www.zeeltronic.com
info@zeeltronic.com

updated 18.12.2019
application version: 00.191211

PROGRAMMING MANUAL
ZeelProg PDCI-265V

Supported control units: **PDCI-265V**

PDCI-265V is 2 channel DC-CDI and exhaust valve controller, with programmable spark power. It has 2 additional outputs for driving non programmable DC-CDI.

Technical info:

- minimum revs	200 RPM
- maximum revs	20000 RPM
- minimum supply voltage	9 Volts
- recommended power supply voltage	12÷15 Volts
- maximum supply voltage	17 Volts
- stand-by current draw	~ 0.05 Amp
- current draw at 1300 RPM	~ 0.4 Amp
- current draw at 12000 RPM	~ 2 Amp
- maximum continuous current for shift light and power jet output	1 Amp
- peak current for shift light and power jet output	5 Amp
- programmable spark energy from idle to 20000 RPM	from 16.5 to 55mJ

Circuit is protected against reverse supply voltage (wrong connection).

Features:
- fast power-up (also starts with condenser)
- full power starting spark energy already at 9Volts power supply
- two isolated trigger input (pickup)
- two ignition coil outputs
- two outputs for additional non programmable DC-CDI
- programmable spark power
- gear sensor input (6 gears...3 gear groups)
- wheel speed sensor input for calculating gears
- two programmable ignition maps
- two programmable power valve maps
- external switch for changing ignition and power valve map while riding
- TPS input (Throttle Position Sensor)
- shift light output
- power jet output...on/off function (TPS and rev dependent)
- duty cycle power jet output...from 0% to 100% (for regulating A/F ratio on some carburettors)

- quick shift...kill time for each gear...smart shift function, with automatic kill time adjustment
- soft rev limit 1
- hard cut rev limit 2 with enable switch input
- reduced spark at high revs with closed throttle (TCT mode)
- tachometer output
- programming while machine running - you can immediately see effects
- signal delay compensation
- programmable PV deviation
- programmable max close and max open positions
- self PV test on power-up
- PV error detecting (position sensor failure, servo motor failure)
- easy and fast programming on the field, via PC
- fast processing for high accuracy - delays from 1us
- instant monitoring with PC

ZeelProg is PC application for programming ZEELTRONIC engine *control units*.
For programming special PC-USB programmer is needed.

- ***ZeelProg*** automatically detects PC-USB programmer connection and enables all functions (without PC-USB programmer, ***ZeelProg*** application is locked).
- ***ZeelProg*** automatically detects type of engine *control unit* connected to PC-USB programmer.

CONTENT

ZeelProg SOFTWARE INSTALLATION GUIDE

CD, or USB flash content:
- driver (USB programmer driver)
- ZeelProg

Software can be also downloaded from web site:
www.zeeltronic.com/page/zeelprog.php

ZeelProg application can be installed on Windows XP/Vista/7/8/10.
At least "NET Framework 4" has to be installed.

Installation:
① Insert CD-ROM, or USB flash, or download files from www.zeeltronic.com .
② Install USB programmer "CDM" driver from "driver" map.
③ Install ***ZeelProg*** with running "setup ZeelProg.exe" from "ZeelProg" map.

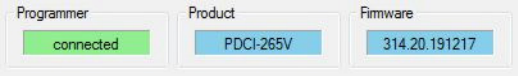
If ***ZeelProg*** does not start, install "NET Framework".

ZeelProg USER INTERFACE

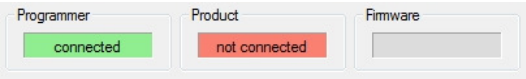
Auto detection

Zeelprog automatically detects USB-Programmer and type of *control unit*.

