NASCAR Sprint Cup Series Primer

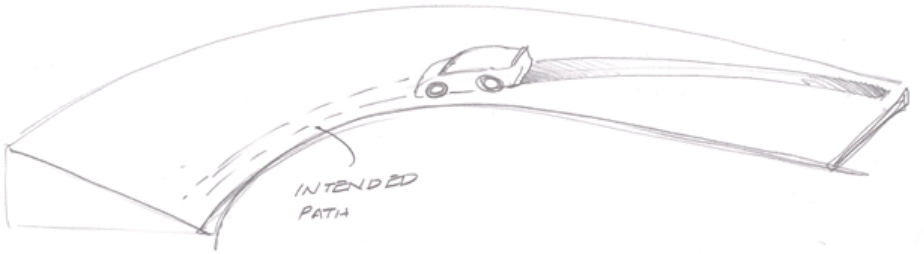
What to look for when watching the Bank of America 500 & other races

If you're new to watching NASCAR races, there are a few terms you should understand because commentators will say them over and over. The jargon includes words like loose, tight, wedge and track bar. All of these terms refer to how the car handles or how to change its handling. Though the actual analysis teams do before and during races to make their decisions is very sophisticated, the basic underlying idea behind how a car handles is pretty simple.

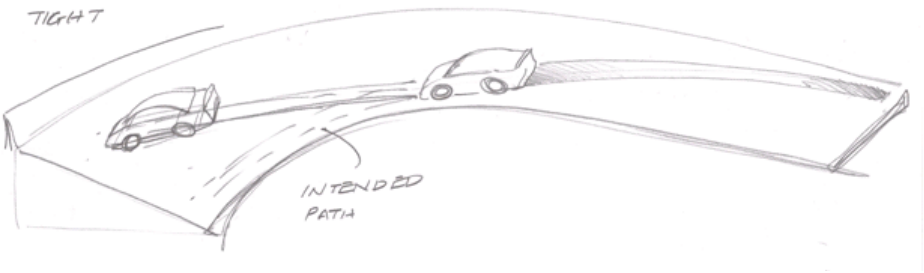
Loose & Tight Handling

The whole idea of racing is to drive at the very edge of control all the time. If you're not driving at the car's limits then another car is passing you. If you're over the limits then you wreck.

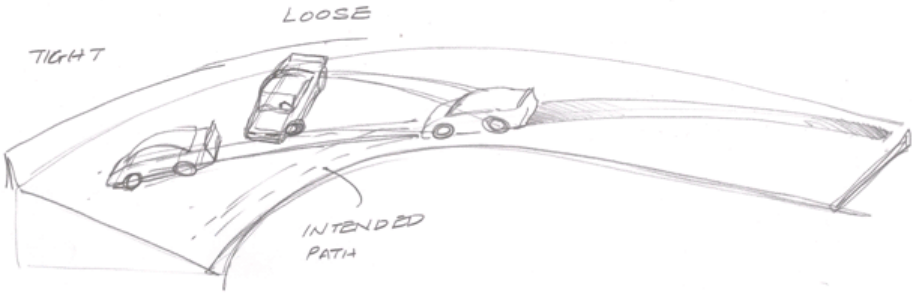
As a car enters a curve, the driver is targeting a certain path, but it doesn't always happen as planned. When drivers and commentators say the car is 'tight', they mean it is rotating less than expected. It under-rotates and heads for the wall instead following the intended curve because the front wheels don't have enough traction compared to the rear wheels.



Of course there is the opposite condition too. The rear wheels don't have as much traction as the front and the car over-rotates (spins out) as the back tires try to pass the front of the car. When this happens the car is 'loose'.



If a car is either loose or tight, the driver has to slow down to avoid wrecking. Other teams that have better balanced cars can drive faster around turns and probably get ahead in the race.



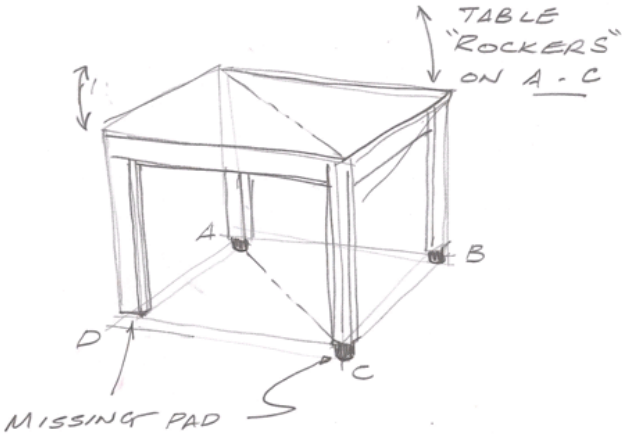
Diagnosing the Problem

So what is the right balance? Though there are literally thousands of small ways NASCAR teams can adjust the balance of their car, the underlying idea is pretty easy to understand. A pretty basic understanding is all you need to enjoy watching the teams compete.

During testing in the weeks and months leading up to a race, teams use very advanced and expensive data collection and analysis technology including:

- Wind tunnels to test aerodynamics and to route air around the car for cooling
- 7-post rigs that move and shake real cars exactly as if they were driving on any one of the tracks
- Sensors all over the car that collect and transmit data on temperature, pressure, torque, etc.

During a race however, the only real feedback for teams on how the car handles is from its driver. Listen during a race to hear how different teams communicate. Some of the best drivers literally tell the crew how the car handles at 6 distinct spots around every turn - entry, exit and 4 places in between. Once a team decides to loosen or tighten the car during a pit stop, they have to figure out which way to modify the car.



