

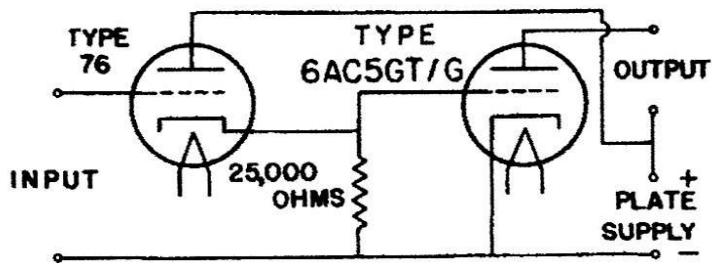
My early copy of Electronic Workbench has modeling for triodes & includes some easily modifiable examples. There are no pentodes, so the usefulness of the software is somewhat limited as far as vacuum tube applications are concerned. And I have yet to master SPICE.

But there are both voltage & current controlled voltage & current sources. So quite a bit of small signal AC modeling can be accomplished. But there is still no easy way to connect feedback or otherwise to a screen connexion.

So why not try the composite triode hookup? I had seen in the old tube manuals back more than 60 years ago some rather odd power tubes. Odd to me, anyway. These would include 6AC5 & 25AC5, a pair of very high mu power triodes.

CIRCUIT

DYNAMIC – COUPLED CONNECTION



The others are 6B5, 6N6G & 25B5, 25N6G with both triodes in the same bottle.

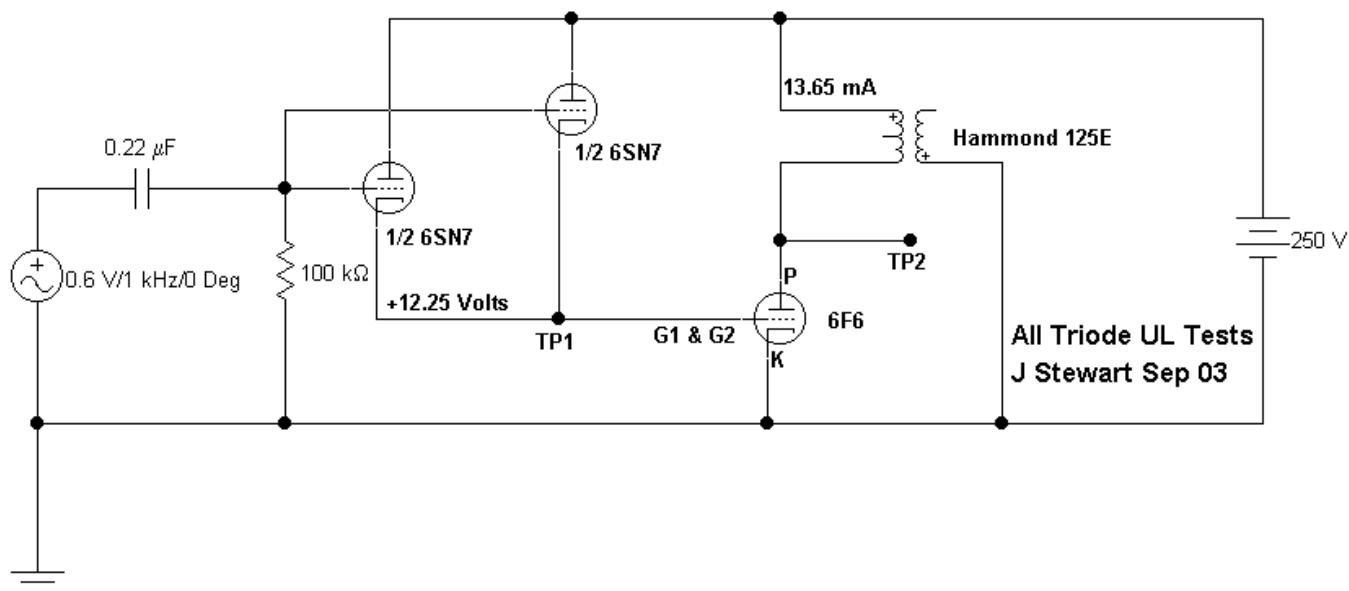
All of these are now quite expensive, I guess the collectors need them to keep the old stuff running. I wondered about simulating them with easy to get tubes. If one thinks of it, most power pentodes when run as triodes with G1 & G2 strapped together have quite a high mu.

It turns out a very good AC model of things like 6V6, 6K5, 6L6, Etc can be constructed with two triodes in that connexion. That way another terminal becomes available to simulate the screen in a pentode.

The simulation uses a somewhat medium mu triode for the input side. For the output side a mu of 50 to 120. If you look at the characteristics of any common pentode or beam tube, the triode mu is most likely in the range 6 to 12. We find some as high as 20. If the G1/G2 strapped characteristics are used, then the resulting triode mu tends to be in the range of 50 or more. So the model simulates all very well, indeed.

I checked some 6F6s in that mode & found mu to be about 50, so OK for some kind of trial. If we check the old tube manuals we find that the recommended driver for the 6AC5 was the 76, a medium mu triode. The 76 is the same as the 6P5G but on the older base.

The trial circuit is quite simple, a 6F6 DC driven by the cathodes of parallel sections of a 6SN7GT. The anodes of the 6SN7GT could be either connected to the B+ supply, the OPT CT or the plate connexion of the 6F6. That varies the amount of NFB applied to the anodes of the 6SN7GT. The resulting reach thru to the 6SN7GT cathode is (1/mu).



