Aftermarket performance-enhancing systems such as Dynojet and Sigma can be a boon but they can also be a curse.

First, Sigma.

They give you new main jets (and shims)—all of which you can acquire on your own. What you do get with Sigma is that they've worked out solutions for various mods, elevation, etc. so you get an assortment for your specific need.

Then they want you to 1) stretch your slide springs, 2) shim your slide needles, and 3 drill your slides.

This is treacherous ground.

In “engineer-speak” a spring's ability to do work is determined by wire gauge and number of turns. If you want your spring to do more work you have to either increase the wire size or add more coils.

When it comes to arbitrarily stretching *any* spring, where does one start? The idea itself grows from ignorance of material science. When spring steel is overstressed, its molecular structure fails. In other words it's no longer an actual spring, although it might superficially continue to behave in a spring-like manner. Sigma, however, has you do just that and hope that the rebound length is within a range that they've determined is better than stock.

Huh? I'd like to see real-life test results on this one.

The spring is longer now I'll grant you that but are *damaged* springs, which is really what we're talking about here, going to behave predictably *over time*?

A slide spring provides a degree of resistance to its companion slide rising too rapidly on throttle up, but its main job is to help the slide *drop* on throttle down. Counter-intuitive to some degree perhaps but the point I want to get across is that uniformity over the long haul is key.

The grand wrinkle in this whole scheme regardless of what in particular you're doing is that questionable variables are best introduced one at a time instead of en masse. This is simply fundamental good practice. You could have a component affecting its respective carburetor differently than a neighboring one, which is to say that response varies between the two, and be misled into thinking that erratic engine behavior is attributable so something else that you did during the process.

Drilling slides is fine provided that one doesn't go too far. A larger bottom vent mitigates resistance to the flow of air from the interior of the slide to the venturi, thus response improves—within limited parameters. Don't overdo!

Moving on...

Needle shimming is a pet peeve of mine. Perhaps it's because we take so many sets apart and find that the needles were shimmed. Mind you, these are carbs that for one reason or another were taken out of service because they didn't work properly. And yes, there have been those times when there was nothing *inside* the carbs to explain trouble.

Free play is designed into the holder such that it allows the needle to move a carefully predetermined

amount independent of the slide.

Think about it: when the slide is up, the needle is sticking down into the airstream. It's going to be pressed sideways into the needle guide—not by a lot mind you, but still...it needs wiggle room.

Too much free play and the needle can jump up and down enough to alter fuel flow according to random vibration rather than throttle position. If I have to tell you why this is a bad thing you should have your keys taken away.

Too little free play by definition means that the needle is locked in place and will rub against the guide, over time wearing the needle itself *and* the guide into an ovoid.

This is by far the most common result. When we find needles that are frozen up, we give a resigned shrug and roll them on the benchtop to detect the flat spot(s) and into the trash they go. Guide inserts are a dime a dozen but factory original needles are (hint-hint) very expensive.

I'm not even remotely suggesting that with all these newly introduced variables you're doomed by doing all the mods that Sigma directs you to do, just that there is in my view too much room for error. Many attest that they have used Sigma kits with great results.

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Dynojet takes what I believe to be a more hard science-based approach by deploying adjustable needles and proprietary jets.

As for jets, it's all about the conic cavity on the carb *interior* side of the jet. A DJ102 jet not only allows more fuel through than a stock (Keihin-branded) #102, even though the orifice size is the same, but it produces a spray pattern that more efficiently disperses fuel into the holder. More gas, and better prepared for burning.

The real magic is in the needle, which has a profile that's wholly unique to DJ. The instructions give you a default clip position but you can adjust the height up or down in 0.3 mm increments until you're dialed in.

Yup, they too make use of shims, but the total thickness of the needle clip and a pair of *always-required* shims is exactly what's needed for perfect free play.

In some models (Honda V4 kits for example) DJ gives you new slide springs rather than have you wreck your existing ones. They're, 1) made of heavier wire, and 2) contain more coils per unit length. Fascinating.

This isn't to say that DJ doesn't come with its own gremlins, the chief complaint amongst which is that they tend to make you too rich.

Maybe, maybe not.

Here's the deal: Dynojet assumes that your compression and valve clearances are perfect so you'll find no mention anywhere in their documentation. For good reason. The system was developed for the track, where these are perfectly reasonable things to expect. “Hey Mr. race engine builder, have you

checked your valves lately?”

But *we* know don't we? Street bikes drift out of spec on all fronts over time. So where DJ (and Sigma) take a stack of things for granted, we don't have that luxury.

Isn't it funny how I always find a reason to bug everyone about compression and valves.

So, before you even *begin* to think about investing in Sigma or DynoJet, GET OUT THE GAUGES.