

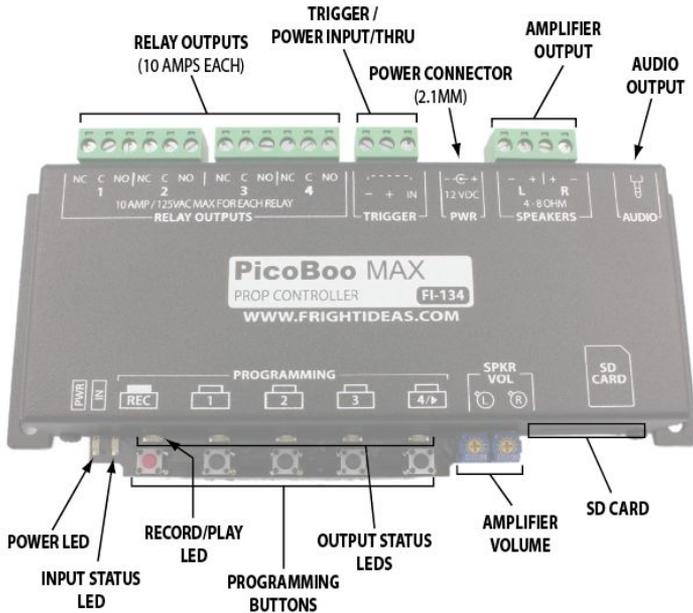
# PicoBoo MAX

OPERATING MANUAL  
V1.0 (Mar 26, 2013)



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[www.frightideas.com](http://www.frightideas.com)

## Getting Familiar with your PicoBoo MAX

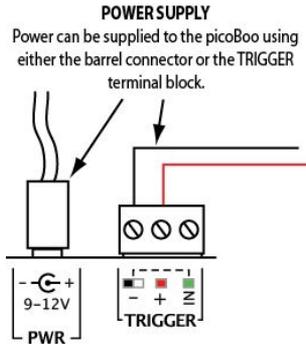


### CONNECTIONS AND CONTROLS

Relay Outputs	Each relay output has normally-open and closed terminals and can handle up to 10 amps at 125 VAC.
Power Connector	Power Input connector. 2.1mm center-positive.
Power Input/Thru Trigger	3 pin pluggable terminal block for optional trigger. The – and + pins on this terminal block are connected directly to the – and + pins on the <i>Power Connector</i> .
Amplifier Output	Speaker output terminals for using the internal 30 watt amplifier.
Audio Output	3.5mm line-output stereo audio jack for connection to amplified speakers or other audio amplifier.
Power LED	Indicates the presence of power.
Input Status LED	Indicates when the trigger input is active.
Amplifier Volume	Volume controls for the <i>Amplifier Output</i> only.
Record/Play LED	Indicates solid red when recording, flashes red while playing. Blinks twice on power-up if write-protection is enabled, once if it's not.
SD Card	Socket for standard SD card. Push to eject. Cards sizes 32MB and higher are supported, including SDHC cards (4GB and higher).
Programming Buttons	Record and Output buttons used to record animation.
Output Status LEDs	Output status LEDs indicate the status of the relay outputs.

## Connecting your Power Supply

Always use a 12 volt DC power supply with your PicoBoo MAX. Using a regulated power supply is highly recommended. If using an unregulated power supply then use a 9 volt power supply. Power is usually connected to the PicoBoo using the 2.1mm barrel connector, but can also be connected using the – and + pins on the *Trigger* terminal block.



## Sizing your Power Supply

Your PicoBoo's power supply must always be 12 volts DC. The wattage you'll need depends on whether you're using the internal amp, and if you're trying to power solenoids from the same supply.

Add up the wattage of all the devices that will be used at the same time and make sure your power supply's wattage is equal to or higher than that number. Use 2 watts for the PicoBoo MAX if you're not using the internal amplifier, or 30 if you are.

If your power supply or devices do not have a wattage rating on them, multiply the A by 12 to get the wattage. If the A value has an "m" in front of it, divide it by 1000 first.

