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Subject: Mono "flanking sub"

Posted by [jonone](#) on Sat, 24 Oct 2015 10:50:41 GMT

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Hi,

I'm using avi adm10 active monitors as mains, they are on wall brackets so very close to the wall, they have a summed mono subwoofer out which is a full range summed signal of the left and right channel, this is what I'm sending to my single "flanking sub" which is a down firing a acoustic elegance td15h+ Apollo in a 17.5" cube with its on plate amp, it's a very clean driver.

I have an Av amp which at the moment is set to "fronts large "and sending the mains the l/r signal, the flanking sub gets a summed version of this.

I'm waiting on ae to make my sub driver which will be a single Av15h with its own plate amp, I'm planing on running this nearfield with maybe a 60hz crossover, so in the end the av amp will send 60hz hp to the mains+ flanking sub and the 60hz lp to the nearfield sub for lfe etc.

I'm going to use a mini dsp for gain/ delay and eq, and also the crossover for "flanking sub " but at the moment I'm just using the 200hz roll off on the plate amp with good effect, the minidsp has bw / Lr and Bessel crossovers ,is bessel the one to use?

I'm using rew and and a umik mic to set this up with the mini dsp but it's all new/ a big learning curve, so your have to bare with me!

I know this is not a true flanking sub method! but a summed mono "midbass" driver covering -up to 200hz, seems to work from initial listening, I.e the stereo image inst obviously effected to my ears, and according to rew it's helped pull out some dips compared to the speakers on there own. I can't really afford more drivers due to cost and space and divorce!

What are people thoughts on what I'm doing?

Thanks,

Jon

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Subject: Re: Mono "flanking sub"

Posted by [Wayne Parham](#) on Sun, 25 Oct 2015 20:20:57 GMT

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A flanking sub is useful for one main speaker. So you can have just one, but if you do, it can't help both speakers of stereo mains. It can only help one.

The main job of a flanking sub is to smooth the self-interference anomalies from nearest boundaries, e.g. the wall behind the speaker and the floor. It also helps smooth vertical modes and other room modes at the high end of the modal region.

But a setup that only contains a single sub will always suffer room mode problems. You can't make the room smooth with just one sub. I think the best you can hope for is to settle for a "sweet spot" by either placing the subwoofer physically close to the listening position or equalizing the

response or both. This can make the one spot sound pretty good, but the rest of the room will suffer.

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Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Mon, 26 Oct 2015 13:14:26 GMT  
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Thanks for replying Wayne!  
So will a summed single flanking sub not help the floor and rear wall notch if it was placed between the stereo pair?

I don't know if it wasn't clear? But I'm planing on having one "flanking sub " by the stereo pair and one true sub 60hz and down nearfield.

If I run the mains large then the flanking sub won't be high passed, so would act as a second sub 60hz and down, but the mains will not have the benefit of being high passed. Do you think that would be more beneficial?

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Subject: Re: Mono "flanking sub"  
Posted by [Wayne Parham](#) on Mon, 26 Oct 2015 13:44:49 GMT  
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My concern with this arrangement is not only with smoothing but with localization. Flanking subs necessarily have some low midrange content. So you'll be making some of your right and left signals panned towards the center, assuming the helper woofer is centered between the mains. Whether or not this is natural sounding, I don't know. Please report back after you've done it a while.

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Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Mon, 26 Oct 2015 17:05:37 GMT  
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I was concerned as well, but surely vocals appear to come from the centre with a good stereo image?  
Anyways mine is under the right speaker and I can't detect any blurring of the stereo image or a lopsided effect, but I don't claim to have golden ears? Maybe the upper frequency's still steer the image?

Can you recommend a track or test that would show up any weird effect?

Thanks jon.

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Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Mon, 26 Oct 2015 20:06:36 GMT  
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I have tried this quickly [http://www.audiocheck.net/audiotests\\_ledr.php](http://www.audiocheck.net/audiotests_ledr.php)

Maybe it does pull it away from the l/r hannel slightly when the flanking sub is in line but it's pretty minimal, not really enough for me to worry about especially with the type of music I mainly listen too, but in a perfect world i agree stereo would be optimum.

I would like to see what others think if they summed a single flanking sub?

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Subject: Re: Mono "flanking sub"  
Posted by [Wayne Parham](#) on Tue, 27 Oct 2015 18:23:31 GMT  
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That's good feedback. Interesting.

You're the only one I know that's done this, so it's useful to hear your impressions of that kind of setup.

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Subject: Re: Mono "flanking sub"  
Posted by [johnnycamp5](#) on Tue, 27 Oct 2015 23:14:37 GMT  
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I am currently running a pair of 4pi's on my front wall.

Until I get the system in my basement, I have been using a single sub.

Initially, I had the sub located outside of either the left or right speaker, with my dac and amp centered.

With this configuration, I could hear/feel the somewhat lopsided bass response towards one side of the room (left or right), as Wayne has described.

I then centered the sub, (swapped it with the dac and amp) and the lopsided bass response went away.

Overall, bass response in my room sounds/measures relatively flat.

But I must say, I believe some of this improvement is a result of extensive (compared to most) room treatments, not just to the centering of the sub.

In fact, before the room treatments in this room, I had a complete 70 hZ "null" (inaudible frequency), dead center in the room!

YMMV.

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Subject: Re: Mono "flanking sub"

Posted by [jonone](#) on Thu, 29 Oct 2015 09:10:01 GMT

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Thanks for the reply, can I ask what crossover point were you using? And if you had any eq applied?

You were not exciting a room mode less by placing the sub in the middle?

Jon

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Subject: Re: Mono "flanking sub"

Posted by [johnnycamp5](#) on Thu, 29 Oct 2015 16:24:20 GMT

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I use a plate amp that is attached to the sub itself.

I tend to prefer it set at 50hZ, which many find too low.

I believe the crossover (low pass 50 to 100hZ)slope is 12db.

I use no eq.

I come from a mindset/point of view where, you try to fix the room first (acoustical treatments in the form of broadband absorbers, bass/corner traps, Helmholtz absorbers) instead of just throwing in multiple subs for correction.

Of course this can be quite tedious, and many view extensive room treatments as "killing ants with a hammer", since you can simply use multiple subs for correction, but I am set in my ways.

Things were not bad at all with the sub in the corner after the room treatments.

I centered it to make bass response in the room as even as possible throughout. In my opinion, there is no denying multiple subs work best, even in heavily treated rooms, but I simply do not have that option in my current listening room.

