SPARKER DCCDIP2 version 105

SPARKER DCCDIP2 is an ignition unit for 1, 2 and 4 cylinder road motorcycles. The ignition principle is capacitive. The unit is programmable through PC. The device is fully adjustable regarding the ignition timing. It contains ignition advance curve / map depending on RPM and position of throttle or underpressure in the intake manifold. The ignition also contains outputs for tachometer, two multifunctional outputs, two multifunctional inputs, outputs and an input to the servomotor exhaust throttle. The unit is also equipped with racing features - function switch for quick-shifting and output for the shift indicator light. When programmed the unit is connected with computer via serial port. DCCDIP2.EXE configuration software ("software") is included.
Unit is a two-channel (suitable for motorcycles with maximum two ignition coils) with a driver for servomotor exhaust throttle. Unit is produced in several further modifications related to the inputs for engine position sensors. The inputs for position sensors are two and each of them can be custom-made in the following versions:
1) For inductive sensor (marked **IND** or unmarked)
2) For inductive sensor with a pulsed rotor with more than 12 protrusions (marked **24-2**)
3) For inductive sensor with a pulsed rotor with more than 36 protrusions (marked **48-2** or **60-2)**
4) For HALL sensor or optical sensor (marked **HALL**)
5) For inductive sensors and pulse rotor with one pulse lobe (marked **ONE LOBE**)

HARDWARE

Supply voltage +12 V input
The nominal power supply voltage should be 14 V. The supply voltage must be between 8-18 V. In this range the unit is able to provide control of all the processes. Above 20 V the unit stops controlling the coils (overvoltage protection). Supply voltage is connected with the positive pole to +12V (pin 13) and with the negative pole to GND (pin 2).
Pins 2, 11 and 16 are interconnected in the unit. They can all be used either to connect the power (power supply) ground or to connect the ground for sensors. Ground for sensors should be connected from unit and it should not be interconnected with power ground or with engine or chassis mass.

Input for the engine load sensor
The input for engine load sensor can be realized by the throttle position sensor (TPS) or by intake air pressure sensor (IAPS).
An input is ready for standard TPS or IAPS sensors used on motorbikes. It is designed to bear voltage up to 5V. Setting up the voltage levels of the TPS for 0% and 100% or IAPS for 0-999 kPa is included in software.
TPS or IAPS are powered by reference voltage +5V (pin 17) and SENSE GND (pins 11 or 16). Ground for sensors should be connected from unit and it should not be interconnected with power ground or with engine or chassis mass. Sensor outlet will be connected to connector (pin 6).

Crankshaft position sensor CKPS
The ignition unit can be used for almost all known and still unknown motor position pickup systems. Most of the systems can be chosen directly by selecting relevant motorcycle type from the list included in software. Different pickup system can be set following a special procedure in software.
An input is ready for standard pickups (inductive, reluctant type) used on motorbikes. On request, we can also deliver inputs for HALL sensors.
One outlet of the CKPS will be connected to connector (pin 9) and the other outlet will be connected to SENSE GND (pins 11 or 16). In double-pickup systems the other sensor's one outlet will be connected to connector (pin 20) and the other outlet will be connected to SENSE GND (pins 11 or 16). Ground for sensors should be connected from unit and it should not be interconnected with power ground or with engine or chassis mass.
In the case of HALL type sensor the sensor can be powered by +5V (pin 17) or by +12 V.

Multifunctional inputs
The unit contains two multifunctional inputs. Inputs should be activated using switch with respect to ground. The inputs can be assigned different functions:

KILL SWITCH	- the unit will stop ignition when input is grounded
BLOCKING	- the unit will stop ignition when input is ungrounded (security circuit of sidestand)
QUICKSHIFT	- activate Quickshift sequence (gear shift up with full gas)
RETARD	- decrease ignition advance with preselected value in full range
START LIMTER	- activate Starting limiter (launch control)
2nd ADVANCE CHART	- switch to 2th ignition advance curve/map

One outlet of the multifunctional input 1 will be connected to M IN 1 (pin 8) and the other outlet will be connected to ground.
One outlet of the multifunctional input 2 will be connected to M IN 2 (pin 19) and the other outlet will be connected to ground.

Outputs for induction coils IC 1, IC 2
One outlet of the induction coil IC 1 will be connected to IC 1 (pin 1) and the other one will be connected to the ground.
One outlet of the induction coil IC 2 will be connected to IC 2 (pin 10) and the other one will be connected to the ground.

