SRX800 HOST
User Guide

WIRELESS
FISH & WILDLIFE MONITORING

Revision 2.1

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1.   INTRODUCTION

This document provides installation instructions for the SRX800 Host Application (hereafter referred to as 'Host'. In addition, instructions for installation of the USB driver are provided on the installation CD. Review of the SRX Host User Guide will assist users in becoming familiar with telemetry concepts, SRX systems and the Host user interface. It is recommended that users also review the SRX800 User Guide, as many subjects are detailed in both Guides.

1.1 Overview

The SRX800 Windows Host (hereafter referred to as 'Host') is a Windows application which will takes full advantage of the GUI (Graphical User Interface) resources supported under Windows.

The SRX Host GUI affords an intuitive view to operation and available features, with pop-up displays with functional summaries of the many available features. This Guide provides more detailed descriptions of certain functions and operations, with others being more self-explanatory upon access to and through use of the Host Software. Note that while the User Guide provides functional descriptions for all available SRX800 features and utilities, they may or may not be applicable depending on the SRX800 model purchased.

2.   INSTALLATION

2.1 SRX800 Host Program Installation

Installation of the Host is a fairly simple procedure. An installation utility is provided to the customer on a CD-ROM.

The CD-ROM contains the following directories, starting from the root directory:

CDROM Drive:\\Install
CDROM Drive:\\USB Driver

Using Window explorer or by selecting "Run…" under the Windows "Start" button, browse to the "Install" directory and run the executable file: SETUP.EXE.

Most of the windows and prompts that are issued during the installation are self-directing. The Host is not a large application and there are no options for installing medium or compact components. The user is asked to read and acknowledge the Lotek end-user license agreement.

The user may wish to alter the installation directory and also the target position of the short cut that will be placed in the Windows program start menu. The mostly likely choices have been offered as defaults:

Program location: C:\Program Files (x86)\Lotek Wireless Inc\SRX800 Host\
Program Folder: Lotek Wireless Inc \ SRX800 Host

Once the options have been adjusted OR defaults have been accepted, the program files are copied to the target directory in a few seconds. The user is informed when the process is complete.

At this point, the user should find that the requested program directory has been created. Under the program directory, sub directories have also been created. Those are, Data, Projects and System.

If this is a first time installation, Data and Projects should be empty.

2.2 USB Communication Port Setup

SRX800 Host installation allows immediate communication using the standard RS232 serial port. To utilize the high speed USB port, additional setup is needed. USB drivers must be installed on the PC to enable connection. Most desktop and laptop systems running Windows recognize when a new hardware device has been connected to the system. This is the best way to begin the process of installing USB port drivers. To start, carry out the following steps:

2.2.1 Connect to the USB Port

With the USB cable provided, connect the USB port located at the pack back of the SRX800 unit and connect the other end to the USB port of your PC or laptop.

Turn the Receiver ON.

2.2.2 New Hardware Wizard

The system task bar of your PC should shortly present a 'Lotek Receiver' message bubble indicating that new hardware has been detected. It will specifically refer to the hardware by name as 'SRX800 Host'.

You can either click on this message bubble or simply wait. Eventually, a dialog window will appear. It will be entitled something like "New Hardware Wizard" but the exact caption will vary depending on the resident Windows operating system.

This dialog should ask the user if they wish to search for the driver automatically OR install from a specific location. Select the **"Specific Location"** option. Click "Next".

2.2.3 Installation Begins

The wizard will begin installing the driver and software. Avoid interrupting this process.

2.2.4 Completion

Windows issues a message once the process is complete. Click the "Finish" button. You may get a message indicating that your new hardware device is ready to use.

3. GETTING STARTED

This section is intended to familiarize users with SRX systems using the SRX800 Host Application.

3.1 Overview

The Host program's primary functions are configuration of the SRX800 and recovery of data from the receiver. Host also supports real time detection display and can support remote control of the SRX800 Receiver.

This section provides an overview of the main menu functions and associated toolbar buttons. Detailed descriptions are deferred to subsequent sections where necessary.

3.2 Host Main Menu Setup

Following successful connection between the SRX800 and your host PC, launching SRX Host presents the setup menu screen display below. Your SRX800 must be On line to establish connection (refer to SRX800 User Guide).

The Main Screen Panel shown below affords access to typical upload, e.g., receiver configuration parameters, as well as data download operations and (where applicable) GPS and remote download connection. Clicking on the 'Receiver Maintenance' display tab provides access to more 'low-level' operations including such functions as remote receiver firmware upgrades and service detail. Users can also view battery status and the installed codesets to enable detection of coded tags.
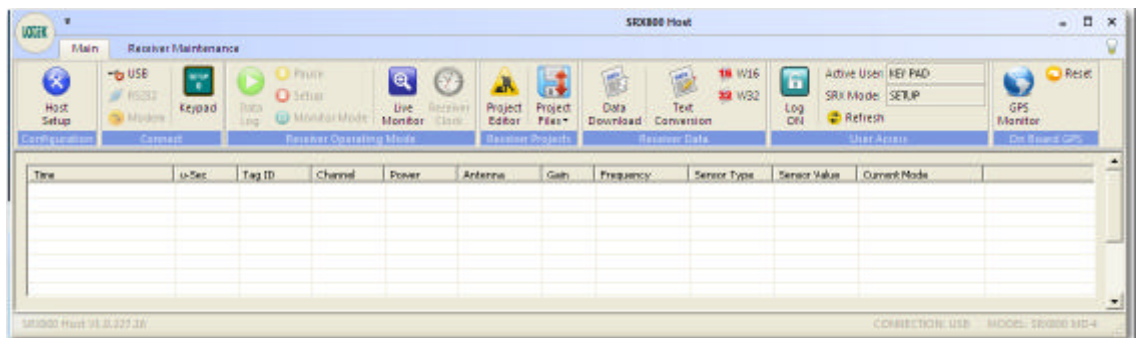

Figure 2-1: Setup Menu

The Host Setup menu provides options for configuring serial port settings and important directories used by the Host. Positioning your mouse arrow over an icon prompts a brief description to be displayed of the actions that can be accessed under that icon. In addition, the Setup Menu provides support for upgrading SRX800 Receiver firmware programs.

Connection status and SRX800 receiver model are presented on the bottom right side of the screen.
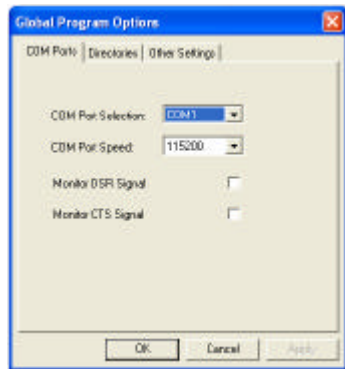
4. CONFIGURATION
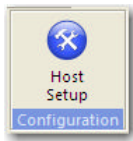
Global Program Options

Clicking the Host Setup icon under Configuration section launches the Global Program Options page which includes COM Port selection, Directories to select and assign files, as well as Log On/Off preferences.

COM Ports

This segment of the program settings refers to the configuration of the COM port used by the SRX800 Host executing on a desktop PC or lap top. If it is intended that the RS232 serial port will be used to connect to the SRX800 Receiver, the user must ensure that the correct serial for the Host system is selected. The baud rate is also important in the event a user adjusts the baud rate used by the SRX800 to a value other than the 115200baud default setting.

