

Introduction to Data Analysis for Snowmobile Racing



Host:

Roger Caddell

AiM Sports - National Training Manager

Co-Host:

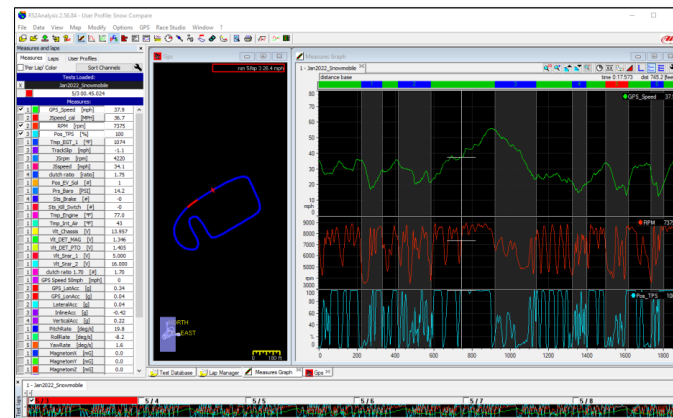
Jesse Heise



[aimsports.com](https://www.aimsports.com) Tuesday January 18th, 2022 6-7pm Central LearnFast™

Today's Agenda

- Introductions
- *About AiM Sports*
- *What is Data Acquisition*
 - Different Methods of Data Acquisition
 - Data = Knowledge
- *Why Use Data Acquisition*
- *How to Use Data Acquisition*
 - Introducing Race Studio Software
 - Data Concepts
 - **What** Happened
 - **Where** Did It Happen
 - **Why** Did It Happen
 - Data Analysis - Data Triangle
 - Driver Performance
 - Vehicle Performance
 - Vehicle Health
 - Actual Data Analysis Examples



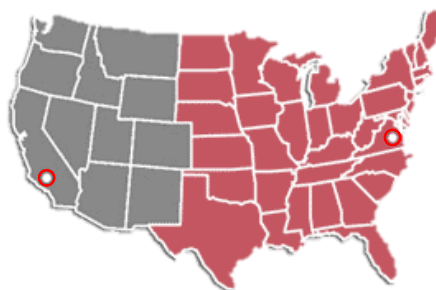


AiM Sports

- AiM Sports has been providing cutting-edge data and video solutions for the motorsports industry for over 25 years. From track-day users to top tier teams, when it comes to electronic instrumentation, data acquisition, and video, AiM Sports is the most trusted name in racing
- Many AiM Sports products combine the functions of traditional tachometer, speedometer, temperature gauge, pressure gauge and lap timer all into one compact, high-performance unit
- Opened in 1996 in Lake Elsinore, CA and expanded with Roanoke, VA in 2002

AiM Sports

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Intro to Snowmobile Data Analysis

About AiM Sports

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What Is Data Acquisition

What is Data Acquisition

Different Methods

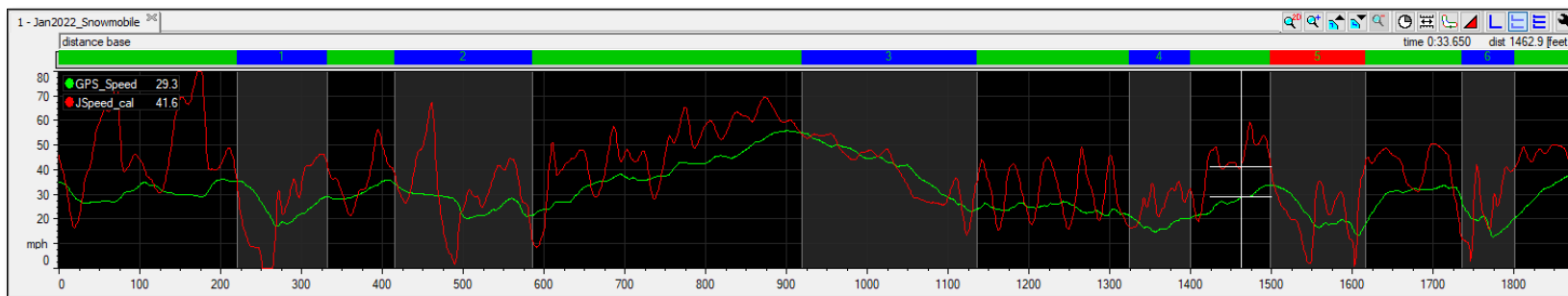
- Seat of the Pants
- Stopwatch
- Video, Especially 'SmartVideo'
- Data Acquisition Systems
 - Hardware and Software



