

Suspension Adjustments, Part 2

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.

LAST MONTH'S ARTICLE WAS the first in a series of articles on how to properly set up your bike's suspension. That article discussed checking the steering head bearings and front wheel alignment prior to making any suspension adjustments. This month wheel and chain alignment and tire pressure are covered.

Stampings on the swingarm will not always align the rear wheel correctly, so prior to starting any suspension adjustment you must check that the chain alignment and adjustment are correct. Incorrect alignment will drastically increase tire, chain, and sprocket wear. Before you adjust the chain, the wheels must first be aligned. To adjust the wheel alignment, the bike needs to be on a rear stand if there is no centerstand available.

Wheel Alignment

To set rear wheel alignment you will need a string that is about 12 feet long. Find the center of the string and wrap that section twice around the rear wheel rim and adjacent to one of the spokes, then tape it in place. Run the left and right ends of the string forward to two steady objects (such as jack stands) located beyond the front wheel (Figure 1). Tie the string ends to the jack stands and add tension to both lines by repositioning the jack stands. Ensure that the line is just touching each edge of the sidewall of the rear tire by looking along the string (Figure 2).

At the front wheel, pick a point on each side of the wheel to measure from (like the edge of the rim). Measure from that point on the left side of the front wheel to the string on that side (Figure 3), then do the same on the right. Compare the measurements. If the measurement on the left side is greater than the measurement on the right side, then the rear wheel is out of alignment and turned toward the left. If the reverse is true then the rear wheel is turned toward the right.

In either case, adjust the rear wheel (following the manufacturer's instructions) until the distances from both sides of the front wheel to the string are the same. Be sure to reposition the string (make sure it is touching the rear tire's sidewall) after each rear wheel adjustment.

If your bike has a single-sided swingarm, the rear wheel will always be in precise alignment. The OEM eccentric cam mechanism makes chain tensioning quick and simple.

Chain Adjustment

Chain adjustment is also critical. If the chain is too tight the shock will not be able to function correctly because the chain will limit the movement of the swingarm and thereby limit the amount of travel of the shock. If the shock travel is limited, the only remaining suspension will be the tire itself, and this is not good.

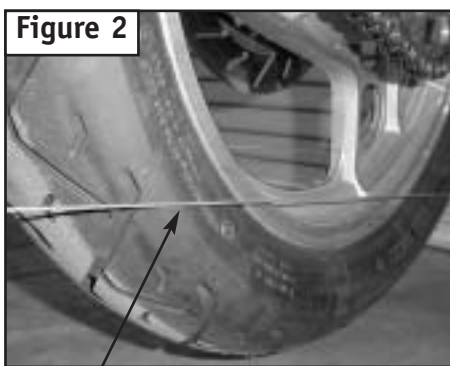
To ensure that the chain is correctly adjusted, sit on the bike with both wheels on the ground. Have a friend make the measurement by holding a tape measure securely against the swingarm and placing the end of the tape on the upper or lower edge of the chain at rest. Move the chain up toward the swingarm and measure the distance the chain has moved (Figure 4). If the distance is less than

Figure 1



A string can be used to check the alignment of the rear wheel by wrapping it twice around the rear wheel, tapping it to the wheel, and tying it to jack stands in front of the front wheel. Photos by Dave Moss.

Figure 2



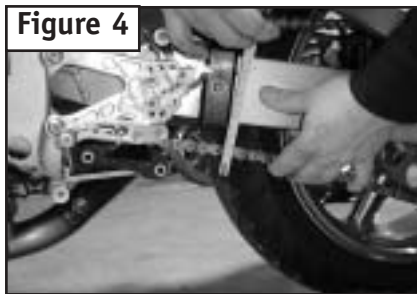
The string that you're using to align the rear wheel must touch the edge of the rear wheel.

Figure 3



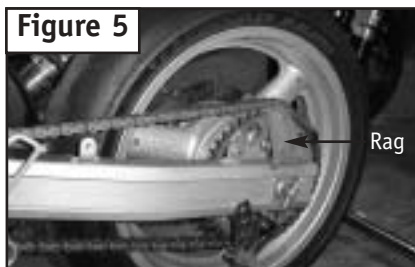
Measure how far the string is from each side of the front wheel. If the measurements don't match then the rear wheel is not aligned properly.

Figure 4



Measure chain slack with both wheels on the ground and the rider on the bike.

Figure 5



Stuffing a rag between the chain and sprocket ensures that the rear axle nut seats itself against the adjusters.

an inch (too tight), follow the manufacturer's instructions to adjust the chain (while the bike is on the centerstand or rear stand), then make the measurement again with both wheels on the ground and you on the bike.

