Subject: 3pi with Sonido SCW-300
Posted by chakija on Wed, 02 Nov 2011 13:50:27 GMT
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Hello kind people!
My name is Dragoslav and i live in Serbia.
I have been reading many post`s here and found them very interesting.
I recently got DE250, and H290 horns i have had for some time but with selenium compression drivers.
I want to use this sonido driver, as i find it very competent contender, and lot better than eminence delta`s.

It is also much easier for me to acquire them than AE drivers.
What i wanted to ask is will these woofers be suitable for this and what are your suggestions for crossover?

http://www.sonido.hu/adat_pdf/scw-300.pdf

Kind regards !

Subject: Re: 3pi with Sonido SCW-300
Posted by Wayne Parham on Wed, 02 Nov 2011 15:03:31 GMT
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There's no way to know how that driver will behave without testing it. I mean, the response below about 500Hz is generally pretty familiar - it acts just like T/S simulators predict with the exception of the potential of standing wave nodes inside the cabinet. Those sometimes make ripples in the lower midrange response, depending on driver and port location.

What's more a variable is the way it acts above 500Hz. The electro-mechanical properties like voice coil inductance have an effect, as do the radiation and flex characteristics of the cone. You really need to make measurements of the system to optimize the crossover. Here's how: Crossover optimization for DI-matched two-way speakers

Subject: Re: 3pi with Sonido SCW-300
Posted by chakija on Sat, 05 Nov 2011 00:16:42 GMT
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Wayne, thank you for replying.
I guess that in order to make some measuring i will need to acquire drivers first

I am still deciding should i go for a 15" version...
http://www.sonido.hu/adat_pdf/scw-400.pdf

Subject: Re: 3pi with Sonido SCW-300
Posted by chakija on Sat, 05 Nov 2011 16:47:40 GMT
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Wayne, here is diagram for SCW-300.
These babies goes pretty linear up to 3,5KHz.
I think this qualify them for a nice 3pi variation loudspeaker ?

File Attachments
1) scw-300.jpg, downloaded 595 times

Subject: Re: 3pi with Sonido SCW-300
Posted by Wayne Parham on Sat, 05 Nov 2011 23:33:33 GMT
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It's definitely a contender. You'll just need to go through the crossover design process. Should make for a good speaker!

Here are some suggestions on how to proceed:
Notes for the DIYer

Subject: Re: 3pi with Sonido SCW-300
Posted by chakija on Mon, 07 Nov 2011 00:07:04 GMT
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Thank`s for useful inputs. Lots of reading though .
Anyway, i got through most of your documents and i came to conclusion that for a starting point i should copy your 3pi crossover for AE woofer and B&C driver with same distance between centers.
Box for sonido driver that I want to use is cca 5,5sqft and plans are on their web page
http://www.sonido.hu/adat_pdf/diy-scw300-sfr175-box.pdf
So, i will need to adjust this floor standing box, and instead of FR driver i will use B&C and H290.
At first i wanted to make separate enclosures for horns, but after reading few suggestions that you gave to a DiY-ers i decided to build them into the box (more aesthetic for smaller WAF factor).
Could you please send me plans for 3pi so i could have something to start with, or should i spend more time reading ?

Subject: Re: 3pi with Sonido SCW-300
Posted by Wayne Parham on Mon, 07 Nov 2011 15:31:27 GMT
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You've got mail!

Subject: Re: 3pi with Sonido SCW-300
Posted by chakija on Sun, 27 Nov 2011 17:11:34 GMT
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Hi Wayne !
Thank you very much for 3pi plans.
I have question regarding driver vertical central distance. According to plans this distance is around 232mm.
However, when i put this distance in CAD program, it looks that it is too narrow and that horn overlaps with woofer cutout ?
Am i doing something wrong ?
I bought crossover components and I tried to listen horn and compression driver with their crossover. It sounds pretty good, but still i could hear some "growl" in vocals...i hope that this anomaly will disappear when I add woofer and when DE250 burn in enough.
I also bought sonido woofers. They look and sound beautiful.
Driver alignment i now my biggest concern. I plan to put another piece of 20mm MDF behind the horns so voice coils are aligned horizontally (as you can see in picture)

File Attachments
1) Capture.JPG, downloaded 9850 times

Subject: Re: 3pi with Sonido SCW-300
Posted by Wayne Parham on Sun, 27 Nov 2011 23:17:32 GMT
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I'm not sure exactly what you're looking at, but the center-to-center spacing of the drivers in the

the center of the woofer is 355mm from the bottom. The center of the tweeter is 125mm from the top.

