AltaLab Instrument's

AltaWeather

By: Jay Costales

Contents

AltaWeather

Conceptual Design

The underlying concept of the creation of the AltaWeather software was simplicity coupled with reliability. The AltaWeather software has been designed to withstand a large number of instances were errors could occur. The software puts an emphasis on reliability of paging and predictions so that you can be guaranteed good trustworthy information needed to accurately predict or monitor your racecar. We make no attempts to overanalyze information, but we do give you a set of tools that can be used to uniquely give you, the racer, a huge competitive edge. In fact, the first time this application was ever used, the racer using it won the race! Every attempt is made with the software to present weather information to you in a clear and understandable format so that you can build the knowledge needed to understand how atmospheric changes affect your racecar.

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contact information included with this product to contact AltaLab.

System Requirements

Requirements

- Microsoft Windows XP/2000/NT/Me/98se operating system

  (Windows NT users need NT 4.0 with Service Pack 6 or later)
- Pentium-class microprocessor

  (Pentium 350MHz or higher recommended)
- Recommended Memory Requirements:
  - 64MB for Microsoft Windows NT/9x
  - 128MB for Microsoft Windows 2000/Me
  - 256MB for Microsoft Windows XP and above
- 85MB free hard drive space
- Microsoft-compatible mouse
- * Network Interface Card for server and multi-display options
- * Dual displays for AltaDisplay option on second monitor

  Dual display capable video card for unlimited number of AltaDisplays on a single computer

* Denotes additional computer hardware items needed for additional software functionality

Note:

Additional license(s) are required for multiple computer connections to an AltaWeather Weather Server! Contact AltaLab Instrument for volume license pricing.

Installing AltaWeather

Installation Steps

1. Launch the AltaWeather vX.X.X.msi installation file

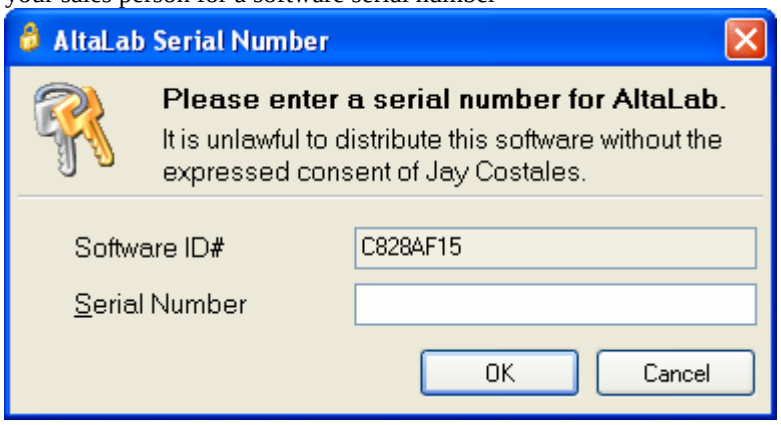
   (Where the X.X.X is the version number of the application being installed)
2. Click **Next**
3. Enter you User Name and Organization
4. Select “Anyone who uses this computer (all users)
5. Click **Next**
6. Click **Install**
7. Click **Finish**

Quick Setup

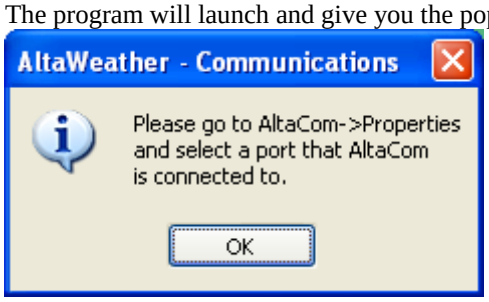
Configuring AltaWeather for AltaCom connection

- Acquire your AltaWeather Serial Number
  1. Install the AltaWeather vX.X.X.exe application
  2. Launch the AltaWeather Application from your desktop shortcut icon 

3. Write down the Software ID# provided and contact AltaLab Instrument or your sales person for a software serial number

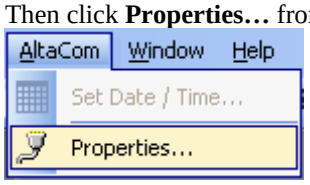


4. Enter in the serial number provided and click **OK**
5. The program will launch and give you the pop-up warning you see here

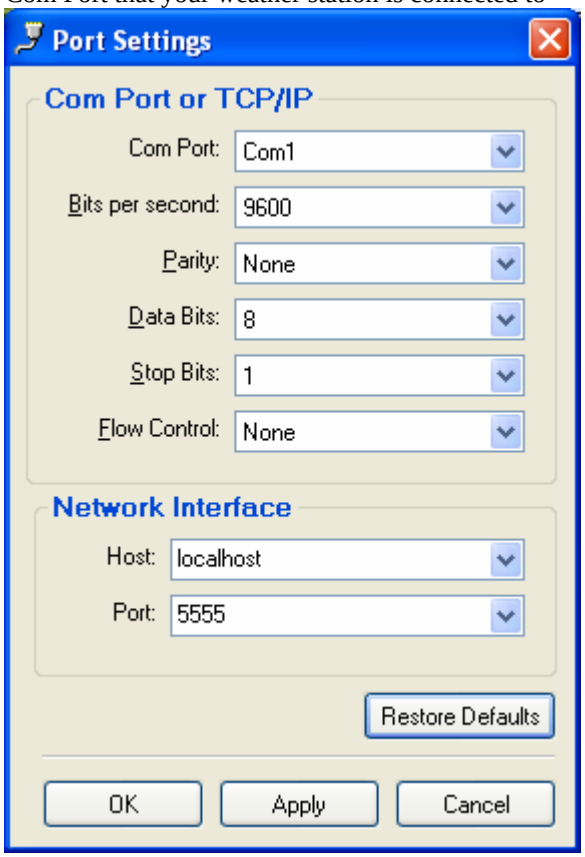


6. Click **AltaCom**

7. Then click **Properties…** from the drop down menu

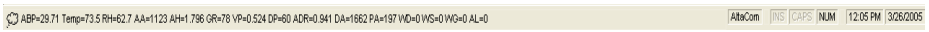


8. With the Port Settings window open click **Restore Defaults** and **select** the Com Port that your weather station is connected to



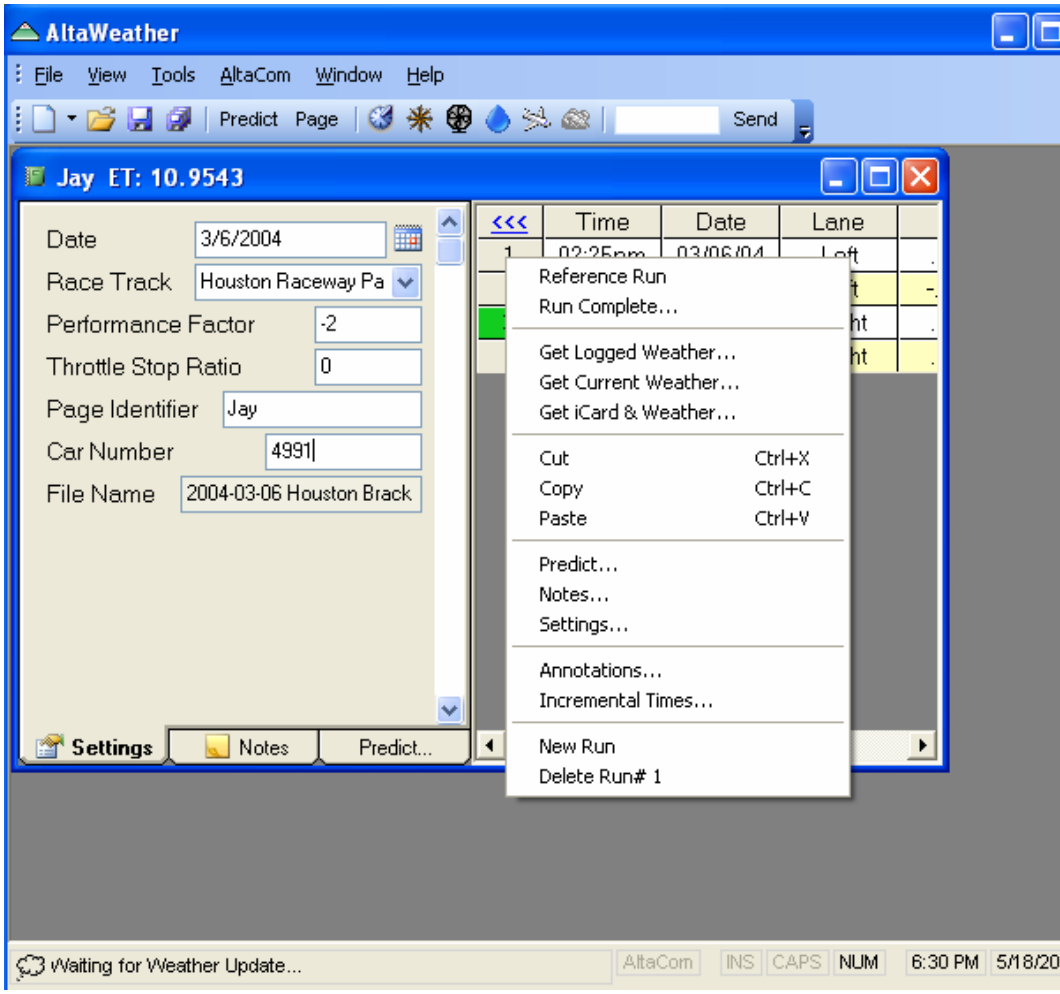
Note:

If AltaWeather is properly installed and connected to the AltaCom unit, you will see weather information display in the status bar as illustrated in the picture below. In addition, you will see the AltaCom label in the status bar blink every 20 seconds indicating the weather information is being updated in AltaWeather from the AltaCom unit.



