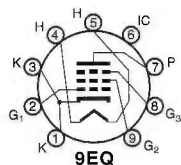


Uncle Eric's Tube Dumpster

The 6688/E180F

By Eric Barbour

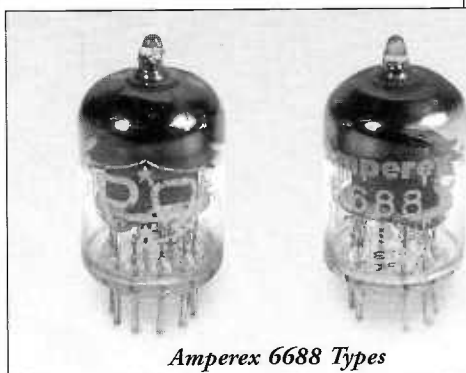
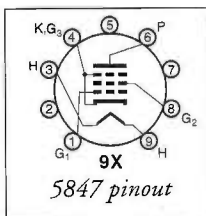
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For obvious reasons, the hard core of tube DIYers has started to use high-transconductance frame grid tubes for small-signal gain. Although they can vary in linearity, just as more conventional small-signal types do, frame grids offer low plate resistance and (hopefully) lower microphony.

Yet again, we see iron tradition in the relatively staid world of the SE amp. The tendency has been to chase after the highest Gm devices (and only glass ones at that), which makes them scarce and expensive. The current fad for the 417A and 437A triodes and 7788 pentode, not to mention recent demand for the obscure Russian 6C15 pentode, are driven by DIY peer pressure and conformity. And those particular tubes always were expensive; now that they are out of production, their prices are skyrocketing. Meanwhile, very good tubes languish in great piles in warehouses.

One of the first frame-grid pentodes was the Western Electric 404A (1948). Widely used in telephone microwave-multiplex equipment, it became an important device for IF amplification. It occupied little space, making it suitable for mobile radios. As made by other manufacturers, it was known by its EIA number 5847.



Amperex 6688 Types

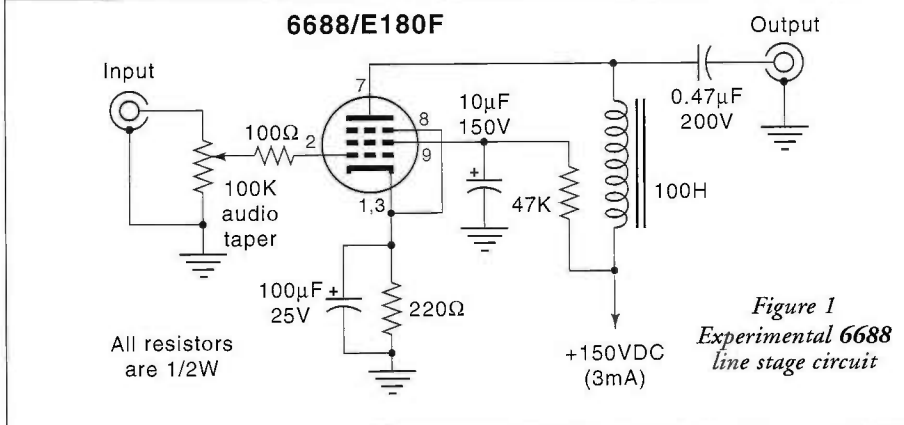


Figure 1
Experimental 6688
line stage circuit

Of course, Philips wanted a piece of this business, so they introduced the E180F in 1956. Unfortunately, they put a different pinout on it, then had to promote it for NEW designs. Still, both in Europe and in the American Amperex form 6688, it got sockets in a variety of military and civilian radio equipment.

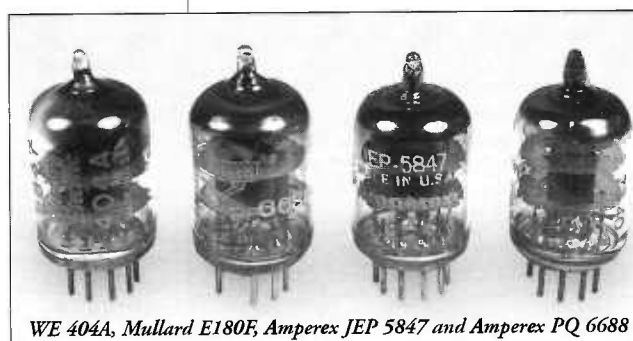
Five years later came the 7788/E810F, also introduced by Philips. The obscure 7788 was a VERY tough tube to manufacture. It represented the outer limits of glass-tube capabilities, with its Gm of 50,000, and it was never as widely used as 6688s due to its high price. So you can bet that we will never see 7788s made, ever again.

Before you say "so what," bear this in mind: Getting such a high Gm means that you must have the grid VERY close to the cathode. In this case, less than 1000 microns away—much less than the thickness of this sheet of paper. This a tough feat to achieve in a planar triode... and unimaginable in a conventional glass pentode! Eindhoven's reject rate on the 7788 production line must have been astronomical.

Our tests have shown a high degree of linearity in a typical 6688—on a par with 6DJ8s and 6922s. Yes, even though it is a pentode.

Figure 1 is a suggested experimental circuit for a super-high-performance line stage using the 6688. You may have to do a little tweaking on your own with this design to get maximum performance. If you use the primary of an old push-pull EL84 amp's out-

put transformer for the choke, you can build a stereo preamp with this circuit for less than \$50.



WE 404A, Mullard E180F, Amperex JEP 5847 and Amperex PQ 6688

Dealers are charging up to \$350 apiece for high-Gm triodes like the 437A, and about \$100 for 7788s. Yet those same dealers are stuck with mountains of 1980s surplus 6688s, which nobody wants because they don't have the highest Gm ratings in the tube manuals. So, don't fall for "Tube Manual Snobbery." Great sound can be gotten from the 7788's smaller brother, at peanut prices. Yes, even though it is a pentode, and even in spite of its moderate transconductance. High Gm is NOT a magic pathway to nirvana.

6688 Specifications

Heater Voltage	6.3V
Heater Current	0.03 amp
Max Plate B+	210V max
Max Plate Diss.	3.0 watts max
Plate Resistance	0.09 megohm
Transconductance	16,500 micromhos
Grid No.2 Volts	175 max
Grid No. 2 Diss	0.9 watt max
Grid No. 1 -Bias	-50V max
Cathode Current	25 mA max