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Subject: Re: Mono "flanking sub"

Posted by [jonone](#) on Thu, 29 Oct 2015 19:23:50 GMT

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Thanks for the reply, I'm surprised 50hz is localisable on the same plane as your speakers, eq can really help a single IMO. The antimode from dspeaker is great plug and play auto eq device.

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Subject: Re: Mono "flanking sub"

Posted by [johnnycamp5](#) on Fri, 30 Oct 2015 10:10:31 GMT

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It wasn't so recognizable from an audible standpoint , as it was from feel.

I have three couches in that room. One on the left, one on the right, and one towards the rear/center, facing the front wall.

When the sub wasn't centered, you/I could sense it, depending on where you were sitting.

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Subject: Re: Mono "flanking sub"

Posted by [jonone](#) on Fri, 30 Oct 2015 10:17:35 GMT

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I see, maybe the gain is to high? But I understand it maybe needed? That's another area multiple subs help.

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Subject: Re: Mono "flanking sub"

Posted by [Wayne Parham](#) on Fri, 30 Oct 2015 21:37:07 GMT

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Flanking subs are run pretty high - over 100Hz. They're a specialized application that's not unlike the helper-woofer of a 2.5-way speaker system. The thing that makes 'em unique is they are able to be offset from the mains in all three planes, so they smooth self-interference notches in the upper midbass and lower midrange. But their relatively high frequency content makes them localizable if they're placed too far away from the speaker they're flanking. Ideally, they are about three feet below, beside and behind the main speaker.

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Subject: Re: Mono "flanking sub"

Posted by [johnnycamp5](#) on Fri, 30 Oct 2015 22:58:28 GMT

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Hey Wayne.

Are these self interference notches caused by reflections, the byproduct of being in a room, or

would they still occur outdoors, in open space?

About crossover frequency:

Don't the 4pi's graph relatively flat down to around 50hZ?

Setting an active crossover on a typical plate amp/sub amp to 100hZ would certainly create a large overlap in the 50 to 100hz range would it not?

I know with my last set of speakers (B741 scan speak) 100hZ was way too high for my liking, and everything sounded very muddy or "subby".

The farther I cranked the crossover frequency down, the better the overall sound became.

Perhaps there is something wrong with my sub. It does use a passive radiator, but I don't know why that would be a problem.

Maybe I'm just not that much of a sub guy. There is plenty of music content I listen to through the 4pi's, and I shut off the sub all together.

In my short time with them, they provide some of the best enjoyment Ive ever had from all my favorites, The old "the band is in the room" experience. And that's without a sub.

Good luck jonone.

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Subject: Re: Mono "flanking sub"

Posted by [jonone](#) on Sat, 31 Oct 2015 18:21:52 GMT

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I'm sure Wayne will answer but yes the interference notches are from the room, and the speakers I'm guessing will be flat outside.

If you don't high pass your mains and you overlap the sub and mains then it makes sense to roll the sub in were the mains roll off to avoid a lump in the bass if they sum together.( or eq them)

If your sub is not that clean then the lower the crossover the better Imo, I had a sub before with a peerless driver and I couldn't cross it over 60hz really as it would get a bit boomy, although eq helped, I've also heard people say passive radiators can be boomy?

The driver I have now is super clean and measures more like a midrange driver and can be used as such, it has a very low le and 3 shorting rings, 150hz crossover is not a problem and I havent eq'd it yet.

Subs don't make good midrange drivers and vice versa so I think your better of using something like the acoustic elegance td series like I am for flanking subs.

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Subject: Re: Mono "flanking sub"

Posted by [Wayne Parham](#) on Sat, 31 Oct 2015 20:37:05 GMT

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Self-interference notches are from room reflections. The speakers measure flat outdoors.

The whole concept of multisubs - which flanking subs are a specialized type - is to create dense interference that smoothes the average sound field. This requires multiple sound sources in the same frequency range. So we want to blend the mains and the subs through the modal region.

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Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Sun, 08 Nov 2015 19:52:45 GMT  
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This is my centre seat, in red are my mains on there own, in green is my mains +mono flanking sub, im using a mini dsp with a 150hz Bessel crossover and time aligned to the right speaker which it sits below.  
this is with adding 6 db boost to 100hz and 180hz just to the flanking sub.

This is the left seat mains in green this time and mains + flanking sub in red(confusing, sorry) I know it's caused a few slight problems elsewhere but that's a big hole filled in!

It needs more tweaking as it's a balance over the three seats, do people generally boost eq points on flanking subs or just use the phase/ delay to flattern the response?

The mains and flaking sub are time aligned, is that wrong? Or should I adjust the delay to get the flattest response? ..... I get confused!

#### File Attachments

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- 1) [centre\\_rew\\_zpsvncadbzx.jpg](#), downloaded 3297 times
  - 2) [left\\_zpsekrahzvr.jpg](#), downloaded 3422 times
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Subject: Re: Mono "flanking sub"  
Posted by [Wayne Parham](#) on Mon, 09 Nov 2015 18:57:28 GMT  
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We can see that the flanking sub approach is smoothing the mains through reduction of the notch around 95Hz - 100Hz. This is largely because of the sub's physical relationship to the mains -

Even though there's just one helper woofer, it's still a couple feet away in each plane. So we can see your mono flanking subwoofer approach works pretty well for smoothing.

From your measurement data, I'd say this is a workable solution provided the single summed subwoofer doesn't throw off the image. That was my biggest concern really - The flanking sub approach requires moderately high-frequencies blended in the subwoofer and the main it is flanking.

Lower midrange can be localized, giving perceptual cues of the position of the source. Having a shared flanking subwoofer between the mains can smooth the self-interference notches - as your measurements have shown - but I was concerned it might mess up the stereo image. I suppose that's a subjective thing, and might be content sensitive. Some (nearly mono) material might sound very good in a single flanking sub setup, while others (with highly panned content) might not work as well.

As for the comments/questions about "time alignment", remember that is impossible to align in three dimensions. You can synchronize in one position, but not all. That's what the multi-sub and flanking-sub approaches are all about. They mitigate anomalies that are created specifically because sound sources and their reflections cannot possibly be time aligned.

Thanks for your feedback on this single summed flanking sub approach. It is very useful and interesting to see.

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Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Mon, 09 Nov 2015 20:44:35 GMT  
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Hi Wayne, thanks for the comments.

The flanking sub is directly below the right hand speaker, so only a couple of feet away in one direction as its down firing, there both very close to the wall.

