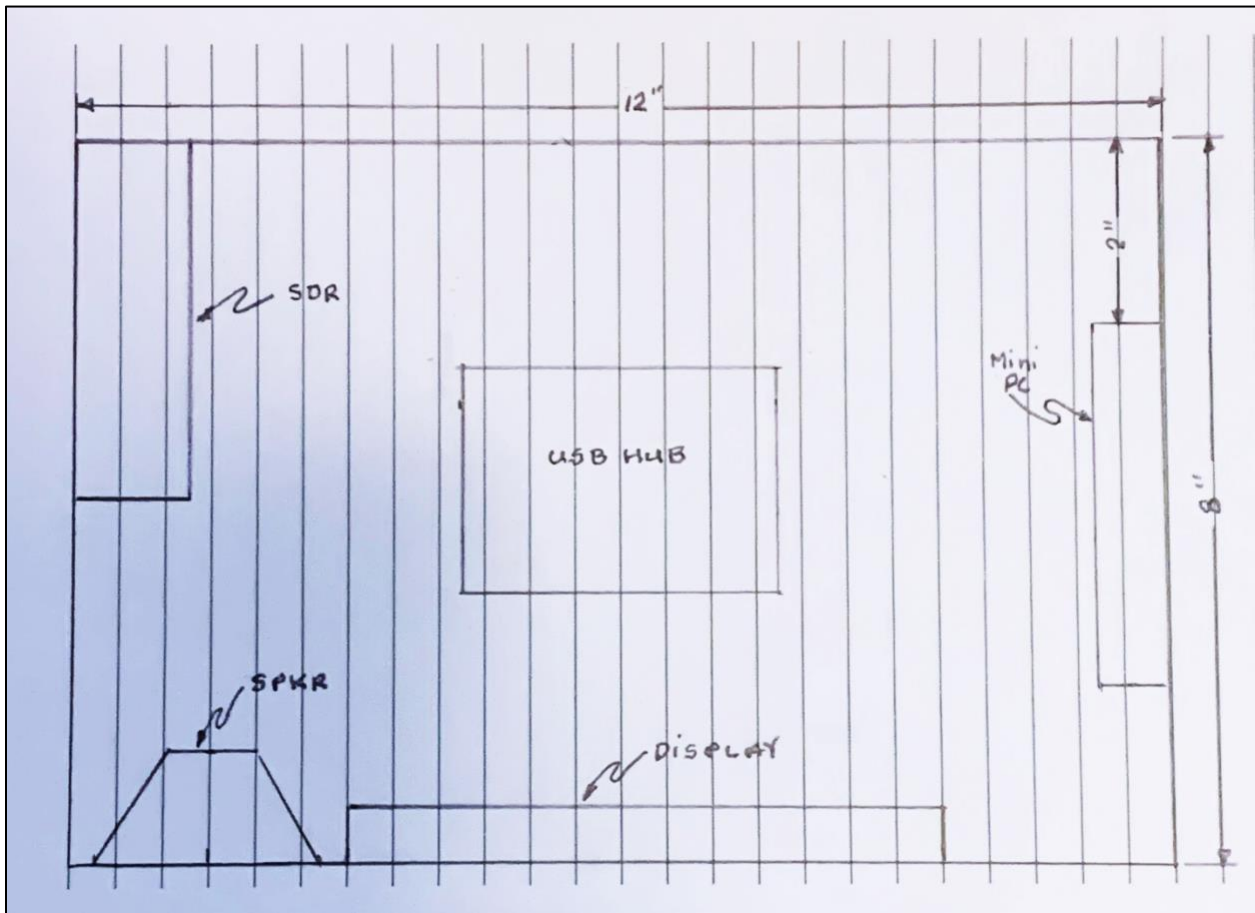


A Communications Receiver to Build - Part 2 of 3:

Part 2 – Putting it all together

So, I mentioned in Part 1 of this series that I wanted to show you how I created this project in terms of the mechanical hardware aspect of it in Part 2. Working with metal is not one of my strengths by any means, but I do know what works for me.

