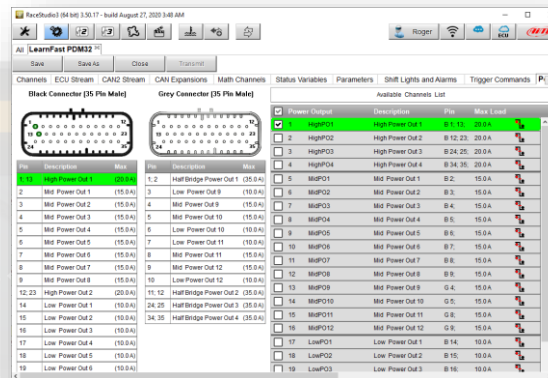




Co-Host
Fabrizio Rizzi
 AiM Sportline - Italy

Webinar Series

Bringing Data Support and Training to You

AiM Sports PDM – Update #2
Power Distribution Module

2020 Webinar #58

October 15th, 2020

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Fabrizio Rizzi

AiM Sportline – Italy
Hardware Team Manager
fabrizio.rizzi@aim-sportline.com



- Currently is the Head of Hardware Development for AiM Sportline in Italy. He has Worked for AiM Sportline Since 2014
- Career Started in 1999 as a Firmware Developer for Microcontrollers. A Couple of Years Later he also Started Hardware Development of the Board Where the Microcontrollers were Mounted



