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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 analysis software.

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 are crossed and when the vehicle comes to a stop.

DataLink Software

1. Provides ability to create GPS track map with start / finish and segment times.
2. GPS maps can be saved and utilized any time the vehicle returns to the same track location.
3. GPS maps provide lap and segment times that can be compared to previous data recordings.
4. Provides information in both graphical and report format.
5. 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) Three wire pigtail (power/ground/engine rpm)
- 7) Compact Flash memory card
- 8) Serial Communication Cable



G2XPRESS INSTALLATION

To assist the customer in becoming quickly familiar with the installation and on-track use, the G2Xpress Install Guide was created. While this guide provides all the basic information required for use, review of the remainder of the complete G2X Instruction Manual is highly recommended, before first time use of the G2X.

Mounting of G2X and Components

Data Logger Orientation

1. Direction of travel: The data logger must be mounted with the X in the G2X logo towards direction of travel.
2. Level front to rear and left to right: Attempt to mount as close to level as possible. It is not necessary to be dead level, but consistently mount the same, each time.
3. Easy Access: Remember, it will be necessary to access the compact flash card for downloading data and attaching the serial cable if updating the setup of the data logger. Hiding the logger typically creates problems for the user.

Power: 12-18 Volts / 1 amp draw

1. Cigarette Adapter: The easiest way to obtain power, with no tach input.
2. Red, Black and Yellow Pigtail: Enables user to install switched power to the G2X and obtain a tach input (yellow wire) for dash display and data analysis.

Engine RPM (tach input tips)

1. Signal requirement: 50% duty cycle, 5-18 volt square wave signal. This is typically the type of signal provided by an aftermarket ignition.
2. Late model vehicle tach signal: Depends upon the vehicle. Some have tach outputs that are compatible with the G2X. Related information can typically be found using an online search relevant to your vehicle.
3. GMR Sensor: The GMR sensor is the best option to obtain a tach signal for coilpak, coil on plug or diesel vehicles. Use of the GMR sensor requires a Power RPM Cable (Racepak PN: 680-CA-PWR-4P).

GPS Antenna

1. Unobstructed view: Mount the antenna on top of the vehicle or in a location that will not block signal reception. The dash, trunk lid or hood is acceptable locations. Avoid Electrical Interference: Avoid mounting the antenna or routing the cable near ignition components, tach wires, radios or even vehicle mounted cameras. If the GPS is working when the vehicle is stationary or at idle, but loses satellite data when the vehicle accelerates, electrical interference is the culprit.

Display Dash

1. In reach of driver. Driver will need to access dash to set start finish, review lap times or toggle through display channels.

Display Dash Programming

The display dash is designed to be intuitive, providing data according to the needs of the user. The following provides an overview of the dash functions

Programming Options

Mode 1: Setup functions for when the vehicle is not moving, such as brightness.

Mode 2: Setup functions that require a moving vehicle, such as gear ratio (engine RPM vs. speed).

Entering Programming Modes

1. Mode 1: Press left button for two blinks of red shift light LED s.'
2. Short press of right button advances settings (example: brightness from 01 to 02).
3. Short press of left button advances to next function.
4. Long press of left button (three blinks of red shift light LED) saves and exits.

Programming Mode 2 uses opposite buttons. Right button enters and left button advances

Factory Setting for Left and Right Display

Left: Engine RPM Right: GPS MPH

Enabled when vehicle moves or engine starts (with engine RPM input).

Changing what is Displayed on Left and Right Side of Dash

If no engine RPM is connected, vehicle must be moving to change display.

1. Short press of left button advances through Lap#, Disp1, Disp2.
2. Short press of right button advances through L. Time, DSP3, L. Diff.
3. Disp1, Disp2 and Disp3 channels may be programmed by user.

Setting Start Finish for Dash Laptime Display

1. Vehicle must be moving. Try to not exceed 40 mph before setting.
2. Press Left dash button for three blinks of the red shift light LED s.'
3. Release the button when the message Set SF appears.
4. Within 30 seconds of the Set SF message, press the left button once.
5. Laptime and Lap number will display for 5 seconds, each time start finished is passed. Dash then returns to default display settings.

Reviewing Lap Time and Lap Number

1. When vehicle stops and all data is written to memory card, lap number and lap time data will be available for review.
2. Right button advances forward one lap at a time.
3. Left button reverses backward one lap at a time.

Clearing Lap Time and Lap Number from Dash

Lap time and lap number data is automatically cleared from the dash, when the vehicle returns to the track and exceeds 25 mph.

Initial Run Information

To Start Logging

1. Enter the track and begin run. When vehicle speed exceeds 25 MPH, logging will automatically start.
2. Drive or race at normal speed.
3. Insure at least two complete laps are made, on the track. This insures one clear lap for trackmapping purposes.

Setting Start Finish for Dash Laptime Display

1. Vehicle must be moving. Try to not exceed 40 mph before setting.
2. Press left dash button for three blinks of the red shift light LED s'
3. Release the button when the message Set SF appears
4. Within 30 seconds of the Set SF message, press the left button once
5. Display will return to default display settings.
6. Laptime and Lap number will display for 5 seconds, each time start finished is passed. Dash then returns to default display settings

Completion of Run


1. Exit track.
2. Come to a complete stop, but **do not** turn off power to G2X
3. The G2X stops writing data when no speed is detected for 30 seconds
4. Watch the red PWR LED. When the logger has written all data to the compact flash card, the PWR LED will glow solid.
5. Turn G2X power off.
6. Pull compact flash card.

How Data is Stored on the Compact Flash Card

1. Each run is numbered in order of occurrence. Any time the vehicle exceeds 25 MPH a file will be started. When the vehicle stops for 30 seconds or longer, writing stops and the file is complete
2. Each file is numbered in consecutive order, starting with 1 (if there are no other files on the card).
3. The data logger will not overwrite old or existing files, but simply creates a new file and numbers according to the number of the last saved file on the card.

Downloading Data

Transferring Data from Compact Flash Card to Users PC

1. Insert compact flash card from G2X into compact flash card reader attached to users PC containing the DatalinkII software.
2. The first time the card is inserted into the reader, a drive window should automatically open. Close this window.
3. Select the New Upload icon found in the DatalinkII software 
4. Follow the download process as outlined in the G2X Manual.

Building a Trackmap

Building a trackmap following download of the first run is of utmost importance. All of the timing functions (lap and segment) along with data reports are based on the trackmap. If no trackmap is created, then it is impossible to open laps, overlay and compare data. In a typical inertia and wheelspeed based data system, the rollout of the tire, combined with wheel rpm provides an approximate distance value, in order to compute data. Keep in mind this is a GPS based data system. As such, no wheelspeed sensors are in use, so it is mandatory to build a trackmap in order to obtain distance values. Complete instructions concerning the building of a trackmap can be found in the G2X Manual. In addition, a demo run is available in the DatalinkII software, along with instructions for use, in the back of the G2X Manual. Use the demo run to practice building a trackmap, before going to the track. If a trackmap is not created following the first run, and subsequent runs are downloaded without a trackmap, the user will then be forced to manually insert a trackmap in all runs that have previously been saved to the users PC.

Trackmap Tips

1. At least two complete laps on the track are required, before the software can construct a trackmap.
2. In or out laps are not considered a complete lap.
3. If inside and outside lines are desired, those laps can be made during a run or at any other time.

Segmenting a Trackmap

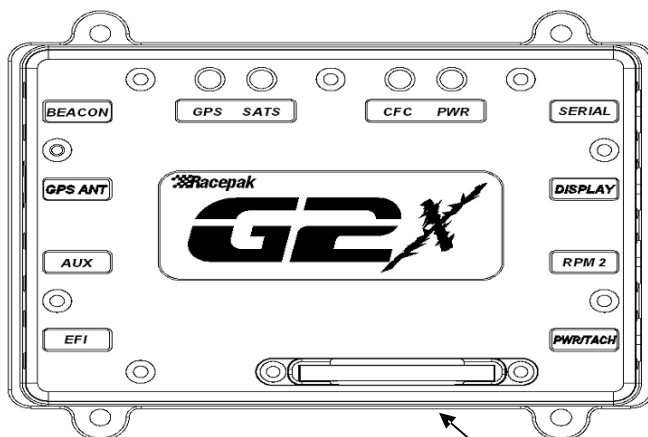
Track segmenting is necessary in order to produce all of the segment related reports available in the DatalinkII software. Segments are created by the use of lateral g data. The start of a corner marker is defined by the Corner Start number as found in Step 2 of the Add Map Segments Runlog page. The end of a corner is defined by the Corner End number entered in Step 2 of the Add Map Segments Runlog page. Complete instructions concerning the segmenting of a trackmap can be found in the G2X manual. In addition, a demo run is available in the DatalinkII software, along with the instructions for use found in the back of the G2X Manual. Use the demo run to practice building segmenting trackmap, before going to the track.

Trackmap Segment Tips

1. Default Corner Start and Corner End numbers are entered by the DatalinkII software. These numbers may be changed according to the needs of the user.
2. Segments are created from one lap (as used to create the trackmap) and are not affected by future downloaded data.
3. Consider the segments markers as GPS plotted points on a virtual trackmap. Once the trackmap and segments are created and saved, the user will have that map for use, forever.
4. If a trackmap is not in view when the Add Map Segment page is open (after a trackmap is created) a complete lap was not used to create the trackmap. Create another trackmap, using a different lap.

STANDARD INSTALLATION

G2X Connection Introduction



BEACON (optional):

Input for the onboard vehicle position receiver.

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.

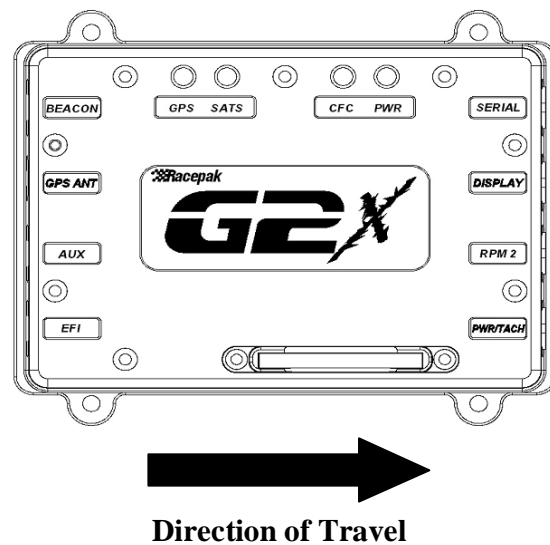
Direction

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.

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



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

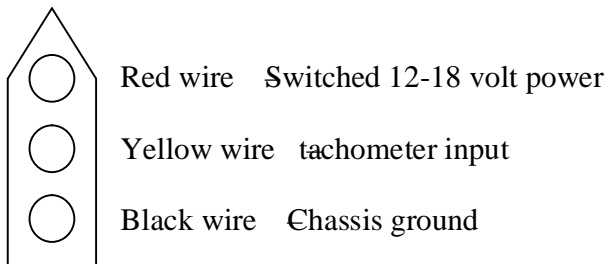
The G2X requires 12-18 volt DC power to operate properly. The power cable connects to the input labeled **PWR / TACH** on the G2X unit. There are two different pigtails provided to allow for both permanent power and tachometer connections to your vehicles electrical system or for quick connection using 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.

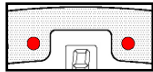
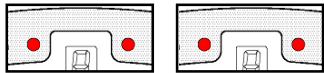
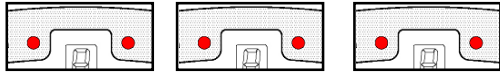
PROGRAMMING AND SETUP UTILIZING THE DISPLAY DASH

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

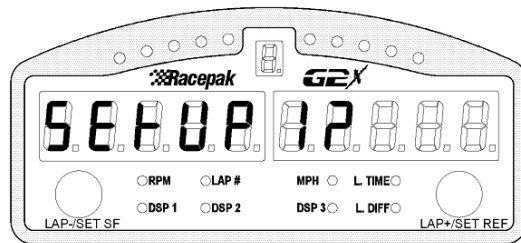
Setup Mode 1 is used to program the unit with default information, without the need to operate the vehicle. Setup Mode 1 presents the programming choices in the following order.

