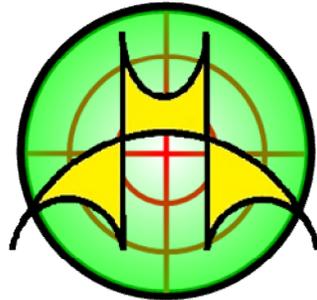


GTools

Generator Tools Software Suite

Version 1.7

Software Manual



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How to contact us

Binary Acoustic Technology is a web-based business.

Web: www.binaryacoustictech.com
E-Mail : info@binaryacoustictech.com

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Chapter 1 : Installation

1.1 : What you should have received

The GTools package includes one GTools CD-ROM and this manual. The CD-ROM contains the GTools 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 GTools before installing new versions.

Chapter 2 : Installing Device Drivers

2.1 : Plug and Play Installation

All Binary Acoustic Technologies Acoustic and Ultrasonic Transmitter products are shipped with a device driver CD-ROM. Please retain this 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.

Important note: the Windows plug and play driver is configuration dependent. In other words, if you change the configuration by adding USB hubs or extender cables. The system will ask you to reload the driver. This only needs to happen once for each new configuration. In some machines, connecting to a different USB port is considered as a new configuration and will require a driver reinstallation.

Driver setup tip: To avoid having to carry the driver disk around, it is recommended that you setup and test all of the possible configurations when you are performing your initial installation. In other words, start with just the receiver and connect the receiver up to all of the USB 2.0 ports on the computer, one at a time.

2.2 : Using USB Extension Cables

USB extender cables can be used to increase the total 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.

Driver setup tip: To avoid having to carry the driver disk around, it is recommended that you setup and test all of the possible configurations when you are performing your initial installation. This includes the extender cables and extender cables with a transmitter connected.

2.3 : Device naming convention

The device naming convention is based on the order that the devices are plugged into the computer. The first device attached will be named USB0. The second device detected will be USB1. The third will be USB2 and the fourth will be USB3.

Chapter 3 : Generator Tools

3.1 : Overview

The generator tools software suite consists of two different software tools, PLAY'R and JAMM'R. Both of these tools are designed to operate any of Binary Acoustic Technologies ultrasonic transmitter products.

PLAY'R is a file playback tool. It allows full bandwidth recordings to be played back in the original ultrasonic frequency range. It is primarily intended to be used in bio-acoustic applications such as bat calling and acoustic environment simulation. PLAY'R also includes a test tone generator that is useful to test ultrasonic monitoring equipment and bat detectors.

JAMM'R is an acoustic masking application. JAMM'R generates broadband acoustic noise in an attempt to “jam” the bats ultrasonic frequency range. It is primarily intended to be used in bio-acoustic applications that intend to deny bat echolocation capability.

Chapter 4 : Running PLAY'R

4.1 : Running from desktop

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

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

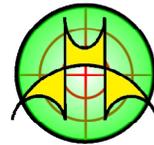


Figure 1: PLAY'R Icon

4.2 : Running from Start Menu

SPECT'R can also be run from the *Start* menu. You can run it by selecting *Start => All Programs => GeneratorTools => PLAYR.*

4.3 : 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.

4.4 : The PLAY'R Main Window

Upon startup the main window appears. The main window has four basic sections. The **file selection and playback section** (top) allow the user to select a file and start and stop playback. The **volume control section** (middle) includes a volume control slider along with an audio level indicator. Finally, The **tone generator section** (bottom) contains a tone enable button, a tone frequency control slider, and a sweep enable button.

