

G2X Pro Installation and User Manual



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Disclaimer	2
Warranty	2
Overview	8
What is the G2X Pro?	8
Design Features	9
Factory tested	9
Custom setup file	9
Simplified setup	9
Motorsports specific software	9
Vnet and Analog External Sensor Channels	9
Vnet	9
Analog	9
RPM:	9
Technical Specifications	10
Items Included With the G2X Pro Package PN 600-KT-G2XPRO	11
Sensor Package Options	11
Display Dash Options	11
Installation	12
G2X Pro Functions	12
G2X Pro Configuration File	12
Logging Start and Stop	12
Download Data	12
DatalinkII Software	12
PC Minimum Requirements	12
Terminology	13
Hardware Installation.....	14
Sensor Package Installation Manuals	15
System Installation Schematics	15
G2XPro with Display Dash and 620-KT-STBB Package	16
G2XPro with Display Dash and 620-KT-STBB Package	17
G2XPro with UDX Display Dash, 620-KT-STBB, 620-KT-4SHOCK and 620-KT-RIDEHT Packages... ..	18
Adding Additional Vnet Sensors	19
Engine RPM and Power Input	20
Power / Engine RPM Cable	20
Mounting Location of Logger	21
Heat	21
Electrical Interference	21
Moisture	21
Easy Access	21
Movement	21
Mounting Orientation of Logger	22
Mounting Method	22
Power Supply and Grounding	23
Engine RPM Signal	23
SD Memory Card Installation	23
GPS Antenna Mounting	24
GPS antenna mounting for stock bodied vehicles	24
GPS antenna mounting for open wheel vehicles	24

Connection of the GPS antenna to the G2X.....	24
GPS LED Display.....	25
System Installation Order.....	26
Datalink II Software Installation	27
Data Download Path.....	27
Downloaded Data.....	27
Configuration File.....	27
DatalinkII Software.....	27
Computer Requirements	28
PC Hardware Requirements	28
Screen Resolution.....	28
PC Software Requirements.....	28
Software Installation.....	29
License Disk Installation	30
SD Flash Card Reader Installation.....	30
DataLink II Help Files.....	31
Demo Run Data File.....	31
Serial Com Port Settings	32
USB to Serial Adapter COM Port Number Setting.....	33
Configuration File.....	34
Motorsports Specific Configuration Files.....	35
Circletrack and Road Racing.....	35
Boating.....	35
Pulling.....	35
Standard.....	35
Setting a Default Configuration	36
Modifying the Data Logger Setup	37
PC Configuration Changes.....	37
Write or Send to the data logger.....	37
Data Logger Configuration Changes	37
Read the data logger Configuration	37
Adding or Removing Sensors - Reading the Configuration.....	38
Modifying the Configuration File.....	39
Writing or Send the Configuration	40
Configuration File Details.....	41
Circletrack and Road Racing Configuration File.....	41
Factory Defined Shock and Ride Height Channels:	41
Factory Defined Math Channels:	41
Shock Velocity.....	41
Ride.....	41
Pitch	41
Pre-Defined Difference Channel:.....	42
Circletrack and Road Racing Runlog Pages.....	43
Session Info and Weather	43
Map Setup.....	43

Map Analysis.....	43
Histograms.....	44
Real Time Displays.....	44
User Defined Runlog Pages.....	44
Car Setup.....	45
Exporting the Start / Finish Position Runlog Page.....	46
TrackVision Export Runlog Page.....	47
Boat Racing Configuration.....	48
Pre-Defined Math Channels:.....	48
Prop Speed.....	48
Prop Slip.....	48
Pre-Defined Difference Channels.....	49
Boat Racing Runlog Pages.....	50
Session Info and Weather.....	50
Map Setup.....	50
Map Analysis.....	50
Prop Data and Accel Reports.....	51
Real Time Displays.....	53
User Defined Runlog Pages.....	53
Exporting the Start / Finish Position Runlog Page.....	54
TrackVision Export Runlog Page.....	55
Puller Runlog Pages.....	56
Session.....	56
Pull Info.....	56
Weather.....	56
Vehicle and Track Info.....	56
Dash Gauges.....	56
User Defined Runlog Pages.....	56
Making the Initial Run.....	57
Transferring Data.....	57
Session Dialog Window.....	58
Map Select Dialog Window.....	59
Puller Run - Setting the Zero Start Point - Very Important.....	61
Create Trackmap (Closed Course) Oval and Road Racing.....	62
Step 1: Select / Create GPS Map	63
Step 2: Select Track Type.....	64
Step 3: SET LAP START	64
Step 4: Create GPS Track Map	64
Track Map Creation (Open - Autocross, Solo & Hill Climb).....	65
Step 2: Select Track Type.....	65
Step 3: Set Lap Start	65
Set Lap End (Open Course Only)	65
Step 4: Create GPS Track Map	65
Add Map Segments - Closed Course Tracks Only.....	66
Step 1: Open Lap	66
Step 2: Generate Segments	66
Step 3: Manually Edit Segments.....	66
Step 3: Manually Edit Segments.....	67
Add Inside / Outside Track - Optional.....	68
Step 1:.....	68
Step 2:	68
Manually Loading GPS Track Maps.....	69

Opening a Lap and Graphing Data	70
Open a Lap	70
Distance Mode Graphed Data	71
Speed and Segment Reports	72
Overlay (Graphing) Multiple Files	73
Advanced features of the DataLink II Software	74
Runlog Pages - Data Comparison in Report Format	74
Reference and Main Settings for Runlog Data Comparison	75
Graph Scaling Explained	76
Graph Scaling Values Changed per Channel	77
Chart Scaling Sets - Universal Scaling Settings	78
Creating Graph Sets for Display - Quick Graphs	79
How to Determine the Currently Graphed and Active Channel	80
Averaging Data Using the Averaging Cursor Action	81
Graphing Data from an Entire Run	82
Zoom Command	83
Viewing Real Time Data (Telemetry) on your PC	84
Setting up the Logger Real Time Telemetry Parameters	84
Entering the DataLink Telemetry Parameters	85
Starting a Telemetry Session	86
Troubleshooting and FAQ	88
No Data Obtained During Run	88
Download Error Received When Download is attempted	88
User's PC will not communicate with the data logger, using the serial cable	88
Does GPS Always Work?	89
Will Rain Affect the GPS Signal?	89
Can I Acquire Elevation?	89
Does the Loss and Gain of Satellites Affect the Data?	89
Speed Accuracy?	89
Laptime Accuracy?	89
GPS Data Does Not Start Until Later in the Run	89
Track Mapping Accuracy?	90
Can I install a larger Memory Card?	90
How can I email a Runfile or Trackmap?	90
Should multiple users comparing data from the same track, use different track maps?	90
Lap times displayed on the dash vs. lap times from the track map?	90
I can not set Start Finish with the dash?	91
I lose satellites when I start to accelerate on the track?	91
My data appears incorrect after downloading?	91
Vnet Sensor Channels "Flat Line" during portions of the run	91
Vnet Sensor Channels disappear from Channel Button area	91
Graphed data drops to the bottom of the graph, during a run.	91
Excessive noise on graphed channels	91
Spikes or drop out in Wheel RPM graphed data	92
Wheel RPM / Engine RPM graphed data appears high or low	92
Beacon lap times are not received	92
Conclusion	93
Appendix I – G2X Demo	94
PC Screen Resolution Settings:	95

Opening the G2X_Demo Runfile:	96
Adjusting the Screen Sections:.....	97
Adjusting On-Screen Font Size:.....	98
Opening a Lap:	99
Graphing a Data Channel:	100
Viewing Data in Distance Mode:.....	101
Graphing Multiple Files (Overlay).....	102
Remove a Data Channel from the Graph Area (Erase):	102
Data Comparison in Report Format (Runlog Pages):	103
Assigning Main / Reference File Setting:	104
Segment Time Data Comparison:	105
Closing a File:	105
Advanced Features of the Datalink II Software	106
Channel Grid Display:	106
Average / Minimum / Maximum Channel Values:.....	106
Understanding Graph Scaling:	107
Changing Scaling Per Channel:.....	107
Creating Chart Scaling Sets	108
Predefining Graph Sets for Display:	109
Graphing Runfile vs. Lapfile Data:	110
Zoom Command:.....	111
Runlog Pages	112
Session Page:	113
Weather Page:.....	113
Create GPS Track Map:	114
Add Map Segments:.....	114
Lap Zoom.....	115
Map Report:.....	115
Segment Report / Segment Compare / Speed Compare:	116
User Pages 1 through 3:.....	117
Min Max Average Compare:.....	117
Gauges:	118
Tire Temperature / Pressure Calculator Page:.....	118
 G2X Pro Instruction Manual Update Section	 119

Overview

What is the G2X Pro?

The G2X Pro is a 44 channel, multi-purpose data logger designed for use in road racing, circle track, driving schools, boating, off road, hill climb or any other type of motorsports that can benefit from the use of GPS data to obtain speed, timing and mapping functions, without the necessity of wheel speed sensors, beacon receivers or transmitters.

When utilized in closed course racing (circletrack, road racing, etc) the data logger obtains GPS data to provide speed and lap time information to the driver. Track mapping with segment (split) times are derived from GPS and accelerometer data and is available upon downloading to the users PC, in addition to data provided by external sensors connected to the data logger.

When utilized for motorsports that do not require timing and track mapping information, the G2X Pro functions as a standard 44 channel data logger, but with the unique ability to provides an accurate method of obtaining ground speed without the use of vehicle mounted sensors.

Adding driver input, chassis or engine related sensors are simplified by G2X Pro sensor kits. Each kit is identified by a single part number and contains all sensors, connectors and wiring necessary for installation. Of course, any sensor offered by Racepak may be utilized by the G2XPro along with certain customer supplied sensors.

Design Features

Factory tested: Each G2X Pro data system is factory assembled and bench tested, before shipping to the customer. This insures that each sensor is set up and functioning correctly, before installation on the vehicle.

Custom setup file: Factory assembly allows the Racepak personnel to create a data logger Configuration (setup) file specifically designed for each system. This Configuration file contains all of the technical information (start logging channel settings, scaling, channel name, calibration values, etc) for the internal data logger sensor channels, along with any external sensors ordered with the data logger package.

Simplified setup: What this means to the customer is a much simplified installation and start up procedure. Following installation of the hardware and software, the data system typically requires no set up procedures, with the exception of data channels that monitor movement such as steering, throttle, and shock or ride height sensors. Out of the box, the data system can gather data.

Motorsports specific software: In addition, the Configuration file created for each data system is specific to the form of motorsports in which the data system will be used, such as circletrack and road racing, boating, pulling, etc.

Vnet and Analog External Sensor Channels

External sensors are connected to the G2X Pro by three different methods:

Vnet: Allows the user to connect up to 32 sensors to a single cable. This single cable is connected to the Vnet port of the data logger. Data from all Vnet sensors is then transmitted by this single cable. Vnet sensors can be installed in any order, in any location on the vehicle. Vnet items are identified by blue coloring.

Analog: The G2X Pro contains two high speed (logging rate) ports, labeled as Analog 1-4 and Analog 5-8. Each port allows the input of four sensors. Analog items are identified by black coloring. Up to 4 high speed analog sensors may be connected to one port.

RPM: 12V power, Engine RPM and wheel speed sensors utilize the RPM port.

Technical Specifications

Total External Sensor Channels - Defined Below	44
Vnet Data Channels	32
Analog Channels	8
Digital (RPM) Channels	4
Internal Channels	In line & Lateral Acceleration / Voltage / GPS
Accelerometer Specifications	
Sample Rate	100HZ - 2 Axis
Accuracy	1% (excluding vibration affect)
Minimum / Maximum Values	+5 / -5
GPS Information	
GPS logging rate	4 Hz with 100HZ inertial assistance
Channels	16
Antenna	High Gain / Active
Accuracy	2.5 Meters
Cold start / Hot start satellite sync time	34 seconds cold / less than 3.5 seconds hot
Memory	
Minimum and Maximum SD Card Size	128MB SD Flash - Included 32MB - 2 GB
Data Writing Rate	
	17Kb / sec
Resolution (ADC)	
Data Logger	10 bit
Steering, Throttle, Brake, Brake Kit	15 bit
Processor Speed	
	20MHz
Sample (Logging) Rates of Data Channels	
Vnet Channels	100 Hz Maximum
Analog Channels	1000 Hz Maximum
Digital Channels	100Hz RPM / 1000Hz Timing
Power & Current	
Input Voltage	10-16V - Less than 10V can affect sensor data
Current Draw	700Ma with dash & no sensors
Reverse Voltage Protection	10-20 V
Operating Temperature	
	32 - 140F / 0-60C
Mounting Orientation	
	Level left & right / Level front & rear
	SD memory card facing direction of travel
Engine RPM Input	
	50% duty cycle, 5-18V square wave signal

Items Included With the G2X Pro Package PN 600-KT-G2XPRO

Item	Part Number
G2X Pro Data Logger with internal G meters	640-MS-G2XPRO
128MB SD Flash Card	CARD-MEM-SD128
Serial Communication Cable	680-CA-SR-G2XP
Power / RPM Cable	680-CA-G2X PRO
GPS Antenna and Cable	ANTG-ANN-05
DatalinkII Software	
Installation Manual	

Sensor Package Options

Packages	Part Number
Steering, Throttle, Brake Front & Brake Rear	620-KT-STBB
Four Shock Travel Package	620-KT-4SHOCK
Four Ride Height Sensor Package	620-KT-RIDEHT
Any Racepak Vnet, Analog or Digital Sensor	Consult catalog or website for details

Each package contains all sensors, sensor cables and connectors. In addition, any Vnet, Analog or Digital sensor currently offer by Racepak may be utilized by the G2X Pro. For a complete listing of available sensors, visit our website located at www.g2xpro.com or www.racepak.com or contact the Racepak customer service department at 949-709-5555 for a catalog. Customer supplied sensors may also be utilized, depending upon the type of sensor and the ability to interface with the G2XPro data logger.

Display Dash Options

Dash Name	Part Number
Display Dash G2XPro (G2X “mini” style)	640-MS-G2XPDASH
UDX Digital Display Dash	250-DS-UDX

Installation

The G2X Pro is the first item mounted. From that point all sensors, cables and connectors are installed in various locations throughout the vehicle, with final termination at the G2X Pro data logger.

G2X Pro Functions

The G2X Pro logger is the main component of the data system, as it contains the memory card and processor, along with an internally mounted GPS board and accelerometers necessary for track mapping, speed and timing functions. In addition, power for all external sensors and sensor connecting ports are supplied by the G2X Pro logger.

G2X Pro Configuration File

The Configuration File sets the parameters for all sensors utilized by the G2X Pro, such as channel name, scaling and calibration values. Following installation of the G2X Pro and external sensors, the Configuration file and data logger are updated utilizing the DatalinkII software by connecting the users PC to the G2X Pro data logger by means of a supplied serial cable.

Logging Start and Stop

Any active channel may be used to start logging. From the factory, the G2X Pro is programmed to start logging at 25 GPS MPH (40 KPH) and stops logging when no speed is detected for at least 30 seconds. A data file is written each time the vehicle exceeds the start logging speed following at least 30 seconds of no speed, and is numbered in subsequent order (1,2,3,etc). The start logging channel may be changed to any valid sensor channel, by the user.

Download Data

Data is stored on a 128MB SD flash card supplied with the data logger, and is downloaded via a customer supplied SD flash card reader to the users PC utilizing the DatalinkII software.

DatalinkII Software

The DatalinkII software is used to both set up (configure) the G2X Pro data logger and provide the ability to download and analyze data. Data stored on the SD flash card is downloaded and converted into a format (.rpk) that is recognized by the DatalinkII software. This .rpk file is then saved to the users PC, for analysis.

PC Minimum Requirements

Windows® 98 / ME / 2000 or XP operating system / 200MHZ (Pentium II) processor
200MB of available hard drive / 16MB of RAM CD ROM drive
Serial port or USB to serial adapter / 1024 x 768 or higher monitor resolution

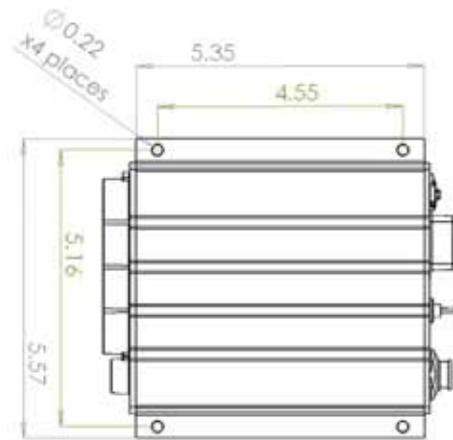
Terminology

In order to assist in the installation and usage of the G2X Pro, the following provides an outline of the most commonly used words that will be encountered in this manual.

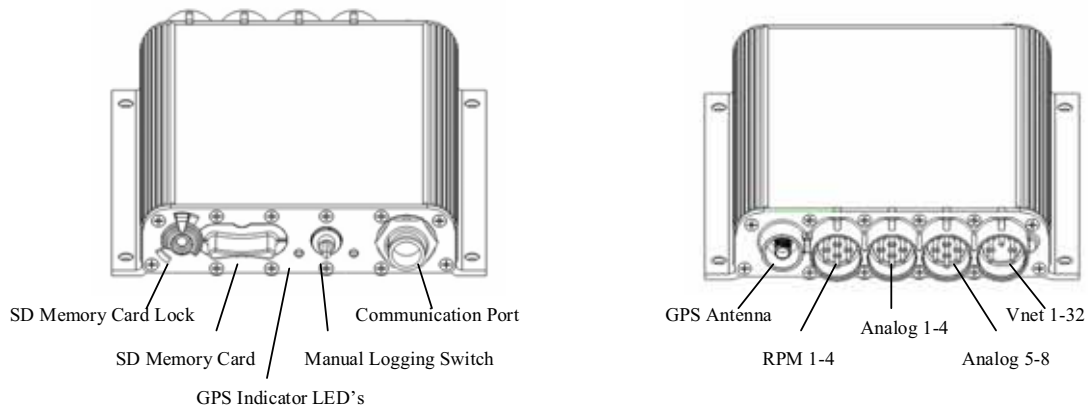
Analog Channel: Data created by the reading of a voltage change sent from a sensor
Bulkhead connector: A male-female connector mounted on a firewall, bulkhead or other area that is between the data logger and sensors. Use of a bulkhead allows the user to pass data through the obstacle, without the necessity of routing a cable through a hole.
Calibrate: The process of assigning values to sensor voltage output, in order to graph and analyze the sensor data.
Canbus: The specific name of the technology utilized to create the Vnet sensor system
Channel: The input from one sensor, as defined by the data logger.
Data Logger: See Data Recorder
Data Recorder: The vehicle mounted hardware device that collects and stores data transmitted from the sensors
Digital: A sensor or signal that has only two values, off or on such as the measuring of ignition pulses to calculate Engine RPM
Download: The process of transferring data saved on the data logger memory card to the users PC using the DatalinkII software, in order to graph and analyze data. Memory card data must be downloaded through the DatalinkII software and can not be open directly from the memory card.
Filter: The process of smoothing the visual appearance of a graphed data channel.
Graph: A visual representation of sensor data, compared to time or distance
HZ: Number of times per second. Used to define logging or sample rate. Example: 4Hz represents data that is saved 4 times (every .250) per second.
KB: Abbreviation for kilobyte, which represents one thousand bytes of information.
Logger: See Data Recorder
Logging Rate: The number of times per second, which the data logger records incoming data from a sensor and is defined as Hertz, or Hz. Each sensors logging rate may be define by the user.
Math Channel: A data channel created from the input of an actual sensor which is then used in a mathematical formula to create a channel available for graphical analysis
MB: Abbreviation for megabyte, which represents one million bytes of information.
Overlay: The ability to graph multiple data channels, all at the same time.
Runfile: The file created when a run is transferred from the data logger memory card to the users PC. Configuration File
Sample Rate: See Logging Rate
SD Memory Card: Secure Digital compact flash memory card
Sensor: A device that converts a physical property, such as pressure into a voltage signal
Smooth: See Filter
Start Logging Channel: The channel that is used to start the logging process
Trace: This term is another method used to describe Graph
Transducer: See Sensor
Transducer: See Sensor
Vnet Channel: Any sensor that is connected to the Vnet port of the data logger
Vnet: Racepak exclusive that allows multiple sensors (analog or digital) to transmit their data over a single cable, back to the data logger.

Hardware Installation

Logger Dimensions



External Connectors and Features



SD Memory Card Lock	Provides positive lock for SD Memory Care
SD Memory Card	128MB SD card provided with logger
Start Logging Switch	Provides an external, manual method to start logging
Communication Port	PC to logger input. Also functions as telemetry input
GPS Antenna Port	GPS antenna cable connection
RPM 1-4	Input for up a total of 4 external RPM sensors
Analog 1-4	Input for a total of 4 external analog sensors
Analog 5-8	Input for a total of 4 additional external analog sensors
Vnet 1-32	Input for a total of 32 external Vnet sensors

Sensor Package Installation Manuals

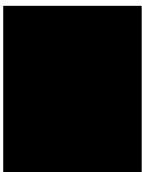
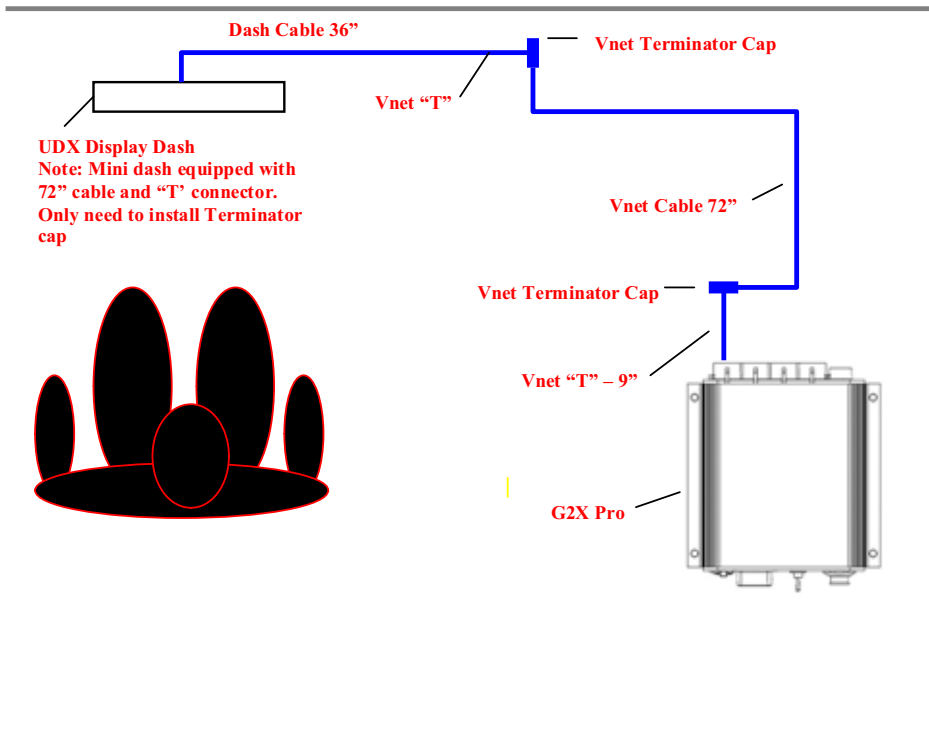
If your G2X Pro system included any of the sensor packages mentioned in the previous section, please proceed to the installation instructions supplied with the sensor package. If your G2X Pro was ordered with any of our standard sensors, please refer to the installation instructions and schematic included with the sensors. Unless ordered otherwise, Racepak personnel have shipped the Vnet and Analog cables noted in each diagram.

