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## USER MANUAL VCDI-30 DIGITAL IGNITION CONTROL UNIT

### 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
- 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:

- three inputs for magnetic pickups
- store and load function for 10 ignition curves
- shift light output
- external switch for changing ignition curve while riding
- 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 10 curve points
- advance/retard whole ignition curve
- three stage rev limit (retard timing, reduced spark, spark off)
- signal delay compensation
- instant monitoring of rev's and angle, 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 . With pressing  or  you can move through menu and with pressing  you can choose. You can exit menu with choosing *Exit*.

## 2. MENU ORGANISATION

<i>Load Settings</i>	- load previously saved ignition curve set (from #1 to #2)
<i>Save Settings</i>	- save new ignition curve set (from #1 to #2)
<i>Ignition Curve</i>	- ignition curve parameters
<i>Advance</i>	- advance/retard whole ignition curve
<i>Rev Limit</i>	- rev limit
<i>Static Angle</i>	- static angle (stator position)
<i>Compensation</i>	- signal delay compensation (from pickup to spark plug)
<i>Pulse Width</i>	- output signal pulse width
<i>Shift Light</i>	- shift light
<i>Remote SW</i>	- activating/deactivating external switch
<i>Exit</i>	

## 3. LOAD SETTINGS

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

## 4. SAVE SETTINGS

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

## 5. Change IGNITION CURVE

Enter menu and move to **Ignition Curve** with pressing  or  and then press  .  
Now you are in submenu for setting ignition curve.

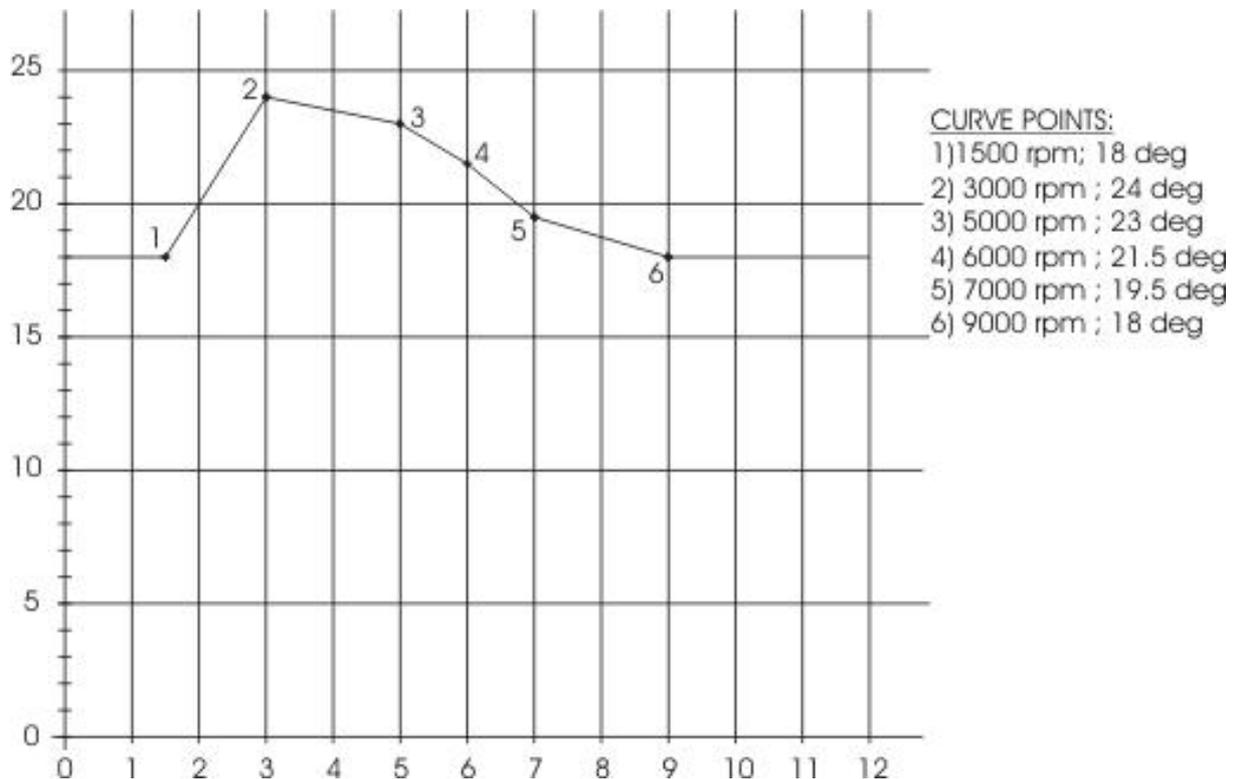
Submenu organisation:

- 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 #0 position.  
Then you can save it to any other position number from #1 to #10.

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  .  
Now you can select number of ignition points, with pressing  or  and then press  .

## 5.2. Change PARAMETERS OF IGNITION CURVE POINT

Move to point you want to change, with pressing  or  and then press .

Now you can change rev point with pressing  or  (in 100 rpm steps) and then press .

Now you can change advance angle with pressing  or  (in 0.1deg steps) and then press .

## 6. Set ADVANCE

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

Enter menu and move to *Advance* with pressing  or  and then press .

Now you can set advance with pressing  or  (in 0.1deg steps) and then press .

## 7. Set REV LIMIT

Enter menu and move to *Rev Limit* with pressing  or  and then press .

Now you can change rev limit with pressing  or  (in 100 rpm steps) and then press .

## 8. Set STATIC ANGLE

Enter menu and move to *Static Angle* with pressing  or  and then press .

