BooTunes Amped

OPERATING MANUAL

Manual Version 1.1 (May 22, 2013)

Control The Fear

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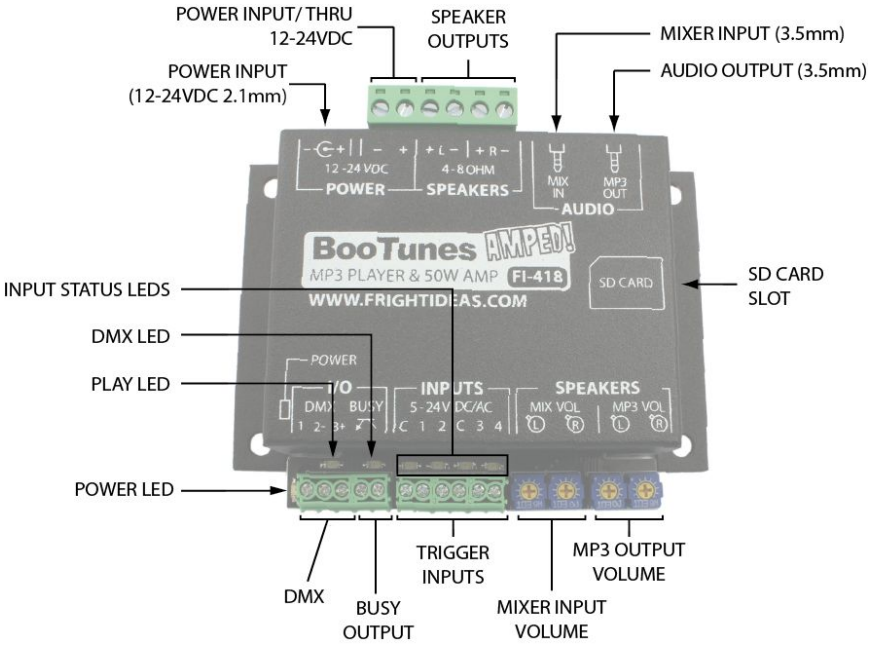
Getting Familiar with your BooTunes Amped



Connection Descriptions

Power Inputs
Power can be connected to the BooTunes Amped using either the 2.1mm barrel connector or the Power Input/Thru terminals on the terminal block. These two power connections are internally connected, the - terminal of the terminal block connects to the outside of the barrel connector, the + terminal connects to the inside.

The BooTunes Amped can operate on any voltage from 12 to 24 volts DC. It draws about 50mA of current when the amplifier is not used, or up to 2.5A when it is.

DO NOT exceed 24 volts on the power supply input or you will damage the amplifier. The power supply used MUST be regulated to ensure the correct voltage at all loads. Unregulated power supplies rated for 24 VDC will output a much higher voltage than shown on the label.

Busy Output
The busy output activates whenever the BooTunes is playing a triggered audio file. This output is an optically isolated open-collector output, perfect for driving relays or inputs to other controllers. Max current is 100mA.

Power LED
This LED illuminates when the BooTunes is connected to a power source.

Play LED
This LED illuminates when the BooTunes is playing a sound. It is also used to blink error codes.

DMX LED
This LED illuminates when the BooTunes is receiving a valid DMX signal.

DMX
The DMX connection is used to connect this unit to another BooTunes Amped, BooTunes, BooBox, or a generic DMX network. This is often done to add additional audio channels to a particular setup.

Trigger Inputs
The BooTunes has four optically isolated trigger inputs. Each trigger input has a status LED that will illuminate when the trigger is active.

Audio Output
Use a 3.5mm stereo cable to connect this output to an amplifier or powered speakers. DO NOT use headphones with this output.

Mixer Input
Line-level input mixed into the amplified Speaker Output. This audio will not be mixed into the Line Out output.

MP3 Output and Mixer Input Volume Controls
The MP3 Output Volume adjustment controls the Speaker Output volume of the BooTunes' MP3 decoder only. The Mixer Input Volume adjustment controls the Speaker Output volume of the Mix In audio.

Audio Output
Use a 3.5mm stereo cable to connect this output to an amplifier or powered speakers. DO NOT use headphones with this output.

SD Card Slot
The BooTunes supports any standard SD card, as well as cards above 2GB (SDHC). Cards must be formatted either FAT16 or FAT32.

