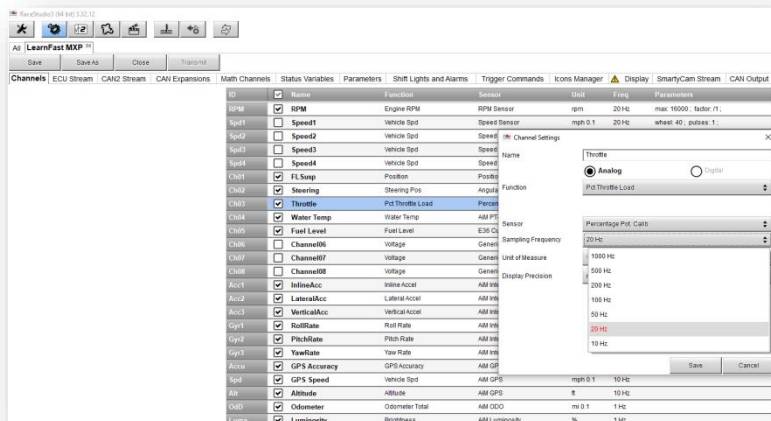




**Co-Host:
John Block**

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Webinar Series

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Data Sampling Rates

Removing the Mystery

2020 Webinar #60

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October 22nd, 2020

1.800.718.9090

John Block

john@auto-ware.com

www.auto-ware.com



Co-Host: John Block

- Involved in Motorsports for 50 years, as a Driver, Designer, Fabricator, Engineer, DAG, Driver Coach, Webinar Instructor
- Indy Cars, ARCA, NASCAR, Indy Lights, Trans AM, SCCA, USF2000, Sprint Cars, Modifieds, Etc



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John Block

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RaceStudio3 Device Configuration

RaceStudio3 (64 bit) 3.32.14

All Configurations

Devices (12)

Manual Collections

Webinar (1)

Connected Devices

No device connected

Connecting to

Trash (3)

New Clone Import Export Receive Transmit Delete

Device Configurations

	Name	Device	Date
☐	0/1		
☐	 MXL2 Larry Funk M3 01	 MXL2	4:21 PM 4:21 PM

Open Selected Configuration

RaceStudio3 (64 bit) 3.32.14

All Configurations

Devices (12)

Manual Collections

Webinar (1)

Connected Devices

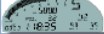
No device connected

Connecting to

Trash (3)

New Clone Import Export Receive Transmit Delete

Device Configurations

1/1	Name	Device	Date
☒	 MXL2 Larry Funk M3 01	 MXL2	4:21 PM

Export This Configuration

Open This Configuration for Editing

Edit Configuration Name or Notes

Delete This Configuration

Erase this item from this collection

Channels & Sample Rates

RaceStudio3 (64 bit) 3.32.14

Save Save As Close Transmit

Channels ECU Stream CAN2 Stream CAN Expansions Math Channels Status Variables Parameters Shift Lights and Alarms Display SmartyCam Stream CAN Output

ID	☒	Name	Function	Sensor	Unit	Freq	Parameters
RPM	☐	RPM	Engine RPM	RPM Sensor	rpm	20 Hz	max: 16000 ; factor: /1 ;
Spd1	☐	Speed1	Vehicle Spd	Speed Sensor	mph 0.1	20 Hz	wheel: 40 ; pulses: 1 ;
Spd2	☐	Speed2	Vehicle Spd	Speed Sensor	mph 0.1	20 Hz	wheel: 40 ; pulses: 1 ;
Spd3	☐	Speed3	Vehicle Spd	Speed Sensor	mph 0.1	20 Hz	wheel: 40 ; pulses: 1 ;
Spd4	☐	Speed4	Vehicle Spd	Speed Sensor	mph 0.1	20 Hz	wheel: 40 ; pulses: 1 ;
Ch01	☒	H2OT AiM	Water Temp	AIM PT-100	F	1 Hz	
Ch02	☒	OILP AiM	Oil Pressure	AIM 0-150 psi (X05PSA00150P1	psi	20 Hz	
Ch03	☒	OILT AiM	Oil Temp	AIM PT-100	F	1 Hz	
Ch04	☒	H2OP AiM	Pressure	AIM 0-50 psi (X05PSA00050P18	psi 0.1	20 Hz	
Ch05	☒	LFpot	Voltage	Generic 0-5 V	V 0.1	20 Hz	
Ch06	☒	RFpot	Voltage	Generic 0-5 V	V 0.1	20 Hz	
Ch07	☒	LRpot	Voltage	Generic 0-5 V	V 0.1	20 Hz	
Ch08	☒	RRpot	Voltage	Generic 0-5 V	V 0.1	20 Hz	
InIA	☒	InlineAcc	Inline Accel	AIM Internal Accelerometer	g 0.01	50 Hz	
LatA	☒	LateralAcc	Lateral Accel	AIM Internal Accelerometer	g 0.01	50 Hz	
VerA	☒	VerticalAcc	Vertical Accel	AIM Internal Accelerometer	g 0.01	50 Hz	
Roll	☒	RollRate	Roll Rate	AIM Internal Gyro	deg/s 0.1	50 Hz	
Ptch	☒	PitchRate	Pitch Rate	AIM Internal Gyro	deg/s 0.1	50 Hz	
YawR	☒	YawRate	Yaw Rate	AIM Internal Gyro	deg/s 0.1	50 Hz	
Accu	☒	GPS Accuracy	GPS Accuracy	AIM GPS	in 0.001	10 Hz	
Spd	☒	GPS Speed	Vehicle Spd	AIM GPS	mph 0.1	10 Hz	
Alt	☒	Altitude	Altitude	AIM GPS	ft	10 Hz	
OdD	☒	Odometer	Odometer Total	AIM ODO	mi 0.1	1 Hz	

Select Desired Sample Rate

RaceStudio3 (64 bit) 3.32.14

All **MXL2 Larry Funk M3 01**

Save Save As Close Transmit

Channels ECU Stream CAN2 Stream CAN Expansions Math Channels Status Variables Parameters Shift Lights and Alarms Display SmartyCam Stream CAN Output

ID	✓	Name	Function	Sensor	Sampling Frequency	Unit of Measure	Display Precision
RPM	☐	RPM					
Spd1	☐	Speed1					
Spd2	☐	Speed2					
Spd3	☐	Speed3					
Spd4	☐	Speed4					
Ch01	☒	H2OT AiM					
Ch02	☒	OILP AiM					
Ch03	☒	OILT AiM					
Ch04	☒	H2OP AiM					
Ch05	☒	LFpot					
Ch06	☒	RFpot					
Ch07	☒	LRpot					
Ch08	☒	RRpot					
InlA	☒	InlineAcc					
LatA	☒	LateralAcc					
VerA	☒	VerticalAcc					
Roll	☒	RollRate					
Ptch	☒	PitchRate					
YawR	☒	YawRate					
Accu	☒	GPS Accuracy					
Spd	☒	GPS Speed					
Alt	☒	Altitude					
OdD	☒	Odometer					

Channel Settings

Name: LFpot

Function: Voltage

Sensor: Generic 0-5 V

Sampling Frequency: 20 Hz

Unit of Measure: 1000 Hz, 500 Hz, 200 Hz, 100 Hz, 50 Hz, 20 Hz, 10 Hz, 5 Hz, 2 Hz, 1 Hz

Display Precision: 1 Hz

Parameters

max: 16000 ; factor: /1 ;

wheel: 40 ; pulses: 1 ;

wheel: 40 ; pulses: 1 ;

