Building Acoustic Source

Model BAS002 Power Amplifier & Speakers

Manual

Larson Davis

Building Acoustic Source

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Information Record

Model	Purchase Date	S/N
BAS002 Power Amplifier		
BAS001 Dodecahedral Source		
BAS003 Directional Source		
Remote Control		

Recycling

PCB Piezotronics, Inc. is an environmentally friendly organization and encourages our customers to be environmentally conscious. When this product reaches its end of life, please recycle the product through a local recycling center or return the product to:

PCB Piezotronics, Inc.
Attn: Recycling Coordinator
1681 West 820 North
Provo, Utah, USA 84601-1341

where it will be accepted for disposal

Product Warranty

Refer to our website, www.larsondavis.com, for a copy of our product warranty.

Table of Contents

1

Introduction

This chapter describes the features, functions, and proper care of the Larson Davis Building Acoustic Source models BAS001, BAS002, and BAS003.

Components

Figure 1-1 shows the components of the BAS002 Power Amplifier System.

FIGURE 1-1 BAS002 System Components

Features

The Larson Davis Model Building Acoustic Source has the following features:

- High power and level output
- Fast and easy-to-use
- Fan-less cooling
- Very low-power output distortion (THD + N < 0.12%)
- Wide bandwidth
- Lightweight and small-dimension components
- Long-range, easy-to-use programmable hand-held remote control using ISM 2.4 GHz radio frequencies
- Arbitrary waveform, using USB memory
- Pre-programmed pink and white noise
- Fully-automated reverberation time measurements with the Model 831 noise generator
- ROHS, CE, ISO 10140, ISO 3382, and ASTM E2235 compliant
- Software for setting parameters and configuration over a LAN

Basic Operations

- Source input selection
- One-button Start and Stop command
- USB file selection
- Timer-driven waveform gating
- Range finder function for remote radio range check
- BasBoost function to enhance lower frequencies
- Stand-By function to interrupt/restore power output

Applications

- Reverberation time
- Building and room acoustics

- Absorption coefficient

Standards Compliance

- EN ISO 10140/3 and EN ISO 10140/4 Standard (dodecahedral source)
- EN ISO 140/S Standard (façade - directional source)
- EN ISO 140-1
- EN ISO 3382
- ASTM E2235
- DIN210

Standard Accessories

The BAS002 Power Amplifier is delivered with the following standard accessories:

- Ethernet cable
- AC power cable
- CBL182 Speakon cable, 50 ft. (16m.)
- ISM antenna
- Hand-held remote control (with PP3 Battery)
- USB device with signal files and manual
- Hardcase for BAS002 power amplifier
- Control application software *odsctrl*

Optional Accessories

The following optional accessories are available:

- BAS001 omnidirectional speaker
- BAS003 directional speaker
- TRP023 tripod for BAS001 and BAS003
- CBL180 connecting Model 831 AC Out to BNC, 6 ft. (2m.)
- CBL181 BNC M:M signal extension, 50 ft. (16m.)

Figure 1-2 shows the deployment layout for Larson Davis building acoustic source and sound level measurement products.

BAS001 Dodecahedral Speaker

CBL182 (Speakon) Speaker Cable

ISM Antenna

USB Device

BAS003 Directional Speaker

Remote Control

TRP023 Speaker Tripod

CBL180 Model 831 AC Out to BNC

FIGURE 1-2 Deployment Layout

Safety and Care

Follow these safety and care guidelines for proper operation and maintenance of the system:

- The amplifier and the loudspeaker are intended mainly for indoor use. Do not use the system outdoors when it is raining.

- Keep the product away from any heat source or dampness.

- Keep the components free from all liquids.

- The system should be used only in locations with an ambient temperature below 60°C or above -10°C.

- Follow the connection directions carefully. A wrong connection can damage the product or its connected parts.

- Do not try to repair this product yourself. If damaged, send it to Larson Davis according to the directions provided at www.larsondavis.com.

Storage

To store the system for long periods of time, remove the main power supply cables from the socket and put the loudspeaker in its case. Remove the battery from the remote control.

Cleaning

Use a damp cloth to clean the outside of the system. Do not use cleaning solutions, chemicals, or solvents as they may cause damage.

2

First Use

This chapter outlines the steps to unpack the Model BAS002 Power Amplifier and prepare it for first use.

Preparing for first use includes the following:

• Unpacking and inspection

• Assembling the amplifier and speaker

• Installing the remote control battery

• Powering-up the Model BAS002

Unpacking and Inspection

Your BAS002 has been shipped in protective packaging. Please verify that the package contains the items listed below. Retain the packaging for safe shipment for calibration service. Report any damage or shortage immediately to PCB Piezotronics, Inc. at 888 258-3222 (toll free) or +1 716- 926-8243.

The BAS002 includes the following:

• BAS002 Power Amplifier

• Amplifier hardcase (17x21x9)

• ISM antenna

• Hand-held remote control

• USB device

• Power supply cable

• CBL182 Speakon cable

• Ethernet cable

• PP3 9V battery

Please record the purchase date, the model and serial numbers for your amplifier, sources and remote control in the spaces provided on the copyright page. You will find model and serial numbers on the labels on the back of the devices.

The amplifier display screen is covered with a protective film. Carefully peel it off without using a scratching tool.

Assembling the Amplifier and Speaker

To prepare the amplifier and connect it to the speaker, follow these steps:

Remember to turn the antenna horizontally (or remove it) when transporting to avoid damage.

Step 1 Mount the antenna, screwing it on the gold-plated connector on the on the front panel.

Step 2 Before connecting the power cord, check that the mains voltage is in the correct range for the version purchased: BAS002-U 90-132.5 VAC (55-65 Hz) or BAS002-E 190-265 VAC (45-55 Hz). The power supply specifications are displayed on the back panel.

Step 3 Place the amplifier vertically on a firm surface and place the tripod in a stable position.

Always stop signal generation and disconnect AUX in before connecting or disconnecting the speaker cable.

Step 4 Connect the amplifier to theBAS001 or BAS003 with CBL182 (Speakon cable). Insert the plug into the right side CBL182 connector of the amplifier. Only one position is allowed. Turn it clockwise until you hear the locking click. Repeat the same steps to connect the source side.

Step 5 Connect the AC power cord.

Installing the Remote Control Battery

To install the PP3 battery in the remote control, follow these steps:

Step 1 Remove the remote control from the rubber boot.

Step 2 Open the bottom slide to access the battery compartment. Note the polarity indicators and insert the battery accordingly.

Step 3   Reassemble.

FIGURE 2-1 Remote Control Bottom

On the top of the remote control, press the power button to turn the remote on or off.

Powering-up the Model BAS002

*By default the value of the power output is set to -40 dB, the amplifier is set to **Stop** mode, and the auxiliary input is not connected to the final power amplifier stage.*

To power up the system, press the power switch on the rear panel of the amplifier. This will turn on the display and generate a tone sound sequence from the internal speaker of the amplifier.

If an incorrect AC power voltage is supplied, the protection fuse will be blown and the amplifier will not switch on.

FIGURE 2-2 BAS002 Amplifier Display

The amplifier should be connnected to a grounded socket.

The default source input is the USB port. The LED near the USB port will flash green and red rapidly during power up, and then will remain off until a USB device is put into the connector.

3

BAS002 Power Amplifier

This chapter describes the components, features, and basic operation of the BAS002 power amplifier.

Components and Features

The BAS002 Power Amplifier generates specific signals useful for acoustic applications and tests. It can also be connected to the Model 831 sound level meter to simplify and speed up RT-60 measurements.

The power amplifier consists of the following components or features:

- USB interface and player
- Auxiliary preamplifier and limiter
- Volume control and filter shaping
- Final power amplifier
- ISM Radio Receiver
- Display and keypad interface
- Power supply and filtering

Before powering down, stop any files from playing or stop the Aux input. Although the amplifier is protected against abrupt source interruption, the speaker may be damaged if an interruption occurs during high sound output.

All functions are controlled by a microprocessor with internal flash memory for saving settings and configurations.

The housing has been designed for field usage, being both light in weight and equipped with shielding to prevent electrical disturbances.

The system provides three different controls, as follows:

- BAS002 amplifier keypad controls
- Remote control
- Software control

The amplifier keypad provides extended functionality over the remote control and the software controls provide extended functionality over the amplifier keypad controls. Each control can be used simultaneously during operation.

The amplifier provides the following interfaces:

Front Panel: Display, keypad, AUX input connector, ISM Antenna for remote control (right side panel), the ethernet connector, monitor output, and the trigger connectors.

FIGURE 3-1 BAS002 Power Amplifier Front Panel

Rear Panel: Power supply connecter and main power switch.
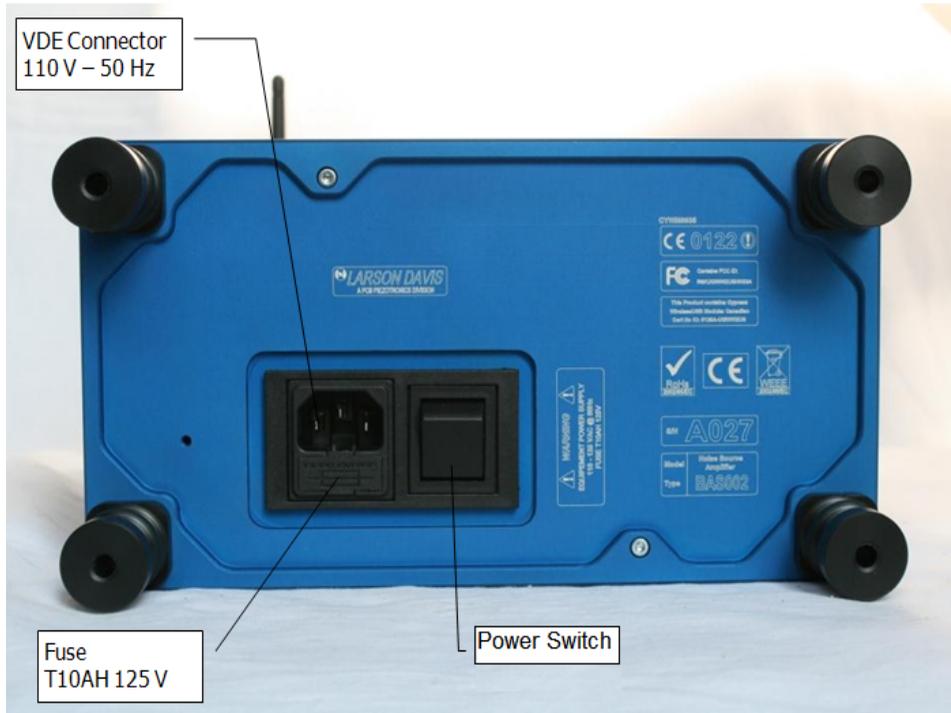
FIGURE 3-2 BAS002 Rear Panel

Connections

POWER IN

The BAS002 is powered as either 110V (U version) or 220V (E version) AC nominal voltage.

SIGNAL OUT

Ensure that proper connection for the signal is made by twisting the connector clockwise.

The signal/power cable to the BAS001 or BAS003 speaker uses CBL182 (Speakon) connecter and is located on the right side of the unit.

SIGNAL IN

The AUX IN or USB connection is available for input signals.

ANALOG OUT

This output offers the "monitor signal" that goes to the speakers before being amplified.

RJ45 ETHERNET

This connecter is used with control software and fixed IP addresses to remotely control the amplifier. Use a crossover cable to connect directly to a PC or a straight cable to connect to a switch or router.

