

Overnight Sensation MTM

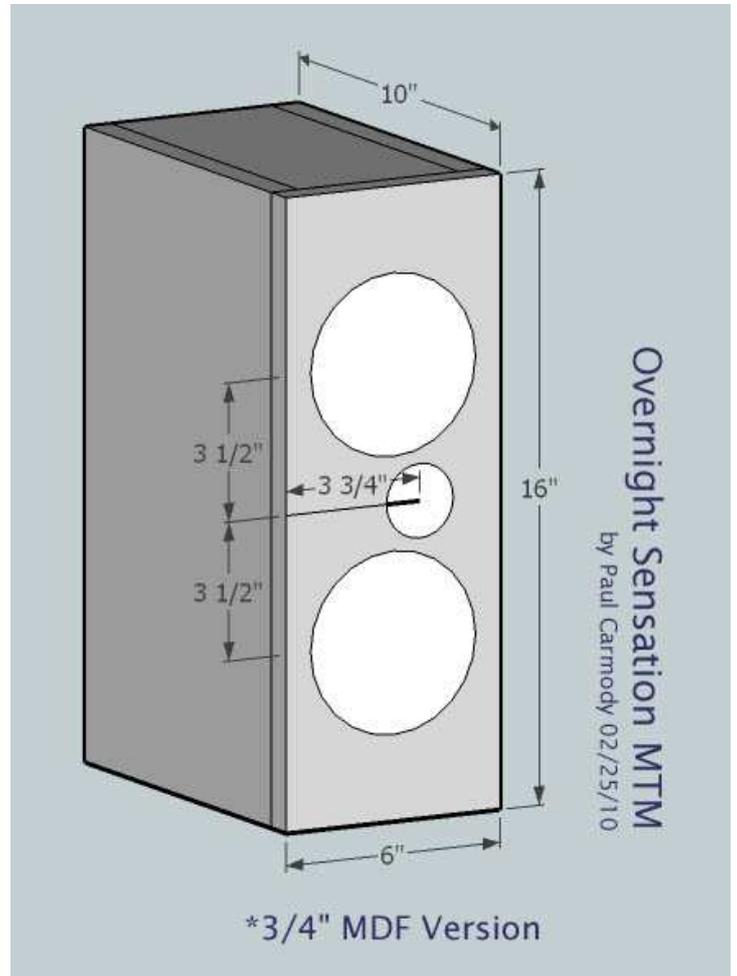
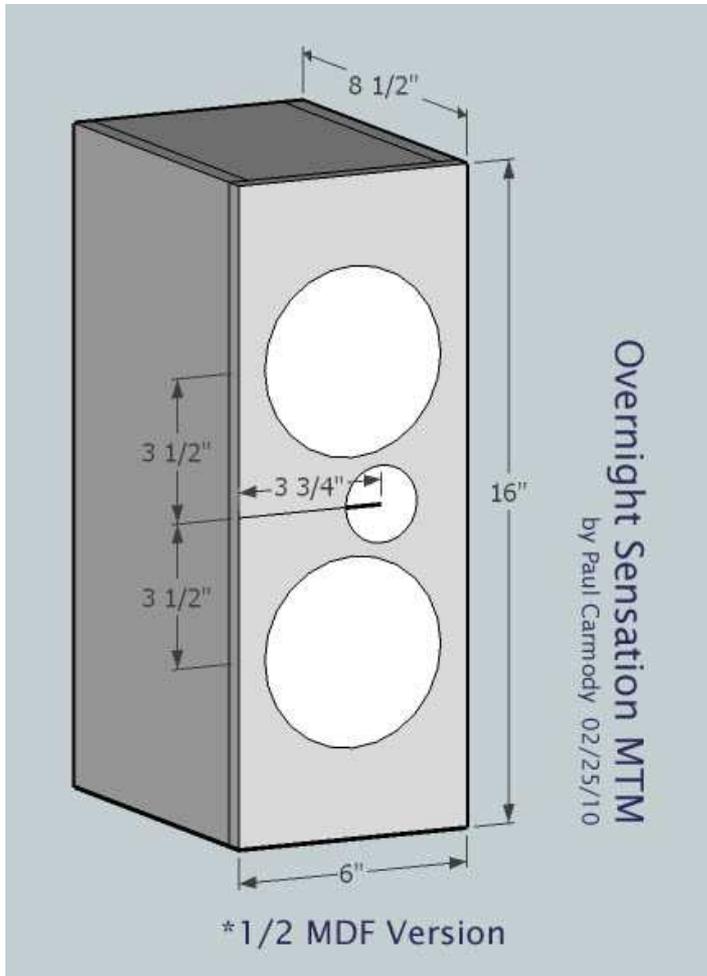
By Paul Carmody

The idea here is to take the heart of the Overnight Sensations (big sound, small box, cheap price), but increase power handling and efficiency by adding a second woofer. The results should be quite satisfying and surprising to those who choose to build it.



