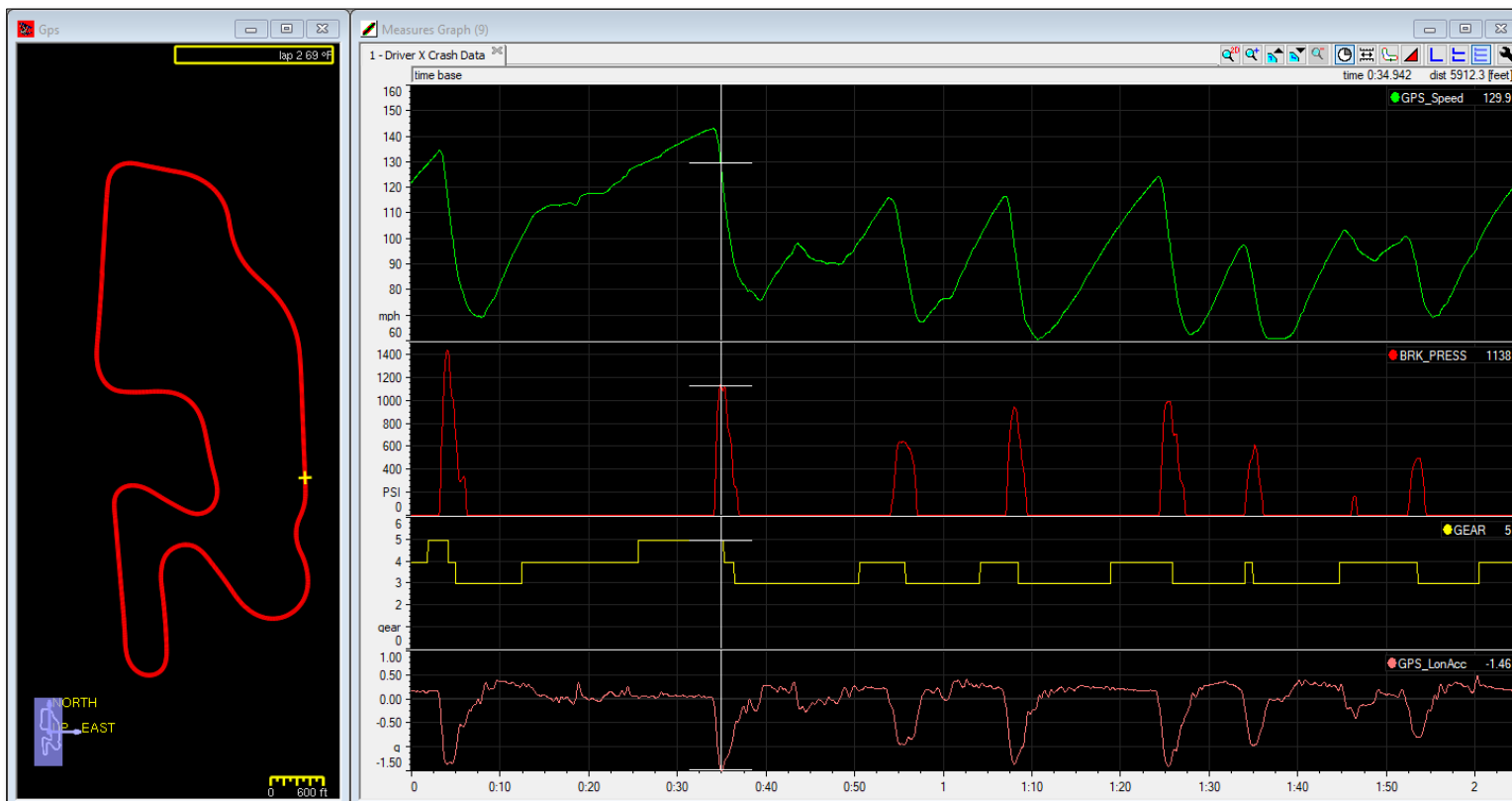


Better Braking With Data

Thinking Outside The Box



Host:

Roger Caddell

AiM Sports - National Training Manager

Co-Host:

John Block

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- Indy Cars, ARCA, NASCAR, Indy Lights, Trans AM,
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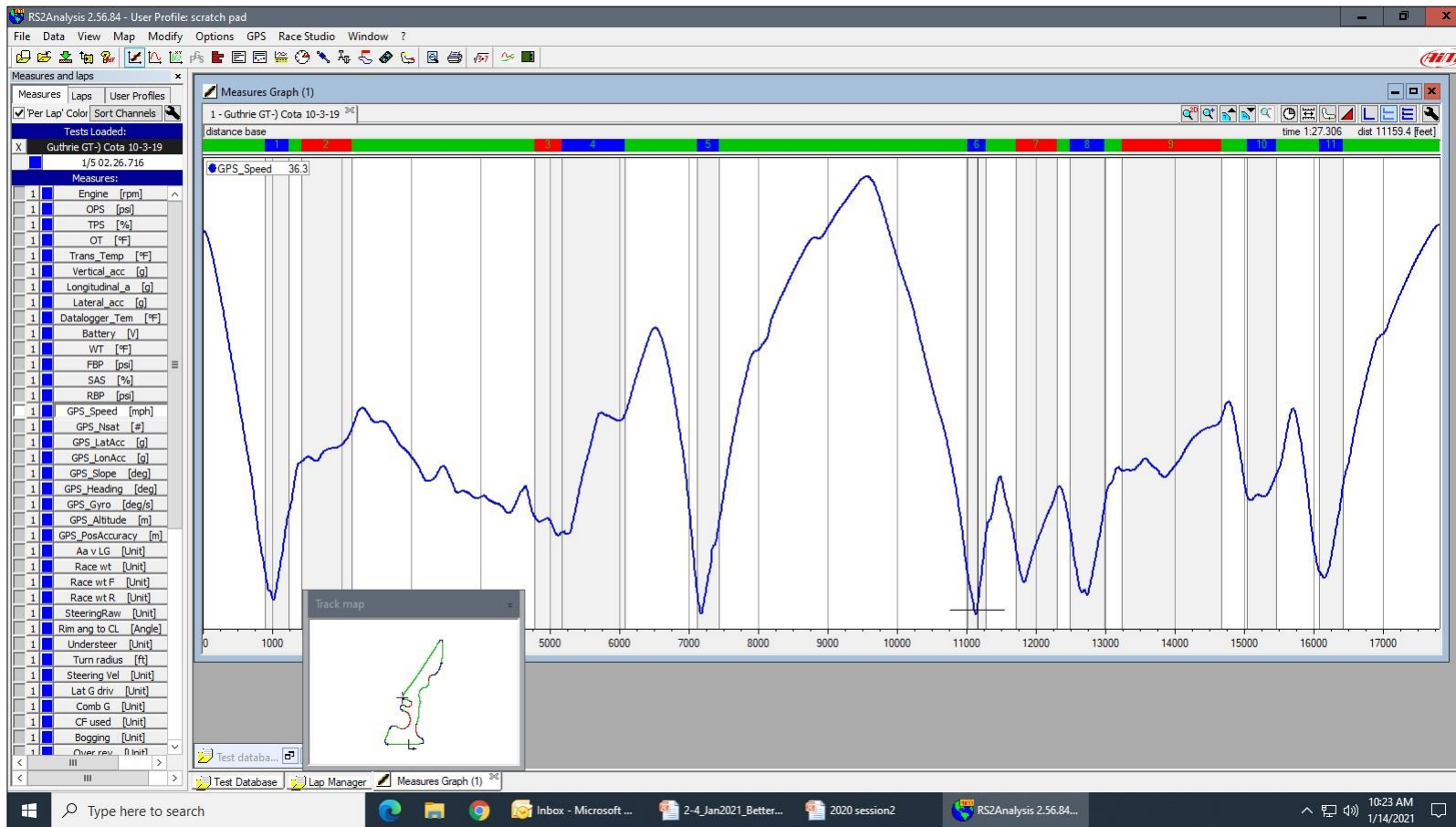
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#1 Racing Fundamental