Display and Keypad

Clipping Indicator
Pause Timer
Run Count
Play/Stop Status
Play Duration
Output Volume Attenuation
Stand-by Indicator
Trigger Indicator
Remote Control Indicator
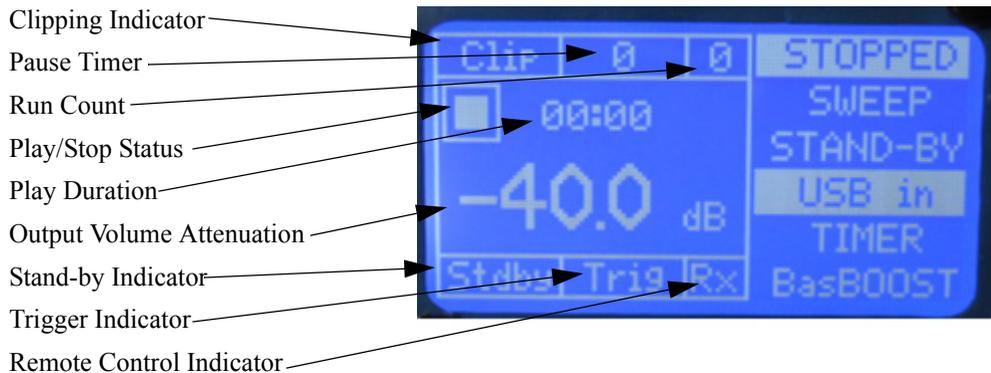
FIGURE 3-3 BAS002 Amplifier Display

FIGURE 3-4 BAS002 Amplifier Keypad

The BAS002 power amplifier display can be used with the keypad to select functions or modes.

Press the up and down arrow buttons of the keypad to make selections on the right side of the display.

Table 3-1 shows the keypad controls for the fields located on the right side of the BAS002 display.

Display Field (Right Side)	Keypad Control
NO PLAY/PLAYING **Aux OFF/Aux ON**	Press **OK** to switch the power output **ON** or **OFF**. In USB mode, press **OK** to start and stop the file reproduction. In AUX mode, press **OK** to drive the power amplifier.
SWEEP **No File** **PINKEQ** **ETC.**	This field shows the currently selected file for reproduction in USB mode. Select this field and press **OK** to scroll forward in the file list. This function is active in USB mode and when the amplifier is not playing.
STAND-BY	Select this field and press **OK** to put the amplifier in low-power mode. Outputs, such as volume, are not changed. Only the power output is excluded.
USB in **AUX in**	Select this field and press **OK** to specify the input source (and amplifier mode). The function is active in USB mode and when the amplifier is not playing.
TIMER	Select this field and press **OK** to start the timer function in the amplifier. The timer plays pre-designated files for a specified time and then pauses the amplifier for a specified time. The timer repeats this action according to the number of times specified. The timer values are specified with the internal memory option. Defaults: play time = 15 sec; pause time = 5 sec; repeat = 3 iterations. To interrupt the timer, select the **NO PLAY** field and press **OK**.

Table 3-1 Keypad Controls for BAS002 Display (Right Side)

Display Field (Right Side)	Keypad Control
BasBOOST	Select this field and press **OK** to enable or disable. When enabled, an "F" appears in the display above the "dB." This function enhances low frequencies, below 100 Hz by pushing a 1/3 octave band up by 15 dB.

Table 3-1 Keypad Controls for BAS002 Display (Right Side)

The left side of the BAS002 display indicates the amplifier status. Table 3-2 describes the indications for each status area.

Status Area	Indication
Clipping Indicator	When inversely lit, indicates that the amplifier is in clipping mode and will activate protection circuits to lower output power.
Pause Timer	Shows the seconds remaining for pause mode.
Run Count	Shows the number of iterations left to complete the TIMER cycle.
Play/Stop Status	When playing, shows the PLAY icon in USB mode or the AUX icon in AUX mode.
Play Duration	The time the current file has been playing in USB mode.
Output Volume Attenuation	Shows volume.
BasBOOST Indicator	Displays an **F** icon when BasBOOST is on.
Cycling Indicator	Displays a **T** icon when cycling is on.
Stand-by Indicator	When reverse lit, indicates that the amplifier is in stand-by mode, lowering the power output signal.

Table 3-2 BAS002 Status Display (Left Side)

Status Area	Indication
Trigger Indicator	Indicates an external trigger has been received.
Remote Control Indicator	Indicates a command from the remote control unit has been received.

Table 3-2 BAS002 Status Display (Left Side)

Basic Operation

Playing Signal Files

To play signal files, follow these steps:

Make sure the volume is initially set to low output levels.

Step 1   Plug in amplifier and power it up as previously described.

*The amplifier plays only **.mp3** and **.wav** files with filenames in the 8.3 character format. Longer file names are truncated.*

Step 2   Insert USB memory. All files in the root directory are loaded automatically. The BAS002 display changes from the **NO PLAY** status to **PLAYING**.

Step 3   When the **SWEEP** field changes to the name of the first file, you can leave that file as the selection or press **OK** in this field to scroll through the list of files.

Step 4   Select the **PLAYING** field and press **OK** to play the file. To stop, press **OK**.

Step 5   To go into **NO PLAY** mode, select **PLAYING** and press **OK**.

Using StandBy

To put the amplifier in Stand-by mode, select the **STANDBY** field and press **OK**. To exit this mode, press **OK** again. This mode puts the amplifier into low-power operation and mutes the output.

Changing the Input Source

To change the input source for the amplifier, select either the **AUX in** or the **USB in** field (whichever is displayed) and press **OK**. The input mode is switched back and forth between these options each time **OK** is pressed.

If **USB in** is selected, the internal preamplifier and the analogue net are connected to the USB source. If the **AUX in** is selected the analogue net is connected to the AUX BNC through a preamplifier/separator stage. Each channels has its own volume control level.

If **AUX in** is selected, **AUX ON** appears in the first field. Selecting the **AUX ON** field and pressing **OK** connects the power amplifier to the analogue net (thus picking up the signal from the external AUX BNC connector).

Selecting **AUX OFF** and pressing **OK** disconnects the channel.

Using with Model 831

To use the BAS002 power amplifier with the Model 831, follow these steps:

CBL180 and CBL181 are optional accessories.

Step 1 Insert the plug end of CBL180 into the AC Out jack of the Model 831.

AC Out

FIGURE 3-5 Model 831 AC Out

Step 2 Insert the BNC connecter end of CBL180 into CBL181 extension cable connector.

Step 3 Insert the BNC connector end of CBL181 into the AUX in connector on the BAS002 amplifier. Figure 3-6 shows the connection.

CBL180 and CBL181 are optional accessories.

FIGURE 3-6 CBL181 Connection to Power Amplifier

Setting the Timer

To use the timer, select the **TIMER** field and press **OK**. The timer starts the following sequence:

The amplifier pauses for a specified **PauseTime**.

- After the pause, the amplifier plays the selected file for the specified **PlayTime**.
- After playing for the specified **PlayTime**, the amplifier pauses again for the specified **PauseTime**.

This sequence is repeated for the specified number of **repeatTimes**.

The default values for **TIMER** variables are as follows:

The PauseTime, PlayTime, and repeatTimes values can be set using the BAS002 software.

- **PauseTime**: 3 seconds
- **PlayTime**: 10 seconds
- **repeatTimes**: 3 cycles

Selecting the **TIMER** field and pressing **OK** stops the sequence but not the playing of the file, if it is running.

Playing must be stopped manually. The file is played until the specified **PlayTime** has elapsed or for the duration of the file, whichever ends first.

Applying the BasBOOST Enhancer

To activate the **BasBOOST** function, select the field and press **OK**. **BasBOOST** enhances lower frequencies, with a selectable roll-off frequency and a selectable gain, and works as a FIR in the DSP. This function is available for the USB source only.

4 *Remote Control*

This chapter describes the functions and operations of the hand-held remote control.

The BAS remote control operates in the ISM band at 2.4 GHz, conforming to world-wide regulatory-approved frequencies.

Antenna

Switch

Three-color LED

Keypad

FIGURE 4-1 Hand-Held Remote Control

Features of the Remote Control

The remote control unit provides a wide radio range at low power and draws low current levels by optimizing the operating and idle status. A low power microprocessor controls the functions of the radio remote control.

The control also includes a range finder to indicate if the amplifier is in range and if the amplifier is playing a sound.

Keypad Functions

- **Left Arrow**: Increases the attenuation, thus lowering the volume.
- **Right Arrow**: Decreases the attenuation, thus increasing the volume.
- **OK Button**: Starts and stops playing in USB mode, and enables or disables the source in AUX mode.

The keypad on the remote control functions the same as the keypad on the amplifier, with the exception of the up and down arrow keys.

- **Up and Down Arrows**: these keys can be programmed by software to activate functions such as BasBOOST, TIMER, STANDBY, etc. Each function that is programmed is saved for next use until a different function is assigned. These keys have no programmed function initially, by default.

LED Status

The LED emits green, red, or yellow, depending on the status of the remote control signal with the system. Also, the LED may flash or show a steady light depending on system status.

- **Green flashing:** the amplifier is successfully receiving signals from the remote control and is muted (no sound signal is produced by the speaker). Press **OK** to start the amplifier playing (the selected file in the USB device will be played or the AUX IN source channel will be driven to the power amplifier).
- **Green steady:** the amplifier is successfully receiving signals from the remote control and playing sound. The signal source may come from USB or AUX IN. Press **OK** to stop the amplifier from playing.

- **Red steady:** the remote control is not in the radio range of the amplifier. Keypad commands are transmitted by the remote control but not received by the amplifier. In this case, move closer to the amplifier until the LED is green and radio connection is re-established.

- **Red flashing:** the remote control battery is low. When the LED is in this state, the battery has 30 minutes of life before the remote control will turn off.

- **Yellow flashing or steady**: The remote control is signaling the amplifier successfully but the battery power is low.

Programming Mode

The hand-held remote control can be put in programming mode to change the radio power output, the radio channel, and the range finder function.When in programming mode, the remote control flashes a fast red-green sequence every eight seconds.

Battery Replacement

The PP3 9V battery in the remote control can be replaced with either alkaline or lithium-ion rechargeable types. Typically, the battery lasts more than 60 hours under normal conditions. For instructions on replacing the battery, see the "First Use" chapter in this manual.

Battery Replacement

5

BAS001 Dodecahedral Speaker

This chapter describes the features and components of the BAS001 dodecahedral source speaker.

The BAS001 is designed with the following specifications:

• High power output

• Omnidirectionality

• Frequency range wide enough for efficiently reproducing the sound field from 100 Hz up to 6300Hz

• Small dimensions and light weight

Each feature can be optimized independently. The frequency range and directivity of the sound source meets the standards for ISO 140, DIN 52210 and ISO 3382.
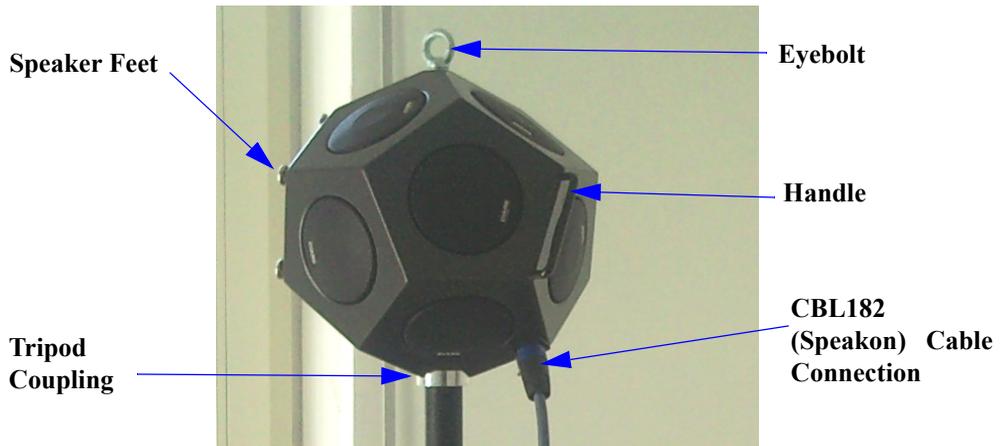
FIGURE 5-1 BAS001 Dodecahedral Speaker

Additional Information

The following tips may be helpful when using the speaker:

- The eyebolt can be used to hang the speaker if a tripod is not a convenient solution.

