Subject: Corner Horn Recommendations
Posted by Spinjack on Fri, 18 Feb 2005 18:58:17 GMT
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The following is a message I posted in another forum. SOme of the people there suggested I post the question here to get some more information. Thanks.Here it is:I'm looking for recommendations on DIY corner horns. The room in question isn't very large (11.5' x 12', with 8' ceiling) so there isn't much room for speakers to be placed out away from the walls. As such, I figured that corner horns may be a good solution. So, any recommendations?Size is still an issue, as the speakers can't protrude into the room very far. I like tight bass (not boomy), and good mid-range reporduction, and I'm not to worried about the high frequencies. I'm more interested in bass range and accuracy than outright bass levels. Basically, the highs and lows can roll off a bit (but not too much). I plan to build an active parametric equalizer to use as a room correction device anyway.I listen to Rock, Jazz, and Classical so the design would have to be versatile. The speakers will be driven by a push-pull tube amp of about 12W that will be feed by a Foreplay linestage. CD source with a turntable to be added later.Any help would be appreciated. Thanks.

Subject: Re: Corner Horn Recommendations
Posted by Wayne Parham on Fri, 18 Feb 2005 23:23:49 GMT
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That's a pretty typical bedroom size, and I know what you mean about needing the space. As far as acoustics are concerned, what you have is small enough there is pretty good room gain, like what you get in a car. On the down side, the furthest you can place speakers apart is twelve feet, unless you place them in diagonal corners, which I don't like to do. At twelve feet, you have 1/2 wave cancellation between speakers at 50Hz. If you place them a little closer together, say 10 feet, then the 1/2 wave notch is at 56Hz. You have 1/4 wave self-cancellation from an opposing wall back to the speaker at 25Hz, but that's pretty much out of bounds. These are issues you'll have whether the speakers are cornerhorns or not.Here are some good articles about room placement that you might find useful:Loudspeakers and Rooms for Multichannel Audio Reproduction, Part 1, Floyd TooleLoudspeakers and Rooms for Multichannel Audio Reproduction, Part 2, Floyd TooleLoudspeakers and Rooms for Multichannel Audio Reproduction, Part 3, Floyd TooleSound System Design Reference Manual, George AugspurgerYou'll probably have more trouble with aesthetics and size than anything else. The cornerhorns have the benefit of being recessed back into corners and out of the way. They seem to take up very little room space. I suggest making a mockup with a cardboard box to get an idea of size and how they fit in the room. Sometimes it's difficult to visualize speaker size. Cornerhorns always seem to be smaller in the room than they really are, and other large speaker boxes always seem to be bigger than they really are. So maybe mock up a pair and see how they sit in the room.If you have the room,

be a good choice for you too, because it can be placed in corners or against walls. And if each of

Subject: Re: Corner Horn Recommendations
Posted by Spinjack on Sat, 19 Feb 2005 13:36:02 GMT
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Thanks for the input. On the other forum it was mentioned that I would need 6' of unobstructed wall to either side of the corner horns for them to work properly. Is that the case? I won't have 6' of unobstructed wall. Also, the speakers will probably be placed on the 11.5' wall. If the bass is cancelled at about 50Hz (which I assume means there will be a noticable dip in the response at that point), would it be better to restrict the bass output to about 60Hz and then add a dedicated sub to handle 60Hz and lower? I'd rather not go this route, but it sounds like I may not have a choice if I want good bass extension.I didn't want the speakers to intrude more than about 16-18" (measured directly out from the corner, 45 degress off each wall) into the room. I can reclaim the space (and increase the wife acceptance factor) by using the speaker as a shelf (I know, blasphemy) or by adding a shelf directly above the speaker.Right now I'm to the point where I'm trying to decide between an Adire HE10.1 setup or the Pi corner horns. My main objective is to build some great sounding speakers don't need to be place out into the room to sound good and that don't take up a lot of space.

