Subject: Pi Studio One Tower
Posted by FredT on Tue, 09 Jan 2007 22:40:37 GMT
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Some time ago I decided to experiment with the Studio One Pi kit in different volume floorstander enclosures, and since then I get the occasional email inquiry about the details of the enclosures. I never did any drawings, but I've posted a picture, and that picture along with this description should be adequate for anybody to build a pair of their own.But first I want to explain why I built a tower version of the Studio One Pi. The One Pi looks puny compared to all the other Pi kits, especially the three and larger models, but it's not a small speaker by contemporary standards. The 8" Eminenec Alpha 8 woofer is larger and capable of moving more air than most mainstream speakers in the $1.5K and under range with their typical low efficiency 6.5" or smaller woofers. When you consider its high sensitivity along with its bass and dynamic capability, it's a great speaker for most small tube amps and also for all mass market receivers, which may have high power ratings but not much drive current capability. The Sherwood two channel receiver I bought on sale for $80 at Circuit City will drive the one pi to very high levels. Add to this it's incredibly low price ($150/pr), and it's a logical speaker choice for any budget system.Ditto for the Two Pi tower, but its much larger enclosure might not fit too well into a small room, especially if there's a wife involved in the decision:) So, I thought, why not build a smaller footprint and not quite so tall tower whose volume will take advantage of all the bass capability of the Alpha 8, and the One Pi tower concept was born.I've built a few variations on the Pi One towers for friends and have finally decided which version offers the best sound. Interior volumes have varied from about 1.2 c ft to 2 cu ft, and I have finally decided a 2 cu ft tuned to about 50hz sounds best to me.I make mine 38" high, which places the tweeter about ear level. To achieve this volume I make the front and back panels 10" wide and the side panels 11-3/4" wide. I like the look of a narrow baffle, and the 10" dimension is about the least you want with an 8+ inch driver. The external dimensions are 10"W, 13-1/4"D, 48"H. I use three brace inside. The top one abuts the front panel between the woofer and tweeter, and is 8.5"W by about 4" deep. The middle brace, placed a couple of inches below the woofer, is an 8-1/2W X 11-3/4"D window frame brace. The lowest brace, also a window frame, is placed halfway between the middle brace and the bottom of the enclosure. The port is mounted halfway between these braces, and the speaker terminals are placed between the bottom brace and the bottom of the enclosure. The best tuning is about 49 to 50hz. In a 2 cu ft enclosure this requires a 3" port cut to 1.5" length or a 4" port cut to 4" length. The Parts Express #260-411 4" port is a good choice. It's marked in half inch increments and you can cut it with a hacksaw. The port can be placed on the front or the back of the enclosure. I usually place mine on the front only because many of my friends listen to low power SET amps in small rooms with the speaker close to the back wall. I prefer back placement if I know the speaker's back will be at least one foot from the back wall - the lowest bass will be augmented a bit more with this placement.It's a good idea to have some kind of base for the speaker. You can make one out of a sheet of mdf that's two inches wider and two inches deeper than the enclosure. I prefer the easy way - I use four Parts Express #260-770 rubber feet. Also, since you're already ordering the ports and rubber feet you might as well order a #081-435 bag of black #6 driver mounting screws. These will work on the woofers, tweeters, speaker terminals, and the feet. For the enclosure material you can use mdf or plywood. Have the store cut a 4X8 sheet to two 4X4 for handling ease. When you get it home, cut each to 38X48. Then cut each to yield two 10X38 boards and two 11.75X38 boards. The remaining material can be used to make the 8.5X11.75 tops and bottoms. You will need some additonal material to make the braces. I usually have enough scraps on hand, but if you don't you

can use a 4X4 piece of 1/2" plywood.I use R-13 fiberglass home insulation for the interior damping material. It's about 4" thick, which is too thick for this application, so I "peel" each piece into two identical 2" thick pieces. I line the back and one side of the interior with one sheet between each of the braces and the top and bottom, and I also place a full thickness piece at the bottom.
Studio One Pi Tower

