

# Soap Box Set Up, Safety, and Tips

## Disclaimer

The following compilation of items come from various sources with no verification to their accuracy. Many items came from the Detroit Metro Soap Box Derby or directly from AASBD. As the rule changes continue to accumulate some older tips, recommendation, or suggestions become partly obsolete. It is strongly suggested that before following any of these tips, you read through and fully understand the rules for the current race season. When in doubt check with: [www.aasbd.org](http://www.aasbd.org)

## Safety

Check the steering, brake system and the general construction of the car to make sure there are no apparent safety problems with the car.

### **Brakes:**

With the driver in the car, make sure that the brakes work and he/she can easily stop the car. (Give the car a gentle push on a flat surface to make this check.) The derby car should have a new brake pad installed to start the race.

### **Steering:**

Make sure the car turns in the same direction the steering wheel turns. Make certain the steering is easy to turn though not too loose or too tight.

### **Weight check:**

Make sure the car + the driver + the wheels do not exceed the total weight specified for the division. In addition check the weight balance to make sure it conforms to the standard for your Local race.

## Set up & Tips

### **Rear axle alignment**

Check the alignment (triangulation) of the rear axle to the center of the front kingpin. The measurement must be the same at both ends of the rear axle square stock to the center of the front kingpin. The construction plans describe how to make this adjustment. This is normally completed during the construction of the car.

### **Alignment of the front axle**

Check the alignment of the front axle to the rear axle. This is also described in the construction plans. Make certain the steering wheel is straight when performing this check. The steering cable should be reasonably tight. If the axles are not parallel to each other when the steering wheel is straight, then you must adjust the front axle cable adjusters until the axles are parallel.

### **Crossbind**

Crossbind is when the car is in a twist, because the axles are not parallel to each other horizontally. This means that on a level surface, all four wheels will not touch the ground at the same time. The two diagonal wheels touching the ground are carrying most of the load. Soap Box Derby drivers prefer to have the load distributed equally to all wheels.

To check for crossbind, place the car on a level surface and raise the front of the car slightly off the ground. Now lower the car until one of the front wheels just touches the ground. If the other front wheel is still off the ground, the car is in a twist normally referred to as "crossbind." This is normally completed during the construction of the car. To correct for crossbind, you may add one shim under one side of one of the axles, (near the kingpin) to adjust and remove the twist.

### **Spindle alignments**

The spindles are the rounded end sections of the axles that hold the wheels. Making spindle alignments is the process of adjusting the camber and toe in of both axles. Before attempting to make spindle alignments, the car must be at the specified weight for the division, the weight balance set and all alignments completed as described above.

When weight is placed on an axle, the ends of the axles (spindles) tend to bend upwards. This causes your wheels to be slanted inward at the top, resulting in uneven load on the wheel bearings, which will slow the car down. As the car travels down the track, some bouncing can be expected, both up and down as well as the axle pulling back because of the forward motion. It is not uncommon for a new axle, at driving weight, to be bent up and out of parallel by at least .025 (twenty five thousandths of an inch).

The spindles on all four wheels may be adjusted and bent so the wheels are level and perpendicular to the ground when the car is at total weight with the driver in the car. You should normally set the spindle alignments within .000 to .004 down and the same dimension forward to compensate for the forward motion of the car. Note: Most racers do not camber their spindles as they do not have the necessary facilities to do so. Be very careful if you attempt this adjustment. Detroit Metro Soap Box Derby tested a car before and after cambering and they did find a slight reduction in rolling resistance, but also noted that it doesn't make much of a difference.

## **Spindle Polishing**

The following is a quotation from the **AASBD's "Lets Go Racing"** stock car assembly plans/rules. "You may polish the axle spindles with very fine grit sandpaper." Now you know it is legal to do so, but the plans never tell you why or what benefits you'll realize. Here is why you should polish your spindles.

Many racers feel that the wheel bearings need to be free to move somewhat on the axles to reduce bearing binding. Most of this movement is a back and forth sliding motion lengthwise along the spindle. This can happen since the bearing recesses in the two halves of the wheel are almost never in perfect alignment as assembled. This causes the two bearings to be on slightly different axes. So when the wheel rotates, the two bearings fight each other. Also, some bearing assemblies wobble as they roll due to manufacturing errors. Such wheels with misaligned or wobbly bearings generate increased rolling resistance, and that limits the speed of your car. By polishing your spindles, you can reduce rolling resistance.

To reduce rolling resistance, racers polish the 1/2-inch diameter spindles with very fine emery paper; usually beginning with 600 followed by successively finer grades, such as, 800, 1200, 1500, and 2000. They then clean off all the residue, and oil or grease the spindles. This allows the bearings to move about slightly on the spindles with as little resistance as possible if the bearings are wobbly or are not perfectly aligned in the same wheel. (The instruction manual that came with the car explains how a do it yourselfer polishes the spindles.)

## **Weight & Balance**

Theory is that a heavier car is faster because it has more energy and that the floor type weights that AASBD sells stiffen the spring motion of the floorboard also increasing speed. The reason ballast is added to achieve a standard weight is to ensure a fair race for as large a weight range of drivers as is practical for each division. Total weight allowed for stock car and driver is 200# and for Super Stock car and driver is 230#. We use 2 scales, one under the nose and one under the tail and total them to calculate the weight.

There is another theory that if you start on a ramp like we do, then more weight in the tail is at a higher elevation and therefore gives the car more kinetic energy. Others argue that the additional rolling resistance on the rear wheels cancels any benefit from loading the tail with more weight. For our race the maximum difference in tail weight to front weight will be 15 #, meaning the rear can weigh up to 107.5# and front 92.5#'s for a stock car and driver weighing in at 200#'s overall. (122.5# rear and 107.5# front for Super Stock.) Driver position will affect the weight from front to back.

## **Driver Position**

Also, in stock and superstock cars, the fastest posture requires the driver to scoot back against the rear of the cockpit to prevent air from flowing down along the back and then being scooped into the opening, generating drag. However, this posture makes an unbalanced car tail heavy.

## **Cockpit Foam**

In both the stock and superstock cars, the front piece is mandatory as a face protector. The rear piece is optional. It is useful if you are trying to close off the rear of the cockpit for a small driver. The superstock rules also allow two sidepieces to close off the cockpit even more.

One club recommends a liquid contact cement (Weldwood© or Liquid Nails© )applied in two separate coats. Most of us used standard spry adhesive last year. If anyone finds a better solution, please share it with us. If you have a superstock and you are going to paint it, consider masking over the area of the lip where the foam goes. Gluing over paint doesn't work well because the glue tends to dissolve the paint and gives a weak bond.