NO LIMIT ENGINEERING
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# WIDE RIDE ALIGNMENT SPECIFICATIONS

The No Limit Engineering Wide Ride Independent Front suspension (IFS) system has a multitude of adjustable components as well as three different configurations allowing the suspension to be setup for a large range of different driving conditions and driver preferences.

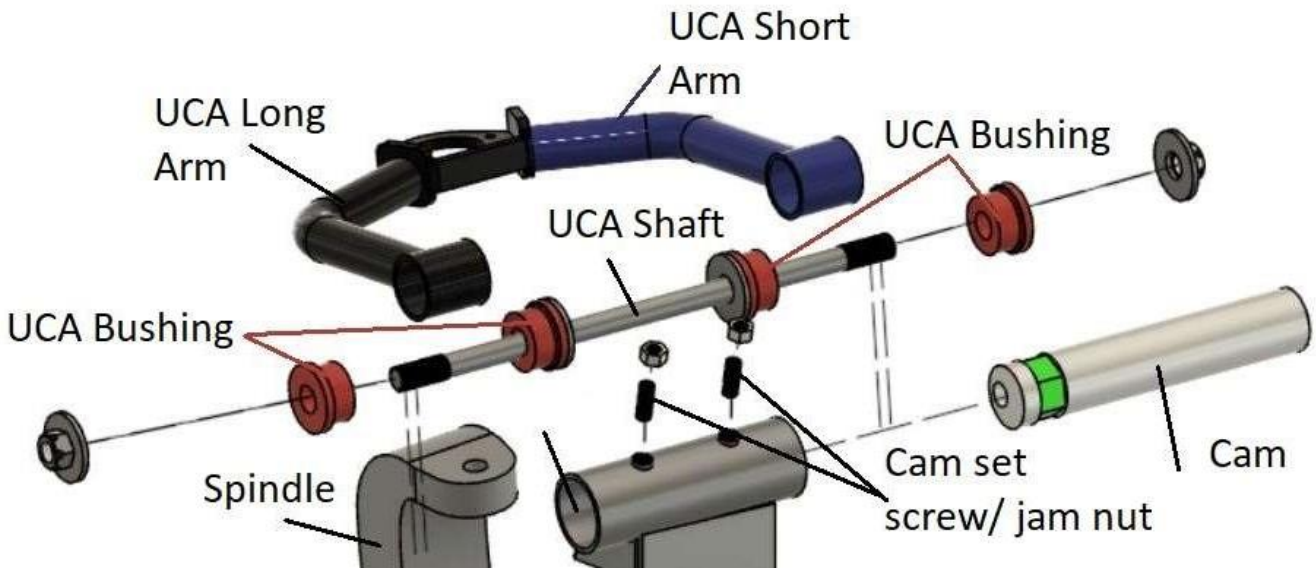


**Figure #1:** Exploded view of adjustable components

**Suspension Setup Overview:**

There are three main adjustments to be made that will affect how the vehicle drives and handles: camber, caster, and toe.

**Camber**: camber defines the contact angle the tire makes in relationship to the road. Ideally, we want the tire to be at a 90-degree angle from the road surface for maximum traction. To account for the camber gain as the suspension system is loaded during driving conditions, we want to set a static negative camber (camber is defined as being negative when the top of the tire is farther in than the bottom). The amount of desired negative camber is dependent on the vehicle use. It is important to understand that as we apply more load to the suspension from harder cornering, the more natural positive camber gain the suspension experiences. Therefore, we need to compensate for this by setting a static negative camber. For typical standard street driven applications, -0.5 degrees is ideal. As we increasingly load the tire by driving the vehicle harder, we need to increase the amount of static negative camber to compensate for harder driving. For spirited driving and autocross, we like to see a static negative camber closer to -1 degree.

**Making the Camber Adjustments**: Camber is adjusted statically (I.e. with the vehicle sitting level at ride height) by loosening the two $\frac{3}{8}$" jam nuts using a $\frac{9}{16}$" wrench; then using a $\frac{3}{16}$" Allen key, loosen the set screws to allow the cam to move freely in the cam tube.

