www.zeeltronic.com
info@zeeltronic.com

updated 20.04.2013
firmware version: 20.130327

PROGRAMMING MANUAL FOR HANDHELD PROGRAMMER

PCDI-RGT PROGRAMMABLE CDI IGNITION

TECHNICAL DATA

Limit values:
- minimum revs   200 RPM
- maximum revs   20000 RPM
- minimum supply voltage   8 Volts
- maximum supply voltage   16 Volts
- max. supply voltage for 1 minute   35 Volts
- current draw   25 mAmp

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

Features:
- CDI charged from hi voltage charging coils (generator)
- programmable ignition map (3D interpolated)
- store and load function for 2 ignition maps
- one input for magnetic pickup
- TPS input (ignition map is 3D interpolated above TPS33%)
- external switch for changing ignition map while riding
- power jet output
- shift light output
- quick shift (shift kill)
- tachometer output
- advance/retard whole ignition curve
- three stage rev limit (retard timing, reduced spark, spark off)
- signal delay compensation
- timing calculation for every 1 RPM change (1000, 1002, .. , 9805, 9806, ...)
- easy and fast programming on the field, via hand held programmer
- programming while machine running - you can immediately see effects
- monitoring of rev's, TPS position, ignition advance angle, via LCD(hand held programmer)
- fast processing for high accuracy - delays from 1us

PCDI-RGT needs 12V supply, or running engine for programming with handheld programmer!

1. HOW TO ENTER MENU

PCDI must be connected to power supply. Connect **programmer** to **PCDI** and wait few seconds for activation of **programmer** and then press enter. With pressing + or - you can move through menu and select with pressing enter .
Exit menu with selecting *Exit.*

2. MAIN MENU

Load Ign. Curve	- load previously saved ignition curve set (from #1 to #2)
Save Ign. Curve	- save new ignition curve set (from #1 to #2)
Ignition Curve	- ignition curve parameters submenu
Advance	- advance/retard whole ignition curve
Power Jet	- power jet
Shift Light	- shift light
Shift Kill Time	- shift kill time
Rev Limit	- rev limit
Static Angle	- static angle (stator position)
Compensation	- signal delay compensation (from pickup to spark plug)
TPS	- enable/disable TPS
TPS close [0%]	- calibrating TPS close position
TPS open [100%]	- calibrating TPS open position
Ign. Map SW	- enable/disable ignition map switch
Pulses Per Rev	- number of pulses per revolution from pickup
Trigger Mode	- trigger mode
Exit	

3. LOAD IGN. CURVE

Enter menu and move to *Load Ign. Curve* with pressing + or - and then press enter .
Now you can select position number of previously saved ignition curve set, with pressing + or - and then press enter .

4. SAVE IGN. CURVE

Enter menu and move to *Save Ign. Curve* with pressing + or - and then press enter .
Now you can select position number to which you want to save your ignition curve set, with pressing + or - and then press enter .

5.   SET IGNITION MAP *(if TPS disabled)*

Enter *Set Ign.* menu and move to *Set Ignition Map* with pressing $\boxed{+}$ or $\boxed{-}$ and then press $\boxed{\text{enter}}$.
...you entered submenu for setting ignition map.

