

SB-101 AVC Slow Recovery After Transmit

The Problem and Solution

{ by WA2HIP }

The Problem

When keying the transmitter, with no output (mike gain @ zero) for about 2 to 3 minutes, upon returning to receive the S-Meter would kick up to S-9 and slowly decay back to normal over 40 to 60 seconds.

Troubleshooting

I applied ALL of the factory and non-factory fixes to no avail. This includes checking voltages and resistances, replacing tubes, checking soldering, etc.

Finally Len (SM5DFF) eMailed me via the Yahoo group about his fix which was to ground the screen grids of the 6146's during receive. I found this curious and investigated.

What I found was... During transmit the screens of the 6146's were at approximately 250 volts, but during transmit they were "floated" in the circuit - at about 0 volts (per the book).

Well, I found that for some reason that the screen grid circuit was holding at about 150 volts and **SLOWLY** decaying. This circuit **HAPPENS** to be supplying the screen of the isolation amplifier (V2-6AU6) which is just after the balanced modulator. This isolation amplifier (V2-6AU6) should be cut off during receive but alas, it was seeing the decaying positive voltage too, as I watched it and its affect on the AVC. As the residual screen grid voltage on this tube decayed the AVC would slowly recover.

ANY residual signal from the balanced modulator (very very small) was *leaking* thru to the "IF" stage and causing the stage to be desensitized by the AVC.

I tested the theory that it was the 6146's by removing the 800V plate voltage and just keying the transmitter and there was **NO PROBLEM** with the positive voltage (see above) or AVC.

Solving the Problem

The solution is rather simple now. Add a relay to ground the screens of the 6146's during receive. Note that I did CAREFULLY wire in a switch to manually simulate this grounding action and the problem was eliminated.

I suspect that there may be some space charge or residual and very small leakage (micro amps??) that is taking place from the hot plates of the 6146's that is causing this problem. Maybe this is a design quirk/flaw in the SB-101. I do not know.

Although I could have used the "spare" contacts on one of the existing relays in the SB-101, these contacts are, or may be used, to key an amplifier and I did not want to lose that option.

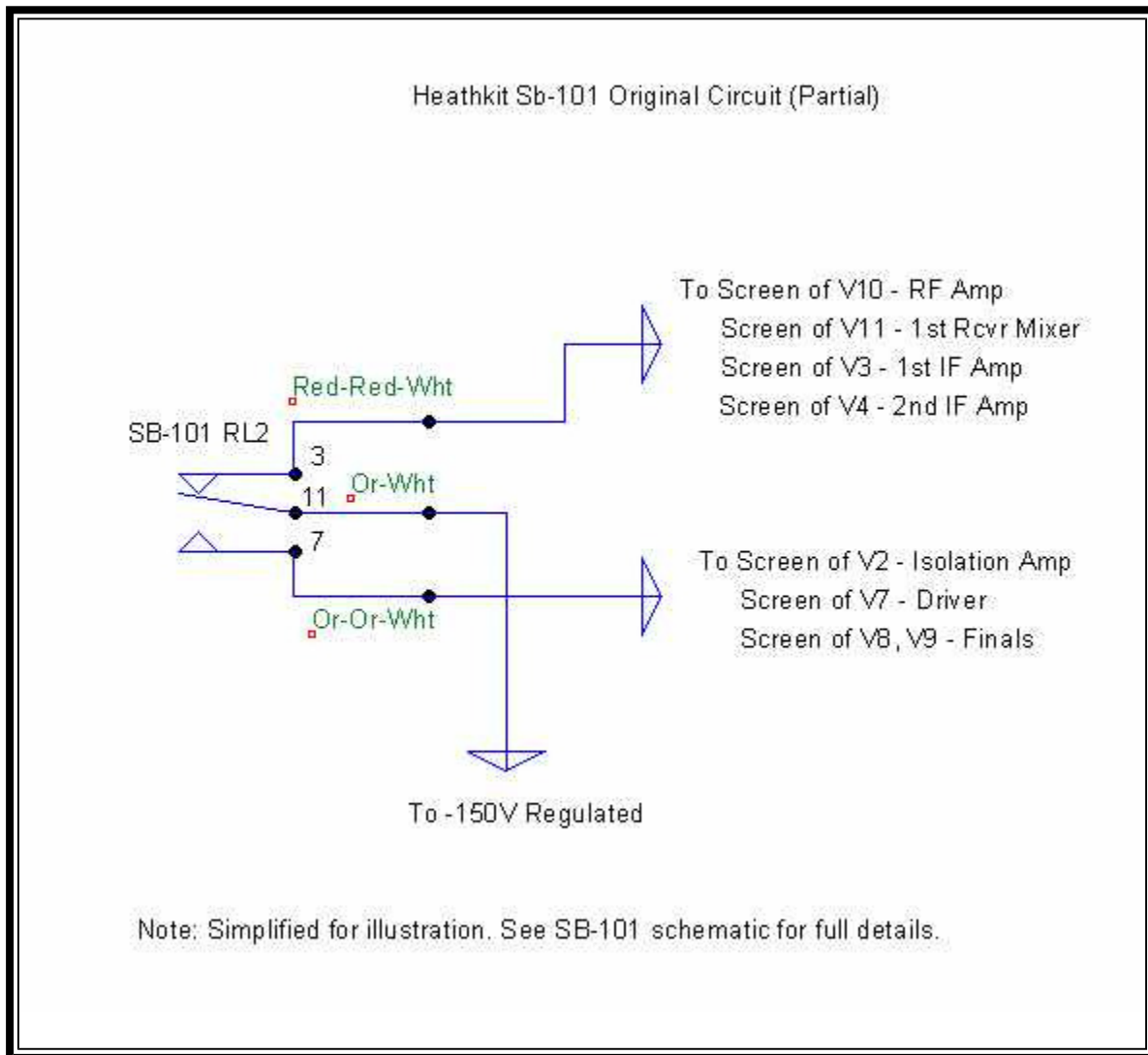
I installed a new DPDT 12 volt relay in the rig on and moved the connections from lugs 3, 7, & 11 to

