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USER MANUAL
PDCI-NS1V PROGRAMMABLE CDI IGNITION AND PV CONTROLLER

PDCI-NS1V is 2 channel DC-CDI and exhaust valve controller, specially designed for Honda RS250 and NSR250. It is programmable with handheld programmer, or PC.

Limit values:

- minimum revs	200 RPM
- maximum revs	20000 RPM
- minimum supply voltage	7 Volts
- recommended power supply voltage	12÷15 Volts
- maximum supply voltage	17 Volts
- stand-by current draw	< 0.09 Amp
- current draw at 1300 RPM	< 0.3 Amp
- current draw at 12000 RPM	< 1.7 Amp
- maximum continuous current for shift light and power jet output	1 Amp
- peak current for shift light and power jet output	5 Amp
- constant spark energy from idle to 13000 RPM	>50mJ

Important!
Circuit is fully protected against reverse polarity from firmware 31.170203.

Features:
- fast power-up (also starts only with condenser)
- full power starting spark energy already at 7Volts power supply
- two isolated input (pickup)
- two 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
- TPS input (Throttle Position Sensor)
- shift light output
- 2 power jet outputs(duty cycle solenoid output)
- quick shift (shift kill)
- soft rev limit (three stage rev limit)
- reduced spark at high revs with closed throttle (TCT mode)
- tachometer output
- easy and fast programming on the field, via hand held programmer
- programming while machine running - you can immediately see effects

- each curve can be set in 4 to 15 curve points
- 3D interpolated ignition map, if TPS selected
- signal delay compensation
- instant monitoring of rev's and angle, via LCD(hand held programmer)
- programmable power valve actuation
- store and load function for 8 PV curves
- external switch for changing PV curve while riding
- 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)
- fast processing for high accuracy - delays from 1us
- 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 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 ORGANIZATION

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

2.1. SET IGNITION PARAMETERS SUBMENU

Load Ign. Map - load (select) ignition map
Save Ign. Map - save new ignition map
Set Ignition Map - ignition map parameters submenu
Advance - advance/retard whole ignition map on both ignition coil outputs
Advance 1 - advance/retard ignition coil output 1
Advance 2 - advance/retard ignition coil output 2
Gear Shift Light - shift light
Quick Shift - quick shift settings

Rev Limit - rev limit
Static Angle - static angle (pickup position)
Compensation - signal delay compensation (from pickup to spark plug)
Power Jet s - set power jets
TPS - enable, or disable TPS
TPS close [0%] - calibrating TPS close position
TPS open [100%] - calibrating TPS open position
TCT mode - reduced spark at high revs with closed throttle
Ign. Map SW - activating/deactivating external switch for selecting ignition map
Trigger Mode - select trigger mode for specific engine
Stop SW Mode - stop switch mode
Tach Ratio - tachometer output pulse ratio
Ignition Test - ignition spark test
Exit

2.2. SET PV PARAMETERS SUBMENU

Load PV Curve - load (select) PV curve
Save PV Curve - save new PV curve
Set PV Curve - PV curve parameters submenu
Deviation +- - deviation of PV position
Close Position - max close PV position
Open Position - max open PV position
PV Test - PV position test
Power-up Test - enable, or disable test cycle at power-up
PV Curve SW - activating/deactivating external switch for selecting PV curve
Exit

3. LOAD IGN. MAP

⇨ Enter ***Set Ign.*** menu and move to ***Load Ign. Map*** 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 ***Set Ign.*** menu and move to ***Save Ign. Map*** 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 *(if TPS disabled)*

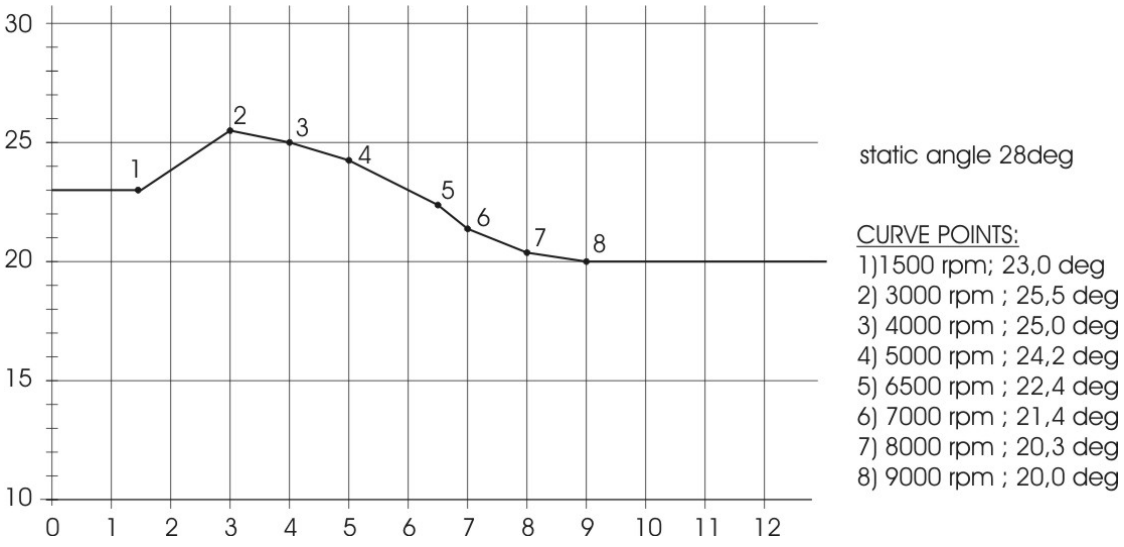
⇨ Enter ***Set Ign.*** menu and move to ***Set Ign. Map*** with pressing + , or - and press ENTER to confirm.
You entered submenu for setting ignition map.