Figure 0-*2*: Setting the COM Port used by the Host
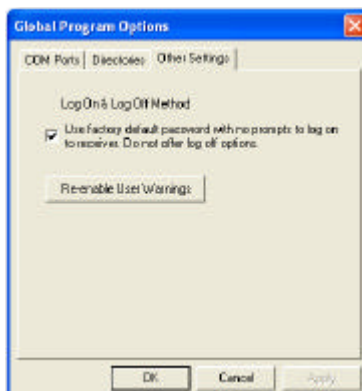
Directories
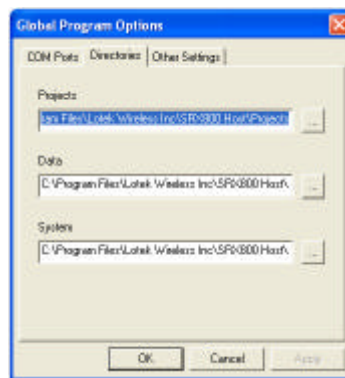
Host will read or write files to any directory or drive that system it is running on or is accessible. However, it will always default to the directories specified in these option windows.

SRX Project configuration files will be written to the Projects directory. Data downloaded from an SRX800 will be written to the Data directory specified. The System directory contains files used by the Host but not normally needed by the user. It is recommended that this directory not be changed or the files within it be moved, deleted or altered.

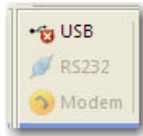Figure 0-*3*: Setting directory options for the Host

Other Settings

The user can select password and default preferences to LogON/OFF the receiver.

Figure 0-1: Setting directory options for the Host

5. CONNECT   There are three available methods to connect to the SRX800.

1.   USB interface which significantly increases data transfer speed
2.   Standard 9 pin D-SUB serial port connector.
3.   Hayes compatible modem interface.

Connection to the SRX800 is a frequently performed operation used to enter and or modify receiver parameters, as well as to download data. Clicking on the intended option will highlight the selected method as shown above. Once a connection option is selected, non-selected options are disabled and can only be accessed by disabling (Click to disable) the active connection.

Note that when connecting to Host, the user should "Log ON' through Host (refer to Fig 3.1) rather than through SRX800 to ensure access to all available utilities.

Keypad Simulator

Once a connection to the SRX800 has been established, selecting the Keypad Simulator icon provides the user with the following virtual display.

Figure 0-5: Keypad Simulator display example

Connecting via Modem (optional feature specific to receiver model)

If the computer running the Host application has a Hayes Compatible Modem set up, it is possible to dial into the SRX800 receiver remotely. If a receiver is to be connected to a modem, additional setup is required.

Connecting with a modem connected to the Host is more involved than connecting with a serial port or USB. When the Modem connect button is clicked, the dialog shown in Fig. 3-6 is launched.

Figure 0-6: Entering Dialing Information for remote connection

The dialog box shown in 3.6 is used to specify the modem type, country and region and dialing out details. Even with a phone system requiring a preset sequence to establish an outside line can be negotiated with a little trial and error. Commas are often added to create appropriate time delays during the connection sequence. In the example shown in Figure 3-6, the remote SRX800 is connected to a phone system with an extension. The Host is also connected to a phone system.

The required sequence to 'call' the SRX800 from the Host is as follows:

1. Host dials "9" to get an outside line and then pauses "," to wait for the dial tone. More delay commas may be needed if the phone system is slow to provide the outside dial tone, but in this case, a single delay comma is sufficient.
2. The area code "905" is dialed. The check box specifying that the area code be dialed is checked because in this region, area codes must be included for local calls.
3. The 7 digit phone number for the SRX800 is dialed, in this case "8636680".
4. A triple pause is inserted, followed by the phone system extension "203" where the SRX600 is connected. The triple extension is used to wait for the main number answering service to pick up and become receptive to the extension of "203".
5. Finally, the line connected to the SRX800 modem starts ringing.

The user will be kept informed of progress during the dialing sequence outline above and also during the connect sequence. If your PC's modem speaker volume is turned up, you will hear the audio sequence as the two modems attempt to establish connection and hear a steady tone once a connection is made. A window as shown below will appear to report progress. This also offers a means to cancel the process.

Figure 0.7: Progress of Modem Connection

After a connection between the two modems is established, the progress dialog disappears. The Host then attempts to establish contact with the SRX800 using either Serial or USB connection. Once a successful link is established, all rules and features available for either Serial or USB local connections apply. Note that slower response times are typical for most remote terminal transactions, particularly when downloading large amounts of data. Quality and speed of the connection between the two modems can is affected by many factors, among them modem type, transfer distance and line quality.

Connection Status Bar

The SRX800 Host continually reports the connection type and speed, if applicable, on the Status Bar found along the bottom edge of the application's main window. The figure below illustrates an example of a serial port connection at 115.2 Kbps.
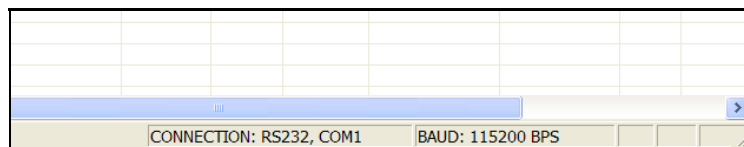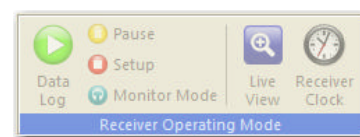

Figure 0-8: Connection Type and Speed shown on Lower Status Bar

6. RECEIVER OPERATING MODE

This section covers operating modes of the SRX800 that can be controlled from the Host. The SRX800 can perform scan cycles and log to memory based on user-defined 'Configuration' (refer to SRX800 User Manual) parameters.

Prior to entering this mode, the user must select one of the 8 configurations (refer to User Manual and Project Configurations section) that are used to control a scan. The configuration cannot be changed while in Data Log (Scan) Mode. The only scan parameter that can be altered while in Data Log (Scan) Mode is antenna gain.

DATA LOG

Setup permits the greatest access to SRX800 receiver configuration options including 'Live Panel' editing and uploading of configurations stored in files.

Pause allows for limited adjustments to the currently active configuration while in suspend mode. To accommodate this, when Data Log (Pause) mode is selected, the Host launches the DataLog Panel which contains the following elements:

- A report of the antenna being scanned when DataLog (Pause) was invoked. This antenna remains active until Data Log (Scan) Mode is resumed.

- A Gain control element that allows for adjustment (refer to page 13).

- A list of the channel and frequency combinations that reflect the configuration being scanned including the status (enabled/disabled) of each.

- The filter set currently selected and a list of the entries for that filter set

- Buttons that allow for the return to Data Log (Scan) Mode OR return to Setup mode. Selecting either of these closes the Data Log (Pause) Panel.

The Data menu includes any functions that support the acquisition, saving and examining of data recovered from the SRX Receiver.

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LIVE VIEW

When an SRX800 is connected to Host, a Live View session can be opened to monitor scan cycle operations in real time based on the selected Configuration. The receiver first needs to be Logged on, ON-line and in either Code/Datalog or Pause mode to monitor activity.
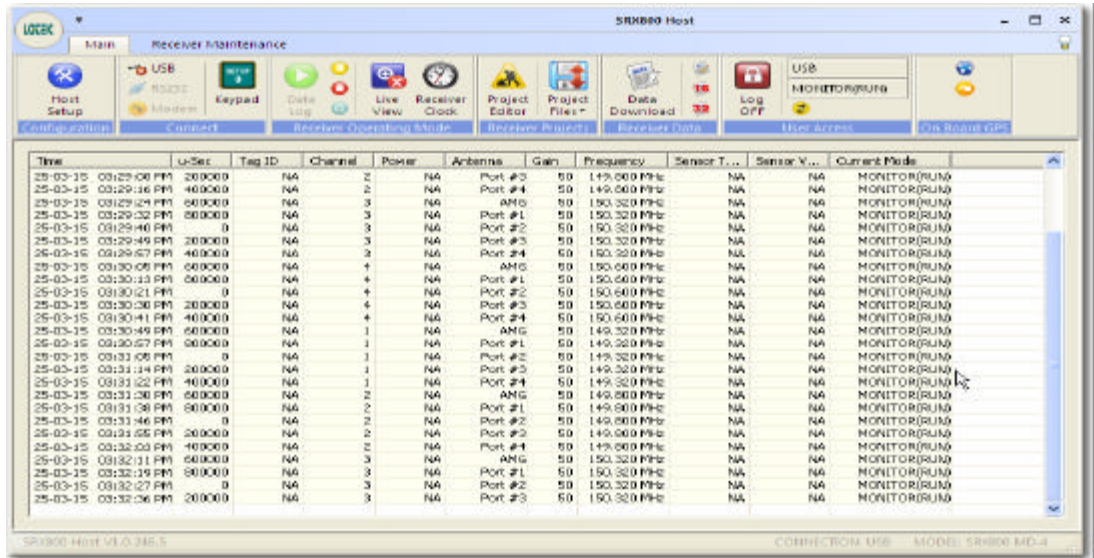
Setup

