160-Meter Linear Amplifier

Using a pair of GI-7bT tubes

by

Glen E. Zook, K9STH

The following is a description of the construction of a linear amplifier designed and constructed by Glen E. Zook, K9STH, using 2 each GI-7bT triode tubes. The cabinet, tube sockets, and other metal (except for the actual chassis) were constructed from sheet metal, aluminum angle, etc. With the power transformer that was available, the power output is just over 800 watts and the power input 1250 watts.

The meters used in this amplifier were from Radio Shack and are 1 mA basic movements. These meters were chosen for 2 reasons: The first is that they were in the “junque” box. The other is that they are physically attractive. One meter, used for the plate current, has a scale from 0 to 15 volts and the other meter has a basic 0 to 10 scale. These exact meters are no longer available from Radio Shack. However, a very similar meter, part number 22-410, is still available. By choosing the correct series resistor, the meter scale can easily correspond to the actual numerical reading desired. The plate metering circuitry used results a reading of 0.1 volts for every 100 mA of current drawn. Since the meter is calibrated for a maximum voltage reading of 1.5 volts there is a direct correlation between the meter scale and the actual current drawn. In the amplifier constructed by K9STH the meter movement with the 0 to 10 scale was used with a 3000 volt maximum reading. This requires a mental multiplication times 3 for each division. If a meter is used with the 0 to 15 volt scale then the meter readings have to be multiplied by 2.

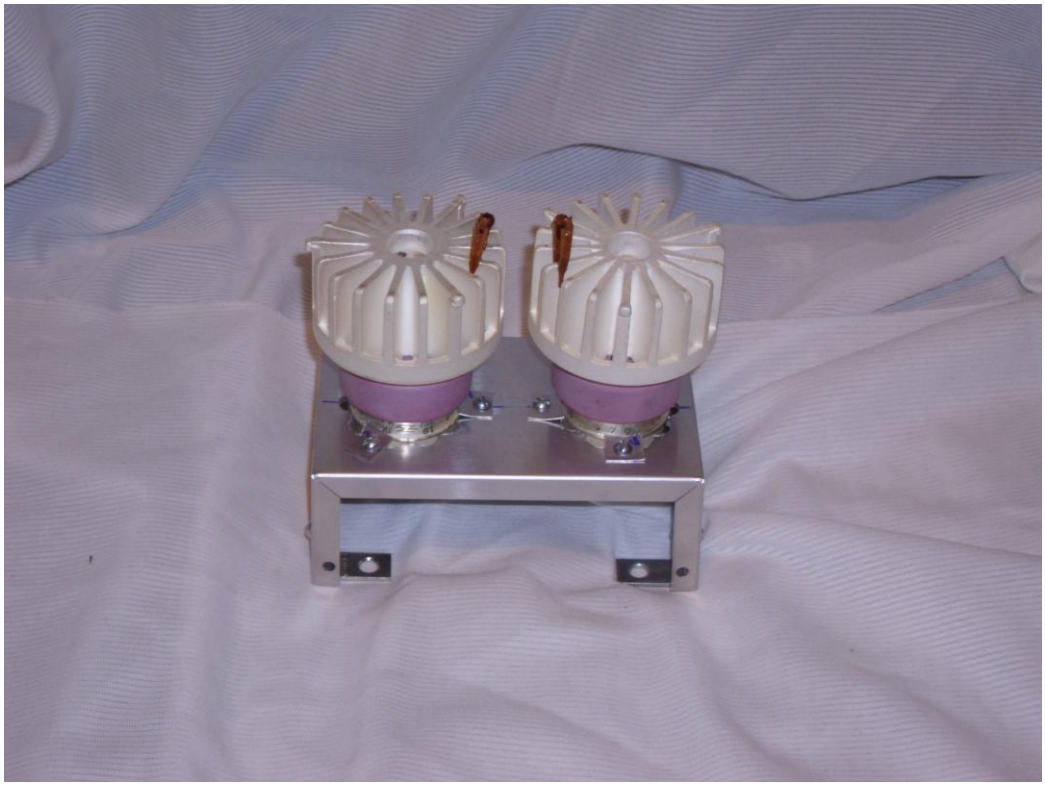
The plate meter circuit and the wiring of the capacitor bank in the power supply differ from the basic circuit used by many amplifier builders. The bleeder current drawn by the resistors across the filter capacitors is read along with the current drawn by the tubes. However, this current is less than 10 mA and out of the 750 mA drawn by this particular amplifier the bleeder current value represents a very small percentage of the meter reading and cannot even be measured by the meter movement. There are certain individuals who claim that this circuit cannot be accurate, that it doesn’t work at all, and so forth. Let me assure any potential builders that this circuit does work, is accurate, and that the results are definitely repeatable.