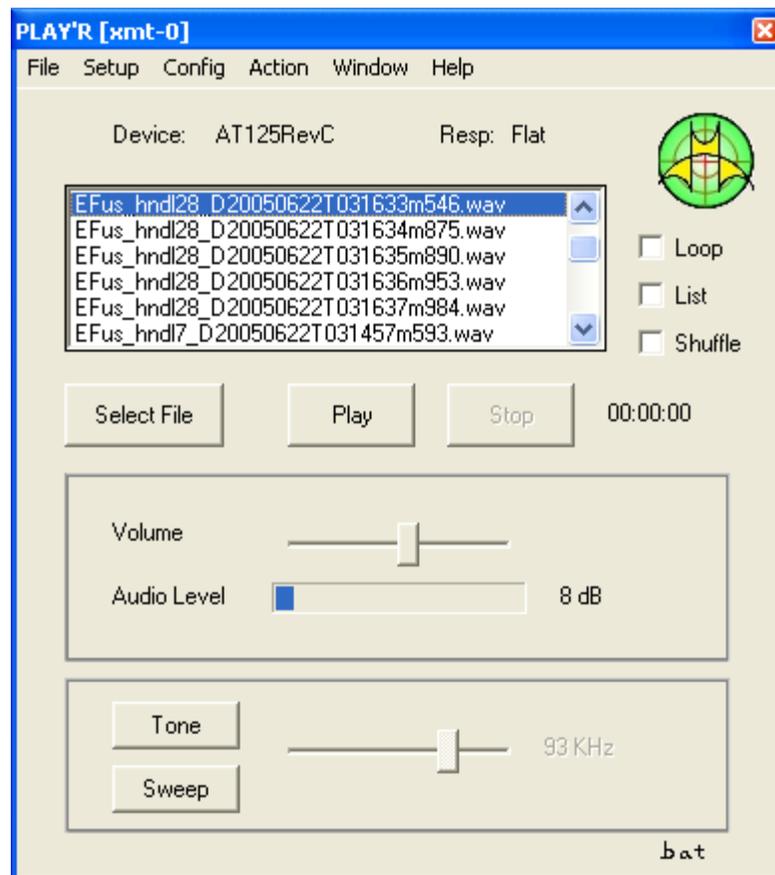


Figure 2: PLAY'R Main Window

Note that PLAY'R is dependent on having the transmitter present to operate.

4.4.1 : File Selection

PLAY'R is capable of working with an entire directory of snapshots and WAV files at one time. The file selection mechanism allows the operator to select a directory and a list of files to work with.

To select a file, click on the *Select File...* button. This will bring up a standard windows file selection tool as shown in Figure 3. Use the file selection tool to navigate through the file directory structure and select a file of interest. Click on the file of interest and then click on the *Open* button. PLAY'R will then update the file list with all the files in that directory.

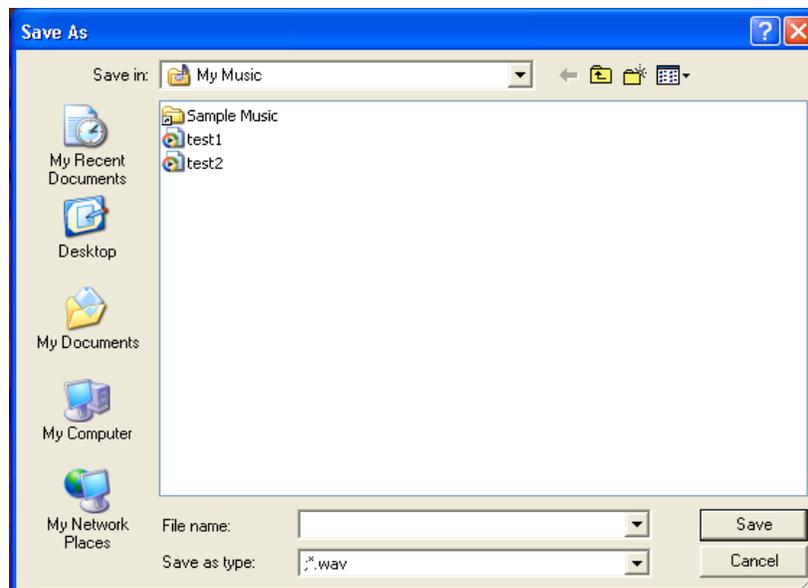


Figure 3: File selection tool

4.4.2 : File List Operation

PLAY'R is capable of performing playback using multiple files. The operation is somewhat analogous to the operation of a CD player or jukebox, but it works with files stored in a computer directory rather than CDs.

