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Subject: 4Pi Rough concept  
Posted by [ggnarley](#) on Wed, 23 May 2018 22:35:20 GMT  
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Working out a design to fit in living room. Hoping to be able to disguise them as end tables/plant stand for (WAF). 3 Sides will be wrapped with vintage grill cloth. Top and bottom capped with solid maple or walnut. May add some small trim pieces to finish out. All dimensions will be exact to Wayne's plans.

Below is first concept and old vintage Grundig unit I am borrowing design idea from.

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#### File Attachments

- 1) [4pi\\_v1.PNG](#), downloaded 303 times
  - 2) [Old\\_Grundig.PNG](#), downloaded 2871 times
- 

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Subject: Re: 4Pi Rough concept  
Posted by [Wayne Parham](#) on Wed, 23 May 2018 23:08:54 GMT  
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That's an awesome look! Can't wait to see those speakers!

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Subject: Re: 4Pi Rough concept  
Posted by [ggnarley](#) on Sat, 02 Jun 2018 03:05:19 GMT  
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Making progress.

Overall design constraints.

- 1) WAF. Try to blend in with living room decor. Don't want them to shout out (I'm a speaker) at first sight.
- 2) Will be used on occasion as PA system for Girl Scout/Church functions in school gym.
- 3) Stick with original 4pi dimensions.

4 pi is 18.5" x 14.5" x 26.5" tall as designed by Wayne. Was going to stretch depth out to 18.5" to make the top of the speaker square. (Would recess the back 4" to keep internal volume of speaker as designed). My idea was to insert a 15" x 15" black granite floor tile on the top of the

speaker and frame it out in maple or walnut. Hopefully this would make it look like more of a piece of furniture/end table. Was also going to wrap speaker grill around 3 sides. Soooooooooo

Bought a couple 3/4" birch plywood sheets and had them ripped in half at store to get them home.

Broke out my tools to break panels down to size.

After a few minute hacking away, I had the panels sized.

Broke quite a sweat in the process so I had to re-hydrate.

Dry fitted panels to get idea of dimensions.

Initial thought is I don't like the extra depth. Proportions just don't look right. Will think on it over night and decide whether to reduce depth by 4 inches to bring external dimensions back to spec.

Paul

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#### File Attachments

- 1) [tools.jpg](#), downloaded 2504 times
  - 2) [panels.jpg](#), downloaded 2492 times
  - 3) [Beer.jpg](#), downloaded 2495 times
  - 4) [Box.jpg](#), downloaded 2483 times
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Subject: Re: 4Pi Rough concept  
Posted by [joshua43214](#) on Sat, 02 Jun 2018 20:32:16 GMT  
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Best hatchet work I've seen in years

Anything remotely cubic will just have a lot of gravity. You have to either embrace it or make a

major design change.

Possible you might be able to "fix" it visually with finish treatments, you can use patterned speaker cloth or maybe do a partial cover. Put it on a plinth so the front has golden rectangle proportions?

What is the style of the house? I'm guessing ranch or one those two story things with the attached garage right in front (forget the name). Those usually have a nice family room with no fixed style and you can make a lot of stuff work.

I feel your pain though. Went around and around this with the tweeter for the 6Pi. It is either fugly or overly "pro-sound" looking.

BTW, looks like you got a nice shop there. Do I spy a joiner just past the drill press holding up the bike?

-Josh

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Subject: Re: 4Pi Rough concept  
Posted by [ggnarley](#) on Sun, 03 Jun 2018 02:39:02 GMT  
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Josh,

Yes, it is one of the ranches. Interior wise, we don't have a set style so I don't have to match any specific style.

That is a jointer that is hiding in the corner. Have to move a couple bikes to use it. I have two car garage's worth of tools in jammed into a one car garage.

Decided to cut the depth down to designed depth of 14.5" They look much better.

I glued and screwed the sides. They will be covered by something so not worried about looks. Trying for the most strength as I envision them being moved a lot. Back is loosely placed in to keep them square while glue dries.

