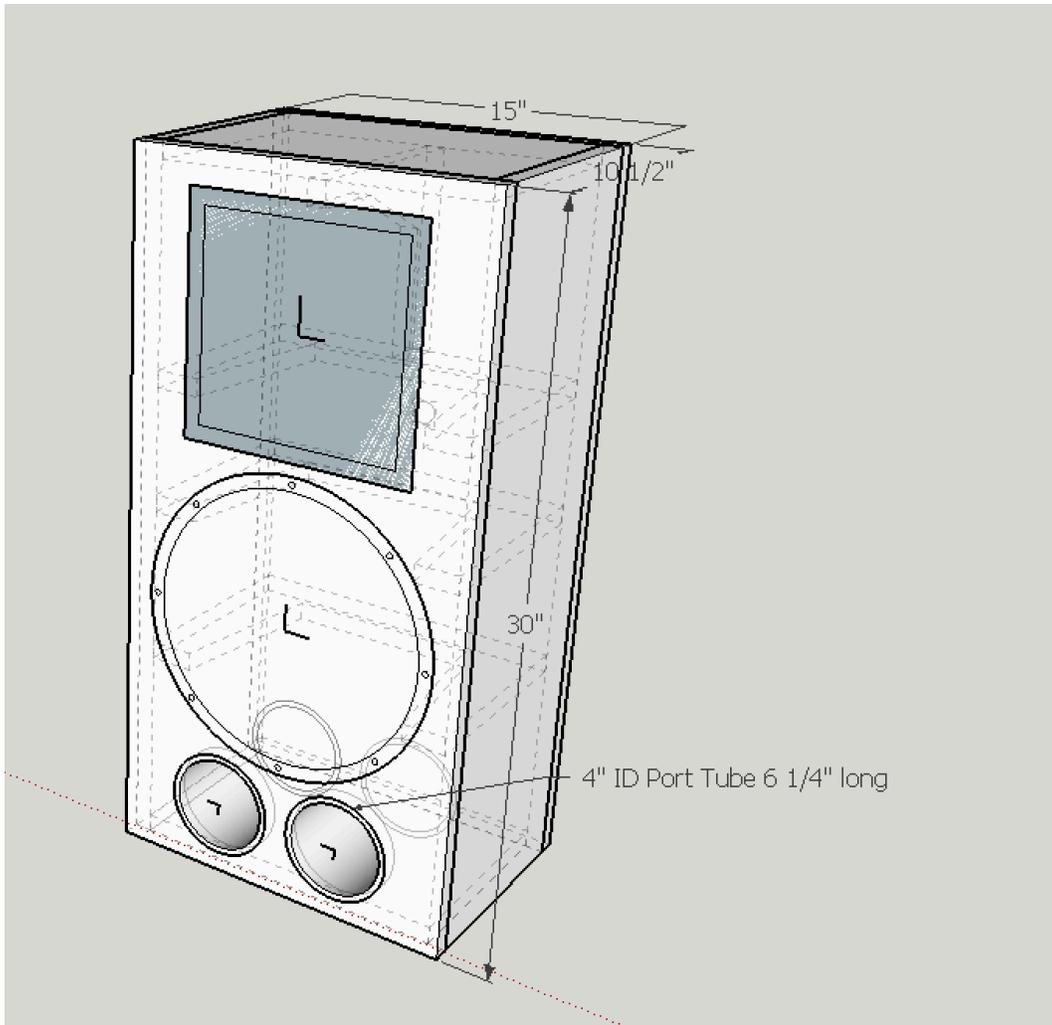


Home Theater 12" Two Way HT12-1

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Introduction

The HT12-1 is a high output, high quality home theater speaker using pro-sound drivers from SB-Audience. The woofer is the SB Audience Nero-12MWN400D paired with the Bianco 44CD-PK mounted on the H250 Horn. This yields a high output home theater speaker with very low distortion, easy impedance and fantastic sound.

