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USER MANUAL
PDCI-31 PROGRAMMABLE CDI IGNITION

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.

1. HOW TO ENTER MENU

⇨ Connect **programmer** to **PDCI** and wait few seconds for activation of **programmer** and press ENTER.
⇨ Move through menu with pressing + , or - and select with pressing ENTER.
⇨ Exit menu with selecting ***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 on all outputs
Advance 1	- advance/retard ignition coil output 1
Advance 2	- advance/retard ignition coil output 2
Advance 3	- advance/retard ignition coil output 3
Gear Shift Light	- shift light
Quick Shift	- quick shift settings
Set Rev Limit	- rev limit parameters submenu
Set Launch Rev Limit	- launch rev limit parameters submenu
Set Burn Out Rev Limit	- burn out rev limit parameters submenu
Static Angle	- static angle (pickup position)
Compensation	- signal delay compensation (from pickup to spark plug)
Power Jet	- power jet
Ign. Map SW	- activating/deactivating external ignition map switch
Nr. of Pickups	- number of connected pickups
Stop SW Mode	- select low, or high level stop
Ignition Test	- test ignition spark
Pickup Test	- test signal from pickups
Exit	

3. LOAD IGN. MAP

⇨ Enter menu and move to ***Load Ign. Curve*** with pressing + , or - and press ENTER .
⇨ Select number of previously saved ignition curve, with pressing + , or - and press ENTER to confirm.

4. SAVE IGN. MAP

⇨ Enter menu and move to ***Save Ign. Curve*** with pressing + , or - and press ENTER .
⇨ Select number to which you want to save your ignition curve, with pressing + , or - and press ENTER to confirm.

5. SET IGNITION MAP

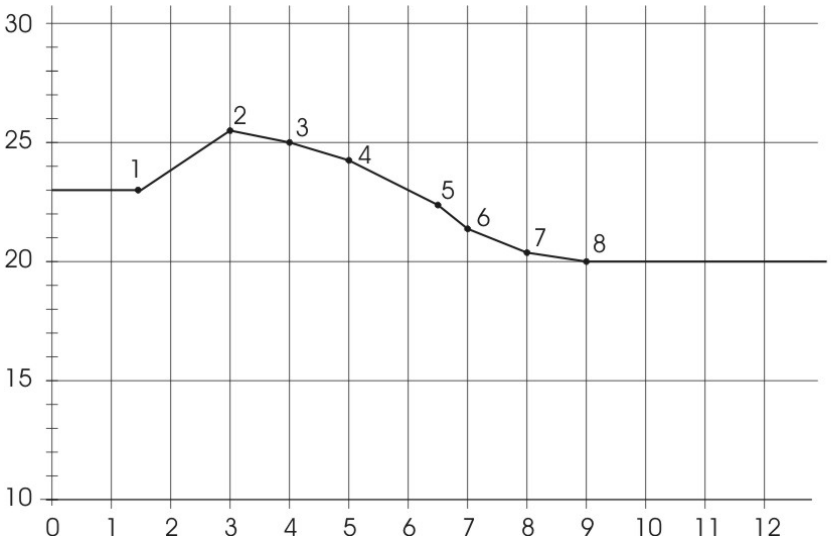
⇨ Enter menu and move to ***Set Ign. Curve*** with pressing + , or - and press ENTER to confirm.
You entered submenu for setting ignition curve.

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 position #0. Later you can save it to any other position from #1 or #2.

Curve Example:



static angle 28deg

CURVE POINTS:
1)1500 rpm; 23,0 deg
2) 3000 rpm ; 25,5 deg
3) 4000 rpm ; 25,0 deg
4) 5000 rpm ; 24,2 deg
5) 6500 rpm ; 22,4 deg
6) 7000 rpm ; 21,4 deg
7) 8000 rpm ; 20,3 deg
8) 9000 rpm ; 20,0 deg

5.1. Change NUMBER OF IGNITION CURVE POINTS

⇨ Move to ***Nr. of Points*** with pressing + , or - and press ENTER to confirm.
⇨ Select number of ignition points, with pressing + , or - and press ENTER to confirm.

5.2. Change PARAMETERS OF IGNITION CURVE POINT

⇨ Move to point you want to change, with pressing + , or - and press ENTER to confirm.
⇨ Change rev point with pressing + , or - (in 100 rpm steps) and press ENTER to confirm.
⇨ Change advance angle with pressing + , or - (in 0.1deg steps) and press ENTER to confirm.