For example, let's calculate the power supply required for a setup with the following devices:

- 2 x 12 VDC 6 watt solenoids
- 2 x 12 VDC 120mA LED lights

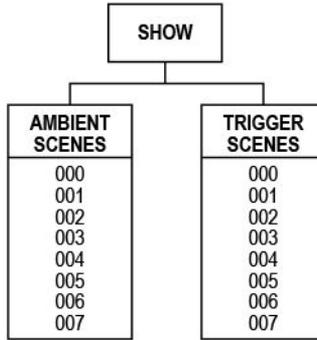
We want to use the amplifier, so we start with 30 watts for the PicoBoo.

30	watts for PicoBoo with Amplifier	
+ 12	watts for two 6 watt solenoids	
+ 2.88	watts for two LED lights. Each LED wattage = $(120\text{mA} / 1000) \times 12 = 1.44$ watts	
= 44.88 watts Maximum		

In this case a 12 volt 60 watt (5 amp) power supply would probably be the best fit. If you knew for sure only one solenoid valve would be on at any one time you could do the calculation with just one of the valves to see if a smaller power supply would work.

## Operation

The PicoBoo MAX is essentially a show controller. In this case, a show consists of different scenes of digital animation and sound that are played upon a trigger. Each of these scenes can be empty, contain one scene, or contain multiple scenes that are indexed through with each trigger. It is not necessary to have a scene programmed in every location. A very simple show may only have one Input or Ambient scene.



Show Diagram

### Scene Length

The length of the animation always dictates the length of a scene. If you have a sound that's four minutes long, and program one minute of animation, you will only hear one minute of that sound when the scene plays. If you want the entire sound to be heard, you must program animation for its entire length.

### Ambient Scene

The Ambient scene loops continuously while the controller waits to be triggered. This scene is most often blank, but when used, can really help build anticipation for the trigger scene. Often there is only audio in this scene, but more advanced scenes may also control any of the relay outputs.

When the trigger input is activated, this scene will be interrupted and the trigger scene will begin. Once the trigger scene is complete, the ambient scene will restart at the beginning. For a little variety, program up to 8 different animation scenes in Ambient. Or if you only need sound in the ambient mode, you can put as many sounds as you want and the PicoBoo MAX will play through them all.

### Trigger Scene

These scenes are triggered when the corresponding trigger input is activated. By default, the scene will be played to completion, ignoring any other trigger inputs. Once completed, the ambient scene will be played if it exists, otherwise the unit will sit idle. If the trigger input is still activated once the scene completes, the scene will loop.

To add a little variety, program multiple scenes and sounds for your trigger scenes. Each time the trigger is activated the next scene will be played.

### Scene Options

Each scene's behavior can be customized to behave differently depending on your requirements. See *Settings* for more information.

The PicoBoo MAX requires certain files and folders to be present on the card for it to function. If you are starting with a fresh card please download the necessary files from the support section of our website.

All audio and animation is stored on the PicoBoo MAX's SD card. This setup allows for easy backup or duplication of your work. The animation files are taken care of by the MAX and should be left alone. The only things you'll need to play with are the audio files.

### Changing the Audio

To change the audio on your PicoBoo MAX you must replace the MP3 audio file(s) located in the AMBIENT and INPUT1 folders. Sound files must be in MP3 format. See *Sound Filenames* below for more information on naming sound files.

### Downloading MP3 Audio Files

A lot of ready to use MP3 files can be easily downloaded from the internet. Try websites such as [www.findsounds.com](http://www.findsounds.com) or <http://www.sounddogs.com> when searching for sound files.

### Creating an MP3 from a CD Track

The easiest way to do this is to use the free iTunes software available from [www.apple.com](http://www.apple.com). The default audio file created by iTunes is AAC, which will not work. After you install iTunes change the import format to MP3. To do this open the Preferences, click on General, then Import Settings, select MP3 Encoder. Import the track from the CD by clicking on the CD in the left column and then clicking import. Once that's done, go to your Music Library and find the new song, then drag it to the SD card.

### Creating or Editing MP3 Audio Files

To create or edit an MP3 audio you'll need an audio editor. A free program *Audacity* is available from [audacity.sourceforge.net/](http://audacity.sourceforge.net/). You'll also need to install the Lame MP3 Encoder listed on their site so you can save as MP3.