Enclosure

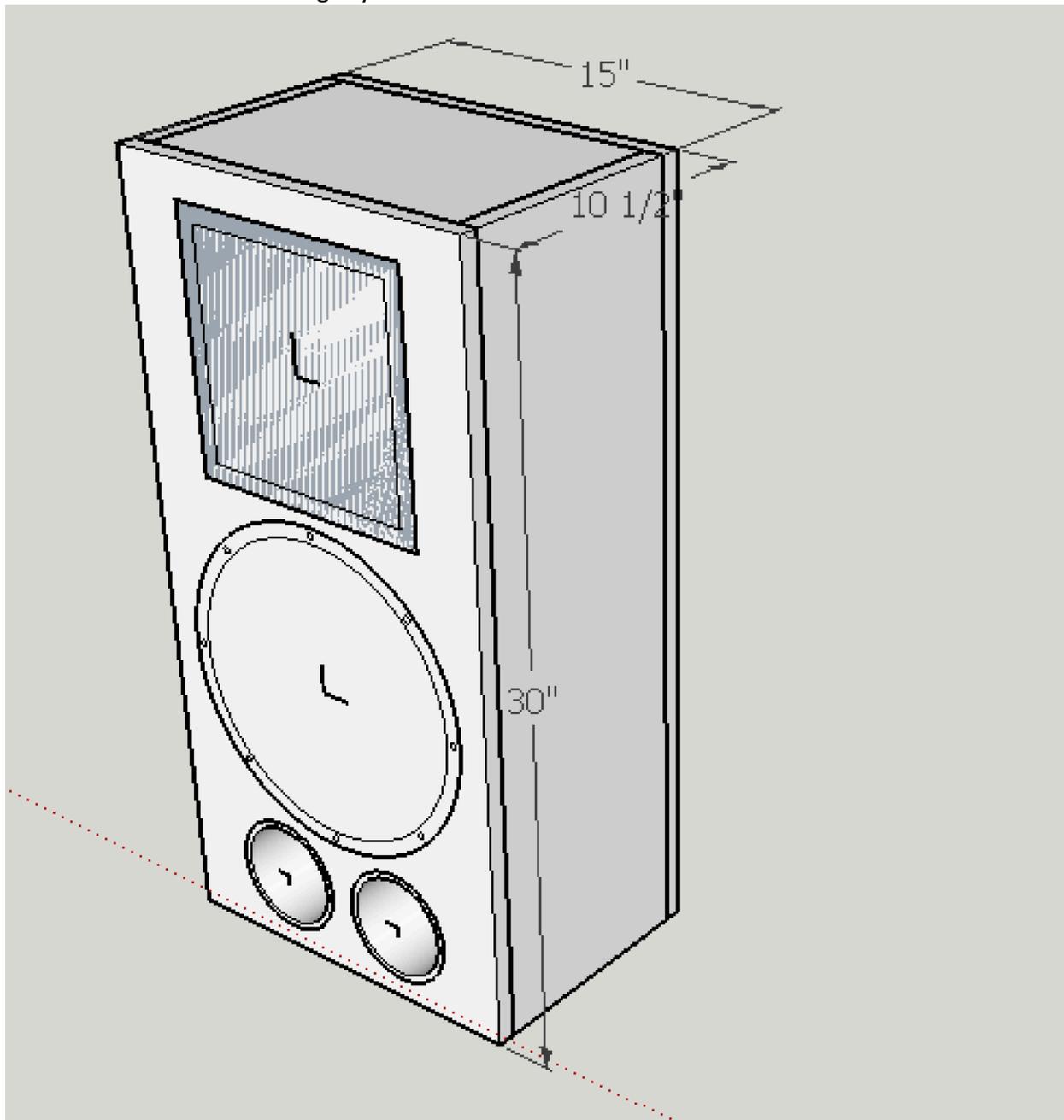
The enclosure is a front ported vented design. The enclosure, crossover and bass alignment were designed for the speaker to be placed relatively close to the rear wall of the room, including behind an acoustically transparent screen. External dimensions are 15" Wide, 30" tall by 10.5" deep.

One catch with high power woofers is that it's easy to overload the bass reflex port. At the tuning frequency of the port, woofer excursion is at a minimum, and the port is producing the sound of the loudspeaker. Since the excursion of the woofer is at a minimum it doesn't matter how much excursion the driver can handle, the port size is basically determined by how much power you can put into the woofer...and these woofers can handle a lot. To maximize bass output I used 2 4" inside diameter ports. You can use Schedule 40 PVC pipe (like I did) or 4" low pressure drain/sewer pipe is a bit cheaper and will work just as well.

