Taking a look around the dyno cell at a shop will give you an idea of what level of work is being done there. Steady state calibration work generates a lot of heat, so good shops are equipped to deal with this. Don't forget to have a fire extinguisher handy either!

manifest as a difference in learned fuel trims and average pulsewidths between the two banks. For literally pennies, the diagnosis can be made with a can of brake or carburetor cleaner. Spraying the mating surfaces with this flammable mixture will yield a surge in engine speed if any of the mixture is drawn into the intake through gasket leaks. Tuning around this or any other mechanical failure condition just opens the door for more headaches in the future.

Tuning for Dyno Numbers

The first thing that comes to mind when comparing two similar engines is power or torque output. Since these are measured on a dynamometer, the ultimate goal when building or tuning an engine is commonly expressed by vehicle owners as some specific desired power level. It's very easy to get lulled into this thought process as an engine calibrator as well, especially if you have worked on similar engines before. I can't count how many times I've heard "This should make XXX horsepower" during bench racing sessions.

The careful distinction comes, however, when it's time to calibrate and measure. When all is said and done, the engine flows some fixed amount of air at maximum effort. Once the throttle is fully opened or the wastegate is working, there is no magical ECU table that forces more air into the cylinders. All the calibrator can do at this point is quantify how much airmass is trapped on each cylinder stroke and attempt to deliver the corresponding fuel mass and ignition angle for the present conditions. Sure, the calibrator can choose a less-than-optimal fuel mass or spark angle, but once the optimum is found there's not really much else he can do. If the final result is an engine that only delivers 495 rwhp on a chassis dyno safely, that's it. Any attempt to show a bigger dyno number is usually the result of an eroded safety margin, unethical manipulation of the numbers, or some other error. Correction factors are imperfect at best, so don't get wrapped up in the need to deliver beyond some magical threshold for power.

The only exception here is that if power is way off from the expected, it may be time to look for mechanical issues. It may be belt slip on a blower pulley failing to deliver full boost, or it may be three cylinders down on compression. Either way, it would be prudent to step back for a minute and take a sanity check. Pull one or all of the spark plugs and investigate. If everything checks out mechanically, chasing a dyno sheet in the name of impressing everyone is seldom a rewarding venture in the long run.

Tuning Only on the Street

There are a lot of skeptics out there who don't feel that a dynamometer accurately reflects the way we drive a vehicle. They claim that an actual vehicle on an actual road gives them the exact conditions they need to tune to. They're right. However, loaded dynamometers do accurately reflect how the fundamentals of the ECU's control system works. The real objective is to calibrate a control system to a mechanical device. Doing this means playing by the rules set forth in the controller. If the controller uses a series of steady state reference tables to determine engine conditions, it's best to populate these tables in steady state. The load-bearing dynamometer allows the calibrator to dial in the exact conditions he is