The first thing is whenever you are designing a new project, plan it out on paper. As you may remember if you looked at the first part of this project, I planned what I wanted in terms of a communications receiver and made a block diagram of the proposed layout. This made it easy to make changes at the onset and many changes were made before purchasing or otherwise obtaining the parts. Just do a little measuring of the main components and lay them out in the most logical way that will provide you with plenty of room to connect everything together. Not doing this in the first place will just waste time and make your project a bit hap hazard and less fun to do. Here is the rough layout of the receiver as I first saw it:

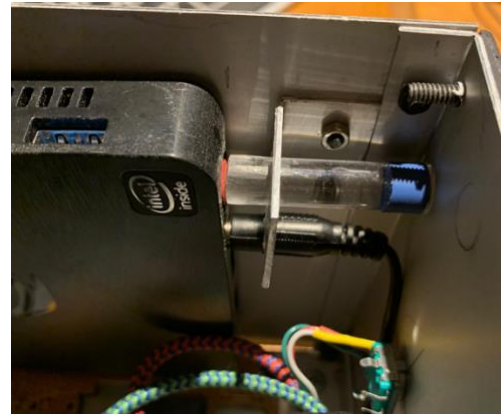


It didn't change a lot from this initial drawing. Let's talk about the components for a moment.

1. I placed the RSP1A as far away from the computer as possible to reduce the likelihood of it inducing RFI into the unshielded case.
2. I placed the Mini PC on the righthand side because the power switch needed to be accessible to the front panel. That way I could



put a small piece of clear acrylic through the panel to control the power and could still use the audio output next to the power switch. By cutting the acrylic and polishing the ends with a heat gun I now had a clear



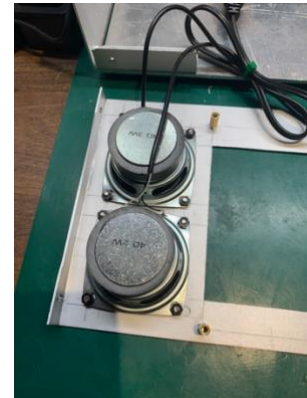
pushbutton with the light of the power switch at the other end shining through. I simply made a small bracket to hold it at the correct height and the panel end has a piece of heat shrink around it to keep it from coming through the panel. It works perfectly.



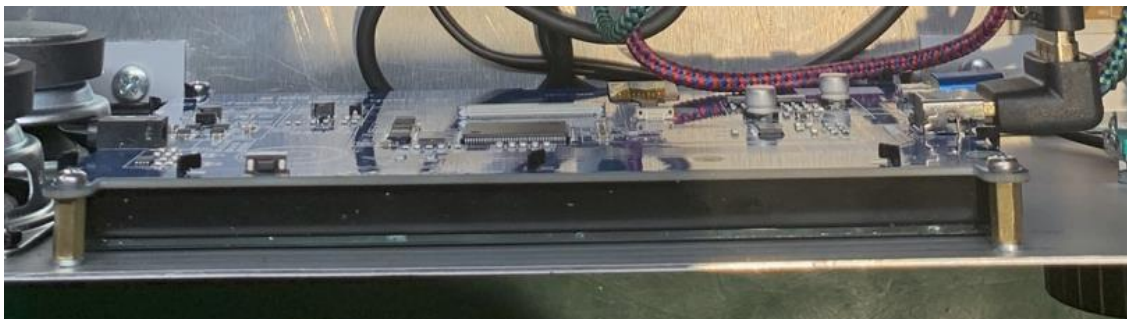
3. Placing the USB hub in the middle gave me a convenient place to dress all the USB cables neatly and no cable is too far away from the component it communicates with.

4. The front panel went through a couple of iterations before I settled on the one I wanted. Because the speakers are stereo I wanted one on each

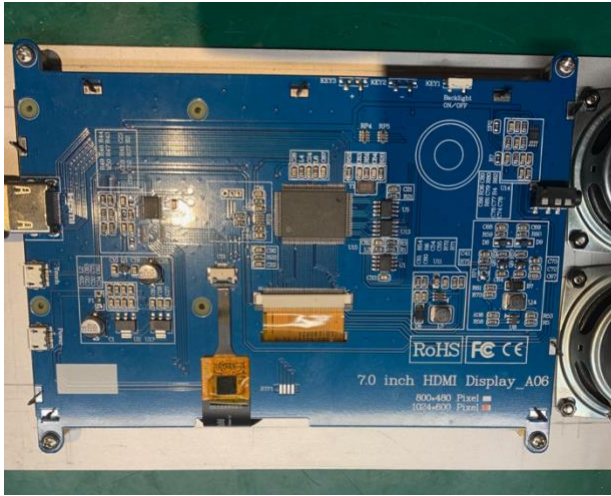
side, but when I tried that with the initial panel I realized it wasn't practical to do because of the connections to the display coming off the right side. These had to be unencumbered so I changed the design by putting the speakers on the left hand side instead and using a right angle adapter for the HDMI connection on the display. I've not found any stereo hams operating on the bands anyway.



