
Subject: Just bought some JBL 3677...? about the CD and horn

Posted by [CDY2179](#) on Mon, 04 Oct 2010 14:28:53 GMT

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I'm a DIY'er (sub's) After trying out tons of speakers I just ordered 3 JBL 3677s. They use a 15" driver (2035HPL) which is very similar to the 2226. The bass and dynamics are outstanding in the theater room.

My only probelm is the horn sounds a little scratchy. I have no probelm swapping the horn (JBL 2373) or the CD (2416-1h). I've heard the Selinium D220Ti with an HM17-25 horn and it sounded smoother.

My question is, is it the horn or driver causing the harshness? Is hte 2416h a good driver? If I change the top end should I go with Selinium or B&C for the CD and also what would be a nice smooth horn to fit the 1.2k xover I have in the 3677?

I know I have a lot of quesitons but I know many here (Wayne) have heard tons of horns.

Subject: Re: Just bought some JBL 3677...? about the CD and horn

Posted by [Wayne Parham](#) on Mon, 04 Oct 2010 15:08:58 GMT

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That 2416 driver is pretty smooth sounding but the 2373 horn gives it a bit of an edge. Swap the horn and I think you'll be happier.

The JBL 2370 was one of the first CD horns I used. While I liked its coverage, I never really liked its spitty sounding harshness. I moved to a Peavey CH-3 pretty quickly and ran it for several years. It's a much smoother sounding horn. Now I run the Eminence H290, because it provides uniform coverage throughout the 90x40 pattern and is very smooth sounding. Its small size is convenient too, making it fit easier on relatively small baffles and also allowing tight CTC spacing, which gives a better forward lobe. Its size a pretty good tradeoff between pattern control (where larger is better) and potential for tight source placement (where smaller is better).

Subject: Re: Just bought some JBL 3677...? about the CD and horn

Posted by [CDY2179](#) on Mon, 04 Oct 2010 15:14:02 GMT

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Thanks a lot Wayne, Your success with the 4pi really pushed me to get the 3677 as it share a lot of similarities. I'll try out the horns and I'm sure I'll make most of my \$\$ back selling the 2373s on Ebay.

Have you even heard or played around with the 2416h-1 CD? How does it compare to the B&C

you like so much?

Subject: Re: Just bought some JBL 3677...? about the CD and horn

Posted by [Wayne Parham](#) on Mon, 04 Oct 2010 18:12:26 GMT

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The JBL 2426 (similar to the 2416) was my premium compression driver for many years. I really liked its smoothness, and the rolloff was pretty much a straight diagonal line, easy to EQ in the crossover. The only trouble is the top end doesn't reach very high. That's where the DE250 has it beat. It's just as smooth, and reaches higher into the top octave. Doesn't cost as much either.

Subject: Re: Just bought some JBL 3677...? about the CD and horn

Posted by [CDY2179](#) on Mon, 04 Oct 2010 18:41:50 GMT

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OK, sounds great. I just wanted to make sure the 2416h's are capable of nice smooth sound...I think the 2426 is a newer design. I also have some Selenium d220Tt's on hand. I may give them a try as they extend higher (and did sound good with no harshness) but the JBL's costing so much more I'd expect them to be a lot smoother. I didn't really think the horn it self could make it this raspy sounding...I guess I was wrong.

I'm using these in a Dedicated Home theater and I got tired of being disappointed with consumer stuff. the JBLs 15"ers really put out great sound with great vocals, I just have to tame these horns.

If you think the DE250 is a smoother CD(I know it reaches higher) than the 2416, I could use the Selenium CD's temporarily with the new horns (that you suggested) and sell the 2416's and get the DE250 with the \$\$.

I want the smoothest best sound I can get..I really don't want any harshness at all.

So I guess I'm asking...If you were me, what would you do?

Subject: Re: Just bought some JBL 3677...? about the CD and horn

Posted by [Wayne Parham](#) on Mon, 04 Oct 2010 23:57:49 GMT

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To be honest, I'm not a big fan of the Selenium drivers. I tried them several years ago and didn't care for them. They're a little bit bright for my tastes. They've no doubt made progress since then, and I've seen lots of people report good things from them. But the response curves still

show that tell-tale breakup up high.

For me, I use the Eminence PSD2002 as a budget driver. It has some of the same "extension" via breakup, but just not as much as the Selenium D220Ti. Both have a little more sizzle and tizz, but I prefer the Eminence in this price range. It sounds better to me.

Either way, I see both the PSD2002 and the D220Ti as decent budget drivers, but wouldn't want to use them in a higher end speaker. For the best sound, I'd stick with the JBL drivers you already have. Keep the Seleniums for an econo build.

