adafruit learning system

3D Printed 20w Amplifier Box

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Guide Contents

Overview

The tiny, yet powerful MAX9744 can pump 20 watts of audio to power two stereo speakers. In this tutorial, we going to upgrade a pair of old school Apple Pro Speakers and hook them up to this bodacious amplifier.

This lovely kit includes a power filter capacitor, terminal blocks and a 1k potentiometer to adjust volume. A 3d printed enclosure will houses the components and can be printed in any color to match your style. A 3d printed volume knob in ninjaflex filament makes a panel mount 1k potentiometer smooth to the touch.

Prerequisite Guide

- MAX9744 Overview (http://adafru.it/dfM)

Tools & Supplies

- 3D Printer (http://adafru.it/d9z)
- Soldering Iron (http://adafru.it/c7b)
- Wire Stripper (http://adafru.it/527)
- Diagonal wire cutters (http://adafru.it/527)
- 20 gauge wrapping wire (http://adafru.it/1446)
- Ninjaflex Filament (http://adafru.it/1690)

Parts

- MAX9744 20w amplifier (http://adafru.it/1752)
- 1k Panel Mount Potential (http://adafru.it/dfN)
- 12V 5A switching power supply (http://adafru.it/352)
- 20w Stereo Speakers (http://adafru.it/1732)

3D Printing

Parts are optimized to print on a Makerbot Replicator 2 (http://adafru.it/d9z) and sliced with Makerware. Download the parts from thingiverse (http://adafru.it/dfO) and print them out using the recommended settings below.

Download STLs

http://adafru.it/dfO

max9744-cover.stl	PLA @230 %15 infill 2 shells 0.2 layer height 90/150 speeds	about 20 minutes
max9744-box.stl	-	about an hour
max9744-bottom.stl	-	about 20 minutes
potknob.stl	Ninjaflex @225 %15 infill 2 shells	about 15 minutes

	0.2 layer height 45/150 speeds	

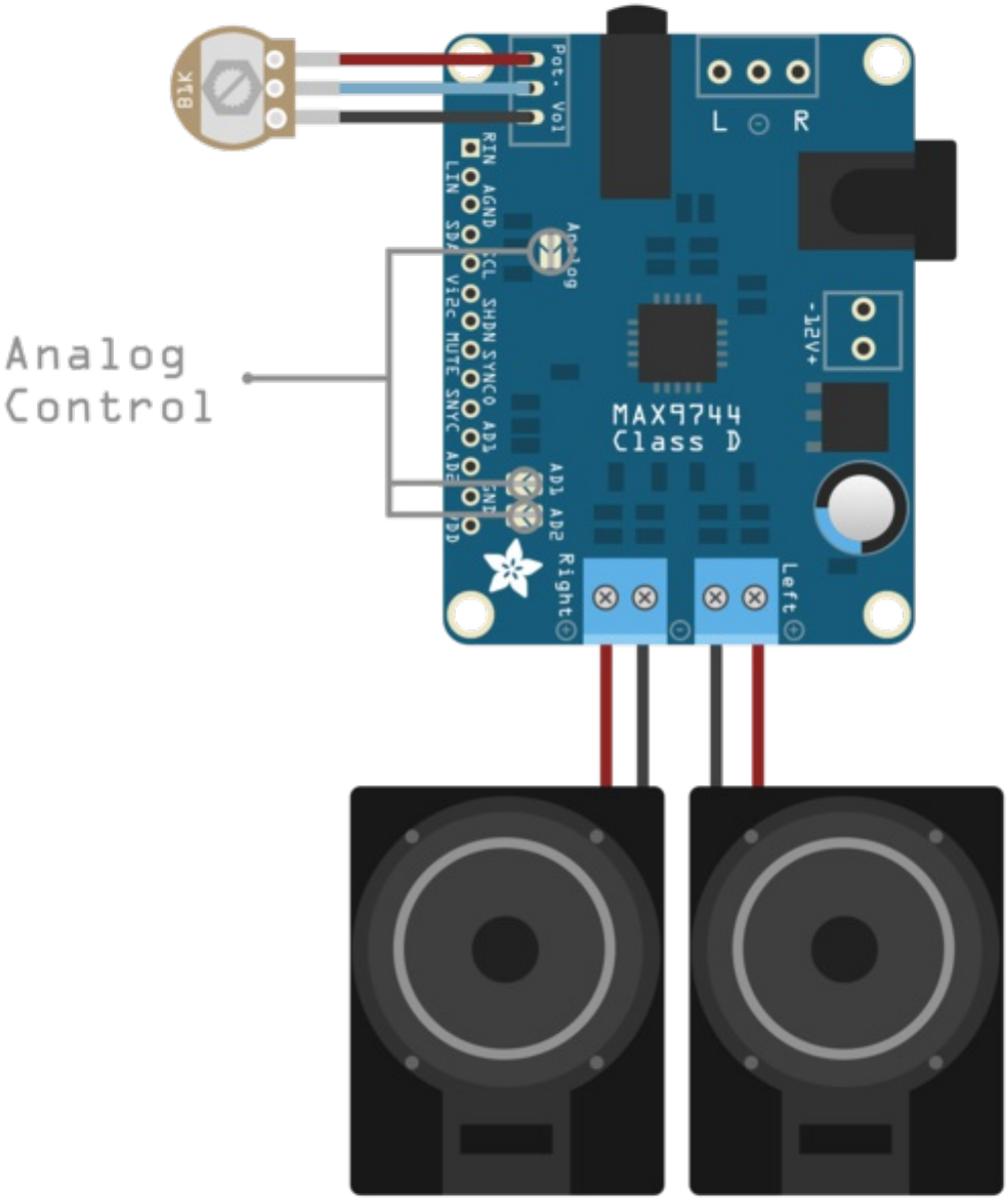
Print in your Favorite Color

The cover, box and bottom parts of the enclosure were optimized for printing in PLA on a makerbot replicator 2. The cover.stl piece can be printed in a color to highlight, while the box and bottom parts can be colored in a matching color to create contrast.

