
Subject: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Thu, 12 May 2011 18:31:05 GMT

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After a couple of years of going back and forth between the 4 Pi and the Deluxe Econowave, I have committed to building three 4 Pi's. Of which, two will be vented with the center being sealed (per suggestion from Wayne Parham). I will be going fully upgraded (JBL 2226H and B&C DE250 + upgraded crossover componets).

Unfortunately I can only complete two of the speakers now - but I am building the third cabinet so it will be ready!

I am adding extra reinforcement to the MDF cabinets because the speakers will need to survive at least two - possibly three - military moves. I am moving this summer for 2 years in Cambodia, so I need to ruggedize as best I can (was going with birch plywood but had issues beyond my control so ended up with MDF). To accomodate, the speaker depth has been increased from 14.25" to 15.75" - internal volume will be as close to Wayne's spec as I can get (+0.1 Ft³) so not to screw up tuning or induce standing wave issues. Both the front and rear baffle will be 1.5" thick (however, the back baffle has cutouts to bring the volume down from .75" to .5" - the cutouts shown in the second attachment will not be used as a window brace but rather will be glued and screwed to the back panel).

File Attachments

1) [Render.jpg](#), downloaded 25972 times

2) [window brace.jpg](#), downloaded 24270 times

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Thu, 12 May 2011 18:42:23 GMT

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Here is the cut MDF for the project:

File Attachments

1) [IMG_3068.JPG](#), downloaded 22479 times

- 2) [IMG_3069.JPG](#), downloaded 22312 times
 - 3) [IMG_3071.JPG](#), downloaded 22328 times
-

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Thu, 12 May 2011 18:59:07 GMT
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Some of the smaller pieces were damaged, so I glued them using Titebond II.

Gluing the ports:

File Attachments

- 1) [4 Pi Build 003.jpg](#), downloaded 22019 times
 - 2) [4 Pi Build 001 - reduced.jpg](#), downloaded 21919 times
-

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Thu, 12 May 2011 19:08:39 GMT
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Final pictures...for now.

File Attachments

- 1) [4 Pi Build 007.jpg](#), downloaded 22249 times
 - 2) [4 Pi Build 018.jpg](#), downloaded 22170 times
 - 3) [4 Pi Build 010.jpg](#), downloaded 21955 times
 - 4) [4 Pi Build 009.jpg](#), downloaded 21735 times
 - 5) [4 Pi Build 008.jpg](#), downloaded 22013 times
-

Subject: Re: 4 Pi Home Theater Build
Posted by [Dave_S](#) on Fri, 13 May 2011 00:04:07 GMT

It looks like you are making good progress.

My 4Pi speaker kits arrived Monday. I chose the same upgrades as you, but I took a step down in the capacitors.

I am tweaking the design and will probably begin the build this weekend. My original plan was to use plywood sides and a solid wood front. Then, I started worrying that the plywood is dimensionally stable and the wood would want to expand and contract. People online have reported the solid wood cracking with that type of design. I decided to go with mostly plywood. Then, I read Wayne's comments about the possibility of crud rattling in the voids of some types of plywood, so I decided to use baltic birch. I still may do a veneer over the top since I would prefer cherry. MDF with a cherry veneer probably would work for my purpose, but I am more comfortable with working with plywood.

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Fri, 13 May 2011 02:16:46 GMT
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Progress seems to be going well, at least the enclosures are square! This is my first build with MDF, and I avoided the cutting by having them CNC'd.

The final boxes will be covered with either oak or cherry veneer, with the front and rear baffles painted flat black (will use a foam roller to apply Duratex the same as BigmouthinDC).

I am not sure if either veneer is better than the other - does anyone have info? Seems like cherry is less porous than oak, this may be important during overseas transport.

Good luck on your build.

Subject: Re: 4 Pi Home Theater Build
Posted by [Wayne Parham](#) on Fri, 13 May 2011 02:35:03 GMT
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That's excellent! Thanks for taking the time to write-up the build process and include pics. I love it when you guys do that!

On the veneers - wait a day and see if Epstein sees this thread and gives his 2¢. He is really a master woodworker, and will probably have some helpful advice. If he doesn't see it in a day or so, post your question on the Craftsmen forum.

Subject: Re: 4 Pi Home Theater Build
Posted by [Dave_S](#) on Fri, 13 May 2011 04:31:32 GMT
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If you are looking for durability for moving, I would say use oak over cherry.

I just made a couple of TV stands as gifts over the winter out of cherry plywood and solid cherry. Cherry is a much softer wood and reminded me more of working with a soft wood like pine. It was almost fun because of how easily it sanded. However, it probably dented much easier than oak.

Oak is more porous, but finish would seal the pores.

There is a link on veneering a few posts down. The recommendation to use only the stuff that warns about being toxic or explosions is pretty valid. I had good luck with veneering until I selected a latex-based contact cement due to the smelly stuff being out of stock. The finish soaked through the veneer and dissolved the contact cement. I haven't done any veneering for 20 years though.

For shipping, you will want to wrap the speakers with plastic and possibly throw some desiccant in with the speakers. I was just in Singapore cleaning up after an inadequately prepared shipment.

Subject: Re: 4 Pi Home Theater Build
Posted by [Bill Epstein](#) on Fri, 13 May 2011 11:16:17 GMT
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Dave_S wrote on Thu, 12 May 2011 20:04 My original plan was to use plywood sides and a solid wood front. Then, I started worrying that the plywood is dimensionally stable and the wood would want to expand and contract. People online have reported the solid wood cracking with that type of design.

It's amazing to me that thousands of years after the Egyptians invented frame and panel doors, people are still unaware of the seasonal movement of wood. They think cabinet doors are made of 5 pieces solely for aesthetics?

Wayne exaggerates; do I have to trot out the pic of the Bat Speakers again?

Table of wood densities/hardness http://www.engineeringtoolbox.com/wood-density-d_40.html

NWC, you're going to finish with polyurethane? Ordinarily, I'm against it, but just as contact cement veneering will protect the MDF from moisture, so too will polyurethane protect the veneer. At least better than the alternatives. You can make it less shiny-plasticky-looking by rubbing out with 0000 steel wool and paste wax.

Ask at your local Lowes/Depot in receiving (just walk back there) for them to save you the large-bubble bubble wrap that some refrigerators come packed in. Pack your speakers in that and

forget about which veneer is harder.

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Sat, 14 May 2011 01:01:11 GMT

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Bill Epstein wrote on Fri, 13 May 2011 06:16

NWC, you're going to finish with polyurethane? Ordinarily, I'm against it, but just as contact cement veneering will protect the MDF from moisture, so too will goopethane protect the veneer. At least better than the alternatives. You can make it less shiny-plasticky-looking by rubbing out with 0000 steel wool and paste wax.

Ask at your local Lowes/Depot in receiving (just walk back there) for them to save you the large-bubble bubble wrap that some refrigerators come packed in. Pack your speakers in that and forget about which veneer is harder.

If polyurethane will provide the best protection then yes. Is there any particular brand I should avoid? I plan on buying the finishing materials from a local wood retailer (http://hardwoodsincorporated.com/tools_accessories.aspx) instead of the big box stores.

Is polyurethane compatible with HeatLock veneer glue? I cannot put a bumpersticker on my car without bubbles, I am afraid that contact cement is a disaster waiting to happen.

Thanks for the tip about the large bubble wrap, I will pursue that option.

Subject: Re: 4 Pi Home Theater Build

Posted by [Dave_S](#) on Sat, 14 May 2011 19:12:12 GMT

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As far as a finish, I used Sam Maloof Poly Oil finish from Rockler Woodworking on the TV stand that I mentioned. I think that it is a polyurethane/tung oil finish. The finish quality was the best I have ever obtained. I would hesitate to anything else any more. It applies with a rag. I screw stuff up whenever I touch a brush. To obtain a nice low luster finish, you have to make sure that you wipe everything off that you can after a few minutes and sand lightly between coats as directed on the can. That brand is an exclusive of Rockler and a little expensive though.

As far as straight polyurethane, I have never noticed much of a difference, but I have only used the Minwax and Varathane brands.

I do not know anything about that type of glue.

I started the cutout on mine. I only have ripped the wood to width so far.

Since the hex nuts that come with the tweeter interfere with the horn, I purchased some socket head cap screws for attaching the tweeter to the horn. A ball end wrench provide enough

clearance to tighten the screws. I needed to temporarily remove the flange on the horn to insert the screws. I purchased M6 x 12mm long screws, but will switch them out to M6 x 16mm screws and use some Loctite thread locker.

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Mon, 16 May 2011 15:44:15 GMT
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Wayne Parham wrote on Thu, 12 May 2011 21:35
That's excellent! Thanks for taking the time to write-up the build process and include pics. I love it when you guys do that!

On the veneers - wait a day and see if Epstein sees this thread and gives his 2¢. He is really a master woodworker, and will probably have some helpful advice. If he doesn't see it in a day or so, post your question on the Craftsmen forum.

Thanks Wayne...Once I order the components for the 4 Pi build approximately how long does it take to ship? I am packing my stuff for my overseas move and need an idea of the time it will take to deliver the materials to Maryland.

No progress on the build this weekend, it was to wet to work outside - which is where I do all the work that generates dust.

Subject: Re: 4 Pi Home Theater Build
Posted by [Wayne Parham](#) on Mon, 16 May 2011 18:58:56 GMT
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It depends on what you order. We keep all the parts for the crossovers in stock, so we can build them pretty fast. Usually takes five days. We build to order because there are so many options, it doesn't make sense to try and maintain inventory of each crossover and each option.

We keep drivers in stock too, but many more of the little stuff than the high end stuff because of the numbers we sell. However, I do usually have a couple JBL 2226 drivers. When I run out, they usually take about a week to replenish, but occasionally they're backordered. The TD12S is the one you can't expect to get for an extended period of time. Those are made to order and I would expect several months lead time.