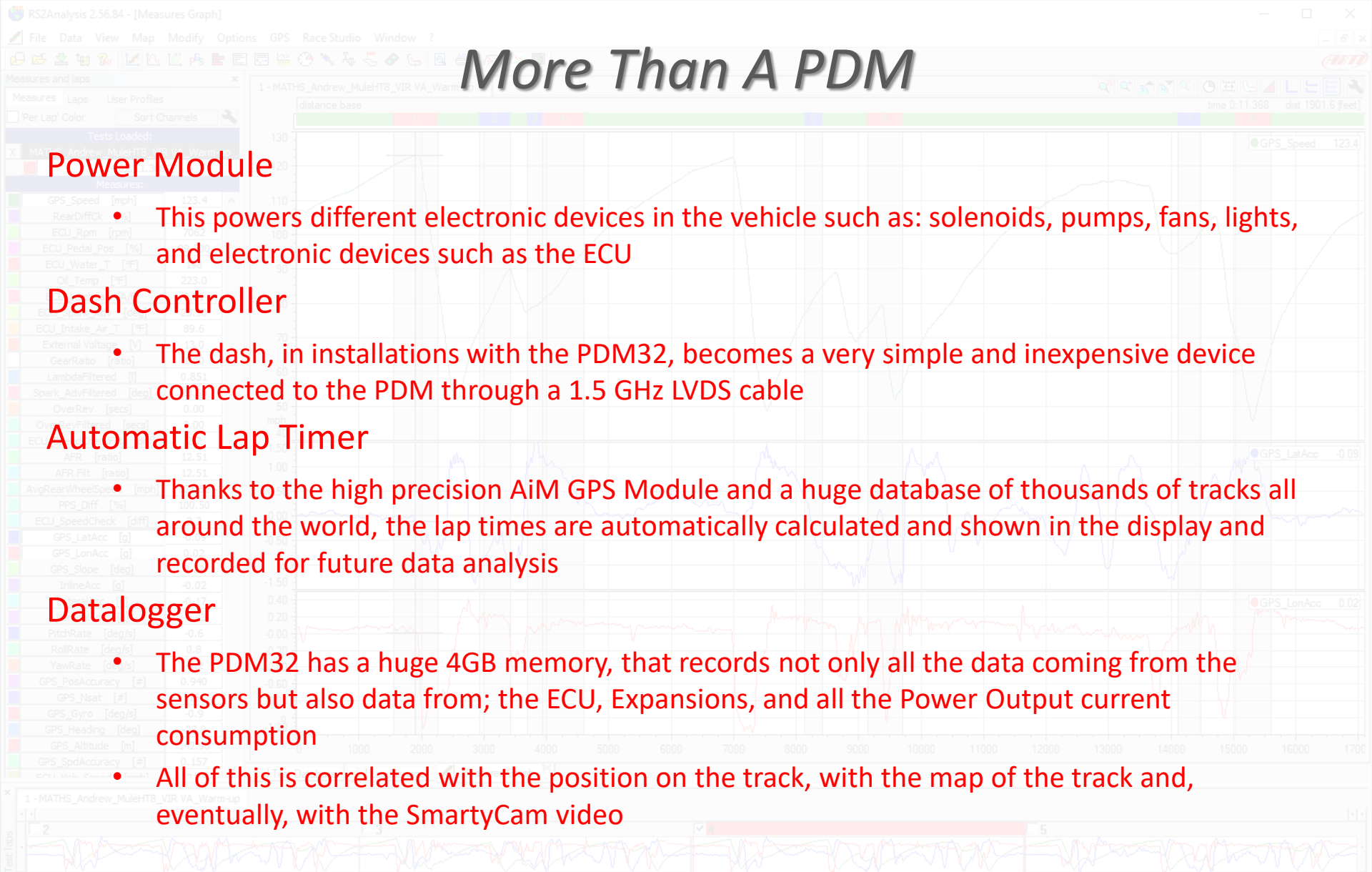
PDM vs. Relay-Fuse Box

Main Advantages:

- Wiring harness and connection is simpler and cleaner
- Reduction of weight
- Easier to check and find a wiring harness malfunction
- Useful during vehicle function development, easier to change strategies
- No hardware change required for adding or removing output channels (only load wire)
- Useful to analyze power data logged
- User can implement many strategies to optimize power consumption

Additional Features:

- Current monitoring and recording
- Predictive warning/alarm state
- Dynamic management
- Easier to change rules for activating and/or deactivating outputs
- Many strategies can be implemented. Difficult to do this with standard relay-fuse box
- User selectable current trip value. Easy to change. Auto restart. No fuse to change or restore. Auto retries are configurable



FileDataViewMapModifyOptionsGPSPaceStudioWindow?

Measures and laps

MeasuresLapsUser Profiles

Per Lap ColorSort Channels

1 - MATHS_Andrew_MuleHT8_VIR_VA_Warm-up

distance base

time 0:11.368 dist 1301.6 feet

GPS_Speed 123.4

Features

Technical specifications

LEDs

Inputs

Power outputs

Lin bus

CAN connections

Inertial platform

Internal memory

External modules

External Analog Camera input

Connectors

Remote display connection

Body

Dimensions

Weight

Waterproof

32 RGB LEDs + 1 PDM ON + 1PDM STS (Status)

14 fully configurable, recorded at max 500 Hz each:

- 8 analog (0-5V ; 0-12V)/digital inputs
- 4 digital inputs
- 2 speed inputs

4 rated up to 20 A (high side)
12 rated up to 15 A (high side)
12 rated up to 10 A (high side)
4 rated up to 35 A (high side/half bridge/low side/configurable PWM at max 10 KHz)
Protected for: over voltage, under voltage, short circuit, over current, over temperature
Total max current: 120 A

1

3

3 axis ±5G accelerometer + 3axis gyro + 3 axis magnetometer

4 GB

GPS Module, Channel Expansion, TC Hub, Lambda Controller, SmartyCam HD, Formula Steering Wheel, Remote I/O pushbutton module