Like this:

I would move it to be between the stereo pair but it's more practical as it is with kids! I honestly don't notice any smearing of the stereo image on the music I listen to, but in the test tracks I posted it was admittedly a little bit better without the flanking sub in but not enough to bother me. It seems you get enough cues from the higher frequency's for imaging?

In an ideal world I would run a stereo pair but it's good enough for me on a budget, I'm lucky enough to have the one flanking sub and nearfield sub In my room and budget.

Can you recommend some content with panning?

Ok so the response can't be time aligned for multiple seats so you just adjust the delay for best response across the seats?

The response doesn't seem to change that much either side of where I have the delay set but seemed to get boomy if I delayed it to far? Is this possible?



Any comments on the 200hz dip, it obviously changes with the xo delay you apply, I'm using 150hz at the moment.

Also do you eq flanking subs? And if so do you eq them with or without the mains?

Thanks.

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## File Attachments

1) [image.jpg](#), downloaded 3425 times

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Subject: Re: Mono "flanking sub"

Posted by [Wayne Parham](#) on Tue, 10 Nov 2015 03:14:06 GMT

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You can always provide equalization to fine-tune the response. That sometimes offers additional improvement. But the biggest advantage is from summing of multiple sound sources, which smoothes the sound field using dense interference. That's the point of multisubs, of which flanking subs are a specialized subset. The best performance comes from running both flanking subs and one or two distributed subs.

What you've done is to dial in a single sub. Running it to relatively high frequency and blending it with the mains tends to smooth the self-interference from nearest boundaries, which is using the principle of the flanking sub approach. That's good, but like I said, I think it may make localization a problem on some material. Still, your measurements have shown it to be effective for you, at least for smoothing of the 80-150Hz range, which is the range where flanking subs are most effective.

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Subject: Re: Mono "flanking sub"

Posted by [jonone](#) on Tue, 10 Nov 2015 20:06:17 GMT

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I've dialled in the flanking sub for now as I'm waiting for my sub driver from ae, I was then going to use that nearfield as I'm only using one so I should get the most tactile output.

I was going to run that from the lfe channel with a 60hz crossover so it's not localisable this also means the mains are being relieved of some bass but the flanking sub get high passed at 60hz too, so maybe I should run them full range as I will get better smoothing by having all three overlapping fully? The down side is I may loose some content from the lfe channel, ( did you get to the bottom of that) and I beleive there will be some intermod distortion from the mains although the manufacture has told me only a 100hz and above crossover helps with that.

I have a mountain of a room mode at 40hz, ( you can just see it peaking out in my graphs) the flanking sub helps reduce it, I was thinking the crossover at 60hz will also reduce it as the mains and flanking sub are rolling of, but maybe not high passing the mains/flanking sub and just overlapping the nearfield at circa 60hz will actually help depending on how it sums?

Do you think I can improve the 200hz region or are flanking subs done at 150hz?

Lastly, my nearfield sub will have a sweepable phase knob 0-180, does this effectively do the same thing as delay? Or do I get it as flat as I can with that then try and adjust the delay afterwards?

Thanks again for your help, I appreciate it!

Jon

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Subject: Re: Mono "flanking sub"

Posted by [Wayne Parham](#) on Tue, 10 Nov 2015 20:43:39 GMT

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I would definitely blend as many sources as possible in the modal region, below 200Hz. Above 200Hz, the sound field is already complex, which is why it is called the statistical region. It is already blended by dense interference from all the multitude of reflections in the room.

There is a transition region where the sound field is neither densely spaced tiny ripples, nor is it consist of large modes. It's somewhere in between, where the modes are becoming closer together but still apparent, at least in measurements. That is a region that's arguably harder to deal with. One can smooth the transition region with an array of midrange drivers. Even a truncated array can be used to good effect. So if you want to put a helper midwoofer very close to the mains and crossover above 200Hz, that can help smooth that region. It's the same approach as a flanking subwoofer, but closer, perhaps mounted on the same baffle like a 2.5-way loudspeaker.

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Subject: Re: Mono "flanking sub"

Posted by [jonone](#) on Tue, 10 Nov 2015 21:21:39 GMT

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Ok so don't high pass the mains/flanking sub run them "large" and run the nearfield sub from the lfe output at 60/80hz crossover depending on localisation.

I think I can do this if I set the bass out to " both" on my av receiver.

You think this is more useful then theoretically "relieving the mains of some bass"

Thanks, again.

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Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Tue, 10 Nov 2015 22:21:04 GMT  
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Just had a thought, the problem with high passing the mains is the flanking sub gets high passed too, leaving one source below the crossover.  
My flanking sub has two inputs that are open at that same time so I could hook up the signal that's hi passed from the mains into one input and the lfe signal into the other input.  
Do you think that will work? That way I have two sources below the crossover and the mains get released of bass.  
Or is it still better to have four sources of bass below 60hz even there maybe some distortion/over excursion of the mains.

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Subject: Re: Mono "flanking sub"  
Posted by [Wayne Parham](#) on Wed, 11 Nov 2015 20:16:12 GMT  
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For flanking subs to provide smoothing, they need to be blended with the mains, overlapping in the modal range. So run the mains full-range, without a high-pass filter. If the mains are vented, they can optionally have a high-pass set at the Helmholtz frequency, to limit excursion. But do not crossover subs to mains and instead blend them with overlap in the bass. We're not looking for pro sound SPL, so over-excursion is rarely a problem with main speakers of any reasonable quality level.

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Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Wed, 11 Nov 2015 20:38:24 GMT  
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Thanks again Wayne, I rarely listen loud to be fair and the speakers go plenty loud enough for me without signs of audible distortion, so your right I don't need pro audio spl!  
So full range it is, I will post some more graphs when I get my sub driver and have had time to set it up.  
I appreciate all the help!  
Jon.

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Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Tue, 24 Nov 2015 17:01:24 GMT  
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Does anyone have problems with male vocals sounding thick at with a 150hz crossover? Should I lower the crossover if this is happening?

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Subject: Re: Mono "flanking sub"

Posted by [Wayne Parham](#) on Tue, 24 Nov 2015 18:46:50 GMT

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The crossover should be very gentle, like second-order, for best results. With a gradual rolloff like that, we're not really doing low-pass "crossover" to the subs because there is too much overlap. Blending with the mains is the goal. The mains and flanking subs should share the modal range, with the helper woofers gradually rolling off.