The cut sheet allows for two speakers to be made from a single sheet of 4x8' ¾" MDF. Some care has to be taken with bracing layout, but it's entirely possible to build a pair of these boxes with a table saw, jig saw and circle cutting router jig.

To aid in ease of construction the woofer/tweeter are not flush mounted...and nor should they be. Both have enough directivity that they won't paint the edges of the baffle with high frequency sound, so diffraction ripple is avoided...and the need to flush mount them is eliminated. In fact...if you do flush mount them you'll change the relative offset of the drivers

and detune the crossover slightly.



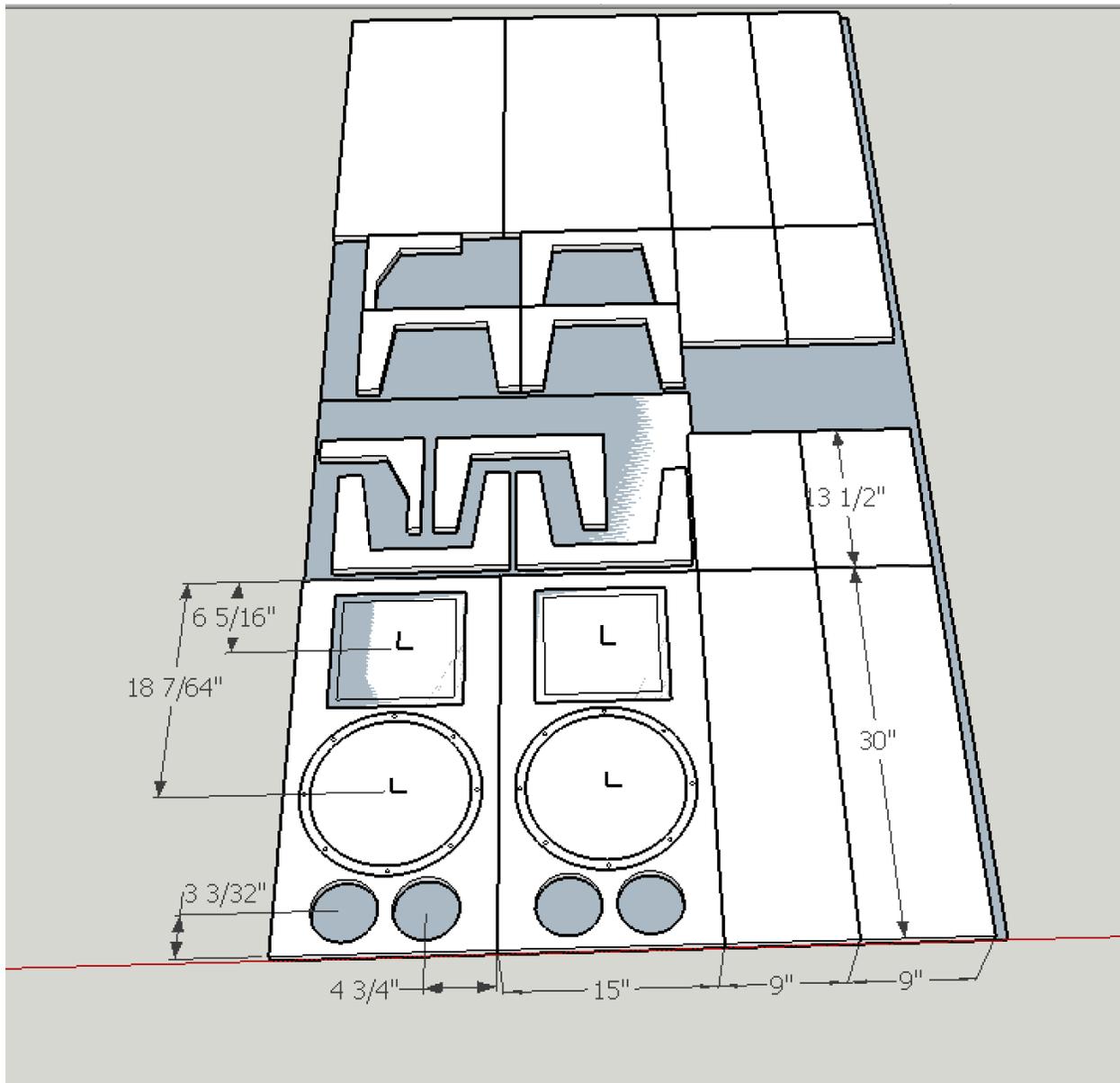


Figure 1 Cutout for 4x8' $\frac{3}{4}$ " MDF

The bracing in the cut sheet is a suggestion...that's what I used..you can see that it's possible to cut them other way as you see fit. I nested them such that I was able to get them all cut in one go on my little hobby CNC...but you could easily cut them with a table saw and jig saw and be just fine.

