



Co-Host:
Emiliano Bina
AiM-Sportline Software Developer

Webinar Series

Bringing Data Support and Training to You

Race Studio 3 Analysis
Info on Beta Software Release – Part 4

2020 Webinar #53

September 29th, 2020

www.aimsports.com



YouTube

1.800.718.9090

Emiliano Bina
software@aim-sportline.com

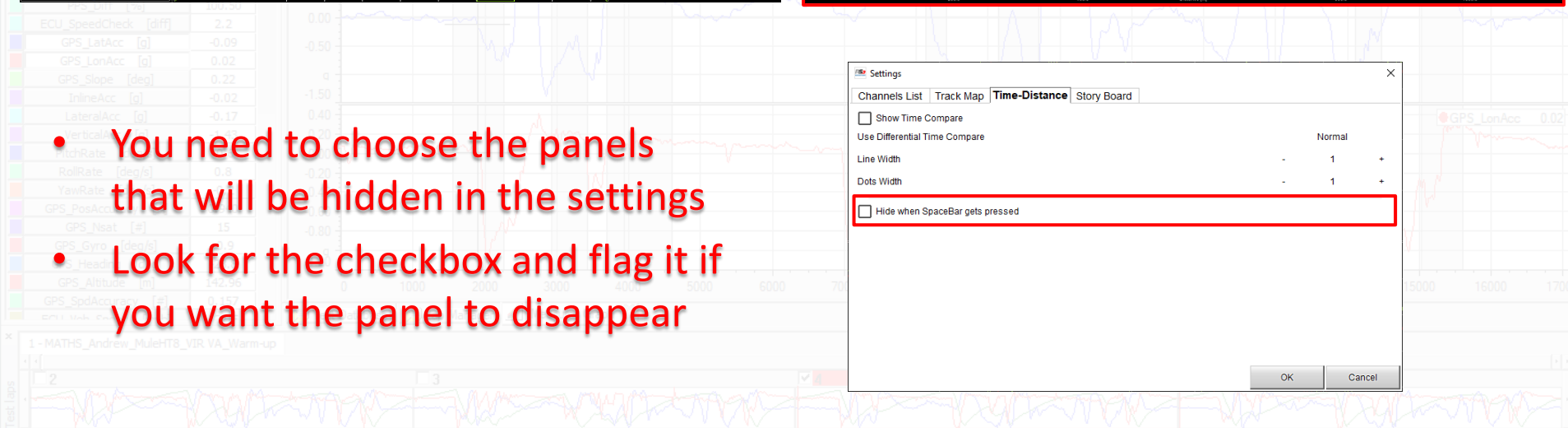


Emiliano Bina

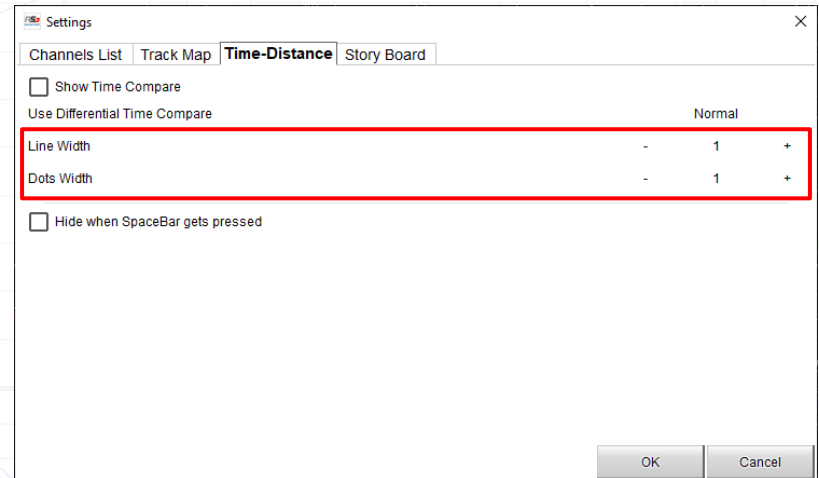
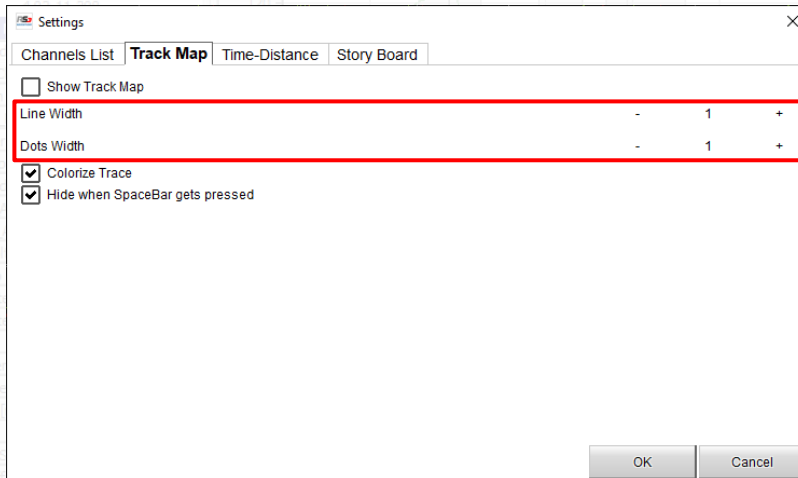
AiM-Sportline Software Developer

- Studies in Vehicle Mechanics and Simulation
- Software Developer for AiM Since 2000
- Passion for Motorsport and Sim Racing

