Subject: Cabbing some Eminence Beta 15s
Posted by JCDC on Sat, 28 Aug 2010 01:34:22 GMT
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Hey All,

I was using B15s for open baffle but now I want to throw them in cabs.
PiAlign comes with many files for the B15: B15, B15 in a pi system and B15 in Boxplot.

The up-to-date specs are:

Vad=11.8
Qd=1.72
Frd=35

Very close to the original:

Vad=11.3
Qd=1.8
Frd=36

PiAlign suggests:
Vol 6.9 cuft, Fr 22.5 and Q .97 (new specs)
Vol 6.3 cuft, Fr 24.3 and Q 1 (old specs)

Going with the new specs yields an aesthetically pleasing 2 x 3 x 1 1/3 ft, 7 cuft cab.
Boxplot shows a 2dB hump centered at 78Hz and an F3 of 44, an F10 of 28 and an F20 of 15.
Not bad!

But that is a pretty big cab!  Could I get away with a 5 cuft or even the 2.5 of a 4 pi?

In a 5 cuft cab with the same tuning, Boxplot shows a 2.5dB hump centered at 82Hz and an F3 of 48, an F10 of 33 and an F20 of 17.

The 2.5 cuft doesn't look good, with a 4dB hump centered at 97Hz and an F3 of 60, an F10 of 43 and an F20 of 25.

What I don't know about is how this affects impulse response?

What do you think?  The 2.5 looks right out ... but how about the 5?

Thanks,
Jeff

PS  PiAlign doesn't update the Encl Fr when I change port dimensions?

Subject: Re: Cabbing some Eminence Beta 15s
Posted by Wayne Parham on Sat, 28 Aug 2010 02:33:00 GMT
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PiAlign choses a cabinet and tuning, and doesn't allow you to change that recommendation. There is a little Helmholtz calculator (below) I always used way back when if I wanted to find the box frequency of a given cabinet volume and port. Now days you can do that with any T/S simulator.

I personally didn't work much with the Beta series parts. Not that I thought good or bad of them, it's just that Eminence had so much overlap between series. I've pretty much settled on Alphas for the lower cost drivers, Deltas for the mids and Omegas for the larger prosound stuff. The Betas and Kappas were always good canidates too, but like I said, they are practically overlapping specs with drivers I already use in my standard lines.

For a while, I had even more cabinet/driver combinations but I've narrowed the line to just a few drivers. Those are what I felt gave me the best price/size/performance ratio. But there are a lot of other combinations that will work very well. Sounds like you're on a good track for finding one of them. Keep us posted with your progress.

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Helmholtz Calculator

Here's a little BASIC program that will calculate the formulas for you, if you can still find an old BASIC interpreter around somewhere.

```
10 INPUT"Enclosure Volume";VE
20 INPUT"Diameter of Port";PD
30 INPUT"Length of Port";PL
40 VB=VE*1728:PI=3.1415926535:AP=PI*((PD/2)^2):LC=PL+((8*PD)/(3*PI))
50 FR=(13548/(2*PI))*(AP/(VB*LC))^.5
60 PRINT"Fr =";FR;"Hz."
70 GOTO 10
```

Subject: Re: Cabbing some Eminence Beta 15s
Posted by JCDC on Sat, 28 Aug 2010 14:31:01 GMT
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Thanks Wayne!

Um, errr, how do I interpret Boxplot?

The 7 cuft has a 2dB hump centered at 78Hz and an F3 of 44, an F10 of 28 and an F20 of 15.

What will that hump sound like?  Does it have consequences for impulse/phase/group delay?

What is an F3 of 44 going to sound like compared to other 15s like an Omega 4Pi or a Delta in a 5 cuft (I had the old theater4)?

Same for the 5 cuft:
5 cuft cab with the same tuning, Boxplot shows a 2.5dB hump centered at 82Hz and an F3 of 48, an F10 of 33 and an F20 of 17.

Also, Boxplot's port calc seems to differ.  With V11.8 Q1.72(.58) F35,  PiAlign's port is
len 2.5 area 7.3  dia 3.06  Boxplot's port is
len 3.3 area 7.35 dia 3.06
???

Thanks for the help,
Jeff

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Subject: Re: Cabbing some Eminence Beta 15s
Posted by Wayne Parham on Sat, 28 Aug 2010 22:47:33 GMT
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Well, indoors, a 2dB hump in a cabinet is probabably not going to matter much, especially if there is plenty of output below it and with a slow rolloff slope.  The larger low-end Eminence woofers all tend to do that in boxes smaller than a house.

I'd prefer the Omega 15 because it's a better woofer and can be used in a much smaller box.  Of course, it's more expensive but the cost of wood for the larger box kind of makes up for that.

No matter how you slice it, the best thing to do is to add subs.  That will smooth everything out.  So in a sense, the thing you're looking for is really midbass and midrange quality.

But if you're looking for a budget build, the multisubs and more expensive midwoofers might be too much.  In that case, the big box build will give you some deep bass, and if you're not using subs, that can be important.

