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## INTRODUCTION

Thank you for your purchase of the G2X, Racepak's easy to use GPS equipped data logger. As with any technical item, the product is easy to use, only if the manual is easy to understand. With that thought in mind, we have created a manual that provides an orderly process to the installation and usage of the G2X. This manual covers the basic installation and use of the G2X data logger and DataLink II analysis software.

Many of you have already asked about the ability to add additional features. In the near future, our new website [www.g2xtreme.com](http://www.g2xtreme.com) dedicated specifically to Racepak's G2X product line will be fully functional. This site will explore the advanced capabilities of the G2X data logger and DataLink II software and provide details for new accessories. The site will offer a forum to provide one to one support for your questions as well as providing feedback for new software features and hardware capabilities.

Thanks again for your purchase. We will be looking forward to hearing from you soon.

**Tip:** Installation and first time usage of the G2X will be much easier if the demo run, along with the entire installation manual is read and utilized. While the G2X and Datalink II software is very user friendly, it requires practice. Attempting to install the G2X, download a run and work through the Datalink II software, without reading the manual, will cause frustration for the user.

# DESIGN AND OPERATION SPECIFICATIONS

The G2X was created to provide an economical and easy method to obtain data that was previously available only when utilizing a standard sensor and wire data system. The combination of the G2X and Display Dash is designed to be an intuitive package, which provides data according to the action of the vehicle.

## Why GPS?

The use of GPS signals provides track mapping, lap times, segments times and MPH. This eliminates the need for tripods, multiple trackside transmitters, onboard beacon receiver and wheel speed sensors. All those items are replaced by simply installing the GPS antenna on the roof of the vehicle.

## G2X Data Logger

- Compact Flash memory provides over 30 hours of GPS data logging when used with a 128MB card.
- Memory card capable of storing single or multiple runs, which are date and time stamped.
- Logging automatically starts when vehicle exceeds 25 MPH.
- Logging stops when vehicle is stationary for greater than 30 seconds.

## Display Dash

- Provides ability to set start / finish line at any point on the track.
- Provides lap number and time data.
- Provides vehicle data such as MPH, Engine RPM, voltage and 2 axis accelerometer.
- Vehicle information automatically is displayed when vehicle is moving.
- Lap time and number is automatically displayed each time the start / finish line is crossed and when the vehicle comes to a stop.

## DataLink II Software

- Provides ability to create GPS track map with start / finish and segment times.
- GPS maps can be saved and utilized any time the vehicle returns to the same track location.
- GPS maps provide lap and segment times that can be compared to previous data recordings.
- Provides information in both graphical and report format.
- Allows overlaying of multiple laps.

## Items Contained in the G2X Package

1. G2X Data Logger
2. GPS antenna and cable
3. Display dash and cable
4. 12V power / RPM cable
5. Cigarette lighter adapter pigtail
6. Direct wiring pigtail (not pictured)
7. Compact Flash memory card
8. Serial Communication Cable (not pictured)

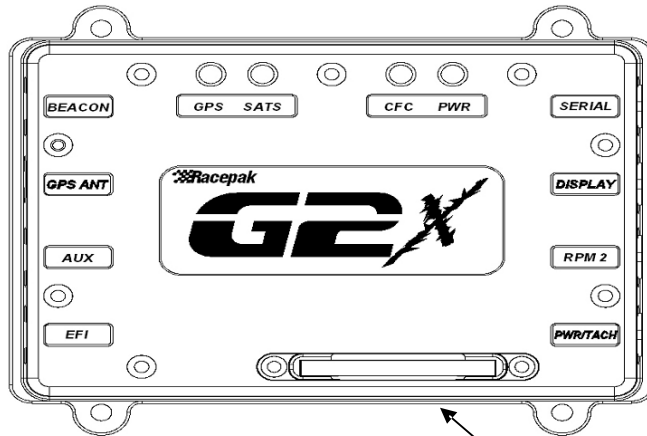






# INSTALLATION

## G2X Connection Introduction



**BEACON (optional):**

Input for the onboard vehicle position receiver.

Compact Flash Card Port

**GPS ANT:**

Provides connection for the external mounted GPS antenna.

**AUX (optional):**

Reserved for future expansion.

**EFI (optional):**

Provides connection for input from select vehicle EFI units.

**PWR / TACH:**

Provides connection for external power source and tachometer signal.

**RPM 2 (optional):**

Provides connection for additional external RPM input.

**DISPLAY:**

Provides connection for the display dash.

**SERIAL:**

Provides connection for the RS-232 serial cable, to enable communication between the users PC and G2X.

**CFC / POWER LED:**

Provides status of the power connection and Compact Flash Card activity.

**GPS / SATS LED:**

Provides status of GPS satellite acquisition.

**COMPACT FLASH CARD PORT:**

Insertion point for Compact Flash card. Provides over 30 hours of GPS information, with 128 MB card.

## Mounting the G2X Main Unit

The G2X is designed to function in a variety of severe environments, but we thought it helpful to provide a list of the extremes of what not to do, when mounting. As with most electronic items, a bit of common sense goes a long way in avoiding potential problems.

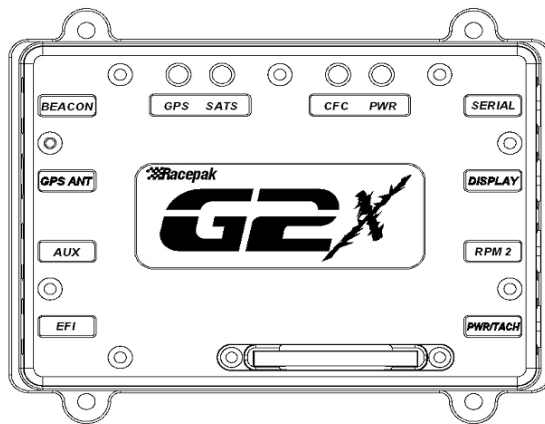
### *Direction*

The internal accelerometers are pre-defined to provide lateral and acceleration G forces. This requires mounting the G2X flat and level to the ground and, if possible, orientated as shown in the diagram below. Mounting of the G2X in a manner other than described will result in the creation of incorrect data. In the event it is impossible to orient the G2X in the proper direction, the accelerometers can be reconfigured using the G2X Display Dash. However, the G2X must always be mounted flat and level to the ground. Refer to page 24 for complete instructions on reconfiguring the accelerometer direction.

### *Location*

There are four items to consider, when mounting the logger.

1. Access to the Compact Flash card.
2. Access to the side ports, in order to connect the GPS antenna, display and other items.
3. Distance from the power and tach source. Insure the G2X is located within distance of the power and dash cables.
4. Although not required, visual access to the GPS and Power LED's on top of the G2X is suggested.



**Direction of Travel**

The G2X may be installed in a variety of locations, in stock bodied vehicles. Velcro applied to the bottom of the G2X will help secure to most carpet and floor mats found in many vehicles. Open wheel vehicle mounting locations are typically determined by the easiest access to the memory card. Rubber isolation mounting pads should be utilized, when mounting in a high performance race vehicle or any other high vibration application. Mounting pads are available from Racepak.

### *Temperature*

While the G2X is a rugged unit, excessive heat from exhaust systems or other sources of high temperatures can damage the unit.

### *Electronic Interference*

Excessive interference from ignition systems or other EMF producing items can interfere with the operation of the G2X. Avoid mounting next to ignition system components, such as coils, spark plug wires, etc.

### *Movement*

It is important to insure the G2X does not move during testing or can become dislodged during an off track excursion.

## **GPS Antenna Location and Mounting Procedures**

Following installation of the G2X, the GPS antenna can now be installed and connected. 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 G2X, 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, for the G2X. 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 ANT** port of the G2X. 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.

## G2X Power and Tachometer Wiring

### *Power Connection*

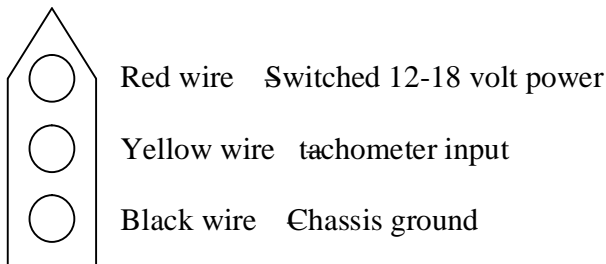
The G2X requires 12-18 volt DC power to operate properly. The power cable connects to the input labeled **PWR / TACH** on the G2X unit. There are two different pigtails provided to allow for both permanent power and tachometer connections to your vehicles electrical system or for quick connection using the cigarette lighter adaptor. If you are using the three wire pigtail to connect the G2X directly to your vehicles electrical system, make sure the connection provides a 2 5 amp fuse to protect against short circuits. The cigarette lighter adaptor has an internal fuse, therefore no other short circuit protection is required.

### *Tachometer Connection*

The tachometer connection is optional and only provided on the three wire pigtail. However, when properly connected and configured, the tachometer input will allow the G2X to display and/or record the following data.

- 1) Engine RPM (Displayed on dash and recorded)
- 2) Gear indicator (Displayed on dash only)

The tachometer input requires a 5-18 volt, 50% duty cycle, square wave output signal. If your vehicle does not have this type of tachometer output or you do not wish to display and record the above information you may leave the yellow wire disconnected. The pinout of the three wire pigtail is as follows:



**!!! IMPORTANT WARNING !!!**  
DO NOT connect the yellow tachometer input wire directly to any part of the ignition coil. Doing so will result in damage to the G2X tachometer input circuitry.

### *Compact Flash Card Installation*

The compact flash memory card should be inserted in the G2X with the manufacturers name facing toward the G2X label. The card is fully inserted when the card is sitting just below flush with the guide. If the card feels like it is hanging up, gentle move it back and forth until it is fully inserted. Forcing the card may damage the connector.



### *Mounting the G2X Display Dash*

The Display Dash is designed to mount utilizing three #10 mounting studs and screws. If the dash is mounted using a different method, insure it is properly secured, to avoid the possibility of breaking free and becoming a projectile that could cause severe injury to a person and/or your vehicle in the event of an accident or sudden stop. Connect the cable from the Display Dash to the port labeled **DISPLAY** on the G2X unit.

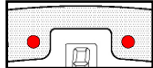
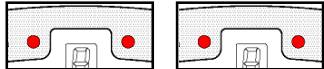
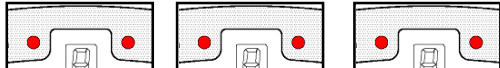
# PROGRAMMING AND SETUP UTILIZING THE DISPLAY DASH

The G2X may be programmed utilizing the Display Dash. There are two Setup Modes available.

1. **Setup Mode #1:** Utilized to program the system when stationary (the car does not need to be running).
2. **Setup Mode #2:** Utilized to program the dash while the vehicle is moving. This is necessary as several of the variables utilize actual data taken from the G2X to set the programming.

The following sections will refer to short, medium and long button press lengths, as setup and control of the Display Dash is through the use of the Left and Right Programming Buttons. The length of time that each button is depressed determines the action that will be performed, according to the current operating mode.

To assist the user in determining the correct time for each button press, the Programming Indicator (Red shift light LED s) will flash each time one of the key press becomes valid. The chart below defines each:

- |                               |               |                            |  |
|-------------------------------|---------------|----------------------------|--|
| 1. Short Press                | = .2 seconds  | = One Flash                |   |
| 2. Medium Press               | = .5 seconds  | = Two Flash                |  |
| 3. Long Press                 | = 2 seconds   | = Three Flash              |  |
| 4. Auto Repeat Long Key Press | = 3.0 seconds | (repeats every .2 seconds) |  |

The point at which the button is released determines the type press that is accepted. Releasing after the second red shift light flash is detected as a medium length press, by the G2X.

### **!!! IMPORTANT WARNING !!!**

The Serial Cable must be disconnected from the G2X data logger during the Dash Setup Procedures. If the serial cable is connected during programming, no programming changes will occur.

## Setup Mode #1

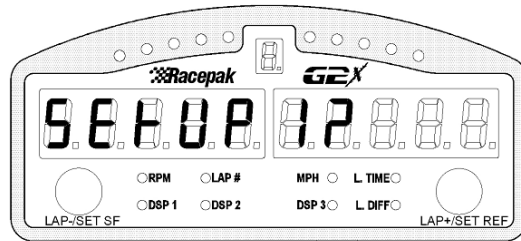
Setup Mode 1 is used to program the unit with default information, without the need to operate the vehicle. Setup Mode 1 presents the programming choices in the following order.

1. **Display Brightness**
2. **Reset all Dash Settings to Factory Defaults**
3. **Tach Pulses Per Two Revolution of Engine**
4. **Engine RPM Source**
5. **Progressive Shift Light RPM Steps**
6. **Shift Light RPM Level for Gears 1-6**
7. **Speed Source**
8. **Gear Indicator Ratios**
9. **GMT Time Offset**
10. **Units of Measure**
11. **Set Default Real-time Display**

Setup mode 1 can be entered either from the Normal or the Lap Replay Display modes.

To enter Setup Mode 1:

1. Press and hold the left key button to send a medium key press (two flashes and release).
2. The following message will be displayed.



3. To confirm you wish to enter Setup Mode 1, press and release the left Programming Button to send a short key press.

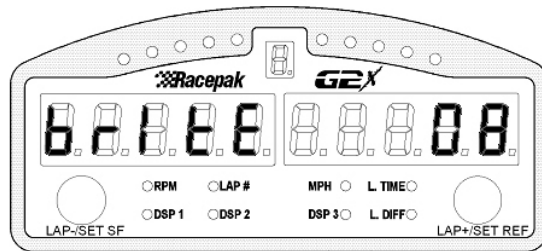
While in Setup Mode 1 the left key presses will always execute the following commands.

- Short left press:** Accept selection and go to next setup parameter
- Long left press:** Save programming and Exit Setup

## ***Display Brightness Adjustment***

Brightness adjustment ranges from a minimum brightness of 2, to a maximum brightness of 15. Each press increases or decreases by 1.

- Increase Brightness: Short right press - At 15 returns to 2.
- Decrease Brightness: Medium right press - At 2 returns to 15



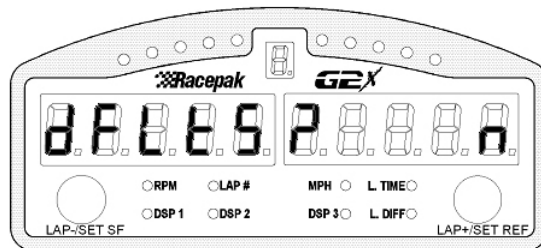
**Short left press:** Accept selection and go to next setup parameter

**Long left press:** Save programming and Exit Setup:

## ***Reset Dash to Factory Default Settings***

This screen is used to reset the dash to factory configuration. To reset, select Y as shown below. When the screen is exited the dash will be reset to factory defaults.

- Y or n: Short right press or Medium Right Press - Toggles between Y and n



**Short left press:** Accept selection and go to next setup parameter

**Long left press:** Save programming and Exit Setup

### **The Default Factory Dash Settings Are As Follows:**

V-8 Engine RPM Tach Signal Input with 8 pulses per two revolutions

8000 RPM Shift Point

100 RPM Spread Between Sequential Shift Lights

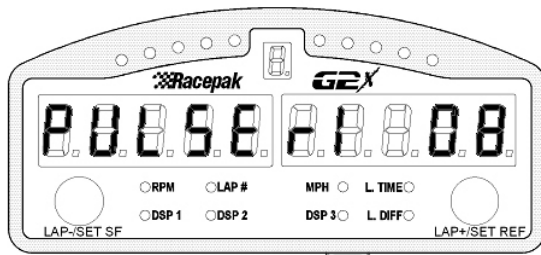
Speed obtain from GPS

Engine RPM Source - Tach

## ***Tach Pulse per Two Revolutions of the Engine***

Set the number of pulses from the tachometer signal for two revolutions. The correct setting would typically match the number of engine cylinders. For example, a V-8 would set at 08. The key commands are as follows.

- Increase pulse count by 1: Short right press - At 20 returns to 0
- Decrease pulse count by 1: Medium right press - At 0 returns to 20



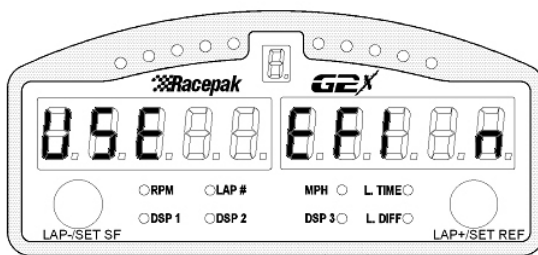
**Short left press:** Accept selection and go to next setup parameter

**Long left press:** Save programming and Exit Setup

## ***Engine RPM Source***

The dash can use the input from the PWR/TACH port on the G2X or from the EFI module if installed. This rpm is then used for display, shift light, gear ratio, etc. The user is prompted to choose either yes or no to EFI rpm input. No, will instruct system to utilize the PWR/TACH port on the G2X.

