



BooTunes

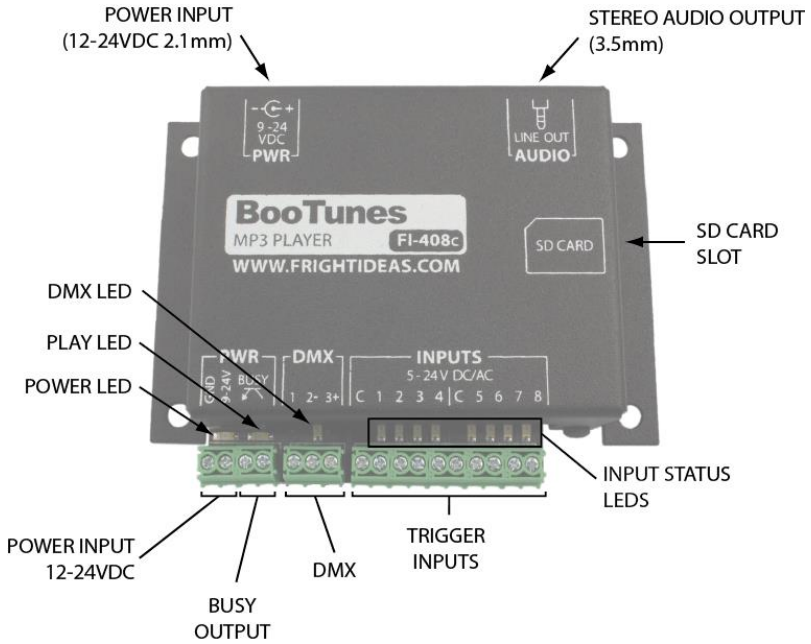
OPERATING MANUAL

Manual Version 2.7 (Oct 22, 2021)



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Getting Familiar with your BooTunes



Connection Descriptions

Power Input

Power can be connected to the BooTunes using either the 2.1mm barrel connector or the power input terminal block. These two power connections are internally connected, the GND terminal of the terminal block connects to the outside of the barrel connector, the PWR terminal connects to the inside.

The BooTunes can operate on any voltage from 9 to 24 volts. It draws about 50mA of current.

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. The maximum current capacity 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 if there is a problem.

DMX LED

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

DMX

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

Trigger Inputs

The BooTunes has eight optically-isolated trigger inputs split into two banks of four. Each trigger input has a status LED that will illuminate when the trigger is active.

Stereo 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. 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 you can download from our website.

NOTE: If you are using an older model BooTunes, it may require the sound folders be located in a folder named FI-408. You can continue to use this method, or you can update to the latest firmware and store the sound folders in the root as shown below. Either method will work on the newer firmware.

SD CARD FOLDER LAYOUT	
FOLDER	DESCRIPTION
\FIRMWARE\	Firmware folder for updates
\AMBIENT\	Folder for Ambient Sounds
\INPUT1\	Folder for Input 1 Sounds
\INPUT2\	Folder for Input 2 Sounds
...	
\INPUT8\	Folder for Input 8 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.

Settings

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		
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <p>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.</p> </div>		
FOLDER NAME	# VALUES	DESCRIPTION
_BINARY		Legacy Binary Mode - All inputs are used to directly address up to 128 sounds. Use inputs 1 thru 7 to set your address, then pulse input 8 to play the sound. The BooTunes will convert the value on inputs 1 thru 7 from binary to a three-digit number and then play that sound from the INPUT1 folder. For example, activating inputs 1 and 2, then pulsing 8 will play sound 003.MP3, activating inputs 1,2, and 4 will play sound 011.MP3.
_BINARY2		Improved Binary Mode – The Legacy Binary Mode above required all sounds to be located in the INPUT1 folder. Ambient sounds didn't play and none of the input options like fade on interrupt, resume, etc., would work. This new mode is much more versatile. See <i>Binary Mode (Improved)</i> for more details.
_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 BooTune's 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.
_TMR####	1-2184	Input 1 Timer – Automatically trigger Input 1 every #### seconds. Leading zeros are not required. Maximum value is 2184 seconds (36 minutes). For Example: _TMR600 to auto trigger every 10 minutes _TMR90 to auto trigger every 90 seconds