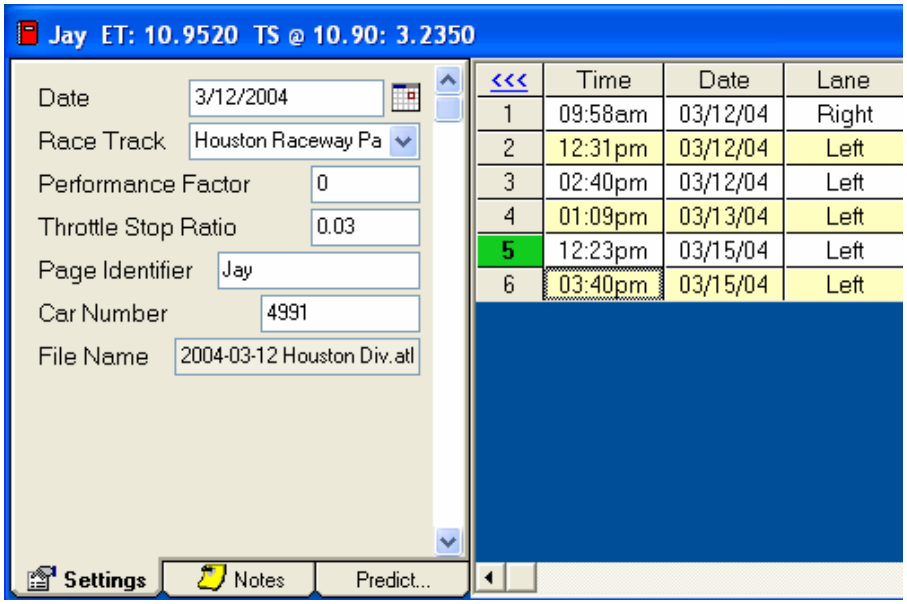
Setting up your first Race Log for predictions

Setting up your first Race Log is done by clicking New Race Log from the File Menu or [CTRL+N] keyboard shortcut. Once a Race Log is created, you need to set all the correct settings for the Settings and Predict Tabs as seen in the illustration below. You can access the different Race Log tabs by clicking the >>> you see in the upper left corner of the Race Log window. ET predictions will start to display in the Race Log title bar when the first round of information is entered and the minimal settings have been provided for the start of the race. Everything that requires user input can be accomplished in a Race Log by **right clicking the run number** to get the pop-up menu you see below. To enter a new run number, right click below the race log grid.


AltaWeather
File View Tools AltaCom Window Help
Predict Page
Send
Jay ET: 10.9543
Date 3/6/2004
Race Track Houston Raceway Pa
Performance Factor -2
Throttle Stop Ratio 0
Page Identifier Jay
Car Number 4991
File Name 2004-03-06 Houston Brack
Settings
Notes
Predict...
<<< Time Date Lane
Reference Run
Run Complete...
Get Logged Weather...
Get Current Weather...
Get iCard & Weather...
Cut Ctrl+X
Copy Ctrl+C
Paste Ctrl+V
Predict...
Notes...
Settings...
Annotations...
Incremental Times...
New Run
Delete Run# 1
Waiting for Weather Update...
AltaCom
INS
CAPS
NUM
6:30 PM
5/18/20

Using the Interface

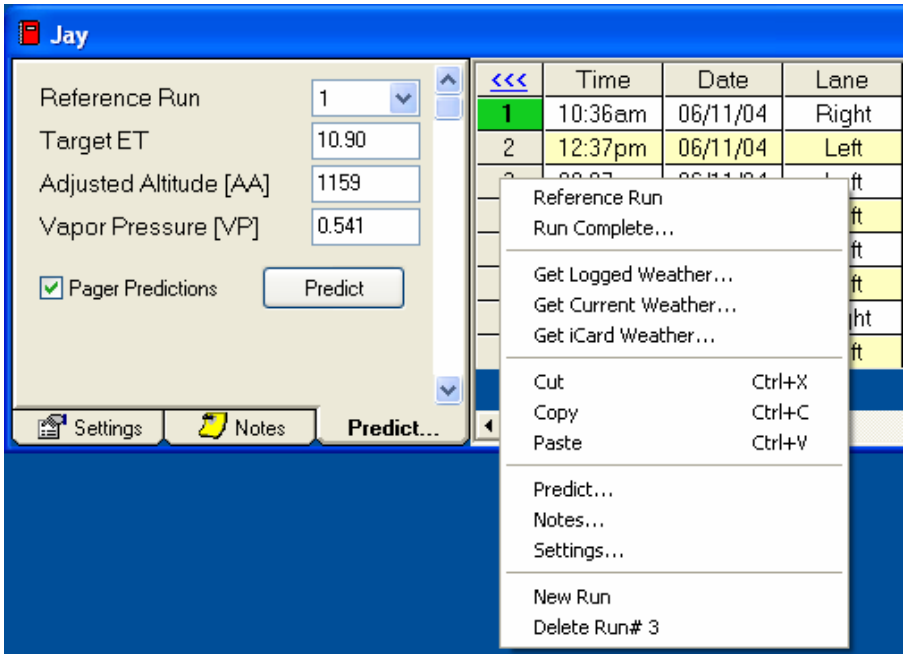
Race Logs



Race Logs are used to store incremental times, weather, and other key information about a race. The race log is a powerful logbook that allows for real-time predictions and analysis using your AltaCom system. It is very important to keep your race logs accurate and up-to-date for every run you make to insure accurate results.

The race log is the most powerful view in the AltaWeather software. There are many advanced features that augment its log book baseline functionality. If you are in doubt on how move forward in the use of the software, remember to **right click the run number**. Everything that you could possible want to do with a race log file can be done by right clicking the run number. All features and options are accessible from the popup menu for the particular run number you have right clicked.

Log Sheet



The log sheet is where all information about a run is stored. Right clicking the run number will give a list of options available to perform on the log or that selected run. Using the pop-up window you can quickly set your desired reference run, run complete a ¼ mile time, get logged or current weather data, cut / copy / paste runs, view the predict / notes / settings window, delete a run, or add a new run. The <<< caption at the left corner of the grid is used to close or open your settings pane for the race log view you have open.

iCardRX Option:

The AltaWeather software v2.3.2 and above will allow a user to use the iCardRX v1.5.3 and above feed to synchronize the time you made your run for a proper logged weather query. In addition, all incremental times stored by iCardRX will be imported into that run. To use the feature right click the run number and select **Get iCard Weather…**

Settings

The settings page is where you initially setup your race log file. The date field is used to help identify when the race occurred as well as act as part of what can be a race log file name. Coupled with the date, the race track name can be typed in or selected from a drop down listing that will help augment the race log file name. Not to mention, it is a helpful reminder as to where the race occurred. The performance factor is basically a scalar value that helps get the predictions dialed in to your particular car. The throttle stop ratio is what you use to determine how much of your delay boxes throttle stop timer changes your elapsed time. As for the page identifier, it is used for multiple things. First, it helps you keep track of what race log file goes with a given racecar. It is also the name that is used to store default settings for a particular racecar. Finally, you have the file name box which helps you understand where your race log file is being saved to and acts as an indicator to if the file has been saved.

Date

The date entry box should contain the date the race event began. This date is used for part of the default file name creation on saving. It also helps keep track of when the race for that log occurred. If you click the  icon, it will give you today's date saving you from additional typing.

Race Track

The race track drop down listing will allow you to type in the race track you are at or select the race track from the drop down listing. You configure the tracks in your drop down listing from the configuration page of the software. This field is used in conjunction with the date to give a default suggested file name for the race log file to save.

Performance Factor

The Performance Factor (PF) entry box provides a way to customize predictions for your vehicle.

Note:

If you are just starting with the software, a 0 (zero) for your PF is a good choice if you are running gasoline and a good starting point if you are running alcohol would be a 5.

You cannot enter values in greater than +/- 10

Throttle Stop Ratio

The Throttle Stop Ratio (TSR) box is used to enter your ratio for how much change of the throttle stop timer affects your Elapsed Time (ET).

Example:

A one to one ratio (1x1) would be entered as .01, two to one (2x1) as .02 and so on…

Page Identifier

The page identifier is what is used to distinguish the paged message for that particular race log. I suggest choosing something meaningful to the car or driver depending on your situation. Not to mention, it is also displayed at the top of each Race Log's title bar along with the predictions making it easy to distinguish predictions for multiple car teams.

Warning:

Do not use a page identifier messages larger than 5 characters. Even though you can enter lager page identifiers, it is not recommended because it will drastically cut down on the available space that is allowed in characters to be sent to the pager. The page to the AltaCom unit will be ignored if it goes over an unspecified size.

Car Number

The Car Number field is used only for iCardRX incremental time imports. With this field, a race log will attempt to find your time slip in the iCardRX log file. The race log must have a valid date and time to perform this task for any run listing. If a valid entry is found, the time field will then be synchronized with the time you ran down the track according to the iCardRX log file; logged weather data for that time will be imported for the run number.

