www.zeeltronic.com
info@zeeltronic.com

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PROGRAMMING MANUAL
PDCIS-A01T PROGRAMMABLE DC-CDI IGNITION

PDCIS-A01T is single channel DC-CDI with 2 switchable ignition maps, shift light, quick shift and output for rev counter.

TECHNICAL DATA

Limit values:

- minimum revs	200 RPM
- maximum revs	24000 RPM
- minimum supply voltage	8 Volts
- maximum supply voltage	17 Volts
- idle current draw	< 3 mAmp
- max current draw	1.2 Amp
- output energy at 14000 RPM	>54mJ
- output energy at 16000 RPM	>50mJ
- output energy at 20000 RPM	>40mJ
- output energy at 25000 RPM	>30mJ

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

Features:
- fast power-up (also starts only with condenser)
- full power starting spark energy already at 8 Volts power supply
- one isolated input for magnetic pickup
- store and load function for two ignition maps
- external switch for changing ignition map while riding
- shift light output
- quick shift (shift kill)
- soft rev limit (three stage rev limit)
- separate rev limit for each ignition map
- latching stop
- tachometer output
- easy and fast programming on the field, via hand held programmer
- programming with PC
- programming while machine running
- signal delay compensation
- instant monitoring of revs and angle, via LCD(hand held programmer)
- fast processing for high accuracy - delays from 1 us

Very important!
Resistor spark plugs must be used, because they produce less electromagnetic disturbances.
Very important!
CDI is protected against static discharge, but too high static charge can damage CDI.
Be careful when using programmer on the dyno, because static charge can build up on the bike and static discharge can damage CDI unit, or programmer. Make ground connection between dyno and bike frame to prevent static discharge through programmer and CDI.

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

1. HOW TO ENTER MENU

PDCIS does not need to be connected to power supply when battery is installed in to the handheld programmer. Connect **programmer** to **PDCIS** and wait few seconds for activation of **programmer** and then press ENTER. Move through menu with pressing + , or - and choose with pressing ENTER.
Exit menu with choosing ***Exit.***

2. MENU ORGANISATION

Load Ign. Map - load (select) ignition map (from #1 to #2)
Save Ign. Map - save new ignition map (from #1 to #2)
Set Ignition Map - ignition map parameters submenu
Advance - advance/retard whole ignition map
Rev Limit 1 - rev limit for ignition map #1
Rev Limit 2 - rev limit for ignition map #2
Static Angle - static angle (stator position)
Compensation - signal delay compensation (from pickup to spark plug)
Ign. Map SW - activating/deactivating external switch for selecting ignition map
Pulses Per Rev - number pulses per revolution from pickup
Trigger Mode - trigger mode
Stop SW mode - select low, or high level stop
Latching Stop - enable/disable latching stop
Shift Light - shift light
Shift Kill Time - quick shift - shift kill time
Min Starting RPM - minimal RPM for starting
Nr Revs Without Ign - number of engine revolutions without ignition at starting
Lobe Length - trigger rotor lobe length in degrees
Starting Retard - ignition retard, only at starting
Ignition Test - sparks are generated for few seconds
Power Supply - power supply voltage monitor
Exit

3. LOAD IGN. MAP

Move to ***Load Ign. Map*** with pressing + , or - and then press ENTER .
Select number of previously saved ignition map, with pressing + , or - and then press ENTER .

4. SAVE IGN. MAP

Move to ***Save Ign. Map*** with pressing + , or - and then press ENTER .
Select number to which you want to save your ignition map, with pressing + , or - and then press ENTER .