5. The display is a 600x1024 with an integrated touch screen. It measures 6.5 x 5 inches including the mounting tabs and therefore the reason for the panel being 5.5 inches high. The actual display is 3.5 x 6.25 inches making it a 7" display. The panel needs to be mounted a half mm or more from the front chassis to not damage the touchscreen so I used some 1 cm brass standoffs that use M3 screws and in order to maintain a half mm

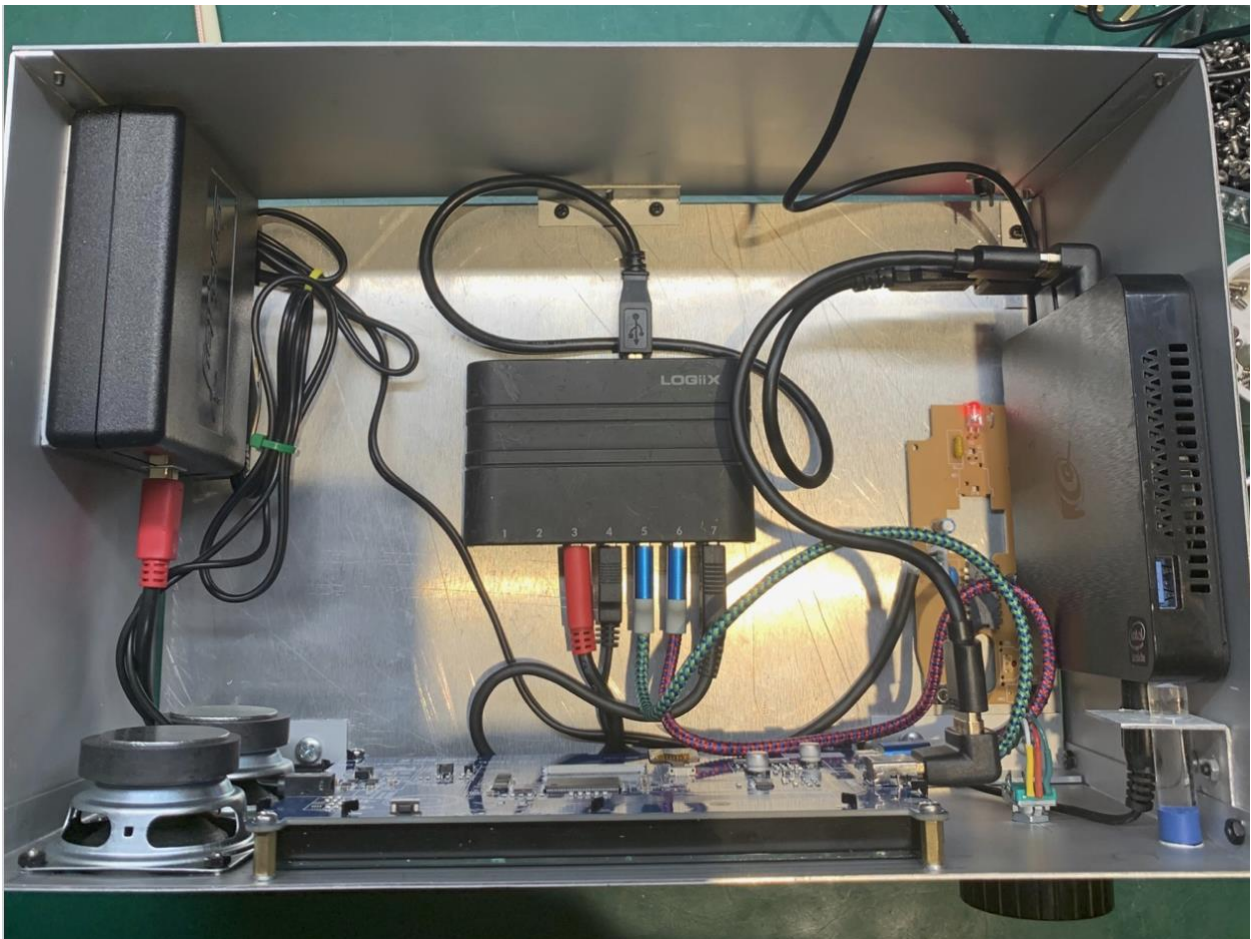


space I put a washer between the mounts and the front panel. It works exactly as it is supposed to.