Subject: Re: Just bought some JBL 3677...? about the CD and horn
Posted by [CDY2179](#) on Tue, 05 Oct 2010 12:11:58 GMT

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I actually swapped out the JBL drivers for the Seleniums last night. They sounded way less harsh but yea a little bright...the higher extension is noticable and sounds kinda nice. They don't have as much weight or heft sound wise as the JBLs...I can tell the horn is having a negative effect though..the smaller horn I used to use with the seleniums sounded much smoother.

I think I'm gonna order the new horns and give the JBLs another try...if I don't like them I'll sell all six drivers (JBLs and Seleniums) and get the B&Cs.

Subject: Re: Just bought some JBL 3677...? about the CD and horn
Posted by [CDY2179](#) on Tue, 05 Oct 2010 13:40:58 GMT

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Hey Wayne, I'm guessing the Eminence H290s with the screw on horn is exactly the same as the bolt on version....am I assuming correctly? It's also a little cheaper too.

Subject: Re: Just bought some JBL 3677...? about the CD and horn
Posted by [Wayne Parham](#) on Tue, 05 Oct 2010 13:50:41 GMT

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It's supposed to be, and while I think that's a safe assumption, I've never measured one. It's a new part. I have always used the original bolt-on mount horn.

Subject: Re: Just bought some JBL 3677...? about the CD and horn

Posted by [CDY2179](#) on Tue, 05 Oct 2010 14:14:02 GMT

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Hmmmm... well my JBLs and Selenium drivers are all screw on. If I get the bolt on I have to get adapters too. As you said they should be the same so I'll be ordering the screw ons.

Thanks for your help Wayne.

Subject: Re: Just bought some JBL 3677...? about the CD and horn

Posted by [CDY2179](#) on Wed, 06 Oct 2010 17:54:43 GMT

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Well last night I ordered

1- H290s and 1-Selenium HC23-25.

I'll try them both and see who wins. The Selenium HC23-25 is odd looking but it seems to be the best selling horn at Parts Express. There are bunches of comments on how nice it sounds and well it images and isn't too aggressive even on axis...it goes really low and it was cheap.

Have you heard that horn Wayne? Anyways looking forward to trying the two horns out.

Subject: Comparing components verses comparing systems

Posted by [Wayne Parham](#) on Wed, 06 Oct 2010 23:16:53 GMT

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The thing is, you have to do some work to optimize a loudspeaker system properly, and you can't really compare the horns until you do. On the other hand, you can make some measurements of the horns by themselves for comparison. This will allow you to make some educated guesses about how each will do when put into a system.

Generally, if the horns are about the same length, width and height, you can expect to have about the same issues when implementing them. There are a lot of other things that are important, of course, including flare rate and profile. But disregarding certain directivity details and other quality metrics for a moment, the basic dimensions have to be somewhat similar to even get close to an apples-to-apples comparison.

The center-to-center distance between the tweeter horn and the next adjacent subsystem (midrange or midwoofer) is largely set by its height. This is a big part of what determines the size of the forward lobe, the distance between vertical nulls. The length of the horn creates a fixed delay, and it's other properties cause it to be partially reactive, especially down low, where crossover usually happens. So these have affect the phase, in part setting the position of the forward lobe and ultimately driving the crossover design which has to take this into consideration. It's not just a matter of splitting out the lows to protect the driver, but it must also provide mass-rolloff compensation and phase manipulation to position the forward lobe.

The bottom line is it is impossible to fully compare the loudspeakers that may be made from two horns without doing some designs and tests. You can compare the horns, but that's not the whole story. If they're similar enough, you can make some assumptions that will probably hold true. But you won't really know until you've successfully built with them.

Subject: Re: Just bought some JBL 3677...? about the CD and horn
Posted by [CDY2179](#) on Thu, 07 Oct 2010 12:53:29 GMT

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Thank's for taking the time to explain that Wayne. Some of that I thought of, some I didn't. The H290s is actually very close to the same size as the 2373 horn within .5" in all measurements. The Selenium HC23-25 is quite different. So if the H290 performs well I should be OK just swapping it out...Right? The depth is about the same so I shouldn't have any delay problems and when I build new boxes I just need to maintain the CD to woofer distance.

Does it sound like I'll be OK?

Also last night I put the JBL CDs back in and it has a much stronger sound to it than the Seleniums do. It sounds a lot better with vocals near the Xover point as it seems to blend with the JBL 15s much better. I EQed the treble up also which did help the top end.

Subject: Re: Comparing components verses comparing systems
Posted by [Wayne Parham](#) on Thu, 07 Oct 2010 14:09:16 GMT

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When swapping horns, if their size is similar (HxWxD) and their directivity characteristics are similar, then they are at least in the same ballpark. There may be some specific details that require attention, and some crossover changes may be required. But the basic crossover topology should probably be the same.