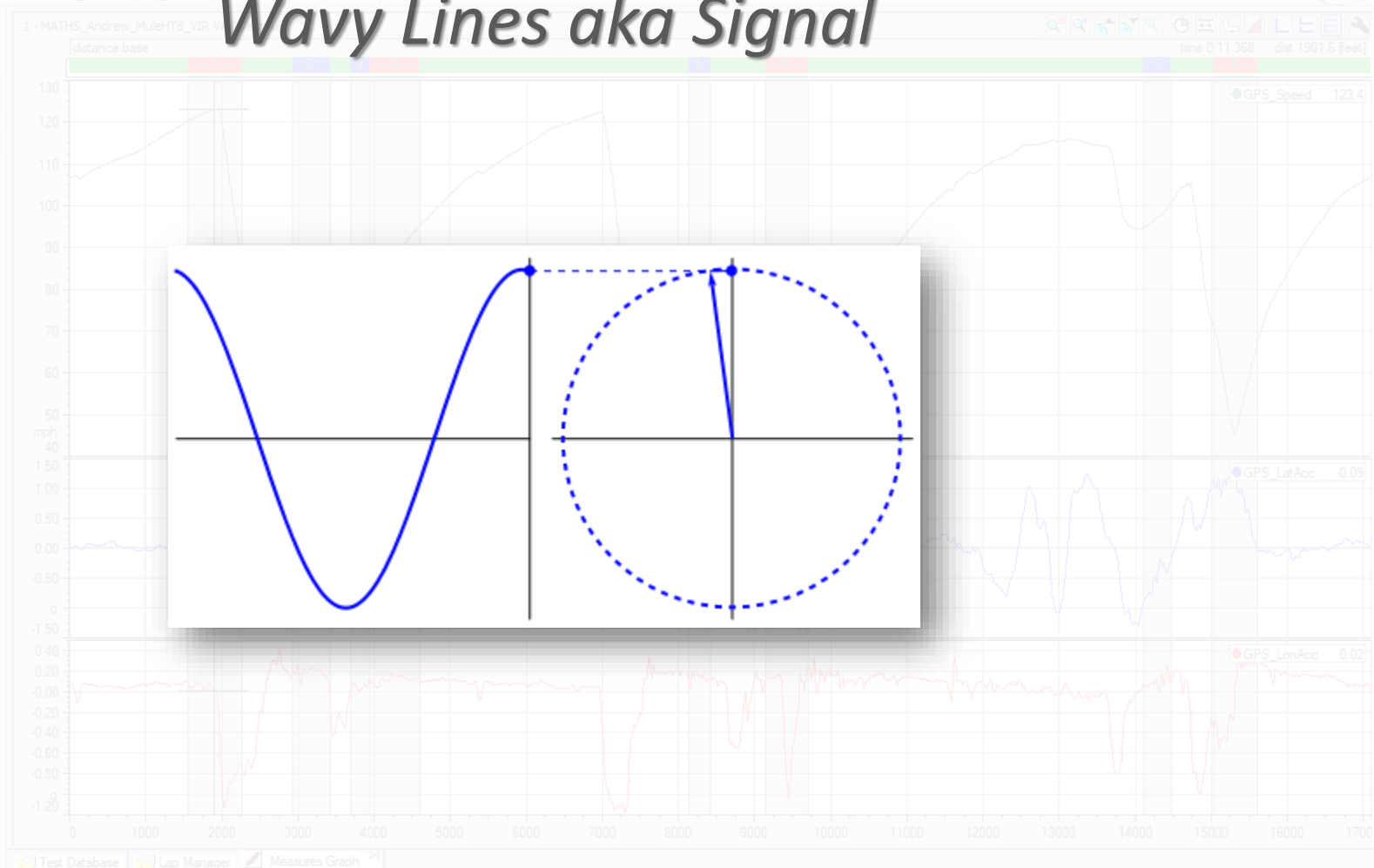
wheel: 40 ; pulses: 1 ;

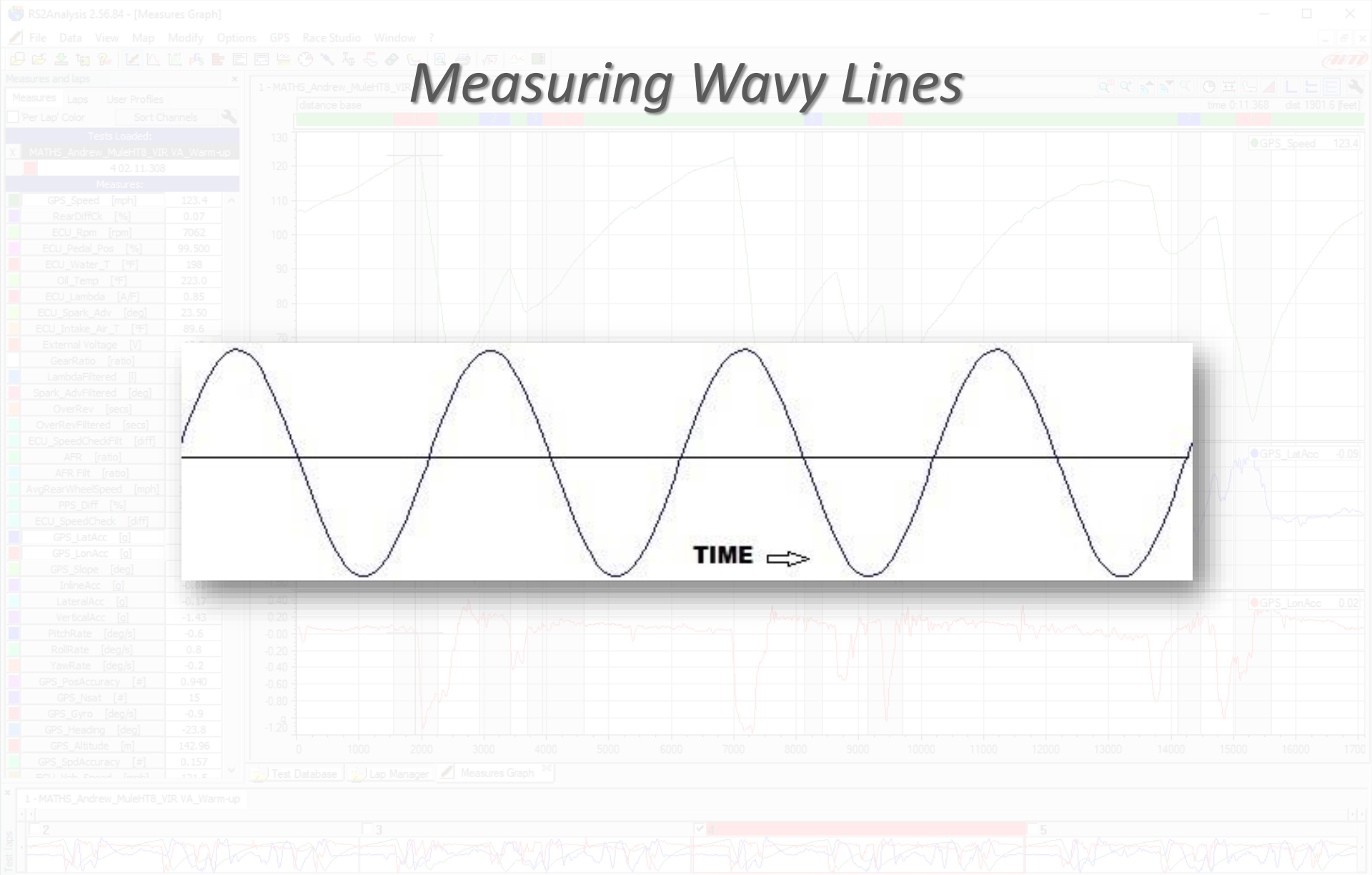
wheel: 40 ; pulses: 1 ;