Operation

Sound Folders
When the BooTunes starts up it will immediately look in the AMBIENT folder located in the root of the SD card. If there's a sound in there it will start playing it. Once that sound is done it will play the next one. Once all files in the folder have been played it will start back at the first one.

If a trigger is activated any time during the playback of an ambient sound, the ambient sound is immediately cancelled and the triggered sound is played. Once a triggered sound is playing, any additional triggers will be ignored until the triggered sound finishes and the BooTunes returns to Ambient mode to start playing the next sound.

Useful Tips
- If you'd prefer the ambient sound faded out instead of ending abruptly, see the _FADINT setting.
- If you'd prefer a particular triggered sound could be interrupted, see the _INT setting.
- If you'd rather the ambient mode would pick up where it left off instead of starting the next sound, see the _RESUME setting.
- If you'd like to connect some of the extra inputs to buttons so they can be used to adjust the volume, skip a track, pause a sound, etc. See the *Settings* section.

Those are just a few examples of the BooTunes settings. There's lots more settings in the *Settings* section!

SD Card Layout

Sound Folders
The BooTunes needs the sounds to be located in specially named folders so it knows when you want them played. There is an AMBIENT folder, as well as one for each input, INPUT1, INPUT2, etc. There may also be a FIRMWARE folder. This is where it will look for firmware updates. Firmware updates are available free from our website's Product Support section.

SD CARD FOLDER LAYOUT	
FOLDER	**DESCRIPTION**
\FIRMWARE\	Folder for firmware updates
\AMBIENT\	Folder for Ambient Sounds
\INPUT1\	Folder for Input 1 Sounds
\INPUT2\	Folder for Input 2 Sounds
…	
\INPUT4\	Folder for Input 4 Sounds

Sound Filenames
If you want sounds to be played in a certain order then you must name them using a three-digit number with 000.MP3 being the first file. The BooTunes will play 000.MP3 first, and then next it will play 001.MP3, then 002.MP3, etc. Make sure the filenames are sequential, if the BooTunes tried to find the next numbered file and it's not there it will start back at 000. The highest numbered file you can use is 999.MP3

If you are not concerned about the order it plays the sounds then any filename is fine. The BooTunes will play them in the order they were copied into the folder. When the BooTunes has played all the files in the folder it will start back at the first one. A maximum of 65536 sound files can be put in each folder.

The BooTunes has many powerful features that can be enabled by simply creating folders with special names. See the tables below for a list of the available features. Some settings affect the overall behavior, some are only valid in Ambient mode, some only in combination with a trigger input. To enable a setting, simply create an empty folder with the appropriate name. The setting folder you create must be located in the appropriate location for it to be recognized by the BooTunes.

GLOBAL SETTINGS

The following settings are global, meaning they affect the overall behavior of the BooTunes. These can only be used in the SD card's **ROOT** folder.

FOLDER NAME	# VALUES	DESCRIPTION
_MVOL##	0 - 25	**Master Volume -** Think of this as the main volume control on a mixer. By default it's at the maximum value of 25. If you would like the BooTunes to power-up at a lower master volume, use this option. The master volume can also be adjusted using the trigger inputs combined with the _VOLUP, _VOLDN, and _DUCK options in the corresponding input folders.
_BASS##	0 - 15	**Bass Enhancement -** This option will enable the BooTunes' powerful bass boosting DSP algorithm. By default this is set at 0 for no bass enhancement.
_TREB##	0 - 15	**Treble Adjust -** This option can be used to increase or decrease the treble. By default this value is set to 8. Using a lower or higher value will decrease or increase the treble output.
_AMPMONO		**Mono Speaker Output -** This option sets the amplifier into a mono mode allowing all 50 watts to be directed into a single 4 ohm speaker. Only the right audio signal will be heard in this configuration. See the speaker wiring diagrams for details on how to wire the speaker in this mode. **NOTE:** Some units require a jumper on the circuit board to be moved to enable mono mode. If the Busy LED continuously blinks 5 times when this _AMPMONO folder exists then you have one of these units. To set these units to mono you must remove the four screws, remove the lid, then move the only jumper to the MONO position.
_NOMUTE		**Disable Automatic Muting –** By default the amplifier is muted if no sound file has been playing for 5 seconds. This helps save power and reduce heat. The two downsides are there is a very slight pop when the amplifier is unmuted, and the Mix In input will not be amplified unless a sound file is playing. Use this option if you prefer the amplifier to be enabled at all times.