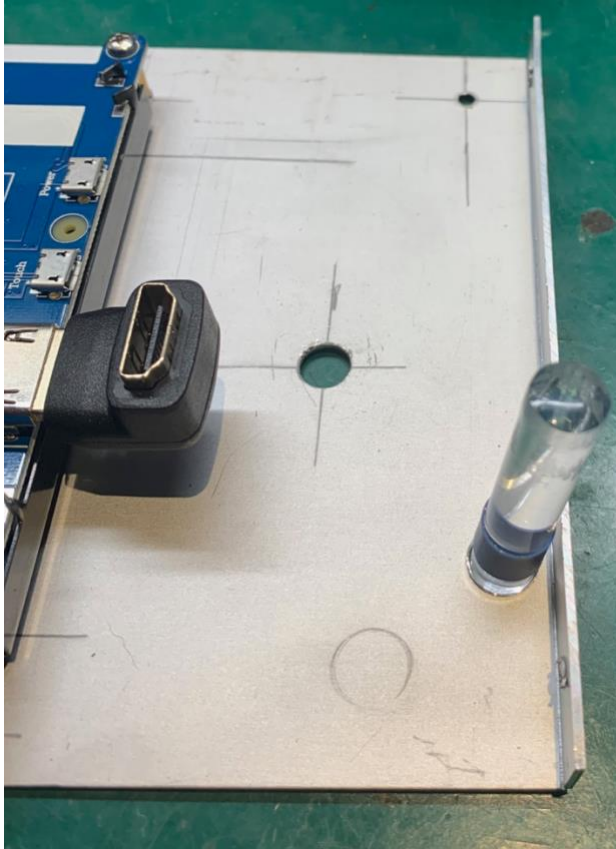


6. And finally I wanted a nice frequency control knob on the right hand side of the panel so I simply measured where I wanted it and placed the Microsoft mouse that I discombubolated on the bottom of the chassis under the Mini PC module. The encoder was mounted on the front panel and it works perfectly for fine tuning with a surplus knob I had in the junkbox.

The final layout shows where everything fits, and I just need to wire the power supply properly and the guts will be finished. But being impatient, I had to try it and it worked exactly as I had planned from the start.



All the components except the speakers and the display are mounted on 1/8" double foam tape for easy removal if I want to change things and also to save having to drill holes in the components to mount them.



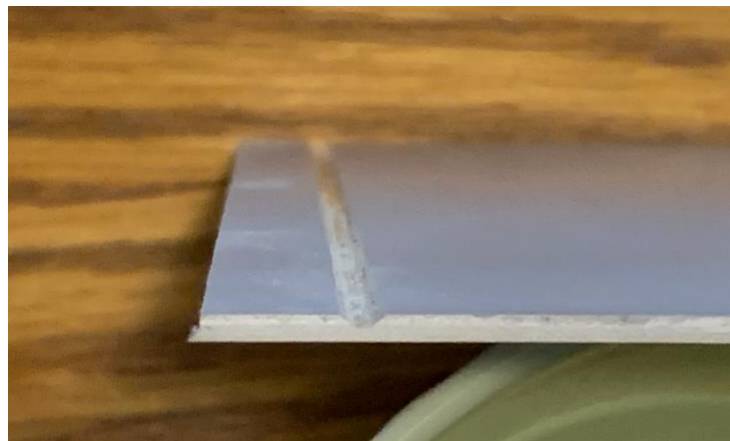
Laying out the radio front panel as I mentioned took a couple of tries. When laying out anything it is always wise to plan ahead and try to anticipate any problems before cutting metal. I thought I had done that but Murphy bit me in the butt and I had to do it twice. Always double check all your measurements and when you have them down, do your cutting. Lay it out on the panel and centre punch every place where you are going to drill or cut.

I use a drill press for drilling my holes to an approximate size then ream them out as necessary to get the hole size exact. I debur them and then they are ready for mounting components.

However I'm getting ahead of myself a bit. How about fabricating the chassis in the first place, you ask? Cutting aluminum is easy if you have the right tools. I bought a non ferrous blade for my table saw. That was the smartest thing I have ever done. My cuts are

accurate and clean and very little filing ever has to be done.

