NNJR "Trackside" Classroom

Advanced Braking Tips

Mario Andretti: "Its amazing how many drivers, even at the F1 level, think the brakes are for slowing the car down."

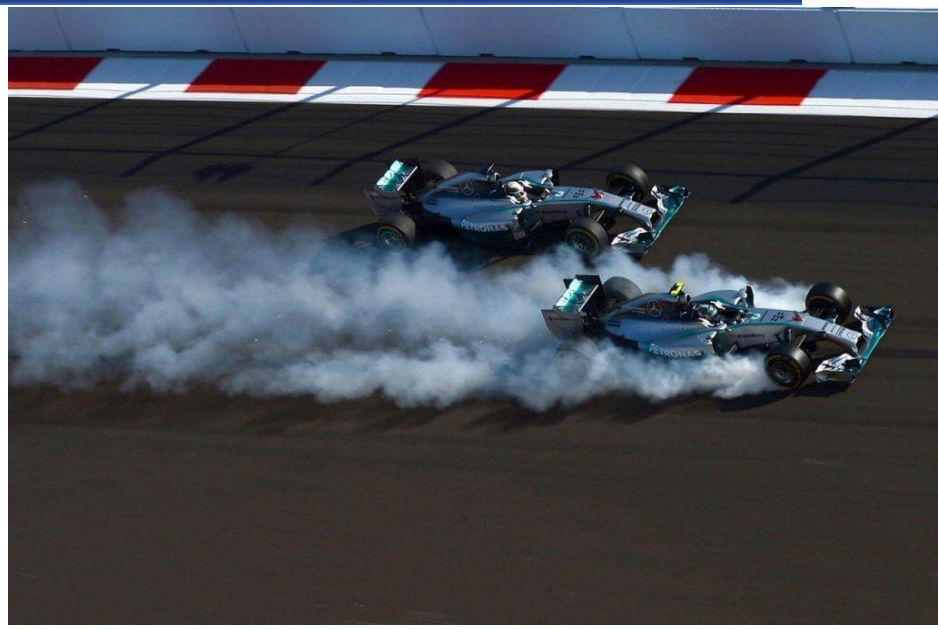
Disclaimer

The techniques shown here have been compiled from experienced sources believed to be reliable and to represent the best current opinions on driving on track. But they are advisory only. Driving at speed at Watkins Glen, Lime Rock, VIR or any other track, requires skill, judgment and experience. These techniques assume the reader has high performance driving knowledge and applies them as applicable to their level of driving experience.

High-performance driving can be very dangerous, carries inherent risks and may result in injury or death. NNJR and PCA make no warranty, guarantee or representations as to the absolute correctness or sufficiency of any representation contained herein. Nor can it be assumed that all acceptable safety measures are contained herein or that other or additional measures may not be required under particular or exceptional conditions or circumstances.

AGENDA

- Priorities
- The Braking Sequence
- Six tips
  1. ATP, not BOB
  2. Strong leg
  3. How much trail?
  4. EOB
  5. Timing, release
  6. Car Rotation
- Summary



"High performance driving is all about the correct timing, application of pressure, and release of the brakes."
-- Ross Bentley

Reminder: Corner Priorities

1. The line
   - i.e. the right one for you and your car
2. "Corner exit car control"
   - Maximize exit speed—and safety
   - "Throttle Application Point"
   - "Wide Open Throttle" (WOT)
3. Braking and entering the turn
   - Smooth transition from straight to throttle application point

Carl Lopez: *Going Faster!*

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Corner Entry Steps

1. Throttle to Brake transition
2. Straight line deceleration

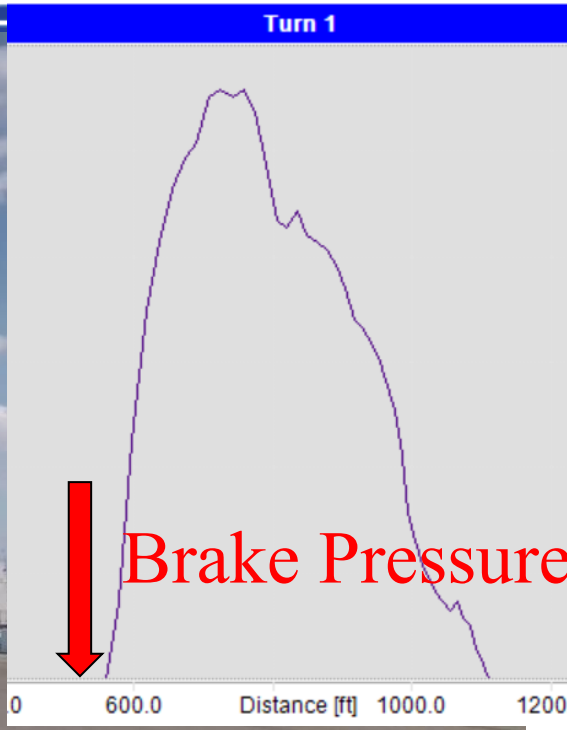
"2/3 of braking in first third of brake zone"
--Ross Bentley

3. Trail Braking (braking while cornering)
   - Most, but not all corners
4. Brake to Throttle transition

Carl Lopez: *Going Faster!*

"Priority/Focus
First third of brake zone: slow
Second third: downshift
Last third: release"
--Gunnar Jeannette

Heavy Braking Example

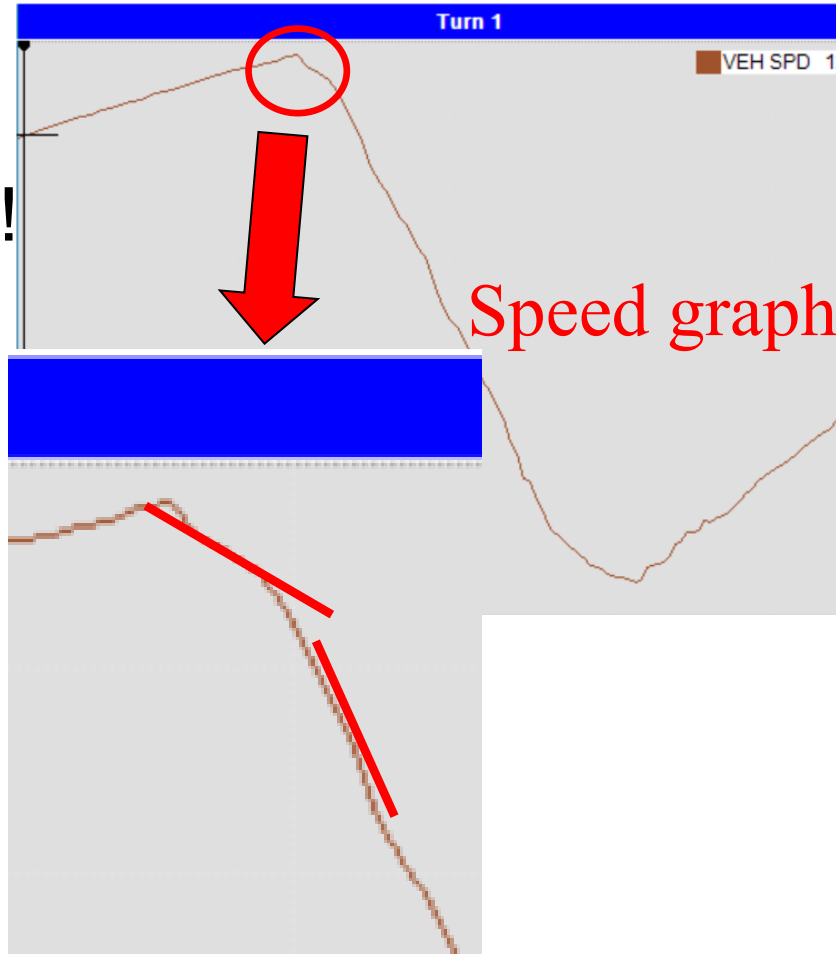


Begin Braking (“BOB”)
Or Accelerate to Point “ATP”