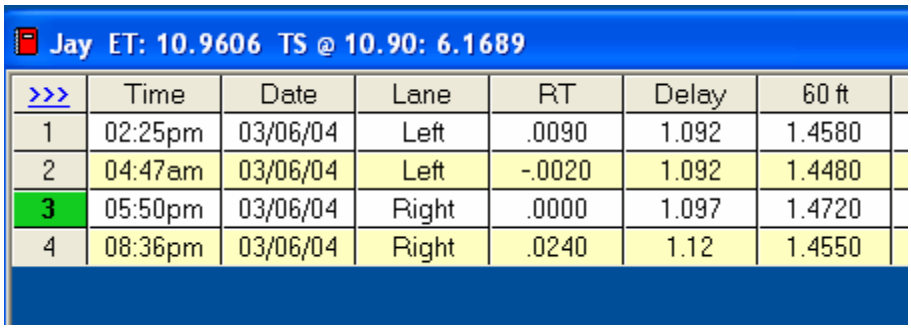
File Name

This box will give you the filename of the race log file being used. This field will be blank if the race log has never been saved. Once saved, the filename box will display the name of the file the race log view is using. In addition, a tool tip is provided if you leave your mouse over this box for a small amount of time without movement that will indicate to the end user the location of the stored file. This can be helpful if you forget where you saved the file off to.

Notes

The notes section of the race log view is used to write miscellaneous information about runs, racecar, and environmental conditions. This section of the race log is automatically modified if a run complete is performed with any given reference run. Since a run complete completely overwrites your ¼ mile time, the notes section can be handy if you want to call up your actual elapsed time for that run at a later date.

Predict



>>>	Time	Date	Lane	RT	Delay	60 ft
1	02:25pm	03/06/04	Left	.0090	1.092	1.4580
2	04:47am	03/06/04	Left	-.0020	1.092	1.4480
3	05:50pm	03/06/04	Right	.0000	1.097	1.4720
4	08:36pm	03/06/04	Right	.0240	1.12	1.4550

The predict button forces a prediction that will be displayed to the title bar of the race log window if all information required is available. If the throttle stop information is left out, it will automatically be omitted from the race log prediction and you will only get an ET prediction.

Looking at the screen capture of this race log, you can see the page identifier (Jay), the ET calculation (10.9606), and a suggested TS setting to run a 10.90 a (6.1689). This helps demonstrate some of the uniqueness of how predictions and pages work. Looking at the title bar for a given race log view, you will always be able to see what is going to be sent to the pager if pager predictions are turned on. Also, you will quickly realize after using the software that you are completely unlimited to the amount of predictions you may want to calculate simultaneously for a given race. As long as you turn pager predictions off, you will be able to load as many instances of the same log file as you want for a greater insight as to how close all predictions are for any given run you may have logged information for. However, this can quickly get out of hand and bring you closer to information overload making it more difficult to make good decisions in a relatively short amount of time (assuming you are approaching that winner circle). This is why AltaWeather comes with a weather server that allows you to connect as many AltaWeather applications to a single weather station. Only one system is allowed to send messages to the pager, but you can have an unlimited number of connections to your weather system. This allows you to relocate all extra data gathering views to another screen with dual displays or a computer with an additional AltaWeather license. If you would like to learn more about these advanced features, visit the advanced topics section of this manual.

Note:

The green indicator for a single run in a race log view is a visual reference to what the current reference run is set to. Always check to verify you are using the correct reference run for race predictions.

Warning:

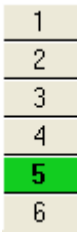
Use caution if loading multiple instances of the same race log view. Loss of information can occur if the wrong race log view is saved. DO NOT SAVE TEMPORARY RACE LOG VIEWS!

Reference Run

The reference run is what is used to calculate how a change in weather will affect your racecar. There are two ways to select a reference run. One is by selecting the desired reference run from the drop down listing in the predict section of the race log settings pane. The other is by right clicking the run number and selecting the reference run option in that pop-up menu.

Note:

The run number being used as the reference run is indicated by the darker green color highlight for that run number as seen in the graphic below.



Target ET

The target ET is what is used to make a determination of what throttle stop change is needed to arrive at that desired ET.

Adjusted Altitude Update

The adjusted altitude value in the race log predicts section of the settings pane is what is used in weather pages and predictions for that race log view.

Warning:

Automatic updates must be checked from the race log options menu bar in order for the AA value to be automatically updated. If you turn off automatic updates, predictions will continually be calculated for the last AA value automatically gathered. USE AT YOUR OWN RISK!

Vapor Pressure Update

The vapor pressure value in the race log predict section is what is used in weather pages and predictions for that race log view.

Pager Predictions

The pager predictions check box is used to turn on or off pager messages for that race log. It is highly recommended that you do not send pages for more than two logs at a time.

Warning:

Do not send more than two race log pages at a time. This could result in no page being sent at all. This is due to the limited characteristic factors of the AltaCom paging unit.

Predict

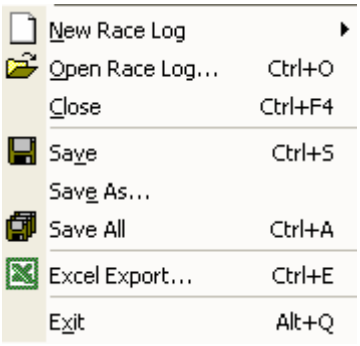
The predict button will force a prediction the title bar of that race log view. Click this button if you have made modifications to the logged data.

Note:

The title bar always contains the message sent to the AltaCom paging unit.

Clicking the Predict button from the applications toolbar will force all open race logs to update their predictions.

File Options



The file options section of the menu bar allows you to create a new race log, open a race log, close a race log or view, save / save as / save all race logs, export race log data to Microsoft's Excel, or exit the application.

New Race Log

Clicking the **New Race Log** option will create a standard default race log. If defaults have been set using the configuration option, it is possible to select a user defined race log that will be created with the default preferences set by the user. The defined race log is uniquely identified by its page identifier.

Open Race Log

Open a previously saved race log

Note:

The open dialog will always open in the directory last selected by the user.

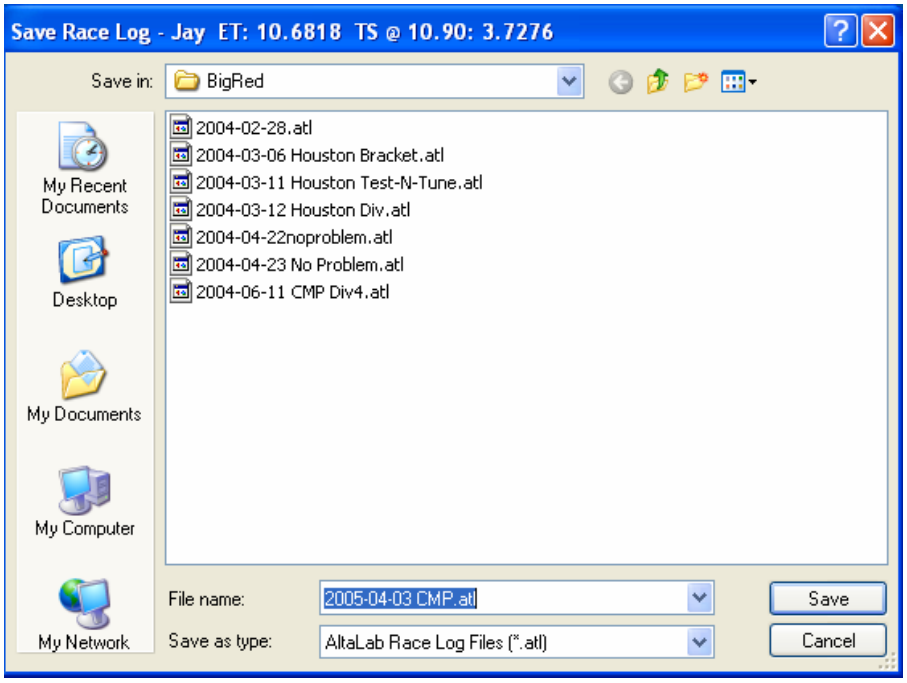
Close

Close the currently active race log or graphical view

Save

Save the currently selected race log

Save As



Save the currently selected race log with the option of changing the default filename.

Note:

It is smart to create a directory structure that further helps in the organization of your AltaWeather Race Log Files for the different racecars or drivers you may have.

Save All

Save all open race log files

Excel Export

Export the currently selected race log file to an excel template of your choice. Excel templates are defined for use in the configuration section of the software.

Note:

You can submit your custom templates to jay@jaycostales.com. Use the included HoustonEngine (www.houstonengine.com) template as a general guideline as to how to create excel templates useful for you.

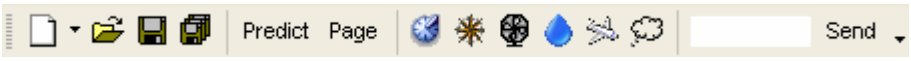
Exit

Exit the weather application

Note:

When exiting the AltaWeather weather software, you will be prompted to save all open race log views. Only save the race logs that you are using!

Tool Bar



The tool bar provides a quick reference to commonly used tasks. All tasks except for the custom page tool are available in the menu bar of the application. The arrow on the far right allows for customization of the toolbar and menu bar for a given session of that single instance of the software. Modifications will not be there on the next load of the software.

Note:

A session is defined to be the time the software is loaded to the time it is closed.

Race Log Creation

 The Race Log icon is a quick link to create a new generic race log. To create a log with predefined defaults, click the drop down arrow and select the correct page identifier for the default log you want to create. Race Log page identifier settings can be setup in the default section of the configuration page.

Quick Links

The quick links section for AltaWeather views in the toolbar allows a user to quickly call up weather system graphs and analysis tools.