5. SET IGNITION MAP

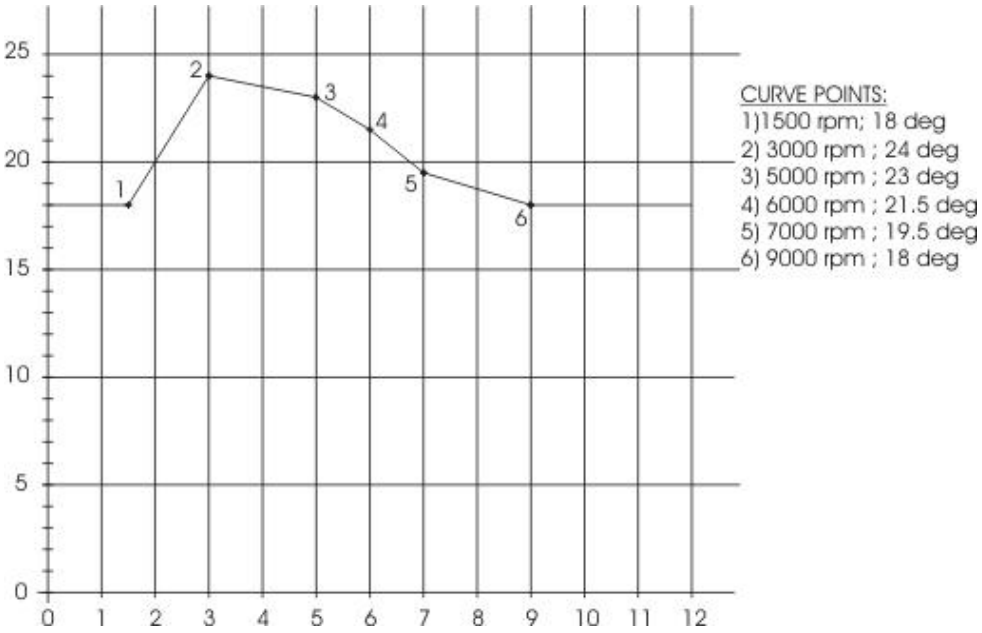
Move to ***Set Ignition Map*** with pressing + , or - and then press ENTER .
...you entered submenu for setting ignition map.

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

<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.

Curve Example with six curve points:



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 0.1 deg steps) and then press ENTER .

6. ADVANCE

With this setting is possible to advance, or retard whole ignition map. When setting is positive, then ignition map is advanced and when setting is negative, than ignition map is retarded. Ignition map is unchanged with setting ***0.0deg***.

Move to ***Advance*** with pressing + , or - and then press ENTER .
Set advance with pressing + , or - (in 0.1 deg steps) and then press ENTER .

7. REV LIMIT 1

Rev limit for ignition map #1.

Move to ***Rev Limit 1*** with pressing + , or - and then press ENTER .
Change rev limit with pressing + , or - (in 100 rpm steps) and then press ENTER .

8. REV LIMIT 2

Rev limit for ignition map #2.

Move to ***Rev Limit 2*** with pressing + , or - and then press ENTER .
Change rev limit with pressing + , or - (in 100 rpm steps) and then press ENTER .

9. STATIC ANGLE

Static Angle is pickup advance position from TDC (Top Dead Centre).

Move to ***Static Angle*** with pressing + , or - and then press ENTER .
Set static angle with pressing + , or - (in 0.1 deg steps) and then press ENTER .

How to measure static angle is explained at the end of the manual.

10. COMPENSATION

It is compensation of signal delay from pickup to spark plugs. 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 have to 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 .

11. IGN. MAP SW

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

Move to ***Ign. Map SW*** with pressing + , or - and then press ENTER .
Enable, or disable external switch with pressing + , or - and then press ENTER .

12. PULSES PER REV

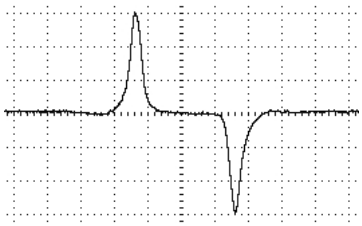
It is number of pulses per revolution from pickup coil and is important for correct rev reading.
Default setting is 1. Set 2 for twins with wasted spark ignition system.

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 .

