

Optimizing Bike Gearing

A Critical Task for a New Track!



Host:

Roger Caddell

AiM Sports - National Training Manager



Co-Host:

Chloé Lerin

MotoAmerica Data Engineer



Chloé Lerin



- Race Data Engineer at MotoAmerica
- AiM Trackside Support Technician
- Powertrain Engineer at Harley-Davidson
- Amateur Motorcycle Club Racer #147
- 10 Years in Internal Combustion Engine Research – Work with Engine Dynos
- Master's in Mechanical Engineering from University of Wisconsin-Madison
- Engineering Diploma from UTT, France



Chloé Lerin

Motorcycle Data Engineer



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New Track, New Bike

How to Shorten the Learning Process

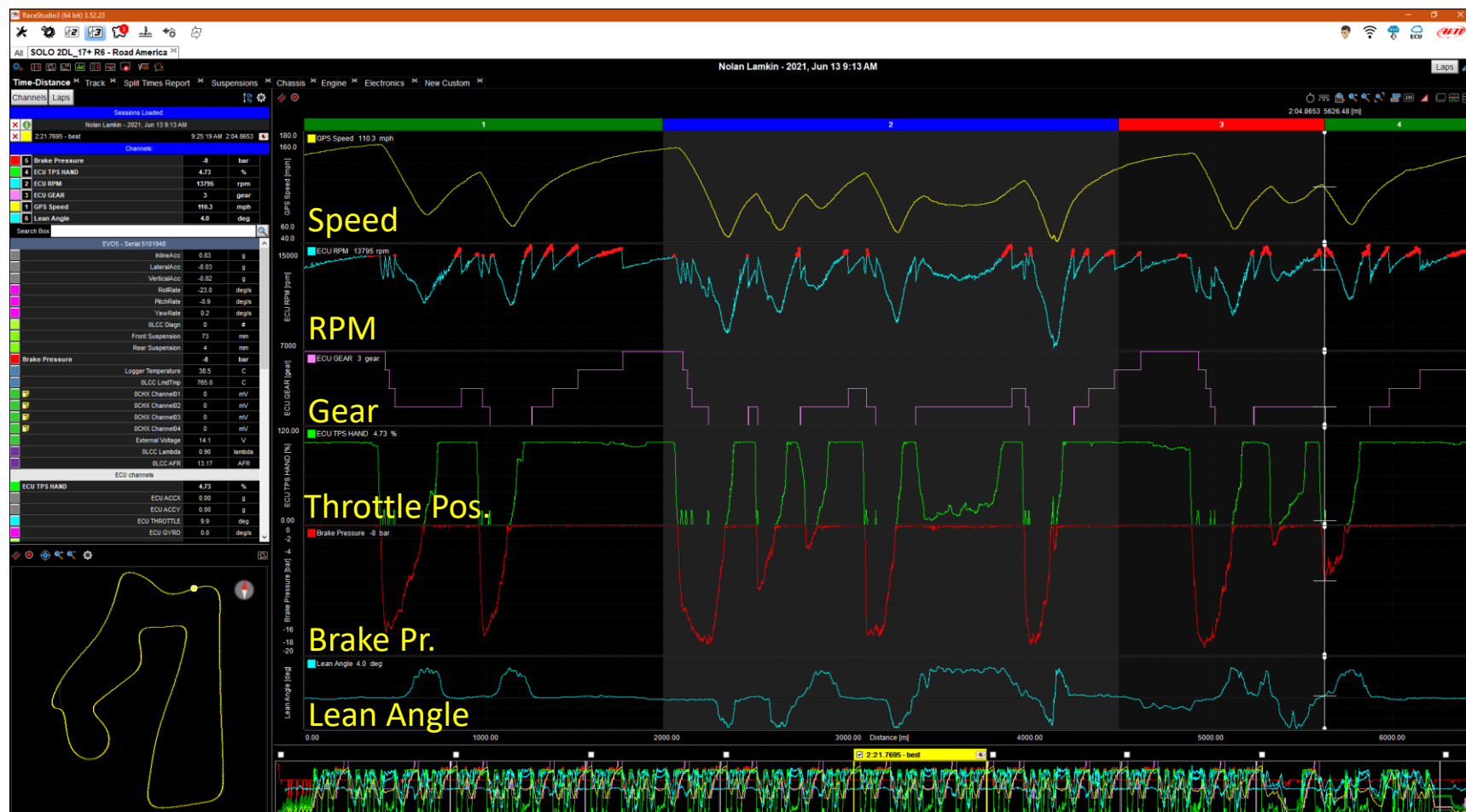
- Motorcycle with Sets of Front and Rear Sprockets
- GPS Data Logger with ECU connection: Solo2DL and Up
- Going the Extra Mile:
 - GPS Data Logger with Analog Channels:
 - Suspension Potentiometers – Front and Rear
 - Brake Pressure Sensor
 - SmartyCam / Adventure Cams



