ProyectECU Kraken Manual

This manual covers the hardware (sensors, wiring, etc.), software configuration, and setting items related to the operation of the ProyectECU. When getting started with ProyectECU, especially if this is your first time installing and configuring an electronic engine management system, this manual will help you understand the capabilities of ProyectECU and how it should be installed, both in terms of hardware and software/firmware.

While this document will help provide information related to ProyectECU setup, it does not cover advanced engine tuning, fuel/ignition strategies, etc. For this we will be having free video talks on the ProyectECU page.

Getting Started

In terms of starting with ProyectECU, it can help to understand the various components that make up the system:

A ProyectECU board- This is the muscle of the ECU and contains all the controllers and IO circuitry. Also, this is the brain of the ECU and contains the processor, memory and storage. ProyectECU connects to interface with the vehicle's wiring harness
Firmware: This is the system software that runs on the processor and powers its operation. New firmware is released regularly with updates, performance improvements and bug fixes.

As a starting point it is generally recommended to connect the ECU to a 12v source and connect it to the tuning software (TunerStudio) before proceeding to installation on the vehicle. The configuration of the software in ProyectECU can be completed without the need for it to be installed in the vehicle and this allows the software and options available to be explored.

About This Manual

This documentation is continually growing, and this means that you may find gaps in the documentation where little information is currently provided. Feel free to post in the ProyectECU group if there's anything you critically (or even not so critically) need missing.

Getting Started with ProyectECU Kraken

Hardware and software can be configured in many ways, so understanding the requirements and configuration steps can be daunting initially.

The links below will help you get an overview of each area, how it should be configured, and how it relates to the general configuration.

Hardware requirements: what hardware you will need to work with ProyectECU (sensors, wiring, injectors, coils, etc.)

Specific ECU information:
ProyectECU Kraken8
ProyectECU KrakenTest

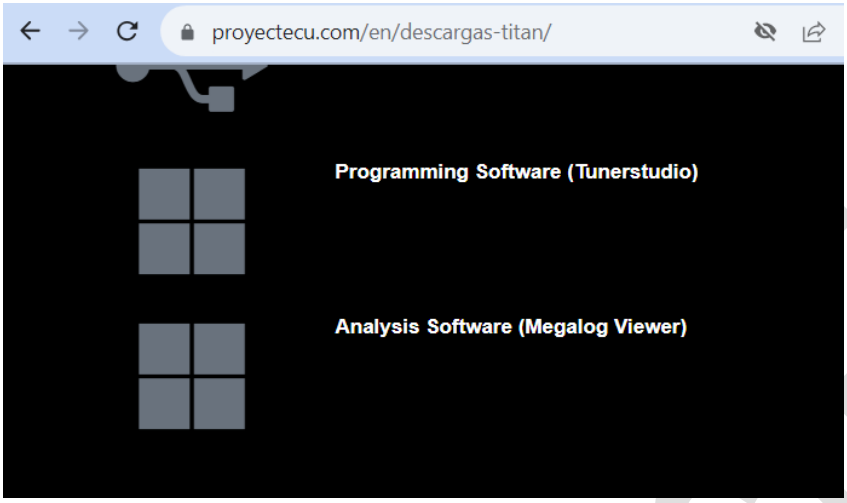
Working with TunerStudio software

Connecting to TunerStudio

Downloading Tuner Studio

If you haven't already, grab a copy of Tuner Studio from EFI Analytics Tuner Studio is available for Windows, Mac and linux and will run on most PCs as it's system requirements are fairly low.

For your convenience it can also be downloaded from ProyecECU.com webpage in the download section (windows version).



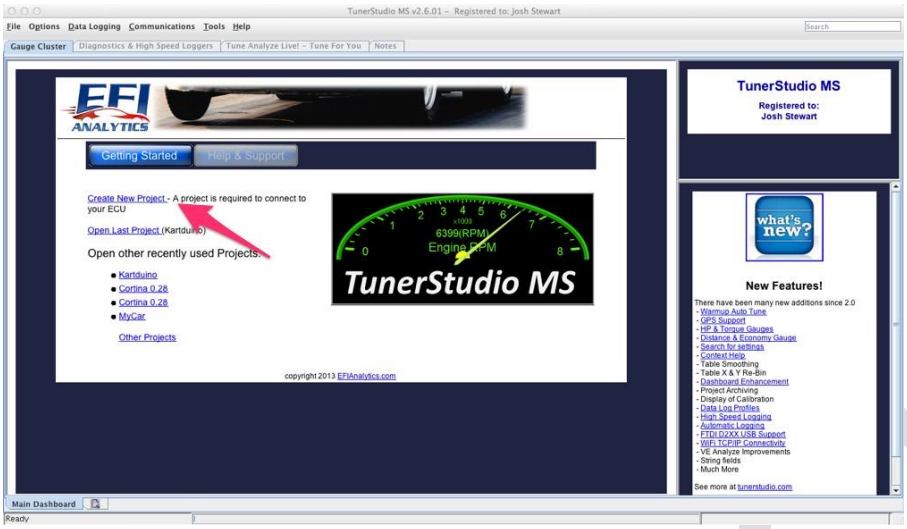
The current minimum version of TunerStudio required is 3.0.7, but the latest version is usually recommended.

If you find Tuner Studio to be useful, please consider paying for a license. This is a fantastic program from a single developer that rivals the best tuning software in the world, it's worth the money.

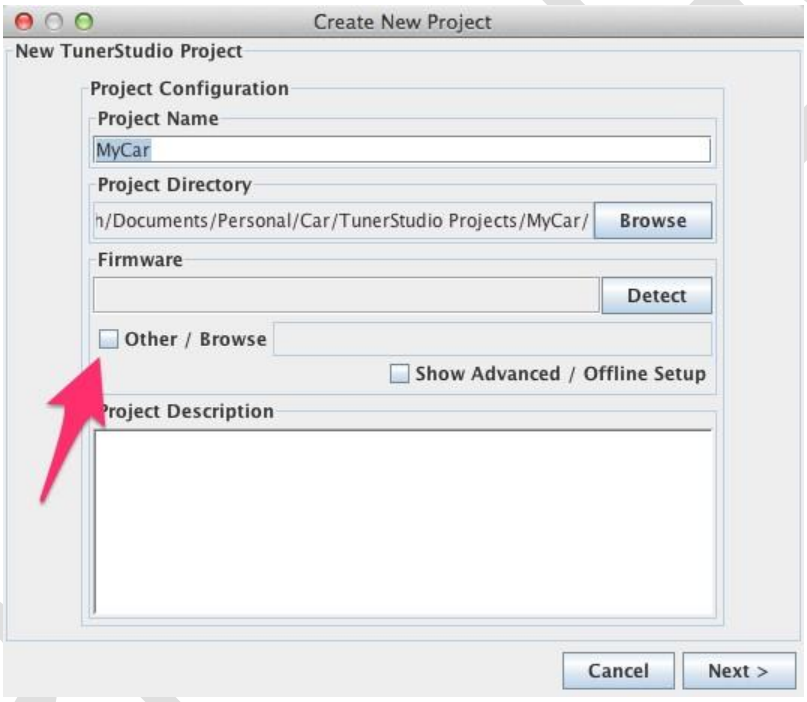
Setting up your project

Create new project

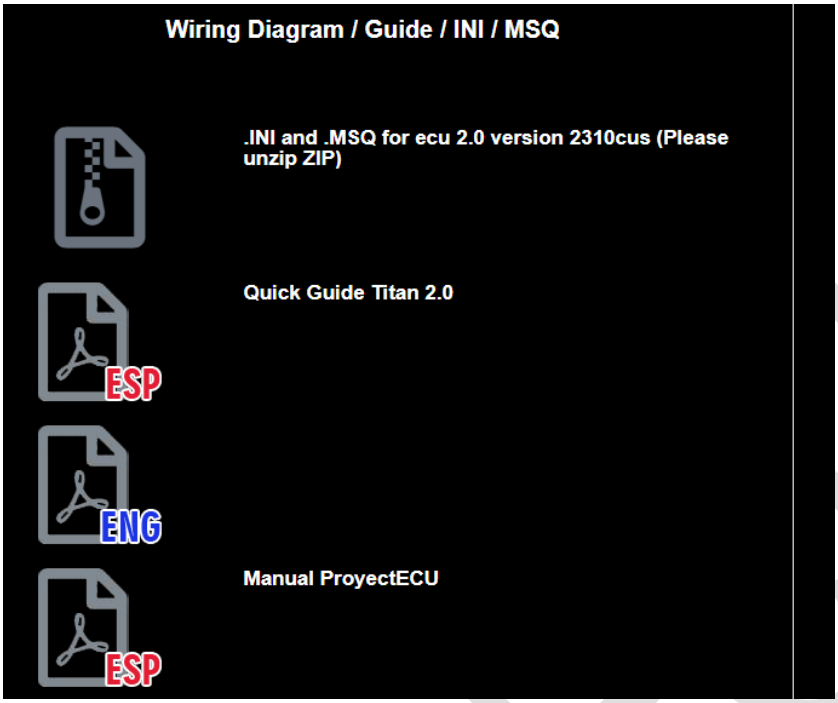
When you first start TunerStudio, you'll need to setup a new project which contains the settings, tune, logs etc. On the start-up screen, select 'Create new project'

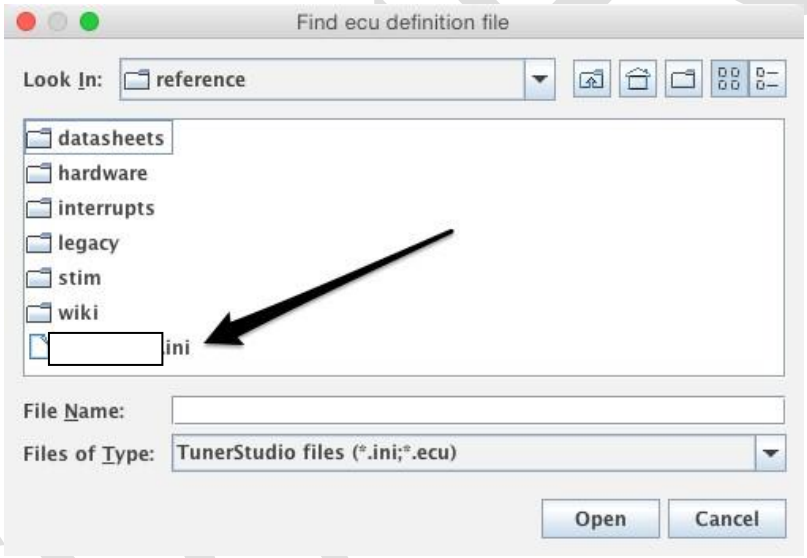


Give you project a name and select the directory you want the project to be stored in. Tuner Studio then requires a firmware definition file in order to communicate with the processor. Tick the ‘Other / Browse’ button.



Then download the .ini file from ProyecECU.com webpage and unzip the zip file and browse to the directory where the ini file is located.

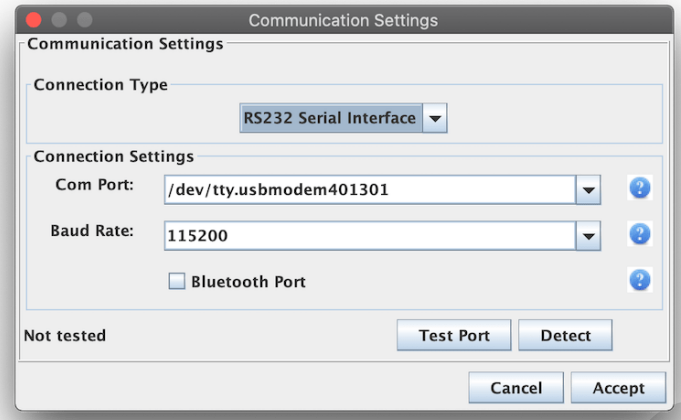




Configuration options

Comms settings

Select your comms options. The exact port name will depend on which operating system you are running, and this will be the same as in the Processor IDE. Baud rate should be 115200.

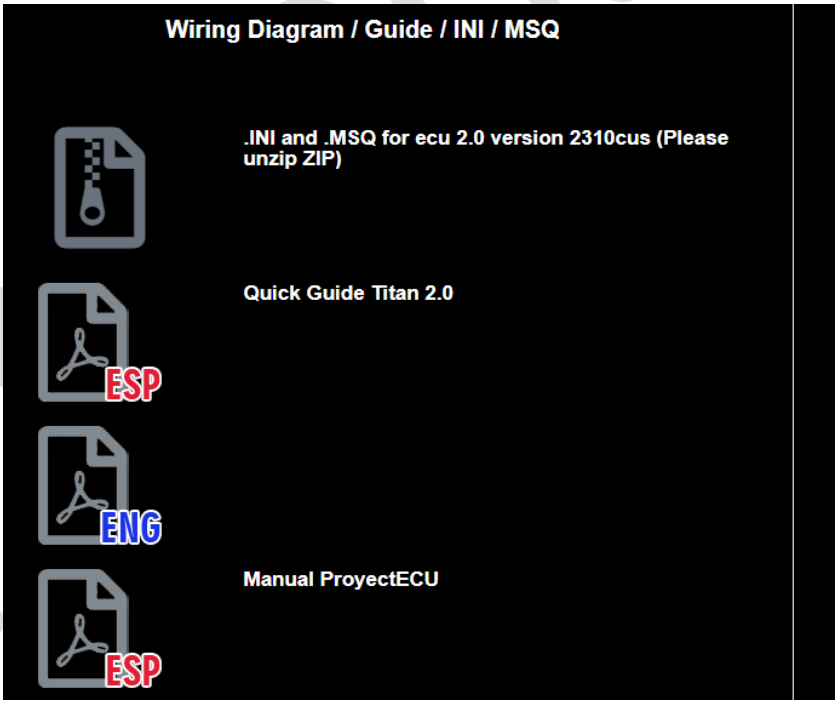


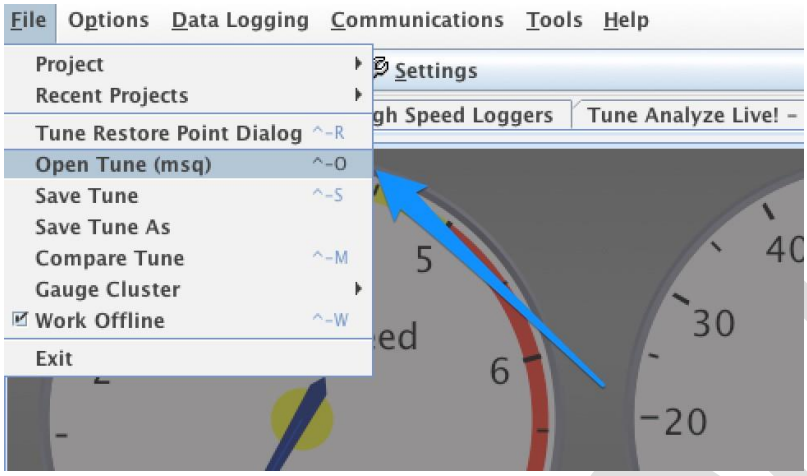
> **Note:** The Detect and Test port options require Tuner Studio version 3.0.60 or above to work correctly

Load base tune

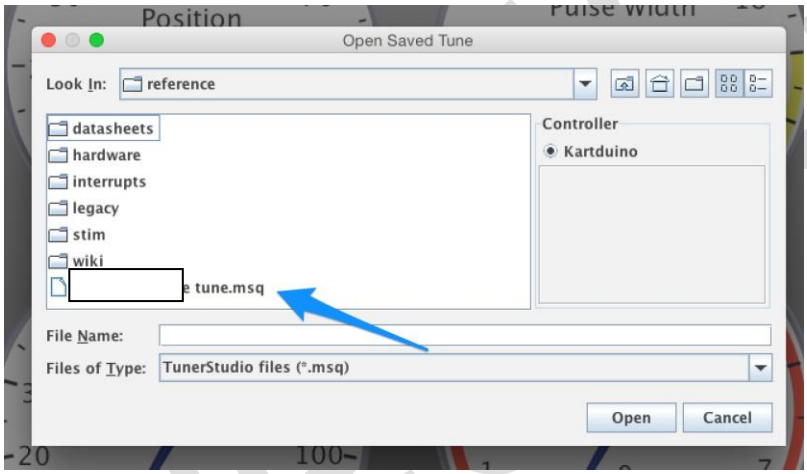
Once the project is created, you'll need to load in a base tune to ensure that all values are at least somewhat sane. Failure to do this can lead to very strange issues and values in your tune.

Normally a base tune is already loaded in the ECU, but also this basetune was downloaded alongside the .ini file from ProyecECU.com webpage.





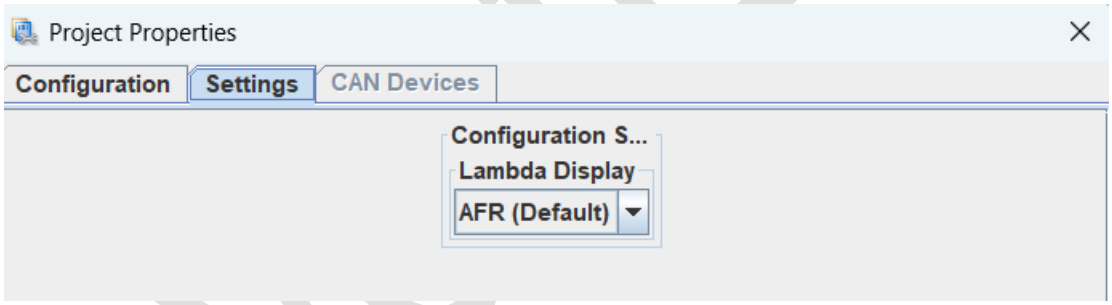
Look for the directory the base tune is located and open it:



And that's it! Tuner Studio should now attempt to connect to the ECU and show a real-time display of the ECU.

Configuring TunerStudio Project Properties

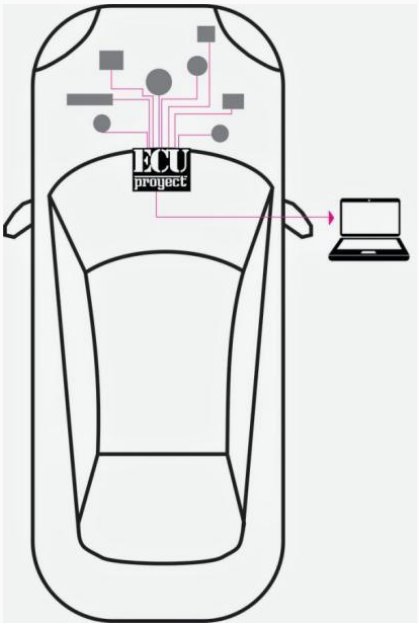
Once opened this page will be seen.

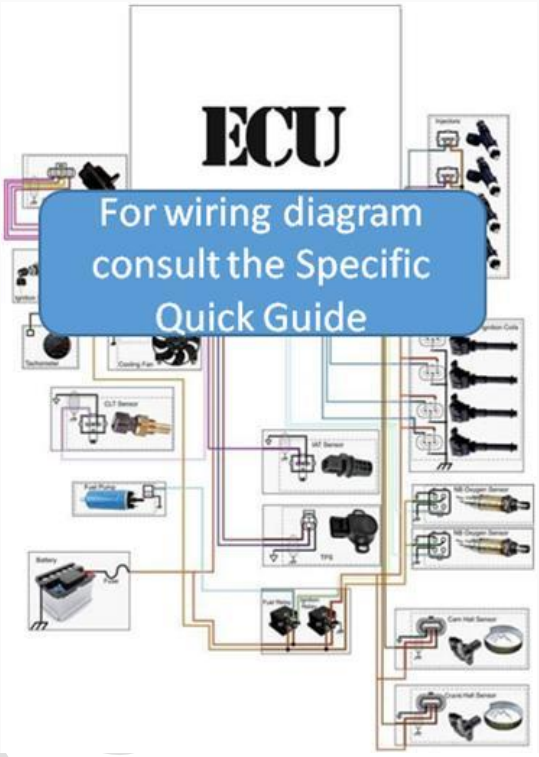


System Wiring Diagram Wiring

Guide

At a glance, ProyectECU can be configured in many ways depending on the engine, sensors, ignition and fuel hardware used. For this reason it is impossible to provide 1 single diagram that covers all scenarios, however the following is provided as a high level guide that can be used as a starting point. (Use ProyectECU Quick Guide).





Function Specific Diagrams
More detailed wiring guides for specific areas can be found below:

Injector/Ignition Wiring

Introduction
ProyectECU Kraken8 contains 8 injector and Ignition control banks and is capable of supporting up to 8 cylinders with these.

Supported Injectors
ProyectECU supports High-Z injectors (also known as 'high impedance' or 'saturated' injectors) natively. Low Z injectors are supported by adding resistors connected in series with the signal wires. High Z injectors are typically those with a resistance greater than 8 ohms.

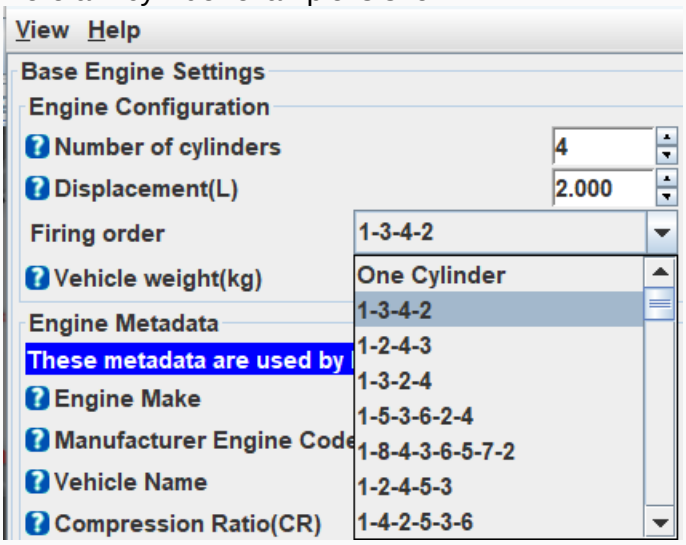
If lower impedance "Low-Z" ("Peak and Hold" or PWM controlled) injectors are used, the wiring will require series resistors on each injector to avoid damaging the injectors or the board with excessive current. The resistance of ohms and watts can be calculated according to Ohm's law, or use a calculator page on the internet.

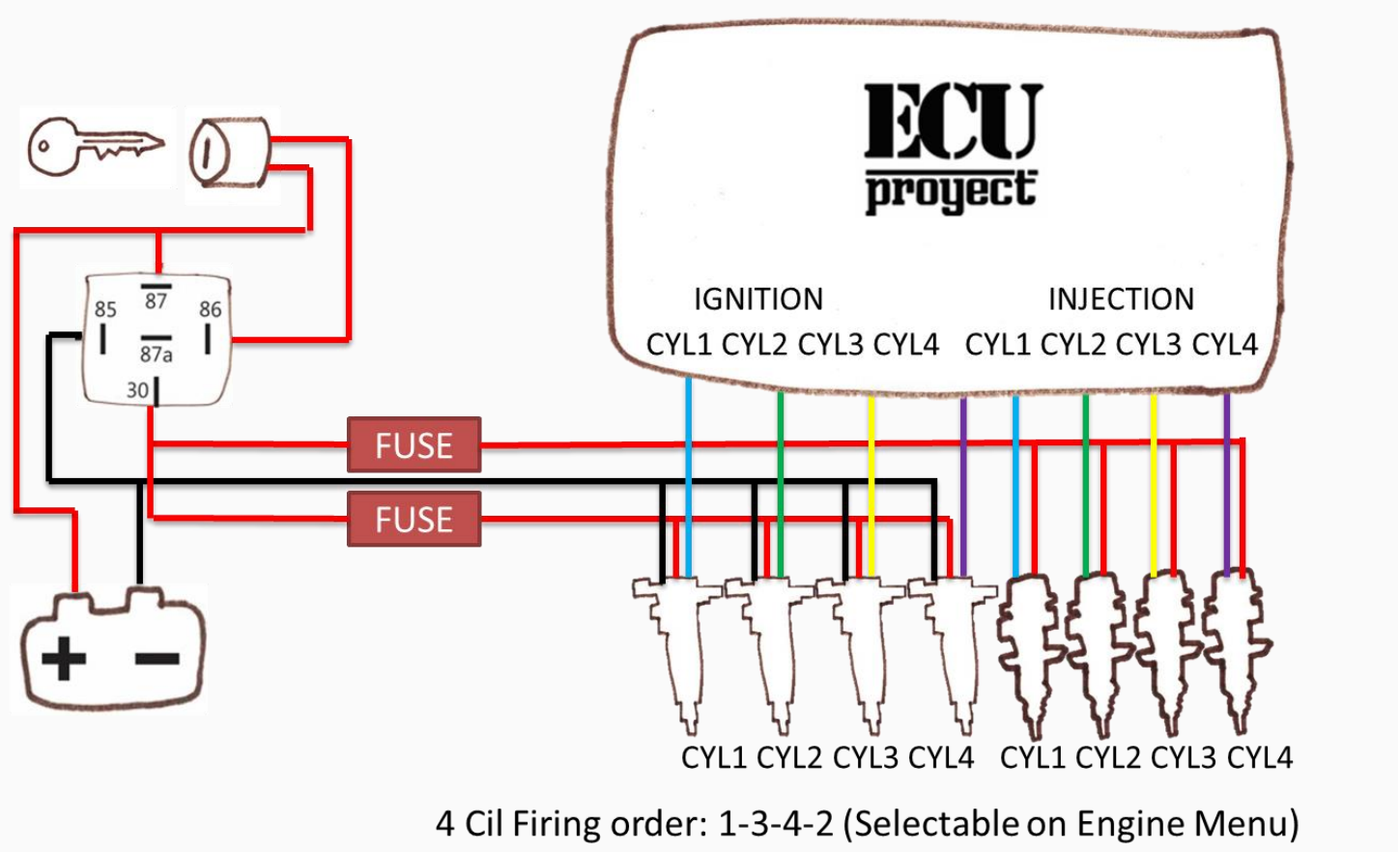
Design
There are several ways to connect the injectors depending on your configuration and preference.

The easy and recommended method is to wire each injector and each coil to its own channel, as an example:
Cylinder 1 – Injector 1 = INJ1, Coil 1 = IGN1
Cylinder 2 – Injector 2 = INJ2, Coil 2 = IGN2
Cylinder 3 – Injector 3 = INJ3, Coil 3 = IGN3
Cylinder 4 – Injector 4 = INJ4, Coil 4 = IGN4
Cylinder 5 – Injector 5 = INJ5, Coil 5 = IGN5
Cylinder 6 – Injector 6 = INJ6, Coil 6 = IGN6
Cylinder 7 – Injector 7 = INJ7, Coil 7 = IGN7
Cylinder 8 – Injector 8 = INJ8, Coil 8 = IGN8

The firing order then can be easily selectable from the Engine menu.

Here a 4-cylinder example is shown:

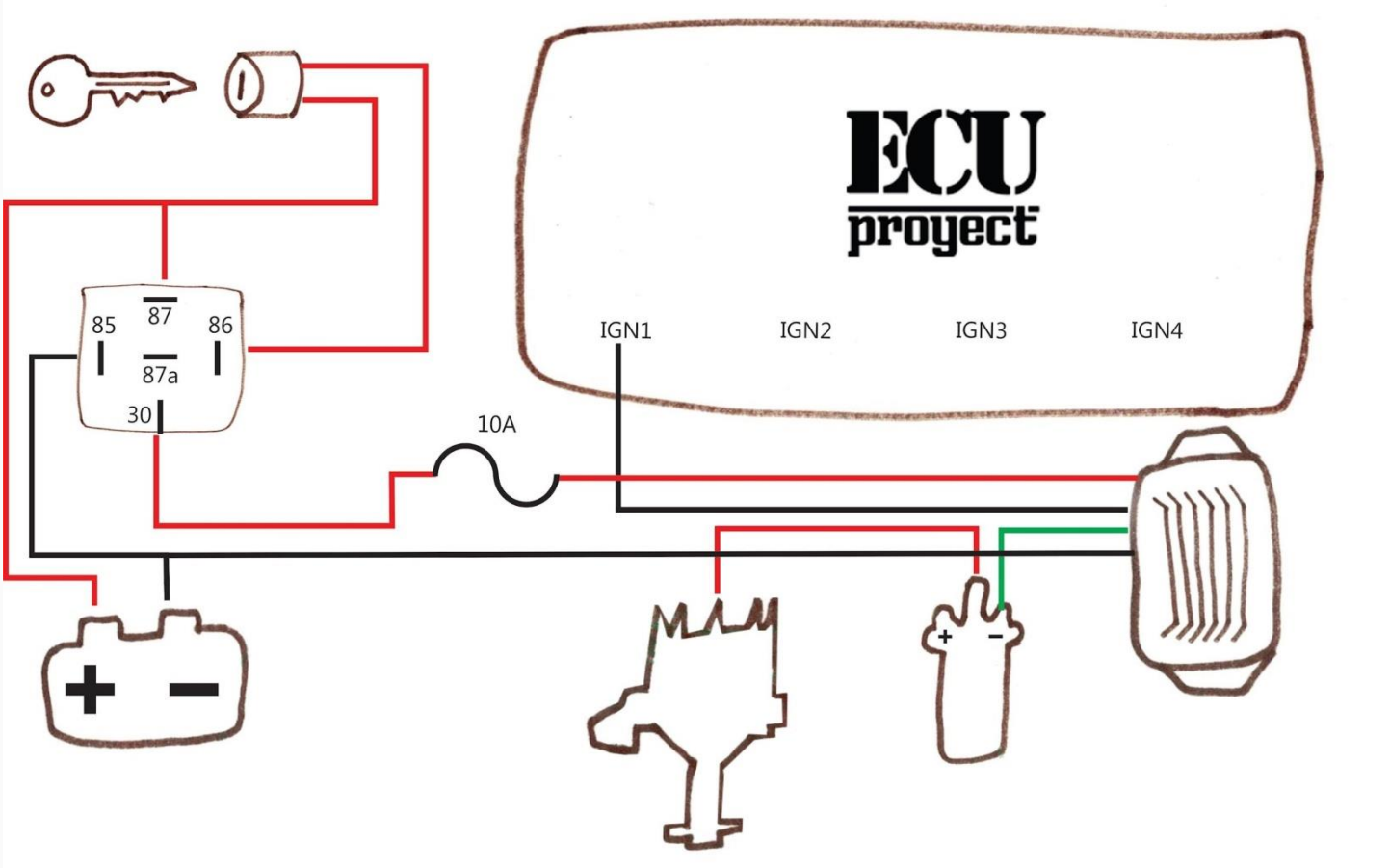




4 Cil Firing order: 1-3-4-2 (Selectable on Engine Menu)

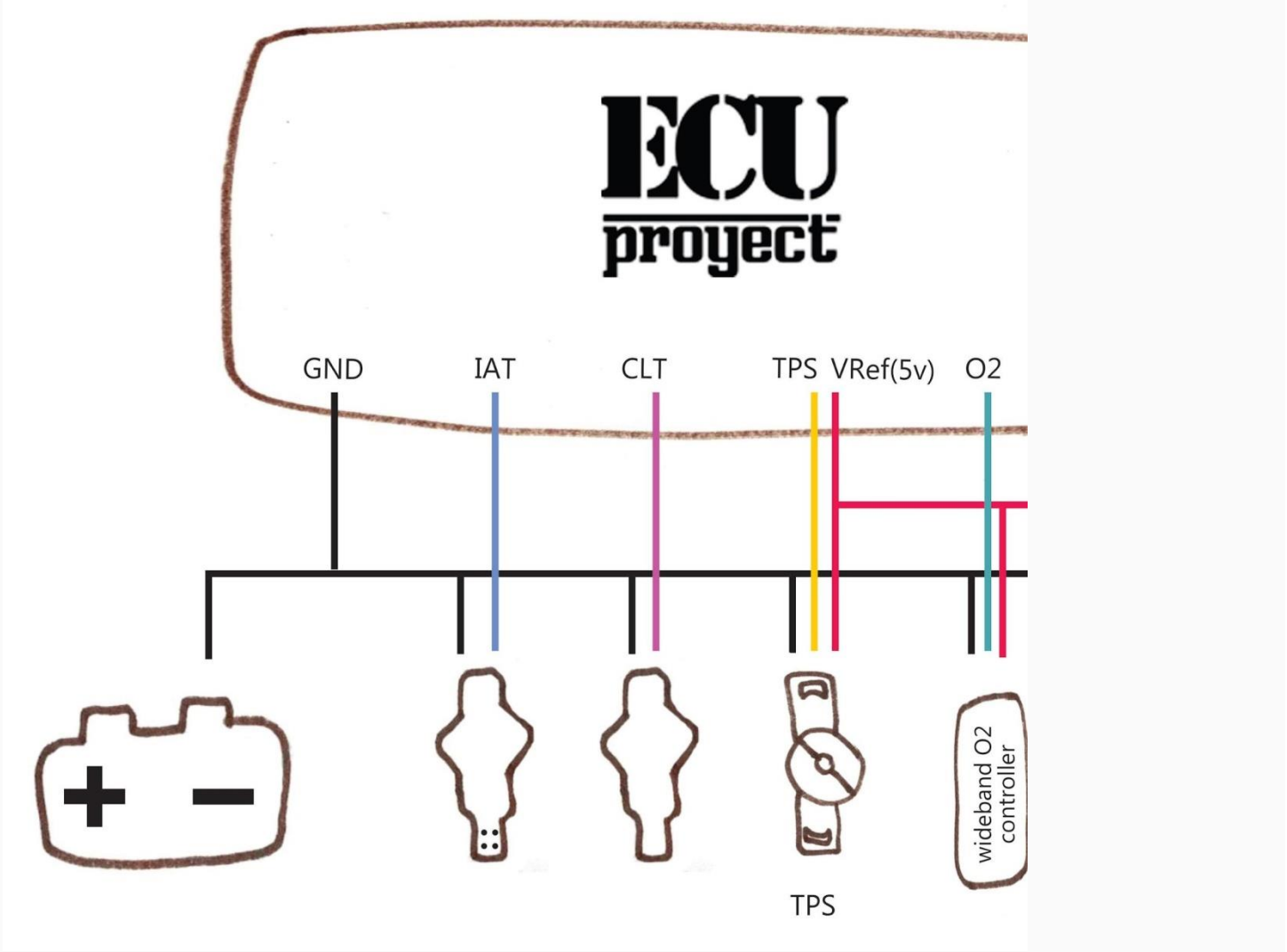
Distributor

If a distributor remains in use, only a single output from the ECU is required. This needs to be fed to a single channel ignition module (such as the common Bosch 124) which can then drive the coil.



Sensor

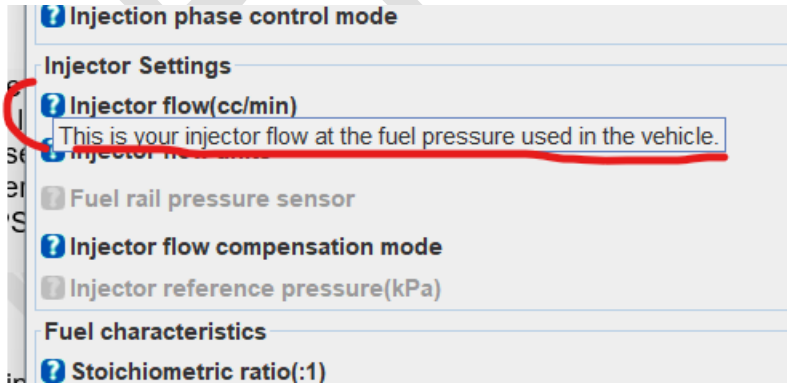
Wiring Analog Sensor Wiring Analog
sensors provide data such as temperatures, throttle position, and O2 readings to the ECU. The following diagram shows typical wiring for these sensors.



Notes: Use of 2-wire temperature sensors is recommended. While 1-wire sensors will work, they are almost always considerably less accurate.
The external MAP sensor in the diagram above is optional and can be omitted if integrated MAP is used. Alternatively, an external Baro sensor can be added in the same way as an external MAP.
A 3-wire variable TPS is required. On/off type TPS are not suitable.

Settings

The menus and settings, all have its own explanation when the mouse cursor passes through the ? icon:



Scope of settings section

The scope of this section of the manual is only a fast approach of settings, the detailed information is already on each of the conceptual menus. They are clear enough to not require an extra explanation in most of the situations, and they come in handy when you are on Tunerstudio screen doing your thing.

Index of settings menus:

Base Engine:
Base Engine
Limits and Protection
Trigger
Advanced Trigger
Battery and Alternator
Outputs
Air Conditioning

Fuel:
Injection configuration
Injection Outputs
Injection test
Cylinder Banks
Injector small-pulse correction
Stagged Injection
Stagged Injection Outputs
Stagged Injection %
Cylinder Fuel Trims
VE
Target AFR
CLT multiplier (Warm Up Enrichment WUE)
IAT multiplier (Air density)
Closed loop fuel correction
Deceleration fuel cut off (DFCO)
Injection Phase
Enrichment Acceleration

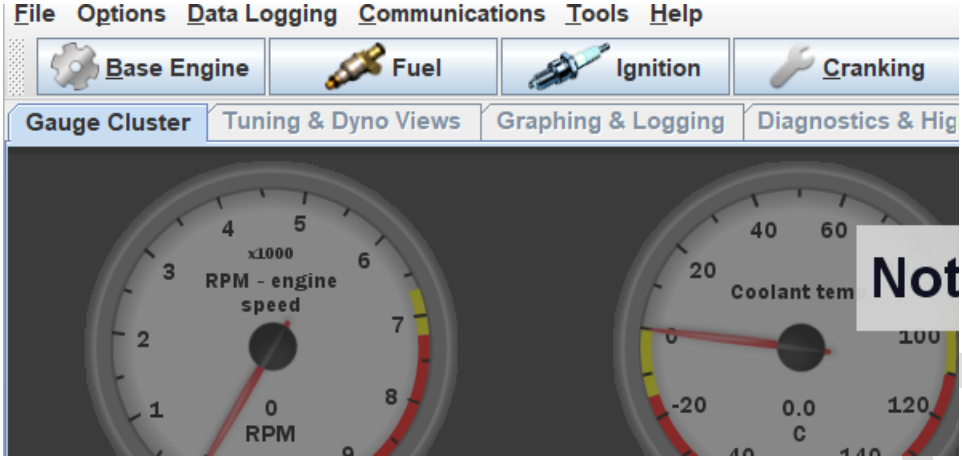
Ignition:
Ignition Settings
Ignition coil test
Multispark
Ignition advance
Ign CLT correction (Warm up timing WUT)
Ign IAT correction (IAT overheat protect)
Dwell
Cylinder ign trims
Knock sensing
Knock retard

Cranking:
Cranking settings
After-start enrichment (ASE)
Priming pulse
Fuel multipliers (Cranking)

Tools Menu
TPS Calibration

Sensors:
CLT sensor
IAT sensor
TPS
Accelerator Pedal
Map Sensor
Map Sampling
Wideband O2 sensor
VR sensor threshold
Speed sensor

Base engine Menu

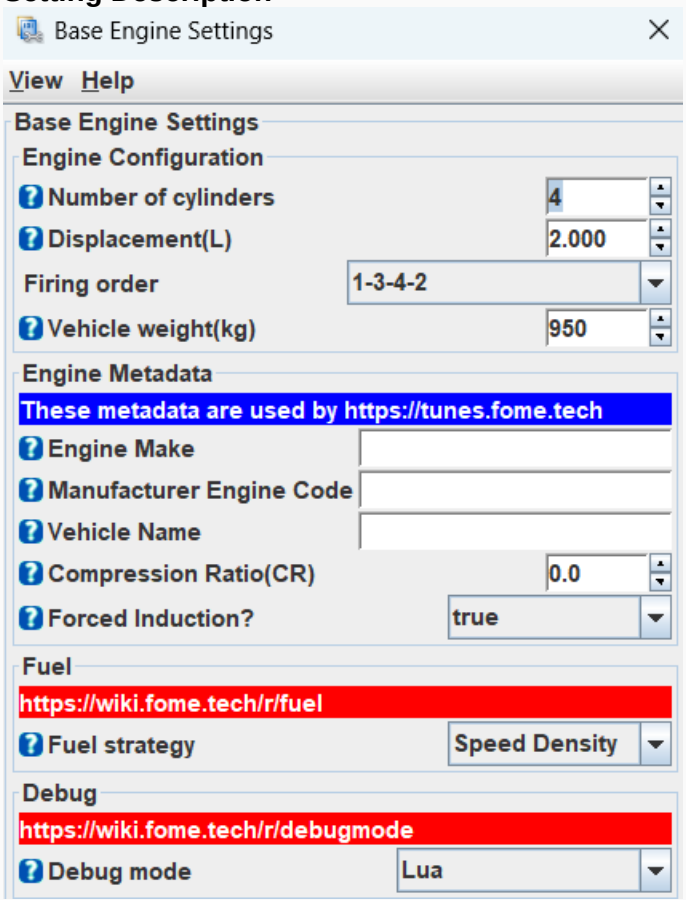


Base engine

Overview

Here you need to set the motor constants. Complete the fields in the section below before calculating the fuel required.

Setting Description

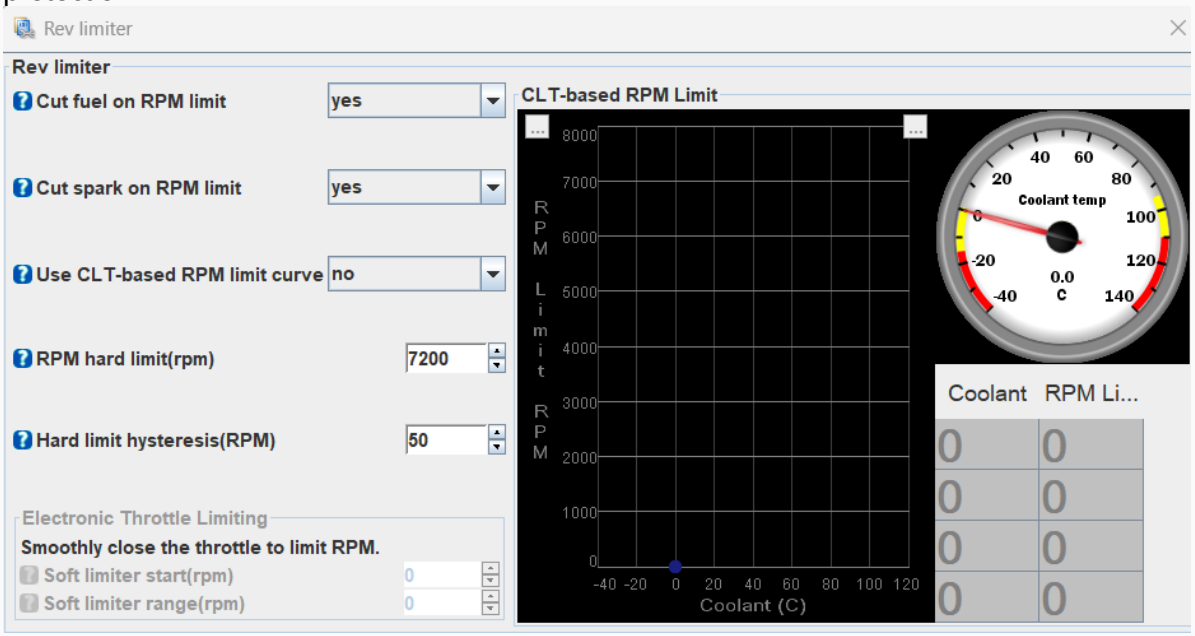


Settings contained here are number of cylinders, and its firing order.

An important parameter is Fuel strategy selection: Alpha-N means drive by TPS commonly only used for NA engines, Speed Density requires MAP sensor and is the default choice for may installs, MAF air charge is a cylinder filling based method that uses a mass air flow sensor.
Other parameters here, is only to describe the vehicle tune (optional, not necessary).
Debug mode is special parameter only for internal usage.

Limits and protection

Overview
On this menu we have Limiters, boost cut, injector duty cycle cut, Oil pressure protection and Lambda protection.



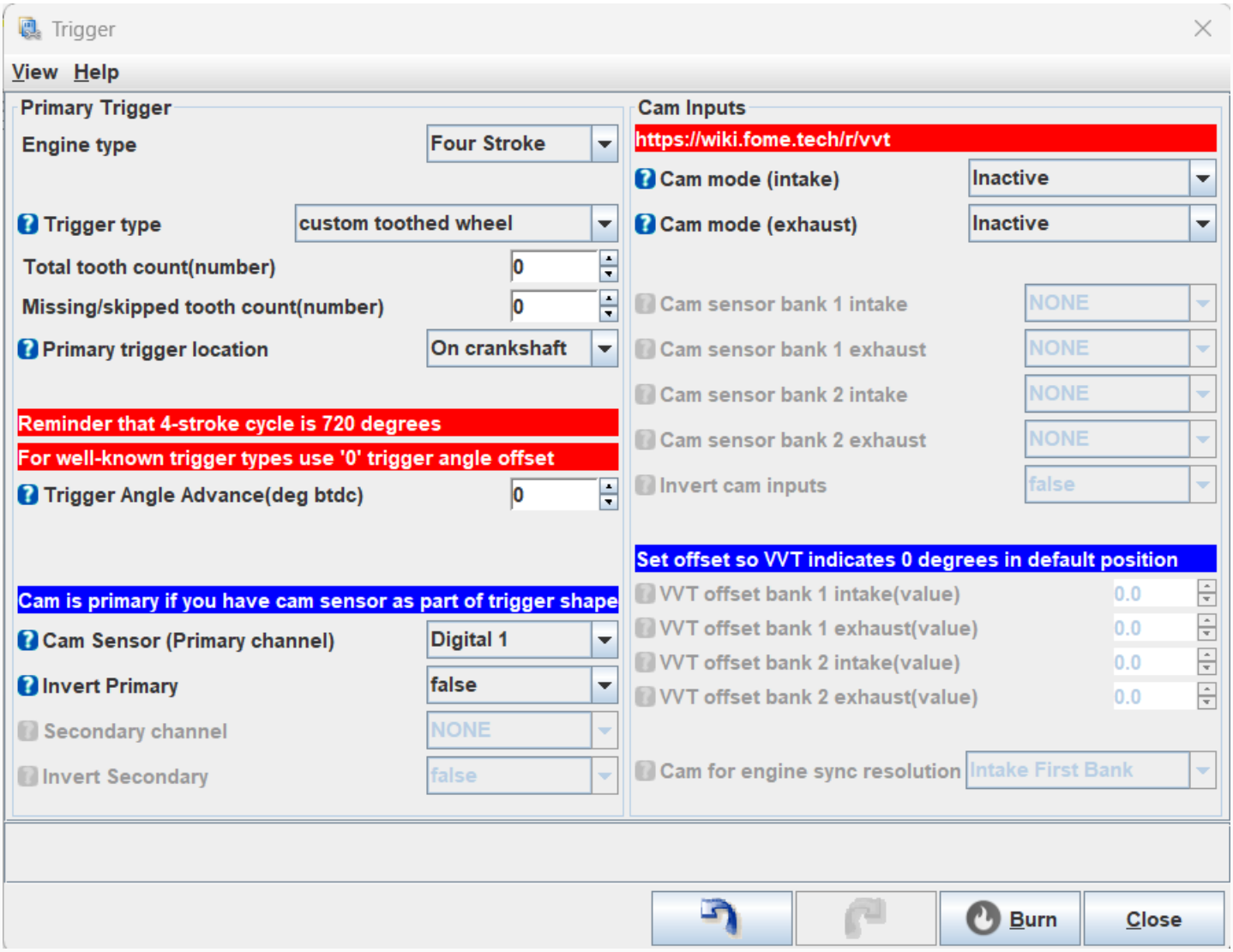
We can select if we want RPM limiter by spark cut and/or fuel cut. The recommendation is of course spark cut, this creates a nice explosive rpm limiter.
CLT base limit curve can be activated to have a protection for overheating, a curve can be setup with several points of RPM limitation over coolant temps.
If Electronic throttle control is available the limiter can also be applied to the throttle position.

Trigger

Overview
One of the most critical components of an EFI setup is the Crank Angle Sensor (CKP or CAS) and how it is used by the ECU. The Trigger dialog is where the trigger settings are defined and it is vitally important to have this correct before attempting to start the motor.

With an incorrect setting, you may have trouble synchronizing or seeing erratic RPM readings.

Note that many of the settings in this dialog depend on your settings, and therefore it is normal for some options to be grayed out.



Theres a selection for engine type: Four or two stroke. And the trigger type, here the selection of triggers varies from a basic distributor to some complex like a VQ35.
For more details on the trigger type and is waveform please consult the CKP/CAM Sensor Patterns chapter on this manual.
For some patters the total tooth count parameter will be available, and this number must include the missing tooths. And the missing tooths must be all consecutive tooths, if a patter has separated missing tooths, then an specific patter must be selected from the menu.
Also, the pater can be located at crank or at cam, (or speeds per se, as you know cam speed is half of the crank speed and its spans over the 720degrees of a 4stroke cycle).
Trigger Angle Advance is the adjustment for the angle of phase of the trigger, **this is on BTDC**, this means a more positive number means a more retarded timing, and a less positive number means a more advanced timing, BTDC used by most of the aftermarket ECUs out there.
Cam Sensor (Primary) refers to the primary input for CKP this is CKP signal, and you can select the pin to be used, it can be a digital pin (with external pullup resistor) for a Hall sensor or a VR input for a VR sensor.
A secondary channel for CKP should be active for advanced trigger patters that use two signals for synchronizing.
Apart from the CKP there's specific inputs for CAM signals and patterns. Depending on the patter it can also use VVT control in close loop. Again, you can select with input will be used here.

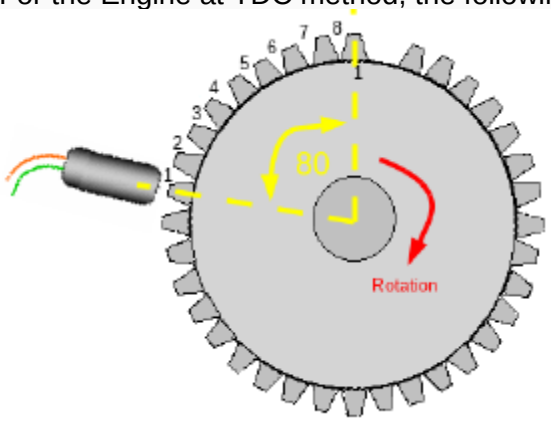
Finding tooth #1 and firing angle

First of all, it is necessary to take into account that the ecu works with ATDC firing angle, which means that increasing the angle means advancing the ignition timing. And decreasing the angle means retarding ignition. It is possible that you come from a tuning environment where it is the opposite. Please take this into account.

Firing angle can be determined in 2 ways:

- Put the engine at TDC (TDC) and check the angle between the ckp sensor and the missing tooth.
- Carrying out an estimative search as explained in the video "Finding firing angle OLD SCHOOL style"

For the Engine at TDC method, the following figure can help:

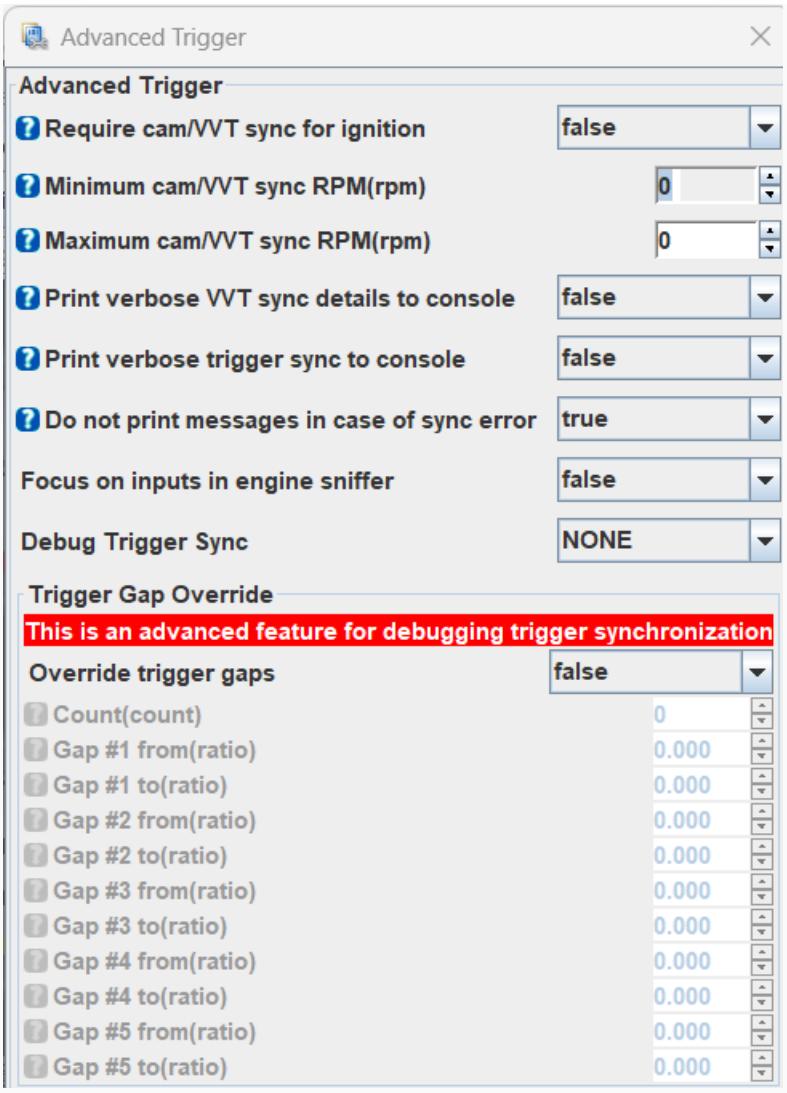


A 36-1 wheel is shown, to obtain the angle per tooth only divide: 360/teeth.
Angle per tooth: 360/36 = 10. We have that the sensor is BEFORE by 8 teeth.
8 teeth means 80 degrees. Because the sensor is before the missing tooth we get BEFORE (negative angle -), AFTER (positive angle +). We use BTDC so:
In this case the angle will be +80 degrees.