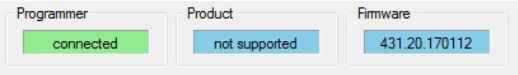
⇨ Programmer connected, product (*control unit*) connected:



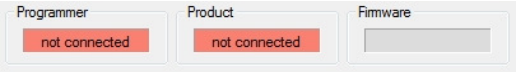
⇨ Programmer connected, product (*control unit*) not connected:



⇨ Programmer connected, product (*control unit*) not supported:

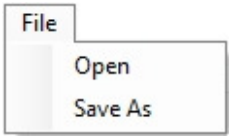


⇨ Programmer not connected, product (*control unit*) not connected:



Menu structure

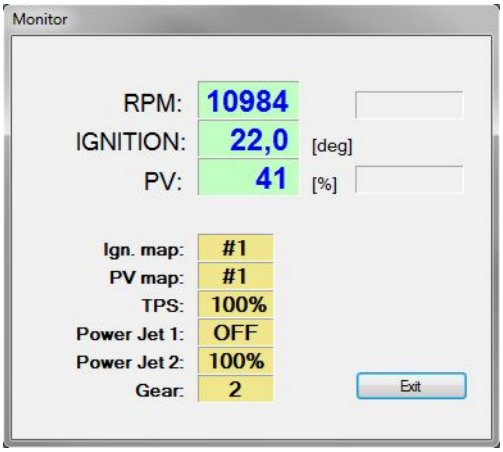
⇨ **File menu** is active when PC-USB programmer is connected



Open → Open an existing *.zee file
Save As → Save all parameters to *.zee file

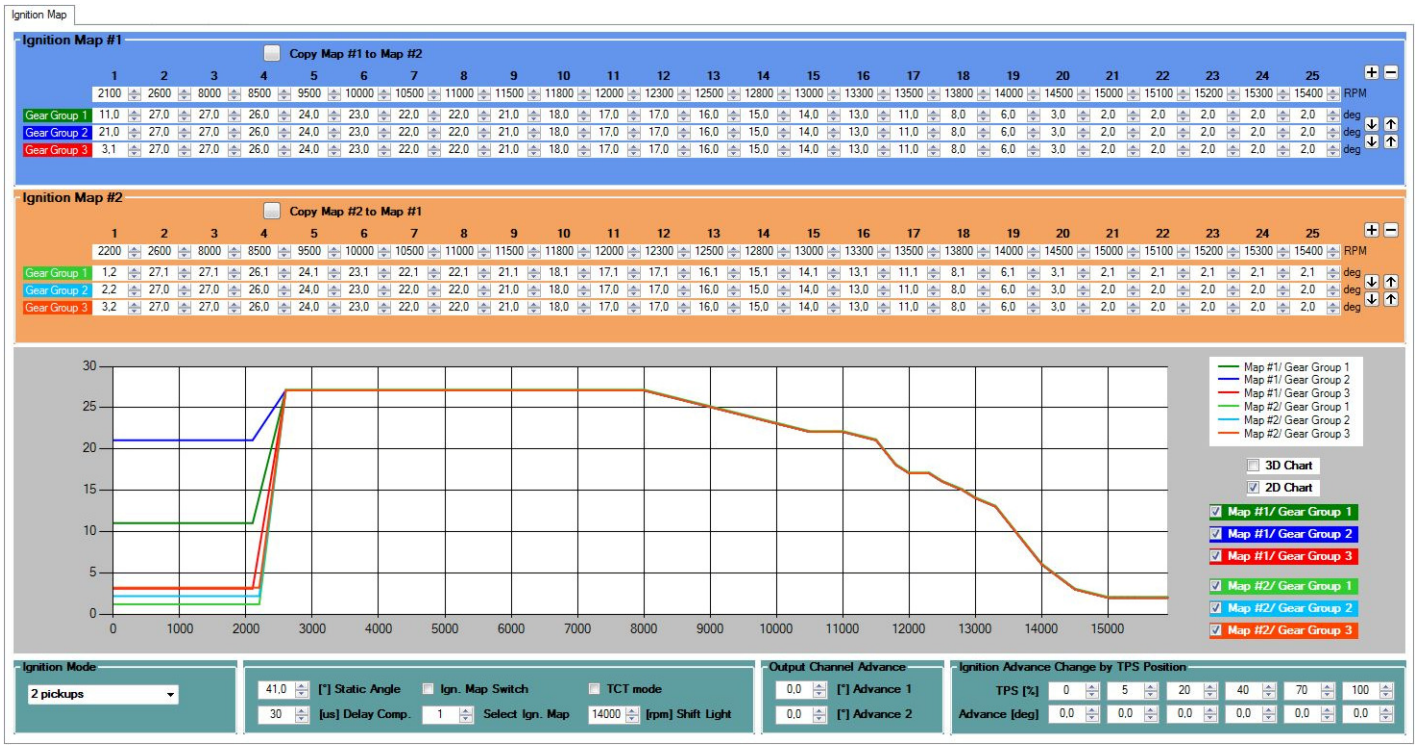
⇨ **Description** can be added to the settings. Description is added to the saved file and also while programming to the product (ECU).