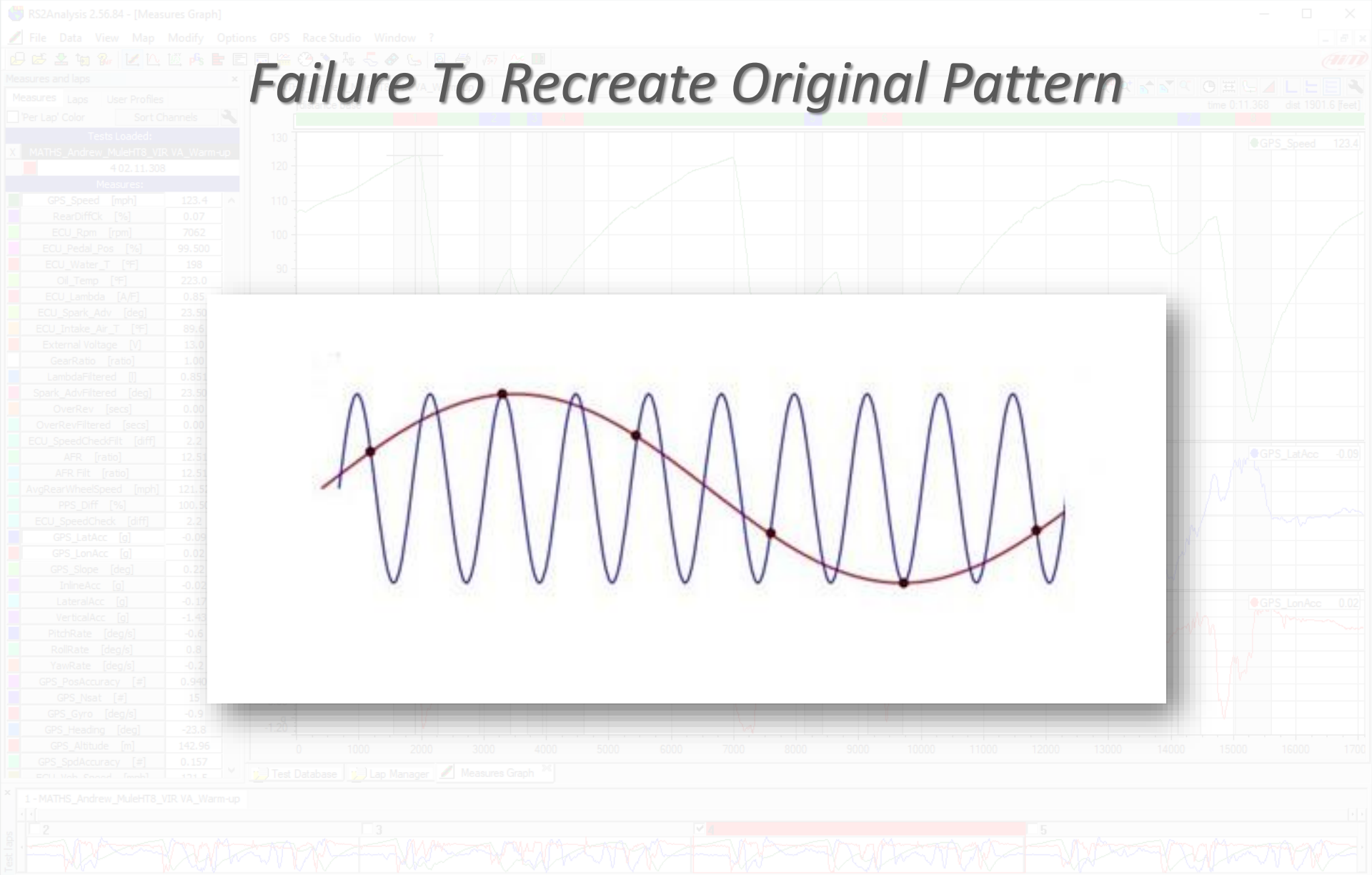


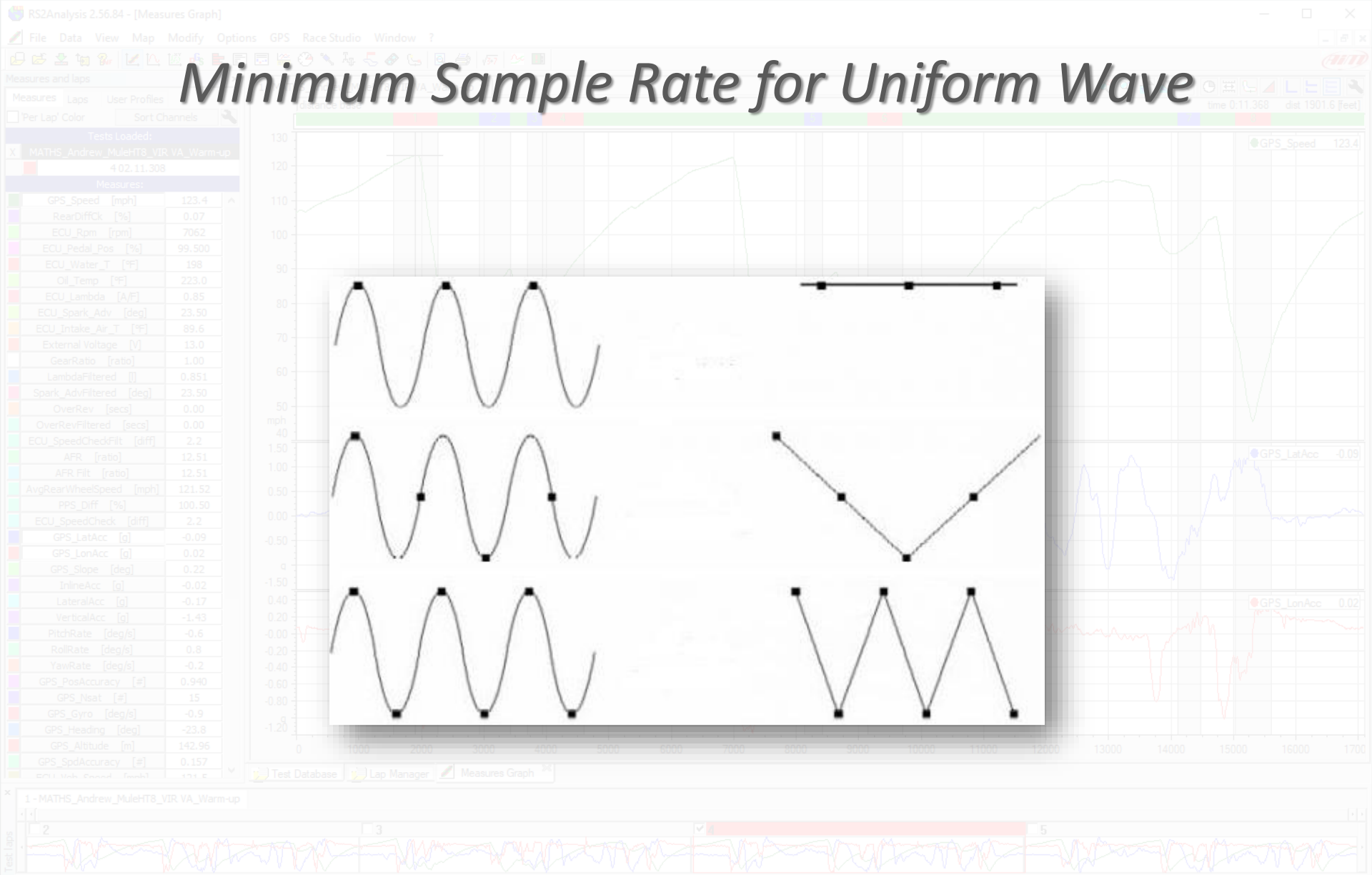
Wavy Lines aka Signal

Measures	Laps	User Profiles
☐ Per Lap Color		Sort Channels
Tests Loaded:		
MATHS_Andrew_MuleHT8_VIR_VA_Warm-up		
4 02:11.308		
Measures:		
GPS_Speed [mph]	123.4	
RearDiffCk [%]	0.07	
ECU_Rpm [rpm]	7062	
ECU_Pedal_Pos [%]	99.500	
ECU_Water_T [°F]	198	
Oil_Temp [°F]	223.0	
ECU_Lambda [A/F]	0.85	
ECU_Spark_Adv [deg]	23.50	
ECU_Intake_Air_T [°F]	89.6	
External Voltage [V]	13.0	
GearRatio [ratio]	1.00	
LambdaFiltered []	0.851	
Spark_AdvFiltered [deg]	23.50	
OverRev [secs]	0.00	
OverRevFiltered [secs]	0.00	
ECU_SpeedCheckFilt [diff]	2.2	
AFR [ratio]	12.51	
AFR_Filt [ratio]	12.51	
AvgRearWheelSpeed [mph]	121.52	
RPS_Diff [%]	100.50	
ECU_SpeedCheck [diff]	2.2	
GPS_LatAcc [g]	-0.09	
GPS_LonAcc [g]	0.02	
GPS_Slope [deg]	0.22	
InlineAcc [g]	-0.02	
LateralAcc [g]	-0.17	
VerticalAcc [g]	-1.43	
PitchRate [deg/s]	-0.6	
RollRate [deg/s]	0.8	
YawRate [deg/s]	-0.2	
GPS_PosAccuracy [#]	0.940	
GPS_Neat [#]	15	
GPS_Gyro [deg/s]	-0.9	
GPS_Heading [deg]	-23.8	
GPS_Altitude [m]	142.96	
GPS_SpdAccuracy [#]	0.157	
GPS_Heading [deg]	171.1	