Advanced Trigger

Overview

This menu is only to “Require” a VVT cam signal for full CKP synchronization. This is advanced feature that only will be used if you know that you require it. Leave untouched if you don’t know about it.



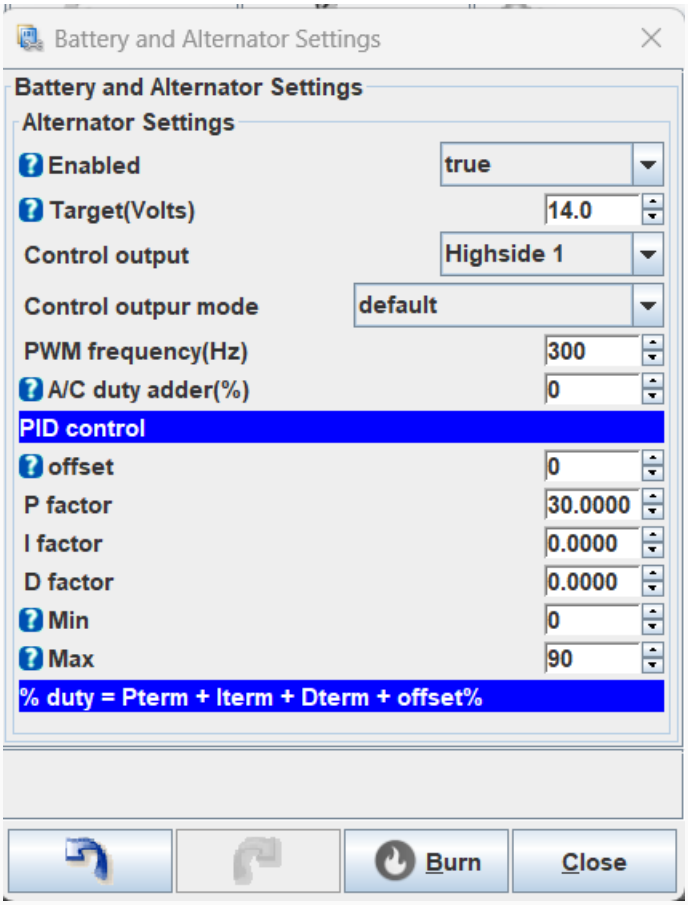
Battery and Alternator Settings

Overview

You can dedicate an output for alternator control in close loop mode, this control will use the alternator input in PWM mode, to modify the internal regulator and to always achieve a desired voltage.

We have an enabled and disabled selector, target voltage, a pin selector to choose any of the unused and desired output pins, the control mode to invert the control or in normal mode, pwm frequency, and an instant adder liked to the AC control (this adds more instant PWM to raise voltage in anticipation of AC turn on).

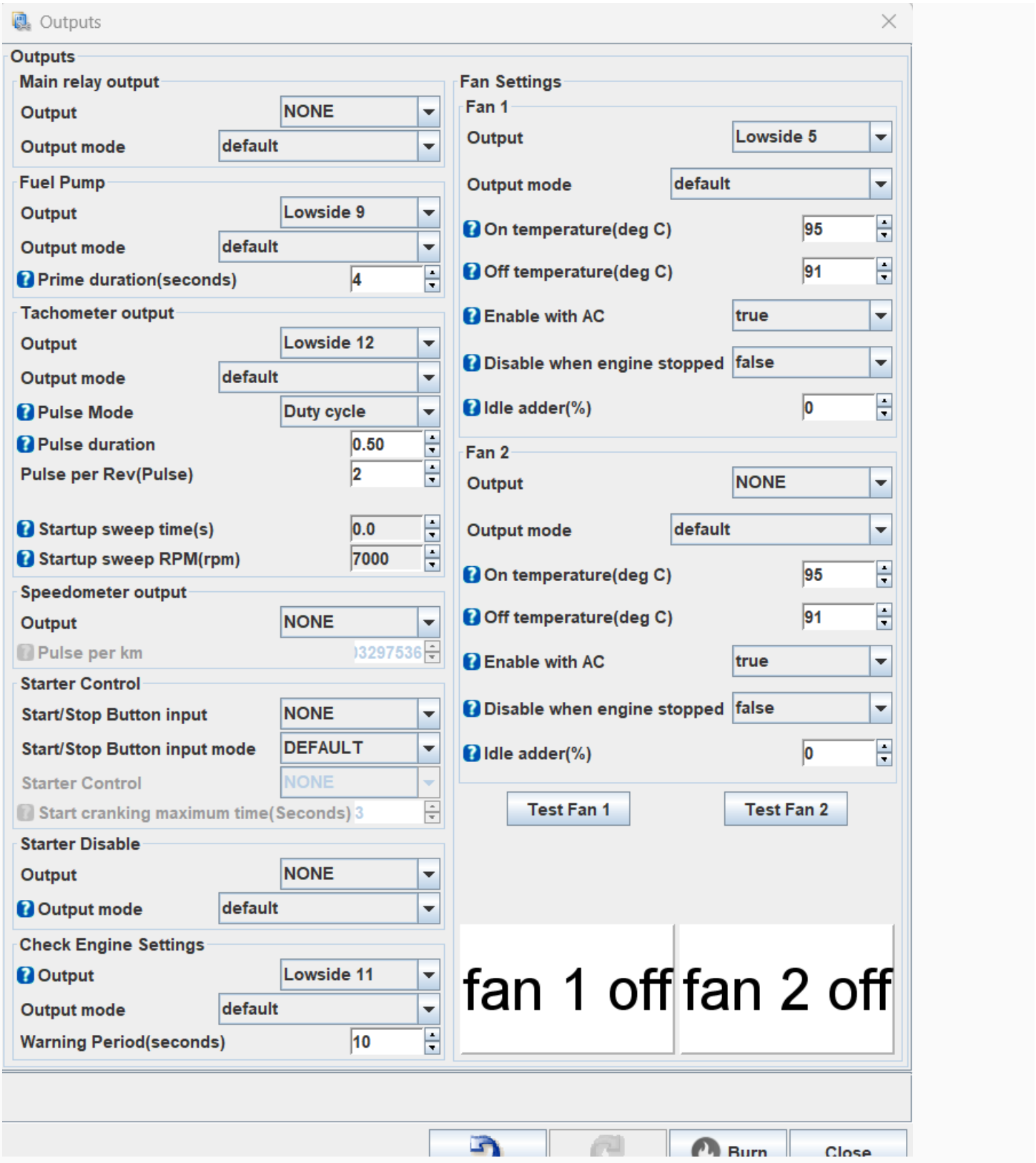
The other parameters must be tuned for the application, a standar offset, and PWM parameters are provided.



Outputs

Overview

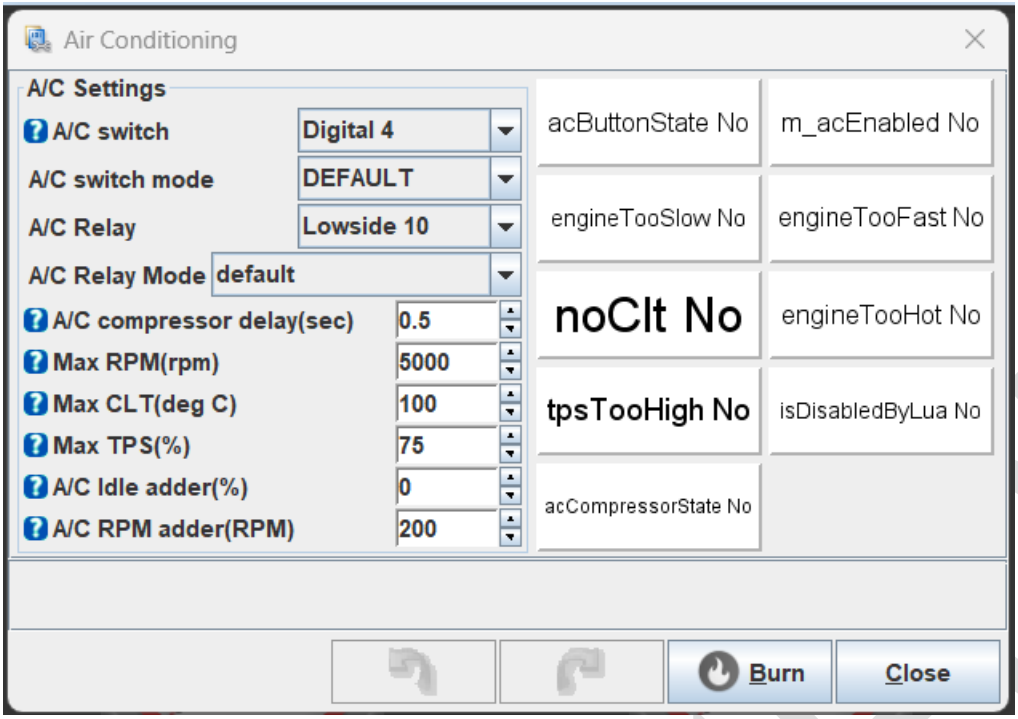
This menu has several modules to control several devices, that includes: Main relay, Fuel Pump, Tachometer, Speedometer, Starter, Check engine light, Fan 1 and Fan 2.
Main relay is simple, just assign an output to it.
Fuel pump, assign an output, and Prime duration in seconds.
Tachometer has parameters for pulse width or duty cycle, pulses per rev, and a nice tach sweep at startup.
Speedometer has a parameter to select output, and pulses per Km.
Starter control has selectable input for starter button, selectable output for starter relay, and maximum starting time in seconds.
Starter Disable lets you wire in a disabler relay or lets you control the disabler if the car has it already.
Check engine light lets you select a desired output to drive a check engine light, this mostly is to let you know more easily something is wrong about CKP or a protection/limiter has been engaged.
Fan control has selectable output parameter, invert, turn on temp, turn off temp, enable if AC is enabled, disable if engine is stopped, and an idle adder in % to turn up the idle before the fans gets full load.
And some nice fan test buttons.



Air Conditioning

Overview

This menu has several parameters to control an AC unit, along with protections to not turn on the AC if is not adequate to have it running. Also, a pair of parameters to raise the engine Idle while on the AC operation. Straightforward and meaningful parameters found here.



FUEL menu

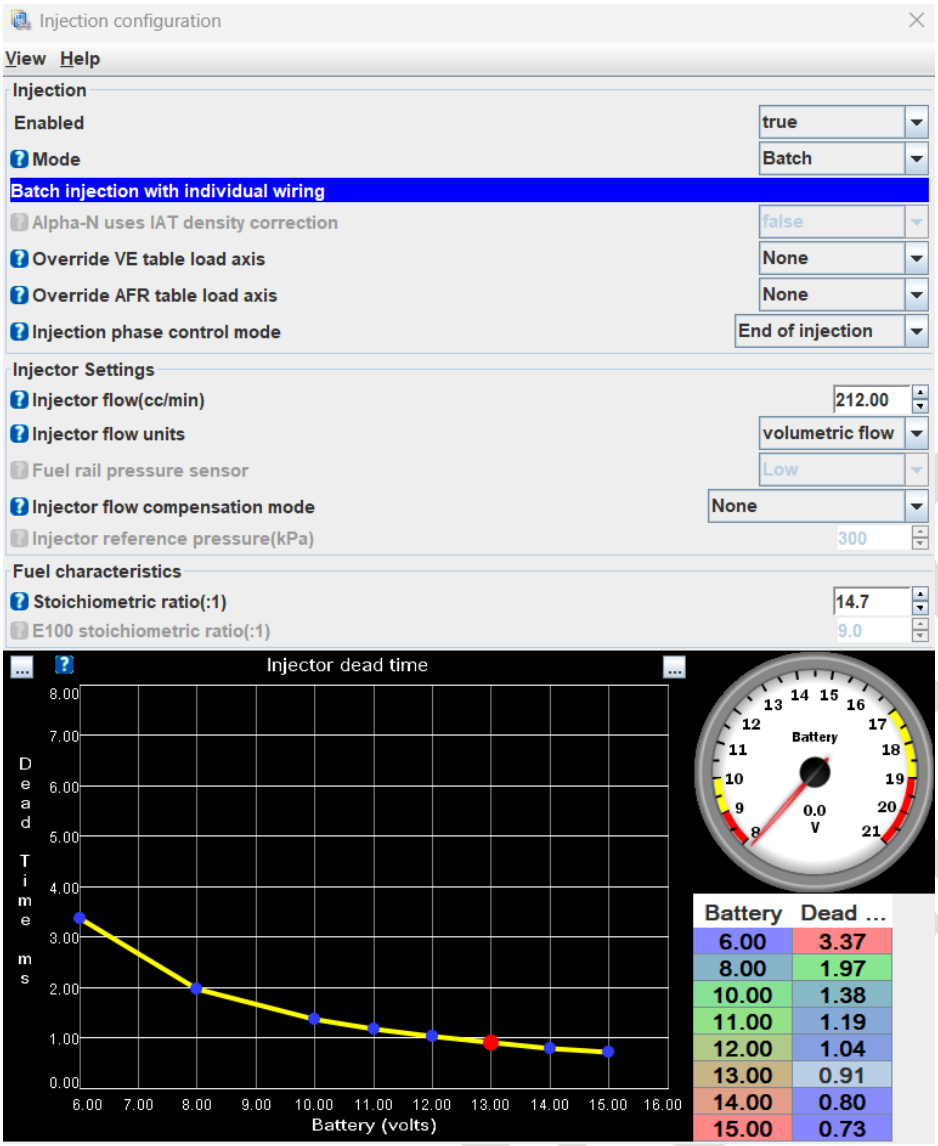
Injection configuration

Overview

We can select if fuel will be active or not, and the fueling mode (aka, Single point, Simultaneous, Batch, Sequential).
Some parameters are for advanced users (Override VE, Override AFR, Injection phase) and should not be touched if you don't need them.

Injector settings: Injector flow in cc/min (volumetric flow) or in g/s (mass flow).
Injector Flow compensation mode: Theres the possibility to compensate the flow calculation by adding a rail pressure sensor, or to static fixed compensate the flow.

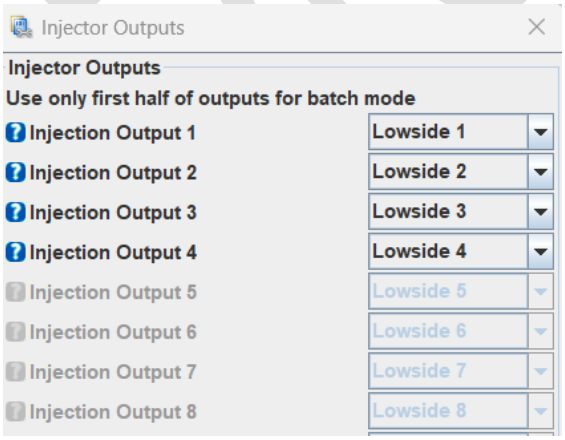
Injector dead time: this is a very important parameter for idle quality, bigger injectors are more slow to response and has bigger dead time while newer/smaller injectors has faster response and lower dead times. This is input in a curve/table mode, you can use the included curve, and add or remove dead time to all points accordingly.



Injection Outputs

Overview

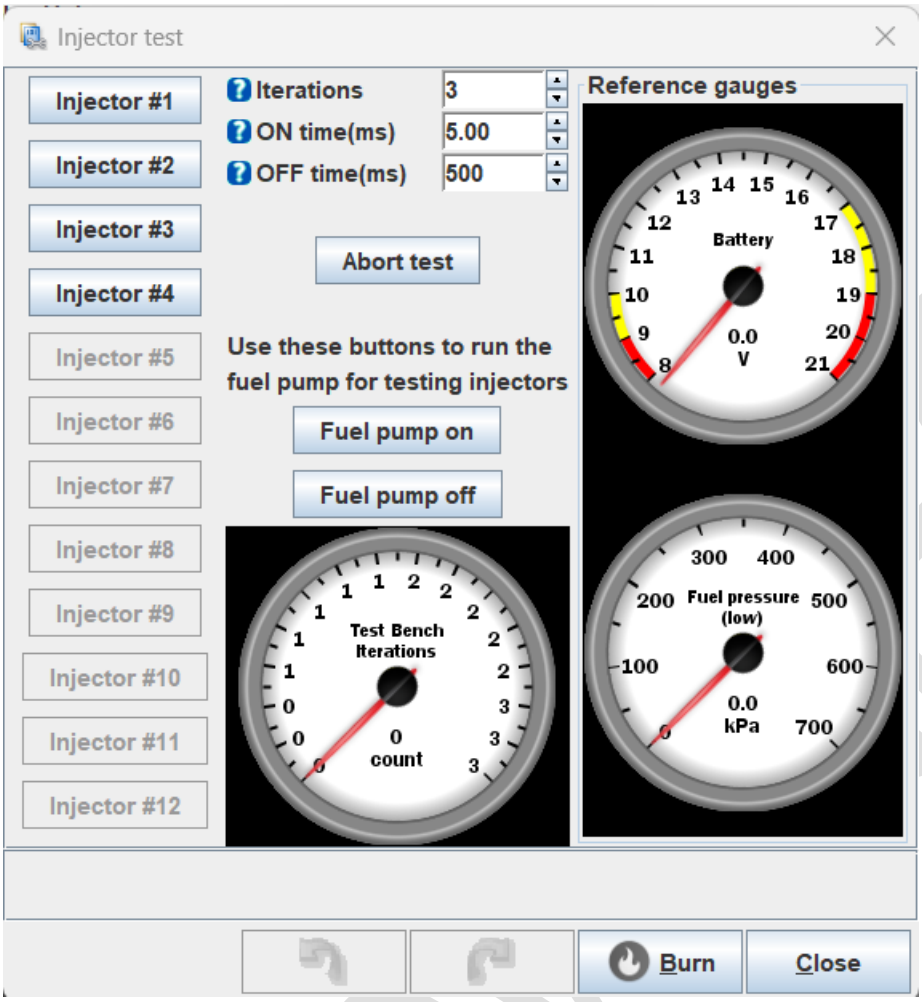
We can select the desired outputs to use for injection channels.



Injection test

Overview

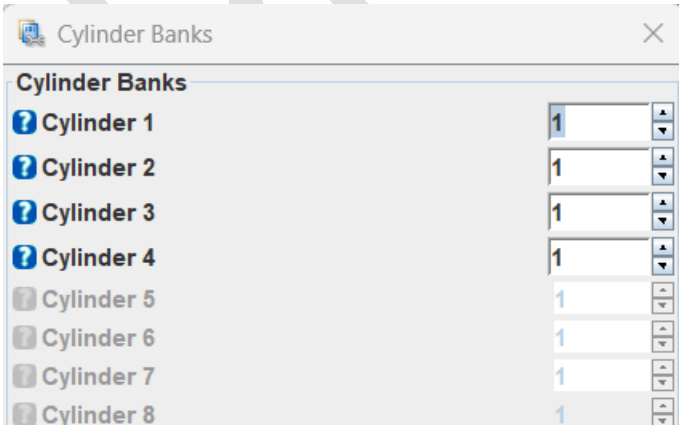
Useful tools to test injectors and injector outputs.



Cylinder Banks

Overview

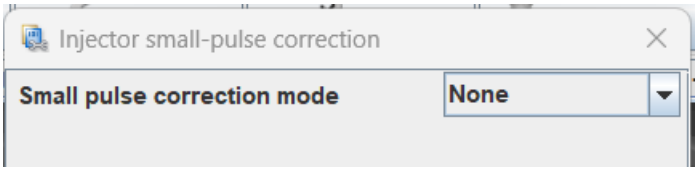
In a scenario there's two O2 banks, you can select which cylinders belong to bank 1 or bank 2 here.



Injector small-pulse correction

Overview

If you don’t know that is this for, then you don’t need it.



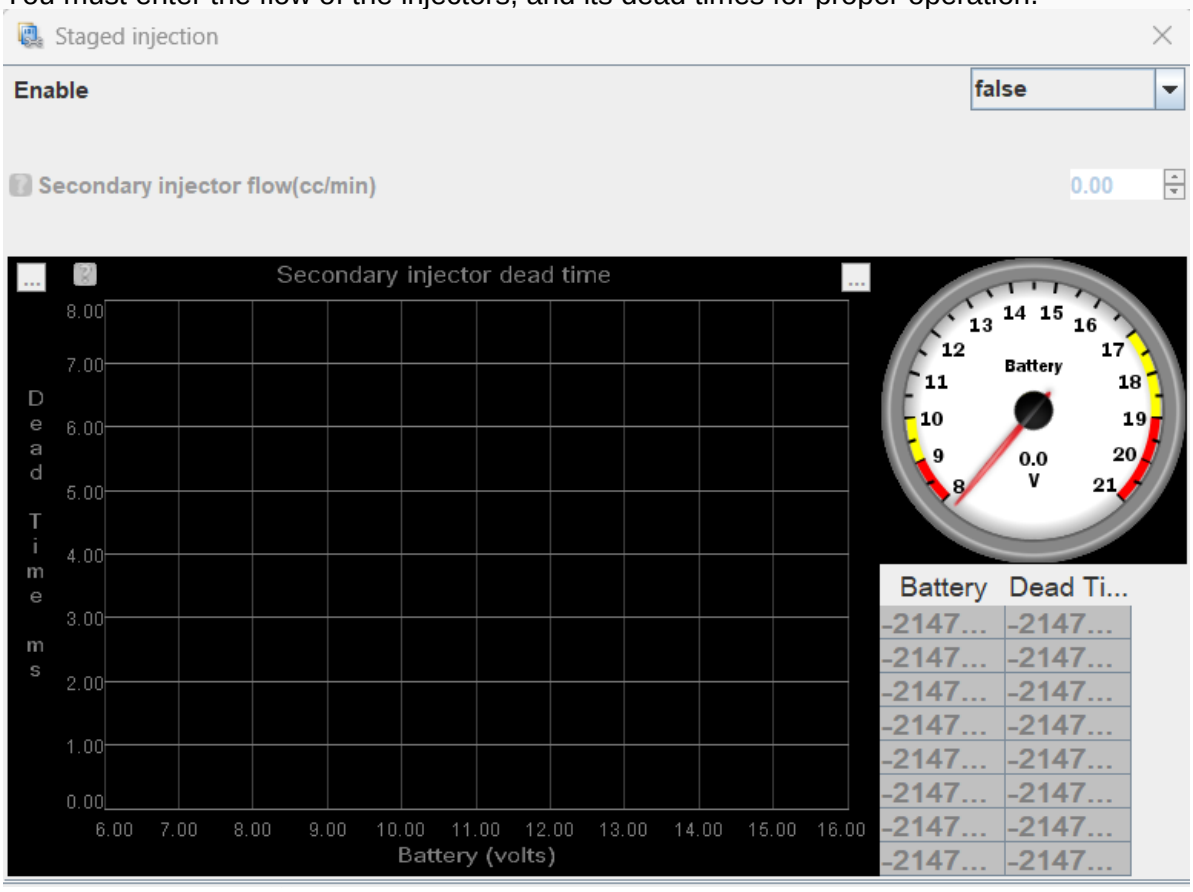
Stagged Injection

Overview

This function can control a secondary fuel stage for engines that have 2 sets of injectors, usually of different capacities. There are few stock engines that come with secondary injectors, the notable exception being many Mazda rotaries. Secondary staged injection is also a common modification, used wherever large injectors are required, but where it is desirable to keep smaller injectors for smoother low RPM performance.

Configuration

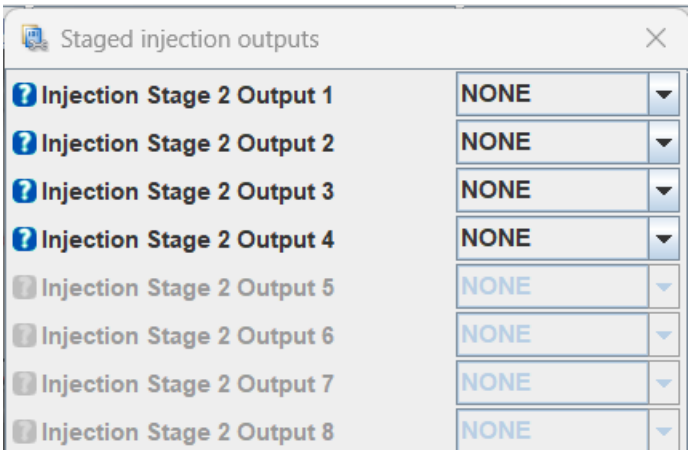
You must enter the flow of the injectors, and its dead times for proper operation.



Stagged Injection Outputs

Overview

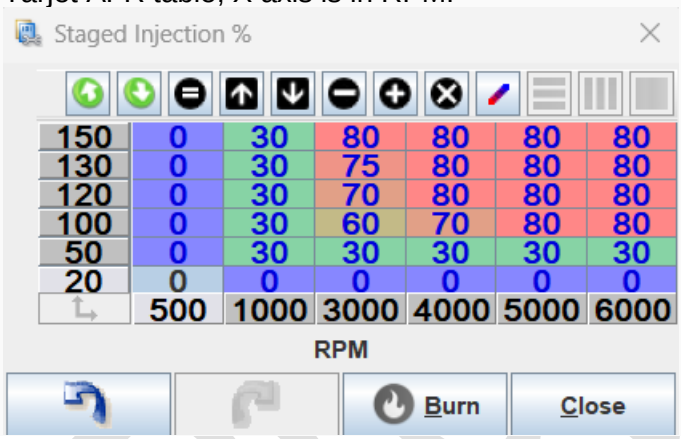
If you activate Stagged Injection, you must also select the desired output channels to drive the injectors.



Stagged Injection %

Overview

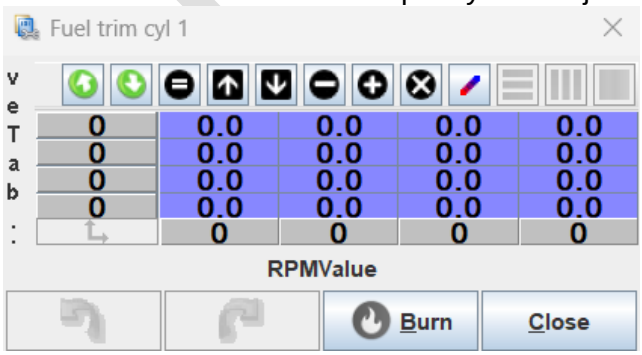
A table of % of stagged injection is provided so you can tune the usage balance between the first and second stage. The % on the table means the balance towards the second stage, a 0% means no secondary stage usage, a 90% means, 10% primary stage and 90% secondary stage balance. Y axis is the same used on the Tarjet AFR table, X axis is in RPM.



Cylinder Fuel Trims

Overview

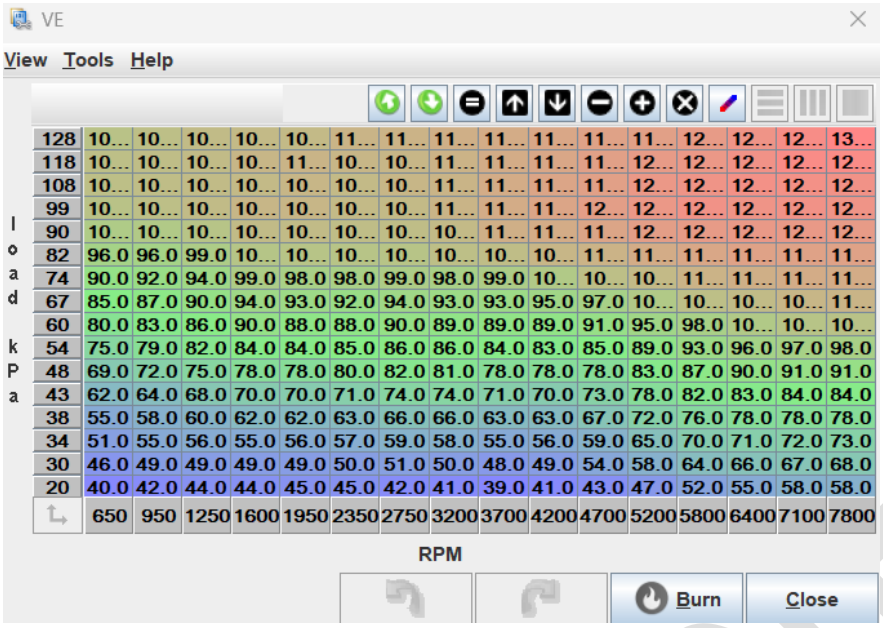
Small tables to add or remove per cylinder injection in %. For fine tuning.



VE

Overview

Table for tuning the VE engine behavior. A bigger number here means more fuel being injected; lower number means less fuel being injected. This is the main place for fuel tuning.



Target AFR

Overview

Table used as a AFR reference for some functions, this is the desired AFR to be used by the autotuning function.

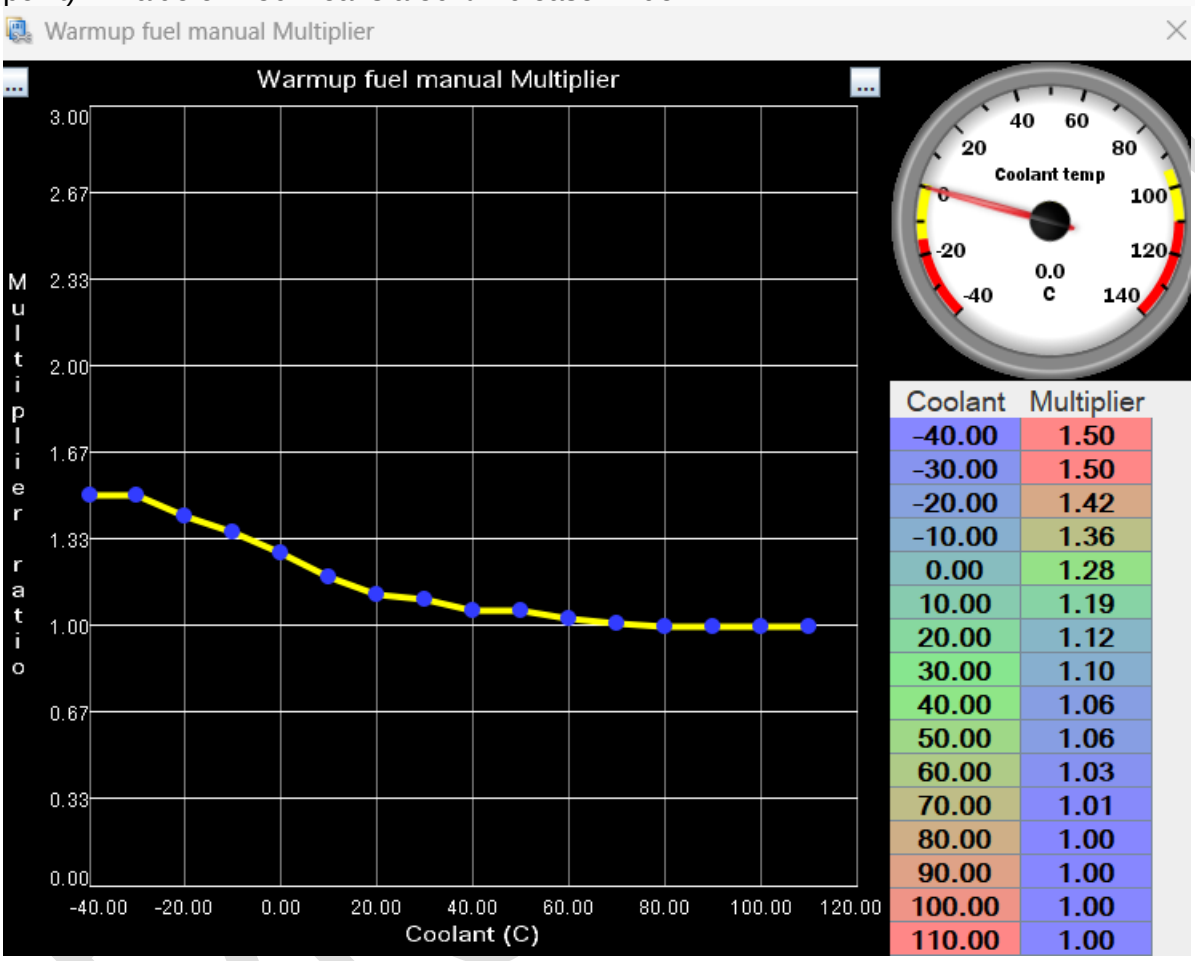
CLT multiplier (Warm Up Enrichment WUE)

Overview

The Warmup Enrichment (WUE) dialog contains settings related to the post-start period (i.e., after starting) but before the engine has reached normal operating temperature. Allow fueling modifications during this time for smooth cold driving.

Warmup fuel manual multiplier

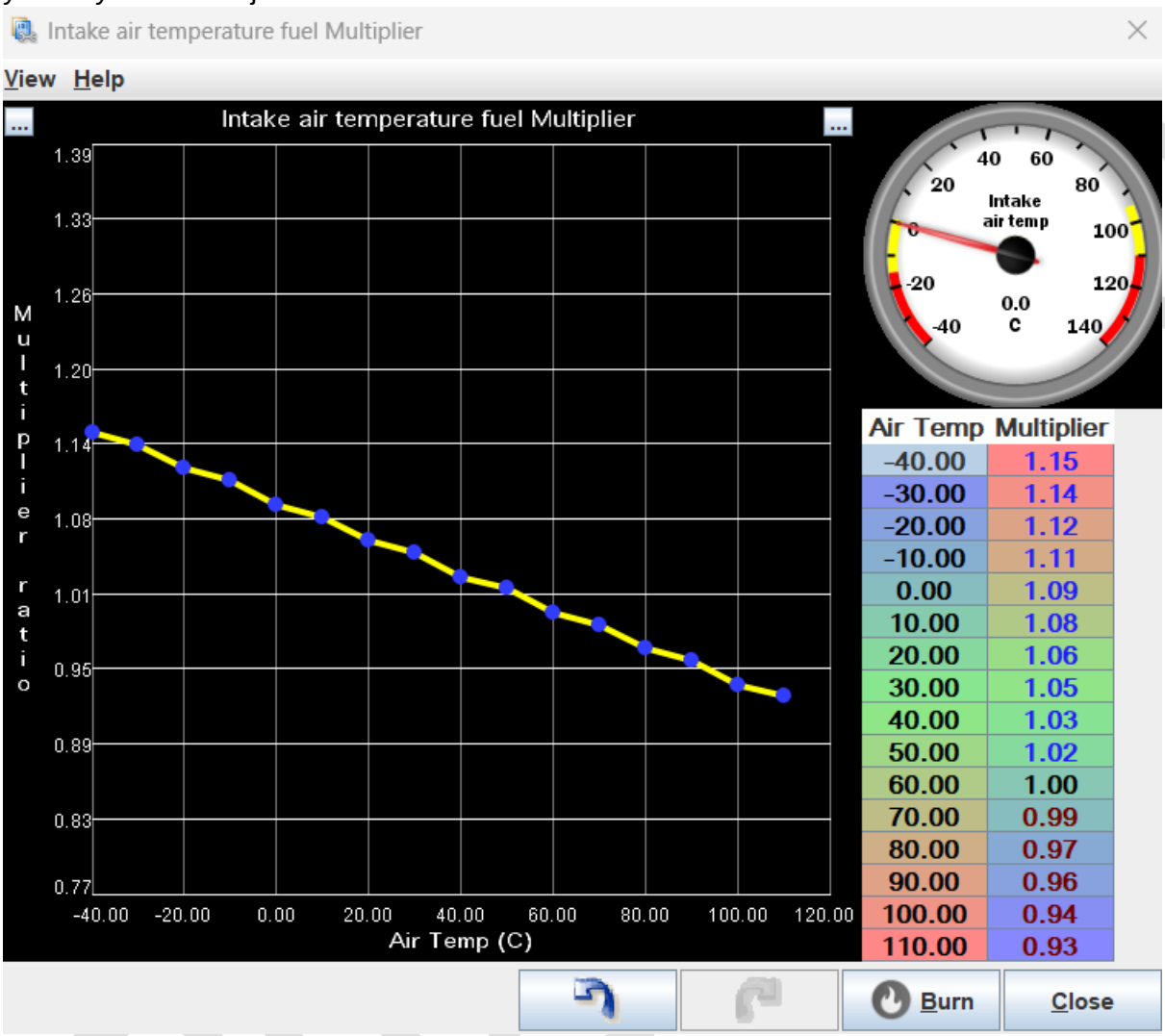
This curve represents the amount of additional fuel that will be added while the engine is coming up to temperature (according to the coolant sensor). The final value on this curve should represent the normal operating temperature of the engine and have a value of 1.0 (representing no change in fuel beyond that point). A value of 1.50 means a 50% increase in fuel.



IAT multiplier (Air density)

Overview

The IAT density curve represents the change in oxygen density of the inlet charge as temperature rises. This default curve approximately follows the ideal gas law and is suitable for most installations, however if you are seeing very high inlet temperatures (Either due to heat soak in the engine bay or from turbocharging) the you may need to adjust the hot end of this curve.

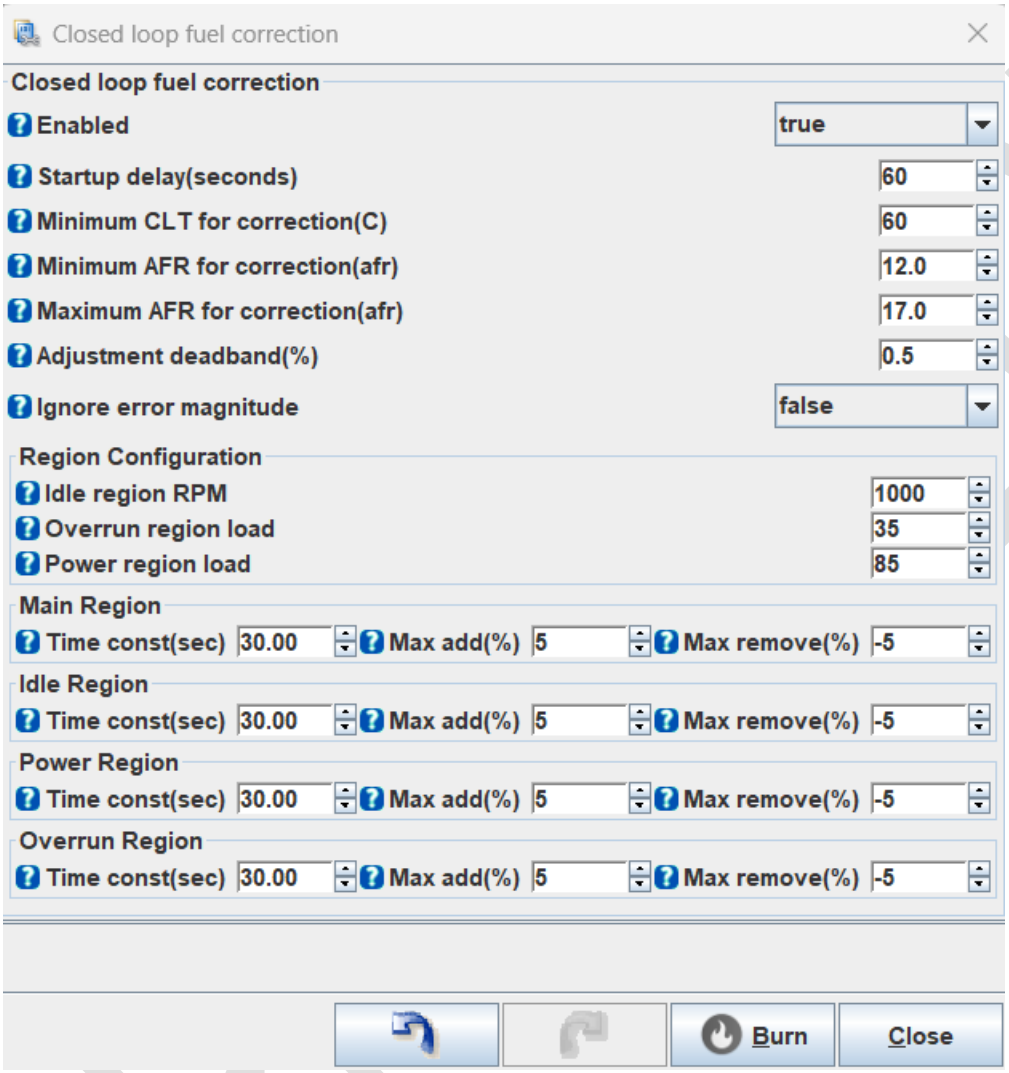


Closed loop fuel correction

Overview

This uses the data from a wideband sensor, to correct on the fly the fuel delivery to have a result near the Target AFR table.

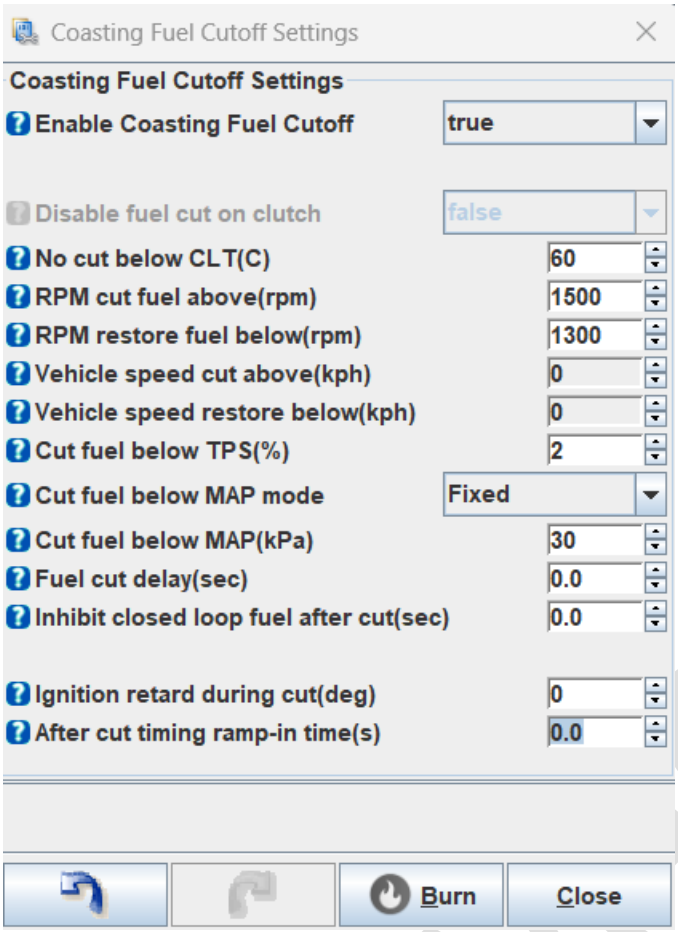
Using a very interesting approach, this has 4 regions of adjustment, one for when Idle, other when cruising, other specifically for the power zone, and one as a general region (main). Theres's parameters to adjust when this specific parameter will engage. Each region acts as trims. Making the adjustment faster and more accurate.



Deceleration fuel cut off (DFCO)

Overview

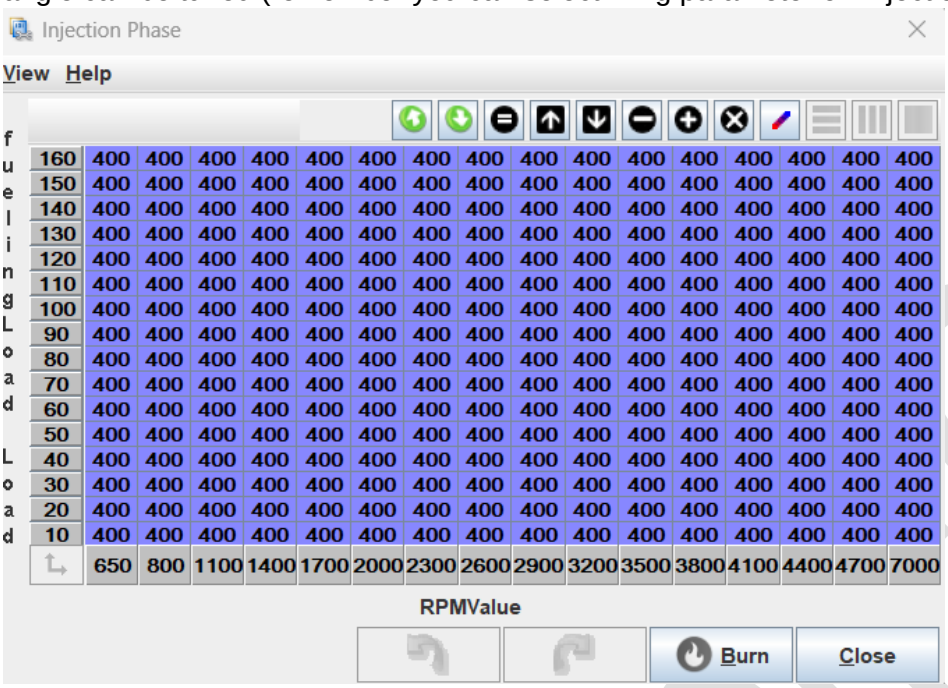
The intention of this feature is purely decreasing fuel consumption, by cutting of the fuel when decelerating, it also can create some nice effects.



Injection Phase

Overview

This is the angle of fire for injectors, normally you can leave this table untouched, but in some scenarios the angle can be tuned (remember you can select firing parameter on Injection configuration menu).

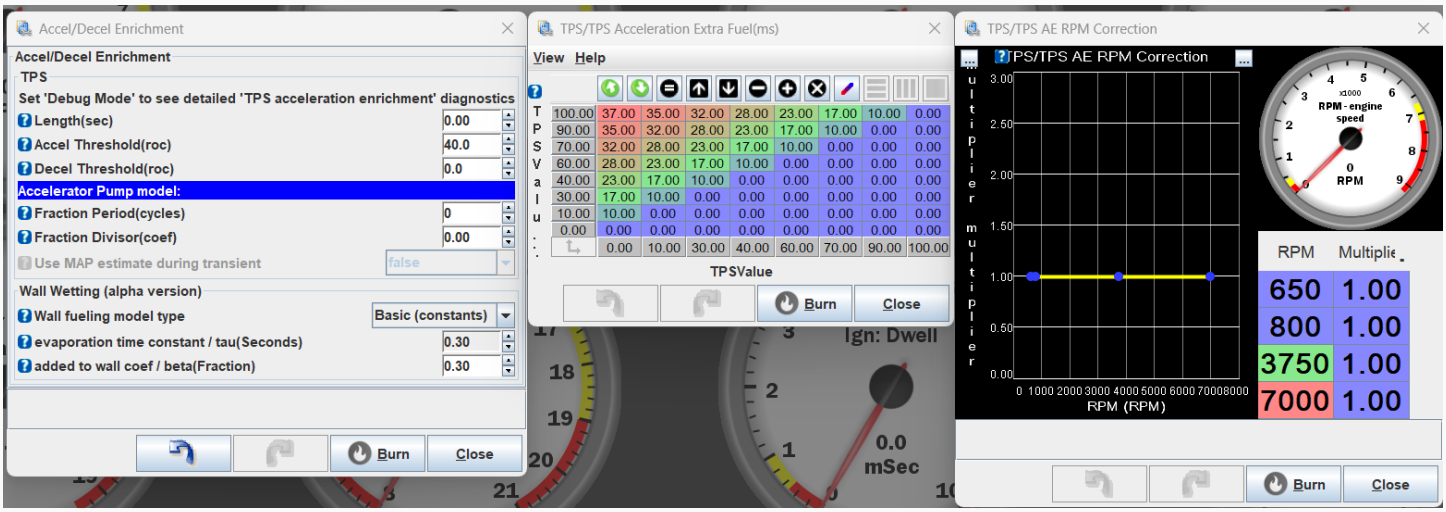


Enrichment Acceleration

Overview

Enrichment (AE) is used to add additional fuel during the short transient period following a rapid increase in throttle. It performs much the same function as an acceleration pump on a carbureted engine, increasing the amount of fuel delivered until the manifold pressure reading adjusts based on the new load.

To function properly you must have a variable TPS installed and calibrated.



The enrichment curve included with the ProyectECU base tune is a good starting point for most engines, but some adjustments are normal depending on injector size, throttle diameter, etc.

In most cases, AE curve adjustment can be performed in a stationary environment, although road or dynamometer adjustment is also possible. Quick and slow throttle taps should be made and the effect on AFRs monitored using the live line graph in the AE dialog.

If you find that the AFR is initially good, but then dips briefly, you should increase the Length Time setting, with recommended increments of 10-20ms.

Theres a full set of settings provided to calibrate AE in detail.

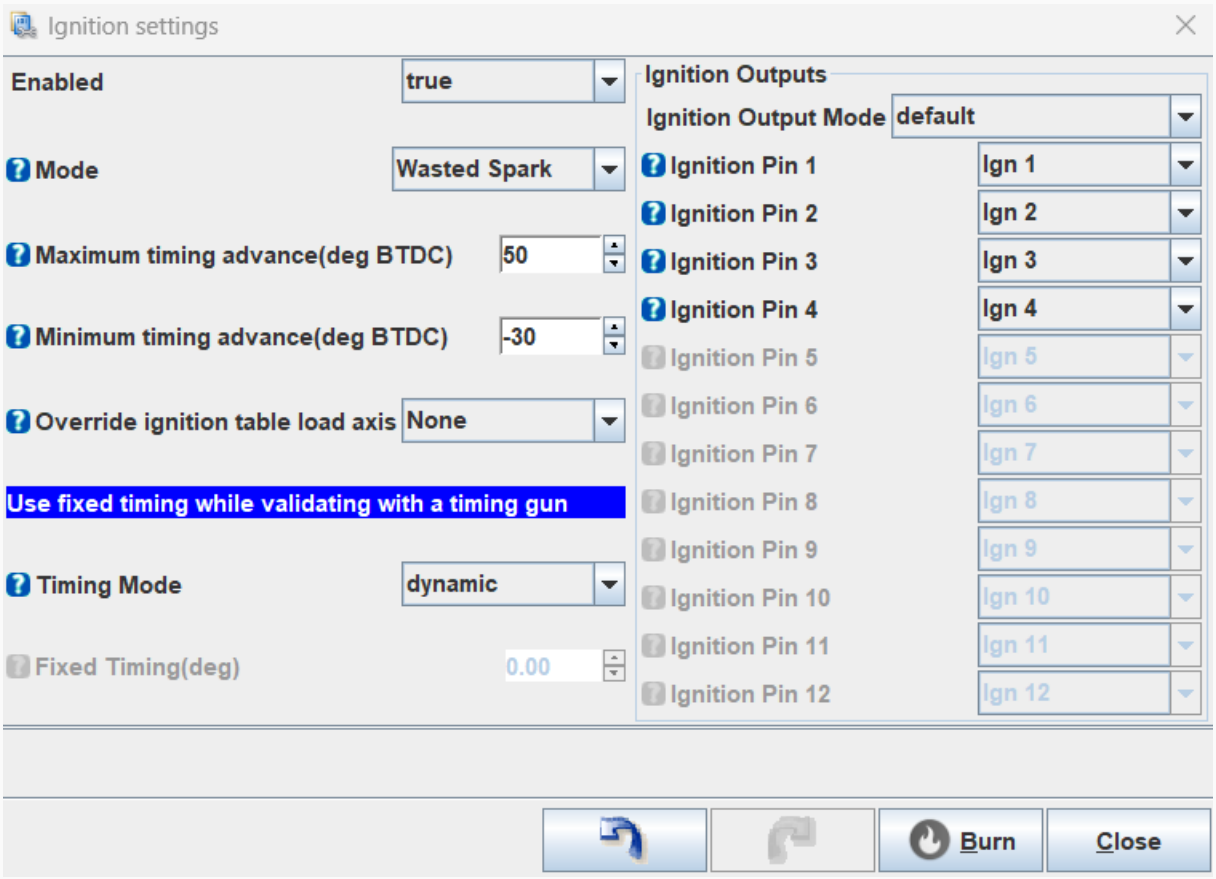
Ignition menu

The Ignition Settings dialog Spark config contains the options for how the ignition outputs will work, including which of the IGN outputs is used and how. These are critical values. Incorrect parameters and parameters will cause the motor not to start and, in some cases, may lead to damaged coils. This dialog also contains a number of options to correct the power-up timing for testing and diagnostics.