Note:

All views are updated once every 20 seconds.

Views

-  Wind Plot
-  Wind Direction
-  Wind Speed
-  Vapor Pressure
-  Adjusted Altitude
-  Weather

Predict

 The toolbar predict button will force a prediction for all open race logs at that given moment.

Note:

Perditions will not change unless there is a weather change or a parameter change. Currently, the system gathers weather information once every 20 seconds. A prediction is automatically calculated for each weather gathering cycle if the automatic updates option is checked.

Page

This button will force a page to the AltaCom remote pager for all race logs that have pager predictions checked.

Note:

You will see the AltaCom units yellow light turn on indicating a page is being sent shortly after the page button is pressed.

Warning:

Do not excessively click this button as it could cause damage to the AltaCom paging unit.

Custom Pages

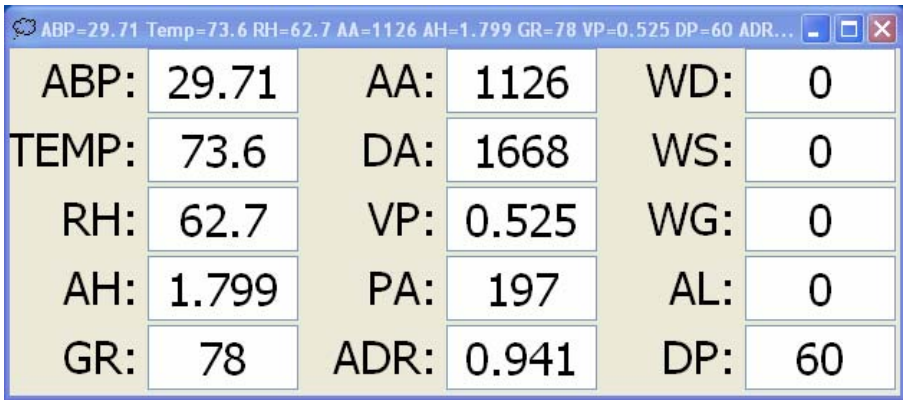
This can be any custom message you would like to send to the pager. Click the send button to send the message in the custom page text box

Status Bar

The status bar will display current weather values queried from the AltaCom unit for the selected values in the race log column selection. The AltaCom label will blink on and off for successful data communications between the AltaWeather weather software and your AltaCom unit. The other labels in the status bar should be self explanatory.

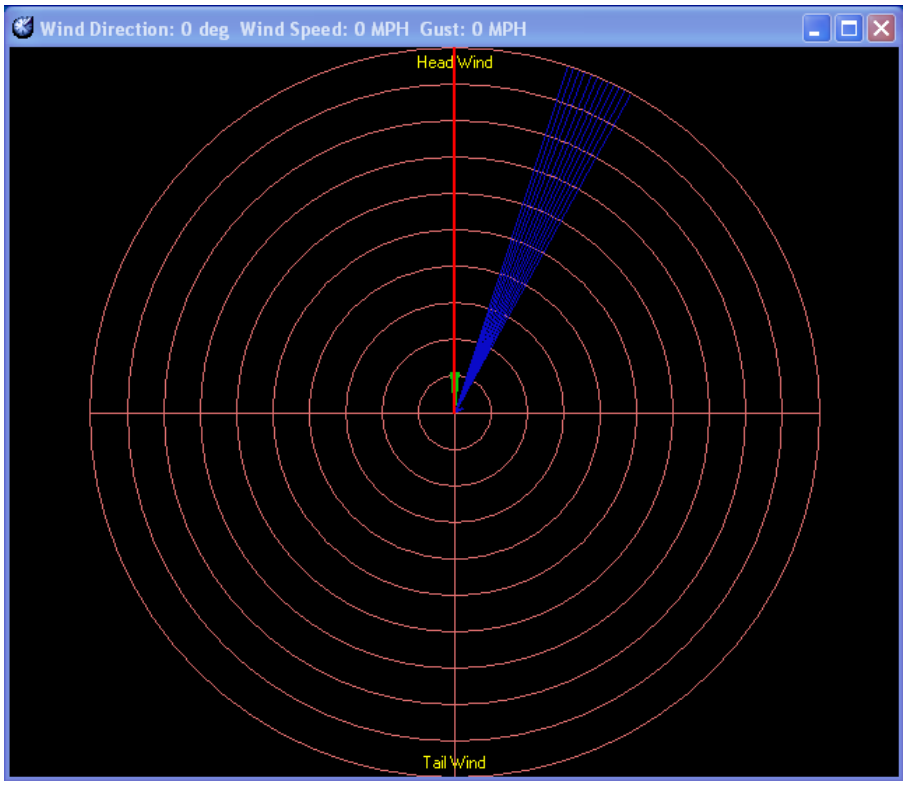
Views

Weather



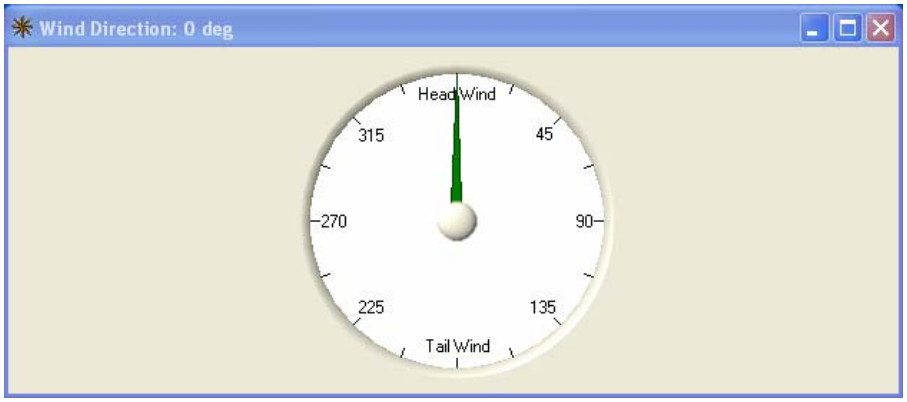
The weather view will display all weather variables in an easy to read display. If you are unsure to what any of the abbreviated terms mean, visit the glossary section of this help file for an explanation.

Wind Plot



The Wind Plot is actually a rose plot used to monitor wind direction and speed in a combined graph. The biggest pie slice you see is a sign that wind has concentrated most of its power in that particular direction over time. This calculation starts at the time you pull up the wind plot graph view. If you close the graph and reopen it, it will start over trying to figure out where the concentration of wind is coming from for the start of that given point of time. The title bar will show current wind direction combined with wind speed and wind gust.

Wind Direction

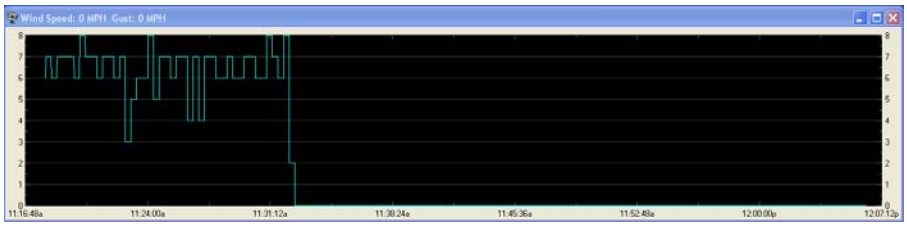


The wind direction view will always display the current direction the wind is blowing at that given time. The title bar always shows the wind direction in degrees.

Warning:

The graph may show an incorrect direction if there is no wind speed or gust.

Wind Speed



The wind speed view displays the history of wind speed over time. The title bar will display the current wind speed value along with the wind gust. The Y-Axis displays wind speed in MPH and the X-Axis displays time.

In addition to basic logging, you can load a cursor for WS to set a reference point that can help determine the change of wind speed over time.

Note:

If you close the graph and reopen it, it will reset the graph view and start logging at the point of time the view was loaded.

Vapor Pressure

The vapor pressure view displays the history of vapor pressure vs. temperature over time. The blue you see on this graph represents the vapor pressure values over time and the red circles represent temperature over time. The Y-Axis displays the graphs values in blue for vapor pressure and red for temperature. The X-Axis displays time.

In addition to basic logging, you can load cursors for both VP and Temp to set a reference point that can help determine the change of either value over time.

Note:

If you close the graph and reopen it, it will reset the graph view and start logging at the point of time the view was loaded.

Adjusted Altitude

The adjusted altitude graph displays adjusted altitude and density altitude over time. The Y-Axis dark yellow values represent the AA value and the dark green values represent the DA values. Of course, the X-Axis displays time.

In addition to basic logging, you can load cursors for both AA and DA to set a reference point that can help determine the change of either value over time.

Note:

If you close the graph and reopen it, it will reset the graph view and start logging at the point of time the view was loaded.

Relative Humidity

Explanation coming soon…

Grains per lb

Explanation coming soon…

Absolute Barometric Pressure

Explanation coming soon…

Graph

The graph view is a trend analysis tool used to find trends such as temperature vs. 60ft.

Warning:

This feature is still in development.

TS Graph

The throttle stop graph attempts to perform some mathematics that have not been proven yet.

Warning:

Use at your own risk!

ET Graph

The throttle stop graph attempts to perform some mathematics that have not been proven yet.

