





Racepak Data Systems30402 EsperanzaRancho Santa Margarita, CA 92688949-709-5555www.racepak.com

INDEX

IQ3 DATA LOGGER DASH	4
The IQ3 Logger Dash Package Includes	. 5
GPS Data Accuracy	. 5
SOFTWARE INSTALLATION INSTRUCTIONS	6
PC Screen Resolution Setting	.7
ROAD (CIRCUIT) RACE DEMO	8
Adjusting the Screen Sections	.9
Adjusting On-Screen Font Size 1	10
Opening a Lap 1	11
Graphing Data vs. Time 1	12
Graphing Data vs. Dis tance1	13
Graphing (Overlay) Multiple Files 1	14
Remove (Erase) a Data Channel from the Graph Area 1	14
DATA COMPARISON IN REPORT FORMAT (RUNLOG PAGES)1	5
Assigning Main / Reference File Setting 1	16
Segment Time Data Comparison1	17
Closing a File 1	17
PULLER DEMO1	8
Puller Run - Setting the Zero Start Point 1	19
Puller Run – Graphing Data2	20
BOAT DEMO2	1
Accel Time and Accel Scroll Runlog Page2	22
ADVANCED FEATURES OF DATALINKII SOFTWARE24	4
Channel Grid Display2	24

Average / Minimum / Maximum Channel Values	24
Understanding Graph Scaling	25
Changing Scaling Per Channel	25
Creating Chart Scaling Sets	
Predefining Graph Sets for Display	27
Graphing Runfile or Lapfile Data	
Zoom Command	
RUNLOG PAGES – ROAD (CIRCUIT) RACE	30
Session Page	
Weather Page	
Create GPS Track Map	
Add Map Segments	
Lap Zoom	
Map Report	
Segment Report / Segment Compare / Speed Compare	
Min Max Avg Compare	35
G-G Plot	35
Gauges	
Tire Temperature / Pressure Calculator Page	
RUNLOG PAGES - PULLING	37
Session	
Pull Info	
Weather	
Vehicle and Track Info	
Engine	
Ignition	

Accel Times with Scroll	
Accel Times	
Prop Data	
RUNLOG PAGES - BOAT	
Tires	
Clutch	
Fuel Timers	
Fuel Nozzles	

IQ3 Data Logger Dash

Thank you for your interest in the IQ3 Data Logger Dash. Before the start of software installation, we would like to provide additional information, concerning the IQ3.

The IQ3 represents a new type of data system, where all external items, such as the data logger, G meters and GPS module are now located inside the dash housing, resulting in an easy to install, lightweight data system.

The high performance IQ3 LCD display is designed for the motorsports environment and contains a variety of features such as:

- 1. Programmable sequential shift lights
- 2. Four programmable warnings with LED notification
- 3. Twenty eight programmable sensor inputs on four individual pages
- 4. Blue backlight with lower luster screen finish
- 5. Gear Indicator
- 6. Predictive Lap time
- 7. Prop Slip
- 8. English and Metric Enabled

While the following items are contained inside the IQ3 housing:

- 1. 3 axis G meters (Accel, lateral and vertical)
- 2. 32 channel data logger
- 3. 512 MB MicroSD memory card
- 4. Internal GPS board

Data provided by the base IQ3 Logger Dash is as follows:

- 1. GPS Lap time and number with segment (section data) via downloaded data
- 2. Accel, Lateral and Vertical G
- 3. GPS Track mapping and GPS Speed
- 4. Engine RPM (with appropriate tach signal) and battery voltage
- 5. Predictive Lap time

The 32 channel data logger contained within the IQ3 housing utilizes Racepak's exclusive Vnet (canbus) sensor technology. This design provides the ability to connect all external sensors to the IQ3 dash by means of a single, small 5 wire cable. The sensors may be connected in any order and any location. The use of the Vnet sensor system eliminates the necessity of a sensor wiring harness.

The IQ3 is designed for use in a variety of motorsports, such as:

- 1. Road (circuit) racing (car and bike)
- 2. Circle track
- 3. Boats requiring lap time and speed (prop slip and prop speed on dash)
- 4. Tractor pulling (GPS ground speed)

The IQ3 Logger Dash Package Includes

- 1. IQ3 Data Logger Dash with 512 MicroSD memory card (up to 2GB allowed)
- 2. Rear entry Deutsch connector
- 3. Power / Ground (earth) / Engine RPM / External Programming Button / External Warning Light harness
- 4. GPS antenna and cable / Serial communication cable
- 5. Software and instruction manuals

GPS Data Accuracy

The original GPS system originally provided location accuracy within approximately 30 feet. Obviously, that was suitable for general position location, but not practical for race car data acquisition.