What is Data Acquisition

Another Tool in the Toolbox

- Just like an engine or shock dyno, the data system measures and records performance
- Not just **Vehicle** performance
- Not just **Driver** performance
- But **Overall** performance!
- Sensors gather values and hardware stores the data of the dynamics of what the vehicle is doing
- Software makes the detailed data analysis possible



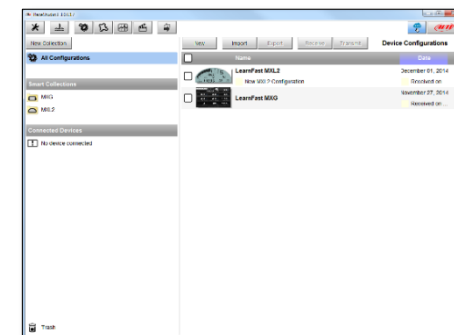
What is Data Acquisition

Software Concepts



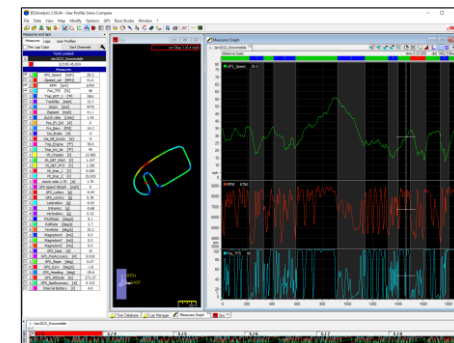
Configuration (Pre-Session)

- Race Studio has Powerful Functions for Configuring Your AiM Sports Data System
- Sensors
- Expansion Modules
- Sampling Rates
- Alarms
- Shift Lights



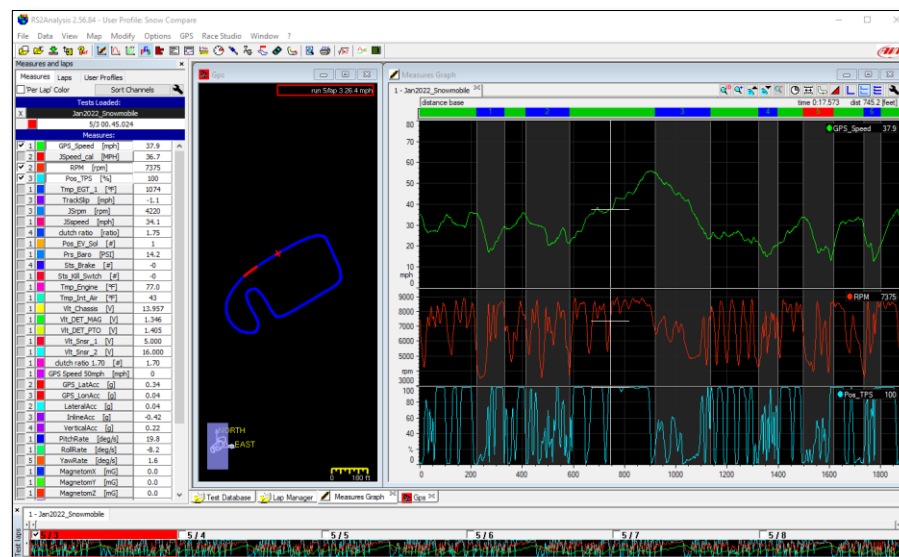
Data Analysis (Post-Session)

- Race Studio Features the Functions Needed to View, Analyze, and Understand Your Recorded Data
- Measure Plots
- X/Y Plots
- Channel Reports
- Suspension Analysis
- And Much More!



What is Data Acquisition

Data = Knowledge



Knowledge = *Speed* ... How **Fast** Do You Want to Go?

Why Use Data Acquisition

Why Use Data Acquisition

Constant Improvement



To Constantly Improve:

- Driver Performance
- Vehicle Performance
- Vehicle Health
- Results!



With the Proper and Consistent Use of Data, Your Race Program Will Improve

*Remember, it is just as important to understand what went **'Right'** as well as what went **'Wrong'***



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Intro to Snowmobile Data Analysis

Constant Improvement

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How to Use Data Acquisition

How to Use Data Acquisition

Best Practices



- Hardware

- Design
- Install
- Configure
- Calibrate
- *Use*
- *Download*

- Software

- Open
- Analyze
 - What Happened?
 - Where Did it Happen?
 - Why Did it Happen?