From DataLog (Scan) Mode, you can return to Setup Mode, which is the mode that permits the greatest access to configuration options of the SRX800 receiver including Live Panel editing and uploading of stored configuration files.

Pause

Monitor (Pause) mode represents a subset of Code Log mode and can only be accessed through Code Log mode. When Pause mode is requested during Live View, the SRX800 halts the current channel and antenna scan though will continue.
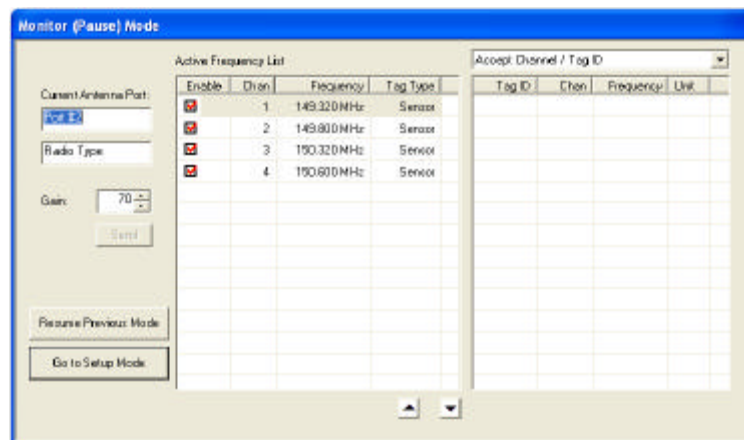

Figure 3.9: The Monitor (Pause) Panel

Adjusting Gain

While in Pause Mode, it is possible to adjust the gain on the active antenna. It is NOT possible to change the active antenna. The gain adjustment applies only to the active antenna directly displayed as show in Figure 3.9. Any adjustment made to the gain for that antenna in this mode will be reflected in the active SRX800 configuration. Gain adjustment made using the UP and DOWN arrow keys are sent to the SRX800 to reflect each increment or decrement and the Configuration parameters are modified and stored accordingly. If the gain input box is altered through the display screen as shown, you must click the SEND button once it becomes enabled to implement the new gain setting value.
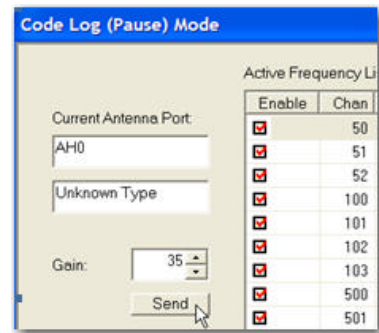
Enabling and Disabling Channels

The "Active Frequency List" display under Pause Mode also offers the ability to control state of each Frequency Channel in the selected Configuration. Checked Channel boxes along the left column (refer to Figure 3.9 above) are active. Clicking the check box toggles the state of the Frequency (enable or disable) and the Host **immediately** sends this instruction to the SRX800 to modify the state and update the Configuration. Disabled channels are removed from the selected scanning cycle. Note that a channel cannot be disabled while it is active. The instruction to disable a channel must be given when a channel is inactive.

Changing Filter Type

From the Pause mode display (refer to Figure 3.9), the active 'Filter Type' can be changed from the selection box as shown. Only the Filter type can be changed, not individual items within a selected filter type. For example, it is possible to change Filter type from 'Reject Channel / Tag ID' to "Reject Tag ID Only', but it is **NOT** possible under the Pause Panel to remove a specific Channel or Tag ID item from the "Reject Channel / Tag ID" filter type.
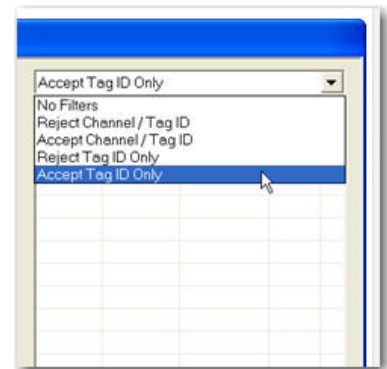
MONITOR MODE

When Code Log Mode or Code Log Pause mode is active, the SRX800 is 'on-line' and engaged in scanning operations. It is possible to view raw detection reports sent from the SRX800 to the Host in Real Time, as tags are detected and logged as code records. To access this feature, click the Monitor Mode button. The SRX800 will immediately begin sending raw detection reports to Host. Data will be presented in the Real Time View display.

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RECEIVER CLOCK

Clicking on the receiver clock icon provides access to enter and update the real time clock as shown. Settings are specified in minutes and in 15 minutes increments each time the up/down arrows. This resolution accommodates global locations with GMT corrections for local time which are not divisible by 30 minutes.
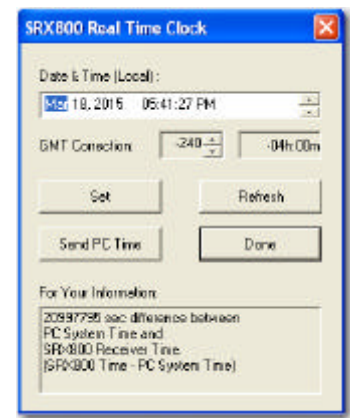
7.   USER ACCESS

The SRX800 only permits user access to those 'Logged ON' to alter receiver settings. After connecting via RS232, USB or Modem, the user is not necessarily logged ON. If not, the user is only allowed access to those operations that do not involve altering any aspect of the Configurations or status in the SRX800. If the user of SRX Host is NOT logged ON, the Log ON' (shown) button will be enabled. When selected, the password entry screen appears.
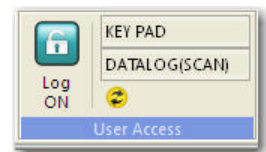
All passwords are 6 digits and contain only decimal numbers. If the password entered is correct (refer to SRX800 User Guide), the user is logged on and the Access Control Bar should report the current status of the SRX and the active user.

Failed Log ON

Should a user be denied log ON access, aside from entering an incorrect password, a log ON attempt may be denied if the receiver is currently logged on through a different interface. In such instances, a screen display will so advise you. The SRX800 will only permit WRITE access to a single interface connection at a time. The interface sources are:

- SERIAL PORT I
- USB PORT
- KEY PAD

Host will deny Log ON access if, when logged OFF, the 'Active User' line of the Access Control Bar reports anything other than 'NO USER'. This signifies there is no current user logged on, so nothing to prevent Log ON from any of the interfaces listed above. Host permits access to periodically verify receiver status. Clicking the 'Refresh' button requests an update of the 'SRX Mode' and 'Active User' status. When the Active User reverts to "NO USER", an alternate interface may then be attempted to log ON.