NinjaFlex

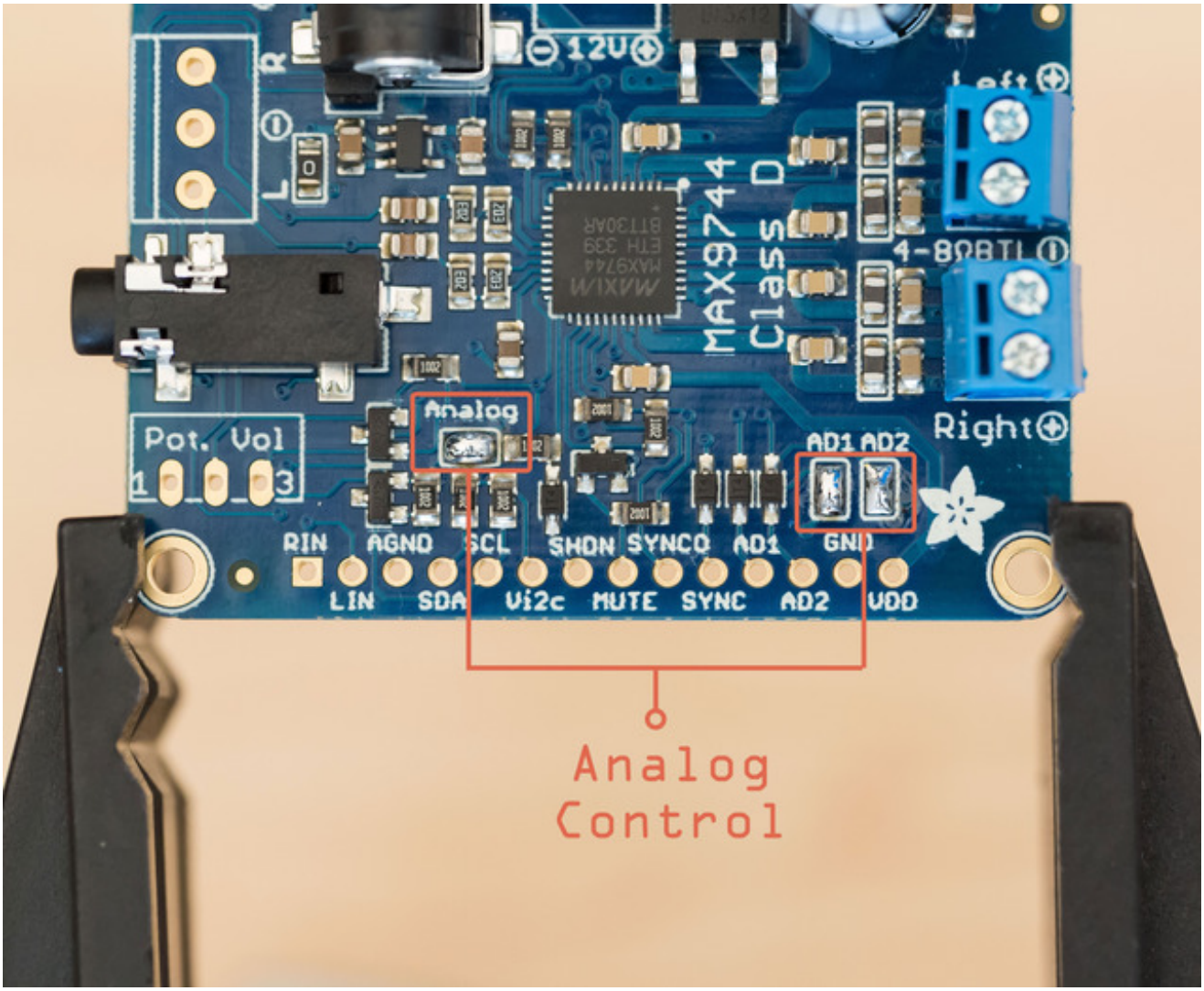
The potknob.stl part was designed to print in Ninjaflex filament. The potknob.stl file is optimized to work with a panel mount 1k potentiometer.

