# Advanced Circuit Driving Techniques

## Article 7:
## **Pro vs. Pro:**
## Finding lap time gains in the most unlikely places

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Article 7: Pro vs. Pro – Finding lap time gains in the most unlikely places

### Nigel Greensall on why a corner sometimes isn't a corner.

"You're driving a Porsche GT3 RSR at 168mph around the banking of Daytona International Speedway. You're approaching the chicane. When do you brake? How hard? On a recent test day with a two times Porsche Supercup Champion, I realised our techniques were very different and that it was possible to gain time in an unexpected way.

Daytona is famed for its 31 degree banked corners, enabling NASCARs to exceed 200mph. The bus stop, half way along the back straight on the 24-hour circuit configuration, is often overlooked by drivers who see it as a standard two-corner chicane. I thought I'd compare my technique with the other pro driver to see if I gained any time using a different approach.

After all, even the best drivers in the world compare their data with team mates in order to go quicker. For example, F1 driver Mark Webber famously used Sebastien Vettel's data in order to find 0.5 seconds in sector two at Abu Dhabi whilst he was fighting for the world championship.

For the most accurate comparison, the other driver and I drove the same 2011 Porsche GT3 RSR Grand Am Spec race car.


Looking at the GPS and video data there was no difference in the lines we drove or our sector times around the circuit, except for the bus stop chicane. This seemingly insignificant section enabled me to gain 0.3 seconds. How? Let's take it from the approach...


Figure 1 The Approach. As shown by the comparison video and data left (I am on the left, with the red border), both of us have the same speed at the end of the banked straight. However I am closer to the wall, which opens up my entry into the left-hander.

As you can see from figure 1, we are both travelling at 168mph as we approach the bus stop. (My video is on the left, and my data is the red line). The speed trace graph below the screenshots and the delta-t graph below that (showing difference in lap times in as we progress around the circuit) shows almost identical performance until this point.

The only difference now is in track position - I am edging the car closer to the wall. This opens up my entry to the left-hander and enables me to carry more speed. Steering right towards a concrete wall at 168mph whilst looking to a left turn ahead takes some getting used to, but track position is the key to speed. You might think you are making full use of the entire width but it's important to look back at your video and data to see if you really are.


Figure 2 Apex of bus stop left-hander. I am using slightly more of the kerb and carrying 9mph more speed

## The braking zone

It is usually in the early part of a corner that the most gains and improvements can be made and this example is no exception.

The extra speed I have been able to carry by getting as close to the wall as possible before turn in has paid off when you look at figure 2, showing the first apex of the chicane. As shown by my video in the left screenshot, I am also making more use of the kerb, straightening out the corner as much as possible.

But the crucial element is trail braking, which enables me to hit the first apex at 97mph. The other driver braked in a straight line before the bus stop. This brought his speed down to 88mph, as he treated the chicane as two corners and coasted between them. However I am looking at the whole section up until the second apex as a braking zone, modulating my brake force as the car rounds the corner.

As I come down the straight and turn towards the first apex I apply the brakes at 100% pressure, then reduce the force to 30% to keep the car balanced (keeping on the brakes hard on the approach to the corner would spin the car), and then increase the pressure to 70% ready for the second apex.

As you can see by the delta-t (the bottom graph in figure 2) I'm beginning to make a gain here, as the blue trace of the other pro driver shows an increase in time in comparison to my red trace.


Figure 3 Entry to bus stop right-hander. Look at the g-force trace (the bottom graph). I am now braking heavily to scrub off the extra speed, whereas the other driver is coasting

## The bus stop

The trail braking technique compared to the traditional method is clear when you look at the G-force graph in figure 3. As you can see by the red trace, I apply the brakes hard at first, reduce the pressure for the first apex, and then increase the pressure again before the second apex of the bus stop – bringing the g-force to 0.7G.

The other driver (the blue trace) hits the brakes hard before the bus stop, but then coasts around the chicane at just 0.2G of braking force, having missed the opportunity for extra speed in the first section.

## Leaving the bus stop

On reaching the second apex of the bus stop the gains made by the extra speed carried through the first section are now clear from the delta-t.

## When a corner isn't a corner

As a driver you would usually see the chicane and brake for it as a normal left followed by a right. But this can mean braking too early. The second apex requires less speed but this doesn't mean you need to get down to this speed the corner before – a quicker lap time results in taking the speed off as close to the right hand corner as possible without coming off your line.

The key point is that I don't look at the bus stop as a traditional chicane, but more as a right hand corner with a curved braking zone. This means I scrub off only as much speed as required to get round it, and then continue the braking for the right-hander.

Of course, these techniques aren't just limited to the bus stop at Daytona. Any circuit featuring two corners close together is ideal for trying out this trail braking technique for a higher apex speed. The Knickerbrook chicane at Oulton Park and the chicane at Anglesey Coastal Circuit in the UK are comparable, as is Des Fagnes (Pif Paf) at Spa Francorchamps.

When you look at a track map don't necessarily accept the traditional approach as the fastest. Try to see where the important sections are, especially those that may appear to be insignificant. You can then use video and GPS data to look at your data and see where gains can be made, particularly when you compare with another driver."


Figure 4 Apex of bus stop right-hander. We now have similar speeds, but look at the delta-t channel at the bottom: I have gained 0.3s in this short section

"When you look at the track map, this section of Daytona appears to be fairly insignificant. But it's homing in on areas like this that enables you to find gains you would never expect."