National Shock Tuning Guide

Set Your Sag!

The first step to setting up your National Shock is to check your rider sag and be sure you have the proper amount of free sag, before you ride. We have provided a spec sheet with your build and you will find our recommended sag numbers for your National Shock. Your shock spring pre-load will have been pre-set by our technicians when your shock was built. However, it may be necessary for you to adjust the spring preload because factors such as where the rider sits on the bike or where your axle is positioned in the swing-arm will affect your rider sag results. The steps outlined below will assist you in obtaining the proper sag numbers:

STEP 1: After installing the suspension back on your bike and with your motorcycle on a stand and the rear wheel off the ground, take a measurement from a point near your rear axle (the corner of your swing-arm or the edge of an axle block) to a point up under the rear fender (like the nut that holds the seat or fender to the frame) using a tape measure. If you have another type of "sag-setter" tool, that will work fine as well. NOTE: DO NOT measure straight up from the axle! Your rear wheel travels in an arc, not in a straight line. You will get more accurate results by measuring on an angle. This is measurement "A".

STEP 2: Take the motorcycle off the stand and put it on level ground. It's very important that you are on level ground-any slope can skew the numbers. Now have the rider stand on the foot pegs (it helps to have an extra person to help balance the motorcycle) and take another measurement from the same two points from the swing-arm to the same point on the fender. This is measurement "B".

STEP 3: Now subtract the measurement "B" from measurement "A". The result is your rider sag. If the rider sag number is more than what we have recommended on your spec sheet, you need to increase the spring pre-load by turning the spring adjustment rings clockwise. If the rider sag number is less than what we have recommended, you need to decrease the spring pre-load by turning the spring adjustment rings counter-clockwise. For most bikes every full turn of the spring adjustment rings will increase or decrease your rider sag number by 1.5mm.

STEP 4: Once you have arrived at the proper rider sag setting, you can double check for the correct spring rate by checking the static sag. You can do this with the rider off the bike and the bike sitting on its wheels on level ground. Take another measurement from the same points as in Step 1. This is now measurement "C". Subtract measurement "C" from "A". The result is your free sag. If the result is within the range recommended on the other side of this booklet, the spring rate is good for your weight. If the result is less than the number recommended, your spring is too light for your weight. If the result is more than the number recommended, your spring is too heavy for your weight. Please call us if your static sag is not correct.

Once you have these steps completed, GO RIDE!!

Set up Guidelines

This section of the Tuning Guide will assist you with set up for different riding conditions or suspension performance issues. It's best to start with fine tuning the shock as it has an enormous effect on how the front end performs. But , first, a few definitions.

Hop or Kick: Defined as the suspensions response from a load being too fast. As an example, you can say that the shock is kicking when your hit a single bump and the shock absorbs the impact, but as the motorcycle travels away from the bump the rear of the bike lifts up from the recoil of the shock.

Spike: Defined as the suspensions inability to absorb a single impact.

Pack: Defined as the suspensions response to multiple loads compounding as it stores residual energy from the previous load or loads. As an example, if a rider is accelerating across a series of bumps and the rear suspension feels as if it is "kicking" or "spiking", then it is actually packing. As a general rule, riders tend to feel kicking and packing as the same, although the causes are very different. Both ends of the motorcycle can exhibit the symptoms described.

Understanding your 5 Adjusters:

Your MXT National shock has 5 external Adjusters.

3 Forms of compression Adjustment: **LSC**: Low Speed compression. **MSC**: Mid Speed compression. **HSC**: High Speed compression.

2 Forms of Rebound Adjustment: **LSR**: Low Speed Rebound. **Rebound**: Clevis based.

Your National shock offers you the ability to tailor the performance to meet your needs. Starting with the compression circuits and in order of operation:

The Compression Adjustments

The **LSC** is a Pure Bypass circuit. When you open (Soften the adjuster) The shocks movement at lower speeds becomes freer in all directions, as more of the damping forces are allowed to bypass the other circuits. If you want softer feel on initial movements, and more motion this is your best adjustment to soften. If you need more control and less "movement" from the chassis then this is a good place to start with making the adjustment stiffer.