Submenu organisation:

Nr. of Points	- number of ignition curve points (from 4 to 15)
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 #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. SET IGNITION MAP *(if TPS enabled)*

Three ignition curves can 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 Ign. Map*** with pressing + , or - and press ENTER to confirm.
You entered submenu for setting ignition map.

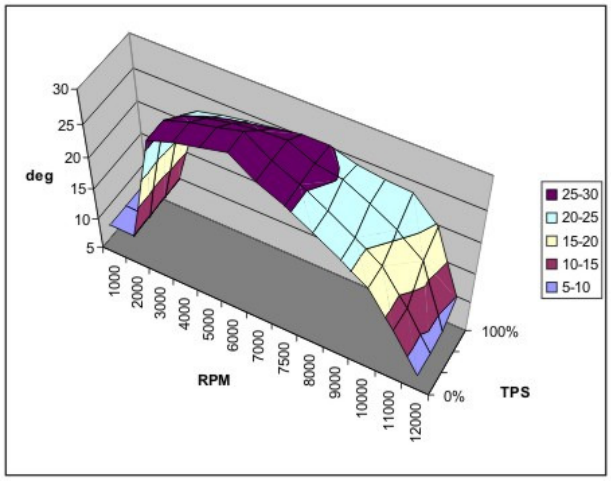
Submenu organisation:

3D Ignition Map	- enable/disable 3D ignition map
Nr. of Points	- number of ignition curve points (from 4 to 15)
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

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.

Ignition Map Example:



5.2. 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.

5.3. 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 of output 1 with pressing + , or - (in 0.1deg steps) and press ENTER to confirm.
⇨ Change advance angle of output 2 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 map on both ignition outputs. When setting is positive then ignition map is advanced and when setting is negative then ignition map is retarded. With ***Advance 0.0deg***, ignition map 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*** is possible to advance, or retard whole map only on output 1. When setting is positive then ignition map is advanced and when setting is negative then ignition map is retarded. With ***Advance 1*** *0.0deg*, ignition map is unchanged.

⇨ Enter ***Set Ign.*** 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 map only on output 2. When setting is positive then ignition cmap is advanced and when setting is negative then ignition cmap is retarded. With ***Advance 2*** *0.0deg*, ignition curve is unchanged.

⇨ Enter ***Set Ign.*** 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. GEAR SHIFT LIGHT

⇨ Enter ***Set Ign.*** 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

10. QUICK SHIFT

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

10.1. 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.

10.2. 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.

11. REV LIMIT

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

12. 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 ***Set Ign.*** 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?

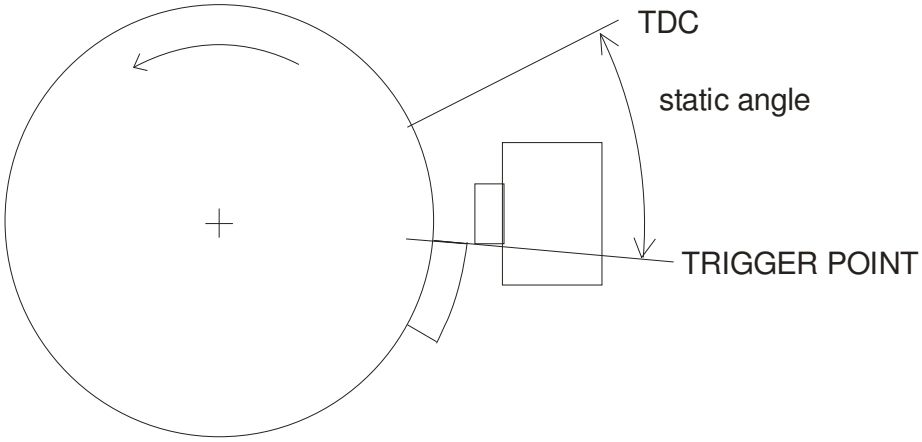
The most accurate procedure is with dial gauge.

