QRP

Number 22 on your Feedback card

Low Power Operation

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HW-9 Thump Suppressers

The mail has been running heavy lately since the word has gotten out the HW-9 is no more. Take it from me, if you hear of or get a catalog in the mail from Heath with the HW-9 listed for sale, they're all gone. What units Heath did have were sold at the Dayton Hamvention in no time. If you're lucky enough to have an HW-9, we might as well do a little bit of fix up work on it.

When the HW-9 goes to transmit, the audio line is shorted to ground via Q303, resulting in a rather loud thump. Jack Lau KH6CP has a simple and easy fix to suppress this thump. He just added a JFET in series with the audio line. Instead of grounding the audio, he opens it up. A lot of HW-9s have Zack's thump suppresser installed.

Another version of the thump suppresser comes from Paul Levesque KB1MJ. Instead of using a JFET to open the audio line, Paul used a 4066 CMOS chip (see Figure 1). This chip has several switches inside. By wiring up the different switches, he mutes the audio while at the same time creating an opening in the audio line. This chip also eliminates the thump from the HW-9's audio. See the schematic for more details.

Bandwidth Improvement

Paul has also improved the HW-9's excessive bandwidth. He writes:

"Perhaps the most annoying fault in the Heath HW-9 is its excessive 3 kHz bandwidth and the desensitizing of the receiver via AGC driven by strong signals in the passband.

"I've been quite successful with the 400 Hz, 3-pole crystal filter suggested by Wes Hayward when driven with a high gain FET in order to simplify the required changes. I can now operate on 40 meters at night, a feat found to be impossible with the original design. See Figure 2.

"I have purchased a small quantity of crystals and have matched them very closely in sets of three in order to provide optimum filter performance. Three crystals and the two 680 pF capacitors I have mounted to a small PC board create a 'drop-in replacement' for the original Heath filter FL301. A high gain FET from the J308 family provides a direct substitute for Q301, and increases the IF gain. A small toroidal transformer established the impedance match between the FET and the input of the crystal filter.

"I can provide a limited number of complete parts kits with step-by-step instructions for this conversion to the HW-9 users who are interested in improving the selectivity and AGC function of their transceivers. Keep in mind you'll forfeit the ability to copy SSB with this modification. The cost of the kit is $26. Write me a note if you are interested in more details. Should the demand exceed my supply, orders will be honored in the order received." Write Paul Levesque KB1MJ at 14 Wesley Street, Dedham MA 02026. Don't send your letters to me; route them to Paul for the filter modification.

