Subject: L-pad on LF driver
Posted by Tom A. on Mon, 08 Apr 2002 15:56:54 GMT
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Wayne (or anyone), what in your opinion are the unintended consequences of using a fixed L-pad (made of sandcast low inductance resistors) in the woofer circuit to drop its output by around 4-5 db ? I know that this can affect the woofer enclosure tuning in bass reflex designs but I really have no clue how it would affect a front horn loaded driver. Im sure that the damping factor of the amplifier must be affected but in what way? I have to match a horn loaded woofer of 103 db in free air to a mid horn and HF horn of about 105 db, so the woofer will need padding of 4-5 db depending on throat matching.....thanks for the forum.....Tom A.

Subject: Re: L-pad on LF driver
Posted by dbeardsl on Mon, 08 Apr 2002 16:53:19 GMT
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I'm not horribly experienced, but I'll take a stab.First, I don't think you'll need to pad it 5db. it MIGHT be 1 or 2db more efficient than 105, but even hornloaded I doubt it would give more than 104 or 5 through the useful range.Anyway, you know more about your driver than I do, so my guess is padding it by 4 or 5db with fixed resistors would actually be better for the amp. This will reduce impedance range(Zmax and Zmin) giving the amp a load that is even closer to being purely resistive.As for it affecting the tuning of a BR design... I don't know, I wouldn't think so, but I'll let someone else answer that.hope my guesses are of help, I'm a little bored at work here.Danny

Subject: Adding resistance changes system peaking at resonance
Posted by Wayne Parham on Mon, 08 Apr 2002 19:31:52 GMT
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Using an L-pad in the woofer circuit will change its damping. The added resistance will act like Res and Qes are higher. The woofer and its cabinet form an acoustic filter, which works just like an electronic filter, and resistance changes filter Q. Series resistance increases peaking and parallel resistance increases damping. So it will probably have an effect on response shape in

addition to amplitude.

Subject: Re: L-pad on LF driver
Posted by freddyi on Mon, 08 Apr 2002 20:21:58 GMT
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Hi Tomnot my fave scenario but had to do it on my Edgarhorn 100 system to match midhorn - the 1/4 size 100Hz m=0.5 horn uses a JBL 2220H so above ~125Hz, sensitiviy is about 109dB 1W/1M - midhorn probababy 103 ss - JBL LE5 on 250Hz rectangular tractrix - bottom augmented by 1-1/8 size 40hz Monolithin this situation impedance fluctuation is pretty benign so I got nice results running everyting including 'sub' with homemade parallel 2A3SE amp and similar-better results with mod Eito ST70 running 6BX7 ppp (Eico has bit higher damping factor - probably ~4)no need for expensive resistors - modern sandcast have little inductance.have you already built the horn? - does it have a small back chamber? what flare, etc? - will assume woofer with 103 rating is low qes (?)Freddy

Subject: Re: L-pad on LF driver
Posted by Tom A. on Mon, 08 Apr 2002 22:23:06 GMT
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Let me layout my project to fill in some of the gaps that I left in my last post. The midrange and tweeters are as follows. A JBL 104 H2 driver on a wooden edgar tractrix midhorn with a flair rate of 300 hz, Dr. Edgar rates this horn combination in the literature at being 105 db/w/m. The tweeter will be an Eminence APT 150 super tweeter horn crossed over at 18db/4000hz, this has a rated sensitivity of 105 db also (according to the Parts Express cat.), which may be as Wayne said, measured on a test waveguide tube rather than on its horn in free space. The bass horn will be a clone of the Klipsch La Scala chosen both for its simple construction, and because when I start the next project, I can sell the empty cabinets on ebay and get enough to buy the birch plywood for the next project. Now I can buy a K33E woofer(made by Eminence OEM) from Klipsch(Fs=34hz, Vas=?,Qes=.410,eff.=96 db/w/m, Klipsch's published figure for this woofer is 104 db in the La Scala) for $100 each or buy a Eminence Kappa 15 with a slighty higher Fs, a Qes that is about 25% lower, a Vas that is around 9.5 cubic ft., but an eff.= 103 db/w/m(listed by Eminence in the specs.) and 250W more peak power handeling than the K33E. PE sells these for

around $90 each. The Kappa freq. response curve shows some peaking in the Khz range so the REAL spl of the Kappa's are more probably like 99 to 100 db in the sub khz range. I would obviously prefer to use the Kappa's since they are superior in all ways except for the sensitivity issue. So looking at it a little more closely, Wayne and Danny, I am really only going to see a probable 2 to 3 db mismatch in the freqs. below about 500 hz. I'm still a little unclear about modeling the amp/woofer circuit though. Im thinking a perfect source with a R determined by the damping factor, a series R and L because of the crossover inductor, the parallel and series R's of the L-pad , A series R and L of the woofer , write a Laplace equation using node and loop equations, and then what? How does the horn loading of the woofer change its impedence values(I think it would have to add to the values because of the mass loading of the horn cone and the added restoring forces of the sealed box). When I do a before and after frequency response plot to see if the L-pad has adversly affected the woofer, where would I take the voltage value? Across the woofer and resistance or ??? Sorry about the long posts, but circuit analysis was more than 28 yrs ago for me. Thanks for all the help, its really appreciated.....Tom A.

Subject: Mathematical models
Posted by Wayne Parham on Tue, 09 Apr 2002 01:26:09 GMT
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Have you used Spice? That will allow you to model the electrical circuit perfectly, and the acoustic filter functions are simple enough that they can be modeled on it if you choose to do so. Coming at it from the other direction, you can use Thiele/Small, adding any attenuation resistance you decided upon by manipulating Qes. And using David McBean's Hornresp, you can model the response of the basshorn with and without additional resistance in the woofer circuit simply by adding it to the motor's Re. So there are several ways to model the system - Some that focus mainly on the acoustic filter functions and others focusing primarily on the electrical filters. Each sort of "touches" on the other.

Subject: Re: Mathematical models
Posted by Tom A. on Tue, 09 Apr 2002 13:14:37 GMT
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Thanks Wayne for your sugestions and the links. I will study up on the Spice simulation to model the L-pad effects just to answer my own curiosity (once a problem is presented, it always seems to beg me to try and solve it, and it looks like the program links you gave me will get me there).Best, Tom A