System Installation Schematics

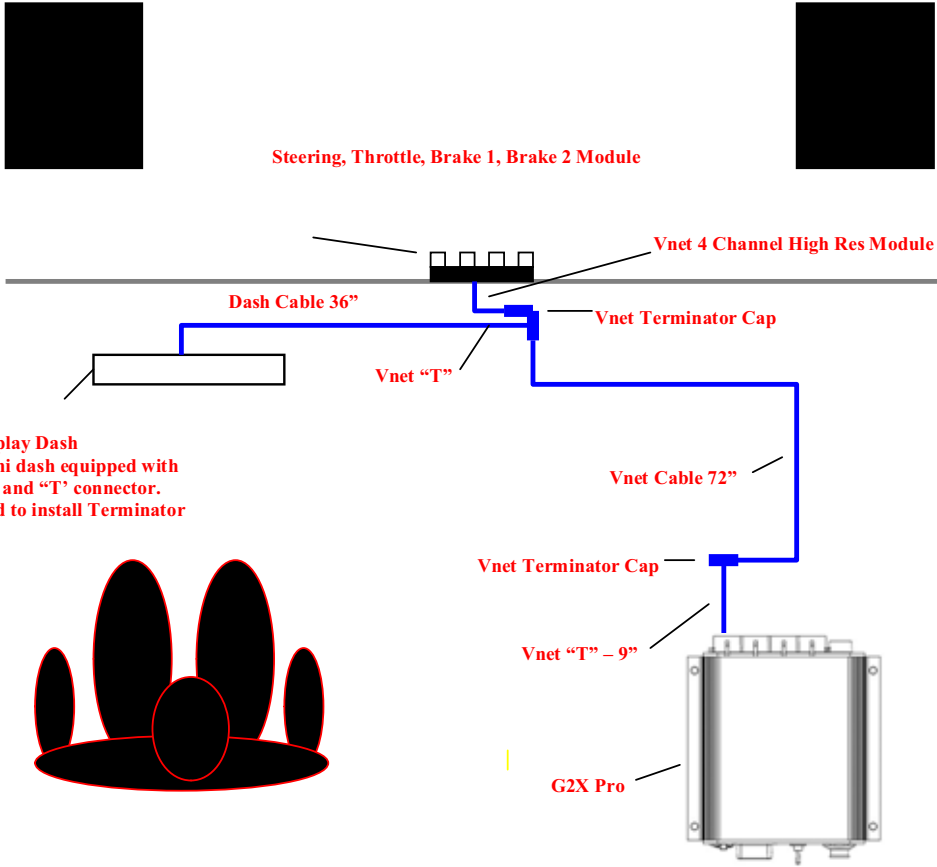
Racepak personnel have created three schematics that are representative of our “standard” circletrack and road racing system. These types of vehicles often share the same basic chassis dimensions and thus can utilize the same installation layout. If your vehicle falls under the circletrack or road racing category, please review the following diagrams. Remember, it is possible your system installation differs from the diagrams, so keep that in mind when reviewing the following information.

While the following provides a general outline, each team can determine the most appropriate method to mount the data system. Each particular form of motorsports will require certain alterations that are unique to the individual racing division and sanctioning body rules concerning the use of data systems.

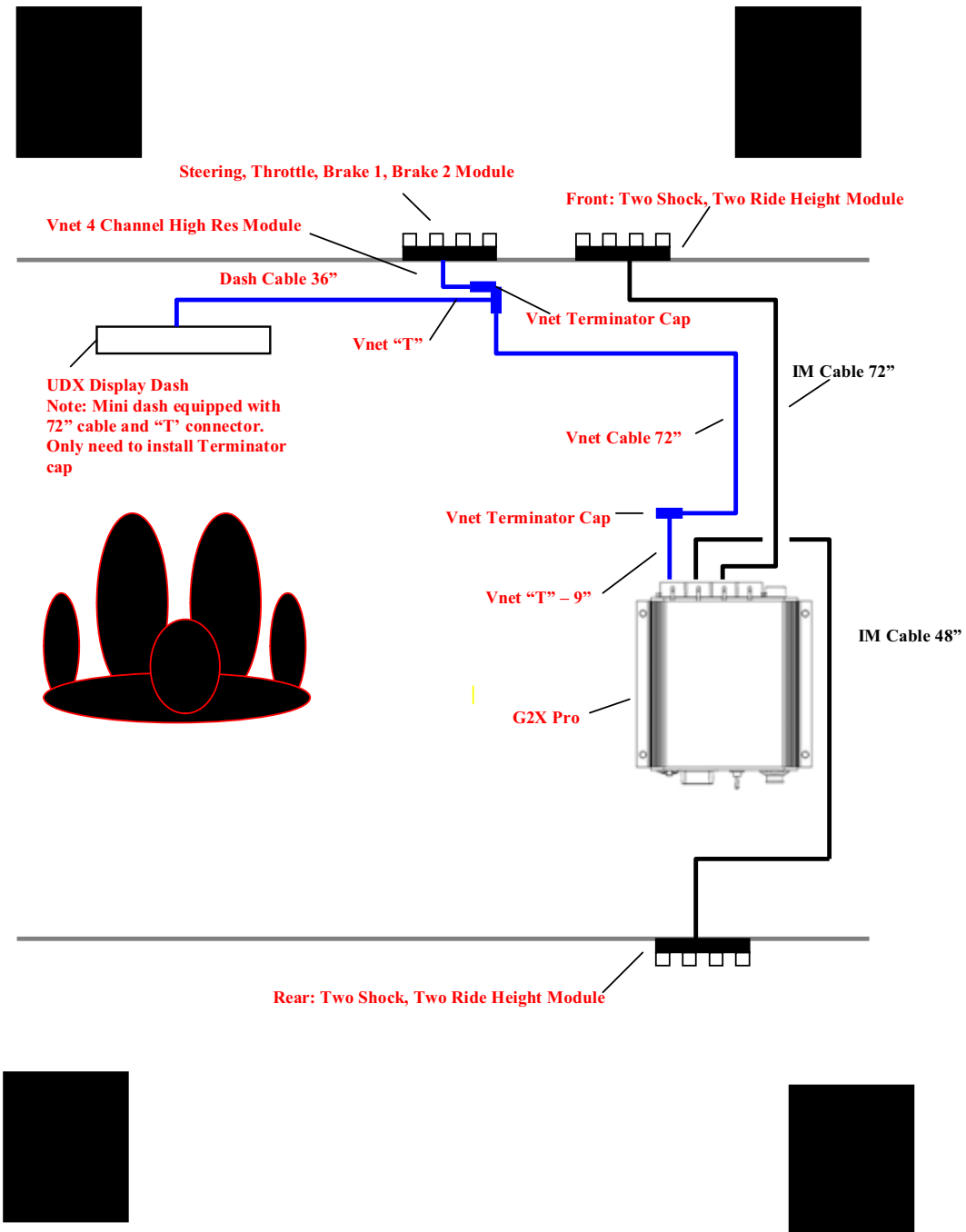
G2XPro with Display Dash and 620-KT-STBB Package



G2XPro with Display Dash and 620-KT-STBB Package

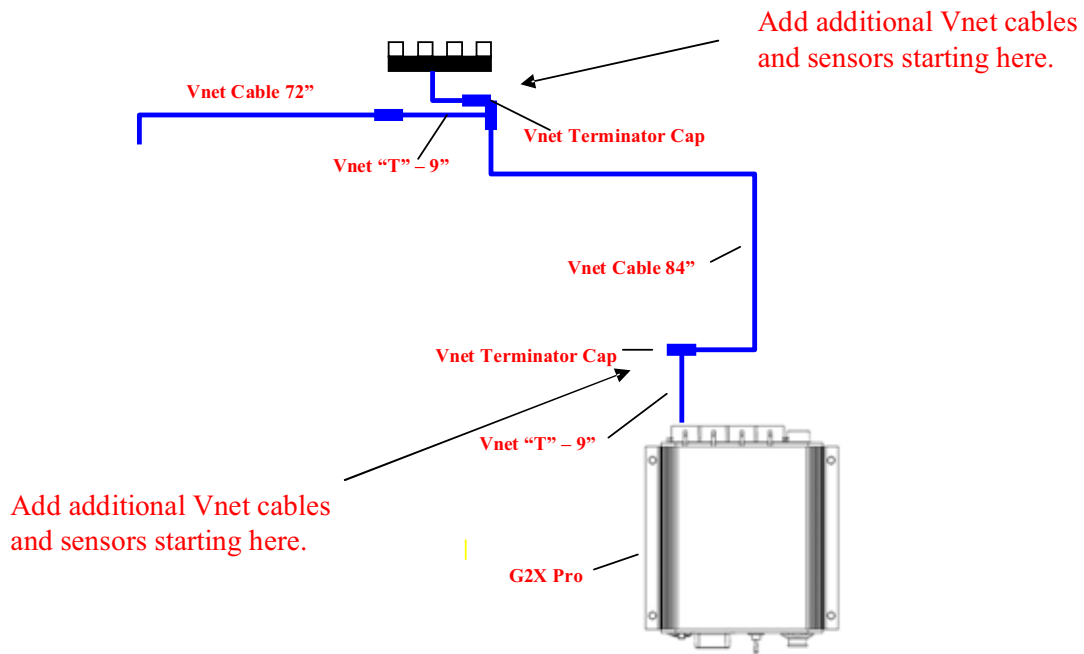


G2XPro with UDX Display Dash, 620-KT-STBB, 620-KT-4SHOCK and 620-KT-RIDEHT Packages



Adding Additional Vnet Sensors

When adding additional Vnet sensors to the previous sensor packages, Vnet Modules or extension cable may simply connect to the 9" Vnet "T" connector located on the G2X Pro data logger or at the firewall location of 4 Channel High Resolution Vnet module. The Vnet Terminator caps are removed, the extension cables and modules connected and the terminator caps reinstalled at the end of the new Vnet modules.



Note: A Vnet Bulkhead connector PN: 280-CA-VMBHEAD should be utilized when passing Vnet extension cables through any firewall location.

Engine RPM and Power Input

The G2X Pro acquires power, ground and engine RPM via the Power / Engine RPM cable. This cable connects to the 1-4 RPM input of the data logger and provides a user terminated method of acquiring this information.

Power / Engine RPM Cable


The three wire pigtail provides input for data logger power, ground and engine RPM. The engine RPM input is a 5-18 Volt, 50% duty cycle square wave type. The three wire pigtail is connected to the data logger by means of the Power-Engine RPM cable. This cable is un-terminated, and supplied with a three pin Molex connector and protective shrink tubing. To install the three pin Molex connector on the Power / Engine RPM cable:

1. Determine the distance from the data logger to the power/ground /engine RPM location.
2. Strip approximately 1” of the outer cable shield. Avoid cutting the wires contained inside the cable.
3. Strip approximately .250 of wire shield from the red, black and clear wire
4. Trim the fourth wire (bare) out of the way
5. Place one of the female pins over one of the stripped wires. The exposed portion of the wire should be positioned to allow the second set of crimp tabs to contain the exposed wire, while a portion of the plastic wire shield should be placed to allow the first set of crimp tabs to contain the plastic shield.
6. Crimp each set of tabs over the corresponding section of wire.
7. Repeat the process for all three wires.
8. Slide both pieces of shrink tube over the three crimped wires and allow each to slide down the cable. Each female connector is designed to snap into the plastic Molex housing
9. To snap each connector into place, simple locate the oval end of the plastic connector, gentle push each connector into the housing, until a snap is felt and heard, according to the drawing shown to the right.
10. Slide the small diameter shrink tube over the three exposed wires, apply heat until appropriately shrunken. Slide the large diameter shrink tube over the end of the plastic Molex housing and repeat the heat and shrink process.




Molex

Following the above procedures, connect the three wire pigtail to the Power/Engine RPM cable by means of the three pin Molex connectors. The three wire pigtail should be connected to the power, ground and engine RPM of the vehicle, as shown below

Power (red) 

RPM (yellow) 

Ground (black) 

Mounting Location of Logger

The data logger is designed to be utilized in a race vehicle environment. However, there are external conditions that can influence the operation and longevity of the system. Typically, the logger should be mounted within the driver cockpit, as this provides the best protection along with easy access. In addition:

Heat

Avoid excessive heat, such as generated from exhaust systems, transmissions, etc. If the exhaust is routed under the floorboards, do not mount the logger on the floor pan. Best performance is usually obtained when the logger is isolated from heat by mounting on a roll bar.

Electrical Interference

Avoid electrical interference. Race vehicle generate electrical interference from a variety of locations such as ignitions, alternators, ECU, spark plugs, coils and radio/telemetry antennas. This interference can affect the data generated by any or all of the sensors.

Moisture

Avoid excessive moisture. The logger is designed to be water resistant but not waterproof. Any liquid on the logger will eventually find its way inside. Shield the logger from direct moisture. If washing the vehicle, first cover before washing. Wipe any remaining moisture off of the logger, when finished.

Easy Access

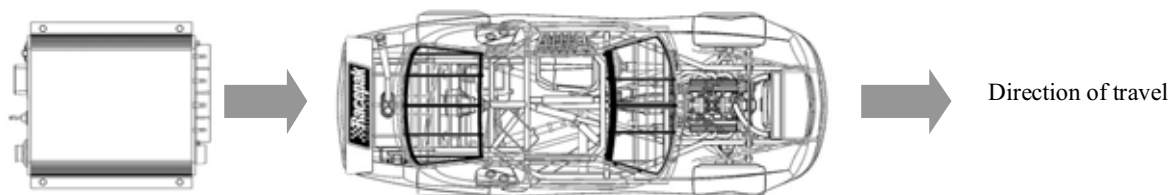
Do not mount the logger in a location that makes it difficult to access the memory card or any connectors. Like any other racing related component, it will sometimes be necessary to access the data logger, so try to avoid “hiding” the logger.

Movement

It is important to insure the data logger does not move during testing or can become dislodged during an off track excursion.

Mounting Orientation of Logger

The logger contains inline and lateral accelerometers that perform two functions. First is for graphical analysis of G data. The second is to work in conjunction with the GPS data to provide trackmapping information. The logger must be mounted in the direction shown below.



The logger should also be mounted as level as possible both left, right and front, rear.

Mounting Method

Four (4) rubber isolation feet are provided with the logger and should be used.

Billet mounting brackets are available from Racepak. These brackets are designed to clamp around a section of roll cage tubing, providing a secure mounting platform.

Racepak Part Number	Outside Diameter of Attachment Tube
800-MB-V500-125	1.250"
800-MB-V500-162	1.625"
800-MB-V500-175	1.750"



If the logger is mounted in any other manner, insure:

1. The logger is securely mounted, using all four mounting holes
2. The logger is oriented correctly
3. The logger avoids heat, moisture and electrical interference
4. The logger can be easily accessed

Power Supply and Grounding

The logger should be connected to a battery source that can supply a constant 10-16 volts. In vehicles that utilize a master power switch, it is recommended to connect the logger to the master power switch. This not only insures the logger will be powered when the vehicle is in use, it also insures power will be disconnected in the event of an emergency.

A good ground is very important to the function of the logger. Insure there is no type of paint, rust or any other type of material that could prevent proper grounding. Boats often present unique grounding problems. If necessary, provide an isolated power and ground for the G2XPro as faulty grounds will create corrupt data.

Warning: Do not attempt to connect or disconnect any logger item, with the power switched on. This action could result in damage to the data system.

Engine RPM Signal

Requirements: 5-18V, 50% duty cycle, square wave output. This signal is typically obtained from the tach signal output of an aftermarket ignition box. Racepak also offers a GMR Inductive RPM Pickup (Racepak PN: 680-SN-GMR) which is attached to the +12V coil power on coilpak, coil on plug or points style ignition systems.

Warning: Do not connect the tach input wire directly to any part of the ignition coil. Doing so will result in damage to the logger.

SD Memory Card Installation

The memory card is designed to utilize the molded card holder. This holder enables the user to securely lock the memory card in place, along with providing a water resistant seal. The card should be inserted into the data logger with the label up, facing the top of the logger. If necessary, the card can be slid from the molded card holder, as it is held in place with double side tape. This is sometimes necessary when placing the memory card in certain memory card readers.

GPS Antenna Mounting

The GPS antenna is a moisture resistant, magnetic based type, designed to be mounted on the exterior roof of the vehicle. If no roof exists or the vehicle is of a composite type, insure the antenna is mounted in clear view of the sky, with no obstructions. The antenna must be mounted at the highest point of the vehicle and level front / rear and left / right. Insure the GPS antenna cable will reach the data logger, before final mounting of the antenna.

GPS antenna mounting for stock bodied vehicles

The GPS antenna is provided with a magnetic mounting base and should always be mounted on the roof of the vehicle, centered within the roof area. Insure the antenna is as level as possible, left to right and front to rear. In the event of a vehicle with a composite roof, Velcro can be utilized. Place a strip of masking tape on the roof of the vehicle. A small piece of Velcro on the antenna and the tape will be sufficient to hold the antenna in place. We understand the value of high performance vehicles and the fact some users will be hesitant to place any type of tape on the surface of their vehicle. In that is the situation, determine the mounting method you are most comfortable with, but will locate the antenna on the roof area.

GPS antenna mounting for open wheel vehicles

By following the above instructions, simply insure the antenna is mounted as high as possible on the vehicle. Various body panels can possible block satellite signals. Insure telemetry or two way radio antennas will not provide interference to the antenna.

Again, the GPS antenna will function well, in a variety of roof mounted locations. The above guidelines will insure the most efficient reception of signals. The antenna has been roof mounted and tested at speeds over 190 mph, so feel free to go at least that fast.

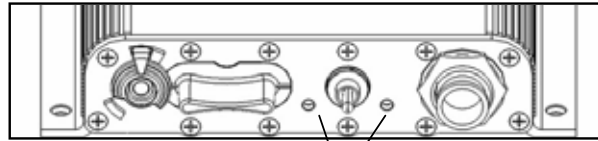
Connection of the GPS antenna to the G2X

Upon completion of mounting of the antenna, simply route the cable to the data logger and connect to the gps antenna port of the data logger. Insure the cable end is screwed tightly to the GPS connector. A small wrench can be used to slightly SNUG the connector. Excessive force can damage the connector, resulting in failure of GPS signal reception.

GPS LED Display

While the number of located and locked GPS satellites is provided by the G2X Pro small display dash, the data logger can also provide this information through a series of **Red** and **Green** LED flashes. In order for the data logger to start logging (when GPS MPH is utilized for logging start) and provide mapping data, it is necessary for the internal GPS board to locate and lock on the position of at least three GPS satellites, orbiting overhead.

Upon initial power up, the user will observe a sequence of **RED** and **GREEN** LED flashes. The following explains the sequence.



LED Indicators

SHORT RED:

Each short red flash indicates the end of one search cycle and the start of the next.

SHORT GREEN:

The green LED will short flash once for each located GPS satellite.

LONG GREEN:

The green LED will long flash once for each located GPS satellite.

Example:



One red flash followed by three long green flashes indicates three GPS satellites locked and in use.

Upon the first power-up of the day, the logger will take less than one minute to locate and lock three satellites positions. If the power to the logger is removed or the vehicle is parked in a covered area (garage) it will typically only take a matter of seconds for the logger to reacquire satellites.

System Installation Order

As a general rule, the recommended order for a data system installation is as follows:

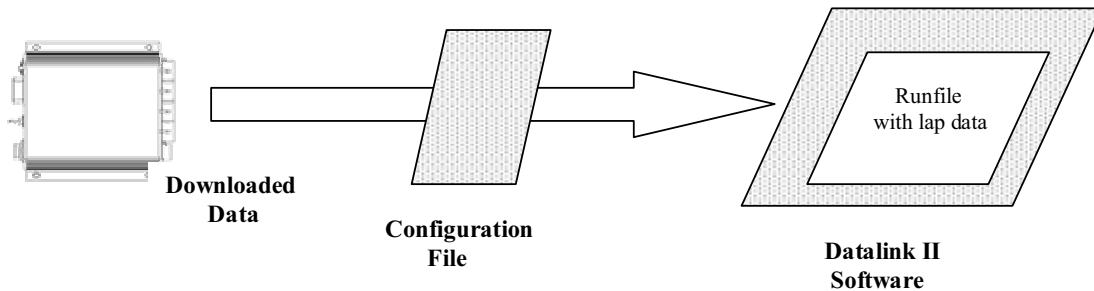
1. Mount the data logger
2. Mount the dash (if so equipped)
3. Mount all under-hood items (front shock sensors / steering / throttle / brake / etc)
4. Mount all rear end items (wheel rpm / rear shock sensors / etc)
5. Connect all under-hood items with appropriate cables (Vnet / Interface)
6. Connect all rear items with appropriate cables (Vnet / Interface / Digital Harness)
7. Connect all driver area items (engine rpm / power / dash /etc)
8. Route front / rear cables to the data logger and connect to appropriate ports on logger.

Maintaining a set procedure for the system installation will simplify the process, as each area of the car is divided into sections (front / rear / drivers compartment) which should help reduce the overall complexity of the system.

Datalink II Software Installation

Data Download Path

The key to using the G2X Pro to improve performance is to understand the relationship between the downloaded data, the G2X Pro Configuration file and the DatalinkII software.



Downloaded Data: Stored G2X Pro data is downloaded to the users PC by means of the SD memory card. Before the data can be opened into the Datalink II software, it must first pass “through” the Configuration file.

Configuration File: The Configuration file contains all the information necessary to convert the raw data saved on the memory card into a format that allows the file to be opened in the Datalink II software. Channel names, scaling and calibrations values are assigned to each individual sensor channel. In addition, the setup values for the data logger are saved in the Configuration file. Each data logger arrives with a Configuration file created specifically for that system. The Configuration file is a “template” for incoming data. All reports, vehicle information and etc that is contained or entered in the Configuration file is transferred to the runfile during the download process.

DatalinkII Software: The Datalink II software provides the ability to open and graph data contained in a runfile. This software is generic in nature, in that it does not store information related to the data logger setup. Instead, the software contains settings relevant to the graphing of data and the users PC setup.

Computer Requirements

PC Hardware Requirements

- USB Port
- Serial Communications Port or USB Serial Port Adapter
- CD/DVD drive
- 3-1/2 inch Floppy Disk Drive
- 3 Button Mouse

Note: The use of a mouse with a center button is highly recommended

If your PC does not have a CD or floppy disk drive please contact RacePak and request the optional DataLink II USB Flash Drive Installation Kit. This kit allows the DataLink II software and license disk to be installed directly through the computers USB port. The DataLink II software does not require a CD or Floppy Disk Drive for normal operation.

Screen Resolution

The DataLink II software requires a minimum screen resolution of 1024 x 768. We recommend the use of the largest and highest resolution monitor that meets your installation and budget requirements. The DataLink II program can present the user with large amounts of data; the larger screen sizes and the higher resolution enhance the presentation capabilities. If your PC is configured with dual monitor support, the DataLink II software has special features to take advantage of the capabilities. An installation using dual flat panel (1280 x 1024 resolution) narrow outline monitor such as those manufactured by Dell and Fujitsu is optimum for high-end applications.

