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PROGRAMMING MANUAL
ZeelProg PDCI-20V

Supported control units: **PDCI-20V**

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.

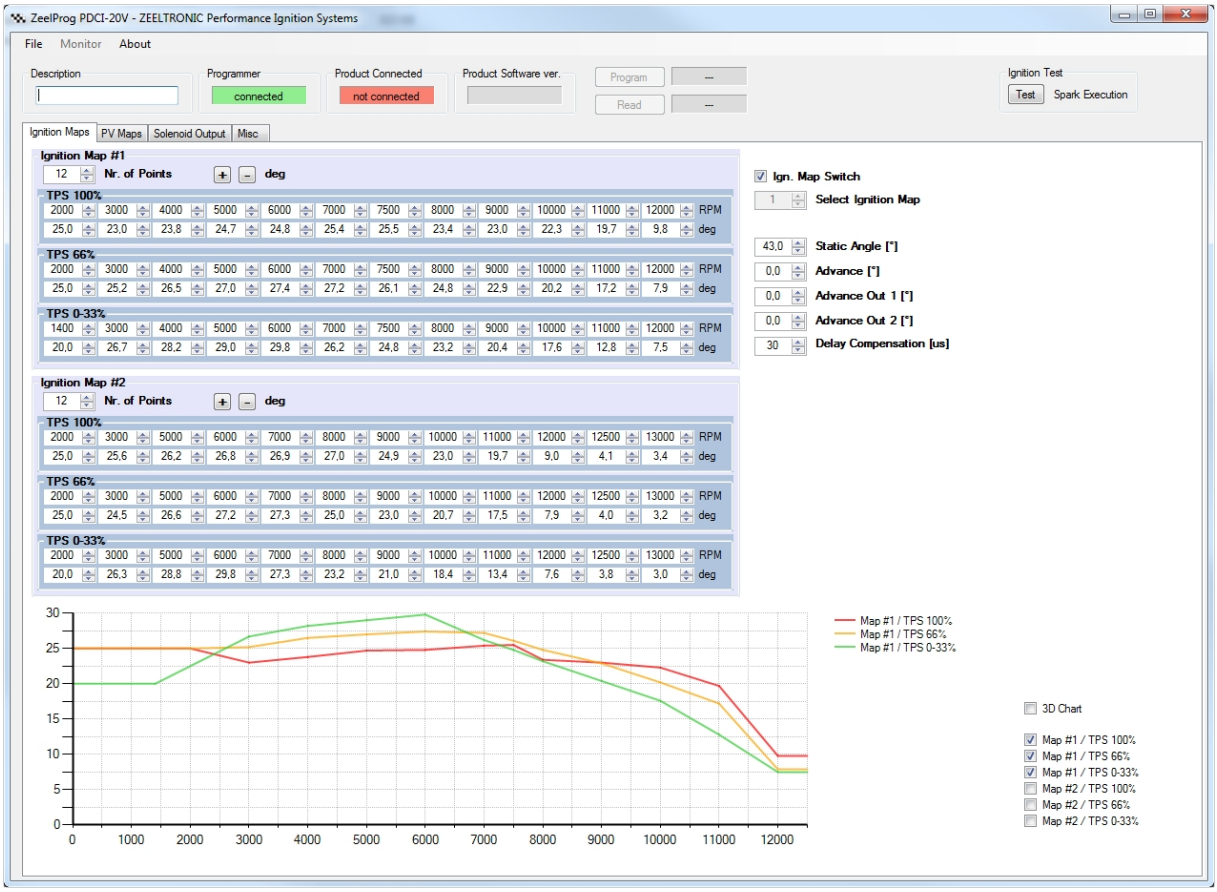
TECHNICAL DATA:

- minimum revs	200 RPM
- maximum revs	20000 RPM
- minimum supply voltage	7 Volts
- recommended power supply voltage	12÷15 Volts
- maximum supply voltage	17 Volts
- stand-by current draw	< 0.09 Amp
- current draw at 1300 RPM	< 0.3 Amp
- current draw at 12000 RPM	< 1.7 Amp
- maximum continuous current for shift light and power jet output	1 Amp
- peak current for shift light and power jet output	5 Amp
- constant spark energy from idle to 13000 RPM	>50 mJ

ZeelProg SOFTWARE

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

ZeelProg application can be installed on Windows XP/Vista/7/8/10/11.

