## Lexus VVT Special Instructions

The ECU is split in a Fuel ECU and a 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 are still standard type which is Intermediate for the Fuel part, and Standard for the Spark part. 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)

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 is 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.
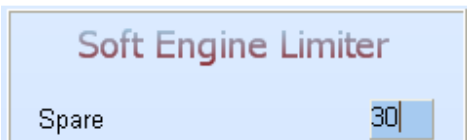
This Parameter adjusts the throttle position at which the Flap must be open or closed. If the TPS is lower than the Spare value, the flap will stay closed for the total RPM range of the engine. If it is higher than the Spare value the next parameter comes into effect.
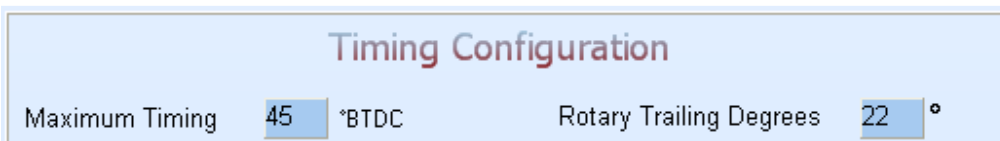
This Parameter adjusts the RPM range where the Flap must be open or close. 45 represent 4500 RPM. The Maximum Timing block represent the High RPM value and the Rotary Trailing Degrees represent the Low RPM value. If the RPM is between the two limits, the flap will always be closed. If the RPM is outside the limits and the TPS is above the Spare 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 are 2500 and 4900 RPM with 60 degree throttle opening.

The rest of the ECU except timing functions operate as normal Ver. 2.2 firmware.

Titan Spark Computer (Jumper Settings all Open)

The ECU will control the 8 coils as in wasted spark applications. The 2 coils of the 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. The ECU is 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 controlled by 2 parameters namely the RPM signal and 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.
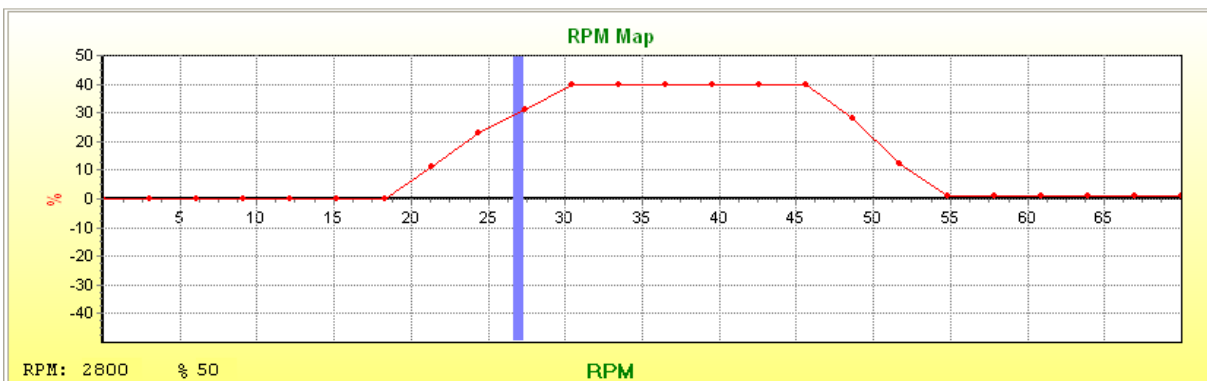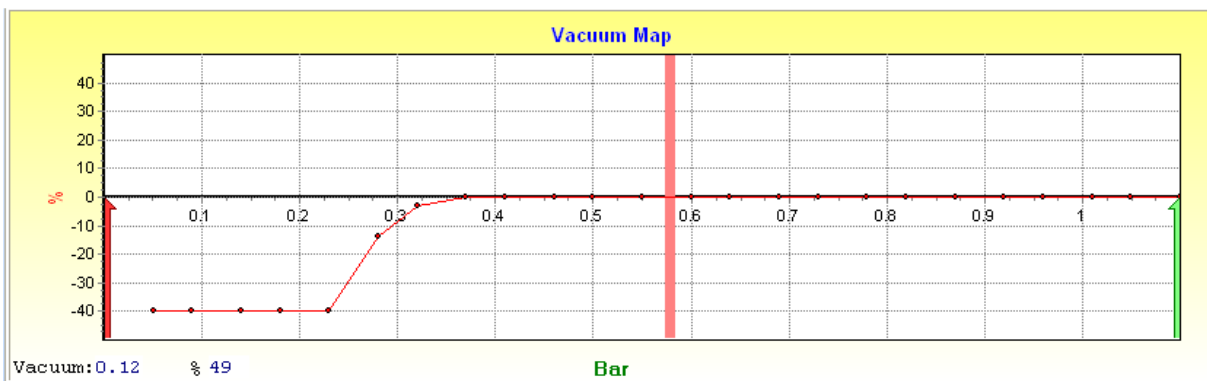
With these 2 graphs the cams can be manipulated with RPM and engine load.
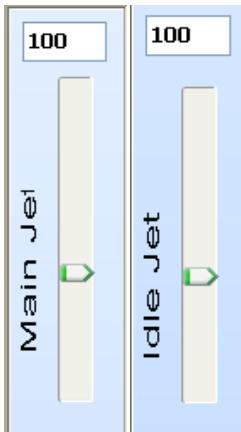
These two settings adjust the cams to a percentage of the control signal. The signal calculated above is multiplied by this % value represented by the Main and Idle Jet. The Main jet is for VVT cam on Cylinder 1 and the Idle jet is for VVT cam on Cylinder 2. This is used to balance the cams should the solenoids react differently in degrees for a certain pulse width. Always keep one at 100%.

The rest of the ECU just the Spark functions operate as normal Ver. 2.2 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 for both ECU's.