PC Software Requirements

The DataLink II software is compatible with Windows 98 Second Edition, ME, 2000, and XP operating systems. If you have a Windows operating system other than those listed above please contact RacePak for additional installation assistance. The DataLink II software is also compatible with most PC's designed for standalone operation currently being manufactured. There are practical limits below which the software will not operate satisfactory. The minimum PC requirements for the DataLink II software are as follows.

- IBM PC or clone with 400 MHz Pentium Processor and 32 Mbytes Ram
- Windows 98/ME/2000/XP Operating System
- 200 Mbytes free disk space
- 3.5 inch 1.4 Mbytes floppy disk drive
- CD-ROM drive
- Video card and monitor with a minimum resolution of 1024 x 768 pixels
- Keyboard and 3 button mouse
- Serial Communication Port or USB Serial Port Adapter
- USB port if uploading data with a data cartridge and USB cartridge reader


Software Installation

NOTE: Before installation, remove any DataLink or DataLink II software that was installed for purposes of reviewing G2X Pro demo data. Removal should be performed utilizing the Uninstall feature of Windows. We also recommend renaming or deleting the C:\RacePakData\ folder installed by the original software. Some of these files cannot be deleted automatically and may interfere with the operation of the G2X Pro.

To install the DataLink II software on your PC, perform the following.

1. Turn on the computer and start Windows.
2. Insert the CD labeled RacePak DataLink II Software into the CD drive.
3. The RacePak DataLink II Setup program will automatically start, and the setup InstallShield Wizard will be displayed. Please note—If you have disabled auto run in your computer the installation wizard will not automatically start.
4. To manually start the installation program; Select **My Computer** from the computer desk top, select the **CD** drive by clicking on it and double click on **Setup** to start the installation program.
5. Read the instructions on the dialog boxes and answer any questions required.

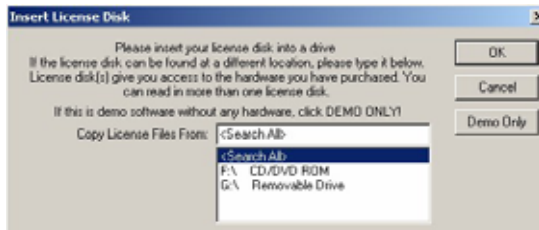
We recommend you install the software in the default directories as indicated during the installation procedure. This will make it easier for our technicians to assist you at a later date should you have an application problem. If you install the software in a directory other than the default directory, please note the install directory, in order to assist our technicians should a problem arise.

The Install Wizard will automatically create a shortcut on  the main desktop for the RacePak DataLink II program.

License Disk Installation

Each data logger contains a serial number unique to that logger. Each G2X Pro data system is shipped with a license disk created specifically for that system. The license disk contains a Configuration (setup) file created specifically for the logger along with a unique set of security numbers necessary to allow the user to open and review run data. These security numbers prevents the transfer of data to another PC, unless the owner provides the security numbers.

To install the license disk information, open the RacePak DataLink II program by clicking on the DatalinkII program icon. If this is the first time you have opened the DataLink II software, the following dialog box will be displayed.



Next, following the below instructions:




1. Insert the license disk into the floppy drive or USB drive, type the correct drive letter in the dialog box and select OK.
2. The program will install the contents of the license disk.
3. If you are installing the software from the optional USB Flash Drive, insert the USB Flash Drive into the computers USB port and enter the drive letter for the USB Flash Drive.
4. Next select OK. The DataLink II software will copy the information from the license disk to your PC. This information copied includes the license keys required to operate the DataLink II software, the base Configuration file created by RacePak for your data logger, initial default settings for your application and updates to the DataLink II software.

SD Flash Card Reader Installation

Data recorded by the data logger is stored on a standard SD memory card. In order to transfer the data to the users PC, it is necessary to utilize a SD memory card reader. Many modern PC's have built-in readers. If your PC does not have a reader, you will need to purchase and install a SD memory card reader, which are available at most electronics stores for a minimal cost. Carefully follow the installation instructions provide by the card reader manufacturer.

DataLink II Help Files

The DataLink II software includes extensive context sensitive help to guide the user through the operation of the program. The help can be accessed by several methods. These are as follows:

1. To get help for any of the menu items simply highlight the menu item by placing the mouse cursor over the menu item. Next press the F1 key to display the help.
2. To get help on the currently displayed dialog box press the F1 Key.
3. To get help on a tool bar item click on the  toolbar button located at the bottom of the toolbar. The mouse cursor will change to a? Position the mouse cursor over toolbar icon for which help is desired and click the left mouse cursor. Help on the icon will be displayed.
4. To get help on the three sections of the DataLink II program screen click on the  toolbar button located at the bottom of the toolbar. The mouse cursor will change to a? Position the mouse cursor over the section of the DataLink II screen for which help is desired and click the mouse button. The help dialog box will be displayed. The three help dialog boxes corresponding to the three data link screen are very useful as a quick start into using the DataLink II program.
5. To get help on a run log page look for the blue icon with a question mark . Simply click on the button to display the help for the run log page.
6. Click on the Help main menu selection and select the Help Topics menu selection. The Help Topics: DataLink II Applications Help will be displayed. Follow the instructions included with the help box to navigate thru the online help

Demo Run Data File

The next step in getting familiar with the DataLink II program is to view and manipulate an existing run data file. The demo run data file G2X_Demo.rpk was copied onto your PC during the installation process. Appendix I include detailed instructions on opening the demo file while providing a quick training session on using the DataLink II program to view run data files. We strongly recommend that you go to Appendix I at this time and work your way through the demo process before initial use of the data system. While this demo data was taken from a G2X data logger, the procedures for graphing and reviewing data are the same for any of our systems.

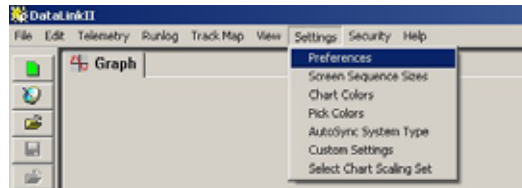
It is much easier to learn how to graph and review data in the comfort of your home as opposed to attempting to learn “on the fly” during a 110 degree day at the race track.

Serial Com Port Settings

In order for the users PC to communicate with the data logger for installation verification, it is necessary to match the com port setting of the serial port to the com port setting of the Datalink II software.

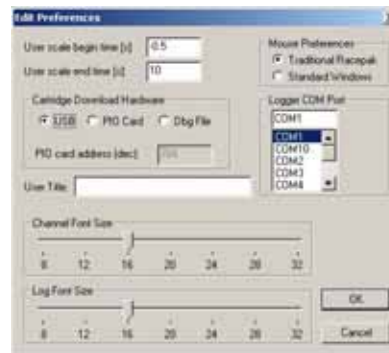
Open the DataLink II program. The connection to your PC is made through the 9 pin serial port, located on the rear of the PC. Modern computers offer multiple connecting ports, which are numbered COM 1, COM 2, etc. Most often, the serial port is considered COM 1. In order for your PC to communicate with the data logger, we will now set COM 1 as the correct port number.

To select COM 1 port for use, select the **Preferences** menu item located in the **Settings** main menu selection.



When selected the **Edit Preferences** dialog box will be displayed as shown below. Locate the section on the dialog box labeled **Logger COM Port**. Select COM 1 from the list to be used by clicking on the name of the port.

If you are unable to determine the com port setting of your serial port, refer to the following instructions or if your PC does not have a serial communications port and you are using a USB to serial port adapter you will need to refer to following instructions.



USB to Serial Adapter COM Port Number Setting

If you are utilizing a USB to serial port adapter, insure the adapter is correctly installed by following the manufacturer's instructions. Following the correct installation of the adapter, it will then be necessary to determine the com port number of the USB port used by the adapter by following these steps:

1. Minimize the Datalink II program and select the Start button located in the bottom left area of your computer display
2. Select the Control Panel icon located in the small window.
3. Select System in the small window.
4. Select the Hardware tab located in the just opened Systems Properties window.
5. Select the Device Manager button located in the center/right of the Hardware page.
6. Locate the Ports (COM & LPT) in the currently opened list and double left click.
7. You will now see Communications Port (COM 1) or the appropriate com number for your system
8. If you disconnect and re-connect the USB adapter, you will see the com port number momentarily disappear, then re-appear thus verifying the com number.

Note the com port number, return to the Datalink II program and set the appropriate number in the software, following the previous instructions.

The above instructions may be followed to verify any com port number, such as needed in the previous Serial Com Port Setting.

Configuration File

The design of a Racepak data system is such that the DatalinkII software, in general, contains little information or commands related to the programming of the data logger. This allows the software to be generic to any form of motorsports. It is the Configuration file, however, that contains all setup and programming features created specific to the data logger and the motorsports in which it will be used.

The role of a config file is vitally important. When a system is ordered, Racepak personnel design a config file specifically for that system. This file is linked to the data logger by means of a serial number that is registered to the purchaser of the Racepak data system. The data loggers' ability to both gather and download data is controlled by the config file.

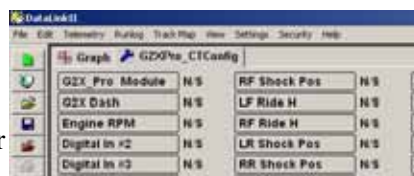
Next, open the config file created for your system. To do so, select File and Open Car Configuration from the Main menu screen.



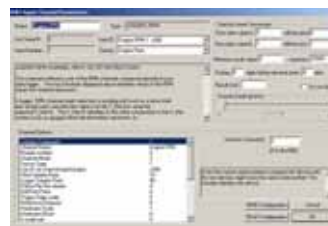
This action will open a small dialog window that lists all config files loaded with your system. By default, generic config files are loaded by the software. The config file will be identified by the serial number that matches your data logger, for example, G2XPro_1234. The left column lists all folders containing config files, while the right column indicates the actual config file. Select the folder

from the left column that matches your data logger serial number. Following this action, the system will display the config file contained within the folder, on the right. Select OK and the config file will open within the DataLink II software.

A config file is identified by the **Blue** wrench icon. All sensors shipped with the system should be represented by a Channel Button. Each button provides access to all functions of that channel. Typically, your data system will not require any update or changes, as Racepak personnel have set up the Configuration file, assembled and bench tested the system before shipping.



For example, to view all the logging parameters of Engine RPM simply place the mouse cursor over the Engine RPM Channel Button and *right* click. By doing so, the VNET Input Channel Parameters dialog box will open and appear as shown at right.



Take time to review all the various items contained within this dialog box. All logging aspects of this channel are accessed through this location. Scaling values, calibration values, channel ID, smoothing and graphed result units, along with other parameters are available to the user. To close the dialog box, simply select Cancel.

Motorsports Specific Configuration Files

Racepak personnel have created a variety of Configuration files that are customized according to the motorsports in which the data system will be utilized. Detailed information concerning each Configuration file can be found in the Runlog and Configuration File Details section of this manual.

Circletrack and Road Racing: This Configuration file contains a combination of Runlog pages and math channels, created specifically for motorsports that require track mapping, lap and segment information. In addition, math channels utilizing shock travel data are included

Boating: This Configuration file contains Runlog and math channel data specific to the needs of boat motorsports that require track mapping, lap and segment information.

Pulling: This Configuration file contains Runlog pages specific to the sport of pulling, which provides customers the ability to input pull specific information, within each run file.

Standard: Motorsports that can benefit from the use of GPS data, but do not fall under the above categories can utilize our standard G2X Pro Configuration file.

Setting a Default Configuration

As you use your data system you may need to modify the setup of the data logger system or enter new setup information for your vehicle. These changes are made via the Configuration file. To simplify making these changes, the Configuration file is opened each time the Datalink II program is run.

Multiple Configuration files may be created for single or multiple vehicles sharing the same data logger. This allows the ability to add or remove sensors depending upon the testing or race purpose, create and save individual Configuration files for each setup, then recall that particular Configuration for use when needed. Each time data is downloaded, the system will prompt the user to select the appropriate Configuration file. To shortcut this process, it is possible to set a default Configuration that will automatically be chosen by the software, upon downloading of data.

1. Open the DatalinkII software and Select File from the main menu area
2. Select Open Car Configuration from the pull down menu. A Select Configuration dialog window will open. A list of folders containing Configuration files will appear on the left side, while the actual Configuration files appear on the right side.
3. Select the G2X Pro folder on the left and the desired config file on the right.
4. Select File from the main menu area, and then click Default Configuration. A check mark will appear before the Default Configuration menu.

At this point, the system should be installed in the vehicle, all sensors are connected and calibrated and the software installed in the users PC. It is very important to become familiar with the software, before performing the first test. The racetrack is not the best location to learn to utilize the data system. While everyone will have software and hardware questions, the test procedure will run more efficiently with a small amount of pre-test study procedures.

Modifying the Data Logger Setup

As was discussed, the Configuration file contains the setup of your data logger, dash display and data analysis screens as well as information entered by the user concerning track, weather and car setup data. Each time new data is uploaded from your data logger the information contained in the Configuration file is copied into the newly created run data file along with the data recorded. The run data file then becomes a permanent record as to the setup of your data logger, vehicle, and weather conditions at the time of the run as well as containing the actual run data.

The Configuration file is contained both in the users PC and the G2X Pro data logger. Any time you make a change to either the Configuration file within your PC (for example a scaling change to an individual channel) or a change to the data logger (add a new sensor) it is necessary to update both the users PC and the data logger. The two situations in which it is necessary to update the Configuration file are:

PC Configuration Changes

Write or Send to the data logger

Any changes made with the Configuration file in the users PC needs to be “sent” back to the data logger, in order to update the logger memory.

Data Logger Configuration Changes

Read the data logger Configuration

Any change made to the data logger needs to be “read” by the users PC, in order to update the Configuration file contained within the PC.

To get the most of your new system, you will want to keep the Configuration file up to date by editing and saving the setup information in the Configuration file prior to loading new data from the data logger. If you forget, the information can also be edited directly in the run data file. You will also need to edit the information in the Configuration file if you wish it to be copied into the next new run data file.

In most cases the factory default setup of the data logger system will meet your testing needs. In certain applications for special testing you may need to modify the setup of the data logger. In these cases the DataLink II software and the Configuration file is used to perform the modifications.

In order to make these modifications to the data logger you will need to perform the following steps:

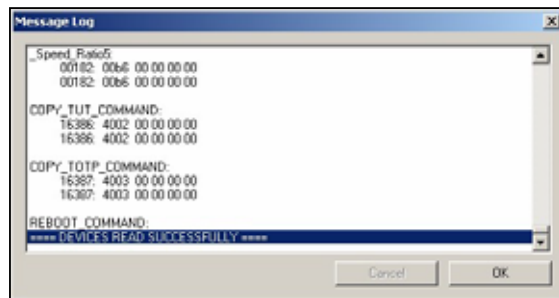
1. Read in the existing Configuration from your data logger system.
2. Modify and save the Configuration file to meet your new requirements
3. Write the Configuration to your data logger system.
4. Power the data logger off and back on to accept changes.

These steps are accomplished as follows:

Adding or Removing Sensors - Reading the Configuration

Following any modifications to the data logger (adding or removing sensors) it is necessary to read the Configuration of the data logger back to the users PC. To perform this step you will need to connect the Racepak serial communication cable between your PC and the Serial input connector on the data logger, then power up the data logger. Next:

Select Edit, then Read VNet Config located in the main menu selection. When selected a Message Log dialog box will be displayed and the read Configuration process will be started. As the information is read in a log of the status will be displayed on the Message Log dialog box. When completed the following Message Log dialog box will be appear as shown below.



The message Devices Read Successfully should appear at the bottom of the dialog box indicating the read was successful. Select OK at this time.

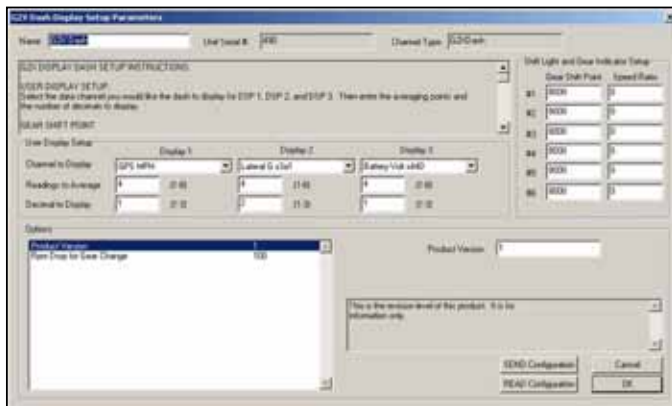
Modifying the Configuration File

After you have updated your Configuration file from the data logger, the next step is to edit the Configuration file to meet your new requirements. You will notice a series of channel buttons at the top of the data link screen when the Configuration file is open.

Each one of these channel buttons controls one of the aspects of the data logger system. For instance the G2XPro_Module channel button is used to set the options such as record start channel and record threshold used to control the main data logger system or the G2X_Dash channel button is used to set the dash display parameters.

To select one of the features to be edited, position the mouse cursor over the desired channel button and click the Right mouse button. An easy edit dialog box for that channel button will be opened. As an example position the mouse cursor over the G2X_Dash channel button and click the Right mouse button.

In the upper left corner of the dialog box is the instruction box “G2X Display Dash Setup Instructions”. The box contains the instructions for setting the various parameters on the G2X dash via the easy edit dialog box.



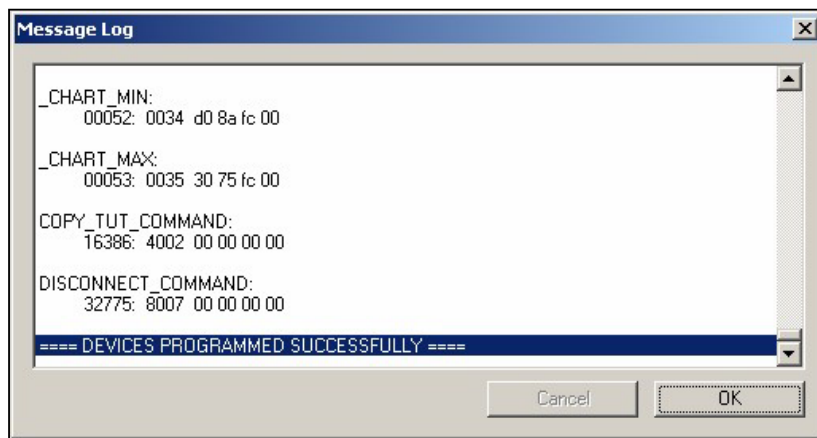
A similar dialog box will be displayed for each of the channel buttons contained in the Configuration file. Although the boxes will be different each will contain the setup instructions in the upper left hand corner. Follow the setup instructions and make the desired modification. After you have made your modifications select the OK button to accept the changes.

Repeat the above process until all of the modifications have been made. Next select the “Save” icon in the toolbar or select the Save option located in the File main menu selection to save your changes to disk.

Writing or Send the Configuration

Following any changes, the final step is to write the Configuration file to your data logger. Be sure the serial cable is still connected between the data logger and your PC and the power is connected to the data logger.

Next select the Write VNet Config menu item located in the Edit main menu selection. The Message Log dialog box will be displayed and status messages will scroll on the box as the Configuration is updated. When the write operation is complete the message Devices Programmed Successfully will be displayed on the bottom of the Message Log dialog box as shown below.



Your data logger has now been programmed with the new changes. Before the data logger can be used the serial cable must be removed from the data logger and power to the data logger must be turned off and back on.

Configuration File Details

Circletrack and Road Racing Configuration File

At this time, the system installation should be complete. Next, we would like to review the custom information contained in each Configuration file, specific to the type of motorsports. Insure the Configuration file is open in the Datalink II software.

Factory Defined Shock and Ride Height Channels: This Configuration file arrives from the factory with four shock and four ride height channels defined. However, they are not active until enabled by the user. Instructions concerning these channels are provided with each sensor package.

Factory Defined Math Channels: Racepak personnel have installed a set of math channels that provide data specific to suspension and chassis analysis. These channels are dependant upon the input of four shock sensors. If the system does not utilize a shock sensor package, data will not be valid.

Shock Velocity

Channel name: LF Shk_Velocity / RF Shk_Velocity / LR Shk_Velocity / RR Shk_Velocity
The above channels provide shock velocity. The data is derived from the shock travel channel multiplied by the derivative.

Ride

Channel name: Ride_Front / Ride_Rear
The above channels provide the front / rear attitude of the vehicle. Positive data indicates pitch down and negative data indicates pitch up.

Pitch

Channel name: Pitch_Total
The above channel provides average pitch of the vehicle in inches, front to rear. Positive data indicates a nose down attitude, while negative data indicates a tail down attitude.

Roll

Channel name: Roll_Front / Roll_Rear / Roll_Total
The above data represents the roll of the vehicle, in inches. Positive data indicates a roll to the right, while negative data indicates a roll to the left.

Pre-Defined Difference Channel:

There are four delta or difference channels provided in this Configuration file. This provides the ability to graphically compare the difference between two channel values. The resulting graph provides a straight graph line for the Reference file, with the Main file showing the difference between the two channels in graphical format.

LapT_Difference

Compares the difference between lap times from two selected Runfiles.

LatG_Difference

Compares the difference between lateral g data from two selected Runfiles.

AccG_Difference

Compares the difference between accel g data from two selected Runfiles.

MPH_Difference

Compares the difference between speeds from two selected Runfiles.

To activate the above channels:

1. Review the Main and Reference instructions in the following section, first
2. Select the desired Main and Reference file
3. Graph the desired difference channel in the Main and Reference file
4. Place the data in distance mode by select View, then Segment X Mode

At this time, the graphed data should be in view, ready for analysis. It is recommended to review only one difference channel at a time, to simplify the review process.

The DataLink II software provides the user the ability to create a multitude of math channels, utilizing the Edit / Channel Maintenance command, found in the main menu selection.

Circletrack and Road Racing Runlog Pages

Racepak personnel have created a selection of pre-configured Runlog pages that are considered standard, for circle track and road race motorsports. To select any Runlog page, simply left click over the MENU Runlog tab. This will access the 8 categories of pre-configured Runlog pages. Left click over any category, to access individual pages.

All Runlog pages are copied into each new run, providing the user an opportunity to insert data relative to each run. Data inserted remains with each run for current or later data analysis

Session Info and Weather

1. Session
2. Weather
3. Run Comments

Provides an input area for run numbering data, weather conditions and comments. Data is inserted by the user, as needed

Map Setup

1. Create GPS Map
2. Add Map Segments
3. Add Inside - Outside Track (optional)

Provides an input area to create and segment track data. Additional information can be found in the following section.

Map Analysis

1. Map Report
2. Lap Zoom
3. Segment Report
4. Segment Compare
5. Speed Compare
6. Min Max Avg Report
7. GG Plot

Provides an input area to review and analyze data. Additional information can be found in the following section.

Histograms

1. Steering Throttle Brake1 Brake2
2. Shock Travel
3. Shock Velocity
4. RPM and MPH
5. Ride
6. Roll
7. G's

The above set of histograms represents the most commonly utilized. In order to activate the histograms, the user must place average cursors within the Main Graph area. To place the cursors:

1. Move the mouse cursor within the graph area, to the desired start of the averaging area.
2. Place a { (beside the P on the PC keyboard) in the graph area
3. Move the mouse cursor to the desired stop of the averaging area.
4. Place a } in the graph area.

The above action will activate the Minimum / Maximum / Average capabilities of the Datalink II software. To view the histograms, simply select the appropriate page, and the histogram data will be in view.

Real Time Displays

1. Dash
2. User Gauges
3. On Track Telemetry

Provides the ability to view data in an analog real-time format. Additional information can be found in the following sections.

