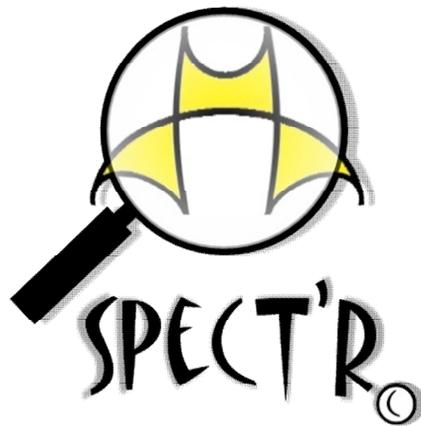


# **SPECT'R III**

**Spectral Analysis, digital Tuning and Recording Software**

**Version 3.3**

**Software Manual**



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Binary Acoustic Technology is a web-based business.

Web: [www.binaryacoustictech.com](http://www.binaryacoustictech.com)  
E-Mail : [info@binaryacoustictech.com](mailto:info@binaryacoustictech.com)

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# Chapter 1 : Installation

## 1.1 : What you should have received

The SPECT'R package includes one SPECT'R CD-ROM and this manual. The CD-ROM contains the SPECT'R software distribution along with a setup function that uses the Microsoft Windows installer.

## 1.2 : New Installation

Place the CD-ROM in the drive. After a short delay the CD-ROM window should open. If this does not happen, double-click the CD-ROM symbol in the *My Computer* folder.

When the CD-ROM window appears double click the *Setup* icon. This will bring up the Window Installer. Follow the directions to complete the installation.

## 1.3 : Updating an Older Version

Follow the same procedure as described in the section 1.2.

*For reasons of safety it is good practice to create a backup of your previous data before proceeding.*

*It is also recommended to uninstall older versions of SPECT'R before installing new versions.*

## **Chapter 2 : Installing Device Drivers**

### **2.1 : Plug and Play Installation**

All Binary Acoustic Technologies Acoustic and Ultrasonic Receiver products are shipped with a device driver CD-ROM. Please retain these even after installation.

The drivers are based on the “Plug and Play” model. To install a device driver you must first connect the receiver product to the computer. If an existing device driver can be found, no action will occur and the receiver is ready to use. Otherwise, an installation wizard will appear instructing you to place the Driver CD-ROM into the CD drive. When you have finished loading the CD-ROM. Enable the wizard to search the CD-ROM and it will automatically install the correct device driver.

If the device drivers do not load automatically, follow the steps outlined in the next section, Updating Device Drivers.

### **2.2 : Updating Device Drivers**

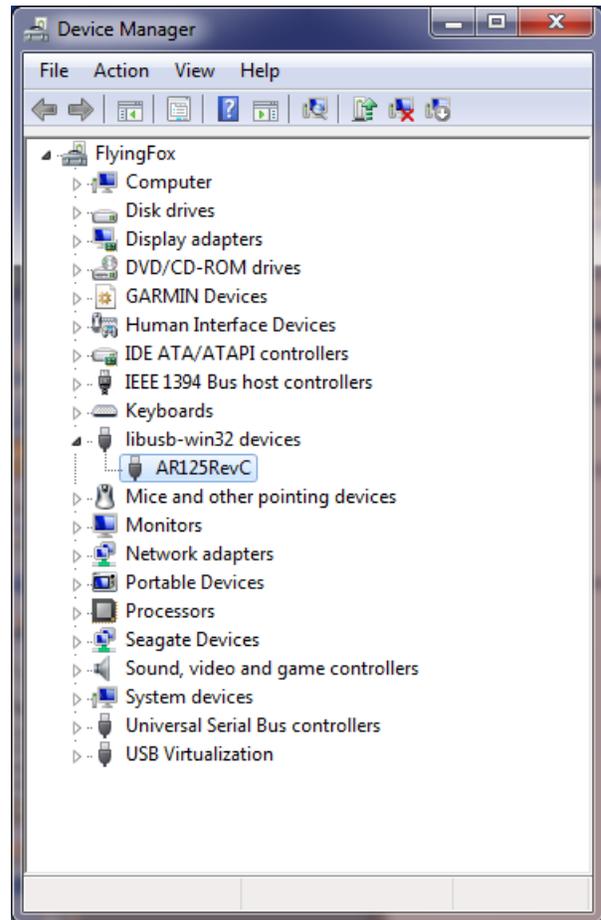
As of version 3.3 SPECT'R III supports new 64-bit operating system drivers. Use the Windows device manager to update the device drivers:

- 1) Click on Start=>Control Panel=>System and Security.
- 2) Find and click on “Device Manager”.

This will bring up the device manager as shown on the next page.

Plug the AR125 into the computer and then find the AR125 entry on the Device Manager window. There are three places that it can appear. First, if no drivers are currently loaded on the computer then it will appear under “Other Devices”. Second, if the original drivers are installed then it will appear under “Universal Serial Bus Controllers”. Third, if 64-bit drivers are installed then it will appear under libusb-win32 devices.

To update the drivers, right-click on the AR125 entry and select “update driver software...”. Insert the BAT driver CD and browse for the “AR Installer” directory. Click Next to update the drivers.



## 2.3 : Using USB extender cables

USB extender cables can be used to increase the cable length up to eighty feet. All binary acoustic technology receivers require USB 2.0 compliant active extender cables.

The recommended procedure for connecting extended cabling is to add only one extender cable at a time starting at the computer and only connect the receiver after all the extenders have been connected. Note: in certain circumstances the driver may need to be reloaded when using extension cables. In this case, an installation wizard will appear. Follow the directions as per section 2.1.

## Chapter 3 : Running SPECT'R

### 3.1 : Running from desktop

A desktop icon is created and placed on your desktop during the install.

You can start SPECT'R from the desktop by double clicking on the SPECT'R icon illustrated by Figure 1.



Figure 1: SPECT'R Icon

### 3.2 : Running from Start Menu

SPECT'R can also be run from the *Start* menu. You can run it by selecting *Start => All Programs => Binary Acoustic Technology => SPECTR. III*

### 3.3 : Exiting

There are two ways to exit the program. The first is using the red 'X' button in the upper right corner of the window. The other way is using the *File => Exit* menu item.

### 3.4 : The Main Window

Version 3 of SPECT'R includes several major improvements including increased range and a file compressor to save disk space. The user interface has also been redesigned to improve ease of use and several of the windows have been either redesigned or have important new features added.

Upon startup only the main window appears. The main window has four primary sections. The **control section** (left) controls the basic software and operation settings. The **sonogram section** (center) displays a two dimensional real-time frequency vs. time plot. The **readout section** (bottom) displays frequency and time measurements. Finally the **tuning section** (right) is the primary mechanism for tuning the detector.