- Y or n: Short right press or Medium Right Press - Toggles between Y and n



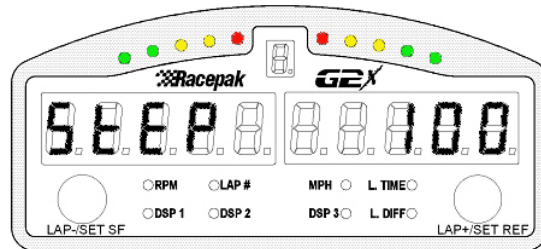
**Short left press:** Accept selection and go to next setup parameter

**Long left press:** Save programming and Exit Setup



## ***Progressive Shift Light RPM Step***

The progressive shift light enables the user to program the green, yellow and red LED s to display in a sequential pattern, using the Shift Point as defined in the next section as the final display. The progressive shift light turns on the LED's in steps of 1 to 500 rpm according to the programming.



**Example:** A shift light RPM programmed for 7400 RPM, with a 100 RPM step would display in this manner:

- >7000 RPM = First two green LED s are displayed
- >7100 RPM = All four green LED s are displayed
- >7200 RPM = All four green and first two yellow LED s are displayed
- >7300 RPM = All four green and all four yellow LED s are displayed
- >7400 RPM = All LED s are displayed

- Increase RPM by 10: Short right press - Returns from 500 to 0
- Decrease RPM by 10: Medium right press - Returns from 0 to 500
- 3. Increase RPM by 50: Long right press - Returns at 500
- Auto increase RPM by 50 every .2 seconds: Hold key - Returns at 500

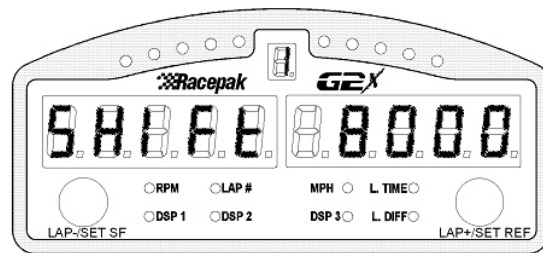
**Short left press:** Accept selection and go to next setup parameter

**Long left press:** Save programming and Exit Setup

## Shift Light RPM Level

Allows the user to program the shift light RPM for up to 6 gears. The current gear being programmed is shown in the gear display at the top of the dash. Upon entry to this programming screen, Gear 1 is automatically displayed.

- Increase RPM set point by 10: Short right press - Returns at 20000 to 0
- Decrease RPM set point by 50: Medium right press - Returns at 0 to 20000
- Increase RPM set point by 50: Long key press - Returns at 20000 to 0
- Auto increase RPM set point by 50: Held Key - Every .2 seconds
- Go to next gear for programming: Short left press



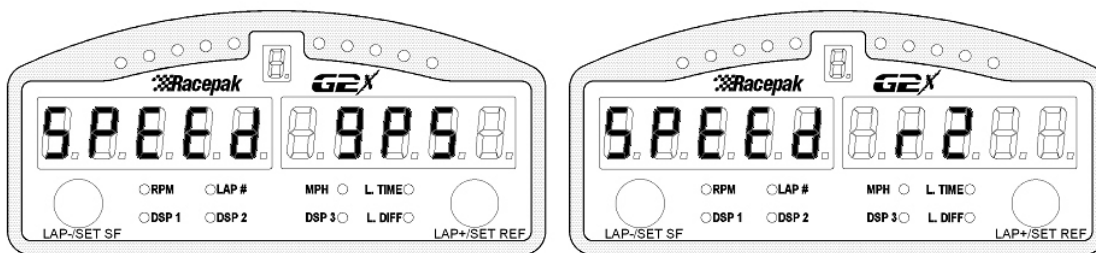
**Short left press:** Accept selection and go to next setup parameter

**Long left press:** Save programming and Exit Setup

## Speed Source

The Display Dash may use GPS or the RPM 2 port as the source of the mph display, and gear calculations.

- Toggle source: Short right key press
- Toggle source: Medium right key press



**Short left press:** Accept selection and go to next setup parameter

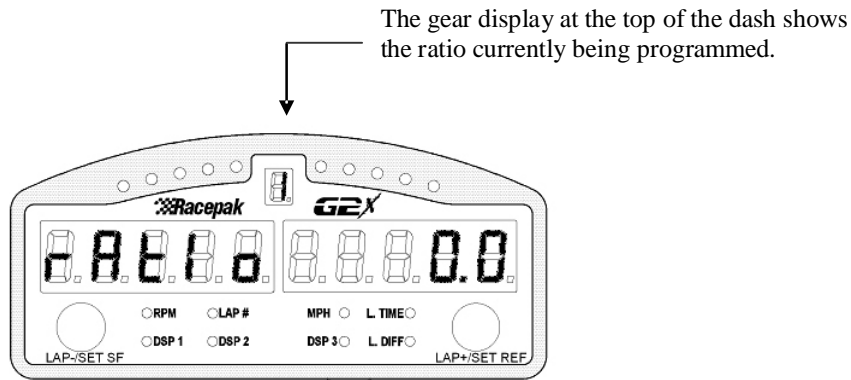
**Long left press:** Save programming and Exit Setup

## ***Gear Indicator Ratios***

This selection allows the user to input the appropriate gear ratios, in order for the Display Dash to activate the Gear Indicator LED. The ratio to be programmed is simply the Engine RPM divided by the mph and can be calculated using gear ratios and tire diameters.

The ratios are programmable from 0 to 500 in increments of 1.  
Key commands are as follows:

- Increment ratio by 1: Short right key press - Return at 500 to 0
- Decrement ratio by 5: Medium right key press - Return at 0 to 500
- Increment ratio by 5: Long right press - Return at 500 to 0
- Auto increment by 5: Press and hold right key - Return at 0 at 500
- Go to next ratio or programming item: Short left key press



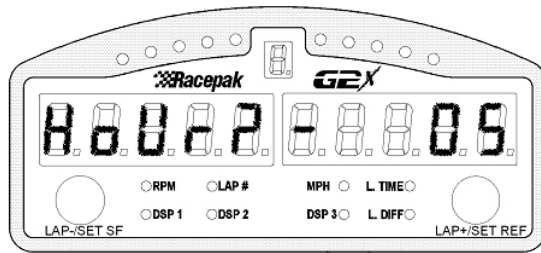
**Short left press:** Accept selection and go to next setup parameter  
**Long left press:** Save programming and Exit Setup

**Tip:** An easier and more accurate method to program the Gear Indicator Ratio is to use SETUP Mode 2. In SETUP Mode 2 you can calibrate the ratios automatically while driving the vehicle.

## GMT Hour Offset

The date and time stamp placed on the data files is derived from the GPS satellite data, which is received in Greenwich Mean Time (GMT). This setting allows you program the G2X with an offset of how many hours your current time is from GMT time. The factory default setting is 05 hours which is Eastern Standard Time (EST).

- Increase hour count by 1: Short right key press - At 12 returns to 12
- Move to next programming item: Short left key press



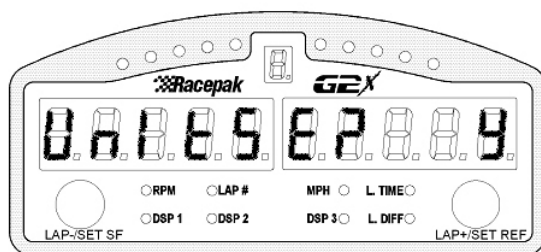
**Short left press:** Accept selection and go to next setup parameter

**Long left press:** Save programming and Exit Setup

## Units of Measure

Programs the G2X dash to display speed in MPH or KPH. After changing this setting you should also reprogram the wheel speed calibration in SETUP Mode 2 if you are using the wheel speed sensor input to display speed. Changing the Units of Measure setting only affects the data displayed on the dash. The GPS\_MPH data will always be recorded in MPH. If you recalibrate the wheel speed sensor the recorded MPH will then be in the newly selected units. Selecting Y for this setting will select MPH. Selecting n for this setting will select KPH.

- Switch between Y and n: Short right key press

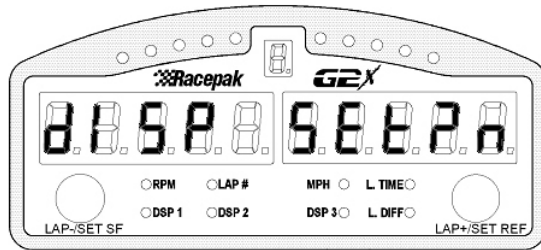


**Short left press:** Accept selection and go to next setup parameter

**Long left press:** Save programming and Exit Setup

## ***Set Default Real-time Display***

Programs the channels initially displayed on the left and right windows when the dash is powered up and enters Real-time display mode.



Before entering SETUP Mode 1, drive the vehicle over 5 MPH to enter Real-time Display mode. Continue entering short presses on the left key until the desired default channel is displayed in the left window. Next, continue entering short presses on the right key until the desired default channel is displayed in the right window.

Now that both windows are displaying the desired default channels, enter Setup Mode 1, again. Continue to enter a short key press on the left button until the above setup parameter is displayed. Now enter a short press on the right key until the letter Y is displayed on the right digit. Enter a short press on the left key to program the default real-time displays and exit SETUP Mode 1. See the following Section for complete instructions on using Real-time Display Mode.

## Setup Mode # 2

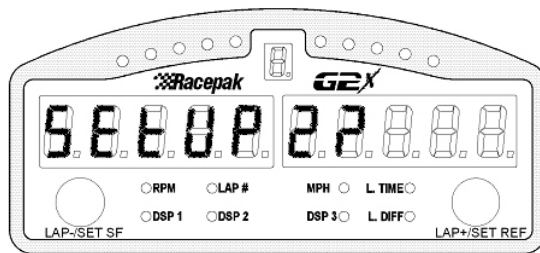
Setup Mode 2 functions allows the user to utilize inputs from the moving vehicle, in order to automate the programming process. Setup Mode 2 presents the programming choices in the following order:

1. **Running Engine RPM Pulse Count**
2. **Rpm 2 Input For Speed**
3. **Gear Indicator Using Engine RPM and MPH**
4. **Installation Direction of the Accelerometers**

Setup Mode 2 can be entered either from the Normal or the Lap Replay Display modes.

To enter Setup Mode 2:

1. Press and hold the right key button to send a medium key press (two flashes and release)
2. The following message will be displayed:



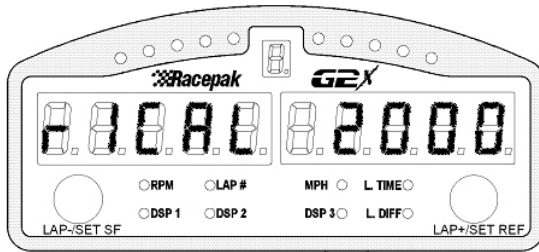
3. To confirm you wish to enter Setup Mode 2, press and release the right button to send a short key press.

A long right press is required following the setup of each of the four above parameters. This long right press also advances the user to the next programming input screen. The Setup 2 Mode may be exited at any time with a long left key press.

**NOTE: SETUP Mode 2 programming requires the vehicle to be in motion. Care should be taken when driving the vehicle to insure safe operation. If possible, take a passenger along to operate the Display Dash and perform the calibration procedures.**

## ***Auto Calibrate Engine RPM Pulse Count***

This setting allows the user to automatically calibrate the number of pulses per two revolutions for the PWR/TACH input on the G2X. The currently calculated rpm will be in view on the right display.



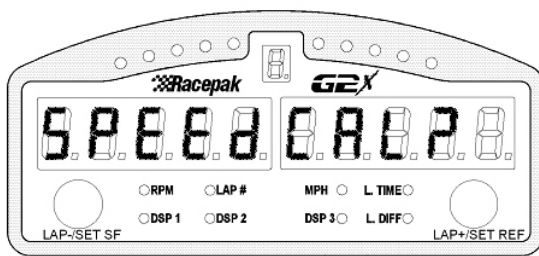
1. The engine should be brought up and held constant at 2000 rpm using a separate tachometer.
2. Enter a long key press by holding the right button for three flashes to program the tachometer pulses and move to the next program item.

**Short left press:** Skip Auto Calibrate Engine Rpm and go to next setup parameter

**Long left press:** Skip Auto Calibrate Save Programming and Exit Setup

## ***Auto Calibrate RPM 2 Speed***

If you are using the RPM2 input of the G2X for wheel speed, you will need to calibrate this channel before it will read the correct velocity. Using the GPS MPH data generated while driving the vehicle, this step calibrates the rpm 2 channel on the G2x to readout in MPH or KPH depending on the units selected in SETUP Mode 1.



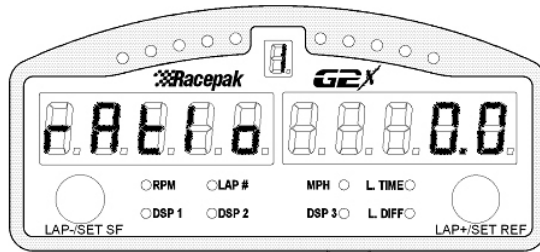
1. Drive the vehicle to a speed between 30 50 mph.
2. Insure the chosen speed is stable. When stable, press and hold the right key for three flashes to perform calibration and move to the next program step.

**Short left press:** Skip Auto Calibrate Rpm 2 Speed and go to next setup parameter

**Long left press:** Skip Auto Calibrate Rpm 2 Speed, Save Programming and Exit Setup

## ***Auto Calibrate Gear Indicator***

This step is used to calibrate the gear ratios for up to 6 gears in the vehicle. The gear ratio (and thus gear number) is automatically calculated for you by the G2X.



1. Ensure that you have properly setup the tachometer signal source (R1 or EFI) and the MPH source (R2 or GPS) used for the calculations in Setup mode 1.
2. The gear ratio currently being programmed is shown in the gear indicator at the top of the dash.
3. The car should be driven at a safe constant speed in the gear indicated in the gear display in the center of the dash.
4. When the speed and rpm are constant press and hold the right key for three flashes. The ratio will be programmed and saved and the programming will step to the next gear.
5. Repeat the process until all gears are programmed. You may skip the programming of any unused gears by entering a short key press on the left key.

**Short left press:** Skip Auto Calibrate Gear Indicator, Save Programming and Exit Setup

**Long left press:** Skip Auto Calibrate Gear Indicator, Save Programming and Exit Setup

## ***Accelerometer Orientation***

If the user was unable to install the G2X in the correct direction, this step allows for the reorientation of the lateral and longitudinal accelerometer. This step will only work if the G2X is installed in any 90 degree direction from recommended. The G2X can not be installed angular to the direction of travel. This does not zero calibrate the accelerometers, but only selects the longitudinal and lateral accelerometer.

1. Drive the vehicle in a straight line at approximately 50 to 60 MPH.
2. Apply the brakes so that the vehicle decelerates at a minimum of 0.25g. While decelerating, press the right key for three flashes.

**Short left press:** Skip Accelerometer Setup, Save Programming and Exit Setup

**Long left press:** Skip Accelerometer Setup, Save Programming and Exit Setup



## OPERATION

### G2X Status LED s'

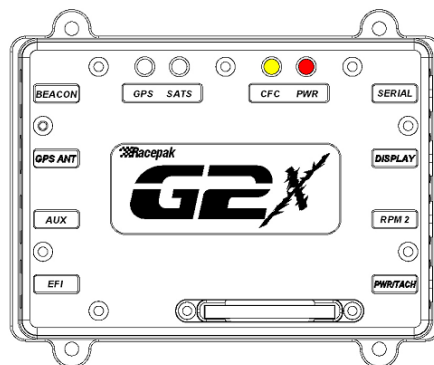
The top of the G2X contains four LED s that provide information concerning the status of the system.

#### *PWR LED*

- The PWR LED will glow a solid **RED**, when power is applied to the system.
- The PWR LED will flash slowly (1/sec) while data is being recorded. (vehicle speed over 25 MPH)
- The PWR LED will flash quickly (10/sec) if the power supply drops below 9 volts. Any open data files will be closed and data will not record begin recording again until the low power condition is corrected.

