
Subject: skywave's 3Pi subwoofer build

Posted by [skywave-rider](#) on Thu, 01 Mar 2012 19:25:37 GMT

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I am planning my 3Pi subwoofer build and I have a few questions regarding woofer mounting.

The Pi Subwoofer driver has 0.26", (6.6mm) mounting holes. What's the best thing to do...should I use all 8 mounting holes, t-nuts, and what size screws work best so as not to distort the mounting flange? I was thinking of getting these.

I am probably not recessing the woofer, and I will use a grill like this, requiring this sort of hardware, unfortunately.

The cheaper plastic grill mounts would be less damaging to the baffle.

Any tips are appreciated.

Subject: Re: skywave's 3Pi subwoofer build

Posted by [Wayne Parham](#) on Thu, 01 Mar 2012 21:02:15 GMT

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I like using T-nuts for the larger drivers, 10-32 size with button head or hex head screws. Wood screws are fine for dome tweeters and small cone speakers, but I do like something a bit more substantial for horns and larger prosound drivers. Some people prefer threaded inserts - and those are great too - but I've worked through all the problems you commonly run into with T-nuts so I'm good with them. The trick is to get good T-nuts (like from Midwest Fastener) and pull them into the wood before assembly.

Don't beat them in with a hammer, and don't pull them in place when you're putting the speaker together. Use a washer and a sacrificial screw (or three) to gradually pull the T-Nut in by tightening it down. Only use the screw to pull-in three or four T-nuts, then discard it and get a new one. I also recommend a drop of PL adhesive on each T-Nut to hold it firmly in place.

Don't skimp on this step. You are planning for the T-Nuts to last the life of the cabinet, and to provide you with trouble-free, serviceable access. If you install them as I've described, they'll be that for you. But if you don't, they can be a real pain. Every time I hear of someone complaining about T-Nuts, they're in one of these categories:

1. Tapped the T-Nuts in with a hammer - The tangs bent, and the T-Nut is loose, held only by the screw clamping force. So when you loosen the screw, the T-Nut spins. Makes it really hard to get the speaker out for service.
2. Didn't put a spot of epoxy on the T-Nut - Even if the tangs go in straight, a few knocks on the head of a partially loosened screw can make the T-Nuts come loose. They hold pretty well, but it's easy insurance to add a dab of PL adhesive during assembly. Just a dab though, don't get any on the threads.

3. Pulled the T-Nuts in with a screw, as described, but used the same screw over and over again, damaging the T-Nut threads - Sacrifice the screw, only use it to set two or three T-Nuts. You don't want them to have damaged threads, 'cause once they're installed, they're permanent.

Put 'em in right, and they'll last a lifetime, giving you trouble-free serviceable access. But put 'em in wrong, and you'll be frustrated to no end when it's time for a woofer to come out.

Subject: Re: skywave's 3Pi subwoofer build
Posted by [skywave-rider](#) on Thu, 01 Mar 2012 21:32:47 GMT
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Thanks, Wayne. I will do my best.

Subject: Re: skywave's 3Pi subwoofer build
Posted by [Psychoacoustic](#) on Fri, 02 Mar 2012 01:41:24 GMT
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G'day skywave- I used those same P.E. grilles on two Pi 3 S/Ws. No installation or vibration problems at all.

Subject: Re: skywave's 3Pi subwoofer build
Posted by [skywave-rider](#) on Fri, 02 Mar 2012 04:32:31 GMT
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Thanks, Psychoacoustic!

Subject: Re: skywave's 3Pi subwoofer build
Posted by [Psychoacoustic](#) on Fri, 02 Mar 2012 04:44:50 GMT
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Just one thing, mate- are you planning on leaving the thickish (10mm?) supplied gasket under the woofer frame? I queried this, Wayne said it stays. If so (I used those same mounting flanges as well), you'll need to fashion spacers for under the flanges to allow for the thickness of the gasket.

Subject: Re: skywave's 3Pi subwoofer build
Posted by [skywave-rider](#) on Fri, 02 Mar 2012 04:58:20 GMT
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I see, spacers for the flanges on the grill clamps?