Wiring a second woofer in parallel gives us a few advantages: most importantly, the speaker is 6 dB louder (twice as loud), which also means the speaker will go 6 dB louder than its TM counterpart. There's a catch, of course. The impedance of the speaker is now cut in half. This means that the OSMTM is a "4 Ohm" design. Don't panic; if your amp is rated for 6 Ohms or lower, you're fine. Also, most chip amps and digital will have no problem running this speaker. This means that the Overnight Sensation MTM might lend itself very well to a compact "plug-and-play" system, where a small amp is incorporated into the speaker itself. All the user would need to do is plug in his source (iPod, computer, Smartphone, etc.) and boom; they're putting out tunes at a volume that might actually cause neighbors or family members to bang on the wall to turn it down.

Enclosure Design



The Overnight Sensation MTM has an internal volume of 9 Liters. It can be built with either 1/2" or 3/4" stock. The trade-off is thus: if you use thinner stock, you get a smaller, lighter box, but you will need at least two internal braces inside the cabinet. If you use thicker stock, the cabinet will be less resonant and may not require any bracing at all, but the box will be slightly larger and heavier. It's up to you. Either way, you will need two "handy panels" (2' x 4') of MDF to build a pair. You can get creative with the box if you put your mind to it. I could easily envision these being made into tall and slender "sticks" like those sold with HTiB sets at the big box stores. Turning the design into a tower would mean simply having a hollow compartment in the bottom, which you could fill with ballast if desired.

I tried to keep the aesthetics of the MTM version the same as the TM version. The cabinet width is still 6" and the tweeters are still offset--although this time it was done mostly to allow the woofers to be as close together as possible. The drivers are still

surface-mounted, but feel free to flush mount them if you like. I kept the cabinet depth pretty shallow so that the speaker would have a small footprint. This created a quirky scenario with the vent tube, though: that is, a single 2" or 3" diameter vent tube would be too long to fit horizontally inside the cabinet, so I used a "dualie" configuration: two 6" lengths of 1.375" diameter tubes (AKA: 1.25" SCH 40 PVC). If you like the look of vents on the front, you could mount them there instead.



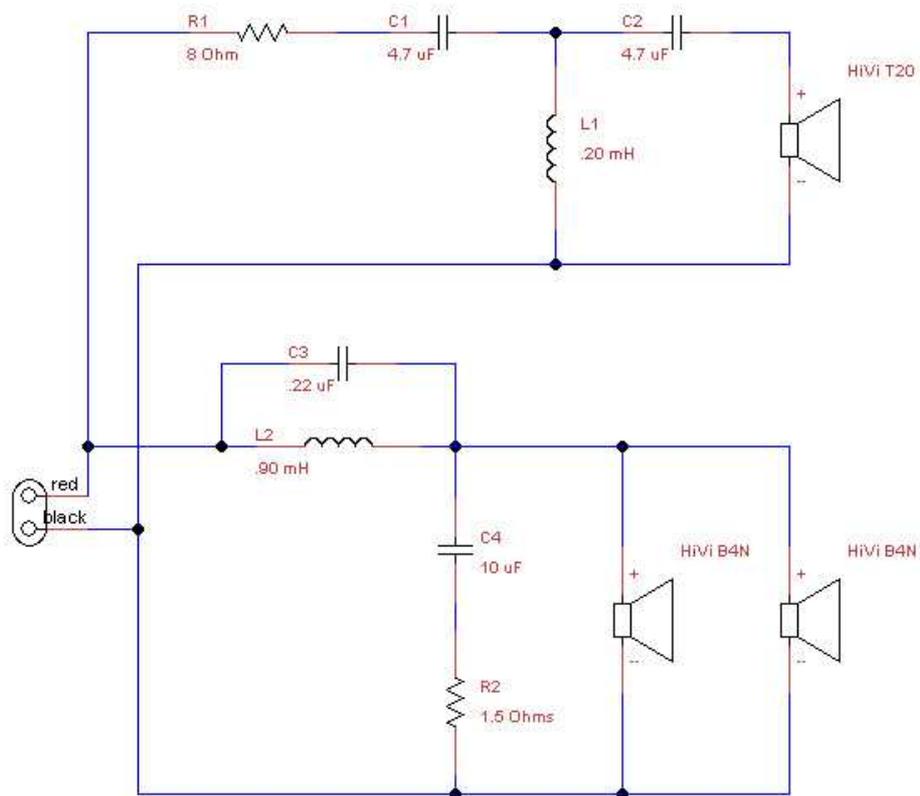
The enclosure could be lined with convoluted foam, which is pretty standard for a vented design such as this. In my case, to keep things simple, I did not line the enclosure at all. Instead, I used a few light handfuls of polyfil behind the woofers (the internal braces sort of held it in place). As I told many people who built the original Overnight Sensations,