Also, I would not suggest aligning the voice coils if you plan to use my crossover. It is designed specifically for the spacing that is created when both the tweeter and woofer are baffle mounted, which creates some offset in their fore-aft positions. The crossover phase and baffle positions combine to create a perfectly centered forward lobe. If you move one of them, then the forward lobe will shift up or down, depending on the alignment of the drivers. You don't have to move either one too far to put a null right in your face.

Subject: Re: 3pi with Sonido SCW-300
Posted by chakija on Mon, 28 Nov 2011 08:41:15 GMT
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Wayne, thanks again for you answer.
It seems that implementing this woofer will be pretty difficult
Regarding your answer about baffle mounting, is it OK to take horizontal distance between AE12 and DE250 voice coils and than apply that same distance (with either baffle or flush mount) with scw-300?

Subject: Re: 3pi with Sonido SCW-300
Posted by Wayne Parham on Mon, 28 Nov 2011 13:55:58 GMT
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Assumimg your woofer models well in a basic T/S simulation, I would probably start with the same cabinet - same driver/horn mounting locations, same port location, etc. Then dial-in the crossover as described earlier in this thread. That way you'll know you're starting from a point that is 90% done already. All you'll really have to do is to adjust the crossover to account for the differences in the behavior of your midwoofer in the crossover region. You'll need measurement equipment, of course, but it could be that the crossover works as-is, or maybe with just a few uF change on a capacitor or something like that.

Subject: Re: 3pi with Sonido SCW-300
Posted by chakija on Tue, 29 Nov 2011 23:13:36 GMT
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Wayne, original box for 3pi is not suitable for these woofers because they need more volume to have proper bass response (according to winISD).
I think i need cca 30l more box volume.
Is there any way to add volume to original 3pi without ruining perfect forward lobe too much ?
Here are measured T/S parameters for mine 2 woofers:

Fs 32Hz
Mmd: 25 g
Mms: 31.12g
Cms: 0.795 g
Rms: 2.721 kg/s
Vas: 260l
Xmax: 4,5mm
Sd: 480cm2
Re: 1mH
Bl: 9.95 Tm
Qms: 2.3

Qes: 0.48
Qts: 0,397
no: 1.7213
SPL: 94.3 db-1W/1m

Subject: Re: 3pi with Sonido SCW-300
Posted by Wayne Parham on Tue, 29 Nov 2011 23:48:47 GMT
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The forward lobe will be right as long as driver spacing and crossover phase are right. That part is really a function of the crossover and of the midwoofer and horn position on the baffle.

The stock box will work with your woofer, but as you've seen, response will fall off below 80Hz. As long as you're running flanking subs, that will be fine.
Room modes, multisubs and flanking subsIf you change box size, what's affected most is the Helmholtz tuning and the position of standing wave nodes. Those will change bass, midbass and lower midrange characteristics. My suggestion is to start off by making the box proportions and port position similar to the standard model. In other words, just grow the box by the amount needed, but keep the same proportions. Put the port at the same distance - about 300mm (center-to-center) and diagonal. I would still suggest you check the response with measurements, paying attention to the bass and lower midrange. But these suggestions will give you a good start.

Subject: Re: 3pi with Sonido SCW-300
Posted by chakija on Wed, 30 Nov 2011 23:00:37 GMT
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Hi Wayne,
I took your advice and made original box proportionally larger so that inner volume is cca 137 liters. I applied distance between horn and upper edge and 285mm c2c for woofer and tweeter.
I decided to flush mount woofer because i like it that way and i will fix alignment with crossover if needed. Material is MDF, front baffle 25mm and side are 19mm. Bracing in corners is 30x30mm and other two are 20x50mm made of hardwood. I made BR vent 105 because bass box pro (that i am simulating with) showed too big vent noise for smaller diameter. I will fine tune length later, but it will be around 70mm.
If you say this all is good enough, i will send cutting plans in workshop asap
One more question... do you have any experience with motor run capacitors used in crossover instead of "audio grade" caps?