Subject: Re: Corner Horn Recommendations
Posted by Wayne Parham on Sun, 20 Feb 2005 09:36:45 GMT
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fully horn-loaded three-way loudspeaker with a 15" woofer, 10" midrange and 1" compression driver.Your room is going to provide a good deal of room gain. Even small loudspeakers will probably sound like they are providing deep bass. The room will actually help you in this regard. But boundary conditions will create some standing wave phenomenon, no matter what

very much like yours, and I have each placed at opposite ends of one wall about a foot and a half

this size and they sounded very good. You can listen to them nicely from just a few feet back, and in spite of the room's size and the issues that causes, the sound is very good. I have a pair in a room that size right now, with one corner completely wrong. I just don't have another place to put them. They still sound glorious.

Subject: Re: Corner Horn Recommendations
Posted by Spinjack on Mon, 21 Feb 2005 11:49:24 GMT
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I read Part 2 and Part 3 this weekend (Part 1 seemed only mildly relevant and the reference manual is BIG). Sounds like (no pun intended) there are definitely some issues to contend with.having speakers placed directly into the corners doesn't give me a lot of flexibility when dealing with room resonance. Also, the fixed 45 degree angle of the corner horns doesn't leave much room for flexibility either.What happens if opt for the 7's and build an asymmetrical horn? Basically, taking the existing design on rotating the bass enclosure a few degrees while leaving the corner section at 45 degrees.This is starting to look like quite an engineering challenge.

Subject: Re: Corner Horn Recommendations
Posted by Spinjack on Mon, 21 Feb 2005 11:58:54 GMT
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I don't suppose there is any way to minimize standing waves without moving speakers around (at least that's the impression I got from the articles you suggested). It is almost sounding like a satellite/sub setup would be a better way to go. That way I can better deal with bass standing waves by relocating a small sub (subs?) while still leaving the main source of the sound in the corners.A guy on the other forum said that I would have a problem at about 57Hz. If that is the case, then my (rather uninformed) guess would be to have main speakers that cut off at, say, 60-70Hz and then use subs to do the rest. Assuming that's the case, would Pi have a solution? Or am I just creating other problems and making this even more complicated for myself?

Subject: Re: Corner Horn Recommendations
Posted by Wayne Parham on Mon, 21 Feb 2005 13:20:46 GMT
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offered and the other is directionality is matched from the lowest bass range up when 90° HF horns are used. This creates a uniform reverberent field like no other loudspeaker configuration I've encountered.

Subject: Re: Corner Horn Recommendations
Posted by Wayne Parham on Mon, 21 Feb 2005 13:37:44 GMT
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I think the mention of 57Hz you are referring to was from my earlier reply to you. I mentioned 1/2 wave cancellation from two speakers, and that it would occur at 50Hz if the speakers were placed 12 feet apart and at 56Hz if placed 10 feet apart. This is the case no matter if the speakers are

placed in corners or not. Effects from room boundaries are another issue entirely.You can

You might position them where nulls from cancellation are counteracted by the sub or by boundary reinforcement. It depends on what you want, what you expect and to what extent you

inexpensive and perform very well. The cabinets are easy to build. That will give you something to work with, and is at least a good starting point. You may find that's plenty for you, and decide

that sound good in rooms your size. You can listen to them a while and decide if you think you'll want a sub later.

Subject: Re: Corner Horn Recommendations
Posted by Spinjack on Mon, 21 Feb 2005 16:02:06 GMT
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Doh! Sorry. I'm working on a couple forums trying to sort out the best approach and am starting to confuse who told me what and where. My preference is a single pair of speakers, but I'm willing to do whatever I need to to solve the problem. The carpentry isn't a big deal to me, so cabinet complexity isn't an issue (I've built a pair of Fostex based back loaded horns and some self-designed bookshelf monitors). The corner horns have the most appeal because they meet most of my requirements. However, the falter in that they don't allow for compensation of room interactions. So, if I could 'magically' eliminate standing waves and other cancellations, the decision would be an easy one for me. Basically, I'd like to be able to end up with an installtion that doesn't have an installed frequency response that looks like a mountain range.

