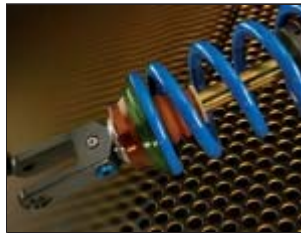




## Set Up Suspension 101

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Whether your new quad is fresh from the factory or out of someone's garage, the chances of its suspension being set up correctly for you is pretty slim. After a bit of riding you may even have noticed things are not perfect. Yet like most of us, you probably just ride it as is without adjusting anything. There is a lot to be gained by maximizing the performance of your quad's suspension. Most folks long for cool, expensive aftermarket stuff but never tune the oft capable stock parts they already own.



Haven't a clue where to begin? This guide should help you identify what adjustments are available and get you going in the right direction.

There are six types of external adjustments available on current shocks: low- and high-speed compression damping (on high-end shocks), rebound damping, preload adjustment, ride-height adjustment and crossover spacers. However, you will not find all of them on a single shock. Preload, low-speed compression and rebound are the most commonly found on production ATV shocks.

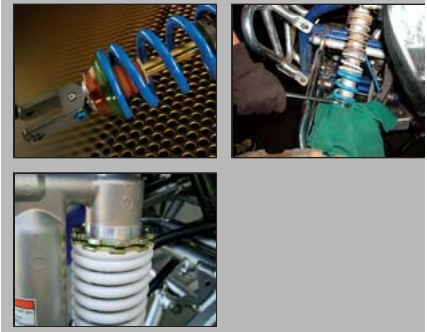
### Preload

This is the spring-tension adjustment on most shocks. On utility vehicles' shocks and even some sport quads' front ends, this is your only means of compression adjustment. You can either add more spring pressure to stiffen up your suspension or back it off to get a plusher ride. Many shocks have a collar with several slots; turning it changes the spring pressure or amount of preload. Put the ATV on a stand so the wheels are off the ground: This allows the collars to turn more easily. A large set of channel locks makes this job simple. Wrapping a rag around the collar before you put a clamp on it will prevent you from scratching the finish.

The other common form of preload adjustment is double locking rings. After loosening the lock ring or nut, you simply turn the adjuster ring (the nut that is against the spring) to make a change then tighten the locknut. There are special tools made to loosen and spin these types of locknuts, but a hammer and punch work fine. The trick is to place your ATV on a stand and get the wheel off the ground, then break loose the locknut with the hammer and punch. Instead of using the punch to spin the preload nut, try spinning the spring with your hand.

Another type of preload adjuster is commonly found on Works

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Performance shocks, PEP front units and the older-style TCS equipment. It is a wire clip that slides into a groove in the shock body; you simply move the clip up or down in the grooves to change the load. Sometimes you can just pull on the spring to release the tension enough to move the clip; in most cases, the load is too stiff to do so. To change the tension, a large open-end 21mm or 13/16 wrench works well. Note: Make sure your wrench is free of burrs that may mar the shock shaft. Use a rat-tail file to deburr the open end of the wrench if needed. Again with the quad on a stand and possibly some extra help, slip the wrench through the spring and around the shock shaft near the shock body. Now holding the wrench in place (a job for your help), you spin the spring, taking the load off the shock. This allows you to move the preload clip.

If you have an ATV with only preload adjustment in the form of the slotted collar, all you can do is try different settings to make the ride more comfortable. Don't be afraid to make a change.

Race sag is another overlooked aspect--it's basically preload. If you have a single-spring rear shock setup, 30 percent of the total travel should be used in sag. Sag is the difference between an unloaded suspension and that with you sitting on your quad. The measurement should be taken at the rear axle. For an ATV with 9 inches of rear-wheel travel, the sag should be 3 inches. You would also want about 10 percent free or static sag. That is the difference between your quad's normal rest position and that with no load at all--you can lift up on the grab bar and extend the suspension or put the machine on a stand to get this measurement. On an ATV with 9 inches of travel, it is just less than an inch. If you are too heavy for the spring rate, you will have to crank in so much preload to get the 3 inches of race sag that you'll end up without any free sag: The only solution is a stiffer spring. Conversely, if you are too light and unable to get the 30 percent race sag with 10 percent static sag, a lighter spring is needed.

### Compression

Compression is the damping that helps to prevent the shock from bottoming. Too much compression can also make the suspension feel harsh. It is the easiest and most-used form of adjustment; the average rider should know if he is using all of the suspension travel he needs to crank in some compression damping. If the travel is too harsh, back off the adjustment.

The compression-damping adjuster is in the form of a knob or screw on the shock reservoir or the body of the shock; it will always be on the big end of the shock, never the shaft end. The adjustment found on most production shocks is a low-speed compression adjustment; it helps in the small bumps, G-outs and braking bumps but does not have a huge effect on big jumps. Most shocks use a needle valve. To find out if you have the needle type of adjuster, screw it all the way in until it stops. If it will stop turning, it is the needle type. Turning the adjuster (with a screwdriver) clockwise tightens or stiffens; counterclockwise loosens or softens. The adjuster is connected to the needle valve--which works by regulating the oil flow. With this type of adjuster, it is best not to screw it in all the way and leave it there: This could result in a bent shock shaft. You should always back it out at least two clicks.