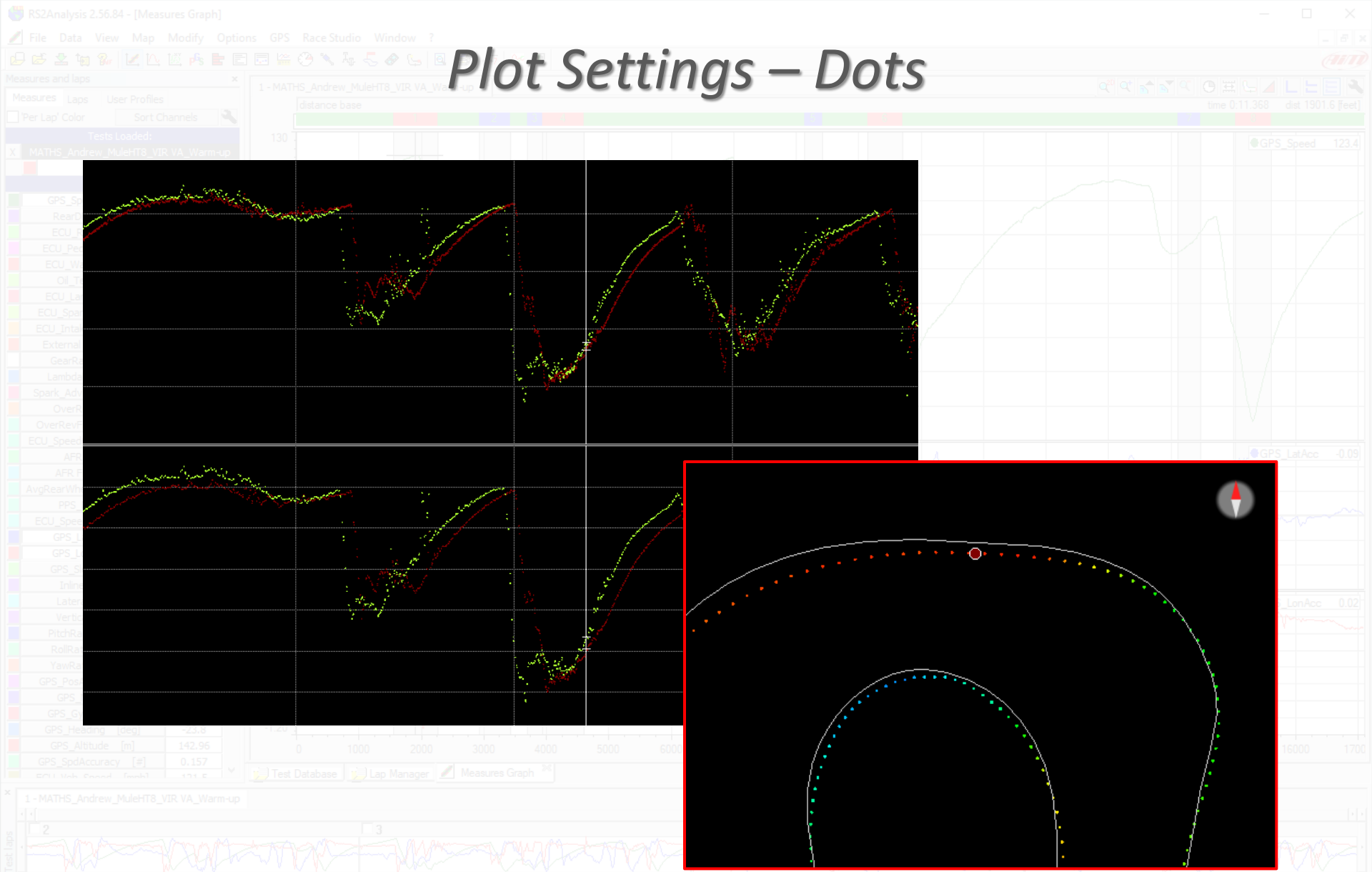




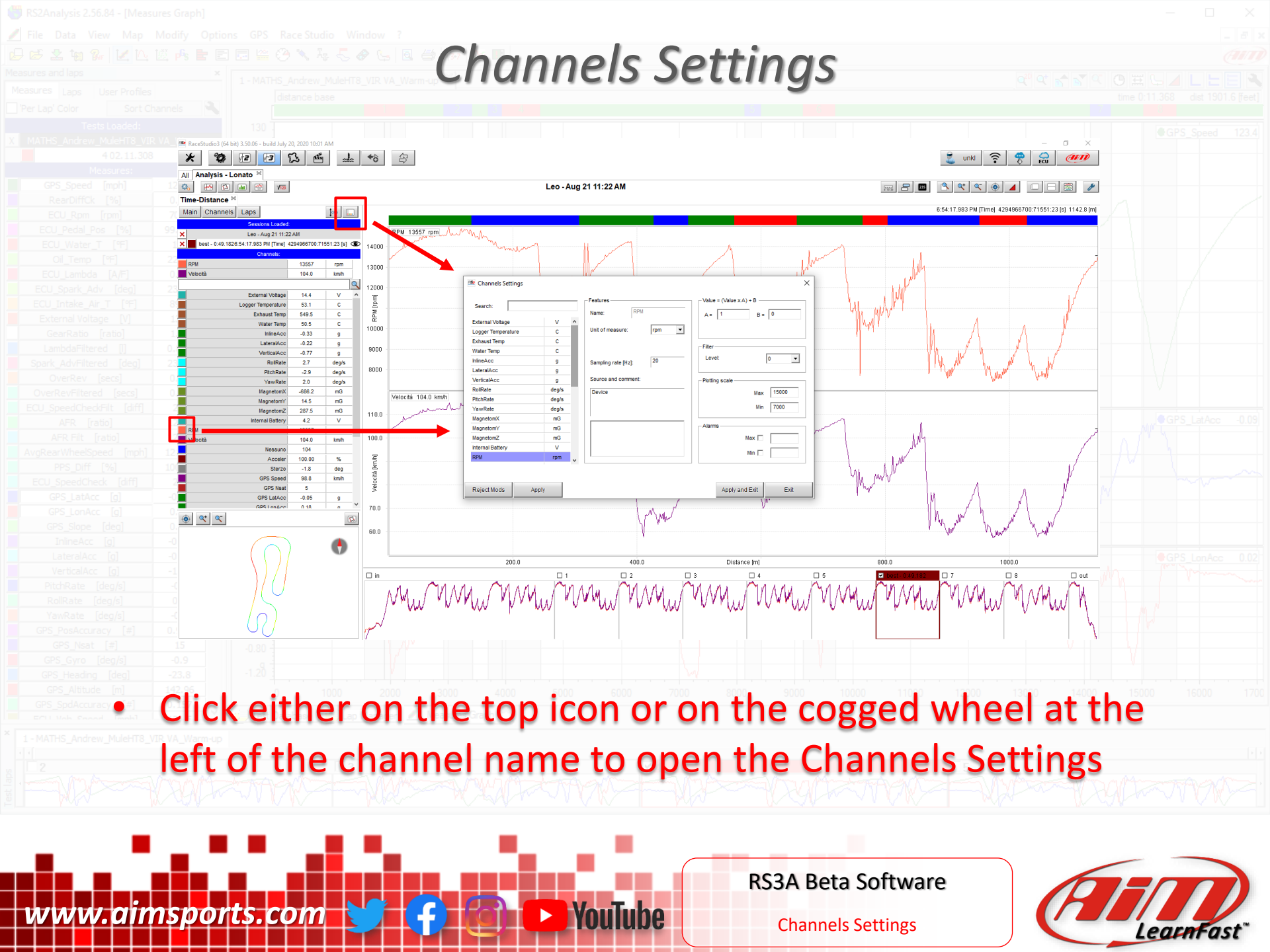
Plot Settings – Dots



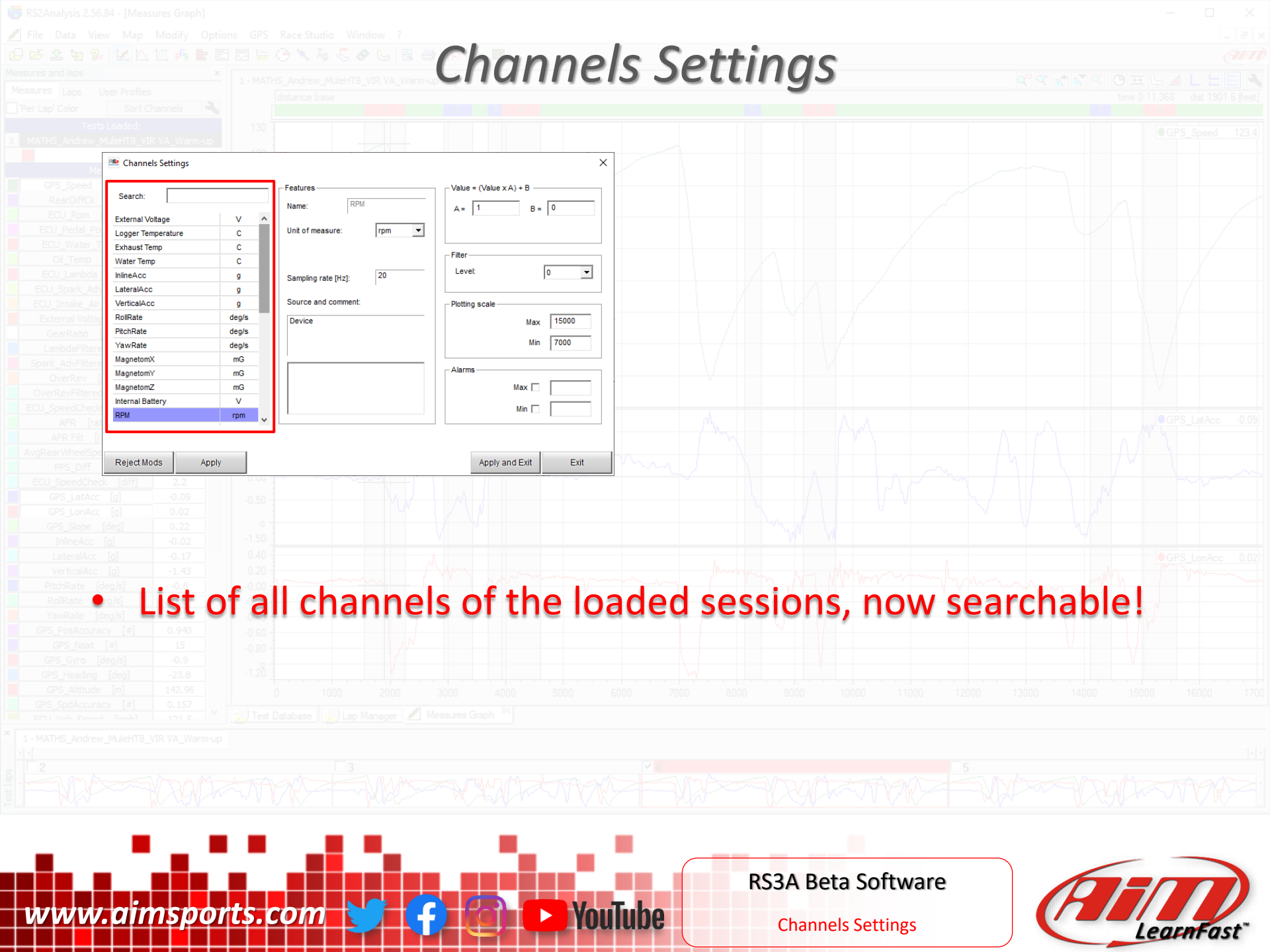
- For the track map and for the time/distance panels, you can choose the thickness of the lines and/or the width of the dots
- This way you can view the data as solid lines or dotted lines







- Click either on the top icon or on the cogged wheel at the left of the channel name to open the Channels Settings



Channels Settings

Channels Settings

Search:

Channel	Unit
External Voltage	V
Logger Temperature	C
Exhaust Temp	C
Water Temp	C
InlineAcc	g
LateralAcc	g
VerticalAcc	g
RollRate	deg/s
PitchRate	deg/s
YawRate	deg/s
MagnetomX	mG
MagnetomY	mG
MagnetomZ	mG
Internal Battery	V
RPM	rpm

Features

Name:

Unit of measure:

Sampling rate (Hz):

Source and comment:

Device:

Value = (Value x A) + B

A = B =

Filter

Level:

Plotting scale

Max: Min:

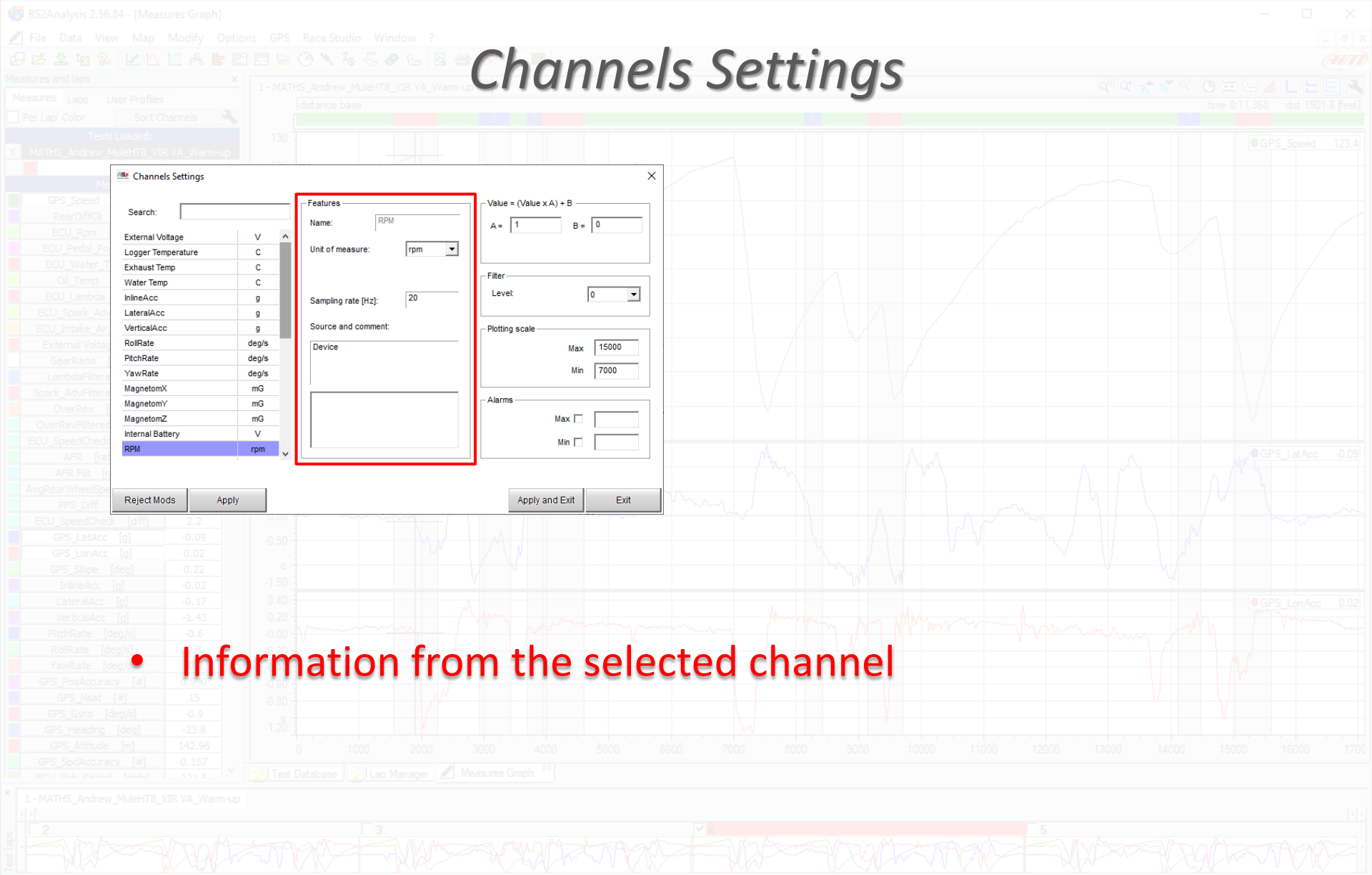
Alarms

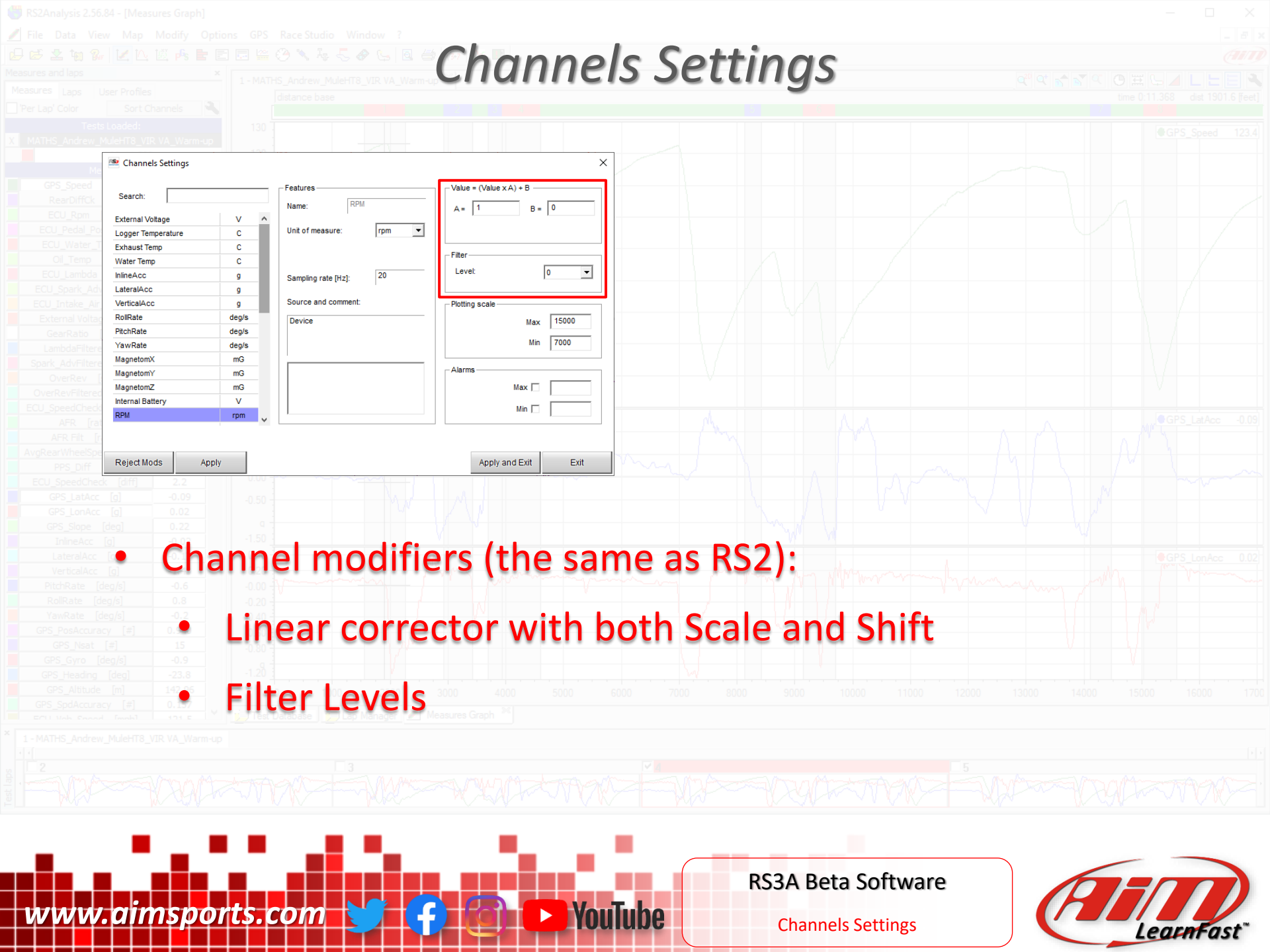
Max: ☐

Min: ☐

Reject Mods Apply Apply and Exit Exit

• List of all channels of the loaded sessions, now searchable!