getting the right amount of stuffing takes a bit of experimentation. I find the best results when I over-stuff a bit, then gradually take some out, listening each time. I know when I get the right sound; the speaker suddenly just sounds "huge."

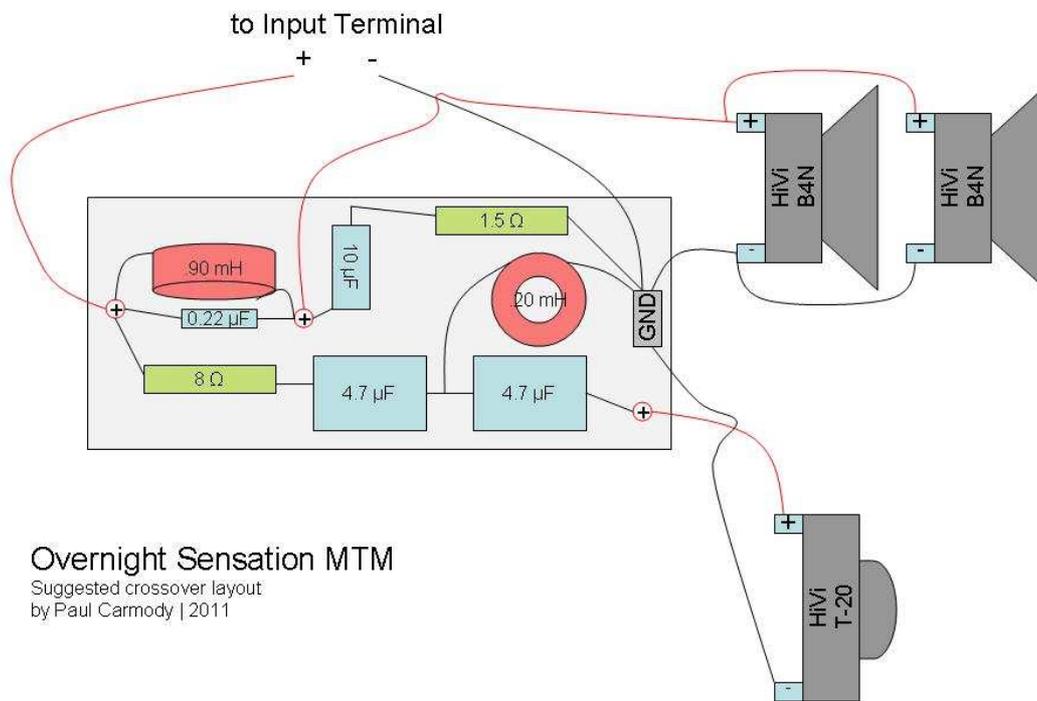
Crossover Design

Overnight Sensation MTM by Paul Carmody | 2011

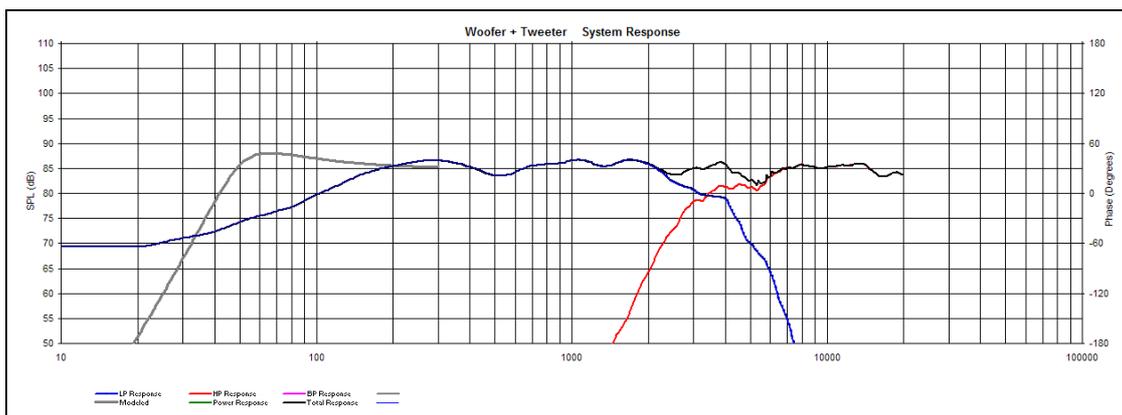


The crossover for the MTM version uses a similar topology to the original TM version, but with a few changes.

The woofer circuit is 2nd order electrical, with the .22 uF capacitor acting as a notch filter to eliminate the god-awful breakup of the B4N, and the 1.5 Ohm shunt resistor contours the midrange response a bit. The tweeter's filter is 3rd order electrical, with the 8 Ohm series resistor acting as attenuation. The crossover point is around 3500 Hz.

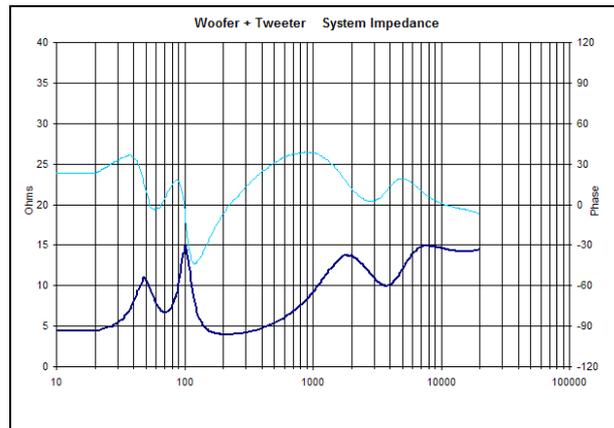


Now, for a bit of help with the layout of the crossover, I made a little drawing to show how I did it. My goal was to fit everything onto a 3x6 inch piece of pegboard, which makes installing the board through the woofer hole, and mounting it on the back of the enclosure a pretty easy task.



Above is the combined Frequency Response of the OSMTM. Please note that the Frequency Response is modeled below 300 Hz (gray line) because I used gated MLS measurements. I do this for some of my designs to give people a better idea of what the true bass response would be.

And here is the Impedance of the OSMTM. As I said, due to the dual woofers in parallel, it is a “4 Ohm” design, but any amp rated “6 Ohms” will have no trouble, and most Class D amps will also run them fine.



Listening Impressions and Conclusion

