RPM over 500. This function is switchet off when 0 is chosen.

3. Simultaneously turn-over all cylinders from petrol to LPG/CNG. This function is helpful for some cars with "full group" injector system, because all petrol injectors could not be interrupted separately.

4. Level sensor. From this menu you can choose type of sensor and also adjust all 4 levels by sliders. Moving non standard type sensor you could adjust all 4 levels, measured in volts. On the screen are shown the LED-s from the switch - petrol, gas, reserve, 1/4, 1/2, 3/4,. When the level from multivalve is increasing and the voltage from the sensor is decreasing, you have to choose "Non standard reverse sensor" The adjustment procedure is thje same.



On the bottom figure you could choose pressure sensor type, by the slide you could choose the RPM when the cold engine starts automatically on gas, it is for the problem cars only for first switch-over. Basically this function is switched off.



Recomendation data for nozzle choice according to the power of the engine with injectors:

4 cylinders								
engine power (hr)	nozzle holes							
	1,2	1,4	1,6	1,8	2,0	2,2	2,5	2,8
	40 - 60							
	61 - 79							
	80 - 100							
	101 - 120							
	121 - 137							
	138 - 160							
	161 - 180							
	181 - 200							

6 cylinders									
engine power (hr)	nozzle holes								
	1,4	1,6	1,8	2,0	2,2	2,5	2,8	3,0	3,5
	140 - 160								
	161 - 180								
	181 - 210								
	211 - 240								
	241 - 270								
	271 - 300								
	301 - 330								
	331 - 360								

Table for calculating the size nozzle (**RAIL**)
(for example 160 hr for 4 cylinders is 40 hr / cyl.)

Calculation table								
power	nozzle holes							
	1,2	1,4	1,6	1,8	2,0	2,2	2,5	2,8
15 hr/cyl.								
20								
25								
30								
35								
40								
45								
50								

ATTENTION: For automobiles with “full group” engines it is necessary to use one or two bigger sizes than those from the table above.

Exemplary data about the type of nozzles for VALTEK/RAIL injectors with some cars

Year	Make/ Model	Engine Type	Displace- ment ms	Power kW	Nmbr of Cyl.	Power per Cyl.	Nozzle mm	
1	1996	MAZDA 626	2.5		6	0.0	1.9	
2	1997	WV CARAVELLA	AET	2.5	85	5	17.0	1.9
3	1998	MERCEDES	E280	2.8	150	6	25.0	2.0
4	2005	MITSUBISHI LANCER	4G18	1.6	72	4	18.0	1.6
5	2001	FORD ESCAPE	1KA	3.0	149	6	24.8	2.0
6	1997	MERCEDES C230		2.3	110	4	27.5	2.0
7	2004	OPEL ASTRA		1.6	74	4	18.5	1.5
8	1999	RGX CITROEN XM-2(XU10J2TE)	2.0	110	4	27.5	1.9	
9	1998	BMW 318i		1.9	103	4	25.8	1.7
10	2000	SCODA OCTAVIA	ADY	2.0	85	4	21.3	1.9
11	2001	SUZUKI GRAND VITARA	H271	2.7	94	6	15.7	1.7
12	2003	FORD FOCUS	CDDA	1.6	71	4	17.8	1.5
13	1999	TOYOTA PICNIC	3S8	2.0	94	4	23.5	1.7
14	2005	VAZ 2115		1.5	56.4	4	14.1	1.3
15	2004	GAZ SOBOL		2.5	103	4	25.8	1.7
16	2005	GAZ 2217 BARGUZIN	40522A	2.5	103	4	25.8	1.8
17	1999	VW TRANSPORTER	AVT	2.5	85	5	17.0	1.9
18	1995	MITSUBISHI PAJERO	6G74	3.5	153	6	25.5	2.0
19	2000	SUBARU LEGACY	EJ25	2.5	123	4	30.8	2.2
20	2005	VAZ 21104	21124	1.6	66	4	16.5	1.7
21	2004	VAZ 21113		1.5		4	0.0	1.6
22	2001	TOYOTA LITE ACE NOAH	3S8	2.0	97	4	24.3	2.0
23	2002	VOLVO SC70	B5254T	2.5	155	5	31.0	1.9
24	1999	MITSUBISHI MONTERO	6G72HJ	3	136	6	22.7	1.8
25	1998	AUDI A6	ALF	2.4	121	6	20.2	1.8
26	1998	SEAT ALHAMBRA	ADY	2	85	4	21.3	
27	1998	BMW 316i	M43	1.6	75	4	18.8	1.8
28	1999	SAAB 9.5	B235E	2.3	125	4	31.3	2.2

WARRANTY CARD

Warranty time:12 months or 30 000 km.

Serial Number

Distributor

Signature

Car brand Number

Drived kilometers since the installing

Owner

Data of the installing

Name & signature of the installer

Warranty terms:

The warranty is only about fabric defects accured during manufacturing witch have accured in the waranty time. Repairs and installing are made only by AUTHORIZED COMPANY EXPERTS!

The warranty is not about damages from not keeping the safety use instructions, mechanical damages and floods in the module. In these cases the warranty is no longer valid and repairs can be done.