



ON TRACK Learning Fuel Mapping

by David Podolsky

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Most people who like motorcycles also like performance; motorcycles are the kings of acceleration. It is not surprising that after the purchase of a new ride the first thing to go is the stock exhaust pipe.

The manufacturers need to build bikes that are noise and emissions compliant. In order to do so, the stock exhaust system restricts air flow through the motor, which in turn reduces horsepower.

The engineers who designed the motor created something that is much more powerful, but as it passes through the process of becoming street legal it gets castrated. Lucky for us there are many exhaust pipe manufacturers who build slip-ons and full systems for closed circuit use that help recover that lost hp.

Your new exhaust will look and sound better, but don't just think you can bolt it on and instantly get more performance. A stock motorcycle is usually very lean, meaning that

very little fuel is delivered to the motor, in an effort to comply with emissions requirements.

Once more air is flowing to the motor thanks to the new exhaust this "lean condition" worsens. This is because there is more air and the same amount of fuel as before. This ratio is what we call the air/fuel ratio.

What needs to be done is to change the fuel injection mapping. This is done by changing the program to the motorcycle's electronic control unit or ECU, typically performed by an after-market fuel injection mapping system.

Recently Dunlop conducted tire tests at Daytona International Speedway and I had a chance to speak with an expert in the industry: Ammar Bazzaz. Bazzaz Performance works with many of the AMA Superbike teams and sponsors the Jordan Suzuki team of Aaron Yates and Geoff May. I asked Bazzaz what fuel injection mapping means to the everyday rider.

Ammar Bazzaz: Fuel injection mapping really is the process of systematically adjusting the fuel/air ratio at all operating points of the engine. The end user could have one of many goals. One concern could be emissions and fuel economy or for racing it would be power and torque. The results would be very different. The OEMs are striving between balance of performance, emissions and noise. At the track we are only tuning for power.

Dave Podolsky: Can every motor use this or only modified motors?

AB: I think if you are looking to gain performance, all motors could use fuel injection

mapping compared to stock. Normally, they are mapped on the lean side with a slant towards emissions.

DP: For this horsepower gain, will reliability be affected?

AB: No. As I mentioned, the bikes are typically lean and to add more fuel the bikes can run cooler and have less detonation. The reality is hp gains are not huge from fuel mapping alone. Many sportbike users change exhaust systems. These exhaust manufacturers recommend that an aftermarket fuel system be used and that's when you can have big gains.

DP: So how do I go about getting started?

AB: The rider would select a slip-on, for example, and install a system like our Z-Fi system. They would buy the system that is proper for his make/model and it comes pre-mapped with a fuel injection map already designed for his bike. Or if a full exhaust system is being used, our Z-AFM system can automatically create the map. The map is generated while the rider is riding the bike. The Z-AFM has an air/fuel sensor that taps into the exhaust and simply plugs right into the wiring harness and they ride the bike. It will generate the proper map for the bike and exhaust.

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I hope that helps explain what "mapping" is all about. Of course the manufacturers have to address many concerns when building a bike for the street, so a balance is created to make the best compromise possible. If you're out on the track and performance is your main goal, then a performance-oriented exhaust and fuel injection mapping is the first place to start on getting gains.

David Podolsky is sponsored by Chicken Hawk Racing competing in the AMA Sports, WERA and AHRMA series and has won 11 National Championships aboard Big V-Twins and GP machinery.

"Fuel injection mapping is the process of adjusting the fuel/air ratio at all operating points of the engine. One concern could be emissions and fuel economy or for racing it would be power and torque."

DP: What should I look for in a fuel injection mapping system?
AB: The first thing the rider should look for is the ability to adjust fuel in both directions – add and subtract fuel for proper tuning. All new sportbikes have eight injectors and many systems only control four injectors. At higher RPMs this is important. A system like our Z-Fi system can control all eight.
DP: What should I expect to pay for a system?
AB: A good system will cost from \$350 to \$400 and installs in a couple of hours.
DP: Can I install this myself or, if not, what should I look for in a service provider?
AB: Most of these systems are designed to have a competent end user install the system. You could get the motorcycle dyno-tuned in a local shop or buy the Z-AFM option to allow the bike to create its own map automatically.



A skilled technician on a dyno is the usual way to develop a new map for your bike, but the new Bazzaz Z-AFM creates the map with an onboard air/fuel sensor.



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