CORRECTIONS

In *audioXpress* April 2009 pp. 40-42, my letter looks OK in many regards, but does have some errors needing correction.

1. The redundant "Special Note:" disclaimer in bold should have been deleted.
2. No author is mentioned; it should have been signed as this letter.
3. On P41 top, 1st column, the first sentence should read as: "So, if the DC bias of M2 is for example 2V, the resistor ratio shown increases it to 3x this, or 6V." The general expression for multiplied bias voltage in the previous paragraph portion ending on p 40 is OK.

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The George Danavaras article "The Reflection Loudspeaker" (March '09, p. 5) suggests using the Audax TM025F1 tweeter for the project. As much as I enjoy the sound of this tweeter, it is discontinued.

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TUBE AMP

My question for Karin Preeda ("A Chip-Driven SE Monoblock," Jan. '09, p. 24): is there a circuit design using a vacuum tube driving the SV811-10? Something like a 6SN7, 6DJ8, 6H30, and so on? I would be interested in building this type of amplifier. I am only a hobbyist, not a circuit designer.

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Karin Preeda responds:

Yes, the SV811-10 can be driven by tube. However, I recommend that you use medium power tubes such as the 6A3 or 6B4G because of its low Rp and ability to drive. Electra-Print makes a suitable interstage transformer that's capable of driving a power tube such as SV811-10 to class A2 because it can provide power to its grid. The transformer's spec is 3K: 3K 60mA 3.5W.

Figures 1 and **2** show a two-stage driver design and power supply. Your choices of using pre-driver tubes are as follows:

1. 6SN7 - R1 22K 3W, R2 750Ω 1W. So, the tube will be cathode biased at 4.5V, Ip is 6mA, and Vplate is approximately 160V.
2. 6N30 - R1 10K 10W, R2 500Ω 1W. The tube will be cathode biased at 7.5V, Ip is 15mA, and Vplate is approximately 150V.

For the power supply, you need a separate set. You can use the Hammond 270DX for HT voltage and filament power for 6A3/6B4G. You also need another 6.3V AC transformer for 6SN7 or 6N30s heater.

LITTLE SECRETS

I was pleased to see Mr. Godmaire's efforts in obtaining the quiescent conditions of triode-strapped/ultralinear pentodes when only limited information on the valve is at hand ("Vg1 Correlations," Mar. '09, p. 32). Certainly there are still those useful "little secrets" to be found!

I would like to point out, though, that Mr. Godmaire's empirical method is only necessary if the datasheet provides *only one* set of plate characteristic curves, corresponding to only one screen voltage. However, there are very few valves I have come across for which such little information is available. If two sets of plate characteristics can be obtained, for different screen voltages, then the quiescent voltages for the valve under any other set of conditions may be derived more directly. The following method is quite accurate for anode voltages greater than about 100V.

1. Note the difference in screen voltage between the two sets of characteristics in hand, which is Δvg2.
2. Select any suitable anode current and voltage (they must be the same on both graphs) and note the corresponding bias voltage shown on each graph. Then calculate the difference between these bias voltages, which is Δvg1.

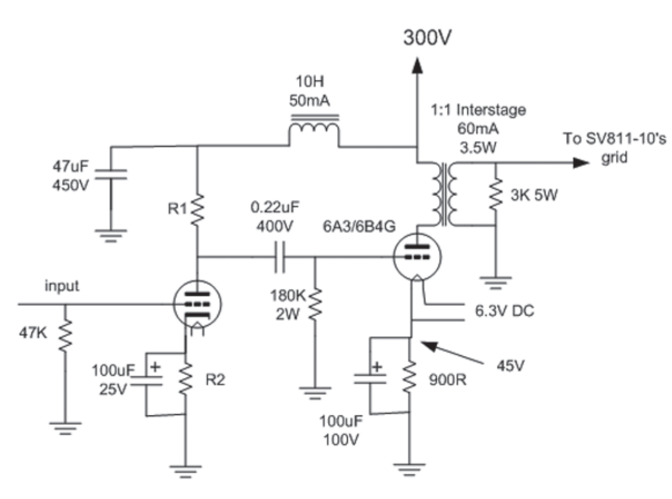

FIGURE 1: Driver circuit.