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Mon, 16 May 2011 19:31:31 GMT

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Thanks for the quick reply...I am looking at ordering the B&C DE250 Compression driver, JBL 2226 Woofer, 15 guage Inductors, Jantzen Zcaps Capacitors and Mills Resistors (already in my shopping cart). Just waiting for final authorization from the comptroller (ie wife) before loading the plastic.

I hope that the LSAF went well for you, wish I could have attended - but TX is a bit far from MD/RI.

Subject: Re: 4 Pi Home Theater Build

Posted by [Wayne Parham](#) on Tue, 17 May 2011 04:06:41 GMT

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It would probably take 10 days to ship if you ordered right now. We have everything in stock but the DE250s, and should get replenishment of those soon.

Subject: Re: 4 Pi Home Theater Build

Posted by [Spec4](#) on Tue, 17 May 2011 21:55:09 GMT

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Hmmm looks like someone is an Inventor user, care to share the files? I'm in the process of building a HT and will be needing to make my own cabs.

Thanks
Justin B

Subject: Re: 4 Pi Home Theater Build

Posted by [Wayne Parham](#) on Tue, 17 May 2011 22:20:56 GMT

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Subject: Re: 4 Pi Home Theater Build

Posted by [Spec4](#) on Tue, 17 May 2011 22:32:53 GMT

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No I've already requested and received the 4 pi plans, just thought this would save me some time when I model my HT.

Thanks
JB

Subject: Re: 4 Pi Home Theater Build
Posted by [Wayne Parham](#) on Tue, 17 May 2011 22:51:32 GMT
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Gotcha, cool.

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Wed, 18 May 2011 02:46:52 GMT
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Just pulled the trigger...it only took 2 years.

I ended up going with the JBL 2226H and B&C DE250 drivers, and the upgraded 15 guage inductor. Decided not to go with the upgraded capacitors and resistors.

Wayne Parham wrote on Sun, 27 March 2011 23:43

Yes, the upgrades are worth it. I would upgrade in the following order, as I think these bring the greatest improvements in this order:

1. Woofer
2. Compression driver
3. Coils
4. Capacitors
5. Resistors

The upgraded woofer make a big difference, especially in midbass and midrange quality. I mean, the Omega 15 sounds nice but it just can't be compared to the JBL 2226. I think the biggest reason for this is the flux stabilization ring in the JBL woofer. It makes the motor more linear, reducing distortion and improving clarity. It also makes the speaker less fatiguing to listen to for extended periods or at high volume levels or both.

The tweeter is next. The DE250 is noticeably smoother than the PSD2002, sounding more "mellow" but at the same time still being as crisp, even more so. The stock tweeter sounds good, and I wouldn't call it harsh by any means. Some titanium drivers are, but the stock one isn't. But

still, the upgraded driver is more smooth, and it's worth upgrading, in my opinion.

The stock crossover is very good, and I think crossover upgrades are mostly for bragging rights. One exception is the coils, with the larger ones having less internal resistance, which improves damping. They aren't necessary by any means, but the low cost of the upgraded coils make that a worthwhile upgrade. The resistors don't cost much either, so some people like to upgrade them as well. The capacitor upgrades are pricey, and to my ears don't buy much. But if you want the very best, the capacitors can be upgraded too.

Wife thinks I am crazy spending this much on a design I have never heard...but all the loyal owners and great feedback about Wayne out on the 'net pushed me over the ledge. I look forward to getting on with the build.

Thanks Wayne for making your designs available to the DIY community!!!

All I need now is for Bill Epstein to walk me off the ledge in regards to using contact cement to apply the veneer. Is there any particular brand I should look for in regards to the contact cement?

File Attachments

1) [4 Pi Order.png](#), downloaded 7786 times

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Thu, 19 May 2011 01:16:12 GMT

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I will be gluing the front baffle on this weekend. Since I have doubled the thickness of the baffle from 0.75" to 1.5" I made the port exactly 0.75" shorter - thus the overall length from the front of the baffle to the end of the port is 10" (as in the original plan).

Is this correct or are there other factors at play that I failed to take into account?

Thanks,

Subject: Re: 4 Pi Home Theater Build

Posted by [Wayne Parham](#) on Thu, 19 May 2011 02:02:03 GMT

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That's right. You want the duct to be 10" long from entrance to exit. It's the airpath length we're concerned with, and the fact that the baffle makes up part of it is fine, as long as the total path length is right.

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Thu, 19 May 2011 02:09:45 GMT
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Thanks Wayne, I thought that was the case but better to ask now than be sorry later.

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Sun, 22 May 2011 03:26:16 GMT
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Made some progress on the enclosures today.

Internal Frame - designed to increase structural robustness of the MDF as the speakers will be subjected to multiple military moves.

File Attachments

- 1) [013 - .25x.jpg](#), downloaded 10158 times
 - 2) [014 - .25x.jpg](#), downloaded 10034 times
 - 3) [021 - .25x.jpg](#), downloaded 10034 times
-

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Sun, 22 May 2011 03:30:56 GMT
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Gluing in the ports:

File Attachments

- 1) [015 - 40.jpg](#), downloaded 10053 times
 - 2) [016 - 40.jpg](#), downloaded 10015 times
 - 3) [017 - 40.jpg](#), downloaded 10041 times
-

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Sun, 22 May 2011 03:39:13 GMT

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Final pictures for today, gluing in the back baffle (solid 0.75" baffle will be glued to this cut-out baffle).

File Attachments

- 1) [023 - 40.jpg](#), downloaded 9963 times
 - 2) [024 - 40.jpg](#), downloaded 10008 times
 - 3) [025 - 40.jpg](#), downloaded 10071 times
 - 4) [019 - 40.jpg](#), downloaded 9984 times
 - 5) [020 - 40.jpg](#), downloaded 10031 times
-

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Mon, 23 May 2011 16:01:18 GMT

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Was able to get the inner front baffle glued/screwed before I had to return to Newport for the week (left nice warm Maryland for cold, drizzly Rhode Island).

- I use a paint brush to apply an even coating of Titebond III glue (2x on the MDF edges as it soaks in during the time required to apply all the glue).

The final picture shows my 18-year old Paradigm 9se MkIII speakers these will replace, my 24" sealed sub (Exodus Audio, Maelstrom-X 18" driver), a bit of my Paradigm PDR 12 sub, and my projection screen. Only the two 4 Pi speakers and the PDR 12 sub will be making the move to Cambodia, the remainder will be going into long-term storage.

File Attachments

- 1) [Afternoon 004 - 40.jpg](#), downloaded 9997 times
 - 2) [Afternoon 005 - 40.jpg](#), downloaded 9995 times
 - 3) [Afternoon 009 - 40.jpg](#), downloaded 9976 times
 - 4) [Afternoon 010 - 40.jpg](#), downloaded 10283 times
-

Subject: Re: 4 Pi Home Theater Build

Posted by [Wayne Parham](#) on Mon, 23 May 2011 16:42:43 GMT

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Looking good! Getting close now!

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Mon, 23 May 2011 20:22:00 GMT

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Thanks...they are coming along and I cannot wait to get my shipment so I can give them a listen!

Next weekend I will add the bracing. I am thinking of using one .75" x 2.5" [a] oak piece side to side w/ three 0.75" x 1.5" [b] oak pieces as shown:

As I already have the wood as leftover from a different project I figured three front-to-back is better than one, it does add an extra 0.025 ft³ of volume but I think this is probably negligible.

Could this bracing modification do more harm than good?

File Attachments

- 1) [4 Pi bracing.png](#), downloaded 9799 times
-

Subject: Re: 4 Pi Home Theater Build

Posted by [Wayne Parham](#) on Mon, 23 May 2011 22:17:26 GMT

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I think that's fine. Don't know if it's better or worse than a cross-brace but I do know it makes a better "rest" for the R11 that should be placed there.

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Tue, 24 May 2011 22:36:50 GMT

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The idea of the brace serving as a better resting place for the insulation was a factor. How do you get the R11 to stay in place?

I ordered a 4' x 8' sheet of Paper-Backed Red Oak Veneer (Flat Cut) and a veneer scraper. Will pick up a bottle of contact cement this weekend - the old fashion toxic version. Will give me an excuse to wear my gas mask.

Subject: Re: 4 Pi Home Theater Build

Posted by [Wayne Parham](#) on Wed, 25 May 2011 00:02:50 GMT

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I cut the cross-section insulation piece to fit, and set it on the brace. I use white glue on the cross-brace and around the perimeter. Basically, the white glue holds it.

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Wed, 25 May 2011 00:33:32 GMT

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Thanks Wayne...getting close to the end of the wait!

Subject: Re: 4 Pi Home Theater Build

Posted by [Wayne Parham](#) on Wed, 25 May 2011 02:07:36 GMT

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...almost there!...

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Thu, 26 May 2011 00:33:56 GMT
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Just checked tracker, they are less than 250 miles away!!!!

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Thu, 26 May 2011 22:40:12 GMT
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Wife just called...the eagle has landed!

Too bad I'm 450 miles away until Sat morning (I am sick of living M-F away from home).

Subject: Re: 4 Pi Home Theater Build
Posted by [Wayne Parham](#) on Fri, 27 May 2011 15:57:20 GMT
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Yeah, I've done several projects where I commuted to another city through the week. So I know the drill. It's fun after you get used to it, but it can be a drag after a while. And hobby projects grind to a halt, 'cause you only have a few hours on weekends to work on them.

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Sun, 29 May 2011 01:39:24 GMT
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I am going on month 20...at first it wasn't to bad but now that I can see the end (1 JUL) it is starting to get old.

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Tue, 31 May 2011 23:52:07 GMT
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Good weekend for the speaker project (although wife complained I spent too much time in the basement).

Added the rear and front inner baffle to the center channel speaker (completed this task last weekend for L and R enclosures). Bondo'd over all the screw holes, sanded and glued on the outer front baffles.

I was very happy that the port lined up perfectly into one continuous unit (3 glue joints - 2 baffles + port).