User Defined Runlog Pages

1. User Page 1
2. User Page 2
3. User Page 3

Provides the ability to create custom Runlog pages. Additional information can be found in the following sections.

Car Setup

1. Chassis Scaling
2. Tire Data
3. Setup Specs

Chassis Scaling Runlog

The function of chassis scales is contained within this Runlog page. By inputting the four corner weights of a scaled vehicle, the Chassis Scaling page can calculate the following information:

1. Total Weight
2. Cross Weight
3. Cross Weight Percentage
4. Left Side Total Weight
5. Left Side Total Percentage
6. Right Side Total Weight
7. Right Side Total Percentage
8. Front Percentage
9. Rear Percentage
10. Total Left Side Lead
11. Total Right Side Lead

Again, this information may be entered into the Chassis Scaling Runlog page, prior to the start of testing. This Runlog page can also be used to calculate the set up information, while at the shop. Simply input the corner weights and the Runlog page automatically provides the above 11 items.

Tire Data

This Runlog page was designed to provide an area to input tire temperatures and pressure build up, during track test events. However, the Tire Pressure Cold data should be entered before the start of testing. Following a test run, if tire temp readings are obtained by means of a hand held probe, the individual temperatures can be inserted into this Runlog page. By doing so, the system can provide the following information:

1. Left Front Average
2. Right Front Average
3. Average Overall Front
4. Left Rear Average
5. Right Rear Average
6. Average Overall Rear

In addition, if the cold and hot tire pressure data is inserted, the system can provide the following information: 1. Left Front / Right Front / Left Rear / Right Rear Pressure Gain

Setup Specs

This page provides a generic chassis setup input area. Any information entered will be saved with each downloaded run, thus assuring relevant chassis data remains with each run. Again, remember to enter this information the Configuration file and update accordingly throughout the test or race session.

Exporting the Start / Finish Position Runlog Page

The G2X_Pro Config file used in Version 2.7b or higher of the DatalinkII software provides the ability to export the start / finish location (as set in the GPS Trackmap) to the memory card. When the card is re-inserted into the data logger, this start / finish location is automatically installed in the data logger, thus eliminating the need to set the start / finish location with the Display Dash.

To export the GPS Trackmap start / finish location to the data logger:

1. Insure a GPS trackmap has been created for the selected Runfile, following all four steps found in the Create GPS Track Map Runlog page.
2. Remember to place the start / finish of the GPS trackmap in a location that will be both familiar to the driver and in an area that laptime data will be easy to read when on the track. Typically this will be on the front straight of most tracks, as that affords the driver a bit of time to glance at the lap time and lap number.
3. Select the Runlog Menu tab found at the bottom of the DatalinkII software.
4. Locate the Write Start/Finish Position to Card button as found under the Favorite Log Page Shortcuts area.
5. Connect the memory card to your PC via the method used when downloading data to the users PC (typically a USB flash card reader).
6. Select the Write Start/Finish Position to Card button.



This action automatically places the GPS trackmap start / finish position on the memory card. Following this action, simply insert the memory card into the data logger and apply power.

The start / finish is now set, which will allow the display dash to provide lap time and lap number information. This start / finish location can be re-set by using the Display Dash method or by exporting another start / finish location to the compact flash card (as taken from the GPS trackmap).

WARNING: Do not make any changes to the start finish file that is saved to the memory card. Editing the name or file type will result in failure to write the start / finish location to the data logger.

IMPORTANT: This feature requires G2X Pro firmware version 36 or higher. Updated firmware is available for free at www.g2xpro.com

TrackVision Export Runlog Page

The G2X_Config file found in Version 2.7b or higher of the DatalinkII program allows the user to quickly export data from the DatalinkII software for use in the TrackVision video software. This is accomplished through the use of our TrackVision Export Runlog page. This page can be accessed by selecting the Track Vision Export button found on the Runlog Menu page, under the Favorite Log Page Shortcuts heading.

The TrackVision Export Runlog page enables the user to quickly export a list of standard TrackVision related data channels. In addition, the user can also create a customized list of data channels to be exported for use in the TrackVision software.

Exporting pre-defined TrackVision data channels:

1. Open a Runfile that was downloaded utilizing the updated G2X_Config file found in Version 2.7b or higher of the DatalinkII software.
2. Select the Run Log Menu Runlog tab at the bottom of the DatalinkII software.
3. Select the Track Vision Export button found under the Favorite Log Page Shortcuts heading as shown below.



The user is presented with two options:

1. Export Standard TrackVision Data
2. Export Custom TrackVision Data



Exporting Standard TrackVision Data:

1. Select the Export Standard Track Vision Data button.
2. Data is automatically exported to the following file folder location:
C:\RacePakData\TrackVision_Std.csv
3. Data is now saved and ready for use in the TrackVision software.

Boat Racing Configuration

Pre-Defined Math Channels: Racepak personnel have installed a set of math channels that provide data specific to boat racing analysis.

Prop Speed

Channel name: Prop Speed

The Prop Speed channel is derived from the input of Engine RPM, Gear Ratio, Prop Pitch and various internal mathematical functions. In order for this channel to provide accurate data, it is necessary to manually insert all the information found in the Prop Data Runlog page.

Prop Slip

Channel name: Prop Slip

The Prop Slip channel is created from the input of GPS MPH and prop speed. Again, insure the PROP DATA information is completed and the GPS data is functioning correctly.

Pre-Defined Difference Channels

There are four delta or difference channels provided in this Configuration file. This provides the ability to graphically compare the difference between two channel values. The resulting graph provides a straight graph line for the Reference file, with the Main file showing the difference between the two channels in graphical format.

LapT_Difference

Compares the difference between lap times from two selected Runfiles.

LatG_Difference

Compares the difference between lateral g data from two selected Runfiles.

AccG_Difference

Compares the difference between accel g data from two selected Runfiles.

MPH_Difference

Compares the difference between speeds from two selected Runfiles.

To activate the above channels:

5. Review the Main and Reference instructions in the following section, first
6. Select the desired Main and Reference file
7. Graph the desired difference channel in the Main and Reference file
8. Place the data in distance mode by select View, then Segment X Mode

At this time, the graphed data should be in view, ready for analysis. It is recommended to review only one difference channel at a time, to simplify the review process.

The DataLink II software provides the user the ability to create a multitude of math channels, utilizing the Edit / Channel Maintenance command, found in the main menu selection.

Boat Racing Runlog Pages

Racepak personnel have created a selection of pre-configured Runlog pages that are considered standard for boat related motorsports. To select any Runlog page, simply left click over the MENU Runlog tab. This will access the 6 categories of pre-configured Runlog pages. Left click over any category, to access individual pages.

All Runlog page data is copied into each new run, providing the user an opportunity to insert data relative to each run. Data inserted remains with each run for current or later data analysis.

Session Info and Weather

1. Session
2. Weather
3. Run Comments

Provides an input area for run numbering data, weather conditions and comments. Data is inserted by the user, as needed

Map Setup

1. Create GPS Map
2. Add Map Segments
3. Add Inside - Outside Track (optional)

Provides an input area to create and segment track data. Additional information can be found in the following section.

Map Analysis

1. Map Report
2. Lap Zoom
3. Segment Report
4. Segment Compare
5. Speed Compare
6. Min Max Avg Report
7. GG Plot

Provides an input area to review and analyze data. Additional information can be found in the following section.

Prop Data and Accel Reports

1. Prop Data
2. Accel Times
3. Accel Times Scroll

Prop Data

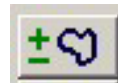
In order to activate the Prop Slip and Prop Speed data channels, it is necessary to complete the gear and prop data information contained on the Prop Data Runlog page. This, in turn, activates the mathematical functions of the Prop Slip and Prop Speed data channels, thus allowing graphing of data. Insure this information is kept current in the Configuration file.

Accel Time and Accel Scroll Runlog Page

The Accel Time Runlog page provides acceleration time data, in report format. The Datalink II software combines GPS MPH data with beginning and ending MPH points inserted by the user, to calculate the time between two MPH points.

1. Open a Runfile and graph GPS_MPH
2. Open Accel Times Runlog page
3. Enter the desired speed to start the report and the desired display MPH increments, in the input area located at the top of the Accel Times Runlog page. For example, if 50 MPH is inserted as the Enter Speed and 10 is inserted in the Display Time Every area, the report will start at 50 MPH and display data in 10 MPH increments.
4. Place the cursor in the Main Graph area, then locate the cursor at a starting point in the acceleration data. Remember to locate the cursor at a point that is below the desired MPH for the start of the report. For example, if the starting point of the report will be 50 MPH, the marker placed in the data can not be located above 50 MPH. If the desired starting point for the report will be 50 mph, locate the cursor at 40 MPH in the Main Graph area.

5. Locate the Add/Edit Segment Lap Markers icon, in the list of vertical icons found on the left side of the Datalink II software.



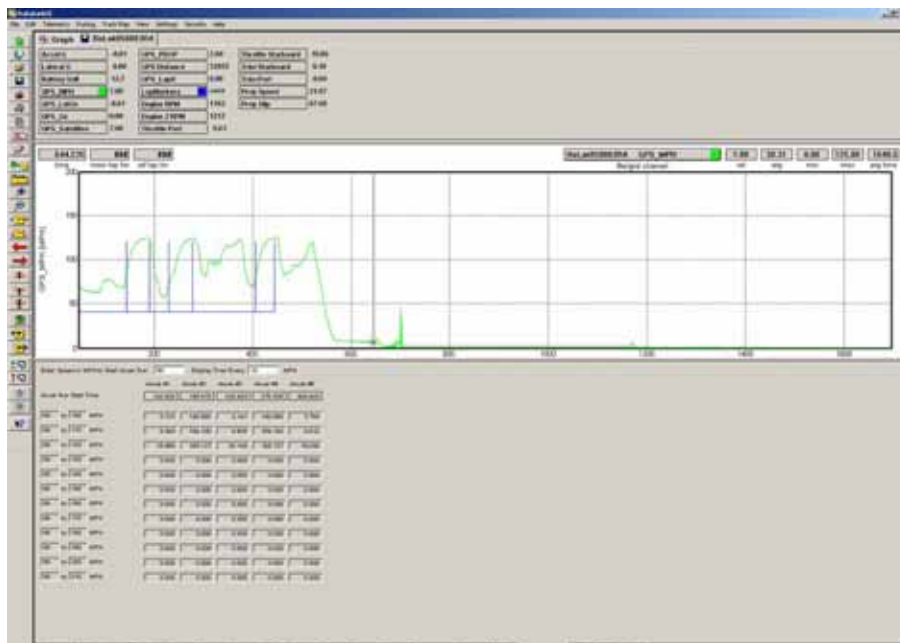
6. Left click the icon, which will open the Edit / Add / Remove Section Markers dialog box.
7. Select the Insert New Lap Marker At Cursor Button



8. Left click the Lap Markers channel button, in order to display the inserted lap marker within the Main Graph area.

8. Move the cursor to the desired ending point of the accel run, and repeat steps 6 and 7.

9. If multiple acceleration runs were made during the run, continue to place markers at desired beginning and ending mph points.
10. Remember to only place markers within acceleration points within the graphed data. Do not place the beginning marker at an acceleration point and a second marker at a slowing down or deceleration point within the data.
11. The Datalink II software is designed to review acceleration data between two markers and provide time data. If multiple markers are placed, the Datalink II software automatically continues to create time data for each pair of markers, as seen in the example below.



To utilize the Accel Scroll Runlog page, simply place the mouse cursor over the slider located at the top of the Accel Scroll Runlog page, right click and hold then drag the slider left or right to move the accel data accordingly. This feature allows the user to view data that extends out of view of the screen area.

Real Time Displays

1. Dash
2. User Gauges
3. On Track Telemetry

Provides the ability to view data in an analog real-time format. Additional information can be found in the following sections.

User Defined Runlog Pages

1. User Page 1
2. User Page 2
3. User Page 3

Provides the ability to create custom Runlog pages. Additional information can be found in the following sections.

Exporting the Start / Finish Position Runlog Page

The G2X_Pro Config file used in Version 2.7b or higher of the DatalinkII software provides the ability to export the start / finish location (as set in the GPS Trackmap) to the memory card. When the card is re-inserted into the data logger, this start / finish location is automatically installed in the data logger, thus eliminating the need to set the start / finish location with the Display Dash.

To export the GPS Trackmap start / finish location to the data logger:

7. Insure a GPS trackmap has been created for the selected Runfile, following all four steps found in the Create GPS Track Map Runlog page.
8. Remember to place the start / finish of the GPS trackmap in a location that will be both familiar to the driver and in an area that laptime data will be easy to read when on the track. Typically this will be on the front straight of most tracks, as that affords the driver a bit of time to glance at the lap time and lap number.
9. Select the Runlog Menu tab found at the bottom of the DatalinkII software.
10. Locate the Write Start/Finish Position to Card button as found under the Favorite Log Page Shortcuts area.
11. Connect the memory card to your PC via the method used when downloading data to the users PC (typically a USB flash card reader).
12. Select the Write Start/Finish Position to Card button.



This action automatically places the GPS trackmap start / finish position on the memory card. Following this action, simply insert the memory card into the data logger and apply power.

The start / finish is now set, which will allow the display dash to provide lap time and lap number information. This start / finish location can be re-set by using the Display Dash method or by exporting another start / finish location to the compact flash card (as taken from the GPS trackmap).

WARNING: Do not make any changes to the start finish file that is saved to the memory card. Editing the name or file type will result in failure to write the start / finish location to the data logger.

IMPORTANT: This feature requires G2X Pro firmware version 36 or higher. Updated firmware is available for free at www.g2xpro.com

TrackVision Export Runlog Page

The G2X_Config file found in Version 2.7b or higher of the DatalinkII program allows the user to quickly export data from the DatalinkII software for use in the TrackVision video software. This is accomplished through the use of our TrackVision Export Runlog page. This page can be accessed by selecting the Track Vision Export button found on the Runlog Menu page, under the Favorite Log Page Shortcuts heading.

The TrackVision Export Runlog page enables the user to quickly export a list of standard TrackVision related data channels. In addition, the user can also create a customized list of data channels to be exported for use in the TrackVision software.

Exporting pre-defined TrackVision data channels:

4. Open a Runfile that was downloaded utilizing the updated G2X_Config file found in Version 2.7b or higher of the DatalinkII software.
5. Select the Run Log Menu Runlog tab at the bottom of the DatalinkII software.
6. Select the Track Vision Export button found under the Favorite Log Page Shortcuts heading as shown below.



The user is presented with two options:

3. Export Standard TrackVision Data
4. Export Custom TrackVision Data



Exporting Standard TrackVision Data:

4. Select the Export Standard Track Vision Data button.
5. Data is automatically exported to the following file folder location:
C:\RacePakData\TrackVision_Std.csv
6. Data is now saved and ready for use in the TrackVision software.

Puller Runlog Pages

Racepak personnel have created a selection of pre-configured Runlog pages that are considered helpful for pullers. To select any Runlog page, simply left click over the Runlog tab.

All Runlog pages are copied into each new run, providing the user an opportunity to insert data relative to each run. Data inserted remains with each run for current or later data analysis.

Session

Provides an input area for run numbering data, weather conditions and comments. Data is inserted by the user, as needed.

Pull Info

Provides an area to input pulled related information.

Weather

Provides an area to input weather information.

Vehicle and Track Info

Provides an area to input vehicle setup and track condition information.

Dash Gauges

Allows the user to select the input channel to activate each gauge. Can be used during telemetry or review of downloaded data.

User Defined Runlog Pages

1. User Page 1
2. User Page 2

Provides the ability to create custom Runlog pages. Additional information can be found in the following sections.


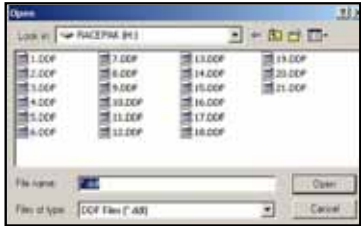
Making the Initial Run

Transferring Data

Following recording of data, drive the vehicle to a safe location in order to transfer and review the data. The logger creates a new file and saves all data gathered from the start of logging (speed greater than 25 MPH) to the end of logging (speed less than 25 MPH for 30 seconds). Each file is saved in a .ddf format and is assigned a number based on date and time. Multiple files can be saved to the memory card.

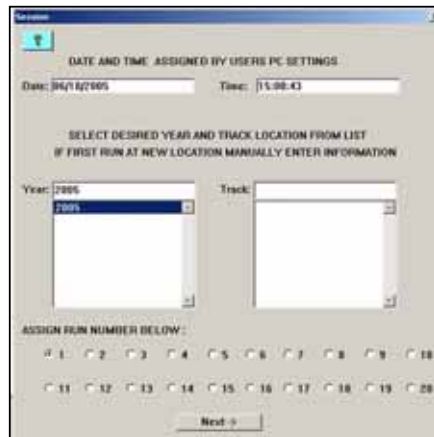
When a .ddf file is transferred to the DataLink II program, it is then assigned a file name based on the track, date and run number. At that time, it becomes a Runfile. All of the lap data is contained within the Runfile and is called a Lapfile. While it is not necessary to transfer your data after each run, it is highly recommended, if at all possible.

Only one Run file can be transferred at a time, so you must perform the following procedure once for each .ddf data file or recording.

1. If desired, dash lap time data can be reviewed before downloading.
2. Turn off power to the data logger.
3. Open the DataLink II program, and insert the memory card into the card reader.
4. Initiate the transfer sequence by selecting the New Upload icon. 
5. The Select Configuration dialog window will open. Select the appropriate Configuration file and **OK**.
6. The Open dialog window will open. The first time data is uploaded you will need to select the drive letter corresponding to the compact flash reader. 
7. There will be one .ddf file for each recording. In this example, there are multiple .ddf files. If multiple files are listed, select the desired file to download and select **Open**.
8. The file will download and the Session dialog window will open.

Session Dialog Window

At this time, we will explain the purpose of the Session dialog window. When data is downloaded to the users PC, a data path must be created. This provides a folder for the DataLink II software to place each Runfile. At the same time, a number must be assigned to the Runfile before the file can be placed into the designated folder. The Session page provides the ability to assign both the run number and the location in which to save the Runfile.



The Year selection creates a folder according to the year entered. The Track selection creates a folder according to the track name entered. For this reason, it is only necessary to enter the Year one time, according to the year of testing. It is also only necessary to enter the Track name one time, at each track.

An example data path: **C:\RacepakData\G2XPro\2005\Infineon**

If 2005 was entered for the Year and Infineon for Track, the above set of folders (or directory) would be created on the user's C drive. The Runfile number is assigned according to the date, location and run number.

1. Enter the appropriate information in the Session dialog box and select **Next**.

Map Select Dialog Window



The Map Select Dialog Window is designed to assist the user in selecting previously created and saved GPS Track Maps. After extended use of the data system, it is possible to have quite a large collection of saved maps. However, the Racepak engineers have created a unique way to provide a limited number of maps for selection. Upon download of a new run, the Datalink II software reviews the location of the vehicle, relative to GPS data. Then, only previously saved maps that are located within a five mile radius of the new uploaded run, will be displayed for selection.

For a run at a new location that does not detect any previously saved track maps within that five mile radius, the above Create New message will appear in the Map Select Dialog Window. Since these instructions assume this is the first download for a new system:

1. Select **Next**
2. The Weather dialog box will be presented. If desired, enter the current weather conditions. If not desired, this information can be entered at a later date, then select **OK**.

WEATHER DATA:

Status:

AltCom Date:

AltCom Time:

Barometric Pressure:

Air Temperature:

Relative Humidity:

Absolute Humidity:

Gases H2O:

Vapor Pressure:

Dew Point:

Air Density Ratio:

Density Altitude:

Adjusted Altitude:

Wind Direction:

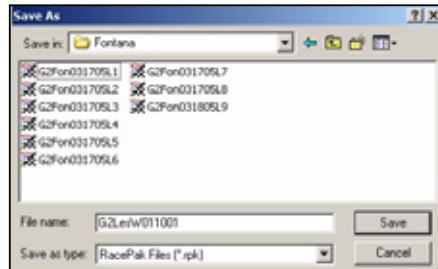
Wind Speed:

Wind Gust:

Track Temperature:

THIS PAGE WILL DISPLAY THE CURRENT WEATHER DATA FROM AN ALTACOM 8 WEATHER STATION.
TO UPDATE THE CURRENT WEATHER CLICK ON THE "GET ALTACOM WEATHER..." BUTTON ABOVE.
IF YOU DO NOT HAVE AN ALTACOM 8 YOU CAN ENTER THE WEATHER DATA MANUALLY.

3. The final dialog window to be presented to the user is the Save window. This allows the user to review the save location and Runfile number. If any changes are desired, they made be performed at this time. If no changes are desired, select **SAVE**.



At this time, the Runfile is now open the DataLink II software. The next step is to create a GPS track map. First, we will review the procedures that must be applied to a Runfile, when the G2X Pro is utilized by pulling competitors. Creating trackmaps does not apply to our Pulling customers.


Puller Run - Setting the Zero Start Point - Very Important

In order for puller competitors to accurately review data, it is necessary to reset the start of graphed data (Zero Point) for each run. When data is initially downloaded and graphed, the starting point of the graphed data is when the data logger started saving data to the compact flash card. For example, if the data logger is set to start logging when engine rpm exceeds 3000, that point could occur while driving up to the sled, on the first pull. Suppose on the second pull, the motor does not exceed 3000 rpm until the vehicle is starting the actual pull. When data is downloaded and graphed, the zero time (or starting point) of the data will be at two totally different locations. This makes it impossible to accurately overlay and graph data.

The solution to this situation is to manually move the zero time point to the same location, within each run. This is accomplished by using the Set Start Time icon, located in the DatalinkII software. To perform this procedure:


1. Open a Runfile

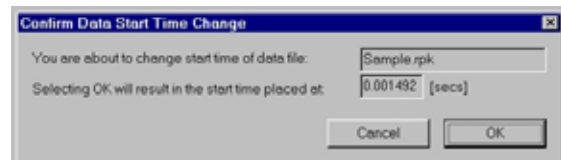
At this time, it will be necessary to determine what data channel will always be used to determine the first movement of the vehicle. For pullers, the Accel G channel works well.

2. Graph the Accel G channel.
3. Select the Autoscale icon. This will display all data from beginning to end. 
4. Place the cursor in the Main Graph area (the area with the colored graph line)
5. Press and hold down the left mouse button (starting at the very beginning of the run).
6. Drag the mouse to the right until the very first movement of the vehicle is noted.
7. The first movement of the vehicle will be obvious, with an upward spike in Accel G data.



Determine the first movement of the vehicle by continuing to hold the left mouse button down and watching the real time Accel G Channel Button data (at the top of the page). The Zero start time will be when the Accel G Channel Button data begins to increase. When the start of the run is located:

8. Select the Set Start Time icon 
9. The Confirm Data Start Time Change window will open. Select OK




At this time, the graphed data will now start at the new zero time as set by this action.