During the 1990's, the ability to receive a more accurate GPS signal was provided, which in turned provide the technology necessary to create a GPS based motorsports data system. The internal GPS electronics, utilized in the IQ3, is of the latest design, thus providing very accurate data.

- 1. GPS MPH: Speed acquired through GPS is true speed, unaffected by tire growth and wheel spin with an accuracy of approximately .1 mph.
- 2. GPS Lap time and Segment Time: Start / finish and segment times derived from GPS data are accurately plotted points around the racecourse. As such, they are not subject to errors such as generated by beacon transmitter pulses. GPS lap and segment times can be utilized upon returning to a previously mapped location, thus providing the ability to compare lap and segment times between multiple vehicles and multiple test sessions.
- 3. GPS Track Map: Track maps created from GPS data are based on GPS plotted vehicle position, which allow for more precise mapping. Inertia based mapping relies on inertia and wheel speed sensors to locate the vehicle. Wheel spin can alter the perceived location of the vehicle, thus providing errors in data.
- 4. GPS G forces: GPS lateral and Accel G forces are derived from vehicle change of position and are not affected by pitch or roll of the vehicle. Inertia based (accelerometer) G forces are affected by location of the data logger in the vehicle, along with pitch and roll of the vehicle. Use of GPS G force data allows for excellent comparison of data between multiple tests or multiple vehicles, without any effect from various IQ3 mounting position.
- 5. Driving Lines: Driving line data is created from GPS plotted vehicle location and can provide accuracy within the 12" range, when utilizing the vehicle location beacon.

Software Installation Instructions

Website Download or CD Install: The IQ3 demo run is automatically loaded with the installation of the IQ3 DatalinkII software. Following installation of the Datalink II software, simply proceed to the following Screen Resolution Setting section. The Racepak software is designed to utilize a three button mouse. Before installation and review of this demo, it is highly recommended to obtain such a device. Usage of a three button mouse greatly reduces the number of keystrokes and allows for easier data review.

Step 1:

Insert the DataLink II CD in your computer. If Autorun is enabled, the DataLink Setup program will start automatically. If Autorun, on your PC is disabled, you will need to start the program manually. To start the program manually, do one of the following:

- Click the Start button on your desktop and then the Run button. At the run dialog box type in X: Setup where X is the drive letter for your CD drive. Next click the OK button the DataLink Setup program will start. Or
- 2. Select My Computer on your Desktop. The My Computer dialog box will be displayed. The RacePak logo should be displayed next to your CD drive icon. Double Click on the logo. The RacePak Setup program will start.

Step 2:

Follow the instructions in the Setup dialog boxes and continue until the following dialog box is displayed. Insure the Demos are selected, as indicated by a check in the selection box as shown below.



Follow the instructions in the remaining dialogue boxes to complete the installation.

PC Screen Resolution Setting

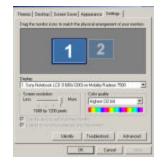
Before reviewing the demo data, it is helpful to verify the PC screen resolution is set to the highest possible level. Doing so insures that all information is visible. In addition, the greater the resolution, the better the graphed data will appear. For some users, higher screen resolution can create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

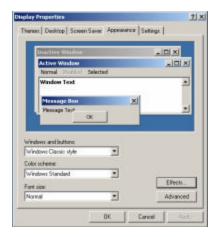
- 1. Close the Datalink II program
- 2. Place the mouse anywhere in the desktop area and right click
- 3. Select Properties in the dialog window
- 4. This action will open the Display Properties dialog window.
- 5. Select the Settings tab.
- 6. Place the mouse cursor over the Screen Resolution slider and move until a setting of 1024 x 768 or higher appears.
- 7. Select Apply
- 8. Select OK

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

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







Road (Circuit) Race Demo

From the factory, the IQ3 is programmed to start recording data to the memory card when GPS MPH exceeds 25. All data gathered from that point until the vehicle drops below the start logging point for greater than 30 seconds, is referred to as a Runfile. The start recording channel can easily be changed by the user to utilize any active sensor channel and value to start the recording process.