- The handle has been placed on the side of the speaker to help in handling and managing the device.

- The source can be positioned on the floor, using the five feet on one side.

- To connect the speaker cable, insert it into the female panel connector and turn clockwise. To disconnect it, pull the tab, turn counter-clockwise and take out the connector.

- Refer to the "Technical Specifications" chapter in this manual for specific electric or physical characteristics.

6

Directional Source BAS003

This chapter describes the features and components of the BAS003 directional source speaker.

Because of its directivity, the BAS003 is designed to allow building façade testing measurements according to specified standards. The BAS003 provides the following:

• High power output

• Good directionality

• Frequency range wide enough for efficiently reproducing the sound field from 100 Hz up to 4000Hz

• Small dimensions and light weight

These features can be optimized independently. The frequency range and directivity of the sound source meets the standards for ISO 140, DIN 52210 and ISO 3382.

FIGURE 6-1 BAS003 Directional Source Speaker

For more information on the electrical and physical characteristics of the BAS003, see the "Technical Specifications" chapter in this manual.

7

Software Control

This chapter describes functions and controls of the BAS002 system software.

Launching the Software

To launch the BAS002 system software, copy the **odsctrl.exe** file from the supplied USB flash memory and paste it to a location on your computer. Then double-click the file icon.
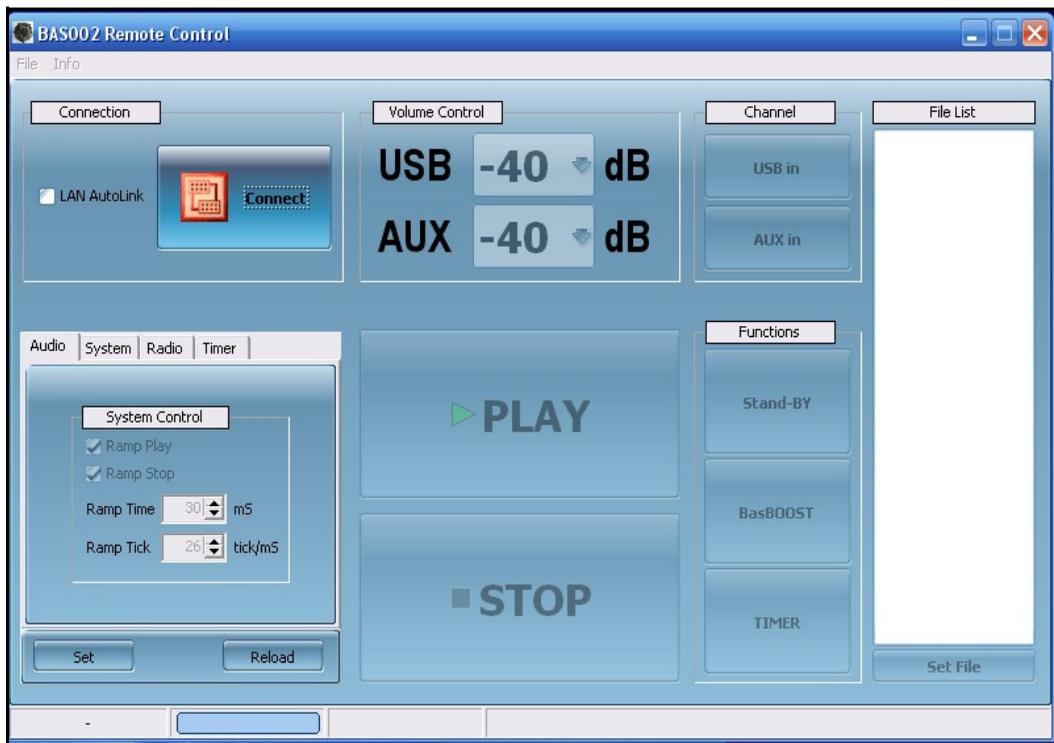
FIGURE 7-1 BAS002 Software Interface

The BAS002 system software provides the most extended control of the system, as shown in Table 7 - 1.

Feature/Function	Remote Control	Amplifier Keypad	Software Controls
Start/Stop	Y	Y	Y
Output Volume	Y	Y	Y
File Selection	Y	Y	Y
Input USB or AUX	N	Y	Y
Standby (Mute)	N	Y	Y
Timer Cycling	N	Y	Y
BasBOOST Enhancer	N	Y	Y
Timer Control and Setup	N	N	Y
Display Contrast	N	N	Y
Radio Power and Setup	N	N	Y
Fade-in and Fade-out	N	N	Y
Radio Programming	N	N	Y
			Y = Yes N = No

Table 7 - 1 BAS002 System Controls

Connecting the Amplifier

Before using the software, connect the BAS002 to your network with an Ethernet cable. If connecting directly to a PC, use a crossover networking cable.

FIGURE 7-2 BAS002 Software Connection

Upon being launched, the software searches for a client. In this state the **Connect** icon is red and flashing. If the **LAN AutoLink** option is checked, the software searches for a BAS002 unit on the same network subnet. The static IP address of the BAS002 amplifier is always 192.168.1.2. The IP address of the PC used to run the software must be in the same subnet as the amplifier. Accordingly, it will be 192.168.1.x, where x is a number between 1 and 254, excluding number 2.

The software controls are not enabled until the connection is established with the amplifier. Upon connection, the connect icon changes to green and the previously-specified settings are loaded.

Configuring TCP/IP

If a message appears indicating limited or no connectiviy, make sure that your PC is assigned a static IP address within the same subnet. Also, if your router is set to configure TCP/IP addresses automatically, through DHCP, the PC will not find the amplifier.

This section shows how to configure TCP/IP on a Windows 7 operating system, as follows:

Step 1   To view the current network connection details, click the **Control Panel** from the **Start** menu and then click **Network and Sharing Center**.

Step 2 On the Network and Sharing Center, click on the **Local Area Connection** link as shown in Figure 7-3.
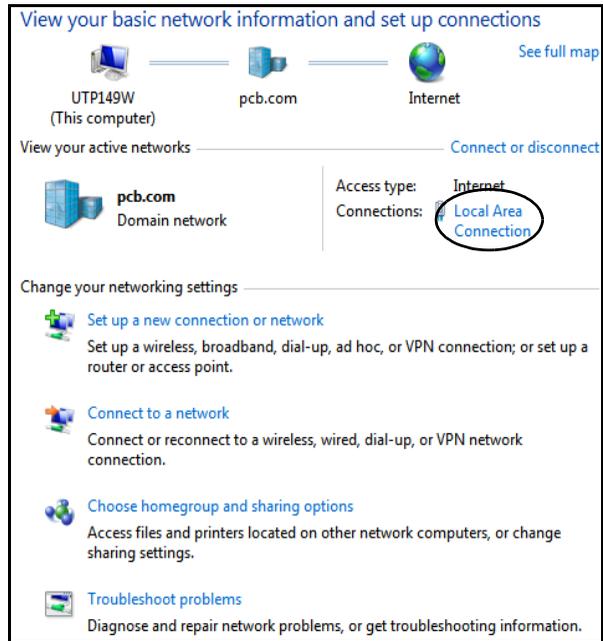
FIGURE 7-3 Local Area Connection Link

Step 3 On the **Local Area Connection Status** dialog box, click the **Properties** button.

Step 4 On the **Local Area Connection Properties** dialog box, select **Internet Protocol (TCP/IP)** and click the **Properties** button, as shown in Figure 7-4.
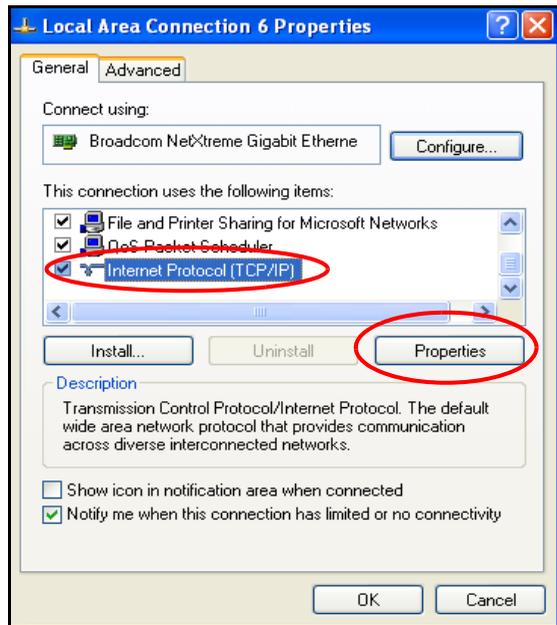
FIGURE 7-4 LAN Properties

On the **General** tab of the **Internet Protocol (TCP/IP) Properties** dialog box, select the option to **Use the following IP address**. Enter the static IP address of your PC in the **IP address** field. For the **Subnet mask** field, press the **Tab** key to allow Windows to define the subnet mask. The **Default gateway** field can be left blank.

Figure 7-5 shows an example of IP address configuration.
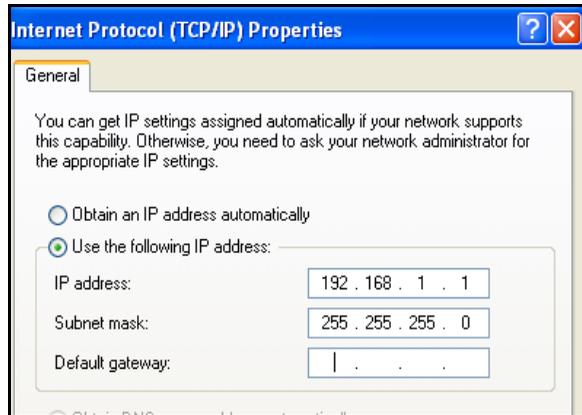
FIGURE 7-5 IP Address Configuration

To simplify the connection, use a CAT5E cable directly to the amplifier.

Once the connection is established, the LED on the Ethernet port changes from a flashing red to a steady green.

Selecting USB Signal Sources

To select USB signal sources in the BAS002 software, follow these steps:

Step 1   Insert the flash memory device containing the source file into the USB port of the amplifier.

Step 2   On the **Channel** area, click **USB in**, as shown in Figure 7-6.
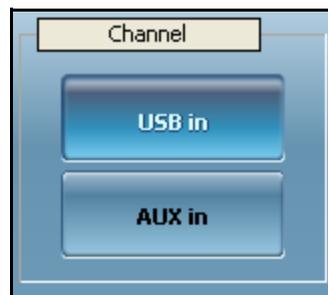
FIGURE 7-6 Channel: USB in

Step 3 Once the USB files appear in the **File List**, select the file to be used and click **Set File**, as shown in Figure .

Once it has been selected and set, the name of the file is also shown on the amplifier display.
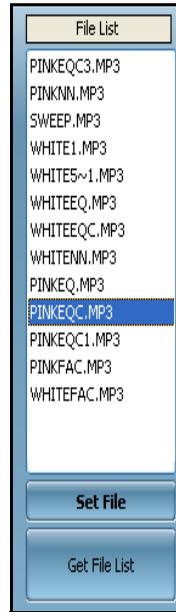
FIGURE 7-7 File List

Larson Davis recommends verifying the signal initially at low output levels.

Step 4 In the **Volume Control** area, adjust the volume by selecting values from the **USB** drop-down list. These values decrease by 1 dB from 0 to -20 dB and by 5 dB from -20 dB to -90 dB.

Step 5 To begin sound measurement, click **PLAY.**

Selecting AUX Signal Sources

To select AUX signal sources with the Model 831 in the BAS002 software, follow these steps:

Step 1   Insert the plug end of CBL180 into the AC Out jack of the Model 831. Figure 7-8 shows the AC Out.

AC Out

FIGURE 7-8 Model 831 AC Out

Step 2   Insert the BNC connecter end of CBL180 into the CBL181 extension cable connector.

Step 3   Insert the BNC connector end of CBL181 into the AUX in connector on the BAS002 amplifier. Figure 7-9 shows the connection.

