# Race Grade

# Catalog 2013

***Electronic Solutions for Motorsports***

**Professional Catalog**

**Revision 2013.1**

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14 January, 2013

# Driver Control Interfaces

## *Keypads*

A keypad is the main interface between a driver and their vehicle. It offers a single integrated electronic device designed to replace rows of individual switches and buttons. It communicates via CAN with a MoTeC PDM (Power Distribution Module) through an interface gateway box. Not only does it provide momentary buttons to activate any PDM output, it also receives feedback status from the PDM on that output. Each button has 3 LED lights along the top indicating output status.

- Left = solid Green = output is on
- Middle = blinking Orange = output faulted & will retry
- Right = solid Red = output off & no retries left

Available in either 15 button or 8 button versions.

**Keypads**

**Part # M KEYPAD 8H** **Price: $ 574.00**
**Part # M KEYPAD 15** **Price: $ 589.00**

## *PDM Gateway for Keypad*

This box translates all the necessary CAN messages between the RaceGrade muti-button keypad and a MoTeC PDM (Power Distribution Module). It facilitates the button commands from the keypad to the PDM, and takes messages from the PDM to the keypad lights for each output status.

RaceGrade Keypad | Keypad Gateway | MoTeC PDM

**Gateway**

**Part # M PDM GATEWAY** **Price: $ 550.00**

## Bi-Color Switches

Custom made switches are available with any text or icon in a rugged water proof enclosure. Its Bi-Color LED bezel allows for function status identification. Red is off. Green is on.

**Part # call** **Price: $ call**

## Bi-Color Control Device

The BCD is used in conjunction with the MoTeC PDM and its cockpit switches utilizing a Bi-Color LED bezel indicator. The BCD inputs are connected in parallel to the PDM outputs using small 26 AWG wiring and therefore able to monitor the state of the PDM output. The BCD outputs then drive the LED bezels on the related cockpit switch to inform the driver of the output's status.

- Green = output is on
- Red = output is off

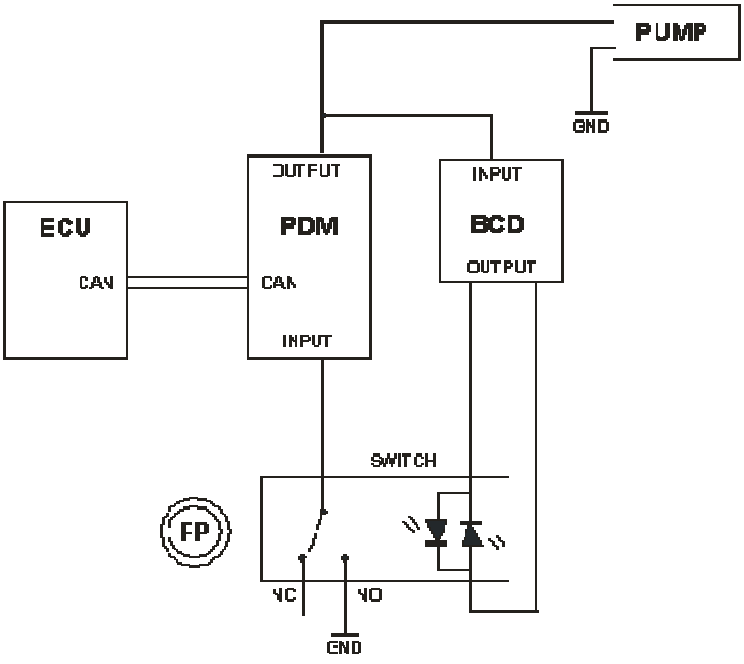
The master switch when on, activates all LED bezel indicators to light red as their off position. As each switch is turned on, the switch activates a PDM output and which will update the Bi-Color Switch to green.

A optional PWM input is provided for brightness control.

**Part # M BCD** **Price: $ call**

***Specifications:***

- Supply Voltage 6.5 - 18.0 VDC.
- Current Consumption: 350mA max, 15mA standby
- LED Outputs: 25mA max.
- Weight: 141 grams
- Dimensions: 4" x 1.5" x 1.25"



# Other Devices

## *Sink Source Driver / SSD*

This device contains 2 high current, high speed output drivers in a tiny package. The inputs may trigger either high or low. The SSD is ideal for nitrous control where multiple stages and accurate timing are required.