Make sure you have checked this setting before attempting to start your engine.

Ignition Settings

Overview
Settings to enable or disable ignition control, along with type of ignition control (aka Single distributor, Wasted Spark, Individual Coils, Dual distributors).
Make sure you have checked this setting before attempting to start your engine.



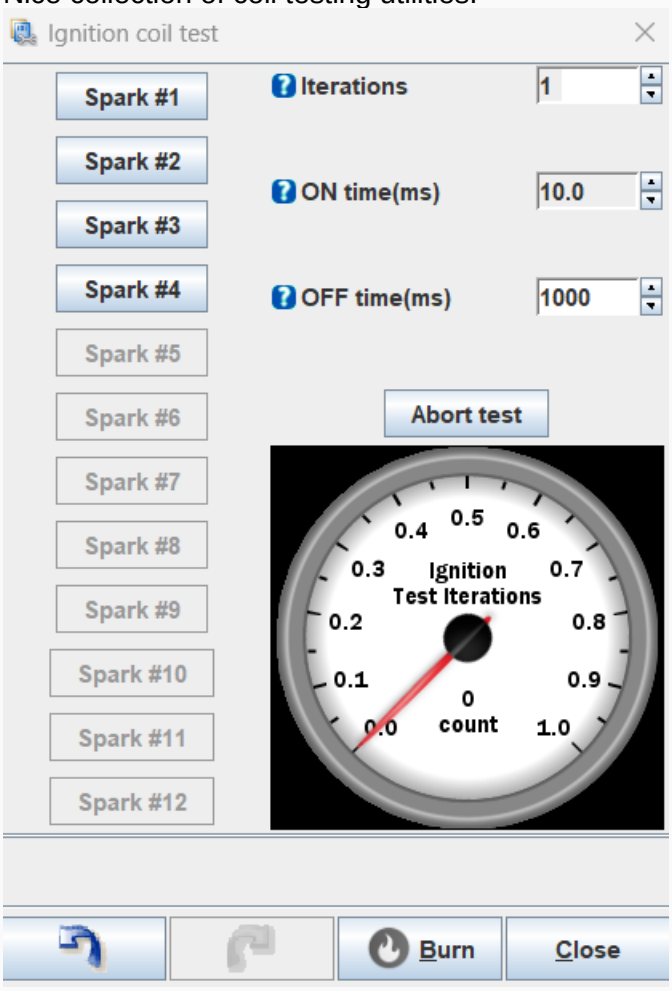
A pair of protection settings are in place, Maximum advance or minimum advance, this is to delimit how high the advance can be under all scenarios, or how negative it can be.
Override ignition table is only for expert use only, if you don't know what it is, means you don't need it.

Timming Mode is useful to switch between table defined timing degrees, or a fixed timing degree (for timing light usage!!!).

Here also we can configure the desired ignition channels to be used.

Ignition coil test

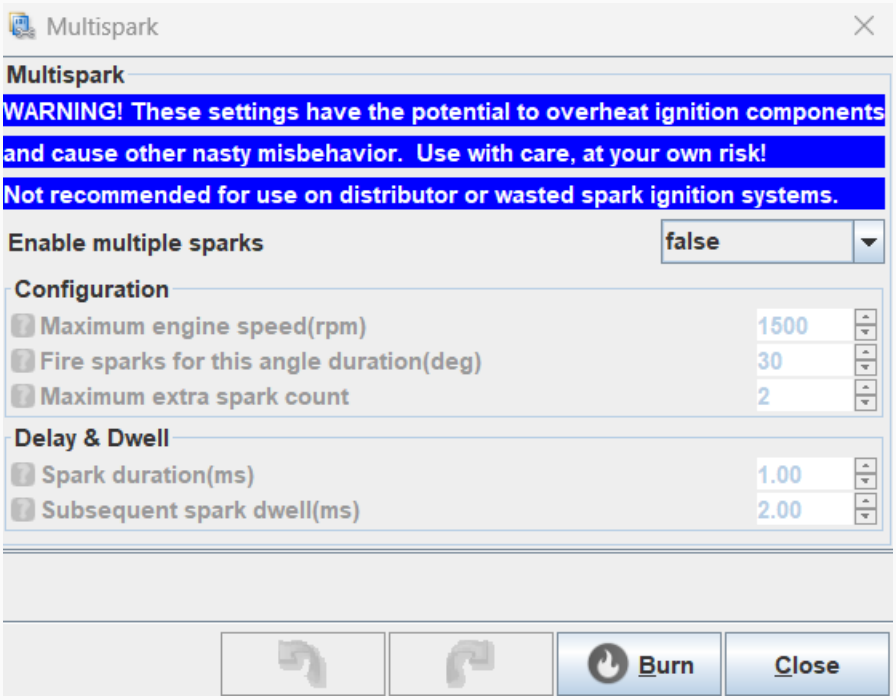
Overview
Nice collection of coil testing utilities.



Multispark

Overview

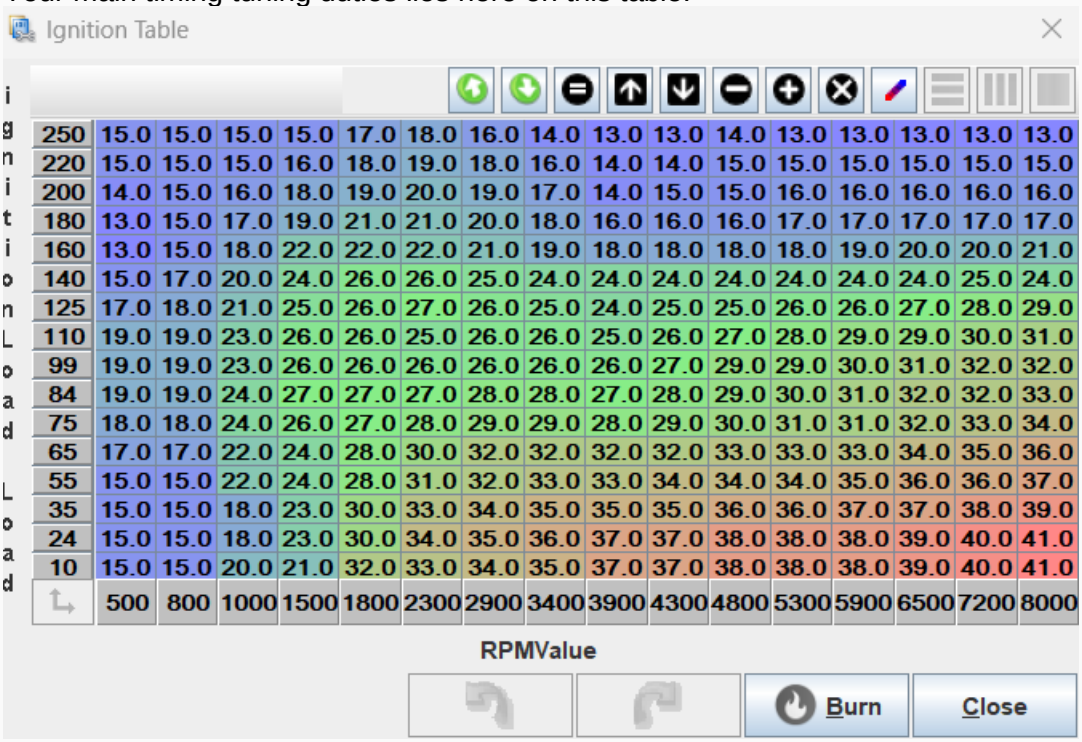
Old school multi spark functionality, not all old means good, as this function is not necessary to be used, and even is recommended not to use it.



Ignition advance

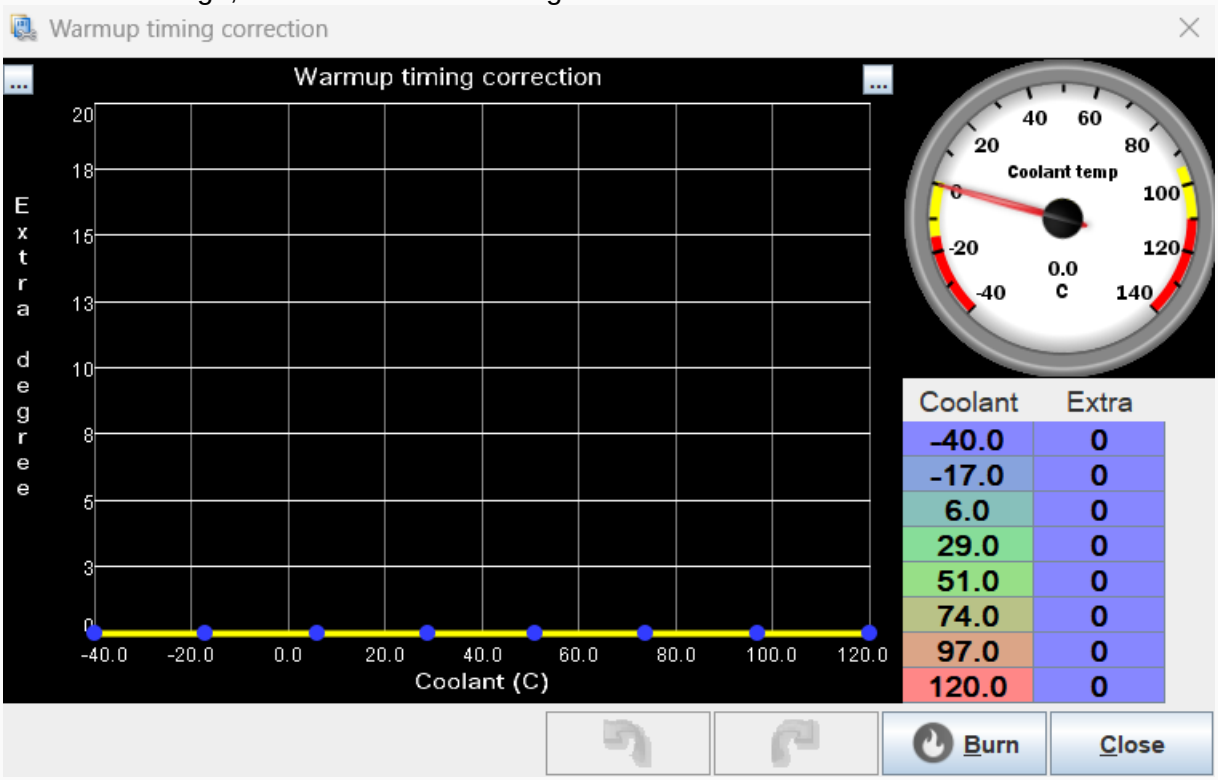
Overview

Your main timing tuning duties lies here on this table.



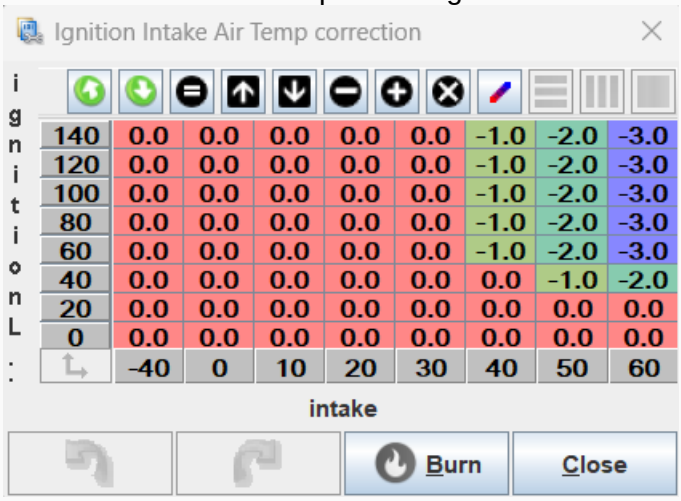
Ign CLT correction (Warm up timing WUT)

Overview
You can add some nice extra degrees of timing while the car is cold to help with the drivability when engine is not warm enough, but maximum 2 or 3 degrees are recommended.



Ign IAT correction (IAT overheat protect)

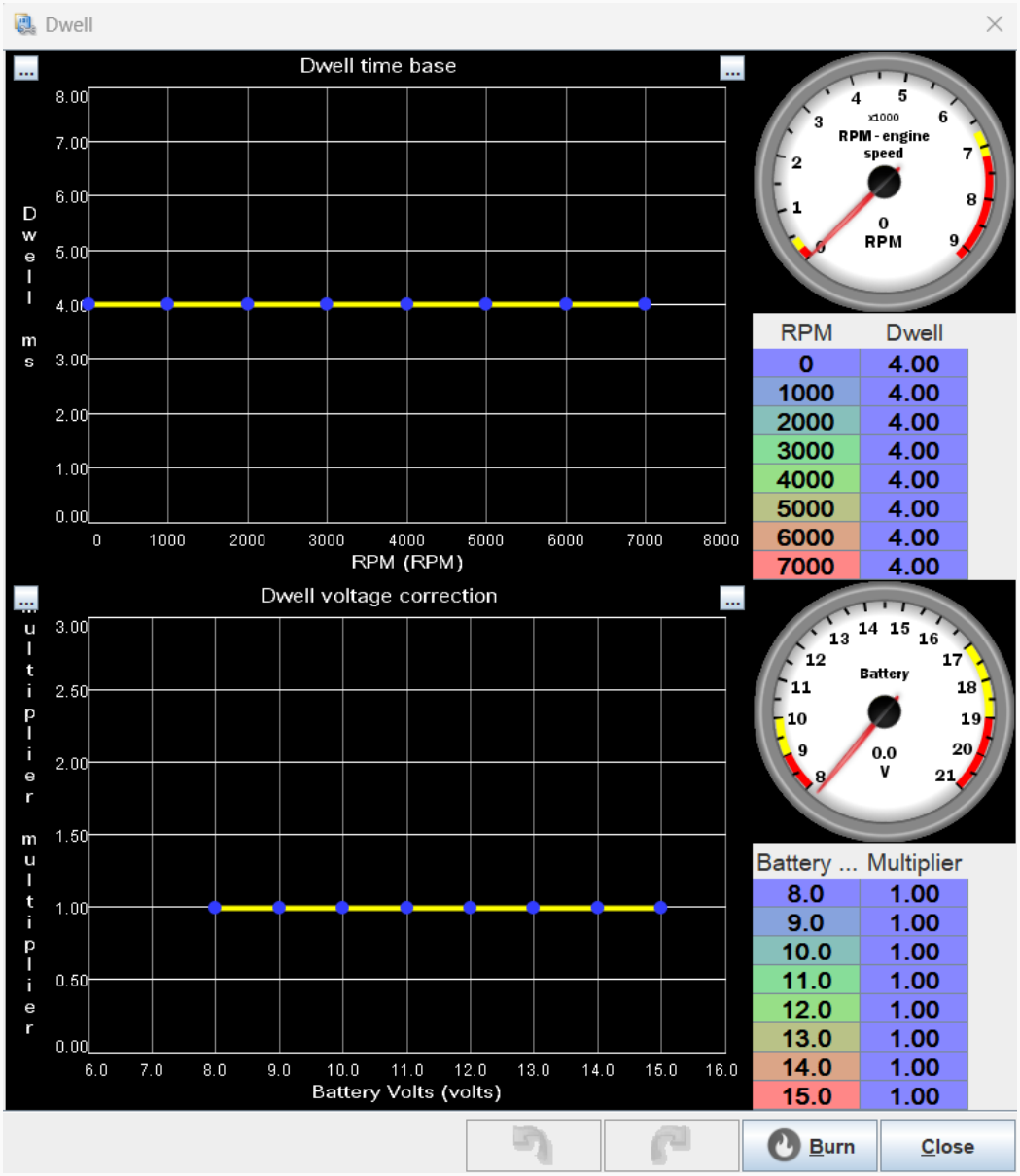
Overview
You can remove some spark timing advance in situations the IAT charge gets too hot to protect vs preignition.



Dwell

Overview
Coils need a time to charge with energy, to be latter deployed into the spark plugs. This needs to be a very specific time and it needs to be tuned. A table to setup different Dwell times is provided for you to fine tune, or a fixed dwell can be used across the rpms.

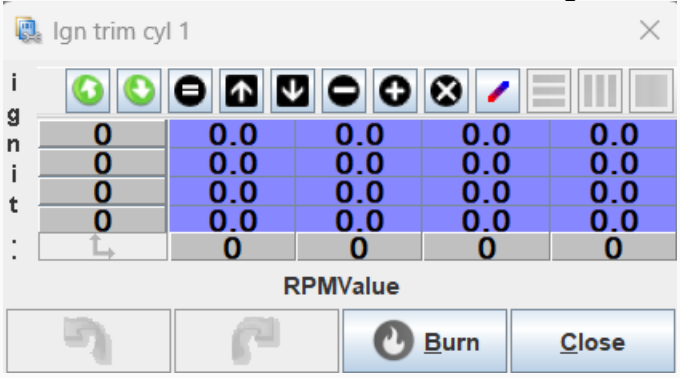
Also, fine tune Dwell is possible by adjusting the multiplier over the different voltages. 1.00 means unchanged, while 1.10 means a 10% increase in Dwell time.



Cylinder ign trims

Overview

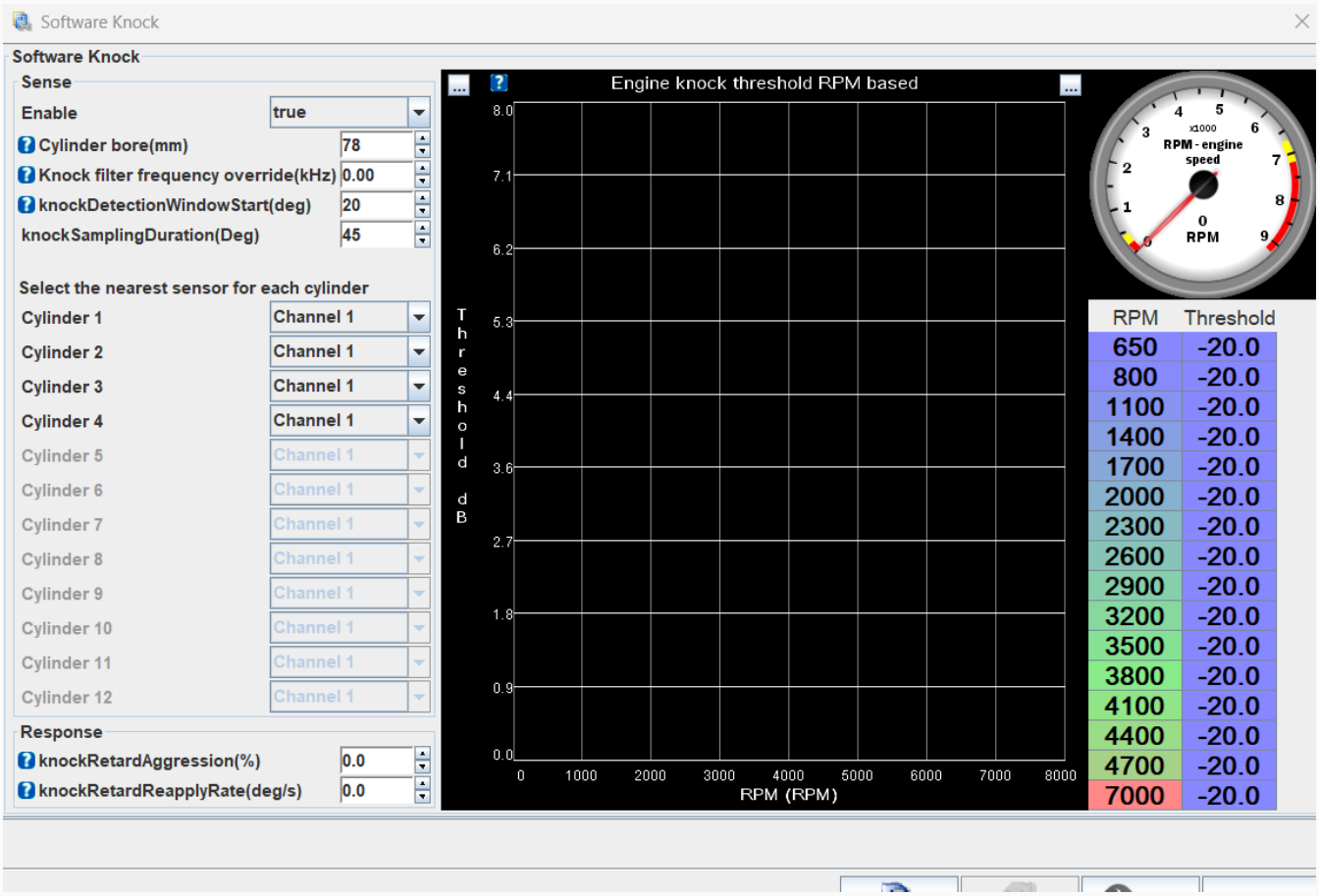
Small tables for fine tune advance in each ignition coil on individual.



Knock sensing

Overview

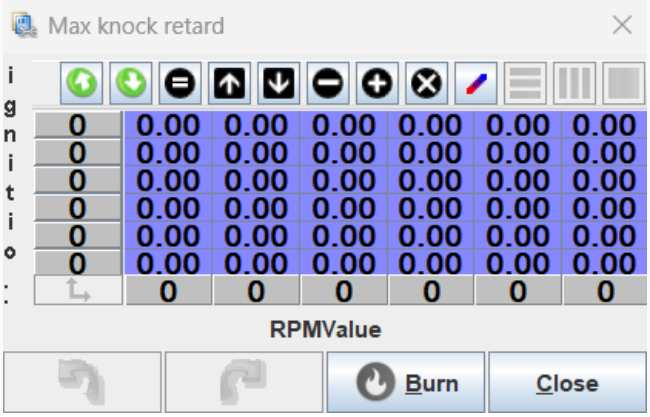
Dual knock inputs for up to 2 banks of knock sensing, each channel can be assigned by cylinder.
Cylinder bore is a necessary parameter for correct detection, the Knock filter frequency is then automatically generated, unless you want to customize it, you need to input a value different than 0.00 to override the internal calculation.
Knock detection is being calculated on specific firing angles, this is for filtering purposes but also so the ECU knows at all times which cylinder has knock.
The threshold needs to be tuned by RPMs using the table.



Knock retard

Overview

On this table you can fine tune how much timing will be taken out if a knock event has been detected.

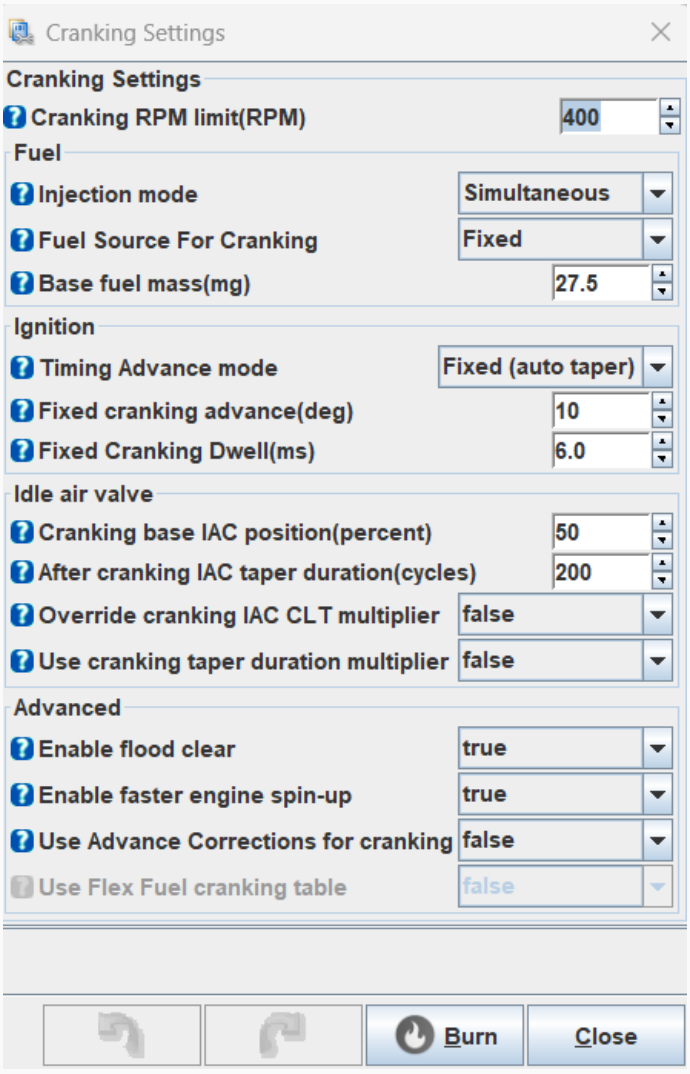


Cranking Menu

This menu has all the adjustments related to starting the engine, like after start enrichment, also special CLT, IAT fuel, timing multipliers special for the cranking moments.

Cranking settings

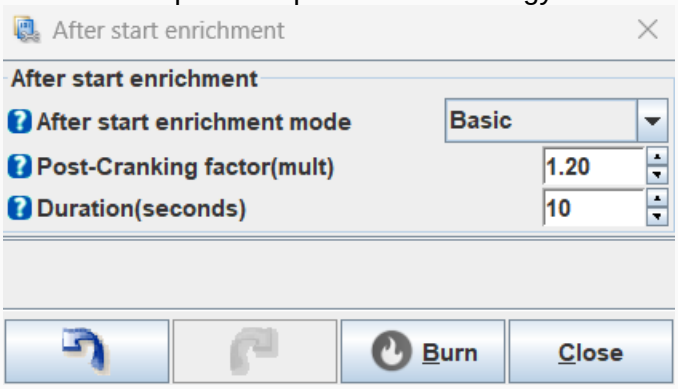
Overview
Conditions typically require multiple adjustments to both fuel and ignition control to provide smooth and quick starts. The settings in this dialog determine when ECU will consider the engine to be in a run/start condition and what settings should be applied during this time.
Here you can select if a fixed parameters fueling strategy will be used, or by map. Same for timing advance, you can use fixed parameters strategy or map-based strategy.
Dwell during cranking is here.



After-start enrichment (ASE)

Overview
Enrichment (ASE) is a separate fuel modifier that operates above the WUE for a fixed period after the engine is first started. Typically, this is a 3-10 second period where a little enrichment can help the engine make a smooth transition from starting to idle.

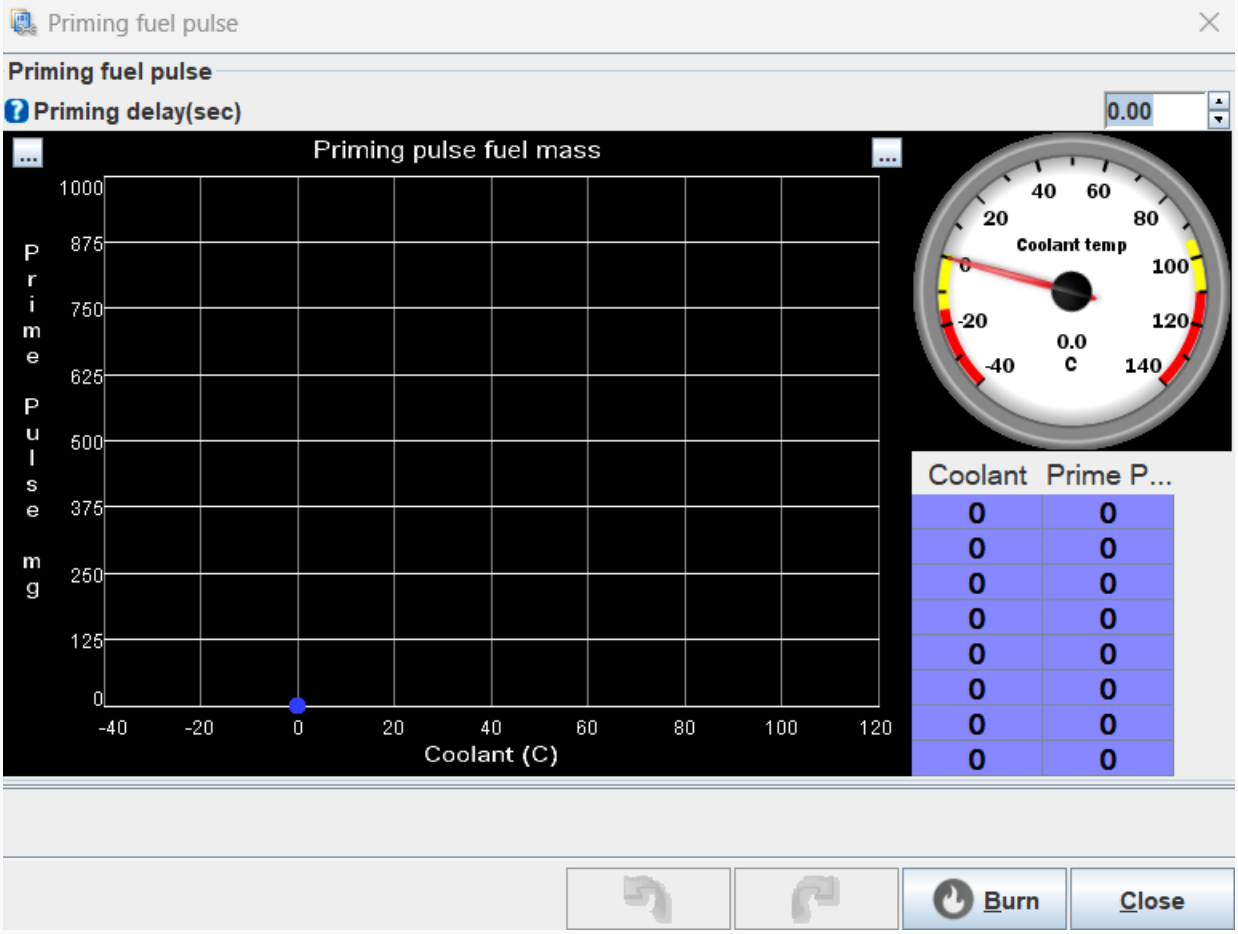
There is a table by temperature to define extra amount of fuel % and duration of ASE, which allows precise adjustments.
You can setup a fixed parameters strategy or use a map to fine tune it.



Priming pulse

Overview

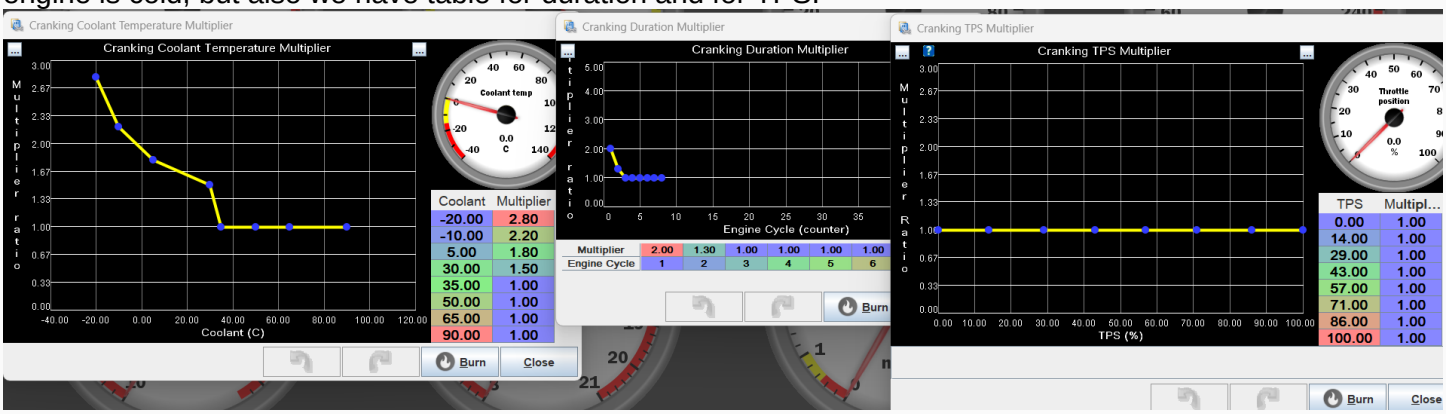
On this table you can fine tune a ECU power on injector priming spray, this is to cleanup bubbles on the injectors, or also to have extra fuel on the chambers for those hard starting situations (really cold situations).



Fuel multipliers (Cranking)

Overview

Several fuel multipliers can be adjusted the most important is CLT fuel multiplier, this injects more fuel when engine is cold, but also we have table for duration and for TPS.



Tools Menu

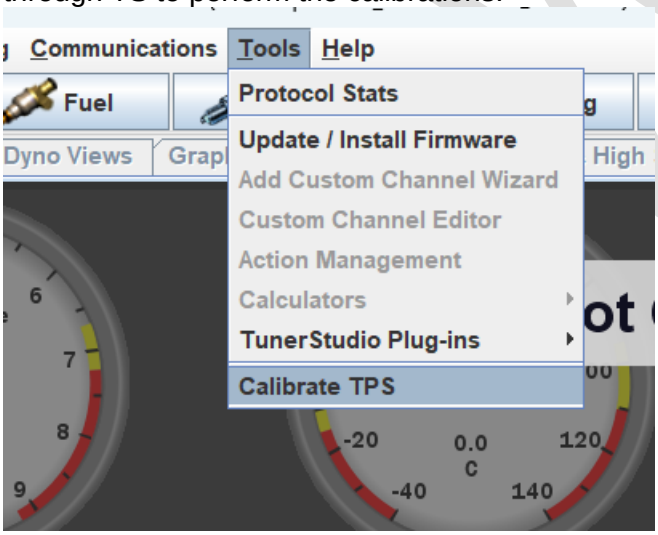
Sensor Calibration

Steps to Calibrate Analog Sensors

Sensor Calibration

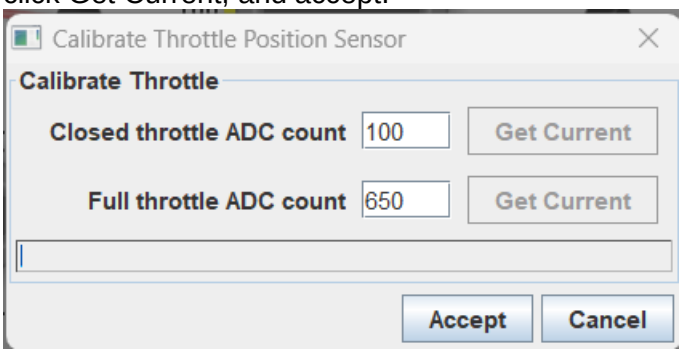
Before your ECU can correctly interpret TPS signal, it must know which sensors you are using. Entering this information into TunerStudio (TS) writes the correct calibration to your ProyectECU. This step is required before you can effectively verify your ProyectECU installation. Note that this is not Tuning your system but just telling you how to understand the signals from the sensors.

This should be done after completing your engine setup. Your laptop must be connected to your ProyectECU through TS to perform the calibrations.



Calibrate TPS

Overview
Here is just to leave the pedal unpressed and click Get Current, then do the same with pedal fully pressed, and click Get Current, and accept.

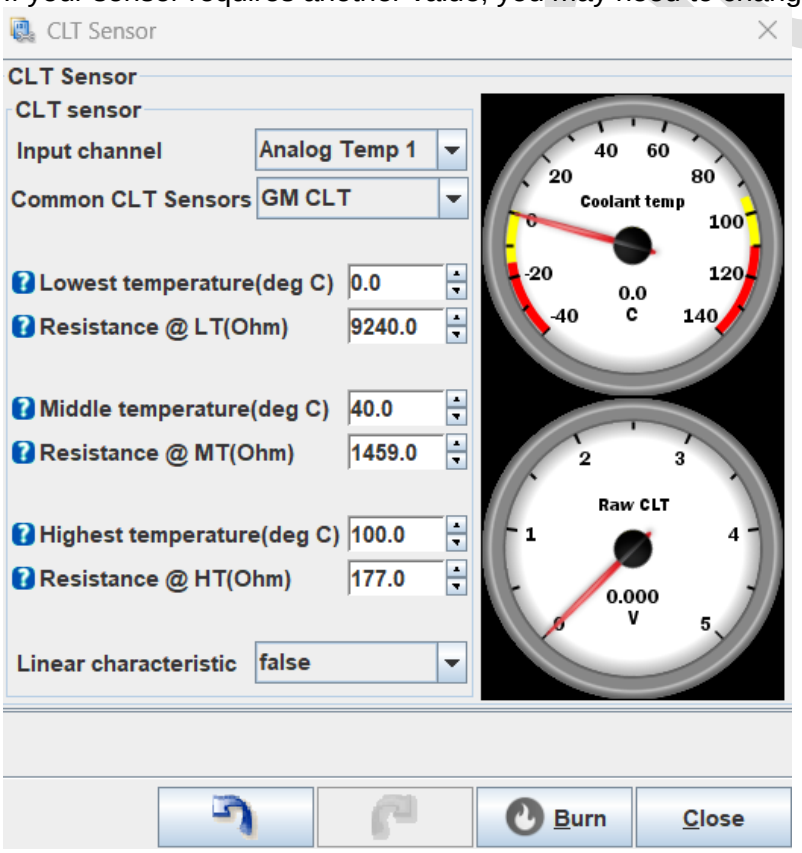


Sensors Menu

This menu contains all the sensor related configurations, from CLT, IAT, to some rare like ambient temp sensor passing to pressure sensors.

CLT sensor

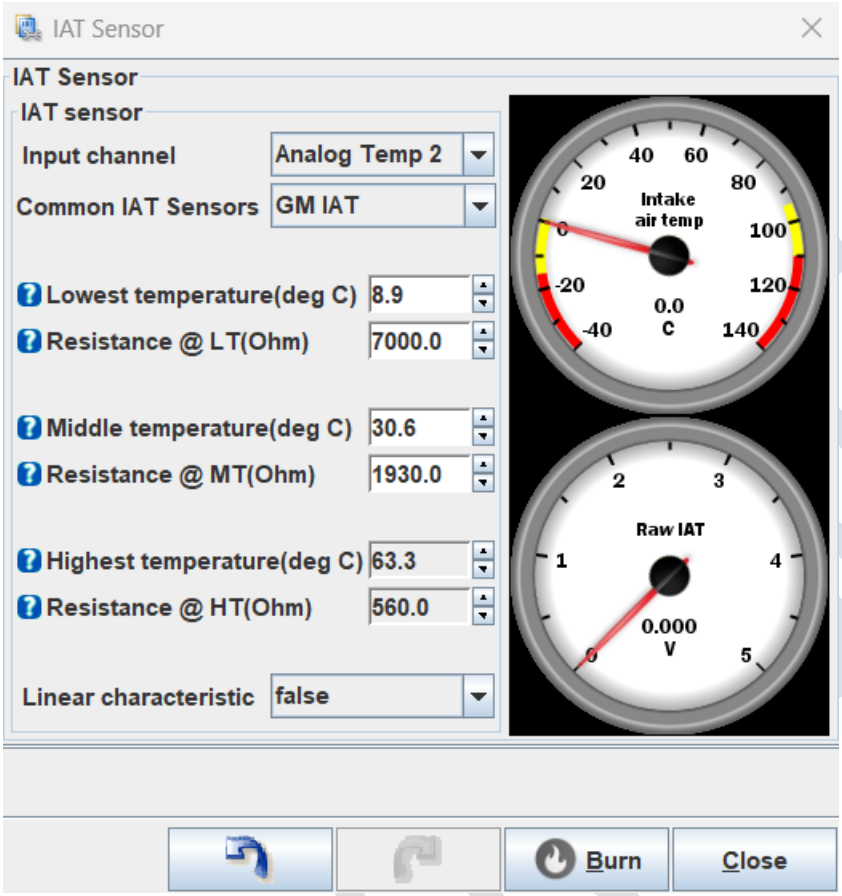
Overview
The configuration lets you choose your desired Temp input from the menu. Also, the selected sensor will be the coolant temperature sensor. Select your sensor from the Common Sensor Values drop-down list. This will put the correct values in the temperature and resistance tables and the bias resistance value. If your sensor is not listed, see Entering Custom Values below.
If your sensor requires another value, you may need to change the resistor to the correct value for your sensor.



IAT sensor

Overview

The configuration lets you choose your desired Temp input from the menu. Also, the selected sensor will be the coolant temperature sensor. Select your sensor from the Common Sensor Values drop-down list. This will put the correct values in the temperature and resistance tables and the bias resistance value. If your sensor is not listed, see Entering Custom Values below.
If your sensor requires another value, you may need to change the resistor to the correct value for your sensor.

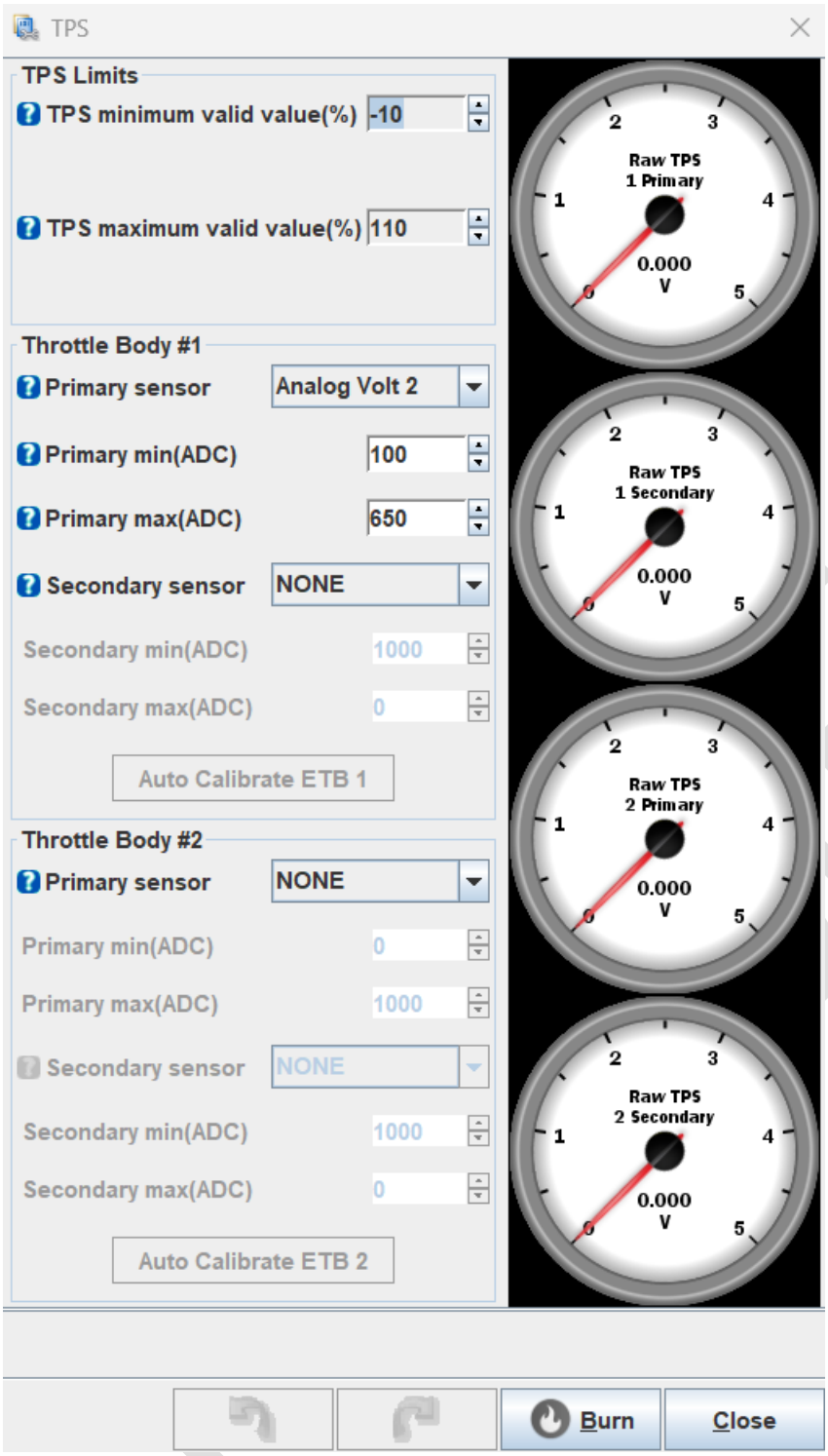


TPS

Overview

Here you can configure your analog TPS, also your Electronic Throttle Body and to calibrate them.
For an analog TPS you must select the desired input from the menu, Primary sensor#1.
And then proceed to TOOLS MENU, and do a TPS calibration there.

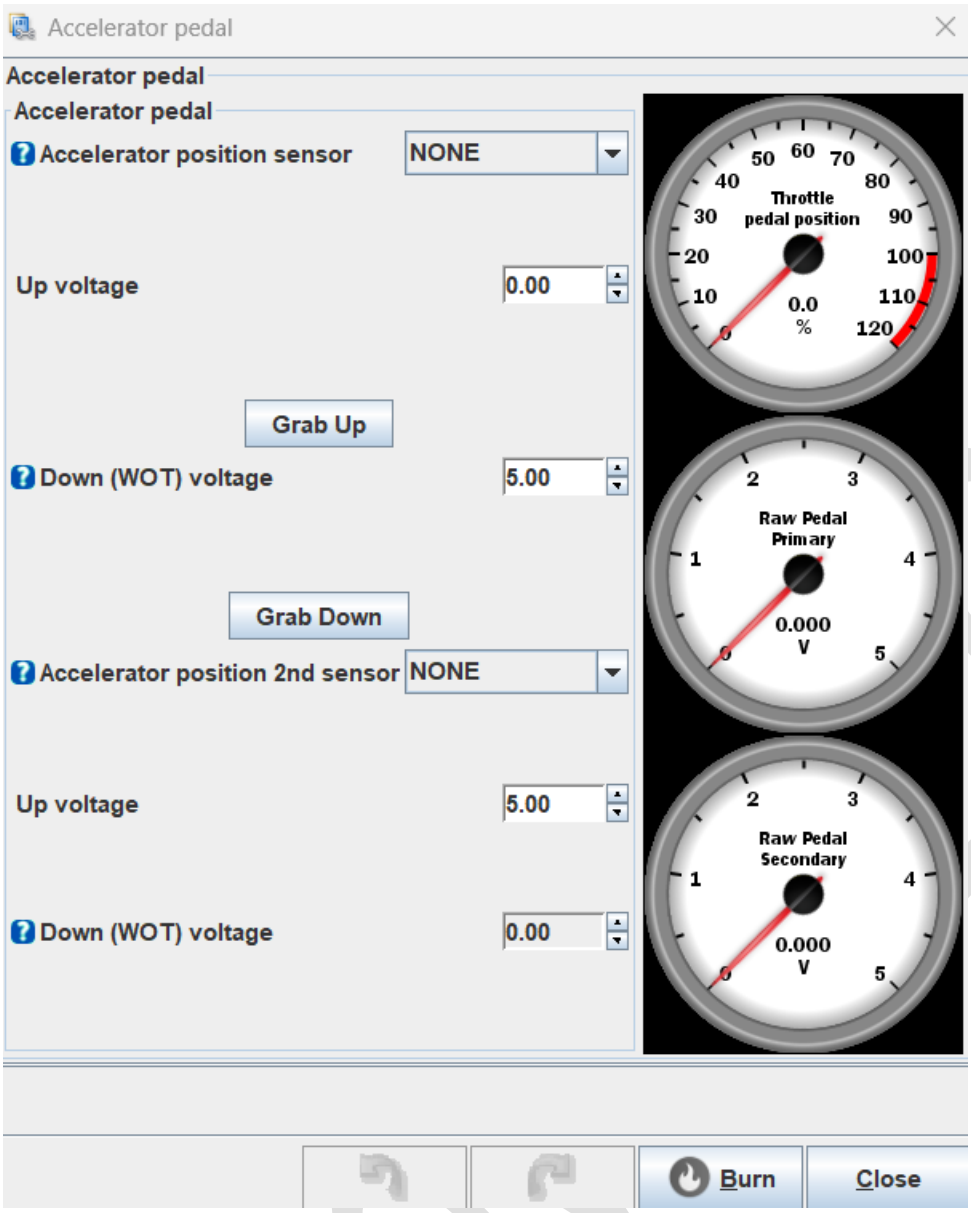
For a ETB (Electronic Throttle Body), you must select your analog signals coming from the ETB, Primary sensor#1 and if you desire enable Secondary sensor#2.
On the Advanced Menu, on Electronic Throttle Body you must select the outputs (explained more in detail in specific manual section).
And finally, open the Accelerator Pedal menu and select the input(s) for the pedal, calibrate using the grab UP and grab DOWN buttons.
Then if you desire you can perform a ETB autocalibration.



Accelerator Pedal

Overview

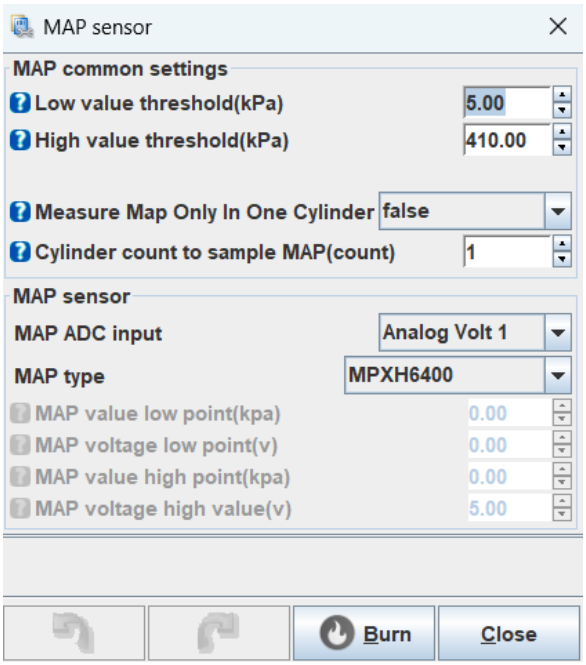
This configuration menu is only on a ETB setup. If analog throttle body is used, the TPS menu should be used instead.
The configuration lets you choose your desired input from the menu. Also, to activate a secondary input and select if if you desire.
Buttons for pedal calibration is provided here, first pedal will be left unpressed, and click Grab Up, then press the pedal fully and click Grab Down.
And accept, this completes the Accelerator pedal for ETB setups.



Map Sensor

Overview

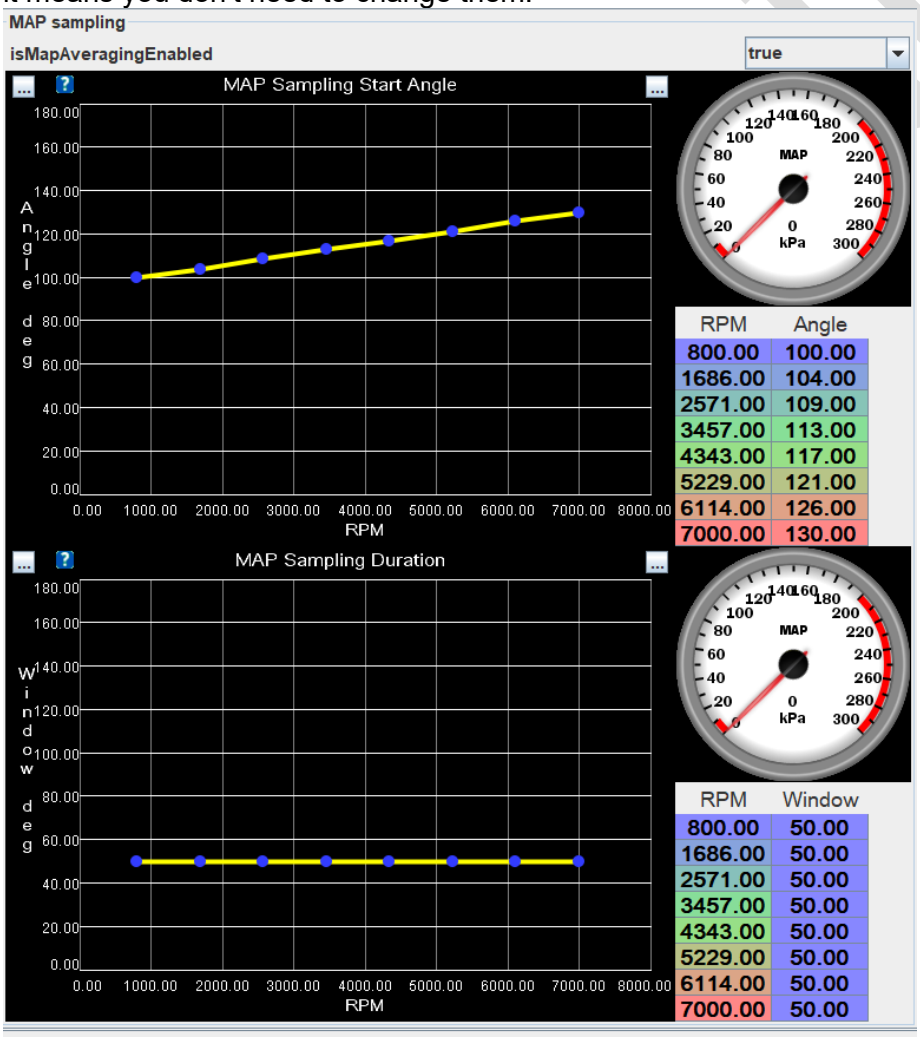
This configuration menu let you choose your map sensor and to fine tune it if you need. Input selection is also available. For some specific engines with lots of variation on the air intake manifold, and option to measure only in 1 cil is available.
Also a full menu of Map sampling is available to fine tune the measurements behavior.