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The Money Line

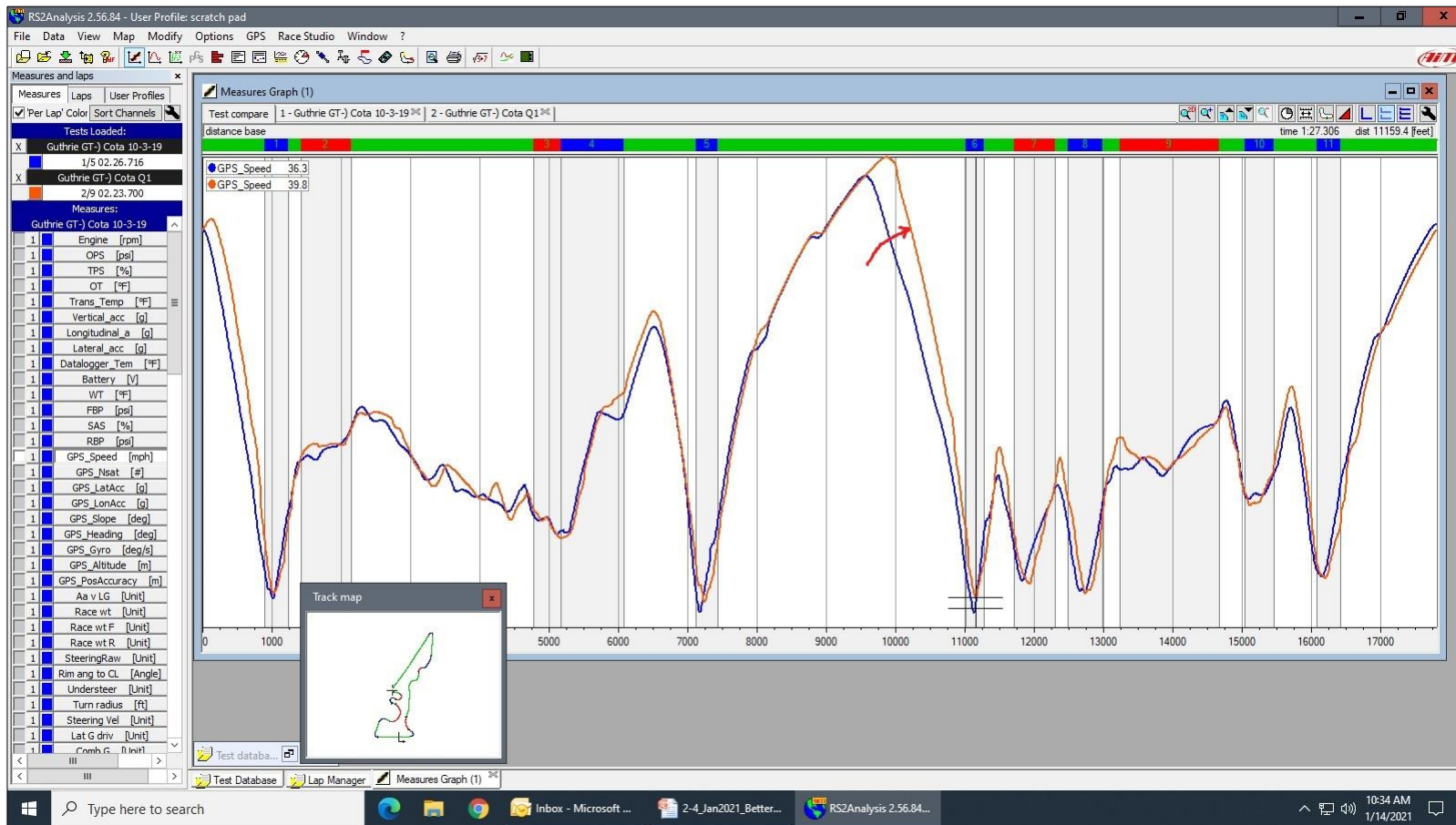
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More Area Under the Curve



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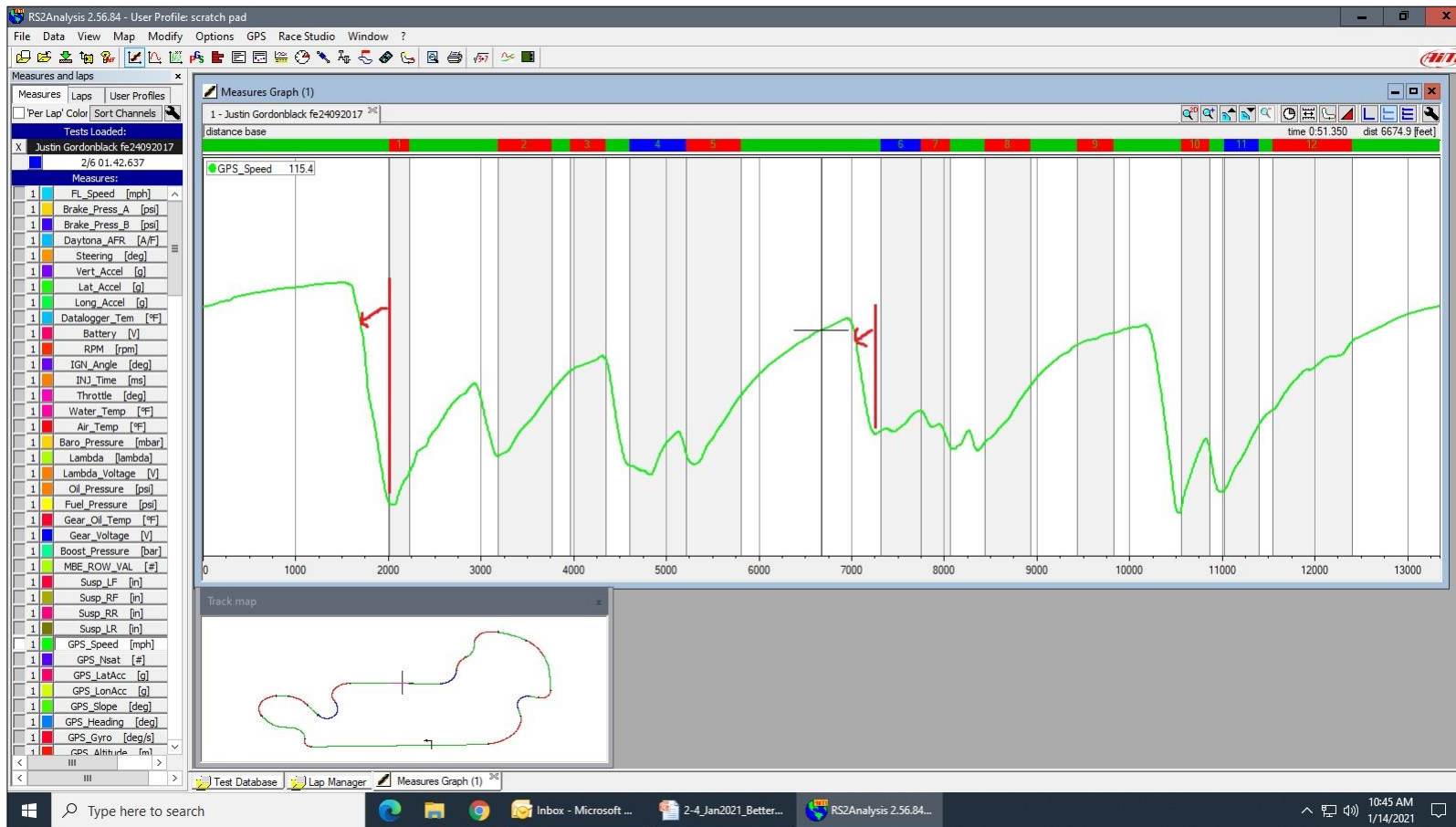
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More Or...



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More Or...