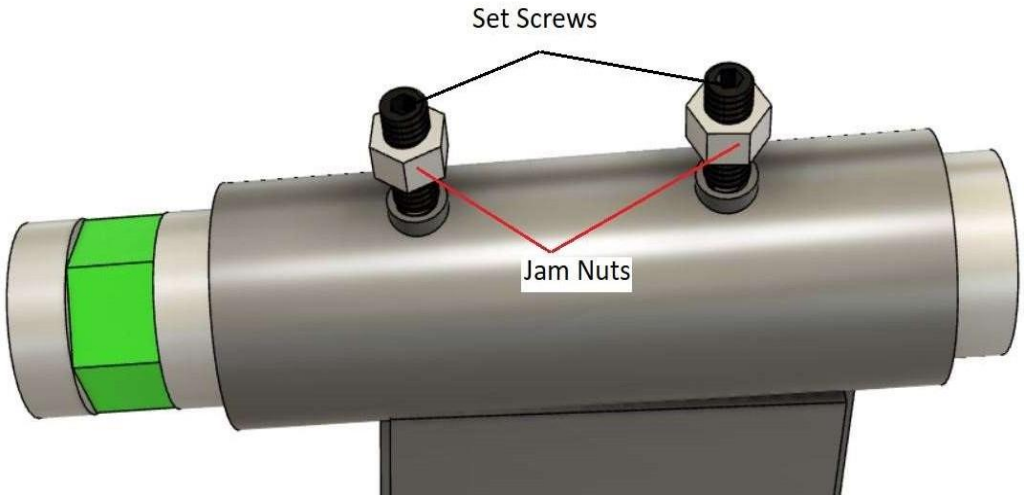


**Figure #2:** Jam Nuts and Set Screws Visual

Using an appropriately sized wrench, rotate the aluminum cam so that it moves the upper control arm (UCA) towards the inside of the vehicle for more negative camber and away for more positive camber. In the next three pictures the UCA has been removed to give a better visualization of how the cam actually adjusts the camber. When the cam is rotated, the eccentric hole that the UCA shaft rides in moves forward and backward which pulls the entire UCA with it. This movement is what translates into a camber change in the suspension.

**Note**: While the cam can rotate freely, it is ideal to keep the centerline of the eccentric hole in the cam below the centerline of the tube in which the cam sits in. any position between the positions represented by the figures below is fine, however rotating the cam past those positions (moving the eccentric hole upward) gives NO BENEFIT. An example of this is given in figure 4.

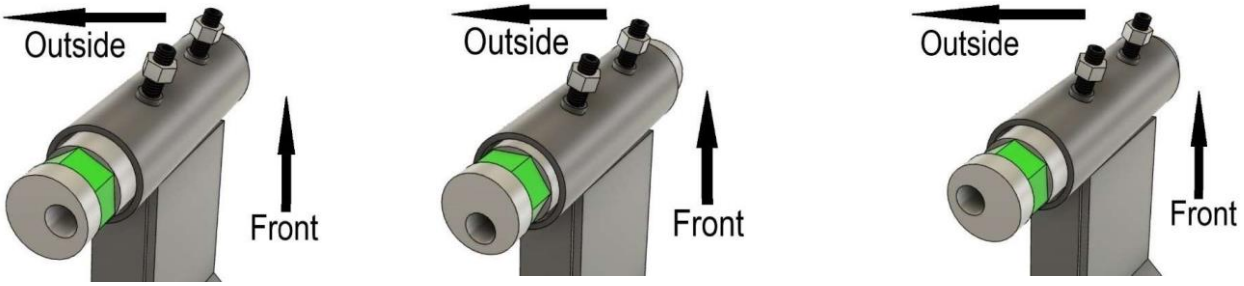


**Figure #3:** this figure demonstrates various positions of the cam's rotation. Camber in each position decreases from the left most picture to the right most picture.

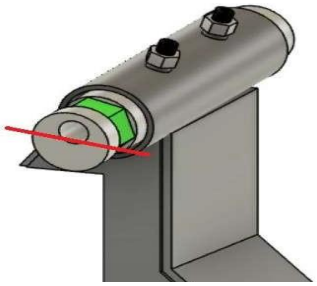

**Figure #4:** Demonstrates an example of an incorrect position of the cam tube. It is ideal to keep the center of the eccentric hole on or below the red line

**Caster:** Caster defines the relationship of the position of the upper and lower ball joints as viewed from the side of the vehicle looking inward on the vehicle. Neutral caster would be when the upper ball joint is directly above the lower ball joint. Positive caster is defined when the upper ball joint moves toward the rear of the vehicle relative to the bottom ball joint. Similar to how we determine what the desired camber is, the desired caster setting is dependent on the driving conditions of the vehicle. For daily and spirited driving we recommend a caster setting between positive 4 and 5 degrees. Typically as the harshness of the driving conditions increase, we also want to increase positive caster. For hard spirited driving and normal autocross we typically run between 5 to 8 degrees of positive caster and for really hard driving and high speed runs we recommend between 7 to 10 degrees of positive caster.