Map Sampling

Overview

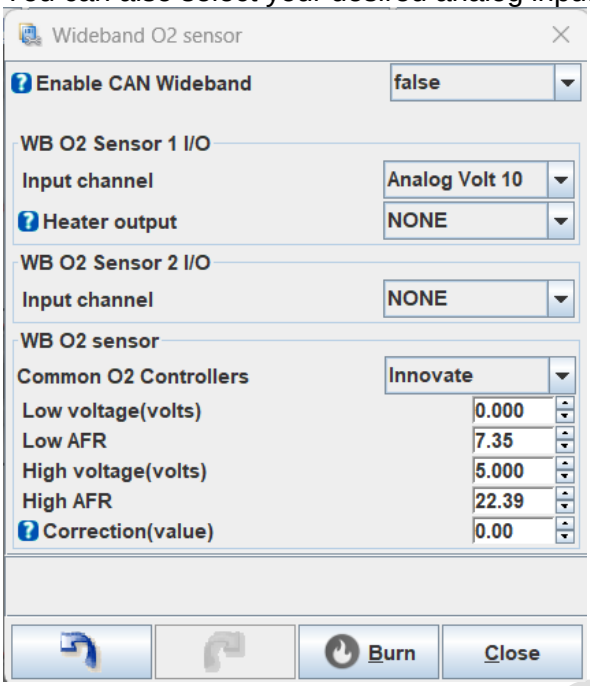
A predefined sampling time and window is shown below, if you don't know what these parameters means, then it means you don't need to change them.



Wideband O2 sensor

Overview

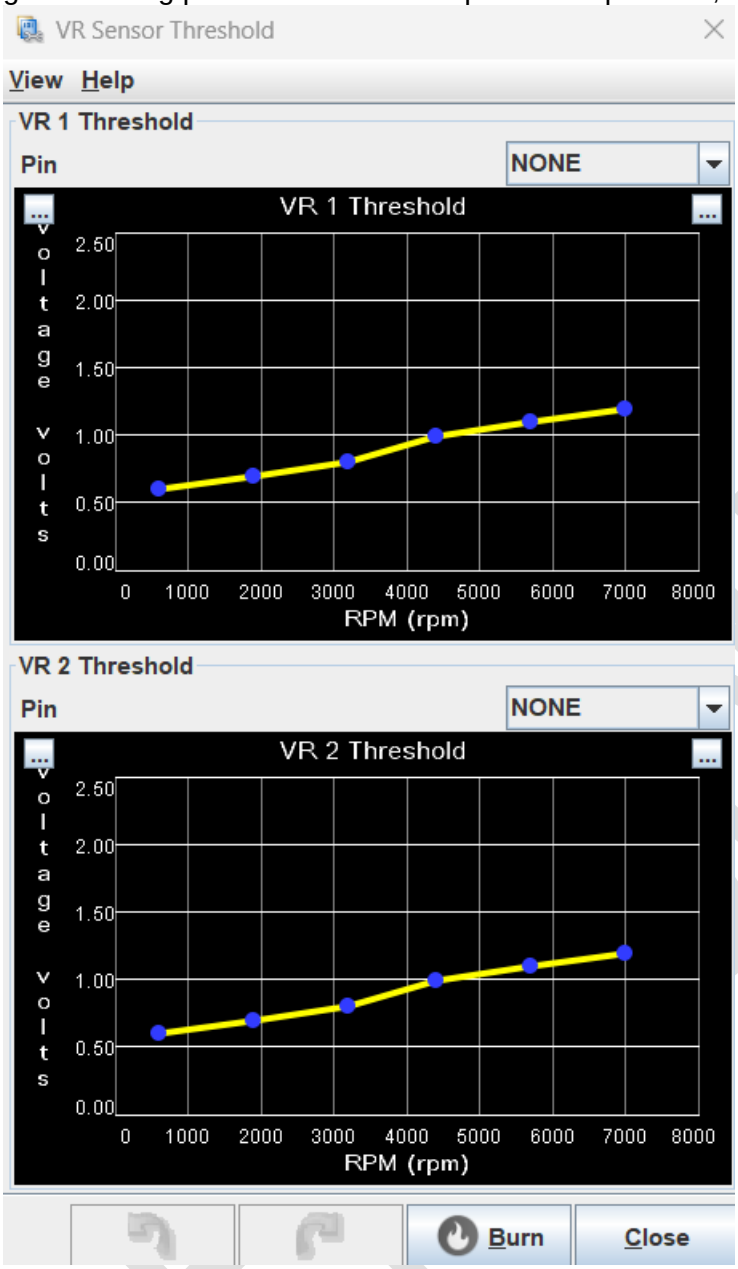
Select your oxygen sensor controller from the Common Controllers Values drop-down list. If you are using a custom oxygen sensor controller select Custom Linear WB and then you can enter the Volts and AFR values at two points (should be published in the controller manual).
You can also select your desired analog input here. For WB sensor 1 and WB sensor 2.



VR sensor threshold

Overview

This is to adjust the sensitivity of the VR input amplifier through the RPMs. The curve provided makes for a great starting point. Selection of output is also possible, but this comes preconfigured on the factory tune file.



Speed sensor

Overview

This configuration menu is to adjust the Vehicle speed sensor, the dropdown elector is for the desired input, it can be digital type or VR. This depends on the type of the sensor.
A filter parameter can help with noisy signals. Try to avoid too much filtering, and better work on the sensor or wiring itself.
Weel revolution per kilometer is the most important calibration parameter, but also several parameters are necessary for correct gear detection: Final drive ratio, Speed sensor gear ration, speed sensor tooth count.

Speed sensor

Speed sensor

Speed sensor

Input: Digital 3

Filter parameter: 0

Wheel revolutions per kilometer(revs/km): 551.0

Speed sensor gear ratio: 1.122

Speed sensor tooth count: 4

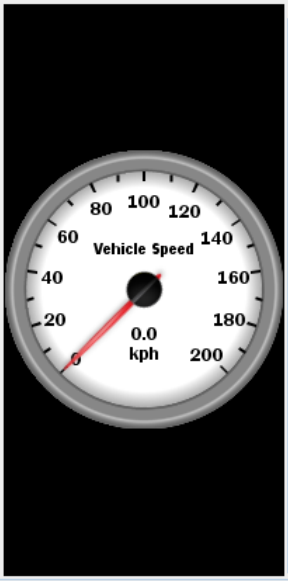
CAN Vehicle Speed

Enable CAN VSS: false

Convert wheel to vehicle speed: Disable

CAN VSS type: BMW_e46

CAN VSS scaling(ratio): 329.7536



Gear Detection

Wheel revolutions per kilometer(revs/km): 551.0

Final drive ratio: 4.30

Common transmissions: Miata NA/NB/NC 5 speed

Forward gear count: 5

1st gear(ratio): 3.14

2nd gear(ratio): 1.89

3rd gear(ratio): 1.33

4th gear(ratio): 1.00

5th gear(ratio): 0.81

6th gear(ratio): 0.00

7th gear(ratio): 0.00

8th gear(ratio): 0.00

Burn

Close

CKP/CAM Sensor Patterns

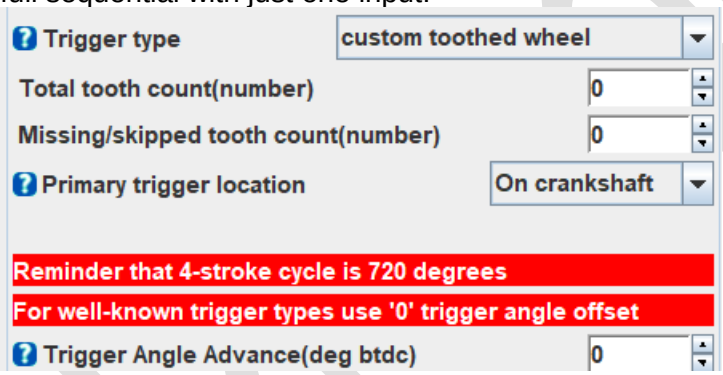
Supported Crankshaft/Shaft Patterns List (for firmware version

ProyectECU supports an increasing number of crankshaft/shaft and CAS decoders. This includes some of the most common OEM configurations, as well as aftermarket favorites (such as MissingTooth wheels).

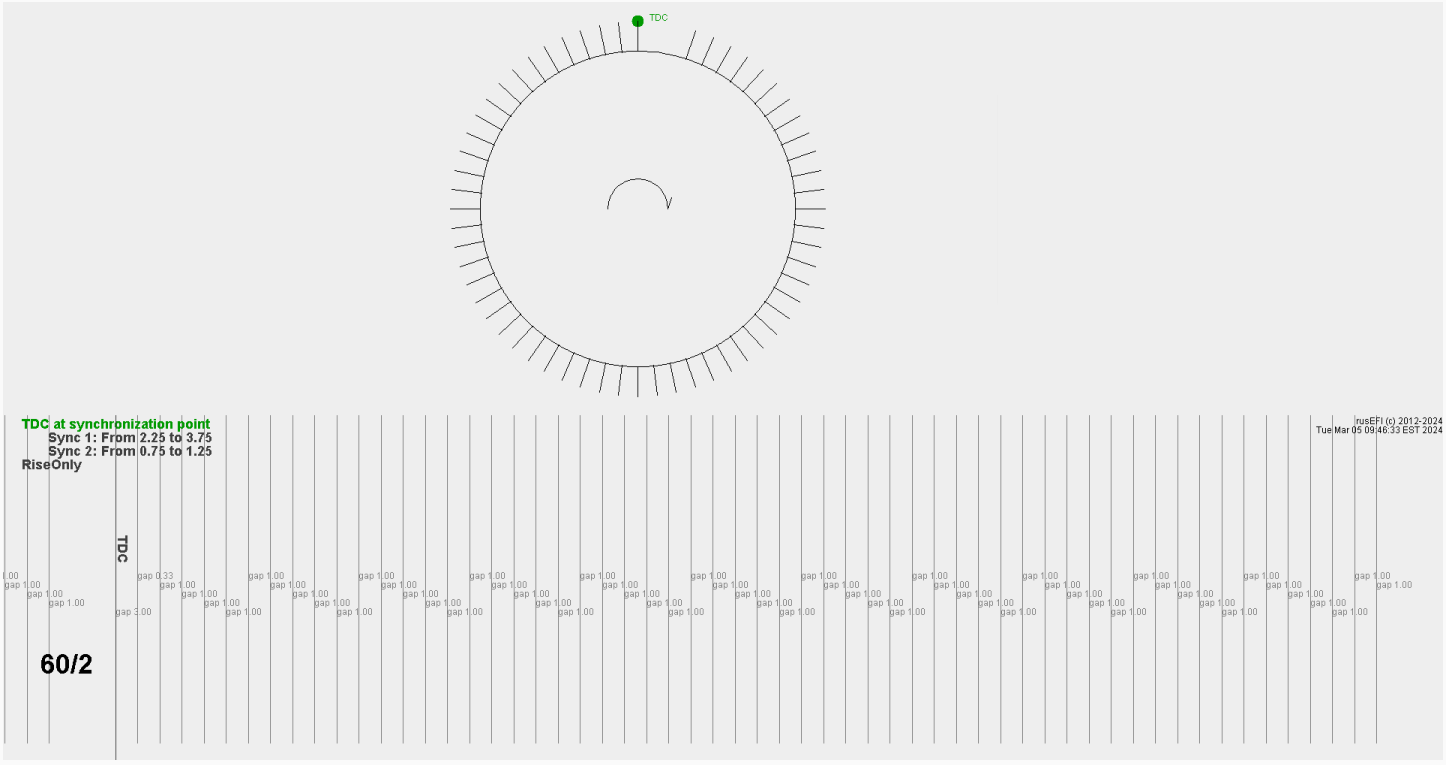
The following list includes all that are currently supported. Each one leads to a page with details about using the decoder (These pages are a work in progress)
"custom toothed wheel", "Ford Aspire", "Dodge Neon 1995", "Miata NA", "GM_7X", "Daihatsu 3 cylinder", "Mazda SOHC 4", "60-2", "36-1", "Mercedes Two Segment", "Single Tooth", "EZ30", "Dodge Neon 2003", "Mazda DOHC 1+4", "1+1", "Half Moon", "Dodge Ram 1+16", "60-2 Wrong Polarity", "Benelli Tre", "Dodge Stratus", "36_2_2_2", "Nissan Primera", "Rover K", "GM 24x 5 degree", "Honda CBR 600 Cam", "ChryslerNGC 36-2-2", "3-1 skipped", "Dodge Neon 2003 crank", "Miata NB", "Subaru 7+6", "Jeep 18-2-2-2", "12crank/24cam", "Dodge Neon 1995 crank only", "Jeep XJ 4 cyl", "FiatIAQ_P8", "Mazda Z5", "Renix 44-2-2", "Renix 66-2-2-2", "Honda K 12+1", "36-2", "Subaru SVX", "Suzuki K6A", "Subaru 7 without 6", "GM 60-2-2-2", "Skoda Favorit", "Kawa KX450F", "Nissan VQ35", "Nissan VQ30", "Nissan QR25", "Subaru SVX Crank 1", "Subaru SVX Cam VVT", "Ford PIP", "Suzuki G13B", "Honda K 4+1", "Nissan MR18 Crank", "32-2", "36-2-1", "36-2-1-1", "3-0", "GM 24x 3 degree", "60-2-2 F3R", "Mitsu 4G63 Crank", "x2 30 Deg camshaft BTDC", "6-0", "Daihatsu 4 cylinder", "Nissan HR", "Arctic Cat", "HR12 in", "HONDA J30A2", "trg88",

Custom Toothed Wheel

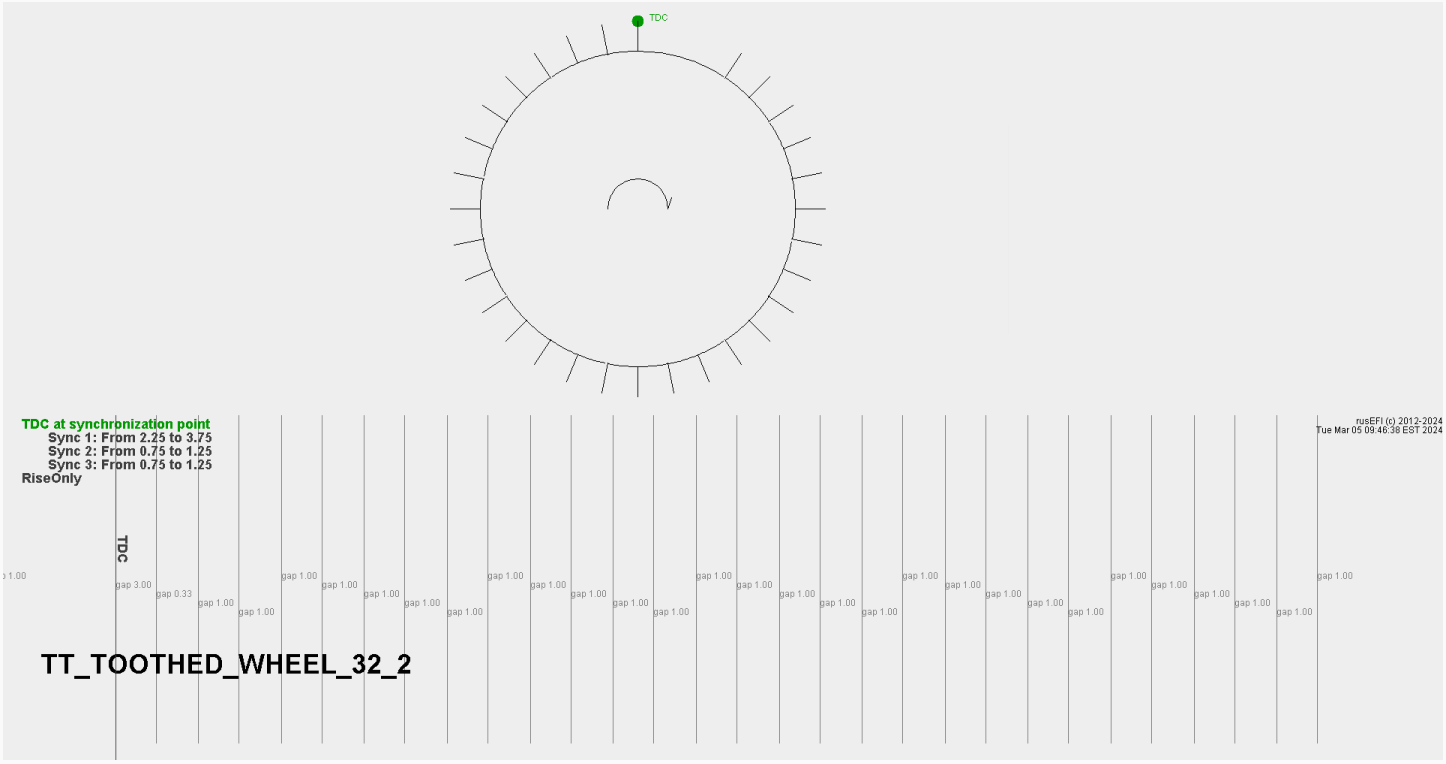
Overview
Missing tooth pattern, the missing tooths needs to be consecutive (example 35 consecutive tooths, 1 consecutive missing tooths, example2 58 consecutive tooths, 2 consecutive missing tooths), if the missing or tooths are not consecutive then they fall into another category, check the other patterns available.
This trigger type can be either on Crankshaft, or in Cam (or cam speed). Cam giving the ECU information for full sequential with just one input.



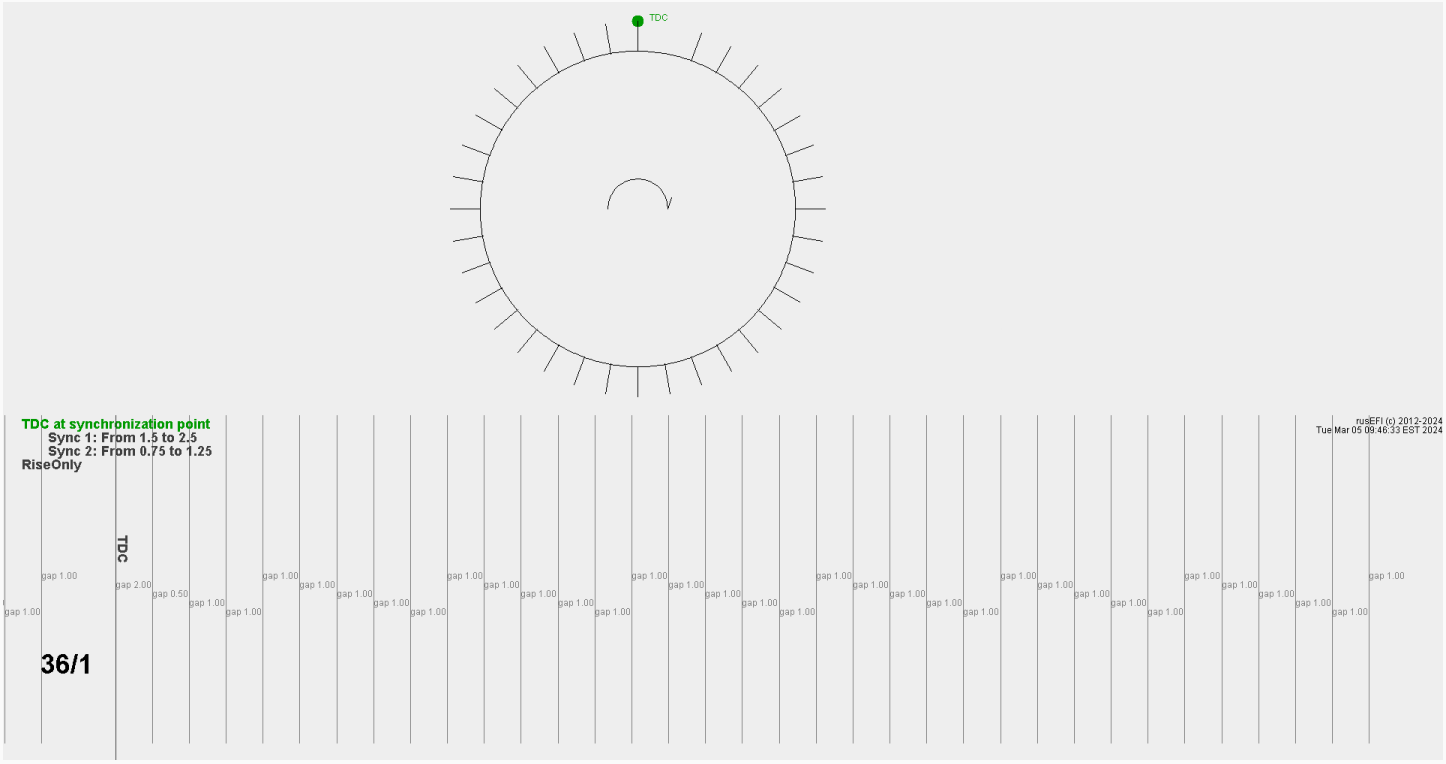
60/2
Overview
If you also have a CAM sensor somewhere see VVT Section ahead.



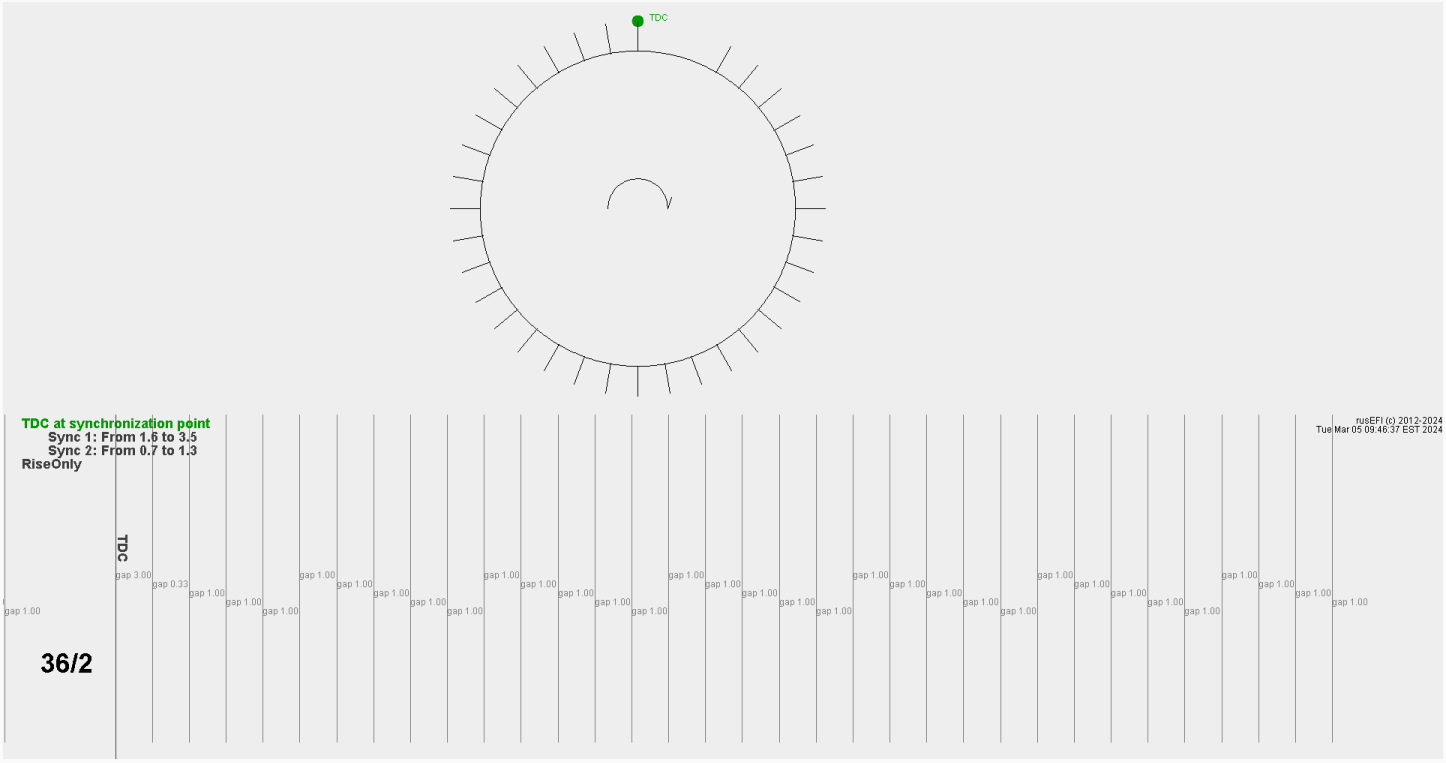
32/2
Overview



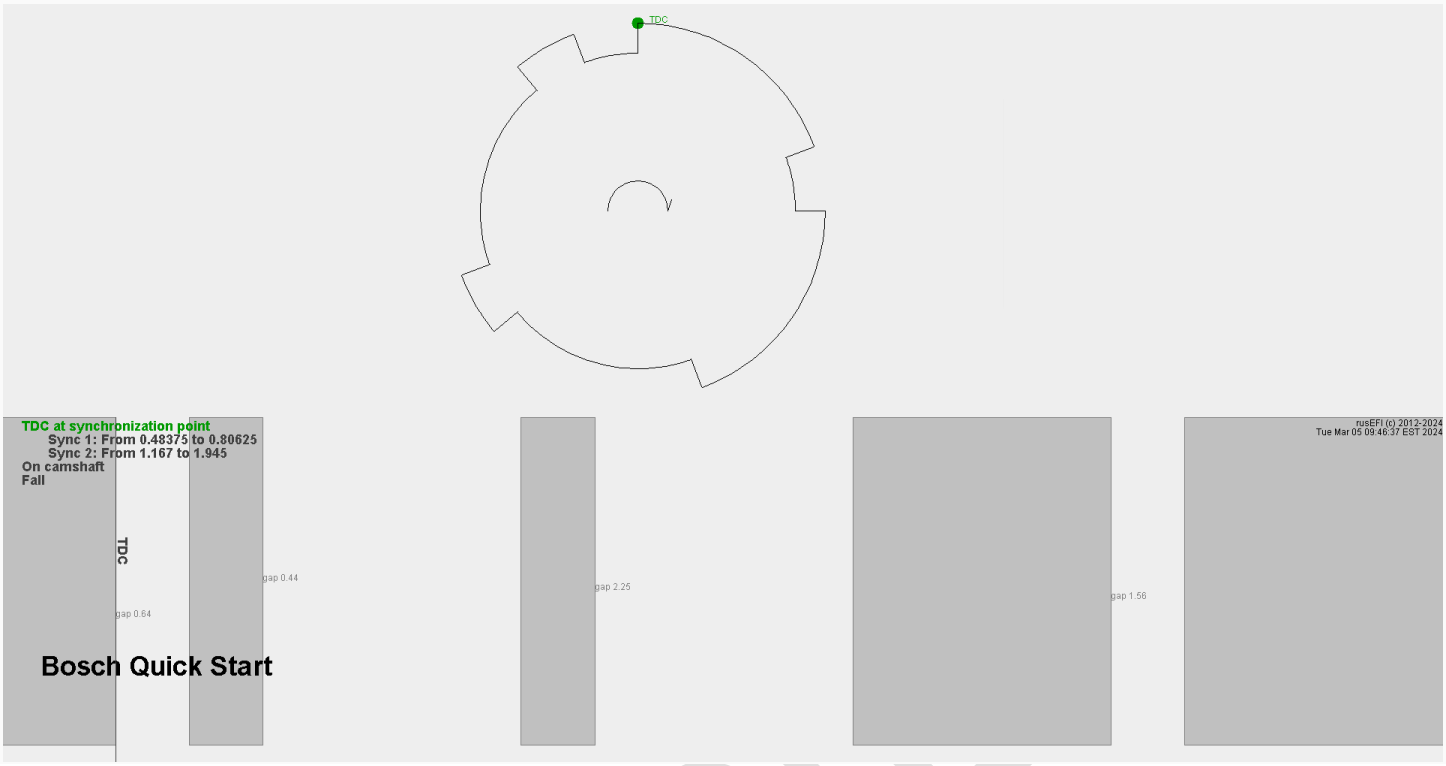
36/1
Overview



36/2
Overview



Bosch Quick Start
Overview



Honda

12 crank/24 crank

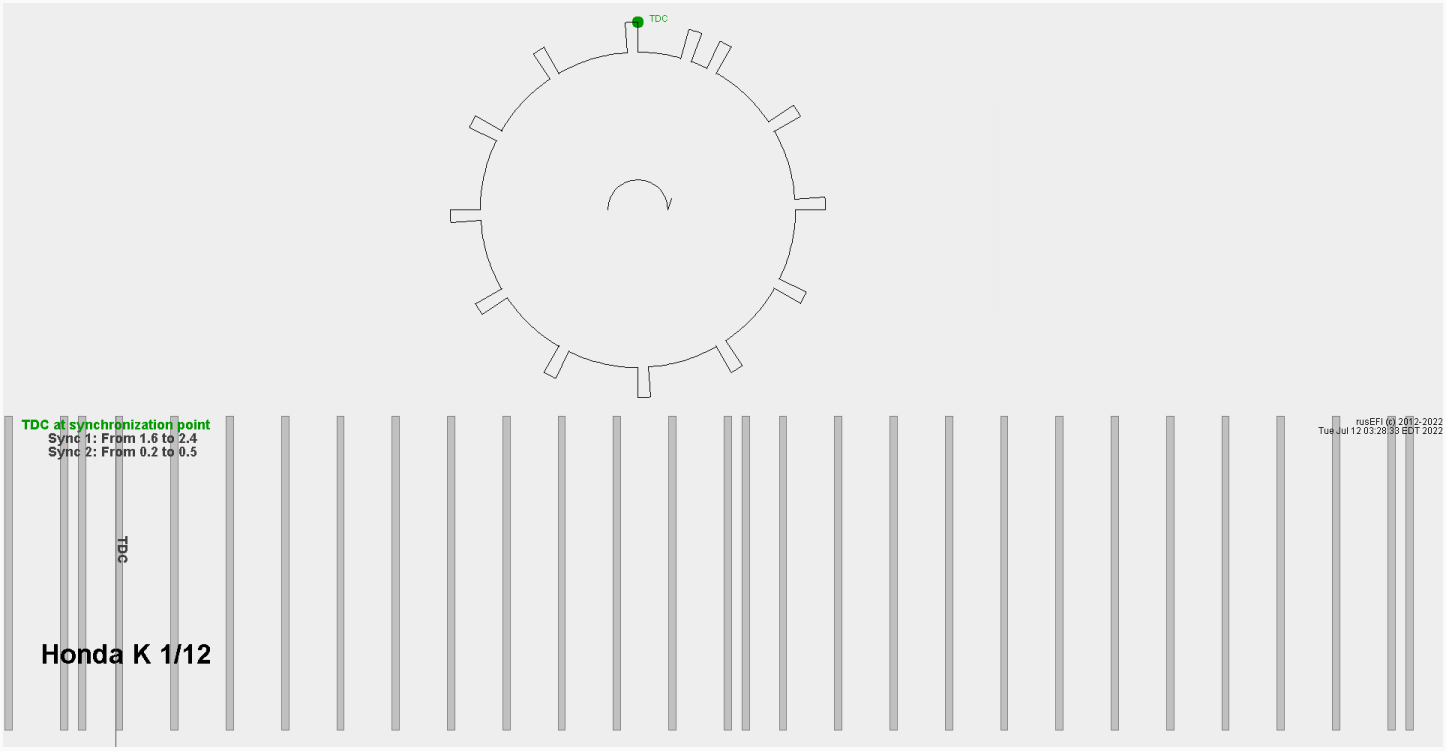
Overview

Similar but different from "Custom 12/0":

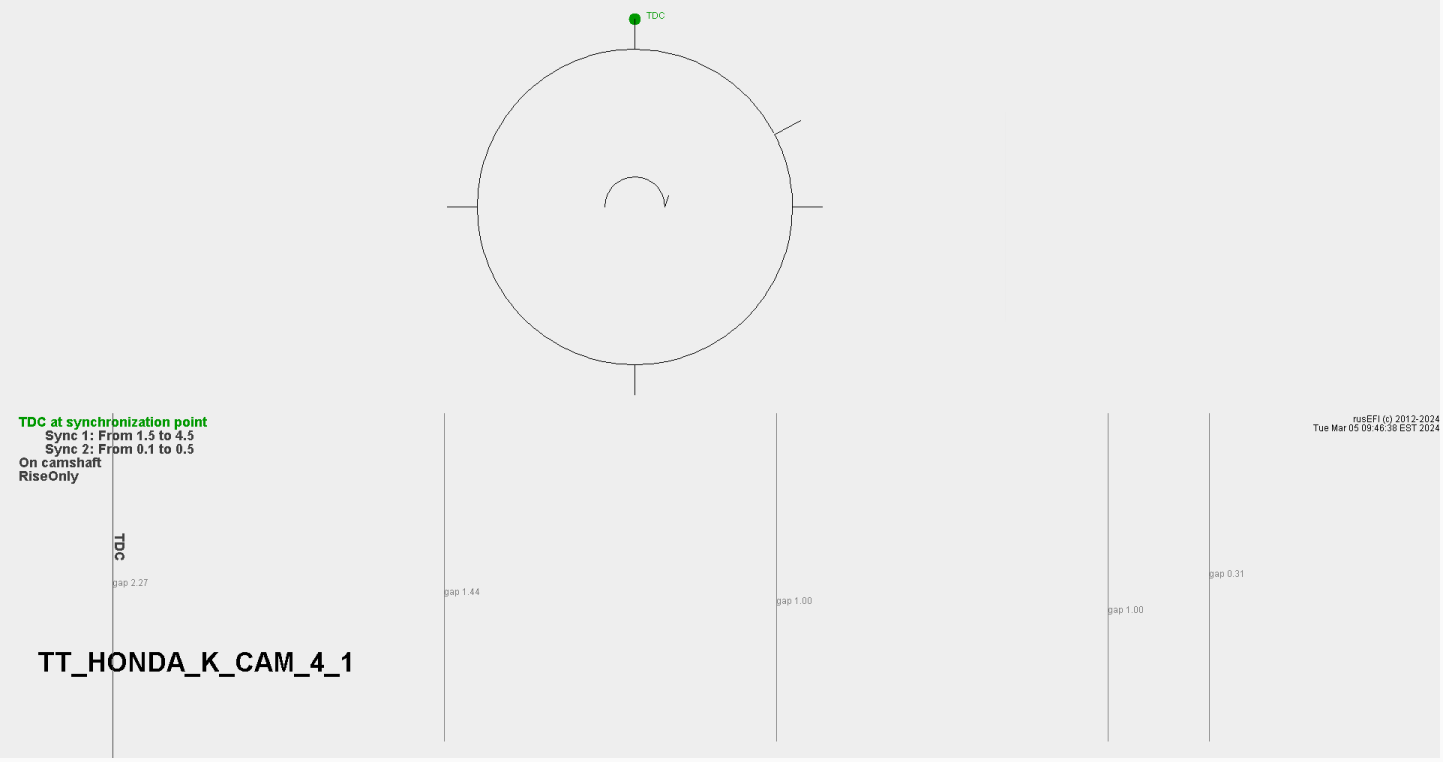
- "Custom 12/0" synchronizes on any tooth relying on a distributor
- "12crank/24cam" is a special popular trigger which depends on cam sensor for engine phase detection.

Honda K 1/12 Crankshaft

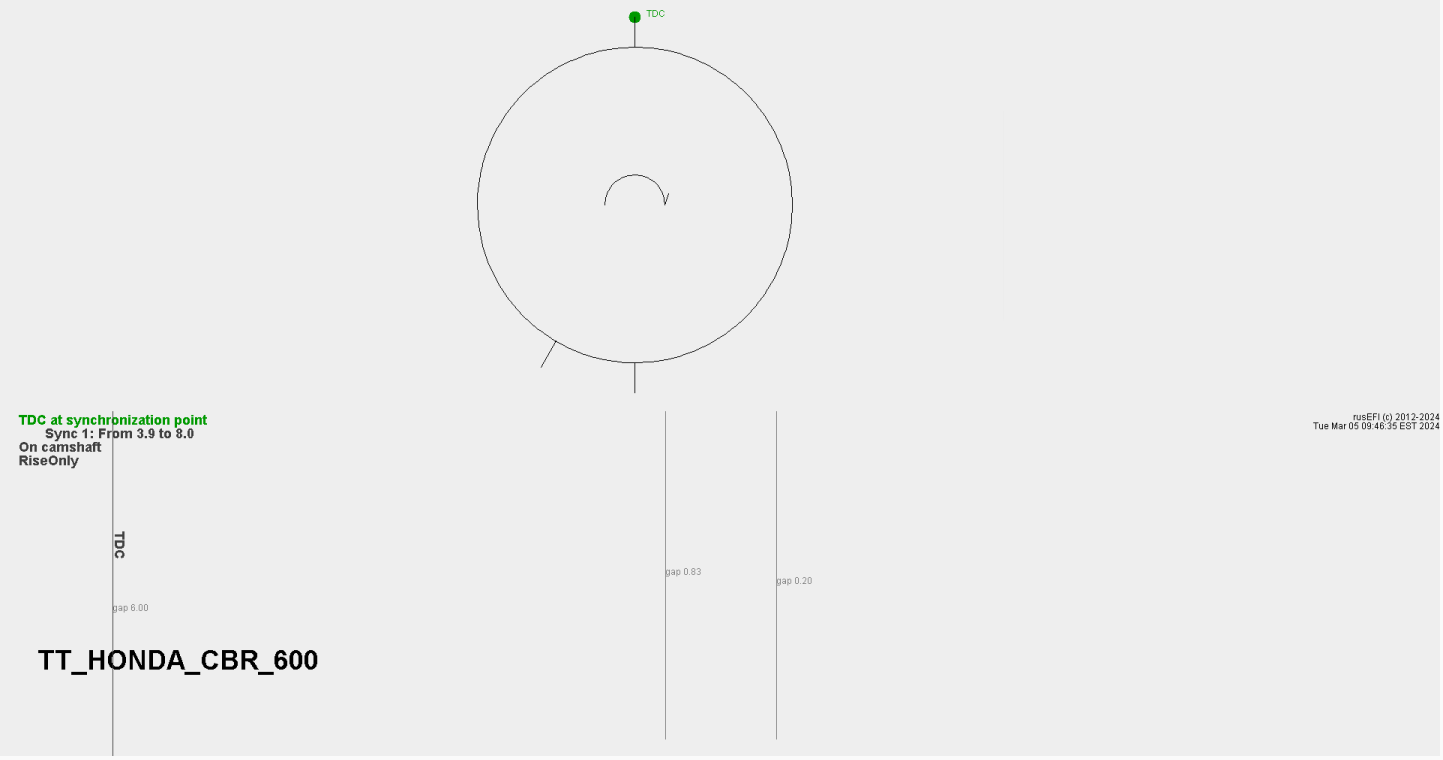
Overview



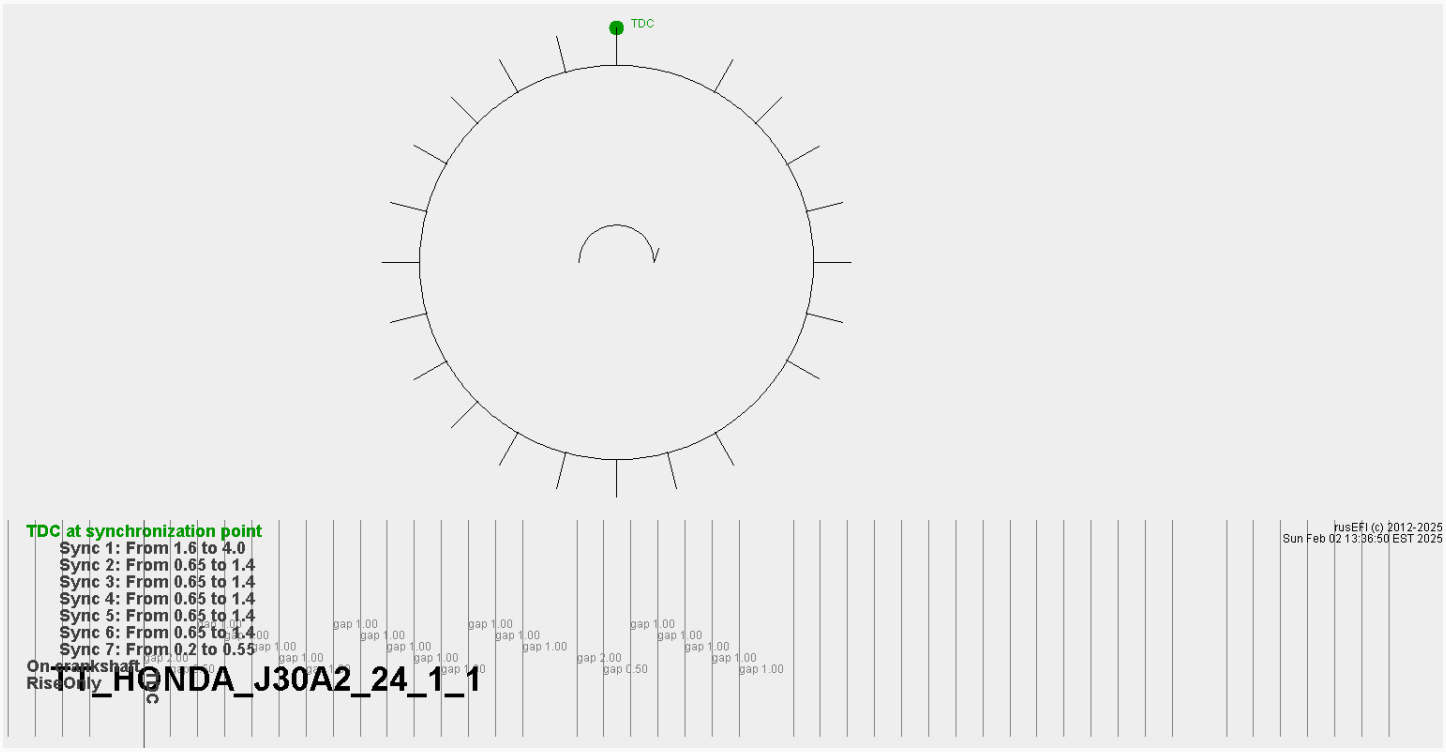
Honda K 4+1
Overview
Honda K Exhaust Camshaft