Apply to single and multiple cylinder engines.

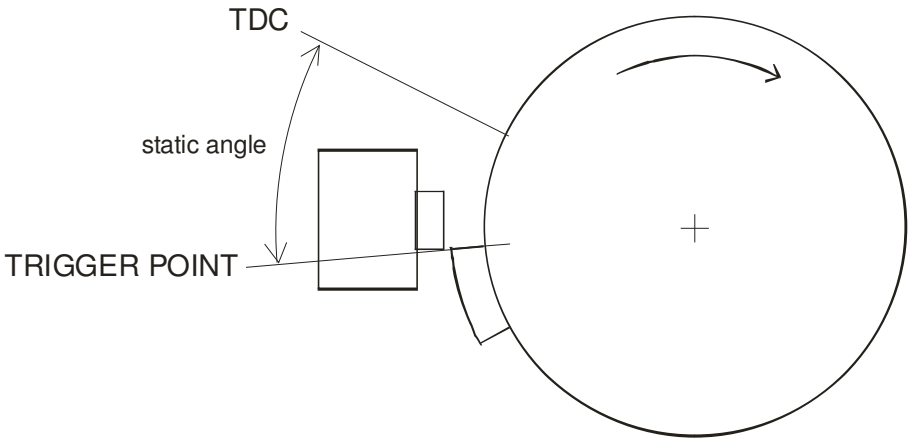
Necessary tools:
- stroboscope light
- dial gauge

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:

$\alpha = \text{ignition advance in degrees}$

$T = \text{ignition advance in mm}$

$R = \text{engine stroke divided by 2 in mm}$

$L = \text{conrod length in mm}$

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

⇨ 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.

13. 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 ***Set Ign.*** menu and move to ***Compensation*** with pressing + , or - and press ENTER to confirm.
⇨ Set ***Compensation*** with pressing + , or - and press ENTER to confirm.

14. POWER JETS

⇨ Enter ***Set Ign.*** menu and move to ***Power Jets*** with pressing + , or - and press ENTER to confirm.
...you entered submenu ***Power Jets***.

Submenu organisation:

Invert Polarity	- invert power jet operation (invert open/close)
set Power Jet 1	- activating/deactivating soft rev limit
set Power Jet 2	- activating/deactivating soft rev limit
Exit	- exit submenu

14.1. INVERT POLARITY of power jets

⇨ Enter ***Power Jets*** menu and move to ***Invert Polarity*** with pressing + , or - and press ENTER to confirm.
⇨ Enable/disable ***Invert Polarity*** with pressing + , or - and press ENTER to confirm.

14.2. set Power Jet 1 *(if TPS enabled)*

Three duty cycle curves for different throttle positions can be programmed. Each curve can be programmed in 8 rev points.

⇨ Enter ***Power Jets*** menu and move to ***set Power Jet 1*** with pressing + , or - and press ENTER to confirm.
...you entered submenu ***set Power Jet 1***.

Submenu organisation:

Curve 0-33%	- duty cycle curve from 0 to 33% TPS
Curve 34-66%	- duty cycle curve from 34 to 66% TPS
Curve 67-100%	- duty cycle curve from 67 to 100% TPS
Exit	- exit submenu

14.3. Change PARAMETERS OF POWER JET 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 duty cycle with pressing + , or - (in 1% steps) and press ENTER to confirm.

14.4. set Power Jet 2

Same as with ***set Power Jet 1***.

15. TPS

⇨ Enter ***Set Ign.*** menu and move to ***TPS*** with pressing + , or - and press ENTER to confirm.
⇨ Enable/disable ***TPS*** with pressing + , or - and press ENTER to confirm.

16. Set TPS close [0%] *(if TPS enabled)*

TPS close position must be calibrated to ensure correct TPS operation!

⇨ Enter ***Set Ign.*** menu and move to ***TPS close [0%]*** with pressing + , or - and press ENTER to confirm.
⇨ Leave throttle at close position and confirm calibrating with pressing ENTER , or exit calibration with pressing - . Displayed number should be between 0 and 500.

17. Set TPS open [100%] *(if TPS enabled)*

TPS open position must be calibrated to ensure correct TPS operation!

⇨ Enter ***Set Ign.*** menu and move to ***TPS open [100%]*** with pressing + , or - and press ENTER to confirm.
⇨ Move throttle to maximum open position and confirm calibrating with pressing ENTER , or exit calibration with pressing - . Displayed number should be between 500 and 1010.