When you do that right, you can't even tell the subs are on. They blend seamlessly, and the sound seems to come from the mains. The upper midbass and lower midrange is made smoother than when the subs are off, but other than that (and the added deep bass extension), you can't tell the subs are even present.

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Subject: Re: Mono "flanking sub"

Posted by [jonone](#) on Tue, 24 Nov 2015 20:01:00 GMT

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Thanks Wayne, I'm using the Bessel filter in the minidsp, but I will check unless I changed it and forgot.

It does sound pretty seamless ( almost like it's not on ) in the middle and left hand seat but the right hand seat I thought I could hear some thickness in vocals, the response is more in even at that seat so it might just be a room mode thing? I'm putting the new sub in that corner next to the right hand seat so from past trials it should help with the room modes there.

If not I can always lower the crossover point? See if that changes it.

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Subject: Re: Mono "flanking sub"

Posted by [jonone](#) on Wed, 25 Nov 2015 22:12:39 GMT

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I just recently swapped av receiver and I think I had the " enhancer" mode engaged I think that what caused the thick vocals.

On a positive I let the auto setup decide the speaker distance and it's made the response flatter with just the mains on there own and even flatter still now I adjusted the delay to my mono flanking sub to create the flattest response across the three seats not " time aligned"

As far as I can tell the Bessel crossover is 12db which is 2nd order I beleive, is a linkwitz Riley 12db or butterworth 12db preferable?

Also I have been using pink noise in rew to measure the response/ adjust the delay is the the right signal to use?

Sorry if this has been covered somewhere.

Thanks

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Subject: Re: Mono "flanking sub"  
Posted by [Wayne Parham](#) on Thu, 26 Nov 2015 00:08:20 GMT  
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The phase differences in filter types are extremely subtle in comparison to the disparate phase relationships between reflections and direct sounds that we seek to address with multiple subs, both flanking and distributed.

The differences between filter types are very important to summing between point sources. But we're not talking about that here. We're dealing with dense interference. Rather than trying to combine two point sources constructively, we're blending a large number of reflections and direct sound sources with complex phase relationships.

So there is no "correct" filter type. It is actually non-sequiter to discuss filter type in this context. Basically, you want the slope that works best. You'll find that empirically. But don't expect much change between the filter types. The phase difference is tiny compared to the differences in phase between sound sources and their reflections.

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Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Thu, 26 Nov 2015 08:58:45 GMT  
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Ok thanks again for the detailed response Wayne! Hopefully this will be helpful for other members.

So I can flick between filters to see if there is any change, but don't expect to see anything measurable because the reflection from boundary's have much more effect.

Is there a filter you use?

Also can you answer to if pink noise is the right signal to use to measure?

Thanks,  
Jon

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Subject: Re: Mono "flanking sub"  
Posted by [Wayne Parham](#) on Fri, 27 Nov 2015 22:23:14 GMT  
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The signal type you use to measure in-room bass isn't too critical, as long as you use a method that doesn't gate out reflections. We're looking at the sound field, not trying to isolate the direct sound as a pseudo-anechoic measurement would. So white or pink noise are fine, as are sweeps. Noise is broadband, while swept-sines are monotonic, but either signal type is fine provided we excite and sample over a long enough period of time to include the reflections from the room.

If we were measuring speakers, I'd suggest the exact opposite. I would want a reflection-free measurement. That's because I would want to know what the speaker does without influence from the environment it is used in. But in this case, we are measuring the speaker and room as a system, and we're looking at the behavior in the modal region. So we really need to see the room reflections and how they affect the sound field.

Measurement signal types

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Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Sat, 28 Nov 2015 17:29:56 GMT  
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Brilliant detailed answer like normal!  
I will post more graphs when I receive my sub driver and Integrate it.  
Thanks

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Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Sun, 29 Nov 2015 20:41:09 GMT  
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I have an eq question, sorry Wayne !  
My original plan is to have one channel of the 2x4 mini dsp for the flanking sub fed from the summed mains and the other channel for the nearfield sub fed from the lfe out but this means they have seperate eq channels also.

I have read you should eq multiple subs globally, I.e as one? so the only way I can think of to do this is to use a splitter before the minidsp so the summed out from the mains and the lfe from the av amp both go into input channel 1 of the mini dsp, I can then apply the appropriate crossovers to each output of 1( flanking sub)&2.(nearfield )

But this means the flanking sub will receive the signal from the summed mains and the lfe signal ( which is probably a good thing) and the nearfield sub will also receive the lfe signal and the summed mains signal but will be low passed by a circa 60hz crossover.

Will there be any weird effects because the subs are sharing both signals? Also it means there will be two crossovers applied to the nearfield sub, the crossover applied by the lfe out(say 80hz) and the mini dsp crossover to low pass it from the summed mains signal say 60hz, can I have a steeper crossover applied to the nearfield to help stop localisation or should that be shallow too?

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Subject: Re: Mono "flanking sub"  
Posted by [Wayne Parham](#) on Mon, 30 Nov 2015 16:31:34 GMT  
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Never apologize for asking questions here. That's what AudioRoundTable.com is for!

The thing is, flanking subs are a specialized type of multi-sub. Each flanking subwoofer is supposed to be placed two to three feet below, beside and behind a main speaker and be presented a low-passed copy of the exact same signal presented to the main speaker it is flanking. They are really intended to smooth the upper midbass and lower midrange by "filling in" the holes caused by self-interference from nearest boundaries. Flanking subs also tend to smooth the higher end of the modal region, above about 80Hz.

Distributed multi-subs are placed further away from the mains and are usually presented the LFE channel or a summation of all bass content in all channels. They can be equalized individually or globally, but the whole approach is to use several sound sources to create dense interference in the modal range, which tends to make equalization less important than location. The main benefit is derived by the number of sound sources and their distribution throughout the room.

Flanking subs are generally used with one or two distributed subs for best results. Flanking subs smooth the higher end of the modal region and the more distant distributed subs smooth the lower end.

---

Subject: Re: Mono "flanking sub"

Posted by [jonone](#) on Mon, 30 Nov 2015 18:27:14 GMT

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Hi Wayne. I've got quite a good Handel on the approach now, and that's sums the technique up perfectly in a couple of paragraphs! Great for new members to the forum

I realise I'm not actually using this technique and in fact what I'm doing is using two subs with one by the mains blended higher to help smooth the upper end of the modal region(which works as shown by my graphs) and overlapping the mains With the two subs for a total of four bass sources to smooth the lower modal region.