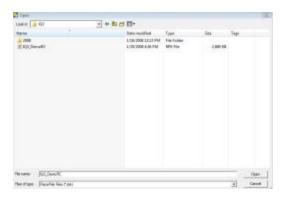
Upon download of data to the user's PC, a Runfile is created. Each Runfile is identified by a group of letters and numbers that reflects the data logger, track location, date and time of the data download. Within the Runfile is contained all the laps (if lap type data was created) from that particular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

For this section, the Runfile we will use for review will be called IQ3 DemoRC. To open this Runfile:

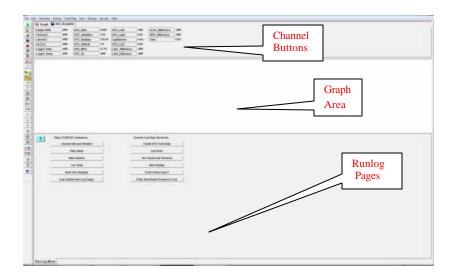
1. Open the Datalink II program



- 2. Select File and then select Open, in the main menu area at the top of the Datalink II page. It is also possible to open a file by utilizing the Open icon, located in the icon toolbar on the left side of the Datalink II software.
- 3. Locate the IQ3 folder.
- 4. Open the IO3 folder. Within this folder will be located the IQ3 DemoRC Runfile.
- 5. Place the mouse cursor over the IQ3_DemoRC Runfile and left click.
- 6. This action will open the Runfile into the Datalink II soft ware



Adjusting the Screen Sections



Your PC screen should now display the following (less the callout boxes):

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

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

The screen is divided into three sections:

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

Adjusting On-Screen Font Size

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

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

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Cartridge Down C USB C PIO card addr	PIC Card		a Filo		ogger COM COM1 COM1 COM10 COM2 COM3 COM3 COM4	
Channel Font 9	ize					
an ann	ize	, 20	, 24	, 28		
Channel Fort 9	Ū.,	, 20	, 24	, 28		DK

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

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

Opening a Lap

At this time, the IQ3_DemoRC Runfile should be open. The Datalink II software saves individual lap data, with corresponding lap times (called a Lapfile) within the Runfile. Simply worded, a Runfile is a folder with all the laps placed inside.

To open a lap:

1. Place the mouse cursor over the IQ3 Demo tab and Right click. Doing so will open the Select Lap dialog window:

elect La	р				• ×
Lap	BeginTime[s]	LapTime[s]	Marker Status		
Lap 1:	122.255	01:42.745	Lap and sections validated	~	Open All
Lap 2:	225.000	01:43.483	Lap and sections validated		Upen All
Lap 3:	328.483	01:43.118	Lap and sections validated		
Lap 4:	431.601	01:43.731	Lap and sections validated		Open Fastest
Lap 5:	535.332	01:42.885	Lap and sections validated		
Lap 6:	638.216	01:43.750	Lap and sections validated		Open Selected
Lap 7:	741.966	01:43.210	Lap and sections validated		
Lap 8:	845.176	01:47.147	Lap and sections validated		
Lap 9:	952.323	00:00.000	Unverified Lap	-	Cancel

2. Left click the Open Fastest button. The fastest lap (1) will now be displayed, as shown below.



	👆 Graph 🔚 IQ3_	_DemoR(C SO 1					
\sim	Engine RPM	0	GPS_Data	2.898	GPS_LatG	-0.14	AccG_Difference	+###
	Vertical G	-0.1	GPS_Satellites	5.00	GPS_LapX	2.90	MPH_Difference	+###
	Lateral G	-0.1	GPS_Heading	243.53	LapMarkers	none	Time	122.31
	Accel G	0.0	GPS_Altitude	-89	GPS_LapT	0.06		
	Logger Volts	13.87	GPS_MPH	114.56	LapT_Difference	+###		
	Logger Temp	51	GPS_Gs	0.00	LatG_Difference	+###		
L								

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

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

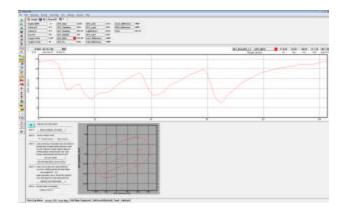
- 1. Open All: This will automatically open all laps contained within the Runfile
- 2. Open Fastest: This will open only the fastest lap.
- 3. Open Selected: This will open one lap, as selected by placing the mouse cursor over the desired lap and left clicking.

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

Graphing Data vs. Time

The next step is to graph a data channel. We will begin by graphing GPS_MPH.

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



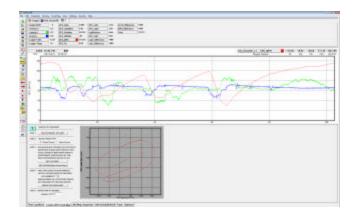
The data now in view represents the GPS_MPH as recorded for one lap. The numbers located at the bottom of the graph represent time, from the start / finish line. When a data channel is graphed, all of the values for the remaining data channels are now activated and displayed beside of each Channel Button.

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

To graph additional channels:

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

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



Graphing Data vs. Distance

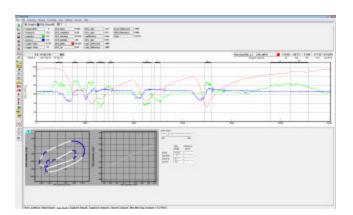
In order to produce a graph, a comparison must take place. In the previous example, the GPS_MPH was compared to time, which begins and ends at the start / finish line. The time into the lap, according to the position of the mouse cursor in the Main Graph area is provided by the Cursor Position Box 9.1. In certain applications, it is often more useful to compare the data to distance from the start / finish line.