Tip #1: ATP, not BOB

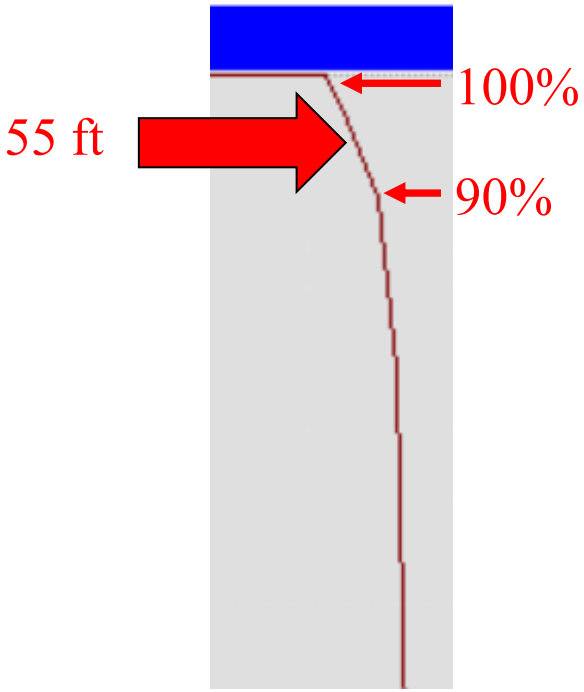
- Beginning of Braking (BOB) **should be** same as Accelerate to Point (ATP)

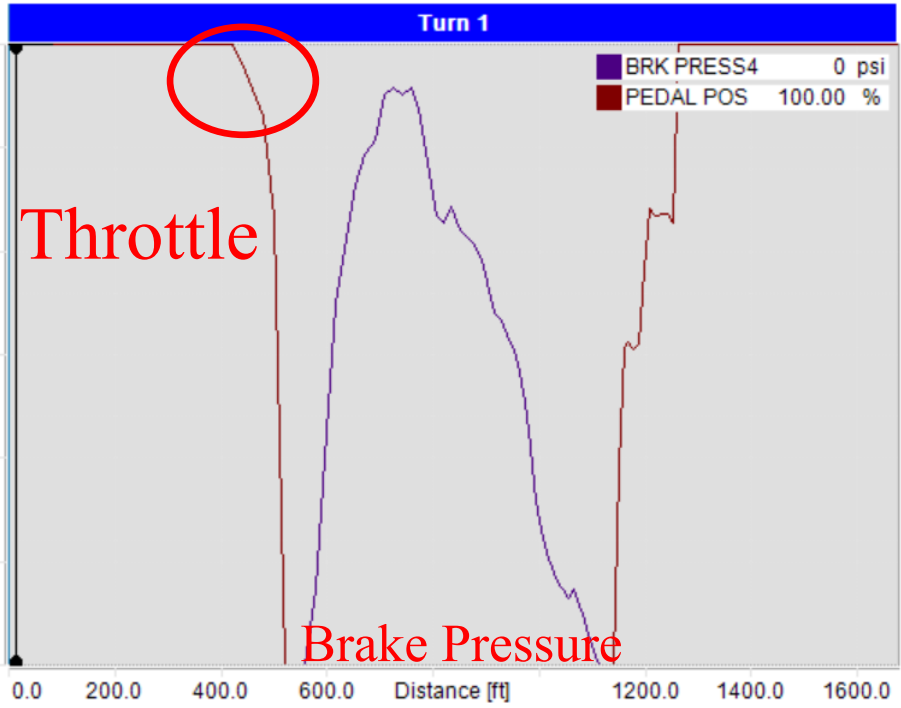
- But many of us coast between!
  - Look at speed graph or long g
  - Or throttle and brake traces



What is the Cause?