The input is untuned. A tuned input was not needed at K9STH since all of the 160-meter transmitters have pi-network outputs. There is a 100 ohm resistor to ground across the input to the amplifier and this will, in many cases, provide sufficient matching for transmitters with fixed 50 ohm output impedance. If needed to match a particular transmitter a tuned input can be easily added.

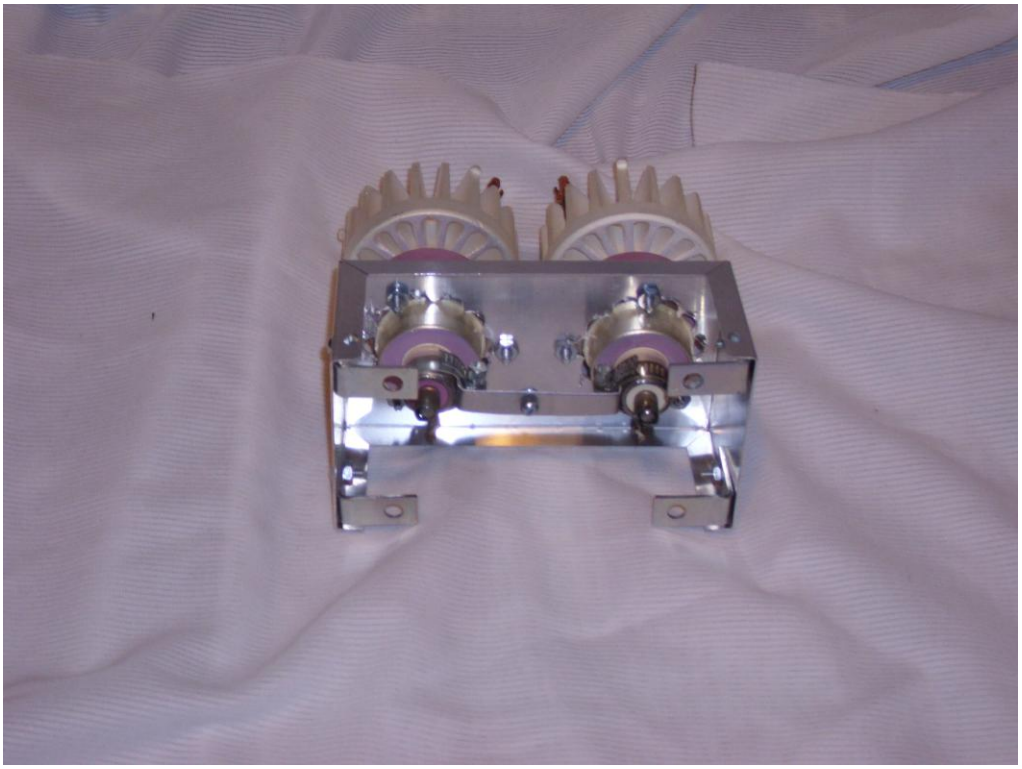
The socket for the 2 GI-7bT tubes was constructed from an aluminum mini-box from Radio Shack (part number 270-238). These boxes cost under $3.00 and are of excellent construction. I do not obtain many things from Radio Shack because, in general, the quality and/or price does not meet my expectations. However, there are certain things like meters, project boxes, perfboard, etc., that are definitely a “good value”. The connections to the cathode/heater rings were made using stainless steel hose clamps with a piece of aluminum between them. The heater connections were made using plate caps for tubes such as the 6146.

For bias, the board designed by the late W4ZT, and now sold by Ed Smith, W4EDS, was used.

