Subject: A little article about a BLH....why go to the trouble.....
Posted by Ed Schilling on Sun, 07 Aug 2005 01:49:28 GMT
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I am NOT, I repeat NOT trying to "stir the pot". This is simply someone elses' opinion about "single drivers" and BLHs.I am not going to argue with these guys....I agree with them. Except about the front venting! It seems to me it's better to have it vent to the rear...but that's just my opinion. The J-Low looks to be a fairly serious single driver speaker. Too bad they used a Jordan and not a Fostex! Draw your own conclusions, or better yet, cut some wood, the plans are there .....some of you have Fostex drivers already.....have at it. Let us know what you find out. My guess is they will kick ass, and play most any music just fine, even "Metal"(easy) and "Classical" (hard). Edhttp://passdiy.com/pdf/j-low.pdf

Subject: Horns, transmission lines and reflex cabinets
Posted by Wayne Parham on Sun, 07 Aug 2005 08:13:51 GMT
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Here's what I'd like to see.Response chart, excursion plot and impedance chart of a specific driver mounted on an infinite baffleResponse charts of said driver in specific back loaded horns, reflex cabinets and transmission linesDriver excursion plots of same driver in specific back loaded horns, reflex cabinets and transmission linesImpedance plots of same driver in specific back loaded horns, reflex cabinets and transmission linesThis makes a valid comparison of the three approaches, and show the strengths and weaknesses of each. I think it is more useful than anything else.

Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Ed Schilling on Sun, 07 Aug 2005 13:21:31 GMT
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Wayne,You are right. That would be much more useful. And it sure would lay it all out there. Unfortunately for me, that is just an impossible set of things to do. It would require WAY to much time and effort to perform the building and testing, I for one simply don't have the time to do it. And for me it would just be doing all over again the things I spent years doing. I have already formed my OPINIONS based on those very things. The trick is I just didn't do it at one time to make a point or to do an experiment. They were done over a period of many years and I built so many enclosures that formed my opinions that I could not count them all. What started the thread was the simple premise..." Why won't a single driver speaker do metal?" I completely disagree with the premise and my only intention was to simply give one type of design that demonstrates this is simply not so. As I stated before.....In my EXPERIENCE I have not heard a sealed (without a sub) or a TL (without a sub) pull it off. So to a point I agree. But that's only to a point.....I know for

a fact that a BLH can do it. The only hard numbers I can offer (at this time) is the testimony from Larry .....If some of you doubt that he or I know what "audible distortion" is or that we don't know what "bass" should sound like (he is a musician, and should "have a clue"), or that 106 dB @ 15 feet is not "loud enough" to qualify as "doing it", well, I can't help it. I am sorry that I can't give a detailed comparison of the designs in question but that was not the original premise anyway. It was the inability of a single driver to play a certain type of music. And that is just wrong.....I linked to the J-Low article because it does have a little bit about what we were going on about. I think in the article Nelson says something to the effect that they built the J-Low because no other enclosure would have the efficiency gains he wanted. And they did in fact build a couple non-BLH boxes. Page 2 of the article says pretty much exactly what I have been saying.....the excursion in the bass severely limited SPL. And so they built a BLH. It is right there and a real example. Anyway.....I never said the other designs don't "sound good" within their limits. But again the only single driver speakers that I have heard that go loud enough (for me at least) have all been BLHs. That's my story and I'm sticking with it! I won't present any more "examples".....I think the Pass article says enough about it. If that does not help the prospective "single driver builder" then I'm sorry....it's all I got!This has been a rather nice discussion.....and it ain't a rule we agree on everything!EdI might add....a person could make the numbers go any way they want by simply building a non-optimum enclosure. In order for the results to be accurate the 3 examples would have to all be the optimum enclosure and the drivers would have to be the same size and since the parameters for the optimum driver for each design are so wildly different a fellow could get any result he wanted. And besides all that, I thought Mr Klipsch settled the efficiency of a horn vs. everything else 50 years ago!

Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Wayne Parham on Sun, 07 Aug 2005 13:36:06 GMT
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Here's the thing, Ed. It isn't fair for you to pounce on Bob's statement, "Single-driver full-range speakers have a limited dynamic range." That was a statement of fact, and you shouldn't use it to launch a campaign. It isn't a statement about horns or transmission lines, it is a statement about single drivers.A backloaded horn doesn't increase efficiency through most of the passband. It only increases output at low frequencies, to augment where the driver is getting weak. So it doesn't help efficiency.The reason I've suggested comparing the horn and the transmission line is that I believe that they are more alike than different. When used at bass frequencies, a horn has to be pretty large. When it is made small, it is really a tuned pipe.Cornerhorns are small tuned pipes that use the corner as the mouth. The physical construction of a small backhorn is very similar to that of a transmission line. They act pretty much the same. Put a transmission line in the corner, and it acts very much like a backhorn placed in the corner. Alternately, take a backhorn out of the corner, and it becomes a tuned pipe.I think it is productive to look at these things, even if just done in models. That will show you what I say is true. You know how I know? Because I've done it.
Basshorn or Transmission Line

Subject: Re: A little article about a BLH....why go to the trouble.....
Posted by SingleMinded on Sun, 07 Aug 2005 14:15:10 GMT
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Maybe one of these days . I will come up and have a listen to the Horneshoppe speakers. Not into heavy metal so I will stay out of the arguements. I also don't listen at 100db ..so the point of them playing at blistering levels are meaningless too me.I do own the BB FTA-2000s and enjoy them immensely. I enjoy different single driver implementations..so I look forward to hearing your models. I find some of the Cain models to be nice sounding and beautiful to look at..but IMHO a bit overpriced.I'm just glad there are fellows like you and Mr.Brines that make world class sounding speakers and real world prices.Have a great weekend or what's left of it!

Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Ed Schilling on Sun, 07 Aug 2005 14:41:49 GMT
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Wayne, "Here's the thing, Ed. It isn't fair for you to pounce on Bob's statement, "Single-driver full-range speakers have a limited dynamic range." That was a statement of fact, and you shouldn't use it to launch a campaign. It isn't a statement about horns or transmission lines, it is a statement about single drivers. "Sorry, didn't mean to start anything. But I might ask the question...limited dynamic range by what standard? Compared to a K-horn? Or compared to similar sized drivers? I have not really noticed "limited dynamic range" to be a problem (when horn loading them). I would assume that my 4 Klipsch La Scalas had adequate dynamic range. Thing is, that at sane levels, they didn't sound any more "dynamic" than the little single driver that replaced them. And that is exactly why they were replaced! Again, I thought the premise was...."Why a single driver can't play metal". I stand by my position. They can. In some cases and loadings." It only increases output at low frequencies, to augment where the driver is getting weak. So it doesn't help efficiency"That IS an increase in efficiency.....it is just at the bottom where it is needed. "When used at bass frequencies, a horn has to be pretty large. "Yes they do, I agree which is why in my favorite example it is actually meant to be used in corners for that very reason. "The physical construction of a small back horn is very similar to that of a transmission line. "Not really, Maybe some.....in my example there is a compression chamber, a throat, and the path is an exponential flare and when in corners the mouth is just about right for the intended cutoff. It is not similar to any TL I have seen. It may "behave" that way when not in the corners but I am not even sure that is right. "Put a transmission line in the corner, and it acts very much like a back horn placed in the corner. Alternately, take a backhorn out of the corner, and it becomes a tuned pipe. "Now, this I have to think about! The TLs I have had experience with simply went "boomy" when placed in corners and the BLH had the cut off raised. So I'm not sure if they are "flip flopping" in the way they behave.....we both know any speaker in a corner will gain a little efficiency. A TL that was not designed for a corner will have a big bump in the LF response that it simply does not need. Boom. "That will show you what I say is true. You know how I know? Because I've done it." I believe you, based on your examples.It should be noted that in my comments I was referring to a TRUE BLH.....one that either has a proper mouth or uses the corners to "fake it".It also has a "real" compression chamber....a "real" throat....and a genuine

exponential flare on a length that is correct for the cutoff. I have not been talking of a hybrid. But rather a "true" horn. In my example that would in fact be a "Back Loaded Corner Horn"I think we agree there is a place where the designs overlap.....but that is not what I have been talking about. I have meant all along a "true" BLH....one with a mouth the right size and if it is vented to the front and not designed to use the corners it will be big like the J-Low.....or you could use the corners and then the walls form the "big" mouth.Boy, this is a touchy subject! The fact that Jeff "outed me" may lead some to think I have some sort of agenda.....nothing could be farther from the truth. I wish that had not happened....it clouds things and may lead guys to a wrong conclusion about why I'm posting my OPINIONS. I was simply trying to encourage guys who might have been thinking about building a single driver speaker to continue on and not be discouraged by the OPINION they can't play "Metal". That is all.Ed

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Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Wayne Parham on Sun, 07 Aug 2005 15:08:50 GMT
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I think that you and the other single driver advocates would like nothing better than for people to enjoy a single driver speaker. I also think that you would encourage rock-n-rollers to try a single driver speaker just as much as you would encourage soft jazz lovers.The thing is, average SPL is not increased whether using a backhorn, transmission line or reflex cabinet. They all boost bass output only. So all of these types of loudspeakers have basically the same maximum SPL limit.

