www.zeeltronic.com
info@zeeltronic.com

updated 15.09.2024
application version: 02.231218

PROGRAMMING MANUAL
ZeelProg PDCIS-MX11T

Supported control units: **PDCIS-MX11T**

PDCIS-MX11T is single channel DC-CDI with 2 switchable ignition maps, TPS, power jet, two general purpose outputs (GPO) and quick shift.

TECHNICAL DATA

Limit values:

- minimum revs	200 RPM
- maximum revs	20000 RPM
- minimum supply voltage	8 Volts
- maximum supply voltage	17 Volts
- recommended power supply voltage	12 ÷ 15 Volts
- max stand-by current draw	30 mAmp
- current draw at 1200 RPM	0.15 Amp
- max current draw without power jet, or GPO engaged	1.1 Amp
- output energy at 11000 RPM	54 mJ
- output energy at 15000 RPM	40 mJ
- output energy at 20000 RPM	30 mJ

Features:
- fast power-up (also starts only with condenser)
- full power starting spark energy already at 8 Volts power supply
- one isolated input for magnetic pickup
- 3D interpolated ignition map
- two selectable ignition maps
- external switch for changing ignition map while riding
- TPS input (Throttle Position Sensor)
- power jet output
- two general purpose outputs (GPO)
- two soft rev limits (two stage rev limit)
- tachometer output (rpm) ... one pulse per revolution
- quick shift
- easy and fast programming on the field, via hand held programmer
- programming with PC
- programming while machine running
- signal delay compensation ensure accurate ignition advance
- instant monitoring of rev's and angle, via LCD(hand held programmer), or PC monitor
- fast processing for high accuracy - delays from 1us

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

Very important!
CDI is protected against static discharge, but too high static charge can damage CDI.
Be careful when using programmer on the dyno, because static charge can build up on the bike and static discharge can damage CDI unit, or programmer. Make ground connection between dyno and bike frame to prevent static discharge through programmer and CDI.

Danger of electric shock!
Avoid connecting PDCIS to 12V power supply before connecting to ignition coil. High voltage is generated and touching free wires can cause electric shock, or damage of the unit.

ZeelProg SOFTWARE INSTALLATION GUIDE

ZeelProg is PC application for programming ZEELTRONIC engine *control units*.
For programming special PC-USB programmer is needed.

➲ ***ZeelProg*** automatically detects PC-USB programmer connection and enables all functions (without PC-USB programmer, ***ZeelProg*** application is locked).
➲ ***ZeelProg*** automatically detects type of engine *control unit* connected to PC-USB programmer.

Software can be also downloaded from web site:
http://www.zeeltronic.com/page/zeelprog.php

ZeelProg application can be installed on Windows XP/Vista/7/8/10/11.

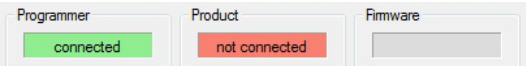
ZeelProg USER INTERFACE

Auto detection

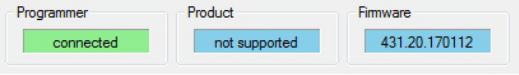
Zeelprog automatically detects USB-Programmer and type of *control unit*.

⇨ Programmer connected, product (*control unit*) connected:

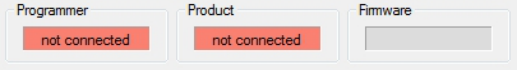
⇨ Programmer connected, product (*control unit*) not connected:



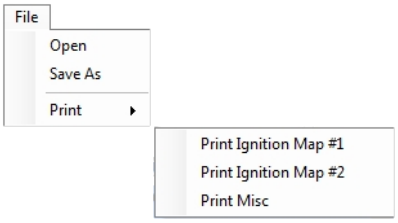
⇨ Programmer connected, product (*control unit*) not supported:



⇨ Programmer not connected, product (*control unit*) not connected:



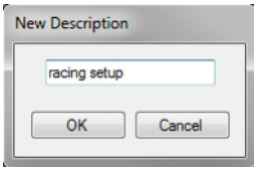
Menu structure



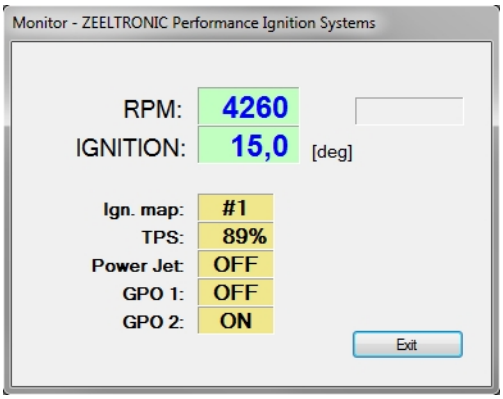
⇨ **File menu** is active when PC-USB programmer is connected

Open → Open an existing *.zee file
Save As → Save all parameters to *.zee file
Print → Print ignition maps and misc parameters

⇨ **Description** can be added to the settings. Description is added to the saved file and also while programming to the product (ECU).