Honda CBR600
Overview



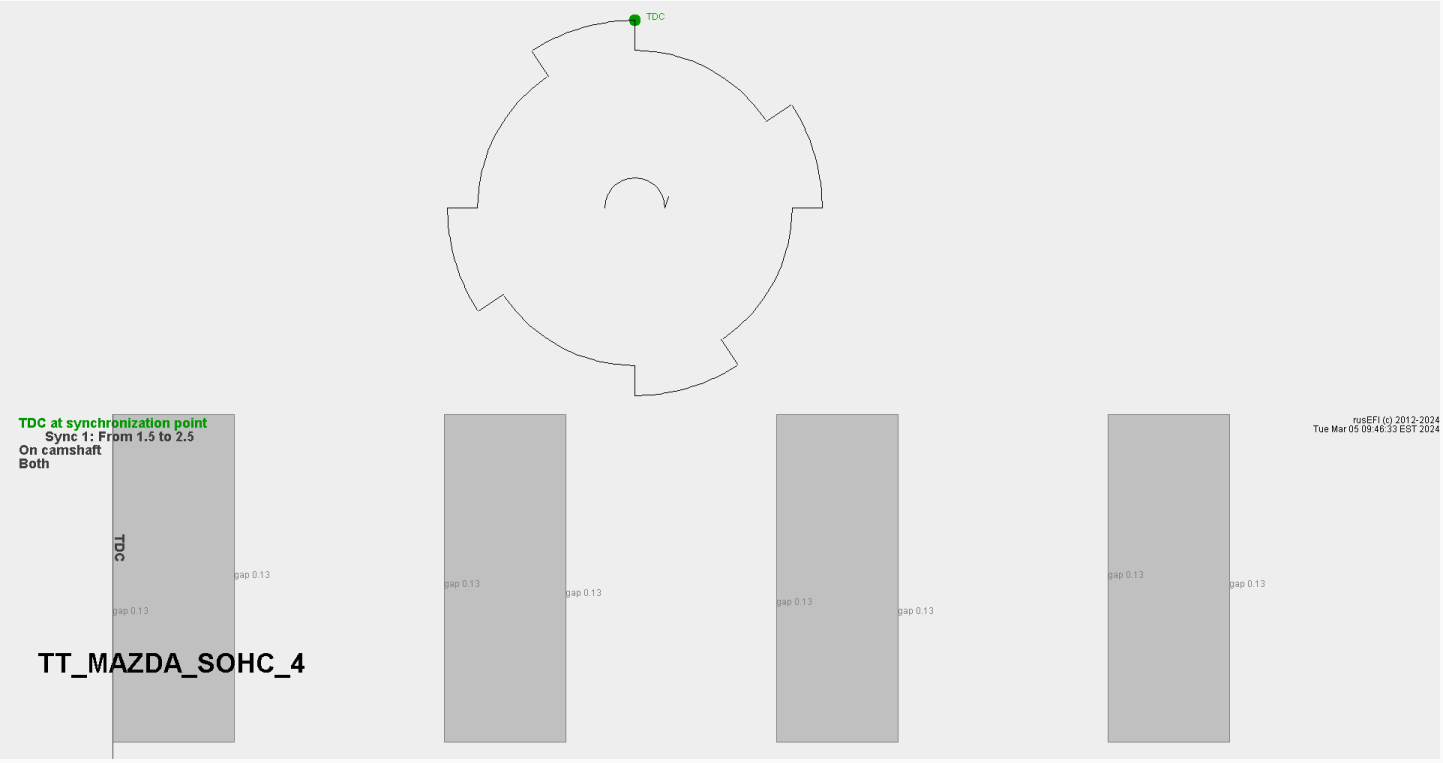
Honda J30
Overview



Mazda

Mazda Protege SOHC

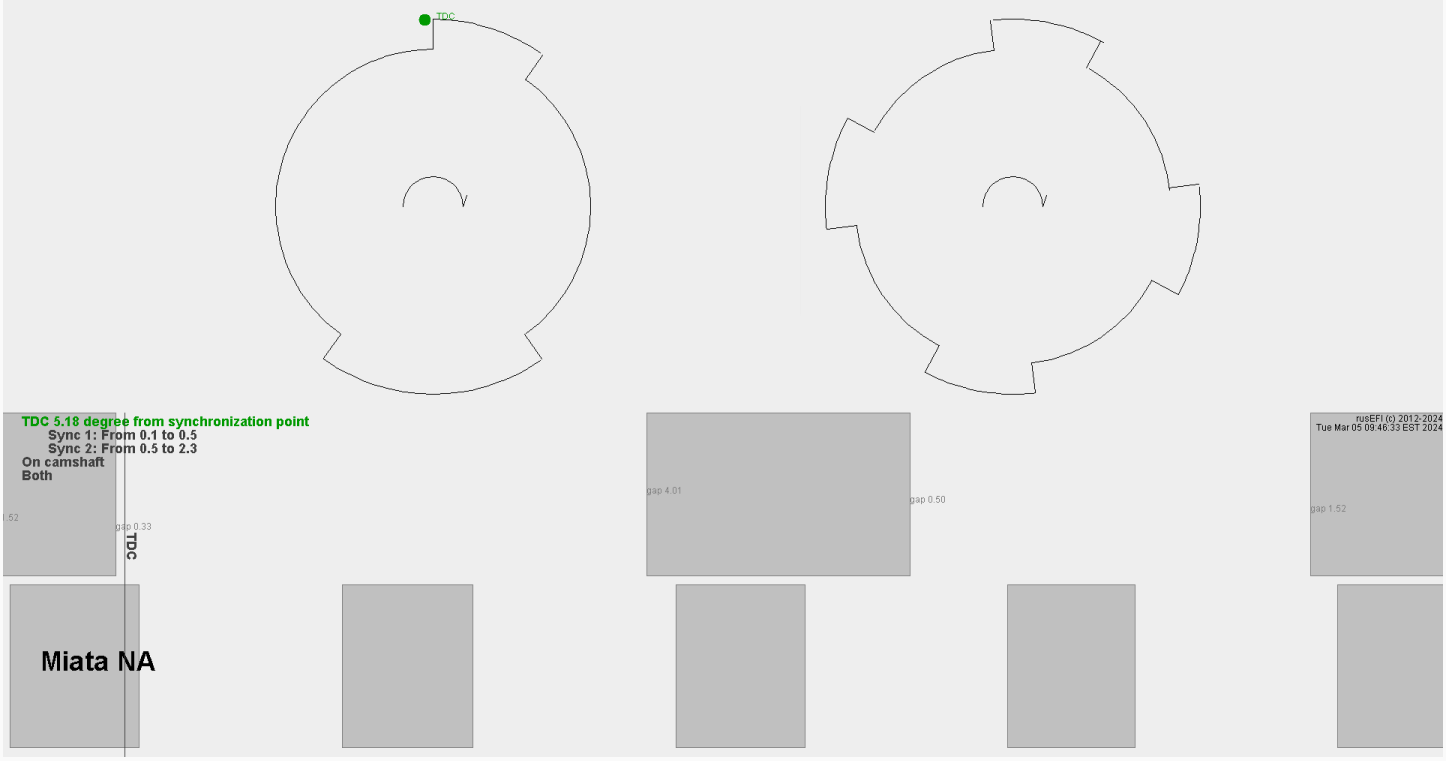
Overview



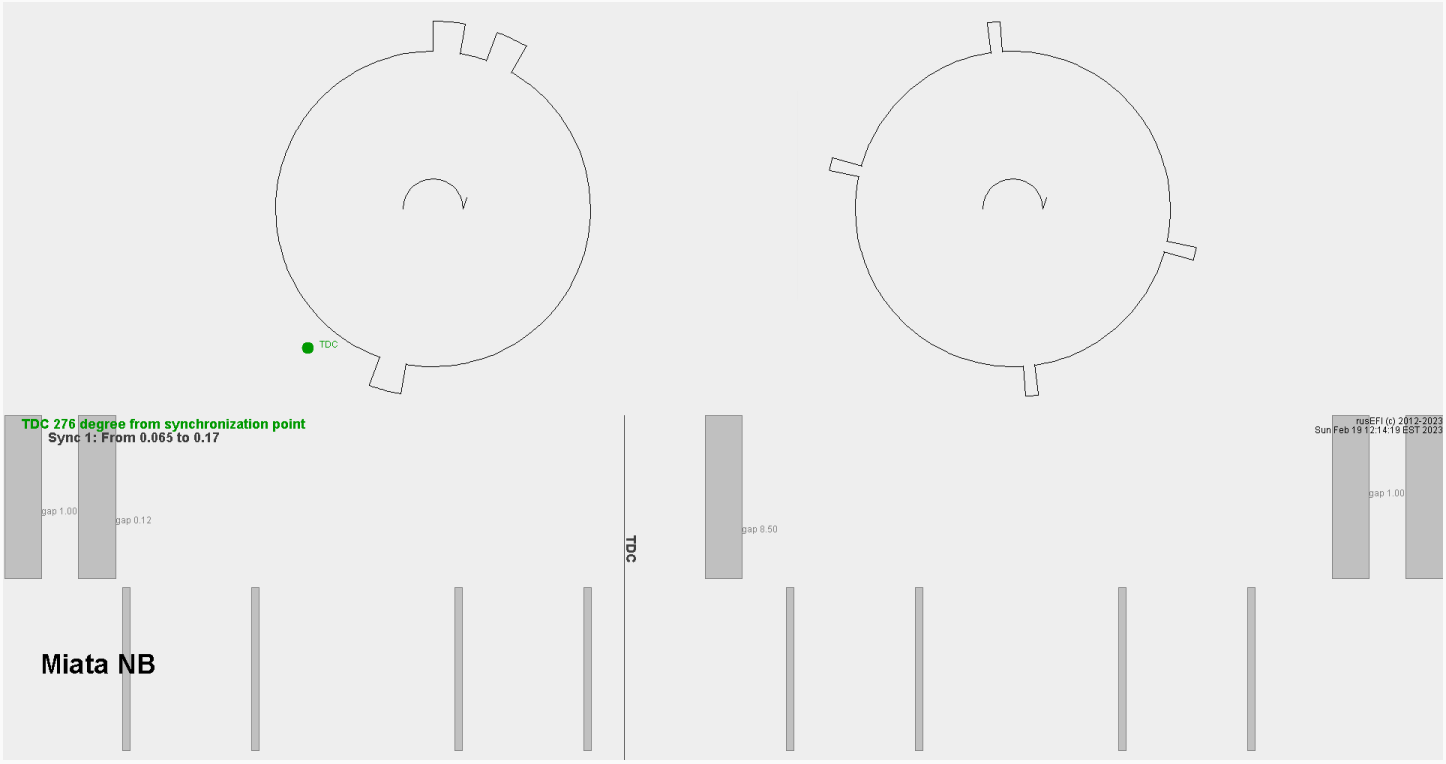
Mazda Miata NA

Overview

Also used on some Mitsubishi like 4g18 4g93

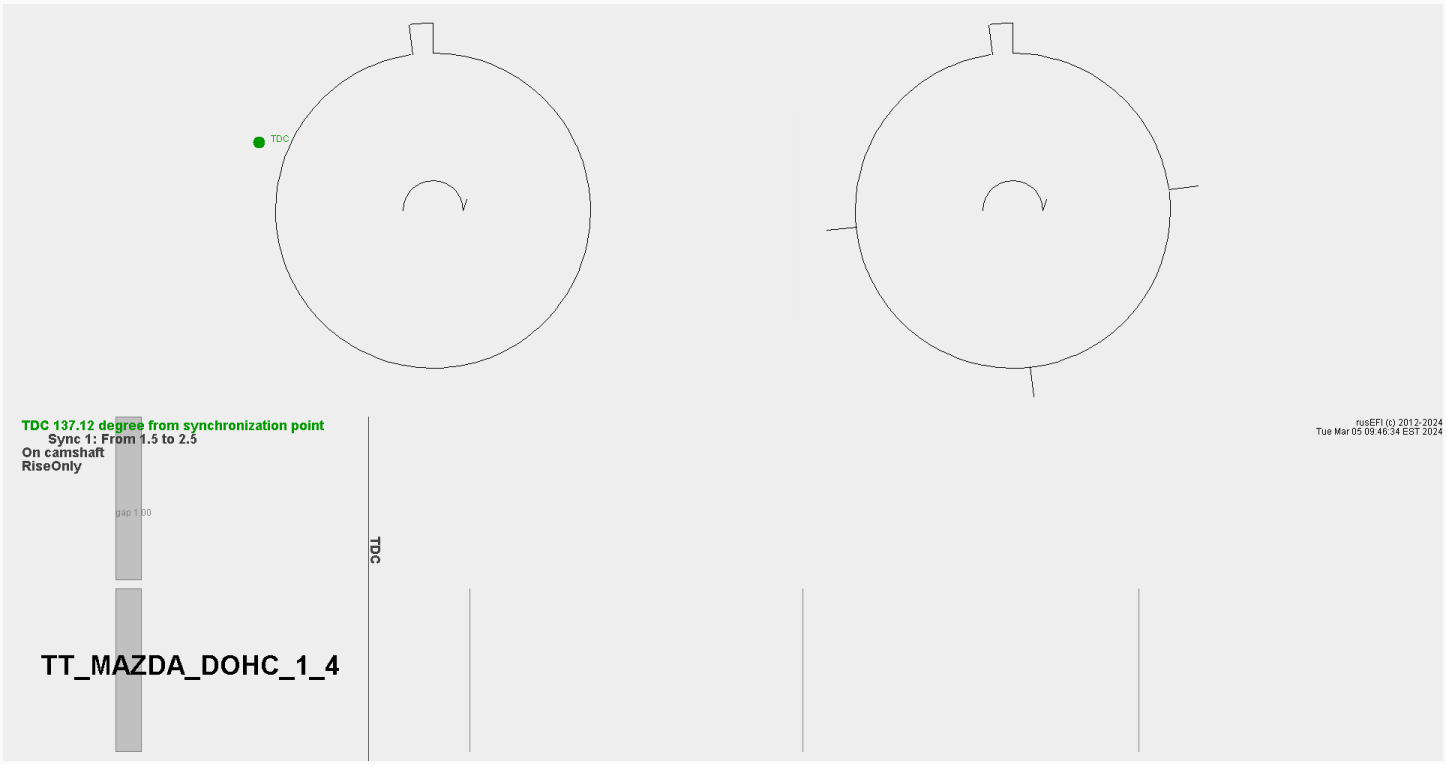


Mazda Miata NB
Overview

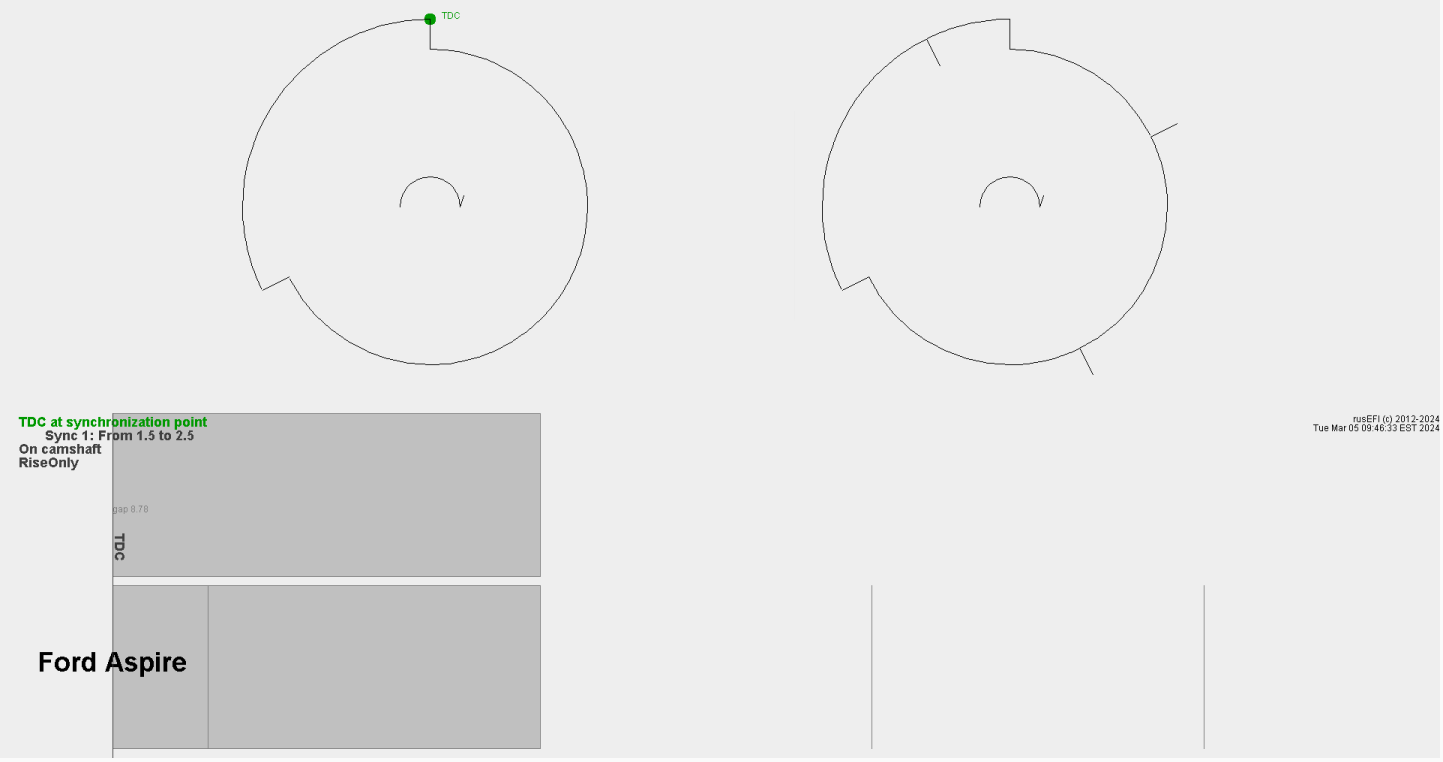


Mazda Miata NC
Overview
See 36-2-2-2

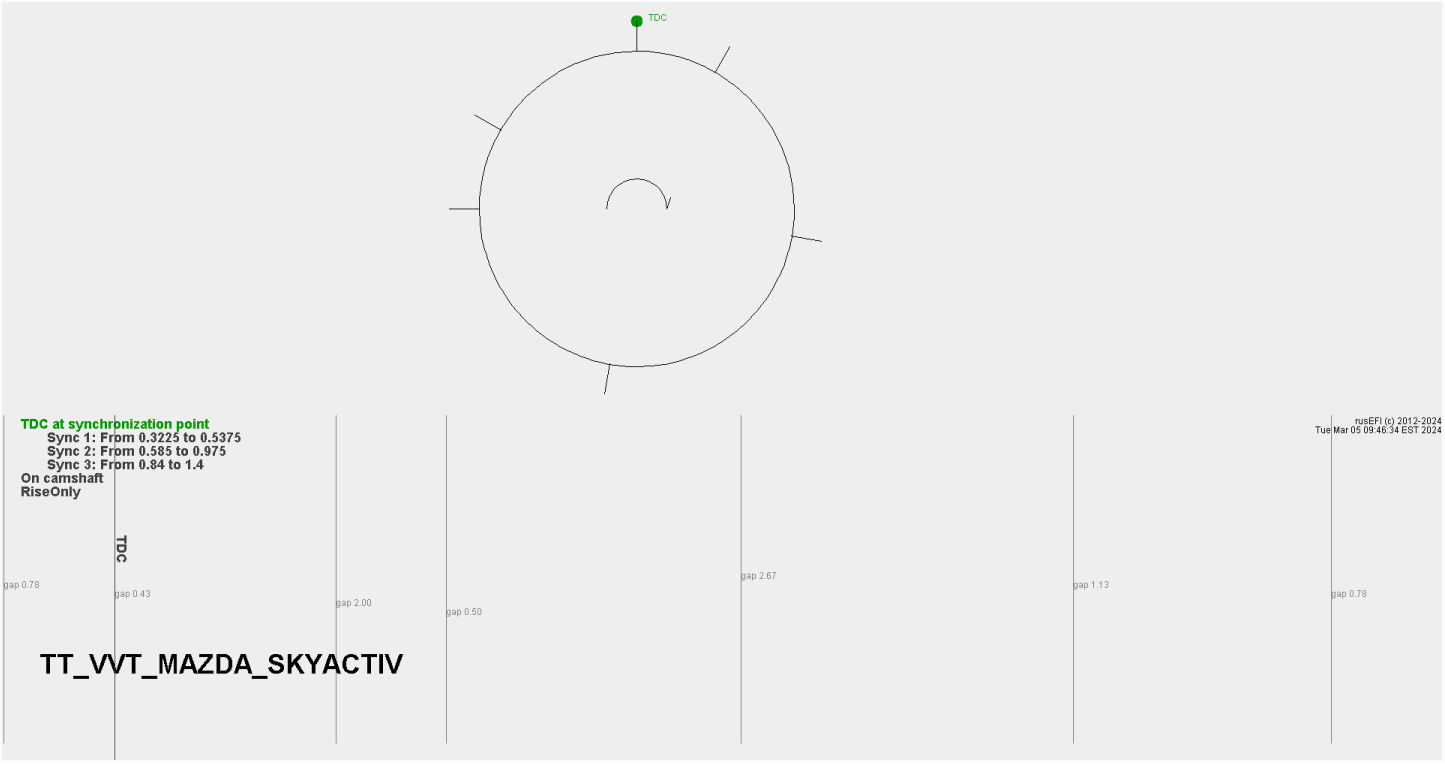
Mazda Protege 1993 DOHC
Overview



Mazda 121/Ford Aspire
Overview



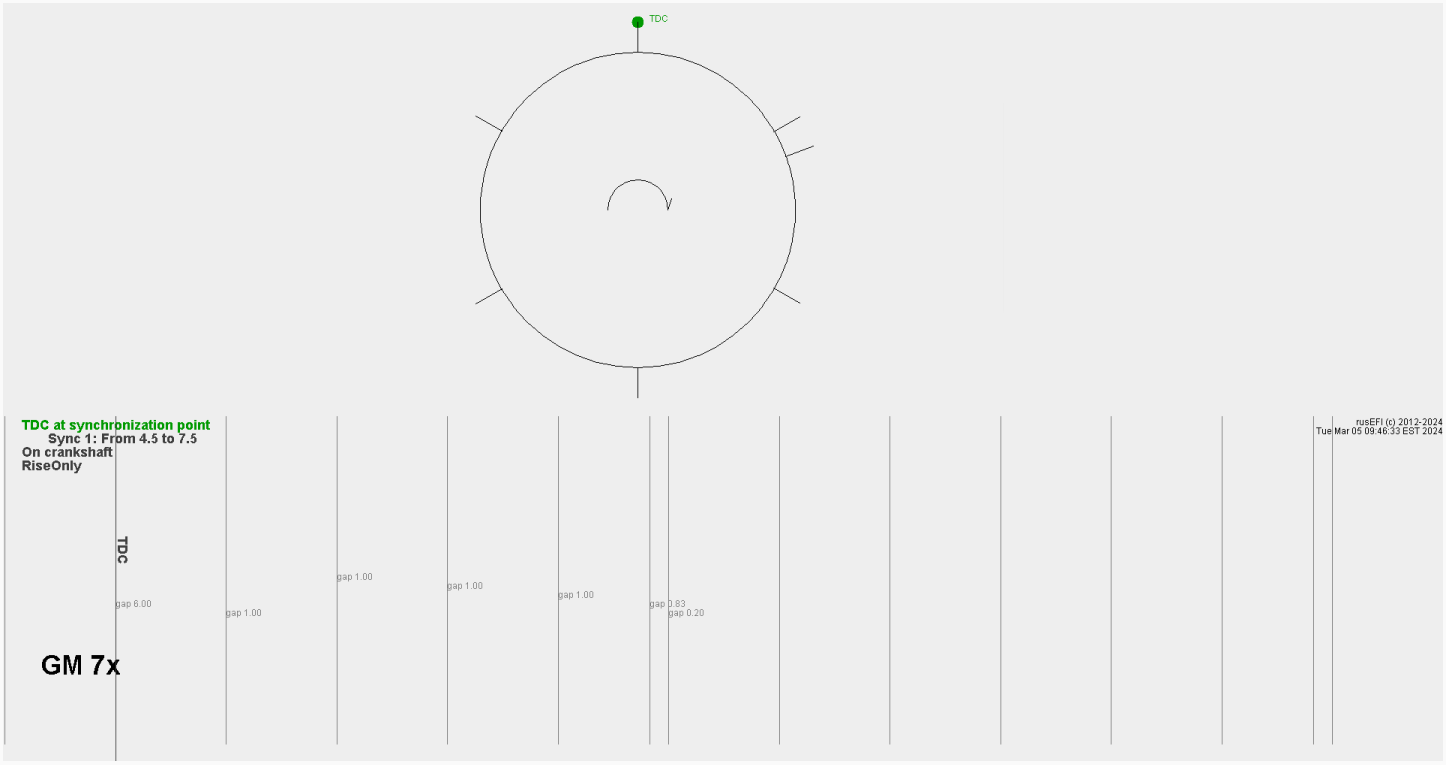
Mazda SKYACTIV
Overview
Also Miata NC etc



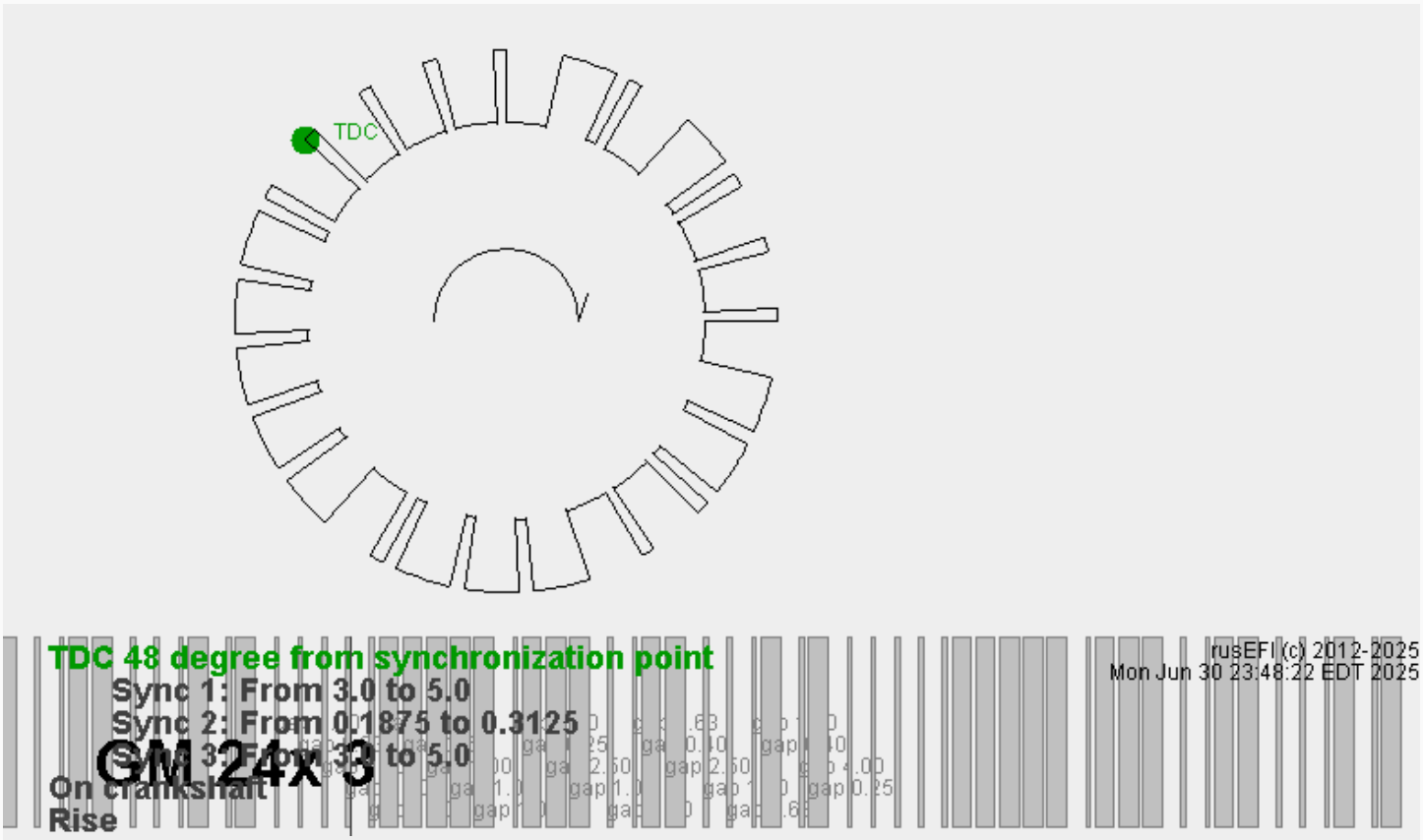
GM

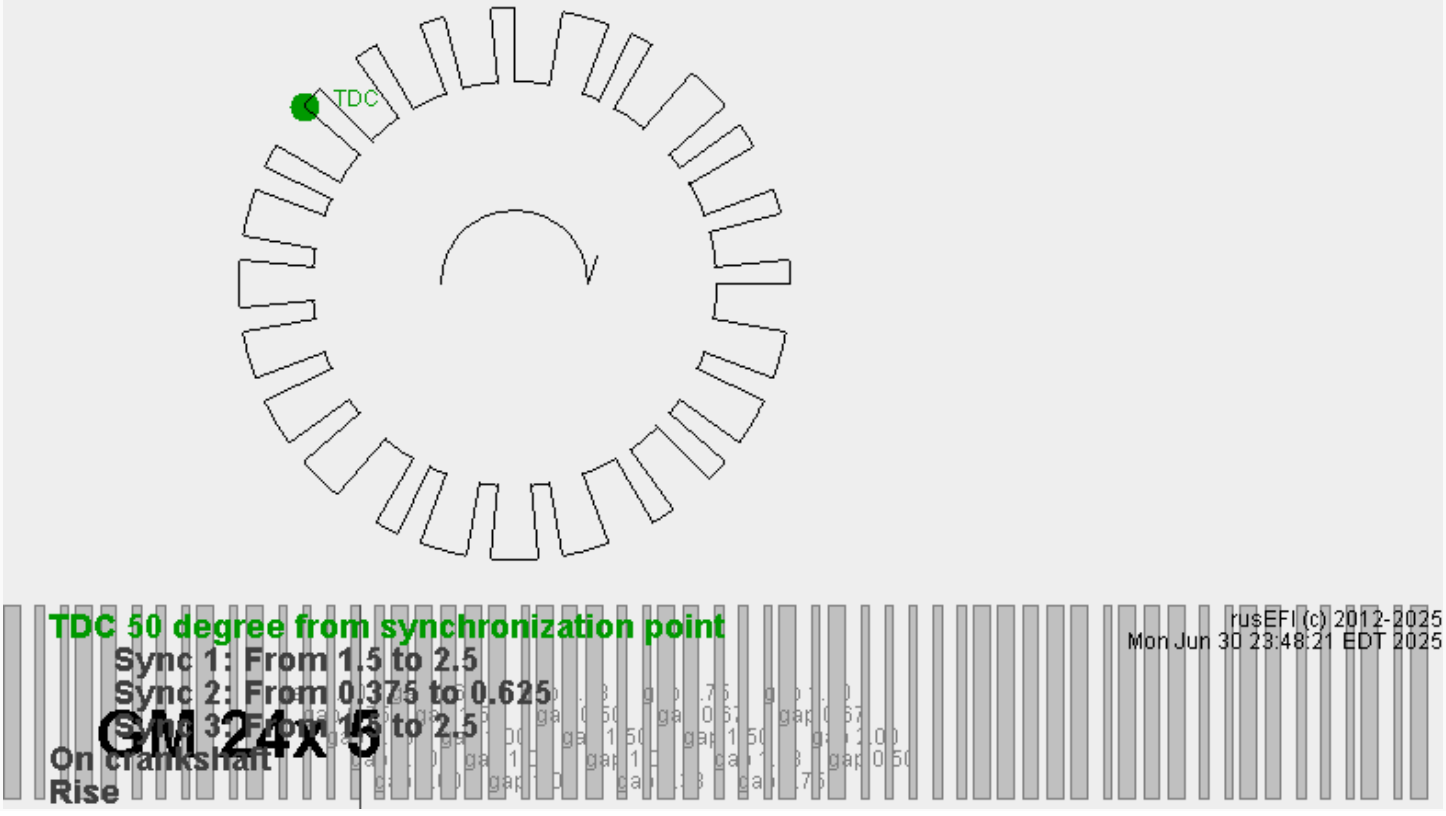
GM 7x

Overview



GM LS 24x
Overview

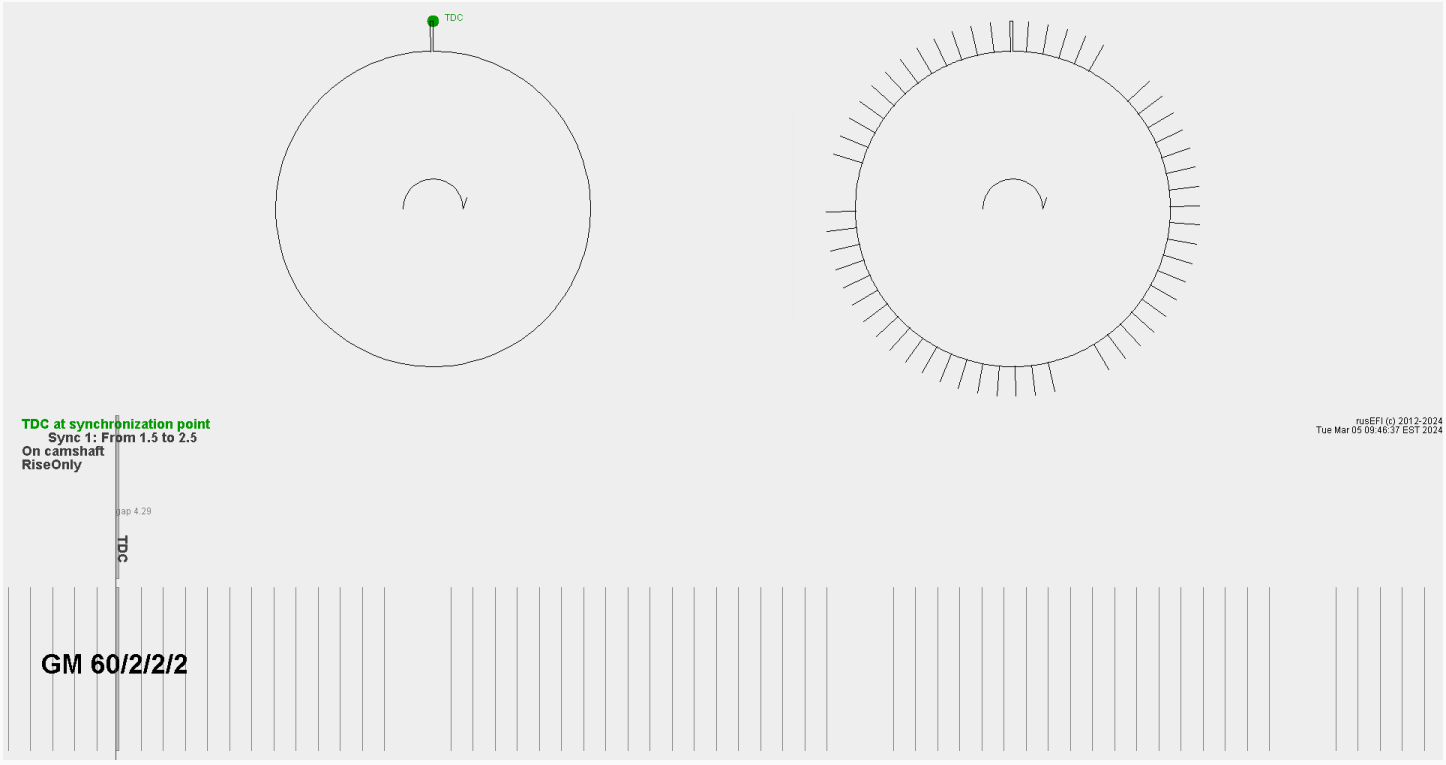




GM 60/2/2/2

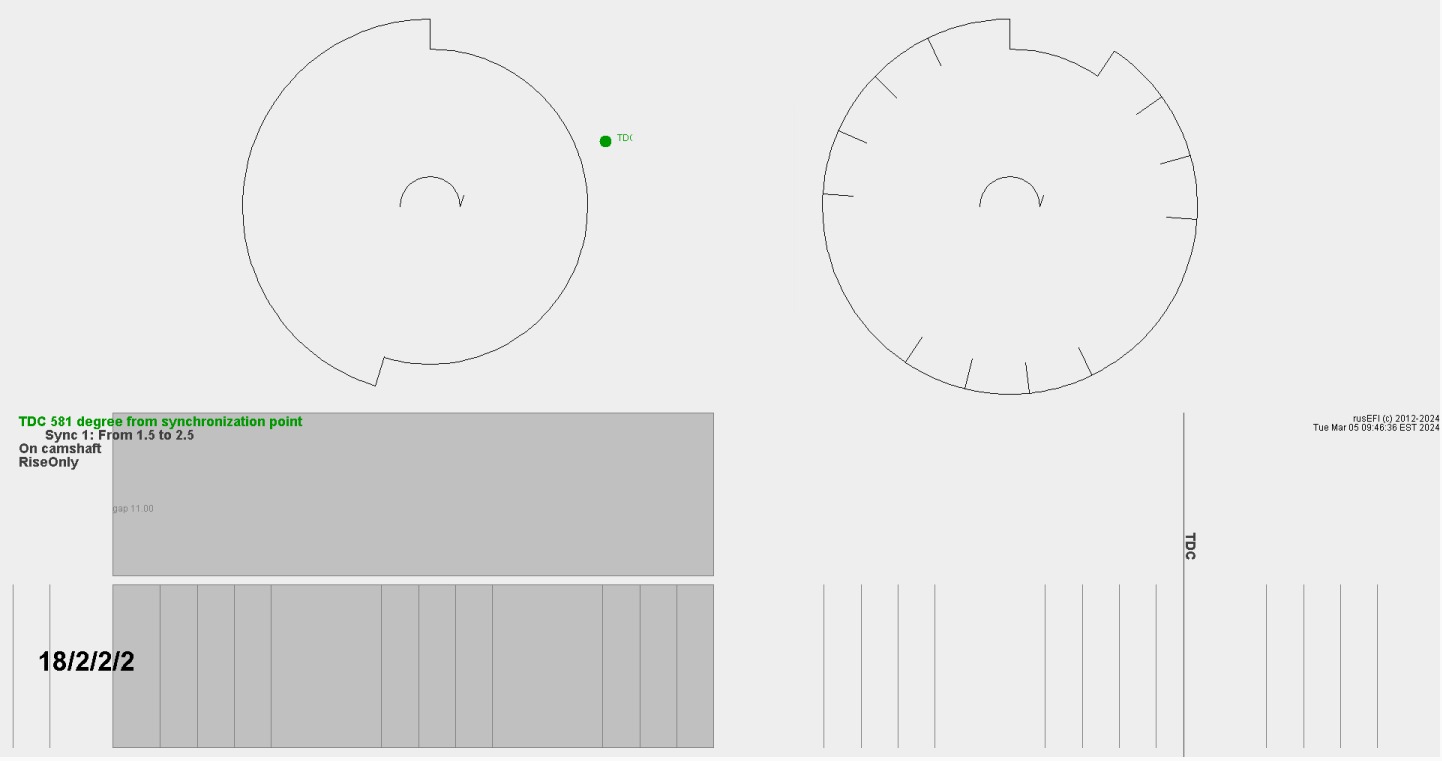
Overview

GM/Daewoo Distributor F8CV

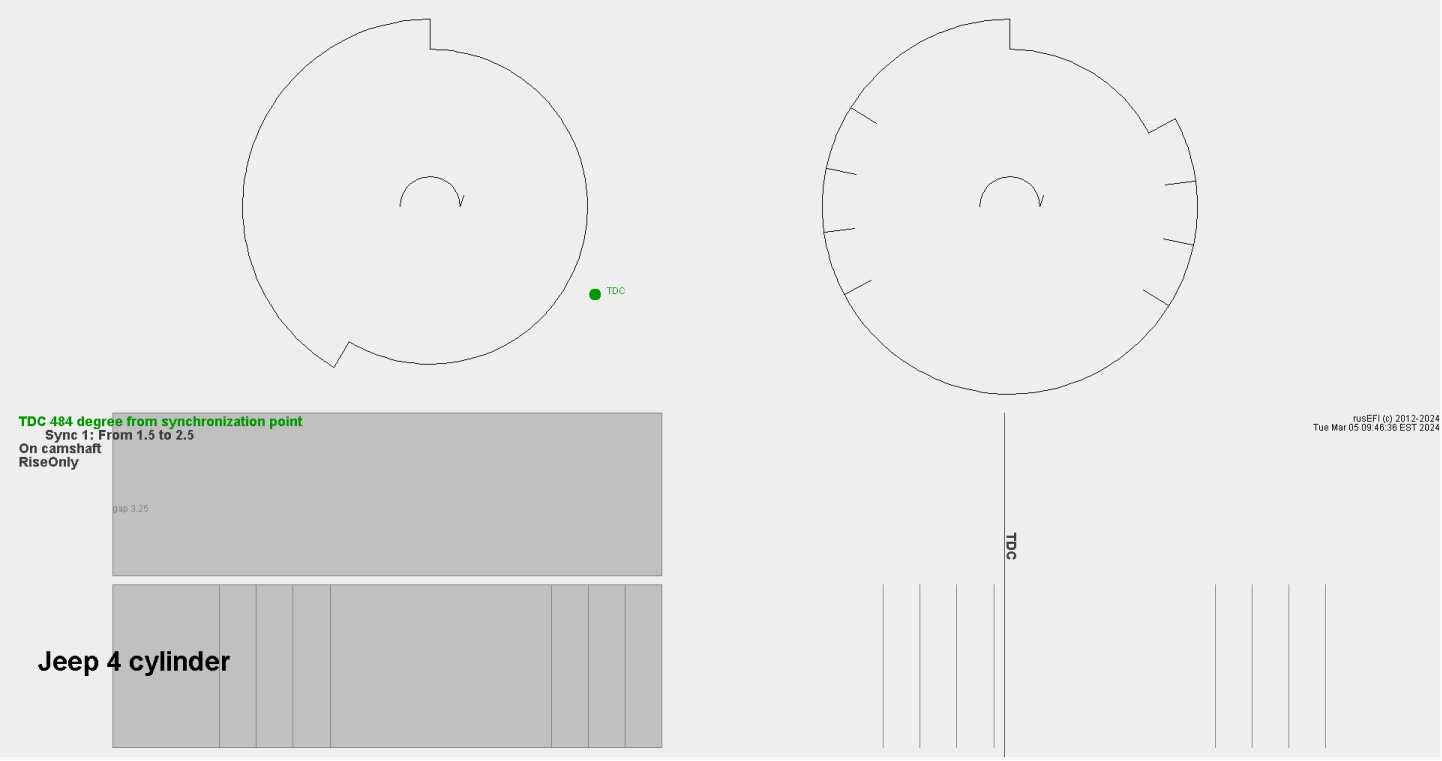


Jeep

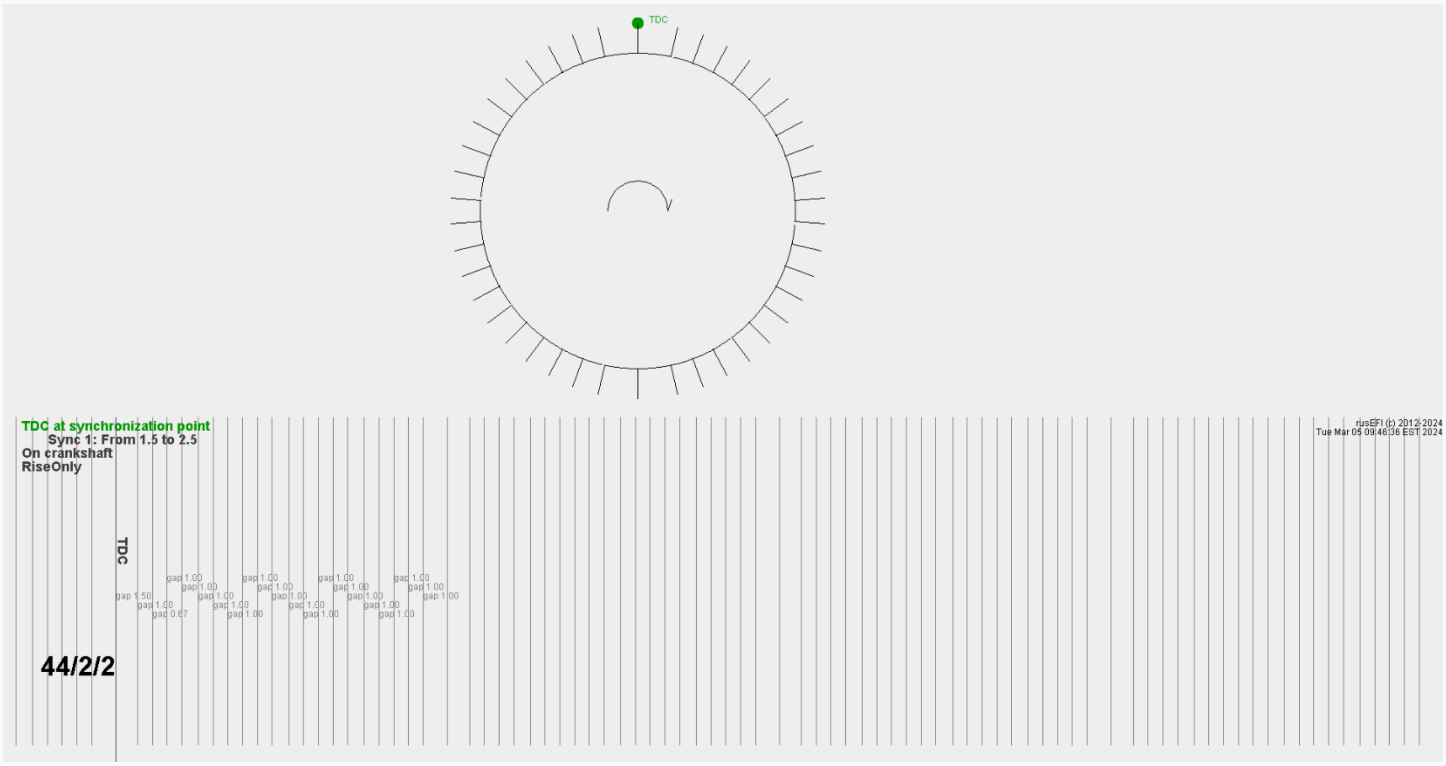
Jeep 18-2-2-2
Overview



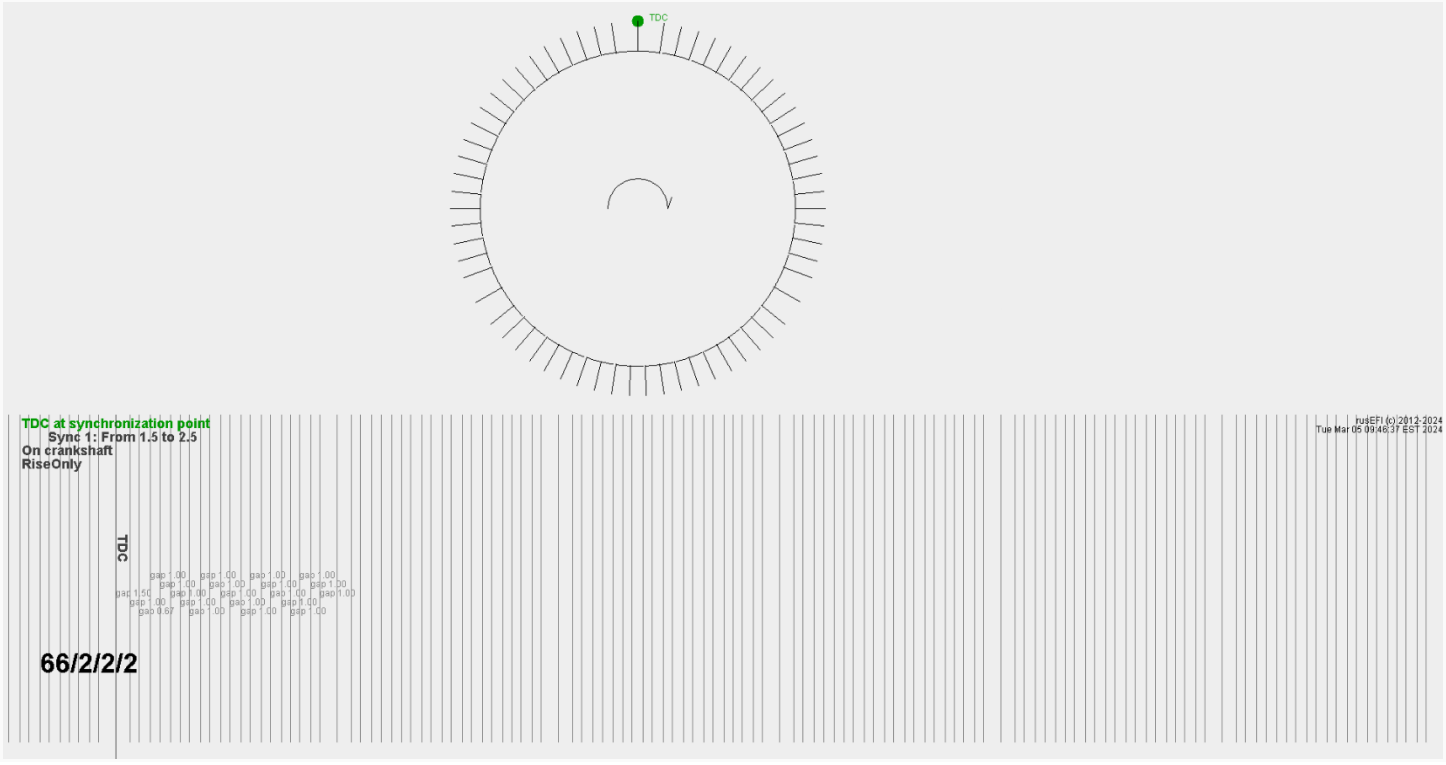
Jeep 4 cyl
Overview



Renix 44/2/2
Overview

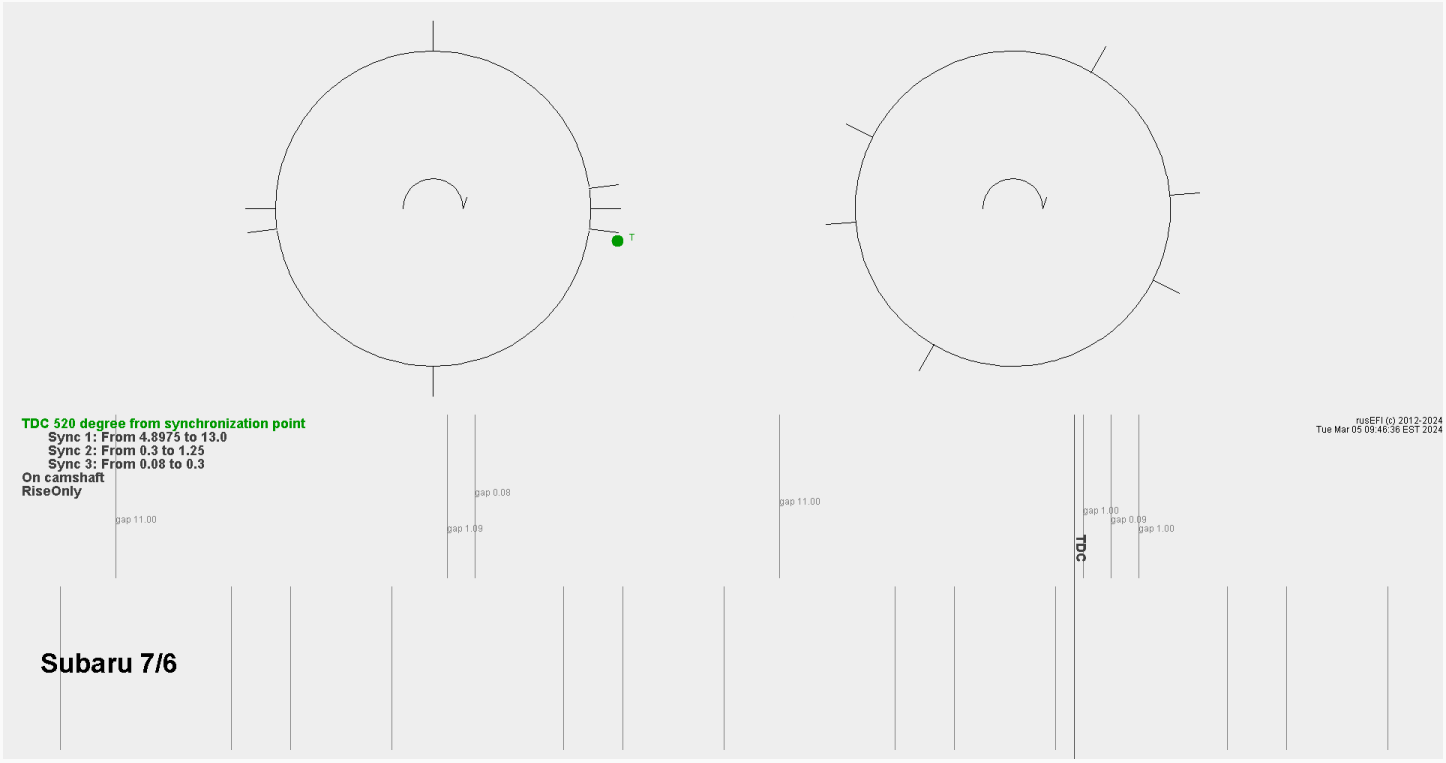


Renix 66/2/2/2
Overview



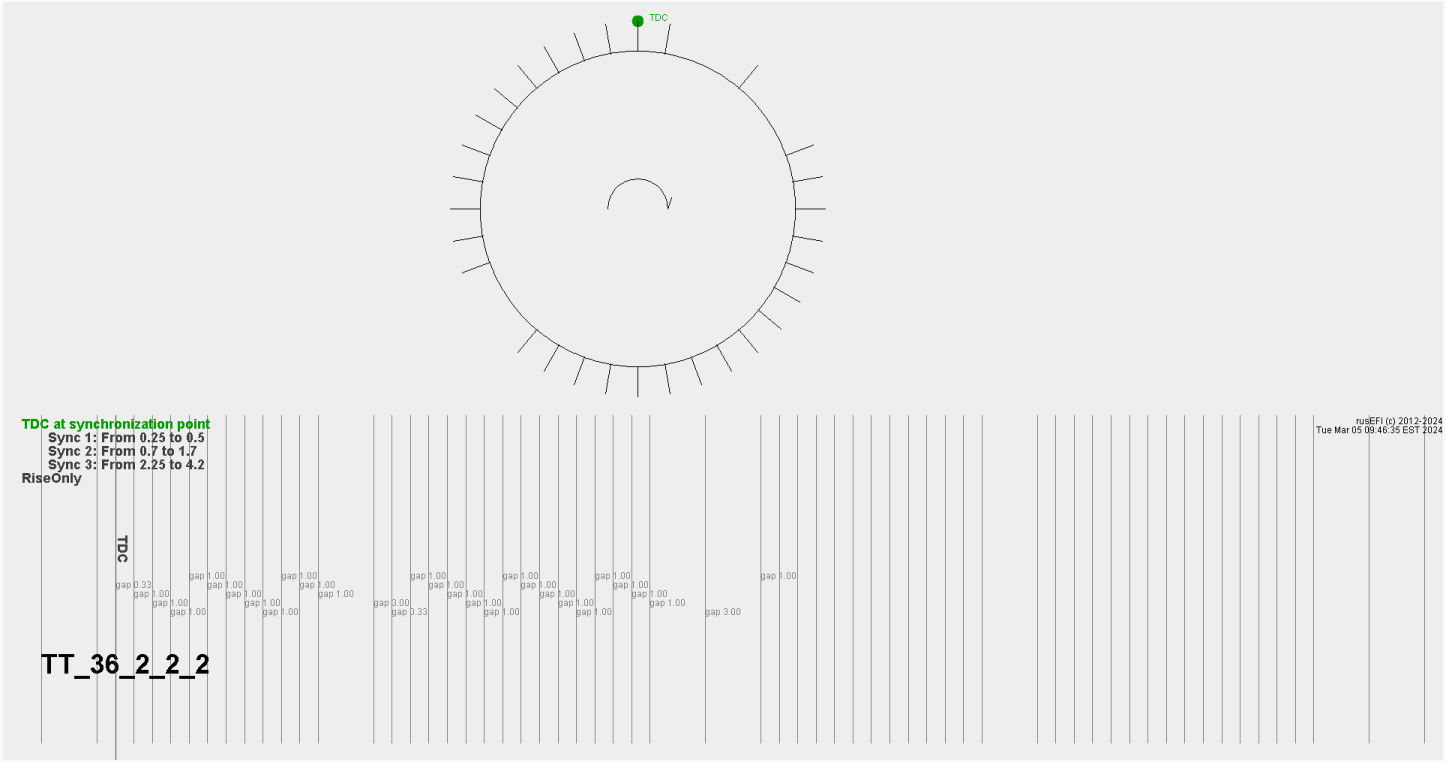
Subaru

Subaru 7+6 tooth
Overview

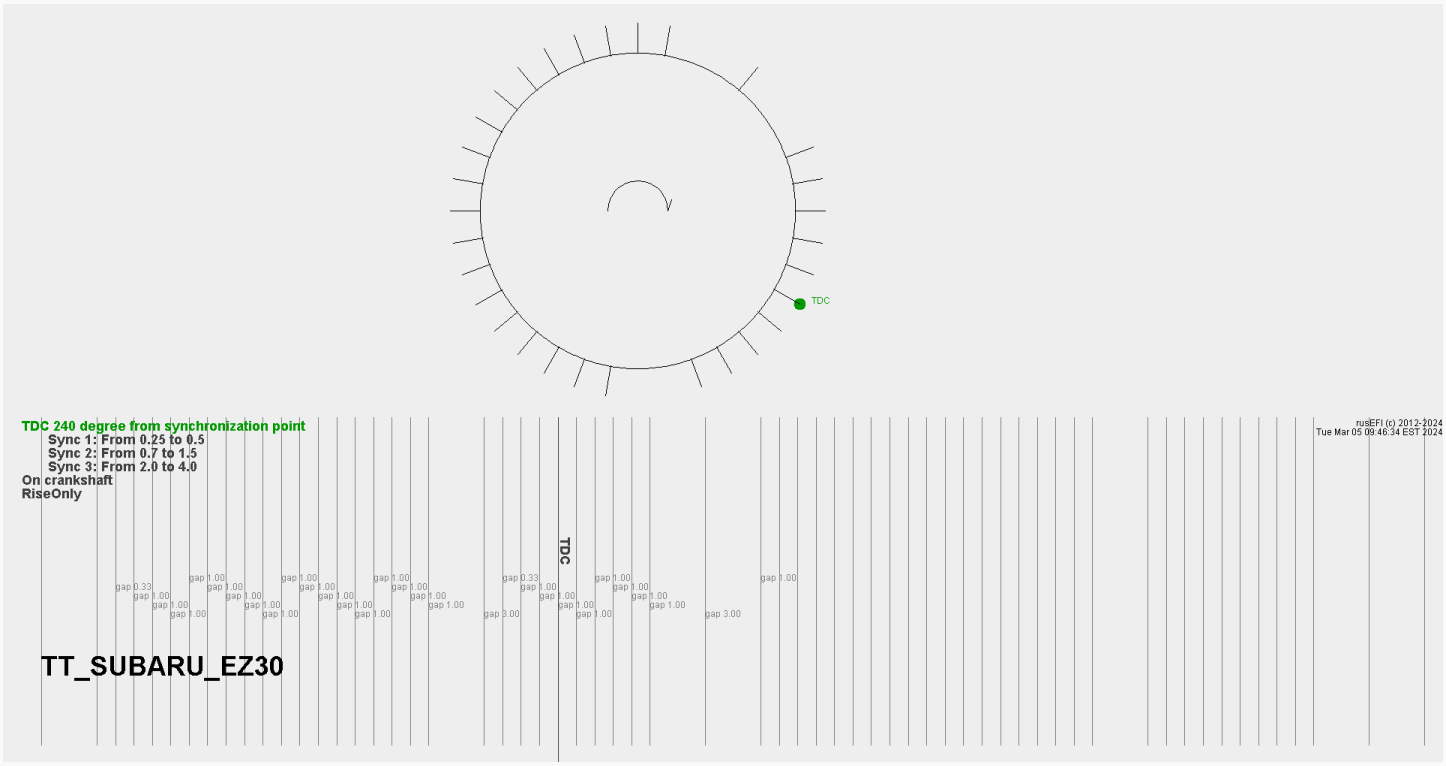


36/2/2/2
Overview

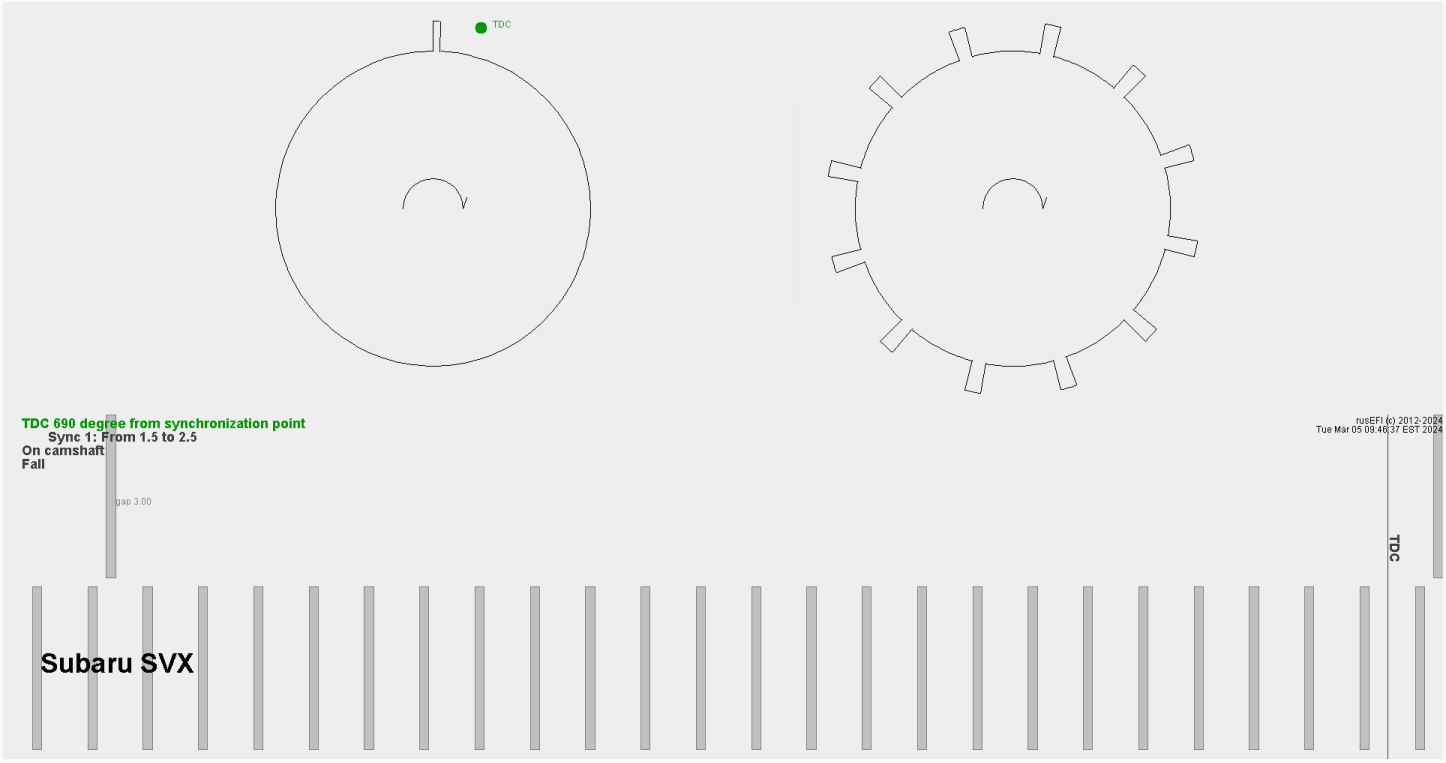
Might also be used on some Daihatsu, Nissan and Mazda RX8/MZR/Miata NC