Subject: A W-bin!
Posted by Poindexter on Sun, 07 Aug 2005 20:53:17 GMT
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And a bloody nice looking one, too. I bet a Fostex FE166E would do well in it, and have about 3 times the sensitivity of the Jordan.I'd like to kerf-bend one up, all smooth curves and flow. Only thing, where in my little cottage would I put 'em;? I'd have to listen through the doorway from the next room!Nelson and Dana are hero designers to me; they really know how to make extreme projects elegant and constructable. Boy, would I like to build a pair of these, suitably poinzified.P.

Subject: Re: A W-bin!
Posted by hurdy_gurdyman on Mon, 08 Aug 2005 02:04:52 GMT
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I'd love to have a pair of those as well, as they sure look cool, but I just know my wife would hurt

me if I brought a pair home.Dave

Subject: Hurt me; hurt me!
Posted by Poindexter on Mon, 08 Aug 2005 04:31:34 GMT
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You got a wife? Hand her the whip. Stick out your tongue, 'BLEAH!'Don't forget to take off your pants first. Do not report back, by all means.P.

Subject: Re: Hurt me; hurt me!
Posted by Bob Brines on Mon, 08 Aug 2005 11:41:47 GMT
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Poindexter,Could you email me, please.Thanks,Bob

Subject: You have mail, Bob.
Posted by Poindexter on Mon, 08 Aug 2005 14:48:07 GMT
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Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Retsel on Wed, 10 Aug 2005 18:41:07 GMT
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This is not my experience comparing my Lowther DX4s in Hedlund Horns versus Open Baffles. In Hedlund horns, the DX4s have an average efficiency of over 100 db (I think 101 db). In Open Baffles, I think that Dick Olsher claims an efficiency for the DX4s of something like 98 db. In open baffles, I use a single inductor as a first order filter to roll off the high frequencies from 500 hz and above. I then have a fairly flat frequency response from 150 hz to the high frequencies (~10 khz). In Hedlund Horns, the DX4s are flat all by themselves (no filter needed) from 70 hz to the high frequencies (~10 khz). Thus there are no losses in inductors, and I can get down lower.Retsel

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Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Wayne Parham on Thu, 11 Aug 2005 10:16:12 GMT
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A backhorn is primarily internded to bring up the bass level to match that of the midband. Output from the front is direct radiation, so no efficiency increase or directivity gain is possible.

Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Retsel on Thu, 11 Aug 2005 12:15:13 GMT
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Except that your post is contradictory. Bringing up the bass IS efficiency increase (more sound and wider frequency response with the same watts). Rather than increase the efficiency of the upper registers, the BLHs don't use crossover components which REDUCE efficiency in other designs. This is why BLHs are more efficient.Retsel

Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Wayne Parham on Thu, 11 Aug 2005 12:28:02 GMT
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"Output from the front is direct radiation, so no efficiency increase or directivity gain is possible." There is no horn loading for output from the front, which is where most of audio band comes from.No point in arguing semantics. The fact is that average sensitivity isn't increased. I'm not advocating any particular design, but I am saying that I think a physically small basshorn acts very similarly to a transmission line, and that they both act like tuned pipes.

Subject: Re: Horns, transmission lines and reflex cabinets
Posted by hurdy_gurdyman on Thu, 11 Aug 2005 14:41:11 GMT
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I think I know what the mis-understanding is here. In a BLH design the bass is brought up to match nicely with the mid-treble response. In a typical box design, the bass isn't brought up as much. In order to get a measurably flat response, some sort of compensation circuit is frequently applied to bring the mid-highs down to the level of this bass. This causes a drop in the direct radiators output. The driver itself hasn't changed in anyway, only the signal going to it.At least, that's what I think this conversation is about. Dave

Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Wayne Parham on Thu, 11 Aug 2005 15:05:41 GMT
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I think your assessment is correct. But I also think it's important to look closely at this, because small basshorns are the same thing as tapered pipes in all but name. Bass-reflex speakers provide augmented bass output too. So to talk about the differences, one must first look at the similarities. There's a huge amount of overlap in each of these designs.Each will have Helmholtz resonance, determined by the dimensions of the exit hole and the volume of the cabinet. Helmholtz resonance is normally associated with bass-reflex speakers, but it is just a physical property that happens when you have a chamber with a hole in it. There will also be standing wave modes, determined by cabinet dimensions, component placement and geometry. And there may be some horn action, depending on flare rate and environment, like corner loading. So there will be each of these properties, whether the speaker is called a reflex system, horn or transmission line. The overlap of each of these makes them more similar than different.