Got the cleats in and screws for back set.

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### File Attachments

- 1) [back.jpg](#), downloaded 271 times
- 2) [sides.jpg](#), downloaded 2396 times

3) [bluetooth.jpg](#), downloaded 2409 times

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Subject: Re: 4Pi Rough concept  
Posted by [ggnarley](#) on Sat, 09 Jun 2018 04:20:17 GMT  
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Baffle trim in place. Hoping to give baffle a little extra support. After installed, baffle will be recessed 3/4" so I can wrap front and sides with grill cloth.

Baffles and pi logo cut.

Paul

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#### File Attachments

- 1) [Baffles 2.jpg](#), downloaded 2268 times
  - 2) [baffle mount trim.jpg](#), downloaded 2218 times
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Subject: Re: 4Pi Rough concept  
Posted by [ggnarley](#) on Mon, 11 Jun 2018 01:36:04 GMT  
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Starting to look like a speaker now.

Had to remove some of inside trim as it was interfering with the port tube.

Finished inside of box

Got to finally listen to just the woofer a bit. Hooked it up as right channel and kept existing small bookshelf speaker as left. Didn't have all ports on cabinet sealed and no insulation or bracing. Sounding much more like a speaker. Was amazed by how much the box was resonating at only 5 watts. The back panel was just tapped in place without any screws, and it felt like rubber. I've only had small bookshelf speakers prior to this and didn't realize how powerful this speaker will be. Definitely going to brace as recommended, and then some.

Paul

## File Attachments

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- 1) [Outside.jpg](#), downloaded 2163 times
  - 2) [Port Trim.jpg](#), downloaded 2175 times
  - 3) [Finished Inside.jpg](#), downloaded 2067 times
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Subject: Re: 4Pi Rough concept

Posted by [ggnarley](#) on Sun, 17 Jun 2018 03:04:20 GMT

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Installed cleats on back board of cabinet to guide brace going from front to back. Slightly tapered the front edge so it will funnel the brace into position. Will put two screws through back and into brace for extra support. On the front side of the brace I used some Kreg pocket screws.

Brace going from side to side is also held in place by pocket screws. Each brace is just a hair longer than needed to give a compression fit.

Port sides are 1/2 baltic birch I had lying around. Glued up port box separately on it's end and stapled with finish nails. After it dried I glued and screwed it to the front face, then added some 2 inch screws.

I'm on the fence with the black foam tape I used for sealing the speaker back. I screwed the back in while I was fitting the braces, and when I took the back off, the foam stayed about completely compressed. I guess I was expecting it to bounce back a little bit.

I have some black speaker grill from parts express and wanted to mock up what the final speaker would look like. Plan on wrapping 3 sides with the cloth. Tried some walnut and it was ok. Liked the maple pictured here a lot better. As of now, my plan is to build a solid 2" thick slab that overlaps a bit on all sides. I will recess the center around 3/4" so it stays in place and covers the top edges. Will oversize a bit to allow for seasonal wood movement. I may also run a maple board about 5" to 6" down the back of each side as pictured. It breaks up the blockiness of the mass. (Hat tip to Josh).

Here is the lumber I will use. It is the last of some maple and walnut I got about 20 years ago. My wife and I refer to that time as BC - (before children). Anyway, still working out exact details of how to attach everything. Noodling a couple ways to be able to remove the grill without too much hassle.

I would like to add some extra protection to the woofer. First, these may be moved and used for various school, church family functions. Second, our house is a bit crazy at times. We have gone through fazes of inside roller bladeing, skateboarding football and soccer. I've looked at various official metal type speaker grills, and even forming my own from hardware cloth. It doesn't have to be pretty as it will be covered by the grill cloth. Then I saw our pizza screen used for baking pizzas and thought it might work. I can get a 15" one for about 3 dollars. If it doesn't work, we use it for cooking. If it does, I will change the speaker name to pizza pi.