To place the Main Graph area in distance mode:

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

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

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



In addition the Cursor Position Box 1027.0 located in the upper left hand corner of the Main Graph region now displays the cursor position in feet into the lap rather than time.

Distance can be displayed in feet or meters. To switch between settings:

- 1. Select View from the Main Menu
- 2. Select Main Chart Metric Units from the pull down menu.

This will change the Main Graph distance to meters. To return to feet, repeat the above steps 1 and 2.

Graphing (Overlay) 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 simultaneous ly using the DataLink II software.

The IQ3_DemoRC Runfile should still be in view, with Lap 1 open. To open another lap for review:

- 1. Place the mouse cursor over the IQ3_Demo tab and right click.
- 2. Select Lap 2 by left clicking over Lap 2.
- 3. Left click the Open Selected button.

flect La	p				
Lap	BeginTime[s]	LapTime(z)	Harker Status		
Lap 2	225 000	01 43 4R3	Lap and sections validated Lap and sections validated		Open All
Lap 3 Lap 4 Lap 5	328,483 431,601	01:43.118 01:43.731	Lap and sections validated Lap and sections validated		Open Factori
Lap5: Lap6: Lap7: Lap8:	536.302 638.216 741.966	01:43,750	Lap and rections validated Lap and sections validated Lap and sections validated	1	Open Selected
Lap 8 Lap 9	845 178 952 323	01:47:147	Lap and sections validated Universitied Lap	-	Cancel

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

- 1. Place the mouse cursor over the Lap 2 tab and left click.
- 2. Now graph the GPS_MPH, Lateral G and Accel G data channels.

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

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

Remove (Erase) a Data Channel from the Graph Area

To clear one data channel from the graph area, single click over the Clear All Graphs icon (white eraser) in the Datalink II toolbar. To clear all graphed data from the Main Menu, double click the eraser icon.

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

Data Comparison in Report Format (Runlog Pages)

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

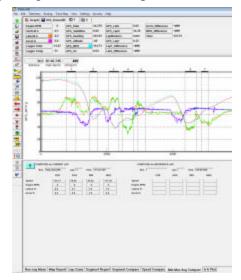
We currently have the same three channels (GPS_MPH, Lateral G and Accel G) graphed from Lap 1 and Lap 2 and the LAP ZOOM page in view. By selecting the Min Max Avg Compare Runlog tab, notice the Minimum, Maximum and Average data now in view.

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

Place the mouse cursor over the Lap1 file tab and left click. The min, max and average data is displayed, for Lap 1. Now, place the mouse cursor over the Lap 2 file tab, and left click. The min, max and average for Lap 2 is in view, replacing the data for Lap 1.

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

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



Assigning Main / Reference File Setting

To compare the min, max and average of Lap 1 and Lap 2, simply:

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

We Edit Telemetry	Rankog Tradi. Har Ve
New	Clank
Nov Telen. Secolori	
Coet	0##0
Close	QE+C
Save	Ord+8
Seve As	
OpenLap	
Set Reference Flight	e.

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

Notice the file tab for Lap 1 is now red [S1]. This indicates a Reference file has been selected. Now, look again at the min, max and average data located below the track map. The above action should activate the comparison between Lap 1 and Lap 2.

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

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

Segment Time Data Comparison

The IQ3_DemoRC Runfile contains two segment and one speed related Runlog pages:

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

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

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

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

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

Closing a File

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

This concludes the basic introduction to the capabilities of the IQ3data logger dash and Datalink II software. The previous information was designed to provide the user with the capabilities of opening and graphing data in the DatalinkII software.

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

Puller Demo

From the factory, the IQ3 is programmed to start the recording process when GPS MPH exceeds 25. Many pulling competitors often reset the start logging channel to Engine RPM above 3000. All data gathered from the time the engine exceeds 3000 until the engine drops below 3000 RPM for longer than 30 seconds is referred to as a Runfile. The start recording channel can easily be changed by the user.

Upon downloading of the new data, a Runfile is created. Each Runfile is identified by a group of letters and numbers that reflects the data logger, track location, date and time of the data download. Within the Runfile is contained all the data for one pull. Multiple files can be opened, in order to overlay and compare graphed data.

For this section, the Runfile we will use for review will be called Puller Demo. To open this Runfile:

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

Note: Please refer to pages 8 and 9 for information on PC screen settings, before proceeding to the following section.

