Subject: Inspired by the McIntosh XRT2K
Posted by Attila on Tue, 23 Jan 2007 16:53:06 GMT
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Hello!I have been thinking of doing a line source for a while, and looking a the massive McIntosh XRT2K triggered a new round of thinking and sketching. A unique (to my knowledge at the least) attribute of the XRT2K is the 'dual-baffle', where the mid and tweeter arrays are put in front of the woofer array. This greatly reduces the width of the speaker - very important in the place I want to use it.Now, I am not interested in cloning this beast (the thought of wiring 220 drivers alone puts me of this...) but I am looking into replicating the principle in a scaled-down speaker. My ideas so far are:-A woofer cabinet consisting of 9 x 6,5" woofers in a sealed enclosure of about 22(w) x 35(d) x 195(h) (all measures in centimeters). The Peerless SDS164 is a good candidate due to its favourable pricing here in Norway and easy mounting (yes, I am lazy...). 9 of these gives me an SD of about 1300cm2 per side, equal to 2,5 12" woofers. Should be sufficient down to about 60hz with plenty of punch!-1 BG RD75 in its own chamber suspended in front of the woofer-array. This chamber would be about 15cm wide and deep (and 195cm tall), and would have a curved back (using a cut-off paper-tube - the kind used for sono-tubes etc.) to cater for the output of the woofer line as well as possible. Sufficiently damped and about 70% filled, this should work well with the RD75 down to about 300hz with these dimensions, any lower in the X and I need to increase chamber size.There is one major issue here: The X-over frequency relative to the radiation pattern and shortest wave-length of the woofer-line output. The XRT2K is crossed at 250hz, and that obviously works well. I _could_ cross this low, but as this would stress the RD75 a bit more than I like and require a somewhat larger chamber for it, I would like to go as far up as possible without messing up the sound of the woofers (500hz would be great, but anything above 300 should be fine for the RD75). So far I have been unable to track down any info on how large an obstacle I can place in front of a woofer at a given frequency. Does anybody have any experience with this, or any sort of guideline that can be applied?I suppose I could build and measure, but this will cost a bit, and I would prefer not to fail miserably attempting an impossible task...FYI this will be an active system using a modified Behringer DCX2496 as well as a DEQ2496 for equalizing. That means that I am not that concerned about (moderate) frequency curve deviations. Power response and dispersion pattern issues are the main concern, as I cannot do anything about these electronically. I also have a couple of Peerless XLS-12 in sealed boxes that will take over below the woofer-lines. Any suggestions for improvements will be greatly appreciated!

Subject: Re: Inspired by the McIntosh XRT2K
Posted by Marlboro on Wed, 24 Jan 2007 02:48:29 GMT
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The RD 75's will go down to 150hz. So give it a nice 350hz cross for extra good measure.At that rate, why use 6.5 in mid woofers? Skip the mids altogether. Go with a group of 5- 10 inchers. You'll be able to go really low. NHT makes a 10 incher with an FS of 23.5. surely you can find something over in Europe like that. I believe that Jim Griffin recommends woofer arrays not less than 10 inch.Marlboro

Subject: Re: Inspired by the McIntosh XRT2K
Posted by Anonymous on Wed, 24 Jan 2007 05:47:28 GMT
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>>Any suggestions for improvements will be greatly appreciated!If you want to make a good line array, my suggestion is;1. Don't use RD752. Don't replicate the concept of the XRT2K Here is a collection of line array pictures found in cyberspace,some are commercial line arrays, many are DIY, and only a feware good designs. Study the pictures and send me an email andI'll give you one opinion on which ones to get inspired by.http://home.pacbell.net/lordpk/speaker//hehe

Subject: Problems with the RD75?
Posted by Marlboro on Wed, 24 Jan 2007 12:45:58 GMT
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I would never buy them because their expense is way over the top for me. Additionally they have a huge spike in their FR, and would need equalization.But what reasons do you have THY, for not using them. Surely if you put the tweeters 6 to 8 inches in front of the woofer coils you will need to put in a time delay, but with the Behringer, I assumed that the poster would do that.I should think that horizontal woofer to tweeter combing wouldn't matter. But I'd be interested in your reasons for not choosing this design, it seems viable, though the RD75 is not my choice.Marlboro