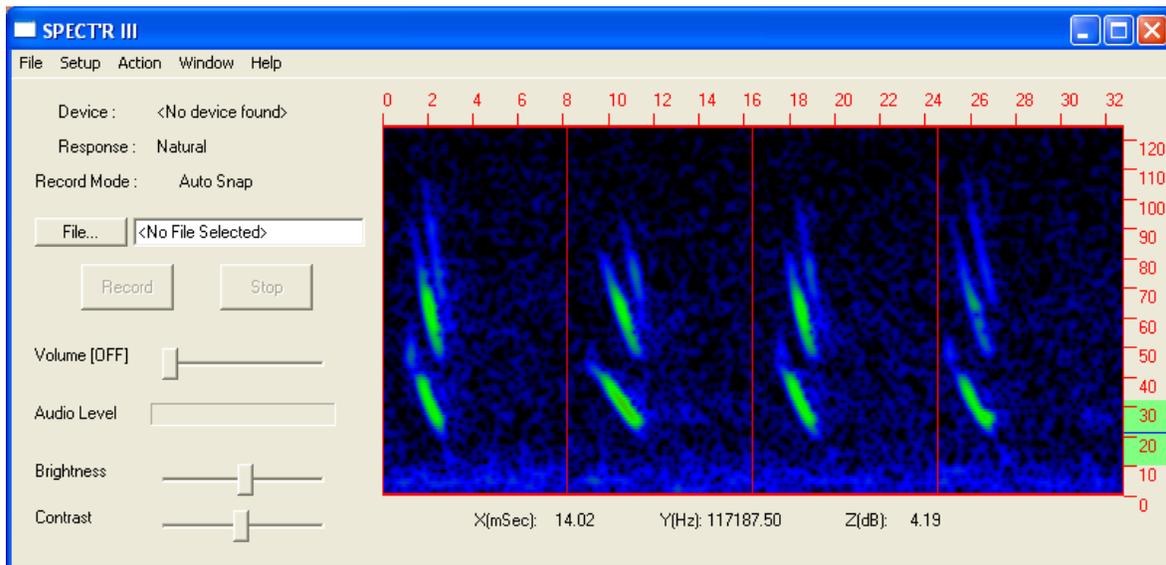
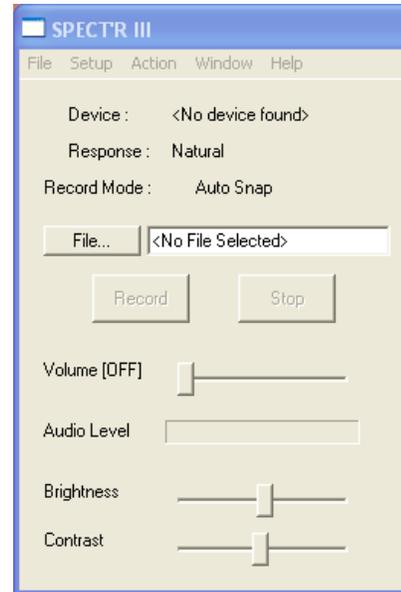


Figure 2: SPECT'R Main Window Layout

Note that SPECT'R is only dependent on having the receiver present when it is actively recording. Otherwise the receiver may be connected or disconnected at any time. The trace and raster displays are only active when the receiver is connected or during playback.

### 3.4.1 : Main Screen Control Section

Starting at the top of Figure 3 and working down, the control section is made up of a **menu bar**; a **device indicator**; a **response selection indicator**, a **record mode indicator**; a record **file selector**; **record** and **stop** buttons; an audio **volume control slider** along with an **audio level indicator**; and a **brightness and contrast sliders**. Each of these will be described in detail in the sections which follow.



#### 3.4.1.1 : Device Indicator

Figure 3 : Control Section

The device indicator displays either the receiver model that is connected or “No device detected” in the case that a receiver has not been detected.

#### 3.4.1.2 : Record Mode Indicator

The record mode indicator displays the record mode setting and can either be “Audio” for audio bandwidth recording, “Full BW” for full receiver bandwidth recording, or AutoSnap for automated snapshot recording.

#### 3.4.1.3 : Response Mode Indicator

The response mode indicator displays the current response setting and can either be “Natural” for uncompensated recording, or “Compensated (Flat)” for recording digitally “flattened” files.

### 3.4.1.4 : Record File Selector

The record file select allows the operator to specify the filename of the file to record. Clicking on the *File...* buttons brings up a standard windows file selection tool, Figure 4, which allows the operator to browse existing folders (or create new folders) and specify a file name.

Important note on naming conventions. SPECT'R treats file-names which end in numeric characters ('0' - '9') specially. Each time a recording is completed. SPECT'R will automatically increment the file name to allow sequences of recording to be made without having to reenter a new filename. The number of digits will increase as required (i.e. '9' => '10') but it is best to use a double or triple digit naming convention. In addition, the file name selected in AutoSnap mode only specifies the base file name. AutoSnap automatically appends a date and time-stamp.

Examples: test1, audio01, or fullbw00.

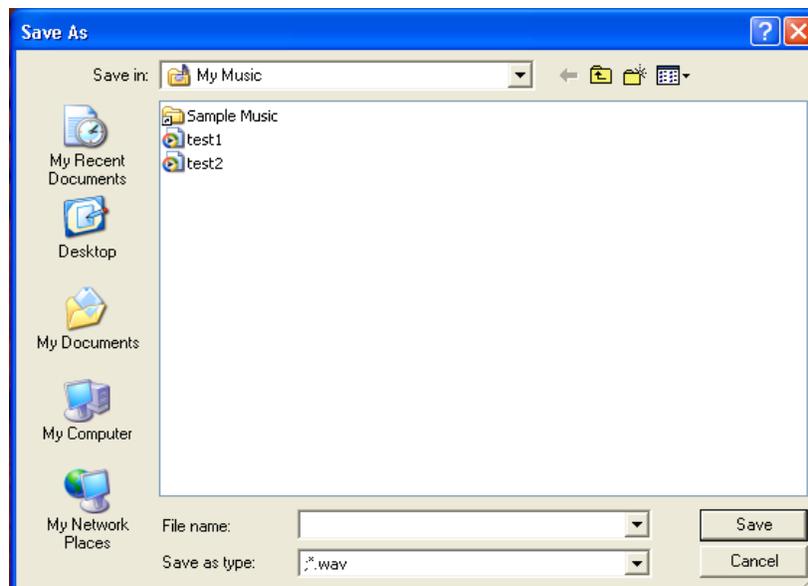


Figure 4: File selection tool

### **3.4.1.5 : Record and Stop buttons**

The **Record** and **Stop** buttons control the recording process. The buttons become active only when they are ready to be used. For example when SPECT'R is first activated both record and stop buttons are inactive (“grayed out”). The first to be activated is the record button. It will only be activated when a file name is selected and either of the following conditions; 1) the record mode is audio and the operator selects a tuning range, or 2) the record mode is either full bandwidth or AutoSnap. The stop button only becomes active while SPECT'R is recording.

### **3.4.1.6 : Volume Control Slider**

The volume control slider controls the volume of the audio level for both the live audio monitor and the audio recording level if the record mode is audio. If the record mode is full bandwidth, the volume control slider only controls the live audio monitor.

The volume control slider can also be used to enable and disable audio processing. When the slider is moved all the way to the left, the audio processing is disabled.

The off position is when the slider is all the way to the left and the maximum level is when the slider is all the way to the right.

### **3.4.1.7 : Audio Level Indicator**

The audio level indicator measures the audio power level in dB and displays it in a bar graph. Like the volume control slider, minimum value is to the left, maximum value is to the right.

### **3.4.1.8 : Brightness and Contrast Controls**

Simply stated, the Brightness and Contrast controls allow the operator to adjust the screen appearance. Moving either slider left reduces the screen brightness/contrast, while moving the slider right increase the screen brightness/contrast.

To be more precise, the Brightness and Contrast controls actually control how the underlying sonographic data maps to the screen color and/or intensity. Explained this way, the brightness and contrast actual control the level of sonographic detail that will be mapped to the screen. The brightness control actually establishes the mean value of the display, while the contrast controls the linear range or sensitivity around the mean value.

Once you master operation of the brightness and intensity controls, you will find them a great tool to use to discover the subtle details of bat vocalizations.

### **3.4.1.9 : Additional SonoSCOPE controls**

In addition to the brightness and contrast sliders, SonoSCOPE has several other controls. These controls are accessed by bring up an independent control window. This window is described in the next section.

### 3.4.2 : SonoSCOPE Control Window

To access the control window use the menu and select *Window => SonoSCOPE*. The window shown in Figure 5 will appear.

Starting at the top and working down, the control window is made up of a **pause button**; a **threshold control slider**; a **detail selection slider**; a **division selection slider**; and two frequency **Marker controls**. Each of these will be described in detail in the sections which follow.

