

Improve Your HW101 or SB100 Rig

(Without Changing Its Selling Price)

By Steve Ray K4JPN ex K1VKW

In 1976 I put together my HW101. It's been a great rig for the money, but over the past 23 years I've found some improvements that I've passed on to a number of HW101 users. I've tested all of these in my HW101 and in several other HW101's and I'm presently using them in my HW101.

S meter won't zero. Heath has had problems with the 6AU6 tubes made by El Menko in that they draw too much plate current. The reason is the ElMenko 6AU6's were manufactured with 5 Volt filaments rather than 6.3 Volt filaments. If the S meter won't zero, replace the 6AU6 at V3 with another brand 6AU6. Simply swapping 6AU6's in the rig will not correct this problem as all the 6AU6's made by El Menko draw too much plate current..

Chirps on CW. This problem usually shows up after several months of operating. It is caused by the same problem that causes the S meter not to zero-a bad 6AU6 at V20 made by El Menko. The fix is to replace the 6AU6 at V20 with another brand.

Loss of sensitivity and/or no output from speaker or phones when going from transmit to receive. Take a piece of typing paper and clean the contacts of RL2, in particular contacts 10 and 2. The plastic cover can be removed on RL1 and RL2 by pulling straight up.

Low transmitter output power, VOX control hard to set, OA2 V18 flashes out when keying rig on CW. Check to make sure the HP23 power supply switch is set for 300VDC not 250VDC. In fact, one should check this first whenever one has problems with the HW101.

Final tune control in wrong position on some bands and/or arcing on some bands in final. The five wires that come from L904 to the band switch can short together if the rig is operated without an antenna by accident. The failure mode is for the wires to short together side by side as they come through the chassis. The fix is to simply replace the shorted wires. Since this is rather difficult to do without disassembling the chassis cage that protects the final, an easy fix is to slide a good grade of plastic sleeving over the shorted wires.

RF in the sidetone oscillator when using headphones (usually occurs with low Z headphones). This can be corrected by a .01 UFD capacitor across pins 3 and 2 on the phone jack. Complaints of RF in Audio, eventually no modulation, but noisy carrier in USB or LSB mode. CW mode OK. Replace the 6EA8 at V1 with a 6CQ8, the tubes are directly interchangeable and you will get a lot more audio drive.

CW sidetone oscillator problems, first check V15, then PEC #84-22. This problem can also show up as sidetone when the rig is in CW mode but not in transmit; when this occurs, suspect V15 has short. Bleed through of the CW sidetone when in CW receive can be cured by simply putting a tube shield on V15.

One of the most important things when problems are encountered with the HW-101/SB-100 series rigs is check the tube voltages per the chart in your manual. I have found several SB-100 series rigs with low output, or weak receive audio that had the wrong voltage on either the VFO driver or the audio output tubes. It is interesting to note that the plate voltages of these tubes were supplied through a 10K resistor and on everyone the resistor had gone up in value. The fix was easy simply change out the bad 10K resistor. I have only seen this on SB-100 series rigs.

Addition of a SO-239 connector at the antenna output. There are several ways to do this. (1) I used a standard SO-239 in place of the phone jack. Use a sheet metal ream to enlarge the hole, then decide if you want to mount the flange inside or outside of the chassis. If outside, simply drill mounting holes and remount the ground going from relay RL1 to one of the mounting screws. If you desire to have the flange on the SO-239 inside the chassis, simply file down one side of the flange till it clears the bracket of the final switch shield. Then drill your screw holes and reconnect the ground from RL1. (2) Another method is to use an 83-875 1002 coaxial connector. This is a single hole SO-239. Don't forget to ground relay RL1 on a convenient ground. This can be the screws in the hole at the shield at the back of the chassis.

S Meter drifting. First try changing V3, next replace R106 with a 33K 2 watt resistor.

Difficulty in neutralizing the rig. This may show up in neutralizing the final, but the problem is in the driver. The final is neutralized on page 123 of the manual; then on page 12-4 one is told to "adjust the driver preselector to produce smooth peaking in RF output". I have found that if the white wire is too far into hole W on the RF driver board one can have trouble neutralizing the final. In my HW101, a 1/4 of an inch into the hole is too far and best results were obtained with the wire only a 1/8 of an inch. So if difficulty is encountered in neutralizing the final, reduce the amount of wire sticking through hole W. This adjustment is important for if the driver is not neutralized properly you will not be able to neutralize the final.

The best way to neutralize the rig is to load the rig up on 10 meters into a 50 ohm dummy load. Then cut the power make sure the power supply capacitors are discharged, then disconnect the plate and screen voltage to the finals. Hook up a 50 Ohm dummy load and a RF probe to the output of the rig and adjust the neutralizing capacitor for minimum output. Do not adjust the plate tuning or loading capacitors or any other adjustments except the neutralizing capacitor. I have found that one gets a lot better neutralization of the finals, then the way described in the Heath manual.