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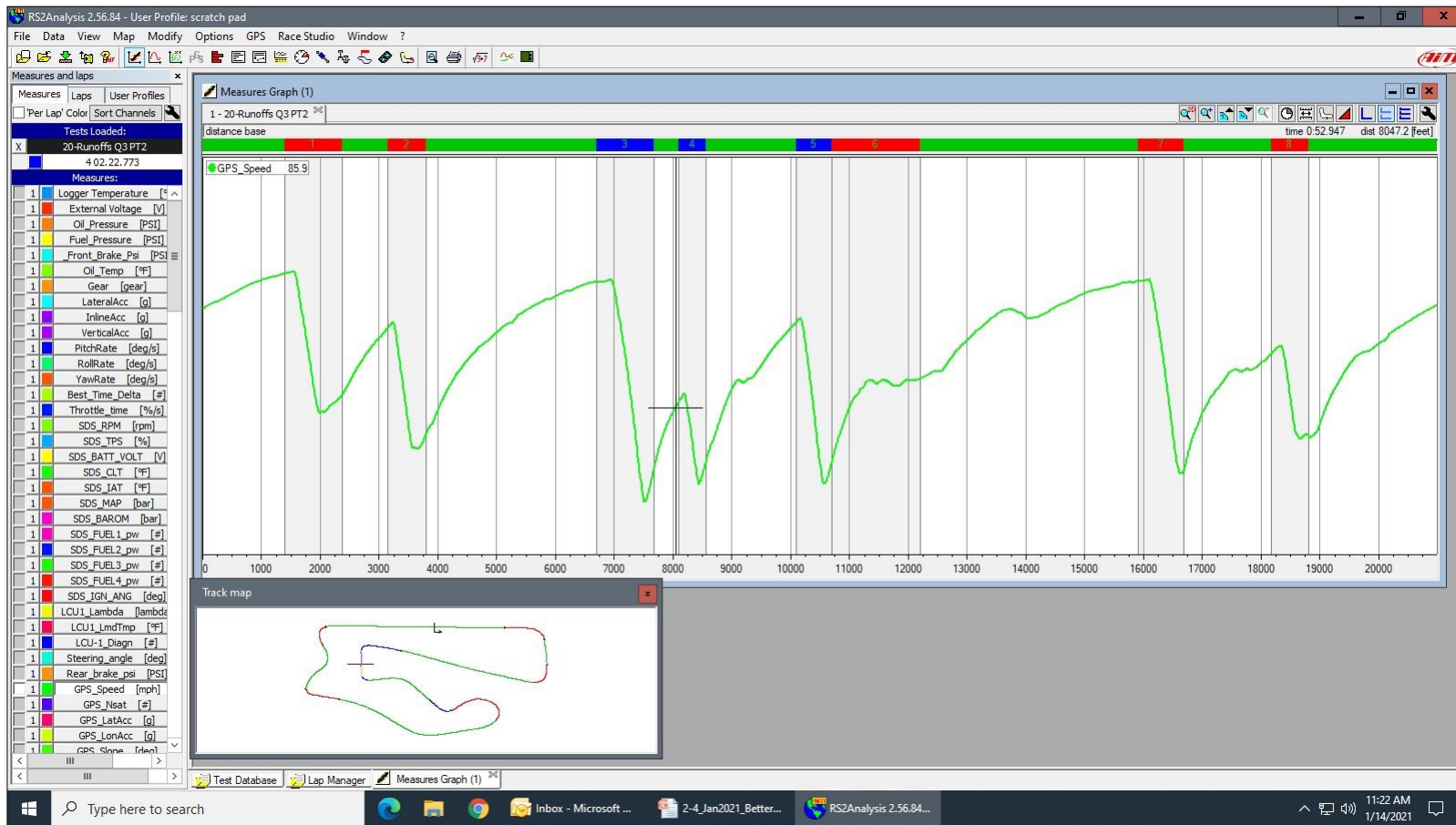


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Too Much



How Can You Tell?



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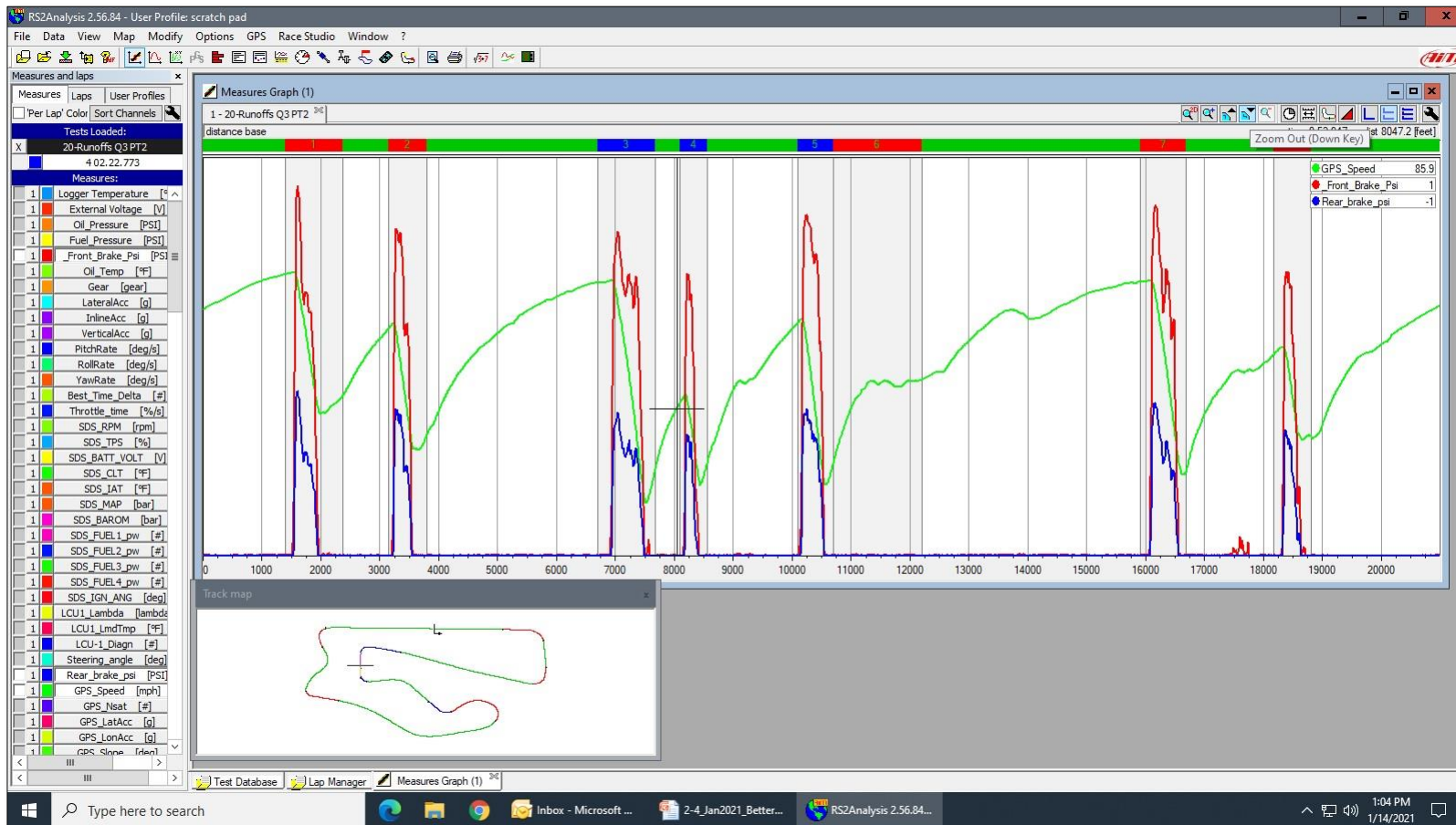
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Brake Pressure... What If?



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Brake Pressure... What If?

