

## **Lilmike's LilWrecker**

### **Basic Assembly Instructions 9-2013**

These plans assume you've read the build thread on AVS, as well as downloaded the cutlist and Sketchup renderings available in that thread. Basic woodworking skills are required, as is a basic knowledge of speaker and horn speaker construction. This is not an easy build, but is within the reach of most folks if you take your time. A helper is nice to have because some of these panels are very large. You will need a 2-wheel dolly or a strong friend or two to safely move the cabinet once it is complete.

#### **Tools Required (bare minimum)**

Circular Saw  
Straightedge circular saw guide  
Framing square  
Tape measure  
Drill/driver  
Jigsaw or router and a circle jig  
2 4" C clamps  
Tap to fit hurricane nuts or inserts (10-32 typically)

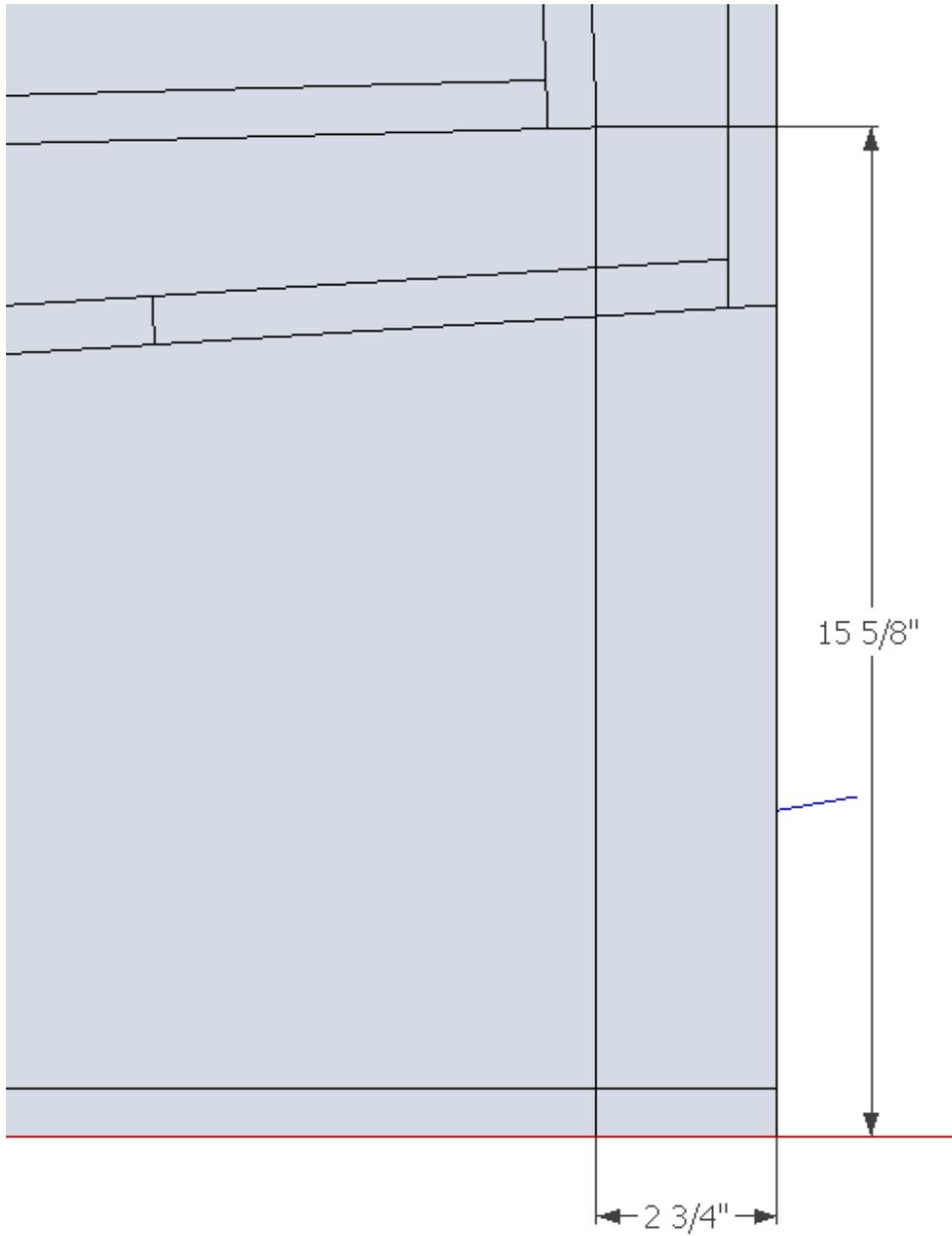
#### **Recommended**

6' long, 3/4" wide by 1/8" thick layout straightedge  
Jevon 3D Squares or similar clamping jigs, more clamps  
Pipe Clamps  
Belt sander  
Orbital sander  
15/16" Forstner bit (for Speakon)

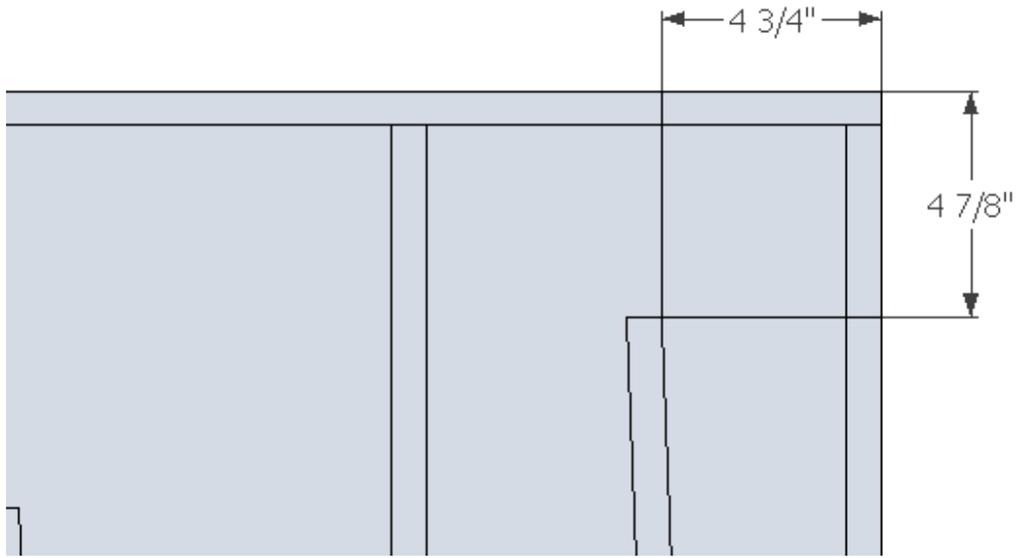
#### **Materials List**

4 full 4X8 sheets of 3/4" plywood  
Box of #8 X 1 5/8" drywall screws  
8 - 10-32 X 1 3/4" socket head cap screws  
8 #10 flat washers  
8 10-32 Threaded Inserts  
PL Premium Construction Adhesive – 2 tubes  
15" Driver (Kicker CVX, Alpine TType S, Stereo Integrity HT15, see build thread for discussions)  
Speakon 2-pole input terminal (they're air-tight and vibration proof, and they cost less)