Puller Run - Setting the Zero Start Point

In order for puller competitors to accurately review data, it is necessary to reset the start of graphed data (Zero Point) for each run. When data is initially downloaded and graphed, the starting time of the graphed data is when the data logger starts saving data to the memory card. For example, if the data logger is set to start logging when engine rpm exceeds 3000, that point could occur while driving up to the sled on the first pull.

Suppose on the second pull, the motor does not exceed 3000 rpm until the vehicle is backing up to the sled. When data is downloaded and graphed, the zero time (or starting point) of the data will be at two totally different locations. This makes it impossible to accurately overlay and graph data based on when the vehicle starts the pull.

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

The demo puller Runfile has not had the zero time point moved. This provides the opportunity to perform this procedure, in order to gain an understanding of the process.

To perform this procedure:

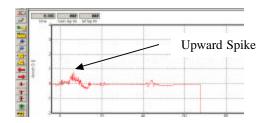
1. Insure the Puller Demo Runfile is open.

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

- 2. Graph the Accel G channel.
- 3. Select the Autoscale icon. This will display all data from beginning to end.
- 4. Place the cursor in the Main Graph area (the area with the colored graph line)
- 5. Press and hold down the left mouse button (starting at the very beginning of the run).

+<mark>∖/</mark>+

- 6. Drag the mouse to the right until the very first movement of the vehicle is noted.
- 7. The first movement of the vehicle will be obvious, with an upward spike in Accel G data.



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

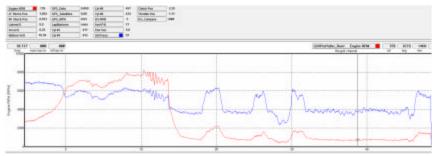
- 8. Select the Set Start Time icon
- 9. The Confirm Data Start Time Change window will open. Select OK

Confirm Data Start Time Change	X
You are about to change start time of data file:	Sample.rpk
Selecting OK will result in the start time placed at:	0.001492 [secs]
	Cancel OK

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

Puller Run – Graphing Data

At this time, the Puller Demo Runfile should be open, with the correct zero point now set. To graph data, simple left click on any of the Channel Buttons which will result in the data channel trace appearing in the Main Graph area. For this example, we have chosen Engine RPM and Oil Pressure.



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.

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

To overlay multiple runs, the user simply selects a second Runfile (only one puller demo Runfile is loaded with the DatalinkII software) and graphs the desired data.

Each Channel Button displays data in reference to the location of the cursor in the Main Graph area. Place the cursor in the Main Graph area, hold down the left mouse button and drag the cursor across the graph area. The Channel Button data will change as the cursor moves across the graph. Remember, the numbers at the bottom of the graph represent time in seconds, from the start of the pull, so the cursor location in the graph represents data at that exact time into the pull.

The following section provides detailed software instructions relevant to all forms of motorsports.

Boat Demo

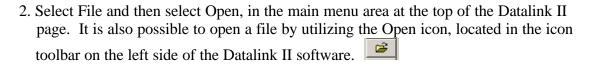
Boating competitors that utilize GPS for track mapping and lap time purposes will use the same software and Runlog pages as the Road Course (Circuit) competitors, with the exception of the addition of three Runlog pages utilized for prop slip testing. First, it will be necessary to open the Boat Demo.

From the factory, the IQ3 is programmed to start recording data to the memory card when GPS MPH exceeds 25. All data gathered from that point until the vehicle drops below the start logging point for greater than 30 seconds, is referred to as a Runfile. The start recording channel can easily be changed by the user to utilize any active sensor channel and value to start the recording process.

Upon download of data to the user's PC, a Runfile is created. Each Runfile is identified by a group of letters and numbers that reflects the data logger, track location, date and time of the data download. Within the Runfile is contained all the laps (if lap type data was created) from that particular outing. Multiple files can be opened, in order to overlay and compare graphed data.

For this section, the Runfile we will use for review will be called Boat Demo. To open this Runfile:

1. Open the Datalink II program



- 3. Locate the Demos3 folder.
- 4. Open the Demos folder. Within this folder will be located the Boat Demo Runfile.
- 5. Place the mouse cursor over the Boat Demo Runfile and left click.
- 6. This action will open the Runfile into the Datalink II software

Note: Please refer to pages 8-16 of this manual, for detailed information on opening and graphing data.