NOTE: It is vitally important to perform this procedure on every run, or accurate data overlay will not be possible. Create Trackmap - Required for Closed Course / Oval & Road Race

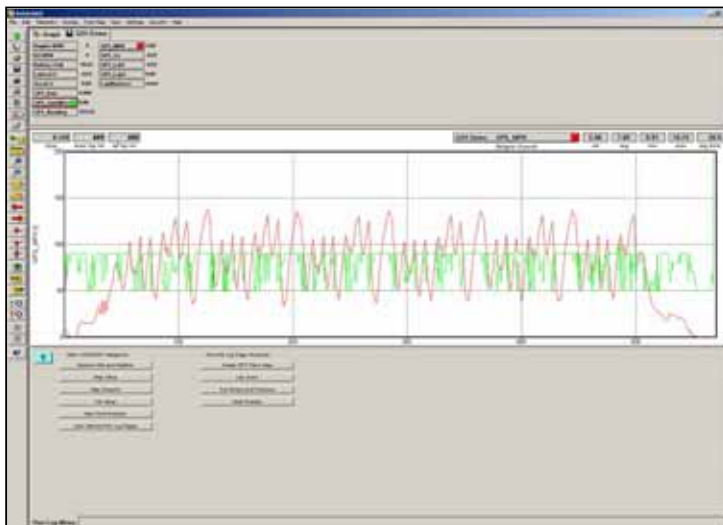
Create Trackmap (Closed Course) Oval and Road Racing

Upon download of the initial run, it is advisable to quickly check two channels, to verify system operation. Two suggested channels are the GPS_MPH and GPS_Satellites. Typically, if those two channels are correct, all the remaining GPS functions will be correct.

At this time, the initial run should be in view, in the DataLink II software. To graph the GPS_MPH channel:

1. Place the mouse cursor over the GPS_MPH Channel Button and left click.
2. The GPS_MPH data should now be in view, in the Main Graph area.
3. Locate and left click the Autoscale icon,  located in the vertical icon list on the left side of the screen. All graphed data, from the start of logging until the end of logging, will be displayed.
4. Next, graph the GPS_Satellites channel by placing the mouse cursor over the GPS_Satellites Channel Button and left clicking. This action will display the number of satellites utilized during this particular run.
5. A minimum of three satellites are required at any given time in a run, in order to produce valid data. Typically, the logger will utilize between three and seven satellites.

Your screen should appear as shown below:



If no previously save trackmap exists for the newly downloaded data, the next action that must be performed is the creation of a GPS track map. A GPS track map is the most important item for data review, as the track map controls all of the timing functions of the logger and DataLink II software. Without a GPS track map, no lap times, segment times or visual driving lines will be available.

In essence, the creation of a GPS track map is the same as physically placing start / finish and segment beacons at various points around the race course. The difference is we are re-creating the track in the DataLink II software utilizing GPS information, then inserting (in the software) the start / finish and segment timing points at various locations around the GPS track map. Those timing points are also GPS plotted positions and provide timing information with the same accuracy as trackside beacons.

GPS track map files are saved according to the name assigned by the user. Typically, the name will reflect the name of the track or location in use. Saved GPS track map files can then be recalled for use, according to the testing location and needs of the user. The procedures for creating a GPS track map are quick, easy and listed in numerical order, Step 1 through Step 4.

At this time, our initial run data should still be in view. To create a GPS track map, select the Map Setup Category button, then select the GPS Trackmap Runlog tab, located at the bottom of the DataLink II screen. The instructions are presented in order from 1 through 4.

Step 1: Select / Create GPS Map

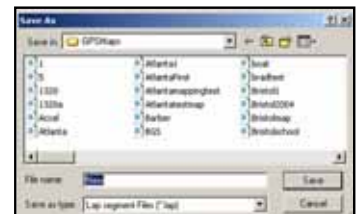
Left click over the Select / Create GPS Map. This opens a Select/Create GPS MAP dialog box. The user is presented with three choices, which are self explanatory:

1. New (Clear) Lap File: This allows the creation of a new track map.
2. Open Different Lap File: This allows the user to load a previously created track map.
3. Rename/Save Lap File: This allows the user to rename a previously created track map or simply save an existing track map.



For the initial run, we will select New Trackmap and then OK.

The Save As dialog box will now be opened for the user. Simply type the desired track or location name (example: Road Atlanta) then select the Save button.



Following this action, the user will be returned to the DataLink II software. The Create GPS Trackmap Runlog page should now display all of the GPS driving data. Remember, at this point the GPS data in view is all data logged from the start until the end of recording.

Step 2: Select Track Type

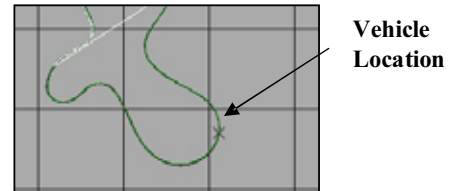
The next step is to assign the type of track in use for testing. Most all testing will be considered the default setting of Closed Course. Open Course is typically used for events such as Autocross and Hill Climbing, which is covered in the following section.

Step 3: **SET LAP START**

SET LAP END (Open Course Only)

As discussed in the previous section, the current data in view represents the GPS position of the vehicle from the start until the end of recording. If you were to place the mouse cursor in the Main Graph area, (insure GPS_MPH is still graphed and the entire run is in view) then left click and drag the mouse cursor through the Main Graph area, you can follow the location of the vehicle in the GPS driving line data. However, there will be no lap data, until a start / finish line is assigned.

To Set Lap Start, place the mouse cursor in the Main Graph area, left click and move the vehicle location (as noted by the small X) in the GPS map data until the approximate start / finish is located. Next, simply select the Set Lap Start button. Just consider this action the same as physically placing a beacon transmitter on the start / finish line of the race course, except this is much easier.



In order to generate a GPS track map, the final step will be to view a lap and create the map from that actual lap.

Step 4: **Create GPS Track Map**

To view a lap, locate the LAP NUMBER widow shown under Step 4. By using the Up / Down arrows, the user can toggle through all of the laps contained within the run. To select a lap, simply choose a lap that represents a complete, high speed lap. This lap will also be utilized to generate segment timing, so choosing a high speed lap with the greatest lateral g forces, will assist in the segmentation.

Now, select the **CREATE GPS TRACKMAP** button. This action now completes the GPS track mapping process.

As with many activities, the actual explanation of the track mapping procedure appears extensive, while the actual process takes less than 30 seconds.

Track Map Creation (Open - Autocross, Solo & Hill Climb)

Through the use of GPS signals, it is possible to create a track map, even if the start and finish line are located at two different locations. In the previous section, we located the vehicle at the desired start / finish and selected the Set Lap Start button. For open course, we need to also establish an end point of the lap, also. To create an open course track map, we will refer to the previous section and follow the same instructions for Step 1. Resuming at Step 2:

Step 2: Select Track Type

For open course, select Open Course.

Step 3: Set Lap Start

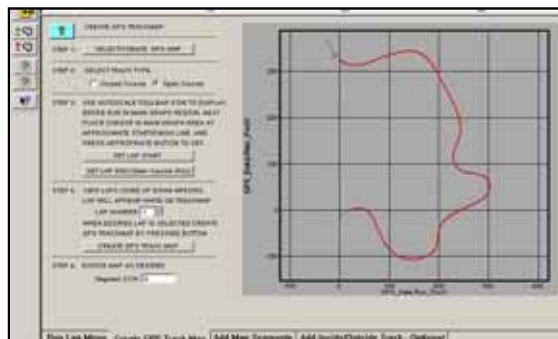
Set Lap End (Open Course Only)

As discussed in the previous section, the current data in view represents the GPS position of the vehicle from the start until the end of recording. If you were to place the mouse cursor in the Main Graph area, (insure GPS_MPH is still graphed and the entire run is in view) then left click and drag the mouse cursor through the Main Graph area, you can follow the location of the vehicle in the GPS driving line data.

To Set Lap Start, place the mouse cursor in the Main Graph area, left click and move the vehicle location (as noted by the small X) in the GPS map data until the approximate start area is located. Next, select the Set Lap Start button. Then, move the cursor to the desire end of the course and select the Set Lap End button.

Step 4: Create GPS Track Map

Finally, select the CREATE GPS TRACK MAP button. This action now completes the GPS track mapping process.



Add Map Segments - Closed Course Tracks Only

Now that we have created a GPS track map, the next step is to create track segments. In order for the DataLink II software to provide segment data, it is necessary to break the track into corners. Each corner will represent the start and end of a timing segment. However, in this instance, we will use Lateral G forces to create the segments for us. By doing so, it automates the process and eliminates the necessity of manually assigning segments.

Open the Add Map Segments Runlog page. Next, graph the Lateral G channel. Review the data and determine the approximate Lateral G value obtained upon entry to most of the corners. Next, determine the approximate Lateral G value upon exiting most corners. At high speed, high lateral g force tracks, it is recommended to attempt to maintain at least .5 G difference between the maximum and minimum values. Following this:

Step 1: **Open Lap**

To generate segments, it is necessary to open a lap. Use the same lap as previously selected to generate the track map.

Step 2: **Generate Segments**

1. Insert the desire maximum Lateral G value in the Corner Start input box
2. Insert the desired minimum Lateral G value in the Corner End input box
3. Select the **Generate Segments** button.

Following this action, the DataLink II software will segment the GPS track map, and assign names to each corner. Often times, a road course will assign a variety of names, to the same corner. For example, the DataLink II software will assign a Turn 7 and Turn 8 to the track map. However, the “official” name for the turn could be shown as Turn 7a and Turn 7b and Turn 7c. In this case, the user may insert a variety of Lateral G values to create the approximate correct number of turns.

When creating circle track segments, the system will automatically create only two turns. In order to divide the track into four corners, it will be necessary to manually edit the segments, as reviewed in the following section

!!! IMPORTANT WARNING!!!

The default Corner Start and Corner End lateral g values that appear are obtained from settings in the G2XPro Config file. Do not create track segments strictly from the default settings. Insure you determine the lateral g forces that best suit your needs and manually change to reflect those needs.

Step 3: Manually Edit Segments

It is also possible to manually name a particular turn, override the assigned name to a particular area of the track or creating additional segments by using the Manual Segment Edit. To do so:

1. Position the location of the vehicle (as noted by the X on the track map) in the desired change area. Select Divide. Move the cursor to the desired ending point of the change select the Divide button again.
2. Place the location of the vehicle between the newly selected Diving markers and choose the desired action: Corner / Straight / Merge / Extend / Divide and the DataLink II software will perform the desired changes.

Road course: We have found it is helpful to obtain a top view of the race course (most are available on the Internet) and duplicate their nomenclature for corners and straights. This agreement between maps will greatly assist, when discussing particular track areas.

Circle Track: To create a four turn track, place the mouse cursor in the Main Graph area and move the vehicle location to the center of turn 1, then select the button. Next, place the mouse cursor in the Main Graph area and place the vehicle location in the center of the opposite turn and select the button. This action will now provide a four turn track. Additional segments may be created by placing the vehicle in the desired location and continuing to divide the track map.

Remember, any segment added to the track map provides timing information, which aids in data analysis.

To manually insert segment markers at desired locations on the track map, position the vehicle at the desired location for the entrance segment marker and select the button. Next, move the vehicle to the desired exit segment marker and again select the button. Then, place the vehicle position between the two segments markers that are in view on the track map and select the button.

Add Inside / Outside Track - Optional

When utilizing GPS data, it is possible to create on-screen inside and outside track edges, to assist in reviewing data. To obtain data for inside / outside driving lines, it is necessary to drive at least two complete laps on the inside of the track and two complete laps on the outside of the track. If the start / finish area is not passed at least two times during each procedure, a suitable lap will not be obtained.

It is advisable to obtain inside and outside track information at some point during an on-track run and utilize this same run for track mapping, segmentation and inside / outside track creation. Then, by using the following instructions, the user simply toggles through the available laps, selecting the desired inside and outside laps.

Following the creation and segmentation of a trackmap, open the Add Inside/Outside Track-Optional Runlog page:

Step 1:

Toggle through the available laps, until a suitable inside lap is obtained. Select the button.

Step 2:

Toggle through the available laps, until a suitable outside lap is obtained. Select the button.

Following these procedures, the inside and outside track area should now be represented by red and blue lines, on the GPS track map graphic area. To save the updated track, select the Create GPS Track Map Runlog page, then the button. This action will open the Select/Create GPS MAP dialog window. Select the Rename/Save Lap File button. The user can save with the existing track map name or rename as desired.

Manually Loading GPS Track Maps

The DataLink II software enables the user to create any number of track maps. For example, it is possible to take the data utilized to create the previous track map and create another map with different segments, corner names, etc. Typically, only one map per track is necessary.

With users testing / racing at different facilities, the question arises of how and where to load a previously created track map into the DataLink II software.

1. Open the desired Runfile in which the trackmap will be loaded
2. Select the Create GPS Trackmap Runlog page.
3. Select the **Select / Create GPS Map** button, found beside of Step 1.
4. When the Select/Create GPS MAP dialog window opens, select the **Open Different Lap File** button.
5. This will present the Open dialog box. From this box, choose the desired track map and select the **OK** button.
6. Select the **Rename/Save Trackmap** button, and select the **Yes** button, when prompted from the Save dialog box.

Now, all that remains is to save the changes to the Runfile. To do so, simply select File, and then Save in the Main Menu command. The Save action can also be accessed by utilizing the Save icon, located in the vertical list of icons, on the left side of the DataLink II screen.



Opening a Lap and Graphing Data

At this time, we have downloaded our first run, made a quick check of data and created and saved a track map. We would now like to review the basic procedures for viewing and graphing data. Before opening a lap for review, double click the Clear All Graphs icon, located in the vertical list of icons on the left side of the DataLink II screen. This will clear all currently graphed data.

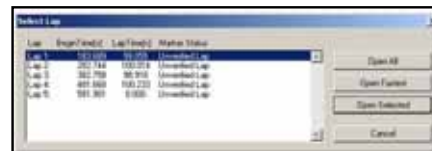


The initial Runfile should still be open. The DataLink II software saves individual lap data, with corresponding lap times (called a Lapfile) within the Runfile. Simply worded, a Runfile is a folder with all the laps placed inside.



Open a Lap

1. Place the mouse cursor over the Runfile tab and right click. To open the fastest lap, select the **Open Fastest** button, as shown below.



2. The fastest lap will now be displayed, as shown in the example below.



Lapfile
Tab

All of the data channels that were active during this test run are now in view in the Channel Button area. However, no graphed data will appear, until the user selects any of the Channel Buttons, as discussed in the next section.

Referring back to the above Select Lap dialog window, laps can be opened by three different methods:

1. Open All: This will automatically open all laps contained within the Runfile
2. Open Fastest: This will open only the fastest lap.
3. Open Selected: This will open one lap, by placing cursor over the desired lap and left clicking.

A Runfile is indicated by the blue disk icon and a Lapfile is indicated by the blue track map icon, along with the corresponding lap number.

Distance Mode Graphed Data

In order to produce a graph, a comparison must take place. When we previously graphed the GPS_MPH channel, the data was compared to time, which began at logging start and ended at power down of the logger. At this time, graph the GPS_MPH, GPS_LatG's and GPS_Gs from your currently open lap.

Since we now have a track map in place, the data will be graphed compared to time from the start / finish line. The time into the lap, according to the position of the mouse cursor in the Main Graph area, is provided by the Cursor Position Box . In certain applications, it is often more useful to compare the data to distance from the start / finish line.

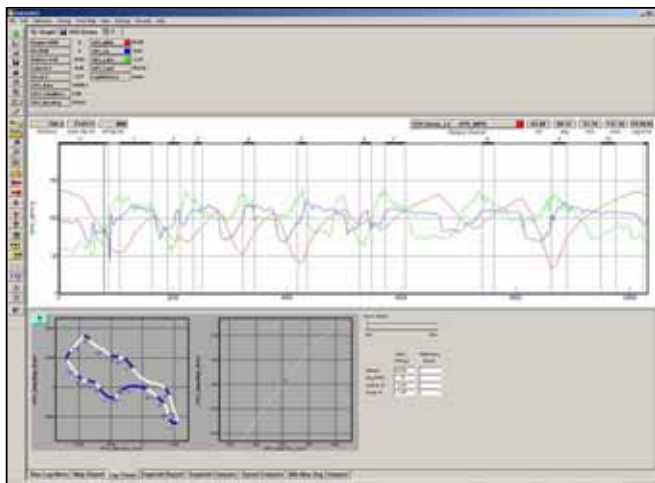
To place the Main Graph area in distance mode:

1. Select View in the DataLink II main menu selection and then select the Segment X Mode option.

You will note the numbers along the bottom of the graph now display distance (feet) around the track and the top of the graph is now broken into track segments as defined by the track map. Track map segments provide a quick view of vehicle location, as defined by the track map.

Your screen should appear as shown above.

In addition the Cursor Position Box located in the upper left hand corner of the Main Graph area now displays the cursor position in feet into the lap rather than time.



Speed and Segment Reports

Following creation and segmenting of the GPS track map, the segment times will be now be available for review in the Runlog Page area. To view:

1. Insure a lap is open and in view
2. Select the Speed Summary Runlog Page tab, found at the bottom of the DataLink II screen.
3. Detailed information concerning segment times, entrance and exit speeds, along with minimum, maximum and average speeds are now available for review.

The

Run: 2008-08-01								Reference Run: 2008-08-01							
Lap	Time	Entrance	Exit	Min	Max	Avg	Max	Lap	Time	Entrance	Exit	Min	Max	Avg	Max
1.1	1:10	1:10	1:10	1:10	1:10	1:10	1:10	1.1	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.2	1:10	1:10	1:10	1:10	1:10	1:10	1:10	1.2	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.3	1:10	1:10	1:10	1:10	1:10	1:10	1:10	1.3	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.4	1:10	1:10	1:10	1:10	1:10	1:10	1:10	1.4	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.5	1:10	1:10	1:10	1:10	1:10	1:10	1:10	1.5	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.6	1:10	1:10	1:10	1:10	1:10	1:10	1:10	1.6	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.7	1:10	1:10	1:10	1:10	1:10	1:10	1:10	1.7	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.8	1:10	1:10	1:10	1:10	1:10	1:10	1:10	1.8	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.9	1:10	1:10	1:10	1:10	1:10	1:10	1:10	1.9	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.10	1:10	1:10	1:10	1:10	1:10	1:10	1:10	1.10	1:10	1:10	1:10	1:10	1:10	1:10	1:10

Segment Report page provides detailed segment timing information for all laps contained within the currently open Runfile.

Run	Time	Entrance	Exit	Min	Max	Avg	Max
1.1	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.2	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.3	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.4	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.5	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.6	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.7	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.8	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.9	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.10	1:10	1:10	1:10	1:10	1:10	1:10	1:10

The Segment Compare page provides the ability to compare segment timing information for two selected laps. To do so requires the user to choose two laps, for comparison. This action, called Main and Reference lap selection, which is covered in the Advanced Features of the Datalink II Software section. The procedure is simple, and takes just a matter of seconds to perform.

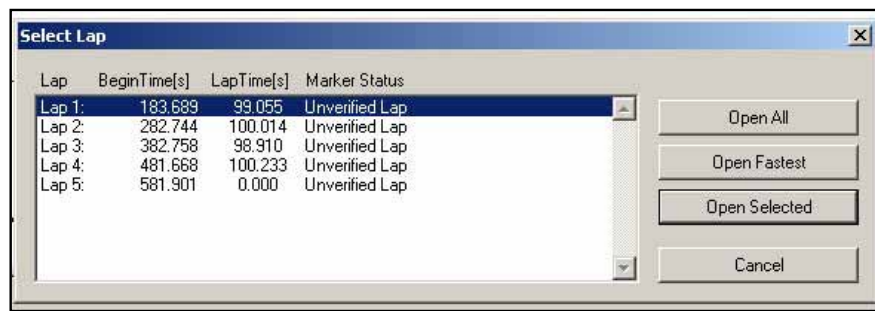
Run	Time	Entrance	Exit	Min	Max	Avg	Max
1.1	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.2	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.3	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.4	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.5	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.6	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.7	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.8	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.9	1:10	1:10	1:10	1:10	1:10	1:10	1:10
1.10	1:10	1:10	1:10	1:10	1:10	1:10	1:10

Overlay (Graphing) Multiple Files

At this point, we have reviewed the basics of how to open and graph a single file. We will now review how to open, graph and compare two files. Multiple files can be viewed simultaneously using the DataLink II software.

To open another lap for review:

1. Place the mouse cursor over the current Runfile tab and right click.
2. Select the desired lap.
3. Left click the **Open Selected** button.



When a new lap is opened, no additional graphed data will appear in the Main Graph area. The user must “activate” the new lap. To do so:

1. Place the mouse cursor over the just opened Lapfile tab and left click.
2. Data can now be graphed.

In essence, that is all that is required to overlay graphed data. To graph data from multiple laps, simply continue opening Lapfiles, and graphing data. To graph data from multiple test runs, open the desire Runfile, open the desired Lapfile and graph the data. The only limit to the number of files that can be opened and graphed depends on the memory capabilities of the users PC.

Remember, to change the graph color of a particular channel, keep the mouse cursor over the Channel Button and continue to left click, until a desired color is obtained.

Advanced features of the DataLink II Software

At this time, the user should now be familiar with the basic skills necessary to create, download and review data. The following sections will review the advanced features of the DataLink II software. This information is intended to provide details concerning steps that can be taken to enhance the review of data, which in turn will assist in improving driver performance. None of the information is difficult to learn, or requires an extensive amount of time.

Runlog Pages - Data Comparison in Report Format

The previous section concerning speed and segment time review provided view of Runlog pages. When the DataLink II software was created, one of the goals was to provide the ability to compare data in a report format. Users not familiar with studying data graphs will appreciate data presented in a report format. To activate the data contained within a Runlog page, the user must first open a lap. As soon as the lap is open, any lap specific data is displayed within the Runlog page.

For example, to activate the data contained within the Segment Compare Runlog page:

1. Open a lap
2. The Segment Data will now be in view, at the bottom of the Runlog page.



This information reflects the minimum, maximum and average of the current “active” file. Remember, a file is made “active” by placing the mouse cursor over that particular file tab and left clicking.

Next, open a second lap. To activate the minimum / maximum / average data for the newly opened lap, simply place the mouse cursor over the Lapfile tab and left click. Notice the data change from the previous to the currently active lap.


Suppose we would like to compare the minimum, maximum and average data, or maybe view a comparison of segment times between two laps. This is possible, by assigning Reference and Main status for two files. Remembering that we can have many files open at one time, the question of how to “tell” the software which two files we wish to compare is answered through the use of Reference and Main files. This solution is extremely easy to use and take just seconds to perform.

Reference and Main Settings for Runlog Data Comparison

Insure at least two Lapfiles are open. To assign the Reference and Main status to two laps, in order to provide comparison data with the Runlog pages:

1. Select any open lap as the Reference by placing the mouse cursor over the desired Lapfile tab clicking the center button on the mouse.

If you are not using a three button mouse, it will be necessary to go to the File Command in the Main Menu and select the Set Reference File / File command.

This action will turn the Lapfile tab **red**  .



2. Select any second lap as the Main file by placing the cursor over any other desired Lapfile Tab (other than the just selected Reference file) and left clicking.

Now, look again at the min, max and average data located below the track map on the Lap Zoom Runlog page. The above action should activate the comparison between Lap 1 and Lap 3.

There is no set method for selecting Reference / Main files. It is at the users' discretion to determine which files will receive the Reference and Main settings. Either selection can be assigned to any open file, by using the above instructions. The only item that must be remembered is to always select the Reference file first, then the Main file second.