Subject: Re: Inspired by the McIntosh XRT2K
Posted by Attila on Wed, 24 Jan 2007 13:51:05 GMT
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Thanks for the feedback!A 350 X-over to the RD75 would be excellent. You don't think that will be any issue in terms of obstructing the output from the woofer-array up to 350? 10" will be to wide I'm afraid, there's some serious WAF restrictions on the width (height and depth are less critical) of the speaker. That's also the reason why I want the mid/tweet in front of the woofers - I would certainly place it besides the woofer-line if possible.8-inchers may work though. I have been looking av 8 Peerless SLS-8 (830667) per side, also a nicely priced alternative with a healthy 13mm P-P excursion. This would allow for a full-range, skipping the subs altogether. Could be a good idea...Regarding the choice of tweeter/mid I can't see that I have a choice for this design. Going with an array of smaller units (like the Neo8) will not allow a cross at 350 without serious compromises i SQ. A long and robust ribbon could do the trick, but short of DIYing one (which I don't dear attempt) they seem to be in short supply... Do you have any suggestions?

Subject: Re: Inspired by the McIntosh XRT2K
Posted by justinc on Wed, 24 Jan 2007 13:53:59 GMT
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Why not replicate it exactly, but use the BG NEO3 PDR instead of those titanium dome tweeters. That should solve most of the flaws with that design. The AuraSound subwoofers are some of the best available at around $600 each. The AuraSound 2" speakers used are also very good and will only cost you about $600 per tower. It would not cost any more than using the peerless drivers. However with the aurasound drivers it must be a 3way not a 2way design.

Subject: Re: Inspired by the McIntosh XRT2K
Posted by justinc on Wed, 24 Jan 2007 13:58:06 GMT
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Regarding the choice of tweeter/mid I can't see that I have a choice for this design. Going with an array of smaller units (like the Neo8) will not allow a cross at 350 without serious compromises i SQ. A long and robust ribbon could do the trick, but short of DIYing one (which I don't dear attempt) they seem to be in short supply... Do you have any suggestions?If you dont want sub/mid and tweeter. try something like the 1 aurasound cougar which is pretty flat from 300hz-20khz. It also will not have comb filtering until much higher in the frequency so it could be a good alternative.

Subject: Re: Inspired by the McIntosh XRT2K
Posted by Attila on Wed, 24 Jan 2007 14:09:21 GMT
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Hi thylantyr,Thanks for your feedback! I am a little bit curious as to exactly why you think replicating the XRT2K concept is a bad idea? I know there are issues connected to obstructing the woofer-line like this, but as it works for McIntosh it should surely be possible to replicate? Or am I missing something? As for the RD75, I agree that this is not perfect. Sensitivity is a bit low, it rolls of too early towards the top and it costs more than a line of shorter drivers outperforming it in the top octaves. However, if I am to attempt this design I can't really see any alternatives - crossing as low as I have to (below 400) means smaller ribbons and planars are out. And, I am hopeful that the RD75 (even with all its limitations) with the help of some EQ could sound very good given the reports I have read on it.BTW; Thanks for the link to the images - some interesting designs there! One I have not seen before is http://home.pacbell.net/lordpk/speaker/26.jpg. Do you know what drivers have been used in this one?

Subject: Re: Inspired by the McIntosh XRT2K
Posted by Attila on Wed, 24 Jan 2007 14:24:58 GMT
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The little Aura 1" is interesting. Around 45 of these per side will be approx 500$, which is a bit cheaper than the RD75. The xmax of these thing is quite amazing, but I am still a little bit skeptical about how clean they sound close to 300hz... Do you know of any independent tests of these little things?Now, wiring 45 drivers is a little bit more work than wiring 1 driver though...;-)

Subject: Re: Inspired by the McIntosh XRT2K
Posted by justinc on Wed, 24 Jan 2007 15:29:23 GMT
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check www.zaphaudio.com for reviews. remember with 45 your sensitivity will inccrease to 90db and your distortion almost non existant. much different than if you are measuring a single driver. since you are using a dcx you can also implement a steep xover slope.

Subject: Re: Inspired by the McIntosh XRT2K
Posted by Anonymous on Wed, 24 Jan 2007 16:00:06 GMT
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Send me an email if you want more feedback.I don't know the story on picture #26.

