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PROGRAMMING MANUAL

ZeelProg PDCI-D22

Supported control units: **PDCI-D22**

PDCI-D22 is programmable CDI ignition for 2 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	17 Volts
- recommended supply voltage	12÷15Volts
- stand-by current draw	~ 0.1 Amp
- current draw at 1300 RPM	~ 0.45 Amp
- current draw at 10000 RPM	~ 2.6 Amp
- maximum continuous current for shift light and power jet output	1 Amp
- output energy up to 11000 RPM	~ 80mJ
- output energy at 15000 RPM	~ 53mJ

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

Features:

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

- ignition map change by gear change
- shift light output
- power jet output
- gear select output
- quick shift (shift kill)
- rev limit
- launch rev limit
- burn out rev limit
- shift counter
- auto shift mode
- 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 to ignition coil. High voltage is generated and touching free wires can cause electric shock, or damage to the unit.

Very important!

PDCI is protected against static discharge, but too high static charge can damage PDCI. Be careful when using programmer on the dyno, because static charge can build up on the bike and static discharge can damage PDCI unit, or programmer. Make ground connection between dyno and bike frame to prevent static discharge.

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

<i>ZeelProg</i> SOFTWARE INSTALLATION GUIDE	4
<i>ZeelProg</i> USER INTERFACE	4
<u>Auto detection</u>	4
<u>Menu structure</u>	5
<u>Ignition Parameters</u>	6
<u>Satic Angle</u>	8
<u>Compensation</u>	9
PROGRAMMING AND SETTING NEW PARAMETERS	9
<u>Changing control unit parameters</u>	10
<u>Make new *.zee file without connecting control unit</u>	10
MONITOR FUNCTION	10
<u>Input Test</u>	11

***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,7,8,10.

"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.

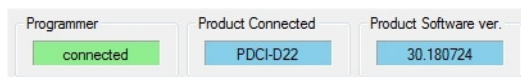
If ***ZeelProg*** does not start, install "NET Framework" from CD-ROM "NET Framework" directory.

***ZeelProg* USER INTERFACE**

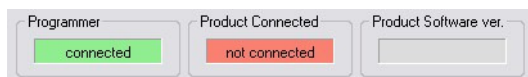
Auto detection

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

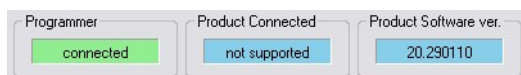
⇒ Programmer connected, product (*control unit*) connected:



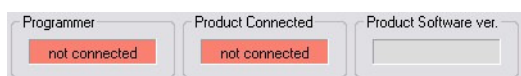
⇒ Programmer connected, product (*control unit*) not connected:



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



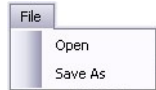
⇒ Programmer not connected, product (*control unit*) not connected:



Menu structure

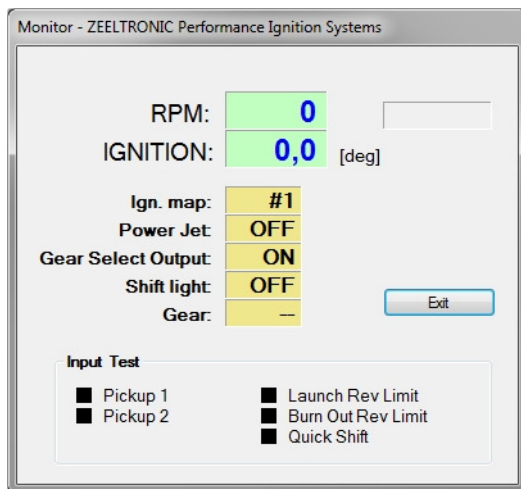


⇒ **File menu** is active when PC-USB programmer is connected



- 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

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		
19,0	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

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		

Shift Functions

shift at GND Shift Level

at 2-3 shift Change Ign. Map

1-2 shift Auto Shift Mode

Quick Shift

☐ Smart Shift

70 Kill Time [ms]

Gear Select Output

OFF Initial Output

output change at 1-2 shift

Stop Switch Mode

☒ Low Level Stop

☐ High Level Stop

Power Jet

☐ Invert Polarity

6000 'ON' rpm

8000 'OFF' rpm

Ign. Map Change

by gear change

1 Select Ignition Map

2 Nr. of Pickups

35,0 Static Angle [°]

0,0 Advance [°]

0,0 Advance Out 1 [°]

0,0 Advance Out 2 [°]

30 Delay Compensation [us]

10500 Shift Light [rpm]

Rev Limit

☒ Soft Rev Limit

11000 [rpm]

Burn Out Rev Limit

☒ Soft Rev Limit

10000 [rpm]

Launch Rev Limit

☒ Soft Rev Limit

8000 [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
- ⇒ **Select Ignition Map...**selection is active only when **Ignition Map Change** is set to "off".
- ⇒ **Nr. of Pickups...** **PDCI** can run with 1, or 2 pickups. When using one pickup, then all 2 ignition coils fire at the same time (wasted spark).
- ⇒ **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.
- ⇒ **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.
- ⇒ **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.