Subaru EZ30 variation of 36/2/2/2
Overview

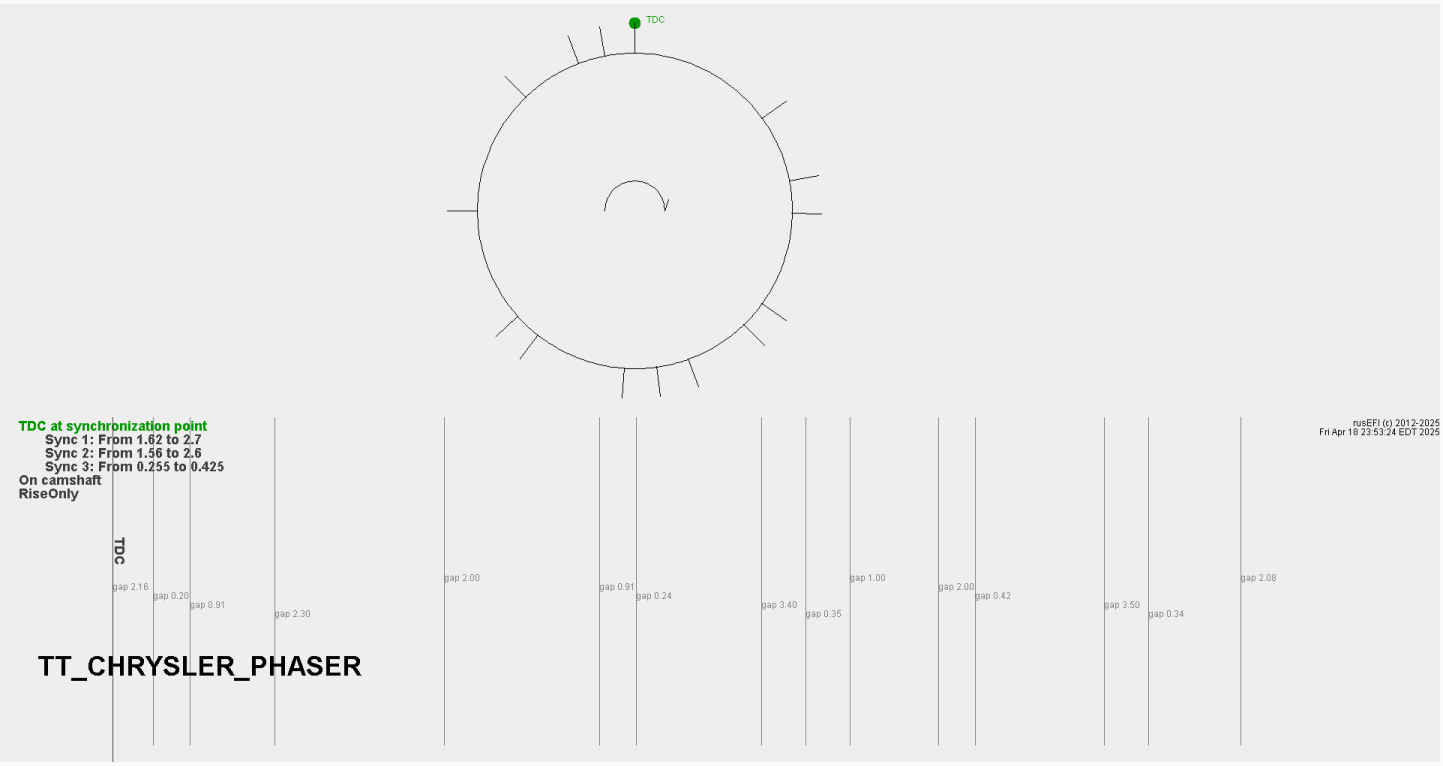


Subaru SVX
Overview



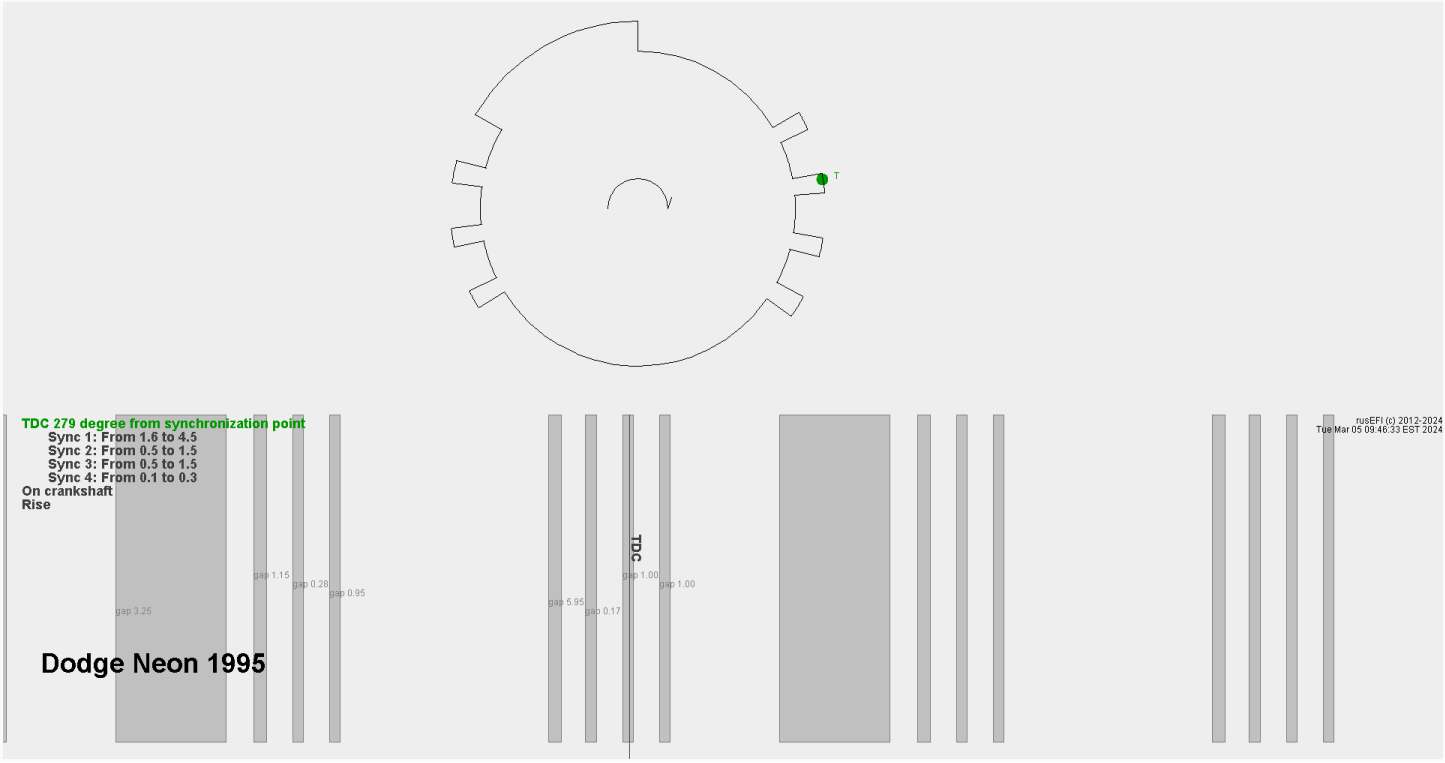
Chrysler

VVT

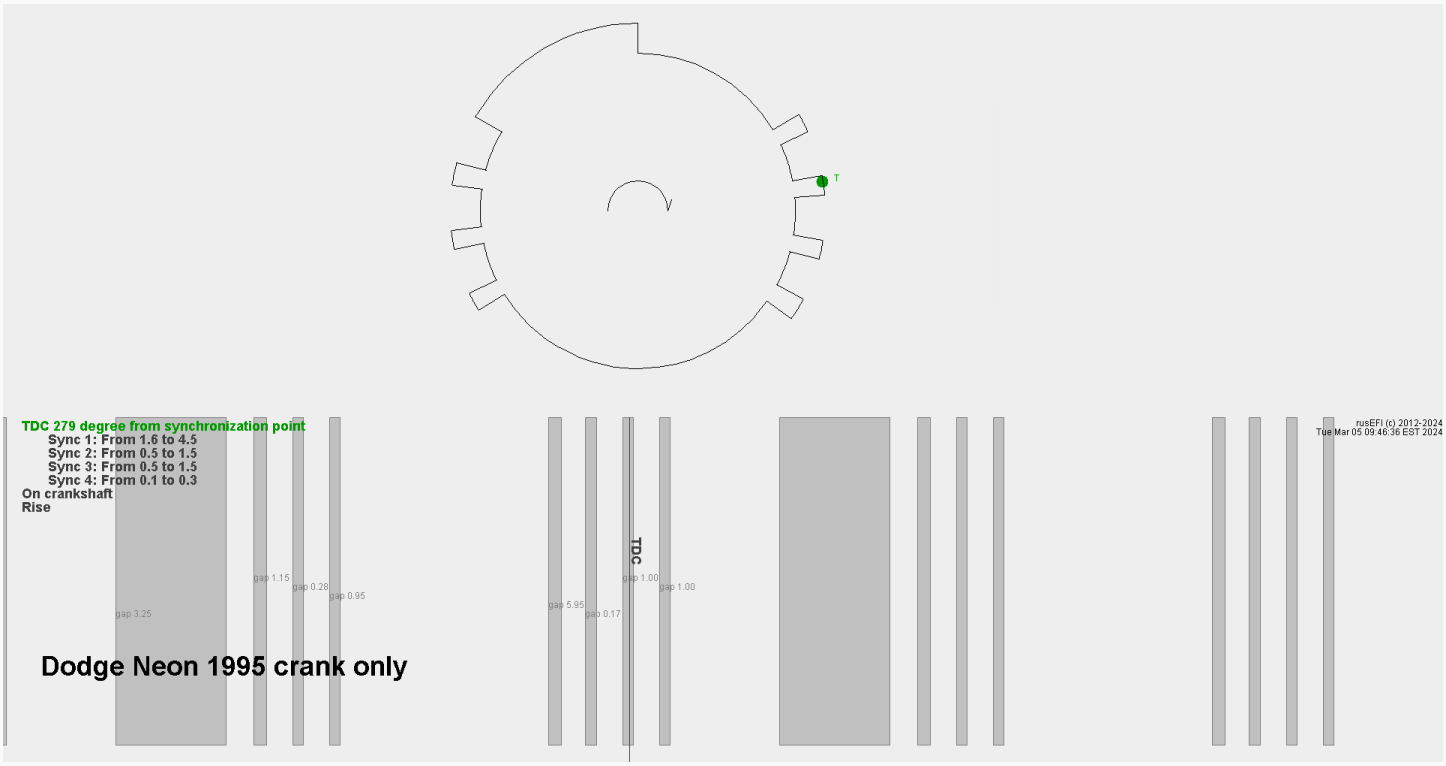


Dodge Neon 1995

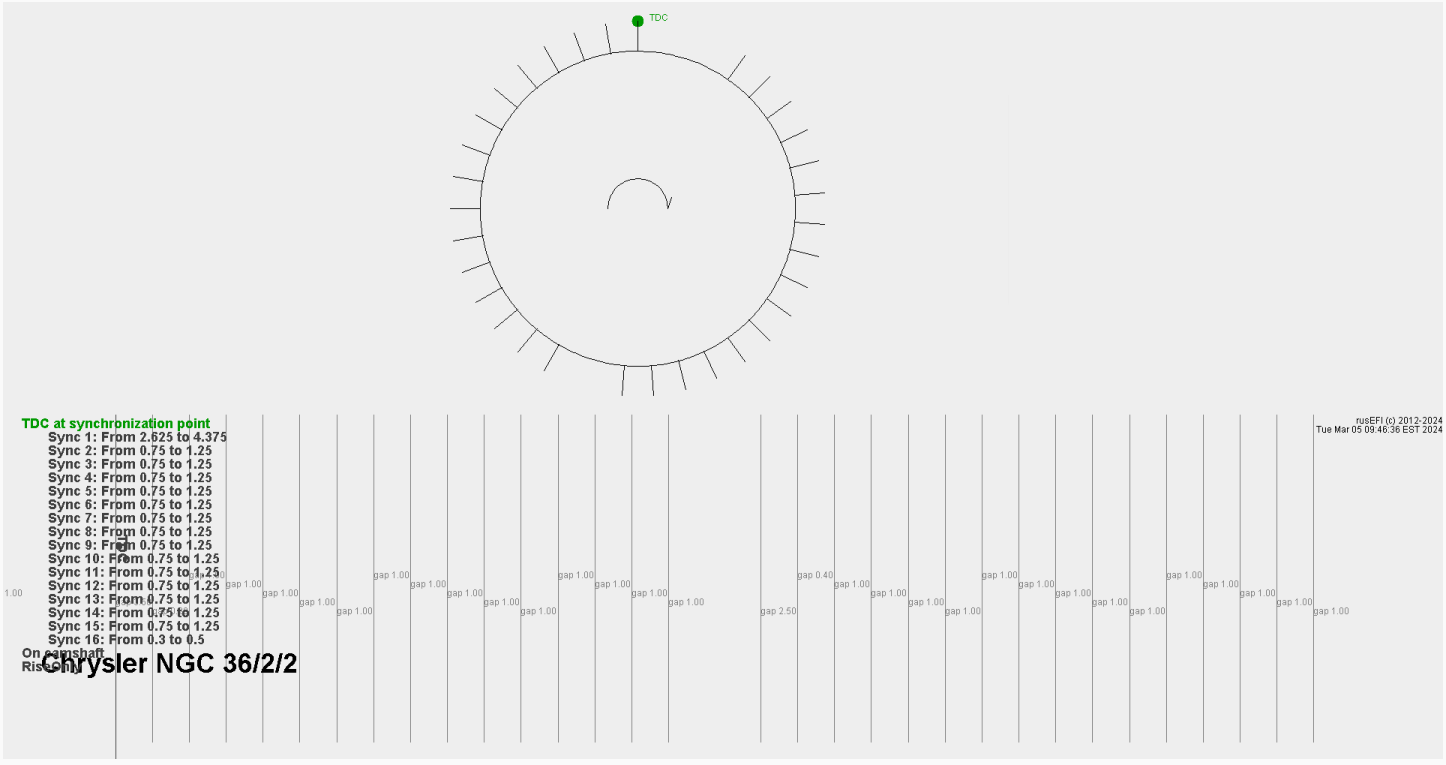
Overview



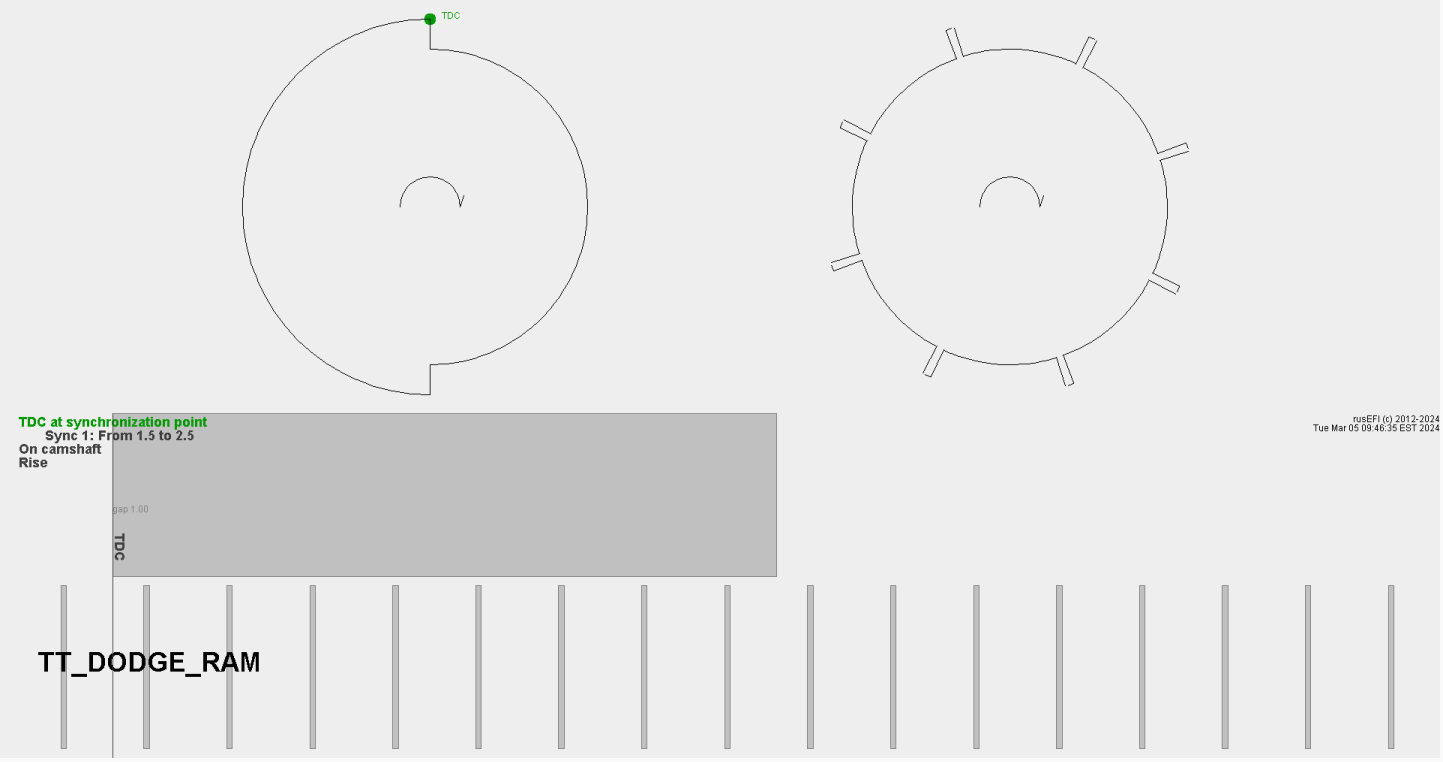
Dodge Neon 1995 only crankshaft sensor
Overview



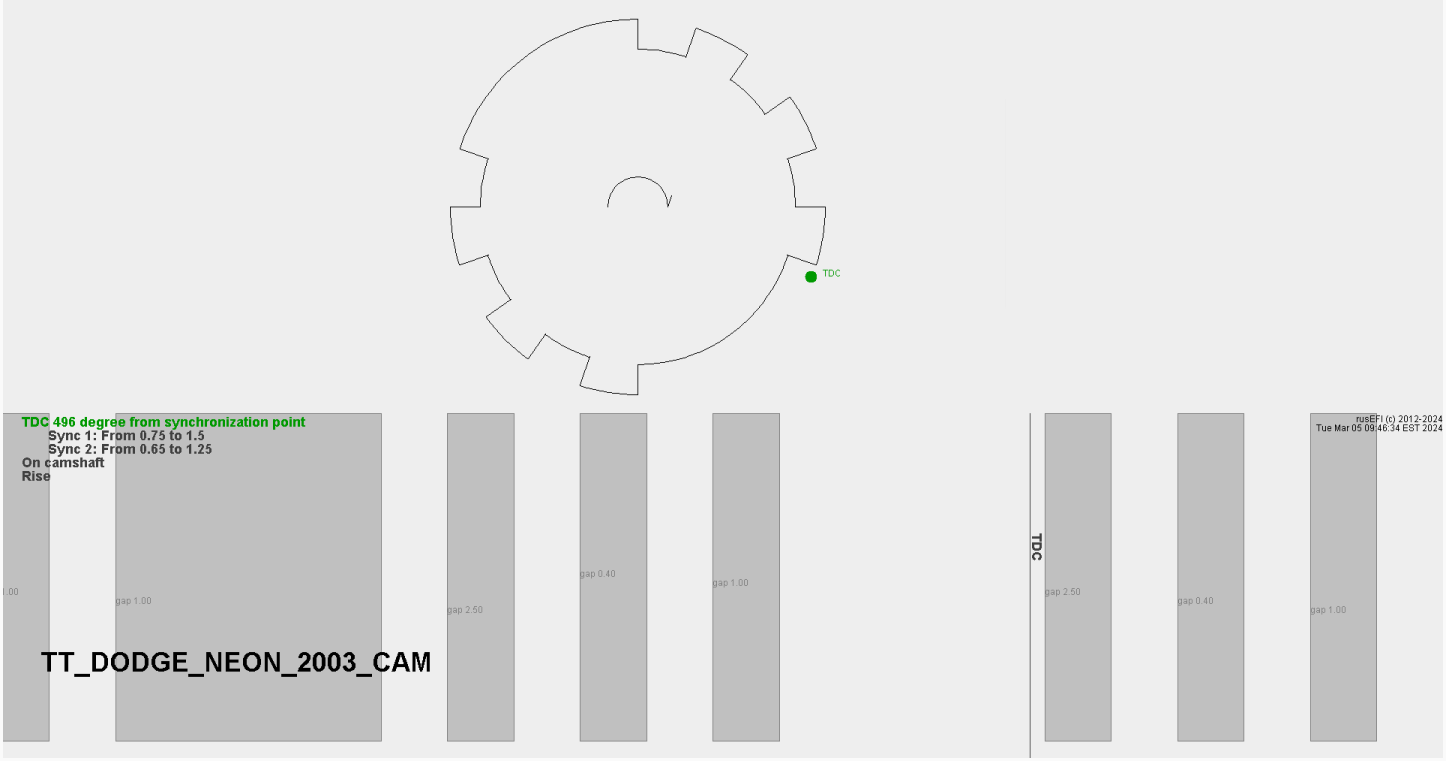
Dodge Hemi and SRT4 (NGC 36/2/2)
Overview



Dodge Ram
Overview



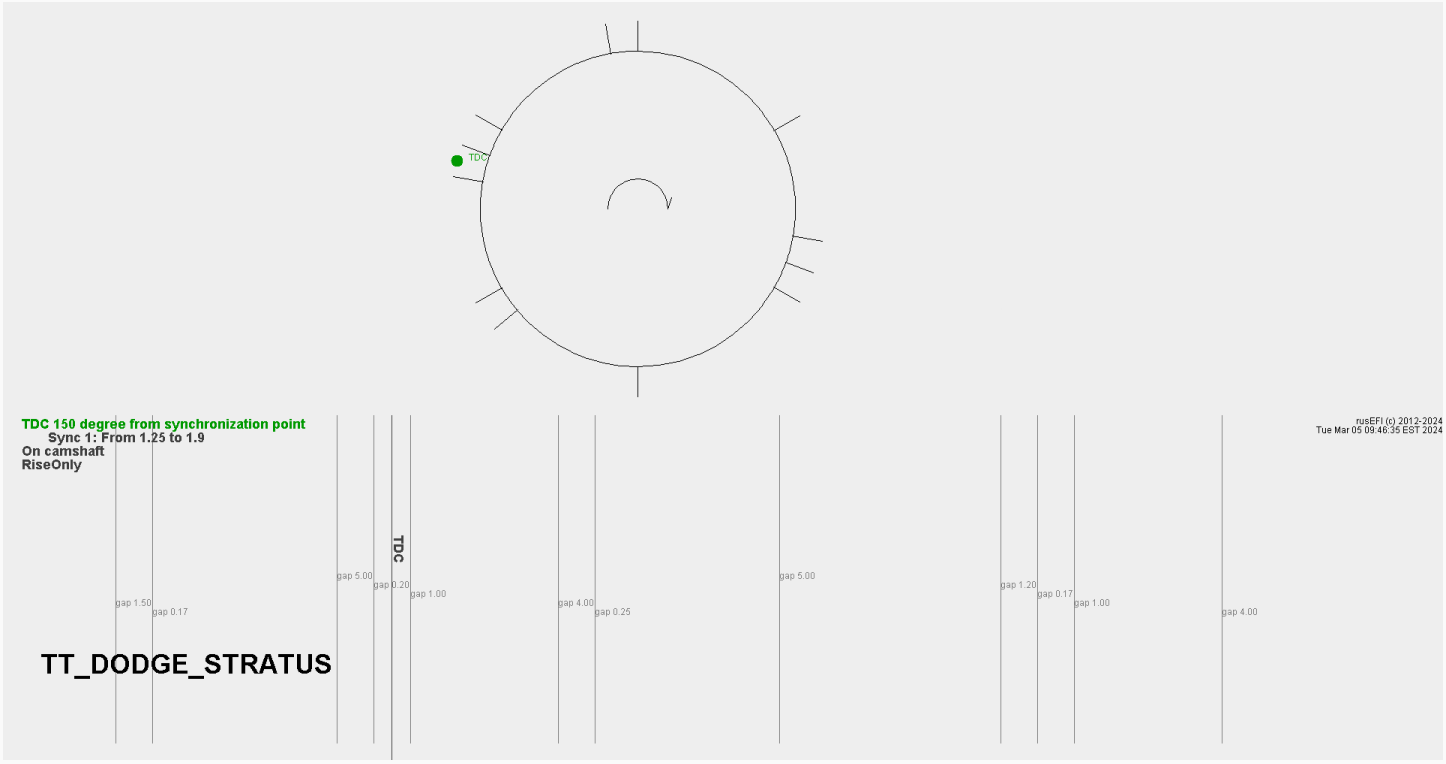
Dodge Neon 2003
Overview
Chrysler NGC 4 cylinder



Dodge Stratus

Overview

Chrysler NGC 6 cylinder

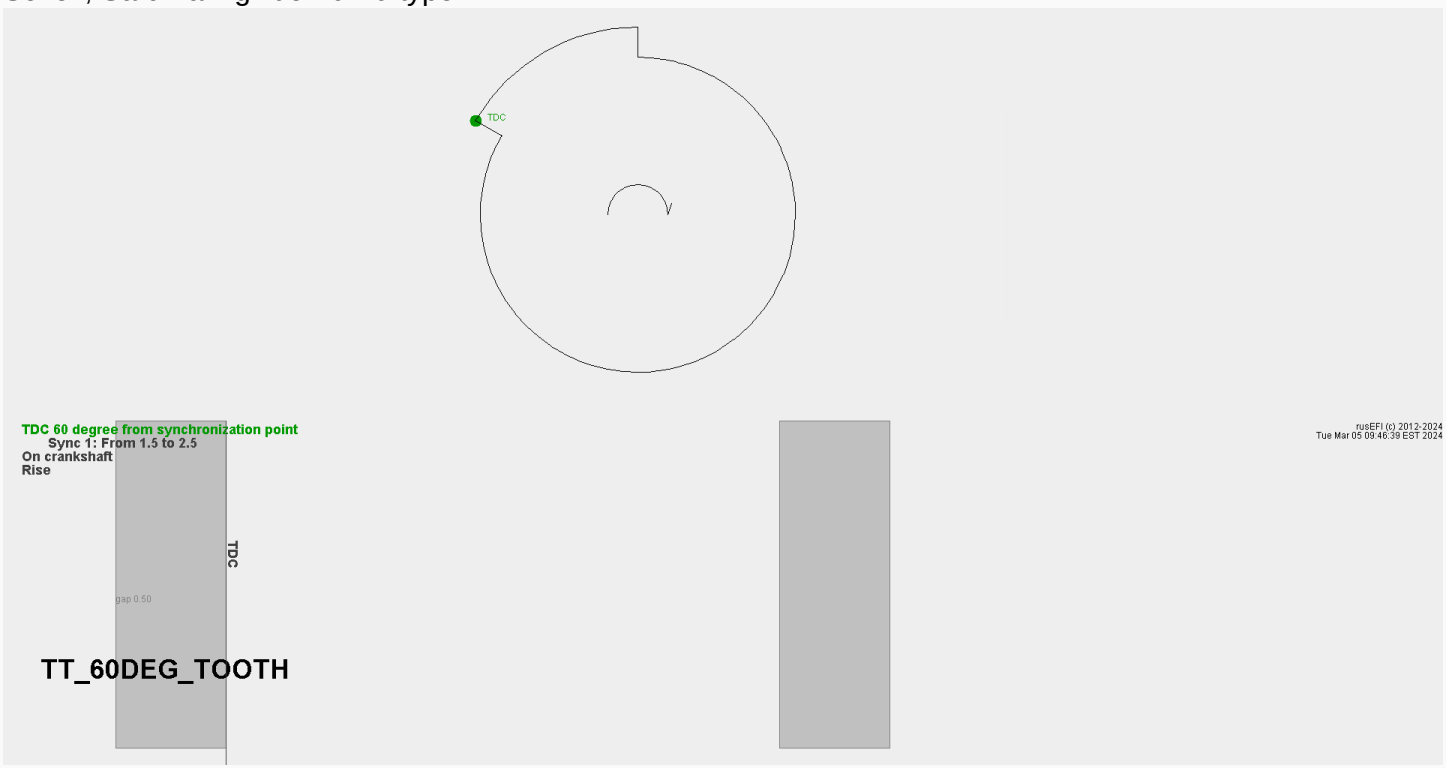


Miscellaneous

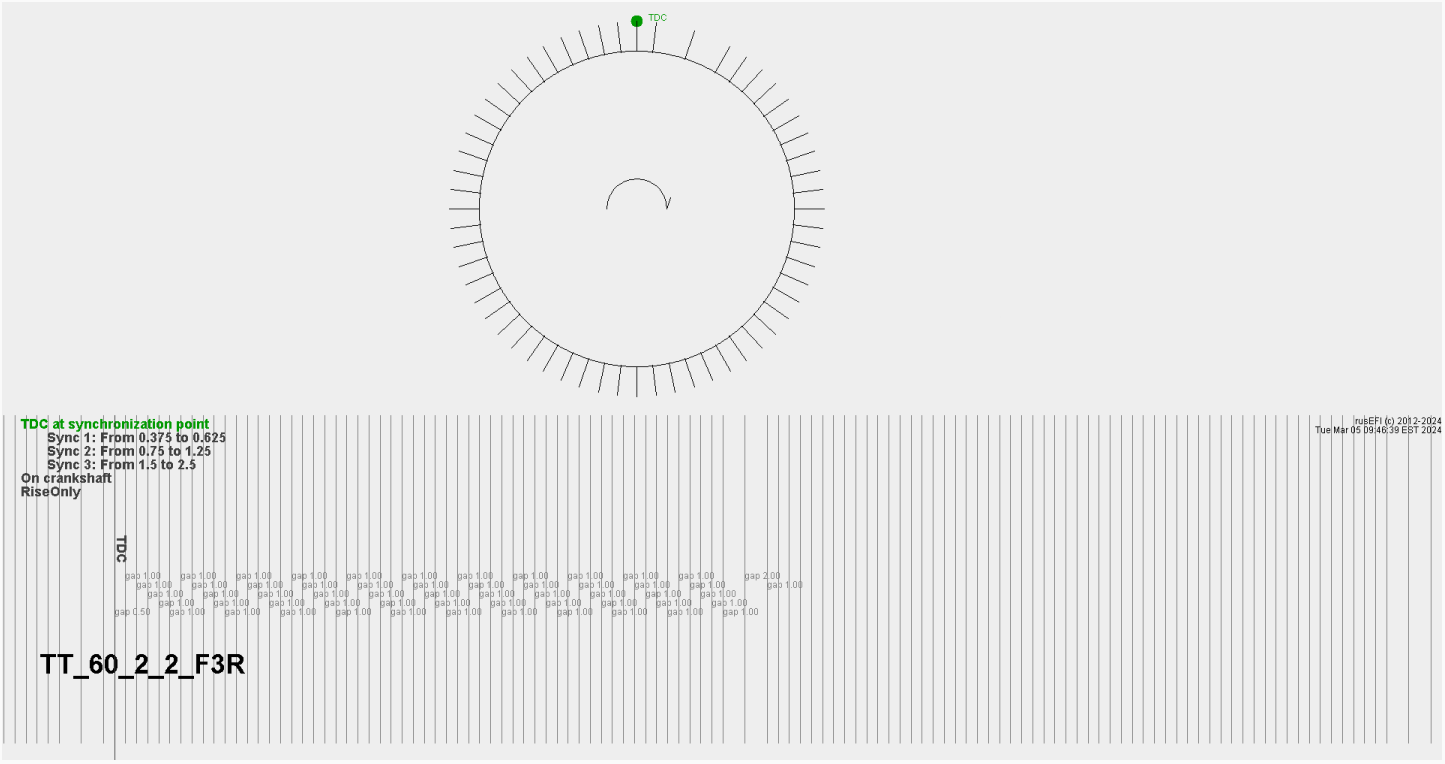
60 degree tooth

Overview

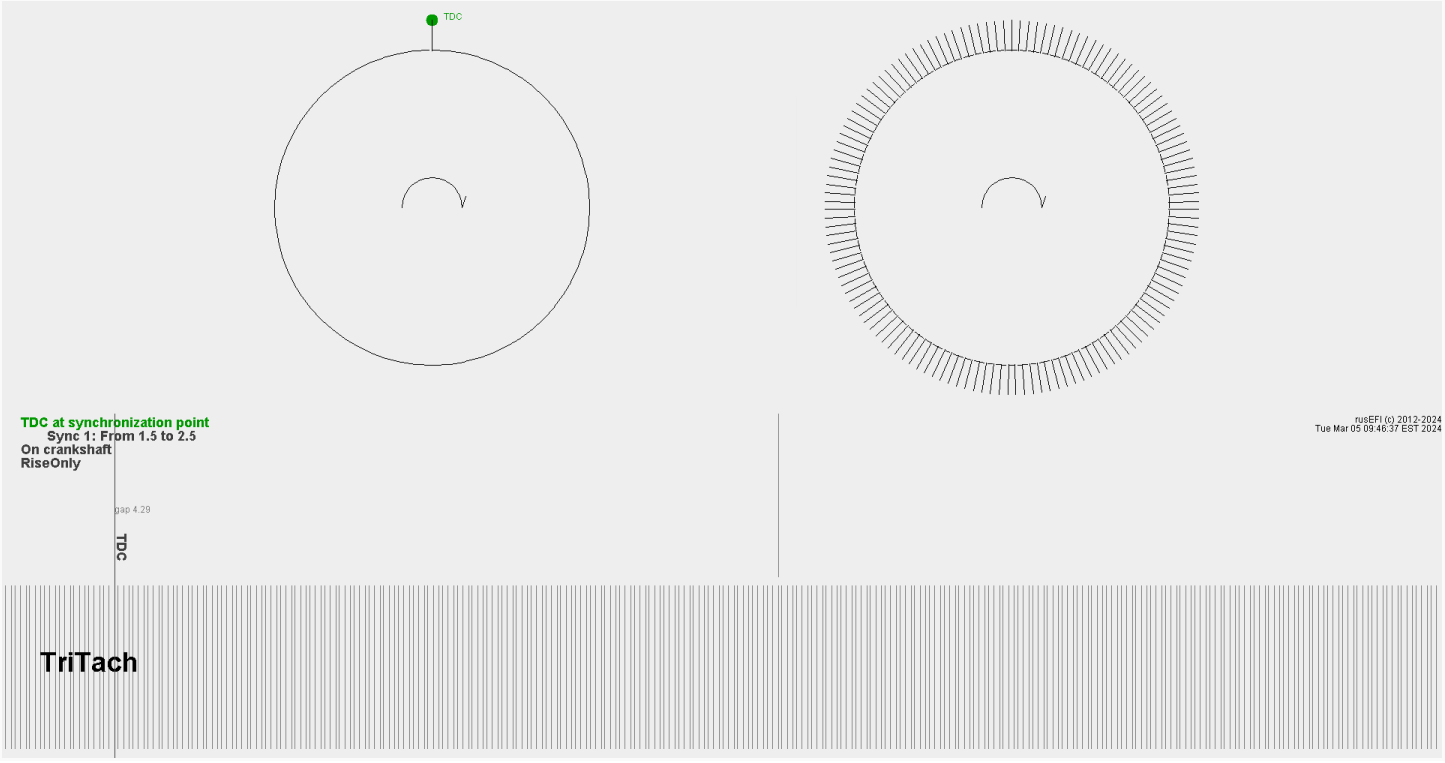
Sovek, Saruman ignition blind type



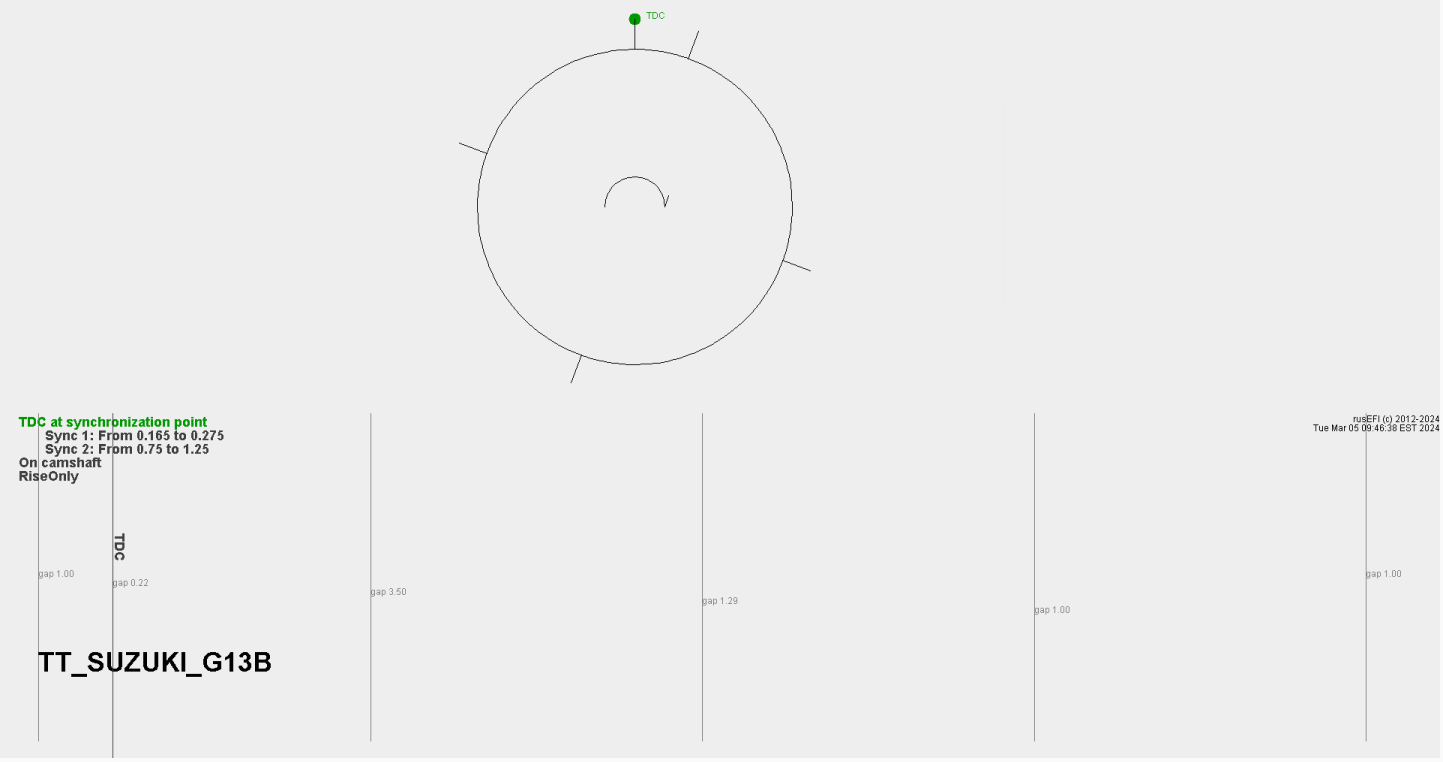
Renault F
Overview
A bit of a 60/2/2



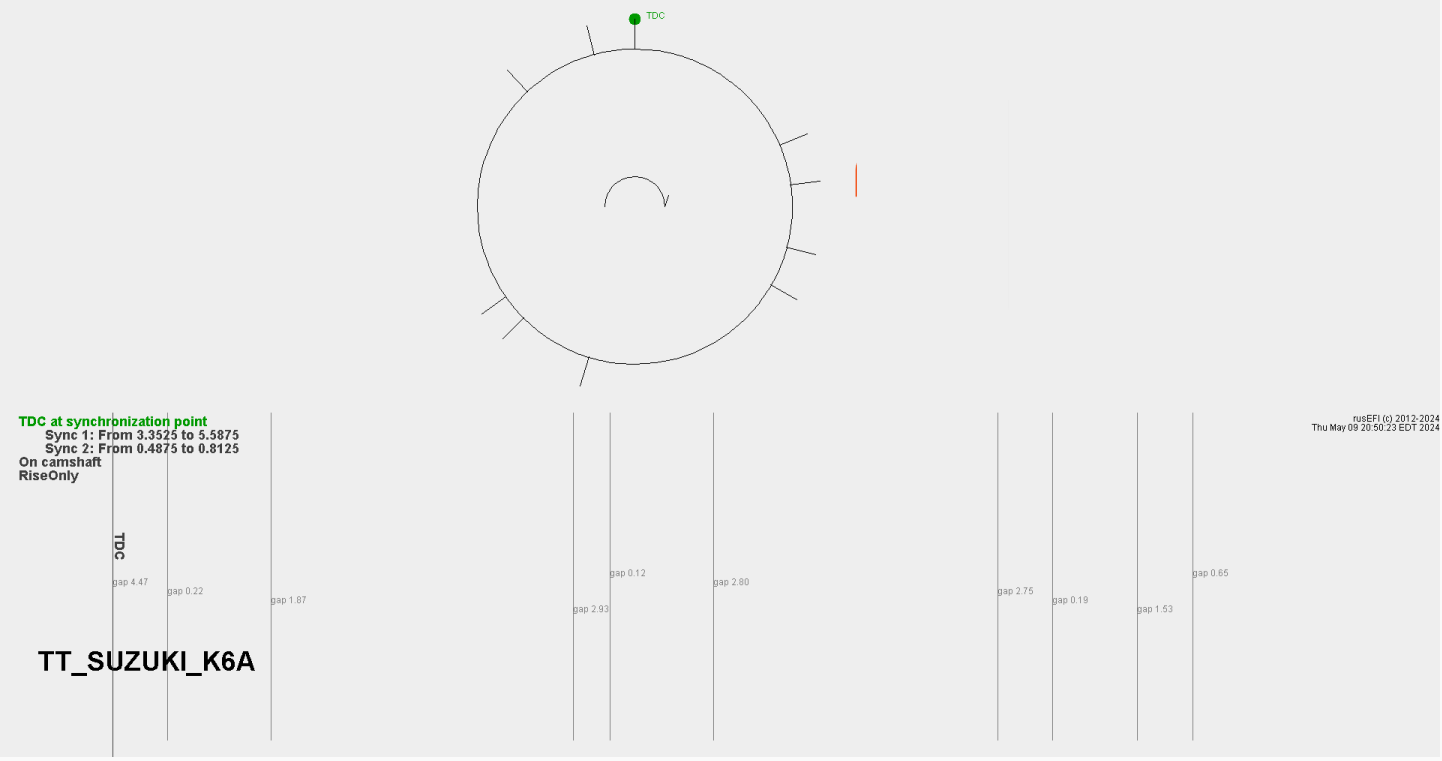
Tri-Tach
Overview
Old audi 5 cylinder: does not work, no priority to make work - that one needs custom handling