Submenu organisation:
Nr. of Points   - number of ignition curve points (from 4 to 12)
1)   - first ignition curve point
2)   - second ignition curve point
...   ...
...   ...
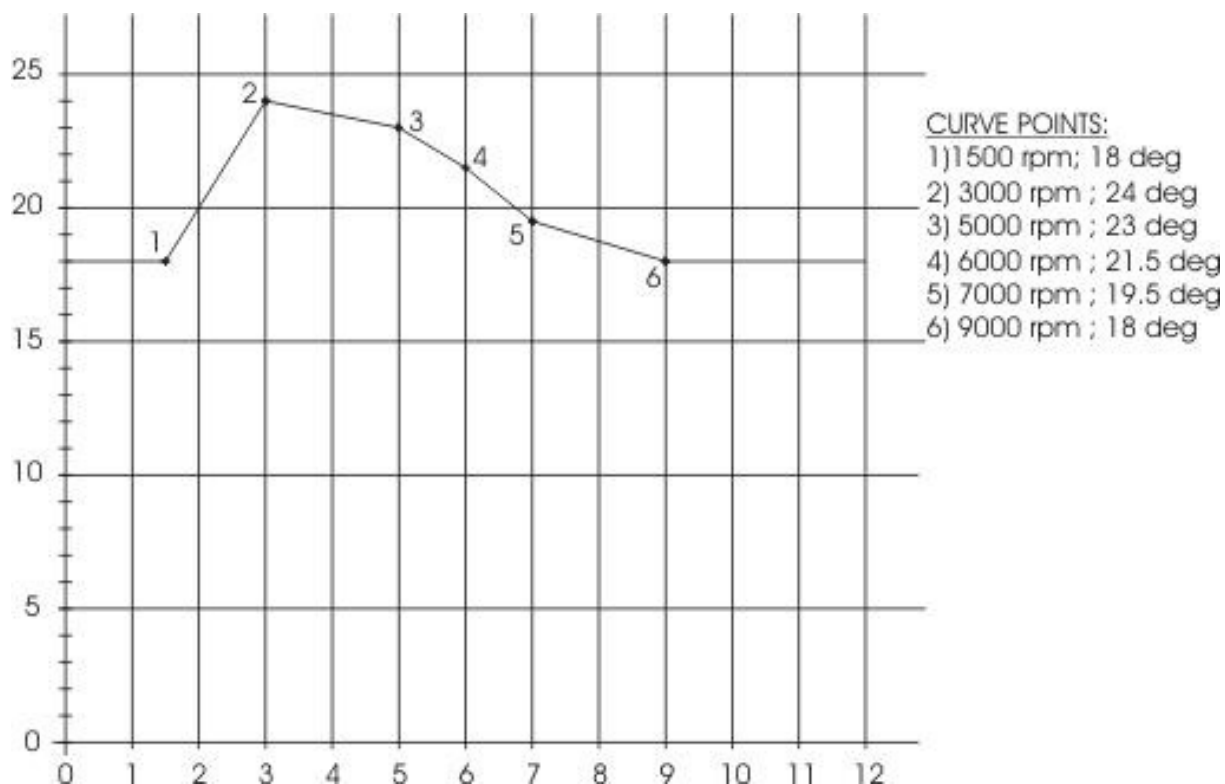*Exit*   - exit submenu

Important!
To avoid wrong processing, don't make unreasonable curve course.
Every time you make any changes to ignition curve, it is automatically saved to number #0.
Later you can save it to any other number #1 or #2.

Curve Example with six curve points:

CURVE POINTS:
1) 1500 rpm; 18 deg
2) 3000 rpm ; 24 deg
3) 5000 rpm ; 23 deg
4) 6000 rpm ; 21.5 deg
5) 7000 rpm ; 19.5 deg
6) 9000 rpm ; 18 deg

5.1.   SET IGNITION MAP *(if TPS enabled)*

Three ignition curves must be programmed for different TPS positions. **PDCI** does not only switch between ignition curves, but also interpolate 3D map for all TPS positions above 33%.

Enter *Set Ign.* menu and move to *Set Ignition Map* with pressing `+` or `-` and then press `enter`.
...you entered submenu for selecting ignition curve.

Submenu organisation:
|	
Nr. of Points	- number of ignition curve points (from 4 to 12)
Curve 0-33%	- ignition curve from 0 to 33% TPS
Curve 66%	- ignition curve for 66% TPS
Curve 100%	- ignition curve for 100% TPS
Exit	- exit submenu

<u>**Important!**</u>
To avoid wrong processing, don't make unreasonable curve course.
Every time you make any changes to ignition curve, it is automatically saved to number #0.
Later you can save it to any other number #1 or #2.

Ignition Map Example:
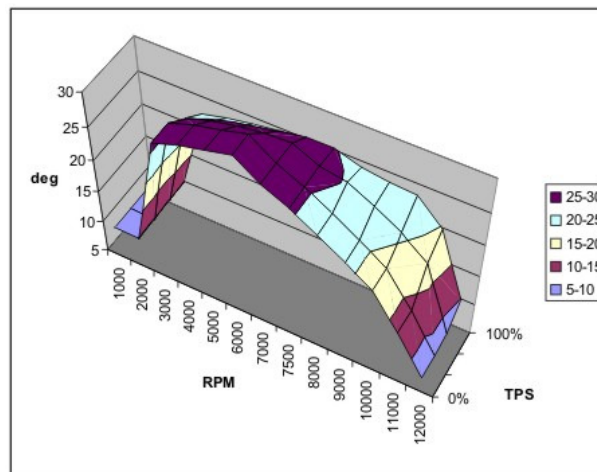
5.2.   Change NUMBER OF IGNITION CURVE POINTS

Move to *Nr. of Points* with pressing `+` or `-` and then press `enter` .
Now you can select number of ignition points, with pressing `+` or `-` and then press `enter` .

5.3.   Change PARAMETERS OF IGNITION CURVE POINT

Move to point you want to change, with pressing `+` or `-` and then press `enter` .
Now you can change rev point with pressing `+` or `-` (in 100 rpm steps) and then press `enter` .
Now you can change advance angle with pressing `+` or `-` (in 0.1deg steps) and then press `enter` .