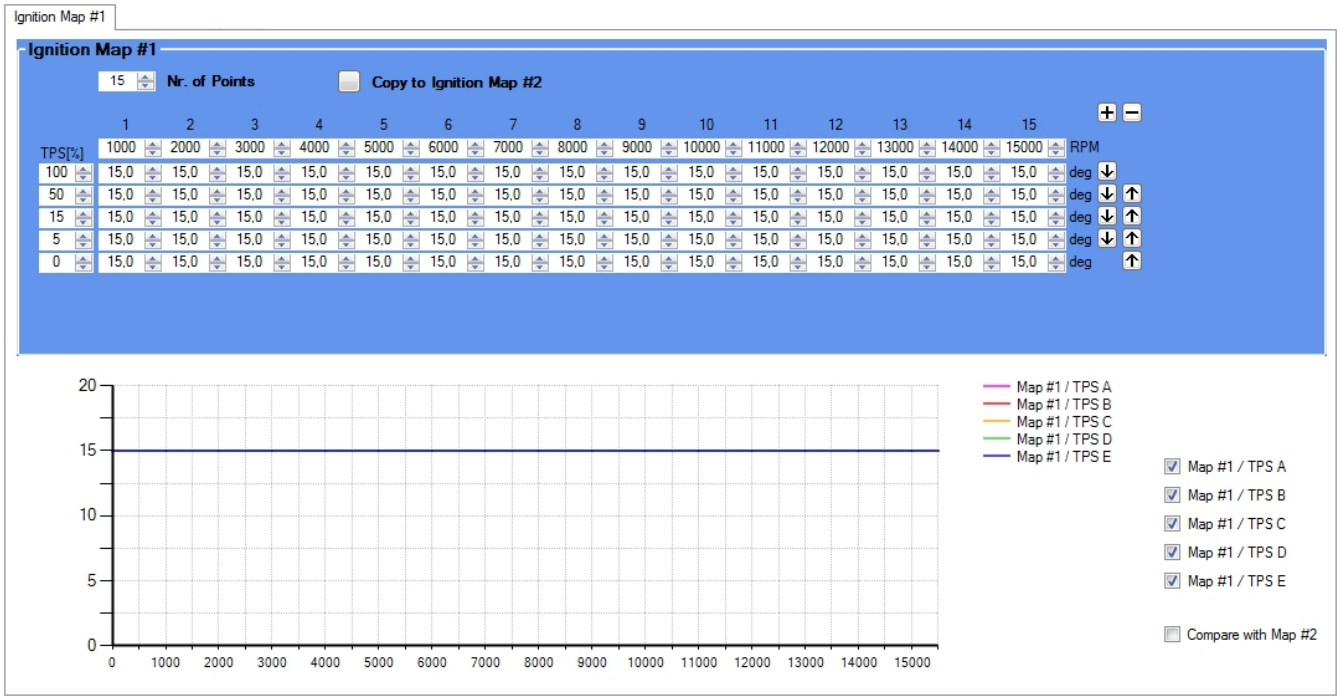


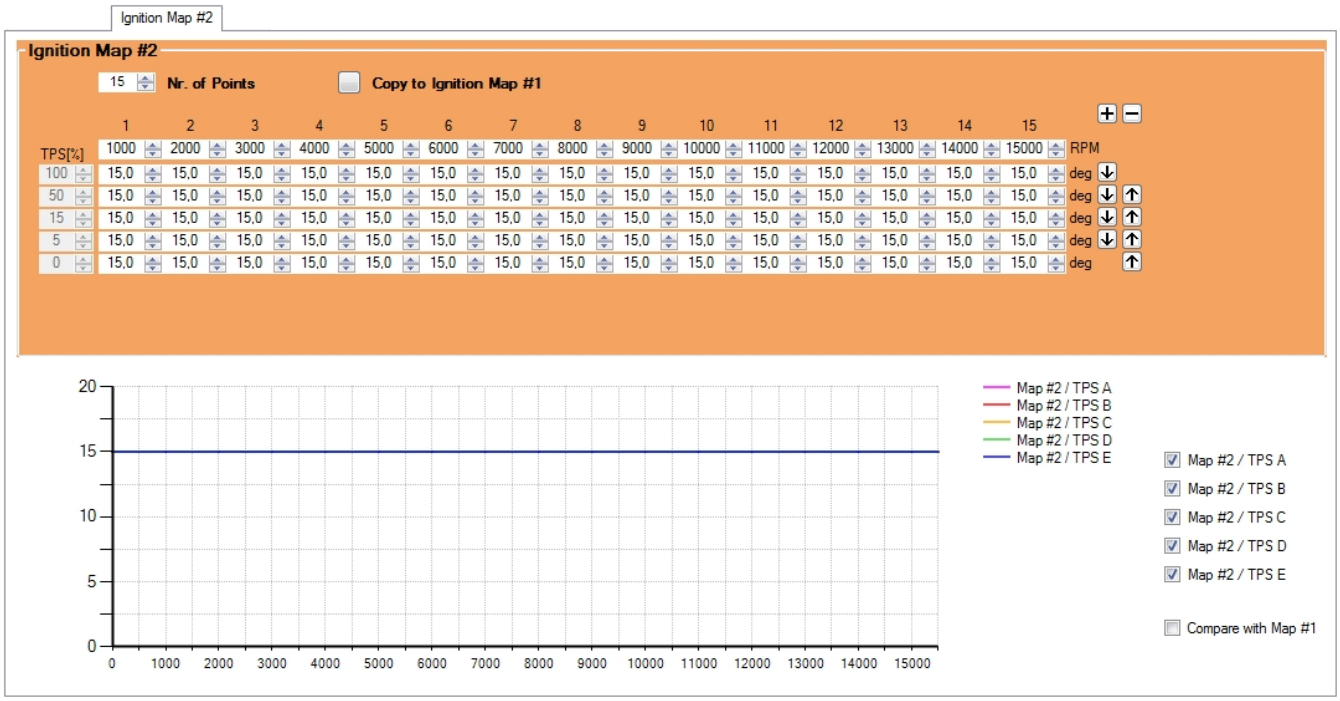
⇨ **Monitor** is active when *control unit* is connected to PC-USB programmer.
Clicking on the **Monitor** opens Monitor window.



⇨ Clicking on **About** opens About window and show some basic information about ***ZeelProg*** application.