These?

<http://www.parts-express.com/pe/pshowdetl.cfm?AID=10500969&PID=1941119&Partnumber=260-352&scqty=1>

or maybe these:

<http://www.parts-express.com/pe/pshowdetl.cfm?AID=10500969&PID=1941119&Partnumber=260-340&scqty=1>

To raise them high enough to work ... I think I get it. The cut sheet I downloaded from Eminence shows a thick gasket on top of the woofer frame. But I can't see if there's also one below. Anyway, I will know in a few days.

Subject: Re: skywave's 3Pi subwoofer build

Posted by [Psychoacoustic](#) on Fri, 02 Mar 2012 05:03:47 GMT

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Right, not the one on top- that won't interfere, but the hard laminated paper gasket below, which I queried with Wayne. Perhaps I misinterpreted his reply and its not meant to be there.

I used scrap MDF for the spacers- little bit rough, yes, but the cabs haven't been veneered either!

Subject: Re: skywave's 3Pi subwoofer build

Posted by [skywave-rider](#) on Sat, 03 Mar 2012 16:40:37 GMT

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Psychoacoustic wrote on Thu, 01 March 2012 23:03: Right, not the one on top- that won't interfere, but the hard laminated paper gasket below, which I queried with Wayne. Perhaps I misinterpreted his reply and its not meant to be there.

I used scrap MDF for the spacers- little bit rough, yes, but the cabs haven't been veneered either!

I just got the woofer, thanks, Wayne.

I see the hard laminated paper gasket referred to by Psychoacoustic. Wayne, since the bottom of the woofer flange is perfectly flat, is there harm in not using the hard paper gasket there? I would use a weatherstrip type tape for a seal instead. The reason is to keep the woofer from protruding as much as is practical. I would leave the top gasket to mount the metal grill on top of so there is enough clearance between the surround roll and the grill.

Regarding the mounting holes in the woofer flange, do I need to worry about the edge of the surround which covers almost 50% of the hole?

Subject: Re: skywave's 3Pi subwoofer build
Posted by [Wayne Parham](#) on Sun, 04 Mar 2012 03:21:39 GMT
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You can take the gasket off if you want, but if you do, be sure to scrape it off completely and clean the surface, like you would do on an engine rebuild. Start with a completely smooth and clean surface for the new gasket. Otherwise, you may not have a good seal.

I guess I don't see the benefit in doing this. If you are concerned with the height from the baffle, wouldn't it be better to route a recess for the woofer to sit in?

About the mounting holes, and the portion of the surround that partially covers them, simply foke through that. It's just an artifact of assembly. You can cut it with a razor, if you want. But you can just poke the mounting screw into the hole too. There's no harm if that bit of material bends or tears.

Subject: Re: skywave's 3Pi subwoofer build
Posted by [Psychoacoustic](#) on Sun, 04 Mar 2012 10:34:08 GMT
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Hope these photos give some perspective. Please excuse the filth- it's all part of the sonic tuning.

Showing spacer, grille, mounts, riser.

Hard time finding veneer here.

Subject: Re: skywave's 3Pi subwoofer build
Posted by [Psychoacoustic](#) on Sun, 04 Mar 2012 10:36:06 GMT
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Forward sub.

Rear.

Subject: Re: skywave's 3Pi subwoofer build
Posted by [skywave-rider](#) on Sun, 04 Mar 2012 13:59:42 GMT
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Wayne Parham wrote on Sat, 03 March 2012 21:21

You can take the gasket off if you want, but if you do, be sure to scrape it off completely and clean the surface, like you would do on an engine rebuild. Start with a completely smooth and clean surface for the new gasket. Otherwise, you may not have a good seal.

I guess I don't see the benefit in doing this. If you are concerned with the height from the baffle, wouldn't it be better to route a recess for the woofer to sit in?

About the mounting holes, and the portion of the surround that partially covers them, simply foke through that. It's just an artifact of assembly. You can cut it with a razor, if you want. But you can just poke the mounting screw into the hole too. There's no harm if that bit of material bends or tears.