⇨ **Monitor** is active when *control unit* is connected to PC-USB programmer.
Clicking on the **Monitor** opens Monitor window.



⇨ Clicking on **About** opens About window and show some basic information about ***ZeelProg*** application.

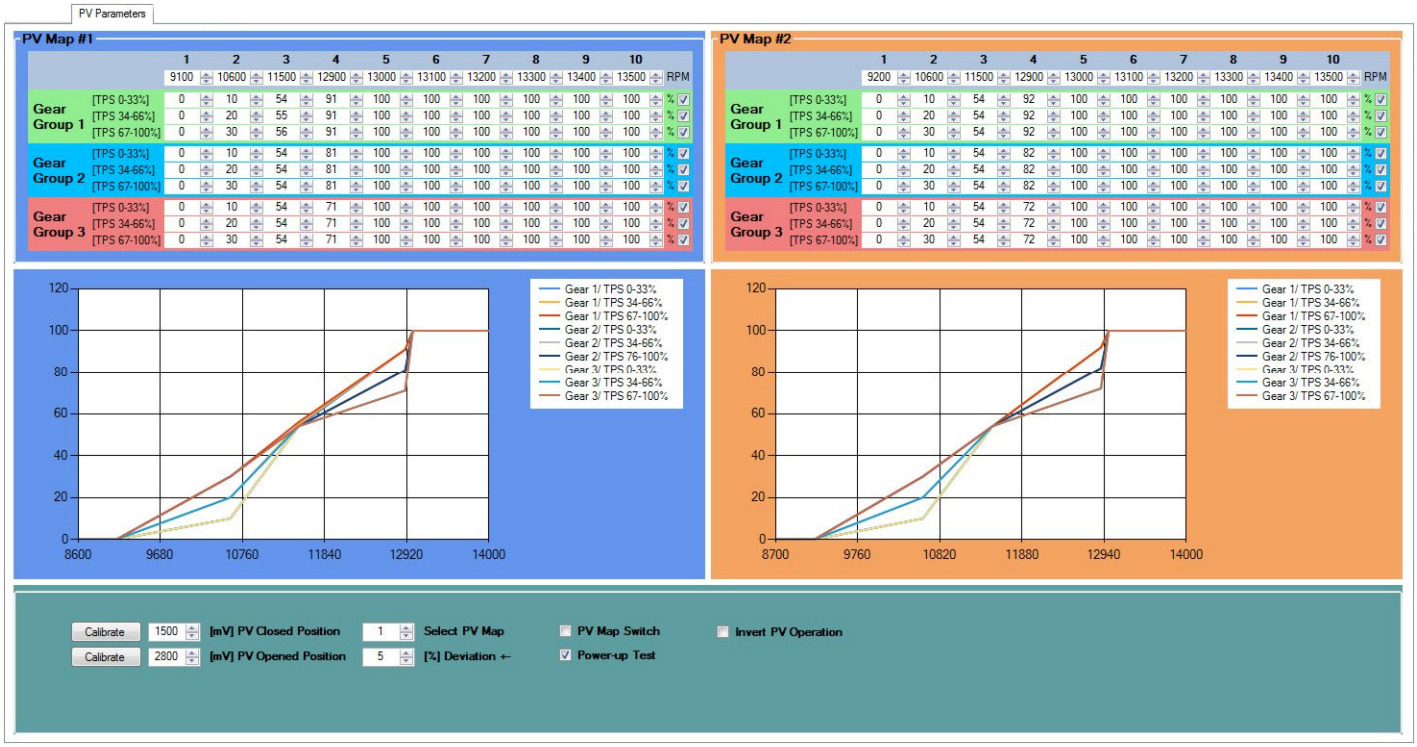
Ignition Parameters



- ⇨ Each ignition map can be programmed in 25 rpm points and 3 Gear Groups.
- ⇨ **Gear Group 1** includes gear 1 and gear 2
- ⇨ **Gear Group 2** includes gear 3 and gear 4
- ⇨ **Gear Group 3** includes gear 5 and gear 6
- ⇨ **RPM** of each ignition point can be set from 500rpm to 20000rpm in 100rpm steps. At the left side must be lowest RPM value and each next point must have higher value then previous...
- ⇨ **deg**...advance of each ignition point can be set from 0deg to 85deg in 0,1deg steps
- ⇨ **Ignition Mode** ... 3 ignition modes are possible: 2 pickups, single pickup big bang, single pickup wasted spark
- ⇨ **Static Angle** is pickup advance position from TDC (Top Dead Centre). It is reference point necessary for ECU to calculate correct ignition advance.
- ⇨ **Advance 1**...advances, or retards whole map on output signal for ignition coil 1, from -10deg to 10deg in 0,1deg steps. Positive value advances and negative value retards.
- ⇨ **Advance 2**...advances, or retards whole map on output signal for ignition coil 2, from -10deg to 10deg in 0,1deg steps. Positive value advances and negative value retards.
- ⇨ **Delay Compensation**...ensure correct ignition angle through whole revs. Default value is 30us.
  Delay compensation is compensation of signal delay from pickup to spark plugs.
  Compensation ensures that ignition advance is same as programmed (accurate).
  How to check, if compensation is correct:
  - program flat ignition curve
  - measure ignition advance with strobe light at low and at high revs
  - if advance at low and high revs is not same, then compensation delay must be adjusted
- ⇨ **Ignition Map Switch**...enables, or disables ignition map switch. Ignition map can be selected with simple on/off switch, when function is enabled.
- ⇨ **Select Ignition Map**...selection is active only when **Ignition Map Switch** is not enabled.
- ⇨ **TCT mode**... Throttle Close spark Termination mode, reduces number of sparks (spark is active every third revolution) above 8000rpm, when throttle is closed. **TCT** mode ensure better engine cooling.