To Log OFF 'completely' means that the active Log ON interface relinquishes WRITE access control and another interface can be used to Log ON. To Log OFF temporarily from an interface means that the interface will no longer have write access, but that it also will not be possible to Log ON from any other interface, only the interface that temporarily logged OFF. This effectively LOCKS the receiver until a log ON instruction is issued from that source.

A user that has connected to the SRX800 but has NOT logged ON, has limited 'read only' access to receiver functions as described below:

- Data Download – Data can be downloaded but not initialized, erased or restored.
- Offline Editor – Full access is available as there is NO interaction with the receiver.
- File Conversion /File Statistics Functions – All Offline services – Full access.
- GPS Monitoring – Can be enabled but will not work if the receiver is not configured for it and you will not be able to alter the receiver's configuration in any way.
- Download SRX Configuration – The current configuration can be downloaded and saved in a file but a stored configuration cannot be uploaded to the SRX600.
- KeyPad Simulation– The keypad can be launched but you will be allowed to view only the current active configuration. No configuration changes are allowed.
- Live View – You may activate real time detection reporting but if the receiver is
- NOT in "CODE LOG" mode, no detections will be received and nothing will be displayed. You need to be logged ON to receiver to enter Codelog/ Monitor mode.

8. RECEIVER PROJECTS
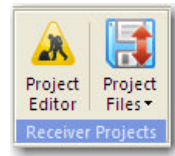
The SRX800 Host offers two different means of creating and altering projects containing receiver configuration parameters.
Clicking the 'Project Editor' button launches the Project Configuration page shown below, through which Configuration parameters may be entered. The project contains:

- One Master Frequency / Channel Table
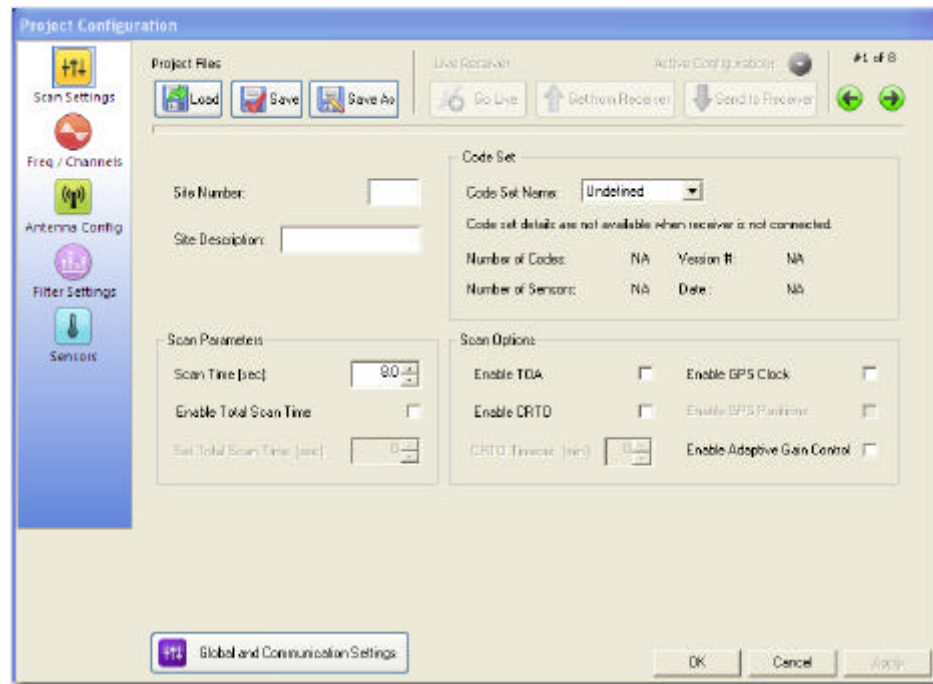- One set of global settings common to all Configurations
- 8 distinct Configurations

Figure 3.10 Project Configuration Panel.

A great deal of parameters can be associated with defining a single receiver Configuration that the SRX800 is capable of handling. A single Project Configuration is sub-categorized as containing:

- **Scan Settings**

- **Frequencies**

- **Antenna Filtering**

- **Sensors**

Each Configuration can be given a **'Site Number'** which can contain up to four digits. A **Site Description** entry option also provides context while other configuration pages are being edited and/or when saved as files. The site description however is not passed on or stored to the receiver.
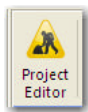
8.1 CREATING/ EDITING PROJECT CONFIGURATIONS

Programming a Configuration directly into the
SRX through its keypad and LCD display interface can be a lengthy and repetitive
task. SRX Host facilitates entry of these parameters in a much more user-friendly
and intuitive manner, providing the facility to design, edit and store Project
Configuration(s) without the need to connect to a receiver. Once parameters are
entered, the resulting Project Configuration can be uploaded to your SRX800 in
seconds.

The SRX800 supports entry for up to eight distinct Configurations, individually
referenced on the top left corner of the page and accessed by clicking the arrow
buttons (highlighted above). This interface is available for both **OFF** and **ONLINE**
'real time' editing. Projects can also be downloaded from an SRX800 connected to
the Host and saved as a project file. This project file can be loaded into the Project
Editor and modified OFFLINE for subsequent upload to the same or another
SRX800 receiver. This utility greatly simplifies repetitive entry of user-configurable
parameters common to a project, e.g., frequencies, antennas, scan cycle times, filter
type, and possibly shared among multiple receivers.

Project Editor

Editing preferences are accessed by clicking/toggling the 'Go Offline/Go Live button
located at the top of the Project Configuration display panel and by clicking the
Project Editor button on the Main Setup Menu Panel (refer to Figure 3.1). Figure 3.10
shows the initialized SRX800 Project Configuration Page, main components of
which include:

- 'Global and Communication Settings' – that provides access to settings shared
  by all (up to 8) Configurations to be created and stored in the SRX800.
- Right/left arrow navigation buttons on the top right of the display to access/
  select the Configuration to be designed/edited.
- Site # and "Site Desc:" labels to individually define each Configuration.
- Five icons (shown left) provide access to the corresponding editor components
  for each configuration. Each editing window activated is referred to as a 'page'.
- Lower window buttons to 'Apply' or 'Cancel' any edits made in the current
  page. The "OK" button has the same effect as "Apply", except that "OK"
  also causes the offline project editor window to close.

Selecting "OK" or "Apply" when using the offline editor causes the data in the
configuration currently being edited to be saved to a file. When a Configuration is
untitled, Host issues a prompt to supply a file name. If the Configuration has been
assigned a file name or was loaded from an existing file, it will simply be saved by
Host under that file name, replacing the original contents.

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### *Global and Communication Settings*

Clicking the "Global and Communications Settings" button launches the editor window for the project to specify and edit settings as shown at right. Settings are either incremented using "UP" and "DOWN" keys or by selecting from a pull-down menu. The increment settings specify how much the applicable parameter will increase or decrease each time the UP or DOWN arrows are pushed on the SRX800 keypad.
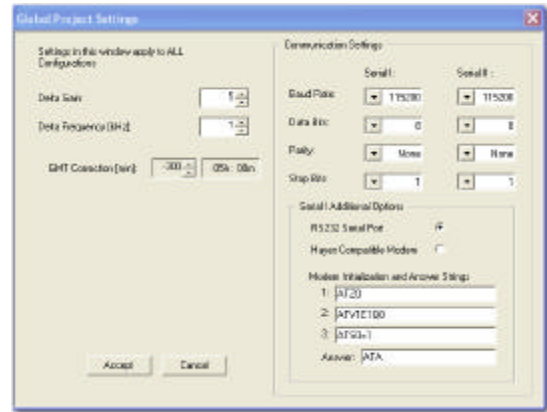
The **GMT Correction** setting is specified in minutes and in increments of 15 minutes each time the up/down arrows are used. This is to accommodate certain global locations that actually have a GMT correction for local time that is not divisible by 30 minutes.