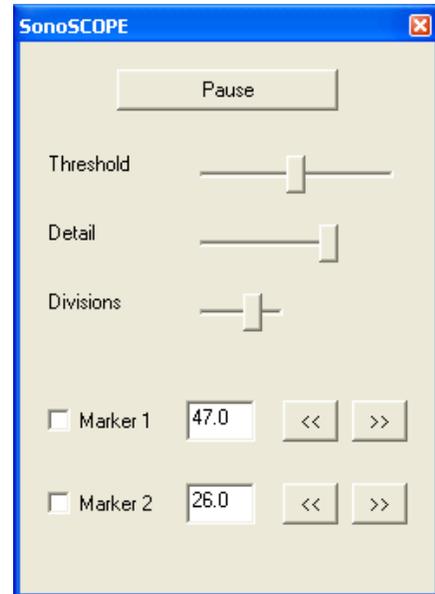


Figure 5 : SonoSCOPE Control Window

#### 3.4.2.1 : Pause Button

The pause button allows the operator to pause and resume the sonogram. Pressing the button once will pause the sonogram, inhibiting further updates and allow the operator to make measurements. Pressing the button again will resume normal sonogram operation.

#### 3.4.2.2 : Threshold Control Slider

The Threshold Slider controls the trigger threshold setting. The threshold establishes the signal pressure required to trigger the SonoSCOPE. The higher the threshold, the more selective the triggering will be. Moving the slider to the left decreases the trigger level. Moving the slider to the right increases the trigger level.

### **3.4.2.3 : Detail Selection Slider**

The Detail selection slider allows the operator to adjust the time-base of the sonogram in order to compress or expand the sonogram on the display. Higher detail generates a sonogram with a finer time-base, but shorter duration. Lower detail generates a sonogram with a courser time base but a longer duration. Moving the slider to the left decreases the detail, while moving the slider to the right increases the detail.

### **3.4.2.4 : Division Selection Slider**

The Division Control slider controls the number of divisions that are placed on the sonogram display. The division control allows the user to partition the display into sub-displays. Each time the SonoSCOPE triggers it is only allowed to fill up a single division. Divisions allow the operator to view the results of several triggered events simultaneously. SonoSCOPE supports either one (1), two (2), four(4), or eight (8) divisions across the display. Moving the slider to the left decreases the number of divisions across the sonogram, while moving the slider to the right increases the number.

### 3.4.2.5 : Frequency Marker Controls

SonoSCOPE includes two frequency markers controls that place frequency reference lines directly on top of the sonographic display. These are useful when you want to quickly distinguish bat calls that are within some specific frequency ranges. They can also be used to make quick frequency measurements.

To enable a marker, click on the associated check box. To disable it, re-click on the check box. Use the up and down buttons to change the frequency of the marker. Alternately, you can change the value by clicking in the edit box and entering the desired value by hand.

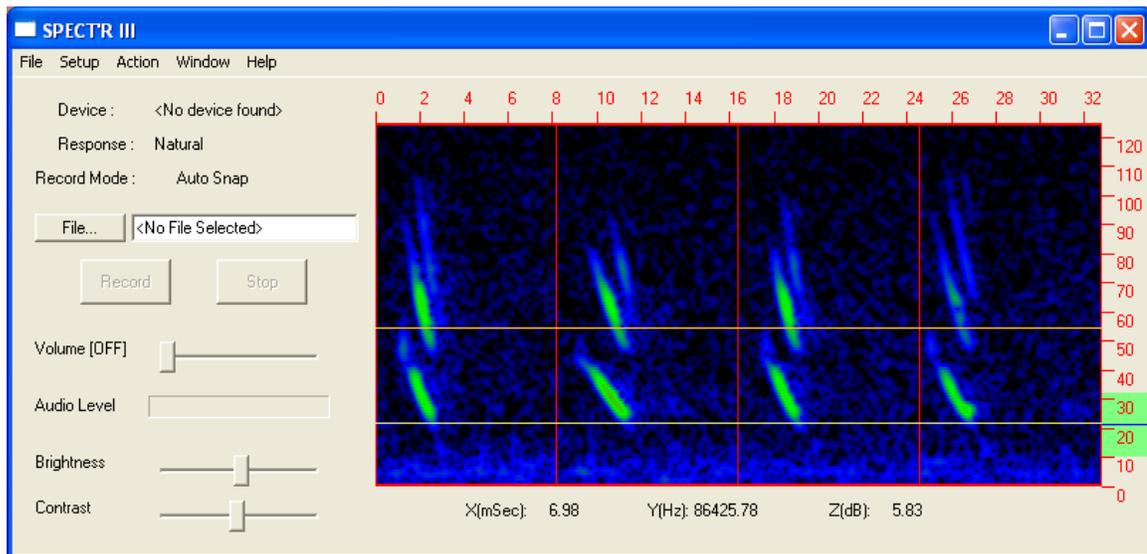


Figure 6 : SonoSCOPE with frequency markers

### 3.4.3 : Spectral Trace Window

Bring up the Spectral Trace window by using the *Windows => Spectral Trace...* menu option. The Spectral Trace window is primarily intended to provide a real-time view of the current acoustic environment. The Spectral Trace window is configured to measure frequency versus sound pressure level (SPL dB). Use the mouse to move the cursor slowly over the trace section. You will notice that the X(Hz), and Y(dB) readouts change as the cursor moves. The X(Hz) readout displays the trace frequency at the cursor position, while the Y(dB) readout display the sound pressure level in decibels at that same cursor position.

The readout works in both standard and differential measurement modes. To switch to differential mode, choose an audio frequency/power-level reference by moving the cursor to a desired position and left clicking the mouse. Two more readouts will appear, dX(Hz) and dY(dB).

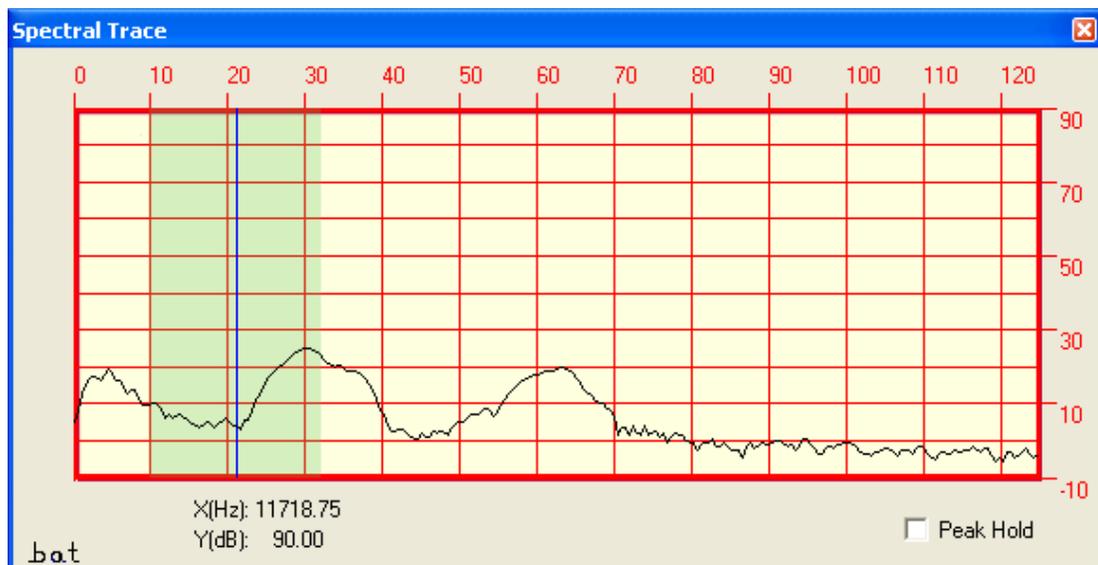


Figure 7 : Spectral Trace Window

### 3.5 : Tuning and Measurements

Tuning and Measurements are made using the sonogram display on the main window as shown in Figure 8.

