

Configuration of a Millen Station Setup

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This document presents diagrams and an explanation of my transmitter setup using popular James Millen Mfg. equipment. Constructed mid-year 2001 this station continues to be operational almost weekly and has been trouble free since its assembly.

The transmitter rack as described contains the following equipment:

Millen 90801 50 Watt Transmitter

Millen 90831 Modulator

Millen 90281 HV Power Supply (PS)

Lambda Model 28 LV Power Supply (Modified)

Millen 90903 Scope (Not used yet)

Three foot Bud open rack.

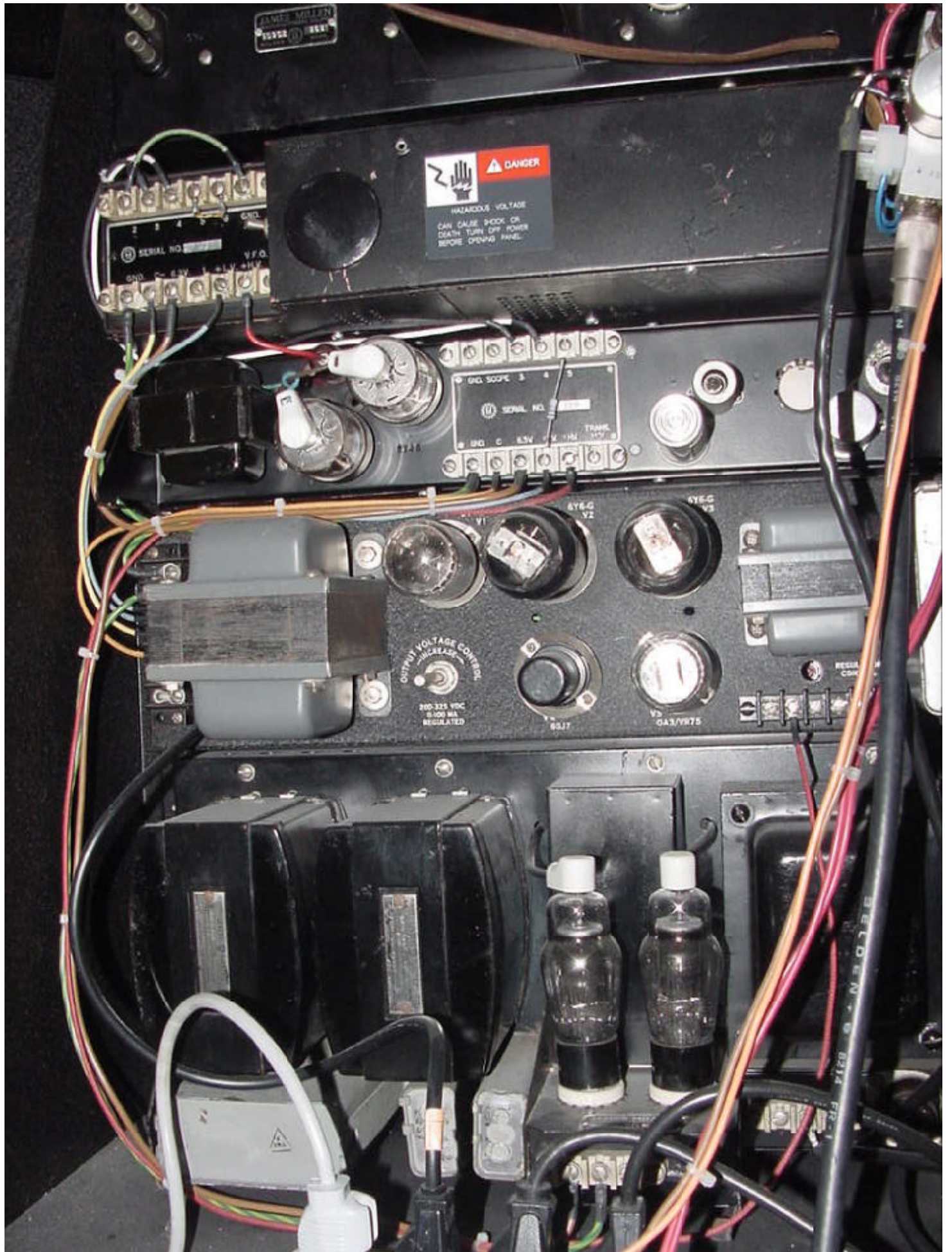
As a general overview I will present pictures of the transmitter rack front and back. I've spent a great deal of time attempting to make this setup look just like it would have if assembled in the early 1950's. Vacuum tube designs were used though out, except internal to the LV supply. The LV supply was modified to provide all negative bias voltages needed for the proper operation of this transmitter on both CW and AM. In addition, HV sensing is utilized to prevent supplying LV to the screens of power tubes, when plate voltage (HV) is not present. Thus preventing destruction of the tubes from excessive screen current. The Lambda Model 28 power supply was chosen because it closely resembles the look of this period of Millen equipment. I even went one step further by reproducing a new ID plate for the front of this power supply, which looks very similar to original Millen style plates.

