Subject: Why do horns handlice twice the power?
Posted by Adrian Mack on Thu, 30 Oct 2003 09:06:33 GMT
View Forum Message <> Reply to Message

Why do people say basshorns handle twice the electrical power of, for example, a vented box subwoofer?

Subject: They don't
Posted by Wayne Parham on Thu, 30 Oct 2003 17:19:02 GMT
View Forum Message <> Reply to Message

This refers to the acoustic loading and how it is reflected back as electrical impedance. Both horn and vented systems unload at a specific low frequency, and this is where they are most vulnerable. Above this frequency, both are limited by the dissipation ability of the motor. If it's the same motor in each cabinet, then the power limit is the same. The impedance may be different though, which then means that the voltage limit is also different.Some make the case that horn loading increases efficiency, so more power is converted to acoustic energy leaving less to be wasted as heat. I don't agree with this because while it is true in theory, in practice even the most efficient horns dissipate a great deal of heat, usually more than 50%. And since most speakers remove heat via venting, the reduced excursion from horn loading limits their ability to cool the voice coil. Where power handling is concerned, the reduced excursion is a two-edged sword. Mechanical limits are increased but thermal limits aren't; In fact, the reduced excursion may reduce thermal limits in some cases.

Subject: Re: They don't
Posted by Adam on Thu, 30 Oct 2003 20:55:03 GMT
View Forum Message <> Reply to Message

Yup. Thermal power handling may even be decreased slightly by horn loading. Particularly in the case of low frequency motors, cone motion is critical to the ventilation and cooling of the motor. Since horn loading dampens cone motion, this effect is somewhat retarded and can result in lower thermal power handling. Mechanical is a different story ;)Adam

Subject: hmmm but

Posted by toxicport.e on Thu, 30 Oct 2003 22:21:11 GMT
View Forum Message <> Reply to Message

quoting some one "A cool thing about horns is that they can increase the effective power capacity of a driver (remember a 300 Watt driver can handle 500-600 Watts on a 50% efficient horn).This output corresponds to about 400 acoustic Watts per box which is a very significant energy.The stack of 6 should produce about 3.2 acoustic horsepower without exceeding Xmax.";-)it makes sense if the energy is being transferred into sound not heat..light a more efficient light bulb-more light less heat but same power in and out in total../end simplistic post :-)

Subject: Voltage and Power
Posted by Wayne Parham on Fri, 31 Oct 2003 04:17:37 GMT
View Forum Message <> Reply to Message

A horn increases electrical impedance of the driver through the horn's passband, which increases the voltage limit but not the power limit. Unless you're doing something to dissipate the heat from the voice coil windings, you still have the same power limits there. Nothing changed the structure of the motor; You may get more output per watt and you may increase impedance, but you won't increase the motor's ability to dissipate power.To use your light bulb analogy, it's like having a reflector or lense that focuses the light and makes it brighter in one spot. You may not need as much power to get the same amount of light in a concentrated area. And you may even be able to reduce the voltage input to the light bulb and get the same candle-power at a specific pinpoint location. But if you increase current through the filament past the limit of the bulb, you'll burn it out whether you have the reflector installed or not. Same thing with the speaker motor, whether installed in a horn or not.Again, even with increased efficiency, we're still talking about a large amount of heat in the motors of a high-power horn. With excursion reduced because of horn loading, it is questionable whether the woofer's venting is as effective.

Subject: Re: Voltage and Power
Posted by toxicport.e on Fri, 31 Oct 2003 06:48:07 GMT
View Forum Message <> Reply to Message

well how can a well respected (by some people) person post what i quoted, and treat it as fact? people run 2kw per labhorn cabinet, no problems. and the woofers are 450watt rms or so.Cheers wayne!

Subject: Re: Voltage and Power
Posted by Wayne Parham on Fri, 31 Oct 2003 07:24:49 GMT
View Forum Message <> Reply to Message

Just because someone connects LABhorns to amplifiers rated 2000 watts doesn't mean they're actually dissipating 2000 watts. Eminence makes good speakers but I'd be willing to bet any amount of money that a pair of LAB12 woofers cannot handle 2000 WRMS for more than a few minutes, more likely seconds, in any style cabinet.

