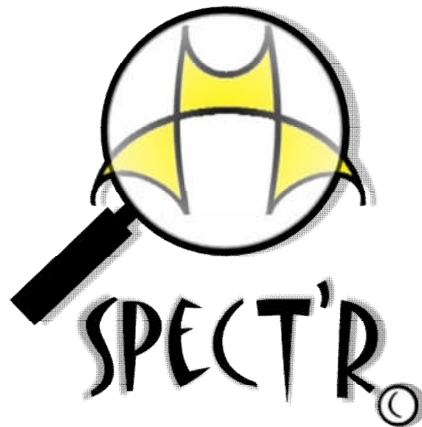# SPECT'R

Spectral Analysis, digital Tuning and Recording Software

Version 3.0
Product description and features

How to contact us

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1.0 Product Description

The SPECT'R software performs spectral analysis, digital tuning, and hard-disk recording. It is designed for field collection and it is capable of operating up to four ultrasonic receivers from a single laptop. SPECT'R can also be used as standalone playback processor to playback and reprocess or analyze recorded data.

SPECT'R features a two versatile spectrum analyzers. Both analyzers operate over the full receiver bandwidth and are designed to allow the operator to quickly visualize the surrounding acoustic environment. They are mouse operated, and allow the operator to perform frequency, time, and signal pressure level measurements.

Figure 1 below shows the main window which includes a control panel along with the SonoScope spectrum analyzer display.
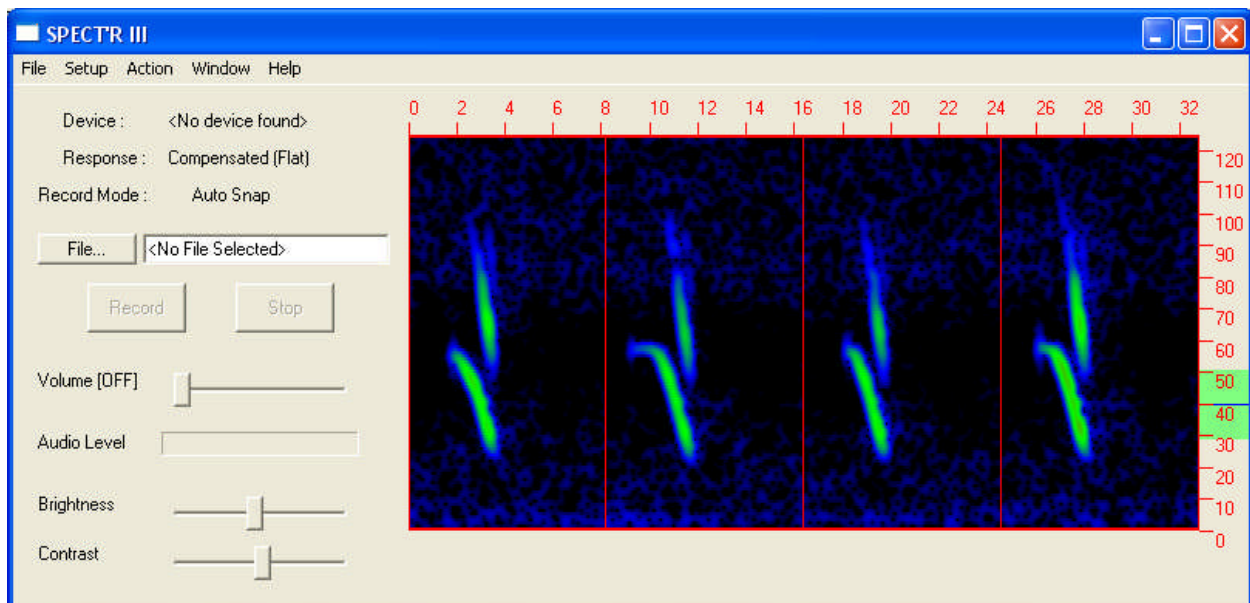

Figure 1: SPECT'R III Main Window (Hoary bat)

SPECT'R also features a high performance digital tuner that translates high frequency ultrasonic signals down to the human audio range. The tuner uses true heterodyning and advanced Digital Signal Processing (DSP) to produce a high quality audio signal which can be piped through a windows compatible sound port, for live monitoring, and simultaneously recorded for future playback.

