Subject: Questions on Midrange Drivers
Posted by GarMan on Mon, 12 Apr 2004 19:57:44 GMT
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Just wondering what's available in high efficiency midrange cone drivers these days. Seems to me, small diametre cones such as 5" to 6" are pretty rare, compared to 12" or 15" cones. JBL doesn't make them anymore. Eminence only has the Alpha6. After a quick search, only Beyma and B&C makes them. Is there any reason for this trend?I did come across the LA6's from Eminence that covers the midrange very well. Can these be used in a 3-way configuration (non-array), or is there something special about them that requires them to be in an array?thanks,Gar.

Subject: Re: Questions on Midrange Drivers
Posted by Adrian Mack on Mon, 12 Apr 2004 22:56:12 GMT
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Its because pro/PA demands larger drivers with more power handling and output. If you look around however you can find more pro speakers which are small. P.Audio, 18-Sound, and Celestion also make 6" drivers and celestion make a 5" model as well. Radian have a high efficiency coaxial 6.5" too. Theres nothing stopping you from using the LA Eminence drivers in a non-line array application if they will suit what you want to do with them.

Subject: Re: Questions on Midrange Drivers
Posted by Adrian Mack on Mon, 12 Apr 2004 22:58:21 GMT
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PHL also make some 6.5" pro drivers.

Subject: Also consider this:
Posted by Bill Fitzmaurice on Tue, 13 Apr 2004 01:35:58 GMT
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Most high efficiency woofers are intended for live pro-sound use, either PA, electric bass or guitar or electric keyboards. For the most part those made for guitar and bass are extended range models and normally aren't paired with midrange drivers. Those intended for PA and keys are usually crossed over at far higher frequencies than hi-fi standards, and then usually to compression horns that have even higher sensitivities than cone drivers, for maximum output

capability. This leaves very little demand for high sensitivity cone midrange drivers, and as with all things if the demand isn't there the supply won't be either. If you're looking for high SPL midranges for hi-fi use consider also full range frivers from Fostex, which make fine midranges when housed in small sealed boxes.

Subject: Re: Questions on Midrange Drivers
Posted by GarMan on Tue, 13 Apr 2004 01:53:58 GMT
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Adrian,I'm glad you answered my post. I wanted to ask you about your choice of Alpha 6 for your midrange horn project. The response curve for the driver looks great. What were your reasons for choosing this cone? In your application, are you finding any limitations with this "entry-level" driver in Eminence's line, compared to their more "advanced" models?About your first statement, that "pro/PA demands larger drivers with more power handling and output", the "more power handling and output" makes sense. But I don't see how the "larger drivers" part fits in. Can't smaller drivers be made with large power handling and output too?Gar.

Subject: Re: Also consider this:
Posted by GarMan on Tue, 13 Apr 2004 01:57:56 GMT
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That's what I figured. That the preference for Compressions for pro-use contributes to the lack of choice for high sensitivity midranges.And yes, I am keeping an eye on the Fostex. You will see questions from me about those in the future. Just taking my time, doing research for now.

Subject: Re: Questions on Midrange Drivers
Posted by Wayne Parham on Tue, 13 Apr 2004 02:04:33 GMT
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The Community M4 diaphragm is approximately 6.5" diameter. It's actually 6.65" if I remember correctly.

Subject: Re: Questions on Midrange Drivers
Posted by Adrian Mack on Tue, 13 Apr 2004 13:11:58 GMT
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Hi GarmanI dont find the 'entry level' Alpha driver to be a shortcoming. Its because of the horn loading which makes it sound so good, a lot better than when I tested it in free air (but with no box.... making the comparison pointless). In any circumstance, horn loaded, it is the best midrange I've ever experienced. It is so clean, you can really hear the distortion reduction the horn makes, direct radiators just cannot match what a horn can do. Its very pleasant and enjoyable to listen too. My choice on using it was mainly because it was one of the few drivers that worked in my application. Originally I had the intent to horn load a 12" driver in something like a 150Hz horn (Erik Forker's 150Hz tractrix loaded with an EV EVM12L was very appealing). Unfortunately I found that no 12" driver would reach 2KHz in a horn within +/- 3db, nor any 10" drivers really according to computer simulations (limited by bigger mass, inductance, and greater phase cancellations in front chamber because of larger path length differences inevitable on a bigger driver). I looked at some 8" drivers, some of which went a bit past 1.5KHz but was still limited. The little 6" Alpha showed the most extended HF response, and in the smallest package. I've gotten it to +/- 2.5db from 300Hz to 2KHz in my horn, something which a bigger driver wont do. My statement about the pro drivers was just a quick general one really. As Bill pointed out it's not just a matter of needing more power and SPL, theres other reasons involved too. As for increasing output and power handling of smaller drivers, this can be done to an extent but you also become limited with what you can do at a point. Larger drivers can have bigger voice coils (less heating for given power level and higher temperature handling), more wire on the VC, room for bigger heatsinks, etc than what a smaller driver might have. I'm talking about something like a 15" vs 6" where the differences are large. 18" vs 15" on the other hand virtually have the capabilities and the same power handling ability. It's usually larger drivers that have higher strength motors/higher efficiency and more cone area, xmax, and as I've just mentioned power handling too for more output. It sounds like you want to use the Alpha as a direct radiator though? Adrian