The current tuning selection and tuning range are illustrated by the green highlight and vertical blue line at the very right of the sonogram display. The vertical blue line indicates the current frequency selection and the green highlight indicates the frequency band that is currently being translated.

To tune the heterodyne receiver., use the mouse or a Table stylus to drag the highlighted region to the desired frequency band.

Standard measurements of time, frequency, and power level are made simply by moving the cursor to the point of interest. You will notice that the readouts track the position of the cursor when it is over the sonogram display. The readouts will be updated to reflect the measurements at the current cursor position.

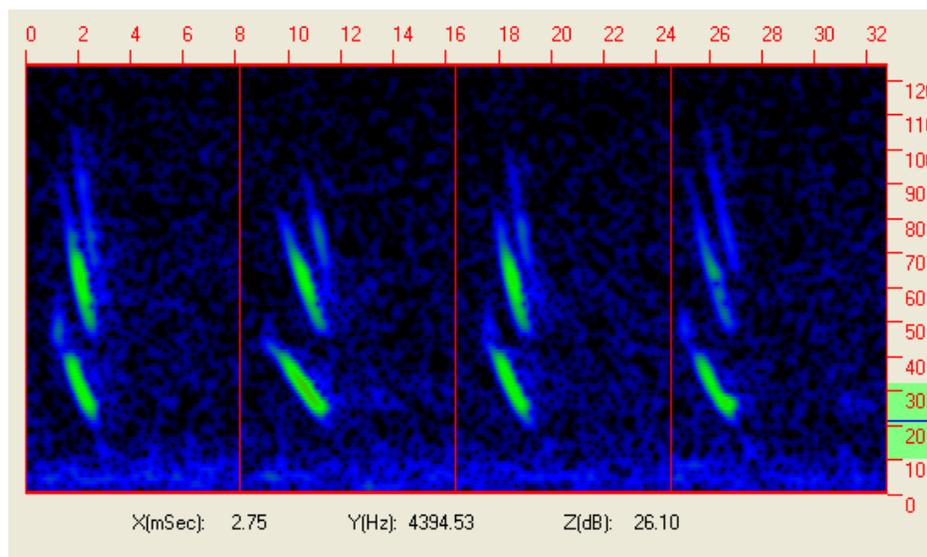


Figure 8 : Sonogram Display

### 3.5.1 : Tuning and Measurement Example

Bring up the Sonogram control window by using the *Windows* => *SonoSCOPE...* menu option. Lower the trigger threshold to fill up the display with triggered events and then press the pause button. This freezes the display, so it will not be updated by any other events. You are now ready to make measurements.

Take the mouse and move the cursor slowly over the SonoSCOPE display section. You will notice that the X(mSec), Y(Hz) and Z(dB) readouts change at the cursor moves. The X(mSec) readout displays the time, in milliseconds, at the cursor position, the Y(Hz) readout displays the frequency at the cursor position and the Y(dB) readout display the sound pressure level in decibels at the cursor position.

Now choose reference point by moving the cursor to the desired position and left clicking the mouse. Once the mouse is clicked, three more readouts will appear, dX(mSec), dY(Hz) and dZ(dB). Start moving the cursor around and you will notice that these measure the difference between the current cursor position and the position of the last mouse click (left click).

## 3.6 : Recording

SPECT'R incorporates a versatile recorder that allows the operator to collect field data and store it directly on to a hard disk. The recorder supports several different record modes, both manual long duration recording and automated snapshot recording. It also includes an operation timer that supports preprogramming SPECT'R to record during only specific times each day. This supports long duration monitoring projects and projects that require monitoring during only certain portions of each day.

As of version 3.0.0, SPECT'R includes a built in file compressor. The file compressor operates much like the popular zip utility. It saves disk space by compressing the recordings as they are being recorded to disk.

### 3.6.1 : Selecting Recording Mode

The recording mode is selected using the *Setup=>Record* menu on the main window. Bring up the menu and click on the desired setting. Two options are available, Full Bandwidth and Automatic Snapshot.

Full Bandwidth is a continuous recording mode. The recorder starts when the record button is selected and keeps recording until the stop button is selected.

Automatic Snapshot mode is not a continuous recording mode, instead the recorder is voice activated and only records short duration snapshots each time it detects activity.



Figure 9 : Record selection

### 3.6.2: Selecting the Response Characteristic

The ideal sensor for collecting and recording bat calls has a completely uniform response over the entire ultrasonic frequency range and, at the same time, it offers high sensitivity with little thermal noise. As you might imagine, real sensors don't quite meet these ideal requirements. However, there are methods to fix non-uniform response characteristics to effectively generate a nearly ideal recording. SPECT'R includes such a method, a digital compensator.

The digital compensator is designed to flatten out the response of an AR125 receiver such that the recording will have a nearly uniform response over the 10KHz to 120KHz frequency range. This is especially important for bat vocalization analysis. Also, digital compensation is highly recommended for users who are using SonoBat to analyze AR125 recordings.

SPECT'R provides two response options, **Natural** and **Digitally Compensated**. If Natural response is selected, no compensation will be performed. If Digitally Compensated is selected, then the compensator will be used to flatten out the response. To select an option, click the appropriate option in the *Setup => Response* menu as shown by figure 15.

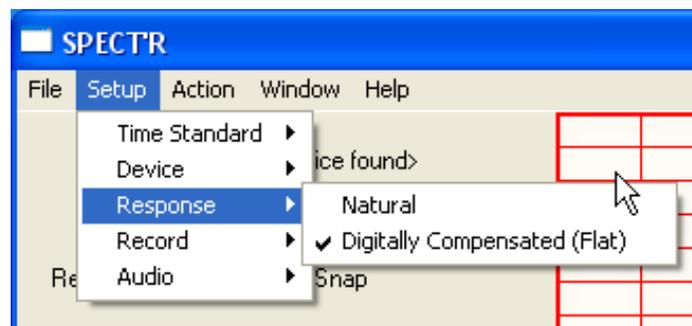


Figure 10 : Response selection

### 3.6.3 : Record Setup Window

The remaining recording settings both of the recording modes are controlled using the record setup window as shown in Figure 11. This window provides controls to configure both the Full Bandwidth recorder as well as the Automatic Snapshot recorder.

Several of the controls are specific to the Automatic Snapshot recorder. These controls are the snapshot trigger controls, the snapshot duration controls and the pop filter enable control. The remaining controls, the output format selector, the time expansion factor selector and the comment field are common to both recording methods.

Each of the controls will be described in detail in the sections which follow.

