

[K1RFD](#)

[Building the K2](#)

[More K2 Photos](#)

[Hot Water for the K2](#)

[EchoStation](#)

Hot Water for the K2

Using an HW-101 as a 100-watt PA

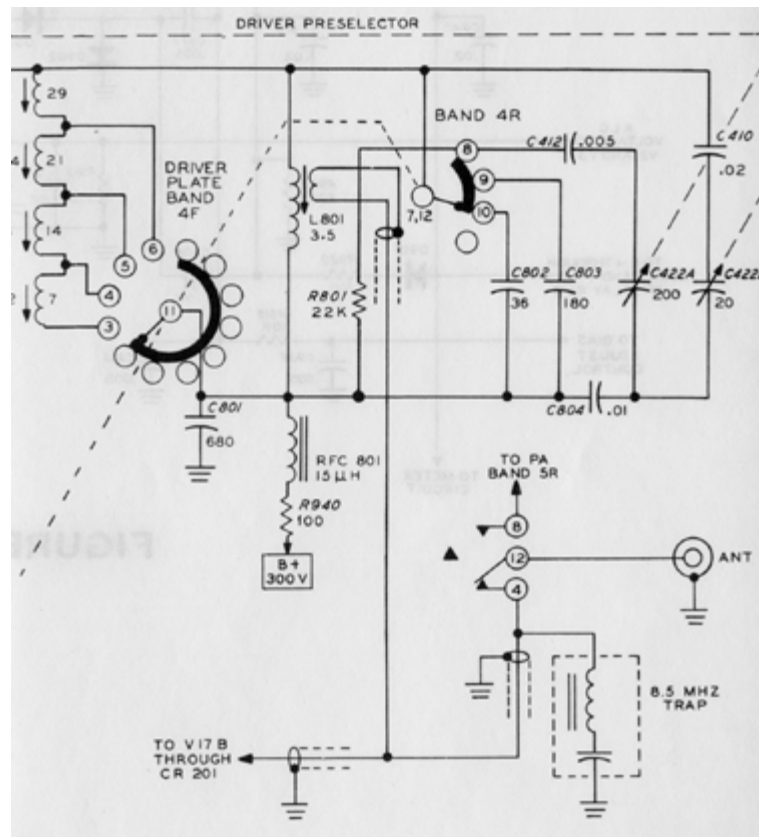
When I was a young ham in 1977, I saved money to buy and build a Heathkit HW-101. The rig has served me well over the years, going in and out of storage as my interests and addresses changed, but it seemed destined to return to storage forever after I finished building the K2.

However, it occurred to me that the HW-101 has a perfectly good final amplifier stage, featuring a pair of 6146s, which might work well as a pair of "shoes" for the K2. The rig easily produces >100 watts output on 80 through 10 meters, excluding the WARC bands.

I got out the HW-101 schematic and considered various ways to drive either the finals or the driver from an external source. I decided the project would not be worth doing if it required extensive modification of the HW-101, since mine was (fortunately) in good working order.

The modification turned out to be easier than I expected. It can be done without rendering the HW-101 inoperative for its original purpose, and it is easily reversible.

The key is that the HW-101's receiver front end is actually coupled to the plate circuit of the transmitter's 6CL6 driver. This allows the driver's L-C circuit to double as a receiver preselector. The signal from the antenna relay is coupled into this via an extra "link" winding around one of the driver plate circuit inductors (L801, in the diagram below).



Therefore, strange though it may sound, the HW-101's final stage can be used as an amplifier by feeding an exciter signal into its receiver input. Testing reveals that this presents a reasonable load impedance to the K2, and about 1 watt of drive is required to bring the HW-101 to full output. The modification consists of wiring one of the rear-panel jacks as an exciter input, and (optionally) wiring another as a receive-antenna output.

The Basic Mod

Remove the bottom cover. Run a short length of miniature coax from the "Spare" rear-apron phono jack to pin 4 of relay RL1. (This is the relay near the antenna connector). This is the same pin to which L905, the 8.5 MHz trap, is connected. Re-label the Spare jack "Exciter In".