- ⇨ **Shift light**...activate shift light output above programmed revs.

⇨ **Ignition Advance Change by TPS Position**...ignition advance can be adjusted in dependence from TPS position. Closed throttle usually require less advance, so ignition have to be retarded. Positive value advances and negative value retards.
⇨ **Ignition Chart** ... use check box to view, or hide each curve and also to select 2D, or 3D view.
⇨ ➕ ... increment all ignition points
⇨ ➖ ... decrement all ignition points
⇨ ⬇ ... copy down entire row
⇨ ⬆ ... copy up entire row

Power Valve Parameters



⇨ Each PV map can be programmed in 10 rpm points, 3 Gear Groups and 3 TPS positions.
⇨ **RPM** of each ignition point can be set from 500rpm to 20000rpm in 100rpm steps. At the left side must be lowest RPM value and each next point must have higher value then previous...
⇨ **%** ... PV position of each PV point can be set from 0% to 100% in 1% steps. 0% means closed and 100% means fully opened valve.
⇨ **Calibrate PV Close Position** ... it is full close position of PV servo.
⇨ **Calibrate PV Open Position** ... it is full open position of PV servo.
⇨ **PV Map Switch**...enables, or disables PV map switch. PV map can be selected with simple on/off switch, when function is enabled.
⇨ **Select PV Map**...selection is active only when **PV Map Switch** is not enabled.
⇨ **Deviation**...too low value can cause 'hunting' of PV servo. Too high value can cause less precise operation.
⇨ **Power-up Test** ... enables, or disables PV test at switching on power supply.
⇨ **Invert PV Operation** ... it can be used, if servo rotate in opposite direction then required.
⇨ **PV Chart** ... use check box to view, or hide each curve.

Power Jet Parameters

⇨ **'ON' rpm (Power Jet 1)** ... revs for activating power jet 1 output
⇨ **'OFF' rpm (Power Jet 1)** ... revs for deactivating power jet 1 output
⇨ **'ON' TPS (Power Jet 1)** ... throttle position for activating power jet 1 output
⇨ **'OFF' TPS (Power Jet 1)** ... throttle position for deactivating power jet 1 output

Power Jet 1 example:
Power jet 1 ON (RPM) = 8000rpm
Power jet 1 OFF (RPM) = 10000rpm
Power jet 1 ON (TPS) = 70%TPS
power jet 1 OFF (TPS) = 90%TPS