Subject: Re: Corner Horn Recommendations
Posted by Wayne Parham on Tue, 22 Feb 2005 00:54:24 GMT
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I think maybe I should point out that it isn't the corner or even the room that we've focused on mostly in this discussion, it's the distance between speakers. The room will play a roll because of its dimensions too, but the thing we've focused on mostly has been the distance between speakers, and the frequency that is 1/2 wavelength there.Please don't think that this is an insurmountable problem. We probably shouldn't be focused solely on the distance between speakers in your room; I merely brought it up because the distance along one wall was less than 18 feet, which meant that if speakers were placed at opposite ends there would be 1/2 wavelength between them somewhere in the bass range. It is just something to think about, and probably you shouldn't base your whole installation on it. Otherwise, you can't even get started because the furthest you can position speakers apart in your room is only about 16 feet, at opposite diagonal corners.There are other placement conditions that cause the same sort of condition as placing two speakers 8-12 feet apart. For example, when a speaker is raised 4 feet off the ground or pulled 4 feet from a wall, this creates a notch at 70Hz because of self-cancellation. The reflection from the

surface makes the wave travel 8 feet back to the source, which is nearly the same distance your speakers will be from each other. It's the same sort of problem. But look at how many people prefer to put their speakers on stands or bookshelves.Honestly, most people don't notice 1/2 wavelength bass cancellation from a pair of stereo speakers in a small room like yours because there are other effects that mask it. The room is so small, it tends to become pressurized uniformly inside and bass seems to be stronger. And also the room isn't a perfectly sealed loss-free system. North American homes typically have drywall with R13 insulation behind them, and this tends to damp standing waves to some degree. There are also things in your room that will also absorb sound and interact with the loudspeakers. All this makes the acoustic environment something between reflective and anechoic. So I don't think you would hear a null in the center of your room.If you did find a null, you could always add a subwoofer later. You'll need a pair of speakers anyway, so you might as well start off with a good pair and try them out first. If you think the bass is missing at 50Hz, go ahead and spring for the sub. But I don't really think you'll be lacking for bass, unless you choose speakers that have weak bass output. Tower two

and you surely won't be wanting for bass with them.Honestly, I think you would be very impressed

though. If you have the budget, go for it. I'm confident you wouldn't be disappointed. But on the

speakers would probably be very enjoyable for you. They are inexpensive and very nice.

Subject: Re: Corner Horn Recommendations
Posted by Spinjack on Tue, 22 Feb 2005 01:59:27 GMT
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Could you give me some dimensions on the corner horns? I'm leaning in that direction, but I still need to give them the acid test. How big are they? I'd like to build some cardboard mockups to get a feel for how the room will turn out. I figure I can plop in a small tuned sub to smooth things out if the room characteristics render the bass unpleasant.

Subject: Re: Corner Horn Recommendations
Posted by Wayne Parham on Tue, 22 Feb 2005 13:37:13 GMT
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Send me your E-Mail address and I'll send you the plans.

Subject: Re: Corner Horn Recommendations

Posted by Russellc on Wed, 23 Feb 2005 13:35:19 GMT
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Sounds to me like you are in "trying to make your mind up hell" and it is driving you nuts. One the one hand you want something no more than 18" out from the corner, but you want to be able to "play" with moving them around for resonance purposes. The adire speaker is not in the same class as the 7Pi. and, while you can move it all over the room, It will not sound as good as the 7Pi no matter what you do. I would strongly suggest the philosophy of "Buy the best and only cry once." Go with the 7 pi. you will not need to move them all around, they will work best right in the corners, where you and your room needs them to be, and you won't lose sleep moving them all over the place, driving you and your wife nuts. If you don't like them, I will be happy to buy your boxes! Nice thing about these speakers, if you offered the finished 7Pi boxes for sale, you would have half this forum fighting over them in your front yard.Just go for it!Russellc

Subject: Re: Corner Horn Recommendations
Posted by Spinjack on Wed, 23 Feb 2005 15:22:00 GMT
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you're right. "Trying to make up my mind hell" was where I was. partly because of my lack of familiarity with any of the proposed solutions (here or on other furims). But, corner horns are what I originally had in mind and once I sorted through all the "noise", the corner horns are probably the best solution. The only issue now is that I want to have a clean front face, meaning that I don't want the speakers to look like 3 separate boxes. I'd like to build them with a contiguous front face. But I'm not sure how to do that since the midrange driver is enclosed in a box that is wider then the bass box. If it where a ported enclosure, I could change the box dimensions to be a bit deeper. But in this case, making the box narrower will change the horn dimensions.Any suggestions?