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.

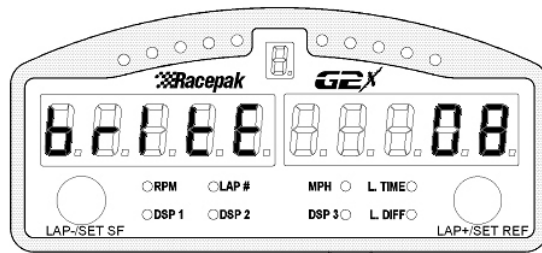
While in Setup Mode 1 the left key presses will always execute the following commands.

- 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.

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



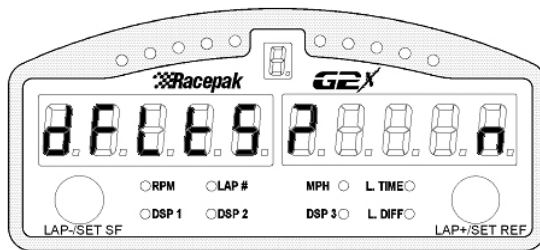
Short left press: Accept selection and go to next setup parameter

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.

- 2) 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

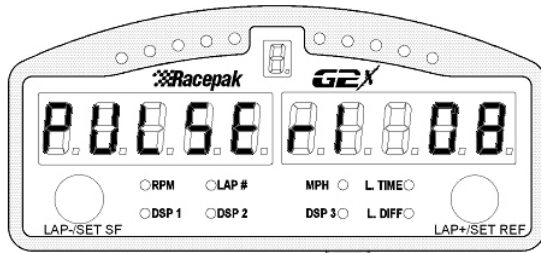
The Default Factory Dash Settings Are As Follows:

- 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.

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



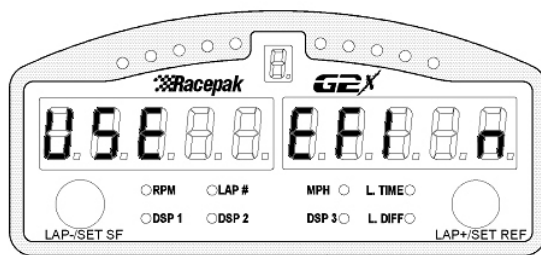
Short left press: Accept selection and go to next setup parameter

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.

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

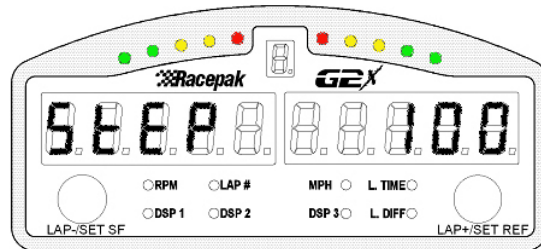


Short left press: Accept selection and go to next setup parameter

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

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

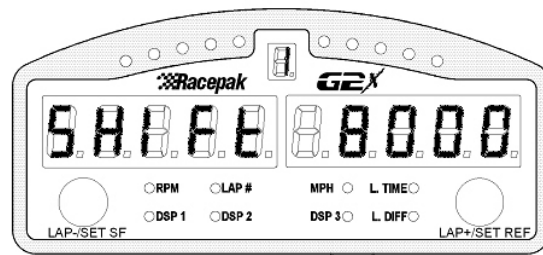
Short left press: Accept selection and go to next setup parameter

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.

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



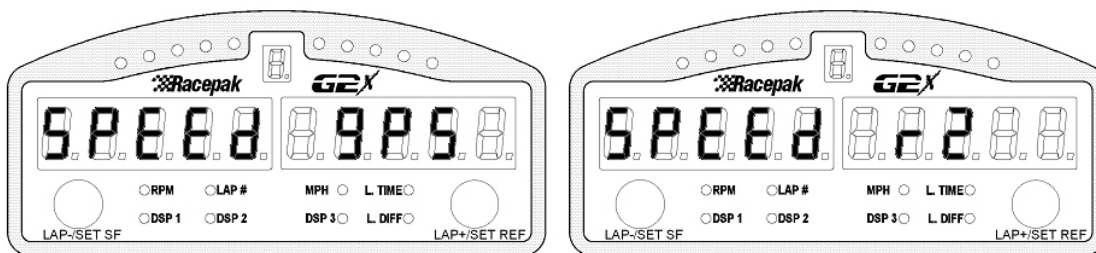
Short left press: Accept selection and go to next setup parameter

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.

- 1) Toggle source: Short right key press
- 2) Toggle source: Medium right key press



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

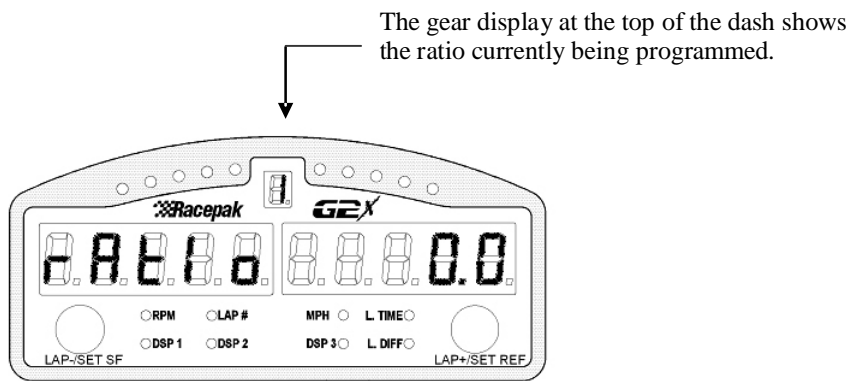
Long left press: Save programming and Exit Setup

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:

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



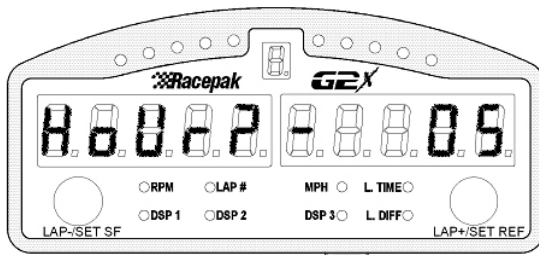
Short left press: Accept selection and go to next setup parameter
Long left press: Save programming and Exit Setup

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).

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

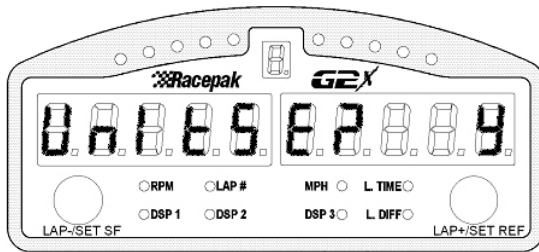


Short left press: Accept selection and go to next setup parameter
Long left press: Save programming and Exit Setup

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.

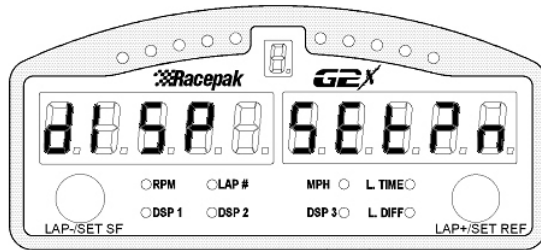
- 7) Switch between Y and n: Short right key press



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

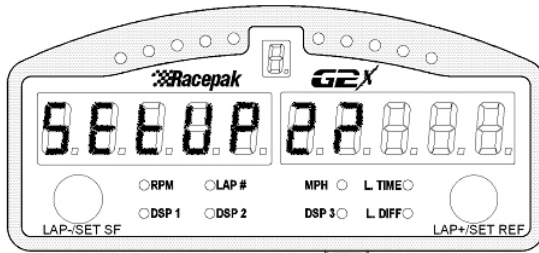
Setup Mode 2 functions allows the user to utilize inputs from the moving vehicle, in order to automate the programming process. Setup Mode 2 presents the programming choices in the following order:

- 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:



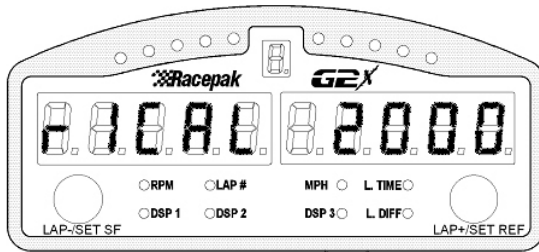
- 3) To confirm you wish to enter Setup Mode 2, press and release the right button to send a short key press.

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.



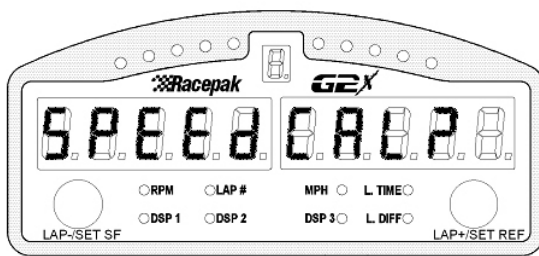
- 1) The engine should be brought up and held constant at 2000 rpm using a separate tachometer.
- 2) Enter a long key press by holding the right button for three flashes to program the tachometer pulses and move to the next program item.

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.



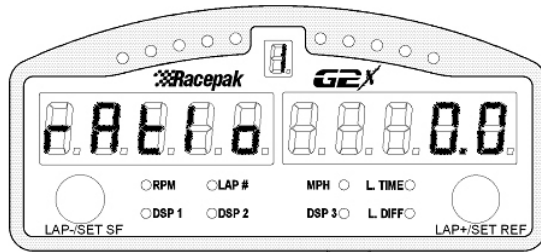
- 1) Drive the vehicle to a speed between 30 50 mph.
- 2) Insure the chosen speed is stable. When stable, press and hold the right key for three flashes to perform calibration and move to the next program step.

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'

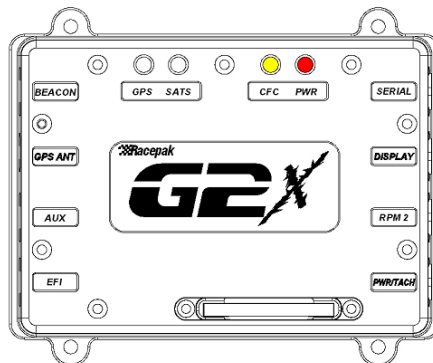
The top of the G2X contains four LED s that provide information concerning the status of the system.

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

1. The CARD LED will flash **YELLOW** anytime data is writing to the compact flash memory card.
2. 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.
3. 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.



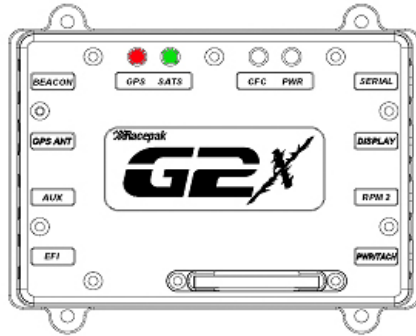
!!! IMPORTANT WARNING !!!

