Subject: Sometimes I surprise myself
Posted by SteveBrown on Mon, 21 Jul 2008 22:52:47 GMT
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Sometimes I surprise myself by re-learning stuff I already know. Last night my wife and I were listening to my 300B mono blocks and I thought I'd do a quick rectifier swap from the 5AR4 that was in them, to a 5U4. I didn't really expect any great sonic difference but for both of us there was an immediate and profound difference in the sound. The 5U4's gave a much more "wooly" sound, really poor compared to the 5AR4's. Due to greater B+ drop across the rectifier? Due to one being indirectly heated as opposed to directly heated? Hmm... we also tried a 5V4, which is a nice rugged rectifier but uses a bunch of heater current. No real noticable difference between it and the 5AR4. Anyway, for those who may have discounted the difference that a rectifier can make, give it a try. Reconfirms for me just how much the power supply influences the sonics of the amp.

Subject: Re: Sometimes I surprise myself
Posted by SteveBrown on Mon, 21 Jul 2008 22:56:15 GMT
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Oops, I said 5V4, but meant 5V3. Which is indirectly heated like the 5AR4, but takes 3.8 AMPS to heat. That means it glows nicely, but you better make sure your heater winding can take it before you sub it in for any length of time. This would not work in your average Dynaco...

Subject: Re: Sometimes I surprise myself
Posted by Wayne Parham on Wed, 23 Jul 2008 16:26:32 GMT
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I hear you. A few months ago, I went on a spending spree and bought about five different types of each tube for my Audio Note Kit 2. The power supply tube makes a difference in the bass, maybe even more than the output tube. I am guessing it may be due to output impedance but I haven't measured to be sure.

Subject: Re: Sometimes I surprise myself
Posted by Thermionic on Fri, 01 Aug 2008 18:00:04 GMT
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The 5U4 did drop the B+ rail voltage probably 30 or 40 volts versus the 5AR4, but that wasn't the only reason everything lost focus and loosened up. You also raised the impedance of the supply

with the 5U4. And, it's always seemed to me that the 5AR4 just naturally seems to have a sharper, firmer sound than the 5U4. It's definitely a much "faster" rectifier, no doubt about that.I know there are those out there who disagree that different rectifier types sound different. I myself have a friend who is a trained, highly gifted engineer, but being such his major focus is specs on paper. He calls rectifier tube rolling "a disease," because they all sound the same. He tells me that I *think* I hear a difference between them, but it's just a placebo effect; my mind playing tricks on me. Well, sorry, it just ain't so.... While on this topic, I thought I'd mention an experiment I once did when tweaking the design of a certain EL84 SE amplifier. I used identical amplifiers with identical power supplies, except for different power transformers. Each trafo's secondary voltage was chosen so as to yield the same net B+ rail voltage with its corresponding rectifier tube type (5AR4 and 5U4). Both power transformers even had the same nominal current ratings, and fairly similar secondary DCR. That way, I would be comparing apples to apples with no other variables involved. The verdict?The 5AR4 version amplifier beat the pants off the 5U4 version, with tighter focus, cleaner overall sound, and far better bass performance. But, interestingly enough, substituting a 5R4-WGA "tater masher" in the 5U4 version amp made everything MUCH better. The 5R4 lowered the B+ rail an insignificant 10 volts versus the 5U4, but there was a huge improvement in every area of performance. While not precisely the 100% equal of the 5AR4 version in the areas of coherency/focus and bass performance, it was nevertheless very close, and as a plus it had a somewhat sweeter midrange tone.One of the things I've noticed from 25 years of experience with tube amps is that 5U4s just seem to sound better in circuits with some seriously big current draw. When lightly loaded, they always seem to sound fuzzy and unfocused. I prefer the 5AR4 and 6CA4 for small, low powered amp designs. Just my observations and my 2¢ worth. Keep the change. Thermionic

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Subject: Re: Sometimes I surprise myself
Posted by Wayne Parham on Sat, 02 Aug 2008 03:44:01 GMT
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Since the supply impedance is in series with the output circuit, I can't imagine an engineer disregarding the potential effect it has on sound. I mean, the filter caps will hold a charge so maybe that's why he thinks the PS tube impedance doesn't matter. But even if the capacitance is large, you still have an RC constant there with the tube playing its part. Seems to me the effects would be measurable.

Subject: Re: Sometimes I surprise myself
Posted by Thermionic on Tue, 05 Aug 2008 16:53:33 GMT
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"But even if the capacitance is large, you still have an RC constant there with the tube playing its part. Seems to me the effects would be measurable."You're right, it most definitely is measurable, both with bench instruments and the most accurate test instruments in the world, our own

ears.Many do not realize that a linear power supply has a bandwidth, just like a loudspeaker or output transformer has a finite bandwidth. Additionally, its impedance varies according to frequency, with peaks and dips across said bandwidth. Add to that the variables of voltage regulation, current reserve, transient response, stability, intermodulations and phase shifted feedbacks within the supply, and well, you get the idea.Then, consider that the tubes themselves do not amplify the signal, but instead manipulate the power supply across their load to produce an increased amplitude copy of the input signal. Perhaps a more accurate term for "tube amplifier" might even be "modulated power supply." With that in mind, it's not hard to see why the power supply quality is so critical to the sonic performance, and can make or break a given amplifier circuit design.Thermionic