Subject: Benefits of a wideband driver for off axis decay
Posted by akhilesh on Wed, 05 Oct 2005 21:21:47 GMT
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Hi Everyone,I was reading an article in Sensible Sound in which they review the new Bang & Olufsen Beo lab 5 (yes this is apparently totally different from the usual schlock B&O produces). In that they talk about the importance of off-axis frequency decay, and how its important for things like imaging and spaciousness. This got me thinking of the following question:What do we think a wide band driver would do? Usually, it leads to beaming, so there are some frequencies over which it will offer less decay than others. In other words, a driver that goes from say 100 to 5000 Hz, and is around 8" will beam around 1500 Hz plus, and the beaming effect will get more pronounced I think as the frequency increases. How would this impact the frequency rolloff off axis? IS a wide band driver a good thing or a bad thing , from the perspective of off axis frequency roll off patterns?-akhilesh

Subject: Re: Benefits of a wideband driver for off axis decay
Posted by Wayne Parham on Wed, 05 Oct 2005 22:48:42 GMT
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Controlled directivity is desireable because you can reduce early reflections by directing the sound so it doesn't bounce off nearby walls. Constant directivity is desireable because it makes the reverberent field uniformly charged. Next best thing is uniformly collapsing DI. A single driver is a direct radiator, so low frequencies are nearly omnidirectional, but the pattern gets more and more narrow as frequency rises. The reverberent field will have less HF energy as a result, but at least early reflections of HF will be reduced and there will no abrupt transitions of directivity.

Subject: Re: Benefits of a wideband driver for off axis decay
Posted by Duke on Thu, 06 Oct 2005 06:23:22 GMT
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I've played around with high-efficiency wizzer-coned Fostex drivers a bit of late, and their HF radiation pattern is considerably wider than piston theory would predict. But then I suppose that's to be expected of a driver in breakup, which is what I think is happening with a wizzer cone. The system I recently built and displayed at RMAF is based on the Fostex FE-206E, and in the design I went to some length to generate a well energized, tonally fairly well-balanced reverberant field, making a few trade-offs along the way. I did not try to control the pattern tightly, as I don't think this type of driver lends itself to particularly well-controlled radiation patterns. For instance, even with a lot of toe-in (Geddes-style) I was still getting some undesirable sidewall interaction from the 8" diameter Fostex drivers, and had to resort to using a plant along one sidewall.In my experience a good horn or waveguide-based system does a considerably better job of radiation pattern

control, provided attention is devoted to minimizing the pattern discrepancy between woofer and horn where they transition. A good fullrange driver has its attributes, but when it comes to pattern control a waveguide or constant-directivity horn is a much more effective device.Duke

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Subject: Re: Benefits of a wideband driver for off axis decay
Posted by Wayne Parham on Thu, 06 Oct 2005 07:03:58 GMT
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I would love to hear your new FE-206 based speaker. That's one of the Fostex drivers I think makes a very nice full range loudspeaker. It has adequate extension both HF and LF and sufficient efficiency and power handling ability to fill the room pretty well. I hope you'll bring a pair to GPAF next May.

Subject: Re: Benefits of a wideband driver for off axis decay
Posted by Bob Brines on Thu, 06 Oct 2005 11:35:18 GMT
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Predicting the directivity of a full-range driver is probably nearly impossible. In order to be be "full-range", the driver has to operate into break-up mode, then it mechanically crosses over to the whizzer cone or dust cap and the process starts over. The graph above is for a speaker using the FE167E, a 6" whizzer-cone driver. The plots are 0, 30 and 60 degrees. You can speculate as to which part of the driver is producing what frequency and where cross-over points are. In any case, there is a lot more energy off axis than for a normal 6" driver.My experience is that the speakers work best toed to cross behind the listener. Imaging is still good at this point and the overall balance is better than normal toe-in. Straight forward, zero toe works well for HT, but leaves too much hole in the middle for music.BobBob

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Subject: worth 1.0k words
Posted by Duke on Thu, 06 Oct 2005 17:20:33 GMT
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Hi Bob,Yes I enjoyed your speakers at GPAF, and have enjoyed your website as well.The on- and off-axis curves you posted are most informative - thanks! I would guess that somewhere between the top two curves - maybe around 15 degrees ballpark - the first-arrival response is smoothest. Then the rising on-axis energy instead becomes reverberant energy, helping to maintain a better tonal balance for the reverberant field than you'd normally get from "flat on-axis" speakers. For the sake of a wider listening area, I toe my Fostex's in so that they criss-cross in just front of the

listener rather than just behind. Also, the FE206E isn't as smooth as the FE167E (more energy between 2k and 10k), so I use a broad, gentle notch filter to bring that region down just a skosh.
Duke

Subject: The Cheetahs
Posted by Duke on Thu, 06 Oct 2005 17:59:20 GMT
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Hi Wayne,In all fairness, my FE206E-based speaker isn't exactly a "single-driver" speaker. I'm using a couple of powered woofers to get adequate bottom end extension in a reasonable box size. Since this is of course cheating, the speakers sort of named themselves.Assuming the picture shows up, the two 6.5" woofers you see are driven by a plate amp on the back of the cabinet. I'm also using a couple of rear-firing drivers to tailor the reverberant field the way I want it. And yes, the stands are too short.If the picture doesn't show up, here's a link:http://gallery.AudioAsylum.com//cgi/gi.mpl?u=2112&f=Cheetah1.jpgDuke

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Subject: Re: The Cheetahs
Posted by akhilesh on Thu, 06 Oct 2005 18:08:59 GMT
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The look great, Duke. Hope you bring them down to the next GPAF. Iowa is closer than nawlins!-akhilesh

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Subject: Re: The Cheetahs
Posted by Duke on Thu, 06 Oct 2005 19:07:25 GMT
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Thanks, Akhilesh!Lori and I are looking forward to attending GPAF again next year. I plan to bring the Cheetahs, and may bring something else as well. I have a couple of other projects in the works, and later today I'll be "making sawdust" - that is, building a prototype box.Earl was at RMAF in another room, and showed an interesting subwoofer with the Summas. I also had a pair of Summas in my room, and alternated between his and mine.Duke

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Subject: Re: Benefits of a wideband driver for off axis decay

Posted by Retsel on Tue, 27 Dec 2005 21:38:03 GMT
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Another approach to reducing off axis sound output and therefore reducing reflections is to mount the wide range drivers on open baffles. Retsel

Subject: Re: Benefits of a wideband driver for off axis decay
Posted by akhilesh on Wed, 28 Dec 2005 16:20:24 GMT
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How would open baffle reduce off axis sound? I don;t see it intuitively. COuld you expand on your post a bit more, Retsel?thanks-akhilesh

Subject: Re: Benefits of a wideband driver for off axis decay
Posted by Retsel on Wed, 28 Dec 2005 18:01:27 GMT
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Open baffle designs result in sound eminating from the front of the driver as well as the rear of the driver, however, the sound coming from the rear is out of phase with that coming out the front. That sound which is eminating towards the sides of the speaker, both front and back, meet at the sides of the speaker and cancel. The result is that there is a much lower output from the sides and top of the speaker than from the front or rear. This results in less side wall and ceiling early reflections than a non open baffle design. Check this out:http://www.kettering.edu/~drussell/Demos/rad2/mdq.html Retsel