Circuit Diagram



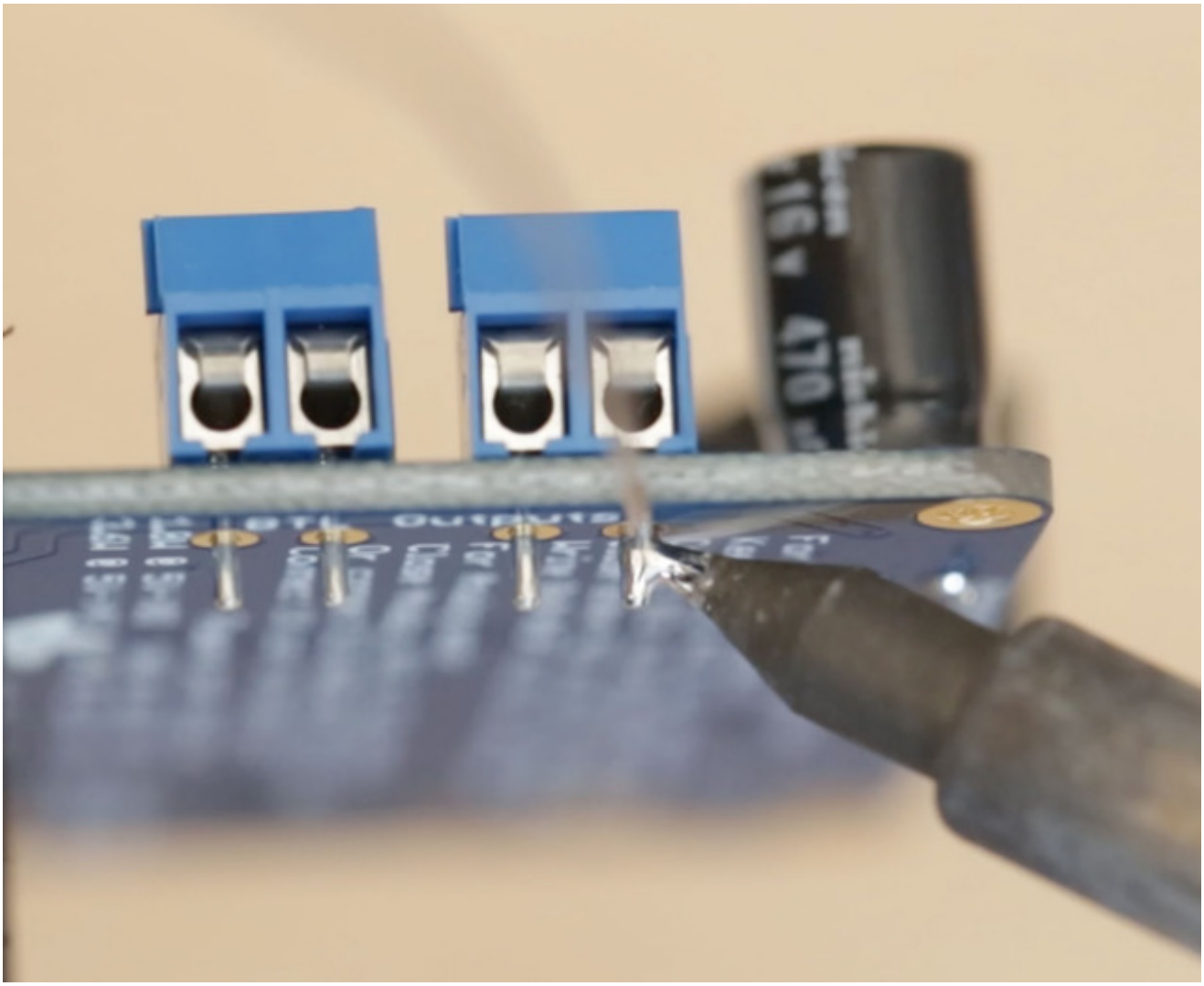
Analog Control

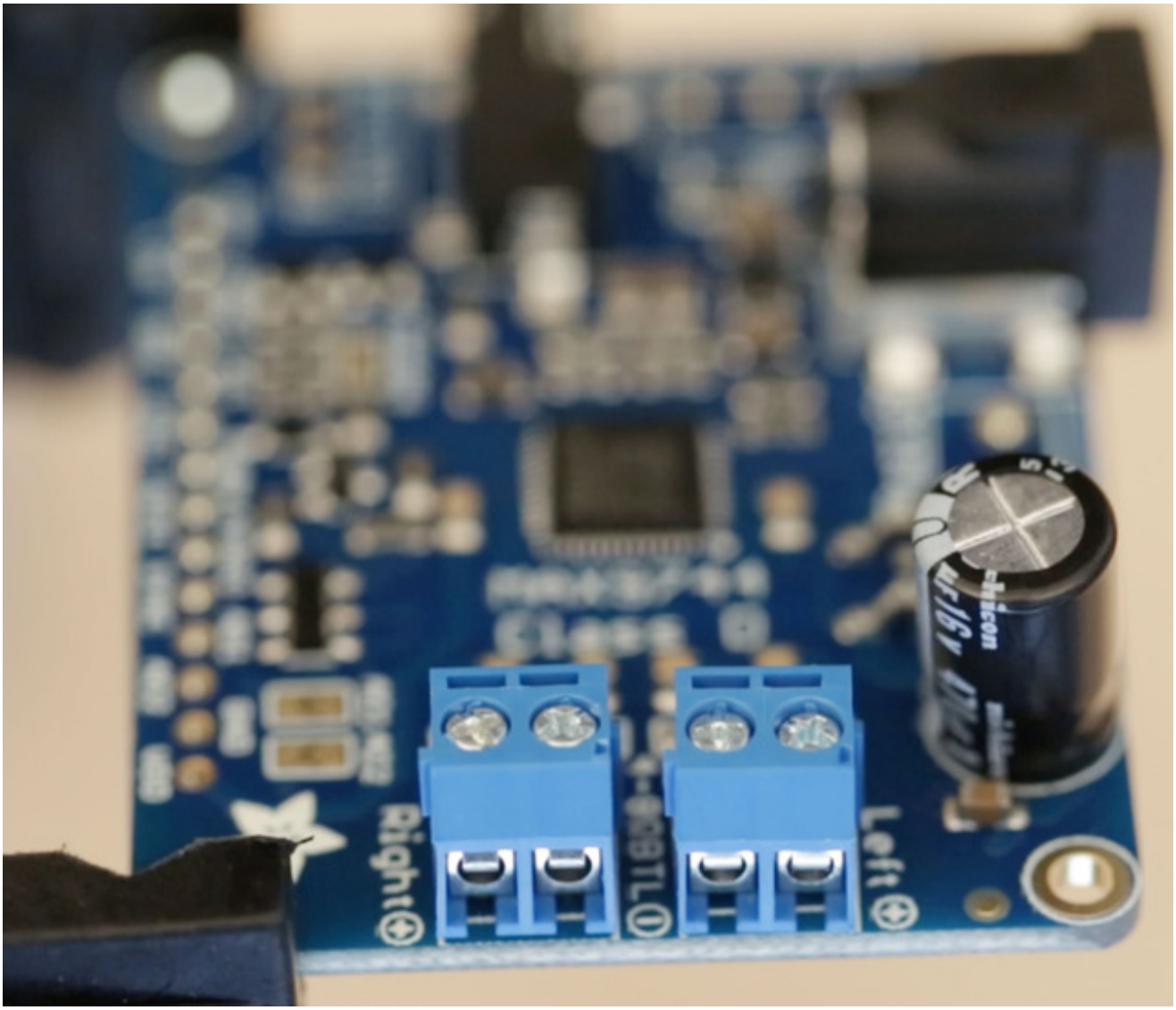
In this project, we'll use analog control since it's the easiest way to get going with the amplifier board. By default, the amplifier breakout is in digital mode. To put it in analog mode we need to close the three solder jumpers labeled **Analog, AD1** and **AD2**.



Adding Terminal Blocks

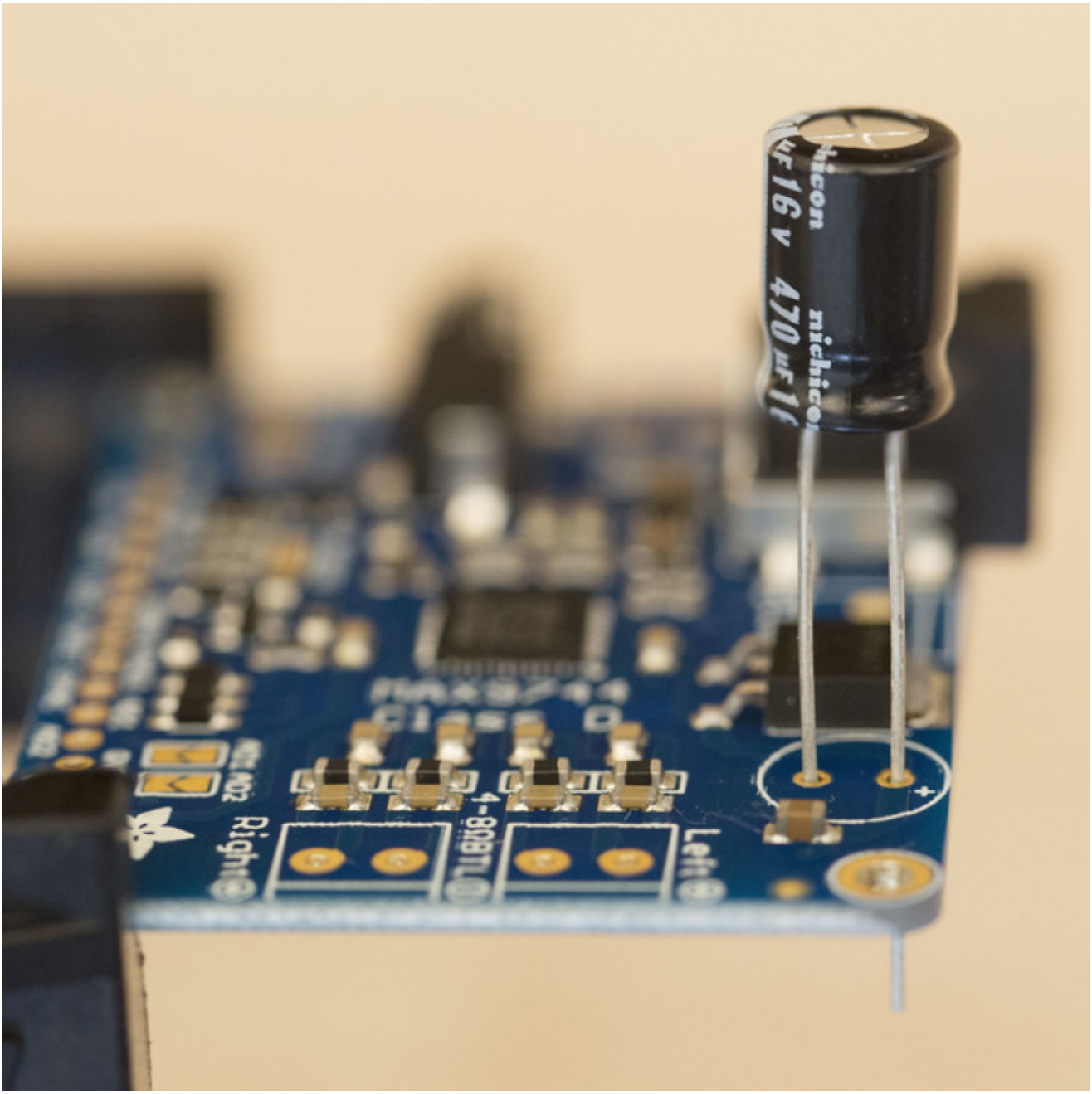
The terminal blocks will be used to connect the two speakers to the audio output of the MAX9744. Follow the negative and positive symbols and insert them appropriately. Solder them in to place for a solid connection.