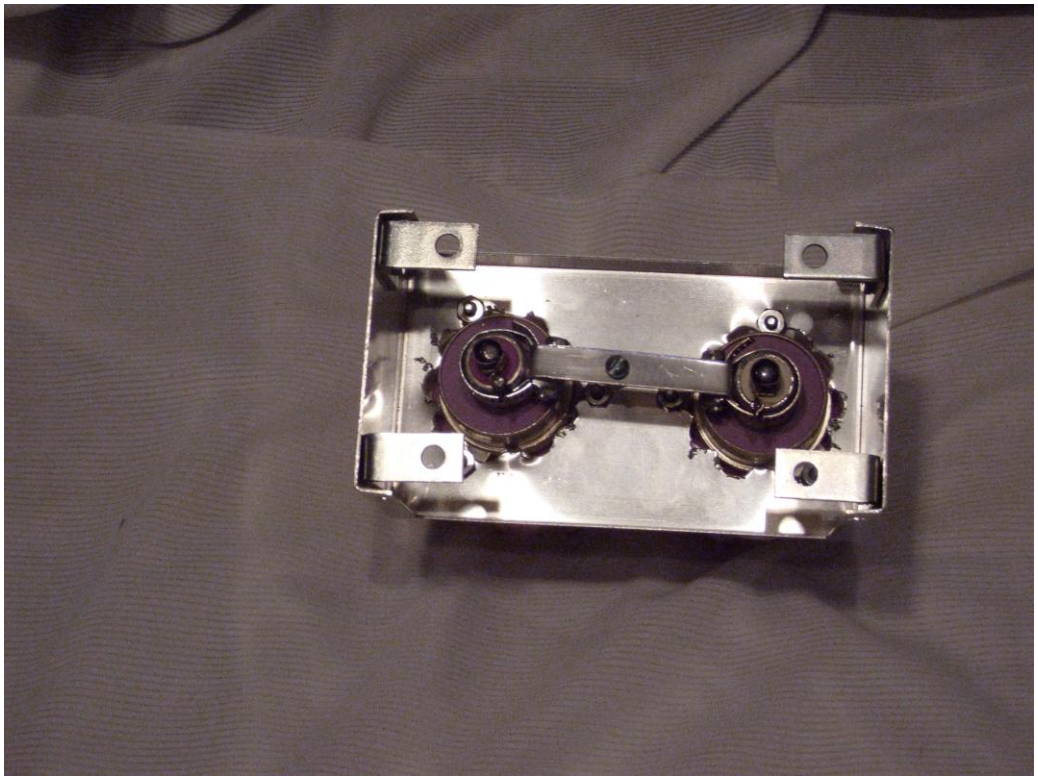
The following pages have schematics and photos of the unit.