**Part # RG SSD P (4 high side)** **Price: $ 240**
**Part # RG SSD2 (high or low side)** **Price: $ 240**

## *TC8 - Thermocouple to CAN module*

A CAN based expansion module that allows for up to 8 thermocouple sensors to be connected. The module works with non amplified K-type thermocouples only.

NOTE: When no sensor is connected to an input, the output reads a high value of 1050°C.

**Part # RG TC8** **Price: $ 470**

***Specifications:***

Input Temp Range: 0 to 1000°C
Thermocouple Style: K-type only
Operating Voltage Range: 6 to 24 vDC
Operating Current Draw: < 0.1 Amps
Operating Temp Range: -40°C to 120°C
Dimensions: 3.5” x 2.26” x 1.0”
Weight: 173 grams

# Tire Pressure Monitoring

RaceGrade now sells and supports a **T**ire **P**ressure **M**onitoring **S**ystem produced by bf1systems. This well established TPMS can provide benefits for any motorsport team. It communicates tire pressure and inner air temperature directly to any data logger via CAN.

## *TPMS Control Box*

| | | | |
|---|---|---|---|
| Part # | F1-100-1214-014 | F1-100-1543-001 | F1-100-1543-002 |
| Description: | OEM Control Box | Pro Control Box | Pro Box w/ Antenna |
| Connector: | plastic + AS adapter | Autosport x 1 | Autosport x 3 |
| Sealing: | IP50 | IP65 | IP65 |
| Weight: | 75 grams | 95 grams | |
| Price: | $750 | $3000 | $3500 |

## *Antenna*

| | | |
|---|---|---|
| Part # | F1-100-1220-006 | F1-100-1220-017 |
| Description: | Club Antenna | Pro Antenna |
| Connector: | Souriau size 6 | Souriau size 2 |
| Price: | $125 ($250 w/IR option) | $300 ($400 w/IR option) |

## *Corner Locater Module*

Part # F1-100-1222-002 Corner Locator Module / LF Trigger

## *Diagnostic Tools*

There are two versions of interrogators available, one called the ***Mini Trigger*** and the other is the ***Mini Analyser***.

| | | |
|---|---|---|
| Part # F1-100-1081-021 | Basic Mini Trigger | $200 |
| Part # F1-100-1451-001 | Pro Mini Analyzer | $1250 |

## Sensor Options

All four sensors are compatible with any control box. The major differences are the update rate of information and the maximum temperature limits of the sensor's electronics and battery.

| Model | Basic | Club | Pro | Pro + IR |
|---|---|---|---|---|
| Part # | F1-100-1495-001 | F1-100-1233-009 | F1-100-1233-002 | F1-100-1263-xxx |
| bf1 Name | Ultra Light | DigiTyre Light | DigiTyre | DigiTyre IR |
| Housing Material | Plastic | Peak | Peak | Peak |
| Max Temperature | 120°C | 130°C | 150°C | 150°C |
| Weight (no stem) | 28 grames | 36 grams | 30 grams | 44 grams |
| Update Interval | 10 sec | 3 sec | 1 sec | 1 sec |
| Price | $ TBD | $200 | $325 | $800 |

F1-02-7560-B 11mm Valve $25
F1-02-7560-B 8mm Valve $60
*Note: Various wheels might require special valve stems.*
No single valve stem will work with every wheel.

The IR sensor also monitors a tire's inner carcass temperature in addition to pressure and inner air temperature.

A yearly software license fee applies to the IR functionality.

## Starter Kits

***Club, Part # F1-100-1558-002, retail price $2700***

Wiring Starter Kit
Club Control Box
Club Antenna x 2
Mini Trigger
Club Sensor x 8

***Mid Level Club, Part # F1-100-1558-003, retail price $3200***

Wiring Starter Kit
Club Control Box
Club Antenna x 2
Satellite Trigger x 4
Mini Analyzer
Club Sensor x 8

***Pro, Part # F1-100-1558-005, retail price $7800***

Wiring Starter Kit
Professional Control Box
Professional Antenna x 2
Satellite Trigger x 4
Mini Analyzer
Pro Sensor x 8

# CAN Adapters

## *J1939 / MEFI to MoTeC M800 CAN adapter*

This adapter is used to interface a MEFI ECU with a MoTeC dash while maintaining the same communications template as the MoTeC M800 data stream format. The adapter automatically poles the MEFI ECU with appropriate J1939 commands on the 250 kbit/s CAN bus, and then combines them into a data stream on the other CAN bus running at 1000 kbit/s baud rate.