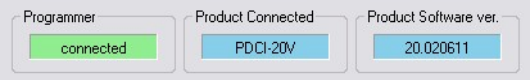


ZeelProg USER INTERFACE

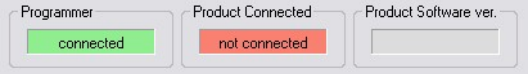
Auto detection

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

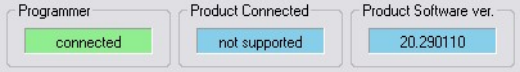
⇨ Programmer connected, product (*control unit*) connected:



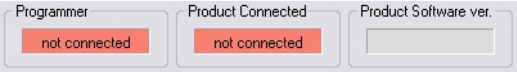
⇨ Programmer connected, product (*control unit*) not connected:



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

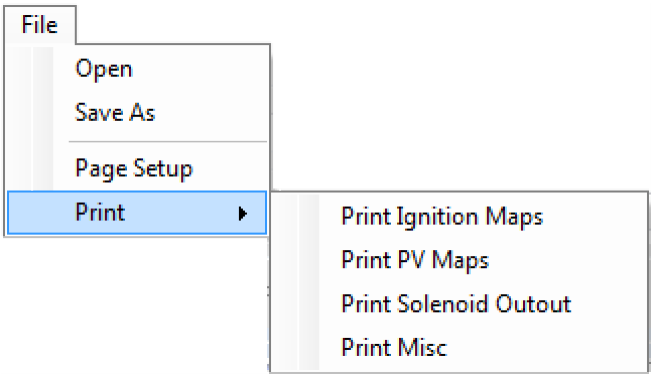


⇨ Programmer not connected, product (*control unit*) not connected:



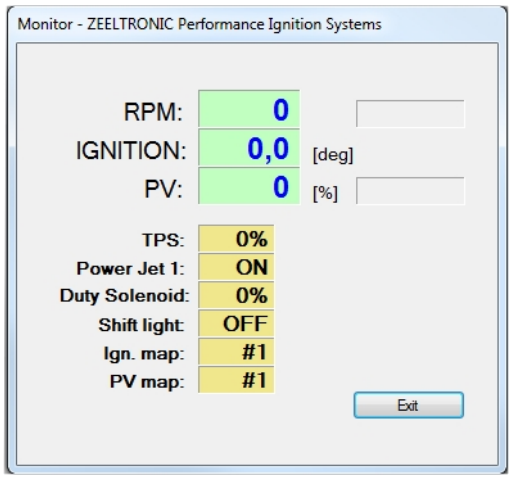
Menu structure

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



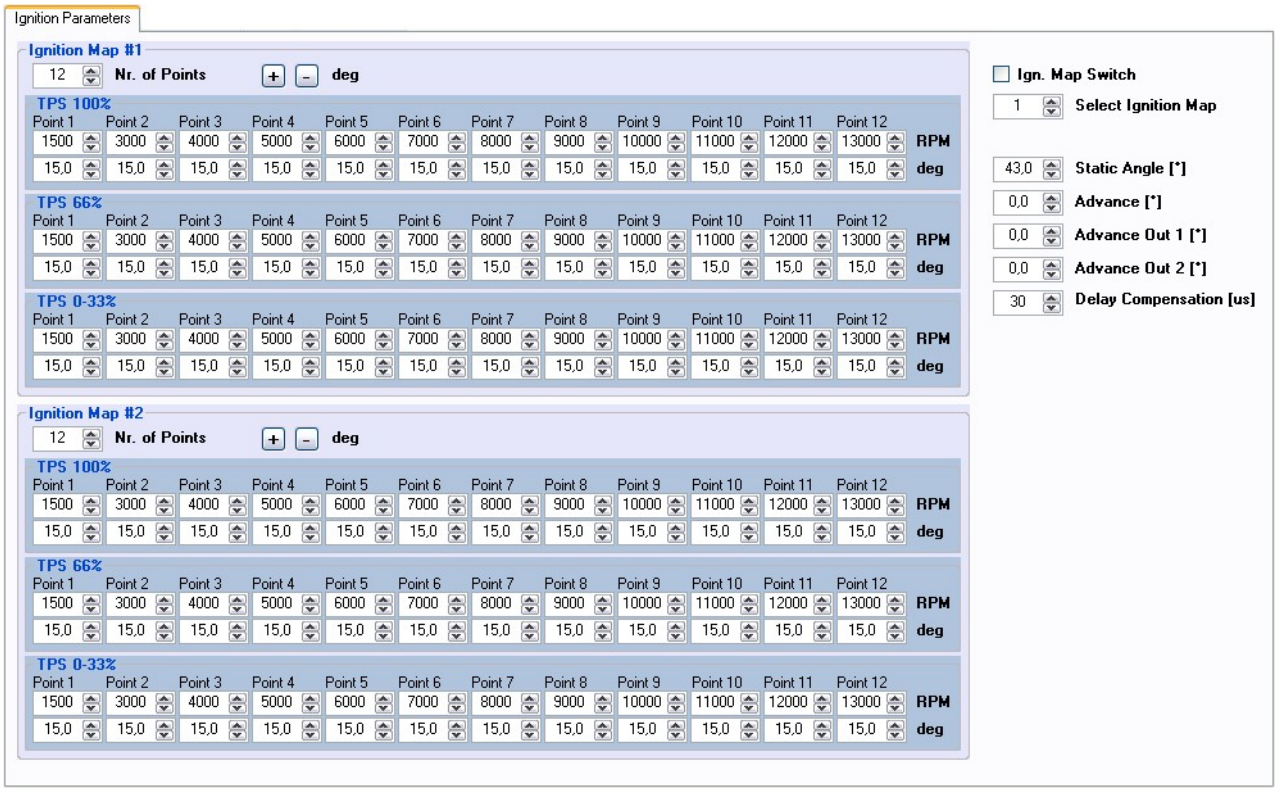
Open → Open an existing *.zee file
Save As → Save all parameters to *.zee file
Page Setup → Page setup for printing
- **Print Ignition Maps** → Print ignition maps page
- **Print PV Maps** → Print PV maps page
- **Print Solenoid Output** → Print solenoid maps page
- **Print Misc** → Print miscellaneous settings

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



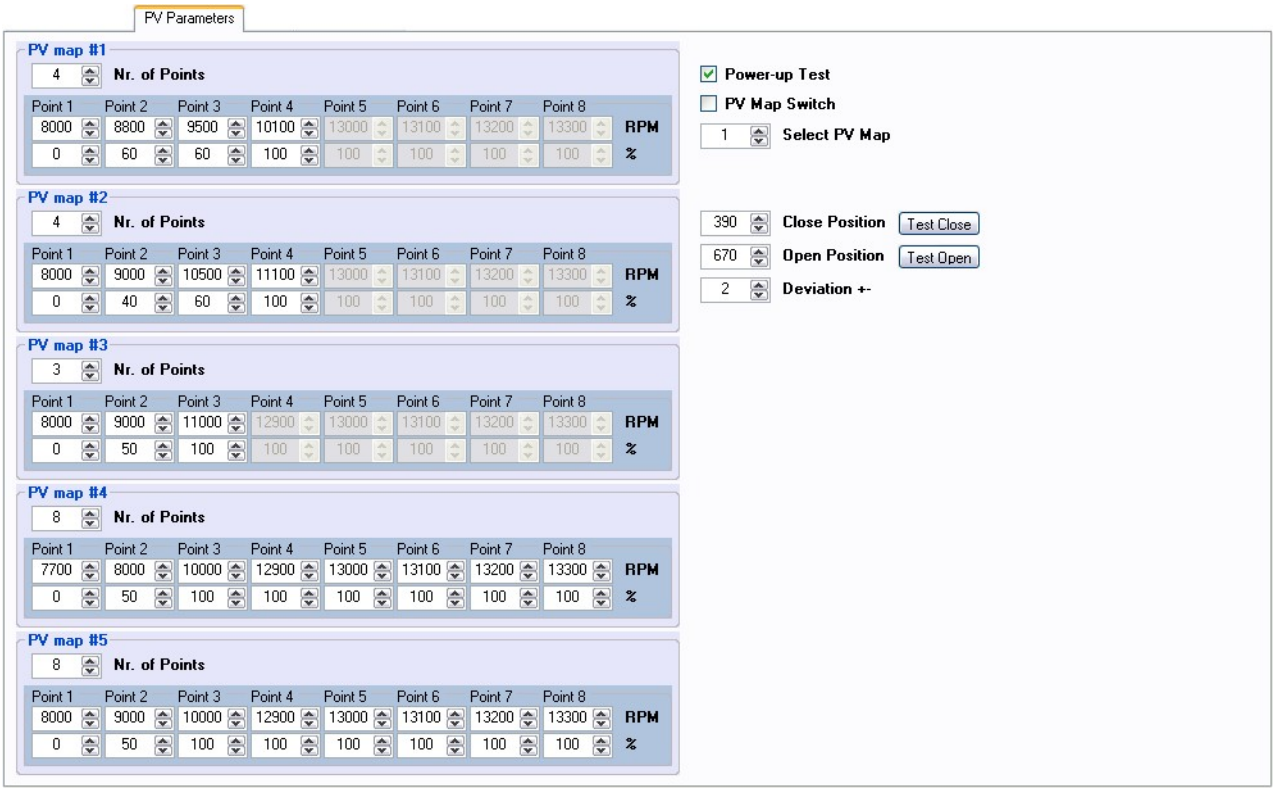
⇨ Clicking on **About** opens About window and show some basic information about ***ZeelProg*** application.