Channels Settings

Search:

External Voltage V
Logger Temperature C
Exhaust Temp C
Water Temp C
InlineAcc g
LateralAcc g
VerticalAcc g
RollRate deg/s
PitchRate deg/s
YawRate deg/s
MagnetomX mG
MagnetomY mG
MagnetomZ mG
Internal Battery V
RPM rpm

Features

Name: RPM

Unit of measure: rpm

Sampling rate (Hz): 20

Source and comment:

Device

Value = (Value x A) + B

A = 1 B = 0

Filter

Level: 0

Plotting scale

Max 15000

Min 7000

Alarms

Max ☐

Min ☐

Reject Mods

Apply

Apply and Exit

Exit

- Channel modifiers (the same as RS2):
- Linear corrector with both Scale and Shift
- Filter Levels

Channels Settings

Measures and laps

Measures Laps User Profiles

☐ Per Lap Color
 ☐ Sort Channels
Tests Loaded:
MATHS_Andrew_MuleHT8_VIR_VA_Warm-up

GPS_Speed	
RearDiffCo	
ECU_Rpm	
ECU_Pedal_Pos	
ECU_Water_Temp	
Oil_Temp	
ECU_Lambda	
ECU_Spark_Adv	
ECU_Intake_Air	
External_Voltage	
GearRatio	
LambdaFilter	
Spark_AdvFilter	
OverRev	
OverRevFilter	
ECU_SpeedCheck	
AFR [g]	
AFR_Fit [g]	
AvgRearWheelSp	
RPS_Diff	
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 [m]	0.940
GPS_Neat [m]	15
GPS_Gyro [deg/s]	-0.9
GPS_Heading [deg]	-23.8
GPS_Altitude [m]	142.96
GPS_SpdAccuracy [m]	0.157
GPS_Speed	123.4
RPM	rpm

Channels Settings

Search:

External Voltage	V
Logger Temperature	C
Exhaust Temp	C
Water Temp	C
InlineAcc	g
LateralAcc	g
VerticalAcc	g
RollRate	deg/s
PitchRate	deg/s
YawRate	deg/s
MagnetomX	mG
MagnetomY	mG
MagnetomZ	mG
Internal Battery	V
RPM	rpm

Reject Mods Apply

Features

Name: RPM

Unit of measure: rpm

Sampling rate (Hz): 20

Source and comment:

Device

Value = (Value x A) + B

A = 1 B = 0

Filter

Level: 0

Plotting scale

Max 15000

Min 7000

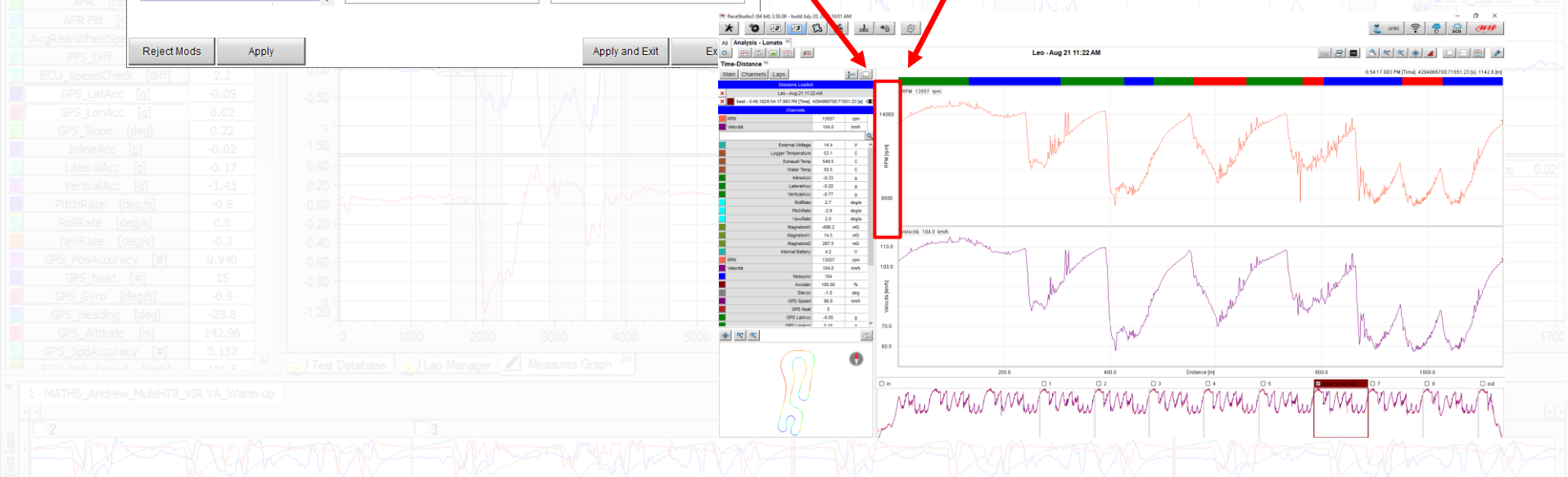
Alarms

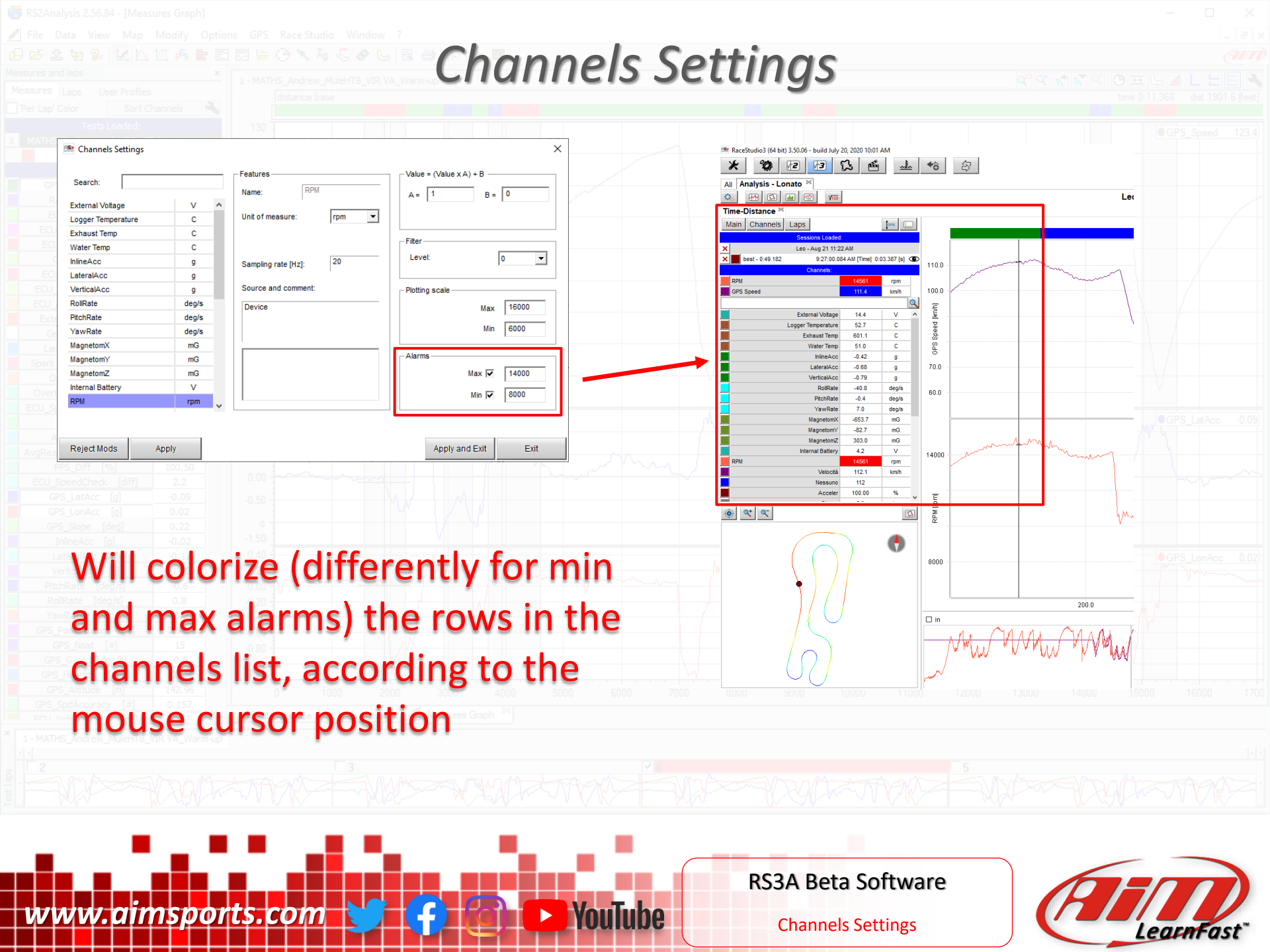
Max

Min

Apply and Exit

Plotting scale settings:
Will affect this Y Axis





Will colorize (differently for min and max alarms) the rows in the channels list, according to the mouse cursor position

Math Channels

Measures and laps

Measures Laps User Profiles

Per Lap Color Sort Channels

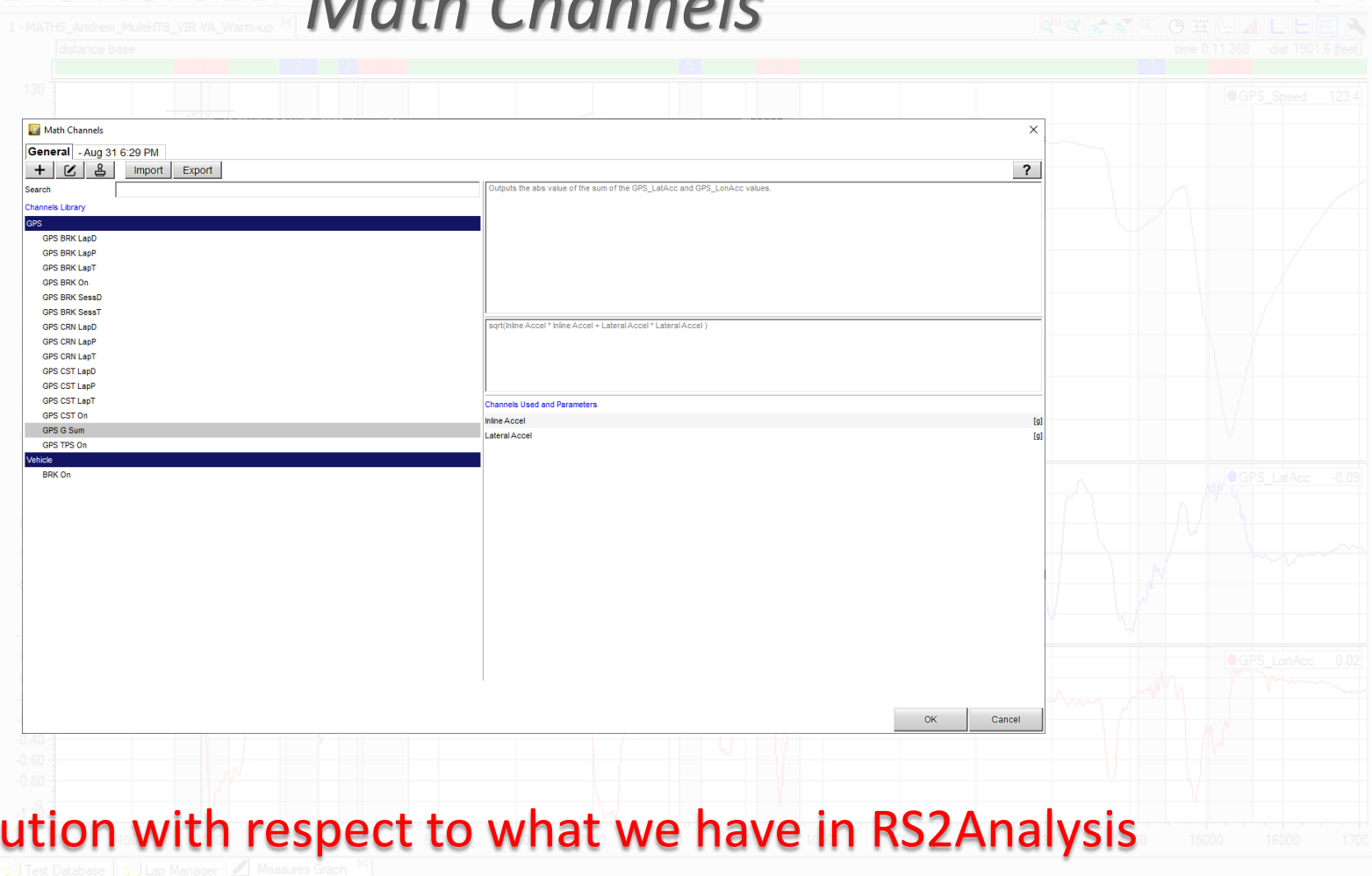
Tests Loaded:

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 [ft]	0.940
GPS_Neat [ft]	15
GPS_Gyro [deg/s]	-0.9
GPS_Heading [deg]	-0.8
GPS_Altitude [ft]	0.157
GPS_SpdAccuracy [ft]	0.157
GPS_Heading [deg]	0.157



- Evolution with respect to what we have in RS2Analysis

Math Channels – Access from Sessions DB

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

4 02:11.308

RaceStudio3 (64 bit) 3.50.20 - build September 28, 2020 11:04 PM

All Sessions (276 of 276)

Date Δ Track

12 2020, August 31 45.531°N, 9.341°E

1 2020, August 31 45.554°N, 9.316°E

1 2020, August 31 NO GPS

21 2020, August 28/29 Lonato Junior

21 2020, August 21 Lonato

3 2020, August 17/20 NO GPS

2 2020, July 11 PIRchicane 2020 Season

122 2020, July 03/05 Lonato ROK

3 2020, June 16/17 NO GPS

9 2020, June 03 45.511°N, 9.124°E

2 2020, June 03 NO GPS

45 2020, May 28/31 NO GPS

2 2020, May 27 45.531°N, 9.341°E

1 2020, February 19 45.531°N, 9.341°E

1 2020, February 18 45.517°N, 9.341°E

2 2019, September 08 ClubMotors

2 2019, May 19 VirFull MASS

9 2018, August 26 Suzuka_Car 2018

1 2018, July 08 M.Tremblant

Recent Sessions

Smart Collections

Manual Collections

Lonato - 2020, August 28/29 - Junior

2020, Aug 28 Δ lap(s) best Generic... Lupiferi Rok Junior Lo...

4:26 PM 5 0:49.86

4:16 PM 12 0:49.635

3:29 PM 3 0:49.746

3:25 PM 4 0:49.857

3:15 PM 12 0:49.624

3:09 PM 1 0:05.560

2:22 PM 9 0:50.152

1:27 PM 4 0:50.186

1:17 PM 12 0:49.945

1:07 PM 1 0:11.561

11:55 AM 8 0:50.421

11:47 AM 1 2:06.974

10:58 AM 5 0:50.092

10:46 AM 14 0:50.072

10:44 AM 1 0:03.572

9:58 AM 4 0:50.888

9:47 AM 13 0:51.114

9:07 AM 13 0:52.215

8:51 AM 1 2:46.574

2020, Aug 29 Δ lap(s) best Generic... Lupiferi Rok Junior Lo...

8:52 AM 9 0:50.529

8:49 AM 1 0:22.018

Speed

3 sessions selected (20 laps enabled)

0:49.624 0:51.133

Session	Lap	Time	Min	Avg	Max
3:15 PM	8	0:49.991	50.0	82.3	112.6
4:16 PM	11	0:49.957	50.1	82.6	108.3
4:16 PM	5	0:49.917	50.9	82.9	109.9
3:15 PM	10	0:49.884	48.7	82.7	112.6
3:15 PM	6	0:49.881	50.6	82.6	110.5
4:26 PM	2	0:49.863	50.8	82.8	110.1
4:16 PM	6	0:49.862	49.4	82.8	109.5
3:15 PM	11	0:49.824	51.4	82.8	110.4
4:16 PM	7	0:49.810	49.2	82.5	109.5
4:16 PM	8	0:49.700	48.0	83.1	109.5
4:16 PM	9	0:49.635	51.0	83.2	110.0
3:15 PM	9	0:49.624	51.4	82.9	111.4

GPS Speed [km/h]

Distance [m]

Math Channels – Access from Sessions DB

The screenshot displays the RS2Analysis software interface. On the left, the 'All Sessions (276 of 276)' list shows various sessions. A red box highlights a specific session: '2020, Aug 28, 2020, 4:26 PM, 5, 0:49.863'. A red arrow points from this session to a table titled '3 sessions selected (20 laps enabled)'. This table lists sessions with columns for Session, Lap, Time, Min, Avg, and Max. A red box highlights the row for 'Lupiferi - Aug 28 4:26 PM'. Below this, a 'Math Channels' window is open, showing a list of channels. A red box highlights the 'Lupiferi - Aug 28 4:26 PM' channel. The background shows a speed graph and a list of math channels on the left.

One tab for every selected session

Math Channels – Access from Analysis

RaceStudio3 (64 bit) 3.50.20 - build September 28, 2020 11:04 PM

All Analysis - Lonato

Time-Distance

Main Channels Laps

Sessions Loaded

Lupiferi - Aug 28 4:26 PM

12:22:31.139 AM [Time] 11:28:05 [s]

Channels

GPS Speed 94.2 km/h

Logger Temperature 26.2 C

External Voltage 15.5 V

Exhaust Temp 507.6 C

Water Temp 47.7 C

AccelerometerX -0.10 g

AccelerometerY 0.05 g

AccelerometerZ -1.19 g

GyroX 1.8 deg/s

GyroY 0.4 deg/s

GyroZ 1.4 deg/s

Int Batt Voltage 4.4 V

RPM 12336 rpm

Velocity 97.6 km/h

Accel 99.98 %

Sterzo -2.3 deg

GPS Speed 94.2 km/h

GPS Next 12

GPS LatAcc 0.09 g

GPS LonAcc 0.32 g

GPS Slope -0.3 deg

GPS Heading 14.6 deg

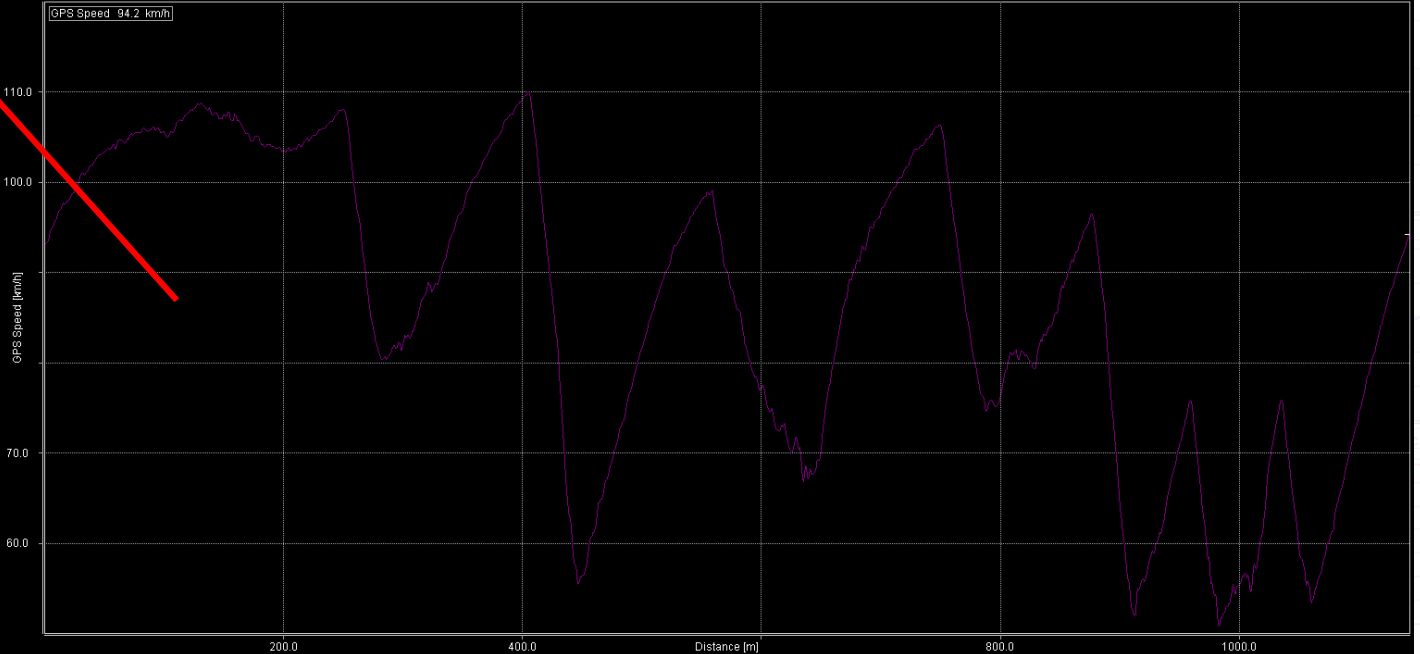
GPS Gyro 1.9 deg/s

GPS Altitude 171.08 m

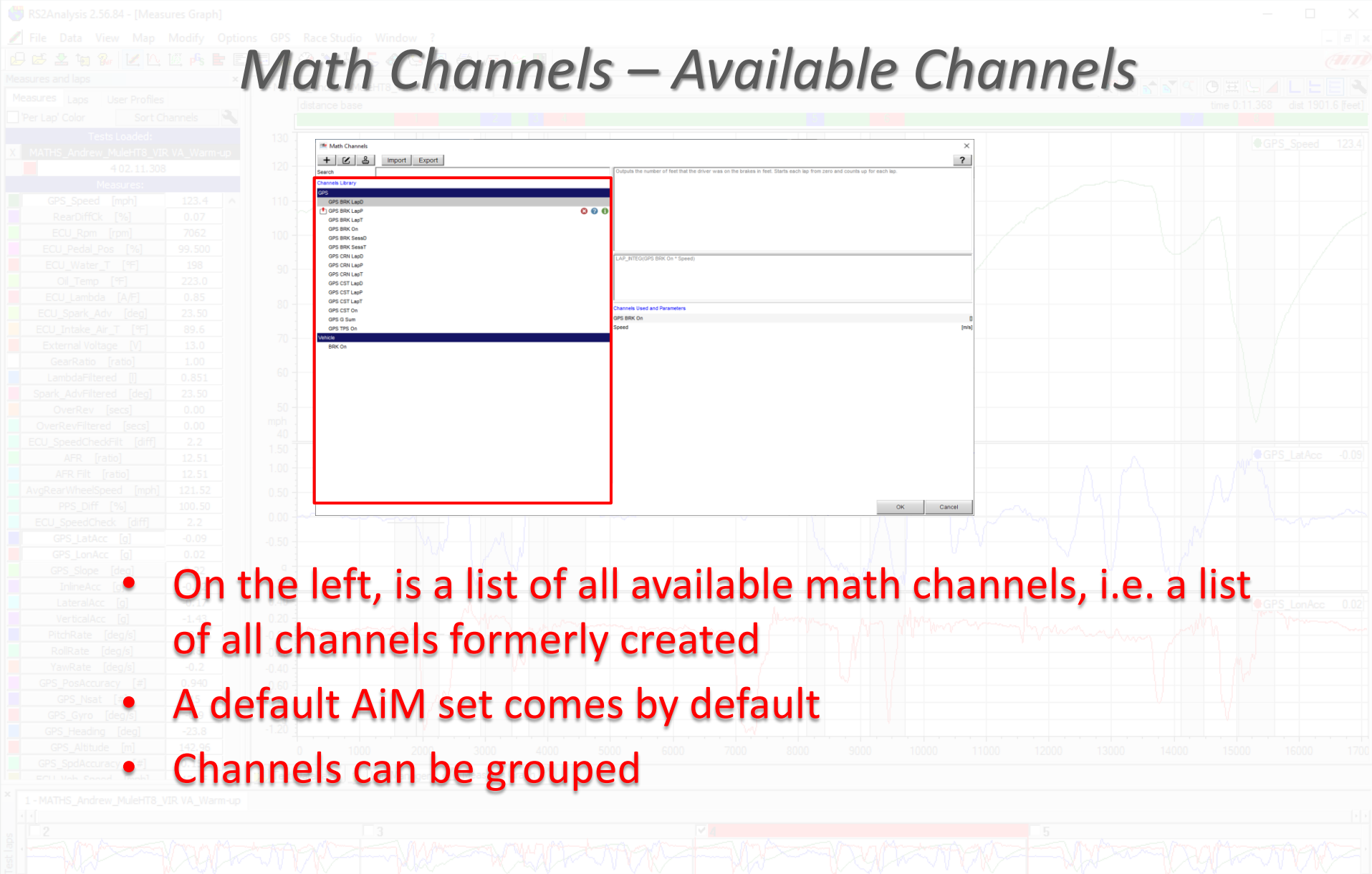
GPS PresBaro 0.61 m

Lupiferi - Aug 28 4:26 PM

12:22:31.139 AM [Time] 11:28:05 [s] 1142.8 [m]