Optimizing Bike Gearing

How to Shorten the Learning Process

My RS3A User Profile – Rider Inputs



Optimizing Bike Gearing

My RS3A User Profile – Rider Inputs

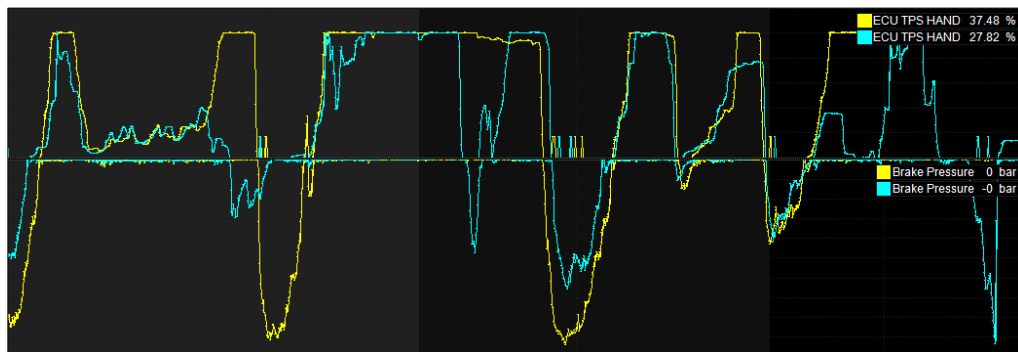
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Step 1: Learn the Line and get up to Speed

- It is Important to do the Work on *YOURSELF* Prior to Making a lot of Adjustments to the Bike
- Often, the Throttle and the Braking Traces are Good Indicators of the Rider's Comfort/Confidence



- Focus on Learning the Race Line and Setting your Reference Points. Note that the Brake Markers will Move as Pace Increases

Optimizing Bike Gearing

Learn the Line and get up to Speed

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Why Gearing Matters

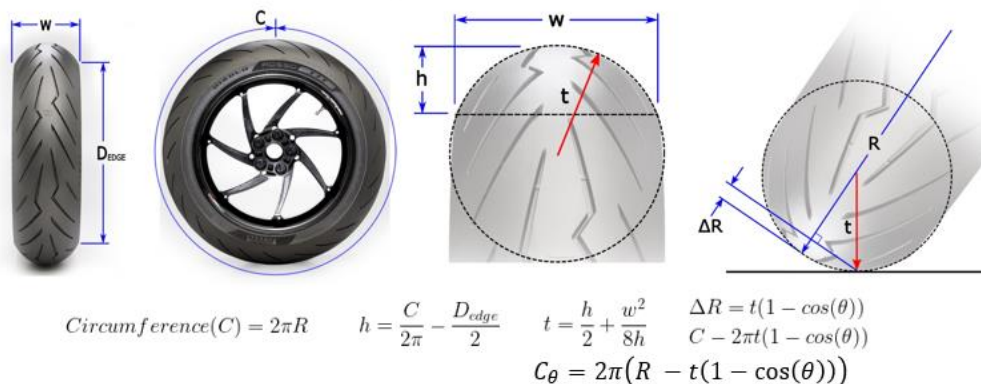
The Math Behind It

- Engine Rotates and Makes the Rear Wheel Rotate via Gears and Chain
- Knowing the Transmission Gear Ratio, RPM, Sprocket Sizes and Tire Diameter, we can Calculate the Wheel Speed

Zero Lean Angle:

$$\text{Rear Wheel Speed} = \frac{\text{Engine Speed} * \text{Front Sprocket} * \text{rear tire diameter} * \pi * 60}{\text{Rear Sprocket} * 1609344 \text{ [mm to mi]}}$$

When the Bike is Leaned Over, the Diameter of the Rear Wheel is Reduced. This can also be Calculated Knowing the Lean Angle and Tire Geometry:



This is why, even with no Speed Change, RPM Increases when the Bike is Leaned Over !!!