Ignition Parameters



- ⇨ **Nr. of Points** for each ignition map can be set from 4 to 12.
- ⇨ **RPM** of each ignition point can be set from 100 rpm to 20000 rpm in 100 rpm steps.
- ⇨ **deg**...advance of each ignition point can be set from 0 deg to 85 deg in 0,1 deg steps
- ⇨ **Static Angle** is pickup advance position from TDC (Top Dead Centre)
- ⇨ **Advance**...advances, or retards whole ignition map from -10 deg to 10 deg in 0,1 deg steps. Positive value advances and negative value retards.
- ⇨ **Advance out 1**...advances, or retards ignition output 1 for -10 deg to 10 deg in 0,1deg steps. Positive value advances and negative value retards.
- ⇨ **Advance out 2**...advances, or retards ignition output 2 for -10 deg to 10 deg in 0,1deg steps. Positive value advances and negative value retards.
- ⇨ **Delay Compensation**...ensures correct ignition angle through whole revs. Default value is 30 us and is correct for most applications.
  Delay compensation is compensation of signal delay from pickup to spark plugs. It can be checked with stroboscope lamp. Without this compensation, ignition advance angle decreasing with rising revs.
  Compensation helps that advance angles in ignition map are accurate.
  How to check, if compensation is correct?
  Set flat ignition curve. Measure with stroboscope lamp, if mark at flywheel moving when changing revs. If mark moving, then compensation delay must be adjusted..
- ⇨ **Ignition Map Switch**...enables, or disables ignition map switch. Ignition map can be selected with switch, when function is enabled.
- ⇨ **Select Ignition Map**...selection is active only when **Ignition Map Switch** is not enabled.
- ⇨ **'+', '-' deg**... increase, or decrease advance of all ignition points in whole ignition map

PV Parameters



⇨ **Nr. of Points** for each PV map can be set from 2 to 8.
⇨ **RPM** of each PV point can be set from 100 rpm to 20000 rpm in 100 rpm steps.
⇨ **%**...PV position of each PV point can be set from 0 % to 100 % in 1 % steps.
⇨ **Power-up Test**...enables, or disables PV test at switching on power supply.
⇨ **Select PV Map**...selecting active PV map.
⇨ **Deviation**...prevents 'hunting' of PV servo. Deviation means how accurate valve is moved to calculated position. If deviation is too low then servo motor won't be stable, it will always search for calculated position in small movements. Default setting is +-5% and should meet in most cases.
⇨ **Close Position** of PV servo. Close position is 0% on PV map.
⇨ **Open Position** of PV servo. Open position is 100% on PV map.
⇨ **Test Close**...clicking on **Test Close** button, opens Test Close window. Function is active when PC-USB programmer and *control unit* are connected.
⇨ **Test Open**...clicking on **Test Open** button, opens Test Open window. Function is active when PC-USB programmer and *control unit* are connected.
⇨ **PV Map Switch**...enables, or disables PV map switch. PV map can be selected with switch, when function is enabled.

