



Ross Bentley's High Performance Driving Tips - #20

DRIVING THE LIMIT

How do you really know when you're driving right at the very limit, getting the very last ounce of speed out of your car (I'm assuming you are talking about driving on the racetrack or slalom course - at least I hope so!)?

First of all, this is one of the toughest aspects of driving to explain. Doing it (driving at the absolute limit) is easy - explaining how to in words, is not. In fact, if I could put down in words the exact components of driving at the limit, I would be a very rich man (which is a good enough reason to try!). However, by reading my comments you may find *your* key to driving much closer to the limit - what it takes for you to drive at the limit may not be the same as another driver.

I'll start with the obvious. Driving at the limit means having the tires at their very limit of adhesion (traction) at all times - during braking, cornering and acceleration. Think of dividing up your driving into those three phases: braking, cornering and acceleration phases. Now, we know that with most cars, we are nowhere near the limit of traction during acceleration at anything above first gear (how many cars can you spin the tires consistently in second, third, fourth or fifth gear?). Which makes the acceleration phase fairly simple.

However, remember from my previous article about the "friction circle" that there should be an overlap of the three phases. Overlapping the acceleration and cornering, and even more so the braking and cornering, is where the skill comes into play.

To drive the very limit, a driver must brake as late as possible at the traction limit all the way to the corner turn-in point, then as he/she begins the cornering phase, eases off the brakes (overlapping the braking and cornering to keep the tires at their traction limit) until at the cornering limit. At this point, the driver begins squeezing on the acceleration while unwinding the steering (again overlapping cornering and acceleration to stay at the limit of traction).

Now, if all this is done properly, you will be driving the car at the very limit of adhesion. And remember, at the limit, the tires are actually slipping a certain amount (how much is dependant on the type of tire), so don't worry if the car is sliding through the corner. As you are driving through the corner, the car should be sliding slightly, with you making very, very small corrections to the brakes, steering and throttle to keep the tires at their optimum slip angles, or traction limits.

But, *your* traction limit may not be as high as the next driver's. Why? Because you may not be balancing the car as well as the other driver. Remember that the better the car is balanced (keeping the weight of the car equally distributed over all four tires) the more overall traction the car will have. So, it is possible for you to drive your car at *your* limit and still have someone else drive your car faster. It all comes down to balancing the car.

For instance, did you ever wonder why Ayrton Senna was usually quicker than Alain Prost when driving for the same team? It wasn't because Senna's car was faster, or that he was braver, or drove a better line through the corner. It's certainly not because Prost wasn't driving his own limit. It's because Senna was able to balance the car so delicately, so perfectly, that his limit of traction was slightly higher than *even* Prost's. That allowed him to enter the corner at a fraction of a MPH faster, or begin accelerating a fraction of a second sooner, meaning he was also faster down the straight.

A driver is at all times receiving information from the car. The more sensitive you are to receiving that feedback, the more able you will be to drive the car at the very limit. People always talk about the feedback a driver gets through the "seat of his pants". Well, I don't know about you, but I have many more nerve endings in my head than in my rear-end! A driver receives more info through vision than through any of the other senses (smell and taste have relatively little to do with driving; hearing and touch a little

more). Imagine yourself looking at the roadway just over the nose of the car. Now, if the car begins to slide you will be looking in a very slightly different direction. But if you were looking farther ahead - almost to the horizon - you would notice a much larger change in sight direction. In other words, the farther ahead you look, the more sensitive you will be to very slight changes in direction, or sliding of the car. Much of the feel of driving comes from your vision.

Now to really answer your question of how to tell if you are driving the limit. The only way to really know for sure is to go beyond the limit. However, that can be a little hard on equipment - unless you are able to go beyond the limit and still catch it before you end up in the weeds. That's the really difficult part.

What I try to do every lap I drive is brake as late as possible (at the last possible moment and still be able to get the car to turn-in properly - which is a mistake many drivers make - braking so late they can't get the car to turn into the corner correctly), then enter each corner at a speed slightly above what I think is the limit, and then make the necessary corrections to balance the car as it slides through the rest of the corner, while beginning to accelerate as early and as hard (still gently to keep car balanced) as possible to maximize my straightaway speed. It's much easier to do than it is to explain.

Oh yes, and don't forget to drive the absolute perfect line - or at least within a quarter of an inch of it. Many drivers can do this for one corner, or one lap. But, to do this consistently lap after lap takes a rare skill. You can drive the limit on the wrong line - but you're going to be slow!

I hope I have at least got you thinking about what it takes to drive the limit. Like anything, it takes practise. And that's half the fun.

Ross Bentley, Senior Instructor, Driving Unlimited
Professional Race Driver