Generally, you have two common directivity contours, constant directivity being one and collapsing directivity being the other.

Exponential and tractrix horns have collapsing directivity and so those can be considered similar to each other when designing the crossover. Mass rolloff is somewhat equalized with acoustic equalization, at least on-axis.

Conical, radial, oblate and prolate spheroidal and the various proprietary constant directivity designs like Mantarays and BiRadials all provide similar response over a wide arc. There is no acoustic equalization from collapsing directivity so mass rolloff has to be compensated with equalization in the crossover. This is the topology of my crossover designs, having an R1/R2/C1

network for top-octave compensation.
Constant directivity, compression drivers and crossovers

Subject: Re: Just bought some JBL 3677...? about the CD and horn
Posted by [CDY2179](#) on Thu, 07 Oct 2010 20:59:31 GMT

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Well hopefully I'll have good luck. Just curious....how much are your xovers for the 4pi with the JBL 15 and B&C CD.

The caps and inductor used in the JBL Xover is surprisingly small..and look cheap. If the horn smooths it out I was thinking of maybe upgrading a few of the components in the Xover to see if it improves the sound even more or buying a xover from you... I realize your's are optimized for the JBL to B&C...so that may mean I have to change the CD too.

Subject: Crossover boards
Posted by [Wayne Parham](#) on Thu, 07 Oct 2010 22:51:59 GMT

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You can get 15 guage or 18 guage coils, your choice of standard or premium resistors and an assortment of brands of high grade poly caps. Below is a photo of the version with Auricaps, Mills resistors and 15 guage coils.

The picture actually shows me drawing an outline to cut out a gasket. I like to mount the crossover boards directly to an inside panel to prevent vibration, and put liberal daubs of silicon under the coils to cushion them too. Use a hole punch on the gasket for mounting holes. Sandwich the gasket between the crossover and bottom or back of the box and snug it down. Easy as Pi!

Subject: Re: Just bought some JBL 3677...? about the CD and horn
Posted by [CDY2179](#) on Fri, 08 Oct 2010 01:22:11 GMT

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WOW..that's an impressive Xover. The JBL Xover board is the size of 1 and a half decks of cards.

Am I correct in the assumption that in order to use your Xover I'll need to use the h290 with the B&C not my current JBL?

I'm almost wishing I had spent my money on a 4pi instead of JBL.

Subject: Re: Comparing components verses comparing systems

Posted by [Wayne Parham](#) on Fri, 08 Oct 2010 16:10:15 GMT

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baffle layout may or may not work as well. Most certainly you'll have to go through a design/test development life cycle if you change anything and still want it to sound as good.

It's just that I've done several designs like this and I have a feel for what changes result when swapping parts, and I also know the amount of effort required to make them right and perfect a design.

The nice thing is it's a pretty simple system, easy to build using inexpensive parts. You've already got the most expensive part - the woofer. So you can easily build the box and procure the horn to build the speaker as shown in the plans. Sell what you don't need and that will help fund whatever you don't already have.

Subject: Re: Just bought some JBL 3677...? about the CD and horn

Posted by [CDY2179](#) on Sun, 10 Oct 2010 15:30:18 GMT

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You're not coming across arrogant at all. I'm very happy to have your input.

The JBLs have smoothed out but they cut off so low they're missing that sparkle. So I'm going to sell the 2416s and buy 3 B&C DE250 and 3 H290s (bolt-on). I'll probably end up buying 3 of your Xovers too.

I will probably start building new enclosures next week. Mains are going in the front corners and the center will be in the wall behind the screen. I'll be mounting the horn outboard on top of the woofer cabinet.

how far should the horn be from the woofer to build a 4pi?

Also I think the 2035hpl is 1db higher sensitivity than the 2226. The JBL 3677 has a sens. of 99db. The JBL 3678 (uses 2226) is 98db. They also have a slightly higher FS so they don't go quite as low.. 48hz is about as low as I can go and get a nice response with a 3.5 cubic' box.

I know it's not much but will this be something I'll need to worry about when it comes to the Xover..and if the different sensitivity of the 2226 vs 2035 will be an issue can you tweak the crossovers (i'm assuming the tweeter attenuation) for me?

Subject: Re: Just bought some JBL 3677...? about the CD and horn

Posted by [CDY2179](#) on Sun, 10 Oct 2010 19:40:53 GMT

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One more question Wayne. How do I go about getting a copy of the plans for the 4pi?

Posted by [Wayne Parham](#) on Sun, 10 Oct 2010 20:55:22 GMT

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You've got mail!

Posted by [CDY2179](#) on Mon, 11 Oct 2010 00:13:35 GMT

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Wayne, I was planning on lining the cabinet with some extra 2" compressed wool, it has similar coefficient factors as Owens Corning 703.

