Subject: Subwoofers vs budget... where do you draw the line?
Posted by j0nnyfive on Mon, 14 Jan 2013 21:44:04 GMT
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I've been reading about the multiple and flanking sub approaches, and I am curious about where you draw the line in terms of how many subs, the price of those subs, and your own budget. What I mean is, for your average Joe income, where would be the point of diminished returns? Obviously, the fewer subs you use, the more money you can put into any one sub. Let's say I can spend up to about $2500 or so on subwoofers alone. I already have the 4 Pi speakers for my 3 mains (home theater), and I already have surrounds. Okay, I'm wanting to replicate real movie theater impact in my living room, so bass is important. How would you distribute this $2500? Two subs in the flanking positions? One monster 18" 'killer' sub front and center?

And let's say I'm trying to create a system to give me great home theater AND a great music experience (I really consider these 2 the same). It's a general movie/music/game entertainment system for general "everything" purpose in your "everyman" living room. lol

Also, I have a receiver with Audyssey calibration already. I'm worried that if I spread my budget out over 3 or 4 subwoofers, I won't have the impact because those subwoofers won't be large enough or dynamic/powerful enough to do the 4Pis justice in terms of theater.

Can you buy two subwoofers and combine the flanking "80-200hz" idea with the summed "20-80hz" idea? It sounds like you would ideally want 2 smaller subs up front with 2 bigger ones farther away if I'm understanding this correctly. But, could you simply get 2 big subs, flank them, and use them for ALL the bass? I feel like I get the theory part, but I'm wondering about money and practicality.

Set me straight guys!!

Thanks!

p.s. Sorry if this has been discussed before. I searched for it but didn't find exactly what I was looking for. Feel free to shoot me a link if this has been done to death! Thanks!

Subject: Re: Subwoofers vs budget... where do you draw the line?
Posted by Wayne Parham on Mon, 14 Jan 2013 23:11:06 GMT
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If I have DI-matched two-way speakers, I always start with flanking subs. I mean, you can run the speakers with no subs at all if you're making an apartment system or something like that, but if we're talking stepping up a notch or two, start with flanking subs first. Don't bother with one sub, start with two and set them up flanking the mains. Then add one or two more distributed subs if you have the budget and the space.

There are two setups that don't require flanking subs. One is constant directivity cornerhorns and the other is soffit mounted speakers. Those eliminate the reflection off the rear wall, so the main

problem that is mitigated by flanking subs is removed. If you have constant directivity cornerhorns or soffit mounted mains, then just run three or four distributed multisubs.

Flanking subs go in a fixed place, a couple feet below, beside and behind the mains. But distributed subs are a little more flexible. Basically, you just want to put them "around the room" where they break up the modes most effectively. If you have four subs, it almost doesn't matter where you put them, as long as they aren't clusteted together. But the fewer subs you run, the more important their locations become. You might want to use CARA and/or measurements to help you find the best placements for them.
Room modes, multisubs and flanking subs
Helper Woofer Location

Subject: Re: Subwoofers vs budget... where do you draw the line?
Posted by j0nnyfive on Tue, 15 Jan 2013 00:19:00 GMT
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Thanks!

Okay, so I'm thinking: Get the best 2 subs I can afford and flank 'em. Sounds good!

More technical question: Is there a way to use the flanking subs so that above 80hz, they only receive a "copy" of the signal of the flanking main, but below 80hz, they receive the summed bass channel? Is this possible or practical?

Thanks again Wayne!

(still planning on my future mega theater w/ 4Pi mains!)

P.S. I'm the guy that used to get the listener's fatigue really easily with the 2Pi speakers. Problem solved! When I quit working at a factory, my listener's fatigue went away. Wow! Der!! I wore hearing protection all day, but I guess hearing the constant machinery was just too much. That's my guess anyway. 2Pi sounds great and doesn't fatigue my ears anymore!! Sorry 'bout the fuss! It just never occurred to me. :/

Subject: Re: Subwoofers vs budget... where do you draw the line?
Posted by Wayne Parham on Tue, 15 Jan 2013 01:10:41 GMT
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You could probably develop a summing filter like that - and it would be useful on any content that wasn't already summed. But there's where you might find the filter is not all that necessary, because most music is already mixed that way. Get your scope out and watch the L/R channels, and you'll see LF is already summed to be the same on both channels in most music.

