

PROJECT 40

Adjusting Ride Height



Time: 1 hour



Tools: Tape measure, ruler or caliper, wrenches, sockets, torque wrench, screwdrivers, Allen keys, jack or lift, assistant



Talent: 



Cost: 0



Parts Required: None



Tip: Lowering a bike can dramatically affect ground clearance, so be careful what you wish for.



PERFORMANCE GAIN: A bike that steers the way you want it.



Although you can measure the height of a fork leg above the triple clamp with a ruler, a caliper will lock into position and allow you to accurately compare the height of both fork legs.

In recent years, sportbike suspensions have sprouted adjustments that, in the not-too-distant past, only GP riders could dream about. With all the talk about preload and compression/rebound damping, the average rider often overlooks one adjustment. Adjusting the ride height of your bike can be an important step toward getting it to behave the way you want it to. Changing the ride height can help with speeding up or slowing down steering, altering rear wheel traction, keeping the chassis attitude the same after changing to a different tire profile (see Project 30), or simply lowering the bike for a shorter rider (see sidebar “Lowering Cautions”).

Lowering Cautions

Anyone with a shorter inseam looking to get better footing while straddling his or her bike needs to be aware of the compromises involved in lowering a bike. First and most importantly, you will decrease your cornering clearance. To put it in plain English, you can no longer lean your bike over as far as its designers intended. If you even only occasionally scraped your footpegs or any other part of your bike while riding, you should avoid lowering your bike. Try reshaping your seat or buying a lower aftermarket seat. Also, consider simply getting more comfortable with only one foot on the ground at a stop. Look at the grid of any AMA National, and you'll see lots of jockey-sized riders in perfect control of their machines with only one foot down.

If you're still with me, the maximum you should ever consider raising the fork tubes in the triple clamp is 15 mm. The increasingly compact sporting packages built today won't allow much more than that. Even then, you should test to make sure that full fork travel doesn't allow the fender or tire to contact the triple clamp or other components, such as the radiator. Since you'll be lowering the front and rear the same amount to maintain chassis attitude, you'll most likely be pretty safe lowering the rear 15 mm, but you should check to make sure that your rear wheel doesn't hit the rear fender when fully compressed.

Lowering your bike any more than the 15 mm will require installation of lowering blocks in the fork as shown in Project 51. You'll also need to shorten the fork springs to deliver the appropriate rate over their new, shorter travel. Also, you won't want to lower the rear of your bike by using longer dog bones than described in that project. Lengthening the tie rods also makes the rear linkage significantly more progressive (i.e., stiffer) and limits your shock's effectiveness. If your shock doesn't have ride-height adjusters, you should consider buying a shorter shock or having a suspension company shorten your shock's shaft. Otherwise you risk significantly compromising the suspension's function.

Other lowering considerations include shortening the side stand. You need to make sure the stand allows the bike to lean over far enough to remain stable and not fall over. Finally, if you do lower your bike, carefully build up to your new maximum lean. Flicking your bike into a corner before you know where the hard parts will drag could have you touching down hard enough to lever a wheel off the ground—and then you'll *really* touch down.



This ZX-6R has a factory spacer already installed. The two washers (right) will allow the shock to be lengthened or shortened in 2-mm increments, which should be more than adequate.



This Penske shock has an integral ride-height adjuster. Just loosen the lower locknut (as shown) and turn the adjuster to lengthen or shorten the shock length. Don't forget to tighten the locknut.

As with any suspension change, little alterations can have big effects on your bike. Take careful notes, beginning with the baseline measurements. After that, make sure you record every change you make. If you ever go in the wrong direction with changes, these notes will make going back to your starting point much easier. To find your baseline rear ride height, measure from the center of the rear axle to a spot on the frame or bodywork directly above the axle with your bike's rear suspension topped out. Write down both the measurement and the point measured to, so you can ensure repeatability. For the fork, measuring a change in ride height is easy. Since the fork tubes extend through the triple clamp on most sportbikes, you simply measure how far they protrude above the triple clamp.

Be clear on what you are seeking with changes to ride height. The factory settings are designed as a compromise to handle most situations a rider is likely to encounter. For example, if you drop the front end to steepen the rake angle and speed up the steering, you may get a bike that turns in quickly but is unstable in a straight line and wants to shake its head over every little road imperfection. You can also experience the same behavior if you raise the rear of the bike to increase ground clearance. The general rules of thumb concerning ride height can be summarized as:

\Bike is nose high (front too high or rear too low):

- Chatter or poor grip on front tire exiting corners
- Difficult to steer or change direction
- Motorcycle runs wide (understeers) exiting corners