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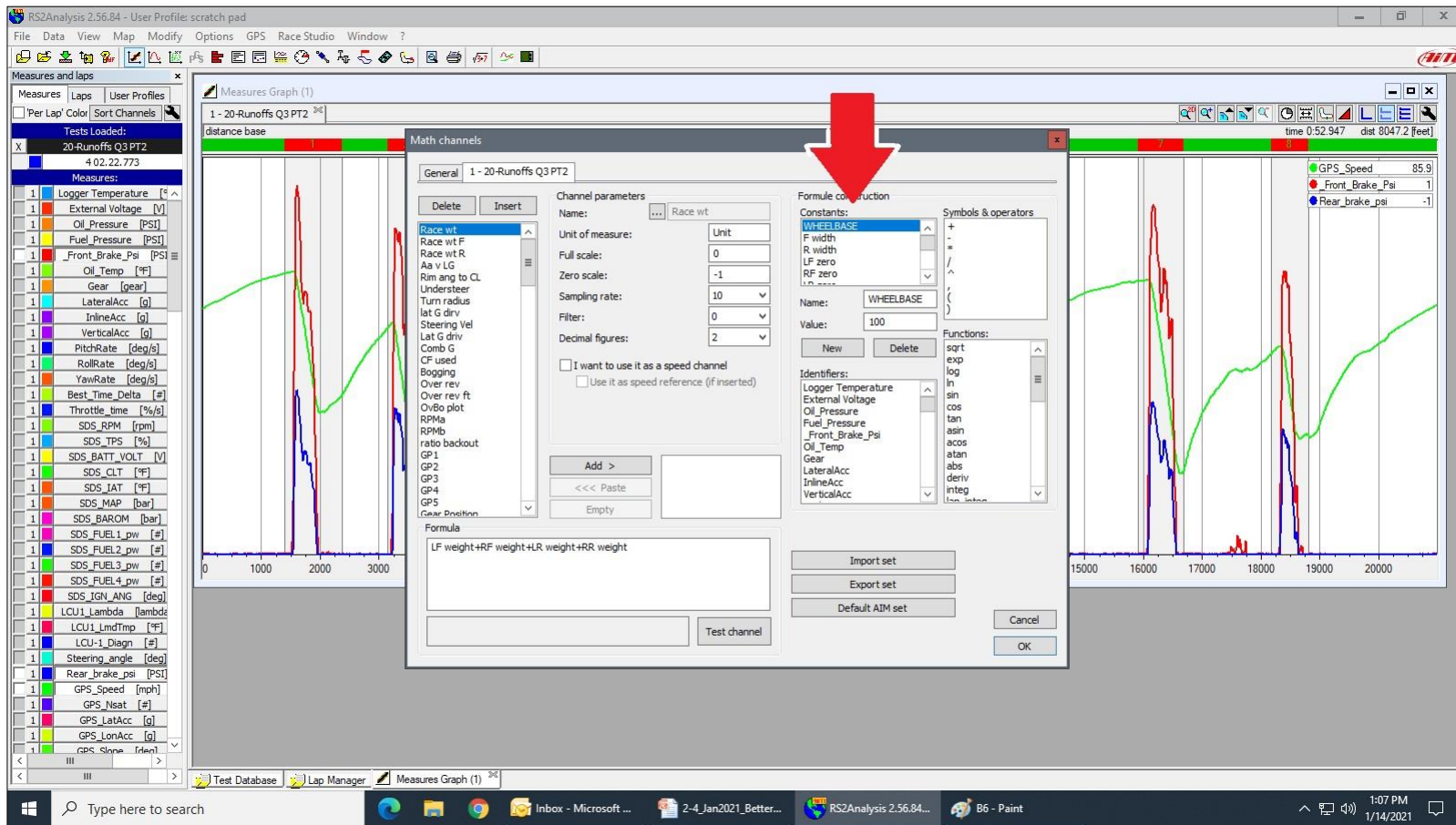
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Simplifying Assumptions



- Flat Earth & Environment
- CF of Tires Constant
- CF of Brake Pads Constant
- All Line Pressure Becomes Force on Pads
- No Weight Change i.e., Body/Fluid Movement
- Ignore Second Law of Thermodynamics
- No Engine Braking, etc.

Math Channel Window



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Math Channel Window

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Needed Math Channel Constants



<u>Constant</u>	<u>Math Channel Name</u>	<u>Units</u>
• Total Vehicle Weight	Race wt	Pounds
• Total Front Axle Weight	Race wt F	Pounds
• Total Rear Axle Weight	Race wt R	Pounds
• Wheelbase	WHEELBASE	Inches
• Vehicles Center Gravity Height	CGH	Inches
• Front Tire Rolling Radius	F Roll radius	Inches
• Rear Tire Rolling Radius	R Roll radius	Inches
• Tire Coefficient of Friction	Tire cf	CF
• Front Brake Rotor Radius	Rotor radius F	Inches
• Rear Brake Rotor Radius	Rotor radius R	Inches
• Front Brake Pad Coefficient of Friction	Pad cf F	CF
• Rear Brake Pad Coefficient of Friction	Pad cf R	CF
• Front Brake Caliper Piston Diameter	Piston dia F	Inches
• Rear Brake Caliper Piston Diameter	Piston dia R	Inches
• # of Front Brake Caliper Pistons	Piston num F	Number
• # of Rear Brake Caliper Pistons	Piston num R	Number

Est. Theoretical Max Front PSI



IF(GT((Long_g*(-1)),0.1),((((Race wt F/2)+((Long_g*(-1))

*Race wt*CGH/WHEELBASE*0.5))*Tire cf*F Roll radius)/

Rotor radius F)/(Pad cf F*Piston num F*((Piston dia F *0.5)^2)*3.1415),0)

Math Channel Color Codes (Suggested)

Actual Sensor Data from Data Logger

Listed in the 'Identifiers' List in the RS2A

This 'Identifiers' List Matches the Channels in the Measures Channel List

Constants Based on the Race Vehicle

Listed in the 'Constants' List in the RS2A

You Can Add 'New', 'Delete', or Edit Existing Constants in RS2A

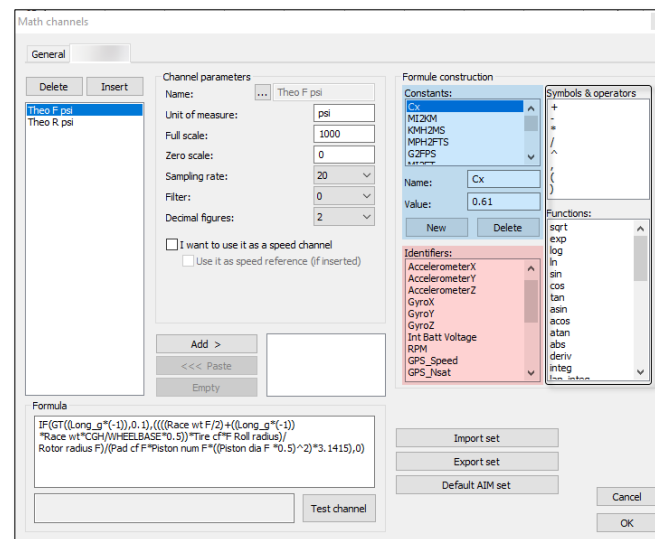
Results from Math Channels Previously Calculated