← Repeat



How to Use Data Acquisition

Data Analysis Concepts

Basic Data Analysis Steps

- What **Happened?** (many stop here!)
- Where **Did it Happen?**
- Why **Did it Happen?**
 - Probable Additional Question... Vehicle **or** Driver?
 - Is the Driver **Reacting** to the Vehicles Movement? or
 - Is the Driver **Creating** the Vehicles Movement
 - This can be a **Critical** Component of 'Why'



Money Channels

- Lap Times and Speed
- All Other Channels Strongly Support the Money Channels



Data Analysis Triangle

- Driver Performance
- Vehicle Performance
- Vehicle Health

How to Use Data Acquisition



Analysis Example: Here we are showing a common 'Measures Graph' view of the time just before and during the start of a race. In the upper window we are looking at: RPM, Throttle Position, and EGT. In the middle window: GPS Speed and Track Speed (named JSpeed_cal) and in the lower window is the Track Slip (Track Speed – GPS Speed). Also note that we are in 'Time' mode for the X-Axis and this is because this is a standing start.



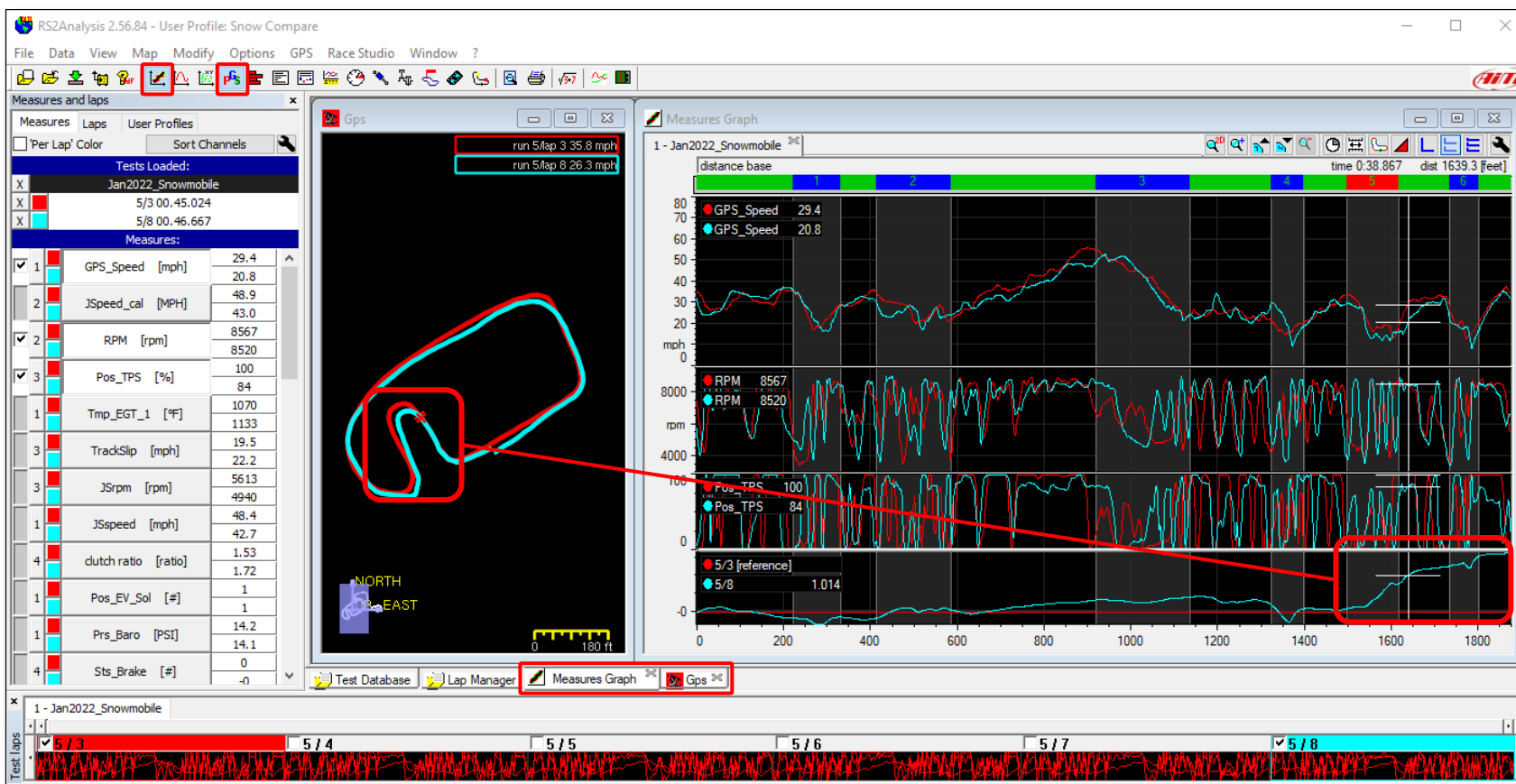
How to Use Data Acquisition



Analysis Example: Here we are showing a common 'Measures Graph' view plus the GPS Track 'Driven Line' map of 2 laps by the same rider to help determine where on the track time was lost during lap 8 (the blue lap).

In the upper window we are looking at: GPS Speed. In the middle window: RPM and in the lower window is Throttle Position.

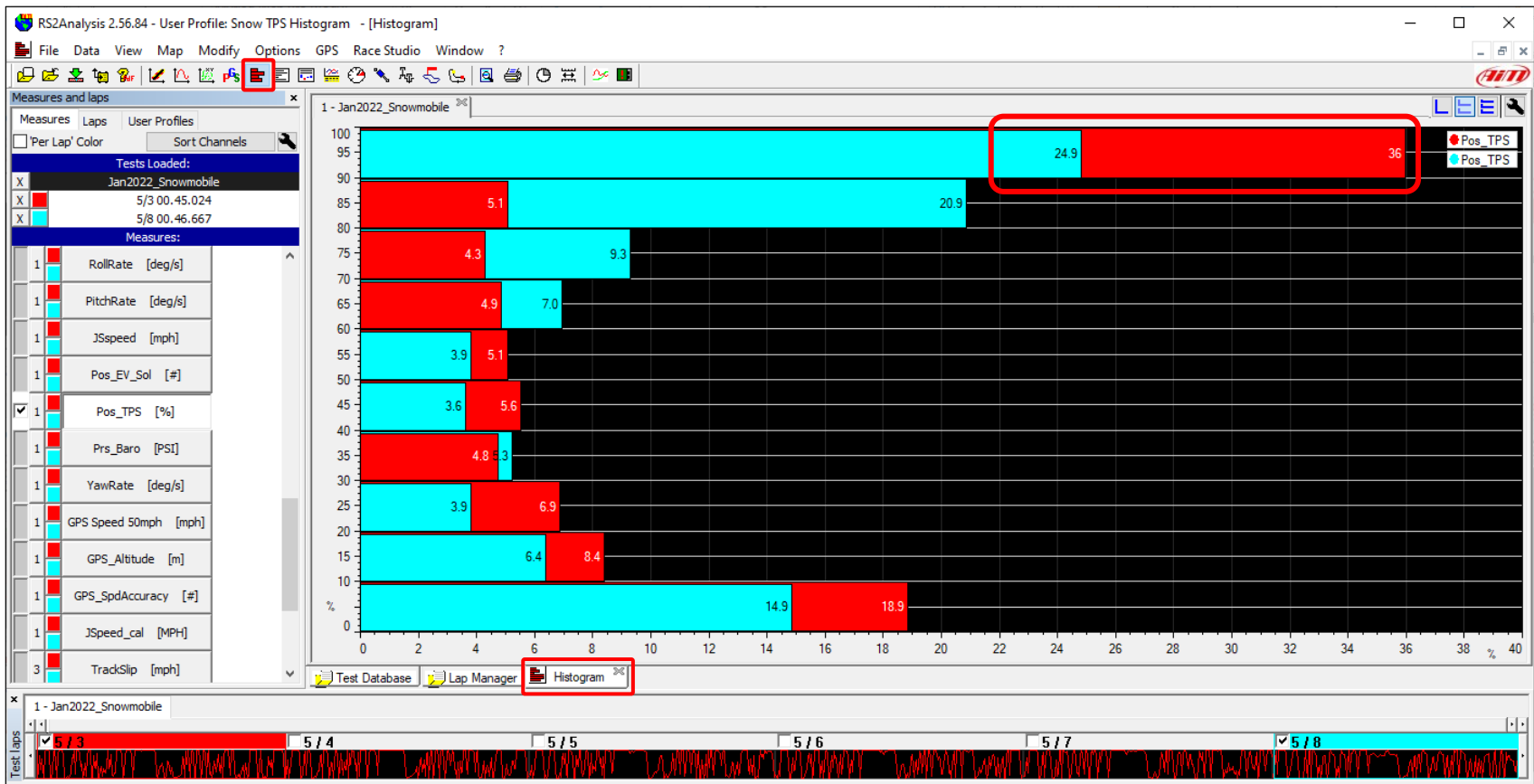
Across the bottom is the 'Time Compare Bar' and this is showing Time Gain or Lost. Where the cursor is you can see that the blue lap is losing time and at about 1 second behind the red lap and that the time loss started happening in the tight right hand hairpin corner.



