A Custom ECU Tune for my NC (2006) Miata
Part 2, "The Tune".

So far in this 3 part article, Part 1 explained about acquiring the Moto-East Data-Logger, and the Delta Force Interface, and then e-mailing the Data File and my stock ECU Tune Template to Mike at Moto East. This month I am going to explain about the "Tune" itself and explain what the "Tune" contains. The Tune Template is basically the Mazda computer program that controls every aspect of operating the motor. The "Tune" is what Mike does with it.

Also as a note, If you have an earlier Miata (Up to 2005) let me remind you of a previous "Flyin' Miata" employee, Ken Hill Jr., (now in our club) who is proficient at Tuning for the earlier year Miatas. He will be very happy to work with you to increase the performance of your NA and NB Miatas. If you have any further questions, Ken can be reached at: ken@oracletuning.net

There are many things looked at when modifying the factory tune to a custom tune for the Miata. One thing Mike does for the Miata is to program around the power restriction Mazda has set into the lower gear OEM Tune. I might understand restricting the lower gear power output on a family car with a large engine, as a family car needs to be manageable for whoever sits in the driver's seat. But WHY do this in a true Sports Car? Removing this restriction in itself really livens up the car for everyday driving. Another noticeable effect of programming around the power restriction is to lessen the feel of a throttle delay between the gas pedal and the throttle plate. Have you have ever driven one of the earlier Miatas before 2006 with an actual cable between the gas pedal and the throttle plate, and then get into a NC Miata with the Throttle by Wire feature? If so, you will know what I mean by the throttle delay. Throttle response is almost instantaneous in the earlier Miatas, but lags in the NC+. Two other items Mike works with while creating a Tune is to set the Spark Advance Timing, and the Air to Fuel Ratio to their optimum values for your car during acceleration. With the computer in our Miatas, this can be infinitely controlled across the entire RPM range to cover all aspects of driving the car.

When I was preparing my car for a drag race "many moons" ago, one of the things I did was to advance the spark timing a few extra degrees ahead of the factory setting. Factory settings are generic settings to be a compromise for all driving conditions. I wanted far more sporty conditions in my drag race car, so by setting the spark timing more advanced, it gave the car a little better acceleration. The nice thing about ECU Tuning is the Tuner can set the spark timing to its optimum "advance" value for during periods of acceleration, and leave it as stock for the rest of the every day driving. This is pretty neat!

Another important item is the Air to Fuel Ratio. (AFR) Mike told me the best AFR for cruising and emissions is a lean 14.7:1. This is 14.7 parts air, and 1 part fuel. Mike does not change the cruise settings in our Custom Tune, so the car will always meet emission requirements and continue to give us the great gas mileage on trips we like. But for acceleration in our Naturally Aspirated Miata (without a Super Charger or Turbo Charger), the best air to fuel mix during acceleration is in the range of 12.5:1 to 13.1:1. This is actually a slightly richer mixture of air to fuel over the best cruise AFR. A "little" richer mixture helps produce more power.

But look at what Mazda did! They made the factory mixture far richer. My stock Mazda Tune had an Air to Fuel Ratio that spiked as rich as 11.1:1 during acceleration. Why so rich you ask? Pumping extra fuel into the motor helps to cool it a little during acceleration, and it helps keep the motor from being destroyed by someone who is constantly flogging the motor. This extra fuel gives a slight internal cooling effect in the motor at the cost of inhibiting the motor from reaching it's potential peak horsepower. So Mazda might save themselves the warranty cost of a couple blown motors in exchange for the power we want. If the motor has forced induction, then Mike would target the AFR to be more around the 11.5:1 to 12:1. Because of the effects of Super

or Turbo charging the motor, this extra fuel is important to help the motor develop max horsepower during boost.

My new Tune now has the “Air to Fuel Ratio” (AFR) **during Full Throttle acceleration** running in the range of 12.4:1 to 12.9:1. This AFR is now in the range for the motor to produce more power. Note this is leaner than the factory settings were during acceleration. This means I am gaining more power while using less gas when doing Sporty driving! WOW,…. How can you beat getting more power while using less gas, and without changing any of the desirable cruise characteristics the Miata is famous for? Thinking back to my drag racing car, if I changed the jets in the carburetor to make it run a certain way on the drag strip, it was that way all of the time. This ECU Tuning gives us the best of both worlds!

So you see that a custom tune can be a benefit even for everyday driving. My Miata now works around the Mazda lower gears power restriction, plus I gained the feel of a quicker throttle response. Also with a leaner AFR mixture during acceleration, I am saving a little gas while gaining more power and having more fun! (LOTS More!)

Read here in next month’s newsletter for the Tune Install Process. I will explain the steps I did to install the tune into my Miata’s ECU, and the process I went thru to “Fine Tune” the Custom Tune. I will also then further explain why I now smile a little more when I drive it.

Zoom-Zoom! Bill Latsha