Paul

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#### File Attachments

- 1) [Brace\\_cleats1.jpg](#), downloaded 1957 times
  - 2) [brace\\_cleats2.jpg](#), downloaded 1948 times
  - 3) [Mock-up.jpg](#), downloaded 1956 times
  - 4) [Maple\\_Boards.jpg](#), downloaded 1971 times
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Subject: Re: 4Pi Rough concept

Posted by [ggnarley](#) on Mon, 25 Jun 2018 01:59:01 GMT

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The goodies from Wayne came in. I purchased the x-overs and wave guides. I only have one set of drivers (JBL 2226 Midbase and B&C 250 cd) at this point, so time to get one up and going.

Placed the waveguide in cutout to mark for mounting holes. Drilled and inserted t-nuts. Somehow I got one of the holes a hair off so will have to pull t-nut, ream hole and reinstall. But that can wait.

Wayne suggests putting something under x-over to keep it from vibrating. Took a tour of our basement and found and old snow sled that would work great. It is just a thin piece of plastic laminated to 1/8 foam.

Measured and cut with utility knife and it worked great. Had to enlarge x-over holes just a bit to allow screws through. Mounted it and resistor to bottom of cabinet.

Have been doing a little more electrical work than normal lately. Finally got some crimpers to make electrical connections and wishing I had bought them years ago. They make really strong professional looking connections. I crimped all the wires for one speaker. I would think spade lugs would give a better connection, but both drivers had only spring loaded connections, so I used those.

Time to listen to some music now. Still don't have insulation in place, but want to hear how it sounds. Got my son to help carry it into the living room and hook it up. They are heavy!

WOW!! I have the 4pi on one one channel and my existing bookshelf speaker on the other channel. Sounds like there is a pillow over the bookshelf speaker compared to the pi. The two things that stick out to me right away are the vocals and percussion. Etta James "At Last" sounded like she was in the room. This is even with just one channel. Percussion was equally impressive. Night and day difference from the bookshelf speaker.

Wife and son also really liked the sound. My younger son then wanted to play something he likes that was only on spotify. It was some current pop song, but you could immediately tell how compressed it was. I stuck to CD rips for the rest of the listening session. Played classic rock, blues, classical, vocals and it was all like listening to the music the first time.

Currently I am running an old NAD 3020 amp I got in college many many moons ago. Only has 20 watts and can barely drive the book shelf speakers to a somewhat loud level. At 1 watt my one 4pi sounds much better. Played a few songs at about 10 watts when rest of family was away and it sounded incredible.

It will be hard to unhook this speaker to finish it up.

Paul

#### File Attachments

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- 1) [T-nuts.jpg](#), downloaded 1746 times
  - 2) [xover\\_foam.jpg](#), downloaded 1760 times
  - 3) [Mounted crossover.jpg](#), downloaded 1748 times
  - 4) [Crimpers.jpg](#), downloaded 1774 times
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Subject: Re: 4Pi Rough concept  
Posted by [johnnycamp5](#) on Tue, 26 Jun 2018 23:06:09 GMT  
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Looking good!

That's great news that you like them. If all your drivers are new, they will loosen up and improve over time (especially in the mid-bass).  
That was my experience.

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Subject: Re: 4Pi Rough concept  
Posted by [ggnarley](#) on Thu, 28 Jun 2018 20:43:11 GMT  
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johnnycamp5,

Yes they are new. Can't wait till they break in. They still are miles above what I have now as is, so it will just be icing on the cake

Paul

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Subject: Re: 4Pi Rough concept  
Posted by [ggnarley](#) on Fri, 29 Jun 2018 15:22:59 GMT  
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Working on insulation. Decided to put 2" wood screws around the perimeter of where any insulation is being installed to tether it in place. These will be moved around from time to time to various functions, so I wanted to make sure insulation is held in place well.

Cut separate pieces for each side and cut openings for wiring and braces. Tried to leave enough area around port so air would not be restricted.

Also reamed hole of t-nut for wave guide that was out of place and reinstalled.

