Subject: Kind of crazy idea for a flanking sub processor
Posted by andy_c on Wed, 06 Mar 2013 02:20:50 GMT
View Forum Message <> Reply to Message

I'll be starting a new project in a couple of months or so, involving two new subwoofer enclosures. The only place I have room for them is close to and a bit behind the two main speakers, on the outside of each one. They'll be sealed sonosubs, with one down-firing and one up-firing driver in each enclosure. There will be a barrier inside each enclosure separating it into two separate sealed compartments, with a separate amplifier channel and filter EQ for each one: two stereo Crown pro amps for the four drivers and either a miniDSP or DCX2496 for EQ and crossover duty.

This sounds an awful lot like flanking subs to me, and I've been intrigued by Wayne's ideas in this area. My mains show a dip of around 10 dB at about 125 Hz, and I'd like to tame that by running the subs to a high enough frequency so they'll smooth that out. But it kind of bugged me that they'd be stereo, even though I realize that's necessary if you run them up that high in frequency.

So I started wondering if it might be possible to design a circuit that took left and right line-level inputs, and produced left and right line-level outputs that are for all practical purposes mono at low frequencies (so the subs act like distributed subs down there) and stereo at frequencies much above 100 Hz or so (so they act like flanking subs up there).

I came up with a circuit that looks like it will work, and wrote an article about it on my web site.

I'd be interested in hearing any input about this idea. Go easy on me Wayne!

Subject: Re: Kind of crazy idea for a flanking sub processor
Posted by Wayne Parham on Wed, 06 Mar 2013 02:27:19 GMT
View Forum Message <> Reply to Message

I think it's a great idea, and I also think you and Darrell should compare notes because he wanted to do the very same thing:
flanking subs with small mainsI think it's pretty cool, and I wish home theater processors had a setting for this arrangement.

Subject: Re: Kind of crazy idea for a flanking sub processor
Posted by andy_c on Wed, 06 Mar 2013 02:58:35 GMT
View Forum Message <> Reply to Message

Ah yes, I see! It took me a while to figure out what he was saying, but after looking at his block diagram, it looks like he wants mono bass below 80 Hz and stereo bass above for the flanking subs. Same thing indeed.

Subject: Re: Kind of crazy idea for a flanking sub processor
Posted by dheflin44 on Wed, 06 Mar 2013 14:47:52 GMT
View Forum Message <> Reply to Message

Glad if it helped. Oddly enough I've been looking at the 7Pi, so I not even sure if I'll be able to try the idea.

Thanks,
Darrell

Subject: Re: Kind of crazy idea for a flanking sub processor
Posted by zheka on Wed, 06 Mar 2013 19:07:22 GMT
View Forum Message <> Reply to Message

Hi Andy,
this is very interesting.

Is your system purely for stereo playback and the reciever you are using does not have bass management capabilities? I am trying to get a better idea about the problem this circuit is supposed to offer a solution to.
If your receiver offers bass management then would not a mixer solution like the one Darrel proposed lead to essentially the same results? And if you planning to use it in a multichannel set up then how the LF signal from other channels and LFE would get integrated?

Thak you.

Subject: Re: Kind of crazy idea for a flanking sub processor
Posted by andy_c on Wed, 06 Mar 2013 22:31:05 GMT
View Forum Message <> Reply to Message

zheka wrote on Wed, 06 March 2013 13:07
Is your system purely for stereo playback and the reciever you are using does not have bass management capabilities? I am trying to get a better idea about the problem this circuit is supposed to offer a solution to.

Yes, my system is stereo-only. I do have an AVR that I use as a DAC/preamp combo (no subwoofers yet). The idea is that I can only place my subs in positions normally suitable for flanking subs, and I have some problems in the 100 Hz - 200 Hz area. I didn't want the subs to operate in mono, as I may cross them over to the mains at 150 Hz or so, maybe even higher. But I didn't want them to operate in stereo either, because below 100 Hz or so, I want as many subs participating in the low-frequency output as possible, to get smoothest response and highest

output too. If there were, say, a 60 Hz signal panned all the way to the left or right, I'd nonetheless want both left and right subs to reproduce it. But a signal at, say, 200 Hz panned all the way to the left or right should go to its designated output and not the other channel.