File Attachments

- 1) [019 - 3 - 40%.jpg](#), downloaded 6549 times
 - 2) [011 - 4 - 40%.jpg](#), downloaded 7810 times
 - 3) [031 - 5 - 40%.jpg](#), downloaded 6573 times
 - 4) [017 - 6 - cropped.jpg](#), downloaded 6784 times
 - 5) [032 - 7 - cropped.jpg](#), downloaded 6698 times
-

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Wed, 01 Jun 2011 00:02:06 GMT

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Unfortunately, the pre-cut openings for the horn were incorrect (they were too small). After much internal debate about getting out the router and developing some sort of jig I decided to remove the extra material with a chisel.

Here is a closeup that shows a little bondo will be required - but it would have anyway as the radius of the horn corners is very different than that of the baffle.

Had to be careful not to split the MDF into layers for the thin section between the horn and the

port - actually did on the first speakers but a "flavor injector" from the kitchen filled with wood glue fixed the problem.

File Attachments

- 1) [003 - 1 - 40%.jpg](#), downloaded 6568 times
 - 2) [013 - 2 - 40%.jpg](#), downloaded 6520 times
 - 3) [020 - 1b - 40%.jpg](#), downloaded 6553 times
 - 4) [013 - 2b - cropped.jpg](#), downloaded 6537 times
-

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Wed, 01 Jun 2011 01:30:22 GMT

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Gratuitous photos of the goods delivered from Tulsa! Wayne has great customer service, the parts came in several days earlier than he projected.

File Attachments

- 1) [025 - 9 -60%.jpg](#), downloaded 9205 times
 - 2) [026 - 10 - 40%.jpg](#), downloaded 9253 times
 - 3) [021 - 12 - cropped.jpg](#), downloaded 9389 times
-

Subject: Re: 4 Pi Home Theater Build

Posted by [Wayne Parham](#) on Wed, 01 Jun 2011 02:56:24 GMT

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Glad they're coming along nicely and sorry about the horn dimensions. I've had to do that on a few horns too. It's very frustrating, because some slip right in, and others don't. Most that don't fit are just a smidge too large but it's still annoying.

I think the biggest problem though, isn't the slight variance between parts. It's the fact that the dimensions published by Eminence are way off. Eminence says hole cutout should be 10.3" x 4.9", but that's way bigger than needed and leaves a frustratingly narrow mounting lip. So our plans show 9.5" x 4.75", which gives a much better fit.

Likewise, Eminence says the overall dimensions are 11.4" x 6.5" but the dimensions are more like 11.625" x 6.5" to 11.7" x 6.6". Those dimensions will work 99% of the time, but occasionally,

they'll send out a horn with a lip even larger than that.

The last pair of speakers I built that gave me this trouble had a very expensive veneer that I didn't want to risk damaging so I shaved the edge of the horn down to fit. It was actually a very easy fix, and I think is my preferred method of dealing with the occasional oversized part.

Subject: Re: 4 Pi Home Theater Build - Primer and Paint Questions

Posted by [NWCgrad](#) on Wed, 01 Jun 2011 16:54:42 GMT

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No worries on the fit of the waveguide, I had previously read your comments on the forum that they sometimes do not fit.

I will be coating the enclosures this weekend with bondo followed by sanding (and repeating as required). The cabinets front and rear baffles (plus interior) will be primed (Zinsser BIN shellac-based) and painted as close to gun metal gray as I can get. The sides will be veneered with oak (glued with contact cement per the advice of Bill Epstein) and finished w/ stain. I assume sides/top/bottom do not need to be primed. I am not sure whether contact cement adheres well to primer??????

The entire enclosure will be given multiple thin coats of polyurethane - inside and out - for a humidity barrier.

Can anyone advise on paint?

I am thinking 100% acrylic latex enamel for durability. Will apply with the typical foam cigar paint roller. I read the technical sheet for the Zinsser primer (shellac-based) and could not tell if the topcoat should be water- or oil-based. The only advantage I can think of for water-based is that it allows the polyurethane coat to be water-based, which apparently cures faster than oil-based polyurethane. Since these will be crated up late June/early July for transport to the SE Asia drying time may be a factor.

Subject: Re: 4 Pi Home Theater Build - Primer and Paint Questions

Posted by [NWCgrad](#) on Thu, 02 Jun 2011 19:30:52 GMT

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Can anyone advise on paint?

Water or oil based is the primary question. Will have less than 30 days after putting on finish to ship to Cambodia (probably by air, missed the finishing window for sea transport).

Thanks,

Subject: Re: 4 Pi Home Theater Build - Primer and Paint Questions

Posted by [Wayne Parham](#) on Fri, 03 Jun 2011 00:11:06 GMT

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This is not my specialty, which is why I didn't reply right away.

The one product I have a lot of experience with is Duratex. It can be put on the raw wood and it will seal and finish coat it in one step. It's very durable and so if that's what you're after, it's probably your best bet. All the prosound speakers use it.

You can also use the "Truck Bed Liner" product sold at Wal-Mart stores. It is as durable as Duratex. Easy to apply with a roller. They also have an aerosol produce available, but the coverage isn't nearly as good.

On the other hand, I understand some people use primer and finish coats like what is done to paint cars. That is probably a more attractive finish, and can be done in any color.

Subject: Re: 4 Pi Home Theater Build - Primer and Paint Questions

Posted by [NWCgrad](#) on Fri, 03 Jun 2011 15:39:42 GMT

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Thanks for the response, I was leaning towards duratex but have decided to go with a 100% acrylic latex over Zinsser shellac-based BIN parimer. Supposedly, the 100% acrylic provides good moisture protection (for a paint).

Hopefully I will get all three boxes sanded, bondcoed, and primed this weekend. The shipment date is set for 27 JUN, so time is rapidly running out.

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Mon, 06 Jun 2011 21:38:06 GMT

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Not much progress this weekend, spent time on yardwork instead.

Did complete the bracing, added two crossbraces instead of the one called for in the plan and the three I planned. Braces are (1) 2.5" x .75" and (2) 1.5" x .75" [actual].

I did get the Zinsser BIN Shellac-based primer tinted grey and purchased a quart of Onyx Black BEHR Premium Plus 1 qt. Satin Deep-Base Enamel Exterior Paint (100% acrylic). I chose this paint based on the fact that it is 100% cured in 2 weeks. There may be better choices out there, but this should suffice.

File Attachments

- 1) [001 - 50.jpg](#), downloaded 8807 times
 - 2) [002 - 50.jpg](#), downloaded 8758 times
 - 3) [004 - 50.jpg](#), downloaded 8738 times
 - 4) [005 - 50.jpg](#), downloaded 8845 times
-

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Mon, 13 Jun 2011 21:54:44 GMT

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First project of the weekend was to bondo/sand the seams, inside of the port, and round the corners of the horn inset:

Second project was to prime (Zinsser BIN shellac) the back of the port and inside face of the cabinet BEFORE adding the rear baffle (would be difficult to get to back of the port after adding the back panel - I put 3 coats on the port):

Final, added oak trim and rear baffle (with cutout for binding post plate):

The 45 degree corners of the trim are not a perfect joint, will fill them in with wood glue mixed with oak dust. Overall, fairly good progress.

File Attachments

- 1) [001-50.jpg](#), downloaded 8515 times
 - 2) [009-50.jpg](#), downloaded 8446 times
 - 3) [007-cropped.jpg](#), downloaded 8397 times
 - 4) [007-50.jpg](#), downloaded 8420 times
 - 5) [015-50.jpg](#), downloaded 8456 times
-

Subject: Re: 4 Pi Home Theater Build

Posted by [Wayne Parham](#) on Mon, 13 Jun 2011 23:30:30 GMT

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Lookin' good! Getting closer!

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Tue, 14 Jun 2011 00:04:05 GMT

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Thanks, I really want to say screw the finish and add the drivers/crossover and let 'em rip. But...

Next weekend I plan to (1) fill gaps in the 45 degree joints of the front trim (oak dust + wood glue) and bring the trim even with top/front with router, (2) prime the remainder of the interior/front baffle/rear baffle of cabinets with Zinsser BIN shellac primer (have two quarts, one in white and the other tinted gray) - will put on two coats, and (3) glue (contact cement - Better Bond Titan DX from Joe Woodworker) the red oak veneer on top/sides/bottom of the cabinets.

Due to lack of time for finishes to "cure" before being packed for shipment to my new digs in Cambodia (still cannot believe my family and I are moving to Phnom Penh). I will paint the front/rear baffles and stain the oak veneer in Cambodia - I assume I can find finishing materials in country. After next weekend it is only ~7 days to the target packout date of 27 JUN - they will travel by sea instead of air due to size/weight.

Any suggestions on how to package the boxes for shipment?

I am planning on leaving the JBL woofers in their original packing and make custom foam packing for the DE250 drivers using parts of two large sheets of TUFF-R R-12.2 1-7/8 in. thick Foam Insulation. I plan on adding a piece to the JBL box - with a cutout for the magnet assembly to fit into for additional crush protection. The horns and crossovers will be installed in the cabinet.

Subject: Re: 4 Pi Home Theater Build
Posted by [Wayne Parham](#) on Tue, 14 Jun 2011 02:28:08 GMT
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God, Phnom Penh. I still remember the 1970s when Phnom Penh was in the news all the time.

For packing, your best bet is to crate them on a pallet. Securely strap them to a pallet, and surround them with styrofoam sheets for padding. Then place plywood or thick cardboard over that. You can probably get all of that locally at a shop that specializes in shipping supplies. They may even offer a packaging service, in which case they'll do all that for you.

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Tue, 14 Jun 2011 19:58:59 GMT
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Wayne Parham wrote on Mon, 13 June 2011 21:28
God, Phnom Penh. I still remember the 1970s when Phnom Penh was in the news all the time.

My father-in-law did three tours in 'Nam (Army grunt), when I asked if he was going to come visit his response was #%% No! Pol Pot did a lot of damage to the country before the Vietnamese finally invaded and removed him from power. Country still seems pretty shakey, but they seem to be coping with their traumatic history.

Hopefully my 24 months in country will be uneventful.

Subject: Re: 4 Pi Home Theater Build
Posted by [Wayne Parham](#) on Tue, 14 Jun 2011 20:05:48 GMT
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Stay active here, please, so we can keep in touch!