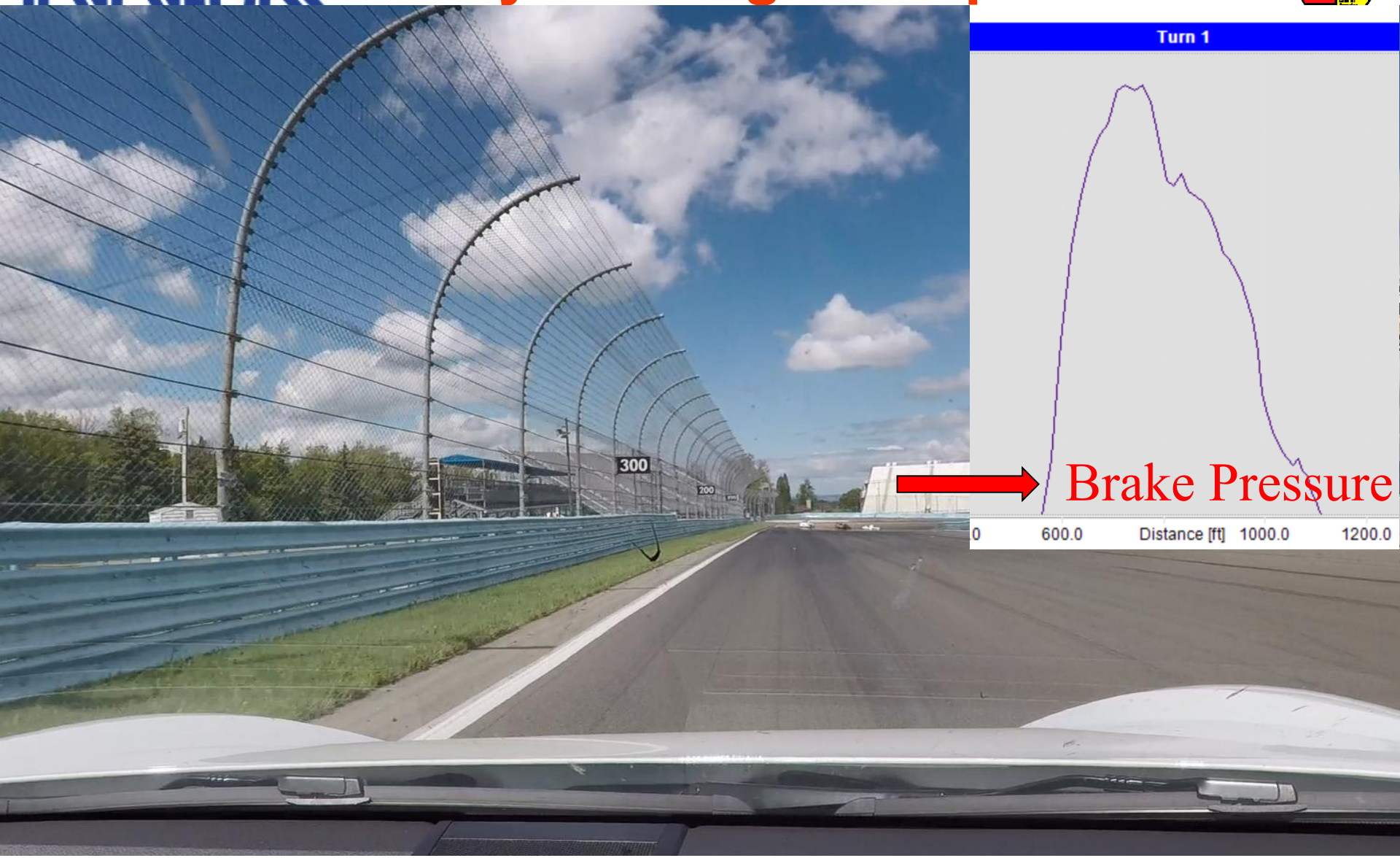
- >50 ft gas <100%



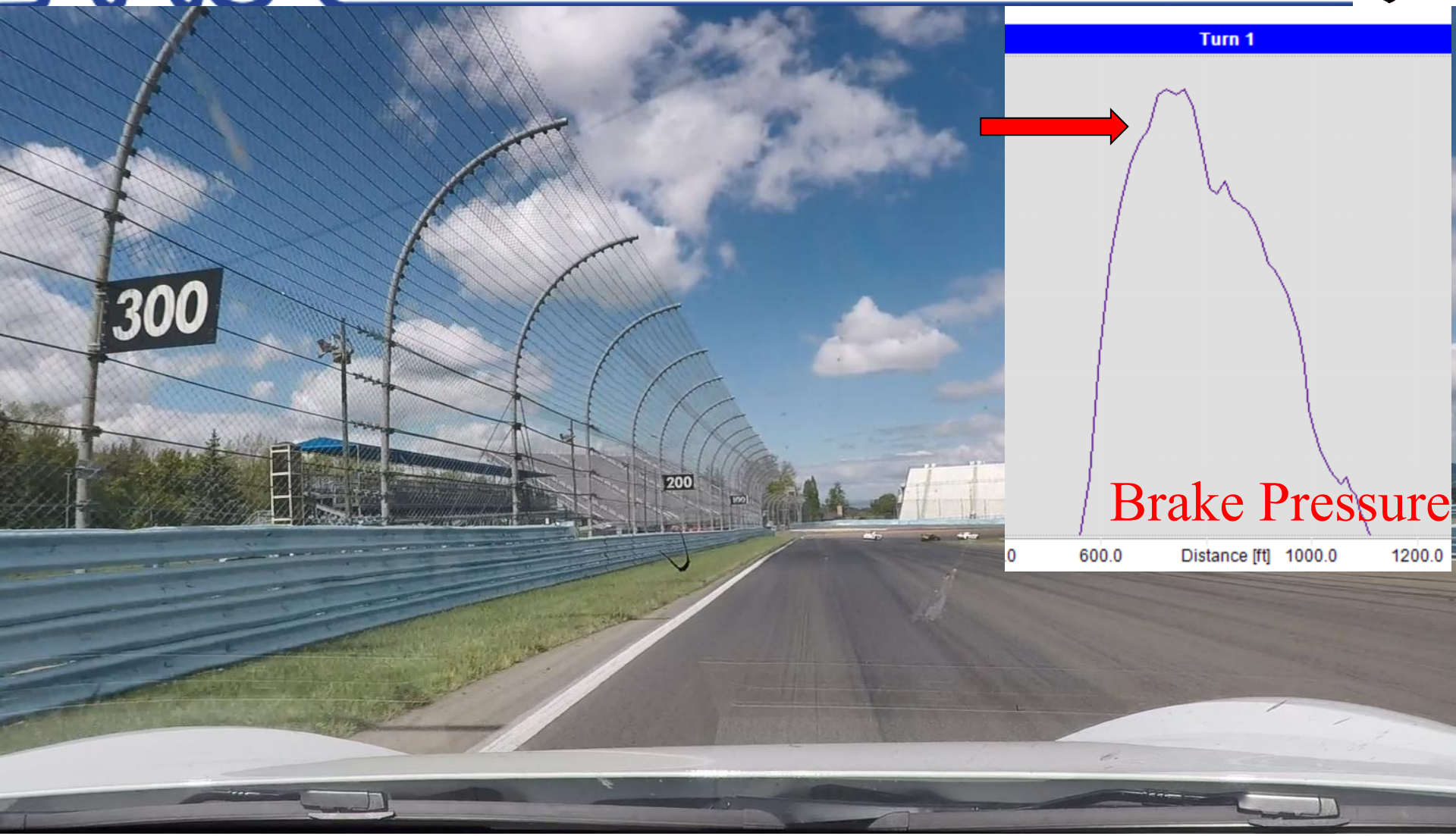


- Note:
  - 90% Gas => 0% in 40 ft
  - 0% Gas => + Brake in 35 ft

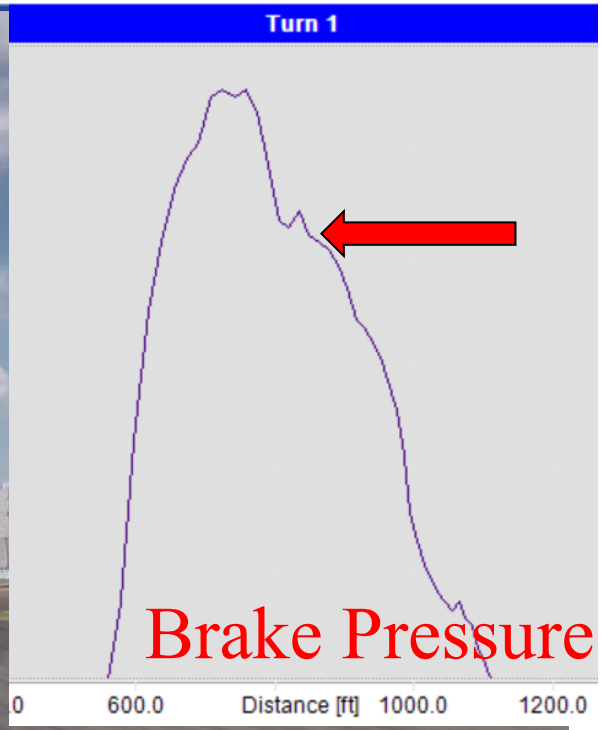
Heavy Braking Example



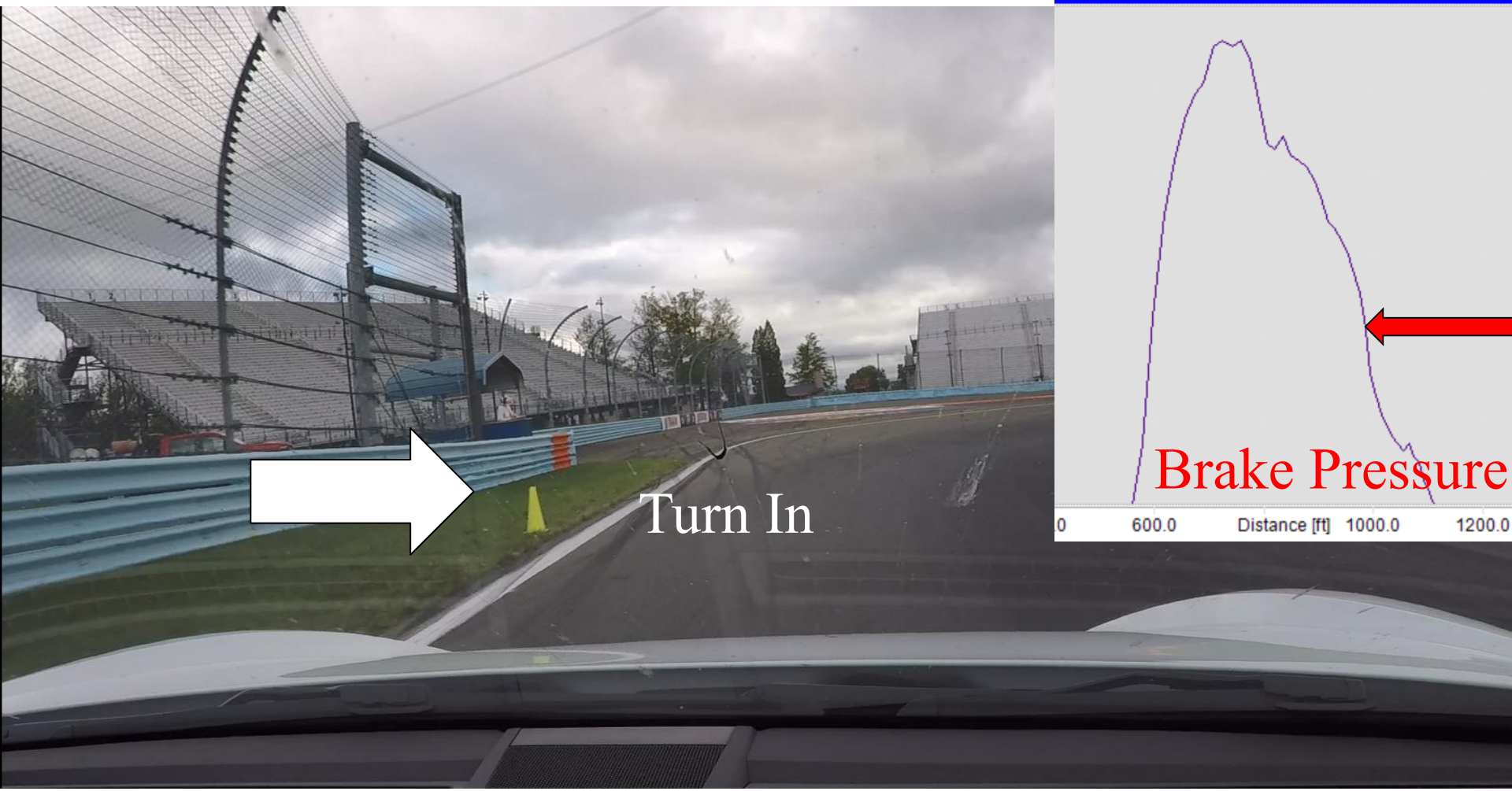
