Subject: My 2 cents
Posted by Bill Fitzmaurice on Thu, 19 Aug 2004 13:03:44 GMT
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Ralph was on the right track when he questioned the possibility of getting to 100% efficiency. That actually would be up in the vicinity of 120dB/watt, and no, you can't get it. The reason why has to do with the same reason why the high end starts to droop as you continually add more drivers.Two things happen when you parallel wire a doubling of the number of drivers. First, you get 3dB of added voltage sensitivity. Add enough drivers and you could in theory get to 120dB/watt IF your amp could operate into a nearly zero impedance load, but since you can't do that you're going to be limited to around 116dB in the real world, which is in the vicinity of 50% efficiency.The second phenomenon that occurs when doubling the number of drivers is that your radiating efficiency doubles, and that gives you another 3dB of sensitivity. This happens regardless of impedance load, so if you have 2 drivers and series wire them you'll lose 3dB wattage sensitivity due to the doubled impedance (and thus halved current draw) but overall sensitivity remains level as you get 3dB gain from the doubling of radiating area. More or less. The 'less' part of the equation comes from the fact that the doubling of radiating efficiency is not linear; it is frequency limited. Once you get to a certain ratio of radiating area to frequency (I have the formula for that stashed somewhere) you max out on the radiating efficiency side of the equation and you can't get any more. That's another reason why you can't get to 100% efficiency by simply continuing to add drivers. It is also why once you get to a certain number of tweeters, how may being dependant on the size of their respective radiating planes, adding more of them will gain additional sensitivity only up to the 'saturation' frequency, while above that radiation sensitivity remains constant no matter how many drivers are added.There is some question as to planar tweeters being unable to achieve as much radiating area sensitivity gain at high frequencies than, say, domes. The answer is a simple one: planars for the most part start off with a higher radiating area to frequency ratio than domes, so when adding more of them they reach 'sensitivity saturation' sooner. The same applies to horns, where the mouth is the radiating plane.