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#### File Attachments

- 1) [insulation\\_both.jpg](#), downloaded 1021 times
  - 2) [insulation\\_side.jpg](#), downloaded 1001 times
  - 3) [twine\\_screws.jpg](#), downloaded 930 times
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Subject: Re: 4Pi Rough concept  
Posted by [ggnarley](#) on Sat, 07 Jul 2018 15:12:44 GMT  
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Picked up second set of drivers for other speaker. Had a hiccup with each one. Went to install the wave guide on the B&C DE250 and noticed one of the 4 screws that go through the back was a bit higher than others. Removed it and tried putting it back in and felt it was a bit tight. Put a tiny dab of oil on it and it went in much better. Was installing the t-nuts on the JBL 2226 and got to the 5th one and noticed it was a different size. I got 5 the correct size and 3 wrong. (Called Harmon and they are sending out new hardware package). Had to remove one and reinstall at four sides to get it installed for testing.

Also used another method to install insulation. Got some 5/8 dowels and put a screw in each side to hold insulation. I think it looks and works much better than old way.

Got to listen for a couple hours at moderate volume as everyone was out of house. (Will talk about sound later, but for now one word WOW!!!) Anyway, wife came home looked at speakers in about area where they will be and said they looked good.

That got me to thinking about grill treatment. My original idea was to wrap speaker on 3 sides with cloth and make solid wood top. After positioning them, they are a bit tall for end tables and think in our room they will need to be raised a bit get sound at better level. Also, they are heavy. Need my son to help carry them. I am going to be transporting these to different functions and could see the grill cloth on the sided getting tore up when moving them. Sooo

Decided to try an inset grill instead. Ripped 3/4" baltic birch scraps of cabinet to 1" depth. Have question though. Will this depth interfere with baffle diffraction? The frame is still outside of the 45 and 90 degree pattern of the wave guide. One thought is to cut off the top of frame to just cover the midbass driver if it does make a difference and work on a thinner or no grill for top. Can't go any less in depth as I don't want speaker hitting grill when playing normally. I have rounded the corners on frame, and for now will lightly tack up one grill to see how it goes and sounds.

Had to rabbet out edge of frame to accommodate edge of wave guide

Final position of grill on speaker

Paul

## File Attachments

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- 1) [Frame\\_On\\_Speaker.jpg](#), downloaded 913 times
  - 2) [babbet.jpg](#), downloaded 893 times
  - 3) [frame\\_back.jpg](#), downloaded 865 times
  - 4) [Insulation\\_New\\_Old.jpg](#), downloaded 906 times
  - 5) [Dowel.jpg](#), downloaded 901 times
- 

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Subject: Re: 4Pi Rough concept  
Posted by [Wayne Parham](#) on Sun, 08 Jul 2018 17:24:05 GMT  
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Getting close now!

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Subject: Re: 4Pi Rough concept  
Posted by [ggnarley](#) on Sun, 08 Jul 2018 23:29:01 GMT  
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Stapling up cloth over frames. Wasted an hour scrounging around looking for my manual staple gun to fasten grill cover on frame. Just about resolved to go get another one, and wife says why don't you try our paper stapler. Worth a shot. Well it turned out to be perfect. Almost all the staple drove cleanly and they ended up below the level of the cloth so overall depth would not be increased.

Sanded all the sides of the frame smooth so it wouldn't catch cloth. Set the four corner blocks around midbass to use as attachment point if needed. I sized the frames to fit snugly inside the recess of the front cabinet so hopefully could just tap them in without any anchor. So far so good.

Had to sand a bit extra on a few edges to get the fit right. Outside of speaker still in rough state. Pencil marks, not sanded only minimal screw in to get them playing.

To continue. Everyone just left so time for some listening.

Paul

### File Attachments

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- 1) [Both.jpg](#), downloaded 883 times
  - 2) [side.jpg](#), downloaded 853 times
  - 3) [front.jpg](#), downloaded 808 times
  - 4) [frame.jpg](#), downloaded 850 times
  - 5) [Stapler.jpg](#), downloaded 841 times
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