Subject: Re: Horns, transmission lines and reflex cabinets
Posted by hurdy_gurdyman on Thu, 11 Aug 2005 15:37:18 GMT
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Wayne,When I was referring to BLH, I was talking about a horn loaded rear wave that should be corner loaded to get any real extension. These tend to have greater bass output. I realise that the short small opening horn typically found on BLH's and almost all FLH's that are designed to be placed farther into the room (typical "audiophile" regulations) aren't really any more efficient in the bass than any other type of box. I do find the actual sound to be typically a bit different, though, so I suspect there's something going on that makes a difference between the different type of bass boxes, but don't ask me what, as I'm not any kind of engineer. I just listen. Maybe I haven't listened to enough variety yet. I'm always open to people sending me (or stopping by with) different speakers so I can broaden my experience. Dave

Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Wayne Parham on Thu, 11 Aug 2005 16:09:17 GMT
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Well, yeah, but you can corner load anything and expect 9dB over freespace. It's 3dB to 6dB more output than what you'd expect other places in the room. I really like that arrangement, so I'm not discounting it at all. I'm just saying that there probably should be no dissention between the backhorn and tapered pipe enthusiasts, because they're so similar.

Subject: Re: Horns, transmission lines and reflex cabinets
Posted by hurdy_gurdyman on Thu, 11 Aug 2005 17:56:09 GMT
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I don't know, Wayne. I tried putting some three way Cerwin-Vegas in the corners once. The bass output was so heavy I could hardly hear the music. The bass was certainly higher in level than when out in the room, but unlistenable in the corners. Of course, the bass was just barely acceptable out in the room. These weren't the best damped speakers I'd ever owned. My Klipsch Heresy's sounded much better and more balanced in the corners than out in the room. I'd suspect that a speaker that is well balanced out in the room just plain has a bit much bass in the corners, so the extra bass gain of corner loading is not a good thing for them. However, if the speaker is designed for corner loading, that's different. I guess any design that has taken corner loading into consideration in it's design would benefit from it. I liked it. Too bad my OB's seem to like out in room better. It would be much more convenient to have them in the corners.I've probably rambled and got off topic enough. Later,Dave

Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Wayne Parham on Thu, 11 Aug 2005 22:04:29 GMT
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Yeah, corner placement provides eight-space loading only up to the point where the distance to the room boundaries are a 1/4 wavelength. After that, the placement transitions to baffle loading only, making a 6dB drop. For frequencies above this point, the walls and floor act as reflectors instead of launch boundaries, so unless the midrange and tweeter are horn loaded, they'll be a source of early reflections.

Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Retsel on Tue, 16 Aug 2005 14:44:24 GMT
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I agree that there are similarities in that all have vents which improve efficiency. But no transmission line or reflex box can have the efficiency improvement of a back horn because they don't have an "expansion," at least no transmission line nor reflex box I have ever seen. If you want to stay stuck in the same interpretation, fine. But the "semantics" you refer to do result in a real efficiency improvement. Are the efficiency improvements huge, NO. But there is an efficiency improvement.There is also increased dynamics inherent in the characteristics of horns. Again, if you choose to ignore this, this is your choice, but it is there.For these reasons, if I am going to put my Lowther DX4s into a box, it will be a back horn, not a reflex box, which Lowther owners say suck, nor transmission lines, which are a step above reflex boxes, but still not as good a match.Retsel

Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Wayne Parham on Tue, 16 Aug 2005 15:00:35 GMT
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The thing that makes the difference is the mouth area. If it's not very large, then the device acts more like a tuned pipe than a horn. So there's a lot of overlap in physical and acoustic characteristics between tapered pipes and horns.

Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Martin on Tue, 16 Aug 2005 22:48:26 GMT
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I agree with Wayne's interpretation of transmission lines and horns. Most back loaded horn designs start out in the low frequencies as transmission lines and transition to horns as frequency increases. If you calculate the cross-sectional area of the mouth of your horn, double it for the floor reinforcement, and then calculate the cut-off frequency I bet you will find it is in the hundreds of Hz range. The bass below this frequency is due to transmission line standing waves not horn action. If you supply your horn mouth's physical dimensions I will do the calculation by return post and we can see what the results show.You also wrote :"For these reasons, if I am going to put my Lowther DX4s into a box, it will be a back horn, not a reflex box, which Lowther owners say suck, nor transmission lines, which are a step above reflex boxes, but still not as good a match."I own seven pairs of Lowther drivers, including a pair of DX4's, and find they perform very well in TL and ML TL style enclosures. So this Lowther owner definitely does not feel that this design option "sucks". It is one compromise that can be considered for Lowther drivers. I also use 200 watts of SS power and can report that does not "suck" either.Martin
Quarter Wavelength Loudspeaker Design

Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Retsel on Thu, 18 Aug 2005 13:08:17 GMT
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I measured the size of the opening of the backhorn opening of my Hedlund Horns to be 27.25 inches x 9 inches. I entered the opening into my spreadsheet for calculating horn performance (assuming 1/4 space performance) and I found that it corresponds to a cut off frequency of 86 hz. This is consistent with the roll-off frequency of the Hedlund Horns which I have seen in plots sent to me (I never have measured the frequency myself). Thus, this suggests that the Hedlund Horn is a true horn and not a transmission line as you suspected. I believe that Jan Hedlund designed them with a Tactrix flair.If you reread my post you will see that I did not say that transmission line speakers suck. I did said that reflex boxes suck. I own a pair of transmission line speakers. They are the premier speakers made by Irving "Bud" Fried. They were originally sold with the name of C3Ls and then when he upgraded the speaker drivers and crossovers, he renamed the satelites

as C5s (as part of his Vahalla system which sold for $10,000 in the 80s). I upgraded to the C5s. They are very excellent speakers. It is just that the Hedlund Horns are better, as they start with better quality drivers. Bud did say that the woofers in those speakers are higher Q drivers. I am sure that the Lowther DX4s are excellent in transmission lines. I bet that you could duct tape a pair to the wall and if coupled with a suitable crossover, they would have respectable sound in that application too. But the point being made by this string of posts is that back horns are the best way to get the most efficiency and dynamics from full range speakers. My experience has confirmed this with Lowther DX4s and particularly so since they have such a low Q. Transmission line speakers probably have a higher WAF then back horns, and you could sell them on that basis, but I doubt that transmission lines will have the dynamics and efficiency of back horns. They may not be different by a lot, but side by side, they would be a notch lower. My question to you is when you put a pair of Lowther DX4s into transmission lines, do you need to pad down the upper frequencies, or is the frequency response relatively flat (I doubt that Lowthers are "flat" in backhorns, but they are so when averaging over the frequency response and they sure sound great without crossover components in the signal path)?Retsel

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Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Wayne Parham on Thu, 18 Aug 2005 13:54:01 GMT
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I think the real measure of a horn is the impedance plot. If it is smooth and resistive, it is acting as a horn. If it is peaky and reactive, it is acting more like a tuned pipe. Cutoff frequency has very little to do with it, except that a higher cutoff frequency can be supported with a smaller mouth.Can't agree with you on bass-reflex either. To say bass-reflex sucks is like saying LC oscillators suck. They do just fine when tuned right and used in the right situation. I don't think I'd want a bass-reflex midrange or tweeter and I don't think I'd want a highly underdamped bass-reflex woofer either. But I think bass-reflex is perfect for high efficiency woofers where low extension and relatively small cabinet size is required.I think that back-loaded horns are a great idea for single driver speakers. But the thing I think is very important to make clear, is that size matters. If a backloaded horn is small, it acts very similarly to a transmission line. This can be seen in both the impedance plot and the frequency response. This also affects excursion, which limits maximum SPL on a single driver speaker.Where efficiency is concerned, backhorn loudspeakers generate midrange and treble from direct radiation, so that sets the limit. You would not want to build a horn that raised the bottom octaves above that of the midrange, so the average SPL of the driver itself is the average SPL of a good single driver loudspeaker. Speaker voicing is a different matter entirely.I understand what you and others are saying, that you would rather use the backhorn as an acoustic filter, to use it instead of a electrical network. But I've heard some very fine transmission line speakers that needed no electrical filter, so I consider the two issues separately. I've also heard some very nice bass-reflex single driver speakers that needed no electrical filter. So I would ask you to understand why I would suggest that the issue of electrical filters be separated from the rest of the discussion, and just look at the similarities and differences of the acoustic chambers themselves.Lastly, consider the amp driving these speakers. The electrical impedance becomes very important on amps with high output impedance. Loudspeaker impedance peaks cause response peaks when used with tube amps, the "First Watt" Pass Amp and others that act like constant current sources. Look at the impedance charts of all these

loudspeakers in question and you'll see that some are more friendly than others in that situation. A moderate peak or two is much better than several notches, so it is important to the overall sound quality to pay attention to that when used with current sources. This is overlooked by many people, and ironically, it is probably more important than anything else when using some amps.

Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Retsel on Thu, 18 Aug 2005 14:32:50 GMT
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If I remember right, the Hedlund Horn is a tatrix expansion, which is a true horn. It may be peakier than an exponential expansion, but it is a horn. My question again to Martin is does his transmission designs allow forgoing all crossover components because the bass boost brings up the bass to match the high frequencies, and is the tipped up response smoothed out? That is the magic of a well designed back horn.I have never had a reflex bass cabinet. I have heard some say that the design is flawed. I am heard from so many that the bass reflex design sucks for Lowhters, so I am convinced of that.Retsel

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Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Wayne Parham on Thu, 18 Aug 2005 14:39:16 GMT
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The thing that makes a horn act like a tuned pipe is its size, not its profile. It doesn't matter if the profile is tractrix, exponential, conical or whatever. The thing that can make it act like a tuned pipe is related to mouth size.And again, bass-reflex cabinets are like LC circuits. There is nothing flawed with them. There are a lot of people spouting nonsense on the internet, and I would suggest to you that comments about reflex designs being flawed are the remarks of a person that doesn't know what they are talking about. It's kind of sophomoric really, like a sticker on the back of a Camaro that has a kid pissing on a Ford logo.

Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Martin on Thu, 18 Aug 2005 20:37:26 GMT
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"I have never had a reflex bass cabinet. I have heard some say that the design is flawed. I am heard from so many that the bass reflex design sucks for Lowhters, so I am convinced of that."Based on what others say you are already convinced. Based on that, I see no real reason to continue the discussion.Martin

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Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Chris K on Fri, 19 Aug 2005 01:29:06 GMT
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Wayne Parham wrote:"The thing is, average SPL is not increased whether using a backhorn, transmission line or reflex cabinet. They all boost bass output only. So all of these types of loudspeakers have basically the same maximum SPL limit."I'm an admitted "novice" at understanding the finer points of horn theory. However, wouldn't the acoustic "resistance" of the horn loading the bass frequencies that have great amounts of electrical energy being fed to the voice coil, provide the amplifier with a corresponding inductive electrical resistance at those low frequencies, thus leaving the amp more "juice" for higher SPLs? All the while the horn mouth providing the needed "area" of air movement (albeit reduced amplitude) thus giving the bass needed boost. In other words my feeling is that if you physically retrained a speaker cone from movement (damped) you could put more power from a low powered tube amp to the coil and have that physical resistance "unload" the amp of its current requirement in that low band of frequencies saving power for the upper audible band. Is this a valid point of view to you "experts" here?

Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Wayne Parham on Fri, 19 Aug 2005 02:14:32 GMT
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Look at it this way. Lets say the speaker isn't excursion limited. Lets say that the horn actually reduces excursion to zero, and it stays that way through the entire bass range. That would be cool, 'cause it would stop IMD. But midrange and treble output would still be provided as direct radiation from the driver. So that sets your SPL limit. You certainly wouldn't want to have the bass range boosted above the midrange and treble.Now look at the real world. Even a very good horn has excursion peaks and dips as you pass through the bass range. The best you can expect is to reduce excursion just above the flare frequency and then again at about twice that frequency, maybe even a third excursion dip above that. But between these dips, excursion rises and it is at those points that you'll want to focus your design efforts. Those excursion peaks will be what sets your limits on the low end.

Subject: Re: Horns, transmission lines and reflex cabinets
Posted by ChrisK on Fri, 19 Aug 2005 03:17:39 GMT
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Thank you for that clarification Wayne.It would seem that "real world" dynamic conditions of the air mass in the horn, compression chamber and room itself as one "trundles" through the low frequencies is going to be "ragged" but in "theory" if a BLH horn is done right the loading of the driver will be a smooth curve through the low end on up eventually fading to no acoustic loading

(by the horn itself). I'd guess that a given compression chamber has a great effect on creating peaks and dips in the mids and highs due to standing waves and cancellation in the chamber. Tough to damp those out especially if the chamber is small but I know "not a thing" about this stuff! With horns and full rangers there really is quite an "interplay" of electrical and acoustical loads and physical mass going on that defy description in a perfect sense. I guess that is the magic of BLH and tubes synergy (ultra synergy if you lucky)!

Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Retsel on Fri, 19 Aug 2005 13:05:23 GMT
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Answer me this one question. When you place Lowther DX4s in tranmission line cabinets, do you need to pad down the upper frequencies or does the cabinet bring up the bass sufficiently to match the upper frequencies so that no equalization is required? Retsel

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Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Wayne Parham on Fri, 19 Aug 2005 14:27:16 GMT
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I've seen implementations done both ways. If you'd like to do some comparisons of specific implementations, I think it would be very interesting for everyone here. For the sake of discussion, comparisons could be made with mathematical or physical models, using predicted response or measured. Or I suppose you could use existing loudspeaker cabinets and make meaurements of them on specific amps. It would be a interesting exercise.

Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Martin on Sat, 20 Aug 2005 11:22:30 GMT
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When you place Lowther DX4s in tranmission line cabinets, do you need to pad down the upper frequencies or does the cabinet bring up the bass sufficiently to match the upper frequencies so that no equalization is required? In all the designs I have built and measured, you need to pad down the upper frequencies with a correction circuit. The cabinet can be designed to produce bass equal in efficiency to the driver radiating into 2 pi space. However, by placing the enclosure out in a room the baffle step will exist which requires correction.Martin

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Subject: Mouth Area and Cut-Off Frequency
Posted by Martin on Sat, 20 Aug 2005 19:16:29 GMT
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For your mouth area, and assuming only floor reinforcement, I get a lower cut-off frequency of 172.5 Hz. The only way I can get your 86Hz is if I assume the speaker is flush against a side wall also. My guess is that your Hedlund horn is really acting like a TL below 200 Hz and transitions to a horn above this frequency. I would also speculate that you are probably getting weak bass and could use a BSC circuit to help tame the rising mid and high frequency response of the DX4 driver, this is probably why you are using a sub woofer to help the low end. With a good BSC circuit design, the sub woofer may not always be needed unless you really want to play bass heavy music.Martin

Subject: Re: Mouth Area and Cut-Off Frequency
Posted by Retsel on Mon, 22 Aug 2005 13:31:24 GMT
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You are right. I mistakenly used an equation that already assumed 1/4 pi space and I was doubling the horn opening thinking that it was not.However, I do not need to pad down upper frequencies in the Hedlund Horn to get balanced reponse. The Hedlund Horn is balanced from 80 - 100 hz up to 10 khz. Perhaps there is a combination of horn and tranmission line bass which gives the balance that the Hedlund Horn enjoys, or perhaps it is the room reinforcement. This is not just to my ears but to any who have heard my system.The subwoofer I was using does not provide much boost for the mid bass as I was crossing it over at 38 hz with a third order crossover. The subwoofer is very desirable, though, for most all music.Retsel

Subject: Re: Mouth Area and Cut-Off Frequency
Posted by Martin on Thu, 25 Aug 2005 23:23:38 GMT
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You should try a well designed correction circuit, you might be very surprised. It would only cost a few dollars and might make a world of difference in your system's performance. Why not give it a try? You can always take it out if you are not satisfied with the results, no permanent damage done.

Subject: Re: Mouth Area and Cut-Off Frequency
Posted by Retsel on Fri, 26 Aug 2005 14:17:16 GMT
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Thanks for the suggestion and some day I may try one, and if I do I would just try to borrow one to see if I would like it.I am skeptical. I am skeptical because I am much more sensitive to transparency then most audiophiles. I work to remove as much from the signal path as possible. For example, years ago when people were raving about the Genesis digital lens, I tried one in my system and immediately removed it because it reduced the transparency of the sound. In recent years I have been soldering or terminating my speaker wires and interconnects directly to my components to avoid the RCA connectors or speaker binding posts which rob the sound of its transparency. I wired my SACD player to remove all resistors from the signal path. I go directly from the digital chip through a set of mu metal transformers to the output. Thus, I am pretty aware of what I would like and what I would not like. I probably would not tolerate such a device in the signal path.The upshot from taking these actions is that the sound from my system is amazing. Retsel