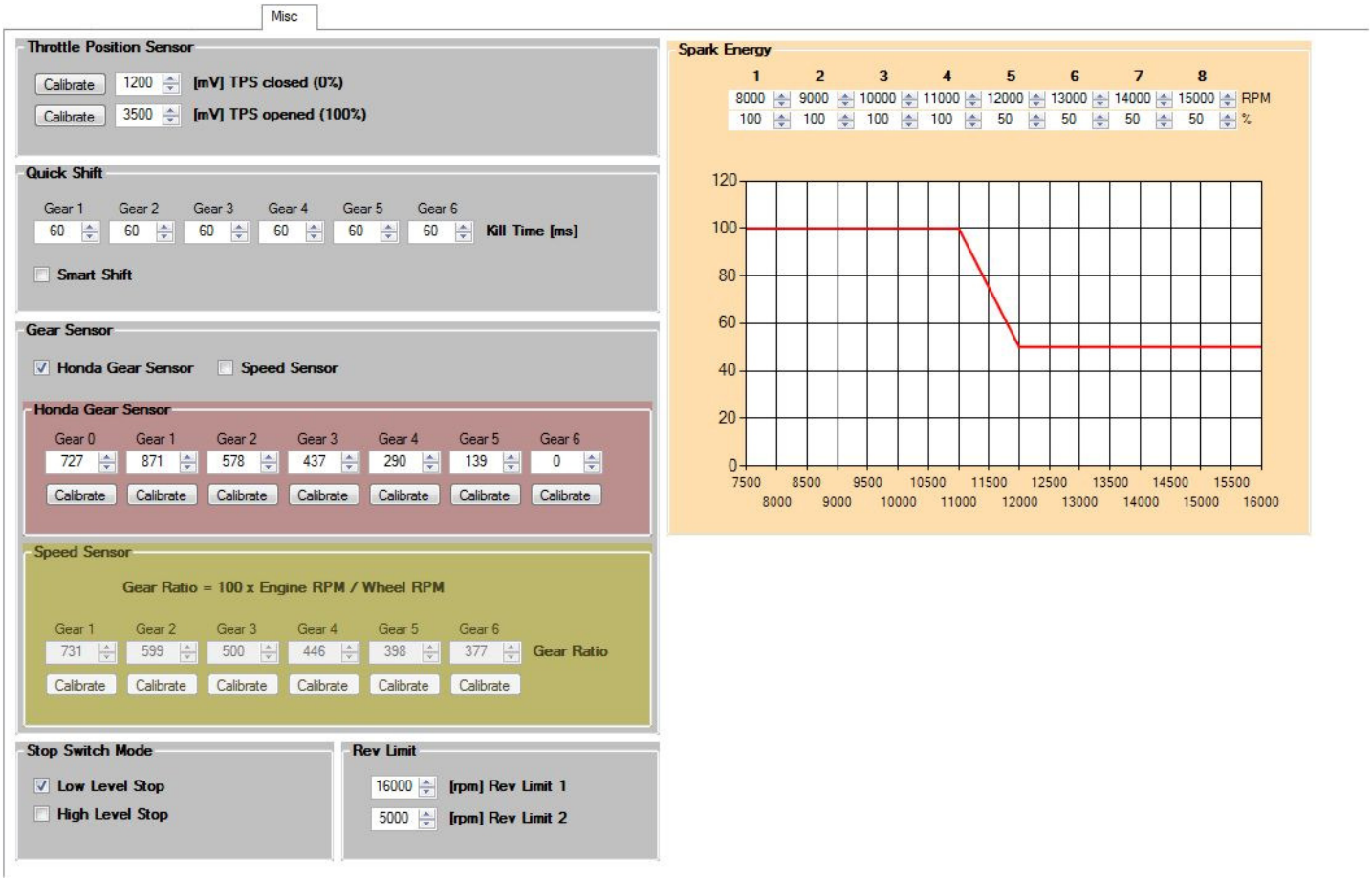
Power Jet 1 output is 'on' when revs are between 8000-10000rpm and TPS between 70-90%.

Power Jet 1 example:
Power jet 1 ON (RPM) = 0rpm
Power jet 1 OFF (RPM) = 2000rpm
Power jet 1 ON (TPS) = 0%TPS
power jet 1 OFF (TPS) = 100%TPS

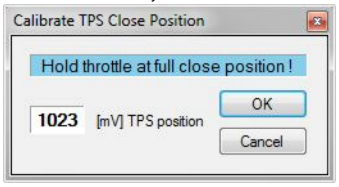
Power Jet 1 output is 'on' from 0 to 2000rpm and at all TPS positions.