Accel Time and Accel Scroll Runlog Page

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

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

- 1. Open the Boat Demo Runfile and graph GPS_MPH
- 2. Open the Accel Times Runlog page
- 3. Enter the desired speed to start the report and the desired display MPH increments, in the input area located at the top of the Accel Times Runlog page. For example, if 50 MPH is inserted as the Enter Speed and 10 is inserted in the Display Time Every area, the report will start at 50 MPH and display data in 10 MPH increments.
- 4. Place the cursor in the Main Graph area, then position the cursor at a starting point in the acceleration data. Remember to locate the cursor at a point that is below the desire MPH for the start of the report. For example, if the starting point of the report will be 50 MPH, the marker placed in the data can not be located above 50 MPH. If the desired starting point for the report will be 50 mph, locate the cursor at 40 MPH in the Main Graph area.
- 5. Locate the Add/Edit Segment Lap Markers icon, in the list of vertical icons found on the left side of the Datalink II software.
- 6. Left click the icon, which will open the Edit / Add / Remove Section Markers dialog box.
- 7. Select the Insert New Lap Marker At Cursor Button
- 8. Left click the Lap Markers Channel Button, in order to display the inserted lap marker within the Main Graph area.
- 8. Move the cursor to the desired ending point of the accel run, and repeat steps 6 and 7.

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- 9. If multiple acceleration runs were made during the run, continue to place makers at the desired beginning and ending mph points.
- 10. Remember to only place markers within acceleration points within the graphed data. Do not place the beginning marker at an acceleration point and a second maker at a slowing down or deceleration point within the data.

The Datalink II software is designed to review acceleration data between two markers and provide time data. If multiple markers are placed, the Datalink II software will automatically continue to create time data for each pair of markers, as seen in the example below.



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

Advanced Features of Datalinkll Software

Channel Grid Display

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

- 1. Place the mouse cursor over the Channel Grid Display, located above the Main Graph area. IQ3_DemoRC_L2 · GPS_MPH I I07.02 78.52 35.09 117.02 103.575 ille/grid channel val avg min max avg time
- 2. Left click the mouse button. This action will change the Main Graph scaling to reflect the values of the channel shown in the Channel Grid Display. Continue left clicking to toggle through all graphed channels. The TAB key on the keyboard will also perform the same function.

Average / Minimum / Maximum Channel Values

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

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

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

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

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

Understanding Graph Scaling

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

200

150

[] HAM

SPS

As is often the case when running at different race tracks, different speed values are obtained. If the speed scaling was set to graph between 0-100 MPH, but 150 MPH was obtained during the outing, the speed graph would go off scale.

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

Changing Scaling Per Channel

To change individual channel scaling:

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



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

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



Creating Chart Scaling Sets

To create a Chart Scaling Set:

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



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



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



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

To select a Chart Scaling set for use:

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

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

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

Predefining Graph Sets for Display

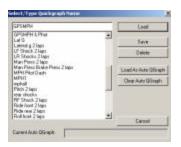
Previously, we graphed data by placing the mouse cursor over the desired data channel and left clicking. Often times, users will find the need to graph the same set of channels, each time data is reviewed. It is possible to "build" graph files that, when selected, will automatically graph the desired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

To create a Quickgraph from the IQ3_DemoRC:

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

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

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



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

To recall a graph set for use:

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

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

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

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

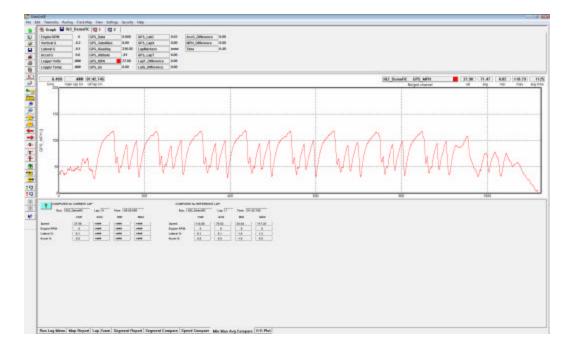
Graphing Runfile or Lapfile Data

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

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

To graph Runfile data:

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



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

Zoom Command

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

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

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

The second method is as follows:

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

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

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

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

Runlog Pages – Road (Circuit) Race

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

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

The following section provides detailed information concerning each Runlog page.

Session Page

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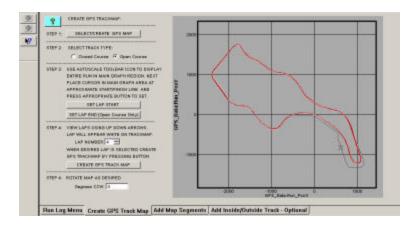
The Session page is automatically opened when new data is uploaded into the PC, from the onboard data logger. The purpose of the Session page is to generate the specifics of each run, such as vehicle, track location, date, and test type / number.