Listed in the 'Identifiers' List in the RS2A

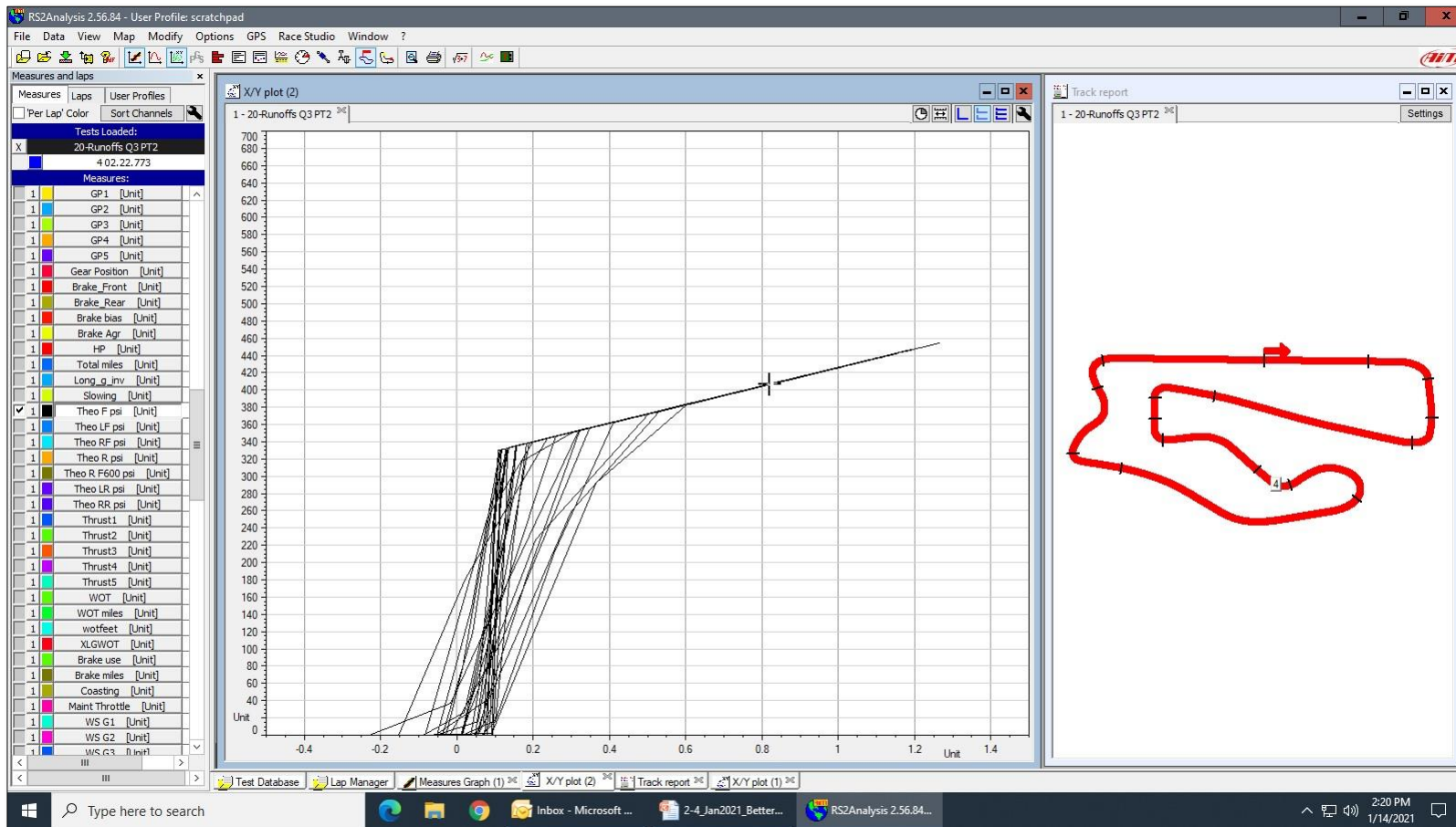
Must be Higher in the Math Channel List to Work

Symbols & Operators and Functions

Listed in the 'Symbols & Operators' and 'Functions' Lists in the RS2A



Plot Est. Max Front PSI



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Plot Est. Max Front PSI

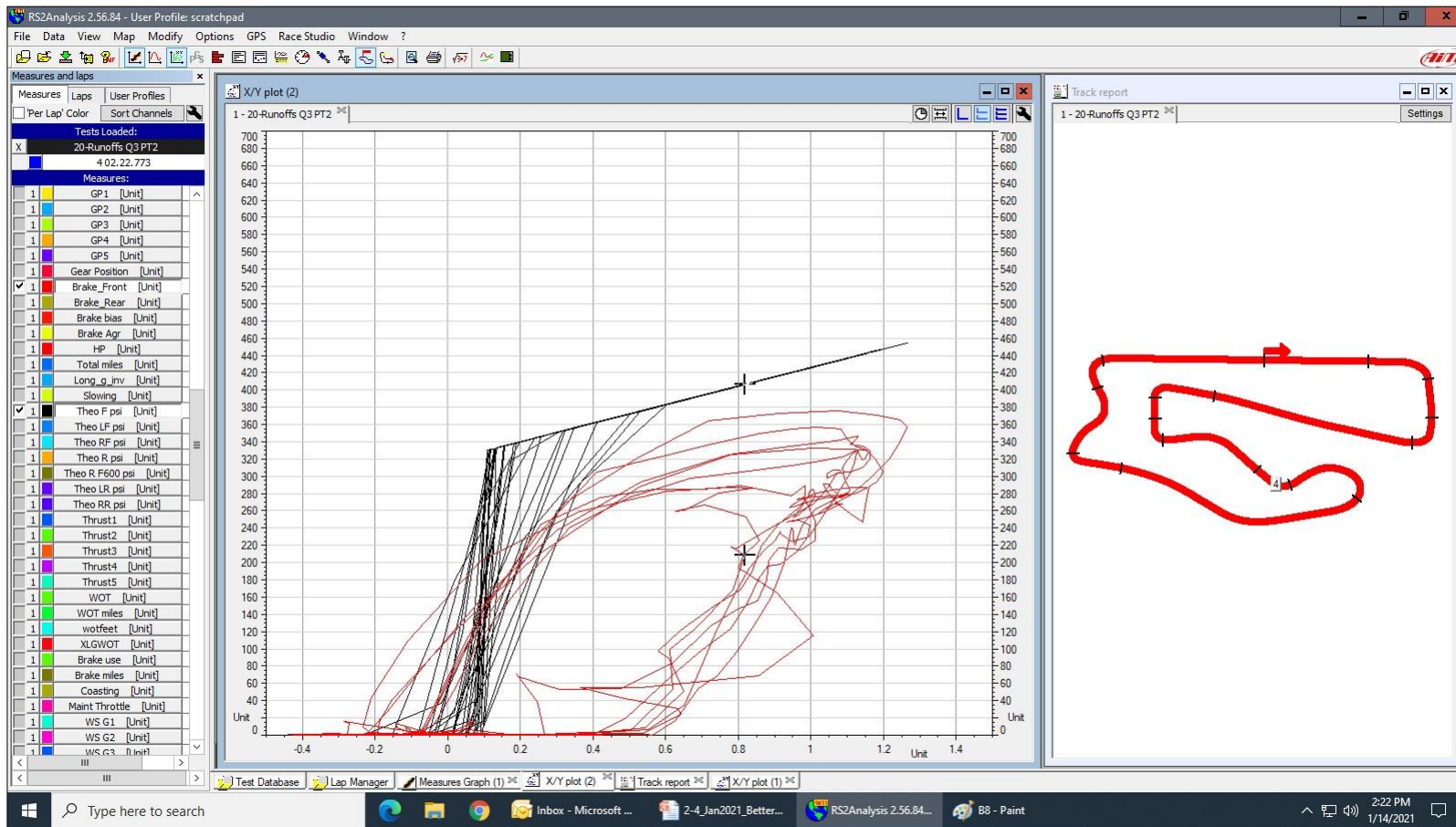
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Lockup Relationship



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Lockup Relationship

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Est. Theoretical Max Rear PSI



$$\text{IF}(\text{GT}((\text{Long_g}^{*(-1)}), 0.1), (((\text{Race wt R}/2) - ((\text{Long_g}^{*(-1)}) * \text{Race wt} * \text{CGH} / \text{WHEELBASE} * 0.5)) * \text{Tire cf} * \text{R Roll radius}) / \text{Rotor radius R}) / (\text{Pad cf R} * \text{Piston num R} * ((\text{Piston dia R} * 0.5)^2 * 3.1415), 0)$$

