

Toe Simplified

Toe is the pointing in or pointing out of the front wheels as viewed from the top of the car. If the front wheels point in, toward the engine, at the front edge of the wheels then you have toe in. If the front wheels point out at the front edge then you have toe out.

In general, racecars are set with a small amount of toe out. The toe out provides directional stability. Toe out pulls on the tie rods taking out the tiny clearances that are built into the tie rod ends. Depending on the type of car typical toe readings are 1/16" to 1/4" out for tracks under 1/2 mile in length.

Toe should be checked often as any contact with other cars or retaining walls is likely to change your toe setting. Changes in ride height can have an effect on toe as well.

Toe can be set with a pair of toe plates that are rested on the sidewalls of the tires. A tape is placed on the toe plates in front of the tire and an additional tape behind the tire. When using toe plates a smaller tape reading on the back tape indicates toe out.

For a very precise reading you can scribe a line in each front tire. Use a tire scribe and spin each of the front tires to get your straight line. You can then measure between the two scribed lines with a tape measure or with a toe bar. As with toe plates, a smaller measurement at the backside of the tire indicates toe out.

Some racers use a toe bar to measure the toe that lies against the sidewall on one side of the racecar. On the other side, this toe bar extends past the sidewall by a few inches. A tape is used to measure from the toe bar back to the sidewall. When this system is used a smaller tape reading at the front of the tire indicates toe out. You will notice that this is opposite the two other methods described above.

Set Toe Properly

You will get better more consistent results adjusting your toe in settings if you go the extra mile to eliminate variables. You must first decide which technique that you plan to use to take the measurements. Each technique offers different benefits and drawbacks. The methods discussed here will be the Toe Plate method, Toe Bar Method and Tire Scribe Method. If you understand each toe setting technique you will be assured of repeatable results.

Before you begin taking measurements you must insure that the car is race ready. Ride heights set, weight percentages correct, driver weight accounted for, bump steer set, camber and caster set, Ackerman set, air pressure set, stagger correct....you get the idea. You should also inspect the steering components and replace any that are worn or bent. Center up the steering before you begin. Center the drag link or rack so that the inner control pivots and inner tie rods are centered to each other. Tie rod lengths should be adjusted to match you lower control points if possible.

String the right side of the car to line up the right front to the right rear. By lining up the right side and starting with the right front in line with the right rear you will

eliminate any Ackerman effect that is in the car. If the wheels are turned away from straight when you take your toe measurement the Ackerman effect can add toe out that will not be present when the wheels are straight ahead. Take the time to string the right side and you will get more precise results. Make sure to settle the car and roll it forward just before taking a reading. By rolling forward the caster in the car will pull the front wheels take any clearance in your suspension components all in one direction. Be sure not to let the car roll back after you have rolled it forward. By rolling the car forward each time you will get more accurate repeatable results. Be sure to roll the car back then forward after each adjustment to relieve any pressure in the tire and suspension components.

When taking toe measurements that utilize the side wall it is a good idea to spin each front tire and mark the high spots on the side wall with a piece of chalk. Jack up the car and spin the RF wheel. Hold a piece of chalk on a jack stand about 1/8" away from the sidewall. Spin the tire and see if the chalk hits anywhere on the sidewall. If the chalk does not leave a mark then move the chalk gradually closer until you get marks on the high spots. Then find the uniform spots on the side wall and orient the tire so that those points will touch the Toe bar or toe plate when the car is on the ground. Lower the car and repeat the process on the other side.

Toe Plate Method: Toe plates offer fast and easy measurement of the front end alignment. When using toe plates be sure to have the toe plates resting flat on the ground and centered on the tire. You should always be sure to have the toe plates flat against the side wall. Make sure that the plate is up against the side wall evenly on both sides. Air up the tires so that there is not a bulge at the bottom of the tire in the center due to under inflation. Go the extra mile and mark the high spots of the side wall with chalk. Use a tape measure to check the back of the tire and the front between toe plates. The toe plate method should give you a smaller number at the back of the tire if you want to have toe out. Remember that any bent wheels or imperfections in the side wall will affect your settings.

Toe Bar Method: When using a toe bar make sure that the toe bar is held in the same place on the side wall each time on both sides of the car. Make sure that the toe bar is straight up and that equal pressure is place both front and back. Chalk the wheels and take your measurements. Measure the difference from the toe bar to the side wall on the back and on the front. To have toe out you will need to see a larger measurement on the back side of the tire. This is opposite of the toe plate and Tire Scribe measurement techniques. Any wheel run out or side wall imperfections will have an effect on your readings.

Tire Scribe Method: Start by scribing a line in each front tire. By spinning the tire and scribing a line with a tire scribe you will take out any variables to to bent wheels or side wall wobbles. Measure the front and back of the tire. A smaller number at the back side of the tire will produce toe out.

Regardless of the method used you should use care to adjust the tire rods equally so as to keep the geometry of the front end correct. Be sure to tighten all jamb nuts and other steering components as well as visually inspecting the steering system. All three methods can give you good results if you take your time and eliminate as many variables as possible.