How to Use Data Acquisition



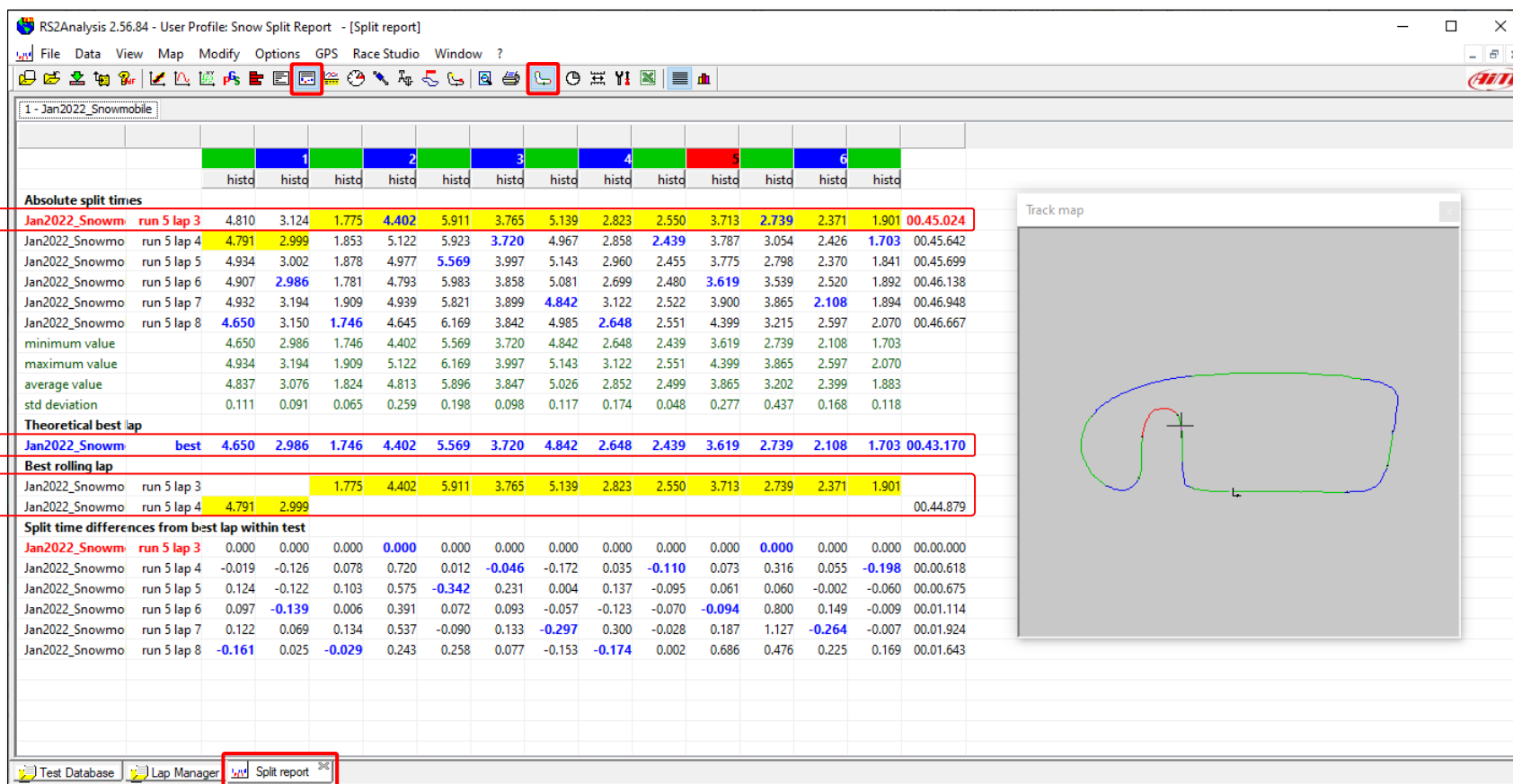
Analysis Example: Here we are showing a 'Histogram Graph' that is showing the % of Throttle Position per lap for the same 2 laps we looked at earlier. Here we can see that the red lap 3 was between 90-100% for 36% of the lap and the slower blue lap was only 24.9% of the lap. As you look deeper you can also see that the slower blue lap was higher in 60-90% Throttle between these 2 laps. Full throttle matters. Also interesting is that the faster red lap has more % of the lap between 0-30% Throttle.



