Subject: L pad
Posted by johnnycamp5 on Sat, 20 Feb 2021 16:08:12 GMT
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I have a very elementary question for any crossover circuit experts...

I am under the impression that a single resistor in series with a loudspeaker can increase overall impedance but also alter/attenuate frequency response, where an L-pad configuration (r-1 series x r-2 parallel) will increase the impedance without changing F.R.

Is this generalization mostly correct?

I have an upcoming build where I am trying to pad down a large waveguide/CD combo (ME464/DCX464) from 111db sensitivity to 98db sensitivity (to closer match a jbl2226). Basically a two way speaker.

They will be hi-amped, so I'm not sure how critical it is, but I'd like to pad down the 8ohm compression driver anyhow to get a closer start and the additional noise floor reduction ...

I am referring to an increase in overall loudspeaker impedance to a decrease in its overall sensitivity, I'm not sure if that is correct or not.

Subject: Re: L pad
Posted by Wayne Parham on Sat, 20 Feb 2021 17:22:46 GMT
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That's right, exactly. A series resistor will attenuate overall SPL but will create a peak at resonance.

Look at the impedance curve of the driver. Better still, if you can, look at the impedance curve of the driver in the box, horn or whatever you have it installed in.

Wherever you see an impedance rise, SPL will be louder. So since the impedance usually has a pretty big peak at resonance - or in some installations, resonances - those will have corresponding peaks in response. It's because the voltage division changes due to the resistance

see that the proportions change. The driver's impedance is 10x greater than the series attenuation, so the attenuation is almost nothing.

This is even more pronounced because of the crossover reactivity. What I said above holds true if you just had the driver installed without a crossover. But the crossover itself has reactive components that are damped by the load so that they do not become resonant. But if the load is decreased, e.g. resistance is increased, then the crossover itself will become resonant. I've seen 15dB peaks from this. Midwoofers without a Zobel sometimes have huge peaks near the crossover frequency. Horn tweeters with series resistors can have similarly large peaks near the

horn's flare frequency, often times two or three of them.

Check out this document I did about 20 years ago. It shows this very well.
Crossover document
Some years at the Lone Star AudioFest, I do a seminar that shows this issue, illustrated with crossover diagrams and response charts. I then hook up a physical circuit and let the audience hear it, switching between a crossover that is improperly damped and another that has proper damping. It lets you actually hear this peak. I encourage you to duplicate these experiments. It's quite interesting.
Crossover Electronics 101 Handout

Subject: Re: L pad
Posted by johnnycamp5 on Sat, 20 Feb 2021 18:02:22 GMT
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Thanks Wayne.
I will read the links you have attached and learn as much as I can absorb at my own (SLOW) pace.

Can these impedance (spl) peaks you mention be corrected with DSP?

In this case, I'm using B&C's crossover that was designed for the coaxial compression driver, supposedly it blends the midrange range/high end ring radiators optimizing phase and amplitude. Granted, the frequency response they publish with the crossover does not look so good, but I don't think that's what they were after. I think they expect it to be treated with DSP for the frequency response, which is it exactly what I'd like to do.

The horn signs off at 300Hz. so that's where ~ I'll have to cross in the 2226h in this case without a zobel?

Again initially I'm just trying to bring down the sensitivity of the coax CD to closer match the Jbl then just DSP from there...

Here a link to the horn that includes the CD and crossover-

https://www.bcspeakers.com/en/products/horn/1-4/0/ME464

Subject: Re: L pad
Posted by Wayne Parham on Sat, 20 Feb 2021 19:14:25 GMT
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You can do pretty much anything with DSP. So - yes - you can correct the anomalies created by reactance with DSP. But really, if you're going to use DSP, it would be better to use it alone rather

than to have any reactive components in the loudspeaker circuit.

The only thing that's a problem is some DSP tools don't allow arbitrary networks to be modeled. If you are trying to duplicate a passive crossover that uses values other than textbook Butterworth or Linkwitz-Riley, it isn't as easy as configuring for a simple slope and frequency. And to tell the truth, that's how most people use DSP. Consequently, it's how most entry-level audio DSP systems are made to be used. So that prevents the user from taking advantage of the power of DSP.

But since some DSP systems come with a sampling mechanism, they can be set to auto-correct response. Just place the measurement microphone at the listening position. That's probably the easiest way to set it all up.

Subject: Re: L pad
Posted by johnnycamp5 on Sat, 20 Feb 2021 19:56:50 GMT
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Thanks I figured as much.

I use a mini DSP-HD. I use it as the system DAC/PEQ.
Analog out to my pre amp, then L and R out to the horns amp and L and R sub out to the 2226's amp.

In this biamp arrangement, I suppose I can try to pull down the horns sensitivity with a resistor (or L-pad) and/or just turn up the gain on the woofer amp.

I suppose I could get another DSP strictly for processing the coaxial CD in place of the passive.... but how many times should I DAC/ADC/DAC!!! :lol:

Subject: Re: L pad
Posted by johnnycamp5 on Sun, 21 Feb 2021 00:44:57 GMT
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I just started digging into the "crossover electronics 101 handout".
What a great read so far!
So cool when I got to the section of "damping"...
I was thinking to myself...this looks and sounds exactly like overdamped and underdamped alignments while playing with "winISD"
It ends up that's exactly what it is!!
