PROGRAMMING MANUAL FOR HANDHELD PROGRAMMER
PCDI-10VT
PROGRAMMABLE CDI IGNITION AND PV CONTROLLER

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
- maximum continuous current for shift light output	1 Amp

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

Features:
- CDI charged from hi voltage charging coils (generator)
- store and load function for 2 ignition maps
- one input for magnetic pickup
- external switch for changing ignition map while riding
- 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, ...)
- programmable power valve actuation
- store and load function for 5 PV curves
- 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 hand held programmer
- programming while machine running - you can immediately see effects
- monitoring of rev's, ignition and PV angle, via LCD(hand held programmer)
- fast processing for high accuracy - delays from 1us

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

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

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.   MENU ORGANISATION

Set Ign.	- set ignition parameters submenu
Set PV	- set PV parameters submenu
Exit	

2.1.   SET IGNITION PARAMETERS SUBMENU

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
Shift Light	- shift light
Kill Time/Stop	- shift kill time, or engine stop
Rev Limit	- rev limit
Static Angle	- static angle (stator position)
Compensation	- signal delay compensation (from pickup to spark plug)
Ign. Map SW	- enable/disable ignition map switch
Pulses Per Rev	- number of pulses per revolution from pickup
Trigger Mode	- trigger mode
Exit	

2.2.   SET PV PARAMETERS SUBMENU

Load PV Curve	- load previously saved curve (from #1 to #5)
Save PV Curve	- save new curve (from #1 to #5)
Set PV Curve	- valve curve parameters submenu
Deviation +-	- deviation of valve position
Close Position	- max close valve position
Open Position	- max open valve position
PV test	- valve position test
Power-up Test	- enable/disable power up test
Exit	

3.   LOAD IGN. CURVE

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

5.   Change IGNITION CURVE

Enter menu and move to *Ignition Curve* with pressing + , or - and then press enter .
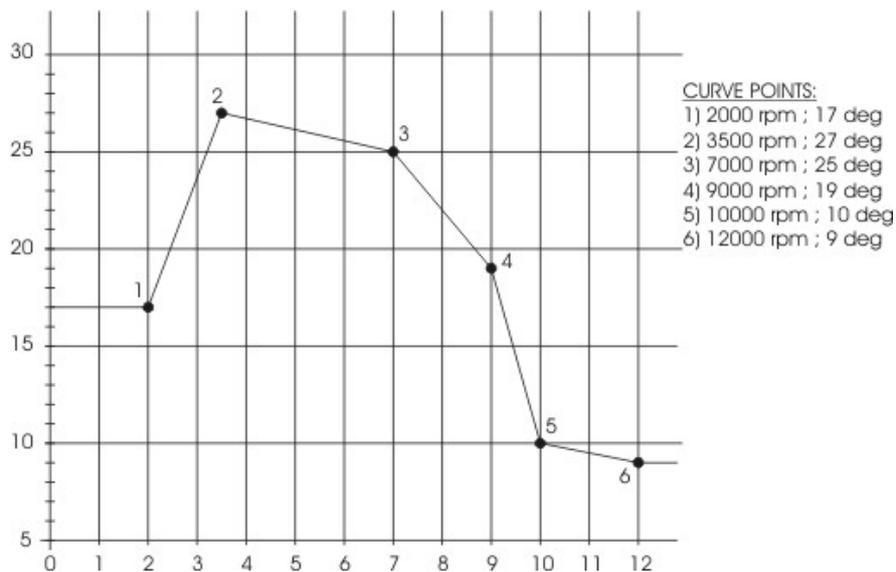Now you are in submenu for setting ignition curve.

Submenu organisation:
Nr. of Points   - number of ignition curve points (from 4 to 10)
1)   - first ignition curve point
2)   - second ignition curve point
...   ...
...   ...
Exit Curve   - 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 #0 position.
Then you can save it to any other position number from #1 to #2.

Curve Example with six curve points:

CURVE POINTS:
1) 2000 rpm ; 17 deg
2) 3500 rpm ; 27 deg
3) 7000 rpm ; 25 deg
4) 9000 rpm ; 19 deg
5) 10000 rpm ; 10 deg
6) 12000 rpm ; 9 deg

5.1.   Change NUMBER OF IGNITION CURVE POINTS

Move to *Nr. of Points* with pressing + , or - and then press enter .
Select number of ignition points, with pressing + , or - and then press enter .

5.2.   Change PARAMETERS OF IGNITION CURVE POINT

Move to point you want to change, with pressing + , or - and then press enter .

Change rev point with pressing + , or - (in 100 rpm steps) and then press   enter .
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 + , or - and then press enter .
Set advance with pressing + , or - (in 0.1deg steps) and then press enter .

7.   Set SHIFT LIGHT

Enter menu and move to *Shift Light* with pressing + , or - and then press enter .
Change rev point with pressing + , or - (in 100 rpm steps) and then press   enter .

8.   Set KILL TIME/Stop

Setting of kill time for quick shifter, or engine stop function.
If setting is 0ms, then engine "low level stop" function is activated...engine will stop when
pink wire is connected to the ground and run when not connected.
If setting is 500ms, then engine "high level stop" function is activated...engine will run when
pink wire is connected to the ground and stop when not connected.
All settings from 10ms to 490ms are engine kill times for quick shifter.

Enter menu and move to *Kill Time/Stop* with pressing + , or - and then press enter .
Change kill time with pressing + , or - (in 10 ms steps) and then press enter .

9.   Set REV LIMIT

Enter menu and move to *Rev Limit* with pressing + , or - and then press enter .
Change rev limit with pressing + , or - (in 100 rpm steps) and then press   enter .

10.   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 22.