One of the most unique parts of the design of the No Limit Wide Ride IFS is the large range of caster adjustment that the suspension system has built in. Before we ever make any caster adjustments, it is important to understand the three possible component configurations our IFS kit has.

**Terminology:**

- **Short vs. Long Arm:** Our UCA's are designed so that they can be flipped or rotated from side toside. One arm of the UCA is actually longer than the other. This gives us one way we can configure the suspension for caster adjustment. Our base setting is to have the short arm of the UCA towards the front of the vehicle. Reversing this and putting the long arm towards the front moves the upper ball joint towards the rear and thus increases the amount of positive caster. In the below figures, the long arm of the UCA is in black and the short arm is in blue. If you are unsure which arm is which, simply measure the length of both arms to determine which one is longer?
- **Wrench Flats Forward vs. Rearward:** As mentioned earlier, the cam tube moves in such a way that we can use it to adjust both camber and caster. The configurable part of the cam tube is whether the wrench flats are on the front or rear side of the cam tube. Our base setting for this iswith the wrench flats on the rear side of the cam tube. With the wrench flats back you will overallhave more positive caster than with the flats forward. In the below figures, the wrench flats are highlighted in green.

**Three Configurations:**

| | Base (1) | Middle (2) | Max (3) |
|---|---|---|---|
| **Configuration** | Short Arm Forward,Wrench Flats Back | Long Arm Forward, Wrench Flats Forward | Long Arm Forward,Wrench Flats Back |
| **Caster Range** | +3 to +6 | +5 to +8 | +7 to +10 |
| **Ideal Use** | Street | Autocross | High Speed Runs |

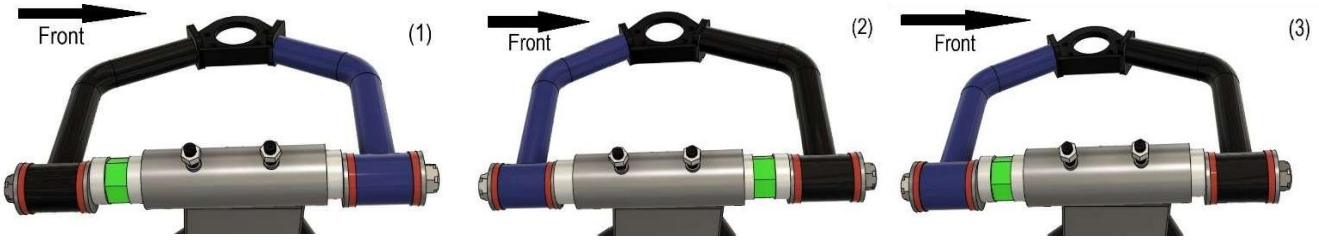


**Figure #9:** Max configuration with the long arm (black) forward and the wrench flats (green) toward the rear.

**Caster Adjustments:** Once you have picked which range of caster you want, it can then befine-tuned simply by loosening the jam nuts and set screws for the cam (exactly how you did toadjust camber) and this time the cam can be slid forward (decrease caster) or rearward (increase caster). This can be better seen in the difference between figures 10 and 11 below.


**Figure #10:** Demonstrates the position of the cam so that it is slid forward thus reducing caster angle.


**Figure #11:** Demonstrates the position of the cam so that it is slid rearward thus increasing caster angle.

**Toe:** Finally, the last adjustment to the suspension system to be made is toe in/out. This defines the amount inward or outward the front of the tires point. Adjusting toe in/out determines how to steering of the vehicle feels. Toeing inward (front of the tires pointing inward) stabilizes the steering to give more a cruiser, steady driving car. Toeing out (front of the tires pointed away from the vehicle) increases the vehicles turn-in responsiveness. This will make the vehicle steer quicker and feel much more responsive in corners. Typically we like to set toe somewhere between $\frac{1}{8}$" in or out for normal driving. If you are planning to autocross the vehicle, typically we will toe OUT approximately $\frac{3}{8}$". This measurement is the difference in widths measured between the fronts of both tires and the rears of both tires.