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Subject: Towers and speakers on stands
Posted by Wayne Parham on Wed, 10 Jan 2007 02:34:17 GMT
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I really like your speaker, Fred.I thought about adding it to the line, as we discussed. But I think it's just as well that we just let people know your version is around - that's kind of how the

to make the speaker with existing kit parts or whatever.Another hybrid I wanted to toss around is a

the larger enclosure volume is really useful for additional damping. The characteristics of the Alpha 8 make it suitable for very small boxes, so you don't really need the enclosure volume. Adding another woofer is no trouble at all in the space you have.What is gained when adding a second woofer is elimitation of floor bounce amplitude notch in the midbass, where distance to the

or a bookshelf speaker on a stand, what you see is a dip in response at the frequency where

ground, and response is smooth. But move the woofer up away from the ground more than a couple of feet, and floor bounce starts making these notches and peaks.By adding a second woofer, you can fill in the dips and average the response. This is one of the characteristics I like about your arrays, they tend to average out the response curve and remove the problem of floor bounce. By using a second woofer, this can be accomplished. Moving the woofer lower will do it too, but that hurts midrange, if the driver is acting as a midwoofer. The Alpha drivers are inexpensive enough that adding a second to eliminate floor bounce is a good option.

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Subject: Re: Towers and speakers on stands
Posted by Matts on Wed, 10 Jan 2007 02:54:25 GMT
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if you added a second woofer, would that also increase the overall efficiency a couple of dBs?

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Subject: Re: also...
Posted by Matts on Wed, 10 Jan 2007 03:03:41 GMT
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would it lower the bass response a touch necessitating a slightly lower tuning of the box?and...thanks for your post, Fred T.!  very cool design & thanks for taking the time to post.

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Subject: Using side wall bounce to counter floor bounce
Posted by Wayne Parham on Wed, 10 Jan 2007 03:25:33 GMT
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Yes, with two woofers, sensitivity would increase.  There are a lot of ways you could go, using a 2.5 way, with the bottom woofer crossed over at 200Hz or so, or maybe go with an MTM.You can also use the side walls as acoustic mirrors, effectively making them act as additional virtual woofers to do the same thing as actual physical woofers would.  For example, place the speakers so the side wall is around half the distance as the woofer is to the floor.  That will tend to fill in the notches from floor bounce with peaks from side bounce, and vice versa.

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Subject: Two Woofer One Pi Tower
Posted by FredT on Wed, 10 Jan 2007 10:25:08 GMT
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Sounds like something I might try. Making it a 2.5 way would provide some baffle step compensation, enhancing the bass without an unwanted increase in midrange sensitivity. The simplest crossover would be an Erse iron core inductor in series with the lower woofer. I probably would also increase the volume a bit by making the enclosure deeper and taller.

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Subject: A Question About the Alpha 8
Posted by FredT on Wed, 10 Jan 2007 12:55:30 GMT
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I'm wondering how near the TS parameters for this driver are to the advertised specs, which appear to have been changed within the past couple of years. Here's a comparison of the specs on the Parts Express 2005 catalog versus the 2006 catalog (I understand the change was actually made before 2005 but wasn't reflected in that catalog):Parameter - Old/NewLE - .65mH/.44mHFs - 76/73SPL - 97/94Vas - 0.5/0.6Qms - 4.5/4.6Qes - .6/.68Qts - .53/.59I'm not suggesting that WinISD always yields the optimum solution, but when I enter these different parameters, for the

old parameters the software suggests a ported 1.23 cu ft box tuned to 57.5hz. For the new parameters I get a 2.1 cu ft box tuned to 49.5 hz. The F3 for the old alignment is 51hz; for the new one its 44hz. Quite a difference.

