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USER MANUAL
PSR-X-T PROGRAMMABLE CDI IGNITION

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

TECHNICAL DATA

Limit values:
- minimum revs	500 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
- peak current for shift light output	5 Amp

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

Features:
- CDI charged from hi voltage charging coils (generator)
- does not require battery supply
- store and load function for 2 ignition maps
- external switch for changing ignition map while riding
- one input for magnetic pickup
- 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, ignition advance,... via LCD(hand held programmer)
- fast processing for high accuracy - delays from 1us

1.   HOW TO ENTER MENU

⇨ Connect **programmer** to **PSR** and wait few seconds for activation of **programmer** and press ENTER .

⇨ With pressing + , or - you can move through menu and select with pressing ENTER .

⇨ Exit menu with selecting *Exit.*

2.   MENU ORGANISATION

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)
Set Ignition Curve	- ignition curve parameters submenu
Advance	- advance/retard whole ignition curve
Rev Limit	- rev limit
Static Angle	- static angle (stator position)
Compensation	- signal delay compensation (from pickup to spark plug)
Ign. Map SW	- activating/deactivating external switch
Pulses Per Rev	- number pulses per rev from pickup
Trigger Mode	- trigger mode
Kickback Protection	- kickback protection
Exit	

3.   LOAD IGN. CURVE

⇨ 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. CURVE

⇨ 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 CURVE

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

Submenu organisation:
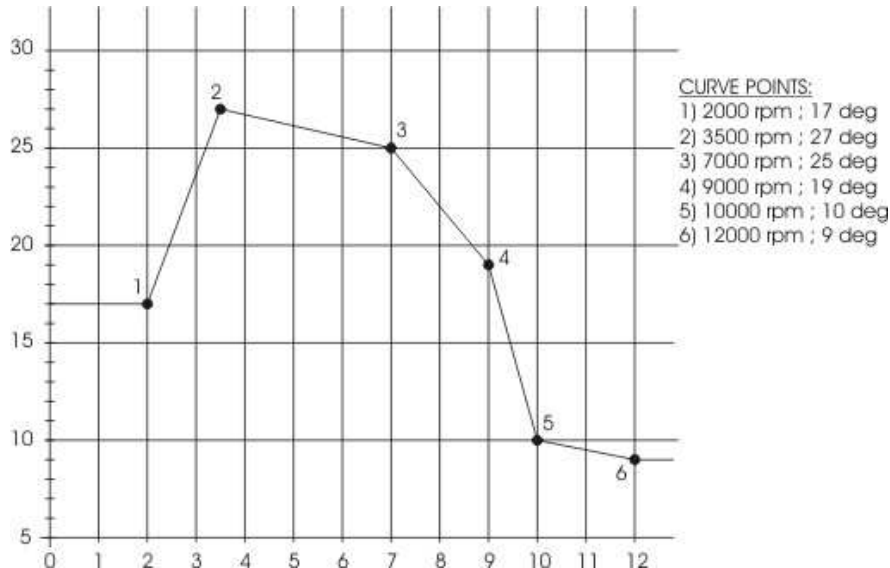
Nr. of Points	- number of ignition curve points (from 4 to 10)
1)	- first ignition curve point
2)	- second ignition curve point
...	...
Exit Curve	- exit submenu

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 position #0. Later you can save it to other position 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 press ENTER .
⇨ Select number of ignition points, with pressing + , or - and press ENTER .

5.2.   Change PARAMETERS OF IGNITION CURVE POINT

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

6.   Set 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 .
⇨ Set advance with pressing + , or - (in 0.1deg steps) and press ENTER .

7. Set REV LIMIT

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

8. 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 .
⇨ Set static angle with pressing + , or - (in 0.1deg steps) and press ENTER .

How to measure static angle?

The most accurate procedure is with dial gauge.
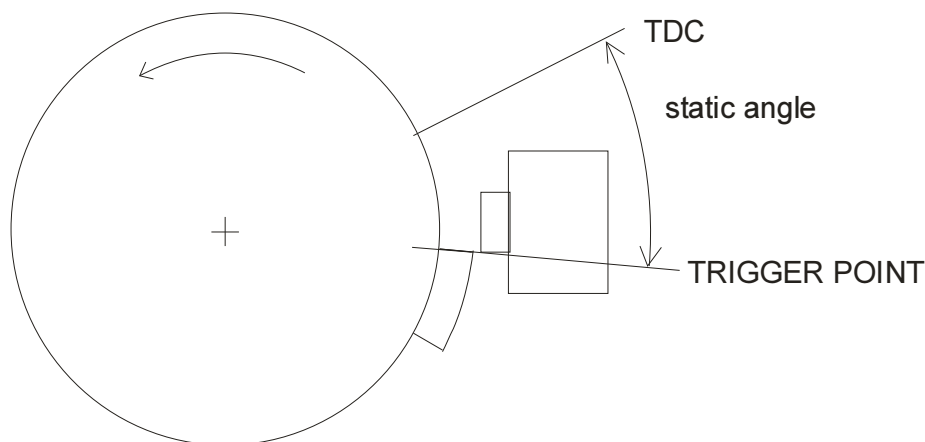
Apply to single and multiple cylinder engines.