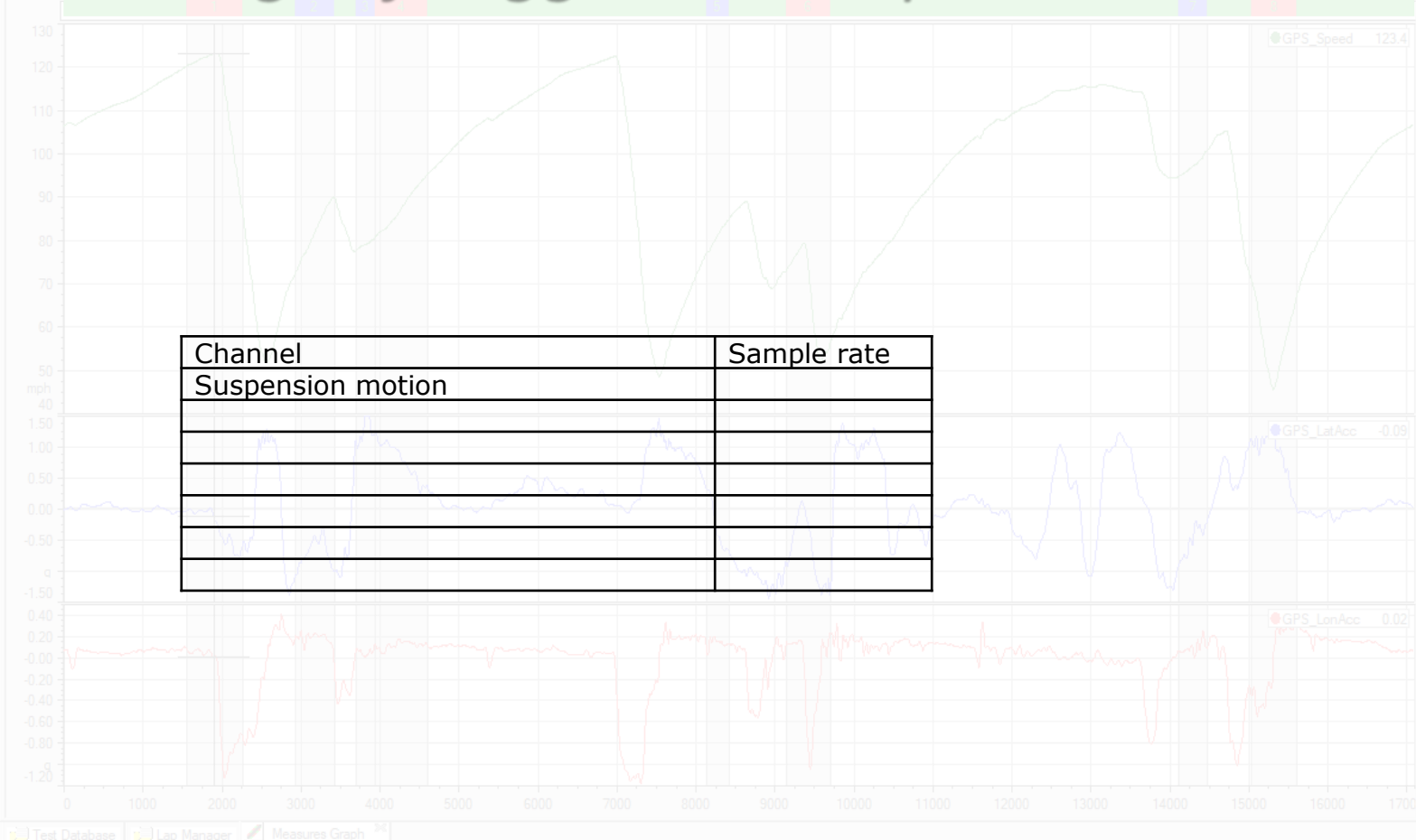


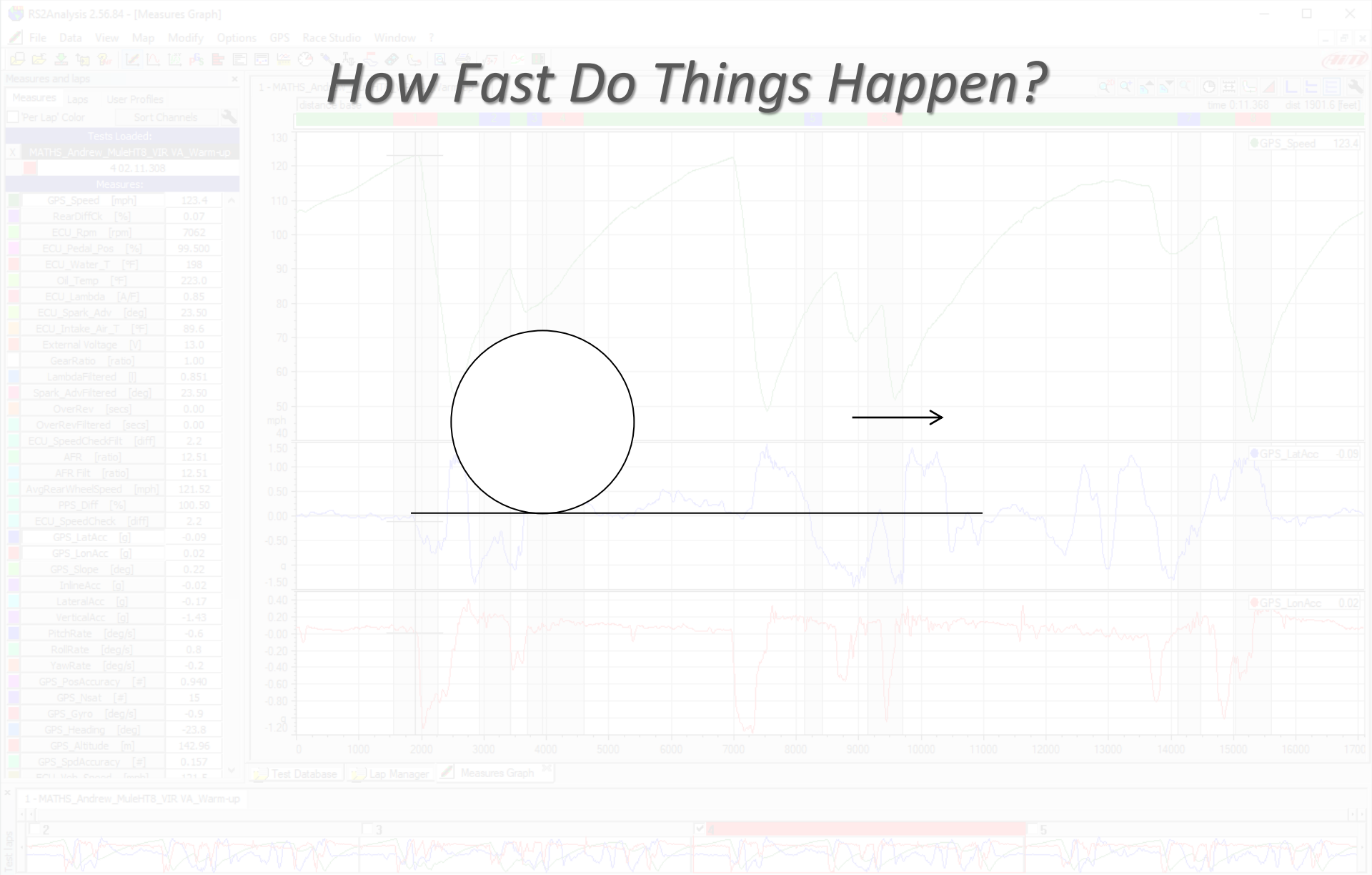


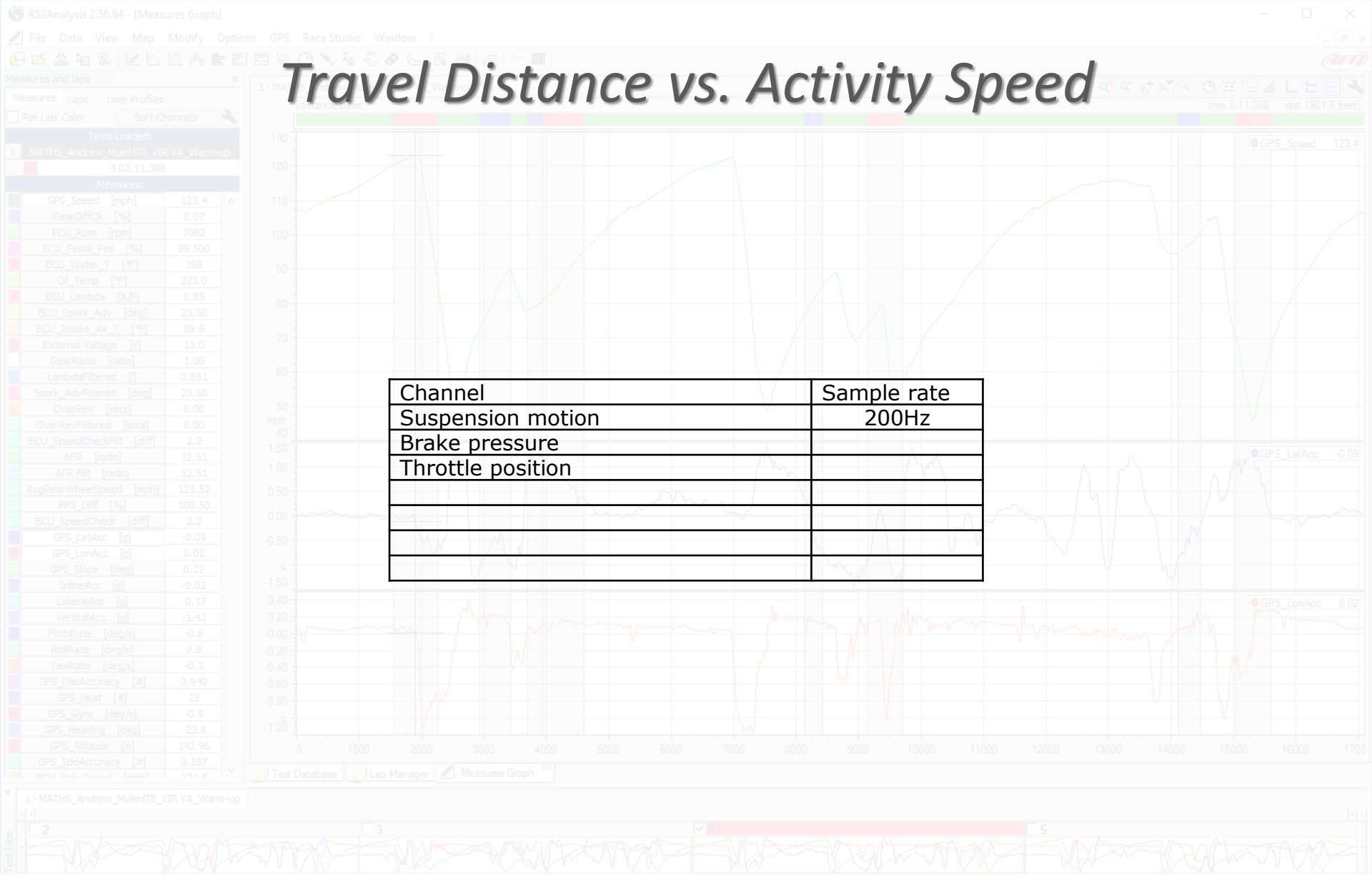


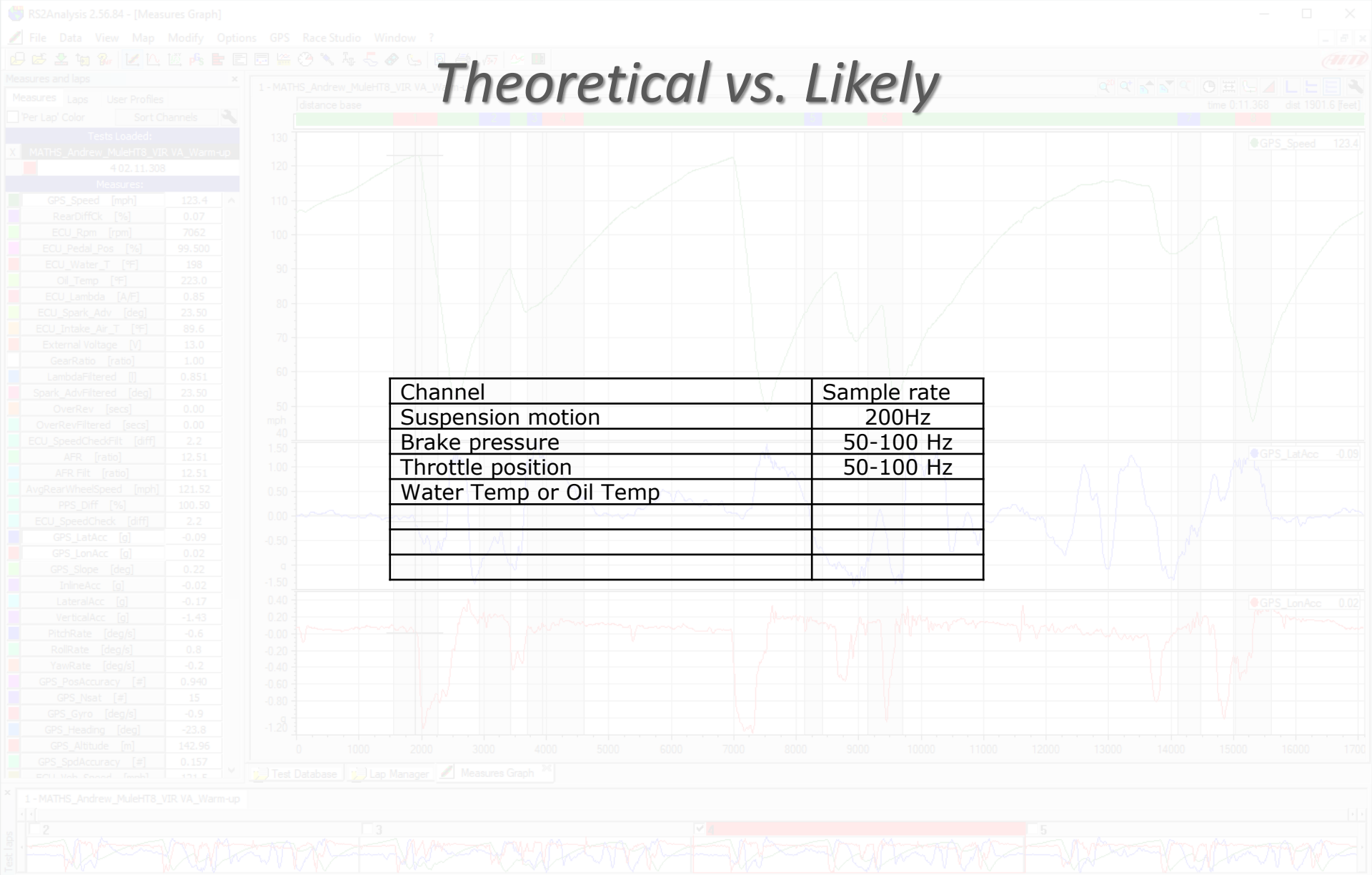