Communication parameters for both serial ports on the SRX800 can be specified here (as applicable based on receiver model). Accommodation for up to **three** modem initialization strings, plus an additional **Answer** string are also provided to set up the SRX800 for remote communication. The default strings specified are typically adequate for most modems although some modems may require additional commands.

Once the user clicks "Accept", any changes made in the editor will be stored in the current project memory. If "Cancel" is selected, changes are discarded.
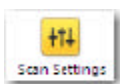
Scan Settings

Scan Settings configuration represents a key component to optimizing the SRX800 receiver and overall performance your telemetry system, from energy and data storage space efficiency, to maximizing data collection probability. The SRX800 receiver offers a variety of options intended to achieve these ends, but if and how they apply depends a great deal on application-specific objectives. Factors to consider include:

- The number of tags in the study
- The number of distinct frequencies and antennas to be monitored.
- Number of tags per frequency.
- Geographic footprint of the study area and release schedule
- Tag Type (ID, Beeper, Sensor)
- System Reception range
- Environmental Factors specific to study area
- Behavioral considerations related to target specifies

Note that additional Scan detail is also covered in the SRX User Guide. Note also that when configuring a project in Offline Editor mode, Host is by definition not connected to a receiver and has no way of verifying whether the receiver supports the selections and entries made. As a result, all options, e.g., Tag Type, antenna, GPS, are presented in drop-down selection box.

Scan Definition

To better understand the meaning and significance of Scan Settings parameters, it is important to understand receiver processes. The SRX800 receiver is designed to monitor a specific frequency for a period of time then move to the next frequency. The frequencies, one or more, are provided from a list by the configuration designer. When the SRX800 completes the cycle of scanning all designated and enabled frequencies (and antennas), the scan cycle refreshes and repeats and so on.

In some configurations, more than one antenna may also be designated (receiver model specific). It is also possible to combine antennas to create "virtual" antennas according to certain rules. In cases where more than one antenna is used (common for autonomous data logging applications), a list of frequencies and antennas must be configured. The user can also define the scanning priority with configurable parameters. There are two related options:

1. Monitor a single frequency in the frequency list, while sequentially listening at each of the listed antennas, then move to the next frequency in the frequency list and again sequentially monitor each of the antennas (and so on). When the scan has cycled through all selected frequencies the operation repeats. This scanning routine is referred to as **Frequency Priority Scan**.

2. Monitor a single antenna in the antenna list, while sequentially listening at each frequency, then move to the next antenna in the antenna list and scan through the list of enabled frequencies again. When all antennas have been scanned in this manner, the scan operation repeats. This scanning routine is referred to as **Antenna Priority Scan**.

Regardless of the option selected, **SCAN** is used to describe the time period over which a receiver monitors a single frequency on a single antenna from the selected list. A COMPLETE SCAN describes a sweep of the entire list of frequencies and antennas. For example: A Configuration is comprised of 4 frequencies, and 2 antennas. Assuming 'Frequency Priority' scan is selected, a complete scan would thus be comprised of 8 single scans. The receiver distinguishes valid detections from spurious noise and logs/record data in its memory.

Scan Parameters

```
┌─Scan Parameters──────────────────────┐  ┌─Scan Options────────────────────────────────┐
│  Scan Time [sec]:          8.0 ▲▼    │  │  Enable TOA          ☐    Enable GPS Clock        ☐  │
│                                       │  │                                                   │
│  Enable Total Scan Time        ☐     │  │  Enable CRTO         ☐    Enable GPS Positions     ☐  │
│                                       │  │                                                   │
│  Set Total Scan Time [sec]:  0 ▲▼    │  │  CRTO Timeout [min]:  0 ▲▼  Enable Adaptive Gain Control ☐ │
└───────────────────────────────────────┘  └─────────────────────────────────────────────┘
```

Single Scan Time – is the length of time that the receiver will monitor on a fixed frequency at a fixed antenna before moving on to the next Ant/Freq pair. This value can be as small as 1 second and as large as 600 seconds (10 minutes).

Enable Total Scan Time - Given the earlier example of 4 frequencies and 2 antennas, provided above and applying for example, a Single Scan Time of 60 seconds, one would calculate the time to carry out a complete scan to be 4x2x60 or 480 seconds. This describes what happens if this option is left unchecked. If this option is enabled, the time to carry out a complete scan can be extended. In the example given, the option is selected and to understand what will happen next depends on the value of the parameter.

Total Scan Time represents another means of conserving battery life and memory storage. Enabling this feature may be useful in a project where detections from tagged animals are expected to be reasonably abundant and missed detections can be tolerated while the receiver sleeps (to extend the battery life). In the example given, where the total time of all single scans is 480 seconds, Total Scan Time is enabled and set to 600 seconds. This means that while the receiver will complete its scan of 8 different frequency and antenna pairings in 480 seconds, it will NOT immediately repeat the scan cycle, but will instead remain in a low power sleep state for 120 additional seconds prior to repeating the scan cycle.

Scan Options (refer also to SRX800 User Guide)

Enable TOA: (Time Out on Arrival). Use of this option conserves battery life. Referring again to the earlier example again where the Single Scan Time is set to 60 seconds: If, during a single scan, a valid tag signal is recorded after only 20 seconds with TOA **enabled**, the receiver does NOT continue scanning for the remaining 40 second time period, but instead moves on to the next frequency / antenna pairing.

Enable CRTO: (Continuous Record Time Out): Specifies that detections of specific code and channel combinations are monitored for a period of time and that the count of detections is stored along with averages for signal strengths and sensor values if applicable. This is tracked separately for each ID, each channel and each antenna. When selected, the user must specify a valid setting for CRTO in minutes. *CRTO* Timeout (min): This input is enabled if CRTO monitoring is selected. This specifies the amount of time a channel/antenna combination will be monitored after which all detections in this time window will be averaged. The resulting averages for each code observed during this period and for this channel/antenna combination are stored as a single record containing start and end times, detections counts and averages signal strength as well as sensor (where applicable) averages.

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Enable GPS Clock: If the GPS clock option is installed on this receiver, the user can choose to use it or not. Enabling the clock ONLY turns the GPS device ON. It does NOT enable the storage of GPS latitude and longitude in the data records.

Enable GPS Records: Latitude and longitude obtained from the GPS engine will be stored in each record.

Enable Adaptive Gain Control: Activates a self-adjusting gain algorithm.

Some of the scan options cannot be enabled in conjunction with other options. Here is an outline of the rules for combining certain options:

1. As CRTO provides an averaged value for detections within the specified time window, once enable enabled, storage of GPS coordinates (receiver model specific) with each record is not permitted.
2. With the GPS Clock option turned OFF, the user cannot select storage of GPS latitude and longitude in the detection records.
3. With CRTO enabled, Adaptive Gain Control cannot be enabled.

The Project Editor automatically enables /disables these options appropriately.
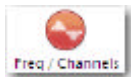
Frequency / Channel Assignment

Clicking on the Frequency Channel icon presents the screen shown at right. While the Configuration Editor will accept any value between 100 and 250 MHz, the value selected needs to correspond with the functional band width of your receiver for operation. Enter a 6-digit value with the appropriate decimal value, e.g., 149.320, for each frequency of interest.

Assigning a Channel number to correspond with a frequency represents a convenient method to simplify selection. Users can select any channel number between 1 and 999, although a few rules do apply. Channel numbers may be entered directly or by the up/down arrows attached to the input box. The editor will also auto-generate default numbers in to sequence as frequency entries are made.