this new relay. I used the NO (normally open) contacts (lugs 7 & 11) of the existing relay to energize the new relay.

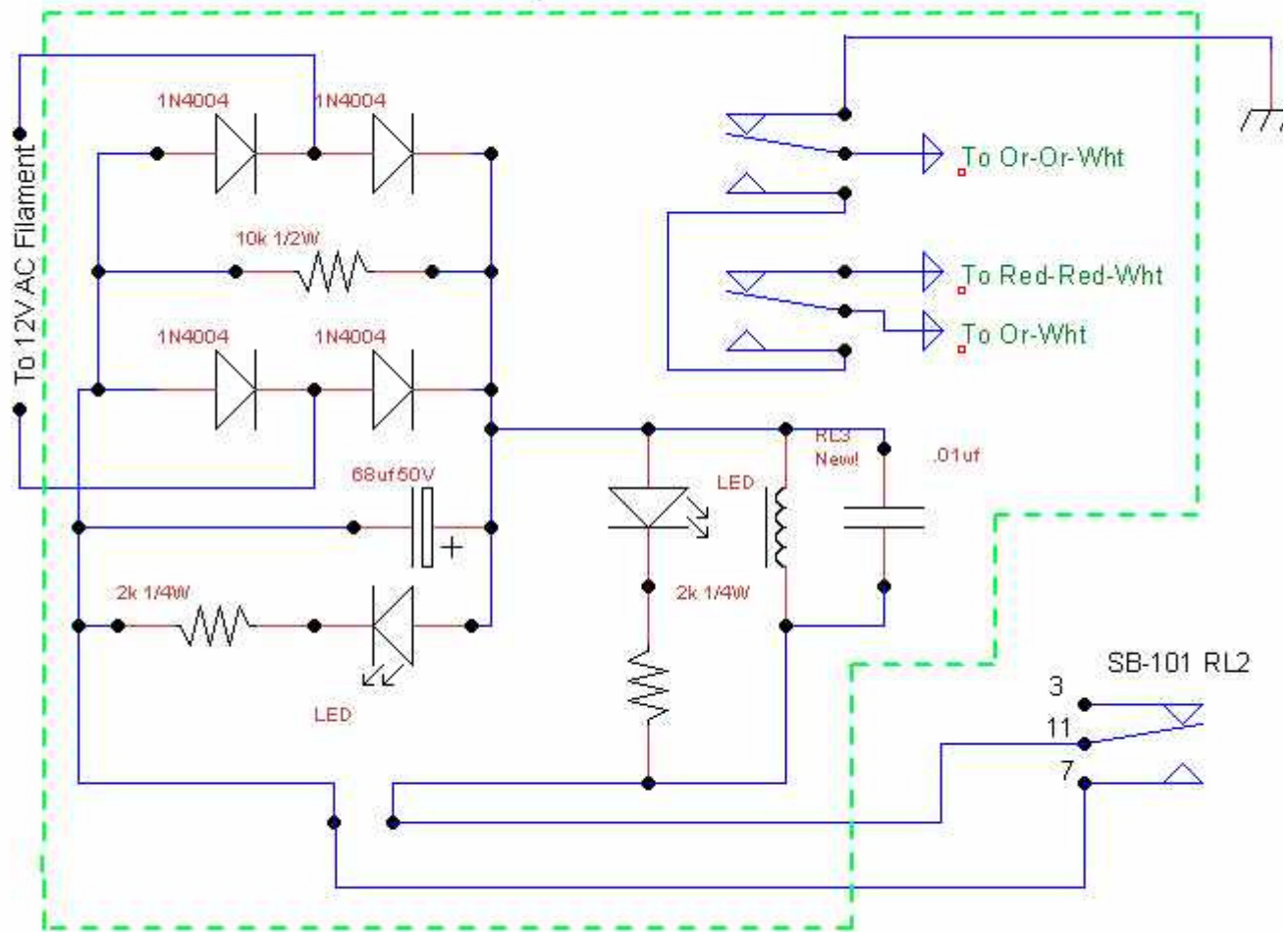
One advantage of this arrangement is that there is no chance that the screen line will be shorted to ground while there is still B+ applied to the screens. A second and perhaps more subtle advantage is that the amplifier's relay will be closed before B+ is applied to the 6146's and thus there will be no *hot switching* of the amplifier.

