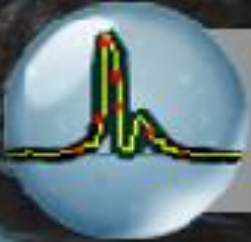**FTS**

EXTREME ENVIRONMENTS. EXTREMELY SIMPLE.

StreamTrac

StreamTrac

Hydrology Data Management and Analysis Software

User Manual

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CHAPTER 1   INTRODUCTION

1.1 GENERAL

FTS Forest Technology Systems Ltd StreamTrac is a data collection software package that automatically or manually retrieves data from a network of FTS remote monitoring stations and then stores the collected data in a central database for analysis and modification. StreamTrac software displays turbidity, stage, sediment, and discharge data in both a tabular and graphical format. It also allows users to modify the data by adjusting the lines and points on a graph while maintaining the original data points, or simply editing the fields of a table. StreamTrac software brings together a wide array of functions and tools for an unprecedented level of flexibility and power in weather data processing.

StreamTrac uses the FTS AutoCaller calling service to ensure timely data retrieval. AutoCaller dynamically handles simultaneous station calls and is capable of collecting data via multiple modem, Internet, and direct data logger connections. A centralized Open Database Connectivity (ODBC) compliant database eliminates the need for users to individually collect data, thus minimizing station calling charges. Once the calling schedule for a remote monitoring station or group of stations is defined, AutoCaller will autonomously (no login required) poll the stations at the predetermined time to retrieve the latest data available and then save this data into the central database.
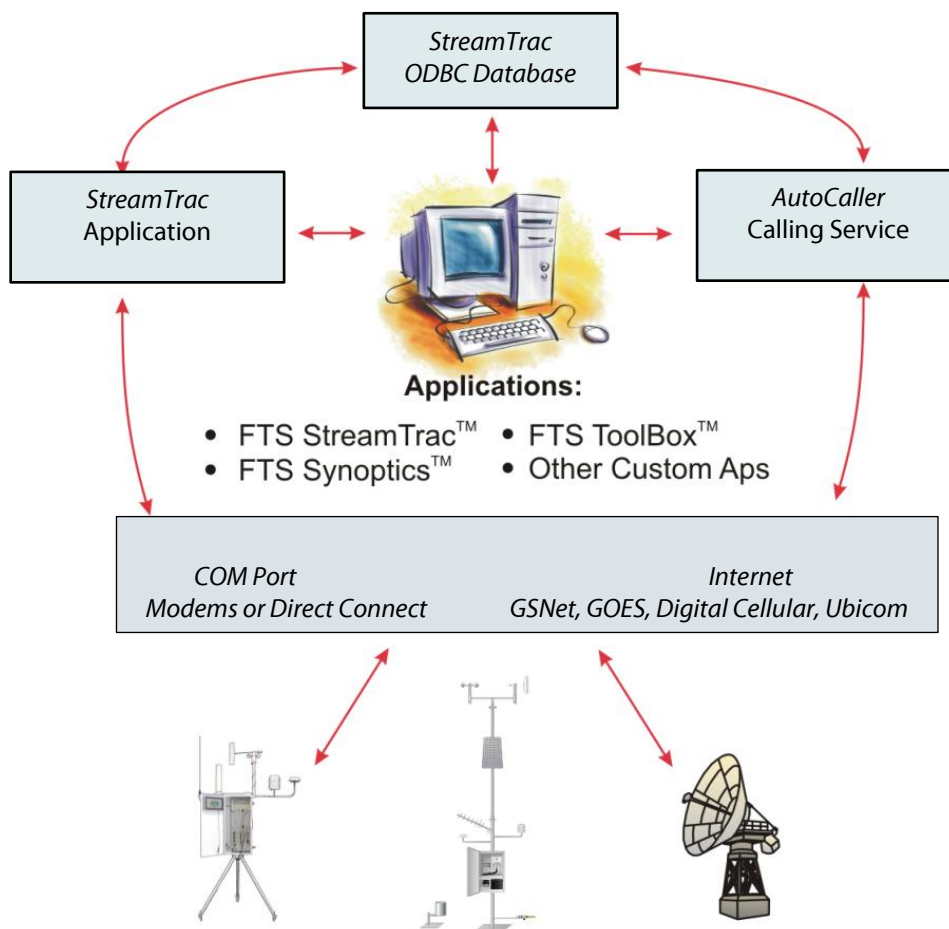
Figure 1-1: StreamTrac System Components

Further details of the StreamTrac system components and its applications can be found in the StreamTrac Overview and Quick Start Guide.

The StreamTrac system user interface, known as the **StreamTrac** application, is a Windows application. It does not require a Station License and may be installed on multiple computers. StreamTrac will allow the creation of any number of stations; however; automatic station data collection by the **AutoCaller** Calling Service will be limited to the number of licensed stations.

The main menus of StreamTrac are outlined after the installation instructions with the relevant details for each menu provided in subsequent chapters.

1.2 INSTALLATION INSTRUCTIONS

System Requirements

- •   Computer running Windows 2000, XP, Vista, or Windows 7.
- •   Microsoft .NET 2.0 or higher.
- •   4 gigabyte (GB) of RAM minimum.
- •   A 1024 x 768 or greater resolution display.
- •   60 gigabytes (GB) of hard disk space.
- •   SQL Server 2000 / 2005 / 2008, or Server 2012 if SQL option is used.
- •   High-speed Internet connection if IP modems are used.

NOTE: You must have administrative rights on the PC to install the software

1)   Double click the file
StreamTrac_XX.XX*.msi
to run it and follow the steps on-screen. All of your data and settings will be preserved from your previous StreamTrac version.

*XX.XX will be replaced with the version number currently being installed
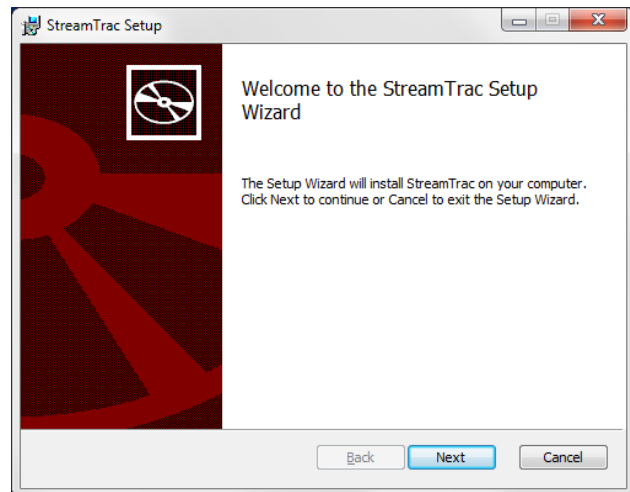
NOTE: If you have installed a previous version of StreamTrac that used the MSI installer, you will be prompted to remove the previous version first. **Removing the application will not remove your MDB files, or your INI files**. Also, if you have version 2.5.2.1 or a version prior to that, your MDB files and INI files will not be overwritten by the new MSI installer.

If you do not MS .NET 2.0 or higher installed, you will not see the Welcome screen.

2) You must accept the License Agreement to proceed with the installation
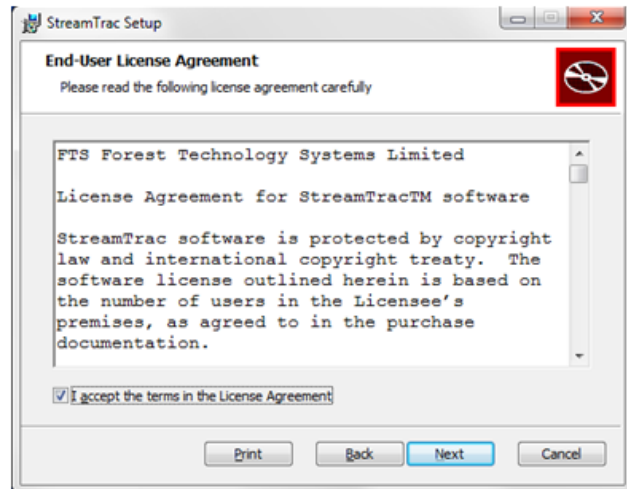
3) Choose the directory in which you want to install the application. Do not change the name of the FTS folder.
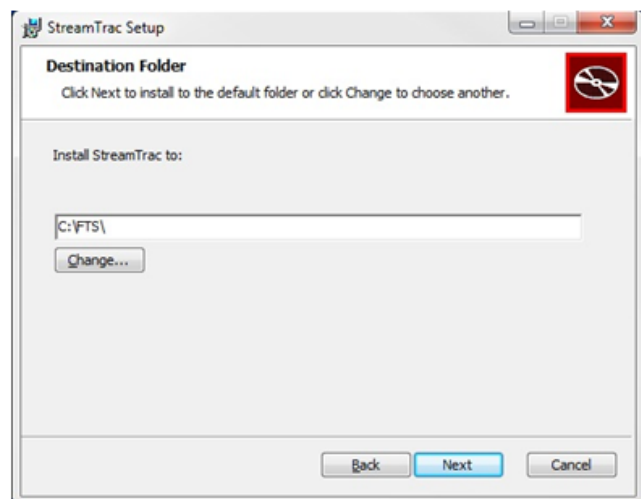
4) The Typical installation will install only the StreamTrac application. To select specific services to install, along with the StreamTrac application, click the Custom button.
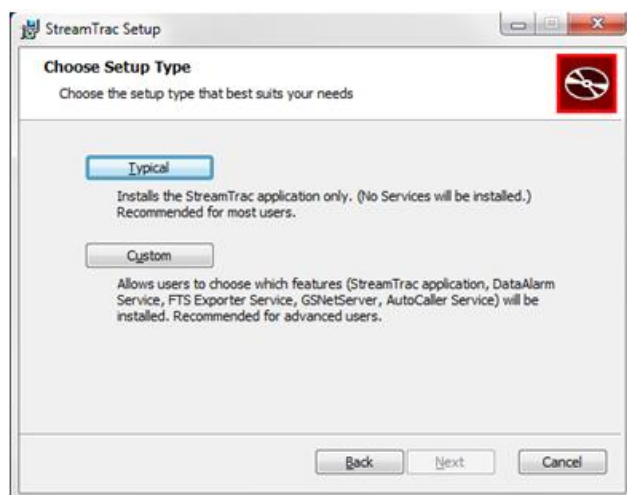
5) If doing a Custom installation, choose the items you wish to install.
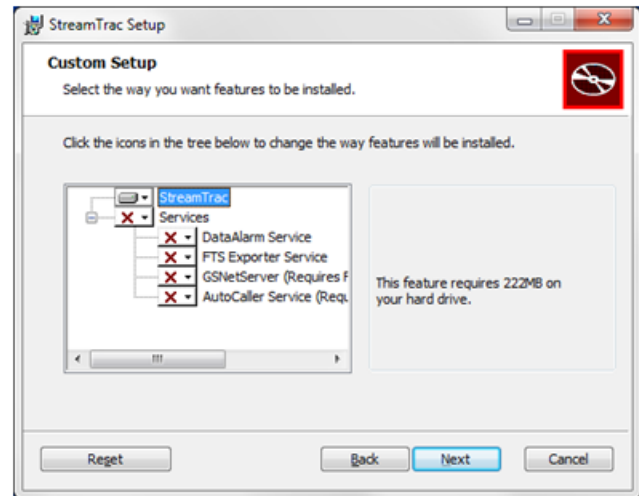
NOTE: In a multi-user environment, where multiple users will be connecting to a common database, the AutoCaller service should be installed on only one of the computers that connects to that database.

6) After Step 5, you have the option to specify the 'Log On As' credentials that any Services to be installed will use when the computer starts up (the default is 'Local System'.) (Optionally, you can run 'services.msc' from the Start Menu after the installation and change the 'Log On As' credentials then.)
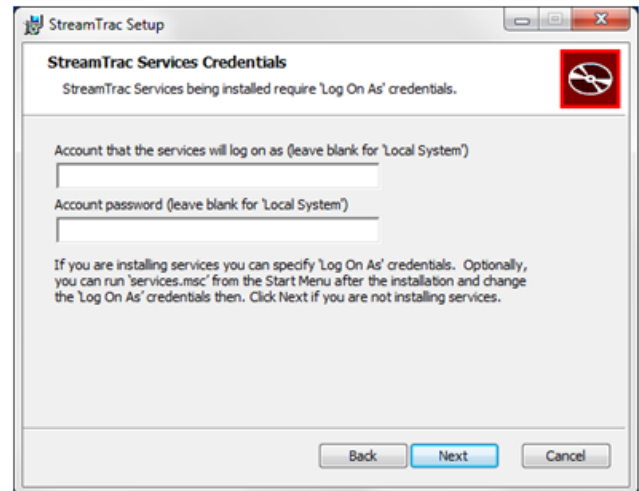
7) After you have chosen the type of installation click Install to proceed with the installation.
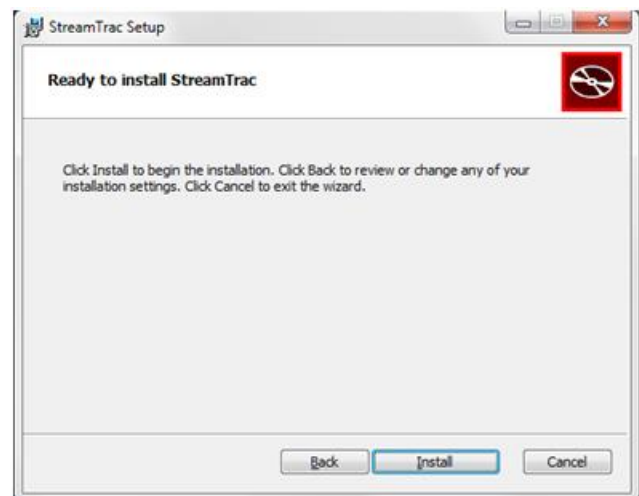
8) Click Finish to complete the installation.
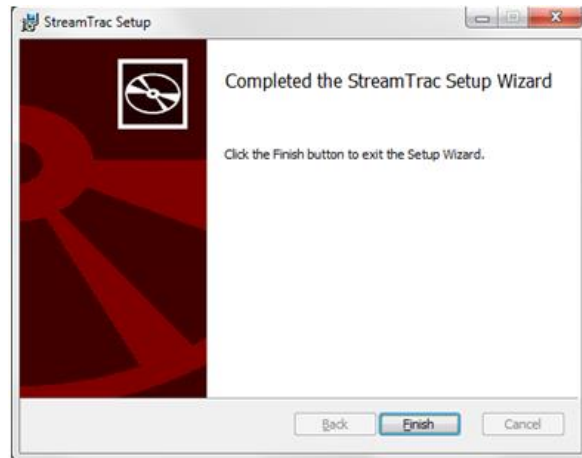
1.2.1 Modifying the Installation or Removing the Application

At any time you can run the installer again to modify your installation.

> NOTE: "Remove" will remove all of the installation files; however, database files (.mdb files) and settings files (.ini) will not be removed. If StreamTrac is later installed on the same PC, all data and settings will still be available.
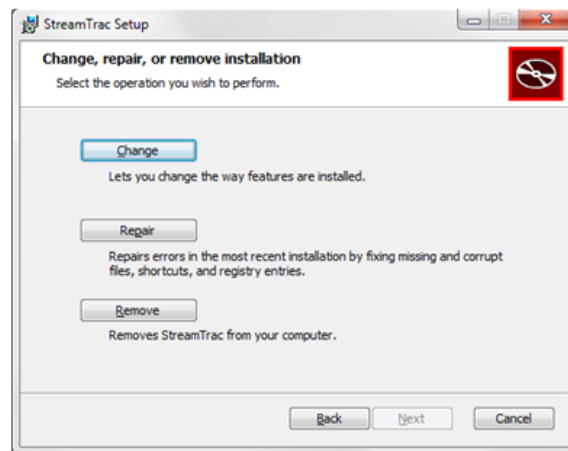
1.3 HOME PAGE

The home page displays a map view which is a geographical representation of the location of defined stations. Use the drop down menu to select which map program to be used. Use scale slider bar to manipulate map scale or use the mouse's scroll button. Use the mouse to left click, hold and drag to pan the map. The database which StreamTrac is interacting with is displayed in the bottom left-hand corner of the screen

Defined stations will appear as location pins and station information will be displayed by hovering the mouse over the pin. A red location pin indicates a station whose data is stale (failed to have been collected within the assigned Failure Hours), whereas a green location pin indicates a station whose data is current. Stations can be selected by clicking on the marker or using the drop down menu at the bottom left corner of the page. The map will automatically pan to the defined station selected from the drop down menu when the **Go To Station** button is pressed. Defined Groups can be located and viewed by selecting the desired groups using the Group Filters button.
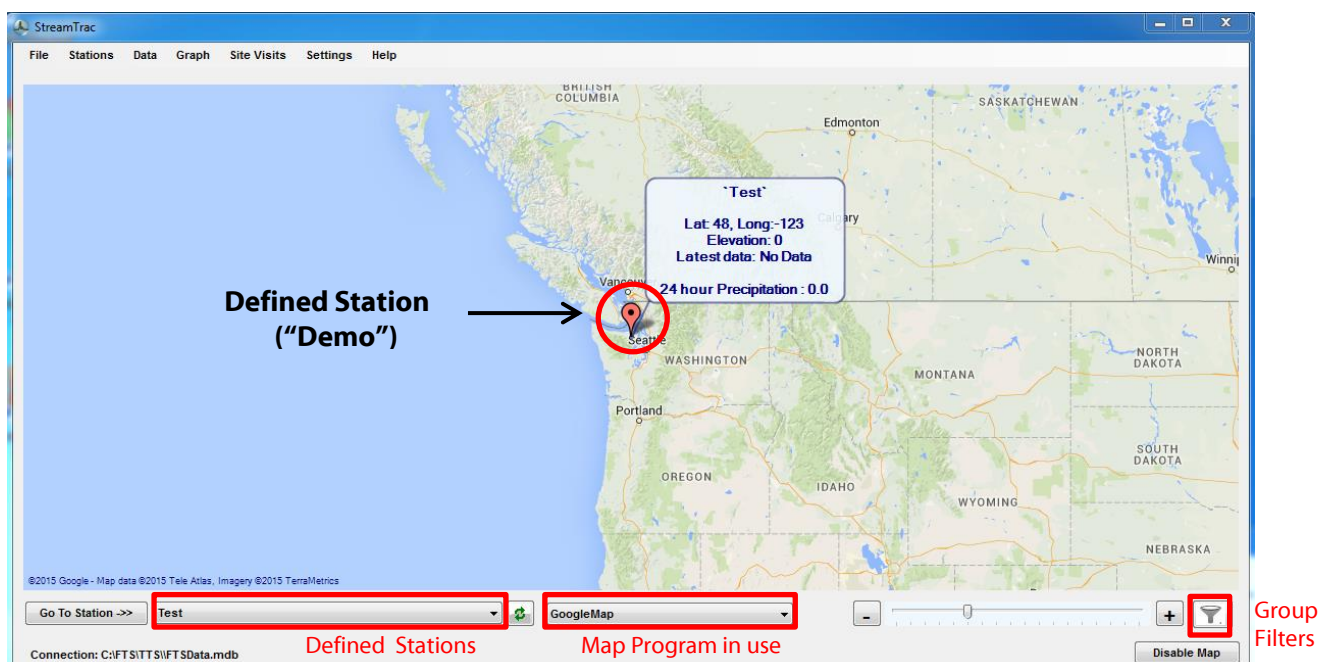
Figure 1-2: Home Page

1.4 MAIN MENUS

The StreamTrac home page consists of 7 main menu headings: File, Stations, Data, Graph, Site Visits, Settings, and Help. Chapter Two will briefly describe the main tabs. Each tab will be described in detail in their individual chapters.

<div style="border:2px solid black; text-align:center;">

CHAPTER 2   MAIN MENUS

</div>

2.1 FILE

The File menu is a basic drop down menu which permits the user to close StreamTrac by selecting Exit. StreamTrac can also be closed by selecting the X in the upper right hand corner of the screen.
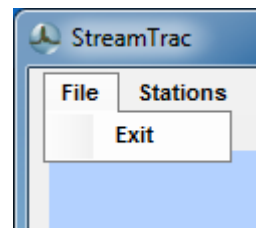
Figure 2-1: File Menu

2.2 STATIONS

The submenus under the Stations menu are used to configure the StreamTrac system for proper station calling (see Figure 2-2). Users can define the remote monitoring stations or modify existing stations. Options include: *Station Setup* for defining individual stations, *Group Setup* for defining the station groups, and *Utilities* to upload UbiCom software.
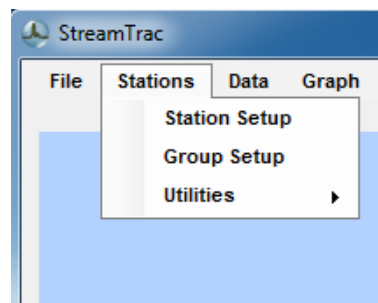
Figure 2-2: Admin Application Stations Menu

2.2.1   *Station Setup*

The **Station Setup** option is used to define a station in the **StreamTrac** system. Through this menu, stations can be added to or deleted from the database, have their telemetry details defined (how to call), have calculations formulated, have the Datalogger program viewed or edited, have their automated calling schedule defined (when to call), and have station details and notes recorded.

Refer to Chapter 3 *STATIONS> Station Setup Menu* for more details on station configuration.

2.2.2   *Group Setup*

The **Group Setup** option is used to define a Station Group in the **StreamTrac** system. Through this menu, Station Groups can be created or deleted from the database. Stations can then be added into one or several groups and each group can have its automated calling schedule defined.

Refer to Chapter 3 *STATIONS> Group Setup Menu* for more details on station group configuration.

2.2.3   *Utilities*

The Utilities option is used to upload UbiCom software for those stations using UbiCom to communicate.

Refer to Chapter 3 *STATIONS> Utilities* for more details on uploading Ubicom software.

2.3 DATA

The **Data** menu allows the user to manually initiate station or group calls, monitor calls (both manual and scheduled), and view results from diagnostic calls. The user can also view the data from a selected station and import, export and transfer data.
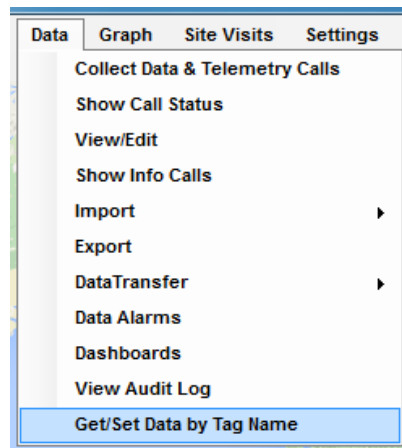
Figure 2-3: Data Menu

2.3.1   Collect Data and Telemetry Calls

The **Collect Data & Telemetry Calls** option is used to initiate manual calls. Through this option the user can choose what information to retrieve or send (data, diagnostic information, send/receive datalogger program, set time) and whether to call an individual station or a station group. Manual data collection can be used to get 'current conditions' at a station or to backfill missing data whereas diagnostic information can be used for network troubleshooting.

Refer to Chapter 4 *DATA> Collect Data & Telemetry Calls Menu* for more details on retrieving data.

2.3.2   Show Call Status

The **Show Call Status** option opens the Call Status window which is used to monitor all call activity to the stations in the database. Recent manual calls from the Admin Application and automatic scheduled calls from the Calling Service are displayed in the Current Status tab of the Call Status window while the History tab is used to filter and view the status of past calls.

Refer to Chapter 4 *DATA> Show Call Status Menu* section of the manual for more call status details.

2.3.3   View/Edit

The **DATA> VIEW/EDIT** menu option opens the currently-selected database and displays stored data for a particular station in a tabular format. The data screen allows the user to select a station and then customize the screen to display and print only specific data fields within a specific time range. Multiple customized data screens can be opened within the Admin Application.

Refer to Chapter 4 *DATA> View/Edit Data Menu* for more details on viewing data.

2.3.4   Show Info Calls

The **Show Info Calls** option opens the Information Call Results window which is used to display information returned by manual calls initiated within the Admin Application. The information shown on the Information Call Results window is generally diagnostic information and is not saved in the **StreamTrac Database**. With a manual data call, the Information Call Results window will indicate what data was written to the database (the retrieved station data will not be displayed in the Information Call Results window).

Refer to Chapter 4 *DATA> Show Info Call Menu* for more call status details.

2.3.5 Import

The **DATA > IMPORT** option allows the importation of data into StreamTrac's records from different source formats. StreamTrac supports both CSV (comma separated variable) and Campbell (Campbell Scientific).

To import data it is necessary to create a template which contains information on what fields are to be imported and how the import is to be done.

Refer to the *DATA> Import Menu* section of the manual for more details on importing data.

2.3.6 Export

The **DATA > EXPORT** option will allow you to export your station or group of stations to CSV or XML files. Furthermore, these exports can be performed on an un-attended scheduled basis using the FTS Exporter service

Refer to Chapter 4 *DATA> Export Menu* for more details on exporting data.

2.3.7 Data Transfer

The **DATA>DATA TRANSFER** option will allow you to create self-contained compacted files which contain one or more stations. These files can then be sent to other StreamTrac users and the data from these fields can then be integrated into the target user's database.

Refer to Chapter 4 *DATA> Data Transfer* for more details on creating and using data transfer files.

2.3.8 Data Alarms

The Data Alarms interface allows you to create and view trigger conditions and manage contacts for alarms generated by the trigger conditions. However, The Data Alarm service must be installed for alarms to be functional.

Refer to Chapter 4 *DATA> Data Alarms* for more details on creating and editing alarms.

2.3.9 Dashboards

The Dashboard screen feature will provide up to the minute weather information on the selected stations. As data is collected the dashboard will automatically update the selected data fields as well as update the chosen fields on the graph. The dashboard is designed to report on a single station, however, the line graph section will allow you to plot multiple stations on a single dashboard for comparison purposes.

Refer to Chapter 4 *DATA> Dashboards* for more details on developing dashboards.

2.3.10 View Audit Log

The **DATA > VIEW AUDIT LOG** option will allow you review events and changes to one or several stations. The date range, source, field and actions to be displayed can be customized.

Refer to Chapter 4 *DATA> View Audit Log* for more details on setting up and viewing an audit log.

2.3.11 Get/Set Data by Tag Name

The **DATA > GET/SET DATA BY TAG NAME** option will allow you to retrieve current variable values for selected data and set values (when permitted) for selected variables.

Refer to Chapter 4 *DATA> Get/Set Data by Tag Name* for more details

2.4 GRAPH

The **Graph** menu is used to produce graphs from the data. Two types of graphs can be produced: Time Series and Wind Roses.

Graphing data allows visual comparison of different data fields as well as comparing data from different stations. Additionally, graph data can be edited visual with the graphing interface while the original data is preserved. The graphing module contains many editing features. Some examples are gap filling, data shifting and point by point dragging/editing.
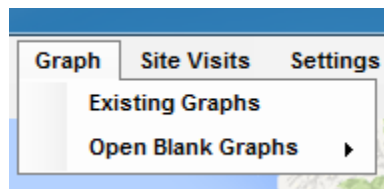
Figure 2-4: Graph Menu

2.4.1   Existing Graphs

The **GRAPH>EXISTING GRAPHS** menu displays a list of all existing graphs. From this menu, selected graphs can be viewed. Filters can be selected to view graphs be the creator, last saved user, last saved date, and graph type.

Selected graphs can also be edited and deleted from this menu.

Refer to Chapter 5 *GRAPH>Existing Graphs* for more details on how to create and manipulate graphs.

2.4.2   Open Blank Graphs

The **GRAPH>OPEN BLANK GRAPHS** menu is used to create a graph template for a Time Series Graph or a Wind Rose graph.

Refer to Chapter 5 *GRAPH>Open Blank Graphs* section for more details on how to create graph templates.

2.5 SITE VISITS

The **Site Visits** menu is used to issue and view Site Visit reports.
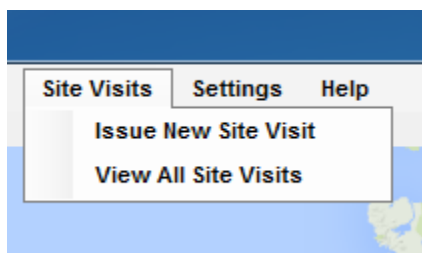
Figure 2-5: Site Visits

2.5.1   Issue New Site Visit

The SITE VISIT>ISSUE NEW SITE VISIT menu displays a page with a variety of tabs to record bottle mapping, site details, calibration samples and any notes or attachments relevant to the visit/station.

Refer to Chapter 6 SITE VISITS>*Issue New Site Visit* for more details on completing a site visit report.

2.5.2   View All New Site Visits

The SITE VISIT>VIEW ALL SITE VISITS menu opens a Site Visits page which allows you to select which visit reports to view by date, station(s) name or site visit number.

Refer to Chapter 6 SITE VISITS>*View All Site Visits* for more details on viewing site visit reports.

2.6 SETTINGS

The **SETTINGS** menu provides the user with the ability to connect to an alternate database and customize the account by adding/deleting accounts, selecting a language, and determining file storage and display formats.
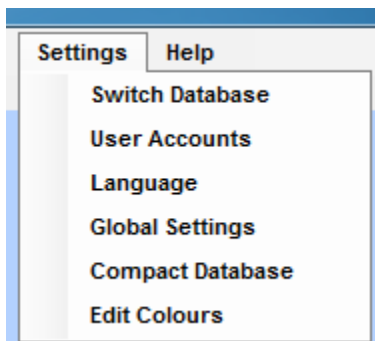
Figure 2-6: Settings

2.6.1   Switch Database

The SWITCH DATABASE menu is intended to be used to select between a local database and the main **StreamTrac Database** when running StreamTrac on a Remote User Computer.

The *Switch Database* option opens a Windows browsing dialog box to allow the user to connect the StreamTrac Application to an alternate database. This option enables a user on a Remote User Computer to switch between monitoring the main **StreamTrac Database** and a local database. The local database could be used for manual test calling of non-permanent stations (stations which you do not want to appear in main **StreamTrac Database**).

> **IMPORTANT!** If the user connects the StreamTrac Application to a different database and the StreamTrac Application is running on the same computer as the Calling Service, then the Calling Service will also use the newly selected database.

Refer to the *DATA> Switch Database Menu* section of the manual for more details on database selection.

2.6.2   User Accounts

The *User Accounts* option shows all the user accounts and can be used to add, delete, or edit the user accounts.

Refer to Chapter 7 *SETTINGS MENU> User Accounts* for more details on editing the user accounts.

2.6.3   Language

The *Language* option opens a drop down menu from which English, Spanish, or Chinese can be selected as the user interface language. Note that a language pack must be installed for language selection other than the language in use by the computer to be fully functional.

2.6.4   Global Settings

The *Global Settings* option shows Overall System Settings consisting of the File Storage Path with a Browse option. The user can also select the preferred Date and Time Display Formats. There is also an Outgoing Alarm Mail Settings section for the user to configure the data alarm service.

Refer to Chapter 7 *SETTINGS > Global Settings Menu* for more details on applying settings and file storage options.

2.6.5   Compact Database

If your StreamTrac is connected to a Microsoft Access database (.MDB) you may need to occasionally compact your database. Clicking this option presents you with a confirmation warning and then will begin this process

> **IMPORTANT!** Make sure that the AutoCaller service, data alarm service and the FTS Importer/exporter service is stopped and that no remote users are actively connected to your database prior to performing this operation.

2.6.6 Edit Colours

The Edit Colours option permits you to edit the colours which indicate the status of the data as it appears in the Data>Edit/View screen.   Clicking on a particular colour category will display a Color chart which can be used to customize the colour selections.

Refer to Chapter 4 *DATA>View/Edit* for more details

2.7 HELP

The Help menu allows the user access to an online user manual and access to version number, serial number, and license information about the StreamTrac system.
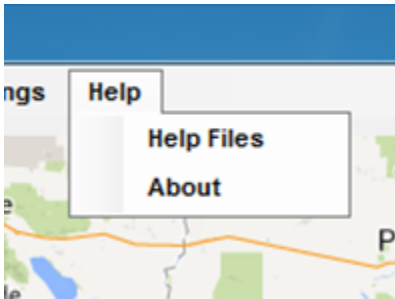
Figure 2-7: Help Menu

2.7.1 User Manual

The HELP> HELP FILES menu option opens a PDF copy of the StreamTrac User Manual and other reference documents.

2.7.2 About

The HELP> ABOUT menu option opens the About window which displays version number, serial number, and license information about the StreamTrac system.   Also, the Add StreamTrac Service Licenses button on the **About** window is used to activate or change the number of stations that the Calling Service is automatically able to call by entering an appropriate license key.

Refer to Chapter 8 *HELP> About Menu* for more details on the help menu and on station license modification.

CHAPTER 3   STATIONS MENU

3.1 MODIFY/ADD STATION

Users can define their remote monitoring stations or modify existing stations through the **STATIONS> STATION SETUP** menu. The name of the currently selected station is displayed in the **Station Name** drop-down menu selection box. All stations that have been configured in the **StreamTrac Database** will appear in this **Station Name** drop-down list.

The **Navigate Through Stations** buttons on the bottom of this window provide the ability to single-step forward and backward through the station list. Individual station details can be changed by using the seven configuration tabs located below the Station Name. These tabs are discussed in detail in the following section.

Figure 3-1: Stations> Station Setup Menu

3.1.1   New Station

To Add a New Station to the **StreamTrac Database**, click the **New Station** button then enter a name for the new station. If you require Turbidity Threshold Sampling (TTS) related fields for the station, check the checkbox and the corresponding fields will be automatically added.
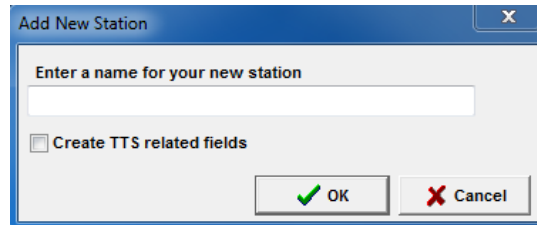
Figure 3-2: Adding a Station

The new Station Name will be displayed in the Description tab, and the blank field cans be filled in. After a station has been added, other station details can be input using the configuration tabs. Once named, a station cannot be renamed due to the internal configuration of the database. Be sure to check the **Show on Maps** checkbox if you want the station to appear on the Map View.

3.1.2   *Copy Station*

To copy a station from the StreamTrac Database, navigate to the station you wish to copy and then press the **Copy Station** button. You will then be presented with a dialog box from which you can enter the new station name as well as choose whether to copy Telemetry, Schedule and/or the station Data.
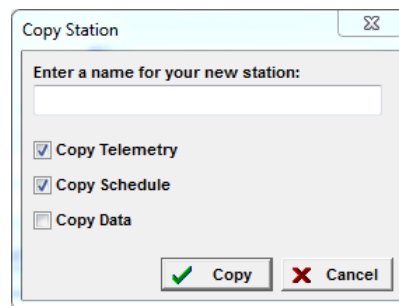
Figure 3-3: Copy Station

3.1.3   *Delete Station*

To delete a station from the StreamTrac Database, navigate to the station you wish to delete and then press the **Delete Station** button. As a precaution you will be prompted to confirm the deletion before the station is removed from the database as the **Delete Station** button removes all station information from the database. Historical station data is not available once the station has been deleted.

3.2 DESCRIPTION TAB

The **Description** configuration tab details the specifics of the remote station data logger. If desired, enter the serial number of the data logger to enable serial number checking of the data being retrieved. A time offset which is applied to the retrieved data before the data is saved in the database may also be entered. Once data has been collected from the station, the names of the data fields being collected in the data logger are displayed in the Field name box. The user can then add notes or comments to each of the various field names.

Figure 3-4: Station>Station Setup>Description Tab

3.2.1 Serial Number

The **Data Logger Serial #** box is a feature designed to ensure that data being saved to the database is being collected from the correct data logger (i.e., eliminate the possibility of having incorrect telemetry information like a wrong phone number). The functionality of this feature is as follows:

1) If the **Data Logger Serial #** box is left blank then the serial number checking is ignored and all data collected from the logger is saved into the database;

2) If a serial number has been entered, then all data collected from the logger is checked to ensure that the serial number of the collected data matches the reference serial number entered in the **Data Logger Serial #** box. If the serial numbers match then the data is saved. If there is a serial number mismatch then:

    - if the call was placed manually through the Admin Application, the user is prompted whether or not to save or discard the collected data; or

    - if the call was placed automatically by the Calling Service, then the data will be automatically discarded.

In both of the above scenarios, when data is saved, the serial number of the data logger will always be saved in the StnLoggerSN (Station Logger Serial Number) field in the database along with the data. This allows the user to track which data logger supplied the data.

> **IMPORTANT!** If serial number checking is enabled and the station datalogger is subsequently replaced, the serial number of the newly installed datalogger must be entered before station data from the new datalogger will be saved to the database.

3.2.2 Data Time Offset

The **Data Time Offset** box allows the user to enter a time offset that will be applied to the data collected from a remote station before the data is saved in the database. The feature is intended to allow the remote station to operate on a time reference different than that of the **StreamTrac Database**. For example, on a remote station equipped with GOES telemetry (an FTS G5/G6 Transmitter) the data logger is synchronized to UTC time via the transmitter's GPS reference while the data in the database can be referenced to the user's local time. Some typical Data Time Offset values are shown below.

Remote Data logger Time	StreamTrac Database Time	Data Time Offset Value
UTC	PST	-8:00 hours
UTC	MST	-7:00 hours
UTC	CST	-6:00 hours
UTC	EST	-5:00 hours

3.2.3 Coordinates

The Coordinates box provides fields to enter the station's latitude and longitude, and elevation and elevation units. South latitudes and West longitudes must be prefaced with a minus symbol. If the Station is connected to a GOES transmitter which is operating with GPS, these values will be entered automatically.

Show on Maps: For the station to appear on the Map View, ensure the checkbox is checked.

Failure Hours: Indicates the time beyond which, if no data is collected, the station's location marker will turn red, indicating a possible problem with the station. Hours can be input using decimals (ie: 1.25 hours for one hour and 15 minutes).

3.2.4 Field Names

The **Field Names** display box will contain the names of the data fields being used in the data logger.

3.2.5 Field Units

Selecting a data field in the Field Name box will display the units of measurement being used. Units for user-defined fields can be manually entered. Field units will be displayed on the **Data>View/Edit** screen in the column headings under the appropriate Field Name.

3.2.6   Field Hints

Notes or comments for each of the data fields displayed in the **Field Names** box can be entered here. The entered comments will appear on the **Data>View/Edit** screen when the cursor hovers over the Field Name heading.

To enter a hint for a particular field:

1) select the field name for which you wish to enter a hint (once selected the field name will be highlighted in blue); and

2) enter the desired information in the Field Hints box.

3.2.7   Add Field

The **Add Field** control allows a new field to be added to the station's database. Enter the desired name. Reserved names or those already in use will be rejected ensuring no corruption of data occurs. Select the **Numeric** or **Text** radio buttons as appropriate to reflect which form the data will be input into the new field. The added field can be used by another application which acts on the **StreamTrac Database**.

Field names, whether Numeric or Text, must start with a letter or underscore symbol (_).
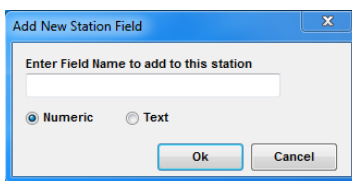
Figure 3-5: Add New Station Field

3.2.8   Delete Field

The **Delete Field** control is used to delete a field from the station's database. Note that deleting a field will also cause the data for that field to be deleted from the database. If the deleted field is a field used by the data logger, then the next time data is retrieved from the data logger, the field will reappear in the Field Names list; however, the data previously collected for that field will remain deleted and only newly collected data will appear in the database.

IMPORTANT! Deleting a field with data in it will erase all of that data permanently!

3.3 COMMUNICATION TAB

The **Communication** configuration tab is used to enter the specifics of each telemetry device connected to the remote station data logger. Through this configuration tab, communication methods can be added, modified, or deleted. A communication method is a defined way of contacting a remote station using a specific computer and its attached devices (i.e. COM ports, modems etc.) and a specific remote telemetry device (i.e. direct connection or telephone modem, radio modem, satellite modem, etc.). Multiple communication methods may be defined for a remote station.
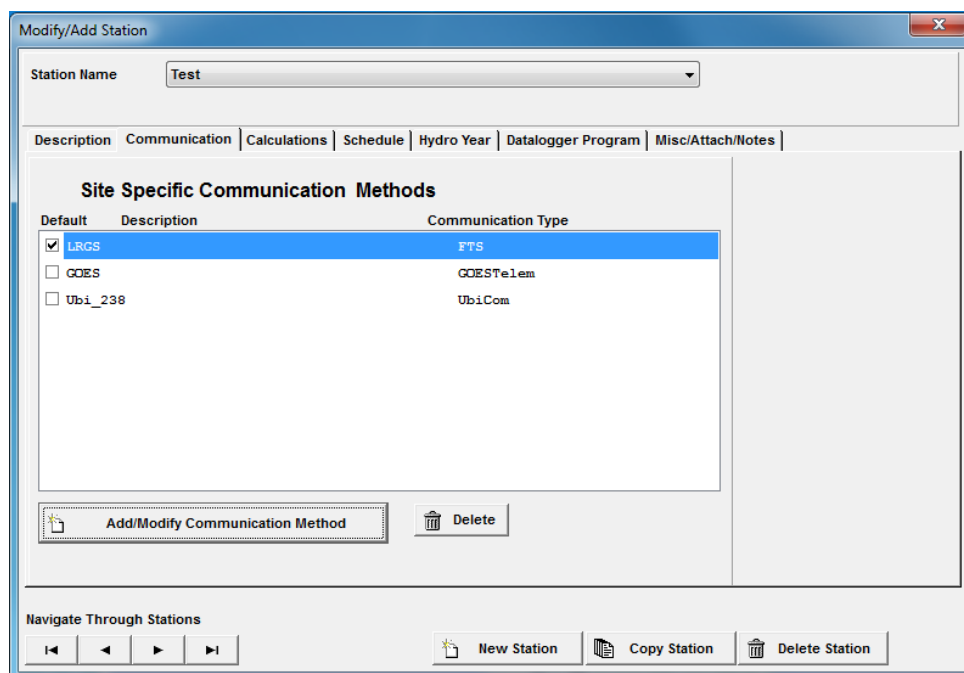
Figure 3-6: Station Setup Menu> Communication Tab

Often there is more than one way to contact a remote station, so a station may have multiple communication methods. For example:

1) a station may have more than one telemetry device; or

2) the station may have a single telemetry device which has more than one mode of operation; or

3) there may be several Remote User Computers, in addition to the Calling Service Computer, which manually collect data from the remote stations (each Remote User Computer would normally require its own communication method).

Each of the above examples would have their own communication method defined as a Site Specific Communication Method.

Although there can be several communication methods defined for one station, there can only be one default communication method (Default checkbox selected). The default communication method is used by the Calling Service to automatically call the station when the station is called as part of a station group.

The example in Figure 3-6 shows that the station has two communication types: GOESTelem and FTS. The GOESTelem (named LRGS) is checked as the default communication method.

3.3.1   Add/Modify Communication Method

Communication methods may be added, modified, or deleted by clicking the **Add/Modify Communication Method** button (or by right-clicking in the communication methods white space) and then selecting the desired action (Add New, Modify, or Delete).

A communication method is deleted by highlighting it (selecting it) then clicking on the **Delete** button or right clicking and selecting Delete Communication Method. When deleting a communication method, the user is prompted for confirmation before the action is carried out

There are four types of communication methods which can be added: FTS, GOESTelem, GSNet, and Ubicom (Figure 3-7).

To add a communication method, select the desired method. You will be prompted to give the method a descriptive name. This is the name that will appear in the list of communication method choices for manual or scheduled calls. A good practice is to begin the name of the communication method with the name of the computer on which the communication method can be used (e.g., "MyComputerName – Telephone Modem"). This allows remote users to easily identify the communication method which was defined for use with their computer and modem.

