

Heathkit HF Linear Mods

Cheap and Easy Afternoon Project

by Keith Stieb VE5XZ

The Heathkit SB 200-220 series of linear amplifiers have been around for years now. These linears have proven to be the workhorses of many amateur stations around the world. There have not been very many modifications made to these amplifiers. Obviously, Heathkit designed them right the first time.

The long-term dependability of the high-voltage series diodes comes into question after a review of the linear's schematic. These diodes are used in a full-wave, voltage-doubler circuit. Consultation with the *ARRL Handbook* and several technical manuals led to the following changes to the power supply.

Improving a Good Design

Figure 1 shows the original circuit, and Figure 2 illustrates the recommended modifications.

The basic changes are in the diode strings. The modifications include use of only four diodes on each string instead of six. Further, the new diodes carry ratings of 3 amperes at 1000 PIV. These diodes cost approximately 60 cents apiece. Use of higher voltage diodes and fewer in each leg of the supply would

yield a cost far exceeding any gains. Because the diodes are capable of handling 3 amps, they can take any sudden current surges, which may occur during initial power up or rapid T/R switching.

A capacitor and a resistor parallels each diode. The resistor keeps the voltage constant across each diode when reverse-voltage is present. This prevents the first diode from taking the brunt of the initial reverse-voltage. The capacitors are there to absorb surges from the diode switching and anything else that could appear on the line. Voltage spikes could damage the diodes.

The 20Ω, 25W resistor serves a special function. It will limit the initial current surge in the high voltage supply at initial application of power. This is because the filter capacitors have no charge at the time and act like a short circuit until they do charge. This could precipitate damage to the rectifier diodes, or worse yet, the transformer winding! Commercial applications would switch this resistor out of the circuit after a few seconds by a time-delay relay. In this application switching is unnecessary.

The results of the power supply modification have been excellent. In the modified SB-

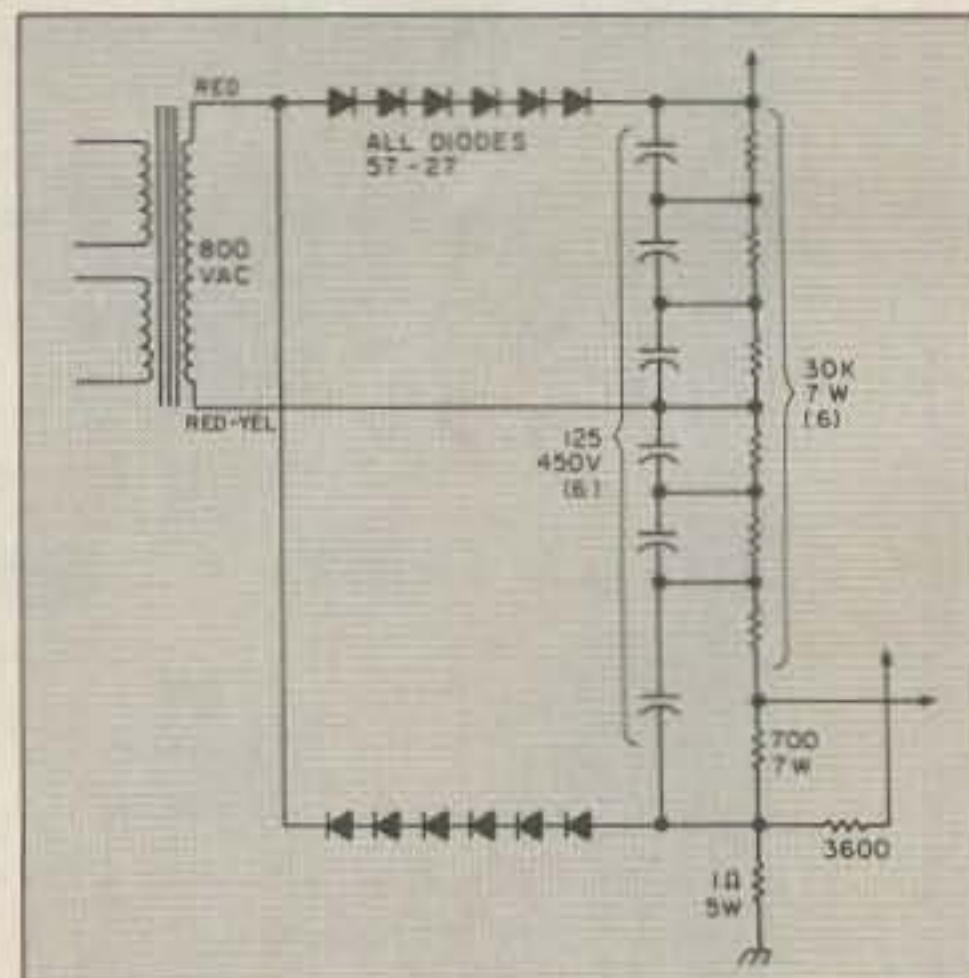


Figure 1. The original circuit.

