Subject: Resistor wattage and other questions.....
Posted by crazychile on Fri, 05 Jul 2002 19:21:14 GMT
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Wayne- I noticed in the plans you sent me for Thermionic 3 pi's that the resistors should be rated at 40watts. Some of the resistors I am thinking about using are 12watt and so three of them in parallel would only be 36watt. Is this close enough? Some of these resistors are kind of expensive so I wondered if I could save a few bucks.Also, How critical are the resitor values given that the tolerances of most power resistors are 5-10%? The reason why I ask is in my search for parts sometimes I cannot find an exact value, (15ohm instead of 16, 27ohm instead of 25,) and I'm wondering if I vary this slightly if it will be audible. (especially on the tweeter)Would you recommend that I not vary from a round port? I tend to favor how a rectangular port can sometimes be less prone to noise. Can I do a rectangular port as long as the total port area remains the same?Thanks for your patience- I bet you just love it when guys ask questions about changing your (proven) design....Eat Mo' Hot Sauce...crazychile

Subject: Re: Resistor wattage and other questions.....
Posted by Adam on Fri, 05 Jul 2002 19:46:29 GMT
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I'm not Wayne, but I thought I would interject anyway... 36 watts will be fine for most designs. Actually, around ten watts would probably be enough for what most people are using. I believe Wayne recommends his resistor values assuming you intend on running a great deal of power through your speakers, like 300-400 watts. If you are running yours with around 100 watts - which is plenty - you only need perhaps 20 watt resistors in your CD crossover.The impedance compensation is a little different. You should try to keep the wattage value as high as you can, but this isn't as much of a problem. You can use the dummy load resistors from PE which are 100 watts or even 200 watts in 4 ohm or 8 ohm models.As far as resistor tolerances go, I personally think within 10% of the intended value is acceptable and not noticable, although some people might disagree. I aim for the closest possible numbers, but I won't lose any sleep using a 9 ohm resistor when it should be 10 ohm, or whatever. 15 instead of 16 and 25 instead of 27 is a very acceptable tolerance, no worries.As for square ports, they will work just as well as round. In fact, some others have used square ports on four pi's, and Wayne's PiAlign gives you the choice of square or round ports. I think he just doesn't do it because it's not worth the trouble when you can easily use a prefab'd round port.Hope I covered everything.Adam

Subject: That's it!
Posted by Wayne Parham on Fri, 05 Jul 2002 19:57:50 GMT
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Yep, I agree.

Subject: as per Adam, you can de-rate
Posted by Sam P. on Fri, 05 Jul 2002 23:19:37 GMT
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the resistors somewhat if you are not running over 100 watts or so. 47 ohm Mills combinations work nicely for what you are building. The series R1 of 25 ohms can be made using a pair of 47 ohms, for 23.5 ohms "actual" at 24 watts. The parallel R2 of 16 ohms takes 3 of the 47's, for 15.7 ohms "actual" at 36 watts. A 12dB pad means you are using 15/16 of the input power to heat those resistors, more or less:) So when the CD horn driver is playing at 100 dB(1/16 watt to the HF voice coil?), the resistors are handling a max of 15/16 of a watt? 10 watt amp, now you're hitting 110dB? Driver still under 3/4 watt input, resistors are not even warm with 9.4 watts or so of heat. Jump to 100 watts, and heat load in the resistors goes to 90 watts...NOT REALLY, music is dynamic, and does not stay at a steady level, so heating is much less than you would assume. Also, music won't contain 100 watts of HF energy coming out of a 100 watt amp. I seriously doubt you would overheat the Mills resistors used as I describe. Zobel resistor wattage might depend upon the driver somewhat, but some JBL examples used as little as a single 10 watt resistor like the 2035 woofer in the 4671B system, a 150 to 300 watt capable speaker. I'm running a 48 watt zobel resistor network, and never could detect any temperature rise during testing, even with sine waves. Be sure to use a good poly cap for the zobel, a 25 volt electrolytic won't cut it there. Good luck, Sam

