A Power Supply for April's Two-Tube Transmitter

In the April edition of this column we presented a two-tube transmitter by Nick Kennedy, WA5BDU. The transmitter required 250 volts at 50 mA for the plates and 6.3 volts for the filaments. Nick used an old boatanchor power supply from his attic to obtain these voltages, but there are many hams who currently don't have one of these on hand. I'm sure there are many of us who cut our teeth on tube-type equipment but are no longer hoarding a high-voltage power supply in our respective basements or attics.

Hence the circuit presented here. In the "good old days," vacuum-tube rectifiers and vacuum-tube voltage regulators were the norm. This power supply resorts to the modern counterparts to these items, namely solid-state diode rectifiers, an integrated circuit regulator, and an FET pass transistor. All of the parts in this design are currently available. Mouser part numbers, in parentheses after each part value in the list below, are included to assist in parts procurement (Mouser Electronics, <www.mouser.com>, (800) 346-6873), but everything is most likely available from other suppliers as well.

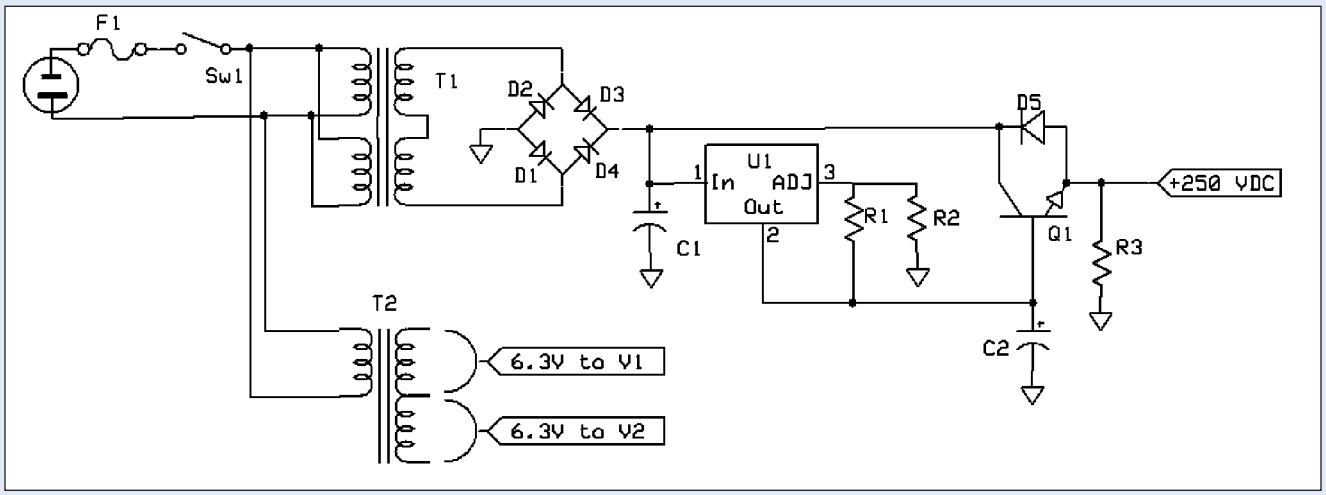
The HV transformer, T1, has four identical windings. The two primary windings are wired in parallel; the secondary windings are in series. After rectification the current passes to an integrated circuit three-Δ1terminal regulator. This is an interesting part. It comes in a TO-92 case and resembles a garden-variety 78L- series low-voltage regulator chip but can handle up to 450 volts! By carefully choosing the values of resistors R1 and R2, we can establish the output voltage, +250 in this case. Since this regulator chip can only handle a few milliamps of current, it needs to have a pass transistor, Q1 in the schematic. This little brute does the heavy lifting, but to do so it needs a heat sink. Driving Nick's transmitter, this transistor got pretty warm after a minute or so of key-down. Hopefully, you would never do this in normal operating.

Besides demanding high voltages, tubes need something to warm their filaments. In the same "good ole days" we referred to earlier you could buy transformers that had both HV and filament windings, but no longer. Hence the need for T2, the filament transformer. This one has a center-tapped 12-volt winding, which is the equivalent of two 6-volt windings. There are other ways to power the filaments, but this one was easy and the transformer in question cost just over $5.00 (cheap!).

A word of caution: High voltage can be lethal! Use caution around high-voltage devices! Be especially careful if you've never worked on anything using more than 12 volts. 250 volts can do nasty things! As my dad taught me, keep one hand in a back pocket!

Parts List (Mouser Part Numbers included)

C1: 100 µF, 450V electrolytic capacitor (66-EKXG451ELL101MM40S)
C2: 1 µF, 450V electrolytic capacitor (598-SK010M450ST)
D1 - D5: 1N 4005 diodes (512-1N4005)
F1: 0.5A fuse, sized to fit whatever holder you use
Q1: TIP50 general-purpose power NPN transistor (511-TIP50)
R1: 2.2k, 1/4-watt resistor
R2: 450k, 1/4-watt (use a 330k and a 120k in series)
R3: 150k, 1/2-watt
T1: 230 VCT, 0.11A power transformer (533-VPS230-110)
T2: 12.6 VCT, 1.0A power transformer (41FG010)
U1: 450V adjustable 3-terminal regulator (689-LR8N3-G)



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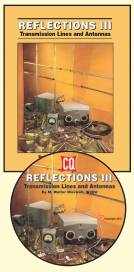

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