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:

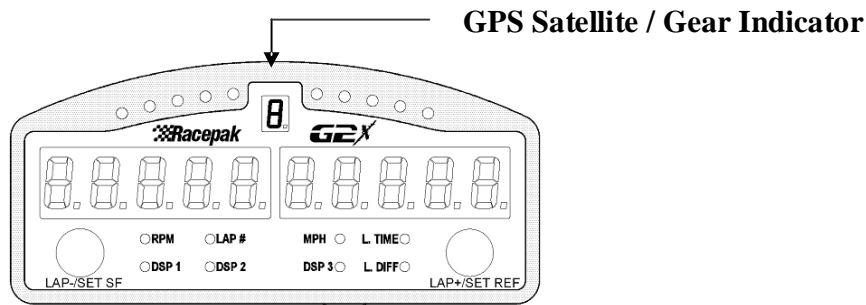


One red flash followed by three green flashes indicates the G2X currently has three GPS satellites locked and in use.

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.



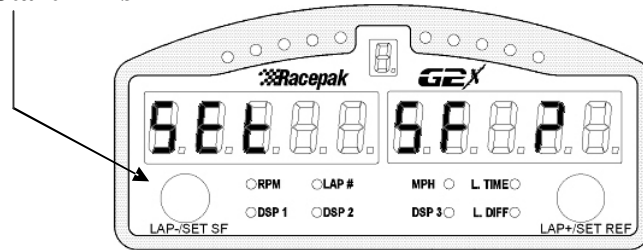
- 1) Position the vehicle outside, providing a clear view of the overhead sky.
- 2) Apply power to the G2X. The G2X automatically initiates the search for satellites, upon power up. Located in the center of the Display Dash is the GPS Satellite Indicator LED. Within approximately one minute, the G2X 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:

1. Provides real-time vehicle information such as lap time and speed to the driver.
2. 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 :

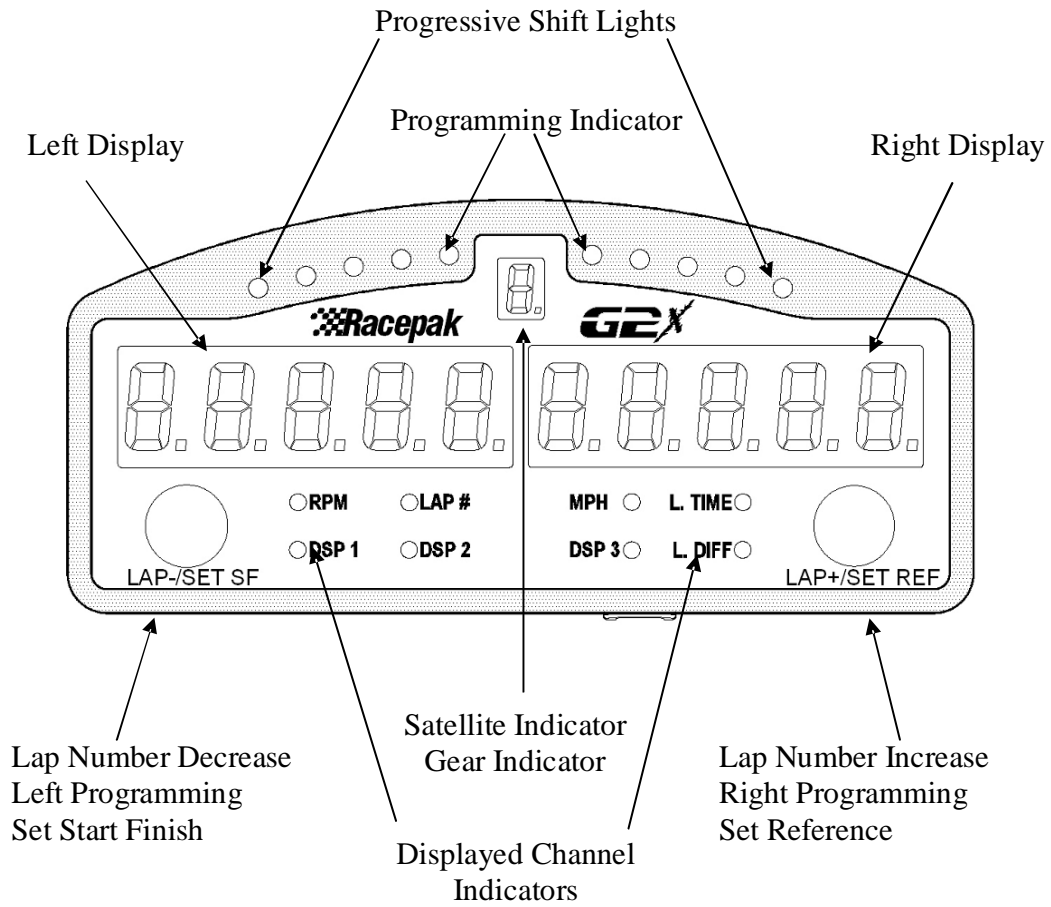
- a) Provides lap time and lap number information from previous laps.
- b) The display will automatically enter this mode anytime the engine is below 300 RPM and the vehicle speed has been below 25 MPH for 30 seconds or longer.
- c) The G2X must be turned off and back on again to reset the display back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



ITEM	DESCRIPTION
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:

- 1) Engine speed is above 300 RPM.
- 2) Vehicle speed is currently above 5 MPH.
- 3) Vehicle speed has been above 25 MPH with in the past 30 seconds.
- 4) 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

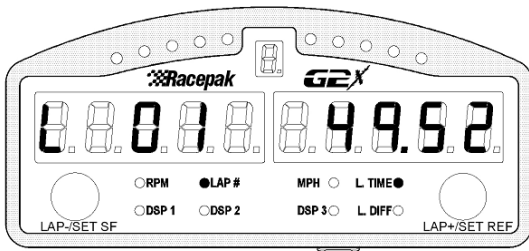
Engine RPM
Current Lap Number
MPH (DSP 1)
Lateral G (DSP 2)

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.

- 1) Short right key press  Increment lap number and time
- 2) Short left key press  Decrement lap number and time
- 3) Long right key press  | Jump to last lap number and time
- 4) 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 Software Installation into the User's PC

Now that we have the G2X installed, the next step is the installation of the DataLink 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 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 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 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 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 software on your computer, perform the following.

1. Turn on the computer and start Windows.
2. Insert the CD labeled RacePak DataLink 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 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 Software

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






DataLink
Program

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

DataLink Online Help

The DataLink 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:

1. To get help for any of the menu items simply highlight the menu item by placing the mouse cursor over the menu item. Next press the F1 key to display the help.
2. To get help on the currently displayed dialog box press the F1 Key.
3. To get help on a tool bar item click on the  toolbar button located at the bottom of the toolbar. The mouse cursor will change to a?. Position the mouse cursor over toolbar icon for which help is desired and click the left mouse cursor. Help on the icon will be displayed.
4. To get help on the three sections of the DataLink 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 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 program.
5. To get help on a run log page look for the blue icon with a question mark . Simply click on the button to display the help for the run log page.
6. Click on the Help main menu selection and select the Help Topics menu selection. The Help Topics: DataLink 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

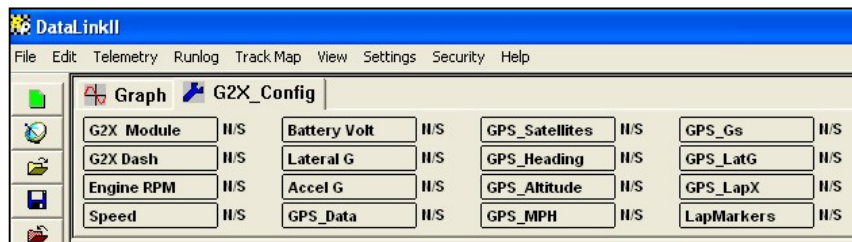
The next step in getting familiar with the DataLink program is to view and manipulate an existing run data file. The demo run data file **G2X_Demo.rpk** was copied onto your PC during the installation process. Appendix I include detailed instructions on opening the demo file while providing a quick training session on using the DataLink program to view run data files. We strongly recommend that you go to G2X Demo File section 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 Datalink program is run. If your system is setup properly your main DataLink screen should appear as shown below after the program is first started.

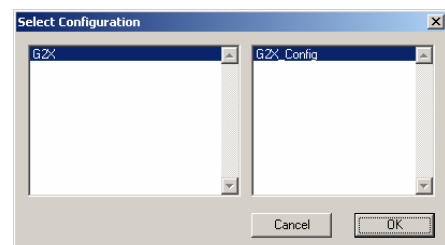


If the file does not open perform the following setup procedure to insure the configuration file will open each time the DataLink Program is started.

Setting the Default Configuration:

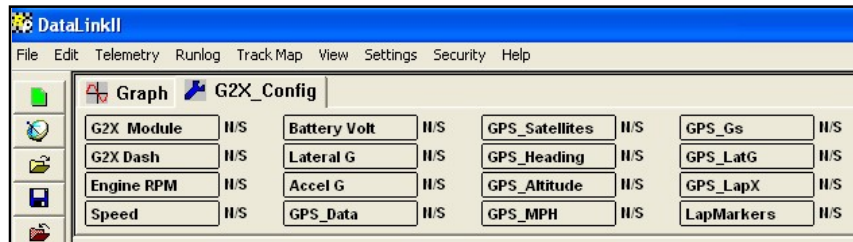
The G2X_Config configuration file should automatically open each time you start the DataLink software. If it does not, you will need to select the file as the default configuration file by performing the following.

- 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 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 software and the G2X_Config configuration file is used to perform the modifications.

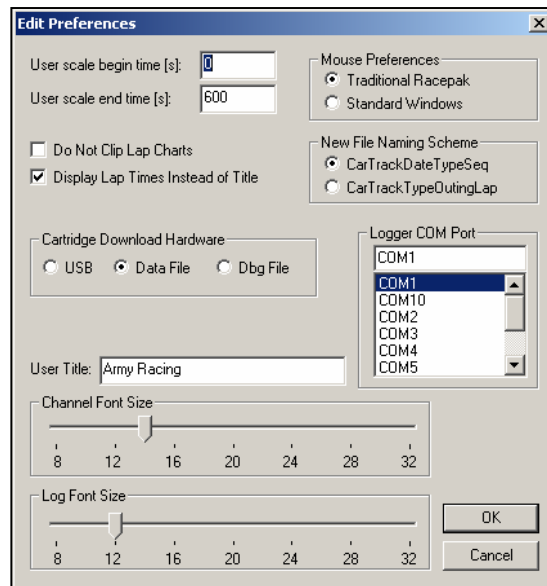
In order to make these modifications to the data logger you will need to perform the following steps;

- 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;

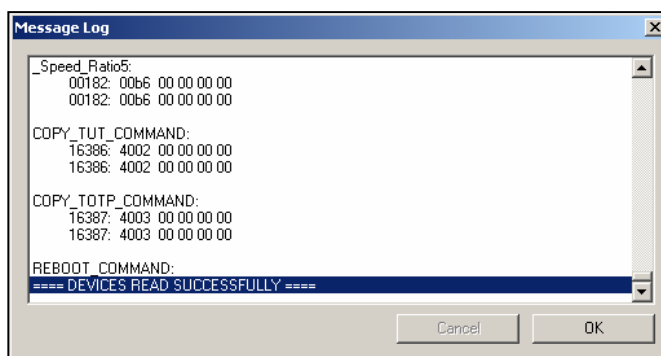
Step 1: Reading the configuration

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 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.