⇨ **Duty Power Jet 2** map can be programmed in 10 rpm points, 3 Gear Groups and 3 TPS positions.
⇨ **RPM** of each Duty Power Jet 2 point can be set from 500rpm to 20000rpm in 100rpm steps. At the left side must be lowest RPM value and each next point must have higher value then previous...
⇨ **%** ... duty cycle of each Duty Power Jet 2 point can be set from 0% to 100% in 1% steps.
⇨ **Duty Power Jet 2 Chart** ... use check box to view, or hide each curve.

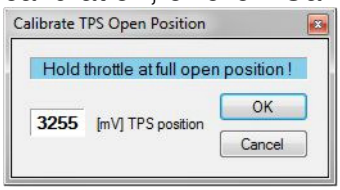
Misc Parameters



⇨ **Calibrate TPS Close Position** ... click on 'Calibrate' button beside TPS closed position value and new window will open. Hold throttle at full close position and click 'OK' to confirm new calibration, or click 'Cancel' to abandon calibration.

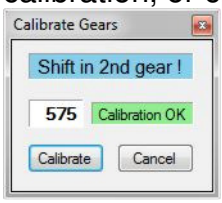


⇨ **Calibrate TPS Open Position** ... click on 'Calibrate' button beside TPS opened position value and new window will open. Hold throttle at full open position and click 'OK' to confirm new calibration, or click 'Cancel' to abandon calibration.

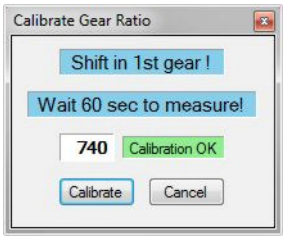


⇨ **Quick Shift** ... kill time is programmable for each gear.
⇨ **Smart shift** ... Smart shift function automatically adjusts kill time for different revs. Shift kill time must be always set, as basic kill time at 12000 rpm.
⇨ **Gear Sensor** ... two types of sensors can be used for detecting gear position.
- Honda gear sensor is resistor type and is mounted directly to gear change shaft
- wheel speed hall sensor can be used to calculate gear position

⇨ **Calibrate Honda Gear Sensor** ... each gear have to be calibrated. Shift to the gear and click 'Calibrate' button for the same gear and new window will open. Click 'OK' to confirm new calibration, or click 'Cancel' to abandon calibration. Use same procedure for each gear.

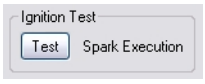


⇨ **Calibrate Gear Ratio when using speed sensor** ... each gear have to be calibrated. Speed sensor has to be mounted on rear wheel. Use rear wheel stand to enable free rotation of rear wheel. Start engine and shift to the gear and click 'Calibrate' button for the same gear. New window will open and click 'OK' to confirm new calibration, or click 'Cancel' to abandon calibration. Use same procedure for each gear.



⇨ **Stop Switch Mode: Low Level Stop**... engine stops with low level signal (stop switch is closed...connected to the ground)
⇨ **Stop Switch Mode: High Level Stop**... engine stops with high level signal (stop switch is opened)
⇨ **Rev Limit 1** ... it is a three stage soft rev limit ... ignition retard by 10deg, educed number of sparks, ignition cut off.
⇨ **Rev Limit 2** ... it is hard cut rev limit. It can be enabled/disabled with external switch.
⇨ **Spark Energy** can be programmed with the points as a curve. Each point is defined with RPM and % of spark energy. Spark energy between programmed points is linearly interpolated (ramp).

Ignition Test



Push test button to activate spark test. Spark will be generated for few seconds on each output separately.

PROGRAMMING AND SETTING NEW PARAMETERS

➲ While programming, or reading, *control unit* does not need to be connected to power supply, because it is supplied through PC-USB programmer.

Changing control unit parameters

① Read parameters from connected *control unit*, by pressing **Read** button.

Progress bar indicate read and verify process.

Successful reading is indicated as: 

Error while reading is indicated as: 

If error occurs, then repeat reading.

② Change parameters

③ Program parameters to connected *control unit,* by pressing **Program** button.

Progress bar indicate program and verify process.

Successful programming is indicated as: 

Error while programming is indicated as: 

If error occurs, then repeat programming.