#### *CARD LED*

- The CARD LED will flash **YELLOW** anytime data is writing to the compact flash memory card.
- If the memory card is removed while data is recording (.i.e. the red PWR LED is flashing slowly) the CFC LED will turn on solid and all data for that recording will be lost.
- The power to the G2X should always be off before inserting or removing the compact flash memory card. You may turn the G2X power off in the middle of a recording, however, doing so will result in lose of the last 5 seconds of data.



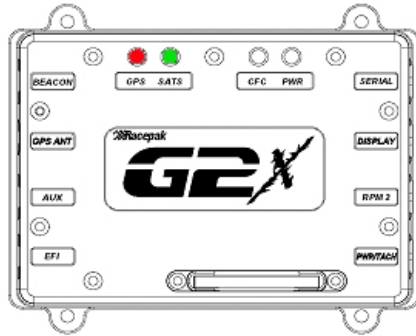
### **!!! IMPORTANT WARNING !!!**

ALWAYS insure the power to the G2X is OFF, when inserting or removing the Compact Flash card.

## ***GPS LED***

While the number of located and locked GPS satellites are provided by the display dash, the G2X can also provide this information through a series of **Red** and **Green** LED s.

In order for the G2X to provide 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.



### **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:

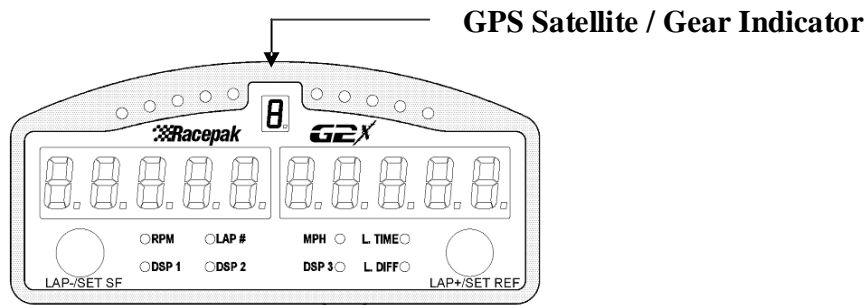


One red flash followed by three green flashes indicates the G2X currently has three GPS satellites locked and in use.

Upon the first power-up of the day, the G2X typically will take less than one minute to locate and lock three satellites positions. If the power to the G2X is removed or the vehicle is parked in a covered area (garage) it will typically only take a matter of seconds for the G2X to reacquire at least three satellites.

## Acquiring Satellites

The G2X requires at least three satellites, in order to provide data. At any given time, there are ten or more GPS satellites orbiting overhead. Not all of the satellite signals will be detected by the G2X, due to a low horizon orbit position, or natural / man made obstructions. The GPS hardware contained within the G2X is of the latest design, which provides quick satellite location and excellent reception. Depending upon your location, the G2X will typically locate and utilize between four and nine satellites.



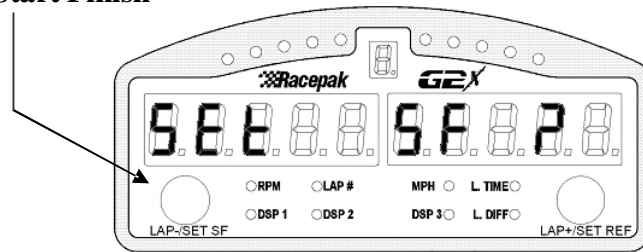
1. Position the vehicle outside, providing a clear view of the overhead sky.
2. Apply power to the G2X. The G2X automatically initiates the search for satellites, upon power up. Located in the center of the Display Dash is the GPS Satellite Indicator LED. Within approximately one minute, the G2X should begin to locate and lock on satellite positions.
3. When the LED display indicates at least 3 locked satellites, the G2X is ready for use. Upon subsequent power up of the G2X, typical time to locate satellites is less than 30 seconds.
4. Note: When properly configured and utilized with a tachometer signal, the GPS Satellite Indicator also functions as a Gear Indicator. Upon movement of the vehicle and the presence of a tachometer signal, the Gear Indicator function is activated. When the G2X is displaying the number of GPS satellites, a small decimal point will show to the lower right of the number. When displaying the gear indicator, the decimal will be off.

## Setting the Start / Finish Line

The G2X has the ability to provide on-track lap times to the driver via the dash display. This can be accomplished by setting the start / finish line while on the track. Through the use of GPS coordinates, the G2X then remembers the location of the start / finish line and a lap time is produced. In addition, the lap +/- difference is also available, after passing start finish.

1. When three satellites are located, slowly begin driving, and then apply a Long Press to the left Lap-/Set SF button for three flashes of the **red** LED shift lights. The message Set SF? will be displayed. To escape this function and start again, press the right button (Lap+/ Set Ref) button for 1 flash of the **red** LED shift lights.

### Lap Set Start Finish



2. Next, simply drive the vehicle slowly (between 10 and 20 mph) across the desired start / finish area. When passing the desired location, apply a Short Press to the Lap-/Set SF button. This is acknowledged by 1 flash of the **red** LED shift lights. The dash will then default to Lap Number and Lap Time display mode. Lap number and time will be displayed, following the completion of the first full lap. The location of the Start / Finish is at the discretion of the user. This action only needs to be performed one time, upon each visit to a location.

For example if a Start / Finish is set upon arrival at Track A, this position will be valid for the entire time at that track. If the user then takes the G2X to Track B and sets a Start / Finish at that location, that Start / Finish location will be valid only for Track B. If the user then returns to Track A, it will be necessary to set the Start / Finish again. It is much the same as trying to obtain a laptime from Track A, if your beacon transmitter was at Track B (if a beacon transmitter & receiver type of system was in use).

**Tip:** In order for the G2X to properly calculate the start / finish line area, the vehicle must be moving in the normal direction of travel when setting the start / finish line area. If the vehicle is stopped when the start / finish line area is set, the G2X will not be able to determine the vehicle heading which will cause the dash to display incorrect lap times.

## **Recording Data**

The G2X records data to files stored on the compact flash card. Each new recording will create a separate file in which the data is stored. The file will be stamped with the date and time the recording was started. The date and time information is obtained from the GPS Satellite data. The date and time from the GPS data is received in Greenwich Mean Time (GMT). This means you must program the G2X with an offset of how many hours your current time is from GMT time. The factory default setting is Eastern Standard Time (EST).

The G2X will automatically begin a new recording each time the vehicle speed exceeds 25 MPH and there are at least three locked satellites. The data will continue to record until the vehicle speed drops below 25 MPH for 30 seconds or the power is turned off. It is recommended that you wait for the recording to stop before turning the power off to the G2X. However, if the power is turned off while the G2X is recording, only the last 5 seconds of data will be lost.

## Display Dash Modes

The Display Dash provides information and programming capabilities in the following modes:

**1. Real-time Mode:**

- Provides real-time vehicle information such as lap time and speed to the driver.
- The display will automatically enter this mode anytime the engine is above 300 RPM or the vehicle speed is above 5 MPH.

**2. Replay Lap Mode :**

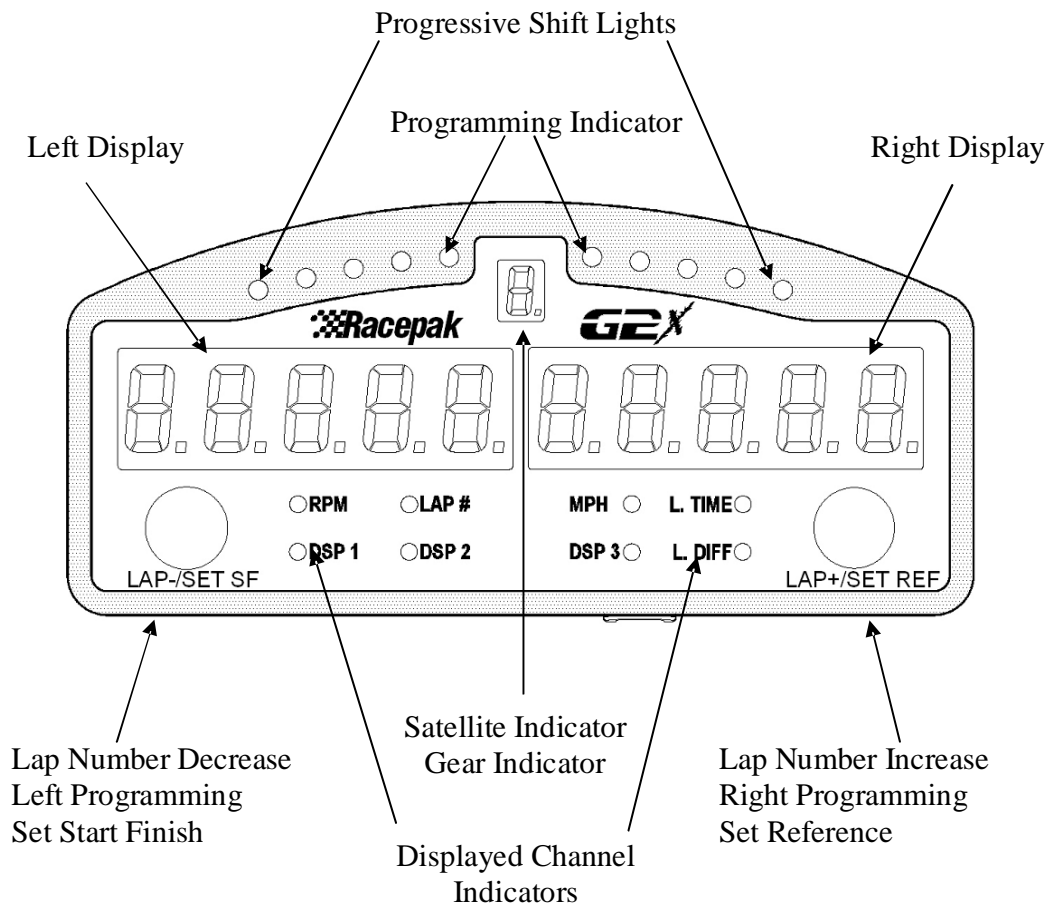
- Provides lap time and lap number information from previous laps.
- The display will automatically enter this mode anytime the engine is below 300 RPM and the vehicle speed has been below 25 MPH for 30 seconds or longer.
- The G2X must be turned off and back on again to reset the display back to lap 0.

**3. Setup Mode** Allows for setup and programming of the dash and G2X data logger.

Note: If the units in SETUP Mode 1 has been programmed for KPH then vehicle speeds describes above are 5 KPH and 25 KPH respectively.

What this means to the driver is the ability to view standard dash functions, such as speed and tachometer, at the most logical time, when the motor is running and the vehicle in motion (**Real-time Mode**). When the driver stops the vehicle and turns off the engine, the dash automatically returns to Lap Number and Lap time display (**Replay Lap Mode**) at which time the driver can review the most recent lap times. To reset back to lap 0, turn the G2X power off and back on.

## Display Dash Physical Features



<b>ITEM</b>	<b>DESCRIPTION</b>
Progressive Shift Light	Green / yellow / red LED shift lights
Programming Indicator	Length of press for programming buttons
Left / Right Display	Real time display of information
Lap Number Decrease	Returns / toggles lap number to start
Lap Number Increase	Returns / toggles lap to end
Left / Right Programming	Enables programming of dash / logger
Set Start / Finish	Sets on track start / finish line
Set Reference	Sets driving line reference point
Displayed Channel	Indicates Left / Right displayed channel
Satellite Indicator	Indicates number of locked satellites
Gear Indicator	Indicates current gear position

## Real-time Display Mode

The Real-time Display Mode, as the name describes, provides the user the ability to view real-time dash data, such as MPH and lap times. The Display Dash automatically enters the Real-time Display Mode, anytime one of the following true:

- Engine speed is above 300 RPM.
- Vehicle speed is currently above 5 MPH.
- Vehicle speed has been above 25 MPH with in the past 30 seconds.
- Lap number and time will display for 3 seconds each time the start / finish line is crossed.

When any one of the above conditions is met, the dash will begin to display real-time data. The default displays upon entering Real-time mode for the first time after power up is the current lap number on the left display and last lap time on the right display. To change the real-time data on the left display enter a short press on the left key. To change the real-time data on the right display, enter a short press on the right key.

### SHORT PRESS TO LEFT OR RIGHT PROGRAMMING BUTTON PRODUCES:

#### Left Dash Display Inputs

Engine RPM  
Current Lap Number  
MPH ( DSP 1)  
Lateral G (DSP 2)

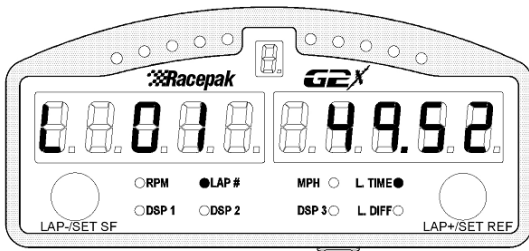
#### Right Dash Display Inputs

MPH  
Current Lap Time  
Battery Volt (DSP 3)  
Lap Time Difference from Best Lap

**Tip:** The channel displayed for DSP 1-3 can be customized. For instance, you can program DSP 1 to display Lap Time and DSP 3 to display Engine RPM. **See Page 21 for instructions.**



## Replay Lap Display Mode



Lap Number and Lap Time

Any time the vehicle is stopped, with the engine shut off (when RPM input is available) the Lap Number and Lap Time screen is in view. This enables the user to review lap data at the most convenient time, when the vehicle is stopped. While the Display Dash is in Replay Lap Mode the button keys perform the following functions.

- Short right key press **(R)** Increment lap number and time
- Short left key press **↵** Decrement lap number and time
- Long right key press **(R)** | Jump to last lap number and time
- Long left key press **|↵** Jump to first lap number and time

**Tip:** Any time the Display Dash is in Replay Lap Mode, the Gear Indicator displays the number of satellites currently in view and locked.

## Setup Mode

In addition, the Display Dash can also function as a programming device, allowing access to the G2X, thus eliminating the need to connect the user's PC to the G2X, in order to program to most commonly changed functions. Some of the more advanced functions must still be programmed using the serial cable and a PC. When functioning as a programming device, the following two modes are enabled:

### SETUP Mode 1: Stationary Setup

Settings that do not require the vehicle to be moving. An example of this type of setting would be Display Brightness.

### SETUP Mode 2: Moving Setup

Settings that require the engine running and the vehicle in motion. An example of this type of setting would be Gear Indicator ratios.

## DataLink II Software Installation into the User's PC

Now that we have the G2X installed, the next step is the installation of the DataLink II software used to view and analyze the data recorded by the G2X data logger. Locate the CD labeled **Racepak DataLink II G2X Data Analysis Software** in the materials shipped with your G2X. Then continue with the installation below.

### Computer Requirements

Although we highly recommend Windows XP, the DataLink II software is also compatible with Windows 98 Second Edition, ME and 2000 operating systems. Your PC, however, must have the following hardware components:

- **800 MHz Pentium Processor or equivalent**
- **128 Mbytes Ram**
- **200 Mbytes free disk space**
- **Video resolution of at least 1024 x 768 pixels**
- **Compact flash card reader**
- **RS-232 serial port or USB serial port adapter**
- **CD/DVD drive**
- **Keyboard and 3 button mouse**

The DataLink II software works best with a screen resolution of 1280 x 1024 or greater. The software will operate at a minimum screen resolution of 1024 x 768; however use of some of the advanced features of the software may be limited. We recommend the use of the largest and highest resolution monitor that meets your installation and budget requirements. The DataLink 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.

If your computer has a USB port, but no serial port, we recommend (and stock) the following:

KeySpan USB / Serial Adapter

KeySpan Part Number: USA-19HS

Racepak Part Number: 890-CA-USB/SER

## Software Installation

**NOTE: Before installation, remove any DataLink or DataLink II software that is on your PC. Typically, the software was installed for the Demo CD that was received by some customers. 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. This folder contains out of date files that are used by the new G2X Demo software. Some of these files cannot be deleted automatically and may interfere with the operation of the G2X.**

To install the RacePak DataLink II software on your computer, 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 Setup program will automatically start, and the setup Install Shield Wizard will be displayed. Please note –If you have disabled auto run in your computer the installation wizard will not automatically start. 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.
4. 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.

## Compact Flash Card Reader Installation

Data recorded by the G2X data logger system is stored on a standard Compact Flash memory card. In order to transfer the data to the users PC, it is necessary to utilize a Compact Flash card reader. Many modern PC s have built-in readers as compact flash cards are used extensively in digital cameras and other electronics devices. If your PC does not have a reader you will need to purchase and install a Compact Flash card reader. USB card readers are available at most electronics stores for a minimal cost. Carefully follow the installation instructions provide by the card reader manufacturer.