When setting up the steering system for the first time it is EXTREMELY important that the steering rack is centered so that the turning radius is equal in either direction. We do this by turning the rack to a full stop in one direction. We will then put a mark on the input shaft of the steering rack and count how many turns the input shaft makes from a full turn one way to a full turn in the other direction. Take the total number of turns, divide it by two, and then turn the input shaft (starting from full lock in either direction) and turn it back the amount of turns that was just determined. This will allow the steering rack to have equal travel in either direction.

Once the rack is centered, toe can be adjusted by turning the steering arm that threads into the tie rod end by using the machined flats on the steering arm. **There is no need to remove the tie rod end from the spindle to adjust toe.** Simply loosen the jam nut and screw the steering arm in or out to achieve the desired toe setting.

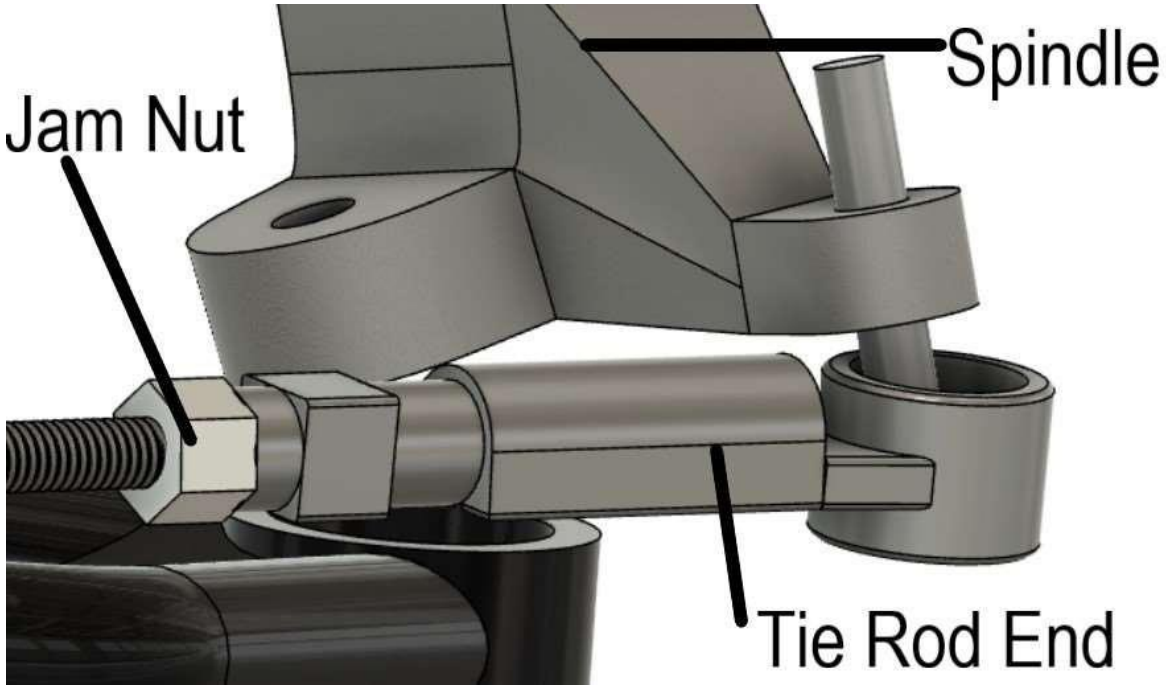