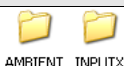
AMBIENT FOLDER SETTINGS



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



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.
_RND		Random Play - Enables random play for this folder. Note that at least one input should be connected when this option is enabled. This is because the random number generator gets its entropy from the timing of the inputs. Thus the random order for any Ambient sounds will be the same after each power-up, until any one of the inputs are triggered.

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.
_PRED###	1-255	Trigger Pre-Delay – When this input is triggered the BooTunes will first delay ### seconds before playing the sound.
_POSD###	1-999	Trigger Post-Delay – After a sound in this folder plays to completion, additional triggers on this input will be ignored for ### seconds.
_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.
_NOLOOP		No Looping - Prevent the audio from looping if the input is still triggered once the audio is finished.
_LOOPONE		Loop One Sound - Loop the next sound file in the folder until interrupted by another input.
_LOOPALL		Loop All Sounds - Loop through all the sounds files in the folder until interrupted by another input.
_PLAYALL		Play All Sounds Once - Play through all the sounds in the folder once then stop.

Binary Mode (Improved)

NOTE: This mode requires firmware version 1.62 or higher. See <http://help.frightideas.com/408c> for the latest firmware.

In binary mode the eight inputs are split into two sets of bits. Inputs 1 thru 4 address a sound number from 001 to 015, and inputs 5 thru 7 address the input folder number from 1 to 8. Input 8 is the Submit input which must be strobed to submit the play request.

SOUND FILE NUMBER				
Inputs				
1	2	3	4	Sound
OFF	OFF	OFF	OFF	Next Sound
ON	OFF	OFF	OFF	001
OFF	ON	OFF	OFF	002
ON	ON	OFF	OFF	003
OFF	OFF	ON	OFF	004
ON	OFF	ON	OFF	005
OFF	ON	ON	OFF	006
ON	ON	ON	OFF	007
OFF	OFF	OFF	ON	008
ON	OFF	OFF	ON	009
OFF	ON	OFF	ON	010
ON	ON	OFF	ON	011
OFF	OFF	ON	ON	012
ON	OFF	ON	ON	013
OFF	ON	ON	ON	014
ON	ON	ON	ON	015

INPUT FOLDER NUMBER			
Inputs			
5	6	7	Folder
OFF	OFF	OFF	INPUT1
ON	OFF	OFF	INPUT2
OFF	ON	OFF	INPUT3
ON	ON	OFF	INPUT4
OFF	OFF	ON	INPUT5
ON	OFF	ON	INPUT6
OFF	ON	ON	INPUT7
ON	ON	ON	INPUT8

Playing a Sound

1. Turn on the inputs to select your sound file and input folder number as shown in the tables above.
2. Pulse input 8 for at least 10ms to start the sound.

Input 8 Strobe Information

If you are using a feature that requires the input to remain on, such as Momentary, Hold, or Duck, you can keep input 8 ON to keep that feature enabled.

If you have requested a sound and leave input 8 on, that sound will loop input 8 is still active when the sound completes. If that's an issue, you can create an empty folder named `_NOLoop` inside the INPUT8 folder to force the strobe to behave in a single shot mode.

Stopping a Sound

Request any sound number greater than 001 that does NOT exist to stop playback, including Ambient mode. Note that the currently playing sound must be interruptible for this to work. Ambient sounds are always interruptible.

Playing the Next Sound

Do NOT use a file named 000, which would be equivalent to all inputs off. This command is reserved to play the next sound file in any particular folder. You can load a folder up with sounds and just keep submitting number 000 to play the next sound in the folder.