AMBIENT FOLDER SETTINGS		
 AMBIENT	The following settings can only be used in the **AMBIENT** sound folder.	
FOLDER NAME	**# VALUES**	**DESCRIPTION**
_RESUME#	1 - 5	**Resume -** This option tells the BooTunes to resume the ambient sound at the point it was interrupted, rather than starting a new sound from the beginning. The # value specifies the fade rate in seconds to fade back into the song. Use this in combination with the _FADINT option to also have the ambient sound fade out when it's interrupted.

AMBIENT OR INPUT FOLDER SETTINGS		
 AMBIENT INPUTX	The following settings can be used in the **AMBIENT or INPUT1-8** sound folders.	
FOLDER NAME	**# VALUES**	**DESCRIPTION**
_VOL-L##	0 - 25	**Volume (L) -** Sets the left channel volume for this sound folder only. Think of this setting as a channel volume control on a mixer. The final output volume is determined by combining both this volume level, as well as the current Master Volume level. For example, if this setting was at 20 (80%), and the Master Volume was at 15 (60%), the effective output volume at the jack would be 60% x 80% = 48%. If this setting is not used, the volume is by default at the maximum value of 25.
_VOL-R##	0 - 25	**Volume (R) -** Same as above but for the right channel.
_FADINT#	1 - 5	**Fade on Interrupt -** If a sound is playing from this folder and is interrupted by another sound, this option will cause the currently playing sound to fade out, rather than end abruptly. The # value specifies the fade rate in seconds. This option will only work in an INPUTX folder if it's combined with _INT or _SELFINT, as sounds played from those folders are not interruptible by default.

INPUT FOLDER SETTINGS		
		The following settings can only be used in the **INPUT1 thru INPUT8** sound folders.
FOLDER NAME	**# VALUES**	**DESCRIPTION**
_INT		**Interruptible -** If another input is triggered during playback, the current sound will be stopped and the triggered sound will be played. By default, triggers from other inputs are ignored until the sound is finished.
_SELFINT		**Self-Interruptible -** If the same input is triggered during playback, the current sound will be stopped and the next sound in this folder will be played. If there is only one sound in the folder, it will be restarted. By default, triggers from the same input are ignored until the sound is finished.
_MOM		**Momentary -** Any sound played from this folder will be Momentary, meaning it will only play for as long as the input is triggered.
_NCINPUT		**Normally-Closed Input -** The input behavior is reversed, a sound will be played when the trigger is de-activated, and not played when the trigger is active. This is useful for some PIR motion sensors that use normally-closed contacts.
_VOLUP#	1 - 5	**Increase Volume -** This option will effectively turn the input into an "Increase Volume" button. Each time the input is triggered, the BooTunes will increase the master volume by the value #. The BooTunes starts with the volume at max (25) unless the global _MVOL option is specified.
_VOLDN#	1 - 5	**Decrease Volume -** Same as above but decreases the volume.
_DUCK##	0 - 25	**Duck Volume -** This option will ramp the master volume to the value ## and then hold it there for as long as the input is held. When the input is released the volume will ramp back to the previous level. The ramp rate is fixed at 1 second. This option can be used to lower the music to an appropriate level before an announcement.
_HOLD#	0 - 5	**Hold -** This option will ramp the master volume down to 0 (mute) over a period of # seconds. Once faded, the sound will be paused. When the input is released, the sound will resume and the volume will ramp back up to the previous level.
_PAUSE#	0 - 5	**Pause -** This option will effectively turn the input into a pause button. Pressing it once will pause the sound, pressing it again will resume it.
_PREV		**Previous Sound -** This option will turn the input into a "Previous Track" button.
_NEXT		**Next Sound -** This option will turn the input into a "Next Track" button.

DMX

DMX is a network interface used to control stage lighting and other theatrical equipment. Our BooBox controllers also use DMX to control lighting and communicate with one another. There are various ways the BooTune's DMX connection can be utilized:

- Multiple BooTunes can be connected together so they all trigger in sync.
- One or more BooTunes can be connected to a BooBox so they trigger in sync with the BooBox.
- The BooTunes can be connected to a standard DMX network and controlled by sending various commands to the selected DMX channel.

DMX Settings
If you are using the BooTunes on a DMX network, one of the options below must be specified depending on your setup.