To modify a communication method, highlight the desired method and then select "Modify Communication Method". This will bring up the setup page which can then be edited. After completing the required alterations, click the OK button to save the changes and close the communication method.
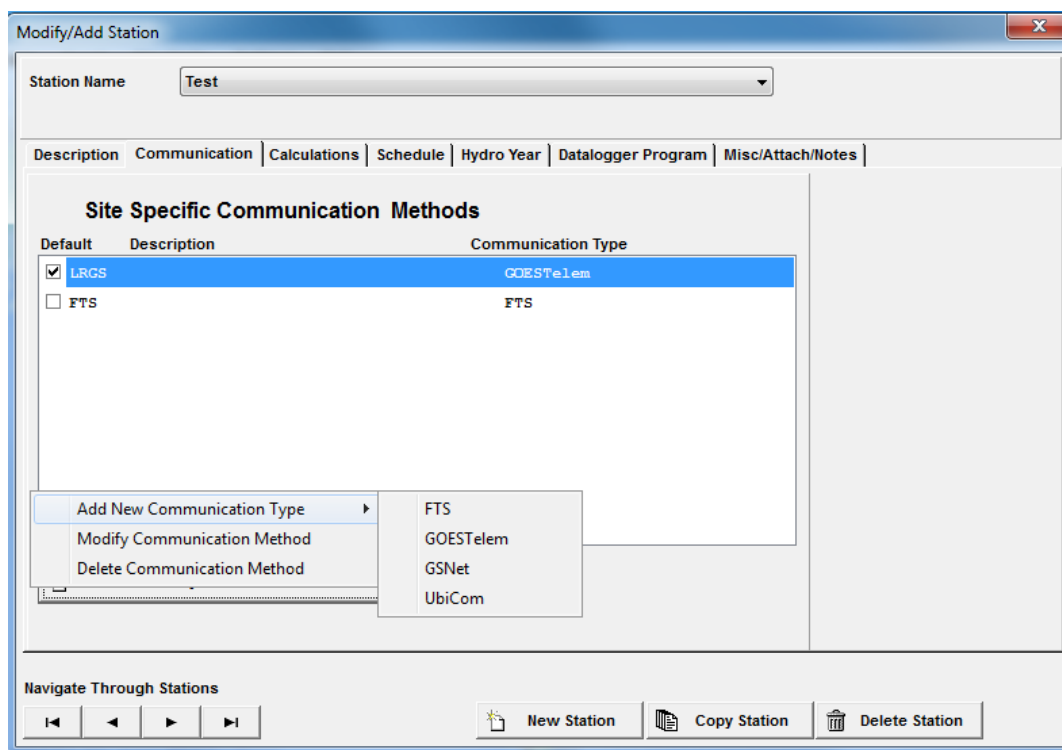
Figure 3-7: Communication Types

A detailed explanation of setting up each of the different communication methods follows.

3.3.2 Communication Type - FTS

The FTS Telemetry type encompasses all connections to the data logger in which the data logger immediately replies to an incoming data request. Telemetry information is stored in a database, which can be local or remote, so it can be accessed by any computer which is connected to the database.

FTS Telemetry supports the following connections to the remote data logger (see Figure 3-8):

- direct cable connections;
- Phone Modem: FTS TM, and FTS TM Ultra, FTS GS4000 and IP (internet protocol) Modem
- Radio Modem:

Figure 3-8: FTS Telemetry Setup

Description: Displays the descriptive name given to the communication type when it was added.

Data Logger: Use the drop down menu to select the type of datalogger used by the station. If the datalogger has a password, enter it here so that the data can be accessed. The *Use Saved Sensor Sets* should be checked in order to limit the amount of information being transmitted. By checking this, the sensor sets are only sent once, and subsequent transmissions will consist of only data.

Telemetry: There are three Telemetry options: Direct Connection, Phone Modem, and Radio Modem. When one is selected, the associated fields will be unlocked and able to be input with the necessary information. All three require the Allowed Com Ports, Baud Rate and Wakeup Delay fields to be populated.

1) **Choose Allowed Com Ports:** select the Com ports which can be used for the communication method. Only active ones will be able to be selected. To activate a COM port, select the **Global Computer Setup** button (see Serial Port Setup section below).

2) **Baud Rate:** The baud rate required for the chosen telemetry configuration is usually automatically set; however, the Baud Rate drop-down menu may be used to override the default selection.

3) **Wakeup Delay:** this is the time interval allowed for the station to respond to a query originating from StreamTrac. The default setting is 300ms but it can be manually changed;

Direct Connection: select this when there are direct cable connections between the Calling Service and the Station.

Phone Modem: Select the Modem Type from the drop down menu and input the telephone number. Valid telephone number characters are numbers (0-9), brackets (for readability ie: area codes), and commas (dial pause operator for getting outside line). Do not use dashes or spaces.

Telephone number example: 9,1(555)1239875

Radio Modem*:* Select the Radio Modem type from the **Add RM** drop down menu (bottom of screen) and follow the prompts. You can also edit the RM address from this area.

Once the radio modem Telemetry Path has been defined, select the Enable Telemetry Devices.

WARNING! Failure to Enable Telemetry Devices will result in the Radio Modem not functioning.

3.3.2.1 *Serial Port Setup*

In order to establish communications with remote sites, the individual computer which is being used to call the site must have its communication ports configured. This is done using the **Serial Port Setup** menu which is opened by selecting the **Global Computer Setup** button.

Global Computer Setup button
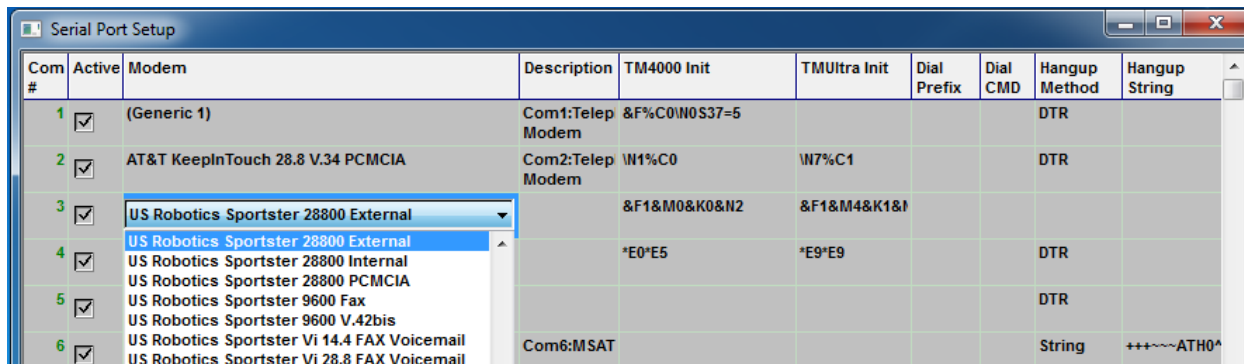
Figure 3-9: Serial Port Setup Screen Example

To add a communications port select an Active checkbox on a blank field (the Com # will initially be red indicating that it is inactive. Once checked it will turn green, indicating that it is active). Left click on the blank Modem field to bring up the drop down menu of Modem types. Scroll to the desired modem type and click on it.

The initialization strings for the TM4000 Init and TMUltra Init fields will be automatically configured (depending on the modem type). The remainder of the fields can be completed by the user.

> **IMPORTANT!.** Ensure that you do not add the dial prefix both here and in the FTS Telemetry page Telephone Number field. The dial prefix is only required in one location.

A detailed explanation of each of the fields can be found in *Chapter Nine< Communication Type - FTS.*

3.3.3   Communication Type – GOES

GOES Telemetry (GOESTelem) is only applicable to those remote stations using GOES Satellite Transmitters. GOES Telemetry retrieves station's data from the GOES ground station at Wallops Island via an Internet connection to the National Oceanic Atmospheric Administration (NOAA's) Local Readout Ground Station (LRGS). Supported GOES data formats are: BLM, Time Ordered, Water Surveys Canada, and pseudo-binary.
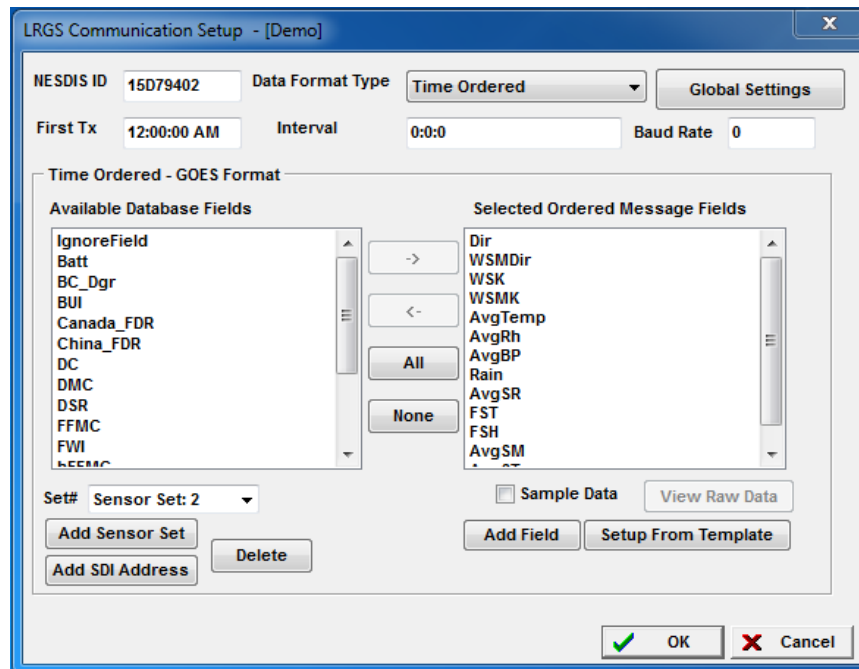
Figure 3-10: GOES Telemetry – LRGS Communication Setup screen

NESDIS ID: The **NESDIS ID** field is the unique identifier for the remote site's GOES transmitter. The identifier is an 8 character identifier supplied by NESDIS (National Environmental Satellite Data Information Service) for a GOES transmitter at a specific remote monitoring site.

Data Format Type: Use the drop down menu to select the Data Format type your system will be using (BLM, Time Ordered, Water Surveys Canada, or pseudo-binary). A detailed explanation of each Data Format Type is found in *Chapter 8<Communication Type – GOES Telemetry*.

Global Settings: Click the **Global Settings** button to open the LRGS Global Settings window. The settings in this window identify the particulars of the LRGS servers at the GOES ground station from which the data will be retrieved.

First Tx: This field is an optional field where the user may enter when the first GOES transmission from the remote site is scheduled to occur. This field is for user reference only and does not need to be populated in order to receive station data via the LRGS connection (i.e., 00:15:30 would indicate that the first GOES transmission would occur at 15 minutes 30 seconds after midnight UTC time).

Interval: The **Interval** field is an optional field where the user may enter how often the GOES transmission occurs (i.e., 01:00:00 is hourly). This field is for user reference only and does not need to be populated in order to receive station data via the LRGS connection.

Baud Rate: The **Baud Rate** field is another optional field where the user may enter the Baud Rate of the remote sites transmission (i.e., 100 bps, 300 bps, or 1200 bps). Again, this field is for user reference only and does not need to be populated in order to receive station data via the LRGS connection.

> IMPORTANT! The **Selected Ordered Message Fields** column <u>must</u> be populated with the desired Database fields to be contained in the message, otherwise an error message is received (seen in the Call Status Error Details column).

Example error messages:

"Sensor fields not defined Write data failed – field mismatch" if the **Selected Ordered Message Field** is left blank.

"[NESID] Had [#] mismatch packet(s) Write data failed – field mismatch" if the message fields entered incorrectly (ie: missing some fields).

Refer to *Chapter Nine<Communication Type - GOES Telemetry* for a detailed explanation of GOES telemetry settings.

3.3.4   *Communication Type – GSNET*

GSNet Telemetry is only applicable to those systems using FTS Globalstar Satellite modems (FTS models: GS-4000, Globalstar, or Globalstar-QD) as the telemetry device at the remote stations.

Figure 3-11: GSNet Communication Setup

Input the information in the description area of the GSNet Communication Setup screen. Note that the **Area Code and Telephone Number** fields for the remote site's modem can only contain numerals (other characters or spaces are invalid).

Password: If a password has been set in the logger, the password must be entered here.

Data Overlap: In order to avoid possible data gaps in the station's database, the value set in the **_Data Overlap_** field should be greater than the value set in the GSNet Host Service **_Max. Wait for Server_** field

Use Global GSNet Host: select this when a GSNet Host Service has been defined using the Edit Global Settings function.

Use GSNet Host Settings Below: select this when the GSNet service for the remote station has been defined locally.

For both a Globally and a Locally defined GSNet Host, the IP Address, Port Number and working folder for the computer running the GSNet Host service must be entered.

> IMPORTANT: A user must have read and write access rights to the Working Folder

Max Wait for Server: this is the maximum time StreamTrac will wait for a reply to an SMS data request. Once this time is exceeded the call will be deemed to have failed. See Data Overlap (above).

Refer to _Chapter Nine<Communication Type – GSNet_ for a detailed explanation of the GSNet Telemetry.

3.3.5   _Communication Type - Ubicom_

UbiCom telemetry only applies to those stations using FTS UbiCom. UbiCom is a dual mode communication system which uses either Iridium satellite or terrestrial cellular communications networks to exchange information and data between a remote station and the **StreamTrac Database.**

When initially setting up the Ubicom Communication Method, you will be prompted to enter a descriptive name.

The figure shown below is an example of a typical Ubicom Communication Setup. Input the required fields then select **OK.**
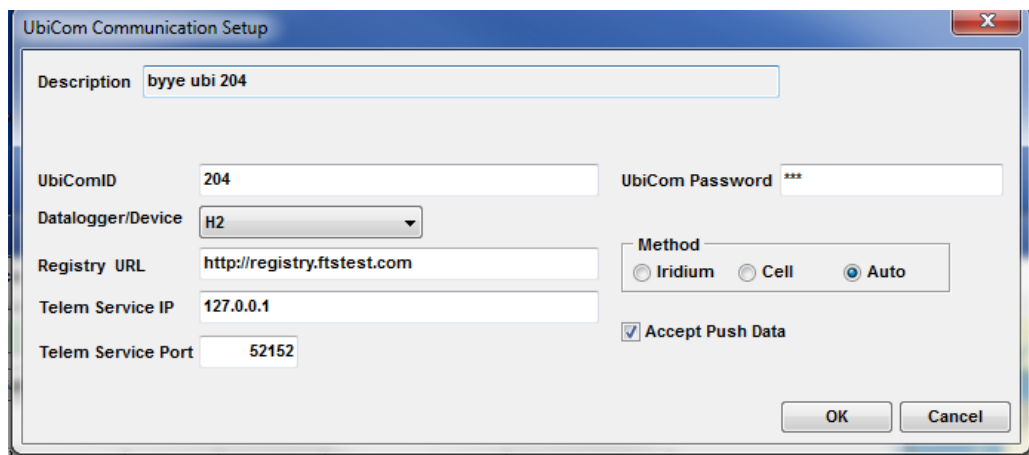
Figure 3-12: Ubicom Setup

Refer to _Chapter Nine<Communication Type – UbiCom_ for a detailed explanation of the UbiCom Telemetry.

3.4 CALCULATIONS TAB

The **Calculations** tab is used to build custom calculations as well as map logged variables to common field names which are used in certain calculations.

Every data file may contain fields whose values result from calculations. This may be as simple as calculating Discharge from Stage, or a range of calculations that record intermediate values for use in other calculations.

The program will automatically perform calculations immediately after calling for data or after importing data.

Map Common Field Names and **Sediment and Carousel-Bottle Mapping Fields:** The field names appearing in these two sections are used in a variety of calculations which run in the background of the program (current conditions and the Station information dialog box on the map view, for example). Because variable names can be customized, the common names must be mapped to the actual variable name which houses the data. Use the drop down menus to select the variable names for the listed common mapping fields. Calculations will use the data from these mapped fields.

Note that this function is separate from any Custom Calculations developed.

3.4.1   Custom Calculations

There are a variety of custom calculations available using values derived from the datalogger. However, some calculation fields may require values that are not derived from the datalogger. In this case, the calculations must be initiated after editing the required data and building your own formula.

To view an existing calculation or to build a calculation/formula, click the **Set-up Custom Calculations** button.
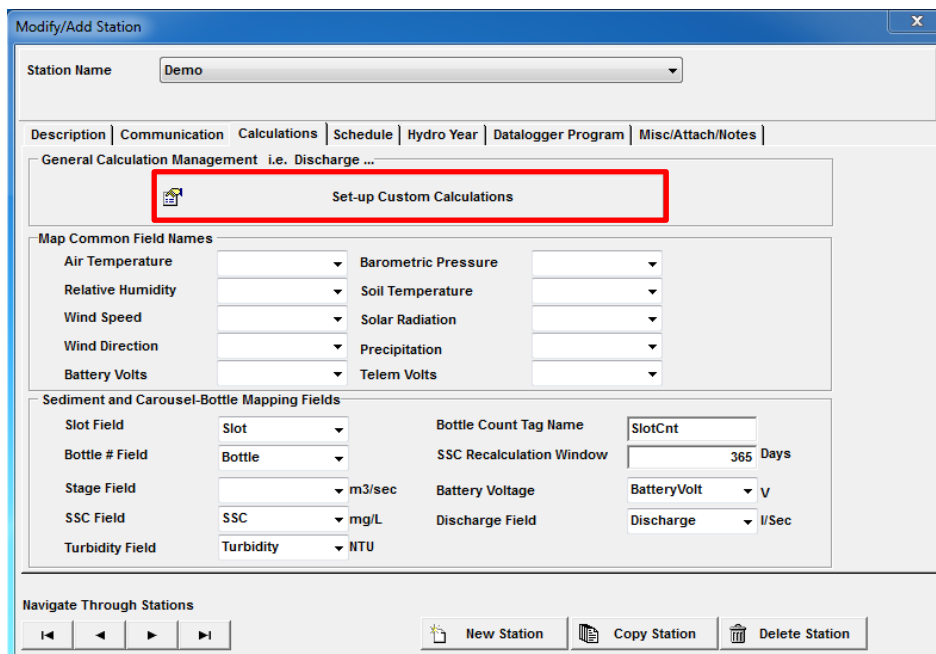
Figure 3-13: Calculations Setup

This will bring up the **Calculations for station "name"** screen which displays a list of existing calculations. From this page existing calculations can be modified or new calculations built.

Calculations are performed in the order they are listed, from top to bottom. The order of execution can be changed using the **Move Up** and **Move Down** buttons. First select the calculation you wish to move by clicking on it, then click either Move Up or Move Down to move the calculation up or down in the list. Calculations are performed from the top down.
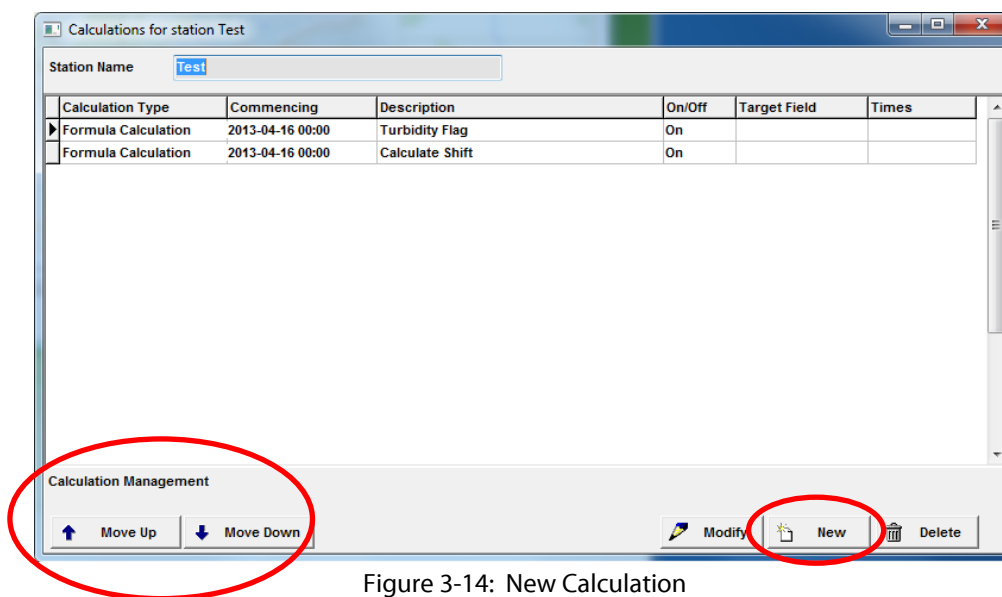
Figure 3-14: New Calculation

Open an existing calculation by double clicking on it. Build a new calculation by selecting the "New" button.

This will bring up the **Choose a new calculation type screen**.
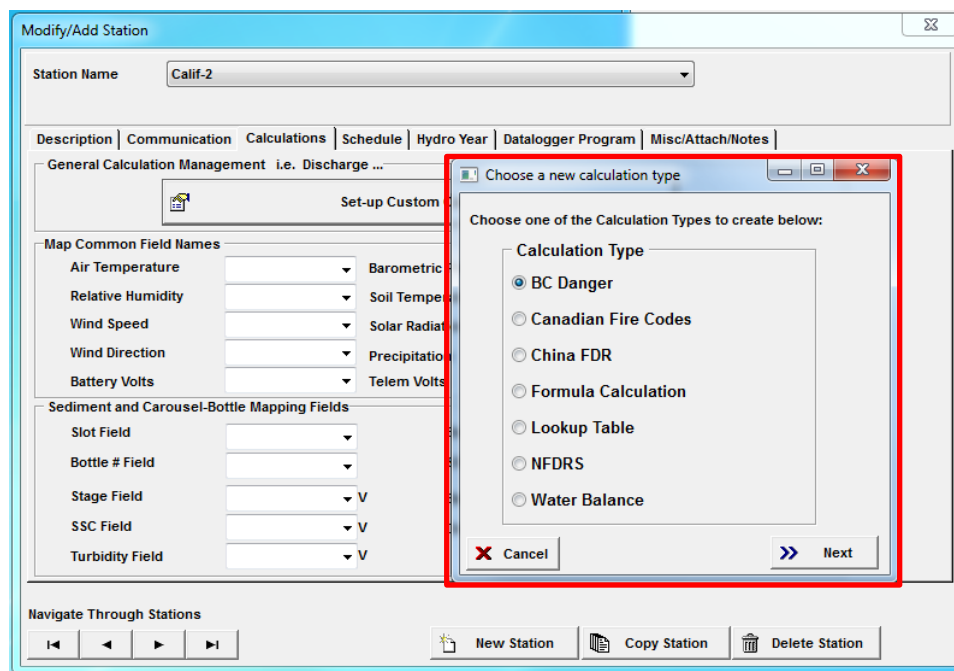
Figure 3-15: New Calculation Types

Select the desired **Calculation Type** from the menu, then **Next**. Detailed explanations of each Calculation Type are found in the following sections.

To modify an existing formula calculation either double click on the existing calculation or select it and click the Modify button.

> **Note**: If date ranges for two formulas overlap the second calculation will overwrite the results of the initial calculation.

If the referenced data has been changed, the results of the calculation will change and the new values will overwrite the old values the next time calculations are refreshed (i.e. clicking the Refresh button on a graphing screen).

3.4.2   BC Danger Calculation

The BC danger rating system uses the BUI and FWI values calculated from the Canadian Fire Danger Rating System to calculate a BC Danger value result. This result will always be a value of 1 thru 5 color coded as shown in the figure below.

Figure 3-16: BC Danger rating system color codes

The BC Danger Calculation setup requires the user to enter a calculation name/description, to map the FWI and BUI fields, to select the BC Danger Region and to set the calculation schedule.

Figure 3-17: BC Danger Calculation Setup

Calculations are the result of the intersection of in the BC danger rating tables of the FWI along the X-axis and the BUI along the Y-axis. There are three BC danger regions represented by three BC Danger rating tables in Figure 3-18.

Figure 3-18: BC Danger Region Tables

> **IMPORTANT!** The BC Danger Calculation uses fields created in the Canadian Fire Codes Calculation, therefore the Canadian Fire Codes Calculation MUST be defined prior to the BC Danger Calculation. The Canadian Fire codes Calculation must also appear before the BC Danger Calculation in the calculation list.

3.4.3   *Canadian Fire Codes Calculation*

This module performs calculations according to the Canadian Fire Danger Rating system. The dialog requires you enter a calculation name/description, map the source fields, and set the calculation schedule. All target fields will be created for you once the calculation is saved. This module will also allow you to create more than one model. In the case of multiple models the module will add a numeric suffix to the target field for each additional model that is created.

Figure 3-19: Canadian Fire Codes Calculation

Start-up values are required before the Canadian Fire module can begin its calculations. These must be entered at the calculation start point. The following fields require start up values: hFFMC, DMC, DC, and FFMC. The start-up values can be entered in the data view/edit screen as shown below. The values shown are just for example purposes. Appropriate values must be entered for your particular regions. See your local fire expert for optimal start values.
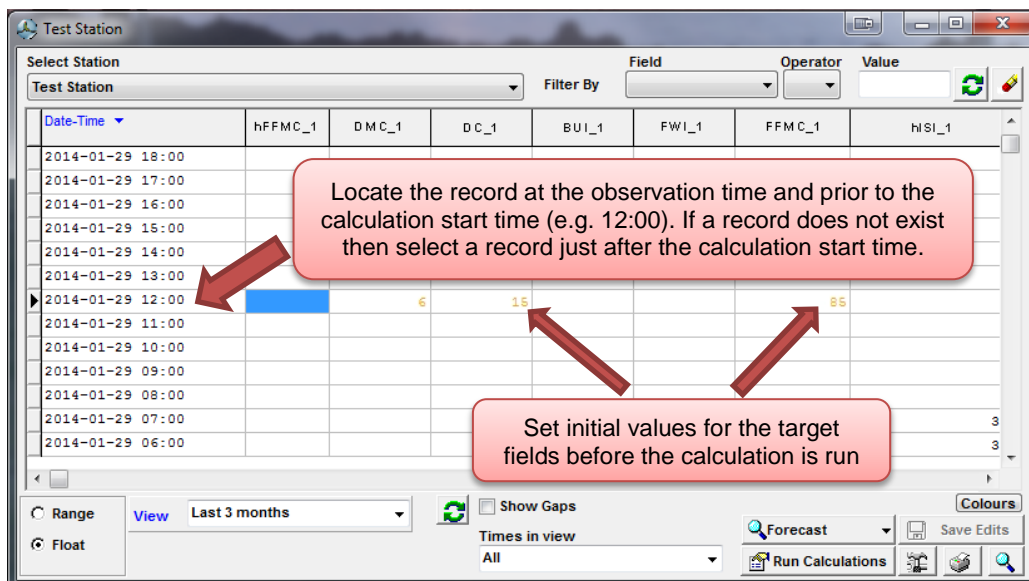
Figure 3-20: Initialize Canadian Fire Code variables

3.4.4 China FDR Calculation

This module performs calculations based on the China Fire Danger Rating system. The dialog requires you enter a calculation name/description, map the source fields, and set the calculation schedule. All target fields will be created for you once the calculation is saved.
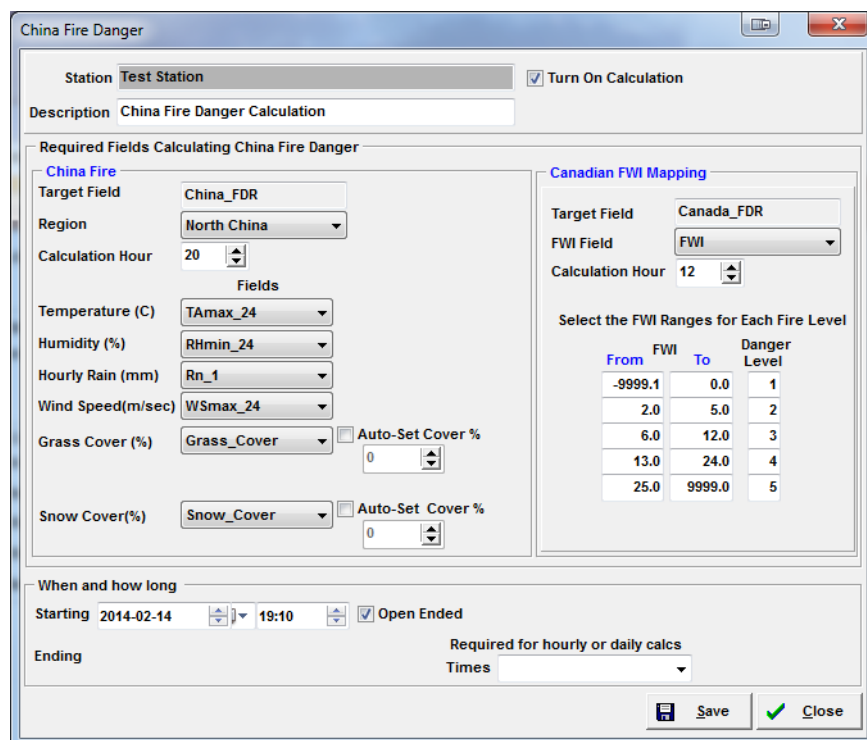
Figure 3-21: China FDR Calculation

3.4.5 Formula Calculations

Formula calculations allow you to setup custom calculations using an FTS scripting language. Programming knowledge is essential to correctly use this feature. FTS assistance should be sought prior to developing custom calculations.

> IMPORTANT! Contact FTS Technical Support for guidance to build custom calculations.

A simple single line formula can be applied to a target field or a more complex formula can be entered into the program box. Variables used in the formula or program must either be pre-defined (present in the read only field's box) or may be entered as internal variables in the user variables box. Pre-defined fields exist in the station's data while user variables are only used inside the calculation. The schedule for the custom formula calculation is also set through this window.

Figure 3-22Custom Formula Calculation setup

Note:
- If date ranges for two formulas overlap the second calculation will overwrite the results of the initial calculation.
- If the referenced data has been changed, the results of the calculation will change and the new values will overwrite the old values the next time calculations are refreshed (i.e. clicking the **Refresh** button on a graphing screen).

3.4.5.1 *FTS Scripting Language Syntax*

The following tables show the scripting language to be used in developing custom formulas.

Variable types:

x,y	: numeric - (integer, float)
a,b	: Boolean (1 or 0)
s,t,v	: string
d	: DateTimeString (StampString)

Type conversion: ¡¡

Boolean (1/0):	Logic(x)
numeric:	Numeric(s)
string:	String(x)
char:	Char(x)
integer:	Ascii(s)
all types:	Eval(f) // where f string is formula in [...]
string :	NumBase(x,base) // base from <2..16>
integer:	BaseNum(s,base) // base from <2..16

Math operations:

numeric (integer): x Div y, x Mod y

Math functions:

Abs(x), Frac(x), Trunc(x), Heaviside(x) or H(x), Sign(x),
Sqrt(x), Ln(x), Exp(x),
Cos(x), CTg(x), Ch(x), CTh(x), Sin(x), Sh(x), Tg(x), Th(x),
ArcSin(x), ArcCos(x), ArcTg(x), ArcCtg(x),
MaxVal(x [,y, ...]), MinVal(x [,y, ...]),
SumVal(x [,y,...]),   AvgVal(x [,y, ...])

String operations:

s || t ,
s Like t,   // (%,_)
s Wildcard t   // (*,?)
"ABC" //string literals must be surrounded by double quotes

String functions:

integer: Length(s), Pos(t,s)   // **Note:** *String indexing starts from 1*
string: Trim(s), TrimLeft(s), TrimRight(s), Upper(s), Lower(s),
Copy(s,x,[y]), CopyTo(s,x,[y]), Delete(s,x,[y])
Insert(s,t,x),
Replace(s,t,v,[1/0=ReplaceAll,[1/0=IgnoreCase]]),
IFF(a,s,t);   //IF a>=1 then Result:=s else Result:=t
numeric: Eval(s)

Date and Time functions:

integer: Year(s), Month(s), Day(s), WeekDay(s),
string: Trim(s), TrimLeft(s), TrimRight(s), Upper(s), Lower(s),
numeric: StrToStamp(d)
string: StampToStr(x), StampToDateStr(x), StampToTimeStr(x)

Interpreter, key words & syntax:

IF ... THEN { ... } [ELSE { ...}]
WHILE ... DO { ... }
PROCEDURE <ProcedureName> { ... }
EXEC <ProcedureName>
BREAK
CONTINUE
EXIT
BEEP
END. //program end
/* note */

Note: all variables are global variables

Statistical

@AVG(FieldName, Days, Hours, Minutes, seconds)
@SUM(FieldName, Days, Hours, Minutes, seconds)
@MIN(FieldName, Days, Hours, Minutes, seconds)
@MAX(FieldName, Days, Hours, Minutes, seconds
*** These functions are database intensive and may cause the calculation to run slower.

Note: all variables are global variables

3.4.5.2 *Syntax Examples*

Simple Stage Calculation:

```
if Stage>=0 then
{
Discharge  :=  (6*Stage^1.538)*0.03;
}
else
{
Discharge  :=  0;
}
end.
```

Calculate Discharge From Stage(Multi-case):

```
if Stage>0 then
{
Discharge  := 0.75530059 + (0.18399245*Ln(Stage)) +
              (0.029399358*Ln(Stage)^2) +
              (0.00060295268*Ln(Stage)^3);
Discharge  := Discharge  + (0.0025560321*Ln(Stage)^4) +
              (0.00037275221*Ln(Stage)^5) +
              (0.000404684*Ln(Stage)^6);
Discharge  := Discharge +(0.000016092901*Ln(Stage)^7)+
              (0.000010707796*Ln(Stage)^8);
}
else
{
Discharge  :=  0;
}
end.
```

Simple Shifting Example:

```
Stage := Stage + 1.370
end.
Flagging Example:
if Turb>100 then
{
TurbFlag := 1
}
else
{
TurbFlag := 0
}
end.
```

String Usage Example:
```
sRun := DataErrors;
sNew  := "";
iCommaPos:=1;
while (iCommaPos>0) do
{
 iCommaPos:=Pos(",", sRun);
 if iCommaPos > 0 then
 {
   sEach := Copy(sRun, 1, iCommaPos-1);
   sRun  := Copy(sRun, iCommaPos+1, Length(sRun));
 }
 else
 {
   sEach := Copy(sRun, 1, Length(sRun));
   sRun:=" ";
 }
 iPos := Pos("#5", sEach);
 if iPos <=0 then
 {
  if Length(sNew) >0 then
  {
    sNew := sNew || ",";
  }
   sNew := sNew || sEach;
 }
}
DataErrors := sNew;
End.
```

3.4.6   *Lookup Table Calculation*

This calculation converts data from a source field value to a target field value using a Lookup Table of reference source and target values. It is commonly used to convert stage values to discharge (or flow).

The calculation will review the data record, find the Source Field data, and then convert those values based on the Target Values in the Lookup Table. The converted Target Value will then be saved to the Target Field line in the data base under the station's name.

> IMPORTANT! If the target field selected is a data point, the data will be overwritten by the Lookup Table values. However, the original data values will be available from the RAW file.

> NOTE! Source Values which are beyond the minimum and maximum Lookup Table values will be converted using the nearest value in the table.

Use the drop down menus to select the Source Field and Target Field. If the desired Target Field does not exist, one can be added from the Stations>Description>Add Field function.

Then the Lookup Table must be built. It can be populated in two ways: manually or by loading a CSV file.

CSV FILE

The CSV file must contain two columns: the first column contains the source values and the second column contains the target values. Press on the Load CSV button and browse to the file. This will over write any values already in the Lookup Table. The table will automatically be ordered in ascending order of Source Values.

MANUALLY

Type in the desired Source and Target Values. Striking Enter will bring up the next line. Lines can also be entered by using the Insert and Repeat Insert buttons. The table will automatically be ordered in ascending order of Source Values.

Interpolate: When selected a proportional value between the source and target values will be used.

Figure 3-23: Lookup Table Calculations -

Source Field and **Target Field**: Use the drop down menus to select the fields.

Load CSV: Lookup table data can be loaded from a CSV file.

Repeat Insert: Selecting this will bring up an Enter Table Values box. Fill in the desired Source and Target Values and then Enter. The values will be entered into the Lookup Table.

Insert: Inserts a line in the table above the last entered value or the selected line. This line is populated with zeroes but they can be overwritten by selecting them and typing in the desired value.

Delete: Deletes the selected line.

When and how long: Input the Starting time and the Ending time. If the Open Ended box is checked the conversion process will be continual.

3.4.7   NFDRS

This module performs calculations according to the U.S. Fire Code National Fire Danger Rating Systems (NFDRS)

Figure 3-24: NFDRS Calculation Set-up screen

Observation Hour: This field determines when the daily calculations will be stored. The default entry for this field is 13 (13:00 Standard Time) and is the accepted observation time for NFDRS calculations.

Annual Precipitation: Enter the typical annual precipitation (in inches) for the site. If you are not sure what it is you can enter an estimated value, but you should make every effort to be as close to the typical value as possible.

Lightning Risk: Lightning Risk Scaling Factor is a multiplier that allows for higher lightning-caused fire occurrences. It is *"used to account for area-specific fuel conditions that affect the fire-starting efficiency of lightning*, - Bradshaw, et al, 1983". The default for this parameter is 1.0, which should be adequate for most users.

Calculate Hourly Fire Codes: If you wish to have fire codes calculated every hour in addition to the daily calculations, make sure this box is checked.

Use Measured Woody F.M.: Check this box if you want the software to use a measured woody fuel moisture value. Ensure the Fuel Stick Temp Field in Field Name Mapping is input.

Wood F.M: Enter the woody fuel moisture value.

Stick Date: Set this field value to the data of the woody fuel moisture measurement. The software will calculate codes for thirty (30) days after the measurement date.

State of Weather (SOW): SOW must be entered manually unless the station returns a fuel stick temperature (FST) value. If FST data is available, then the NFDRS module, will calculate an approximate SOW value by comparing the FST to the Air Temperature (Temp) using the following algorithm:

FST - Temp	SOW
22.5 <= value	0
15.5 <= value < 22.5	1
8.5 <= value < 15.5	2
value < 8.5	3

Human Risk Factor: The current day's Human Caused Risk factor ranges from 0 to 100 and contributes to the Human Caused Occurrence Index (MOI). This is a semi-calculated field. The NFDRS module will not overwrite existing values. By default, the NFDRS module will store a value of 20 in the MCR field on weekdays and a value of 40 on weekends. You can edit it different values for any particular day.

Fuel Model List: Lists the fuel models that have been defined for the system. There is no limit to the number of fuel models which can be created for each station.

Click on the **Add** button to add a new fuel model to your station, or click on an existing model and click **Modify** to bring up the Modify NFDRS Model screen:

Figure 3-25: Adding Fuel Model

System: This allows you to select the NFDRS fuel modeling system (1978 or 1988) that is used for this fuel model.

Note that if you select NFDRS 1988, the selections for Shrub Type and Set 1 Hr = 10 appear on the dialog.

Use the drop down menus to select Model, Slope, Climate, and Grass and Shrub Type.

Set 1 Hr=10 checkbox: If you have selected the 1988 fuel model then you will have the option of choosing to set the fine dead fuel moisture equal to the 10-hour time lag fuel stick moisture.

Field Name Mapping: In order for the NFDTS Calculation to run, the listed fields should be mapped. Use the drop down menus to select the variable names for the listed common mapping fields.

Figure 3-26: Field Name Mapping

3.4.8 Water Balance Calculation

The water balance calculation returns target field values based on the region type, elevation and source field inputs. The module also requires you set the calculation schedule. The calculation assumes that only one data record per hour exists for the station.

Figure 3-27: Water Balance Calculation setup

3.5 SCHEDULE TAB

The **Schedule** allows the user to enter the calling schedule for the remote station data logger. Through this configuration tab the user is able to specify when and how to call the station, the number of retries per call attempt, and, in addition to having the data saved in the **StreamTrac Database**, whether or not to write the retrieved data to a CSV (comma separated variable) file.

Figure 3-28: Station Admin Menu> Schedule Tab

Scheduled data calls always retrieve only the data required to update the **StreamTrac Database**. Prior to placing a scheduled call, the Calling Service will examine the station's database to determine the date and time of the most recently stored data. In order to minimize data collection times and potential airtime charges, the subsequent scheduled call will only request the data from the last record stored in the database to the current time (up to a maximum number of days – the default setting is 3 days but this can be changed).

NOTE: All times indicated are in local time.

Enable Scheduled Data Collection

There are two ways to automatically collect data from remote stations:

1) Stations can have individual call schedules defined using the Schedule configuration tab, or

2) Stations can be added to a Station Group and then have a common call schedule defined for the specific group (refer to the Stations>Group Setup menu section of this manual for details on this option).

In order to individually schedule a station for automated data collection then the **Enable Scheduled Data Collection** checkbox must be selected in order to allow the Calling Service to individually collect data for the selected remote station.

When scheduled data collection is enabled, a call schedule with fixed daily periodic intervals and other daily non-periodic times can be specified.

Use Fixed Schedule

The **Use Fixed Schedule** checkbox must be selected in order to specify periodic calling times. The Fixed Schedule is a daily schedule whose cycle restarts at midnight each day. In Figure 3-28 the defined Fixed Schedule will cause the Calling Service to call the Test Station hourly starting at 12:00 (noon) until 23:59 (11:59 p.m.).

Other Times

The **Other Times** line is used to specify daily non-periodic calling times. In Figure 3-28, the defined Other Times will cause the Calling Service to call the Demo station at 4:05 am (04:05) and 10:05 pm (22:05) each day in addition to the periodic call times defined by the Fixed Schedule. Other Times should be entered in 24 hour format (hh:mm) with a space between the different call times.

Comm. Type

The **Comm. Type** drop-down box is used to select which of the station's defined communication methods will be used by the Calling Service when making the individually scheduled station calls. The selected communication method can be different from the default communication method specified in the Communication configuration tab. The default communication method is used by the Calling Service when the user schedules a station to be called as part of a Station Group.

Time Synchronization

The **Perform Logger Time Synchronization (UTC)** check box allows the user to synchronize the datalogger to the PC clock and automatically offset to the Logger's local time by using UTC as the benchmark time. This synchronization can be set to a schedule similar to the data collection and export schedules.

Additional Group Schedules Affecting This Station

The **Additional Group Schedules Affecting This Station** table displays all group calls and exports that include the current station. Double clicking on a listing in this table will open the corresponding group in the Group Manager or Export Template from the Export Template manager. Right clicking on a group allows you to quickly open the Group Manager or the Template Manager for creating new Group Calls or Export Templates.