Sound File Naming

Sound file names don't have to be numbered unless you want sounds to play in a particular order, or you need to be able to call out specific sounds in each folder. If you are using numbered filenames, do NOT use 000, start with 001.

Ambient Folder

When any triggered sound is finished the BooTunes will return to the Ambient folder to play the next Ambient sound in the folder. The `_FADINT#` and `_RESUME#` options can be used to resume and fade out the Ambient sounds if desired. If you don't want Ambient sounds just leave this folder empty.

Interrupting Sounds, Other Input Features

This binary mode is much like the normal operating mode. Input sounds cannot be interrupted by default, you must use the `_INT` or `_SELFINT` folder options to enable that. All the other folder settings like Pre-Delay, Post-Delay, No Loop, Loop All, Duck, Hold, Pause, etc., will work as well.

Examples:

Play sound 001 in the INPUT1 folder	Turn on Input 1. Pulse input 8.
Play sound 005 in the INPUT3 folder	Turn on Inputs 1, 3, & 6. Pulse input 8.
Play the next sound in INPUT4 folder	Turn on Inputs 5 & 6, Pulse input 8.
Stop a Sound	Turn on Inputs 1-7 to address a sound file greater than 000 that does not exist. Pulse input 8.
Increase or Decrease Volume	Create the <code>_VOLUP#</code> or <code>_VOLDN#</code> folder inside one of the INPUTX folders. Select that folder on inputs 5 thru 7. Pulse input 8.
Play part of a sound	Use the Momentary feature. Create a folder named <code>_MOM</code> in the folder where the sound resides. Setup inputs 1-7 to address the sound and turn on input 8. The sound will play for as long as the inputs stay on. When you want to stop the sound turn off input 8.
Ducking or Holding a sound	Create the <code>DUCK##</code> or <code>HOLD#</code> folder as described in the Input Folder Settings. Select that folder using inputs 5 thru 7. Turn on input 8, the volume will decrease and the sound will pause if you are using <code>HOLD#</code> . Release input 8 to resume the sound and let the volume increase.

DMX and BooBox Slave Mode

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.
_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 <i>Generic DMX Commands</i> for more details on the commands that can be sent.
_DMXVOL		DMX Volume Control - This option can be combined with the _DMX### option above to enable volume control over DMX. With this option enabled the BooTunes' second DMX channel will control the volume of the MP3 decoder. So if _DMX### is set to _DMX021, commands must be sent to channel 21, volume can be controlled on channel 22.

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 (10h). All commands are shown in decimal with the hexadecimal equivalent in the brackets.

AMBIENT	
DMX Cmd	Sound
128 (80h)	000.MP3
129 (81h)	001.MP3
130 (82h)	002.MP3
131 (83h)	003.MP3
132 (84h)	004.MP3
133 (85h)	005.MP3
134 (86h)	006.MP3
135 (87h)	007.MP3

INPUT1	
DMX Cmd	Sound
136 (88h)	000.MP3
137 (89h)	001.MP3
138 (8Ah)	002.MP3
139 (8Bh)	003.MP3
140 (8Ch)	004.MP3
141 (8Dh)	005.MP3
142 (8Eh)	006.MP3
143 (8Fh)	007.MP3

INPUT2	
DMX Cmd	Sound
144 (90h)	000.MP3
145 (91h)	001.MP3
146 (92h)	002.MP3
147 (93h)	003.MP3
148 (94h)	004.MP3
149 (95h)	005.MP3
150 (96h)	006.MP3
151 (97h)	007.MP3

INPUT3	
DMX Cmd	Sound
152 (98h)	000.MP3
153 (99h)	001.MP3
154 (9Ah)	002.MP3
155 (9Bh)	003.MP3
156 (9Ch)	004.MP3
157 (9Dh)	005.MP3
158 (9Eh)	006.MP3
159 (9Fh)	007.MP3

INPUT4	
DMX Cmd	Sound
160 (A0h)	000.MP3
161 (A1h)	001.MP3
162 (A2h)	002.MP3
163 (A3h)	003.MP3
164 (A4h)	004.MP3
165 (A5h)	005.MP3
166 (A6h)	006.MP3
167 (A7h)	007.MP3