Optimizing Bike Gearing

Why Gearing Matters

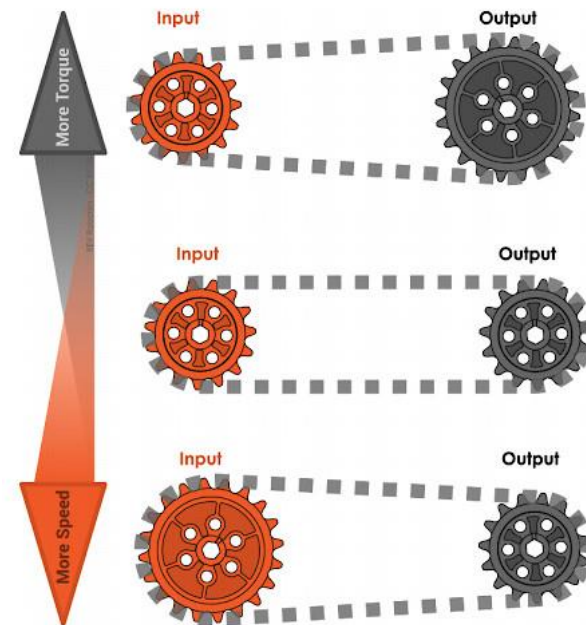
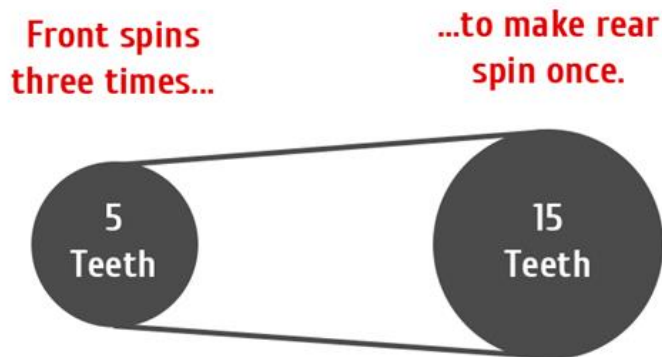
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Gearing Made Simple

It is All About Compromises



- The Faster your Engine Spins the Faster the Rear Wheel will Spin (Considering 100% Grip)
- All Engines have an RPM Limit → To Increase the Wheel Speed Limit, Gearing needs to be Changed
- **A Larger Rear Sprocket will Provide More Torque in Corner Exit**
- **A Smaller Rear Sprocket will Provide More Top Speed**