CBL180 and CBL181 are optional accessories.

FIGURE 7-9 CBL181 Connection to Power Amplifier

Make sure the volume is initially set to low output levels.

Step 4 In the **Volume Control** area, adjust the volume by selecting values from the **USB** drop-down list. These values decrease by 1 dB from 0 to -20 dB and by 5 dB from -20 dB to -90 dB.

Step 5 To begin sound measurement, click **PLAY.**

Refer to the Larson Davis *Model 831 Manual* for more information on playing sound files.

Setting Parameters

In the lower left corner of the software interface, you can set amplifier parameters by clicking on the following tabs:

- **Radio**
- **System**
- **Audio**
- **Timer**

Radio (Remote Control)

To set the remote control parameters in the amplifier, follow these steps:

Step 1 Click the **Radio** tab. Figure 7-10 shows the tab.
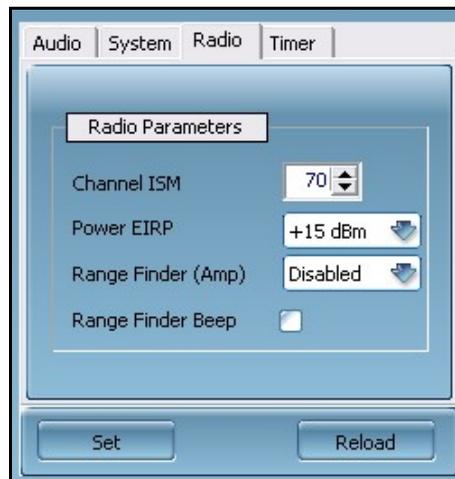
FIGURE 7-10 Radio Tab

Step 2 Specify the following parameters:

The amplifier and the remote control must be set to the same radio channel to function properly.

- **Channel ISM**: Specify radio channels 10, 30, 50, or 70.
- **Power EIRP** (Transmit Power): Specify ranges from -14, -10, -6, -1, +6, +10, +13, +15 dBm. The higher the power, the wider the range. Remember to comply with EIRP limits and local regulations

Disable the range finder in the remote control before activating the range finder in the amplifier.

- **Range Finder** (on amplifier): Select **Enabled** or **Disabled**.
- **Range Finder Beep**: Select this option to have amplifier beep each time it receives a signal from the remote control for testing purposes. This option should not be selected during measurements.

*After clicking **Set**, the parameter configurations are stored in the amplifier memory for use even after turning off the amplifier.*

Step 3 Click **Set**. The LED on the remote control flashes green when it is connected to the amplifier. See the chapter on the hand-held remote in this manual for further information on LED indications.

Timer

To set timer parameters in the amplifier, follow these steps:

Step 1 Click the **Timer** tab. Figure 7-11 shows the tab.
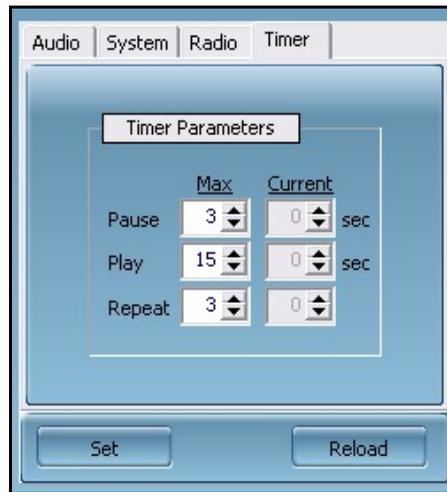
FIGURE 7-11 Timer Tab

Step 2   Specify the values for each option:

- **Pause**: Specify the **Max** number of seconds for the starting pause value. Specify the **Current** number of seconds for the on-going pause time.

- **Play**: Specify the **Max** number of seconds for the starting play time. Specify the **Current** number of seconds for the on-going play time.

- **Repeat**: Specify the **Max** number of seconds for the starting number of play-pause cycles. Specify the **Current** number of seconds for the on-going play-pause cycles.

*To start the timer immediately, click the **Timer** button in the **Functions** area.*

Step 3   Click **Set**.

System

To set system parameters in the amplifier, follow these steps:

Step 1   Click the **System** tab. Figure 7-12 shows the tab.

FIGURE 7-12 System Tab

Step 2   Specify the following options:

- **UP key function**: Select a dedicated function for the up arrow key of the remote control.
- **DN key function**: Select a dedicated function for the down arrow key of the remote control.
- **OK key function**: Select a dedicated function for the **OK** key of the remote control.
- **Contrast:** Select available values from **high** to **blank**.
- **Back Light:** Select this option to turn on the backlight.

Step 3   Click **Set**.

Audio

To set Audio parameters in the amplifier, follow these steps:

Step 1   Click the **Audio** tab. Figure 7-13 shows the tab.
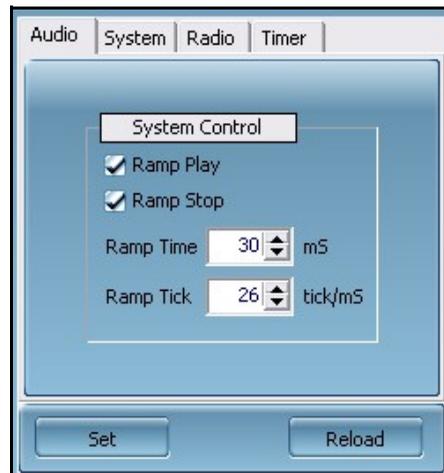
FIGURE 7-13 Audio Tab

Step 2   Specify the following options:

- **Ramp Play**: Select this option to ramp volume up from mute to specified output.
- **Ramp Stop**: Select this option to ramp volume down from specified output to mute.
- **Ramp Time**: Specify the duration in number of mS to ramp up or ramp down.

- **Ramp Tick**: Specify the number of steps for increasing or decreasing volume in Ramp Time.

Step 3   Click **Set**.

Using Functions

The same functions available on the amplifier display menu are also available on the software interface, including:

To perform any of these functions, click the buttons labelled accordingly.

- BasBoost
- StandBy
- Timer

The timer function parameters can be set on the **Timer** tab, as described in the "Setting Parameters" section in this chapter.

For more information on the use of these functions, refer to the "BAS002 Power Amplifier" chapter in this manual.

A *Technical Specifications*

The specifications contained in this chapter are subject to change without notice. Please refer to calibration and measurement results for data on a specific unit.

Acoustic Standards met by BAS002 Amplifier

ISO 140-3:2010	When used with BAS001
ISO 140-4:2010	When used with BAS001
ISO 140-5:2010	When used with BAS001 or BAS003
ISO 3382-1:2009	When used with BAS001
ISO 3382-2:2008	When used with BAS001
ASTM E90	When used with BAS001
ASTM E336	When used with BAS001 or BAS003
ASTM E966	When used with BAS003
ASTM E2235	When used with BAS001
DIN 52 210	When used with BAS001 or BAS003

Electrical, EMC & Safety

Low Voltage Directive	2006/95/EC
EMC Directive	2004/108/EC
	IEC 60065 6'th Ed
Low Voltage	IEC 60101-1
	UL 6500 2'nd Ed
FCC	FCC part 15b Class A
EMC	Emissions IEC 61000-6-4
EMC	Immunity IEC 61000-6-1
CE	
ROHS	2002/95/EC ROHS
WEEE (RAEE) Electronic waste disposal	2002/96/EC
	2002/95, 2002/96, and 2003/108/EC Directive
	2004/108/EC Directive

Model BAS002 Power Amplifier Specifications

Physical Charcteristics

Dimensions	12.2 x 9.4 x 4.7 in	31 x 24 x 12 cm
Weight	8.8 lbs	4 kg
Temperature Range		-20°C to +70 °C
Relative Humidity		<90% not condensing

Power Supply

BAS002-U	115 V	90-132.5 VAC	55-65 Hz	Fuse T6.3AH (5x20mm)
BAS002-E	230 V	190- 265 VAC	45-55 Hz	Fuse T3.15AH (5x20mm)

Connectors & Signals

	Connector	BNC
AUX IN	Input Voltage	+/-10 Vpk (max)
	Input Impedance	100 k Ω
	Connector	BNC
Analog Out	Output Voltage	+/- 10 Vpk (max)
	Output Impedance	50 Ω
	Connector	Neutrik SpeakOn 4-pole
	Minimum Load	2 Ω
Speaker Output	Max Output Voltage	80 V
	Maximum Current	35 A
	Max pure capacitive Load	470 nF
	Connector	Mini XLR 3-pin male (Rean)
	Pin 1 (trigger out)	0 - 5 VDC, 30 mA max Pulse on start and stop
Triggers - Digital I/O	Pin 2 (Ground)	0 VDC
	Pin 3 (Trigger input)	0 - 5 VDC, 30 mA max Pulse high to start and stop
Ethernet	Connector	RJ45
	LAN	10/100 Mbps
Power Supply	Connector	VDE 10 A

ISM Antenna	Connector	SMA
	Impedance	50 Ω
	Frequency Range	ISM Band 2.4 GHz
	Gain	2 dBm
USB	Connector	Type A female
	Version	2.0 12 Mbps

Power Amplifier

Output Power	0.05% Thd+n, 1khz, 4 Ω	500 W
Bandwidth	4 Ω Load	5 Hz – 80 Khz
Thd + N	Aes17 Filter, 10hz-20khz	0.12%
Efficiency	500 W, 4 Ω, 230 Vac	81%
Voltage Gain		27.1 dB
Linearity	20 Hz – 20 Khz	±0.5 dB
Imd		0.0005%
Tmd		0.003%
Idle Noise		80 uV
Power Consumption	725w Max	3 W Standby Power
Dynamic Range		115 dBA
Features	Overcurrent, Thermal, Clipping Protection, Supply Filtering	

USB Player

USB	Version 2.0 – 12 Mbps
THD	0.1%
Dynamic Range	>90 dB
S/N ratio	83 dB
Linearity	± 0.1dB
DAC resolution	18 bits

Supported WMA Formats

Sample rate Hz	Bitrate (kbit/sec)																		
	5	6	8	10	12	16	20	22	32	40	48	64	80	96	128	160	192	256	320
8000																			
11025																			
16000																			
22050																			
32000								WMA4											
44100																WMA7/8	WMA7/8	WMA9	WMA9
48000												WMA9		WMA9			WMA8/9		

Note: Windows Media Audio codec version 2,7,8 and 9 are supported. All WMA profiles (L1, L2 and L3) are supported. WMA9 Professional and WMA 9 Lossless are not supported. In addition to these WMA decoding profiles, all other bitrate and samplerate combinations are supported, including variable bitrate WMA streams.

Supported MP3 Formats (MPEG layer III)

MPEG 1.0 Samplerate - Hz	Bitrate – kbit/sec													
	32	40	48	56	64	80	96	112	128	160	192	224	256	320
48000	X	X	X	X	X	X	X	X	X	X	X	X	X	X
44100	X	X	X	X	X	X	X	X	X	X	X	X	X	X
32000	X	X	X	X	X	X	X	X	X	X	X	X	X	X

MPEG 2.0 Samplerate - Hz	Bitrate – kbit/sec													
	8	16	24	32	40	48	56	64	80	96	112	128	144	160
24000	X	X	X	X	X	X	X	X	X	X	X	X	X	X
22050	X	X	X	X	X	X	X	X	X	X	X	X	X	X
16000	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Note: Variable Bit Rate (VBR) format is supported. Incompatibilities may occur with MPEG 2.5 because it is not a standard format.

Radio Unit

Operating Band	ISM - Frequency 2.4 GHz – 2.483 GHz
Receiver sensitivity	-95 dBm
Output Power EIRP	-14, -10, -6, -1, +6, +10, +13, +15 dBm
Baseband	GFSK
Modulator	DSSS
Channels	available from 2 to 78 – 10, 30, 50, 70 selectable
Channel Separation	1 MHz

Note: For European use, the maximum power level is 10mW ERP. This condition is satisfied with +10dBm.The radio unit is FCC compliant as channels 0, 1 and 79 are avoided.