### SD Card Layout

The PicoBoo MAX needs the sound files to be located in the appropriate folders so it knows when you want them played. There is an AMBIENT folder, as well as one for INPUT1. There may also be a FIRMWARE folder. This is where it will look for firmware updates you can download from our website.

SD CARD FOLDER LAYOUT	
FOLDER	DESCRIPTION
\FIRMWARE\	Firmware folder for updates
\AMBIENT\	Folder for Ambient Sounds and Animation
\INPUT1\	Folder for the Trigger Sounds and Animation

### Sound Filenames

If a particular scene folder will only have one sound with synced animation, or multiple sounds with no animation, then the sound filenames can be anything. If you have multiple sound files, each with its own animation, then the sounds must be named with a three digit number starting with "000.MP3". See *Recording Multiple Scenes* for more information on multiple sounds with animation.

Depending on the settings of your operating system, you may or may not see the .MP3 portion of the filename. If you don't see it then don't add it. This will result in a file named "000.MP3.MP3" which will not work.

The .BIN files are animation files, and can be copied to other folders or SD cards to clone scenes.

## Recording Animation

The PicoBoo MAX's animation can be programmed in real-time using the buttons on the unit, or by using our free software *Director*. For highly complicated shows with many scenes, or if you want to tweak an existing show, we recommend checking out Director.

### Recording the Trigger Animation

1. Press "REC". The red light will turn on and the scare sound will start playing.
2. Press the "1" thru "4" output buttons to turn on the outputs as you want them to turn on. Synchronize your actions with the sound. You can press each button as many times as you want or hold them for as long as you want. Whatever you do on those buttons will be recorded.
3. Press "REC" again to stop recording. The scene is automatically saved. Press "4" or trigger the input to preview the scene.

NOTE: If you are having problems recording and are using a normally-closed motion sensor for a trigger, disconnect the motion sensor and change the input back to normally-open before recording.

### Recording Ambient Animation

The PicoBoo MAX can also have animation in the ambient mode. To record it:

1. Remove the power from the PicoBoo.
2. Hold the "3" button. Power up the PicoBoo while holding the button. When the yellow "3" light turns on you can let go.

Pressing the "REC" button will now record the ambient animation. To preview your scene press "3". To go back to recording the scare animation, power down and back up without holding any buttons.

### Recording Outputs One at a Time

1. Hold the "REC" button for a few seconds until all the output LEDs turn on.
2. While still holding the "REC" button, use the output buttons to toggle the outputs you'd like to record. If the light is on that output will record, if it's off it will play back.
3. Once you've selected the outputs you'd like to record, let go of the "REC" button.

Now when you record, only the outputs you enabled will accept new animation, the disabled outputs will play back any previously recorded animation. If you need to shorten or clear your scene, you'll need to enable all the outputs again. A scene can only be shortened if all the outputs are enabled for recording.

### Recording Multiple Scenes

If you'd like additional scenes with animation in either the Ambient or Input1 folders follow the procedure below.

In either the AMBIENT or INPUT1 folder (wherever you want the extra scene)...

1. Make a copy of the 000.BIN file and rename it 001.BIN.
2. Rename the 000.MP3 file to 001.MP3.
3. Put the additional sound into the folder and rename it 000.MP3.
4. Record using either the *Trigger Animation* or *Ambient Animation* method above.

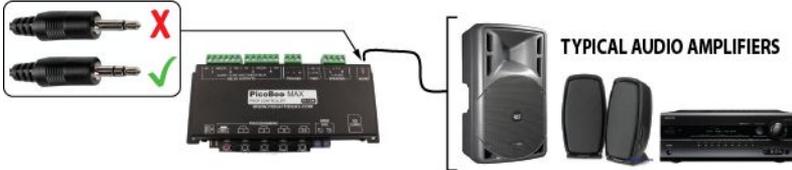
For additional scenes simply repeat the above steps, renaming 001.BIN and 001.MP3 in steps 1 and 2 to 002, 003, etc., each time.

Triggering the PicoBoo MAX will play the 000 files the first time, 001 the second, 002 third, etc.