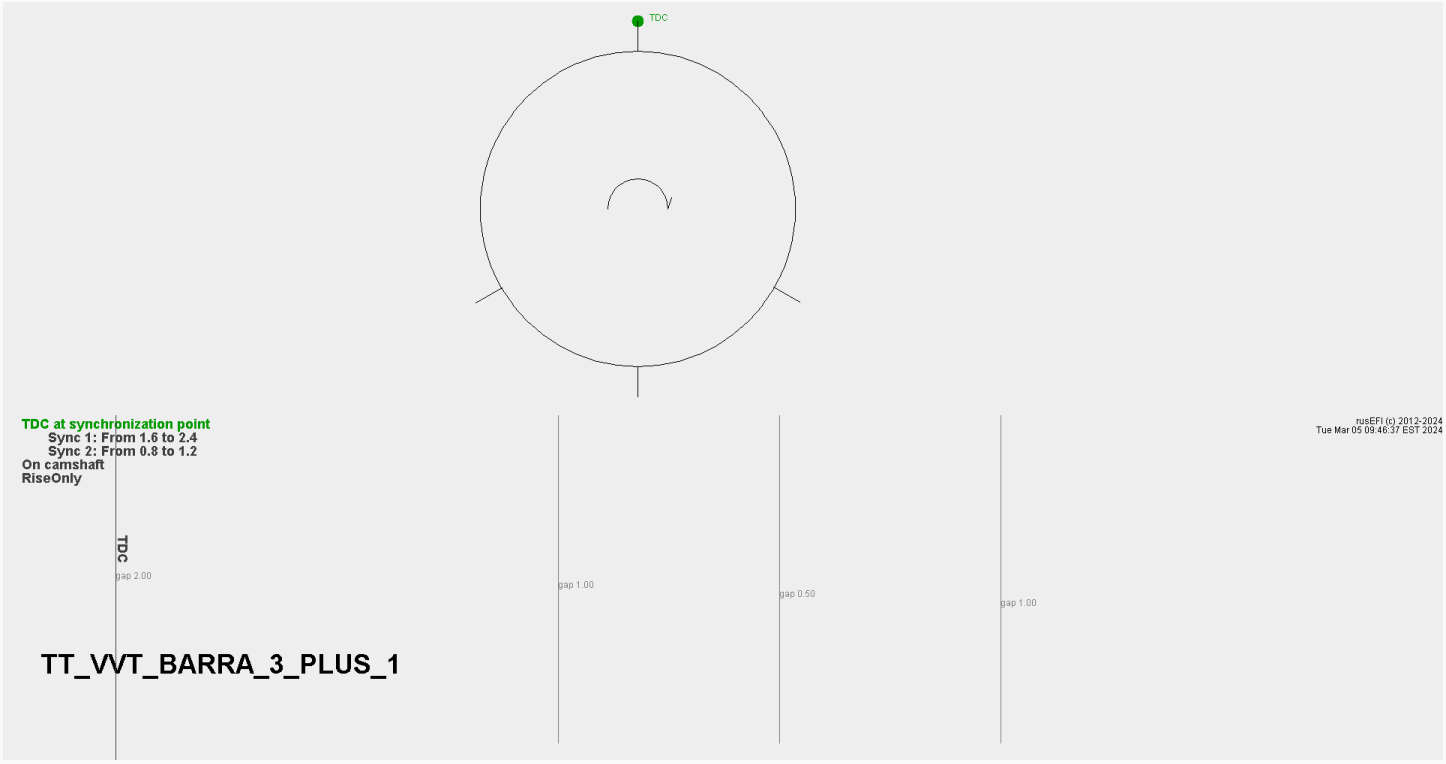
Suzuki G13B
Overview



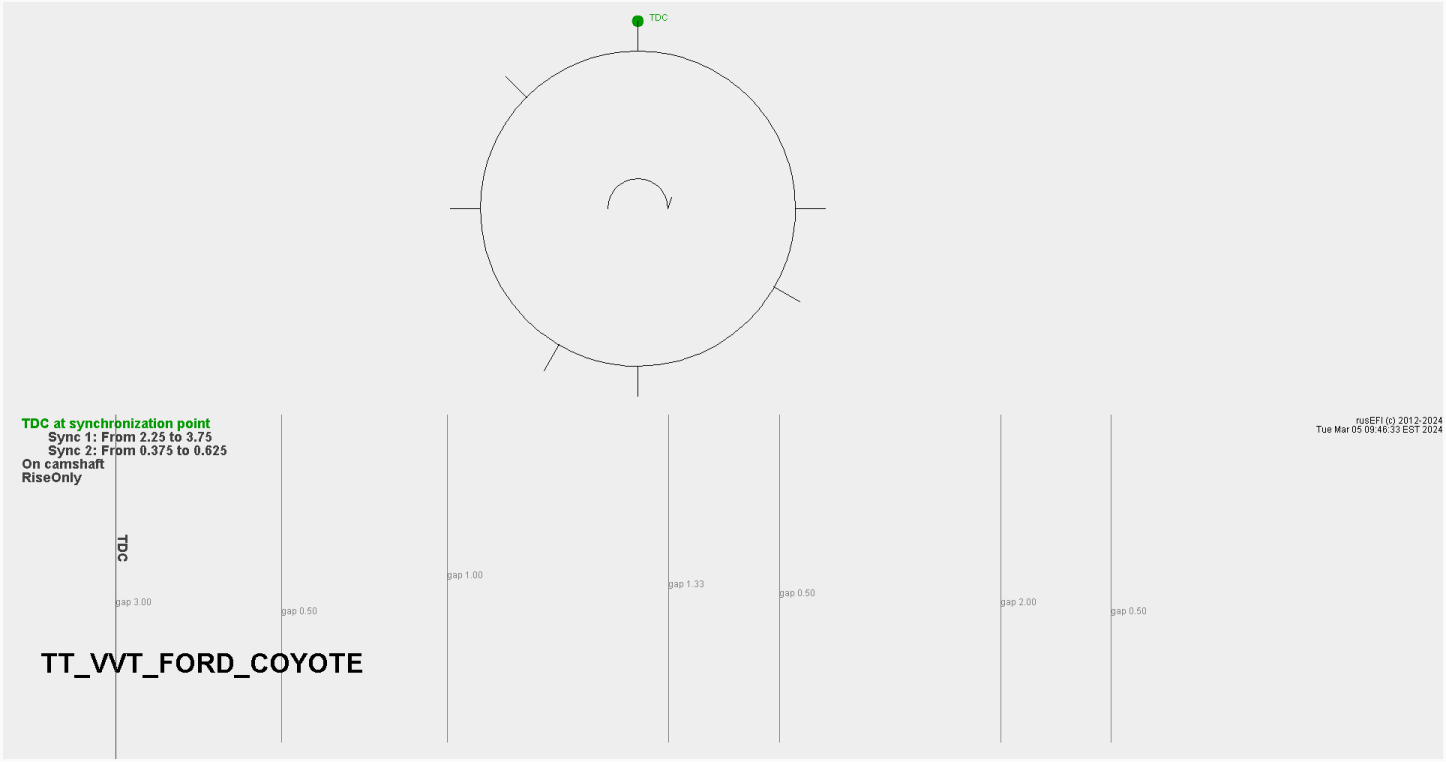
Suzuki K6A
Overview



Ford Barra VVT
Overview

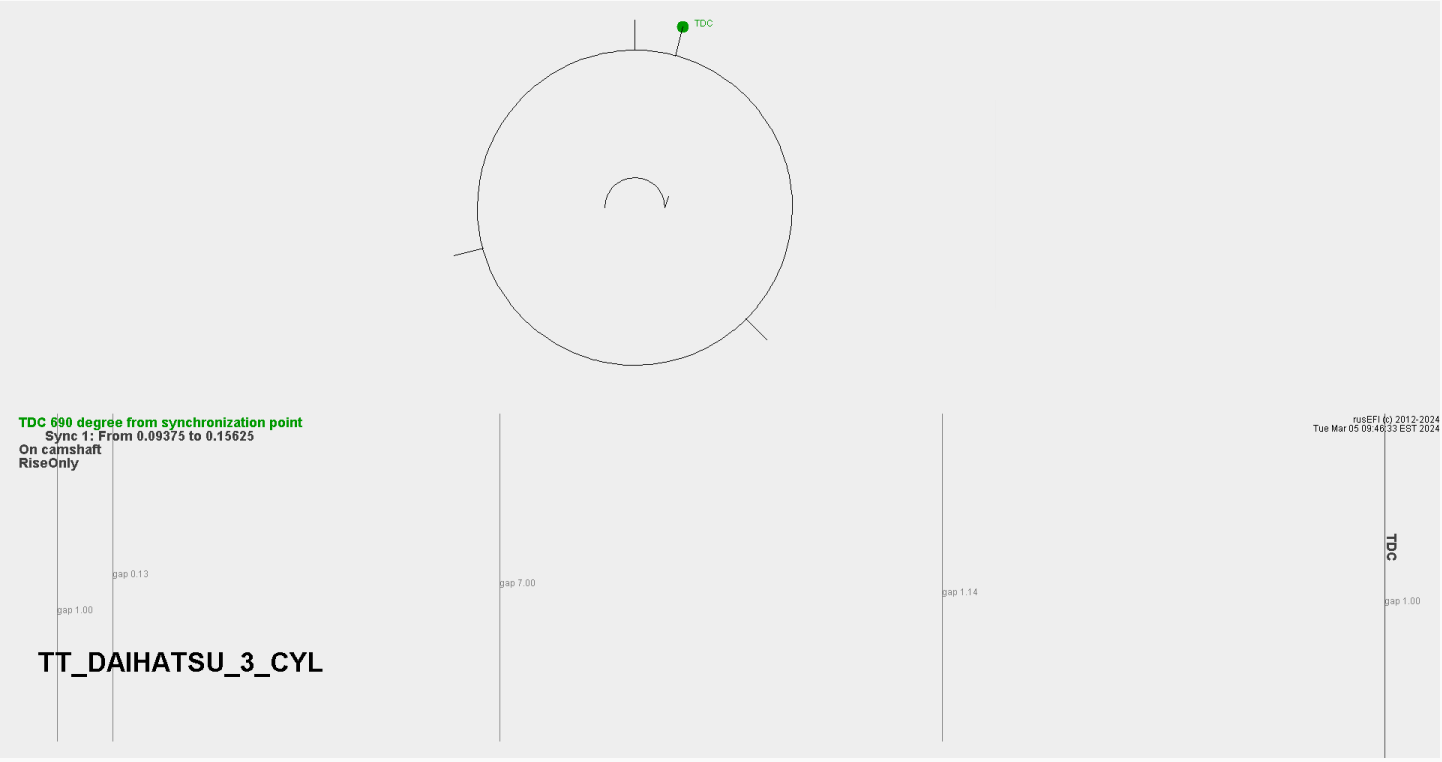


Ford Coyote VVT
Overview

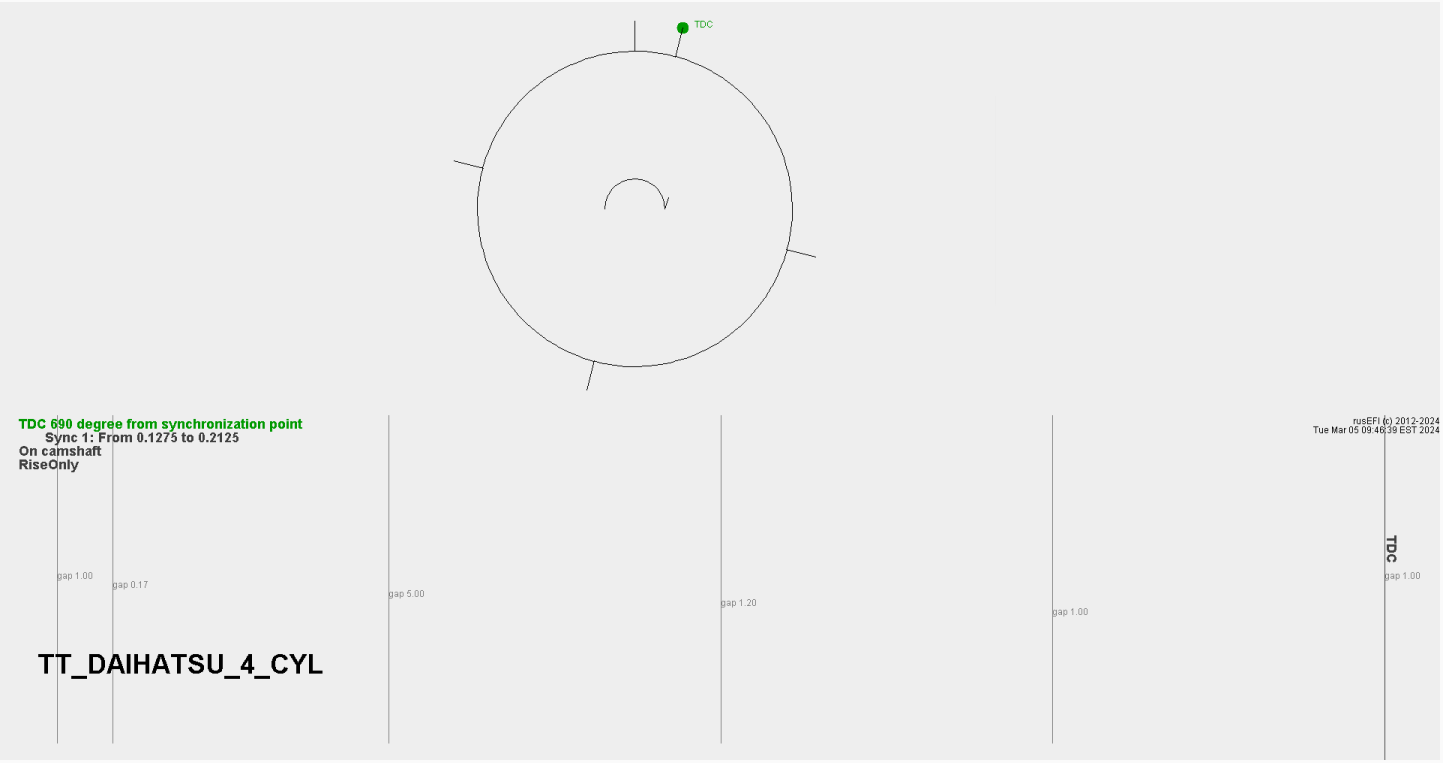


Daihatsu

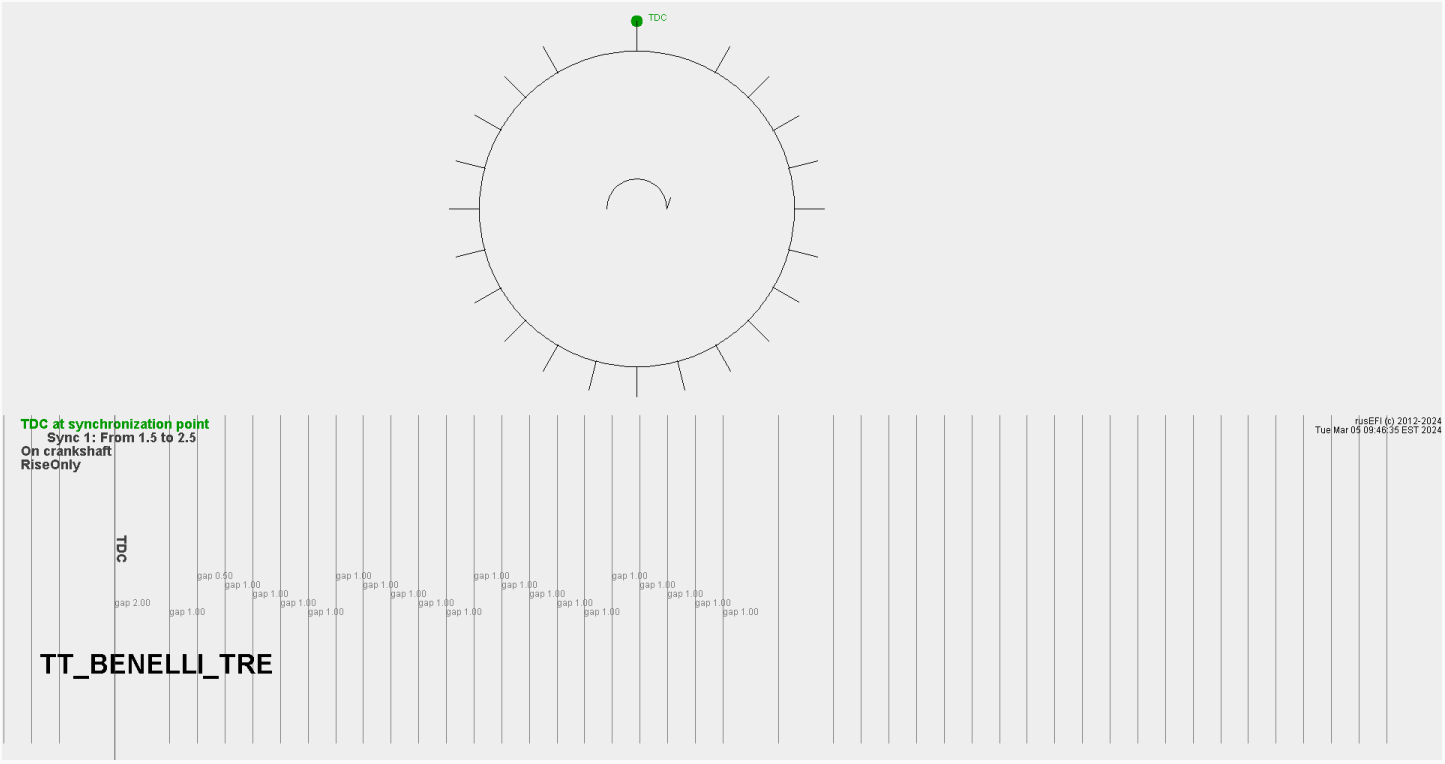
3 cylinder



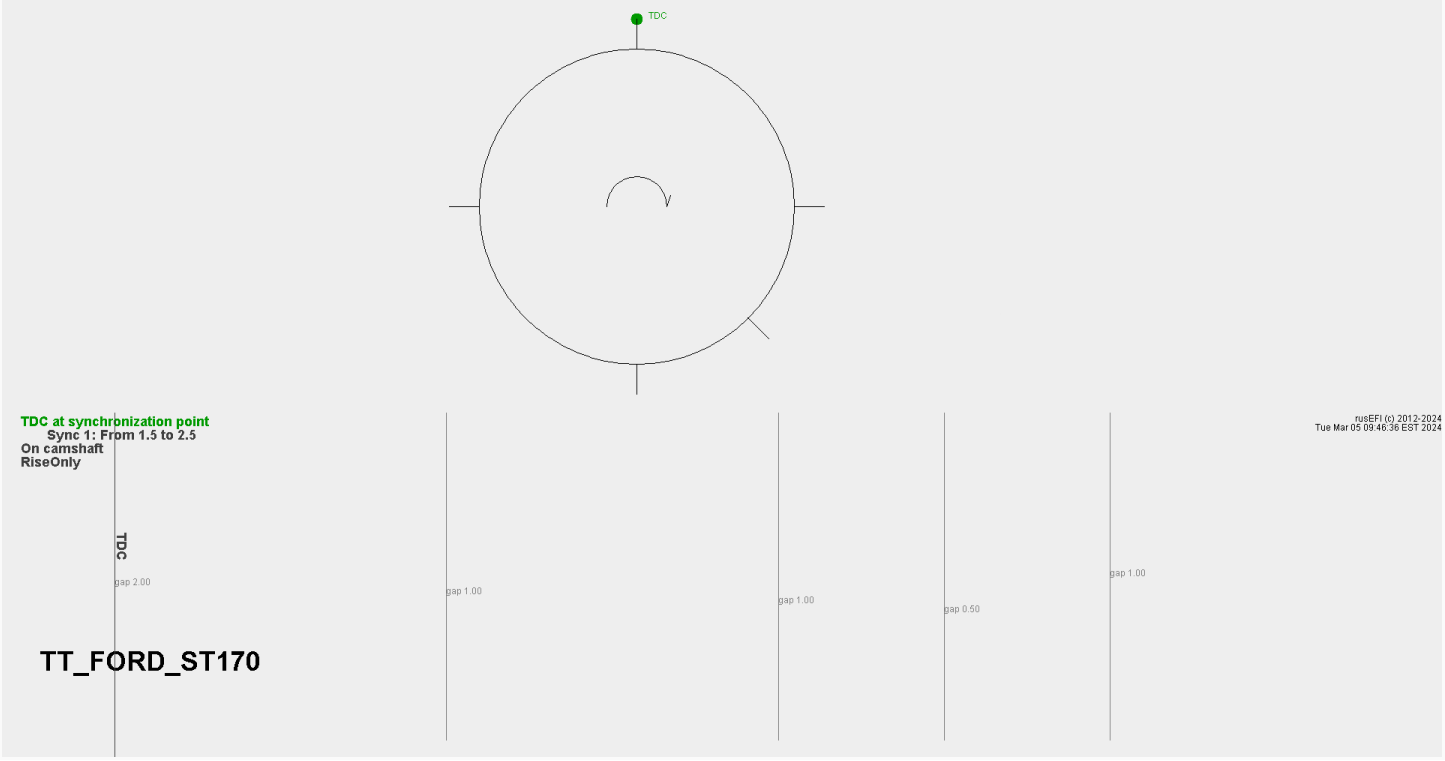
4 cylinder



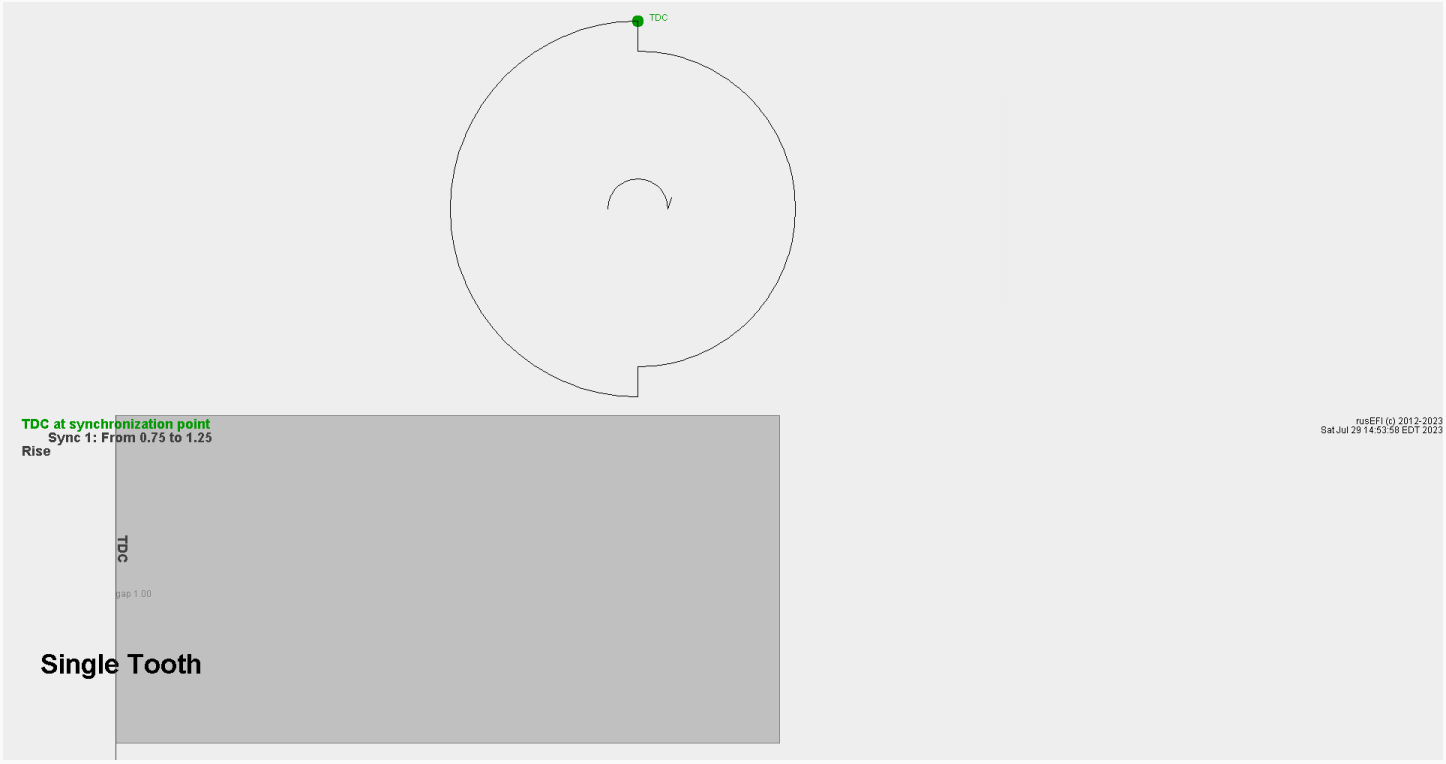
Benelli Tre
Overview



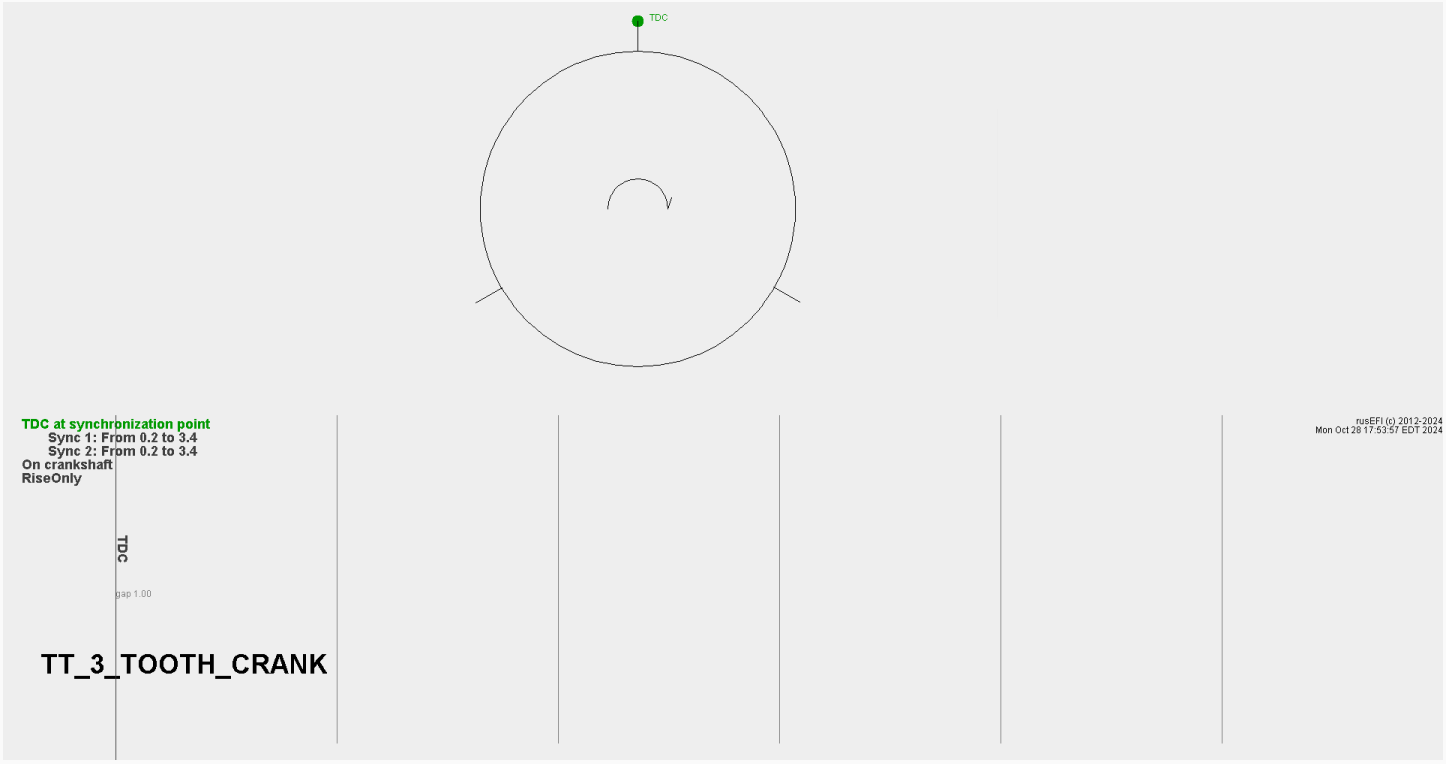
Ford ST170
Overview



One tooth
Overview

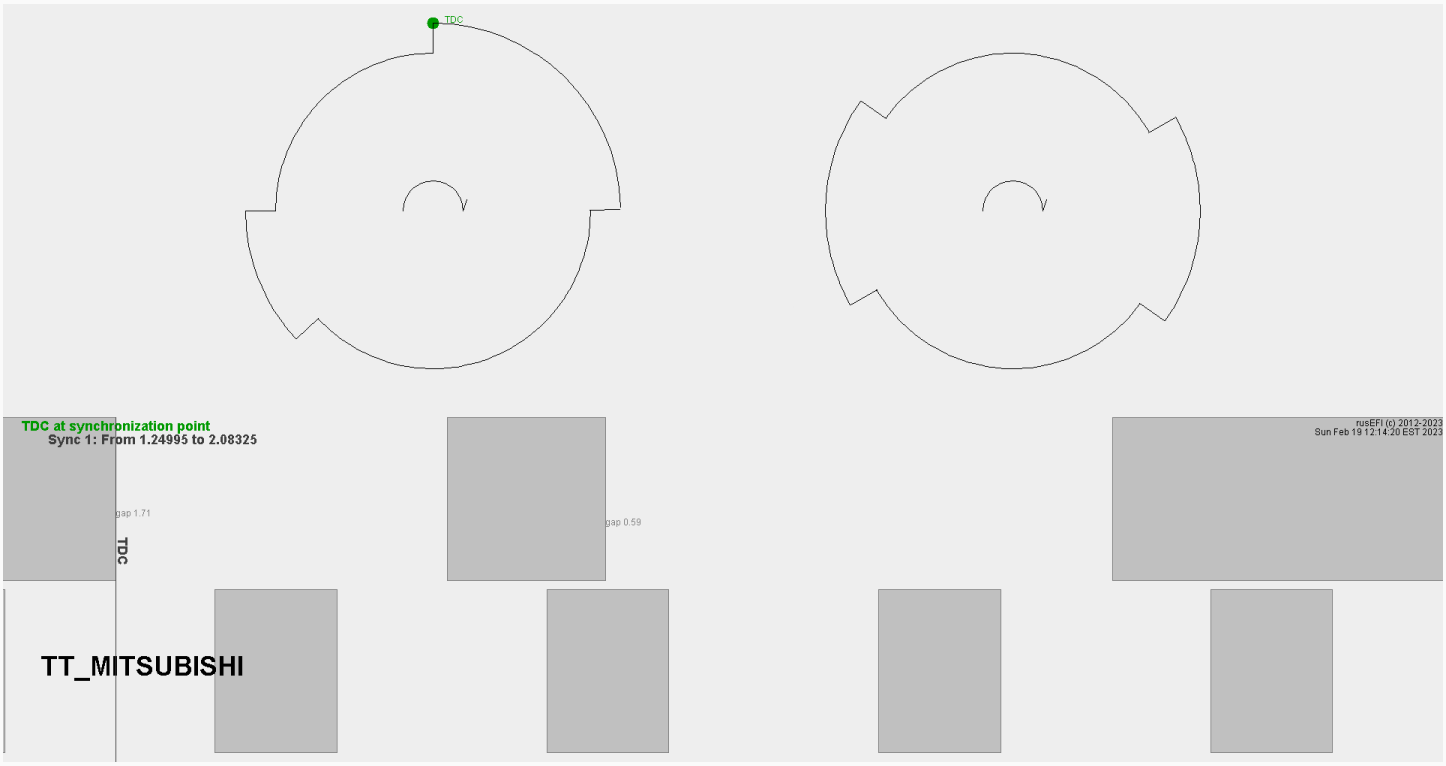


Mitsubishi
3 tooth crank
Overview



4G93

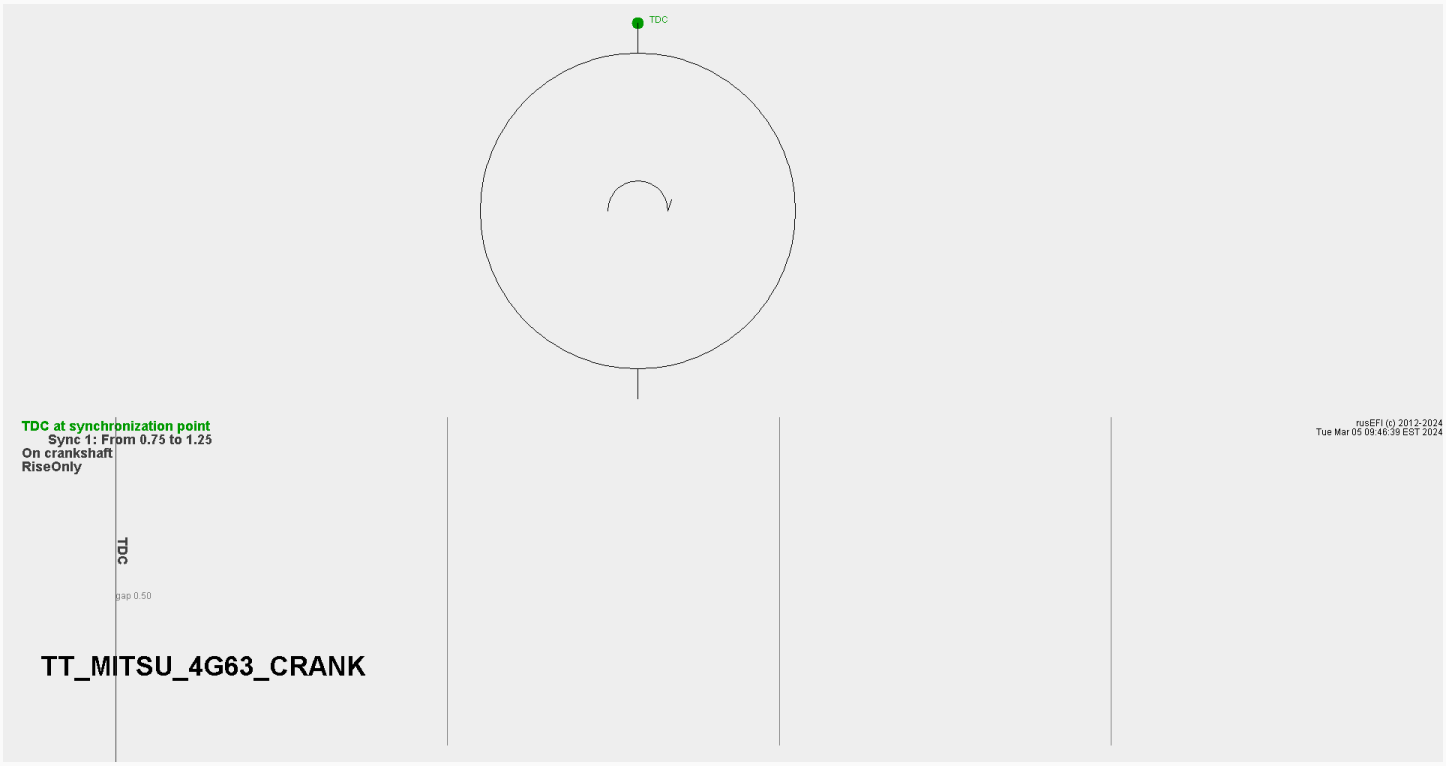
Overview



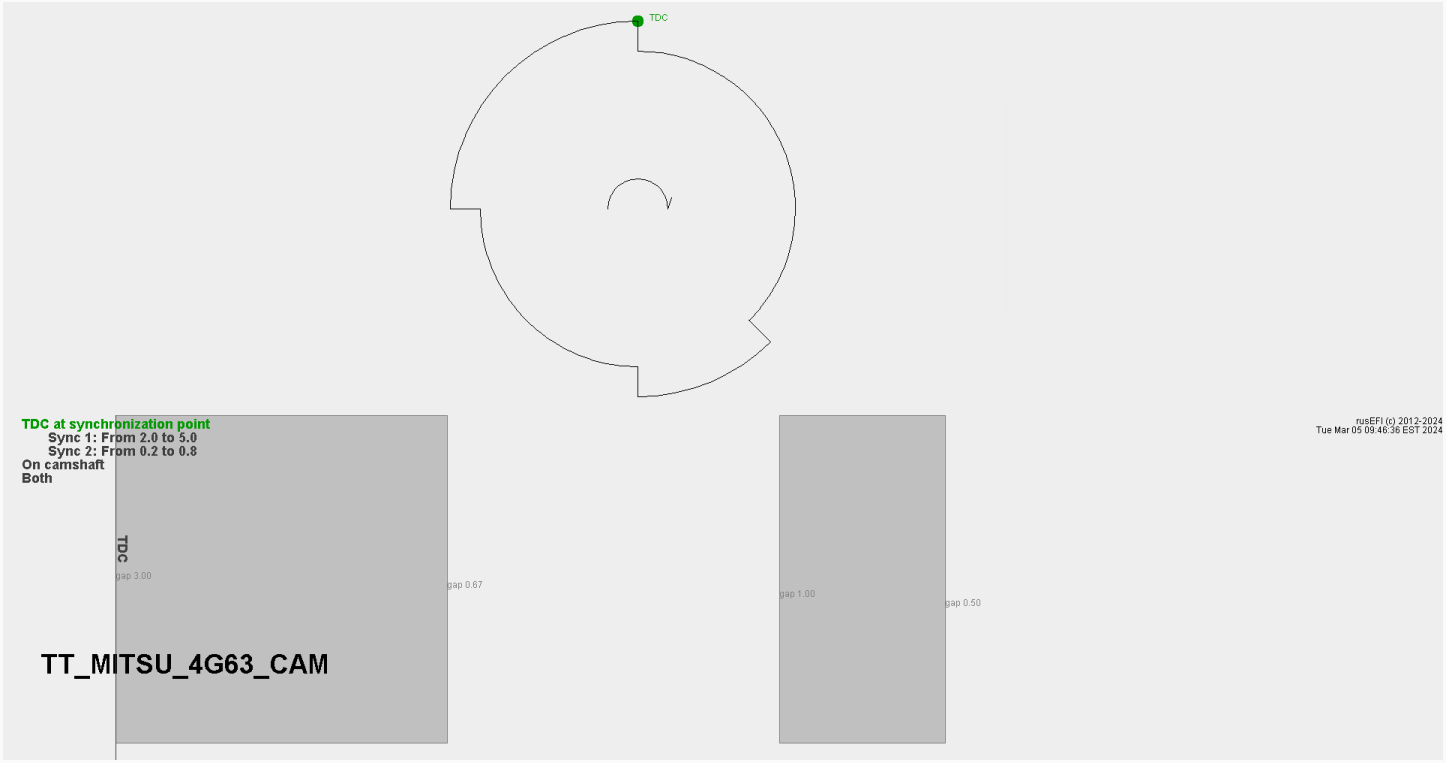
4G63

Overview

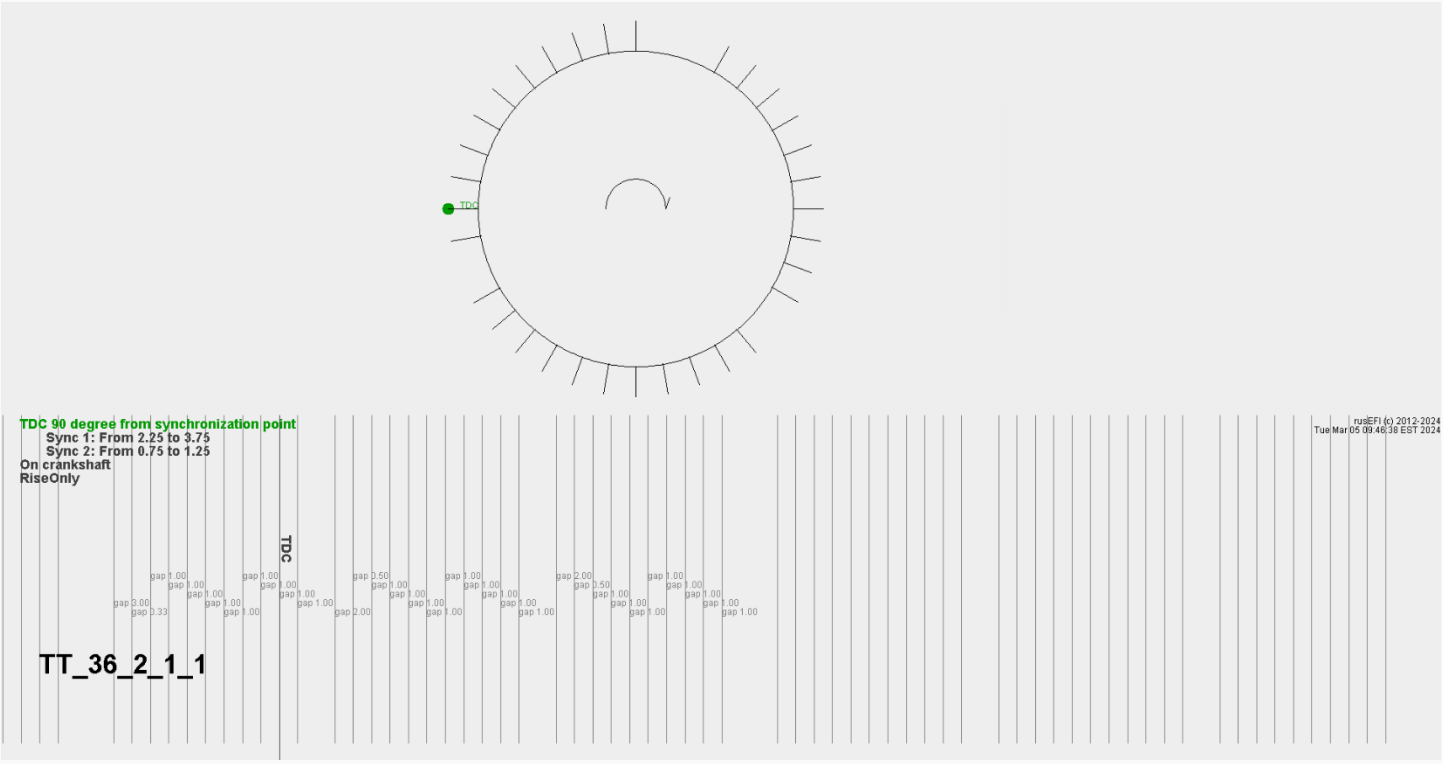
Crank



Cam

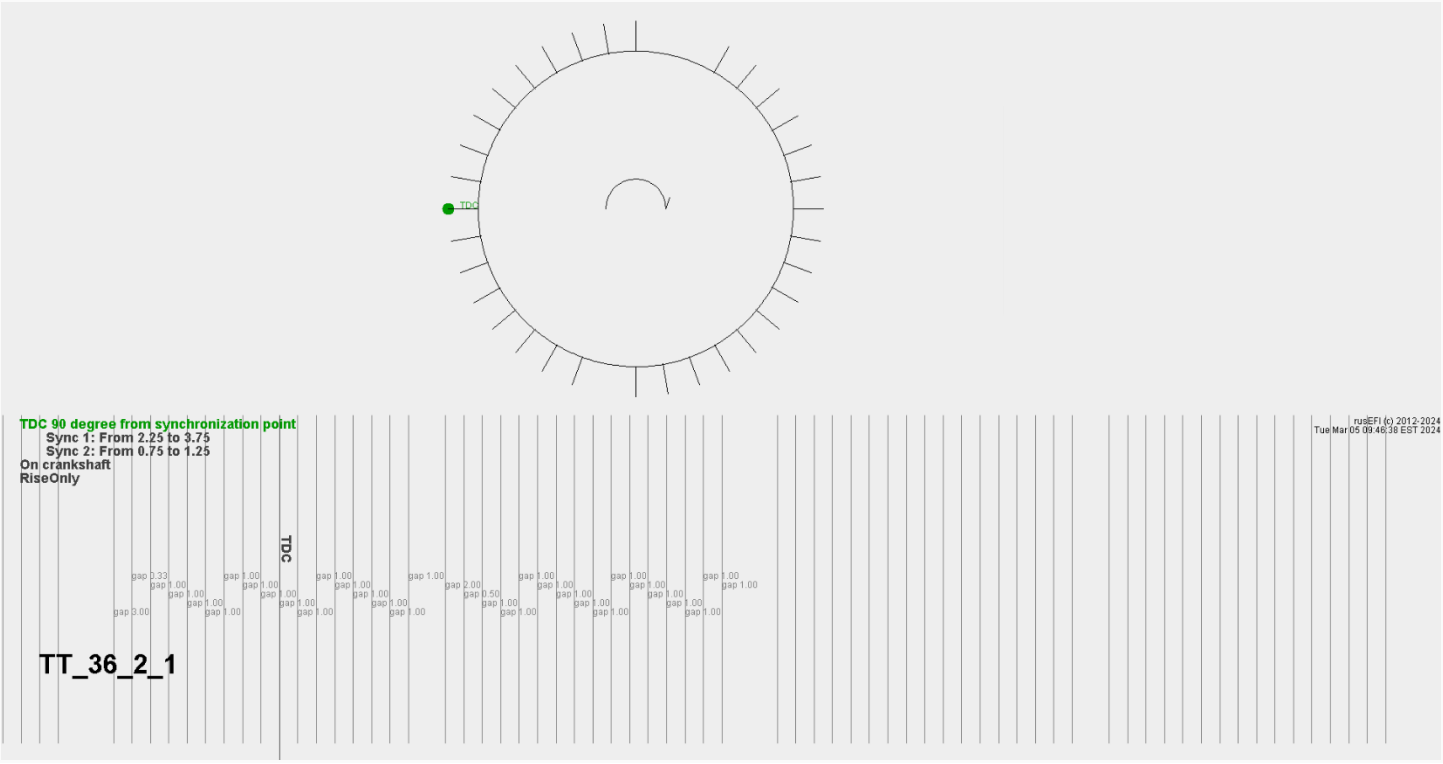


36-2-1-1
Overview

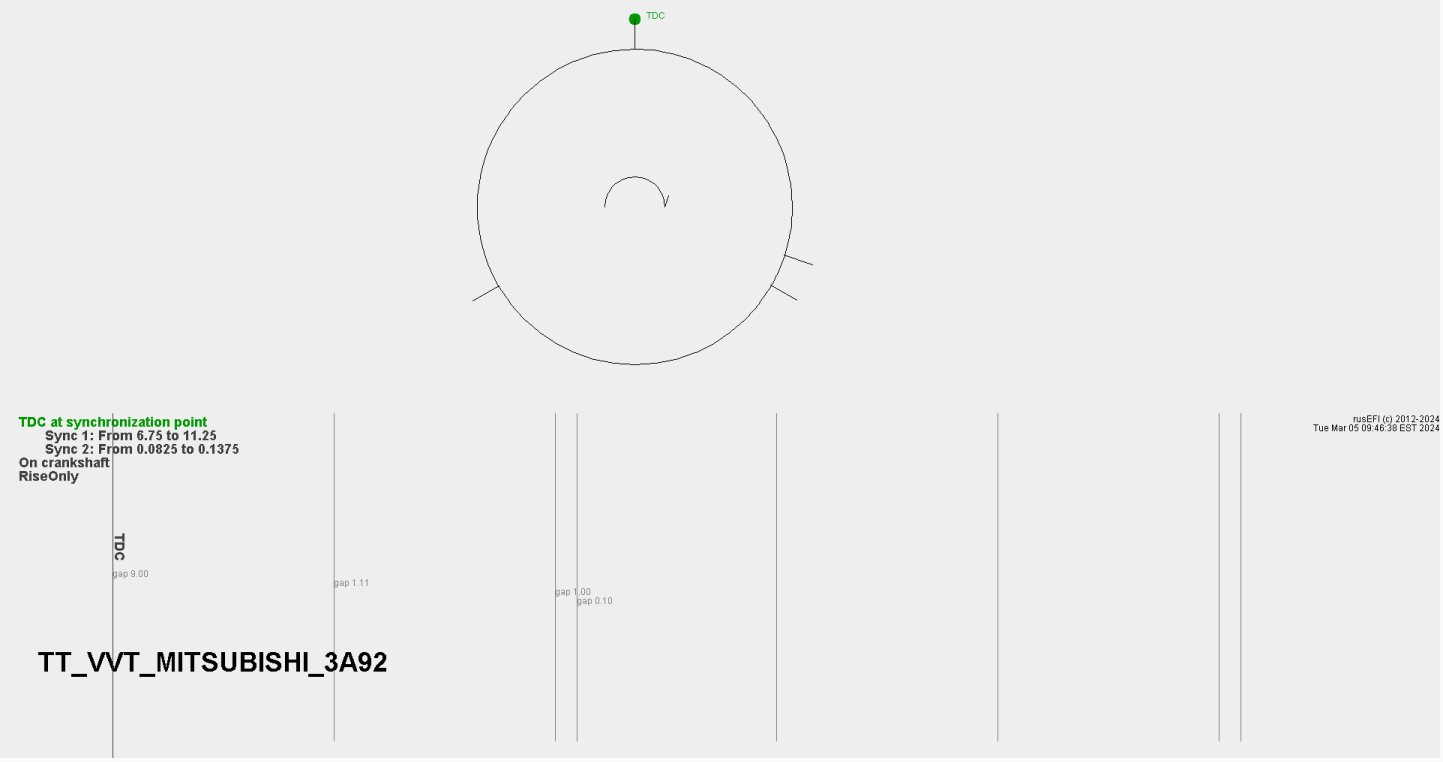


36-2-1
Overview

For example 4B11 4G15 4G69

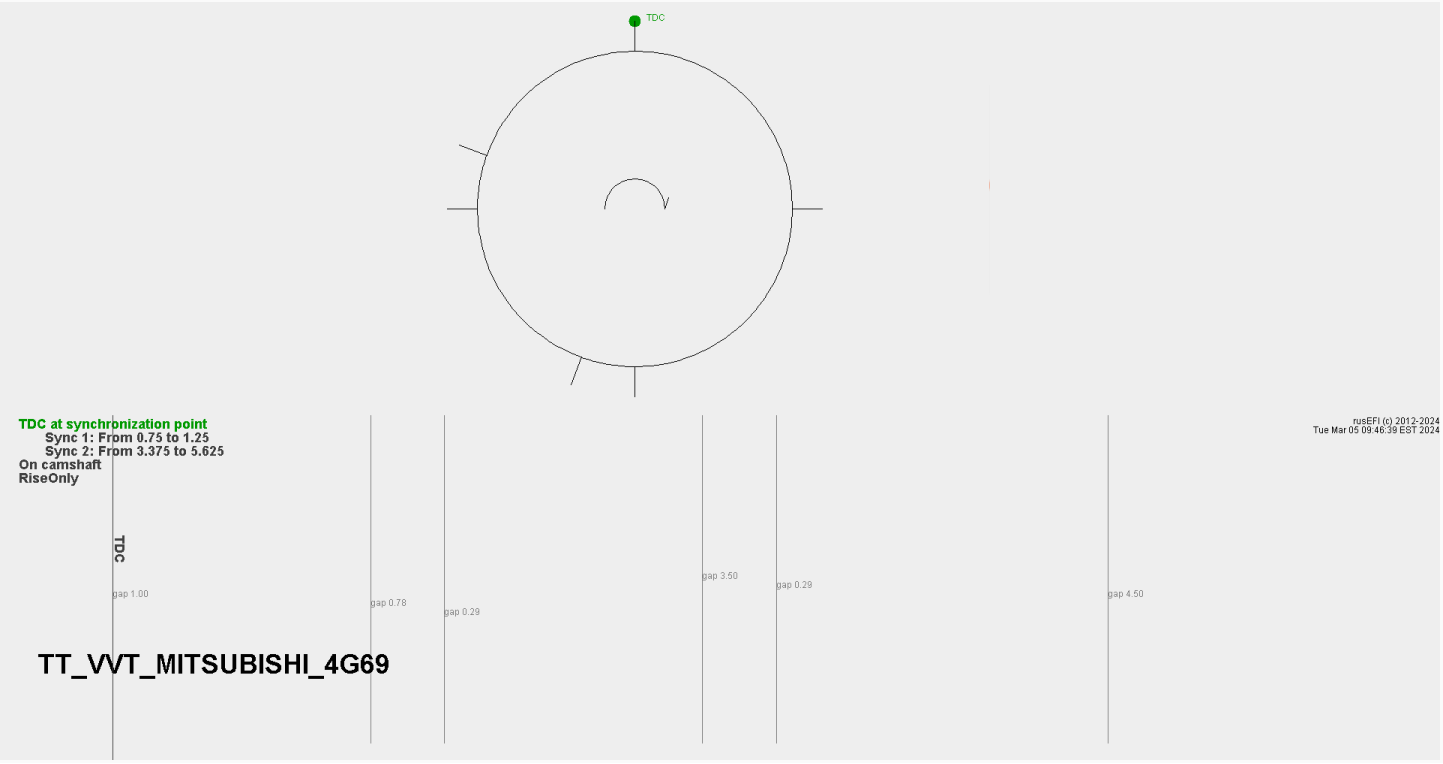


3A92 VVT
Overview

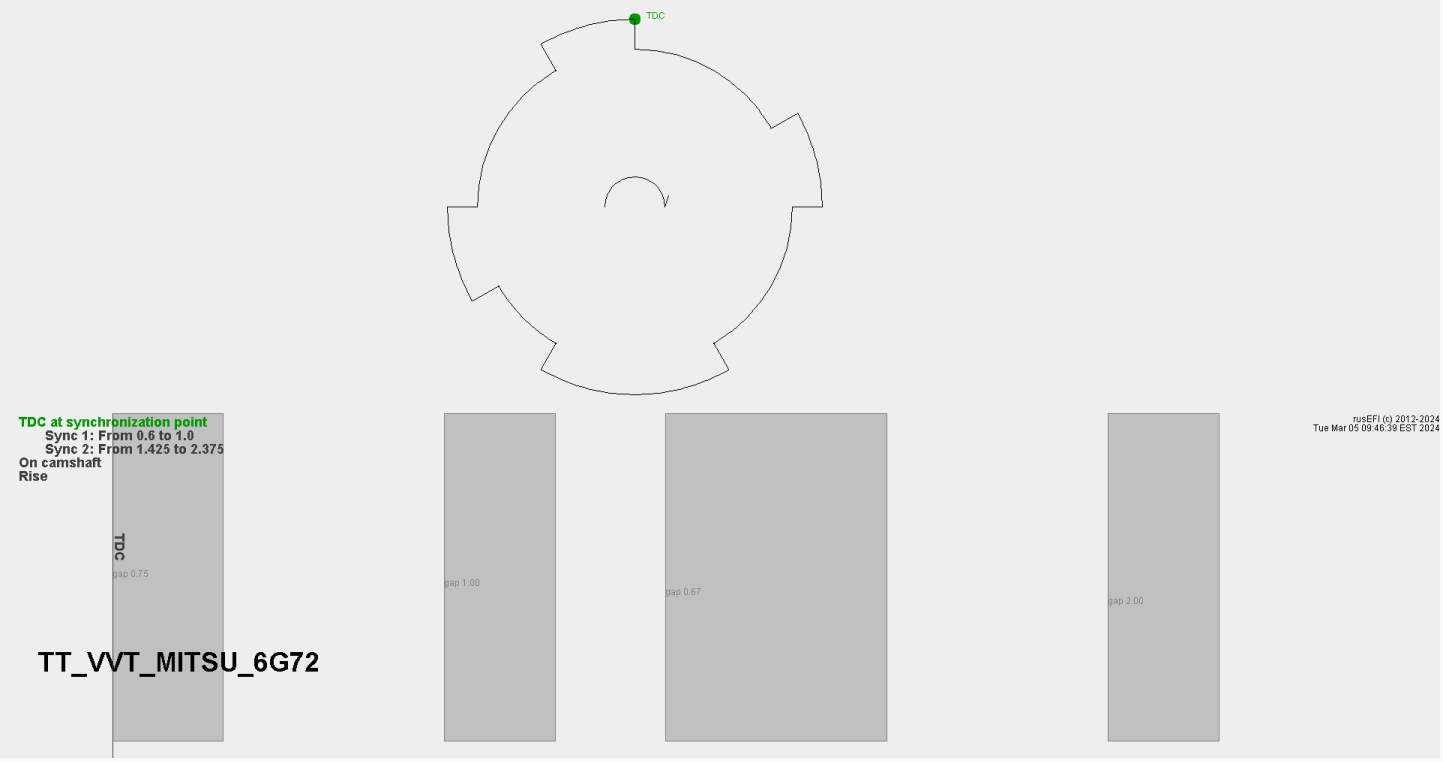


4G69 VVT
Overview

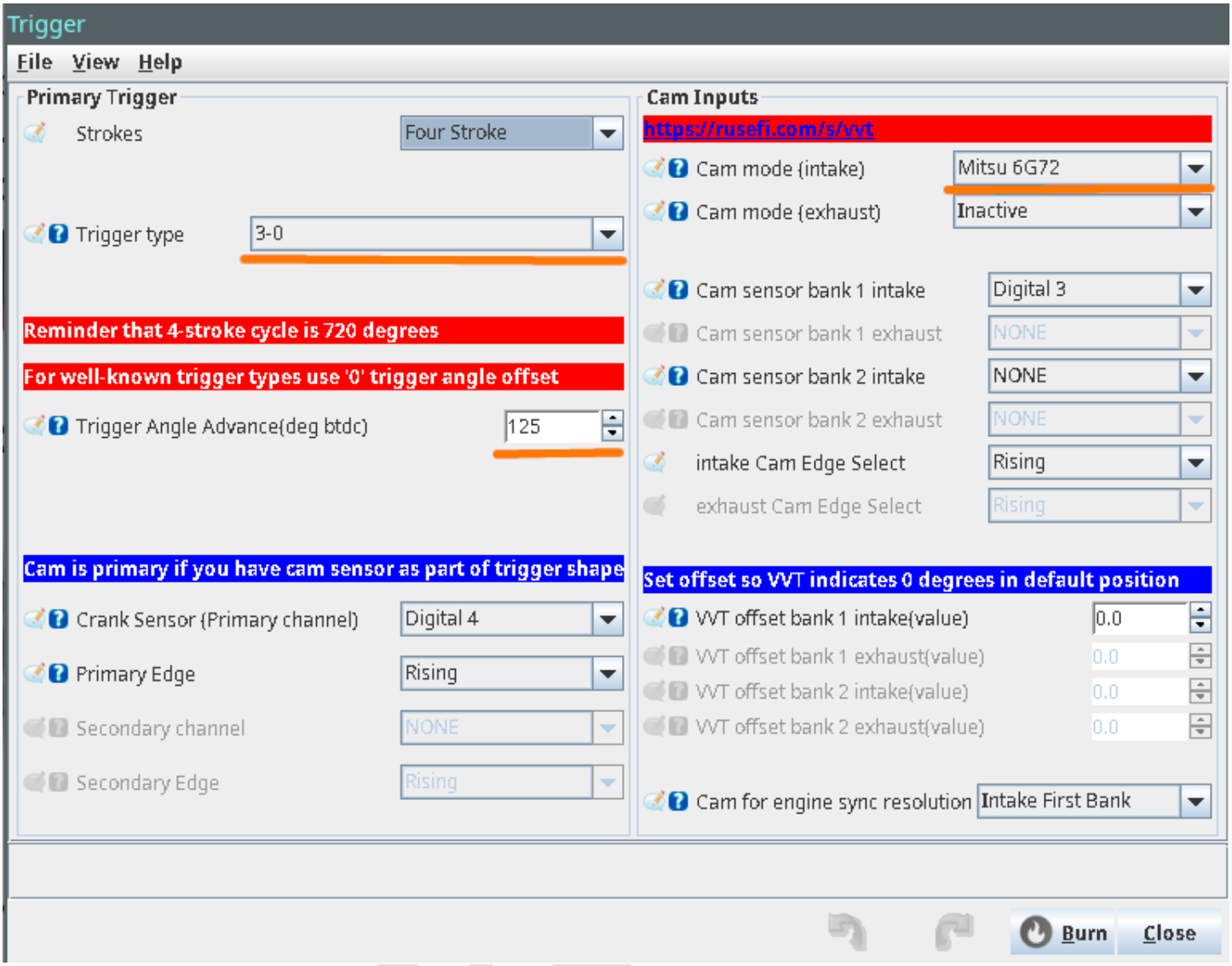
Same as 4G15



6G72 Cam
Overview



Use this cam trigger with special 3+0 symmetrical crank trigger.