Ignition Parameters

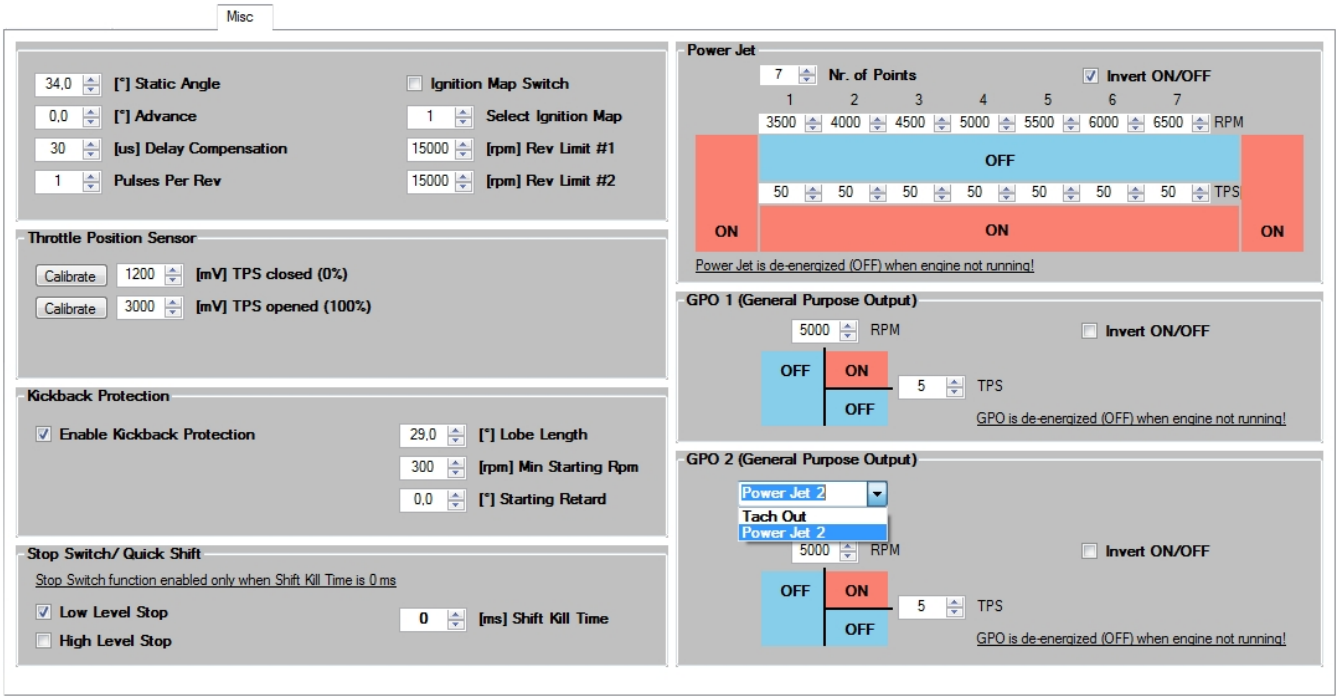




Ignition advance is 3D interpolated.

- ⇨ **Nr. of Points** for each ignition map can be set from 4 to 15.
- ⇨ **RPM** of each ignition point can be set from 500rpm to 20000rpm in 10rpm steps. At the left side must be lowest RPM value and each next point must have higher value then previous...
- ⇨ **deg**...advance of each ignition point can be set from 0deg to 85deg in 0,1deg steps
- ⇨ **TPS[%]**...TPS points can be set from 0% to 100% in 1% steps. At the bottom must be lowest TPS value and each next point must have higher value then previous.
- ⇨ ➕... increment all ignition points
- ⇨ ➖... decrement all ignition points
- ⇨ ⬇... copy down entire row
- ⇨ ⬆... copy up entire row

Misc Parameters



⇨ **Static Angle** is pickup advance position from TDC (Top Dead Centre)
⇨ **Advance** ... advances, or retards whole ignition map from -10 deg to 10 deg in 0,1deg steps. Positive value advances and negative value retards.
⇨ **Delay Compensation** ... ensure correct ignition angle through whole revs. Default value is 30us.
Delay compensation is compensation of signal delay from pickup to spark plugs. Compensation ensures that ignition advance is same as programmed (accurate).
How to check, if compensation is correct:
- program flat ignition curve
- measure ignition advance with strobe light at low and at high revs
- if advance at low and high revs is not same, then compensation delay must be adjusted

⇨ **Ignition Map Switch**...enables, or disables ignition map switch. Ignition map can be selected with simple on/off switch, when function is enabled.
⇨ **Select Ignition Map**...selection is active only when **Ignition Map Switch** is not enabled.
⇨ **Rev limit** #1 ... rev limit for ignition map #1
⇨ **Rev limit** #2 ... rev limit for ignition map #2
⇨ **Pulses per Rev** ... for singles set to 1 and for twins (wasted spark) set to 2.

Throttle Position Sensor:

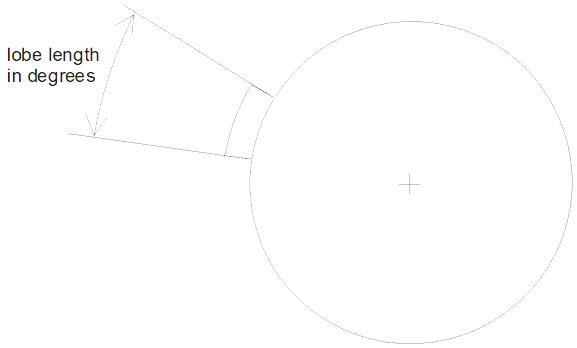
⇨ **TPS closed [0%]**...TPS close position must be calibrated, for correct TPS operation !
⇨ **TPS opened [100%]**...TPS open position must be calibrated, for correct TPS operation!