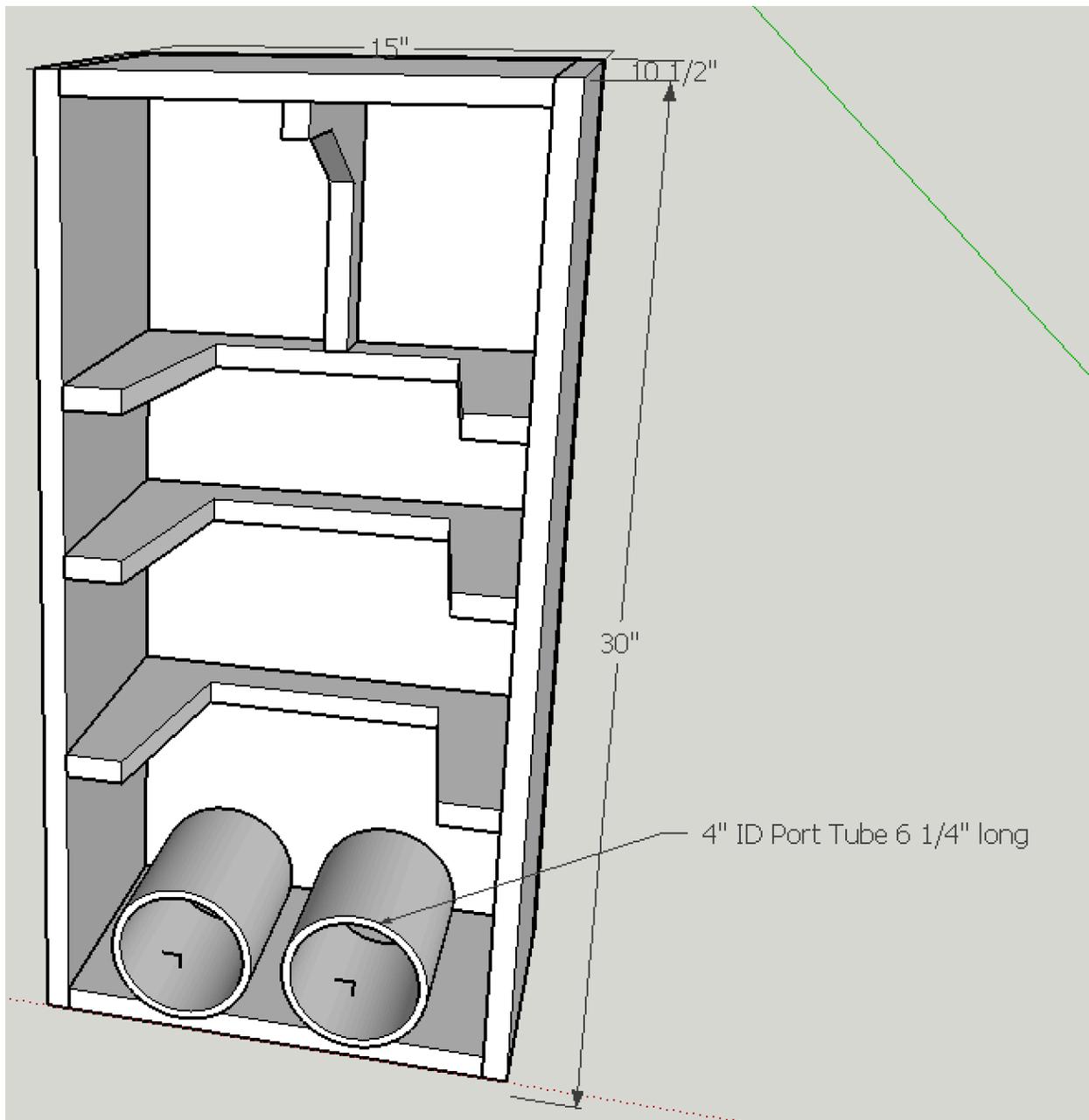


Figure 2 Rough Brace Layout

The ***ENTIRE*** area above the port tubes should be loosely filled with Acousta-Stuff or Dacron polyfill. The challenge will be to keep it from falling down and blocking the port tubes. I've used string, or pantyhose material to make a net to keep it falling down successfully in the past.

