



TECH TALK

Here, I would like to cover a few of the basic fundamentals of vehicle handling. Essentially, we would like to have an enormous amount of traction "grip" all over the track. Unfortunately, physics prevents us from having just that. There are, however, a few changes that can be made to get back to, or at least closer to a neutral setup, which may help you get around the track a little quicker. The two biggest complaints that I hear are "My car just will not turn!" "I have terrible understeer" or "I just can not seem to get rid of this push!" On the other end of the spectrum I will hear "My car is so loose!" "I have terrible oversteer" or "The back end just seems to want to come around" You should seriously consider trying one change at a time so that you may feel and better understand exactly what each adjustment has really done. Do keep in mind, if trying more than one change at the same time, smaller adjustments can be made due to the combination of changes.

Lets start with understeer, a situation in which you are having trouble getting your vehicle to turn. Conversely, Oversteer, a situation where your vehicle turns to well (the rear seemingly wants to break loose and cause a spin) you would be rectified by performing the opposite changes.

-Increase your front tire pressure by a few pounds.

-Decrease your rear tire pressure by a few pounds.

If doing just one of these does not work, play with a combination of the two. Example - If front and rear tires are all at 35psi, increase the front to 39psi, while decreasing the rears to 31psi. Doing this should definitely provide a change in your overall handling.

-Wider front tires, providing a larger front tire contact patch.

-Thinner rear tires, providing a smaller rear tire contact patch.

If making just one of these changes does not provide the desired effect, try a combination of the two. Example - If your vehicle comes standard with 245/40-18 tires on the front, and 285/35-19 tires on the rear, try going to a set of 255/40-18 in the front, and 275/35-19 in the rear. Understand that the first number indicates this tire is X millimeters across from the widest point of its outer sidewall to the widest point of its inner sidewall when mounted and measured on a specified width wheel. This measurement is referred to as the tire's section width. Because many people think of measurements in inches, the Xmm can be converted to inches by dividing the section width in millimeters by 25.4 (the number of millimeters per inch). $Xmm / 25.4 = \text{section width in inches}$

-Increase Negative Camber on the front wheels.

-Increase Positive Camber on your rear wheels.

Let me quickly explain Camber in case it has slipped your mind. Camber is the lean of the wheel. If the top of the wheel is tilted away from the car, that is referred to as positive camber. If the top of the wheel is tilted in towards the car, that is referred to as negative camber. Keep in mind that when adjusting Camber, it can cause a pull to one side or the other depending on the direction of the lean. The car will pull in the direction of the wheel with the most positive camber, so keep your adjustments even.

-Install Softer front springs.

-Install Stiffer rear springs.

When changing springs, consider a few things. Determine what the exact corner weights of your car will be (left front, right front, left rear, right rear) with the car at race weight (including the driver weight, fuel, oil, etc.). Spring rates are determined by the amount the spring deflects versus the weight placed upon it. As an example, a 250 pound spring rate is a spring which will deflect 1 inch for every 250 pounds placed upon it. This sounds

simple, but there's more: The actual suspension geometry can influence how much the spring deflects. You have to compensate for the geometry when determining the correct spring rate for your race car. Thus, this may be something effectively left to a suspension professional. But if you are a professional "Do-It-Yourselfer" I would recommend between 5lbs and 15lbs changes.

-Adjust the front sway bar to Softer settings, or install a smaller, softer front sway bar altogether.

-Adjust the rear sway bar to Stiffer settings, or install a larger, stiffer rear sway bar altogether.

Understand that normally, without a sway bar, when the car corners the weight of the chassis shifts toward the outside of the turn. This effectively will compress the springs on that one side. The springs on the inside would generally extend a little, or do nothing. Relatively to the chassis itself, it appears that the outside suspension compresses and the inside doesn't. A sway bar couples the suspensions on each side to each other, *AND* relative to the chassis. To explain; if you could put the car up on a lift and actually compress the suspension on one side by hand, then a sway bar makes the compression of one side also try to compress the suspension on the other. If it is still not really obvious why that's useful, I'll say the same thing a different way. A sway bar effectively increases the spring rate on whichever side is compressed the MOST. If the sway bar were ABSOLUTELY solid with no twist so there's a 100% coupling between each side, then an attempt to compress one spring actually becomes an attempt to compress both springs. It doubles the spring rate. If the bar has some twist, then it may only increase the spring rate by say 50% on whichever side is compressed the most. To sum it all up, a softer or smaller bar in the front would allow more roll, and increase the load on one side more, while stiffer or larger in the rear would decrease the individual side to side compression and even the load which has an increase on front tire traction.

Notice as we go on to more complex changes, I do a bit more explaining. As you get into changing components, smaller changes can have much more adverse effects, as well as unwanted effects on other components. To achieve the theoretical idea of a perfectly balanced chassis, there are a number of changes which can be made. Some in a minute or two, and others over a weekend. I personally recommend you always use high quality components, consider all safety aspects, and employ a professional whenever necessary. Good luck, and remember to be patient while learning how to get the most out of your vehicles handling ability.

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