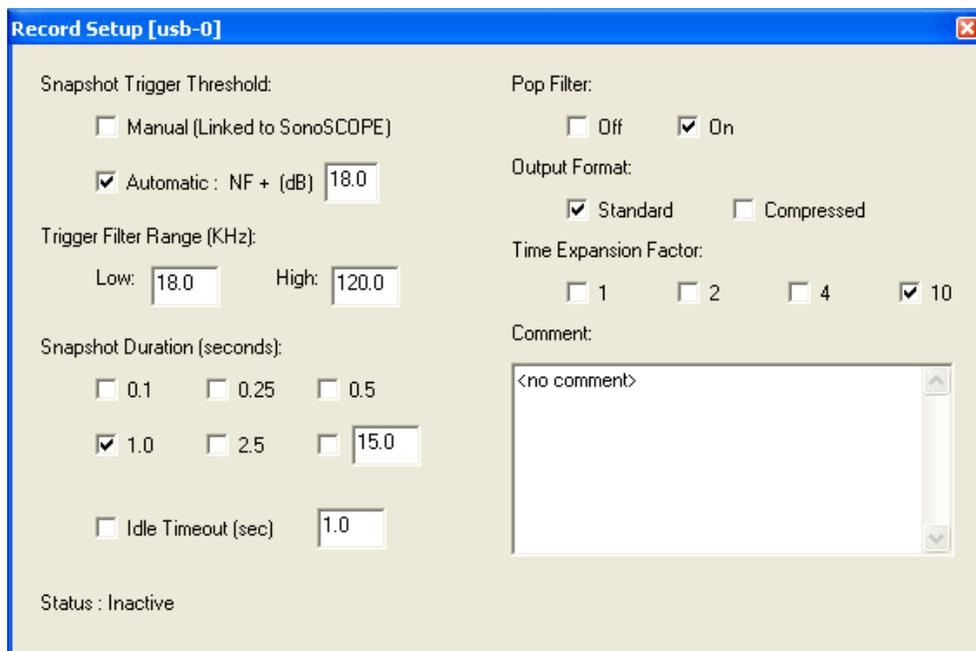


Figure 11: Record Setup Window

### **3.6.4 : Snapshot specific controls**

To enable Automated Snapshot recording and bring up the Record Setup window, use the main menu to select *Setup=>Record=>AutoSnap...* This will bring up the window as shown in Figure 11.

#### **3.6.4.1 : Selecting trigger threshold**

AutoSnap supports two different thresholding mechanisms, the first is a manual fixed threshold and the second is automated variable threshold based on the noise floor of the ultrasonic receiver. The automated threshold is the default selection and is recommended for most applications. However, the manual mode is available in case the users have special triggering requirements.

Manual mode links the AutoSnap triggering mechanism to the SonoSCOPE Threshold slider. This allows the operator to fine tune the threshold setting using SonoSCOPE and then start the snapshot recording using the same setting.

Automatic mode is not linked to SonoSCOPE. In automatic mode, the snapshot generator monitors the input of the receiver and sets the trigger threshold based on measurement of the receiver Noise Floor (NF) along with the user specified threshold. For example, if the threshold is set to 10 dB, then AutoSnap sets the trigger point 10 dB above the current receiver noise floor. This mode is quite handy and works well in cases where the background noise changes throughout the day. It's primary advantage is that it avoids false triggering problems due to changes in background noise.

### **3.6.4.2 : Selecting the trigger filter range**

SPECT'R includes a versatile triggering filter which limits the frequency range that is used to trigger snapshots. The default range is 18 KHz to 120 KHz. This range was chosen to inhibit triggering due to human audible sounds like birds, frogs and geese.

The filter settings can be modified by the operator. To change the range, click in one of the edit boxes and change the value.

### **3.6.4.3 : Selecting the snapshot duration**

SPECT'R supports six different snapshot durations from one-tenth of a second up to five seconds. The control panel includes a patch of checkboxes that list the supported durations and allow the operator to select a desired duration. To select the duration, simply click on the checkbox next to the desired setting.

SPECT'R provides one custom duration option that can be modified by the operator. This allows SPECT'R to support non-standard snapshot duration. To modify the custom duration, click with in the duration edit box and enter the desired duration. The setting will be saved and reused each time SPECT'R is used.

### **3.6.4.4 : The Idle Timeout option**

The Idle Timeout option is a new feature which can be used to create variable length files based on call activity. Enabling this option tells the recorder to stop recording the current snapshot if no activity is detected for the specified time interval.

As an example, a common configuration is to set the snapshot duration to 15 seconds and the idle timeout to 3 seconds. Each recording will be a maximum of 15 seconds, but will terminate early if no activity is detected over a 3 second interval.

### 3.6.4.5 : Enabling the pop filter

In addition to the trigger filter range, SPECT'R includes a pop filter which is used to reject pop noise such as electrostatic noise and certain bug noises. The pop filter is recommended for most applications. It significantly reduces the number of falsely triggered snapshots and has been shown to have little or no impact on actual bat calls.

## 3.6.5 : Common Recording Controls

The remainder of the recording setup window controls are shared between the full bandwidth and automatic snapshot recorders

### 3.6.5.1 : Selecting the output format

SPECT'R supports two output formats, standard wave files (\*.wav) and compressed wave files using the open source WAVPACK format. To record standard wave files select the *Standard* option. To record compressed wave files select the *Compressed* option.

The compressed files are roughly one-third the size of standard wave files and as such they save on disk space. WAVPACK was chosen because it is a lossless compression technique and produces superior results. WAVPACK is open source software and is licensed under the BSD Software License by Conifer Software.

**Important note: all Binary Acoustic Technology software supports WAVPACK files. However, use the standard format if you plan to analyze the recordings using SonoBat.**

### **3.6.5.2 : Selecting the time expansion factor**

SPECT'R is actually a real-time recorder and does not actually need to time expand the data for recording purposes. The time expansion factor selector is included to make the recorded files compatible with existing analysis tools and multimedia players. Time expansion is select by clicking on the desired setting. The default time expansion is 10x.

**Important note: Use the default time expansion factor of 10x, if you plan to analyze the recordings using SonoBat.**

### **3.6.5.3 : Entering a Comment**

The Auto Snap Setup window includes a text editing box for comments. Comments are useful because they allow the operator to add collection details which will be placed into the files as they are recorded. The comments can be read back and displayed on playback, giving important reference information about the original collection.

The comment field is automatically updated during file playback to allow comments to be propagated from a source file to any files recorded from it.

To enter or edit a comment, simply click in the comment editing box and type. The comment field is limited to 400 characters.

### **3.6.7 : File Compatibility**

SPECT'R generates industry standard wave file (\*.wav) format that can be read by both Windows and Mac based personal computers. SPECT'R also adds recorder setting and operator comments attributes to the files. These are inserted into the recordings as they are created. The attributes are compatible with SonoBat. This allows AutoSnap generated files to be read directly into SonoBat without having to perform any formatting or setup operations, which saves time and confusion.

SPECT'R also generates compressed wave file (\*.wv) format as specified and created by the WAVPACK audio compressor. All of Binary Acoustic Technologies software products have been updated to handle compressed wave files. There are also a number of other audio processing tools and players that can read these files. See [www.wavpack.com](http://www.wavpack.com) for more details.

### **3.6.8 : Log File Generation**

The snapshot recorder includes an activity logging function. As the recorder is recording it automatically generates a log file. The log file is useful in determining how the recorder was recording in the event that the batteries ran out while performing a recording session. The log file uses the same base file name as the snapshot, but with “\_DYYYYMMDD\_log.txt” appended to the base name. It is located in the same directory as the snapshots.

## 3.7 : Operation Timer

The operation timer is a new feature introduced in version 2.1.8. It enhances the unattended operation capability of SPECT'R, allowing the operator to specify the time windows that SPECT'R is allowed to record. This allows the operator to leave the equipment in the field for multiple days at a time. It also includes a power saver feature that conserves CPU cycles and power when it is not actively recording.

### 3.7.1 : Enabling the Operation Timer

To enable the Operation Timer, use the main menu to select *Window=>Operation Timer...* and the Operation Timer window shown in Figure 12 will appear.

The Operation Timer window includes a current time indicator, a status indicator, two record program sections and a power saver selector. The window also include a power saving button that shuts down the processing intensive portions of the software when it is not actively recording. This conserves power and increases battery life.

The individual controls are described in the sections which follow.

