**Multi-voltage Station Power Supply – Documentation**

This P.S. is intended to supply the voltages commonly required by homebrew equipment on the operating bench. The following voltages are available:

* 50 – 800 volts DC, variable, at 350 ma, fused at 500ma.
* 320 volts DC@ 500ma. It might vary a bit with load but is quite stiff.
* -140 volts at low ma for bias purposes.
* 8.3 – 0 – 8.3 VAC (unloaded) for filaments (will need reduction to 6.3 volts)

**High Voltage:** The AC is supplied by a Viking Valiant 270 watt plate xfmr.

* The AC to the xfmr primary runs through a panel-mounted 275 watt variac so that the plate voltage can be adjusted for almost any tube transmitter.
* 12KV, 450ma microwave diodes and 3 x 2000uf x 450 volts filter caps in series (= 667uf x 1350 volts) are used. 667 uf should provide a large current reservoir.
* The secondary of a microwave oven xfmr provides a ~15 henry choke (its primary is shorted). The choke and a 270 ohm resistor are inserted in the transformer’s center tap grounding lead. The 270 ohm resistor reduces the voltage somewhat and slows the inrush current. A 500 ma fuse is inserted directly following the rectifiers.
* A 50K ohm resistor feeds the voltmeter which needs 15 ma to read 750 volts.
* A 0.5 ohm series resistor develops enough voltage to power the milliameter which is bypassed with one foot of nichrome wire (1.3 ohms per foot).
* Running this transformer for 20 minutes at 150 ma produced no noticeable heat.

**Medium, regulated, bias and filament voltages** all stem from two 450 watt UPS transformers.

* The first is fed by 120 VAC and its 8 – 0 – 8 volt (unloaded) secondary is connected to the similar 8 – 0 - 8 volt secondary of the second transformer. The 8-0-8 volts are pulled from the secondary of the rear transformer.
* The center taps of both secondaries are grounded.
* The second xfmr then outputs an isolated 120 VAC from its primary.
* Common UPS transformers are intended to run for only about 15 minutes before the UPS battery gives out, so a 450 watt UPS xfmr should be derated to perhaps 300 watts for constant use.
* Running them 15 minutes at 4 amps load produced no noticeable transformer temperature rise.
* The 8 – 0 – 8 volt filament voltage did not drop when the 4 amp load was energized.

**Medium DC voltage** is derived from the 120 VAC output (primary winding) of the second (front) UPS xfmr. This is fed into a voltage doubler circuit consisting of two 12 KV 450 ma microwave diodes, two 470 uf/200 volt electrolytics, and a 56K (6 ma) bleeder. Adding the 6 ma bleeder current to the 8 ma meter current totals 14 ma of “bleed” constantly flowing. This produces an unloaded DC voltage of about 340 volts. A 750 ohm 20 watt resistor in series reduces this voltage to 320 volts. It will vary with load but is quite “stiff.”

**Bias voltage** is produced by a small 120:14 volt transformer (run backwards) that is connected to the 8 – 0 – 8 volt junction of the two back-to-back UPS transformers. The AC is rectified and filtered and produces about -140 volts at low ma.

**AC for filaments** is taken from either side of the 8 – 0 - 8 volt junction of the two UPS transformers. It will need some voltage reduction at the using equipment end. Reducing 8.3 volts to 6.3 volts (2 volt drop) at 5 amps would require an 0.4 ohm 2.52 ohm dropping resistor. Use 10 watts. This 8 – 0 – 8 volt supply is very “stiff.”

**Metering:** Four matching Simpson meters were used. Each was disassembled and the internal shunts were removed where found.

* 50 – 800 High voltage is measured by a milliameter that reads 0 – 1000. It is fed by a 50K 50W dropping resistor (11.25 watts dissipated in the resistor). Reading 750 volts produces a 15 ma current flow through the meter
* High voltage current is measured by a milliameter that measure the voltage drop across a 0.25 ohm 25 watt resistor inserted in the high voltage line, producing an 0.00375 volt drop. The meter is bypassed by about a foot of 1.33 ohm/foot nichrome wire wound around a form attached to the meter terminals.
* Medium voltage is measured by a milliameter fed from the MV supply through a 40K resistor, producing an 8 ma flow through the meter. 5.76 watts are consumed in the resistor.
* Filament voltage is measured by a 0 – 10 VAC meter placed across one leg of the filament transformer. It thus displays 8.3 VAC. Feeding a 50 watt (6 amp) automotive light bulb produced less than 0.1 volt drop.

**Output Connections:** A 4-pin ceramic tube socket was placed on the rear panel to output HV, MV, one 8.3 VAC and Bias voltages. Several additional color-coded terminals with these same voltages were also installed, as well as a ground lug. Color-coding of these terminals is as follows: Red = HV, Yellow = MV, Gray = Bias and Green = Filament. About 14.5 VAC can be obtained from the two Green filament terminals, each being attached to separate legs of the filament transformer. This could be rectified and fed into a voltage doubler to produce 38-40 volts of DC to run a solid-state xmtr or other equipment.

**Switching & Panel Lights:** Separate panel-mounted toggle switches are used for Filament, Medium Voltage and High Voltage. The Medium Voltage switch also activates the Bias supply. Each switch feeds a matching Red, Yellow or Clear panel light. These are NE51’s, fed through a 100K resistor from the 120 VAC line. Each bulb consumes about 1.2 ma.

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