2

2 AMP connectors + 2 Binder connectors + 1 Amphenol Surlok connector + 1 Rosenberger connector

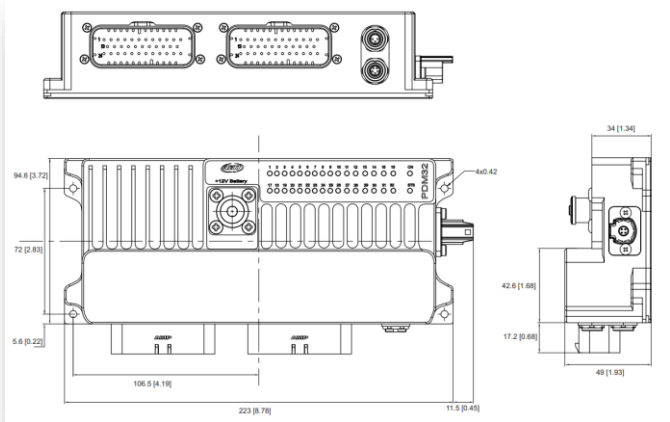
1 AiM stream output

Anodized Aluminum

234.5 x 94.6 x 49.5 mm

761g

IP65



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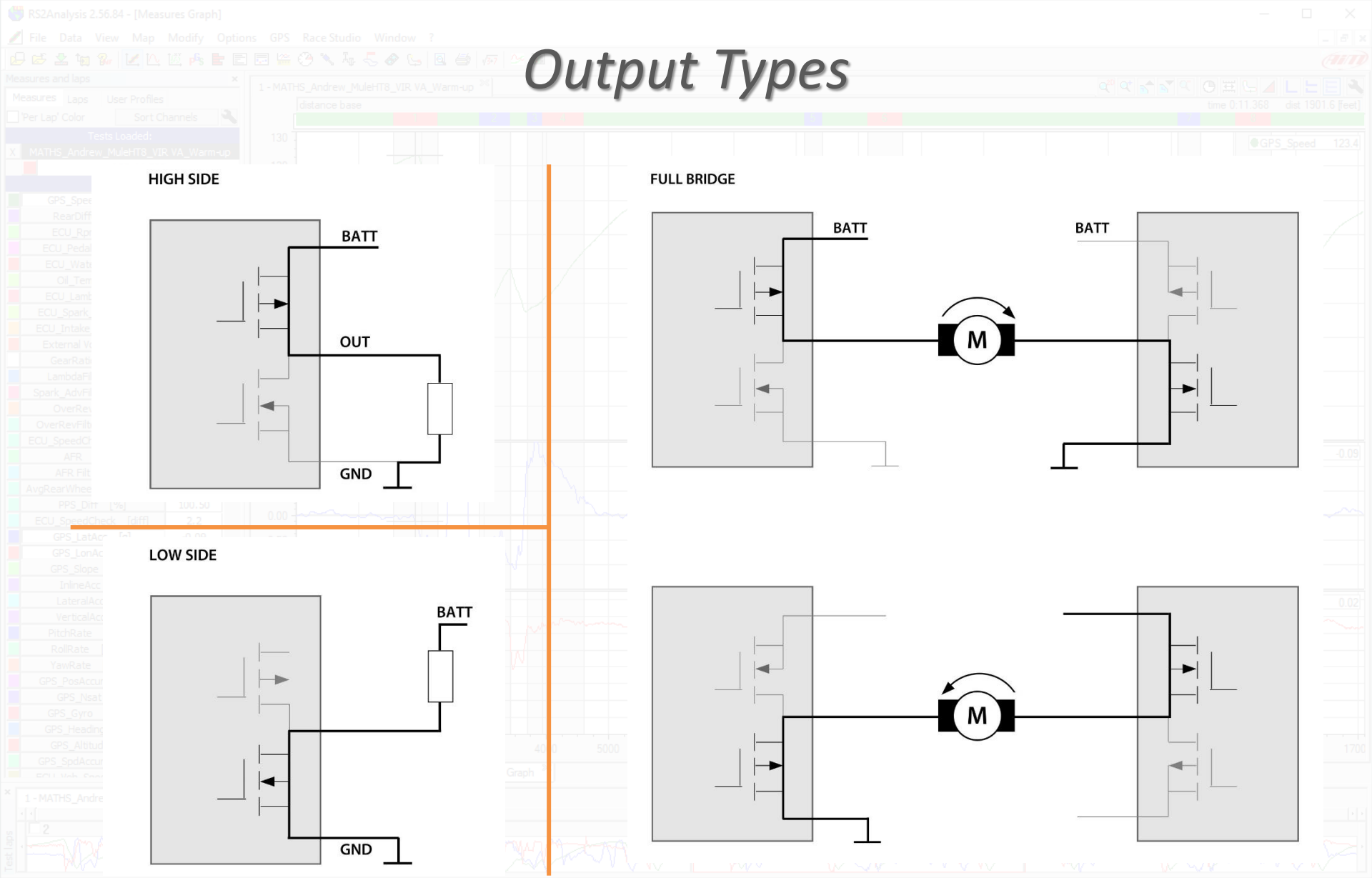