Stop Switch/ Quick Shift

⇨ ***Shift Kill Time*** must be set when quick shifter is used. Usually it have to be set around 60 ms. When shift ***Shift Kill Time*** is set above 0 ms, then stop switch function is disabled.
⇨ **Stop Switch Mode: Low Level Stop**... engine stops when low level signal (when stop switch connected to the ground)
⇨ **Stop Switch Mode: High Level Stop**... engine stops when high level signal (when stop switch is opened)

Kickback protection:

⇨ **Enable Kickback Protection**... enables, or disables kickback protection.
⇨ **Lobe Length [°]**... trigger lobe length in degrees. Lobe length is used to calculate RPM at starting. Wrong value result in wrong calculation.
⇨ **Min Starting RPM**... minimal RPM for starting.
⇨ **Starting Retard [°]**... ignition retard, only at starting.



Power Jet:

Power jet changes state when TPS value is lower, or higher from programmed value.
Min and max revs setting also change power jet state.
TPS curve is interpolated between RPM points.

⇨ **Nr. of Points**... number of RPM and TPS points.
⇨ **Invert ON/OFF**... inverting power jet operation. ON means energized power jet and OFF means de-energized power jet.
⇨ **RPM** of each point can be set from 500rpm to 20000rpm in 10rpm steps. At the left side must be lowest RPM value and each next point must have higher value then previous...
⇨ **TPS[%]**...TPS points can be set from 0% to 100% in 1% steps.
⇨

Example of power jet operation:
Apply to above screenshot settings...
ON means energized power jet and OFF means de-energized power jet.
PJ is OFF when TPS is higher then 50% and revs are between 3500rpm and 6500rpm.

GPO 1 (General Purpose Output):

GPO changes state when revs and TPS are higher/lower then programmed value.

⇨ **Invert ON/OFF**... inverting GPO operation. ON means energized GPO and OFF means de-energized GPO.
⇨ **RPM** of each point can be set from 500rpm to 20000rpm in 10rpm steps.
⇨ **TPS[%]**...TPS points can be set from 0% to 100% in 1% steps.

GPO 2 (General Purpose Output):

⇨ **GPO 2** output can be configured as **Tachometer** (rpm) output, or **Power Jet 2** output.
Tachometer (rpm) output always gives 1 pulse per revolution.
⇨ Selected as **Power Jet 2** operates same as **GPO 2**
⇨ *Example of GPO operation:*
Apply to above screenshot settings...
ON means energized GPO and OFF means de-energized GPO.
GPO is ON when revs are above 5000rpm and TPS is above 5%.

PROGRAMMING AND SETTING NEW PARAMETERS

➲ While programming or reading, *control unit* does not need to be connected to power supply, because it is supplied through PC-USB programmer.

Changing control unit parameters

① Read parameters from connected *control unit*, by pressing **Read** button.

Progress bar indicate read and verify process.

Successful reading is indicated as: 

Error while reading is indicated as: 

If error occurs, then repeat reading.

② Change parameters

③ Program parameters to connected *control unit*, by pressing **Program** button.

Progress bar indicate program and verify process.

Successful programming is indicated as: 

Error while programming is indicated as: 

If error occurs, then repeat programming.

Make new *.zee file without connecting control unit

① Connect PC-USB programmer to PC.

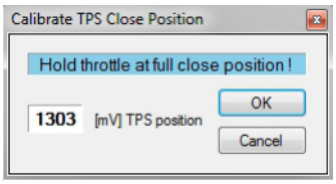
② Set parameters

③ Save parameters by clicking **Save As** from **File menu**.

TPS Close Position [0%]

TPS close position must be calibrated, For correct operation of TPS function!

TPS close position can be set manually by entering number, or calibrated by clicking on **Calibrate** button.
Using **Calibrate** function is more recommended.



Clicking on **Calibrate** button opens **Calibrate TPS Close Position** window.

⇨ to finish calibration: hold throttle at full close position and press **OK** button

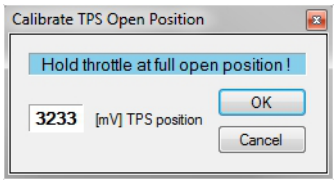
⇨ to cancel calibration: press **Cancel** button

TPS Open Position [100%]

For correct operation of TPS function, TPS open position must be calibrated!

TPS open position can be set manually by entering number, or calibrated by clicking on **Calibrate** button.
Using **Calibrate** function is more recommended.

Clicking on **Calibrate** button opens **Calibrate TPS Open Position** window.