Optimizing Bike Gearing

Gearing Made Simple

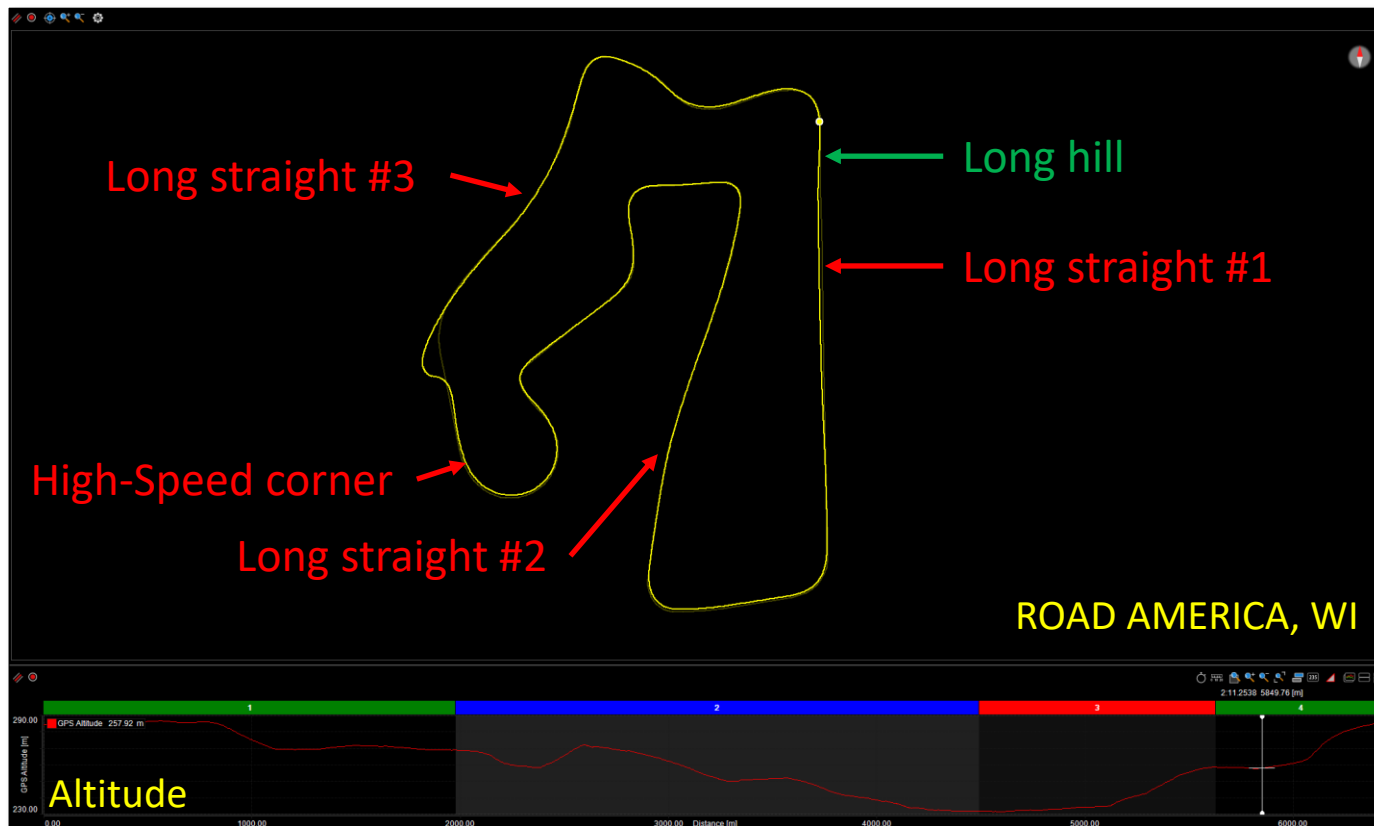
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Step 2: Identify Important Areas

- Questions to Ask Yourself:
 - How Long are the Straights? How Big is the Elevation Change? How Many Corners? Where is the Start/Finish in Relation to the Last Turn?