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Tue, 14 Jun 2011 21:48:44 GMT
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Will do...your speakers will be exposed to a whole new demographic. Hopefully I can pick up an

inexpensive tube amplifier while in SE Asia. I know the nOrh SE-9 integrated amplifier is made in Bangkok, Thailand which is only about 300 mi away.

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Fri, 17 Jun 2011 03:13:44 GMT

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Made a lot of progress today, will have them ready for shipment by end of weekend (I was able to come home early this week from Newport to prepare the house for moving).

First, routed the edges of the oak trim glued to the front panel. The oak strip was both thicker and wider than the intended space to account for "variations."

After flush trimming the oak the speakers looked MUCH better, I was a little concerned about the process but it worked great. A little woodfiller and a lot of sanding followed.

File Attachments

- 1) [002-cropped.jpg](#), downloaded 7323 times
 - 2) [003-50.jpg](#), downloaded 7406 times
 - 3) [007-cropped.jpg](#), downloaded 7438 times
 - 4) [008-cropped.jpg](#), downloaded 7402 times
 - 5) [010-50.jpg](#), downloaded 7440 times
-

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Fri, 17 Jun 2011 03:16:41 GMT

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Next, I used woodfiller to augment the bondo used last week to enable a better fit of the waveguide.

Not yet perfect, but it is getting better.

File Attachments

- 1) [012-50.jpg](#), downloaded 7409 times
 - 2) [014-50.jpg](#), downloaded 7391 times
-

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Fri, 17 Jun 2011 03:23:31 GMT

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Finally, two coats of primer (first coat white and second coat gray). Starting to see the light at the end of the tunnel.

Tomorrow - or Saturday - will veneer the cabinets. Going to try the "Better Bond Titan DX™" Contact Cement from veneersupplies.com. Since most of the work is in my home theater I wanted to avoid VOC's, reviews of Titan DX on the net have been good, so I decided to go for it. Also, need to sand the primer and add a third coat.

The plan is to paint the front/rear baffles and stain/seal the veneer once I arrive in Cambodia, not enough time for paint/polyurethane to cure before they will be packed for shipment.

File Attachments

- 1) [020-40.jpg](#), downloaded 7430 times
 - 2) [01940.jpg](#), downloaded 7404 times
 - 3) [023-50.jpg](#), downloaded 7569 times
 - 4) [023-50.jpg](#), downloaded 7524 times
-

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Sun, 19 Jun 2011 00:44:11 GMT

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Due to the high volume of moves in the DC area, my packout is most likely to be pushed back by at least two weeks. So....

Sanded the primer and painted front/rear with two coats of BEHR PREMIUM PLUS® Exterior Satin Enamel. I will let it cure for a week before veneering the remainder of the cabinet.

File Attachments

- 1) [007-50.jpg](#), downloaded 7304 times
 - 2) [009-50.jpg](#), downloaded 7331 times
 - 3) [008-cropped.jpg](#), downloaded 7254 times
 - 4) [010-50.jpg](#), downloaded 7298 times
-

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Sun, 19 Jun 2011 00:47:57 GMT

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I have not veneered before and am not sure whether there is a particular order to gluing the sheets to the cabinet. I am planning on starting with the bottom, then both sides and finally the top. Is this order correct? If not, what is the best order?

Will use router with a new flush cut bearing bit to trim.

Thanks for the assistance!

Subject: Re: 4 Pi Home Theater Build

Posted by [Wayne Parham](#) on Sun, 19 Jun 2011 04:04:28 GMT

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Oh, wow, that push-out will help with your schedule.

I am not a woodworker, don't even play one on TV, and tend to defer to those that I trust like Epstein. But I have dabbled a time or two with finishing, and I do the sides that won't be seen first (bottom and back) and then the sides, top and front. Same order you said. My reasoning is the last surfaces get the "final" attention, so they are probably going to be the best. I have no idea if that is what the woodworking pros do or not, so in this case, I'm not sure it's worth 2¢. Just a thought.

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Sun, 19 Jun 2011 04:22:33 GMT

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Thanks Wayne. The painted baffles - matched with the solid oak trim pieces - look really good once dried. Nice smooth texture and the H290 horn really blends in. I am getting excited to install the drivers and crossover, probably next weekend!

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Wed, 22 Jun 2011 01:57:26 GMT

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Just got word today, the speakers will be boxed for my move on Monday. Will just have enough time to veneer them on Sat with 24-48 hours to dry before packing. The painted front/rear baffles will have "cured" for a little over 7 days - the brochure indicated 14 - 28 days before attempting to clean with cleaning materials.

I am going to box them myself - but not seal the box so that the mover is responsible for damages. I found boxes of the appropriate size on uHauls website (see attachment).

As of now, my plan is to enclose the box in all three dimensions with rigid foam insulation (2" thick) and wrap the speakers initially with Mover's Stretch Plastic Wrap (also from uHaul) and then bubble wrap. The three layers of protection plus heavy taping of the outside of the box to secure joints should offer pretty good protection. The boxes must fit into a large shipping crate - along with 2500 pounds of household goods (and electronics) - that will be sealed for transport.

Would adding a ½" thick plywood to the bottom of the box add anything or is it just a waste of material? I will ensure that the speakers do not have room to move inside of the boxes.

Thanks for any feedback on my packing scheme, I am open to suggestions.

File Attachments

1) [Pi 4 Packing.png](#), downloaded 9600 times

Subject: Re: 4 Pi Home Theater Build

Posted by [Wayne Parham](#) on Wed, 22 Jun 2011 03:36:46 GMT

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It's hard to say what they'll encounter. I've had some packages arrive undamaged, and very little packaging would have probably been needed. Then I've had some packages hit on the side so hard with what appeared to be a dagger or rod of some sort - went right through and damaged the contents beyond repair. I've seen some tube amps that were packaged with several inches of foam in place surrounding them - dropped so hard that internal bracing shifted under the impact load. No scratches on the outside because of the foam, but it was obvious that the box had been dropped a great distance.

Can you palletize the boxes? In my experience, this seems the most reliable. Maybe it's because they can easily maneuver the package with a forklift, I don't know. But I've had consistently good results with palletized packages.

Subject: Re: 4 Pi Home Theater Build
Posted by [blvdre](#) on Wed, 22 Jun 2011 03:45:18 GMT
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Palletizing would be a good idea, if affordable. Wayne, the dagger you mention was probably from a fork lift. I've seen that type of damage before. Also, UPS has some of its conveyors up high, and sometimes packages take a dive.

I work for a medical test equipment manufacturer in the service department, and I'm amazed at how poorly packed some of our instruments are when they come back from the customer. Some instruments cost up to \$70k. More often than not, though, they get lucky and the instruments are received without any damage.

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Wed, 22 Jun 2011 16:37:05 GMT
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I cannot palletize because my entire shipment of 2500 lbs must fit into a shipping crate. I don't know the size of the crate, but all my stuff must fit in it along with the speakers.

Subject: Re: 4 Pi Home Theater Build
Posted by [blvdre](#) on Wed, 22 Jun 2011 22:41:18 GMT
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I need to read more carefully. Yes, as long as everything's in a well packed large crate, the boxes, plastic, and bubble wrap should do the trick.

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Mon, 27 Jun 2011 03:03:22 GMT
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Lost most of my last weekend to finish the speakers ill. Today I managed some progress:

First, covered the H290 horns with Dynamat I had leftover from a car stereo install:

Added hanger bolts to bottom of cabinets for the crossover and 100W resister:

Cut rubber (1/16" thick) as gasket, pushed over the hanger bolts:

Bolted on crossover and 100W resister:

File Attachments

- 1) [1-50.jpg](#), downloaded 10052 times
 - 2) [2-50.jpg](#), downloaded 9279 times
 - 3) [3-50.jpg](#), downloaded 9317 times
 - 4) [4-50.jpg](#), downloaded 9339 times
-

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Mon, 27 Jun 2011 03:08:28 GMT

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Final pictures before the speakers are packed and shipped to Phnom Penh. I did not get the veneer put on due to illness on Sat, will send the raw veneer with the speakers and install once they arrive. Will also ship the R13 insulation that I bought today.

Installed the H290 (w/ 2 layers of rubber gasket) using pocket screws. They project out a little further than I would like - but should be okay.

Overall, this has been a great build - my first outside of a sealed subwoofer.

Thanks Wayne for making your plans available and freely sharing your expertise.

File Attachments

- 1) [5-50.jpg](#), downloaded 9254 times
 - 2) [6-50.jpg](#), downloaded 9301 times
 - 3) [7-50.jpg](#), downloaded 9482 times
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Subject: Re: 4 Pi Home Theater Build
Posted by [Wayne Parham](#) on Mon, 27 Jun 2011 04:06:24 GMT
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Looks great!

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Tue, 28 Jun 2011 19:49:42 GMT
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Thanks, this is my first speaker build. I built a sealed subwoofer two years ago, but this was more challenging due to multiple boxes.

Did not get the speakers packaged as well as I would have liked as I was ill. Ended up having the movers wrap the speakers in the R13 insulation (I bought Johns Manville 384"L x 15"W x 3.5"D R-13 Formaldehyde-Free Fiberglass Insulation Roll from Lowes) and then multiple layers of the moving paper. I watched them load into the shipping crate, where they formed the bottom rear level. Probably as good as one could expect.

I wish I had taken a photo of the mover carrying the JBL woofers stacked, on his back. I was ready to hear them crash to the ground at any time! Thankfully, they were not dropped and were loaded on top the speakers.

The crate was completely filled, with extra boxes stuffed into empty spaces so there should be minimal movement during shipping. The crates will be caulked and sealed with steel bands prior to loading on the ship.

I am hopeful they arrive in good condition. I will have to wait until August (possible September depending on the wait at customs) to install the woofers and give them a listen. The continued wait sucks!!!

Subject: Re: 4 Pi Home Theater Build
Posted by [Wayne Parham](#) on Tue, 28 Jun 2011 20:07:59 GMT
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Godspeed!