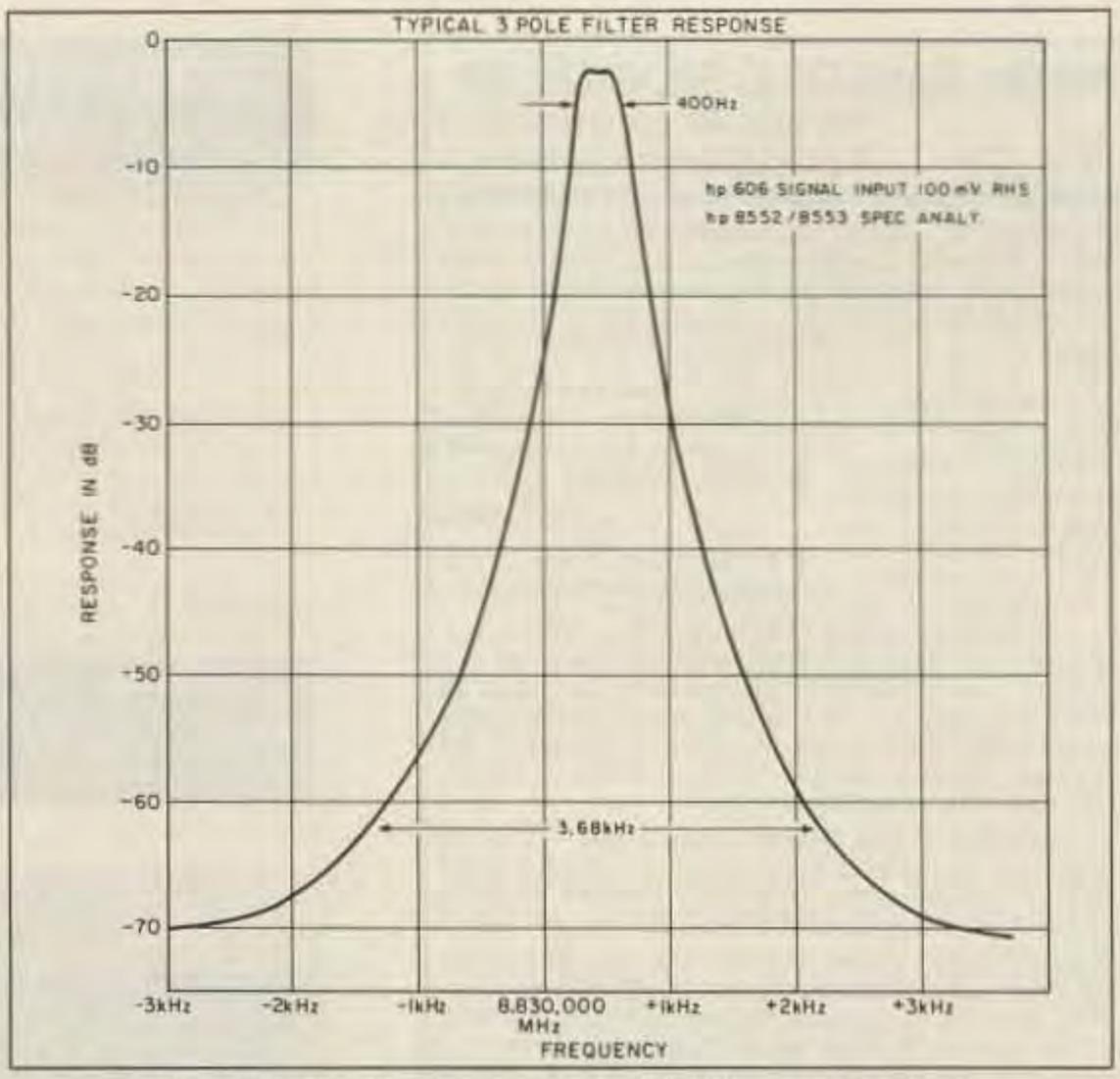

Figure 2. The audio response with the KB1MJ crystal filter circuit.

Calming the Transmitter

I've received several letters and even some phone calls about transmitter instability in the HW-9. There is really no one fix, but rather several fixes that *might* cure the instability. Some HW-9s, like the one I owned, exhibit no instability. I think some cases of instability may be traced back to how the rig was assembled.

When there is instability, it seems to occur mostly on the 15 and 10 meter bands. Adjusting the drive above 3 watts on 10 meters will slam the meter all the way over. This is a good indication of instability. If you have a high SWR on a resonant antenna, but a good SWR into a dummy load, you've got instability problems, too.

Several fixes may help you calm down your HW-9. First, re-solder the PA components as close to the board as possible. Excess lead length will cause problems. Also, change Q402 to a 2N4401 transistor. Since the circuit seems to be quite sensitive to transistor parameters, more than one might have to be tried. In real stubborn cases, try changing C434 to a slightly smaller value. Check the temperature of the PA's heat sinks. If one is really hot, and the other is cold, you might have one dead final transistor. This makes the other one work harder, upsets the design parameters of the PA stage, and results in transmitter instability. Both heat sinks should be comfortably warm after a five minute QSO.

The driver stage, Q404, uses inverse feedback in the form of R414 and C432. To reduce the drive, decrease the value of R414. Go down in small amounts; you don't want to reduce the drive to the point of reducing the power output. These "fixes" should calm down the HW-9's transmitter.

Looking for Trouble

Now, what about the HW-9 that will only put out one watt? Try inserting an ammeter in series with the supply leads. If the input current is excessive, with little RF being produced, your best bet is to start looking at diode D407 for the source of the trouble. If the diode goes bad, almost all of the power from the transmitter goes to transformer T404. Nothing bad happens, but you'll only see a watt or two on any of the bands.

Some of the modifications you may have done to improve the sensitivity of the HW-9's receiver call for replacing the diodes in the front end T/R switching scheme. The diodes are low power Shottky diodes. If you have replaced D407 with the Shottky diode or the recommended HP 5082-2835 diodes, D407 will fail. Diode D407 requires at least a 50 volt rating. There's a lot of RF across it during transmit.

Since Heath has dropped the entire line of ham kits, many of you have written to me, asking for schematics for the HW-7, HW-8, and the HW-9. Heath will still sell you a copy of the HW-7 manual for $17.50. Manuals for the rest of the QRP rigs should also be available. I don't know about parts. Heath tells me they only stock parts for five years after production ends. Call Heath for more details if you're looking for parts.

