

## Tips and Tricks To the Trinity Evolution Reactive Caster Front Suspension System, by Joel Magic Johnson

The Trinity Evolution front end can be intimidating at first but is very simple once the principles are understood. In this article will be hints and tricks that will aid in the learning process of this next generation front end.

Before we try to learn how each adjustment works lets make the adjustment process easier. To make this easier get all the right hand threads on the turnbuckles pointed in the same direction or marked so we know which way to turn the links when an adjustment is necessary. The right handed thread is the standard thread direction and detected by just trying to thread the turnbuckle in to the plastic or turning the links that are on the car already. If you turn them clockwise and they start to unscrew then you know that the right hand thread is threaded into the nylon ball cup. What I like to do is I put all the right hand threads into the upper A-arm ball support and clevis. If you happened to have threaded the left hand threads into the clevis or upper support you could try to re-top that piece right handed by using and 4-40 tap or just force thread the link into the plastic. If you don't want to risk a loose thread or stripping the part just locate all the right hand threads on the front end and color that side of the turnbuckle with a felt pen, preferably a permanent one. Also lets get an .050 90 degree allen wrench or a piece of piano wire bent at a 90 degree angle to use as an adjusting tool.

Now that we have established which way to turn all of our turnbuckles lets move on to understanding the adjustments in the front end. When looking at the front end you might think that each of

the turnbuckles on the front end works independently of the other. Once you try to adjust the front end you find this theory is false. When making an adjustment to the front end each link has to be adjusted including the steering rod to the servo because the toe-in and toe-out can be affected as well.

Notice the link at the back of the front end is shorter than the link at the front. Since this link is shorter and at less of an angle than the front rod it is more sensitive to adjustment than the front rod. By this I mean that a quarter turn on the rear rod equals about 3/4 of a turn on the front rod for them to move an equal amount. Always keep this in mind when making adjustments.

Now let's start working with the front end to understand what I just wrote. First I would like to get the front end at zero. By this I mean that the king pin should have no castor (not leaned back) or camber (not leaned in towards the center of the car). It should be perfectly straight up and down. If your front end is already together you will learn the adjustments as you get it back to zero.

If your front end is adjusted with castor and camber in it already lets take out the castor to start with. Lets adjust the rear link first by locating which side the right hand thread is on and rotating the link counter clockwise or unscrewing the link until you see the king pin is almost straight up and down. At this point camber should be slightly bowed out. Don't make it straight up because when we adjust the front link it will pull the king pin in and forward to complete the adjustment. Now take the front link and turn it clockwise or screw it into the upper arm or clevis until the king pin is straight up and down. If this was done right the camber of the wheel should be almost at zero also. Now lets take the camber out of the front end.



If you have ended up with the wheel bowing out its ok, just do the opposite of the following instructions.

Now lets take both links starting with the rear one and unscrew (lengthen) it until the king pin is almost straight. At this point the king pin might be leaning forward a bit but when we lengthen the front link it will push the king pin back straight because of the angle of the two links. Now lengthen the front link and we should be at zero. This might not happen the first time but keep experimenting. The key is knowing which way to turn the link by having the right hand threads marked.

After that exercise you should now have a feeling of how each link reacts to the other. To add castor you must shorten the rear link and lengthen the front link remembering to only get to  $3/4$  of the desired castor angle with the rear link and let the front link adjust it the rest of the way. To adjust camber either tighten both links or lengthen both links. Remember if you adjust the camber always check the castor and vice-versa. Also check the toe-in in the front wheels as this will change.

The key to learning to adjust this front end is understanding how each link affects the other and the relationship of how much to turn each link to get the equal length out of each. Once these two properties are understood this front end will award you with unequalled performance and adjust ability.

Now that you understand better how to adjust the front end lets cover some set-up tips. On a road course we generally run about 2 degrees of castor and enough camber to get the wheels to wear flat, this is usually about 2 degrees also. You can try using more castor which helps the car go straighter but it also makes the car lazy in the tight turns which is not desirable for road course. Also we usually start with our white or red progressive springs. For oval we

usually run about three or four degrees of castor c both sides for the high speed banked ovals to desensitize the cars at high speed. The spring rates vary a lot in oval but you might try reds to start wi

Another trick we have discovered with the front ends is trimming the shoulder of the king pin bushing down to get more travel out of the front end and less preload on the front springs when using an ring. First take the bushings out of the front end c get a piece of course sand paper such as 360. No find a flat table or counter and sand down the shoulder of the bushing until it is about  $1/16$ " thick. After this is done remove the spindles and sand abo  $1/16$ " off the bottom of those also. Sanding the bottom of the spindle is really what gives more trav to the front end. If after doing this if there is slop between the spring and the bottom of the front end plate place one or two washers on the top of the front end between the e-clip and the upper ball until there is about  $1/16$ " of pre load on the spring.  $1/8$ " Magic! front spindle shims work good for this. Preload on the spring means that the spring will nec to be compressed  $1/16$ " to get the bottom e-clip and washer on.

I hope these tips and tricks help in the adjustment of your Evolution front end and put you in the winner's circle soon. Good luck and good racing.