John's Range of Suggested Sample Rates



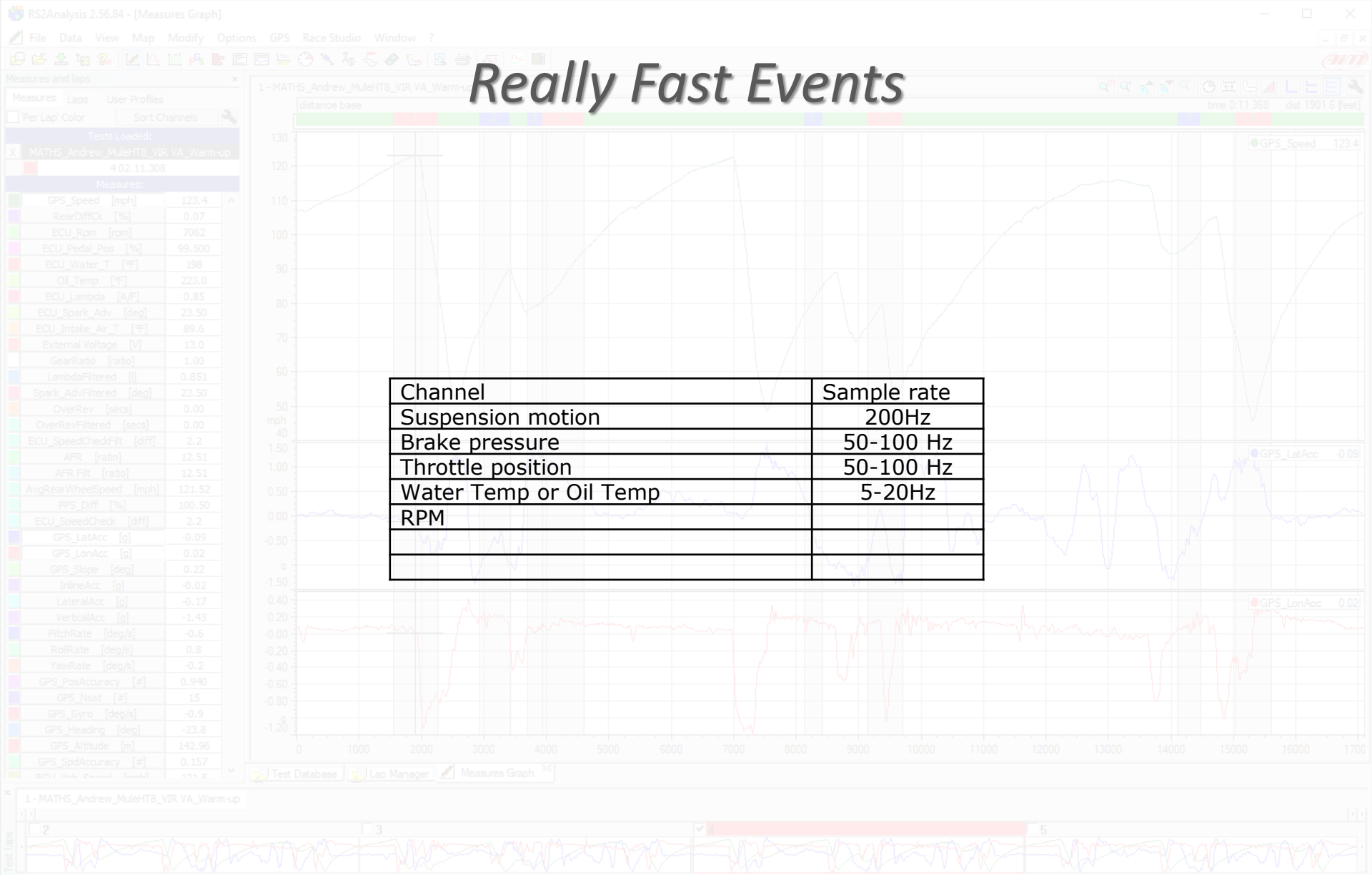


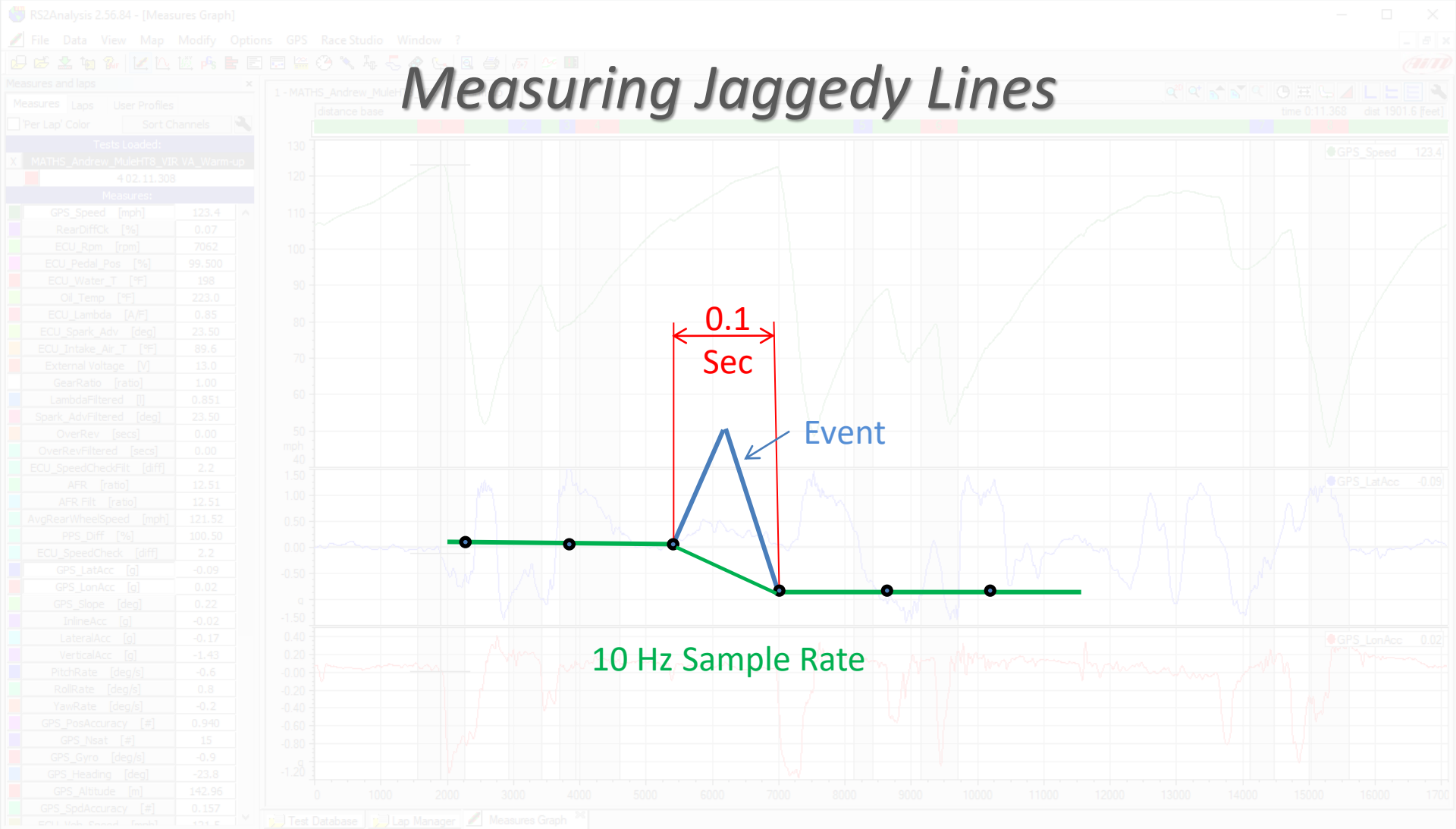