DMX SETTINGS		
The following settings folders must be located in the SD card's **ROOT** folder.		
_SLAVE		**BooTunes Slave Mode -** This option will set the BooTunes to act as a BooTunes/BooBox slave. Use this option if you want the BooTunes to stay in sync with the triggering of a master BooBox or BooTunes. In this mode the BooTunes will follow the master's lead, playing audio from it's own AMBIENT / INPUTX sound folders at the same time the master is triggered to play those same scenes.
_MASTER		**BooTunes Master Mode -** This option is useful if you want to connect multiple BooTunes together so they are triggered at the same time. Use this _MASTER option on only one of the BooTunes, usually the one that is connected to the triggers. When a trigger is activated, it will broadcast the trigger signal to all the other BooTunes on the DMX network. Use the _SLAVE option on all the slave BooTunes units.
_DMX###	1 - 512	**Generic DMX Slave Mode -** This option sets the BooTunes to a generic DMX mode, and sets the DMX channel to ###. In this mode the BooTunes can be triggered to play sounds from each folder using a single DMX channel. See *Generic DMX Commands* for more details on the commands that can be sent.

Generic DMX Commands
DMX controllers send out a value of 0-255 on each channel. Most DMX software will allow you to specify the exact value that is sent down a particular channel. The values the BooTunes needs to receive to play certain sounds from each folder are shown below.

Stopping a Sound
To stop a sound from playing send a DMX value of 16.

AMBIENT	
DMX Cmd	Sound
128	000.MP3
129	001.MP3
130	002.MP3
131	003.MP3
132	004.MP3
133	005.MP3
134	006.MP3
135	007.MP3

INPUT1	
DMX Cmd	Sound
136	000.MP3
137	001.MP3
138	002.MP3
139	003.MP3
140	004.MP3
141	005.MP3
142	006.MP3
143	007.MP3

INPUT2	
DMX Cmd	Sound
144	000.MP3
145	001.MP3
146	002.MP3
147	003.MP3
148	004.MP3
149	005.MP3
150	006.MP3
151	007.MP3

INPUT3	
DMX Cmd	Sound
152	000.MP3
153	001.MP3
154	002.MP3
155	003.MP3
156	004.MP3
157	005.MP3
158	006.MP3
159	007.MP3

INPUT4	
DMX Cmd	Sound
160	000.MP3
161	001.MP3
162	002.MP3
163	003.MP3
164	004.MP3
165	005.MP3
166	006.MP3
167	007.MP3

INPUT5	
DMX Cmd	Sound
168	000.MP3
169	001.MP3
170	002.MP3
171	003.MP3
172	004.MP3
173	005.MP3
174	006.MP3
175	007.MP3

INPUT6	
DMX Cmd	Sound
176	000.MP3
177	001.MP3
178	002.MP3
179	003.MP3
180	004.MP3
181	005.MP3
182	006.MP3
183	007.MP3

INPUT7	
DMX Cmd	Sound
184	000.MP3
185	001.MP3
186	002.MP3
187	003.MP3
188	004.MP3
189	005.MP3
190	006.MP3
191	007.MP3

INPUT8	
DMX Cmd	Sound
192	000.MP3
193	001.MP3
194	002.MP3
195	003.MP3
196	004.MP3
197	005.MP3
198	006.MP3
199	007.MP3

DMX Wiring Information
DMX devices use differential signaling to help prevent electrical noise from corrupting the data. For this to work, pins 2 and 3 on each DMX device **must** be connected using twisted pair. If this rule is not followed then the network will be very unreliable.

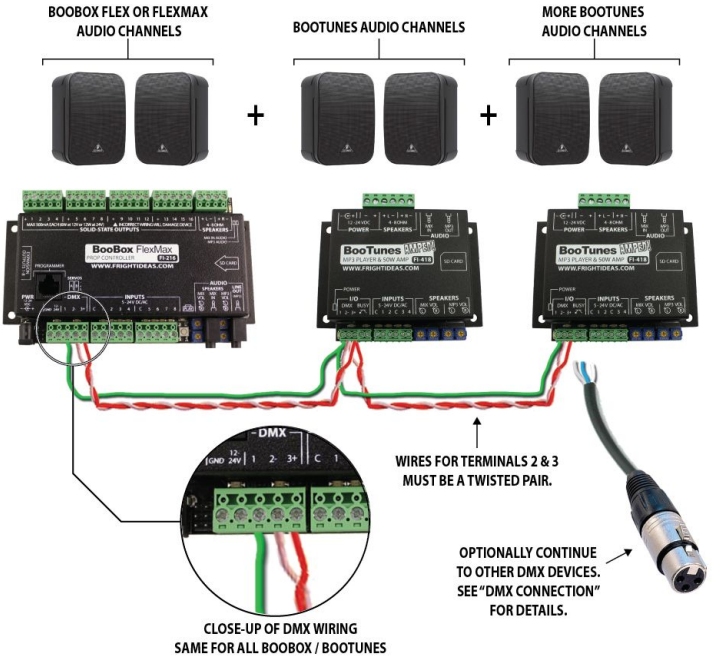
Some sources for twisted pair cables:
DMX Cable - These can be somewhat pricey, especially if you're just going to cut the ends off and connect a few BooTunes together. There is one pair of wires inside the cable, the shield is connected to pin 1.