After selecting a file to playback (see section 4.4.3), PLAY'R notes the directory and updates the file list with a listing of all the files in the selected directory. It then highlights the name of the file selected in the list to note the file that is currently selected as illustrated in figure 4.

The file list is operated by the mouse. To select a new file, use the left mouse button to click on a new file name. Once clicked, the new file will be highlighted and will become the currently selected file. Double clicking on a file name will select it and start playback at the same time.

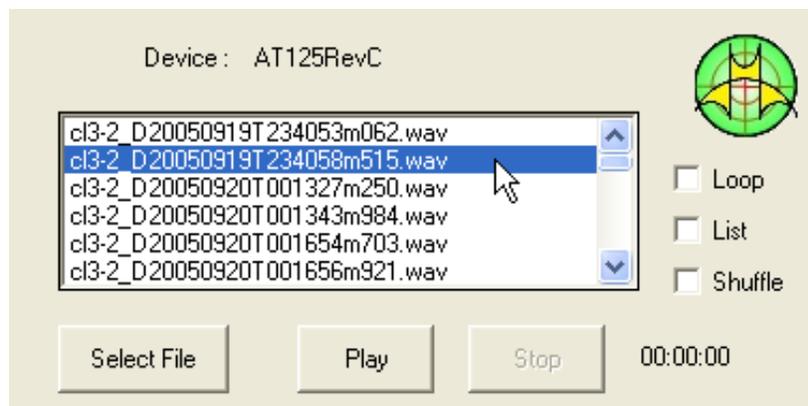


Figure 4: File list

4.4.3 : Playback Configuration Settings

PLAY'R supports several different playback modes which range from playing back a single file to playing back a list of files in random order. The default mode is single file playback. However, PLAY'R control panel includes several select buttons to change the behavior as described below.

4.4.3.1 : Loop back Selector

The loop back selector is used to configure playback to operate in loop back mode. When loop back is selected, a single file will be looped back and repeated continuously.

4.4.3.2 : List Playback Selector

The list playback selector is used to configure playback to operate in list playback mode. When list playback is selected, PLAY'R will sequentially playback every file in the list. When the end of the list is reached, it will reset the list and start over again from the beginning.

4.4.3.3 : Shuffle Playback Selector

The shuffle playback selector is used to configure playback to operate in random playback mode. When shuffle playback is selected, PLAY'R will playback files from the list in random order. Like Loop back and List, it operates continuously and will not stop until the *Stop* button is pressed.

4.4.4 : Play and Stop buttons

The **Play** and **Stop** buttons control the playback process. The buttons become active only when they are ready to be used. For example when PLAY'R is first activated both the play and stop buttons are inactive (“grayed out”). The first to be activated is the play button. It will only be activated when both a file name is selected and a transmitter device has been detected. The stop button only becomes active while PLAY'R is in playback.

4.4.5 : Volume Control Slider

The volume control slider controls the volume of the transmit audio level. The minimum level is when the slider all the way to the left and the maximum level is when the slider is all the way to the right.

4.4.6 : 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.

4.4.7 : Tone Generator Button

The **Tone** button starts the tone generation process. It becomes active only when it is ready to be used. For example when PLAY'R is first activated the play, stop, and tone buttons are inactive (“grayed out”). The tone button will only be activated when a transmitter device has been detected and PLAY'R is not actively playing a file.

4.4.8 : Tone Control Slider

The tone control slider controls the frequency of the tone generator output. The minimum frequency is when the slider all the way to the left and the maximum frequency is when the slider is all the way to the right.

4.4.9 : Tone Frequency Indicator

The tone frequency indicator is just to the right of the tone control slider. The indicator displays the current frequency selected by the slider. The indicator will change as the tone control slider is moved.

4.4.8 : Sweep Generator Button

The **Sweep** button starts the sweep generation process. Like the tone button, the sweep button becomes active only when it is ready to be used. The sweep generator generates a sweeping tone that covers the entire frequency range of the ultrasonic transmitter. The sweep generator is useful for testing bat detectors and other ultrasonic receiving devices.

