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Subject: Powering my PI Speakers

Posted by [dutchswan0311](#) on Fri, 17 Feb 2012 20:42:10 GMT

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Greetings!

I am now entering the arena of trying to figure out how to power the three 4pi mains, twelve 1pi surrounds (and my four F20 subwoofers) that make up the sound for our winery's dinner theater. Any help anyone might offer in suggesting rack mountable pro amps that would be appropriate in driving these is greatly appreciated! I have attached images of what I am looking at so far, but I am somewhat new to the pro-amp stage and am in need of a little guidance.

Note: The 4pis will be using the JBL 2226h/B&C DE250 upgrades.

Also: I see the tweeter for the 1pi is 4ohm, and the woofer is 8ohm. Forgive a newbie question, but what ohm do I use for the amp that powers the pair?

-Jon Michael

(P.S. The "F20" subs will be using the 500W Dayton Audio RSS390HF-4 15" Reference HF Subwoofer @ 4 Ohm. "Lilmike", who designed the sub, said the enclosure is bandwidth-limited, and recommends a max of 300W per F20)

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### File Attachments

- 1) [audiovideobudget01.jpg](#), downloaded 2716 times
  - 2) [audiovideobudget02.jpg](#), downloaded 2785 times
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Subject: Re: Powering my PI Speakers

Posted by [Wayne Parham](#) on Fri, 17 Feb 2012 21:51:14 GMT

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A few thoughts, in no particular order:

I'd run each of the mains on their own channels, and I'd run the surrounds in series / parallel if several were to be combined on each channel. Most prosound amps are pretty tolerant of their limit.

It looks like you are planning to run each speaker on its own amp, which is even better than a series / parallel arrangement. I see no issues doing this.

the customary peaks at resonance, but they're mild. See the chart at the link below:

Looks like what you have is a pretty conservative setup, with no amp being pushed too hard. All are well rated both in terms of impedance and power overhead.

If you were planning to push the system hard, I would suggest that you high-pass the mains and surrounds at their Helmholtz frequencies. But from the power levels you're talking about, none will be pushed hard. The amp will hit a clipping limit before the speakers hit their limits. That, of course, would cause more HF energy than normal, which would create thermal issues on its own. But that's another topic.

My expectation is that you won't be pushing the system to its limits, and if you find that you are, then you'll probably add speakers as well as amps. What you have looks pretty well matched, and should work well within its limits.

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Subject: Re: Powering my PI Speakers

Posted by [dutchswan0311](#) on Fri, 17 Feb 2012 22:15:44 GMT

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Can you define "pushing it to the limit"? I would like to crank things up, and figured matching the wattage from amp to speaker WOULD maximize output, without risking someone accidentally blowing a driver by turning an amp to high. In this configuration, I figured "cranking the amp all the way" would utilize the maximum potential of the driver without risk of damage.

Is my approach wrong or misguided?

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Subject: Re: Powering my PI Speakers

Posted by [Wayne Parham](#) on Fri, 17 Feb 2012 22:58:37 GMT

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I think matching amp power to speaker thermal limits makes sense. However, there is a school of thought that says amps should be rated higher, because of bandwidth issues. The idea is that if the amp is near the rails, then the complex waveform has frequency components that are individually below the rails. Said another way, if the content has a low frequency that is near clipping - say maybe 80% below - and then another much higher frequency is present too - say at 50% power, then the peak signal is far above the rails, driving the amp to clipping. Remember that the high frequency content rides the low frequency content, sort of modulated by it.

Subject: Re: Powering my PI Speakers

Posted by [dutchswan0311](#) on Fri, 17 Feb 2012 23:34:05 GMT

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Does that school of thought, though tested and tried experience, suggest what % the amp be rated beyond the rating of the driver? 10% (e.g. 330watt amp for 300 watt driver?)

I am not looking to put more through the 1pis, as it seems unlikely the surround channels would really receive a signal from the preamp that would even hit the 100W they are rated for (correct me if I'm wrong).

I guess I would be more concerned with ensuring the 4pis and subs are used to their full potential.

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Subject: Re: Powering my PI Speakers

Posted by [Wayne Parham](#) on Sat, 18 Feb 2012 00:49:13 GMT

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I think some would go as far as doubling the amp power level, but remember that this is all about making sure the amp doesn't clip. Your speakers will handle the rated power, all-day, every day. But if you go much beyond that, the speakers will be the limiting factor.

Also remember that the decibel difference provided by doubling of power is only 3dB, so it isn't like you will want to push anything to the limits anyway. It just doesn't buy you very much. By the same token, if you aren't at least doubling power, you're not doing much. Either way - the point is - Stay back off the limits. Get enough gear for the SPL desired, and don't get near the limits.

I've run pretty serious power with Crown or QSC amps, and knew that I wasn't even close to the rails. I've also run 100 watt home hifi receivers and amps, my favorites being from Yamaha and Harman-Kardon. And I've run flea-power tube amps, some with as little as 2 watts but most often in the 10 watt range. A good 10 watt SET amp has plenty of power for home hifi or home theater. Naturally, you'll need more power than the flea-power tube amps but my point is any of those setups can sound good.

The only time the system sounds bad is when the amps are pushed past their electrical limits, or when the speakers are pushed past their mechanical limits. You can't possibly push the speakers past their mechanical limits with the power levels you've shown, but you can push the amps past their electrical limits. If you increase amplifier size, you might be able to push the speakers past their limits, but you probably won't be able to max out the amps. So it's all about the limits, and what you hit first.

In my opinion, it is reasonable to size the amps max power to the speakers limit somewhere between a ratio of 1-to-1 and 2-to-1. I know that doesn't help you much, because it means choosing between 600 watts for the mains or 1200 watts, which is a pretty wide spread. Same for the surrounds, it's 100 to 200 watts, a wide spread. But these are reasonable numbers. With an amp sized the same as the speaker's thermal limit, you'll clip the amp before the speakers strain. When the amp is twice as large, you'll be able to push the speakers beyond their limits.

I will say that a stressed speaker sounds a little different than a clipping amp, but I'm not sure which I prefer. Both sound harsh, but different. The speaker pushed past its excursion limit sounds like it's gargling, then in extreme cases it begins to clack. The amp pushed past its limit sounds grainy and raspy. There is a third limit, when the speaker reaches a thermal limit, but you can't usually hear this. It just doesn't get as loud as it should. The real first notice of a speaker pushed too hard is when it exceeds mechanical limits.

This is why high-pass filters are helpful. They protect the speaker from reaching its excursion limits. So if you plan to push them hard, high-pass the mains at the Helmholtz frequency. Don't go crazy with this though, because we do want modal smoothing. So don't high-pass the mains at 100Hz like you might do at an outdoor even or larger room. We need the modal smoothing, so let the mains run all the way down to the Helmholtz frequency.

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Subject: Re: Powering my PI Speakers

Posted by [dutchswan0311](#) on Sat, 18 Feb 2012 01:05:46 GMT

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Does this look a little less conservative, but not over-the-top?  
Anything I should be careful of if I use this configuration?

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#### File Attachments

1) [audiovideobudget01.jpg](#), downloaded 2288 times

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