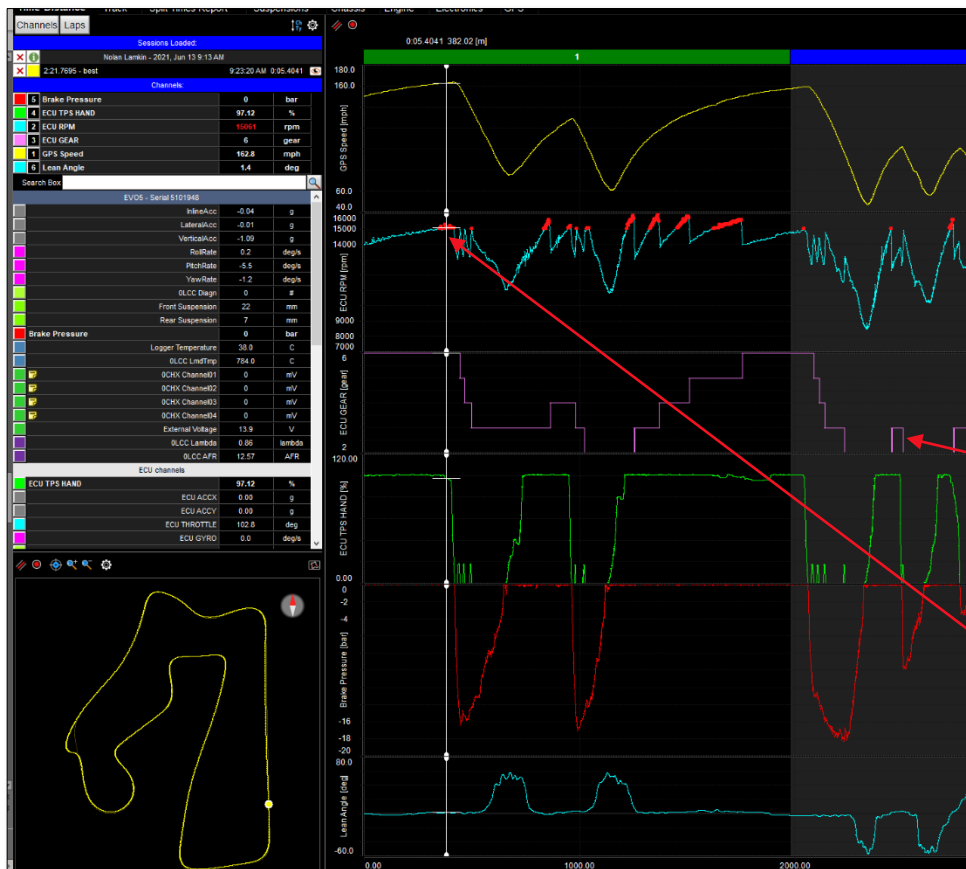


Optimizing Bike Gearing

Identify Important Areas

Step 3: Consider Shifting Points

- Questions to Ask Yourself:
 - Where am I Shifting? Am I Using all the Gears? Where is my Top Speed Reached?



- Up-Shifting Happens when the Bike is Close to Redline.
- Down-Shifting is Needed when Slowing Down, or when Needing more Torque. (Torque Curves Always Falls after a Certain RPM)
- Short Excursion into 3rd Gear and Back Down to 2nd to Climb the Hill
- Shift to 6th Early Enough to Carry 6th to the End of the Straight Away. Rev Limit is Touched Just before Downshifting

Optimizing Bike Gearing

Consider Shifting Points

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Step 4: Adjust Gearing and Go Have Fun !!!



Optimizing Bike Gearing

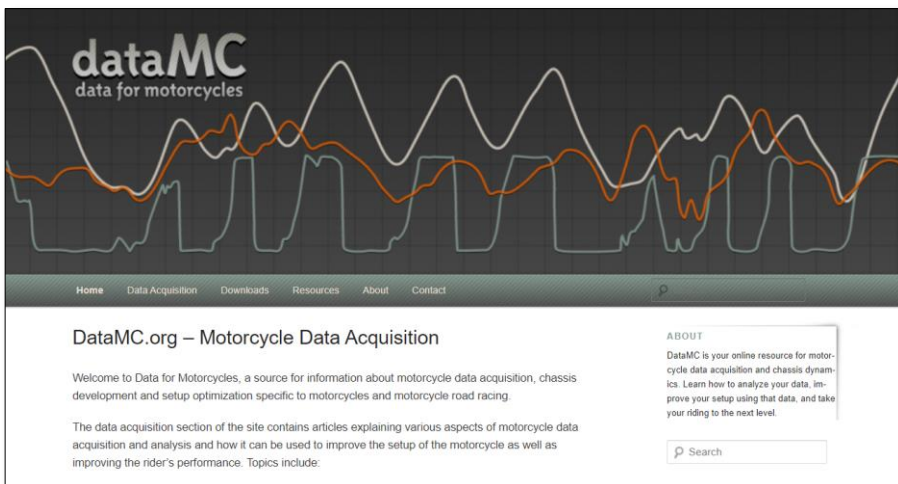
Adjust Gearing and Go Have Fun !!!