Tachometer output TACHO
The tachometer output is compatible with most on-board devices used on motorbikes. Number of pulses per one revolution and possible corrections are set using software.
TACHO is supplied by 12 V voltage and GND. TACHO output will be connected to TACHO (pin 15).
The revolution indicator output is not compatible with on-board devices used on old Honda motorcycles from the 1990s (ignition units with OKI 16pin connector). Unit can be equipped with revolution indicator output compatible with these on-board devices (marked **HONDA TACHO**).

Multifunctional outputs
The unit contains three multifunctional outputs (Power Outs). Outputs are type NPN opek collector (it provide ground when is switched on). Outputs can switch resistive or inductive load up to 2 A. Outputs can work with various modes preselected with software:
Fuel pump - it is switched on for 4 seconds after unit switch on and always when engine is running.
Gear shift light - two stage gear shift light.
PowerJet Honda - behavior like PowerJet at Honda RS125.
Special - switch on and and switch off according curve/map with pulse-width modulation possibility (powerjet).
Special PWM - continuous control with pulse-width modulation according curve/map (powerjet for example).
Speciál pulse - continuous control using the pulse length according curve/map (oilmaster for example).
Multifunctional output 1: Load should connected with one outlet to POWER OUT 1 (pin 3) and second outlet to +12 V.
Multifunctional output 2: Load should connected with one outlet to POWER OUT 2 (pin 12) and second outlet to +12 V.
Multifunctional output 3: Load should connected with one outlet to POWER OUT 3 (pin 14) and second outlet to +12 V.

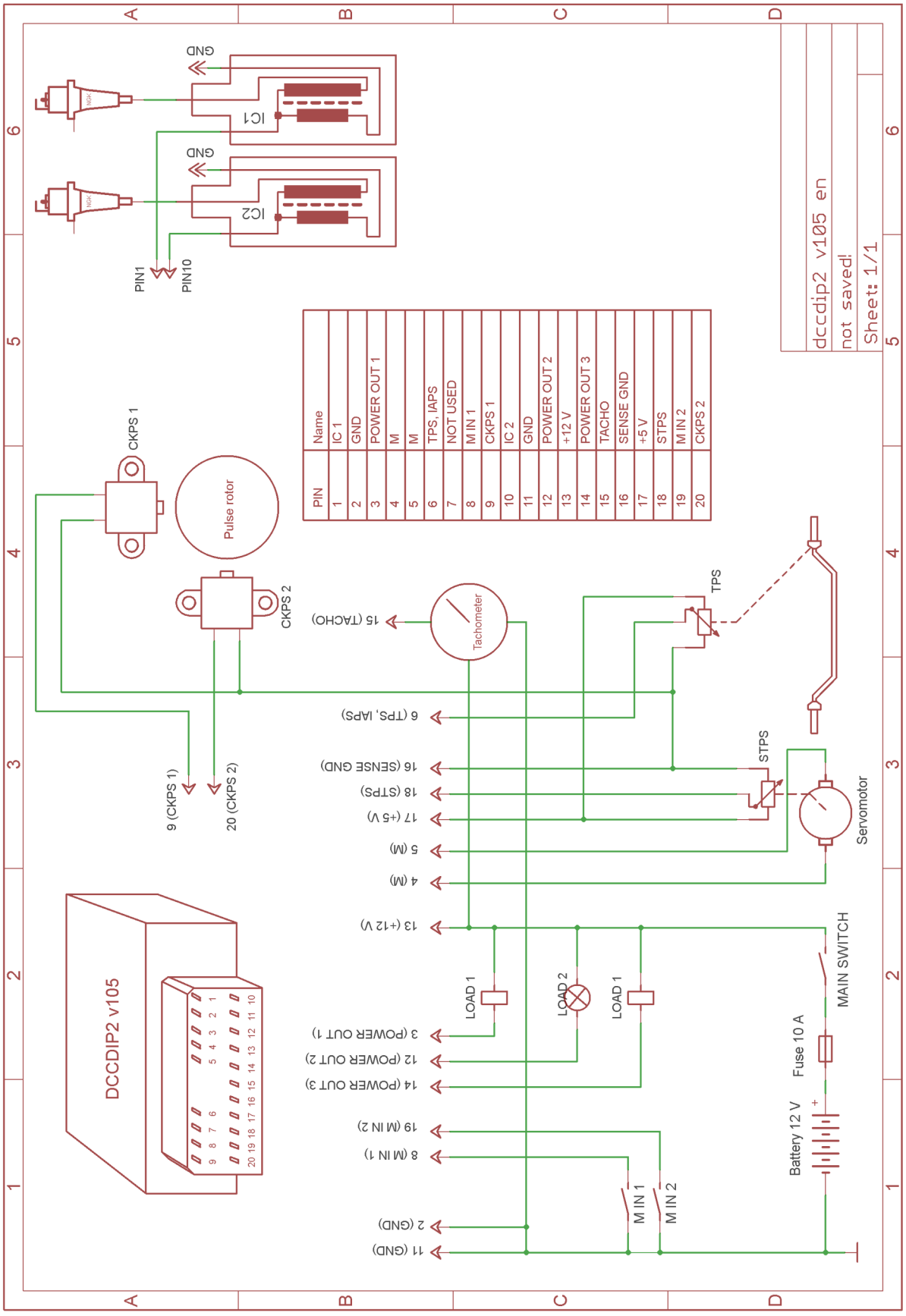
Outputs and input for SERVO
Servo outputs and input are compatible with most of servomotors used on motorbikes for exhaust throttle (e.g. Yamaha EXUP). Required dependency of servo position on RPM and engine load can be configured in program.
Servomotor outputs are M (pins 4 and 5). Power supply for servo position sensor is connected to +5V (pin 17) and SENSE GND (pins 11 or 16). The output of position sensor is connected to STPS (pin 18).

