USER MANUAL
VCDI-24 DIGITAL IGNITION CONTROL UNIT

VCDI-24 is designed to work with one pickup sensor, throttle position sensor and two outputs with programmable timing offset.

VCDI-24 does not only switch between ignition curves, but also calculate timing between programmed curves for all TPS positions above 33%. From idle to 33%, is used one ignition curve.

TECHNICAL DATA

Limit values:

minimum revs	200 RPM
maximum revs	20000 RPM
minimum supply voltage	8 Volts
maximum supply voltage	20 Volts
max. supply voltage for 1 minute	40 Volts

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

Features:
- three programmable ignition curves (TPS33%, TPS66%, TPS100%)
- store and load function for three ignition curve sets
- TPS function (ignition curve is 3D interpolated above TPS33%)
- 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 12 curve points
- three stage rev limit (retard timing, reduced spark, spark off)
- signal delay compensation
- programable timing offset between twin output (RD/RZ500)
- instant monitoring of rev's, angle and TPS position, via LCD(hand held programmer)
- fast processing for high accuracy - delays from 1us
- timing calculation for every 1 RPM change (1000, 1002, .. , 9805, 9806, ...)

1.   HOW TO ENTER MENU

VCDI must be connected to power supply. Connect **programmer** to **VCDI** and wait few seconds for activation of **programmer** and then press `enter`. With pressing `+` or `-` you can move through menu and with pressing `enter` you can choose.
You can exit menu with choosing *Exit Settings.*

2.   MENU ORGANISATION

Load Curve	- load previously saved ignition curve set (from #1 to #3)
Save Curve	- save new ignition curve set (from #1 to #3)
Ignition Curve	- program ignition curve parameters
Rev Limit	- rev limit
Static Angle	- static angle (stator position)
Compensation	- signal delay compensation (from pickup to spark plug)
Pulse Width	- output signal pulse width
Pulses Per Rev	- number pulses per rev from pickup
Out 1→2 offset	- timing offset between outputs
TPS close [0%]	- calibrating TPS close position
TPS open [100%]	- calibrating TPS open position
Exit Settings	

3.   LOAD SETTINGS

Enter menu and move to *Load Settings* with pressing `+` or `-` and then press `enter` .
Now you can select position number of previously saved ignition curve set, with pressing `+` or `-` and then press `enter` .

4.   SAVE SETTINGS

Enter menu and move to *Save Settings* with pressing `+` or `-` and then press `enter` .
Now you can select position number to which you want to save your ignition curve set, with pressing `+` or `-` and then press `enter` .

5.   Change IGNITION CURVE

Three ignition curves must be programmed for different TPS positions. **VCDI** does not only switch between ignition curves, but also calculate timing between programmed curves for all TPS positions above 33%. From idle to 33% is used only one ignition curve.

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

Submenu organisation:

Nr. of Points — number of ignition curve points (from 4 to 12)
Curve 0-33% — ignition curve from 0 to 33% TPS
Curve 66% — ignition curve for 66% TPS
Curve 100% — ignition curve for 100% TPS
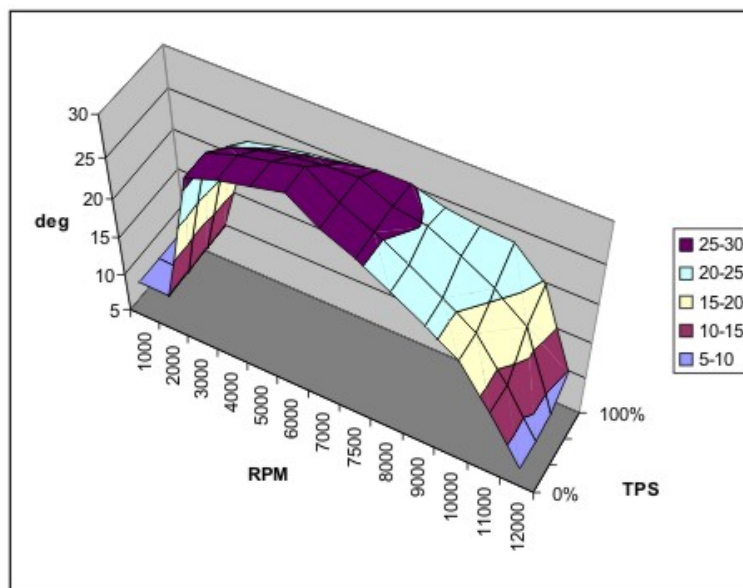*Exit Curve* — exit submenu

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 #3.

Curve Example:

5.1.   Change NUMBER OF IGNITION CURVE POINTS

Move to *Nr. of Points* with pressing ⊞ or ⊟ and then press ⌷enter⌷ .
Now you can 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⌷ .
Now you can change rev point with pressing ⊞ or ⊟ (in 100 rpm steps) and then press ⌷enter⌷ .
Now you can change advance angle with pressing ⊞ or ⊟ (in 0.1deg steps) and then press ⌷enter⌷ .

6.   Change REV LIMIT

Enter menu and move to *Rev Limit* with pressing `+` or `-` and then press `enter` .
Now you can change rev limit with pressing `+` or `-` (in 100 rpm steps) and then press `enter` .

7.   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 12.

8.   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 moving then you must change compensation delay.

Change Compensation:
Enter menu and move to *Compensation* with pressing `+` or `-` and then press `enter` .
Now you can change compensation delay with pressing `+` or `-` and then press `enter` .

9.   PULSE WIDTH

It is output pulse width (duration) in us. It affect on CDI triggering. Recommended setting is 200us or 100us.
Enter menu and move to *Pulse Width* with pressing `+` or `-` and then press `enter` .
Now you can change pulse width with pressing `+` or `-` (in 100us steps) and then press `enter` .

10.   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 then press `enter` .
Now you can change nr. of pulses per rev with pressing `+` or `-` and then press `enter` .

11.   OUT 1→2 OFFSET

It is timing offset from output 1 to output 2 in degrees. Programmable timing offset enable compensation of front to rear crank offset on RD/RZ500.
Enter menu and move to ***Out 1→2 offset*** with pressing `+` or `-` and then press `enter` .
Now you can change offset in degrees with pressing `+` or `-` and then press `enter` .

12.   TPS close [0%]

For correct operation, TPS close position must be calibrated!
Enter menu and move to ***TPS close [0%]*** with pressing `+` or `-` and then press `enter` .
Leave throttle at close position and confirm calibrating with pressing `enter` , or exit calibration with pressing `-` . Displayed number should be between 0 and 500.

13.   TPS open [100%]

For correct operation, TPS open position must be calibrated!
Enter menu and move to ***TPS open [100%]*** with pressing `+` or `-` and then press `enter` .
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.

14.   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 **VCDI**.

For example:
Measured **Static Angle** = 39.2deg   (this angle you must enter in VCDI)

Calculating mm to deg or vice versa:

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

15.   MONITORING

Connect **programmer** to **VCDI** 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 TPS position.

Information!
You can connect or disconnect **VCDI** unit from **processor** unit 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!

16.   ERROR REPORTS

Two errors can be displayed:
Program Memory Error - when program memory is corrupted. With this error present, function of program could be faulty.
EEPROM Error - when eeprom memory is corrupted. All programmable data are stored in eeprom memory (curve, rev limit...). With this error present, function of program could be faulty. *You must check all your settings and correct changed.*