Compatible with either the MEFI 4 or 4b ECU

Connection 1 - MoTeC CAN bus

Connection 2 - MEFI CAN bus

**Part # M MEFI COMMS ADPTR Price: $ 525**

## *CAN bus Speed Changer*

This adapter will transfer messages on one CAN bus speed to the other. Available in various configurations:

- Single direction bus speed change, for example 500kbit/s to 1mbit/s or 1mbit/s to 500kbit/s.
- Bi-directional bus speed change where all messages are transferred back and forth.
- Message filtering may be turned on to only transfer messages of your choice.

**Part # RG CAN ADAPTER Price: $ 550**

# GPS

This 12 channel GPS receiver provides speed, heading, latitude and longitude data. Using differential correction satellites sub meter accuracy is easily obtained. It provides a true non-interpolated 10 Hz or 20 Hz serial output conforming to NMEA standards. There is also a speed output pulse for applications that don't accept serial data. An optional serial-to-CAN or STC can be installed inside the unit for applications which require a CAN interface, but must be specified at the time of ordering.

**Part # M GPS BL** **Price: $ 901**
**add 20 Hz update** **Price: $ 735**
**add CAN output** **Price: $ 300**

***Specifications:***

- 12-channel GPS engine.
- Horizontal accuracy < 0.7 meter at 95%
- Update rate of 10 Hz or optional 20 Hz.
- 57600 baud serial, other rates available upon request.
- NMEA message output GGA and RMC, others available upon request.
- Optional CAN output
- Supply Voltage: 6 to 18 VDC
- Temperature Range: -30° to 70° C
- Weight: 160 grams w/o antenna
- Dimensions: 3.95 x 2.7 x 0.9 inches, 100 x 69 x 23 mm

# Telemetry Gear

## *Data Radios*

The latest in 900 MHz spread spectrum wireless radios has been built to survive hostile environments from vibration and water splashes with its built in o-ring seal. The enclosure has been optimized to be the smallest and lightest possible with the entire radio weighing in at only 202 grams.

| | |
|---|---|
| Frequency: | 902-928 MHz spread spectrum |
| Output Power: | up to 1 Watt |
| Sensitivity: | -110dBm |
| Baud Rate: | up to 115.2 Kbps |
| RF Connector: | SMA female |
| Supply Voltage: | 6 to 30 VDC |
| Temp. Range: | -20° to 75° C |
| Weight: | 202 grams |

Compatible with any RS232 serial stream of data from different logger manufacturers.

**Part # M TEL FGR2 Price: $ 2250**

A pit side harness to provide 12 volts and a laptop connection for the telemetry radio.

**Part # M TEL AS PIT Price: $ 405.53**

**Software - Race Fuel Strategy Spreadsheet**
RaceGrade offers a customized race fuel strategy program tailored to your team's needs. See the Software section further down in this catalog.

**Software - Live Google Earth Telemetry View**
RaceGrade offers a software package which plots a vehicles location live in Google Earth over telemetry. See the Software section further down in this catalog.

## Antennas

Car side antenna featuring 2.5 dB gain.

**Part # M TEL 9HMHZ 2DB Price: $ 129**

A pit side omni antenna featuring 8dB gain.

**Part # M TEL 9HMHZ 8DB Price: $ 295**

## Pit Lane Filter

A bandpass filter designed to decrease interference from 400MHz voice and data radios, and higher frequencies used for live TV radios. The insertion loss is low, but will result in slightly decreased range. Therefore it works best with high gain antennas like the RaceGrade 8db omni.

***Specifications:***

- Connectors: SMA Female / SMA Male
- Insertion Loss: 1.1 dB
- Weight: 15 grams
- Dimensions: 1.2” x 0.75” x 0.46”

**Part # M TEL FILTER BP Price: $ 126**

## In-Car Filter

A low pass filter for operating below 1000 MHz. It prevents interference into highly sensitive GPS antenna and decreases interference from higher frequencies used for live TV radios. The insertion loss is low, and will work best with high gain car antennas like the RaceGrade 2.5db.