Assembly Drawing
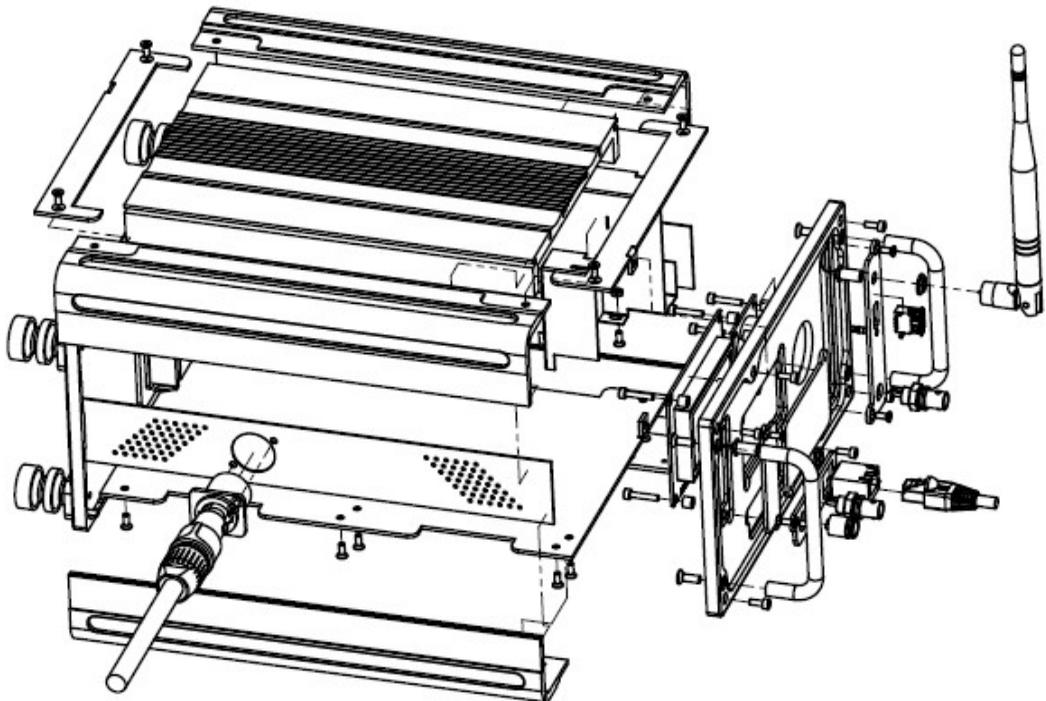
Hand-Held Remote Control Specifications

Features

Wide Radio Range
Worldwide Radio Standard compatibility ISM band
Low power consumption & long operating time
Multifunction Status Indicator
Range Finder function
Programmable keys
Selectable Channels and Tx Power
Polarity inversion protection
Protecting Rubber boot

Physical Characteristics

Dimension	5.7 x 3.1 x 1.6 in	14.5 x 8 x 4 cm
Weight (with battery)	0.44 lbs	200 g
Temperature Range		-20°C to +70 °C
Relative Humidity		<90% not condensing

Power Supply

PP3 Battery (IEC 6LR61, ANSI 1604A)	9 V	Alkaline or LiIon
Operating Life		60 hr, on-the-field usage

Radio Unit

Operating Band	ISM - Frequency 2.4 GHz – 2.483 GHz
Receiver sensitivity	-95 dBm
Output Power EIRP	-14, -10, -6, -1, +6, +10, +13, +15 dBm
Baseband	GFSK
Modulator	DSSS
Channels	available from 2 to 78 – 10,30,50,70 selectable
Channel Separation	1 MHz
Power consumption	10 mW standby, 0.25W Tx peak

Model BAS001 Dodecahedral Source Specifications

Features

High sound power level output
Acoustically Isotropic Source
Frequency Response Flatness in Standards Range
Lightweight
Compact dimensions

Physical Characteristics

Dimensions (carrying case CCS044)	14½ x 14½ x 15¼ in	37 x37x39 cm
Weight	17 lbs	7.7 kg
Temperature Range		-20°C to +70 °C
Relative Humidity		<90% not condensing

Acoustical Specifications

Sound Power	117 dB re 1 pW (not-equalized)
	109 dB re 1 pW (equalized 50-5kHz)
Sound Pressure Level	95 dB(Z) at 10 m
Operating range	50 ~ 12.5 kHz
THD	0.1%
Amplitude linearity	±2 dB from 50 to 5 kHz

Electrical Specifications

Input Impedance @ 1kHz	5.5 Ω
Max Power	720W

Min/Max Directivity Errors
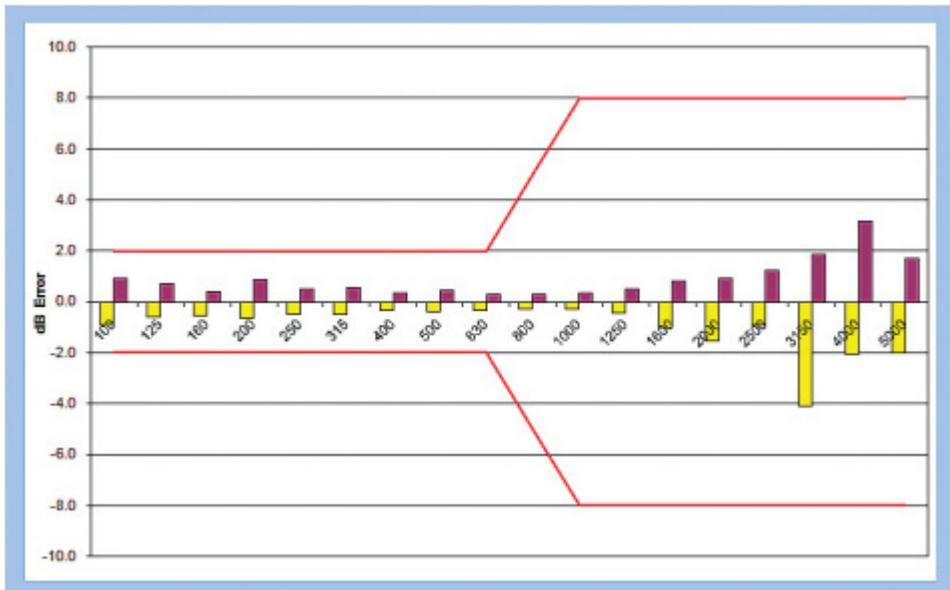
Equalized output power
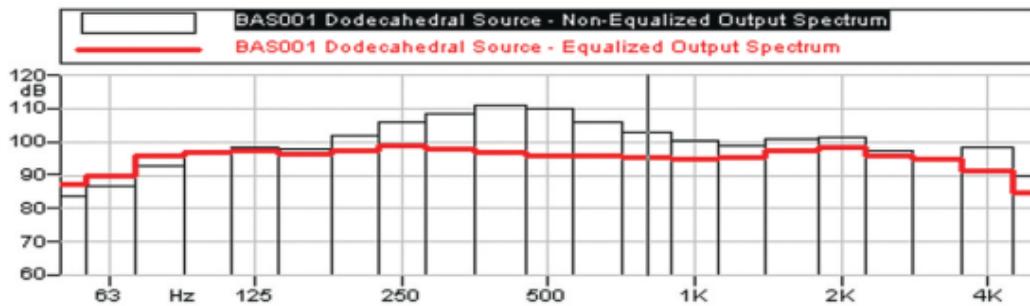
Directivity
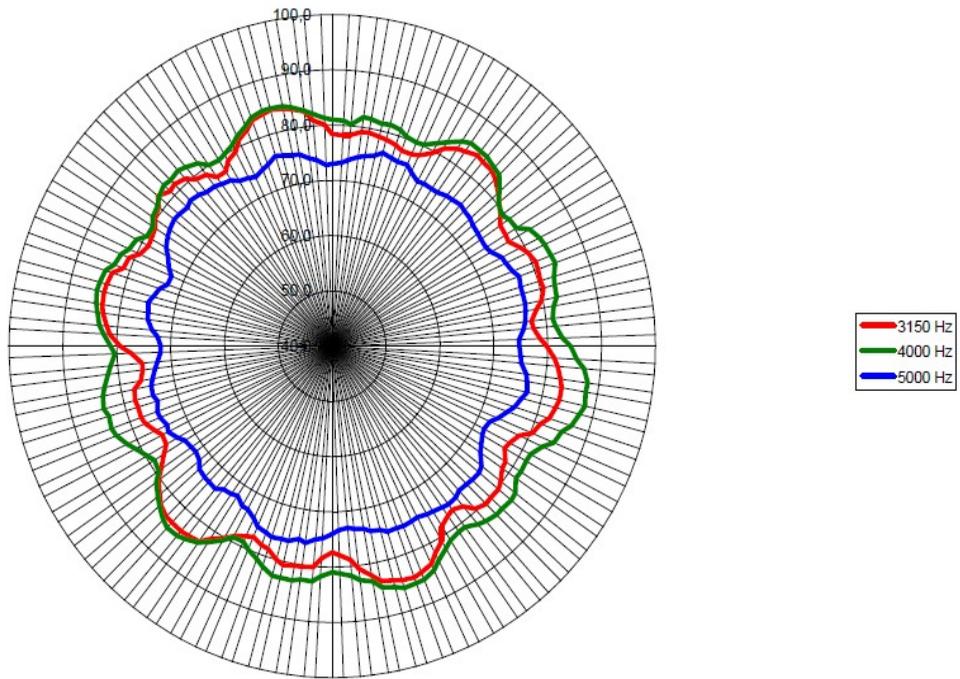
Model BAS003 Directional Source Specifications

Features

High sound power level output
Acoustically Directional Source
Frequency Response Flatness in Standards Range
Lightweight
Compact dimensions

Physical Characteristics

Dimensions (carrying case CCS044)	14½ x 14½ x 15¼ in	37 x37x39 cm
Weight	17 lbs	7.7 kg
Temperature Range		-20°C to +70 °C
Relative Humidity		<90% not condensing

Acoustical Specifications

Sound Power	113 dB re 1 pW (not-equalized)
	116 dB re 1 pW (equalized 50-5kHz)
Sound Pressure Level	95 dB(Z) at 10 m
Operating range	50 ~ 12.5 kHz
THD	0.1%
Amplitude linearity	±2 dB from 50 to 5 kHz
Directivity	20° @ -3dB