## Getting Started with the DataLink II Software

After you have installed the DataLink II software, the next step is to start the DataLink II program and to get familiar with some of the features of the program. To begin, locate the DataLink II icon on your desktop as shown below and click on the icon.






DataLink II  
Program

The main DataLink II program screen will be displayed indicating the program has been installed properly. Proceed with the following to become familiar with the DataLink II program.

### DataLink II Online Help

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

- 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.
- To get help on the currently displayed dialog box press the F1 Key.
- 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.
- 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.
- 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.
- 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.

Take a few minutes to experiment with the online help. Now, continue on to the next section and open the G2X\_Demo.rpk demo run data file. While reviewing the file, be sure to explore the online help as described above.

## **G2X\_Demo Run Data File**

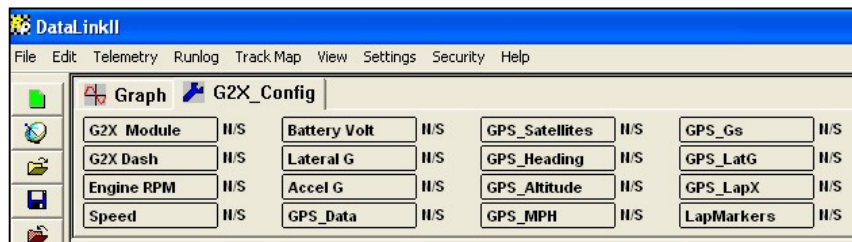
The next step in getting familiar with the DataLink II program is to view and manipulate an existing run data file. The demo run data file **G2X\_Demo.rpk** was copied onto your PC during the installation process. Appendix I include detailed instructions on opening the demo file while providing a quick 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.

If you have installed an earlier version of the G2X\_Demo file you will still want to quickly review the new demo file included with the installation disk. The new data file includes several revised run log pages that will be used during the file creation and analysis process. You will want to be familiar with these new features before going to the track.

## The G2X\_Config Configuration File

During the software installation, a configuration file named G2X\_Config.rcg was installed in your PC. This configuration file contains the default factory setup of your data logger, display dash, and the data analysis screens used to view and analyze the data collected by the G2X system. The configuration file also contains run log pages used to enter items such as the current track location, weather conditions and the setup of your vehicle. Typically, the G2X will not require any additional changes to the G2X\_Config file. These instructions are only if changes such as logging start parameters are made, or additional sensors are added to the G2X. From the factory, the G2X will automatically start logging data at 25 mph.

As you use your G2X data logger 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 G2X\_Config file. To simplify making these changes, the G2X\_Config.rcg file is opened each time the DatalinkII program is run. If your system is setup properly your main DataLink II screen should appear as shown below after the program is first started.

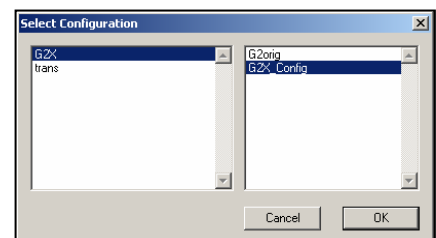


If the file does not open perform the following setup procedure to insure the configuration file will open each time the DataLink Program is started.

### Setting the Default Configuration:

The G2X\_Config configuration file should automatically open each time you start the DataLink II software. If it does not, you will need to select the file as the default configuration file by performing the following.

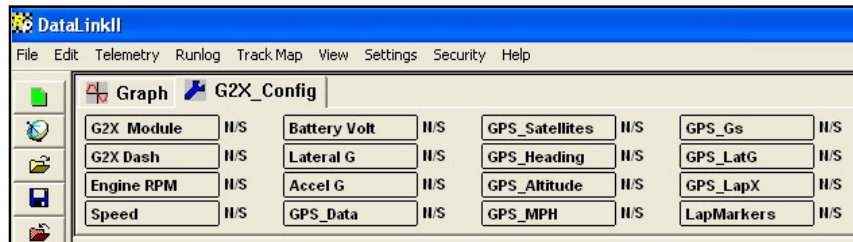
1. Select **File** from the menu bar.
2. Select **Open Car Configuration** from the pull down menu. The **Select Configuration** dialog window will appear as shown to the right. A list of the folders containing configuration files will appear in the left window. The names of the configuration files located in the selected folder will appear in the right window.



3. Select the folder G2X and then the configuration file G2X\_Config and then select the OK button to open the configuration file.

4. Select **File** from the Menu bar.
5. Click on the **Default Configuration** menu item from the drop down menu. A check mark should appear before the Default Configuration menu item showing the selected configuration file is the default configuration.

The DataLink II software should now be open, with the Configuration File in view, as shown in the example below. The blue wrench icon identifies the file as a Configuration File.



## Working with the G2X\_Config Configuration File

As was discussed above, the G2X\_Config 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.

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.

### *Modifying the Data Logger Setup*

In most cases the factory default setup of the G2X data logger system will meet your testing needs or can be modified by using the dash setup modes as discussed in previous portions of this manual. In certain applications for special testing you may need to modify setup features of the G2X data logger not accessible through the dash commands. In these cases the DataLink II software and the G2X\_Config configuration file is used to perform the modifications.

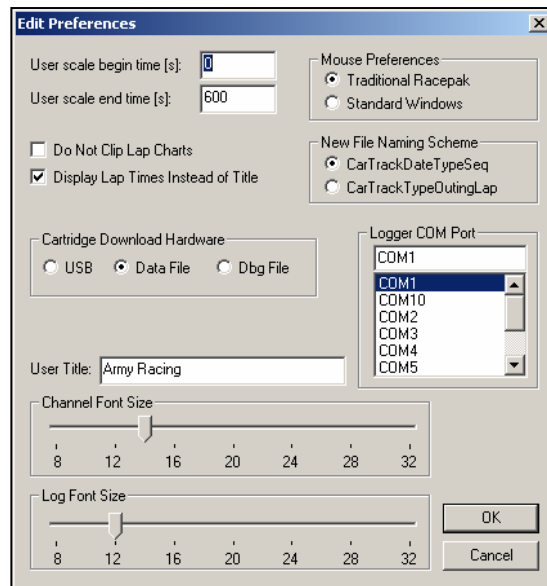
In order to make these modifications to the data logger you will need to perform the following steps;

1. Read in the existing configuration from your data logger system.
2. Modify and save the G2X\_Configuration file to meet your new requirements
3. Write the configuration to your data logger system.

These steps are accomplished as follows;

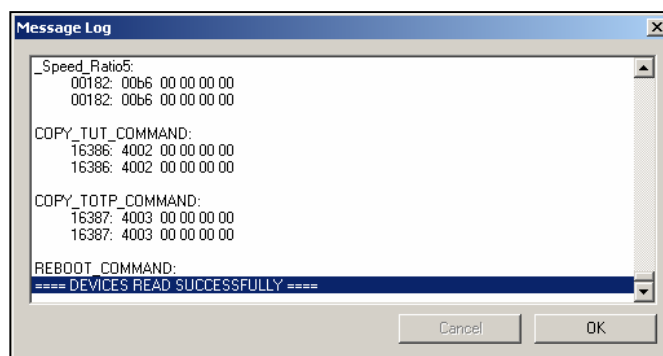
### Step 1: Reading the configuration

The first step is to read in the configuration of your data logger. To perform this step you will need to connect the serial communication cable supplied with the G2X kit between your PC and the Serial input connector on the G2X data logger and supply power to the data logger. Next check to be sure the default communication port used by the DataLink II program is the same as the port to which you connected the serial cable. This is checked by selecting the Preferences menu item located under the Settings main menu selection. When selected the following dialog box will be displayed.



On the middle left side of the dialog box is the **Logger Com Port** selection box. Select the appropriate communication port by clicking on the name of the port in the selection box. Select OK to accept your selection.

Next select the **Read VNet Config** menu option located in the **Edit** 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.

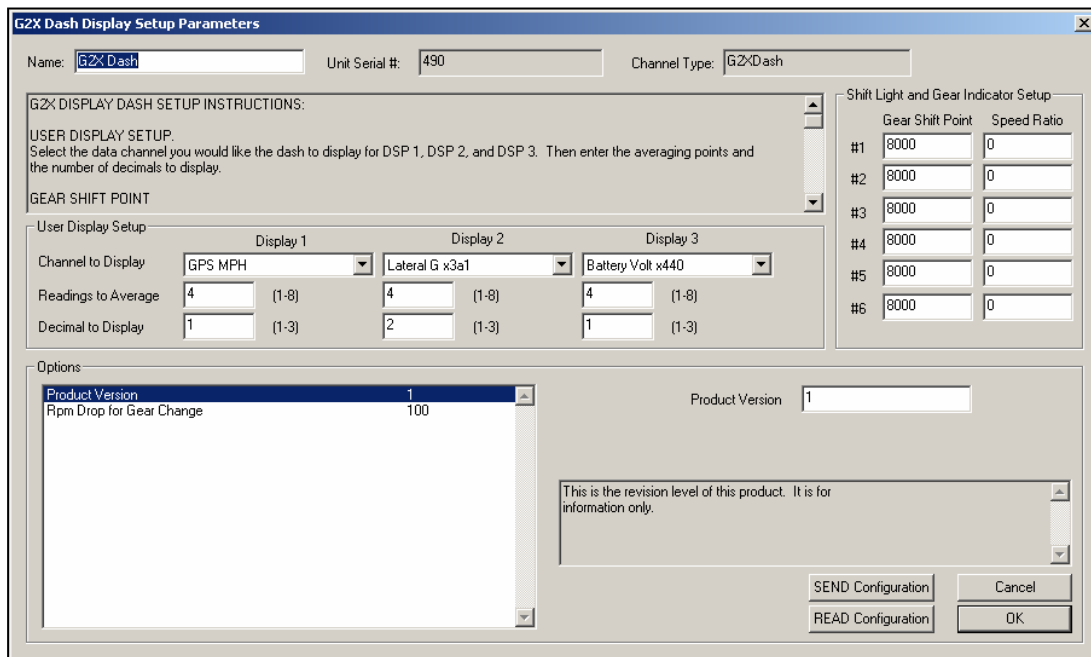


## Step 2: Modifying the Configuration File

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 opened as shown below.



Each one of these channel buttons controls one of the aspects of the data logger system. For instance the G2X\_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. The following dialog box will be displayed.



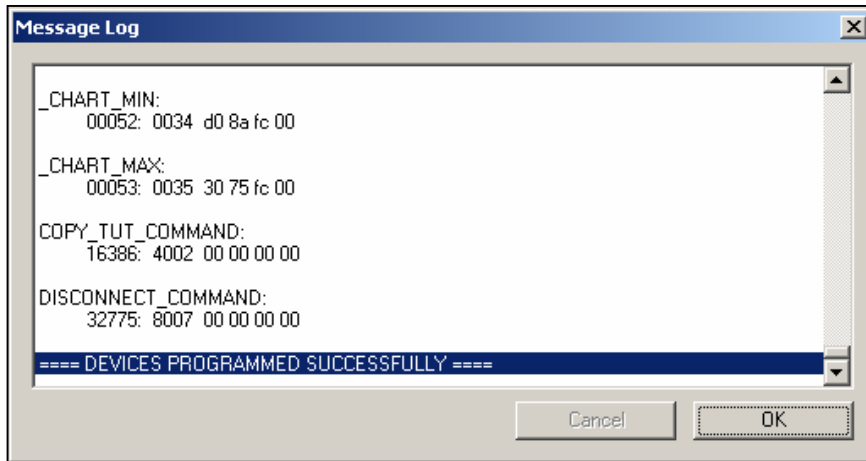
In the upper left corner of the dialog box is the instruction box **G2X Display Dash Setup Instructions** .” The box contains the instructions for setting the various parameters on the G2X dash via the easy edit dialog box.

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.

### **Step 3: Writing the Configuration**

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.

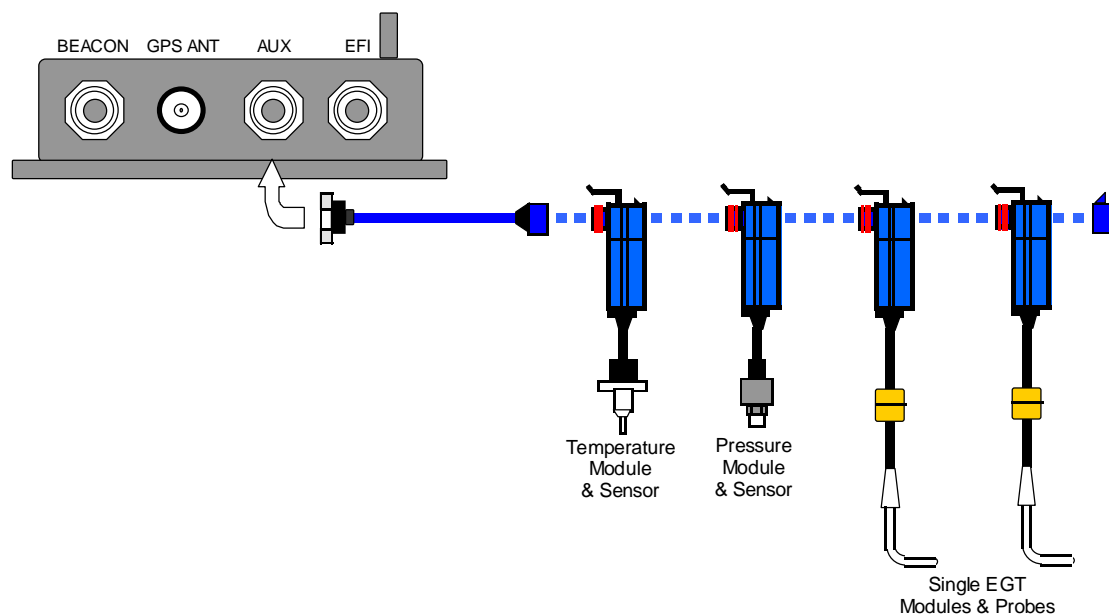


Your data logger has now been programmed with the new changes. Before the data logger can be used the serial cable must be removed from the data logger and power to the data logger must be turned off and back on.

## ***Adding New Devices to Your G2X Data Logger***

The capabilities of your G2X data logger system can be expanded by adding a variety of internal and external sensors. The design of the G2X utilizes our standard VNet series of sensors. This Racepak technology creates a smart sensor in that each sensor is connected to pre-defined, blue VNet module. Each module contains all the scaling and calibration values for each sensor. The VNet modules may be attached in any order, to the G2X. Then, through the function of the Edit / Read command in the main menu of the Datalink II software, the sensors are automatically added to the G2X hardware and the G2X\_ Config file software.

For standard sensors which are not monitoring movement (steering, throttle, etc), no additional calibrations procedures should be required, following the above Edit / Read command. The example below shows the addition of four external sensor modules connected to the AUX port on the G2X data logger. The AUX port on the G2X data logger provides access to the RacePak VNet onboard vehicle network system.

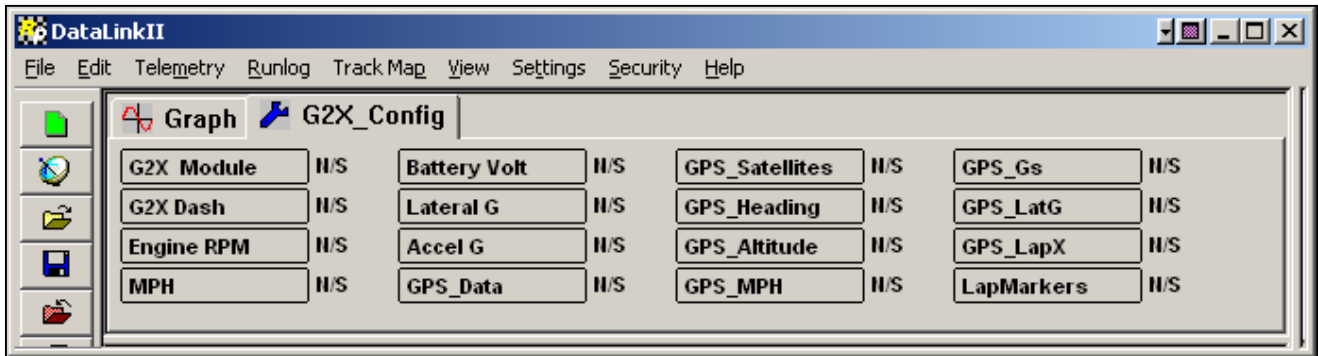


### ***Step 1: Adding the hardware modules***

To add external modules to your data logger, turn off power to the G2X and connect the **G2X to VNet** adapter cable to the AUX input on the G2X data logger. Follow the mounting instructions included with each of the VNet sensor modules to place and secure the modules on your vehicle. Using VNet interface cables as required connect the modules together in any order, as shown above. Finally, place a VNet terminator in the last module. If the VNet terminator cap is not installed the addition sensors will not function properly.