Two recording modes are supported, full-bandwidth and snapshot. The full-bandwidth recording mode employs continuous recording. The input from the AR125 or other ultrasonic receiver is written directly to the hard disk. This allows an operator to record highly dynamic events such as roost emergences without the risk of missing anything. The snapshot recording mode, AutoSnap is an automated, non-attended record mode. AutoSnap employs an energy detector to trigger short duration snapshot recordings. These snapshots are recorded only when bat vocalizations are detected.

All recordings are stored using industry standard 16-bit .wav file format. The files are compatible with the SonoBat$_{tm}$ (www.sonobat.com) analysis software.

Finally, SPECT'R includes a variable-rate playback feature, supporting all recording modes. The playback rate is operator selectable which allows a operator to employ a combination of time-stretching and digital heterodyning to obtain an optimum translation of ultrasonic acoustics into the audio range.
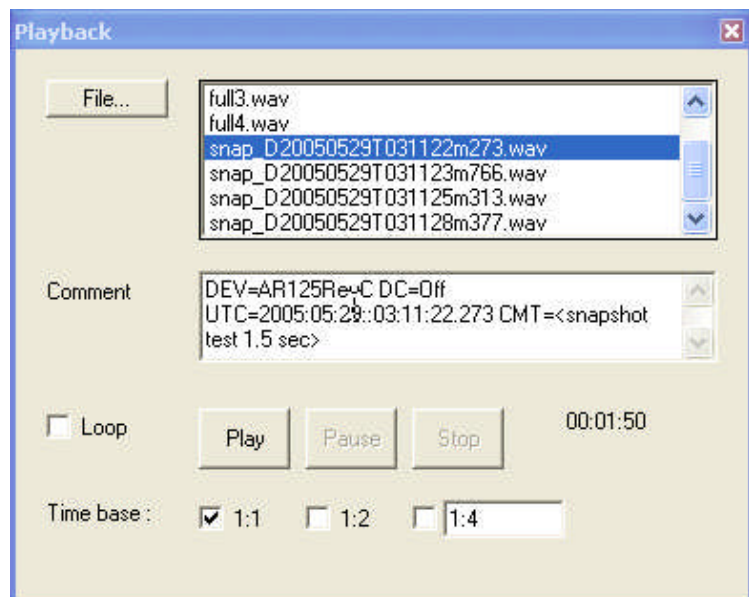
2.0 SPECT'R III Features and Enhancements

2.1 Improved Design

The SPECT'R 3.0 software package is a major revision to earlier versions. It includes many new features and enhancements that were requested by SPECT'R users, field technicians and researchers.

2.2 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. Below is a screen capture of the SonoSCOPE window. The window includes a dedicated control panel along with the sonographic display
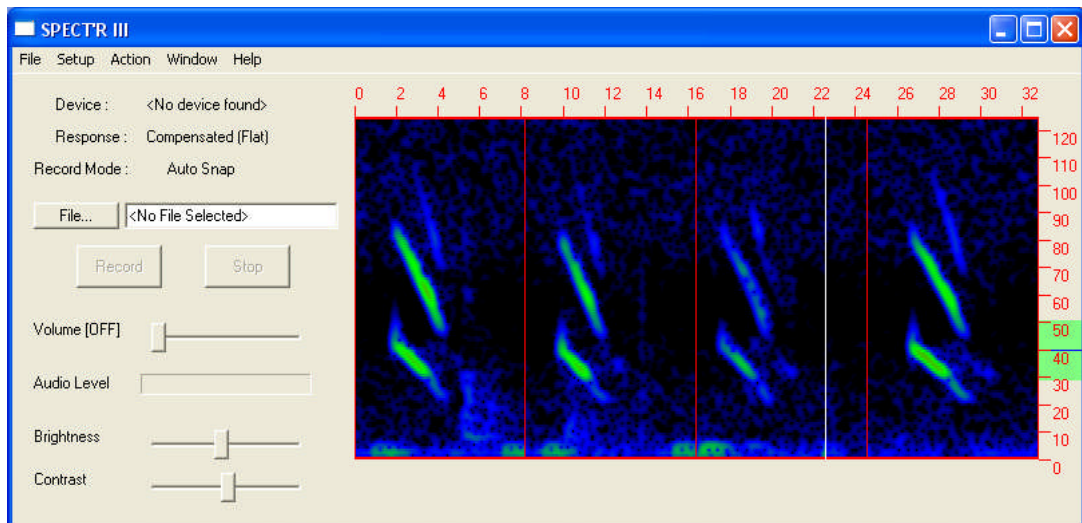