As for the rest of the channels for home theater, this approach could surely be extended to the

rest of the channels but I'm not sure it is warranted. I guess if the budget allows, it couldn't hurt. But I don't think it is as important as the front mains, especially for music.

Subject: Re: Subwoofers vs budget... where do you draw the line?
Posted by j0nnyfive on Tue, 15 Jan 2013 03:31:47 GMT
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Ahh...

Just so I understand, to compare this to your "typical" home theater arrangement where only one sub would be used and the receiver would be set to crossover at 80hz... instead, I would use 2 flanking subs and set the crossover (in the receiver) to 100hz or maybe a bit higher? Because I don't have to worry about localization since the subs are close to the speakers? But these 2 subs (since they are my only subs) would ALSO handle all of the bass, period? I just want to make sure I'm not missing anything. Nothing "special" needs to be done to these subs? Like, no special connections between the flanking mains or anything?

Subject: Re: Subwoofers vs budget... where do you draw the line?
Posted by Wayne Parham on Tue, 15 Jan 2013 05:42:44 GMT
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No, sorry, I wish it were that simple. The LFE output can be used for distributed subs, but it can't be used for flanking subs.

Flanking subs need a low-passed version of the signal sent to the main speaker they're flanking. So you need to run the preamp level output to a plate amp or some other subwoofer amplifier with a built-in or external low-pass filter. Flanking subs work best with relatively gentle slopes like second-order, so an inexpensive 100Hz or 120Hz inline filter can be used to good effect.

Subject: Re: Subwoofers vs budget... where do you draw the line?
Posted by j0nnyfive on Tue, 15 Jan 2013 22:08:21 GMT
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Just when I thought I was understanding this, you had to get all Tony Stark on Captain America here. lol

I'm a little lost now. So in order to do this, does my receiver need pre-amp outs for the left and right mains? Yikes! I hope that isn't the case. My receiver only has speaker-level outs it seems.

The sub has a pre-amp out I think. My own sub has an amp built in. I'm not sure how you would implement this flanking configuration with the receiver I have. Am I not understanding this?

Thanks for your patience.

Subject: Re: Subwoofers vs budget... where do you draw the line?
Posted by Wayne Parham on Wed, 16 Jan 2013 00:46:28 GMT
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What you need to do is connect to the preamp level outputs on your receiver. Sometimes those are used to connect equalizers and sound processors. The preamp level signal is sent to the subwoofer amp through a low-pass filter. Plate amps usually have low-pass filters built into them.

Subject: Re: Subwoofers vs budget... where do you draw the line?
Posted by j0nnyfive on Wed, 16 Jan 2013 02:18:18 GMT
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Ouch. My receiver doesn't have preamp outs. There is a single one for one sub, but the privilege of preamp outputs is reserved for the more expensive units apparently. (Grrr) I'm recommending home theater equipment for my friends who want a nice(r) sound system but I marked "receivers with preamp outs" off the list due to prices.

So, I guess I need to scrap the flanking idea? Is there something else that could be done? Maybe a "next best thing?" Or am I misunderstanding something else? (Could be could be)

Subject: Re: Subwoofers vs budget... where do you draw the line?
Posted by dheflin44 on Wed, 16 Jan 2013 03:39:58 GMT
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Hi j0nny,

A lot of sub plate amps have high-level inputs as well as the normal low-level RCA inputs that connect to an AVR's pre-outs. To use the high-level inputs just connect them in parallel to the same speaker wires as the main L/R speakers. Note unlike an actual speaker, the high level amp inputs have a very high impedance so you don't have to worry about overloading your main speaker's amp.

This is not the ideal way to connect signals to your plate amps, but it beats buying a new receiver or ditching flanking subs all together.

Subject: Re: Subwoofers vs budget... where do you draw the line?
Posted by j0nnyfive on Wed, 16 Jan 2013 03:55:06 GMT
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Hey dheflin44!