<http://www.atsacoustics.com/item--Roxul-Acoustical-Fire-Batts-Mineral-Wool-2-inch-Case-of-6--1006.html>

I used this for my DIY acoustic panels and have 3 or 4 sheets left over. Would this be better than R13?

Posted by [Wayne Parham](#) on Mon, 11 Oct 2010 01:44:53 GMT

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I don't know, but the insulation and its position are pretty important. For example, if you don't span the cross-section with a sheet placed on the brace between the woofer and tweeter, you'll notice a blip in the lower midrange. So don't experiment with the insulation unless you know it is equivalent or you have some measurement gear to check it out.

Subject: Re: Just bought some JBL 3677...? about the CD and horn
Posted by [skywave-rider](#) on Tue, 12 Oct 2010 15:52:14 GMT

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Thumbsup on building the 4Pi as designed!

Subject: Re: Just bought some JBL 3677...? about the CD and horn

Posted by [CDY2179](#) on Wed, 13 Oct 2010 16:42:28 GMT

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OK about to build my boxes. My center will be going in the wall..of course it'll stick out of the wall some. I'll be keeping the proper volume and tuning. My question is how shallow can I make it and not effect performance. The woofer is 6" deep, my plans are to put it into a box that is 7.5" deep(inside clearance).

Subject: Dealing with internal standing waves

Posted by [Wayne Parham](#) on Wed, 13 Oct 2010 18:09:11 GMT

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It's hard to say, really. The port is 10" long, so you'll have to bend it if you make the box any that, built it, test it and see.

My suggestion is to make a sacrificial cabinet out of MDF. It's cheap enough and the box is easy

That will tune the Helmholtz frequency right, so you'll know what you have there. What you won't know is what the internal standing waves do to response. So build the cabinet and make some acoustic measurements. You can even do an impedance sweep if acoustic measurements are hard to do.

If you see any noticable blips, then the box isn't good enough and you'll need to move something, port position, woofer position and/or cabinet geometry. And don't forget to use insulation - three sides and often a sheet spanning the cross-section, somewhere in the middle of the box. That will damp internal standing waves in the lower midrange better than just lining the walls inside.

Subject: Re: Just bought some JBL 3677...? about the CD and horn

Posted by [CDY2179](#) on Wed, 13 Oct 2010 21:02:06 GMT

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Sounds good. I plan on using the compressed wool I spoke of earlier. It's absorption factors are much better than r-13..because it's compressed it's equivalent to over a foot of fluffy (standard insulation)..that's why it's used as acoustic panels at first reflections. Crossbraces will be wrapped

as well.

I'll probably use two 2.75" ports as the 3677 uses which means the ports only have to be 1.75" long each...but I'll probably use REW to test tuning to see if I need to tweak a port to get a better response.

Because I'll only have 1.5" of clearance behind the woofers magnet..can I leave the portion of box directly behind the magnet untreated with stuffing? I want to make sure the vent can breath...I was thinking I could just cut a circle slightly larger than the magnet.

Subject: Re: Just bought some JBL 3677...? about the CD and horn

Posted by [Wayne Parham](#) on Wed, 13 Oct 2010 21:42:48 GMT

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I think so, yes. With the back so close to the woofer, you'll have no choice, really, because you don't want damping material sucked into the cooling vents. That would make them turn into one-way valves, which would not only affect cooling but would change tuning and even introduce a slight amount of asymmetry in cone motion. So keep the damping material away from the woofer's cooling vents.

Subject: Re: Just bought some JBL 3677...? about the CD and horn

Posted by [CDY2179](#) on Mon, 18 Oct 2010 20:14:48 GMT

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Hey Wayne, wondering if I could pick you brain one more time. I've built and painted my corner cabinets they're 43" tall with a 30 deg angle for the baffle. I've braced it really well and wrapped it all with r-13 with my acoustic material behind the driver only and r-13 everywhere else.

once I lined everything it got pretty tight in the two places I used crossbracing. Anyways tonight I,m gonna install the ports and finish them up. Would you think it would be better to put the ports off to the sides but near the woofer on the baffle like the 3677 orignally came or midway down the baffle or lower in the cabinet? Or does it not matter?

Subject: Internal standing waves and port position

Posted by [Wayne Parham](#) on Mon, 18 Oct 2010 21:02:44 GMT

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Sorry to sound like a broken record, but ultimately you're still dealing with the same issue. The thing you're concerned about is internal standing waves. You can't prevent them from lining up inside the box, but you can prevent them from adversely affecting the response curve. The way to

do this is to put the port in a benign position and/or damp the inside of the cabinet with strategically placed absorbent material. The problem is it isn't always easy to know what positions work best. But you can model the cabinet mathematically, and verify with measurements. Without that, you're sort of working in the dark.