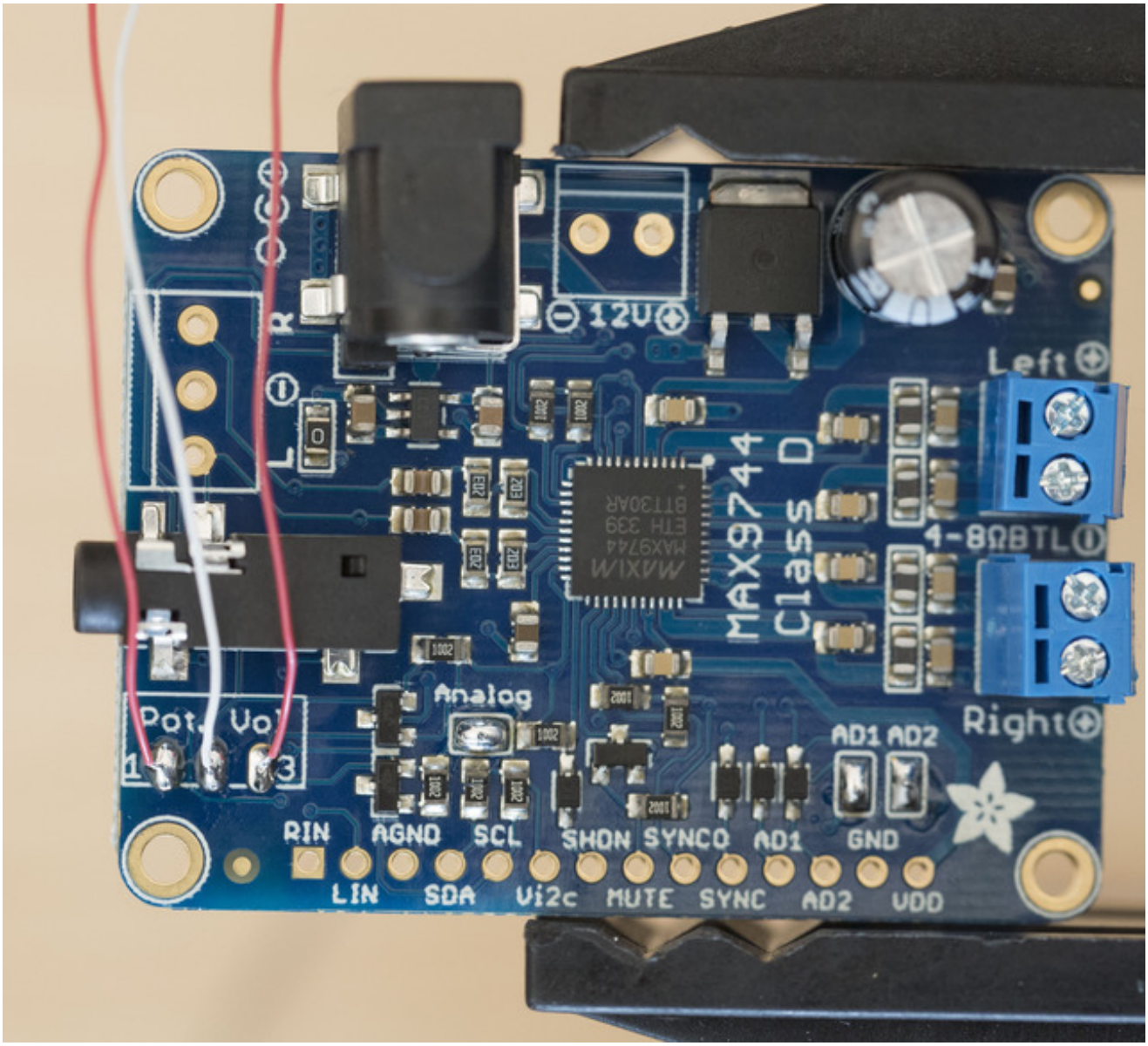
Adding Capacitor

Insert the capacitor with the longer lead going into the pad marked + Push it in all the way and bend the leads to keep it in place while you solder it in.