There has been a lot of articles on what type of finals to run in the HW-101/SB-100 series rigs. I have run 6146's 6146A and 6146B's. I have found the best to be the 6146B's provided you neutralize them with the plate and screen voltage disconnected. I have had a set of 6146B's in my HW-101 for over 3 years now of heavy use and not had a bit of problems with them.

The following mods and trouble shooting techniques are from Heathkit. Again I've checked them all on my HW101.

To improve drive on all bands, remove R-202, the 10K resistor between V3 and V5A and replace with a wire. R-202 is the resistor that connects the Band pass board with the IF board.

To improve filament voltage balance (the HW101 has the filaments in a series/parallel circuit in which the pilot lamps are part of the load) replace the #44 (bluebead) with #47 (brownbead) pilot lamps. Under no condition operate the HW101 without both pilot lamps installed. It should be noted the Heathkit Manual calls out #47 pilot lamps, but every HW101 I've seen has #44 pilot lamps.

Alignment tip. Filter T1 will peak at two points. Use the peak with the slug at the top. S meter instability (this is a rare problem so first check V3). Replace R-107 with a 100K 1 watt resistor.

S Meter instability first check V3 if that does not cure it, try replacing R-107 with a 100K 1 watt resistor.

The following mods, are from the 1978 addition of the ARRL publication Hints and Kinks. I have tried them all. (1) On page 37, the "Improved Recovery for Heath Transceivers and Modification for the SB-200 Linear Amplifier". This mod is easy to do and works great. (2) On page 47, eliminating AC Buzz in the Heathkit SB-102 transceiver is also applicable to the HW101. I found that grounding the shield on the circuit board was not adequate. I found it necessary to add a ground lug to the chassis and ground the shield at the chassis and circuit board at the circuit board end of the shielded cable.

There are several mods I've heard about and tried. One is using 6AU6's for the 6HS6's at V10 and V11 to reduce the susceptibility of the receiver to cross modulation. I tried this and prefer the 6HS6's. Another mod is to substitute 6AK5's for V10 and V11. It will be necessary to cut off pin 2 on the 6AK5's before they are used. This mod seems to reduce the front end noise, but the 6AK5's appear to get gassy after they have been run for a while. If you have a couple of old 6AK5's try it and see if you like it. It is important that you replace both V10 and V11 with 6AK5's if you try using only one 6AK5 you will unbalance the filament voltage.

I've heard several fellows talk about removing the 6.8 MHz trap in the grid circuit of V5A to improve drive. This trap is used to eliminate the second harmonic of the oscillator getting into the drive and then out of final. This mod should be tried only if one has access to a spectrum analyzer to see if there are any spurious signals coming out of the HW101 after the filter is removed.

If your HW101 has El Menko tubes for the 6AU6, 6HS6, 6EA8, 12AT7, 12AU7, 6CL6, etc. I'd recommend you have spares of another brand. I've not been pleased with the El Menkos, they don't seem to last plus the bad 6AU6's made by El Menko with the wrong filament voltage. I replaced all the ElMenko tubes in my HW-101 many years ago and I believe me it has saved a lot of problems.

I recommend any Heath Kit fan visit <http://members.accessus.net/~dwentz/kb9jja/heathkit/> Well, try these mods. They are all easy and are worth the time and effort. I'm interested in any mods for the HW101. There are several mods for RIT, and improving VOX response on CW.

When I've tried them I'll write them up. I'll respond to any questions on the mods provided a self addressed, stamped envelope is sent with the question.
Good luck.

Steve Ray K4JPN ex K1VKW HW-101, HW-8,
SWL 30-40, Pixie II, NC 38S, OHR 100A 30 M and Heath Kit fan

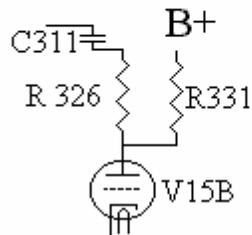
Email sbralr@worldnet.att.net

Adjustable CW Sidetone Volume Control for the HW-101

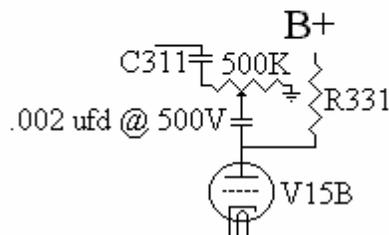
1. Remove R-326 from the audio circuit board.
2. Install a .002 ufd 500 VDC capacitor from the pad where R-326 was removed to the pad between where R-329 is mounted and with C-311 is mounted. There is nothing mounted on this pad.
3. Install a printed circuit pot 500K ohms through the hole on the Audio Circuit board, near R-326.
4. Solder the pot terminals to the circuit board.

Sidetone Volume Control

Existing Circuit



New Circuit



5. I recommend one examine the two excerpts from the schematic and the figure on page 189. A volume control for the side tone level on the SB-101 was provided. However, Heath didn't do this on the HW101. The SB-101 and HW101 use the same circuit boards so this is a real easy mod as the hole and terminals are already provided for mounting the pot.