If I had the space and funds I would have four subs, two flanking , two distributed.

So maybe I should just call them my midbass and sub to be fair to your method as it's not true to it and realise it's not doing it justice.

I also understand eq is not required nearly as much as the smoothing effect from overlapping sources adjusted by delay does this.

But in an ideal world is it better to eq my midbass and sub globally or is separate ok?

Also is it better that the lfe signal and summed mains signal both get sent to the mid bass and sub?

It is probably easier for me to keep the midbass and sub on seperate channels of the mini dsp and the bonus is I get the option to add more delay to the sub if needed via the lfe distance setting inside the amp as the mini dsp only goes up to 7.5ms., The down sides are that way the the sub only gets the lfe signal and the midbass only gets the summed mains signal, they also don't share

an eq block to eq them globally if that's even a problem?

Thanks, jon

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Subject: Re: Mono "flanking sub"

Posted by [johnnycamp5](#) on Tue, 01 Dec 2015 18:01:10 GMT

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jonone wrote on Mon, 30 November 2015 13:27Hi Wayne. I've got quite a good Handel on the approach now, and that's sums the technique up perfectly in a couple of paragraphs! Great for new members to the forum

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Thanks, jon

Jon-

Not to repeat..... but I repeat.....

I think you might be better off setting up your two subs as "flanking" the mains, instead of "one helper woofer, one lfe, distant woofer" approach.

I say this because I use a "single sub" (centered) technique, and I sometimes like it, but I also struggle with it.

For me, with just the one centered sub, (as Wayne has mentioned) stereo imaging can get smeared when crossed over high (above 80hZ), and localization becomes a problem.



If I turn down the crossover point to 50hZ, those factors diminish, but so does the midbass smoothing.

I have considered an eq for my system, but personally, if I had a second (same as my first) sub, I would set it up "flanking", with no distant lfe sub, before I got wrapped up in Eq'ing things with a one-one (single helper/single lfe) set up.

Just don't want to see you put the cart before the horse here. Apologies if I have mis-understood your system/set up. Perhaps you have already tried flanking both mains.

Regards!

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---

Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Tue, 01 Dec 2015 22:05:57 GMT  
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---

Hi,I haven't tried flanking the mains with two, as I only have the "midbass" at the moment and my sub driver is not built yet. They are quite different drivers so not the best match to make a stereo pair, I also don't have the space (or wife approval)to put the pair up front "flanking". I don't seem to really suffer from smearing of the stereo image, and it's definitely not localisable on the same plane as the mains. The driver is a very clean and can play up to 1khz off axis, my old sub that was regarded as "clean" would sound awful at 150hz, I personally think you need a different type of driver for flanking/helper woofers compared to distributed subs. Something to think about with your own system?

---

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Subject: Re: Mono "flanking sub"  
Posted by [johnnycamp5](#) on Wed, 02 Dec 2015 02:10:50 GMT  
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jonone wrote on Tue, 01 December 2015 17:05Hi,I haven't tried flanking the mains with two, as I only have the "midbass" at the moment and my sub driver is not built yet. They are quite different drivers so not the best match to make a stereo pair, I also don't have the space (or wife approval)to put the pair up front "flanking". I don't seem to really suffer from smearing of the stereo image, and it's definitely not localisable on the same plane as the mains. The driver is a very clean and can play up to 1khz off axis, my old sub that was regarded as "clean" would sound awful at 150hz, I personally think you need a different type of driver for

flanking/helper woofers compared to distributed subs. Something to think about with your own system?

Your situation sounds very similar to mine, as far as space for the two front subs, and the waf!

However, your sub sounds quite the opposite of mine. Mine sounds very muddy and bloated, even crossed at 100hZ. As I have said, it is a passive radiator design, with a 4db boost at 25hZ from the plate amp.

<https://www.madisoundspeakerstore.com/subwoofer-speaker-kits/scan-speak-discovery-30w-12-subwoofer-kit-with-passive-radiator/>

This feature is pretty neat while watching movies but-

This boost in the amp gives me the impression it is more of a distant sub/home theater design, than it is a hifi helper woofer design, with clean, even response.??

I agree with you that I would need a different type of sub (subs) for the "flanking" configuration. When I finish my basement, I will relocate my system down there, in which case I will have enough space, and freedom from the wife, to use/build two flanking subs

Actually, I'm looking to buy two 3pi sub kits from Wayne. I would like to know what plate amps he might recommend with them. My hunch is that no more than 200watts per sub would be required?

Also, Id better not show any pics of the room they'll be going in. If members here see the two opposite corners with no doors or windows, Ill be forced to build the 7pi's!

Regards!.

---

Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Wed, 02 Dec 2015 08:58:48 GMT  
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---

This is my driver : [http://www.aespeakers.com/drivers.php?driver\\_id=74](http://www.aespeakers.com/drivers.php?driver_id=74)  
Even though scanspeak make great drivers, passive radiators can be notoriously boomy. From my experience control over though cone is less boomy, so you want a big motor/magnet. I would have thought you want more of a pro style driver for flanking subs, with low distortion, lighter cone and lower xmax which can play cleanly into the midrange. Subs tend to have heavier cones and high xmax but higher distortion figures generally. I would go with what Wayne recommends.

---

Subject: Re: Mono "flanking sub"

Posted by [johnnycamp5](#) on Wed, 02 Dec 2015 11:19:12 GMT

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---

Agreed.

Hence why I plan to build two of the 3pi subs.

I believe they are all of what you describe, compared to my existing sub.  
Larger magnet/voice coil, lighter cone and such.

Regards!

---

---

Subject: Re: Mono "flanking sub"

Posted by [jonone](#) on Wed, 02 Dec 2015 13:07:14 GMT

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---

If that's what Wayne suggests, I'm sure there be perfect!

---

---

Subject: Re: Mono "flanking sub"

Posted by [jonone](#) on Sat, 05 Dec 2015 14:27:19 GMT

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---

Finally put the amp in the cab for my sub, just got to wait for the driver now!

Here's a few shots of the room, bare in mind it's a small "English" room, not like in the states!

---

#### File Attachments

- 1) [zpskkinch0b.jpg](#), downloaded 4969 times
  - 2) [zpsgvjjpggef4.jpg](#), downloaded 5021 times
  - 3) [zpsj9sbymrz.jpg](#), downloaded 4925 times
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Subject: Re: Mono "flanking sub"

Posted by [johnnycamp5](#) on Sat, 05 Dec 2015 21:54:12 GMT

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---

That ought to do it man.