Warning:

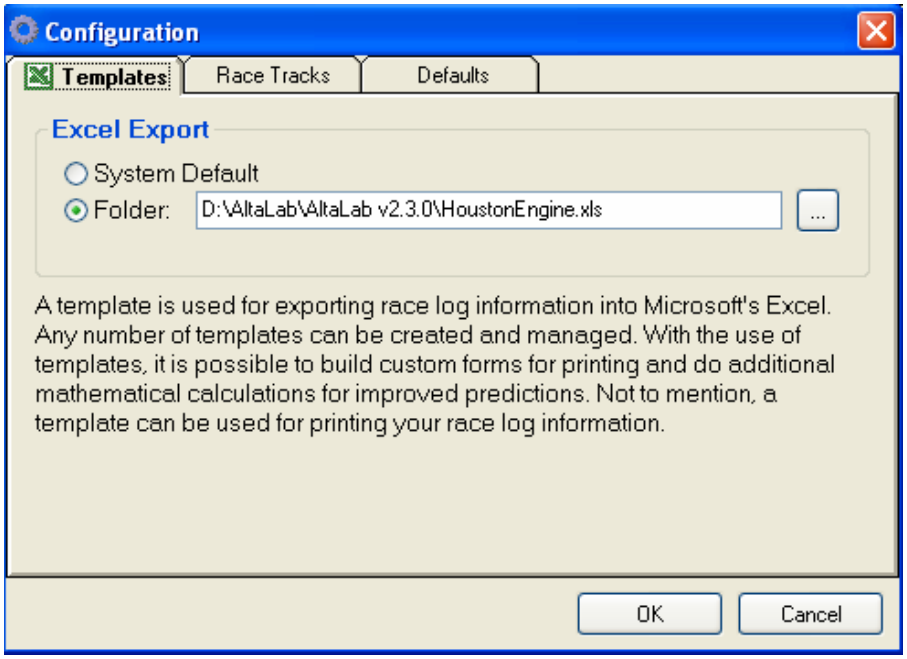
Use at your own risk!

Tools

Configuration

The configuration page is the place you setup your default templates, define the racetracks you race at, set AltaCom paging properties, and setup race log default file settings. Each page has a helpful explanation for use at the lower portion of the view.

Templates

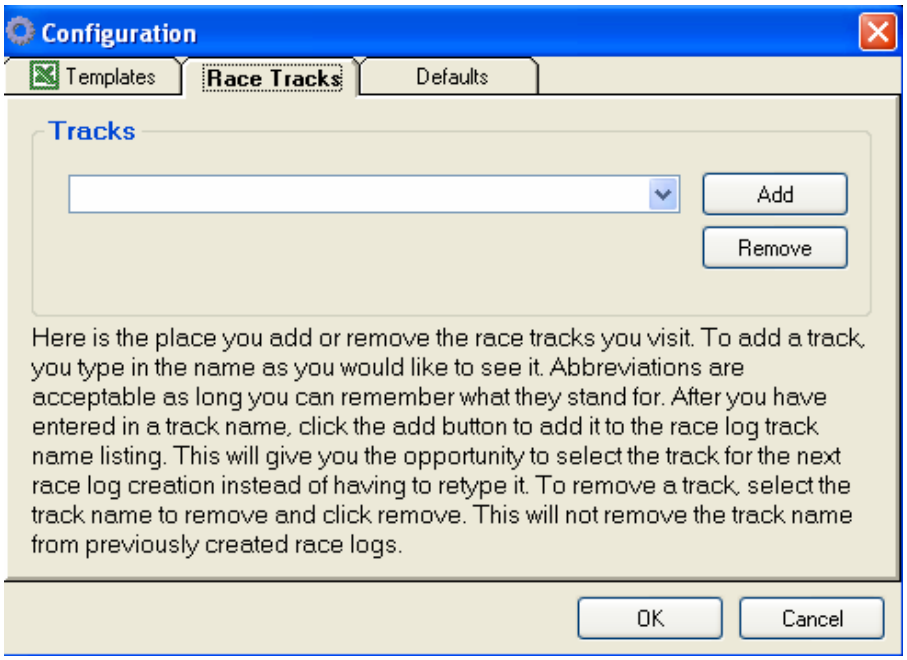


Templates are used for race log data export. When using templates, a user can customize or design his or her own predictions with Microsoft's Excel. The AltaWeather software will export all race log information to Excel for printing or external drag race analysis. This provides a very quick way for the end user to perform custom drag race analysis unique to their own racing program.

Note:

You can submit your own custom templates for integration into AltaWeather.

Race Tracks



The race tracks section of the configuration page is where you add or remove the race tracks you visit. This allows a user to quickly select a race track for the race log file's settings options.

Add a Track:

1. **Type** in the name as you would like to see it

   Abbreviations are acceptable as long as you can remember the meaning at a later date.

2. Click the **add** button to add it to the race log track name listing

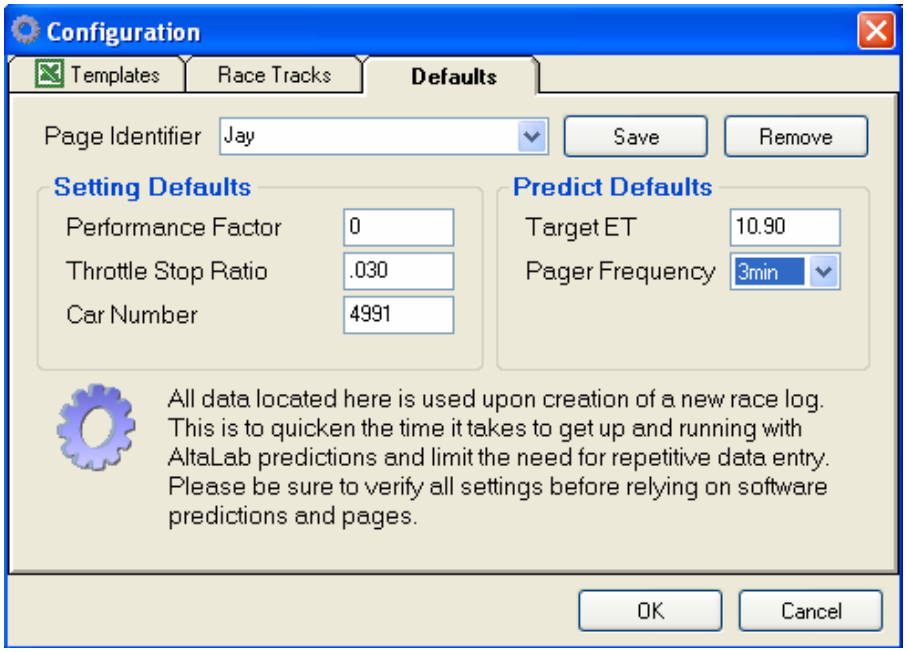
   This will give you the opportunity to select the track for on the next race log creation instead of having to retype it.

Remove a Track:

1. **Select** the track name to remove from the drop down listing
2. **Click** remove

   This will not remove the track name from previously created race logs.

Defaults



This section is used to set race log default settings for use on the creation of a new race log view. This helps quicken the time it takes to get up and running with AltaWeather predictions and limits the need for repetitive data entry while limiting user entry error.

- Performance Factor
- Throttle Stop Ratio
- Car Number

  The Car Number field is used only for iCardRX incremental time imports. With this field, a race log will attempt to find your time slip in the iCardRX log file. The race log must have a valid date and time to perform this task for any run listing. If a valid entry is found, the time field will then be synchronized with the time you ran down the track according to the iCardRX log file; logged weather data for that time will be imported for the selected run number.

- Target ET

  The Target ET value is required for bracket racing with a throttle stop. This is the ET you want your car to hit and the software will provide predictions and pages to help calculate what delay box settings are required to do this.

- Pager Frequency

  The pager frequency drop down listing is used to determine how often a page is requested of the AltaCom unit.

  Note:

  It is normally common to have pager frequency times less than 5 minutes but greater than 3 minutes.

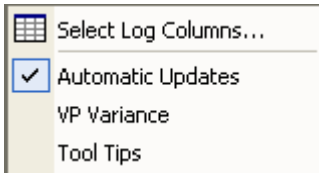
  Warning:

Paging your AltaCom unit at high rate intervals can devalue your weather data gathering capability of the AltaCom unit. It is strongly suggested that you keep your paging frequency above a 3 minute interval.

Warning:

Please be sure to verify all settings before relying on software predictions and pages.

Race Log Options

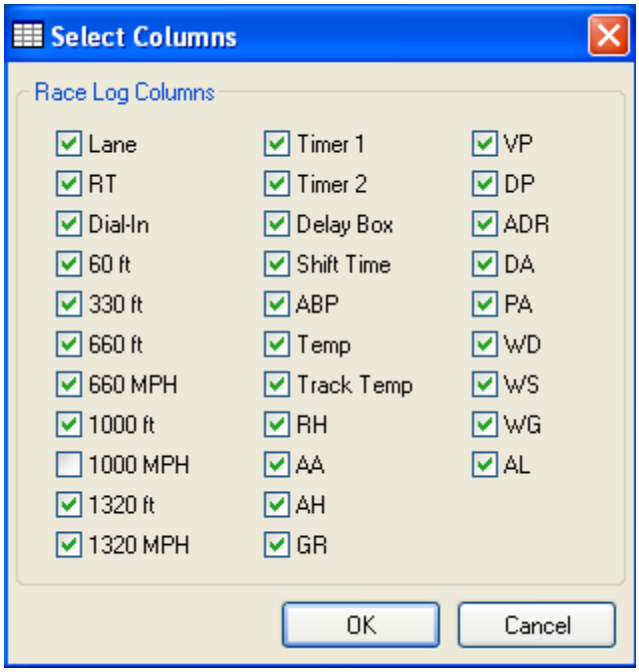


The race log options are very useful for quick customization for all of your race log views.