18. TCT mode

Throttle Close spark Termination mode, reduces number of sparks (spark is active every third revolution) above 8000rpm, when throttle is closed. TCT mode ensure better engine cooling.

⇨ Enter ***Set Ign.*** menu and move to ***TCT mode*** with pressing + , or - and press ENTER to confirm.
⇨ Enable, or disable ***TCT mode*** with pressing + , or - and press ENTER to confirm.

This setting is primarily for race use, for normal road use the recommended setting is 'DISABLED'.
If you getting errors on the rev counter then 'DISABLE' this setting.

19. IGN. MAP SW

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

⇨ Enter ***Set Ign.*** 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.

20. Trigger Mode

Select trigger mode for specific engine.
Trigger Mode '1' is for RS250 NF5 and NSR250 MC21
Trigger Mode '2' is for RS250 NX5

⇨ Enter ***Set Ign.*** menu and move to ***Trigger Mode*** with pressing + , or - and press ENTER to confirm.
⇨ Change ***Trigger Mode*** with pressing + , or - and press ENTER to confirm.

21. Stop Switch Mode

It defines stop switch position for engine stop.
"**Low Level Stop**" ... engine stops at low level signal (when stop switch connected to the ground).
"**High Level Stop**" ... engine stops at high level signal (when stop switch is opened).

⇨ Enter ***Set Ign.*** menu and move to ***Stop SW Mode*** with pressing + , or - and press ENTER to confirm.
⇨ Change ***Stop SW Mode*** with pressing + , or - and press ENTER to confirm.

22. Tach Ratio

Tachometer output pulse ratio can be set to 1, or 2 pulses per revolution.

⇨ Enter ***Set Ign.*** menu and move to ***Tach Ratio*** with pressing + , or - and press ENTER to confirm.
⇨ Change ***Tach Ratio*** with pressing + , or - and press ENTER to confirm.

23. 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 ***Set Ign.*** menu and move to ***Ignition Test*** with pressing + , or - . With pressing ENTER multiple sparks will occur, for about 1s separately on each cylinder.

24. Load PV Curve

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

25. Save PV Curve

⇨ Enter ***Set Ign.*** menu and move to ***Save PV 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.

26. Set PV Curve

⇨ Enter ***Set PV*** menu and move to ***Set PV Curve*** with pressing + , or - and press ENTER .
...you entered submenu for setting PV curve.

Submenu organisation:

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

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

26.1. Change Number of Curve Points

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

24.2. Change Parameters of PV Curve Points

⇨ Move to point you want to change, with pressing + , or - and press ENTER to confirm.
⇨ Change rev point with pressing + , or - and press ENTER to confirm.
⇨ Change PV position from 0% to 100%, with pressing + , or - and press ENTER to confirm.

25. Deviation

⇨ Enter ***Set PV*** menu and move to ***Deviation*** with pressing + , or - and press ENTER to confirm.
⇨ Change deviation from 2% to 20% with pressing + , or - (in 1% steps) and then ENTER to confirm.
Deviation means how accurate valve move 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.

26. Close Position

Max close position must be calibrated. Max close position is when curve is set to 0%. Close position can be moved to any desired position.

⇨ Enter ***Set PV*** menu and move to ***Close Position*** with pressing + , or - and press ENTER to confirm.
⇨ Set close position with pressing + , or - and press ENTER to confirm.

27. Open Position

Max open position must be calibrated. Max open position is when curve is set to 100%. Open position can be moved to any desired position.

⇨ Enter ***Set PV*** menu and move to ***Open Position*** with pressing + , or - and press ENTER to confirm.
⇨ Set open position with pressing + , or - and press ENTER to confirm.

28. PV Test

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.

⇨ Enter ***Set PV*** menu and move to ***PV Test*** with pressing + , or - and press ENTER to confirm.
⇨ Set valve position with pressing + , or - and press ENTER to confirm.

29. Powe-up Test

Enabling, or disabling test cycle of PV servo at power-up.

⇨ Enter ***Set PV*** menu and move to ***Power-up Test*** with pressing + , or - and press ENTER to confirm.
⇨ Enable, or disable power-up test with pressing + , or - and press ENTER to confirm.

30. PV CURVE SW

Enabling, or disabling PV curve switch for changing PV curves while riding.

⇨ Enter ***Set PV*** menu and move to ***PV Curve SW*** with pressing + , or - and press ENTER to confirm.

⇨ Enable, or disable ***PV Curve*** switch with pressing + , or - and press ENTER to confirm.

31. MONITORING

Connect **programmer** to **PDCI** 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, TPS position...depends on setting 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 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!

32. ERROR REPORTS

PVerr 1 – position sensor error, or servo motor disconnected
PVerr 2 – servo motor error (short connection)