Misc Parameters

- ⇨ **Pulses per Rev**...set to 1 for twin cylinder with 2 pickups and single cylinder, set to 2 for wasted spark twin cylinder with 1 pickup.
- ⇨ **Rev limit**...limits maximum revolutions. Set to maximum 20000 rpm in 100 rpm steps.
- ⇨ **Shift light**...activate shift light output above programmed revs. Set to maximum 20000 rpm in 100 rpm steps. It works as Fuel Pump output when set to 0 rpm (CDI firmware version have to be 306.32.XXXXXX, or greater).
- ⇨ **TCT mode**... Throttle Close spark Termination mode, reduces number of sparks above 8000 rpm (spark is active every third revolution), when throttle is closed. TCT mode ensures better engine cooling.
- ⇨ **Stop Switch Mode: Low Level Stop**... engine stops with low level signal (stop switch connected to the ground)
- ⇨ **Stop Switch Mode: High Level Stop**... engine stops with high level signal (stop switch is opened)
- ⇨ **TPS Enable**... enable, or disable TPS (Throttle Position Sensor).
- ⇨ **TPS closed [0%]**... for correct TPS operation, TPS close position must be calibrated!
- ⇨ **TPS opened [100%]**... for correct TPS operation, TPS open position must be calibrated!
- ⇨ **Smart Shift**... enable, or disable Smart Shift. Smart shift function automatically adjusts kill time for different revs. Shift kill time must be always set as basic kill time.
- ⇨ **Kill Time**... for shifting without using clutch - shift sensor is required. Function is disabled with setting to 0 ms.
- ⇨ **Power Jet 1 'ON' rpm**... revs for activating Power Jet 1
- ⇨ **Power Jet 1 'OFF' rpm**... revs for deactivating Power Jet 1
- ⇨ **Power Jet 1 'ON' TPS**... throttle position for activating Power Jet 1
- ⇨ **Power Jet 1 'OFF' TPS**... throttle position for deactivating Power Jet 1

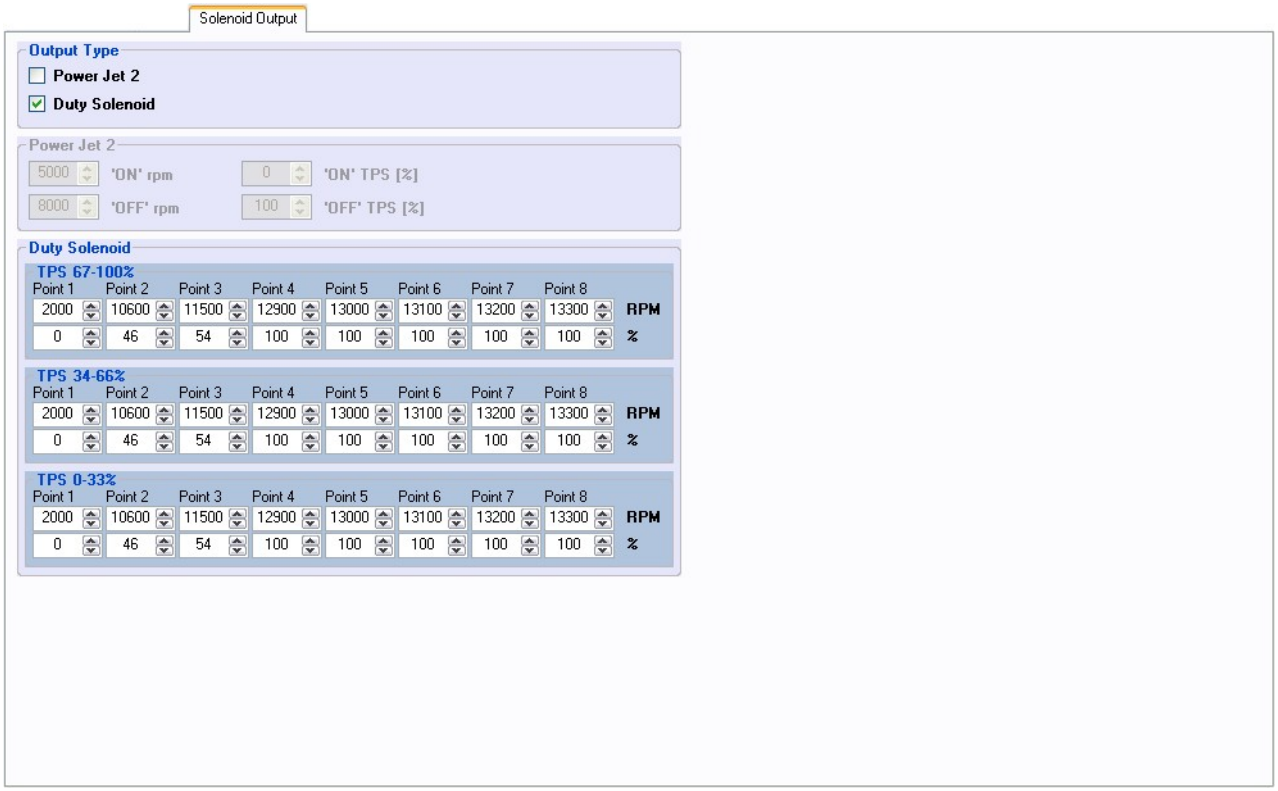
Power Jet 1 example:

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 is switched on when revs are between 8000-10000rpm and throttle position is between 70-90%, otherwise power jet is switched off.

Solenoid parameters



⇨ **Solenoid Output Type**... Solenoid output function can be configured as Power Jet 2, or Duty Solenoid. Duty solenoid is used for adjusting A/F ratio on some carburettors.
⇨ **Power Jet 2 'ON' rpm**... revs for activating Power Jet 2
⇨ **Power Jet 2 'OFF' rpm**... revs for deactivating Power Jet 2
⇨ **Power Jet 2 'ON' TPS**... throttle position for activating Power Jet 2
⇨ **Power Jet 2 'OFF' TPS**... throttle position for deactivating Power Jet 2
⇨ **RPM** of each Duty Solenoid point can be set from 100 rpm to 20000 rpm in 100 rpm steps.
⇨ **%** of each Duty Solenoid point can be set from 0 % to 100 %.

Power Jet 2 example:
Power jet 2 ON (RPM) = 8000rpm
Power jet 2 OFF (RPM) = 10000rpm
Power jet 2 ON (TPS) = 70%TPS
power jet 2 OFF (TPS) = 90%TPS

Power jet is switched on when revs are between 8000-10000rpm and throttle position is between 70-90%, otherwise power jet is switched off.

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 indicates 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

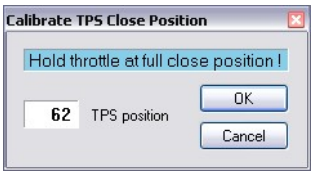
③ Save parameters by clicking **Save As** from **File menu**.

TPS Close Position [0%]

For correct operation of TPS function, TPS close position must be calibrated!

TPS close position can be set manually by entering number, or calibrated by clicking on **Calibrate** button.
Using **Calibrate** function is more recommended.

Clicking on **Calibrate** button opens **Calibrate TPS Close Position** window.



⇨ to finish calibration: hold throttle at full close position and press **OK** button
⇨ to cancel calibration: press **Cancel** button

TPS Open Position [100%]

For correct operation of TPS function, TPS open position must be calibrated!

TPS open position can be set manually by entering number, or calibrated by clicking on **Calibrate** button.
Using **Calibrate** function is more recommended.

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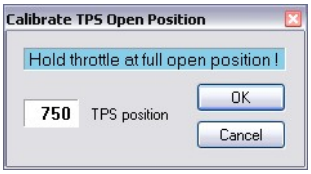
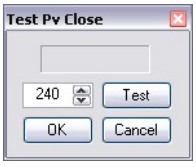


⇨ to finish calibration: hold throttle at full open position and press **OK** button
⇨ to cancel calibration: press **Cancel** button

Set PV close position

Max close position must be calibrated after installation. Max close position is when curve is set to 0%. Close position can be moved to any desired position.

⇨ Clicking on **Test Close** button opens Test Close window.
Function is active when PC-USB programmer and *control unit* are connected.

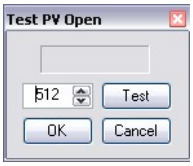


⇨ PV servo close position can be tested before confirming... PV servo moves to close position, after clicking on **Test** button.
⇨ If PV servo can't move to close position then **error 1** will occur. To clear **error 1** change close position and click on **Test** button.
⇨ Click on **OK** button to confirm close position, or **Cancel** to keep old close position.