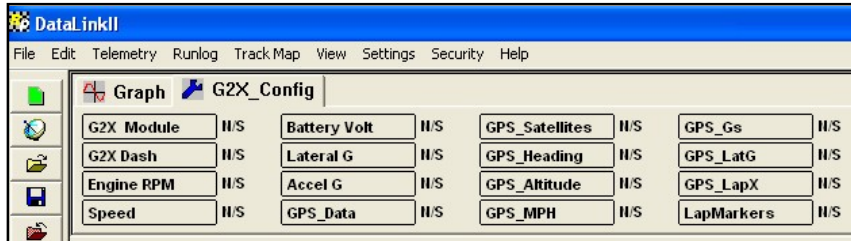
Next select the **Read VNet Config** menu option located in the **Edit** main menu selection. When selected a Message Log dialog box will be displayed and the read configuration process will be started. As the information is read in a log of the status will be displayed on the Message Log dialog box.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



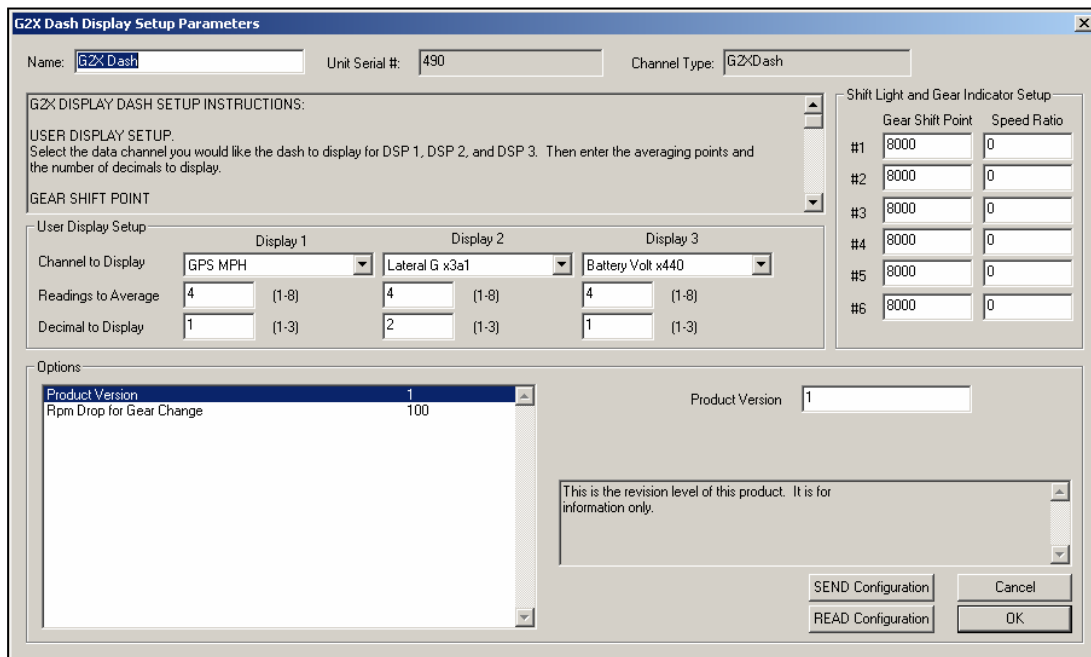
The message Devices Read Successfully should appear at the bottom of the dialog box indicating the read was successful.

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.



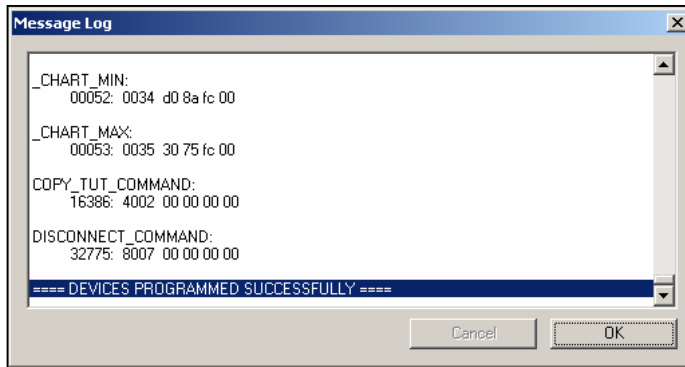
In the upper left corner of the dialog box is the instruction box "G2X Display Dash Setup Instructions ." The box contains the instructions for setting the various parameters on the G2X dash via the easy edit dialog box.

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

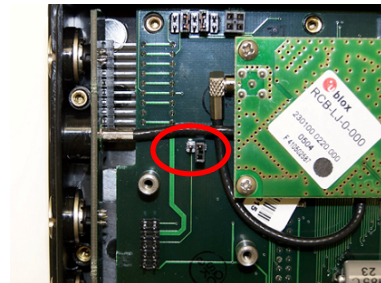
The capabilities of your G2X data logger system can be expanded by adding a variety of internal and external sensors. The design of the G2X utilizes our standard VNet series of sensors. This technology creates a smart sensor in that each sensor is connected to a pre-defined blue VNet module. Each module 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 VNet Config command in the main menu of the DataLink software, the sensors are automatically added to the G2X hardware and the G2X_ Config file software.

Step 1: Hardware installation

Adding VNet modules to the AUX port

The AUX port on the G2X data logger provides access to the RacePak VNet onboard vehicle network system. When adding VNet modules to the AUX port you must remove the internal bus termination jumper inside the G2X. This requires you to remove the top cover on your G2X.

- a) Turn the power off and remove the compact flash card.
- b) Remove all 10 screws on top of the G2X. Make sure to note the location of each screw as there are 4 different lengths. The diagram on the next page illustrates the correct location of each screw.
- c) Carefully remove the top cover. There may be some slight resistance due to the status LED connectors.
- d) Next to the GPS antenna jumper cable you will find a 2 pin jumper. Remove the jumper from the two pins and replace it back on one of the pins for storage in case of future need.
- e) Carefully replace the top cover making sure to properly align the male pins on the status LED s' with the matting female connector on the G2X.
- f) Reinstall the 10 screws, again making sure to use the proper length screw in each location. Do not over tighten the screws, they only need to be snug.



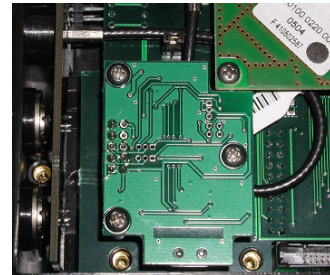
The next step is to connect the VNet module to the AUX port on the G2X. This requires a G2X Aux cable, P/N: 680-CA-AUX-084 and an external bus termination cap P/N: 280-CA-VM-TCAPM. Connect the G2X Aux cable between the G2X AUX port and the appropriate side of the first VNet module. Next, connect the external termination cap on the other side of the last VNet module.

TIP: When adding VNet modules to the AUX port it is very important that you remove the internal bus termination jumper and then install the external bus termination cap on the last VNet module installed on the AUX port. Failure to properly perform these steps may result in erratic operation of all modules connected to the G2X AUX port.

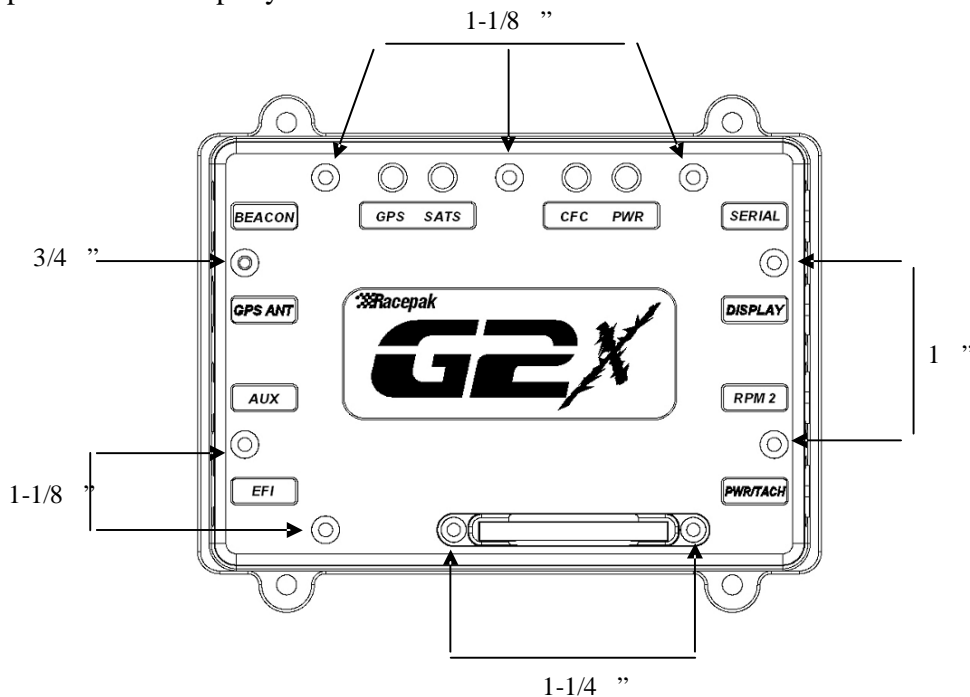
Adding an internal module to the EFI port.

The G2X also has internal port designed to interface with third party devices like aftermarket EFI systems, OBDII, or Innovate LC-1 wideband lambda sensor. Installing these modules requires you to remove the top cover on your G2X.

- a) Turn the power off and remove the compact flash card.
- b) Remove all 10 screws on top of the G2X. Make sure to note the location of each screw as there are 4 different lengths. The diagram below illustrates the correct location of each screw.
- c) Carefully remove the top cover. There may be some slight resistance due to the status LED connectors.
- d) On the G2X printed circuit board, directly behind the AUX and EFI ports, you will find a two row male connector. Plug the module in to this connector. Make sure the 3 mounting holes on the module line up with mounting stand offs on the G2X.
- e) Install the three screws provide with the module.
- f) **DO NOT REMOVE THE INTERNAL BUS TERMINATION JUMPER AS OUTLINED ABOVE UNLESS YOU ARE ALSO GOING TO ADD EXTERNAL VNET MODULES TO THE AUX PORT.**
- g) Reinstall the 10 screws, again making sure to use the proper length screw in each location. Do not over tighten the screws; they only need to be snug.

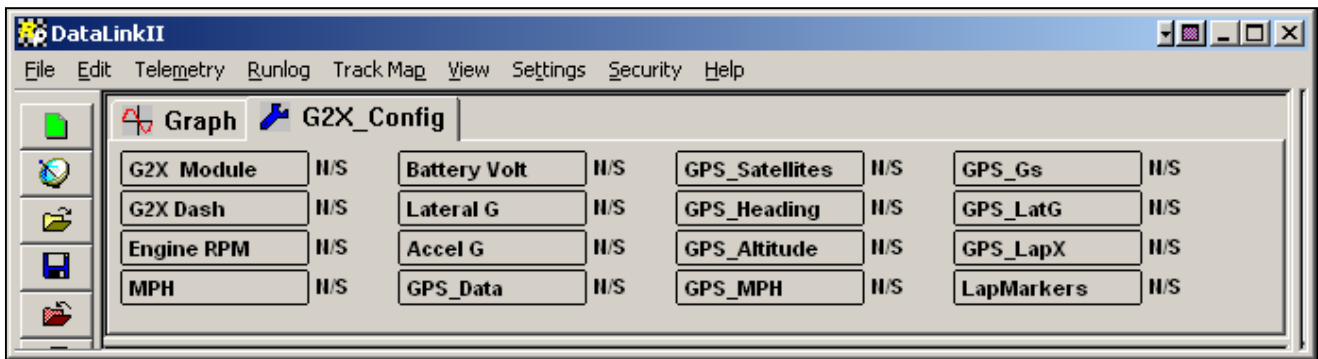


Now that the module is installed, connect the supplied cable between the EFI port on the G2X and the appropriate port on the third party device.



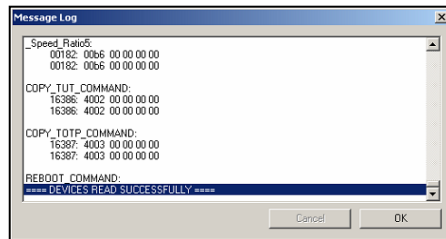
Step 2: Updating the G2X_Config Configuration file.