Necessary tools:
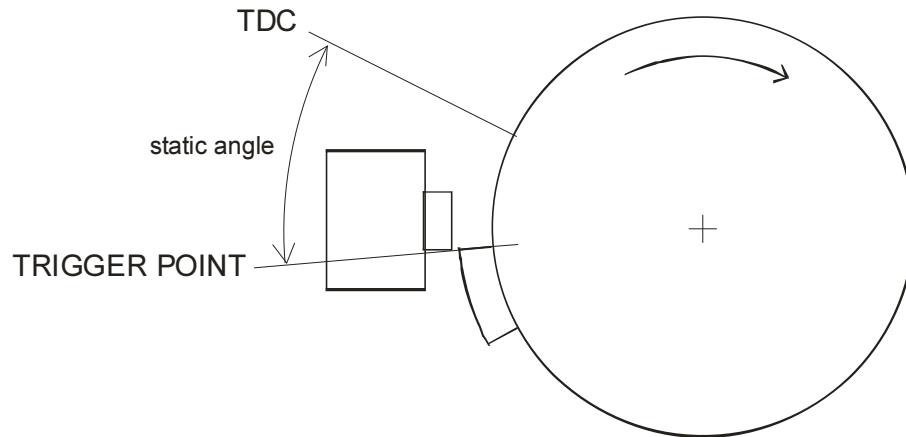- stroboscope light
- dial gauge

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.

9. 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.
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 .
⇨ Set **Compensation** with pressing + , or - and press ENTER .

10. Set Ign. Map SW

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 .
⇨ Enable, or disable external switch with pressing + , or - and press ENTER .

11. PULSES PER REV

It is number of pulses per rev from pickup coil and is important for correct rev reading. Setting is 2 for all twins with wasted spark ignition system.

⇨ Enter menu and move to **Pulses Per Rev** with pressing + , or - and press ENTER .
⇨ Set **Pulses Per Rev** with pressing + , or - and press ENTER .

12. 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 .
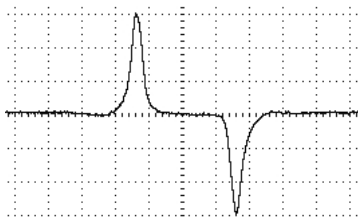
Trigger signal from pickup consist of positive and negative pulse. Positive pulse must be first and is generated by leading edge of trigger bar...negative pulse must be second and is generated by trailing edge of trigger bar.

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.
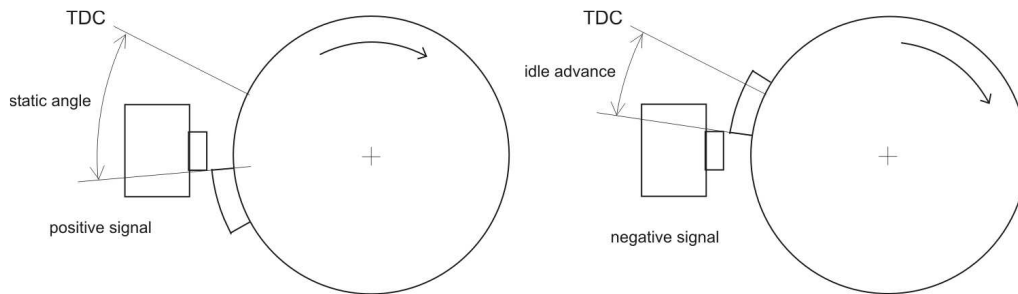
When **"only [+] signal"** is checked, then only positive signal is detected and ignition timing is calculated with all revs as programmed with ignition map.

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.
<u>Example:</u> 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.

13.   KICKBACK PROTECTION

Kickback protection is necessary for large single cylinder engines. Kickback is possible when engine rotate too slow while kick starting...too low inertia while ignition.
Ensure enough inertia with setting minimal revs to correct value. Too high value will make starting harder.

⇨ Enter menu and move to ***Kickback Protection*** with pressing `+` , or `-` and press `ENTER` .
⇨ Change minimal revs with pressing `+` , or `-` (in 100 rpm steps) and press `ENTER` .

14.   MONITORING

Connect **programmer** to **PSR** 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 **PSR** 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!

Important!
Excessive static charge can damage PSR, or programmer. Large static charge can
build up while running on the dyno. To prevent any harm, it is recommended to make
ground connection between bike and dyno chassis.