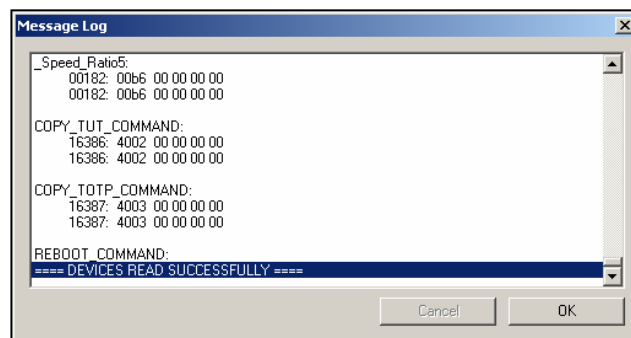
**Step 2: Updating the G2X\_Config Configuration file.**

After you have added the new hardware modules to your G2X system you will need to update the G2X\_Config configuration file before you will be able to record and view data from your new sensor modules. (Please refer to **Step #1- Reading the Configuration** in the previous topic **Modifying the Data Logger Setup** )”To update your configuration file connect the G2X serial cable from your PC to the G2X data logger. Next turn on power to your G2X data logger and run the DataLink II program. Your screen will appear as shown below.



Insure that all files, other than the G2X\_Config file are closed, at this time.

Next select the **Read VNet Config** menu option located in the **Edit** main menu selection. When selected, a Message Log dialog box will be displayed and the read configuration process will begin. As the information is read, 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. Click **OK** to continue. A new channel button will be added for each new sensor added to your G2X system and the G2X\_Config configuration file will be updated as shown below.



You should next verify that a new channel button has been added for each new device added to the system. If any devices are missing check the mechanical installation to insure all devices were properly connected and repeat the process above.

After you have verified all the data channels are available click on the **Save** icon in the toolbar or select the **Save** menu item located in the **File** main menu selection to save the modified configuration file to disk. You are now ready to begin using your new sensor modules.

If you wish to change the default configuration on any of the new sensors added to your system simply position the mouse cursor over the channel button on the desired sensor and click the right mouse button. The easy edit dialog box for that module will be displayed. Please refer to Step 2 and 3 in the previous section for detailed instructions.

Insure you add any new installed sensors to the Currently Selected Real Time Channels. Instructions for this procedure can be found in the paperwork that accompanies each new sensor.


## Making the Initial Run Data File

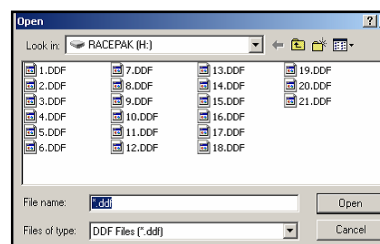
### Transferring Data

Following the G2X recording of data, drive the vehicle to a safe location in order to transfer and review the data. The G2X 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 Compact Flash card.

When a .DDF file is transferred to the DataLink II program, it is then assigned a filename based on the track, date and run number. At that time, it becomes a Run file. 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.

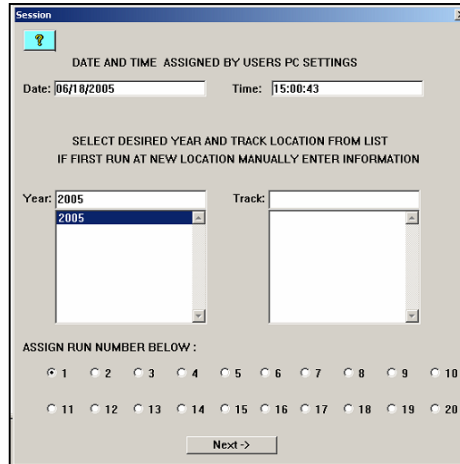
Only one Run file can be transferred at a time, so you must perform the following procedure once for each .DDF data file or recording.

1. If desired, dash lap time data can be reviewed before downloading.
2. Ensure that the red PWR LED is solid and not flashing before turning the power off to the G2X. It should take 30 seconds after the vehicle speed has gone below 25 MPH for the G2X to stop recording. When the recording has stopped, turn off the power to the G2X and remove the compact flash card.
3. Open the DataLink II program, and insert the compact flash card in to the USB card reader.
4. Initiate the transfer sequence by selecting the New Upload icon. 
5. The Select Configuration dialog window will open. Select **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.

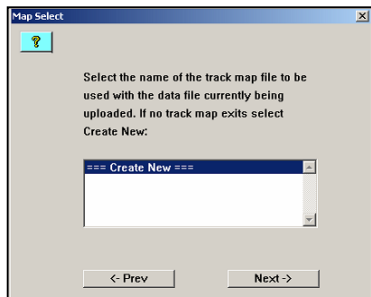


The Year selection creates a folder according to the year entered. The Track selection creates a folder according to the track name entered. For this reason, it is only necessary to enter the Year one time, according to the year of testing. It is also only necessary to enter the Track name one time, at each track. An example data path: **C:\RacepakData\G2X\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.

9. 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 G2X, 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 lateral and longitudinal information. Then, only previously saved maps that are located within a five mile radius of the new upload, will be displayed for selection.

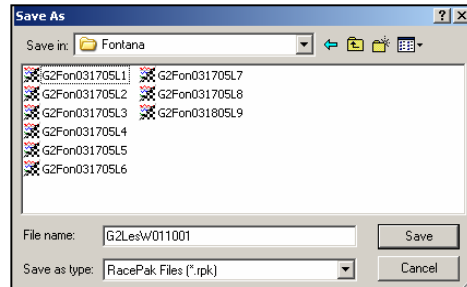
For a run at a new location that does not detect any previously saved track maps within that five mile radius, the above Create New message will appear in the Map Select Dialog Window. Since these instructions assume this is the first download for a new G2X system:

9. Select **Next**

10. 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**.



11. 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.

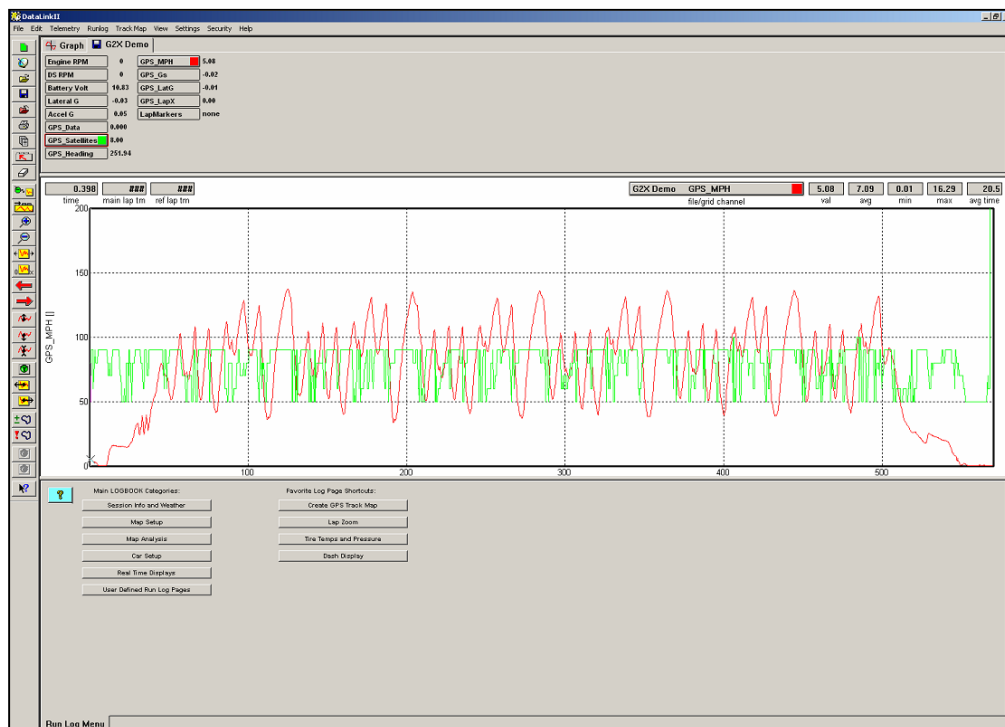
## Trackmap Creation (Closed Course - Oval & Road Race)

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 by the G2X, 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 G2X 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 G2X 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.

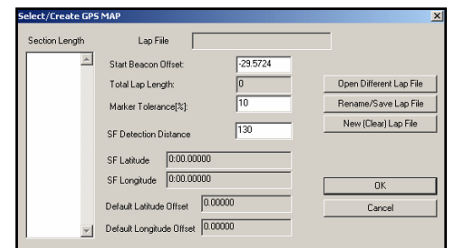
GPS track map files are saved according to the name assigned by the user. Typically, the name will reflect the name of the track or location in use. Saved GPS track map files can then be recalled for use, according to the testing location and needs of the user. The procedures for creating a GPS track map are quick, easy and listed in numerical order, Step1 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**

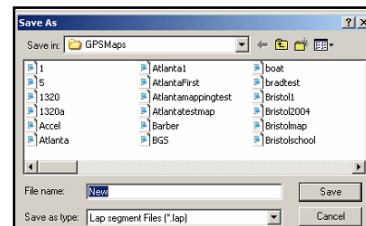
Left click over the Select / Create GPS Map. This will open the Select/Create GPS MAP dialog box. The user is presented with three choices, which are self explanatory:

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***

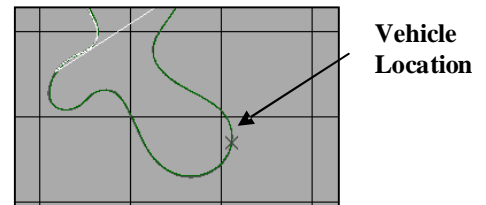
The next step is to assign the type of track in use for testing. Most all testing will be considered the default setting of Closed Course. Open Course is typically used for events such as Autocross and Hill Climbing, which is covered in the following section.

### ***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**

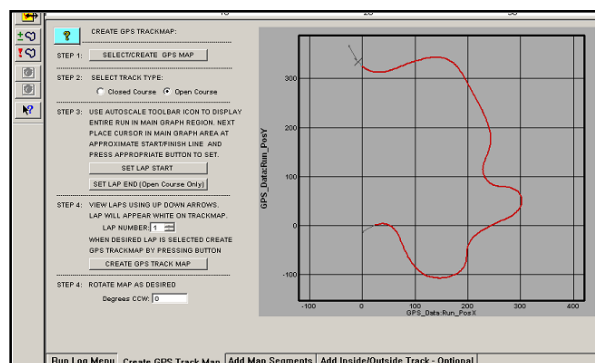
### **Set Lap End (Open Course Only)**

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

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 desired 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 G2X\_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.
2. Choose the desired action: Rename / 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 **Divide** 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 **Divide** 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 **Divide** button. Next, move the vehicle to the desired exit segment marker and again select the **Divide** button. Then, place the vehicle position between the two segments markers that are in view on the track map and select the **Corner** 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.



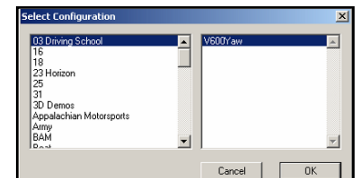
## Loading GPS Track Maps

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 or new track map, into the DataLink II software. Referring to the Configuration file discussion (Section 4.5) information loaded in the Configuration file provides a template for data display. Incoming data from a new download must first pass through the Configuration file. Therefore, any track map to be used for testing purposes must be loaded into the Configuration file. It is important to always insure the appropriate track map is loaded, in order to obtain the correct timing and mapping information. If your Configuration file is not currently open:

1. Open the G2X Configuration File by selecting File, then Open Car Configuration from the Main Menu command.

2. The Select Configuration dialog box will open. The folder containing the configuration file created for your G2X will appear on the left side, while the actual Configuration file appears on the right.



3. Select the file, and then select the **OK** button.

4. To load the just completed GPS track map, select the Create GPS Trackmap Runlog page contained in the Configuration file.

5. Select the **Select / Create GPS Map** button, found beside of **Step 1**.

6. When the Select/Create GPS MAP dialog window opens, select the **Open Different Lap File** button.

7. This will present the Open dialog box. From this box, choose the desired track map and select the **OK** button.


8. 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 Configuration file. 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. Insure all changes are also saved in the Runfile, also.

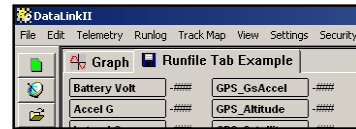


Again, while the explanation appears extensive, the amount of time necessary to create, save and load a GPS track map is approximately one or two minutes. It is only necessary to perform these actions one time per test. After that, let the on-track fun begin.

## 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. 

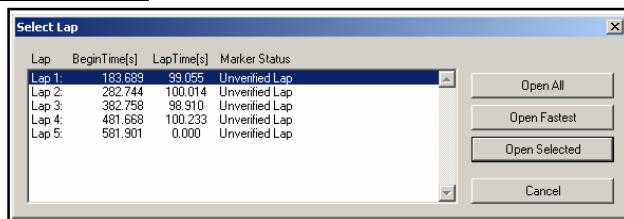
The initial Runfile should still be open. The DataLink II software saves individual lap data, with corresponding lap times (called a Lapfile) within the Runfile. Simply worded, a Runfile is a folder with all the laps placed inside.



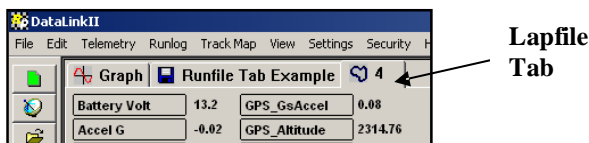
### Open a Lap

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.



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 G2X. 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 **9.1** . In certain applications, it is often more useful to compare the data to distance from the start / finish line.

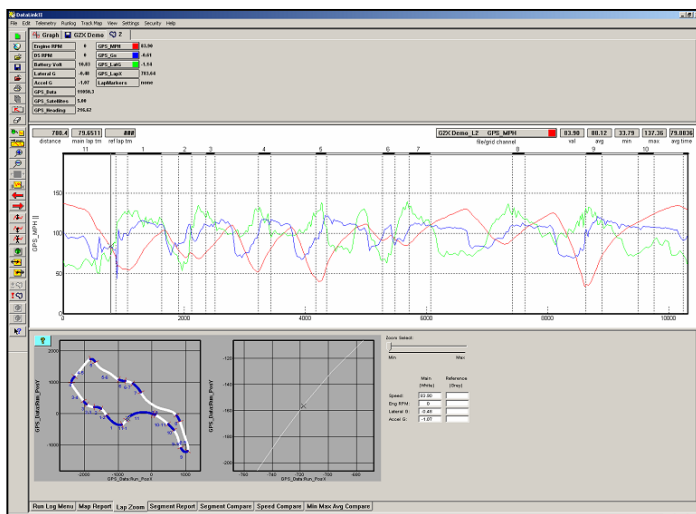
To place the Main Graph area in distance mode:

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 **1027.0** 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.