11.   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 moves, then you must change compensation delay.

Change Compensation:
Enter menu and move to *Compensation* with pressing + , or - and then press enter .
Change compensation delay with pressing + , or - and then press enter .

12.   Set IGNITION MAP SW

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

Enter menu and move to *Ign. Map SW* with pressing + , or - and then press enter .
Enable, or disable external switch with pressing + , or - and then press enter .


13.   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 + , or - and then press enter.
Change nr. of pulses per rev with pressing + , or -   and then press enter .

14.   Set TRIGGER MODE

Enter *Set Ign.* menu and move to *Trigger Mode* with pressing + , or - and then press enter.
Change *Trigger Mode* with pressing + , or -   and then press enter .
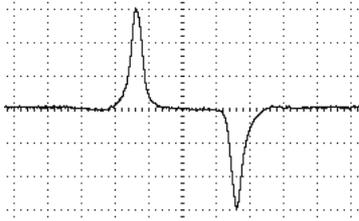
Trigger signal from pickup consist of positive and negative pulse. Positive pulse must be first and is generated by leading edge of trigger bar...negative pulse must be second and is generated by trailing edge of trigger bar.
If trigger signal is opposite (first negative and second positive), then wires 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.
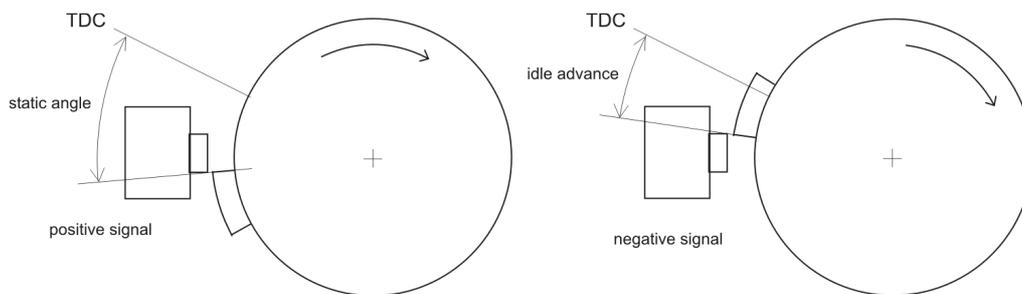
When **"only [+] signal"** is checked, then only positive signal is detected and ignition timing is calculated with all revs as programmed with ignition map.

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.

15.   LOAD PV CURVE

Enter menu and move to ***Load PV Curve*** with pressing + , or - and then press enter .
Select position number of previously saved ignition curve set, with pressing + , or - and then press enter .

16.   SAVE PV CURVE

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

17.   Set PV Curve

Enter menu and move to ***Set PV Curve*** with pressing + , or - and then press enter .
Now you are in submenu for setting valve curve.

Submenu organisation:
Nr. of Points   - number of valve curve points (from 2 to 8)
1)   - first valve position point
2)   - second valve position point
...   ...
...   ...
Exit   - exit submenu

<u>Important!</u>
To avoid wrong processing, don't make unreasonable curve course.
Every time you make any changes to valve curve, it is automatically saved to #0 position.
Then you can save it to any other position number from #1 to #5.

17.1.   Change Number of Curve Points

Move to ***Nr. of Points*** with pressing + , or - and then press enter .
Select number of curve points, with pressing + , or - and then press enter .

17.2.   Change Parameters of Valve Position Curve Points

Move to point you want to change, with pressing + , or - and then press enter .
Change rev point with pressing + , or - (in 100 rpm steps) and then press   enter .
Change valve position from 0% to 100%, with pressing + , or - (in 1% steps) and then press enter .

18.   Deviation

Enter menu and move to *Deviation* with pressing + , or - and then press enter .
Change deviation from 2% to 20% with pressing + , or - (in 1% steps) and then press enter .
Deviation means how accurate valve is moved to calculated position. If deviation is too low
then servo motor won't be stabile – it will always search for calculated position in small
movements. Default setting is +-5% and should meet in most cases.

19.   Max Close Position

Enter menu and move to *Close Position* with pressing + , or - and then press enter .
Set close position with pressing + , or - and then press enter .
Max close position is when curve is set to 0%. This close position can be moved to any
desired position. For RZ350 default close position is 240. Max close position can be moved to
deeply closed or less closed position.

20.   Max Open Position

Enter menu and move to *Open Position* with pressing + , or - and then press enter .
Set open position with pressing + , or - and then press enter .
Max open position is when curve is set to 100%. This open position can be moved to any
desired position. For RZ350 default open position is 512. Max open position can be moved to
more open or less open position.

21.   PV Test

Enter menu and move to *PV Test* with pressing + , or - and then press enter .
Set valve position with pressing + , or - and then press enter .
PV test can be used for testing, or measuring valve position. Valve can be moved to any
position from 0% to 100%, without engine running.

22.   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:

$$\alpha = \text{ignition advance in degrees}$$
$$T = \text{ignition advance in mm}$$
$$R = \text{engine stroke divided by 2 in mm}$$
$$L = \text{conrod length in mm}$$
$$P = R + L - T$$
$$\alpha = \cos^{-1}\left(\frac{P^2 + R^2 - L^2}{2 \cdot P \cdot R}\right)$$
$$T = L + R \cdot (1 - \cos\alpha) - \sqrt{L^2 - (R \cdot \sin\alpha)^2}$$

23.   MONITORING

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

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

Information!
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.

Important!
Do not use too much force when connecting or disconnecting **programmer** unit!

24.   ERROR REPORTS

Two errors can be displayed:
PVerror 1 – PV position sensor error, or servo motor disconnected
PVerror 2 – PV servo motor error (short connection)