Connector adapter, basic harness
For many motorcycles we manufacture so-called **connector adapter**. This is a short bundle, on one side equipped with a connector fitting into unit and on the other side equipped with a connector fitting the original ignition unit. This connector adapter provides **plug and play** connection possibility with the original cable harness.
Next connection possibility is **Basic harness**. This is counterpart connector with all wires with pins crimped. Lenght is 1.3 m.
We offer also **Reduced basic harness**. This contains only wires necessary for basic work of ignition.
In the connector adapters we use the colours of the wires listed in the following table.

Wire colors DCCDIP2.

Wire colour	Connector pin number	Name	Description
orange	1	IC 1	ignition coil 1
blue	2	GND	power ground
purple	3	POWER OUT 1	multifunction output 1
green	4	M	servomotor output
green	5	M	servomotor output
grey	6	TPS/IAP	engine load sensor
	7	NC	not used
black	8	M IN 1	multifunction input 1
yellow	9	CKPS 1	crankshaft position sensor 1
white	10	IC 2	ignition coil 2
blue or light blue	11	SENSE GND	power ground or sensor ground
blue/white	12	POWER OUT 2	multifunction output 2
red	13	+12V	power supply 12 V
pink	14	POWER OUT 3	multifunction output 3
green/yellow	15	TACHO	engine speed indicator output
blue or light blue	16	SENSE GND	power ground or sensor ground
white/red	17	+5V	power supply for sensors
white/blue	18	STPS	servomotor position sensor
grey/red	19	M IN 2	multifunction input 2
brown	20	CKPS 2	crankshaft position sensor 2

DCCDIP2 - recommended connection diagram



DCCDIP2.EXE software

Pull down menus

File - includes items:

New - default data setting.
New for current tab - default data settings only for the current tab.
Open - opens data file.
Open from exe dir - opens data file from the same directory as the control software.
Open for current tab - opens data file for the current tab only.
Save - saves data file.
Save to exe dir - saves data file to the same directory as the control software.
Nine last opened data files
Print - prints current settings of the current tab.
Exit - exits the program.
Clicking **New** results in automatic default settings of all parameters. These correspond to four-stroke engine without TPS.

Port - includes items to select the communication line.
COM offline - communication off.
COM XX - list of useable serial ports.
COM auto - automatic connection
For PCs without serial port (USB only) it is necessary to use USB/RS232 adapter.

Ignition - includes items
Read - reads data from the unit.
Verify - |compares data in PC with data in the unit.
Program - sends data to the unit and performs verification.
Reset - resets the unit.

Tools – includes tools to set the advance, UNDO and REDO.

Language - language settings: **English, Czech, German**

Help - includes items
Help - opens Assembly guide (this file).
About the program - information on the software (version, date).

Icons menus

- sets default values. Warning!!! Clicking this icon results in automatic default settings of all parameters.

- opens data file.

- saves data file.

- prints the current settings.