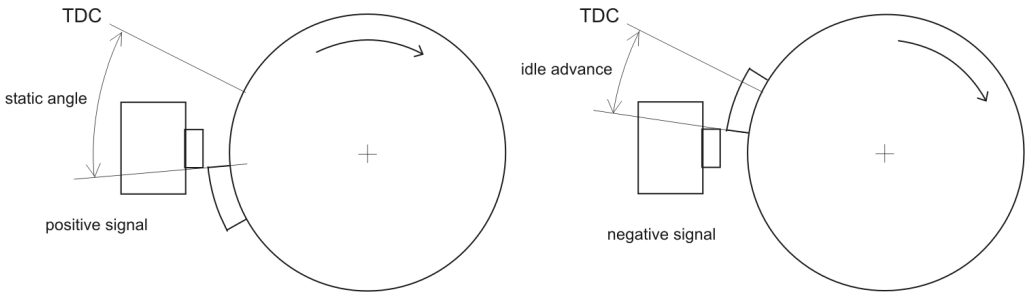
Setting is not applicable for trigger mode "long & short lobe" and "short & long lobe".

13. 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 lobe ... negative pulse must be second and is generated by trailing edge of trigger lobe.
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 selected, then only positive signal is detected and ignition timing is calculated for all revs as programmed with ignition map.
When **"[+] and [-] signal"** is selected, then both signals are detected. Rpm setting of first ignition point defines switching point between programmed ignition map and idle running timing position.
- Ignition timing is defined with trailing edge of trigger lobe at revs lower then first ignition point (idle advance ... see drawing above).
- Ignition timing is defined with programmed map at revs higher then first ignition point.
Example: if first ignition point is programmed at 1500 rpm, then below 1500 rpm ignition timing is defined with trailing edge of trigger lobe (idle advance ... see drawing above) and above 1500 rmp 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.

When **"long & short lobe"**... trigger rotor has two lobes, first long and second short. Long lobe meet pickup first. CDI ignore short lobe and use only long lobe. Rpm setting of first ignition point defines switching point between programmed ignition map and idle running timing position.
- Ignition timing is defined with trailing edge of long trigger lobe at revs lower then first ignition point (idle advance ... see drawing above ... short lobe is not at the drawing).
- Ignition timing is defined with programmed map at revs higher then first ignition point.

When **"short & long lobe"**... trigger rotor has two lobes, first short and second long. Short lobe meet pickup first. CDI ignore short lobe and use only long lobe. RPM setting of first ignition point defines switching point between programmed ignition map and idle running timing position.
- Ignition timing is defined with trailing edge of long trigger lobe at revs lower then first ignition point (idle advance ... short lobe is not at the drawing).
- Ignition timing is defined with programmed map at revs higher then first ignition point.

14. STOP SW MODE

Selects stop switch operation mode. Engine can be stopped with low level (stop switch connected to the ground), or with high level (stop switch is opened).

Move to ***Stop SW Mode*** with pressing + , or - and then press ENTER .
Select low level stop "0", or high level stop "1" with pressing + , or - and then press ENTER .

15. LATCHING STOP

When "**Latching Stop"** enabled then engine stops with short push on stop switch.

Enter menu and move to ***Latching Stop*** with pressing + , or - and press enter. Enable, or disable ***Latching Stop*** with pressing + , or - and then press enter .

16. SHIFT LIGHT

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 .

17. SHIFT KILL TIME

Move to ***Shift Kill Time*** with pressing + , or - and then press ENTER .
Change kill time with pressing + , or - (in 1 ms steps) and then press ENTER .

18. MIN STARTING RPM

It sets minimum rpm required for engine starting. It can be set to minimum 200 rpm.
Minimal required rpm for starting also depends on the pickup, trigger rotor diameter and air gap between pickup and trigger rotor. Larger rotor diameter and smaller air gap gives stronger pickup signal, that means CDI can read pickup signal at lower rpm.

Correct minimum starting rpm protects from kickback at starting.
Engines sensitive on kickback require trigger mode 2 **"[+] and [-] signal"**, also trigger lobe length must be measured and programmed to CDI. In some cases even starting retard have to be programmed.

Move to ***Min Starting Rpm*** with pressing + , or - and press ENTER to continue.
Set rpm with pressing + , or - and press ENTER to confirm.

19. NR REVS WITHOUT IGN

Number of revolutions without ignition at starting is sometime necessary to prevent kickback at starting with electro starter.

Move to ***NrRevsWithoutIgn*** with pressing + , or - and press ENTER to continue.
Set number of revolutions with pressing + , or - and press ENTER to confirm.