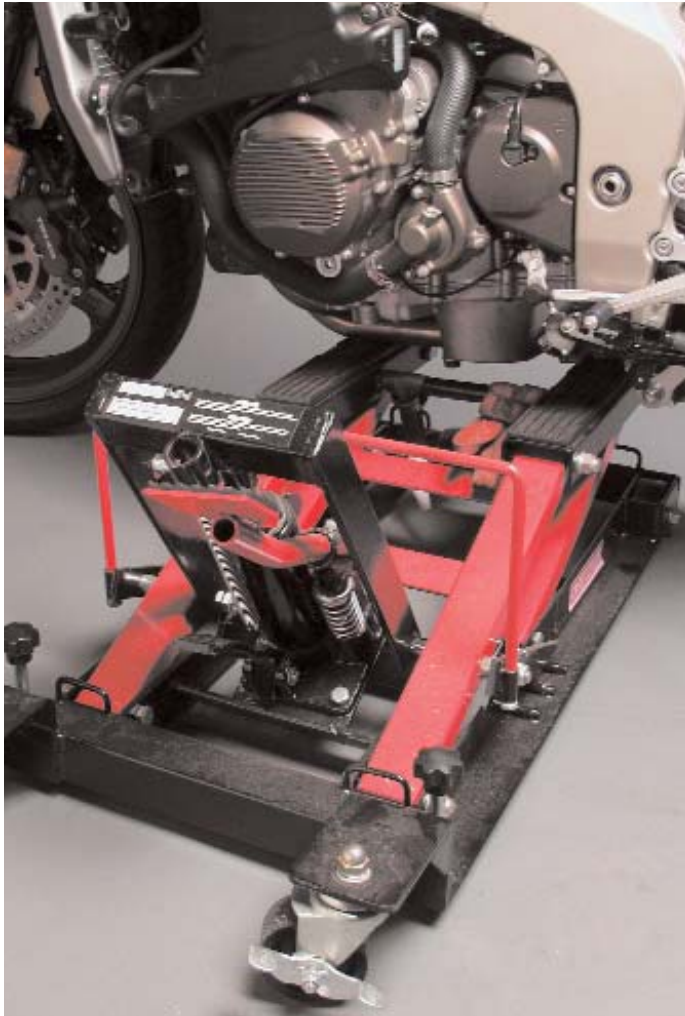
Bike is nose low (front too low or rear too high):

- Motorcycle unstable at high speeds
- Unstable, tries to swap ends under hard braking
- Lack of grip from rear tire

Since these same symptoms can also represent damping problems, you should consider talking to a suspension expert or having an experienced friend help you when attempting to alter a bike's geometry for the first time.

Typically, you change the front's ride height by sliding the triple clamp up or down on the fork legs. While you can do this with the bodywork on the bike, I usually take it off and use a jack to support the front end when I'm working alone. (At the track, where strong bodies are easier to come by, I can ask people to help lift or lower the bike while I work on the fork.) Use a rear stand to stabilize the bike. Place a jack or lift under the front of the bike and crank it up until the fork is fully extended. This takes the pressure off the fork and makes it easier to slide the legs up and down inside the triple clamp.

Working on one leg at a time, loosen all of the triple clamp pinch bolts except one. Even if you've supported the front of the bike with a jack, prepare for the front to drop when you loosen the final bolt. You can assist a fork tube in slipping through the triple clamp by twisting it slightly. If the triple clamp will not slide down on the fork leg, a retaining clip may be hidden under the top triple clamp. You'll need to raise the clamp and remove the clip before you can lower the triple clamp. When the front has been lowered or raised the proper amount, tighten one bolt and carefully measure the fork height. If you are raising the triple clamp on the



A bike lift eases the process of adjusting the front ride height by taking the bike's weight off the front suspension. You can also use the lift to assist in raising or lowering the triple clamp on the fork tubes.

fork, lifting the bike slightly on the jack may help. Don't raise the triple clamp on the fork so high that the fork cap is below the clamp's top surface. If you get to this point, move to the back of the bike and lower the rear. Some bikes with inverted forks have registration marks on the top of the tube to assist in setting the height, but you should still double-check the height with a ruler or caliper. When you're certain of the height, retorque all of the pinch bolts and move on to the second fork leg.

Altering a bike's rear ride height can be a bit more complicated than the front. If you've already installed a spiffy aftermarket shock with an integral ride-height adjuster, simply loosen the locknut and crank the adjuster up or down until the desired height is reached. However, make sure that you don't alter the height beyond the shock manufacturer's recommended range. You don't want the shock's piston rod to fail, do you?

Those of you with nonadjustable shocks have two choices for altering the rear ride height. You can change the length of the shock, or change the suspension tie rods (or dog bones). Both of these options offer compromises. First, changing the length of the dog bones will change the progression rate of the entire rear suspension. If you lengthen the dog bones to drop the bike, the progression rate will increase, giving a stiffer ride. For instructions on how to install dog bones, refer to Project 51. While you can alter the rear ride height by changing the shock's sag, you will compromise its ability to do its job.

To keep the progression rate the same on a lowered or raised bike, altering the length of the shock or the shock mount is the preferred way to go. Some bikes, like the ZX-6R shown in the photos, have the top shock mount bolted to the frame with a spacer. You'll need to remove the shock, as shown in Project 47, to gain access to the mounting bracket. Next, take the bracket (or the spacer) to your local hardware store to find washers that fit the mount. By combining washers of varying thicknesses with the stock spacer, you will be able to raise or lower the rear ride height. Keep the changes small. Current rear suspension linkages have a leverage ratio of about 2:1. So, a 2-mm spacer will raise the rear about 4 mm.

After each change—either front or rear—reassemble your bike and ride it to make sure you haven't created handling problems. If you have, set your suspension back to the previous state before the problem cropped up. If you have lowered the bike, remember that you have *decreased* your cornering clearance. If you were touching down toe feelers before, carefully build up to maximum lean so you can find where it is. If you drag hard parts, you can lever (or high-center) one of your wheels off the ground, putting you and your bike in a world of hurt.



Although dragging bodywork is relatively benign, beware: Hard parts usually aren't far away. To increase the ride height without altering the chassis attitude, the front and rear of this bike needed to be raised an equal amount to eke out some more clearance on a tight and bumpy track.