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Wed, 10 Aug 2011 07:29:32 GMT

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I have arrived in Phnom Penh and started to settle in...my household goods (including the nearly completed speakers) should arrive within a month (more or less).

It is hot here, but not as bad as the heat wave scorching the US.

Wayne may get a kick out of the fact that the other night my family and I were sitting at an outdoor restaurant in Phnom Penh listening to the Red Hot Chili Peppers with my local sponsor who is from Tulsa. It's a small world afterall!

Subject: Re: 4 Pi Home Theater Build

Posted by [Wayne Parham](#) on Wed, 10 Aug 2011 13:11:57 GMT

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Wow, yeah, small world!

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Thu, 01 Sep 2011 10:42:14 GMT

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Just got word today, my household goods - including the 4 Pi's (L and R only, C box went into long-term storage) - are scheduled to arrive and clear customs by the end of this month. Seems like forever ago that were packed for shipment.

Any suggestions for "optimizing" a square room, actually more like a cube (14'1" W x 14'2" D x 9'10" H). The room has a door to the living/dining room and a door to a bathroom (see attached diagram).

I know this is far from ideal! Walls are brick covered with some sort of plaster (exterior and interior) and the floor is granite tile (have a large area rug being delivered from the US Embassy that should cover about 70% of the floor). I only brought one subwoofer with me, a Paradigm PDR-12 so I may have uneven bass. My receiver, Onkyo TX-SR805, has MultEQ XT so I hope to tame the worst nodes.

Right now this is the loudest house I have ever lived in, all the rooms have tile floors and very little rug coverage! The joys of living in a sweltering environment.

HELP!!!!!!! Solutions need to be cheap, temporary, and deliverable to APO address.

File Attachments

1) [Room.png](#), downloaded 7669 times

Subject: Re: 4 Pi Home Theater Build

Posted by [Wayne Parham](#) on Thu, 01 Sep 2011 15:41:49 GMT

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The hardest thing to deal with is those rigid walls. I saw this in Europe too, lots of concrete flats with stucco walls. Hard surfaces on all six boundaries - all four walls, ceiling and floor. You can damp the midrange and treble reflections with carpets and absorbent materials; You can diffuse the reflections with bookshelves and bric-a-brac. But none of this helps room modes. The frequencies are too low for absorption or diffusion. You could install panel absorbers, basically false walls that can vibrate to absorb some LF energy. But nothing like carpets or pillows or foam will help at low frequency. The best thing to do is to add subs, even better when combined with panel absorbers.

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Fri, 02 Sep 2011 01:54:25 GMT

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Wayne, thanks for the information. Will be very hard to add subs here in Cambodia. Any educated guesses on where I should place the Paradigm sub?

The back wall will have two large 8' tall bookshelves, containing shoe boxes of multiple sizes (they are NOT mine). Should help to diffuse reflections.

Perhaps I should look into building DIY bass traps? Or are they ineffective for this environment.

Thanks again.

Subject: Re: 4 Pi Home Theater Build

Posted by [Wayne Parham](#) on Fri, 02 Sep 2011 02:10:46 GMT

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Bass traps are effective, provided they actually absorb enough energy. Panel absorbers work best. They can be made as a false wall, and therefore can be somewhat inconspicuous.

Too bad you can't get more subs. Even just a couple more small car subs in boxes would help you a lot, provided they sounded good in the midbass. There's not much you can do to smooth room modes with just one sub. You can't do anything about the primary room mode, because

there will be only one sound source from 20Hz to 40Hz, where the first mode will be. A single sub probably can't be used to smooth the midbass/midrange either because that requires flanking subs, which are paired with the mains.

Without flanking subs, you'll have a pretty deep notch around 120Hz or so. That will make the vocals and instrumentals sound odd. It can make a sort of "singing in the bathroom" sound, which will seem like it boosts some instruments and/or vocals and makes others a little too thin sounding.

What you might try is to put your sub right in the middle between the mains, sort of like a shared flanking sub. It should be a couple feet behind the mains and a couple feet below, assuming the mains are on stands or risers of some sort. Of course, the subwoofer will also be a few feet to the inside of each main speaker. That might help smooth the upper midbass / lower midrange like flanking subs do. It might be tricky to get it to blend in such a way that it smoothes that range without giving away its position, drawing the lower range of instruments and vocals towards the center.

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Fri, 02 Sep 2011 02:23:29 GMT
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Just looking at the specs for the Eminence Lab 12 you use in the Pi 3 sub. Since I do not have any tools for the next two years, how well would a pair of Lab 12's work in a sealed 1.0 ft³ Subwoofer Cabinet (could order premade from the states) to solve my issues? Eminence literature says the driver works in sealed boxes from 0.8-1 ft³.

If so, do you deliver the 3 Pi sub kit to APO address?

Subject: Re: 4 Pi Home Theater Build
Posted by [Wayne Parham](#) on Fri, 02 Sep 2011 02:43:39 GMT
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As a flanking sub, a LAB12 in a 1.0ft³ sealed box would work just fine. But it won't give you much extension, with f3 around 45Hz. Still, that's plenty for flanking subs. Should work great.

We can send kits to APO addresses via USPS.

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Fri, 02 Sep 2011 02:47:44 GMT

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Awesome, looks like I will give up buying a new HTPC and go with two flanking subs instead!

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Sat, 03 Sep 2011 14:28:19 GMT

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Just ordered two of the 3 Pi subwoofer kits.

I am having a local Cambodian furniture maker build two 16" x 16" x 16" boxes from 1" thick plywood for \$50.00. I am sure it is not going to be baltic birch at that price, but should be good enough to last the two years I am over here.

Sealed box is 1.5 ft³ with a Qts of 0.75. Calculated relative -3 dB Point = 42.19 Hz, -6 dB Point = 32.59 Hz and 10 dB Point = 24.93 Hz; should be more than adequate for flanking subs.

Does the kit come with binding posts?

Thanks Wayne for making the high end affordable!!!

File Attachments

1) [SPL.png](#), downloaded 10072 times

2) [Flanking Sub Cone Excursion Graph.gif](#), downloaded 9923 times

Subject: Re: 4 Pi Home Theater Build

Posted by [Wayne Parham](#) on Sun, 04 Sep 2011 02:01:27 GMT

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Yes, the kit comes with binding posts.

That smaller box should work nicely for flanking subs, even with f3 around 45Hz. Then later, when space permits, you can build the 20"x20"x20" box shown in the plans for 20Hz extension.

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Sun, 04 Sep 2011 04:39:51 GMT

Thanks Wayne!

If the boxes don't suck - no guarantee at \$25/ea - I am thinking about keeping them as the flanking subs and then add two additional 3 Pi subs in the normal 20" ported design for deeper bass when I return to the States.

This should give me strong bass coverage down to 20 Hz. I am thinking I could then add a Linkwitz Transform circuit to my 24" sealed Maelstrom-X (18") subwoofer for augmentation of the region from 10 Hz to about 20 Hz.

Five quality subwoofers should be sufficient for my needs.

File Attachments

- 1) [Completed but Unstained.png](#), downloaded 10007 times
 - 2) [Finished front view.png](#), downloaded 10120 times
-

Subject: Re: 4 Pi Home Theater Build

Posted by [Wayne Parham](#) on Sun, 04 Sep 2011 06:00:42 GMT

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Sounds like an excellent plan!

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Sat, 17 Sep 2011 03:56:12 GMT

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LAB 12 drivers arrived in excellent condition. Ready to pick up the boxes from the furniture maker next week.

Delivery on my goods from the US has been pushed back - again! Now it looks like an Oct delivery date. The wait is killing me.

Pretty scary flying into Phnom Penh yesterday from a meeting in Manila. We have had very heavy rains and the ENTIRE city is surrounded by miles of water. The city is on the verge of major flooding due to a very heavy monsoon season. Hoping for the best, preparing for the worst.

Subject: Re: 4 Pi Home Theater Build
Posted by [smokarz](#) on Sat, 17 Sep 2011 14:28:29 GMT
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NWC, i used to live in southeast asia (vietnam).

i totally understand the weather over there.

good luck with everything.

Subject: Re: 4 Pi Home Theater Build
Posted by [Wayne Parham](#) on Sat, 17 Sep 2011 15:46:50 GMT
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Glad you got the subs. Keeping my fingers crossed on the mains and the rest of the stuff.

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Mon, 26 Sep 2011 07:41:11 GMT
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Picked up the 16" boxes yesterday. One is pretty much perfect:

However, this one has the hole cut to large:

I can take it back to have it remade, but I would REALLY hate to make her eat the cost as the people here barely make any money.

I think I have three options,

1) Clamp the gasket to the box and fill in all the gaps behind the gasket with a hot glue gun. Would seal the two screw holes that would leak. Not sure how durable of a solution this would be in the long run. However, I am planning on building new boxes when I return to the States.

2) Take the box back and have her replace the front baffle. These seem really well made (except for the cutouts which were made by hand without the use of power tools - no jig saw or router which led to the error in sizing) so I am not sure how easy it would be for her to replace just the baffle. It is a 16" x 16" size, so it could be cut off I suppose.

3) Have her add a new front baffle over the existing one on both boxes. I think 1/2" thick should be sufficient. I think this would be the easiest on her end and cost her the least amount of money.

Anyone have other suggestions? Would #1 work?

Thanks for any advice!

File Attachments

- 1) [007 - cropped.jpg](#), downloaded 9356 times
 - 2) [010 -cropped.jpg](#), downloaded 9329 times
-

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Mon, 26 Sep 2011 08:11:31 GMT
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Wayne Parham wrote on Sat, 17 September 2011 10:46
Glad you got the subs. Keeping my fingers crossed on the mains and the rest of the stuff.

My stuff is supposed to arrive this week!

Subject: Re: 4 Pi Home Theater Build
Posted by [Wayne Parham](#) on Mon, 26 Sep 2011 12:59:28 GMT
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The sub boxes look nice. Sorry about the misshapen woofer cutout.