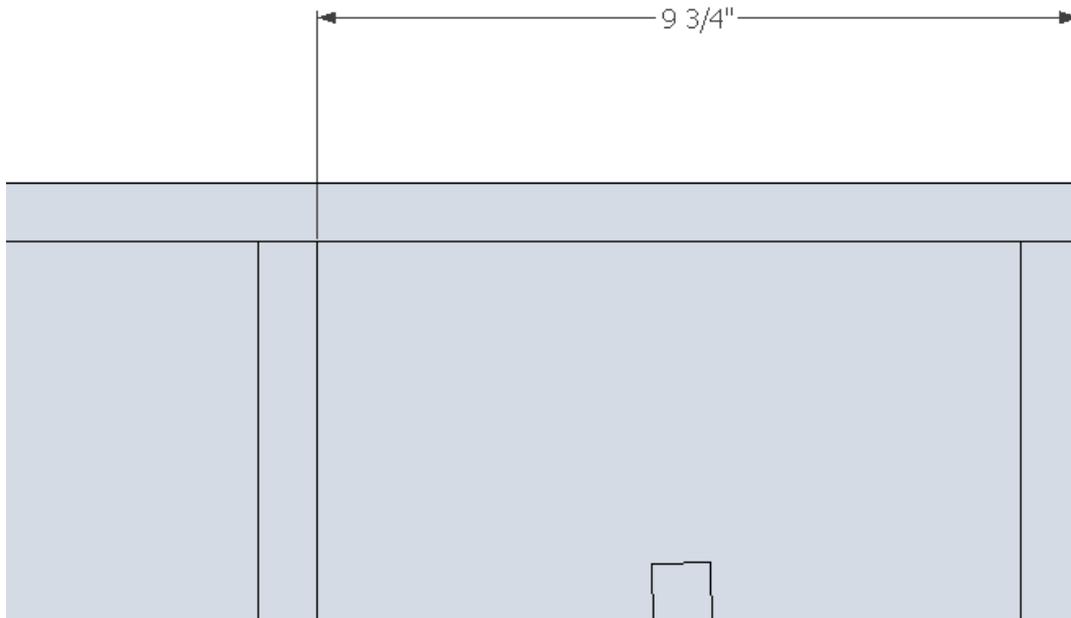




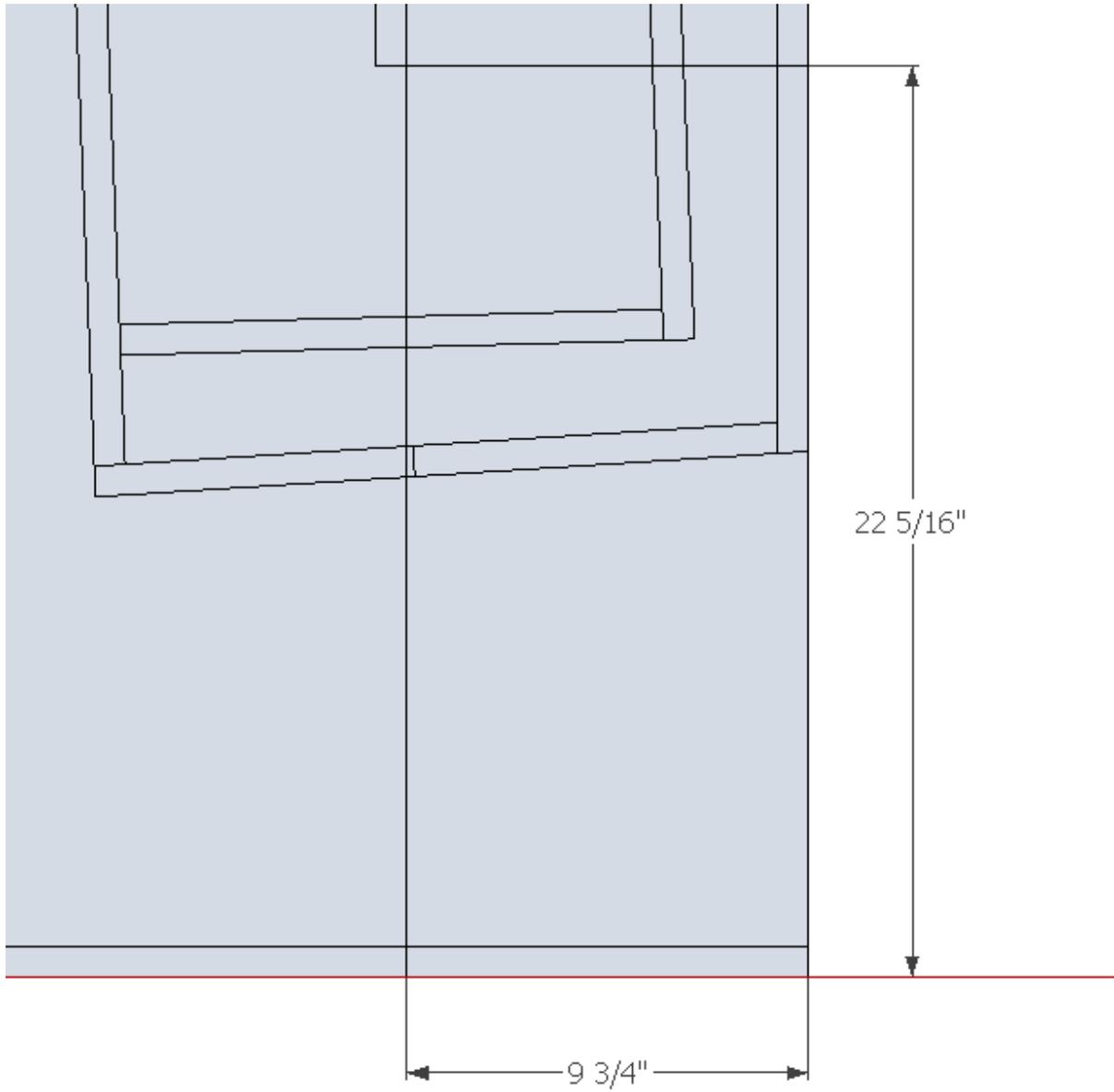
Point 3 is the end of the first flare near the top right of the cabinet. This point is located  $4 \frac{3}{4}$ " in and  $4 \frac{7}{8}$ " down from the top.



