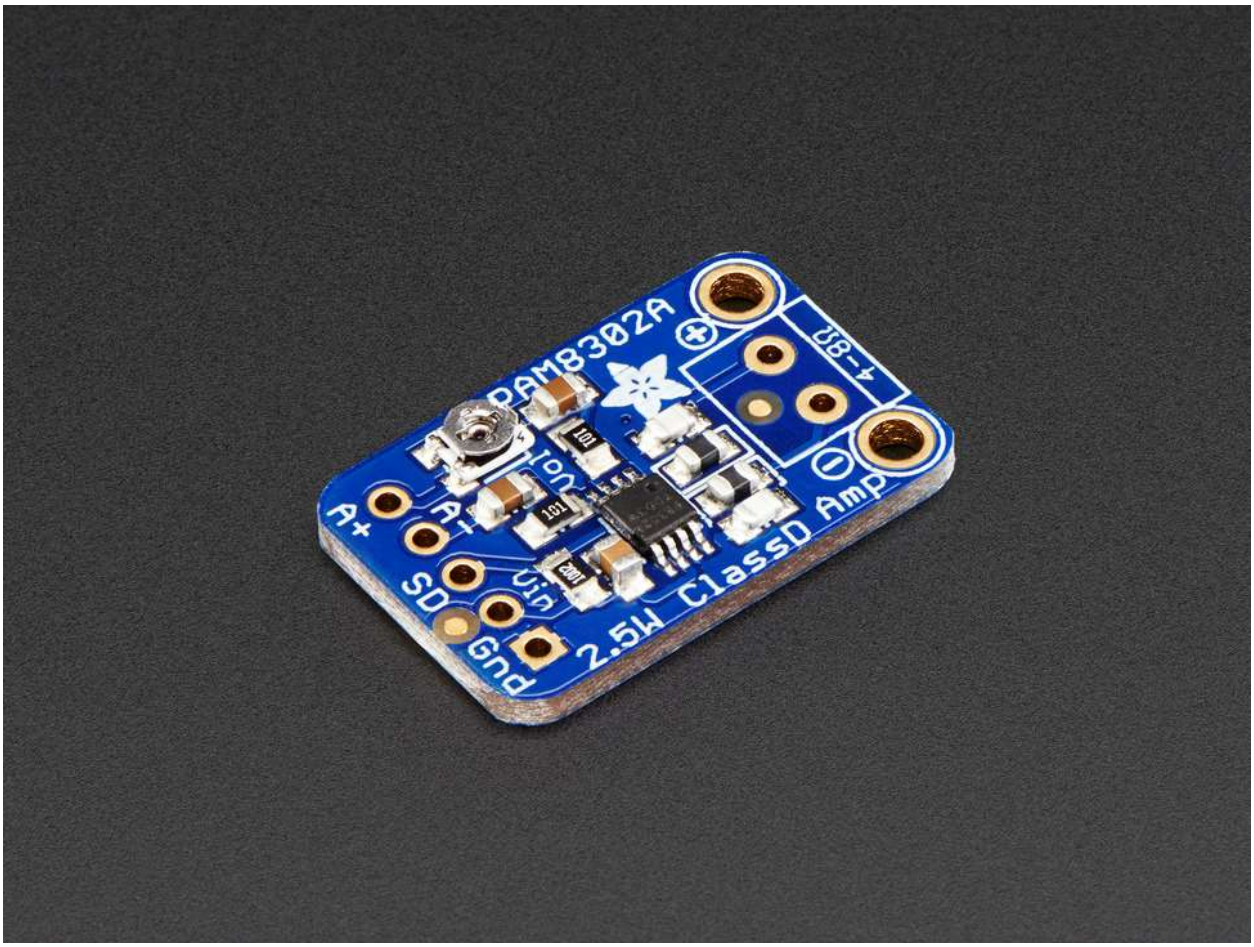
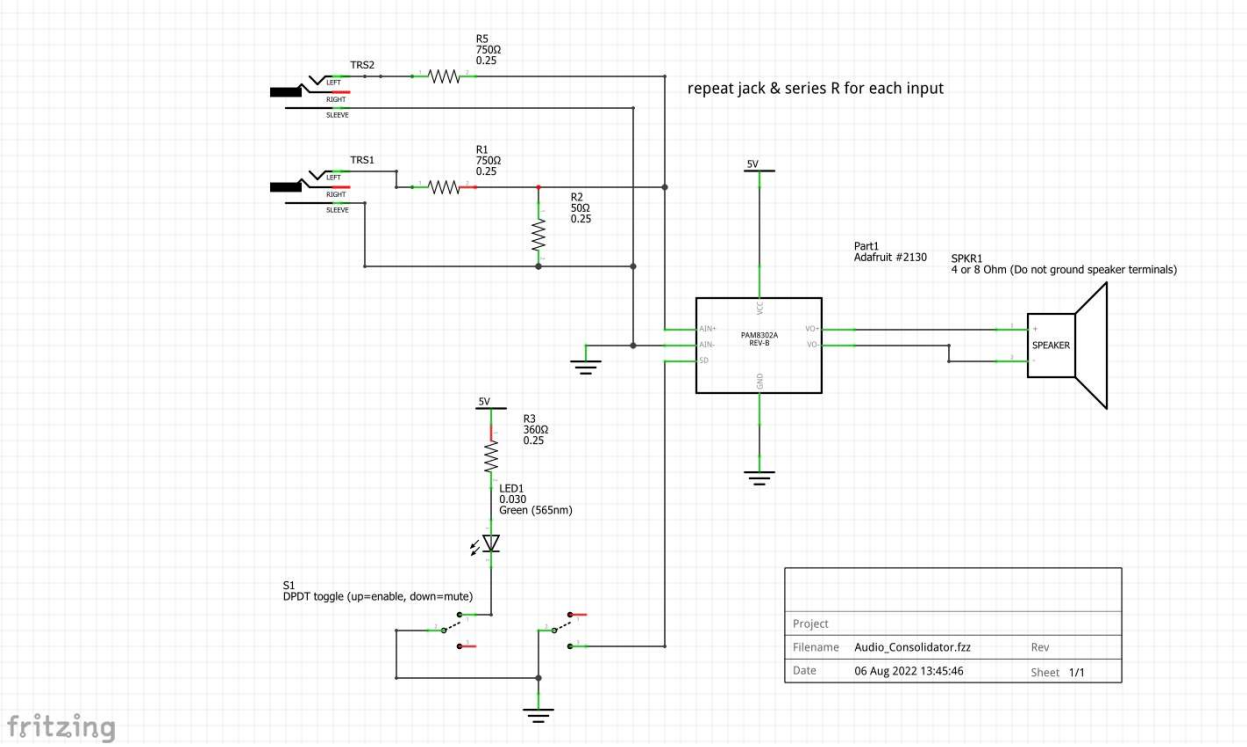
I have several radios, all with internal speakers, but the speakers are mediocre at best. I prefer good quality external speakers. But that's a lot of speakers in my shack. That takes a lot of room and a lot of wires. It occurred to me, there's a better way. What I want is to have a mixer combine the audio outputs of all the radios and drive a single amplifier output to a single speaker. I can still use the volume controls on the individual radios. I'm not looking for channel volume controls or equalization. Just a speaker amplifier with four inputs. For a few dollars I chose to build an **AUDIO CONSOLIDATOR**.