I thought about that but was under the impression that connecting the subs this way wouldn't sound as good. You think it would still be worth it? So now I'm thinking about:

a.) Having flanking subs connected to speaker level outputs.

b.) Having 2 distributed subs with the summed bass and LFE.

c.) Having them purchase 1 louder and better sub that's twice as expensive as each of the 2 subs. (and carefully positioning it).

The flanking idea is still king eh? Yay or nay?

Subject: Re: Subwoofers vs budget... where do you draw the line?
Posted by skywave-rider on Wed, 16 Jan 2013 05:26:46 GMT
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Sorry to butt in, but in my opinion, yes. :)
Why not try the speaker level inputs dheflin44 suggested? The plate amps I have bought all have them, but I never tried those inputs, so have no opinion on their sound quality.

I edited this post because I previously made a suggestion I realized later would not work! Ask me why in PM if you want... LOL

Subject: Re: Subwoofers vs budget... where do you draw the line?
Posted by j0nnyfive on Wed, 16 Jan 2013 05:59:52 GMT
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Hey skywave-rider!

Butt in all you want! Yes, multiple sources. Absolutely. This is designed to be a "will do lots of things very well" kind of system.

I can't really try anything because I don't have 2 subs or the opportunity to really trial and error this thing. I'm being theoretical here I guess. I'm kinda just weighing people's opinions about what's best in which situation. (I know that ultimately it comes down to individual pref/subjective and there's no way/with great power comes great responsibility) etc. But... let's have fun and

speculate! lol

So the flanking method is really that incredible huh? Well, I'm excited about it. I have to admit the speaker-level issue does make me a little nervous though. See, I'm dealing with people who aren't as crazy about this stuff as I am, but they're not NOT picky either. They want the best they can get for a reasonable amount of money, and I'm trying to figure out... okay, for such and such amount... what can we really accomplish? Sorry.. tangent.

Okay, the priorities of this system are:
1. Movies (because movies contain movies AND music)
2. Music
3. Games, whatever else.

For movies, I want the fullness and impact. Effortless, powerful, SPL. When big "booms" happen in movies, I want it to be humbling.

I just want to do the best I can do without breaking the bank.
That's why I'm asking... 2 subs or 1. It's the extra SPL of the bigger sub vs the evenness of the 2. Anyway... it's late and I got rambly, but I'm not going to edit this down. I'll keep my posts short for a while.

Oh! P.S. Are flanking subs only for these controlled directivity type of speakers, or is this for your more usual "cone and dome" speaker as well? Does the speaker type matter?
Thanks guys!

Subject: Re: Subwoofers vs budget... where do you draw the line?
Posted by rkeman on Wed, 16 Jan 2013 15:05:54 GMT
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The theory behind flanking subwoofers is valid and the approach is useful in many circumstance, but remember that experimentation is the key. For some time my home theater used subwoofers flanking 3Pi front speakers and a phantom center with fine results, but using a summed subwoofer channel with the same speaker layout had a similar frequency response and was easier to implement with the chosen electronics. A change to 6Pi front left and right speakers and a 3Pi center channel obviated the need for flanking subwoofers entirely. Try a variety of configurations (L - Sub - Sub - Right worked best in my room) and crossover frequencies if going with the subwoofer and satellites approach. Electronic room correction is also an option worth exploring if your AVR offers the feature. The results may be surprisingly good. Obtain a good sound level meter and test discs or a measurement system such as Dayton Audio's Omnimic if possible as these really aid in correctly setting up any stereo or home theater.

Subject: Re: Subwoofers vs budget... where do you draw the line?
Posted by dheflin44 on Wed, 16 Jan 2013 17:38:18 GMT
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I haven't tried high-level sub inputs before, but they should be fairly close to the quality low-level inputs. Most of the complaints with high-level inputs have to do with cheaper HTIB systems that implement a passive crossover inside the sub to separate the sub/main outputs. In your case there will be no crossover between the mains and their flanking subs.

Subject: Re: Subwoofers vs budget... where do you draw the line?
Posted by j0nnyfive on Wed, 16 Jan 2013 18:50:53 GMT
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Guys I want to thank you all for you continued, VERY helpful advice! I have learned a lot from just this one thread!