Now you can set static angle with pressing  or  (in 0.1deg steps) and then press .

More information's about static angle you can find in section 13.

## 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.

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 .

Now you can change compensation delay with pressing  or  and then press .

## 10. Set 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  $\boxed{+}$  or  $\boxed{-}$  and then press  $\boxed{\text{enter}}$ .

Now you can change pulse width with pressing  $\boxed{+}$  or  $\boxed{-}$  (in 100us steps) and then press  $\boxed{\text{enter}}$ .

## 11. Set SHIFT LIGHT

Enter menu and move to **Shift Light** with pressing  $\boxed{+}$  or  $\boxed{-}$  and then press  $\boxed{\text{enter}}$ .

Now you can change rev point with pressing  $\boxed{+}$  or  $\boxed{-}$  (in 100 rpm steps) and then press  $\boxed{\text{enter}}$ .

## 12. Set REMOTE SW

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

Enter menu and move to **Remote SW** with pressing  $\boxed{+}$  or  $\boxed{-}$  and then press  $\boxed{\text{enter}}$ .

Now you can enable or disable external switch with pressing  $\boxed{+}$  or  $\boxed{-}$  and then press  $\boxed{\text{enter}}$ .

## 13. 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**.

Example:

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

*Calculating mm to deg or vice versa:*

$\alpha$  = ignition advance in degrees

$T$  = ignition advance in mm

$R$  = engine stroke divided by 2 in mm

$L$  = conrod length in mm

$P = R + L - T$

$$\alpha = \cos^{-1} \left( \frac{P^2 + R^2 - L^2}{2 \cdot P \cdot R} \right)$$

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

## 14. MONITORING

Connect **programmer** to **VCDI** and wait few seconds for activation of **programmer**. First 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 **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!

## 15. 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.*

## How to measure static angle?

The most accurate procedure is with dial gauge.

Apply to single and multiple cylinder engines.

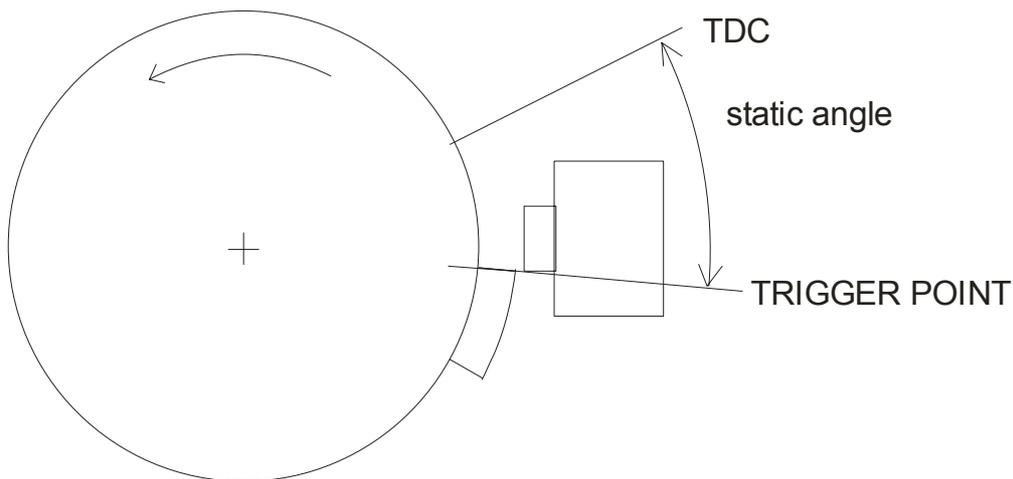
### Necessary tools:

- stroboscope light
- dial gauge

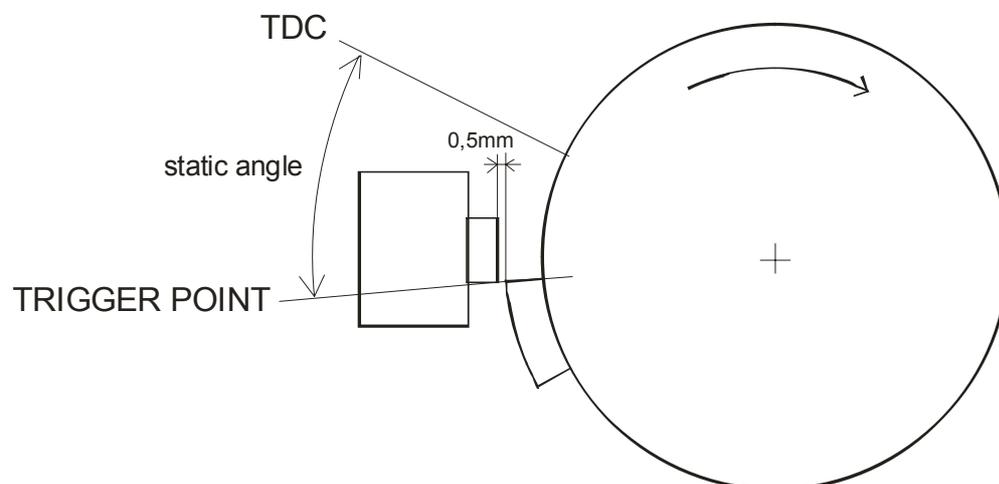
### Follow the procedure:

⇒ 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:

$\alpha = 16\text{deg}$  (ignition advance)

$L = 110\text{mm}$  (conrod length)

$R = 54/2 = 27\text{mm}$  (engine stroke divided by 2)

$T = 1,3\text{mm}$  (calculated ignition advance in mm)

Equation for calculating from degrees to millimetres:

$\alpha$  = 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.