Wayne,

Actually, the woofer arrived with no gasket at all on the bottom part of the flange. The top has a neoprene (maybe) gasket which is possibly be glued on. I don't want to mess with it. A thick paper or fiber gasket was taped to the top of that, for use on the bottom. So I have a clean surface on the bottom flange.

As far as the recess goes, I would love to do that but it will require a thicker baffle and more cost. The protection and aesthetic the recess offers is something to consider, though.

Thanks for the tips on the mounting holes. I managed to accidentally remove the surround on a PE woofer once with mounting screws, but that's a different animal I'm sure.

Subject: Re: skywave's 3Pi subwoofer build
Posted by [skywave-rider](#) on Sun, 04 Mar 2012 14:12:37 GMT

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Psychoacoustic,

Thanks for the photos. Your system looks formidable. Actually, I don't mind a raw finish or a utility finish. I could live with that for sure.

The detail of the spacer used on the grill mount assembly is great, and I can now see that shape is not very easy to make.

I admire your skills, and I would love to hear those cornerhorns.

Isn't it interesting how many avid hi-fi and horn-system fans there are in Japan?

Subject: Re: skywave's 3Pi subwoofer build

Posted by [Wayne Parham](#) on Sun, 04 Mar 2012 14:54:01 GMT

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skywave-rider wrote on Sun, 04 March 2012 07:59: Actually, the woofer arrived with no gasket at all on the bottom part of the flange. The top has a neoprene (maybe) gasket which is possibly be glued on. I don't want to mess with it. A thick paper or fiber gasket was taped to the top of that, for use on the bottom. So I have a clean surface on the bottom flange.

Of course, you're right. So sorry for the confusion! I was thinking of the pressed framed drivers that have the gasket glued on. Those are rather thin, and don't make much sense removing. But the cast drivers don't have them. You're talking about that extra gasket, loose in the box, the one that comes with the woofer.

The included unattached paper gaskets that come with the woofers are good. They double as spacers for installations where the woofer is mounted to a compression plate. But if you want a spacer and don't need the extra thickness, try making a gasket with PVC material. Like this:

Subject: Re: skywave's 3Pi subwoofer build

Posted by [skywave-rider](#) on Mon, 26 Nov 2012 22:09:44 GMT

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Wayne, your T-nut installation instructions should go into your FAQ thread if it isn't already. Stupid question, is Gorilla Glue going to hold the T-nuts? Or is epoxy, as you mentioned, the way to go?

Subject: Re: skywave's 3Pi subwoofer build

Posted by [Wayne Parham](#) on Mon, 26 Nov 2012 22:18:04 GMT

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Good catch, I'll add that T-Nut installation page to the FAQ right now.

I like using 5-minute epoxy but PL adhesive or Gorilla glue will work just fine too. The whole goal is to give 'em just a little more "stick". I've found that T-Nuts tapped in bend the prongs sometimes, so that leaves us with nothing holding them. But even when you pull 'em in as described in the "installation instruction" post linked above, they still just have the three or four prongs holding them in. The rasped ones hold better than the straight ones, but still, I've had them get loose over time. A dab of glue prevents this. It really stinks when you go to remove a woofer for whatever reason, and the T-Nut spins. So this is just extra precaution. I've never had a problem with a T-Nut that I added a dab of glue before installing it.

Subject: Re: skywave's 3Pi subwoofer build
Posted by [steve f](#) on Tue, 27 Nov 2012 03:16:32 GMT
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Been following the thread. I personally don't like Gorilla Glue for mounting tee nuts. The glue expands as it dries, and you have to keep wiping off the excess. If you assemble the woofer wet, glue can get on threads, gaskets, etc. You will have one heck of a time removing the driver for servicing. Epoxy or non expanding glues work best.

Another way to insert tee nuts is to drive them in with a C clamp. No thread distortion at all.