I found a tiny class-D amplifier called PAM8302. It is available on a postage-stamp size board from Adafruit PN 2130, https://www.adafruit.com/product/2130 it is $3.95.



You may have read about class-D amplification in your license studies [*ARRL Extra Class License Manual*, Ed. 12, page 6-12].

It is, basically, a highly-efficient amplifier, up to 2.5W (4Ω to 8Ω) on a postage-stamp-size board. Match it with some connectors for input/output, and you have a cheap solution. You can run it off 5V. I use a USB cable to power it. Schematic shown below.



I am using 3.5mm (1/8") jacks (TRS1, TRS2) for the input/outputs. The PAM8302 has a shutdown input (SD) that I am using as a "mute" switch. I added an LED to indicate the mute status.

There is the issue of matching input levels. The Adafruit board has about 24dB gain (x16) and is designed for line-level inputs. There is a gain adjustment pot. Radio speaker outputs are higher than that, so I need an input attenuator. Since I am suppling the consolidator with four inputs, I want to design input dividers that adjust the radio outputs down to make it effectively unity-gain. I'm using a 50Ω input resistor (added to the A+/A-) and a 750Ω series input for each jack. That is about -24dB input attenuation to compensate for the unit 24dB gain.

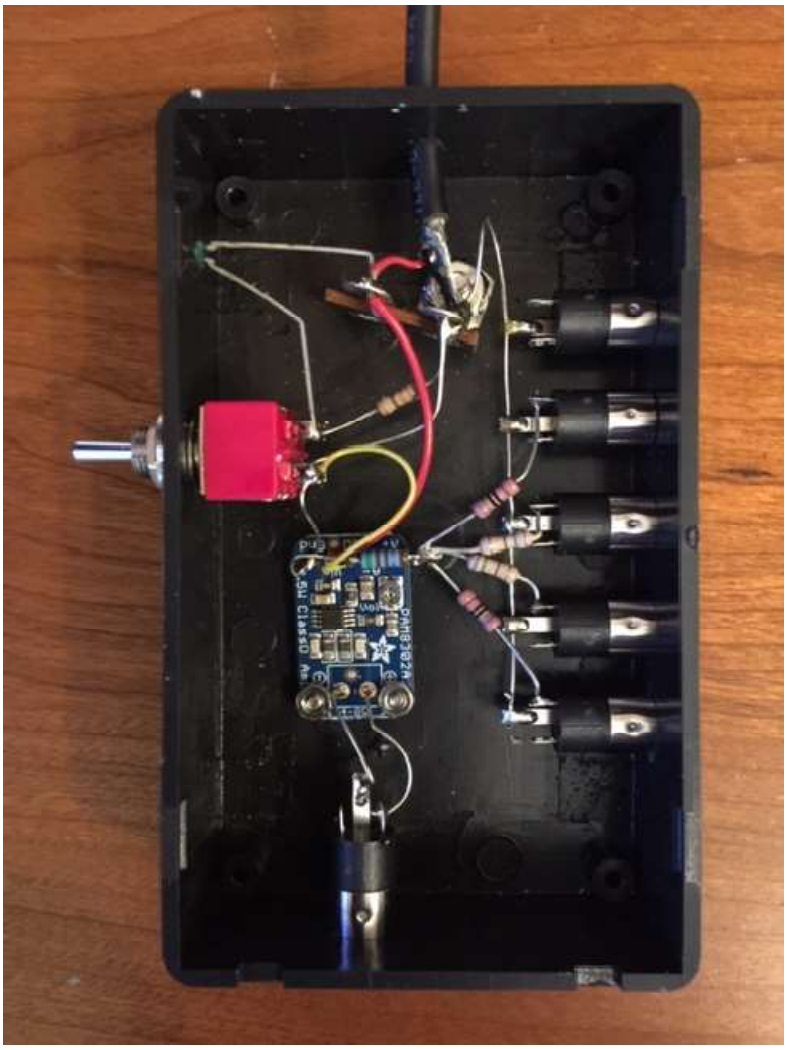
With a 750Ω input series and a 50Ω resistance, the input attenuation is 0.064. The amplifier gain is 16.

16 * 0.064 = 1 unity gain

The input network also prevents one radio's output from interfering with another radio's output. There is a shutdown input that I use as an overall mute switch. You can mute all your radio outputs with the flip of a switch.

Be sure to read the Adafruit PAM8302 Primary Guide, https://learn.adafruit.com/adafruit-pam8302-mono-2-5w-class-d-audio-amplifier. Connect the output directly to a speaker. They are bridged outputs so don't connect speaker terminals to ground. Not sure it will work with headphones, as the speaker coil is part of the class-D output filter.

I put it in a 3x5" project box with 5 inputs (one extra) and an output. Completed project shown below.



There is a DPDT toggle switch (mute), and LED (mute status) and a USB cable input (for 5V). I can still adjust all my radio outputs with their volume controls. But I get their combined audio on a single quality speaker. I use the mute switch if I have to do a phone-call/meeting/XYL interruption.

The class-D amplifier has reasonable fidelity. The high-efficiency means there are no heatsinks needed