Weather Page



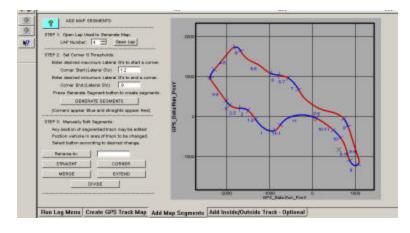
Weather data can be entered utilizing one of two methods. The first method is to manually enter the weather conditions, either during or after the data is downloaded. The second method requires the use of the appropriate Altalab weather station. The user simply *left* clicks the "Get ALTACOM Weather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

Create GPS Track Map



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

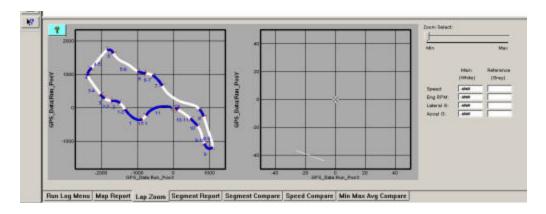
Add Map Segments



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

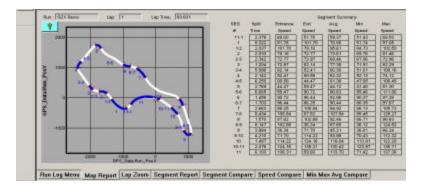
Lap Zoom

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



Map Report

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



Segment Report / Segment Compare / Speed Compare

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

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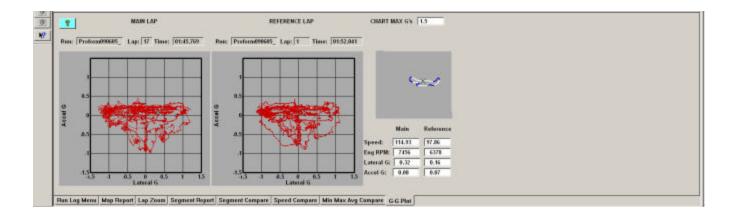
Min Max Avg Compare

The Min Max Avg Compare Runlog page allows the user to compare minimum, maximum and average data between any two selected Main and Reference laps.

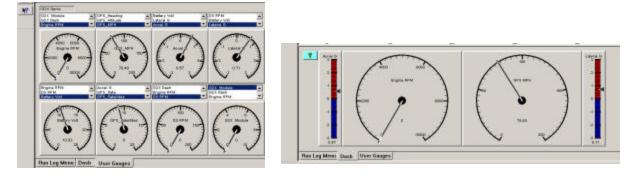
Run	Preform090685_	Lape 17	Time: 01	:45,769	Raa: F	Postarmit90605_	Lap: 1	Time: 0	152.041
	CUR	AV6	MIN	MAX		CUR	AV6	MIN	MAX
Speed:	114.93	76.43	33.38	123.76	Speed:	57.86	72.58	32,02	113.23
Engine RPM:	7456	6796	4580	8868	Engine RPM:	6378	6385	4158	8748
Lateral G:	0.32	40.17	1.29	1.19	Lateral Gc	0.16	40.15	-1.13	1.11
Accel 6:	0.08	0.01	-0.98	0.47	Accel Gr	0.67	0.81	-0.89	0.42

G-G Plot

The G-G Plot Runlog page provides plotted accel and lateral G force data, compared between any two selected Main and Reference laps.



Gauges



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

Tire Temperature / Pressure Calculator Page

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

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

Enter Hal Our-II		Enter	And I	Garda
		2022	117.0	1000
LEFT FROM TEMPS	INCIST TEMP AND		Pager 28	OHE TEMPS
	10			-
UF ANOLE			HANS	
LEFT HEAR TEAM"S	GENE TEMP with			
La Pagessian				
Cold the Owinit		Cold	Ref.	Opini 2

Runlog Pages - Pulling

The puller configuration file (IQ3_Config-PL) contains Runlog pages designed specifically for the pulling competitor.

Session

ABT:	2007	To	ick: Test	Date:	Time:	
	2908					

Pull Info

PHL NFO.	
Drew Position	
Distance Pulled:	
Trent Weight Solonce: " Heavy " Ught " Connet	
Seeding Roote: C Let C Right # 1 C 2 C 1 C 4 C 5 C 4 C 7 C 8 C 7 C 8	
Careera	1

Weather

Get Computech	Weather	
Get Altal ab W		
	ounor	
Status:		
Date:		
Temp:		
Humidity:		
Barometric Pressure:	•	
Pressure Altitude:		
Corr Factor:		
Density Alt:		
Adjusted Altitude:		Altalab only
Air Density:		
Grains of Water:		
Vapor Pressure:		
Dry Barometer:		
Dew Point:		
Wet Bulb Temp:		Computech only
Track Temp:		
	,	

