Subject: 2Pi Tower Update: APT80 Tweeters
Posted by GarMan on Mon, 01 Dec 2003 18:31:23 GMT
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Hello everyone.Just thought I'd give everyone an update on how I'm doing with my 2Pi Towers. From my post a couple of weeks ago, the Towers are complete as originally designed. The piezo was not to my taste. However, putting a 22ohm resistor in parallel with it did cool it down.The Towers are good speakers with many strengths. However, at the end of the day, they are still "budget speakers" and do have their shortcomings. For me, I wanted to explore alternatives to the KSN1038. For the last two weeks, I've been working on and off, trying to integrate a pair of Eminence APT80 with the Tower cabinet and Alpha10's. Going through the project of integrating the APT80, I did learn to appreciate the benefits of Wayne's simple approach to his 2Pi:1) Less variables to control (and to get wrong)2) Greatly reduce costs. I can't believe how quickly crossover components add up!3) Maximum efficiency. Crossover components do not only suck up money, but also SPL.4) Speed/effortlessness. My crossover seemed to have robbed some of the micro-dynamics that the original Pi had.I want to make a note about my qualifications on this topic, as a warning to anyone who wants to copy my "design". Qualifications: ZERO! I also don't have any measurement equipment of any kind. All I'm going by is what I've read on loudspeakers101.com, what I was able to understand from Wayne's paper on crossovers, and by my own ears. I tried using programs like SPICE, but could not get it to work on my computer. I'm not taking responsibility for anyone who spends money to follow these steps and don't like what they hear.Cabinet PrepFirst thing I did was install a double binding post cup on the back baffle and rewire the woofer and tweeter directly to their own set of terminals. I knew I was going to do a lot of tweaking with the crossover and I did not want to open and close the thing every time I made a change. The double terminal allowed me to have the crossover external of the cabinet for tweaking.WoofersI put a Zobel across the woofer with values of 11uF and 6.6ohms to stabilize its impedance at 6 ohms. Aided by the dBSPL chart on the Alpha10's spec sheet and many sheets of logarithmic graph paper, I decided that a first-order cross at 1K would have the effect of flattening the hump that starts at 850Hz. I was hoping that the 1K cross would give me a flat response at 94dB with f3 occurring between 3K and 3.5K. Value for the coil worked out to be 1mH (using 6 ohms as load).TweeterThird order Butterworth at 3500Hz. Couldn't find the exact values in parts, so I ended up using 3.3uF for C1, 0.27mH for L1, and 11uF for C2. The dBSPL chart on the APT80's spec sheet shows flat response at 104dB. I didn't know if this referred to the APT50 without horn attachment or with horn. I started with values for a 12dB attenuation L-Pad with Rs=6 and Rp=2.7 to see what it would sound like.Putting it all togetherThe crossover components were assembled in the old-school fashion of breadboarding it on a plank of 1/4 inch poplar I had lying around. Instead of nails, I drilled holes and inserted pieces of solid 8 gauge copper wires that I had use as a ground-bus in a previous amp project. Components were wrapped around the copper spikes and made for easy changes.How did it sound?I like the sound of the APT80's. To me, it was an improvement to the KSN1038's. However, it also costs five times more. The APT also does not integrate as well with the Alpha10's as the KSN1038. The Alpha10's and 1038's have very similar timbres. If you stick your face in front of the speaker and move your head back and forth between the APT and Alpha, you will notice they have different timbres. However, stepping back, the combined sound that they make is very pleasant.Without running my values through software, or measuring the speakers, I can't tell if I've integrated the drivers well. I have however reduced the L-pad to only 9dB attenuation as I found the -12db too dark. I also listened for a while with the 0.5mH coil that came with the kit in place of the 1mH in series with the woofer, but preferred the 1mH.Another concern I have with the current set up is

phase response. I'm not sure if I have to reverse polarity for the tweeter or not. But from time to time, something's definitely happening phase-wise. Kind of like that fake surround sound effect you can get on Sony TVs. I was not able to find any information on what compensations are necessary to match 1st order with 3rd order. In fact, I'm not even sure if the woofer is 1st order anymore as the addition of the Zobel would make it resemble a 2nd order.Overall, I like the improvements the APT has made, even with my questionable crossover design. I did cost me approx $100 USD in components for the pair and I am losing out on some efficiency and effortlessness of the original design. I don't think with project is for everybody. It really depends on what's important for you in a speaker.I'm very interested in hearing from others if they've had any success integrating a tweeter like the APT80, or if there are any suggestions on how I can improve my crossover. I see a lot of potential with this current set up and if done properly, would fit perfectly in price and performance between the 2Pi and 3Pi. Perhaps we're halfway there in designing a 2 1/2 Pi?Gar.