***Specifications:***

- Connectors: SMA Female / SMA Male
- Insertion Loss: 0.7 dB
- Weight: 10 grams
- Dimensions: 1.43” x 0.41”

**Part # M TEL FILTER LP Price: $ 47**

# Sensors

## *Accelerometers*

### Three Axis

Designed to measure vehicular motion accelerations from three orthogonal axis. Also available is a +/- 4 G option.

- Range: -/+4G or +/-10G
- Response: up to 100 Hz
- Supply Voltage: 4.9 - 5.5 V
- Output Voltage: 0.5 - 4.5 V ratiometric
- Temp. Range: -40° to 105° C

**Part # M ADXL-3 Price: $ 941**

### Single Axis

Designed to measure data from uprights/hubs and chassis specifically for use with shaker rig testing. This small and lightweight accelerometer responds to both DC and AC accelerations and comes in a sealed harsh environment case.

- Range: -50 to +50 G
- Response: up to 1600 Hz
- Supply Voltage: 4.75 - 5.25 V
- Output Voltage: 0.5 - 4.5 V
- Output type: single ended or differential
- Current Draw: 10 mA
- Temp. Range: -40° to 125° C

**Part # M ADXL-1 50G Price: $ 520**

## *Yaw Rate*

A solid state MEMs angular rate sensor available in either a 100 or 200 deg/s maximum rate. Unlike accelerometers, this sensor is independent of chassis vibration and has a faster response time.

- Supply Voltage: 4.75 - 5.25 V
- Output Voltage: 0.5 - 4.5 V
- Temp. Range: -20° to 85° C

**Part # M YAW 100 Price: $ 550**
**Part # M YAW 200 Price: $ 550**

## Aero / Differential Pressure

Available in either 1,4 or 8 channel units, these differential pressure sensors are ideal for aerodynamic measurements. All models feature a common reference port.

***Specifications:***

| | |
|---|---|
| Output Method: | 0 to 5 volt |
| Supply Voltage: | 5 Vdc |
| Range: | +/- 2 PSI |
| Resolution: | 0.01 kPa |
| Response Time: | 0.001 sec |
| Update Rate: | > 1000 Hz |
| Temp Range: | -20° to 85° C |

| Part #: | Inputs: | Price: |
|---|---|---|
| **M AERO 1** | **1 channel** | **$ 310** |
| **M AERO 42** | **4 channel** | **$ 1281** |
| **M AERO 8** | **8 channel** | **$ 1783** |

## UltraSonic Ride Height

A low cost alternative to expensive laser distance sensors for measuring ride height. This unique sensor was developed specifically for motorsport use and is immune to sunlight. Requires laminar flow of air under the sensor.

***Specifications:***

- Output Voltage: 0 to 10v or 0 to 5v
- Supply Voltage: 12 to 24 Vdc
- Update Rate: 100 Hz
- Sonic Cone Angle: 7° minimum
- Temperature Range: 0° to 60°C
- Protection Ratings: IP67

**Part # M ADL RH** **Price: $ 770**

## Club Level Pressure Sensors

An ideal high volume, low cost pressure sensor. It features a small, compact and lightweight brass body with a 1/8” NPT mechanical fitting and an industry standard Metri-Pack electrical connection. Available in 50A, 75A or 100G.

***Specifications:***

- Output: 0.5 to 4.5 Vdc
- Supply: 5 Vdc
- Temperature Range: -20°C to 100°C
- Main Seal: o-ring
- Weight: 40 grams

| Part #: | Range: | Price: $ 69.30 |
|---|---|---|
| M P50A-E4C | 50 PSI Absolute | |
| M P75A-E4C | 75 PSI Absolute | |
| M P150G-E4C | 150 PSI Gauge | |

## Professional Pressure Sensors

A high quality all stainless steel pressure sensor for repeatable and reliable readings. Compatible with any fluid media. Features a female Dash-3 fitting designed for use with a Dash-3 male adapter to any thread size. Available in many pressure ranges.