Subject: Re: Inspired by the McIntosh XRT2K
Posted by auplater on Wed, 24 Jan 2007 22:26:56 GMT
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I dunno... I've had pretty good luck with the RD-75's (but paid less than half they're going rate)...I only run them as enhanced midrange (see below)http://www.audioroundtable.com/ArraySpeakers/messages/1281.htmlAS such, there's virtually NO cross driver interference (limited only to horizontal plane), the planars are FAST, and the imaging is spectacular.total cost per speaker was ~$700 US.

Subject: Re: Inspired by the McIntosh XRT2K

Posted by Anonymous on Wed, 24 Jan 2007 22:40:59 GMT
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>but paid less than half they're going rateThis is an exception. Those drivers new cost about $1500 a pair,therefore I can find something better for that budget. I wouldn'tspend that kind of money for RD75, I'd want more performance forthat kind of coin.

Subject: Re: Inspired by the McIntosh XRT2K
Posted by Marlboro on Wed, 24 Jan 2007 23:43:53 GMT
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I didn't want you to get the idea that I agreed with blocking the woofers, I don't. But you could make it work, I suppose. And why do you haved to have a 2 way crossing at 350hz?I don't agree with spending the amount of money you are talking about, and compromising the array in the way you have done. I mean $1500 for the tweeters?I don't understand.Email me and we'll talk about it off-line.marlboro

Subject: Re: Inspired by the McIntosh XRT2K
Posted by Attila on Thu, 25 Jan 2007 09:26:40 GMT
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Zaph was the place - thanks! The Aurasound cougar looks a bit rough, but that may be the measuring procedure of Zaph stressing it to hard. I think he tests at 90db/0.5m, right? Still, sensitivity and more importantly max SPL will go up considerably with close to 50 drivers, and 90 looks about right for 2.83v/1m for 45 of them. This may work, but it will require some quite serious amplification - reacing peak at 20w/driver means 900w dissipated for an SPL of 97db at 1 meter. This is still a bit on the low side, and 11db lower than the RD75 at peak power (400w).I am not writing this of, but dynamic headroom is important. And based on these numbers the savings from going with the cheaper drivers may not outweigh the costs in terms of less headroom and much more work in building the things...

Subject: Re: Inspired by the McIntosh XRT2K
Posted by Attila on Thu, 25 Jan 2007 09:35:37 GMT
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auplater,Interesting setup! Could I ask if you have tested the RD75's to see how far they can go upwards and downwards? I see that you got some advise from ThomasW to cross relatively high

to the HDS182's, but there are quite a few reports of good results down below 300. Any experience with this?Also, have you tried EQing the RD75's to get them (closer to) flat up to 20k? 700/speaker is not bad BTW - I have a feeling I am looking at the wrong side of 2k per speaker. Still, should be worth it!

Subject: Re: Inspired by the McIntosh XRT2K
Posted by justinc on Thu, 25 Jan 2007 11:09:23 GMT
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with 45 of them 900w of power will give you an spl of over 127db, but you will have reached their xmax. you only need 100 watts of power to reach 120db spl and come close to reaching xmax.

Subject: Re: Inspired by the McIntosh XRT2K
Posted by Attila on Thu, 25 Jan 2007 12:09:38 GMT
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At 120db from this I think there would be some cones flying! If my thinking is not completely off (that happens!), reaching 120db with 1 line of 45 drivers would require a total of 45000 watts - that is a bit more than my fuses can handle...The 90db sensitivity rating for 1w/1m with 45 drivers is a bit misleading. This is a measure for the SPL with 1w energy dissipated for each driver. The SPL for 1w total energy dissipation does not change, that remains at 74db/1m (according to Zaph), only it is now generated by 45 drivers burning off 1/45w each. The real gain is in lower distortion and more headroom. It is more meaningful (although not very precise due to impedance variation over frequency) to use the SPL @ 2.83v/1m measure here, as 2.83v across all 45 drivers will produce around 90db/1m.Anyway, you are right in that my number was too low, it should be around 103,5 max SPL with 20w/driver peak. That is actually less than 5db off the RD75, so this may not be so bad. More thinking required!