6. Set ADVANCE

With this setting is possible to advance or retard whole ignition curve. When setting is positive then ignition curve is advanced and when setting is negative than ignition curve is retarded. With *Advance 0.0deg*, ignition curve is unchanged.
Enter menu and move to *Advance* with pressing $\boxed{+}$ or $\boxed{-}$ and then press $\boxed{\text{enter}}$.
Now you can set advance with pressing $\boxed{+}$ or $\boxed{-}$ (in 0.1deg steps) and then press $\boxed{\text{enter}}$.

7. POWER JET

Enter *Set Ign.* menu and move to *Power Jet* with pressing $\boxed{+}$ or $\boxed{-}$ and then press $\boxed{\text{enter}}$.
...you entered submenu for setting *Power Jet* parameters.

Submenu organisation:

Invert Polarity   - enable/disable invert polarity
Power Jet ON RPM   - revs for activating power jet
Power Jet OFF RPM   - revs for deactivating power jet
Power Jet ON TPS (if TPS enabled)   - throttle position for activating power jet
Power Jet OFF TPS (if TPS enabled)   - throttle position for deactivating power jet
Exit   - exit submenu

Example:
Power jet ON (RPM) = 8000rpm
Power jet OFF (RPM) = 10000rpm
Power jet ON (TPS) = 70%TPS
power jet 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.

7.1. INVERT POLARITY

Operation of Power Jet can be inverted, or not.
When **Invert Polarity** "disabled" then Power Jet output is activated as programmed.
When **Invert Polarity** "enabled" then Power Jet output operation is inverted.

8. Set SHIFT LIGHT

Enter *Set Ign.* menu and move to *Shift Light* with pressing $\boxed{+}$ or $\boxed{-}$ and then press $\boxed{\text{enter}}$.
Now you can change rev point with pressing $\boxed{+}$ or $\boxed{-}$ (in 100 rpm steps) and then press $\boxed{\text{enter}}$.

9. Set SHIFT KILL TIME

Enter menu and move to *Shift Kill Time* with pressing $\boxed{+}$ or $\boxed{-}$ and then press $\boxed{\text{enter}}$.
Now you can change kill time with pressing $\boxed{+}$ or $\boxed{-}$ (in 10 ms steps) and then press $\boxed{\text{enter}}$.

10.   Set REV LIMIT

Enter menu and move to *Rev Limit* with pressing `+` or `-` and then press `enter` .
Now you can change rev limit with pressing `+` or `-` (in 100 rpm steps) and then press `enter` .

11.   Set STATIC ANGLE

Enter menu and move to *Static Angle* with pressing `+` or `-` and then press `enter` .
Now you can set static angle with pressing `+` or `-` (in 0.1deg steps) and then press `enter` .
More information's about static angle you can find in section 19.

12.   Set 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.
This compensation helps that advance angles in ignition curve are real (more accurate).

How to check, if compensation is correct:
First you must set flat ignition curve. Then measure with stroboscope lamp, if mark at flywheel moving when changing revs. If mark moving, then you must change compensation delay.

Change Compensation:
Enter menu and move to *Compensation* with pressing `+` or `-` and then press `enter` .
Now you can change compensation delay with pressing `+` or `-` and then press `enter` .

13.   TPS

Enabling, or disabling Throttle Position Sensor.

Enter *Set Ign.* menu and move to *TPS* with pressing `+` or `-` and then press `enter` .
Now you can enable or disable TPS with pressing `+` or `-` and then press `enter` .

14.   Set TPS close [0%]

For correct operation, TPS close position must be calibrated!
Enter menu and move to *TPS close [0%]* with pressing `+` or `-` and then press `enter` .
Leave throttle at close position and confirm calibrating with pressing `enter` , or exit calibration with pressing `-` . Displayed number should be between 0 and 500.

15.   Set TPS open [100%]

For correct operation, TPS open position must be calibrated!
Enter menu and move to **TPS open [100%]** with pressing $\boxed{+}$ or $\boxed{-}$ and then press $\boxed{enter}$.
Move throttle to maximum open position and confirm calibrating with pressing $\boxed{enter}$, or exit calibration with pressing $\boxed{-}$. Displayed number should be between 500 and 1010.

16.   IGNITION MAP SWITCH

Enabling, or disabling ignition map switch for changing ignition curves while riding.

Enter menu and move to **Ign. Map SW** with pressing $\boxed{+}$ or $\boxed{-}$ and then press $\boxed{enter}$.
Now you can enable, or disable external switch with pressing $\boxed{+}$ or $\boxed{-}$ and then press $\boxed{enter}$.

