Subject: Can a notch filter improve phase lag?
Posted by akhilesh on Wed, 31 Mar 2004 18:26:38 GMT
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HI Everyone, Here is a speculative argument as to why a notch filter may improve phase shift. in a BR box, the bass frequencies will come from the vent, and there is a phase lag. A notch filter will add afurhter phase lag. THe difference in ear-driver and ear-vent distances will also come into play. If the former is more, then it will lead to phase lead for the bass. In some cases, the combination of the factors that cause phase lag (box & notch filter) and phase lead (distance difference) can mayeb cancel each other out. In other cases, if the ear-driver distance is smaller enough, it may lead to a 360 degree phase lag, whioch may lead to a better integration of the music. What do you all think?-akhilesh

Subject: Re: Can a notch filter improve phase lag?
Posted by Martin on Thu, 01 Apr 2004 00:11:37 GMT
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Hi akhilesh,By a notch filter do you mean a BSC circuit or are you talking about something else?Martin

Subject: Re: Can a notch filter improve phase lag?
Posted by Wayne Parham on Thu, 01 Apr 2004 00:24:02 GMT
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There are a lot of things that act as filters. The box, the mechanical movement of the driver, the electronics. So you're on the right track here. But the fact remains that whatever filters are used to modify response have the same result, no matter if they are mechanical, electrical or acoustic.Basically, whatever you do to modify the amplitude response also modifies the phase response. So if you do something that equalizes the characteristic response curve, you have also modified its phase response too. It really doesn't matter if the equalizer is an electrical, mechanical or acoustic filter, the laws of physics apply to them all the same. If you change the amplitude response by any means, then you must have also changed the phase response.

Subject: Re: Can a notch filter improve phase lag?
Posted by akhilesh on Thu, 01 Apr 2004 00:40:17 GMT
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i mean A BSC type circuit (low pass inducror with resistor in parallel), not necessarily set for the baffle loss frequency, but maybe higher (in my example maybe for the frequency = the max coming from the vent)My rationale was that maybe the distance differences between the ear-vent and the ear-driver can combine with the inductor phase shift (for the frequencies below the filter) and the acoutic phase shift (becuase of the box) to actually make it sound more in-phase...-akhilesh

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Subject: Re: Can a notch filter improve phase lag?
Posted by Wayne Parham on Thu, 01 Apr 2004 01:58:40 GMT
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For what it's worth, I'll bet your phase shift from adding the coil and resistor is pretty small, like less than 10 or 15 degrees.

Subject: Re: Can a notch filter improve phase lag?
Posted by akhilesh on Thu, 01 Apr 2004 02:00:37 GMT
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hi Wayne,i thought it would be 90 deg at crossover freq.no?-akhilesh

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Subject: Re: Can a notch filter improve phase lag?
Posted by Wayne Parham on Thu, 01 Apr 2004 02:13:56 GMT
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A compensation circuit like this doesn't have a crossover frequency. It never reaches that much slope.

Subject: Re: Can a notch filter improve phase lag?
Posted by Martin on Thu, 01 Apr 2004 11:17:22 GMT
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The phase shifts from the BR enclosure will be extreme near the tuning frequency, least say 50 Hz. By the time you get to the baffle step center frequency, probably near 400 Hz or higher, the box is no longer an issue.In the frequency range where the baffle step occurs there is a smaller

phase shift due to the summation of the "sources" along the edge of the box combining with the driver's reponse. For my Lowther DX3 ML TL enclosure this amounted to about 30 degrees maximum. If you apply a Zobel across the driver, the combination behaves as a pure resistor. Then placing a BSC circuit in series the baffle step is corrected including the phase. The BSC circuit has the opposite phase shift whne compared to the baffle step response. Above the baffle step region the BSC circuit acts as a pure resistor so you have a simple voltage division with the driver/Zobel to pad down the SPL magnitude. There is no impact on the phase.This is how the circuit worked for my Lowther DX3 ML TL design. I measured the response and plotted the SPL and phase (after subtracting out the time of flight phase shift). The phase response was improved with the BSC circuit in place! I verified this with some calculations in MathCad. This is just one data point but I think it is accurate for most situations, I am sure somebody could dream up a situation where this was not the case. They probably reside over at AA. The purists at AA have completely closed minds and very little technical understanding beyond the rhetoric. Our frined TC is a prime example.Hope that helps,Martin

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Subject: Re: Can a notch filter improve phase lag?
Posted by Wayne Parham on Thu, 01 Apr 2004 12:23:08 GMT
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I second Martin's analysis. Sometimes - often times - a system like this is made more pure with a couple of components. The Zobel is a good example. A speaker driver is a reactive device, so compensation is sometimes in order.I understand the idea of minimalist solutions and low parts count. But remembering that the speaker motor/diaphragm/cabinet is a system that has many filters, sometimes having a part of two in the circuit counteracts reactances and makes the system as a whole more pure.I really like keeping it simple, and sometimes that's best. Phil's little speakers sound great just bolting the speaker in the box. But there are other systems that are definitely improved with passive compensation. And it's not necessarily a matter of quality, or of artificially "fixing" a driver's response. It's just the way linear systems act.

Subject: Re: Can a notch filter improve phase lag?
Posted by akhilesh on Thu, 01 Apr 2004 16:06:11 GMT
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Thanx Wayne. I was operating on the axiom that an inductor is a pure low pass filter that will ALWAYS put the frequencies that pass through it 90 degress out of phase at the point, but i think my knowledge of crossovers/filters is just random enough to be dangerous. Nice thread though...learning a lot!-akhilesh

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Subject: Re: Can a notch filter improve phase lag?
Posted by akhilesh on Thu, 01 Apr 2004 16:08:16 GMT
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INformative post, Martin! Thanx. -akhilesh

Subject: Your not qualified
Posted by TC on Thu, 01 Apr 2004 18:05:52 GMT
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>>The purists at AA have completely closed minds and very little technical understanding beyond the rhetoric. Our frined TC is a prime example. ==Oh Martin Behave. There's a beauty in "purity" you are not qualified to comment on.I learned a long time ago that engineers have difficulty seeing art, or understanding art. They discard art like everything else that does not fit a "particulate" way of thinking. What you percieve as a lack of "technical background" or "undrstanding" is replaced with a "balance". My background in hydraulics and fluid dynamics was coupled with avionics and basic electrical circuitry design by the 8th grade. I was lucky my dad was/is a sr Boeing Engr. So by the time I was 18 I had had enough of pure engineering, so what? I moved on to art.It's almost insulting I should have to write this. But I HAVE a technical background. So what if my methods do not subscribe to your matchcad worksheets. They only let you "see" the potential. ANd tell you nothing of "how" to build.I am not about to quibble technical trivia about music reproduction with a pure engineer as yourself. Just go about managing your acoustic particles without getting personal. And please try not to confuse lack of technical sophistication with a well balanced art and technical background or I'll be forced cause further purist insights into why passive circuits suck.TC