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Subject: Re: Pi Studio One Tower
Posted by LAL on Wed, 10 Jan 2007 15:53:23 GMT
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Fred,Perhaps the next step is to add a side firing subwoofer and a plate amp on the back to power the subwoofer.Larry

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Subject: Re: A Question About the Alpha 8
Posted by Wayne Parham on Wed, 10 Jan 2007 16:12:36 GMT
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You're right. Eminence made a change late in 2005. They do this periodically and keep the same part number, without a version number to identify the difference. It's kind of frustrating, to tell the truth. But the good news is they are pretty good about keeping variations compatible with one another. The specs are different, but when put in a box designed for an earlier version, the response doesn't change all that much. I can see how Eminence would want some manuvering room to source their materials, so maybe slight variations from time to time are unavoidable.

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Subject: Re: Two Woofer One Pi Tower
Posted by Wayne Parham on Wed, 10 Jan 2007 16:16:34 GMT
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I like the speaker as it is, that's for sure. But with the low cost of the Alpha series drivers and the small size of the cabinet needed for the Alpha 8, a dual-woofer model could be easily done. Two to four cubic feet is plenty for a pair of Alpha 8's.

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Subject: Correction
Posted by FredT on Wed, 10 Jan 2007 21:06:51 GMT
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In my intitial post I erroneously stated the external height of the One Pi Tower is 48". The correct dimension is 38".

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Subject: So..when will the dual kit come ? =)
Posted by Steve H on Thu, 11 Jan 2007 02:33:31 GMT
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Im looking forward to seeing the dual woofer kit (hint hint !). That would be the perfect thing for the amp on my workbench right now...

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Subject: Side Firing Sub
Posted by FredT on Thu, 11 Jan 2007 10:44:58 GMT
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Good idea! If I were doing this I probably would use a different design from the One Pi, with an Eminence Beta 8 in a sealed chamber instead of the Alpha 8 in a ported one. The Beta 8 has greater power handling capacity and it will perform well in a sealed box as small as 0.3 cu ft. A good economical woofer section could include the Dayton 10" DVC sub that's on sale for $25. You could drive it with the 75 watt MCM plate amp that's now on sale for $40. The Dayton DVC sounds really good in a 1.5 cu ft sealed enclosure, so everything would fit fine in the original One Pi Tower enclosure with the mid, tweeter section sealed off from the woofer section just below the Beta 8.Here's another idea that would be helpful if you were driving this with flea power SET amps like my Paramours. You could drive the subs' plate amps directly from the line output of the preamp and insert a passive high pass filter at each SET amp's input to roll off it's output below 100hz. Relieving the amps of low bass duty would enhance their ability to drive the Beta 8's.Now I'm confused about which version of the enhanced One Pi tower I should build:)

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Subject: Re: Could be popular.
Posted by Matts on Thu, 11 Jan 2007 18:42:12 GMT
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The one pi as is is great- i"ve built a pair. But if the cab size could stay relatively small with 2 woofers in there, it could be the answer to the SET dream of a good hi-eff speaker with "good" bass, minimal xover components, and, low cost. The 8" Alpha is a nice driver.

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Subject: Xover thoughts...
Posted by Steve H on Fri, 12 Jan 2007 02:16:09 GMT
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Thoughts on how to go about a smooth crossover for the two woofers ?

Subject: Re: Xover thoughts...
Posted by Wayne Parham on Fri, 12 Jan 2007 05:45:45 GMT
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I would use a 2.5-way crossover, measure it and see how it goes. I can't see any reason it wouldn't provide everything you would want. The idea is to crossover one woofer at a relatively low frequency, so both are playing down low. Then run the second woofer up to the tweeter crossover point. The low frequency woofer should be mounted low in the box, and the midwoofer should be mounted higher. I'd put them all on the same baffle, aligned vertically. The low woofer

would run the low woofer up to 150Hz or 200Hz, so that it can smooth the floor bounce modes that would exist for the upper woofer were it to be operated alone. As I said, I would position it no

decade above low woofer cutoff, around 2kHz. The tweeter should be placed just above the

first-order, because none of the drivers is particularly sensitive to over-excursion, and each driver

