Ham Radio 101
The Anatomy of a Restoration
Part 1
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In the past several years I have spent time in my workshop at first tinkering with some Heathkit transceivers. My selection has been the HW12A, HW22A and the HW32A.

For this article, I will be concentrating on an HW22A Heathkit single band transceiver. It covers the 40M band from 7.2MHZ to 7.3MHz. This was the phone band when it was originally designed.

Figure 1
Front of the HW22A

This version covered Upper Sideband and Lower Sideband, even though most of the activity was on Lower Sideband (LSB)

When I first turned it on, it worked just fine. It put out 100W and the receiver sounded very crisp and clear. As the receiver portion heated up, the performance faded to just a lot of noise. The output power dropped to zero.
In fact the radio went dead. That is completely dead. Then it would come back to life.

My first task was to get the radio to work reliably. After prodding around, I found three wires in the power plug that were not soldered. After soldering them, the radio would at least come alive.

Figure 2
Picture of Cathode Bypass Capacitors

In figure 2, you can see three green color capacitors. These are .1ufd cathode bypass capacitors.

Upon an initial inspection, I found one of the capacitors completely open.

With an open capacitor, the gain defaults back to the cathode resistor.

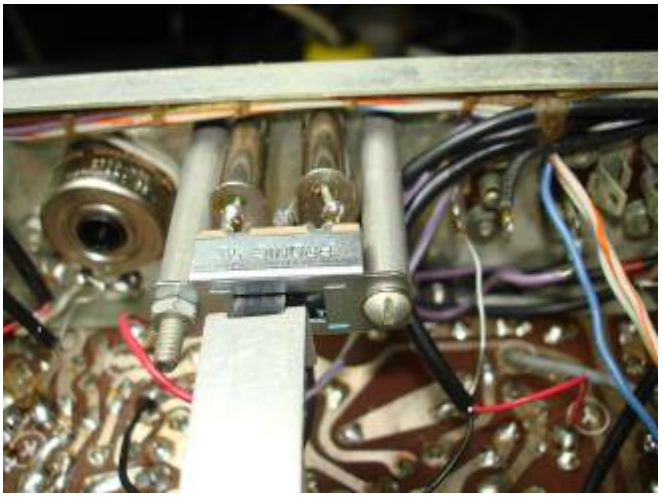
I replaced all of the bypass capacitors. This added to the positive response of the receiver. These capacitors are 50 years old and the values have changed from the nominal .1ufd to an open circuit.

The capacitors were purchased on line and were shipped to me from the Far East.

Sometimes there was a crisp sound and sometimes nothing. I decided to look at the signals that were in the radio.

I found that the crystal oscillators that set the USB and USB were present at the slide switch. However, the output from the slide switch had no output. I removed the slide switch and found that it to be open between the inputs to the output.

Fortunately, I had bought several slide switches and replaced the faulty slide switch. I also concluded that the Tune/Bias slide switch on the front panel may also be suspect. That too was open and it was replaced. Slowly, the radio was coming alive.

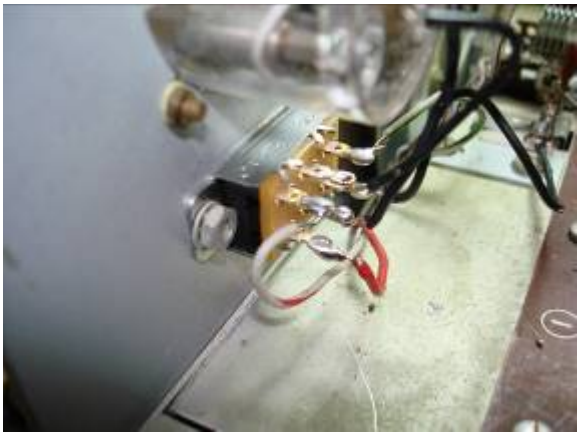


The tube for the carrier oscillator circuit is V11B 12AT7. The USB circuit is 2306.7 KHz and the LSB circuit is 2303.3 KHz. Both of these are set by quartz crystals.
I also replaced the crystals themselves. The crystals were supplied from the **Heathkit Users Group**
There will be more on quartz crystals later in the article.

Figure 3
Carrier Oscillator Slide Switch Assembly

The picture in figure 3 is a slide switch for the **Bias/Tune Switch.** The switch is the same part number of the carrier oscillator slide switch. The switch was bought on line from E Bay.

It appeared to me that the switch was about 50 years old. When I replaced the switch, it helped keep the radio come alive. There was still something else that made the radio intermittent.



The next part of the investigation was to look at another signal that is generated in the radio. That was the heterodyne oscillator circuit. This circuit is used to mix with other signals to either receive the 7.2MHz to 7.3MHz or transmit the 7.2MHz to 7.3MHz Signal.
The output of the heterodyne

Figure 4
Bias/Tune Switch

oscillator was dead. There was no output power from the transmitter part of the circuit.

I tried the easy thing first and replaced the 6BE6 V14. That did not correct the problem.

My first thing was to remove all of the components. Most of them were at least 20% out of tolerance. I kind of expected it, for a 50 year old radio.

I removed the crystal and tested it in a test circuit that I fabricated. The crystal was dead.

Figure 5
Part Placement of the Heterodyne Oscillator

I thought that I would go on line and get a crystal but quickly rejected that I idea. If I did I might wind out with a 50 year old crystal. I have found that other Heathkit radios, have had dead crystals. What I did was to buy a crystal from a commercial crystal company. The cost of the commercial crystal was the same as the cost of a crystal available on line.
In the HW22A the heterodyne oscillator crystal is 11.190MHz. When the new crystal was installed, the radio receiver came alive and tuned, the band listening to several clear LSB signals.

There was no power output from the transmitter. Then after prodding around, the transmitter came up and yielded full power. It turns out that L2 was not properly soldered. After re-soldering L2, the transmitter section of the HW22A yielded 100W in the tune position. I have retested it several times and have yielded 100W each time.

There is one more thing to resolve but will be done for the next installation. The S meter reading in the receive position, does not seem to work. During the time the radio is first turned on, the S meter induction goes to full scale and the settles to down to a lower level.

That will be resolved in the next installment.

Editor's note: The picture in figure 1 is not the rig being restored. It is used only for a sample of an HW22A.

If there are any questions or comments, please contact me at WB6WXO@SOARA.org