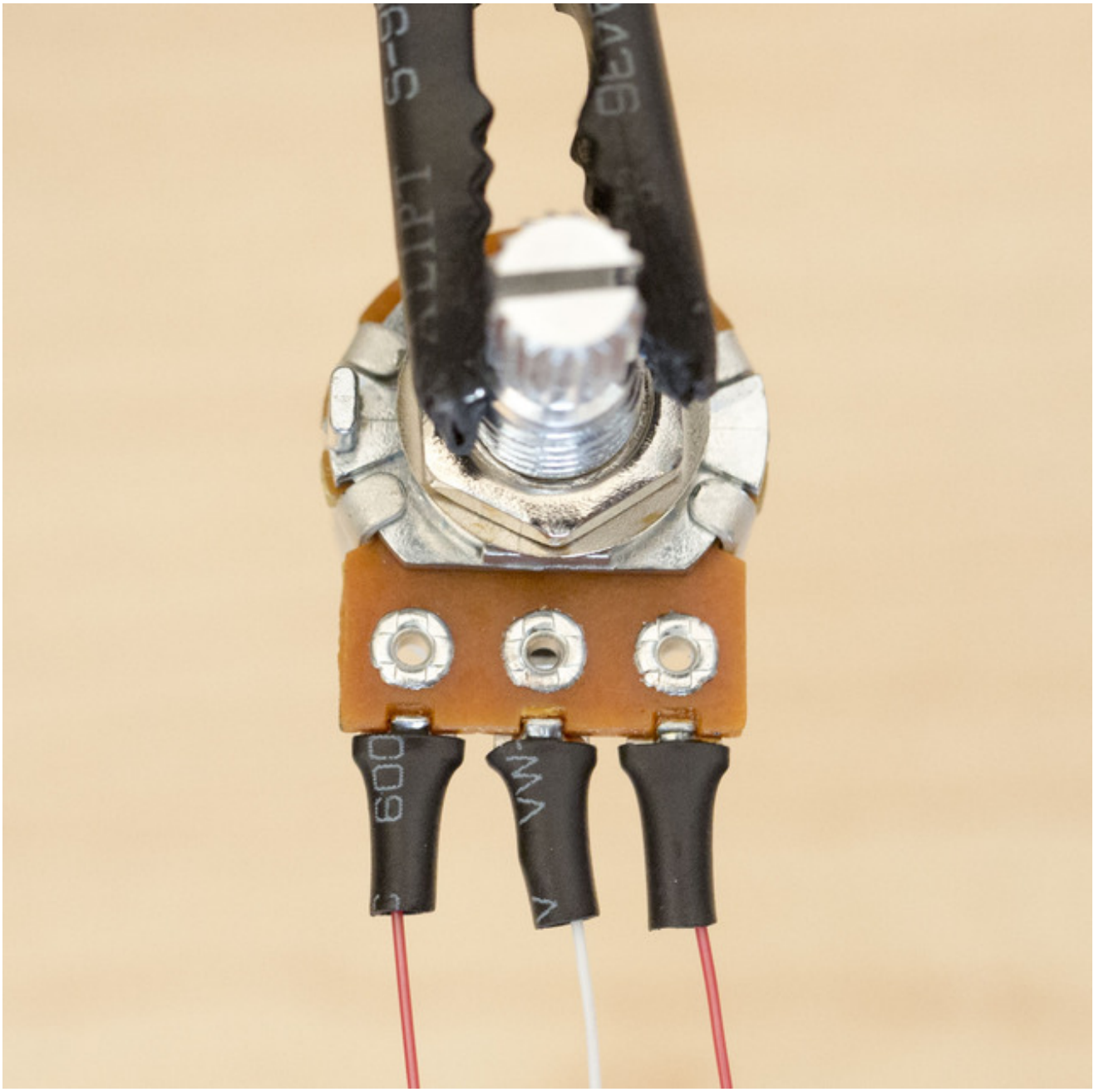
Volume Control

We're using a panel mount style potentiometer which is a bit bigger than the 1k pot that comes with the kit. Solder three strands of wrapping wire to the pin outs labeled **Pot. Vol.** Line up the leads of the pot with the pins to ensure turning it to the right will encase the values. Solder the far right lead of the pot to **Pot. Vol. pin 3**



1K Potentiometer

Add pieces of shrink tuning to the wrapping wire for a safe and secure wire connection. Tin the three leads of the potentiometer to make the wrapping wire stick to the leads better. Solder the wrapping wire to the potentiometer. Position the pieces of shrink tubing over the terminal leads and use a heat source to shrink the tubing.



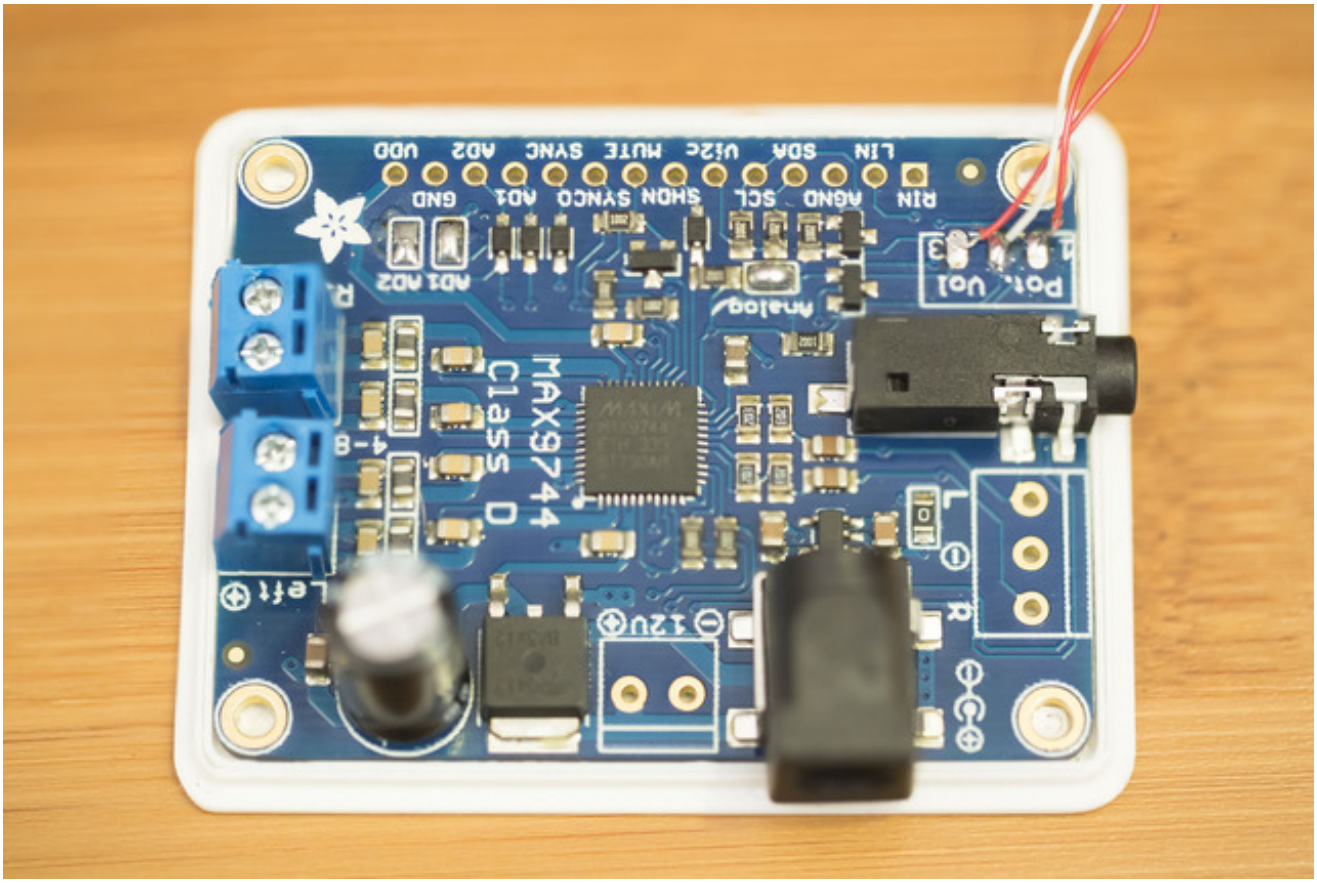
Naked Circuit

At this point you should have a working naked circuit! In the next page, we'll protect it in a the 3D Printed enclosure box.