INPUT5	
DMX Cmd	Sound
168 (A8h)	000.MP3
169 (A9h)	001.MP3
170 (AAh)	002.MP3
171 (ABh)	003.MP3
172 (ACh)	004.MP3
173 (ADh)	005.MP3
174 (AEh)	006.MP3
175 (AFh)	007.MP3

INPUT6	
DMX Cmd	Sound
176 (B0h)	000.MP3
177 (B1h)	001.MP3
178 (B2h)	002.MP3
179 (B3h)	003.MP3
180 (B4h)	004.MP3
181 (B5h)	005.MP3
182 (B6h)	006.MP3
183 (B7h)	007.MP3

INPUT7	
DMX Cmd	Sound
184 (B8h)	000.MP3
185 (B9h)	001.MP3
186 (BAh)	002.MP3
187 (BBh)	003.MP3
188 (BCh)	004.MP3
189 (BDh)	005.MP3
190 (BEh)	006.MP3
191 (BFh)	007.MP3

INPUT8	
DMX Cmd	Sound
192 (C0h)	000.MP3
193 (C1h)	001.MP3
194 (C2h)	002.MP3
195 (C3h)	003.MP3
196 (C4h)	004.MP3
197 (C5h)	005.MP3
198 (C6h)	006.MP3
199 (C7h)	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:

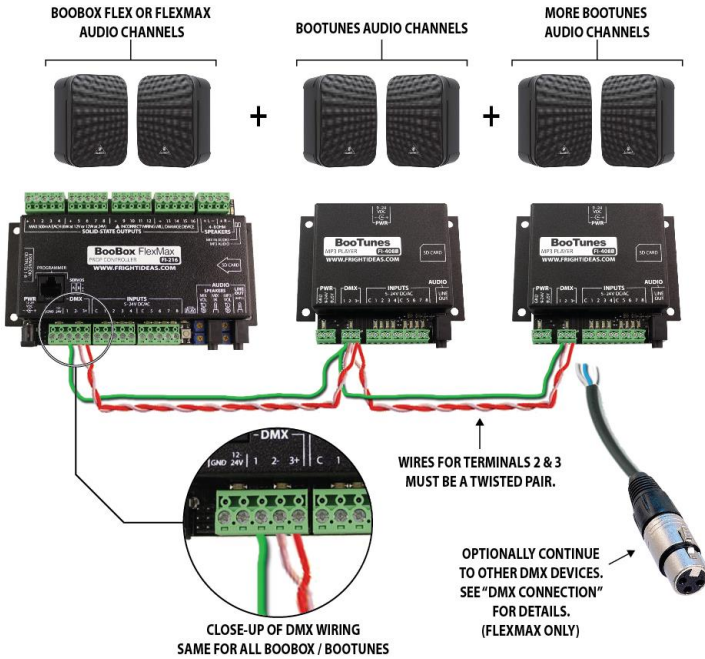
DMX Cable - These can be somewhat pricey, especially if you're just going to cut the ends off and connect a few BooTunes together. There is one pair of wires inside the cable, the shield is connected to pin 1.

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.

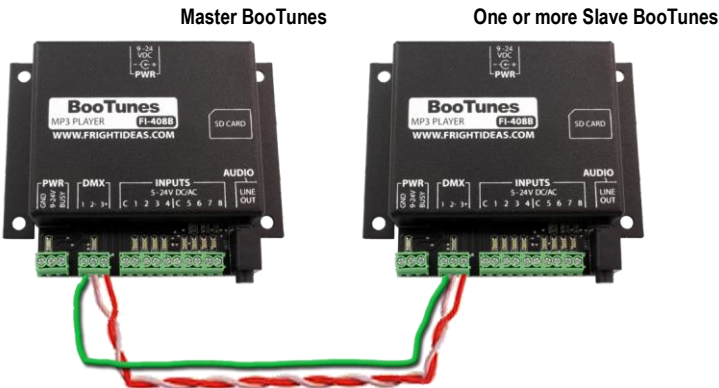
Connecting BooTunes to a BooBox

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.