NWCgrad wrote on Mon, 26 September 2011 02:41 Take the box back and have her replace the front baffle. These seem really well made (except for the cutouts which were made by hand without the use of power tools - no jig saw or router which led to the error in sizing) so I am not sure how easy it would be for her to replace just the baffle. It is a 16" x 16" size, so it could be cut off I suppose.

That's the route I would take. Wouldn't be hard to do even with the crudest hand tools and it solves the problem without being a potentially troublesome or ugly compromise.

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Tue, 04 Oct 2011 00:49:08 GMT
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I spoke the the builder about fixing the front panel and she was not very receptive, she wanted to either refund my money or just build entirely new boxes. Due to the depressed economy over here (average family income is less than \$1,000 USD/year) I could not in good conscience have her eat any of the cost. When I meet with her to discuss the build it was clear she had no idea what the boxes were to be used for and did not understand the requirement for accuracy. Looks like a language barrier problem, I NEED to learn Khmer!!!!

I have found a solution:

A member on AVS forum kindly made me two 1/2" thick plywood rings that I will glue/screw over the baffle to eliminate the irregular edges and provide a nice mounting surface for the drivers. Plus, they should make the boxes a little more interesting to look at.

File Attachments

- 1) [Speaker Ring.png](#), downloaded 8712 times
 - 2) [Rings - shrunk again.png](#), downloaded 8755 times
-

Subject: Re: 4 Pi Home Theater Build

Posted by [Wayne Parham](#) on Tue, 04 Oct 2011 01:40:45 GMT

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Excellent! Good solution. Might be a pretty cool look, sort of a protruded woofer.

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Sat, 15 Oct 2011 06:12:08 GMT

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Just received my household goods shipment, including my mostly completed 4 Pi speakers. Good news is they arrived relatively intact, bad news is one of the solder joints connecting the DE250 CD broke free.

Looks like the movers decided to "store" a role of duct tape in the speaker before packing. I do not have a soldering iron so I am out of luck until I can send for one from the States. Hopefully it will be an easy fix, I haven't touched a soldering iron in almost 30 yrs.

I guess it will be a few more weeks before I get to listen to the speakers.

File Attachments

1) [Broken Terminal.jpg](#), downloaded 8708 times

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Sat, 15 Oct 2011 13:24:01 GMT

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I was able to hot glue the terminal back to the crossover for a temporary fix. The two metal parts fit tightly together and the hot glue is holding them in place.

Finished the woofer install and getting ready to give them a listen once I unclutter all the crap from the movers and find my patch cords.

Subject: Re: 4 Pi Home Theater Build

Posted by [Wayne Parham](#) on Sat, 15 Oct 2011 13:45:05 GMT

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Wow, what nuts! Glad you got it cobbled back together but I do hope you can get your hands on an iron soon.

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Mon, 17 Oct 2011 01:59:20 GMT

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Finally have the speaker's setup and started to break them in by playing a blues CD on repeat all day. Initial impression of the sound is very positive, they are significantly better than the Paradigm 9seMkIII's they are replacing. Here is a picture of them - and the flanking subs - in the room (screen is photoshopped to represent the size of the projected image, I left my screen in the states and am projecting on the blank wall and could not take a good photo showing the image and the speakers).

Right now I am running them with an Adcom GFP-555/GFA-555 combo with an el-cheapo Sony Bluray/SACD player as the source. The combo has way too much power as the volume knob is barely off 0 at normal listening levels. These are very sensitive speakers, easily demonstrated by the fact that the amp continues to play for nearly a minute after it is turned off.

I was unable to veneer them before my move and one of the speakers suffered very mild water-induced damage during the move (glue joint swelling requiring additional sanding to re-smooth the surface). Since I do not have any equipment in Cambodia, and finding that I

absolutely hate MDF, I purchased oak vinyl laminate from Parts Express. Seems crazy to finish a thousand dollar speaker in vinyl, but the boxes will be rebuilt with baltic birch upon my retirement from the navy (less than 7 yrs). The enclosures have to survive at least two more military moves before I build new ones.

Based on initial listening the speakers meet my expectations and I expect to be using them for the next 20 years. I kept my paradigms as main speakers for over 15 - I do not make speaker changes often so I try to get the best bang for the buck.

Thanks again Wayne for your awesome support to the DIY community!

File Attachments

1) [IMG_0529.jpg](#), downloaded 8234 times

Subject: Re: 4 Pi Home Theater Build

Posted by [Wayne Parham](#) on Mon, 17 Oct 2011 17:50:29 GMT

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They look great. I love the way you have your room setup. It isn't like back home, but it sure looks like it will do the trick. The flanking subs are set just right.

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Tue, 18 Oct 2011 10:32:24 GMT

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I received the rings to complete the flanking subs from the US today.

Will try to locate glue, black stain and sandpaper this week so I can complete over the weekend.

Almost finished.....

File Attachments

1) [IMG_0530-cropped.jpg](#), downloaded 8190 times

Subject: Re: 4 Pi Home Theater Build

Posted by [Wayne Parham](#) on Wed, 19 Oct 2011 03:16:21 GMT

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That's going to look cool with black stain on the ring. Way to make lemonade!

Subject: Re: 4 Pi Home Theater Build

Posted by [Psychoacoustic](#) on Wed, 19 Oct 2011 06:06:14 GMT

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You'll love your set up even more for all that effort that's gone into it. Great to see a happy outcome. Yep, they get really loud, really fast so any amp can drive them adequately with ease. Congrats on your build.

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Sat, 22 Oct 2011 15:40:02 GMT

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Psychoacoustic wrote on Wed, 19 October 2011 01:06You'll love your set up even more for all that effort that's gone into it. Great to see a happy outcome. Yep, they get really loud, really fast so any amp can drive them adequately with ease. Congrats on your build.

Thank you. The speakers sound amazing! They sound like my Magnepan MMG's on acoustic jazz (Al Di Meolia, Acoustic Alchemy, and Pat Methaney), but when switch to heavy music - such as Iron Maiden or Beethoven - they no longer sound so polite. So far, they are very neutral to portraying the music on the disc. The SACD of Jimmy D Lane (APO records) is unbelievably realistic.

Here are pictures of the completed flanking subs, I think they turned out pretty well for less than \$150/ea - Thanks Wayne!!!!

I have moved the subs to the final flanking position per the guidance of Wayne.

File Attachments

- 1) [IMG_0539_cropped.jpg](#), downloaded 10808 times
- 2) [IMG_0544_cropped.jpg](#), downloaded 10559 times
- 3) [IMG_0534_cropped.jpg](#), downloaded 10468 times

Subject: Re: 4 Pi Home Theater Build

Posted by [Wayne Parham](#) on Sat, 22 Oct 2011 18:31:51 GMT

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Wow, those look great!

Did the flanking subs measure/sound better set inside the mains rather than outside them? Sometimes they do work better inside, but not usually when they're that close together. I find in general, they work better placed inside when the right/left spread is wide and outside when the right/left spread is narrow.

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Fri, 18 Nov 2011 02:16:35 GMT

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Wayne Parham wrote on Sat, 22 October 2011 13:31

Wow, those look great!

Did the flanking subs measure/sound better set inside the mains rather than outside them? Sometimes they do work better inside, but not usually when they're that close together. I find in general, they work better placed inside when the right/left spread is wide and outside when the right/left spread is narrow.

Wayne, I was running the flanking subs on the outside of the left/right speakers as shown in the first picture. Basic room calibration was performed using Audyssey MultEQ in my receiver. I have ordered measurement capacity (Dayton Audio EMM-6 Electret Measurement Microphone, Nady SMPS-1X Phantom Power Supply, cables and microphone stand) so I can measure the in-room response using REW (<http://www.hometheatershack.com/roomeq/>).

I have moved the flanking subs to the inside as pictured, but spread the left/right further apart. I like this sound better as the soundfield is wider and the bass response did not audibly change significantly.

I have noticed is that while good recordings sound great (SACD's, most classical and jazz recordings) many of my rock CDs sound like crap - lots of weird buzzes and distortion. I have to assume they are on the recording since I do not get the buzzes and distortion on SACDs and BluRay recordings of rock concerts. These very revealing speakers have altered the CDs I listen to. It goes beyond age of recording (Pink Floyd "Meddle" CD sounds really good whereas newer rock records sound like crap damn the "loudness wars" that have led to over-compressed recordings) or the dynamics of the music (full-scale classical is more demanding on speakers than Black Sabbath due to increased dynamic range).

Subject: Re: 4 Pi Home Theater Build
Posted by [Wayne Parham](#) on Fri, 18 Nov 2011 03:52:11 GMT
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I definitely know what you mean about noticing lesser quality recordings through these speakers. I have always winced when I listened to some albums, and tended to play them less because of their quality.

Most of the music I listen to was recorded, mixed and pressed well, like Yes, for example. But even they suffered from one poor quality pressing (the first one). Same for Genesis - the earliest albums have noticeable hiss and lack dynamic range. A tough pill to swallow because those early albums needed the dynamic range the most - they have long quiet passages. King Crimson does too, In the Court of the Crimson King, for example. At least you can get that one in a half speed master pressing, which helps. Moody Blues too, their early albums also hissed and lacked range, but again, you can get them in half speed master pressings that are a lot better.

It's really a drag to have music that you love, but that you don't want to play because the pressing isn't that great. With any luck, your favorites are available in a re-release that is better quality.

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Fri, 18 Nov 2011 13:03:35 GMT
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Just received my 5.1 surround SACD of Pink Floyd's Wish You Were Here (Acoustic Sounds). WOW! On well recorded discs these speakers (and flanking subs) are fantastic. Currently listening to Diana Krall on SACD and it sounds great (it was too bass heavy on my Paradigms, but on the 4 Pi's in my new room it is pretty evenly balanced). The new reissues of Nat King Cole are also impeccable. On the other end, the new Avenged Sevenfold CD is down right crappy! The CD sounded great in my car - which should have been a clue it wouldn't sound good on real speakers.

I am hoping that the reissue of Pink Floyd's The Wall (due out in Jan) will have surround sound on Blu Ray. The standard CD version of The Wall is a text book example of digital done poorly back in the early days of transitioning music to CD.