Completed Tube Socket Assembly



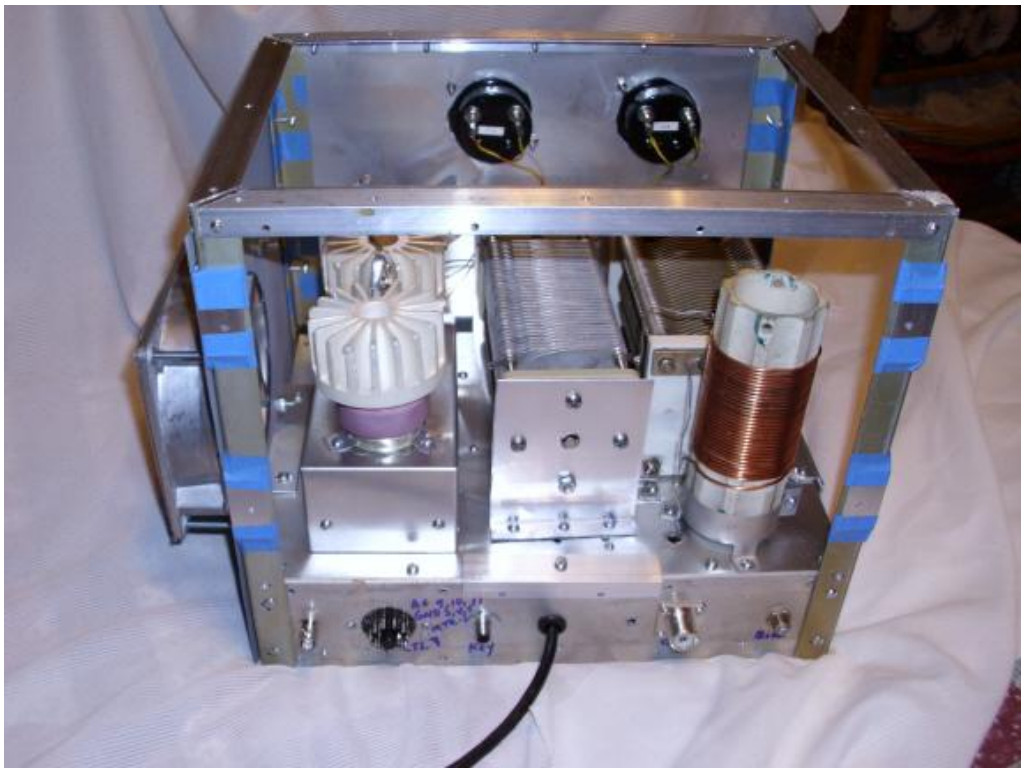
Underside of Tube Socket Assembly



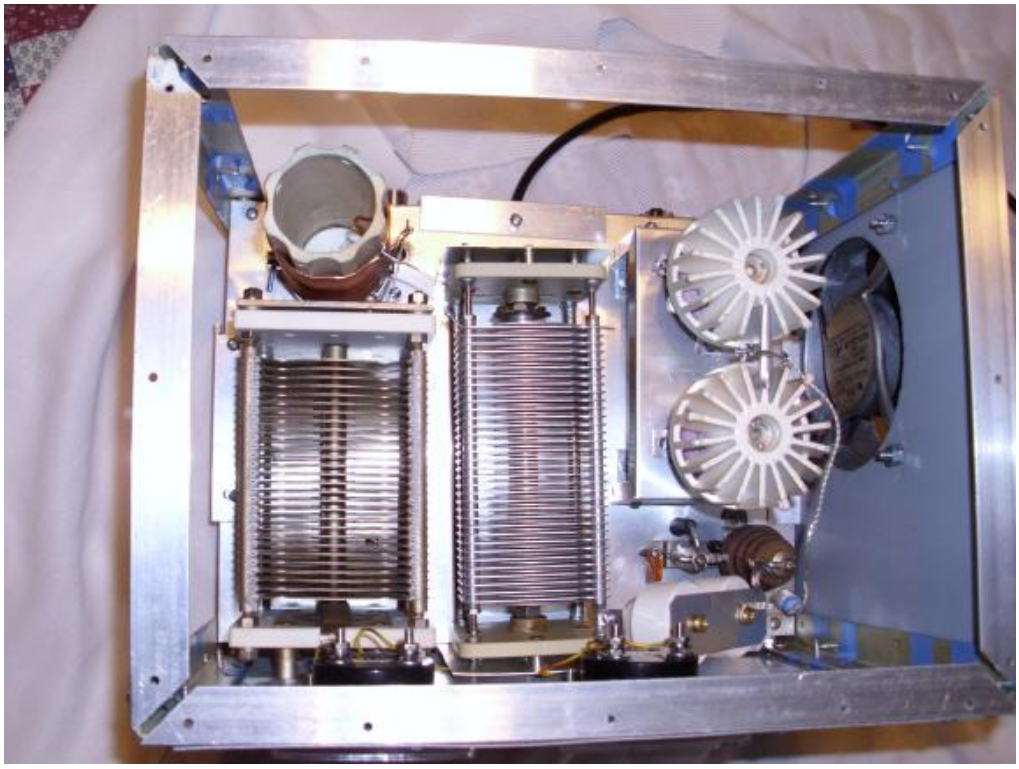
Underside of Tube Socket Assembly

Bifilar Wound Filament Choke

Front of Amplifier

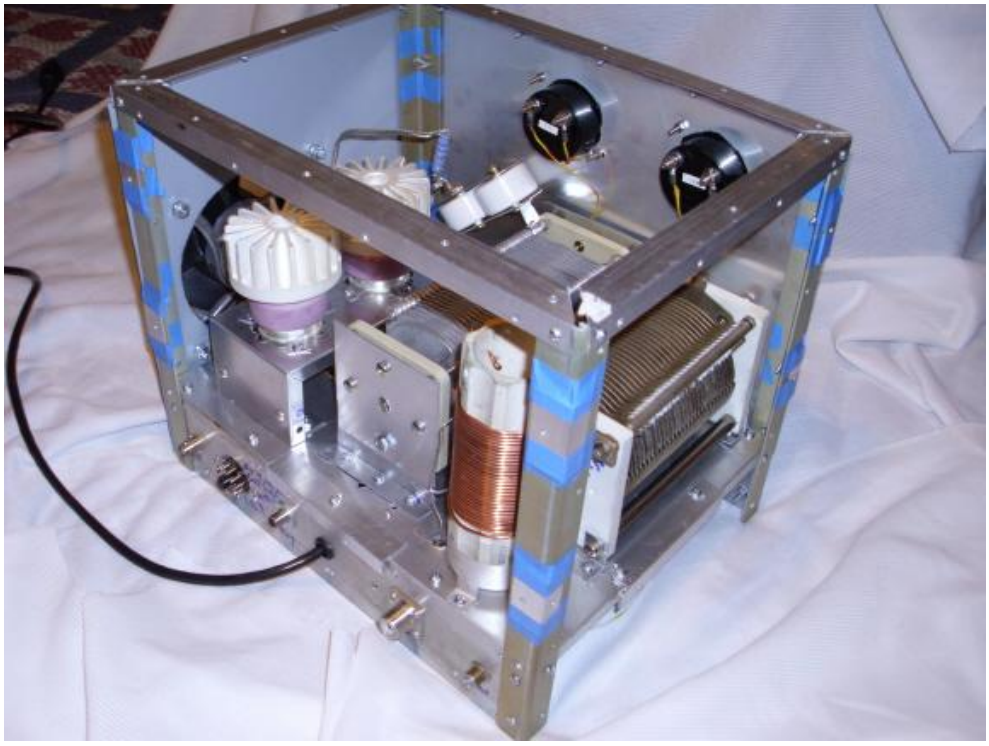


Back of Amplifier

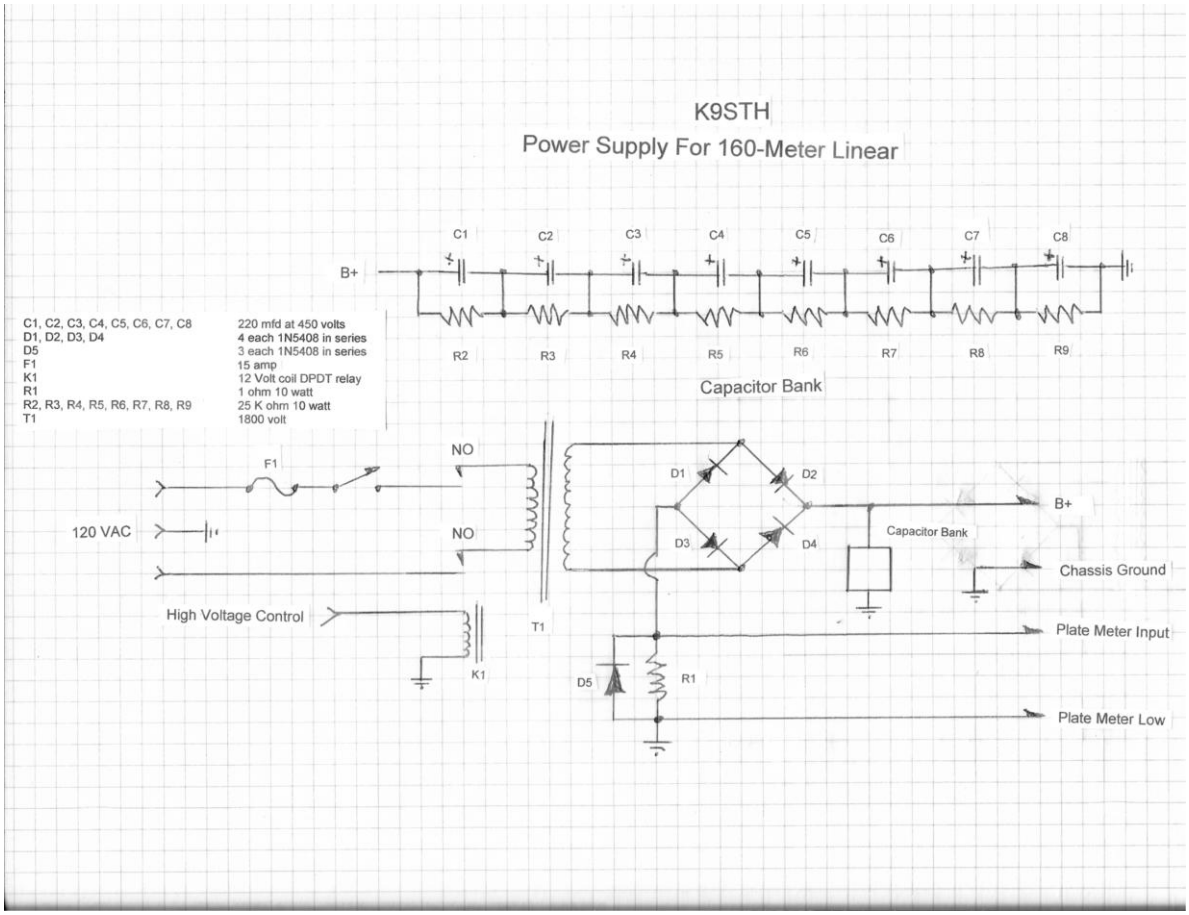