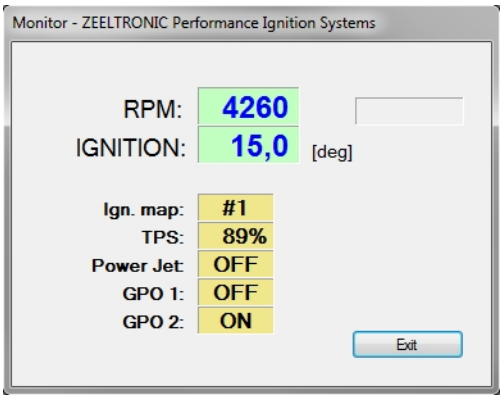


⇨ to finish calibration: hold throttle at full open position and press **OK** button
⇨ to cancel calibration: press **Cancel** button

MONITOR FUNCTION

⇨ **Monitor** function is active when *control unit* is connected to PC-USB programmer.

Clicking on **Monitor** opens Monitor window.



⇨ Monitor show engine revolution, ignition advance angle, TPS position, selected ignition map, rev limit operation, power jet operation, GPO operation.

MEASURING STATIC ANGLE

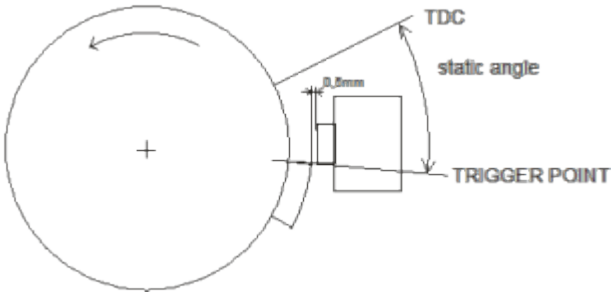
Measuring correct static angle is very important. Wrong static angle will cause inaccurate ignition advance. If static angle is programmed larger than mechanical static angle ignition advance will be smaller than programmed, or vice versa.
The most accurate procedure of measuring static angle is with dial gauge and strobe light.

Procedure applies to single and multiple cylinder engines. If you have a multi cylinder engine with multple pickups it is recommended (but not required) that you perform this procedure on each cylinder/pickup pair for most accurate timing.

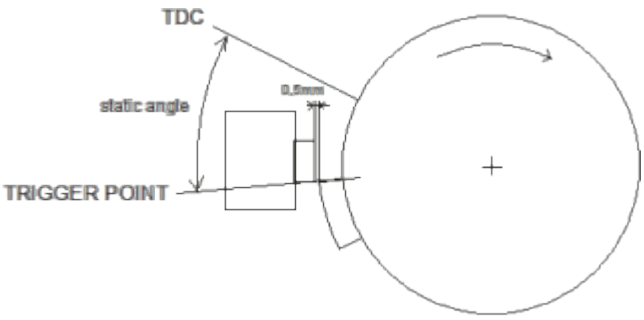
Necessary tools:
- strobe light
- dial gauge

Follow the procedure:
Measure approximate static angle with a degree wheel, just to have starting point...look at the drawing below.

Counterclockwise 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

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

Downloadable spreadsheet is available on request.

- remove sparkplug from cylinder head and mount dial gauge in cylinder.
- find TDC (Top Dead Centre)
- rotate engine backwards (opposite from running engine rotation) to calculated advance in millimetres (in example above it is 1,3mm) and make marks on rotor and stator
- remove dial gauge and install sparkplug back in cylinder head
- start engine and run at constant speed of 3000rpm to 4000rpm
- use a strobe light to check alignment of marks on rotor and stator
- adjust static angle with programmer to align marks on the rotor and stator

Result of above procedure is very accurate static angle.

Important!

- Static angle is reference point for CDI to calculate delay for programmed ignition advance.
- Static angle has to be greater then maximum ignition advance!
- Example - If maximum advance in ignition map is 30deg, then static angle has to be at least 31deg.
- Very large static angles are not a good solution, because it decreases electronic ignition advance stability (do not use static angle greater then 45deg if not necessary).

If you find when testing with your strobe light that your timing marks are off by 10 or more degrees it may be neccessary to reverse the wiring from the reluctor pickup to the ignition and test again. Reluctor pickups have polarity but it is rarely marked on the pickups so must be determined by the trial and error method. Incorrect wiring polarity will cause the reluctor pickup to send the trigger signal on the trailing edge of the rotor instead of the required leading edge of the rotor.

Explanation of trigger signal from pickup

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.
Leading edge of trigger bar defines static angle position and trailing edge defines idle running timing position.