Flyin' Miata

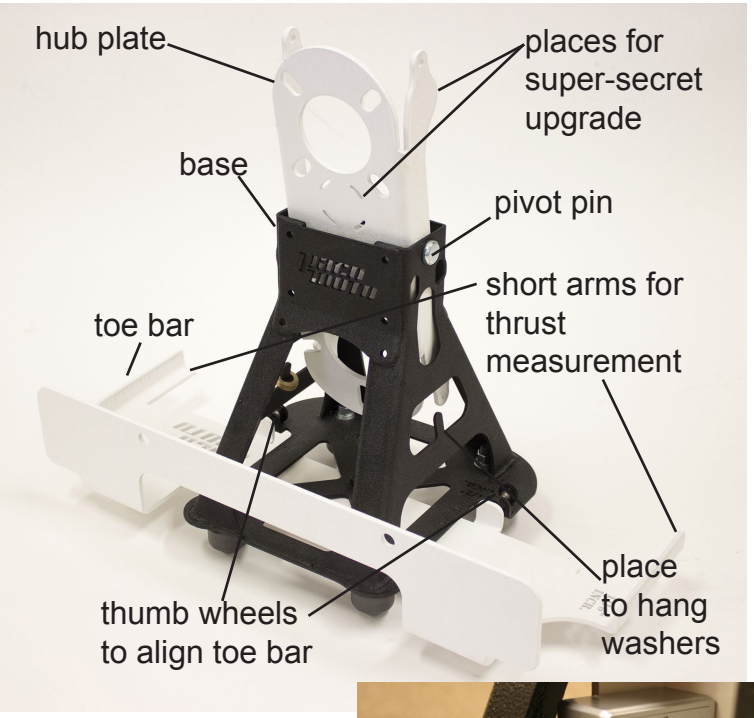
Hub Stands
35-70050

Congratulations on your new Flyin' Miata hub stands! These tools will make setting up your suspension much easier.

First, assemble the stands as shown - with one exception. Leave the toe bar off for now (keep reading). The hub plate has two bolt patterns on it, use the correct end for your car.

When installing the stands and after, be aware that the car can roll around on the stands. In other words, don't use these on a hill!

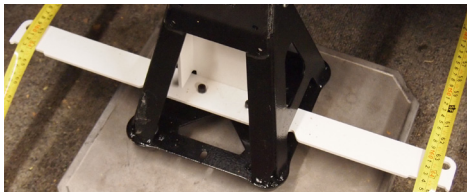
The toe bar can be used by itself to measure toe. Remove the toe bar from the stand, then press the toe bar flush against the side of the tire on both sides of the car. Finally, measure the distance between the fronts of the two toe bars and the rears (as described below). The difference is your toe.



The extra piece at the top is for a future improvement which will make adjustments dramatically easier. Stay tuned! It'll be available as a standalone upgrade that will work with your stands.

Adjusting the toe bars

Begin with the toe bars off of the stands. Press them against the tires and measure the toe. Again, the toe is the *difference* between the front and rear measurements. Be sure to record whether the front or rear is longest. Remove ONE wheel, bolt the toe bar onto the hub stand (snug but not tight), and install the hub stand. Be sure the steering wheel doesn't change position. Match the toe measurement you found with both toe bars against the tires. Use the thumb wheels to rock the toe bar back and forth until you have the correct numbers. Again, you're looking to match the *difference* - the actual number will be different from what you measured the first time, but you should be able to match the front:rear difference. Now, install the second hub stand (bolt the toe bar on first), and again match the *difference*. Once that's done, your toe bars are adjusted properly.



To install the hub stand, simply remove the wheel and bolt the hub stand into place. Use your existing lug nuts and the included washers. Be sure that the hub plate sits flush. If it interferes with something (e.g., the hardware for two-piece rotors or a bolt holding the rotor on), use washers (or something) to space the hub plate out enough to eliminate the interference. Be certain that the plate is still parallel to the rotor.

How to align your car with our hub stands

These instructions are Miata-specific. If you are working on some other car, the methods of adjustment (or even the possible adjustments) will vary. Our suggested alignment is on the last page.

Alignment on the Miata is set using the two alignment cams on each lower control arm. By rotating the cam, you can move the control arm in and out. You will need some sort of angle measuring device to check caster and camber, such as our digital angle gauge or a smartphone with an appropriate app. Bubble gauges can be used, but are difficult to use accurately. Be sure both ends of the car are at roughly the same height during the alignment.

Front

On the front, start with the caster. Turn the steering wheel 3/4 of a revolution off center in one direction. Check the vertical angle of the hub plate (as if you were checking the camber), then turn the steering wheel 3/4 off center in the other direction. Check the angle again. The sum of the two angles is your caster angle. Caster is adjusted with the rear cam on the control arm. By moving the arm further out, you will increase the caster. Adjust it to your desired value.