Steve

Subject: Re: skywave's 3Pi subwoofer build
Posted by [Wayne Parham](#) on Tue, 27 Nov 2012 04:00:26 GMT
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You're right that Gorilla glue and PL adhesive expand as they cure. But if you just put on a drop, just a smear of film, that kind of adhesive works great. That's all we want, really, just a dab. It adds extra hold and prevents the T-Nuts from backing out. But yeah, whether epoxy or PL adhesive, you have to be careful not to get it on the threads or anywhere else you don't want it.

Using a C-Clamp is basically the same approach I usually recommend, which is to pull T-Nuts in with a screw and washer rather than tapping them in with a hammer. I think the C-Clamp method is a fine way to do it too. The main thing is to apply a slow, even and straight pressure rather than with sharp impacts from a hammer, which tend to bend the tongs rather than driving them in.

My experience with high-power horns subs is what drove me towards these methods. Prosound subs beat the hell out of stuff, and you would be suprised what that much vibration can do.

Most people won't punish their subs the way prosound horns subs are, and many won't ever need to remove a woofer. So for them, this is probably overkill. But there's nothing worse than a spun T-Nut when you're trying to remove a driver, so I think it's worthwhile to do anyway.

Subject: Re: skywave's 3Pi subwoofer build
Posted by [chrisR](#) on Tue, 27 Nov 2012 22:30:28 GMT
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Wayne,

Have you tried the hurricane nuts from PE? No prongs, but a sort-of thread on the outside of barrel. They've been easier to deal with for me. Chris

Subject: Re: skywave's 3Pi subwoofer build
Posted by [Wayne Parham](#) on Wed, 28 Nov 2012 01:22:03 GMT
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chrisR wrote on Tue, 27 November 2012 16:30 Have you tried the hurricane nuts from PE? No prongs, but a sort-of thread on the outside of barrel.
Yeah, I've tried them. They remind me of Heli-Coils, which I really like for metal. But I personally prefer T-Nuts for wood. Lots of folks here like those Hurricane nuts though, so if it's working for you, it's all good. I think with a dab of epoxy, it's probably six one way and a half-dozen the other.

Subject: Re: skywave's 3Pi subwoofer build
Posted by [skywave-rider](#) on Sat, 15 Dec 2012 20:27:17 GMT
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Wayne,
I finally found some Baltic birch in NYC. Very expensive, and I hope the shop can make straight cuts for me (they have a table saw, nothing fancier.)

Hoping not to bend your ear too much, I have a few questions.

The sub build is being done at my school as a Professor-financed student project. So we are not going fancy. I am a poor college professor! Hahaha.

I need it all done and integrated for a sound final exam exhibition and after party by Friday. So it has to be built in 1.5 days max.

But, in the room, a rectangular classroom, I want to use flanking subs. There is only one 3 Pi to be built. I was thinking of, if the wood was available, making 2 identical 3Pi boxes and loading the second with a Dayton classic sub and plate amp. (I already built this into a too small box for mediocre performance. What if I put the Dayton into that extra 3Pi box and tuned it for similar LF response?)

I understand that it's really the low mid-bass performance of the sub which is critical for flankers set up for stereo operation. So I don't know if it's worth a shot.

Another idea I had which would be less effective in eliminating the backwave rear wall bounce cancellation would be 1 mono sub between and behind the stereo mains, another at the mid point of an adjacent wall. I realize that would collapse the stereo image somewhat.

If I don't feel like spending the extra dough for the extra 3Pi box, I could borrow a Genelec sub from the recording studio. Don't know how that would flank with the 3Pi. It has some decent rolloff selections however.

Any good ideas here? Remember, the power requirements will not be much and excursion issues

are unlikely.

Subject: Re: skywave's 3Pi subwoofer build
Posted by [Wayne Parham](#) on Sat, 15 Dec 2012 22:39:10 GMT
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Flanking subs are stereo pairs, one for each main. So you really want them to be matched, e.g. a would be worried that the balance would be off.

More distant subs don't have to be matched though. For the distributed multisubs, you can run the same model as the flanking subs, but they don't have to be.