Math Channels – Available Channels



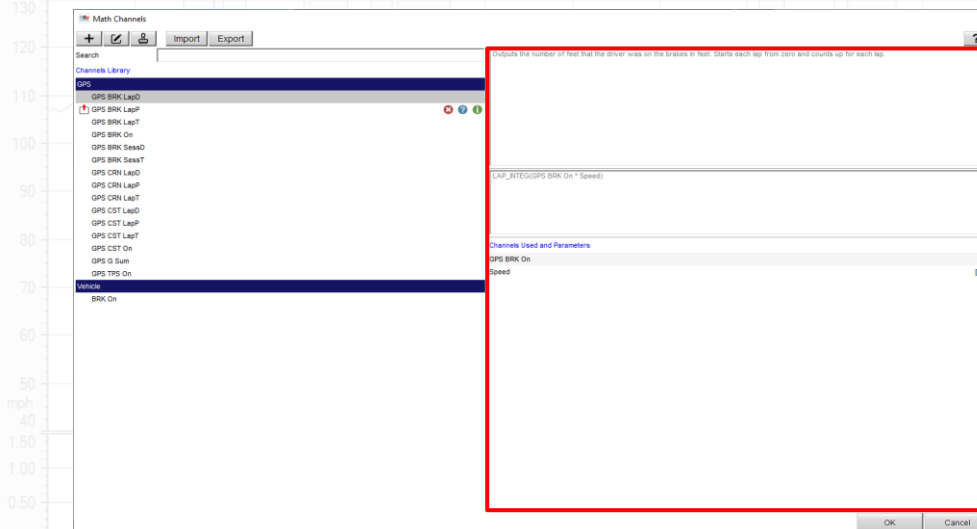
Math Channels – Available Channels

Look at the three icons to the right:

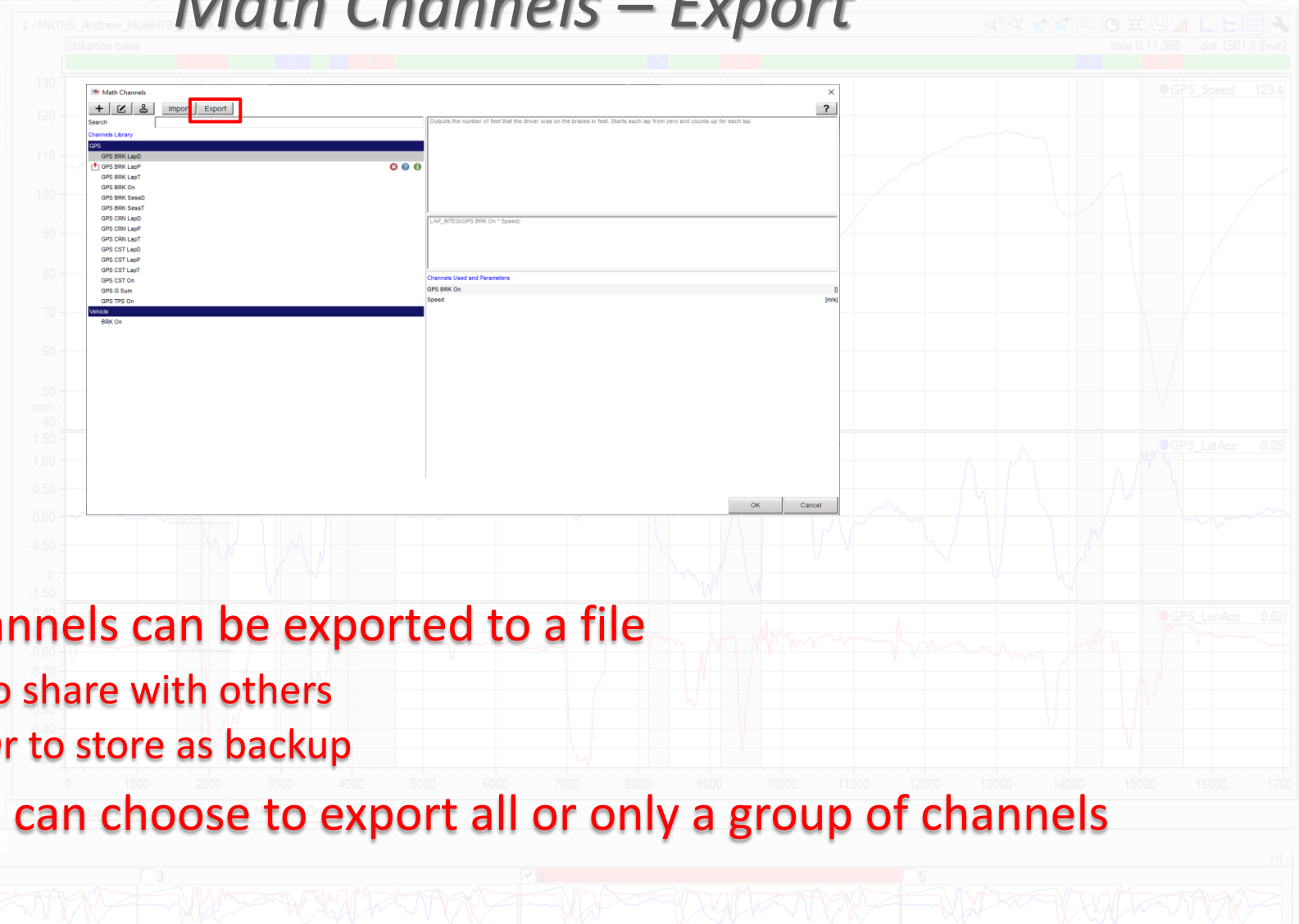
- Deletion Icon: click to remove the channel from the list
- Question Mark: click to open an informational page about the math channel on the web (for AiM default channels only)
- Information Icon: when hovering the mouse over this icon, shows the comment into a tooltip

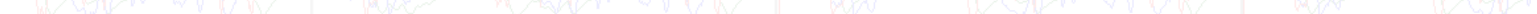
Math Channels – Available Channels

Measures and Laps		
Measures		
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]	-1.43	
LateralAcc [g]	-0.6	
PitchRate [deg/s]	0.8	
RollRate [deg/s]	0.940	
YawRate [deg/s]	-9.9	
GPS_PosAccuracy [#]	-23.8	
GPS_Neat [#]	148.05	
GPS_Gyro [deg/s]	0.157	
GPS_Heading [deg]		
GPS_Altitude [m]		
GPS_SpdAccuracy [#]		
GPS_Heading [deg]		



- On the right for the selected channel, the window shows:
- Comment
- Formula
- Channels required



- 1 - MATHS_Andrew_MuleHTS_VJR VA_Warm-up
- 
- Test logs
- Time

Math Channels – Import

Measures and laps

Measures Laps User Profiles

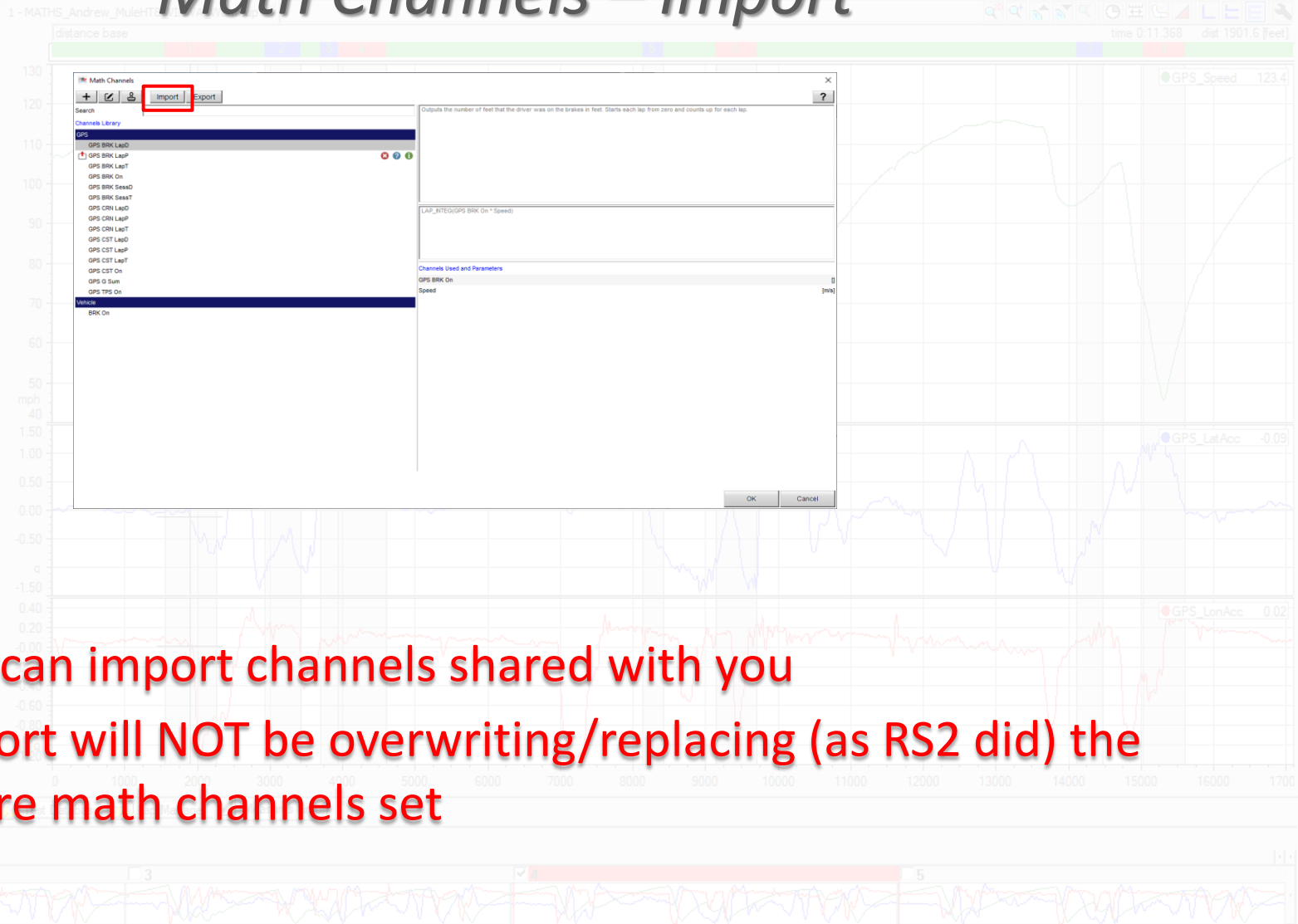
Per Lap Color Sort Channels

Tests Loaded:

MATHS_Andrew_MuleHT8_VIR_VA_Warm-up

4 02:11.308

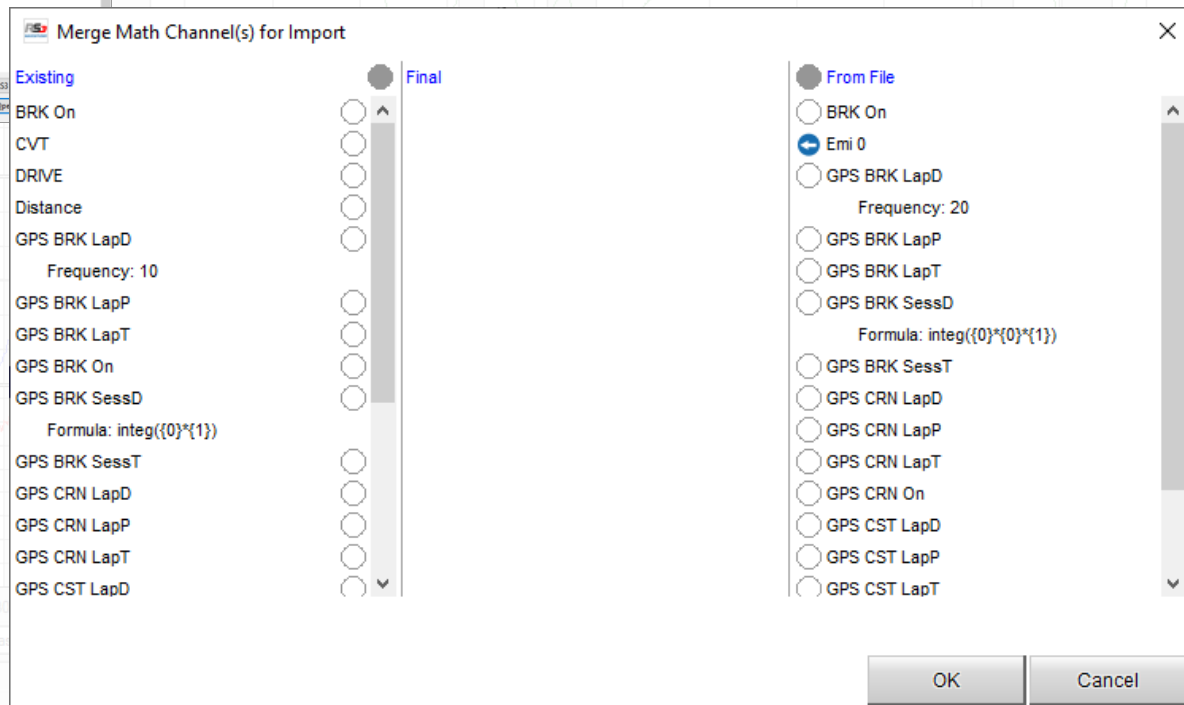
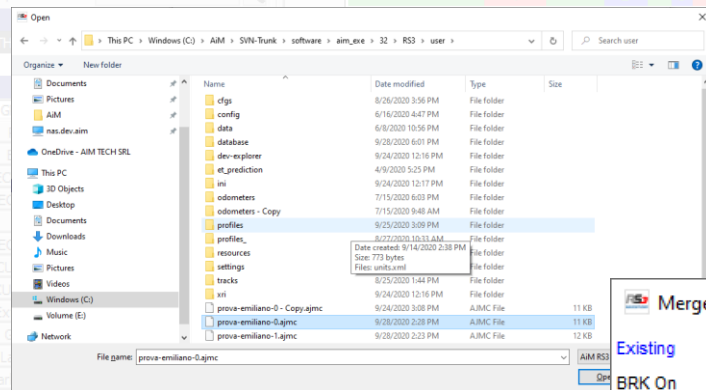
Measures:		
GPS_Speed [mph]	123.4	
RearDiffCk [%]	0.07	
ECU_Rpm [rpm]	7062	
ECU_Pedal_Pos [%]	99.500	
ECU_Water_T [°F]	198	
Oil_Temp [°F]	223.0	
ECU_Lambda [A/F]	0.85	
ECU_Spark_Adv [deg]	23.50	
ECU_Intake_Air_T [°F]	89.6	
External_Voltage [V]	13.0	
GearRatio [ratio]	1.00	
LambdaFiltered []	0.851	
Spark_AdvFiltered [deg]	23.50	
OverRev [secs]	0.00	
OverRevFiltered [secs]	0.00	
ECU_SpeedCheck [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]	0.00	
RollRate [deg/s]	0.00	
YawRate [deg/s]	0.00	
GPS_PosAccuracy [ft]	0.940	
GPS_Neat [ft]	15	
GPS_Gyro [deg]	0.00	
GPS_Heading [deg]	0.00	
GPS_Altitude [m]	142.96	
GPS_SpdAccuracy [ft]	0.00	



- You can import channels shared with you
- Import will NOT be overwriting/replacing (as RS2 did) the entire math channels set

Math Channels – Import Merge

Select the file to import from...



Then merge the
math channels for
your import

Math Channels – Import Merge

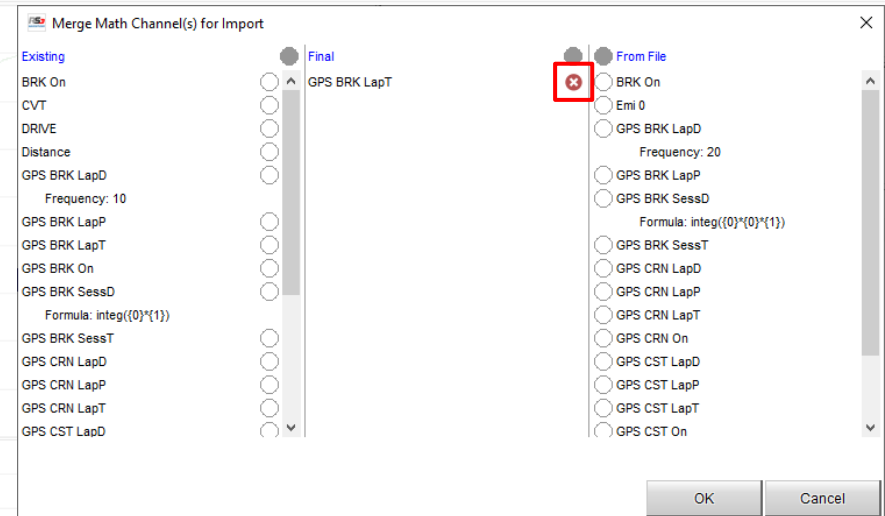
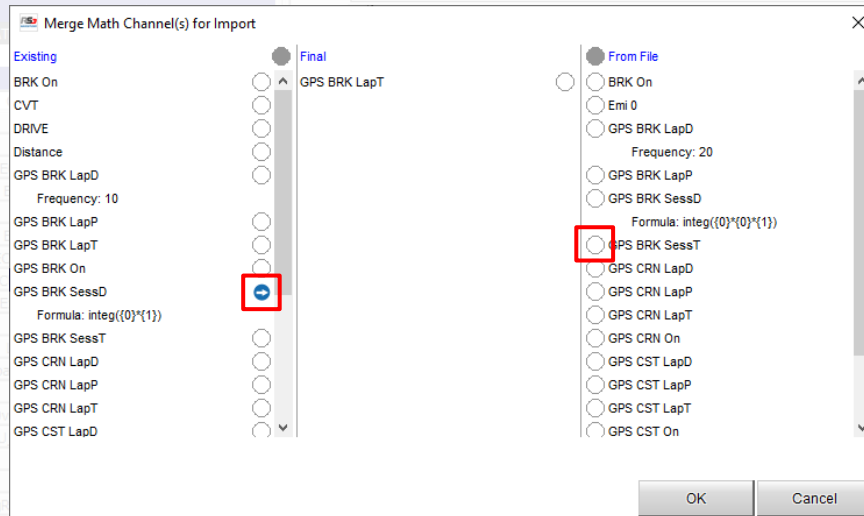
The screenshot displays the 'Merge Math Channel(s) for Import' dialog box in the RS2Analysis software. The dialog is divided into three main sections:

- Existing:** A list of math channels currently in the user's set, including BRK On, CVT, DRIVE, Distance, GPS BRK LapD, GPS BRK LapP, GPS BRK LapT, GPS BRK On, GPS BRK SessD, GPS BRK SessT, GPS CRN LapD, GPS CRN LapP, GPS CRN LapT, GPS CRN On, GPS CST LapD, GPS CRN LapP, and GPS CST LapD. The 'GPS BRK SessD' channel is highlighted with a red box, and its formula is shown as $\text{integ}((0)*(1))$.
- From File:** A list of math channels from the file being imported, including BRK On, Emi 0, GPS BRK LapD, GPS BRK LapP, GPS BRK LapT, GPS BRK SessD, GPS BRK SessT, GPS CRN LapD, GPS CRN LapP, GPS CRN LapT, GPS CRN On, GPS CST LapD, GPS CRN LapP, and GPS CST LapD. The 'GPS BRK SessD' channel is also highlighted with a red box, and its formula is shown as $\text{integ}((0)*(0)*(1))$.
- Formula:** A central column where the user can compose the list of math channels that will result in being available when they click 'OK'. The formula for the 'GPS BRK SessD' channel is $\text{integ}((0)*(1))$.

The background shows a graph of various vehicle metrics over time, including GPS_Speed, GPS_LatAcc, and GPS_LonAcc.

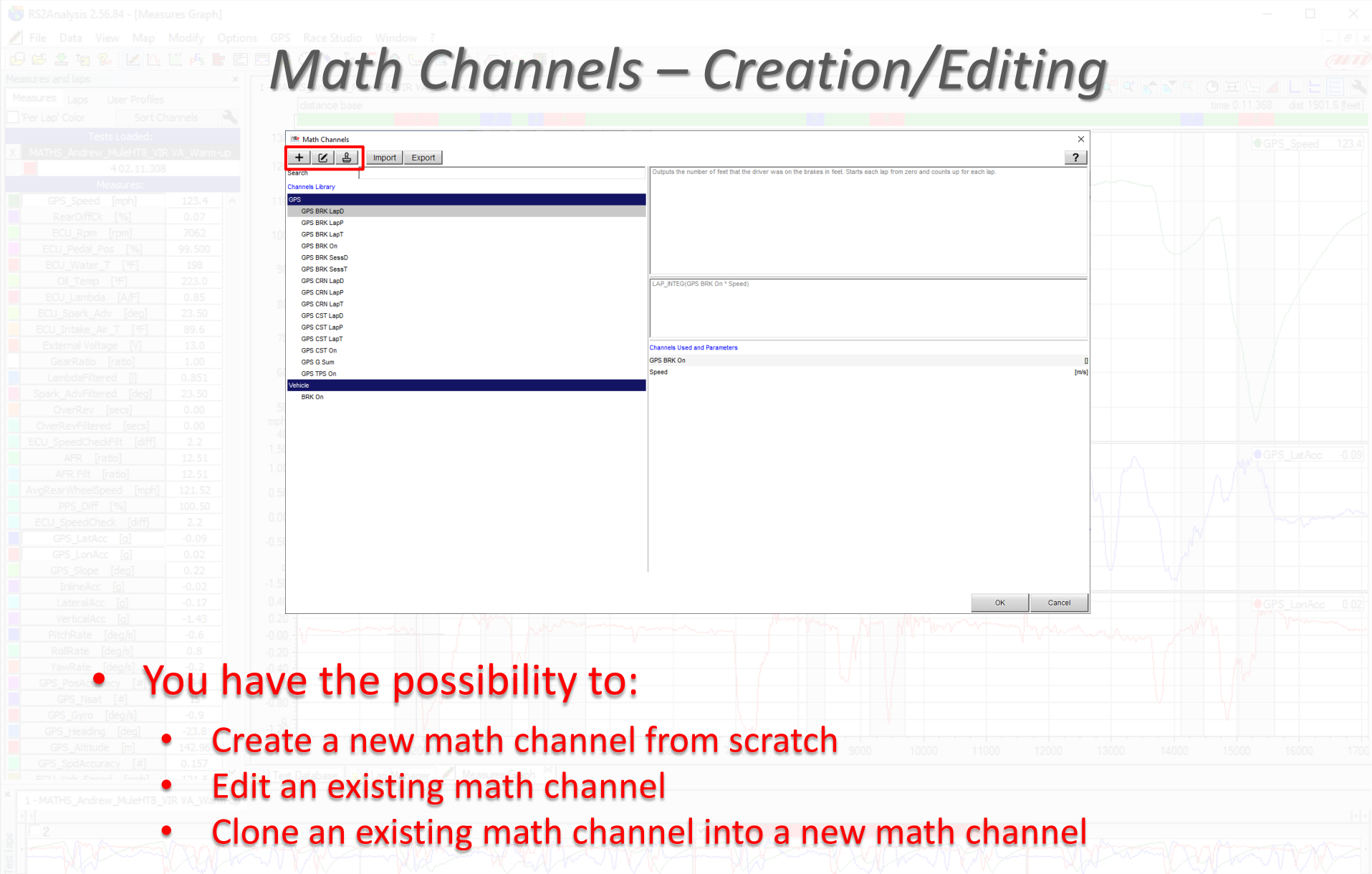
- On the left is the list of all math channels currently in your math channels set
- On the right is the list of all math channels in the file you are importing
- In the center you can compose the list of math channels that will result in being available when you click 'OK'
- For math channels with the same name and differing formula, the differences will be shown