Math Channel Color Codes (Suggested)

Actual Sensor Data from Data Logger

Listed in the 'Identifiers' List in the RS2A

This 'Identifiers' List Matches the Channels in the Measures Channel List

Constants Based on the Race Vehicle

Listed in the 'Constants' List in the RS2A

You Can Add 'New', 'Delete', or Edit Existing Constants in RS2A

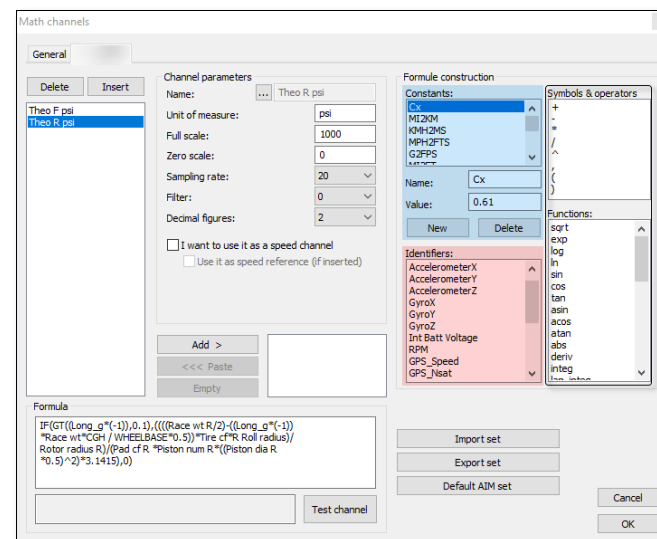
Results from Math Channels Previously Calculated

Listed in the 'Identifiers' List in the RS2A

Must be Higher in the Math Channel List to Work

Symbols & Operators and Functions

Listed in the 'Symbols & Operators' and 'Functions' Lists in the RS2A



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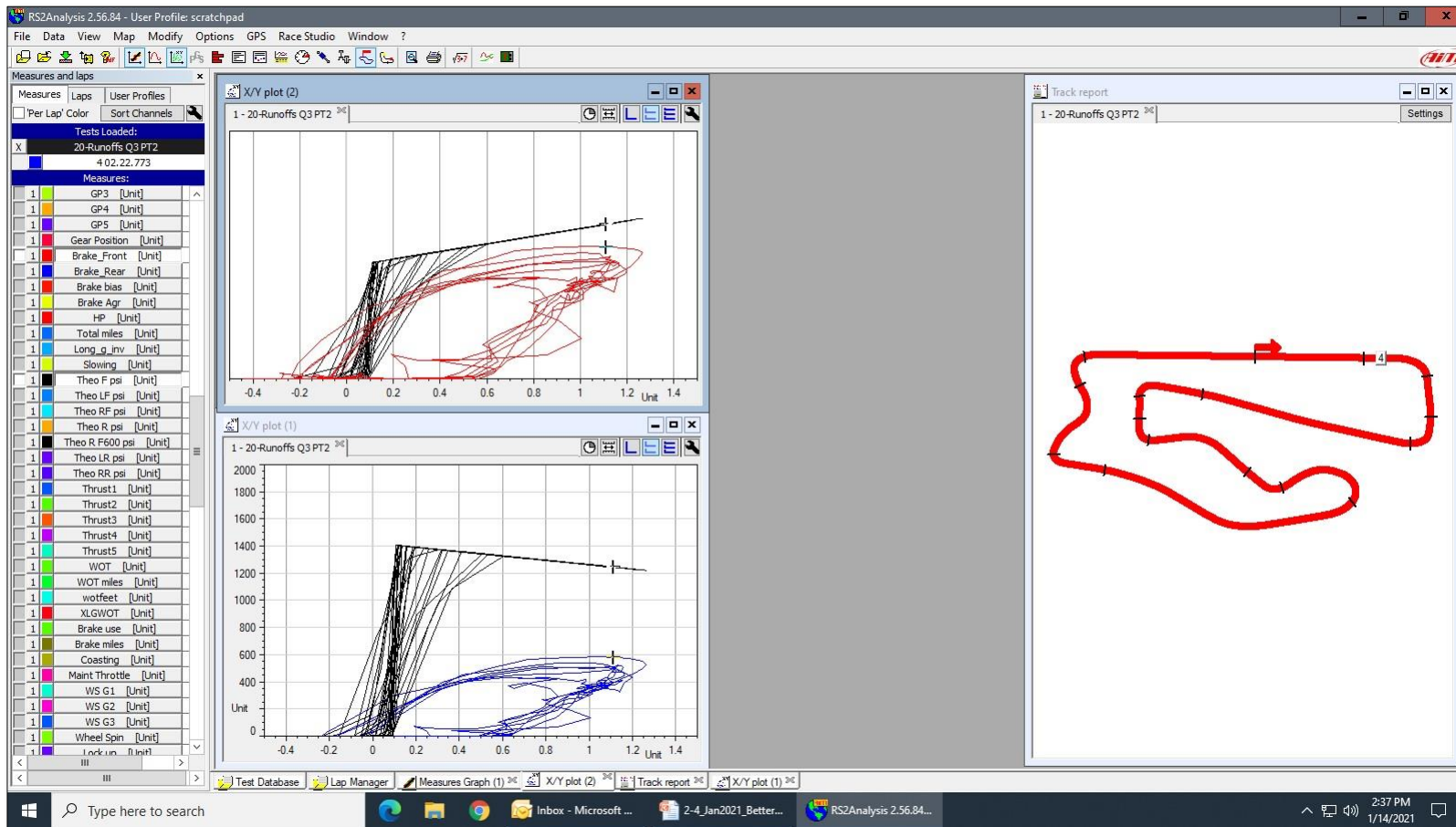
Est. Theoretical Max Rear PSI

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Brake Bias Direction



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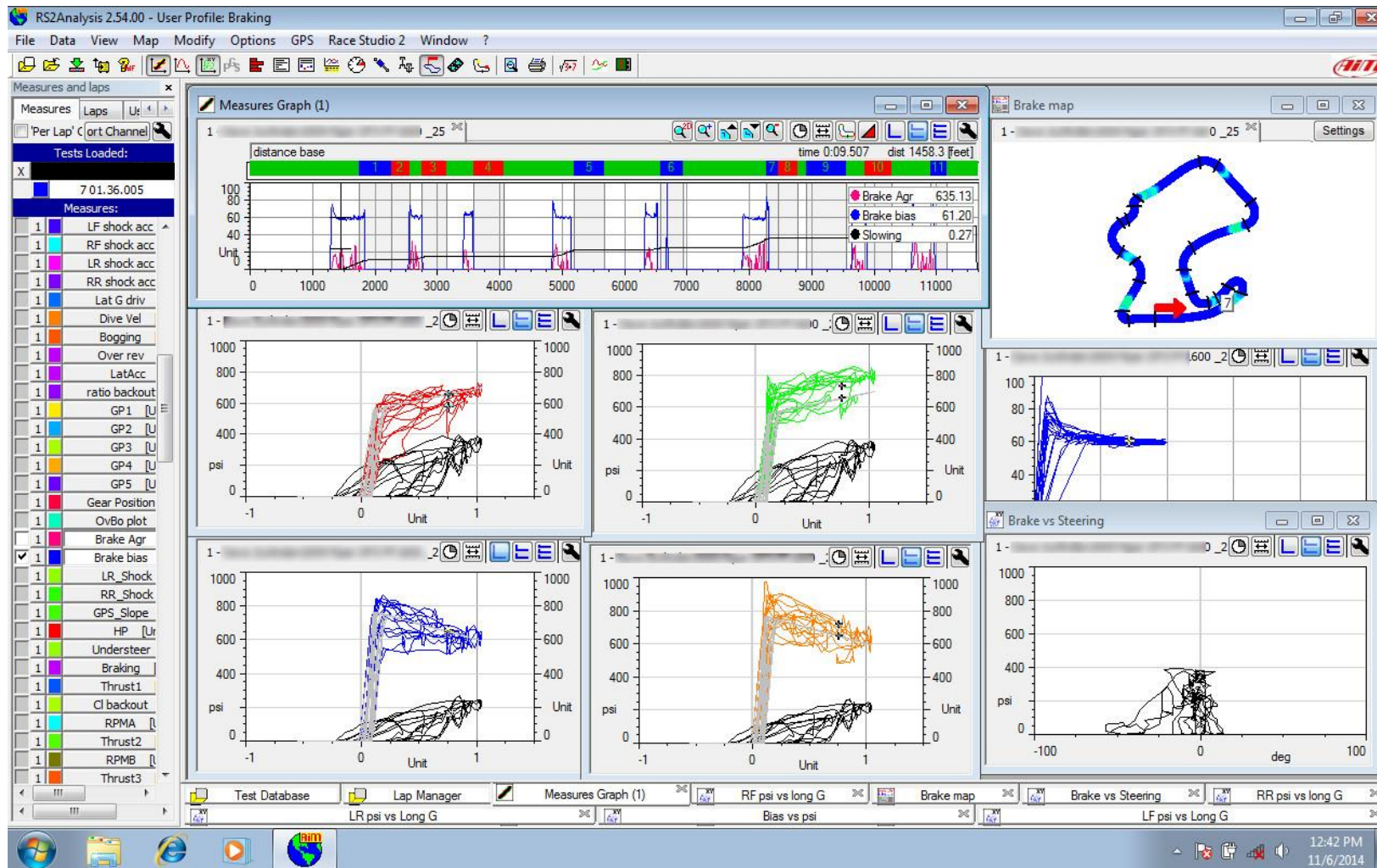
Brake Bias Direction