If you are lucky enough to have purchased a Millen 90281 HV power supply I also include information on how to wire this supply to provide the required control for a standard 120VAC antenna relay. Not only am I able to switch the antenna from the receiver to the transmitter, and vice versa, but auxiliary relay contacts will mute the receiver during transmit and turn off the VFO (Millen 90711) during receive. All this is done via the PLATE switch located on the front of the 90281 supply.

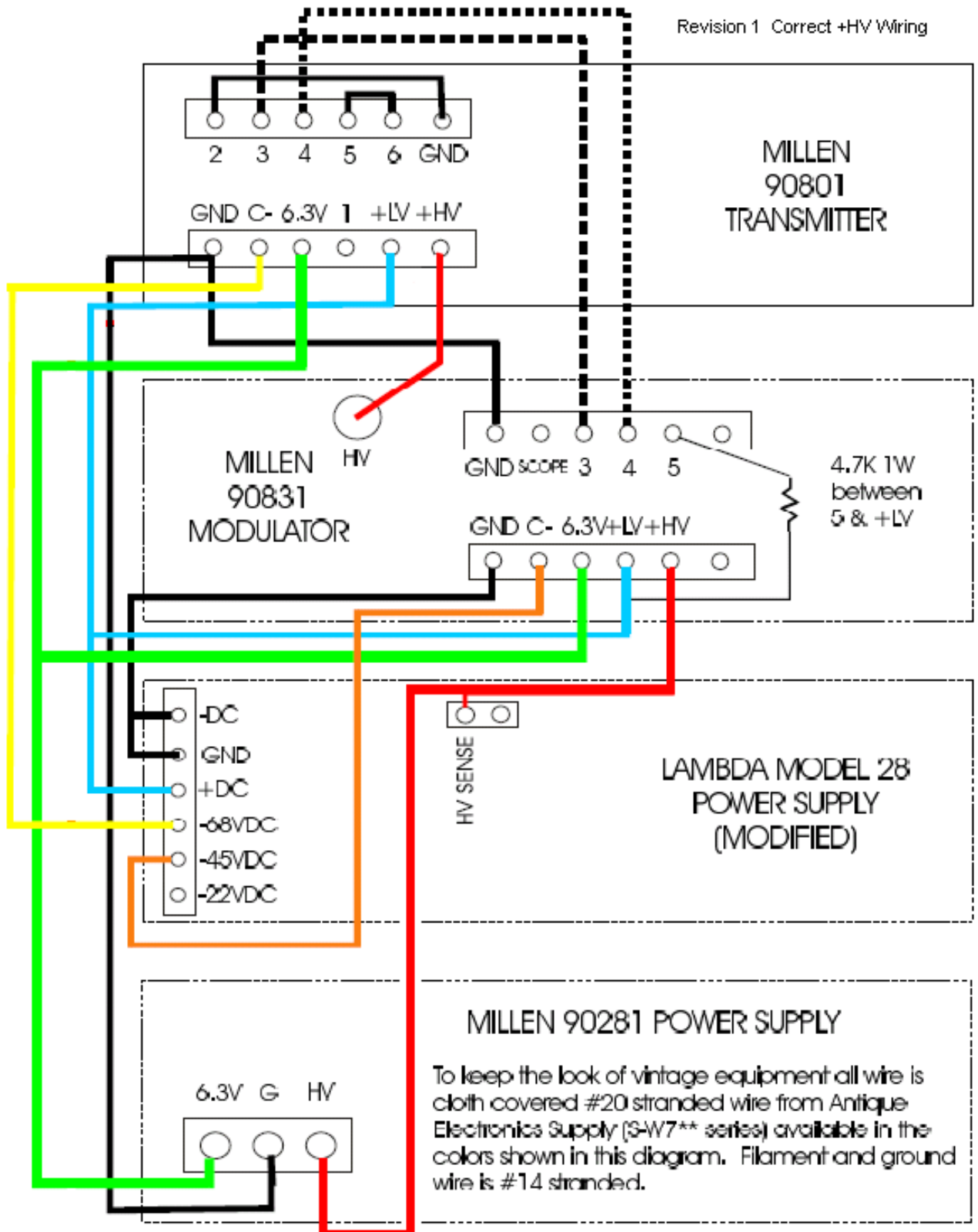
I hope the reader finds this information of value.