- tools for going back or forward step by step when changing the settings.

- see pull down menu Ignition.

Tab sheet Miscellaneous

Limiter - engine speed limiter value settings (limits with all ignitions off).
Start limiter - Start limiter value settings (limits with all ignitions off)
Start limiter delay - Start limiter activation delay value settings. This is useful when Start limiter switch is located at clutch lever. Start limiter is activated with delay, so that are not problems if clutch is used for next driving.
Quickshift time - sets ignition switch off period during gear shift.

Quickshift pause - sets time of clutch master insensitivity after gear shift.
Retard - sets the value for ignition advance retard if the function is active.
Inputs for neutral and side stand - multifunctional inputs 1 and 2 will be used for connection of neutral switch and sidestand switch. Function is similar to function Blocking, but using two inputs. If at least one multifunction input is grounded, the bike is not blocked).
Multifunctional Input 1, 2
Off - no function.
Kill switch - when input is grounded - the unit will stop ignitions.
Blocking - when input is not grounded - the unit will stop ignitions.
Quickshift - function to interrupt or retard the ignition when gear up shifting. Settings is at tab sheet Race.
Retard - function to decreases the ignition advance by preset value.
Start limiter - function to activate Start limiter.
2nd advance chart - function to change ignition advance from curve/map 1 to curve/map 2.
Inverse polarity - standard polarity is that input is activated by grounding. With inverse polarity will input activated by ungrounding.
Input = - visualisation of input activation.
Sensor - here you can find the selection of engine load sensor.
None - no load sensor is in use.
TP - throttle position sensor is used.
IAP - inlet air pressure sensor in the intake manifold is used.
TPS sensor - here you can set values of the TPS voltage [mV] for 0% and 100% opening of throttle.
IAP sensor - here you can set characteristic of IAPS using two points voltage/pressure.

- by pushing it measures and sets voltage for 0% TPS (unit connected with PC, no gas).

-by pushing it measures and sets voltage for 100% TPS (unit connected with PC, full gas).

After determining the limit values, it is necessary to store these values in the ignition by pushing the "program" button, otherwise they will not be executed.

Motorbike tab

Motorcycle type - crankshaft position sensing system selection for specific motorbike.
Tachometer output
Number of pulses per revolution - basic tachometer output settings.
Corrections - percentage corrections of tachometer values [%].
Compensation - frequency compensation of the phase error of engine position inputs. The phase error is due to the frequency dependency of trigger level of input and the delay that occurs when processing the input signal. The phase error is mainly dependent on the number of lobes of the pickup system of the motor position.
RPM without ignition - sets the number of starting revolutions without ignition. For a **kick start system** this value represents the number of revolutions when all channels ignite together.
Sensor polarity - Sensor polarity selection (Plus/Minus/Auto).
Plus - designed for pickup connection, where - as the pulse lobe is getting near to the sensor, it generates positive voltage, and when the lobe is moving away it generates a negative voltage.
Minus - designed for pickup connection, where - as the pulse lobe is getting near to the sensor, it generates negative voltage, and when the lobe is moving away it generates a positive voltage.
Auto - unit itself determines correct polarity automatically (the algorithm is based on the assumption that the sum of pulse lobe angles is lower than the sum of gaps in between).
Pickup interchange - interchanges the engine position sensor inputs (pins 9 and 20).
No polarity check - the unit controls polarity of the sensor using shape of the signal. If the actual polarity of the sensor is different from the selected one, the unit will block ignition. This option cancels the blocking of ignition.
Interlock input - this option works only for pickup system **1 lobe, 2 pickups**. With elevated levels of electromagnetic interference (e.g. at the time of ignition) on some motorcycles (e.g. Ducati) unwanted activation of the pickup input may occur, especially that input which at the moment is not active. This option prevents unwanted activation blocking input 2 during activation of input 1, and vice versa: blocking input 1 during the activation of Input 2. This option, however, may cause problems, when combined with automatic determination of sensor polarity.
Spark possible before lobe - during standard operation of the unit ignition can take place only in the section after the start of the virtual lobe. This option allows to burn even before the virtual lobe. Unfortunately this is at the cost of the virtual lobe being 360 °, which significantly affects the accuracy of ignition especially at low revolutions.
Lower advance at start (next edge) - this option decreases (moves) advance to the next start pulse edge compared to the standard starting position in advance. Valid only for starting speed (speed less than 500 RPM). This option can be used especially for large volume single-cylinder engines to prevent kick-back when starting el. starter. You can use this option only for some pickup systems.