When the chain is correctly adjusted, the rear axle can be tightened. Before retightening the axle nut, roll the wheel backwards to engage a rag between the rear sprocket and the chain (Figure 5). This is critical as often times when just tightening the axle nut, the axle will not always seat itself completely against the adjusters unless you are firmly pushing the rear wheel against them. The rag forces the axle against the adjusters so you can properly torque the axle nut. Roll the wheel forward and remove the rag then

recheck chain tension.

Once the rear wheel is aligned, precise movement of the chain tensioners will ensure that the rear wheel always stays in exact alignment.

Tire Pressure

It is critical that the wheels are balanced correctly when tires are installed and that the weights used stay on the wheel. If you are going to a track day, covering the weights with a piece of duct tape should ensure that they stay in place.

A lot of tire wear conditions and poor handling is often blamed on the suspension, but in a significant number of cases it is due to incorrect tire pressure. When taking tire pressures, you need to use a quality, calibrated gauge.

When attending track days, you can use street-compound tires, but you would get more from a set of race-compound tires whether those be DOT-type race tires or slicks. If you are using street tires, do not run normal recommended tire pressures. Depending on the engine size and weight of the bike, the basic rule of thumb for the track is 30 psi for the front and 28 psi for the rear.

On the street the manufacturer's recommended tire pressures ensure optimum wear for the tire as the bike spends most of its time upright. Using that same tire pressure at the track may cause the tire to slide as it will not be able to reach full operating temperature and work optimally.

On the track the bike will spend very little time upright, and the tire is going to be subjected to higher speeds and significantly-increased cornering forces. That requires a much bigger contact patch with the track surface, and decreased tire pressure ensures this.

Whether on the street or the track, tire pressures should be set first thing in the morning when the tire is truly cold. The more heat cycles you place on a race-compound tire, the harder it becomes, so keeping the tires at an even temperature while the bike is off the track is highly recommended.

However, these pressures do not reflect track or ambient temperatures that change throughout the day. When you return from a session on the track, immediately take the tire pressure. You should have a gain of close to five psi. If you do not have that, then the tire pressure must be adjusted, but you have to wait until the tire is cold again to do this right.

If the tire is overheating it will lose traction and slide, and you may also see the tire "hot tearing" as the rubber shreds in a band around the tire. In this case there is too little air in the tire—the tire is heating too quickly as shown by a gain of seven psi or more. Once the tire has cooled down, increase tire pressure by one-half to one psi, and then ride the bike again. Once you return, immediately take the tire pressure. Adjust as necessary until you reach the correct gain.

If the tire is not reaching correct operating temperature it

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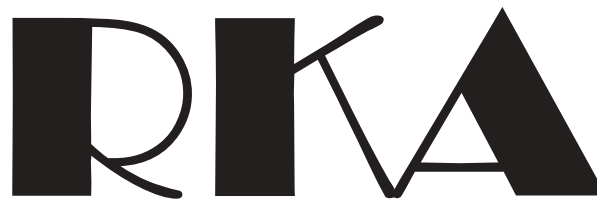
will lose traction and slide, and you may also see the tire "cold tearing" as the rubber shreds in a band around the tire. In this case there is too much air in the tire—the tire is not heating enough as shown by a gain of only 3 psi. Once the tire has cooled down, decrease tire pressure by one-half to one psi, and then ride the bike again. Once you return, immediately take the tire pressure again. Adjust as necessary until you reach the correct gain.

Although an overheated tire and an underheated tire seem to show the same symptoms, an experienced eye can distinguish between the two quite quickly. The only way to tell why a tire is sliding is to check the gain against the starting tire pressure. Hot and cold tearing are segregated as they are two distinct issues caused by two different problems.

Tire Size

Different manufacturers do not make the same circumference tires so the overall geometry of your bike can change by up to 5mm between tire brands. If the bike is set up for one tire brand, it may handle drastically different when you change brands. To compensate, always measure the overall diameter of each tire when mounted and inflated from the ground to the top of the tire using some form of straight edge. This can be done with the wheel in place or off the bike. Then you can compensate by raising or lowering the forks in the triple clamps and adding or removing ride height from the shock (if there is a capability to do so) to ensure that the geometry you have in place (and like) stays exactly the same. That will provide the opportunity to evaluate tires accurately and see what brand of tires suits your needs best. **FZ**

Dave Moss started riding in 1974. He currently works with Bay Area Yamaha (formerly Redwood City Yamaha) helping new bike owners set up their bikes as well as providing chassis geometry/suspension classes for customers at the dealership and at track day events with local groups.



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