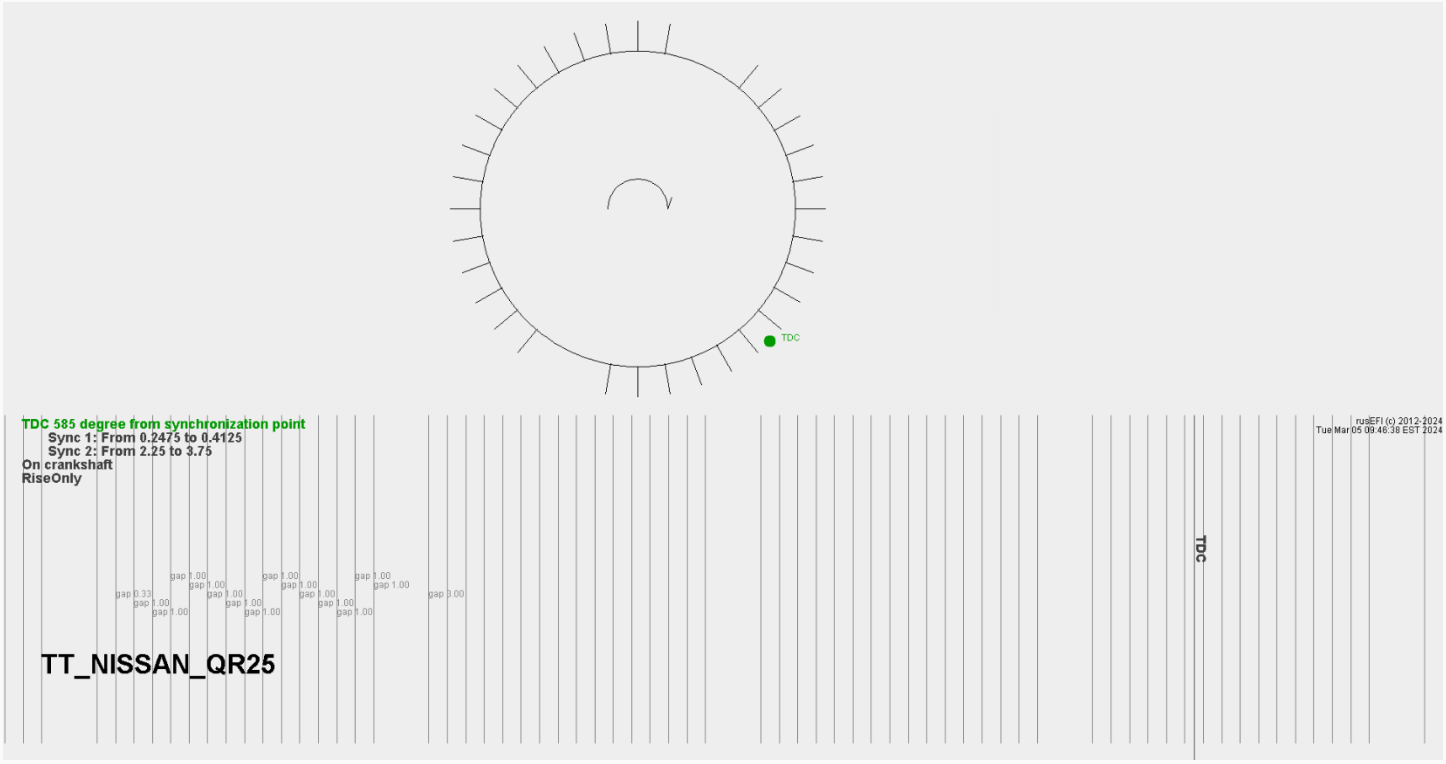

Trigger
File View Help
Primary Trigger
Strokes
Four Stroke
Trigger type
3-0
Reminder that 4-stroke cycle is 720 degrees
For well-known trigger types use '0' trigger angle offset
Trigger Angle Advance(deg btdc)
125
Cam is primary if you have cam sensor as part of trigger shape
Crank Sensor (Primary channel)
Digital 4
Primary Edge
Rising
Secondary channel
NONE
Secondary Edge
Rising
Cam Inputs
https://rusefi.com/s/vvt
Cam mode (intake)
Mitsu 6G72
Cam mode (exhaust)
Inactive
Cam sensor bank 1 intake
Digital 3
Cam sensor bank 1 exhaust
NONE
Cam sensor bank 2 intake
NONE
Cam sensor bank 2 exhaust
NONE
intake Cam Edge Select
Rising
exhaust Cam Edge Select
Rising
Set offset so VVT indicates 0 degrees in default position
VVT offset bank 1 intake(value)
0.0
VVT offset bank 1 exhaust(value)
0.0
VVT offset bank 2 intake(value)
0.0
VVT offset bank 2 exhaust(value)
0.0
Cam for engine sync resolution
Intake First Bank
Burn
Close

Nissan

QR25

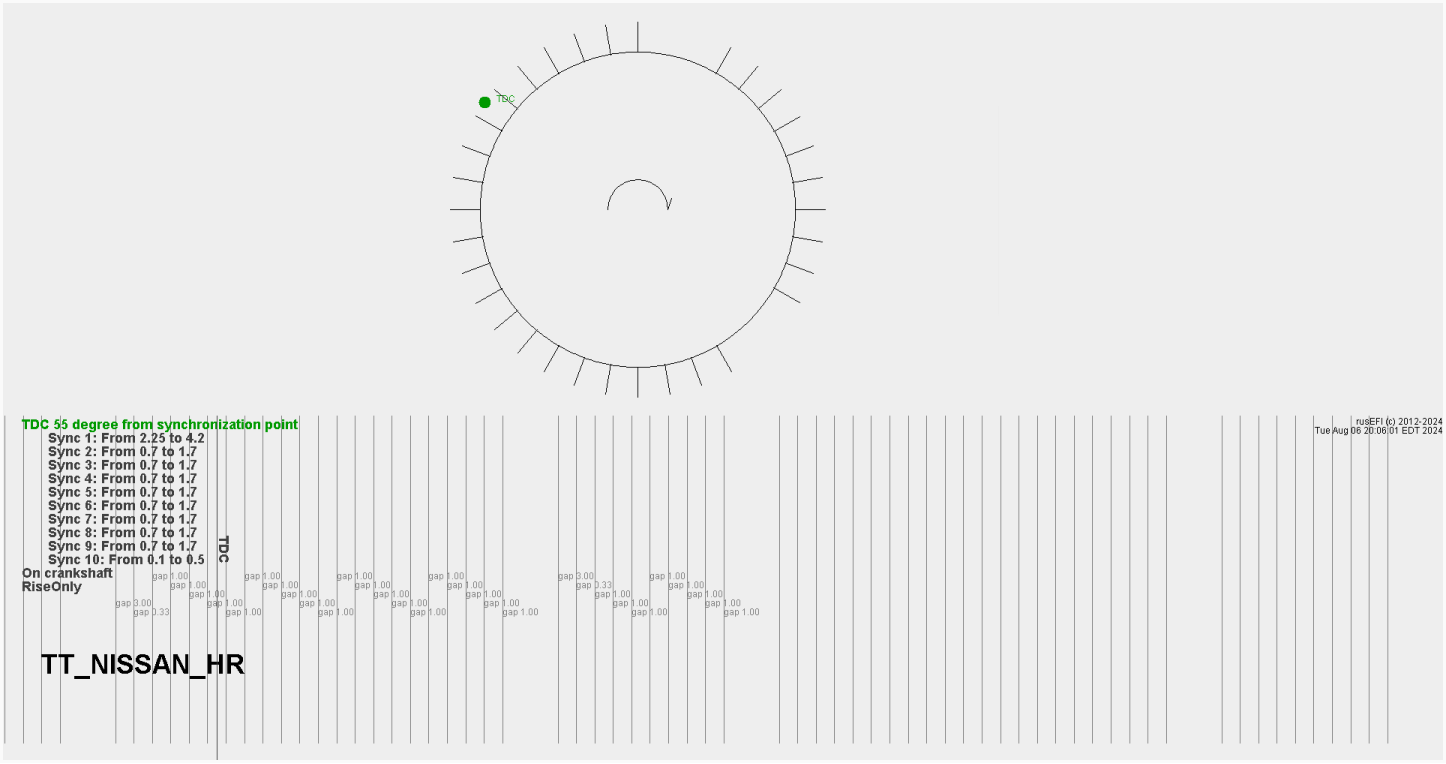
Overview

crank



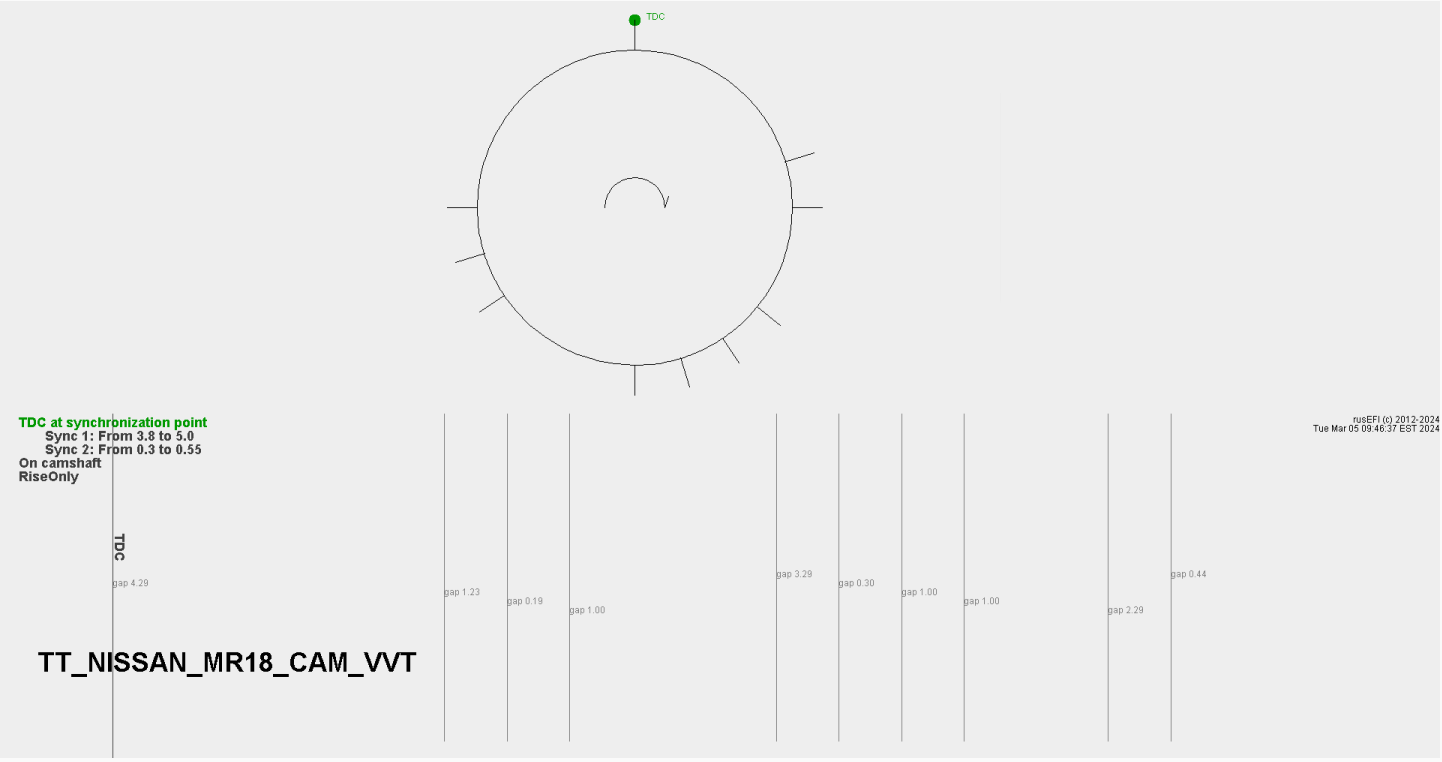
HR

crank



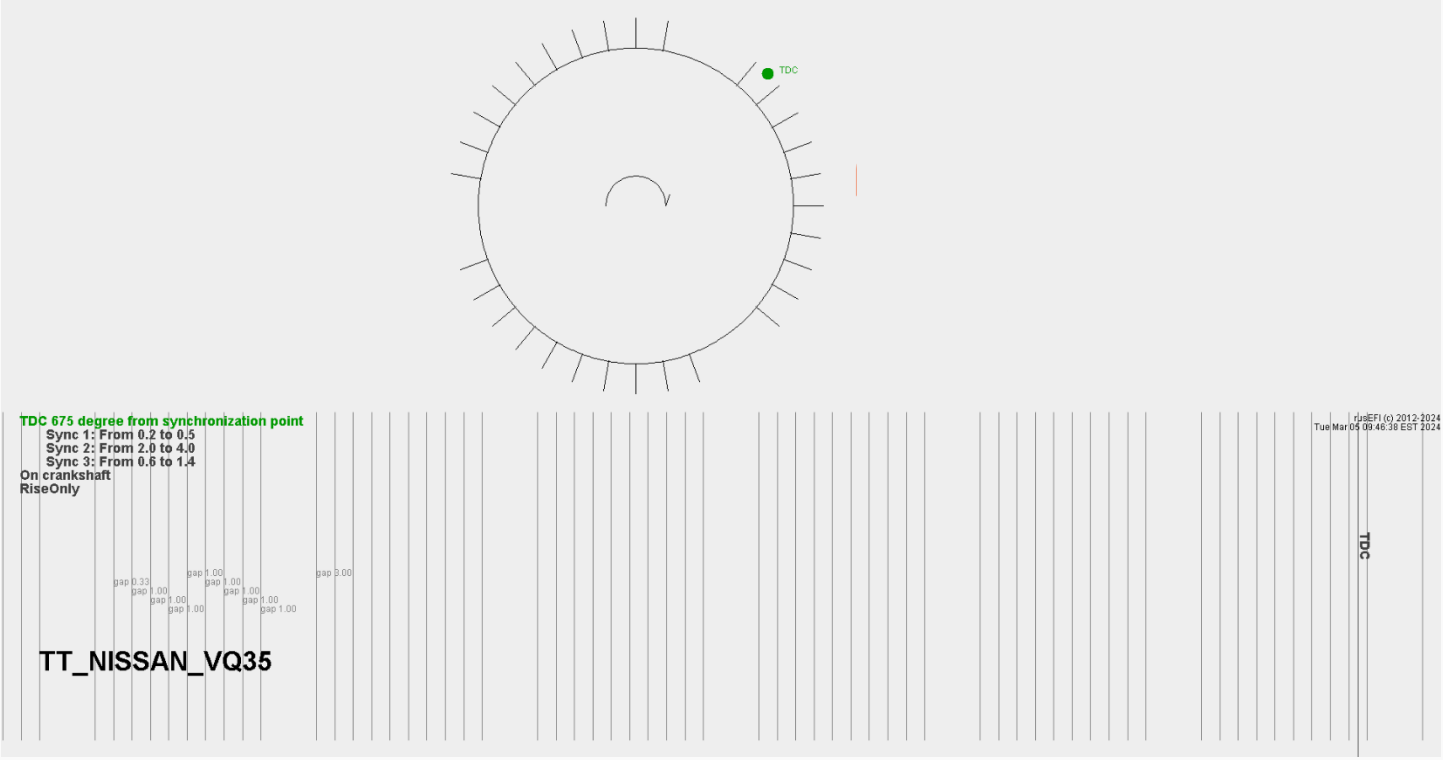
QR/MR

cam



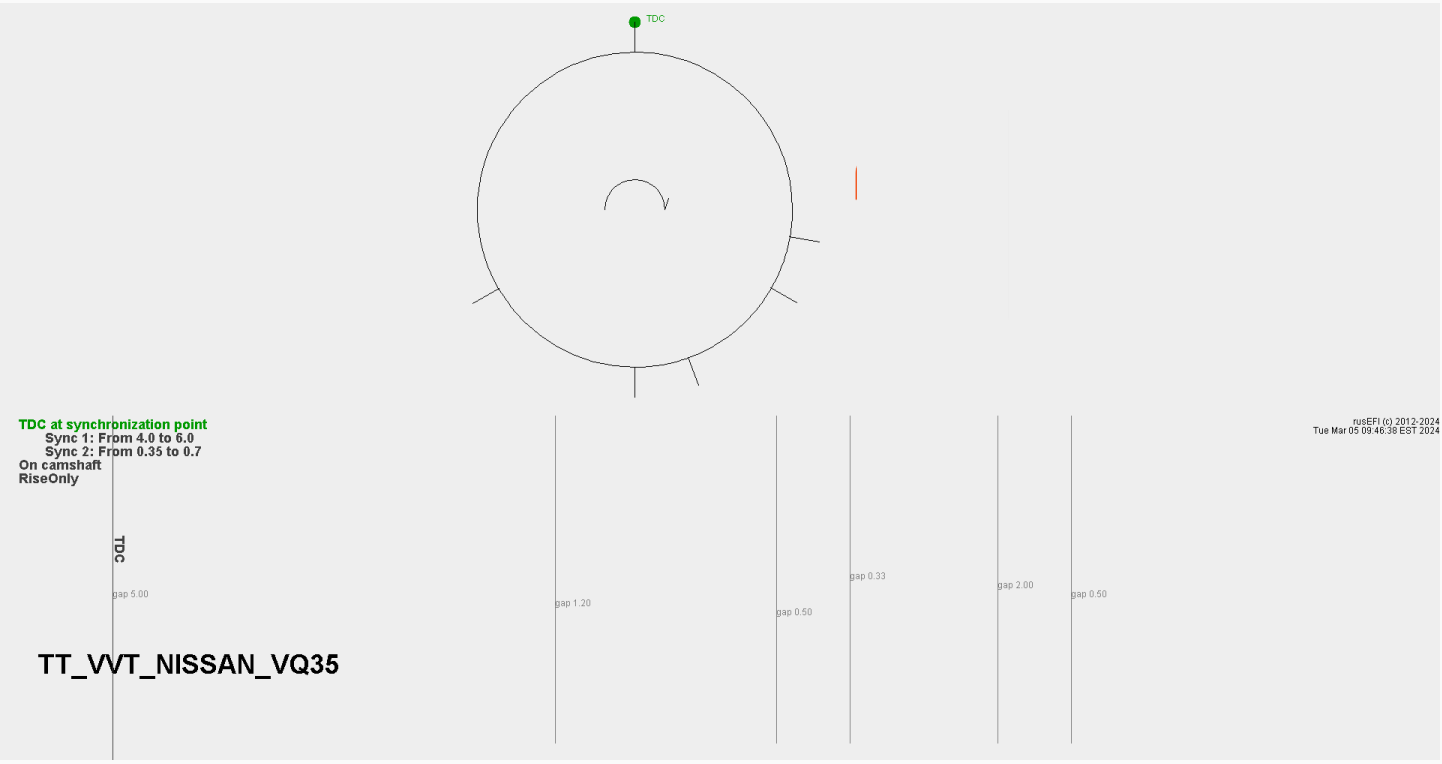
VQ35

crank

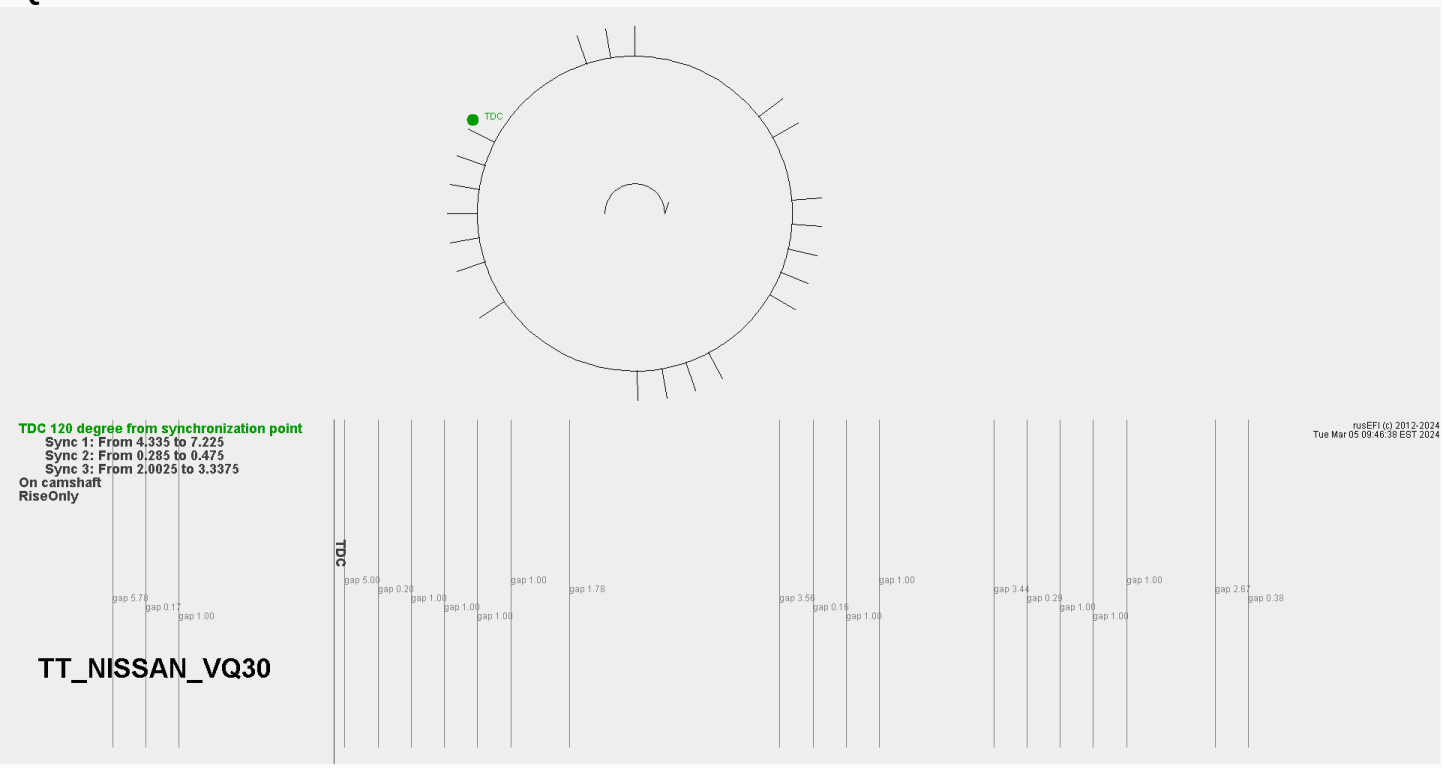


VQ

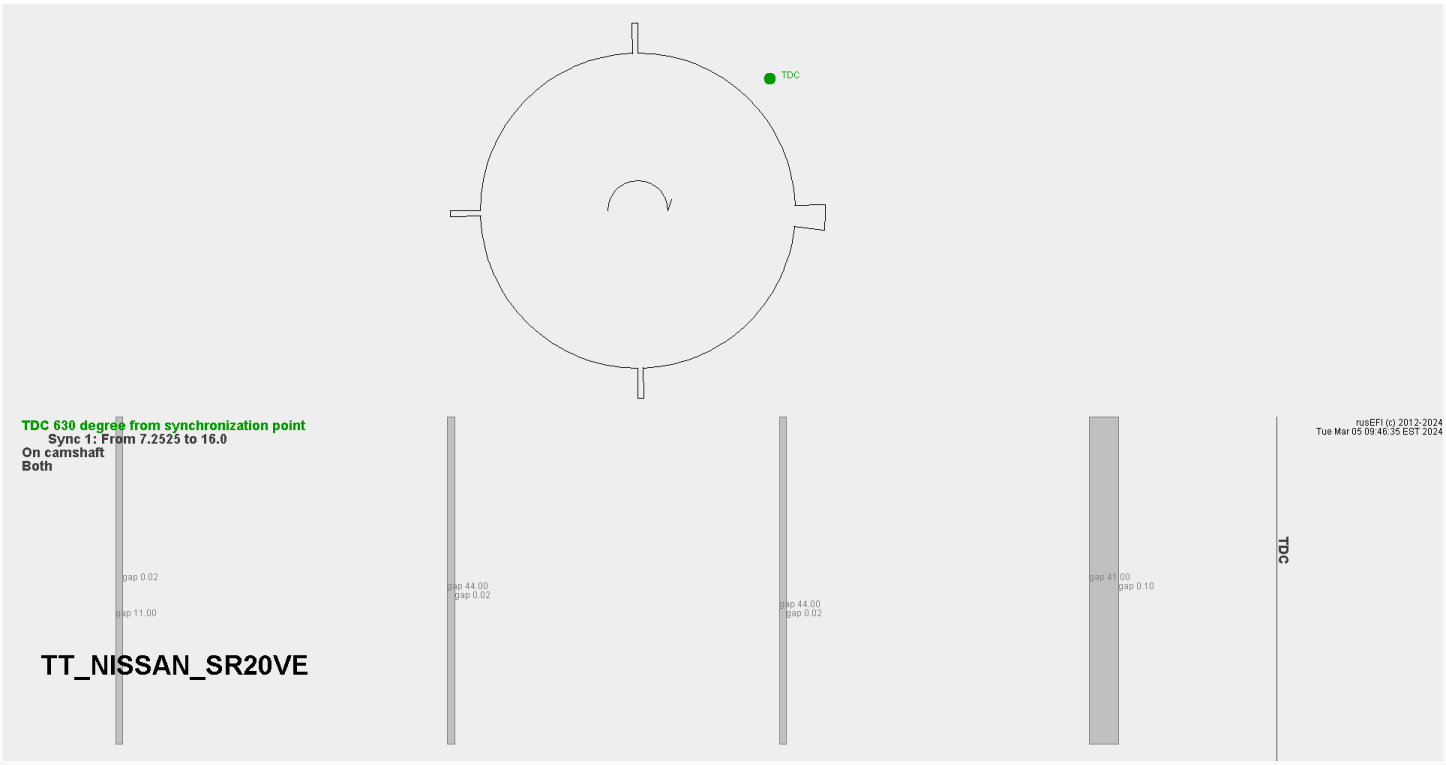
cam



VQ30



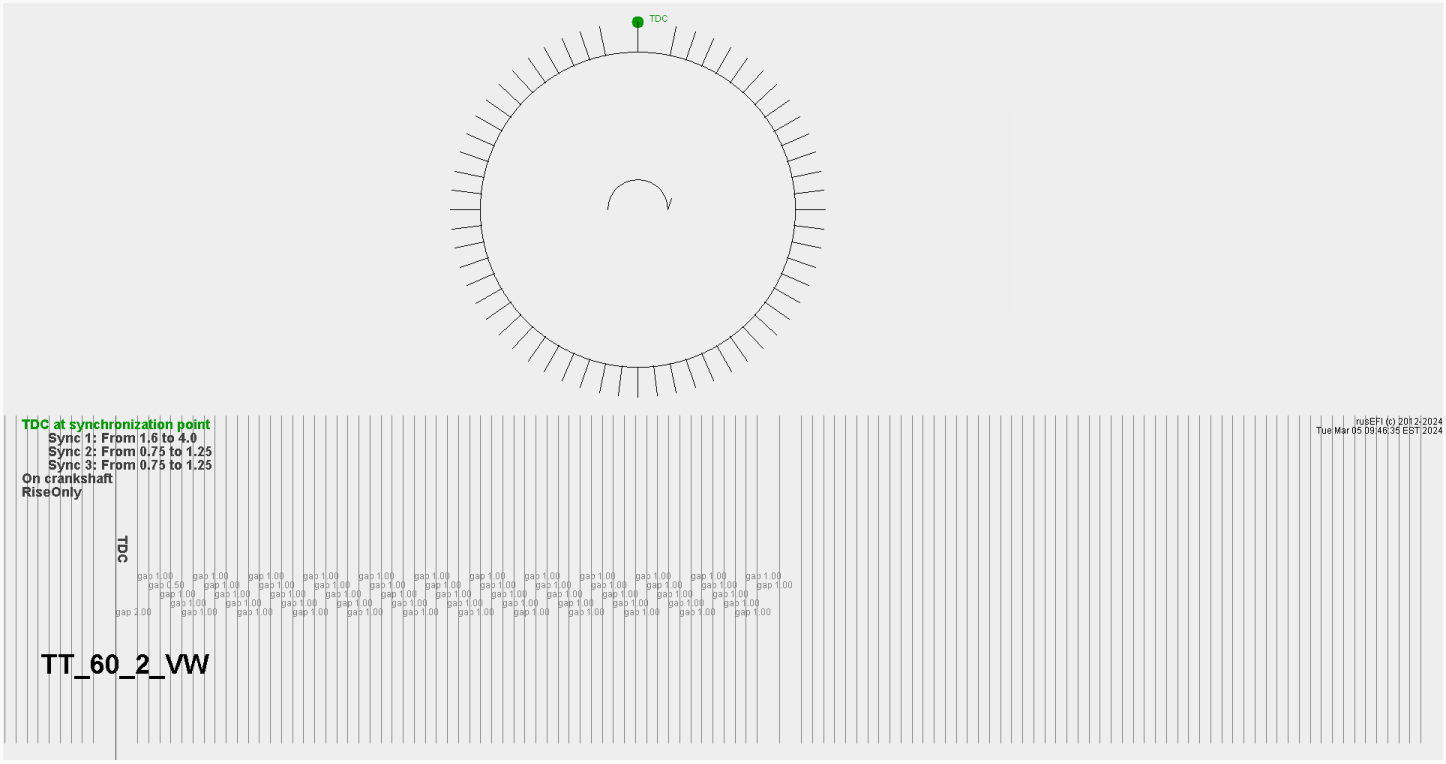
360 slot trigger is too weird, no plans to support it.



60-2 with flipped wires

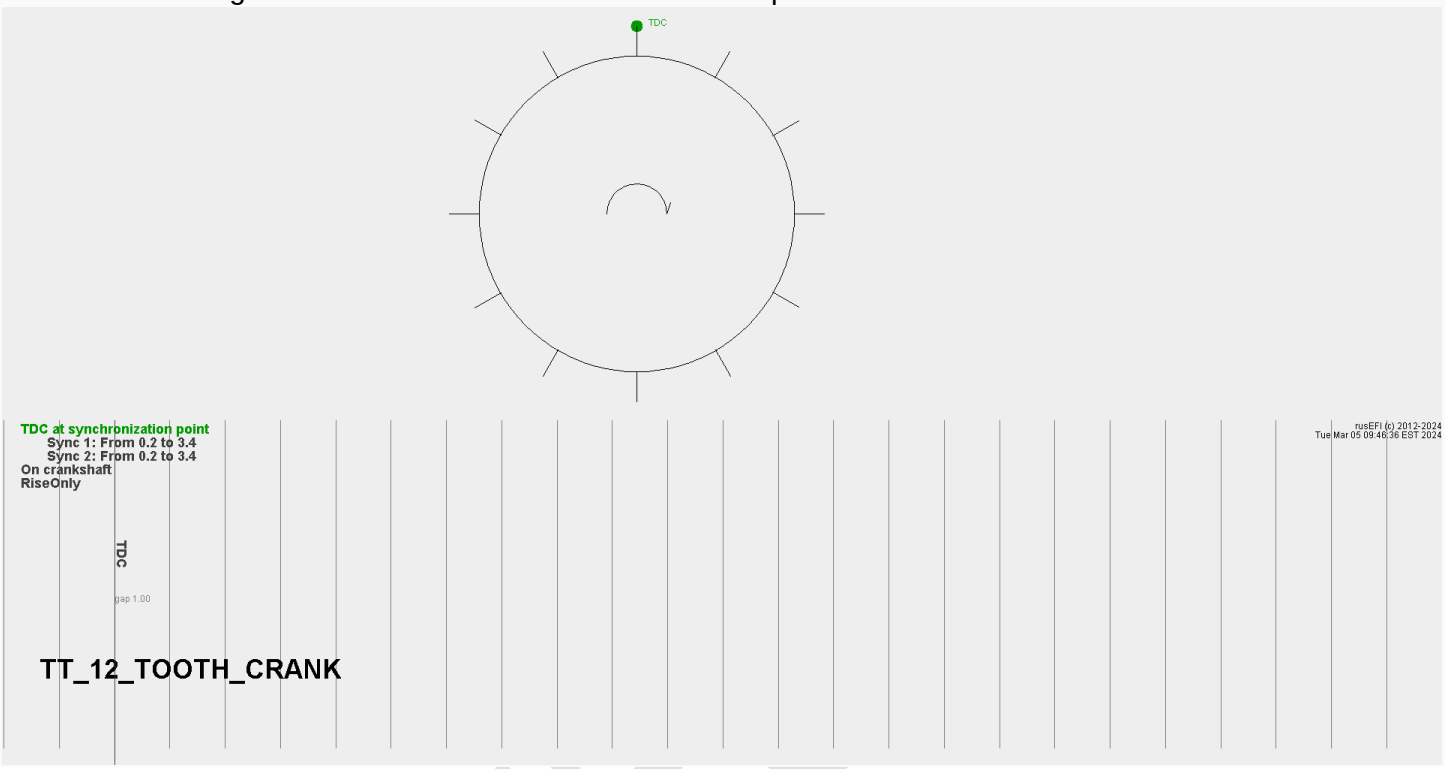
For historical reasons we support wrongfully wired 60-2

See also *Universal True 60/2*



Toyota

Toyota 2JZ
1/12 version
2JZ would use global trigger offset 65
Use this with "Single Tooth First Half" VVT mode for cam input

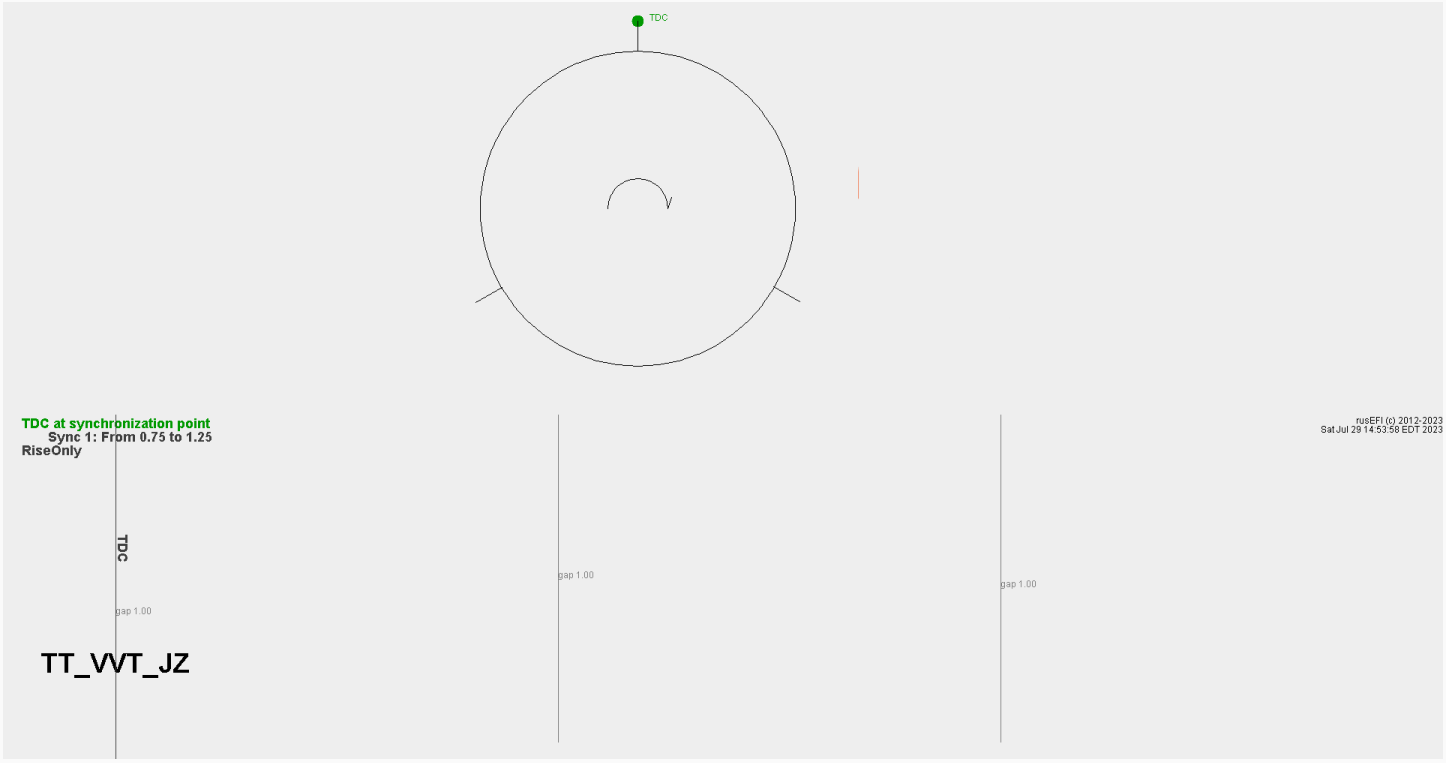


3/34 version

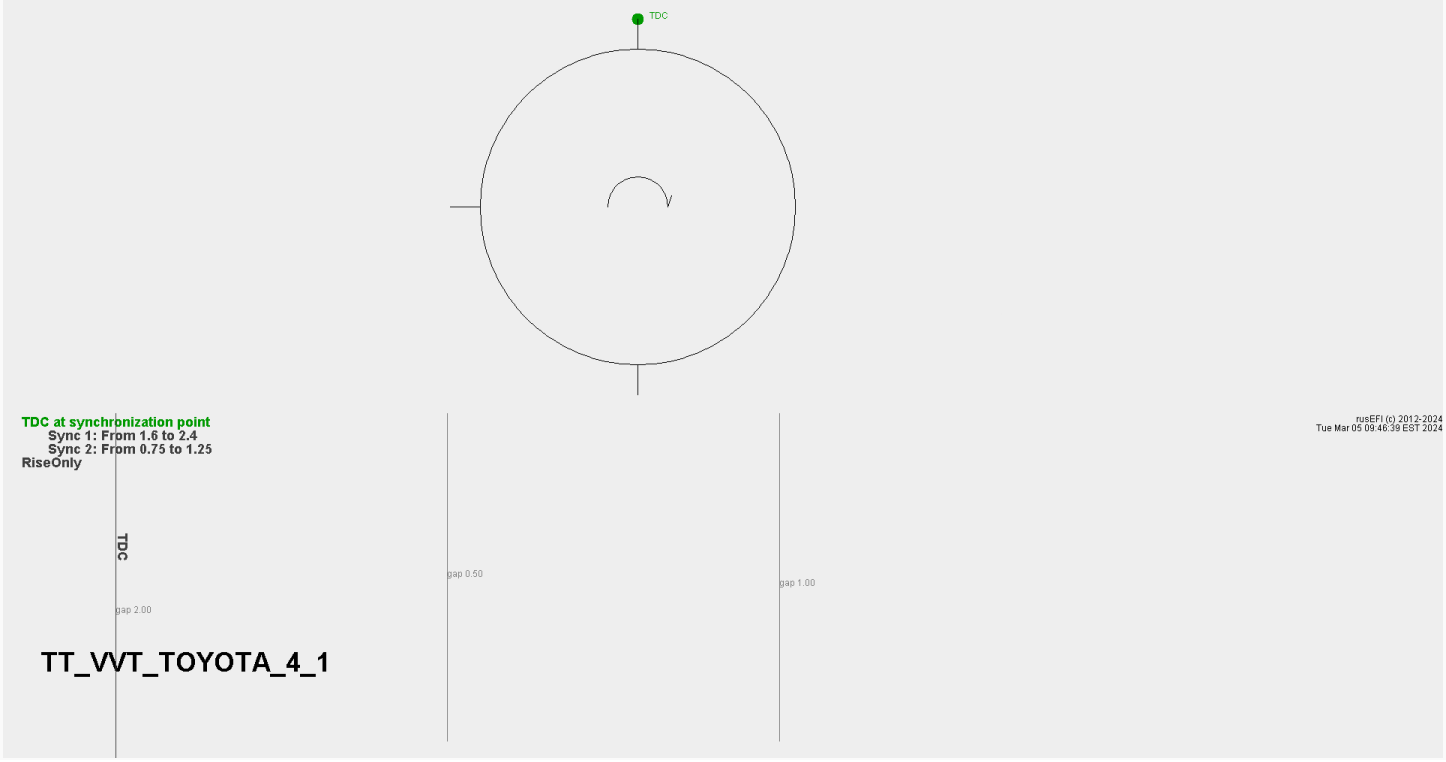
Use skipped wheel for crank and "Toyota 3 Tooth" previously known as "VVT: 2JZ" for cam.

VVT 3-0 "Toyota 3 Tooth" previously known as "VVT: 2JZ"

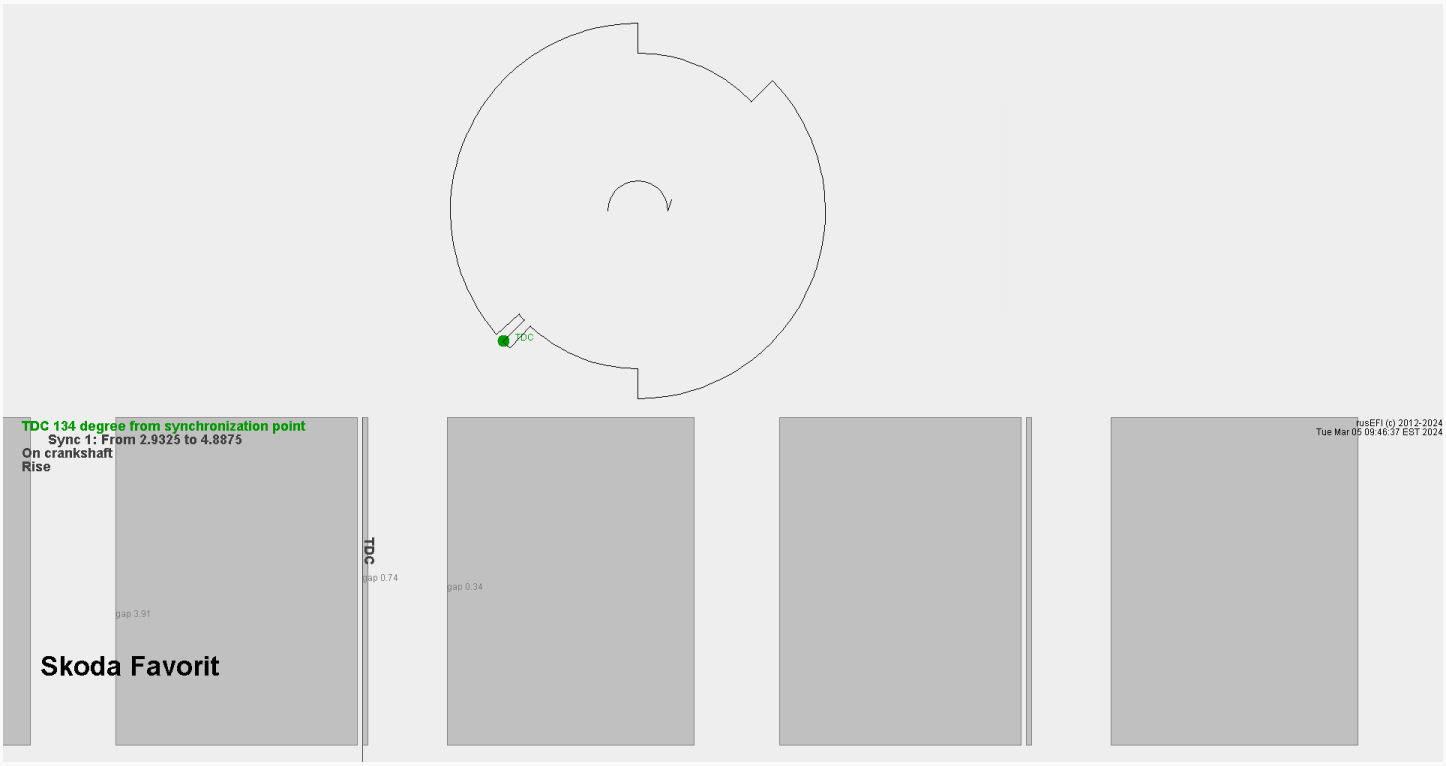
This one is pretty special - it has extra setting for position. At the moment this one is only adjustable on first cam.



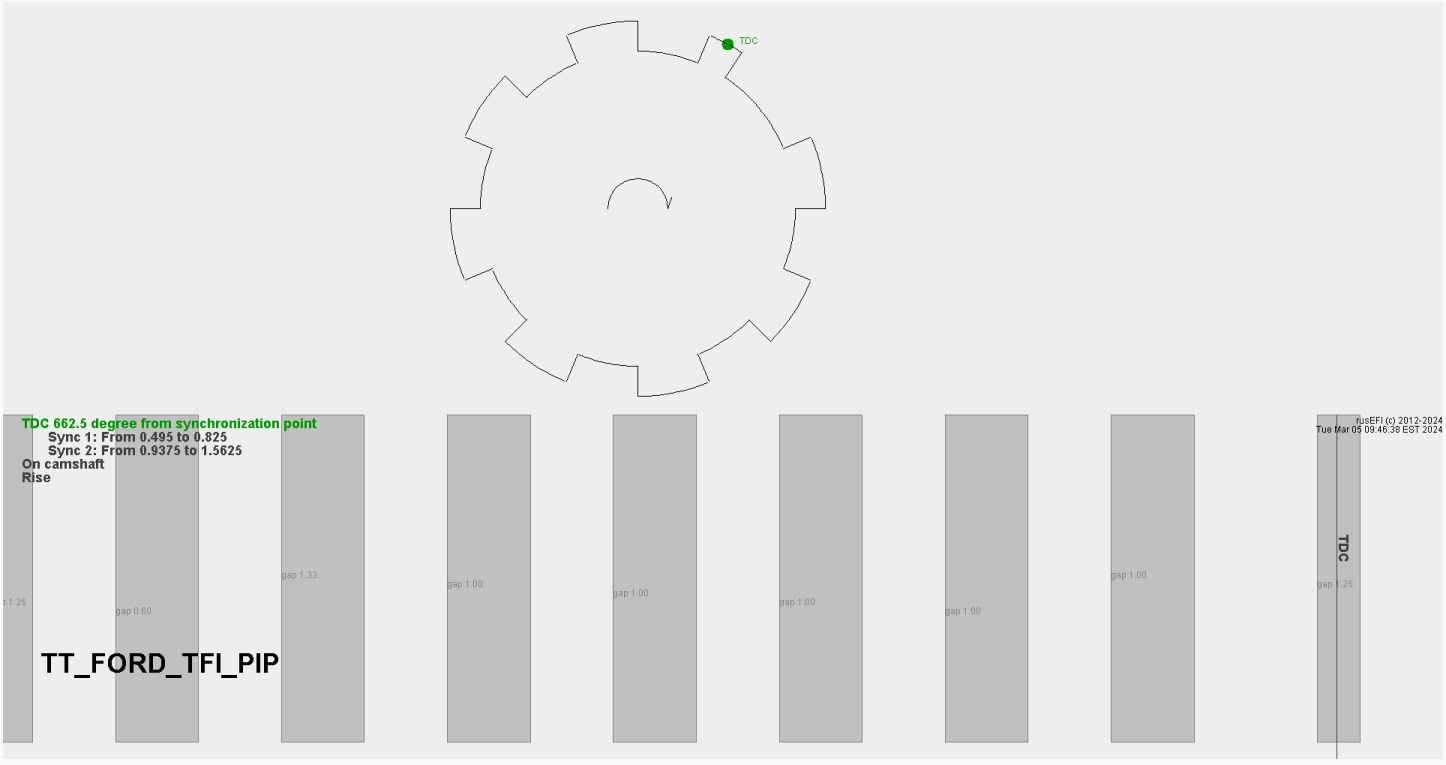
VVT 4-1



Skoda Favorit
Overview



Ford PIP
Overview



VVT: Variable Valve Timing

The ECU has proper closed-loop VVT control, supporting multiple trigger options including:

"one-tooth"
Mazda Miata NB (2nd generation)
Mazda Skyactive
Toyota 2JZ family
Bosch Quick Start
Ford Focus ST 170
Ford Barra: 3+1
Nissan VQ family
Nissan MR18
Honda K family
Mitsubishi 3A92
Mitsubishi 4G92/93/94
Mitsubishi 4G63
Mitsubishi 6G75
The ECU supports up to quad VVT input/output.

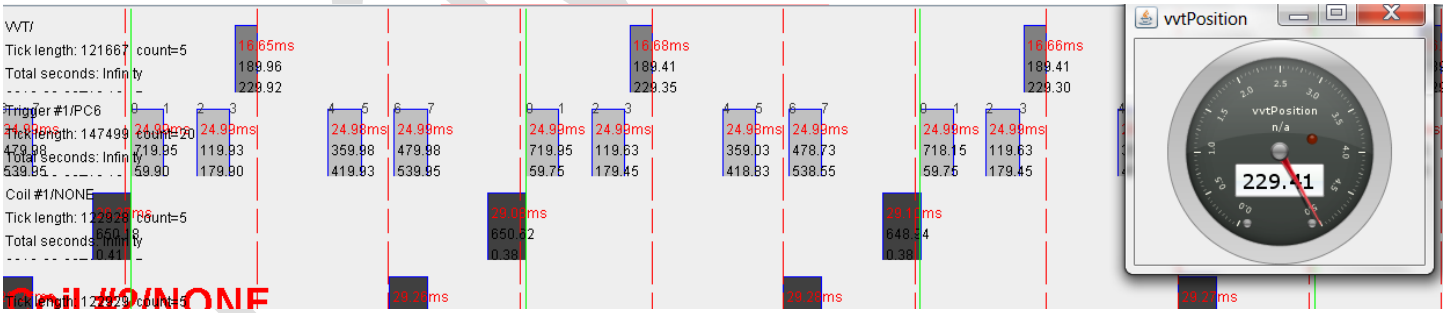
ECU trigger configuration is the most confusing part of ECU configuration unfortunately.

If the ECU does not know your exact overall trigger shape and you use composite setup with crank sensor driving RPM and single tooth cam sensor providing phase information, that's considered "4 stroke without cam with VVT". Even if you do not have VVT :(

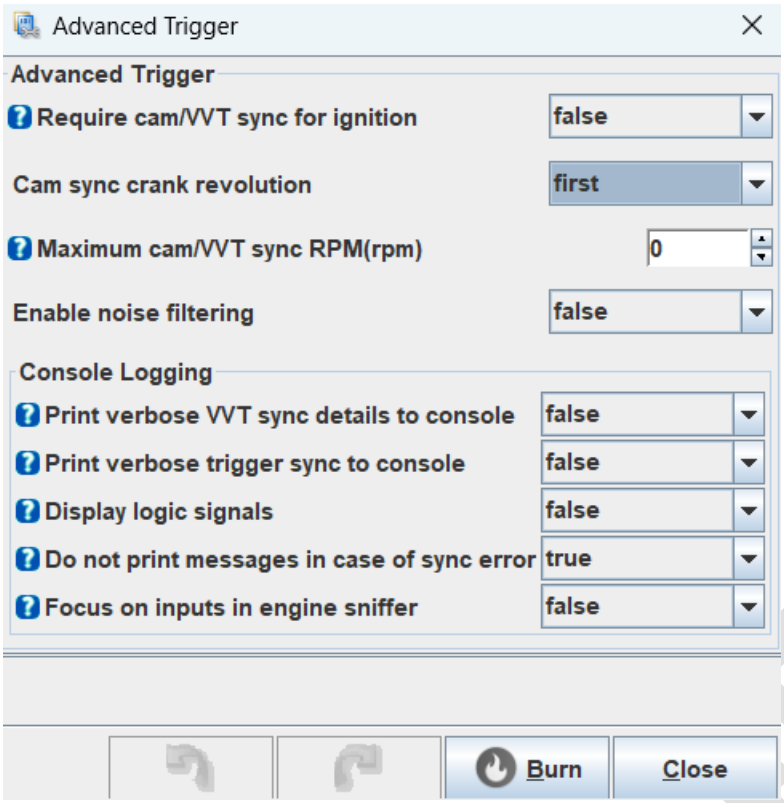
VVT mode 'first half'
This mode could be used for skipped-tooth wheels with single tooth cam sensors in order to support individual injection and coil-on-plug setups.

For example, 3/1 skipped wheel with cam sensor in the first half of the 720 cycle:

VVT First half



VVT Config



Manual Beta Version
26/Aug/2025