Theoretical vs. Likely

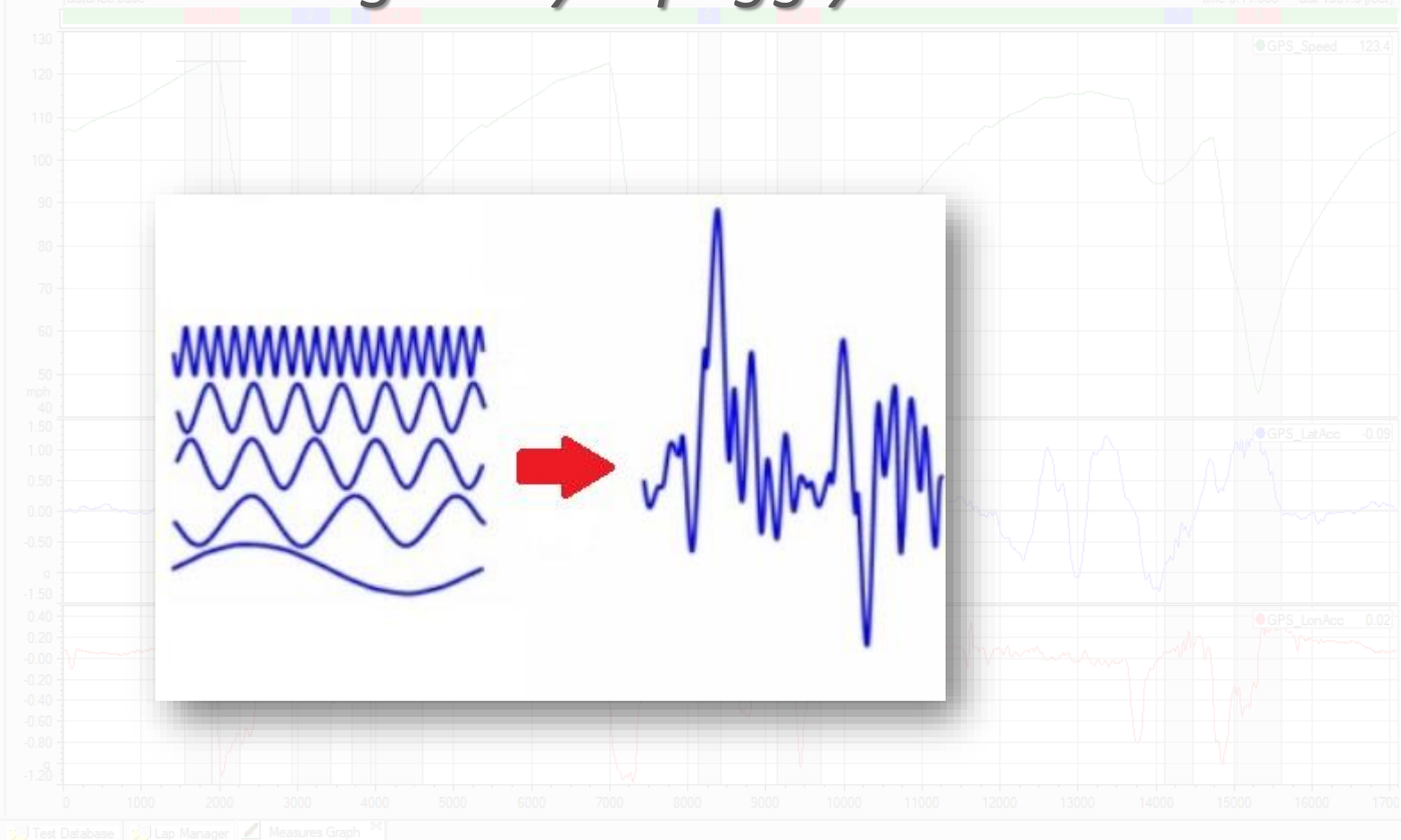
Channel	Sample rate
Suspension motion	200Hz
Brake pressure	50-100 Hz
Throttle position	50-100 Hz
