Subject: Efficiency of backhorns
Posted by Audioholic on Mon, 14 Apr 2008 17:42:45 GMT
View Forum Message <> Reply to Message

bass frequencies only but others say it raises efficiency across the board. I was under the impression it would load the bass which would take some pressure off the driver in the mids. I don't know if that makes it more efficient though.

Subject: Re: Efficiency of backhorns
Posted by DMoore on Wed, 16 Apr 2008 02:30:43 GMT
View Forum Message <> Reply to Message

Derived from Plach:Back-loading generally is not as efficient as a front-loaded horn, all things being equal.The gain of back-loading is that the horn's frequency response bandwidth is increased over a comparable front-loaded horn.Rear-loading a horn generally requires a driver with a higher Fs than the horn's Fc, and a "rising response curve" for the driver in question.A front-loaded horn is best utilized with a LOWER Fs driver than the horn's Fc of relatively linear (flat) response. However, if I remember correctly, Bruce Edgar advocates a driver of a higher Fs (than Fc) and lower Qt for a front-loaded application. So there is plenty of arguments both ways.One note of precaution, though: a rear-loaded horn often requires that the high(er) frequencies be limited by some method (i.e., a tortuous horn pathway, or an acoustic filter of some sort) to prevent them from going through the horn, which will result in comb-filter distortion when the same frequencies are being produced by the front of the cone at the same time. Having an indirect (i.e., downward or rear-firing, etc.) horn mouth may eleviate this effect somewhat.DM

Subject: Re: Efficiency of backhorns
Posted by Martin on Wed, 16 Apr 2008 03:05:21 GMT
View Forum Message <> Reply to Message

Most BLH designs you find on the Internet are really a hybrid of a TL at low frequencies that transitions to a horn as frequency rises. Once it has transitioned to a horn then a properly sized coupling volume behind the driver can be used to filter out higher frequencies from being tranmitted by the horn mouth. The transition frequency from TL to horn behavior is determined by the size of the mouth taking into account nearby room boundaries.This is my definition of how most reasonably sized BLH work. Others might, and probably will, strongly object to this dexcription of how a BLH works. Based on my definition the low frequencies produced by the hybrid TL/horn reinforce the rolling off SPL response of the driver. Typically low Qts full range drivers are used by most BLH builders so they need help down low. But to answer the oriiginal question, if done correctly the efficiency of the system will not be increased across the entire

frequency spectrum. For example, if your full range driver has a SPL level of 95 dB/W/m and a Qts of 0.2 then the goal of the BLH design is to provide bass output that extends down to maybe 40 or 50 Hz at the same 95 dB/W/m. In most cases this is easier said then done.

Subject: Re: Efficiency of backhorns
Posted by Audioholic on Wed, 16 Apr 2008 21:59:25 GMT
View Forum Message <> Reply to Message

Pardon my ignorance: Who is Plach?Response bandwidth increase is what I was going for. I don't expect efficiency gain per se. What I wanted was to prevent cone excursion from bass to free the midrange and keep it from gargling.

Subject: Re: Efficiency of backhorns
Posted by Audioholic on Wed, 16 Apr 2008 22:08:38 GMT
View Forum Message <> Reply to Message

My research brought me to the same conclusion. There are differences between various TL but in general they are the same as BLH. That isn't to say a Voigt pipe is the same as a MLTP is the same as a BLH but I think the basic principles are the same. A front loaded horn is more efficient but it only works for an octave or two so can't be used for a single driver. At least that's what I thought. Then one guy (who will remain anonymous here) tried to tell me a backloaded horn can be as efficient as a frontloaded horn so I wanted to get some opinions here. Looks to me like his opinion is not shared by anyone else. As much as I like my speakers, they do what they do and it is unrealistic to expect them to be as loud as say a compression horn with the same 1 watt input. No problem, I'm after quality not quantity.

Subject: Re: Efficiency of backhorns
Posted by DMoore on Thu, 17 Apr 2008 03:02:14 GMT
View Forum Message <> Reply to Message

Daniel Plach worked for Jensen in the 50's. Authored a famous paper in JAES covering horns, which is what I was referring to.The increase in bandwidth is due to less acoustic resistance being applied to the driver because typically the front of the cone is radiating into atmospheric pressure (the horn presents higher pressure to the rear of the driver than the front which is atmospheric). That also tends to reduce the overall efficiency of the horn/driver combination compared to a sealed back chamber typical of front-loaded horn.So the trade off is higher bandwidth with a lower efficiency, that is, what is gained in one aspect is lost to the other. It also follows that a higher amount of IM distortion may be present, too, due to driver excursion being less limited in the

forward direction compared to the rear, but careful back chamber/throat area/reactance adjustments can provide some ability to balance that for lower distortion, within the imposed limitations, of course. The best method of balancing this would be a front-horn AND a back horn feeding from the same driver.Most of this is a moot point from what I see because like Martin said, most small footprint rear-loaded "horns" are not true LF horns but are more likely to act like a 1/4 wave transmission line at best or at worse, a somewhat wide-band resonating column. Peaky response at best, but covered up somewhat by the directly radiating driver output, hence their seeming popularity.DM