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Subject: Re: Questions on Midrange Drivers
Posted by Bill Wassilak on Tue, 13 Apr 2004 13:40:19 GMT
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Adrian,>>Unfortunately I found that no 12" driver would reach 2KHz in a horn within +/- 3db, nor any 10" drivers really according to computer simulations.I kind of have to disagree with this statement, because I have 12" drivers loaded where I hit a -3db point at 1.2K and they stay that way up to about 2Khz before they start rolling off more, approx. -6db@2.8Khz (measured on my horns) it depends the on how the horn loads the driver.If designed right, with the right driver you can get a 12" within -3db at 2K, and with smaller drivers it's even easier to achieve.Bill W.

Subject: Re: Questions on Midrange Drivers
Posted by Adrian Mack on Tue, 13 Apr 2004 14:27:11 GMT
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Hi BillI have not investigated all 12" drivers but the ones I simulated wouldn't go. I'd imagine with a phase plug one could extend HF response pretty far though and keep it within +/- 3db. I'd imagine a tractrix or exponential flare directly on-axis with a high DI may be able to reach 2Khz but polar response would be poor as the expense, off axis response is very important (at least to me). What driver and horn are you running? Is response within +/-3db from lower cutoff to 2KHz? Have you got a measured response curve that you can post? Id like to see what your doing. Adrian

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Subject: Re: Questions on Midrange Drivers
Posted by Bill Wassilak on Tue, 13 Apr 2004 14:48:21 GMT
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Some of the computer simulations I have ran had a hard time predicting hi freq response of cone drivers. I didn't measure the off axis polar response of my horns, but I was shooting for 90deg at the upper cutoff frequency (1.2Khz) to match the dispersion of my JBL2345 midhorns on top. The flare taper of my horns are a hyper-expo taper flare at 150hz, response was measured with a Peavey Scorpion Plus model 12825, a 12" guitar speaker that Peavey makes. The lowest I can run them is about 180hz otherwise I start getting that horn shout if I run them any lower. But other than that they are very smooth upto the 1.2k x-over point even off axis they pretty well match the JBL horns off axis.Bill W.

Subject: Re: Questions on Midrange Drivers
Posted by GarMan on Tue, 13 Apr 2004 16:46:12 GMT
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Thanks for the detailed explaination, Adrian.At this time, I'm at the "research" stage for a 3-way and yes, I am considering using the Alpha 6 as a direct radiator. I'm looking for a midrange that'll take me from 100Hz up to 3KHz to 4KHz. The reponse graph of the Alpha looks great and I was wondering how it would sound. According to the graph, it's putting out close to 100dB with 1 watt, so I never even considered horn loading it.In terms of "sound", I interested to know how smooth it is pass the 1.5 KHz mark, whether it breaks up into a cardboardy sound. I noticed that the Alpha 10 in my 2 PI Towers sound a lot better after I crossed it at 1.6KHz with a PSD2002, rather than let it run into 4KHz.About power handling, I've noticed that within a product line, the smaller drivers tend to have 3 - 6 more dB's in sensitivity than the larger driver. Same SPL at 50% or 25% of the power required for the larger drivers, meaning power handling becomes less of an issue.Like I said, just research for now, so there'll be more questions to come.Gar.

Subject: Beware predicted HF responses.
Posted by Bill Fitzmaurice on Tue, 13 Apr 2004 20:11:42 GMT

I use McBean, and while it is reasonably accurate in predicting Fc and about an octave or two higher, it is way off the mark past that. How high can a twelve go? My DR12 loaded with an EVM 12L gets 114dB at 4kHz, and it's a folded horn to boot. The question shouldn't be how high can you go, but how high before dispersion gets too beamy for a particular application. For example, look at the axial plot in this chart for my DR 250a, and note how things start getting a bit hinky around 2kHz, which is where it gets crossed over to the HF section not because of SPL (the SN10 woofer is fine to 4kHz) but because of dispersion.
http://hometown.aol.com/fitzmauricew/myhomepage/photo.html

Subject: Re: Questions on Midrange Drivers
Posted by Adrian Mack on Tue, 13 Apr 2004 23:45:17 GMT