3.6 HYDRO YEAR TAB

The Hydro Year tab permits the user to define the dates of the selected station's hydro year.
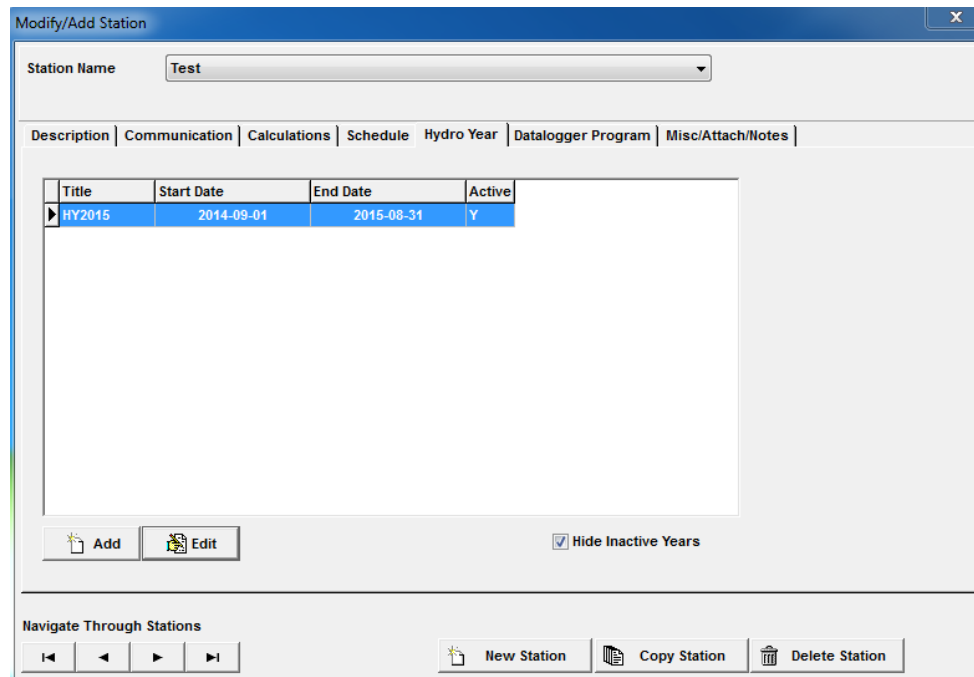
Figure 3-29: Hydro Year Tab

Use the drop down menu to select the desired station. To add a new hydro year, select the Add button. Input the desired dates. Note that a "To" date one year from the "From " date will be automatically entered. Additionally, a Title will also be generated based on the selected dates and formatted as HYyyyy). This title can be changed if desired.
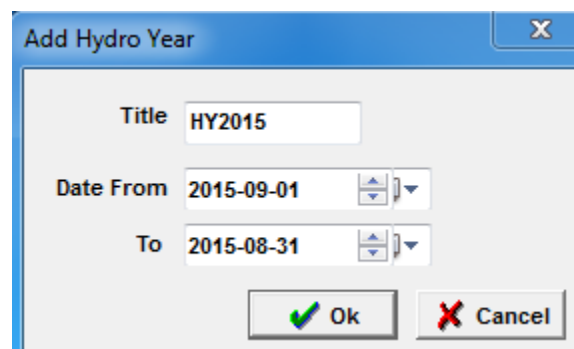
Figure 3-30: Hydro Year formatting

3.7 DATALOGGER PROGRAM TAB

The **Datalogger Program** tab allows the user to retrieve the datalogger program from the datalogger, to edit the datalogger program and to send the datalogger program to the datalogger. Select the **View/Edit Datalogger Program** to launch the Datalogger Program window enabling these functions.
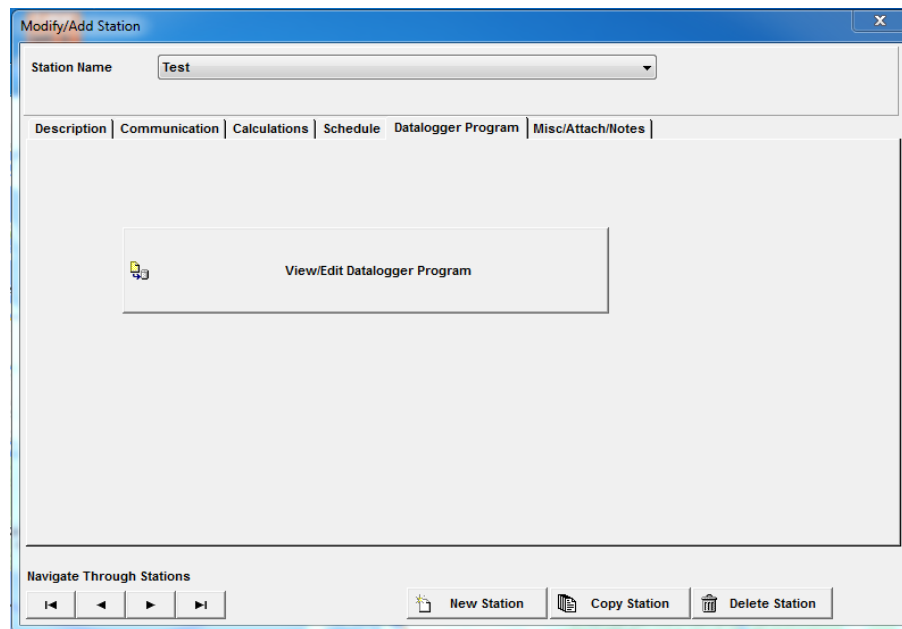
Figure 3-31: Datalogger Program Tab

Use the Choose File button to navigate to the desired file, and select the Send Now or Get Now button as required.
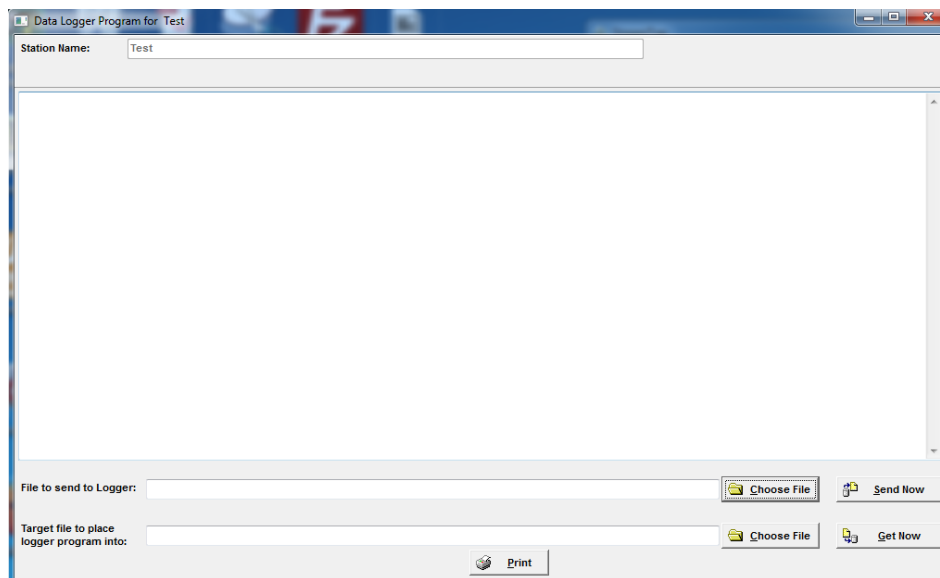
Figure 3-32: Selecting a file

Axiom Datalogger programs must be in .XML format.

See sections 4.1.3.3 (Action Calls) for more details.

3.8 ATTACH NOTES TAB

The **Attach/Notes** tab is intended to allow the user to store a wide variety of information about the station. Files of any sort (i.e. site map & directions, site pictures, site contact information etc.) can be added in the **Attachments** section – much like attaching a file to your e-mail –while text entries can be typed in the **Notes** section. The information entered in the **Attach/Notes** tab is solely for the user's convenience as this information is not used by the Admin Application or the Calling Service. Files and text added in the **Attach/Notes** tab are stored in the **StreamTrac Database**.
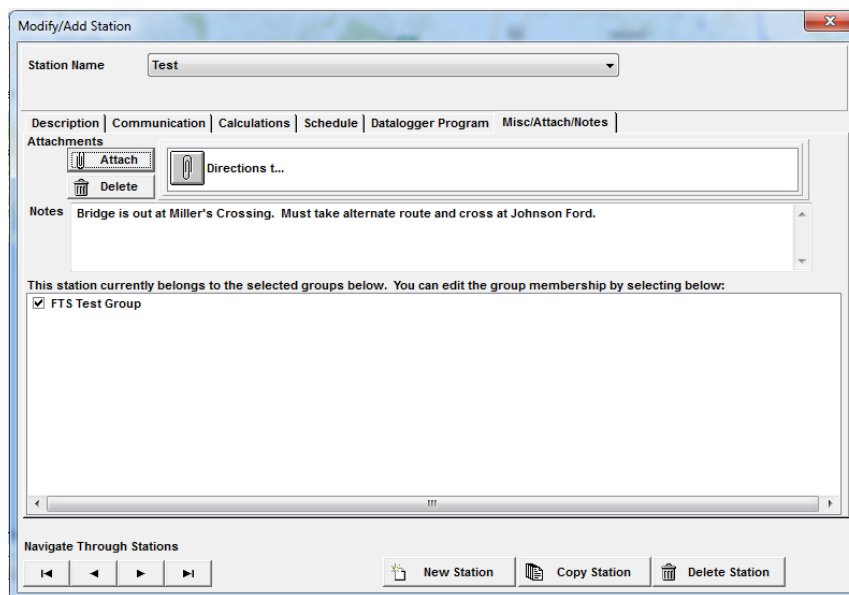
Figure 3-33: Attach/Notes Tab

Attach: To add a file to the Attachments section:

1)   Click the Attach button located in the Attachments section.

2)   Browse to the desired file.

3)   Select the file.

The file is now attached in the Attachments section and can be opened by double clicking on it.

Delete: To remove a file from the Attachments section:

1)   In the attachments section, click on the file you wish to remove. The file should become highlighted with a blue background.

2)   Click the Delete button located in the Attachments section.

The file is now removed from the **StreamTrac Database** and no longer shows up in the Attachments section.

Notes: Text notes can be typed or pasted into the Notes section. Notes are saved in the **StreamTrac Database** when the user closes the Modify/Add Station dialog box or switches to another station.

3.9 STATIONS>GROUP SETUP MENU

3.9.1   Group Manager

A "Group" is the term used to identify a selection of stations which can have a single function applied to them. The Group Setup menu is the menu through which users can organize remote monitoring stations into groups for convenient data collection. The Group Manager menu is used to create Station Groups, to select which stations belong to the various groups, and to schedule data collection for the group. This window also provides the ability to select existing groups so that they can be modified or removed from the database.
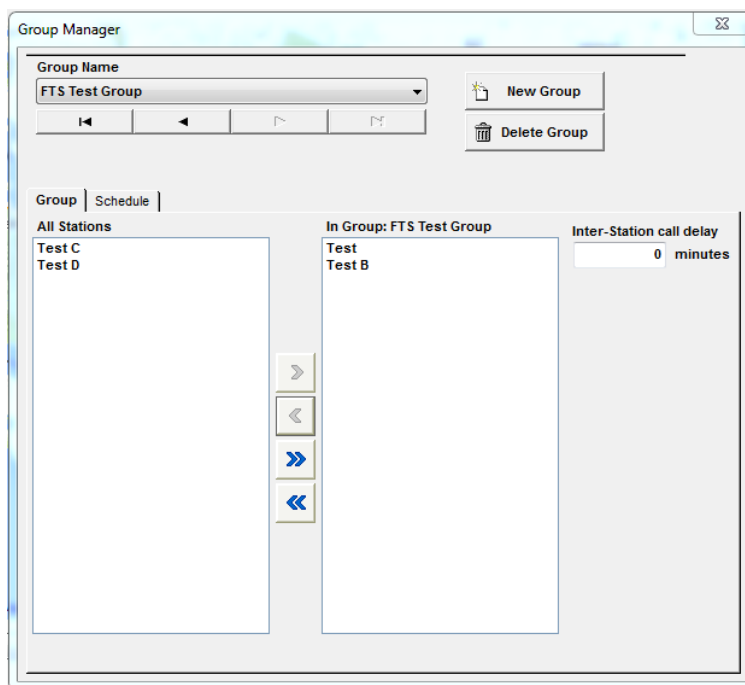
Figure 3-34**:** Group Admin Menu

Group navigation can be performed using the Group Name drop-down list or using the navigation buttons. The navigation buttons located below the Group Name drop-down selector are used to single-step forwards and backwards through the group list ⬛ or to jump to the first or last group in the list ⬛

3.9.1.1   *Group Tab*

NEW GROUP

New groups are added by clicking the **New Group** button on the Group Manager window. The user will then be prompted to enter a name for the new group. Once a group has been named, a list of currently defined remote stations will be displayed in the **All Stations** column. The right-hand **In Group** window pane displays the stations which belong to the currently selected group.

Stations are added or removed from the to the group using the arrows

>   **>**   :   adds the selected station to the group,
>   **>>**   :   adds all stations to the group,
>   **<**   :   removes the selected station from the group,
>   **<<**   :   removes all stations from the group.

DELETE GROUP

To delete a station from the StreamTrac system, the user simply navigates to the group they wish to delete and then presses the **Delete Group** button. As a precaution the user is prompted to confirm the delete before the group is removed from the database. When deleting a group, only the station group is deleted, the individual stations in the group remain untouched.

INTER-STATION CALL DELAY

Enter the desired time delay between station calls here.

3.9.1.2   *Schedule Tab*

The **Schedule** tab is used to enter the calling schedule for the station group.

The functionality of the **Schedule** tab in the Group Admin menu is identical to the functionality of the **Schedule** tab in the Station Setup menu. The only exception is that when the Calling Service processes a scheduled group call, each station in the group will be called using its default communication method.

If a station and its associated group are both scheduled to be called at the same time and both calls are using the same communication method, the StreamTrac will optimize the calling regime by only placing one station call.

Refer to the schedule portion of the STATIONS> Station Setup> Schedule Tab section of this manual for details on configuring call schedules.

Figure 3-35: Group Admin Schedule Tab

3.10   STATIONS>UTILITIES

This is used to update the Ubicom Firmware when required. The FTS Firmware Updater tool must be used. Instructions will be included with the Firmware release and included on the FTS Support web page.

3.10.1   Upload UbiCom Firmware

Ubicom ID: Enter the assigned ID number here.

Password: Enter the Ubicom password here. Use the password that was created when the Ubicom was setup.

Gateway URL: This is the URL of the Gateway you are operating on. If unsure, contact FTS Service.

Firmware File: Browse to find the file (usually downloaded from a USB stick)

Once the above information has been entered and the file path identified, select **Upload.**

CHAPTER 4   DATA MENU

4.1 DATA>COLLECT DATA & TELEMETRY CALLS MENU

Through the **Collect Data & Telemetry Calls** menu, calls can be manually initiated to remote monitoring stations. Calls made can retrieve data and other site information as well as set logger time and send and retrieve Data logger programs from an individual station or station group. Once the Call button is clicked, the Call Status screen will be displayed so the user can monitor the call's progress.

4.1.1   Manually Calling Stations/Groups

The **Call Station** radio button enables the drop-down station list which allows the user to select which station they wish to contact. The **Call Group** selector button enables the drop-down group list which allows the user to select which station group they wish to contact.
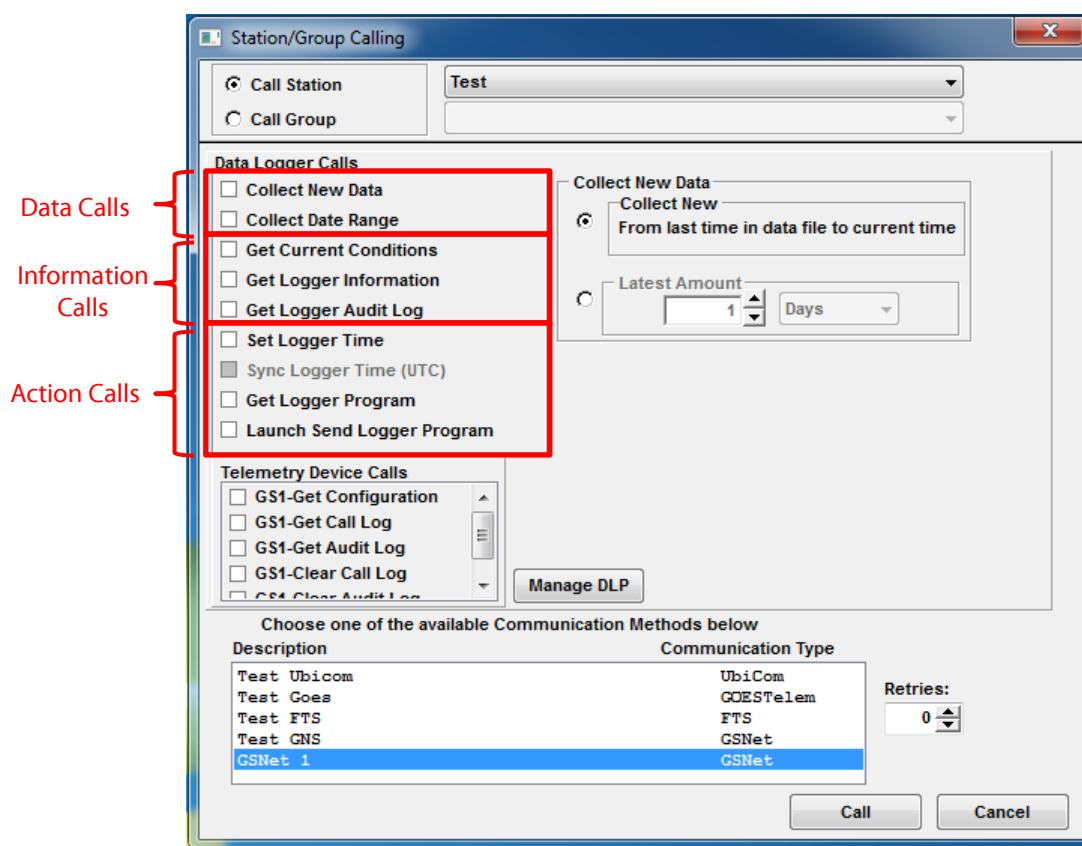
Figure 4-1: Manually Calling Stations

4.1.2   Communication Method

When calling a station the user has the choice of which communication method the call should use to contact the station. As a convenience, the station's default communication method is pre-selected (highlighted in blue).

The **Communication Method** selection box is the feature which enables multiple remote users to manually call the remote stations because it allows users to place the call using the communication method defined specifically for their computer.

The Communication method and device type will determine which kinds of Data Logger Calls can be made.

Retries

The **Retries** box allows the user to select how many calling attempts, in addition to the first call, should be made in order to successfully retrieve the requested data. Note that call retries does not apply to GSNet communication type calls.

Call: this initiates a manual call

Cancel: this cancels a call in progress

4.1.3   Datalogger Calls

Data Logger calls are calls that communicate with the data logger located at the remote site. There are three types of Data Logger Calls: Data calls, Information calls, and Action Calls (see Figure 4-1).

Data Calls: Data collected using manually initiated data calls is stored in the station's database (similar process as data collected through scheduled calls). This allows users to backfill missing data or to bring the database up-to-date with the latest data available from the data logger.

Information Calls: Information returned from site information calls (current conditions, logger information, or special calls) is only displayed in the Information Call Results window at the time the call is made. This information is not stored in the station's database.

Action Calls: These calls will initiate the selected action.

Available Data Logger Call methods will vary depending on the device and communication type. Only those Data Logger Calls compatible with the Communication Method and device type will be able to be selected (the checkboxes will be white).

> **IMPORTANT!** When using GOES Telemetry, only data calls are supported as the StreamTrac retrieves station data from the GOES ground station rather than directly from the data logger.

4.1.3.1   Data Calls

COLLECT NEW DATA

The **Collect New Data** checkbox provides the user the option of collecting only the data required to bring the database up-to-date or collecting all data within a period backdated from the current time (i.e. last 2 hours).
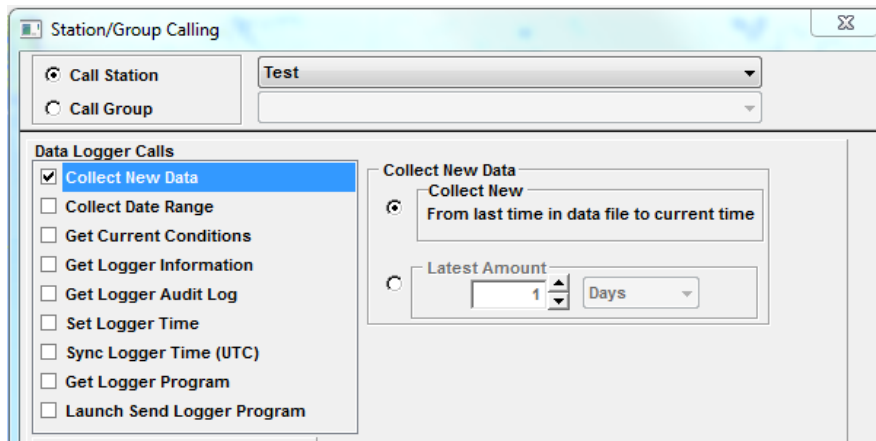
Figure 4-2: Collect New Data

Collect New: When the ***Collect New From Last Time in Data File to Current Time*** radio button is selected, the data call will request the data logger return the data required to bring the station's database up-to-date. Prior to calling the station, StreamTrac queries the station's database for the date and time of the last data entry so that only the information required to update the station's database to the time of the call (as provided by the calling computer's clock) is requested from the data logger.

Note that the ***Collect New From Last Time in Data File to Current Time*** is the type of call that is performed when the station is automatically called by the Calling Service.

Latest Amount: When the ***Latest Amount*** radio button is selected, the data call will request the data logger return a specific time period of the most recent data stored in the data logger (i.e., the last 2 days or the last 3 hours etc.). The date and time of the returned data may or may not coincide with the time shown on the calling computer as the data returned by this call is dependent on the time set in the data logger. The data returned from the data logger is saved in the station's database.

<u>COLLECT DATE RANGE</u>

The ***Collect Date Range*** checkbox is used to request a specific range of data from the data logger by specifying the range start and end times. This type of call can be used to backfill data missing from the station's database (if the data is actually available from the data logger).
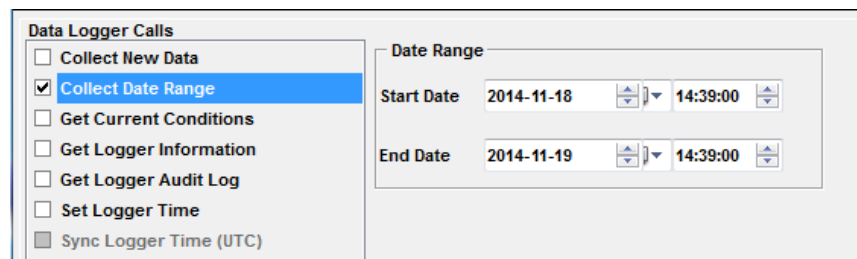
Figure 4-3: Date Range

4.1.3.2   ***Information Calls***

<u>GET CURRENT CONDITIONS</u>

The ***Get Current Conditions*** checkbox is used to request the remote data logger return the data from an immediate reading of the sensors specified in the data logger program. The Current Conditions information returned from the data logger is displayed on the Admin Application's Information Call Results window. Current Conditions data is not saved in the station's database.

GET LOGGER INFORMATION

The **Get Logger Information** checkbox is used to request information about the data logger at the remote site. Logger Information data is not saved in the station's database.

GET LOGGER AUDIT LOG

The **Get Audit Log** checkbox is used to request information about data logger changes and other events such as "Set time" and , "Logger restarted" at the remote site. Audit Log data is not saved in the station's database.

4.1.3.3   *Action Calls*

SET LOGGER TIME

The **Set Logger Time** checkbox is used to set the time of a data logger. The time can be set to the current time of your PC clock or you can set it to a manually pre-adjusted time.
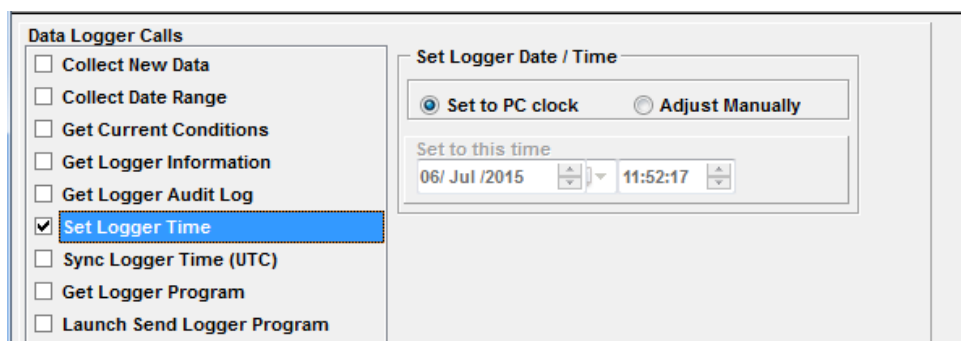
Figure 4-4: Set Logger Time

SYNC LOGGER TIME

Selecting this will synchronize the logger time to the UTC on GPS enabled stations when the station is called.

GET LOGGER PROGRAM

The **Get Logger Program** checkbox is used to download a copy of the data logger program (DLP) to the StreamTrac Database. Once downloaded, a copy will be displayed in the screen, and it can be copied (and other actions) by using the right click function on the mouse. As well, the program will automatically be saved to the Station Set-up and can be viewed from the Datalogger Program tab of the Station Set-up dialog.
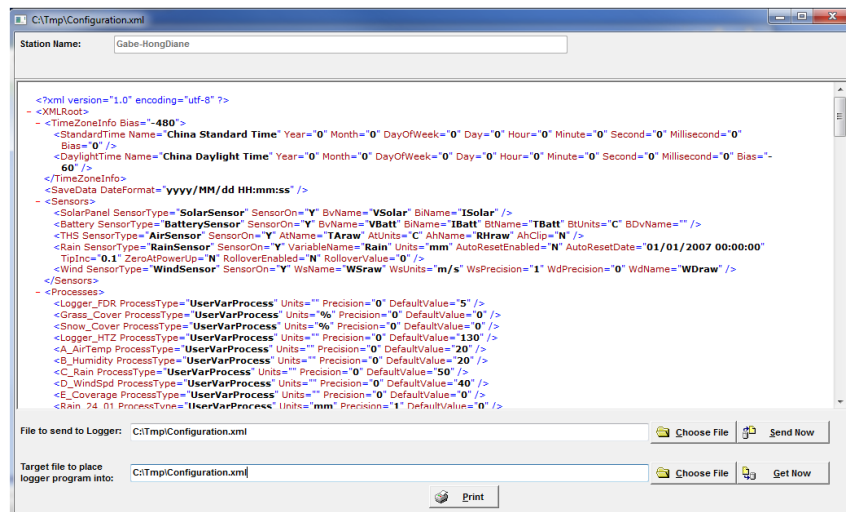
Figure 4-5: Get Logger Program

The datalogger program can also be copied to a different target file if desired. Use the Choose File button to browse to the file then select Get Now.

LAUNCH SEND LOGGER PROGRAM

The **Launch Send Logger** Checkbox is used to send a program to the logger. The same screen used to **Get Logger Program** will open (see above). Use the **Choose File** button adjacent to the **File to send to Logger** field to browse and select the file. Once this step is completed, that data logger program is automatically entered into StreamTrac and the Station Setup>Datalogger Program will be updated. Click on the **Send Now** button to complete the process.

4.1.4   Telemetry Device Calls

Telemetry Device Calls are special calls that communicate with specific telemetry devices located at the remote site, namely the FTS Globalstar (GSNet) satellite modem and the RMX radio modem. These devices have the ability to provide diagnostic and configuration information.

Information retrieved through special calls is only displayed in the StreamTrac Information Call Results window and is not saved in the station's database.
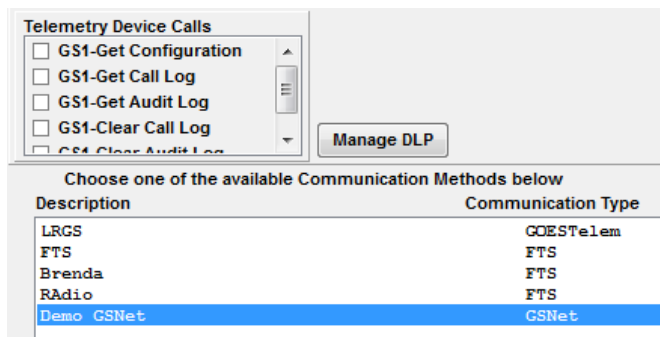
Figure 4-6: Telemetry Device Calls – GSNet

4.1.4.1   *Globalstar Satellite Modem (GSNet)Calls*

The FTS Globalstar Satellite modem can provide its control board configuration information and log files. These features are only available when calling the modem using a GSNet telemetry method.

Refer to the FTS Globalstar Satellite Modem Operating Manual (FTS manual 700-GLOBALSTAR) for detailed information on the FTS Globalstar modem.
When a GSNet communication method is selected, a series of options appears in the Telemetry Device Calls box. Select the desired action from the list.

GS1- Get Configuration: this special call retrieves the remote site's Globalstar modem configuration settings.

GS1- Get Call Log: this special call retrieves the call log file from the remote site's Globalstar modem control board. This file contains time-stamped information regarding the call time and duration of successful communications with the Globalstar modem. Both asynchronous and GSNet calls are recorded in the control board call log. The time set in the control board is used as a reference for these messages.

GS1- Get Audit Log: this special call retrieves the audit log file from the remote site's Globalstar modem control board. This file contains time-stamped messages of what the control board considered to be anomalous events. The time set in the control board is used as a reference for these messages.

GS1- Clear Call Log: this special call empties the call log file from the remote site's Globalstar modem control board. The fact that the call log was cleared is recorded in the control board's audit log.

GS1- Clear Audit Log: this special call empties the audit log file from the remote site's Globalstar modem control board. The fact that the audit log was cleared is recorded in the control board's audit log.

4.1.4.2   *RMX Radio Modem Calls*

The RMX radio modem can provide its configuration information and log files as well as the station identifiers (station IDs) of the other RMX modems to which it can communicate.

Refer to the RMX Radio Modem Transceiver Operating Manual (FTS manual 700-RMX) for detailed information on the RMX radio modem.

When an RMX Radio Modem communication method is selected, a series of options appears in the Telemetry Device Calls box.

RMX – Get Neighbours: this special call causes the remote site's RMX to transmit a query to determine which other RMX units are within its RF range. The remote site RMX returns the station IDs of the RMX units which reply to the query. The returned station IDs are given in hexadecimal format (base 16) as indicated by the 'h' suffix.

This call can be used to build a radio cluster diagram (determine radios paths) as the user can systematically call successive RMX radio modems to determine modem RF connectivity.
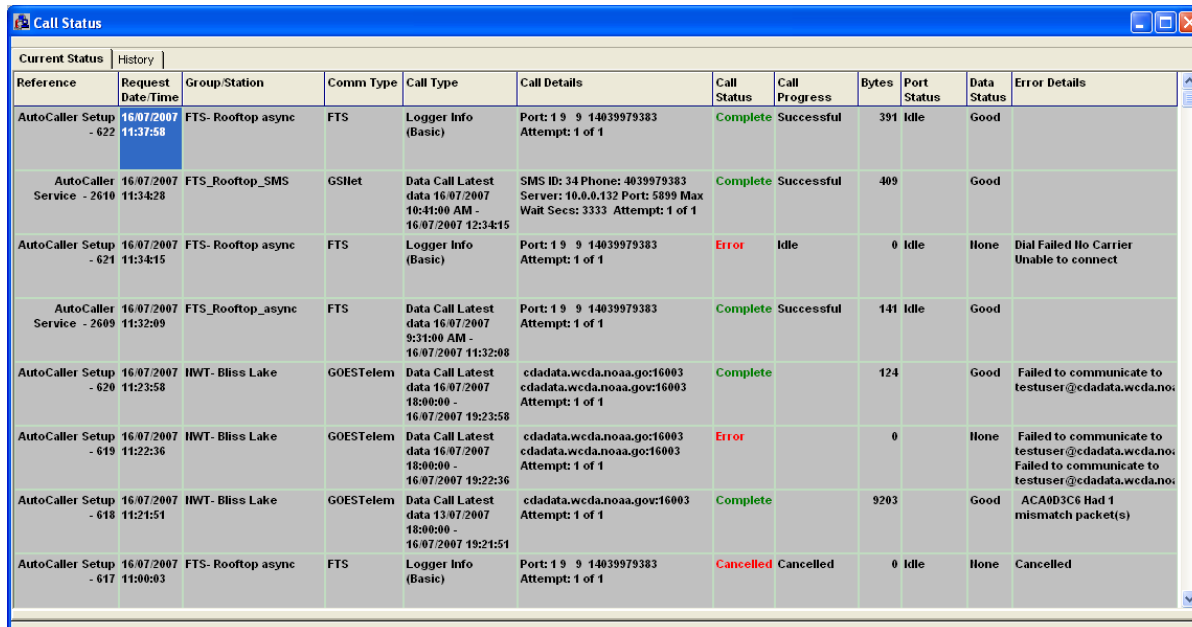
RMX – Get Radio Quality Log: this special call retrieves the radio quality log file from the remote site's RMX. This file contains data regarding the quality of the radio transmissions with neighbouring RMX modems.

RMX – Get Information: this special call retrieves the remote site's RMX configuration settings as well as the current RMX time.

RMX – Get Audit Log: this special call retrieves the audit log file from the remote site's RMX. This file contains time-stamped messages of what the RMX considered to be anomalous events. The time set in the RMX is used as a reference for these messages.

4.2 DATA>SHOW CALL STATUS MENU

The Call Status window is the screen that allows the user to view the status of past, present, and queued station calls. The Current Status tab is automatically updated to show the status of the most recent calls while the History tab allows the user to selectively view previously completed calls.

Figure 4-7: Call Status Screen

4.2.1 Current Status Tab

The **Current Status** tab shows the status of all queued, active, and recently completed station calls. This screen is automatically refreshed from the information in the **StreamTrac Database**. Call Status information for completed calls not shown on the Current Status tab can be viewed using the History tab.

A manually placed call can be cancelled by selecting it (the call background will turn blue), right-clicking the mouse, and then selecting the cancel call option. After canceling a call, it may take a few seconds for the cancelled call's status to change. AutoCaller service calls cannot be cancelled. Other right click functions include:

1) Collect Data: brings up the Data>Collect Data and Telemetry Calls screen for the chosen station

2) Data View: brings up the Data>View/Edit screen for the chosen station

3) Station Set-up: brings up the Stations>Station Setup screen for the chosen station

The Current Status tab has several fields to accurately report the status of each station call. An explanation of each field follows.

Reference: The **Reference** field displays the originator of the call coupled with a unique reference number. This can be either the Calling Service (displayed as AutoCaller Service) or StreamTrac. This field allows the user to distinguish between scheduled AutoCaller calls and manually placed calls.

When RMX radio modems that are part of the same radio cluster are called as a group, the reference number for these calls will be the same as the RMX is able to handle simultaneous data calls.

Request Date/Time: The *Date/Time* field displays the date and time the call was placed into the calling queue.

Group/Station: The *Group/Station* field displays the group and name of the station being called.

Comm Type: The *Comm Type* field displays the whether the call uses regular FTS telemetry, GSNet telemetry or GOES Telemetry to communicate with the remote station.

Call Type: The *Call Type* field displays what information is being requested from the remote station (i.e., Latest Data, Current Conditions, Logger Information, etc.).

Call Details: The *Call Details* field displays specifics of the call to the remote site.

1) For an FTS communication type call this field will display call retry information, the COM port used for the call and, if applicable, the remote site's phone number.

2) For a GSNet communication type call this field will display the ID number of the outgoing SMS e-mail, the remote site's phone number, the GSNet server's IP address and port number, as well as the timeout value (in seconds) for the GSNet call. Call retry information is also displayed; however, GSNet type calls do not support call retries.

3) For a GOES communication type call this field will display the IP address and port number used for the connection to the LRGS database as well as call retry information.

Call Status: The *Call Status* field displays the state of the call to the remote site. One of six messages is displayed in this field (see below).

Queued	:	The call is waiting for a COM port or phone number to become available.
Calling	:	The call is in progress.
Complete	:	The call cycle has been completed.
Cancelled	:	The call was cancelled before the call process was completed. A manual call can be cancelled by the user while a scheduled call will be cancelled by the Calling Service if the call does not proceed in a timely manner.
Retry Wait	:	The previous attempt of this call was unsuccessful and the call is now waiting for its next call attempt.

Call Progress: The *Call Progress* field displays information on each step of the call to the remote site (i.e., initializing modem, dialing, etc.).

Bytes: The *Bytes* field displays the number of bytes received from the remote site. The received bytes can be data or error message information from the remote station.

Port Status: The *Port Status* field displays the state of the COM port during the call. This field is only used when communication is through a telephone modem.

Data Status: The *Data Status* field displays the state of the data received from the remote site. One of three messages is displayed in this field (see below).

Good	:	Data was successfully retrieved from the remote station.
None	:	No data was received.
Invalid	:	The returned bytes did not contain valid station data.

4.2.2   *History Tab*

The *History* tab shows the status of all station calls (manual and automatic). The History tab has several filters which enable the user to selectively view station call information. After entering the desired filter information the StreamTrac will update the History screen after approximately 2 seconds or the user can immediately manually update the screen by clicking either of the refresh icons
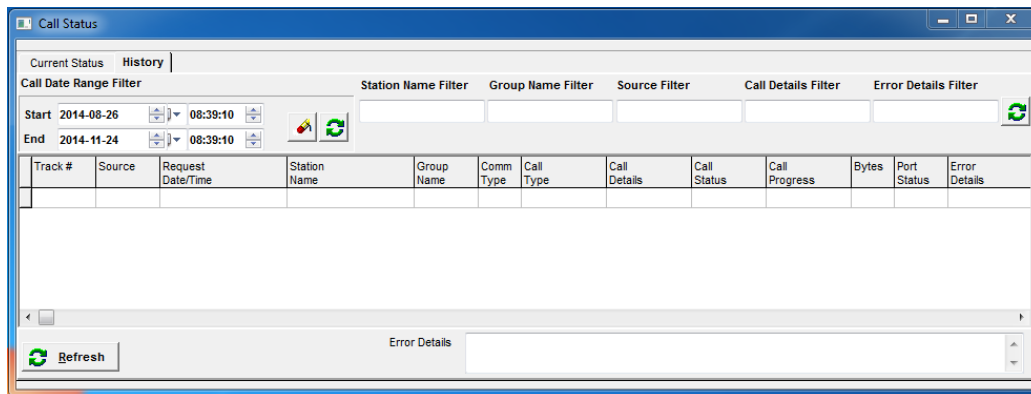
Figure 4-8: Call Status History Tab

In addition to filtering the station call information, the information can be sorted by clicking on any of the *History* tab Field Headings.

4.2.2.1   *Call Information Filters*

Six filters are available to allow the user to selectively view call information. The filters work in conjunction with each other, only calls which match all filter requirements will be displayed. If a filter is left blank, it will be ignored in the sorting criteria.

Call Date Range Filter: this filter allows the user to select the date range of the calls that the user wishes to examine. This filter requires that a start and end date be specified (note that the end date can be in the future).

Station Name Filter: this filter allows the user to select which station(s) calls appear in the History tab. The Station Name filter can be a partial string so that stations with similar names can be displayed at the same time.

Group Name Filter: this filter allows the user to select which station group(s) calls appear in the History tab. Like the Station Name filter, the Group Name filter can be a partial string so that station groups with similar names can be displayed at the same time.

Source Filter: this filter allows the user to select whether to display manually generated calls (StreamTrac) or scheduled calls (AutoCaller Service) in the History tab. If this filter is left blank, both manual and scheduled calls will be displayed.

Call Details Filter: this filter allows the user to isolate the details of the calls that are displayed. For example, the user could choose to display only calls on a certain COM port or calls to a certain telephone number.

Error Details Filter: this filter allows the user to only display calls with certain errors. For example, the user could choose to display all calls that required more than 1 attempt.

4.2.2.2   *History Fields*

The History tab has several fields to accurately report the status of each station call. Many of the fields contain the same information as the Current Status tab; however, the History tab does have additional fields. Fields in the History tab may be rearranged (drag and drop the Field Heading) to suit specific needs. An explanation of each Field Heading follows.

Track #: The **Track #** field displays a reference number unique to the method in which the call was made (manual call via StreamTrac or scheduled call via the AutoCaller Service). This reference number is the same as the number shown in the **Reference** field of the Current Status tab.

Source: Like the Reference field on the Current Status tab, the **Source** field displays the originator of the call; either the Calling Service (displayed as AutoCaller Service) or StreamTrac.

Request Date/Time: The **Request Date/Time** field displays the date and time the call was placed into the calling queue. This field is the same as the Date/Time Field on the Current Status tab.

Station Name: The **Station** field displays the name of the station being called. This field displays the station name portion of the Group/Station Field on the Current Status tab.

Group Name: The **Group** field displays the group of the station being called. This field displays the group name portion of the Group/Station Field on the Current Status tab.

Comm Type: This field is the same as the Comm Type Field on the Current Status tab.

Call Type: This field is the same as the Call Type Field on the Current Status tab.

Call Details: This field is the same as the Call Details Field on the Current Status tab.

Call Status: This field is the same as the Call Status Field on the Current Status tab.

Call Progress: This field is the same as the Call Progress Field on the Current Status tab.

Bytes: This field is the same as the Bytes Field on the Current Status tab.

Port Status: This field is the same as the Port Status Field on the Current Status tab.

Error Details: The **Error Details** field displays specifics errors that occurred during the call process. If the call has multiple retries then successive error messages are appended and displayed in this field. This means that even though a call retry successfully retrieves data, the Error Details field will still display an error message from the previously failed call attempt. This information is repeated in the Error Details box at the bottom of the screen.

Attempt #: The **Attempt #** field displays a count for the number of attempts made to collect the data. This field is useful for identifying stations whose communications may be problematic (i.e., perhaps a poor radio link or telephone line).

Max Attempts: The **Max Attempts** field displays the number of attempts allowable to collect the data. This field identifies how many retries are allowed for a specific station call (i.e., if a call is allowed 2 retry attempts then the Max Attempts field will display 3 – one original call plus 2 additional retries in the event of communication failures).

Actual Port Used: The **Actual Port Used** field displays the actual COM port used for the station communications. This field is useful when the user has a pool of modems that can be used to call stations as it identifies which COM port was used to make the station call.

Call Start Date/Time: The *Call Start Date/Time* field displays the date and time the station calling process was actually started.

Call End Date/Time: The *Call End Date/Time* field displays the date and time the call to the station was completed.

Data Status: This field is the same as the Data Status Field on the Current Status tab.

Origin PC: This field provides information on which PC originated the call.

User Name: This field provides information on which user originated the call.

4.3 DATA>VIEW/EDIT MENU

The **View/Edit** menu allows users to examine and edit the data retrieved from remote monitoring stations. The View/Edit window is used to select a station from the **Select Station** pull-down list. The data will be displayed in tabular form (with rows and columns). The date and times are displayed down the left side of the screen and the abbreviated data field names are across the top.

The displayed data can be filtered using specific data fields and operators, or by using a variety of chronological filters. After selecting a desired data range and/or setting a data field filter, the data should updated by using either of the screen's Refresh icons ![refresh icon] .

Additionally, a series of Action Buttons enables common actions to be initiated or modified from this screen (ie: running/modifying calculations or adding/clearing forecasted data)
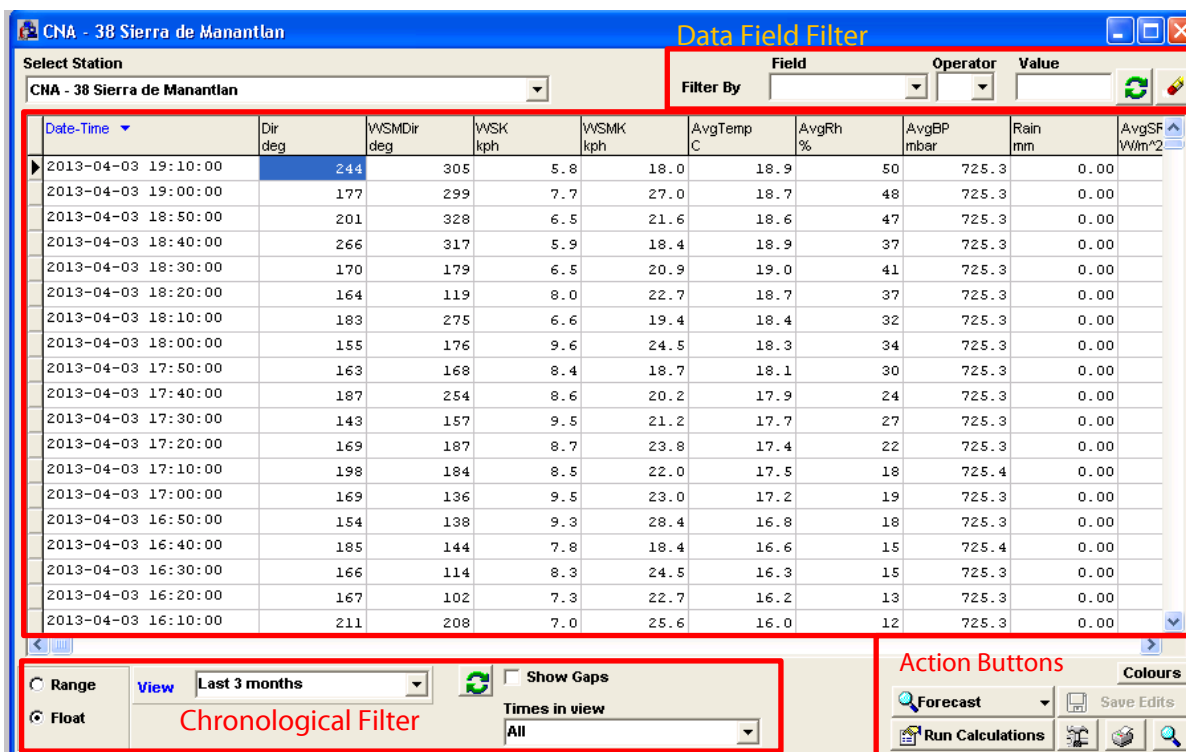
Figure 4-9: View Data Screen

The data will appear in a variety of colours indicating the state of the data (normal, changed, editing, deleted, selected, raw, or forecast). The colour code can be viewed by selecting the Colours button at the bottom right corner or to bring up the Column Control Panel (see the following section).