## Audio and Speaker Connections

The PicoBoo MAX has a line-level audio output, as well as an amplified speaker output. You can use just one or both at the same time.

### Connecting to the Line-Level Output



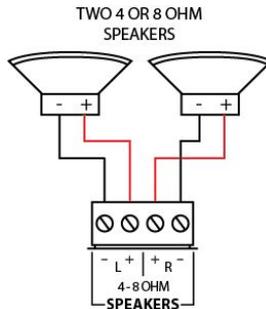
The PicoBoo MAX's internal MP3 player outputs the standard line-level audio signal typically expected by most audio amplifiers. Amplified speakers, computer speakers, and AV Receivers are a few examples of amplifiers that will work great with your PicoBoo MAX.

The end of the audio cable that connects to the PicoBoo MAX should be a 3.5mm stereo jack, same as a set of headphones. The other end will have to match the input of your amplifier. A 3.5mm stereo jack, or red and white RCA jacks, are the most typical inputs for these devices.

### Using the Internal Amplifier

The PicoBoo has an internal 30 watt audio amplifier that can be used to drive standard speakers. Car speakers or horn speakers are common examples. Horn speakers are inexpensive and work well for screams and other mid to high pitch sounds. Standard 4 ohm car speakers are best if you are playing music or lower pitch sounds. 8 ohm speakers are common with home stereos, and can also be used, but will only receive half the power from the amplifier.

If you hear the audio cutting out as it plays, your power supply is likely overwhelmed. Either swap out the supply with one of higher wattage, or turn down the volume.



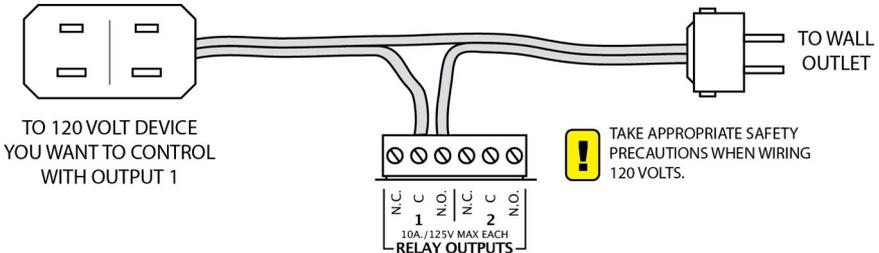
PicoBoo MAX Speaker Wiring Diagram

## Relay Outputs

The relay outputs are simple contact closures, which are switches that you must wire to turn whatever device you want to control on or off. One wire must always go into the common terminal (C), the other into either the normally-open (N.O.) or normally-closed (N.C.). Using the N.O. terminal will result in the device normally being off, and turning on when you press the output's button, while the N.C. terminal will give you the opposite result. Each relay can handle 10 amps at 125 volts.

### Controlling 120 Volt Loads

The easiest way to control a 120 volt load is to wire an extension cord through one of the output relays. Cut one of the wires, strip the two ends, and insert them into the C and N.O. terminals. If it's a three-wire extension cord, cut the black wire as previously described.

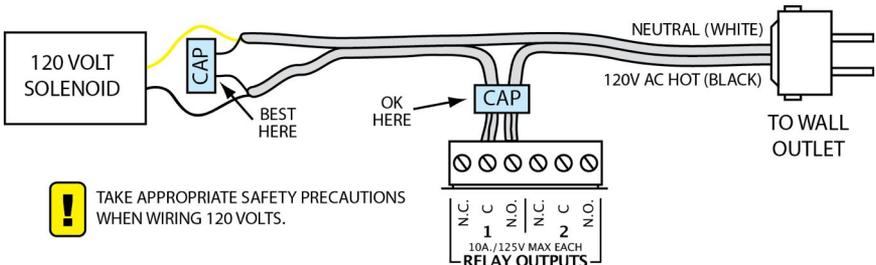


### Controlling Solenoids or Large Relays

Solenoids and Large Relays create a lot of interference, which can wreak havoc with nearby electronic devices, including the PicoBoo. If you notice erratic behavior when controlling one of these devices, this is the most likely problem. The solution depends on whether you are using AC or DC solenoids.

