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Subject: 3pi, smaller cab possible?

Posted by [smokarz](#) on Thu, 23 Jun 2011 23:27:45 GMT

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i really like the AE 12" driver and those seems to have a huge following. however the current size could be a bit challenging for my small room.

is it possible to go smaller on the cab, maybe in a sealed config?

sorry, i understand Wayne has spent countless times on finessing his designs, but just had to ask.

thanks!

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Subject: Re: 3pi, smaller cab possible?

Posted by [Wayne Parham](#) on Thu, 23 Jun 2011 23:39:43 GMT

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I dunno, man, it is one sweet speaker. I wouldn't mess with it.

Of course, you can do just about anything you can dream up. But if you want the best results, you'll need to do your homework. Some modeling and testing would be in order.

To tell the truth, these speakers work well in even very small rooms. They're big compared to mini-monitors, but they're really not that big. Make a nice looking cabinets, put them on classy stands and enjoy.

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Subject: Re: 3pi, smaller cab possible?

Posted by [smokarz](#) on Thu, 23 Jun 2011 23:51:23 GMT

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thanks wayne, i just love your set up man.

simple, yet really cool.

just wondering, is it ideal to have the speakers so close together?

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Subject: Re: 3pi, smaller cab possible?

Posted by [Wayne Parham](#) on Fri, 24 Jun 2011 00:26:07 GMT

Well, it makes the preferred listening area narrower. But if all you need is a few feet for a couch, I guess that's alright. That photo was taken in a small hotel room. No room for any wider spacing.

If you separate the speakers further, you'll have more room for people to sit in. The uniform directivity and toe-in makes the "sweet spot" seating area very wide.  
Imaging, placement and orientation

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Subject: Re: 3pi, smaller cab possible?

Posted by [smokarz](#) on Thu, 30 Jun 2011 12:51:00 GMT

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wayne, someone model the TD12S in a 2cf sealed box and it looks pretty good, what do you think?

<http://www.avsforum.com/avs-vb/attachment.php?attachmentid=216390&d=1309395818>

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Subject: Re: 3pi, smaller cab possible?

Posted by [Wayne Parham](#) on Thu, 30 Jun 2011 13:55:37 GMT

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I think models like that don't include the effects of internal standing waves. They cause ripple in response at higher frequencies; Where I'm mostly concerned in a loudspeaker like this is the lower midrange.

On the other hand, a 2 cubic foot box is getting small enough the internal standing waves will probably shift high enough in frequency the stuffing can attenuate them pretty well. Might work pretty well.

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Subject: Re: 3pi, smaller cab possible?

Posted by [smokarz](#) on Thu, 30 Jun 2011 14:57:52 GMT

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thanks much wayne. a smaller sealed cab is so much easier to integrate into my small room.

if i go with the TD12S and DE250 sealed, will i be able to use your prebuilt 3pi crossover? thanks

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Subject: Re: 3pi, smaller cab possible?

Posted by [Wayne Parham](#) on Thu, 30 Jun 2011 17:32:25 GMT

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If you baffle mount the horn and midwoofer, and maintain the same vertical spacing, it should give

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Subject: Re: 3pi, smaller cab possible?

Posted by [smokarz](#) on Sat, 02 Jul 2011 14:39:54 GMT

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wayne, baffle mount meaning mounting the horn and woofer from outside? no recess?

also, can i have the 3pi plan?

thanks

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Subject: Re: 3pi, smaller cab possible?

Posted by [Wayne Parham](#) on Sat, 02 Jul 2011 15:32:41 GMT

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I've sent plans to your email address.

You can route to recess the woofer and the tweeter or surface mount both of them. Just don't do one and not the other. As long as they are both flush or routed on the baffle, their depth (distance from the listener) the same, i.e. one won't be further than the other, which would angle the forward lobe up or down.

Also, maintain the same vertical distance between the woofer and tweeter. For example, don't move the tweeter up outside the box unless you move the woofer up a distance to match. I don't think that's in the cards for you, but it might be worth saying, just in case.

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Subject: Re: 3pi, smaller cab possible?

Posted by [smokarz](#) on Sat, 02 Jul 2011 16:22:13 GMT

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thanks wayne,

so the gap between the horn and woofer is 3 1/4"?

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Subject: Re: 3pi, smaller cab possible?

Posted by [Wayne Parham](#) on Sat, 02 Jul 2011 19:35:45 GMT

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That's roughly the distance between the baffle cutouts, but the actual edge-to-edge distance once the woofer and tweeter are installed is 1.6".

But - Yes - maintain that baffle cutout spacing and you'll be good.