73

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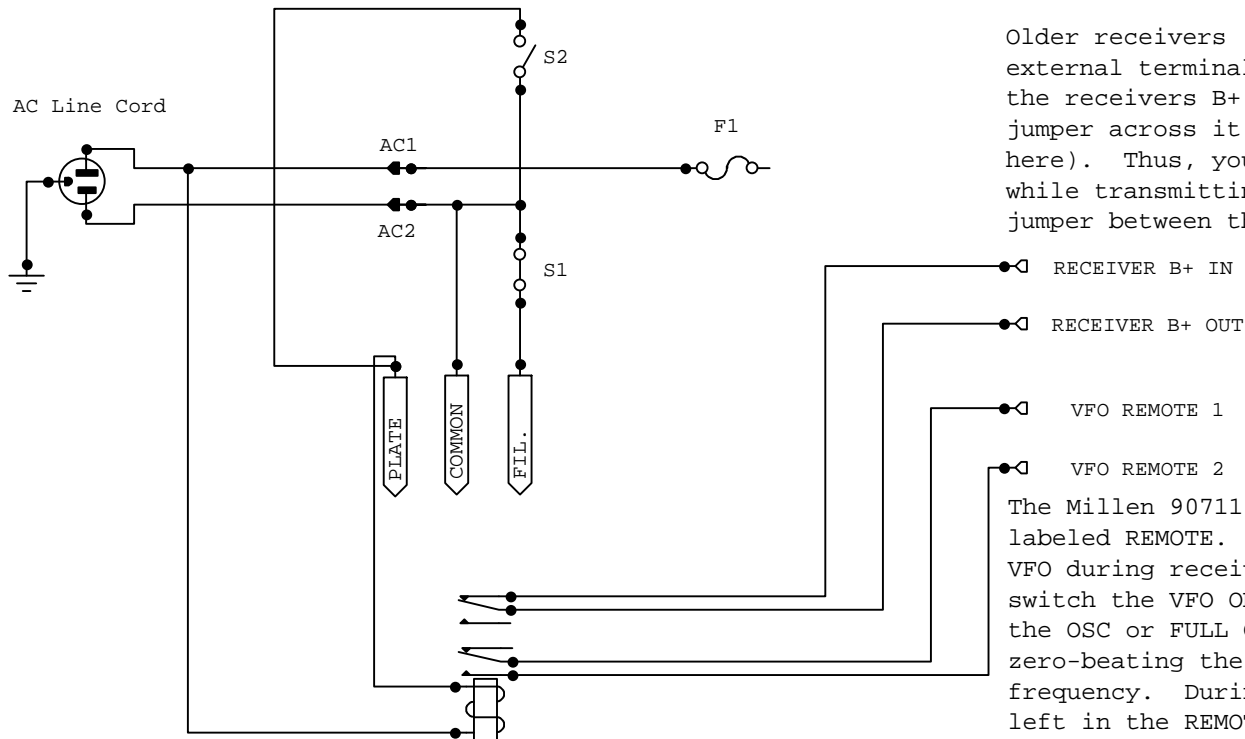
Revision 1 Correct +HV Wiring