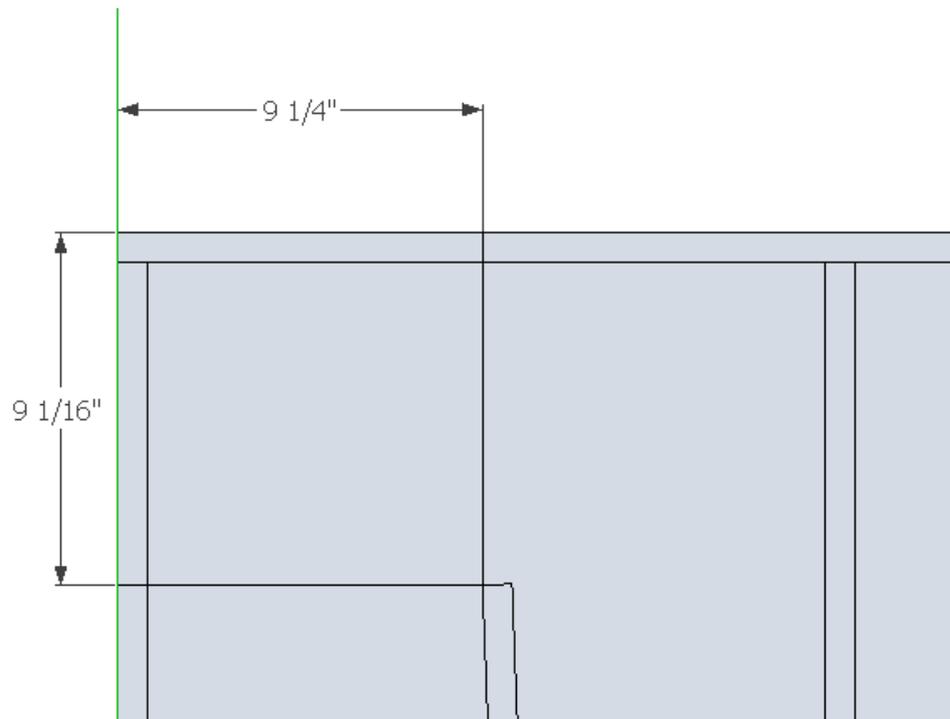
Point 4 is the end of flare #2 at the top of the cabinet,  $9 \frac{3}{4}$ " in from the front.



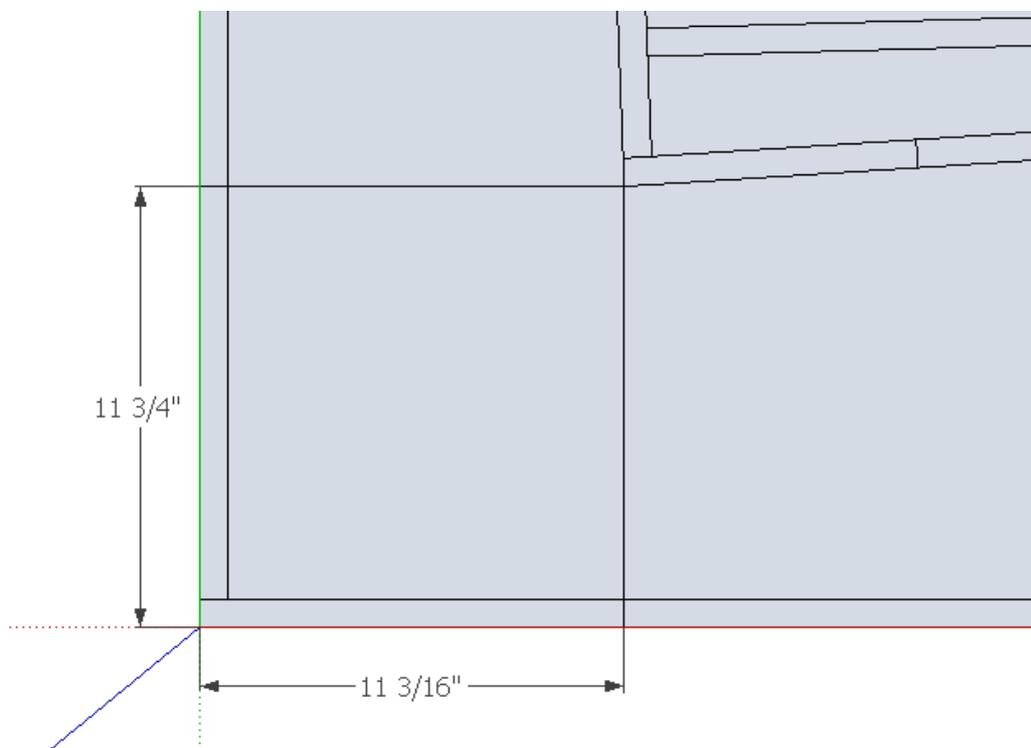
Point 5 is the other end of Flare #2. Flare 2 is not angled from the front of the cabinet, so the end is  $9 \frac{3}{4}$ " from the front of the cabinet and  $22 \frac{5}{16}$ " from the bottom edge.



Point 6 is the top of flare 3, and is referenced **from the back side of the cabinet**. It is located  $9 \frac{3}{4}$ " from the back side, and  $9 \frac{1}{16}$ " from the top.

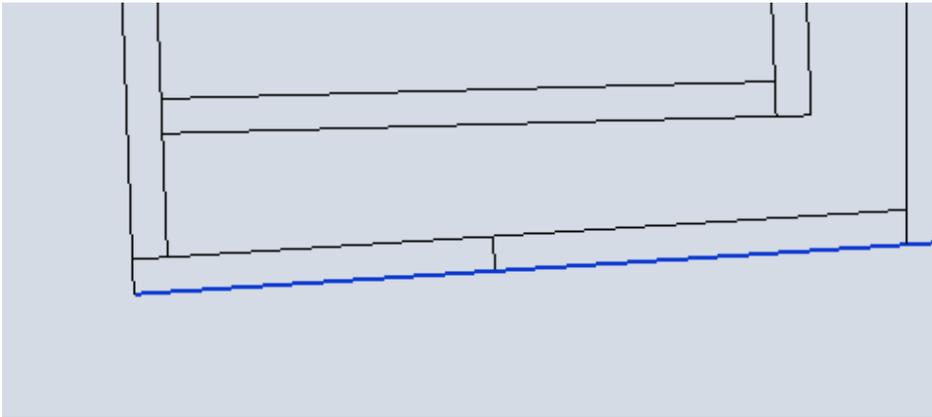


Point 7 is the last of the key layout points, the corner between the baffle and flare 3. This point is also **referenced from the back**, and is  $11 \frac{3}{4}$ " from the bottom and  $11 \frac{3}{16}$ " from the back of the cabinet



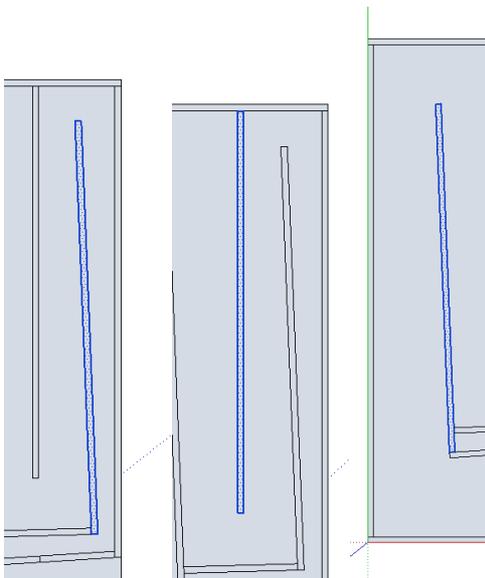
Now – we need to lay out the panels. We need to draw where the wood panels will be on the side panel. I'll freely admit it - I cheat. I use a  $\frac{3}{4}$ " wide strip of  $\frac{1}{8}$ " thick aluminum. This allows me to lay out both sides of the panel without moving the straightedge. Yes – the plywood is thinner, but the  $\frac{1}{32}$ " is not that big of a deal.

Set your straightedge at points 1 and 7, and draw in the location of the baffle.



