

Suspension Adjustments, Part 3

by Dave Moss

Editor's note—This month's article is aimed at riders who frequently work on their own motorcycles. If you have any doubts about your ability to perform the procedures described here, please take your motorcycle to a qualified mechanic.

IN THE LAST TWO articles we covered items that need to be adjusted and aligned before working on actual suspension settings. This month we will discuss suspension sag and fork stiction and how to measure both.

What is Sag?

Sag is the difference between the suspension being fully extended (no rider) and naturally compressed (with rider). If the sag is too small, the suspension settings or springs are too stiff for the rider's weight. If the sag is too large, the suspension settings or springs are too soft for the rider's weight.

If the correct sag cannot be reached by the procedure that follows, then the OEM springs must be replaced to accommodate the rider's weight. There are different numbers for ideal sag for the forks and the rear shock that ensure that the basic geometry of the bike remains with a weight balance of 50/50.

In order to measure sag correctly two people are needed in addition to the rider dressed in full gear (not including helmet). Both wheels must be on the ground to set the sag properly. Make sure that paper, pen, and metric tape measure are on hand before starting.

Setting Fork Sag

To set the correct sag on the forks, two people must each hold a handlebar and lift the front end in order to extend the forks to their maximum length (when the front wheel is just off the ground, Figure 1). The person making the measurements (metric tape measure is easier) should pick two points to measure between. Traditional forks should be measured from the base of the triple clamp to the shoulder of the lower fork leg. Upside down forks should be measured from the shoulder of the upper leg to the end of the chrome tube where it enters the axle casting. *Once the measurement points are picked, do not change them.* Record the measurement for the forks at full extension, then put the bike back on the ground.

While one person holds the bike firmly upright from the back (use whatever is solid on the rear of the motorcycle), the rider should climb aboard, put both feet on the pegs, and squeeze the front brake lever to keep the bike stationary. The person making the measurements should compress the front suspension by pulling down on the handlebars then letting go. After the bike has settled, the second measurement is taken using the same two points used previously (Figure 2). Subtract the smaller measurement from the larger to get the sag of the front suspension.

As a general principle, the front fork sag should be 32–38mm. If it is greater than 38mm, preload (if available) can be added. Preload is the amount of load placed on the spring. When adding preload, you are adding tension to the spring (compressing it) and making it less prone to compressing when further pressure (like from the rider's weight) is added to it.

Removing preload relieves the tension on the spring (expanding it) and makes it more prone to compressing when further pressure is added to it.

If all the available preload is added and the resulting sag is still greater than

Figure 1



To measure front suspension sag, the front suspension must first be extended fully by having two people lift the front end off the ground. Photos by Dave Moss.

Figure 2



The second measurement is made when the front suspension is naturally compressed by the rider's weight.

Figure 3



Rear suspension sag is measured in almost the same way as front suspension sag, except to extend the suspension the rear wheel does not have to be lifted off the ground.

Figure 4



The second measurement of rear suspension sag must be made with the rider on the bike.

38mm, then the fork springs are too soft and should be replaced. Or, if all the preload is removed and the correct sag cannot be reached, the fork springs are too stiff and should be replaced.

Setting Rear Shock Sag

To set the correct sag on the rear shock, one person lifts the rear end just far enough to extend the shock to its maximum length (Figure 3). The rear wheel does not have to be lifted off the ground. The person making the measurements must pick a point on the center of the rear axle and a point on the bike's plastic (using contour lines or edges of decals helps) to measure between. If there is no plastic use a piece of electrical tape somewhere on the seat, subframe, or other location. This measurement must be made over as straight a line as possible. Again, *once the measurement points are picked, do not change them.* Record the measurement for the shock at full extension, then put the bike back on the ground.

While one person holds the bike firmly upright from the front (using the upper triple clamp is easiest), the rider should climb aboard, put both feet on the pegs, and squeeze the front brake lever to keep the bike stationary.

The person making the measurements should compress the rear suspension by pushing down on the rear of the bike then letting go. After the bike has settled, the second measurement is taken using the same two points used previously (Figure 4). Subtract the smaller measurement from the larger to get the sag of the rear suspension.

As a general principle, the rear sag should be 28–32mm. If there is more than 32mm, preload (if available) can be added using the appropriate tool(s). Shocks with ramp adjusters (like on the Yamaha R6) have limited preload, whereas shocks with lock rings (Penske, Fox, Ohlins, Works Performance, and some OEMs) have a great deal more adjustment. Adding more than five turns of preload on a rear spring to get the right sag is a good indication that the wrong spring (too soft) is on the bike.

Stiction

Another point of note is stiction (a combination of the words sticky and friction), or the amount of drag exhibited by the sliding tube portion of the fork. The greater the amount of stiction, the slower the forks will respond to pavement irregularities.

Stiction can be measured using the same two points used for fork sag. With the rider off the bike and holding the brake, the person making the measurements should compress the front forks and then let go. After the bike has settled, the gap is measured. Next, extend the forks and let the bike settle again. Measure this gap and calculate the difference.

Five millimeters of stiction is acceptable, but sometimes you will see as much as 15mm. This is a good indication of dry fork seals. Regreasing the seals will allow the chrome sliding tube to pass through the seal with less friction. To do this, you need to disassemble the forks completely.

Next Month

Next month's article will discuss suspension settings such as preload, compression damping, and rebound damping. **FZ**

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