



# Not All Tuners Are Equal

## Fujin Technologies

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Preface: Since there are vast misconceptions about tuning motorcycles, we thought we should share some of our thoughts, philosophies, and knowledge on the subject in an effort to be fully transparent in not only our capabilities as a shop, but also for the options available to you as a motorcycle enthusiast. This is not a technical article but rather a general overview to help anyone interested in the services we offer or dyno tuning motorcycles in general.

### Why Dyno?

Every motorcycle leaving the factory is tuned to meet emissions and noise standards, therefore, each motorcycle is uniquely tuned. Each unit is not only tuned via the exhaust but also, via the air going into the airbox using various parameters. Before 1999 there were few regulations on these restrictions but one bike in particular changed everything. The 1999 Hayabusa, in 100% stock form, is capable of almost 200 mph off the showroom floor. Since then Uncle Sam and other governments have been restricting the top speed of all factory motorcycles to 186mph with rare exceptions (the Kawasaki H2R most recently). The detuning of factory motorcycles is achieved via the engine control unit (ECU) controlling certain parameters. We have found on some sport bikes up to 15HP is lost because of these factory ECU restrictions. The bottom line is if you want the maximum performance from your motorcycle, these factory restrictions are in the way.

### Tools for tuning?

Although addressing the factory ECU restrictions is essential to maximizing performance, it is not the only way to tune a motorcycle. Tuning through the factory ECU, which is very time consuming, or using a piggyback module are the two methods to tune a motorcycle. At Fujin, we work with all piggy back modules but highly recommend, and prefer, **Power Commander**. Most tuners use one or the other method but rarely are both methods offered in house. Often times you have to send your ECU off to get flashed, wait for it to get back, install it, confirm that it works properly, and then dyno your motorcycle. If something is wrong with your ECU flash you can face substantial down time for your bike. ECU tuning can be finicky depending on the makes and model so extreme caution and attention to detail must be taken when changing ECU parameters.

Fujin highly recommends using an oxygen sensor as close to the exhaust valve as possible in your exhaust pipe versus the “sniffer” that is more commonly used to measure air / fuel (A/F) or lambda ratios. The “sniffer” simply is not able to provide the best possible reading because it is too far downstream from the exhaust valve, thus decreasing the ability to tune accurately, and increasing the amount of time spent on the dyno. Most quality aftermarket pipes come with a wideband bung already installed in the pipe however we offer installation of custom made TIG welded bungs on stainless, mild steel and titanium pipes.

### Live tuning vs flashing?

We mentioned that tuning through the ECU is very time consuming and here is why: there is no “live tuning” through the ECU. Live tuning is the ability to make changes while the engine is running. Although most flashing software offer an AutoTune feature, it incorrectly implies it can modify the A/F ratio while the bike is running. The truth is that the O2 sensor data logs information from the bike and a tuner must

compare these numbers to a predetermined table that ‘someone’ must setup. The difficulty in this is knowing the correct pre-determined table because each RPM range and throttle position should have unique A/F ratios. After comparing the data logged information to the pre-determined table, you must accept the change and re-flash the ECU. This process of re-flashing is required until the pre-determined table matches the data that is logged. Each time you accept the changes you must turn off the motorcycle and re-flash, taking up to 5 minutes each time! We have yet to see an engine properly tune using only the ECU for fuel tables on our dyno. “Live tuning” via a Power Commander is accomplished on the fly while the bike is running on the dyno with changes immediately implemented. With virtually no wait time and the ability to make numerous changes, this method increases tuning accuracy, reduces running time of the engine and decreases costs for the customer.

### **What are the benefits of tuning through the ECU?**

Although tedious and sometimes complex, there are many benefits of tuning through the ECU. Depending on the make and model, by going through the ECU we are able to control various ECU parameters such as: what temperature the fan(s) come on, emission controls, rev limit, steering damper controls, gear maps, secondary throttle position map(s), fuel maps, and ignition maps. This is a general list and is not comprehensive because each make and model of motorcycle is unique. Tuning through the ECU is also the only way to *properly* advance ignition timing. Through these various channels, we are usually able to remove nearly all of the factory restrictions built into the ECU. Additionally, tuning through the ECU can cut costs on unnecessary gimmick devices such as a timing retard eliminator (TRE).

### **Why we recommend Power Commander?**

Although there are other piggyback modules available, we highly recommend DynoJet Power Commander products. It is true that almost all piggyback systems have very similar features, including ease of user interfaces, only one piggyback module comes with superior tech support. DynoJet Research, Power Commander’s parent company, has over 40 years in the industry, working with and sponsoring various classes of racing including but not limited to AMA Superbike, Worldbike and Supersport classes. DynoJet also produce an officially AMA licensed dyno with cutting edge technology. No other piggyback module company comes close to having this level of knowledge and tech support readily available to its customers.

### **Why are not all tuners equal?**

At Fujin we offer, and prefer, to tune using BOTH methods combined. Sure we can tune your bike via the piggyback method only, and it will run much better, but we don’t just tune for wide open throttle. Our goal is to get the most out of every RPM range. And sure we can flash your ECU and you’ll gain the improvements outlined above, but the only way to truly maximize your bike’s performance is to combine BOTH tuning methods. Other shops might only just get close enough when tuning, but at Fujin, tuning to just get “close enough” is unacceptable. We treat every customer’s motorcycle like it is our own and we strive to maximize performance while achieving your goals. We use only SAE correction factors and our DynoJet 250 is equipped with a torque cell (a rare option for a motorcycle dyno). We leverage decades of engine building and tuning experience to ensure that no motorcycle will ever leave our shop without us attempting to reach every viable adjustment point possible, within the scope of the customer’s goals and our company standards.