The other form of adjuster has orifices, so there will be a set number of adjustments and it won't stop turning. Custom Axis shocks, for example, have eight adjustment settings. There is a mark on the reservoir that you align with a number on the knob. The higher the number, the stiffer the adjustment. Unlike the needle-valve system, the dial type can be used on the stiffest setting.

The basic rule of thumb is to use the minimum amount of compression adjustment that suits the track you are riding. With the compression knob

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out or on the lowest setting possible, the quad will have better oil flow, keeping the shock and oil cooler. The tires will also stay on the ground more in the small braking bumps, ensuring better braking.

### **Rebound**

Rebound controls how fast the shock returns to the "up" position and is probably the least-used form of adjustment for the recreation rider but may be the most important in making your ATV do what you want it to do. If you have too fast a setting, the shock can kick you as you leave jumps or whoops; too slow, and the shock can "pack up" as you go through whoops. Packing up occurs when the shock doesn't have enough time to fully extend before becoming compressed again on a successive bump. After several bumps in a row, you may be left with almost no suspension travel. The symptom is your ATV kicks from side to side, acting as if it wants to deposit you on the ground. A proper rebound setting will allow you to ride through a section faster than you thought possible. If you have a fast rebound setting and the shock still acts as though it's packing up, try going in with the compression adjuster a few clicks: This will take away some of the working travel in whoops, so the shock has less tendency to pack up. The rebound adjuster is found near the bottom of the shock on the shaft end. We don't know of any factory front shocks that have it, but it can be found on most performance quads' rear shocks. It is either a screw adjuster or a collar that spins near the bottom of the shock shaft.

### **Ride-Height Adjustment**

Ride-height-adjustable (RHA) shocks--PEP ZPS, TCS Sag Control System, Custom Axis, Elka and Works Performance all offer some form of them--have virtually no preload. On RHA shocks, stiffening or softening the ride simply raises or lowers your quad. RHA shocks have from two to as many as four separate springs; the commonality is they will have one soft spring that retains some pressure on shock clips to keep slight tension on them. There are many different ways to change the adjustment depending on the manufacturer, but that is out of the scope of this story.

### **Crossover Spacers**

These are the spacers between the small springs on a multispring shock. Works Performance, PEP, TCS, Custom Axis and Elka use this arrangement on some of their shocks. The idea is to make the shock more progressive in spring rate. The main spring will be your stiffest spring rate; you will have one, two or even three short springs that are softer. The spacers are essentially large washers that prevent the spring stack from collapsing in on itself like a telescope. Changing the number of spacers between springs allows you to fine-tune the overall progressiveness of the spring rate. Spacers are put inside the small spring, so you have the soft spring rate for a portion of the travel, then it bottoms on the crossover spacer and goes into the next stiffer spring. Having the ability to change crossover spacers to stiffen or soften the spring rate can be beneficial.

### **Looking Ahead**

External high-speed adjustment is not found on production ATV shocks at this time. It is available on most performance motocross rear shocks and is beginning to show up on high-end aftermarket ATV shocks. We would expect to see it in the near future on performance production ATVs as it gives a much larger range of adjustment. High-speed adjuster-equipped shocks can be identified by the reservoir having an inner and outer screw or adjuster nut arrangement. The high-speed compression can be used to prevent bottoming off big jumps or large hits. You don't need to be concerned with backing it off for better oil flow as you do with a low-speed knob. However, cranking in too much adjustment will give you a harsh ride through the medium stuff.

When all is said and done, you can't get the maximum performance from what you have without trying. Make some changes, pay attention to the differences and keep adjusting as needed. You'll end up with a better

setup. Remember: You can always go back to the original settings.



These double lock rings are the most-common form of preload adjusters. How-ever, some front shocks have a collar with various slots to change the amount of tension placed on the spring.



A few brands of aftermarket shocks like this RHA model use a wire clip with multiple grooves to set spring preload. You must first relieve the spring pressure to remove and reposition the clip.



3-4. Checking your machine's sag and free sag are how you determine the proper spring and spring preload. Begin by measuring the quad topped out by lifting up the back until the shock is fully extended (3). Free sag is the amount your machine sags without the rider and should be about 10 percent of the travel (multiply the travel of your quad by 0.1 to calculate the desired free sag) (4). The final and most-crucial measurement is the sag with the rider sitting in the middle of the seat. That should be one third of the travel (multiply the travel by 0.333). If it is more than this, you need to tighten your spring and vice versa.



5-6. The compression adjusters are almost always on the top of the shock reservoir. They are either a small screw or a knob and click into the available positions. Turning it clockwise will stiffen the suspension and counterclockwise will soften the suspension.



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