Subject: Re: Inspired by the McIntosh XRT2K
Posted by justinc on Thu, 25 Jan 2007 21:47:24 GMT
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Im really not sure about technical details I just plug the values into bassbox and modeled it and thats what I got My understanding though is since the drivers will be spaced about 1" apart the wave pattern in a line array is summative up to about 14,000hz where it will then start to decline. Here's the info I found about how bassbox calculates values. When multiple drivers are used, the sound waves emanating from them will combine to create a composite sound wave that is louder. BassBox Pro assumes that the drivers are all the same kind and, in most cases, that they are

driven with identical signals so that their sound waves will usually sum coherently. This means that the net sound level will increase 6 dB with every doubling of drivers.However, there may be occasions when the sound waves do not add coherently and the “Drivers do NOT add coherently” option should be turned on. In these cases the net sound level will increase only 3 dB for every doubling of drivers. The following list describes situations when coherent additions will not happen. Turn on the “Drivers do NOT add coherently” option for these situations:• The drivers will not sum coherently if they are wired separately and are driven with different signals. For example, two woofers are mounted in a common cabinet but one is driven from a left stereo signal and the other is driven from a right stereo channel.• The drivers will not sum coherently if they are mounted too far apart. Their center-to-center spacing should be no greater than one quarter (¼) wavelength for the frequencies in their passband. This is usually not a problem for subwoofers because they are driven only with low-frequencies having long wavelengths. For example, many subwoofers use a crossover frequency of 100 Hz or less—the wavelength of 100 Hz is 136 inches (345 cm). As long as the drivers reproduce frequencies that are not higher than 100 Hz then the drivers in the subwoofer can be mounted as far as 34 inches (86 cm) apart because this is one quarter of 136 inches.

Subject: Re: Inspired by the McIntosh XRT2K
Posted by auplater on Fri, 26 Jan 2007 01:20:36 GMT
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I did try running them swept up to ~16K or so... pretty much followed the response found online on numerous forums... hence the panasonic supertweeter... down lower I didn't need as the peerless midwoofs are smooth up to > 1Khz and have plenty of wallop (>108dB @ 15 feet listening position)...rather than pushing the RD75's w/eq, I added the ATC neoplanar 25's I found on ebay for ~$175 ea. they're good past 20Khz, @ ~92 - 93 db/w.. handle 150W RMS...had to pad them down abit to match the RD75's.I would have probably built using only the neoplanars had I found them first, but this setup sounds incredible as is.. so I'm a happy camper... keep your eyes out for these planars... not withstanding the nay-sayers... I can never go back to pisstonic cone speakers (other than bass and subs) after building and hearing these line source dipoles... the imaging is staggeringly rock solid and lifelike...

Subject: Re: Inspired by the McIntosh XRT2K
Posted by Attila on Fri, 26 Jan 2007 09:03:47 GMT
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You are right in your assumptions, but I think there may be a problem using BassBox in this way, as it apparently assumes parallel wiring of all drivers. That is fine with 2 drivers, but with 45 the impedance would drop way below the 'amplifier-up-in-smoke' level as each doubling of driver numbers will half the nom impedance, leaving you with a load of about 0.15ohm for 45 drivers.

Not good!If, on the other hand, you assume constant impedance (for 49 drivers that could be 7 parallel series of 7 drivers each), you only gain about 3db by doubling the number of drivers, or a bit more precise: 10*LOG(49), which is 16.9db going from 1 to 49 drivers. If the impedance due to your wiring goes down from 8ohm (single driver) to say 4ohm nominal, you will get an additional gain of 10*LOG((8/4);10), which is about 3db in addition to what the extra radiating area gave you.

Subject: Re: Inspired by the McIntosh XRT2K
Posted by Anonymous on Fri, 26 Jan 2007 16:01:25 GMT
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Keep your line array idea simple. Get some good $100 tweetersand $20 - $25 4" - 6" midwoofers and you are good to go.My budget array is ten $25 tweeters and sixteen 49 cent 4" midrangesper tower, ported.I've been able to hit 122dB[c] on midrange from 12 feet away usingthe Radioshack SPL meter. Upper midbass is >126dB[c] and I've hadstuff fall off the shelves in the kitchen.I have four PLX3402 in bridged mode power the array with DCX2496.It's a simple design. I don't know why you want to make adesign so complicated that performance might be compromised.If you use drivers better than 49 cents and use better tweeters, and execute the rest of the design well, it will be very sweet.

Subject: Good link
Posted by Renato on Tue, 30 Jan 2007 23:36:54 GMT
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thylantyr,>http://home.pacbell.net/lordpk/speaker/ This is a good link.. Tks,Renato

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