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JB's Brake Profile



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JB's Brake Profile

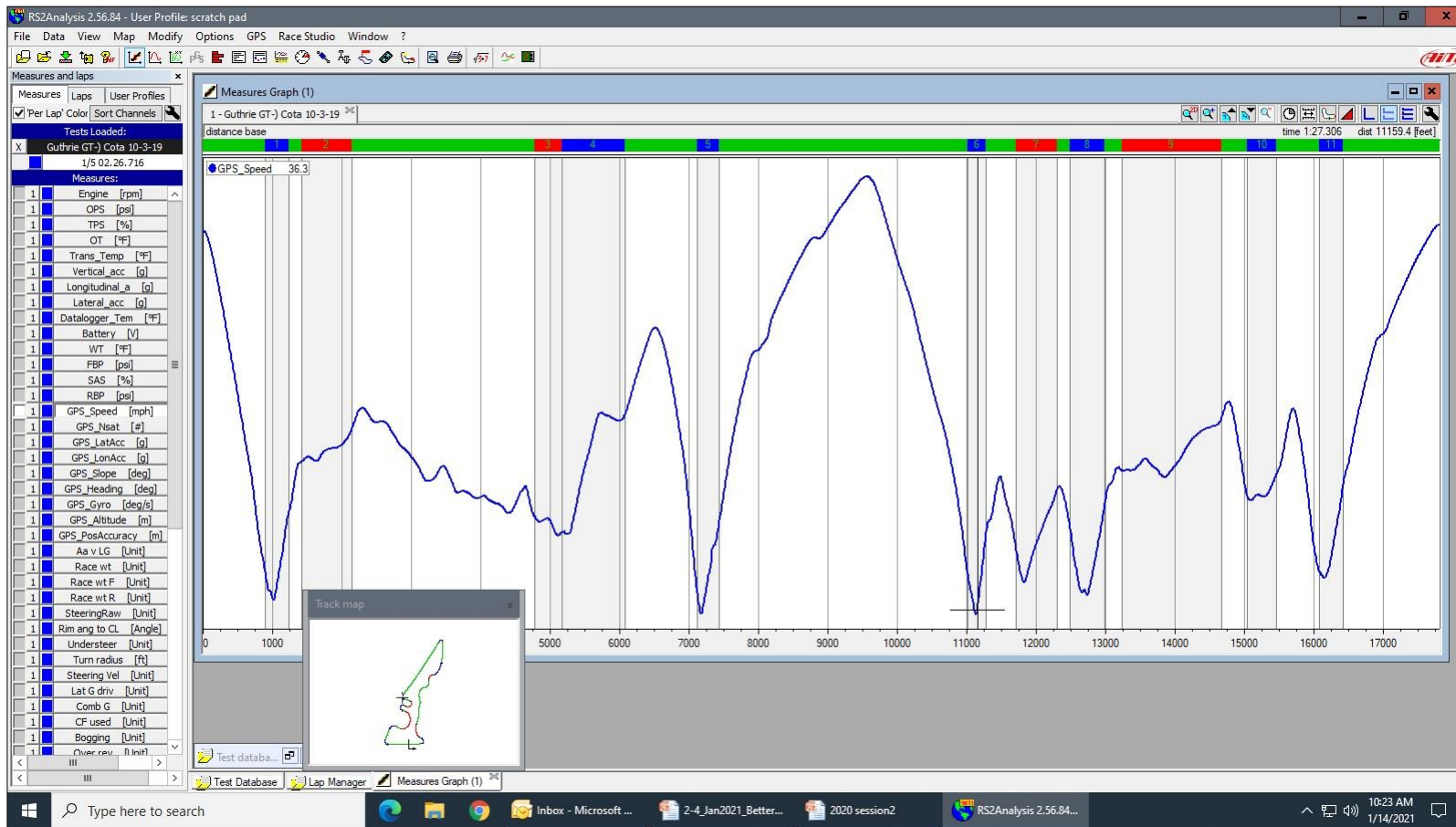
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Remember The Objective



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AIM Sports - National Training Manager

Co-Host:
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Engineering The Driver
The Science of Motorsport

Host:
Roger Caddell
AIM Sports - National Training Manager

Co-Host:
Matt Romanowski
@11a11a11a11a

Guest:
Dr. David Ferguson
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 - Measure Units
 - Sort Channels
 - Test Properties
 - Per Lap Color
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 - Setting Time
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Additional Materials

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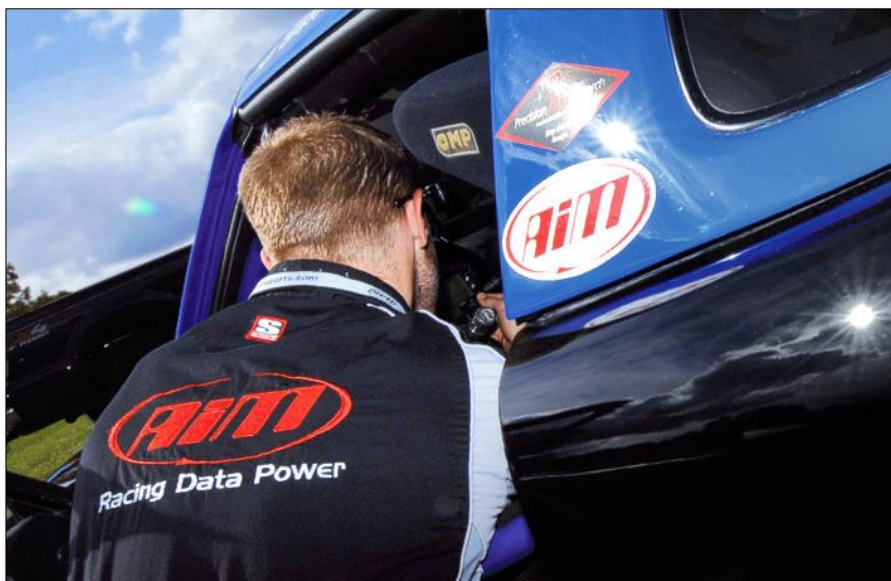
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Next Round of Webinars Start: Monday, February 1st

- Start Time 8pm Eastern / 5pm Pacific
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Not the Other Cars
Be Safe and Have Fun!