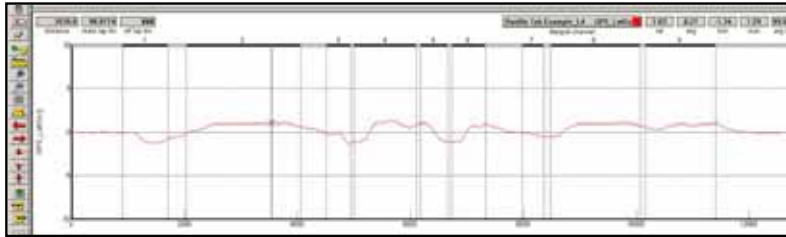
While it is not necessary to select Main and Reference settings to graph and view data, it is necessary to perform the above actions in order to compare data in the Runlog pages.

Graph Scaling Explained

Racepak technicians assign each channel a default minimum and maximum graph scaling value. As shown, GPS_MPH is set to graph data between 0 and 200 MPH.

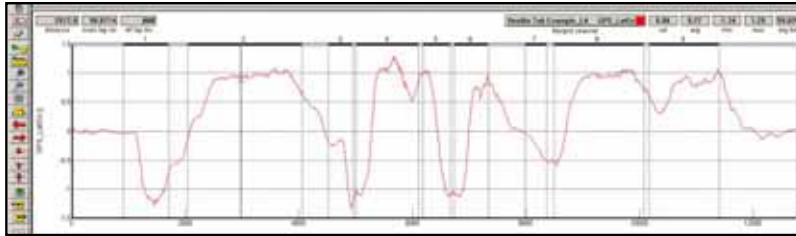
When testing/racing at various locations, different values are obtained. For example, the MPH obtained on a one mile track would be slower than the MPH obtained on a two mile track. If the MPH scaling was set to graph between 0-100 MPH, but 150 MPH was obtained during the run, the MPH trace would go off the top of the graph, thus the importance of graph scaling.

Let's take a moment to discuss graph scaling. The visual rise and fall of graphed data is determined by the scaling values. To provide a graphic example, look at the following two graphs. Both are the same GPS_LatGs data, but with different scaling values.



Scaling:
-10 to 10

GRAPH A



Scaling:
-1.5 to 1.5

GRAPH B

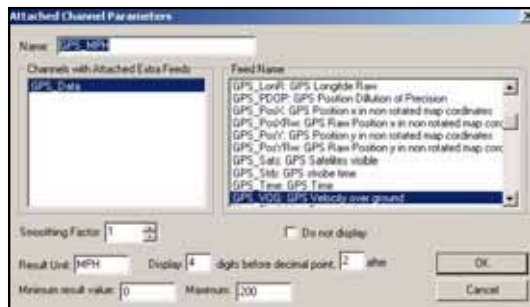
Upon first glance, the data appears to be totally different channels. What appear to be small changes in GPS_LatGs in **Graph A** suddenly become quite large and detailed changes in **Graph B**. To improve performance using data acquisition, it is important to keep scaling values close to the minimum and maximum values of the channel. It is very important to insure the same scaling values, for the same channels are in place. If the above two channels with different scaling values were overlaid, the user could easily interpret the data in an incorrect manner. Remember, the above data is the same channel from the same lap, but with different scaling values.

Graph Scaling Values Changed per Channel

The DataLink II program provides two methods to change graph scaling. The first method will change the scaling for one channel within one file.

To change individual channel scaling:

1. Place the mouse cursor over the desired Channel Button and right click the mouse button. For this example, we selected GPS_MPH.
2. The Edit Dialog Box for that channel will be displayed.



The Minimum and Maximum result values correspond to the minimum and maximum values displayed in the Main Graph area, for that channel.

3. To set the graph to display from 0 to 100 MPH, simply enter the minimum and maximum values accordingly.
4. Select OK

Chart Scaling Sets - Universal Scaling Settings

The preferred method of graph scaling involves the creation of a Chart Scaling Set. A Chart Scaling Set is universal, in that it has the ability to override all current scaling values and insert user defined values. The Chart Scaling Set applies the values to all selected channels, for all files, until removed by the user.

1. Select Settings, then Select Chart Scaling Set from the Main Menu selection. The following dialog box will be displayed.



2. Enter the name you wish to call the new scaling set into the text entry box located directly below the Select Name heading. For the purpose of our example, we will use the name "New Scaling".
3. Enter the name of the channel and the minimum and maximum graph values to be displayed. For this example we will rescale the GPS_MPH data channel to graph from 0 to 100 MPH. The data will be entered as shown below.



4. Select the **Insert** button to accept the rescaling values. The dialog box will appear as shown below:




5. Enter the remaining data channels to be rescaled in the same manner.
 6. When you are finished, select the **OK** button.
- To load a Graph Scaling set for use:
1. Select Settings, then Select Graph Scaling Set from the main menu selection.
 2. Select the name of the desired scaling file to use by positioning the mouse cursor over the name of the Scaling Set and click the left mouse button, then select the **OK** button.

NOTE: Channel names must be entered exactly as they appear on the Channel Button


Creating Graph Sets for Display - Quick Graphs

Previously, we graphed data by placing the mouse cursor over the desired data channel and left clicking. Often times, users will find the need to graph the same set of channels, each time data is reviewed. It is possible to “build” graph sets that when selected, will automatically graph the desired channels. These files are called Quick Graphs. To create a Quickgraph:

1. Erase all graphs by double clicking the Clear All Graphs icon 

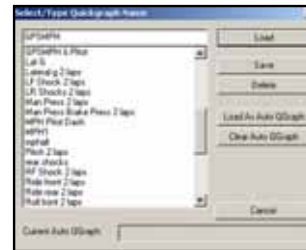
2. Graph the desired channels, in the desired colors.

At this time, we have pre-set the channels and colors we wish to save as a Quick Graph. To name and save the Quick Graph:

1. Select the Quick Graph icon  in the DataLink toolbar.

2. Enter a name for the Quick Graph. For this example, we used GPS_MPH.

3. Next, click on the Save button to save for later use.



We have now created and saved a Quick Graph. To recall a graph set for use:

1. Double click the Clear all Graphs icon  in order to remove all graphed data from the Main Graph area.

2. Select the Quick Graph icon  in the DataLink II toolbar.

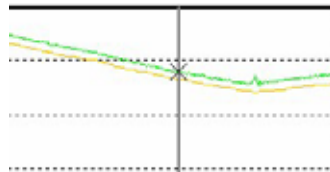
3. Select the desired Quick Graph name.

4. Select the **Load** button.

The graphed data should automatically load, into the Main Graph area.

How to Determine the Currently Graphed and Active Channel

When graphing and reviewing multiple channels, the location of the mouse cursor in the Main Graph area is indicated by an **X**. The **X** represents the channel that the mouse cursor will follow, when moving left and right in the Main Graph area. As previously discussed, the Channel Buttons display the current values for each channel, according to the cursor position in the Main Graph area.



To determine which channel the **X** is following, simply look at the Channel Grid Display, found at the top, right corner of the Main Graph area. In addition to noting the current active channel, the Channel Grid Display can also provide:

G2X Demo_L4	GPS_MPH		85.79	88.59	54.51	122.43	99.0207
file/grid channel			val	avg	min	max	avg time

1. Val: The current channel value, according to cursor position in the Main Graph Area
2. Avg: The average value for the active channel. This is determined by averaging the values for the channel as displayed in the entire Main Graph area.
3. Min: The minimum value obtained, over the entire Main Graph area
4. Max: The maximum value obtained, over the entire Main Graph area
5. Avg Time: The average time period for the entire Main Graph area or as determined by placing average cursors in the Main Graph area.

To move (toggle) the mouse cursor to the next graphed channel:

1. Place the mouse cursor over the Channel Grid Display.
2. Left click the mouse button. This action will update the Main Graph scaling to reflect the next graphed channel shown in the Channel Grid Display. Continue left clicking to toggle through all graphed channels. The TAB key on the keyboard will also perform the same function.

Averaging Data Using the Averaging Cursor Action

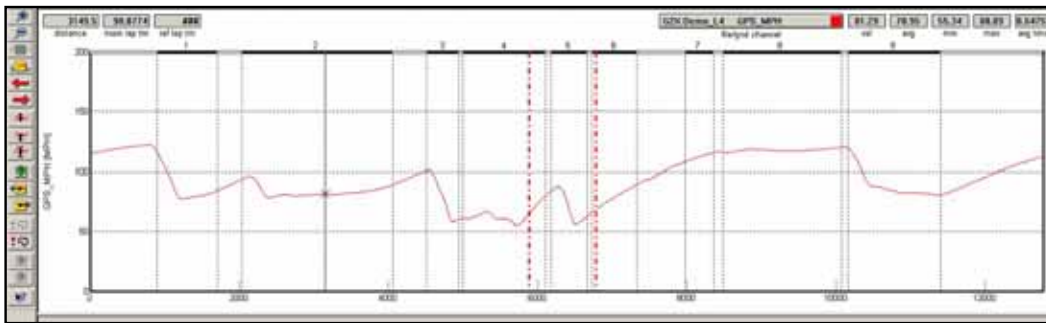
The DataLink II software will automatically calculate average channel data, according to the beginning and ending data displayed in the Main Graph area. There are times however, that a detailed look at data in a particular area is desired. This can be accomplished by placing Averaging Cursors within the Main Graph area.

With this action, the DataLink II software will provide minimum, maximum and average values for data only between the Averaging Cursors. To perform this action:

1. Move the graph cursor to the desired starting point and press the [key on the keyboard. A vertical bar will be displayed on the graph.
2. Move the graph cursor to the desired ending point and press the] key on the keyboard. A second vertical bar will be displayed on the graph.

The Channel Grid Display will now be updated to show the current, average, minimum and maximum values between the two Averaging cursors. To view the average values of other graphed channels simply press the Tab key or move the mouse cursor over the Channel Grid Button and click the left mouse button as described above.

To remove the averaging cursors from the display simply press the [key and then the] key without moving the graph cursor. The Averaging Cursors will be removed.





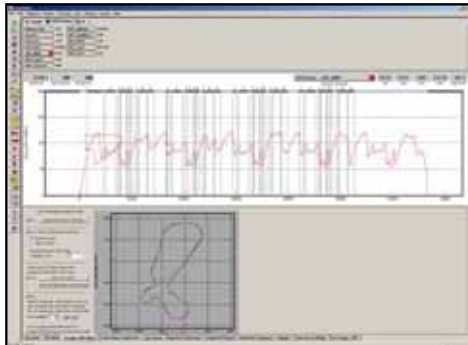
Graphing Data from an Entire Run

There are occasions when it is necessary to review all of the data created during one test outing on the track (Runfile). Data from a Runfile may be graphed the same as data from a Lapfile.

Often times, changes that occur are often easier to detect when reviewing the entire Runfile, as opposed to reviewing only one lap of information.

To graph Runfile data:

1. Double click the Clear all Graphs icon  in order to remove all graphed data from the Main Graph area.
2. Left click over the desired Runfile tab.
3. Graphed the desired channel.
4. Left click the Autoscale icon, located in DataLink II icon list 
5. The screen should appear as below.



As can be seen, the entire GPS_MPH, from start of logging until end of logging, can now be reviewed.



Zoom Command

The Main Graph area as previously described displays an entire lap on the display screen. In many instances you may wish to zoom in on a particular area for a detailed analysis. Two methods are available.



The first method is to create a zoom box using the right mouse button. To do so:


1. Determine the desired zoom area of the Main Graph.
2. Place the mouse cursor in the upper right corner of the desired zoom area.
3. Hold down the right mouse button and drag the zoom box over the desired zoom area. Release the right mouse button.
4. Time / distance or data channel scaling is zoomed according to what portion of the graph is included in the zoom box.

The second method is as follows:

1. Place the mouse cursor at the center of the graph region to be zoomed.
2. Left click the Zoom In  icon or the Zoom Out  icon in the vertical toolbar. The graph region will zoom in or out accordingly.

Once you have zoomed in on a section of data, you may also want to shift either to the left or right to view additional data without changing the current zoom settings.

1. Click on the Shift Left  or the Shift Right  icon in the RacePak Chart data toolbar to move the displayed graph region left or right.

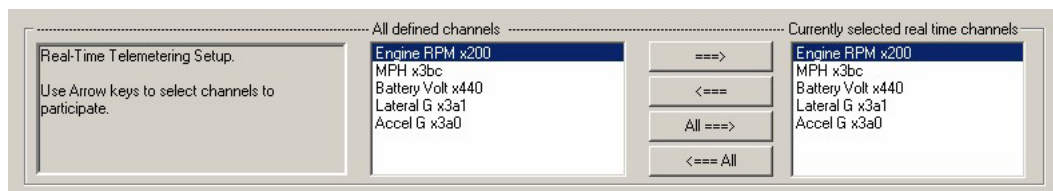
To reset the main Graph region back to displaying an entire lap, click on the User Scale  button in the Datalink II data toolbar.

At this time, we have covered the basic instructions concerning the installation, programming, on track usage and downloading and graphing of data.

Viewing Real Time Data (Telemetry) on your PC

Data from your data logger can be displayed and recorded real time on your PC computer using the DataLink II program. A telemetry session is regarded much the same as a data file from an on-track run. The user will be presented with many of the same procedures that are utilized when downloading on-track data from the Compact Flash memory card.

Telemetry is accomplished by connecting the Communication Serial cable to your PC, via a serial port or USB / Serial port adapter and the opposite end to the logger. Before you can view the data, however, you must first setup the real time parameters in your data logger. To setup your data logger's real time Configuration, open your Configuration file and right click on the G2X Pro Module channel button. An edit dialog box will be displayed. In the center of the dialog box will be a Real – Time Telemetry Section as shown below.



Setting up the Logger Real Time Telemetry Parameters

This section will contain two lists. The list on the left-hand side of the telemetry section will include all of the data channels currently being monitored by your data logger. The list on the right-hand side of the telemetry sections includes all those channels that will be displayed during a real time telemetry session. To add a channel to the telemetry list:

1. Highlight the name of the channel in the left-hand list and click on the right arrow → button to add the selected channel to the real-time channel list.
2. To remove a channel from the real-time channel list highlight the name of the channel in the right hand list and click on the left arrow button ←. Remember that only channels in the right hand list will be displayed during a real time telemetry session.
3. Use the All → button to select all of the channels for telemetry. Select ← All to remove all of the channels from the telemetry list
4. Next select the Real Time Sample Rate from the options list in the lower left-hand corner of the dialog box and select the desired real time sample rate as shown below;



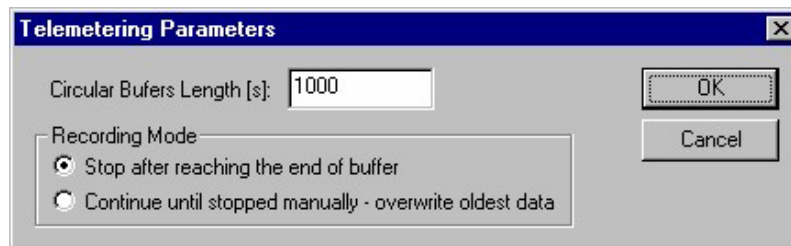
Note: The V_Net Sample rate of each of the modules to be monitored should be equal to or greater than the real time sample rate. If they are not, the last data points will be repeated during the sample process.

Next select the Real Time Communications Port option and type in the name of the serial communications port on your PC you will be using to receive the real time data from the V_Net system. Normally this is the same as the default Logger Com Port set in the initial software installation. Typically, this is COM 1.

After you have edited the options use the Send Configuration button to transmit the setup data to your data logger. Next select OK to exit the edit box. You will need to turn the power to your data logger off and back on to allow the changes to take effect. When you have completed the edit, save the Configuration file by clicking the Save icon in the toolbar or selecting the Save menu item located in the File main menu selection


Entering the DataLink Telemetry Parameters

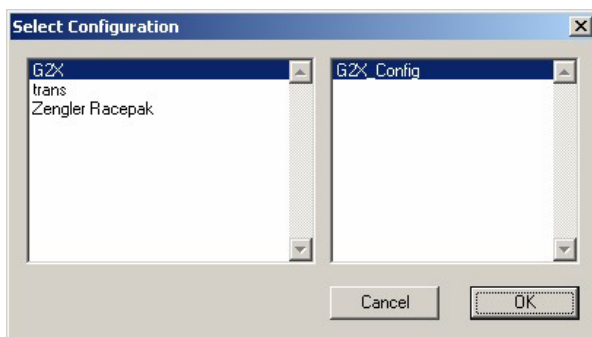
The final step in setting up the real time telemetry session is to set the DataLink II real time recording parameters. These parameters are set by selecting the Recording Parameter menu item found in the Telemetry main menu selection. The following dialog box will be displayed.



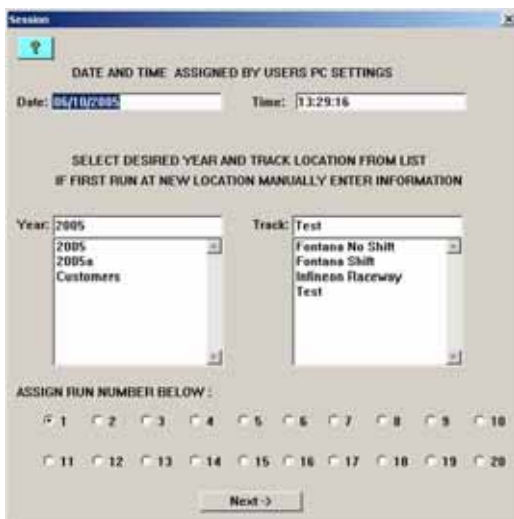
The first parameter Circular Buffer Length is used to set the amount of data to record in seconds. The Recording Mode is used to determine whether the recording will stop when the maximum record time is reached or whether the oldest data will be overwritten. For example if a Circular Buffer Length of 1000 seconds is entered and stop after reaching end of buffer is selected, the program will record data for 1000 seconds and stop. If continue until stopped manually- overwrite oldest data is selected the program will continuously record until stopped by the operator. Only the last 1000 seconds of data will be stored.

Starting a Telemetry Session

The next step is to start a telemetry session. Select the Telemetry icon  or the New Telem. Session menu item located in the File main menu election. A dialog box, as shown below will be displayed and you will then be asked to select the Configuration file to use for this session.



Select your configuration file. A dialog box will then be displayed to allow you to enter the session information (the same as when uploading run data). Enter the appropriate year, track, race type, and race sequence information as shown below. The system will enter the date and time.



If you need help in completing the dialog box, select the Help icon located in the upper left-hand corner of the dialog box.

Select Next. Additional dialog boxes may be displayed. These are part of the Runlog sections that are user programmable to allow test information to be entered during the download process. Complete the information as appropriate.

The File Save dialog box will then be displayed. Select the Cancel button. Typically, there is no need to save a telemetry file. A new file tab with the channel data will be opened. Your real time data session is now ready.

Next, insure the serial communication cable is connected between the data logger and the serial port on your PC selected above and power is supplied to the logger. The real time session is controlled via two icons located above the context sensitive help icon in the left side tool bar. Only one icon will be active at a time depending on the status of the telemetry session. The Start Data Acquisition icon is shown active on the left. The Stop Data Acquisition icon is shown active on the right.



Start Data Acquisition - Green Light



Stop Data Acquisition - Red Light

To start the real time data acquisition, left click on the Start Data Acquisition Icon at the bottom of the tool bar. The data acquisition will start at time 0. Once the real time data acquisition has been started the value of the data channels will be displayed next to the channel button in the top portion of the display area. To display the data from a channel on the graphics screen simply select the channel by left clicking on the channel button in the same manner you display data from a recorded file.

To stop the data acquisition left click on the Stop Data Acquisition icon located at the bottom of the tool bar. The real time data acquisition session will be suspended.

If you wish to continue the real time data acquisition simply click on the Start Data Acquisition icon. The telemetry session will restart at the same point it was suspended. If you wish to restart the session from the beginning select Erase from the Telemetry main menu. All previously recorded data will be erased from the file.

If you wish to save the data, stop the data acquisition and click the Save icon located in the tool bar or select Save located in the File main menu.

Important: When a telemetry session is started, the G2X remains in the Telemetry mode until power is removed from the unit. If you wish to change the Configuration of the G2X once a telemetry session has been started, stop the telemetry session as described above and then cycle the power to the G2X data logger.

Troubleshooting and FAQ

The G2X Pro is designed to provide trouble free performance. At times, problems could be encountered that may affect data. We have attempted to provide answers for some of the most common questions and problems.

No Data Obtained During Run

The G2XPro utilizes GPS MPH greater than 25 MPH to initiate logging. If there is no GPS data, the data logger can not initiate logging. Insure the GPS cable is connected or has not been damaged due to side window or door closing on the cable. Insure the GPS antenna is mounted on the roof or top of the vehicle. Insure the Compact Flash card is not removed, until 30 seconds following the stopping of the vehicle. Insure at least three satellites are acquired, before starting the run. If a different channel has been selected to start logging, insure it is functioning correctly.

Download Error Received When Download is attempted

Insure the PC is not allowed to go into “Sleep” or power save mode. Often, this action will cause the USB port to become unavailable, after the computer is brought back from sleep mode. To prevent this action on the users PC:

1. With no programs open, place the mouse anywhere in the desktop area, right click the mouse and select Properties / Screen Saver / Power commands.
2. Select Never for Turn Off Monitor / Turn Off Hard Disks / Systems Standby.
3. Save this setting as Trackside in the Power Scheme window. Each time the data system is utilized, select this Power Scheme setting and the computer will not “Sleep”.

User’s PC will not communicate with the data logger, using the serial cable

Verify the correct COM port of the user’s PC is selected. To perform this procedure:

- A. Minimize the DataLink II program and select the Start button located in the bottom left area of your computer display.
- B. Select the Control Panel icon located in the small window.
- C. Select System in the small window.
- D. Select the Hardware tab located in the just opened Systems Properties window.
- E. Select the Device Manager button located in the center/right of the Hardware page.
- F. Locate the Ports (COM & LPT) in the currently opened list and double left click.
- G. You will now see Communications Port (COM 1) or the appropriate COM number for your system.

Does GPS Always Work?

While GPS produces excellent data, no system is perfect. If the data logger is unable to acquire at least three satellites, data will not be useable. There are conditions that can affect signal reception.

1. Driving through a tunnel or any location that will hide or shroud the GPS signals.
2. Driving through an extensive row of trees, or other natural or man made objects that might shroud signal reception for an extensive period of time.
3. Natural or man made obstructions, such as walls, signs, etc.

Will Rain Affect the GPS Signal?

We have not encountered an affect from rain, in our on track testing and usage. Again, there could be some type of severe conditions that could affect the GPS signals.

Can I Acquire Elevation?

If the G2X Pro has acquired 4 satellites, elevation is available.

Does the Loss and Gain of Satellites Affect the Data?

No, as long as the GPS satellites remain at 3 or above, the DataLink II software compensates for signal change.

Speed Accuracy?

In typical usage, the speed accuracy is approximately .50 MPH / .1 KMH. This number represents the upper end of the accuracy statistic and would have no effect on data review. In reality, how many drivers can detect a change of ½ mph, in high performance driving situations?

Laptime Accuracy?

In multi-year testing of G2XPro vs. trackside beacon lap times, a maximum variance .05 has been noted. GPS based lap times are dependant only upon vehicle location, and can not be affected by sunlight, signal blockage from other vehicles, power loss to the transmitter, or other problems associated with trackside transmitters.

GPS Data Does Not Start Until Later in the Run

If the vehicle is not outside and stationary before a run, the GPS system will have difficulty locating the position of the vehicle. If the vehicle is moving before locking onto at least three satellites, it will take a longer period of time into the run, before GPS data is gathered. Always insure at least three satellites are located, before moving the vehicle.

Track Mapping Accuracy?