Run: G2X Demo Lap: 1 Lap Time: 83.631							Reference Run: G2X Demo Lap: 2 Lap Time: 79.6511						
SEG #	Split Time	Entrance Speed	Exit Speed	Avg Speed	Min Speed	Max Speed	SEG #	Split Time	Entrance Speed	Exit Speed	Avg Speed	Min Speed	Max Speed
11-1	2.378	68.00	51.78	69.37	51.43	69.53	11-1	2.265	73.42	65.10	61.13	65.54	75.77
1	5.322	51.78	101.70	70.85	51.74	97.05	1	5.227	55.10	101.78	72.13	64.43	97.98
1-2	2.037	101.70	79.18	95.61	84.73	102.50	1-2	2.034	101.76	80.18	96.79	85.60	104.75
2	2.033	79.18	72.77	73.61	69.76	81.46	2	2.026	80.18	75.33	74.66	69.82	81.92
2-3	2.342	72.77	72.97	69.46	67.06	72.98	2-3	2.317	75.33	76.63	71.86	68.78	76.90
3	1.204	72.97	82.14	77.38	71.91	82.29	3	1.184	76.63	87.40	79.84	76.60	83.22
3-4	5.998	82.14	62.41	80.30	51.01	108.16	3-4	5.707	87.40	62.20	84.83	53.30	110.73
4	2.142	62.41	80.58	62.22	52.13	74.12	4	2.187	62.20	79.26	61.70	52.07	75.71
4-5	6.290	80.58	44.47	81.38	47.05	106.45	4-5	6.104	79.26	44.69	82.83	46.96	107.49
5	2.769	44.47	69.47	44.12	41.40	51.30	5	2.821	44.69	59.95	43.89	39.92	54.11
5-6	6.665	69.47	90.72	90.63	55.46	111.90	5-6	6.601	59.95	91.60	32.53	59.82	111.66
6	1.458	90.72	96.44	92.86	90.37	97.28	6	1.454	91.60	95.05	93.73	91.10	97.91
6-7	1.703	96.44	86.25	90.44	86.35	97.67	6-7	1.724	95.05	85.39	89.74	84.90	95.83
7	2.663	86.25	108.84	94.92	86.13	105.73	7	2.641	85.39	110.51	95.56	85.19	106.78
7-8	8.434	108.84	87.82	107.54	85.45	128.27	7-8	8.228	110.51	91.17	110.18	86.88	130.73
8	1.570	87.82	102.88	92.46	86.71	98.63	8	1.534	91.17	104.96	95.19	89.74	100.40
8-9	8.147	102.88	36.34	87.65	36.12	124.52	8-9	7.745	104.96	34.79	91.54	33.79	125.98
9	3.984	36.34	71.70	45.21	36.01	66.24	9	4.010	34.79	71.46	43.44	33.96	64.24
9-10	4.210	71.70	114.22	93.88	70.43	112.32	9-10	4.217	71.46	113.88	92.41	68.57	111.08
10	1.487	114.22	124.16	118.04	113.91	122.28	10	1.490	113.88	123.85	116.81	112.84	121.16
10-11	2.476	124.16	136.31	130.42	123.97	135.71	10-11	2.482	123.85	133.31	129.60	122.83	135.26
11	6.103	136.31	69.60	113.70	71.42	137.36	11	5.825	133.31	78.92	116.84	93.23	134.38

3. Detailed information concerning segment times, entrance and exit speeds, along with minimum, maximum and average speeds are now available for review.

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

Lap #	Start Time	Lap Time	11-1	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	41.998	83.631	2.378	5.322	2.037	2.033	2.342	1.204	5.998	2.142	6.290	2.769	6.665	1.458	1.703	2.663	8.434	1.570	8.147	3.984	4.210	1.487	
2	41.998	83.631	2.378	5.322	2.037	2.033	2.342	1.204	5.998	2.142	6.290	2.769	6.665	1.458	1.703	2.663	8.434	1.570	8.147	3.984	4.210	1.487	
3	124.992	79.651	2.265	5.227	2.026	2.026	2.317	1.184	5.707	2.187	6.104	2.821	6.601	1.454	1.724	2.641	8.228	1.534	7.745	4.010	4.217	1.490	
4	204.640	79.651	2.187	5.226	2.026	2.026	2.343	1.204	5.998	2.142	6.290	2.772	6.665	1.454	1.689	2.584	8.089	1.513	8.089	3.984	4.210	1.487	
5	284.480	80.037	2.184	5.221	2.054	1.996	2.389	1.277	6.230	2.379	6.227	2.806	6.671	1.425	1.708	2.681	8.062	1.514	8.062	3.984	4.210	1.487	
6	364.333	80.037	1.996	5.350	1.996	1.996	2.295	1.208	5.847	2.177	6.221	2.786	6.730	1.485	1.727	2.681	8.118	1.460	8.138	3.940	4.256	1.484	
Theoretical Fast Lap:			79.676	1.996	5.227	1.996	1.895	2.295	1.184	5.707	2.142	6.104	2.769	6.601	1.425	1.689	2.584	8.089	1.513	7.745	3.940	4.194	1.482

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.

The screenshot shows the 'Segment Compare' interface for a 'G2X Demo' run. It displays two laps of timing data across 10 segments. The top table shows Lap # 2 with a total lap time of 124.988. The bottom table shows Lap # 1 with a total lap time of 41.258. The segment times for Lap 1 are highlighted in green, indicating they are the selected reference lap.

Ref Run:	Scroll Segments LEFT:																					
Ref Run:	G2X Demo																					
Lap #	Start Time	Lap Time	11-1	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
2	124.988	79.651	2.265	5.227	2.034	2.026	2.317	1.184	5.707	2.187	6.104	2.921	6.601	1.454	1.724	2.641	8.228	1.534	7.745	4.010	4.217	1.490
Run:	G2X Demo																					
Lap #	Start Time	Lap Time	11-1	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	41.258	83.631	2.378	5.322	2.037	2.033	2.342	1.204	5.998	2.162	6.250	2.765	6.665	1.458	1.705	2.663	8.434	1.570	8.147	3.984	4.216	1.487

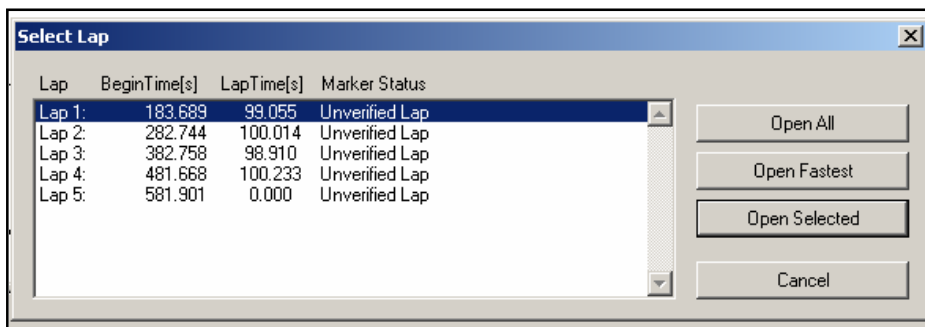
Run Log Menu | Map Report | Lap Zoom | Segment Report | Segment Compare | Speed Compare | Min Max Avg Compare

## 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 desired 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 from the G2X. 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 from the G2X, 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.

Ref Run:	Start Time	Lap Time	11-1	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	
02X Demo	1:24.989	78.851	2.285	5.227	2.034	2.228	2.317	1.184	5.707	2.187	6.104	2.821	6.801	1.454	1.728	2.641	8.228	1.934	7.345	4.610	4.217	1.429
02X Demo	41.205	83.631	2.378	5.222	2.037	2.039	2.342	1.204	5.988	2.142	6.200	2.355	6.895	1.498	1.710	2.893	8.424	1.870	6.147	1.944	2.210	1.440

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.

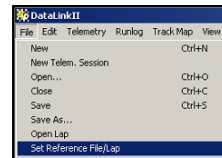
## Assigning Reference and Main for Runlog Data Comparison

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.

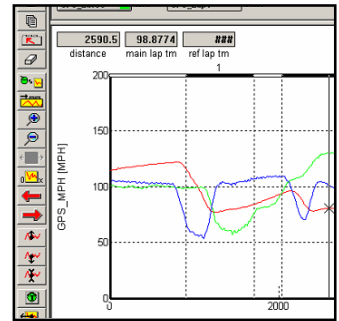
While it is not necessary to select Main and Reference settings to graph and view data, it is necessary to perform the above actions in order to compare data in the Runlog pages.



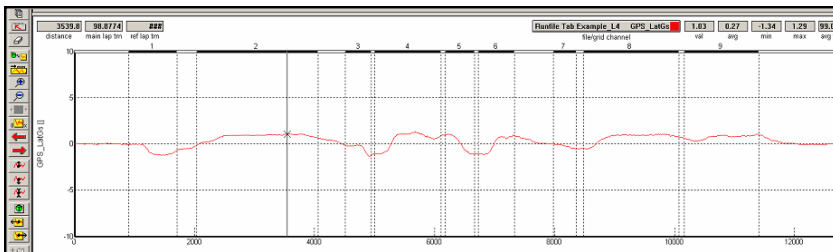
## Graph Scaling Explained

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.

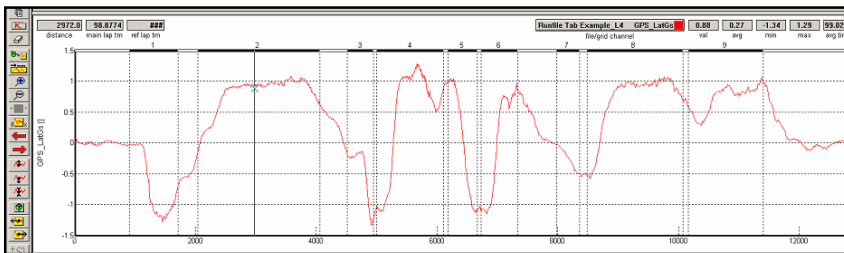


Let's take a moment to discuss graph scaling. The visual rise and fall of graphed data is determined by the scaling values. To provide a graphic example, look at the following two graphs. Both are the same GPS\_LatGs data, but with different scaling values.



Scaling:  
-10 to 10

**GRAPH A**



Scaling:  
-1.5 to 1.5

**GRAPH B**

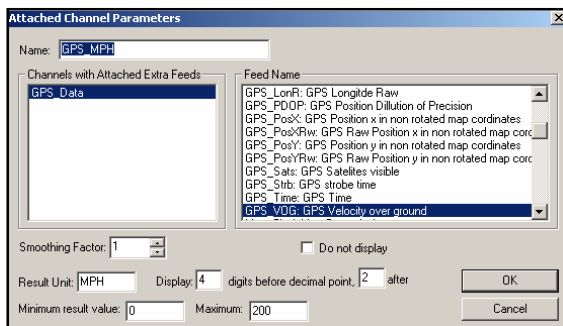
Upon first glance, the data appears to be totally different channels. What appear to be small changes in GPS\_LatGs in **Graph A** suddenly become quite large and detailed changes in **Graph B**. To improve performance using data acquisition, it is important to keep scaling values close to the minimum 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.



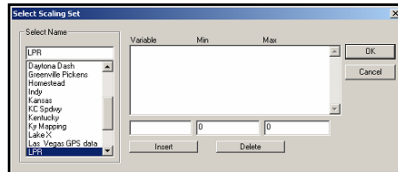
The Minimum and Maximum result values correspond to the minimum and maximum values displayed in the Main Graph area, for that channel.

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

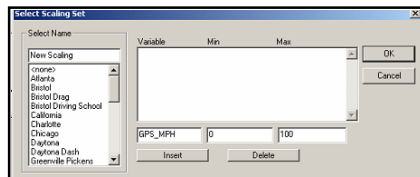
## Chart Scaling Sets

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.

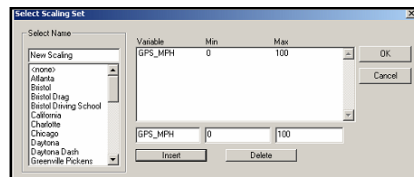
1. Select Settings, then Select Chart Scaling Set from the Main Menu selection. The following dialog box will be displayed.



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.**

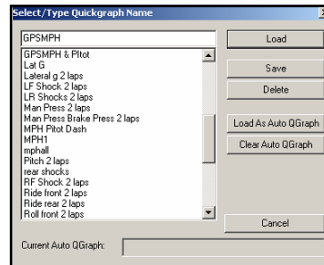
## Creating Graph Sets for Display - Quick Graphs

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



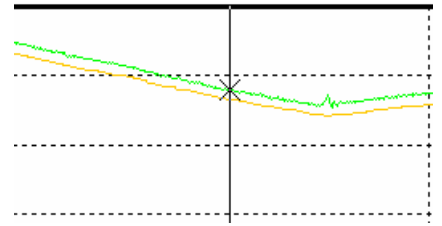
We have now created and saved a Quick Graph. To recall a graph set for use:

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 obtain, 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

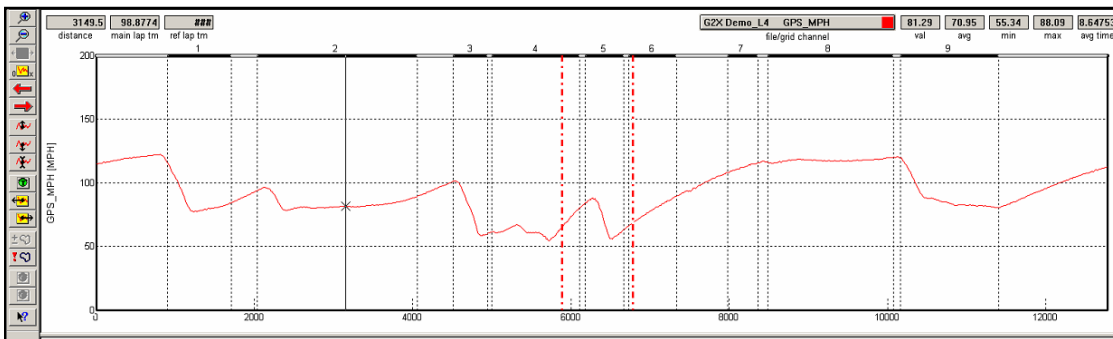
The DataLink II software will automatically calculate average channel data, according to the beginning and ending data displayed in the Main Graph area. There are times however, that a detailed look at data in a particular area is desired. This can be accomplished by placing Averaging Cursors within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





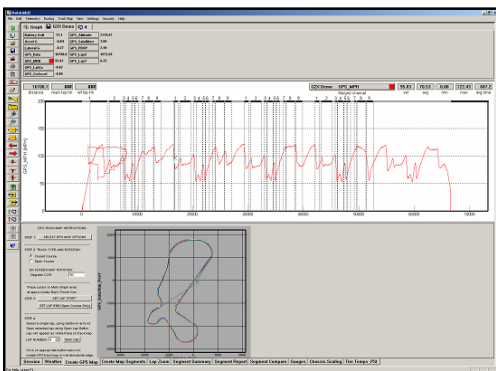
## Graphing Data from an Entire Run

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 RacePak Chart data toolbar.

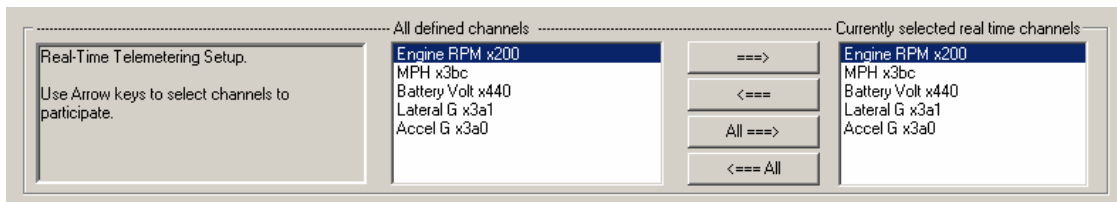
At this time, we have covered the basic instructions concerning the installation, programming, on track usage and downloading and graphing of data.



## Viewing Real Time Data (Telemetry) on your PC

Data from your G2X 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 G2X. 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 the G2X\_Config file and right click on the G2X 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.



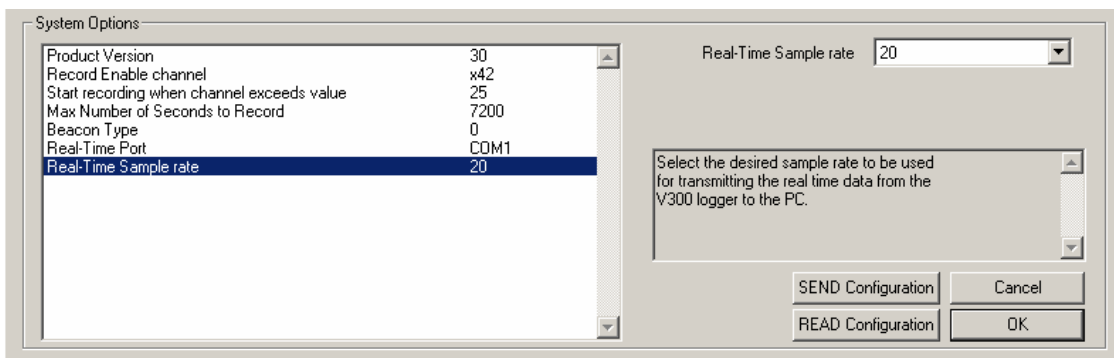
### *Setting up the Logger Real Time Telemetry Parameters*

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 highlight the name of the channel in the left-hand list and click on the right arrow  $\Rightarrow$  button to add the selected channel to the real-time channel list. 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  $\Leftarrow$ . Remember that only channels in the right hand list will be displayed during a real time telemetry session.