Electrical Specifications

Input Impedance @ 1kHz	4 Ω
Max Power	120Wrms

Equalized output power
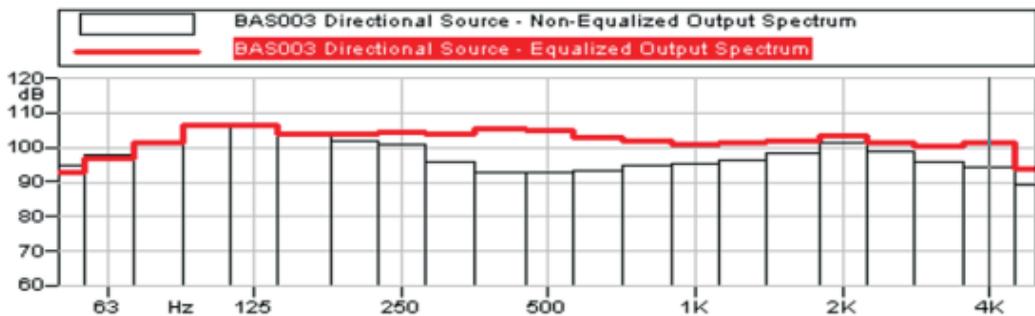
Directivity
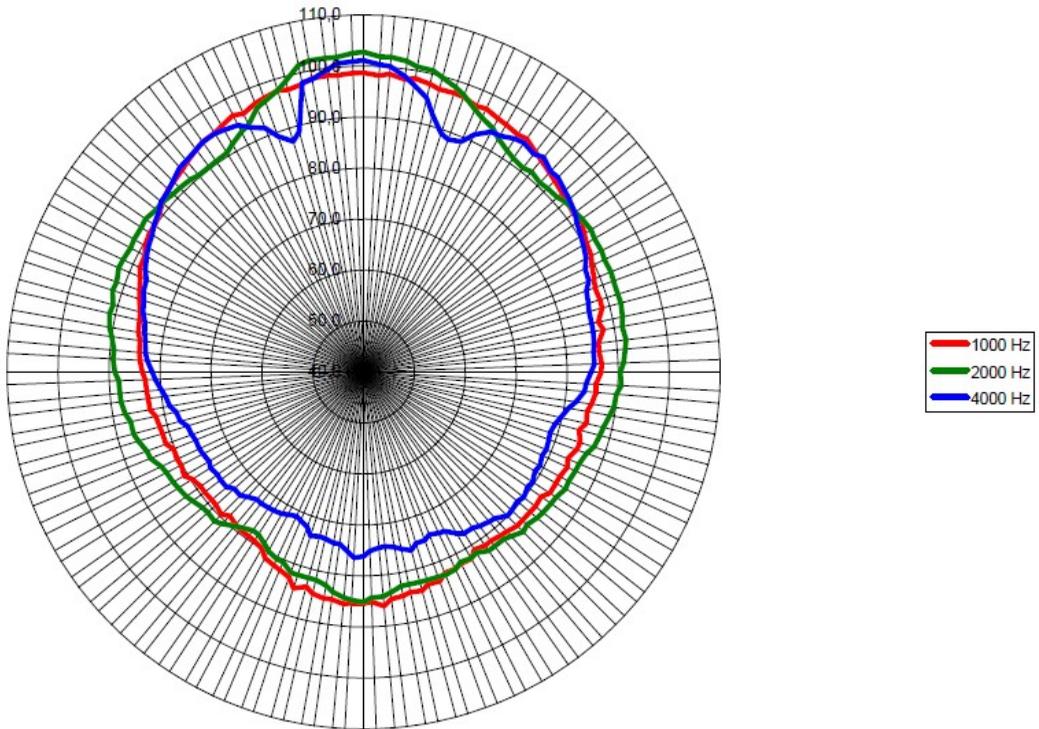
CE Declaration of Conformity

PCB Piezotronics, Inc. declares that:

Model BAS002 Power Amplifier
has been measured in representative configuration with:

- Model BAS001 Dodecahedral Source
- Model BAS003 Directional Source
- Remote Control

and the following cables:

- CBL182 Speakon Signal Power cable
- CBL180 Model 831 AC out to BAS002

with a generated acoustic field of 115 dB of Equalized White Noise.

The Model BAS002 complies with the European Community EMC Directive (2004/108/EC) and also the Low Voltage Safety Directive (2006/95/EC) by meeting the following standards:

- IEC 61326-1:2005: Electrical equipment for measurement, control and laboratory use – EMC requirements.

- IEC

- 61000-4-2:2008 Electrostatic discharge (ESD) immunity. ± 4kV contact discharges and ± 8 kV air discharges.

- IEC 61000-4-3:2006 Radiated, radio frequency, electromagnetic field immunity. 26 MHz to 1 GHz at 10 V/m, 1.4 GHz to 2 GHz at 3 V/m, 2.0 GHz to 2.7 GHz at 1 V/m with 1 kHz 80% AM.

- IEC 61000-4-4:2004 Electrical fast transient (EFT)/burst immunity. ±2 kV (5/50 ns, 5 kHz).

- IEC 61000-4-6:2008 Immunity to RF conducted line disturbances. 10 V, 1 kHz 80% AM from 150 kHz to 80 MHz.

- IEC 61000-4-8:2001 Power frequency magnetic field immunity. 80 A/m. 50/60 Hz.

- CISPR 11:2009: Industrial, scientific and medical (ISM) radio-frequency equipment - Electromagnetic disturbance characteristics - Limits and methods of measurement Class B

- IEC 60101-1:2001 Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General Requirements.

B

Default MP3 Files

This appendix describes the default MP3 files provided on flash memory with the BAS002, as shown below.

The BAS002 display limits the actual size of the files to 8 characters.

pinkeq.mp3
pinkeqc.mp3
pinkeqc1.mp3
pinkeqc3.mp3
Pinkfac.mp3
pinknn.mp3
sweep.mp3
white1.mp3
white50_10k.mp3
whiteeq.mp3
whiteeqc.mp3
Whitefac.mp3
whitenn.mp3
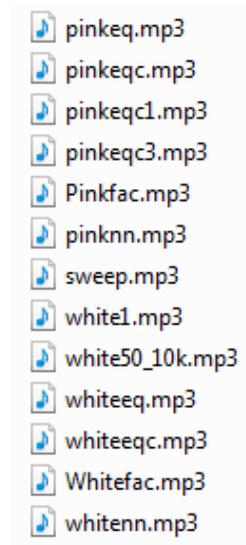
Signal Type

- **pink**: pink noise

- **white**: white noise

- **sweep**: sine sweep

Equalization

- **eq**: Equalized for dodecahedral speaker. Signal is modified to account for output of this speaker (inverse transfer function applied).

- **eqc**: Equalized and compressed. Compression is used to reduce the crest factor in order to have more power output without clipping.

- **fac**: Equalized for façade speaker BAS003.

- **Nn**: No equalization.

C

MP3 File Creation: An Example

This appendix provides an example for editing sound waves and generating MP3 files for use with the BAS002 power amplifier and speakers.

Creating MP3 Signal Files: Overview

The BAS002 power amplifier accepts files in MP3 format for replay. When creating file, follow these general steps:

Step 1   Define your signal type, e.g. pink noise, white noise.

Step 2   Define the frequency range of interest.

Step 3   Adapt the signal to the BAS001 speaker output.

Step 4   Compress signal to gain output power.

Step 5   Normalize signal within the MP3 file.

Creating MP3 Signal Files: Example

For the most current information on using Audacity, refer to the specific manuals, guides, and software help for the application.

The following MP3 file creation example includes using Audacity V1.3.13 software, coupled with the LAME MP3 export routine. Both applications can be downloaded from the internet. Once the software has been downloaded, installed, and opened, follow these steps.

Step 1   Create new file. Click **File** > **New**.

Step 2   Create track. Click **Tracks** > **Add New** > **Audio Track** (or press CTL+SHIFT +N).

Step 3 Fill with noise. Click **Generate** > **Noise**. The following **Noise Generator** dialog box specifies white noise for six minutes.
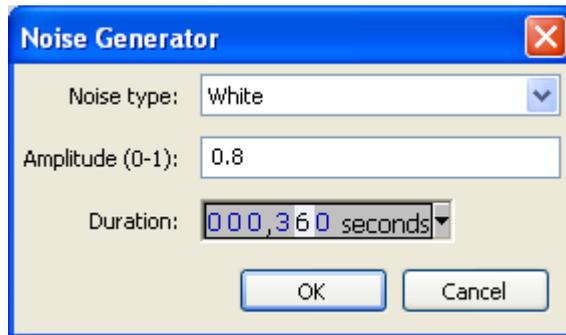
The resulting screen allows you to verify the following:

*Click the **Audiotrack** drop-down arrow to switch views.*

- Mono (or Stereo)
- Sampling rate: 44100 Hz
- Precision: 32-bit float
- Amplitude: 0.8
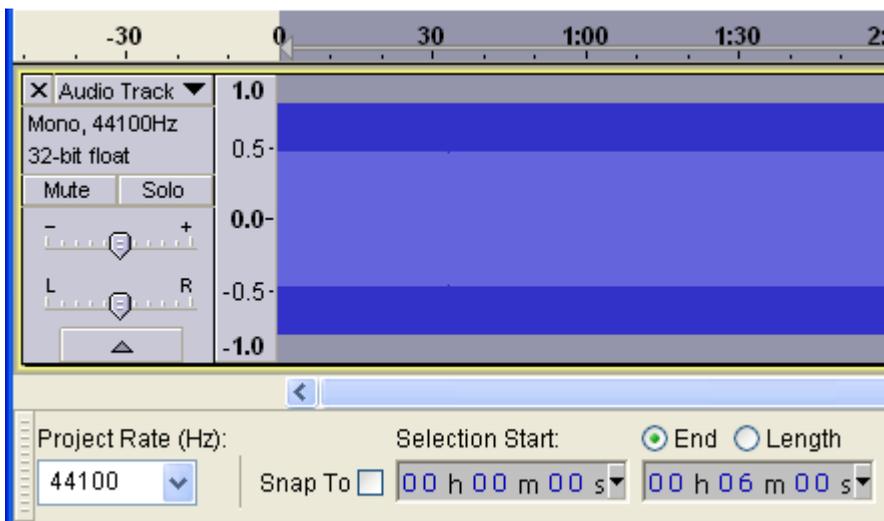
Step 4 Sharpen frequency contents. Click **Analyze** > **Plot Spectrum**.