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AiM Sports PDM – Update #2

Features



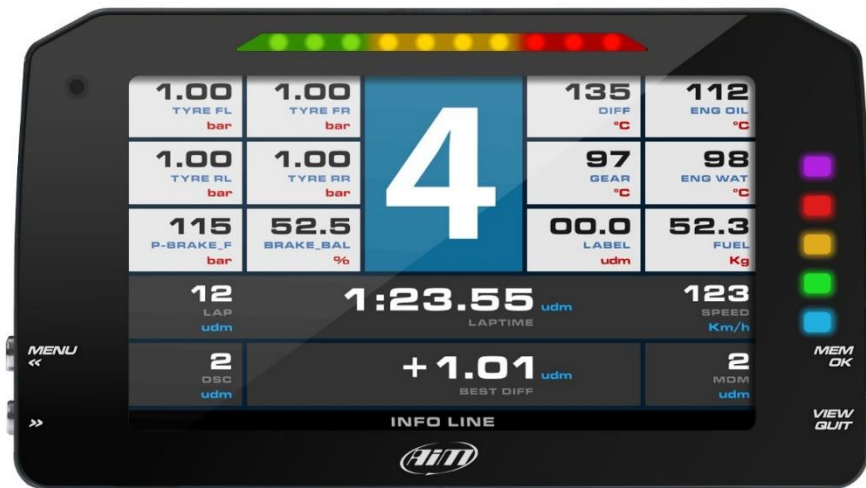


Remote Display Connection



- The AiM PDM has a highspeed link used for the remote display. This is done by an AiM 1.5GHz LVDS cable
- This cable transmits the TFT information and LED status to the remote display
- The PDM receives light sensor data and push button status from the display
- This same cable powers the remote display, making a simple and reliable connection
- Rosenberger connectors allow high immunity noise levels and IP67 class connection

6 Inch Remote Display



- Display Size : 6.2"
- Resolution : 800 x 480
- Contrast : 600:1
- Brightness : 700 cd/m2
- Ambient Light Sensor : Yes
- Status Information LEDs : 5
- Shift Lights LEDs : 10
- User Pushbuttons : 4
- Waterproof : IP65

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:

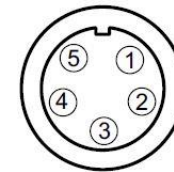
GPS_Speed [mph]	123.4
RearDiffCk [%]	0.07
ECU_Rpm [rpm]	7062
ECU_Pedal_Pos [%]	99.500
ECU_Water_T [°F]	198
Oil_Temp [°F]	223.0
ECU_Lambda [A/F]	0.85
ECU_Spark_Adv [deg]	23.50
ECU_Intake_Air_T [°F]	89.6
External_Voltage [V]	13.0
GearRatio [ratio]	1.00
LambdaFiltered []	0.851
Spark_AdvFiltered [deg]	23.50
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]	-0.9
GPS_Heading [deg]	-23.8
GPS_Altitude [m]	142.96
GPS_SpdAccuracy [ft]	0.157
GPS_Vibe_Count [count]	171