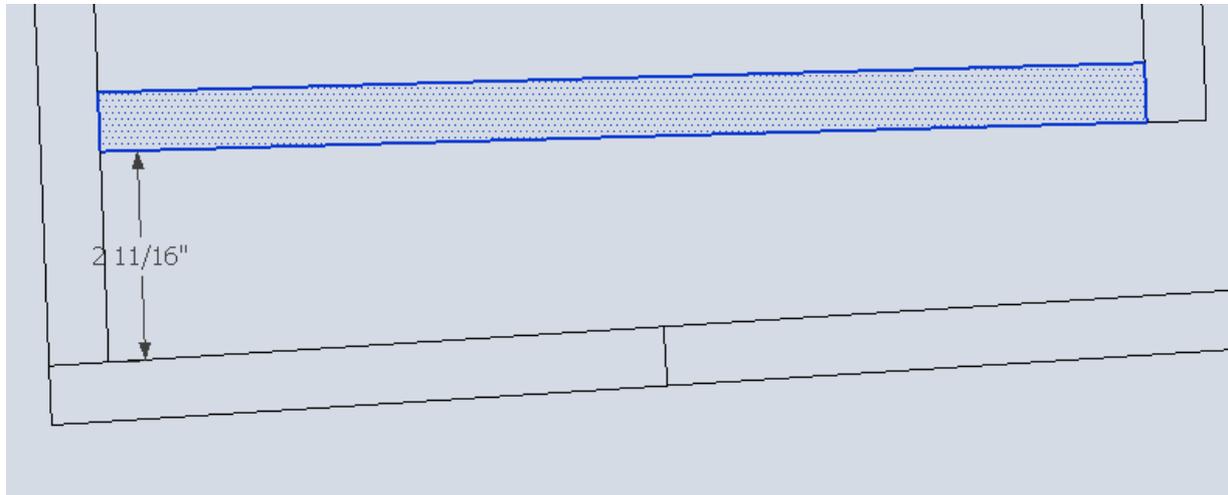
Offset it  $\frac{3}{4}$ " up, and draw the other side, one panel done. Let's pick the rest of the low fruit here, Draw a line that is  $\frac{3}{4}$ " from the edge of the side panel from the mouth opening all the way round to the bottom. That covers the front, top, back, and bottom layout. Four more panels done, only four left to go.

Now – set the straightedge at points 2 and 3 and draw in the first flare (1). Reset to points 4 and 5 and draw the 2<sup>nd</sup>, then reset to points 6 and 7 and draw the third. **Remember to offset the third flare to the inside of the cabinet**, the control points are the outside edge.



So now we have all but the final panel in place. Now it is time to make sure that the panel junctions are drawn exactly as in the plans, otherwise the parts will not line up correctly during construction.

The final panel location can now be drawn in. Measure  $2\frac{11}{16}$ " from the inside corner of the baffle and flare three as shown. Set your straightedge between this point and point 2, and draw in the final panel location, as shown. It is designed to be a negative flare rate.



That's it, layout is done. Now is a great time to take a break, step back and then doublecheck your work and make sure that the layout matches the drawings provided. Then, check it again. It is easy to fix now, nearly impossible to fix later.

Satisfied with your layout? Let's move on to the next step.

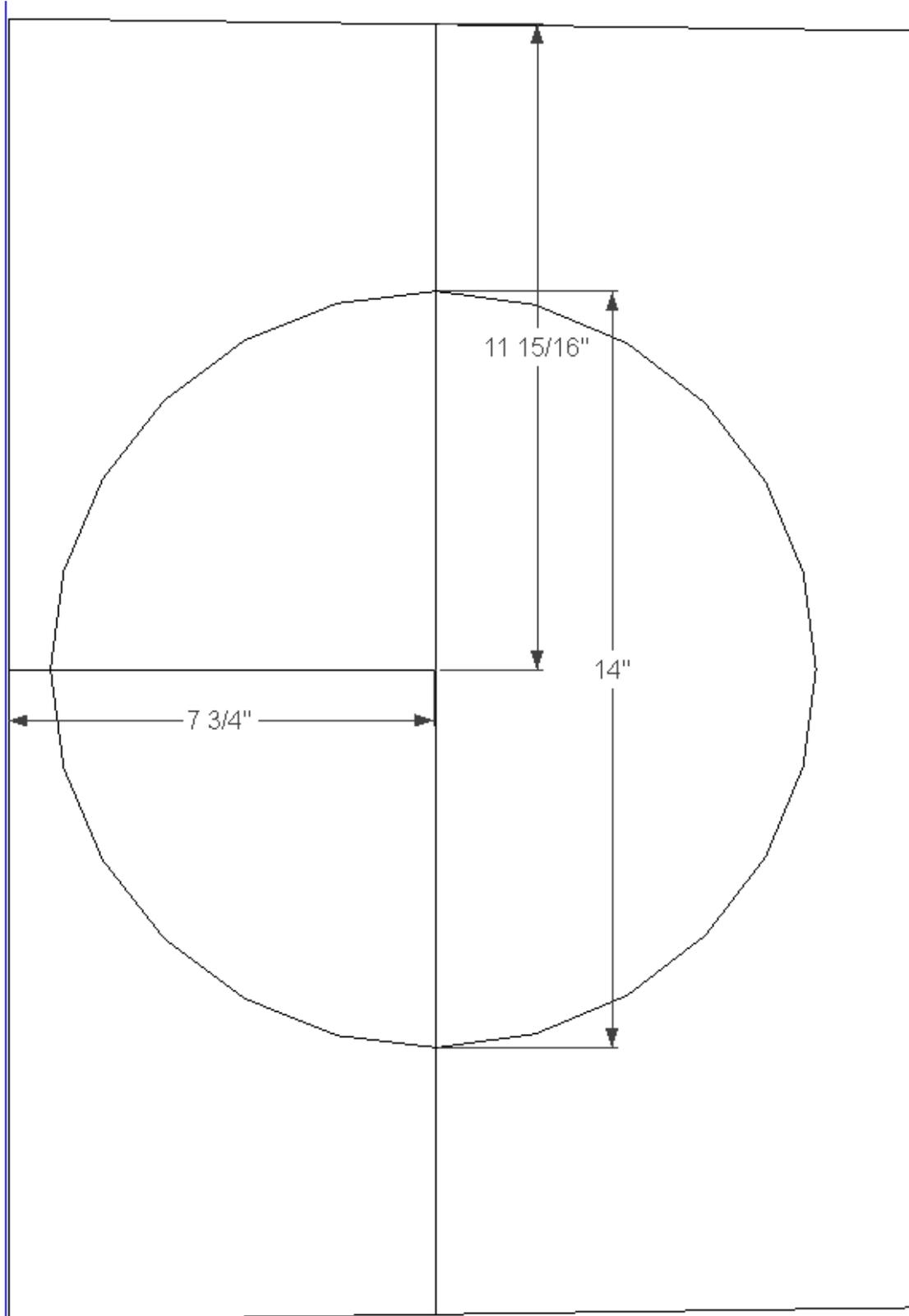
### **Step three - Indexing the second side.**

Line up both sides and clamp them into place, making sure all edges match up.

