sales@kozmicmotorsports.com
281-890-4772

The following is intended to help professional tuners get SST equipped cars to perform well. ECU calibration is time consuming and if improperly done can have catastrophic effects on the engine. The calibration should always be performced by a qualified professional. The end user assumes all risks and is solely responsible for the safety and reliability of the vehicle in question. In other words, USE THIS INFORMATION AT YOUR OWN RISK!

MAF: The maf tables are a load calculation table based solely off of intake air flow. Raising or lowering these values will effect every load based table in the ECU.

3xMAP: These tables are load calculation tables based solely off of the MAP pressure sensor and manifold air temperature sensor. Raising or lowering these values will effect every load based table in the ECU.

Calibration Fuel Map: This is a fuel multiplier table that effects fueling but not load calculations. This table has much higher resolution than the primary fueling table. Raising or lowering these values will effect fueling only, regardless of whether the car is running off of MAF or MAP based fueling. This table is commonly referred to as the VE (volumetric efficiency) table.

Primary Fueling tables: These are the primary fuel target tables in afr.

High powered SST cars will have their load calculation lower than similarily powered 5 speed cars. It is not desireable for an SST equpped car to exceed 300 calculated load. For this reason, in almost all cases the transmission will need to have its load tables remapped in order for the transmission to operate properly and hold engine torque output.

Tips for calibrating fueling and load. It is best if the load in the 3x MAP tables on high powered SST cars does not exceed 290. It is common to need to adjust the last 3 columns above 5000 rpm in order to have a proper load vs rpm escallation rate. It is also best if the MAP based load is lower than the MAF based load for MAF values above 2.8volts. This will force the car to weight the MAP tables heavier than the MAF tables, and in effect put the car into speed density mode while in boost. This is the factory method for 2008-2010 Evolutions.

MAF calibration: Fueling can be used as a guide to determine MAF adjustment. However you also need to pay attention to the load split between the MAF load calc and the MAP load calc. If the car is running MAP load calc, making an adjustment to the MAF solely off of fueling can have inconsistent, or even no effect on fueling. In vacuum it seems that the car actually prefers a load split in the range of 3 to 8 load, with idle regions having allowing a much larger load split favoring the maf. Keep in mind that at a load of 45, a 5 load split is over 10%. There is no observed benefit to having MAP and MAF load calcs line up perfectly, so long as the split between them is relatively consistent and doesn't jump all over the place.

Primary Fuel Calibration:
On heavily modified cars and cars with cams and upgraded turbos, the Calibration Fuel Map should be used to get the car to run relatively close to the fuel map. The Calibration Fuel Map has much higher resolution than the primary fuel maps, and will make it much easier to attain desired fueling. If you visualize this table as a map of the engine volumetric efficiency, you will be able to see why it's shape will change with engine modifications. The easiest way to do this is to set the target fuel map to one flat value at all loads above 180, and then use the calibration fuel map to adjust the actual afr the car runs. Using a dyno's afr read out and the dyno's rpm pick up to determine rpm, along with the map tracing feature of EvoScan will make this relatively simple, though it is still time consuming. For example, you can set the entire fuel map from 2000 rpm above 180 load to 11.0. After doing a pull, you see the car is running an actual afr of 11.8 for load cell 220 at 3k rpm. You would go to that cell in the calibration fuel map, and using the multiplier function of ecu flash, multiply the value in that cel by 1.072. (actual afr/target afr = necessary adjustment.) If you note that the adjustment has much greater or less effect, then you reduce or increase the next adjustment relative to the actual effect.

Once you get the car running reasonably close to the the air fuel ratio in the target map, then you can adjust the target map to the desired afr you want the car to run, using a combination of the Primary fuel map and the calibration fuel map to get the car to run the afr you want.

If you are familiar with tuning stand alone ecu's, this process should be relatively familiar.

Cam Timing: Caming timing can have a dramatic effect on fueling, fuel ecconomy, and for large turbos, compressor surge. Exhaust cam timing has 2 primary purposes, neither of wich is to spool the turbo. Purpose one is to reduce pumping loss and increase fuel efficiency. The second is for EGR. There is no reason for there to be negative cam timing anywhere the car is above 200 load. The Evo X has a hard time controlling the exhaust cam timing as it is, and even if values are set to zero, the car will frequently run negative exhaust cam timing, often as much as -3 degrees.

Intake cam timing and exhaust cam timings relationship to each other will also effect fueling as a result of overlap. This overlap is used by the OEM for EGR. Increasing or reducing intake cam timing can have an effect on fueling by controlling the amount of air going into the engine. It can also be used to help a turbo maintain manifold pressure and keep intake air velocity up. Cam timing adjustments should only be done with the aid of a dyno so that effects can be accurately measured.