It should certainly help even things out in your room. Your room looks to be a decent size. If I understand correctly, smaller rooms benefit from multiple subs more so than larger ones.

Regards!

---

---

Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Sun, 06 Dec 2015 10:26:29 GMT  
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---

Yes smaller room are worse for modes I beleive.  
Jon

---

---

Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Thu, 14 Jul 2016 08:00:10 GMT  
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---

Hi Wayne, do you have any opinion on which way a woofer should face for flanking subs, should they face forward? I've seen others mention firing towards to the sidewalls, or is it just a case of which measures best or do they sound best facing forward because of the frequency range they play up to?

I'm thinking of ordering a matching woofer so in the future so I can run a true flanking sub setup with a stereo pair, at the moment my single woofer is downfiring because of children, so I was wondering wether to make them forward firing for the future or I could have them both down firing. Thanks.

---

---

Subject: Re: Mono "flanking sub"  
Posted by [Wayne Parham](#) on Thu, 14 Jul 2016 13:46:20 GMT  
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---

I always face mine forward. But at the frequency they're used, orientation doesn't matter much. They're run high for subs, but still low enough that shading isn't an issue except for very large objects like walls.

---

---

Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Thu, 14 Jul 2016 15:50:09 GMT  
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---

Thanks Wayne, they will be aimed at a concrete floor, does that not act the same as a wall?

---

Do you think there will be a measurable effect in the <200hz area by adding a second?.  
Jon

---

---

Subject: Re: Mono "flanking sub"  
Posted by [Wayne Parham](#) on Thu, 14 Jul 2016 16:08:36 GMT  
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---

Of course, the floor is the biggest reflector. But when I said "shading isn't an issue," what I meant was that subwoofer orientation won't cause much attenuation. Neither will acoustically small things like barstools and small furniture. Large padded chairs and sofas will attenuate the sound and walls definitely will, if they're between you and the subwoofer. So as long as the object in between you and the sub is acoustically small, it won't attenuate very much. While I personally would prefer having my flanking subs facing me, having them face a different direction isn't a deal-breaker.

---

---

Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Thu, 14 Jul 2016 17:39:42 GMT  
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---

Ok thanks Wayne, I might try and make them so there down firing for now but can be forward firing in the future when the children are bigger.

The speakers are close to the rear walls on brackets and the flanking subs will be directly below them, (the only space I have)so not in your recommended positions, so they should definitely help with the notch caused by the floor but maybe not much for the side or rear reflections? but having the mains so close to the rear should help with that reflection anyway?

Would you expect to see a improvement in the response by adding the second flanking sub over the single?

---

---

Subject: Re: Mono "flanking sub"  
Posted by [Wayne Parham](#) on Thu, 14 Jul 2016 17:46:30 GMT  
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---

The best performance is when each main speaker has a flanking sub placed beside, below and behind two to three feet in each plane. The signal sent to each is a low-passed copy of what is sent to the mains, with a relatively mild (first or second order) slope, allowing content in the 100Hz-150Hz range to be presented to the subs. The knee frequency is usually around 100Hz, but with a gentle slope which provides significant energy blending with the mains through the octave above that.

---

---

Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Thu, 14 Jul 2016 18:01:25 GMT  
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---

But there should be some benefit from my suggested setup?  
At the moment I'm crossing over at 150hz with a Bessel filter.

---

---

Subject: Re: Mono "flanking sub"  
Posted by [Wayne Parham](#) on Thu, 14 Jul 2016 18:40:10 GMT  
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---

I have realized over the last decade or so that it always helps to add bass sound sources, up to about four where we start to see diminishing returns. But even beyond that, there are improvements. I have also learned that placement matters most when there are fewer bass sound sources. In the midbass, we want helper woofers a.k.a flanking subs. For lower bass, we want distributed multisubs.

So there are many take-aways from this. For one thing, the idea of high-passing mains to crossover to a single sub is useful for reducing excursion on the mains, but it is counter-productive for bass smoothness. Where modal smoothing is concerned, it would be better to have the mains be more capable of good bass reproduction, and to blend the subwoofer with them. That provides several bass sound sources, from the mains and the sub(s).

That's where I see your approach. You have a single sub, but it's blended with the mains. That provides some modal smoothing. It also can probably help reduce self-interference notches from nearest boundaries, provided the summed signal matches the mains in the problem frequencies.

Self-interference and room modes are both boundary-related problems, by the way. So while they are different problems, they are related in both their general symptoms and by the suggested treatments. Not the same, but close.

---

---

Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Thu, 14 Jul 2016 19:30:58 GMT  
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---

Hi Wayne thanks for the detailed response again!  
I have two subs now, the single "flanking sub" receiving a summed signal from the mains crossed over @150hz and a nearfield sub fed from the lfe out of my av amp with a 40hz crossover applied.

---

So eventually I will have three subs, one distributed ( nearfield ) fed from the lfe out put and stereo subs below the mains receiving a copied signal.

Can you explain by what you mean in saying "provided the summed signal matches the mains in the problem frequency's?"

---

---

Subject: Re: Mono "flanking sub"  
Posted by [Wayne Parham](#) on Thu, 14 Jul 2016 20:00:27 GMT  
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Let's say your mains are 2.5 feet away from the wall behind them, creating a self-interference notch at 110Hz. If the flanking sub is somewhere closer to the back wall - say one foot away - and it is presented the exact same signal, then it will reduce the size of that notch considerably.

But let's say the two mains are phased in such a way that the summed signal is greatly reduced at 110Hz - like if they have some kind of flanger effect on a guitar or something that swaps phase - then the benefit of the summed flanking sub will be lost.

That's probably a rare scenario but it's what I was talking about when I said the summed signal must match the mains at the problem frequency.

---

---

Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Thu, 14 Jul 2016 20:32:36 GMT  
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Ok thanks again Wayne, I think I understand.

---

---

Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Fri, 15 Jul 2016 08:27:05 GMT  
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Wayne, am I right in thinking if a speaker is pushed very close to the rear wall the cancelation from the rear wall is reduced? ( but I take it people don't do this as it's not so good for imaging ?)

Also does the floor normally cause the biggest notch compared to the rear and side walls?

Subject: Re: Mono "flanking sub"  
Posted by [Wayne Parham](#) on Fri, 15 Jul 2016 13:36:39 GMT  
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---

Each of the boundaries creates a self-interference notch. The wall behind the speakers makes a notch that is nearly fixed in frequency, because the path lengths between the direct sound and the reflection are nearly consistent even when the listener moves throughout the room. The floor bounce notch changes frequency as the listener moves because the path length difference changes much more.