Full Brake Pressure



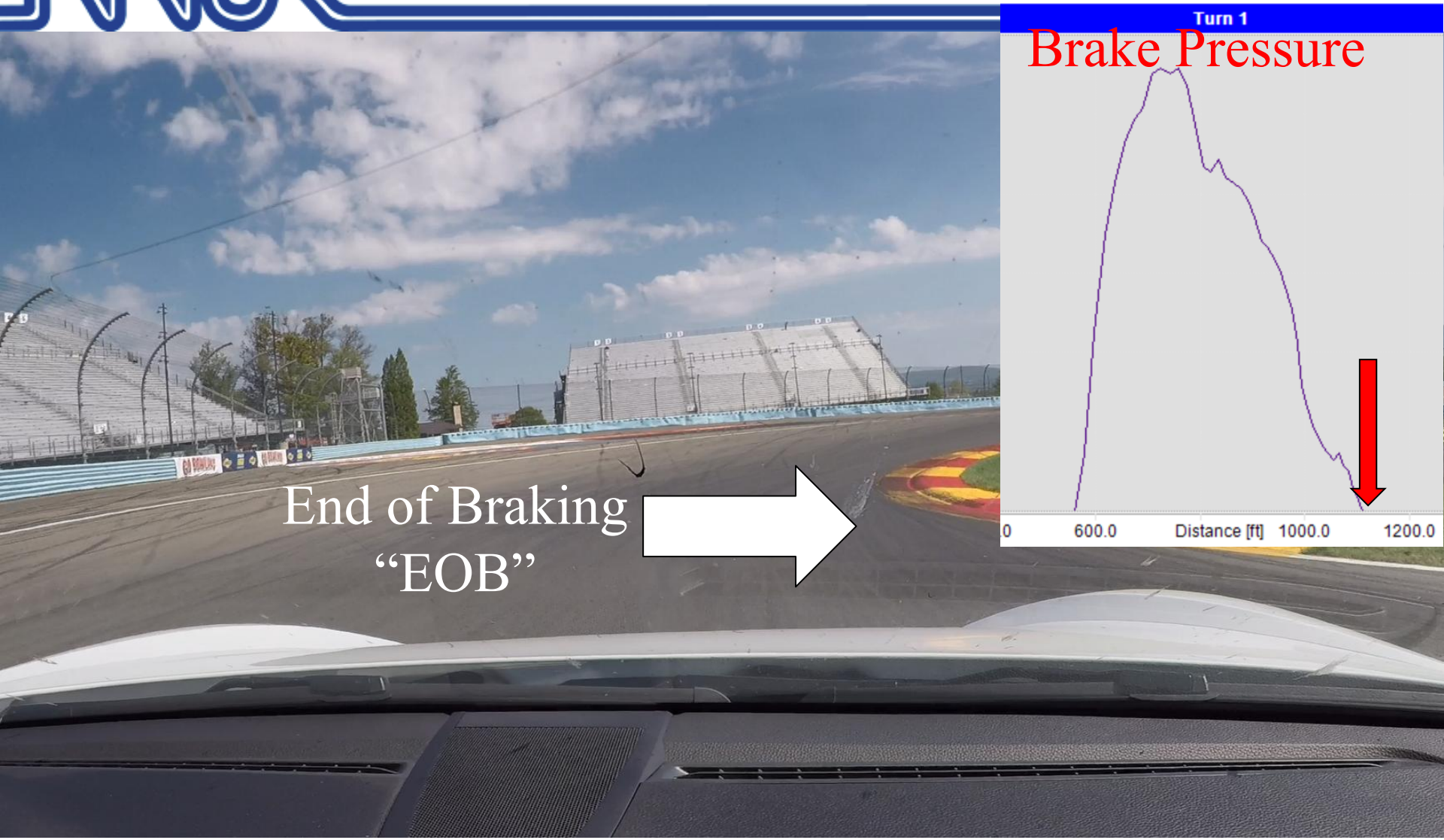
Begin to Reduce Brake Pressure



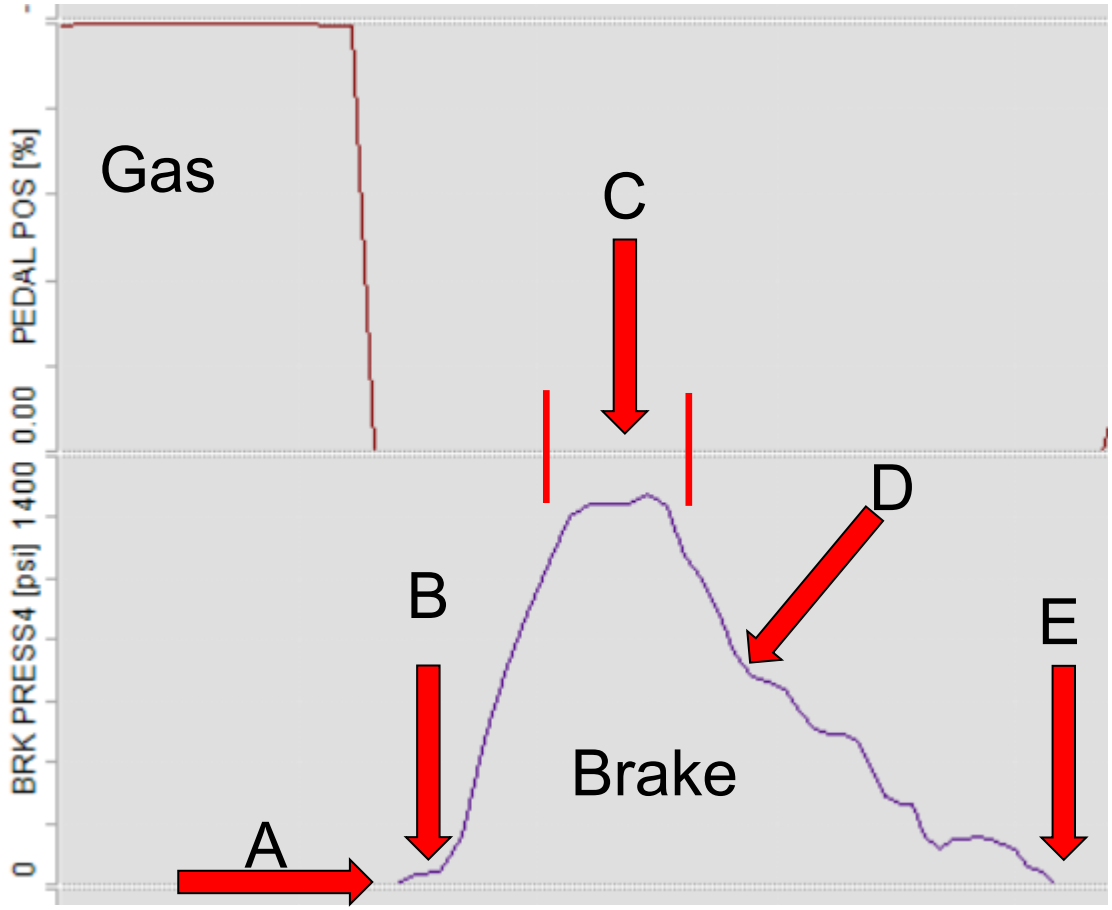
Trail Braking: Preparing to Turn



End of Braking



Lime Rock: Turn 1 (Big Bend)



Location

A. Marker 5
B. Marker 4 ½
C. Marker 3 ½ to 2
D. Marker 1