#### 120 VAC Solenoids

High voltage capacitors can be used to absorb feedback from AC solenoids. The best place to install them is as close to the solenoid as possible. If that's not possible, then across the terminal block may work as well. A 0.1uF capacitor rated for at least 200V is recommended. (Radio Shack part numbers 272-1053 or 272-1051)



#### 12 Volt DC Solenoids Powered from the PicoBoo's Power Supply

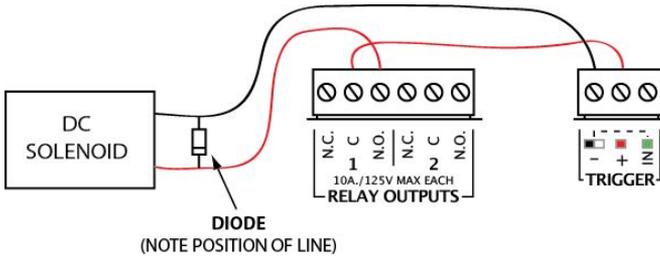
If the power supply used to power the PicoBoo is large enough, you can use it to power the solenoid as well. Use the trigger terminal block to share the PicoBoo's power supply. When sizing your power supply, make sure you reserve at least 2 watts for the PicoBoo, if you're not using the amp, and at least 15 watts if you are. See the diagram below for wiring details.

### 24 Volt DC Solenoids or Any DC Solenoid Powered from a Separate Power Supply

If your solenoid is not 12 VDC, or your PicoBoo's power supply does not have enough wattage to power both the PicoBoo and the valve, you'll need to use a separate power supply. See the diagram below for details.

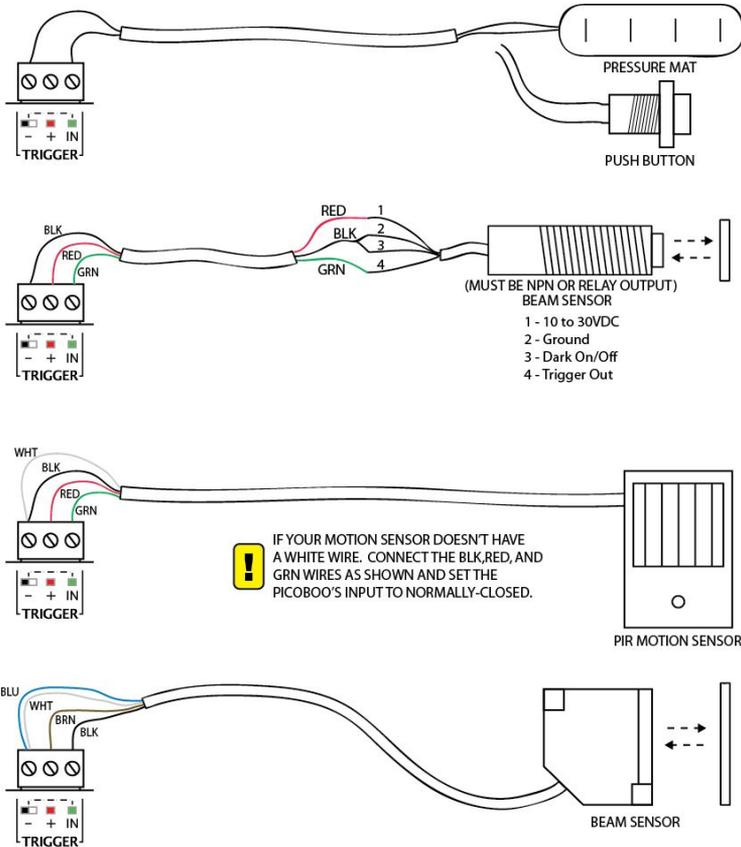
#### Diodes for Feedback Suppression

Diodes are recommended to absorb feedback from DC solenoids. Note the orientation of the diode, using the line on the one side as a guide. Locate the diode as close to the solenoid as possible. A standard 1N4001 – 1N4004 diode will work fine, and they're available for less than a dollar at your local Radio Shack. (Radio Shack part numbers 276-1103 or 276-1102)



## Trigger Input

The PicoBoo MAX is designed to work with low-voltage sensors or contact closures only. DO NOT use typical outdoor motion sensors found at local hardware stores. The PicoBoo will trigger when the IN terminal is connected to the GND terminal. As illustrated below, this can be accomplished in several ways.