In the world of sound reproduction, there's a limit on bass extension vs. speaker compactness vs. efficiency; if you want more of one factor, you have to compromise with the other two. This rule is called Hoffman's Iron Law, and this design is as close as I've ever come to breaking it. These are fairly small speakers, and to most ears they will put out a sound that defies their size. This is one speaker that will keep you wondering, "Is the sub still on?" Some may argue that there's a bit of "fake bass" going on, because of a slight hump below 100 Hz, but that doesn't explain these speakers ability to play sonic booms in songs like Fear Factory's "Shock," or to pump out the rolling, thumping sub-bass line in Massive Attack's "Karmacoma." <Shrug> I'm not even sure how they do it.

Part of the magic of the Overnight Sensations series is in the drivers. The HiVi B4N can put out deceptively-good bass in a very small enclosure, and the price is very reasonable. They also have quite a bit of power handling; I have pushed the MTM version here with program material to 99 dB with no problems. The HiVi T20 is also quite a sleeper, at a paltry \$8. It's not too difficult to work with in a crossover, and tends to “disappear” sonically (rather than attract attention to itself, as cheap tweeters often do). I think it's definitely a contender for super-budget tweeter champ!

The overall sound quality of the MTM version of the Overnight Sensations is similar to the original TM. The sound is big, and they sort of pick up where the TM version leaves off. Where the TM version does its best work in a small room, the MTM version can easily rock the walls in such a room... and might be better suited to a medium-sized room. They still work as desktop speakers, and will have a nice, immersive soundstage, but please be careful with your hearing--and be respectful of those whose desk is near yours. These things pack a bit of a party.