
Subject: 4Pi - alternate compression driver mounting?
Posted by [areohbe](#) on Tue, 21 Sep 2021 18:16:01 GMT
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Disclaimer: My first speaker build was a -- somewhat surprising -- massive success. I mainly followed the plans and didn't invest much time into actually understanding the physics/technical aspects of speaker design. I am planning to change with my upcoming 4Pi build (just placed crossover/waveguide order :d). But, sorry in advance if this is a totally non-sensical question...

Would there be significant/any drawbacks to modifying the 4Pi plans such that the compression driver was mounted, exposed, on top of the cabinet? It's purely an aesthetic preference. I am willing to make some degree of sonic sacrifice, ideally it wouldn't be noticeable to the average listener.

Subject: Re: 4Pi - alternate compression driver mounting?
Posted by [Wayne Parham](#) on Wed, 22 Sep 2021 13:57:24 GMT
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That's actually been a pretty popular mod around here. The main concerns are keeping the geometry the same between the midwoofer and the waveguide and keeping the geometry the same between the midwoofer and the cabinet walls and the port.

The easiest way to do this is to turn the cabinet upside-down, with the woofer high in the cabinet and rest the waveguide in a cradle sitting on top of the cabinet.

This ensures the polar response remains good because the woofer and tweeter positions are the same in relation to each other. And it ensures the internal standing wave alignment is the same because the woofer and port are each in the same place in the box.

Subject: Re: 4Pi - alternate compression driver mounting?
Posted by [areohbe](#) on Wed, 22 Sep 2021 18:11:20 GMT
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Thanks, Wayne! I tried digging around the forum for build threads with a similar approach, but didn't have any luck. Do you happen to know of one so I can spare you a bunch of follow up questions?

Subject: Re: 4Pi - alternate compression driver mounting?
Posted by [Wayne Parham](#) on Wed, 22 Sep 2021 19:53:02 GMT
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I don't think there are any build threads from people that used that approach. But I've seen a lot of photos of loudspeakers made this way, so you might search again. Hard to search for photos, I guess, just gotta scan the internet for them.

Some people put the waveguide in a box and mount it traditionally, setting the tweeter box on top of the woofer cabinet. Others have the waveguide sitting on top, bare. Many people paint the waveguide.

When sitting the waveguide bare on top, the biggest challenge is what to do with the waveguide mounting holes. I would suggest using a filler material - like is commonly used in auto body repair shops - to fill the holes. Then lightly sand the front face so the filler blends and to remove any mold lines. Paint the waveguides with enamel and set 'em on a cradle. I use the cradle approach when I mount wood horns, and I think it looks really nice. See one of my tweeter cradles, below:

Tweeter Cradle

One last thing - I mentioned above that the woofer/tweeter geometry should be the same but you can center the tweeter. I assumed you knew that but wasn't sure, so I thought it best to clarify. It's just important that the waveguide face be flush with the midwoofer face and that the two are as close together as possible. That's why most people turn the cabinet upside-down - to make it closer to the tweeter.

Subject: Re: 4Pi - alternate compression driver mounting?

Posted by [areohbe](#) on Thu, 23 Sep 2021 03:53:02 GMT

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That looks lovely.

Turning the cabinet upside down makes sense. That's what I was planning on. Auto body filler is a great call!

I'd like to modify the port dimensions, also for aesthetic reasons. This is a bit over my head, but sounds like I'll need to consider standing wave issues. Think I will start with an MDF front baffle to take some acoustic measurements and go from there.

Subject: Re: 4Pi - alternate compression driver mounting?

Posted by [areohbe](#) on Thu, 23 Sep 2021 07:03:39 GMT

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Here's my working design:

Shortened overall height by 1", depth & width not changed
Port is now 8.75"x2.4" w/ a depth of 3"

This result is a cabinet volume of 2.79 cubic feet, equivalent to the original design. I'm sure there are potential drawbacks with this approach but doubt my ear could pick it up. Getting excited to begin the build!

File Attachments

1) [CleanShot 2021-09-22 at 23.55.31.png](#), downloaded 355 times

Subject: Re: 4Pi - alternate compression driver mounting?
Posted by [Wayne Parham](#) on Thu, 23 Sep 2021 12:59:41 GMT
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That looks great, so my hat's off to you for the aesthetics. But you're right about the potential internal standing wave issues. The link you included in your post above describes them, so you know what to look for. Pay attention in particular to the region between 200Hz and 400Hz, and even up to 800Hz.

Subject: Re: 4Pi - alternate compression driver mounting?
Posted by [alexg](#) on Wed, 10 Nov 2021 17:35:54 GMT
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Wayne,

Top mounted wave guide looks interesting.

After flipping box upside down, does the woofer stay in place per plan or should the the woofer be moved higher up in the box to maintain the same spacing as called for in the plans?