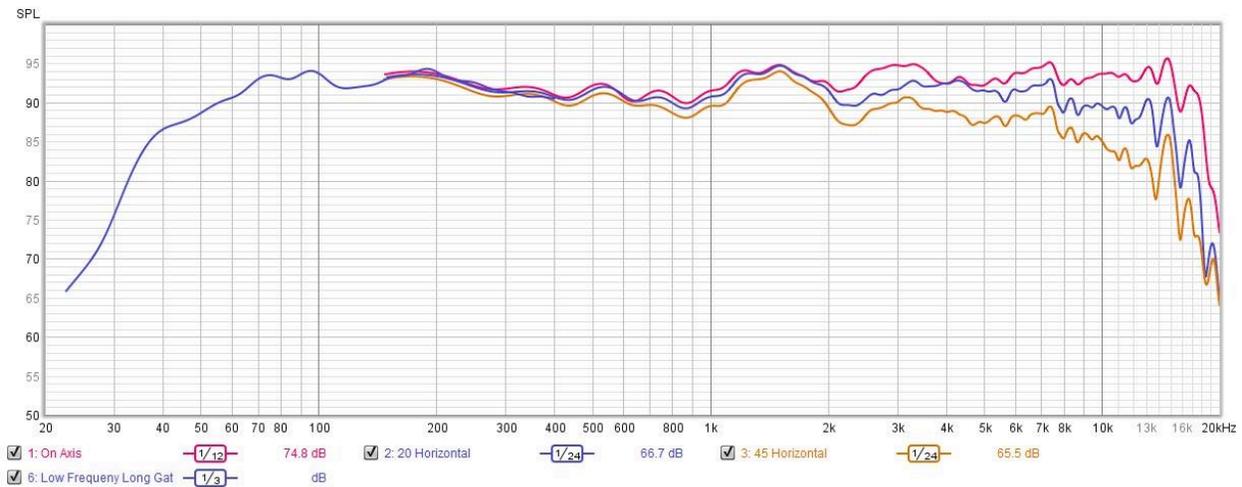
The crossover is relatively self-explanatory, except for a couple of things that may not be immediately obvious. The crossover frequency is $\sim 1\text{kHz}$ acoustically and about 1.2kHz electrically. The spec sheets for the driver/horn combo indicate that a higher crossover frequency should be used, but that's for a PA application. The torture in that application is significantly higher than in HT. Let's put it this way...if you're distorting the tweeters on this speaker and your room is less than roughly $20' \times 30' \times 10'$ you're probably doing permanent hearing damage.

The woofer circuit is a 3rd order electrical (4th order acoustical) filter with a bit of notch filtering and impedance compensation. The filter compensates for *most* but not all of the loudspeakers baffle step (which helps it keep a bit more sensitivity while still going quite low) so keeping it near the rear wall is a must in operation. The 25 ohm parallel impedance compensation should be at a minimum 25W, highly recommended to go 50 if you're going to listen loudly. Pay attention to how those resistors are mounted so that you don't get funny smells as polyfill is melting to them.

The tweeter circuit is a 3rd order electrical (4th order acoustical) filter with an L-pad and a notch filter to tame a peak at roughly 2.5kHz . One of the reasons I'm not worried about the



lower crossover point is that there's roughly 15dB of padding between the l-pad and the crossover filter transfer function.



Sensitivity is 93dB, frequency response is 50Hz to 18kHz +/-3dB. I'd probably put the power handling at a good 250-300W but that will depend highly on whatever high pass filter is used for the subwoofer.

The Horizontal frequency response is smooth through 45 degrees, but after that it'll drop rapidly so plan accordingly in seating positions. You have a 90 degree horizontal dispersion speaker, you can use this to keep things from splashing off the side walls and still cover the entire listening area with very even sound.

Impedance is an easy 8 ohm nominal load. For you tube lovers out there...if you wire 20 ohms in parallel with the speaker and hook it up to your 8 ohm tap tube amps...I think you'll be quite happy. (The parallel resistor makes it an even easier load...with very little phase swing.)