HSC: This is a gate style valve using a tapered cone and progressive Spring. This serves as a pressure dump, and has the biggest impact on Higher Speed movements. By design it has a very large impact on overall compression damping characteristics. Use it to control higher speed large movements.

MSC: The MSC controls the amount of pressure shuttled between the main compression valve and the LSC: If you want to increase the LSC adjustment control spectrum you can increase the midspeed compression, if you want to decrease the LSC's impact you can soften the MSC.

TIP: In simplest perspective the mid speed is used to blend the threshold between the HSC and LSC. If you find that either adjuster is in an extreme position you can adjust the range of the adjuster that is nearly full stiff or soft. This improves the overall balance of the valving improving feel over a wide range of conditions. Example: LSC:<3 out Increase Midspeed compression. Now the LSC can be run in a more Neutral position.

Rebound Adjustments

LSR: The Low Speed Rebound standard adjustment is 5-7 clicks out. We used 3 letter acronyms, but had we used 4 we would have chosen ULSR, or Ultra low Speed Rebound. It is reducing the force created by the rod charge, and has an ability to calm the shock in large rolling undulations at corner entry or at times when the chassis is partially unweighted (such as hard-pack corner entry). It does this without having to over adjust the shocks primary clevis. This creates a calmer and more planted chassis without a sacrifice in the shocks ability to follow the ground while under throttle in low traction situations.

Rebound Adjustment Tip: The LSR is the last adjuster to tune. Its effect is somewhat elusive in certain conditions. Until you recognize the symptoms and response, I recommend you wait until you are riding a slick hard surface with bumps and undulations. Pay attention to the adjuster's effect at corner entry and the feel of the bike as you brake or drop off a ledge. Adding LSR will slow the lift and give the rider a calmer feeling bike. Once you notice the effect tuning this circuit it will become more intuitive. You may be asking yourself why would I not just run it full in? The effect can still limit traction and can increase the shocks tendency to pack up when on the gas over larger rollers. So like all adjusters, there is a sweet spot that balances the positive and negative aspects.

Rebound Clevis based: This is your bypass to the Main Valving piston and works as any rebound adjustment.

Testing:

Adjusting the Shock for Hard to Intermediate Terrain:

Find a fast straight with braking bumps leading into a corner. Reduce the shock rebound damping until the rear begins to hop or feel loose. Once at that point, increase the rebound damping until the sensation diminishes. If your shock is equipped with a high-speed adjuster, go over the same type of terrain as described in step one and add high-speed compression until the shock begins to spike as you hit the first of the bumps in the section. Next, turn the high-speed adjuster out until the spiking feeling is reduced to a manageable level. It is important to remember that the high-speed adjuster does not control true "highspeed" compression of the shock, but rather an upper range of the low-speed compression. The high speed adjuster mainly impacts how the bike responds to jump faces and the down-side of jump landings and shifts in the rider's weight distribution on the bike. There is a wide over-lap between the low-speed adjuster and the high-speed adjuster so it is not inappropriate to adjust both as one gets near the end of its range. When you run your compression stiffer you gain feel (through feedback from the suspension), but you lose traction in the trade. Find a corner with acceleration bumps on the exit. The rear wheel should follow the ground. If the shock packs, reduce the rebound damping of the shock. If this does not help, increase the low-speed compression damping by two clicks. In this situation it is likely that the bike's acceleration forces are causing a weight transfer to the rear of the bike, causing the suspension to compress while greater damping and spring rates compound the

problem. By adding low-speed compression, you reduce the chassis initial movement and effectively reduce damping rates, making the suspension better able to absorb impacts and follow the terrain. Find a “G-Out” to ride through. The rear suspension should not bottom hard under the load. Increase low-speed compression to fight bottoming. If you do not notice an improvement in bottoming control, increase the high-speed compression by 1/3 turn. You should gently bottom off the biggest g-load obstacle on the track. If you don’t, you aren’t getting maximum traction from your suspension. Do not attempt to control flat-landing bottoming issues with the compression adjusters! The adjusters have a primary effect on low-to mid-speed suspension movements, so even a large adjustment of the compression may only have a small effect on this type of bottoming resistance. If you are bottoming hard in g-loads and your compression adjusters are maxed out, the internal valving must be turned for more low to mid-speed compression damping. Remember that bottoming your suspension is not necessarily a bad thing, as long as the bottoming is controlled.