***Specifications:***

- Output: 0.5 to 4.5 Vdc
- Supply: 5 Vdc
- Temperature Range: -20°C to 125°C
- Main Seal: welded stainless, no o-ring
- Weight: 120 grams

| Part #: | Range: | Price: |
|---|---|---|
| M EPT 75A | 75 PSI Absolute | $ 224 |
| M EPT 100G | 100 PSI Gauge | $ 200 |
| M EPT 150G | 150 PSI Gauge | $ 200 |
| M EPT 300G | 300 PSI Gauge | $ 200 |
| M EPT 1000G | 1000 PSI Gauge | $ 200 |
| M EPT 2000S | 2000 PSI Gauge | $ 200 |
| M EPT 3000S | 3000 PSI Gauge | $ 200 |

## Manifold Air Pressure / Temp

A small compact sensor designed for automotive use of measuring air pressure and temperature for the intake / manifold of an engine.

***Specifications:***

- Output: 0.5 to 4.5 Vdc
- Supply: 5 Vdc
- Temperature Range: -20°C to 125°C
- Weight: 27 grams

| Part #: | Range: | Price: $ 74.95 |
|---|---|---|
| **M 16-4360** | **1 Bar** | |
| **M 16-8191** | **3.5 Bar** | |

## Fluid Temperature

Perfect for any type of fluid temperature measurement, this small compact sensor reads from -40 to 200 deg C. All stainless steel body with a thread size of 1/8”-27 NPT.

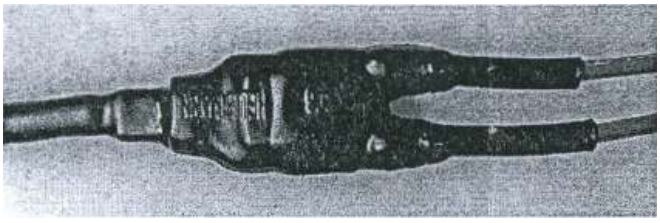
***Specifications:***

- Output: variable resistance
- Supply: pull-up to 5 Vdc
- Temperature Range: -40°C to 200°C
- Weight: 23 grams

**Part # M 25-2197 Price: $ 69.22**

## Current Sensor

This hall effect in-line current sensor will report the actual current flowing through its wires. It requires a 5v supply and outputs a 0-5v variable voltage based on the current. Senses current flow in both directly, and is available in many different ranges.



***Specifications:***

- Output: 0-5v, 2.5v @ 0 Amps
- Supply: 5 Vdc
- Range: +/- 150 Amps
- Wire Size: 8 AWG red

**Part # M CS-150-8 Price: $ 250.00**

# Software

## *Fuel Prediction*

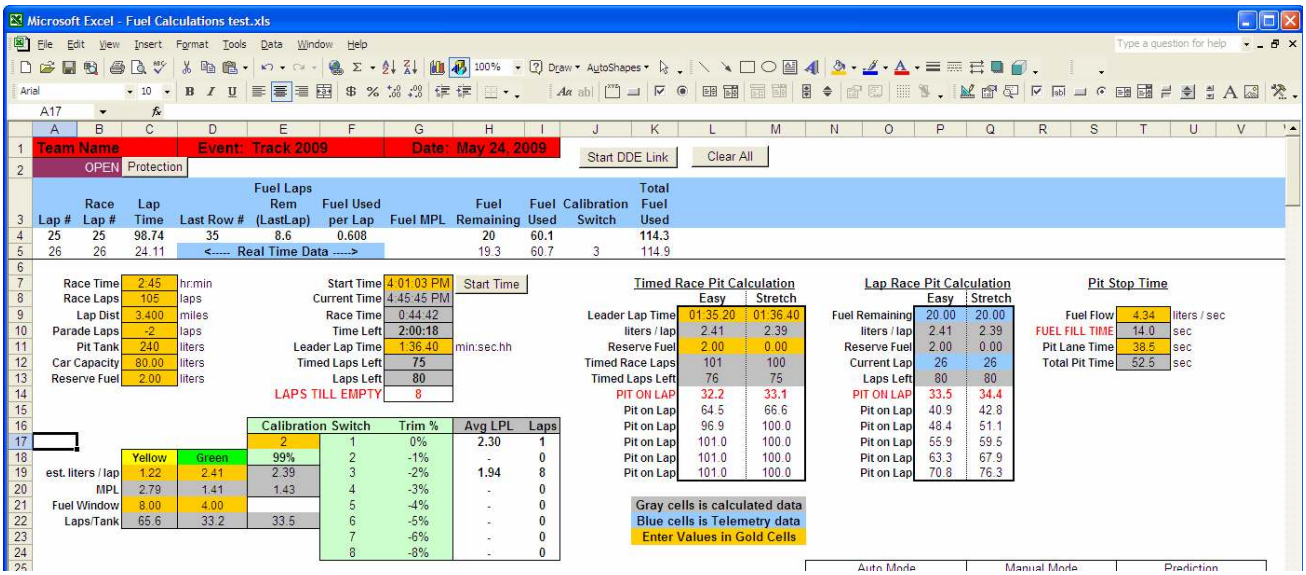
RaceGrade offers consulting services that can help race teams link their fuel prediction or other Excel based data analysis live with Telemetry Monitor data.