### Using PIR Motion Sensors

Some motion sensor's outputs are normally-closed, meaning it connects the IN to GND when there's no motion, and disconnects it when there is. If this is the case, you must set the PicoBoo's input to normally-closed. See the Settings section on the next page for details on how to do this.

If you are unsure if your motion sensor is normally-open or normally-closed, connect it using the third diagram above. Power up the PicoBoo, wait a few minutes for the motion sensor to warm up. Trip your sensor as you watch the yellow input light on the PicoBoo. If the yellow light turns ON when the motion sensor activates, it's normally-open. If it turns off, it's normally-closed. If it does nothing there is a wiring problem.

The PicoBoo MAX has some hidden features that can be enabled by creating empty folders with special names. See the tables below for a list of settings that can be enabled. To enable the setting, simply create the folder in the location shown.

## GLOBAL SETTINGS

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

FOLDER NAME	# VALUES	DESCRIPTION
_PROTECT		<b>Write Protect</b> - Use this option to write-protect your animation. The REC button will be disabled. When the MAX powers up it will blink the red REC light twice if it's write-protected, or just once if it's not.
_BASS##	0 - 15	<b>Bass Enhancement</b> - This option will enable the MAX's powerful bass boosting DSP algorithm. By default this is set at 0 for no bass enhancement.
_TREB##	0 - 15	<b>Treble Adjust</b> - 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.

## AMBIENT OR INPUT FOLDER SETTINGS

The following settings can be used in the **AMBIENT** or **INPUT1** folders.

FOLDER NAME	# VALUES	DESCRIPTION
_LENSND		<b>Scene Length = Sound Length</b> - Use this option if you want the particular scene length to be exactly the same as your sound. Using this will stop scene recording and playback when the sound is finished playing.

## INPUT FOLDER SETTINGS

The following settings can only be used in the **INPUT1** folder.

FOLDER NAME	# VALUES	DESCRIPTION
_NCINPUT		<b>Normally-Closed Input</b> - Use this option to set the trigger input to normally-closed. Required for some PIR motion sensors.
_MOMENT		<b>Momentary Input</b> - Use this option if you want the input scene to play only for as long as the trigger is active. This is useful for some actor-controlled scares where the actor needs to control the length of the scene.

## Troubleshooting

TROUBLESHOOTING TABLE	
Problem	Solution
The IN LED blinks after power up.	- The PicoBoo MAX has detected that a PIR motion sensor is likely connected to its input. It's ignoring the trigger for 1 minute while the sensor warms up.
Tapping the REC button does not start recording	- The unit may be write-protected. See the <i>Settings</i> section.
No Sound	- Make sure the audio file is in MP3 format and it is correctly named. See <i>SD Card and Audio Files</i> .

Certain SD card errors will trigger an error code which will cause the REC LED to continuously blink. Count the number of blinks before each pause, and then see the chart below for the cause.

REC LED ERROR CODES	
Blinks	Error Description
1	No SD Card
3	No INPUT1 folder
4	No 000.BIN file found for recording.
5	Error writing to the SD card
13	SD card FAT error. Usually means card format is not FAT16 or FAT32.
14	SD card I/O error.

## Specifications

SPECIFICATIONS TABLE	
<b>Audio</b>	
Capacity	Size of SD card
Quality	Up to 48kHz, 320kbps MP3
<b>Amplifier</b>	
Wattage	4 ohm speakers: 13 watts RMS per channel 8 ohm speakers: 8 watts RMS per channel
<b>Physical</b>	
Length	5.375"
Width	2.5" enclosure only, 3.5" including connectors
Height	1.25"
Weight	0.3 Lbs (0.14Kg)
<b>Electrical</b>	
Operating Voltage	12 VDC
Power Consumption	2 watts (150mA) without amplifier, up to 30 watts (2.5 A) with
Relay Outputs	120 VAC max., 10 amps max. (each output)