Assembly

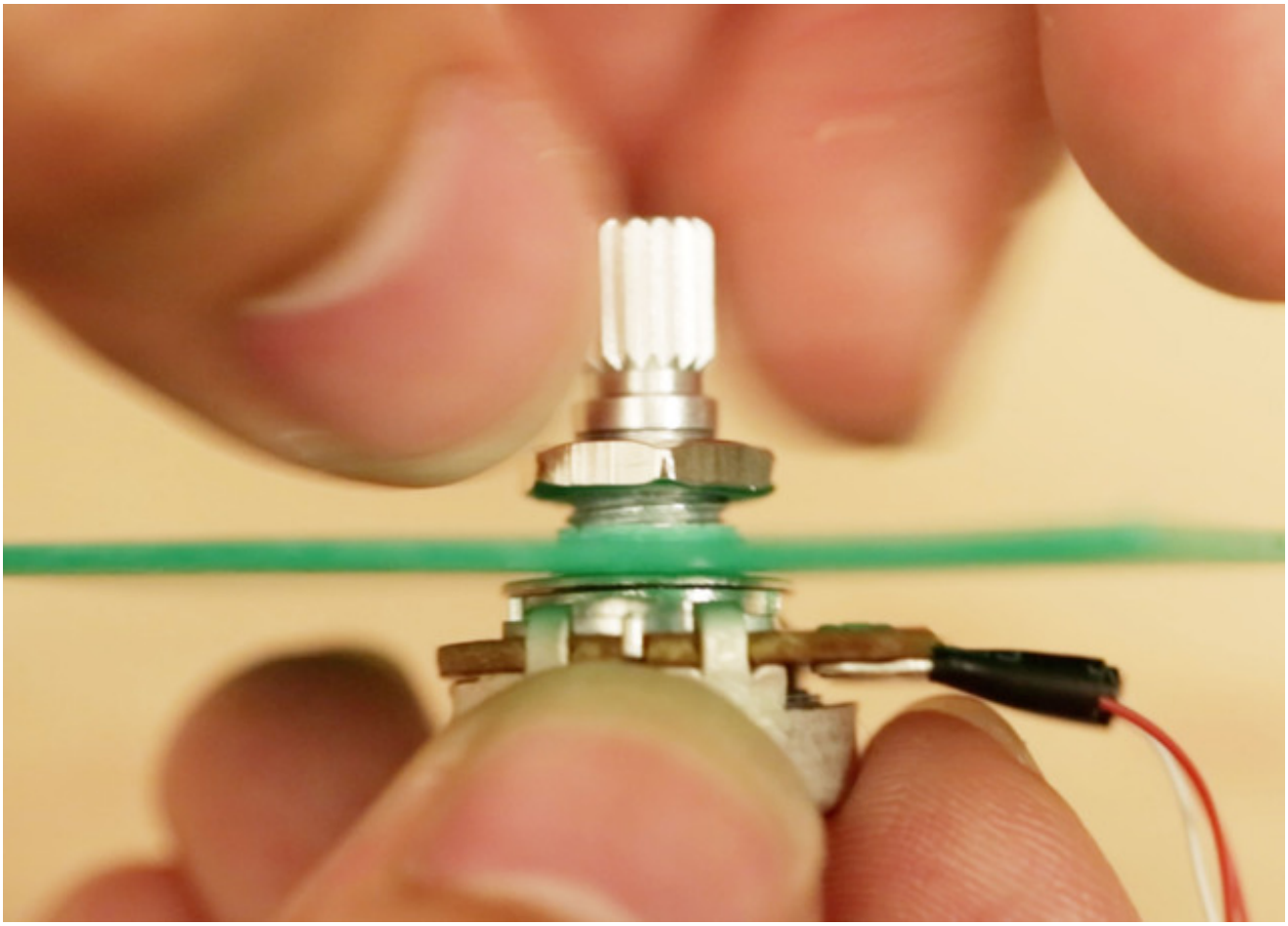
Mounting MAX9744

The MAX9744 will snap fit into the **bottom.stl** part with the 4 corner cylinders. The orientation doesn't matter. Gently press the amp down into the bottom part.



