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Subject: Effects of a low pass notch filter on BR versus TL: speculations

Posted by [akhilesh](#) on Wed, 24 Mar 2004 17:21:29 GMT

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Hi Everyone, Since it is my lunch break, I got to thinking about the differential effects of a low pass notch filter on a bass reflex versus a TL box. My initial thought was: A bass reflex box emphasizes the midrange too, because of resonance. It emphasizes the midrange more so than a TL. A low pass notch filter (one inductor and one resistor in parallel as a unit, and the unit in series with the driver) will allow for a HIGHER resistor value without losing clarity, since the midrange is getting emphasized in the BR box. Of course, a higher resistor would lead to MORE bass. So, for a given driver, the differential effect of a low pass notch filter will be greater for a well designed BR box, than for a well designed TL box. I understand that the BR may not emphasize all frequencies equally, and a TL may be a bit less colored, but put that aside for a while. What do you all think? -akhilesh

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Subject: Re: Effects of a low pass notch filter on BR versus TL: speculations

Posted by [Wayne Parham](#) on Wed, 24 Mar 2004 21:04:56 GMT

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The fundamental tuning device of a bass-reflex cabinet is a Helmholtz resonator, which has one predominant frequency. A transmission line has a primary resonant frequency, but it also has multiple harmonics above that. So I would expect a transmission line to have more resonances than a bass-reflex cabinet, with the TL acting sort of like a horn. In both transmission line and bass-reflex loudspeakers, the designer generally intends for midrange energies entering the cabinet to be attenuated so that they are not present. Low-pass filters formed by acoustic insulation and by woofer crossover components both serve to reduce energies that energize unwanted higher-frequency resonances. But for what energies are within the cabinet, the major issues are caused by standing waves, which is the property transmission lines are based upon. You may be interested in the paper called Acoustic Filters, Waveguides and Transmission Lines, by Daniel Russell.

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Subject: Re: Effects of a low pass notch filter on BR versus TL: speculations

Posted by [akhilesh](#) on Wed, 24 Mar 2004 22:30:17 GMT

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Thanx for the pointer Wayne! I was trying to intuit (with complete ignorance of any acoustic engg theory of course) that a bass reflex has no stuffing, while a transmission line does. Hence the bass reflex would emphasize smaller waves more than the TL, where the stuffing would capture the smaller waves from the backward movement of the driver. Of course this is an unsophisticated, intuitive kind of analysis... Basically, the "hollowness" of the BR should make it

more resonant of the higher frequencies. Of course if adequate absorptive material is used around the walls, then you are right, it won't matter. In fact the resonant frequency will be a single one for the BR box, as you say. So, what do you think, will the contour shaping notch filter circuit affect a BR more or less?-akhilesh

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Subject: Re: Effects of a low pass notch filter on BR versus TL: speculations  
Posted by [Martin](#) on Wed, 24 Mar 2004 23:04:27 GMT

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Hi akhilesh, If we restrict our discussion to a classic TL (no restriction at the open end) and a classic BR (no stuffing). Ignoring any internal standing waves between the sides or the front and back of the boxes. In the BR ignore the standing wave from the top to the bottom, we need to include this direction in the TL or it would not work. The BR will have a smoother midrange response which is essentially just the woofer's SPL response. The mass of air in the port should kill all higher frequency output, remember that the port's acoustic SPL response rises at 12 dB/octave to a peak at the tuning frequency and then falls at 12 dB/octave above the tuning frequency. The SPL output from the port above the tuning frequency should monotonically fall as frequency increases. The classic TL's output from the terminus will produce gentle peaks and dips at the odd higher harmonics of the tuning frequency (assuming it is a straight line). This will create a ripple around the SPL that the woofer would naturally put out over the midrange. In the midrange, where baffle step occurs, the two systems should exhibit essentially the same average efficiency complete with the 3 to 4 dB rise due to the baffle step. The correction circuit should have the same effect on both types of designs. The only difference might be the frequency range which BSC cuts in due to size differences in the enclosures. Martin

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Subject: Re: Effects of a low pass notch filter on BR versus TL: speculations  
Posted by [Wayne Parham](#) on Wed, 24 Mar 2004 23:34:36 GMT

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I'd call it six one way and a half dozen the other. Both the bass-reflex and the transmission line have internal dimensions that encourage standing waves at specific frequencies in the midrange. If these frequencies are allowed to enter the chamber, they will tend to energize standing wave modes. So stuffing and/or crossover electronics that attenuate the midrange inside the cabinet are a pretty important detail for either type of enclosure.

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Subject: Re: Effects of a low pass notch filter on BR versus TL: speculations  
Posted by [akhilesh](#) on Thu, 25 Mar 2004 15:43:08 GMT

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Thanx, Wayne & Martin. I guess my conception of how a TL behaves versus a BR was flawed. Your posts have certainly clarified their effects. I should probably read up more before making speculative posts!thanx-akhilesh

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Subject: Re: Effects of a low pass notch filter on BR versus TL: speculations

Posted by [roncla](#) on Thu, 01 Apr 2004 03:31:21 GMT

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A transmission line has a primary resonant frequency, but it also has multiple harmonics above that. So I would expect a transmission line to have more resonances than a bass-reflex cabinet, with the TL acting sort of like a horn. True, but in a straight TL the harmonics are in an odd multiple order. In a TQWT the harmonics are in an even order (closer together) which gives a greater LF response bandwidth. Even though the TQWT will not go quite as low as a TL in frequency (given the same sound path length) I like the TQWT a bit better as the LF has a better response over a greater frequency range. ron

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