Lower advance at start (%) - this option delayed starting advance upon angle. This angle is determined as % part of virtual lobe. Valid only for starting speed (speed less than 500 RPM). This option can be used especially for large volume single-cylinder engines to prevent kick-back when starting el. starter. You can use this option for most pickup systems.
Description of synchronization - here the current pickup system can be modified, or new one created (only when selecting **Special settings** in the **Motorbike type menu**). BEWARE: only for very experienced users. Please consult with us any atypical configurations of pickup systems.
System work so: Unit read signal from pickup and find trigger condition. This condition can be long lobe or narow lobe or long gap (missing lobe) or narow gap (inserted lobe) etc. If condition is founded - unit will numbering lobes. First lobe after founded condition is nuimber 1, next is number 2 etc.
Each item allows you to define the so-called **Virtual pulse lobes.** The virtual pulse lobe can be either a single pulse lobe or a sequence of several pulse lobes and spaces between them. First edge of Virtual lobe is determined by Maximal advance and second edge is determined by Starting advance. Each edge of Virtual lobe is determined by lobe number, edge (begin or end) and pickup (CKPS 1 or CKPS 2)
Number of lobe at rotor - setting of number of lobes at pulse rotor.
Number of outputs (coils) - setting of number of used ignition outputs (coils).
Maximum advance - determination of begin edge of Virtual lobe.
Start advance - determination of end edge of Virtual lobe.
Number of ignitions per revolution - setting of number of ignitions per revolution. Determine how many ignitions per one revolution are executed by ignition outputs. This can be different if pickup system is located at crankshaft or at camshaft etc.

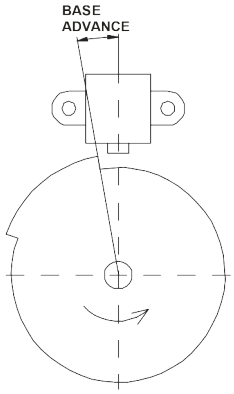
On the bottom left of this tab there are some statistical data collected from the unit. These data are read out even in the case when the version of the unit control firmware and software are not compatible. It is sufficient when the connection is established and active. The following data are read: The name of DCCDIP2 unit, firmware version date, number of programming sessions.

Advance map tab

It contains two sub tab sheets of switcheable ignition advance curves/maps Advance 1 and Advance 2.

Advance map 1 and 2
The advance map contains up to 15x10 adjustable points depending on revolutions and the engine loads (TPS or IAP) value. If no load map is used, the advance map becomes just a 15-point curve of advance depending on the revolutions. Number of the columns is possibele to set with tool at right side of curve/map.
Setting of the advance map (curve) can be done in several ways.
- by writing individual values directly into the edit boxes of the PC keyboard.
- by using graphic tools up / down arrow (always to the right from the value of the edit field).
- using +/- buttons. This option allows you to change only the current edit box in the engine running mode(the active field is green) or when **ALL** option is activated the entire map (curve) can be moved in both running and off modes.
- by pressing F4 and F5, F4 has the same function as the button "-" and F5 has the same function as the button "+".
- using the scroll wheel of the mouse – by tapping the edit box the option to change by scrolling is activated.
- in display mode of the advance map **TAB** and **2D** it is also possible (using the mouse) to pull individual points of the curve.

Base advance - is the angular difference between the position when the crankshaft position sensor is directed to the end of the virtual pulse lobe pulse and the top dead centre position (see angle "base advance" in the picture below). **This value is always determined by the mechanical constitution of pickup system and shall never be changed by software settings!!!**
The field "**Base advance**" thus is not there to change the base advance: into this field the value must be entered that corresponds to the physical condition of the engine. Use stroboscope lamp for check of base advance value.
To the first point of the revolution of advance curve the unit ignites on the value of base advance (at the end of the virtual pulse lobe). The exception is the "**Start of lobe system**" that can ignite at the beginning of the of the virtual pulse lobe. **Therefore for revolutions lower than the first point of advance curve early ignition point cannot be set, as it is derived from the mechanical design of the pickup system!!! The first revolution point of the curve in most cases should be chosen above idle speed!!!**
Please contact us in case of any uncertainties regarding the design of the pickup systems and their functioning with unit.



Correction - Correction of the advance of individual cylinders [°].