To add a channel, click the double green arrow key. To remove a channel from the current configuration, simply click on the row to highlight the channel you want to remove, then click the double gold arrow key. The channel is removed but remains in the Master Frequency List (refer to Page 23), where frequencies can be similarly added.

The order in which the channels are entered and listed in a Configuration is the order in which they will be scanned. The **scan order can be changed** simply by clicking on the applicable frequency to highlight the row; then click the blue UP/DOWN arrow buttons on the lower right of the panel display to modify the order.

It is also possible to enter a list of channels/frequencies then decide that one or more of the channels will NOT be monitored. In such cases, channels may be **disabled**. This avoids the need to re-enter channel data.

Monitoring specific frequencies within the entire list of frequencies may be of interest at some point in a study for example, based on release strategy of the tagged population and or applicability of all channels relative to geographic area being monitored, and or specific interest in certain tagged animals.

To disable a channel, simply click the "checkmark" that appears at the left-most column of the input grid. The channel entry is maintained within the configuration but it will NOT be monitored during the receiver scan cycle. Re-enable the channel by clicking the empty box. The checkmark will reappear.

Rules for Entering Channel Numbers and Frequencies

Host enforces the following rules and provides explanations where possible, when an entry request is denied.
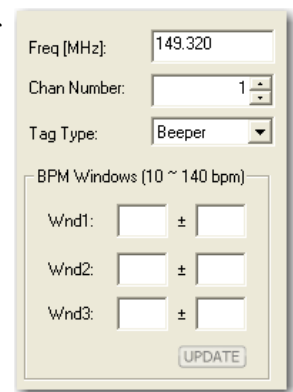
- You **cannot** assign the same channel to 2 different frequencies. Host will offer to assign it to the next unassigned channel.
- You **cannot** assign the same frequency to two different channels. Host will simply find and use the existing frequency to which the channel was originally assigned.
- Channel numbers can have a value of anywhere from 1 to 999 but the SRX800 can store no more than 128. You **cannot** create any **new** channels once the shared master reference table is full.
- You **can** use the same channel in a configuration as many times as you want.
- You **can** use the same channel in any number of configurations.

Tag Type offers three options: ID only, Sensors and Beeper tags. Selection of ID or Sensors requires no further input to specify channel, although additional sensor input is required to complete a Configuration as described in the related section. Beeper Tags require additional parameters. A configuration may contain any combination of ID-Only, Sensor, and Beeper tags, although they must assigned distinct frequencies.

ID Only reflects use/selection of digitally encoded (coded) tags that emit a sequence of 4 closely spaced radio pulses. The temporal spacing of the pulses within each pulse 'burst' is modulated to identify each individual tag, so effectively represents the 'signature' code for that tag. This affords the ability to assign many tags on the same frequency and reduce scan time. The SRX800 distinguishes tags by their pulse signature code and displays and or logs the corresponding code. Detection of only a single valid code is required to identify each tag.

Sensors reflect coded tags with an enhanced code structure. A sensor tag identifies itself by way of unique temporal spacing of a pulse burst as described above, but also modulates burst spacing to support transmission and logging of temperature, pressure and activity data.

Specifying Tag Type as **Beeper** activates the BPM (Beeps Per Minute) section of the input panel as shown, prompting the user to enter applicable parameters and beat rate tolerance boundaries which the receiver applies to define valid detections. A 20% tolerance represents a common value, although transmit frequency can vary depending on tag model selected and the temperature range through which tags will operate. Beeper tags simply transmit single pulses on a fixed frequency with an interval between each pulse.

The SRX800 listens for these pulses, measures the temporal spacing between two consecutive signals, then calculates and displays 'BPM'.

When designing a configuration to monitor specific tags, each channel must specify one BPM "Window" for each tag. Tags are shipped specifications with that include transmit frequency and pulse rate in BPM. Click this to add the first channel in the list of required channels.

There may be occasions where two or even three beeper tags occupy the same frequency. In such instances, differentiating these tags requires that they transmit at different 'beat rates'. The second and third BPM window provides the means to define and differentiate such tags should this apply to your project. In situations where multiple beeper tags are selected/specified to transmit on the same frequency, careful consideration must be given to ensure there is sufficient variance in the selected beat rates and that specified tolerances are sufficient to optimize data collection while avoiding the possibility of overlap.

The editor will not accept an entry until a BPM and tolerance value is entered. With valid inputs, the channel and associated frequency are added to the internal **Master Frequency List** which has a capacity of up to 128 channels.

The **Master Frequency List** is shared among all 8 configurations. When a new channel and frequency pair is accepted into a configuration, that pair is also entered in the Master List and the configuration to which the channel/frequency pair is assigned is referenced on the list. Channels/Frequencies can also be selected from the Master list to be used in a Configuration.

Antenna Configuration

The first selection a user must make is whether the main antenna will be used for this configuration or whether the configuration will define an antenna array, e.g., ASP-8 port. Note that use of ASP-8 and support for antenna switching options described is receiver model specific. Users with SRX800 receiver models configured exclusively for mobile tracking, e.g., M1, M2, operation, simply need to consider and configure gain value setting for single antenna that connects to front panel. SRX800 receiver models configured to support autonomous datalogging, e.g., MD2, MD3, MD4, can connect to ASP devices as described below.

To enable use of external ASP antenna switchbox in a Project Configuration, the user must complete the following steps:

1. Assign a physical port to each antenna
2. Assign gain value to each port.
3. Determine whether and how the master antennas will be designated.
4. Assign gain values to be used for master antennas, if applicable.
5. Select Scan Priority type and determine whether the Master Preview protocol will be utilized.
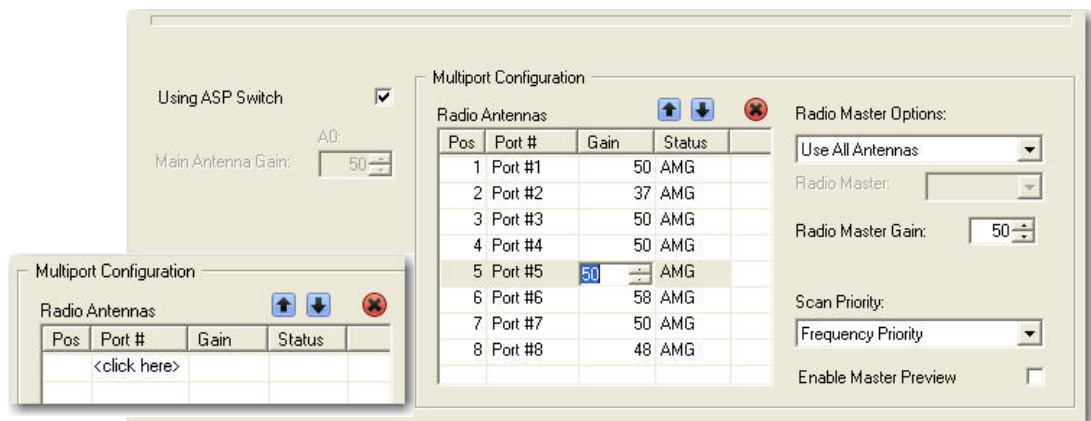
Once use of ASP switching is selected, the Multiport Configuration display becomes active, allowing entry of (up to 8) Port#'s as shown above. Entry is simply a matter of clicking on the each row. Host prompts the Configuration Designer to 'click here' (as shown in left inset above) to automatically add ports. Antenna ports are sequentially added as shown along a common gain value, which can be individually adjusted for each antenna using the up/down scroll arrows highlighted in the selected cell (shown above).

Note that during a scan cycle, antennas are scanned in the order in which they appear. The blue up/down arrow buttons allow the designer to re-order the port number sequence based on antenna monitoring priority preferences, while the ⊗ button allows highlighted ports to be deleted.