Adjusting the Forks for Hard to Intermediate Terrain:

Find a large “G-Out” to ride through. The forks should not bottom hard in the g-load. Increase compression to fight bottoming. If you do not feel a difference, then turn the adjuster back in 1-2 clicks. You should gently bottom off the biggest g-load. If you don’t, you’re not getting maximum traction from your suspension. Find a section of rough braking bumps. If the forks feel harsh in braking bumps, then you are experiencing a packing condition with the suspension. Increase the compression by 1-2 clicks. If you feel an improvement, add 1-2 more clicks of compression until you have found a decent compromise between braking bump performance and mid-corner traction. If you are struggling to find a good compromise, the oil volume can be reduced in the fork. This will reduce the compounding effects of the air-spring and will make the forks feel plusher in braking bumps. Flat-landing bottoming in general can be controlled by fork oil level adjustments. The fork should bottom on the biggest track obstacle. If the for bottoms harshly, you can add oil to the fork in 5mm increments. If no bottoming is occurring, you can remove oil to reduce the effect of the airspring and allow the fork to use more of the available travel. You should always strive to use the lowest oil level possible, as this will make the fork more compliant over braking bumps. The fork rebound should be adjusted to alter the mid-corner-to-exit characteristics of the motorcycle. Find a sweeping corner to ride through. When the forks compress for the turn the rate at which the forks return impacts the steering geometry. If the forks rebound too quickly, the extension of the fork will result in less fork rake and weight transfer and the bike will drift wide or wash (understeer). If the rebound is too slow, the bike will tuck under (oversteer). In general, the lighter you can run your rebound the better the suspension will work in terms of traction and comfort when you are going in a straight line. Find the best balance between good steering geometry and comfort for each track.

Sand Tracks (non-square edge):

Increasing the low-speed compression and rebound is necessary. Start by increasing compression 2-4 clicks at a time to keep the bike from loading in to each whoop face. Do not adjust the rebound until you have the bike feeling stable and going straight. Increase the rebound 2 clicks at a time until the rear suspension follows the bumps without hopping off the top of each whoop. Don’t be concerned if your clickers are nearly maxed out in sand conditions (unless your original valving set up was for sand conditions). Supercross (G-Loads, curb hits): G-loads produce low piston speeds. This means that less damping is produced by the fork and shock valving in a situation that creates more bottoming load.

Increase the compression damping by turning the adjusters in 2-6 clicks and in some cases increase the fork oil level.

Harshness in rocks, roots:

This is usually an internal valving issue, but in a pinch you can decrease compression clickers by 1-2 clicks. Reduced spring rates may also be necessary.

Rear Wheel Kicks: Check to be sure the shock is not packing, which in loam to hard pack conditions the rear of the bike will kick to the side. Reduce rebound damping. However, shock valving will not help here if you lock the rear wheel or pull in the clutch while entering corners!

Chassis set-up

While the clickers and external tuning features are primarily used for fine-tuning your suspension, you can also adjust your chassis to change the feel and characteristics.

Fork Tube Height: This increases or decreases the weight on the front wheel. If you're struggling to get good braking bump feel you can lower your forks in the clamps, decreasing weight distribution on the fork and reduce the tendency to pack. You could also increase the rear sag to reduce weight transfer to the front of the motorcycle.

Huck Valves are a MXT engineered solution for bottoming control, giving your bottoming control mechanism speed sensitivity. With Huck Valves you may never completely bottom your fork. So use the tuning guide to maximize control and comfort. Huck Valves are not externally adjustable.

Tip: Keep a record of your adjustment settings from track to track. That way you'll always have a good base-line to refer to!

Thank you for your purchase and confidence in our ability to build you the best suspension possible. Although the National is an MX-Tech product, we at Enduro Spec have spent countless hours working with them and on our own to develop the best off-road settings possible. If at any time you feel lost or not able to get the desired effect out of the shock, please contact us at Enduro Spec. Sometimes just talking through the scenario with you will make all the difference in getting the shock finely tuned and working perfectly for you. The above text is mostly credited to MX-Tech with our slight changes as needed. We thank Jeremy and the team for all their hard work.

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