

CORRECTION

In the July issue, there is an error in John Sunier's "Super Fidelity" (p. 45). The Si-belius: Symphony No. 2 was listed with an incorrect number. The correct number is HDTT (DVD-R) 12HDDVD.

Eds.

POWER FACTOR

I read with interest Iain McNeill's article and subsequent letters on the Mains Analyzer (Nov. 2007, p. 8). Readers may be interested in a device called "KILL A WATT," model P4400, available from P3 International (www.p3international.com). I bought one from Harbor Freight for about \$30.

This relatively small device has a US male connector on one side with a female connector on the other. It has an LCD and several buttons and measures voltage, current, watts, volt-amperes, power factor, kilowatt hours, and hours.

Its low-frequency limit is 47Hz by measurement. I could not test it above 100Hz because that is the limit of my variable frequency AC power supply. The label states maximums of 125V, 15A, and 1875W. It uses a shunt resistor and no transformers and is totally enclosed in a plastic case. It does not indicate whether the power factor is leading or lagging.

I have found it to be a useful device in testing all manner of equipment. I have always believed that current consumption is an indicator of the health of electrical equipment. It is also interesting to see what the idle current is on a computer that is supposed to be "off."

Power factor is an item that we will be seeing more of in the future. Simply stated, it is the ratio of real power (watts) to the product of voltage and current (volt-amps, or VA). It is unity for resistive loads and less than unity for reactive loads. Capacitive input power supplies are poor, often with a leading power factor of about 0.6. This is because the current required to charge the filter capacitor is high while the capacitor is charging. When the capacitor is charged to the peak voltage, its charging current is zero.

New regulations—both US and European—are imposing limits on how poor the power factor can be. Most of these rules affect switching power supplies. Ways to improve power factor are beyond the scope of this letter.

Just a note on safety: The TV shop where I worked in the 60s had a large isolation transformer on the outlets that powered the workbenches. Many TVs and most radios of the day had one leg of the AC line tied to the chassis with insulators on the shafts and other metal parts that were on the outside of the cabinet. Most outlets did not provide a ground connection. I do not remember any line voltage shocks, although undischarged filter capacitors were another story, especially the second anode of picture tubes (CRT).

I have an isolation transformer and variable transformer on an outlet that I use for new projects. The remaining outlets are on a ground fault interrupter (GFI). This device switches the power off if the difference in current between the hot and neutral wires is greater than a few milliamps. This means that the current is returning through another path. These devices, however, can be fooled with line filters that have large capacitors to ground.

*Robert Bodmer
Richland, Wash.*

SHUNTS

I enjoyed reading Are Waagbø's article on shunt regulators (Feb. '08, p. 30), but, unfortunately, he doesn't mention the best part about shunt regulation. He does mention that it presents a constant current load to the power supply, but the reason this is so wonderful is that when multiple stages in a device have individual regulation, they do not interact in any way because the shunt is preventing trash from being thrown on the power supply rails.

It is very enlightening to listen to the power supply rails on typical consumer gear, using a signal tracer. There is often a lot of signal that winds up on the supply rails, because the supply impedance is nonzero and the individual loads run

class A or AB and are modulated by the signal passing through them. This is a prime source of subtle degradation, and in extreme cases can be a prime source of stability trouble as well.

Shunt regulation has fallen into disfavor in these days of cheap three-terminal series regulators, but it still has a place in this world, and Mr. Waagbø's overview on shunt topologies is very welcome.

*Scott Dorsey
Kludge Audio
Williamsburg, Va.*

Are Waagbø responds:

Thank you for filling me in and highlighting the best parts of shunting. Using Signal Tracker, looking for signal windings up on the supply rails—that tells me that you are a man who knows what you are talking about. It's another good reason to use shunts in audio!

With the article, I mainly wanted to share this project with other hi-fi enthusiasts: a simple and cheap way to great sound improvement! I did not want it to be a "scientific but more like a practical project" that everyone with electronic skills can make, and have fun.

FLY POOP

I would like to ask the author of the AmpliBass article (Dennis Colin, Dec. '07, p. 22), which I really enjoyed, whether he has stock in the 1% resistor industry. What is his penchant for using 1% resistors, of odd values, in seemingly arbitrary places?

For example, R15, the output protection resistor, is specified at 200Ω, 1%, MF. Why? It seems to me it could be anything from 150 to 330Ω at 5% and still be perfectly functional and less expensive. There are other examples that seem equally questionable, and I'm not referring to any of the filter networks or frequency/phase shift components. Again, the voltage divider network of R9 and R10 specifies 7,870Ω, 1% resistors—when it appears that any pair of like-valued resistors from 2200 to 6800Ω five percenters would be adequate.