The Original Data Acquisition Webinars

NEXT SESSION STARTS Feb 1st. All sessions start 8pm Eastern - 7pm Central - 5pm Pacific unless other arrangements have been made.

How it works: Each classes consisting of 5 sessions. Prior to each live session you will receive (via email) handouts to use for notes during the live session. Also, after each live session you will get a link to a recording of that session.

Data Acquisition session 1, Feb 1st.
Data displays; reading & understanding the different ways data can be displayed and placing different signals from the car in the display types.

Data Acquisition session 2, Feb 8th.
Working with data display appearances, manipulating and creating your own displays and creating typical pages/tabs/profiles for your own analysis.

Data Acquisition session 3, Feb 15th
Tips and tricks prior to analyzing your data; math channels (understanding and creating). Understanding data quality, calibrating, sample rates, filtering & noise.

Data Acquisition session 4, Feb 22nd.
Using your views to analyze and interpreting the data; first things first, lap/segment times, driver skill & performance and the secret tool of comparing drivers.

Data Acquisition session 5, Mar 1st.
Part 2, Using your views to analyze and interpreting the data; steady state handling, transient handling, chassis platform movement, and shock absorber performance, tire loading and pre-failure diagnostics.



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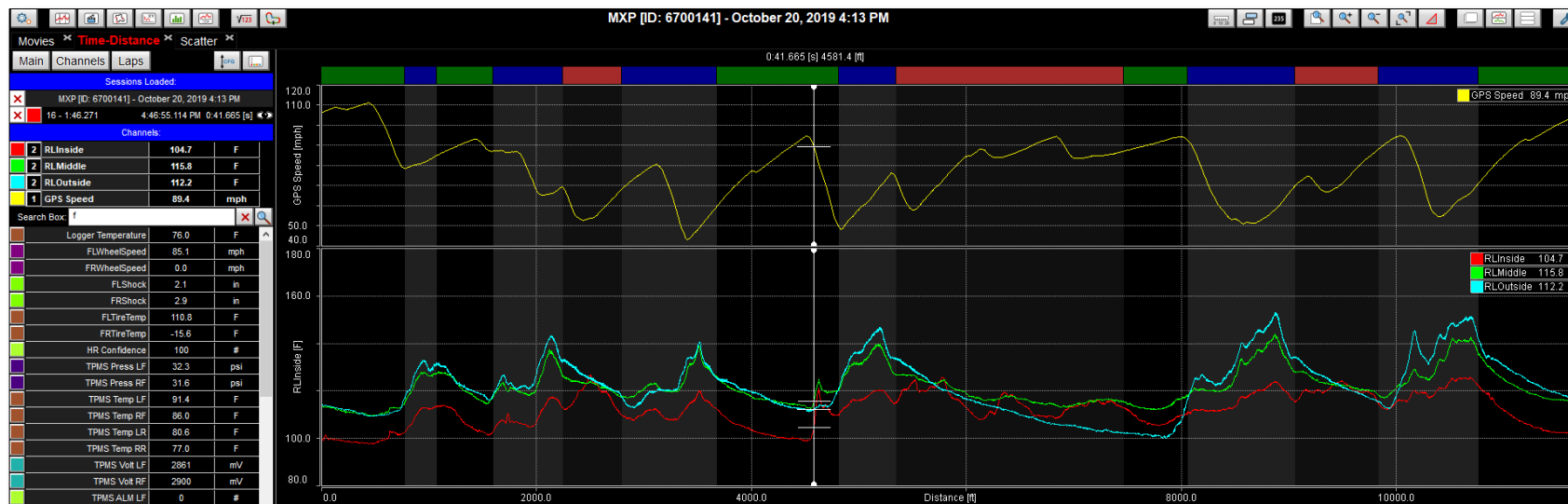
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Adapting Your Learning Style

What You Do Not Know!



Host:

Roger Caddell

AiM Sports - National Training Manager

Guest:

James Colborn

JamesColborn.com

Next Webinar: Tuesday February 2nd, 2021 - 10:00am Pac/1:00pm East

Next Webinar Topic

Adapting Your Learning Style

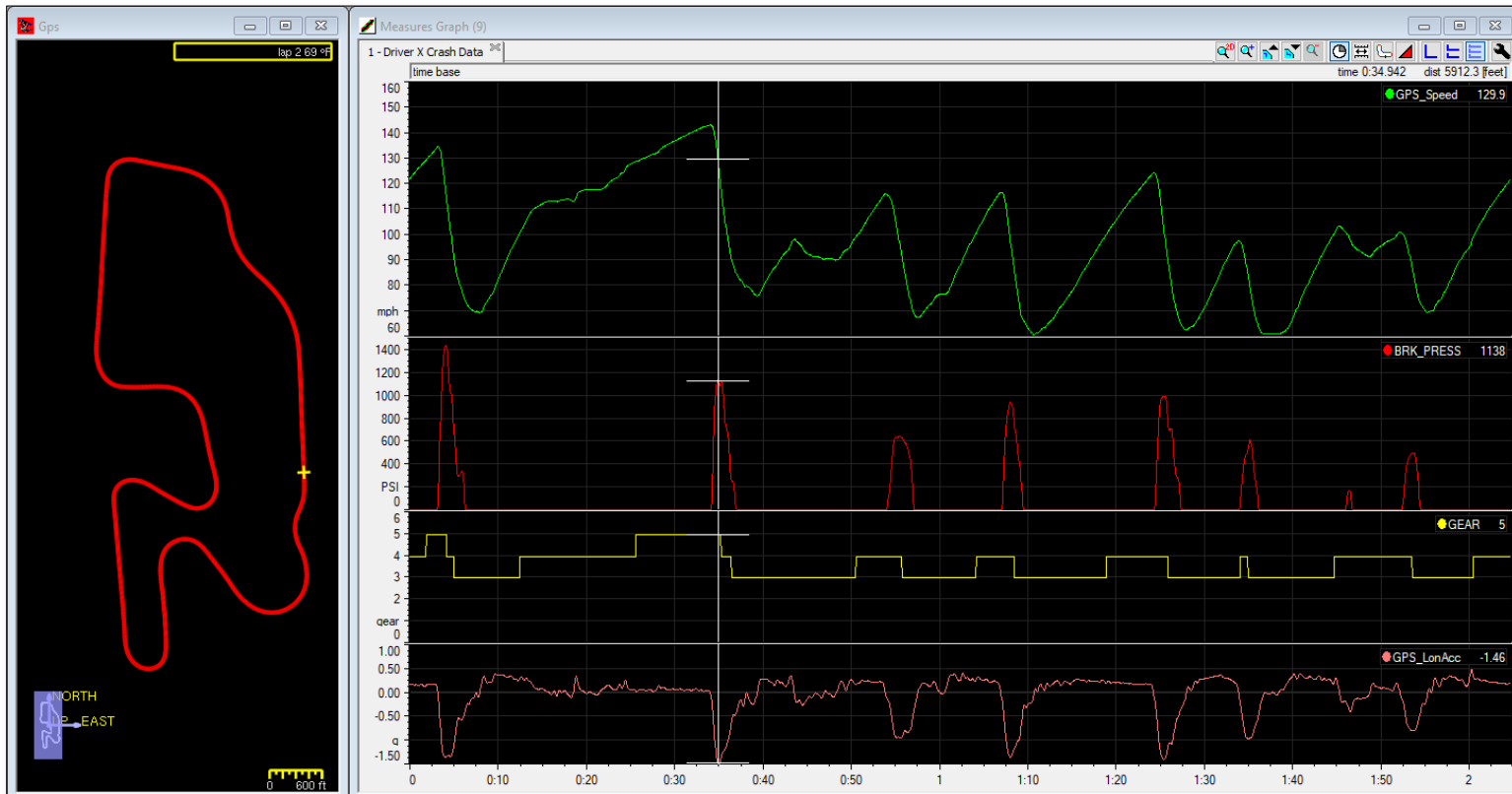


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