Water Temp or Oil Temp	







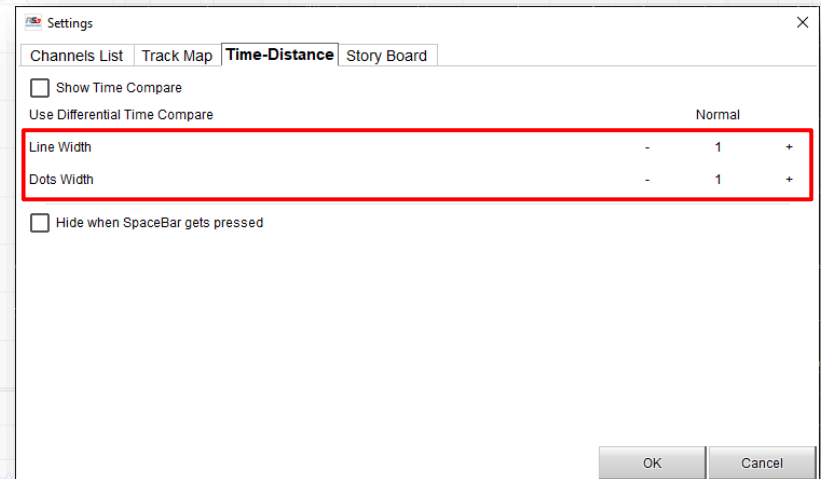
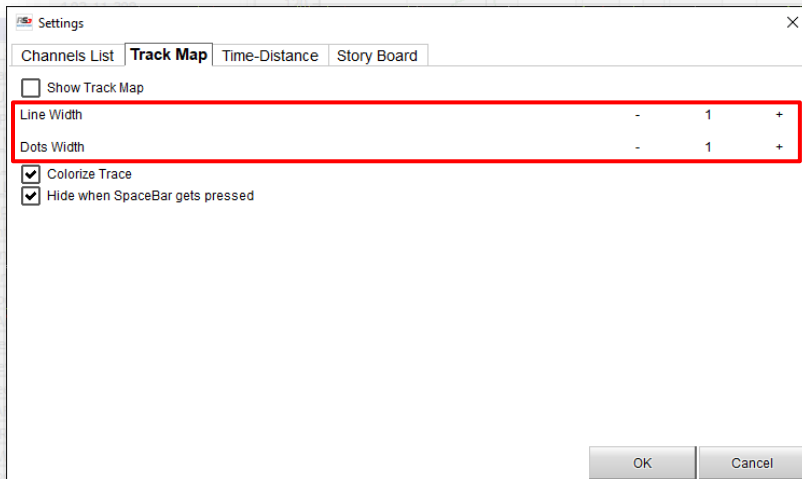
Measuring Crazy Squiggly Lines