File Attachments

1) sonido 3pi.JPG, downloaded 7754 times

Subject: Re: 3pi with Sonido SCW-300
Posted by Wayne Parham on Thu, 01 Dec 2011 01:49:16 GMT
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Motor run caps are hit and miss. Some are excellent, so it's worth experimenting with them, in my opinion. But some are too lossy and others just plain sound bad. The ones to avoid are the poly caps. The oil filled ones are the ones you want.

Box simulators that show port airspeed almost always give DIYers the wrong impression. If you're building a prosound subwoofer, then you really need the displacement capacity and the performance at full excursion is important. But hifi mains are completely different and you shouldn't be overly concerned with airspeed "chuffing" problems.

If you're push the woofer hard enough to get port chuffing, then you have other problems anyway. We aren't expecting a lot of excursion from the mains - don't want it - because it causes intermodulation distortion, which is a bigger potential problem than vent noise.

The rule of thumb is to keep port airspeed under 100KPH. But the box simulators usually calculate airspeed at full excursion. This is unrealistic. If you want to get a better idea of minimum port size for mains, run the numbers at a fourth of full excursion.

I would also be concerned with standing waves, as already mentioned earlier in this thread. Larger ports tend to be more prone to cause midrange ripple. Not that I'm opposed to large ports - far from it - if you can have your cake and eat it too, all the better. A large port situated so that there is no midrange ripple is just fine. But it does bring back an issue I've mentioned before. You'll need to test this loudspeaker to see what effects your changes have made.

Having said that, I wouldn't worry about it too much. You only went to a 4" port, which probably won't give you any trouble. Hard to say, really, since the port length also comes into play. Only measurements will tell you for sure.

So you'll definitely want to get out the measurement gear and test the speaker, looking not only for the position of the nulls but also for ripple in the lower midrange, between 80Hz and 200Hz or so. These are the two things most likely to need adjustment. If you find ripple in the lower midrange, you'll want to change the size, shape and/or position of your port. If you find ripple in the crossover region, or if the nulls aren't above and below the centerline by approximately +/-25°, you'll need to adjust crossover component values. I find the midwoofer values are usually easiest to modify without a complete redesign. A little movement of one of two component values will shift the nulls and slightly change the response.

Good luck!

Subject: Re: 3pi with Sonido SCW-300
Posted by chakija on Thu, 02 Feb 2012 20:30:53 GMT
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I finally managed to "complete" boxes for my 3pi clone.
I must say that results are very very satisfying
For now I feel like I don`t need to adjust anything in crossover. Sonido woofers are really superb performers. Bass is very well defined, and goes low enough. They blend with B&C250 perfectly with your 3pi crossover. They show absolutely no sign of cone breakup and sound very linear and smooth.
I used a little program called "Box notes" that helped me to determine right proportions for box.
BR pipe is made of 3 peaces of 20mm birch plywood as you explained in plans for 3pi.
Woofer is offset 10mm from vertical axis because of side standing waves. I believe that this is not audible, but it is not bothering me aesthetically so i decided to give it a try.
Final outer dimensions for boxes are 870x540x380mm.
Note my pink high-end stands. They are ofc temporary, but in this sloped position I have best results. Back side of box is resting on some 3mm rubber pads.
I tried to put them on some 150mm stands but got much worse bass response.
For now here are some final pictures of boxes. I hope that I will menage to put some pictures from building process.
I am really enjoying the sound of this great loudspeakers.
I want to thank you Wayne for all your generous contribution for DiY community!

File Attachments
1) IMG_7333.JPG, downloaded 8236 times
2) IMG_7335.JPG, downloaded 7380 times

Subject: Re: 3pi with Sonido SCW-300
Posted by Wayne Parham on Thu, 02 Feb 2012 21:22:22 GMT
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Looks very nice! Thanks for reporting back with your impressions of the Sonido woofer!