XLR Audio Cable - While not officially rated for DMX, these will often work fine. They have the same structure as a normal DMX cable, one twisted pair inside a shield. The shield is connected to pin 1.

CAT 5 (Ethernet Cable) - This is by far the cheapest source for twisted pair. Cut up any standard CAT5 cable, or buy it in lengths at a hardware store. Use one of the pairs to connect pins 2 and 3. Use both wires from one of the remaining pairs to connect the pin 1s together.

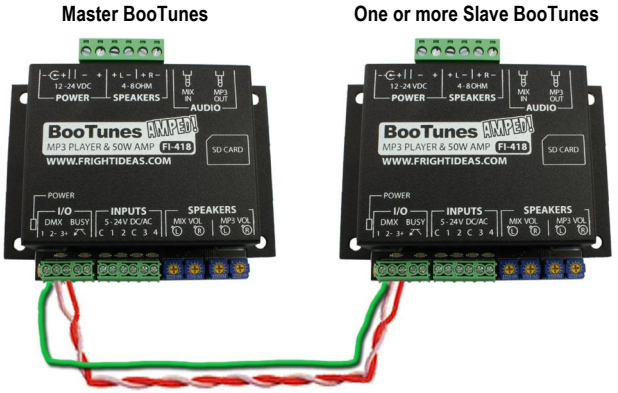
Connecting BooTunes to a BooBox

BooTunes slaved to a BooBox must have the _SLAVE option set. See *DMX Wiring Information* for some important tips on wiring the devices together.



Connecting Multiple BooTunes Together

One of the BooTunes on the network must be set to a master using the _MASTER option. The remaining BooTunes must use the _SLAVE option. Connect the triggers to the master unit. When the triggers are activated on the master, the slave units will play along as if the triggers were connected to them as well. See *DMX Wiring Information* for some important tips on wiring the devices together.



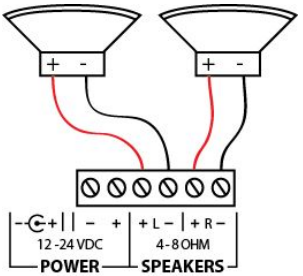
Amplifier and Mixer Input

About the Internal Amplifier

The BooTunes Amped includes a 50 watt Class D stereo amplifier. To take full advantage of this amplifier the power supply needs to be 24 volts and have at least 50 watts of power.

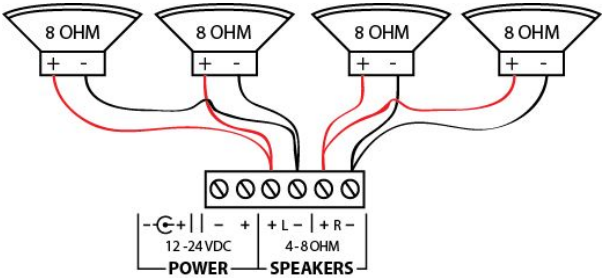
Two Speaker Wiring Diagram

The most common setup. Use only 4 or 8 ohm speakers. This setting will drive up to 25 watts into each speaker. If using 4 ohm speakers, **DO NOT** turn the volume past 50% or you will overload the amplifier.