Build the [K2 Amplifier Keying Circuit](#), which will drive the HW-101's T-R relay from the 8R output of the K2. I elected to build this in an external enclosure and connect it through the Aux I/O connector, but it can also be installed inside the K2. (Be sure to enable the 8R Hold feature of the newer firmware release.) Connect the output of this circuit to the PTT and ground lines of the HW-101's microphone connector. You can either use a substitute microphone plug,

or wire the HW-101's PTT line to a rear-panel phono jack.

Verify that the PTT circuit is working correctly, then connect the antenna output of the K2 to the new Exciter In jack, and the antenna to the HW-101's antenna jack. Verify that the K2's receiver is working normally through the new antenna connection.

I have the KAT2, and I found it useful to connect the K2's Ant2 output to the HW-101, and Ant1 to an antenna switch which switches the antenna between the K2 and the HW-101. This makes it easy to switch between "barefoot" and the amplifier.

Be sure to disconnect the K2 completely when using the HW-101 as a transceiver.

The Enhanced Mod

When the HW-101 switches to transmit, the receiver front end is disabled by applying a cutoff bias to the receive stages. It is (probably) important to avoid transmitting directly into the receiver front end when the receive circuits are active, that is, when the HW-101 is in the receive mode. An additional mod helps prevent this from happening accidentally. This mod requires that the receive-antenna option (160RX) be installed in the K2.

The mod involves re-wiring relay RL1, and using its two spare sets of contacts, for more sophisticated T-R switching, and wiring a "receiver" jack to the back panel. If you prefer to go this route, perform the steps below *instead* of the steps above.

Disconnect the shielded cable from lug 4 of relay RL1, and connect it to lug 11 instead. Disconnect the yellow wire that goes to the center pin of the back-panel ALC jack, and cover it with tape. Run a short piece of miniature coax from the ALC jack to lug 4 of RL1. Re-label this jack "Receiver Out".

Run another short piece of miniature coax from the Spare back-panel jack to lug 7 of RL1. Re-label this jack "Exciter In".

Connect a short piece of wire between lug 4 and lug 3 of RL1.

With this modification, the HW-101's T-R relay connects the

HW-101's receiver front end to the antenna on receive, and to the exciter input only on transmit. It also routes the HW-101's antenna input to the receiver jack on receive.

Make the PTT connection between the K2 and the HW-101 as described in the previous mod. Connect the K2's antenna output to the HW-101's Exciter input, and the HW-101's Receive Out to the K2's receiver antenna connection. When using the K2 with the HW-101, enable the K2's receiver-in jack. Verify that the K2's receiver is working normally through the new antenna connection.

Adjustment

Turn the MIC/CW Level control of the HW-101 fully counterclockwise, and the Mode switch to CW. Set the bandswitch to the appropriate band and the final tuning control to the appropriate position.

The final stage of the HW-101 can be tuned up by turning the K2's Power control to minimum and putting the K2 into TUNE. The HW-101 relay should activate and the plate current meter should show idle current. Advance the K2's Power control slowly until more plate current is noticed, then peak the HW-101's Driver Preselector control and dip the Final Tune as usual. Once resonance is reached, advance the K2's Power control until no further increase in plate current is noticed, then back it off a tad.

I found that full output power could be achieved on all 5 bands with between 1 and 2 watts of output from the K2. The HW-101 exciter input presents an SWR of between 1.2:1 and 3:1 depending on the band.

If you plan to run SSB with this setup, be sure to check your signal on a scope to ensure that the amplifier is not being over-driven, as there is no ALC feedback to the K2.

Note that it does not appear that the setting of the MODE switch (CW vs. SSB) has any effect on the biasing of the final amplifier.

More on the HW-101

Heath sold thousands and thousands of HW-101s from 1970 to 1983, making it probably the most successful Amateur Radio product ever produced in kit form. (The K2 is closing in fast!)

I am by no means an expert on the HW-101, but I've recently come across useful information on other mods to this rig, and various troubleshooting and repair info. Try these links:

[Optimizing the HW-101](#)

[KB9JJA Heathkit Page](#)

(Includes complete HW-101 service bulletins)

[HW-101 Mods from K4JPN](#)

(Some of this duplicates the service bulletins)