Warning:

If you uncheck the automatic updates your race log will no longer have its AA value or VP value updated for pager predictions. The automatic updates must be checked to have weather effect your pager predictions.

Select Log Columns



The different check boxes for the log columns are used to determine what is displayed to a newly loaded race log and what weather information is sent to the pager in conjunction with the pager predictions.

Automatic Updates

The automatic updates option allows you to turn off AA and VP updates that are sent to the race log views. This allows the user to enter their own values for manual driven calculations and predictions.

Note:

This feature is helpful when doing drag race analysis away from the track and when you are disconnected from your AltaCom unit.

Warning:

Do not forget to keep automatic updates on to continue to receive current race predictions.

VP Variance

With the vapor pressure variance checked, a special message will be sent to the pager and displayed in the predictions for every race log view. This provides a notification of the VP difference from the reference run if it is greater than .02.

Tool Tips

With the tool tips option checked, informational tool tips will be displayed for the current round selected in any race log view. This can be helpful if you want to view your times and weather information from top to bottom.

Note:

If you make a change to this setting, the software must be closed and reopened before the changes will take affect.

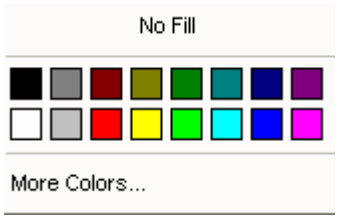
Calculator

This is a quick launch key to the systems calculator. The system calculator comes in handy if you are verifying predictions or performing custom modifications to your race log views.

Note:

Remember to take notes when times or settings are modified in the race log view so that you can remember why something was chagned at a later date.

Background Color



Choosing a color for the background will paint the main forms background the selected color. All race logs inherit the color of the background form.

Note:

You can use this feature to color code your race log views differently from one another. This will make it easier to determine what proper race log file, goes with

what car or driver. This can be handy in multi car teams. This feature is not meant to replace the page identifier displayed in the title bar for every race log view.

Refresh

Clicking the refresh button will repaint everything on the screen. Use this feature if your computer hardware is having screen painting problems.

AltaCom Options

Set Date / Time

This feature is used to set the date and time to the AltaCom unit.

Note:

We have temporarily disabled this feature as no time information is needed from the AltaCom unit with this software.

Properties

The default settings for communications to your AltaCom hardware is 9600, N, 8, 1. Where 9600 is the baud rate, N is the parity, 8 is the number of data bits, and 1 is the number of stop bits.

Port

The com port the AltaCom unit is connected to. If you are making a TCP/IP connection to a weather server, please select the TCP/IP selection at the bottom of the drop down listing.

Example:

Com1, Com2, Com3, Com4, Com5, … TCP/IP

Baud Rate

The baud rate is a representation for the number of bits per second used to talk on the selected com port.

9600 (Default)

Parity

The parity can be even, mark, none, odd, or space

None (Default)

Data Bits

Valid data bit values are 4, 5, 6, 7, and 8

8 (Default)

Stop Bits

Valid stop bits can be 1, 1.5, or 2

1 (Default)

Flow Control

Valid values are None, Xon / Xoff, RTS, RTS / Xon / Xoff

None (Default)

Host

This is the full computer name for the computer the AltaWeather weather server is running on.

Note:

To get the full computer name of the computer on Windows XP:

- **Click** Start
- **Click** Control Panel
- **Click** System
- **Select** the Computer Name tab
- **Read** the text next to the label Full computer Name:

Port

The Port is the address that the computers use to talk to each other on. This setting must be the same for every computer using a specified weather server.

Window Options

Tile Horizontally

This provides a great way to organize your views and race logs. Use this option often in the initial setup of your different AltaWeather views.

Note:

A view remembers what its last screen orientation and settings were for the next time it is called up.

Tile Vertically

This provides a great way to organize your views and race logs. Use this option often in the initial setup of your different AltaWeather views.

Cascade

This provides a great way to organize your views and race logs. Use this option often in the initial setup of your different AltaWeather views.

Note:

Using the Cascade view will allow you to view all title bars that contain current race prediction calculations and current weather information.

Close All

The close all button will close all windows open for the given instance of the AltaWeather or AltaDisplay software.

Windows Listing

The window listing is a top to bottom listing of all views loaded for any given session of the AltaWeather or AltaDisplay software. Use this feature if you are having problems finding a particular window you think you have opened.

Note:

Clicking a view from the window listing will highlight that view in that instance of the application. This is a helpful feature if you were to lose track of a particular race log or graphical view.

Advanced Topics

Weather Server

The weather server allows you to connect an unlimited number of computers to a single AltaCom weather system. This allows a user to distribute the weather informational views to other computers or screens.

Note:

To make use of multiple computers, additional AltaWeather licenses must be purchased from AltaLab Instrument.

To feed the weather server once opened, you must peform the following steps.

- **Click** Tools
- **Click** Properties
- **Verify** Host and Port settings
- **Click** Ok

AltaDisplay

An AltaDisplay will load if you make an attempt to load more than one instance of the application on a single computer.

Note:

You are limited only by computer speed and memory for the number of AltaDisplays you load to a single computer.

About Page

Version Information

Keyboard Shortcuts

Shortcuts

Shortcut	Action
Ctrl+N	New Race Log
Ctrl+O	Open Race Log
Ctrl+F4	Close Active Window
Ctrl+S	Save Active Race Log
Ctrl+A	Save All Race Logs
Ctrl+E	Export the Active Race Log to Microsoft's Excel
Alt+Q	Exit the Application
Ctrl+W	Open Weather View
Ctrl+R	Open Wind Plot View

Ctrl+K	Open Configuration Window
Ctrl+H	Tile Horizontally
Ctrl+F12	Close All Open Windows
Ctrl+F1	About AltaWeather Software (Version Information)

Glossary of Terms

Weather

Absolute Barometric Pressure (ABP)

Absolute Barometric Pressure (ABP), expressed in inches of Mercury ("Hg), is not the same as what is reported on weather forecasts, which is Sea Level Corrected pressure. Absolute is the actual air pressure at elevation. Roughly every thousand feet of elevation reduces barometric pressure by one inch of mercury. For instance, if you were in Colorado at 6000', the absolute pressure would be around 24 "Hg, while the Sea Level Corrected reading would be around 30 inches. By using absolute, you need not recalibrate for every new location, and you need not know the elevation of the track.

When the barometric pressure is higher there is more oxygen available for combustion in a given volume. During a typical 12 hour period the barometric pressure will change only 1 to 2 tenths of an inch of Mercury (for example from 27.24 to 27.40). An approaching front may bring in air that is higher or lower by 1"Hg (28.95" to 27.95").

Barometric pressure is caused by the gravitational pull on the 'column of air' lying directly above the place you are measuring. It is usually measured with an altimeter or barometer. Creative racers (with way too much time on their hands) may wish to experiment with a hypsometer, which indicates pressure by monitoring the boiling point of water.

Temperature (Temp) in Degrees Fahrenheit

This is the air temperature in degrees Fahrenheit, measured with a thermometer or temperature sensor.

There are several common types of digital temperature sensors. The RTD, or Resistance Temperature Detector; the Semiconductor; and the Thermistor, which boasts of great accuracy in the lab, but is non-linear, and not often properly temperature compensated. Altalab uses solid state semiconductors which are highly linear and fast responding.

Track Temp (TT)

Track Temperature

Relative Humidity (RH)

Expressed as a percent, this figure is the ratio of the amount of water vapor in a particular temperature air to the maximum amount of water vapor that temperature air could hold.

100% RH means saturation, or dew point at that temperature. Do not get confused with relative humidity readings at different temperatures. For instance, air at 90 degrees at 50% RH has the same amount of moisture as does air at 70 degrees and 100% RH.

One reason Altalab offers racers several different calculated values that describe moisture in the air, is because RH *is relative*, it is relative to temperature. For example, early in the morning it is cool and the RH is high. Later in the day it warms up and the RH drops. Then, after dark the temperature cools and the RH goes up again, *but the actual amount of moisture in the air has not changed!* (Unless a different air mass has moved in.) Some of the other calculated values, like Absolute Humidity, Grains per Pound, Vapor Pressure, and Dew Point indicate the quantity of moisture in the air in such a way that can be more useful to the racer trying to tune or predict.

Adjusted Altitude (AA)

Adjusted Altitude, This one number, expressed as a footage, is a relative performance altitude compared to STP (Standard Temperature and Pressure which is 60 ^{o}F, 0% RH, and 29.924 "Hg). We have found this one number, which relates directly to observed engine performance, to be the most accurate value for horsepower correction and predicting vehicle performance, and our software for ET and TS prediction uses AA. All Altalab weatherstations calculate AA. (The Alta Series also provides . Density Altitude.)

Absolute Humidity (AH)

This calculated value expresses the actual amount of moisture present in the air as a percentage of volume. This reveals the displacement of O2 molecules by water molecules, and has a direct relationship with the power making capabilities of your motor.

Grains per lb (GR)

This value of this interesting yet archaic number was discovered early on in drag racing by Austin Coil and Ronnie Swearingen, both sucessful crewchiefs for sucessful drivers. In their search for a more meaningful number for humidity than RH, they refered to a Carrier air conditioning and heating psychrometric chart that was made available to the trade and public in huge quantities. Both realized that if you line up the coordinates of temperature and RH, you could shoot off to the right side of the chart and find this little curious number. It seemed to relate well to various performance changes regardless of the RH alone.