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. 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 program. Your screen will appear as shown below.

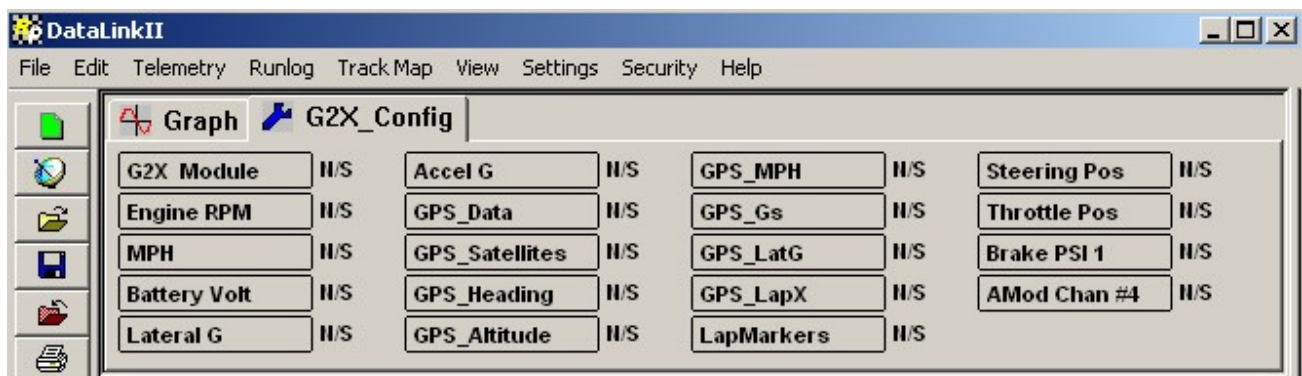


Insure that all files, other than the G2X_Config file are closed, at this time.

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

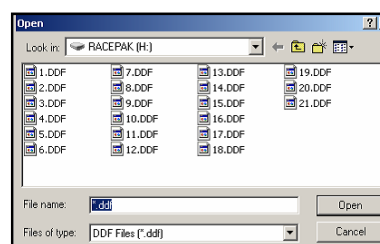
Transferring Data

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 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.

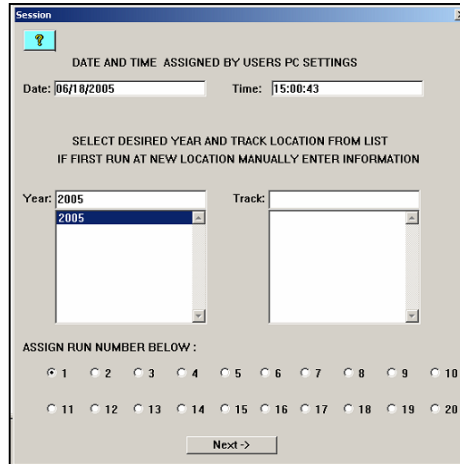
- 1) If desired, dash lap time data can be reviewed before downloading.
- 2) Ensure that the red PWR LED is solid and not flashing before turning the power off to the G2X. It should take 30 seconds after the vehicle speed has gone below 25 MPH for the G2X to stop recording. When the recording has stopped, turn off the power to the G2X and remove the compact flash card.
- 3) Open the DataLink 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.



NOTE: The .DDF data files can only be transferred using the compact flash card and reader. You cannot use the serial port to transfer data files from the G2X. The serial port connection is used only for configuring the G2X.

Session Dialog Window

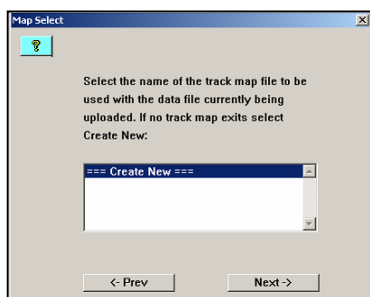
At this time, we will explain the purpose of the Session dialog window. When data is downloaded to the users PC, a data path must be created. This provides a folder for the DataLink software to place each Runfile. At the same time, a number must be assigned to the Runfile before the file can be placed 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. 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 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, select **Next**

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

WEATHER DATA:

Status:

AltaCom Date:

AltaCom Time:

Barometric Pressure:

Air Temperature:

Relative Humidity:

Absolute Humidity:

Grains H2O:

Vapor Pressure:

Dew Point:

Air Density Ratio:

Density Altitude:

Adjusted Altitude:

Wind Direction:

Wind Speed:

Wind Gust:

Track Temperature:

THIS PAGE WILL DISPLAY THE CURRENT WEATHER DATA FROM AN ALTACOM 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.

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**.

Save As

Save in: Fontana

- G2Fon031705L1
- G2Fon031705L2
- G2Fon031705L3
- G2Fon031705L4
- G2Fon031705L5
- G2Fon031705L6
- G2Fon031705L7
- G2Fon031705L8
- G2Fon031805L9

File name: G2LesW011001


Save as type: RacePak Files (*.rpk)

At this time, the Runfile is now open the DataLink software. The next step is to create a GPS track map.

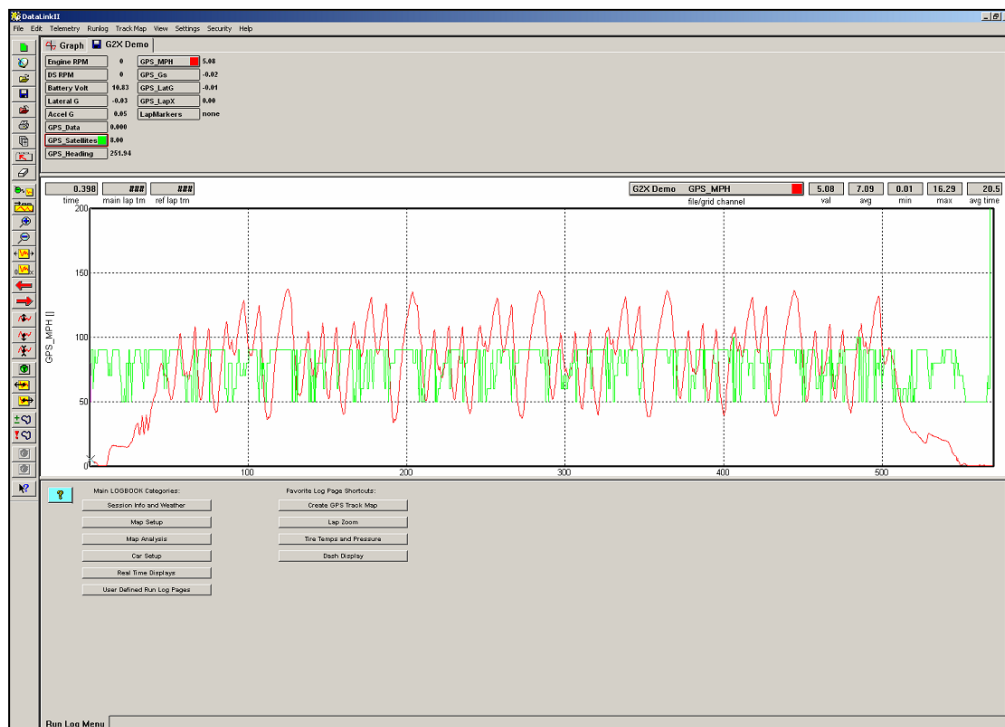
Trackmap Creation (Closed Course - Oval & Road Race)

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 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 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 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.

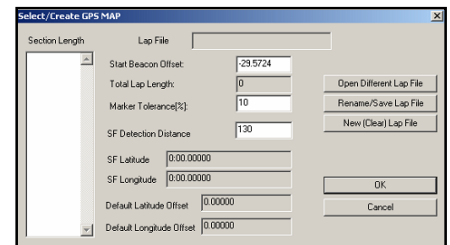
GPS track map files are saved according to the name assigned by the user. Typically, the name will reflect the name of the track or location in use. Saved GPS track map files can then be recalled for use, according to the testing location and needs of the user. The procedures for creating a GPS track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

Step 1: Select / Create GPS Map

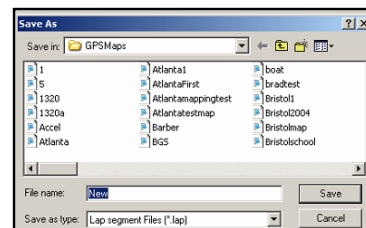
Left click over the Select / Create GPS Map. This will open the Select/Create GPS MAP dialog box. The user is presented with three choices, which are self explanatory:

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 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

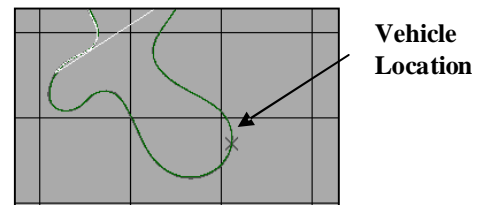
The next step is to assign the type of track in use for testing. Most all testing will be considered the default setting of Closed Course. Open Course is typically used for events such as Autocross and Hill Climbing, which is covered in the following section.

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.

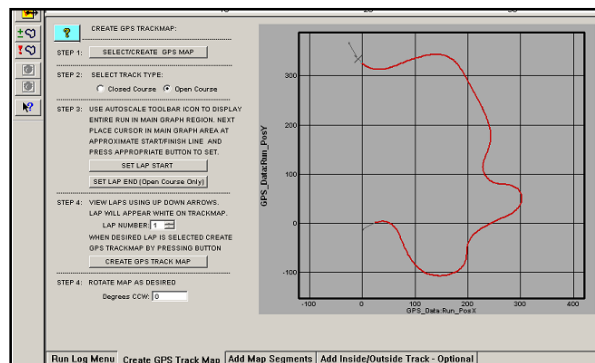
Step 3: Set Lap Start / Set Lap End (Open Course Only)

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 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 button.

Following this action, the DataLink 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 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 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 **Create Inside Track** button.

Step 2:

Toggle through the available laps, until a suitable outside lap is obtained. Select the **Create Outside Track** 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 **SELECT/CREATE GPS MAP** 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.

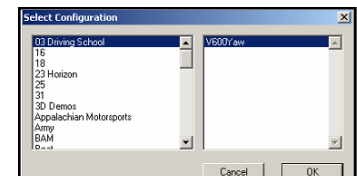
Loading GPS Track Maps

The DataLink 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 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:

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

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.



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

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

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

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

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


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 screen. Insure all changes are also saved in the Runfile, also.

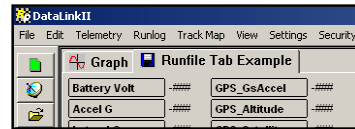


Again, while the explanation appears extensive, the amount of time necessary to create, save and load a GPS track map is approximately one or two minutes. It is only necessary to perform these actions one time per test. After that, let the on-track fun begin.

Opening a Lap and Graphing Data

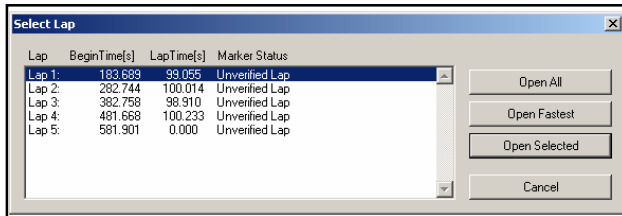
At this time, we have downloaded our first run, made a quick check of data and created and saved a track map. We would now like to review the basic procedures for viewing and graphing data. Before opening a lap for review, double click the Clear All Graphs icon, located in the vertical list of icons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

The initial Runfile should still be open. The DataLink 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.

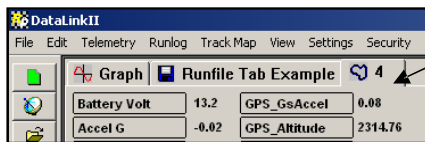


Open a Lap

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



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



Lapfile
Tab



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

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

Open All: This will automatically open all laps contained within the Runfile

Open Fastest: This will open only the fastest lap.