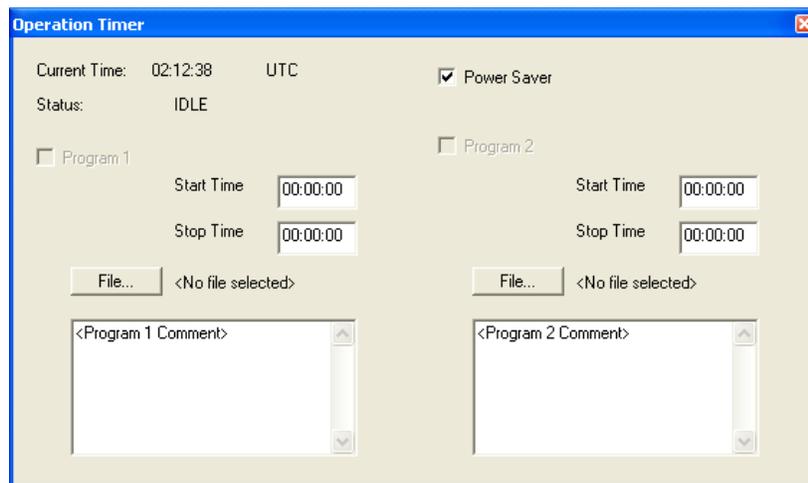


Figure 12: Operation Timer

### **3.7.2 : Current Time Indicator**

The current time indicator is at the top of the Operator Timer Window. It updates once per second to indicate the current time. The time will be displayed either as Local time or Universal Coordinated Time (UTC), depending on the current setting of SPECT'Rs Time Standard. For information on how to set the Time Standard see section 3.9.1.

### **3.7.3 : Status Indicator**

The status indicator displays the current status of the operation timer.

### **3.7.4 : Record Window Program Section**

The Operation Timer window includes two record window programming sections. Each section consists of start and stop times, a file selector, and a comment box. The start and stop times control the start and stop times of a recording session. These values are interpreted as either Local or UTC times, depending on the current Time Standard setting. The file selector button brings up a windows file selection tool that allows the operator to choose a file name that will be used for all files recorded during the time window specified. The program section also includes a comment box. The contents of the comment box will be written to all files recorded during the time window.

To program a record session, set the start and stop times, choose a file by clicking on the *File...* button, enter the file comment in the comment box. Once all this has been configured, click on the *Program* check box to activate the program.

### 3.8 : Remote File Transfer

As of version 3.3.1, SPECT'R III supports remote file transfer. The remote file transfer feature enables a remote collection system to automatically transfer snapshot recording back to a web-accessible computer or FTP site. This allows a collection station to be operated remotely without the need to send technicians into the field to collect data.

In order to support remote file transfer the computer system running SPECT'R III must be outfitted for internet access using a broadband access service or a cellular or satellite modem.

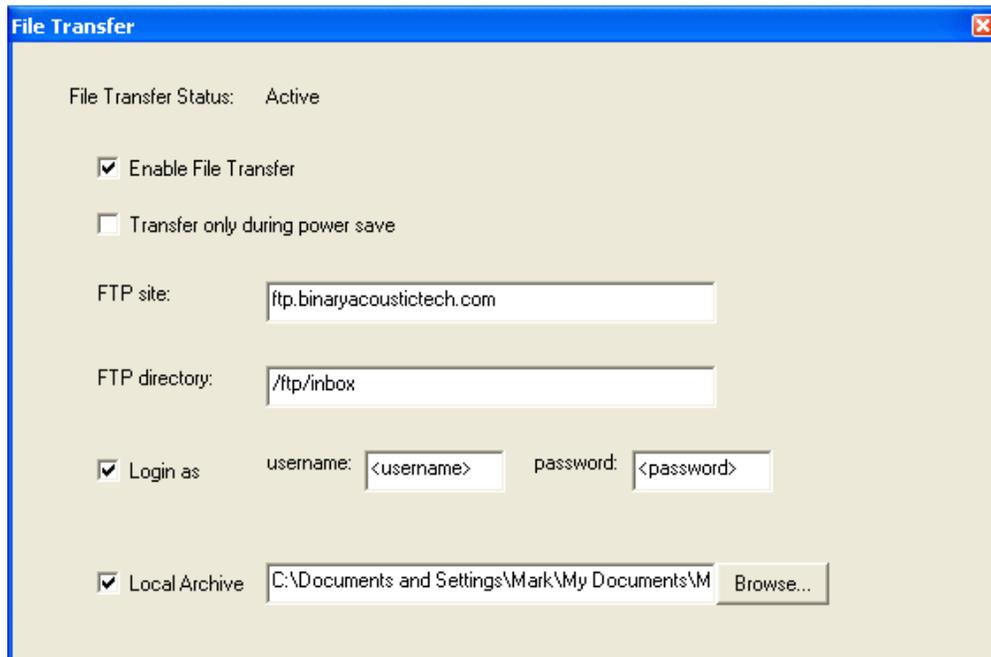


Figure 13: File Transfer window

### **3.8.1 : File Transfer Status Indicator**

The status indicator displays the current status of the file transfer engine. The status will be “InActive” while no SPECT’R III is idle. It will indicate “Active” while SPECT’R III is operating in any of the supported recording modes. It will also display the progress of all file transfer operations.

### **3.8.2 : Enabling File Transfer**

To enable file transfer operations simply click on the **Enable File Transfer** check box. When checked, file transfer operations are enabled.

### **3.8.3 : Limiting the transfer times**

When using slower computers it may become necessary to limit the file transfer times and only transfer files will SPECT’R III is idle and in power save mode. To limit the transfer time, click on the **Transfer only during power save** check box. When checked, SPECT’R III will only transfer file during power save. Note: when using this option be certain that the power save feature is also enabled in the operation timer.

### 3.8.4 : Configuring the file transfer location

In order to setup the file transfer location (the place to send the files), you must know the web site address of the computer to send the data to along with the directory in which the files will be stored. To configure SPECT'R III to send the files, enter the web site address in the **FTP site** edit box and enter the desired directory in the **FTP directory** edit box.

The web addresses are usually of the form ftp.<sitename>.com and the directory names follow the general UNIX standard path name specifications, for example “/<top directory>/<sub directory>.” If no directory is used, the **FTP directory** should be set as either a single period character (‘.’) or a single forward slash character (‘/’).

### 3.8.5 : Enabling Login Option

Most websites will require and username and password in order to accept file transfers. To enable operation with usernames and passwords click on the **Login as** option and enter the appropriate **username** and **password** in to there respective edit boxes.

### 3.8.6 : Local Archive Option

By default, SPECT'R III will delete (send to recycle bin) all files once they have been successfully transferred. If you wish to keep a local copy then click on the **Local Archive** check box and select an archive directory by clicking on the **Browse** button. *Note: the archive directory must be unique and can not duplicate any of the snapshot directories.*

### 3.8.7 : File Transfer Tips

- 1) It is highly recommended to use file compression when operating using remote file transfer. This significantly reduces the link bandwidth and transfer time requirements. If you are using SonoBat to analyze the file, you can always convert them back into wav files using a the WAVPACK unpack function.
- 2) When SPECT'R III deletes files, it actually sends them to the recycle bin. To avoid filling up the recycle bin it is recommended to configure the recycle bin to delete all files rather than saving them. To do this, right click on the recycle bin icon and choose **properties**. When the Recycle Bin Properties window appears, click on the Global tab and select the *Do no move file to the recycle bin. Remove file immediately when deleted option*. This will keep the disk from filling up the recycle bin during extended duration operation.
- 3) When setting up the site name, directory, username, and password, you can test it live by enabling snapshot recording and generating a few snapshots. If any of the settings are wrong the Status display will generate warnings. You can edit the values while SPECT'R III is running until the status indicates that files are being transferred properly

Important Note: the file transfer features only operates when the operation timer is active (either program 1 or program 2 is enabled) or when the main snapshot recorder is active. If the status indicator is "InActive", then neither of the above conditions is true.

## 3.9 : File Playback

### 3.9.1 : Enabling Playback

To enable the playback feature, select *File=>Playback...* and the playback window shown in figure 13 will appear. SPECTR only supports one input stream at a time. During playback any ultrasonic receiver that is connected will be ignored and only the playback function will be allowed to supply data. Once the playback control window is dismissed, the ultrasonic receiver will resume.