4.4 : The Operation Timer Window

The operation timer window is new as of version 1.6. This window provides operations that are timed and sequenced to the computer clock. Currently, PLAY'R supports one timed operation program, a pulsed tone option. To bring up the operation timer select the *Window=>Operation Timer* menu at the top of the main window. The operation timer window will appear as illustrated in Figure 5.

Two status displays are at the top of the window, the **current time indicator** and the **status indicator**. Below these are the program control selectors which include: the **program select box**, the **start and stop time controls**, the **on and off period controls** and the **tone frequency control**.

The **start and stop time controls** specify the time of day that the program will run. In addition, the start time synchronizes the operation to the computer clock. The **on and off period controls** specify the on time and the off time of the pulsed tone. The on period is generated first, followed by the off period. The period can be specified down to a millisecond. The **tone frequency control** specifies the pulsed tone frequency. It can be specified down to a Hertz. Once the desired settings have been entered, click on the **program select box** and the pulse toned program will become active.

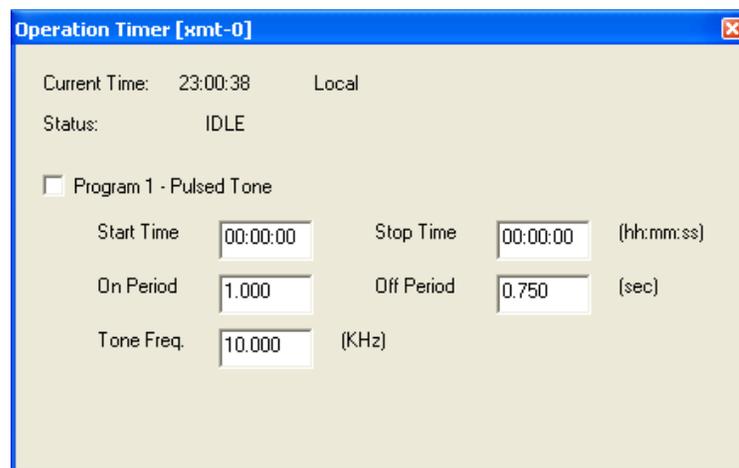


Figure 5: Operation Timer Window

4.5 : The PLAY'R Menu Options

4.5.1 : Device Selection

PLAY'R can operate one of up to four transmitters. This feature allows a single laptop to operate multiple transmitter at the same time. Each instance of PLAY'R handles only a single receiver. Startup an additional copy of PLAY'R for each additional transmitter.

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 logical driver assignment for each transmitter is based on the order that they were originally plugged in.

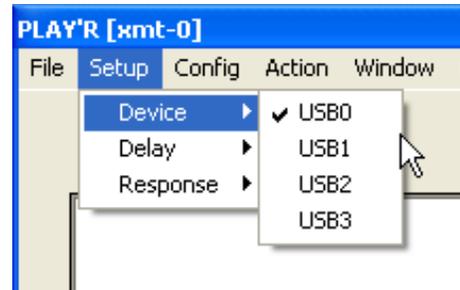


Figure 6 : Device selection

4.5.2 : Device Indicator

The device indicator displays the type of transmitter device that is connected to the selected USB port. If not device is detected, the device indicator will display “No device detected”, indicating that a transmitter has not been found. The display indicator is dynamic and will change as transmitters are connected or removed. It will also change as the device selection is modified.

4.5.3 : Delay Selection

PLAY'R can insert up to a four second delay between files. The delay is useful for creating non-continuous or sporadic transmissions that are useful in bio-acoustic field or lab studies.

The file delay is selected using the *Setup=>Delay* menu on the main window. Bring up the menu and click on the desired delay. The current setting is displayed as a checked menu option.

The delay setting is applied each time a new file is selected, either manually or using one of the automated modes. The is inserted prior to the actual file start. During the delay, PLAY'R is programmed to generate low level acoustic noise. This is an important feature which provides acoustic continuity and a smooth transition between files.