Subject: Re: Why do horns handlice twice the power?
Posted by Walt on Fri, 31 Oct 2003 09:06:45 GMT
View Forum Message <> Reply to Message

If we put 2000W electrical power in, that power should also come out as sound and heat. Since a good horn can have a 30-50% efficiency this would mean that up to half of the input power is converted into sound. The other half will be lost as heat. A direct radiating system usually has only 1-10% efficiency so the coil has do dissipiate a lot more power. Therefore the horn will handle more power!Best regards,Walt

Subject: physics-no cheating allowed
Posted by Mike.e on Fri, 31 Oct 2003 09:17:28 GMT
View Forum Message <> Reply to Message

"I'd start saving for a second 3402 - in theory that should give you 12-1400w per cab"Even with 2500 watts a box I haven't really discovered what seems to be a clear power limitation.""I run my 3002's bridge-mono giving 3000 watts @ 4 ohms per cabinet. The first green (labeled "signal") LED on the amp just tickle's on and stays on for the majority of the signal input. I hit LED's 2 & 3 (-20 and -10) for the transient bursts"Regardless of what people say they use, and what music with bass content they may use-the issue remains that certain people beleive that u can input more power into efficient horns, and i beleived them, it made sense.i see both sides of the issue, only 1 can be correct ;-)should i try it-make a labhorn and input 2kw sine for a week?perhaps its a simple matter of some one saying RMS instead of Music power in a post i saw, setting me off on a tangent.CheersMike.e

Subject: Transformation

Posted by Wayne Parham on Fri, 31 Oct 2003 09:33:21 GMT
View Forum Message <> Reply to Message

Yes, there is more power transformed from electrical energy to acoustic energy in a 30-50% horn than in a 1-10% direct radiator. But then again, there is also a reduction of excursion, making the thermal management system - the cooling vents - less effective. So I'm not sure it is reasonable to expect a doubling of power handling from horn loading. I think it will definitely increase the mechanical limits, but am not sure the thermal limits are improved. In fact, I think in some cases, thermal limits may be reduced.

Subject: Re: physics-no cheating allowed
Posted by Wayne Parham on Fri, 31 Oct 2003 09:51:58 GMT
View Forum Message <> Reply to Message

I think the discussion has probably slipped into one of semantics. A horn increases radiating resistance which modifies the parameters of the gyrator transformations. There are a handful of things that result from this. You'll definitely get more output from a horn, and it is definitely more efficient. It also has higher impedance, so all of these things combine to allow a higher voltage input and a higher output as well. But you still can't exceed thermal limits from long-term double and quadruple over-current conditions and expect it to survive.

Subject: Simple (very) math
Posted by JLapaire on Fri, 31 Oct 2003 17:18:46 GMT
View Forum Message <> Reply to Message

I'm going to hop in with a thought. Because the impedance of the driver loaded in a horn is higher than nominal, the amp can output a higher voltage without the driver actually seeing more power. If power dissipated = voltage squared over resistance, than an increase in resistance results in lower power. Is that about right?John

Subject: Re: Simple (very) math
Posted by Wayne Parham on Fri, 31 Oct 2003 20:13:56 GMT
View Forum Message <> Reply to Message

Power is directly proportional to the reciprocal of impedance and to the square of voltage, so a

small increase in impedance requires a larger increase in voltage to develop the same amount of power across the load. Large power amplifiers are typically good current sources, and can be viewed as current multipliers. But still, the output voltage is what is typically constant, not the current.So if you set two different impedance loads across two amps that are generating the same voltage output, the one with higher impedance will dissipate less power than the one with lower impedance. If you set them so that both are dissipating the same amount of power, then the higher impedance load requires a higher voltage output as described by the formula.A horn loudspeaker can be described as having an electrical-to-mechanical transformation and a mechanical-to-acoustic transformation. The acoustic load generated by the horn is reflected back through the mechanico-acoustic transformation to modify the diaphragm's reactive and resistive properties. It acts to modify the primary resonant frequency and adds a few more, which is described by its reactance. It also impedes motion of the diaphragm as a damping force. This resistive component is more linear at higher frequencies, but is present to some degree at all frequencies in its passband.These mechanical transformations are reflected back through the electro-mechanical transformation to modify the electrical impedance curve. It has both a resistive and reactive component, and the increased resistance is an indication of the horn's increased efficiency. It also means that less electrical power is transferred at a given voltage, even though the horn's efficiency increase may have made the acoustic output greater. So a horn loaded driver can be expected to operate safely at a higher voltage, because its impedance is higher. But that is what we're really talking about here, and not the electrical power transferred to the load.