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Subject: how'd we get here (or where is this)?

Posted by [grindstone](#) on Sat, 31 Dec 2011 08:55:32 GMT

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Advance apology for an apparent troll but it's just honest ignorance in its native habitat.

Been all over the map trying to answer a sort of simple question caused by stumbling on this catalog page tonight.

Basically, if we're 47 years past this, how come we need LF (and/or HF) reinforcement, too? Not talking about a specific design, more the whole type. Is it just different priorities or is it something else?

Do people not make parts that'll do that anymore?

Were those just marketing claims (and maybe optimistic)?

Did they not care as much about pattern and traded a hole at xo?

Do people hate big cabs so much that they trade LF and efficiency?

Do "2-way people" all use them for HT so subs are already there?

Do current preferences align more for clarity from swanky motors than FR?

...

on and on--I got a million of 'em, but that's sort of my point.

As near as I can tell, people have been making reflex + horn boxes for almost 80 years

The priorities have moved a few times already. But, save for adopting some whole other thing, why do people seem to forego wider range responses?

Even granting bunches of money--for example, those nice-motored midbass drivers are not so inexpensive--and we still need bass supplementation (?)

Do the current standards for acceptable clarity at higher efficiency preclude reaching lower even in giant boxes even when granted non-trivial expense?

I mean, why work soooo hard on driver spacing and phase and waveguides and all that--just to be band-limited and need one or both ends to be supplemented?

Is it just because the drivers don't sort neatly into higher-volume "pro" or "auto" categories so there's just not work being done in those areas?

At least these are what I'm wrestling with...not pointing at any one thing, just the "2-way way" in the higher-efficiency sandbox.

Thanks for the bandwidth, the time, and the education.

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### File Attachments

- 1) [1964\\_altec\\_catalog\\_math.jpg](#), downloaded 3275 times
  - 2) [lansing\\_iconic\\_2way.jpg](#), downloaded 3413 times
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Subject: Re: how'd we get here (or where is this)?

Posted by [Wayne Parham](#) on Sat, 31 Dec 2011 16:19:30 GMT

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Altec made excellent speakers in that era. Not too bad by today's standards either. But they definitely don't compare with a properly designed modern matched-directivity two-way (waveguide) loudspeaker, even though they look similar.

The following document tells you why, and even has a little bit of history too. You'll probably recognize an Altec horn in this whitepaper:

High-Fidelity Uniform-Directivity Loudspeakers  
The differences are mainly the result of iterative improvements, not so much a paradigm shift. What Altec was trying to do in the 1950s is pretty much the same idea today. We're just better at it.

Top-of-the-line modern drivers provide smoother response, lower distortion, higher SPL and dynamic range. Modern horn/waveguides have less internal reflections and are also able to generate a more constant pattern, one with fewer coverage holes. Crossovers are more thoroughly optimized too, made possible using today's accurate measurement systems. As a result, response is better and the coverage pattern is more uniform.

As for the matter of subs verses mains with deeper extension, to me, there is no question which is better. There are several qualitative reasons to split the deepest bass out to subs. Distortion (both harmonic and intermodulation) is reduced by splitting the band and using dedicated subs. But the biggest improvement, in my opinion, is modal smoothing. See the following thread for more information about using distributed bass sound sources to smooth room modes:  
Room modes, multisubs and flanking subs

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Subject: Re: how'd we get here (or where is this)?

Posted by [grindstone](#) on Sat, 31 Dec 2011 22:03:14 GMT

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Thanks, Wayne. I had actually reread 2/3 of that before I posted and finished the rest of both again now. You have been singularly clear and generous in communicating your approach and rationale in a way that lifts all boats--sincere thanks. And again I wasn't pointing at any one design or even set of choices--just thinking the parts and possibilities for the Type would be farther along in all this time (and maybe they are and I'm clueless). There's a zeitgeist-thing these years, still. Maybe you don't feel as much because you've been so consistently on your own path for so long. Zilch et al, even Earl a good ways back, lots of mindshare. It's like when everyone was running UL amps because that was the thing

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Subject: Re: how'd we get here (or where is this)?  
Posted by [Wayne Parham](#) on Sun, 01 Jan 2012 00:28:09 GMT  
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Yeah, you're right. I found this path three decades ago and never looked back. There are other design types that have come and gone, the darlings of the day for audiophiles. But in this approach, I've never wavered. It's the best way to build loudspeakers for high-fidelity, in my opinion.

I was lucky, I suppose, because I sort of stumbled across this design approach. I liked Klipsch speakers as a kid, but didn't like their warts. They were powerful, but could be harsh. When I decided to take that design concept but use better drivers, I found night-and-day better sound.

I ditched the folded basshorn, opting for the simpler expansion formed by the walls extending away from the apex of the corner. The extra efficiency provided from an exponential throat expansion wasn't needed for home hifi, and removing the folds that formed this expansion prevented the problem of having vocals going there. Pushing that Klipsch horn to 400Hz made vocals pretty wooly sounding. My corner speakers, with 22xx series JBL drivers and constant directivity horns, sounded so much better and had the advantage of sounding good everywhere in the room, not just directly on-axis.

I realized that there were two features that contributed to the success of my early corner speakers, first being the quality drivers and second being the constant directivity created by the expansion of the corners. They formed a waveguide for the midbass and lower midrange, and when paired with constant directivity HF horns, one could achieve constant directivity through the whole audio band, from the Schroeder frequency upwards. These became the key features of all my designs.