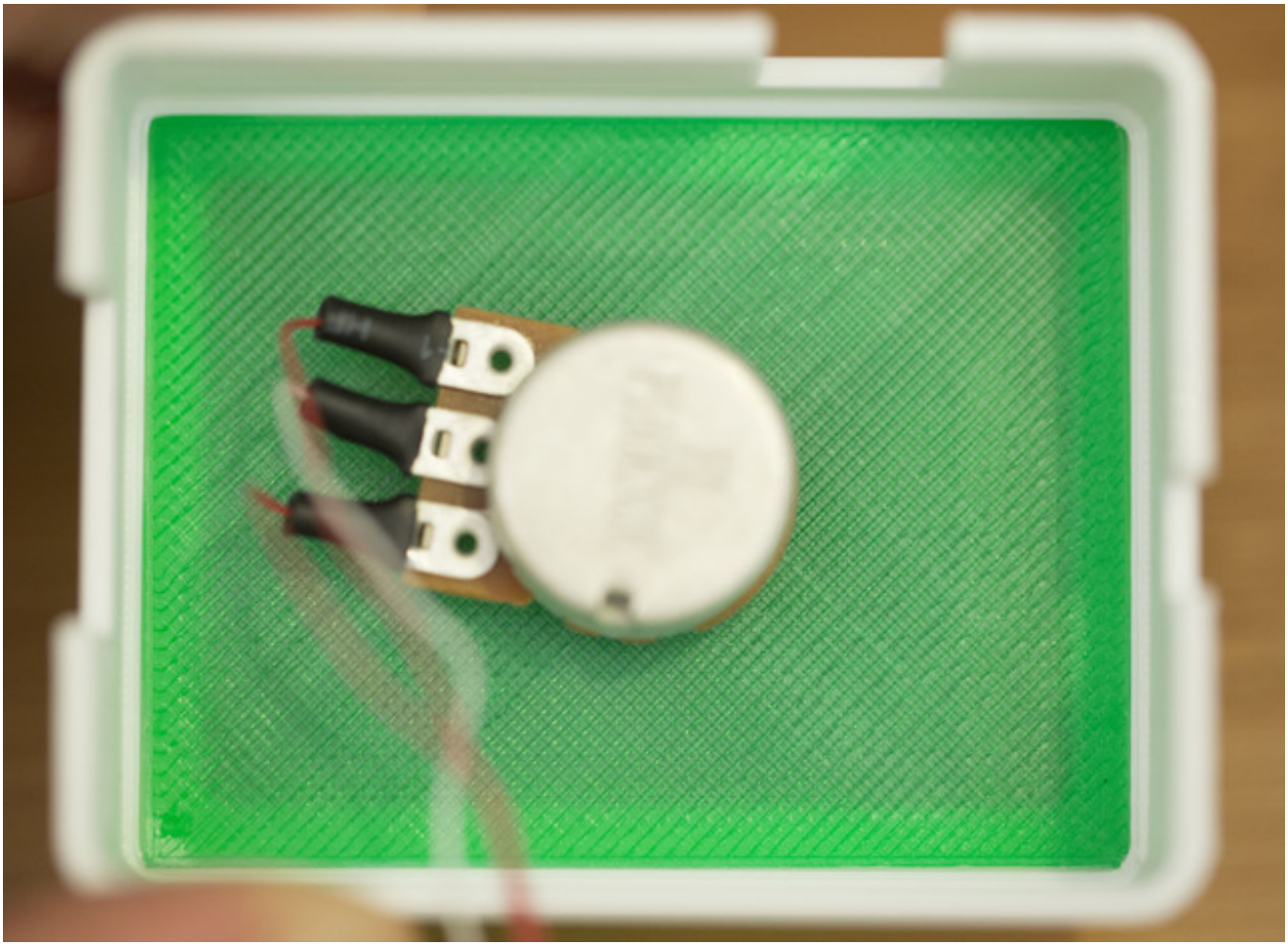
Mounting 1k Potentiometer

Panel mount style potentiometers should come with a washer and screw nut. Place the washer on the turning knob. Insert the knob of the pot into the **cover.stl** part with the terminal leads facing either the left or right side (as shown in the photo). Insert the screw nut onto of the knob and tighten it down to secure the pot to the **cover.stl**



Installing Cover

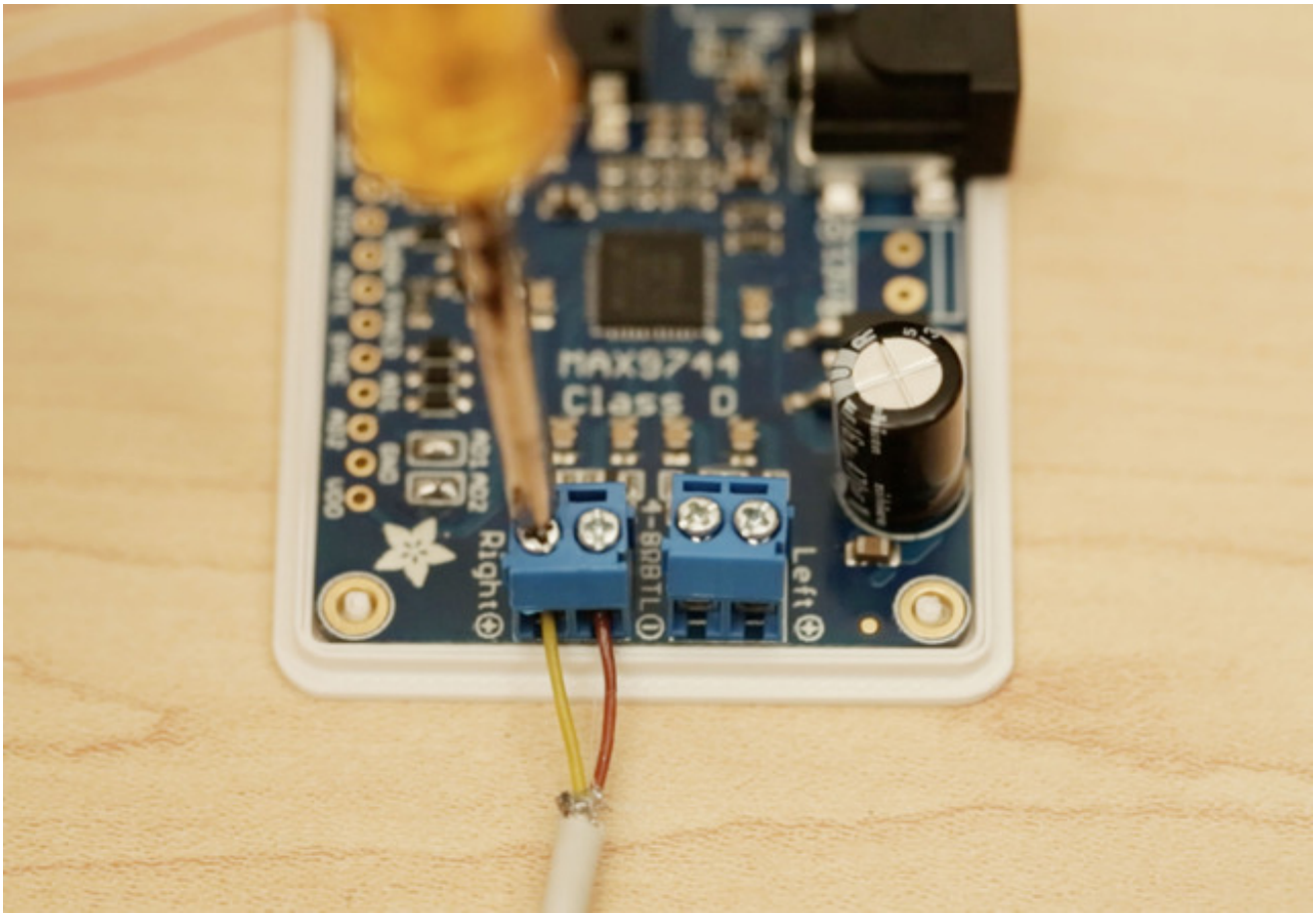
Carefully insert the cover.stl part into the bottom of the box part. The box part has an inner lip that allows the cover to snap into place. The tolerances may vary so you may need to secured the cover with either tape, glue or any other adhesive that will bind two plastic parts together.