Math Channels – Import Merge



- Click on the 'Arrow' buttons in the left or right list items to move the math channel to the central 'Final' list
- Click on the 'X' button in the central list items to remove, in case you selected the wrong one

Math Channels – Creation/Editing



- You have the possibility to:
- Create a new math channel from scratch
- Edit an existing math channel
- Clone an existing math channel into a new math channel

Math Channels – Creation/Editing

Details of the channel
being created/edited

Available identifiers (session
channels or user session data)

Available operators
and functions

Edit Math Channel

Name: Freq: Unit:

Function:

Area:

Comment:

Formula:

Channels Used and Parameters

Inline Accel	[g]
Lateral Accel	[g]

Identifiers

- AFR
- Acceleration
- Air Mass Flow
- Air Temp
- Altitude
- Altitude for SmartyCam
- Ang Velocity
- Angle
- Battery Voltage
- Best Temp
- Best Lap Number for SmartyCam
- Best Lap Time
- Best Lap Time for SmartyCam
- Brake Pos
- Brake Press
- Brightness
- Clutch Pos
- Code
- Consumption
- Coordinate
- Current
- Date
- Density
- Diff vs Best Lap Time
- Diff vs Best Lap Time of Run
- Diff vs Best Lap Time of Today
- Diff vs Previous Lap Time
- Diff vs Reference Lap Time
- Digital Status
- Distance
- Economy
- Engine Off Time
- Engine RPM
- Error Code

Operators

- (
-)
- [
-]
- +
-
- *
- /
- ^

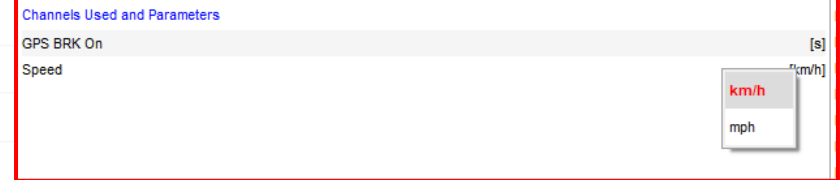
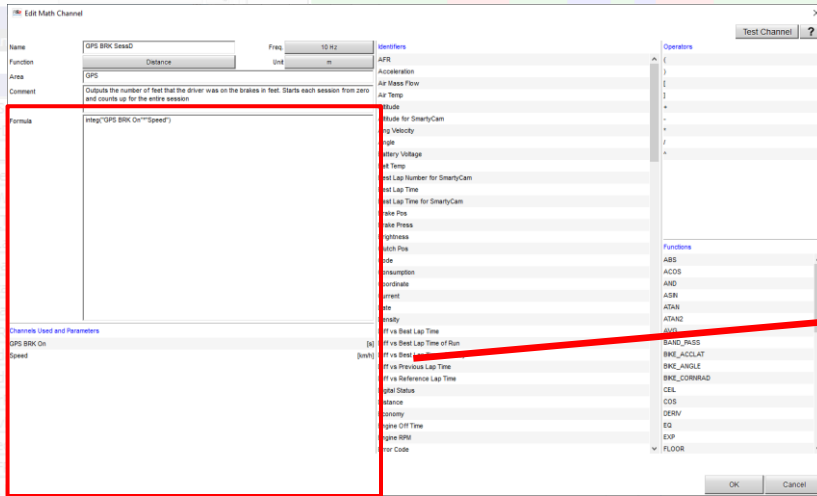
Functions

- ABS
- ACOS
- AND
- ASIN
- ATAN
- ATAN2
- AVG
- BAND_PASS
- BIKE_ACCLAT
- BIKE_ANGLE
- BIKE_CORNRAD
- CEIL
- COS
- DERIV
- EQ
- EXP
- FLOOR

Test Channel ?

OK Cancel

Math Channels – Units



- When you write a formula, you are given the opportunity to choose the units you are using
- The math channel will use these units to compute the channel
- When you apply the math channel to any session, the RS3 math channel engine will use the correct units for you

Math Channels – Identifiers

Measures and laps

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 [%] 9.500

ECU_Water [°F] 150.0

Oil_Temp [°F] 150.0

ECU_Lambda [A/F] 0.85

ECU_Spark_Adv [deg] 15.00

ECU_Intake_Air [°F] 150.0

External Voltage [V] 12.00

GearRatio [ratio] 1.00

LambdaFiltered []

Spark_AdvFiltered [deg]

OverRev [secs] 0.00

OverRevFiltered [secs]

ECU_SpeedCheckFilt [diff]

AFR [ratio] 12.51

AFR_Filt [ratio] 12.51

AvgRearWheelSpeed [mph] 121.52

RPS_Diff [%] 100.50

ECU_SpeedCheck [diff] 2.2

GPS_LatAcc [°] -0.09

GPS_LonAcc [°] -0.02

GPS_Slope [°] -0.17

LateralAcc [°] -0.17

VerticalAcc [°] -0.17

PitchRate [deg/s] 0.8

RollRate [deg/s] -0.2

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] -23.8

GPS_Altitude [m] 142.96

GPS_SpdAccuracy [°] 0.157

GPS_Heading [deg] -23.8

GPS_Altitude [m] 142.96

GPS_SpdAccuracy [°] 0.157

GPS_Heading [deg] -23.8

GPS_Altitude [m] 142.96

GPS_SpdAccuracy [°] 0.157

- You can use channels as Identifiers as in the past
- You will (*) be able use User Sessions Data, that are constant values inserted by the user, per session (i.e. vehicle setup data, ...)

(*) it's not on the very first version of the math channels engine but will follow soon

1 - MATHS_Andrew_MuleHT8_VIR_VA_Warm-up

2 3 4 5

Test Laps

2 3 4 5

Test Laps

2 3 4 5

Test Laps

2 3 4 5

Test Laps

2 3 4 5

Test Laps

2 3 4 5

Test Laps

Math Channels – Syntax

Measures and laps

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] 170.0

ECU_Lambda [ratio] 0.051

ECU_Spark_Adv [deg] 23.50

ECU_Intake_Air_T [°F] 89.5

External_Voltage [V] 13.0

GearRatio [ratio] 0.051

LambdaFiltered [ratio] 0.051

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] -0.02

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 [m] 0.940

GPS_Neat [m] 15

GPS_Gyro [deg/s] -0.9

GPS_Heading [deg] -23.8

GPS_Altitude [m] 142.96

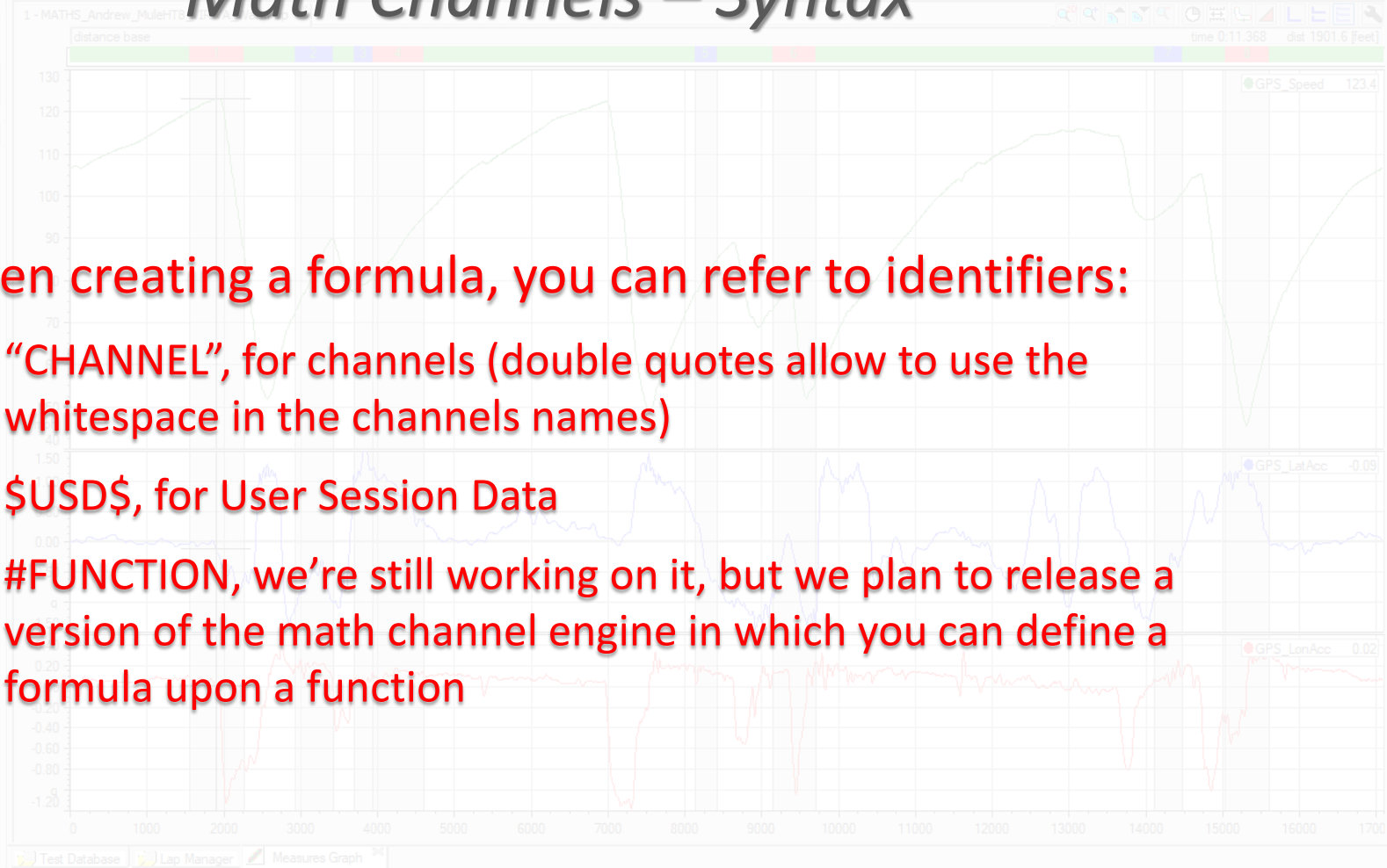
GPS_SpdAccuracy [m] 0.157

GPS_Heading [deg] -23.8

GPS_Altitude [m] 142.96

GPS_SpdAccuracy [m] 0.157

GPS_Heading [deg] -23.8



- When creating a formula, you can refer to identifiers:
- “CHANNEL”, for channels (double quotes allow to use the whitespace in the channels names)
- \$USD\$, for User Session Data
- #FUNCTION, we’re still working on it, but we plan to release a version of the math channel engine in which you can define a formula upon a function

1 - MATHS_Andrew_MuleHT8_VIR_VA_Warm-up

2

3

4

5

6

7

8

9

10

11

12

Math Channels – Functions

• Differences vs RaceStudio2Analysis:

• Comparison operators will be inserted accordingly to common spell: (CHA GT CHB) or (CHA > CHB) instead of GT(CHA, CHB)

• MIN and MAX will work:

• MIN(CHA) will result in computing the minimum value of the channel CHA in the session

• MIN(CHA, CHB, ..., CHN) will result in computing the minimum running value, at sample time, between channels from CHA to CHN