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Subject: Re: 3pi, smaller cab possible?

Posted by [zheka](#) on Thu, 27 Dec 2012 23:04:23 GMT

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Wayne Parham wrote on Sat, 02 July 2011 10:32

You can route to recess the woofer and the tweeter or surface mount both of them. Just don't do one and not the other. As long as they are both flush or routed on the baffle, their depth (distance from the listener) the same, i.e. one won't be further than the other, which would angle the forward lobe up or down.

Also, maintain the same vertical distance between the woofer and tweeter. For example, don't move the tweeter up outside the box unless you move the woofer up a distance to match. I don't think that's in the cards for you, but it might be worth saying, just in case.

Wayne,

Is it important to keep width of the baffle the same as on the original 3Pi?

thank you

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Subject: Re: 3pi, smaller cab possible?

Posted by [Wayne Parham](#) on Fri, 28 Dec 2012 01:14:42 GMT

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Changing the size of the baffle will alter the speaker's directivity at low to midrange frequencies. At low frequencies, the speaker radiates omnidirectionally but as frequency rises, the baffle

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begins to limit the radiation pattern to the forward-facing hemisphere. This directivity shift modifies both on-axis and off-axis response. Some call the modification to the on-axis response the "baffle step".

However, a small change in the dimensions won't make much difference. Making it smaller will shift the transition frequency upwards, and larger will shift the transition frequency downwards. As long as the changes are small, it won't matter much, especially if the baffle is large anyway. If the transition region is below the Schroeder frequency, room modes play a much bigger part than baffle directivity shifts. Self-interference anomalies from nearest boundaries are also in play.

The loudspeaker baffle is sort of like a 180° waveguide, with the baffle dimensions being like the mouth dimensions of a horn. Actually, it isn't merely like a 180° waveguide - that's precisely what it is, a conical waveguide having 180° wall angle and "mouth" dimensions equal to the height and width of the baffle.

Just like a horn loses directivity control based on its mouth size, so does a baffle. It will lose pattern control at a different frequency in the horizontal than it does in the vertical if the baffle has a different height than width. If it is taller than wide, it will maintain a 180° pattern in the vertical to a lower frequency than it can in the horizontal, widening at low frequencies. But also, just like a horn suffers waistbanding in the transition region where it is losing directivity control, so does a baffle in the frequency range where it transitions between 180° beamwidth and omnidirectional radiation.

As frequency drops, beamwidth narrows briefly before it widens. This directivity ripple creates a slight on-axis response ripple, although power response remains flat. Since power response remains flat, and since the transition region is near the Schroeder frequency on large baffles, I do not recommend any sort of electrical EQ (aka baffle step filters) to modify on-axis response. Baffle StepAll that to say, as long as the baffle size is large enough, small changes don't matter much. What anomalies occur are in the modal region and so should be mitigated in the same way as self-interference from nearest boundaries and room modes, using multisubs and flanking subs.

On the other hand, if the dimension changes are large enough, then the directivity changes will become apparent. Narrow baffles cause directivity shifts above the modal range, up in a range where directivity shifts are probably more offensive. Perhaps even more importantly, if the cabinet is modified enough, its internal standing waves line up differently and without measurements, you can't really know what you've got. That's why I sometimes caution people against making modifications unless they have measurement equipment to validate their changes. Tower speakers are really cool looking and convenient to place, but they take a little extra care because they are particularly vulnerable to pipe modes in the lower midrange and upper midbass, where internal stuffing is unable to damp effectively. You definitely don't want a pressure node to line up with the driver or port, because it can create prominent response ripple.

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Subject: Re: 3pi, smaller cab possible?  
Posted by [zheka](#) on Fri, 28 Dec 2012 01:37:37 GMT

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I am toying with an idea of smaller sealed version of 3pi for the surrounds. It is an overkill, I know, but I figured I should at least seriously consider it before going with one of the SEOS designs. And I have the wave guides already

It looks like I can reasonably expect F3 just below 80Hz in 2 cu.ft enclosure. would 16x20 baffle require any crossover changes? I will maintain the relative positioning of the drivers as you instructed.

thank you

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Subject: Re: 3pi, smaller cab possible?

Posted by [Wayne Parham](#) on Fri, 28 Dec 2012 04:50:49 GMT

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I think that's probably worthwhile. being sealed will make it a little less vulnerable to standing waves, because there is no worry a port will lie on a pressure node. And smaller cabinets shift the internal standing waves upward in frequency, where the stuffing is better able to damp them. So both those things go in your favor. Still, I'd measure it just to be sure.

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