**Figure #12:** Diagram showing tie rod end, jam nut, and steering arm.

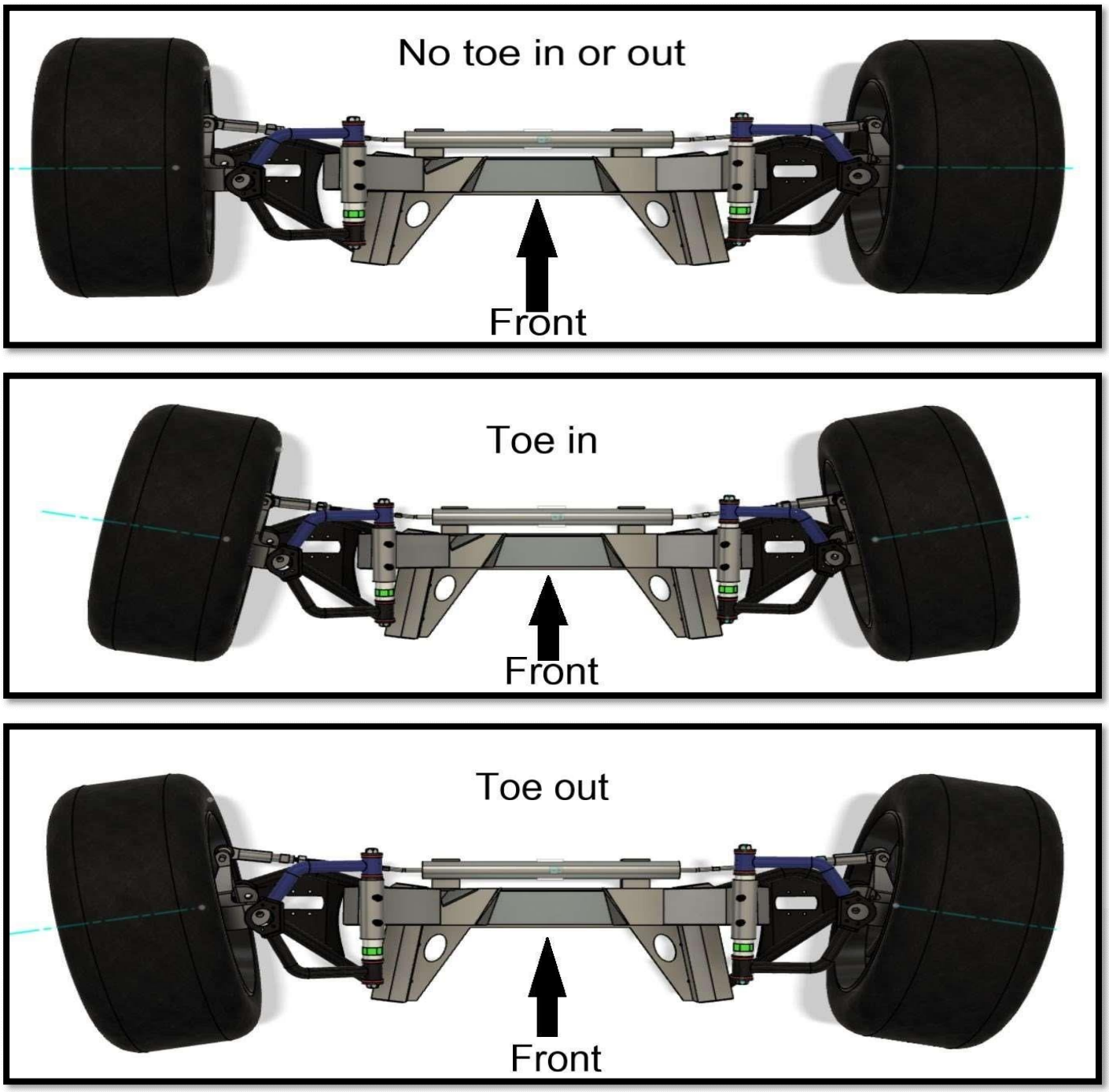


**Figure #13:** Demonstrates the difference of no toe in or out (top), toe in (middle), and toe out (bottom).

**Note:** The three pictures above are solely a visual representation and the amount of toe in/out was greatly exaggerated to make for a better visual.

| Suspension Setup Reference Guide | | | | |
|---|---|---|---|---|
| | Camber | Caster | Toe | Recommended configuration |
| All Street | $-\frac{1}{2}$ degree | 3 to 4 Degrees | Up to $\frac{1}{8}$" in or out | Base |
| Mostly Street/ Some Autocross | $-\frac{3}{4}$ degree | 4 to 5 Degrees | $\frac{1}{8}$" Out | Base |
| Mostly Autocross/ Some Street | $-1$ degree | 6 to 7 Degrees | $\frac{3}{8}$" Out | Middle |
| High Speed Runs | $-\frac{1}{2}$ degree | 8 to 9 Degrees | $\frac{1}{8}$" Out | Max |

**Note:** The above values are simply a starting point. For the best performance fine tuning of these parameters may be beneficial both to handling capability and driver feel.