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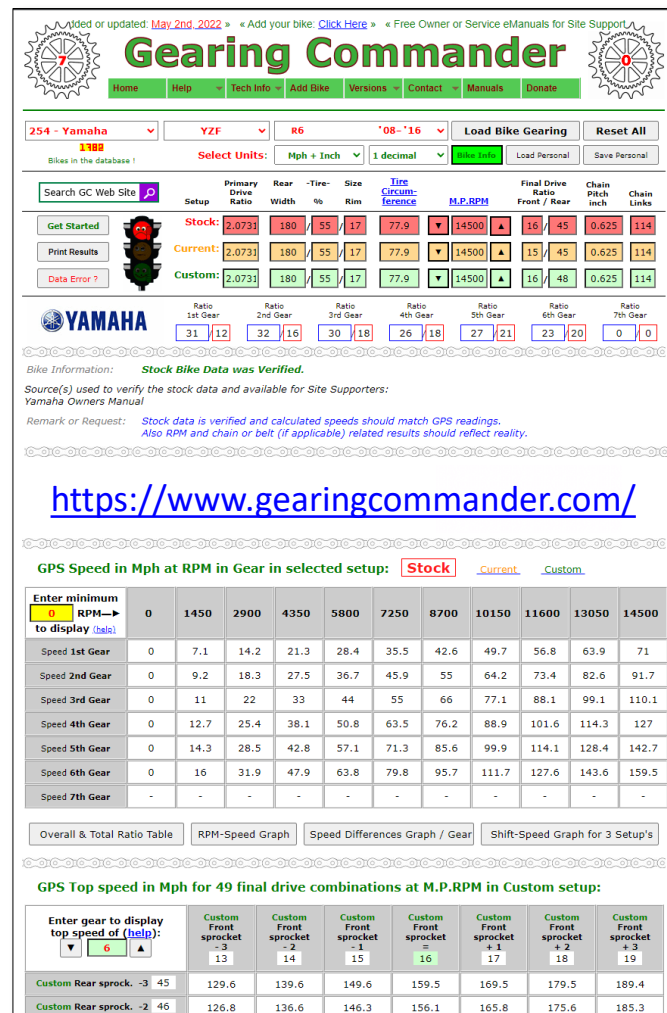
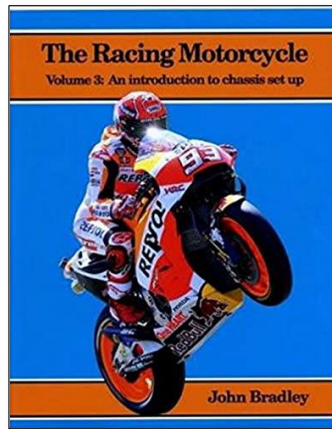
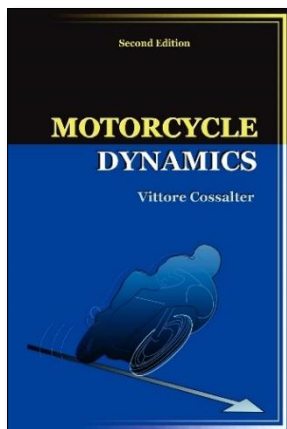


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Other Gearing Resources



<https://www.datamc.org/>



<https://www.gearingcommander.com/>

Optimizing Bike Gearing

Other Gearing Resources

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LearnFast™ E-Training Videos



Currently **210** Videos and Growing

YouTube www.youtube.com/aimdata

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If You Have Questions

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Host:
Roger Caddell
AiM Sports - National Training Manager

Co-Host:
Chloé Lerin
MotoAmerica Data Engineer

aimsports.com Tuesday May 31st, 2022 LearnFast™

We Have Answers!
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#145

Introducing The SmartyCam 3
"Smart" - The Ultimate Motorsport Camera
Specifically Designed for Karting and Club Racing



Host:
Roger Caddell
AiM Sports - National Training Manager

Co-Host:
Fabrizio Ruggi
AiM Sports - National Training Manager

aimsports.com Tuesday May 24th, 2022 LearnFast™

Webinar Series

Bringing Data Support and Training to You

Data Download Options
In Race Studio 3

March 31st, 2020

www.aimsports.com 1.800.718.9090

- 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
 - Selection Criteria
 - Data Views
 - Sensor Calibration
 - Measure Units
 - Conditional Alarms
 - Sort Channels
 - Gear Position
 - Test Properties
 - Firmware Update
 - Per Lap Color
 - Solo Configuration
 - Export Tests
 - Transmit Tracks
 - Channel Reports
 - Gps Manager Overview
 - Setting Time
 - New GPS Track
 - Track Mapping
 - Webinars
- * *Most Popular and Recommended*

Additional Materials

LearnFast™ E-Training Videos

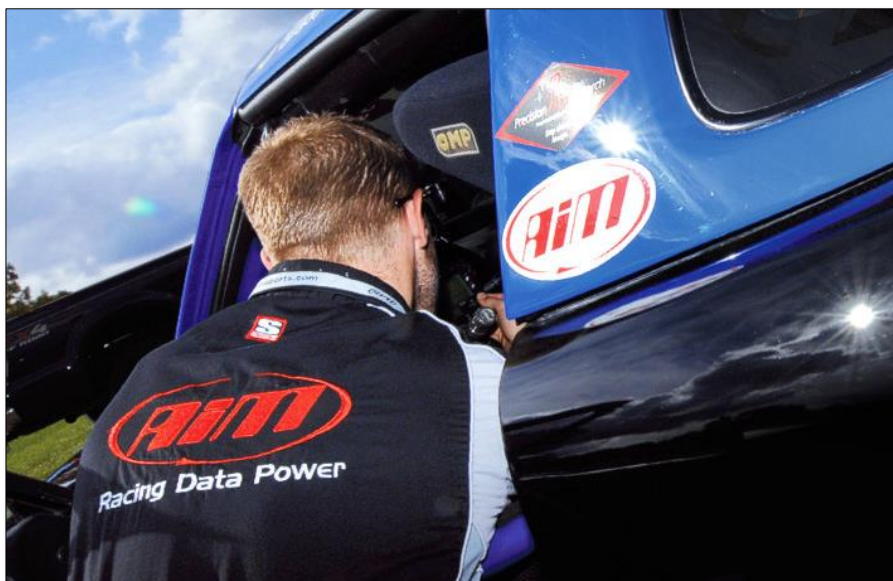
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Customer Support