The following dialog box appears:
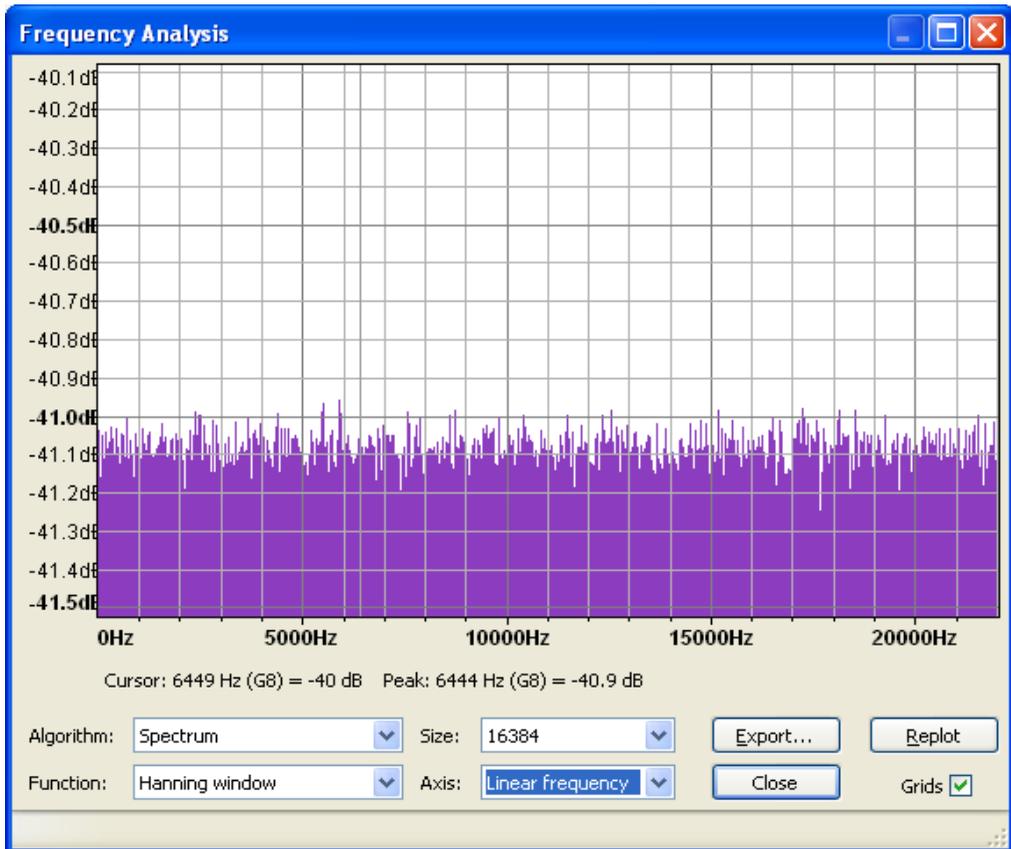
Step 5   Edit the graphical curve. Click **Effect** > **Equaliza-tion**. . . Use the **Draw Curve** mode to edit, as shown below. You can also use the **Graphic EQ** function to modify the curve.
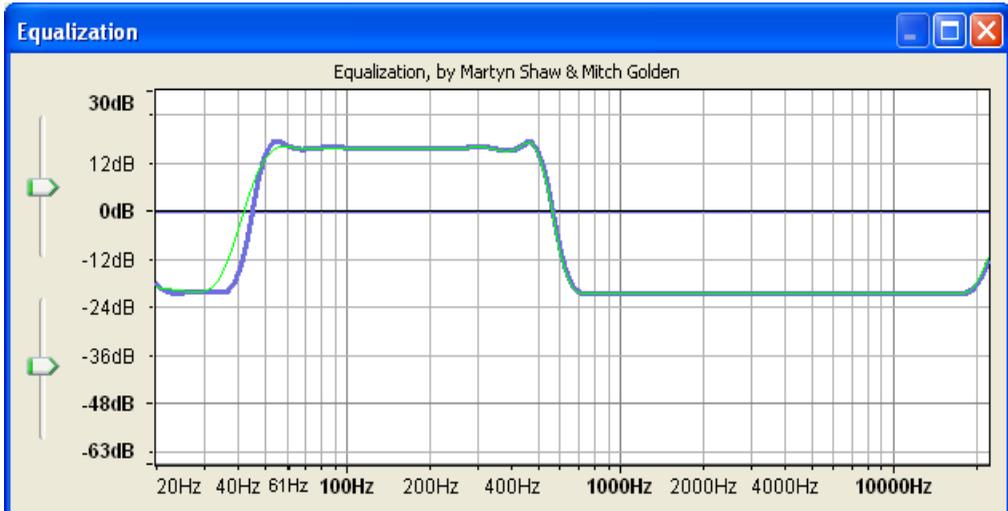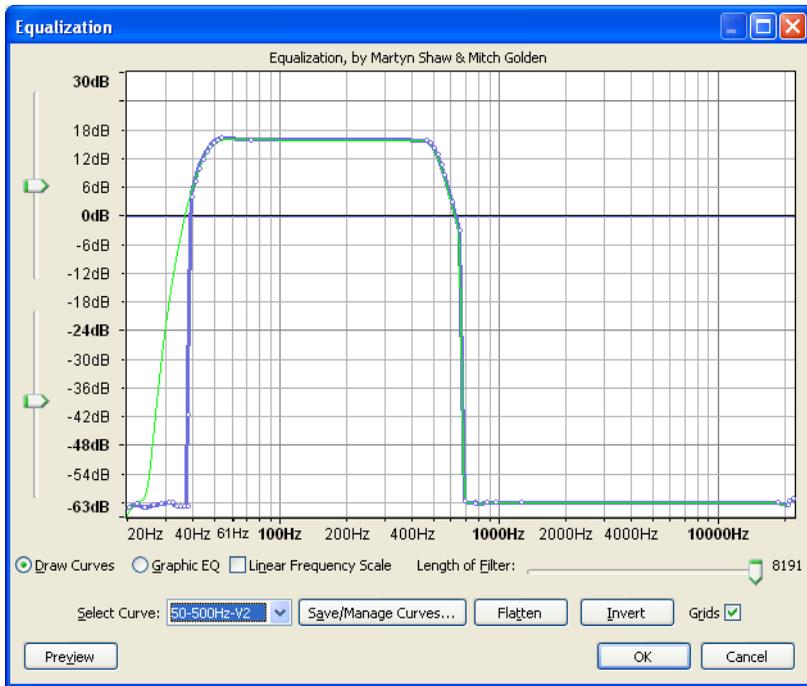
Step 6 Normalize. Click **OK**, then click **Effect** > **Normalize**. The **Normalize** dialog box appears, as shown below. Although Audacity limits the dynamic range of the filter, this will be corrected automatically.
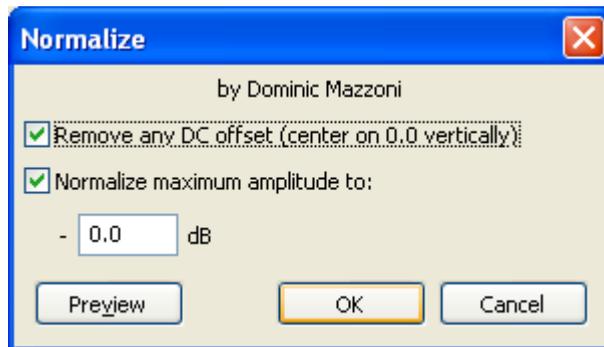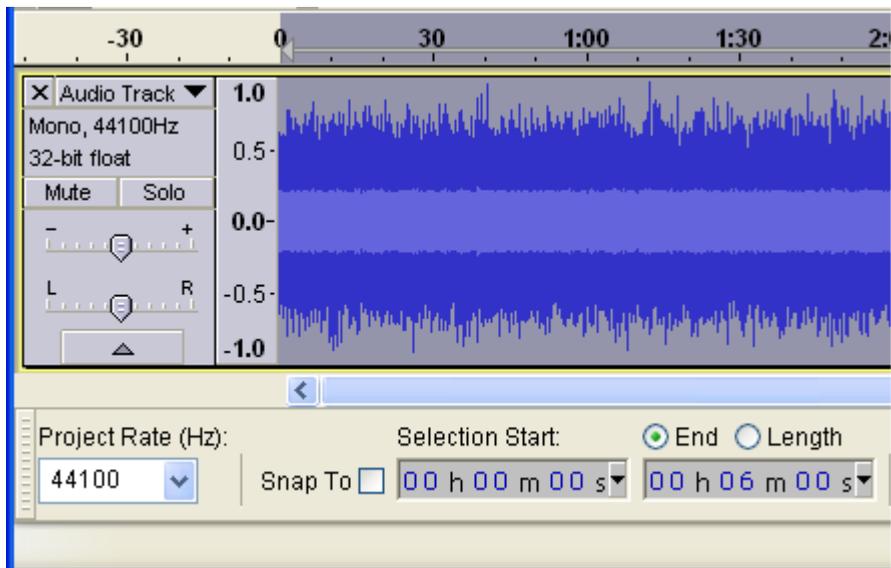
Step 7 View the plot spectrum. Click **Analyze** > **Plot Spectrum**.
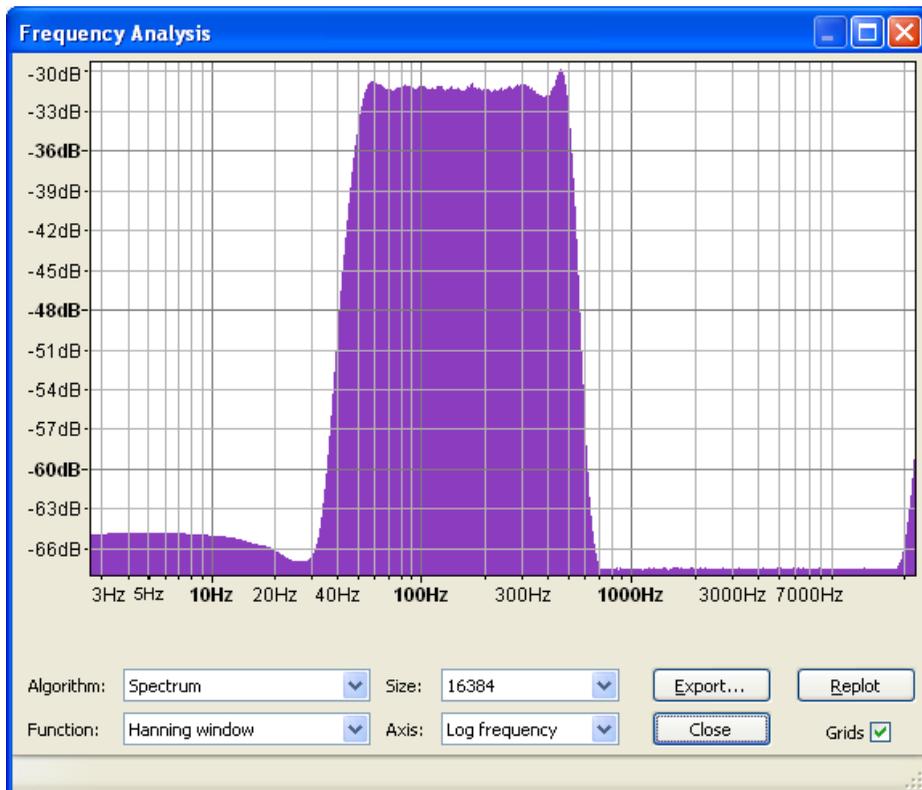
Step 8 Select the curve. Click **Effect** > **Equalization**. . . Select the **eq12cawhite** curve, as shown below. This curve is the BAS001 white noise inverse transfer function.
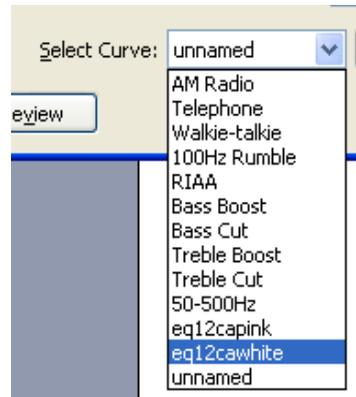
Step 9 Click **OK**. The **Equalization** graph shows the curve below.
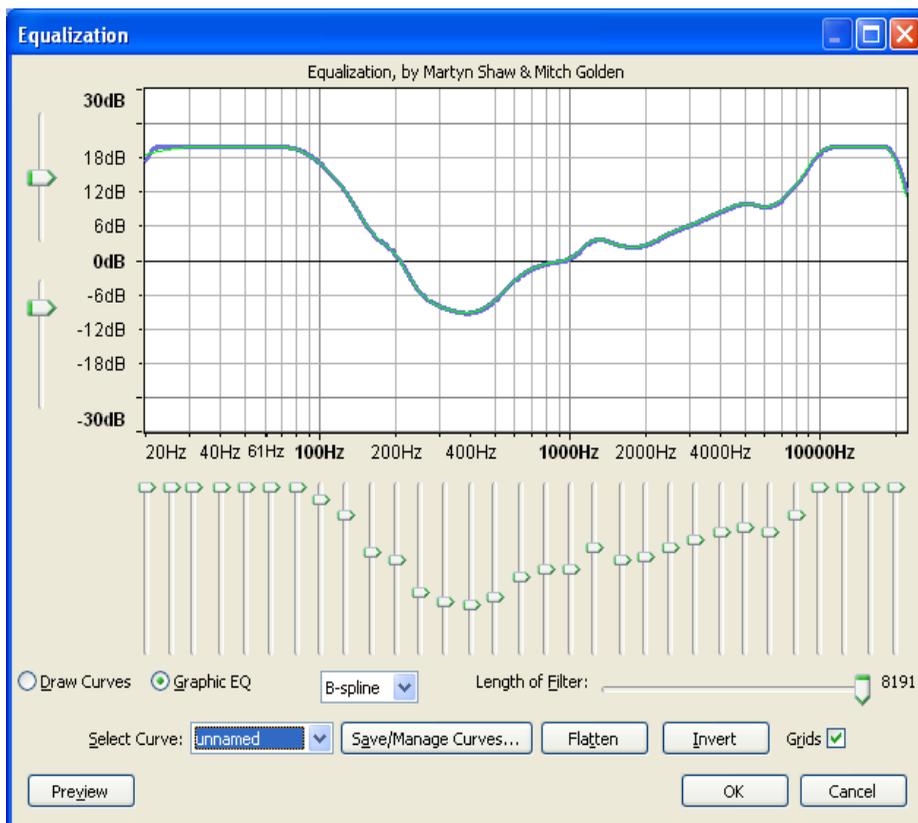
Step 10 Click **Effect** > **Normalize**. Then click **OK**.
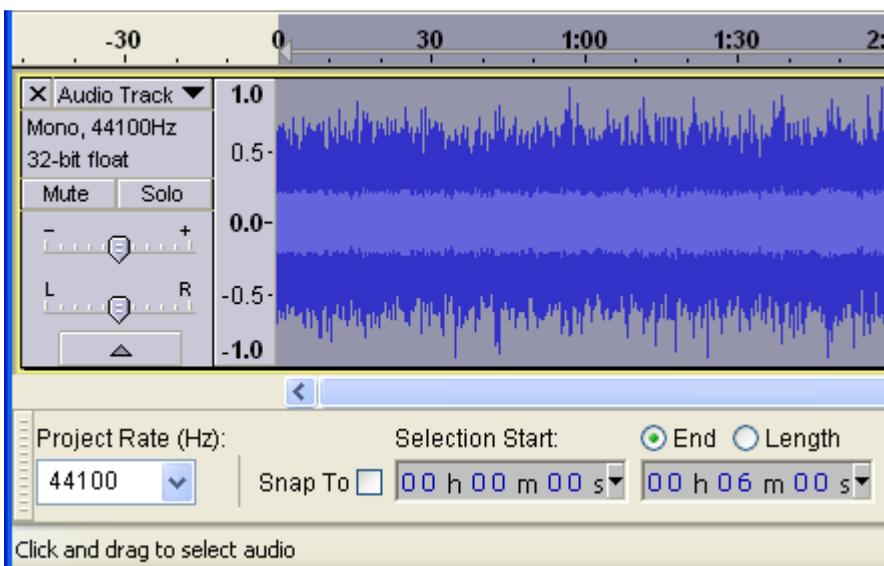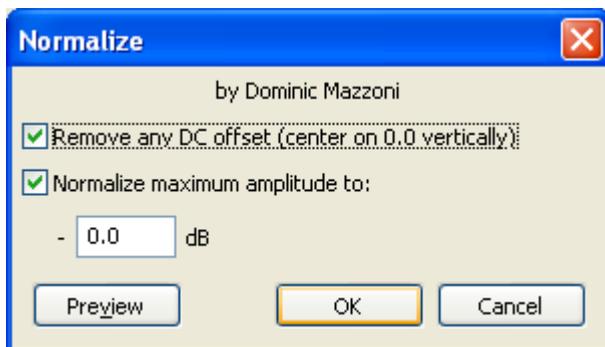
Step 11 Click **Analyze** > **Spectrum**.
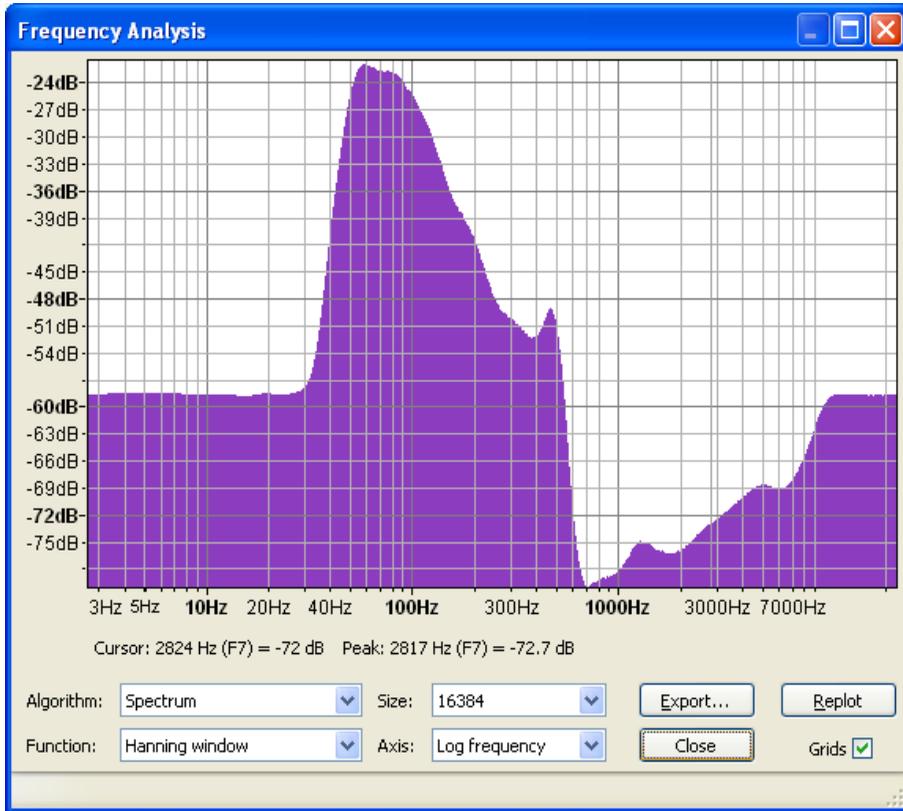
Note: Log frequency.