Figure 3: SonoSCOPE Display (Townsends big-eared bat)

2.3 Automated Snapshot Generator

The automated snapshot generator, AutoSnap, is automated, non-attended, recording mode that saves disk space by recording only short duration snapshots when triggered by actual bat vocalizations. It includes two methods to set the triggering threshold, manual and automatic. It also allows the operator to select one of six snapshot durations between one-ten and five seconds.

To enhance operation and reduce the number of falsely triggered recordings do to extraneous sounds (like birds, frogs, and insects), AutoSnap includes a sound pressure level trigger, a frequency range selection filter, and a pop filter. This allows the operator to select both the desired sound pressure level and the frequency range of vocalizations that can trigger a snapshot recording.

SPECT'R III introduces two more enhancements. First, it includes higher performance detection and filtering algorithms to improve detection range and reduce the number of false detections. Second, SPECT'R III includes the WAVPACK loss-less file compressor to reduce the snapshot recording size and increase the allowable time span of unattended recording. In typical operation, WAVPACK is able to reduce the file sizes by a factor of three ,without any degradation of fidelity or recording quality.
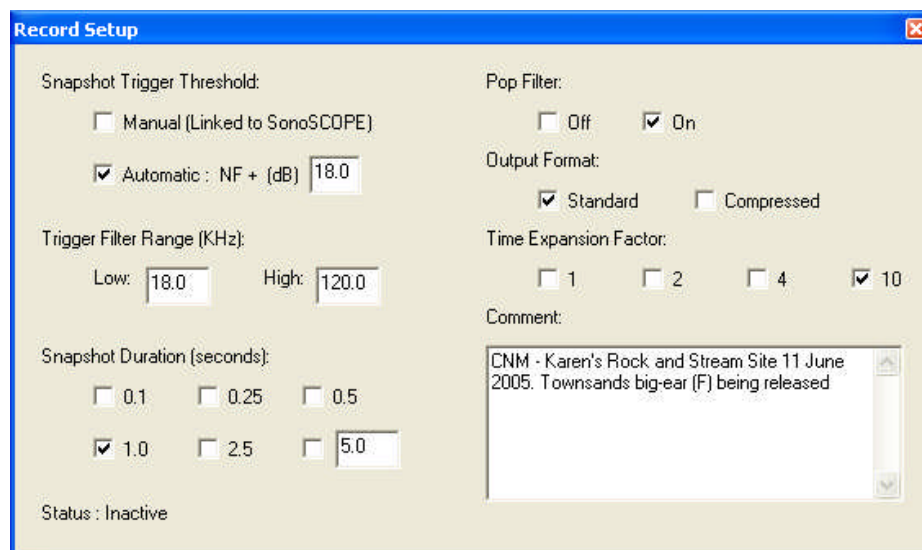
2.4 Operation Timer

The operation timer is a new feature which enhances unattended operation by allowing the operator to specify up to two snapshot recording periods per day. For each recording period the operator selects the start and stop times; selects the base file name and directory that the snapshots will be written to; and optionally specifies the comment that will be included in each file during that period.