Hi GarmanThe little Alpha 6 is more like 93db 1w/1m actually in its pistonic range. These are the 1w/1m figures taken directly from the Eminence Sensitivity Guide page. Using the referance efficiency n0 equation and converting to SPL @ 1w/1m also agrees with an average 93db 1w/1m. Many larger 12" to 18" drivers can do ~98db 1w/1m, some more, some less, and they have higher power handling too. Note this is just generalization, what can potentially happen but also what usually does. I think intended use is more of the issue, small midrange drivers arn't needed for MI apps like Bill said, those guys usually want a big driver that can go lower for thier bass guitars and then cross to a compression driver at the top end. Even in pro/PA horns, most tend to use larger drivers instead because they can get even more output this way and/or they want to cover a lower frequency range. Or they just incorrectly run a 2" driver crossed too low until you here the diaphragms about to snap, hence not needing a small 5/6" midrange driver :P either way!In my horn, and on-axis the Alpha 6 is +/- 2.5db from 300Hz to 2KHz. Off axis response is pretty smooth throughout this range. Off axis and in the horizontal plane, response in the conical horn was best to 1.8KHz or so to just within its coverage angle, a nominal 60 deg between each extreme or 30 left and 30 right. It was the same thing for the vertical plane, 40 degrees between each extreme, though obviously at a little lower levels at the extremes because its asymmetric, so DI is different. I designed it this way to minimize destructive interfernace between subsystems. I'm crossing this horn over to a 1" compression driver at 1.8KHz. Output above 2KHz falls, and you can start to get mouth resonances and stuff happening here too so I'm not going to use it here. Note this is all in my horn though, and as a direct radiator like you're using it, things will be different. Looking at Eminences graph, breakup modes start happening around ~1.3KHz on the Alpha 6 where output rises on axis. I think the 1st breakup mode is actually lower than this, but its damped enough not to show itself. Breakup modes on this driver arn't as severe as on others. Breakup modes on the Alpha 10 show themselves a lot more, although you do have it tamed down with the inductor, so on axis it is smooth but as a result off axis response has fallen even further. Exact figures arn't known however because Eminence dont publish actual off axis response curves for thier drivers. Breakup modes also introduce distortion, so I dont like to use drivers too far into their breakup mode regions unless I see actual distortion figures that prove its low and on and off axis response is reasonably smooth. I'm not sure if I'd want to use an Alpha 6 at 100Hz. Its free air resonance is

118Hz, and 2nd and 3rd harmonic distortion is dramaticaly higher below resonance on any VC motor. Perhaps just cross more around 150Hz or 200Hz. Bare in mind the driver has zero VC overhang and about 1.3mm of linear xmax, although for midrange this isn't important, but below fh you need to examine it. If you cross at 200Hz, the Alpha 6 can easily get close to 115db at 1m at full power (100w) and not exceed mechanical limitations in a box which is nice and flat, I think vented between 5L and 20L tuned between 60Hz and 80Hz worked pretty well, it's been awhile since I've modelled it. I remember there were a lot of alignments that resulted in a flat response for this driver. Adrian

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Subject: Confused about sensitivity information
Posted by GarMan on Wed, 14 Apr 2004 01:33:19 GMT
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Now I'm really confused about the sensitivity of the Eminence drivers. I've alway gone by the graph at the bottom of the datasheet. But comparing the graph with the data on the Sensitivity Guide, they seem completely different. What gives? Am I interpreting the graph incorrectly?Gar.

Subject: Re: Confused about sensitivity information
Posted by Adrian Mack on Wed, 14 Apr 2004 22:30:59 GMT
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The Eminence sensitivity guide should be showing the real 1w/1m levels of the driver. The graph must be showing something else, maybe 2.83v or something. I'd trust the sensitivity guides numbers, which are the real numbers. n0=(9.64*10^-10*(Fs_a^3*Vas_a))/Qes_a =(9.64*10^-10*(118^3*5.8))/0.60 =0.0153SPL 1w/1m= 112+10*LOG(n0) = 112+10*LOG(0.0153) = 93.85db 1w/1mReference efficiency converted to 1w/1m sensitivity, it corresponds to Eminences sensitivity guide, but not the graph. The graph must be measured under different conditions. Adrian

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Subject: Same measurement method by different results?
Posted by GarMan on Thu, 15 Apr 2004 12:18:19 GMT
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I always thought the response curve was correct. I've cut and paste below the measurement description found on every driver's web page: Eminence response curves are measured under the following controlled test conditions: * All speakers are tested at 1W/1m using a variety of test set-ups for the appropriate impedance * LMS using 0.25" supplied microphone (software calibrated) mounted 1m from wall/baffle * 2ft. X 2 ft. baffle is built into the wall with the

speaker mounted flush against a steel ring for minimum diffraction * Hafler P1500 Trans-Nova amplifier * 2700 cu. ft. chamber with fiberglass on all six surfaces (three with custom-made wedges)This sounds consistent with the description found on the sensitivity page you provided, but yet, the numbers don't match up. What gives? Someone's going to receive a nasty letter.Gar.

Subject: Re: Same measurement method by different results?
Posted by Adrian Mack on Thu, 15 Apr 2004 13:53:59 GMT
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It might be that the response curve/graph is measured in half space (baffle mounted) whilst the numbers itself in the sensitivity guide are in free-air, which is what the free-air referance efficiency equation I quoted tells you. Maybe you'd want to email Eminence and ask them though just to be double sure.

Subject: Re: Same measurement method by different results?
Posted by John Sheerin on Wed, 21 Apr 2004 11:18:06 GMT
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Hi,The response curve is wrong - it is shifted higher for some unknown reason. I am getting it corrected.John

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