Thanks

Subject: Re: 4Pi - alternate compression driver mounting?
Posted by [Wayne Parham](#) on Wed, 10 Nov 2021 22:25:57 GMT
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There's the rub.

When flipping the box over, the waveguide and midwoofer are placed closer together than they

would be if the woofer remained low in the box with the waveguide perched on top. So flipping the box over brings 'em closer together, pretty much the same distance apart as they are in the stock design.

I say "pretty much the same distance apart" but they're not exactly the same distance. Not that we need to split hairs about tenths of an inch or anything like that, but the difference is more than that - they're about an inch further apart.

That's not horrible, but it will draw the vertical nulls closer together making the forward lobe smaller. It's not what we want.

On the other hand, the forward lobe is pretty large and the nulls are spaced far enough apart we don't have to push it. That's why the stock design has a gap between the midwoofer and tweeter. If we needed, we could bring them closer together to get more distance between vertical nulls. But we really don't need that - the nulls are widely spaced.

Then we also have to consider the internal standing waves. If we move the midwoofer or the port, the standing waves will align differently inside the cabinet. So we cannot know for sure if modifications will create midrange anomalies without measuring the cabinet.

I moved stuff around for testing way back when I originally designed this cabinet, and I tried a lot of configurations both with mathematical models and then ultimately with measurements of physical loudspeakers. But that was a long time ago and I cannot remember what movements were OK and what weren't. I know this particular configuration measured well.

So for the person considering this mod, those are things to consider.

Subject: Re: 4Pi - alternate compression driver mounting?

Posted by [alexg](#) on Sat, 13 Nov 2021 17:03:07 GMT

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Wayne,

Thanks for the info.

Top mounting sounds / looks cool but probably not worth messing with your design.

Subject: Re: 4Pi - alternate compression driver mounting?

Posted by [areohbe](#) on Sun, 14 Nov 2021 06:23:02 GMT

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I'm a complete amateur and a sucker for aesthetics. I have a pair of Wayne's crossovers and waveguides in hand.

I hope to have some prototype MDF cabinets complete by end of year. Will share results once I get there.

Subject: Re: 4Pi - alternate compression driver mounting?

Posted by [areohbe](#) on Mon, 29 Nov 2021 18:03:26 GMT

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Squeezed in a couple hours of work over the Thanksgiving holiday.

JBLs arrive later this week. Then, I'll complete the cutouts for the driver and port.

DE250 is backordered until 12/15. :? But, still hoping to have some measurements by end of year.

File Attachments

1) [Plans.png](#), downloaded 195 times

2) [MDF Panels.png](#), downloaded 187 times

Subject: Re: 4Pi - alternate compression driver mounting?

Posted by [areohbe](#) on Mon, 03 Jan 2022 02:31:24 GMT

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All glued up!

Will be diving in to REW for the first time this week. Hoping the frequency response gods are looking fondly on me and everything measures as desired.

The DE250 is still backordered. Hoping it arrives mid Jan when I get back from an upcoming trip.

Had a lot of inspiration/design tweaks while building out this prototype cabinet. And, of course, made a few mistakes that I'll be able to avoid in the final build.

I thought I was excited before, but it's starting to feel real and I can't wait to get these hooked up and in their final resting place.

File Attachments

1) [EA81438A-9D5F-40A4-AD17-F197BD99E7CD.jpeg](#), downloaded 132 times

Subject: Re: 4Pi - alternate compression driver mounting?
Posted by [Wayne Parham](#) on Mon, 03 Jan 2022 15:40:57 GMT
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Lookin' good!

Fingers crossed on the measurements!

Subject: Re: 4Pi - alternate compression driver mounting?
Posted by [areohbe](#) on Wed, 12 Jan 2022 03:17:07 GMT
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The DE250's got pushed back again. Parts Express is now estimating March. :(

I picked up some PSD2002's in a panic. They were already out of stock at PE. I'd imagine they'll be backordered everywhere soon as well.

The 2002s are schedule to arrive tomorrow. :d

Subject: Re: 4Pi - alternate compression driver mounting?
Posted by [areohbe](#) on Sat, 15 Jan 2022 00:25:19 GMT
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\$75 class D amp, no dampening yet, and already pure bliss. :d :d :d

File Attachments

1) [83CE7A83-FF0A-436A-AA2D-4599D4A73151.jpeg](#), downloaded 70 times

Subject: Re: 4Pi - alternate compression driver mounting?
Posted by [areohbe](#) on Sun, 16 Jan 2022 02:36:40 GMT
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Short video if anyone is interested. Nothing fancy, recorded on an iPhone. YouTube link.

I'm by no means an audiophile, but sounds pretty damn good to my ears.

Subject: Re: 4Pi - alternate compression driver mounting?
Posted by [Wayne Parham](#) on Sun, 16 Jan 2022 16:56:30 GMT
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Looks like a really cool build!