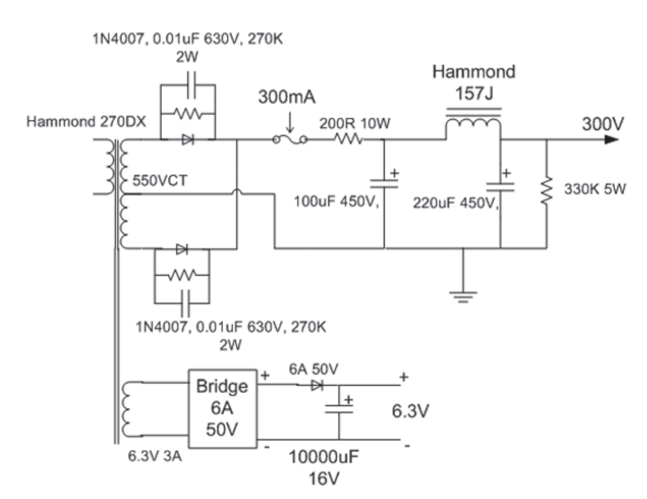

FIGURE 2: Power supply.

3. From these two values, you can find the triode amplification factor, μ_t:

$\mu_t = \Delta vg2/\Delta vg1$

Once you know this, you can readily obtain the quiescent conditions for any screen voltage (and therefore triode/UL mode also):

4. On one plate characteristics graph, note the bias voltage at the desired anode voltage and current that you intend to use in triode/UL mode; this is $Vg1_{(pentode)}$.
5. Take the difference between the screen voltage for this set of plate characteristics, and the desired anode voltage for triode/UL mode. This gives $\Delta vg2$. The required bias voltage is then:

$$Vg1_{(triode/UL)} = Vg1_{(pentode)} + \Delta vg1 = Vg1_{(pentode)} + (\Delta vg2/\mu_t)$$

(Note: Be careful to observe the sign of $\Delta vg2$ in step 5. If the screen voltage for the set of plate characteristics used is *less* than the desired anode voltage in triode/UL mode, then $\Delta vg2$ will be a positive number, and vice versa.)

See also:
Shimmins, A. J. (1950), "The Determination of Quiescent Voltages and Currents in Pentode Amplifiers," *Electronic Engineering*, (September) pp. 386-8.

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Rudy Godmaire responds:

The letter from Mr. Blencowe exemplifies one of the many merits of a publication such as *audioXpress;* it offers a medium to share knowledge that might be otherwise lost. This is especially important when we think about vacuum tube technology.

I was not aware of the methodology described by Mr. Blencowe and I sincerely thank him for taking the time to share his exposé. I will certainly look forward to trying this very interesting approach and, out of curiosity, compare its results with the "Vg1 Correlations."

I was intrigued by the Rudy Godmaire article "Vg1 Correlations" (March '09, p. 32), because searching correlations between variables of such simple systems which are valves is really an unexpected strategy. In fact, both correlations, established empirically and proposed by Rudy Godmaire in his article, can simply be established analytically, assuming that working points on power valves are always close to their maximum anode power dissipation. This is really an excellent example which demonstrates that, when your knowledge on a system is sufficient, it is always more effective to work on it using this knowledge rather than refusing it and considering the system as a black box.

There is no doubt that both correlations obtained and proposed by Rudy Godmaire will be appreciated by many DIYers. Nevertheless, these DIYers must keep in mind that the generality of such correlations is doubtful and that the bias determination of power valves cannot be reduced to such correlations.

It is, in fact, a difficult problem which takes into account the class of operation of the valve as well as the distortion rate. I thank Rudy Godmaire very much for having proposed his findings to *audioXpress* readers, and I strongly encourage him to continue his personal research.

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Rudy Godmaire responds:

I was pleased to read the comments of Mr. Touzelet, and I appreciate his observation about the probable pitfall of using such a mathematical model. It is important to clarify that the "Vg1 Correlations" exposed in my article are not meant to substitute for the design of an output stage, which is a completely different matter.

Generally speaking, I find that for a given operating voltage, better performance can be achieved when the bias is set near its maximum value. In this respect, when the plate characteristics for the triode or ultralinear mode are not available, the "Vg1 Correlations" offer an alternate way to facilitate the design of the driver stage before committing to build the amplifier. This is the only purpose of this model, and I hope DIYers will use it this way. aX