I have about 200 copies left of the *Hot Water Handbook* (containing modifications for the Heath HW series of rigs). After they're gone, that's it! There'll be no more printed. If you want a copy, send $8.95 to me, Mike Bryce WB8VGE, at the above address.

Since we have covered both the HW-8 and the HW-9, pick up one at the hamfest. They're a lot of fun to fix and modify, and with the days growing shorter, tinkering is especially fun. 73

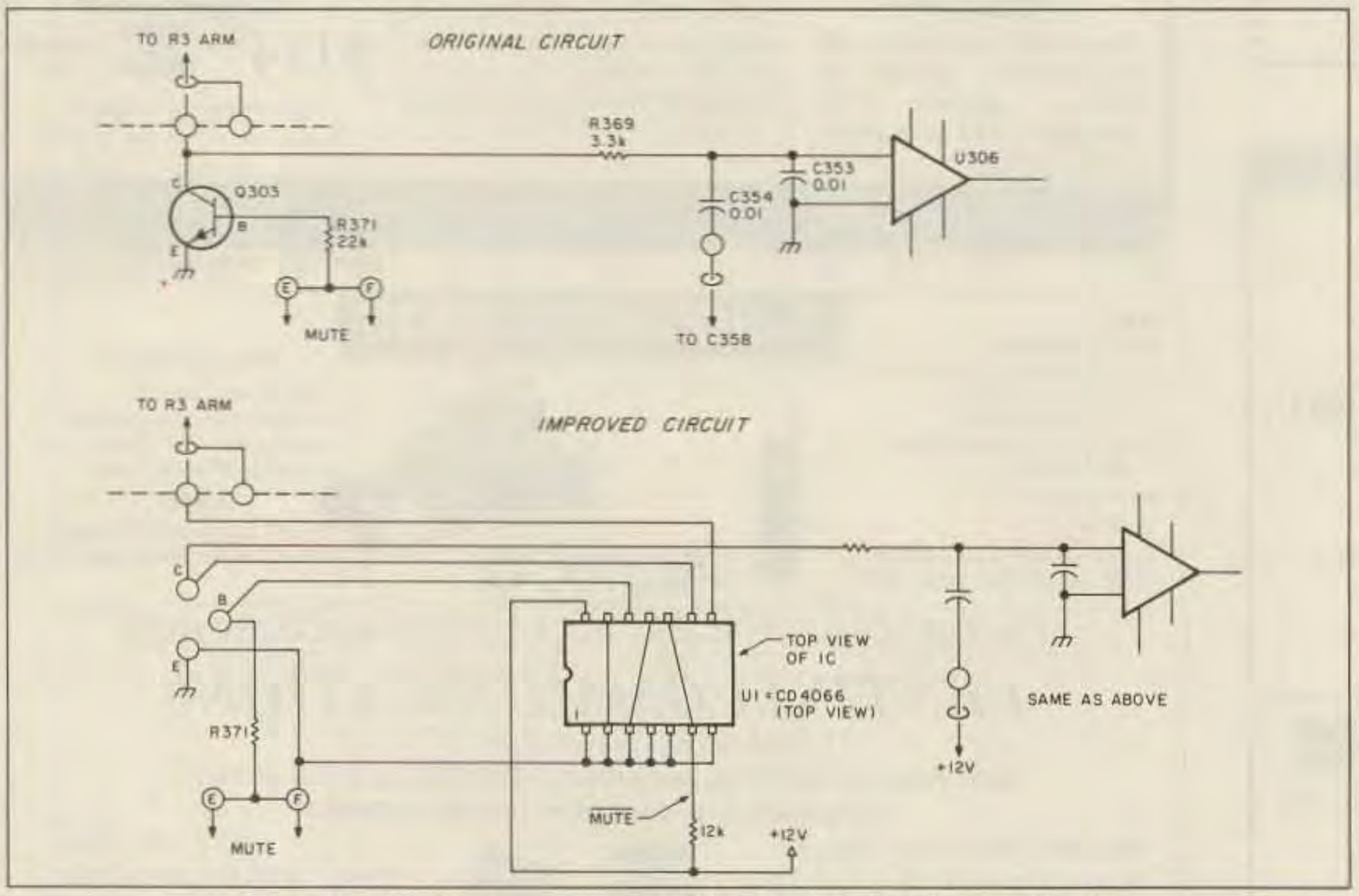

Figure 1. The key-thump suppressor for the HW-9. Courtesy of Paul Levesque KB1MJ.