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Subject: Baffle spacing for 4Pi?
Posted by JCDC on Sun, 29 Aug 2010 18:13:30 GMT
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I decided to go with a larger cab.  I decreased the size a bit to make it fit better on a 4 x 8.  33 x 22 x 16.

I did a quick search to find the baffle spacing between the tweet and the woof for the 4Pi. I found a reference to 13.25" but I think that was the old Theater 4 Pi.

Judging from the picture of the 4Pi it looks closer to 12".

What is the exact baffle spacing for the 4Pi?

Thanks,
Jeff

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Subject: Re: Baffle spacing for 4Pi?
Posted by Wayne Parham on Sun, 29 Aug 2010 19:38:02 GMT
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I'll send plans, but where wooger/tweeter spacing is concerned, it's almost always safe to assume closer is better. The thing you'll need to worry about is those internal standing waves. They can really mess up the midrange. This has to do more with the positions of the midwoofer and port in relation to the cabinet walls. You can't rely on an existing plan to help, unless cabinet dimensions are the same, because distances to the inside walls will be different. Sometimes there are pipe modes within the port itself too, but only if the port is long.

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Subject: Re: Baffle spacing for 4Pi?
Posted by JCDC on Sun, 29 Aug 2010 22:50:31 GMT
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Thanks Wayne,

I was going to center the B15 top-to-bottom and left-to-right and then put the tweet 12" above that.

At 33 x 22 x 16 it's close to a 3 Pi. So I was imagining a 3 Pi with a 15. I was going to use the same port placement (or the port the same height but centered.)

Using an online standing wave calculator I get:

multiples of 213 Hz for H=31.75"
multiples of 327 Hz for W=20.75"
multiples of 452 Hz for D=15"

Will I run into any problems?

Thanks,
Jeff

Subject: Re: Baffle spacing for 4Pi?
Posted by Wayne Parham on Mon, 30 Aug 2010 02:24:58 GMT
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port in the same positions, I would not expect you to have any problems with standing wave harmonics mucking up the midrange. That's a design that has been tested extensively.

Putting a 15" woofer in there makes it a little different though, in that the midwoofer is larger. But I think the standing waves would line up pretty much the same, and the pressure and zero nodes would be in the same places. So that's a pretty good way to go.

The thing is, I think that cabinet may be a little small for your woofer in terms of damping. You won't have standing wave problems, but you may have more traditional T/S alignment problems. That part is easy enough to check with garden variety T/S simulators though.

Subject: Re: Baffle spacing for 4Pi?
Posted by JCDC on Mon, 30 Aug 2010 23:57:55 GMT
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My cabs are 33 x 22 x 16.25 (5/8 MDF) which is 5.7 cuft (or 5.5 cuft with 300 cubic inches subtracted for offset a la PiAlign)

I tried to stick close to the proportions from PiAlign.

I don't know the dimensions of the 3 Pi. Are they close enough to not worry?

Thanks,
Jeff

Subject: Re: Baffle spacing for 4Pi?
Posted by Wayne Parham on Tue, 31 Aug 2010 03:14:20 GMT
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making an assumption that the standing waves will line up the same. Down low, certainly they will, but up higher they'll be much different. And it's the midrange we're concerned about. I'd

definitely model and/or measure the speaker, watching what it does above 150Hz or so.

close to what you propose - and it is - but the difference is significant both in terms of overall volume and in the distances to interior cabinet walls. This will make enough difference you can't really compare one with the other in terms of where standing waves line up inside, particularly at the higher multiples, above the fundamental standing wave nodes. That's usually what you have to watch out for. It is important that the woofer and port not be near standing wave nodes ideally at all harmonic multiples from the fundamental up through the woofer's passband, or at least up high enough that the insulation can effectively damp the sound.

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Subject: Standing wave calculator?
Posted by JCDC on Thu, 02 Sep 2010 19:15:55 GMT
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Do you know of any decent, free standing wave calculator software?

Cheers,
Jeff

PS Yes, I did get the 4 Pi plans, thanks!
PPS Thank goodness the plans are .pdf instead of those large picture files from a few years ago!

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Subject: Re: Standing wave calculator?
Posted by Wayne Parham on Thu, 02 Sep 2010 20:50:36 GMT
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Sorry, I don't know where there are any calculators for this purpose. Martin King had some for a while but I understand he stopped making them available.

You can calculate the positions of standing wave nodes to avoid manually. That's what I used to do. It's a long, boring process but not too hard. It certainly wasn't any more trouble than calculating phase at various listening angles. That's something else I used to do during the design phase. You really had to know that, to know where the forward lobe would be, finding its edges, where nulls would form.

There are lots of things to juggle. In the end, you might find it easier to build a test speaker and measure it, watching for blips in the midrange. Maybe make one with a replaceable front baffle, so if it doesn't measure well, you can put the woofer and/or port in a different location and try again.

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