



DECWARE HIGH DEFINITION TOWERS

by Steve Deckert

October 2005

The HDT cabinet design was actually my first serious endeavor into hi-end audio. It came to pass during the 1980's when I developed my first serious infatuation with hi-fi. I had taken a job selling hi-fi in a local stereo store and found myself surrounded by good loudspeakers. I was in what could be called after-hours heaven. During this time I had a pipe dream idea for a loudspeaker and being "in the biz" made for several unique R&D opportunities. After all, how many times in your life do you have a whole store full of speakers to compare your ideas against?

I built a single prototype of the design so I could find out if it was even going to work. (No point building a pair until you know for sure that it's going to be worth the effort.)

I compared my single cabinet (configured as an 8 inch two-way) design continuously with the better speakers we had at the store. Tweak, compare, tweak, compare, and tweak some more. This went on for about a year until I had a speaker that I, my fellow employees and regular customers all agreed was the favorite during A/B tests with everything we had. I found a picture of the original single cabinet / shown at left.

Once I reached that point, I built a fresh PAIR of the speakers. You can imagine the anticipation of hearing a pair for the first time after listening to only one all that time!

*During this process **I learned that you can easily judge the transparency of a loudspeaker by listening to only one.** Basically if a single loudspeaker could disappear by itself then you knew a pair of them would be great!*

With a finished and tweaked-out pair that everyone agreed was the best sound we had at the store I set off for the Consumer Electronics Show in Chicago to see how it fared against the hi-end industries best. I was surprised to find only a few speakers that were in even in the same league. Mostly what I saw and heard was overpriced half-baked ideas that sounded like crap. I remember thinking " *this is what hi-end audio is like?*"

The CES experience, being my first, was a profound bit of enlightenment. The prices and poor sound left me stunned. It gave me the confidence to seriously consider becoming a manufacturer. With that goal I spent several more years perfecting the HDT design with hopes it could be a flagship for a new speaker company someday. (Remember this is 20 years ago). I finally reached a point where I simply couldn't find any ways to improve the design. I got to a point where I listened to them for two years without changing anything.

■ DECWARE™

AUDIO WHITE PAPER

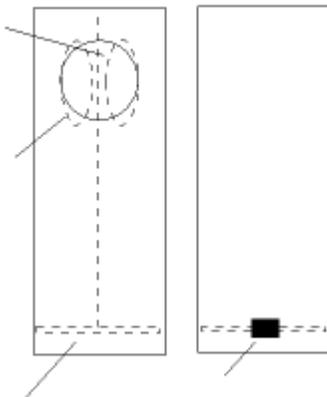
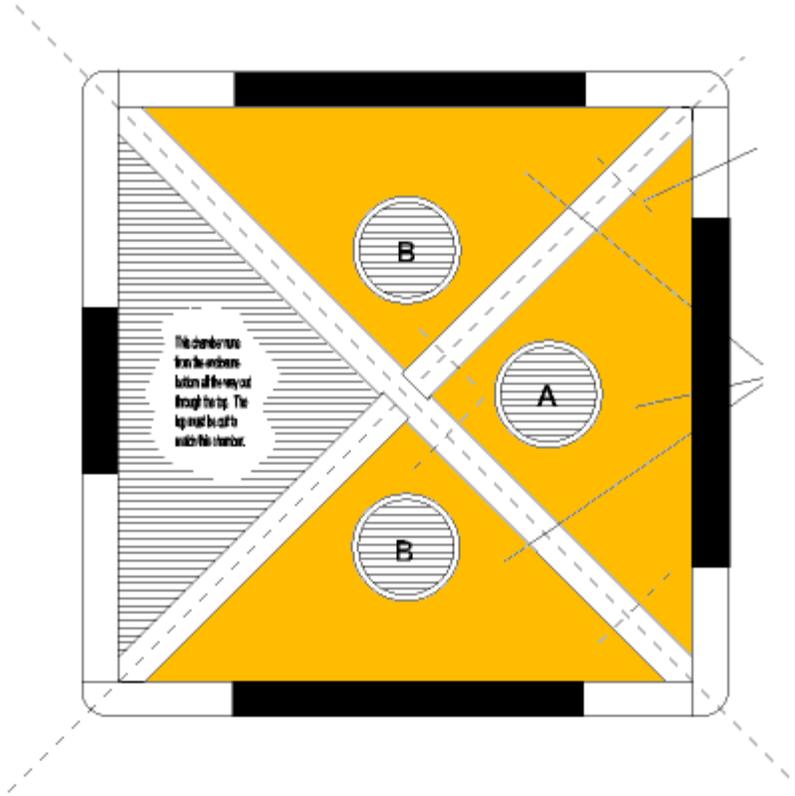
I decided to put my energies into some new ideas and see if I could eventually come up with anything that might top these. To let myself explore fresh ideas, I needed to put them "on ice" and get them out of site and out of mind for a few years. My designs took several different paths and it actually took another 10 years before I had something that I thought might be as good (or better). You learn so much in 10 years time. I was pretty confident that my tastes and hearing had also evolved. When the day came to have the face off between my original design and current work I expected to hear the HDT differently and judge it more harshly. It didn't happen.