Master Antenna Assignment

Each configured Antenna Group can have either a Master Antenna or have no Master Antenna assigned. If no Master Antenna is to be assigned to a group, select 'Not Using Radio Master' from the pull-down options menu as shown at right. When selected, related inputs are disabled as they no longer apply.
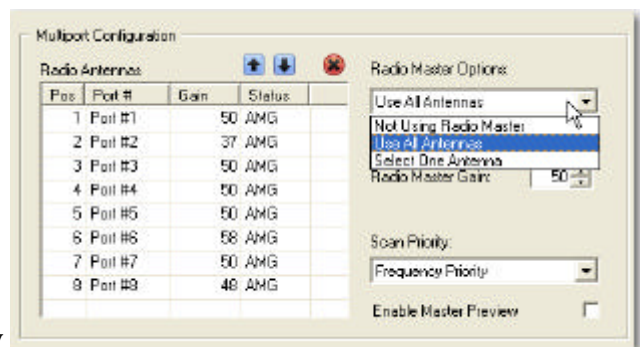
If a Master Antenna is to be assigned, Master Antennas can be defined in one of two ways:

1. Group Master: The Master will consist of ALL members of the antenna group and will be activated simultaneously. 'Use of All Antennas' assigns this scan type. When selected, 'AMG' (Radio Antenna Group) appears in the Status column cell(s) as shown above, to signify 'Antenna Master Group'.

2. Single Master: The Master will be one and only one of the physical ports within the associated group. 'Select One Antenna' assigns this scan type. The designer selects the Antenna Port# from the corresponding 'Radio Master' pull-down menu and its Status is updated in the panel display. For example selecting Port#3 results in displaying 'AM3' (Antenna Master, Port 3) under the Status column.

Based on application specific factors and antenna deployment, the designer must determine:

- Which Antenna Master 'type' best suits requirements: Group or Single?
- If Single, which of the antenna ports within the group needs to be assigned as the Single Master. A single Antenna Master may for example be chosen owing to it being deployed in a manner where any tagged animal must transit through its reception zone prior to entering the reception zone(s) of other antennas.
- Set the gain for the Antenna Master.

Enabling Master Preview specifies that the 'Master Antenna' will preview a channel. If no valid signals are detected during this preview, the SRX800 will NOT proceed with scanning this channel at other antennas in the group. As well as reducing scan cycle time, this also conserves power. This feature can only be used under Frequency Priority, as it would make no sense under Antenna Priority.
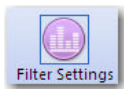
Filter Settings

The Filter Configuration Page affords access to filtering at the code/Tag ID and channel level, as well as the ability to define how tags will be filtered at a pulse level as raw signal transmissions are detected and discriminated by the SRX800. Clicking on the Filter Settings button presents the page below which is divided into two sections: Code and Channel Filters and Pulse Filters

There are five **Tag ID and Channel Level filters** types as shown above. Entries can be created for all filter types but only one filter type can be active at any given time.

No Filters - Configuration page input controls are disabled. The receiver will display and/or log detections of any valid code on any enabled frequency.

Reject Channel/Tag ID - When any Reject filter type is selected, all detections will be accepted except those that appear on the reject filter list.

Accept Channel / Tag ID- When any Accept filter is selected only those entries that appear on the Accept filter list will be accepted. Any other detection will be discarded.
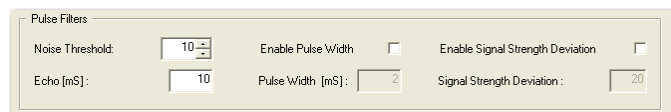
Tag ID Only- When either **Accept** or **Reject** is selected, the list box containing the Frequency and Channel assignments is disabled as the list is not relevant.

To enter a selected filter from the list, select a channel from the list of channels as shown and enter the Tag ID(s) based on the filter type selected and click on the ![button] button. Your selection is transferred to the list.

Clicking the ![button] button deletes highlighted entries. Click the ![button] button to delete all filter entries.

Pulse Level Filters

The Pulse Filter segment of the Filter Configuration page is along the bottom portion of the window as shown above. The available settings are:

- Noise Threshold: A setting for the minimum signal level. A detected signal below the value entered will not be accepted as a valid signal by the receiver.

- Echo [mS]: An incoming signal transmission may arrive at the receiver via direct path, as well as from multiple echo paths. It is not desired that the echo be misinterpreted as a valid signal. The echo filter places a minimum limit on the time period between reception of the first signal pulse and any subsequent pulses. Should another pulse arrive prior to the specified time period, it is treated as an echo of the first signal and discarded.

- Enable Pulse Width: This filter may only be enabled or disabled. The default pulse width limit parameter is shown (mS) but is not editable. Pulse width reflects the minimum width of a pulse that must be measured before the processor will accept it as a valid signal. Anything smaller than this setting is discarded.

- Enable Signal Strength Deviation: This discriminator filter can likewise only be enabled or disabled. When this filter is enabled, detected signals comprised of pulse streams with amplitudes that vary in strength relative to the default value will be discarded.

Use of Pulse Filter is an application specific consideration for fine-tuning a system. In noise prone environments, use of the filters affords better discrimination of valid signal transmissions from noise events, so can reduce the number of logged noise events. This extends relative time to fill available memory, improves data storage efficiency and simplifies download and post processing. Use of filters can also result in valid detections being discarded, for example weak transmissions at the limit of signal reception range.

Any changes made to these setting should be verified during the system calibration process (deployment and related field testing) to ensure the values entered address anticipated requirements and optimize overall system performance.

Sensor Configuration

The Sensor Configuration page provides a means of specifying sensor use and type to be monitored in the configuration being designed. It also provides a means to specify conversion boundaries to ensure that raw sensor data tag transmissions detected by the SRX800 are correctly interpreted and converted into meaningful data.

There are four sensor types from which to choose from the pull down menu as shown at right. As the Sensor page indicates, up to three sensors can be selected.

Sensor Class is an internal index value that can be set from 0 to 9. Lotek provides corresponding sensor settings for the user to enter with tag shipments (typical Sensor Class is 2). Contact Lotek as required for detail.

Once appropriate sensor types are selected, the user must identify and enter:

- Minimum and maximum sensor values
- # of sensor range 'levels' to be divided

Min/ max values and # of levels for a sensor can be adjusted in their respective columns/cells irrespective of whether the sensor has been selected. Simply highlight the sensor from the list and then apply appropriate values in the entry boxes provided.

To remove a Sensor, simply highlight the applicable row and click the button.

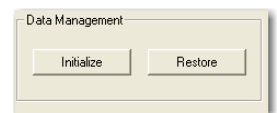**Project Files**

When the project configuration you have designed is complete and saved to disk, the file can be uploaded to the SRX800. Once connection has been established, either through USB or RS232, the upload option will be enabled under the "Project" menu. Select the saved file from the pull-down menu. A dialog will appear to inform you of the progress of this operation. When transfer of the Configuration file shows complete, click the 'Done' button.