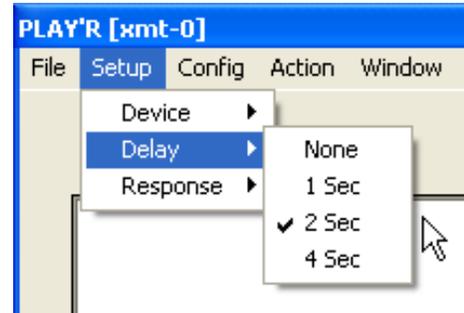


Figure 7: Delay selection

4.5.4 : Response Selection

PLAY'R includes a digital compensation filter that is calibrated to flatten out the response of BAT's ultrasonic transmitter products. The response selector gives the operator a choice of enabling or disabling the filter. If *Natural* response is chosen, the transmitter will operate normally. If *Digitally Compensated* is chosen, the filter will be applied to flatten out the transmitter response.

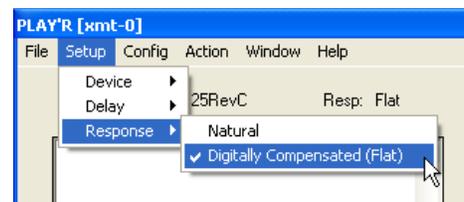


Figure 8: Response selection

4.5.5 : Configure Default Time Expansion

In order to play back files in their original frequency band, PLAY'R needs to know the time expansion factor that was used to generate the recordings. This is normally performed automatically, as long as the recordings were generated by SPECT'R, SonoBat, or BatSound. However, when playing back generic *.wav files or files recorded by other systems, the operator must select a default time expansion factor.

The default time expansion factor is selected using the *Config=>Default=>Time Expansion* menu on the main window and then choosing between the options. PLAY'R currently supports three of the most common expansion factors, 1x, 10x, and 16x.

The default time expansion is applied only when PLAY'R is not able to determine the time expansion setting by reading the file. In most cases, this will only be when PLAY'R is attempting to playback a generic *.wav file.

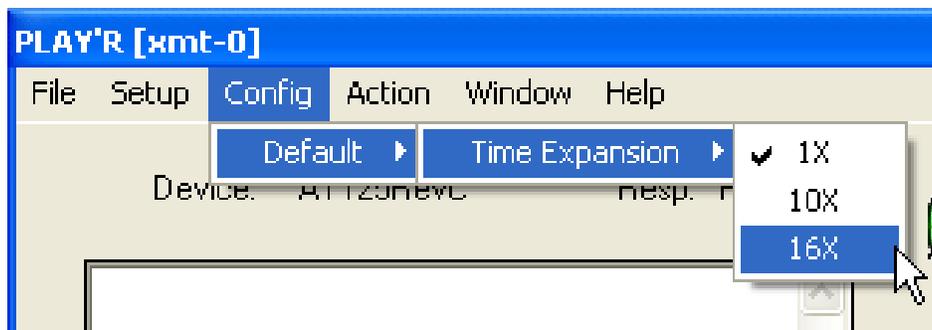


Figure 9: Selecting default time expansion

4.6 : PLAY'R Run Through

To startup PLAY'R double click on the green PLAY'R icon. This will bring up the main window. Next, connect the transmitter to one of the configured USB ports. If the computer asks for a device driver please insert the driver disk to load the device driver (this only needs to be performed once). Once the transmitter is recognized, the device indicator will display the transmitter type.

Next, generate a test tone. Click on the Tone button to start the tone generator and use the tone frequency slider to set the frequency to an audible frequency such as 3 KHz. Then use the volume slider to increase the volume to a desired level. At this point, the transmitter should be emitting an audible 3 KHz tone. To change the frequency simply move the frequency slider to the desired value. To turn off the tone generator, press the Stop button.

Finally, lets playback a file. Your software package should contain an Example Recordings CD that can be used to test the playback feature. Place this CD in the CD drive. Click on the File button to bring up the file selection tool. Navigate to the Example Recordings CD and pick out one of the files. Once the file has been selected the file name will appear highlighted in the file list window and the Play button will become active. (Note: must stop the tone generator before beginning a playback) Press the play button to start playback and then use the Volume slider to control the volume. Adjust the volume until the audio level indicator is at about half of its full range. To stop playback press the stop button.