6. ADVANCE

With ***Advance*** setting is possible to advance, or retard whole ignition curve. When setting is positive then ignition curve is advanced and when setting is negative then ignition curve is retarded. With ***Advance 0.0deg***, ignition curve is unchanged.

⇨ Enter menu and move to ***Advance*** with pressing + , or - and press ENTER to confirm.
⇨ Set advance with pressing + , or - (in 0.1deg steps) and press ENTER to confirm.

7. ADVANCE 1

With ***Advance 1*** setting is possible to advance, or retard whole curve only on output 1. When setting is positive then ignition curve is advanced and when setting is negative then ignition curve is retarded. With ***Advance 1*** *0.0deg*, ignition curve is unchanged.

⇨ Enter menu and move to ***Advance 1*** with pressing + , or - and press ENTER to confirm.
⇨ Set advance with pressing + , or - (in 0.1deg steps) and press ENTER to confirm.

8. ADVANCE 2

With ***Advance 2*** setting is possible to advance, or retard whole curve only on output 2. When setting is positive then ignition curve is advanced and when setting is negative then ignition curve is retarded. With ***Advance 2*** *0.0deg*, ignition curve is unchanged.

⇨ Enter menu and move to ***Advance 2*** with pressing + , or - and press ENTER to confirm.
⇨ Set advance with pressing + , or - (in 0.1deg steps) and press ENTER to confirm.

9. ADVANCE 3

With ***Advance 3*** setting is possible to advance, or retard whole curve only on output 3. When setting is positive then ignition curve is advanced and when setting is negative then ignition curve is retarded. With ***Advance 3*** *0.0deg*, ignition curve is unchanged.

⇨ Enter menu and move to ***Advance 3*** with pressing + , or - and press ENTER to confirm.
⇨ Set advance with pressing + , or - (in 0.1deg steps) and press ENTER to confirm.

10. GEAR SHIFT LIGHT

⇨ Enter menu and move to ***Gear Shift Light*** with pressing + , or - and press ENTER to confirm
⇨ Change rev point with pressing + , or - (in 100 rpm steps) and press ENTER to confirm

11. QUICK SHIFT

⇨ Enter menu and move to ***Quick Shift*** with pressing + , or - and press ENTER to confirm.
...you entered submenu for ***Quick Shift***.

Submenu organisation:
Shift Kill Time - basic kill time (at 12000rpm)
Smart Shift - activating/deactivating automatic kill time for different revs
Exit - exit submenu

11.1. SHIFT KILL TIME

⇨ Enter ***Quich Shift*** menu and move to ***Shift Kill Time*** with pressing + , or - and press ENTER to confirm.
⇨ Set kill time with pressing + , or - (in 1ms steps) and press ENTER to confirm.

11.2. SMART SHIFT

Smart shift function automatically adjusts kill time for different revs. Shift kill time must be always set, as basic kill time.

⇨ Enter ***Quich Shift*** menu and move to ***Smart Shift*** with pressing + , or - and press ENTER to confirm.
⇨ Enable, or disable ***Smart Shift*** function with pressing + , or - and press ENTER to confirm.

12. Set REV LIMIT

⇨ Enter menu and move to ***Set Rev Limit*** with pressing + , or - and press ENTER to confirm.
...you entered submenu for ***Set Rev Limit***.

Submenu organisation:
Rev Limit - rev limit activation revs
Soft Rev Limit - activating/deactivating soft rev limit
Exit - exit submenu

12.1. Rev Limit

⇨ Enter ***Set Rev Limit*** menu and move to ***Rev Limit*** with pressing + , or - and press ENTER to confirm.
⇨ Change ***Rev Limit*** with pressing + , or - (in 100 rpm steps) and press ENTER to confirm.

12.2. Soft Rev Limit

Soft Rev Limit work in three stages.
⇨ 20rpm before rev limit...ignition is retarded for 10deg
⇨ after rev limit revs...number of ignitions is reduced...ignition is every third revolution
⇨ 20rpm after rev limit...no ignitions

⇨ Enter ***Set Rev Limit*** menu and move to ***Soft Rev Limit*** with pressing + , or - and press ENTER to confirm.
⇨ Enable, or disable ***Soft Rev Limit*** function with pressing + , or - and press ENTER to confirm.

13. Set LAUNCH REV LIMIT

Launch rev limit is activated only when launch rev limit switch is activated...look at wiring diagram.
Launch rev limit override normal rev limit.

⇨ Enter menu and move to ***Set Launch Rev Limit*** with pressing + , or - and press ENTER to confirm.
...you entered submenu for ***Set Launch Rev Limit***.