Subject: Re: Pi Studio One Tower
Posted by dB on Sat, 13 Jan 2007 17:41:45 GMT
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Hi FredT,Very nice. I lyke your One's.I appreciate very much your "Old Style Theatre Speakers" (and your work), the ()3 Pi Theater two-way using Eminence drivers. They could go in a movie retracting the fifties: They have a very powerfull "wood" looking, real vintage style. Nice.I like your "right tools" you have on your speaker-shop. I would bring them to my mum's dinning room where I have my speakers on the dinning table for a few months. Hi hi.(Sorry mum). They despise speaker people anyway, I don't know why, and is not because of loud sound. Nice work on the Shop. dB

Subject: It Could Be A While
Posted by FredT on Mon, 15 Jan 2007 09:52:29 GMT

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All this talk about the Studio One Pi motivated me to pull my One Pi towers out of my cavernous speaker storage warehouse (a small upstairs bedroom:) and set them in the system for a few days. I have to admit these speakers are hard to beat just as they are with one 8" woofer. They probably woulnd't fare as well as most high end speakers in an anechoic chamber test, but it a real room they sound very "right" - tight and reasonably extended bass, warm midrange, just enough treble sparkle to let you know they are quality speakers, and no hard edges anywhere. Anyway, I have all the parts for a couple of other projects including enclosure refinishing for a pair of Cornwalls, so I believe I'll set this project on the back burner. Somebody has asked about buying the existing One Pi tower enclosures, and if he does I'll be left with a pair of one Pi kits with no enclosure, and that will provide the motivation to buy another pair of Alpha 8's and get started on the dual woofer towers. In the meantime if anybody else in the Houston area wants the tower enclosures they're $100 with internal damping material, bi wire spkr terminals and ports installed (and your word you'll order the One Pi kits from Wayne).

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Subject: Re: Pi Studio One Tower
Posted by tomlang on Tue, 26 Jan 2021 22:28:16 GMT
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This is certainly the oldest thread I have ever brought back from the dead. It seemed appropriate though, as I went back through this forum and behold, found something very interesting to build.

I have attached a proposed dimensioned drawing of the One Pi 2.5 speaker. Assuming running the lower woofer only up to 200 Hz, I come up with a 1/4 wavelength of 16.875 inches, so I spaced the lower woofer up 16.5 inches from the floor and same spacing to the upper woofer. Does this seem reasonable? Is 200 Hz a good choice? If I went lower, say 150 Hz I could make the tower taller. But not knowing the tweeter crossover point I'm not sure if that is better.

This 3 cu ft box is tuned at 49 Hz, F3=43 Hz. That is not quite as low as the single woofer 2 cu ft box discussed above. That brings up a question as I have never listened to a 2.5 speaker before. Will the 2.5 seem like more apparent base as it fixes some floor bounce problems?

## File Attachments

1) 1 pi dual tower.JPG, downloaded 183 times

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Subject: Re: Pi Studio One Tower
Posted by Wayne Parham on Wed, 27 Jan 2021 15:45:51 GMT
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I like the whole concept of the 2.5-way speaker very much. It's the best and most natural way to resolve baffle step, in my opinion. Of course, that means running the lower "helper" woofer up to the baffle step frequency.

This brings me to the flanking sub concept though, which is a modified form of a 2.5-way system. By detaching the helper woofer and offsetting it a couple feet in all three dimensions, it mitigates SBIR and lower-frequency room modes in addition to baffle-step correction.

That's a pretty big deal, because it smoothes the notches created by reflections from nearest boundaries. As you've mentioned, there's a notch created by the reflection from the floor and there's also notches from reflections from other nearby boundaries. The one I've found is actually most objectionable in most cases is the wall behind the speakers. It's responsible for a huge 15dB hole somewhere between 80Hz and 120Hz in a large number of installations.

So if you place the mains on a stand so they are at ear level, and then put the helper woofers on the floor - beside and slightly behind the mains they are flanking - they will provide SBIR mitigation and will reduce higher frequency room modes in addition to baffle step compensation.

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