By the way, I obtained the 12 volt DC from a bridge rectifier from the 12VAC filament supply.

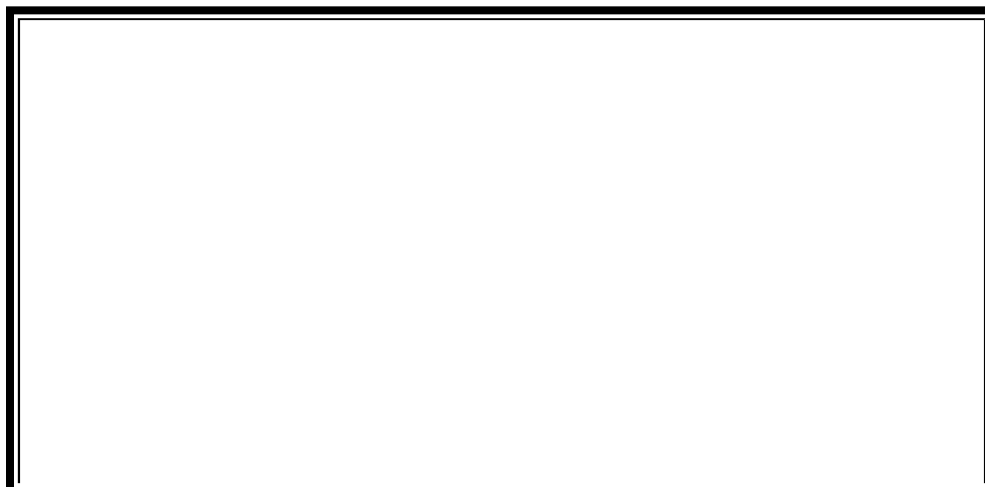
Below are diagrams of the original circuit (simplified) and the upgrade & fixes.



Heathkit Sb-101 Revision for AVC Hang Problem
by WA2HIP



Note that the LED's are just "fluff" an may be eliminated.





It is interesting to note that there is a similar mod for the HW-101 in the Heathkit-Issued Factory Service Bulletin.