10 Inch Remote Display



- Display Size : 10.3"
- Resolution : 1280 x 480
- Contrast : 1100:1
- Brightness : 800 cd/m2
- Ambient Light Sensor : Yes
- Status Information LEDs : 6
- Shift Lights LEDs : 10
- Waterproof : IP65

Camera Inputs



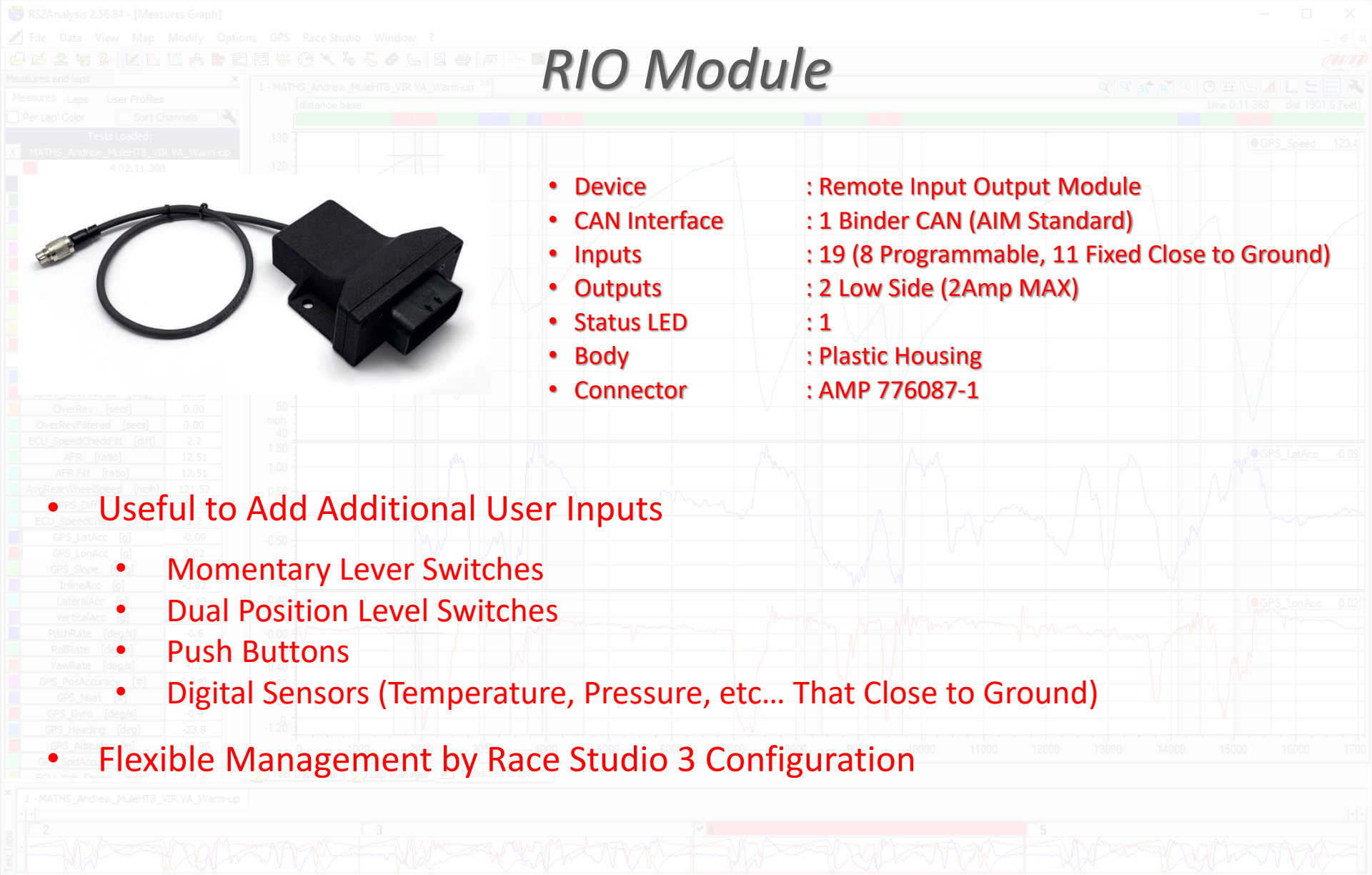
- 1 - Video input 1
- 2 - GND
- 3 - +Vb output CAM
- 4 - GND
- 5 - Video input 2