How to Use Data Acquisition



Analysis Example: Here we are showing a 'Split Report'. This is a function that reports how much time was spent in each segment. Here we can also see the segmented track map. Here are 3 areas we are going to focus on: 1) This is the sessions fastest full lap, The time is highlighted in red. 2) This is the 'Theoretical Best Lap' and is the fastest segments all combined. 3) This is a riders Best Rolling Lap, think of it as a lap actually accomplished but possibly not from the start/finish line but rather from any segment point on the track.



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Currently **190** Videos and Growing

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If You Have Questions

Kyle Busch
Using Data as a Racer and a Racing Dad

Host:
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AIM Sports - National Training Manager

Guest:
Kyle Busch
NASCAR Champion and Racing Dad

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Tuesday January 11th, 2022
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Racing Sim Data
How Best to Use it in Race Studio Analysis

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Webinar Series
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Data Download Options
In Race Studio 3

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- All New 2020 - 22 Live Webinar Videos
 - Software Updates with Race Studio 3
 - Pre-Calculated Gear Position Function
 - Configuring WiFi Communication
 - Customizing AiM Device Logos
 - Race Studio 3 Basic Configuration - Part 1
 - Race Studio 3 Basic Configuration - Part 2
 - **I Have Downloaded my Data, Now What - Part 1*
 - **I Have Downloaded my Data, Now What - Part 2*
 - GPS Lap Insert
 - Data Views
 - Measure Units
 - Sort Channels
 - Test Properties
 - Per Lap Color
 - Export Tests
 - Channel Reports
 - Setting Time
 - Track Mapping
 - Selection Criteria
 - Sensor Calibration
 - Conditional Alarms
 - Gear Position
 - Firmware Update
 - Solo Configuration
 - Transmit Tracks
 - Gps Manager Overview
 - New GPS Track
 - Webinars
- * Most Popular and Recommended*

Additional Materials

LearnFast™ E-Training Videos

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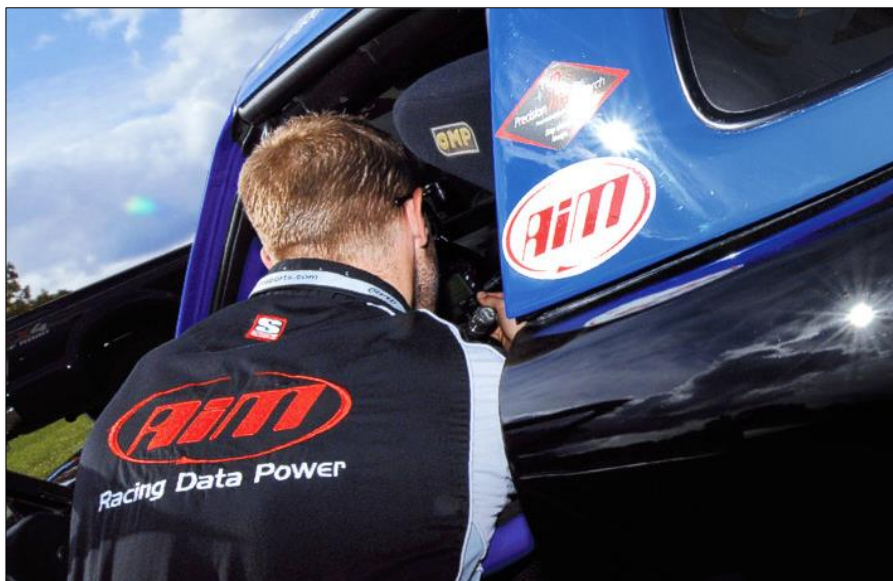
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Customer Support



AiM Sports Technical Support Staff Regularly
Attend Races and Other Events

Look For Us At An Event Near You
Or Call Us At **800.718.9090**



Customer Support

At An Event Near You!

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[aimsports.com](https://www.aimsports.com)

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