With a  $\frac{1}{8}$ " diameter bit, drill a hole approximately 1" in from the end of each panel in the center of the width all the way through both panels. These holes will serve as guides for final assembly. Once you've drilled all 18 holes, mark the mouth opening on the inside, mark the outside, then set panel 2 aside, we'll be building on panel 1.

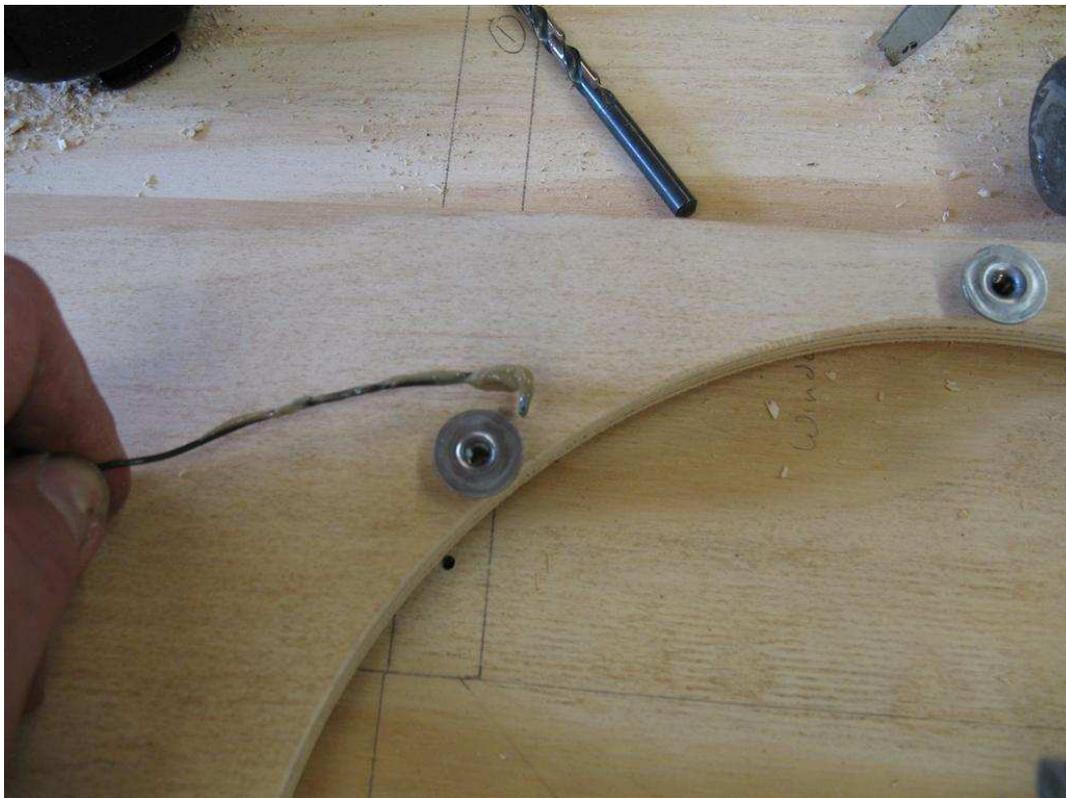
### **Step four – Machine the baffle**

We need a driver cutout, as well as an array of driver mounting holes drilled, then we need to install our threaded inserts. This is a good time to trim the mouth end of the baffle with a slight angle (about 3.5 degrees) to make things mate up tightly and look good. First – set your circle jig for a cutout that is appropriate for your diver (usually 14"). Second – drill a pilot hole for your circle jig on the baffle, located as shown,  $7\frac{3}{4}$ " from the end, centered on the baffle's width.



Cut the driver cutout, then drop the driver through to locate the screw holes. Center the driver in the cutout (yes – it is a little large, that is by design, I don't want the surround to hit), then mark the 8 mounting holes in the driver's frame. You can square the mounting holes to the axes of the baffle if you prefer, I doubt that it will have an effect on the sound.

Drill the mounting holes through the baffle, using a sharp bit, and drilling into a backer board to eliminate chipout. I use a 1/4" bit for the threaded inserts I use or hurricane nuts, but I drill each location with the 1/8" bit first. Working on the throat side (small end of the horn path) of the baffle, slightly countersink the each mounting hole. I typically clean the hurricane nuts or inserts with acetone or brake cleaner, you could use soap and water if you wanted. The key here is to get the oil off of them so that the PL bonds well. Gently tap a hurricane nut or threaded insert into the mounting hole on the throat side of the baffle – NOT THE MOUTH SIDE, then apply PL to the exposed portion of the shank with a bent wire, like the following pic, then set the insert or hurricane nut into place.



Lather, rinse repeat. Basically, repeat these steps 7 more times, once for each mounting point. Finally - chase the threads with a tap when the PL has cured and VERIFY that the driver mounts perfectly. **Do not skip this final step. You WILL regret it.**

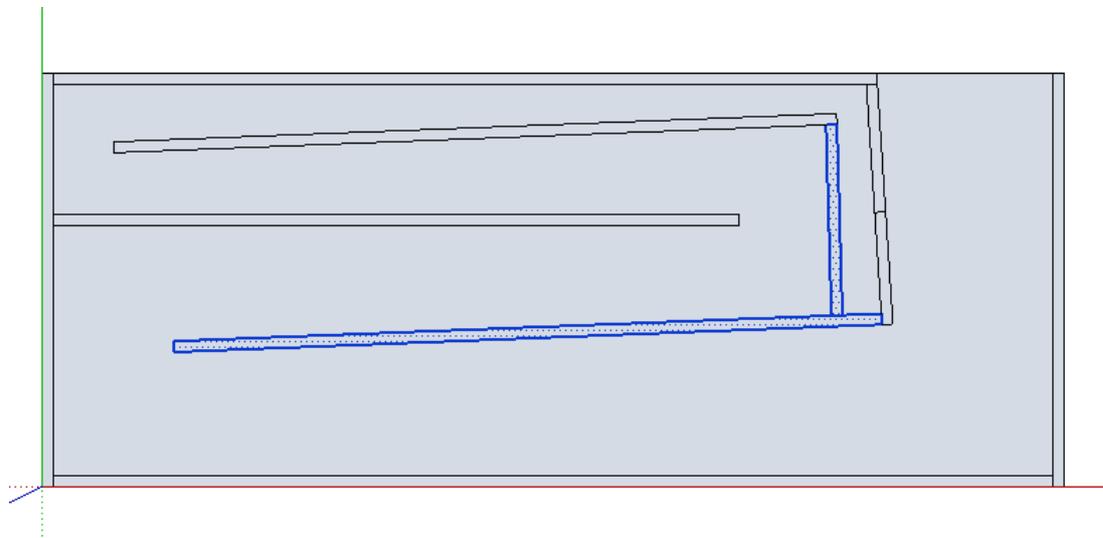
### Step five - Assembly.

Have you got a couple of free hours? Cause when you start – it is go-time. I use a thin (1/4", and flattened) bead of PL Premium Adhesive for the full length of each joint. I can do a cabinet this size with a single tube if I skimp, but this is not a place for economy, the glue is the cheapest (and most critical) part, so have a second on hand ready to go. A scrap to catch the PL dribbles is nice, because my caulking gun never quite stops pushing the PL out.....even when I hit the release.