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Subject: Maximum SPL charts
Posted by Wayne Parham on Mon, 12 Sep 2005 11:02:06 GMT
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Here's a chart that will help quantify matters. Below is an SPL chart based on Fostex specs. Add

which of course assumes that X-max is not an issue and that there is no compression. In other words, the maximum SPL listed here is rather optimistic.[Model][size][SPL at 1W/1M][Max power][Max SPL at 1M][Max SPL at 10 feet][Max SPL at 15 feet]==========F83E 3" 88dB 10watts 98.00dB 88.25dB 84.75dBF120A 5" 89dB 30watts 103.75dB 94.00dB 90.50dBF200A 8" 90dB 80watts 109.00dB 99.25dB 95.75dBFE87E 3" 89dB 15watts 100.75dB 91.00dB 87.50dBFE103E 4" 89dB 15watts 100.75dB 91.00dB 87.50dBFE107E 4" 90dB 15watts 101.75dB 92.00dB

5" 93dB 45watts 109.50dB 99.75dB 96.25dBFE127E 4.7" 91dB 45watts 107.50dB 97.75dB 94.25dBFE166E 6" 94dB 65watts 112.15dB 102.40dB 98.90dBFE167E 6" 94dB 65watts 112.15dB

100.25dBFE206E 8" 96dB 90watts 115.50dB 105.75dB 102.25dBFE207E

120watts 117.75dB 108.00dB 104.50dBFF125K 4.5" 92dB 50watts 109.00dB 99.25dB 95.75dBFF165K 6.5" 94dB 70watts 112.50dB 102.75dB 99.25dBFF225K 8" 96dB 100watts 116.00dB 106.25dB 102.75dB

Subject: Re: Horns, transmission lines and reflex cabinets

Posted by Retsel on Mon, 03 Oct 2005 15:41:09 GMT
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Here is a recent testamonial which describes the improvement of a Lowther DX4 in a back horn over that of a reflex box.
http://www.audioasylum.com/forums/hug/messages/94352.htmlTransmission lines are probably between a reflex box and a backhorn, but still would not have the same quality of sound that a backhorn provides. Again, perhaps the most important benefit of backhorns is that the backhorn allows for a sufficient expansion and low frequency boost that does away with crossover components for these very fine drivers. Retsel

Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Wayne Parham on Mon, 03 Oct 2005 18:57:43 GMT
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Not to be rude, but an impassioned "testimonial" from an anonymous post on Audio Asylum does absolutely nothing for me.

Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Retsel on Mon, 03 Oct 2005 19:41:11 GMT
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Thanks for your opinion Wayne and it is not rude by any means as we all must carefully consider the claims made by these posts (including this one) before acting on them. Indeed those are words of wisdom to all our readers. Although while I also have found some of these posts to be "blather," I have found that many have some very important information or observations which deserve my consideration. Indeed, some of the best tweaks I have made to my audio system came from such posts. I did not post this comment for your eddification as your opinions seem so strong that I really did not think that you would change your mind based on this individual post, or even a multitude of such posts. However, for the thousand or so other readers out there who have not made up their minds, this post should help them to consider choosing, or at least listening to, a back horn before they might choose a reflex box or transmission line. They may still choose a reflex box or transmission line for WAF issues or for cost, if they can get a reflex box cheaply on E-bay from one who has upgraded to a backhorn, but they are doing so with the full knowledge of the tradeoffs in musicallity involved.Retsel

Subject: Re: Horns, transmission lines and reflex cabinets
Posted by Wayne Parham on Mon, 03 Oct 2005 20:15:46 GMT

Don't misunderstand me. I like backhorns. But I also like reflex and transmission lines. They are more similar than different. It's the specific implementations that I'm more interested in, because that gives you something to talk about. Without specifics, you're not able to make comparisons.Consider a tapered transmission line with its closed end having the same cross-section area as a backloaded horn, its mouth at the same position and area, expansion rate and driver the same. What I am describing to you are two identical boxes, one called a transmission line and the other called a backhorn. Without more specificity, you can't necessarily say there's a difference.Another example is to compare a 2ft3 transmission line or backloaded horn with a 4" or 6" 90dB 20 watt driver to a 10ft3 reflex box with a 95dB 600 watt flux-stabilized 18" woofer. It's not really a fair comparison, because the scale doesn't match. The reflex box will beat the TL/BLH in terms of efficiency, maximum output, distortion and extension. It won't work as a full range driver, but my point is that without more specificity, the conversation has no reference point and therefore no meaning.Pipes, tapered pipes and Helmholtz resonators