- ⇒ **Ign. Map Change**... Ignition map change can be set to:
 - "off" ... ignition map can't be changed without programmer
 - "by map switch" ... ignition map can be changed by map switch
 - "by gear change" ... ignition map can be changed by gear change (for more details look at Shift Functions)

Shift Functions

- ⇒ **Shift Level**... shift detection at connecting quick shift input to the GND, or at +12V
- ⇒ **Change Ign. Map**... changing ignition map at shifting. Function must be enabled in "Ign. Map Change"
Possible settings:
 - "off" ... function disabled
 - "at 1-2 shift" ... ignition map change at 1-2 shift
 - "at 2-3 shift" ... ignition map change at 2-3 shift
 - "at 3-4 shift" ... ignition map change at 3-4 shift
- ⇒ **Auto Shift Mode**... auto shift mode deletes shift kill function at programmed shifts:
 - "off" ... function disabled
 - "1-2 shift" ... deletes kill at the first shift
 - "1-2-3 shift" ... deletes kill at the first two shifts
 - "1-2-3-4 shift" ... deletes kill at the first three shifts
- ⇒ **Gear Select Output**... gear select output allow systems to be triggered according to which gear the transmission is in. Initial output can be set to "ON", or "OFF".
Possible settings:
 - "output change at 1-2 shift"
 - "output change at 2-3 shift"
 - "output change at 3-4 shift"
 - "output change at 4-5 shift"
 - "output change at 5-6 shift"

- ⇒ **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.

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.

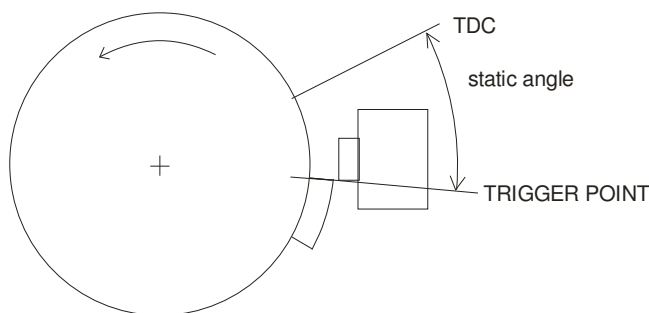
Necessary tools:

- stroboscope light
- dial gauge

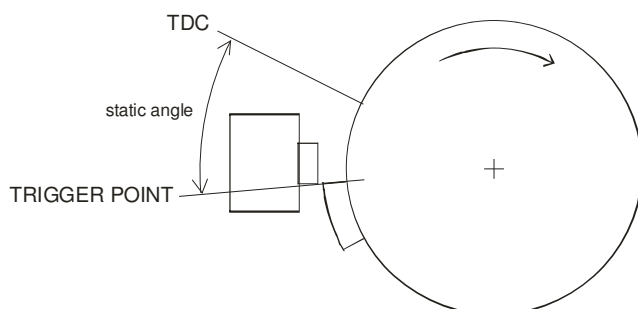
Follow the procedure:

- ⇒ 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**.

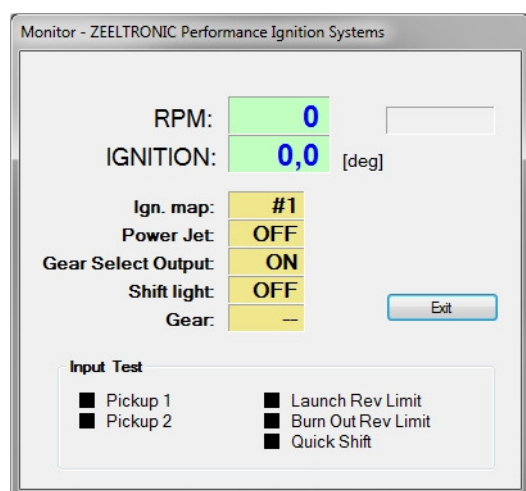


MONITOR FUNCTION

- ⇒ **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.

● Pickup 1
● Pickup 2 → no signal from pickups

● Pickup 1
● Pickup 2 → signal from all pickups accepted

● Launch Rev Limit
● Burn Out Rev Limit
● Quick Shift → all input switches are in "off" position

● Launch Rev Limit
● Burn Out Rev Limit
● Quick Shift → all input switches are in "on" position