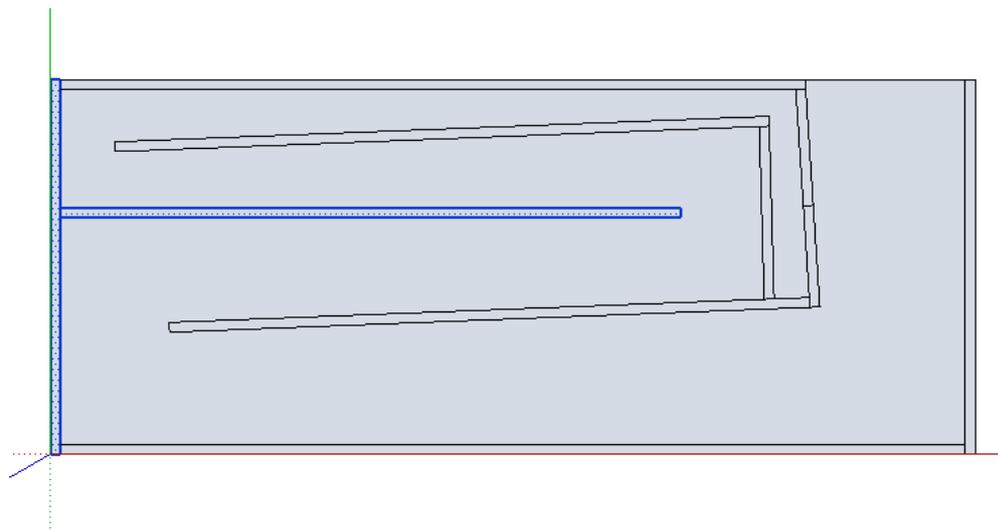
Ready?? Let's go.

I'd assemble things as follows:

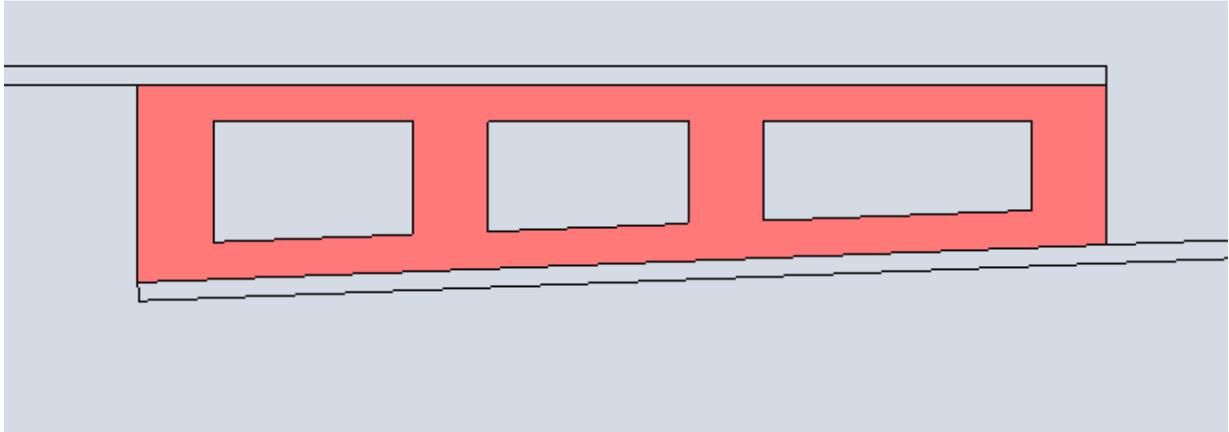
Flare 3 and the throat first.



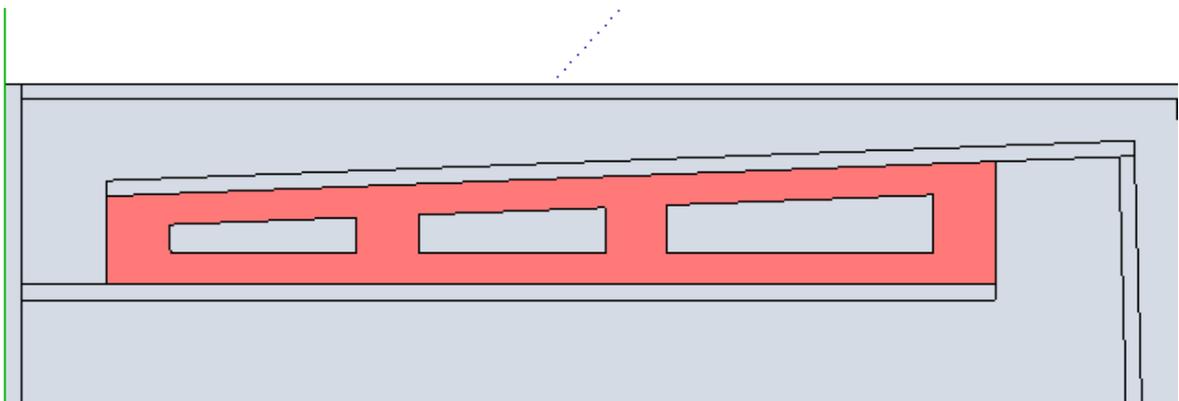
Then add the top and flare 2, installing a proper brace between flares 2 and 3



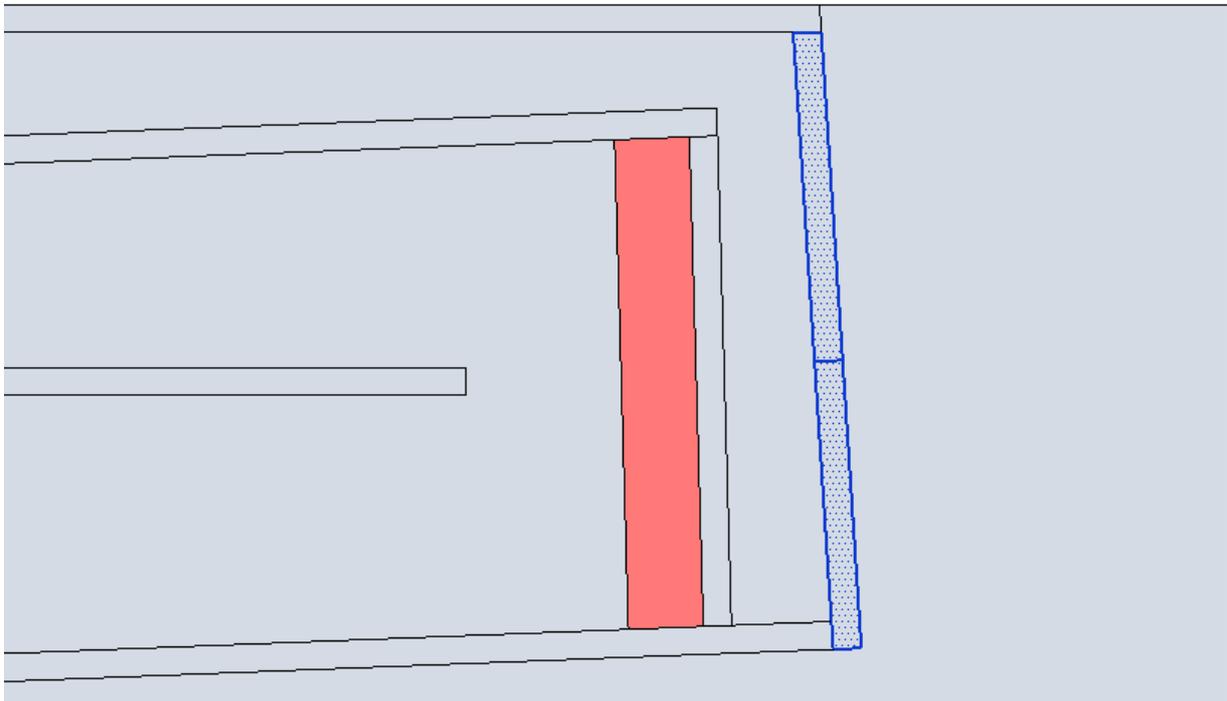
I suggest bracing things like this. One windowed brace is sufficient; center it on the interior panels. With  $\frac{3}{4}$ " material, and a  $23 \frac{7}{8}$ " internal width, a pair of spacers that are  $11 \frac{9}{16}$ " high will help support the braces for installation. These cabinets can not be too strong. Cut and fit the brace, then when happy with the fit, cut the windows, then glue it and screw it into place, making sure that the assembly stays square.