- Up to 2 External Camera Inputs are Available
- Activation of Camera Inputs are Fully Configurable by Race Studio 3
- Available in Both 6 Inch and 10 Inch Displays
- Integrated +12V Camera Power Supply





- Useful to Add Additional User Inputs
- Flexible Management
- Users can Build CAN Protocols to Manage Different Keypads



RIO Module Configuration

Measures and Laps

Measures Laps User Profiles

Per Lap Color Sort Channels

Tests Loaded:

MATHS_Andrew_MuleHT8_VIR_VA_Warm

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_Heading [deg] 15

GPS_Gyro [deg/s] -0.9

GPS_Heading [deg] -23.8

GPS_Altitude [m] 142.96

GPS_SpdAccuracy [ft] 0.157

GPS_Heading [deg] 171.0

GPS_Heading [deg] 171.0

GPS_Heading [deg] 171.0

GPS_Heading [deg] 171.0

GPS_Heading [deg] 171.0

GPS_Heading [deg] 171.0



Expansion Name (6 characters max.)

R2a

Get Expansion
Serial Number

Expansion Serial Number (S.N.)

0

Channel Settings

ID	✓	Name
Ch01	✓	R2a C
Ch02	✓	R2a C
Ch03	✓	R2a C
Ch04	✓	R2a C
Ch05	✓	R2a C
Ch06	✓	R2a C
Ch07	✓	R2a C
Ch08	✓	R2a C
Ch09	✓	R2a C
Ch10	✓	R2a C
Ch11	✓	R2a C
Ch12	✓	R2a C
Ch13	✓	R2a C
Ch14	✓	R2a C
Ch15	✓	R2a C
Ch16	✓	R2a C
Ch17	✓	R2a C
Ch18	✓	R2a C
Ch19	✓	R2a C

Name

R2a Channel01

Function

Digital Status

Sensor

Status

Sampling Frequency

20 Hz

☒ Logged

Active when signal is:

☒ close to ground☐ close to VBatt☒ Momentary☐ Toggle☐ Multiposition☐ use as button with pressure time dependent statusNot active
label [0]Active
label [1]

Save

Cancel

Freq

20 Hz

20 Hz

20 Hz

20 Hz

20 Hz

20 Hz

20 Hz

20 Hz

20 Hz

20 Hz

20 Hz

20 Hz

20 Hz

20 Hz

20 Hz

20 Hz

20 Hz

20 Hz

20 Hz

20 Hz

Blink Marine Keypad Configuration

Measures and Laps

Measures Laps User Profiles

☐ Per Lap Color ☐ Sort Channels

Tests Loaded:

 X 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_Healt [#] 15

GPS_Gyro [deg/s] -0.9

GPS_Heading [deg] -23.8

GPS_Altitude [m] 142.96

GPS_SpdAccuracy [#] 0.157

GPS_Healt [m] 171.0

1 - MATHS_Andrew_MuleHT8_VIR_VA_Warm-up

2

CAN2 Keypad Protocol:

AIM_TECH - REL_4_Keypad (ver. 02.00.01) 125 Kbit/sec

Change Protocol


☒ Enable the CAN Bus 120 Ohm Resistor

☒ Enable Keypad with ID: 15

Key Status

WorkAs

K1

K2

K3

K4

K5

K6

K7

K8

Key Status Settings

Name K1

WorkAs

☒ Momentary

☐ Toggle

☐ Multiposition

Multiposition Settings

☐ Use timed presses

Minimum time for long pressure - sec 0.5

Position	Label	Value	Short Press leads to	Long Press leads to	
0	S0	0	S1	S1	+
1	S1	1	S0	S0	+

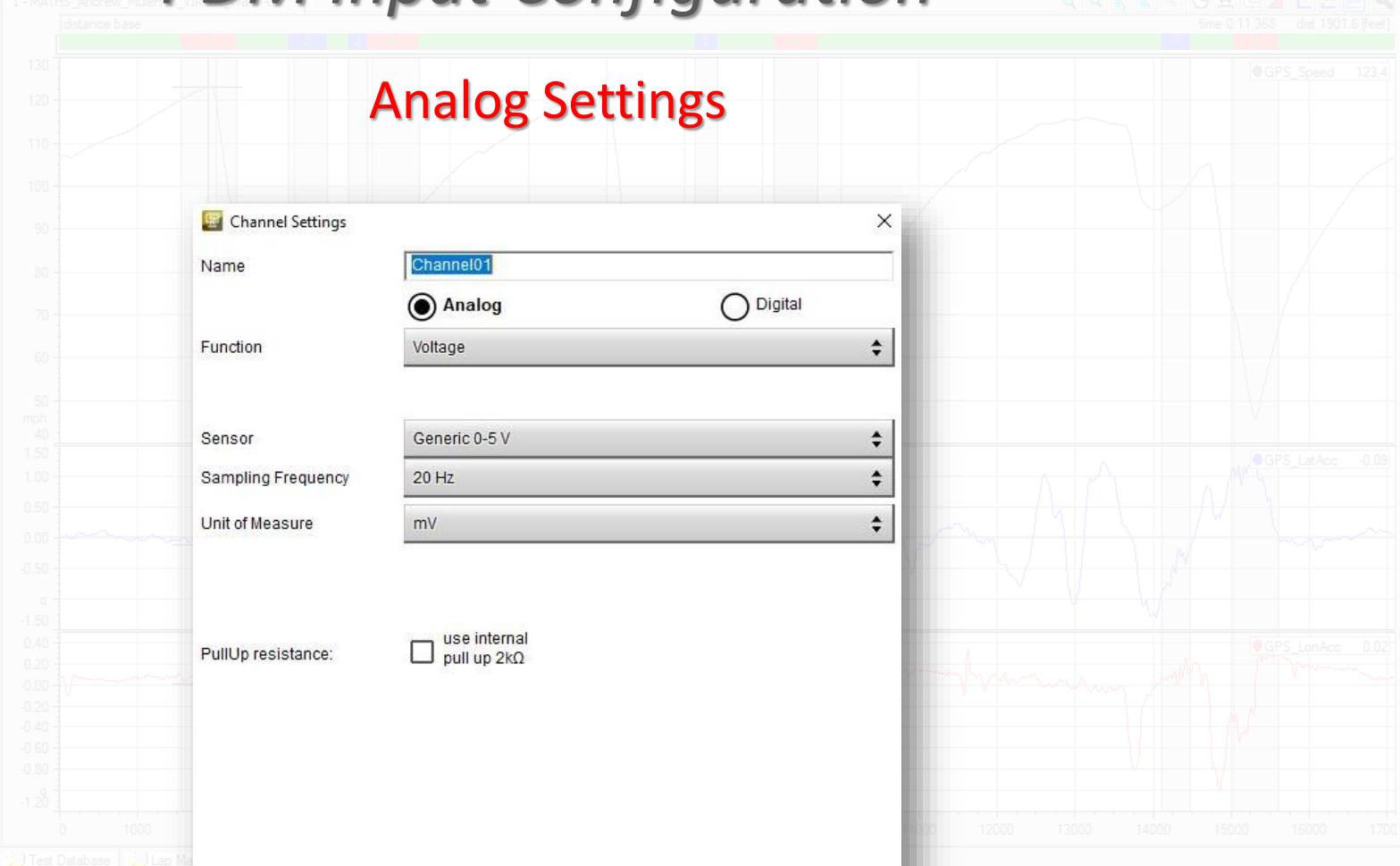
Save

Cancel

PDM Input Configuration

Analog Settings

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]	-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	



