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PROGRAMMING MANUAL

ZeelProg PDCI-31

Supported control units: **PDCI-31**

PDCI-31 is programmable CDI ignition for 3 cylinder engines and was designed for drag race applications. Spark energy is improved to get maximum from highly tuned engine.

TECHNICAL DATA

Limit values:

- minimum revs	200 RPM
- maximum revs	20000 RPM
- minimum supply voltage	7 Volts
- maximum supply voltage	16 Volts
- stand-by current draw	~ 0.09 Amp
- current draw at 1300 RPM	~ 0.75 Amp
- current draw at 10000 RPM	~ 3.5 Amp
- maximum continuous current for shift light and power jet output	1 Amp
- peak current for shift light and power jet output	5 Amp
- output energy at 9000 RPM	~ 69mJ
- output energy at 12000 RPM	~ 44mJ

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

Features:

- fast power-up
- full power starting spark energy already at 7Volts power supply
- 3 isolated inputs for pickups
- 3 independent ignition coil outputs
- individual advance/retard of each output
- store and load function for two ignition maps
- external switch for changing ignition map while riding

- shift light output
- power jet output
- quick shift (shift kill)
- rev limit
- launch rev limit
- burn out rev limit
- tachometer output
- easy and fast programming on the field, via hand held programmer
- PC-USB programming
- programming while machine running - you can immediately see effects
- each curve can be set from 4 to 12 curve points
- signal delay compensation
- instant monitoring of rev's and angle, via hand held programmer and PC
- timing calculation for every 1 RPM change (1000, 1002, .. , 9805, 9806, ...)

Very important!

Resistor spark plugs must be used, because they produce less electromagnetic disturbances.

Danger of electric shock!

Avoid connecting PDCI to 12V power supply, before connecting it to ignition coil. High voltage is generated and touching free wires can cause electric shock, or damage to the unit.

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.

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***ZeelProg* SOFTWARE INSTALLATION GUIDE**

CD content:

- driver (USB programmer driver)
- NET Framework
- ZeelProg

Software can be also downloaded from web site:

<http://www.zeeltronic.com/page/zeelprog.php>

ZeelProg application can be installed on Windows XP/Vista.

"NET Framework 3.5" needs to be installed.

Installation:

- ① Insert CD-ROM and browse content.
- ② Install USB programmer driver with running "CDM20600.exe" from CD-ROM "driver" directory.
- ③ Install ***ZeelProg*** with running "setup ZeelProg.exe" from CD-ROM "ZeelProg" directory.

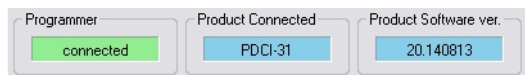
If ***ZeelProg*** does not start, install "NET Framework" from CD-ROM "NET Framework" directory.

***ZeelProg* USER INTERFACE**

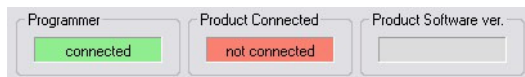
Auto detection

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

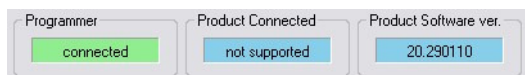
⇒ Programmer connected, product (*control unit*) connected:



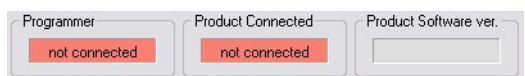
⇒ Programmer connected, product (*control unit*) not connected:



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



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



Menu structure

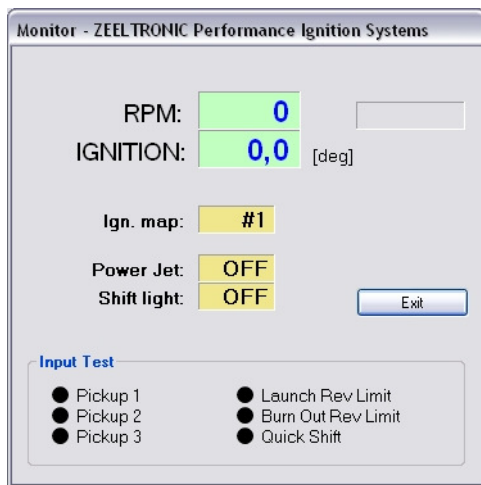


⇒ **File menu** is active when PC-USB programmer is connected



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

⇒ **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

Ignition Parameters

Ignition Map #1

Nr. of Points: 12 deg

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	RPM	deg
2000	3000	4000	5000	6000	7000	7500	8000	9000	10000	11000	12000		
20,0	26,0	28,2	29,0	29,8	26,2	24,8	23,2	20,4	17,6	12,8	7,5		