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.

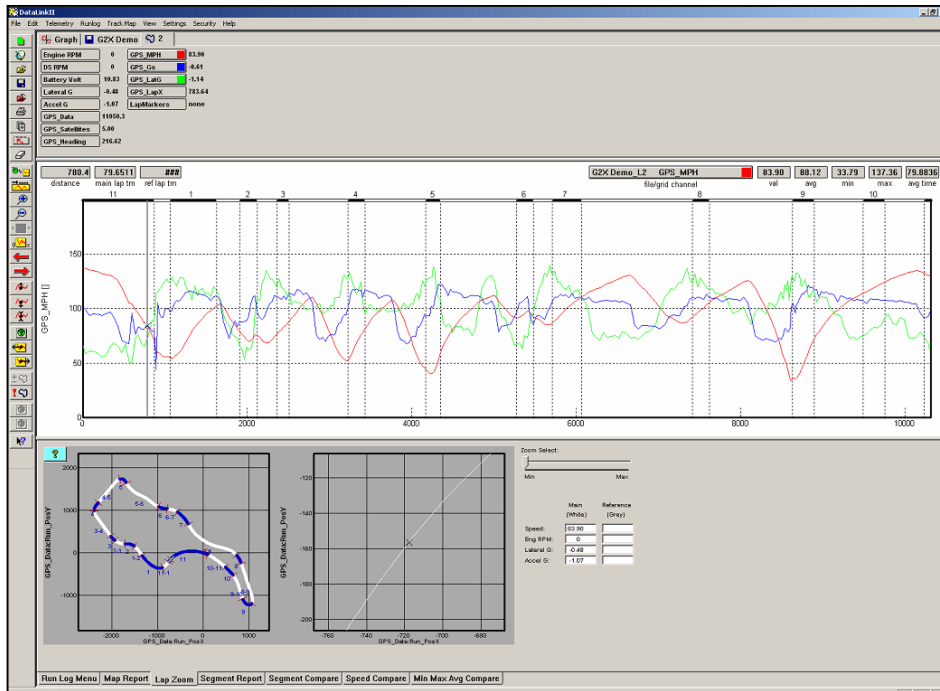
Distance Mode Graphed Data

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, select View in the DataLink 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:

Insure a lap is open and in view

Select the Speed Summary Runlog Page tab, found at the bottom of the DataLink screen.

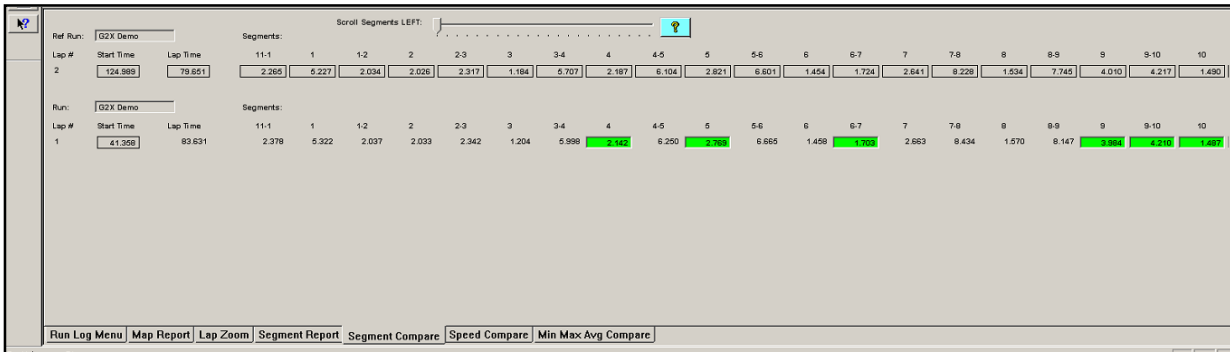
Run: G2X Demo Lap: 1 Lap Time: 83.631							Reference Run: G2X Demo Lap: 2 Lap Time: 79.6511						
SEG #	Split Time	Entrance Speed	Exit Speed	Avg Speed	Min Speed	Max Speed	SEG #	Split Time	Entrance Speed	Exit Speed	Avg Speed	Min Speed	Max Speed
11-1	2.378	68.00	51.78	69.37	51.43	69.53	11-1	2.265	73.42	55.10	61.13	55.54	75.77
1	5.322	51.78	101.70	70.85	51.74	97.05	1	5.227	55.10	101.78	72.13	54.43	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	108.45	4-5	6.104	79.26	44.69	82.83	46.96	107.49
5	2.789	44.47	59.47	44.12	41.40	51.30	5	2.821	44.69	59.95	43.89	39.92	54.11
5-6	6.665	59.47	90.72	90.63	55.46	111.90	5-6	6.601	59.95	91.60	32.53	58.82	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	138.31	130.42	123.97	135.71	10-11	2.482	123.85	133.31	129.60	122.83	135.26
11	6.103	138.31	69.60	113.70	71.42	137.36	11	5.825	133.31	78.92	116.84	93.23	134.38

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	41.358	83.631	2.378	5.322	2.037	2.033	2.342	1.204	5.998	2.142	6.290	2.789	6.665	1.458	1.703	2.663	8.434	1.570	8.147	3.984	4.210	1.487	
2	124.989	79.601	2.265	5.227	2.034	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	
3	204.640	78.600	2.137	5.288	2.006	1.936	2.343	1.204	5.914	2.144	6.150	2.772	6.565	1.443	1.688	2.584	8.148	1.511	8.148	3.958	4.194	1.482	
4	284.480	80.478	2.180	5.291	2.054	1.896	2.389	1.277	6.330	2.378	6.327	2.806	6.971	1.424	1.708	2.631	8.085	1.511	8.085	3.940	4.210	1.482	
5	364.933	80.071	1.996	5.350	1.996	1.961	2.395	1.208	6.417	2.177	6.321	2.788	6.790	1.485	1.727	2.681	8.118	1.540	8.118	3.940	4.256	1.484	
Theoretical Fast Lap:			70.676	1.996	5.227	1.996	1.695	2.295	1.184	5.707	2.142	6.104	2.769	6.601	1.425	1.688	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 Software section. The procedure is simple, and takes just a matter of seconds to perform.



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 software.

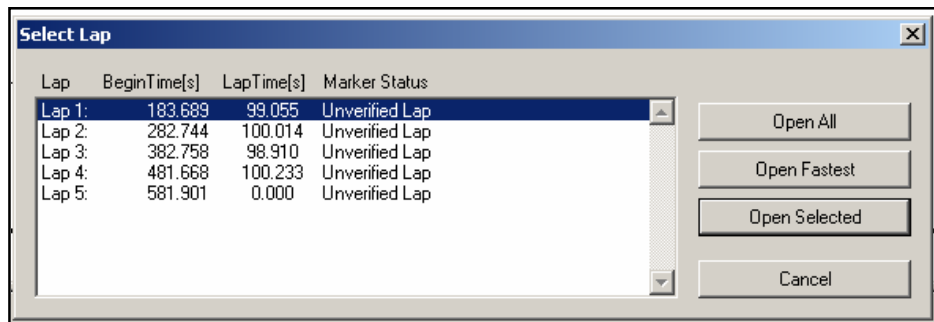
To open another lap for review:

Place the mouse cursor over the current Runfile tab and right click.

Select the desired lap.

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:

Place the mouse cursor over the just opened Lapfile tab and left click.

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.

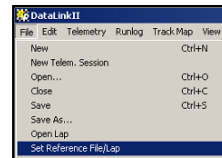
Remember, to change the graph color of a particular channel, keep the mouse cursor over the Channel Button and continue to left click, until a desired color is obtained.


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:

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**  .

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.

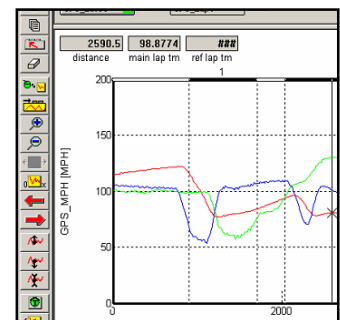
There is no set method for selecting Reference / Main files. It is at the users discretion to determine which files will receive the Reference and Main settings. Either selection can be assigned to any open file, by using the above instructions. The only item that must be remembered is to always select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

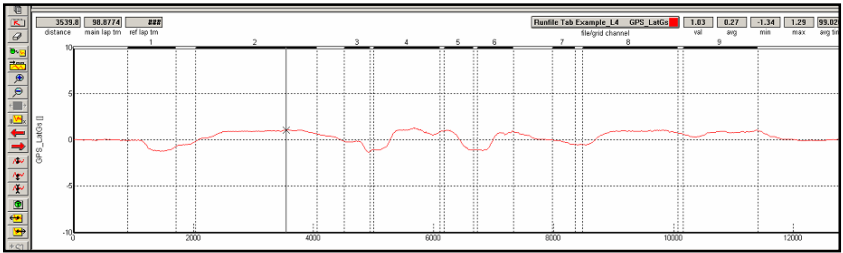
Graph Scaling Explained

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.

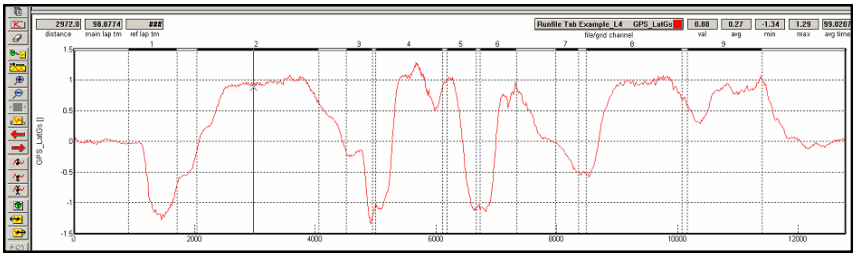


Let s take a moment to discuss graph scaling. The visual rise and fall of graphed data is determined by the scaling values. To provide a graphic example, look at the following two graphs. Both are the same GPS_LatGs data, but with different scaling values.



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 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 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:

Place the mouse cursor over the desired Channel Button and right click the mouse button. For this example, we selected GPS_MPH.

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

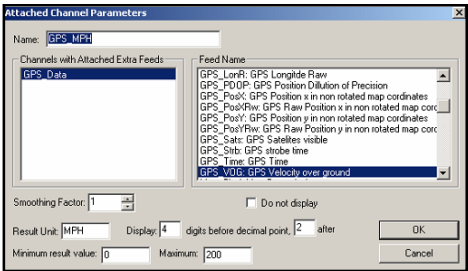
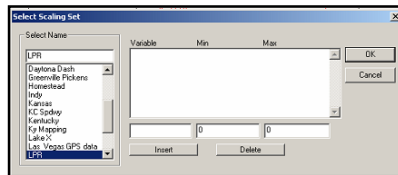


Chart Scaling Sets

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.

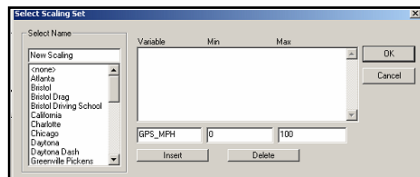
Select Settings, then Select Chart Scaling Set from the Main Menu selection.

The following dialog box will be displayed.

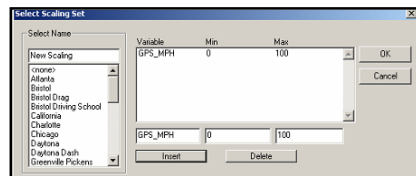


Enter the name you wish to call the new scaling set into the text entry box located directly below the Select Name heading. For the purpose of our example, we will use the name 'New Scaling'.

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.



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



Enter the remaining data channels to be rescaled in the same manner.