Top of Amplifier

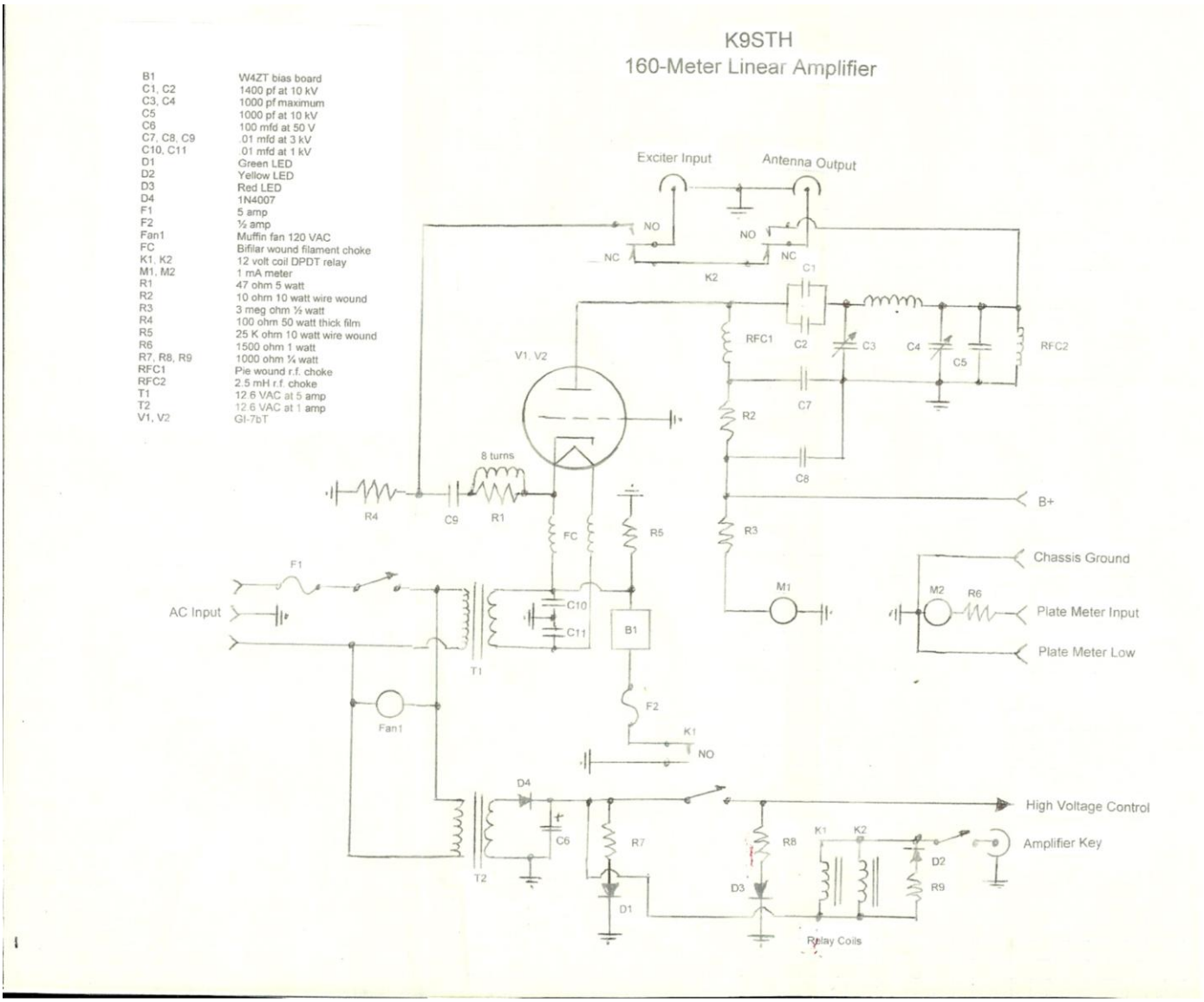
Right Side of Amplifier



Left Side and Rear of Amplifier



Power Supply Schematic



Amplifier Schematic

The blue colored tape in the photographs was used to hold spacers in place while the sheet metal panels were installed. They were left in place after the panels were attached.

The front panel of the amplifier is aluminum while the remainder of the cabinet, including the bottom panel, were made from galvanized iron.

All parts, except for the GI-7bT tubes, were from my “junque” box, which has an accumulation from over 50 years of being a licensed amateur radio operator.