John's Range of Suggested Sample Rates

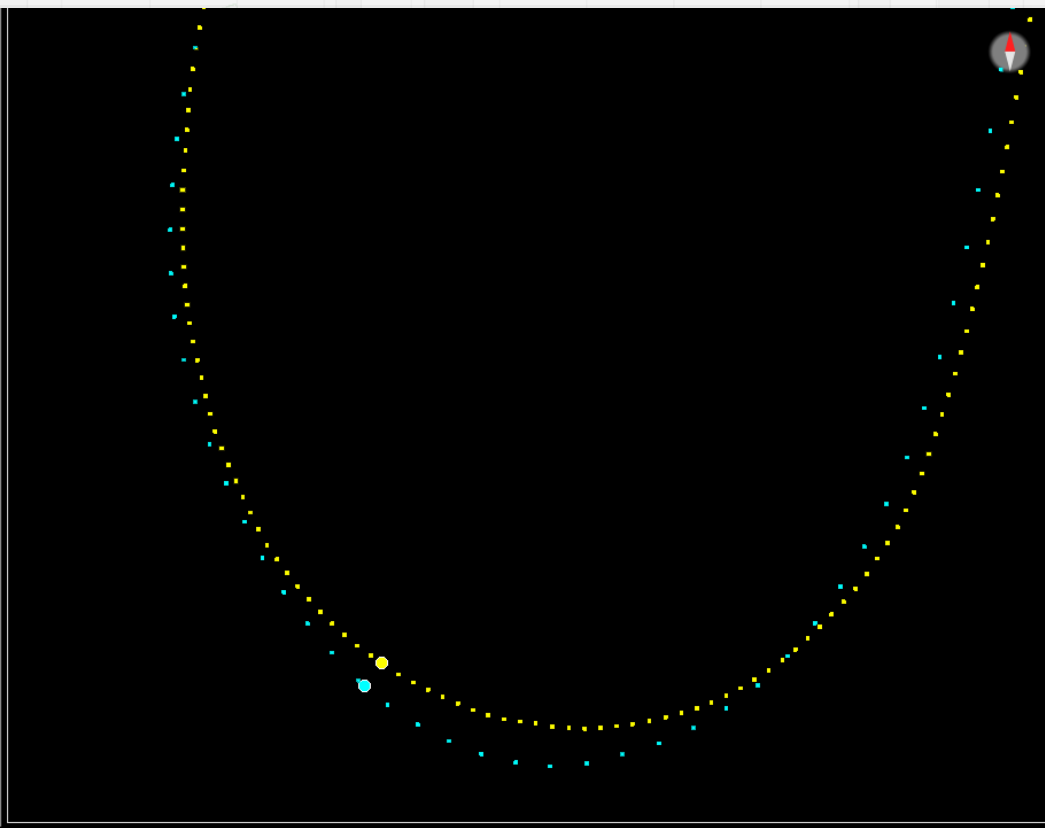
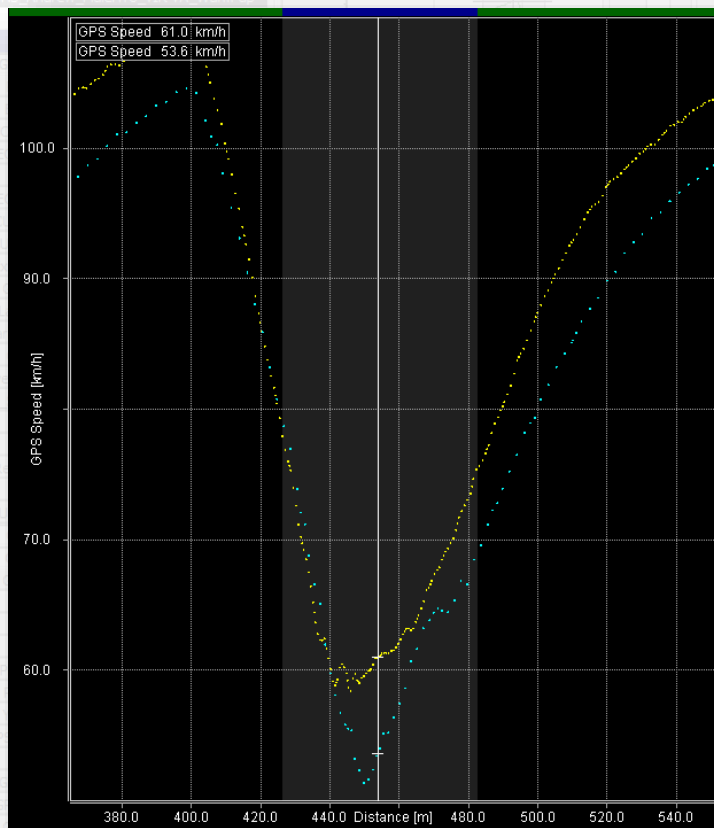
Channel	Sample rate
Suspension motion	200-500Hz
Brake pressure	50-100 Hz
Throttle position	50-100 Hz
Water Temp or Oil Temp	5-20Hz
RPM	20-200Hz
Lat, Long G	20-50Hz
Steering	20-50-100Hz

Plot Settings – Dots



- For the Track Map and the Time-Distance Plots, you can Choose the Thickness of the Lines and/or the Width of the Dots
- This Allows you to View the Data as Solid Lines or Dots

Plot Settings – Dots



- The Same Will be Available in the Measures Graph and the GPS Map View
- Blue is the GPS08 Sensor at 10Hz and the Yellow is the New GPS09 Sensor at 25Hz

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Currently 126 Videos and Growing

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- 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
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Additional Materials

LearnFast™ E-Training Video



RS2Analysis 2.56.84 - [Measures Graph]

File Data View Map Modify Options GPS RaceStudio Window ?

Measures and Laps

Measures Laps User Profiles

Per Lap Color Sort Channels

Tests Loaded:

MATHS_Andrew_MuleHT8_VIR_VA_Warm-up

130

4 02:11.3

Measures:

GPS_Speed [km/h]		
RearDiffCk		
ECU_Rpm [rpm]	7062	100
ECU_Pedal_Pos [%]	99.500	
ECU_Water_T [°F]		
Oil_Temp [°F]	0.85	
ECU_Lambda [A/F]		
ECU_Spark_Adv [deg]		
ECU_Intake_Air_T [°F]		
External_Voltage [V]	13.0	
GearRatio [ratio]	1.00	
LambdaFiltered []	0.851	60
Spark_AdvFiltered [deg]	23.50	

1 - MATHS_Andrew_MuleHT8_VIR_VA_Warm-up

distance base

time 0:11.368 dist 1301.6 feet

123.4

Customer Support

AiM Sports technical support staff regularly attend races and other events

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A black AiM service van parked next to a large black banner that reads 'THE RUMBLE' with a car icon.



A technician wearing an AiM 'Racing Data Power' shirt works on the side of a blue race car, which features an AiM logo and an OMP sticker.



A man stands in front of an AiM booth at a race event. The booth includes a red canopy with the AiM logo and website, a red feather flag, and a white AiM service van.

www.aimsports.com

    YouTube

Customer Support

At an Event Near You!



With Education, Imagination Is Your Only Limit In Race Studio Analysis

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http://www.auto-ware.com/webinar_home.html
john@auto-ware.com or (505)-890-8708

Next Round of Webinars Start: **Monday, November 2nd**

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- Handouts and Links to Recordings Included
- Limited to Only 8 Attendees per Session
- Highly Interactive with Even More Features

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Not the Other Cars
Be Safe and Have Fun!

The Original Data Acquisition Webinars

NEXT SESSION STARTS Nov 2nd. 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, Nov 2nd.

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, Nov 9th.

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, Nov 16th

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, Nov 23rd.

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, Nov 30th.

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.

Next Webinar

Tuesday Oct 27th, 2020

10:00am Pac / 1:00pm East

Co-Host

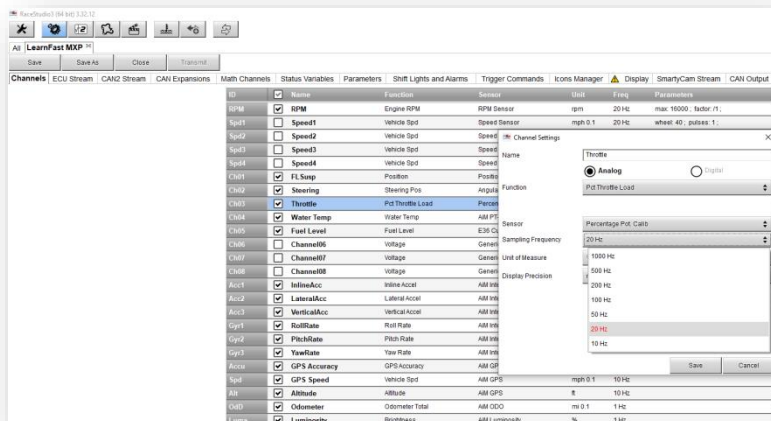
Emiliano Bina

AiM Sportline - Software

Race Studio 3 Analysis

Public Beta - Update #5





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