I also learned a trick years ago about bending metal that will make many of you laugh. If the metal is thin, it will bend easily, hmmm? Now that has something to do with physics I expect. So, if you want something to bend easily, make it thinner at the point where you want it to bend, duh. To do that with aluminum sheets, use that metal blade for your table saw. If you want perfect cuts every time, use one of these blades to not only cut the aluminum sheeting but also to score the path where you want your bends. Simply set your blade half the thickness of the sheet and run it through the saw. Makes sense, doesn't it? It is still strong and accurate if you remember to run the

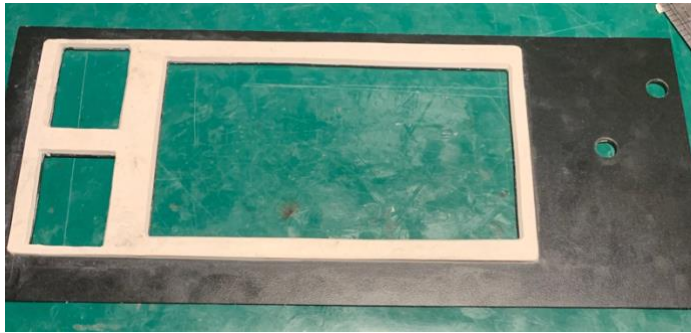


blade at the edge of where you need to make the bend. You will end up with a perfect corner every time.



Cutting large holes in the chassis or the front panel is easily done if you invest in a Rockwell Blade Runner tabletop saw. My XYL bought me one of these dandy devices many years ago and it is indispensable when making cuts in aluminum panels. They are inexpensive and you can use them for many projects where you require a relatively clean cut with either round or square holes. It all depends on the blade so buy wisely when it comes to blades. This thing is brutal so keep your fingers away from that blade. I cut all the holes for the panel and the speakers using this saw and it made the work easy.

I wanted a front panel that had a raised bezel around the display and the speakers with a cloth covering over the speakers. I scratched my head a bit on this one at to what I was going to use to fabricate it. I finally decided on doing something new to me by creating a mock panel of what I

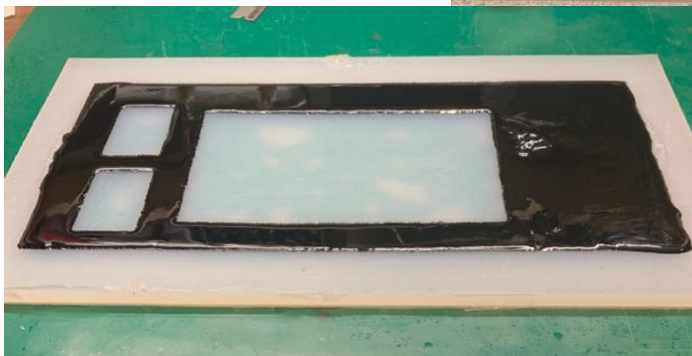


wanted and then casting it into a rubber mold and making a front panel out of plastic. It was tougher than I thought it was going to be but I decided to carve out some Plasticine that I had put on a mock panel made of Arborite material I had on hand. Quite frankly it was a bitch to work with but I got finally after many hours of trying and cast the rubber mold.

Then I waited and waited and waited about 24 hours for the rubber mold to set and removed the plug. Wow does that stuff ever work. The rubber mold was an exact copy of the original and it looked great. (Or as great as an old nincompoop like me could expect.)



Then came making the actual panel with some fast setting plastic material from Smooth-On products. I used the Smooth-On Cast ONYX Fast Black Liquid Plastic. It was an equal part A and B and stir and pour. BOY



DOES THAT STUFF EVER SETUP FAST. Don't waste time stirring for too long because by the time you finish pouring it is basically setting up. It was fully cured and ready to come out of the rubber mold in 10 minutes and it was a perfect image of it (including all the

flaws.) Don't forget to put some WD 40 on the rubber mold first to make it release a bit easier. I forgot to do that but it still released ok, whew!

After sanding and filing and cutting the holes for the components other than the speakers and the display, it all came together. I put some labels using transparent white on it and it looks like a nice little receiver in the end. A few more things to be done on it yet, but I'm happy with the results and with a few changes in the procedures, especially in terms of how I make the plug for the panel I would do it again. Here's the final front panel:



There are a few things to do to finish off the panel and make it all come together in the end, but that can come at a later date. In the meantime this completes my new communications receiver project and the next installment will be the software setup on it.

73

Tom VE6ARG