Use the All  $\Rightarrow$  button to select all of the channels for telemetry. Select  $\Leftarrow$  All to remove all of the channels from the telemetry list

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;



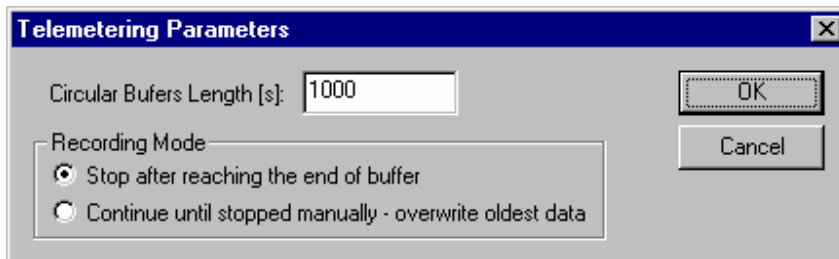
**Note:** The V\_Net Sample rate of each of the modules to be monitored should be equal to or greater than the real time sample rate. If they are not, the last data points will be repeated during the sample process.

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 COM1.

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.



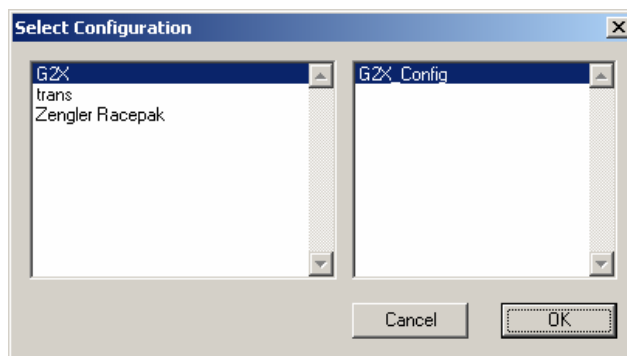
The first parameter **Circular Buffer Length** is used to set the amount of data to record in seconds. The **Recording Mode** is used to determine whether the recording will stop when the maximum record time is reached or whether the oldest data will be overwritten. For example if a Circular Buffer Length 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

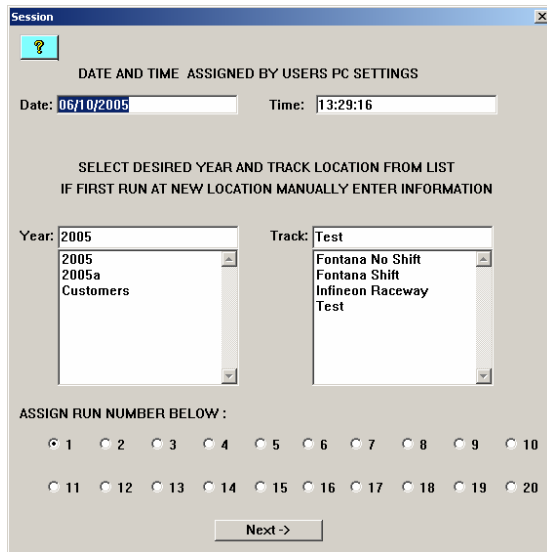
The next step is to start a telemetry session. Select the **Telemetry icon** or the **New Telem. Session** menu item located in the **File** main menu election. A dialog



box, as shown below will be displayed and you will then be asked to select the configuration file to use for this session.



Select the G2X\_Config file as shown above. 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 G2X data logger and the serial port on your PC selected above and power is supplied to the G2X unit. 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 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.

### **Display Dash is Emitting a High Pitch Sound. Is something wrong?**

No, the high pitch sound you hear coming from the Display Dash is the power supply and it is normal.

### **No Data Obtained During Run**

The G2X 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.

### **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?**

The most often asked question, concerning the G2X. 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 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 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 G2X 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 Compact Flash 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\G2X\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 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. Remember, your vehicle may not generate the same lateral g forces at the same point on the track. Therefore your segments would differ, if the same lateral g forces were used to create the segmented track map.

## **What is the difference between lap times displayed on the dash, and lap times as set by the creation of a 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.



## **Appendix I – G2X Demo**

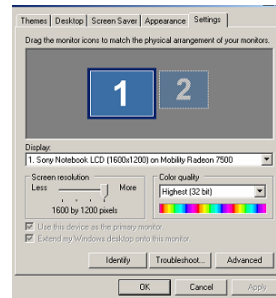
## PC Screen Resolution Settings:

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

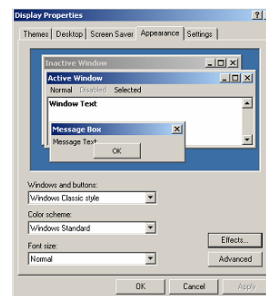


4. This action will open the Display Properties dialog window.
5. Select the Settings tab.
6. Place the mouse cursor over the Screen Resolution slider and move until a setting of 1024 x 768 or higher appears.
7. Select Apply
8. Select OK



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 preference, from within this area.





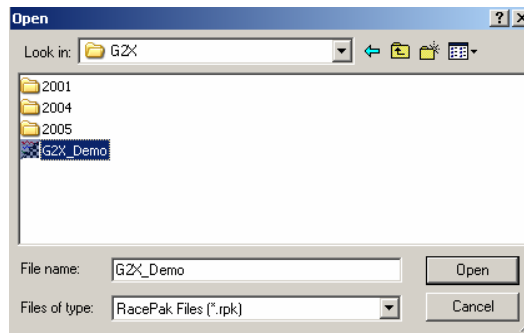
## Opening the G2X\_Demo Runfile:

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.

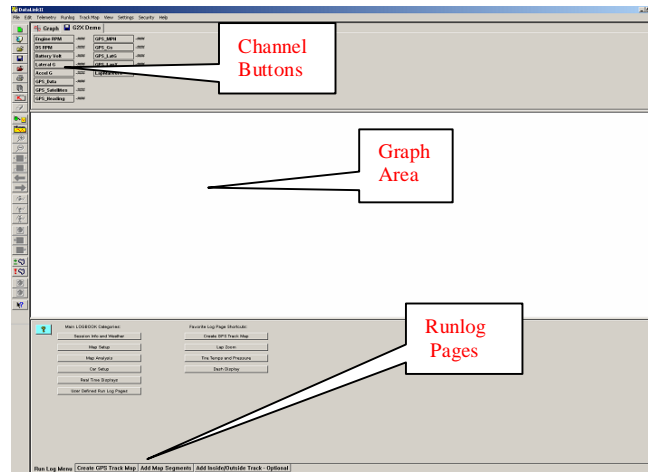
For demo purposes, the Runfile we will use for review will be called G2X\_Demo. To open this Runfile:

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.

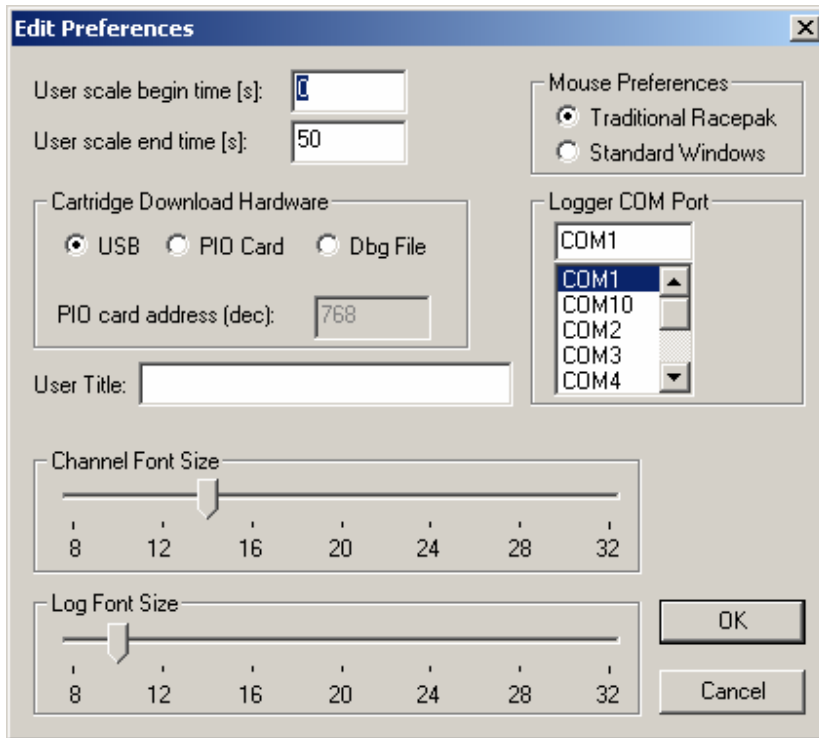
The screen is divided into three sections:

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.

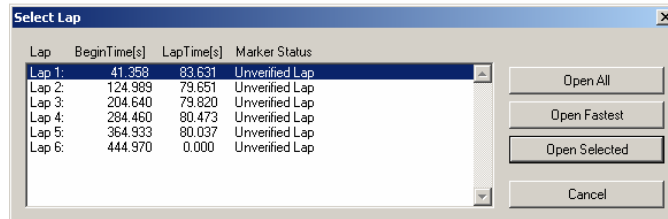
Now that the initial on screen appearance changes are complete, we can now proceed to opening and reviewing data.

## Opening a Lap:

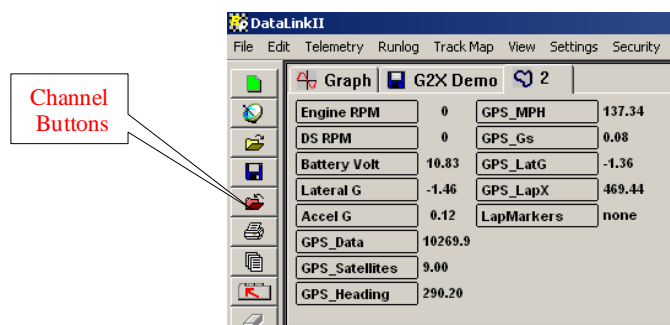
At this time, the G2X\_Demo Runfile should be open. The Datalink II software saves individual lap data, with corresponding laptimes (called a Lapfile) within the Runfile. Simply worded, a Runfile is a folder with all the laps placed inside.

To open a lap:

1. Place the mouse cursor over the G2X\_Demo tab  and Right click.





2. Left click the Open Fastest 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.

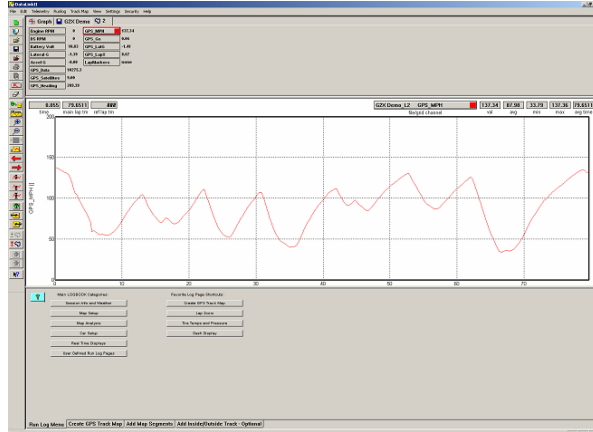
A Runfile is indicated by the  blue disk icon and a Lapfile is indicated by the  blue track map icon, along with the corresponding lap number.

## 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.



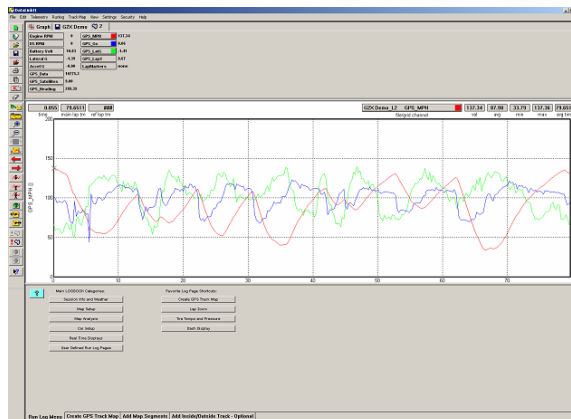
The data now in view represents the GPS\_MPH as recorded for one lap. The numbers located at the bottom of the graph represent time, from the start / finish line. When a data channel is graphed, all of the values for the remaining data channels are now activated. To review the data:

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:

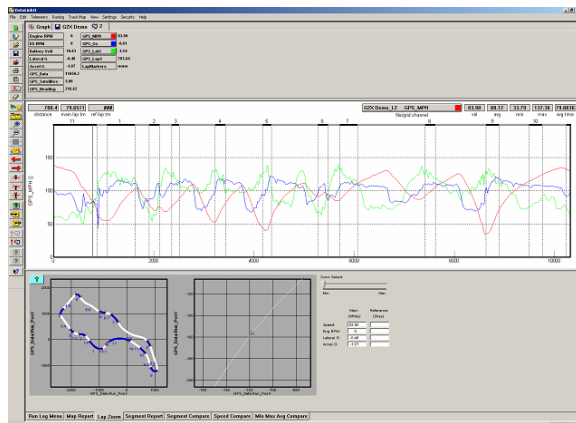
In order to produce a graph, a comparison must take place. In the previous example, the GPS\_MPH was compared to time, which begins and ends at the start / finish line. The time into the lap, according to the position of the mouse cursor in the Main Graph area is provided by the Cursor Position Box  . 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.

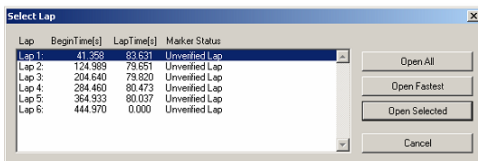


### ***Graphing Multiple Files (Overlay):***

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 desired 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):***

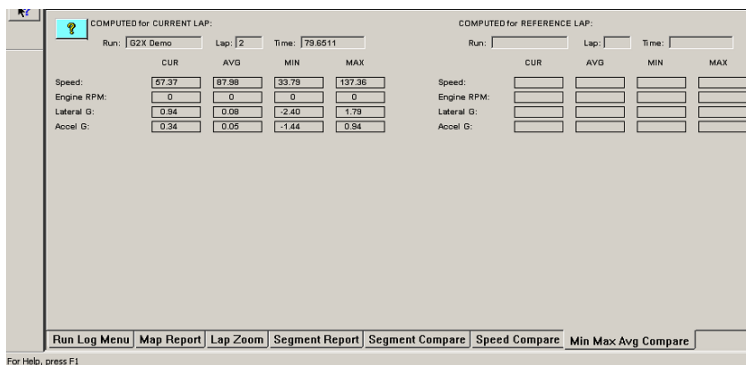
To remove all of the graphs currently displayed, double left click on the Clear All Graphs  icon (white eraser) in the Datalink II toolbar.


(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.



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.

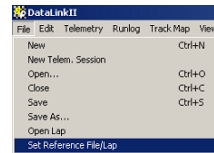
Suppose we would like to compare the minimum, maximum and average data, or maybe view a comparison of segment times between two laps. This is possible, by assigning Reference and Main status for two files. Runlog pages were designed to compare the data from two files and present it to the user, for evaluation. 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\_LatG 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.

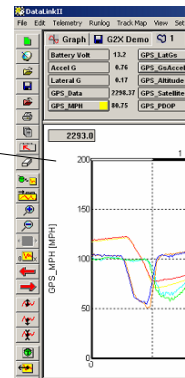
To view the average values of other graphed channels simply press the Tab key or move the mouse cursor over the Channel Grid Button and click the left mouse button as described above. If no additional channels are graphed, no additional values will be displayed.

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 1/2 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.

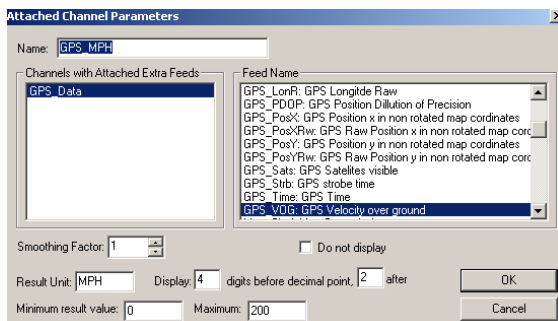


The Datalink II program provides two methods to change scaling. The first method will change the scaling within one file. The second (and preferred method) involves the creation of Scaling Sets. A Scaling Set has the ability to override all current scaling values and insert a pre-defined channel value.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



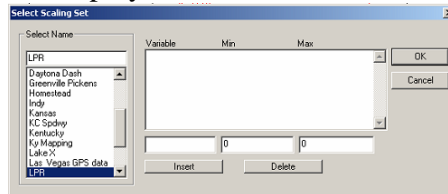
The Minimum and Maximum result values correspond to the minimum and maximum values displayed in the Main Graph area, for that channel.