I would have dusted off the original HDT's when I started selling low power amps in 1996 but they only had an efficiency of 89dB. They just barely got loud enough with the 2 watt amps to be enjoyable. I needed a speaker that was in the mid to high 90's.

This search for efficient speaker designs took me through several years of evaluating single driver crossoverless speakers like Lowther and Fostex. I didn't care for any of the cabinet designs these speakers were using and one day it occurred to me that the HDT cabinet design might actually work. It did. This became the first production HDT model to be marketed and is still a strong seller today.

Re-issuing the original 2-way design became possible when I finally found a driver compliment that mimicked the originals but with higher efficiency. The HDT Mk II's ended up sounding actually better than the original and now has an efficiency of 94dB making it ideal for low power gear.

HOW IT WORKS



The image above is a cross sectional view of the cabinet looking down from the top. The orange represents the three chambers that the speaker sees. Chamber A is the primary chamber where the speaker is mounted. Pictured to the left is a front and rear view of the cabinet. The two ovals behind the speaker opening are located directly behind the cone to allow the back wave off the cone to enter the secondary chambers (B) where it is absorbed by the passive radiators. The ovals cut directly behind the speaker opening couple the three chambers together at the top while the ports in the bottom of each chamber couple to an averaging chamber in the base.

DECWARE

AUDIO WHITE PAPER

This allows us to tune the primary and secondary chambers some distance apart to improve the dampening. The averaging chamber in the base turns into a straight transmission line that runs the length of the cabinet where it exits at the top. There is a duct on the lower rear of the cabinet that tunes the averaging chamber and sets up the tuning for the transmission line. Having multiple chambers each specifically tuned and coupled together resonates across a much wider bandwidth than any known reflex box design I've ever seen. The wide band frequencies that come up the transmission line are dispersed into a radial pattern. This combined with the passive radiators and rear duct creates a more radial sound pattern than conventional designs. It has sound coming off 5 sides of the box in the lower registers of the midrange and bass regions.

In the Fostex based HDT a single plate floating above the cabinet is used to load the transmission line. In the HDT Mk II things get a bit more complicated.



■ DECWARE

AUDIO WHITE PAPER

The top plates are used to load the transmission line which has its opening at the top of the cabinet just below the bottom plate. They also serve to disperse the sound coming from the transmission line into a radial pattern. The upper of the two plates is solid, while the lower plate has an opening 1/2 the area of the transmission line opening at the top of the cabinet. This splits the dispersion of the line between the two plates. The arcs cut from the front of each plate allow the energy from the line to create a nice arc behind the tweeter helping it to project beyond its normal off axis points.

The tweeter is decoupled from the cabinet via a foam pad which also serves to reduce reflections. The tweeter is also physically time aligned with the woofer/midrange by being set back from the cabinet face. A single crossover cap is used with the tweeter and phased to acoustically cancel the overlap out in front of the cabinet. The integration of the two are perfectly seamless to the ears. Staging is deep.

Steve Deckert