Once you have the caster set, it's time to do the camber. This is done with the wheels straight. Use the forward cam to adjust the camber. Moving the arm further out will increase the amount of negative camber. Check the caster occasionally, as the two adjustments will affect each other somewhat.

With the camber and caster set, it's time to set the toe. This is adjusted with the tie rods coming from the steering rack. Get your steering wheel centered, then measure the toe with a pair of tape measures - hook one end on the toe bar on one side of the car, then measure the distance to the other. The difference in measurements is your amount of toe. If the front measurement is smaller than the rear, you have positive toe or toe-in. Shorten or lengthen the tie rods equally to adjust the toe.

Rear

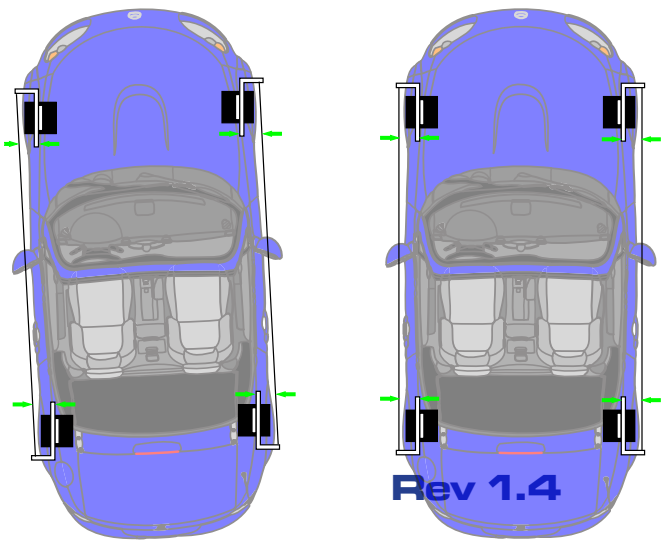
There is no caster measurement for the rear wheels, so start with camber. On 1990-05 Miatas, you'll have to adjust both of the alignment cams to set the camber, turning them both the same direction. On 2006-15 models, camber is adjusted with the rear cam.

Once the camber is set, turn your attention to the toe. This is easily set on the 2006-15 cars using the forward cam. On a 1990-05, you will have to again use both alignment cams. This time, you can adjust them in opposite directions - by making the same adjustment on both cams in opposite directions, you will make a minimal change to the camber. On 1990-05, you'll want to double-check the camber.

Thrust angle (refer to Appendix B for older hub stands)

Thrust angle refers to the angle of the wheels relative to the chassis. If the thrust angle is off, the car will not run straight down the road. It's primarily set with the rear wheels. Start by making sure that the steering wheel is straight.

With our latest design, the thrust angle is much easier to measure. First, find a string and tie it to the arm with the graduations (part of the toe bars). Tie the string to the end farthest from the other hub stand, as shown - be sure it's tied in the exact same location on the graduations or the measurement won't work. Next, run it to the same place on the other hub stand, on that same side (as shown). Do this for both sides. Measure the distance from the string to the other side of the same toe bar for both sides of the same end of the car (as shown with the green arrows). This measurement should be the same - if it's not, adjust the toe on



both sides by equal (but opposite) amounts until it is. The front-rear comparison is irrelevant, only the side-to-side matters. The picture on the left shows a bad thrust angle, the right shows a correct thrust angle. Double-check the toe once the thrust is set.

When you're done, tighten all the alignment cams good and tight. Mazda gives a torque setting, but they can slip unless you crank them down as hard as you can. Don't use a 4' breaker bar, but do get them as tight as you can by hand with your normal wrenches. If you suspect the cams may be slipping, mark their positions before you put the wheels on.

FM alignment specs - These are what we recommend for most Miatas, other cars or unique setups may use different numbers.

Front:

Caster: 5.0°

Camber: 1.0° negative

Toe-in: 1/16" total (1/32" per side)

Rear:

Camber: 1.5° negative

Toe-in: 1/16" total (1/32" per side)

Conversions:1/16" toe = 0.15° = 9 arcminutes

Appendix B: Adjusting thrust on older hub stands

The new Hub Stands make this much easier, and the specific parts that make it easy are available as upgrades for older stands. Seriously consider simply upgrading to the current spec. If you need to do it now, here's how:

You'll need to measure from the toe bar to a symmetric point on either side of the chassis, such as the edges of the subframe. You want to be sure that the toe is symmetric from side to side - e.g., if you have 1/8" total toe-in, you want 1/16" on each side, not 1/8" on one side and 0" on the other side.

To check the thrust angle, meaure from the front of the toe bars to your symmetric points on either side. The distance should be the same on each side of the car. For the rear, if it's off, you'll have to adjust it until it's the same on both sides and still the overall value you want.

In the front, make sure the steering wheel is straight first, then check the toe in the same way, with symmetric points. If it's off, the wheel will be crooked. Again, be sure the values are the same side-to-side, abd your overall value is correct.