---

Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Fri, 15 Jul 2016 13:49:32 GMT  
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---

Ok makes sense, so I take it you can work out the wall reflection notch by way of measurement to seating position?

More importantly how do you set the volume on your flanking subs to match your mains?

Really appreciate all the detailed answers your giving me, it's really kind!

---

---

Subject: Re: Mono "flanking sub"  
Posted by [Wayne Parham](#) on Fri, 15 Jul 2016 15:25:58 GMT  
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---

Self-interference notches are very apparent in measurements. And they line up exactly as you would expect: At the frequency where path length distance causes a 180° shift, you'll see a 10dB to 20dB notch.

As for subwoofer volume, setting is pretty easy: Just match the subs to the mains. If you have measurement gear, you can set it for overall smooth response. Or you can dial it by ear pretty easily.

---

---

Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Fri, 15 Jul 2016 16:09:55 GMT  
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---

So say you play 75db pink noise through just your mains, do you then play the subs on there own



and increase them until 75db? Or do you sweep them playing together until the midbass is smooth?

---

---

Subject: Re: Mono "flanking sub"  
Posted by [Wayne Parham](#) on Fri, 15 Jul 2016 18:41:50 GMT  
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---

Sweep them playing together and adjust volume until the amplitude response is smooth. Neither sub bass nor mains should be louder than the other. And yes, the midbass is where you should see this best, because that's where both mains and subs overlap. Both should be equally loud. But the goal isn't really to set them independently to match SPL; The goal is for the system to generate flat amplitude response.

---

---

Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Fri, 15 Jul 2016 18:53:33 GMT  
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---

Ok great that is pretty much what I did for my single!

I have tried to look and I'm sure I've asked you before but couldn't find the answer, do you add any delay to the mains or flanking subs to smooth the response?

I imagine because in your method the subs are behind the mains you could delay the mains slightly, does this help to reduce the notch's?

Can you please explain why you do or don't use delay.

---

---

Subject: Re: Mono "flanking sub"  
Posted by [Wayne Parham](#) on Fri, 15 Jul 2016 22:16:28 GMT  
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---

Delay is set by position. That's the point of having the subs behind, beside and below the mains. It creates delay in three dimensions, which no electrical method can do. Having the subs behind the mains delays the direct sound and it makes the reflection from the wall behind the speakers come sooner than the reflection from the mains. This also happens with respect to reflections from other boundaries, in all directions.

---

---

Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Sat, 16 Jul 2016 06:37:11 GMT  
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---

That explains it perfectly Wayne!  
Do you think delay may still help my setup because mine won't be in totally different 3d space, only except below the mains?

Do you apply delay to you distributed subs? I remember reading geddes recommends an adjustable "phase" dial on subs?

---

---

Subject: Re: Mono "flanking sub"  
Posted by [Wayne Parham](#) on Sat, 16 Jul 2016 14:06:36 GMT  
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---

I use positioning as the sole cure and do not apply any electrical delay. As I said above, electrical delay is a one-dimensional parameter and as such, it cannot correct a three dimensional problem.

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---

Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Sat, 16 Jul 2016 14:25:57 GMT  
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---

It's interesting that I found adding no delay to my two subs gave the flattest response, this was after hours of trying endless possibilities of delay between the two.

Thanks again for being so helpful!

---

---

Subject: Re: Mono "flanking sub"  
Posted by [johnnycamp5](#) on Sat, 16 Jul 2016 16:48:53 GMT  
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---

Wow.....  
page 7 of this thread is a great bit of info.

I've been wondering about "delay" for the flanking subs as well, but Wayne confirmed my thoughts, with using "positioning".

I see a ton of home theater guys (example AVS forums) use electronic delay as if there is no question about it.

Why would anyone use electronic delay, especially when it only corrects in one plane (depth)?

---

Perhaps if you cannot adjust your mains from your subs in depth (all the same distance from the front wall), but can have the subs positioned next to (left or right) and lower than the mains, it can be of use?

I've always felt that electronic delay, used incorrectly, might be as bad as room eq. We all know what room correction eq does

I've seen some stereo mains (typical tower speaker) designed in such a way that the bottom of the front baffle is out in the room more than the top (in other words, a tapered cabinet that is deeper in depth at the bottom than the top).

I understand this is to place the woofer/woofers out closer to the listeners, as to correct for the slight delay in timing/phase between the bottom woofers, mid range, and top tweeters.

If this line of thinking has merit, wouldn't this lead us to believe that placing the flanking subs out in front of the mains, closer to the listeners, with the mains being backed up against the walls might be another way of positioning?

The only thing I can think of is, the mains should be toed in, therefore generally positioning the mains out in the room more than normal, suggesting you put the subs against the front wall.

---

Subject: Re: Mono "flanking sub"

Posted by [Wayne Parham](#) on Sun, 17 Jul 2016 14:31:29 GMT

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---

Physical position of midrange and tweeter drivers is sometimes offset to get the summing right. It's kind of similar, except in this case, the goal is to match the phase of each subsystem.

In multisub setups - both flanking and distributed - we're actually going the opposite direction. Since we know we can't match phase of all reflections, we're trying to smooth the anomalies using dense interference.

So the goal of driver baffle offset is phase-related, but it is an attempt to match phase to reduce interference. The goal of mutisubs is to increase interference.

---

Subject: Re: Mono "flanking sub"

Posted by [jonone](#) on Sun, 17 Jul 2016 15:04:14 GMT

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Wayne Is there an explanation why zero delay was flatter than most other options I tried? Any delay configuration I tried just moved the dips somewhere else in the response?

One thing I did try before I got my new amp was to change the mains distance to further away than the real distance /auto setup suggested distance,as I think because the sub goes through eq and sub amp it's probably behind the mains in arrival time? And delaying the subs only made this gap bigger, I know this is not the idea behind multiple subs, but from memory it may have helped raise the dip slightly in the 100hz area... I need to try it again with the new amp, I just did auto setup for distance etc.

---

---

Subject: Re: Mono "flanking sub"

Posted by [Wayne Parham](#) on Sun, 17 Jul 2016 16:16:41 GMT

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---

Delay is equivalent to making the distance further in one dimension. So naturally, this changes the frequency where self-interference cancellation happens.