20. LOBE LENGTH

Lobe length is applicable only when trigger mode 2 **"[+] and [-] signal".**
Lobe length is used to calculate RPM at starting. Wrong value results in wrong calculation.
Engines sensitive on kickback require trigger mode 2 **"[+] and [-] signal"**, minimum starting

rpm, trigger lobe length must be measured and programmed to CDI. In some cases even starting retard have to be programmed.
Lobe length can be programmed to 0 deg, with engines less sensitive on kickback.

Move to ***Lobe Length*** with pressing + , or - and press ENTER to continue.
Set lobe lenght with pressing + , or - and press ENTER to confirm.

21. STARTING RETARD

Starting retard is applicable only when trigger mode 2 **"[+] and [-] signal"** and lobe length larger then 0 deg.
Starting retard is in function only at starting. Starting retard is necessary with most kickback sensitive engines. Lobe length have to be measured correctly for correct starting retard function.

Move to ***Starting Retard*** with pressing + , or - and press ENTER to continue.
Set retard with pressing + , or - and press ENTER to confirm.

22. IGNITION TEST

Spark execution test without running engine. Spark can be optically checked, with removed spark plug connected to plug cup and to the ground.

Enter menu and move to ***Ignition Test*** with pressing + , or - . With pressing ENTER multiple spark will occur, for about 1 second.

23. MONITORING

Connect **programmer** to **PDCIS** 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 ... depends on setting in the menu.

Information!
You can connect, or disconnect **PDCIS** 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!

MEASURING STATIC ANGLE

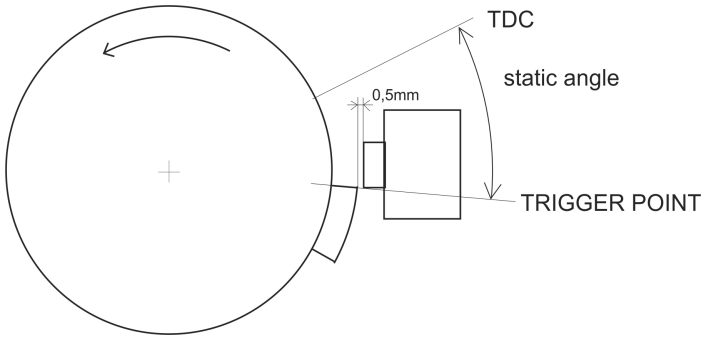
Measuring correct static angle is very important. Wrong static angle will cause inaccurate ignition advance. If static angle is programmed larger than mechanical static angle ignition advance will be smaller than programmed, or vice versa.
The most accurate procedure of measuring static angle is with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

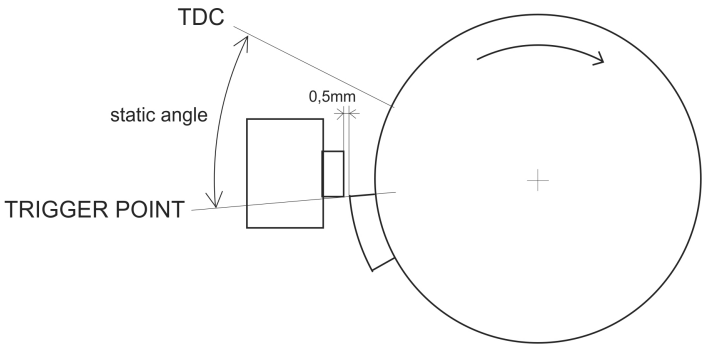
Necessary tools:
- strobe light
- dial gauge

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...16deg advance is suitable for most engines.
- find information about engine stroke and conrod length
- convert programmed flat ignition advance angle to millimetres

Example:
α =16deg (ignition advance)
L=110mm (conrod length)
R=54/2=27mm (engine stroke divided by 2)
T=1,3mm (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 1,3mm) 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 3000rpm to 4000rpm
- 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 30deg, then static angle has to be at least 31deg.
- Very large static angles are not a good solution, because it decreases electronic ignition advance stability (do not use static angle greater then 45deg 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.