I respect Mr. Colin's expertise, but I'm

curious about the overkill of specifying 1% resistors, which most hobbyists don't keep on hand in a large variety. Are we picking the fly poop out of the pepper shaker, or is there a legitimate reason?

Bard Kallestad
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Dennis Colin responds:

First, let me say it's very refreshing to *not* be criticized for my using "non-audiophile" resistors (e.g., quantum-aligned unobtainium alloy). To your issue:

1. You are correct about the non-critical-valued resistors; nothing wrong with 5 or even 10% units.
2. 1% MF resistors aren't that much more expensive than 5% carbon film. Because I needed a large assortment, I had purchased five each of all values from 10Ω to 10MΩ (Digi-Key kits).
3. Even in simple gain-setting positions, I like the extra precision (and temporary stability), especially where tolerances of many paths might accumulate.

That said, I used to use 5% carbon films. In my various Intrinsic Fidelity tests (June and Nov. '07 *aX*) I heard *no* audible degradation in some components that used 5% carbon resistors (and my hearing, recently tested, is very good). Audiophiles from certain areas of the planet who claim to "hear" fly poop on their boutique resistors will disagree, but they haven't provided their burden of proof. (I know: "But the stress of testing impairs my brain's quantum physics!") Thanks for your interest.

HELP WANTED

A zobel (capacitor-resistor impedance equalizer circuit) helps to flatten the rising impedance caused by inductive reactance from the woofer voice coil. Good enough. This brings about a nice resistive load that makes life easier for the power amplifier.

My question is—and what I am asking help with—how do I equalize the *impedance drop* caused by capacitive reactance, as in an electrostatic loudspeaker? What kind of circuit can I cobble together that would turn the capacitive load into a resistive load?

Angel Rivera
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CORRECTIONS

There is an error in the "HD-2 Class-A Headphone Amp" (*aX*, June '08) schematic on page 34. D1 and D2 cathodes should be connected together then to C1+, and C1- should go to the T2 center-tap (as shown for D7, D8, C5, T3).

Also, I think the readers will need a translation for the last sentence on page 45 ("A Greek Hybrid in Blue"), "I mounted a magic eye (EM84) to show when the mounter is ready to kill." Also, in Table 1, Amp Parts List, T3 and T1 are shown as type "56." Does this mean MPSA56?

Chuck Hansen
Ocean, NJ

Jim Dungan responds:

Thank you, Mr. Hansen, for noticing the error in my headphone amp article. You are correct that the D1 and D2 cathodes must be connected together, then connected to the C1(+). The center tap of T2 is then connected to the C1(-). My apologies to you, *aX*, and the readers. I reviewed the drafts three times but did not notice what I should have corrected.

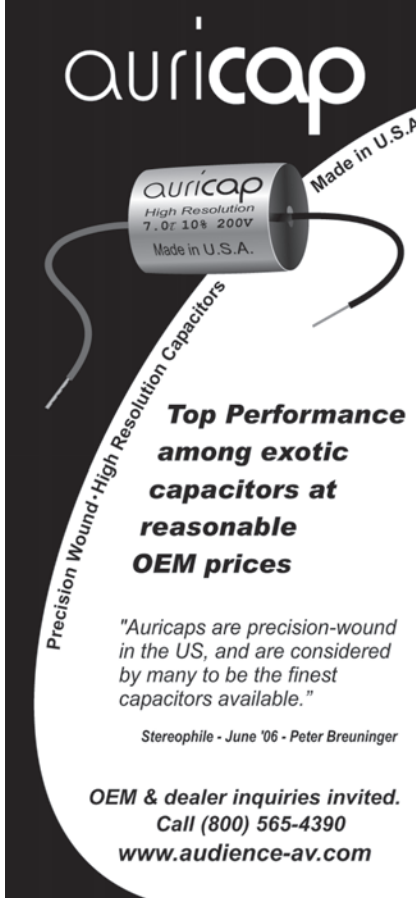
Alex Arion responds:

The right word on page 45 is "Monster." In Table 1, yes, the transistors are MPSA56. I thank Mr. Hansen for reading my little articles. I appreciate this coming from such a known personality as he is.

LINE-ARRAY COSTS

In Mr. Bird's reference to my 20-driver, wide-range column¹, I think he neglected to mention the cost of my system compared to the system in his article². He claimed he had never spent over \$300 for any speaker system, yet my design was only \$200 for all the parts including an adjustable equalizer. This would fit nicely within his maximum budget.