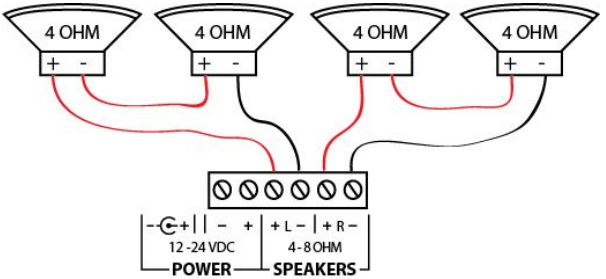


Four Speaker Wiring Diagrams

Four 8 ohm speakers can be connected in parallel. This appears as a single 4 ohm load on each speaker output. **DO NOT** turn the volume past 50% or you will overload the amplifier.

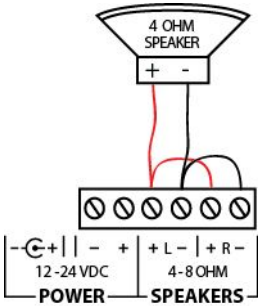


Four 4 ohm speakers can be connected in series. This appears as a single 8 ohm load on each speaker output.



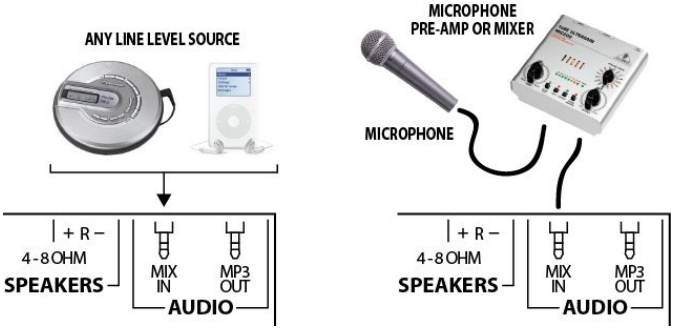
Mono Connection

This configuration will drive up to 50 watts into a single 4 ohm speaker. To use this configuration you MUST set the BooTunes Amped into mono mode. See the *Settings – Global* section for details. If you do not change this setting before wiring the speaker in this configuration you may permanently damage the amplifier.



Mix In Connection

The Mix In is a line-level audio input that allows other sound sources to take advantage of the BooTunes' internal amplifier. Any audio on this connector will be mixed with the BooTunes' output and amplified. Control the amplified volume level of this audio using the MIX VOL controls. This audio will not be mixed into the Line Out connection, only the speaker outputs. Note that you may need to use the _NOMUTE option for this input to work correctly. See *Global Settings* for more information.



Mix In Microphone Setup

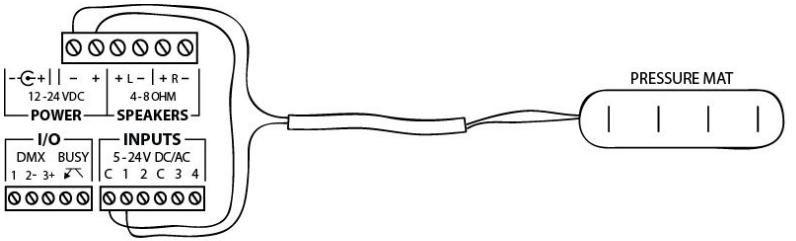
Microphones do not generally output a line-level audio signal like the BooTunes Amped expects to receive at the Mix In input. To use a standard microphone you must use a mixer or microphone pre-amp to amplify the audio to line-level before it is input into the BooTunes.

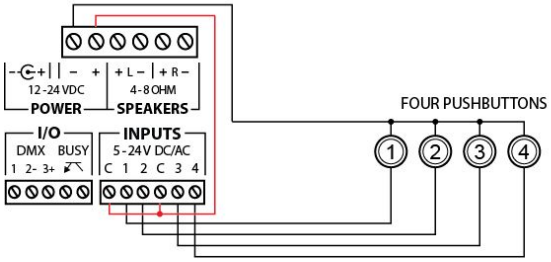
Reducing Electromagnetic Interference

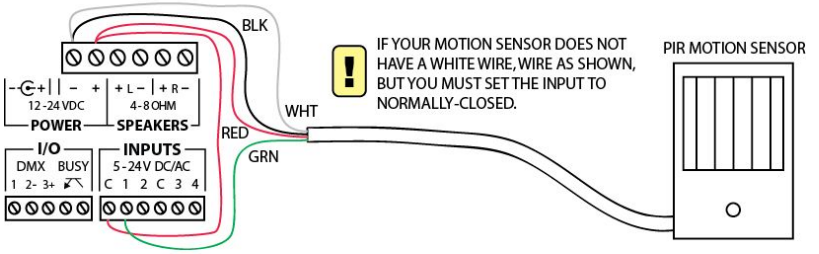
The amplifier uses efficient high frequency modulation techniques to amplify the sound to such a high level without wasting loads of energy as heat. This is how we can fit it inside the BooTunes Amped without needing the giant heat sinks typically seen on amplifiers at this wattage. This technique does however create interference in the form of high frequency noise. Not to worry, it doesn't affect sound quality, it's well beyond what humans can hear. If you'd like to keep the FCC happy and cut down on this interference, it's recommended to use shielded speaker cables. Connect the shield to the - pin in the power section of the terminal block.