Adding Speakers

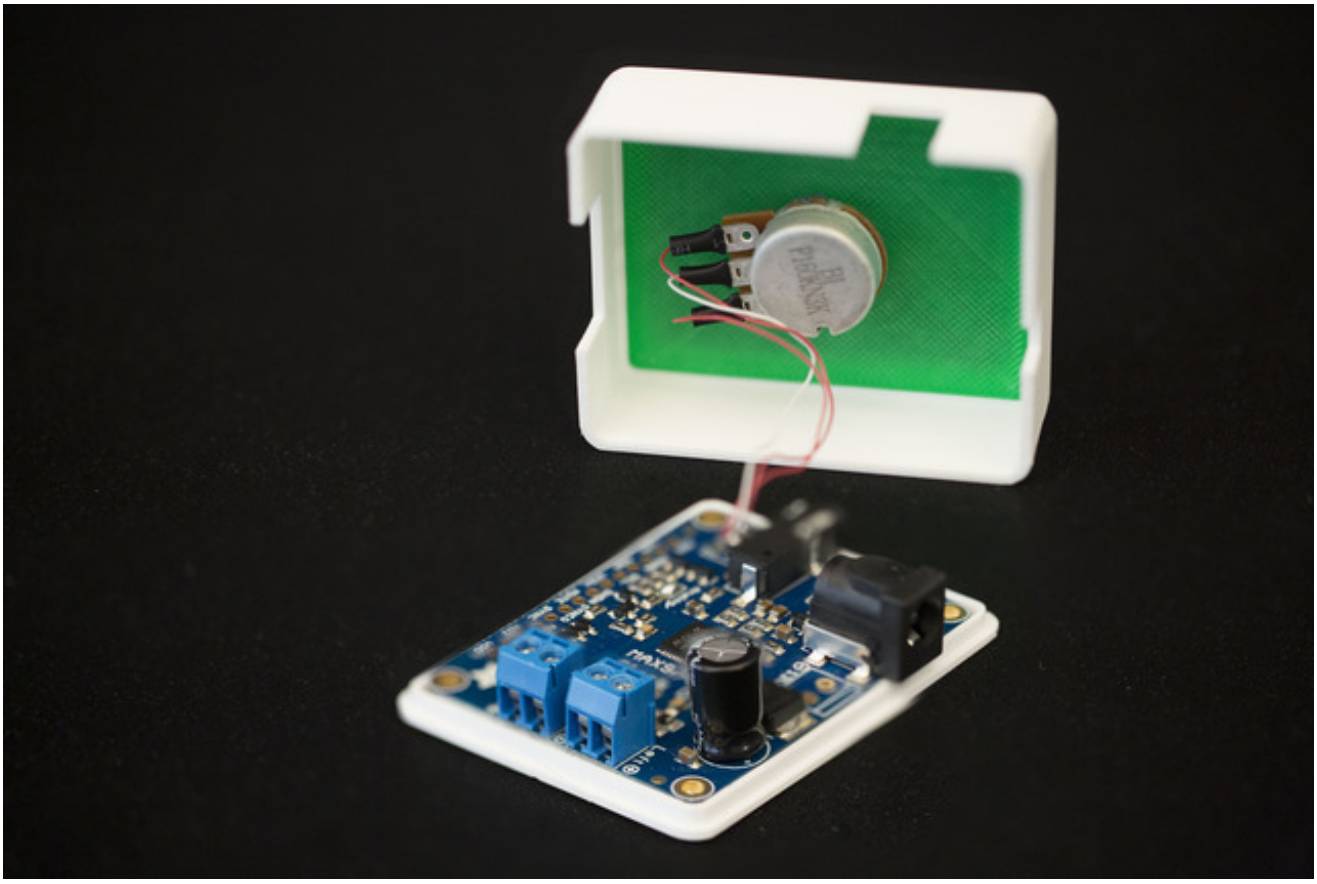
Since the amplifier can pump 20 watts of power, you should use some equally capable speakers. In our project we upgraded a pair of Apple Pro Speakers. You can easily use any other type of stereo speakers. The positive and negative connections of the speakers should align up with the terminal blocks on the side. Use a small screw driver to loosen and tighten the screws of the terminal.

To ensure a secure connection, gently yank on each wire after clamping it into the terminal block, it should be a solid connection, not possible to yank out of place. Loose wires will be a problem!



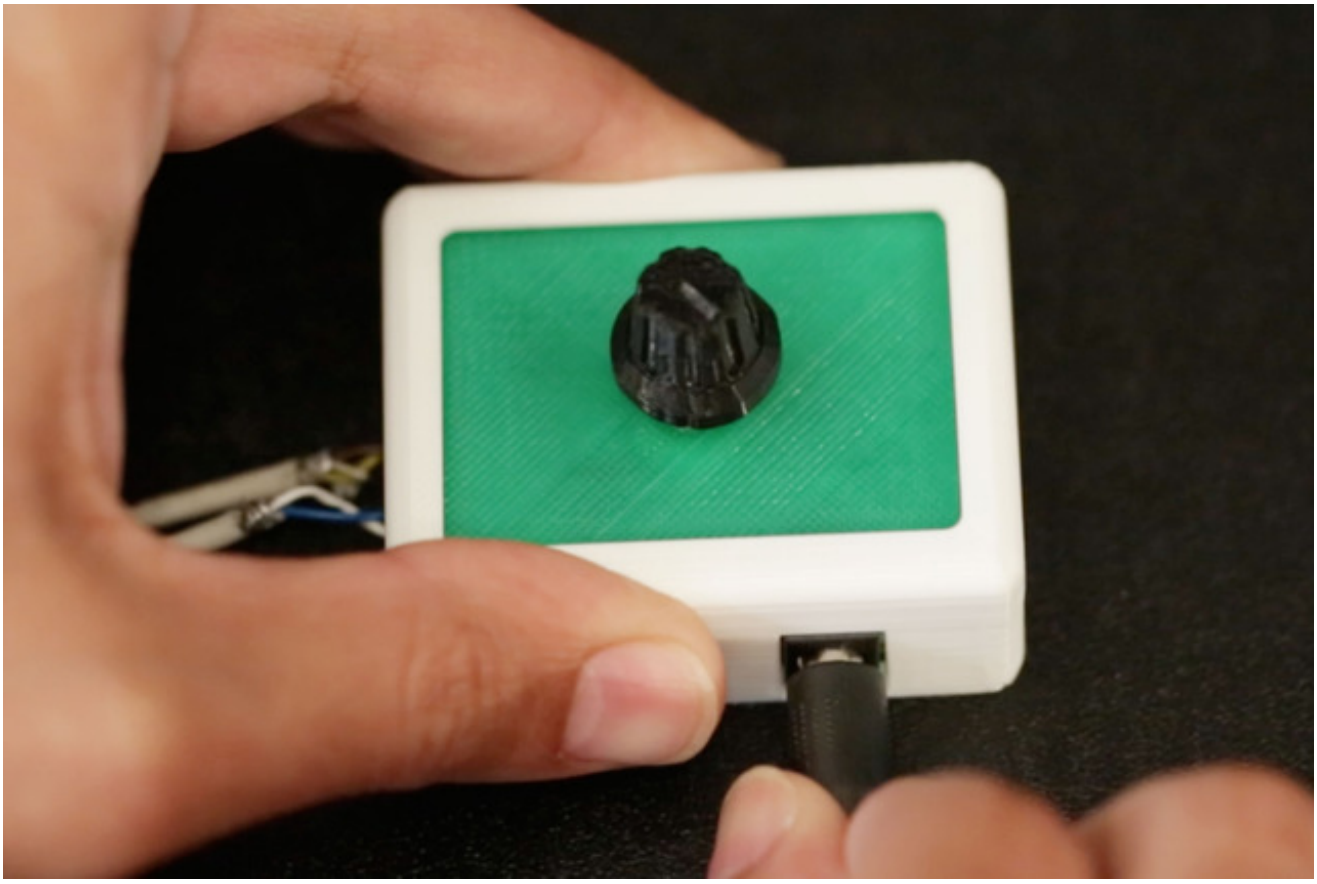
Enclosing Amp Box

Line up the large opening on the side of the **box.stl** with the terminal blocks of the **MAX9744.** Gently press the **box.stl** part down, snapping it to the **bottom.stl** part.



Powering Amp

Connect 5-12VDC power (http://adafru.it/352) to the board using a wall adapter.



Audio Input

Use a 3.5mm male/male cable (http://adafru.it/876) to connect it to your favorite audio player like a computer or phone. Now your ready to pump some awesome sound!