Submenu organisation:
Launch Rev Limit - launch rev limit activation revs
Soft Rev Limit - activating/deactivating soft launch rev limit
Launch Switch - testing launch rev limit switch
Exit - exit submenu

13.1. Launch Rev Limit

⇨ Enter ***Set Launch Rev Limit*** menu and move to ***Launch Rev Limit*** with pressing + , or - and press ENTER to confirm.
⇨ Change ***Launch Rev Limit*** with pressing + , or - (in 100 rpm steps) and press ENTER to confirm.

13.2. Soft Launch Rev Limit

Soft Launch Rev Limit work in three stages.
⇨ 20rpm before launch rev limit...ignition is retarded for 10deg
⇨ after launch rev limit revs...number of ignitions is reduced...ignition is every third revolution
⇨ 20rpm after launch rev limit...no ignitions

⇨ Enter ***Set Launch Rev Limit*** menu and move to ***Soft Rev Limit*** with pressing + , or - and press ENTER to confirm.
⇨ Enable, or disable ***Soft Launch Rev Limit*** function with pressing + , or - and press ENTER to confirm.

13.3. Test Launch Rev Limit Switch

Test function is for testing launch switch operation.

⇨ Enter ***Set Launch Rev Limit*** menu and move to ***Launch Switch Test:*** with pressing + , or - .
⇨ Programmer returns information about launch switch position...**ON**, or **OFF**.

14. Set BURN OUT REV LIMIT

Burn out rev limit is 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.

⇨ Enter menu and move to ***Set Burn Out Rev Limit*** with pressing + , or - and press ENTER to confirm.
...you entered submenu for ***Set Burn Out Rev Limit***.

Submenu organisation:

Burn Out Rev Limit	- burn out rev limit activation revs
Soft Rev Limit	- activating/deactivating soft burn out rev limit
Burn Out Switch	- testing burn out rev limit switch
Exit	- exit submenu

14.1. Burn Out Rev Limit

⇨ Enter ***Set Burn Out Rev Limit*** menu and move to ***Burn Out Rev Limit*** with pressing + , or - and press ENTER to confirm.
⇨ Change ***Burn Out Rev Limit*** with pressing + , or - (in 100 rpm steps) and press ENTER to confirm.

14.2. Soft Burn Out Rev Limit

Soft Burn Out Rev Limit work in three stages.
⇨ 20rpm before burn out rev limit...ignition is retarded for 10deg
⇨ after burn out rev limit revs...number of ignitions is reduced...ignition is every third revolution
⇨ 20rpm after burn out rev limit...no ignitions

⇨ Enter ***Set Burn Out Rev Limit*** menu and move to ***Soft Rev Limit*** with pressing + , or - and press ENTER to confirm.
⇨ Enable, or disable ***Soft Burn Out Rev Limit*** function with pressing + , or - and press ENTER to confirm.

14.3. Test Burn Out Rev Limit Switch

Test function is for testing burn out switch operation.
⇨ Enter ***Set Burn Out Rev Limit*** menu and move to ***Burn Out Switch Test:*** with pressing + , or - .
⇨ Programmer returns information about burn out switch position...**ON**, or **OFF**.

15. 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.

⇨ Enter menu and move to ***Static Angle*** with pressing + , or - and press ENTER to confirm.
⇨ Set static angle with pressing + , or - (in 0.1deg steps) and press ENTER to confirm.

How to measure static angle?

The most accurate procedure is with dial gauge.

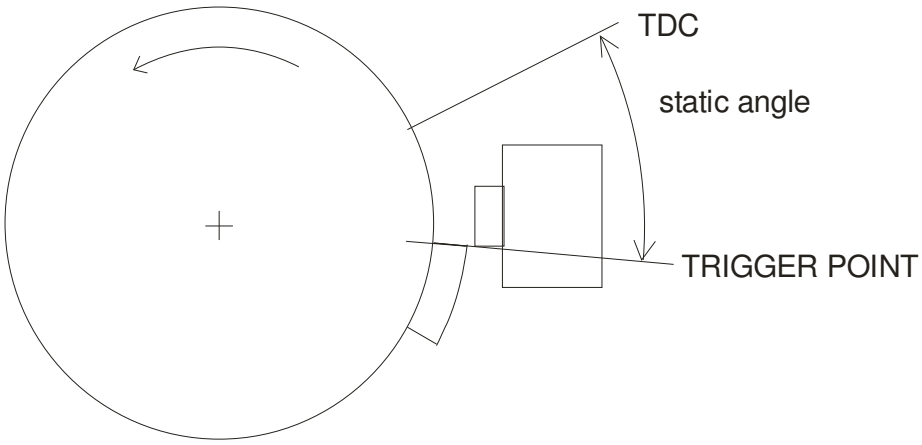
Apply to single and multiple cylinder engines.