When you are finished, select the **OK** button.

To load a Graph Scaling set for use:


Select Settings, then Select Graph Scaling Set from the main menu selection.

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 create graph sets that when selected, will automatically graph the desired channels in a desired color. These files are called Quick Graphs. To create a Quickgraph:

Erase all graphs by double clicking the Clear All Graphs icon 

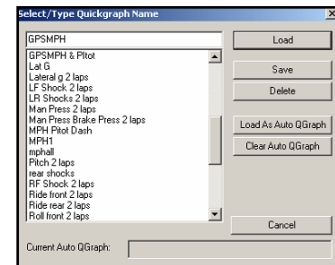
Graph the desired channels, in the desired colors.

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:


Select the Quick Graph icon in the DataLink toolbar. 


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

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:

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

Select the Quick Graph icon  in the DataLink toolbar.

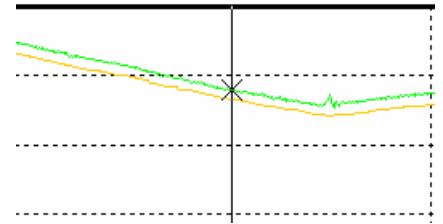
Select the desired Quick Graph name.

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

Val: The current channel value, according to cursor position in the Main Graph Area

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.

Min: The minimum value obtain, over the entire Main Graph area

Max: The maximum value obtained, over the entire Main Graph area

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:

Place the mouse cursor over the Channel Grid Display.

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 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.

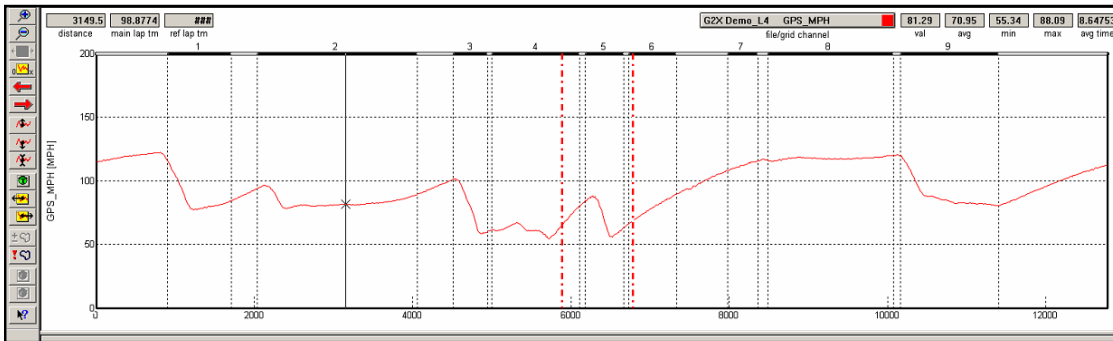
With this action, the DataLink software will provide minimum, maximum and average values for data only between the Averaging Cursors. To perform this action:

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.

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:

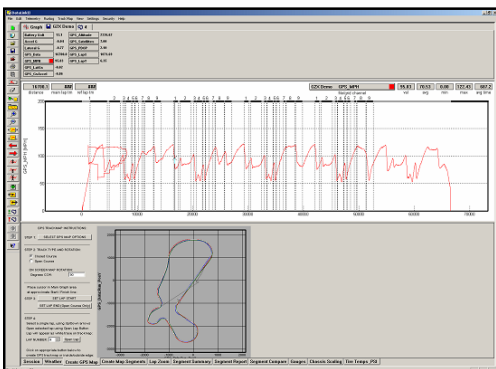
Double click the Clear all Graphs icon  in order to remove all graphed data from the Main Graph area.

Left click over the desired Runfile tab.

Graphed the desired channel.

Left click the Autoscale icon, located in DataLink icon list 

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:
Determine the desired zoom area of the Main Graph.

Place the mouse cursor in the upper right corner of the desired zoom area.

Hold down the right mouse button and drag the zoom box over the desired zoom area. Release the right mouse button.



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:

Place the mouse cursor at the center of the graph region to be zoomed.

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.

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.

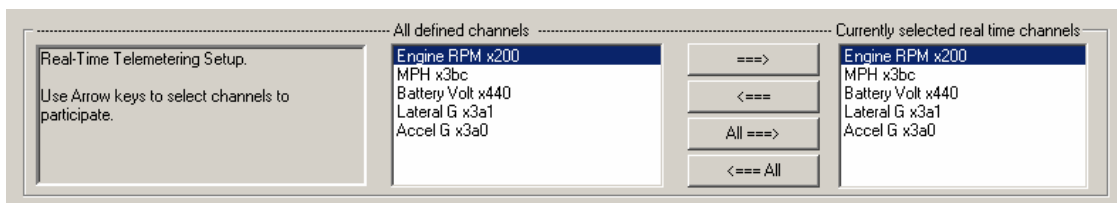
To reset the main Graph region back to displaying an entire lap, click on the User Scale  button in the RacePak Chart data toolbar.

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 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 uploading on-track data from the Compact Flash memory card.





Although GPS related data channels will appear in a real time telemetry file, the data for these channels is not currently available during a real time telemetry session. Therefore, the data will always read zero for all GPS related channels while during this time.

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 Telemetering Section as shown below.

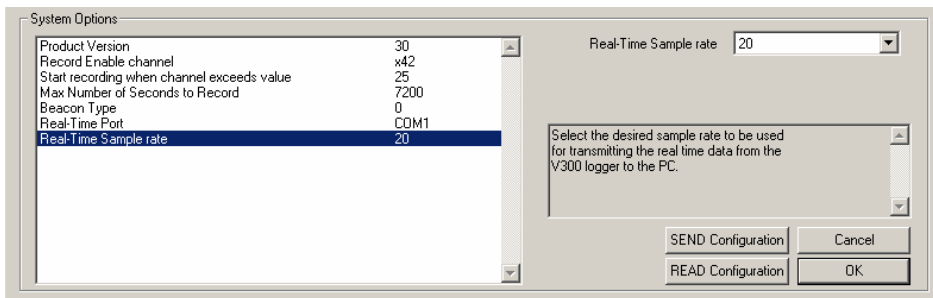


Setting up the G2X Real Time Telemetry Parameters

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 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 . Use the All  button to select all of the channels for telemetry. Select  All to remove all of the channels from the telemetry list. Only channels in the right hand list will be displayed during a real time telemetry session.

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 on the next page.



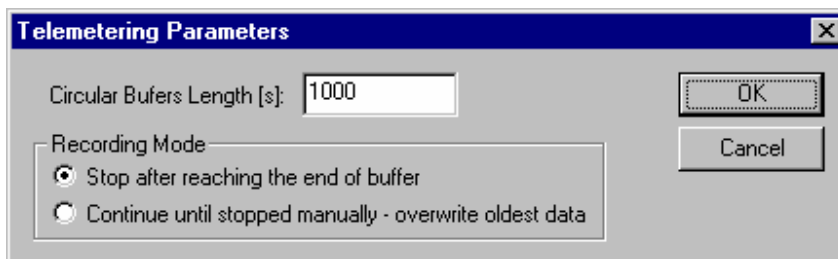
Note: The V_Net Sample rate of each of the modules to be monitored should be equal to or greater than the real time sample rate. If they are not, the last data points will be repeated during the sample process.

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 File Parameters

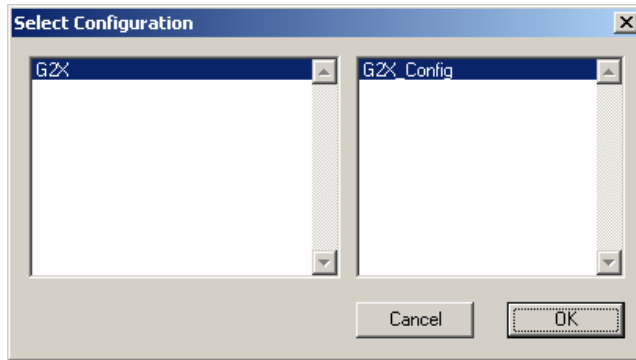
The final step in setting up the real time telemetry session is to set the DataLink real time recording parameters. These parameters are set by selecting the **Recording Parameter** menu item found in the **Telemetry** main menu selection. The following dialog box will be displayed.



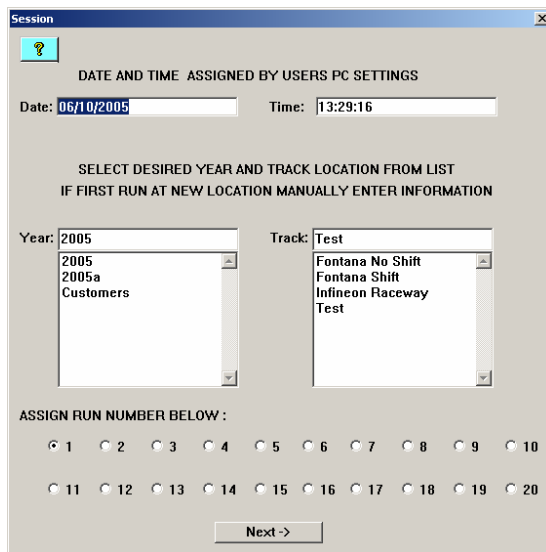
The first parameter **Circular Buffer Length** is used to set the amount of data to record in seconds. The **Recording Mode** is used to determine whether the recording will stop when the maximum record time is reached or whether the oldest data will be overwritten. For example if a Circular Buffer Length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

After configuring the real time telemetry parameter you are ready 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.

Frequently Ask Questions

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.

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 1/2 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.

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 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 software. In addition, it makes it possible to graph the Lapmarker channel, in the Datalink software. The Lapmarker channel will display a vertical mark, each time the vehicle passes the start / finish area, in graphed data.

Troubleshooting

The Troubleshooting section was created to provide answers to some of the most common questions that G2X users may encounter. If you are not able to resolve your questions using the following information, please call our tech support department at 949-709-5555.

Note: One thing to remember, when using the G2X is to not *ôüt think* this system. What may appear to be a simple deviation from the instructions can affect the operation of the G2X. The software and hardware functions are all designed to interact seamlessly. If the instructions are followed as written in the manual, the logger is mounted in the correct orientation, the antenna is placed where recommended, power is supplied from at least a 12V source and the compact flash card is used exclusively in the G2X, the G2X will function properly and create data.

GPS Related

- I have no GPS satellites: Insure the serial cable supplied with the G2X is not connected to the Serial port of the G2X data logger. If so, this action will turn off the GPS board and prevent satellite acquisition
- My GPS data works at idle, but I lose data when I accelerate: This is related to electronic interference. Check the routing of the GPS antenna cable. More than likely, the cable will be routed near or attached to the Engine RPM cable. Move the cable away from anything that could provide interference. We have encountered situations where a digital camera mounted beside of the antenna has knocked the GPS data offline.

Engine RPM Related

- My Engine RPM data is incorrect: If Engine RPM data is correct in terms of rising and falling with the revving of the engine, but numerically is off by a percentage, the Pulses per Revolution dash setting is incorrect. For example, your actual Engine RPM is 4000, but the G2X is reading 2000 or 1000 or 8000. Recheck the Pulse per Revolution setting as outlined in the installation manual. Typically the Pulse per Revolution setting should match the number of cylinders of your engine.
- My Engine RPM data is correct at idle, but is way off when I rev the vehicle: This is due to an incorrect signal being received by the G2X. If you are obtaining your Engine RPM signal from an ECU or other output pins located on your vehicle, the signal is incorrect for the G2X.