For customers with their own fuel prediction spreadsheet it is possible to link this into Telemetry Monitor via DDE. Those with programming experience may do this for free, or may contract such programming through RaceGrade Consulting Services.

**Price: $ 100 / HR**

For customers without an existing fuel prediction spreadsheet, RaceGrade has also developed an Excel file for fuel prediction. It features a protection mode to prevent accidental entries, clear worksheet to start over and a start DDE link. It's designed to estimate pit stop windows and work with either timed or lap based races. All end-of-lap data is stored in a separate worksheet to be used for end-of-lap charts and graphs created by the user. The cost includes an implementation setup period where VB programming is customized to the customer's needs. Only the VB code is password protected, all the formulas and worksheet are open and user programmable.

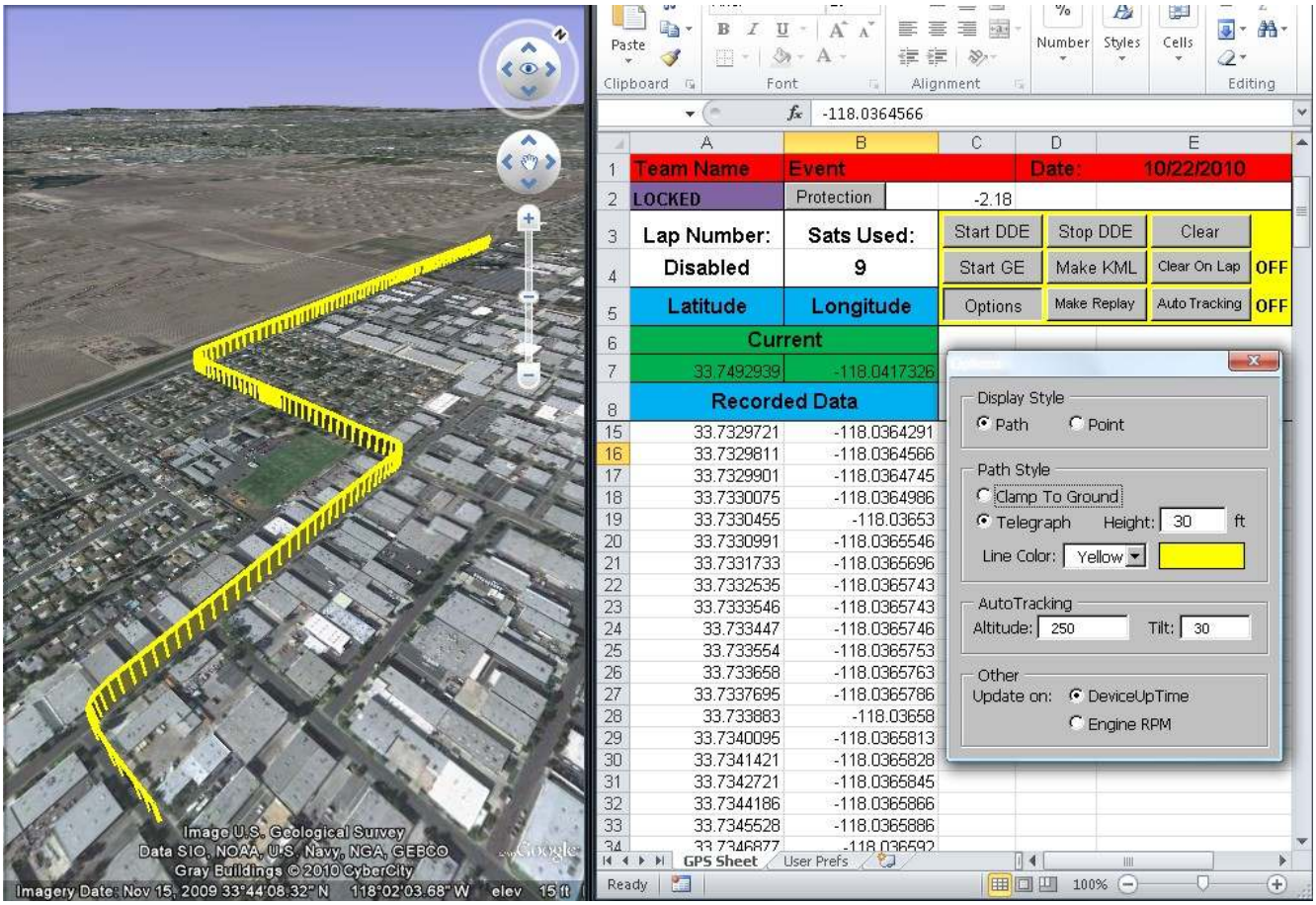
**Part # M TEL DDE Price: $ 500**



# Live Google Earth View

The Google Earth Telemetry Utility - GETU - is an Excel spreadsheet designed to transfer GPS positional data in Google Earth. The GETU receives GPS coordinates via the MoTeC Telemetry Monitor and draws a path in Google Earth in real time.

RaceGrade offers a software package which plots a vehicles location live in Google Earth over telemetry. Now the team can monitor the progress of their race vehicle throughout long courses such as the Baja 1000. The software uses Microsoft Excel as a conduit between MoTeC Telemetry Manager and Google Earth.




***Features:***

- AutoTracking option lets you keep the view of Google Earth centered on the current location of the vehicle.
- Option to automatically clear data on end of lap to avoid overlapping paths.
- Watch the live vehicle's path as it traces a prior saved path.
- Save KML files to keep a record of your vehicle's path for viewing at a later time.