Make new *.zee file without connecting control unit

① Connect PC-USB programmer to PC.

② Set parameters

③ Save parameters by clicking **Save As** from **File menu**.

MEASURING STATIC ANGLE

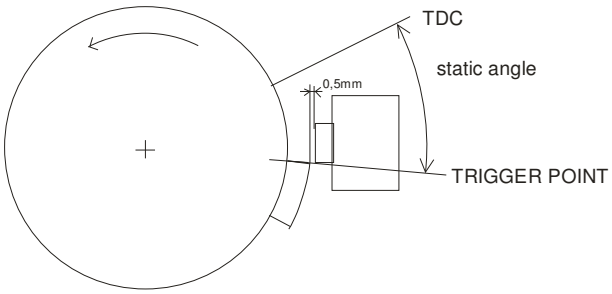
Measuring correct static angle is very important. Wrong static angle will cause inaccurate ignition advance. If static angle is programmed larger than real static angle, then ignition advance will be smaller than programmed, or vice versa.
The most accurate procedure of measuring static angle is with dial gauge and strobe light.

Procedure applies to single and multiple cylinder engines. If you have a multi cylinder engine with multple pickups, it is recommended (but not required) that you perform this procedure on each cylinder/pickup pair for most accurate timing.

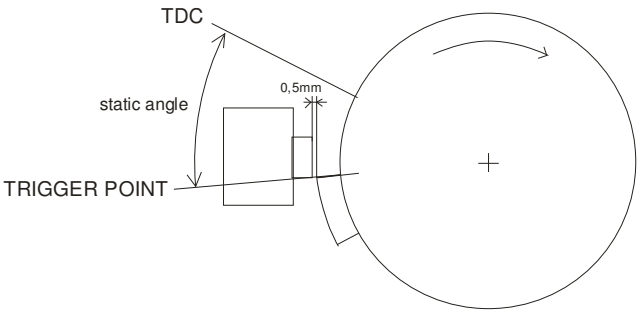
Necessary tools:
- strobe light
- dial gauge

Follow the procedure:
Measure approximate static angle with a degree wheel, just to have starting point...look at the drawing below.

Counterclockwise rotation:



Clockwise rotation:



- program CDI with measured approximate static angle
- program CDI with flat ignition curve...16 deg advance is suitable for most engines.
- find information about engine stroke and conrod length
- convert programmed flat ignition advance angle to millimetres

Example:
α =16deg (ignition advance)
L=110mm (conrod length)
R=54/2=27mm (engine stroke divided by 2)
T=1,3mm (calculated ignition advance in mm)

Equation for calculating from degrees to millimetres:
$\alpha = \text{ignition advance in degrees}$
$T = \text{ignition advance in mm}$
$R = \text{engine stroke divided by 2 in mm}$
$L = \text{conrod length in mm}$

$$T = L + R \cdot (1 - \cos\alpha) - \sqrt{L^2 - (R \cdot \sin\alpha)^2}$$

Downloadable spreadsheet is available on request.

- remove sparkplug from cylinder head and mount dial gauge in cylinder.
- find TDC (Top Dead Centre)
- rotate engine backwards (opposite from running engine rotation) to calculated advance in millimetres (in example above it is 1,3mm) and make marks on rotor and stator
- remove dial gauge and install sparkplug back in cylinder head
- start engine and run at constant speed of 3000rpm to 4000rpm
- use a strobe light to check alignment of marks on rotor and stator

- adjust static angle with programmer to align marks on the rotor and stator

Result of above procedure is very accurate static angle.

Important!

- Static angle is reference point for CDI to calculate delay for programmed ignition advance.
- Static angle has to be greater then maximum ignition advance!
- Example - If maximum advance in ignition map is 30deg, then static angle has to be at least 31deg.
- Very large static angles are not a good solution, because it decreases electronic ignition advance stability (do not use static angle greater then 45deg if not necessary).

If you find when testing with your strobe light that your timing marks are off by 10 or more degrees it may be neccessary to reverse the wiring from the reluctor pickup to the ignition and test again. Reluctor pickups have polarity but it is rarely marked on the pickups so must be determined by the trial and error method. Incorrect wiring polarity will cause the reluctor pickup to send the trigger signal on the trailing edge of the rotor instead of the required leading edge of the rotor.