

## Lexus VVT Special Instructions Manual

(The values in the sample are from a tuned vehicle courtesy **Schalk** from **Dyno Logic Repairs** in Pretoria.)

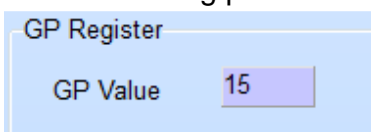
### Description

The ECU is divided in an Intermediate Fuel ECU and a Standard Spark ECU. With this configuration fuel and time is tuned on separate ECU's. Unfortunately you need to log out from one unit and into the other. The advantage is that the ECU's hardware is standard. There are no modifications on the hardware required. This combination makes the Titan ECU working in tandem to accommodate 12 drivers and 4 GP outputs. Now it can control all the functions with drivers to spare. A separate Idle control valve or Stepper may be added but it will only function on the Fuel ECU, as there is no TPS signal on the Spark ECU. Note that Tuning software is not modified at this time and we use tuning tabs from the fuel or spark data that is not used.

The harness E25 is modified to accommodate both ECU's. No extra wiring required for the installer. The only signals connected on the E25 to the Spark ECU are 12 Volt Ignition supply, the RPM signal, the MAP signal and the Air temperature signal. These are the only signals that normally affect the timing on the engine. Each ECU has an E21 harness which connects to the relevant drivers. The ECU may require the feedback diode on the 12 way connector that is wired in for idle control valves. This is to prevent the ECU from working after the ignition is switched off.

### Titan Fuel Computer (Jumper Settings Normal Magnetic)

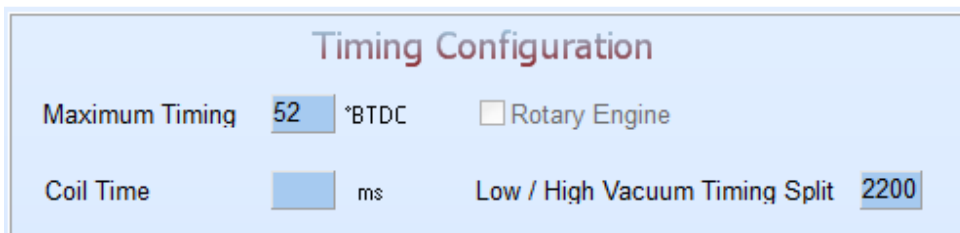
The ECU will control the 8 injectors with split sequential injection as with the old Lexus engine. The red wire of the Drivers cable will be connected to the Intake Manifold Flap which varies the length of the intake runners. This flap is controlled by 2 parameters. Throttle position and RPM. Since there are no modifications on the normal PC tuning software at this stage, we use tuning blocks that are spare since the timing part is not used in this ECU. Power on the solenoid will close the flap.



GP Register

GP Value

On the *Setup Engine GP Outputs* is this *GP Value* that adjusts the TPS position % limit at which the Flap must be open or closed. If the TPS is lower than the *GP Value*, the flap will stay closed for the total RPM range of the engine. If the TPS is higher than the *GP Value* the next settings comes into effect.



Timing Configuration

Maximum Timing  \*BTDC  Rotary Engine

Coil Time  ms Low / High Vacuum Timing Split

On the *Setup Timing Configuration* these two values adjusts the RPM range where the Flap must be open or close. The *Maximum Timing* block, 52 = 5200 RPM, represents the High RPM value and the *Low / High Vacuum Timing Split*, 2200 = 2200 RPM, represents the Low RPM value. If the RPM is between the two limits, the flap will always be closed. If the RPM is outside the limits and the TPS is above the *GP Value*, the flap will be open. This will make the intake runners shorter on low and high

rpm during high engine load conditions. Typical settings from Toyota are 2500 and 4900 RPM with 60 degree throttle opening.

The rest of the ECU except timing functions operate as normal Ver. 2.3 firmware.

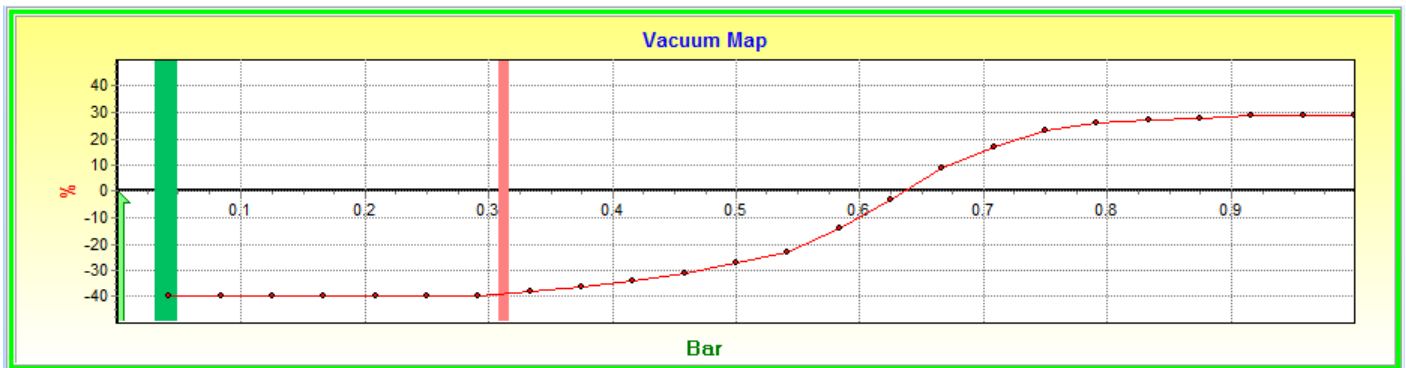
### **Titan Spark Computer (All Jumper Settings are Open)**

