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Subject: 7Pi questions and plan

Posted by [clarus](#) on Mon, 03 Jun 2024 21:21:45 GMT

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I'm moving into a new room which is 10.4(w) x 16.7(l) x 12(h) (feet). Was looking into whether there is a speaker for corner placement and came across the Pi7 and this forum. Have done quite a bit of reading on articles here including the FAQ and I must say Wayne has put a treasure trove of information on this forum. I still have the following questions and would appreciate some guidance:

- 1) I plan to put the speakers in the corners along the 10.4ft wall. Based on what I have read so far, it should work. There are no openings along the wall from the corner for 6ft. Would the ceiling height be a problem?
- 2) The room currently is empty and have severe echo. I plan to put acoustic panels on ceiling and all walls. How close to the corners (where the speakers are) can I place absorptive acoustic panels at listening height along all walls?
- 3) Is there still flat pack for the mid horn available? Or I have to build everything from scratch? Would appreciate if I could review the plan to understand the difficulty in building the bass enclosure and the mid horn.
- 4) Same for crossover, would I need to build it from scratch and would the plan include the schematics and BOM?
- 5) I see a lot of measurements in the frequency domain. Is there any time domain measurements available such as step response and waterfall plots? I believe time domain performance is just as important as frequency domain, if not more. Can the bass, mid and high be time aligned at the listening position mechanically (i.e. with digital delay/DSP)?

thanks.

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Subject: Re: 7Pi questions and plan

Posted by [Wayne Parham](#) on Tue, 04 Jun 2024 14:54:12 GMT

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You've got mail!

I sent plans to your email address. We do have midhorn flatpacks available, but we do not have flatpacks for the bass bin or the midhorn cabinet. Just the midhorn flare. To tell the truth, the rest of the build is pretty easy.

Crossovers come fully assembled. Or you can build your own from the schematic. We have both assembled crossovers and the raw unpopulated PCB available for sale online.

Having constant directivity cornerhorns along the 10-foot wall will make your best listening area be from around 6 feet back to around 12 feet back. That's a really nice room layout 'cause it will can potentially keep listeners away from the wall behind them. That will help with the slap-echo problem you mentioned.

I expect that once the room is filled with furniture, the slap-echo will be attenuated somewhat.

And using constant directivity cornerhorns will help too, because they tend to direct energy into the room rather than at sidewalls and ceiling. But it almost never hurts to add damping material, especially to the wall behind the speakers. Again, having the listeners a few feet away from the wall behind them really helps too, because it ensures the direct sound is much louder than the reflection from behind them.

I always measure impulse response during development, but mostly "just for fun." I like to see the spike followed by the ramp rather than the LF bulge first followed by the HF spike or even the HF spike followed much later by an LF hump. When I see the spike followed immediately by a ramp, it tells me we're in the ballpark.

But what really directs me is the polars - the location of the lobes punctuated by nulls. And that's what I publish. I always design with purpose to set the vertical nulls symmetrically above and below the centerline about 20 degrees. And when you see that - it's really the same time-related information but shown in the frequency domain - when you see that, you're ensured that the forward lobe is summing properly and is clean.

One last thing. You'll notice that the cornerhorns rolloff down low and could use subs. It's perfect to use a multisub approach so that the energy distribution down low in the modal region is as uniform as it is in the reverberant field. So consider adding subs in whichever multisub configuration works best for your room layout.

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Subject: Re: 7Pi questions and plan  
Posted by [clarus](#) on Wed, 05 Jun 2024 14:06:53 GMT  
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Thanks for the reply and the plan. I will have to study and make plans for it as I'm not an avid woodworker. I do have a small table saw which is not quite suitable for cutting large sheet goods.

The room will not have any furniture other than a listening chair and equipment rack, and back wall will be shelves of records. So I don't expect the slab echo to improve without adding significant sound absorbing panels. I just want to confirm these panels on the walls along the corner horn will not interfere with the corner horn operation.

Looking at your article on corner wave propagation, you mentioned that the sound source should ideally be at the apex of the corner. The further away from it, the more anomalies in the wave you will observe. I am still trying to understand how best to align the drivers. I am particularly sensitive to time domain smearing hence I am also looking into full range single driver solution. I need to digitally align my previous 3-way horn speaker before I can live with it.

Is there a reason why the bass is rolled off so early as the 2226H should be capable of going much lower?

As for the crossover, I see that there are a lot of padding for the mid and high. Would it be a better option to use 16ohm drivers and reduce the padding. I always thought that padding would increase the driving source impedance hence reduce the damping on the driver. May be a step

down auto-former?

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Subject: Re: 7Pi questions and plan

Posted by [Wayne Parham](#) on Wed, 05 Jun 2024 17:01:00 GMT

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You can place sound damping materials on the walls, in and around the corner and anywhere else you want. They'll absorb sound mostly at high frequencies and upper midrange, depending on how thick the panels are. So the sound radiating from the bass bin will be almost totally unaffected.

Damping at bass frequencies requires very large panels. That's certainly an option, and a good one too. But fortunately, the multsub configuration helps in this regard, since it is a method of dealing with room modes. You can always use both - panel dampers and multisubs - but if I had to choose just one, I'd choose multisubs.

The 2226H can be used down to 40Hz, but it really isn't designed for deep bass. Its best use is as a midwoofer. One can casually observe that its large size would seem to indicate that it would be useful at subwoofer frequencies, but it really isn't. It's a prosound midwoofer that is always used in conjunction with subs.

As for padding in the crossover, one could surely use an auto-former. Any of the reactive elements can be used as a filter or attenuator, depending on source and load and intended purpose. If one of those three reactive components were clearly less capable - like back in the days when large capacitors were usually electrolytics for cost reasons - one might want to consider that. But in the case here, I don't see any advantage using an auto-former for attenuation.

An auto-former would provide impedance matching, but I'm not really concerned with that here. The biggest impedance swing in a loudspeaker usually comes from the woofer's peak at resonance, but in this case, the midhorn and bass bin impedances are in parallel and it damps that peak. So one of the side benefits of that is the constant-directivity cornerhorns have an unusually peak-free impedance curve. It varies some with frequency, but it doesn't have the big peak that one normally sees down low.

Efficiency could also be examined, in that impedance matching improves efficiency. That's what horn-loading does acoustically. And that's why the midhorn and the tweeter need a little attenuation - their acoustic impedance matching is a little better than the bass bin. Both the tweeter and midrange horns provide more acoustic load than the bass bin does. But the design is really focused more on directivity than acoustic loading. It doesn't completely ignore the benefits of acoustic loading, of course - it is a high-efficiency design, after all. But it doesn't prioritize acoustic loading above all other things as some horn loaded loudspeaker designs do. That's why its efficiency is just north of 100dB/2.83v/M. Not 105dB, but still, pretty high.

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Subject: Re: 7Pi questions and plan  
Posted by [Rusty](#) on Wed, 05 Jun 2024 21:48:09 GMT  
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Hi Clarus. I just wanted to say reading you had a small tablesaw. For large sheet panels, a friend and I used a circular saw cutting guide to build a pair of 2Pi towers. In a cramped basement and a modest workbench. Here's a link to the one we used if you're interested.

<https://milesraft.com/product/tracksawguide/>

Not cheap but quality, and not overly expensive plus it's accurate. We used a sacrificial 4x8 sheet of insulation foam board under the MDF we cut. Good luck with your project. You won't be disappointed.

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Subject: Re: 7Pi questions and plan  
Posted by [clarus](#) on Thu, 06 Jun 2024 14:09:13 GMT  
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Thank you for your advise. Will definitely look into it.

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