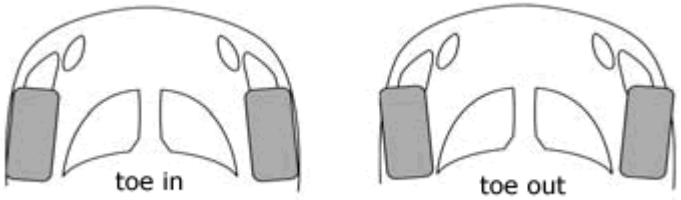
Toe-in / Toe-out



Looking on the axle from above, if the fronts of the wheels are closer to each other then the rears, this is called Toe-in. If the opposite is true, e.g. the rear side of the wheels are closer to each other then the fronts, this is called Toe-out.

Toe-in will produce high-speed straight line stability but will make the car a slow turner. You have to work harder to get into corners.

Toe-out will not help you for straight line stability. The car will be pretty nervous, but it will want to attack each and every corner. There is no such thing as the perfect setting for Toe-in / Toe-out. The ideal setting for a (semi)-professional race car driver might be horrible for you. Keep in mind, the more toe you set, the harder your tyres will wear!

Camber

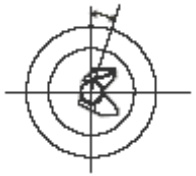


You will now have to look at the wheel from the front or the rear. The camber can be called negative if the top of the wheels are closer to each other than the bottom.

Positive camber is the setting where the bottom of the wheels are closer to each other than the top.

Where camber is concerned nearly every possible setting, the camber will be negative. The only question is.. how far should you go? The effect of negative camber might be loss of straight-line grip. As you're setting the surface of the tyre in an angle to the surface of the road, you are losing grip. But as soon as you enter a corner (which is the place where you lose most speed when track- driving), the surface of the tyre will deform and, when your setup would be 0 Camber, you'll lose grip. Having the car set with negative camber, the road surface contact will actually increase in the corner, thus improving grip. Exactly what you want!

Castor



This one is a little more difficult to explain.. You will have to look at the wheel from the side. The hub is behind the wheel and if you look at it, you will see that there's an angle between the top and bottom connection of the wishbones. This angle is called Castor. Castor is controlled by shims at the connection points of the upper front wishbone.

If the castor angle is too small, the car will feel very unstable at high speeds and will react very nervously on any steering action. If the castor angle is too big, the tyres will wear very quickly and you will lose grip in corners. The reason for this is that castor (on the front wheels) will produce camber as soon as you turn the wheels. Finding the right balance is key again.

I can hear you thinking now: 'The workshop I'm visiting has a very expensive test setup to do these alignments. How could I possibly do that on my garage floor?' The good news is - you can! The bad news is… it'll take you some time to get there. If you are serious about this, you could bring your car to this workshop to try a new setting you've figured out, but in the end, it

would cost quite some money. An optimal setup for a nice, warm, dry track is different to that for the cold, wet roads at home, so you might end up queuing at the workshop every week.

So it’s time to make a decision here. Are you going to try a handful of general setups during a season? You might opt for the workshop. If you would like to end up making your own setup per different track or according to weather, you could start investing in your own equipment. You could look at companies like www.longacreracing.com who are selling quite interesting low-budget solutions for Geometry modifications. If you search on the Internet, you will also find other companies, and also descriptions of doing a setup yourself using small ropes.

There’s one thing which is important to understand before you start. The floor you are doing the setup on needs to be level and you must put some weight in the driver’s seat (preferably something that matches your own).

One more thing: say you’ve added a shim in the front suspension. You’ve lifted the car, removed the wheel, done the shimming and built it all together again. After doing that you should check what you’ve done, but you shouldn’t just measure again after lowering the car! Roll it forward and roll it back again! The suspension needs to settle, and you do that while rolling the car back and forth.

Your car came out of the factory with what you’d call a general setup. Depending on what you want to achieve, there are a couple of different setups that you can use as a starting point to find your own. Lotus has released quite a few setups for the Elise, Exige and 340R. You can choose one of these as a starting point and start modifying from there. If you’re doing your own Geo for the first time, I’d advise you to take it step by step: e.g. first do the Toe-in / Toe-out until you’re satisfied with the behaviour. Next step could be the camber, etc.

It’s winter - a good time to start understanding all of this and preparing yourself for a new season. Once you’re able to do your own Geo, I’ll start nagging you about bump steer settings and springs and dampers.

This articel, written by Yvo Tuk, is taken from issue 2 of the Lotus Enthusiast, the magazine for SELOC Members.