The ECU will control the 8 coils in wasted spark configuration. The 2 coils of the two cylinders that move up and down together will be fired simultaneously. The coils have drivers in them and the triggers are connected with a 220 Ohm pull-up resistor to 12Volt. See the drawing for correct wiring. **NB! The ECU must be set to external driver.** The 2 remaining drivers on the white and black wires are used to control the VVT cams in open loop, with pulse width modulation signals.

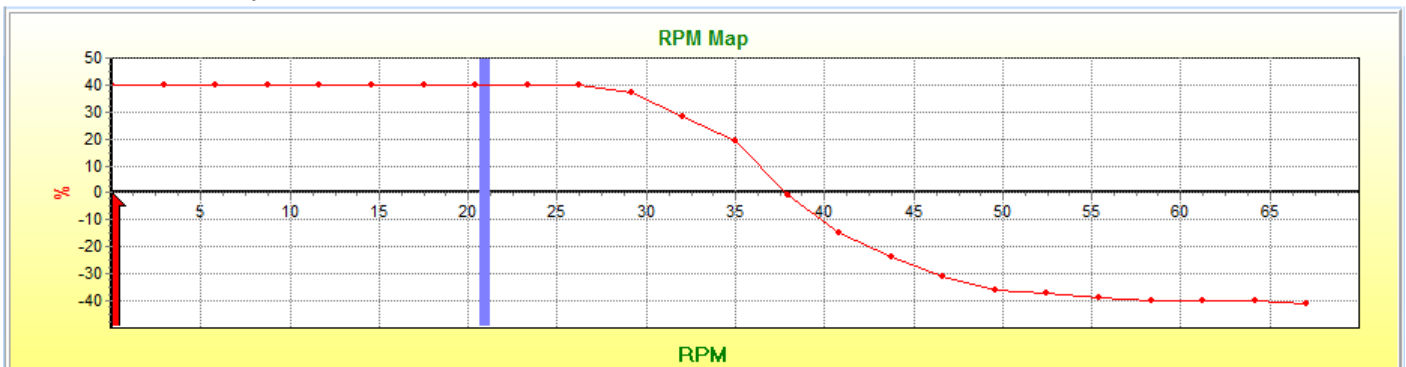
On the Drivers cable the white wire will be connected to the Cylinder 1 VVT cam control solenoid and the black wire will be connected to the Cylinder 2 VVT cam control solenoid. Again see the drawings.

These VVT cams are adjusted according to the RPM signal and the MAP sensor value. Since there is no modifications on the normal PC tuning software at this stage, we use the Lambda correction graphs as they are not used in the timing ECU. On these graphs 50% represent 100% cam movement. The 2 graphs are added or subtracted together to form an end result. For example +50% on one graph and -30% on the other will result in  $20\% * 2 = 40\%$  cam signal. The signal is pulse width modulated at 600Hz. When adjusting, keep the maximum below 80% to prevent the solenoids from overheating. This is 40% total in the graphs.

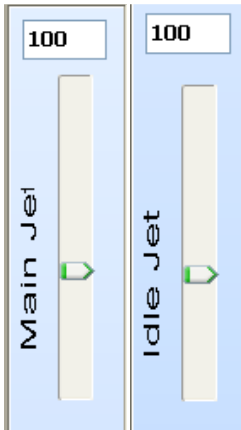
### Lambda Vacuum Graph



### Lambda RPM Graph



In the above example the Map signal on the top graph will cancel the any cam movement on light load regardless of the RPM of the engine. Then on high load it will activate the cams. But on high RPM the cam movement will be deactivated regardless of the load on the engine. With other words the cams will be activated only on high loads above 50% on the Map Sensor and also below 3500 RPM's.



These two settings adjust the cams to a percentage of the control signal. The signal calculated above is multiplied by this % value represented by the Main and Idle Jet. The Main jet is for VVT cam on Cylinder 1 and the Idle jet is for VVT cam on Cylinder 2. This is used to balance the cams should the solenoids react differently in degrees for a certain pulse width. Always keep one at 100%.

The rest of the ECU's Spark functions operate as normal Ver. 2.3 firmware. GP outputs can be setup for RPM, Map or Air temp outputs. There is no RPM output wire on this ECU. The Fuel relay output will work on both ECU's to switch power to the specific circuits.