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

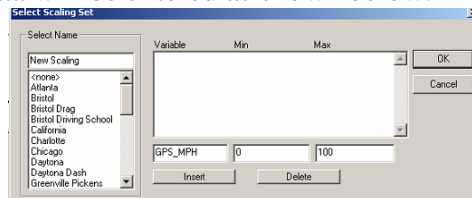
## Creating Chart Scaling Sets:

To create a Chart Scaling Set:

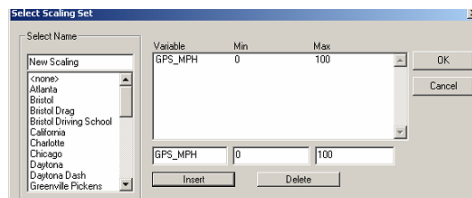
1. Select Settings, then Select Chart Scaling Set from the main menu selection. The following dialog box will be displayed.



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:***

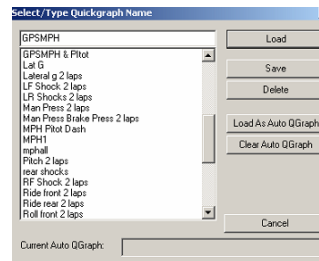
Previously, we graphed data by placing the mouse cursor over the desired data channel and left clicking. Often times, users will find the need to graph the same set of channels, each time data is reviewed. It is possible to build graph files that, when selected, will automatically graph the desired information.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





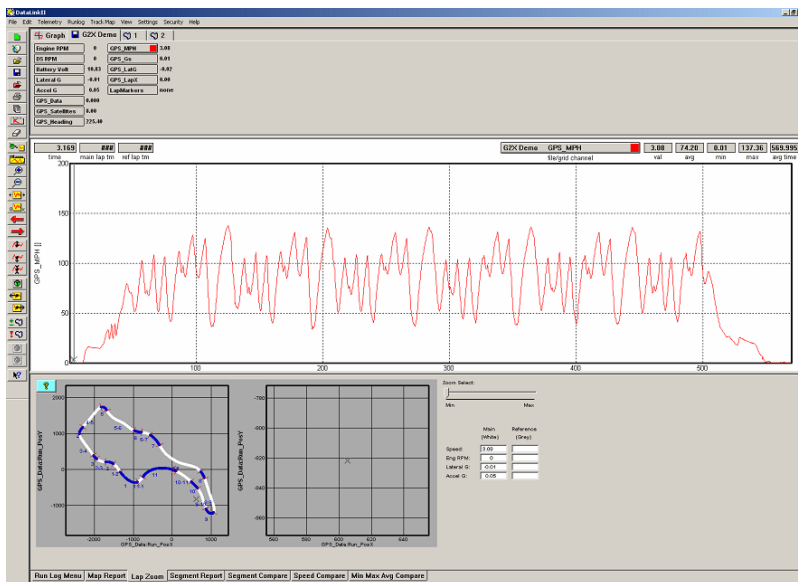
## Graphing Runfile vs. Lapfile Data:

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 screenshot shows a window titled "Session" with a close button. Below the title bar, there is a question mark icon and the text "DATE AND TIME ASSIGNED BY USERS PC SETTINGS". Two input fields are present: "Date: 06/18/2005" and "Time: 15:00:43". Below these is the instruction "SELECT DESIRED YEAR AND TRACK LOCATION FROM LIST IF FIRST RUN AT NEW LOCATION MANUALLY ENTER INFORMATION". There are two dropdown menus: "Year:" with "2005" selected and "Track:" which is currently empty. At the bottom, there is a section "ASSIGN RUN NUMBER BELOW:" with radio buttons for numbers 1 through 20.

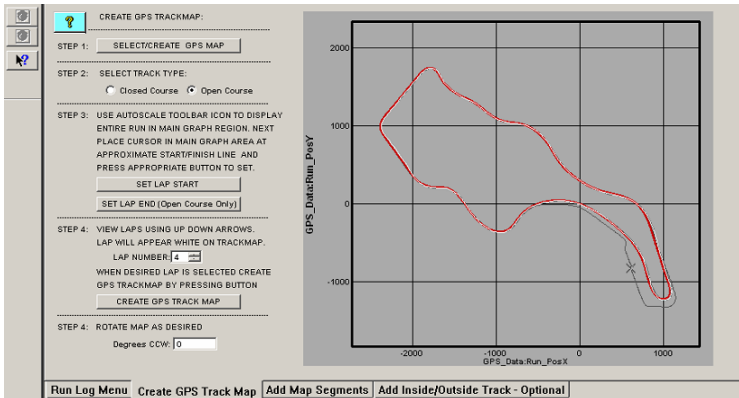
The Session page is automatically opened when new data is uploaded into the PC, from the onboard data logger. The purpose of the Session page is to generate the specifics of each run, such as vehicle, track location, date, and test type / number.

## Weather Page:

The screenshot shows a window titled "Weather" with a question mark icon and two buttons: "Get ALTACOM Weather on COM1" and "Get ALTACOM Weather on COM2". Below the buttons is a "Status:" label followed by an empty text field. A grid of input fields follows, with labels on the left and right. The left column labels are: "AltaCom Date:", "AltaCom Time:", "Barometric Pressure:", "Air Temperature:", "Relative Humidity:", "Absolute Humidity:", "Grains H2O:", and "Vapor Pressure:". The right column labels are: "Dew Point:", "Air Density Ratio:", "Density Altitude:", "Adjusted Altitude:", "Wind Direction:", "Wind Speed:", "Wind Gust:", and "Track Temperature:". Below the input fields is a paragraph of text: "THIS PAGE WILL DISPLAY THE CURRENT WEATHER DATA FROM AN ALTACOM II WEATHER STATION. TO UPDATE THE CURRENT WEATHER CLICK ON THE 'GET ALTACOM WEATHER...'" button ABOVE. IF YOU DO NOT HAVE AN ALTACOM II YOU CAN ENTER THE WEATHER DATA MANUALLY." At the bottom, there is a navigation bar with tabs: "Session", "Weather", "Run Comments", and "Run Log Menu".

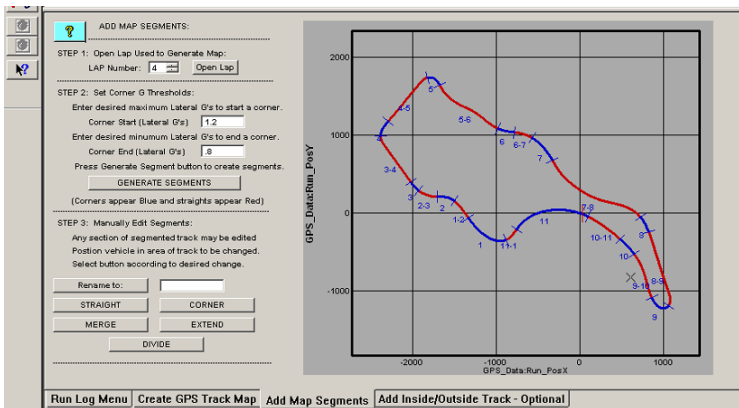
Weather data can be entered utilizing one of two methods. The first method is to manually enter the weather conditions, either during or after the data is downloaded. The second method requires the use of the appropriate Altalab weather station. The user simply *left* clicks the "Get ALTACOM Weather 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.

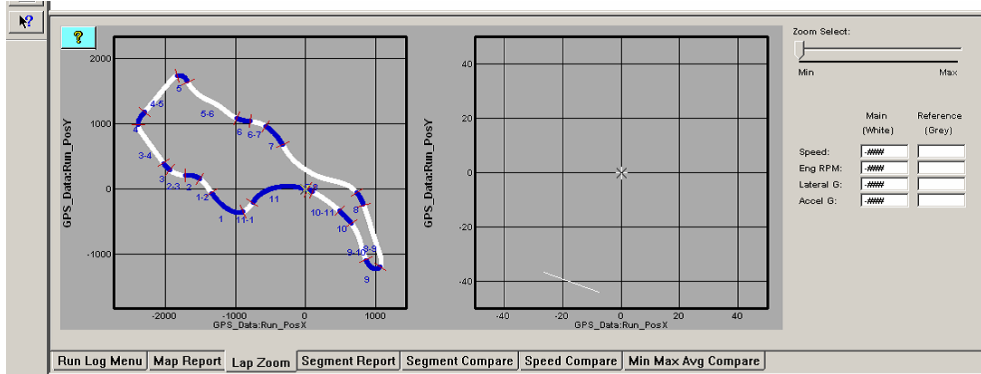
## Add Map Segments:



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.

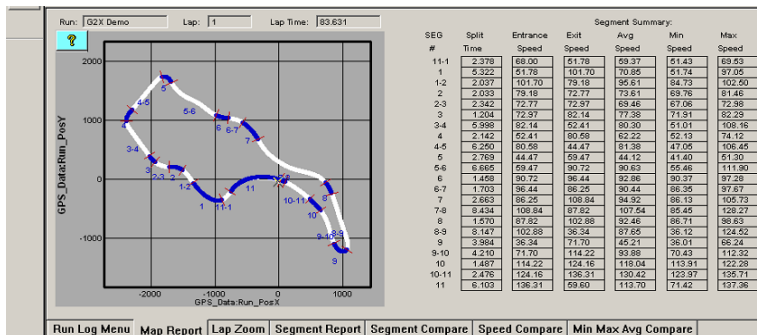
## Lap Zoom:

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.

Lap #	Start Time	Lap Time	Segments: Scroll Segments LEFT: 1 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	41.358	83.631	2.378	5.322	2.037	2.033	2.342	1.204	5.998	2.142	6.250	2.769	6.665	1.458	1.703	2.663	6.434	1.570	8.147	3.984	4.210	1.487	
2	124.989	78.651	2.265	5.227	2.034	2.026	2.317	1.184	5.707	2.187	6.104	2.821	6.801	1.454	1.724	2.641	6.320	1.624	7.745	4.010	4.217	1.490	
3	204.640	78.820	2.197	5.268	2.006	1.956	2.343	1.204	5.814	2.144	6.165	2.772	6.665	1.443	1.689	2.584	6.146	1.513	8.148	3.958	4.184	1.482	
4	284.460	80.473	2.180	5.241	2.054	1.880	2.389	1.277	6.330	2.379	6.227	2.808	6.871	1.435	1.708	2.631	6.088	1.514	8.092	3.940	4.210	1.492	
5	364.833	80.037	1.956	5.360	1.996	1.903	2.235	1.208	5.847	2.177	6.221	2.788	6.730	1.485	1.727	2.681	6.118	1.420	8.135	3.940	4.256	1.484	
Theoretical Fast Lap:			78.676	1.986	5.227	1.986	1.885	2.295	1.184	5.707	2.142	6.104	2.769	6.601	1.425	1.689	2.584	6.089	1.513	7.745	3.940	4.194	1.482

Ref Run:	Start Time	Lap Time	Segments: Scroll Segments LEFT: 1 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																		
124.989	78.651	2.265	5.227	2.034	2.026	2.317	1.184	5.707	2.187	6.104	2.821	6.801	1.454	1.724	2.641	6.320	1.624	7.745	4.010	4.217	1.490
Run:	Start Time	Lap Time	Segments: 1 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																		
41.358	83.631	2.378	5.322	2.037	2.033	2.342	1.204	5.998	2.142	6.250	2.769	6.665	1.458	1.703	2.663	6.434	1.570	8.147	3.984	4.210	1.487

Run:	Lap:	Lap Time:	Reference Run:										Lap:	Lap Time:
G2X Demo	1	83.631	G2X Demo										2	79.651
SEG #	Split Time	Entrance Speed	Exit Speed	Avg Speed	Min Speed	Max Speed	SEG #	Split Time	Entrance Speed	Exit Speed	Avg Speed	Min Speed	Max Speed	
11-1	2.378	68.00	51.78	59.37	51.43	69.53	11-1	2.265	73.22	55.10	61.13	55.54	76.77	
1	5.322	51.78	101.70	70.85	51.14	97.05	1	5.227	55.10	101.76	72.13	54.43	97.58	
1-2	2.037	101.70	79.18	95.61	84.73	102.50	1-2	2.034	101.76	80.18	96.79	85.60	104.75	
2	2.033	79.18	72.77	72.51	59.76	81.46	2	2.026	80.18	75.23	74.95	59.62	81.52	
2-3	2.342	72.77	72.97	69.46	67.06	72.98	2-3	2.317	75.23	76.63	71.96	59.78	75.80	
3	1.204	72.97	82.14	77.98	71.81	82.29	3	1.184	76.63	87.40	79.84	76.60	83.22	
3-4	5.998	82.14	82.41	80.30	51.01	108.16	3-4	5.707	87.40	82.20	84.83	59.38	110.73	
4	2.142	82.41	80.98	62.22	52.13	74.12	4	2.187	82.20	79.26	81.70	52.07	75.71	
4-5	6.250	80.98	44.47	81.38	47.05	106.45	4-5	6.104	79.26	44.59	82.83	46.86	107.49	
5	2.769	44.47	59.47	44.12	41.40	51.30	5	2.821	44.59	59.95	43.99	39.32	54.11	
5-6	6.665	59.47	80.72	80.63	55.46	111.90	5-6	6.801	59.95	81.60	52.53	59.62	111.66	
6	1.458	80.72	86.44	82.86	80.37	97.28	6	1.454	81.60	85.05	83.73	81.10	87.81	
6-7	1.703	86.44	86.35	80.44	66.35	97.67	6-7	1.704	85.05	85.39	89.74	84.90	95.69	
7	2.663	86.35	108.94	84.92	86.13	105.79	7	2.641	85.39	110.51	85.56	85.19	106.78	
7-8	6.434	108.94	87.62	107.54	85.45	128.27	7-8	6.228	110.51	81.17	110.18	86.88	130.79	
8	1.570	87.62	102.89	92.46	86.71	98.69	8	1.534	81.17	104.96	95.19	89.74	100.40	
8-9	6.147	102.89	36.34	87.65	36.12	124.62	8-9	7.745	104.96	34.78	81.54	33.78	125.98	
9	3.984	36.34	71.70	45.21	36.01	66.24	9	4.010	34.78	71.46	43.44	33.96	64.24	
9-10	4.210	71.70	114.22	53.88	70.43	112.32	9-10	4.217	71.46	113.88	52.41	59.37	111.08	
10	1.487	114.22	124.16	118.04	113.91	122.28	10	1.480	113.88	123.85	116.81	112.84	121.16	
10-11	2.476	124.16	136.31	130.42	123.97	135.71	10-11	2.482	123.85	133.31	129.60	122.83	135.26	
11	6.103	136.31	59.80	113.70	71.42	137.36	11	6.925	133.31	78.92	116.84	59.23	134.98	

### User Pages 1 through 3:

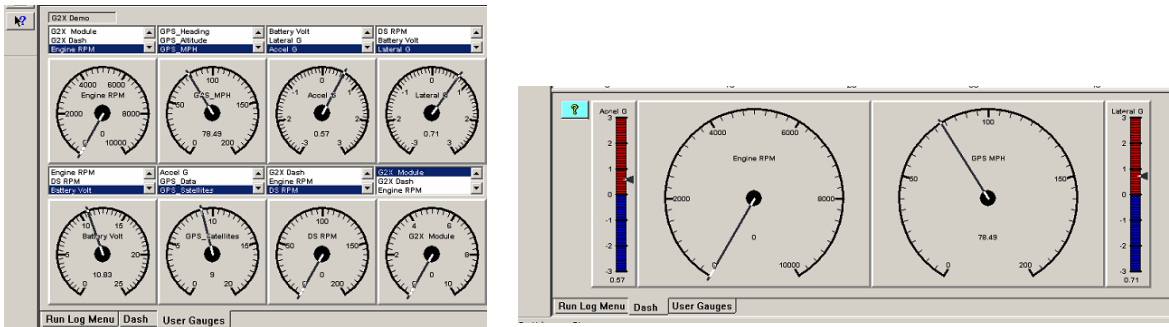
The User Pages 1, 2 and 3 provide the ability to create custom Runlog pages, which contain input areas particular to each individual users needs. Each page can be pre-defined with a question / answer type of configuration. Any type of text may be entered in the first area, with answers inserted in the 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 dashboard 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.