Set PV open position

Max open position must be calibrated after installation. Max open position is when curve is set to 100%. Open position can be moved to any desired position.

⇨ Clicking on **Test Open** button opens Test Open window.
Function is active when PC-USB programmer and *control unit* are connected.



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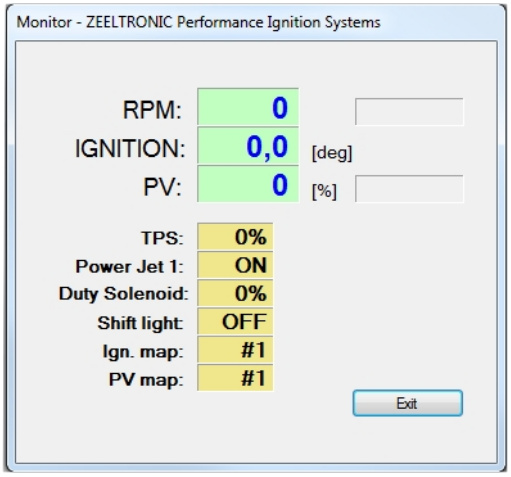
⇨ Click on **OK** button to confirm open position, or **Cancel** button to keep old open position.

MONITOR FUNCTION

⇨ **Monitor** function is active when *control unit* is connected to PC-USB programmer.

Clicking on **Monitor** opens Monitor window.



⇨ Monitor shows engine revolution, ignition advance angle, PV position, TPS position, selected ignition map, selected PV map, shift light operation, rev limit operation, power jet 1 operation, duty solenoid operation, PV error
⇨ PV error 1...when PV servo can't move to position.
⇨ PV error 2...when too high current on PV servo output.

MEASURING STATIC ANGLE

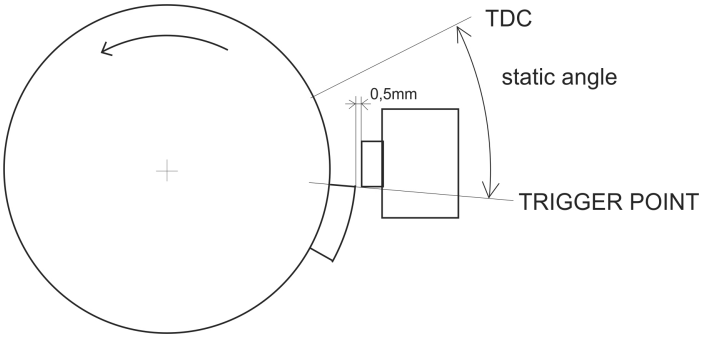
Measuring correct static angle is very important. Wrong static angle will cause inaccurate ignition advance. If static angle is programmed larger than mechanical static angle then ignition advance will be smaller than programmed, or vice versa. The most accurate procedure of measuring static angle is 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.

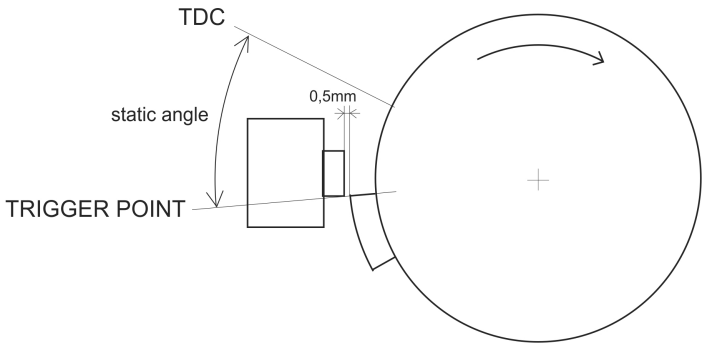
Necessary tools:
- strobe light
- dial gauge

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

Equation for calculating from degrees to millimetres:
a = ignition advance in degrees
T = ignition advance in mm
R = engine stroke divided by 2 in mm
L = 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 1,3 mm) 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 3000 rpm to 4000 rpm
- 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 30 deg, then static angle has to be at least 31 deg.
- Very large static angles are not a good solution, because it decreases electronic ignition advance stability (do not use static angle greater then 45 deg 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.

NOTES