GPS created track maps are created from vehicle position. The characteristics of GPS signals are such that the vehicle position accuracy is relative to the period of time the vehicle is in motion. For example, during an on track period of 10-15 minutes, the true vehicle distance could vary a distance of less than 12". Over a period of hours, the worst case scenario for vehicle location to vary is 9 feet. However, the Racepak software is capable of providing corrections to the data, in order to bring the accuracy within acceptable limits. GPS track mapping is capable of producing accurate track maps from courses that combine highly bank and extremely flat areas (such as the road course at Daytona) without the typical problems associated with inertia based mapping.

Can I install a larger Memory Card?

Yes, it is OK. A 128MB card can store over 30 hours of GPS data.

How can I email a Runfile or Trackmap?

Runfiles are contained in the following directory:

C:\RacepakData\G2XPro\Year\Track

Track maps are contained in the following directory:

C:\RacepakData\GPSMaps

Runfiles and track maps may be emailed the same as any other email attachment, such as photos, Word documents, etc. It is suggested to first ZIP either, before attaching to the outgoing email. Emailed Runfiles and track maps should be placed in the same directory, by the recipient.

Should multiple users comparing data from the same track, use different track maps?

No, if multiple G2X Pro users are at the same track and desire to compare data, it is best for one user to create the map, and share between all users. This assures the ability to accurately compare segment times.

Lap times displayed on the dash vs. lap times from the track map?

In terms of accuracy, nothing. The point to remember is the setting of start / finish using the display dash is the same as passing a beacon transmitter, on the racetrack. However, when a track map is created, it is still necessary to located the start / finish area in the Datalink II Create GPS Map Runlog page. The main advantage of setting start / finish with the dash is the ability to instantly receive laptime data from the display dash, along with viewing laptimes in the Datalink II software. In addition, it makes it possible to graph the Lapmarker channel, in the Datalink II software. The Lapmarker channel will display a vertical mark, each time the vehicle passes the start / finish area, in graphed data.

I can not set Start Finish with the dash?

After the Set SF message is brought up on the display, attempt to set the start finish point within less than 1 minute. Best results are obtained by setting within 30 seconds.

I lose satellites when I start to accelerate on the track?

This is typically related to ignition interference. If the GPS data works at idle and driving slowly but is lost when the car accelerates, review the routing of the antenna cable. Typically, when the engine accelerates and the GPS antenna cable is routed near ignition components, the GPS data can be knocked offline by the electrical interference. Reroute the cable to insure no interference.

My data appears incorrect after downloading?

Insure the data logger is given time to complete the writing process to the memory card, before turning power off to the logger. This can affect data.

Vnet Sensor Channels “Flat Line” during portions of the run

If a Vnet channel is subjected to excessive electrical interference, the channel will shut down for a period of time, then re-set and start logging again. Insure none of the Vnet modules or cables are against or in the immediate area of ignition system components.

Vnet Sensor Channels disappear from Channel Button area

Insure no part of the Vnet system was disconnected while the data logger was powered on. If this occurs, it will be necessary to connect the user PC to the data logger and “Read” the system. If the system fails to see the modules, the channels are assumed to not exist and data will not be gathered.

Graphed data drops to the bottom of the graph, during a run.

Check battery voltage. Low battery voltage can affect all channels. If the data logger is not receiving at least 10 Volts, all data will be affected.

Excessive noise on graphed channels

Again, electronic interference can create spikes in graphed data. Refer to the above.

Spikes or drop out in Wheel RPM graphed data

The location of the sensor relative to the trigger point can create spikes or dropouts in data. If the data displays spikes, the sensor is too close to the trigger point. If the data displays drop outs, the sensor is too far away from the trigger point. Adjust according to the instructions included with the wheel speed sensor.

Wheel RPM / Engine RPM graphed data appears high or low

Both Wheel RPM and Engine RPM rely on calibration values input by the user. If the incorrect numbers of pulses are entered for either, the graphed data will appear incorrect.

Beacon lap times are not received

1. Insure the Beacon Transmitter is fully charged.
2. Insure the Beacon Transmitter is no further than 50' from the vehicle, if possible. The transmitter will work up to 75', but best performance is achieved around 40'.
3. Insure the Beacon Transmitter is at the approximately same height as the on-board Beacon Receiver, and facing the vehicle as it passes by.
4. Insure the Beacon Receiver is correctly positioned on the vehicle. Much the same as a television remote must be aimed towards the receiver in the television, so must the Beacon Receiver must be aimed towards the Beacon Transmitter. The receiver must be mounted flat, at a 90 degree angle to the direction of travel. Insure there no items shielding the view of the receiver.
5. Do not mount the receiver facing forwards or rearward.
6. Insure the Beacon Transmitter and Beacon Receiver are correctly programmed.

Conclusion

We hope this manual has proved helpful to your entry into the usage of a Racepak data system. While the knowledge gained from our data system will provide beneficial to any race team, it is the desire to commit the time and effort to learning how to utilize the system that will prove most beneficial.

As with any endeavor, the work invested in properly learning the usage of the system will pay dividends in the data the system will return. There are a variety of books available, concerning the data analysis. Take time to locate the books and spend time learning the art of data analysis. Most teams have discovered that once a data system is installed, the ability to produce effective test data without a system is nearly impossible. The gains in all forms of motorsports within the previous fifteen years can be directly attributed to the growing usage of data acquisition.

As always, if there are any questions concerning any aspect of the system, please feel free to contact the Racepak support personnel at 949-709-5555.

Thank you,

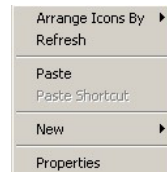
Racepak Data Systems

Appendix I – G2X Demo

PC Screen Resolution Settings:

Before reviewing the demo data, it is helpful to verify the PC screen resolution is set to the highest possible level. Doing so insures that all icons are visible. In addition, the greater the resolution, the better the graphed data will appear. For some users, higher screen resolution can create smaller Desktop Icons. This can also be adjusted, following the screen resolution change.

1. Close the Datalink II program
2. Place the mouse anywhere in the desktop area and right click
3. Select Properties in the dialog window



4. This action will open the Display Properties dialog window.
5. Select the Settings tab.
6. Place the mouse cursor over the Screen Resolution slider and move until a setting of 1024 x 768 or higher appears.
7. Select Apply
8. Select OK



If the above settings create small desktop icons, it is possible to adjust the size of the icons. To do so:

1. Utilizing the above dialog window, select the Appearance tab.
2. The Font Size may now be adjusted to user Reference, from within this area.





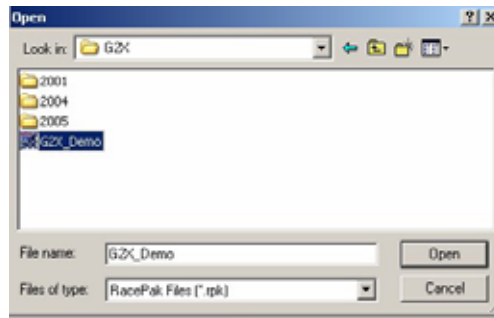
Opening the G2X_Demo Runfile:

In typical usage, the G2X starts the recording process when a pre-set number is obtained, for a given channel. For example, recording can start when the GPS MPH exceeds 25. All data gathered from that start point until the vehicle returns to the pit area is referred to as a Runfile.

Upon downloading of the new data, a Runfile is created. Each Runfile is identified by a group of letters and numbers that reflects the car number, track location, date and time of the data download. Within the Runfile is contained all the laps (if lap type testing was conducted) from that particular test outing. Remember, test data can consist of laps, acceleration tests, lateral g and accel g tests, or any variety of information the user desires to obtain. Multiple files can be opened, in order to overlay and compare graphed data.

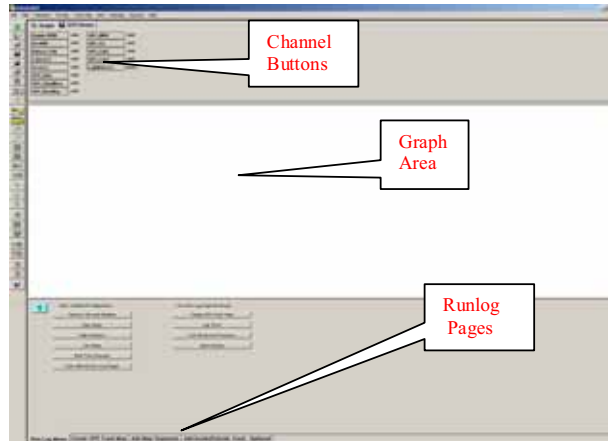
For demo purposes, the Runfile we will use for review will be called G2X_Demo. To open this Runfile:

1. Open the Datalink II program 
2. Select File and then select Open, in the main menu area at the top of the Datalink II page. It is also possible to open a file by utilizing the Open icon, located in the icon toolbar on the left side of the Datalink II software. 
3. Locate the G2X folder.
4. Open the G2X folder. Within this folder will be located the G2X_Demo Runfile.
5. Place the mouse cursor over the G2X_Demo Runfile and left click.
6. This action will open the Runfile into the Datalink II software



Adjusting the Screen Sections:

Your PC screen should now display the following (less the callout boxes added for manual clarity):



Upon opening of the above Runfile, it will be necessary to adjust the horizontal size of the Channel Button, Graph and Runlog page area. To do so:

1. Place the mouse cursor on the border between any of the three areas. The mouse cursor will change to up and down arrows.
2. Next, hold down the left mouse button and drag the horizontal line separating each area either up or down, according to the need. The size of each area can be pre-set, according to the user's preference. That subject will be reviewed at a later time.

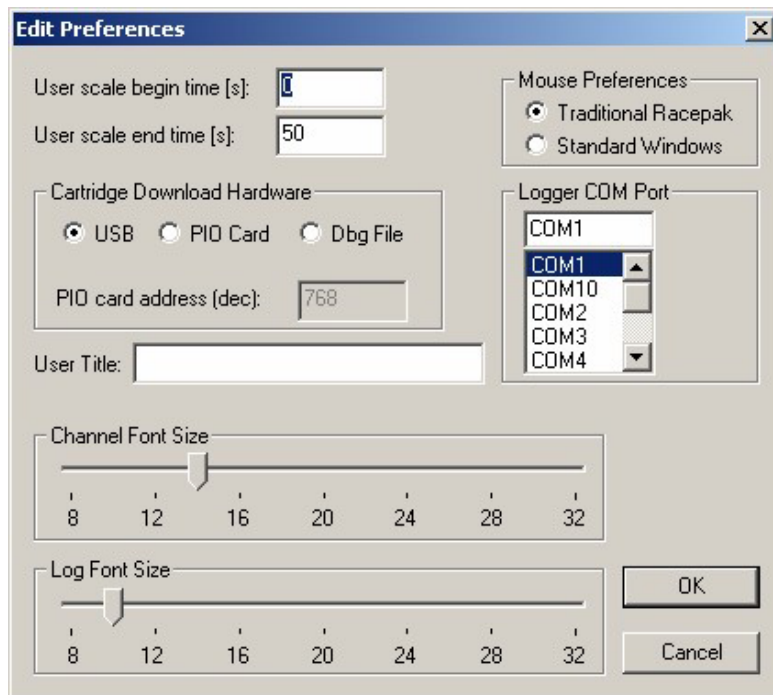
The screen is divided into three sections:

1. Channel Buttons: A Channel Button is a visual representation of every data channel with valid data and provides **real time** values for each data channel.
2. Main Graph: As data channels are selected, the graph will appear in the main Graph region, with the graph color corresponding to the Channel Button color box.
3. Runlog: This section is a combination logbook, spreadsheet, database and graphical analysis area. Each tab at the bottom of the screen represents a separate page. Runlog pages are factory designed analysis pages, charts, graphs and screens that eliminate the "paper trail" commonly found in all forms of motorsports

Adjusting On-Screen Font Size:

The on-screen font size of the Channel Button and Runlog areas may be enlarged or reduced, to suit the users needs. To adjust the size:

1. Select Preferences, then Settings from the Main Menu. The following dialog box will be displayed.




2. Adjust the Channel Button font and Runlog font through use of the slider bar located below each heading, according to the user's preference.

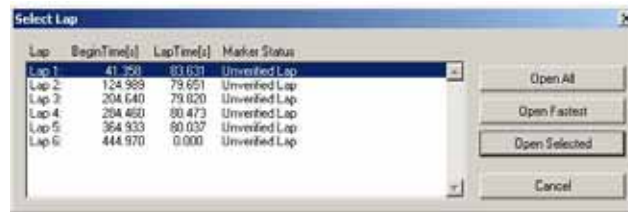
Now that the initial on screen appearance changes are complete, we can now proceed to opening and reviewing data.


Opening a Lap:

At this time, the G2X_Demo Runfile should be open. The Datalink II software saves individual lap data, with corresponding laptimes (called a Lapfile) within the Runfile. Simply worded, a Runfile is a folder with all the laps placed inside.

To open a lap:

1. Place the mouse cursor over the G2X_Demo tab  and Right click.





2. Left click the Open  button. The fastest lap (2) will now be displayed, as shown below.

All of the data channels that were active during this test run are now in view in the Channel Button area. However, no graphed data will appear, until the user selects any of the Channel Buttons, as discussed in the next section.



Referring back to the above Select Lap dialog window, laps can be opened by three different methods:


1. Open All: This will automatically open all laps contained within the Runfile
2. Open Fastest: This will open only the fastest lap.
3. Open Selected: This will open one lap, as selected by placing the mouse cursor over the desired lap and left clicking.

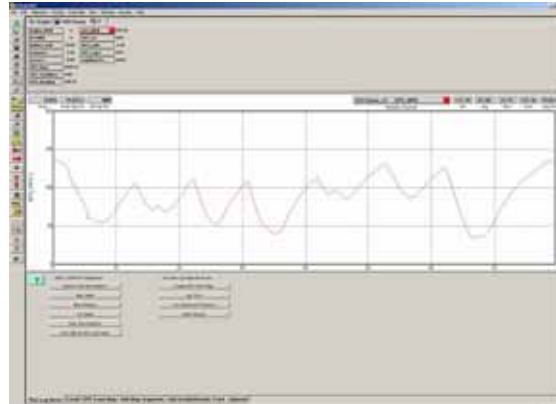
A Runfile is indicated by the  blue disk icon and a Lapfile is indicated by the  blue track map icon, along with the corresponding lap number.

Graphing a Data Channel:

The next step is to graph data on the Datalink II screen. We will begin by graphing a single channel, the GPS_MPH.

To graph a single channel:

1. Place the mouse cursor over the GPS_MPH Channel Button.
2. Left click the mouse button. The GPS_MPH Channel Button will now have a color box displaying the color of the data graph that is now in view in the main Graph window.
3. To insure the entire lap is displayed, select the User Scale button  in the DataLink toolbar.

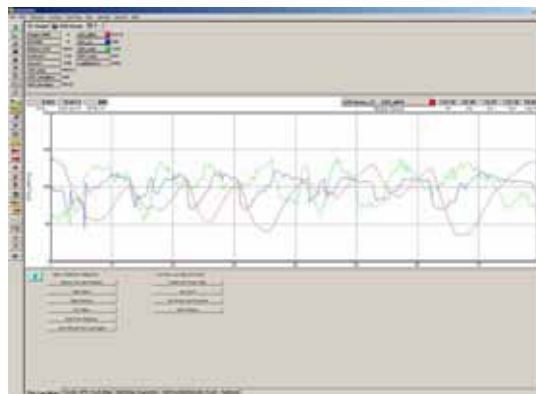


The data now in view represents the GPS_MPH as recorded for one lap. The numbers located at the bottom of the graph represent time, from the start / finish line. When a data channel is graphed, all of the values for the remaining data channels are now activated. To review the data:

1. Place the mouse cursor in the main Graph window and click the left mouse button.
2. With the mouse cursor in the main Graph window, click and hold the left mouse button and drag the cursor left and right. Observe the Channel Buttons while dragging the cursor. Data is updated real time, relative to main Graph cursor location. The Left and Right arrow keys can also be used to move the cursor in a similar manner.

To graph additional channels:

1. Place the mouse cursor over the GPS_LatG Channel Button and click the left mouse button.
2. Add a third data channel by repeating the same process for the GPS_Gs Channel Button.



To remove a data channel from the graph, simply left click over that channel. To change the color of a channel, continue to left click until a desirable color is located.

Viewing Data in Distance Mode:

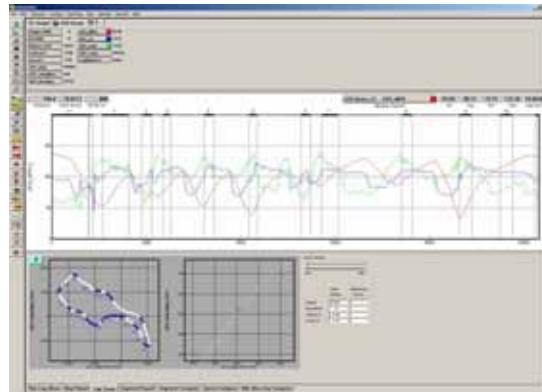
In order to produce a graph, a comparison must take place. In the previous example, the GPS_MPH was compared to time, which begins and ends at the start / finish line. The time into the lap, according to the position of the mouse cursor in the Main Graph area is provided by the Cursor Position Box . In certain applications, it is often more useful to compare the data to distance from the start / finish line.

To place the Main Graph area in distance mode:

1. Select View in the DatalinkII main menu selection and then select the Segment X Mode option.

You will note the numbers along the bottom of the graph now display distance (feet) around the track and the top of the graph is now broken into track segments as defined by the track map. Track map segments provide a quick view of vehicle location, as defined by the track map. To view the GPS track map created for this test session:

1. Locate and left click the Map Analysis button located in the Run Log Menu page
2. Select the Lap Zoom Runlog tab, at the bottom of the screen.
3. Insure all data is in view. If necessary drag the area between the Graph and Runlog area upward, as reviewed in the Adjusting Screen Settings section.



In addition the Cursor Position Box located in the upper left hand corner of the main Graph region now displays the cursor position in feet into the lap rather than time.

Graphing Multiple Files (Overlay):

At this point, we have reviewed the basics of how to open and graph a single file. We will now review how to open, graph and compare two files. Multiple files can be viewed simultaneously using the DataLink II software.

The G2X_Demo Runfile should still be in view, with Lap 2 open. To open another lap for review:

1. Place the mouse cursor over the G2X_Demo tab and right click.
2. Select Lap 1 by left clicking over Lap 1.
3. Left click the Open Selected button.



Since we previously had graphed GPS_MPH, GPS_LatG and GPS_GsAccel from Lap 2, that data will remain graphed. However, no data from Lap 1 will appear in the Main Graph area, until selected. In order to “activate” Lap 1 for graphing:

1. Place the mouse cursor over the Lap 1 tab and left click.
2. Now graph the GPS_MPH, GPS_LatG and GPS_Gs.

In essence, that is all that is required to overlay graphed data. To graph data from multiple laps, simply continue opening Lapfiles, and graphing data. To graph data from multiple test runs, open the desire Runfile, open the desired Lapfile and graph the data. The only limit to the number of files that can be opened and graphed depends on the memory capabilities of the users PC.

Remember, to change the graph color of a particular channel, keep the mouse cursor over the Channel Button and continue to left click, until a desired color is obtained.

Remove a Data Channel from the Graph Area (Erase):

To remove all of the graphs currently displayed, double left click on the Clear All Graphs icon (white eraser) in the Datalink II toolbar.



(Do not erase the currently graphed data, as we will use it in the following sections)

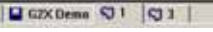
Data Comparison in Report Format (Runlog Pages):

When the Datalink II software was created, one of the goals was to provide the ability to compare data in a report format. Users not familiar with studying data graphs will appreciate data presented in a report format.

We currently have the same three channels (GPS_MPH, GPS_LatG and GPS_Gs) graphed from Lap 1 and Lap 2 and the LAP ZOOM page in view. By selecting the Min Max Avg Compare Runlog tab, notice the Minimum, Maximum and Average data now in view.

COMPUTED FOR CURRENT LAP					COMPUTED FOR REFERENCE LAP				
Run:	Lap:	Time:			Run:	Lap:	Time:		
CDR	AVG	MIN	MAX		CDR	AVG	MIN	MAX	
Speed	21.31	27.38	23.76	32.78					
Engine RPM	0	0	0	0					
Latent G	0.36	0.33	-2.37	-1.79					
Axial G	0.36	0.33	-1.44	-0.84					

At the bottom of the window, there is a navigation bar with tabs: Run Log, Menu, Map Report, Lap Zoom, Segment Report, Segment Compare, Speed Compare, and Min Max Avg Compare. The 'Min Max Avg Compare' tab is currently selected.

This information reflects the minimum, maximum and average of the current “active” file. Remember, a file is made “active” by placing the mouse cursor over that particular file tab and left clicking .

Place the mouse cursor over the Lap 1 file tab and left click. The min, max and average data is displayed, for Lap 1. Now, place the mouse cursor over the Lap 2 file tab, and left click. The min, max and average for Lap 2 is in view, replacing the data for Lap 1.

Suppose we would like to compare the minimum, maximum and average data, or maybe view a comparison of segment times between two laps. This is possible, by assigning Reference and Main status for two files. Runlog pages were designed to compare the data from two files and present it to the user, for evaluation. Remembering that we can have many files open at one time, the question of how to “tell” the software which two files we wish to compare is answered through the use of Reference and Main files. This solution is extremely easy to use and take just seconds to perform.

The following section provides details concerning the assigning of Reference and Main files.


Assigning Main / Reference File Setting:

At this time, we have Lap 1 and Lap 2 open, with GPS_MPH, GPS_LatGs and GPS_Gs from both runs, graphed. To compare the min, max and average of Lap 1 and Lap 3, simply:

1. Select Lap 1 as the Reference by placing the mouse cursor over the Lap 1 tab and clicking the center button on the mouse. If you are not using a three button mouse, it will be necessary to go to the File Command in the Main Menu and select the Set Reference File / File command.



2. Select Lap 3 as the Main file by placing the cursor over the Lap 3 tab and left clicking.

Notice the file tab for Lap 1 is now red . This indicates a Reference file has been selected. Now, look again at the min, max and average data located below the track map. The above action should activate the comparison between Lap 1 and Lap 3.

There is no set method for selecting Reference / Main files. It is at the users' discretion to determine which files will receive the Reference and Main settings. Either selection can be assigned to any open file, by using the above instructions. The only item that must be remembered is to always make the Main file active, by left clicking on the file tab AFTER selecting the Reference file.

While it is not necessary to select Main and Reference settings to graph and view data, it is necessary to perform the above actions in order to compare data in the Runlog pages. Now that we understand the above procedures, we can see the benefit of this procedure, by reviewing the remaining Runlog pages.

Segment Time Data Comparison:

The G2X_Demo file contains two Segment and one Speed related Runlog pages:

1. Segment Compare
2. Segment Report
3. Speed Compare

We previously assigned Reference and Main lap file settings to Lap 1 and Lap 2. Therefore, in order to review the segment data from Lap 1 and Lap 2, simply place the mouse cursor over any of the three Segment Runlog pages and left click.


Speed Compare provides a comparison of segment/speed data for two laps as determined by the Main and Reference settings.

Segment Report provides a breakdown of segment times for all laps contained within the G2X Demo Runfile.

Segment Compare provides segment comparison data between two laps. Any two laps designated as Reference and Main will be compared.

Remember, all of this data was created strictly through the use of GPS signals. As can be seen, the simplicity of the system installation compared to the data acquired is a tremendous value to the user.