E. First Apex

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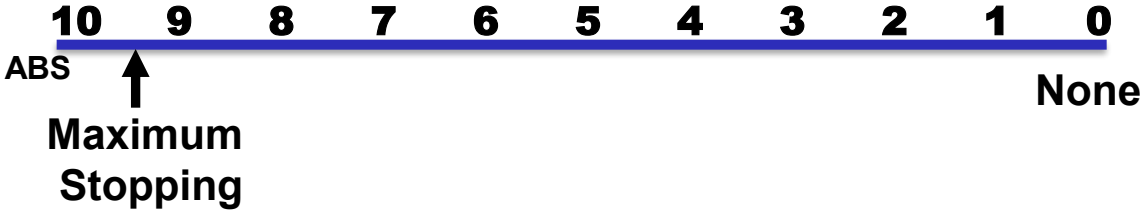
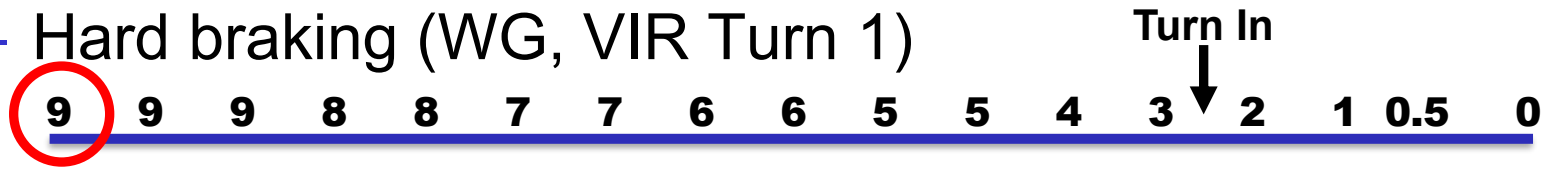
Be Aware of Brake Pressure

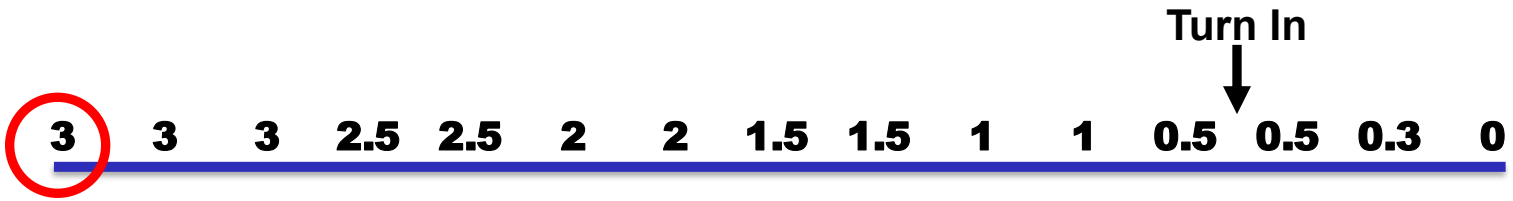
- Focus on brake pressure



  - Hard braking (WG, VIR Turn 1)