The fields with the _Raw suffix whose data values appear in red are locked in the database and cannot be changed. They are retained as a record of the original data from the data logger. All other values can be edited by clicking in the field then entering a new value.

In addition to editing the data colours, the Data Table can be manipulated to suit individual requirements (see Figure 4-10). Column locations can be re-arranged by dragging the column headings and dropping them in the desired location in the table. This can also be done by using the Column Control Panel (see the following section).

Normally data is displayed in descending chronological order; however, the data can be sorted by clicking on any data field heading on the Data View screen and using the up or down arrow beside the data field heading to toggle between ascending or descending order.

Regions can be selected by clicking and dragging the mouse over a region or by using the Column Control Panel (see the following section). Only single columns or regions within a single column can be selected. Once a region is selected the data can be copied or cut and pasted into a different column by right clicking and using the Column Control Panel (see the following section).
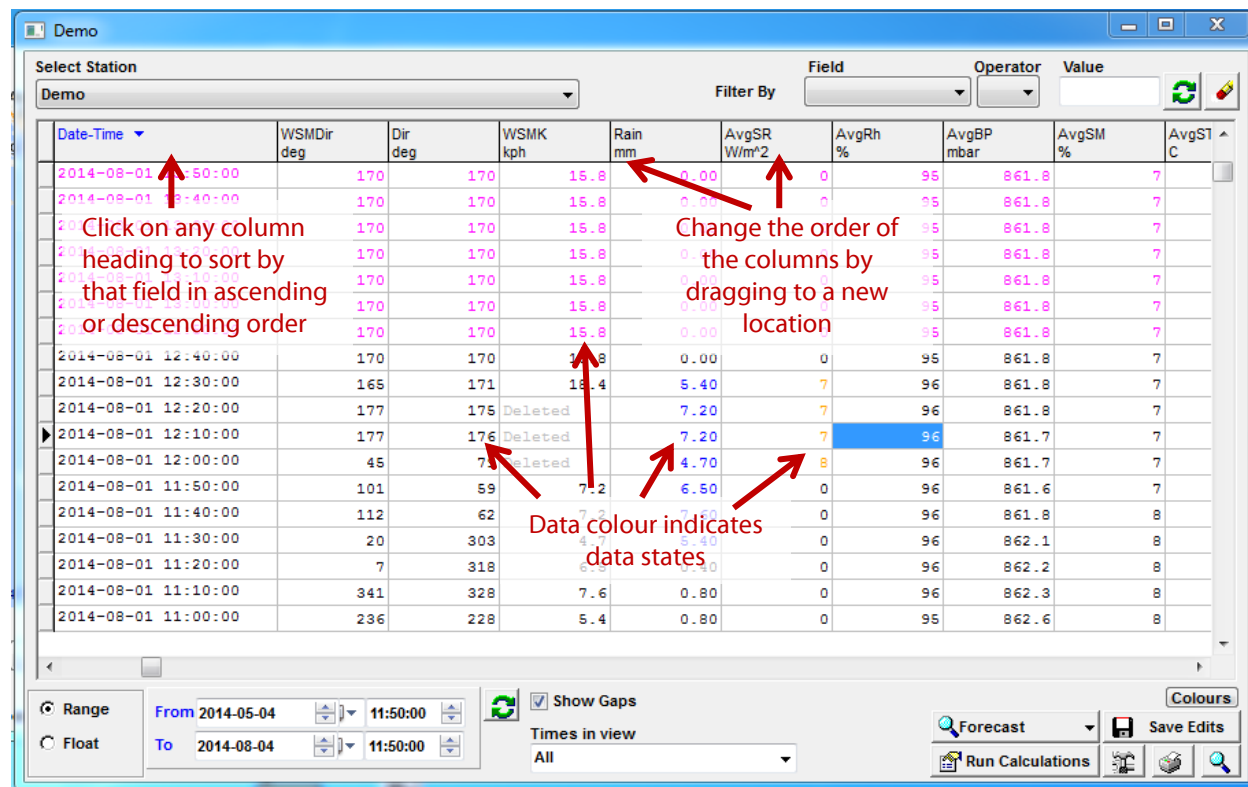
Figure 4-10: Sorting Data

4.3.1 Data Field Filter

The Data Field filter allows the user to further refine the station data that is displayed. The Data Field filter is a simple filter as it only filters based on one data condition on one station data field.

Field: this drop-down selection box selects which one of the station's data fields will be used as the filter.

Operator: this drop-down selection box selects the action to perform on the data field. The available mathematical operator choices are:

- equal to (=)
- less than (<)
- less than or equal to (<=)
- greater than (>)
- greater than or equal to (>=)

Value: this entry box allows the user to enter a number to set the desired filter value.

Clear Filter: this icon deletes the data filter settings to allow all data to be displayed.

4.3.2 Chronological Filter

Station data can be viewed in one of two ways: by specifying a specific date and time range, or by selecting a more general "floating" range from a drop down menu.

Range

The *Range* button enables the From and To selection boxes so that specific dates and times can be selected. Dates are selected by left clicking on the month, day or year portion of the date, and then using the up and down arrows to select the desired number. Right clicking in either selection box will provide a drop down menu with the following automatic date selection options: Today, First Date in File, Last Date in File, and Beginning of Month.

Note the dates are displayed in month/day/year format, and times are displayed using the 24 hour clock.
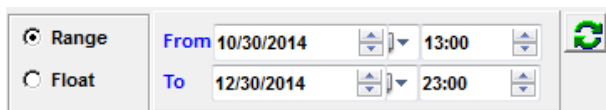
Figure 4-11: Range date selection

Float

The *Float* button enables the View selection box with specific time periods in a drop down menu. The user may input a period of their choosing (i.e., Last 65 days, Last 6 hours).
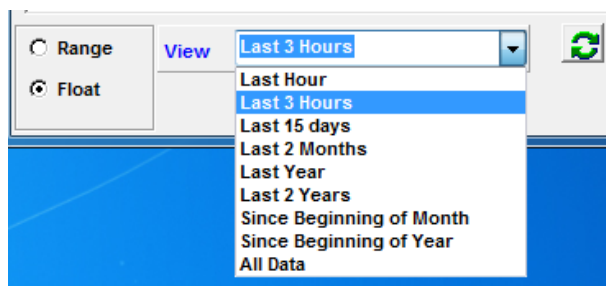
Figure 4-12: Float Time Options

Times in View

The *Times in View* drop down selection box is used to select which data from the database to view. The user may select from the dropdown choices or can modify one of the choices so that only the desired data is displayed.
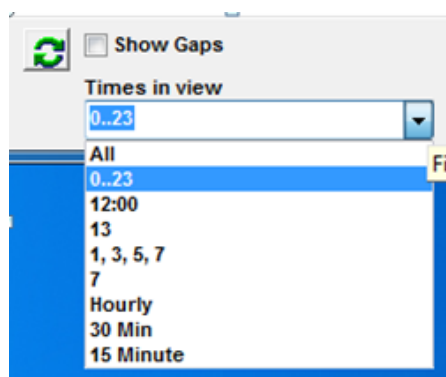
Figure 4-13: Times in View
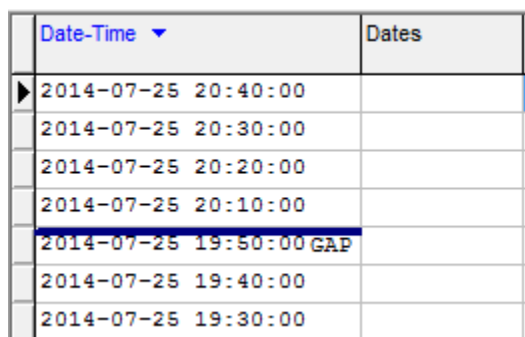
There are nine drop down menu items:

ALL	Will display all times of day
0..23	Displays only hourly data from midnight until 11 p.m. (23:00)
12:00	Displays only noon data
13	Displays only 1 p.m. data (13:00 on the 24 hour clock)
1,3,5,7	Displays only hours 1 a.m., 3 a.m., 5 a.m., and 7 a.m.
7	Displays only 7 a.m. data
Hourly	Displays only hourly data for each of 24 hrs
30 Min	Displays will be every thirty minutes starting on the hour
15 Min	Displays will be every fifteen minutes starting on the hour

To input a customized time remember that times use the 24 hour clock. Also, a specific time can be viewed by placing a colon in the format (i.e. 08:30 will view only 8:30 a.m. data).

Show Gaps

The *Show Gaps* checkbox enables visual markers in the station's data which indicate that there is data missing (a gap) between two data points. StreamTrac determines if there is a data gap by examining the data point time interval. In the example, the data is on a 10 minute interval and StreamTrac has indicated the gap where the 20:00:00 data should have appeared with a thick blue line and annotated it with the word GAP.

Figure 4-14: GAP indicator

4.3.3 *Action Buttons*

There are several Action Buttons at the bottom right corner of the screen which can be used to edit the screen appearance, perform and edit calculations, and view and print data.

Save Edits: any editing to the data table which was undertaken will be saved by selecting this button.

Run Calculations: selecting this will run any calculations which have been setup using the STATIONS> STATION SETUP> CALCULATIONS .

Modify Calculations: selecting this icon [ ] displays the calculations for the current station. The Calculations Screen can also be reached from the Station Admin screen via the Stations>Station Setup>Calculations tab.

Print Data: selecting this icon [ ] prints the data as it is displayed on the View Data screen.

Print Preview: selecting this icon [ ] displays how the data will be printed.

Colours

The data will appear in a variety of colours indicating the state of the data (normal, changed, editing, deleted, selected, raw, or forecast). The colour code can be viewed by selecting the Colours button at the bottom right corner to display the Set View/Edit Colour window or right clicking to bring up the Column Control Panel (see the following section). Clicking on a particular square will display a Color chart which can be used to customize the colour selections.

Note that the default colours for Raw and Normal values (red and black respectively) cannot be edited.
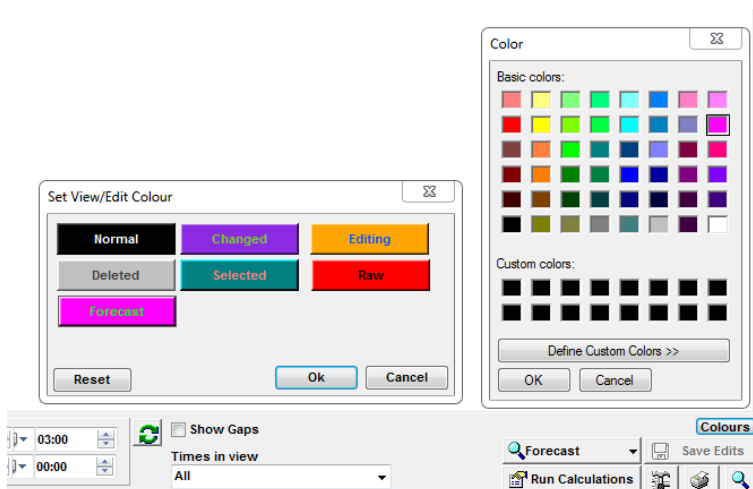
Figure 4-15: Data Colours

4.3.4 Forecast

StreamTrac will allow you to enter estimated forecast data for a maximum of 72 hours into the future. Select the desired forecast **Start** and **End** date and times.

Forecasted data will be overwritten as new real data is collected with no record kept of the forecasted data.

Figure 4-16: Create Forecast Data screen

Data Interval: Input the desired data interval

Fill Style: Select the Fill Style from the two options:

    1)   Fill With Historical Data: this option will automatically fill the future records from the most recent data from the past;

    2)   Fill with Blanks: this option provides blank records which can be filled in manually

Forecasting can also be done using the Column Control Panel. See the Column Control Panel section for details.

4.3.5 Column Control Panel

In addition to the filters and display manipulation discussed previously, the Column Control Panel provides a drop down menu of a variety of options to customize how the station's data is displayed or edited. To display the Column Control Panel, right click on the Data Table. The options included in this panel include:

    1)   selecting which sensor's data to view;

    2)   editing data; and

    3)   launching select Station Admin menus.
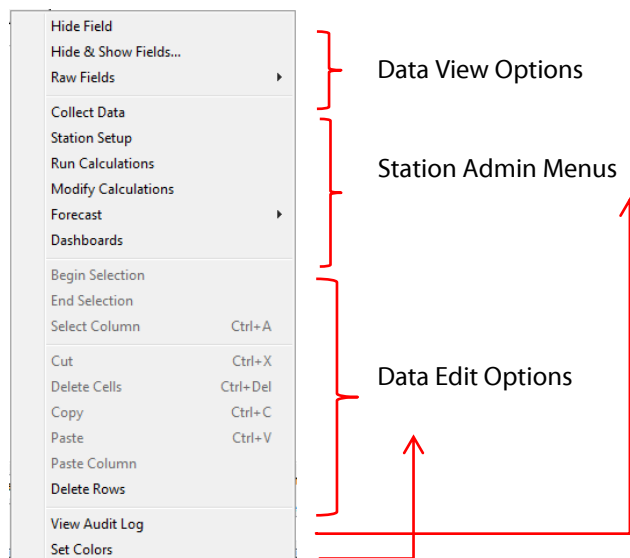
Figure 4-17: Column Control Panel

4.3.6 Data View Options

Data Columns can be displayed or hidden by right-clicking within the column to display the column control panel. Selecting Hide Field will remove that column from the display.

To hide or display several data fields, select Hide and Show Fields. A detailed Manage Data Columns will appear.
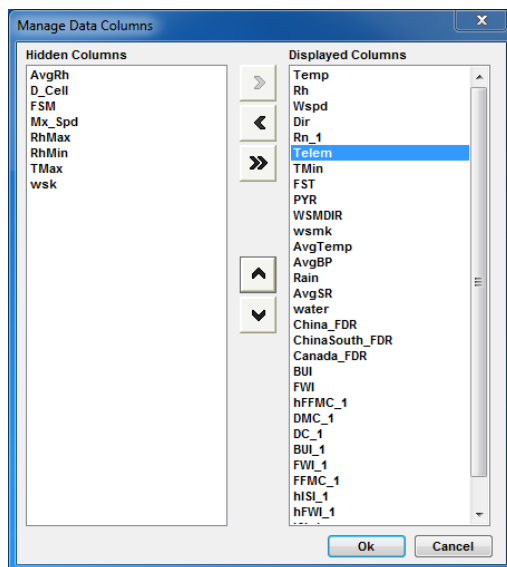
Figure 4-18: Manage Data Columns Menu

Move a field between the two columns by selecting it (it will be highlighted in blue) and using the **move left (<)** and **move right (>)** arrows accordingly. The **Move all (>>)** arrows will move all field from the Hidden Columns to the Displayed Columns. Several fields can be selected by holding the mouse down and dragging it over the selections.

To re-order columns, first select the field or group of fields you wish to move then click the up arrow to move them up in the list or down arrow to move the fields down in the list. The top field will be the left most field

displayed in the **View/Edit** screen. Clicking **OK** will save any changes you have made. If you do not wish to save your changes click **Cancel** instead.

Raw Fields can be hidden or displayed by selecting the Raw Fields drop down menus. Select Hide Raw Fields or Show Raw Fields as desired.

4.3.7   Data Editing Options

The Data Edit options on the Column Control Panel provide a means of selecting, deleting, copying, and cutting and pasting data. Move the cursor over the desired field and right click. The field will be highlighted in blue and the Column Control Panel will be displayed. Left click on the desired edit option in the Column Control Panel then right click on the field to be edited. Left click on the desired edit option from the Column Control Panel to complete the action.

Use the Set Colours menu item to customize the data colours. See the previous Action Buttons – Colours section.

4.4 DATA>SHOW INFO CALL MENU

The Information Call Results window displays the information returned from station information calls. Information returned from a Current Conditions, Logger Information, or Special Call is displayed as the data is retrieved and will remain displayed until information from subsequent calls 'pushes' the older data off the bottom of the window. The user can clear the Information Call Results window by pressing the Clear button at the bottom of the window.

Information made from these calls is not stored in the database.
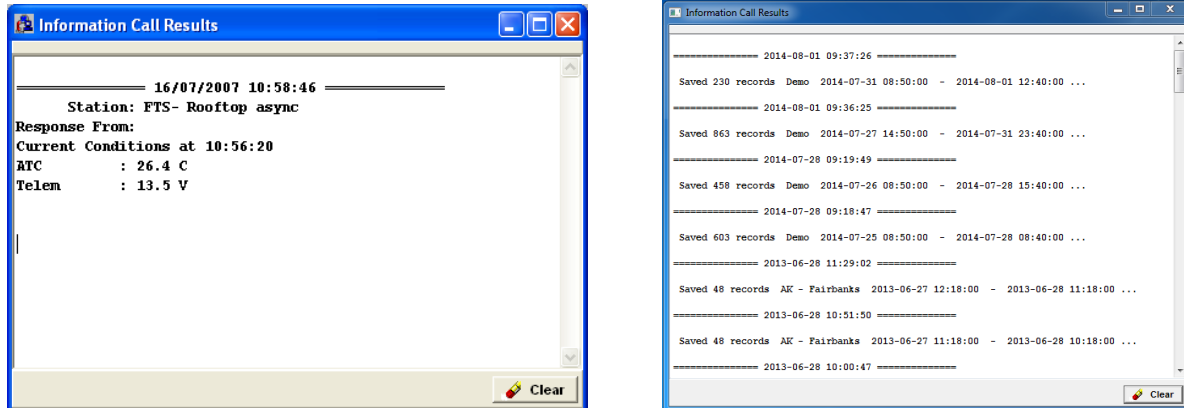
Figure 4-19: Examples of Different Information Call Results Displays

Clear: this icon ![Clear] clears the Information Call Results window. No station data is deleted during this operation, only the information on the display is cleared.

4.5 DATA>IMPORT MENU

The **Import Data** menu permits the importation into the StreamTrac database of additional data from CSV, Text, and Campbell Scientific formats. To import data it is necessary to create a template which contains information on what fields are to be imported and how the import is to be done.

4.5.1   Creating an Import Template – CSV and Text

Selecting Data>Import>CSV & Text will display the Import Template menu. Use the drop down menu to select the Target Station (Step 1). This is the Station's name in the database to which the data will be imported. Use the Browse button to select the file for importation (Step 2).
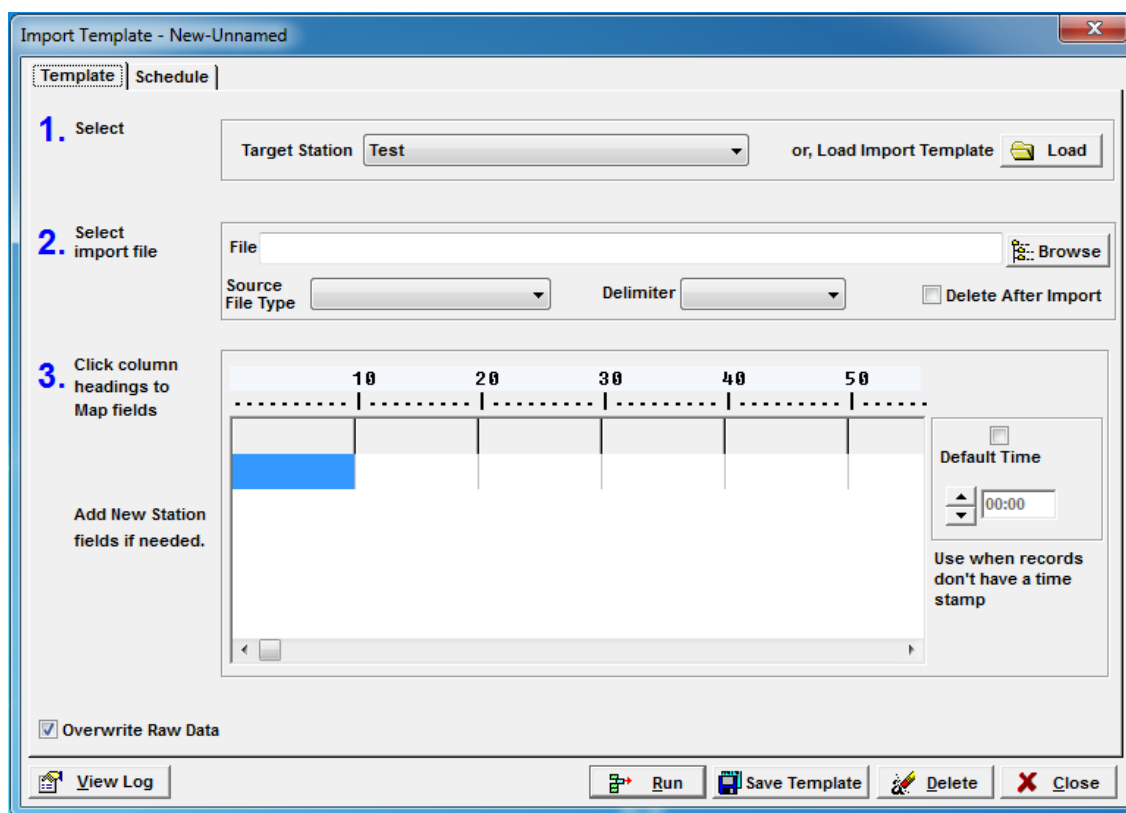
Figure 4-20: Import CSV Template

Source File Type: After selecting a source file, use the Source File Type drop down menu to select the appropriate source file type.
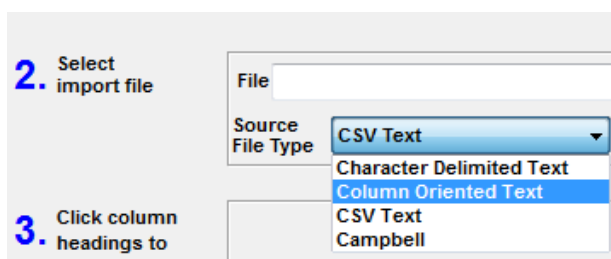
Figure 4-21: Source File Type drop down menu

There are four choices:

Character Delimited Text: Columns are separated by a specified character. Note: In some cases, you may have to change the character the program uses to identify column separations (i.e. from comma to asterisk). This is done using the Delimiter drop down menu to the right of the data column window.
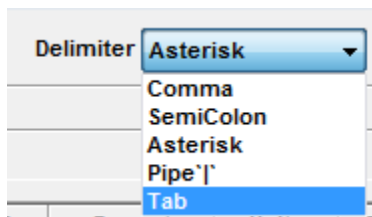
Figure 4-22: Delimiter drop down menu

Column Oriented Text: Column widths are defined by manipulating the column control in the "Map data columns to station fields" table.

CSV Text: Comma Separated Variable. This is the same format StreamTrac exports into, it is very straightforward to setup for data import.

Campbell: See Campbell Scientific section below.

4.5.1.1 *Mapping the Fields*

The data fields to be imported are mapped using the following procedure.

Right-click on each column of data in the Field Definitions window and select a field from the station's shell records using the drop down menu. If applicable, the field units should also be selected.
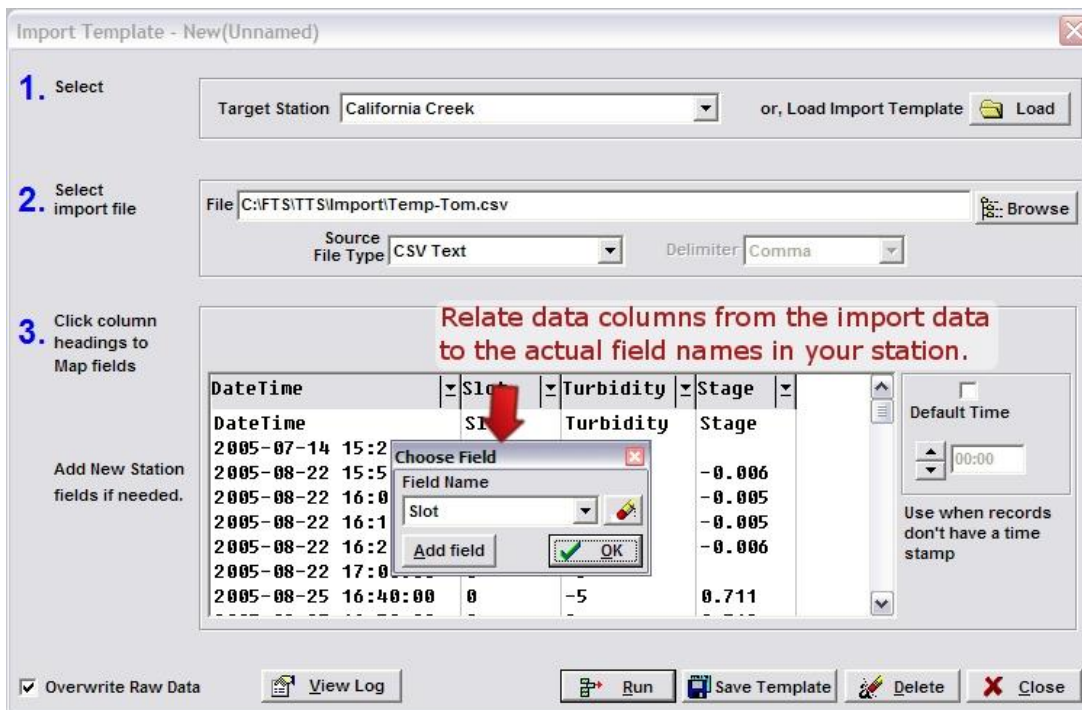
Figure 4-23: Import Template dialog

In the event that the import data has a field which does not exist in the selected station's shell records, it can be added directly by clicking on the Add Field button. There is no need to modify that station using the Stations Menu.

4.5.1.2 *Formatting Date/Time*

Any chronological field selected must be formatted for the date and time. Use the drop down Field Format menu and select the desired format.
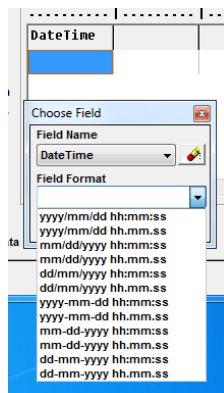
Figure 4-24: Date-Time Formats

Default time checkbox: when the records contain only dates and no time, this can be selected and a default time input. In such a case the data will be time stamped with the date and default time when it is saved to the database.

Overwrite Raw Data: when selected, any raw data will be overwritten

View Log: selecting this will display the Import History Log. The Import History Log is a record of events and errors which occurred when importing data

Run: once the template is complete, selecting this will import the data

Save Template: saves the template to a source file

Delete: deletes the template from the source file

Close: closes the template.

4.5.2 *Creating an Import Template – Campbell Scientific (1)*

There are two ways to create an Import Template for Campbell Scientific data files. Steps 1 and 2 are completed the same as for a CSV and Text Template. However, once Campbell is selected from the Source File Type drop down menu, Step 3 is replaced with the Campbell Field Arrays box.
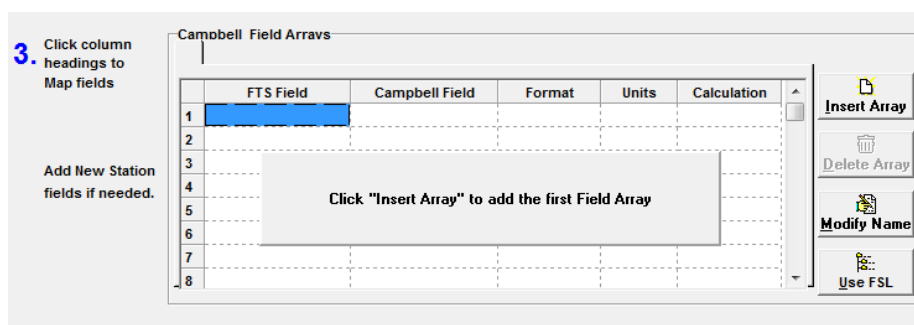
Figure 4-25: Campbell Scientific Import Template

Any number of Field arrays can be defined using the Insert Array button and will appear as tabs at the top of the section.
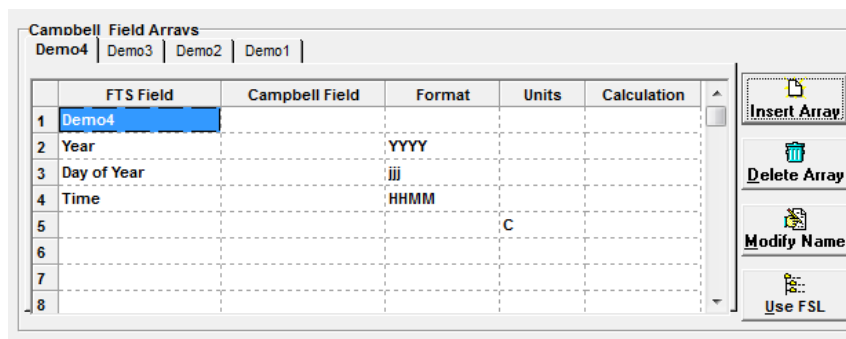
Figure 4-26: Field Array Tabs

Insert Array: select this to add a Field Array. Follow the prompt to name it. The Year, Day of Year, and Time fields and their formats are automatically entered.

Delete Array: use this to delete an array. Ensure you have selected the click on the tab of the desired array, and then select Delete Array

Modify Name: use this to change the name of an array

Use FSL: the FSL (Final Storage Label) is a Campbell Scientific template which can be copied (template) to the array. It will overwrite the template. Follow the prompts to browse for the FSL.

4.5.2.1 ADDING AN FTS FIELD

To add a field, left click in the FTS column and use the drop down menu to select a field. Note that the drop down arrow is offset to the right from the associated field.
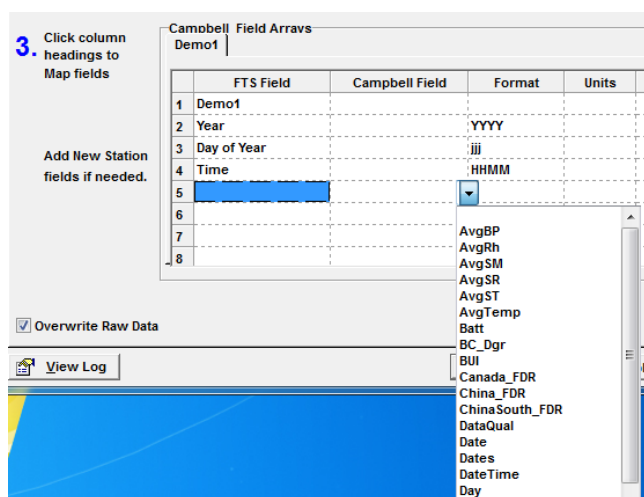
Figure 4-27: Adding an FTS Field

4.5.2.2 CAMPBELL FIELD

The associated Campbell Field name which matches the FTS Field name must be manually inserted in this column.

4.5.2.3 FORMAT

The format field can be left blank in which case all of the decimals in the number will be imported. The number of decimals can be limited by the format strings consisting of the letter "d" mirroring the desired format of the number. For example dddd.dd will limit the size of the number to 4 digits with 2 decimal places.

4.5.2.4 UNITS

Left clicking in this column will bring up a drop down menu arrow (offset one column width to the right). Make a selection form this list or type in units which do not appear in the list.

4.5.2.5 CALCULATION

Selecting a space in the Calculation column will display the Calculation Editor. This can be used to perform basic calculations using the data in that field.
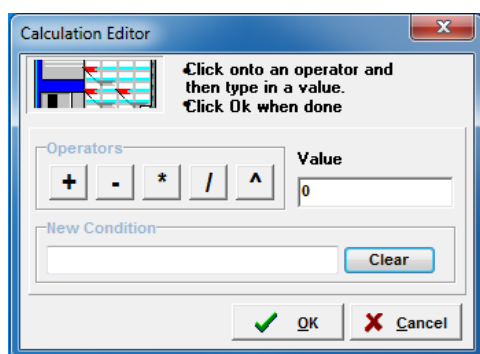
Figure 4-28: Calculation Editor

4.5.3 Creating An Import Template – Campbell Scientific (2)

The second way to create a Campbell Scientific template is to select **DATA>IMPORT>CAMPBELL**. The following import wizard specially designed to deal with Campbell Scientific data files will be displayed.
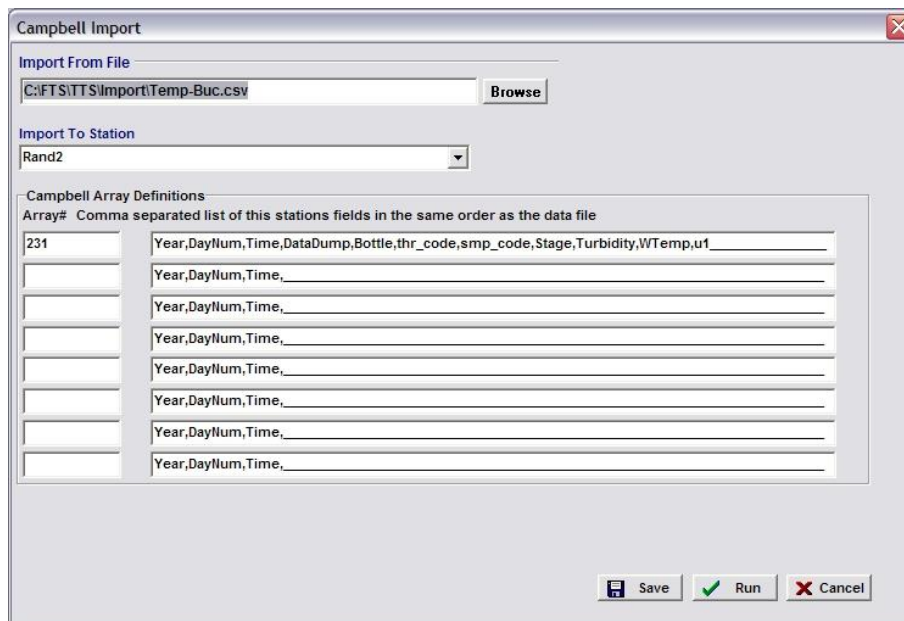
Figure 4-29: Campbell Import screen

First a source file from which to import from must be selected. Use the **Browse** button to browse to the file's location, select the file, and click **Open.**

Next, select the station to receive the imported data using the drop down menu.

To set up the import template, the different arrays in the Campbell Scientific data files must be identified by using the array tags. Care must be taken to ensure the correct array tag is identified and to distinguish the data in each array for some arrays, although similar, may not be exactly the same.

Array#: this must be filled with the identifying number for each data array on the Campbell file.

Year, DayNum, Time,: these fields are automatically entered

Blank Fields: fields which are meant to come after the Year,DayNum,Time, fields must be manually input. This is done by typing the exact name of the field (for the station being imported to) that the data will be entered into followed by a comma. There are no spaces between data field names and commas.

> Important Note: If there is a field in the source file you would like to skip, you must still enter a comma, but do not enter a field name.

> Example: Year,DayNum,Time,Stage,Turbidity,,Pressure

> This would enter data from the first five columns of the Campbell Scientific file into the fields **Year**, **DayNum**, **Time**, **Stage** and **Turbidity**, but would skip the sixth column and enter data from the seventh into the **Pressure** field.

4.6 DATA>EXPORT MENU

The Export Data menu allows the users to export your station or group of stations to CSV or XML files. Furthermore, these exports can be performed on an un-attended scheduled basis using the FTSExporter service. The basis of the export system is the "Export Template" which is a way to define and then save an export definition for later use by the user or to be used by the export schedule service to perform un-attended exports.

4.6.1 Manage Existing Export Templates

Selecting Data>Export will display the "Export Template" screen which is used to define and save an export definition for later use either by the user or to be used by the export schedule service to perform un-attended exports.
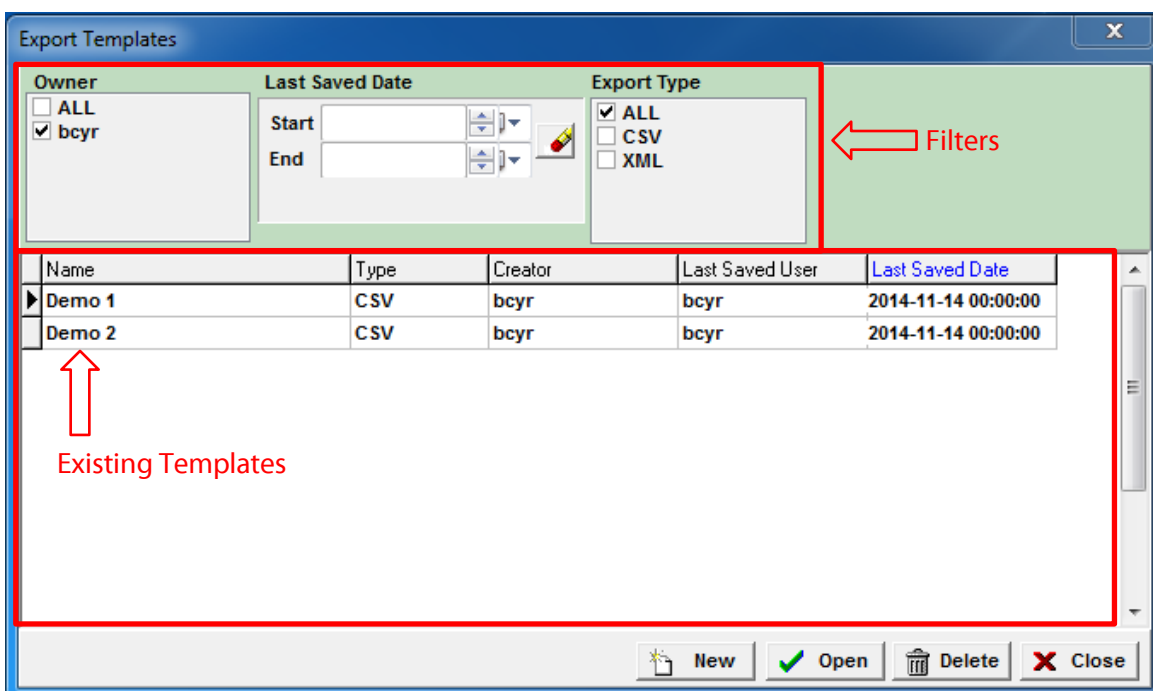
Figure 4-30: Export Templates Screen

From this screen, existing templates can be viewed, edited and deleted, and new templates can be created. The existing templates can be sorted by double clicking on the header to change from descending to ascending order, and vice versa.

To view and edit an existing template, double click on it. To create a new template, select the **New** button.

The templates can be filtered by Owner, Last Saved Data and Export Type. The filter will refresh in about 2 seconds after the last keystroke.

4.6.2 *View/Edit/Create Export Templates*

Double clicking on an existing template or selecting the New button will display the Export Template screen.
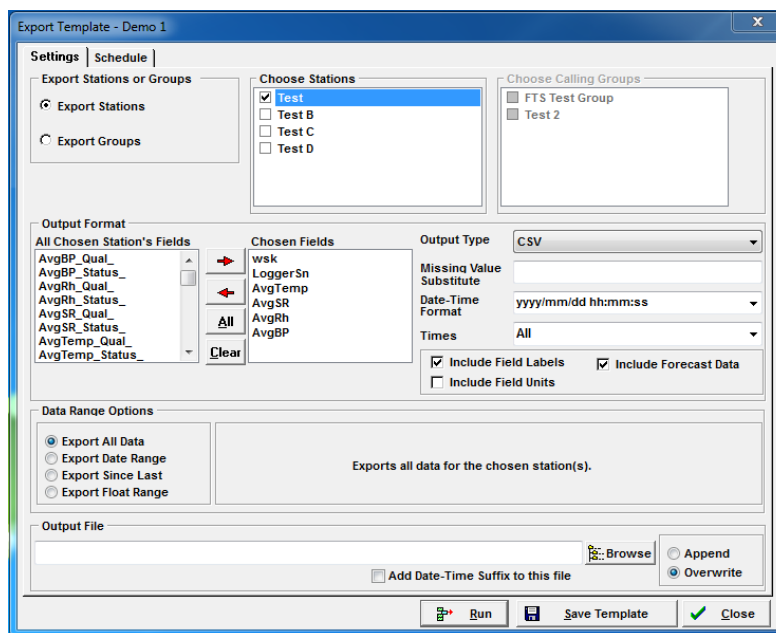
Figure 4-31: Export Template Settings

4.6.2.1 *Settings Tab*

Export Stations or Groups: use the radio buttons to select the desired option. The appropriate Choose Stations or Choose Calling Groups will become active. Select which station(s) or group(s) to export.

Note: The selection made here will determine what fields are available in the All Chosen Station's Fields box below. Failing to choose a station or group will result in an empty box.

OUTPUT FORMAT

All Chosen Station's Fields: The box will contain all the available fields within the selected stations or groups. Fields that are not a part of the station choices will not appear here. Move items between the All Chosen Fields column and the Chosen Fields column by clicking on the desired field then using the left and right arrows as appropriate.

Chosen Fields: The fields in this box are the only data fields that will be exported. They will be exported in the order that they appear from top to bottom and appear from left to right in the CSV data file. All fields will remain in the same column number. Therefore, if a field is not valid for one of the chosen stations, then an empty cell will appear on that station's line in place of that field. This rule will maintain CSV column integrity while allowing multiple stations to be exported to a single file.

Note: The first two columns of all CSV exports will be the station name followed by a comma then the date and time value for each record.

Output Types: Use the drop down menu to select either CSV, XML, or XML Custom for the data output.

A) **CSV (Comma Spaced Variable)** is defined as a single line for each data record with each field on the line separated by commas. Output lines will contain a mandatory station name field followed by a date-time as the first two columns, then followed by each of the selected fields in the order as they appear (top to bottom) in the chosen fields box.

B) **XML** output is a fixed format where all fields for each record contain a field name tag. Every selected record will appear but empty fields for each record will not.. Example:

```
<?xml version="1.0" encoding="UTF-8" ?>
- <dataroot xmlns:od="urn:schemas-microsoft-com:officedata" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
      instance" xsi:noNamespaceSchemaLocation="TestXML.xsd" generated="2008-06-25T09:10:22">
  - <FTS_Rooftop_async>
        <DateTimeNum>2008-04-24T10:40:00</DateTimeNum>
        <ATC>11.2</ATC>
        <LoggerSn>1006</LoggerSn>
        <Telem>14</Telem>
        <ATC_Raw_>11.2</ATC_Raw_>
        <Telem_Raw_>14</Telem_Raw_>
    </FTS_Rooftop_async>
  - <FTS_Rooftop_async>
        <DateTimeNum>2008-04-24T10:50:00</DateTimeNum>
        <ATC>11.3</ATC>
        <LoggerSn>1006</LoggerSn>
        <Telem>13.9</Telem>
        <ATC_Raw_>11.3</ATC_Raw_>
        <Telem_Raw_>13.9</Telem_Raw_>
    </FTS_Rooftop_async>
  - <FTS_Rooftop_async>
```

XML output will also create an XML Schema file with the same name as the output file with the extension "XSD"

C) **XML Custom** is a specific XML format designed to meet the particular needs of a limited user group. An example of its format follows.

```
<?xml version="1.0" encoding="UTF-8"?>
<message>
    <station>Demo</station>
    <date>2013/12/29 22:40:00</date>
    <missing></missing>
    <met>
        <AvgRh>29</AvgRh>
        <AvgBP>856.2</AvgBP>
    </met>
</message>
<message>
    <station>Demo</station>
    <date>2013/12/29 22:50:00</date>
    <missing></missing>
    <met>
        <AvgRh>30</AvgRh>
        <AvgBP>856.3</AvgBP>
    </met>
</message>
<message>
    <station>Demo</station>
    <date>2013/12/29 23:00:00</date>
    <missing></missing>
    <met>
        <AvgRh>32</AvgRh>
        <AvgBP>856.5</AvgBP>
    </met>
```

Missing Value Substitute: This field is only relevant to CSV files. Input the desired character to be used to indicate a missing value. If left blank a missing character will be indicated by two commas in succession.

Date Time Format: This box determines how the date-time is formatted to the CSV file (date-time always starts at the second column of the CSV). Use the drop down menu to select from the standard formats or type directly into the text area of the box to create unique date and time formats. Placing commas between the date and time characters will cause them to be placed into separate columns in the CSV. For example:

Example #	Date-Time Mask	CSV Output Example
1	yyyy/mm/dd hh:mm:ss	StationName,2008/06/20 09:45:00,data1,data2 …..
2	mm dd yyyy hh:mm:ss	StationName,Jun 20 2008 09:45:00,data1,data2 …..
3	mm dd yyy, hh:mm:ss	StationName,Jun 20 2008,09:45:00,data1,data2 …..
4	yy,mm,dd,hh:mm	StationName,08,06,20,09:45,data1,data2 …..