- Save replay files to later watch the vehicle's playback around its path.
- Customize the path with two display styles and several colors.
- Compatible with MoTeC ACL and ADL3 with Telemetry Monitor version 2.3 or later.

**Part # M TEL GOOGLE Price: $ 75**

## Weather Stations

RaceGrade now supports and sells Davis Weather Stations. There are two types available, the ***Vantage Vue*** and ***Vantage Pro2***. Customers will also want to purchase a ***WeatherLink*** module to connect the weather station to their PC. A math plugin is provided to integrate the weather station data directly into the *MoTeC i2 Pro* logged data files! The weather console receives and displays weather information and the ***WeatherLink*** module sends this data directly to a PC for both displaying and logging.

The integration of data with *MoTeC's i2 Pro* analysis software requires a ***math plugin***. The plugin links channels of data from the Davis Weather station log file directly into data files opened with *i2 Pro*. These weather channels can then be graphed or used in math just like any other channel. The data will coincide to the time of the data download, or be synched via GPS time if available in the log file.

***Integrated sensors*** transmits data over a wireless link to the Console. → ***Console*** receives & displays data, then sends it to the PC. → ***WeatherLink*** module plugs into the PC. → ***Math Plugin*** then links the weather log file to any data file opened in i2 Pro.

| Part # | Description | Price |
|---|---|---|
| M 6152 | Vantage Pro2 | $595 |
| M 6250 | Vantage Vue | $395 |
| M 6510SER | WeatherLink - serial | $165 |
| M 6510USB | WeatherLink - USB | $165 |
| M 6555 | WeatherLink - IP/ether | $295 |
| M I2 WEATHER | i2 Math Plugin License* | $ 50 |

**Provides the following channels:**

- Ambient Temperature
- Humidity
- Barometer
- Average Wind Speed
- High Wind Speed
- Wind Direction

*one license included in a purchase of a Davis Vantage Pro2 or Vantage Vue.