In this day of scientific and metric values, grains per pound seems quaint at best, but it does hit the desired effect on the head. A grain is an ancient measurement which is equal to one seven thousandths of a pound. Sort of arbitrary, don't you think? Soon, many fuel and alky racers were using this secret weapon. In reality, if you were to plot Absolute Humidity, Dew Point, and Grains per Pound on a graph, they would follow each other in lock-step although the actual values are different. Grains is a

mass of water (grains) to a mass of dry air (pound), whereas, the other two are volume to volume numbers.

Altalab Instrument weatherstations provide gr/lb automatically. In the past, one had to line up values on what is essentially a three axis chart . Using a chart is tedious and there is room for error. Not only that, but the charts are made for sealevel standard pressure. There is no explaination on the chart of how to make a correction for actual pressure, and so no one until Altalab was doing it.

Vapor Pressure (VP)

This is the part of atmospheric pressure (absolute barometric pressure) due to water vapor, and is expressed as inches of mercury.
Abs - vp = dry pressure, or the partial pressure of dry air.

Vapor Pressure is often monitored by racers of alcohol fueled vehicles, who have noticed vehicle performance changes at some observed vapor pressure. For example, a sportsman drag racer might rely on the Adjusted Altitude for predictions unless the Vapor Pressure is over a certain point that the racer has observed decreases performance.

Dew Point (DP)

The Dew Point is the temperature at which the air you are measuring would be saturated (100% RH), and condensation (dew) would begin appearing on surfaces. As air cools it contracts, leaving less room for moisture. If the track cools to the Dew Point, condensation will occur on the racing surface. The air and other surfaces may reach DP before the track does, as the asphalt can hold heat.

Dew Point temperature is a good indicator of water vapor quantities and is used frequently by the meteorological folks on their weather maps. A typical summer day, with sub-tropical air flowing north from the Gulf of Mexico, may have dew points ranging well into the seventies. The mid-day air temps could easily be into the ninties producing extremely uncomfortable conditions for outdoor activities like racing. These conditions are also ripe for afternoon thunderstorms.

At the other extreme, a nice brisk, blue sky day in early spring can have dew points way down in the teens or twenties. In both cases, the dew point is indicating the total amount of water vapor present in a quantitive sense. When dew points are in the seventies, absolute humidity will be above 3%, when dew points are extremely low, AH will be less than one percent.

Air Density Ratio (ADR)

Air Density Ratio, Similar to the information from an air density gauge, ADR is calculated using the added effect of water vapor displacement of oxygen. ADR is expressed as a percentage, or ratio and is usually used when tuning maintain an ideal air/fuel ratio in changing conditions.

Density Altitude (DA)

Density Altitude Originally developed from formulas used by aircraft pilots to calculate lift, this relative performance altitude when calculated for racing includes additional compensation for the effects of humidity on engine performance.

Altalab prefers Adjusted Altitude as an indicator of the oxygen available for combustion, but our Alta Series weatherstation also include DA. Our version of this

number matches the most commonly calculated versions used for ET and TS prediction. See STP.

PA

Pressure Altitude

WD

Wind Direction

WS

Wind Speed

WG

Wind Gust

AL

Ambient Light

Software

Accuracy

What a wonderful word, and as with statistics, the numbers used can be made to say almost anything. When you say an instrument has 1% accuracy do you mean it is 99% inaccurate? No, accuracy is usually measured *in terms of inaccuracy* but expressed as accuracy, and as a percentage of the full-scale range. Two things to keep in mind when evaluating claims of accuracy are:
1) The plus/minus statement which can make a gauge look twice as good as it tests out to be. For example, a thermometer that claims + or - 1% accuracy full scale is really 2% accurate, not 1%.

2) On the lighter side, remember that you will seldom use a gauge to both ends of its scale. So a 2% full scale temperature sensor (measuring from 0 to 125 degrees) that you only use from 45 to 100 degrees is for all practical purposes better than 1%, (or + or - 4/10 of a degree).

ACE Factor (ACE)

The Air-Cooled-Engine Factor describes the cooling ability of the air. Moist air cools more efficiently than dry air. Developed by Altalab to help Junior Dragsters predict ET in situations where using the AA alone is not sufficient, the ACE Factor can also help Kart racers avoid costly engine destruction.

Air

Atmospheric air is Moist Air, which is a mixture of Dry Air,Water Vapor, and contaminants like smoke or pollen.

Dry Air exists when all contaminants and water vapor are removed from Atmospheric Air. The composition of Dry Air by volume is nitrogen, 78.084; oxygen, 20.9476; argon, 0.934; carbon dioxide, 0.314;neon, 0.001818; helium, 0.000524; methane, 0.00015; sulphur dioxide, 0 to 0.0001; hydrogen, 0.00005; with krypton, xenon and ozone at 0.0002.

The amount of Water Vapor in Moist Air (humidity) varies from none (Dry Air) to Saturation (100% Relative Humidity). The most common ways of describing the amount of moisture in the air are by Relative Humidity, Absolute Humidity, Grains per Lb., and Dew Point.

Altimeter

An instrument which determines altitude, or physical elevation. Usually pressure altitude can also be shown. A good reconditioned aircraft quality altimeter can be very accurate, but more expensive than a comparable quality barometer.

Analog

Characterizes instruments whose output varies continuously and smoothly, as opposed to digital instruments whose output switches immediately from one level to another. (You know, the difference between a dial type and digital watch.)

Anemometer

An instrument that measures the velocity of the wind. Wind *velocity* is a vector term, and describes both speed and direction. Common types include the low tech handheld ball and vane type, the contact, and the cup anemometer.

Barometer

An instrument that measures the pressure of the atmosphere. The two most common analog barometers are the aneroid (or dial type); and mercurial.

Poor quality aneroid barometers are subject to *creeping*, or sluggish response to a large, sudden change in air pressure; and also to hysteresis, the tendency of the gauge not to return completely to a previous value.

Barometric Pressure

See Absolute Barometric Pressure

Blackbody

A theoretical body which absorbs all incident radiation (direct solar and IR), independent of wavelength and direction.See IR Heat.

Calculated Values

Altalab's calculated values have been extensively tested. They are ideal for predicting performance changes, and for evaluating engine performance on the track or with a dyno. These are calculated from the measured readings of the sensors, and can provide a more definitive analysis of air quality and moisture content than the measured readings alone.

Which of these additional calculated values proves most helpful to you is a combination of observation, previous experience, fuel type and other vehicle characteristics. We place special emphasis on evaluating the amount of moisture in the air, and provide several different calculated values to help monitor this important component.

In addition to the measured values of Temperature, Relative Humidity, and Absolute Barometric Pressure, the standard weatherstations include Adjusted Altitude, Vapor Pressure, Dew Point, Grains per Pound, and Absolute Humidity. Density Altitude and ADR are also included with AltaCom II and AltaCom TDS. The Delta ACE replaces vapor pressure and grains/lb with Air Density Ratio and the ACE Factor.

Cold Front

When a mass of colder air arrives, it sinks below and displaces the warmer air. When a mass of colder air arrives, it sinks below and displaces the warmer air.

Dew

Dew is water that has condensed on objects near the ground, as a result of those objects, like car windshields, getting cooler than the Dew Point temperature.

Dry Bulb Temperature

The temperature of the air, especially for comparison to Wet Bulb temperature.

Fan Aspiration

Altalab pioneered fan-aspiration for motorsports weatherstations. The fan pulls air across the sensors so they can measure the ambient air, and the fan also prevents the case and sensors from overheating in direct sunlight. All our weatherstations have the fan as standard or optional equipment. See IR Heat for more information.

Fog

A form of precipitation made up of water droplets so small they can remain suspended in the atmosphere indefinitely.

Front

The boundary, or transition zone between 2 air masses.

Humidity

Water Vapor content of the air. This is a big deal in racing because not only is moist air lighter (less dense) than dry air, moisture additionally displaces oxygen needed for combustion. Humidity can be expressed as relative humidity, absolute humidity, grains/lb, and also Dew Point.

Hygrometer

An instrument that measures relative humidity. Analog hygrometers (dial type gauge) use a hair or synthetic filament which shrinks and expands in length with

changes in RH. A synthetic filament is more accurate full scale. Digital rh sensors may be thin film silicon.

Hygroscopic

Attracting or absorbing moisture. Salt and alcohol fuel are examples.

IR Radiation (Heat)

One of the biggest problems getting accurate and reliable information at the track is IR Heat. Objects in the sun can absorb heat and re-radiate it to your weatherstation. What you're trying to measure is *air temperature*, and that extra heat has NOTHING to do with actual air temperature. Even if you shade your weatherstation from direct sunlight, it can gain heat radiating from the asphalt, black trailer walls, hot cars, etc. If your weatherstation registers extra heat in this way, the Temperature will read higher and the Relative Humidity will be artificially lower than actual air conditions. Radiation effects can be minimized by shielding and by fan aspiration.

First, you should select a weatherstation that offers some immunity from IR Heat through its design. For example, in our weatherstations we put our temperature and humidity sensors inside the case, not sticking out. This shields them from direct sunlight. We chose a light colored case, which is slower to gain solar radiation than a dark case. (See blackbody.) Both our portable DeltaLite and Delta ACE have screened air vents to encourage maximum air flow and minimum radiation gain. If you have fan-aspiration, the movement of air will both prevent the sensors and case from heating up, and promote best response to ambient air changes.