6SN7 6F6 Direct Coupled Composite Amplifier Test Results

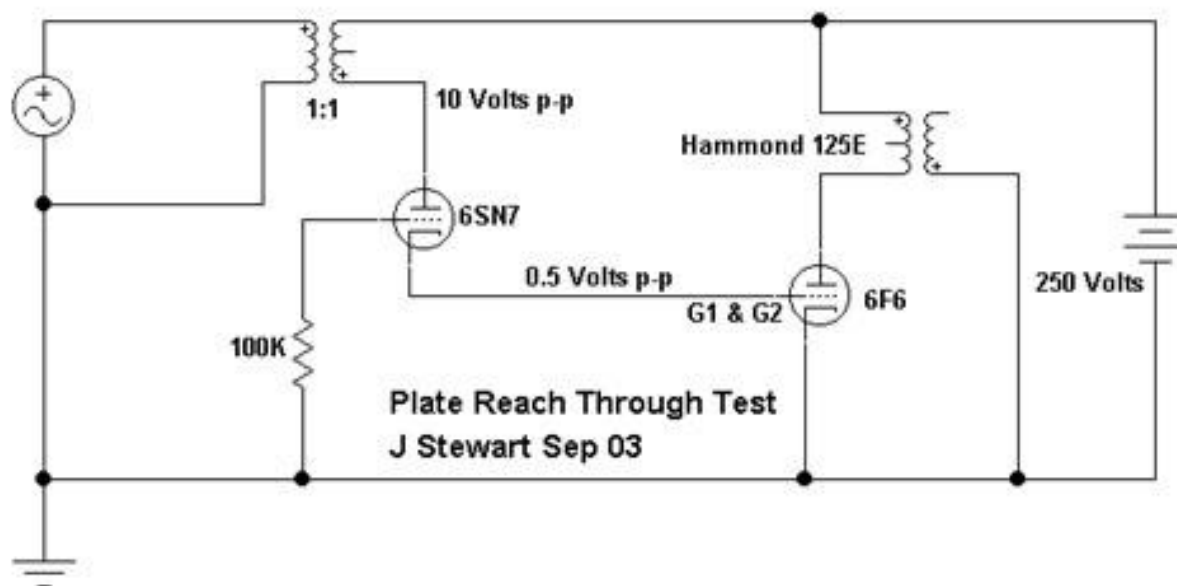
Both sections of 6SN7 cathode follower direct coupled to a 6F6 whose G1 & G2 are strapped together.

Input test signal is 6 volts p-p. All measurements as seen through a X10 Scope Probe.

R_p determined by what resistance in parallel with the unloaded output transformer will reduce the output signal by 50%.

Test	6SN7 Plate Connexion	Signal at 6SN7 K volts p-p TP1	Signal at 6F6 Plate volts p-p TP2	Composite Mu	6F6 Mu	Measured R _p
1	+ve Rail	0.48	21.5	35.83	44.79	51K
2	50% Tap	0.25	11.8	19.67	47.20	27K
3	6F6 Plate	0.16	7.9	13.17	49.38	15K

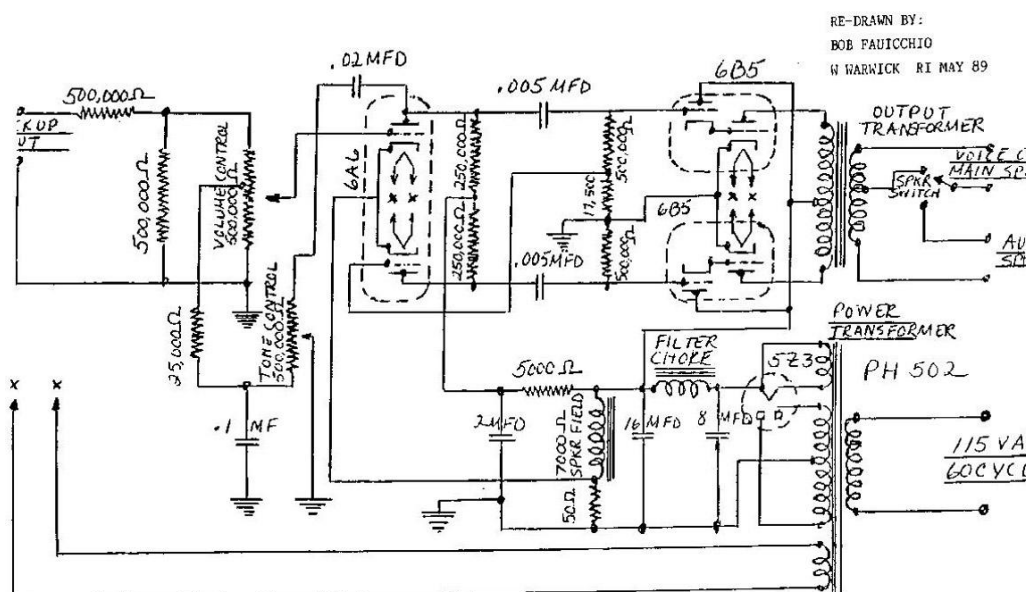
In addition, I wanted to get a direct measurement of the effect the input triode plate had on the end result. For that this hookup was used-



Mu of the 6SN7 driver is 20 so looks like the 'reach thru' is $(1 / \mu)$

I never did build the complete PP UL circuit. I realized that the driver plate(s) direct to B+ version was used commercially in some radios in the 30s. If you look at the base connexions on the octal 6N6G & 25N6G they are identical to many common power tubes such as the 6F6GT, 6K6GT, 6V6GT & so on. In the circuit they are self biasing, no cathode resistor required. But they did not catch on. Probably more expensive to build these tubes than the corresponding pentodes with there two cathodes, etc.

Anyway, an interesting exercise. And here is a circuit that was in production & could have been easily modified to Ultralinear-



SCHEMATIC WIRING DIAGRAM OF ROCKOLA AMPLIFIER MODEL "B"