WARNING: BAT's ultrasonic transmitters use a transducer that has low efficiency in the audible frequency range. Even though these transmitters appear to be operating at low volume levels, they are actually transmitting high level ultrasonic signals (up to 110dB SPL). Do not put the transmitter near your ears. Prolonged exposure to high-level ultrasonic emissions may cause permanent damage or hearing loss.

Chapter 5 : Running JAMM'R

5.1 : Running from desktop

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

You can start JAMM'R from the desktop by double clicking on the JAMM'R icon illustrated by Figure 10.



Figure 10: JAMM'R

5.2 : Running from Start Menu

SPECT'R can also be run from the *Start* menu. You can run it by selecting *Start => All Programs => Generator Tools => JAMMR.*

5.3 : 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.

5.4 : The JAMM'R Main Window

Upon startup the main window appears. The main window has four basic sections. The **method selection and play section** (top) allow the user to select a method and start and stop the transmission. The **volume control section** (middle) includes a volume control slider along with an audio level indicator. Finally, The **band enable section** (bottom) contains a sequence of band enable buttons along with a duration control slider.

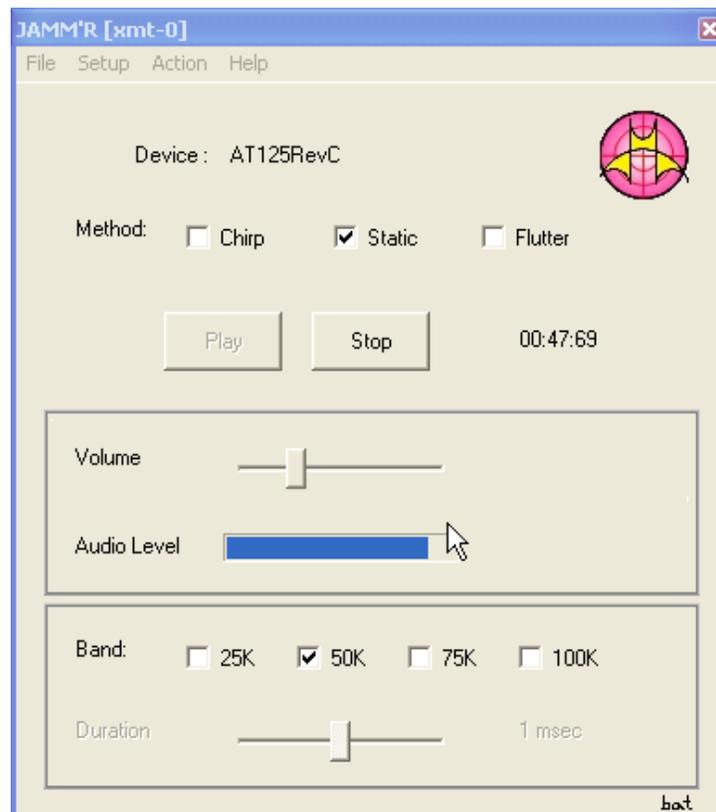


Figure 11: JAMM'R Main Window

Note that JAMM'R is dependent on having the transmitter present to operate.

5.4.1 : Device Selection

JAMM'R can operate one of up to four transmitters. This feature allows a single laptop to operate multiple transmitters at the same time. Each instance of JAMM'R handles only a single receiver. Start up an additional copy of JAMM'R for each additional transmitter.

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 logical driver assignment for each transmitter is based on the order that they were originally plugged in.



Figure 12: Device selection

5.4.2 : Device Indicator

The device indicator displays either the transmitter model that is currently connected to the selected device. Otherwise it will display “No device detected”, indicating that a transmitter has not been detected. The display indicator is dynamic and will change as devices are added or removed. It will also change as the device selection is modified.

5.4.3 : The Method Selector

The JAMM'R software is programmed with three different ultrasonic masking methods; **chirp**, **static** and **flutter**. The method selector buttons allow the operator to select between them. The methods can be changed at any time, even when JAMM'R is emitting. Below is a brief description of each method.