Second, stay aware of the location of your weatherstation and provide additional shielding if necessary. For example, if your weatherstation is not fan-aspirated it must stay in the shade. You can also place corrugated cardboard between your gauges and objects that may be radiating IR Heat. Stand where your weatherstation is and look around to find any sources of IR Heat. If you can see it, so can your gauges. For example, gauges under an awning will usually benefit from cardboard placed across their face. Placing a weatherstation under the gooseneck of a trailer is usually a good place, as is the wheel well. (You might want to hang a *"remove before flight"* tag on it to prevent the obvious.)

If you are a drag racer who wants to take the weatherstation to the lanes you should read about microclimates.

Third, provide air flow. Place your weatherstation in a lawn chair. If you use a pit fan place the weatherstation where it will get the benefits of air movement. Don't hang the weatherstation too close to the awning. Even a light colored awning will heat up in the sun. In addition, since hot air rises there is likely to be a pool of warmer air just under the roof, particularly if the awning has side walls that trap air by preventing air flow.

If your weatherstation is fan-aspirated so much the better. Our DeltaLite/f and Delta ACE/f can be operated in direct sunlight without picking up extra heat, and obviously the fan-aspirated remote sensor housing on the Alta and AltaCom weatherstations is designed to withstand direct solar radiation. But keep in mind that even a fan-aspirated weatherstation must be protected from IR Heat. A classic mistake would be to have the fan running full tilt with the weatherstation sitting on a 120 degree car hood. The fan will pull that hot air right across the sensors. That's why our Alta remote sensor housing is supposed to be mounted at least 4 feet away from the trailer roof or walls.

Linear

The output of a linear instrument in response to change of a certain amount is the same at all ends of its range. In contrast, a non linear instrument might show smaller changes in output at one end of its range than the other. A non linear dial type gauge would have a graduated scale to compensate, with smaller steps between values at one end. A non linear digital sensor would need software or circuit compensation.

Microclimate

In racing, microclimates refer to the difference in the air between two nearby locations. A macro example is how air temperature in a city is usually several degrees warmer than a few miles outside town. This is because city buildings and asphalt gain ir heat. In the racing environment, drag racers should realize that the air near the head of staging may not be the same as the air downtrack. In staging you have asphalt and cars which absorb ir heat and block airflow. In other forms of racing the difference between the track and the sidelines may be less severe.

If you take measurements at the track sometimes, and at the trailer other times, you may be observing and recording the difference between microclimates instead of the difference in ambient air between one time and another. Altalab has solved this problem with AltaCom wireless weatherstations, which provide the ease of portable information from sensors located in the same place all the time.

Millibar

A unit of measuring pressure. In the United States pressure is usually expressed as inches of Hg (mercury). Our weatherstations use inches Hg, and we have a conversion chart available for racers in other countries which has millibars, inches Hg and mm Hg. Call 304 497 2756 or email us for this free chart.

Nitrogen

About three-quarters of the Earth's atmosphere is nitrogen. For our purposes, it does not readily combine with other substances. Therefore, it has negligible effect on the internal combustion process. It is interesting to note that compounds of nitrogen make up most manufactured explosives.

One compound of racing interest is nitromethane, the fueler's go juice. Nitro is very stable under normal pressures and temperatures, however, if it exceeds ~600 degrees and ~900 psi it will self-detonate with awesome results. When this explosion is controlled and harnessed, it can produce the 800 horsepower per 62 cubic inch cylinder in a Top Fuel motor, or around 13 horsepower per cubic inch. The average HP per cubic inch for your average race car is only one or two. Hopefully, this perspective should indicate a more manageable task in producing and predicting performance in the relatively sedate race motor.

Noise

Noise in a digital instrument is any signal that isn't supposed to be there. It can be caused by tiny electrical sparks when a switch is activated, or from electrical, magnetic or radio signals leaking from one circuit to another, or by poor quality components. In a well designed instrument, noise can be minimized or eliminated.

Oxygen

This is the gas we want to know about. It takes up more percentage by weight than volume because oxygen is a relatively heavy molecule for a gas. It s molecular mass is 32.00 compared to 28.01 for nitrogen, 18.02 for water vapor, and only 2.01 for hydrogen. You'd think that this heavy molecule could settle down in calm valleys as to enrich the oxygen content, but atmospheric mixing forces prevents this from occurring.

Oxygen readily combines with many substances. When fuels such as oil, wood, or racing gas are burned (oxidized), the oxygen combines with the hydrogen and carbon in the fuel to form carbon dioxide, water, and, of course, the desired release of energy. The earth's vegetation keeps our oxygen at a stable percentage.

Since the whole point of a motorsports weatherstation is to measure oxygen why doesn't AltaLab use an O2 sensor?

Answer: Altalab pioneered the use of the O2 sensor when we released the 02 ALTA in the Fall of 1994, but gave it up after 1 year because it had more problems than could be justified by the value of information gained. The four main reasons for our decision are listed here.

3. Current technology 02 sensors function like a battery, and slowly drain down over their lifespan. They need annual calibration in order to remain accurate, particularly if the racer wants to build upon previous performance. Also, they have non-linear output, so to compensate we calibrated each sensor individually and generated from 6 to 10 calibration points per sensor. Most racers do not want to be bothered with an annual calibration, and their ability to relate current information to past references thus degrades over time.
4. The current technology O2 sensor contains an electrolye, and poor temperature compensation. When overheated heated, such as would happen on the dashboard of a car, the readings could go haywire and could take HOURS to settle. Altalab does not consider this acceptable in a portable instrument designed for motorsports. Our 02 Alta (like our current Altas), was trailer-based with fan aspirated sensors.
5. The O2 sensor currently available has a 1% accuracy rating which sounds pretty good until you realize that this means 1% from 0-100%, not 1% of 20.94 (standard O2 %). You could have an arbitrary fluctuation from 20.54% to 21.54% and still be within spec. This is NOT useful or reliable information.
6. Perhaps the most important reason - In all the testing and weatherlogging with the 02 sensor over a 2 yr. period, and after studying data from more than 20 different weatherstations we did not find significant correlation between 02 measurement changes and performance changes. The biggest changes in 02 measurement were caused by temperature fluctuations.

Psychrometer

An instrument used to calculate relative humidity. The temperature indicated by a wet bulb thermometer is compared to a dry bulb thermometer. The difference indicates the amount of moisture in the air.

A sling psychrometer can be very accurate, but in the field care must be taken to use distilled water, and to carefully repeat the length of time spent swinging. We have

seen racers wet the wick with spit or pepsi! This leaves residue in the wick which leads to inaccuracy.

Remote Sensing

Altalab pioneered remote sensing in motorsports. In our ALTA Series weatherstations the temperature and RH sensors are located inside an aluminum, fan-aspirated housing that is connected to the console by a cable. This provides the important benefit of elevating the sensors away from generator exhaust or warm air trapped under an awning. It also means that readings are coming from the same location all the time. AltaCom further add wireless transmission from the weatherstation to a pager. Readings on the pager are unaffected by its location.

Repeatability

Usually measured as non-repeatability, but expressed as repeatability, as a percentage of full scale range. This measure of sensor quality describes the degree to which an instrument gives the same measurement when placed in the same conditions at different times.

Resolution

The smallest change in the environment that will cause a response in the instrument.

Response Time

The length of time it takes an instrument to register changes in what is being measured. Sometimes called "settling time". If you bring a weatherstation from one environment to another, (such as from the air-conditioned motor home to the track) it will take some time for the instrument to correctly read new conditions.

The larger and heavier the instrument, the longer it will take. Typically a small digital instrument will settle faster than a bulky analog weatherstation. A fan-aspirated weatherstation will respond quickest, as the fan will both provide a sample of new air to the sensors and help the components of the weatherstation to come to the new temperature.

Saturation

When the air is at 100% RH. Dew Point is the saturation temperature of a particular air sample.

Settling Time

The length of time it takes an instrument to register changes in what is being measured. See Response Time.

Station Pressure

The same as Absolute Barometric Pressure. This term is used at airports.

STP

Standard Temperature and Pressure, accepted by international agreement to be:
29.9231 "Hg (or 760mm or 1013.25 mb)
60 degrees F (some scales use 59 degrees)
0% RH (or dry air)
Some values of a weatherstation which are calculated from all three of these measurements directly relate to STP. At STP the Adjusted Altitude and Density Altitude are equal to 0 feet, and Air Density Ratio is equal to 1.

Thermometer

A typical analog thermometer is a bimetallic coil, two thin metal strips that expand and contract differently brazed together into a coil that swings an indicator in response to temperature changes.

TS

Throttle Stop

ET

Elapsed Time

Lane

Left or Right lane of the race track

RT

Reaction Time

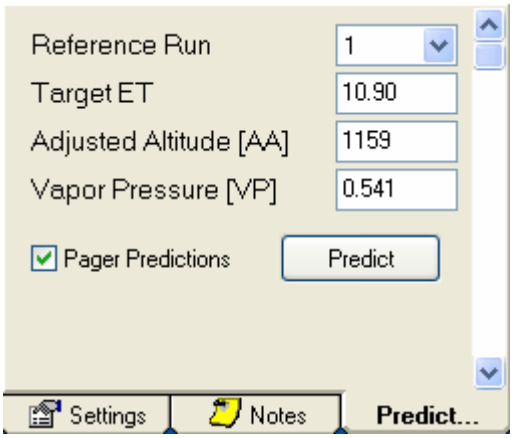
Timer 1

Timer 2

Delay Box

Shift Time

Settings Pane



The Settings pane is used to set all necessary parameters for a race log view.

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