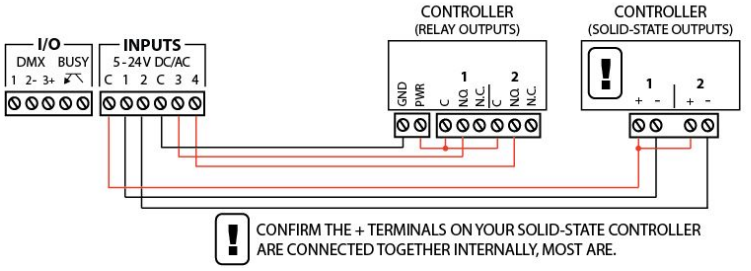
Input Wiring Diagrams

The BooTunes Amped has four optically isolated trigger inputs. Optically-Isolated inputs allow the BooTunes to be triggered by other controllers without having to share a common ground. This keeps any electrical interference and noise from the other systems power supply out of the BooTunes.





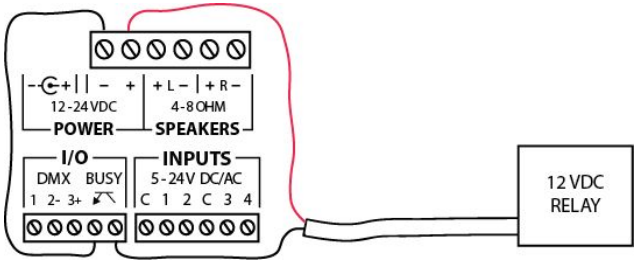




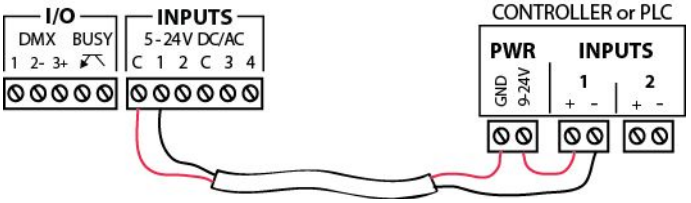
Busy Output

The BooTunes has a busy output that becomes active when a triggered sound file is playing. This can be used to drive a relay connected to a light, solenoid, or other device you'd like to turn on during playback. The maximum current the output can handle is 100mA, plenty for most relays. DO NOT connect a solenoid directly to this output as they generally draw a minimum of 250mA or more.

Busy Output Wiring Diagrams



In the example above the BooTunes is being powered by a 12 VDC power supply using the barrel connector in the back. The busy output is borrowing power from this power supply to power the relay. The load voltage must match the BooTunes power supply voltage when connected in this way.



In the example above the BooTunes is optically isolated from the device it's connected to. This is the best option when connecting the BooTunes to a controller on a different power supply.

Specifications

SPECIFICATIONS	
Audio	
File Format	MP3 Only (MPEG 1 and 2 Layer 3)
Maximum Bitrate	320Kbps (CBR, VBR)
Physical	
Length	4.1”
Width	3.375”
Height	1.125”
Amplifier	
Wattage	24VDC Stereo Mode: 25 watts RMS into each 8 ohm speaker Mono Mode: 50 watts RMS into a single 4 ohm speaker or 30 watts into a single 8 ohm speaker 12VDC Stereo Mode: 10 watts RMS into each 8 ohm speaker Mono Mode: 20 watts RMS into a single 4 ohm speaker
Speakers	Ideally 8 ohm for stereo mode, or a single 4 ohm for mono. Speakers should be rated for at least 100 watts.
Electrical	
Operating Voltage	12 - 24 VDC
Current Consumption	50mA during playback with no amplifier, up to 2.5A with amplifier
Busy Output Current	100mA Maximum
Input Trigger Voltage	5-24 VDC or VAC
Input Impedance	3.3k Ohm