From reading through this thread and many other forums, sites, and articles... I am convinced that two subwoofers is the way to go. My reasoning is this:

a. Possible flanking.

b. Possible distributed ala Parham, Geddes, and others...

c. An experiment at Sound and Vision seemed to indicate that
after blind listening to one 15-inch, two 12-inch, and four 8-inch, people tended to like all three for one reason or another but were excited about implimenting a middle-of-the-road "2 sub" approach.

d. Possible stacking.

e. Other research (I forget where) seemed to indicate a perceptive "spatiousness" was caused by having two or more subs spread out over a distance vs just one or more in the same spot.

f. One forum member on another site mentioned the idea that some subwoofers may be localizable via harmonic distortions or other phenomina besides frequency, and that having two subwoofers up front could create a "stereo image" of this distortion, thereby placing it (appropriately) in the center. (Or at least prevent all the action from sticking to one side.)

Also, from my own observations from reading many differing opinions on two or more subs: I've observed on other forums that even when people INTEND to stop at one "mega sub", they rarely do. lol In just about every thread I read through, there were multiple people who intended to stop at one, but just couldn't. But, on the other hand, it seems that many people are more than satisfied with only two subs. Three would be icing on the cake. Many people tend to be willing to buy 2 "monsters", but the 3rd one... they have a harder time with that idea. lol Two seems to be the sweet spot. Makes sense!

From my own personal tendencies, I don't think I would want to buy a third sub. Instead, I would buy two BETTER subs, replace the ones I was using, and try to use all four subs! If adding a third wouldn't be as great an improvement as adding a second, then why not skip to the chase and add two more! lol This also opens you to the possibility of building two systems both with 2 subs.

Lastly, having more than one sub opens you to far more ways to have fun experimenting. I think it does anyway. Not only can you experiment with the subs relationship to the room, but you can see how they affect each other, and also play around with flanking and using higher frequencies, etc.

My conclusion? In most cases, you should probably always plan to buy subs in pairs. (If money permits!)

What do ya'll think? Post was too long wasn't it? lol
Thanks for your help!

Subject: Re: Subwoofers vs budget... where do you draw the line?
Posted by gofar99 on Fri, 18 Jan 2013 01:46:14 GMT
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Hi, Too long, never. You gave me some ideas. All probably bad as my system is just fine now. A pair of Martin Logan Vista electrostatics and a pair of Martin Logan powered subs. But..... I have 4 more other brand powered subs in storage. Now if I put one in each corner of the room for max room gain and the other two in the middles of the flanking walls.... If I cranked everything up at once it would probably cause serious internal gastric distress not to mention possible structural failure of the room. Then to top it off I have a pair of 7.5 cubic foot un-powered subs and a few spare amps and crossovers. Seismic overload.

Anyhow, I certainly agree on the minimum of two subs. In my case two really are enough that's why the others are in storage right now. I did at one point try 4 in various combinations of flanking, asymmetric and symmetric patterns and found that it was difficult to avoid serious peaks and nulls. With only two and some reasonable test gear you can usually make two work IMHO.

Subject: Re: Subwoofers vs budget... where do you draw the line?
Posted by j0nnyfive on Fri, 18 Jan 2013 17:33:37 GMT
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Hey gofar99,

You would probably get a good workout with that setup as well!! If you're going to go that route, let me make a suggestion: Pepto Bismol. lol

Yeah, something I didn't list but has been mentioned elsewhere is room aesthetics. Having two subs looks more symmetrical, and having randomly placed distributed subs would allow for easier concealment probably. Anyway...

Now I'm curious gofar, you brought up a good point... To integrate DIFFERENT subs with the two you already have, what are some things you need to watch for? What kinds of subs play well together, and what kind do not?