Once the operation timer has been setup, SPECT'R will monitor the current time and activate itself at the appropriate times. If requested SPECT'R will deactivate portions of its operation during idle times to reduce power consumption and increase battery life.
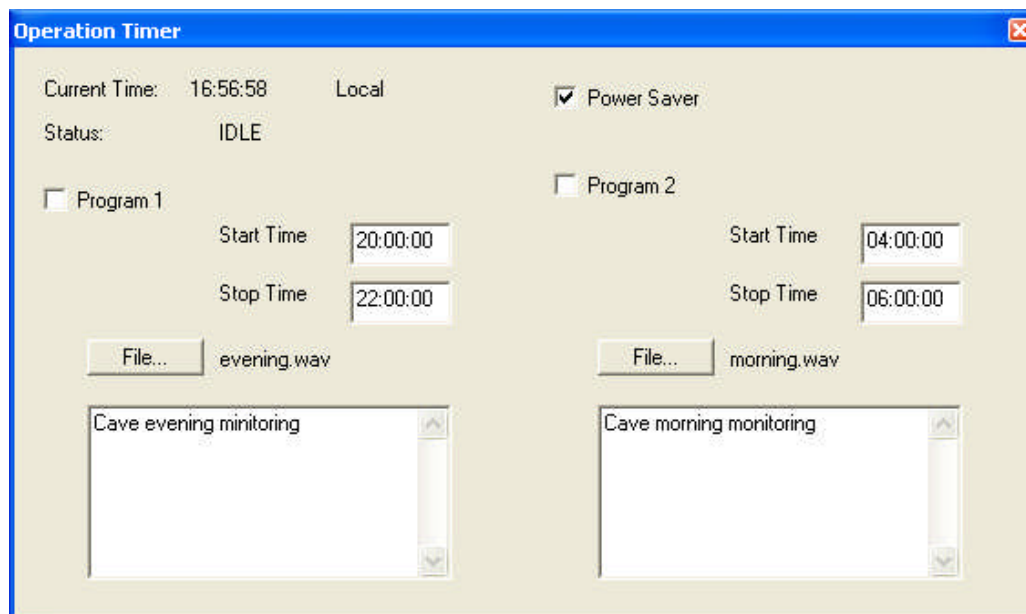
2.5 Digital Compensation Filter

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.

As of version 2.1.4, SPECT'R incorporates a digital compensator. This 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 (www.sonobat.com) 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 below.
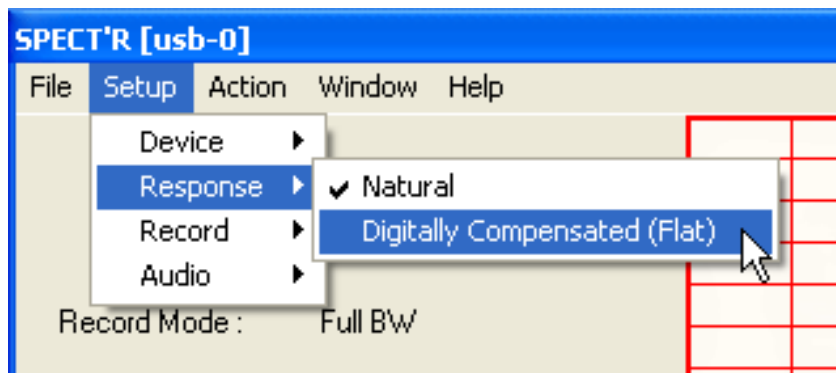
2.6 Multiple Receiver Capability

SPECT'R Version 2.0 now supports multiple receivers. This feature is designed to allow the operator to perform multiple sensor surveys. One laptop can operate up to four receivers allowing the operator to use multiple sensors and cover a wider area .

2.7 SonoBat File Compatibility

As of version 2.0, AutoSnap generates SonoBat compatible files. All SonoBat attributes including a comment field are supported and stored directly into the snapshot files as they are recorded. The files may be post processed by SonoBat without having to setup the importer correctly, which saves time and confusion.

For more information on SonoBat, please visit www.sonobat.com.

3.0 Minimum System Requirements

1.0GHz Pentium M processor equivalent or higher
256Mbytes RAM
Windows 98SE/ME/2000/XP
Windows compatible sound port
One (1) USB 2.0 compatible port per receiver

About

Binary Acoustic Technology

SPECT'R III - Spectral Tuning and Recording software

Version: 3.0.0

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WAVPACK - Hybrid Lossless Wavefile Compressor

Version: 4.41

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