I really wish I would have brought my turntable and albums with me. CDs as a whole are not as good. Unfortunately all my classic music (CCR, Yes, Jethro Tull, etc) is on vinyl.

I am very pleased with the 4 Pi's...I am set (at least until the upgrade bug for the 7 Pi cornerhorns when I retire from the Navy in about 6 years).

Thanks Wayne for all your support during my 2+ years of thinking about/building these speakers.

Subject: Re: 4 Pi Home Theater Build
Posted by [tom-m](#) on Fri, 18 Nov 2011 20:47:49 GMT
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For music in a high quality format, I may try a few downloads from [hdtracks.com](#). I have started to keep and play music from a hard drive. [hdtracks](#) has stuff mostly in 24/96. I get the FLAC format. I have not tried much, but may try Hotel California. Of course they don't have everything. And it can be expensive.

Tom

Subject: Re: 4 Pi Home Theater Build
Posted by [skywave-rider](#) on Fri, 18 Nov 2011 22:27:49 GMT
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Great thread!

Going back, what of the long clamps would you recommend for box building?

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Sat, 19 Nov 2011 02:49:53 GMT
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I bought my clamps from Harbor Freight. The 36" bar clamps (blue) worked well, they are not as good as Bessey clamps but the cost differential is about 3:1. The smaller clamps also worked well (Harbor Freight). The hand-ratchet clamps they sell are complete crap, for that style I will stick with Irwin.

If I had an active woodshop I would probably buy Bessey clamps - the one that I have is clearly better made than the the harbor Freight clamps. But for building a few speakers from time-to-time the Harbor Freight clamps work fine, for the price they are hard to beat.

Subject: Re: 4 Pi Home Theater Build
Posted by [skywave-rider](#) on Sun, 20 Nov 2011 20:11:34 GMT
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Thanks. I ordered some of the blue ones.

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Mon, 21 Nov 2011 00:19:21 GMT

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tom-m wrote on Fri, 18 November 2011 14:47 For music in a high quality format, I may try a few downloads from [hdtracks.com](#). I have started to keep and play music from a hard drive. [hdtracks](#) has stuff mostly in 24/96. I get the FLAC format. I have not tried much, but may try Hotel California. Of course they don't have everything. And it can be expensive.

Tom

I have looked into HDtracks and will be buying some of their HD offerings soon. I need to re-do my digital library, I ripped all me CDs as bit-perfect WAV files unaware that this file format doesn't store the metadata (album and song titles, etc). Am in the process of converting to AIFF so the metadata is kept with the music files. Digital music is nice, but kind of a PTA.

I have 2 terrabyte USB harddrives (I keep two copies in case of drive failure). With WAV if I try to re-load iTunes from the back-up drive I lose all track information. I read this would bnot be the case with AIFF, I guess we will see.

Subject: Re: 4 Pi Home Theater Build
Posted by [petew](#) on Mon, 21 Nov 2011 12:56:42 GMT
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You might be able to transcode your .wav files to another lossless format. Save the hassle of re-ripping everything.

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Wed, 23 Nov 2011 00:09:30 GMT
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petew wrote on Mon, 21 November 2011 06:56 You might be able to transcode your .wav files to another lossless format. Save the hassle of re-ripping everything.

I was able to transcode all the .wav files to AIFF. Now I must re-import them into iTunes. I also have backup copies of all the songs in both formats (I only have about 6,000 songs and a lot of harddrive space).

Looks like my next audio adventure will be trying to replicate the Bryston BDP-1's (digital player that plays files from an attached harddrive) sound quality for far less cash. The Auraliti PK100 provides automatic bit perfect playback of music from 16/44.1 kHz through 24/192 kHz and costs less than \$800. My brother is a computer wonk, so hopefully he can build me one for less that uses the same or better components.

Aside, listened to some old Audioquest CD's last night and they sounded excellent. To bad all CD's don't sound that good.

Subject: Re: 4 Pi Home Theater Build
Posted by [Psychoacoustic](#) on Fri, 25 Nov 2011 04:06:01 GMT
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Wonder how long it will be until you get the itch to try the 7Pi? Only two drivers and a mid-horn flat pack away...

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Fri, 25 Nov 2011 05:44:01 GMT
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Psychoacoustic wrote on Thu, 24 November 2011 22:06 Wonder how long it will be until you get the itch to try the 7Pi? Only two drivers and a mid-horn flat pack away...

I guess about as long as it takes to get an appropriate room. As soon as I get the proper layout, the 4 Pi boxes will be firewood and I will build 7 Pi's. That's the problem with DIY, it never ends.....

Yesterday I hooked up a Win7-based laptop to my onkyo 805 receiver (which has BurrBrown 24bit/192kHz DACs per channel) via a Behringer U-control UCA202 USB/Audio Interface (converts digital from the USB to toslink to run into the receivers DACs). Playing AIFF via iTunes sounds as good or better than the CDs they were ripped from, I think this digital player thing may catch on! If only I had the cash for the Bryston.

Since the internet is so hinky in Cambodia I do not have the laptop running iTunes connected to the internet, makes it a pain to add music as I have to move the HDD to my networked computer. My next quest is maximizing my computer setup, without spending much \$\$\$.

Subject: Re: 4 Pi Home Theater Build
Posted by [skywave-rider](#) on Fri, 25 Nov 2011 19:13:06 GMT
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At home I haven't played a CD for quite a while. Using iTunes and ripped all my CDs to either AIFF or Apple Lossless. Itunes is very good for this, and it's free. :)

I use another drive for backup of my library via Carbon Copy Cloner, which does it automatically whenever I power up my b-u drive.

I found out, as you did, that Wave files don't hold metadata like artwork, so it's either AIFF or Apple Lossless for me. I go AIFF for material I might want to edit (I work in the sound field) and Lossless for music I will only want to listen to. I do that because I can directly edit AIFF files in other programs. The lossless stuff would have to be converted. However, Apple lossless saves a little bit of HD space.

I only use my iPod when traveling. So the option to convert to 128kbit AAC for the iPod only is fine for me. I can then leave my library uncompressed.

I do download some music online from iTunes or Amazon when I can't wait for a CD to be delivered. Sometimes there is no CD option. :)

I also listen to some internet radio stations via iTunes.

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Tue, 26 Jun 2012 14:25:10 GMT
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Finally got around to measuring my 4 Pi speakers and two modified 3 Pi flanking subs (using REW and Dayton EMM-6 electret condenser microphone). Speakers were measured at my listening position, average of 8 measurements. Room is nearly perfect cube which isn't optimal.

Not an expert, but the response looks okay...

File Attachments

1) [Capture.JPG](#), downloaded 8329 times

Subject: Re: 4 Pi Home Theater Build
Posted by [Wayne Parham](#) on Tue, 26 Jun 2012 15:32:04 GMT
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That looks good from 100Hz up, which tells me the flanking subs are setup correctly. I do think you might benefit from adding one or two more distant subs to smooth the lowest modes. You could fill in that 60Hz notch, for example. That would make the 40-50Hz region sound less pronounced, because the bass would be more uniform, overall.

You'll notice the difference between the peaks and valleys below 100Hz is around 15dB. This is typical of room modes that aren't well damped. The peaks and dips above 100Hz would also be this large without your flanking subs filling them in. The flanking subs reduce the ripple by about half. Add another sub or two placed further away and you can expect the same sort of smoothing below 100Hz as the flanking subs provide above 100Hz.

Subject: Re: 4 Pi Home Theater Build
Posted by [blacklabel0730](#) on Tue, 26 Jun 2012 19:52:01 GMT
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Check out <http://www.foobar2000.org/> It will play any format. It is free, and uses very little

memory to run. I switch between that and windows media player. The updated version really does a good job.

I am running http://www.asus.com/Multimedia/Audio_Cards/Xonar_Essence_STX/ for my sound card with RCA cables straight from my PC to my pre-amp and play mostly .flac files. It is slightly compressed but the sound quality is very impressive.

Not sure if that helps you at all, but good luck.

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Fri, 06 Jul 2012 17:32:18 GMT
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Wayne Parham wrote on Tue, 26 June 2012 10:32

That looks good from 100Hz up, which tells me the flanking subs are setup correctly. I do think you might benefit from adding one or two more distant subs to smooth the lowest modes. You could fill in that 60Hz notch, for example. That would make the 40-50Hz region sound less pronounced, because the bass would be more uniform, overall.

You'll notice the difference between the peaks and valleys below 100Hz is around 15dB. This is typical of room modes that aren't well damped. The peaks and dips above 100Hz would also be this large without your flanking subs filling them in. The flanking subs reduce the ripple by about half. Add another sub or two placed further away and you can expect the same sort of smoothing below 100Hz as the flanking subs provide above 100Hz.

One or two more subs, do I look like a sub junkie to you!

Okay, maybe I could become one. When I return to the US (nearly 1 year complete, 1 more to go) I am thinking about building true 3 Pi sub enclosures (vice 16" sealed cubes) for my flanking subs (set to the outside of the 4 Pi's), a JBL STX828S sub (dual 18" 2242 H drivers, 37 Hz 120 Hz +/- 3 dB), and a DIY 18" LLT (large, low tune) sub tuned to 11 Hz for the bottom (models at >110 dB at 10 Hz, 1200 W input, slightly under Xmax).

With proper distribution this combination should address the room modes and be flat from below 20 Hz to LPF.

If not, I could always add more

File Attachments

1) [myLLT1200wExodusMaelstrom-Xgen2.gif](#), downloaded 8170 times

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Fri, 06 Jul 2012 17:36:34 GMT
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blacklabel0730 wrote on Tue, 26 June 2012 14:52 Check out <http://www.foobar2000.org/> It will play any format. It is free, and uses very little memory to run. I switch between that and windows media player. The updated version really does a good job.

I am running http://www.asus.com/Multimedia/Audio_Cards/Xonar_Essence_STX/ for my sound card with RCA cables straight from my PC to my pre-amp and play mostly .flac files. It is slightly compressed but the sound quality is very impressive.