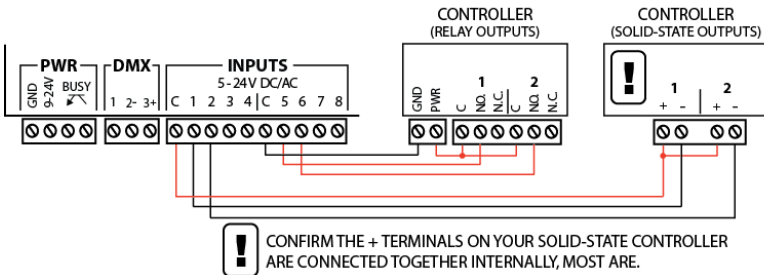
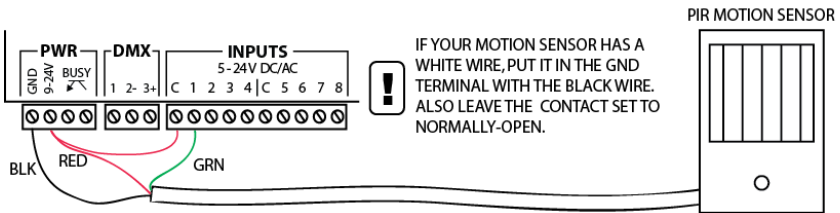
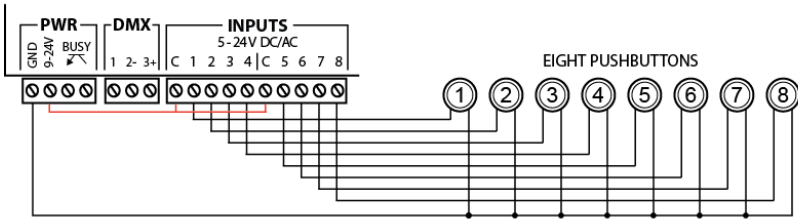
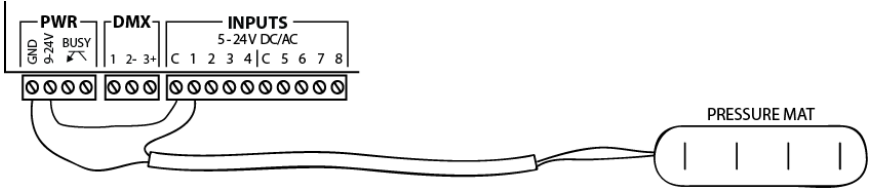


Wiring Diagrams

Input Wiring Diagrams

The BooTunes has eight optically-isolated trigger inputs split into two banks of four, each with its own common terminal. 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.

The reason for two separate banks is so you can maintain electrical isolation even if you are triggering the BooTunes from two different sources. For example, two different controllers or one controller and a few pushbuttons. See the Input Wiring Diagrams for more information.



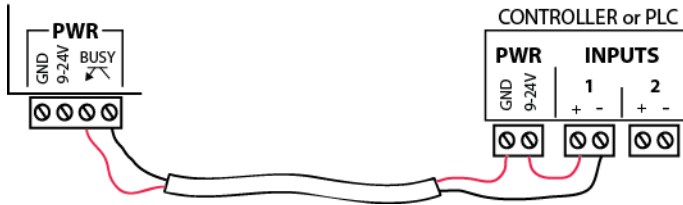
Busy Output

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, 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	2.75"
Height	1.125"
Electrical	
Operating Voltage	12 - 24 VDC
Current Consumption	50mA during playback
Busy Output Current	100mA Maximum
Input Trigger Voltage	5-24 VDC or VAC
Input Impedance	3.3k Ohm