Ignition Map #2

Nr. of Points: 10 deg

Point 1	Point 2	Point 3	Point 4	Point 5	Point 6	Point 7	Point 8	Point 9	Point 10	Point 11	Point 12	RPM	deg
2000	3000	6000	7500	8000	9000	10000	11000	12000	13000	13100	13200		
20,0	27,0	29,8	24,8	23,2	20,4	17,6	12,8	7,5	6,5	6,5	6,5		

Rev Limit

☒ Soft Rev Limit

18000 [rpm]

Launch Rev Limit

☒ Soft Rev Limit

8000 [rpm]

Burn Out Rev Limit

☒ Soft Rev Limit

10000 [rpm]

Stop Switch Mode

☒ Low Level Stop

☐ High Level Stop

Quick Shift

☒ Smart Shift

70 Kill Time [ms]

Power Jet

☐ Invert Polarity

6000 'ON' rpm

8000 'OFF' rpm

Ign. Map Switch

☐ Ign. Map Switch

1 Select Ignition Map

3 Nr. of Pickups

35,0 Static Angle [°]

0,0 Advance [°]

0,0 Advance Out 1 [°]

0,0 Advance Out 2 [°]

0,0 Advance Out 3 [°]

30 Delay Compensation [us]

12000 Shift Light [rpm]

- ⇒ **Nr. of Points** for each ignition map can be set from 4 to 12.
- ⇒ **RPM** of each ignition point can be set from 100rpm to 20000rpm in 100rpm steps.
- ⇒ **deg**...advance of each ignition point can be set from 0deg to 85deg in 0,1deg steps
- ⇒ **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.
- ⇒ **Nr. of Pickups**... **PDCI** can run with 1, or 3 pickups. When using one pickup, then all 3 ignition coils fire at the same time.
- ⇒ **Static Angle** is pickup advance position from TDC (Top Dead Centre)
- ⇒ **Advance**...advances, or retards whole ignition map from -10deg to 10deg in 0,1deg steps. Positive value advances and negative value retards.
- ⇒ **Advance out 1**...advances, or retards ignition output 1 for -10deg to 10deg in 0,1deg steps. Positive value advances and negative value retards.
- ⇒ **Advance out 2**...advances, or retards ignition output 2 for -10deg to 10deg in 0,1deg steps. Positive value advances and negative value retards.
- ⇒ **Advance out 3**...advances, or retards ignition output 3 for -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.
- ⇒ **Shift light**...activate shift light output above programmed revs. Set to maximum 20000rpm in 100rpm steps.
- ⇒ **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 at 12000rpm.
- ⇒ **Kill Time**... for shifting without using clutch - shift sensor is required. Function is disabled with setting to 0ms.
- ⇒ **Stop Switch Mode: High Level Stop**... engine stops with high level signal (stop switch is opened)

- ⇒ **Stop Switch Mode: Low Level Stop**... engine stops with low level signal (stop switch connected to the ground)
- ⇒ **Rev Limit**...limits maximum revolutions. Set to maximum 20000rpm in 100rpm steps.
- ⇒ **Launch Rev Limit**... is activated only when launch rev limit switch is activated...look at wiring diagram. Launch rev limit override normal rev limit.
- ⇒ **Burn Out Rev Limit**... activated only when burn out rev limit switch is activated...look at wiring diagram. Burn out rev limit override normal rev limit and launch rev limit.
- ⇒ **Soft Rev Limit**...enable, or disable soft rev limit. Soft rev limit can be set individually for all three rev limits.
Soft rev limit work in three stages:
 - ①...20rpm before rev limit...ignition is retarded for 10deg
 - ②...after rev limit revs...number of ignitions is reduced...ignition is every third revolution
 - ③...20rpm after rev limit...no ignitions
- ⇒ **Power Jet 'ON' rpm**... revs for activating Power Jet
- ⇒ **Power Jet 'OFF' rpm**... revs for deactivating Power Jet
- ⇒ **Invert Polarity of Power Jets**... when checked, operation of power jets is inverted.

Example:

Power jet ON (RPM) = 8000rpm

Power jet OFF (RPM) = 10000rpm

Power jet is switched on when revs are between 8000-10000rpm, otherwise power jet is switched off.

Static Angle

Static angle is reference point for CDI unit. Correct static angle is very important for correct ignition advance. If programmed static angle is not same as mechanical position of pickup(trigger point), then ignition advance will not be correct. Too much difference will result in bad running engine, or even non operational engine. Ignition is always after static angle(trigger point)...that means that static angle must be always greater than maximum ignition advance.