The **static** method is the easiest to understand. Static generates broadband ultrasonic noise. It is equivalent to the audio static generated by a TV tuned to a wrong channel, but much wider bandwidth. The static method generates continuous non-fluctuating noise that will mask out or reduce a bats ability to hear the reflections from it's echolocations.

The **flutter** method is a variation of the static method. Flutter generates a random ON/OFF time modulated broadband noise source. The motivation behind the flutter method is to increase the dynamics of the masking signal such that it is more easily detectable by the bats. The ON/OFF modulation rate is controlled by the **duration slider**.

Finally, the **chirp** method does not employ noise. Instead, it creates a fast random signal that changes frequency constantly. Rather than spread the transmitted energy over a wide frequency range, the chirp method concentrates all of the transmit energy at specific frequencies. The chirp modulation rate (the rate that the generator switches frequencies) is also controlled by the **duration slider**.

5.4.4 : Play and Stop buttons

The **Play** and **Stop** buttons control the playback process. The buttons become active only when they are ready to be used. For example when PLAY'R is first activated both the play and stop buttons are inactive (“grayed out”). The first to be activated is the play button. It will only be activated when both a file name is selected and a transmitter device has been detected. The stop button only becomes active while PLAY'R is in playback.

5.4.5 : Volume Control Slider

The volume control slider controls the volume of the transmit audio level. The minimum level is when the slider all the way to the left and the maximum level is when the slider is all the way to the right.

5.4.6 : 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.

Special note: The maximum audio setting for linear response is at the 80% level. Above this, the transmitter will begin to generate harmonics. This is intentional, harmonics can be potentially useful in jamming.

5.4.7 : The Band Enable Selectors

The band enable selectors allow the operator to chose independent frequency ranges to mask out or jam. Each band is 25 KHz wide and centered at the frequency specified by the selector. Specifically, the 25 KHz selector controls the frequency band between 12.5KHz to 37.5KHz. The 50 KHz selector controls the band between 37.5 KHz to 62.5KHz. The 75 KHz selector controls the band between 62.5 KHz and 87.5 KHz. Finally, the 100KHz selector controls the frequency band from 87.5 KHz to 112.5KHz.

Enabling a selector enables transmission of a masking or jamming signal for that specific frequency range. There are no restrictions as to the number or sequence of band selections that can be made.

Special note: the effectiveness of each band is dependent on the properties of the transmission hardware that is employed. For example, the AT100 operated most efficiently (highest transmit power) in the 50KHz band and has good response in both the 25 and 75 KHz bands. The 100 KHz band can be used, but is the least efficient.

5.4.8 : The Duration Control Slider

The **duration control slider** controls the modulation rate for both the **flutter** and **chirp** jamming methods. The modulation rate increases as the slider is moved to the left and decreases as the slider is moved to the right. Note that as the slider is moved to the left (higher modulation rates), both the flutter and chirp signals become more and more like broadband noise.

5.5 : JAMM'R Run Through

Below is a quick run through of JAMM'R software operation.

To startup JAMM'R double click on the red JAMM'R icon. This will bring up the main window. Next, connect the transmitter to one of the configured USB ports. If the computer asks for a device driver please insert the driver disk to load the device driver (this only needs to be performed once). Once the transmitter is recognized, the device indicator will display the transmitter type.

Next, select a method, for this example chose **chirp**. Click on the Play button to start the transmission. Use the volume slider to set the audio level to between 80 and 90%. Finally, move the duration slider all the way right to select the lowest modulation rate. If you have set everything correctly, then you will be able to hear an audible chirp jamming signal.

Next, try selecting different frequency bands. JAMM'R initially enables the 25, 50, and 75 KHz bands. First, disable the 25KHz band. This will reduce the signal level that you can hear. Next, disable the 75 KHz band.

Finally, chose and alternate jamming method. For this example chose the static method and enable the 25 KHz band so you can hear it.

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6.0 : Further Information

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

Web: www.binaryacoustictech.com
E-Mail : info@binaryacoustictech.com