Times Box: The purpose of this box is to filter the data records based on time of day. Only records that meet these criteria will be exported. There are nine selections in the drop down menu, or a custom time selection can be typed in the box. Note that times reflect the 24 hour clock. For a specific time, type the complete time in using a colon (i.e. 16:40).

The Drop down selections are:

ALL	Will display all data recorded at times
0..23	Exports only hourly data for each of 24 hours
12:00	Exports only noon data
13	Exports only 13:00 (1 p. m.) data
1,3,5,7	Exports only hours 1 a.m., 3 a.m., 5 a.m., and 7 a.m.
7	Exports only 7 a.m. data
Hourly	Exports only hourly data for each of 24 hrs
30 Min	Exports will be every thirty minutes starting on the hour
15 Min	Exports will be every fifteen minutes starting on the hour

Include Field Labels: When ticked, causes the first line of the CSV export to contain the field labels for each of the fields to be exported. It has no effect on XML output format.

Include Field Units: When ticked, causes the second line of the CSV export to contain the field units each of the fields. It has no effect on XML output format

Include Forecast Data: When ticked, will include the forecast data in the CSV export It has no effect on XML output format

4.6.2.2 *Schedule Tab*

Export templates can be scheduled to run at pre-selected times in an un-attended mode by completing the schedule tab of the export template.
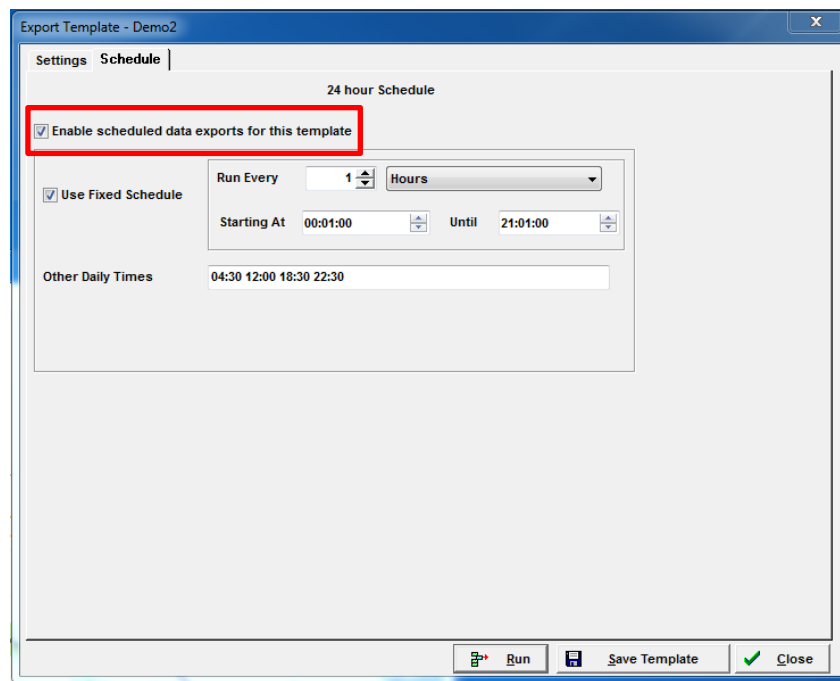
Figure 4-32: Export Templates Schedule

> IMPORTANT! The **Enable Scheduled Data Collection** checkbox must be selected in order to allow the Exporting Service to use this template to export data.

Use Fixed Schedule: This checkbox must be selected in order to specify periodic exporting times. The Fixed Schedule is a daily schedule whose cycle restarts at midnight (local) each day.

Use the drop down menus to set how often data is exported, the units of time, and the time bracket. Note the time brackets use the 24 hour clock and are in hh:mm:ss format.

In Figure 4-32 the defined Fixed Schedule will cause the Calling Service to call the Demo 1 station hourly starting at 00:01 (12:01am) until 21:01 (9:01 pm) each day.

Other Daily Times: This line is used to specify daily non-periodic exporting times. In Figure 4-32, the defined Other Daily Times will cause the exporting Service to run this template at 04:30 (4:30 am), 12:00 (noon), 18:30 (6:30 p.m.), and 22:30 (10:30 p.m.) each day in addition to the periodic call times defined by the Fixed Schedule. Other Times should be entered in 24 hour format (hh:mm) with a space between the different call times.

4.7 DATA>DATA TRANSFER MENU

The DATA > DATA TRANSFER function permits the transfer of self-contained, compacted files which contain one or more entire stations information including data and meta data such as field names and units. It has two parts: Create Data Transfer File and Load Data Transfer File.
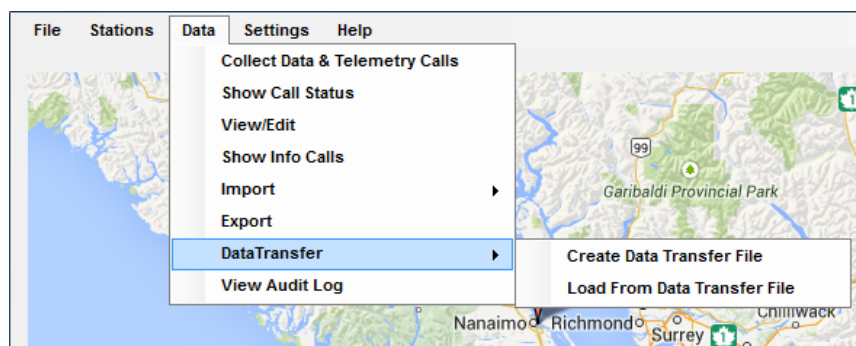
Figure 4-33: Data Transfer Menu

4.7.1 Create Data Transfer File

The Create Data Transfer File creates self-contained, compacted files which contain one or more entire stations information including data and meta data such as field names and units. This file can then be sent to other offices to load the contained stations into their own databases using the **Load Data Transfer File** function.
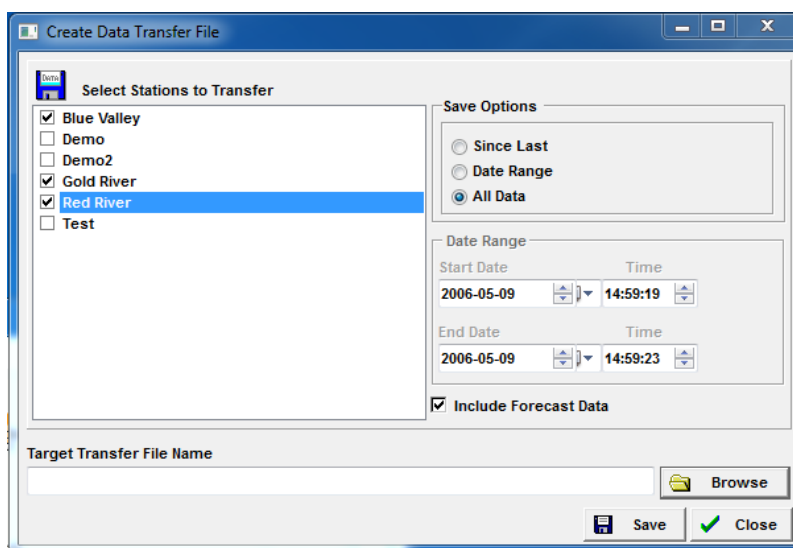
Figure 4-34: Creating a Data Transfer File

Select Stations To Transfer: Place a check beside all the stations to be exported. The choices will be placed into a single data transfer file together with the data range chosen and all metadata such as field names and units.

Save Options: This option determines the amount of data to transfer by providing three available data range options:

1) **Since Last**: will keep track by station as to the last transfer data date and time so that the next data transfer will begin at that point;

2) **Date Range**: allows a specific start and end date time to transfer using the drop down menus; and

3) **All Data:** exports all the data for each of the stations chosen.

Include Forecast Data: Select this box to have forecasted data included in the data transfer.

Target Transfer File Name: Identify a file into which to transfer the data. Click the **Browse** button and choose a path and file name. You cannot type directly into the file box nor can you change the extension of the file. The file must remain as .DTZ in order for the recipient's **Data Transfer Load Function** to recognize it.

Select **Save** and then **Close.**

4.7.2   Load from Data Transfer File

The **Load Data From Transfer File** function enables a Data Transfer File (.dtz) sent from another source using the **Create Data Transfer File** function to be opened and loaded. This is a self-contained compacted file which can contain one or more entire stations information including data and meta data such as field names, units etc..
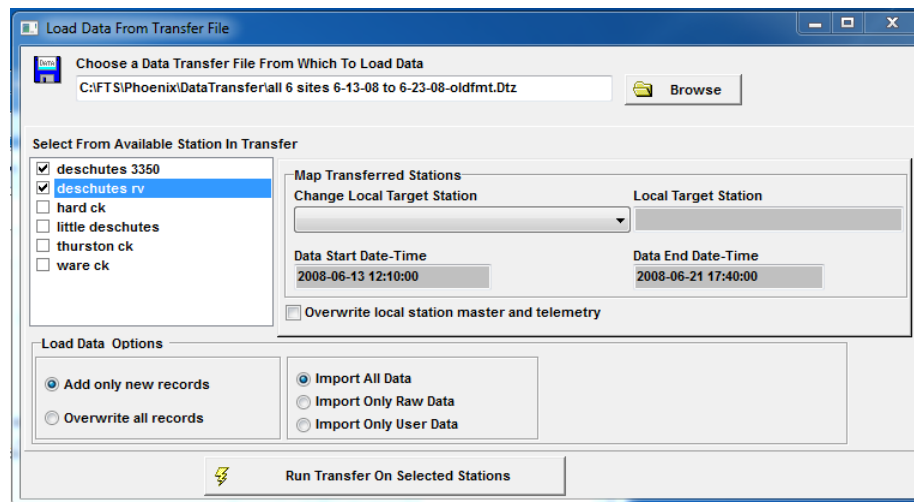
Figure 4-35: Load Data from Transfer File

Choose a Data Transfer File: Data transfer files will be appended by .dtz. B**rowse** to the desired .dtz file and click open. A list of **Available Stations** will appear in the **Select From Available Station In Transfer** box as shown in Figure 4-35.

Select From Available Station to Transfer: Tick one or more of the listed stations to load into the database. They can be loaded with the listed station names or they can be re-named by using the **Map Transferred Station** function described below. Stations that do not exist in the receiving database will be created using the name in the **Available Station In Transfer** list.

4.7.3   Map Transferred Stations

This function will transfer the data from the selected Available Station to a differently named local station. If the receiving office has different naming conventions than the sending office, there is a danger that different stations may have the same name. This function prevents overwriting an existing station's data with the data being transferred.
To map an Available Station to a differently named local station, first select it from the Available Station to Transfer box (it will be highlighted in blue). Use the Change Local Target Station drop down menu to select the desired Local Target Station. Once selected, that station's name will populate the Local Target Station field. This can be done for any number of Available Stations.

The Data Start Date-Time and Data End Date-Time are for information purposes and will display the range of data in the chosen transfer file.

4.7.4 Load Data Options

Add Only New Records: This option is to load records that do not exist in the target station and will not overwrite any existing records even though they are part of the sent data.

Overwrite All Records: This option will replace all of the target station records with those from the transfer file**.**

Import All Data: This option will import both the field (user) data as well as the raw data to the target station.

Import Only Raw Data: This option will import only the Raw copy of the data leaving the target station's field (user) data un-touched.

Import Only User Data: This option will import only the User copy of the data leaving the Raw data un-touched.

Run Transfer on Selected Stations

Once all the options have been selected, click the **Run Transfer on Selected Stations** button to complete the data transfer.

4.8 DATA>DATA ALARMS MENU

The Data Alarms interface allows you to create and view trigger conditions and manage contacts for alarms generated by the trigger conditions. To access the **Data Alarms** Module, select **Data> Data Alarms**. A list of existing alarms will be displayed or the screen will be blank if no alarms have been created

> **NOTE**: The Data Alarm service must be installed for alarms to be functional. Alarms can be edited without the service, however no messages will be sent.

To access the **Data Alarms** Module, select **Data** from the main Menu Bar, then **Data Alarms**. A list of existing alarms will be presented.
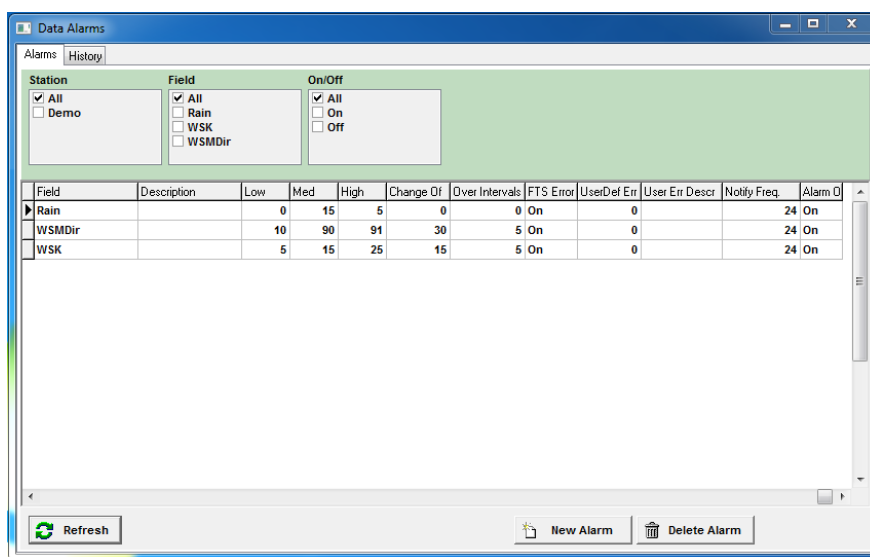
Figure 4-36: Data Alarms Screen

Every time StreamTrac is opened, a Data Alarm Warning screen will appear if there have been any newly triggered alarms.
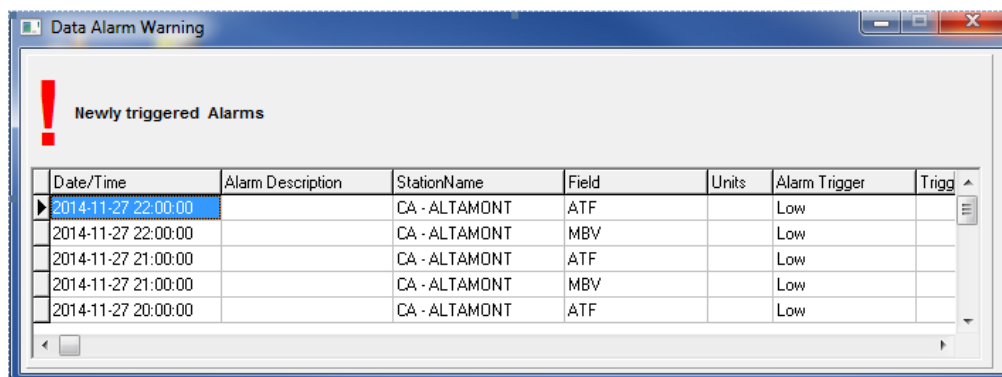
Figure 4-37: Data Alarm Warning Screen

4.8.1 View Existing Alarms

From the Data Alarm summary page existing alarms can be viewed and sorted. Double clicking on an existing alarm will open the **Create/Edit Alarm** page with that alarm loaded. Any modifications to the alarm can be made on this page (refer to the Creating/Editing alarms section for details).

Existing alarms can be filtered by station name, field, or whether the alarm is On/Off (whether the Alarm On box is enabled or not in the Create/Edit Alarm page – see the following section). Select the desired filters. The screen will automatically update with the filters in place.

To delete an alarm first select the alarm then click on the **Delete Alarm** button.

4.8.2 Creating/Editing Alarms

To create or edit an alarm either click the **New Alarm** button or double click on the existing alarm in the Alarm summary tab.

Figure 4-38: Creating an Alarm

When creating a new alarm first select the Station Name then select the field using the drop down menus. A short description of the alarm can be typed in the Description field.

The Alarm can be enabled or disabled as a whole using the **Alarm On** check box.

4.8.2.1 *Alarm Triggers*

Triggers can then be set up for the selected field. Individual triggers can be turned on or off using the **On/Off** check box that corresponds with the trigger. However, if the Alarm On checkbox, described above, is not selected any Alarm Triggers that are **On** will not trigger an alarm.

Tiered Alarm Triggers (Low, Medium, High) are checked from high down to low. A high alarm takes precedence over a medium or low alarm and a medium alarm takes precedence over a low alarm. Tiered alarms can be triggered either when the value is greater than the trigger or when the value is less than the trigger. This can be set using the "Trigger tiered alarm when:" radio box selection.

The **Change Alarm** denoted by "**Change of # Over # Intervals**" is triggered when an absolute change of at least the change amount occurs over the specified number of intervals.

FTS Error Code: this is a text message which will be displayed when an FTS Error code is encountered in the data.

Some examples of FTS Error Messages:

Bad response from sensor	Over range value returned
Missing sensor	Floating point
Sensor error	No Data

User Defined Error Code: this is used to input a specific value that will trigger an alarm along with a description.

Maximum Notify Frequency Setting: this controls how often a Data Alarm is re-triggered.

For example: if a high alarm is triggered and the Maximum Notify Frequency is set to 24 Hours then another high alarm will not be triggered for at least 24 hours. A custom notification frequency can be set for each alarm using the **Use Custom** setting. The Global notify frequency can be changed in the **Settings>Global Settings** screen.

Last Notification sent: this displays the time the last notification was sent.

4.8.3 *Contact Tab*

The **Contact** tab of the **Create/Edit Alarm** interface is used to assign who receives alarms for a particular station. Contacts exist on a per station basis (i.e. a contact for 'Station Demo' will receive all alarms generated for that station).
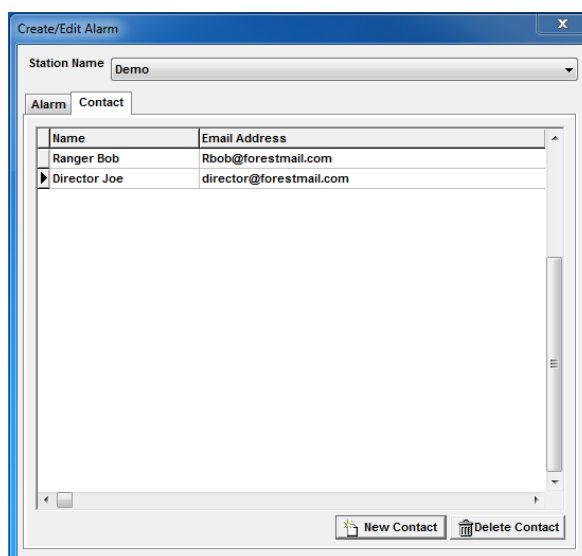
Figure 4-39: Alarm Contact Tab

New contacts can be added by clicking the **New Contact** button and entering the required information. To delete a contact either highlight select the contact and press the **Delete Contact** button or right click on the contact and select **Delete Contact**. To edit an existing contact simply double click on the contact you wish to change.

4.8.4   *Alarm History*

The History page (Data>Data Alarms>History) will list all the alarms which have been triggered and sent. The list can be filtered by date, station, field type, and alarm trigger. Once a filter has been input, use either of the refresh icons to update the screen. To clear a filter, highlight it and select the Erase button.

Figure 4-40: Alarm History Tab

4.9 DATA>DASHBOARDS

The Dashboard screen feature will provide up to the minute weather information on the selected stations. As data is collected, the dashboard will automatically update the selected data fields as well as update the chosen fields on the graph. The dashboard is designed to report on a single station; however, the line graph section will allow multiple stations to be plotted on a single dashboard for comparison purposes.
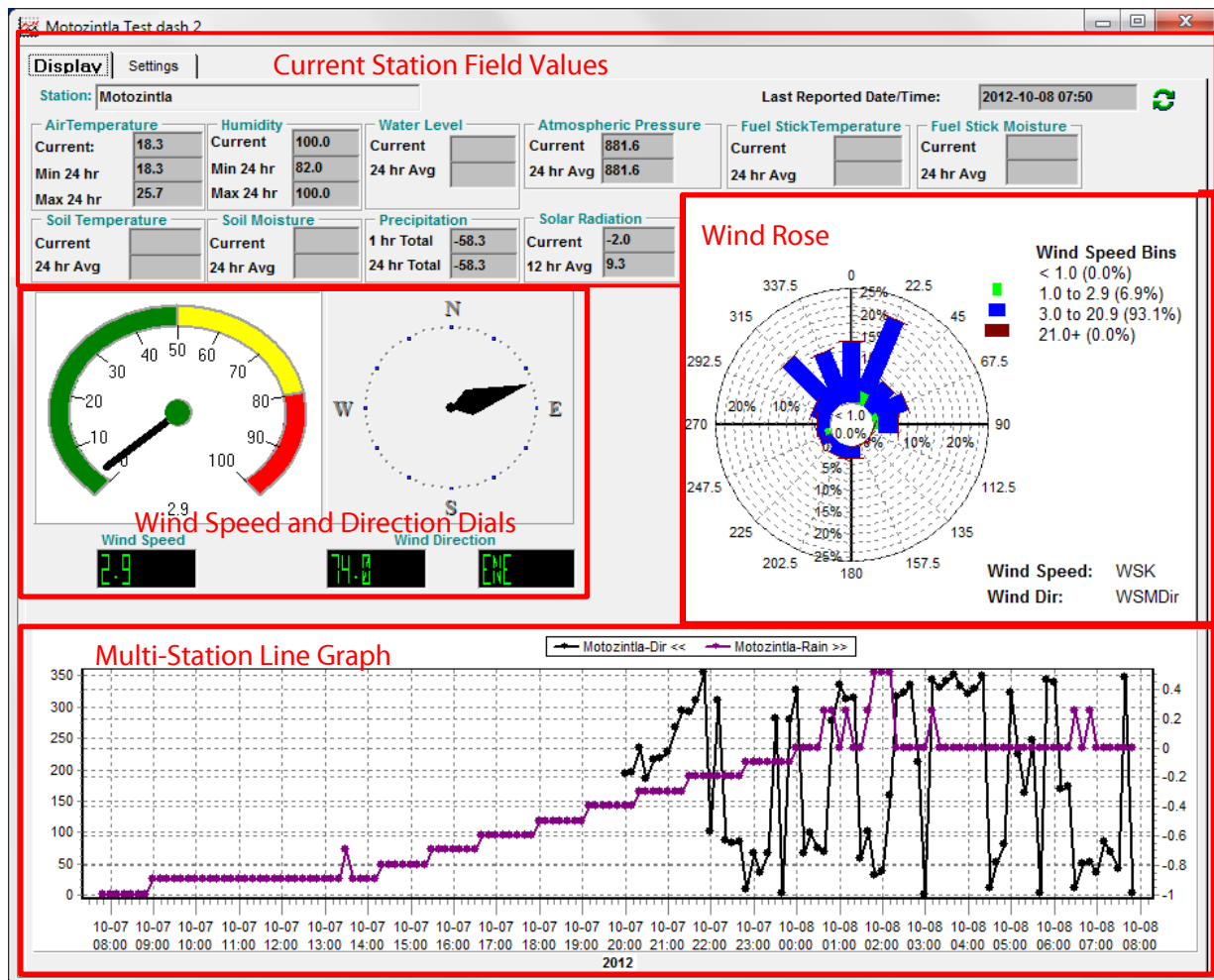
Figure 4-41: Dashboard Screen

Current Station Field Values: this portion provides single values for the selected station including Air Temperature, Precipitation, Humidity, Soil Temperature, Atmospheric Pressure, and Solar Radiation.

Wind Rose: this chart provides a visual analysis of the Wind Speed and Direction using colour coded wind speed bins.

Wind Speed and Direction Dials: The Wind Speed and Direction Dials provide a quick visual reference for the most recently logged Wind Speed and Direction

Multi-Station Line Graph: This graph provides a line graph of the current weather information. Several stations and fields can be plotted together. The point readouts will be displayed by hovering the cursor over the points

4.9.1   Creating a Dashboard

To create a dashboard, select New to display the New Dashboard screen. The Display tab will be blank until the dashboard is defined using the Settings Tab. Click on the Settings Tab.
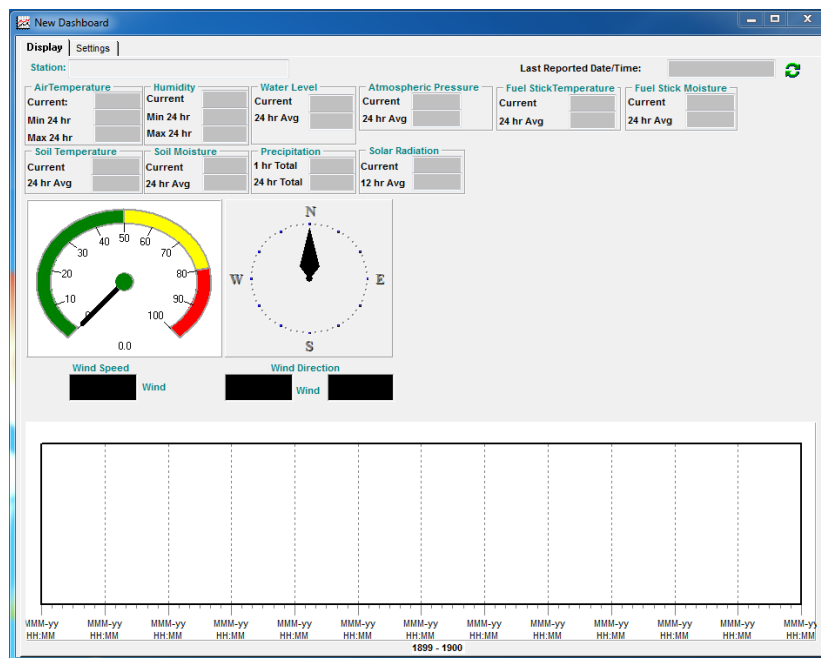
Figure 4-42: Creating a Dashboard

4.9.2   Defining the Settings

The Settings tab provides the fields that will be used to define the dashboard display.   It has four sections: General Settings, Field Name Mapping, Windrose Settings, and Line Graph Settings.
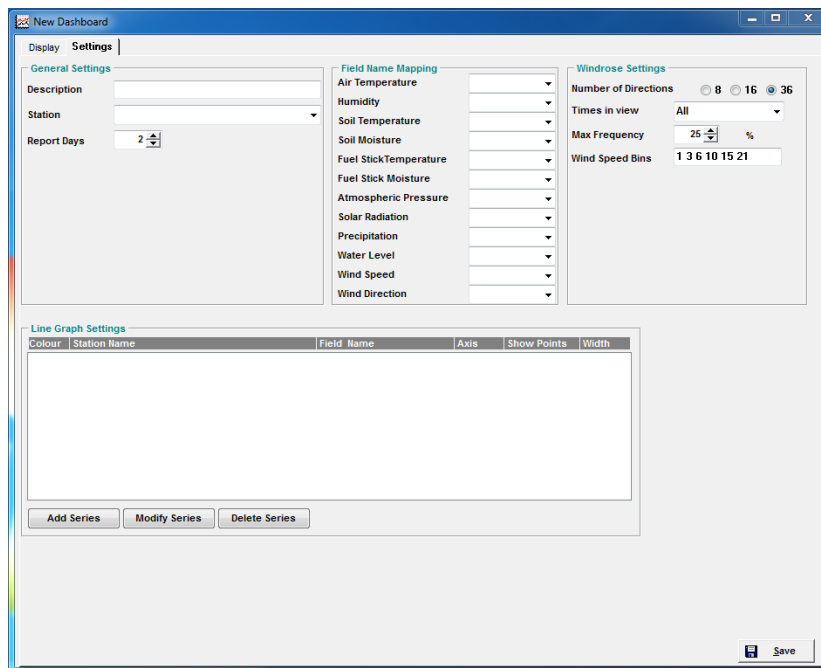
Figure 4-43: Dashboard Settings

GENERAL SETTINGS

Description: this section must be filled with a descriptive name for the dashboard

Station: use the drop down menu to determine the station for which the dashboard will be developed

Report Days: input the number of days of data which will be collected and displayed on the dashboard.

FIELD NAME MAPPING

Determine which fields are to display data and use the drop down menu to select a field name. Only those field names available to the selected station will appear in the menu. To delete a field name click on it (it will be highlighted in blue) and select delete on the keyboard.

WINDROSE SETTINGS

Number of Directions: this determines how many radial arms and the respective true bearings will be marked on the compass rose: eight (8) will be every 45 degrees, 16 will be every 22.5 degrees, and 36 will be every 10 degrees.

Times in View: this will determine which data from the database will be displayed. Times reflect the 24 hour clock and the menu can be customized by typing specific time requirements in the field following the format of the drop down menu examples. The drop down menu consists of the following nine selections:

ALL	Will display all data logged throughout the day
0..23	Displays only hourly data for each of 24 hours
12:00	Displays only noon data
13	Displays only 13:00 (1 p.m.) data
1,3,5,7	Displays only hours 1 a.m., 3 a.m., 5 a.m., and 7 a.m. data
7	Displays only 7 a.m.
Hourly	Displays only hourly data for each of 24 hrs
30 Min	Displays every thirty minutes starting on the hour
15 Min	Displays only data logged every fifteen minutes starting on the hour

Max Frequency: the frequency indicates the percentage of time the wind blows from a particular direction. Max Frequency determines the maximum percentage of time which will be displayed on the wind rose. These frequency percentages appear as concentric circles emanating from the centre of the wind rose, the centre being zero and the frequency increasing to the outer circles. If the wind is blowing at a greater frequency from any direction than the selected Max Frequency, then that wind spoke will extend past the boundaries of the wind rose. This can be corrected by increasing the Max Frequency to extend the frequency range.

Example: Figure 4-44 has a max frequency of 25% and the wind was blowing from 022.5 T° 20% of the time.

Wind Speed Bins

A Wind Speed Bin is a range of wind speed which will be colour-coded and superimposed on the wind rose for a visual analysis of the Wind Speed and Direction. Once defined, each bin is automatically assigned a colour and will be displayed in the upper right hand corner of the Wind Rose (see Figure 4-44).
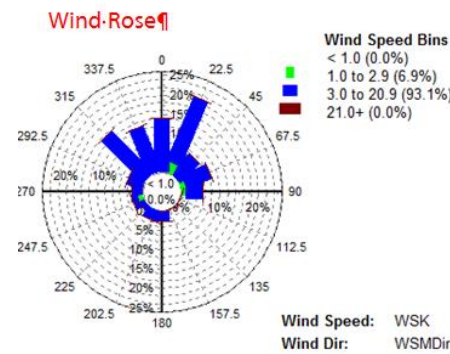
Figure 4-44: Wind Speed Bins Display

For example:

The following ranges are input:

Wind Speed Bins   1 3 6 10 15 21

.

Selected units of measurement are kph
The Wind Speed Bins range from 1-2.9 kph (green), 3-5.9 kph (blue), 6-9.9 kph (maroon), 10-14.9 kph (violet), 15-20.9 kph (yellow), and 21+ kph (cyan).
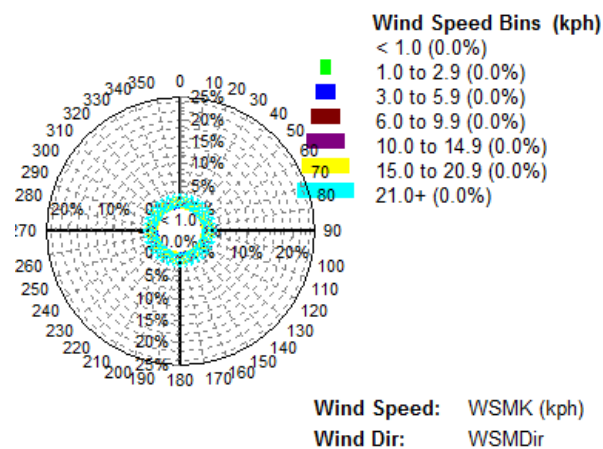
Figure 4-45: Wind Speed Bins Setup Example

4.10 DATA>VIEW AUDIT LOG MENU

The **Data>View Audit Log** menu is another route to bring up the Audit Log Viewer previously explained in the **Data>Collect Data and Telemetry Calls** section.
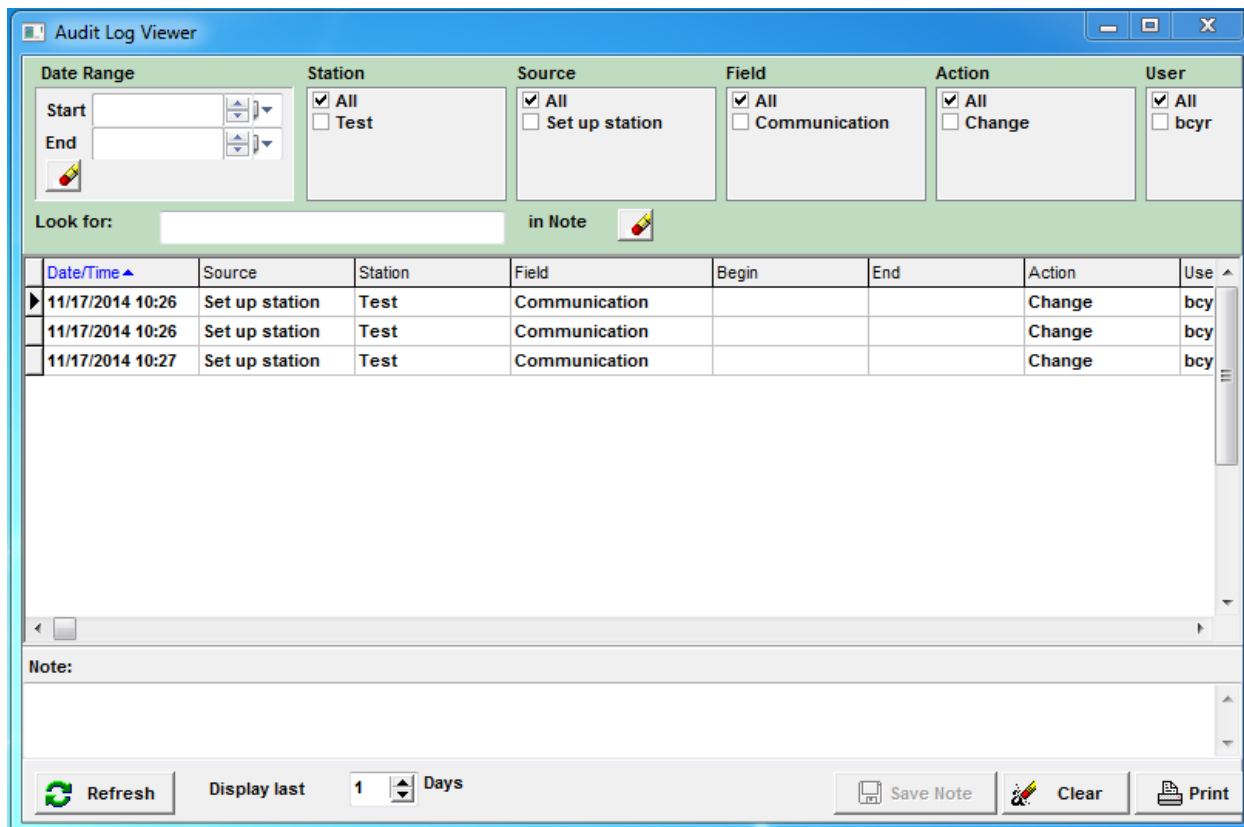
Figure 4-46: Audit Log Viewer

4.11 DATA>GET/SET DATA BY TAG NAME

The **Data>Get/Set Data by Tag Name** menu will allow you to retrieve current variable values for selected data, and set values (when permitted) for selected user defined variables (such as setting cumulative rain amounts or . setting staff gauge/plate measurements). This function will only set values in the Datalogger's data file and will not affect data in the AutoCaller data base.
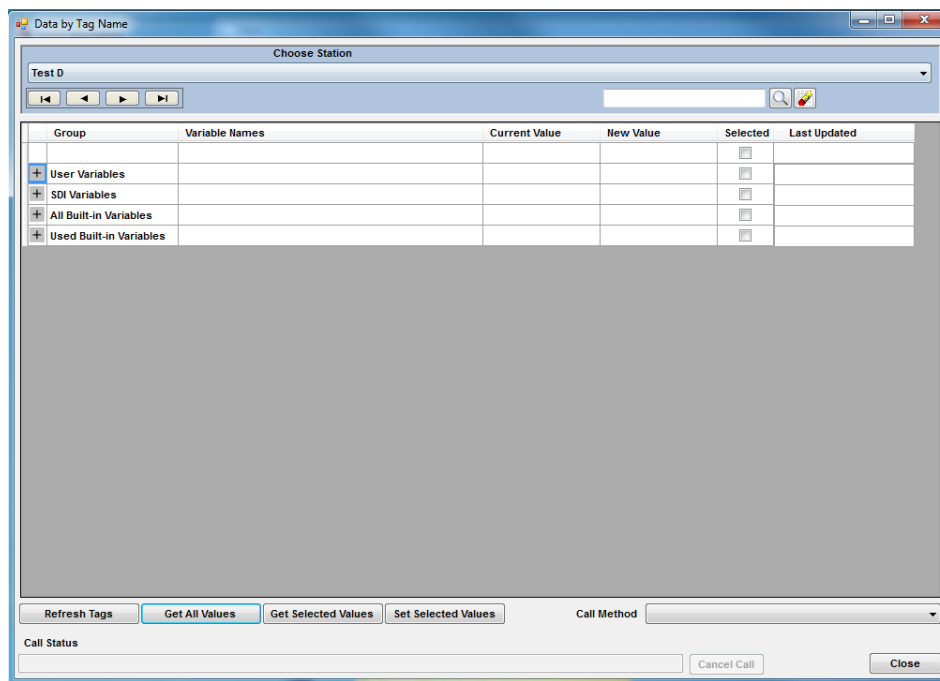
Figure 4-47: Get/Set Data by Tag Name Screen

Choose Station: Select the desired station by using the drop down menu or use the search feature The grey arrows can be used to go to the beginning/end of the station list or to scroll through by individual station..

Group: This lists the different groups in which the variables are found. The lists can be expanded or minimized using the +/- icon.

Variable Names: Displays the variables found in each of the groups.

Current Value: Displays the current values for the named variables.

New Value: Used to set a new value. This value will be saved to the Datalogger's data file and used in any calculation or process that includes that variable.

Selected: Click on the checkbox to select the desired groups or specific variables from an expanded Group list. The top checkbox will select all values.

Last Updated: Will display the last time the value was updated.

Call Method: Use the drop down menu to select the desired call method.

Call Status: Indicates the status of the Call to the station

Cancel Call: Selecting this will cancel the call.

4.11.1 *Getting/Setting Values*

Prior to getting/setting a value, select the appropriate call method. Click on the **Refresh Tags** button to ensure the most recent information is displayed. Select the **Get All Values** or the **Get Selected Values** button.   If the intention is to get selected values, ensure the selected checkbox for the desired Group or variable(s) has been made prior to getting the values.

CHAPTER 5   GRAPH MENU

StreamTrac's graphing capabilities allow easy production of graphs from your data. Graphing data allows visual comparison of different data fields as well as comparing data from different stations. Additionally, graph data can be edited visually with the graphing interface while the original data is preserved. The graphing module contains many editing features. Some examples are: gap filling, data shifting and point by point dragging/editing.

After initial display, the graph's appearance can be modified. For example, the color and drawing style of a line can be changed or fields can be organized into separate graphs. The Graphing Module provides several easy-to-use editing tools that allow you to customize a valuable graph with the titles, labels, fonts, colors, and line styles you want. A graph can be saved, allowing you to recall it at a later time.

There are two types of graphs which can be produced: a time series graph (in either line or bar form) and a wind rose (already seen in the Data>Dashboards section of this manual).

5.1 VIEW EXISTING GRAPHS

To view existing graphs select **Graphs> Existing Graphs** to display the Open Graph screen. The graphs can be filtered based on Creator, Last Saved User, Last Saved Date and Graph Type. The columns can be arranged by left clicking and dragging the column title to the desired position. Left clicking on the column title will arrange the columns in alphabetical/reverse alphabetical or descending/ascending chronological order.

Click on the desired graph to be opened and then select **Open**. Graphs can be deleted the same way by selecting **Delete.**

A new graph can be created by selecting the **New** button on the bottom of the page.
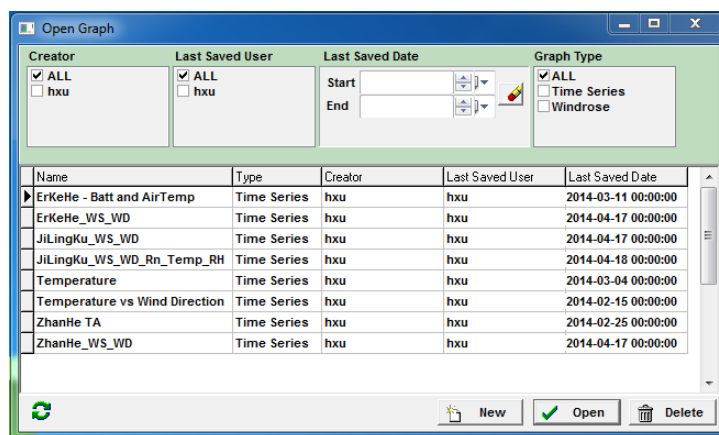
Figure 5-1: View Existing Graphs

5.2 CREATING A TIME SERIES GRAPH

To create a time series graph, select **Graphs>Open Blank Graphs>Time Series.**
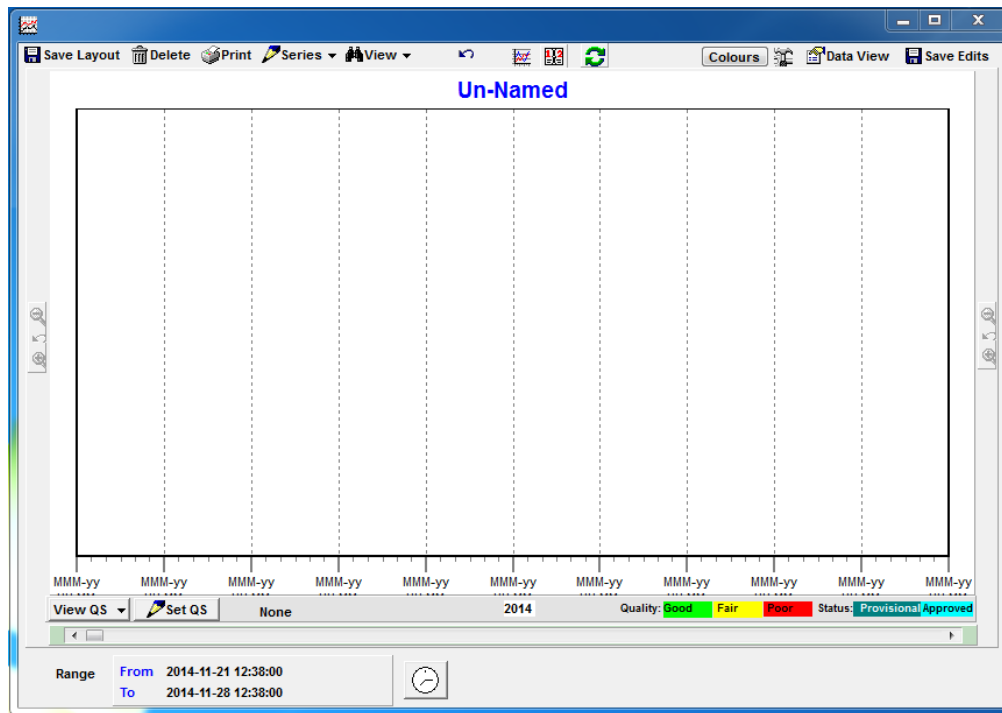
Figure 5-2: Creating a Time Series Graph

Note: the graph will appear blank until a station and a series to be plotted are selected.

5.2.1   Adding or Modifying a Series

Series are the lines or bars which populate the graph. More than one series can be assigned to a particular graph. The series can consist of data from different fields of the same station (including historical data) or data taken from several stations.