The evolution of these designs, for me, was iterative, mostly stepping back into radial horns to replace the spitty CD horns I originally used. I also optimized the crossover, and came upon a crossover design approach that I think is as close to ideal as can be found, while at the same time being sort of templated. It's not a generic crossover, because you have to dial it in for the drivers

chosen. But since the constant directivity cornerhorn loudspeaker layout is standardized, the crossover topology could be standardized too.

I played around with different midrange configurations over the years, mostly as an academic and not reflectors. Some had direct radiating mids, some just forward-facing, others with mids in front and in back, some even omitted the midhorn and ran the rear-firing midwoofer up through the midrange band. In spite of the many variants, the truth is most of them worked well and sounded really good. I think the key was the quality parts and corner placement.

The current model is the perfected design because it uses a midhorn to set the pattern at the higher end of the midrange and allows the walls to assist down low, where the horn isn't acoustically large enough. This lets the design have cake and eat it too, since it keeps the sound that.

The matched-directivity two-ways are also an evolution, a branch of the same family tree of loudspeakers. This design approach borrowed from the JBL 4430, having a direct radiating midwoofer that is crossed-over to a constant directivity horn at the point where the midwoofer directivity collapses to match that of the horn. These cannot provide constant directivity down low, but it is at least uniformly collapsing so there is no abrupt change in directivity, and therefore, no off-axis ripples in response. The power response is uniform, therefore the room's reverberent field is uniform. This is a close second to perfect constant directivity, and it has the added benefit of not being limited in placement options to room corners.

Like the constant directivity cornerhorns, the matched-directivity two-way loudspeaker is a standardized type, and drivers are placed in specific locations. So here again, this standardized consistency allowed me to optimize a crossover topology that works with any suitable drivers. Of course, as with the constant directivity cornerhorn, some component values are nudged up a little or down a little for the drivers chosen, to optimize the crossover and dial-in the forward lobe. But the basic crossover topology is the same between models.

So, yeah. This is a road I've traveled for a long, long time. It's like the road between home and school, the one you walked every day for years. It's so familiar you knew every little nook and cranny, all the details of the asphalt, all the cracks and crevices. That's how this design approach is for me. It's kind of my baby.

I've heard other designs that I enjoyed, but none so much as this one. It gives the best sound, the best coverage and the most powerful presentation. It is the best approach I've ever heard.

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Subject: Re: how'd we get here (or where is this)?  
Posted by [grindstone](#) on Thu, 05 Jan 2012 08:44:44 GMT  
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Hi Wayne, thanks for the great response. Very sweet sorta "I believe..." kind of smack-down post.

FWIW, I didn't intentionally attack anything on-purpose but now I see how it could have come-off wrong. My deal was actually the converse; I was really sorta stumped at what seemed straight-forward & I knew that this was one of the very few places to float such an inquiry and have a chance at (a) tolerance and (b) a rational response. Thank You for taking the time to post and Thank You (and those who make it possible) for this place! Sincerely!

I guess I'm making my way, fumbling along in plain-view, out-loud and w/o tact. As part of my (this weeks?) process, I think I finally "got" the beauty of the 8 pi.

Still learning about and working the problem & I still always struggle with words for a lot of stuff in audio. I don't, for example, have much of any way to say how 10" drivers vs. say 15" drivers, on about any sort of material & crossed however-wise...in whatever kind of cabinet anyone likes, are pretty-much distinguishable from one-another. The words "tone" or "timbral <...this or that>" often come-up, but--I'll be honest--I've got nothing even though the differences have probably been well-established for ages. I just don't know what the words are to be able to talk about that, and yet I bet ya a pop that I can tell a 10 from a 15 (in about any kind of cab ya want) at 5 paces

Sorta gets back to your post about, basically, liking what you hear. You (one would) use a large-format driver for <insert audio-words here> even though it doesn't do bass. In my non-audio lingo, "because pianos sound more right", etc. And hey--I'll personally trade quality of bass for quantity, for sure. Or quality of MR, more-properly, for extension. If I'm tracking, that's another way to say what you said.

Probably none of this was worth a response, but I wanted to say thanks for taking the time and wanted to let you know that the characters didn't go to waste.

I have begun to wonder, for example, why trading filter vs. maybe a backhorn in the same 8 pi box size, though, was the better thing to do...if you have time/inclination. Compound horn, you know, like maybe Tannoy autograph corner unit. If not, thanks BIG anyway! Erm, okay, here's a pic bec "autograph" means a few things:

<http://users.on.net/~richard.norrish/Autograph/>

So, in this case, you'd basically (?) do what you did except eat less gain in your filter (?) by acoustically pumping the bottom instead of electrically eating mid (and top?)

I can see some tomato/tomahto for mid-wall vs corner loads and not hassling over a couple dB here or there--lotta room for flexibility, actually. I'm just mostly a low-watt-guy, so every 3 dB maybe seems a bigger deal...

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Subject: Re: how'd we get here (or where is this)?  
Posted by [Wayne Parham](#) on Thu, 05 Jan 2012 15:14:39 GMT  
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No offense taken. Comparisons with other loudspeakers are common, especially Altec and

Klipsch. Each has a lot in common. My designs are more refined, but that's because they're more modern and I could take advantage of better drivers and better design tools. I truly stand on the shoulders of those earlier designs. The Klipsch cornerhorn was the inspiration for my constant directivity cornerhorn designs. Altec published a document that described how to aim the forward lobe by reversing phase and looking for the deepest notch. JBL went a step further in their whitepaper about the 4430. Each of these were pioneering efforts in their time, and I base my work on them, using those as a sort of starting point. So it's good to bring them up, and it makes a nice segue for discussion.

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