200, the high voltage line increased about 300 volts, and power output increased by about 50 Watts.

The Nitty Gritty

Users may exercise their own options to mount the parts required to complete the modification. One method is to solder the capacitors across the body of the diodes and to place the resistors to the foil side of the PC board. The 20Ω resistor can be mounted on this side as well. Some people may choose to mount the resistor on terminal strips located beside the PC board. Others may cut the PC board trace in appropriate locations and directly solder the resistor on the bottom of the board. This will depend on the size of the resistor.

This modification should be done on the SB-220 linear as well. Another diode in the series-string will keep a safety margin. If the manufacturer rates the diodes at 1000 PIV, for instance, a 750 PIV design rating builds in a 25% safety factor.

This modification doesn't take a great deal of time and can be classed as an easy week-end project for a stormy winter! **73**

Keith VE5XZ has been a firefighter for seven years for the city of Prince Albert, Canada, as well as an emergency rescue instructor for St John's Ambulance. He's been a ham for 17 years.

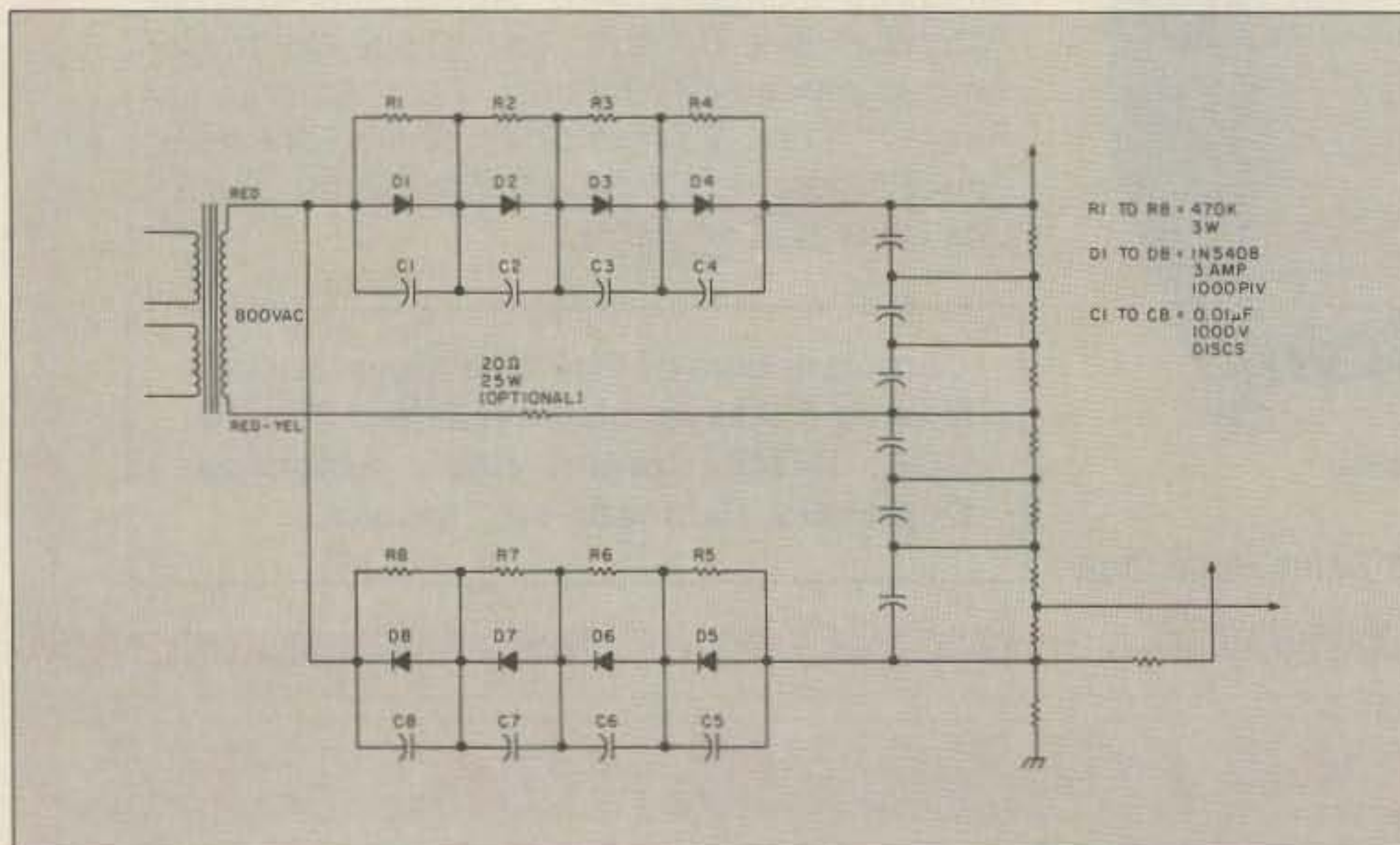


Figure 2. The modified circuit. The basic changes are in the diode strings.