To add a series click on the **Series** -> **Add** button.
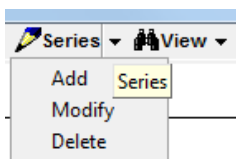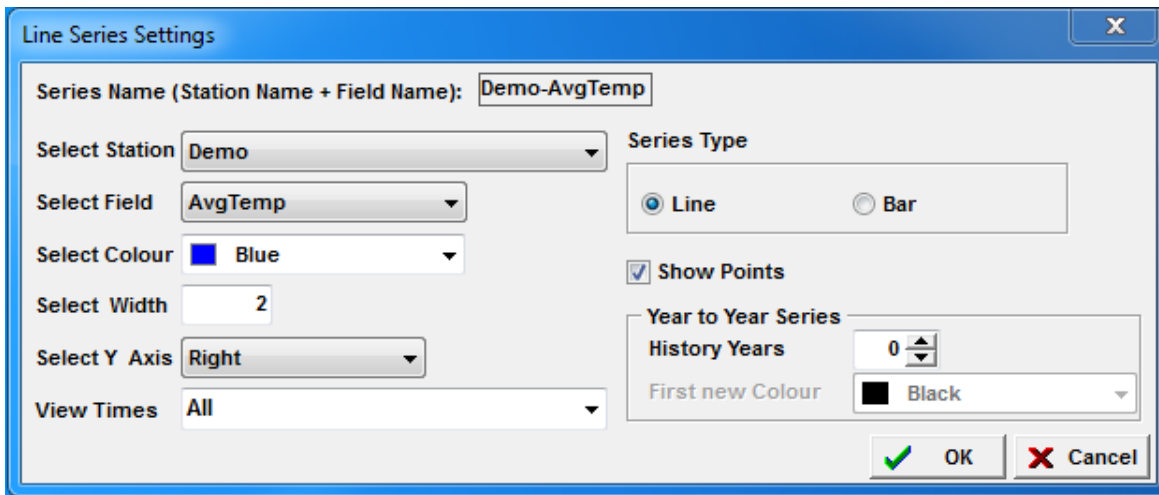
Figure 5-3: Adding a Time Series Graph

The **Line Series Settings** screen will be displayed. Select the desired station and field from which to plot data, and then edit the other fields. Continue to do this until all desired data from different stations and fields is entered.

Figure 5-4: Adding a Graph Series

Series Name: The program will assign a default name consisting of the Station Name and the Selected Field.

Select Colour: This will be automatically populated with an unused colour. Use the drop down menu to make a different selection.

Select Width: Determines the width of the plotted line in pixels.

Series Type: The default series type is Line series but you can also create a Bar series. However, data editing capabilities are not allowed when Bar series are chosen.

Select Y Axis: Select the axis on which to plot the series field. The options are Right, Left and Both. Always combine fields on the same axis that has similar upper and lower ranges

View Times: the drop down menu provides a series of options or a customized option can be typed in following the format of the drop down menu examples. Times reflect the 24 hour clock. The drop down menu consists of the following nine selections:

ALL	Graphs all data logged throughout the day
0..23	Graphs only hourly data for each of 24 hours
12:00	Graphs only noon data
13	Graphs only 13:00 (1 p.m.) data
1,3,5,7	Graphs only hours 1 a.m., 3 a.m., 5 a.m., and 7 a.m. data
7	Graphs only 7 a.m.
Hourly	Graphs only hourly data for each of 24 hrs
30 Min	Graphs every thirty minutes starting on the hour
15 Min	Graphs only data logged every fifteen minutes starting on the hour

Show Points: When checked, a small dot will appear at the data point in addition to the continuous line. The point value and information will be displayed when the cursor hovers over it.
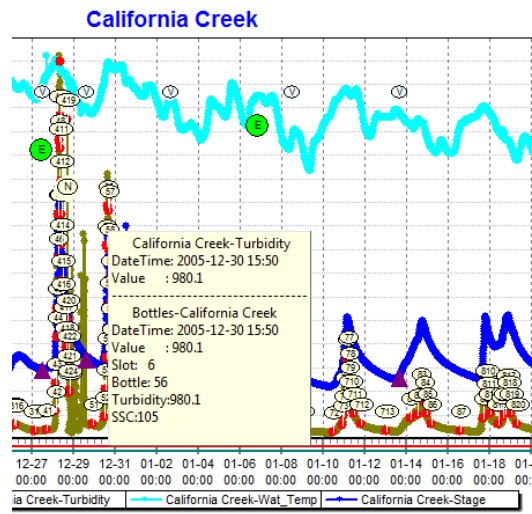
Figure 5-5: Data Point Information

Year to Year Series: select the number of years of data to be included. This will include historical data on the graph in individually assigned colours for every year.

Once the settings are complete, click the **OK** button. The series will appear in the graphing interface and the series name and colour will be shown in the legend.
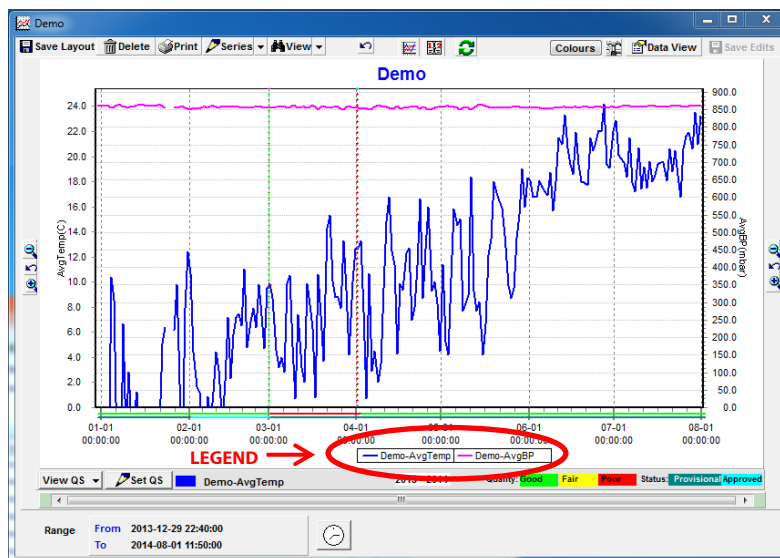
Figure 5-6: Example Graph

5.2.2   Graph tool bar

These are the series of buttons which are found along the top and bottom border of the graph.

Save/Delete/Print: The graph can be saved, deleted or printed using the corresponding button.

Series: Use the drop down menu to add, modify or delete a series. Hovering the cursor over **Modify** or **Delete** displays a list of the plotted series. Click on the series you wish to amend.
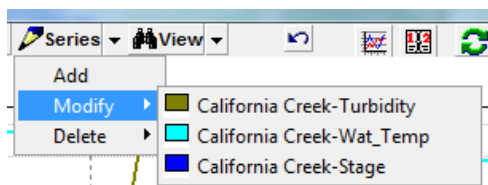
Figure 5-7: Series Options

View: Use this drop down menu to select the information to be displayed on the graph and to adjust vertical scrolling and zooming options.
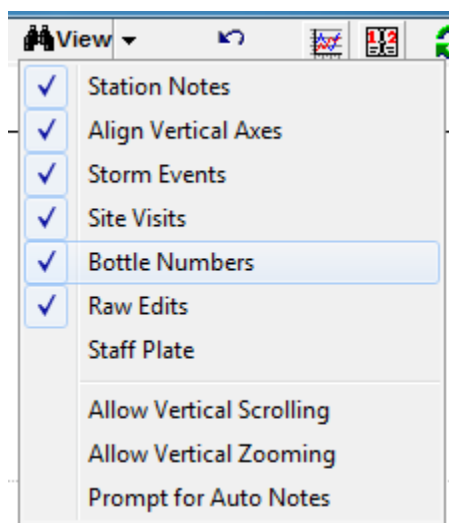
Figure 5-8: View Options

Event Tags: Figure 5-9 illustrates the symbols used on the graph to indicate event tags. In order for the event tags to be displayed, the corresponding item in the **View** menu must be selected. Hovering over these tags will bring up a dialog box which contains the information for that item.
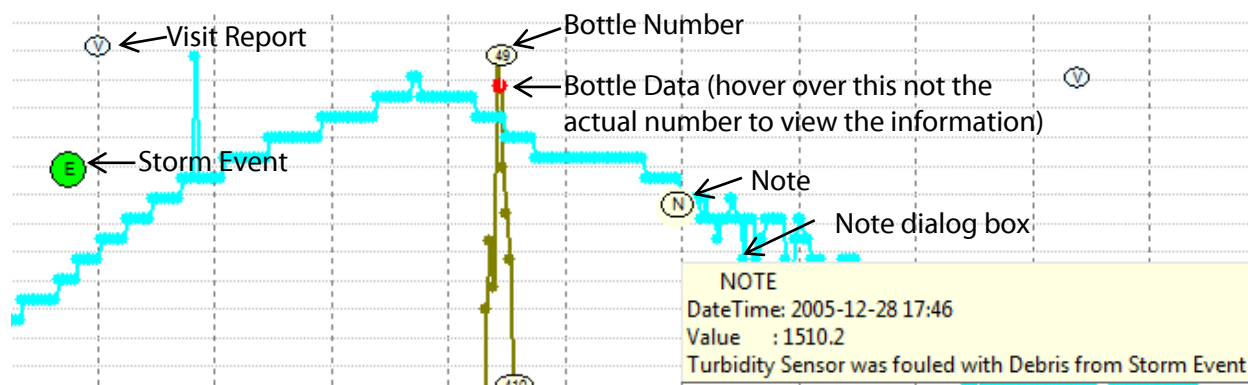
Figure 5-9: Event Tags

Undo Zoom: This will undo the last zoom.

View XY: Selecting this will display the entire XY axis

View X: Selecting this will display the entire X axis

Refresh: The Refresh button retrieves the current values from the data. If data changes are made to a series using the View/Edit Data tool you must click refresh to see the changes in the graphing module.

Colours: Use this to view and edit the graph line colours. To change the colours, click on the feature you wish to change. A colour chart will be displayed. Select the desired colour and then OK. Note that Normal and Raw cannot be edited.
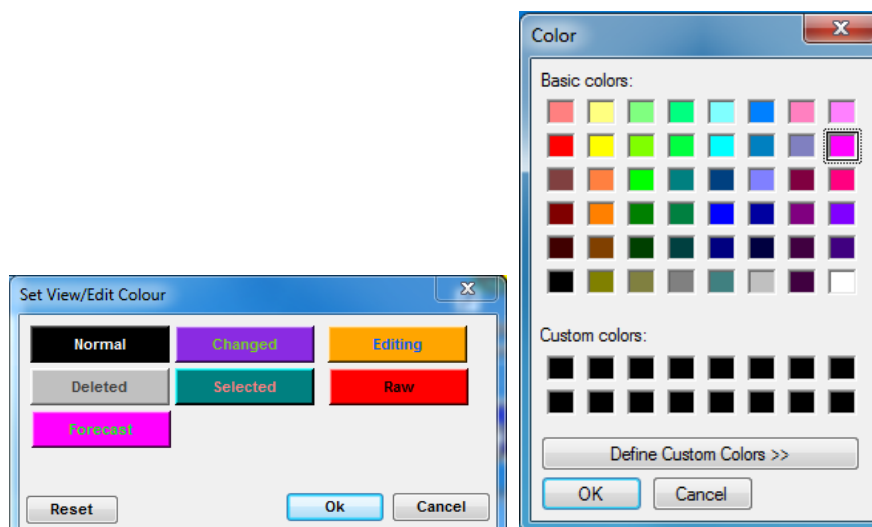
Figure 5-10: Colour menus

General Graph Settings: After a graph is produced the appearance can be customized using the advanced features using the menus found here.
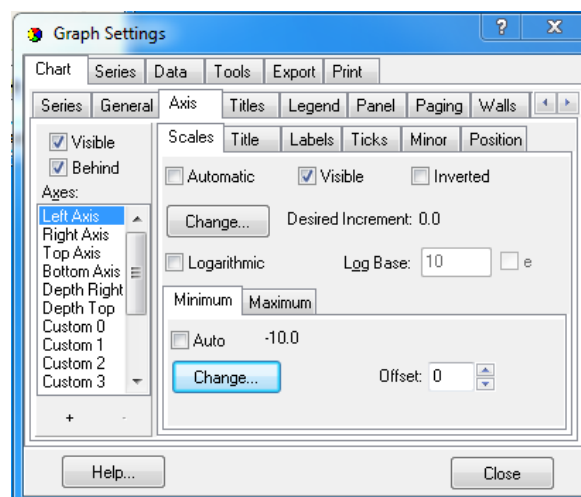
Figure 5-11: General Graph Settings screen

Some of the editing choices available are:

Change fonts, colors, and line styles
Input the minimum and maximum axes values to be displayed
Add labels and titles
Turn zooming, panning etc. on and off.
Export the finished graph as a BMP or WMF graphic file to be used in documents
Print the graph

The **Chart Tab - Series sub-menu** is not fully compatible with all StreamTrac functions. Attempting to use this tab can cause StreamTrac to stop responding. Relevant functions on this tab are done directly on the graph using the graph tool bars and buttons. Changes made to the graph using this function will not be saved.
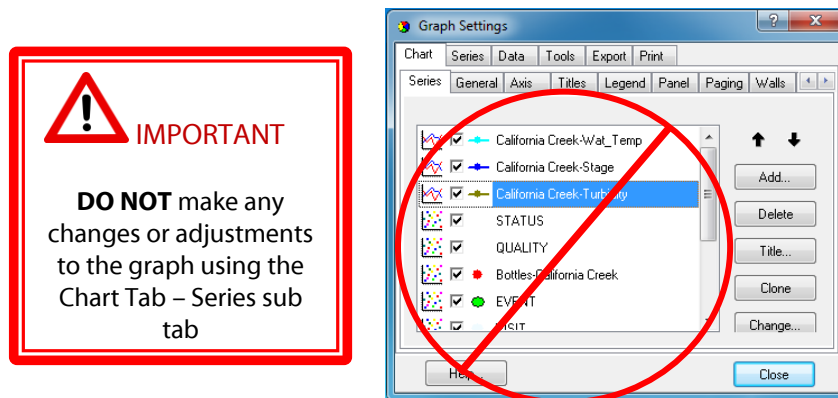
Figure 5-12: Chart Tab – Series sub tab

Data View: The Data View button opens two dialogs: **Point Information** and **View Series Data.** Clicking on a data point will populate the Point Information dialog with information about that point and will populate the View Series Data dialog with the series data surrounding the point clicked (the clicked point will be highlighted).
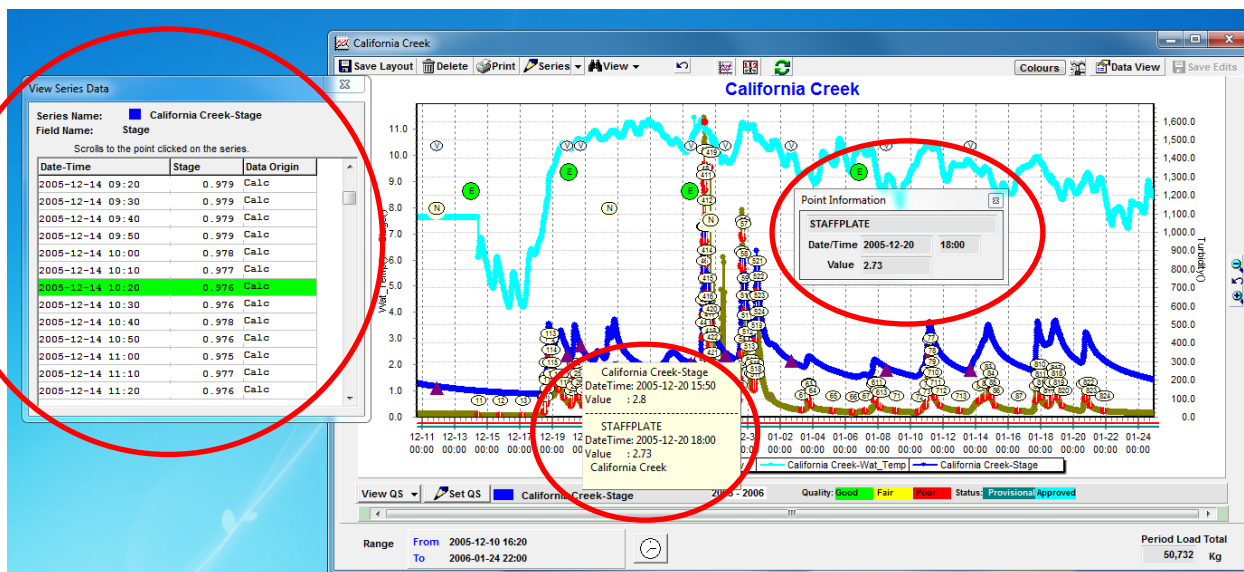
Figure 5-13: Data View
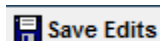
Save Edits: Selecting this will save any edits made to the graph.

Time Frame: Use this to select the time frame of the graph to be displayed. Click the **Set Range** button (clock icon) to open the date range edit interface. From the set range dialog you can select either a date range or floating range.
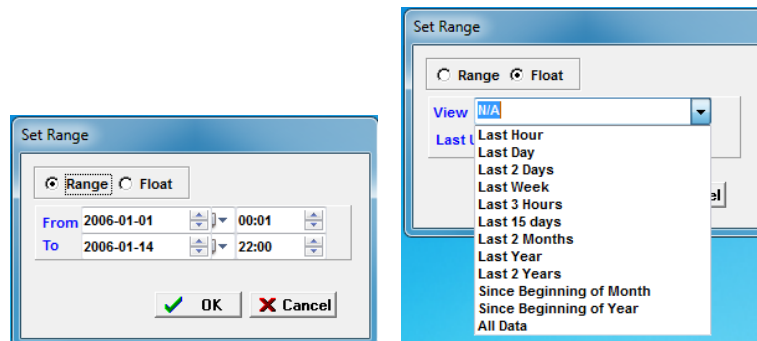
Figure 5-14: Set Range: Date Range and Float Range options

To set a **Date Range**, select the date/time element you wish to change (it will be highlighted in blue) then use the up and down arrows to adjust it accordingly.

The **Float** option allows you to select a "floating" date or time period based off the current time or last time run. Use the drop down menu in the View field to display the choices. Be sure to click the **View All XY** or **View All X** button after adjusting the date range to view the entire range.

5.2.3   Viewing Data

Hovering the cursor over a series line or an event tag will bring up an information box for that item.

5.2.3.1   Scrolling

To scroll left, right, hold down the **right** mouse button and drag on the graph in any direction, or use the scroll bar to quickly move left or right.

To scroll up and down, click on the **View Icon** and enable **Allow Vertical Scrolling** and use the scroll bar on the mouse to move up or down.

5.2.3.2   Start/End Cursors

To perform many of the manipulation functions you will be required to define a region on which to perform the functions. This is accomplished using the **Start** and **End** Cursors. To position these cursors, right click on the graph and click either the **Set Start Cursor** or **Set End cursor** menu items. After cursors have been placed they can be moved by placing the mouse cursor over the line of the cursors and click-dragging left or right.

5.2.3.3   Zoom Functions

The zoom functions control zoom level on both axis. Use the mouse to click and drag, from left to right and release the mouse button. This creates a bounding box on the section of graph you to zoom in on. However, it will only zoom horizontally along the X-axis unless vertical zooming is enabled. To enable vertical zooming, click on the **View Icon** and enable **Allow Vertical Zooming**.

To reverse zoom, use the mouse as above while holding the shift or the alt button. The arrow button at the top of the screen   is an 'undo-zoom' button, which will return you to the previous view of your data.

Y axis Zoom Functions:

 The zoom buttons on the left and right of the graphing screen control only the Y axis on that side. Zooming in and out with these will change the scale of the Y axis and adjust the plotted series accordingly. The arrow button is an 'undo-zoom' button.

To zoom vertically, click on the **View Icon** and enable **Allow Vertical Scrolling**.

5.2.4   Graph Interface Options

5.2.4.1   *Start/End Cursors*

Right clicking on a blank portion of the graph will display the Graph Interface menu. It has four options: Set Start Cursor, Set End Cursor, Add Note and Event Summary.
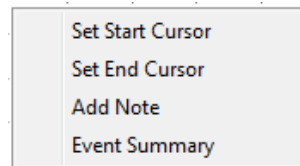
Figure 5-15: Graph Interface menu

The Start/End Cursors are used to frame a section of data which can then be edited or manipulated using other graphing functions.

Left click on **Set Start Cursor** and two hashed vertical lines will appear. The green line indicates the data range start and the red line indicates the data range end. Left click and drag the lines so that they mark the desired data range.
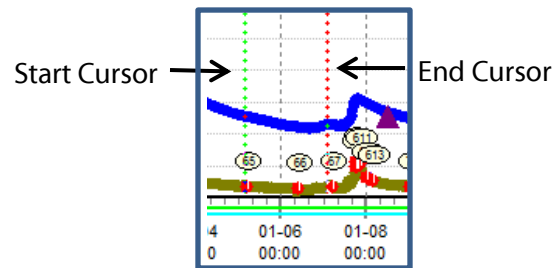
Figure 5-16: Start and End Cursors

5.2.4.2   *Adding Notes*

Notes can be added by right clicking on a blank section of the graph where you wish the note to appear and selecting the **Add Note** option. The **Modify Station Note** screen will appear:
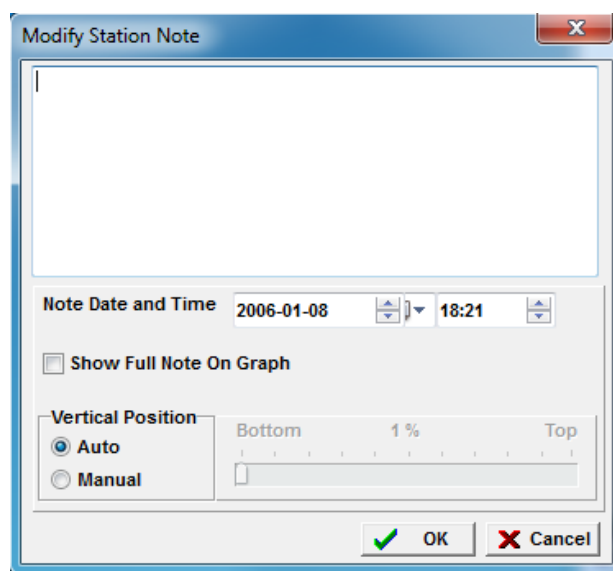
Figure 5-17: Add Note

The **Note Date and Time** will reflect the cursor position. This position can be adjusted by manually entering the date and time using the arrows. Select the date and time of the note

Show Full Note On Graph: Check this to display the full note. If left blank, the presence of a Note will be

indicated by Ⓝ and the full note will be displayed when the cursor is hovered over it.

5.2.5   *Setting Data Quality and Status*

Data can be labelled with its quality and status using the functions found on the Quality and Status tool bar located under the legend.

The three quality settings are **Good**, **Fair**, and **Poor**. The two status settings are **Provisional** and **Approved**. To view/edit quality and status of a series, click the **View QS** button and select the desired series.
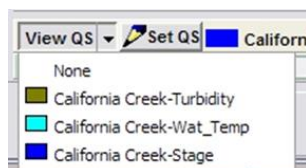
Figure 5-18: View QS menu of the Graph dialog

Two bars will appear along the bottom of the graph; the top one is **Quality**, and the lower **Status**. After selecting a series, use the cursors to set a date/data range. Right click anywhere on the graph to display the following menu:

Left click on **Set Start Cursor** and two hashed vertical lines will appear: one green (data range start) and one red (data range end). Left click and drag the lines so that they mark the desired data range. Once a range has been set, click on the **Set QS** button
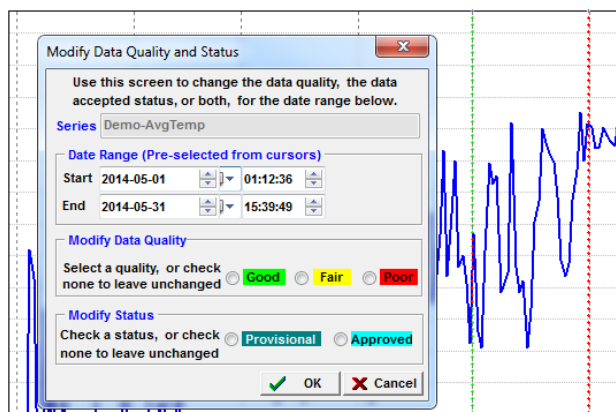
Figure 5-19: Modify Data Quality and Status dialog

A dialog will appear allowing you to select quality and status for your marked date-time range. Note the Start/- End cursor selections are indicated by the vertical red and green hashed lines and the selected range appears in the Date Range fields of the dialog box.

After setting the quality and status, the two bars running along the bottom of the graph will be updated.

> **NOTE**: If the quality and status bars do not appear after clicking on **View QS**, click on **Refresh**.

5.2.5.1   *Adding Notes*

Notes can be added by right clicking on a blank section of the graph where you wish the note to appear and selecting the **Add Note** option. The **Modify Station Note** screen will appear:
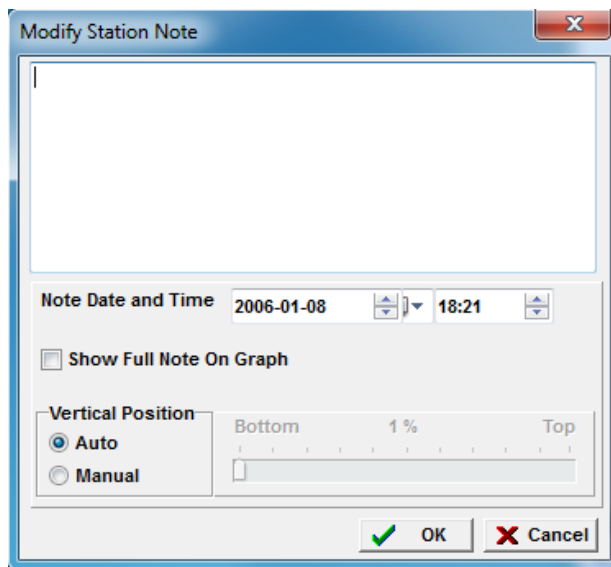
Figure 5-20: Add Note

The **Note Date and Time** will reflect the cursor position. This position can be adjusted by manually entering the date and time using the arrows. Select the date and time of the note

Show Full Note On Graph: Check this to display the full note. If left blank, the presence of a Note will be indicated by (N) and the full note will be displayed when the cursor is hovered over it.

5.2.6   *Editing Series Data*

To begin editing data using the graph, right click either on the series or on the legend item for the series you wish to edit and the following menu will appear.
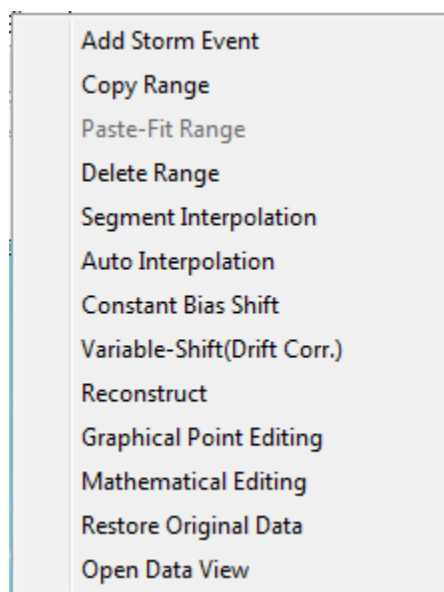
Figure 5-21: Edit Data Graphical Interface

Add Storm Event: The Add Storm Event feature allows addition of a storm event to the graph. To add a storm event, use the Start/End cursors to set the range of the event and then right click on the series line or legend that you wish to mark as a Storm Event and then select **Add Storm Event** from the drop down menu.

Copy Range: After marking a range of data (using the Start and End cursors) a range of a series graph can be copied into memory for pasting into the same station or into a different station using the **Paste-Fit Range** function.

Paste-Fit Range: The Paste-Fit function pastes a previously copied section of data into the area defined by the Start and End cursors. If the target range is not identical to the copied range the data is proportionately fitted into the target range.

Delete Range: This will delete the range of data defined by the Start and End cursors. A Note with the date and time of the action will automatically be inserted in the graph.

Segment Interpolation: This function will fill a missing section with data. It can do an interpolation between two points of existing data or fill a range of data with a constant value. Figure 5-22 shows a graph which will be interpolated to fill a missing data range. Use the start/end cursors to select the time-date range or enter the data points manually. Start Y/End Y are the data points which frame the selected missing data. Select **Run**. A Note with the date and time of the action will automatically be inserted in the graph.
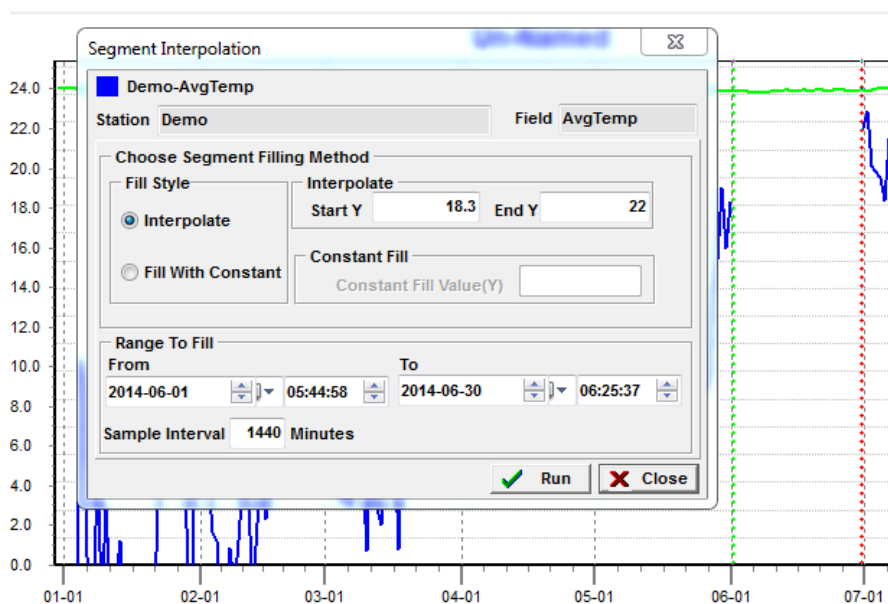
Figure 5-22: Graph Segment Interpolations

Auto Interpolation: This will fill multiple gaps linearly over a consistent sample interval. . **Sample Interval** is the minimum time gap before auto-interpolation takes effect. **Max Interpolation Gap** refers to the maximum number of data points that are to be interpolated. Auto Interpolation will fill the gap to either the maximum number of interpolation points or to the end range date and time, whichever is reached first. A Note with the date and time of the action will automatically be inserted in the graph.

For example: Figure 5- 23 shows that a data point will be plotted every 10 minutes for a maximum of 30 data points. Auto interpolation will stop at 2006-01-10 at 16:17, after 300 minutes (10 minute interval x 30 data points), well before the end range date and time. In order to auto interpolate the entire range, ensure the Sample Interval and Max Interpolation Gap settings permit that.
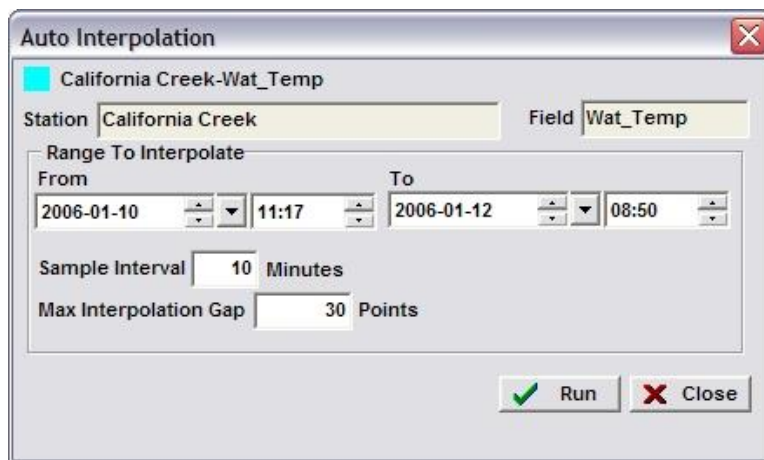
Figure 5-23: Graph Auto Interpolation

Constant Bias Shift: This option lets you shift all of the data in a selected time period and shift it up or down by a constant amount, or assign a constant value to a range of points. The time range will default to the range between cursors if they are set up, otherwise the default is the current day and time. A Note with the date and time of the action will automatically be inserted in the graph.

The following example shows that a constant shift bias of 10 degrees was applied to the range of data (Demo-Avg Temp) framed between the cursors. Once Run was selected, the data points between the cursors moved 10 degrees higher than the previous values.
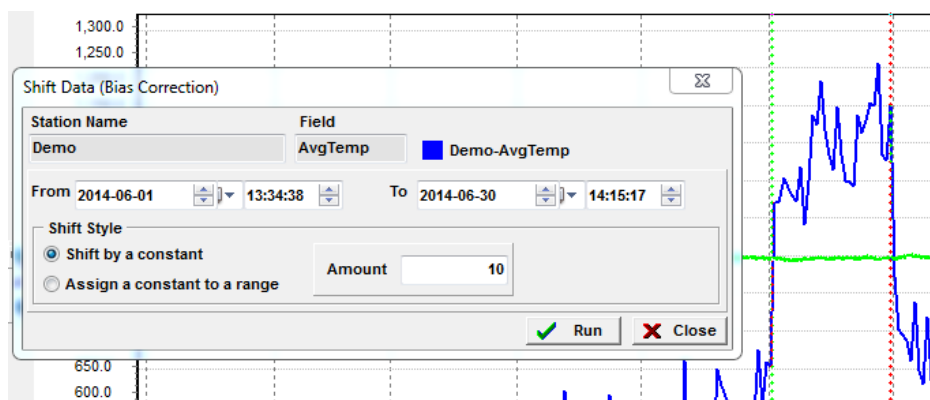
Figure 5-24: Constant Shift Bias

Variable Shift (Drift Correction): This function allows the editing of a series by moving a sub-set of data along one or more pivot points. This function is useful in correcting sensor drifts due to fouling. A Note with the date and time of the action will automatically be inserted in the graph.
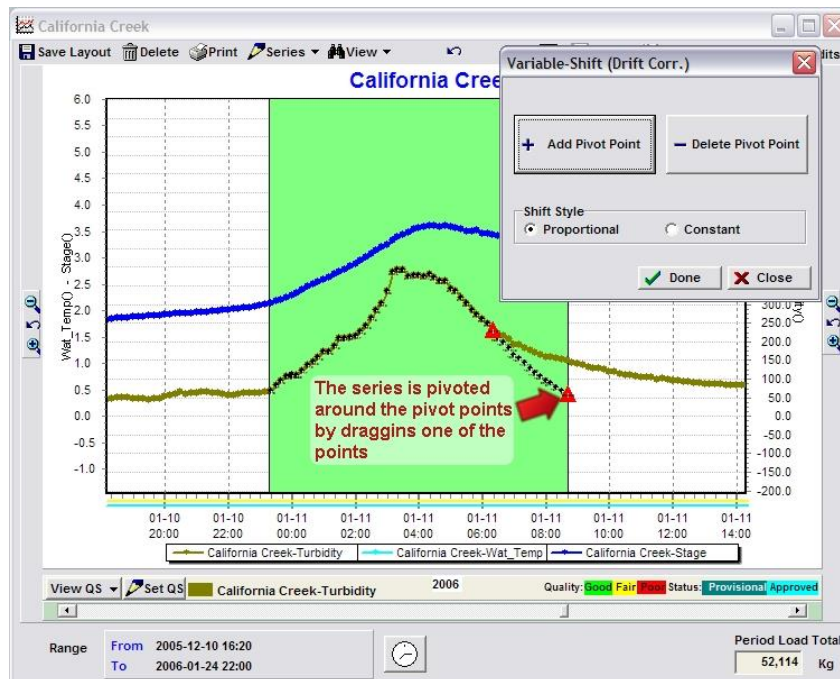
Figure 5-25: Variable Shift (Drift Correction)

Select **Add pivot point** and click the graph where this pivot point is to be placed. Shifting this pivot point by dragging it will shift the data points within the selected range. A Proportional shift will move the pivot point and the other points while maintaining a proportional distance between the points. A Constant shift will maintain the relationship between the pivot point and the data points and shift the data points using the same bias by which the pivot point is shifted. See Figure 5-26.
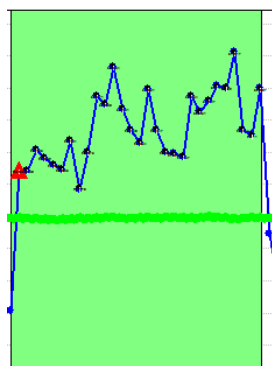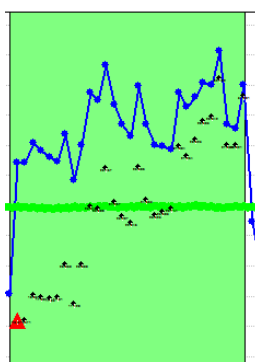
Adding Pivot Point   Proportional Variable Shift   Constant Variable Shift
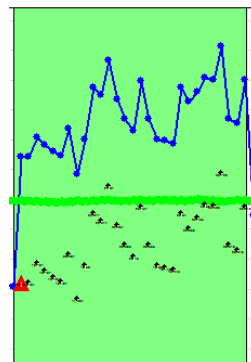
Figure 5-26: Single Pivot Point Shifts

Adding a second pivot point will cause the data point to shift between the two pivot points within the selected range when the left hand pivot point is moved. If the right hand pivot point is moved, all the data within the range will shift for a Proportional shift

Shifting Left Pivot Point   Shifting Right Pivot Point   Shifting Left Pivot Point   Shifting Right Pivot

Proportional Variable Shift   Constant Variable Shift
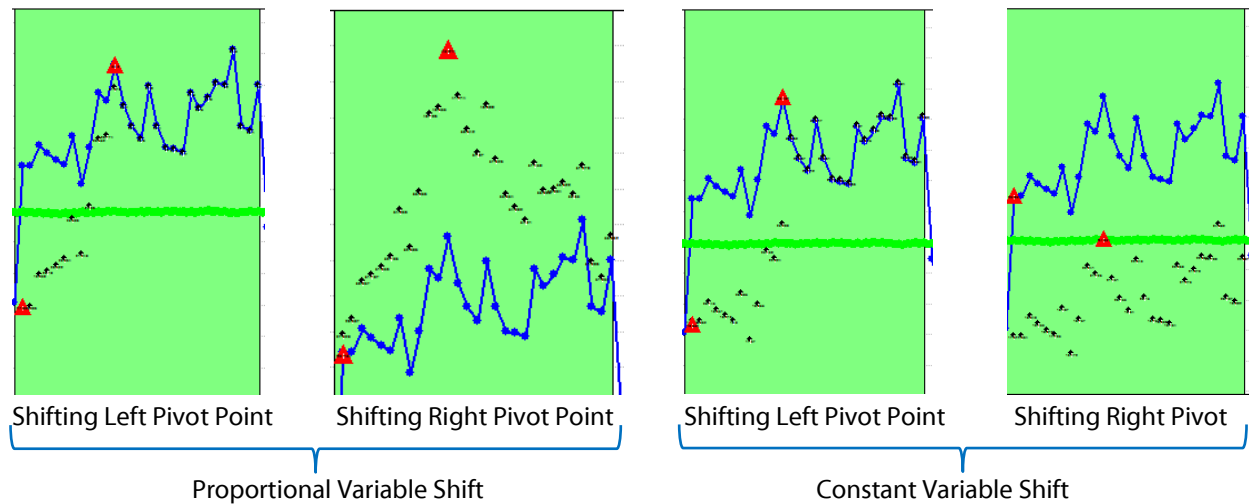
Figure 5-27: Duo Pivot Point Shifts

Reconstruct: This function aids in the reconstruction of a series by using the relationship of this series to another field (surrogate) over a period of time when both fields were present. A Note with the date and time of the action will automatically be inserted in the graph.

Figure 5-28: Reconstruct Data Dialog

Graphical Point Editing: The point editing method allows a user to physically drag the data points up or down to correct data errors. Simply click and drag each point with the mouse to the required new value. This method also allows double-clicking above or below a point, which will move the point up or down to the double-clicked spot. This is helpful for removing data outliers.
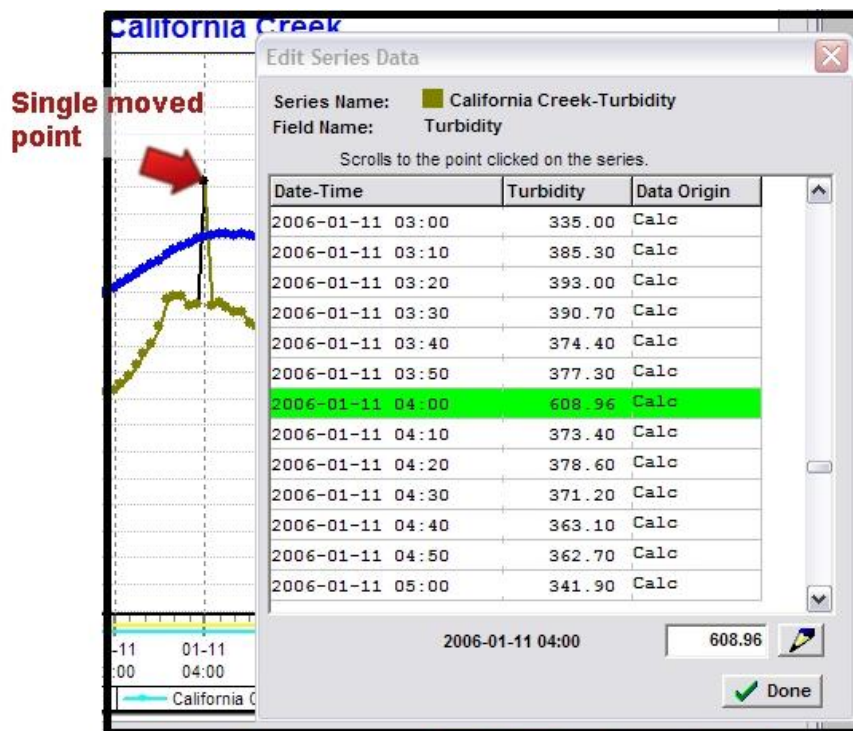
Figure 5-29: Edit Series Data Dialog

Mathematical Editing: This function will fill a range of data using a mathematical formula. See the **Stations>Stations Setup>Calculations** section of this manual for details of completing the form. The Formula can use another field within the current record set to calculate values.

Figure 5-30: Calculation Form

Restore Original Data: This function discards all changes to the data (even if changes have been saved). Clicking on this menu item will restore the data to its original form (the Raw data for each field or series). Raw data is stored separately from edited data; therefore, it is always available for restoring data to its original state.

5.3 STORM EVENTS

A storm is identified by a rise and fall in turbidity. StreamTrac allows you to create what is called a Storm Event to track these occurrences. The event allows you to calculate the estimated load of sediment for the period of the storm.