Weight Balance

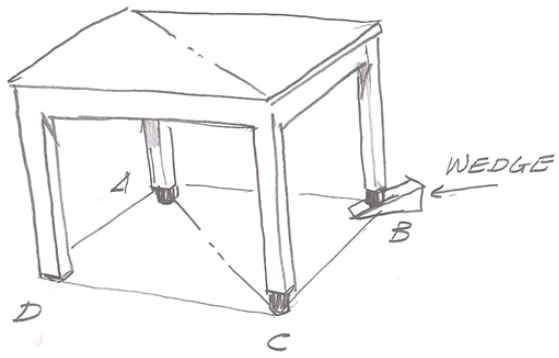
You can draw from your own experience to understand weight balance. Have you ever been to a restaurant where the table is 'tippy' because one leg is too short?

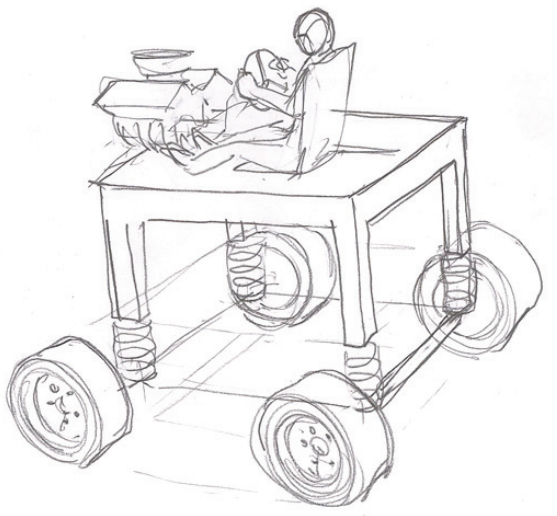
The table actually rocks on two of the legs, labeled A and C in the sketch. Theoretically, these two legs carry the entire weight of the table so there's no load on legs B and D.

You can easily fix the tippy table by placing a wedge under one of the dangling legs, B or D. Depending on the wedge you use and how you place it, the final weight distribution on all legs can vary a lot.

During a pit stop when you hear someone comment that they've "added wedge" to the car, this is essentially what they're doing.

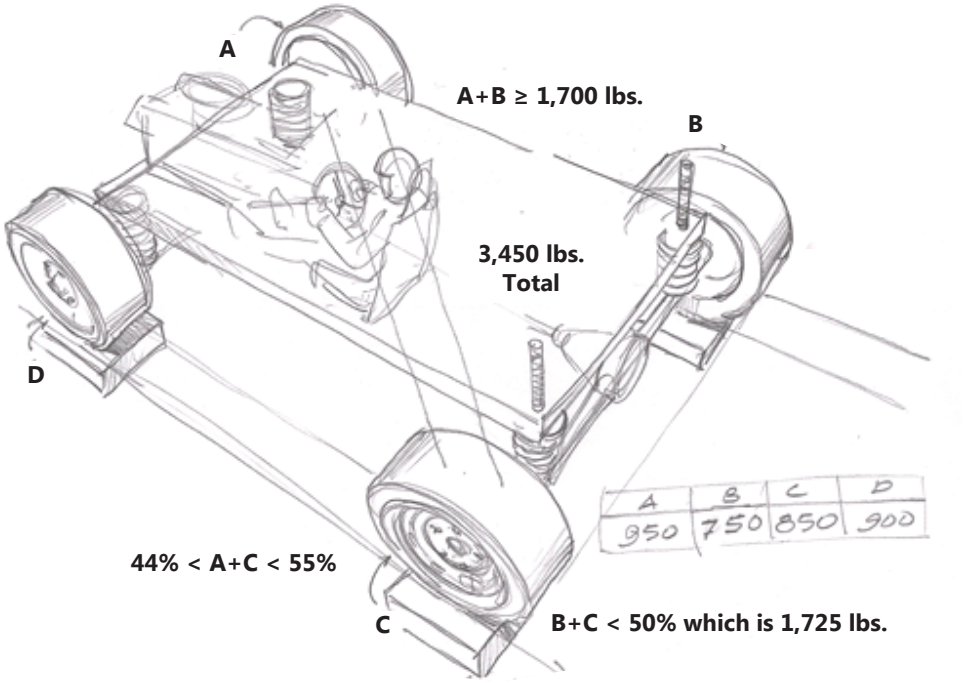
Now that you have a baseline idea of weight balance, we can begin to complicate our picture so it aligns a little better to NASCAR cars and teams. In a NASCAR race car, all four corners are sitting on springs which sit on wheels.





One more change completes the (somewhat silly) picture. The chassis does ride on a spring at each corner, but those springs are on top of wheel axles. We'll shorten the 'legs' from here on too.

The car is weighed by placing a scale (an oversized bathroom scale) under each wheel. The "weight balance" refers to the fraction of the total weight carried by each wheel.



There are rules about weight and weight balance in the NASCAR Sprint Cup Series. Cars are inspected just before races to make sure they adhere to these and many others:

- Total weight is at least 3,450 pounds including oil in the engine and gasoline in the tank.
- The back wheels, B and C, together must carry less than 50% of the total car weight.
- The two right side wheels, A and B, together must carry at least 1,700 pounds.
- The right front and left rear wheels, A and C, together may carry a combined weight between 44 and 55% of the total car weight. A plus C is also called "cross weight".

So if a driver says the car is loose, here is one possible fix.

Just as with the tippy table, this image shows the corner marked B 'jacked' up by putting a wedge under the leg. The same is done with a race car except instead of putting a wedge shaped object under the spring on corner B, the 'wedge bolt' or 'jack bolt' is screwed down having the effect of lifting the corner of the car. This increases the fraction of weight carried by B plus D and decreases the fraction of weight carried by A plus C.