Subject: Re: 3pi with Sonido SCW-300
Posted by chakija on Sun, 11 Nov 2012 20:56:15 GMT

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It has been almost 9 months since i have assembled my 3pi sort-of loudspeakers, and boy what a listening joy did they bring me.
In meantime, I have had mine H290 plastered with cca 2 lb of plumbers putty .
I have one issue that is bothering me...
Sonido woofers sound really good, with beautiful mids and nice lows.
However, i think that manufacturer has been too optimistic with sensitivity specs.
Only with cca 70R value on R1 I found DE250 enough tamed to play together with sonido.
I dont know how much is it in db but sure is plenty.
I am afraid that with this much attenuation i will "kill" loudspeakers dynamics
Other values on crossover are same as on original 3pi, and I feel no need to adjust anything.
So, my question is, if I apply this much attenuation on R1, which values on crossover would I need to adjust to have best response ? (this is mostly refereed on R2)

Subject: Re: 3pi with Sonido SCW-300
Posted by Wayne Parham on Mon, 12 Nov 2012 07:08:59 GMT
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Please see the link below for a chart of values for various attenuation levels:
Compensation component values

Subject: Re: 3pi with Sonido SCW-300
Posted by chakija on Mon, 12 Nov 2012 21:48:58 GMT
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Thanks again Wayne!
Chart was very helpful.
For now, i settled with 42R R1, 12R R2, 0.25uF C1.

Subject: Re: 3pi with Sonido SCW-300
Posted by chakija on Wed, 22 May 2013 07:24:27 GMT
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Hi Wayne.
I wanted to thank you once again for all the effort on developing of pi speakers!
Here are some results of measurements that I took recently.
Microphone is WM61A and I used integrated sound card on my laptop.

File Attachments
1) revizija_5.jpg, downloaded 4629 times

Subject: Re: 3pi with Sonido SCW-300
Posted by rkeman on Wed, 22 May 2013 12:26:36 GMT
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The measured response looks excellent and similar to the measurements that I've done with the 3Pi (AE TD12S, B&C DE250 and Eminence H290). Try doing some in-room analysis and experiment with the speaker and listening positions. Even small changes can make for significant improvement.

Subject: Re: 3pi with Sonido SCW-300
Posted by Wayne Parham on Wed, 22 May 2013 13:46:33 GMT
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Agreed. Looks very nice!

Subject: Re: 3pi with Sonido SCW-300
Posted by chakija on Wed, 22 May 2013 15:01:45 GMT
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Thanks
BTW, measuring was performed from 1m on axis with loudspeaker`s mid-center, with mid-center between drivers approximately on 1/2 room`s height.
Measuring equipment is as much poor man`s as possible

Mic stand and holder are the things that I am most proud of.
I will try to play more with room position and measure response.
I think my next step will be building flanking sub`s. What do you think of using some car audio subwoofers for this purpose?

File Attachments
1) measuring_setup.jpg, downloaded 4789 times

Subject: Re: 3pi with Sonido SCW-300
Posted by Wayne Parham on Wed, 22 May 2013 15:04:08 GMT
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I think that's definitely the way to go!

Good job setting up your measurement system!

Subject: Re: 3pi with Sonido SCW-300
Posted by chakija on Wed, 22 May 2013 20:50:56 GMT
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Here are results of offset measurement.
on 15deg, which is normally listening position, response almost looks unreal.

Overal sensitivity of loudspeaker is around 91db.
Is there a thread regarding subwoofer drivers selections and how to connect and integrate them into system?

File Attachments
1) merenja_offset.jpg, downloaded 4641 times

Subject: Re: 3pi with Sonido SCW-300
Posted by Wayne Parham on Wed, 22 May 2013 21:21:10 GMT
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Looks great!

About the subwoofer information, look at the following links, which are a part of the Pi Speakers FAQ:

High-Fidelity Uniform-Directivity Loudspeakers
Speaker placement and wavefront launch
Room modes, multisubs and flanking subs
Helper Woofer Location
Flanking Subs vs Helper Woofers