To create a storm event, use the cursors to mark the beginning and end of the event then right click on the line series or on the legend label and select Add Storm Event from the popup menu.
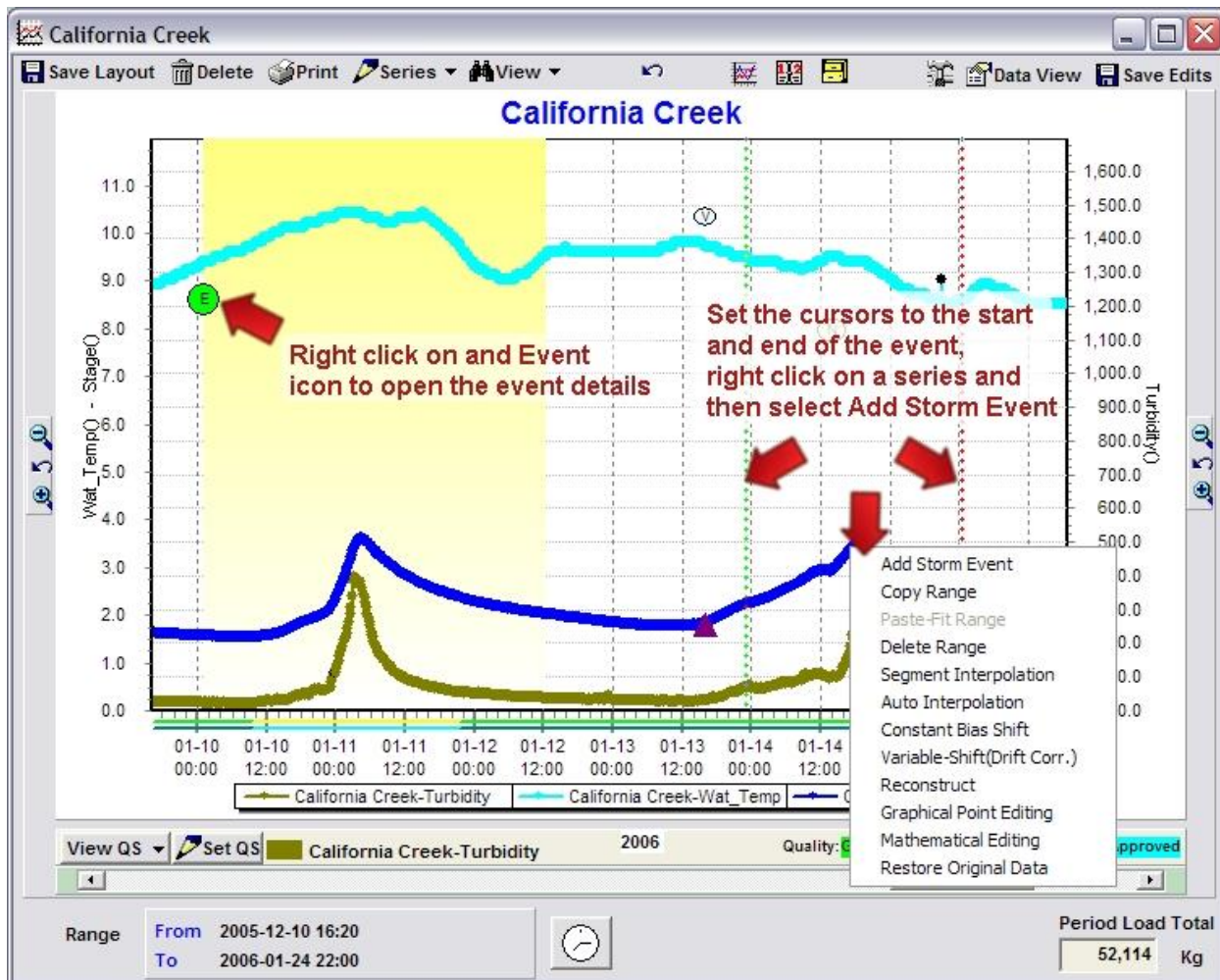
Figure 5-31: Add an event

To open an existing event: right click on the event tag in the graph interface then select **View/Modify**.

Opening an event will present the **Regression and Calculation** which is used to calculate the trend of suspended sediment against turbidity over the period of the event (Event Load Calculation).

To delete an event: right click on the event tag in the graph interface then select **Delete.**

5.3.1   Event Load Calculations

The **Regression and Calculation** screen is used to calculate the trend of suspended sediment against turbidity over the period of the storm event. There are a number of ways to display the data and execute the calculations.
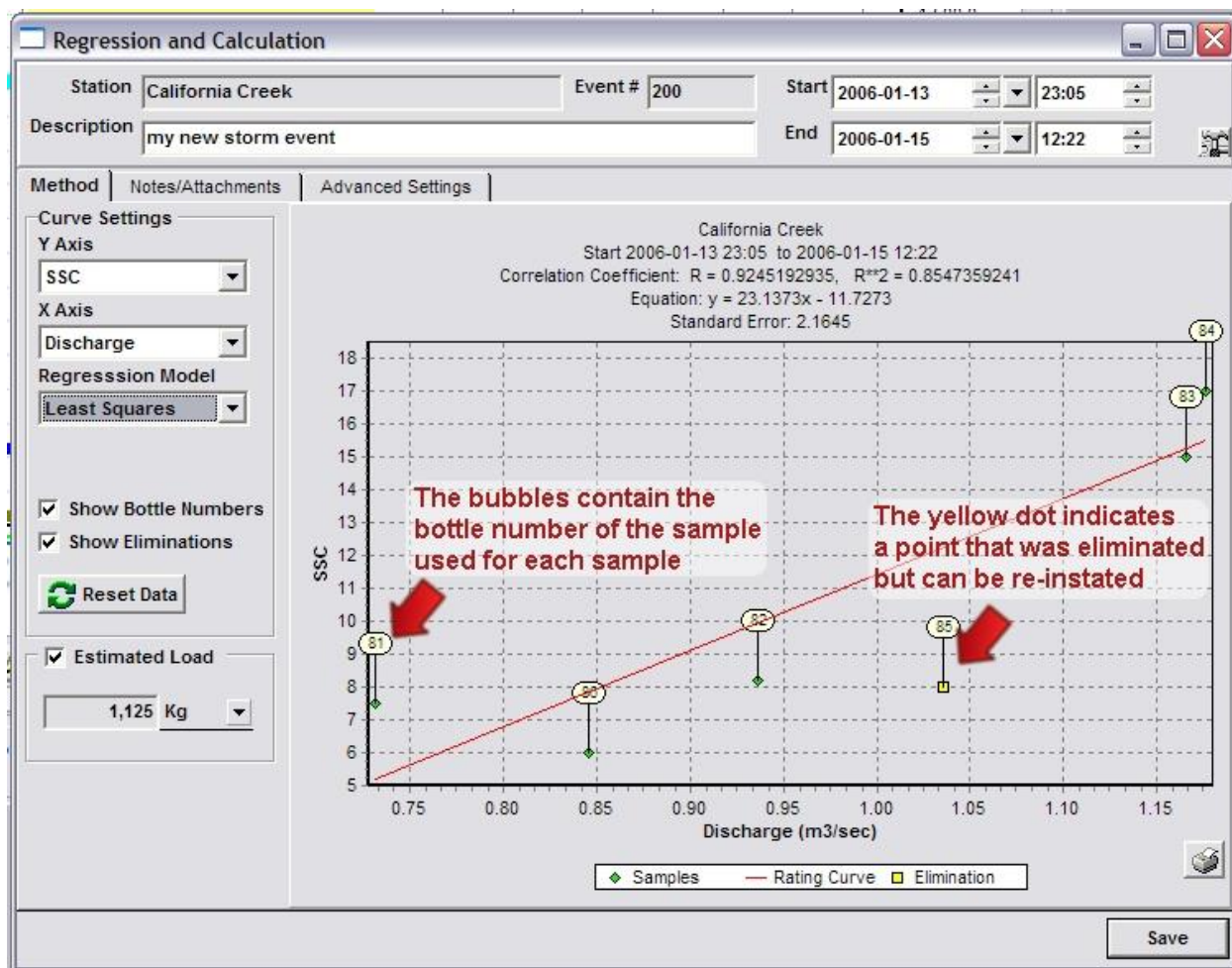
Figure 5-32: Regression and Calculation screen

The **Station** and **Event** number will be auto populate. The **Start** and **End** time will be the range delineated by the Start/End cursors. This can be fine-tuned by manually adjusting the date and time using the arrows.

Description: This will be auto populated sequentially. An event name can be manually entered if desired.

The graph's look can be customized using the **General Graph Settings Tool.**

5.3.1.1 *Method Tab*

Y axis: The Y axis will be SSC (suspended sediment concentrations).

X Axis: Use the drop down menu to select either Discharge or Turbidity.

Regression Model: This drop-down selector allows you to choose the regression model you like to use. The options are:

    Least Squares
    LOWESS
    Log-Log
    Power Function

Use the checkboxes to view/display the associated data.

5.3.1.2 *Notes/Attachments Tab*

This tab is used to add notes and add attachments.

Figure 5-33: Notes/Attachments Tab

5.3.1.3   *Advanced Settings Tab*

This tab is used to customize the Curve Settings. Use the drop down menus to select the variables available for selection on the Method Tab.

Figure 5-34: Advanced Settings Tab

5.3.2   *Trend line Relationship Calculations*

5.3.2.1   *Linear*

Calculates the least squares fit (minimal sum of the deviations squared) for a line represented by the following equation:

$$y = a + bx$$

where b is the slope and a is the intercept.

A linear trend line is a best-fit straight line that is used with simple linear data sets. Your data is linear if the pattern in its data points resembles a line. A linear relationship usually shows that a variable is increasing or decreasing at a steady rate.

Coefficients a and b can therefore be obtained:

$$a = \frac{(\sum y)(\sum x^2) - (\sum x)(\sum xy)}{n(\sum x^2) - (\sum x)^2}$$

$$b = \frac{n \sum xy - (\sum x)(\sum y)}{n(\sum x^2) - (\sum x)^2}$$

where $\sum$ ... stands for $\sum_{i=1}^{n}$ ....

5.3.2.2 *Polynomial*

Calculates the least squares fit through points by using the following equation:

$$y = b + c_1 x + c_2 x^2 + c_3 x^3 + \ldots + c_6 x^6$$

where b and $c_1, \ldots, c_6$ are constants.

A polynomial trend line is a curved line that is used when data fluctuates. It is useful, for example, for analyzing gains and losses over a large data set. The order of the polynomial can be determined by the number of fluctuations in the data or by how many bends (hills and valleys) appear in the curve. An order 2 polynomial trend line has at most one hill or valley, order 3 at most two hills or valleys, order 4 generally has up to three.

As an example a 2nd-order polynomial trend line (one hill) could illustrate the relationship between speed and gasoline consumption.

5.3.2.3 *Logarithmic*

Calculates the least squares fit through points by using the following equation:

$$y = c \ln x + b$$

where c and b are constants.

A logarithmic trend line is a best-fit curved line that is most useful when the rate of change in the data increases or decreases quickly and then levels out. A logarithmic trend line can use negative and/or positive values.

5.3.2.4 *Exponential*

Calculates the least squares fit through points by using the following equation:

$$y = c e^{bx}$$

where c and b are constants.

An exponential trend line is a curved line that is most useful when data values rise or fall at increasingly higher rates. You cannot create an exponential trend line if your data contains zero or negative values.

5.3.2.5 *Power*

Calculates the least squares fit through points by using the following equation:

$$y = cx^b$$

where c and b are constants.

A power trend line is a curved line that is best used with data sets that compare measurements that increase at a specific rate. For example, the acceleration of a race car at 1-second intervals. You cannot create a power trend line if your data contains zero or negative values.

5.3.2.6 *R-squared Value*

Note: The R-squared value you can display with a trend line is not an adjusted R-squared value. For logarithmic, power, and exponential trend lines, Microsoft Excel uses a transformed regression model.

a and b are defined in this model as:

$$a = \frac{(\sum y)(\sum x^2) - (\sum x)(\sum xy)}{n(\sum x^2) - (\sum x)^2} = \frac{\bar{y}(\sum x^2) - (\sum x)(\sum xy)}{(\sum x^2) - n\bar{x}^2}$$

$$b = \frac{n\sum xy - (\sum x)(\sum y)}{n(\sum x^2) - (\sum x)^2} = \frac{\sum xy - n\bar{x}\bar{y}}{(\sum x^2) - n\bar{x}^2}$$

(Kenney and Keeping 1962). These can be rewritten in a simpler form by defining the sums of squares:

$$ss_{xx} = \sum_{i=1}^{n}(x_i - \bar{x})^2 = \left(\sum_{i=1}^{n}x_i{}^2\right) - n\bar{x}^2$$

$$ss_{yy} = \sum_{i=1}^{n}(y_i - \bar{y})^2 = \left(\sum_{i=1}^{n}y_i{}^2\right) - n\bar{y}^2$$

$$ss_{xy} = \sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y}) = \left(\sum_{i=1}^{n}x_i y_i\right) - n\bar{x}\bar{y}$$

Which are also written as:

$$\sigma_x^2 = \frac{ss_{xx}}{n}$$

$$\sigma_y^2 = \frac{ss_{yy}}{n}$$

$$\text{cov}(x, y) = \frac{ss_{xy}}{n}$$

Here, $\text{cov}(x, y)$ is the covariance and σ_x^2 and σ_y^2 are the variances.

Note that the quantities $\sum_{i=1}^{n} x_i y_i$ and $\sum_{i=1}^{n} x_i{}^2$ can also be interpreted as the dot products

$$\sum\nolimits_{i=1}^{n} x_i y_i = \mathbf{x} \cdot \mathbf{y}$$

$$\sum\nolimits_{i=1}^{n} x_i{}^2 = \mathbf{x} \cdot \mathbf{x}$$

In terms of the sums of squares, the regression coefficient b is given by

$$b = \frac{\text{cov}(x, y)}{\sigma_x^2} = \frac{\text{ss}_{xy}}{\text{ss}_{xx}}$$

and a is given in terms of b as

$$a = \bar{y} - b\bar{x}$$

The overall quality of the fit is then parameterized in terms of a quantity known as the correlation coefficient, defined by

$$r^2 = \frac{\text{ss}_{xy}^2}{\text{ss}_{xx}\,\text{ss}_{yy}}$$

which gives the proportion of ss_{yy} which is accounted for by the regression.

Let $\hat{y}_i$ be the vertical coordinate of the best-fit line with x-coordinate x_i, that is,

$$\hat{y}_i \stackrel{\text{def}}{=} a + b\, x_i$$

then the error between the actual vertical point y_i and the fitted point is given by:

$$e_i \stackrel{\text{def}}{=} y_i - \hat{y}_i$$

Now define s^2 as an estimator for the variance in e_i. Then s can be given by:

$$s = \sqrt{\frac{ss_{yy} - b\,ss_{xy}}{n-2}} = \sqrt{\frac{ss_{yy} - \dfrac{ss_{xy}^2}{ss_{xx}}}{n-2}}$$

(Acton 1966, pp. 32-35; Gonick and Smith 1993, pp. 202-204).

The standard errors for a and b are:

$$\text{SE}(a) = s\sqrt{\frac{1}{n} + \frac{\bar{x}^2}{ss_{xx}}}$$

$$\text{SE}(b) = \frac{s}{\sqrt{ss_{xx}}}$$

5.3.2.7   ***Standard Error***

There are two different definitions of the standard error.

The standard error of a sample of sample size n is the sample's standard deviation divided by $\sqrt{n}$. It therefore estimates the standard deviation of the sample mean based on the population mean (Press *et al.* 1992, p. 465). Note that while this definition makes no reference to a normal distribution, many uses of this quantity implicitly assume such a distribution.

The standard error of an estimate may also be defined as the square root of the estimated error variance $\hat{\sigma}^2$ of the quantity:
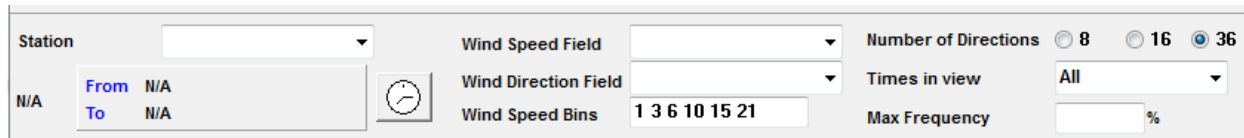
$$s_e \stackrel{\text{def}}{=} \sqrt{\hat{\sigma}^2}$$

(Kenney and Keeping, p. 187; Zwillinger 1995, p. 626).

5.4 CREATING A WIND ROSE GRAPH

To create a wind rose graph, select **Graphs>Open Blank Graphs>Windrose.** The main graphing screen will appear.

 Note: The graph will appear blank until the station, a wind speed parameter and wind direction parameter fields are populated.

Figure 5-35: Creating a Wind Rose Graph

Station: Use the drop down menu to select a station.

Time Range (Clock): See #1 in Figure 5-36. Set the desired time range to be graphed (either a range or a float time). The Float option allows you to select a "floating" date or time period based off the current time or last time run. For example, you can select "Since Beginning of Year" which could be one day to 365 days' worth of data. To update the data points in the date range, click on the **Update Data** button.

Wind Speed Field: Use the drop down menu to select the wind speed field.

Wind Direction Field: Use the drop down menu to select the wind direction field.

Wind Speed Bins: Input the speed start range for each of the bins. The bins will be displayed in the legend (#2 in Figure 5-36) along with the percentage of wind in each bin over the input time range.

Number of Directions: Select the number of radial arms the wind rose will display.

Times in View: Use the drop down menu to select a time or input your own.

Max Frequency: Input the maximum percentage that will be displayed in the radiating concentric circles.

Once all fields are populated, select **Save Layout**.
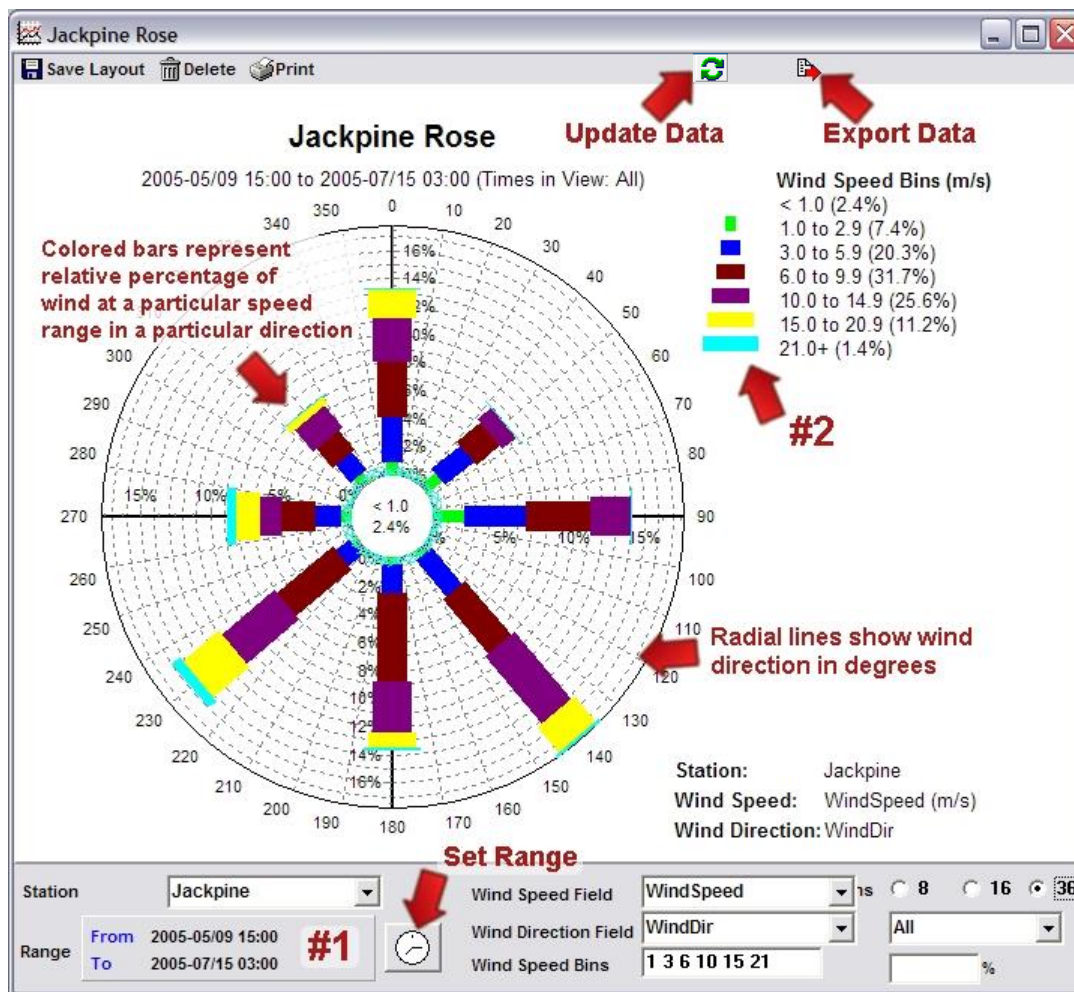
Figure 5-36: Windrose Graph

Save Layout: This button saves the graph in its current state so it can be viewed at a later date. The graph name will be automatically populated with the station name but this can be changed if desired.

Delete: This button will delete the current graph.

Export Data: This will open a browse window to export the graph as a bit map (.bmp) file to the selected folder.

5.4.1   Editing Graph Data

Any of the parameters can be amended by clicking on the field and changing as required. Update the graph by selecting the **Refresh** button to display any changes.

CHAPTER 6   SITE VISITS

6.1 SITE VISIT FORMS

The purpose of these forms is to record various information and conditions during a visit to the site. One of the most important pieces of information for Suspended Sediment calculation is the bottle position recording within the auto sampler.

The StreamTrac software requires that the bottle number contained in each carousel slot be recorded at the time that the bottles are swapped (full bottles removed and empty ones put in their place). In other words, record when you leave the site, NOT when you arrive. Secondly, the date time of the bottle swapping as well as station name must be accurately recorded on this electronic form.

Once the bottle numbers are recorded, the StreamTrac software will seamlessly place the bottle numbers in the proper place within the data stream requiring.

6.2 NEW SITE VISIT

To issue a new Site Visit form, from the main menu click on **Site Visits> Issue New Site Visit**. Use the drop down menu which appears in the Issue New Site Visit dialog box to input the Station's name.
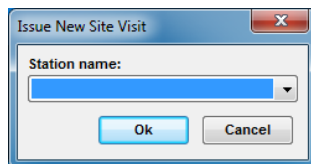
Figure 6-1: Issue New Site Visit dialog box

The Site Visit form will be displayed.

6.2.1   *Carousel-Bottle Mapping Tab*

From this screen you can record bottle numbers and their corresponding carousel slot numbers, as well as record the SSC results once the samples have been processed.

The **Start Date & Time** is the only mandatory field. All other fields can remain blank if desired.

Figure 6-2: New Site Visit Form

CHAPTER 7   SETTINGS MENU

When first installed on the Calling Service Computer or the Remote User Computer, the StreamTrac system interacts with the locally installed **StreamTrac Database** (FTSdata.mdb). The Switch to Another Database menu option allows a user running the **StreamTrac Application** on a Remote User Computer to switch from the locally installed database to the main database used by the Calling Service. This enables the remote user to monitor calls and view data from the main **StreamTrac Database**. The remote user must have network privileges to allow them to connect to the computer which contains the main database.

To switch to another database, select the Choose button to browse to the desired path.

When switching to a Microsoft SQL Server your network administrator or DBO must first transfer your database from MS Access to the SQL server before switching. The database on the server must allow full security rights to all StreamTrac users. This includes table add and delete rights. Your network administrator will need to fill in the SQL section shown.

Figure 7-1: Settings Menu

Important - Note:

> The DATA> SWITCH DATABASE *menu is intended to be used to select between a local database and the main* **StreamTrac Database** *when running the StreamTrac Application on a Remote User Computer.*

> *If the user connects the StreamTrac Application to a different database and the StreamTrac Application is running on the same computer as the Calling Service then the Calling Service will also use the newly selected database.*

7.1 SETTINGS>USER ACCOUNTS

Selecting **Settings>User Accounts** will display, in tabular form, a list of all Administrators and User accounts. From this page, users can be added, deleted, and their accounts edited. However, only those with Administrator rights are able to perform those functions.
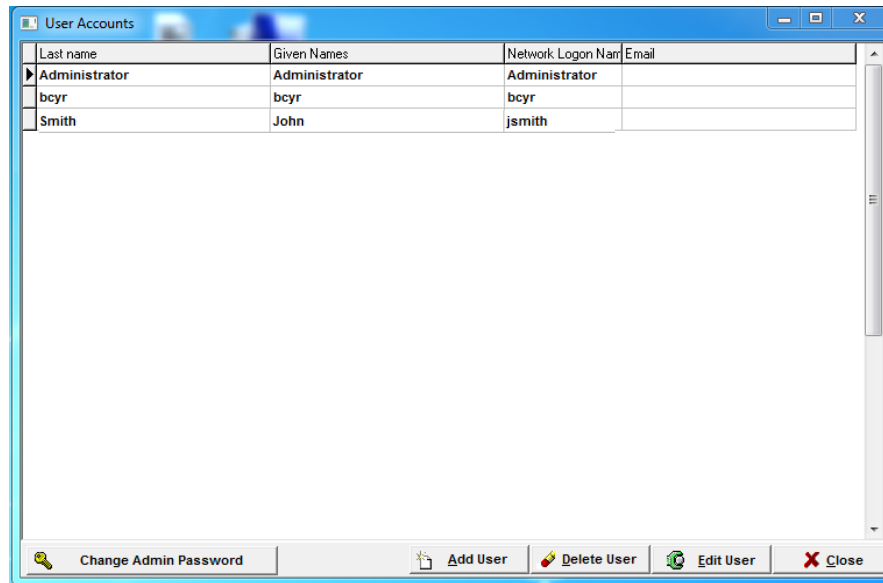
Figure 7-2: User Accounts Display

7.1.1   Adding/Editing Users

When adding or editing a user the User Account screen is displayed. It contains access right controls for the various components of StreamTrac. It should be noted that some settings will affect other components or settings. For example: The Data Access - Edit option controls the ability to edit data in the View/Edit screen as well as the graphing screen. See the descriptions below for more information.
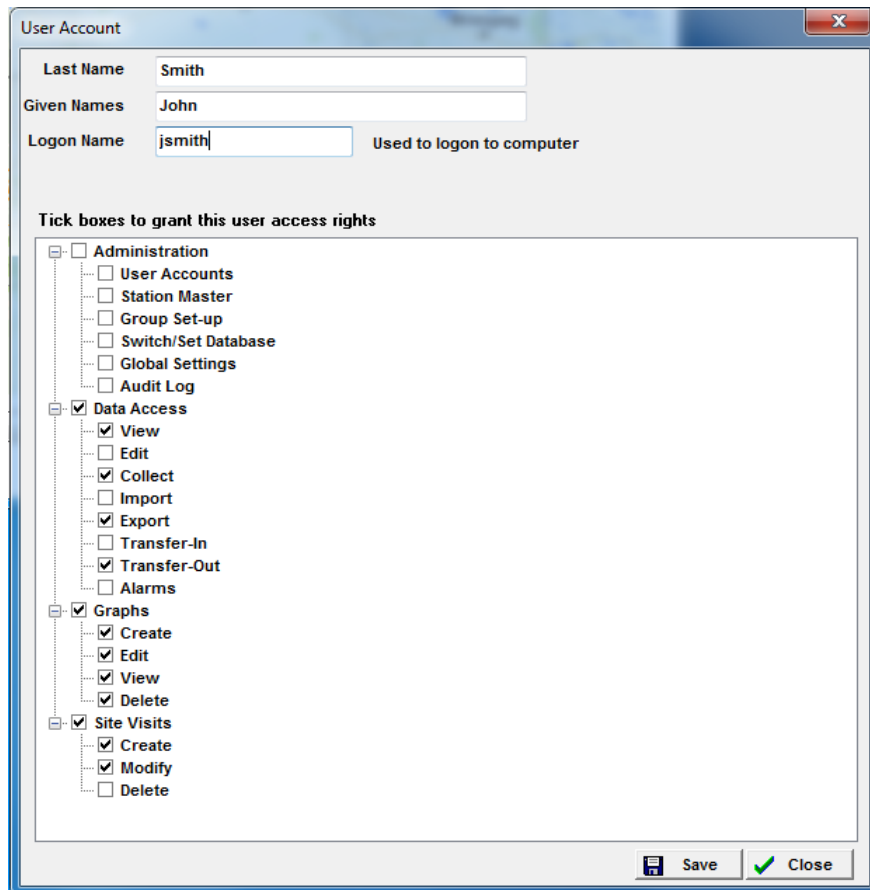
Figure 7-3: Assigning User Access Rights

7.1.2   *Access Rights Descriptions*

ADMINISTRATION

User Accounts: Allows overall administrator rights

Station Master: allows adding deleting and all other changes to the station.

Group Set-up: Allows the user to create and modify station groups.

Switch/Set Database: User can change the connection to the default or active database.

Global Settings: Gives access to the screen where global date formats and other common settings are stored.

Audit Log:

DATA ACCESS

View: User allowed only to view data both in tabular and graphing views.

Edit: Users are allowed to edit data both in the tabular form and on the graphing form. Data edits include Sensor/Field record data, Graph Notes, Events, Site visits and data corrections.

Collect: Allows access to the data collection menu items. However, if not ticked users can still make calls that provide information only such as Current conditions and Data Logger information but will not allow calls which add to the sensor variable database such as collect data by date range and collect data since last call etc.

Import: Controls access to the ability of users to import data from text or CSV files into the station database.

Export: Controls the exporting of data to text or CSV files.

Transfer-In: Controls Access to the data transfer method of moving data from a data transfer zip file into the database (similar to importing).

Transfer-Out: Controls Access to the data transfer method of moving data from the database to a data transfer zip file (similar to exporting).

Alarms: Users are allowed to set alarms.

GRAPHS

Create: Allows access to creating blank graphs.

Edit: Allows users to edit graph layouts, i.e. the number of series on the forms, the colours of the series and Adding Events and notes etc…not to be confused with editing actual data using the graph's editing tools. For access to editing data using the graph **Data Access-Edit** feature item must be selected.

View: Allows user to view existing graphs only.

Delete: Allows deletion of graphs

SITE VISITS

Create: Allows users to create a new site visit.

Modify: Allows an existing site visit to be added.

Delete: Allows a user to delete a site visit form.

7.2 Settings>Language

StreamTrac's interface can be set up in any of three languages: English, Spanish, and Chinese. The **Settings>Language** menu displays the Change Language screen. Use the drop down menu to select the language of choice.
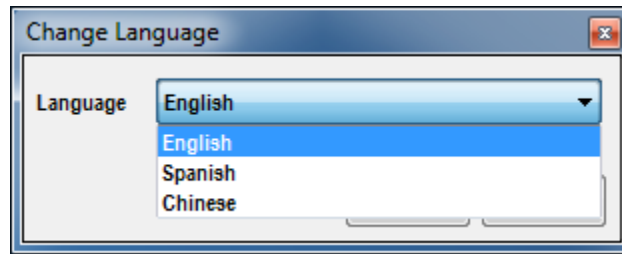
Figure 7-4: Change Language menu

NOTE: The regional language pack must be installed for the proper characters to appear, especially in the case of the completely graphical Chinese characters (Unicode).

7.3 SETTINGS>GLOBAL SETTINGS MENU

The Global settings menu allows the user to make changes to the file storage path, date and time display formats, and the outgoing alarm settings.
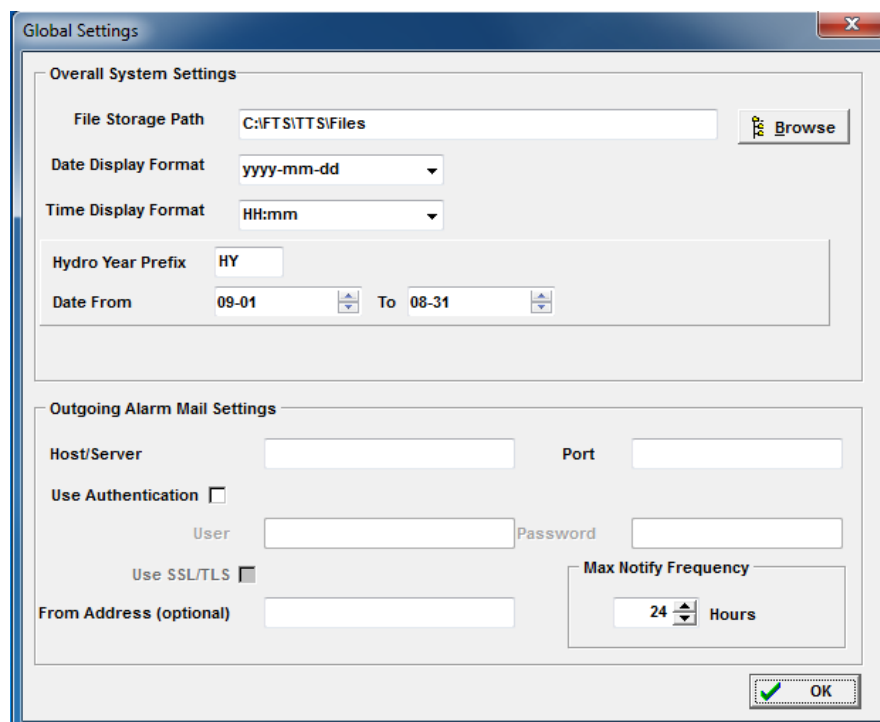
Figure 7-5: Global Settings Menu

7.3.1 *Overall Systems Settings*

File Storage Path: This path is the location where StreamTrac can store and create its sub-directory structure. It is recommended that this be the running folder of the StreamTrac software, which is also the location of the StreamTrac database, thereby keeping everything in one folder which makes back-ups as easy as copying the contents of this folder onto your backup location. Use this to browse to the directory and select the desired file path for the **StreamTrac Database.**

Date Display Format: Use this drop down menu to select the desired date display format which will be used throughout the StreamTrac program.

Time Display Format: Use this drop down menu to select the desired time date display format which will be used throughout the StreamTrac program.

Hydro Year Prefix: This is the identifying prefix for the Hydro Year. The default setting is HY and this can be changed if desired.

Date From/To: This defines the start and end date of the hydro year. When a start date is inserted in the Date From field, the To field is automatically populated to end one year after the From date.

7.3.2 *Outgoing Alarm Mail Settings*

These settings affect the Data Alarm Service. These settings should be verified with your local network administrator.

Host/Server: This is the name or IP address of your SMTP mail server through which alarms will be directed.

Port: This is the port the server will accessed on (default port for SMTP is 25).

Use Authentication: Select this to set a password to allow the SMTP server to accept and forward e-mails. When selected, input **User** and **Password** details. The **Use SSL/TLS** option attempts to send the username and password over a secure channel. This must be setup on the mail server. Some mail servers require this to connect.

From Address (optional): This optional field can be filled in to identify the e-mail or text message of the alarm's originating sender.

Max Notify Frequency: Input the desired frequency to be notified of any alarms. Specifically, if an alarm is triggered once, and then subsequently triggered, another notification will not take place unless the alarm is triggered AFTER the maximum notification frequency time.

7.4 SETTINGS>COMPACT DATABASE MENU

If the StreamTrac Database is connected to a Microsoft Access database (.MDB), it may occasionally need to be compacted. Clicking this option immediately presents you with a confirmation warning and then will begin this process once **Yes** is selected.
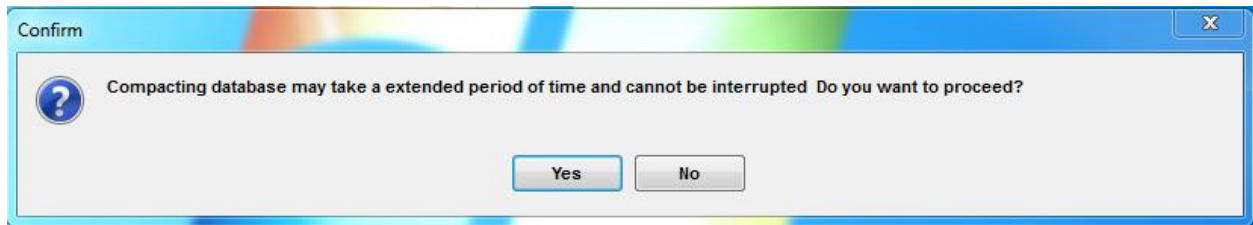
Figure 7-6: Confirm Compact Database

IMPORTANT NOTE: Ensure the AutoCaller service, data alarm service and the FTS Importer/Exporter service are stopped and that no remote users are actively connected to the database prior to performing this operation.

CHAPTER 8   HELP MENU

8.1 HELP FILES

This menu item allows users to access a PDF version of this the User Manual and other reference documents. If more assistance is necessary, contact the FTS Technical Support (contact information located on the frontispiece of this manual).

8.2 ABOUT

The About menu allows the users to view the particulars of the StreamTrac system. Software version is displayed as well as the License Count for the number of stations that can automatically be called by the **StreamTrac Calling Service**.

Figure 8-1: About Screen

Add AutoCaller Service Licenses: The **Add AutoCaller Service Licenses** button opens the dialog box shown in Figure 8-2. The dialog box prompts the user to enter the 16 character License Code provided by FTS which then enables the StreamTrac Service to automatically call the licensed number of stations.

Figure 8-2: Update Software Licenses screen

Upon correctly entering the License Code, the Software Name, Software Number, and License will automatically be displayed. After clicking the Update button, the AutoCaller calling service must be restarted (see the Stopping & Starting the Calling Service section in this manual) in order for the License information to take effect.

<div style="border:1px solid black">

CHAPTER 9   TELEMETRY

</div>

9.1 COMMUNICATION TYPE - FTS

The FTS Telemetry type encompasses direct data logger connections as well as telephone, radio, satellite, or IP modem connections used to retrieve data from a remote monitoring station. Parameters of the remote site's data logger and telemetry equipment as well as parameters for the computer calling the remote station must be properly identified in the communication method's FTS Telemetry window (shown below) in order to communicate with the remote station.

Access to this window is provided through **STATIONS> Station Setup > Add/Modify/Delete Communication Method** button.

Figure 9-1: FTS Telemetry Example

Note: *Figure 9-1 is an example of an FTS Telemetry communication method for a remote station FTS Demo. On this computer (CEDAR), modems on either Com1 or Com2 can be used to connect to the radio cluster hub site which has a TM Ultra telephone modem and an RMX radio modem (ID: 010Ah). The hub site communicates with repeater site (ID: C02Fh) which communicates with the FWS-12S Data logger at the FTS Demo site via FTS Demo's RMX radio modem (ID: 0005h).*

9.1.1   <u>Description</u>

The Description field displays the name of this particular Communication Method at the time it was created. The name given in the Description field will appear in the Communication Tab – Site Specific Communication Methods list and also in the Communication Methods choices list when making manual calls to the station. When naming a communication method, a good practice is to begin the name of the communication method with the name of the computer on which the communication method can be used. This allows remote users to easily identify the communication method they defined for use with their computer and modem (i.e. see Figure 9-1: "CEDAR- FTS Telemetry Example").

9.1.1.1   *Datalogger Information*

Data Logger Type: this field identifies the model of FTS data logger at the remote site. Select the appropriate model from the drop-down menu list. If the remote site does not have a data logger (i.e. is a radio repeater site only) then select 'None'.

Password Box: If your data logger is password enabled (i.e. a password has been set in the logger) then in order to perform certain functions such as Set Time, Send Data Logger Program and other functions which may change the behavior of the logger you will need to enter this password in this box.

Use Saved Sensor Sets: Sensor set information is information about the data that the data logger transmits along with the actual data on each data request (i.e., data field names, data storage information, etc.).

If the Use Saved Sensor Sets checkbox is enabled then on the first data call to the station the returned data logger sensor set information will be saved. Subsequent calls to the station will result in only data being collected from the data logger. If the saved sensor set information does not match the incoming data, StreamTrac will automatically update its sensor set information. The user should enable the Use Saved Sensor Sets option when utilizing telemetry options that incur airtime charges as this option will minimize the data transmitted from the station on each data call.

9.1.1.2   *Telemetry Options*

There are three Telemetry options: Direct Connection, Phone Modem, and Radio Modem. When one is selected, the associated fields will be unlocked and able to be input with the necessary information.

Figure 9-2: Telemetry Options

All three options require the Allowed Com Ports, Baud Rate and Wakeup Delay fields to be populated.

<u>Choose Allowed COM Ports</u>

The **Choose Allowed COM Ports** selection box is used to select which of the computer's COM ports can be used to contact the station. The StreamTrac system is multi-call, multi-thread capable so all of the COM ports on the computer which can be used to connect to the remote station can be identified. When making a call to a remote site, the Calling Service will use whichever of the allowable COM ports (and associated modem) is available to place the call.

> **Important - Note:**
>
> *COM ports are hardware devices which are specific to each computer. A user on a Remote User computer **cannot** initiate a call to a station with a communication method that was configured for use on the Calling Service computer. This is because the Remote User computer is not able to access and control the COM ports on the Calling Service computer.*
>
> *If the user wishes to place a manual call to the station with the Application running on a Remote User computer then the user **must** configure a communication method which utilizes a COM port (and associated modem) on the Remote User computer. This is why it is good practice to begin the name of the communication method with the name of the computer on which the communication method can be used.*

Baud Rate

The baud rate required for the chosen telemetry configuration is usually automatically set by StreamTrac; however, the Baud Rate drop-down menu may be used to override the default selection

Default baud rates for the various FTS telemetry devices are shown in the table below.

Telemetry Device	Baud Rate
Direct Connection	9600 baud
TM4000 telephone modem	1200 baud
TM Ultra telephone modem	9600 baud
RM 4000 radio modem	1200 baud
RMX radio modem	4800 or 9600 baud [1]
Globalstar satellite modem	9600 baud
MSAT satellite modem	9600 baud
IP Modem	not used

(1) Setting is dependent on the RMX radio modem configuration

Wakeup Delay

This is the time interval allowed for the station to respond to a query originating from StreamTrac. This ensures two-way communication is established   prior to transmitting any information or data. If the station does not respond within this time interval, StreamTrac will continue to attempt to "wakeup" the station. The default setting is 300ms but it can be manually changed to meet specific requirements (ie: older equipment may require a longer interval);

Each individual FTS communication method can only have one of the following telemetry configurations defined:

- •   Direct Computer to Data logger Connection
- •   Direct Computer to Radio Modem Connection

- Telephone Modem to Data logger Connection
- IP Modem to Data logger Connection
- Combination Telephone / Radio Modem to the Data logger

The setting of the options below determines the telemetry configuration. As the telemetry is configured, the telemetry path for the remote site is visually displayed at the bottom of the FTS Telemetry window (see Telemetry Path section).

Double-clicking on a telemetry icon will enable or disable that particular telemetry device from the telemetry.

Direct Computer to Datalogger Connection

This option is used when a point-to-point cable connection exists between the station's data logger and the computer's COM port. Select the **Direct Connection** check box.

The telemetry path will display the Direct icon with the Data Logger Type.
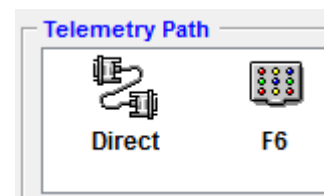
Figure 9-3: Telemetry Path Example

Telephone Modem to Datalogger Connection

The **Phone Modem** selection box should be selected when either:

a) the remote station is equipped with a telephone modem, or

b) the radio cluster hub site of the radio path to the remote site is equipped with a telephone modem.

Select the **Phone Modem** checkbox. Use the Modem Type drop down menu to select the modem type and enter the phone number for the remote site.

Telephone Numbers: Valid telephone number characters are numbers (0-9), brackets (for readability ie: area codes), and commas (dial pause operator for getting outside line). Do not use dashes or spaces.

Telephone number example: 9,1(555)1239875

The Telemetry Path will display the modem type with Data Logger Type.
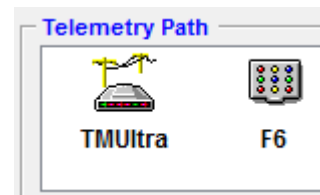
Figure 9-4: Telemetry Path Example

IP Modem to Datalogger Connection

The IP Modem option is selected when the remote site is equipped with a modem which communicates over the internet (i.e. a digital cellular modem). This modem type does not require a computer COM port as the communications to the remote site are via the internet.

Figure 9-5: IP Modem to Datalogger Connections Screen

DNS: The DNS (domain name server) field is the name used by the domain name server to identify the remote site's IP Modem. . A DNS entry is required when the remote modem does not have a static IP address. However, the DNS field is not required when the remote modem is provisioned with a static IP address. If information is entered into both fields, then the information in the DNS field takes precedence.

IP Address: The IP Address field is the static IP address of the remote site's IP modem. The IP Address field should be left blank if the DNS field is used to identify the remote modem.

Port Number: The Port Number field identifies the device port used by the remote site's IP modem.

The telemetry path will display the IPModem icon with the Data Logger Type.
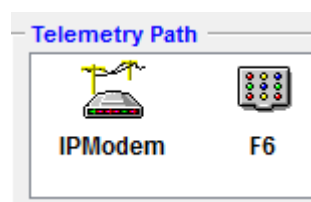
Figure 9-6: Telemetry Path Example

Radio Modem to Datalogger Connection

The **Radio Modem** checkbox should be selected when a radio modem (either an RM4000, TS4000, or an RMX) is used to communicate to the remote site. After selecting the **Radio Modem** selection box, the radio modem buttons below the **Telemetry Path** box are enabled. Use the Add RM button to select the type of modem, and then enter its hexadecimal address
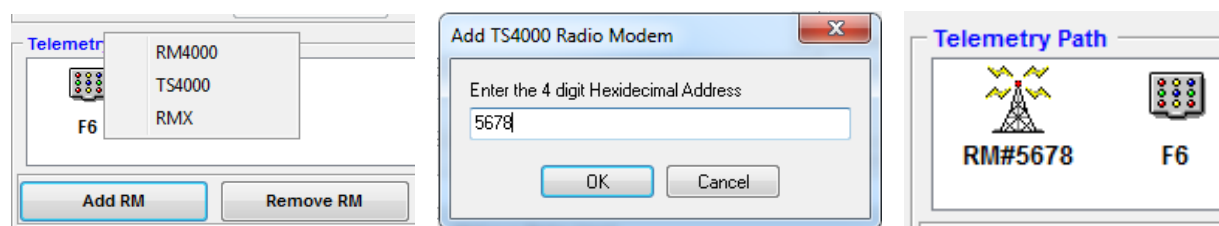
Figure 9-7: Adding a Radio Modem to Datalogger Connection

Several Radio Modems may be entered by following the above steps if there is a radio cluster hub which is being used to communicate with the datalogger.