To keep the look of vintage equipment all wire is cloth covered #20 stranded wire from Antique Electronics Supply (S-W7** series) available in the colors shown in this diagram. Filament and ground wire is #14 stranded.

Millen T/R Wiring

If you are using the Millen 90281 HV PS on your Millen setup the diagram below shows how you can wire things up to allow the front panel PLATE switch to control the complete setup for receive-transmit control. An old style push (switch) to talk!



Older receivers (like the HRO) have external terminals which allow opening the receivers B+ line (normally has a jumper across it which gets removed here). Thus, you can mute the receiver while transmitting by simply opening the jumper between these two terminals.

Dowkey 110VAC Antenna Relay with DPDT external contacts. RF relay connections are not shown here! Shown in Receive state (PLATE switch S2 on 90281 PS is OFF).

The Millen 90711 VFO has two rear terminals labeled REMOTE. This will allow turning off the VFO during receive. You will still be able to switch the VFO ON from the 711 front panel via the OSC or FULL ON position and thus allowing zero-beating the receiver to transmitter frequency. During normal operation the 711 is left in the REMOTE switch position!

To determine the AC1 and AC2 connection on the 90281 PS you will need an ohm meter to determine which is which. They are not labeled.

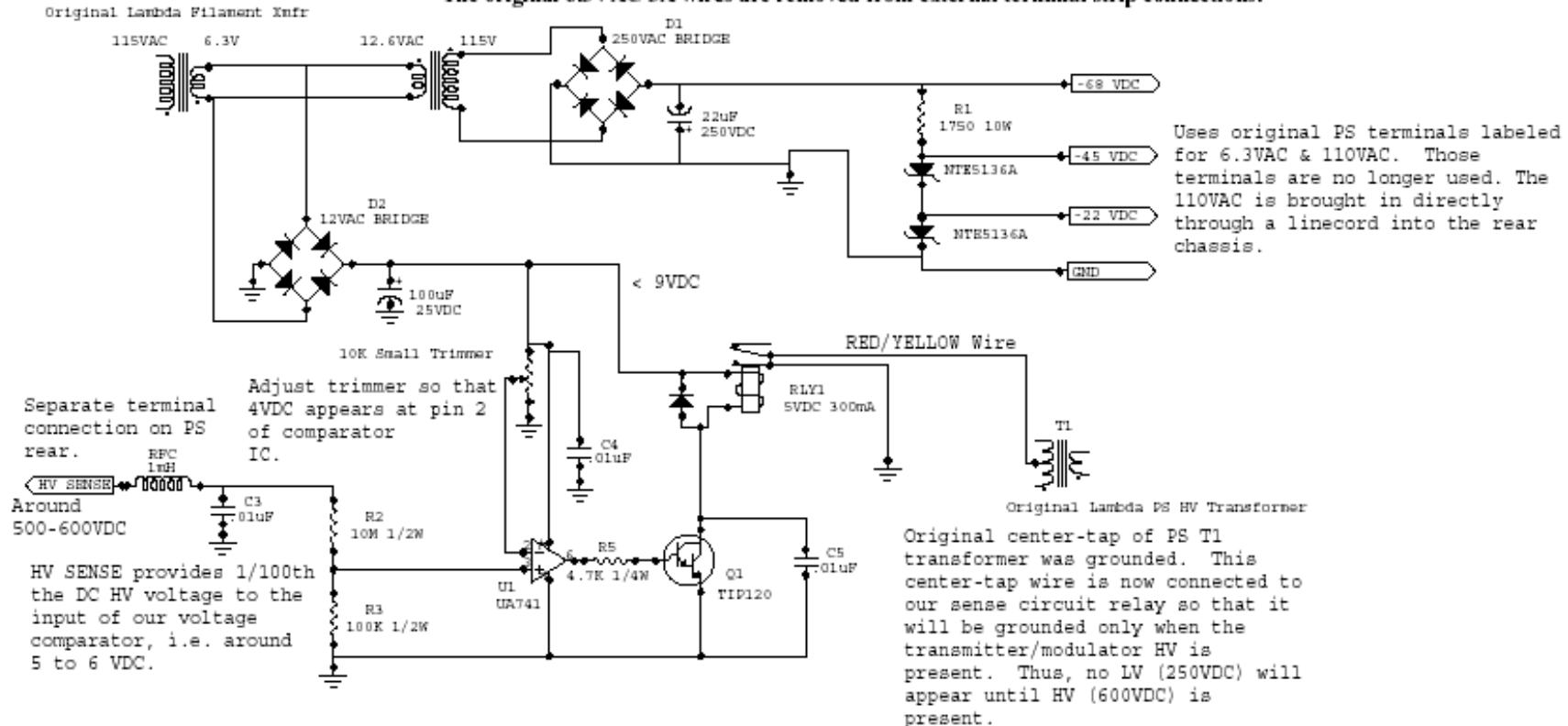
NOTES:

- 1) My 90281 PS does not have the HIGH/LOW voltage switch as shown on the schematics located at the James Millen Society website. For operation in the 90801/90831 transmitter-modulator setup in my shack I opted for setting mine up for low voltage. This means I needed to open up the power supply and remove the filter input capacitor connection for C4 & C5 that originally connected to L1 (10 HY Choke). This make the supply an inductor input filter which provides better DC regulation, but at the expensive of lower output voltage. My supply delivers 500VDC key-down per the 90801 trasmitters VM meter. In later 90281 supplies they also added a resistor in series with the main power transformer when LOW voltage was selected. I did not add this into my supply.
- 2) I only showed a limited number of 90281 components in the above diagram. Consult your PS schematic for a full understanding of what I am presenting here.

HV Sense Modifications for a Lambda Model 28 or 28M LV Power Supply:

Summary of Mods:

- 1) LV Output will not appear until the transmitter/Modulators HV power supply is sensed.
- 2) Used original 6.3VAC circuit to generate all bias supply voltages needed in Millen setup.
The original 6.3VAC 3A wires are removed from external terminal strip connections.



Most of the parts I used were from my junk box so don't be overly critical of values. The exception being the zener bias diodes. The HV sense circuitry may require playing around with values. I tried a bunch of junk box relays to find one that would work when keyed by Q1. You should experiment with this circuit on a breadboard using a low voltage supply at the junction of R2 & R3. I have mine set so that the output of U1 will go high when pin 3 of U1 goes above 4VDC (adjustment made to set pin 2 to 4VDC using 10K trimmer resistor). This represents a sense of 400VDC or greater on the HV line. Anything above the level of the LV supply (250VDC) is acceptable. After that is done you can play with different relays for RLY1. Something in the 5 or 6VDC range with around a 300mA coil rating worked well. Lower value coil resistances may require an additional resistor be placed in serial with the relay coil to reduce collector current in the Q1 darlington transistor. Remember the relay contacts are handling the fairly high AC voltage and need to carry about 100mA max. So don't use any wimpy relays! Use you own ideas here and remember I just used stuff that I had lying around.

The Lambda Model 28's or 28M's (M version has voltage and current monitoring meters on front) are pretty common on the used equipment market. I used a 28 in my Millen setup, but have also acquired a 28M for future projects. They provide a regulated/adjustable 200-325VDC @ 100mA, plus 6.3VAC @ 3A. Great for those small transmitter or receiver construction projects!

5-April-2003 Don Buska, N900

Revised 15-Aug-2005 (Bias Supply Polarity)