

Corner Balance

What is it, why does it matter?

What is corner balance?

Corner balancing is the process of shifting the weight carried by each wheel to approach optimal values. Although some weight can be shifted between wheels by physically relocating parts of the car, the corner balance process is focused on shifting weight by adjusting the suspension spring height. Any relocation of parts should be performed before corner balancing begins.

Why corner balance?

A properly corner balanced car will handle evenly in left and right turns. Unbalanced handling occurs when front-to-rear weight distribution is not equal for left and right sides.

In a symmetric car out-of-balance is easily understood as excessive weight carried by one pair of diagonal wheels resulting in a teeter-totter affect. If the imbalance is extreme, one of the light wheels may be completely off the ground even at rest!

Street cars are rarely corner balanced and typically have no provision for adjusting spring height. That's because their spring rate is relatively low, perhaps 100 lbs/in. With such low spring rates it would take a huge imbalance in spring height to have a significant affect on corner balance.

Performance and race cars may have spring rates of 300, 400, 500 lbs/in and higher. Corner balance becomes much more important due to the high spring rates - small changes in height greatly impact weight carried. Additionally, we are much more concerned with handling and performance with race cars so corner balance becomes very important.

Corner balance goal

The goal of corner balancing is to have the same front-to-rear weight ratio for both left and right sides. Expressed as an equation, the target is -

$$\frac{LF}{LR} = \frac{RF}{RR}$$

Corner balance equation

This equation works for real-world cars that are asymmetric. With this equation in balance, the car will handle the same through left and right turns. That is the goal.

Notice that if the car is symmetric the diagonal weights targeted by the Corner balance equation are equal! If the car is asymmetric, the targeted diagonal weights are not equal.

How to Corner Balance

The process is to measure wheel weights and plug them into the Corner Balance Equation. In the real world the equation will never be in perfect balance. If the imbalance is outside acceptable range you will adjust one or more spring heights, re-measure the wheel weights and do another trial of the Corner Balance Equation. Repeat until the imbalance is brought to an acceptably low value.

Note that a car with a lot of [friction](#) or [binding](#) in the suspension components will not deliver repeatable corner weights. The friction will resist all suspension movement preventing the

corner weights from measuring true (also creates erratic handling). Fix any friction and binding before you corner balance.

Deciding which wheel to adjust is the key. Look at the left and right sides of the imbalanced Corner Balance Equation. Balance can be achieved by increasing weight of the front wheel of the low numeric side or increasing weight of the rear wheel of the high numeric side. Alternatively balance can be achieved by decreasing weight of the rear wheel of the low numeric side or decreasing weight of the front wheel of the high numeric side.

Which wheel you choose to adjust depends on how you wish to impact ride height. In general, adjust the wheel whose ride height varies greatest from your target height. Loading a wheel will raise ride height, lightening a wheel will lower ride height. If ride height is correct and corner balance is off, lighten one wheel and load another to maintain correct height.

The process is one of trial and error and with experience becomes intuitive.

As you consider which wheel to adjust keep in mind the following set of rules:

Rule 1 - You can't shift total weight between axles, $LF + RF = \text{Constant}$

Rule 2 - You can't shift total weight between sides, $LF + LR = \text{Constant}$

Rule 3 - You can shift total weight between diagonal measures, $LF + RR \neq \text{Constant}$

Rule 4 - Adjusting any one wheel weight will change all wheel weights