Closing a File:

In order to close a file, simply select the file, then select the Close icon  , located in the Datalink II toolbar.

This concludes the basic introduction to the capabilities of the G2X data logger and Datalink II software. The previous information was designed to provide the user with the capabilities of opening and graphing data in the DatalinkII software.

There are many additional features of the DatalinkII software, available to the user. The following section provides an advanced review of those features.

Advanced Features of the Datalink II Software

Channel Grid Display:

Multiple channels from multiple files may be graphed at the same time, in the Main Graph area. However, the scaling of the Main Graph area can only reflect one channel. To change the Main Graph scaling to reflect the values of other graphed channels:

1. Place the mouse cursor over the Channel Grid Display, located above the Main Graph area.



2. Left click the mouse button. This action will change the Main Graph scaling to reflect the values of the channel shown in the Channel Grid Display. Continue left clicking to toggle through all graphed channels. The TAB key on the keyboard will also perform the same function.

Average / Minimum / Maximum Channel Values:

The Channel Grid Display will automatically display the min / max / avg of a channel, over the course of one lap.



To determine the average of a channel between two points other than start / finish:

1. Move the graph cursor to the desired starting point and press the [key on the keyboard. A vertical bar will be displayed on the graph.
2. Move the graph cursor to the desired ending point and press the] key on the keyboard. A second vertical bar will be displayed on the graph.

To view the average values of other graphed channels simply press the Tab key or move the mouse cursor over the Channel Grid Button and click the left mouse button as described above. If no additional channels are graphed, no additional values will be displayed.

To remove the averaging cursors from the display simply press the [key and then the] key without moving the graph cursor. The Averaging cursors will be removed.

Understanding Graph Scaling:

Each channel is assigned a default minimum and maximum graph scaling value. As shown, GPS_MPH is set to graph data between 0 and 200 MPH.



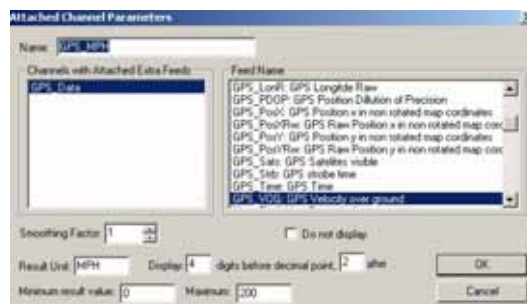
As is often the case when testing at multiple race tracks, different MPH values are obtained. For example, the MPH obtained on a ½ mile track would be much slower than the MPH obtained on a 1 mile track. If the MPH scaling was set to graph between 0-100 MPH, but 150 MPH was obtained during the test session, the MPH graph would go off scale.

The Datalink II program provides two methods to change scaling. The first method will change the scaling within one file. The second (and preferred method) involves the creation of Scaling Sets. A Scaling Set has the ability to override all current scaling values and insert a pre-defined channel value. The Scaling Set applies the values to all files, until de-selected by the user.

Changing Scaling Per Channel:

To change individual channel scaling:

1. Place the mouse cursor over the desired Channel Button and right click the mouse button. For this example, we selected GPS_MPH.
2. The Edit Dialog Box for that channel will be displayed.



The Minimum and Maximum result values correspond to the minimum and maximum values displayed in the Main Graph area, for that channel.

3. To set the graph to display from 0 to 100 MPH, simply enter the minimum and maximum values accordingly.
4. Select OK

Creating Chart Scaling Sets:

To create a Chart Scaling Set:

1. Select Settings, then Select Chart Scaling Set from the main menu selection. The following dialog box will be displayed.



2. Enter the name you wish to call the new scaling set into the text entry box located directly below the Select Name heading. For the purpose of our example, we will use the name "New Scaling".
3. Enter the name of the channel and the minimum and maximum graph values to be displayed. For this example we will rescale the GPS_MPH data channel to graph from 0 to 100 MPH. The data will be entered as shown below.



4. Select the Insert button to accept the rescaling values. The dialog box will appear as shown below:



5. Enter the remaining data channels to be rescaled in the same manner.
6. When you are finished, select the OK button.

To select a Chart Scaling set for use:

1. Select Settings, then Select Chart Scaling Set from the main menu selection.
2. Select the name of the desired scaling file to use by positioning the mouse cursor over the name of the scaling set and click the left mouse button.
3. Select OK.


As can be seen, this is an easy method to quickly change scaling values, with a few simple mouse clicks.

NOTE: When entering channel names, remember you must enter the channel name exactly as it appears in the Channel Button area.


Predefining Graph Sets for Display:

Previously, we graphed data by placing the mouse cursor over the desired data channel and left clicking. Often times, users will find the need to graph the same set of channels, each time data is reviewed. It is possible to “build” graph files that, when selected, will automatically graph the desired information. These files are called Quick Graphs.

To create a Quickgraph from the G2X_Demo:

1. Erase all graphs by double clicking the Clear All Graphs icon 
2. Graph GPS_MPH for Lap 1 and Lap 2



At this time, we have pre-set the channels and colors we wish to save, as a Quick Graph. To name and save the Quick Graph:

1. Select the Quick Graph icon  in the DataLink toolbar.
2. Enter a name for the Quick Graph. For this example, we used GPS_MPH.
3. Next, click on the Save button to save for later use.




We have now created and saved a Quick Graph. Any time we have a Main and Reference file selected, we can recall this Quick Graph.

To recall a graph set for use:

1. Double click the Clear all Graphs icon  in order to remove all graphed data from the Main Graph area.
2. Select the Quick Graph icon  in the DataLink II toolbar.
3. Select the GPSMPH name.
4. Select the Load button.

The graphed data should automatically load, into the Main Graph area.

To create a Quick Graph for one file only, without the use of Main and Reference files:



1. Double click the Clear all Graphs icon  to remove all graphed data from the Main Graph area.
2. Graph the desired channels in the desired colors.
3. Next, simply repeat steps 1 and 2, from the first paragraph in this section.

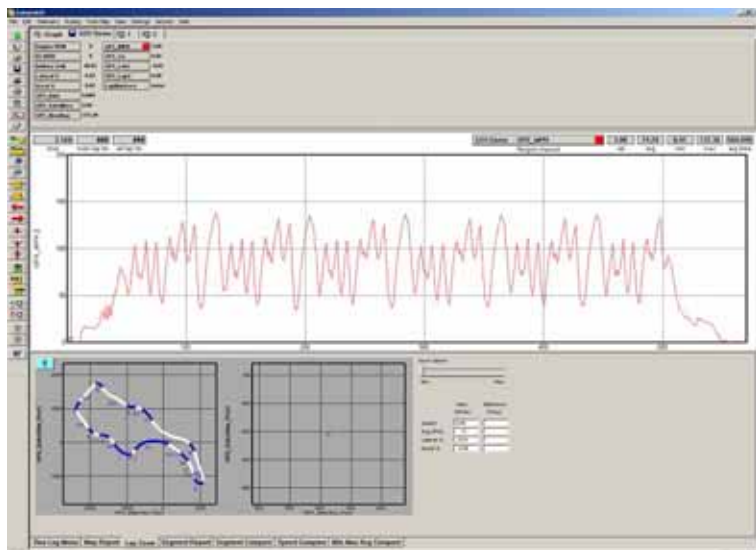
Graphing Runfile vs. Lapfile Data:

There are occasions where it is necessary to review all of the data created during one test outing on the track (Runfile). Data from a Runfile may be graphed the same as data from a Lapfile.

Often times, changes that occur are often easier to detect when reviewing the entire Runfile, as opposed to looking at only one lap of information.

To graph Runfile data:

1. Double click the Clear all Graphs icon  in order to remove all graphed data from the Main Graph area and return to distance mode.
2. Left click over the G2X_Demo Runfile tab.
3. Left click over the GPS_MPH channel, in order to graph the data.
4. Left click the Autoscale icon, located in Datalink II icon list .
5. The screen should appear as below.



As can be seen, the entire GPS_MPH, from start of logging until end of logging, can now be reviewed.



Zoom Command:

The Main Graph area as previously described displays an entire lap on the display screen. In many instances you may wish to zoom in on a particular area for a detailed analysis. Two methods are available.



The first method is to create a zoom box using the right mouse button. To do so:


1. Determine the desired zoom area of the Main Graph.
2. Place the mouse cursor in the upper right corner of the desired zoom area
3. Hold down the right mouse button and drag the zoom box over the desired zoom area. Release the right mouse button.
4. Time / distance or data channel scaling is zoomed according to what portion of the graph is included in the zoom box.

The second method is as follows:

1. Place the mouse cursor at the center of the graph region to be zoomed.
2. Left click the Zoom In  icon or the Zoom Out  icon in the vertical toolbar. The graph region will zoom in or out accordingly.

Once you have zoomed in on a section of data, you may also want to shift either to the left or right to view additional data without changing the current zoom settings.

1. Click on the Shift Left  or the Shift Right  icon in the RacePak Chart data toolbar to move the displayed graph region left or right.

To reset the main Graph region back to displaying an entire lap, click on the User Scale  button in the RacePak Chart data toolbar.

Runlog Pages

The Runlog pages at the bottom of the Datalink II screen are a general-purpose data analysis section. These pages offer a combination of graphics display, logbook, database, spreadsheet, and mathematical analysis capability.

The purpose of the pages is to provide real time data analysis of the run data. By doing so, this reduces the technical expertise required for data analysis.

The G2X_Demo Runfile included with this demo includes a set of standard Runlog pages. The following section provides detailed information concerning each Runlog page.

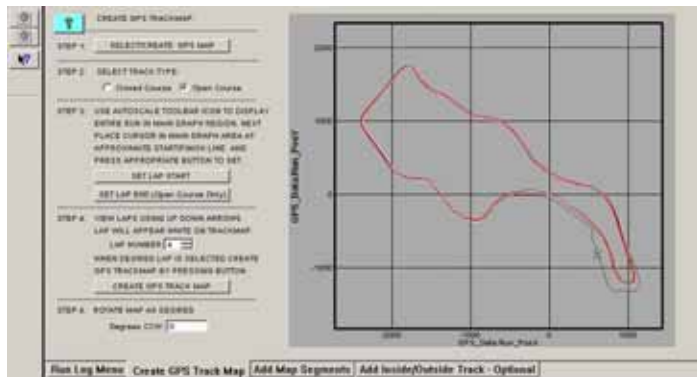
Session Page:

The Session page is automatically opened when new data is uploaded into the PC, from the onboard data logger. The purpose of the Session page is to generate the specifics of each run, such as vehicle, track location, date, and test type / number.

Weather Page:

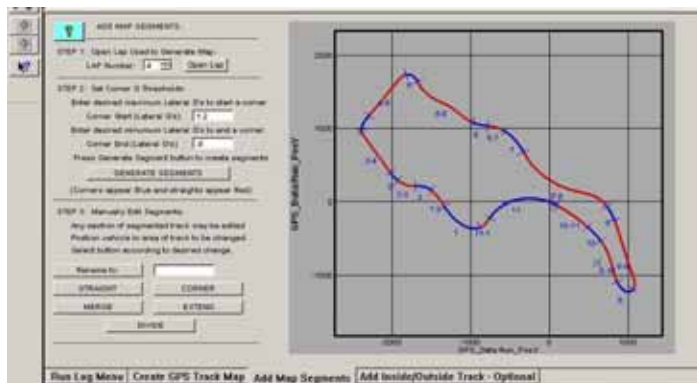
Weather data can be entered utilizing one of two methods. The first method is to manually enter the weather conditions, either during or after the data is downloaded. The second method requires the use of the appropriate Altalab weather station. The user simply *left* clicks the “Get ALTACOM Weather on COM 1” (or COM 2, dependant upon the port utilized by the weather station) button. If the Altalab weather station is connected to the user’s computer, weather data will automatically download into the appropriate areas of this page.

Create GPS Track Map:



The Create GPS Map page is utilized to create a GPS based track map. Following the numbered steps, a GPS track map can be created in a matter of seconds.

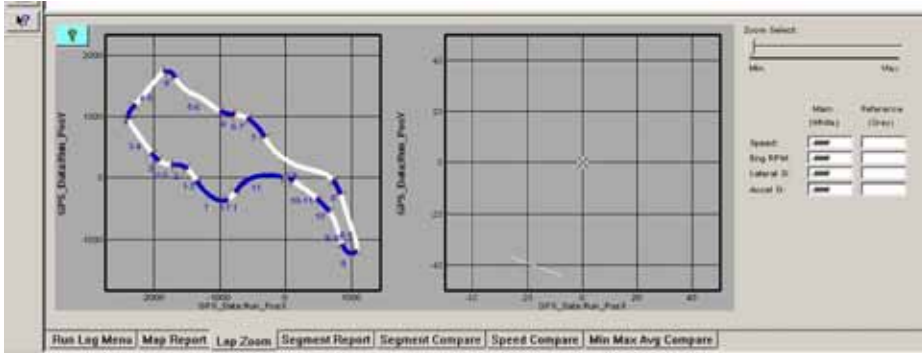
Add Map Segments:



The Add Map Segment page is used to divide a track map into timing segments for data analysis. The track map can be broken into segments automatically utilizing lateral acceleration or can be divided manually by the user. GPS based segment times are based on GPS plotted points, and are therefore as accurate as trackside segment beacons.

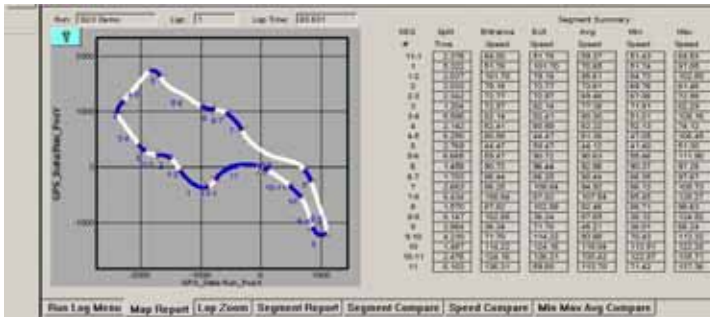
Lap Zoom:

The Lap Zoom page provides a both a GPS track map and GPS track map with zoom features. The zoom feature allows the user to zoom into any area of the track map, for detailed data analysis.



Map Report:

The Map Report page provides detailed speed analysis for each track segment. This information is automatically produced, upon opening of a lap.



Segment Report / Segment Compare / Speed Compare:

Each page provides detailed segment timing information. Segment Report provides a review of all segment times, for all laps contained within one Runfile. Speed Report provides an analysis of segment / speed for two laps. Segment Compare provides the ability to compare segment times from two selected laps.

Segments		Small Segments (LPT)																					
Lap #	Start Time	Lap Time	1.1	1	1.2	2	2.3	3	3.4	4	4.5	5	5.6	6	6.7	7	7.8	8	8.9	9	9.10	10	
1	41.359	01:02:11	2.276	0.202	2.217	2.222	2.242	2.209	0.999	2.162	0.280	2.169	0.999	4.498	1.709	2.262	0.439	1.970	0.147	2.984	4.270	4.211	1.490
2	41.359	01:02:11	2.276	0.202	2.217	2.222	2.242	2.209	0.999	2.162	0.280	2.169	0.999	4.498	1.709	2.262	0.439	1.970	0.147	2.984	4.270	4.211	1.490
3	41.359	01:02:11	2.276	0.202	2.217	2.222	2.242	2.209	0.999	2.162	0.280	2.169	0.999	4.498	1.709	2.262	0.439	1.970	0.147	2.984	4.270	4.211	1.490
4	41.359	01:02:11	2.276	0.202	2.217	2.222	2.242	2.209	0.999	2.162	0.280	2.169	0.999	4.498	1.709	2.262	0.439	1.970	0.147	2.984	4.270	4.211	1.490
5	41.359	01:02:11	2.276	0.202	2.217	2.222	2.242	2.209	0.999	2.162	0.280	2.169	0.999	4.498	1.709	2.262	0.439	1.970	0.147	2.984	4.270	4.211	1.490
Theoretical Fast Lap		79.676	1.998	0.227	1.996	1.999	2.205	1.994	0.707	2.142	0.194	2.109	0.921	4.425	1.699	2.264	0.399	1.972	0.145	2.745	3.940	4.194	1.462

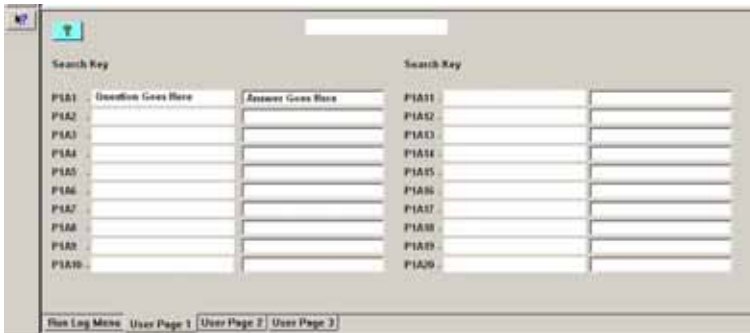
Segments		Small Segments (LPT)																					
Lap #	Start Time	Lap Time	1.1	1	1.2	2	2.3	3	3.4	4	4.5	5	5.6	6	6.7	7	7.8	8	8.9	9	9.10	10	
1	41.359	01:02:11	2.285	0.207	2.234	2.228	2.215	1.986	0.709	2.187	0.282	2.182	0.991	4.454	1.724	2.241	0.228	1.934	0.148	2.788	4.016	4.217	1.489

Segments		Small Segments (LPT)																					
Lap #	Start Time	Lap Time	1.1	1	1.2	2	2.3	3	3.4	4	4.5	5	5.6	6	6.7	7	7.8	8	8.9	9	9.10	10	
1	41.359	01:02:11	2.278	0.202	2.207	2.202	2.242	1.994	0.999	2.171	0.272	2.176	0.999	4.499	1.699	2.262	0.439	1.970	0.147	2.984	4.270	4.211	1.490

Run	Start	End	Speed	Time	Reference Run	Start	End	Speed	Time
11.1	1:19.00	0:58.00	47.56	0:58.27	11.1	1:19.00	0:58.00	47.56	0:58.27
1	1:19.00	0:58.00	47.56	0:58.27	1	1:19.00	0:58.00	47.56	0:58.27
1.2	1:19.00	0:58.00	47.56	0:58.27	1.2	1:19.00	0:58.00	47.56	0:58.27
2	1:19.00	0:58.00	47.56	0:58.27	2	1:19.00	0:58.00	47.56	0:58.27
2.3	1:19.00	0:58.00	47.56	0:58.27	2.3	1:19.00	0:58.00	47.56	0:58.27
3	1:19.00	0:58.00	47.56	0:58.27	3	1:19.00	0:58.00	47.56	0:58.27
3.4	1:19.00	0:58.00	47.56	0:58.27	3.4	1:19.00	0:58.00	47.56	0:58.27
4	1:19.00	0:58.00	47.56	0:58.27	4	1:19.00	0:58.00	47.56	0:58.27
4.5	1:19.00	0:58.00	47.56	0:58.27	4.5	1:19.00	0:58.00	47.56	0:58.27
5	1:19.00	0:58.00	47.56	0:58.27	5	1:19.00	0:58.00	47.56	0:58.27
5.6	1:19.00	0:58.00	47.56	0:58.27	5.6	1:19.00	0:58.00	47.56	0:58.27
6	1:19.00	0:58.00	47.56	0:58.27	6	1:19.00	0:58.00	47.56	0:58.27
6.7	1:19.00	0:58.00	47.56	0:58.27	6.7	1:19.00	0:58.00	47.56	0:58.27
7	1:19.00	0:58.00	47.56	0:58.27	7	1:19.00	0:58.00	47.56	0:58.27
7.8	1:19.00	0:58.00	47.56	0:58.27	7.8	1:19.00	0:58.00	47.56	0:58.27
8	1:19.00	0:58.00	47.56	0:58.27	8	1:19.00	0:58.00	47.56	0:58.27
8.9	1:19.00	0:58.00	47.56	0:58.27	8.9	1:19.00	0:58.00	47.56	0:58.27
9	1:19.00	0:58.00	47.56	0:58.27	9	1:19.00	0:58.00	47.56	0:58.27
9.10	1:19.00	0:58.00	47.56	0:58.27	9.10	1:19.00	0:58.00	47.56	0:58.27
10	1:19.00	0:58.00	47.56	0:58.27	10	1:19.00	0:58.00	47.56	0:58.27
10.11	1:19.00	0:58.00	47.56	0:58.27	10.11	1:19.00	0:58.00	47.56	0:58.27
11	1:19.00	0:58.00	47.56	0:58.27	11	1:19.00	0:58.00	47.56	0:58.27

User Pages 1 through 3:

The User Pages 1, 2 and 3 provide the ability to create custom Runlog pages, which contain input areas particular to each individual users needs. Each page can be pre-defined with a question / answer type of Configuration. Any type of text may be entered in the first area, with answers inserted in the second area. In the below example, the Question Goes Here was inserted in the first area, with an answer of Answer Goes Here in the second section. To set up the pages, simply insert the desired text in the first area, within the G2X_Config file. Upon downloading of a new run, simply insert the desired answer information in the second section of the downloaded run.

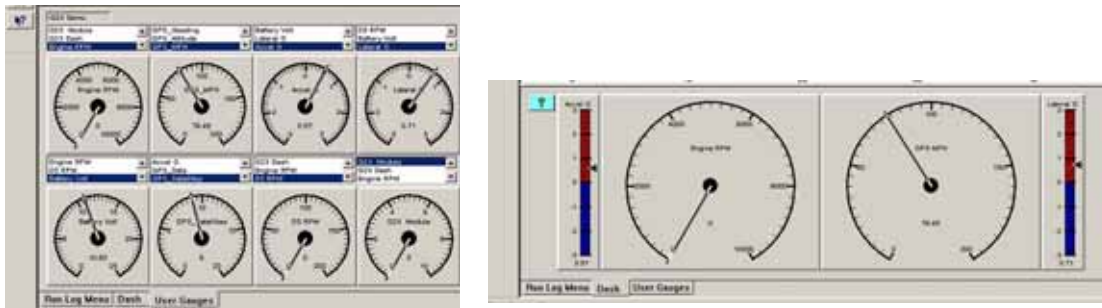


Min Max Average Compare:



Min Max Average Compare provides the user with data in report format. Information is by lap and can be compared using the Main / Reference settings.

Gauges:



The Gauges page provides a “dash panel” view of graphed data. User Gauges page provides the ability to select the input of each gauge as defined the user, according to the data under review. The Dash page is pre-defined and provides RPM / Speed and G force data. As the mouse cursor is moved through the graph area, the gauge movement corresponds to the data channel associated with the gauge.

Tire Temperature / Pressure Calculator Page:

The Tire Temperature & PSI page provides the user a means of logging tire temperatures, following each run. Upon insertion of all tire temperature data, the page will calculate average per tire, along with front and rear average, thus eliminating the time consuming manual calculation of data. In addition, this page provides the user a quick visual to assist in determining chassis setup changes.

The Pressure area provides the means to monitor tire pressure gains, with each run. The user simply inserts the Cold and Hot pressure readings for each tire, and the system will calculate pressure gains per tire.



G2X Pro Instruction Manual Update Section

The following section is for future updates to the G2X Pro Instruction Manual. Each update will be accompanied by a cover sheet detailing the updated information. All updates will be available online at www.g2xpro.com or may be obtained by contacting the Racepak office.

If desired, the G2X Pro Instruction Manual can be installed in a three ring binder in order to allow insertion of future updates.