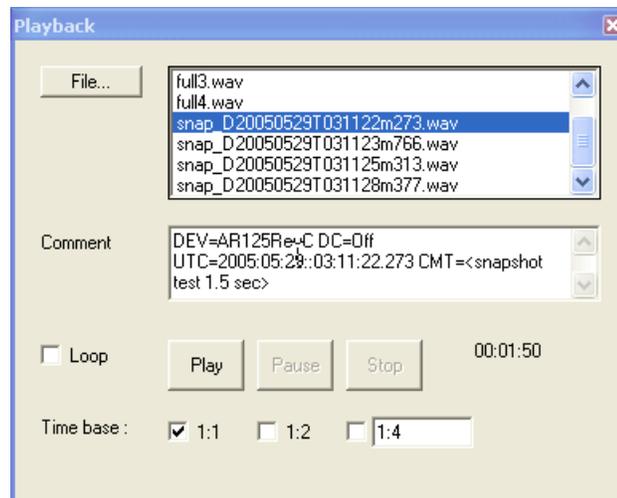


Figure 14: Playback window

### 3.9.2 : Exiting Playback

There are two ways to exit playback. The first is using the red 'X' button in the upper right corner of the playback control window. The other way is using the **Exit** button.

### 3.9.3 : Selecting File

To select the playback file. Select the *File...* button in the playback control window. This will bring up a file selection tool similar to figure 4. Select the file of interest and press *Open*.

### 3.9.4 : Loop Selection

The **Loop** selection allows the same file to be played backed in loop mode. When **Loop** is selected the file will be continuously played back. If it is not selected, playback will automatically stop at the end of the file.

### 3.9.5 : Play , Pause, and Stop Buttons

The **Play**, **Pause** and **Stop** buttons control the playback. **Play** starts the playback. **Pause** stops the playback in its current position allowing **Play** to resume from there. **Stop** stops the playback and resets it to the beginning of the file.

### 3.9.6 : Time Base Selection

One of the very powerful features of playback is its ability to perform variable rate playback. This is commonly referred to as “Time-Stretching”. The playback control window provides two preset time base selections and a third user defined selection. The two preset selections are 1:1 (normal speed) and 1:2 (half speed). The variable selection is defaulted to 1:4 (one fourth speed). While all the default selections are power-of-two ratios, the variable rate selection can support any ratio (with in reason!).

### **3.9.7 : Playback Comment Box**

If the playback file contains a comment attribute, the comment will be displayed immediately after the file is selected.

Editing this comment from the Playback feature has no effect and the comments in the Playback box are NOT automatically passed on to any files that are processed and recorded using playback. To pass comments on, the comment must be highlighted and copied from the Playback comment box and then pasted to the AutoSnap comment box.

## 3.10 : GPS Receiver Interface

### 3.10.1 : Enabling GPS Function

The GPS interface in SPECT'R III is fully automated. To enable it just plug in a compatible GPS receiver. The main requirement for GPS receivers is that they must support the Garmin PVT, type 800, protocol. To check if SPECT'R III recognizes the receiver click on Window=>GPS Status to bring up the status window shown below.

The GPS receiver that SPECT'R III is tested against at the factory is the **Garmin GPS18x USB**.

Starting from the top to the bottom, the status window displays *the receiver information string*, the *current location*, the *receiver status*, and *the GPS satellite numbers that are currently in view*.

When first plugged in it takes a minute or so to generate a location fix. SPECT'R III will ignore the receiver until it generates a valid GPS Fix.

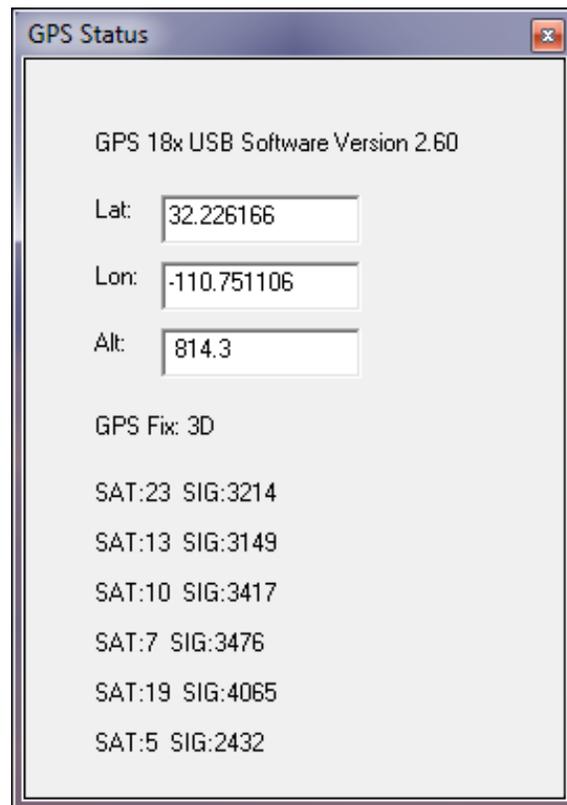


Figure 15: GPS Status window

## 4.0 : Basic Operations

### 4.0.1 : Selecting the Time Standard

As of version 2.1.8, SPECT'R allows the operator to select the time standard used to time stamp the snapshot files. SPECT'R supports either Local Time, the current time zone selection of the computer, or Universal Coordinated Time (UTC) which is effectively Greenwich mean time.

The time standard is selected using the *Setup=>Time Standard* menu on the main window. Bring up the menu and click on the desired setting.



Figure 16 : Device selection

### 4.0.2 : Selecting Input Device

SPECT'R can select between multiple input receivers. This feature allows a single laptop to operate multiple receivers at the same time. Each instance of SPECT'R handles a single receiver. Startup an additional copy of SPECT'R for each additional receiver.

The input device is selected using the *Setup=>Device* menu on the main window. Bring up the menu and click on the desired driver. The current mode setting is displayed as a checked menu option. The driver assignment for the actual receivers is based on the order that they were plugged in.



Figure 17 : Device selection

### 4.0.3: Selecting Recording Mode

The recording mode is selected using the *Setup=>Record* menu on the main window. Bring up the menu and click on the desired setting. The current mode setting is displayed as a checked menu option as described in section 3.6.1.

### 4.0.4: Selecting the Response Characteristic

SPECT'R provides two response options, **Natural** and **Digitally Compensated**. If Natural response is selected, no compensation will be performed. If Digitally Compensated is selected, then the compensator will be used to flatten out the response. To select an option, click the appropriate option in the *Setup => Response* menu as described in section 3.6.2.

### 4.0.5 : Audio Monitoring

Audio monitoring is performed using the SPECT'R heterodyne detector. To operate the audio monitor, select the desired tuning frequency by moving the cursor to the desired frequency in either the trace or raster displays and left click the mouse. The selected region will be highlighted on the trace and audio will start flowing.

Use the volume slider to adjust the audio output level to suit your preferences. If no sound is present or if the levels are not suitable you can adjust the computer system audio card by selecting *Start=>Control Panel=>Sound,Speech,and Audio Devices=>Adjust the System Volume*.

## 4.0.6 : Full Bandwidth Recording

Full bandwidth mode records the entire receiver bandwidth to disk. Full bandwidth recordings are ideal because they contain the full spectra and all the nuances of the original signals. They can either be played back at normal rates and re-processed to generate tuned audio cuts, or they can be played back at a reduced rate (so called time-stretching) for an entirely different auditory experience. With time stretching the signals are played back in slow motion and all the frequencies collapse down into the audio frequency range. This preserves the nuances and harmonic relationships of the original ultrasonic signal.

