

Teach Me Suspension (Part 4): Setting Sag

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In the last part we discovered that we can use preload to change the characteristics of our suspension as well as change how much of the suspension's range is used.

The goal behind this is to ensure that we are using as much of the range as possible, but not too much so that we bottom or top out the suspension.

Doing either is bad because it means the suspension can no longer effectively do its job of keeping the tyres in contact with the track.

Sports bikes are typically fitted with springs that are stiff enough so that topping or bottoming of the suspension never occurs.

However, if your setting is way out, or your spring rate is not correct for you, it is still a danger.

One of those settings that could be way out is rider sag.

Rider sag is the measurement of how much the forks and shock compress when you get on the bike. Setting the sag lets you change where in the range your suspension 'sits' with you on board, and it gives the suspension an initial point to work in either direction.

Too big a sag figure (it drops too much when you get on) and your suspension could bottom out under braking and cornering. Too small a figure (doesn't drop enough) and it could top out under acceleration or over bumps.

Setting Sag

In order to set sag, you will be making changes to the preload adjusters, but before that let's get our base figures so we know where we currently are.

With the methods I'm going to be recommending, it's most easily done with the help of two friends.

Measuring Front Sag

Ask your two friends to lift the front of the bike by the handlebars. Once the front forks have fully extended, you need to take a measurement.

For conventional forks, take a measurement from the top of the slider to the triple clamps.

For USD forks, take it from the slider to the top of the axle casting.

Write this down as measurement A.

Now it's time to take a measurement with you on board. With all your gear on, have one of your friends hold the bike up from the back and hop on the bike.

Before you take the measurement you need to account for any friction inside the suspension mechanism, as friction exists between any parts of the suspension's make up that rub on one another.

To account for this, ask one of the friends to push down on the bars relatively slowly and then release them. Let the bike settle and then take a reading from the same place. Call this measurement B1 (the 1 will be explained in a little bit).

Now ask the friend to lift the front up by the bars, again letting go and letting it settle. Take another reading. This is B2.

With any luck there won't be a massive difference between B1 and B2. If the difference is larger than 25mm then there's too much friction and it's something that you're going to want to look into. If it's less, you're ok.

Ok, so now what you need to do is add B1 and B2 together, and then divide the resulting figure by 2 to get the average of them both. Let's call the result of that measurement B. So it's...

$$(B1 + B2) / 2 = B$$

And then all that's left is:

$$A - B = \text{Rider Sag}$$

Now you have your sag figure for the front end and can turn your attention to the rear shock.

You just need to follow the same procedure, only you take the readings from the axle to a solid and easily readable area on the seat directly above it. Sometimes sticking a bit of tape on the seat can help.

You also need to account for friction in the rear shock before taking the readings.

Have a friend push down on the seat and let it rise up. Take a reading. Then lift the rear and let it settle again. Take your second reading. For a rear shock, the difference ideally should not be more than 5mm.

Typical sag figures for the rear will be about 25-30mm for track riding.

The front can differ somewhat depending on the machine. With newer, more powerful bikes, some high sag numbers can be seen (45-50mm) in an attempt to keep the front from topping out under acceleration.

Really it's down to getting your bike to behave as you want, but anything under 25mm and you may start to risk topping the front end out under acceleration, causing the front wheel to skip along the ground and possibly send you into a tank slapper.

Now that you have your base sag setting, you can make changes if necessary to bring it into the ideal range or fine tune your setup.

How to Adjust Preload for Sag

Rear

For rear preload changes you will see a variety of different applications.

A common setup is the use of locking threaded rings. The top ring acts as the lock and pins the adjustment ring in place.

To undo the top ring you can use your bike's supplied C-wrench, or a simple hammer and punch will do the trick. Undo the locking ring and spin it to the top.

Now you can turn the lower ring (the one touching the spring) to add or remove preload as needed. It's a good idea to mark up one of the tabs on the lower ring so you know for certain when you have made one full turn.

Be sure to take a before and after measurement of how much preload you have added or removed. Do this by measuring the amount of exposed thread at the top of the shock.

Another common arrangement in stock shocks is a step collar adjuster, whereby all you need is your bike's C-wrench to turn the collar.

Make sure you count the number of notches so you know your old and new settings.

If you're lucky enough to have an aftermarket, ultra blingy rear shock, they often feature a hydraulic unit that allows you to easily make preload changes. Follow the supplied instructions on how to make the necessary changes.

Front

To adjust front preload you will simply need a socket or a wrench.

Front preload adjusters are found on top of the forks and typically move independently of the fork tube.

What you may also see is lines running around the outside of the preload adjuster. You can use these lines to keep track of your settings.



When you twist the preload adjuster (the blue bit) clockwise, it moves down inside the fork tube and you are adding more preload. To remove preload, twist the adjuster anticlockwise so that it begins extending out of the tube.

Fewer lines = More Preload

More Lines = Less Preload

The arrangement you see above is typically what you'll find on older machines, but on newer bikes what you may find is that the preload adjuster doesn't extend or retract independently of the fork cap.

You still use the same methods with a socket or wrench to make the changes, but in order to know where your setting is currently positioned you're going to have to count the number of turns in the range.

In one full turn increments, turn the preload adjuster all the way in (clockwise) counting the turns as you go. Make sure you do it slowly as not to ram the adjuster onto the stop on the final turn.

You can then count the turns back out (anticlockwise) to determine the full range and where you sit in it.

There are some other arrangements often found on aftermarket forks, or even stock bikes that ship with third party forks such as Showa and Ohlins. Sometimes the preload adjusters can be found at the bottom of the forks with varying tools needed to adjust them.

In these cases it's always worth consulting the manual for your suspension setup.

Once you've adjusted your preload and your sag is in range, you can then go and test it to make sure you aren't using too much of the available travel.

For this, you can use the age old method of testing travel, and that is to place a cable tie around the fork tube. It only needs to be tight enough so it doesn't slide down, but not so tight that it interferes with your suspension.

After each session you'll be able to see just how much travel you're using by how much the zip tie has been pushed down (or up) the fork.

If you make another change, be sure to move the zip tie to its original spot.

Checking Spring Rate With Free Sag

One last thing you can do to check if the spring rate is in the right range for your weight after you've set your sag is to check what's called free sag.

Free sag is the measurement of how much the bike sinks under its own weight. If you've had to use a lot of preload to get the correct rider sag figure then your bike may top out with you get off of it.

Hop off and have a go at lifting the rear of the bike up. You should feel a distinct movement upward.

If it does top out when you get off and you can't feel any movement when you lift, it likely means you have too much preload and that your spring rate isn't stiff enough for your weight.

If there's a lot of movement and you may need less preload, or a softer spring.

In terms of numbers, a good free sag figure is between 5-10mm. To find your exact free sag figure go through the same process as you did for rider sag, just without you getting on it.

Ok that about covers sag setting.

In the next part we are going to be moving the conversation onto the other possible adjustment changes – damping.

We'll cover both compression and rebound damping, as well as the variations of high and low speed adjustments.