The thing is, our goal is not achieved by this. We need to create dense interference by increasing the number of sound sources to mitigate the anomalies caused by boundary reflections.

---

---

Subject: Re: Mono "flanking sub"

Posted by [jonone](#) on Sun, 17 Jul 2016 17:05:46 GMT

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---

But if using delay on the mains helps the response across the seats because the flanking subs are not in the optimum position, it's not a problem?

---

---

Subject: Re: Mono "flanking sub"

Posted by [jonone](#) on Sun, 17 Jul 2016 17:55:28 GMT

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---

I remember earl geddes suggesting having adjustable Phase knobs on the back of subs in a multi sub set up, so presumably like you say you can move the points in the frequency where the cancellations happen to help smooth the response.

---

---

Subject: Re: Mono "flanking sub"

Posted by [Wayne Parham](#) on Sun, 17 Jul 2016 20:31:29 GMT

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---

You can manipulate electrical phase and/or delay, certainly. I'm just saying that it's pretty limited in what you can accomplish with that. The better solution is to set the delay with position in 3D

---

space.

---

Subject: Re: Mono "flanking sub"  
Posted by [johnnycamp5](#) on Sun, 17 Jul 2016 21:18:03 GMT  
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Wayne Parham wrote on Sun, 17 July 2016 16:31  
You can manipulate electrical phase and/or delay, certainly. I'm just saying that it's pretty limited in what you can accomplish with that. The better solution is to set the delay with position in 3D space.

How important is sub enclosure shape?

Lets use a 40"x40"x40" cube as a huge example.

Instead of a cube, could one build sub enclosures tall and thin, for example- 40" wide x 80" tall x 20" deep?

This does not change internal volume.

This example could locate both the subs and mains approx. 20"s closer to the front wall vs. a typical 40" box.

While maintaining the mains and subs offset in depth, could this be acceptable?

---

Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Mon, 18 Jul 2016 12:52:19 GMT  
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Wayne Parham wrote on Sun, 17 July 2016 15:31  
You can manipulate electrical phase and/or delay, certainly. I'm just saying that it's pretty limited in what you can accomplish with that. The better solution is to set the delay with position in 3D space.

Did welti use electrical phase/delay or just 3D space? is that another way geddess and welti are different, aside from the symmetrical vs random?

Subject: Re: Mono "flanking sub"  
Posted by [Wayne Parham](#) on Mon, 18 Jul 2016 15:46:46 GMT  
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---

Subwoofer cabinet shape isn't really important because the cabinet is acoustically small. Standing waves cannot setup inside.

Welti started off doing just position but later added equalization. Geddes probably followed suit. It's an Nth degree thing - The biggest improvement comes from using multiples and placement, but equalization is also useful to a lesser degree. Nobody would advocate equalization in lieu of multiple subs, but once you already have multiple subs, it is potentially worthwhile to equalize for an incremental improvement.

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Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Wed, 10 Aug 2016 18:25:37 GMT  
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Wayne can I ask how important you feel phase is between the drivers in a speaker? The manufacture of my speakers feels this is crucial and much more important than flat amplitude. If you also feel this is crucial can you explain why the phase between flanking subs and the mains doesn't seem to matter and we don't hear that they're not in phase? Is it because of the frequency flanking subs operate in? I hope it makes sense what I'm asking.

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Subject: Re: Mono "flanking sub"  
Posted by [Wayne Parham](#) on Wed, 10 Aug 2016 20:01:19 GMT  
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When we talk about phase anomalies (time domain) or when we talk about peaks and dips in the amplitude response (frequency domain), we're essentially talking about flip sides of the same coin. I've always been more focused on the frequency domain because I know that anomalies in frequency response are audible, when the peaks or dips are large and wide enough. Anomalies in the time domain are a little more controversial, unless the defects are large enough to cause a time delay between two sounds that were supposed to be simultaneously presented. But again, the two things are really inter-related, and problems in the time domain are presented in the frequency domain, and vice-versa.

Beyond that, see the Pi Speakers FAQ, and especially the sections about Crossovers, Room Effects and Loudspeaker Interactions and Simulations and Measurements. They talk a lot about what is required to get proper summing between adjacent subsystems. This will address what you asked "how important you feel phase is between the drivers in a speaker?" They also talk a lot about room interactions, room modes and the ways to correct the problems that result. That

will answer your questions about flanking subs and the frequency range they're used in.

In a nutshell, it is important to get summing right in the statistical range, above 200Hz. This is what you're calling "phase between drivers." We want them to act as a single point source. On the other hand, it is impossible to do this in the modal range, below 200Hz, because of the multiple reflections from each room boundary. Since we can't achieve a point source in the modal region, we want dense interference to smooth the sound field instead.

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Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Thu, 11 Aug 2016 13:00:43 GMT  
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Ok thanks I will have a read.  
Great simple explanation at the end of the post though?

I know I've asked this before and you have said its not that important but is there a specific filter type you use and a xo point you reccomend for flanking subs or is it room / speaker dependent? What do you use in your own set up?

Is there a technique to best choose the filter and xo?

Also should the subs be a certain db down (l.e 6db or something) at 200hz to help the speakers be the point source above 200hz?

P.s I've ordered another td15h+ from ae to make steps towards a true flanking sub setup.

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Subject: Re: Mono "flanking sub"  
Posted by [Wayne Parham](#) on Thu, 11 Aug 2016 13:40:43 GMT  
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The links in the FAQ explain all that and more.

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Subject: Re: Mono "flanking sub"  
Posted by [jonone](#) on Thu, 11 Aug 2016 19:54:09 GMT  
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Something I found.

"Low-pass frequency for flanking subs should be between 80Hz and 150Hz, and use second-order or third-order for best results. Fourth-order can be used, but it doesn't sound as good to me - It doesn't blend as well. The higher the slope, the higher the the crossover frequency. So for example, second-order at 90Hz or 100Hz often works well, third-order is better around 125Hz and fourth-order usually has to be set higher still. Set the amplitude for SPL matching the mains in the overlap band."

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Subject: Re: Mono "flanking sub"

Posted by [jonone](#) on Fri, 21 Oct 2016 17:52:50 GMT

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My new woofer has arrived, so I can use them as flanking subs, I've also had some new cabs made so they will be forward firing this time.

The Amps ordered and the cabs are being sprayed, so I'm pretty much ready to rock.

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#### File Attachments

1) [image.jpg1\\_zpsx6slg2j9.jpg](#), downloaded 1482 times

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