So the idea is to have a circuit with left and right inputs, and left and right outputs. Roughly speaking, the outputs should be mono below some frequency (say 80-100 Hz) and stereo above that. In reality, the transition is gradual, but sudden enough such that the crosstalk is about -30 dB at 200 Hz when the transition frequency is set to 100 Hz.

zheka wrote on Wed, 06 March 2013 13:07
If your receiver offers bass management then would not a mixer solution like the one Darrel proposed lead to essentially the same results? And if you planning to use it in a multichannel set up then how the LF signal from other channels and LFE would get integrated?

Darrel's idea is very clever. In fact, after seeing it, I realized I can simplify my circuit a lot. I don't have the changes up on my web site yet, but it does look a lot more like his concept now.

The only reservation I would have with that particular approach is due to the typical crossover implementation in AVRs. The low-pass is typically a fourth-order Linkwitz-Riley filter, but the high-pass is usually a second-order Butterworth (half of a fourth-order Linkwitz-Riley). The original idea behind this was that the mains were assumed to be a closed box with QTC=0.707 (Butterworth), and the crossover frequency would be chosen to be the fc of the mains, such that the second-order high-pass characteristic of the electrical filter, plus the electroacoustic second-order high-pass characteristic of the mains would combine for a net fourth-order electroacoustic high-pass. But when the low-pass and high-pass signals are combined purely electronically, that assumption is violated. I'm not sure what kind of ripple that would cause in the summed output, but I'll put it into a simulator to check it out.

The only solution I can think of for flanking subs in a MCH system is to set the left and right mains as large, and use the flanking subs to process the bass of those channels only. Then the distributed subs would be used for LFE and bass from the other channels. This leaves the front center speaker as being treated differently from the left and right fronts. It's a difficult problem for the MCH scenario.

Subject: Re: Kind of crazy idea for a flanking sub processor
Posted by j0nnyfive on Thu, 07 Mar 2013 18:39:08 GMT
View Forum Message <> Reply to Message

Just butting in here because I think I get what you guys are cooking up and I likey!

What about this idea: Come up with a circuit of some kind that will allow you to connect Left, Right, and CENTER. Then, when bass above 80hz pans hard left, it goes left. Right, right. But to smooth the center channel, both flanking subs participate thereby "imaging" the bass into the middle.

Possible? Worthwhile? I like the flanking subs approach, but I've already decided that I will NOT

buy 3 subs just to place all 3 across the front. (For multiple reasons) But 2 of my mains having flankers while the most important HT channel does not have anything helping it? Blasphemy. (IMHO tee hee).

I'm imagining having 2 flanking subs that can:

a. Handle summed bass below 80hz.
b. Handle hard pans left and right above 80hz.
c. Work together to smooth the center channel above 80hz.
d. Still be able to be nicely EQed using the popular Behringers.

I don't have the skills to figure this out, so I'm relying on you smarter people to handle it. lol I'm just dreaming. If you could make this (or something better than this) happen, wow that would be so awesome. . . In this situation, I may even skip the 3rd sub and build beefier flanking subs.

If you guys already talked about this above, I apologize, it was over my head. lol Carry on being awesome.

Subject: Re: Kind of crazy idea for a flanking sub processor
Posted by dheflin44 on Fri, 08 Mar 2013 05:34:14 GMT
View Forum Message <> Reply to Message

andy_c wrote on Wed, 06 March 2013 16:31

The only reservation I would have with that particular approach is due to the typical crossover implementation in AVRs. The low-pass is typically a fourth-order Linkwitz-Riley filter, but the high-pass is usually a second-order Butterworth (half of a fourth-order Linkwitz-Riley). The original idea behind this was that the mains were assumed to be a closed box with QTC=0.707 (Butterworth), and the crossover frequency would be chosen to be the fc of the mains, such that the second-order high-pass characteristic of the electrical filter, plus the electroacoustic second-order high-pass characteristic of the mains would combine for a net fourth-order electroacoustic high-pass. But when the low-pass and high-pass signals are combined purely electronically, that assumption is violated. I'm not sure what kind of ripple that would cause in the summed output, but I'll put it into a simulator to check it out.

Hi Andy,

Maybe a partial solution for the asymmetric XO would be to add a FMOD high-pass filter to the mains line input to the summer. This should get the slopes fairly close, but I'm not sure about the problems the Butterworth vs LR filter types might cause.

Thanks,
Darrell
