

W7RY Heathkit SB200 QSK Modification

This modification is intended for amateur radio operators that are experienced with the workings of linear amplifiers, amplifier concepts and metering circuits of these amplifiers. If you don't have these skills, please get someone locally to assist you.

A good reference site is:

http://www.w8ji.com/metering_amplifier.htm

**Linear amplifiers contain HIGH VOLTAGE and can KILL YOU!
Please be careful and use safe practices as shown in ANY ARRL
HANDBOOK or the Heathkit SB-200 Linear Amplifier Manual.**

- The following components are removed:
 - R1, R2, R16, R24, R19, R20, R21, R22, R18. R11 is removed and jumpered. R13 unhooked but left in panel.
 - C3, C41, C23, C20, C19, C17, C18, C29, C14, C15
 - D17, D18, CR1, CR2
 - RL1
 - C10 is changed to a .01 mF 3KV (or more) Disk
 - All of the SWR metering moni-match hardware and associated components.
- The filament choke is changed to a longer core with more wire (more inductance). This provides much better input SWR on 80 meters.
- The Green/Yellow filament center tap wire is removed from ground and hooked to W8 of the QSK Board. You can add a .01mF >200v disk capacitor here if you wish (there is one on the QSK board already C7).
- The Blue wire on the 120 volt winding is removed from ground. Then this secondary is connected to W3 and W4 respectively of the QSK Board. I had to lengthen these wires to reach the mounting location of the QSK Board.
- **The W7RY Step Start Board** is wired between CB1 and the power switch and CB2 and the power switch. The Step Start Board relay voltage is hooked across the fan motor winding; Black and Yellow/Black of power transformer T1. D1 and R1 (1.3k) are also required on the Step Start Board.
- The Tubes V1 and V1 grid pins, pin 3 is directly ground to the chassis with a **short WIDE piece of braid or solid piece of copper strap. DO NOT use just a single piece of wire.**
- Double check PC1 and PC2 to make sure the resistor is not burned. **PLEASE DONT REPLACE THE PARASITIC SUPPRESSORS WITH ANYTHING OTHER THAN STOCK VALUES AND STOCK DESIGN. There is no need to. See final thoughts below.**

Metering Circuits

The metering circuits are completely re-wired. The stock amplifier uses negative-voltage cutoff bias that is controlled by the relay coil. With the W7RY QSK Board, the metering is now the same as any other standard ground grid linear amplifier. I have provided a separate schematic for your reference.

I also include a “PTT Disable” pin W7, on the QSK Board for a standby switch. Just ground this point to keep the amplifier from switching into transmit mode. I hook this point to the meter switch positions that were used to measure power output and SWR. Doing this provides a convenient way to switch the amplifier to standby when you want to. This also makes it so you don’t have to install another switch into the front panel of your SB-200! If you want to do this, using the forward or reverse meter positions, (I used both positions to disable PTT), simply remove all existing wires from these switch positions on the **second wafer** (the front wafer, please see the schematic), and install a ground on pin 13, and jumper pins 14 and 15 together, and run to W7 on the QSK Board. You can also remove R13, (the sensitivity control) and replace it with a rotary switch and ground W7 this way.

A note about ALC

ALC is not needed with today’s modern transceivers. There is a RF Power control on most all transceivers. All of the transceivers that I have used during my W7RY QSK Board testing have worked flawlessly. There is NO ALC overshoot. BUT all of the older Kenwood hybrid transceivers have considerable overshoot of 150 to 170 watts of an initial output RF spike.

The ALC in amplifiers decreases transmitter power AFTER the amplifier has already been overdriven! The horse is already out of the barn. IT’s like taking antacid after you have heartburn (I use Prilosec). And as Larry The Cable Guy says, “It’s like checking your hamburgers after their burnt”!

Bottom line, I don’t use ALC in my amplifiers.

Final Thoughts

I notice after all of the modifications and QSK board installations that I have done in MANY different brands of amplifiers, (L4B, SB-220, Ameritron AL-82, SB-200, Kenwood TL-922) they no longer arc in the plate tuning capacitors during tune-up and operation! In my opinion, and many other agree, this is because the antenna transfer relays no longer “hot switch” and they are not late getting to the party! In other words, the relays are energized and have stopped bouncing (yes relay contacts bounce) and are ready for power to be applied from the exciter and ready to deliver their power to the load!

In the SB-200, **the drive power can be reduced to about 70 or 80 watts**. After this modification, the SB-200 puts out 800 watts easily with this drive level (a bit less on 10 and 15 meters). This is with the original 1968 tubes and with low line voltage which is 235 to 238 volts AC.