17.   Set PULSES PER REV

It is number of pulses per rev from pickup coil and is important for correct rev reading. Set 1 for single cylinder engines. Set 2 for all twins with wasted spark ignition system.
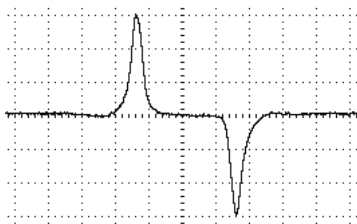Enter **Set Ign.** menu and move to **Pulses Per Rev** with pressing $\boxed{+}$, or $\boxed{-}$ and then press $\boxed{enter}$.
Change nr. of pulses per rev with pressing $\boxed{+}$, or $\boxed{-}$ and then press $\boxed{enter}$.

18.   Set TRIGGER MODE

Enter **Set Ign.** menu and move to **Trigger Mode** with pressing $\boxed{+}$, or $\boxed{-}$ and then press $\boxed{enter}$.
Change **Trigger Mode** with pressing $\boxed{+}$, or $\boxed{-}$ and then press $\boxed{enter}$.

Trigger signal from pickup consist of positive and negative pulse. Positive pulse must be first and is generated by leading edge of trigger bar...negative pulse must be second and is generated by trailing edge of trigger bar.
If trigger signal is opposite (first negative and second positive), then wires from the pickup need to be switched...that changes polarity of signal from pickup.
Positive pulse defines static angle position and negative pulse defines idle running timing position.
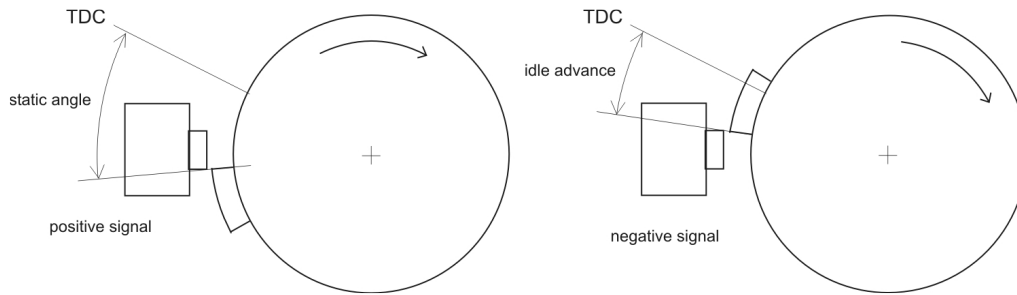
When **"only [+] signal"** is checked, then only positive signal is detected and ignition timing is calculated with all revs as programmed with ignition map.

When **"[+] and [-] signal"** is checked, then both signals are detected. Revs of first ignition point define switching point between, programmed ignition map and idle running timing position.
- Ignition timing is defined with trailing edge of trigger bar, at revs lower then first ignition point (idle advance...se drawing above).
- Ignition timing is defined with programmed map, at revs higher then first ignition point.
Example: if first ignition point is programmed at 1500rpm, then below 1500rpm, ignition timing is defined with trailing edge of trigger bar (idle advance...se drawing above) and above 1500rmp, ignition timing is defined by programmed ignition map.

Set **"only [+] signal"** when using custom, or modified trigger rotor, or upgrade from static ignition timing CDI.
Set **"[+] and [-] signal"** when using original trigger rotors, or flywheels. First ignition point should be programmed somewhere between 1000-2000rpm.

19.   MECHANICAL SETTINGS (Static Angle)

Static Angle is ignition advance angle, set with stator (generator).
Measure this angle with dial gauge. This measured **Static Angle** is your maximum advance angle you can set with **PCDI**.

Example:
*Measured **Static Angle** = 39.2deg   (this angle you must enter in PCDI)*

Calculating mm to deg or vice versa:

α = ignition advance in degrees
T = ignition advance in mm
R = engine stroke divided by 2 in mm
L = conrod length in mm
$P = R + L - T$

$$\alpha = \cos^{-1}\left(\frac{P^2 + R^2 - L^2}{2 \cdot P \cdot R}\right)$$

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

20.   MONITORING

Connect **programmer** to **PCDI** and wait few seconds for activation of **programmer.** Fist information displayed on the **programmer** is firmware version.

With **programmer** you can watch revs, calculated advance ignition angle and TPS position.

<u>Information!</u>
You can connect or disconnect **PCDI** unit from **programmer** any time you want, without any harm. It is not important, if motor running or not and if power supply is connected or not.

<u>Important!</u>
Do not use too much force when connecting or disconnecting **programmer** unit!