

Talkbox

After several weeks of trying to think of a project that combined physics with music, my younger brother of all people, suggested that I build him a talkbox. Being a fan of Peter Frampton, he had been wanting one to try out with his guitar for a while now. I checked some online sources to find out exactly how a talkbox device works, and found that it was something I was definitely capable of building. A fun and useful project; exactly what I was looking for.

A talk box directs the sound from a guitar (or other instruments if you wish) into the mouth of the performer, allowing them to shape the sound with their lips and vocal cavities. They are able to produce vowel sounds, consonants, and words, all without producing any sound with their own vocal chords. This gives the impression that the guitar is talking. The talkbox is not incredibly loud, so it is best to amplify with a microphone.

Inside the talkbox enclosure is a compression or horn driver which outputs the sound. I found an old, unwanted driver for my talkbox, and it worked just fine. A vinyl tube is fastened to the open end of the driver. The tube should be approximately $\frac{1}{2}$ inch in diameter, so that it can easily fit into the performer's mouth and should be long enough to reach from the floor to their mouth. One of the difficulties in this project was connecting the tube to the driver, because the driver had a much larger diameter. For my

talkbox I used several different kinds plumbing utensils from the hardware store to attach the two tightly.

To power the driver in the talk box I purchased small Marshall solid state guitar amplifier. I wanted my design to be able to work with the amplifier in three different ways. The first two ways work with the talkbox hooked up to the guitar amplifier. The performer should be able to switch between using the talkbox as the output and using the guitar amplifier speaker as the output. To enable the performer to quickly switch between these two options, I used a foot switch on the talkbox. The third option was that I wanted the amplifier to be able to be used alone, without the talkbox connected, just as it worked when I purchased it.

With these concerns in mind, I began designing the circuit for the talkbox. My circuit diagram can be seen attached in Appendix I. I knew that the signal would have to go from the amplifier to the switch inside the talkbox. For purposes of using the amplifier speaker while the talkbox is connected, the signal would have to also run back to the speaker inside the cabinet of amplifier from the switch. Initially, I thought that this would require two cables to be run from the talkbox to the amplifier, one sending the signal to the talkbox and one sending the signal back to the speaker cabinet. In this case, one would have to short the two ¼ inch jacks on the amplifier together in order to use the guitar amplifier alone.

Luckily, a simpler design was possible, requiring only one balanced audio cable to connect the amplifier to the talkbox. By using one balanced cable, along with a TRS jack on the guitar amplifier box and one TRS jack on the talkbox, the signal could be sent to and from the amplifier along one cable. In this case, the signal was sent to the talkbox

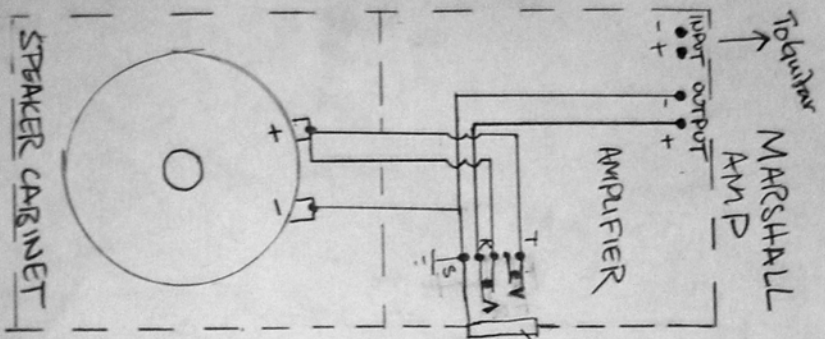
on the “tip” of the TRS, and from the talkbox back to the speaker cabinet on the “ring” of the TRS. The “sleeve” provided the ground signal.

The last problem with this design was how to enable the amplifier to be used alone. Using a standard TRS jack on the amplifier, there would be a signal going from the amplifier to the jack and from the jack to the speaker inside the amplifier cabinet, but there would be no connection between these two signals. Fortunately there are TRS shorting jacks just for this purpose. By using one of these jacks, the two signals are shorted together when nothing is plugged into the jack, perfect!

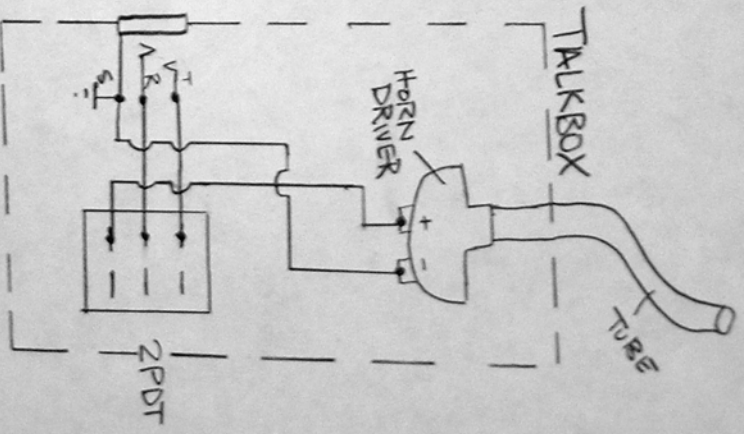
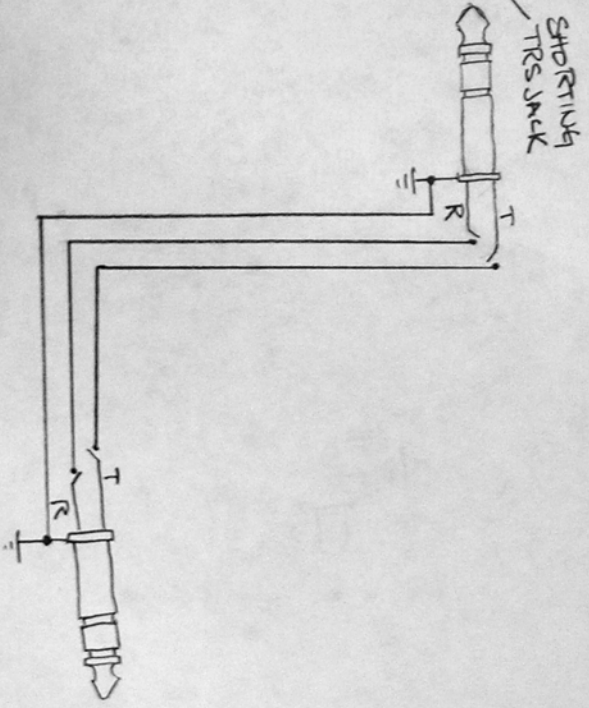
After coming up with this final design and obtaining all of the parts necessary, came the dirty work of putting everything together. Holes had to be drilled in the talkbox enclosure for the jack, the footswitch, the tube, and the driver (which Professor Errede helped me with so that I didn’t chop any fingers off). All of the wires had to be soldered properly and the balanced audio cable had to be constructed, among many other things.

The finished talkbox worked properly on the first try. I am very happy with the finished product, especially after seeing others use it (I don’t play the guitar). I had never seen one in person, but it’s the sound that can be produced with it are really neat. I also tried hooking it up to a synthesizer and it worked great with that as well. Overall, I had a lot of fun doing this project and even learned quite a bit in the process. Photos of my finished talkbox can be seen in Appendix II.

Appendix I



TALK BOX



Appendix II