Not sure if that helps you at all, but good luck.

Thanks I will give it a shot. I ordered the Audioengine W-3 wireless transmitter (cd quality DAC, not high res) to send from my computer to the stereo without using the internet (which is not so good here in Cambodia) or wires (which are fine here, but I don't want them running across the room).

Subject: Re: 4 Pi Home Theater Build
Posted by [blacklabel0730](#) on Wed, 22 Aug 2012 15:02:01 GMT
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What size hanger bolts did you use?

File Attachments

1) [2-50.jpeg](#), downloaded 7035 times

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Fri, 24 Aug 2012 10:14:59 GMT
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I believe they were 10-24, but am not positive. Seemed to be around an 8th inch.

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Sat, 30 Aug 2014 00:52:35 GMT
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Started the completion of the center channel speaker. Ordered a used JBL 2226H off eBay. Arrived in great condition, especially considering it has a sticker from 1996 on the magnet.

Ordered a crossover from Wayne this morning. Hope to have last speaker up and running by next weekend.

I got rid of the two sealed enclosures for the LAB12's and built two 100 L ported enclosures (tuned to 22 Hz per winISD).

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Thu, 04 Sep 2014 11:56:08 GMT
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Here are some photos of the LAB-12 based flanking subs:

File Attachments

- | | | |
|----|-------------------------------------|-------------------------|
| 1) | 20140710_093135.jpg | , downloaded 5895 times |
| 2) | 20140710_093034.jpg | , downloaded 5904 times |
| 3) | 20140710_103811.jpg | , downloaded 5794 times |
-

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Thu, 04 Sep 2014 11:57:37 GMT
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Photos of the 4 Pi build progress:

File Attachments

- | | | |
|----|-------------------------------------|-------------------------|
| 1) | 20140830_114000.jpg | , downloaded 5923 times |
| 2) | 20140830_114018.jpg | , downloaded 5895 times |
| 3) | 20140830_114027.jpg | , downloaded 5933 times |
| 4) | 20140903_201143.jpg | , downloaded 5926 times |
-
-

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Thu, 04 Sep 2014 12:00:27 GMT
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And finally, original two built 3 yrs ago getting Duratex finish:

As soon as I get the third crossover from Wayne I will be up and running with LCR. Will be nice to have a center channel again!

File Attachments

- 1) [20140902_142509.jpg](#), downloaded 5924 times
 - 2) [20140903_195608.jpg](#), downloaded 5900 times
 - 3) [20140903_202812.jpg](#), downloaded 5900 times
-

Subject: Re: 4 Pi Home Theater Build
Posted by [Wayne Parham](#) on Thu, 04 Sep 2014 15:06:11 GMT
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Lots of good memories there, and in this thread.

I'll send your crossover tomorrow morning. The silicon adhesive that cushions the coils has been curing since Monday. Those thick blobs take a long time to cure, but I think they're solid enough now to make the trip. I usually let 'em sit a week.

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Fri, 05 Sep 2014 22:35:27 GMT
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It's been a looooong trip...the speakers have literally been around the world.

They sound a lot better after the refinish job, apparently during the transit from Cambodia the bolts holding on the DE250 CD's came loose, on both speakers (that or I didn't get them tight 3 yrs ago, I'm going with trouble in transit so I don't look stooped!). Amazing how much more top end there is now.

Great news about the crossover shipping, I'm putting on the final Duratex coats on the center channel speaker today.

File Attachments

1) [Avatar.png](#), downloaded 5817 times

Subject: Re: 4 Pi Home Theater Build

Posted by [Wayne Parham](#) on Mon, 08 Sep 2014 15:29:49 GMT

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Your speakers have traveled further than most prosound speakers have!

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Fri, 12 Sep 2014 02:43:36 GMT

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Center channel speaker complete. ..5.1 system w 3 subs good to go. Ran through several concert Blu Rays (from Adele to Metallica) and the sound is great.

Next step is busting out the measurement equipment and getting busy with measuring and equalizing the system.

Subject: Re: 4 Pi Home Theater Build

Posted by [Wayne Parham](#) on Fri, 12 Sep 2014 13:30:05 GMT

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I've become a big fan of concert BluRays too. There are some great ones out there, aren't there?!!

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Wed, 24 Sep 2014 23:35:11 GMT

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There sure are and amazingly sometimes are cheaper than CD's of the concert. I really like Sully

Erna Avalon blu ray. Although he is the lead Singer of the band Godsmack you would never know from his solo work. He brought in the drummer from Dead Can Dance and a cello player from Bulgaria. Music is along the lines of DCD but not quite as out there musically (DCD is one of my favorite bands). Lots of hand drumming. Very good sound quality.

I just bought Leonard Cohen's new CD yesterday. It is definite must have. Sounds phenomenal on the 4 Pi's. Hard to believe he is pushing 80.

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Fri, 12 Dec 2014 15:42:39 GMT
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Finally developed rudimentary REW skills. Here is the current measurements (L+R, Flanking Subs, and Near-Field Sub).

Sounds great.

File Attachments

1) [Measurements.png](#), downloaded 4111 times

Subject: Re: 4 Pi Home Theater Build
Posted by [Wayne Parham](#) on Fri, 12 Dec 2014 16:35:21 GMT
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Looks really good! I can see that your setup sounds great!

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Fri, 12 Dec 2014 17:30:18 GMT
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I am very happy with the sound.

Working a building 4 surrounds based on the Eminence Beta 10cx and PSD2013S-8 drivers. Starting with the Eminence XO and if required will start tweaking the XO. I need to get it done fairly soon as I am going to Africa to battle ebola early 2015.

Subject: Re: 4 Pi Home Theater Build
Posted by [Wayne Parham](#) on Fri, 12 Dec 2014 21:35:25 GMT
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Wow, looks like you gotta travel the world some more, man, that's cool!

I'm with you on the surrounds. I like the sound of mains alone, and surrounds aren't needed for a satisfying experience. But having them definitely adds something. Some effects are especially dependent on the content of surrounds, especially action films. A good surround system really enhances the illusion of "being there" they're trying to create in some movies.

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Mon, 02 Apr 2018 19:00:28 GMT
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Haven't posted in a while. System has changed significantly. I bought a pair of JBL Pro Cinema 4645B's (w/ JBL's 18in 22242H driver). The cabinets were huge (39¾ in x 26½ in x 17¾ in) so I designed a new speaker that combined the 4Pi's and the 4645B's, with a bit of a twist.

Concept:

Build:

File Attachments

- 1) [DIY Pi-JBL Cabinet design 2.jpg](#), downloaded 1538 times
 - 2) [workspace 2.jpg](#), downloaded 1400 times
 - 3) [glueing the cabinet.jpg](#), downloaded 1477 times
 - 4) [finish front.jpg](#), downloaded 1497 times
 - 5) [bracing bottom of cabinet.jpg](#), downloaded 1478 times
-

Subject: Re: 4 Pi Home Theater Build

Posted by [NWCgrad](#) on Mon, 02 Apr 2018 19:04:58 GMT

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Final photos:

Started out with the JBL 2123H drivers for the Midhorn, but transitioned to a pair of JBL 2012H drivers I had re-coned with genuine JBL re-cone kit). All JBL Pro drivers, which was a goal.

Decided the 4 Pi in the center was out of place, but due to not having an acoustically transparent screen had to come with a different plan (one that used the JBL 2226H's from the previous 4 Pi speakers).

Overall I am very pleased with the system. Running active with a dbx Venu360 processor (and a stack of Crown amps).

File Attachments

- 1) [Midhorn driver rear chamber, .6 cu ft.jpg](#), downloaded 1492 times
 - 2) [148617057611395820032.jpg](#), downloaded 1455 times
 - 3) [20170814_193132.jpg](#), downloaded 1489 times
-

Subject: Re: 4 Pi Home Theater Build

Posted by [Wayne Parham](#) on Mon, 02 Apr 2018 20:13:44 GMT

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Wow, Steve, those look awesome!

Great to hear from you!

I love the color - Looks like a dark blue - is that the lighting or are they actually that color? Nice touch!

Subject: Re: 4 Pi Home Theater Build

Posted by [tom-m](#) on Mon, 02 Apr 2018 21:02:40 GMT

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Heavy duty... Looks good, and big. what are the crossover points?

tom

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Wed, 11 Apr 2018 12:57:32 GMT
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Wayne Parham wrote on Mon, 02 April 2018 16:13
Wow, Steve, those look awesome!

Great to hear from you!

I love the color - Looks like a dark blue - is that the lighting or are they actually that color? Nice touch!

Wayne, Glad you like the looks. They are True Blue (Behr Marquee paint). I was going to veneer them, even bought the veneer. However, the cabinets were slightly over 200 lbs without drivers and I could not physically maneuver them by myself to safely veneer.

Subject: Re: 4 Pi Home Theater Build
Posted by [NWCgrad](#) on Wed, 11 Apr 2018 13:12:07 GMT
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tom-m wrote on Mon, 02 April 2018 17:02 Heavy duty... Looks good, and big. what are the crossover points?

tom

They are rather large @ 48" H x 28.75" W x 19.5" D. I used the JBL Pro 4355 Monitor and HLA 4895 speakers as inspiration for the build.

Current XO points are:
HF LP-out; HP-3kHz, BW6, 0 dB gain
MF LP-3kHz, BW6, -2 dB gain; HP-200Hz, BW6
LF LP-215Hz, LR24; HP-20Hz, LR48.

Used REW measurements to determine XO slopes, microphone was 6 inches off the front baffle, centered with driver.

Still a work in progress. I wanted to build a speaker of sufficient quality to last for several years. The limitation of the speakers is my ability to dial in the XO and PEQ.

I have heard a lot of great home theaters, using speakers ranging from the JBL Pro M2 (awesome speaker!!!!!!), JTR 215, Danley Sound Labs SH50's, and Yorkville Unity U215. While all these speakers are top notch, I don't believe any are clearly superior to the ones I built.

Wayne deserves big kudos! I started with his excellent 4 Pi's and then using the midhorn from the 7 Pi speakers built my dream speaker.