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!

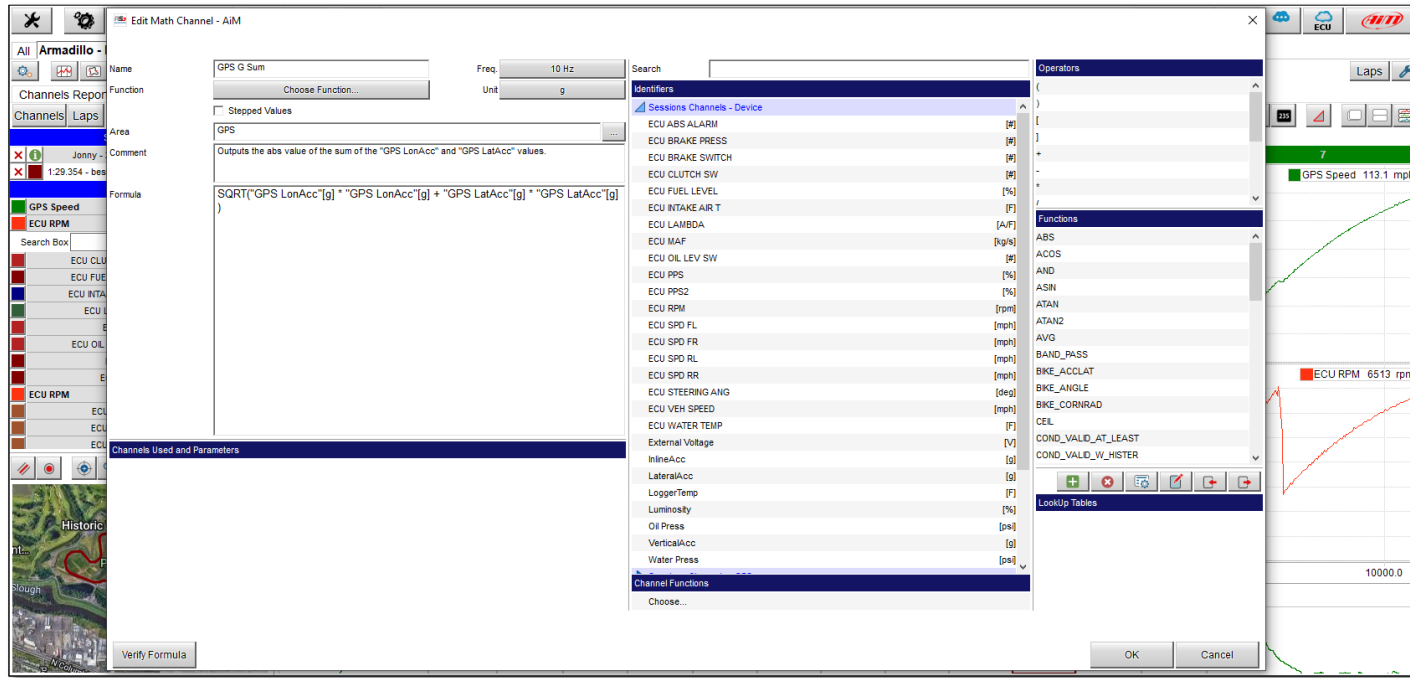
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Math Channels

Practical Use of the RS3A Math Channel Function



Co-Host:

Emiliano Bina

AiM-Sportline - Software Lead

Host:

Roger Caddell

AiM Sports - National Training Manager

Co-Host:

Matt Romanowski

TrailBrake.com - Owner

Next Webinar: Tuesday June 7th, 2022 - 10:00am Pac/1:00pm East

Next Webinar

Race Studio 3 Math Channels

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

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