## WayPoint Identification

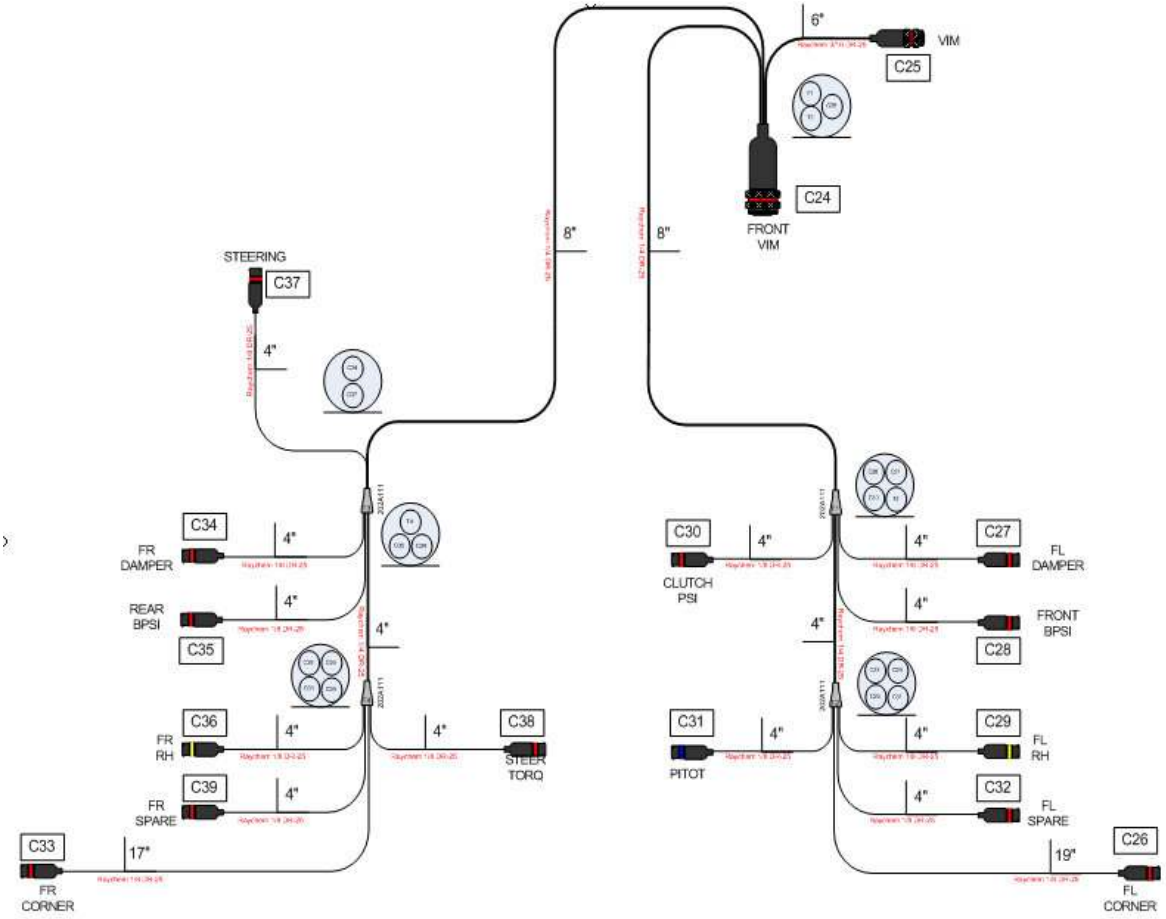
Designed to work with Garmin or Lowrance GPS systems where the waypoints are marked first in the MoTeC data system. Then after the data is downloaded to i2 Pro all of the details for each WayPoint can be input, generating a Waypoint file that is uploaded to the Garmin or Lowrance GPS system.

**Part # M i2 WAYPOINT Price: $ 75.00**

# Wiring

From complete car wiring to simple corner extensions or design consultancy, MoTeC East's wiring department located in Mooresville NC can handle any of your harness needs.

For price and lead times please contact MoTeC.




| MoTeC MOTEC SYSTEMS EAST | | | |
|---|---|---|---|
| CHRIS MILLER | | SAMEX INDY CAR FRONT VIM HARNESS | A |
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