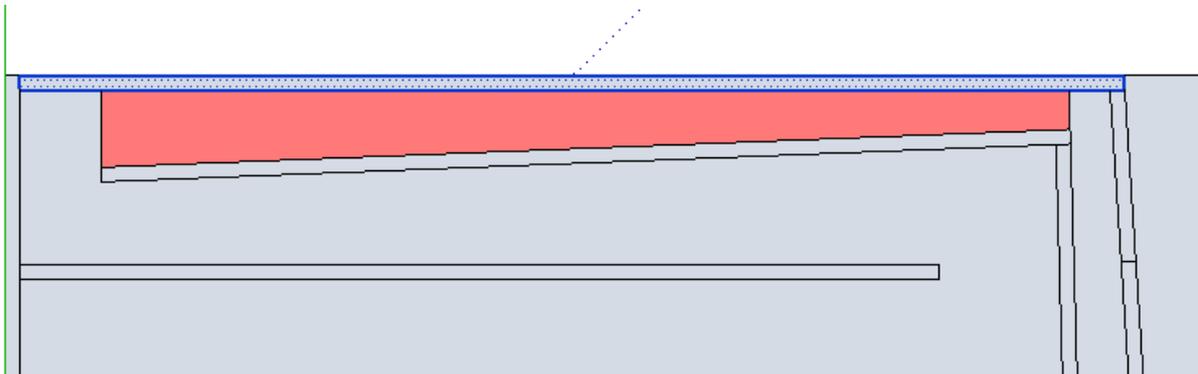
At this point, I'd install flare 1 and brace it similarly to flare 2 and 3. Make sure things stay square, I can't stress that enough.



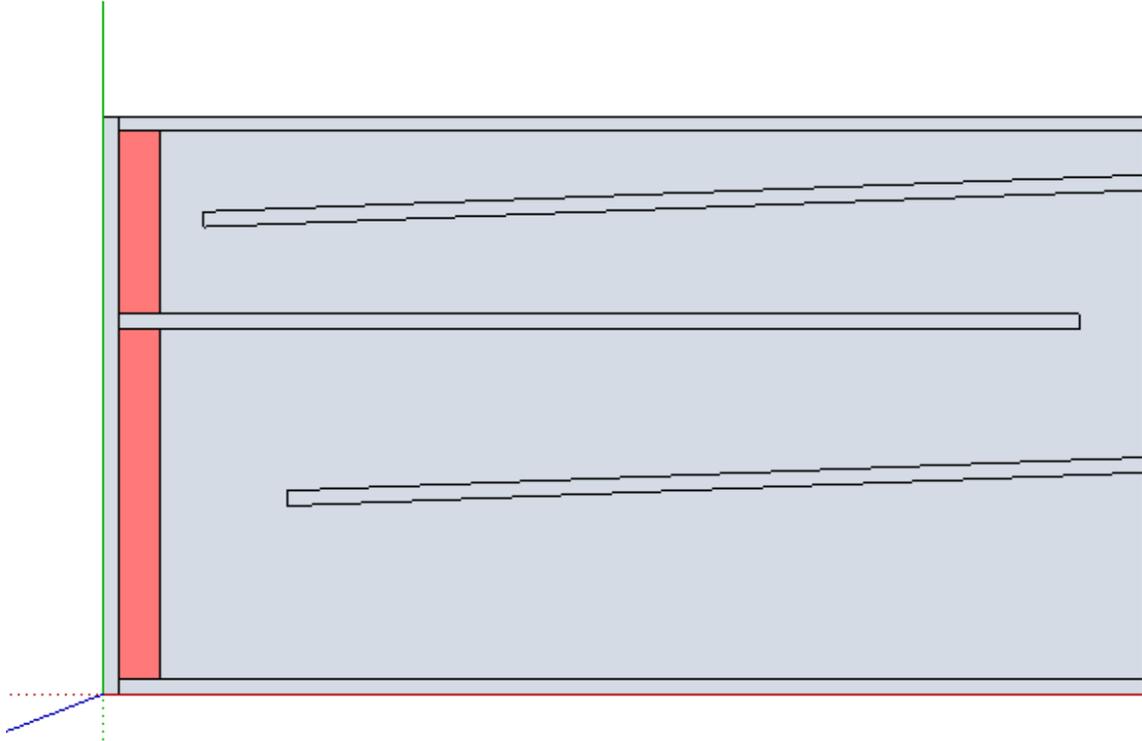
Next, I'd brace the throat and install the baffle. Throat bracing is a single 2" board screwed and glued to the back of the throat, opposite the driver.



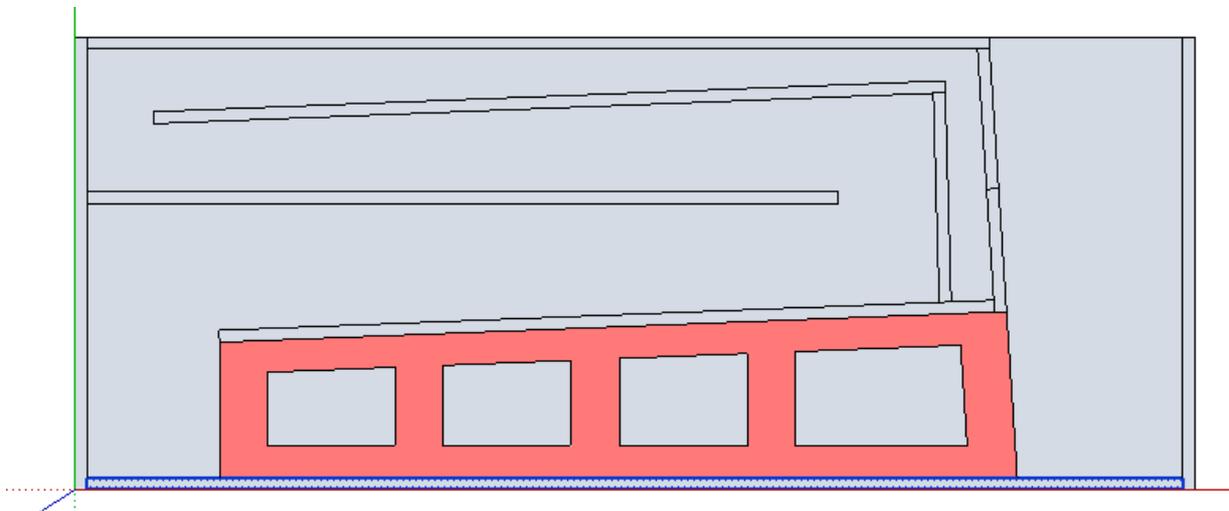
Now – it is time to install the front and brace it to flare 1. Pocket screws will help with this, as the back side is blind. Trim the front to fit perfectly, install the brace on flare 1, then attach the front in place. This brace really can't be windowed, no worries. Solid works fine.