Note: the SRX800 will reject attempts to upload new Configuration parameters if there are any data stored in its receiver memory that has not been downloaded. This preserves and safeguards data stored in memory that had been collected based upon Configuration parameters entered prior to receiver deployment.
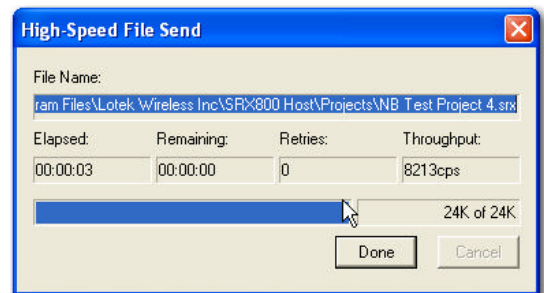
The SRX800 only allows Configuration edits to be uploaded following receiver data download and once the receiver has been reinitialized. The receiver is initialized from the Data Management section (shown right) of the Data Download Panel.
A complete configuration stored on an SRX800 can be downloaded to Host. When you select the download option, you will be asked to provide a file name. Once entered, a dialog reporting the progress will be launched and will indicate when the transfer is complete.
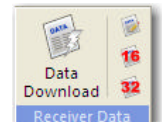
9.   RECEIVER DATA

To download data from the SRX800, click the 'Data Download' button shown above to launch the SRX Data Download Panel below.
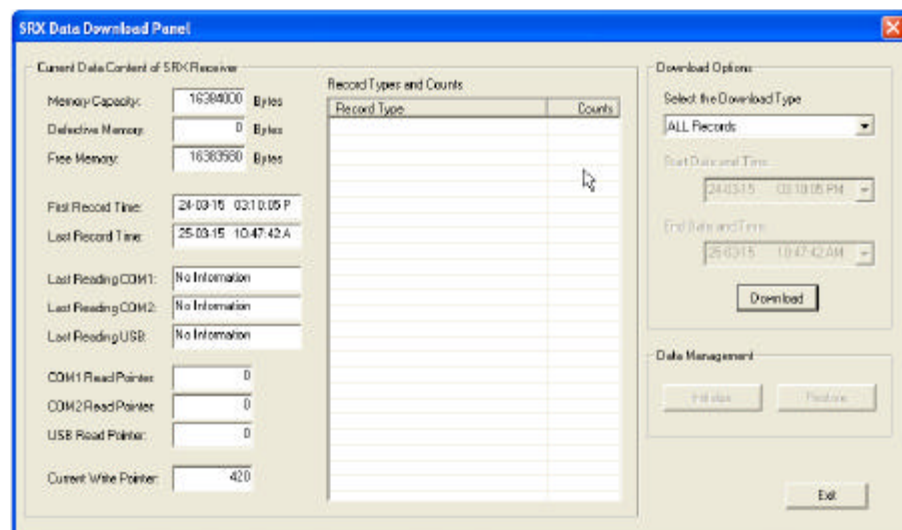
The Data Download Panel provides useful statistical information pertaining to data stored in the SRX800, as well as past download activity information including:

- Available Memory, how much has been used as well as any defective memory.
- Dates and times of first and last record stored in memory,
- Dates and times of the last download events for each (3) possible interface connections
- Read and current write pointers for each different interface connectors (diagnostic tool)
- A complete data content listing of the SRX. There are 22 different types of records that could be stored in the memory. A list box provides a manifest of the record types are and the number of each of these records.
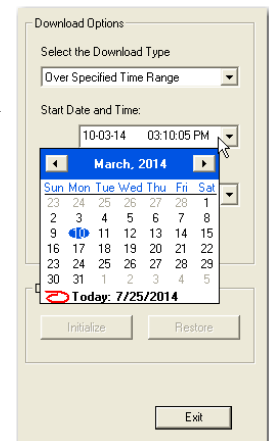
Data Download

Data stored in the SRX800 can be downloaded by selecting one of three different download options as shown:

1. ALL Records download all recorded data
2. Everything since Last Download downloads any new data logged since the last download using the current communication port
3. Over Specified Time Range downloads based on a user-specified start and end date and time
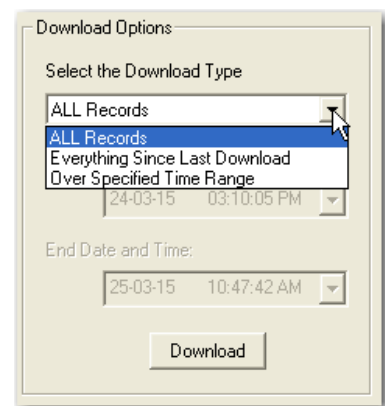
Choosing either of the first two options launches the "Save as…" window shown. Enter a file name and click 'Save'. A second window is launched to report on the progress of the download.

Choosing the third option requires entry of start and end times. Inputs are enabled as shown at right. Once date and times are specified, click the download key and proceed with specifying a target file name and downloading.

Note When an instruction is given to download based on a specified range of date and time, this refers to dates and times of DATA records and NOT environment records.

Example: A receiver contains a combination of data and environment records with a number of environment records stored on March 10, 2014 during the hour of 12:00am and 1:00am, but NO data records were logged until after 2:00 am the same day.

If the user requests data records and a range from 12:00 am March 10, 2014 until 2:00 am the same day, the result will be NO DATA TRANSFER, as only environment records were stored between 12:00 am and 2:00 am.

Data Management

The Data Management segment of the Data Download Panel supports two functions, Initialize Data and Restore Data.

Initialize Data causes internal pointers and counters that track stored data in the SRX800 to
be reset to 'zero' positions of the FLASH memory. Although data content is NOT
destroyed, when data logging operation begins, new data records will begin to
overwrite old data, starting at the reset/ zero position. Note that it is still possible to
recover from inadvertent use of the "Initialize" button using Restore Data as
described below.

Restore Data instructs the SRX800 to perform a search of FLASH memory to recover data
pointers and counters lost as a result of a damage or misuse of the Initialize Data
function.
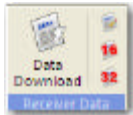
Data File Conversion

Under the Receiver Data Section, the SRX800 Host provides three conversion services to enable data files to be converted into text formats. Two of the formats emulate legacy SRX (**16** and **32**) receiver family formats to facilitate data processing in projects where legacy SRX receiver models are also deployed. The upper format is designed to maximize the information content provided by the SRX800.

The conversion utilities are accessed under the Data main item, as shown. Selecting any of the three options will launch a window, requesting selection of an input data file previously stored in the **Data** directory. The user is presented with a typical "File Open" dialog where they must select the SRX data file for conversion. Once the file is selected, the process is completed in a few seconds and the resulting text file is left in the same directory as the source SRX data file from which it was loaded.

The output file will be saved under the SAME ROOT NAME as the input file, but will have a "TXT" extension rather than its original binary 'BIN' file extension.

10. ON-BOARD GPS

SRX800 receiver models that support on-board NMEA compatible GPS can be configured to report GPS status. The GPS menu sub-items is shown below.

To enable GPS Monitoring the receiver must be Logged ON and in "Code/Data Log Mode'. Note that the active configuration receiver must also specify that the GPS Clock be enabled. This is performed in Host simply by checking the applicable checkbox under the Project Configuration page (refer to Page 16, Figure 3.10).

Clicking the [icon] button sends a request to the receiver to enable monitoring GPS status reports fromHost. The receiver will continue to send these reports until Host is either taken out of Code Log mode or until the menu item is selected again, which toggles the request to the OFF state.
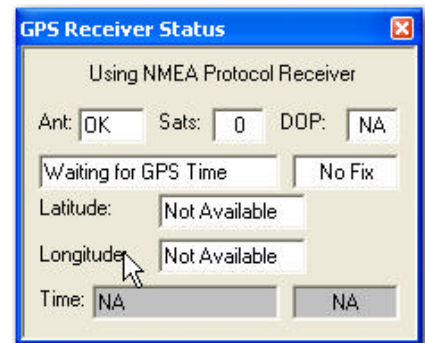
Note: Obtaining GPS fixes requires that the GPS antenna be affixed to the receiver back panel. The ability to establish GPS connection indoors to enable GPS fixes, may be impaired by shielding effect of the building. If difficulty is experienced in making a connection, try positioning the end of GPS antenna (oriented flat side down) on or outside a window ledge.