Combination Telephone/Radio Modem to Datalogger Connection

To setup up a telephone/radio to datalogger connection, select both the Phone Modem and Radio Modem checkboxes, then add the appropriate modems following the preceding steps.

The telemetry path will display the selected telephone and radio modems with the datalogger.
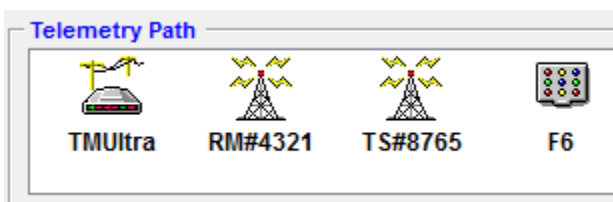
Figure 9-8: Telemetry path Example

9.1.1.3   **Telemetry Path**

The communication path from the office computer to the remote site is pictorially displayed in the **Telemetry Path** box. The radio modem buttons below the **Telemetry Path** box are used to manage radio modem path information for remote sites which use radio communications. As radio modems are added and deleted the appropriate icons are shown in the telemetry path. Double-clicking a telemetry icon will disable/enable the telemetry device from the station's telemetry path without deleting information entered in the Admin Application.

Figure 9-9: Telemetry Path iconically displayed

Add RM (Radio Modem): This control is used to insert a radio modem into the telemetry path for the remote site. When adding a radio modem 4 digit hexadecimal address for each radio modem in the path must be supplied. When adding an RM4000, the hexadecimal address is determined by the RM4000's serial number. When adding an RMX, the hexadecimal address is determined by the RMX's programmable Station ID setting.

> **IMPORTANT:** The RM4000 and RMX radio modems are not compatible with each other so they cannot be selected to be in the same telemetry path

Remove RM (Radio Modem: This control is used to delete the selected radio modem from the remote station's telemetry path. To select a radio modem, single click on the modem (the modem's address will become highlighted with a blue background).

Edit RM Address: This control is used edit the hexadecimal address of the selected radio modem. To select a radio modem, single click on the modem (the modem's address will become highlighted with a blue background).

Enable Telemetry Devices: This control is used to enable all telemetry devices in the station's telemetry path that were disabled.

9.1.1.4 *Configuring Comm Ports*

Clicking the **Global Computer Port Setup** button opens the Serial Port Setup Screen which is used to define which COM ports are available on the computer and also to define the specifics for each COM port's modem (computer modem, data logger, radio modem, etc.).
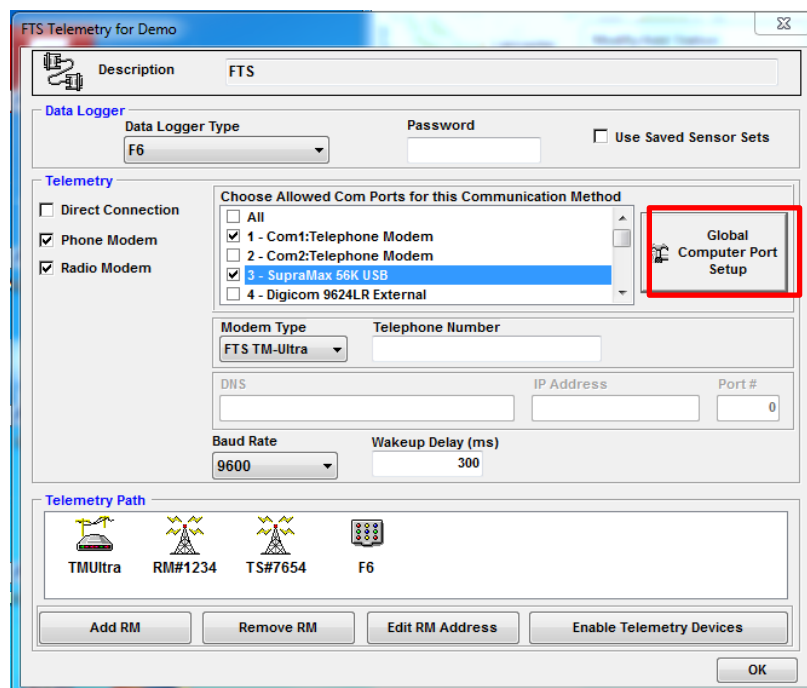
Figure 9-10: Global Computer Port Setup button

The **Serial Port Setup** menu only applies to the computer that is running StreamTrac. That is, if StreamTrac is running on Remote User Computer #1 it **cannot** configure the COM ports on any other Remote User Computer or the Calling Service Computer even if Remote User Computer #1 is connected to another computer's database.

If you wish to perform a manual call using StreamTrac on a Remote User computer, you must configure the Remote User computer's COM ports and then define a communication method which uses the appropriate port. Computer Port Setup information is not stored in the **StreamTrac Database** - port information is stored locally on each computer.

> **Important Note:** The StreamTrac Application does not use Windows modem driver information. Modem configuration information must be supplied in the Serial Port Setup window.

Refer to the **STATIONS> Station Setup> Communication Type – FTS> Serial Port Setup** section of the manual for details on configuring the computer's COM ports.

Serial Port Setup Screen
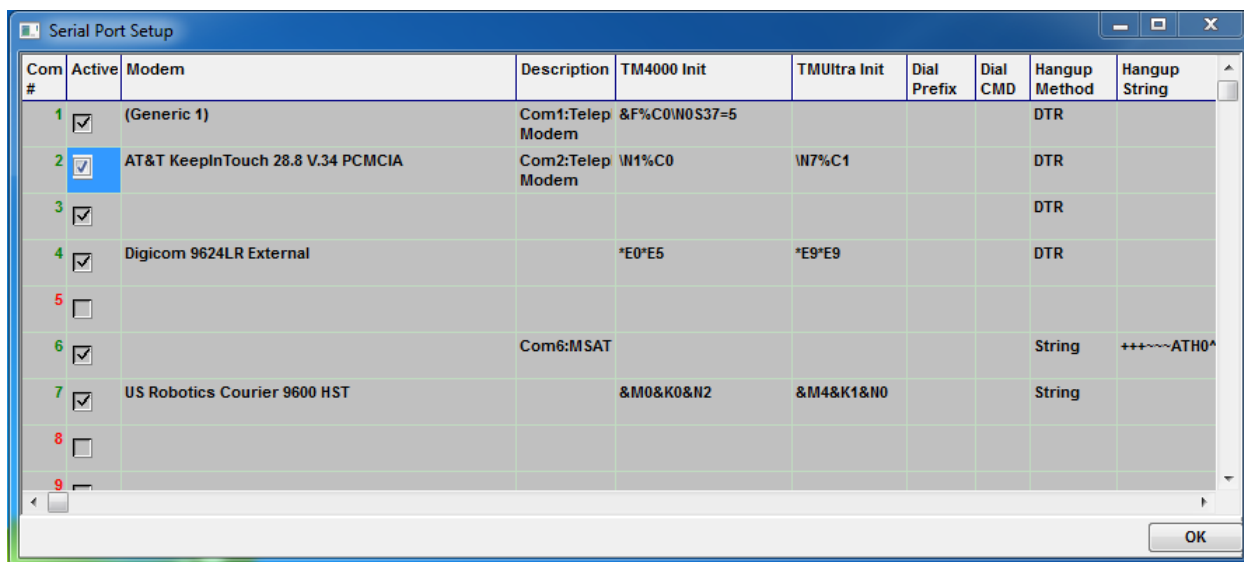
Figure 9-11: Serial Port Setup screen

Com #: The **Com#** field refers to the actual computer's serial COM port. Green numbers indicate that the Com port is active. Ref numbers indicate an inactive com port. This field is not editable.

Active: The **Active** field is a checkbox which, when selected, signals to the StreamTrac system that the corresponding COM port is available for use. The port's Com# field changes from red to green when the Active checkbox is selected.

Modem: The **Modem** field is a drop-down list which allows the user to select which model modem is connected to the COM port. To display the drop down menu, click on the empty Modem field for the relevant Com# line. When a particular modem is selected the TM4000 and TM Ultra Initialization fields are automatically configured for the selected modem.

Description: The **Description** field is a textbox which allows a user to enter a descriptive name for the port. The name provided by the user appears in the Choose Allowed Ports window when configuring FTS Telemetry methods.

TM4000 Init: The **TM4000 Init** field is a textbox which contains the initialization string required for the computer's modem to communicate effectively with a remote site's FTS TM4000 telephone modem. This field is automatically configured when the user selects a modem from the drop-down menu in the Modem field; however, the initialization strings in this field can be user modified as required. For proper communications with a TM4000, the computer modem should be initialized as follows:

1) its baud rate fixed at 1200 bps;

2) data compression should be disabled; and

3) error correction should be disabled.

TM Ultra Init: The **TM Ultra Init** field is a textbox which contains the initialization string required for the computer's modem to communicate effectively with a remote site's FTS TM Ultra telephone modem. This field is automatically configured when the user selects a modem from the drop-down menu in the Modem field; however, the initialization strings in this field can be user modified as required. Normally the default settings are appropriate for the TM Ultra as the TM Ultra is a relatively modern telephone modem.

Dial Prefix: The **Dial Prefix** field allows a user to enter a prefix to each call made using this COM port. The intention of this field is for the user to enter the specific prefix required to gain access to an outside

telephone line instead of adding the prefix to each station's telephone number. For example – a prefix of '9,' (dial 9 and then a comma): 9 to get an outside line and a comma to add a delay while the outside line is being switched in.

> **IMPORTANT!**. Ensure that you do not add the dial prefix both here and in the FTS Telemetry page Telephone Number field. The dial prefix is only required in one location.

Dial Command (Dial CMD): The *Dial CMD* field allows a user to enter a command that will be used to dial the modem attached to this COM port. If this field is left blank, the Dial Command for the modem defaults to Hayes AT command set standard of ATDT (Attention and Dial Tone).

Hang-up Method: The *Hang-up Method* field allows the user to select which method is used to disconnect from a device connected to the COM port. The two options are drop the DTR (Data Terminal Ready) line (standard for most telephone modems) or use the command string defined in the Hang-up String field.

Hang-up String: The *Hang-up String* field allows a user to enter a specific string that will be used to disconnect from a device connected to the COM port. Refer to your modem manual for this information. Note that the following hang-up string is required when using MSAT satellite modems: +++~~~ATH0^M.

9.2 COMMUNICATION TYPE – GOES TELEMETRY

An Internet connection to NOAA's LRGS database is used to retrieve station data sent over the GOES satellite network. In order to establish the connection to NOAA's database, all of the following issues must be satisfied:

1) The remote station data logger and associated GOES transmitter must be installed and operating.

2) The user must know the format of the data transmitted through the GOES transmitter. There are currently four supported formats: BLM, Time Ordered, Water Surveys Canada, and pseudo-binary.

3) The GOES Telemetry communication method must be properly configured within the StreamTrac Application.

4) The user must have an account and password issued to them by NOAA.

When adding or modifying a GOESTelem Communication method, the LRGS Communication Setup "Descriptive Name" screen for the identified station will be displayed.
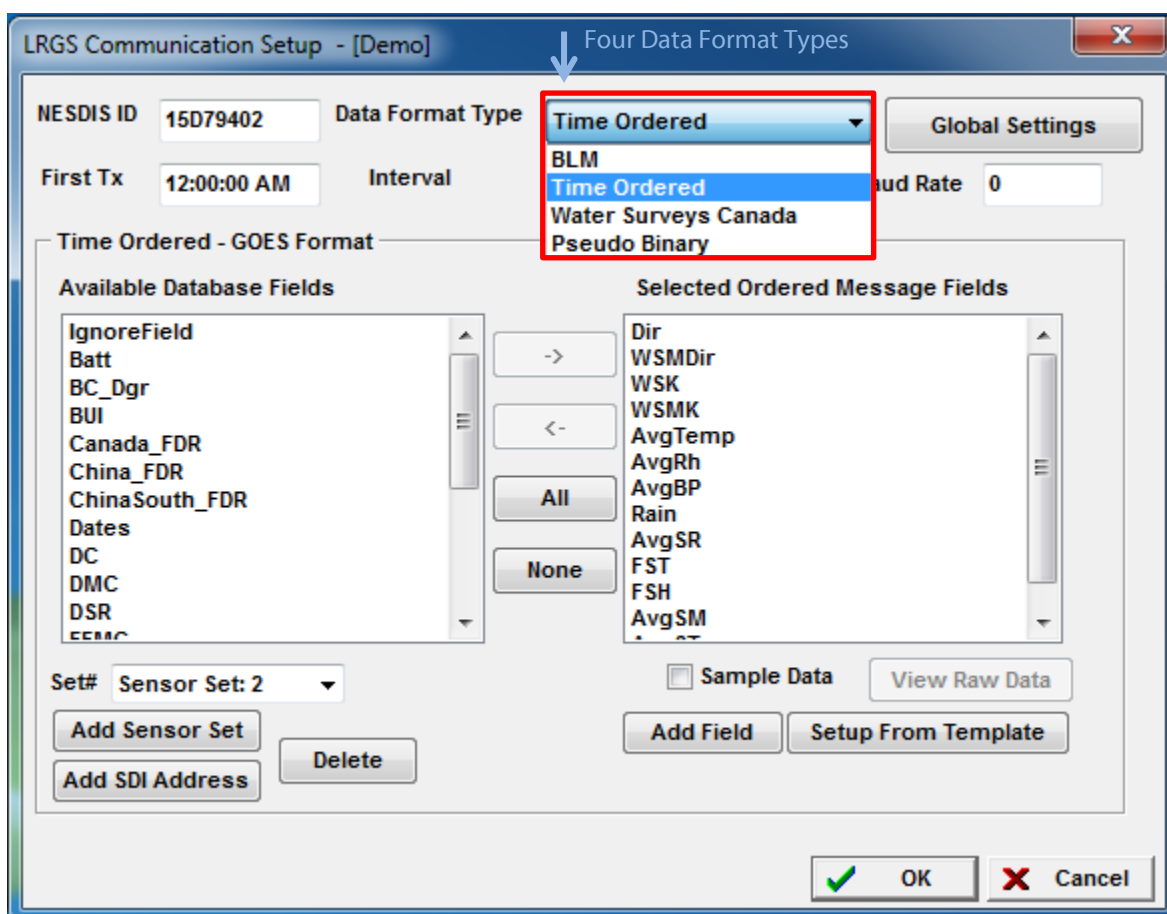
Figure 9-12: Goes Telemetry Communication Setup screen

The header bar has fields common to all the Data Format Types. Each of the four supported Data Format Types (BLM, Time Ordered, Water Survey Canada, and Pseudo-Binary) will display its unique choices and buttons for formatting the incoming data with its specific parameters.

The Common Header Fields will be explained, followed by detailed explanations of the four Data Format Type screens.

9.2.1   Common Header Fields

NESDIS ID: The NESDIS ID field is the unique identifier for the remote site's GOES transmitter. The identifier is an 8 character identifier supplied by NESDIS (National Environmental Satellite Data Information Service) for a GOES transmitter at a specific remote monitoring site.

Data Format Type: This box specifies which format to use to interpret the incoming data. The four supported types are BLM, Time Ordered, Water Surveys Canada, and pseudo-binary. Each selected Data Format Type will display its unique choices and buttons for formatting the incoming data with its specific parameters.

First Tx: The First Tx field is an optional field where the user may enter when the first GOES transmission from the remote site is scheduled to occur. This field is for user reference only and does not need to be populated in order to receive station data via the LRGS connection (i.e., 00:15:30 would indicate that the first GOES transmission would occur at 15 minutes 30 seconds after midnight UTC time).

Interval: The Interval field is an optional field in which the user may enter how often the GOES transmission occurs. It should be populated in hh:mm:ss format (i.e., 01:00:00 is hourly). This field is for user reference only and does not need to be populated in order to receive station data via the LRGS connection.

Baud Rate: The Baud Rate field is another optional field where the user may enter the Baud Rate of the remote sites transmission (i.e., 100 bps, 300 bps, or 1200 bps). Again, this field is for user reference only and does not need to be populated in order to receive station data via the LRGS connection.

Global Settings: Click the Global Settings button to open the LRGS Global Settings window. The settings in this window identify the particulars of the LRGS servers at the GOES ground station from which the data will be retrieved. Data will always be collected from the primary server. In the event that StreamTrac cannot connect to the primary server, StreamTrac will attempt to collect data from the secondary server.

Figure 9-13: Assigning LRGS Servers
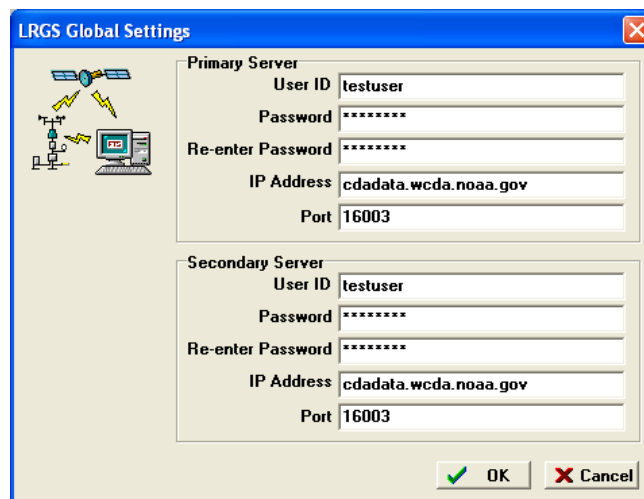
User ID: The User ID for the user's LRGS server account should be entered in this field.

Password: The Password for the user's LRGS server account should be entered in this field as well as in the **Re-enter Password** field.

IP Address: The IP Address of the LRGS server should be entered in this field.

Port: The Port Number of the LRGS server should be entered in this field.

9.2.2   BLM Format

The screen below is an example of a typical LRGS Communication Setup window for BLM format. An explanation of the fields follows.
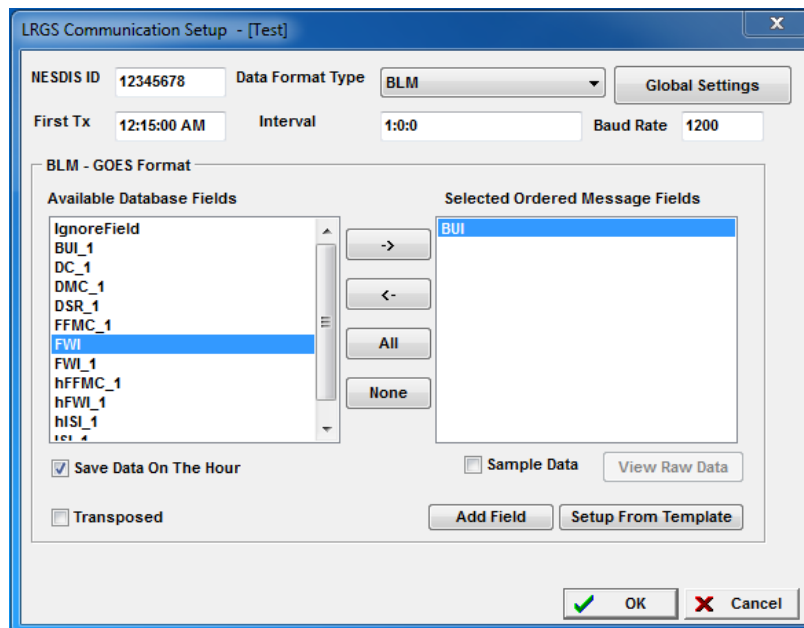
Figure 9-14: BLM Message Format Setup

Available Database Fields: This lists the **Fields** from which the **Selected Ordered Message Fields** can be created. Move the desired database fields between columns by clicking on it, and using the left and right arrows to toggle between the two columns. Selecting **All** moves every available database field to the right hand column. Selecting **None**, moves all the selected ordered message fields back to the available database fields column.

The *Available Database Field* list box shows the data fields available in the station. Upon initial station Setup this list is blank and must be populated from the template file or by individually adding station field names in the Station> Station Setup>Description tab>Add Field.

Selected Ordered Message Fields: The *Selected Ordered Message Fields* list box displays the selected order of the sensor data fields as they will be received from the LRGS database. The Right Arrow, Left Arrow, All, and None buttons can be used to create the properly sequenced data fields under the *Selected Ordered Message Fields* list box from the data fields under the *Available Database Field* list box.

Save Data On The Hour: The *Save Data On The Hour* checkbox allows the user to save the data retrieved from the LRGS database as top of the hour data instead of saving the data with the time of the GOES transmission. Please contact FTS Technical support if you have any questions regarding your specific Admin.

Transposed: Select this if you desire to receive data in the transposed format (see Section 9.2.2.1).

Sample Data: When ticked, this box will overlay the actual data from the station alongside the fields' names that you have chosen to aid you in choosing the correct fields mappings. The data is overlaid in lighter gray alongside the field names.

View Raw Data: This button will allow you to view a sample of the raw data that is returned by the station with the chosen NESDISID. This aids in properly mapping the incoming data to the station's fields.

Add Field: This button will allow you to add a field to the station without having to open the Station Setup Screen. Instead, simply click this button, choose a valid name and click ok. The new field will appear as the next item in the selected fields (right side) box.

Setup from Template

Clicking the Setup From Template button displays a series of common predefined formats containing specific database fields. You can also create your own template and place in the folder if desired.
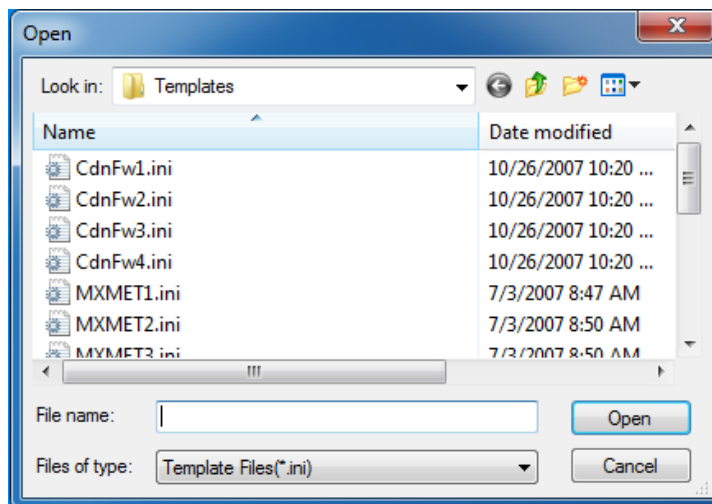
Figure 9-15: Open Template screen

To view the database fields contained in a template, right click on it then select Open. The template type will be identified (BLM) followed by the fields which make it up.
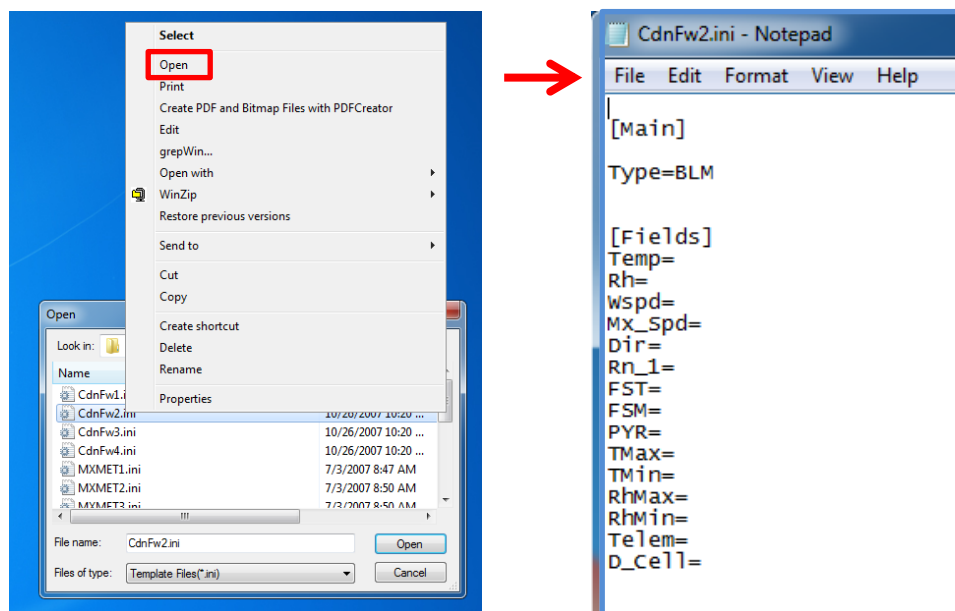
Figure 9-16: BLM Database Fields

The template fields will be transferred into the Selected Ordered Message Fields column.
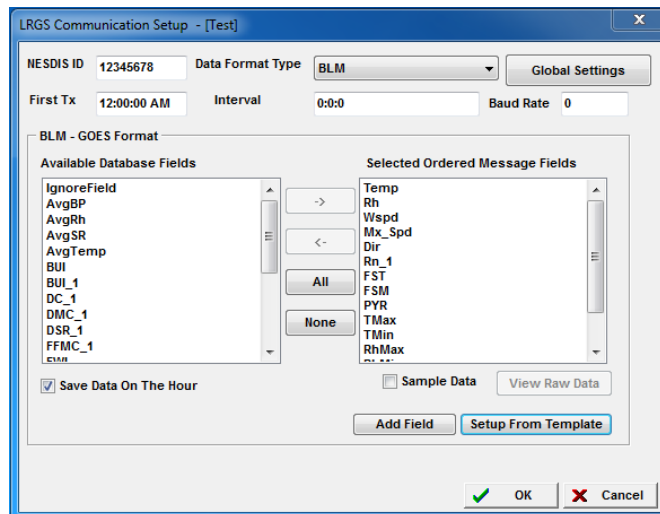
Figure 9-17: Selected Ordered Message Fields populated with CDNFw2.ini template fields

To minimize set-up time you can choose a template that is close to your format and tailor it to your need by adding and removing fields.

9.2.2.1 *Regular vs Transposed BLM Message Format*

BLM messages can be received in either the regular or the transposed format. In the regular format, the data is located in columns, each column headed by the time with the data located vertically beneath the relevant time:

Regular BLM message format:

```
9A70232A15244145622G44-0NN158WUB00075
04.52        04.52        04.52
000          000          000
095          095          095
027          027          027
032          032          032
089          089          089
12.8         12.8         12.8
000.0        000.0        000.0
074          074          074
002          002          002
00001        00001        00001
```

In transposed format, the data is organized in lines, with each line initiated by the time with the data located horizontally:

Transposed BLM message format:

```
9A70232A15244135622G44-0NN158WUP00075
 04.52 000 095 027 032 089 12.8 000.0 074 002 00001
 04.52 000 095 027 032 089 12.8 000.0 074 002 00001
 04.52 000 095 027 032 089 12.8 000.0 074 002
```

9.2.3 Time Ordered Format

The screen shown below is an example of a typical LRGS Communication Setup window using Time Ordered format.   An explanation of the fields follows
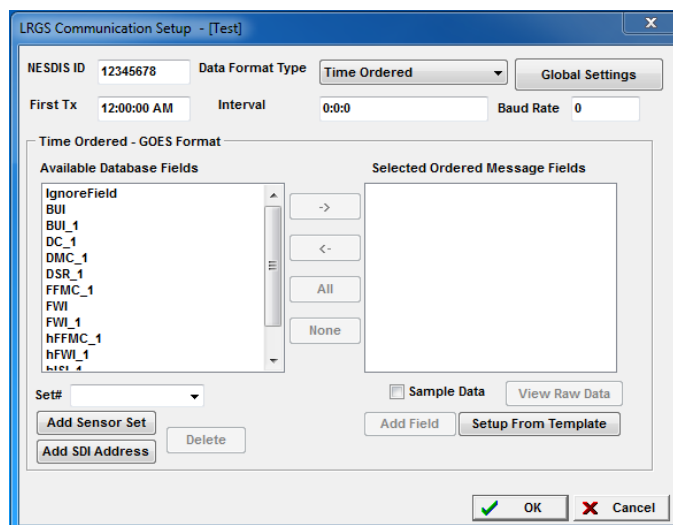
Figure 9-18: Time Ordered Message Format

Sensor Sets: Sensor Sets allow the transmission of several different sets of data, each set requiring individual definitions for the incoming data. More than one Sensor Set can be defined and will appear in the **Set#** drop down menu, and the same database field may appear in more than one sensor set.

To create a sensor set click **Add Sensor Set**, and fill in an identifying numeral when prompted. The sensor set is defined by adding the desired database fields from the **Available Database Fields** column to the **Selected Ordered Message Fields** column by using the left and right toggle arrows. Any previously defined sensor sets can be edited by selecting them from the drop down menu, and toggling the database fields between the two columns.
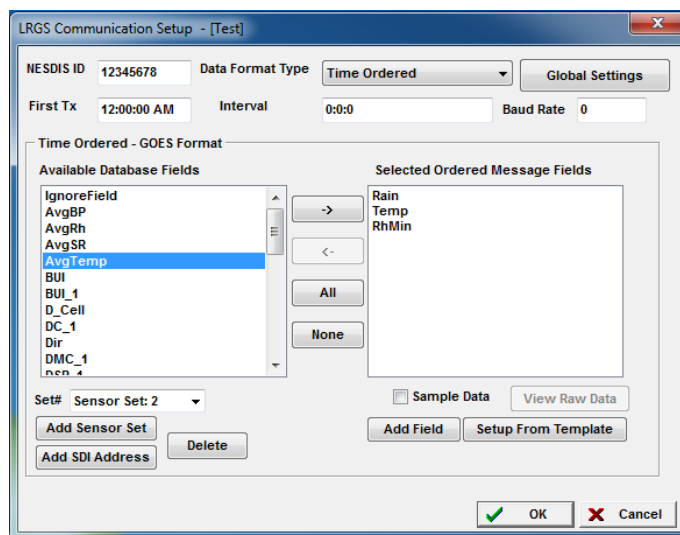
Figure 9-19: Defining a Sensor Set

Sample Data: When ticked, this box will overlay the actual data from the station alongside the chosen fields' names to aid in choosing the correct fields mappings. The data is overlaid in lighter gray alongside the field names.

The Sensor set number is the first number on each line of the raw incoming data.

Add SDI Address: Select this to add the fields from an SDI sensor whose fields do not appear in the Available Database Fields column.

Add Field: This button will allow you to add a field to the station without having to open the Station Setup Screen. Instead, simply click this button, choose a valid name and click ok. The new field will appear as the next item in the selected fields (right side) box.

Setup From Template: Clicking the **Setup From Template** button displays a series of common predefined formats containing specific database fields.

Selecting the template is done in the same manner as for BLM formats (see previous section). Ensure any template you select is identified as a Time Ordered Format.

9.2.4   Water Surveys Canada Format

The screen shown below is an example of a typical LRGS Communication Setup window using Time Ordered format.

 An explanation of the fields follows
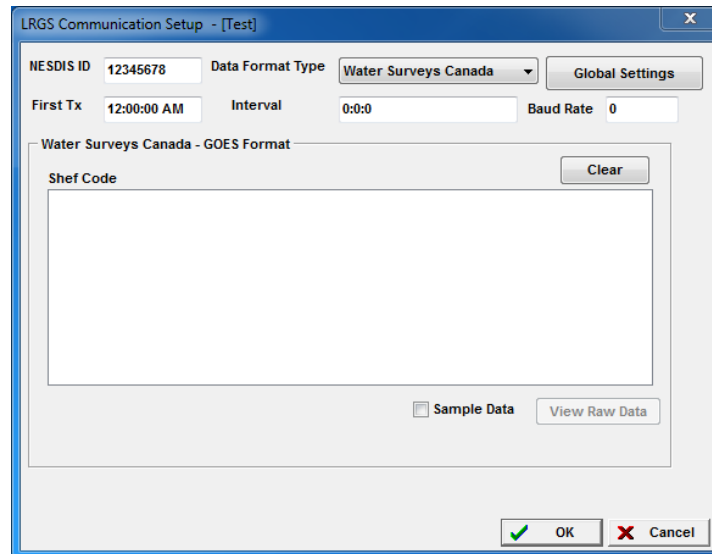
Figure 9-20: Water Surveys Canada Format

Shef Code: Data will be displayed in Standard Hydrometeorological Exchange Format (Shef) Code.

Clear: Clicking on Clear will delete all the Shef Codes

Sample Data: When ticked, this box will overlay the actual data from the station alongside the fields' names that you have chosen to aid you in choosing the correct fields mappings. The data is overlaid in lighter gray alongside the field names.

View Raw Data: This button will allow you to view a sample of the raw data that is returned by the station with the chosen NESDIS ID. This aids in properly mapping the incoming data to the station's fields.

9.2.5   *Pseudo-Binary*

The screen shown below is an example of a typical LRGS Communication Setup window using **Pseudo Binary format**. There are two formats of Pseudo Binary that can be selected using the **Format** button: FTS and Environment Canada.

Figure 9-21: LRGS Communication Setup – FTS Pseudo-Binary Format

FTS Pseudo Binary Format: This format is modeled from the standard NOAA 3 byte Pseudo-binary format. It is a bit packed modified ASCII transmission format.

Environment Canada Pseudo Binary Format: This format uses a 3 byte Pseudo binary format on top of or, encoding a two byte Campbell Scientific format (see Campbell CR1 10x manual). All data-time information is encoded into the packet and automatically interpreted by StreamTrac without referencing the GOES header Date-Time stamp.

CREATING DATA SETS

Pseudo Binary messages are configured by defining data sets. A data set is a group of data points transmitted in a defined ordered. Multiple data sets can be defined for Pseudo Binary transmission.   Each data set transmission includes the Data Set's ID number followed by the defined data.

Data Sets allow the transmission of several different sets of data, each set requiring individual definitions for the incoming data. More than one Data Set can be defined and will appear in the **Data Set#** drop down menu, and the same database field may appear in more than one data set.

To create a data set click **Add Data Set**, and fill in an identifying number when prompted. The data set is defined by adding the desired fields from the **Available Fields** column to the **Selected Ordered Fields** column

by using the left and right toggle arrows. Any previously defined Data Sets can be edited by selecting them from the drop down menu, and toggling the database fields between the two columns.

When adding a Field, a Set Precision (decimal accuracy) prompt will appear. The Min and Max Values that will be able to be sent via pseudo-binary are indicated below the Precision and will change as the precision changes (see figure 9-22). Ensure that your expected values will fall between those Min Max parameters after you set the precision. Precision can be edited by selecting (highlighting) the desired field, and pressing the **Precision** button.
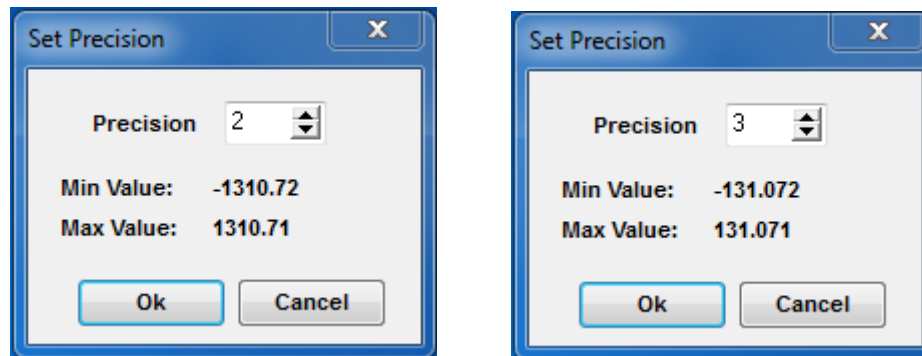
Figure 9-22: Illustrating change in Min/Max values with Precision change

Data will be transmitted in the order it appears in the **Selected Ordered Field** column. This order can be adjusted by clicking on a specific field and using the Up and Down buttons to move it within the column.

To delete a data set, select it in the Data Set drop down menu, then select Delete Data Set. A prompt will appear verifying if you wish to delete it.

Add Field: This button will allow you to add a field to the station without having to open the Station Setup Screen. Instead, simply click this button, choose a valid name and click ok. The new field will appear as the next item in the selected fields (right side) box

9.3 COMMUNICATION TYPE – GSNET TELEMETRY

GSNet Telemetry is only applicable to those systems using FTS Globalstar Satellite modems (FTS models: GS-4000, Globalstar, or Globalstar-QD) as the telemetry device at the remote stations. GSNet Telemetry allows users to retrieve their station's data through an Internet connection (Globalstar Direct Internet mode) instead of a telephone connection (Globalstar Asynchronous mode).

Direct Internet mode's main advantage over the standard asynchronous telephone modem connection is that Globalstar satellite constellation 'gaps' are effectively eliminated as the SMS message is only delivered when satellite signal is available. There are also cost advantages when using Direct Internet mode because of how Globalstar bills for airtime usage – essentially data requests (SMS messages) are free and the user only pays for the Internet reply.

Globalstar Direct Internet mode works as follows:

1) Data is retrieved using the GSNet Telemetry module (FTS GSNet service is required) to send a coded SMS e-mail message addressed to the remote modem instead of using a conventional telephone modem to achieve the connection to the remote site.

2) The e-mailed message is processed by the Globalstar SMS server which delivers the message when a satellite signal path is available to the remote modem. If the message cannot be immediately delivered, the SMS server periodically tries to resend the message until it is successfully delivered to the remote modem.

3) When there is satellite coverage and the SMS message is delivered to the remote FTS Globalstar Satellite modem, the FTS modem decodes the received SMS message.

4) The FTS Globalstar Satellite modem then collects the requested information from the connected data logger and prepares the data for transmission back to the GSNet Telemetry module.

Note that up to this step no Globalstar airtime charges have been incurred. Globalstar does not charge airtime for delivering an SMS message.

5) Once the data is ready to be transmitted, the FTS Globalstar Satellite modem creates a connection to the Internet through the Globalstar gateway. Airtime charges are now being incurred.

6) Once the Internet connection is established, the FTS Globalstar Satellite modem sends the requested data over the Internet to the StreamTrac GSNet Telemetry module.

7) After all the data has been successfully transmitted, the Internet connection is terminated. Airtime charges stop being accrued on termination of the internet connection.

8) The call is completed.

Figure 9-23: GSNet Communication Setup

STATION INFORMATION FIELDS

Description: The descriptive name assigned at the time this communication method was created. If you are setting up a new method, a dialog box will appear to prompt you to enter a description.

Area Code and Telephone Number: Enter the numbers for the remote site's modem using only numerals (no other characters or spaces are valid).

Password: If a password has been set in the logger, the password must be entered here.

Data Overlap: The purpose of the Data Overlap field is to compensate for the time it may take to deliver a Globalstar SMS message to the remote site when satellite service is not available. In order to avoid possible data gaps in the station's database, the value set in the **Data Overlap** field should be greater than the value set in the GSNet Host Service **Max. Wait for Server** field

GSNET HOST SERVICE INFORMATION FIELDS

Use Global GSNet Host: Select this when a GSNet Host Service has been defined using the Edit Global Settings function.

Use GSNet Host Settings Below: Select this when the GSNet service for the remote station has been defined locally.

For both a Globally and a Locally defined GSNet Host, the IP Address, Port Number and working folder for the computer running the GSNet Host service must be entered.

> **IMPORTANT:** A user must have read and write access rights to the Working Folder

Max Wait for Server: This is the maximum time StreamTrac will wait for a reply to an SMS data request. Once this time is exceeded the call will be deemed to have failed. See Data Overlap (above).

9.4 COMMUNICATION TYPE - UBICOM

Ubicom telemetry only applies to those stations using FTS Ubicom. Ubicom is a dual mode communication system which uses either Iridium satellite or terrestrial cellular communications networks to exchange information and data between a remote station and the **AutoCaller Database.**
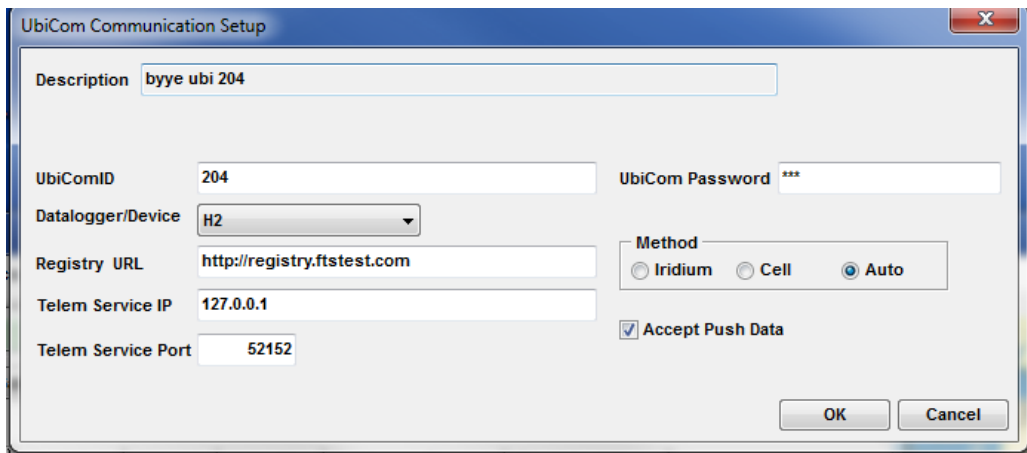

Figure 9-24: Ubicom Communication Setup

UbiComID: Every Ubicom has an FTS assigned ID which is provided with your unit. Input the assigned ID number here.

UbiCom Password: When the unit is setup a password is provided by FTS. It must be entered here.

Datalogger/Device: Use the drop down menu to select the Datalogger model to which the Ubicom will be attached.

Registry URL: Fill in the registry URL here. If unsure, this can be provided by FTS Service.

Method: Select the primary transmission method Ubicom will be using.

Auto: This feature is only functional when operating on the Auto-Switching Gateway. It permits communication with the Ubicom as it automatically switches between Iridium and cellular or when the Ubicom's communication method is switched using Panorama.

> NOTE: If the Auto-Switching Gateway is not being used, and if the Ubicom method is switched using Panorama, it must also be switched here in order to maintain Ubicom connectivity.

Telem Service IP: Enter the IP address of your service.

Telem Service Port: Enter the number of the FTS telemetry service port.

Accept Push Data: When selected, in addition to requested data, this feature will permit all data to be pushed. It is no longer necessary to request the data.

CHAPTER 10   TROUBLESHOOTING GUIDE

10.1   *TROUBLESHOOTING*

If you get an error message trying to contact a station check the following:

No station selected. A station or group must be selected.

No communication method selected. A communication method must be selected.

Communication method was set up wrong:

- o *Telephone Modem*:

    - Do you have the right COM port selected? If you don't know which COM port your modem uses, ask your system administrator.

    - Are you using the right baud rate? Correct model of modem?

    - Double-check the station's phone number.

    - Make sure you have a standard RJ34-terminated phone line running from the modem you are using to an operational wall jack.

    - Do you have to dial a prefix to access an outside line? If so, this can be set up by adjusting the Computer Defaults. Click on the **Edit Defaults** button in the communication method setup screen to enter a prefix that will be dialed before calling the station. From this menu you can also adjust the telephone modem's COM port setting.

    - If you've checked all these settings with no success, then you may want to consider checking the station itself, to make sure it is still operational.

- o *Radio Modem*:

    - Check that the hex address is correct (Note: The address for our Radio modems is the four-digit serial number found on the side or bottom of the modem).

    - Try resetting the radio modem, and double check that you have the correct model of radio modem listed.

    - **Note**: To modify your communication settings, open the **Stations** menu from the main menu bar and select **Station Setup**. From the **Station Setup** dialog, click on the **Communication** tab to access communication method settings. Double-click on a method to open its properties.

- o *GS Net:* Please consult the GS Net manual.

DOCUMENT REVISION HISTORY

Revision	Date	Description
1	05 Oct 2015	Original release. Incorporated 700-StreamTrac Help Rev 1 contents. Updated to AS ver 4.0 (Ubicom push, transposed GOES BLM message format, NFDRS calculation, Ubicom (communication method).
2	29 Oct 2015	Added Get/Set Data by Tag (Section 2.3.11). Corrected formatting and cross referencing errors.

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