Power Out tab

Contains settings for two multifunctional outputs **Power out 1, 2, 3**
Off - the output is not active.
Fuel pump - to control the fuel pump relay, after the ignition is activated for 4 s, when engine running always activated.
Gear shift light - to control the two-state gear shift indicator. One state blinking, second state lighting.
Power jet Honda - to control PowerJet. The output is switched to ground according to truth table (marked cell) after the comparison limits derived from values on table axes are exceeded. Settings is predefined as original control at motorcycle Honda RS125.
Special - to control specific devices (pair valve, Powerjet). The output is switched to ground according to truth table (marked cell) after the comparison limits derived from values on table axes are exceeded.
Hysteresis [RPM] - engine speed hysteresis. Difference of RPM for switch on and switch off. (for Special and Power jet Honda).
PWM [%] - percent value of duty for pulse-width modulation (for Special). Frequency of modulation is 10 Hz.
Special PWM - to control specific devices (pair valve, Powerjet) using PWM (pulse-width modulation). Values of PWM you can set in curve/map. Frequency of PWM can be set 2-20 Hz.
Special pulse - to control specific devices (oil master) using repeated pulses. Periode of pulses you can set in curve/map. Lenght of pulses can be set 5-500 ms.
POUT1, POUT2, POUT3 - Power out work visualisation.

Servo tab

Servo on - Software activation of servo controller.
Map of positional requirements - of servo controller has up to 15x10 adjustable points depending on revolutions and engine load (TPS angle or the pressure in the intake manifold IAP). If no load map is used, the map becomes only (up to) 15-point curve. Number of the columns is possibele to set with tool at right side of curve/map.
The requirement for the position of the servo controller has two modes.
Voltage (option "percent" is not checked) - the servo controller searches for the calculated voltage resulting from the map (or curve). After the ignition is switched on the unit checks the servo controller so that it must find the highest and lowest required voltage value, which is located on the map (or the curve) of voltage requirements. When these voltage values are not found (whether due to mechanical obstructions or due to wrong settings), the servo is shut down.
2) **Percent** (option "percent" is checked) - the servo controller searches for the calculated percentage values resulting from the map (or the curve). After the ignition is switched on the unit finds (through mechanical stops - must be available!!!) lower position, which is marked as 0% and the upper position, which is marked as 100%. The servo controller then moves between these points according to calculated current requirements.
1/P[mV] **-** this is the voltage deviation from which there is linear decrease of the performance of the servo controller towards the required value. Size must be set so that the engine does not tremble and at the same time it must have the smallest regulation deviation. In practice 100 - 600 mV. BEWARE - in case you set too low value there is a risk of servo oscillation.
Off [mV] **-** voltage deviation from which the servo is completely switched off towards the required value of servo position. In practice 5-50 mV.
Servo = - actual demanded/measured value of servomotor position [mv].

Tests tab

Here you can manually perform some actions that are used to test the outputs of the unit.
Ignition - test of individual ignition outputs.
Servo - test of servo outputs (both directions). The parameter **Time** specifies the time period during which the servo test is carried out.
Rpm - test of tachometer output. Rpm parameter specifies the engine speed with which the output will be tested.
Powerouts - test of multi-function outputs 1 and 2.
Hourmeter - running hours counter
monitor PickUps - run window for pickups signals monitoring.

Monitor

The monitor is located in lower section. Sensor values and engine's operational characteristics can be observed here. Should there be **No connection with PC** prompt displayed in the upper right corner, the unit is not connected, switched on, or it correct COM port is not selected.
When unit start communication - software reads data from unit and compare it with current data in software. If data in unit and in software are different - software will notice you.
If you will open setting data file - you can see full path to file location at upper toolbar.

Programming after a change - automatic programming settings (after every change).
Not Reading - reading is not allowed (after programming with this option data cannot be retrieved from the unit).
COM - signal of currently used communication port.
RPM - current engine speed.
TP/IAP - current throttle position.
Pickup 1 and 2 - pickup work or error of pickup system visualisation.
U - current supply voltage.
ADVANCE 1 to 4 - current ignition advance of individual cylinders.
Kill switch - visualisation of Kill switch function activation.
Blocking - visualisation of Blocking function activation.
Quickshift - visualisation of Quickshift function activation.
Retard - visualisation of Retard function activation.
Limiter - visualisation of rev Limiter activation.
Start limiter - visualisation of Start rev limiter activation.
2nd advance chart - visualisation of switch to 2nd advance chart.