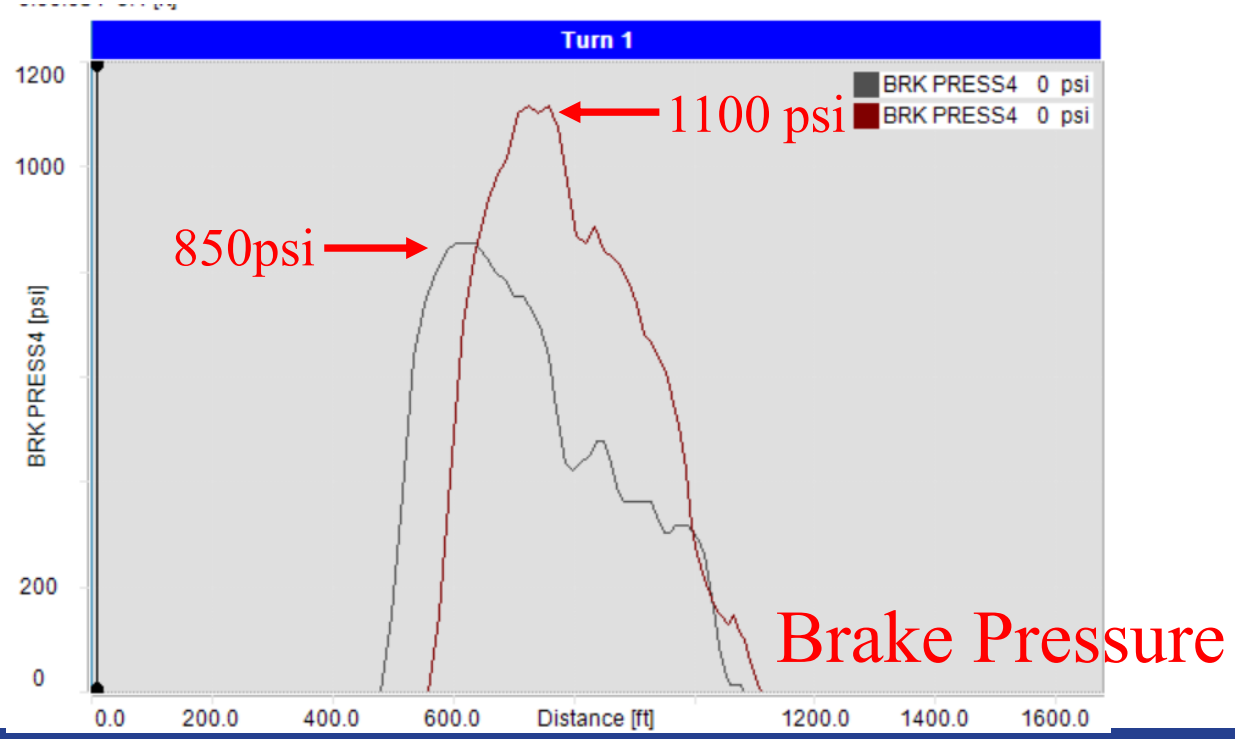


  - Fast Corners (WG, VIR Turn 10, LR Uphill, West Bend, Downhill)



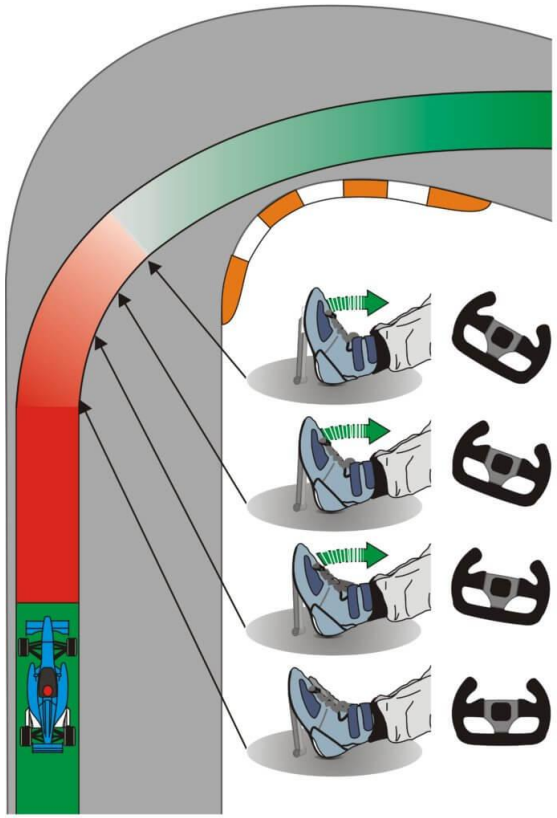
Tip #2: Strong Leg

- Modern Porsches require a strong leg!
- Brakes: squeeze then press. 1, **2!**
  - *Graph: Later BOB, ~ same EOB*



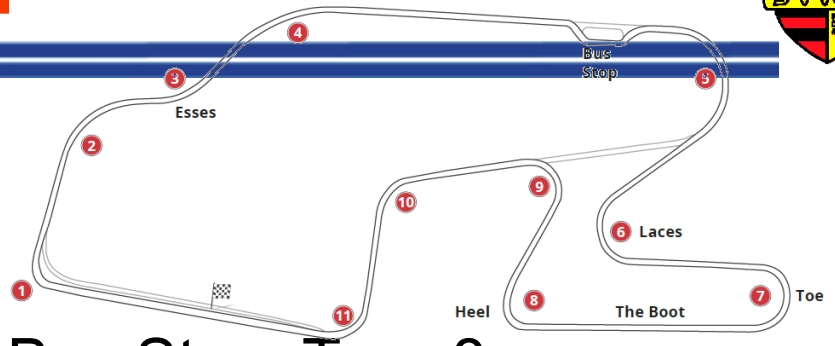
Tip #3: How Much Trail?

- How much trail brake for each corner?
  - Be aware: how much pressure? For how long?
  - Decide what works / Experiment
- General rules
  - Long corners, slow corners = more trail
  - Fast corners = less or no trail
  - Adjust for camber and elevation
  - Mid-engine cars may need less trail
- Common mistakes
  - Too much trail
    - Too much brake pressure at/after turn in
    - Trail too far



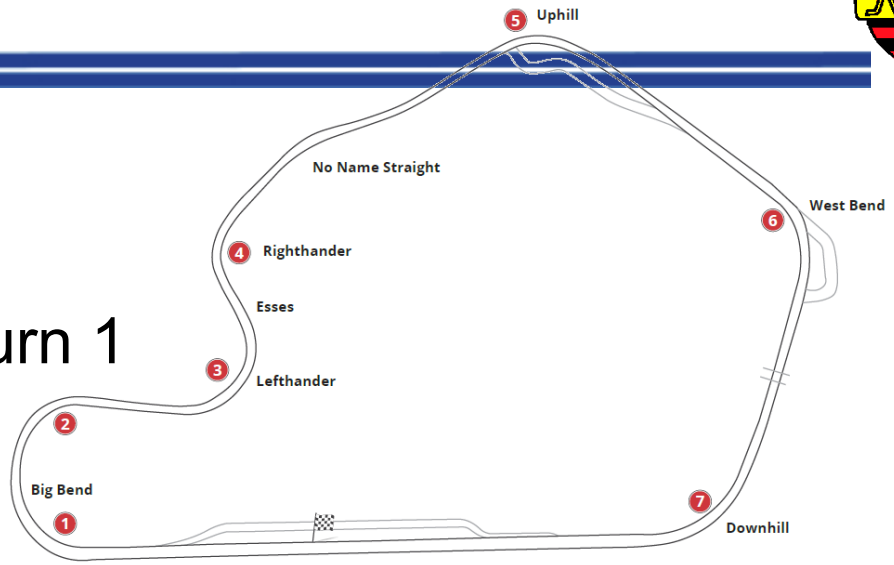
Graphic: Ross Bentley

Watkins Glen



- No slow corners
- High speeds
  - Heavy brake zones: Turn 1, Bus Stop, Turn 8
- Trail braking
  - Turns 6, 8, 9, Bus Stop
- Elevation helps and hurts braking
  - Turn 6: downhill vs. turn 7 uphill
- Turns 10 and 11
  - Fast Corners
  - Very little trail brake (most braking in straight line)
  - Require gentle braking to avoid upsetting the car