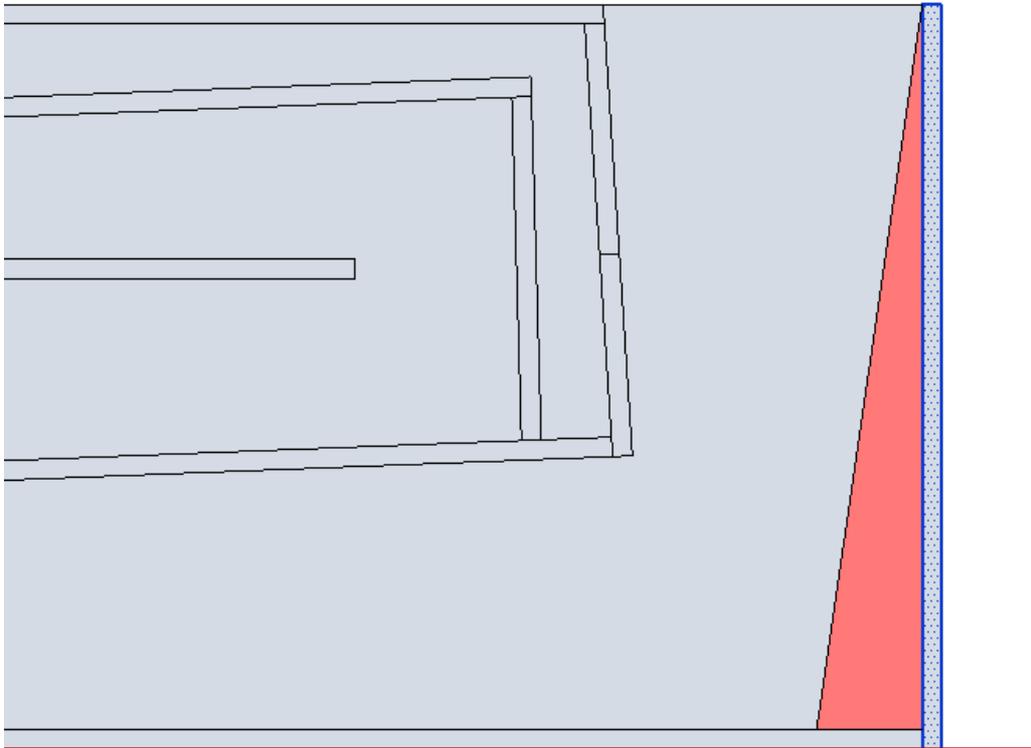
Next, I'd brace the top. This will take 2 2-inch wide strips, one about 9" long, one about 17 1/4" long.



Now it is time to brace and install the back. You definitely want to window this brace. Pocket screws will help install this one too.



Down to the last panel, the bottom. This should be braced as well, but we have to be able to get the driver installed, so a bit of planning is needed. In other builds, I've had good luck with a pair of tapered stiffeners on the bottom, spaced about 5" off the panel center line so that there is space for the magnet to fit. It's not a bad idea to tie the baffle to the bottom too, but there is not a lot of room to work with. No matter what you choose, **MAKE SURE THE DRIVER FITS!!!**



Last step is to install the other side. There are easy ways and hard ways, I prefer easy myself.

First things first, use your straightedge or a piece of pipe to look for high and low spots. If you cut things accurately and assembled it correctly, there shouldn't be any. If you find high spots, a belt sander works well to fix things. Low spots are a bit more challenging, but PL will fill a 1/8" gap, just add a bit of glue there. More than an eighth requires some attention. This is also the last time you'll be able to fix things inside, so give it a final check before installing the other side.

I tip the cabinet up onto its back so that the mounting face is vertical, supporting it on some scrap to keep the glue squeezeout off the floor. Run a continuous bead of PL on all of the panels. Make sure that the inside of the panel is oriented to the inside of the horn, and that the mouth openings are matched up so that the layout holes will work. Set the panel on edge in the proper orientation, then slide it into the cabinet. I usually use some clamps to hold things in place. Clamp the cabinet as needed to pull it square and line up the corners. You may need to screw one edge in place to make things easier. Once all four corners are lined up as well as you can get things, screw the side into place around the edges. Connect your layout holes with pencil lines to show the panel layout on the outside of the cabinet, then place screws along those lines to attach the interior panels.

OK, that's it, the hard part is done. Now you can take a break. Before you turn out the lights, now is the time to clean the PL off of everything, including you. I use mineral spirits, Acetone also works. Look for

glue squeeze-out all the way through the build, make sure all the joints are tight. It might not hurt to leave some clamps as needed to pull things into place. If it is not square now, it never will be. Let it sit, preferably overnight, for the PL to set. PL sets slowly when it is cold out, so give it extra time if it is below 50 degrees.

#### **Step six - Install the driver**

Rotate the cabinet so that the driver mounting surface is close to horizontal (mouth on top). Put a dab of acrylic latex caulk into the throat side of each of the hurricane nuts or inserts to seal them. Check to see that your driver gasket is sealed. If not – small pieces of speaker caulk or Duct Seal can be used to seal things up. I like to use a small bead of speaker caulk or duct seal to guarantee the driver gasket is sealed to the cabinet. Install the driver with 10-32X1 3/4" socket head cap screws and flat washers. An allen wrench makes installation easy. I typically use an allen insert and a 1/4" socket wrench. I install all 8 screws finger tight, then wiggle the driver to ensure it is centered on the screws. Once the driver is in position, tighten the screws in a crosswise pattern, similar to torquing wheel lugs. Be careful to not overtighten – the gasket will compress, that is as far as you need to go, the frame may deform if you overtighten.

#### **Step seven - Install input terminal and wire**

I use speakons. They are solid, easy to use, and stay put. To install the 2-pole connector, drill a 15-16" hole (I use a forstner bit) through the cabinet where you need it. Solder the speaker wire to the speakon, then thread the wire through the hole. Put a ring of speaker caulk or duct seal around the barrel of the speakon, then screw the speakon into place. Attach the wires to the driver terminals. I used about 2 feet of #14 wire, use whatever you need, but give yourself a bit of slack. I used cable ties with screw eyes to hold the wires in place. With the CVX, the polarity is marked, but it is goofy. **MAKE SURE YOU HAVE THE DRIVER WIRED RIGHT!** It is easy to check and fix now, it is much more of a challenge once the cabinets are in place.

#### **Step eight - Wire it up and make some noise. That's it, you're done!**