Setting Start Finish with Display Dash Related

- I am not getting laptimes after setting start finish with the dash
 1. Insure you are moving. The start finish can not be set while sitting still.
 2. Insure you see the Set SF message on the dash.
 3. Do not drive a complete lap with the Set SF message on the dash, before actually setting the start finish location. Attempt to set with 30 seconds after bringing up the Set SF message.
 4. Insure you have GPS data. Setting start finish depends on speed and location
- Can I set start finish if I am beside the track: Yes, just insure where you will be driving on the track is within 30-40 feet of where you are setting start finish. The G2X looks perpendicular to your direction of travel, when marking the start finish location.
- Can I set the start finish point if I am driving slower than 25 mph: Yes
- Can I set the start finish point if I am driving faster than 40 mph: Typically, yes but try to avoid roaring down the track at 100 mph while setting start finish.

Mounting of the G2X Data Logger Related:

- Can I mount the logger on it s`side or end: No, please mount the logger flat both front to rear and side to side and insure the X on the G2X logo is facing direction of travel
- Can I mount the logger under the seat, in the glove box, etc: You can, but it makes it really tough to access the compact flash card or to connect the serial cable to the logger, if you need to update.

Serial Cable Related:

- Can I leave the serial cable connected to the Serial port of the data logger: No, as this will disable the GPS data and prevent the logger from working properly.

Compact Flash Card Related:

- Can I use a Compact Flash card with more memory: Yes, but try to stick with standard 128, 256 or 512 MB cards. Unless you are running in a 24 hour event, 128MB of memory will be MORE than sufficient for any type of racing event.
- My G2X is not writing to my memory card. Insure you have the two things necessary for creating data, GPS Speed and driving faster than 25 mph. If you have those two things, then refer to the next question.
- I took the compact flash card out of my camera, etc and used it in the G2X, but there is no data on the card: The G2X must have a clean card, void of ANY data, when the card is initially installed into the G2X, in order for the G2X to format the card for use. Clear ALL data off of the card, then reinsert into the G2X
- I used my G2X compact flash card in my camera, etc and now the G2X will not write data to the card: See the above.
- I am pulling the compact flash card as soon as I stop the vehicle: If the G2X is still writing data to the compact flash card, data will be skewed or lost. Do not turn power off to the logger until the PWR LED stops flashing at the end of a run.

Track Mapping Related:

- I can not build a trackmap: If you did not pass start finish at least two complete times, there will not be a complete lap recorded by the G2X, which prevents a map from being created. The DatalinkII software must have one complete lap, before building a map.
- I have more than one map for a track and now my data does not overlay correctly: Insure you do not have different trackmaps loaded in different Runfiles.

To further explain trackmapping, graphed data is based on one of two items, time or distance. To further break it down, time is based on two things, time from when the data logger started recording data or time based on the start finish location. If you do not have a trackmap in a Runfile, all graphical data is going to be based on when the data logger started logging. For example, if you exceeded 25 mph on pit road, that is where your 0 time point will start for your first outing. On the next outing, if you exceeded 25 mph when you entered the front straight, that is where your 0 time point will occur for the second outing.

Now, if you attempt to graph Runfile data from both runs, the starting point for each run will be two totally different points, with hundreds of feet of difference. This makes it impossible to accurately overlay data. That is why a creating a trackmap is vitally important, following the FIRST run on the track. Do not wait until after the day is over and you have downloaded all the Runfiles (without trackmaps). If so, you will then have to manually load the trackmap into each Runfile.

After the same trackmap is in place for each Runfile, data can then be accurately compared as the 0 start point for every lap will be based on either the time from start finish or the distance from start finish, according to what mode you are reviewing data.

Track Segmented Related:

- I can not segment the track: See above Track Mapping Related information
- My segments locations are off: Note that from the factory, the default Start and End lateral G settings to create segments are 1 to start a corner and .5 to end a corner. These numbers must be adjusted according to the speed/lateral g capabilities of your vehicle and also according to where you wish to see corners start and end.

To further explain the segmenting process, if 1 is entered for Corner Start and .5 is entered for Corner End any time the vehicle exceeds 1 lateral g, a corner start marker will be placed. Any time .5 lateral g or less is noted, a corner end marker will be placed. If your corners start too early, decrease the lateral g number for Corner Start or adjust according to where you want each corner to start or end.

My PC Can Not Communicate With the G2X via the Serial Cable Related:

- USB to Serial Adapter: Insure you have installed the drivers for the USB to serial adapter according to the instructions provided with the adapter. A quick test is to unplug and plug the adapter from the USB port. Your PC should provide an audible note or a visual note in the bottom right corner of the PC, if the adapter has been unplugged/plugged back in.
- Check the Com port setting of your PC: The DatalinkII software is defaulted to communicate through COM 1. If the COM or USB port you are connected to is not COM 1, the PC can not communicate with the G2X. To verify the Com port setting of your PC:
 1. Minimize the DataLink II program and select the Start button located in the bottom left area of your computer display.
 2. Select the Control Panel icon located in the small window.
 3. Select System in the small window.
 4. Select the Hardware tab located in the just opened Systems Properties window.
 5. Select the Device Manager button located in the center/right of the Hardware page.
 6. Locate the Ports (COM & LPT) in the currently opened list and double left click.
 7. You will now see Communications Port assigned to either your serial port or to the USB to serial adapter.
 8. Note the Com Port number, close all windows and return to the DatalinkII program
 9. Select Settings, then Preferences from the Main Menu area.
 10. Not the Logger Com Port window. Select the Com Port number that matches the Com Port number noted in the above process and select OK
-

Downloading Data Related:

- I can not download data from the Compact Flash card: Insure the instructions were followed, concerning the installation of the reader
- Can I take a data file straight from the Compact Flash card into the DatalinkII software: No. A .ddf format file must be downloaded into the DatalinkII software using the New Upload green colored icon.
- I want to download using the serial cable: The G2X is designed to download using the Compact Flash card.

Building An Open Course Track Map Related:

An open course trackmap allows the user to overlay data much the same as a closed course trackmap. With a closed course trackmap, all graphed lap data starts from a zero point. This zero point is based on the start/finish as set in the trackmap.

With an open course trackmap, what we are trying to accomplish is allowing the user to overlay data based on the same start point, which syncs all the data. The endpoint of the trackmap is not that important, as we can only sync the data based on one point, which is start.

Building an open course trackmap uses the same commands as a closed course. Set 1, name the map. Step 2, select the track type. Step 3, Set Lap Start and Set Lap End.

To set lap start, the user places the cursor in the desired location to start the map, and then selects the Set Lap Start button. Then, move the cursor to the desired ending location and select the Set Lap End button.

Finally select the Create GPS Trackmap as found in Step 4. Remember, there will not be lap data, as this is not a closed course map.

Now, if you make additional open course runs, you will then be able to select the trackmap (upon downloading) just the same as if you were making laps on a closed course.

When comparing data between open course outings, remember it is necessary to place the data in Distance mode (View / DistanceX Mode). The reason for this is the fact that when you are looking at open course data in time mode, the zero or starting point is based on when the G2X started logging. That point occurs at different locations, as you might exceed 10 mph (if you have reset your G2X to start logging at 10 mph for example) 20 feet from the starting line on one run and 30 feet the next run. Time mode does not allow the user to overlay and compare data all based on the same starting point.

In the above example, you need to overlay data based on a set starting line point, not when the G2X started logging. If you place the graph area into distance mode, then all data will start from the Set Lap Start location assigned in Step 3.

For autocross, the G2X can be set to start logging with various channels. Some users have programmed the G2X to start logging at .2 or .3 accel g data. This allows almost instant logging start, as soon as the vehicle moves.

G2X Boat Configuration File Supplement

The G2X_ConfigBoat is a standard G2X configuration file with the addition of a Prop Slip and Prop speed math channel. Both channels derive their data from a combination of engine rpm and GPS MPH along with prop data that is input by the user into the configuration file thus enabling the channels.

If you downloaded the G2X_ConfigBoat file from the www.g2extreme.com website, it will be necessary to unzip and place it in the following location, on your PC:

C:\RacePakData\G2X This is assuming the DatalinkII software was installed on the C drive.

If you obtained the G2X_ConfigBoat file in any other manner, insure it is located in the above directory, on your PC.

The following supplement provides the user with guidelines for the Racepak G2X, when utilizing the G2X_ConfigBoat configuration file.

Opening the G2X_ConfigBoat for Use

The DatalinkII software is designed to automatically open the automotive related G2X_Config file, at startup. To enable the G2X_ConfigBoat file to automatically open at the startup of the DatalinkII program:

1. Open the DatalinkII program
2. Place the mouse cursor over the G2X_Config file tab and left click
3. Close the G2X_Config file by selecting the **red folder** located in the vertical icon column on the left side of the DatalinkII screen

Next, select File, then Open Car Configuration from the Main Menu command. The user will be presented with the Select Configuration dialog window:

1. Select G2X from the left column
2. Select G2X_ConfigBoat from the right column
3. Select OK

At this time, the G2X_ConfigBoat will now be in view. To set as the default config file (automatically opens with DatalinkII):

1. Select File
2. Select Default Configuration

This action will place a check next to Default Configuration.

The G2X_ConfigBoat is now ready for the user to input prop data relative to boat in order to obtain prop slip and speed, upon downloading of data.

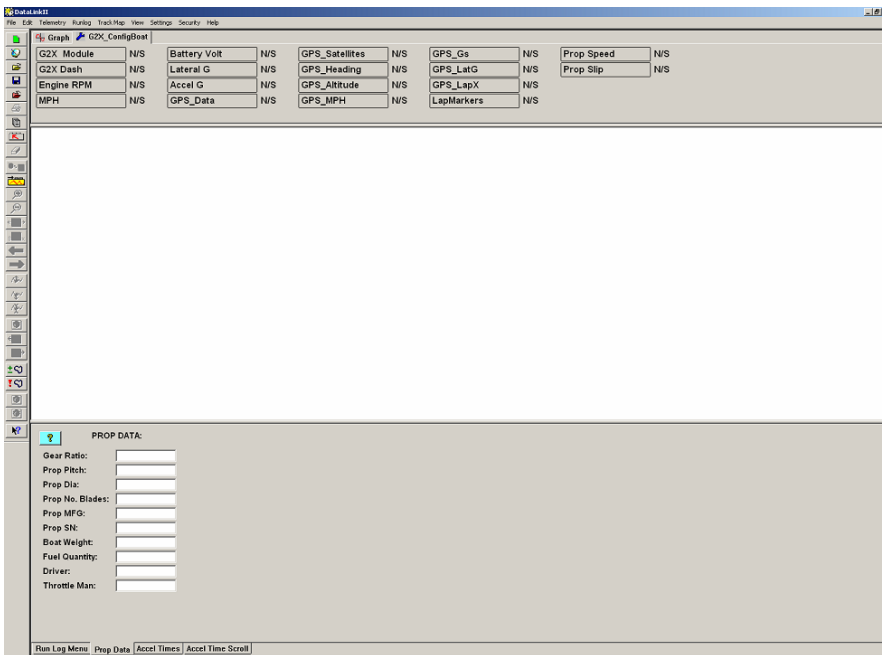
The G2X_ConfigBoat is the template for incoming, downloaded data. Remembering this, if a prop or gearing change is made, take the time to change the prop information within the configuration file **before** the run. Failure to do so will result in erroneous prop slip and prop speed data and require the user to manually change the prop data in each runfile, until the configuration file is updated. The configuration file can only affect data that has not been downloaded. Any run data that is already in the users PC will have to be manually corrected.

Prop Information

To enter the prop data, select the Boat button as found at the bottom of the Runlog area of the DatalinkII software. This action will open the Prop Speed, Prop Slip and Accel Time Runlog pages. Next, select the Prop Speed tab at the bottom of the screen.

Prop Speed

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



Prop Slip

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

Following the input of prop data, select File, then Save from the Main Menu command area.

NOTE: In order to the Prop Speed and Prop channels to function properly, it is necessary to have a reliable tach or engine rpm input.