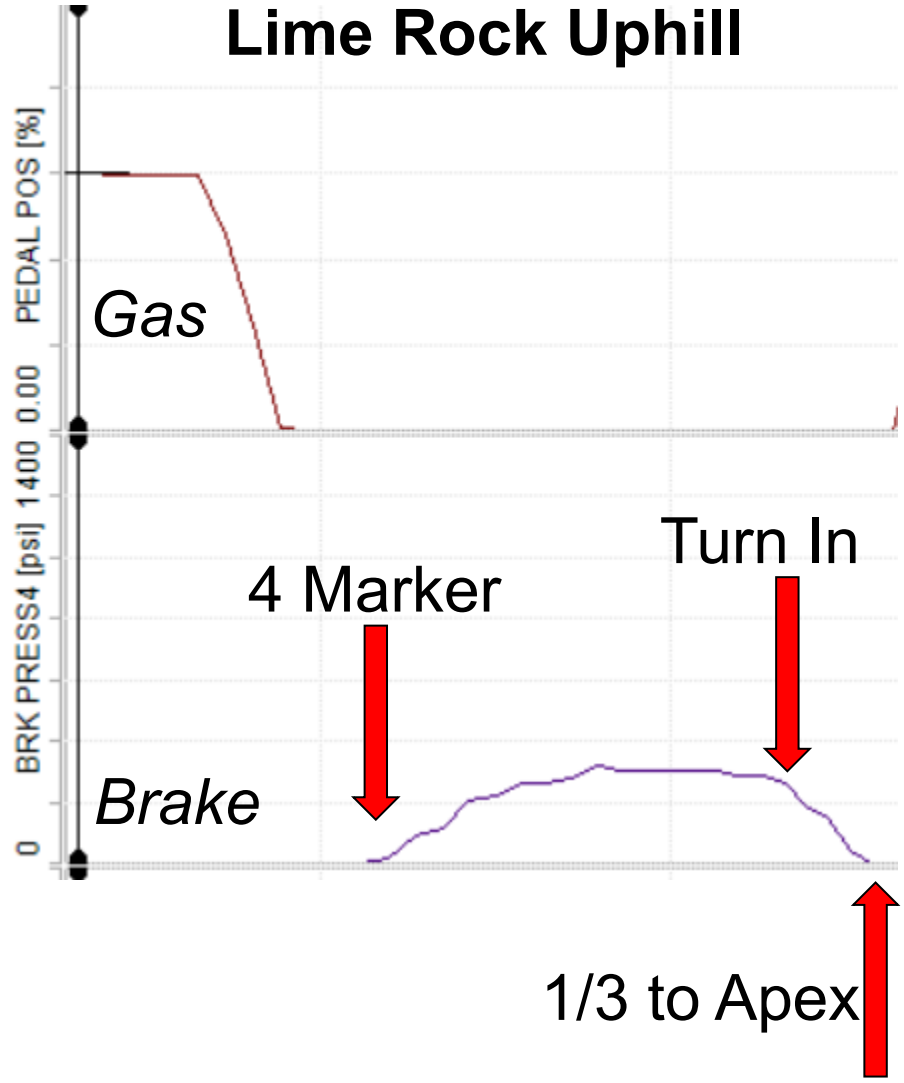
Lime Rock



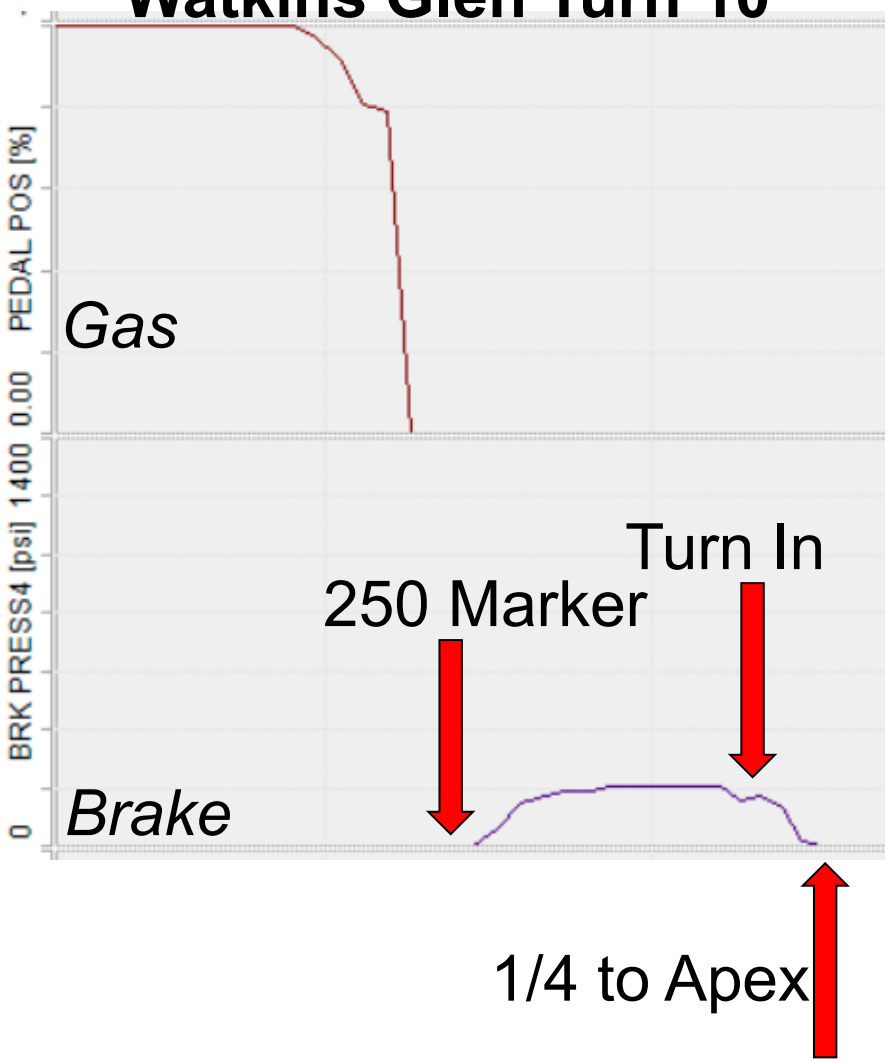
- No slow corners
- High speeds
  - Only one heavy brake: Turn 1
- Trail braking
  - Turn 1: Classic long trail
  - Left hander
- Elevation helps and hurts braking
  - Uphill, Downhill
- Fast corners
  - Uphill, West Bend, Downhill
  - Very little trail brake (most braking in straight line)
  - Require gentle braking to avoid upsetting the car