Step 12 Click **Effect** > **Compressor**. Compress the signal with the **Dynamic Range Compressor** dialog box, as shown below.
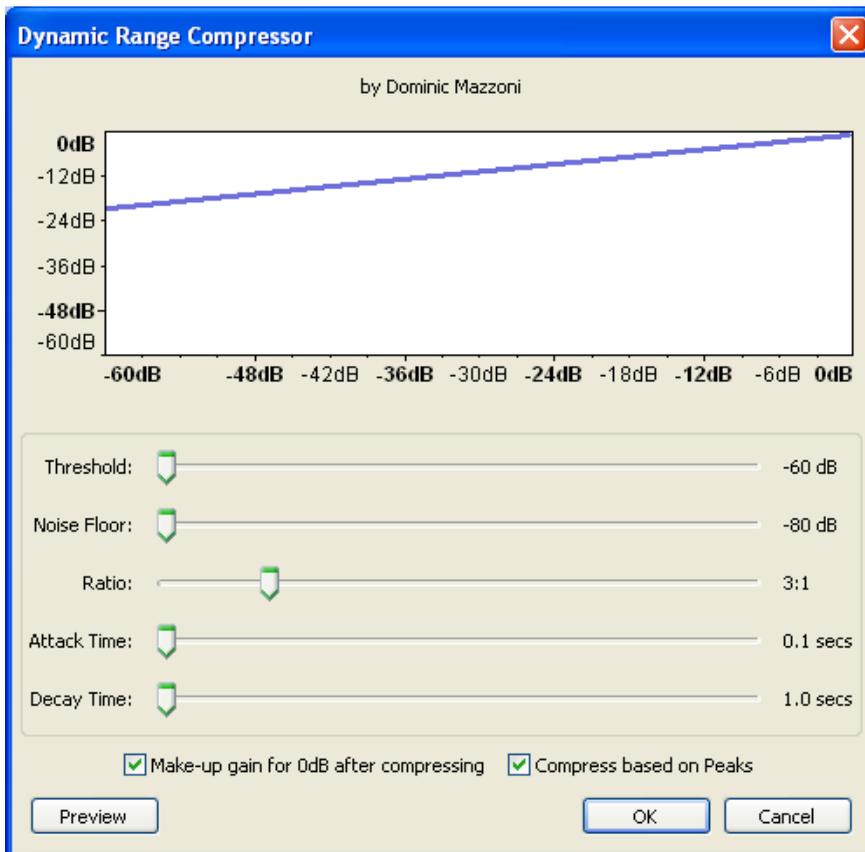
Step 13 Click **OK**.
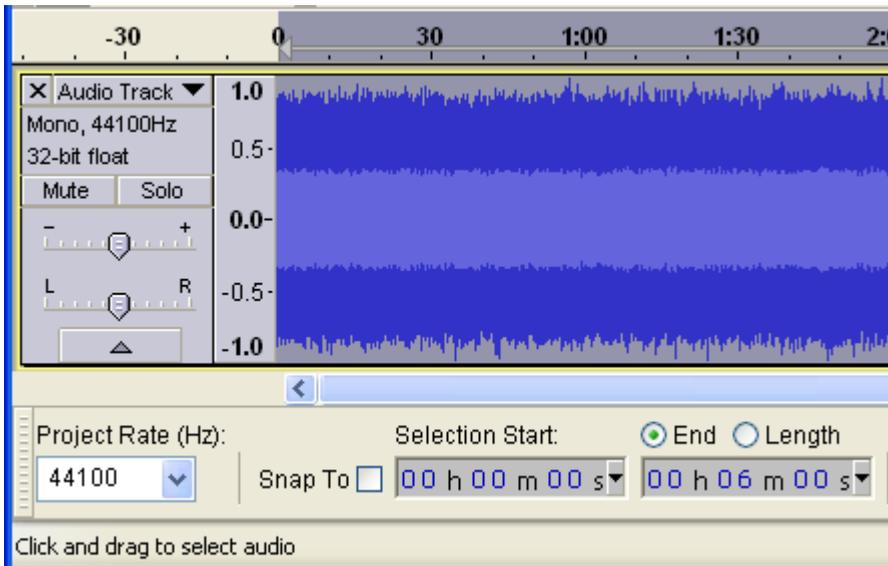
Click **Analyze** > **Plot Spectrum**.
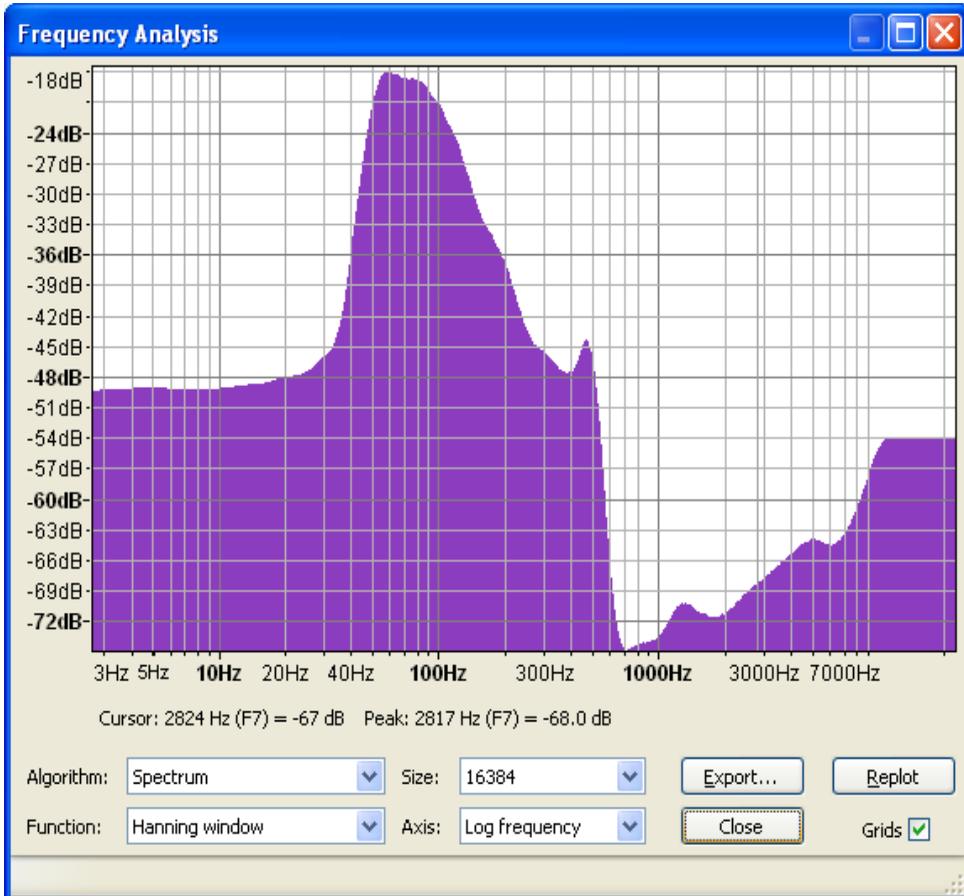
For easy recognition on the BAS002 display, filenames should be 8 characters or less. Duplicates are displayed with the same first 6 characters but the last 2 characters are shown as "➔2".

Step 14 Save as MP3 file. Click **File** > **Export**. Then select **Format: MP3**.

Step 15 Transfer to USB Memory.

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