How to measure static angle?

The most accurate procedure is with dial gauge.

Apply to single and multiple cylinder engines.

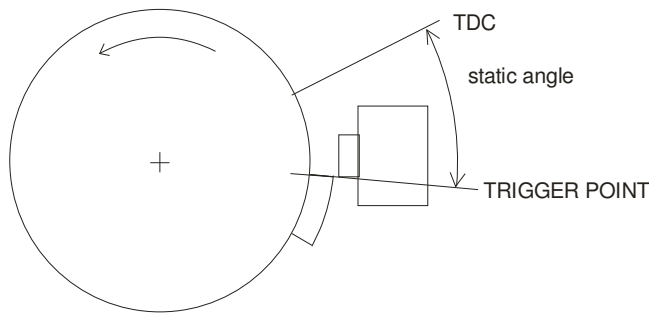
Necessary tools:

- stroboscope light
- dial gauge

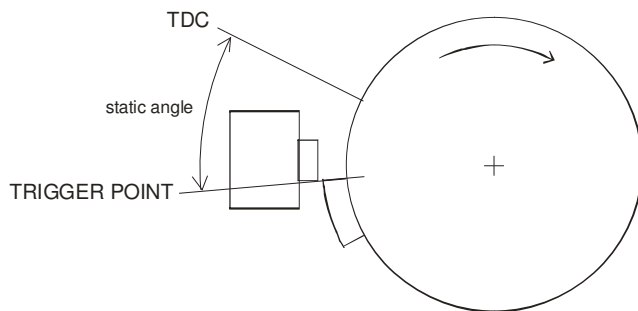
Follow the procedure:

- ⇒ measure approximate static angle, just to have starting point...look at drawing below.

Anticlockwise rotation:



Clockwise rotation:



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

Example:

$\alpha = 16^\circ$ (ignition advance)

$L = 110\text{mm}$ (conrod length)

$R = 54/2 = 27\text{mm}$ (engine stroke divided by 2)

$T = 1,3\text{mm}$ (calculated ignition advance in mm)

Equation for calculating from degrees to millimetres:

α = ignition advance in degrees

T = ignition advance in mm

R = engine stroke divided by 2 in mm

L = conrod length in mm

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

- ⇒ remove sparkplug from cylinder head and place dial gauge
- ⇒ find TDC (Top Dead Centre)
- ⇒ rotate engine backwards (opposite from engine running rotation) to calculated advance in millimetres (in example is 1,3mm) and make marks on rotor and stator
- ⇒ remove dial gauge and place sparkplug back to cylinder head
- ⇒ start engine and run with constant revs of about 3000rpm, or 4000rpm
- ⇒ use stroboscope light to check, if marks on rotor and stator align

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

Result of above procedure is very accurate static angle.

Compensation

It is compensation of signal delay from pickup to spark plugs. You can check this delay with stroboscope lamp. Without this compensation, ignition advance angle decreasing with rising revs.

Compensation helps that ignition advance is correct (accurate).

How to check, if compensation is correct:

- ⇒ Set flat ignition curve...16deg advance is suitable for most engines
- ⇒ Measure with stroboscope lamp, if mark at flywheel moving when changing revs. If mark moves, then change compensation delay.

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:



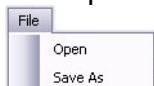
Error while programming is indicated as:



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**.

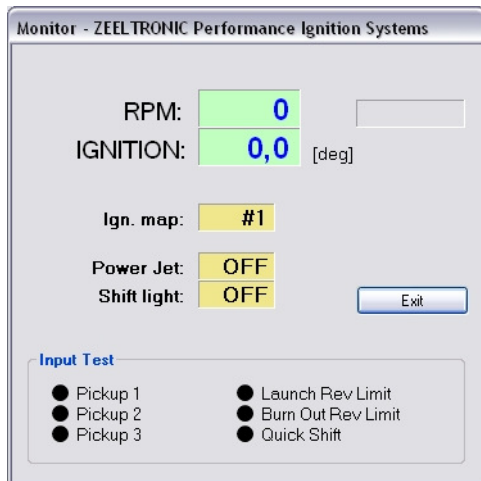


MONITOR FUNCTION

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



Clicking on **Monitor** opens Monitor window.



⇒ Monitor show engine revolution, ignition advance angle, selected ignition map, shift light operation, rev limit operation, power jet operation.

Input Test

Input test results are at the bottom of the Monitor window.

Pickup test can be performed only when engine rotate.