To select full bandwidth mode use the setup menu as shown in Figure 6. Select *Setup=>Record=>Full BW..* to choose Full bandwidth recording. This will bring up the Record Setup window and update the **Recode Mode indicator** in the main window control section. Next, you must specify a filename as described in section 3.5.3. After the filename is selected, the Record button will become active. Click on the Record button to start recording. Notice that the Record button deactivates, but at the same time the Stop button activates. When you are finished, click the Stop button and the recording will complete.

A full bandwidth recording can be stored as a time expanded file and can include comments. These features are controlled from the Record Setup window.

In practice it is best to keep the recordings to a manageable size. If a two or three digit number is added to the end of the filename, SPECT'R will automatically increment these digits each time a record is stopped. This mechanism provides the operator with an easy way to breakup the collection into a set of indexed files. The operator only needs to stop and then restart the recording periodically, every few minutes or so.

## 4.0.7 : Snapshot Recording

Snapshot mode also records the entire receiver bandwidth to disk, but it only records short duration snapshots and it only records when it detects activity. This is extremely useful when performing field surveys over an extended time period. The snapshot mode reduces disk space use and it reduces the effort required to go back and analyze the results. Like full bandwidth recordings, the Snapshot recordings can be played back and processed to generate short audio cuts, however, they are primarily intended for bat vocalization and identification analysis using an analysis package like SCAN'R or SonoBat.

To select snapshot mode use the setup menu as shown in Figure 6. Select *Setup=>Record=>Auto Snap...* This will bring up the Record Setup window and update the **Recode Mode indicator** in the control section. For now, leave the default settings but enter a comment into the comment box. Next, you must specify a filename as described in section 3.5.3. For AutoSnap it is recommended to employ a short filename, because AutoSnap will automatically append a date and time stamp to your file name. After the filename is selected, the Record button will become active. Click on the Record button to enable recording. Notice that the Record button deactivates, but at the same time the Stop button activates. This action only arms the recorder. Snapshots will be created only when activity is detected.

The Record Setup window includes a snapshot status indicator near the bottom. This can be used to monitor recorder activity. The statue indicator also displays the name of the most recently recorded file and can be used to monitor snapshot activity.

To stop recording, click the Stop button and the recording will complete.

## 4.0.8 : Running SonoSCOPE

SonoSCOPE is a sonographic analyzer that is optimized for live processing and bat identification. It uses a synchronized triggering mechanism that maintains visual alignment on the display, allowing the operator to see events that actually occur faster than a blink of the eye.

Bring up the SonoSCOPE control window using the main menu bar, select *Window=>SonoSCOPE...* Next, adjust the trigger level by first sliding the threshold to the left until SonoSCOPE begins triggering and then sliding it just slightly right to slow down the triggering to a few per second. Next, set the number of divisions across the screen using the division slider and then set the level of detail using the detail slider. Note: the combination of divisions and detail controls the time span displayed each time SonoSCOPE triggers.. Finally, use the brightness and contrast controls to set the display mapping to your preference.

To make measurements using the SonoSCOPE display, first click on the PAUSE button to stop all updates. Then place the cursor over any point in the sonogram and the readouts will display the three dimensional position pointed to by the cursor. To make differential measurements, click the mouse on the desired reference position. This will be the reference point for all differential measurements.

The current tuning selection and tuning range are illustrated by the green highlight and vertical blue line at the very right of the sonogram display. The vertical blue line indicates the current frequency selection and the green highlight indicates the frequency band that is currently being translated.

To tune the heterodyne receiver., use the mouse or a Table stylus to drag the highlighted region to the desired frequency band.

## 4.0.10 : Playback

The Playback function supports both full bandwidth and audio bandwidth recordings. In fact, it will support any 16-bit mono .wav formatted file. Stereo files are not supported and will not playback correctly. Recordings can either be played back at normal rates or they can be played back at variables rates (time-stretching or time-compressing). For best time-stretching results, it is best to use full bandwidth recordings. This is because time-stretching causes higher frequencies, including ultrasonic frequencies, to collapse down into the audio frequency range. Time-stretching is less useful for audio recordings, but you can still have fun experimenting with it.

To select playback mode use the file menu. Select *File=>Playback...* and the playback control window will appear. Select a file to playback by pressing the **File...** button and using the Windows file selection tool to select a file. Choose the playback time base and press the **Play** button to start playback.

While playback is running, the selected file will be imported into the main SPECTR application. The main application will function as if the file were the input of the ultrasonic receiver allowing audio monitoring, audio recording and spectral analysis.

## 4.0.11 : Operation Timer

The Operation Timer supports all recording modes. Be certain to select the appropriate record mode (section 3.9.3) prior to enabling the operation timer.

Programming an operation requires three steps:

First, enter the desired start and stop times. All times are specified in the HH:MM:SS format. SPECT'R interprets these as either Local cpu time or UTC time depending on the *Time Standard* setting (section 3.9.1).

Second, select a desired base file name and directory by clicking on the *File* button. This will bring up a standard file selection window. The file names follow SPECT'R standard file naming conventions.

Third, enter a comment that will be used with all files recorded during the program.

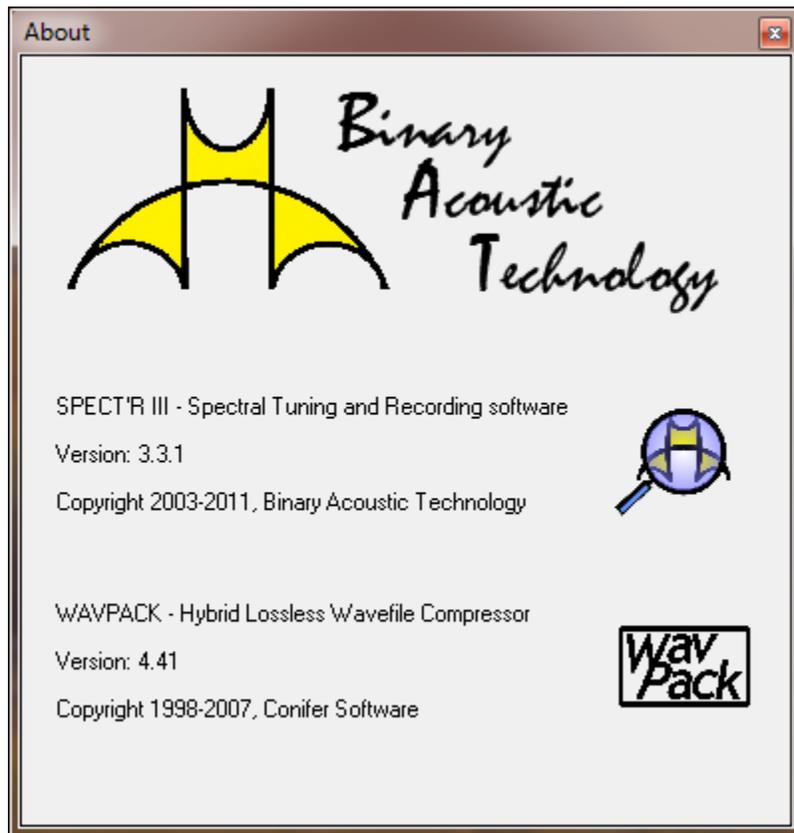
Once all three of the steps above are completed, you can activate the program by clicking on the *Program* check box.

Note: the operation timer include a *Power Saver* mode. When power saver mode is enabled SPECT'R disables it's processing flow which will save battery power, especially if your laptop uses some of the new mobile CPU's with speed step or other low power use mode.

## 5.0 : Further Information

For further information or trouble shooting, please contact us or visit our web site.

Web: [www.binaryacoustictech.com](http://www.binaryacoustictech.com)  
E-Mail : [info@binaryacoustictech.com](mailto:info@binaryacoustictech.com)



For more information on SonoBat, visit [www.sonobat.com](http://www.sonobat.com).  
For more information on WAVPACK, visit [www.wavpack.com](http://www.wavpack.com)