

Safety Tips #39
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SUSPENSION, Pt. 3

Hello again! I'm back with the third (and final) bit on motorcycle suspensions and how to set them up. I ended the last article having described spring selection and set-up, along with the promise of how to set up the damping rates. But first, I want to pass along a note I got from my friend Kevin Finnegan, who is a racer and a rider coach, with some of his comments about the information in the previous articles. It's good stuff to consider. Kevin says, "You should be very careful adjusting the preload setting. It directly affects the geometry of the bike which will greatly affect the handling of the bike, possibly more so than just adjusting the rebound or compression. When you add preload to the spring, it puts more pressure or tension in it by compressing it. Seems logical right? What doesn't seem blatantly logical (at least to me) is that it will adjust ride height of the bike above the spring. Because when you put more constant pressure on the spring by compressing it, it wants to push back up even harder, which will raise the seat/tail section of the bike. Which is going to decrease the stability of the bike, decrease suspension travel (I think), meanwhile increase weight on the front end of the bike which will generally make the front turn and transition quicker and easier. So you compromise stability for handling. The reason I felt compelled to email you was because I worry some riders may start adjusting away on the preload before knowing all the full effects and also before taking any baseline measurements and they could possibly get their bike so out of whack that they will reach a high level of frustration and affect safety." OK, Kevin! Thanks! I guess it should come as no news that every action – in this case, a change to your suspension settings - has an equal and opposite reaction; that said,

this is input of a specific nature from a guy who knows the effects of suspension adjustments in a high-performance environment. And while I can't personally vouch for Kevin's claims, I would agree that it's a great idea to take measurements before fiddling with any settings. That way we can go back to the original set-up if we don't achieve the desired results from any changes we make.

And now for some information on damping: Damping is what we need to mitigate the quickness of the action of the springs. Have you ever seen (or been in) a vehicle that, when it went over a bump, rose and fell repeatedly, like pogo stick, until it seemed like it would never end? What you were experiencing was a suspension that had springs that were working but shock absorbers (dampers) that were not. Those springs needed some damping to keep them from "pogo-ing" down the road. Most motorcycles have springs and shocks (usually combined into a single unit), and some bikes' suspensions have adjustable damping rates, too. This applies to both front and rear suspensions on some bikes. When Kevin spoke of "rebound" and "compression" he was referring to both the down (compression) and up (rebound) actions of suspension. This nice little clarification comes from the Feb., 2009 issue of Motorcyclist (http://www.motorcyclistonline.com/howto/adjust_motorcycle_suspension/index.html#13107512167651&DISPLAYINTERSTITIAL_15):

Compression damping assists the spring in resisting bumps and loads placed on the motorcycle, which is manifested in upward wheel motion. This kind of damping does not add spring rate or make the bike carry a bigger load; it merely changes the rate at which the wheel is allowed to travel upward relative to the chassis. Rebound is the opposite. After the wheel has hit a bump, the spring tries to force the suspension and wheel back toward the ground. As you might guess, rebound damping controls the rate at which the wheel is allowed to extend. Bumps come in all shapes and sizes, so the suspension needs different damping rates at different times.

When you twiddle an adjuster, you are controlling only the low-speed damping--that is, the control exerted inside the shock or fork over large, rolling kinds of bumps, or during braking and acceleration. Except for a few high-end shocks, you do not have any control over high-speed damping, which comes into play when the tires ride over closely spaced, rippled bumps. Remember, it's the speed of the suspension component we're talking about here, not the velocity the bike is traveling over the ground... Few adjusters give you an obvious indication of the settings, and if you get lost--was that two turns in or two clicks?--you'll have a harder time zeroing in on the right settings. Finally, take a few moments with your bike's manual and get to know the suspension-adjuster locations and quirks. (Thank you, Motorcyclist!)

So adequate damping on compression for the front end will keep the bike from tending to “nose dive” under quick braking. Damping on rebound will keep the bike from popping back up too quickly, or “topping out”, which can cause problems as well. Few bikes have separate adjustments for both compression and rebound damping on the front end, so a compromise setting is often necessary. Also, merely changing the weight of the oil in the forks can make a big difference in damping.

Adequate damping on compression for the rear end will keep the bike from sitting down too quickly when you go over a bump or accelerate very quickly. Adequate damping on rebound will keep the bike from topping out on the back end, and/ losing traction on the rear wheel.

So, to summarize all the information from this series of articles:

- Suspension exists for the purposes of comfort and control.
- Most bikes have adjustments for some or all of the parameters, which are spring pre-load, and compression and rebound damping.

- Your owner's manual should tell you how to make adjustments. Use it.
- Adjustments you make will affect other settings; it's all interactive. Take notes on the initial settings (before you make any changes). Make one change at a time and see if you like the result; but also note how that change affects other aspects of the ride. Be methodical, and take your time. Remember that those carefully selected settings will be subject to change if other things change, such as the type of riding you will be doing, the load your bike will be carrying, the tires you use, the pressure in the tires, and the road surface upon which you will be traveling.
- Finally, do your own research, and get advice from mechanics and/or racers; don't take my work as gospel. I am not an expert in motorcycle suspension. I am like most riders – I just tend to use the factory settings, or make a slight change or two and “set-it-and-forget-it”. Yes, of course I make changes to suspension and tire pressure if I will be carrying a passenger, but that's about it. But if you are seeking a better ride from your bike, or your performance needs change, it is very possible that your bike can be set up to make it more comfortable and safe. And that's what it's all about!