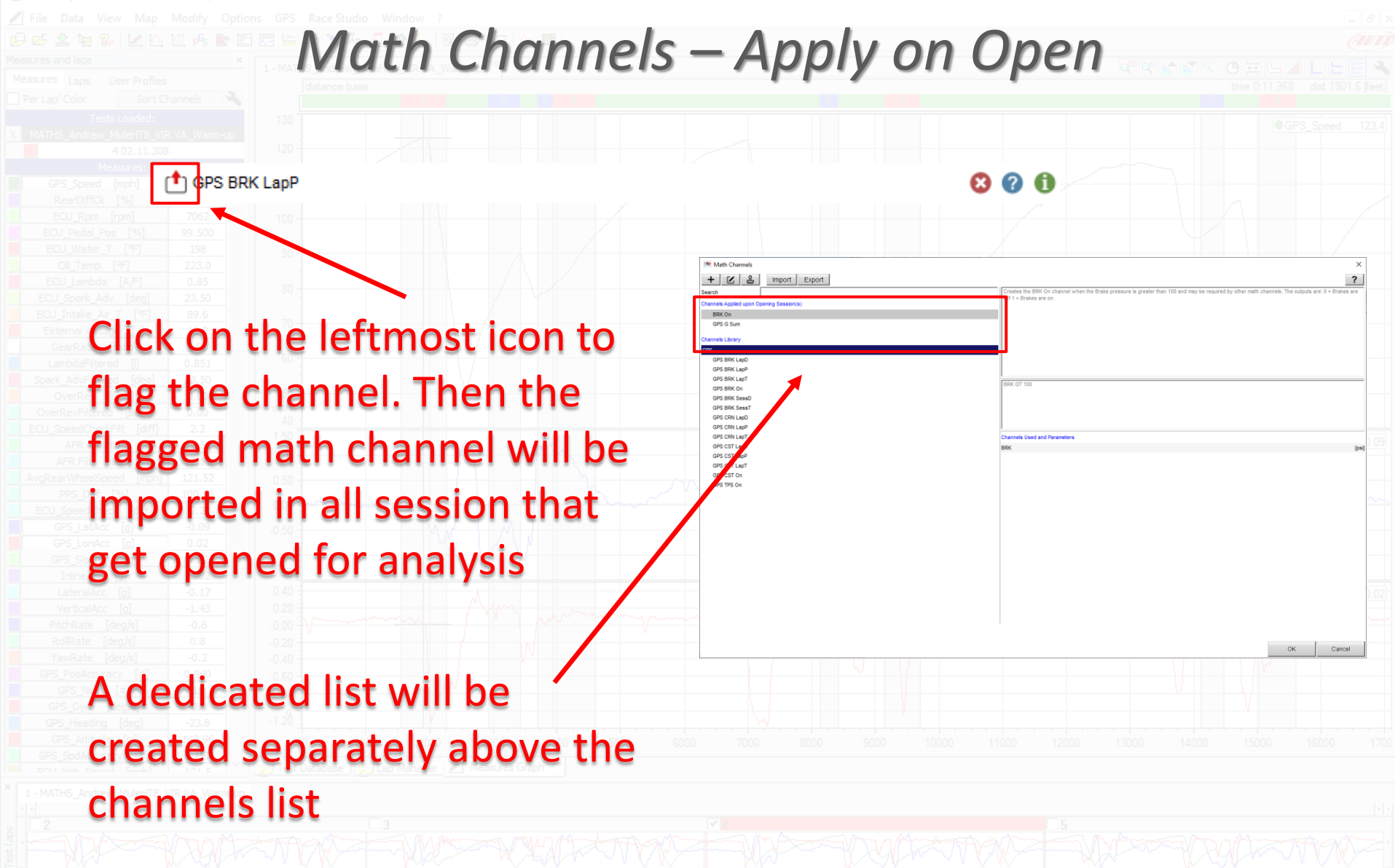
• TIME_SHIFT(CH, SHIFT_SEC) will result in computing the time shifted value of the channel

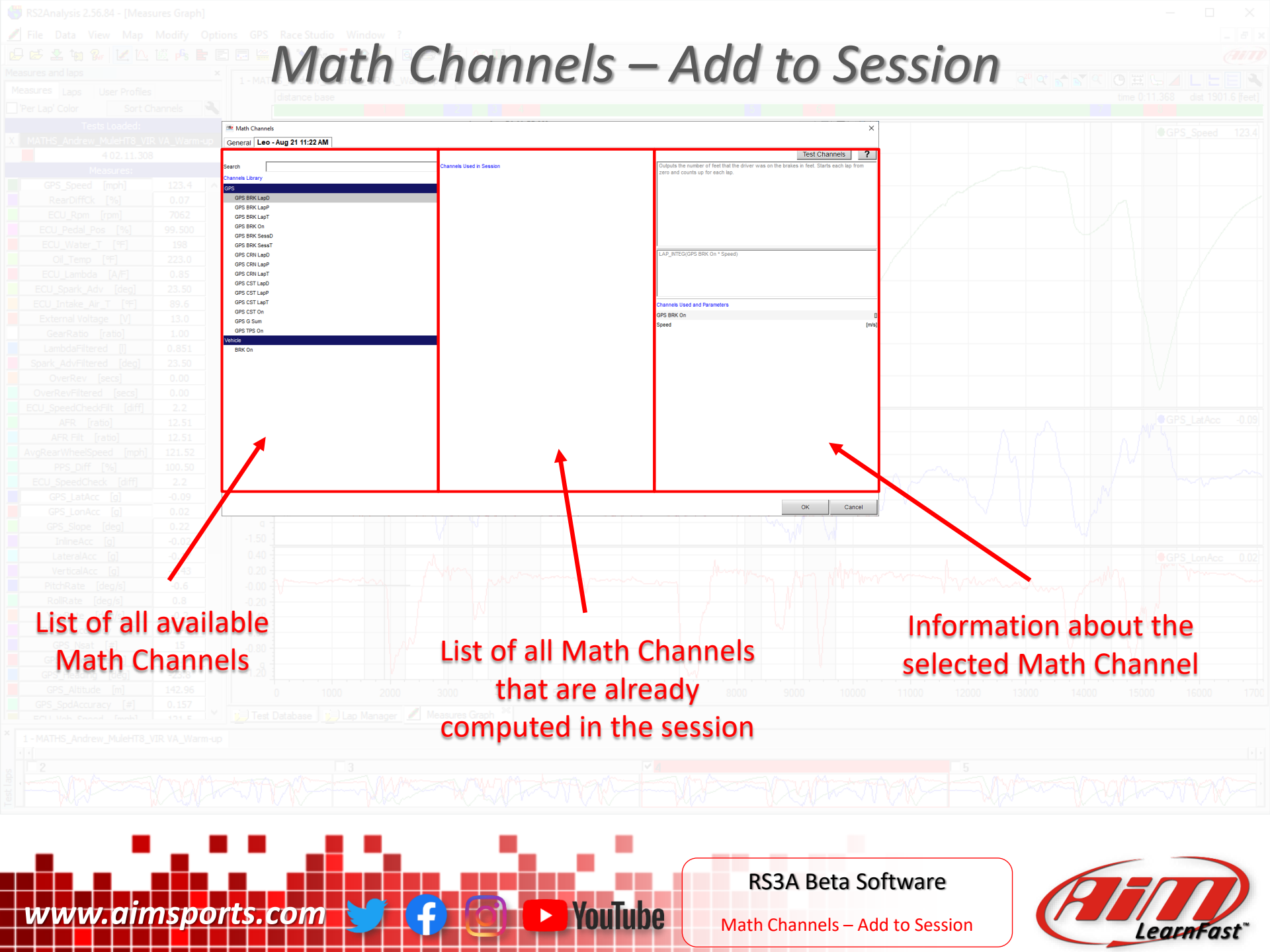
• Filters and LookUp Tables will be made available

Math Channels – Apply on Open

Click on the leftmost icon to flag the channel. Then the flagged math channel will be imported in all session that get opened for analysis

Math Channels – Apply on Open





Math Channels – Add to Session

Search

Channels Library

GPS

GPS BRK LapD

GPS BRK LapP

GPS BRK LapT

GPS BRK On

GPS BRK SessD

GPS BRK SessT

GPS CRN LapD

GPS CRN LapP

GPS CRN LapT

GPS CST LapD

GPS CST LapP

GPS CST LapT

GPS CST On

GPS G Sum

GPS TPS On

Vehicle

Brk On

Channels Used in Session

Test Channels ?

Outputs the number of feet that the driver was on the brakes in feet. Starts each lap from zero and counts up for each lap.

LAP_INTEG(GPS BRK On * Speed)

Channels Used and Parameters

GPS BRK On

Speed

OK

Cancel

List of all available Math Channels

List of all Math Channels that are already computed in the session

Information about the selected Math Channel

Math Channels – Add to Session

Measures and laps

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]	0.00
RollRate [deg/s]	0.00
YawRate [deg/s]	-0.2
GPS_PosAccuracy [ft]	0.940
GPS_Neat [ft]	0.5
GPS_Gyro [deg/s]	0.00
GPS_Heading [deg]	180.00
GPS_Altitude [m]	163.99
GPS_SpdAccur [ft/s]	0.00
GPS_Heading [deg]	180.00

Math Channels

General | Leo - Aug 21 11:22 AM

Search

Channels Used in Session

Channels Library

GPS

- GPS BRK LapD
- GPS BRK LapP
- GPS BRK LapT
- GPS BRK On
- GPS BRK SessD
- GPS BRK SessT
- GPS CRN LapD
- GPS CRN LapP
- GPS CRN LapT
- GPS CST LapD
- GPS CST LapP
- GPS CST On
- GPS G Sum
- GPS TPS On

Vehicle

- Brk On

Test Channels ?

Outputs the number of test that the driver was on the

zero and counts up for each lap.

LAP_INTEG(GPS BRK On * Speed)

Channels Used and Parameters

GPS BRK On

Speed

[m/s]

OK

Cancel

The “Test Channels” button will analyze if the math channel can be computed. If there is a problem, it will tell you what’s possibly wrong with it



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- **I Have Downloaded my Data, Now What - Part 2*
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- Measure Units
- Sort Channels
- Test Properties
- Per Lap Color
- Export Tests
- Channel Reports
- Setting Time
- Track Mapping
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Additional Materials
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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 [rpm]	7062	100
ECU_Rpm [rpm]	99.500	
ECU_Pedal_Pos [%]		
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

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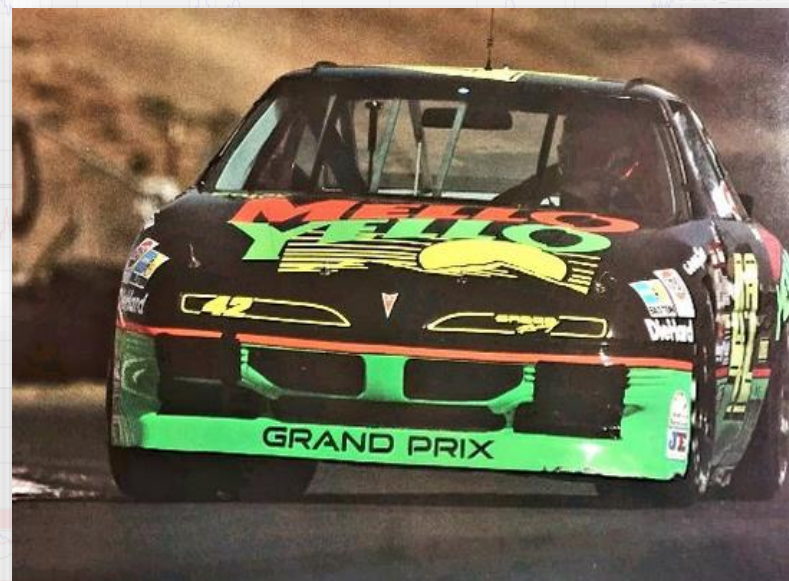
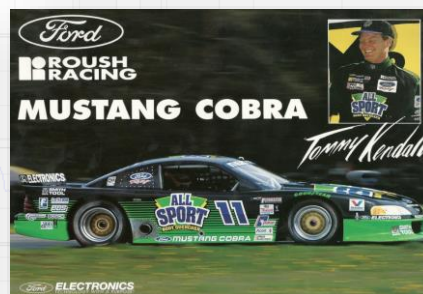


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Contact Info

Roger Caddell

roger@aimsports.com

Emiliano Bina

software@aim-sportline.com

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