Channel Settings

Name: Channel01

☒ Analog ☐ Digital

Function: Voltage

Sensor: Generic 0-5 V

Sampling Frequency: 20 Hz

Unit of Measure: mV

PullUp resistance: ☐ use internal pull up 2kΩ

Save Cancel

Digital Settings

 Channel Settings

Name

☐ Analog
 ☒ Digital
 

Function

Sensor

Sampling Frequency

☐ Logged

Active when signal is:
 ☒ **close to ground**
☐ close to VBatt

☐ use internal pull up 10kΩ

☒ **Momentary**
☐ Toggle
 ☐ Multiposition

☐ use as button with pressure time dependent status

Not active label [0]
 Active label [1]

Save

Cancel

PDM Input Configuration

Speed Input Settings

Channel Settings

Name:

Function:

Sensor:

Sampling Frequency:

Display Precision:

Speed Parameters

Wheel circumference [mm]:

Pulse per wheel revolution:

Save Cancel



Remaining PDM Q&A's



AIM LearnFast PDM11

Channels: ECU Stream, CAN2 Stream, CAN Expansions, Math Channels, Status Variables, Parameters, Shift Lights and Alarms, Trigger Commands

Black Connector (15 Pin Male) Gray Connector (15 Pin Male)

No.	Description	Min	Max
1	HighPower Out 1	15.0A	25.0A
2	Mid Power Out 1	15.0A	25.0A
3	Mid Power Out 2	15.0A	25.0A
4	Mid Power Out 3	15.0A	25.0A
5	Mid Power Out 4	15.0A	25.0A
6	Mid Power Out 5	15.0A	25.0A
7	Mid Power Out 6	15.0A	25.0A
8	Mid Power Out 7	15.0A	25.0A
9	Mid Power Out 8	15.0A	25.0A
10	Mid Power Out 9	15.0A	25.0A
11	Mid Power Out 10	15.0A	25.0A
12	Mid Power Out 11	15.0A	25.0A
13	Mid Power Out 12	15.0A	25.0A
14	Low Power Out 1	15.0A	25.0A
15	Low Power Out 2	15.0A	25.0A
16	Low Power Out 3	15.0A	25.0A
17	Low Power Out 4	15.0A	25.0A
18	Low Power Out 5	15.0A	25.0A
19	Low Power Out 6	15.0A	25.0A

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- 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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Tuesday Oct 20th, 2020

10:00am Pac / 1:00pm East



Co-Host
Bob Knox

A Practical Guide to Race Car Data Analysis

by Bob Knox



A Practical Guide To
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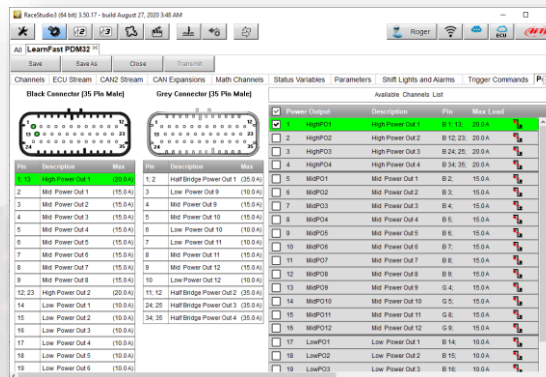


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Next Webinar Topic

A Chat with Bob Knox





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fabrizio.rizzi@aim-sportline.com

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