Vehicle and Track Info

TRACK:			
Treck Composition:	Clay	C Seed	CLoan
Track Holeture:	C Wet	(" Dry	C Average
Light Conditions:	C Sen	/ Clouds	E Night
Consistency:	C Same	C Better	(* Worse
EHICLE			
ire Pressure:	Loft Rear	R	ight Rear
rana Gener:	61-6	2 03	1° 4
ront Weight Tetal:	-		
eft Weight Total	_		
ight Weight Total:	-		
lear Weight Totalt	-		
HGHE:			
web:	/" Rich	CLean	Correct
ngine Timing:	-		
OMPETITION INFO			
lumber in class:	-		
Placed position:	-		

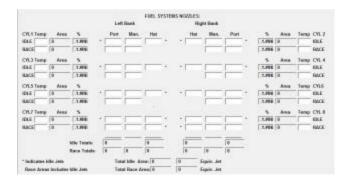
Engine

ENGINE		PINTON DATA		TURNE LAPI.	
Block #	CyLAT		Cyl M2	Valve Look in	· · · · ·
Crank R	Cyl 45		CALIN	Valve Lash Ex	1
Carls Types	Cyl #5	- C	C/F MI	Timing	1
Cam Timing:	CyLIET		Cyl M	River CD	1
Hoad Type:		and the set		Fuel Persp	-
Read CC's		HERD GASHETS:		Main Jot	-
Manifold F	Let		Flight		

Ignition

	GNITION SYSTEM SE	TUP				
MAGNETOS:	DELAY BO	IKES:				
MAG #1 Manufacture:	Delay T	ype: C Mech	anical C	Single Step	Three Step	C Six Step
Type: Mag Serial # :	DELAY TH	AERS:				
Box Serial # :				RPM	Nog 1	
Coil Serial # :	Control	Time On	Time Off	Threshold	Retard	
Trigger Type: 🗂 Magneto 🛛 Crank	- 2			-		
TIMING: MAG #1	3	-				
Base Timing:	5	F				

Fuel Nozzles



Fuel Timers

ENRICHMENT TIMERS				FUEL INVAGEMENT SYSTEM: LEAN OUT TIMERS:				
Times	Set Point	31	AREA	Timor	Set Point		AREA	
÷.			0			· · · ·	1	
2	-	-	0	2		-	1	
3	-	-	0	3	-	1		
3 4 5		-	0	4		1		
5	1	-	0	5		1		
4	-	-	0		_	-	1	
7		-	0				_	
7 8 9	-	1	0		Total +	4	14	
	r	1	0					
18		1	0					
11		-	0	MADE 3	611 -			
11 12	-	-	0			AT	AFEA	
			-					
Total =			0					

Clutch

CLUTCH IN	~	
Clutch type:	- ·	
Type Discs:		
Hardness:	C	
Static Prese:		-
Counter Wt:		_

Tires

Rear Wheel Rollout(inches): 75 This number is used to calculate the RW MPH Type Rear Tires: .	
Tire Pressure: Runs on Tires:	channel

Runlog Pages - Boat

The boat configuration file (IQ3_Config-BT) contains the same Runlog pages as the Road Race Config file, with the addition of three pages designed specifically for the boat competitor. These pages allow for the graphing and comparison of prop slip and speed, along with the ability to create acceleration comparison charts for use when prop testing.

Prop Data

Gear Ratio	
Prop Pitch:	
Prop Dia	
Prop No. Diades:	
Prop MFG:	
Prop SH	
Beat Weight:	
Fuel Quantity	
Delet	
Teretto Marc	

Accel Times

•	East	er Speed is MPH to Start Accel Run	Display Time Every	MPH
	turn Sta	rt Tiene:		
	10 0	- MPH		
	80 0	- MPH		
	0 0	- MPH		
	10 0	14PH		
1	10 1	- MPH		
	0 0	- MPK		
	10 a	" MPH		
1	0 0	ante		
	0 0	10 ⁻ MPH		
	10 a	- M2H		
	0 0	- MPH		
	B 4	- MPH		

Accel Times with Scroll

P Enter Speed in MPH	Display Scenik	Construction of the second second	100
Accel Run Start Tires:			3
0 to 0 MPH			
0 to 0 MPH			
0 to 0 MPH			
0 to 0 MPH			
0 to 0 MPH			
8 to 0 MPH			
0 10 0 MPH			
0 to 0 MPH			
0 to 0 MPR			
0 m 0 MPH			
8 to 0 MPH			
0 to 0 MPH			

Conclusion

Thank you for taking time to review the IQ3 demo. At Racepak Data Systems, our goal is to provide the best data analysis hardware and software available, along with unparalleled customer service. We hope this demo has provided an insight into our commitment to this goal. If you have any questions, please feel free to contact one of our technical representatives.

Thank you,

Racepak Data Systems

30402 Esperanza Rancho Santa Margarita, CA 92688 Phone: 949-709-5555

www.racepak.com