Necessary tools:
- stroboscope light
- dial gauge

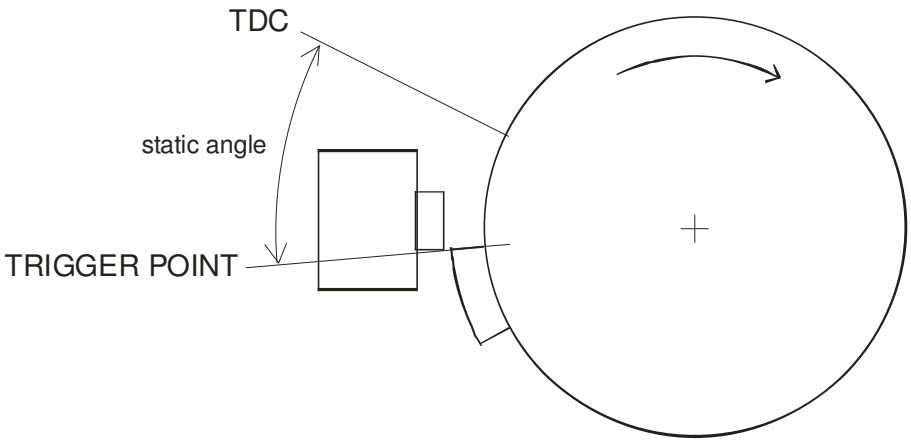
Follow the procedure:

⇨ 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:
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:

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.

16. 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.

Change Compensation:
⇨ Enter menu and move to ***Compensation*** with pressing + , or - and press ENTER to confirm.
⇨ Set ***Compensation*** with pressing + , or - and press ENTER to confirm.

17. POWER JET

⇨ Enter menu and move to ***Power Jet*** with pressing + , or - and press ENTER to confirm.
...you entered submenu for setting ***Power Jet*** parameters.

Submenu organisation:

Invert Polarity	- enable/disable invert operation of power jet
Power Jet ON RPM	- revs for activating power jet
Power Jet OFF RPM	- revs for deactivating power jet
Exit	- exit submenu

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.

17.1. POWER JET ON RPM

⇨ Enter ***Power Jet*** menu and move to ***Power Jet ON RPM*** with pressing + , or - and press ENTER to confirm.
⇨ Change ***Power Jet ON RPM*** with pressing + , or - (in 100 rpm steps) and then press ENTER to confirm.

17.2. POWER JET OFF RPM

⇨ Enter ***Power Jet*** menu and move to ***Power Jet OFF RPM*** with pressing + , or - and press ENTER to confirm.
⇨ Change ***Power Jet OFF RPM*** with pressing + , or - (in 100 rpm steps) and then press ENTER to confirm.

18. IGNITION MAP SWITCH

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

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

19. NUMBER OF PICKUPS

PDCI can run with 1, or 3 pickups.
When using one pickup, then all 3 ignition coils fire at the same time.

⇨ Enter menu and move to ***Nr. of Pickups*** with pressing + , or - and press ENTER to confirm.
⇨ Change nr. of pickups with pressing + , or - and press ENTER to confirm.

20. STOP SWITCH MODE

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

⇨ Enter menu and move to ***Stop SW Mode*** with pressing + , or - and press ENTER to confirm.
⇨ Select low level stop "0", or high level stop "1" with pressing + , or - and press ENTER to confirm.

21. IGNITION TEST

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

⇨ Enter menu and move to ***Ignition Test*** with pressing + , or - .
⇨ After pressing ENTER , multiple sparks will occur, for about 1s for each output channel.

22. PICKUP TEST

With pickup test is possible to check, if PDCI accept signal from pickups.
Pickup test can be performed only when engine rotate.

⇨ Enter menu and move to ***Pickup Test*** with pressing + , or - .

1[ ] ... no signal from pickup 1
1[*] ... signal from pickup 1 accepted
2[ ] ... no signal from pickup 2
2[*] ... signal from pickup 2 accepted
3[ ] ... no signal from pickup 3
3[*] ... signal from pickup 3 accepted

23. MONITORING

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

Programmer show revs, calculated ignition advance angle...depend on settings in the menu.

Information!
You can connect, or disconnect **PDCI** unit from **programmer** any time you want, without any harm. It is not important, if engine running, or not and if power supply is connected or not.

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