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Subject: Re: That's it!
Posted by crazychile on Fri, 05 Jul 2002 23:48:07 GMT
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Thanks everyone for the input and the electronics theory primer. I'll be running the 3pi's with a blistering 3.5 watts of 2A3 power so its nice to know I have the situation covered. On rare occasion I might break out the 60w Adcom which is the biggest amp I own. Eat Mo'Hot Sauce,crazychile

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Subject: Re: That's it!
Posted by Paul C. on Sun, 07 Jul 2002 01:23:05 GMT

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Sam and Adam hit it on the head as far as power requirements. This can also be applied to the tweeter driver, but I like overkill on this component.Let's talk power distribution in music... I am a musician. I can tell you of a band I played in, and we were pretty well balanced for power. This was a 5 pc 50's/60's rock and roll band. The synthesizer and guitar each had little Peavey 40W RMS amps with a single 12" spkr. The drummer had NO amping. The PA, with all voices and my sax, was 240 watts, but just barely cranked, about 2 on the 0-10 of the knob. The bass player had a 300 watt amp, and was fairly well in balance with the band.In real music, as opposed to sinewaves, about 90% of the power is in the bass frequencies under about 300 hz. On top of that, the peaks are many times more than the average level. OK, so you are reproducing that music with a 100 watt amp. The amp is just on the verge of clipping, or occasionally does clip slightly at its full 100 watts output. The AVERAGE music power coming out is only about 10-15 watts. And of that, most of that is going into the bass frequencies.So, your tweeter and resistors there are only absorbing a few watts. Just don't do anything stupid like jerking leads out of sockets while cranking on the amp. THAT pop will blow a tweeter in a milisecond. Also, when you drive the amp into distortion, all that energy in the corners of that squarewave being generated is high level, high frequency stuff. And that goes straight to the tweeter and zaps it. That is why you easily can blow a tweeter with too small an amp.Let's talk power now... if you want to sound twice as loud, well, though 3 db increase is a doubling of power, it is barely noticable. To most people, if you want to sound twice as loud, you need to increase around 10 db, which is a 10x increase in power requirement. So, if your 50 Watt RMS amp is not cutting it, forget that 100 or 200 watt amp you have your eye on... better go for 500 watts if you really want to hear a difference.Now, you are running some 100 db/wt/mt very high efficiency Pi Spkrs. In your living room. Well, you will be feeling real pain before you burn out 10 watt resistors.You get into a large hall, say, a civic auditorium, well, you need MORE POWER, but for home use, you are OK, guy.

Subject: 1 More thing
Posted by Paul C. on Sun, 07 Jul 2002 01:27:08 GMT
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Oh, sorry, forgot... if you really want to give your speakers and amp a break, with NO audible difference, put a sharp high pass filter in there, cutting out sounds below about 25 hz. Nothing musical there, but you will stop the woofer from bouncing around from popping electric bass strings, warps in vinyl LP's, and other noise. The music will sound the same.

Subject: Re: 1 More thing
Posted by Adam on Sun, 07 Jul 2002 12:56:27 GMT
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Paul, I would only recommend doing this actively and doing it with ported boxes only.It's called a subsonic filter (as I'm sure you know), but I certainly would not do this with passive components. You'd need something like a 50 mh inductor just to do a passive 1st order high pass at 25 Hz. That *will* degrade sound big time. Every component in the signal path degrades the quality. Subsonic filters should be done actively only.I included a chart of power input vs frequency in typical musical material.

Subject: Re: 1 More thing
Posted by Paul C. on Sun, 07 Jul 2002 20:00:46 GMT
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Adam: I agree, active filtering only. While a subsonic filter will help on ported boxes, in the region where the woofer is unloaded, and bounces around, but will also prevent you from wasting a lot of amp power with a sealed box, too.I am not sure I really understand what your chart is supposed to represent.

Subject: Re: 1 More thing
Posted by Adam on Sun, 07 Jul 2002 20:35:27 GMT
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It's a distrubution chart of where the power is allocated in typical musical material.Like 50% of the energy is located below 315 Hz, roughly 75% of it below 1.25 kHz (and thus 25% above), etc. etc...Adam

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Subject: Re: 1 More thing
Posted by Paul C. on Tue, 09 Jul 2002 00:52:08 GMT
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OK, gotcha... I may be off a little in my percentages, but in general, we agree.