Subject: Re: Subwoofers vs budget... where do you draw the line?
Posted by gofar99 on Fri, 18 Jan 2013 20:40:29 GMT
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Hi, the problems I ran into were routed in the room dimensions and the spacing of the subs. Wayne is the expert here, but the wave length of sound in frequencies below say 200HZ is fairly long and in many cases a multiple of a room dimension. It is real easy to cause nulls and peaks with subs. The spacing between any two can (will) cause nulls and peaks as well. So when you try to marry up all the nulls and peaks into a unified sound it quickly gets out of hand. Move one sub and cause problems with two more and so on. Even with good test gear it can quickly become an effort in frustration. I ended up with the two I have side by side next to my listening chair. It was the right distance from the mains to plus up the sub 100 range without interfering much with the sound above 100 (there will always be some interactions). Mine are set for an F3 of 45 HZ. The mains are rated to 35 HZ and drop fast below that. The room is 12 X 17(long)X 9.5 high. The room testing program says the worst peaks are at about 335 and its multiples to 1200 ish. Worst nulls at the listening position are at 65 and 179 HZ. The placement of the subs next to me pretty much fixed the 65, but the 179 is still there. Placing my mains (Martin Logan Electrostatics) where ML said to cut down on the peaks quite a bit even if the speakers are further into the room than I would like. BTW they have a math formula on where to put them - likely only works for the particular speakers though. All in all no free lunch. I tried many combinations and locations on the subs, rather tedious doing all the measurements. Out of frustration I nearly converted the fireplace to a dual 15 inch sub cabinet. The number crunching said it would work.... spouse said some unprintable things so I guess you know what didn't get done.

Subject: Re: Subwoofers vs budget... where do you draw the line?
Posted by j0nnyfive on Fri, 18 Jan 2013 22:40:15 GMT
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Why, whatever would be wrong with a fireplace sub? lol I see no problem with that!

Subject: Re: Subwoofers vs budget... where do you draw the line?
Posted by Wayne Parham on Fri, 18 Jan 2013 22:59:49 GMT
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The multisub approach is intended to mitigate room modes. The problem is the direct sound from the subwoofer and the reflections from each boundary combine differently at each point in the room. So there are hot spots and dead spot in the room, and they're in different places at different frequencies. They form a sort of a checkerboard pattern, with just a few widely-spaced nodes down low, and a larger number of closer-spaced nodes as frequency goes up. By the time you reach the Schroeder frequency, the spaces between nodes become close enough together you can't tell them apart, they aren't well defined and the sound field begins to average.

You can think of a subwoofer as a source, and each boundary as another virtual source. Since many of the reflections are futher than a quarter-wavelength away, you cannot setup the subs so

they avoid destructive interference between subs or between the subs and the mains. There is destructive interference caused by the room, itself.

Think of it like a pool of water that stretches for miles in each direction. The goal would be still water, perfectly flat. Then throw in a rock and you'll see well-defined ripples appear. If you through in one more rock (or add a single reflector for the waves to bounce off), then you see a clearly defined interference pattern. The peaks and valleys are well defined. This is course interference. But now sprinkle the pool with many impacts, like from rain, for example. The nodes are now indistinct, the energy is distributed pretty evenly. This is dense interference.

To look at the difference between a wave expanding without a reflection and the interference that comes upon meeting a reflection, see the post below:
Speaker placement and wavefront launchThe multisubs arrangement is done to create dense interference. It is intended to actually create more interference, not less. The best goal is to have no interference, to have point source summing. That's possible outdoors, but not indoors in a small room. So the next best thing is to have dense interference, because at least then the sound field is averaged. What you don't want is course interference, because that is what causes sharp nulls.

Distributed subs are placed far away, and they tend to smooth the sound field at low frequencies. Flanking subs are placed closer, and are used to smooth the sound field at midbass and lower midrange frequencies. Each is designed to "fill in the holes" caused by course interference, to actually make the interference more dense.

Room modes, multisubs and flanking subs

Subject: Re: Subwoofers vs budget... where do you draw the line?
Posted by j0nnyfive on Sun, 20 Jan 2013 07:22:40 GMT
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Ah, I get it! The pool analogy helps! And the distinction between coarse and dense... I tend to run across discussions that over-simplify the situation (like "interference bad, no interference good"). But, in a room, you can't help but to have SOME interference... so if you purposefully create interference everywhere, then it becomes effectively nowhere. Thanks!

Now I can explain it better to my friends. lol