He pointed out that I did not use tweeters. Tweeters were not necessary with response already out to 15kHz³. Adding an extra driver or drivers to fill the range to 20kHz would contribute very little to the design. My system adequately demonstrated the advantages of the unique column such as better coherence, image stability, depth, spaciousness, and so on, without the need



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for tweeters, crossovers, and extra driver locations that could compromise some of the advantages.

The difference between that system and the later update article was in the use of 25 smaller and higher quality drivers and a few other embellishments⁴. High-frequency response was extended with this updated version.

Mr. Bird seemed concerned about the cost of the 25-driver system that was made into a potentially high-end commercial version priced at \$18,000. However, if he were to try to market a high-end system, I expect he would find that it would also be very expensive, considering the high cost of quality cabinets, drivers, packaging, manual, advertising, and so on. The speaker market is very competitive and speaker companies come and go fairly often over the years. It also means that if the dealers do not get a 50% or more markup, they would not be interested in selling the system.

As a rule of thumb, the selling price should be five times the materials cost.

For the IDS-25, including a custom-dedicated equalizer and all the other material, cost for the pair comes to \$3,600. That is a pretty tight budget to start a new venture.

The final test is in listening. The sound of the IDS-25 system was well received at the 2007 Rocky Mountain Audio Fest and the room was very crowded for three days. We received many compliments and it was favorably mentioned with pictures in several magazine reports. Our first customer sold his \$22,000 Wilson speakers and bought a pair of IDS-25s. Better sound is definitely worth the price for some people.

Of course, you can always build a pair of the 25-driver design for a lot less. All the plans, parts, and equalizer settings are shown in the *aX* article. It uses the same adjustable McIntosh equalizer that was in the 20-driver article but with different settings. After the article was published, the drivers became available at considerable savings from Madisound.

REFERENCES

1. "A Unique Stereo Column System," *aX*, Nov. 2005.
2. "The Sidewoofer Line Array," *aX*, May 2008.
3. Measured with a Bruel & Kjaer 4133 microphone.
4. "Upgrading a Unique Stereo Column System," *aX*, July 2006.

Roger Russell

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AMPLIFIER BUYER'S GUIDE

Readers will note the loudspeaker buyer's guide that appears in this issue (p. 21). This marks the first in a series we will be publishing in upcoming issues. The next buyer's guide of finished equipment will focus on amplifiers. Manufacturers who wish to be included should fill out a form that is available on our website at www.audioXpress.com. Further information is available by contacting Laurel Humphrey at 603-924-9464, or by e-mail at laurel@audioXpress.com. The deadline for the forms is August 29. *aX*

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Bruce Brown ("How To Buy Gear on the Web," p. 6) is a registered pharmacist who works in the medical research area for a major pharmaceutical company. He has been experimenting with electronics for over 35 years, remaining actively interested in electronics, building kits, and "home brew" audio. Online auctions have stimulated new interests. He has just recently become interested in restoring vintage audio equipment and writing articles to assist other hobbyists. His wife, Kristin, has been invaluable help with editing his ramblings. He currently uses many restored and homebuilt audio amplifiers and welcomes communication about vintage equipment and restorations. He can be reached at Tuninfork@aol.com.

David Ivan James ("Choosing Cathode Bypass Capacitors," p. 19) is a retired physicist. He began working for Ericsson designing gas regulator tubes and counting valves, before moving to the Rubber and Plastics Research Association. He is also a fellow of the Institute of Physics.

Merlin Blencowe ("Choosing Cathode Bypass Capacitors," p. 19) is a young valve audio fanatic and experimenter. After graduating two years ago, he is now test technician and head of thermionics for Welsh hi-fi company Leema Acoustics.

Ed Simon ("An On-Peak Power Supply, Pt. 1" p. 37) received his B.S.E.E. at Carnegie-Mellon University. He has installed over 500 sound systems at venues including Jacob's Field, Cleveland, Ohio; MCI Center, Washington D.C.; Museum of Modern Art Restaurants, New York; The Coliseum, Nashville, Tenn.; The Forum, Los Angeles; Fisher Cats Stadium, Manchester, N.H.

Joel Cohen (Book Report: *Professor Poor's Guide To Buying HDTV, Second Edition*, p. 48) has worked in the audio and video fields for over 40 years and is currently V.P. of Technology for Crystal View Inc. and its associated companies.

Barry Fox ("Touring Recording's Memory Lane: 1958," p. 50) reports on the audio industry as columnist for the British publication *Hi-Fi News*. His commentary appears in every issue of *Multi Media Manufacturer*.

John Shand ("Jazz Track," p. 54) is a CD reviewer for *Australian HiFi and Home Theatre Technology*.