Subject: Front horns
Posted by JeffM on Sun, 22 Aug 2004 23:02:15 GMT
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I understand that back horns use the horn to boost deep bass. Basically the driver is used wide range and the bass is boosted where it gets weak. What I don't understand is how to use a single driver speaker in a front horn. Wouldn't this boost midrange only?

Subject: Re: Front horns
Posted by GM on Mon, 23 Aug 2004 00:59:06 GMT
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Depends on how big you make it. ;^) Realistically though, 70-80Hz is ~the practical limit size wise unless the room is long enough to allow a very long horn.GM

Subject: Re: Front horns
Posted by akhilesh on Mon, 23 Aug 2004 01:08:19 GMT
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Jeff,I am not very familiar with horn design, but my IMPRESSION from reading the posts of authorities like Wayne Parham is:1. Front horns & rear horns BOTH boost a frequency range (usually a low frequency range). 2. rear loaded horns can amplify lower frequencies (or is it a wider range?) for a given horn length than front loaded horns3. This is why reasonable sized front horns do not give as much bass as rear horns. my 2 ents...corrections from experts welcome!-akhilesh

Subject: Re: Front horns
Posted by JeffM on Mon, 23 Aug 2004 02:09:42 GMT
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I think a front horn *could* be made to boost bass as much as a rear horn, certainly if they are the same size. The problem would be less midrange and treble would get through, wouldn't it?

Subject: Re: Front horns

Posted by JeffM on Mon, 23 Aug 2004 02:13:44 GMT
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What do you do to extend treble in a front horn? If a horn is made large enough to boost bass, doesn't it stop working in the midrange? The idea of a back horn is to let the speaker work by itself in the front, and just boost bass from the backwave, right? If made as a front horn, all sound goes through the horn so won't that give it narrow range?

Subject: Re: Front horns
Posted by GM on Mon, 23 Aug 2004 04:35:48 GMT
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To extend a horn's HF BW requires higher compression (smaller throat), but FR drivers diaphragms aren't designed to handle the load, so will distort at very low power. Also, a phase plug is required to keep cancellations from occurring due to different pathlengths from the larger diaphragm to the much smaller exit.It stops working if you design it to do so, though it's true that the lower you extend a compression loaded Fc, the lower its max Hf cutoff will be and vice versa. Since there's no compression loading of either a FR driver BH or FR (excluding the dual horn), the throat size/filter chamber sets the BH's Hf corner since it's applying pressure to the rear of the diaphragm, while it's the FH's throat size/wall angle since it has no filter chamber of note.You only load the rising response portion of a FR driver's LF/midbass BW, whether front or back loaded. Done right, there's just enough gain to make it ~flat on axis, i.e. no baffle step. In a BH, more extreme flare rates can/should be used to lower Fc and limit gain so it doesn't overpower the mids/HF output. In a FH, the gain must be very low to keep throat pressure low so that it doesn't roll off the driver's HF response as well as not overpower the mids/HF, ergo the horn must be much larger for a given LF/midbass BW, plus you can't fold it up like a BH without rolling off the HF somewhat.Then there's the dual horn where you load the rear more, then mildly front load the mids to tonally balance it out. With these, you either need a rising HF response such as the Fostex FE206E has, or add a horn loaded tweeter. Either way, a fairly narrow 'sweet spot'.With no size constraints a FR driver can be front loaded all the way to Fs without losing any HF BW. Two 40Hz ones would ~fill my room though, and all things considered not worth the effort from a SQ POV unless used either in a aircraft hanger sized room or outdoors, though not where really high SPL is required due to their limited eff./power handling. GM

Subject: Re: Front horns
Posted by JeffM on Mon, 23 Aug 2004 05:15:49 GMT
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I think I get it. You don't make a compression horn with a full range driver, for a front horn you just add a flare with no compression. This makes it act differently. The idea is to get a mild gain, more of a directional edge than anything else. The response boost is light and complements the driver

sort of like a back horn. Is that about right?

Subject: Re: Front horns
Posted by roncla on Mon, 23 Aug 2004 15:19:13 GMT
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There is loading on a FL horn ,but its not to the degree as a DL horn. Using a FR driver there will not be the same % of gain between the FL and the BL horn (dual horn). I am presently working on a dual (FL/BL) horn using the 206e driver. At first i was aiming for a 200 hz XO but after running numerous sims i can see that a 250 hz and greater XO will be more effective.Its a real balancing act as the filter chamber gets larger in a BL horn as well as the throat getting larger for a lower XO which means less loading which means less power before cone motion gets out of hand.I may even end up XO at around 300 hz which has the advantage of a smaller FL horn and better loading overall. I believe that two seperate drivers may be more effective (one a dedicated bass horn the other a FL 200 hz and greater).But the challenge of a single driver dual horn is hard to resist.ron

Subject: Re: Front horns
Posted by GM on Mon, 23 Aug 2004 15:38:04 GMT
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Right, I mean there's a small amount of non-linear compression due to confining the pressure more on one side than the other, but it's negligible, and of course the larger FH for a given BW normally yields a lower distortion than a BH, but due to our falling hearing acuity with decreasing frequency and the increasing room affect on it, it's pretty much moot.Also, this doesn't mean that some ~FR drivers can't be compression loaded, just that its BW will be more HF limited than if not. FR drivers that have a peaking mids/HF roll off FR indicate a stiff/damped enough diaphragm to compression load for use as a wide BW midbass/mid FR.GM

Subject: Re: Front horns
Posted by akhilesh on Mon, 23 Aug 2004 15:49:15 GMT
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No idea, Jeff. MAybe if the SHAPE influences the frequency accentutated, it may. I have never actually looked at horn design, so I honestly don't know.akhilesh

Subject: Re: Front horns
Posted by robertG on Mon, 23 Aug 2004 16:18:49 GMT
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A back horn does "boost" both low and mid frequencies. It is mainly used with very low Qts drivers with defficiencies in low and mid band. Typically, it will enhance frequencies from 50 or 60Hz all the way to 300Hz. So it is a very efficient design. Both the upper and lower limits are design dependent (cavity volume and throat area for higher freq.) horn lentgh and mouth area (as well as horn profile - or expansion curve) for lower cutoff point.Naturally, the driver itself plays a major role in the equation (size, resonance frequency).A front horn has the same effect, except the physical properties are different. It will be used for mid and upper mid reinforcement, and very little bass reinforcement, unless it is both very long with a very large terminus, in which case higher frequencies will suffer (being radiated at the end of a very long tunnel - with very little dispersion). The idea with BLH is that the energy past the higher cut-off will radiate from the driver (without need for reinforcement).Everything is design dependent, and a front horn would be used effectively as a mid-driver in an all horn loaded 3 way system. All kind of variances can be applied, like the Voice of Theater (Altec A7), in which the bass driver is both reflex-loaded and front-horn loaded (very short horn), with a mid-high front horn on top (and very large optional wings for lower freq. support).Horn requirements for high frequencies is frequency dependant, meaning that high freq. are very short and do not need large horns.

Subject: Thanks Robert
Posted by akhilesh on Wed, 25 Aug 2004 11:52:29 GMT
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Very Informative post for Horn design laypeople, like myself.-akhilesh

Subject: Re: Front horns
Posted by Lee on Mon, 30 Aug 2004 06:06:45 GMT
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Shape *does* influence frequency accentuated. The M value (flare rate) sets expansion and ultimately horn shape. Size influences response smoothness and frequency range. Dispersion and efficiency are set by both.