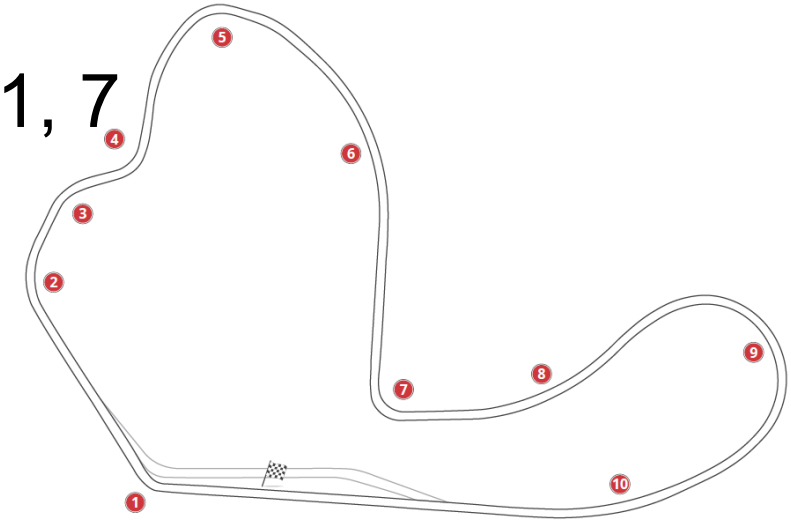
Fast Corners

Lime Rock Uphill



Watkins Glen Turn 10

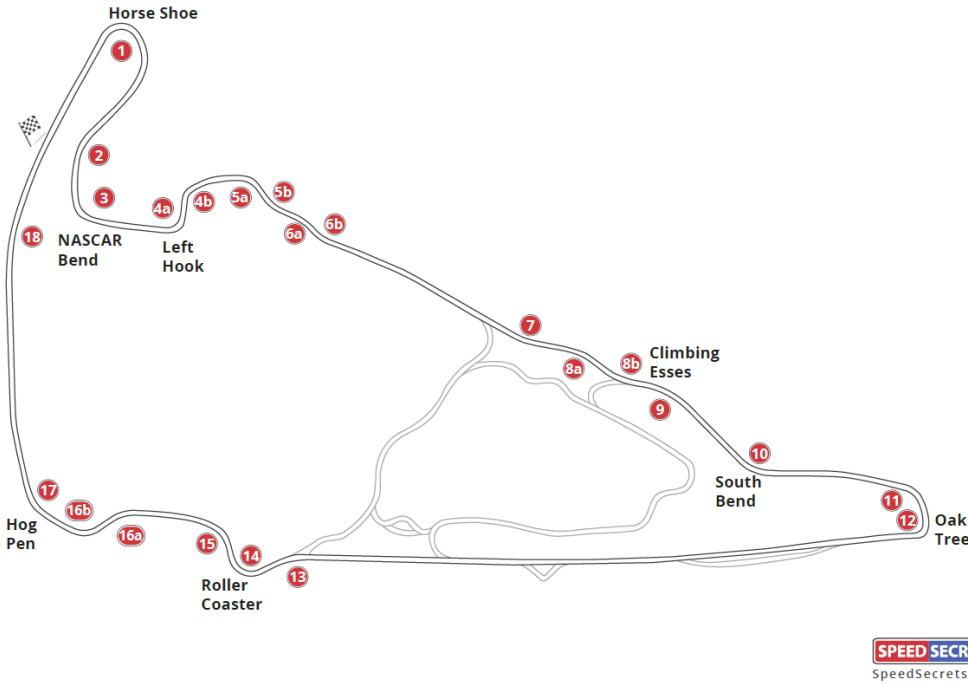




- Heavy brake zones: Turns 1, 7
- Trail braking
  - Turns 1, 2, 5, Lightbulb
- Elevation helps braking
  - Turn 1 and Lightbulb
- Turn 7: braking determined by camber
  - Very little trail brake (most braking in straight line)
  - Favorable camber with early apex, otherwise unfavorable

SPEED SECRETS
SpeedSecrets.com

- Heavy brake zones
  - Turns 1, 4, 13
- Trail braking
  - Turns 1, 4, OakTree, 13-14
- Elevation helps braking
  - OakTree (T11), 13
- Fast corners: Turns 3, 10
  - Little trail brake (most braking in straight line)



Tip #4: EOB

- Focus on End of Braking (EOB)
  - Much more important than start of braking
    - Better to brake a few feet earlier and modulate
  - End of Braking is a critical Reference Point
    - Same point, speed (+/- 1-2 mph) each lap
  - First Step: Be aware of brake pressure at Turn In
    - Should be the same each lap
  - Second Step: Be aware of modulating the brake to get a consistent EOB
  - Third Step: Experiment, earlier or later EOB

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Tip #5 Timing, Rate of Release

- Experiment with different timings and rates of brake release.
  - Release early but slow, late but quickly, at turn-in and slowly, at turn-in and fast, etc.
- Pick one or two corners and spend a session just experimenting with timing and rate of release
  - Write down the effects
  - Do they make sense?
  - Try to understand why

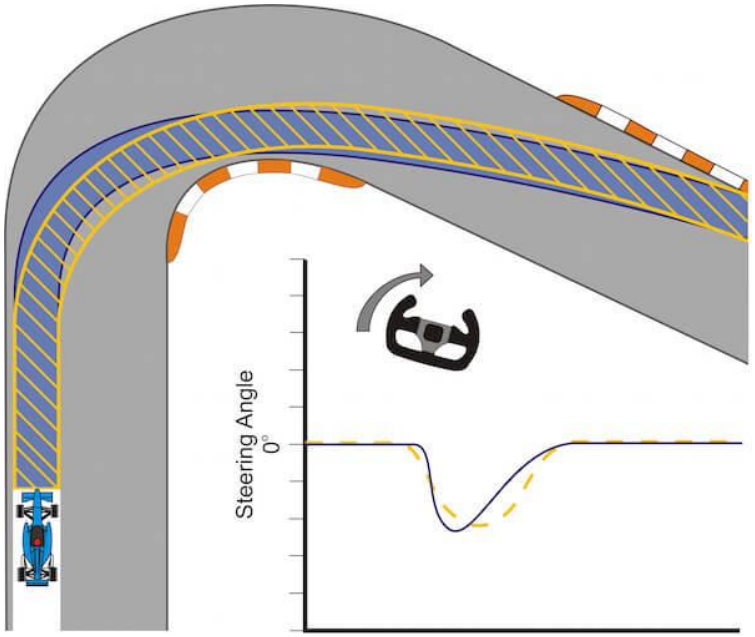
"I spend more time coaching drivers on their brake release than anything else."

--Ross Bentley

Source: Ross Bentley

Tip #6: Rotation

- Car rotation
  - Applies to slower, some medium speed corners
    - Not applicable or wanted in high-speed corners
  - Just enough speed, trail brake and steering input to cause car to rotate
    - Too much = oversteer or spin
    - Too little = car on rails
  - Steps
    1. Enough entry speed
    2. Quick, crisp steering input
    3. Manage with brake release
  - Not for everyone!



Source: Ross Bentley Speed Secrets July 2016

Advanced Braking Tips

Remember the Priorities: i.e. line and WOT first!

Braking Tips

1. ATP, not BOB
2. Strong leg
3. How much trail?
4. EOB focus
5. Timing, rate of release
6. Car rotation

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Questions?

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