

Hyper Racing's ATV Sway Bar September 2015

At Hyper Racing, we are persistent seekers of truth and perfection in everything we do. We are never happy with anything other than a complete understanding and the trajectory towards perfection. We believe in educating our customers with all the knowledge we acquire.

Hyper Racing's ATV Sway Bar restricts the front roll of the ATV by increasing roll resistance without affecting the vertical or up and down movement of the suspension. When roll resistance is increased in the front of the bike, it will be tighter. Here is an explanation why.

Due to the inherent design of the typical ATV, there is an infinite amount of rear roll resistance, there is no way for the rear to roll due to the design of the rear suspension. This makes for a really loose bike.

Why? Vehicle dynamics, a specific area of physics, tells us that:

Maximum traction in the rear of a car is achieved when both rear tires have the same amount of weight on them. This is due to a factor called **tire efficiency** which states that the available traction for any tire goes up when more weight is added to it, but it does not go up in a straight line, it levels off. Weight can be added to a tire, but its traction goes up less and less as more weight is added. Therefore it is best for maximum traction to keep the rear tires equally loaded.

Also the amount of weight transferred from the left side tires to the right side tires in a left handed turn is defined by the following formula:

Lateral Weight Transfer (side to side weight transfer) = (Weight x CGH / TW) x G (lateral)

Center of Gravity Height=CGH, Track Width = TW, G-force=G, and Weight = the weight of the Car

Pretty simple actually, and no other factors are involved. This formula tells us the **total** amount of weight transfer, the front and the rear combined. Some of the weight is transferred off the left front to the right front and some is transferred off the left rear to the right rear. The front and rear **roll resistance** determines how much weight comes off of each tire. The stiffer the rear roll resistance the more weight comes off the left rear tire, making the car looser (due to the tire efficiency fact), the stiffer the front roll resistance, the more weight comes off the right front tire, leaving the

rear tires more equally loaded making the car tighter.

This is why the ATV is an inherently loose vehicle. Its rear roll resistance is really, really high causing almost all the weight to transfer from the left rear to the right rear. This is evident by how quickly the left rear lifts off the ground in a turn, it is transferring all its weight to the right rear.

We can counter this by adding more roll resistance to the front, the more resistance we add, the tighter the bike will be because it will be transferring the weight off the left front and leaving more weight on the left rear giving more traction to the rear. Our Sway bar does exactly that, it adds front roll resistance. We can control how much front roll resistance we add by using different diameter bars (bigger bars add more) or by changing the distance from the bar the linkage mounts. The closer the linkage is to the bar, the stiffer the roll resistance is. We have 5 holes to choose from offering a very wide range of adjustment.

With all this new found knowledge, a few of you are asking, "why don't we just go to stiffer front springs to add roll resistance instead of adding the extra weight of a sway bar? Good question. Stiffer front springs will do the exact same thing as far as adding front roll resistance. The disadvantage of going to stiffer front springs is it also increases the vertical (up and down) spring rate. This spring rate controls how well the bike takes bumps and jumps. Make the front spring rate stiffer and it will not take bumps or jumps as well. It will cause the front tires to loose compliance (contact) with the surface of the track creating a loss of steering.

Written into the mission statement of Hyper Racing when Mike and Christy started the business 21 years ago was the concept of educating our customers and to not have the "secrets" so common in the racing community. We understand the risk of making our competitors faster, but to withhold knowledge from the world for selfish reasons is to waste a life. We will do our best to educate the community on knowledge we have acquired. Knowledge and truth is not something we own, but a gift that has been shown to us and a responsibility to share. We hope you feel the same and share the knowledge you acquire.