Fender Champ Construction

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For my project for physics 398 EMI, I chose to build a guitar amplifier. This seemed like an adventurous undertaking for me and also had the potential for having a useful momento that I could take out of this class. In the following text I will describe the process of creating my amp.

After concluding that I wanted to make some sort of amplifier, I needed to narrow down the possibilities. I knew that I would like to construct a vacuum tube amp, because they're so difficult to find and extremely expensive to purchase. As for size, I wanted an amp that would be loud enough to bother my roommates, but not so loud that it would bother my landlords, so I settled on the Fender Champ. The Champ would give sufficient power for my personal needs while still allowing me to turn it all the way up for good distortion. The Champ has also been a beneficial selection because it is one of the simplest amps possible, with a single volume pot and one power tube, so it is ideal for a first-time project.

After settling on the Champ, I needed to begin construction. I chose to build my own cabinet for my amp, because I wanted something that would look unique. I decided to use red oak for the cabinet because of its strength and beauty. I then constructed a simple box that measured approximately 12" x 12" x 8". I also used dovetail joints at the corners because of their strength and asthetic appeal. At this point, the wood was looking so nice that I decided to leave it exposed, rather than covering the cabinet with tweed like the original. So I stained the wood with a rosewood stain and put twocoats of high-gloss polyurethane to provide resistance to wear and tear.

Then I needed to finish the functional components of my amp. I first purchased an aluminum chassis that was the right size for my amp, but a fellow student had found a smaller, already molded chassis that he offered to swap with me. I agreed, although I am now wondering if I should have stuck with the big new chassis, since I have subsequently run into real estate issues in my chassis. But, I proceeded to follow the schematic of the early tweed model Fender Champ. I found all the parts that I needed and proceeded to solder my way toward completion. I made a few modifications based on my needs. I only used one input jack, since I couldn't see myself plugging anything other than a guitar into my little amp and I also scrapped the light, which I may regret down the line. My 6V6, and 5Y3 vacuum tubes were found in a pile of old tubes and I purchased a Mesa 12AX7 at Pro Sound for about ten bucks. These tubes have been operating beautifully.

The last crucial component to my amp was the speaker. I chose to go with an 8 inch speaker, but was unable to find much selection in the last few days of finals week so I ended up just buying a Radio Shack full range speaker (15 watt - unknown frequency response) with the intention of finding a nicer speaker down the road.

After finishing these necessary steps, I decided to try it out. Professor Errede helped me look over the amp for wiring mistakes and such - then we plugged it in and hoped for the best. The power supply worked, but after turning up the volume, it became apparent that there was a tremendous amount of hum. It turned out that my input jack had been miswired, so we fixed it and tried again. This time the amp sounded great. It was much louder than I had anticipated and provided a rich sound. It will have to undergo further analysis for a better description of the sound. But for now I am simply revelling in the joy of seeing my creation work.

This leads to the future plans of my amp. In addition to finding a nicer speaker (perhaps even try a 10 inch), I have some other items on my list. I would like to install a handle on the top for easy carrying and asthetic appeal; this should be simple enough. I would also like to work on the asthetics of my chassis. It currently looks like a messy jumble of loose wires, so I hope to find a bigger chassis with a cover for better safety and a professional look. I would also like to cut down on the hum. There is still a small amount of hum which may be caused by coupling between wires, poor grounding, or having long paths of wire in the preamp, which would lead to attenuation and higher impedance.

All in all, I was very pleased with this project. Through the construction, I learned a tremendous amound about the inner workings of an amplifier. The hands-on nature of this project also provided me with much needed experience in working with electrical components, monitoring voltages and continuity, and even improving my wood-working skills. This class, with hands-on work in addition to conceptual knowledge is the best way to learn about how physics works.