Subject: Re: Corner Horn Recommendations
Posted by Wayne Parham on Wed, 23 Feb 2005 19:04:52 GMT
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You can glue all three cabinets together and use the same finish for each, if you wish. We stake them together so they are fixed in place but can be disassembled for transport. But the idea is the same, to have them be a single loudspeaker system in appearance as well as function.One more thing worth mentioning: You might really like a two-tone finish. It was popular back in the 40's and 50's, and it is really catchy for loudspeaker systems like these. So be creative; You might like the looks of a little contrast in woods.

Subject: Re: Corner Horn Recommendations
Posted by Spinjack on Wed, 23 Feb 2005 21:41:56 GMT
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Which brings up another question. Any wood recommendations? Originally I was going to use Baltic Birch plywood, but I'm not sure that it is available in the recommended 3/4" thickness. Aside from appearance considerations, what is the best wood for 'acoustic performance'?

Subject: Re: Corner Horn Recommendations
Posted by Wayne Parham on Wed, 23 Feb 2005 22:15:22 GMT
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They're not so large that MDF is prohibitively heavy. You can also use 5/8" baltic birch.

Subject: Re: Corner Horn Recommendations
Posted by Russellc on Thu, 24 Feb 2005 01:01:00 GMT
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Yeah, I know what you mean. I can only offer two solutions, neither perfect. One, don't use the mid horn, build the original 2 way 7 Pi. the tweeter was mounted on the front panel at the top. No mid horn. Problem...No mid horn! Two, build the 18" woofr version. The top box is the same width. Problem...starting to get much larger. G-R-R-R-RR! I'm getting a headache! How about the 8Pi?I am considering doing a 7 Pi like the pictures on the Pi site...it shows the mid horn without an enclosure sitting on top, with the tweet on top of that. Looks more clean. I asked wayne about this and he told me it works....but...Problem...You of course get a little back wave reflection off the back of the driver, which is reflected by the corner. It's always a compromise. I have had all six JBL drivers for months and I amstill hung up on building boxes, well, finding someone to do it for me. I started out wanting 4 Pi w/ JBL, But I found an excellent deal on a pair of new in the box 2123H midrange drivers.Regards, Russellc

Subject: Re: Corner Horn Recommendations
Posted by Wayne Parham on Thu, 24 Feb 2005 15:52:26 GMT
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late 1990's, I tried them with woofers having rising response, and used the rear chamber as an acoustic filter. It was an interesting combination and some people liked it a lot. But the midrange

is clearer with a dedicated midrange driver, so we've gone back to the original three-way design configuration.

Subject: Re: Corner Horn Recommendations
Posted by Spinjack on Thu, 24 Feb 2005 17:30:14 GMT
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Which brings up another approach I was considering. That would be making the bass box wider and shorter. But, that would affect the dimensions of the back horn and therefore, presumably, the sound.How critical are the dimensions of the back horn? I'm guessing the design wasn't arbritrary. If I were to increase the width and decrease the height to compensate, what else would need to change to maintain the effectiveness of the horn.

Subject: Re: Corner Horn Recommendations
Posted by Wayne Parham on Thu, 24 Feb 2005 19:04:50 GMT
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There are a few things to consider. One is the area of the opening and volume of the chamber between the woofer and the walls. Another is the distance from the woofer to the wall. This is actually more important in this particular cabinet because the area of the opening is much larger than the area of the radiator. Then there is also the matter of height of the HF horns. So to keep things right, make sure the distance from woofer to corner is the same, the area of the opening is larger than 200in2 and make sure the MF and HF horns are approximately ear level within the dispersion angle.