Subject: Re: skywave's 3Pi subwoofer build
Posted by [skywave-rider](#) on Sun, 23 Dec 2012 17:31:52 GMT
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Just a quick note reporting that the sub got built with just enough time for the glue to dry and was immediately thrown into service:
(Pardon the hyperbole)
The Earpocalypse

Some things might be of interest to newbie box builders like myself:
I followed Wayne's T-Nut Installation Instructions and those suckers went in like a dream. I used 2 dabs of Gorilla Glue on each T-Nut for mounting the LAB 12 driver. However, the 4 T-nuts used to mount the PE speaker grill used Phillips head screws, so I could not get enough torque to pull them in all the way. I got them half way and gave them 2 shots with a hammer. All seems well.

I live in Manhattan and have no workshop, so I and the students built the box in the hallway and a tech closet at school. That meant I had to find a lumber yard which had Baltic birch ply and could do straight cuts. Nearly impossible here. I finally found a little storefront wood guy who had a RATTY table saw; but he had a 5X5 sheet of wood, so I took the chance. His cuts were fairly consistent except for one panel which was a little small in one dimension. I only noticed it during the dry fit. Of course we went with it anyway. I have to say that is nice strong wood. It looks nice too. I laid out the panels so the edges could be seen from the top, which I like. If all the panels were the same size it could have been an acceptable "furniture" or home use build. I realized after seeing it together that the box is a rather nice side table.

We went glue and screw. I bought 4 big clamps because I wanted to use the no screw method, but now I know you need a nice work table, 1 million clamps and skill to do that. So, screw it.

We never had time to apply the truck liner paint I bought, so we ran it raw. I will paint it next week

during my grading period.

I added wood blocks to the bottom and attached casters. I did not know if they would be rattlers, but in use, they were quiet and great for a mobile sub.

As a guy with little experience with a router, I am proud to say I made the port cutout the correct size to accept a snug press-fit of the tube, flush with the front of the baffle. I ran a bead of Gorilla Glue around it on the inside.

We loaded the woofer in after an overnight dry and immediately put it into service. It kicked ass. I ran it with another, smaller sub, both crossed low, in hopes of smoothing some modes. Because of time constraints, I was not able to do the set up with measurements. But tuned by ear. Placement of the 3Pi near mid point of a side wall, the other sub was offset mid point along the front wall.

One other thing: We used some 1 1/4" stock ripped into a right triangle for corner bracing in the cab. I literally found this wood on the street already cut like that. My bad is that I did not calculate how much volume that took up in the cab and adjust. I am pretty sure it would be negligible, though.

I'll post pics later.

I want to thank Wayne for providing this great design and all the help, tips, expertise and mega good will.

Thank you Wayne from my self and the student builders.

Subject: Re: skywave's 3Pi subwoofer build

Posted by [skywave-rider](#) on Mon, 31 Dec 2012 23:14:14 GMT

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Happy New Year to all!

Here's a few pics of the 3Pi Sub. We will be applying truck bed liner paint later in the week. I'll post the results, good or bad.

:)

File Attachments

1) [1220122103a.jpg](#), downloaded 5079 times

- 2) [1220122104.jpg](#), downloaded 5188 times
 - 3) [1230121524b.jpg](#), downloaded 5092 times
 - 4) [1230121525b.jpg](#), downloaded 5142 times
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Subject: Re: skywave's 3Pi subwoofer build
Posted by [Wayne Parham](#) on Tue, 01 Jan 2013 22:31:44 GMT
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Lookin' good! Happy New Years to you to!!!

Subject: Re: skywave's 3Pi subwoofer build
Posted by [skywave-rider](#) on Fri, 01 Feb 2013 20:04:25 GMT
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OK, here's the truck bed liner version in grotesque industrial dreadnaught black. In the future I would try something else. The fumes are amazing for glue sniff-heads, and the blotchy-ness was not consistent as to look intentional. LOL.

But it's done. And works great!
The students get to do all the dirty work:

File Attachments

- 1) [studentpaint.jpg](#), downloaded 4674 times
 - 2) [0122131618.jpg](#), downloaded 4781 times
-

Subject: Re: skywave's 3Pi subwoofer build
Posted by [Wayne Parham](#) on Fri, 01 Feb 2013 20:54:33 GMT
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Niiiiice!

Good job!
